



Washington Metropolitan Area Transit Authority

## ANNUAL INTERNAL REVIEW 2017

# Metrorail Structural Inspections

## QICO Internal Review

June 9, 2017



### Quality Assurance, Internal Compliance & Oversight (QICO)

*"Quality Trumps Quantity"*



# QICO INTERNAL REVIEW

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## Internal Review Summary

### Why QICO Performed This Review:

- This internal review is intended to provide Metro's senior management with an assessment of the state of Metrorail Structural Inspections and promote the actions needed to address any concerns.
- QICO is independent from the functions it oversees, authorized by the GM 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 measureable resolution of identified concerns. To check the status of CAP implementation go to [www.wmata.com/initiatives/transparency/](http://www.wmata.com/initiatives/transparency/).

June 2017

## Metrorail Structural Inspections

### QICO's Review Results:

*Improving Quality of Inspections and Timeliness of Reporting Will Ensure the Authority Achieves and Sustains a State of Good Repair.*

The process of structure inspection can be improved with the implementation of procedural documents, internal quality checks, and engineering input. Based on our review results QICO identified and noted several **Wins (What Worked Well)** and **Areas for Improvement**:

- ✓ Procedural documents have been developed.
- ✓ Good housekeeping practices.
- ✓ Training certifications/records up-to-date.
- Structural findings that do not pose an imminent danger to passengers or others are not being addressed efficiently.
- Condition assessments performed by different parties determined different levels of defect.
- Unavailable inspection equipment.
- Inadequate coordination with external parties for bridge inspections.
- Inconsistent recording and reviewing of inspection activities.
- Long lead-times for completing inspection reports.
- Noncompliance with existing internal QC requirements.
- Inconsistent reporting in Monthly Preventive Maintenance Summary.
- Under-utilization of the enterprise asset management system for inspection documentation.
- Ineffective management of inspection data through current reporting software.
- Expired materials in storage areas.

### Required Actions:

- **QICO-SIM-17-01:** WMATA must continue developing a strategy to address structural findings. *(Risk Rating: Elevated)*
- **QICO-SIM-17-02:** Establish formal processes to ensure that critical inspections are completed according to schedule. Alternatively, evaluate the potential outsourcing of critical inspections to ensure these items are completed on-time. *(Risk Rating: High)*
- **QICO-SIM-17-03:** Perform an evaluation of current inspection and reporting practices employed by the structures inspection team, in relation to WMATA's standards and industry best-practices, instituting corrective measures and management controls to eliminate deficiencies identified in the evaluation. *(Risk Rating: Elevated)*
- **QICO-SIM-17-04:** Establish and implement written requirements to govern the capture, completion, quality control, and engineering review of inspection activities/reports. *(Risk Rating: Elevated)*
- **QICO-SIM-17-05:** Establish formal practices for the capture of inspection defects in the enterprise asset management system for improved data quality/integrity. *(Risk Rating: Moderate)*

# 1 DEPARTMENT/FUNCTION OVERVIEW

## Metrorail Structures Inspection (STIN)

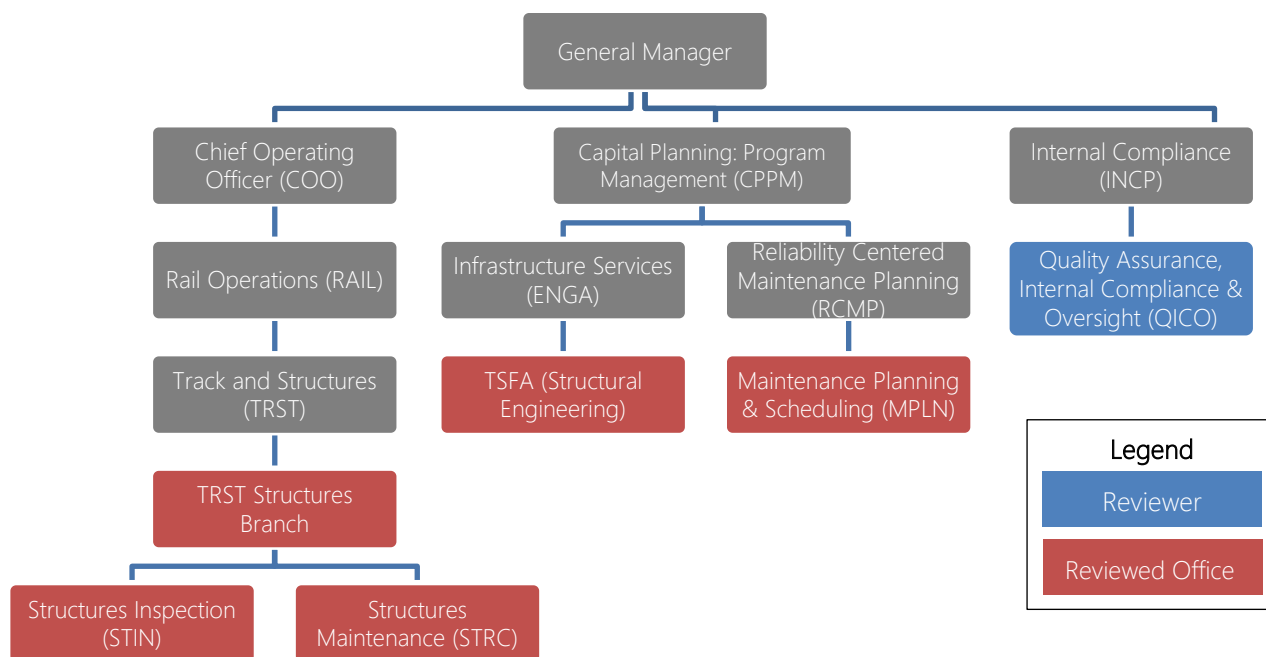
The Office of Track and Structures (TRST) is responsible for inspecting and maintaining all Metrorail structural assets including approximately 97 miles of tunnels, 311 shafts, 119 miles of right-of-way fence, 153 aeriels/bridges, 91 stations and station platforms, and 30 parking structures. Proper monitoring and rehabilitation of these structures is critical to the safety of passengers at every stage of their experience at Metrorail, as structural issues can seriously affect other systems (e.g. tunnel leakage deteriorating traction power cabling). The major parties involved in this goal include:

- (a) The Structures Inspection group (STIN) performs preventive maintenance inspections on structural assets and logs observations in [InspectTech](#).
- (b) The Structures Maintenance group (STRC) is responsible for conducting preventive and corrective maintenance of structural assets throughout the system (e.g. grout pads, concrete spalls, leak mitigation, etc). Larger and more complex structural repairs and modifications are typically contracted out (e.g. demolition and renovation of aerial structures).
- (c) Structural Engineering (ENGA:TSFA) is the owner of the structural assets and their governing documentation; they are occasionally consulted to help address structural engineering concerns with the inspected assets.

# 2 REVIEW METHODOLOGY

## Review Stakeholders

The Infrastructure Assurance branch of the Office of Quality, Internal Compliance and Oversight (QICO) conducted a review of the structures inspection group (STIN) and the structures maintenance group (STRC) of Track and Structures (TRST). As shown in **Figure 1: Review Stakeholders**, QICO is entirely independent of these groups to the general manager's office. QICO performed the review between February 2 – March 31, 2017.

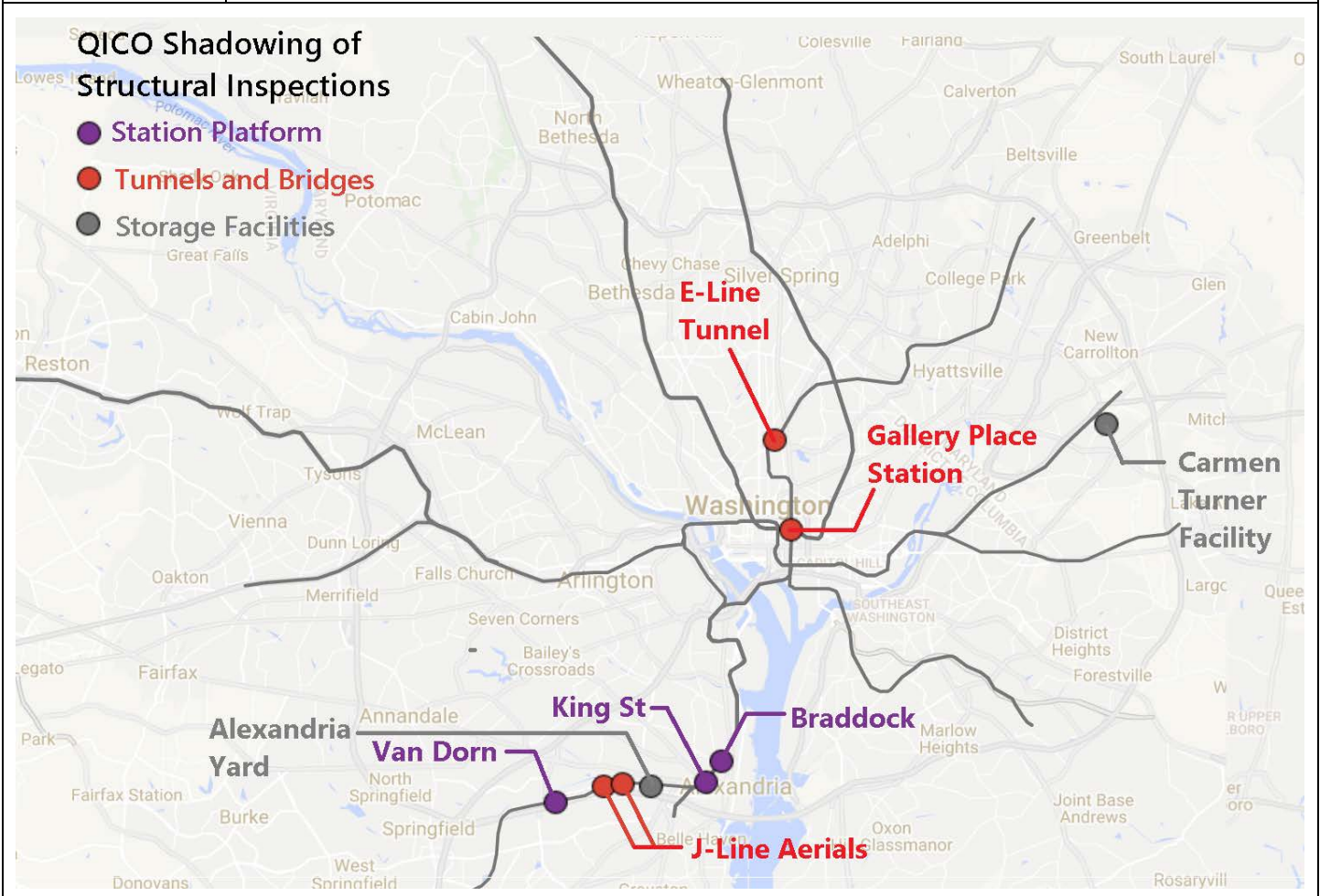


QICO's findings are categorized into four groups: **Quality of Work**, **Compliance with Standards**, **Records Management** and **Safety**. For each finding there is an associated **Recommendation** (a suggestion for improving a process based upon QICO's systematic review). Findings are combined into several **Required Actions**, which summarize the steps actions owners must take to address deficiencies.



## 2.1 REVIEW SCOPE

| Category                         | Description  |
|----------------------------------|--|
| Review of Existing Documentation | <ul style="list-style-type: none"> <li>- Governing Maintenance Documentation: WMATA-2000, Work Instructions</li> <li>- Bridge Inspection Manual (pending approval)</li> <li>- Operation Manuals</li> <li>- Standard Documents (Design Criteria, Standard Specifications)</li> <li>- Previous Recommendations from WMATA Oversight: Federal Transit Administration (FTA) Corrective Action Plans (CAPS) and recommendations from the National Transportation Safety Board (NTSB)</li> <li>- Inspection Reports</li> <li>- Defect and Maintenance Database (Maximo and InspectTech)</li> <li>- Training Records</li> </ul> |
| Shadowing Field Inspections      | <ul style="list-style-type: none"> <li>- Station Structural Inspection</li> <li>- Station Platform Edge Inspection</li> <li>- Tunnel Leak Inspection</li> <li>- Bridge Deck Inspection</li> </ul>  |



## 2.2 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; e.g. work zone organization and cleanliness.   |
|                           | Quality Control Measures           | Internal management controls that ensure the consistency and reliability of work performed.                         |
|                           | Materials and Tooling              | Measureable properties of parts and tools used to perform work.   |
| Compliance with Standards | 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, etc.                   |
|                           | Procedural Requirements            | Formal documented standards that identify specific actions to be taken; i.e. who, what, when, where, how?           |
|                           | Regulatory Findings                | Findings issued by outside regulatory entities (FTA, NTSB, GAO) that generate recommendations or required actions.  |
|                           | Internal Findings                  | Findings issued by internal oversight entities (OIG, QICO, SAFE) that generate recommendations or required actions. |
| Records Management        | Work Order Management              | Protocols established to control maintenance scheduling, documentation, and tracking.                               |
|                           | Processes                          | Documented requirements for departmental activities.  |
|                           | Records Storage and Retention      | Documented requirements for the maintenance of records and documentation.   |
| Safety                    | RWP                                | Documented requirements for work zone setup and personal protective equipment.                                      |
|                           | Applicable Job Safety Requirements | Any documented safety requirements that apply to specific work performed.   |

## 2.3 RISK ASSESSMENT SUMMARY

**Note:** Findings and required actions are rated based on severity of risk. 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 |

