



Washington Metropolitan Area Transit Authority
ANNUAL INTERNAL REVIEW 2017

Metrorail Car Track Equipment Maintenance (CTEM)
QICO Internal Review
September 13, 2017



Quality Assurance, Internal Compliance & Oversight (QICO)
"Quality Trumps Quantity"



QICO INTERNAL REVIEW

Table of Contents

DEPARTMENT/FUNCTION OVERVIEW	4
CTEM SHOP LOCATIONS & SHOP FUNCTIONS	5
REVIEW METHODOLOGY	6
REVIEW SCOPE	7
REVIEW CRITERIA	8
RISK ASSESSMENT SUMMARY	8
WHAT WORKED WELL	9
AREAS FOR IMPROVEMENT	10
SUMMARY OF REQUIRED ACTIONS	12
CORRECTIVE ACTION PLANS	13
SUPPLEMENTAL MATERIALS	23
APPENDIX A: RISK ASSESSMENT	24
APPENDIX B: DEFINITIONS	27
APPENDIX C: APPLICATION OF REGULATORY CAPS	34
APPENDIX D: PHOTOGRAPHS	36
APPENDIX E: NEW CARROLTON FIELD ASSESSMENT	43
APPENDIX F: ALEXANDRIA FIELD ASSESSMENT	58
APPENDIX G: BRANCH AVENUE FIELD ASSESSMENT	69
APPENDIX H: GREENBELT FIELD ASSESSMENT	82



Internal Review Summary

Why QICO Performed This Review:

- This internal review is intended to provide Metro senior management with an assessment of the current methods and practices associated with the maintenance and operation of rail-borne equipment throughout the authority. The review will promote the actions needed to address areas of concern.
- The Office of Quality Assurance, Internal Compliance & Oversight (QICO) is independent from the functions it oversees, authorized by the Metro General Manager to conduct objective reviews with unrestricted access to all functions, records, assets and employees under its purview.

QICO's Methodology:

- Developed relevant review activities by identifying and assessing risks to quality of work, compliance with standards, records management and safety.
- Reviewed maintenance documentation, observed maintenance and inspection work while in-progress, and interviewed key personnel.
- Review findings and required actions are rated based on risk, which ranges on a scale from "Insignificant" to "High".

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

September 2017

Metrorail Car Track Equipment Maintenance (CTEM)

QICO's Review Results:

Key Takeaway: Increased engagement between CTEM, engineering, and maintenance groups will improve maintenance efficiency and reliability.

Wins and Areas for Improvement:

- ✓ CTEM facilities are documenting preventative and corrective maintenance using MAXIMO.
- ✓ CTEM maintains uniform practices to ensure parts are properly organized and labelled.
- ✓ Torque indicating tools and bench test equipment (BTE) are consistently calibrated.
- Car Maintenance (CMNT) documents lack sufficient detail to govern some CTEM-specific processes.
- CTEM performs some equipment modifications without involving Vehicle Engineering (CENV), potentially compromising reliability.
- Inconsistent communication of failure information results in additional diagnosis and troubleshooting for equipment repair.
- QICO observed shop cranes in CTEM spaces with expired inspection certifications, introducing concerns for shop personnel when operating equipment.
- Placement of emergency eyewash stations presents concerns.
- Shelf life considerations for parts and materials are inadequately monitored and controlled.

Required Actions:

- **QICO-CTE-17-01:** To ensure consistent and reliable work results, develop formal instructions to outline CTEM processes, including requirements for equipment modification, designating roles and responsibilities, manpower analysis, and for establishing quality control plans to ensure consistent application.
(Risk Rating: Moderate)
- **QICO-CTE-17-02:** To improve the communication of defects and efficiency of troubleshooting/repair, coordinate with customer maintenance groups to develop written procedures for reporting equipment failure, making necessary revisions to repair logs to include description fields.
(Risk Rating: Moderate)
- **QICO-CTE-17-03:** To provide a safe environment for work in CTEM shop areas, develop formal methods to ensure that all tools, equipment and documentation are accessible, up-to-date and in compliance with applicable inspection and calibration requirements.
(Risk Rating: Elevated)
- **QICO-CTE-17-04:** Develop tracking mechanisms to ensure materials and components with shelf life limitations or other expirations are used or replaced appropriately.
(Risk Rating: Low)

DEPARTMENT/FUNCTION OVERVIEW

Car Track Equipment Maintenance Processes

As a branch of Car Maintenance (CMNT), Car Track Equipment Maintenance (CTEM) is the sole maintenance support group responsible for the preventative and corrective maintenance of all Authority owned non-licensed (Non-Highway) equipment utilized by the Office of Track and Structures (TRST) to maintain WMATA's Railroad and Infrastructure. As of July 5, 2017 CTEM is responsible for 211 Pieces of Heavy Rolling Stock (prime movers, tampers, spike drivers, spike pullers, Pettibone Speedswings, tie removers, Flat cars, rail trains, etc.) and over 1,400 pieces of ancillary support equipment (rail drills, spikers, saws, power generators, jack hammers, Etc.)

Heavy rolling stock is subject to Preventative Maintenance (PM) on a time basis determined by its expected time of use. For example: A prime mover will be scheduled on a frequency of 90 days whereas a tie crane, less frequently used, is scheduled on a frequency of 120 days. Flatcars, due to their inherent durability and lack of serviceable components, are subject to PM Inspection every 180 days. All heavy equipment has additional levels of maintenance based on manufacturer recommendations as well as established best practices such as a 2-Year PM. The frequency of PM assures all equipment minimally meets the OEM and CTEM established best practices for maintenance required to keep equipment safe and reliable for customer use.

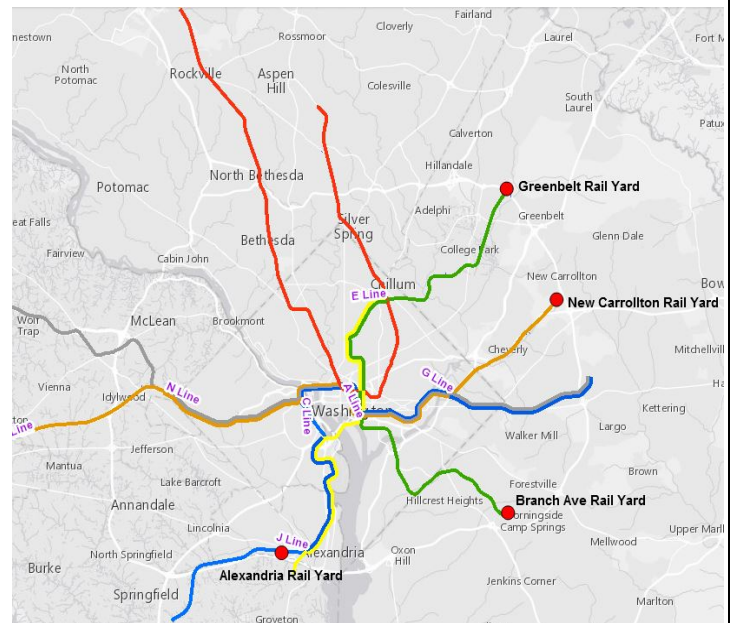
Small Equipment is also subject to PM on a time basis but the time is determined not by the expected frequency of use but by the type of equipment and its service requirements. For example: A diesel engine equipped coach screwing machine will require a 90 day frequency whereas an electric rail drill is scheduled every 180 days for PM. The array of small equipment is extremely diverse however frequencies are based on a number of factors such as; combustion engine equipped, electric, or hydraulic system related, and special use.

CTEM provides maintenance and services to its customers in the following methods:

- PM.
- Safe-Track support coverage.
- Rail system emergency response.
- Mainline or yard TRST track rights support service.
- Severe weather support services.
- New equipment procurement specification review and technical evaluation team participation.
- New equipment milestone inspections.
- Old equipment decommissioning.
- Engineering review and Engineering Modification Instruction (EMI) implementation
- Railcar load and offload yard movement.

Currently WMATA has four (4) heavy maintenance facilities:

- Greenbelt rail yard.
- New Carrollton rail yard (support equipment capable).
- Branch Ave rail yard.
- Alexandria rail yard.



At the time QICO conducted field audits, CTEM had a total of 47 mechanics as following:

- Greenbelt shop had a total of 17 mechanics, working 2 shifts.
- Alexandria shop had a total of 15 mechanics, working 2 shifts.
- Branch Ave. shop had a total of 8 mechanics, working 1 shift.
- New Carrollton shop had a total of 7 mechanics working 1 shift.
- CTEM mechanics report to region supervisors at their assigned shop. Region supervisors report to the assistant superintendent and superintendent. The superintendent reports to the CMNT general superintendent.

CTEM SHOP LOCATIONS & SHOP FUNCTIONS

Greenbelt Rail Yard (Opened 1995)



- Shifts: Day [REDACTED] | Night [REDACTED].
- Heavy rail equipment maintenance facility.
- CTEM highlighted (Beltsville, MD).

New Carrollton Rail Yard (Opened 1978)



- 1 shift: Day [REDACTED].
- Support & small equipment maintenance facility.
- CTEM highlighted (Hyattsville, MD).

Alexandria Rail Yard (Opened 1981)



- Shifts: Day [REDACTED] | Night [REDACTED].
- Heavy rail equipment maintenance facility.
- CTEM highlighted (Alexandria, VA).

Branch Ave. Rail Yard (Opened 2002)

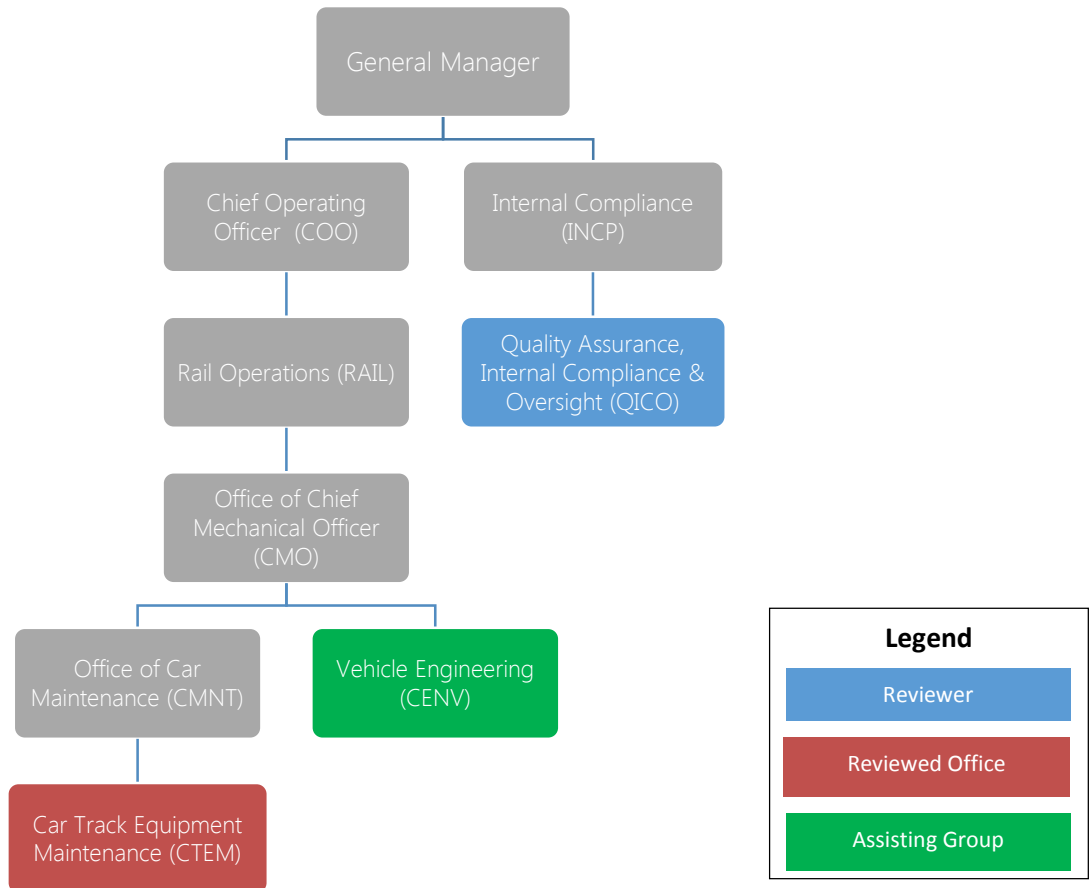


- 1 shift: Day [REDACTED].
- Heavy rail equipment maintenance facility.
- CTEM highlighted (Suitland, MD).

REVIEW METHODOLOGY

Internal Review Stakeholders

The **Office of Quality, Internal Compliance and Oversight (QICO)** conducted an internal review of the CTEM group, which resides within the Office of Car Maintenance (CMNT), within the Department of Rail Operations (RAIL), under the Chief Operating Officer. As shown below, QICO is independent of the function under review, reporting to the General Manager through Internal Compliance (INCP). QICO provides objective quality assurance and compliance services in order to improve the quality of Metrorail operations, processes and compliance to regulatory requirements.



QICO performed the internal review from July 5 to July 10, 2017.

QICO conducted a desk interview with CTEM key personnel, performed field observations, and reviewed governing CTEM documentation. Field observations were conducted at the New Carrollton CTEM Shop on July 7, 2017, Alexandria CTEM Shop on July 11, 2017 and Greenbelt and Branch Ave CTEM Shop on July 12, 2017.

This internal review notes both positive findings ([What Worked Well](#)) and negative findings ([Areas for Improvement](#)). The findings are rated based on severity of risk, which ranges from 'Insignificant' to 'High.' Recommendations are combined into several [Required Actions](#), which summarize the steps actions owners must take to address deficiencies.

REVIEW SCOPE

Category	Description
<p>Review of Existing Documentation</p>	<ul style="list-style-type: none"> - Approved WMATA Repair/Maintenance Procedures. - CTEM SOPs: <ul style="list-style-type: none"> o SOP 1 Preventative Maintenance Manuals. - CMNT SOP: <ul style="list-style-type: none"> o SOP 1.02 Management of Torque Indicating Devices Rev. 4 (Dated: 1/5/2017). o SOP 1.04 Documenting Corrective Maintenance Work Orders Rev. 3.4 (Dated: 4/7/2016). o SOP 1.08 Shelf Life Management Program Rev. 2 (Dated: 9/8/2015). o SOP 2.04 Attaining Job Classification Training Requirements Rev. 5.1 (Dated: 6/1/2016). o SOP 2.10 Supervisor Duties Rev. 0 (Dated: 9/13/2016). - Inspection records such as supervisor quality checks and technician work completion check sheets. - Employee list, training, certification, and/or qualification documents for each location. - Tooling / Bench Testing Equipment calibration records. - List of equipment responsible for. - Work Flow Process plan/procedure
<p>Interviews of Key Personnel</p>	<ul style="list-style-type: none"> - Superintendent – [REDACTED] - Assistant Superintendent – [REDACTED] - Assistant Superintendent – [REDACTED] - Region Supervisor – [REDACTED] (Alexandria) - Region Supervisor – [REDACTED] (Branch Ave) - Vehicle Engineer (CENV) – [REDACTED]
<p>Field Observations (Appendix E, Appendix F, Appendix G, Appendix H)</p>	<ul style="list-style-type: none"> - Work site visits: Greenbelt CTEM Shop, Alexandria CTEM Shop, Branch Ave. CTEM Shop, New Carrollton CTEM Shop - Component documentation (work orders, asset numbers, serialization, labels) - Tools & equipment calibration - Inspection reports (bench testing sheets / MRO supervisor quality checks, etc.) - Maximo usage for corrective and planned maintenance activities

REVIEW CRITERIA		
Quality Measures	Definition	
Quality of Work	Workmanship	Qualitative or quantitative measurement of material characteristics of work performed.
	Performance of Work	Qualitative or quantitative measurement of actions taken to complete work.
	Housekeeping	Assessment of site conditions; i.e. work zone organization and cleanliness.
	Quality Control Measures	Internal management controls that ensure the consistency and reliability of work performed.
Records Management	Work Order Management	Protocols established to control maintenance scheduling, documentation, and tracking.
	Processes	Documented requirements for departmental activities.
	Testing/Quality Checks	Documented records of supervisor quality checks and operational testing of equipment.
	Training	Documented training, certification and qualification records
	Records Storage and Retention	Documented requirements for the maintenance of records and documentation.
Safety	PPE	Requirements for personal protective equipment.
	First Aid Kits & Eye Washing Stations	First aid kits and eye washing stations positioned and can be identified throughout work area.
	Emergency Evacuation plan	Required emergency evacuation plan posted and identifiable.
	Hazardous Waste & Material Control	Hazardous waste / Material control designated storage areas.
	Applicable Job Safety Requirements	Any documented safety requirements that apply to specific work performed.
Compliance with Standards	Materials and Tooling	Measureable properties of parts and tools used to perform work.
	Technical Specifications	Engineering requirements that outline the minimum requirements for material and workmanship standards.
	Business Practices	Formal documented standards governing business practices; i.e. P/I's, departmental policies,
	Procedural Requirements	Formal documented standards that identify specific actions to be taken.

RISK ASSESSMENT SUMMARY		Note: Required actions are rated based on severity of risk, which ranges from 'Insignificant' to 'High' scale. Refer to Appendix A Risk Assessment for details.		
Definitions				
Insignificant	Low	Moderate	Elevated	High
Reasonable assumption that this risk will not occur and unlikely to cause the activity to fail to meet part of its objective.	Reasonable assumption that this risk will likely not occur & may cause a failure of the business process to meet part of its objectives.	Reasonable assumption that this risk may occur & may cause a failure of the business process to meet a significant part of its objectives.	Reasonable assumption that this risk will likely occur & likely to cause a failure of the business process to meet a significant part of its objectives.	Reasonable assumption that this will occur & will cause a failure of the business process to meet its objectives or cause objective failure in other activities.

WHAT WORKED WELL

Measure	Finding	Description
Records Management	CTEM facilities are documenting preventative and corrective maintenance using MAXIMO.	<ul style="list-style-type: none"> - Samples of work orders (WO) examined by QICO contained all necessary documentation, with supporting information uploaded and attached to the work order by the Supervisor. - Assistant Superintendents validate work completed prior to closing each work order.
Quality of Work	CTEM maintains storage areas with consistent organization and labelling.	<ul style="list-style-type: none"> - CTEM storage rooms had parts and materials properly labelled on shelves within the storage areas. (Appendix D: Photograph #1)
Compliance with Standards	Torque indicating tools and bench test equipment (BTE) are consistently calibrated.	<ul style="list-style-type: none"> - During field assessments, QICO found that all CTEM locations are in compliance with proper required calibration of torque indicating tools and bench test equipment (BTE). (Appendix D: Photograph #2)

AREAS FOR IMPROVEMENT

Note: Findings are rated based on the associated risk to organization's objectives, provided as Type of Risk followed by Risk Severity (Impact rating, Probability rating) Color Coding.