### 3 WHAT WORKED WELL?

| Measure                   | Finding   | Description  |
|---------------------------|---|--|
| Compliance with Standards | Procedural documents have been developed as directed by finding <a href="#">QIG-01</a> , Investigation No.14-0005-1 | <ul style="list-style-type: none"> <li>- The Engineering and Architecture (ENGA) department has developed inspection manuals for bridges and parking structures in response to requirements by both the FTA and WMATA Office of Inspector General (OIG). These inspection manuals will serve as procedural documents and clarify inspection standards, document standards, personnel responsibilities, deadlines and other essential department processes.</li> </ul>  |
| Compliance with Standards | Housekeeping within Structures Maintenance storage facilities was found to be acceptable.                           | <ul style="list-style-type: none"> <li>- QICO conducted a visual inspection of STRC maintenance and inspection storage facilities located at Alexandria Yard, 3421 Pennsy Drive, and CTF. The facilities were well organized. WSADs (Warning Strobe Alarm Device) were also inspected and found to be in compliance.</li> </ul>  |
| Records Management        | Certifications, roadway safety training, and other training records are up-to-date.                                 | <ul style="list-style-type: none"> <li>- STIN conducts periodic reviews of certifications for Roadway Worker Protection (RWP), Bridge Safety Inspection – 1 class, Commercial Driver’s License (CDL) and other department training records.</li> <li>- QICO examined Vehicle Inspection Sheets completed for November on vehicles 23565 and 23564 and found the forms correctly completed, with the exception of two forms that were unsigned for vehicle 23564.</li> <li>- On 02/15/2017, QICO conducted an assessment of STIN’s recordkeeping practices by sampling paper records of: Daily Safety Rule Forms, Roadway Job Safety Briefing Forms, TRST Safety Equipment Compliance Sheets, TRST Structural Inspection Daily Work Assignments, and Non Right-of-Way Roadway Job Safety Briefing Forms.</li> </ul> |

## 4 AREAS FOR IMPROVEMENT

**Note:** Findings are rated based on risk on a 1 (Insignificant) to 5 (High) scale. Refer to [Appendix A](#) (Risk Assessment) for further details.

| Measure         | Finding  | Description   |
|-----------------|--|---|
| Quality of Work | <p><b>F-SIM-01:</b><br/>                     Inspection reports are not consistently recorded following the actual inspection, often taking multiple weeks to complete.</p> <p><u>Operational Risk</u><br/> <u>Elevated (3.5)</u> <span style="background-color: yellow; border: 1px solid black; display: inline-block; width: 15px; height: 10px; vertical-align: middle;"></span></p> | <ul style="list-style-type: none"> <li>- The inspectors must rely solely on notes, photos, and their recollection of events that occurred weeks in the past to generate an inspection report. It is current practice for the inspectors to conduct several inspections per day for several days in a row before compiling inspection observations into a report. This may have an adverse effect on the quality of the reports; STIN management prioritizes staying compliant with the inspection schedule. It is difficult for inspectors to submit reports on-time partly because inputting notes and photos into InspectTech is a time consuming process.<br/>                     (Source: Interviews with STIN management and inspectors)</li> </ul> <p><b>Recommendation:</b> Establish written requirements to capture inspection data as soon as practicable, following completion of inspection activities. This process ensures and assures that data is accurate and valid.</p> <ol style="list-style-type: none"> <li>(1) Develop a process for data capture and assurance.</li> <li>(2) Coordinate with Information Technology (IT) Asset Management Systems (AMS) in evaluation of STIN mobile data capture solutions.</li> </ol> |

## 4 AREAS FOR IMPROVEMENT

**Note:** Findings are rated based on risk on a 1 (Insignificant) to 5 (High) scale. Refer to [Appendix A](#) (Risk Assessment) for further details.

| Measure | Finding | Description |
|---------|---------|-------------|
|---------|---------|-------------|

Quality of Work

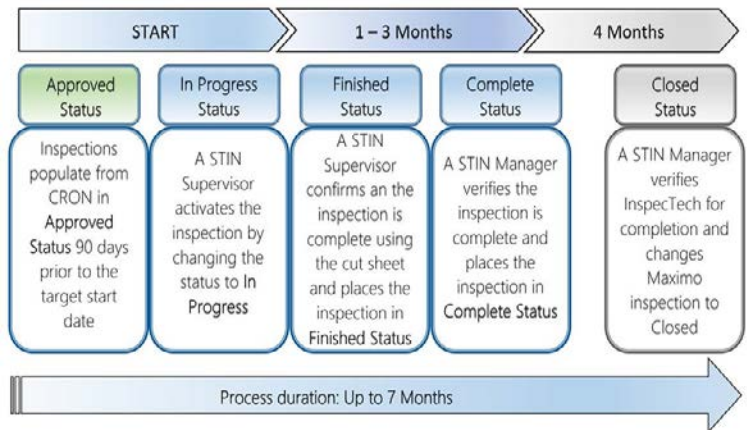
**F-SIM-02:**  
QICO observed that reports can be completed up to six months after inspections are performed.

Operational Risk  
Moderate (4.5) ■

- There is no consistent timeframe for completing the reports. It is routine for the physical inspection to be completed but the report is not generated for months. For example, the 2016 New Carrollton Aerial Structure inspection was physically inspected over a period of three months (6/22/16 to 09/28/16) but the report was not approved by the inspection manager in [InspectTech](#) until 3/21/17 (six months later).

(Source: *InspectTech software*)

- The current bottleneck in the process seems to be inputting the data (comments and photos) into [InspectTech](#) and generating the report.
- The figure below shows the steps in Maximo for a typical inspection, although timelines can be significantly longer or shorter than the 7 months shown.



**Recommendation:** Establish written requirements to complete/finalize inspection reports, in coordination with engineering.

Quality of Work

**F-SIM-03:**  
Inspection report generation does not incorporate quality control measures as required in the WMATA-2000.

Governance Risk  
Elevated (3.5) ■

- Management is not reviewing or quality checking the inspection reports. The way the structures inspection group currently designates an inspection “Complete” in Maximo is misleading because at that point only the physical inspection has been performed but the report has not been created. The [WMATA-2000 Inspection Work Order Process](#) section instructs the Maintenance Manager to conduct QC under the status “Finished” and change the status to “Complete” if work is satisfactory. It also calls for the Assistant Superintendents and Maintenance Managers to conduct random quality checks.

(Source: *Review of WMATA-2000 TRST*)

**Recommendation:** Incorporate internal quality checks as outlined in [WMATA-2000 “TRST Maximo Work Order Process”](#) into the report generation process.

## 4 AREAS FOR IMPROVEMENT

**Note:** Findings are rated based on risk on a 1 (Insignificant) to 5 (High) scale. Refer to [Appendix A](#) (Risk Assessment) for further details.

| Measure         | Finding  | Description   |
|-----------------|--|---|
| Quality of Work | <p><b>F-SIM-04:</b><br/>Structural findings that do not pose an imminent danger to passengers or others are not being addressed efficiently.</p> <p><a href="#">Governance Risk Elevated (4,3)</a> <span style="background-color: yellow; border: 1px solid black; padding: 2px;"> </span></p> | <p>QICO reviewed the list of priorities developed by (ENGA:TSFA) <a href="#">Structural Priorities List</a>. Other departments keep similar lists but the agency is working on an integrated lifecycle asset management and capital program and strategy to prioritize systemwide needs.</p> <ul style="list-style-type: none"> <li>- For example, Structural Engineering identified 15 locations in a document dated May 2016 (<a href="#">Reference 3</a>) showing signs of <a href="#">concrete deterioration at station platform edges</a>. In some cases platforms have been temporarily supported using tubular steel columns due to the severity of the deterioration. The current version of the <a href="#">Structural Priorities List (Reference 5)</a> contains seven platform locations in need of repair.</li> <li>- The locations above, along with West Falls Church and New Carrollton stations have been tracked on the <a href="#">Structures Priority List</a> for several years. Locations such as King Street and National Airport have a record of deterioration going back to 2010, yet no permanent solution has been implemented. Recently Structural Engineering missed an opportunity to utilize the extended closure of King Street Metro Station provided by SafeTrack to push for a more permanent solution of the platform edge deterioration. <i>(Source: Structures Priority List Rev March 2017, InspectTech, Platform Edge Concrete Deterioration and Repair Summary)</i></li> </ul> <p><b>Recommendation:</b> WMATA must continue developing a strategy to address structural findings.</p> |



## 4 AREAS FOR IMPROVEMENT

**Note:** Findings are rated based on risk on a 1 (Insignificant) to 5 (High) scale. Refer to [Appendix A](#) (Risk Assessment) for further details.

| Measure                | Finding  | Description  |
|------------------------|--|--|
| <p>Quality of Work</p> | <p><b>F-SIM-05:</b><br/>                     Inspection reports are not consistently reviewed by engineers to ensure adequate monitoring of inspection and maintenance activities.</p> <p><u><a href="#">Operational Risk</a></u><br/> <u><a href="#">Moderate (3.4)</a></u> <span style="background-color: yellow; border: 1px solid black; padding: 2px;"> </span></p> | <ul style="list-style-type: none"> <li>- The organization spent approximately 1.8 million dollars in 2016 on structures inspection personnel salaries in order to inspect and collect data on the structural infrastructure. After all of this data was collected there is no written procedure to utilize it in the most effective way. This means that of all the Structural Inspections Reports completed 276 inspections in 2016 (per the MPLN Monthly Maintenance Summary Reports), only a small portion are being fully reviewed.</li> <li>- Currently the main users of the data are the structural maintenance managers and the TSFA structural engineer assigned to work with the structural inspection group. The structural maintenance manager (TRST) uses the reports as one of his tools to plan maintenance work. Besides being alerted to issues through department internal communication, the structural engineer also reviews the inspection reports on a selective basis, querying inspection data for assets rated below a threshold. However, beyond voluntarily running checks on low rated assets, there is no internal policy which directs the Maintenance Manager on how to use the inspection information.</li> <li>- The Structural Engineer assigned to work with STIN uses a similar technique to query ratings below a certain threshold (usually 5 and below out of 9) on an as needed basis.<br/> <i>(Source: Interviews with STIN Asst. General Superintendent, STIN Superintendent, STRC Maintenance Manager, TSFA Structural Engineer).</i></li> </ul> <p><b>Recommendation:</b> Establish written requirements for engineering review of inspection reports, including provisions for site visits on select inspections.</p> |

## 4 AREAS FOR IMPROVEMENT

**Note:** Findings are rated based on risk on a 1 (Insignificant) to 5 (High) scale. Refer to [Appendix A](#) (Risk Assessment) for further details.

| Measure                | Finding  | Description  |
|------------------------|--|--|
| <p>Quality of Work</p> | <p><b>F-SIM-06:</b><br/>                     Inspection reports omit current photos, in favor of archived photos, bringing into question the accuracy and reliability of inspection records.</p> <p><a href="#">Governance Risk High (4,4)</a> <span style="color: yellow;">■</span></p> | <ul style="list-style-type: none"> <li>- QICO selected assets throughout the authority at random for sampling of inspection reports in <a href="#">InspectTech</a>. This included aerials/bridges, pedestrian bridges, tunnel structure, and special platform edge inspections for the last three (3) years (<a href="#">46 total inspection reports</a>).</li> <li>- Archived photos are used in report (<a href="#">Addison Aerial Structure Inspection 2014</a>). This is an issue previously reported by the <a href="#">QIG report</a>. According to STIN Management, inspectors have been instructed verbally not to use archived photos.</li> <li>- It is common to see photos that are not dated, making it difficult to verify when the photo was taken (Example: <a href="#">Congress Heights Station Inspection 2016</a>).</li> <li>- Reports identify defects but do not contain supporting photos (Example: <a href="#">Addison Road Aerial Inspection 2016</a>). Defects found in a previous year can disappear from the following year's report without a repair photo or work order number. Similarly, defects can receive a better rating from the previous year's report without photo evidence of repair.</li> <li>- Inspection reports were observed with comments that were the same as the previous year's report. QICO noted that when creating a new report in <a href="#">InspectTech</a>, the new report brings all existing comments from previous year's report by default unless the user chooses to change to a blank form. See <a href="#">QIG finding 03</a>.<br/>                     (Source: <i>Review of Inspection Reports</i>)</li> </ul> <p><b>Recommendation:</b> Perform an evaluation of current inspection and reporting practices employed by the structures inspection team, in relation to WMATA's standards and industry best-practice, instituting corrective measures and management controls to eliminate deficiencies identified in the evaluation.</p> |

## 4 AREAS FOR IMPROVEMENT

**Note:** Findings are rated based on risk on a 1 (Insignificant) to 5 (High) scale. Refer to [Appendix A](#) (Risk Assessment) for further details.

| Measure                          | Finding   | Description  |
|----------------------------------|---|--|
| <p>Quality of Work</p>           | <p><b>F-SIM-07:</b><br/>                     Condition assessments performed by QICO and ENGA at the Van Dorn Street differ in remediation conclusions.</p> <p><i><a href="#">Operational Risk</a></i><br/> <i>Moderate (3,3)</i> <span style="color: yellow;">■</span></p> | <ul style="list-style-type: none"> <li>- During a visual inspection QICO noted <a href="#">concrete delamination and exposed rebar</a> at the Van Dorn Street Station platform. QICO discussed the issue with the Assistant Chief Engineer, Structural Engineering (ENGA/TSFA) on March 9, 2017. He dispatched a structural engineer to investigate the issue and provide a report of the state of the platform.</li> <li>- On March 15, 2017 an engineering report (<a href="#">Reference 1</a>) was shared with QICO which determined that despite the visible concrete delamination, "there is no immediate impact on the structural safety and no tripping hazards to customers. No shoring posts are required for this location." In order to validate these findings and recommendations, QICO sent an independent consultant structural engineer to conduct a similar inspection and report on March 20 2017 (<a href="#">Reference 2</a>).</li> <li>- QICO's findings were similar in nature with one significant difference. The structural engineer tasked by QICO to inspect the platform recommended that a temporary support system be installed under the platform edge at track 1 near chain marker 690 +00.</li> </ul> <p><b>Recommendation:</b> Perform reassessment of concrete conditions at the Van Dorn station platform, taking into account the findings of the QICO inspection report.</p> |
| <p>Compliance with Standards</p> | <p><b>F-SIM-08:</b><br/>                     Materials in storage areas past expiration date.</p> <p><i><a href="#">Governance Risk</a></i><br/> <i>Low (3,2)</i> <span style="color: green;">■</span></p>  | <ul style="list-style-type: none"> <li>- QICO inspected the materials storage facilities at Alexandria Yard and at 3421 Pennsy Drive and found Eucospeed repair mortar stored past its marked expiration date (10/2016)</li> </ul> <p><b>Recommendation:</b> Inspect all storage facilities for expired materials and dispose of them.</p>   |

## 4 AREAS FOR IMPROVEMENT

**Note:** Findings are rated based on risk on a 1 (Insignificant) to 5 (High) scale. Refer to [Appendix A](#) (Risk Assessment) for further details.

| Measure                          | Finding   | Description   |
|----------------------------------|---|---|
| <p>Compliance with Standards</p> | <p><b>F-SIM-09:</b><br/>Essential bridge inspection equipment has been unavailable for over a year due to inadequate certification.</p> <p><i>Operational Risk</i><br/><i>High (5,5)</i> <span style="color: red;">■</span></p>   | <ul style="list-style-type: none"> <li>- There are eight (8) bridge inspections that are critically behind schedule due to the lack of available <a href="#">telescopic bridge inspection units (down &amp; unders)</a>, which give inspectors access under the bridges to inspect critical elements. WMATA has three of these vehicles; as of the end of the review period (March), all three were out of commission for lack of annual certification.</li> <li>- The inspection most significantly behind schedule is Bush Hill Aerial (on the J-Line). This inspection was scheduled for March 2016 but as of April 2017 is still incomplete (<a href="#">down &amp; unders</a> are out of commission).</li> <li>- In 2014 WMATA's procurement office requested STIN to modify the down &amp; unders contract to avoid sole-sourcing. The down &amp; unders were last inspected and certified for use in 2015; since then, STIN management has been unable to coordinate with the procurement department to secure an inspection contract.</li> <li>- QICO learned that at the time of this review (April 2017) that STIN had made progress in securing a new contract for the inspection of this equipment.</li> </ul> <p><i>(Source: InspectTech, Interviews with STIN Superintendent, Asst. Superintendent, and Maintenance Manager)</i></p> <p><b>Recommendation:</b> Develop a formal process to ensure critical inspection equipment is inspected and/or certified according to their specific needs. Alternatively, evaluate the potential outsourcing of critical inspections requiring specialized equipment to ensure these certifications do not prevent completion of these items.</p> |
| <p>Compliance with Standards</p> | <p><b>F-SIM-10:</b><br/>Bridge inspections are delayed due to inconsistent processing/securing of agreements with CSX railroad, where WMATA requires access to CSX right-of-way to complete inspections.</p> <p><i>Operational Risk</i><br/><i>High (4,4)</i> <span style="color: orange;">■</span></p> | <ul style="list-style-type: none"> <li>- In order to perform inspections of <a href="#">assets located around CSX property</a>, WMATA has to arrange for support from CSX. The inspection group expressed difficulty arranging these agreements and inspections have been delayed.</li> <li>- Every year, the inspection group has to complete a multi-step application process with CSX to obtain the agreements. The processing time on this request varies and once the request has been approved by CSX the inspection group must contact the road master (CSX personnel in charge of providing support within designated zones) to set up the inspection. STIN management intends to explore the possibility of going from a yearly cycle of support agreements with CSX to a multi-year agreement.</li> </ul> <p><i>(Source: Maximo...WO#...12705985, Interviews with STIN Superintendent and Maintenance Manager)</i></p> <p><b>Recommendation:</b> Coordinate with procurement and external relations functions to establish written requirements for securing CSX support agreements with enough lead time to ensure inspection target start date is met, and evaluate the potential to secure these agreements on a multi-year basis.</p>   |

## 4 AREAS FOR IMPROVEMENT

**Note:** Findings are rated based on risk on a 1 (Insignificant) to 5 (High) scale. Refer to [Appendix A](#) (Risk Assessment) for further details.

| Measure                          | Finding   | Description  |
|----------------------------------|---|--|
| <p>Compliance with Standards</p> | <p><b>F-SIM-11:</b><br/>The Monthly Preventive Maintenance Summary produced by RCMP does not accurately represent the state of compliance with scheduled structure inspections.</p> <p><u><a href="#">Operational Risk</a></u><br/><u><a href="#">Moderate (3,3)</a></u> <span style="background-color: yellow; border: 1px solid black; display: inline-block; width: 15px; height: 15px; vertical-align: middle;"></span></p> | <ul style="list-style-type: none"> <li>- The <a href="#">Monthly Preventive Maintenance summary (MPLN)</a> produced by Reliability Centered Maintenance Planning (RCMP) is simplistic and does not convey to the reader if an inspection remains out of compliance for an extended period. The MPLN attempts to measure the schedule compliance of the inspection group. It considers an inspection in compliance if that inspection is advanced to the "Closed" or "Complete" Maximo status within 40 days of the target start date. In the case of an inspection that requires three months to complete, there is the possibility that inspection would be wrongly classified as non-compliant once the 40 days have expired. If an inspection is out of compliance for several months, the summary reflects it for a single month and does not carry over for subsequent reports.<br/><i>(Source: 2016 RCMP Monthly Compliance Reports)</i></li> </ul> <p><b>Recommendation:</b> Improve reporting processes to ensure that all out-of-compliance inspections are included in current reports, to reflect the actual status of compliance with inspection requirements.</p> |
| <p>Compliance with Standards</p> | <p><b>F-SIM-12:</b><br/>Inspection intervals are extended by structure inspection personnel without the consultation of engineering.</p> <p><u><a href="#">Governance Risk</a></u><br/><u><a href="#">Moderate (3,3)</a></u> <span style="background-color: yellow; border: 1px solid black; display: inline-block; width: 15px; height: 15px; vertical-align: middle;"></span></p>   | <ul style="list-style-type: none"> <li>- For example, STIN management changed the Maximo target start date of the 2016 structural tunnel inspections. They were originally scheduled for November 2016 and performed every 24 months. The STIN Inspection Manager changed the status of the inspections to PMPASS ("Admin Agrees to Skip This PM") and set the new target start date for 2018. The reason STIN management had for changing the inspection start date was to allow inspectors to participate in a tunnel inspection class.</li> <li>- The inspections started in February of 2017 (four months out of compliance) and in conjunction with tunnel leak inspections. A four month change in the inspection cycle may not be significant, but the inspection manager has leeway to move inspection start dates without engineering input. <i>(Source: <a href="#">Maximo WO# 12967436</a>, Interviews with STIN Superintendent)</i></li> </ul> <p><b>Recommendation:</b> Establish written requirements for engineering approval prior to changing the periodicity of inspections.</p>   |

## 4 AREAS FOR IMPROVEMENT

**Note:** Findings are rated based on risk on a 1 (Insignificant) to 5 (High) scale. Refer to [Appendix A](#) (Risk Assessment) for further details.

| Measure            | Finding   | Description  |
|--------------------|---|--|
| Records Management | <p><b>F-SIM-13:</b><br/>The enterprise asset management system (currently Maximo) is not fully utilized to document inspection information.</p> <p><i>Operational Risk</i><br/><i>Moderate (3,4)</i> <span style="background-color: yellow; border: 1px solid black; display: inline-block; width: 15px; height: 15px; vertical-align: middle;"></span></p>                                 | <ul style="list-style-type: none"> <li>- There are no current work orders in <a href="#">Maximo</a> for the tunnel leak inspections or structural tunnel inspections mentioned <a href="#">above</a>. The labor for these inspections was reported in <a href="#">Maximo</a> under labor reporting, which makes it difficult to associate work activities to expenditures.</li> <li>- Changes and notes associated with an inspection are not being logged within comments in <a href="#">Maximo</a>. In the case of the <a href="#">Bush Hill Aerial</a>, which was left unfinished due to the unavailability of a <a href="#">Down &amp; Under</a> telescopic inspection unit, there is no comment in <a href="#">Maximo</a>. Logging these notes would help anyone reviewing the work orders.</li> <li>- Task IDs that describe the work activities performed are not being used when logging work hours in <a href="#">Maximo</a>.</li> <li>- <a href="#">Maximo</a> has the capacity to break down a large asset such as a bridge into more detailed sub assets (parts of a bridge to be inspected). Logging work hours to this level of detail will increase accountability, improve planning, and better budgeting.</li> <li>- There is no record connecting findings and corrective actions within inspection reports. Incorporating <a href="#">Maximo</a> work order numbers into the inspection reports when a defect is corrected will close the loop on the inspection and maintenance cycle.</li> </ul> <p><b>Recommendation:</b> Continue implementation of FTA CAP <a href="#">IOC-SRT-15-006</a> requiring Maximo work orders be incorporated into InspectTech.</p> |
| Records Management | <p><b>F-SIM-14:</b><br/>Current reporting software utilized to generate inspection reports is ineffective in management of inspection data for current and future analysis.</p> <p><i>Operational Risk</i><br/><i>Moderate (3,3)</i> <span style="background-color: yellow; border: 1px solid black; display: inline-block; width: 15px; height: 15px; vertical-align: middle;"></span></p> | <ul style="list-style-type: none"> <li>- The inspection group uses the software <a href="#">InspectTech</a> to generate and store all inspection reports. Since the software allows for some customization, WMATA has been working with the provider (Bentley) over the past few years to obtain a version that is suitable for authority requirements. The current version of the software produces a paper version of the report that is difficult to navigate and does not provide basic asset information to a reviewer. The photos are disjointed from the comments related to them.</li> </ul> <p><b>Recommendation:</b> Evaluate system capabilities to ensure the reporting and data collection needs of WMATA can be satisfied by the current database system, or through alternative methods.</p>  |



## 5 SUMMARY OF REQUIRED ACTIONS

**Note:** Required actions are rated based on risk on a 1 (Insignificant) to 5 (High) scale. Refer to [Appendix A](#) (Risk Assessment) for further details.

| Required Action  | Finding  | Owner  |
|--|--|--|
| <b>QICO-SIM-17-01:</b><br>WMATA must continue developing a strategy to address structural findings.<br><br>Elevated <span style="color: yellow;">■</span>  | F-SIM-17-04<br><span style="color: yellow;">■</span> | Structural findings that do not pose an imminent danger to passengers or others are not being addressed efficiently.<br><br>ENGA   |
|  | F-SIM-17-07<br><span style="color: yellow;">■</span> | Condition assessments performed by QICO and ENGA at the Van Dorn Street differ in remediation conclusions.<br><br>ENGA   |
|  | F-SIM-17-08<br><span style="color: green;">■</span>  | Materials in storage areas past expiration date.<br><br>TRST   |
| <b>QICO-SIM-17-02:</b><br>Establish formal processes to ensure that critical inspections are completed according to schedule. Alternatively, evaluate the potential outsourcing of critical inspections to ensure these items are completed on-time.<br><br>High <span style="color: red;">■</span>  | F-SIM-17-09<br><span style="color: red;">■</span>    | Essential bridge inspection equipment has been unavailable for over a year due to inadequate certification.<br><br>TRST  |
|  | F-SIM-17-10<br><span style="color: yellow;">■</span> | Bridge inspections are delayed due to inconsistent processing/securing of agreements with CSX railroad, where WMATA requires access to CSX right-of-way to complete inspections.<br><br>TRST |
|  | F-SIM-17-12<br><span style="color: yellow;">■</span> | Inspection intervals are extended by structure inspection personnel without the consultation of engineering.<br><br>TRST   |
| <b>QICO-SIM-17-03:</b><br>Perform an evaluation of current inspection and reporting practices employed by the structures inspection team, in relation to WMATA's standards and industry best-practice, instituting corrective measures and management controls to eliminate deficiencies identified in the evaluation.<br><br>Elevated <span style="color: yellow;">■</span> | F-SIM-17-06<br><span style="color: yellow;">■</span> | Inspection reports omit current photos, in favor of archived photos, bringing into question the accuracy and reliability of inspection records.<br><br>TRST                                  |
| <b>QICO-SIM-17-04:</b><br>Establish and implement written requirements to govern the capture, completion, quality control, and engineering review of inspection activities/reports.<br><br>Elevated <span style="color: yellow;">■</span>  | F-SIM-17-01<br><span style="color: yellow;">■</span> | Inspection reports are not consistently recorded following the actual inspection, often taking multiple weeks to complete.<br><br>TRST   |
|  | F-SIM-17-02<br><span style="color: yellow;">■</span> | QICO observed that reports can be completed up to six months after inspections are performed.<br><br>TRST  |
|  | F-SIM-17-03<br><span style="color: yellow;">■</span> | Inspection report generation does not incorporate quality control measures as required in the WMATA-2000.<br><br>TRST  |

|   |                  |   |      |
|---|------------------|---|------|
|   | F-SIM-17-05<br>■ | Inspection reports are not consistently reviewed by engineers to ensure adequate monitoring of inspection and maintenance activities.                   | ENGA |
| <b>QICO-SIM-17-05:</b><br>Establish formal practices for the capture of inspection defects in the enterprise asset management system for improved data quality/integrity.<br><br><b>Moderate</b> ■  | F-SIM-17-11<br>■ | The Monthly Preventive Maintenance Summary produced by RCMP does not accurately represent the state of compliance with scheduled structure inspections. | RCMP |
|   | F-SIM-17-13<br>■ | The enterprise asset management system (currently Maximo) is not fully utilized to document inspection information.                                     | TRST |
|   | F-SIM-17-14<br>■ | Current reporting software utilized to generate inspection reports is ineffective in management of inspection data for current and future analysis.     | TRST |
| These required actions are composed of corresponding findings and recommendations listed in the previous sections of this document. Response to these items is required within 30 days of this report's publication, including assignment of action owners, proposed actions, and estimated completion dates. QICO will provide any additional guidance and/or clarification necessary through the development of corrective action plans (CAPs). |                  |   |      |

## 6 CORRECTIVE ACTION PLANS



**INTERNAL REVIEW**

**Metro's Structure Inspections**

In response to the internal review report for Metrorail Structure Inspections dated April 10, 2017 QICO has coordinated with Operations and Engineering departments to develop five (5) comprehensive CAPs. Each CAP outlines the findings, requirements and recommendations addressed, and a detailed action plan outlining responsible parties and specific actionable items.