Refer to [Appendix A: Risk Assessment](#) for further details

Measure	Finding	Description
Quality of Work	<p>F-CTE-17-01</p> <p>While CTEM practices fall under CMNT governing documents, these documents lack sufficient detail to document some CTEM-specific processes.</p> <p><i>Operational Risk</i> <i>Moderate (3.3)</i> ■</p>	<ul style="list-style-type: none"> - CTEM provided an informal document labelled "CTEM Business Practice", providing instructions to mechanics on Maximo data entry. However, no comprehensive process flow was provided to QICO. <p>Recommendation: To ensure effective and consistent workflow, develop documentation for CTEM-specific practices including a comprehensive process flow, a quality control plan and training to ensure consistent application.</p>
	<p>F-CTE-17-02</p> <p>CTEM performs some equipment modifications without the involvement of Vehicle Engineering (CENV), compromising the consistency and reliability of uncontrolled modifications.</p> <p><i>Operational Risk</i> <i>Moderate (3.3)</i> ■</p>	<ul style="list-style-type: none"> - There is no written procedure for addressing equipment modifications, however a verbal agreement exists between CTEM and CENV. - QICO discovered modifications completed to heavy rail equipment without following the agreed practice. It was reported by CTEM management that this deviation from agreed practices was due to limited support available from Vehicle Engineering (CENV) at the time of the modification (Appendix D: Photograph #3). <p>(Source: Branch Ave CTEM field assessment)</p> <p>Recommendation: To ensure future modifications of track equipment produce results that are consistent and reliable, develop formal requirements to govern the modification process, and conduct analysis of dedicated manpower required to properly support CTEM.</p>
	<p>F-CTE-17-03</p> <p>Failure information and equipment status is not effectively communicated from customer maintenance groups to CTEM, resulting in additional requirements to diagnose and repair equipment.</p> <p><i>Operational Risk</i> <i>Moderate (3.3)</i> ■</p>	<ul style="list-style-type: none"> - At New Carrollton, QICO observed, failed equipment brought in for repair are not accompanied with a detailed description of the failure, which creates additional work load during troubleshooting <p>(Source: New Carrollton CTEM Field Assessment)</p> <p>Recommendation: To improve the communication of defects and efficiency of troubleshooting/repair, coordinate with customer maintenance groups [Automatic Train Control Maintenance (ATCM), Track and Structures (TRST), and Plant Maintenance (PLNT)] to develop written procedures for reporting equipment failure, making necessary revisions to repair logs to include description fields.</p>

AREAS FOR IMPROVEMENT

Note: Findings are rated based on the associated risk to organization's objectives, provided as Type of Risk followed by Risk Severity (Impact rating, Probability rating) Color Coding.

Refer to [Appendix A: Risk Assessment](#) for further details

Measure	Finding	Description
Safety	<p>F-CTE-17-04</p> <p>Select heavy lifting equipment was out of compliance with inspection requirements, introducing safety concerns for equipment operation.</p> <p><i>Safety Risk</i> <i>Elevated (4.4)</i> ■</p>	<ul style="list-style-type: none"> - QICO observed at New Carrollton portable gantry and pedestal cranes with overdue annual rig inspection labels, indicating a last inspections date of 20 May 2016. - Both cranes have been labelled out of service by CTEM management after it was brought to their attention by QICO. CTEM has notified Plant Maintenance (PLNT) and a work order has been created to have the equipment inspected. Annual rigging inspections are completed by outside contractor (Appendix D: Photograph #4). <p>(Source: New Carrollton Field Assessment)</p> <p>Recommendation: To provide for the safe operation of shop equipment, establish methods to ensure all heavy lifting equipment that require regular inspection are monitored for compliance.</p>
	<p>F-CTE-17-05</p> <p>Current placement of emergency eyewash stations presents accessibility and safety concerns.</p> <p><i>Safety Risk</i> <i>Elevated (4.4)</i> ■</p>	<ul style="list-style-type: none"> - QICO observed an eyewash station in the welding room in Greenbelt facility that was inaccessible for immediate, emergency use. - At Alexandria facility, QICO observed a wall mounted eyewash station placed adjacent to electric panels, which imposes a risk of electrical shock and serious bodily injury (Appendix D: Photograph #5). <p>(Source: Field Assessments – Greenbelt and Alexandria)</p> <p>Recommendation: To ensure eyewash stations are accessible and safely located, assess current the location and placement of all CTEM eyewash stations and establish formal measures to resolve, maintain and inspect the stations on a periodic basis.</p>
Compliance with Standards	<p>F-CTE-17-06</p> <p>Shelf life considerations for parts and materials are inadequately monitored and controlled, increasing the likelihood expired materials are available for use.</p> <p><i>Governance Risk</i> <i>Low (3.2)</i> ■</p>	<ul style="list-style-type: none"> - QICO observed deteriorated rubber bushings in a storage drawer along with newer bushings. - QICO discovered expired adhesives and lubricants stored in a flame resistant cabinet (Appendix D: Photograph #6). - Although CTEM conducts shelf life inspection, the findings indicate that the criterion is not sufficient <p>(Source: New Carrollton Field Assessment)</p> <p>Recommendation: Develop tracking mechanisms to ensure materials and components with shelf life limitations or other expirations are used or replaced appropriately.</p>

SUMMARY OF REQUIRED ACTIONS

Note: Findings are rated based on the associated risk to organization's objectives, provided as Type of Risk followed by Risk Severity (Impact rating, Probability rating) Color Coding.

Refer to [Appendix A: Risk Assessment](#) for further details

Required Action	Finding	Owner
QICO-CTE-17-01: To ensure consistent and reliable work results, develop formal instructions to outline CTEM processes, including requirements for equipment modification, designating roles and responsibilities, manpower analysis, and for establishing quality control plans to ensure consistent application. Moderate ■	F-CTEM-17-01 ■	While CTEM practices fall under CMNT governing documents, these documents lack sufficient detail to document some CTEM-specific processes. CMNT
	F-CTEM-17-02 ■	CTEM performs some equipment modifications without the involvement of Vehicle Engineering (CENV), compromising the consistency and reliability of uncontrolled modifications. CMNT CENV
QICO-CTE-17-02: To improve the communication of defects and efficiency of troubleshooting/repair, coordinate with customer maintenance groups (ATCM, TRST, and PLNT) to develop written procedures for reporting equipment failure, making necessary revisions to repair logs to include description fields. Moderate ■	F-CTEM-17-03 ■	Failure information and equipment status is not effectively communicated from customer maintenance groups to CTEM, resulting in additional requirements to diagnose and repair equipment. CMNT RAIL
QICO-CTE-17-03: To provide a safe environment for work in CTEM shop areas, develop formal methods to ensure that all tools, equipment and documentation are accessible, up-to-date and in compliance with applicable inspection and calibration requirements. Elevated ■	F-CTEM-17-04 ■	Select heavy lifting equipment was out of compliance with inspection requirements, introducing safety concerns for equipment operation. CMNT PLNT
	F-CTEM-17-05 ■	Current placement of emergency eyewash stations presents accessibility and safety concerns. CMNT
QICO-CTE-17-04: Develop tracking mechanisms to ensure materials and components with shelf life limitations or other expirations are used first or replaced appropriately. Low ■	F-CTEM-17-06 ■	Shelf life considerations for parts and materials are inadequately monitored and controlled leading to expired materials made available for use. CMNT

CORRECTIVE ACTION PLANS



INTERNAL REVIEW

Car Track Equipment Maintenance (CTEM)

In response to the internal review report for Metro's Car Track Equipment Maintenance (CTEM) practices and processes dated August 17, 2017, the office of Quality Assurance, Internal Compliance & Oversight (QICO) has coordinated with the Operations department to develop four comprehensive CAPs. Each CAP outlines the findings, recommendations and requirements to be addressed, ad a detailed action plan outlining responsible parties and specific actionable items.

EXECUTIVE LEADERSHIP OF RESPONSIBLE PARTIES

Corrective Action Plan Commitment

9/12/17
Date

Joseph Leader
Chief Operating Officer (COO)

WMATA INTERNAL OVERSIGHT

Corrective Action Plan Acknowledgement

09/12/17
Date

Angel Peña
Managing Director, Quality Assurance, Internal Compliance & Oversight (QICO)

9/12/17
Date

Eric Christensen
Chief, Internal Compliance (INCP)

9/13/17
Date

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



CORRECTIVE ACTION PLAN

Purpose and Scope

On August 17, 2017 QICO issued a comprehensive Report from an internal review into assessment of the Car Track Equipment Maintenance (CTEM) practices and processes. This Corrective Action Plan (CAP) has been developed to address the finding and required action per **QICO-CTE-17-01**.

QICO Finding

QICO Recommendation

F-CTE-17-01: While CTEM practices fall under CMNT governing documents, these documents lack sufficient detail to document some CTEM-specific processes.

- To ensure effective and consistent workflow, develop documentation for CTEM-specific practices including a comprehensive process flow, a quality control plan and training to ensure consistent application.

F-CTE-17-02: CTEM performs some equipment modifications without the involvement of Vehicle Engineering (CENV), compromising the consistency and reliability of uncontrolled modifications.

- To ensure future modifications of track equipment produce results that are consistent and reliable, develop formal requirements to govern the modification process, and conduct analysis of dedicated manpower required to properly support CTEM.

Required Action

QICO-CTE-17-01: To ensure consistent and reliable work results, develop formal instructions to outline CTEM processes, including requirements for equipment modification, designating roles and responsibilities, manpower analysis, and for establishing quality control plans to ensure consistent application.

(Risk Rating: Moderate)

Plan Description

CTEM will develop standard operating procedures (SOPs) to outline the Engineering Request (ER), Maximo records and the Quality Control processes. These SOPs will also include identification of roles and responsibilities. CTEM will train all personnel on new and revised processes.

The office of Chief Mechanical Officer (CMO) will develop a staffing analysis to determine additional engineers CTEM needs.

Business Impact – Budget/Cost Estimate

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

PLAN SCHEDULE

Actionable items		Description	Responsible Party	Estimated Start	Estimated Completion
1	Staffing Assessment	Staffing analysis to determine additional engineers CTEM needs of the CENV engineers to reflect appropriate roles and responsibilities.	John Doherty (CMO)	11/1/17	12/04/17
2	Quality Control SOP	Develop a quality control (QC) procedure to ensure consistent application of CTEM processes.	Larry Skelton (CMNT)	08/28/17	10/02/17
3	Quality Control SOP Acknowledgement	Present and discuss with CTEM personnel new QC SOP, including employee signature acknowledgement of new SOP in the meeting roster.	Larry Skelton (CMNT)	10/02/17	11/16/17



PLAN SCHEDULE

Actionable items		Description	Responsible Party	Estimated Start	Estimated Completion
4	Maximo SOP	Develop CTEM SOP for Maximo to include work order and labor data entry procedures.	Larry Skelton (CMNT)	10/02/17	11/16/17
5	Maximo SOP Acknowledgement	Present and discuss with CTEM personnel new CTEM SOP for Maximo, including employee signature acknowledgement of new SOP in the meeting roster.	Larry Skelton (CMNT)	11/16/17	12/27/17
6	Engineering Request SOP	SOP will describe the CTEM Equipment Modification Engineering Review (ER) process.	Sachit Kakkar, Larry Skelton (CENV, CMNT)	08/28/17	11/20/17
7	Engineering Request SOP Acknowledgement	Present and discuss with CTEM personnel new ER SOP, including employee signature acknowledgement of new SOP in the meeting roster.	Sachit Kakkar, Larry Skelton (CENV, CMNT)	11/20/17	12/27/17
8	QICO CAP Verification Report	QICO will evaluate actionable items submitted to confirm there is reasonable evidence that the findings and this required action have been resolved, taking into account the actionable item descriptions and performance measures.	QICO	12/27/17	01/29/18

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

COMPLETION DOCUMENTATION

Performance Measures

- 90% of active CTEM personnel provide signature acknowledgement of updated SOPs developed under actionable items #3, #5, and #7.

RESPONSIBLE PARTIES

Chief Mechanical Officer	John Doherty	[Redacted]
CMNT	Larry Skelton	[Redacted]
CENV	Sachit Kakkar	[Redacted]

SECOND LEVEL RESPONSIBILITY

AGM, RAIL	Andrew Off	[Redacted]
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CORRECTIVE ACTION PLAN
Purpose and Scope

On August 17, 2017 QICO issued a comprehensive Report from an internal review into assessment of the Car Track Equipment Maintenance (CTEM) practices and processes. This Corrective Action Plan (CAP) has been developed to address the finding and required action per **QICO-CTE-17-02**.

QICO Finding

F-CTE-17-03: Failure information and equipment status is not effectively communicated from customer maintenance groups to CTEM, resulting in additional requirements to diagnose and repair equipment.

QICO Recommendation

- To improve the communication of defects and efficiency of troubleshooting/repair, coordinate with customer maintenance groups (ATCM, TRST, and PLNT) to develop written procedures for reporting equipment failure, making necessary revisions to repair logs to include description fields.

Required Action

QICO-CTE-17-02: To improve the communication of defects and efficiency of troubleshooting/repair, coordinate with customer maintenance groups (ATCM, TRST, and PLNT) to develop written procedures for reporting equipment failure, making necessary revisions to repair logs to include description fields.

(Risk Rating: Moderate)

Plan Description

CTEM will update the current SOP 1.01 "Reporting on Roadway Maintenance Machines Unusual Occurrence(s) and/or Equipment Malfunctions", and collaborate with TRST, PLNT and ATCM for execution. In addition CTEM will edit the small equipment repair log to include a column to report the detailed description of failure.

Business Impact – Budget/Cost Estimate

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

PLAN SCHEDULE

Actionable items		Description	Responsible Party	Estimated Start	Estimated Completion
1	Revise SOP 1.01	CTEM will collaborate with TRST, PLNT and ATCM to update SOP 1.01 for reporting equipment failures. This will include reporting on failures involving small equipment.	Larry Skelton (CMNT)	08/28/17	12/13/17
2	Maintenance Bulletin	Generate a bulletin, distributed to all maintenance groups to communicate the requirements for equipment failure reporting outlined in SOP 1.01.	Andy Off, (RAIL)	12/13/17	01/24/18
3	Revise Small Equipment Log Book	Edit the small equipment repair log book to include a column to report the detailed description of failure.	Larry Skelton (CMNT)	08/28/17	10/25/17
4	Tool Box/ Safety Briefing and SOP Acknowledgement	Present and discuss with CTEM personnel new SOP, including employee signature acknowledgement of new SOP in the meeting roster.	Larry Skelton (CMNT)	12/13/17	01/24/18



PLAN SCHEDULE

Actionable items		Description	Responsible Party	Estimated Start	Estimated Completion
5	QICO CAP Verification Report	QICO will evaluate actionable items submitted to confirm there is reasonable evidence that the findings and this required action have been resolved, taking into account the actionable item descriptions and performance measures.	QICO	01/24/18	02/28/18

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

COMPLETION DOCUMENTATION

Performance Measures

- Evidence of equipment failure reporting in accordance with updated requirements, as outlined in actionable item #1 and #2.
- 85% of active CTEM personnel provide signature acknowledgment of updated SOP, as outlined in actionable item #3.

RESPONSIBLE PARTY

CMNT	Larry Skelton	
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SECOND LEVEL RESPONSIBILITY

AGM, RAIL	Andrew Off	
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CORRECTIVE ACTION PLAN

Purpose and Scope

On August 17, 2017 QICO issued a comprehensive Report from an internal review into assessment of the Car Track Equipment Maintenance (CTEM) practices and processes. This Corrective Action Plan (CAP) has been developed to address the finding and required action per **QICO-CTE-17-03**.

QICO Finding

QICO Recommendation

F-CTE-17-04: Select heavy lifting equipment was out of compliance with inspection requirements, introducing safety concerns for equipment operation.

- To provide for the safe operation of shop equipment, establish methods to ensure all heavy lifting equipment that require regular inspection are monitored for compliance.

F-CTE-17-05: Current placement of emergency eyewash stations presents accessibility and safety concerns

- To ensure eyewash stations are accessible and safely located, assess current the location and placement of all CTEM eyewash stations and establish formal measures to resolve, maintain and inspect the stations on a periodic basis.

Required Action

QICO-CTE-17-03: To provide a safe environment for work in CTEM shop areas, develop formal methods to ensure that all tools, equipment and documentation are accessible, up-to-date and in compliance with applicable inspection and calibration requirements.

(Risk Rating: Elevated)

Plan Description

CTEM will develop a plan to ensure Lifting equipment not maintained by CTEM is regularly inspected for certification or maintenance compliance.

CTEM will assess locations of eye wash stations and relocate or remove any deemed improperly placed. Inspection and maintenance of eyewash stations is reviewed and addressed during the monthly 12 point inspection procedure.

Business Impact – Budget/Cost Estimate

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

PLAN SCHEDULE

Actionable items		Description	Responsible Party	Estimated Start	Estimated Completion
1	12 Point Inspection	Revise Monthly 12 Point Inspection requirements to include inspection of equipment not maintained by CTEM (e.g. shop cranes). Implementation will be through on-the-job training (OJT) for persons who perform 12 Point Inspections.	Larry Skelton (CMNT)	09/05/17	12/04/17
2	Monthly Inspection Reports	Provide 3 months of data-Completed monthly 12 Point Inspection Reports	Larry Skelton (CMNT)	12/04/17	03/05/18



PLAN SCHEDULE

Actionable items		Description	Responsible Party	Estimated Start	Estimated Completion
3	Eyewash Station Report	Report outlining the evaluation and resolution of eyewash station locations, providing solutions for stations currently inaccessible or otherwise hazardous for use.	Larry Skelton (CMNT)	09/05/17	12/05/17
4	QICO CAP Verification Report	QICO will evaluate actionable items submitted to confirm there is reasonable evidence that the findings and this required action have been resolved, taking into account the actionable item descriptions and performance measures.	QICO	03/05/18	04/09/18

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

COMPLETION DOCUMENTATION

Performance Measures

- Completed inspection reports indicate examination of heavy lifting equipment for inspection/certification requirements.
- Evidence of accessibility and safe placement of eyewash stations in all CTEM facilities.

RESPONSIBLE PARTIES

CMNT	Larry Skelton	
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SECOND LEVEL RESPONSIBILITY

AGM, RAIL	Andrew Off	
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CORRECTIVE ACTION PLAN

Purpose and Scope

On August 17, 2017 QICO issued a comprehensive Report from an internal review into assessment of the Car Track Equipment Maintenance (CTEM) practices and processes. This Corrective Action Plan (CAP) has been developed to address the finding and required action per **QICO-CTE-17-04**.

QICO Finding

QICO Recommendation

F-CTE-17-06: Shelf life considerations for parts and materials are inadequately monitored and controlled, increasing the likelihood expired materials are available for use.

- Develop tracking mechanisms to ensure materials and components with shelf life limitations or other expirations are used or replaced appropriately.

Required Action

QICO-CTE-17-04: Develop tracking mechanisms to ensure materials and components with shelf life limitations or other expirations are used or replaced appropriately.

(Risk Rating: Low) ■

Plan Description

CMNT has developed a Shelf Life Management Procedure, Standard Operating Procedure (SOP) 1.08 to improve management of inventory with shelf life limitations, and will provide training to staff in the requirements of this SOP to ensure it is being followed and adhered to consistently.