**EXECUTIVE LEADERSHIP OF RESPONSIBLE PARTIES**


**Corrective Action Plan (CAP) Commitment**

  
\_\_\_\_\_  
Joseph Leader  
Chief Operating Officer (COO)

6/7/17  
\_\_\_\_\_  
Date

**WMATA INTERNAL OVERSIGHT**

**Corrective Action Plan (CAP) Acknowledgement**

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

06/07/17  
\_\_\_\_\_  
Date

  
\_\_\_\_\_  
Eric Christensen  
Chief, Internal Compliance (INCP)

6/8/17  
\_\_\_\_\_  
Date

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

6/9/17  
\_\_\_\_\_  
Date



CORRECTIVE ACTION PLAN

Purpose and Scope

On April 10, 2017 QICO issued a comprehensive report from an internal review of Metrorail's Structure Inspections. This Corrective Action Plan (CAP) has been developed to address the following finding and required actions per QICO-SIM-17-01.

| QICO Finding   | QICO Recommendation   |
|--|---|
| <b>F-SIM-17-04:</b> Structural findings that do not pose a danger to passengers or others are not being addressed efficiently. | WMATA must continue developing a strategy to address the major structural deficiencies.   |
| <b>F-SIM-17-07:</b> Condition assessments performed by QICO and ENGA at the Van Dorn Street differ in remediation conclusions. | Perform reassessment of concrete conditions at the Van Dorn station platform, taking into account the findings of the QICO inspection report. |
| <b>F-SIM-17-08:</b> Materials in storage areas past expiration date.   | Inspect all storage facilities for expired materials and dispose of them.   |

Required Action

QICO-SIM-17-01: WMATA must developing a strategy to address structural findings.

(Risk Rating: Elevated)

Plan Description

**F-SIM-17-04:** WMATA will develop a new integrated lifecycle asset management and capital programing process that will move the existing asset base to a State of Good Repair and prioritize new needs from concept to completion. Policy Instruction 1.18/0 Transit Asset Management Policy will be updated and require each department to create or maintain an asset inventory and condition assessment in Enterprise Asset Management Registry (Maximo). Departments will also develop and manage an asset management strategy and plans. WMATA plans to roll out implementation Summer 2017.

**F-SIM-17-07:** The office of Infrastructure Renewal Program Group (IRPG) has just initiated phase 1 of the preliminary design and engineering of rehabilitation of 10 station platforms including Van Dorn street. Funding allocated for this project in FY 17and FY 18 are CIP- 246 and D&E capital respectively. IRPG will provide quarterly updates to QICO.

**F-SIM-17-08:** STRC acknowledges that a materials management plan needs to be developed and implemented. Initial action involved the removal and disposal of all expired materials from TRST-Structures storage areas. Second action will require a thorough assessment of current practices and needs based on daily operational responsibilities. Once completed, a business plan will be generated specifying a scope of work in addition to any tools and labor resources required. Plan is to at minimum include processes for ordering, receiving, stowing/storing, bin/location management, restocking, and reporting needs.

Business Impact – Budget/Cost Estimate

- **Process Execution** – A current process/procedure exists that meets the QICO Required Action, this type of initiative does not need additional resources.

PLAN SCHEDULE

| Actionable items                               | Description   | Responsible Party*                                  | Estimated Start | Estimated Completion |
|--|---|---|-----------------|----------------------|
| 1<br>Capital and Assessment Program Management | WMATA will develop a new integrated lifecycle asset management and capital program and update Policy Instruction 1.18/0 Transit Asset Management. | Shyam Kannan,<br>Thomas Webster<br><br>(PLAN, OMBS) | 06/01/17        | 10/31/17             |



PLAN SCHEDULE

| Actionable items |                                    | Description   | Responsible Party*   | Estimated Start | Estimated Completion |
|------------------|------------------------------------|---|----------------------|-----------------|----------------------|
| 2                | Station Platforms-Rehabilitation   | Quarterly update / progress report for station platform reconstruction; including scope schedule and budget.  | Kenneth Spain (IRPG) | 05/01/17        | 12/05/17             |
| 3                | Disposal Acknowledgement           | STRC management acknowledging disposal of all expired materials from TRST-Structures storage areas.   | Kim Keene (TRST)     | 05/15/17        | 06/29/17             |
| 4                | Materials Management Business Plan | Assess materials management needs within STRC. Develop a business plan to address findings and implement processes based on industry standards and agency objectives.   | Kim Keene (TRST)     | 05/15/17        | 10/31/17             |
| 5                | Contractual support                | Establish funding. Draft contract documentation for gaining resource(s) to support development of a materials management process. Staff augmentation process to include solicitation and onboarding.                                | Kim Keene (TRST)     | 05/15/17        | 08/21/17             |
| 6                | Project Plan                       | Produce a scope of work for implementation. This is to include project schedule, tool assessment and labor resources required.  | Kim Keene (TRST)     | 8/21/17         | 10/31/17             |
| 7                | 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                 | 12/05/17        | 01/24/18             |

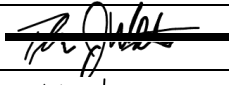
\*In the event of personnel or departmental changes, responsibilities for actionable items shall transfer to the new leadership.

COMPLETION DOCUMENTATION

Performance Measures

- 100% removal of expired materials in TRST storage areas in accordance with actionable item #3.
- Completed project scope, schedule and budget information for station platform rehabilitations.
- Compliance with materials management practices established under actionable item #4.

RESPONSIBLE PARTIES

|      |                |   |
|------|----------------|---|
| IRPG | Kenneth Spain  |   |
| PLAN | Shyam Kannan   |  |
| OMBS | Thomas Webster |  |
| TRST | Kim Keene      |  |

SECOND LEVEL RESPONSIBILITY

|          |            |   |
|----------|------------|---|
| AGM RAIL | Andrew Off |  |
|----------|------------|---|



**CORRECTIVE ACTION PLAN**

**Purpose and Scope**

On April 10, 2017 QICO issued a comprehensive report from an internal review of Metrorail’s Structure Inspections. This Corrective Action Plan (CAP) has been developed to address the following findings and required action per **QICO-SIM-17-02**.

| QICO Finding   | QICO Recommendation  |
|--|--|
| <b>F-SIM-17-09:</b> The Essential bridge inspection equipment has been unavailable for over a year due to inadequate certification.  | Develop a formal process to ensure critical inspection equipment is inspected and/or certified according to their specific needs. Alternatively, evaluate the potential outsourcing of critical inspections requiring specialized equipment to ensure these certifications do not prevent completion of these items. |
| <b>F-SIM-17-10:</b> Bridge inspections are delayed due to inconsistent processing/securing of agreements with CSX railroad, where WMATA requires access to CSX right-of-way to complete inspections. | Coordinate with procurement and external relations functions to establish written requirements for securing CSX support agreements with enough lead time to ensure inspection target start date is met; evaluating the potential to secure these agreements on a multi-year basis.                                   |
| <b>F-SIM-17-12:</b> Inspection intervals are extended by structure inspection personnel without the consultation of engineering.   | Establish written requirements for engineering approval prior to changing the periodicity of inspections.  |

**Required Action**

**QICO-SIM-17-02:** Establish formal processes to ensure that critical inspections are completed according to schedule. Alternatively, evaluate the potential outsourcing of critical inspections to ensure these items are completed on-time.

(Risk Rating: High) ■

**Plan Description**

- F-SIM-17-09:** TRST-Structures will develop formal procedures for equipment management in order to ensure that critical equipment is regularly maintained, appropriately certified, and ready to use when needed. Inspection and certification as well as training for the telescopic bridge inspection unit will be conducted by a third party consultant.
- F-SIM-17-10:** The current access agreement with CSX will expire on June 29, 2017, with CSX moving to an online-only process for Right of Entry agreements on June 30. Office of Real Estate and Station Planning and General Counsel will develop a draft and work on approving a long-term Master Agreement with CSX, TRST-Structures will provide both offices supporting information on all Metro assets needed to facilitate the process.
- F-SIM-17-12:** A procedure by which variances in structure inspection frequency are reviewed for approval by ENGA are in development and will be incorporated into a future revision of each relevant Asset Inspection Manual

**Business Impact – Budget/Cost Estimate**

- **Process Execution** – A current process/procedure exists that meets the QICO Required Action, this type of initiative does not need additional resources.



PLAN SCHEDULE

| Actionable items |   | Description   | Responsible Party*    | Estimated Start | Estimated Completion |
|------------------|---|---|-----------------------|-----------------|----------------------|
| 1                | Equipment Management SOP                        | Develop a SOP and assign accountable staff which manages the maintenance and certification of critical inspection equipment.  | K. Keene (TRST)       | 05/10/17        | 08/15/17             |
| 2                | Recertification, Training Curriculum and Roster | Consultant will recertify the use of telescopic bridge inspection units and develop training for relevant personnel.  | K. Keene (TRST)       | 07/15/17        | 09/28/17             |
| 3                | Draft-WMATA/ CSX Contract                       | Long Term Contract between WMATA and CSX clarifying access to CSX right-of-way, anticipated cost flagmen and other overheads  | Anabela Talaia (LAND) | 05/29/17        | 09/28/17             |
| 4                | Executed WMATA/ CSX Contract                    | Long Term Contract between WMATA and CSX clarifying access to CSX right-of-way, anticipated cost flagmen and other overheads  | Anabela Talaia (LAND) | 09/29/17        | 01/31/18             |
| 5                | New Request Form                                | Approved Request for Engineering Approval for Delay in Inspection   | K. Keene (TRST)       | 05/29/17        | 09/28/17             |
| 6                | 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                  | 09/29/17        | 02/28/18             |

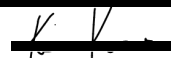
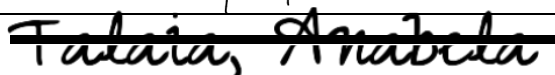
\*In the event of personnel or departmental changes, responsibilities for actionable items shall transfer to the new leadership.

COMPLETION DOCUMENTATION

Performance Measures

- 95% of active, relevant personnel receive training as prescribed under actionable item #2.
- Long-term agreement secured with CSX.

RESPONSIBLE PARTIES

|      |                |   |
|------|----------------|---|
| TRST | Kim Keene      |  |
| LAND | Anabela Talaia |   |

SECOND LEVEL RESPONSIBILITY

|          |            |   |
|----------|------------|---|
| AGM RAIL | Andrew Off |  |
|----------|------------|---|



CORRECTIVE ACTION PLAN

Purpose and Scope

On April 10, 2017 QICO issued a comprehensive Report from an internal review of Metro’s Structure Inspections. This Corrective Action Plan (CAP) has been developed to address the following finding and required action per QICO-SIM-17-03.

QICO Finding

QICO Recommendation

F-SIM-17-06: Inspection reports omit current photos, in favor of archived photos, bringing into question the accuracy and reliability of inspection records.

Perform an evaluation of current inspection and reporting practices employed by the structures inspection team, in relation to WMATA’s standards and industry best-practice, instituting corrective measures and management controls to eliminate deficiencies identified in the evaluation.

Required Action

QICO-SIM-17-03: Perform an evaluation of current inspection and reporting practices employed by the structures inspection team, in relation to WMATA’s standards and industry best-practice, instituting corrective measures and management controls to eliminate deficiencies identified in the evaluation.

(Risk Rating: Elevated)

Plan Description

F-SIM-17-06: TRST-Structures is undertaking two initiatives: 1) Moving to Maximo from InspectTech to take advantage of workflow customization, integration with the work order system already in place, and provide mobile capture solutions which should improve the turnaround time from inspection to completed reporting; and 2) Development of a new Standard Operating Procedure (SOP) for Inspection Reporting to formally require staff to perform their inspection functions according to WMATA requirements, industry standards and generally accepted practices for structural inspection. While a new system in Maximo for inspection reports is being developed and evaluated, the Inspection Reporting SOP will focus primarily on the functions and capabilities of the existing InspectTech software; it will, however, include timelines for when reports from a given inspection must be entered and approved, and quality checks as described in WMATA-2000 Inspection Work Order Process. All inspection staff will be trained on the new SOP.

Business Impact – Budget/Cost Estimate

- **Process Execution** – A current process/procedure exists that meets the QICO Required Action, this type of initiative does not need additional resources.

PLAN SCHEDULE

| Actionable items |                                     | Description   | Responsible Party* | Estimated Start | Estimated Completion |
|------------------|-------------------------------------|---|--------------------|-----------------|----------------------|
| 1                | Structural Inspection Reporting SOP | Finalize SOP and develop training for all inspection staff. | K. Keene (TRST)    | 05/15/17        | 08/04/17             |
| 2                | Employee Training                   | Train employees on new procedures.                          | K. Keene (TRST)    | 08/07/17        | 09/28/17             |



PLAN SCHEDULE

| Actionable items |                                  | Description   | Responsible Party* | Estimated Start | Estimated Completion |
|------------------|----------------------------------|---|--------------------|-----------------|----------------------|
| 3                | Inspect Tech – Maximo Transition | Establish feasibility in using Maximo for inspection process to maintenance measures. Assess ability to perform reporting capabilities and download historical data. Partner with IT/AMS to analyze requirements and resources needed. Produce a project plan that captures all aspects for moving forward and indoctrinating Maximo as the tool to use for holistic asset management (to include mobile applications). | K. Keene (TRST)    | 05/15/17        | 12/27/17             |
| 3a               | Obtain contractual support       | Establish funding. Draft contract documentation for additional resource(s) to support Maximo transitioning effort. Staff augmentation process to include solicitation and onboarding.   | K. Keene (TRST)    | 05/15/17        | 08/21/17             |
| 3b               | Project Plan                     | Produce a project plan for implementation. This is to include a scope of work, project schedule, resource assessment, stakeholders and pilot group.   | K. Keene (TRST)    | 08/21/17        | 12/27/17             |
| 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               | 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

- 95% of active inspection personnel complete training as prescribed in actionable item #2.
- Evidence of data migration from Inspect Tech to Maximo, as established under actionable item #3.