Business Impact – Budget/Cost Estimate

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

PLAN SCHEDULE

Actionable items		Description	Responsible Party	Estimated Start	Estimated Completion
1	Shelf Life Inspection	Provide on the job training (OJT) on SOP 1.08 will be provided to all CTEM personnel and recorded and filed as required.	Larry Skelton (CMNT)	8/28/17	10/05/17
2	Shelf Life Checklists	Completed shelf life inspection checklists, developed as part of SOP 1.08, demonstrating regular inspection of inventory.	Larry Skelton (CMNT)	8/28/17	10/25/17
3	QICO CAP Verification Report	QICO will evaluate actionable items submitted to confirm there is reasonable evidence that the findings and this required action have been resolved, taking into account the actionable item descriptions and performance measures.	QICO	10/25/17	11/29/17

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



COMPLETION DOCUMENTATION

Performance Measures

- 90% of active CTEM personnel provide signature acknowledgement of requirements established under SOP 1.08.
- Completed checklists from all four (4) CTEM shop locations indicate adherence to requirements established under SOP 1.08.

RESPONSIBLE PARTY

CMNT	Larry Skelton	
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SECOND LEVEL RESPONSIBILITY

Chief Mechanical Officer	John Doherty	
AGM, RAIL	Andrew Off	

SUPPLEMENTAL MATERIALS

APPENDIX A: RISK ASSESSMENT

APPENDIX A: RISK ASSESSMENT

Risk Assessment Methodology

What is Risk?

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

Risk management is an attempt to answer the following questions:

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

Categories of Risk

- *Safety* – Risk associated with harm to customers and employees and critical equipment or asset safety
- *Governance* – Risks associated with internal controls and compliance
- *Operational* – Risk related to inefficient and ineffective business processes, disruption to normal business operations, non-compliance, negative public perception, breach to physical security, etc.
- *External* – Risks related to changing regulations, unfavorable economic conditions, industry or customer needs change, litigation and damage/loss to company assets
- *Financial* – Risks associated with uncollectable receivables, incorrect financial models or analysis, fluctuation in capital levels and adverse movement of interest rates

- *Technological* – Risk associated with unauthorized access to information, unavailable or unreliable information, technology not meeting business needs and compromised information security

Risk Assessment

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

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

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

Figure 1: Risk Assessment Matrix

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

APPENDIX A: RISK ASSESSMENT

Risk Assessment Methodology

Probability of Occurrence of Risk Events Defined

Rare | 1 – Reasonable assumption that this risk will not occur
Unlikely | 2 – Reasonable assumption that this risk will likely not occur
Possible | 3 – Reasonable assumption that this risk may occur
Likely | 4 – Reasonable assumption that this risk will likely occur
Almost Certain | 5 – Reasonable assumption that this will occur

Potential Impact of Risk Events Defined

Negligible | 1 – Unlikely to cause the activity to fail to meet part of its objectives.
Minor | 2 – 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.
Moderate | 3 – 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.
Significant | 4 – Likely to cause a failure of the business process to meet a significant part of its objectives, or negatively impact the objectives of other activities, which may expose Metro to significant financial losses, reductions to or ineffectiveness of operations, non-compliance with laws and regulations, sizable waste of resources, etc.
Major | 5 – 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.

APPENDIX B: DEFINITIONS

APPENDIX B: DEFINITIONS

Definitions

Photos

Automated Single Car Brake Test Device (ASCTD)

The purpose of the single car testing device is to provide a means of making a general check on the condition of the brake equipment on cars as called for in the *Field Manual of the AAR Interchange Rules*.

Wabtec offers an Automated (computer – electronic) controlled Single Car Test Device which offers significant time and cost savings compared to the traditional way single car tests are performed manually. Its fundamental accuracy improves line of road reliability on flat cars being maintained. The ASCTD uses air to simulate braking applications.



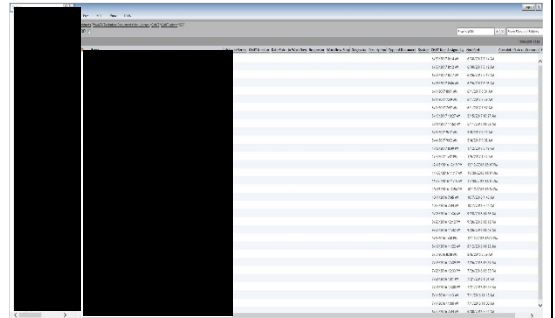
Bench Testing equipment (BTE)

The equipment used to evaluate new or repaired components, devices, apparatus, etc., prior to installation to ensure that it is in perfect condition



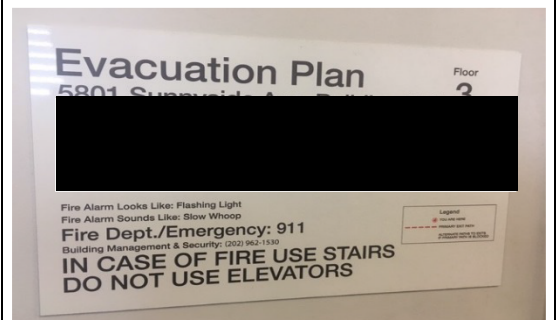
Documentum

Software asset management system that provides a single source for documentation storage and controlled access.



Emergency Evacuation Plan

Emergency evacuation plan is the urgent immediate egress or escape of people away from an area that contains an imminent threat, an on-going threat or a hazard to lives or property. Building Evacuation plans should clearly display evacuation routes to exits as well as a muster location away from the building to verify personnel accountability.



APPENDIX B: DEFINITIONS

Definitions

Photos

Engineering Modification Instruction (EMI)

An EMI is a document authorizing and recording design changes throughout the prototyping and life-cycle phases of a part/component. EMI documents a developed by Vehicle Engineering group (CENV).

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY
AGM - TIES
VEHICLE PROGRAM SERVICES (CENV)
ENGINEERING MODIFICATION INSTRUCTION
ADDITION OF NAME PLATE FOR CONVENIENCE OUTLET
KAWASAKI 7000 SERIES RAILCARS

1.0 PURPOSE
To add the name plate for Convenience Outlet.

2.0 BACKGROUND
Design Improvement, to be noticed high voltage connection behind the Convenience Outlet.

3.0 APPLICABLE CARS

4.0 APPLICABLE EQUIPMENT
• On car, cab, A-CAR F-END L-Side Locker, see drawing 2 Attachment.

Engineering Request (ER)

An engineering request (ER) is used to describe a suggested enhancement or problem with a product. An ER initiates the change process, it promotes discussions within the organization to help determine the impact of a change and the best possible solution.

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY
AGM-RAIL
VEHICLE PROGRAM SERVICES (CENV)
ER FORM - REQUEST FOR ENGINEERING ASSISTANCE
ER [redacted] DATE: Aug 11, 2018

Requestor: [redacted] Supervisor e-mail: [redacted]
Location / Tel: [redacted]

Request for Change Request for Information Other

Select appropriate box(es) to define the scope of your request.

1K 2.3K 4K 5K 6K 7K CTEM/MOW

Modification Request Electrical Cars out of service
 Safety Related Process Improvement/Failure Warranty
 Procurement Information Mechanical

NOTE: Requests for new/existing drawing must be submitted with the Engineering Drawing Request Form (EDRF-00.1) ONLY.

REASON FOR ENGINEERING REQUEST
(Brief description of the reason[s] / specific problem[s]. Please list all POCs, if applicable).
CTEM has had multiple lower window failures on the Norzco quad drills and soke cutters due to personnel

Eyewash Station

An emergency eyewash station is a portable or permanent station for the exclusive purpose of rinsing the eyes after worksite contamination. Stations allow employees to make use of on the spot decontamination within seconds of exposure. In many industries, eye wash stations are essential compliments to such personal protective equipment as goggles, and face shields. Emergency eyewash stations are fitted with a flushing fluid that has been found to be a medically acceptable means of flushing contaminants from the eye.



Flame Resistant Cabinet

Flame resistant safety cabinets are designed to store flammable liquids, corrosives, pesticides and other hazardous materials.



APPENDIX B: DEFINITIONS

Definitions

Photos

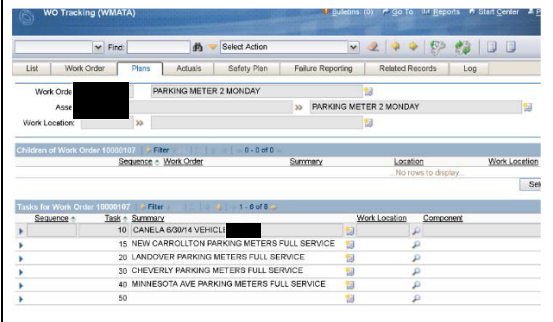
Flatcar

A multifunctional, flatbed railroad freight car without bulkheads, a roof and raised sides.



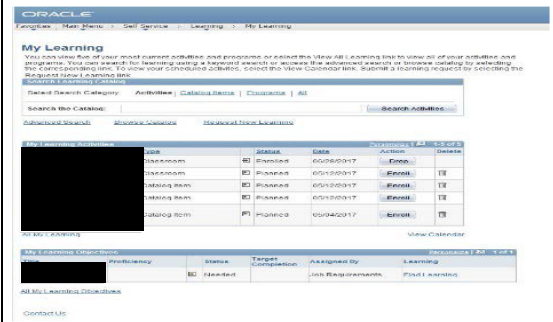
Maximo

Maximo is WMATA's maintenance management system used for work order, incident, and track defect tracking.



PeopleSoft ELM

A computer based program that documents all the pertinent training data for WMATA employees and serves as their training record repository.



Personal Protective Equipment (PPE)

The protective clothing, helmets, goggles, or other garments or equipment designed to protect the wearer's body from injury or infection. The hazards addressed by protective equipment include physical, electrical, heat, chemicals, biohazards, and airborne particulate matter.



Pettibone Speedswing

A do-it-all rail crane designed to tackle a variety of railroad applications, Speedswing provides the power to lay rails, set ties or clear the path ahead.



APPENDIX B: DEFINITIONS

Definitions

Photos

Power Generator

A power generator is a device that converts mechanical energy to electrical energy for use in an external circuit. The source of mechanical energy may vary widely from a hand crank to an internal combustion engine. WMATA's prime movers are equipped with power generators and CTEM also maintains portable power generators used by track maintainers.



Prime Mover

A power plant (locomotive) used in trains to provide traction power for haulage and propulsion. Prime movers are usually equipment with support and small equipment need for track and equipment maintenance.



Rail Drill

A rail drill is a portable, hydraulic power tool use to drill hardened or standard rail.



Rail Saw

A portable track maintenance power tool consisting of a circular saw blade, mounted on an arbor that is driven by an electric motor used to cut metal rail.



APPENDIX B: DEFINITIONS

Definitions

Photos

Rubber bushing

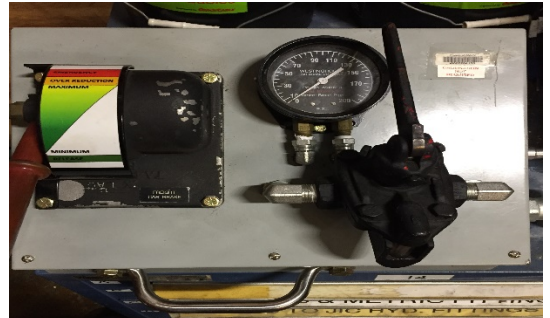
A bushing or rubber bushing is a type of vibration isolator. It provides an interface between two parts, damping the energy transmitted through the bushing.



Single Car Brake Test Device (SCTD)

The purpose of the single car testing device is to provide a means of making a general check on the condition of the brake equipment on cars as called for in the *Field Manual of the AAR Interchange Rules*.

This is manually operated device uses air to simulate braking applications to the braking system of a railcar to allow testing and troubleshooting.



Spike Driver

The spike driver is a machine uses vertical pounding force to drive spikes into wooden rail ties securing the rail and tie plate to the ties ensuring a secure, strong stable connection. Spike drivers allow track maintenance workers to work faster, more accurate, more efficient and make the job less labor-intensive.



Spike Puller

The Spike puller is a machine designed to remove spikes from rail ties. The spike use a claw which grasp spikes under the head while the work head assembly pulls straight up, allows the spike to stay straight and re-usable. Spike Pullers allow track maintenance workers to work faster, more accurate, more efficient and make the job less labor-intensive.



Standard Operating Procedure (SOP)

Standard Operating Procedures (SOP) delineate responsibilities and procedures for performing certain Metrorail functions.

Washington Metropolitan Area Transit Authority			
OFFICE OF CAR MAINTENANCE			
Standard Operating Procedure			
CATEGORY	TOPIC		
Operational/Maintenance	Torque Indicating Devices		
SOP NO.	TITLE		
1.02	Management of Torque Indicating Devices		
LATEST REVISION NO.	ORIGINATION DATE	DATE REVIEW DUE	EXPIRATION DATE
4	January 10, 2010	January 4, 2019	None
LATEST REVISION DATE	LATEST REVIEW DATE		
January 5, 2015	January 5, 2017		
SOP APPLIES TO:			
All Car Maintenance (CMNT) Personnel			
DEPARTMENT/OFFICE/INDIVIDUAL OF PRIMARY RESPONSIBILITY (OPR)			
CMNT/Manager, Technical Support Services			

APPENDIX B: DEFINITIONS

Definitions

Photos

Tamping Machine

A tamping machine or ballast tamper is a machine used to pack (or tamp) the track ballast under railway tracks to make the tracks more durable. Prior to the introduction of mechanical tampers, this task was done by manual labor. Tamper machines allow track maintenance workers to work faster, more accurate, more efficient and make the job less labor-intensive.



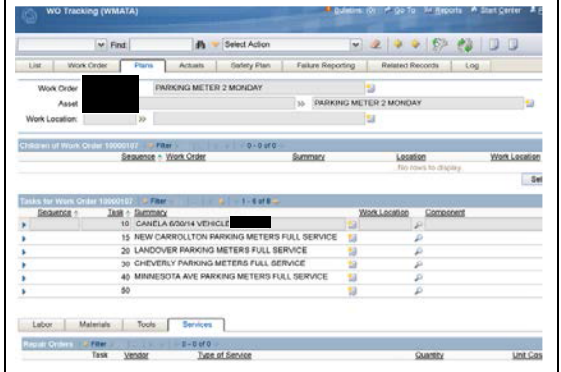
Torque Indicating Tool

An example of a torque indicating tool is a torque wrench as seen in the photo. A torque wrench is used where the tightness of screws and bolts is crucial. It allows the operator to measure the torque applied to the fastener so it can be matched to the specifications for a particular application. This permits proper tension and loading of all parts.



Work Order (WO)

A Work Order (WO) specifies a particular task and the labor, materials, services, and tools required to complete the task. Work Orders are tracked primarily through Maximo.



APPENDIX C: APPLICATION OF REGULATORY CAPS

APPENDIX C: APPLICATION OF REGULATORY CAPS

Measure	Finding	QICO Review During Review
<p>Regulatory Findings - FTA</p>	<p>CAP R-2-16-d</p> <p><i>WMATA must establish guidelines for maintenance employees responsible for providing on-the-job training (OJT).</i></p> <p>Status as of 9/8/2017: Under FTA review</p>	<ul style="list-style-type: none"> ✓ QICO found that the actionable items to satisfy FTA CAP R-2-16-d have been submitted to the FTA for review and closure. Three (3) of the five (5) items have been closed. Training classes have begun and CTEM has had selected on-the-job (OJT) instructors (technicians) who have attended or is currently enrolled to attend training. Supervisors have attended in-house QA training. ✘ QICO found that OJT instructor checklists have been developed. However, instructors have not been trained to mentor and checklist have not been rolled out to CTEM. OJT is still being conducted informally by CTEM Supervision and Mechanics.

APPENDIX D: PHOTOGRAPHS

APPENDIX D: PHOTOGRAPHS

Finding & Description

Photos

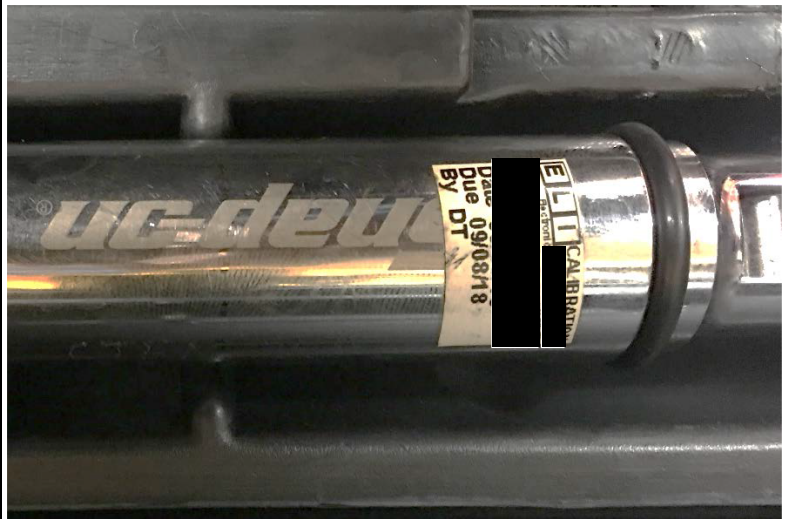
Photograph #1

The photograph shows an example of the parts drawers used in CTEM facilities, all parts are clearly labelled and organized.



Photograph #2

The photograph shows an example of a torque indicating tool (torque wrench) with compliant calibration dates.



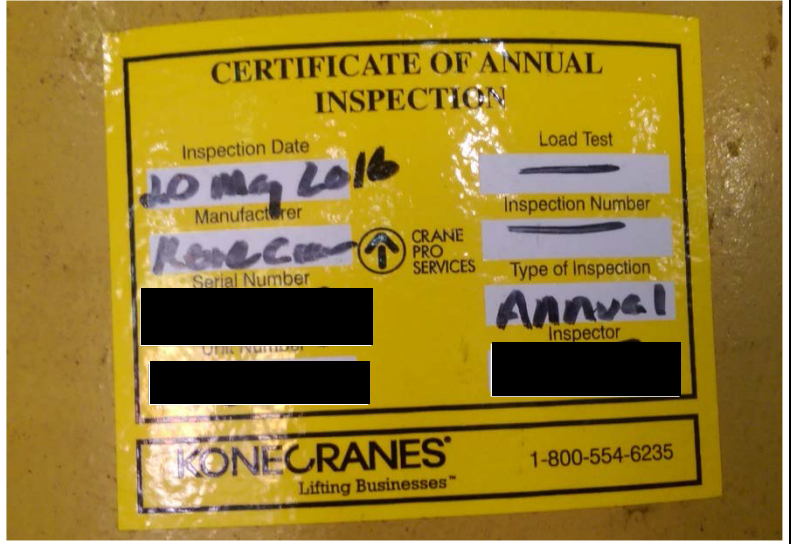
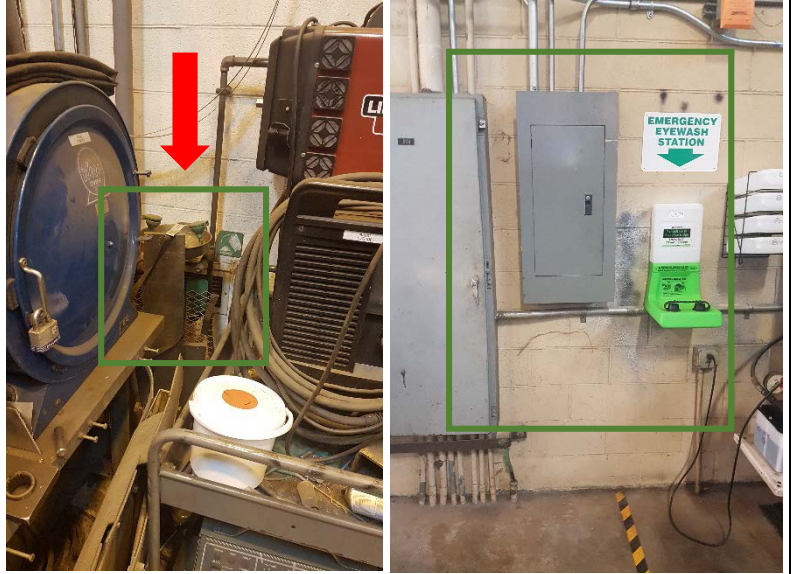

Photograph #3

F-CTE-17-02

At Branch Avenue CTEM facility, QICO observed a completed modification to a rail tie car without the involvement of Vehicle Engineering (CENV).