RESPONSIBLE PARTIES

|      |           |  |
|------|-----------|--|
| TRST | Kim Keene |  |
|------|-----------|--|

SECOND LEVEL RESPONSIBILITY

|          |            |  |
|----------|------------|--|
| AGM RAIL | Andrew Off |  |
|----------|------------|--|

**CORRECTIVE ACTION PLAN**

**Purpose and Scope**

On April 10, 2017 QICO issued a comprehensive report from an internal review of Metrorail’s Structure Inspections. This Corrective Action Plan (CAP) has been developed to address the following finding and required actions per **QICO-SIM-17-04**.

**QICO Finding**

**QICO Recommendation**

**F-SIM-17-01:** Inspection reports are not consistently recorded following the actual inspection, often taking multiple weeks to complete.

Establish written requirements to capture inspection data as soon as practicable following completion of inspection activities. This process ensures and assures that data is accurate and valid.

- (1) Develop a process for data capture and assurance.
- (2) Coordinate with Information Technology (IT) Asset Management Systems (AMS) in evaluation of STIN mobile data capture solutions

**F-SIM-17-02:** QICO observed that reports can be completed up to six months after inspections are performed.

Establish written requirements to complete/finalize inspection reports, in coordination with engineering.

**F-SIM-17-03:** Inspection report generation does not incorporate quality control measures as required in the WMATA-2000.

Incorporate internal quality checks as outlined in WMATA-2000 “TRST MAXIMO Work Order Process” into the report generation process.

**F-SIM-17-05:** Inspection reports are not consistently reviewed by engineers to ensure adequate monitoring of inspection and maintenance activities.

As part of the changes made to create the proposed “Assets inspection teams” (Bridges, Parking garages, stations, etc....) the requirements for inspection report review will be outlined; delineating personnel responsibilities.

**Required Action**

**QICO-SIM-17-04:** Establish and implement written requirements to govern the capture, completion, quality control, and engineering review of inspection activities/reports.

(Risk Rating: Elevated)

**Plan Description**

**F-SIM-17-05:** Structures and ENGA will develop different inspection teams and corresponding approved manuals which will delineate personnel responsibilities including the team Engineer. Approved Manual will establish a standard for inspecting WMATA structures. The scope of inspection is to detect structural and nonstructural damages and deficiencies, to document structures’ current conditions for asset management, to provide recommendations for maintenance and rehabilitation actions, and to ensure the safety and reliability of transit operations. The overall objective of Structure inspection and asset management program is to minimize the total life-cycle costs of maintaining WMATA’s infrastructure network, while ensuring safe and efficient services.

**F-SIM-17-01, 02 and 03:** Structures is undertaking two initiatives: 1) Moving to Maximo from Inspect Tech to take advantage of workflow customization, integration with the work order system already in place, and provide mobile capture solutions which should improve the turnaround time from inspection to completed report; and 2) Development of a new Standard Operating Procedure (SOP) for Inspection Reporting to formally require staff to perform their inspection functions according to WMATA requirements, industry standards and generally accepted practices for structural inspection. While a new system in Maximo for inspection reports is being developed and evaluated, the Inspection Reporting SOP will focus primarily on the functions and capabilities of the existing Inspect Tech software; it will, however, include timelines for when reports from a given inspection must be entered and approved, and quality checks as described in WMATA-2000 Inspection Work Order Process. All inspection staff will be trained on the new SOP.

**Business Impact – Budget/Cost Estimate**

- **Process Execution** – A current process/procedure exists that meets the QICO Required Action, This type of initiative does not need additional resources.



PLAN SCHEDULE

| Actionable items |                                     | Description   | Responsible Party* | Estimated Start | Estimated Completion |
|------------------|-------------------------------------|---|--------------------|-----------------|----------------------|
| 1                | Assets Inspection Manuals           | Approved inspection manuals: Bridges, Parking garages, stations   | K. Keene (TRST)    | 05/15/17        | 10/16/17             |
| 2                | Structural Inspection Reporting SOP | Finalize SOP and develop training for all inspection staff. Same as QICO-SIM-17-03 (#1 & #2)  | K. Keene (TRST)    | 05/15/17        | 08/04/17             |
| 3                | Inspect Tech – Maximo Transition    | Establish feasibility in using Maximo for inspection process through to maintenance measures. Assess ability to perform reporting capabilities and download historical data. Partner with IT/AMS to analyze requirements and resources needed. Produce a project plan that captures all aspects for moving forward and indoctrinating Maximo as the tool to use for holistic asset management (to include mobile applications). Same as QICO-SIM-17-03 (#3) | K. Keene (TRST)    | 05/15/17        | 12/27/17             |
| 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               | 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

- Evidence of data migration from Inspect Tech to Maximo, as established under actionable item #3.
- 100% of active inspection personnel provide signature acknowledgement of approved inspection manuals under actionable item #1.

RESPONSIBLE PARTIES

|      |           |  |
|------|-----------|--|
| TRST | Kim Keene |  |
|------|-----------|--|

SECOND LEVEL RESPONSIBILITY

|          |            |  |
|----------|------------|--|
| AGM RAIL | Andrew Off |  |
|----------|------------|--|



**CORRECTIVE ACTION PLAN**

**Purpose and Scope**

On April 10, 2017 QICO issued a comprehensive report from an internal review of Metrorail’s Structure Inspections. This Corrective Action Plan (CAP) has been developed to address the following finding and required actions per **QICO-SIM-17-05**.

**QICO Finding**

**QICO Recommendation**

**F-SIM-17-11:** The Monthly Preventive Maintenance Summary produced by RCMP does not accurately represent the state of compliance with scheduled structure inspections.

Improve reporting processes to ensure that all out of- compliance inspections are included in current reports, to reflect the actual status of compliance with inspection requirements.

**F-SIM-17-13:** The enterprise asset management system (currently MAXIMO) is not fully utilized to document inspection information.

Continue implementation of FTA CAP TOC-SRT-15-006 requiring MAXIMO work orders be incorporated into Inspect Tech

**F-SIM-17-14:** Current reporting software utilized to generate inspection reports is ineffective in management of inspection data for current and future analysis.

Evaluate system capabilities to ensure the reporting and data collection needs of WMATA can be satisfied by the current database system, or through alternative methods.

**Required Action**

**QICO-SIM-17-05:** Establish formal practices for the capture of inspection defects in the enterprise asset management system for improved data quality/integrity.

(Risk Rating: Moderate)

**Plan Description**

**F-SIM-17-11:** The office of Reliability Centered Maintenance Planning (RCMP) is working on an alternate reporting procedure to highlight Work Order’s that are overdue using a 30/60/90+ day overdue reporting format. Currently the Monthly Preventive Maintenance summary doesn’t capture overdue WO’s.

**F-SIM-17-13:** TRST-Structures is continuing to work with MOC to establish and implement a process for creating Maximo work orders for non-structural defects. TRST SOP 208-06 has been established to require the creation of Maximo work orders for structural defects with a rating of 4 or less.

**F-SIM-17-14:** TRST-Structures is undertaking two initiatives: 1) Moving to Maximo from InspectTech to take advantage of workflow customization, integration with the work order system already in place, and provide mobile capture solutions which should improve the turnaround time from inspection to completed reporting; and 2) Development of a new Standard Operating Procedure (SOP) for Inspection Reporting to formally require staff to perform their inspection functions according to WMATA requirements, industry standards and generally accepted practices for structural inspection. While a new Maximo system for inspection reports is being developed and evaluated, the Inspection Reporting SOP will focus primarily on the functions and capabilities of the existing InspectTech software; it will, however, include timelines for when reports from a given inspection must be entered and approved, and quality checks as described in WMATA-2000 Inspection Work Order Process. All inspection staff will be trained on the new SOP.

**Business Impact – Budget/Cost Estimate**

- **Process Execution** – A current process/procedure exists that meets the QICO Required Action, this type of initiative does not need additional resources.



PLAN SCHEDULE

| Actionable items |   | Description   | Responsible Party*   | Estimated Start | Estimated Completion |
|------------------|---|---|----------------------|-----------------|----------------------|
| 1                | Continue implementation of FTA CAP TOC-SRT-15-006 | Work with MOC to implement the process for creation of Maximo work orders for non-structural defects.   | K. Keene (TRST)      | 05/15/17        | 07/31/17             |
| 2                | TRST SOP 208-06                                   | Excerpt of SOP which states the requirement for the creation of Maximo work orders for structural defects with a rating of 4 or less.   | K. Keene (TRST)      | 05/01/17        | 06/12/17             |
| 3                | New Procedure- SOP                                | New reporting approach to highlight Work Order's that are overdue using a 30/60/90+ day format. Sample reports will be included in the submission.  | Frank Palmeri (RCMP) | 04/25/17        | 05/25/17             |
| 4                | Inspect Tech – Maximo Transition                  | Continue development of existing Maximo proof-of-concept for inspection reporting and asset management with IT AMS and establish a 'Pilot' team to further refine the software and develop attendant procedures.                    | K. Keene (TRST)      | 05/15/17        | 12/27/17             |
| 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                 | 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

- Evidence of accurate reporting mechanisms in accordance with actionable item #3.
- Evidence of data migration from Inspect Tech to Maximo, as established under actionable item #4.

RESPONSIBLE PARTIES

|      |               |  |
|------|---------------|--|
| TRST | Kim Keene     |  |
| RCMP | Frank Palmeri |  |

SECOND LEVEL RESPONSIBILITY

|      |            |  |
|------|------------|--|
| RAIL | Andrew Off |  |
|------|------------|--|

## 7 SUPPLEMENTAL MATERIALS

## 7.1 APPENDIX A: RISK ASSESSMENT

### Risk Assessment

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 relations, breach to physical security, etc.
- *External* – Risks related to changing regulations, unfavourable 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**

|                    |                                |                              |               |                 |           |          |
|--------------------|--------------------------------|------------------------------|---------------|-----------------|-----------|----------|
| Almost Certain (5) | ↑<br>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) |          |

## 7.1 APPENDIX A: RISK ASSESSMENT

### Risk Assessment

#### Probability of Occurrence of Risk Events Defined

Rare | 1 – Reasonable assumption that this risk will not occur

Likely | 4 – Reasonable assumption that this risk will likely occur

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

Almost Certain | 5 – Reasonable assumption that this will occur

Possible | 3 – Reasonable assumption that this risk may occur

#### Potential Impact of Risk Events Defined

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

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.

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.

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.

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.



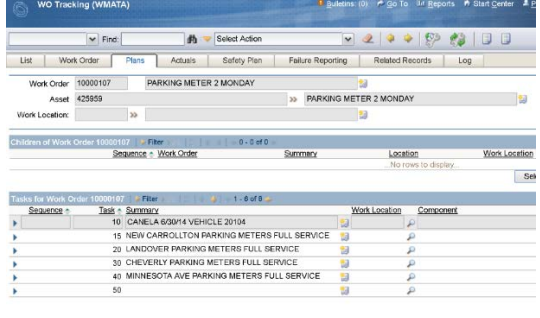
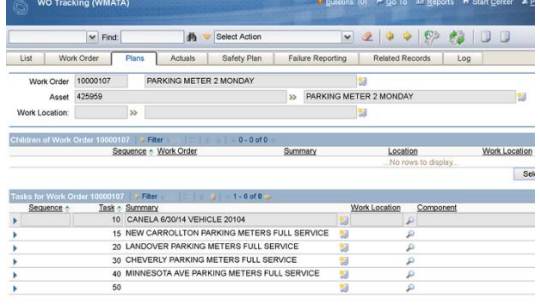
## 7.2 APPENDIX B: Inspection Report Records Reviewed

### Inspection Report Records Reviewed

During the course of the review for Metrorail structural inspection and maintenance, QICO reviewed the following reports:





- Addison Aerial Structure for 2014, 2015, and 2016.
- Cameron Run Bridge form 2010, 2014, and 2016.
- Congress Heights Station (F07) for 2014, 2015, and 2016.
- Dupont Circle Station (A03) for 2014, 2015, 2016, and 2017.
- Ft. Totten Station (B06) for 2013, 2014, 2015, and 2016.
- L- Line Bridge for 2014, 2015, and 2016.
- [Lally Columns](#) installed under the granite edge inbound at the King Street Station for December 2015, June 2016, Oct 2016, and December 2016.
- Pentagon Station (C07) for 2014, 2015, and 2016.
- QICO Van Dorn Station Platform Inspection.
- Route 7 Bridges for 2014, 2015, and 2016.
- TRST Van Dorn Station Platform Inspection.
- Tunnel Inspections on the B line track 2 IB from B09 to B10 for 2010, 2012, and 2014.
- Tunnel Inspections on the E line track 1 OB from E02 to E03 for 2010, 2012, and 2014.
- Tunnel Inspections on the F line track 2 OB from F07 to F08 for 2010, 2013, and 2014.
- Vienna Pedestrian Bridge Track 1 Inbound for 2014, 2015, and 2016.
- Vienna Pedestrian Bridge Track 2 Outbound for 2013, 2014, and 2015.
- West Falls Church Station (K06) for 2014, 2015, and 2016.

## 7.3 APPENDIX C: Definitions

| Definitions  | Photos   |
|--|--|
| <p><b>Aerial Structure</b></p> <p>At Metrorail, aerial structures suspend track above the ground; note that under this definition, station bridges, which are underground, are considered aerial structures.</p>   |    |
| <p><b>Aspen Aerial (Down &amp; Under) Telescopic Inspection Unit</b></p> <p>(Vendor term) A bridge inspection machine that utilizes turntables and multiple joints to allow inspectors to access the underside of an aerial structure from the roadway above, particularly when ladders from the ground below are not practical.</p> |   |
| <p><b>Maximo</b></p> <p>Maximo is WMATA's maintenance management system used for work order, incident, and track defect tracking.</p>  |  |
| <p><b>Work Order (WO)</b></p> <p>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.</p>  |  |



## 7.3 APPENDIX C: Definitions

| Definitions  | Photos   |  |                  |  |  |  |                    |                        |                  |                  |          |            |         |            |               |  |            |         |            |               |  |            |                             |            |                |  |            |                    |            |                |  |            |                 |            |                |  |            |                    |            |                |  |            |                 |            |                |  |            |                    |            |            |  |            |                 |            |            |  |            |                    |            |            |  |            |                 |            |            |  |            |                    |            |            |  |
|--|--|--|------------------|--|--|--|--------------------|------------------------|------------------|------------------|----------|------------|---------|------------|---------------|--|------------|---------|------------|---------------|--|------------|-----------------------------|------------|----------------|--|------------|--------------------|------------|----------------|--|------------|-----------------|------------|----------------|--|------------|--------------------|------------|----------------|--|------------|-----------------|------------|----------------|--|------------|--------------------|------------|------------|--|------------|-----------------|------------|------------|--|------------|--------------------|------------|------------|--|------------|-----------------|------------|------------|--|------------|--------------------|------------|------------|--|
| <p><b>Common Corridor (CSX, Norfolk Southern)</b><br/>                     Portions of the WMATA system located in common corridors shared with highways and railroads (CSX, Norfolk Southern). This produces occasional obstacles to performing maintenance on Metrorail, as it requires additional permission from the other stakeholders.</p> |    |  |                  |  |  |  |                    |                        |                  |                  |          |            |         |            |               |  |            |         |            |               |  |            |                             |            |                |  |            |                    |            |                |  |            |                 |            |                |  |            |                    |            |                |  |            |                 |            |                |  |            |                    |            |            |  |            |                 |            |            |  |            |                    |            |            |  |            |                 |            |            |  |            |                    |            |            |  |
| <p><b>Concrete Delamination and Exposed Rebar (Example)</b><br/>                     Van Dorn Station, March 2017.</p>   |    |  |                  |  |  |  |                    |                        |                  |                  |          |            |         |            |               |  |            |         |            |               |  |            |                             |            |                |  |            |                    |            |                |  |            |                 |            |                |  |            |                    |            |                |  |            |                 |            |                |  |            |                    |            |            |  |            |                 |            |            |  |            |                    |            |            |  |            |                 |            |            |  |            |                    |            |            |  |
| <p><b>Cut Sheet</b><br/>                     The Cut Sheet is a simple chart used to track the progress of an inspection.</p>  | <table border="1" data-bbox="982 961 1513 1276"> <thead> <tr> <th colspan="5">REVISED: _____ SUPERVISOR'S NAME _____</th> </tr> <tr> <th>DATE OF INSPECTION</th> <th>STRUCTURAL DESCRIPTION</th> <th>REPORT SUBMITTED</th> <th>INSPECTOR'S NAME</th> <th>COMMENTS</th> </tr> </thead> <tbody> <tr> <td>07/09/2016</td> <td>Deck IB</td> <td>07/25/2016</td> <td>Robert Walsh*</td> <td></td> </tr> <tr> <td>07/12/2016</td> <td>Deck OB</td> <td>07/25/2016</td> <td>Robert Walsh*</td> <td></td> </tr> <tr> <td>08/28/2016</td> <td>South Abutment D-5466 IB/OB</td> <td>09/01/2016</td> <td>Donald Thomas*</td> <td></td> </tr> <tr> <td>08/28/2016</td> <td>Span-5471 IB/CS/OB</td> <td>09/01/2016</td> <td>Donald Thomas*</td> <td></td> </tr> <tr> <td>08/28/2016</td> <td>Pier-5477 IB/OB</td> <td>09/01/2016</td> <td>Donald Thomas*</td> <td></td> </tr> <tr> <td>08/28/2016</td> <td>Unit-5483 IB/CS/OB</td> <td>08/31/2016</td> <td>Donald Thomas*</td> <td>Night inspection / J. Davis deck IB/OB</td> </tr> <tr> <td>08/28/2016</td> <td>Pier-5488 IB/OB</td> <td>09/01/2016</td> <td>Donald Thomas*</td> <td></td> </tr> <tr> <td>09/27/2016</td> <td>Span-5494 IB/CS/OB</td> <td>09/28/2016</td> <td>Mark Hale*</td> <td></td> </tr> <tr> <td>09/27/2016</td> <td>Pier-5500 IB/OB</td> <td>09/28/2016</td> <td>Mark Hale*</td> <td></td> </tr> <tr> <td>09/27/2016</td> <td>Span-5506 IB/CS/OB</td> <td>09/28/2016</td> <td>Mark Hale*</td> <td></td> </tr> <tr> <td>09/27/2016</td> <td>Pier-5511 IB/OB</td> <td>09/28/2016</td> <td>Mark Hale*</td> <td>Krist night insp / J. Davis deck IB/OB</td> </tr> <tr> <td>09/28/2016</td> <td>Span-5517 IB/CS/OB</td> <td>09/28/2016</td> <td>Mark Hale*</td> <td>Krist night insp / J. Davis deck IB/OB</td> </tr> </tbody> </table> | REVISED: _____ SUPERVISOR'S NAME _____ |                  |  |  |  | DATE OF INSPECTION | STRUCTURAL DESCRIPTION | REPORT SUBMITTED | INSPECTOR'S NAME | COMMENTS | 07/09/2016 | Deck IB | 07/25/2016 | Robert Walsh* |  | 07/12/2016 | Deck OB | 07/25/2016 | Robert Walsh* |  | 08/28/2016 | South Abutment D-5466 IB/OB | 09/01/2016 | Donald Thomas* |  | 08/28/2016 | Span-5471 IB/CS/OB | 09/01/2016 | Donald Thomas* |  | 08/28/2016 | Pier-5477 IB/OB | 09/01/2016 | Donald Thomas* |  | 08/28/2016 | Unit-5483 IB/CS/OB | 08/31/2016 | Donald Thomas* | Night inspection / J. Davis deck IB/OB | 08/28/2016 | Pier-5488 IB/OB | 09/01/2016 | Donald Thomas* |  | 09/27/2016 | Span-5494 IB/CS/OB | 09/28/2016 | Mark Hale* |  | 09/27/2016 | Pier-5500 IB/OB | 09/28/2016 | Mark Hale* |  | 09/27/2016 | Span-5506 IB/CS/OB | 09/28/2016 | Mark Hale* |  | 09/27/2016 | Pier-5511 IB/OB | 09/28/2016 | Mark Hale* | Krist night insp / J. Davis deck IB/OB | 09/28/2016 | Span-5517 IB/CS/OB | 09/28/2016 | Mark Hale* | Krist night insp / J. Davis deck IB/OB |
| REVISED: _____ SUPERVISOR'S NAME _____   |  |  |                  |  |  |  |                    |                        |                  |                  |          |            |         |            |               |  |            |         |            |               |  |            |                             |            |                |  |            |                    |            |                |  |            |                 |            |                |  |            |                    |            |                |  |            |                 |            |                |  |            |                    |            |            |  |            |                 |            |            |  |            |                    |            |            |  |            |                 |            |            |  |            |                    |            |            |  |
| DATE OF INSPECTION   | STRUCTURAL DESCRIPTION   | REPORT SUBMITTED                       | INSPECTOR'S NAME | COMMENTS                               |  |  |                    |                        |                  |                  |          |            |         |            |               |  |            |         |            |               |  |            |                             |            |                |  |            |                    |            |                |  |            |                 |            |                |  |            |                    |            |                |  |            |                 |            |                |  |            |                    |            |            |  |            |                 |            |            |  |            |                    |            |            |  |            |                 |            |            |  |            |                    |            |            |  |
| 07/09/2016   | Deck IB  | 07/25/2016                             | Robert Walsh*    |  |  |  |                    |                        |                  |                  |          |            |         |            |               |  |            |         |            |               |  |            |                             |            |                |  |            |                    |            |                |  |            |                 |            |                |  |            |                    |            |                |  |            |                 |            |                |  |            |                    |            |            |  |            |                 |            |            |  |            |                    |            |            |  |            |                 |            |            |  |            |                    |            |            |  |
| 07/12/2016   | Deck OB  | 07/25/2016                             | Robert Walsh*    |  |  |  |                    |                        |                  |                  |          |            |         |            |               |  |            |         |            |               |  |            |                             |            |                |  |            |                    |            |                |  |            |                 |            |                |  |            |                    |            |                |  |            |                 |            |                |  |            |                    |            |            |  |            |                 |            |            |  |            |                    |            |            |  |            |                 |            |            |  |            |                    |            |            |  |
| 08/28/2016   | South Abutment D-5466 IB/OB  | 09/01/2016                             | Donald Thomas*   |  |  |  |                    |                        |                  |                  |          |            |         |            |               |  |            |         |            |               |  |            |                             |            |                |  |            |                    |            |                |  |            |                 |            |                |  |            |                    |            |                |  |            |                 |            |                |  |            |                    |            |            |  |            |                 |            |            |  |            |                    |            |            |  |            |                 |            |            |  |            |                    |            |            |  |
| 08/28/2016   | Span-5471 IB/CS/OB   | 09/01/2016                             | Donald Thomas*   |  |  |  |                    |                        |                  |                  |          |            |         |            |               |  |            |         |            |               |  |            |                             |            |                |  |            |                    |            |                |  |            |                 |            |                |  |            |                    |            |                |  |            |                 |            |                |  |            |                    |            |            |  |            |                 |            |            |  |            |                    |            |            |  |            |                 |            |            |  |            |                    |            |            |  |
| 08/28/2016   | Pier-5477 IB/OB  | 09/01/2016                             | Donald Thomas*   |  |  |  |                    |                        |                  |                  |          |            |         |            |               |  |            |         |            |               |  |            |                             |            |                |  |            |                    |            |                |  |            |                 |            |                |  |            |                    |            |                |  |            |                 |            |                |  |            |                    |            |            |  |            |                 |            |            |  |            |                    |            |            |  |            |                 |            |            |  |            |                    |            |            |  |
| 08/28/2016   | Unit-5483 IB/CS/OB   | 08/31/2016                             | Donald Thomas*   | Night inspection / J. Davis deck IB/OB |  |  |                    |                        |                  |                  |          |            |         |            |               |  |            |         |            |               |  |            |                             |            |                |  |            |                    |            |                |  |            |                 |            |                |  |            |                    |            |                |  |            |                 |            |                |  |            |                    |            |            |  |            |                 |            |            |  |            |                    |            |            |  |            |                 |            |            |  |            |                    |            |            |  |
| 08/28/2016   | Pier-5488 IB/OB  | 09/01/2016                             | Donald Thomas*   |  |  |  |                    |                        |                  |                  |          |            |         |            |               |  |            |         |            |               |  |            |                             |            |                |  |            |                    |            |                |  |            |                 |            |                |  |            |                    |            |                |  |            |                 |            |                |  |            |                    |            |            |  |            |                 |            |            |  |            |                    |            |            |  |            |                 |            |            |  |            |                    |            |            |  |
| 09/27/2016   | Span-5494 IB/CS/OB   | 09/28/2016                             | Mark Hale*       |  |  |  |                    |                        |                  |                  |          |            |         |            |               |  |            |         |            |               |  |            |                             |            |                |  |            |                    |            |                |  |            |                 |            |                |  |            |                    |            |                |  |            |                 |            |                |  |            |                    |            |            |  |            |                 |            |            |  |            |                    |            |            |  |            |                 |            |            |  |            |                    |            |            |  |
| 09/27/2016   | Pier-5500 IB/OB  | 09/28/2016                             | Mark Hale*       |  |  |  |                    |                        |                  |                  |          |            |         |            |               |  |            |         |            |               |  |            |                             |            |                |  |            |                    |            |                |  |            |                 |            |                |  |            |                    |            |                |  |            |                 |            |                |  |            |                    |            |            |  |            |                 |            |            |  |            |                    |            |            |  |            |                 |            |            |  |            |                    |            |            |  |
| 09/27/2016   | Span-5506 IB/CS/OB   | 09/28/2016                             | Mark Hale*       |  |  |  |                    |                        |                  |                  |          |            |         |            |               |  |            |         |            |               |  |            |                             |            |                |  |            |                    |            |                |  |            |                 |            |                |  |            |                    |            |                |  |            |                 |            |                |  |            |                    |            |            |  |            |                 |            |            |  |            |                    |            |            |  |            |                 |            |            |  |            |                    |            |            |  |
| 09/27/2016   | Pier-5511 IB/OB  | 09/28/2016                             | Mark Hale*       | Krist night insp / J. Davis deck IB/OB |  |  |                    |                        |                  |                  |          |            |         |            |               |  |            |         |            |               |  |            |                             |            |                |  |            |                    |            |                |  |            |                 |            |                |  |            |                    |            |                |  |            |                 |            |                |  |            |                    |            |            |  |            |                 |            |            |  |            |                    |            |            |  |            |                 |            |            |  |            |                    |            |            |  |
| 09/28/2016   | Span-5517 IB/CS/OB   | 09/28/2016                             | Mark Hale*       | Krist night insp / J. Davis deck IB/OB |  |  |                    |                        |                  |                  |          |            |         |            |               |  |            |         |            |               |  |            |                             |            |                |  |            |                    |            |                |  |            |                 |            |                |  |            |                    |            |                |  |            |                 |            |                |  |            |                    |            |            |  |            |                 |            |            |  |            |                    |            |            |  |            |                 |            |            |  |            |                    |            |            |  |
| <p><b>Lally Column</b><br/>                     Adjustable Floor Jack used as a temporary solution for platform edge deterioration.</p>  |    |  |                  |  |  |  |                    |                        |                  |                  |          |            |         |            |               |  |            |         |            |               |  |            |                             |            |                |  |            |                    |            |                |  |            |                 |            |                |  |            |                    |            |                |  |            |                 |            |                |  |            |                    |            |            |  |            |                 |            |            |  |            |                    |            |            |  |            |                 |            |            |  |            |                    |            |            |  |
| <p><b>Pedestrian Bridge</b><br/>                     Bridges for foot traffic, oftentimes crossing multiple tracks in common corridors.</p>  |    |  |                  |  |  |  |                    |                        |                  |                  |          |            |         |            |               |  |            |         |            |               |  |            |                             |            |                |  |            |                    |            |                |  |            |                 |            |                |  |            |                    |            |                |  |            |                 |            |                |  |            |                    |            |            |  |            |                 |            |            |  |            |                    |            |            |  |            |                 |            |            |  |            |                    |            |            |  |



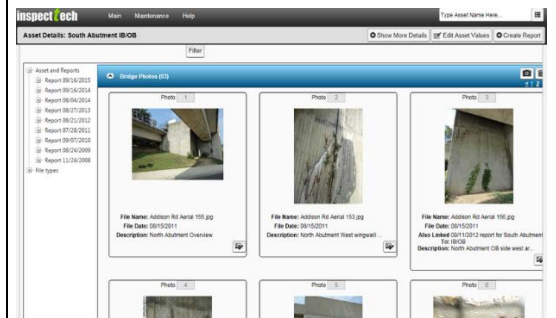
## 7.3 APPENDIX C: Definitions

### Definitions

#### InspectTech

InspectTech is reporting software for structural inspections of bridges, bus garages, elevators, escalators, parking garages, row fences, retaining walls, service pits, shafts, stations, tunnels, and other miscellaneous reports. InspectTech helps Track and Structures (TRST) and Engineering (ENGA) track the degradation of these structures over time and to schedule preventative maintenance to these structures.