APPENDIX D: PHOTOGRAPHS

Finding & Description	Photos
<p>Photograph #4</p> <p>F-CTE-17-04</p> <p>QICO observed at New Carrollton a portable gantry and pedestal cranes with overdue annual rig inspection labels indicating a last inspections date of 20 May 2016.</p>	
<p>Photograph #5</p> <p>F-CTE-17-05</p> <p>QICO observed an inaccessible eyewash station in the welding room in Greenbelt facility and a wall mounted eyewash station placed adjacent to electric panels in Alexandria facility, which imposes a risk of serious bodily injury.</p>	
<p>Photograph #6</p> <p>F-CTE-17-06</p> <p>QICO observed deteriorated rubber bushings in a storage drawer along with newer bushings as well as expired adhesives and lubricants stored in a flame resistant cabinet.</p>	

APPENDIX D: PHOTOGRAPHS

Finding & Description

Photos

Photograph #7

OBSERVATION
O-CTE-17-01

It was reported by CTEM management and observed by QICO at the New Carrollton CTEM facility that during heavy rainfall the shop gets flooded due to the shop floor being lower than the outside ground.



Photograph #8

OBSERVATION
O-CTE-17-01

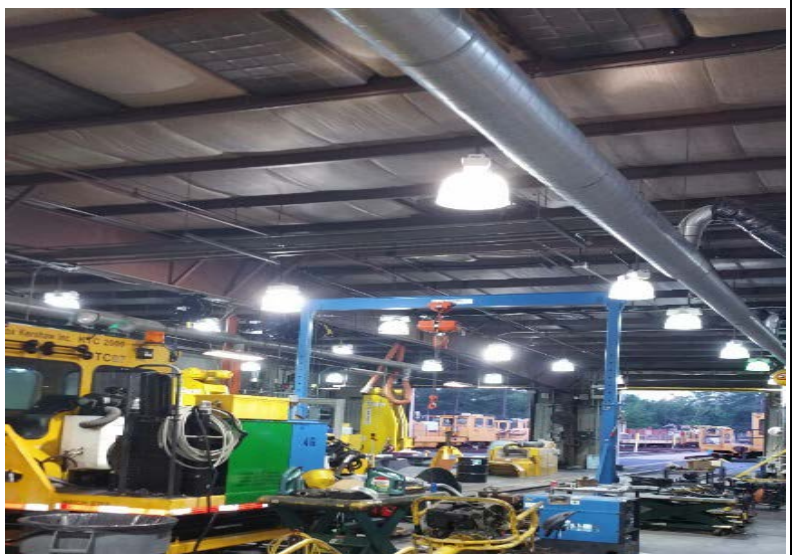
QICO observed badly damaged ceiling insulation due to birds nesting.





Photograph #9

OBSERVATION
O-CTE-17-01

New Carrollton CTEM Facility has no overhead crane for heavy lifting which poses a challenge for mechanics.



APPENDIX D: PHOTOGRAPHS

Finding & Description	Photos
<p>Photograph #10</p> <p>OBSERVATION O-CTE-17-01</p> <p>Tracks are protruding above the shop floor level posing a tripping, and lacks a pit to work under equipment.</p>	
<p>Photograph #11</p> <p>OBSERVATION O-CTE-17-02</p> <p>QICO observed new and salvaged parts being stored within the same storage drawer.</p>	
<p>Photograph #12</p> <p>OBSERVATION O-CTE-17-03</p> <p>At Alexandria, QICO discovered a manual single car brake test device (SCTD) with a label noting "CALIBRATION NOT REQUIRED" while at other locations, the same device was being calibrated.</p>	

APPENDIX D: PHOTOGRAPHS

Finding & Description

Photos

Photograph #13

OBSERVATION
O-CTE-17-03

At Branch Ave, QICO discovered the Wabtec Automated Single Car Brake Test Device (ASCTD) had an overdue calibration date of 2/14/2017.



Photograph #14

OBSERVATION
O-CTE-17-04

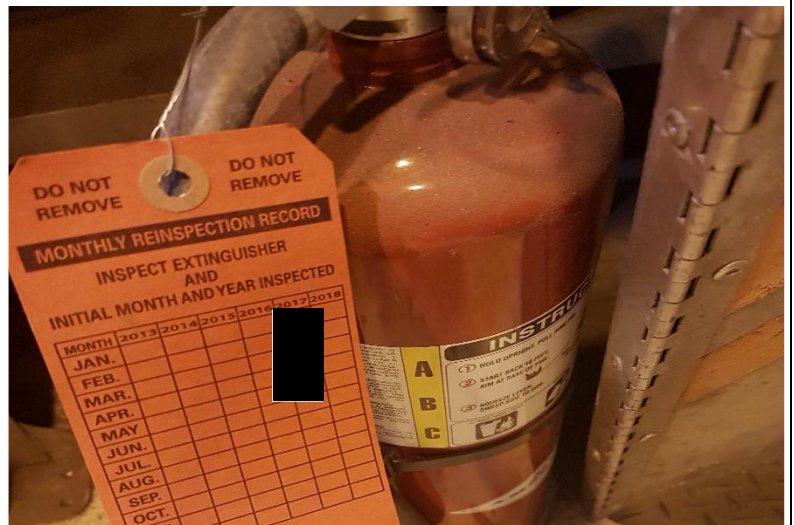
At all locations, CTEM maintained and managed their own inventory of parts in uncontrolled rooms with no dedicated store room controller.



Photograph #15

OBSERVATION
O-CTE-17-05

QICO observed fire extinguishers in welding rooms at Alexandria, Branch Ave and Greenbelt CTEM facilities with overdue monthly inspections. As per CTEM management, inspections of fire extinguishers are completed during preventative maintenance (PM).



APPENDIX D: PHOTOGRAPHS

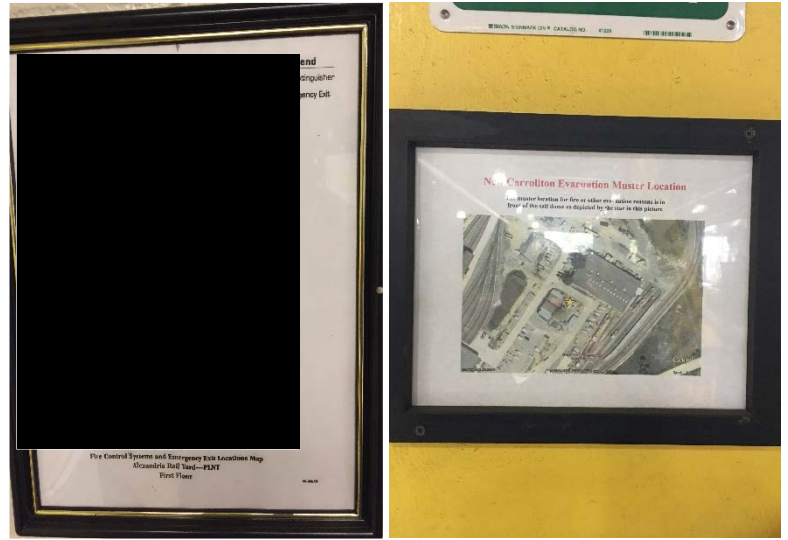
Finding & Description

Photograph #16

OBSERVATION
O-CTE-17-06

Building emergency evacuation plans are not very detailed posing a challenge for timely evacuations.

Photos



APPENDIX E: NEW CARROLTON FIELD ASSESSMENT



METRO ROLLING STOCK ASSURANCE PROGRAM

Audit Checklist

AUDIT SUBJECT Maintenance & Use of Rail-borne Equipment LEAD AUDITOR [REDACTED]
 AUDIT LOCATION New Carrollton CTEM Facility AUDIT DATE(S) July 7, 2017

OVERVIEW	
Category	Description
QICO Audit Team	[REDACTED]
Audit Objective	- Field Assessment on the maintenance & use of rail-borne equipment.
Audit Criteria	- Supervisor Shop Oversight - Housekeeping: Work Zone Organization - Quality Checks / Completion Sign Off Sheets - Employee Training / Certification: Requirements - Tools & Equipment Calibration - Preventative Maintenance Plan

AUDIT INTERVIEWS			
Role/Function	Name	Location	Date
Assistant Superintendent	[REDACTED]	Greenbelt	July 7, 2017
Shop Leadsman	[REDACTED]	New Carrollton	July 7, 2017
Mechanic	[REDACTED]	New Carrollton	July 7, 2017
Mechanic	[REDACTED]	New Carrollton	July 7, 2017

INTERVIEW QUESTIONS					
No.	Evaluation Criteria	Response/Comments	Yes	No	N/A
1.	What formal & informal training have you received to perform your job duties? Interview 2 technicians on training.	- QICO interviewed CTEM mechanics, [REDACTED] When interviewed, both mechanics reported they have received on-the-job training (OJT) in regards to the equipment that was being worked on. Both Technicians had previous experience as automotive mechanics.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
		- QICO discovered OJT training is not being properly documented and there is no proficiency checklist throughout the OJT training process.			
2.	Do you have work instruction manuals to follow for different maintenance task?	- At New Carrollton shop QICO reviewed the available hard copy OEM manuals available for technician consultation and found the manuals to be out of date.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

INTERVIEW QUESTIONS

No.	Evaluation Criteria	Response/Comments	Yes	No	N/A
	Check availability, ease of access, document control, collect date, and collect revision level.	<ul style="list-style-type: none"> - QICO inspected "GEISMAR PT XL TRACK DRILL" PM Manual; release date 11/24/2014- First Draft, "GEISMAR MTX-400" PM manual; release date 5/1/2015, and "GEISMAR MTX-50-H" PM manual; release date 5/1/2015. - Up-to-date, Final draft revisions are available through Documentum and CTEM's shared drive (J: Drive). CTEM's technicians have access to the J: Drive but several of them do not have access to Documentum and have not received any training on how to use Documentum. New Carrollton CTEM Shop is set up with 3 work stations and 1 employee kiosk (See photograph #1, #2, & #3). - At the time of the audit, mechanics were unable to demonstrate the process of accessing documents on the kiosk due to a security error popping up on the screen, but could explain the steps. 			
3.	<p>Is there any specific testing required after completion of any work? If so what procedure do you use and how do you record and maintain the results?</p> <p>Verify inspection & test sheets – are they tied to any procedures or testing instructions, bench test equipment, demonstrations</p>	<ul style="list-style-type: none"> - Mechanics were able to locate and show QICO check sheets located within the equipment PM manuals. Check Sheets are to be filled out after the completion of each PM. Numbered as a step on that these check sheets is operational testing. Mechanics are to test and sign their initials after completing this step. - Once completed, check sheets are validated by the lead man, and the supervisor updates the W/O status to completed in MAXIMO. The checklist and any associated paperwork is uploaded into MAXIMO for record keeping. Hard copies of check sheets are stored in office filing cabinets. 	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4.	<p>How do you verify the correct parts when making repairs?</p> <p>OEM manuals, work instruction manuals – collect dates & revision levels</p>	<ul style="list-style-type: none"> - Mechanics use OEM manuals to verify procedure and parts. - QICO had a technician demonstrate how he would verify parts for piece of equipment that he was currently working on. Technician consulted with manual, "PORTACO, INC Model GP-10-29-0 & GP-10-29-1 Grinder Profile"; release date was 5/5/1990 which had 	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

INTERVIEW QUESTIONS

No.	Evaluation Criteria	Response/Comments	Yes	No	N/A
		reference part diagrams and parts list (See photograph #4).			
5.	<p>How do you complete modifications on equipment (mainly on class 2 equipment and including small equipment)?</p> <p>What documents are required to make the modifications and who is involved throughout the process?</p>	<ul style="list-style-type: none"> - Mechanic(s) contact management to discuss reason for the modification, CTEM management develop an Engineering Request (ER) and presents it to Vehicle Engineering (CENV) so an Engineering Test Procedure (ETP) can be developed. - Mechanics receive modification instructions in the form of an Engineering Test Procedure (ETP). If all is well with the testing, CENV rolls the ETP into Engineering Modification Instruction (EMI) document. - Modification process involves CTEM and CENV. 	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6.	<p>What info is provided to allow for troubleshooting of equipment coming into the shop for unscheduled repairs?</p> <p>Is the history being examined before troubleshooting?</p> <p>What equipment is used during troubleshooting? (Portable test equipment, etc.)</p>	<ul style="list-style-type: none"> - At the moment small and support equipment is dropped off by the user (TRST), the New Carrollton Repair Log is filled in and a Repair Tag is attached to the equipment (See photograph #5). - TRST often drops off equipment during CTEM off hours (evenings or nights), consequently, equipment it's not checked-in by CTEM personnel and failure descriptions are not left with the equipment. - History is rarely examined on support and small equipment and only if the piece of equipment in question is back in the shop in a short amount of time or repeatedly is the history being reviewed. - Mechanics have GEISMAR Track Wrench, Load Bank for generators, Torque Tester, Torque gas impact gauge, available to troubleshoot and work on different pieces of equipment. 	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
7.	<p>Storage room (parts) Check for cleanliness Proper identification of parts Storage infrastructure (space, racks, load limits on racks) Storage and handling of rejected/defective/damaged parts</p>	<ul style="list-style-type: none"> - CTEM manages and maintains its own part inventory and storeroom. QICO discovered safety stock and re-order points are not utilized which imposes risk to maintain equipment on time. - CTEM management maintains it inventory 	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

INTERVIEW QUESTIONS

No.	Evaluation Criteria	Response/Comments	Yes	No	N/A
		<p>stock using an excel spreadsheet which is updated weekly. Region supervisor reports to Assistant Superintendent what items were used from inventory for each corrective or preventative maintenance carried out on equipment. Parts have already been issued from a financial perspective.</p> <ul style="list-style-type: none"> - Parts are properly identified on shelves or bins. - Shelves are clearly labeled for load limits, with the exception for a storage rack outside of welding booth and a metal rack next to the sandblaster (See photograph #6). - QICO observed various items laying on the storage room floor, obstructing walkways (See photograph #7 & #8). - On the floor, surrounding the sandblaster, there was a good amount of dust, posing a slip hazard (See photograph #9). - Several burned out fluorescent tubes inappropriately stored on top of a shelf rack in the storage room (See photograph #10). - Defective/rejected parts are sent back to vendor/manufacturer. Damaged parts on equipment in for repair are placed in scrap metal bin. If barcoded sent to CTF – Salvage & Disposition. 			
8.	<p>Storage of hazardous materials Fire proof cabinets Aerosol cans properly store and covered Fuels, oil and other lubricants, spent oil</p>	<ul style="list-style-type: none"> - Hazardous materials (aerosol cans), adhesives, fuel, unused oil (1 quart bottles) and lubricants, were properly stored in specific designated flame resistant cabinets. - Spent Oil and lubricants were appropriately stored in 55 Gallon drums in designated areas with spill collection bases. 	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9.	<p>Examine work space layouts for input space and output space per bench Salvaged/defective parts are identified</p> <p>Examine Work carts: Mix of parts Salvaged/defective parts are identified</p>	<ul style="list-style-type: none"> - Work benches are not set up for input/output space. - Salvaged power tools (grinders, saws, etc.) to be cannibalized for parts were found inside a barrel (See photograph #11). 	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

INTERVIEW QUESTIONS

No.	Evaluation Criteria	Response/Comments	Yes	No	N/A
		<ul style="list-style-type: none"> - Salvaged parts, ready to be reused, or salvaged equipment (for parts) were found on shelves, next to new part (See photograph #12 & #13). - Barcoded parts removed from equipment are taken to CTF – Salvage and Disposition and are disposed following WMATA procedure. 			
10.	Examine storage areas for material storage conditions, shelf life of rubber items, shelf life of tapes and lubricants.	<ul style="list-style-type: none"> - QICO found rubber bushings dry rotted and reduced to crumbles, in a part drawer with newer bushings (See photograph #14). - Although it was verified that shelf life inspections were being carried out monthly, QICO discovered expired adhesives and lubricants (See photograph #15). - Shelf life of time sensitive parts (rubber items), is not monitored and controlled. 	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
11.	<p>What is your equipment or tool calibration process?</p> <p>Pull 3 asset numbers (on torque indicating devices), document and verify calibration inspection and due dates.</p>	<ul style="list-style-type: none"> - Mechanical torque wrenches have all recently been replaced with new digital torque wrenches. Their original calibration certificates were provided. - Equipment requiring calibration is assigned an asset number and are monitored using MAXIMO. Each tool or piece of equipment that require calibration receives an annual validation by an outside contractor [REDACTED]. - Calibration certificates are scanned and attached to the WO when entered into MAXIMO. Calibration certificates are not being uploaded into Documentum. - QICO verified the calibration and due date on a torque wrench and two pressure gauges. - A discrepancy was observed between the serial number on the label on a pressure gauge ([REDACTED]) and the serial number on the certificate ([REDACTED]). This was an error on ELI, the calibration contractor's behalf (See photograph #16). 	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

INTERVIEW QUESTIONS

No.	Evaluation Criteria	Response/Comments	Yes	No	N/A
12.	Do you record the work you perform? If yes, how do document the work completed?	<ul style="list-style-type: none"> - Mechanics fill out any necessary check sheet required by the repair/PM manual and submit the completed check sheet to the lead man or supervisor for validation. - The WO is then updated into MAXIMO. Hard copies are stored in office filing. 	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13.	<p>Who performs pre/post inspections and how?</p> <p>Is it being entered into Maximo? If yes, by who?</p> <p>Do you receive copies of pre/post inspection sheets?</p>	<ul style="list-style-type: none"> - When the equipment is being used out in the field Track and Structures (TRST) Operators are responsible for performing pre/post inspections. Per Car Maintenance (CMNT) SOP 1.01 Rev 0 (7/18/2014) there is a blank "TRST rolling Stock Prior to Use Inspection" form that TRST operators should be filling out. - CTEM does not receive copies of this form (See Reference #7 for samples of TRST Prior to Use Forms). 	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
14.	Inspect Fire Extinguishers: Check condition and last inspected date	<ul style="list-style-type: none"> - Fire extinguishers available throughout the shop were easily accessible and had attached inspection tags showing visual checks were being completed monthly. - Emergency Evacuation Plan was on display and consisted of an aerial image of the area with a star representing the meeting area in case of evacuation (See photograph #17). 	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15.	Employees in Adherence to PPE and PPE condition	<ul style="list-style-type: none"> - Personnel were observed wearing appropriate PPE for the work performed. 	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16.	Inspect First Aid Kits & Eye-Washing Station maintained	<ul style="list-style-type: none"> - First aid kit was not maintained, QICO observed expired items and a list of required items to be enclosed in the kit was not present (See photograph #18). - Eye washing stations were present throughout the shop, eye washing solution was not expired. Stations were labelled and accessible. 	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
17.	Identification of annual rigging inspections on cranes	<ul style="list-style-type: none"> - Inspection of portable gantry and pedestal cranes is performed and records maintained on MAXIMO by PLNT. Inspection on both cranes was overdue, their annual inspection stickers showed "20 May 2016" as last inspection date (See photograph #19). 	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