### Photos



#### Right-of-Way Fence

Fencing for at-grade track that clearly delineates Metrorail property. The fence is sometimes lined with an Intrusion Detection Warning (IDW) system in shared corridors with highways in order to detect incursion of vehicular traffic onto Metrorail property.



#### Vent Shaft

Vent shafts are large underground structures that are part of the Tunnel Ventilation System. These structures are inspected by STIN.



## 7.4 APPENDIX D: Application of Regulatory CAPs

| Measure                   | Finding  | QICO Review During Review  |
|---------------------------|--|--|
| Regulatory Findings - FTA | <p>TOC-SRT-15-001:<br/> <i>WMATA must conduct an assessment to determine which assets such as escalator shafts are not being inspected as often as originally required and intended and then establish and implement a new inspection schedule that includes these assets</i></p> <p><b>Status:</b> Closed</p>   | <ul style="list-style-type: none"> <li>- WMATA revised its previous practice for the inspections of interior escalators so that all interior escalators are inspected on a biennial basis. In addition to this, the 2016 inspection schedule shows the addition of the N-Line escalators. QICO confirmed this is on STIN's inspection schedule.</li> </ul>   |
| Regulatory Findings - FTA | <p>TOC-SRT-15-002:<br/> <i>WMATA must revise track inspection procedures, documentation, and reporting processes to ensure that leak measuring and monitoring is a routine aspect of inspections</i></p> <p><b>Status:</b> Under FTA Review.</p>   | <ul style="list-style-type: none"> <li>- During the review QICO discovered that STIN inspects the tunnels every two years for leaks, while Track Inspectors (Another branch of TRST) inspects for leaks twice a week.</li> <li>- In addition, Optram (viewer for Maximo defect data) has a "water leak" preference file to view water-based defects noted by walking track inspections throughout the system. This should be utilized by structures inspection and maintenance for planning purposes.</li> </ul> |
| Regulatory Findings - FTA | <p>TOC-SRT-15-003:<br/> <i>WMATA must update its existing quality control check procedures to make it more specific including a checklist and specific instructions for Structures Maintenance Managers to conduct spot checks through field verification and to document results or corrective actions that are completed.</i></p> <p><b>Status:</b> Under FTA Review</p> | <ul style="list-style-type: none"> <li>- QICO discovered that this was addressed in SOP 208-8, Maintenance Management signed by TRST General Superintendent 02/15/2017.</li> </ul>   |
| Regulatory Findings - FTA | <p>TOC-SRT-15-004:<br/> <i>WMATA must complete the required MCP revision with full updates to references and procedures as necessary.</i></p> <p><b>Status:</b> Open/Past Due</p>  | <ul style="list-style-type: none"> <li>- QICO discovered that TRST is currently updating the MCP (WMATA 2000) to satisfy the CAP.</li> </ul>   |

## 7.4 APPENDIX D: Application of Regulatory CAPs

| Measure                   | Finding  | QICO Review During Review   |
|---------------------------|--|---|
| Regulatory Findings - FTA | <p>TOC-SRT-15-005:<br/> <i>WMATA must create a list of asset structures assets with details/characteristics relevant to maintenance.</i></p> <p>Status: Closed</p>   | <ul style="list-style-type: none"> <li>- QICO found during the review a Structures Priority List dated 03/07/2017 which ranks the Structural assets in need of repair on a prioritized basis.</li> <li>- QICO also notes that a compilation of all structural assets including condition assessments was completed by TSFA for phase 1 of the Transit Asset Inventory Condition Assessment (TAICA) project.</li> <li>- FTA closed CAP on March 14, 2017.</li> </ul> |
| Regulatory Findings - FTA | <p>TOC-SRT-15-006:<br/> <i>WMATA must improve use of the <a href="#">InspectTech</a> program to display the work order ticket number created in Maximo or note when no work order is needed for each deficiency note in an inspection.</i></p> <p>Status: Under FTA Review</p> | <ul style="list-style-type: none"> <li>- QICO did not observe this practice being utilized. After reviewing reports QICO found instances where defects have been reported in past inspections not being reported in the latest inspection without any work order numbers (or photos) to back up the condition changes.</li> </ul>   |
| Regulatory Findings - FTA | <p>TOC-SRT-15-010:<br/> <i>WMATA must revise existing maintenance procedures or develop new ones to include information about hours and personnel numbers needed, tools, and access requirements.</i></p> <p>Status: Open/Past Due</p>   | <ul style="list-style-type: none"> <li>- QICO notes work procedures for Structures are currently being revised to a new standard including hours tools etc.</li> </ul>  |

## 7.4 APPENDIX D: Application of Regulatory CAPs

| Measure                   | Finding   | QICO Review During Review   |
|---------------------------|---|---|
| Regulatory Findings - FTA | <p>TOC-SRT-15-007:<br/> <i>WMATA must enhance written inspection procedures to require documentation of all the defects based on location and quantity (possibly as estimated overall linear footage per area of the asset) as a baseline so that the structure conditions can be compared over time and monitored for any deterioration requiring intervention.</i></p> <p><b>Status:</b> Under FTA Review</p> <p>TOC-SRT-15-011:<br/> <i>WMATA must establish discrete definitions or guidelines on the rating scale for the condition of structures such as tunnel and passenger stations (all structures other than bridges) and institute software for inspection management that is appropriate for structures other than bridges.</i></p> <p><b>Status:</b> Under FTA Review</p> | <ul style="list-style-type: none"> <li>- QICO notes that a Bridge Inspection Manual has been developed by ENGA and is under review. This manual if approved will address these CAP's.</li> </ul>  |
| Regulatory Findings - FTA | <p>T-5-1-A:<br/> <i>WMATA must address debris and equipment blocking emergency access landing areas of refuge ensuring contractors are briefed on proper safety protocols.</i></p> <p><b>Status:</b> Under FTA Review</p>   | <ul style="list-style-type: none"> <li>- QICO observed on another review (Metrorail Tunnel Ventilation Fan Maintenance: Inspection and Testing) many instances where other departments have left work equipment that obstructs PLNT maintenance crew's ability to perform maintenance tasks. Also noted was trash and debris left behind by other groups for PLNT to clean up. (Source: Information gathered by sampled fan shaft visits and conversations with PLNT maintenance personnel.)</li> <li>- WMATA requested for the CAP closure on July 15, 2016 and FTA provided the following comments on November 16, 2016 :</li> <li>- <i>Conduct and document TRST's system-wide assessment of all emergency egress areas and areas of refuge, including explicit reference to the status of these areas; Clear all emergency egress areas and areas of refuge and document these activities; Identify and provide the WMATA policy(ies) or procedure(s) that relate to maintaining clear areas of refuge and emergency egress areas and update the Memorandum, Maintaining Housekeeping Memorandum</i></li> </ul> <p><b>Resubmission date - TBD</b></p> |

## 7.4 APPENDIX D: Application of Regulatory CAPs

| Measure                   | Finding  | QICO Review During Review   |
|---------------------------|--|---|
| Regulatory Findings - OIG | <p>01-OIG:<br/> <i>(OIG Investigation No.14-0005-1)</i><br/> <i>Lack of standard inspection procedures manual.</i></p>           | <ul style="list-style-type: none"> <li>- A Parking Garage Inspection Manual and a Bridge Inspection Manual were developed and are currently under review by WMATA stakeholders.</li> <li>- According to ENGA a Tunnel Inspection Manual is also under consideration.</li> </ul>   |
| Regulatory Findings - OIG | <p>02-OIG:<br/> <i>(OIG Investigation No.14-0005-1)</i><br/> <i>Lack of current photos being used in inspection reports.</i></p> | <ul style="list-style-type: none"> <li>- QICO noted defects without corresponding photos in some of the reviewed reports as described <a href="#">above</a>.</li> </ul>   |
| Regulatory Findings - OIG | <p>03-OIG:<br/> <i>(OIG Investigation No.14-0005-1)</i><br/> <i>Inspection report remarks were being cut and pasted.</i></p>     | <ul style="list-style-type: none"> <li>- After reviewing approximately 15 assets and comparing their inspection reports for three (3) or more years QICO observed several comments that were the same as the previous inspection reports. QICO noted that when creating a new report in InspectTech the new report brings all existing comments from previous years report by default unless the user chooses to change to a blank form. STIN management addressed this issue by having their inspectors choose the blank forms in InspectTech however there is no written procedure for this.</li> </ul> |
| Regulatory Findings - OIG | <p>04-OIG:<br/> <i>(OIG Investigation No.14-0005-1)</i><br/> <i>Lack of consistent inspection process.</i></p>                   | <ul style="list-style-type: none"> <li>- QICO observed STIN inspectors performing inspections and noted there is an inconsistency in how the inspections are carried out amongst the various inspectors.</li> </ul>   |
| Regulatory Findings - OIG | <p>05-OIG:<br/> <i>(OIG Investigation No.14-0005-1)</i><br/> <i>Lack of tracking method to verify completion of repairs.</i></p> | <ul style="list-style-type: none"> <li>- STIN intends to address this OIG finding with SOP 208-06 STRC (dated 02/01/2017), which outlines the full process of reporting a defect and documenting a repair plan with a work order number</li> </ul>  |

## 7.4 APPENDIX D: Application of Regulatory CAPs

| Measure                   | Finding  | QICO Review During Review   |
|---------------------------|--|---|
| Regulatory Findings - OIG | <p>06-OIG:<br/> <i>(OIG Investigation No.14-0005-1)</i><br/> <i>Institute QA/QC recommendations from the 2013 report "Recommendations for Aerial Structure Inspection and Maintenance.</i></p> | <ul style="list-style-type: none"> <li>- QICO discovered that some of the recommendations are not being followed. For example, section 3.5.1. Report Review states that a QC Engineer has to review each inspection report for completeness and conformity to the Departments requirements.<br/> <i>(Source: Interview with structural engineer assigned to work with STIN department)</i></li> </ul> |
| Regulatory Findings - OIG | <p>07-OIG:<br/> <i>(OIG Investigation No.14-0005-1)</i><br/> <i>Documents supervisory reviews on the inspection reports</i></p>  | <ul style="list-style-type: none"> <li>- There is no documentation of supervisory reviews of the inspection reports. Also noted in review findings <a href="#">F-SIM-03</a> and <a href="#">F-SIM-05</a> above.<br/> <i>(Source: Interview with structural engineer assigned to work with STIN department)</i></li> </ul>   |

## 7.5 Appendix E: Job Descriptions

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY  
POSITION DESCRIPTION

DIVISION SUPERINTENDENT, TRST, LS-12  
TIES/TRST

DATE: 10/1/12

FLSA: EXEMPT  
ROLE: 04

REVIEWED:

TIES: ~~\_\_\_\_\_~~

HRSD: ~~\_\_\_\_\_~~ 10/1/12

REPORTS TO: Assistant General Superintendent, TRST

SUMMARY:

This is professional, supervisory, technical, and administrative Track & Structures maintenance work of a difficult nature. Employee in this class may be responsible for coordinating, scheduling and supervising track, way and inspection activities to include tracks, yards, tunnels, structures, systems, related properties, and special projects. Employee has considerable latitude for independent judgment and action within established guidelines.

MAJOR DUTIES:

Plans, develops, manages and implements policies and procedures within the General Superintendent's operation. Establishes, analyzes, and evaluates branch programs, goals, and objectives as they pertain to track, way and systems maintenance functions.

Maintains knowledge of recent developments in transit track and way, structure and inspection management operations, and system maintenance activities. Evaluates, recommends and assists in implementation of those which are seen as beneficial to the achievement of TRST goals and objectives.

Coordinates activities between various departments to ensure that necessary material and equipment are requisitioned. May prepare technical specifications and details for track and way projects. Evaluate and recommend acceptance of offers from vendors and contractors in accordance with the Authority's procurement manual. Monitors and serves as Technical Representative of the Contracting Officer on contracts pertaining to track, way and structure projects. Attends office and department committee meetings to make presentations regarding contractual needs, when required.