INTERVIEW QUESTIONS

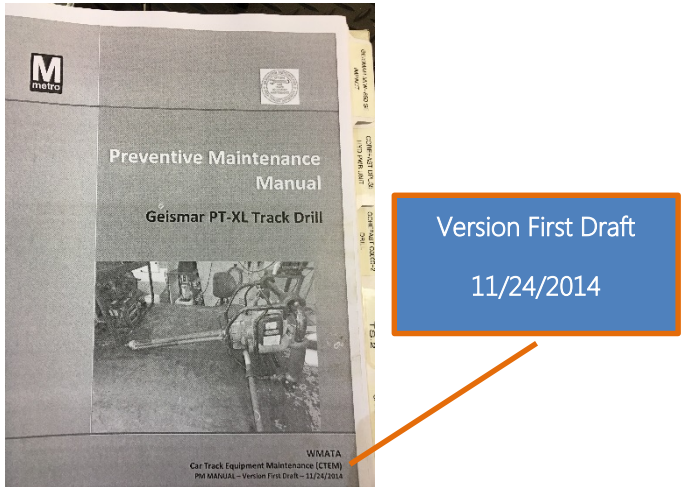
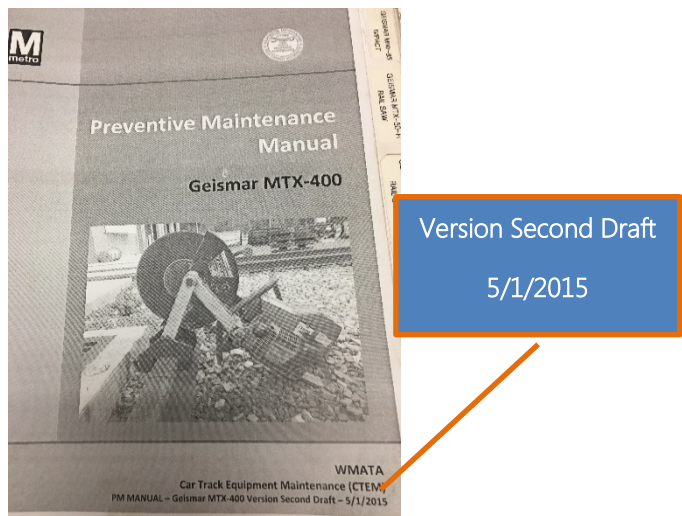
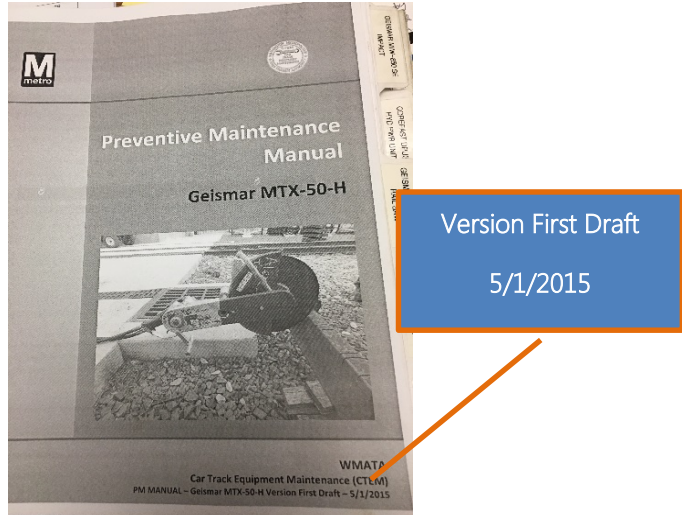
No.	Evaluation Criteria	Response/Comments	Yes	No	N/A
18.	Inspect areas where fueling of equipment takes place / hazardous waste / material storage	<ul style="list-style-type: none"> - Fuel for small and support equipment was properly stored in flame resistant cabinets. No fueling of heavy rail equipment is done at the facility. - Spent oil is being collected and stored in labelled (used oil) drums with spill collection palette. Old oil filters are being crushed and drain and then disposed of in scrap mental bin outside of the shop. - An outside vendor comes on site monthly and collects hazardous waste from cleaning area (Pressure wash/steam cleaning area) using a vacuum truck which connects outside of the shop the hazardous waste is pumped from a runoff collection basin. 	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

AUDIT NOTES

Observations

- At New Carrollton CTEM Facility, building conditions presents some challenges for the mechanics. The shop is poorly insulated and has a bird infestation in the ceiling. The insulation in the ceiling is badly damaged from nesting birds and the floor in certain areas is covered with bird feces.
- Due to the building initially being a temporary location it is not fully equipped to handle heavy rail equipment repairs. The shop has a low ceiling, poor ventilation and is not equipped with a heavy lifting overhead crane. Also the shop does not have a pit to allow the mechanics to go under the heavy equipment that is serviced at the shop. As an alternative to work under equipment, power jacks have to be used but are limited due to the lower ceiling height.
- QICO found due the limited space within the shop, the New Carrollton CTEM team lacks storage space for parts and equipment, staging areas for defective equipment is limited, administrative office is not spacious, and work bench layouts are affected and does not allow the team to have designated stations for the various pieces of equipment. CTEM's New Carrollton location is mainly responsible for support and small equipment corrective and preventative repairs.
- The shop operates one (1) shift, 6:00 AM to 2:30 PM, Monday through Friday with seven (7) mechanics.

PHOTOGRAPHS

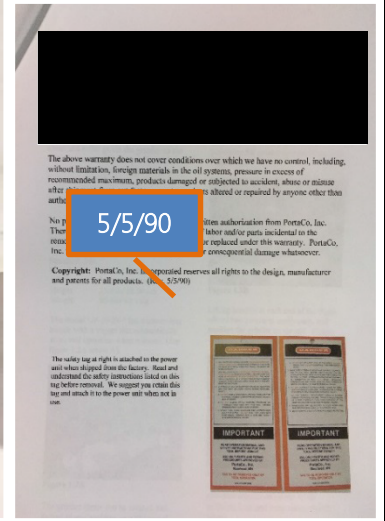
Finding & Description	Photos
<p>Photograph #1</p> <p>Reference hard copy manuals were discovered out of date.</p> <p><i>Source: QICO performing field observation on 7/7/2017 09:27 AM – New Carrollton CTEM Shop)</i></p>	
<p>Photograph #2</p> <p>Reference hard copy manuals were discovered out of date.</p> <p><i>Source: QICO performing field observation on 7/7/2017 12:20 PM – New Carrollton CTEM Shop)</i></p>	
<p>Photograph #3</p> <p>Reference hard copy manuals were discovered out of date.</p> <p><i>Source: QICO performing field observation on 7/7/2017 12:20 PM – New Carrollton CTEM Shop)</i></p>	

Finding & Description | **Photos**

Photograph #4

"PORTACO, INC Model GP-10-29-0 & GP-10-29-1 Grinder Profile" manual used as a reference for parts list. Revision level was dated 5/5/1990.

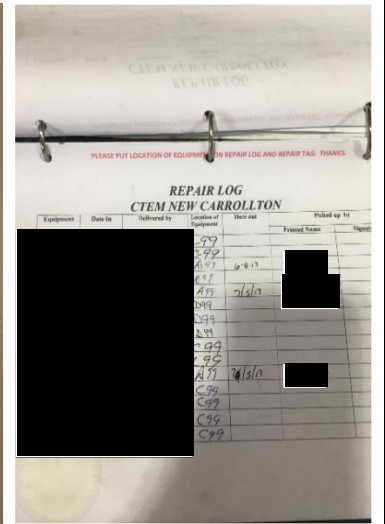
(Source: QICO performing field observation on 7/7/2017 09:39 AM – New Carrollton CTEM Shop)



Photograph #5

New Carrollton Repair Log (sign in and sign out sheet) and Repair Tag.

(Source: QICO performing field observation on 7/7/2017 11:18 AM – New Carrollton CTEM Shop)

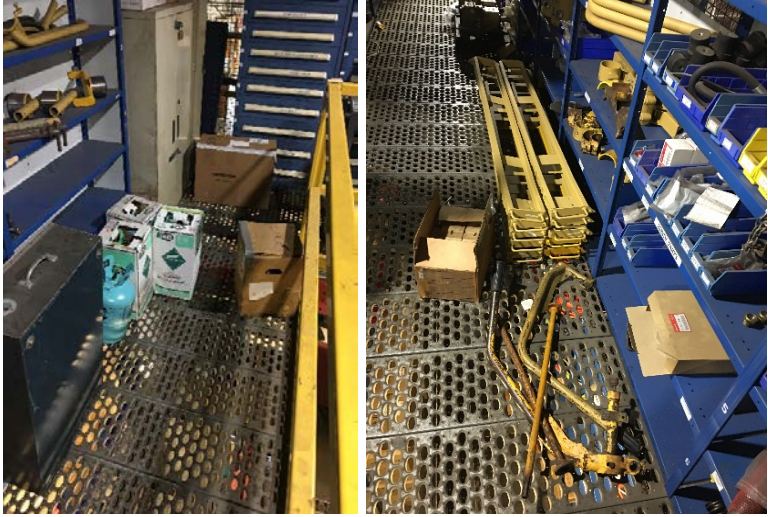




Photograph #6

Storage rack outside of welding booth and metal rack next to the sandblaster, not labeled for Load Limit.

(Source: QICO performing field observation on 7/7/2017 11:13 AM – New Carrollton CTEM Shop)



Finding & Description	Photos
<p>Photograph #7</p> <p>Various items laying on the storage room floor, obstructing walkways.</p> <p><i>(Source: QICO performing field observation on 7/7/2017 11:35 AM – New Carrollton CTEM Shop)</i></p>	
<p>Photograph #8</p> <p>Various items laying on the storage room floor, obstructing walkways.</p> <p><i>(Source: QICO performing field observation on 7/7/2017 11:38 AM – New Carrollton CTEM Shop)</i></p>	
<p>Photograph #9</p> <p>Dust on the floor surrounding the sandblaster, poses risk and creates a slipping hazard.</p> <p><i>(Source: QICO performing field observation on 7/7/2017 11:15 AM – New Carrollton CTEM Shop)</i></p>	

Finding & Description	Photos
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Photograph #10

Several burned out fluorescent tube bulbs were inappropriately stored on top of a shelf rack in the storage room.

(Source: QICO performing field observation on 7/7/2017 11:50 AM – New Carrollton CTEM Shop)



Photograph #11

Salvaged power tools to be cannibalized for parts, are being stored inside a barrel.

(Source: QICO performing field observation on 7/7/2017 11:57 AM – New Carrollton CTEM Shop)



Photograph #12

Salvaged parts or equipment stored on shelves along with new parts. Salvaged parts are not being properly cleaned and labelled for identification.

(Source: QICO performing field observation on 7/7/2017 11:36 AM – New Carrollton CTEM Shop)



Finding & Description	Photos
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Photograph #13

Salvaged parts or equipment stored on shelves along with new parts. Salvaged parts are not being properly cleaned and labelled for identification.

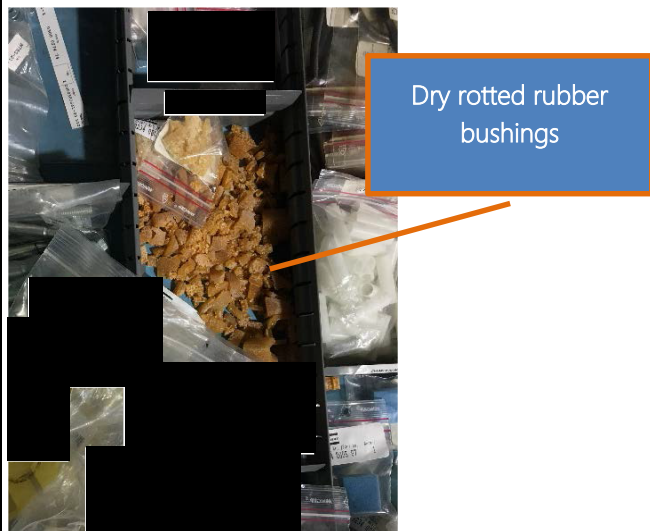
(Source: QICO performing field observation on 7/7/2017 11:38 AM – New Carrollton CTEM Shop)



Photograph #14

Rubber bushings dry rotted and reduced to crumbles. Stored along with other bushings in better condition.

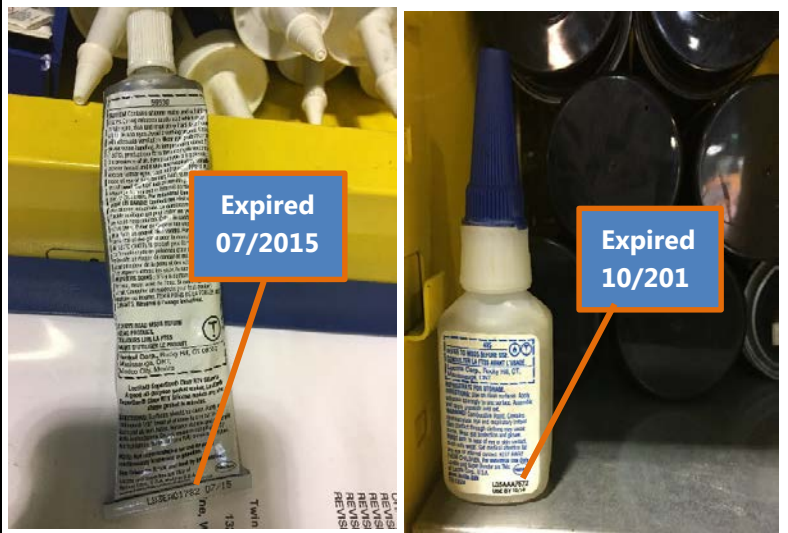
(Source: QICO performing field observation on 7/7/2017 12:04 PM – New Carrollton CTEM Shop)



Photograph #15

Expired adhesives found in storage cabinet.

(Source: QICO performing field observation on 7/7/2017 12:04 PM – New Carrollton CTEM Shop)

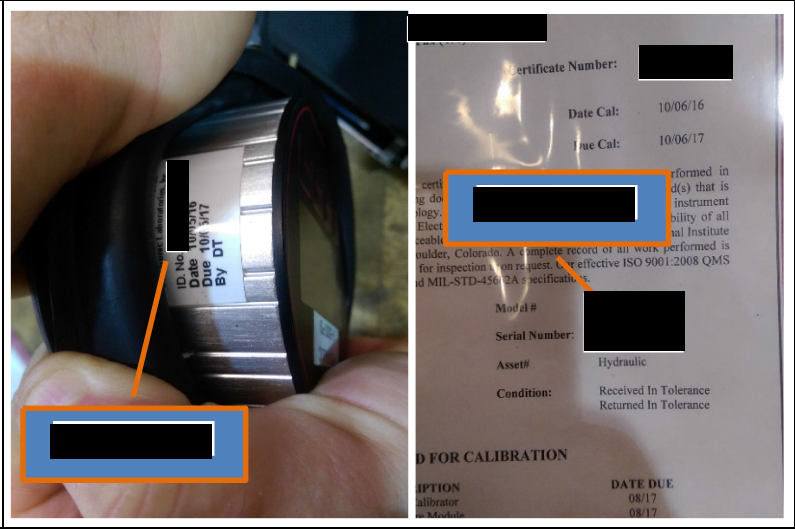


Finding & Description	Photos
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Photograph #16

Discrepancy noted between the serial number on the label on a pressure gauge and the serial number on the certificate.

(Source: QICO performing field observation on 7/7/2017 10:11 AM – New Carrollton CTEM Shop)



Photograph #17

Emergency Evacuation Plan consisting of an aerial image of the area, with a star representing the meeting area in case of evacuation.

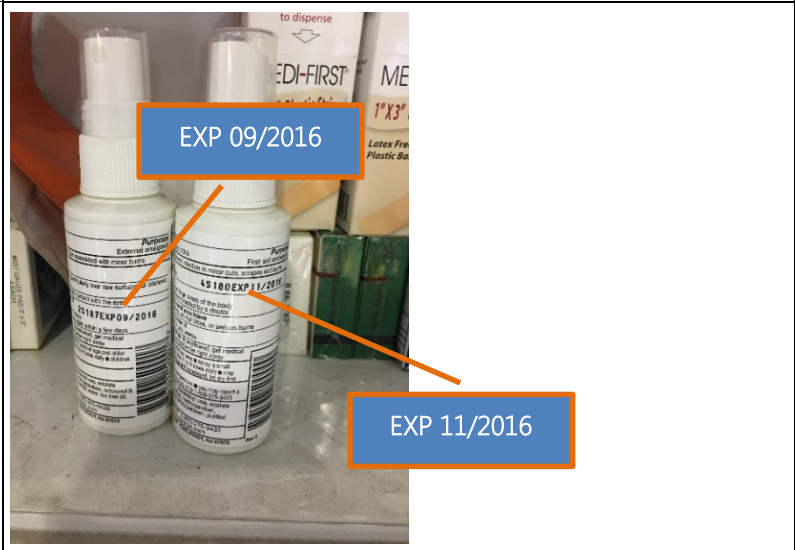
(Source: QICO performing field observation on 7/7/2017 10:44 AM – New Carrollton CTEM Shop)



Photograph #18

Expired items in the first-aid kit and missing checklist of items to stock. QICO discovered first-aid kits are not being inspected and properly maintained.

(Source: QICO performing field observation on 7/7/2017 10:41 AM – New Carrollton CTEM Shop)



Finding & Description	Photos
<p>Photograph #19</p> <p>Portable gantry and pedestal crane inspection stickers show past due dates. Last annual inspection was on "20 May 2016".</p> <p>Cranes have been removed from service by CTEM management, PLNT has been notified to have the cranes inspected.</p> <p><i>(Source: QICO performing field observation on 7/7/2017 11:58 AM – New Carrollton CTEM Shop)</i></p>	 <div data-bbox="781 638 1005 716" style="border: 1px solid orange; padding: 5px; display: inline-block;">Pedestal Crane</div> <div data-bbox="1162 653 1468 730" style="border: 1px solid orange; padding: 5px; display: inline-block;">Portable Gantry Crane</div>

APPENDIX F: ALEXANDRIA FIELD ASSESSMENT



METRO ROLLING STOCK ASSURANCE PROGRAM Audit Checklist

AUDIT SUBJECT Maintenance & Use of Rail-borne Equipment LEAD AUDITOR [REDACTED]
 AUDIT LOCATION Alexandria CTEM Facility AUDIT DATE(S) July 11, 2017

OVERVIEW	
Category	Description
QICO Audit Team	[REDACTED]
Audit Objective	- Field Assessment on the maintenance & use of rail-borne equipment.
Audit Criteria	<ul style="list-style-type: none"> - Supervisor Shop Oversight - Housekeeping: Work Zone Organization - Quality Checks / Completion Sign Off Sheets - Employee Training / Certification: Requirements - Tools & Equipment Calibration - Preventative Maintenance Plan

AUDIT INTERVIEWS			
Role/Function	Name	Location	Date
Assistant Superintendent	[REDACTED]	Greenbelt	July 11, 2017
Region Supervisor	[REDACTED]	Alexandria	July 11, 2017
Mechanic	[REDACTED]	Alexandria	July 11, 2017
Mechanic	[REDACTED]	Alexandria	July 11, 2017

INTERVIEW QUESTIONS					
No.	Evaluation Criteria	Response/Comments	Yes	No	N/A
1.	What formal & informal training have you received to perform your job duties? Interview 2 technicians on training.	<ul style="list-style-type: none"> - QICO interviewed CTEM mechanics, [REDACTED] [REDACTED]. When interviewed both mechanics reported they have received classroom instruction and on-the-job training (OJT) on heavy repair equipment usually instructed by the manufacturer as new machinery is delivered. Both technicians have come to WMATA with previous automotive experience. - After further review of employee training records provided, QICO discovered numerous areas where mechanics have not received the training courses from manufacturers on numerous pieces heavy rail 	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

INTERVIEW QUESTIONS

No.	Evaluation Criteria	Response/Comments	Yes	No	N/A
		equipment being used throughout the WMATA system.			
2.	<p>Do you have work instruction manuals to follow for different maintenance task?</p> <p>Check availability, ease of access, document control, collect date, and collect revision level.</p>	<ul style="list-style-type: none"> - Alexandria CTEM shop has hard copies of manufacturer (OEM) manuals for technicians to use. Also computers installed in "kiosk" locations with electronic copies of all manuals, manuals have been updated by LTK and WMATA - (Hard Copies reflect the same revision levels as the manuals uploaded to Documentum, final draft versions). - QICO discovered mechanics were not familiar with accessing OEM/preventative maintenance (PM) manuals at the interactive computer kiosks. 	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.	<p>Is there any specific testing required after completion of any work? If so what procedure do you use and how do you record and maintain the results?</p> <p>Verify inspection & test sheets – are they tied to any procedures or testing instructions, bench test equipment, demonstrations</p>	<ul style="list-style-type: none"> - Mechanics were able to locate and show QICO check sheets located within the equipment PM manuals. Check Sheets are to be filled out after the completion of each PM. Numbered as a step on that these check sheets is operational testing. Mechanics are to test and sign their initials after completing this step. - Once completed, check sheets are validated by the lead man and the supervisor updates the W/O status to completed in MAXIMO. The checklist and any associated paperwork is uploaded into MAXIMO for record keeping. Hard copies of check sheets are stored in office filing. 	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4.	<p>How do you verify the correct parts when making repairs?</p> <p>OEM manuals, work instruction manuals – collect dates & revision levels</p>	<ul style="list-style-type: none"> - Parts are verified by referencing manufacturer (OEM) manuals and Parts manuals. Additionally, OEM part numbers are listed adjacent WMATA part numbers on many parts shelves, for example; filters. WIX filter part # [REDACTED] is WMATA part [REDACTED]. [REDACTED] Employees are able to verify product OEM part number on the packaging to the part number on the shelf (See photograph #1). - A challenge that CTEM management faces is to ensure OEM manuals are the most current revisions. Currently there is not set plan in place to verify manuals. Management uses the manufacturers' website if the manuals are posted or try to find a contact point with the 	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

INTERVIEW QUESTIONS

No.	Evaluation Criteria	Response/Comments	Yes	No	N/A
		<p>OEM support teams. Due to some of the manufacturers being in Europe, this also poses a challenge where there are language barriers.</p> <ul style="list-style-type: none"> - Preventative Maintenance Manuals developed by LTK and WMATA have "Final Version Draft" dates on the cover page, verified to the documents uploaded to Documentum. 			
5.	<p>How do you complete modifications on equipment (mainly on class 2 equipment and including small equipment)?</p> <p>What documents are required to make the modifications and who is involved throughout the process?</p>	<ul style="list-style-type: none"> - CTEM technicians and management are heavily involved in the development of modifications prior to contacting CENV. They create a document called an Engineering Request (ER) which highlights the reason for the modification and what they deem to be the best solution. Modifications are usually specific to a single piece of equipment. - Documented Engineering Modification Instructions (EMIs) are collected and stored in a central binder. QICO discovered CTEM mechanics are not trained and do not access Documentum to verify revision levels or access documents such as EMIs. Mechanics have to seek assistance from management to retrieve documents from Documentum (See photograph #2). - QICO found that CTEM personnel are not fully onboard with the modification process due to the lack of CENV presence and responsiveness to develop the modification instruction. 	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6.	<p>What info is provided to allow for troubleshooting of equipment coming into the shop for unscheduled repairs?</p> <p>Is the history being examined before troubleshooting?</p> <p>What equipment is used during troubleshooting? (Portable test equipment, etc.)</p>	<ul style="list-style-type: none"> - CTEM Supervisor, Theron Hall reported usually they would receive a phone call from the Track and Structures (TRST) group reporting what issue they are having with the equipment in question. A Road Mechanic is then out to investigate the issue. The road mechanic's work truck is equipped with an assortment of tools and troubleshooting equipment to address common issues reported on the machinery. It was reported by the mechanics interviewed that they do not review the equipment history before going out to the location of the equipment failure. 	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

INTERVIEW QUESTIONS

No.	Evaluation Criteria	Response/Comments	Yes	No	N/A
		<ul style="list-style-type: none"> - Equipment history is not being reviewed by the mechanics, but is reviewed by the lead man or supervisor. - Un-scheduled maintenance is addressed by past experience, OEM manuals and troubleshooting guidelines provided. - Technicians have pressure gauges, multi-meters and brake system specific test equipment. CTEM also have tough laptops with equipment specific software for obtaining fault codes, and troubleshooting the equipment. 			
7.	<p>Storage room (parts) Check for cleanliness Proper identification of parts Storage infrastructure (space, racks, load limits on racks) Storage and handling of rejected/defective/damaged parts</p>	<ul style="list-style-type: none"> - The Alexandria CTEM facility has a large amount of building materials lined off along the parts storage area. Material is being used by an outside contractor working on the HVAC system performing work for Plant Maintenance (PLNT). Per interview with the CTEM Supervisor this material has been at the facility for approximately one (1) year (See photograph #3). - CTEM management maintains it inventory stock using an excel spreadsheet which is updated weekly. Region supervisor reports to Assistant Superintendent what items were used from inventory for each corrective or preventative maintenance carried out on equipment. Parts have already been issued from a financial perspective. - QICO discovered safety stock and re-order points are not utilized which imposes risk to maintain equipment on time. - Three large parts (2 hydraulic winches and a crane arm), that are stored by a wall of the premises, without identification tags. An unidentified collection of hydraulic or air cylinders was also found (See photograph #4 and #5). 	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
8.	<p>Storage of hazardous materials Fire proof cabinets Aerosol cans properly store and covered Fuels, oil and other lubricants, spent oil</p>	<ul style="list-style-type: none"> - 55 gallon drums are stored on spill collection pallets. Empty drums are cut, crushed and disposed of in a metal scrap bin on the outside of the facility (See Photograph #6). 	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

INTERVIEW QUESTIONS

No.	Evaluation Criteria	Response/Comments	Yes	No	N/A
		<ul style="list-style-type: none"> - Spent Oil and lubricants were appropriately stored in 55 Gallon drums in designated areas with spill collection bases. - Hazardous materials (aerosol cans), adhesives, fuel, small quantities (1 quart bottles) of unused oil and lubricants, were properly stored in specific designated flame resistant cabinets. 			
9.	<p>Examine work space layouts for input space and output space per bench Salvaged/defective parts are identified</p> <p>Examine Work carts: Mix of parts Salvaged/defective parts are identified</p>	<ul style="list-style-type: none"> - Work benches are not set up for input/output space. - Work bench areas and pedestal power tools (table saws, drill presses, lathes, and grinders) are not overcrowded and clean. - Welding booth with flash protection does not have a designated area. Make shift booth set up across a shop track. 	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
10.	<p>Examine storage areas for material storage conditions, shelf life of rubber items, shelf life of tapes and lubricants.</p>	<ul style="list-style-type: none"> - Shelf life of time sensitive parts (rubber items), is not verified. - QICO observed Rubber parts being stored in part drawers and not in packages with part information which does not allow CTEM to track its shelf life. 	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
11.	<p>What is your equipment or tool calibration process?</p> <p>Pull 3 asset numbers (on torque indicating devices), document and verify calibration inspection and due dates.</p>	<ul style="list-style-type: none"> - Equipment requiring calibration is assigned an asset number and are monitored using MAXIMO. Each tool or piece of equipment that require calibration receives an annual validation by an outside contractor [REDACTED]. - Calibration certificates are scanned and attached to the WO when entered into MAXIMO. Calibration certificates are not being uploaded into Documentum. - All torque wrenches had current calibration labels, and copies of calibration certificates were provided. - A single car brake test device (SCBTD) was found with a "Calibration not required" label. This test unit does require calibration as observed at other locations (See photograph #7). 	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

INTERVIEW QUESTIONS

No.	Evaluation Criteria	Response/Comments	Yes	No	N/A
12.	Do you record the work you perform? If yes, how do document the work completed?	<ul style="list-style-type: none"> Currently technicians enter their time into Maximo, with brief description of work done and items taken from the parts inventory. Lead men and supervisors take that information and verifies the work done before changing the status to complete. The completed work order (WO) will include a description of the work completed, necessary documents such as PM check sheets and/or supervisor quality checks are uploaded to MAXIMO as well. 	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13.	<p>Who performs pre/post inspections and how?</p> <p>Is it being entered into Maximo? If yes, by who?</p> <p>Do you receive copies of pre/post inspection sheets?</p>	<ul style="list-style-type: none"> Hard copies are stored in office filing. When the equipment is being used out in the field Track and Structures (TRST) Operators are responsible for performing pre/post inspections. Per Car Maintenance (CMNT) SOP 1.01 Rev 0 (7/18/2014) there is a blank "TRST rolling Stock Prior to Use Inspection" form that TRST operators should be filling out. CTEM does not receive copies of this form. 	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
14.	Inspect Fire Extinguishers: Check condition and last inspected date	<ul style="list-style-type: none"> Fire extinguishers available throughout the shop were easily accessible and had attached inspection tags showing visual checks were being completed. Emergency Evacuation Plans are displayed, but small, in an 8"x10" frame (See photograph #8). 	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15.	Employees in Adherence to PPE and PPE condition	<ul style="list-style-type: none"> CTEM mechanics observed were wearing all the required PPE for the task at hand. QICO observed a contractor working on the interior of building, operating scissor lift without an assistant escort (See photograph #9 and #10). 	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16.	Inspect First Aid Kits & Eye-Washing Station maintained	<ul style="list-style-type: none"> QICO found an eye wash station very close to an electrical panel box. The adjacent electrical panel box did not have an electric arc flash label and was not locked (See photograph #11). 	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
17.	Identification of annual rigging inspections on cranes	<ul style="list-style-type: none"> CTEM provided certification of overhead crane inspection at Alexandria CTEM Facility. Inspection of the cranes are managed by PLNT and records are maintained using MAXIMO. 	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

INTERVIEW QUESTIONS


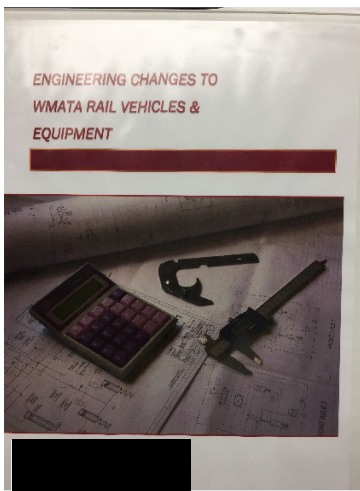

No.	Evaluation Criteria	Response/Comments	Yes	No	N/A
		- QICO discovered CTEM personnel does not have access to the main power cut off switch due it being on the inside of the caged storage area belonging to PLNT. QICO was unable to verify at the time of the audit an inspection label onsite during the field visit.			
18.	Inspect areas where fueling of equipment takes place / hazardous waste / material storage	- Fueling of heavy rail equipment does not take place at the Alexandria CTEM facility, nor is it stored.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

AUDIT NOTES

Observations

- At Alexandria CTEM Facility, due to HVAC renovations that are taking place by an outside contractor space along the tracks is being utilized to store HVAC equipment awaiting installation, These parts have been sitting for approximately 1 year.
- Alexandria CTEM facility does not have a designated welding area. A portable welding booth is set up on the west end of track that is currently being used to store truck sets.
- The shop operates two (2) shifts, 6:00 AM to 2:30 PM and 10:00 PM to 6:00 AM, Monday through Friday with fifteen (15) mechanics.

PHOTOGRAPHS

Finding & Description	Photos
<p>Photograph #1</p> <p>Example of OEM Part Numbers adjacent to WMATA Part Numbers.</p> <p><i>(Source: QICO performing field observation on 7/11/2017 Alexandria CTEM Shop)</i></p>	
<p>Photograph #2</p> <p>Modification information is collected and kept in a central Binder.</p> <p><i>(Source: QICO performing field observation on 7/11/2017 Alexandria CTEM Shop)</i></p>	
<p>Photograph #3</p> <p>HVAC material is stored alongside Plant Maintenance (PLNT) cage.</p> <p><i>(Source: QICO performing field observation on 7/11/2017 Alexandria CTEM Shop)</i></p>	

Finding & Description	Photos
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Photograph #4 and #5

Rebuilt Hydraulic cylinders some with parts labels or tags without parts tags.

Crane boom and winches without parts tags

(Source: QICO performing field observation on 7/11/2017 Alexandria CTEM Shop)



Photograph #6

55 gallon drum in the process of being cut and crushed for disposal.

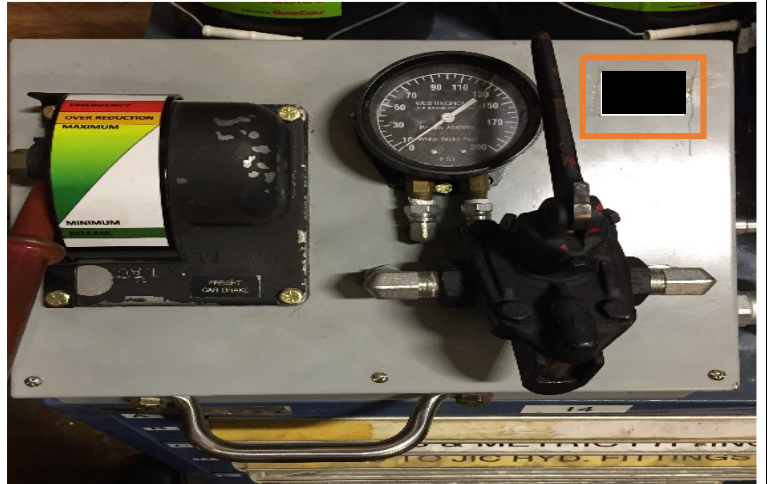
(Source: QICO performing field observation on 7/11/2017 Alexandria CTEM Shop)

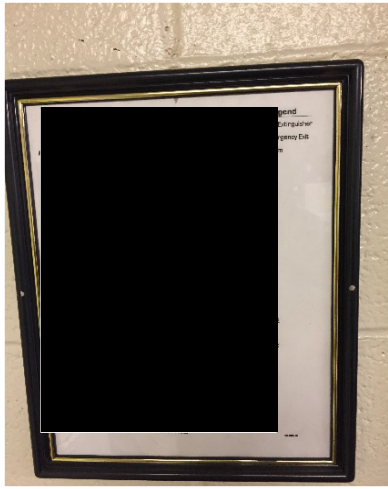
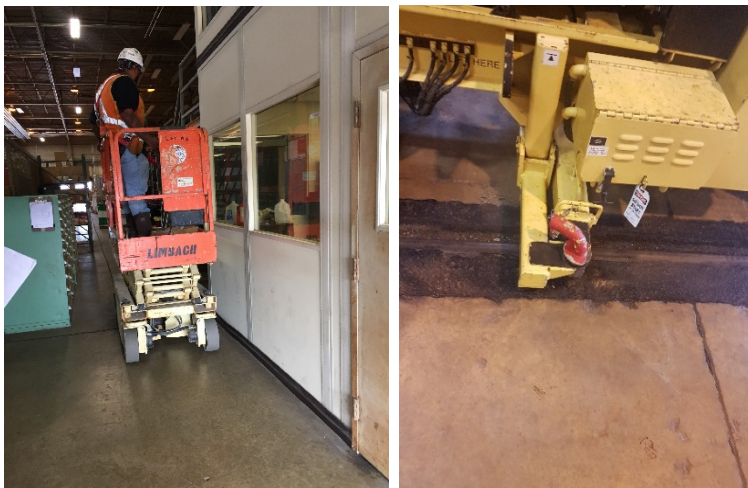



Photograph #7

Single Car Brake Test Device (SCBTD) (In-house built) unit requires calibration. Unit had a sticker "CALIBRATION NOT REQUIRED"

(Source: QICO performing field observation on 7/11/2017 Alexandria CTEM Shop)



Finding & Description	Photos
<p>Photograph # 8</p> <p>Fire Control Systems and Emergency Exit Location Map</p> <p><i>(Source: QICO performing field observation on 7/11/2017 Alexandria CTEM Shop)</i></p>	
<p>Photograph #9 and #10</p> <p>Contractor is operating a scissor lift without a WMATA escort.</p> <p>Heavy equipment that is tagged out but not locked.</p> <p><i>(Source: QICO performing field observation on 7/11/2017 Alexandria CTEM Shop)</i></p>	
<p>Photograph #11</p> <p>Eye wash station in a partially blocked location and mounted very close to building electrical panels.</p> <p><i>(Source: QICO performing field observation on 7/11/2017 Alexandria CTEM Shop)</i></p>	

APPENDIX G: BRANCH AVENUE FIELD ASSESSMENT



METRO ROLLING STOCK ASSURANCE PROGRAM Audit Checklist

AUDIT SUBJECT Maintenance & Use of Rail-borne Equipment LEAD AUDITOR Rajui Audain
 AUDIT LOCATION Branch Ave CTEM Facility AUDIT DATE(S) July 12, 2017

OVERVIEW	
Category	Description
QICO Audit Team	[REDACTED]
Audit Objective	- Field Assessment on the maintenance & use of rail-borne equipment.
Audit Criteria	- Supervisor Shop Oversight - Housekeeping: Work Zone Organization - Quality Checks / Completion Sign Off Sheets - Employee Training / Certification: Requirements - Tools & Equipment Calibration - Preventative Maintenance Plan

AUDIT INTERVIEWS			
Role/Function	Name	Location	Date
Assistant Superintendent	[REDACTED]	Greenbelt	July 12, 2017
Region Supervisor	[REDACTED]	Branch Ave	July 12, 2017
Mechanic	[REDACTED]	Branch Ave	July 12, 2017
Mechanic	[REDACTED]	Branch Ave	July 12, 2017
Mechanic	[REDACTED]	Branch Ave	July 12, 2017

INTERVIEW QUESTIONS					
No.	Evaluation Criteria	Response/Comments	Yes	No	N/A
1.	What formal & informal training have you received to perform your job duties? Interview 2 technicians on training.	<ul style="list-style-type: none"> - During the audit, QICO interviewed CTEM technicians, [REDACTED] [REDACTED] Mechanics reported that they have not received any formal training, just on-the-job training (OJT). - QICO discovered OJT is not being properly documented for record keeping. - They had previous experience in job fields related to the job they perform at CTEM. Their background include working on hydraulic heavy equipment, automotive technician and working with metal 	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

INTERVIEW QUESTIONS

No.	Evaluation Criteria	Response/Comments	Yes	No	N/A
		fabrication.			
		<ul style="list-style-type: none"> Both technicians does not have an official OJT instructor title or receive any instructor training, but they do train newer employees. 			
2.	<p>Do you have work instruction manuals to follow for different maintenance task?</p> <p>Check availability, ease of access, document control, collect date, and collect revision level.</p>	<ul style="list-style-type: none"> CTEM shop has hard copy OEM manuals available for technician consultation. However, QICO discovered CTEM is rebuilding various components/parts of equipment such as starter motors, hydraulic cylinders, stabilizer cylinders, spike hammers, spike kickers and more, without OEM or CENV overhaul manuals. Most of the rebuilt components are not serialized and are not tracked into MAXIMO. (See photograph #5). QICO inspected: GC-GEISMAR 360 Manual, Version Final Draft 9/8/2015; NTS NORDCO TIE SHEAR Manual, Version Final Draft 3/2/2015; TR NORDCO TRIPP MACHINE Manual, Version Final Draft 2/25/2015; Plasser Prime Mover PMC-50 Manual, Version Final Draft 5/19/2016; CORE DRILLING EQUIPMENT FLATCAR Manual, Version Final Draft 5/5/2015 (See photograph #1, #2, & #3). QICO also observed obsolete manuals marked "OLD - Do Not Use – For Ref Only", kept on a separate shelf (See photograph #4). Branch Ave CTEM Shop is set up with two (2) computer work stations and two (2) employee interactive kiosks. At the time of the audit, technicians were unable to demonstrate the process of accessing documents on the kiosk due to a network issue with the terminals. 	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.	<p>Is there any specific testing required after completion of any work? If so what procedure do you use and how do you record and maintain the results?</p> <p>Verify inspection & test sheets – are they tied to any procedures or testing instructions, bench test equipment, demonstrations</p>	<ul style="list-style-type: none"> Mechanics were able to locate and show QICO check sheets located within the heavy equipment preventative maintenance (PM) manuals. Check Sheets are to be filled out after the completion of each PM. Numbered as a step on that these check sheets is operational testing. Mechanics are to test and sign their initials after completing this step (See photograph #6). 	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

INTERVIEW QUESTIONS

No.	Evaluation Criteria	Response/Comments	Yes	No	N/A
		<ul style="list-style-type: none"> - There are no check sheets for corrective / unscheduled repairs and no supervisor quality inspections are being done. - Once completed, check sheets are validated by the leadman and the supervisor updates the W/O status to completed in MAXIMO. The checklist and any associated paperwork is uploaded into MAXIMO for record keeping. Hard copies of check sheets are stored in office filing. - For components / parts being overhauled such as starter motors, there are no check sheets and no quality inspections being done on these work tasks. No check sheets, no record keeping, no procedures are available. 			
4.	<p>How do you verify the correct parts when making repairs?</p> <p>OEM manuals, work instruction manuals – collect dates & revision levels</p>	<ul style="list-style-type: none"> - Mechanics use manufacturer (OEM) manuals to verify procedure and parts. - The mechanic rebuilding starter motors uses a non-approved WMATA manual (WAI Alternator Parts Book – 2007 Edition), to verify and order parts (See photograph #7). - A challenge that CTEM management faces is to ensure OEM manuals are the most current revisions. Currently there is not set plan in place to verify manuals. Management uses the manufacturers’ website if the manuals are posted or try to find a contact point with the OEM support teams. Due to some of the manufacturers being in Europe, this also poses a challenge where there are language barriers. 	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5.	<p>How do you complete modifications on equipment (mainly on class 2 equipment and including small equipment)?</p> <p>What documents are required to make the modifications and who is involved throughout the process?</p>	<ul style="list-style-type: none"> - Mechanics report their problem with the machinery to CTEM management, CTEM develops a solution or modification. CTEM management consults with Vehicle Engineering (CENV) to develop an Engineering Request (ER). - Mechanics receive modification instructions in the form of an Engineering test procedure (ETP) or Engineering Modification Instruction (EMI). 	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

INTERVIEW QUESTIONS

No.	Evaluation Criteria	Response/Comments	Yes	No	N/A
		<ul style="list-style-type: none"> - Modification process involves CTEM management and Vehicle Engineering (CENV). - QICO discovered modifications completed to heavy rail equipment without following the appropriate practice due to limited support from CENV (See photograph #8). 			
6.	<p>What info is provided to allow for troubleshooting of equipment coming into the shop for unscheduled repairs?</p> <p>Is the history being examined before troubleshooting?</p> <p>What equipment is used during troubleshooting? (Portable test equipment, etc.)</p>	<ul style="list-style-type: none"> - A description of the failure is provided by Track and Structures (TRST) group via telephone report of the issues, when the equipment is dropped off at the CTEM facility or it is submitted via E-mail or FAX. - A CTEM mechanic usually has to inspect the equipment to verify the report from TRST and what the actual deficiency or issue is. - CTEM mechanics are not reviewing equipment history before dispatching out to the location of the where the failure is reported. - It was reported by CTEM management that the Supervisor reviews the equipment history and possible open WOs, once the unit is brought into the shop for repair. - A status report is created and sent out daily by the Asst. Superintendent. - Road mechanics utilize various common tools and testing equipment which is stored in the work truck for on-site troubleshooting. - CTEM is also equipped with a well-stocked utility trailer with tools and materials for common line of road repairs, and a portable WABTEC electronic automated single car test device (calibration expired) (See photograph #9). 	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7.	<p>Storage room (parts) Check for cleanliness Proper identification of parts Storage infrastructure (space, racks, load limits on racks)</p>	<ul style="list-style-type: none"> - CTEM management maintains it inventory stock using an excel spreadsheet which is updated weekly. Region supervisor reports to Assistant Superintendent what items were used from inventory for each corrective or preventative maintenance carried out on 	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

INTERVIEW QUESTIONS

No.	Evaluation Criteria	Response/Comments	Yes	No	N/A
	Storage and handling of rejected/defective/damaged parts	<p>equipment. Parts have already been issued from a financial perspective.</p> <ul style="list-style-type: none"> - QICO discovered safety stock and re-order points are not utilized which imposes risk to maintain equipment on time. - Parts are properly identified on shelves or bins. - Shelves are clearly labeled for load limits. - QICO observed various items laying on the storage room floor, obstructing walkways (See photograph #10). - QICO observed the sandblaster main shut off switch was obstructed (See photograph #11). - Damaged parts on equipment in for repair are placed in scrap metal bin. 			
8.	Storage of hazardous materials Fire proof cabinets Aerosol cans properly store and covered Fuels, oil and other lubricants, spent oil	<ul style="list-style-type: none"> - Hazardous materials were properly stored in designated flame resistant cabinets. - Fuel was stored in a locked, flame resistant cabinet outside of the shop. - Oil and lubricant were appropriately stored in designated areas. - Spent oil and lubricant were appropriately stored in a specific hazmat container. - Prior to the audit, CTEM received a box of expired Spray Lube from stock (expiration date: 02/2017). See photograph #12. 	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9.	Examine work space layouts for input space and output space per bench Salvaged/defective parts are identified Examine Work carts: Mix of parts Salvaged/defective parts are identified	<ul style="list-style-type: none"> - Work benches are not set up for input/output space. - Many salvaged/defective parts are rebuilt as they come in the shop, without OEM or CENV overhaul manuals. - No checklist is filled out as the work is completed, and rebuilt parts do not have asset numbers to allow tracking repairs and work done in MAXIMO. 	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

INTERVIEW QUESTIONS

No.	Evaluation Criteria	Response/Comments	Yes	No	N/A
		<ul style="list-style-type: none"> - Defective items waiting to be repaired are identified are tagged with a red card containing description of defect or status. - Mechanic toolboxes were discovered in much disorganized condition. 			
10.	Examine storage areas for material storage conditions, shelf life of rubber items, shelf life of tapes and lubricants.	<ul style="list-style-type: none"> - Shelf life of time sensitive parts (rubber items), is not verified. 	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
11.	<p>What is your equipment or tool calibration process?</p> <p>Pull 3 asset numbers (on torque indicating devices), document and verify calibration inspection and due dates.</p>	<ul style="list-style-type: none"> - Calibration certificates are scanned and attached to the WO when entered into MAXIMO. Hard copies are stored in office filing. - QICO verified the calibration and due date on a mechanical torque wrench, a digital torque wrench, a digital caliper, a pressure gauge, a single car test device and two Motorola radios. - A discrepancy was observed between the ID number on the single car test device [REDACTED] and the ID number on the invoice [REDACTED]. See photograph #13. 	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12.	Do you record the work you perform? If yes, how do document the work completed?	<ul style="list-style-type: none"> - With the exception of rebuilt items, mechanics fill out any necessary check sheet required by the repair/PM manual and submit the completed check sheet to the lead man or supervisor for validation. - The WO is then updated into MAXIMO. Hard copies are stored in office filing. - Mechanics utilize the kiosks to keep track of their own time. 	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13.	<p>Who performs pre/post inspections and how?</p> <p>Is it being entered into Maximo? If yes, by who?</p> <p>Do you receive copies of pre/post inspection sheets?</p>	<ul style="list-style-type: none"> - When the equipment is being used out in the field Track and Structures (TRST) Operators are responsible for performing pre/post inspections. Per Car Maintenance (CMNT) SOP 1.01 Rev 0 (7/18/2014) there is a blank "TRST rolling Stock Prior to Use Inspection" form that TRST operators should be filling out. CTEM does not receive copies of this form. 	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
14.	Inspect Fire Extinguishers: Check condition and last inspected date	<ul style="list-style-type: none"> - The shop is equipped with five fire extinguishers mounted on walls throughout the shop, and six fire extinguishers on 	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

INTERVIEW QUESTIONS

No.	Evaluation Criteria	Response/Comments	Yes	No	N/A
		<p>moveable welding carts. All fire extinguishers had attached inspection tags showing visual checks were being completed. One fire extinguisher was partially obstructed (See photograph #14).</p> <p>- Emergency Evacuation Plan was on display in the shop.</p>			
15.	Employees in Adherence to PPE and PPE condition	- Mechanics were observed wearing appropriate PPE for the work being performed.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16.	Inspect First Aid Kits & Eye-Washing Station maintained	<p>- First-aid kit on shop floor was brand new.</p> <p>- Eye washing stations were in good condition (ready to use) and easily accessible.</p>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17.	Identification of annual rigging inspections on cranes	- Annual rigging inspections on overhead crane, was in compliance.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18.	Inspect areas where fueling of equipment takes place / hazardous waste / material storage	- Cans and containers of fuel were stored and locked away in a fire proof cabinet, outside of the shop.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

AUDIT NOTES

Observations

- At Branch Ave CTEM Facility, QICO observed numerous electrical generators being stored on the shop floor utilizing a large area of space. CTEM management has no storage area to hold these units. The generators are for the prime movers and in good working status.
- QICO also observed a water line coming out of the steam cleaner with water running out which has been reported to PLNT.
- The shop operates one (1) shift, 6:00 AM to 2:30 PM, Monday through Friday with eight (8) mechanics.

PHOTOGRAPHS

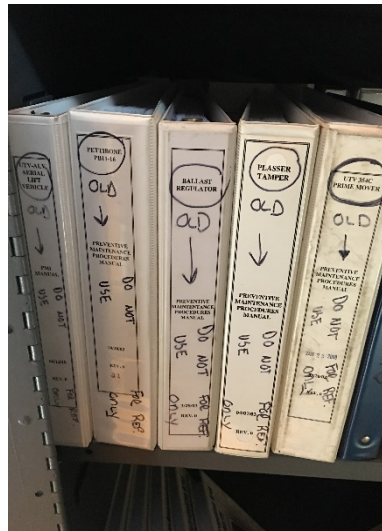
Finding & Description	Photos
<p>Photograph #1</p> <p>Examples of hard copy manuals and release date.</p> <p><i>(Source: QICO performing field observation on 7/12/2017 09:47 AM – Branch Ave CTEM Shop)</i></p>	
<p>Photograph #2</p> <p>Examples of hard copy manuals and release date.</p> <p><i>(Source: QICO performing field observation on 7/12/2017 09:54 AM – Branch Ave CTEM Shop)</i></p>	
<p>Photograph #3</p> <p>Examples of hard copy manuals and release date.</p> <p><i>(Source: QICO performing field observation on 7/12/2017 09:55 AM – Branch Ave CTEM Shop)</i></p>	

Finding & Description	Photos
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Photograph #4

Obsolete manuals marked "OLD - Do Not Use – For Ref Only".

(Source: QICO performing field observation on 7/12/2017 09:55 AM – Branch Ave CTEM Shop)



Photograph #5

Example of items rebuilt by CTEM mechanics.

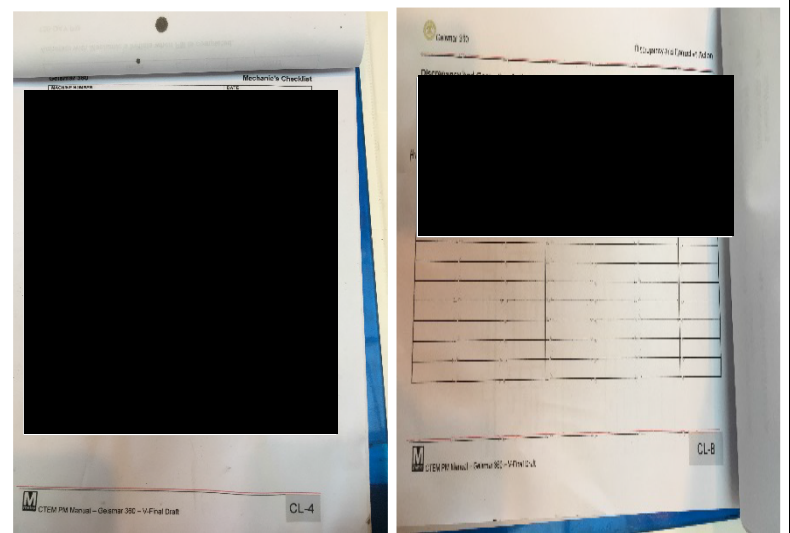
(Source: QICO performing field observation on 7/12/2017 11:02 AM – Branch Ave CTEM Shop)



Photograph #6

Checklist & a Discrepancy and Corrective Action Form.

(Source: QICO performing field observation on 7/12/2017 09:51 AM – Branch Ave CTEM Shop)

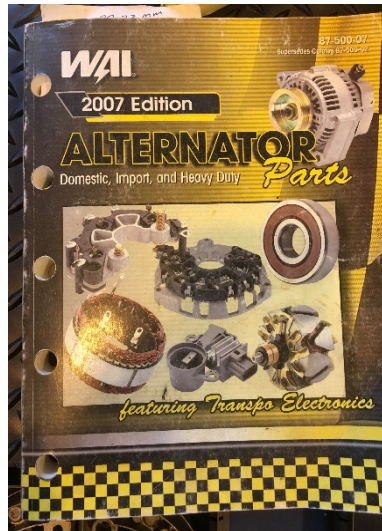


Finding & Description	Photos
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Photograph #7

WAI Alternator Parts Book – 2007 Edition.

(Source: QICO performing field observation on 7/12/2017 12:00 PM – Branch Ave CTEM Shop)



Photograph #8

Example of modification applied to a flatbed car without an approved CENV Engineering Modification Instruction (EMI).

(Source: QICO performing field observation on 7/12/2017 11:16 AM – Branch Ave CTEM Shop)



Photograph #9

Calibration expired on WABTEC electronic, automated single car test device (SCTD).

(Source: QICO performing field observation on 7/12/2017 09:34 AM – Branch Ave CTEM Shop)



Finding & Description	Photos
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Photograph #10

Various items laying on the tool storage room floor, obstructing walkways.

(Source: QICO performing field observation on 7/12/2017 12:03 PM – Branch Ave CTEM Shop)



Photograph #11

Obstructed sandblaster main shut off switch.

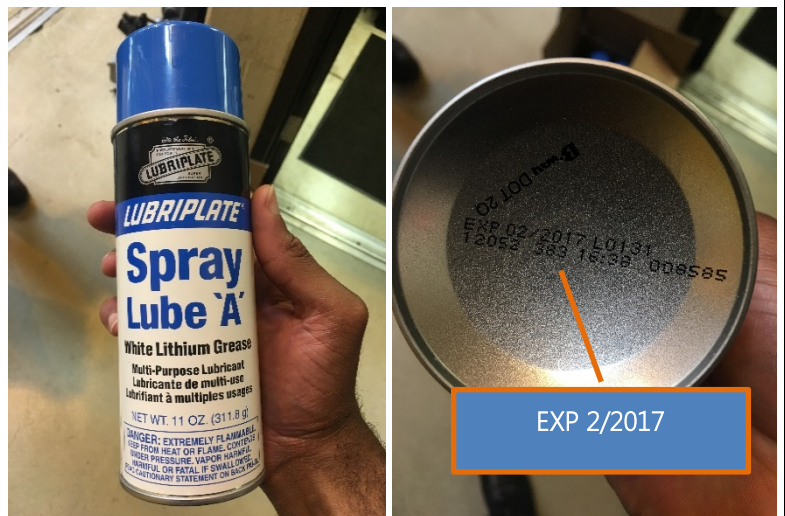
(Source: QICO performing field observation on 7/12/2017 10:29 AM – Branch Ave CTEM Shop)



Photograph #12

Expired Spray Lube received from in-house WMATA store room.

(Source: QICO performing field observation on 7/12/2017 11:30 AM – Branch Ave CTEM Shop)

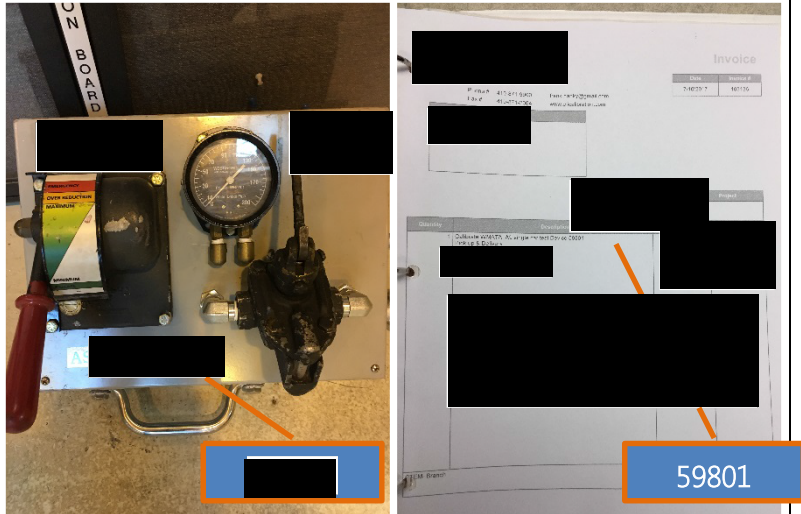


Finding & Description	Photos
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Photograph #13

Discrepancy between the ID number on the single car test device and the ID number on the invoice.

(Source: QICO performing field observation on 7/12/2017 09:36 AM – Branch Ave CTEM Shop)



Photograph #14

Fire extinguisher partially obstructed.

(Source: QICO performing field observation on 7/12/2017 10:29 AM – Branch Ave CTEM Shop)



APPENDIX H: GREENBELT FIELD ASSESSMENT



METRO ROLLING STOCK ASSURANCE PROGRAM Audit Checklist

AUDIT SUBJECT Maintenance & Use of Rail-borne Equipment LEAD AUDITOR [REDACTED]
 AUDIT LOCATION Greenbelt CTEM Facility AUDIT DATE(S) July 12, 2017

OVERVIEW	
Category	Description
QICO Audit Team	[REDACTED]
Audit Objective	- Field Assessment on the maintenance & use of rail-borne equipment.
Audit Criteria	- Supervisor Shop Oversight - Housekeeping: Work Zone Organization - Quality Checks / Completion Sign Off Sheets - Employee Training / Certification: Requirements - Tools & Equipment Calibration - Preventative Maintenance Plan

AUDIT INTERVIEWS			
Role/Function	Name	Location	Date
Assistant Superintendent	[REDACTED]	Greenbelt	July 12, 2017
Mechanic Leadman	[REDACTED]	Greenbelt	July 12, 2017
Mechanic	[REDACTED]	Greenbelt	July 12, 2017

INTERVIEW QUESTIONS					
No.	Evaluation Criteria	Response/Comments	Yes	No	N/A
1.	What formal & informal training have you received to perform your job duties? Interview 2 technicians on training.	<ul style="list-style-type: none"> - QICO interviewed two mechanics at Greenbelt CTEM, [REDACTED] [REDACTED]. Both have received training on various pieces of equipment by the manufacturer. Usually training courses from the manufacturer are only offered when the new equipment is delivered and is not repeated for new hires. - QICO found OJT is not being properly documented in all cases. CTEM management has no guidelines for OJT training and no assigned OJT instructors, senior technicians accompany junior mechanics during jobs as means of knowledge transfer. 	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

INTERVIEW QUESTIONS

No.	Evaluation Criteria	Response/Comments	Yes	No	N/A
		<ul style="list-style-type: none"> - QICO found that some mechanics have received the necessary or some of the technical training, while others have not received any WMATA instructor lead courses. [REDACTED] has received 5 weeks of general technical training given by WMATA, [REDACTED] has not. 			
2.	<p>Do you have work instruction manuals to follow for different maintenance task?</p> <p>Check availability, ease of access, document control, collect date, and collect revision level.</p>	<ul style="list-style-type: none"> - Hard copies of manufacturer (OEM) and preventive maintenance (PM) manuals are available for mechanics. - Mechanics interviewed were able to demonstrate to QICO auditors how they reference the manuals, how to locate check sheets at the back of the PM manuals, and how to use the kiosk to verify the reference level of the documents. - OEM and PM manuals are also available on computers stationed at the shop kiosk locations. While the leadmen and supervisors are proficient accessing electronic copies of manuals from a shared drive and Documentum. QICO found some technicians are not familiar retrieving work manuals, does not have access to Documentum and/or have not received training on how to use the software for accessing these documents. 	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.	<p>Is there any specific testing required after completion of any work? If so what procedure do you use and how do you record and maintain the results?</p> <p>Verify inspection & test sheets – are they tied to any procedures or testing instructions, bench test equipment, demonstrations</p>	<ul style="list-style-type: none"> - Check sheets are available for planned maintenance (PM) procedures that document requirements and signatures. Check sheets are not available for un-scheduled maintenance. One of the steps in the check sheets is operational testing. Mechanics are to test and sign their initials after completing this step. Once completed, check sheets are validated by the leadman and the supervisor updates the W/O status to completed in MAXIMO. The checklist and any associated paperwork is uploaded into MAXIMO for record keeping. Hard copies of check sheets are stored in office filing. - Quality check sheets are available for supervisors to perform Quality follow up 	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

INTERVIEW QUESTIONS

No.	Evaluation Criteria	Response/Comments	Yes	No	N/A
		inspections. These inspections are done randomly, monthly intervals. Two (2) Quality inspections per supervisor. Quality check sheets are uploaded to MAXIMO attached to the associated work order (WO) number.			
4.	How do you verify the correct parts when making repairs? OEM manuals, work instruction manuals – collect dates & revision levels	<ul style="list-style-type: none"> – Parts are verified by referencing OEM and Parts manuals. Additionally, OEM part numbers are listed adjacent to WMATA part numbers on many parts shelves. – Parts are well labeled and identified. 	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5.	How do you complete modifications on equipment (mainly on class 2 equipment and including small equipment)? What documents are required to make the modifications and who is involved throughout the process?	<ul style="list-style-type: none"> – The modification process is not clearly defined. CTEM technicians and management are heavily involved in the development of modifications prior to involving CENV in the process. QICO found modifications are specific to a single piece of equipment. – Mechanics report their problem with the machinery to CTEM management, CTEM develops a solution or modification. CTEM management consults with Vehicle Engineering (CENV) to develop an Engineering Request (ER). – Mechanics receive modification instructions in the form of an engineering test procedure (ETP) or Engineering Modification Instruction (EMI). – Modification process involves CTEM management and Vehicle Engineering (CENV). – Modification, those related to an EMI and unapproved modifications, are written on the back of PM work orders, and are entered in to MAXIMO by the leadman or supervisor. 	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6.	What info is provided to allow for troubleshooting of equipment coming into the shop for unscheduled repairs? Is the history being examined before troubleshooting? What equipment is used during troubleshooting? (Portable test equipment, etc.)	<ul style="list-style-type: none"> – A description of the failure is provided by Track and Structures (TRST) group via telephone report of the issues, when the equipment is dropped off at the CTEM facility or it is submitted via E-mail or FAX. – A CTEM mechanic usually has to inspect the equipment to verify the report from TRST and what the actual deficiency or issue is. 	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

INTERVIEW QUESTIONS

No.	Evaluation Criteria	Response/Comments	Yes	No	N/A
		<ul style="list-style-type: none"> - CTEM mechanics are not reviewing equipment history before dispatching out to the location of the where the failure is reported. - Un-scheduled maintenance is addressed by mechanic's experience working on the equipment and troubleshooting guidelines provided by the OEM manuals. - Equipment history is not reviewed by the technician, but is reviewed by the leadman or supervisor once the equipment is brought into the shop. - Technicians have pressure gauges, multi-meters and brake system specific test equipment. CTEM also have laptops with equipment specific software for obtaining fault codes. 			
7.	<p>Storage room (parts) Check for cleanliness Proper identification of parts Storage infrastructure (space, racks, load limits on racks) Storage and handling of rejected/defective/damaged parts</p>	<ul style="list-style-type: none"> - Un-tagged parts on top of cabinets were noted. CTEM manages their own store rooms, so storage rooms are uncontrolled. Parts have already been issued from a financial perspective and the inventory count is maintained. However, minimum stock and re-order points are not utilized. - Filters and other parts were observed stored on top of tool cabinets. An un-identified electrical component board was also found (See photograph #1 and #2). 	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
8.	<p>Storage of hazardous materials Fire proof cabinets Aerosol cans properly store and covered Fuels, oil and other lubricants, spent oil</p>	<ul style="list-style-type: none"> - Hazardous materials are stored in flame resistant cabinets. However, QICO discovered chemicals stored in improperly labeled fluid bottles and stored in a regular cabinet. - Two of the improperly stored fluids were marked "R134R oil" used with refrigerant, and one was marked A/C dye, a leak detector fluid used in HVAC systems (See photographs #3 and #4). 	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9.	<p>Examine work space layouts for input space and output space per bench Salvaged/defective parts are identified</p> <p>Examine Work carts: Mix of parts</p>	<ul style="list-style-type: none"> - The welding area at this location has a lot of clutter, this area is shared with the Track & Structures (TRST) department. - Salvaged parts were observed throughout the shop. Parts did have identification tags. 	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

INTERVIEW QUESTIONS

No.	Evaluation Criteria	Response/Comments	Yes	No	N/A
	Salvaged/defective parts are identified	(See photographs #5 and #6)			
10.	Examine storage areas for material storage conditions, shelf life of rubber items, shelf life of tapes and lubricants.	<ul style="list-style-type: none"> - Rubber O-rings were found in parts organizers not in seal packages. Shelf life is not monitored. - Shelf life of time sensitive parts (rubber items), is not verified. 	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
11.	<p>What is your equipment or tool calibration process?</p> <p>Pull 3 asset numbers (on torque indicating devices), document and verify calibration inspection and due dates.</p>	<ul style="list-style-type: none"> - Equipment requiring calibration is assigned an asset number and sent for calibration at regular intervals. - All torque wrenches had current calibration labels, and copies of calibration certificates were provided. - A Single Car Brake Test Unit was found with a "CALIBRATION NOT REQUIRED" label next to an identical test unit that had a calibration label. A drawer with un-labeled pressure gauges was also found, along with an un-labeled tachometer and electronic tester (See photograph #7, #8, #9 and #10). 	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12.	Do you record the work you perform? If yes, how do document the work completed?	<ul style="list-style-type: none"> - Currently technicians enter their time in Maximo, with brief description of work done. Leadmen and supervisors take that information and enter a more comprehensive description of the work performed, parts used, and upload any associated documents before changing the status to complete. 	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13.	<p>Who performs pre/post inspections and how?</p> <p>Is it being entered into Maximo? If yes, by who?</p> <p>Do you receive copies of pre/post inspection sheets?</p>	<ul style="list-style-type: none"> - When the equipment is being used out in the field Track and Structures (TRST) Operators are responsible for performing pre/post inspections. Per Car Maintenance (CMNT) SOP 1.01 Rev 0 (7/18/2014) there is a blank "TRST rolling Stock Prior to Use Inspection" form that TRST operators should be filling out. CTEM does not receive copies of this form. 	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
14.	Inspect Fire Extinguishers: Check condition and last inspected date	<ul style="list-style-type: none"> - QICO found a fire extinguisher with an inspection tag that was 1 month out of compliance in the welding room (See photograph #11). Building fire extinguishers throughout the shop were in compliance. - Emergency Evacuation Plan was on display in the shop. 	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

INTERVIEW QUESTIONS

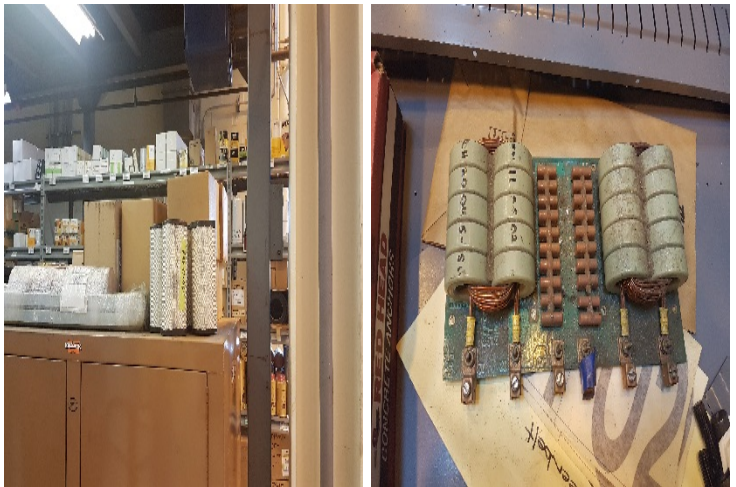


No.	Evaluation Criteria	Response/Comments	Yes	No	N/A
15.	Employees in Adherence to PPE and PPE condition	- Technicians were observed with proper PPE. Greenbelt shop Lockout/tag out procedures are not uniform (See photograph #12).	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
16.	Inspect First Aid Kits & Eye-Washing Station maintained	- The eye wash station is blocked in the welding room (See photograph #13).	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
17.	Identification of annual rigging inspections on cranes	- CTEM provided certification of overhead crane inspection at Greenbelt.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18.	Inspect areas where fueling of equipment takes place / hazardous waste / material storage	- Fueling of equipment does not take place at the shop nor is the storage of fuel being at the facility.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

AUDIT NOTES

Observations

- CTEM's Greenbelt location is mainly responsible for the corrective and preventative maintenance of heavy rail equipment. The shop has one (1) overhead heavy lifting crane and 2 tracks with a pit.
- QICO found due the limited space within the shop the Greenbelt CTEM team lacks storage for parts, staging areas for defective equipment is limited and there are no work benches.
- QICO found at Greenbelt CTEM Facility the Lockout/tag out procedures is not uniform.
- The shop operates two (2) shifts, 6:00 AM to 2:30 PM and 10:00 PM to 6:00 AM, Monday through Friday with seventeen (17) mechanics.

PHOTOGRAPHS

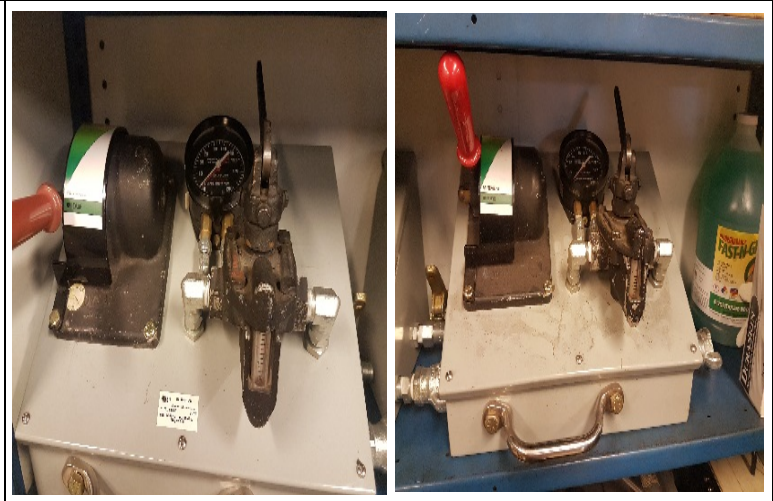
Finding & Description	Photos
<p>Photograph #1 and #2</p> <p><i>Un-wrapped filters kept on top of tool cabinet.</i> <i>Un-identified electrical component board found in a drawer.</i></p> <p><i>(Source: QICO performing field observation on 7/12/2017 – Greenbelt CTEM Shop)</i></p>	
<p>Photograph #3 and #4</p> <p><i>Un-identified and improperly labelled fluid found in non-flame resistant cabinet.</i></p> <p><i>(Source: QICO performing field observation on 7/12/2017 – Greenbelt CTEM Shop)</i></p>	
<p>Photograph #5 and #6</p> <p><i>Welding area has clutter, first aid kit (white box on wall) and the eye wash are obstructed.</i></p> <p><i>Salvaged part has an identification/status tag.</i></p> <p><i>(Source: QICO performing field observation on 7/12/2017 – Greenbelt CTEM Shop)</i></p>	

Finding & Description	Photos
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Photograph #7 and #8

Identical test units, one with a calibration label, one without.

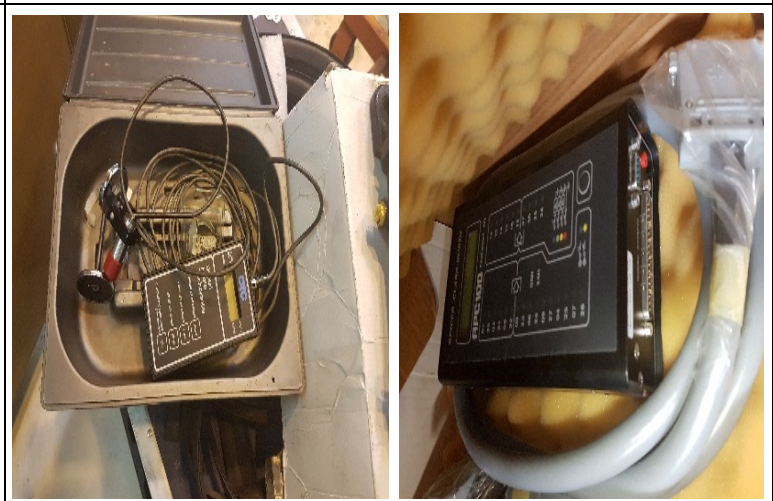
(Source: QICO performing field observation on 7/12/2017 – Greenbelt CTEM Shop)



Photograph #9 and 10

Photo optic tachometer and test bow without any calibration label (“calibration label and date”; “calibration not required” or “self-test before use”).

(Source: QICO performing field observation on 7/12/2017 – Greenbelt CTEM Shop)

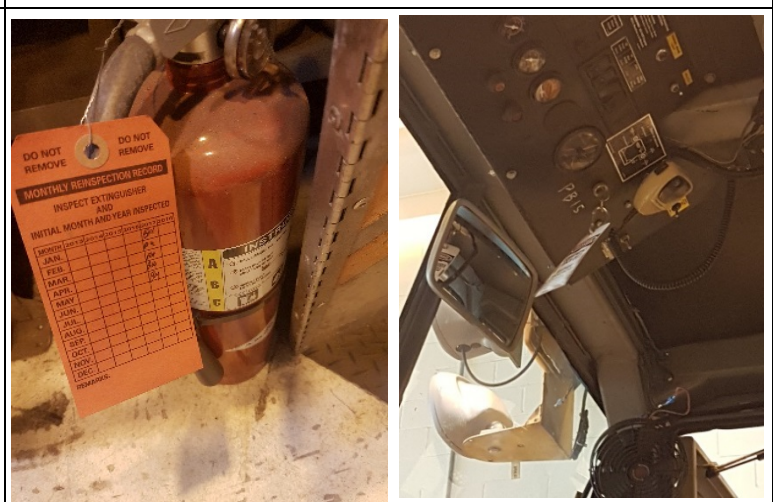


Photograph #11 and 12

Fire extinguisher is one month out of compliance.

Vehicles undergoing maintenance have start key tagged but not locked.

(Source: QICO performing field observation on 7/12/2017 – Greenbelt CTEM Shop)



Finding & Description	Photos
<p>Photograph #13</p> <p>Eye washing station is not accessible, blocked by welding equipment.</p> <p><i>(Source: QICO performing field observation on 7/12/2017 – Greenbelt CTEM Shop)</i></p>	 <p>Non-accessible eye washing station.</p>