Conducts periodic staff meetings with regional staff to ensure efficient regional branch operations. Supervise, develop and coordinate an effective track way and systems maintenance inspection function for the Authority's track related properties.

Prepares assignments, insures that necessary material and equipment are requisitioned, and evaluates performance of assigned work crews, recommending appropriate methods and techniques to be implemented as necessary.

Participates in evaluation of track and structures work to be accepted for subsequent phase operations, and of new equipment to be acquired for the track maintenance activities.

Implements procedures for undertaking corrective measures in emergency situations without interruption to normal train operations service when feasible.

Ensures proper and timely notification is provided to central control operations when undertaking work assignments.

Assists in the preparation of budgetary forecasts and insures personnel are properly trained and follow established safety guidelines.

Supervises subordinate staff to include recommending applicant selection, disciplinary actions, resolution of grievances, assigning duties, directing work, conducting performance evaluations, approving leave requests and timesheets, and ensuring appropriate training is provided.

Attends meetings, hearings and high-level planning sessions, inside and outside the Authority pertinent to the execution of the functional responsibilities of Track and Structures.

Periodically represents the Authority at similar national and local conferences. May visit other transit properties to observe and possibly incorporate best practices to operate a more efficient and safe railroad.

**The above duties and responsibilities are not intended to limit specific duties and responsibilities of any particular position. It is not intended to limit in any way the right of supervisors to assign, direct and control the work of employees under their supervision.**

**KNOWLEDGE, SKILLS AND ABILITIES:**

Thorough knowledge of how a rapid rail transit system is regulated; a working knowledge of current track and structures maintenance as well as inspection and systems maintenance procedures, to include emergency operations; and a working knowledge of the principles of failure modes in structural components.

Extensive knowledge of WMATA's and Federal DOT Standards and all applicable Federal, State and local codes governing Track Maintenance.

Comprehensive knowledge of the Authority's rules and regulations; rapid rail transit maintenance engineering plans; and procedures and Collective Bargaining Agreements.

Ability to lead, manage and train all the diverse Track and Structures and Inspection personnel and functions in compliance with applicable Authority human resources and labor relations policies, procedures, regulations and agreements.

Ability to maintain current knowledge and understanding of the state-of-the-art rapid rail activities and to contribute to the solution of select technical problems.

Ability to communicate effectively and use Maximo or other computer based asset management system.

**MINIMUM QUALIFICATIONS:**

Graduation from an accredited college or university with a Bachelor's Degree in Electrical, Mechanical, Civil engineering field, and a minimum of eight (8) years progressively responsible experience in rapid rail transit track, structural or systems maintenance and inspection organization with knowledge of the application of state-of-the-art track and structural maintenance equipment, including computerized bridge jacking systems, snooper cranes, sophisticated scaffold systems and ground penetrating radar. Experience must have included four (4) years of Supervisory and or managerial experience.

Or, a combination of post high school education and twelve (12) years progressively responsible experience in rapid rail transit track and structural maintenance and inspection organization with knowledgeable of the application of state-of-the-art track and structural and systems maintenance equipment, including computerized bridge jacking systems, snooper cranes, sophisticated scaffold systems and ground penetrating radar. Experience must have included four (4) years of Supervisory and or managerial experience.

**LICENSE:**

Possess a valid motor vehicle operator's license from jurisdiction of residence.

**MEDICAL GROUP:**

Ability to satisfactorily complete the medical examination for this class. Must be able to perform the essential functions of this job either with or without reasonable accommodation(s).

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY

JOB DESCRIPTION

JOB : Asst. Superintendent, Track & Structures LS-10

DATE 10-15-03

DEPT/OFFICE: RAIL/TRST

REVIEWED:

RAIL : [Signature]

HRMP : [Signature]

REPORTS TO: Superintendent, Track & Structures

JOB SUMMARY:

This is supervisory, administrative and technical track and way maintenance work involving the management of activities associated with the execution of planned and scheduled preventive maintenance, inspection and repair of all major track and structures and other support systems within a region or systemwide. Employee assists in the initiation and implementation of appropriate policies and procedures associated with track and structures maintenance and inspection. Employee has latitude for independent judgment and action within established guidelines.

DUTIES:

Manages and implements, for the assigned area, an effective inspection schedule, preventive maintenance and repair program for facilities, related systems and equipment to ensure their continuous availability in the provision of safe, efficient and clean use of bus/rail facilities, operational support service, and related activities.

Supervises the assignment of tasks or duties to be performed by crews in accordance with established priorities. May conduct periodic staff meeting to ensure enhanced communications and effectiveness among employees.

Evaluates the efficiency and effectiveness of assigned inspection and maintenance crews, assessing such items as adherence to phased work plans and allowable costs, how well performance, work quality and safety objectives are achieved and the incidence of follow-up repairs. May recommend improvement in work methods and techniques to correct maintenance deficiencies.

Supervises subordinate staff to include recommending applicant selection, disciplinary actions, resolution of grievances, assigning duties, directing work, conducting performance evaluations, approving leave requests and timesheets, and ensuring appropriate training is provided.

Prepares and presents oral/written reports or recommendations for Superintendents and others within area of assigned responsibility as may be appropriate.

May make recommendations regarding the establishment of policies and procedures for programs affecting the safety and operational effectiveness within the assigned area of responsibility.

Performs related management duties as required.

**KNOWLEDGE, SKILLS AND ABILITIES:**

Knowledge of the methods and procedures required to carry out large scale track maintenance, structures maintenance, and monitor systemwide inspections, for their respective branches, and the ability to evaluate and recommend new procedures to upgrade and refine existing programs.

Knowledge of Authority and rail rules and regulations, operational plans and procedures, regulatory agencies' guidelines and appropriate collective bargaining agreements.

Demonstrated ability to diagnose difficult maintenance problems, critical safety problems and render corrective actions in a timely manner.

Ability to lead, manage and train all the diverse Track and Structures maintenance and Inspection personnel and functions in compliance with applicable Authority human resources and labor relations policies, procedures, regulations and agreements.

Ability to communicate effectively.

**MINIMUM QUALIFICATIONS AND EXPERIENCE:**

Graduation from an accredited college or university with a Bachelor's Degree in Electrical, Mechanical, Civil or a related engineering field, and six (6) years of progressively responsible experience in rapid rail transit track and structural maintenance and inspection organization.

**Code No.: 5321**

Or, a combination of post high school education and a minimum of ten (10) years of progressively responsible experience in rapid rail transit track and structural maintenance and inspection organization.

**LICENSE:**

Possess a valid Maryland, Virginia or District of Columbia motor vehicle operator's license from jurisdiction of residence.

**MEDICAL GROUP:**

Ability to satisfactorily complete the medical examination for this class. Must be able to perform the essential functions of this job either with or without reasonable accommodation(s).

**FLSA: EXEMPT**



WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY

JOB DESCRIPTION

JOB : Track and Structures Maintenance Manager, LS-09

Date: 10-15-03

DEPT/OFFICE: RAIL/TRST

REVIEWED:

RAIL : ~~\_\_\_\_\_~~

HRMP: ~~\_\_\_\_\_~~

LABR : ~~\_\_\_\_\_~~

10/16/03

REPORTS TO: Superintendent, Track & Structures

JOB SUMMARY:

This is a technical supervisory and administrative track and structures maintenance and inspection work of a difficult nature. An employee in this class will be selected for and assigned to either track and way or structures work. Employee in this job is responsible for the effective supervision of assigned personnel in the performance of prompt and efficient maintenance of the track and way and support structure, mainline and yard, and other maintenance activities such as station leak repair, to support the General Superintendent in the overall review, inspection, investigation, identification and instruction of the work process to correct and ensure proper track and structures maintenance activities. Employee has latitude for independent judgment and action.

DUTIES:

Supervises subordinate staff to include recommending applicant selection, disciplinary actions, resolution of grievances, assigning duties, directing work, conducting performance evaluations, approving leave requests and time sheets/cards, and ensuring appropriate subordinate training is provided using sound employee relations practices in accordance with applicable Collective Bargaining Agreements or the WMATA Personnel Policies and Procedures Manual.

Observes and enforces established safety rules and regulations when performing and directing assignments, especially during revenue operating hours. Prepares regional track rights request based on priority work requests, and submits such in a timely manner. Prepare back-up track rights requests in the event of track right bumping or cancellation. Prepares necessary documentation for support from other branches or contractors.

**Code No.: 5456**

Provides assistance to other track and structures supervisors, as necessary; and promptly, efficiently and effectively responds to track and structures emergencies, as required.

Inspects track and way or track structure facilities, to ensure trains are riding properly on aerials, bridges and track structures, and they are in the proper condition to ensure the safe operation of trains, within established WMATA specifications.

Responds to problems on assigned track and structures, appropriately investigates and accurately determines if the track or structure is safe for continued operations and what repairs are necessary either for immediate action or to be accomplished by a scheduled work crew. Forwards all necessary documentation required to order work completion by other personnel to the appropriate Superintendent and Assistant Superintendent.

Outlines, via sketches or drawings, the specific problem and location, relative to established markers, analyzes the problem and determines what steps and materials will be required for repairing the track or structure as well as appropriately evaluating and recommending the level of priority to be given a specific project by accurately completing all necessary documentation required to order work completion.

Ensures work crews are properly staffed and equipped before giving the order for the work crews to proceed with the assigned task.

Communicates with both Central and Maintenance Control Personnel to ensure movements along track to work sites are within proper operating procedures.

Inspects work completed by subordinate personnel or other work crews as to progress made and to ensure proper accomplishment of tasks, which includes, but is not limited to, taking correct measurements of rail for proper curves or drilling, or bridge repairs, station structural repair or leak work.

Prepares, submits and maintains required status reports on shift activities to provide the next shift with the accurate information necessary to ensure materials and equipment required for the continuation or completion of track and structures repair are obtained in a timely manner to ensure prompt, efficient and effective completion of required maintenance tasks during the next shift.

Prepares, submits and maintains data on performance of track or structures equipment and facilities, to include rail wear, special track work, structural retrofit work, track

girder corrosion, and inventories on hand to include, but not limited to, the initiation of necessary replacement requisitions.

Participates in the inspection of track and structures facilities, to include, but not limited to, track, stations, tunnels, aerials, and right-of-ways, to be accepted from contractors and effectively ensure all necessary documentation is prepared, submitted and maintained to record the activities of the inspections.

**KNOWLEDGE, SKILLS AND ABILITIES:**

Knowledge of track and way and structures maintenance including the correct use of tools, equipment, operation of track equipment and inspection methods.

Knowledge of track work design and the problems associated with the maintenance of continuous welded rail; required to review, analyze and recommend corrective actions

Knowledge of structural design and the problems associated with the maintenance of concrete and steel structures; required to review, analyze and recommend corrective actions.

Knowledge of safety rules and regulations and the rules governing protection of self, others and traffic during periods of track repair and operations.

Knowledge of the Authority's rail operation, maintenance and administrative procedures.

Demonstrate ability to effectively supervise, train and evaluate subordinate staff in compliance with applicable Authority personnel and labor relations policies, procedures, regulations and agreements.

Ability to establish and maintain accurate records and reports related to maintenance activities and performance of work crews, performance of track and structures and its related components, status and work accomplished for each section of track.

Ability to accurately complete required reports and prepare detailed work sketches for those sections of track in need or repair.

Ability to determine efficient resources required to complete repairs to support Assistant Superintendents in work planning.



Ability to effectively prepare budgetary estimates and management reports to support the total track and structures maintenance objectives and activities.

Ability to distinguish basic colors for safety purposes.

Ability to communicate effectively.

Ability to deal tactfully and effectively with associated personnel.

Ability and willingness to work variable shifts.

**MINIMUM QUALIFICATIONS AND EXPERIENCE:**

Graduation from high school or possession of a high school equivalency certificate with vocational training in construction, welding or related fields. A minimum of seven (7) years experience that has included experience in all phases of track installation, repair and maintenance with demonstrated track inspection and maintenance analysis experience or structures repair and maintenance with demonstrated structures inspection and analysis and three (3) years supervisory experience is required.

**LICENSE:**

Possession of a valid motor vehicle operator's license from jurisdiction of residence.

**MEDICAL GROUP:**

Ability to satisfactorily complete the medical examination for this job. The employee must be able to perform the essential functions of this job, either with or without reasonable accommodation(s).

**FSLA: EXEMPT**

CODE NO: 5568

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY  
POSITION DESCRIPTION

SUPERVISOR, STRUCTURE MAINTENANCE & INSPECTION, LS-08  
DEPT/OFFICE: TIES/TRST

DATE: 3-13-13

FLSA: NON-EXEMPT  
ROLE: 03

REVIEWED:

TIES: ~~LS~~ 3/21/2013  
HRCB: ~~LS~~ 3/13/13  
LABR: ~~LS~~ 3-11-13

REPORTS TO: Assistant Superintendent or Maintenance Manager

SUMMARY:

This position is responsible for supervising structure maintenance and inspection crews in the maintenance, construction, and inspection of the Authority's track and way system including facilities. Incumbent has latitude for independent judgment and action with the established guidelines and is supervised by the Assistant Superintendent or Maintenance Manager depending on assigned shift.

MAJOR DUTIES:

Oversees activities such as structure maintenance, structure inspection, new bridge and facility construction. The variety of repairs will include, leak repairs, expansion joints, drains, fence, structure support beams and fabrications to all types of structures, concrete, block, wood, and steel.

Ensures structure personnel performing maintenance and inspection work are aware of standards, tolerances, and typical adverse conditions that may affect the movement and behavior of structures, facilities, and the track.

Ensures structure personnel are trained in the proper use and operation of all equipment. Provides on-the-job training to subordinate personnel.

Maintains records and reports of work production, procurement, usage of materials, and verifies daily time reports of employees.

Ensures safety requirements and WMATA rules and regulations are followed while performing maintenance, inspection and construction activities.

**CODE NO: 5568**

Plans methods and sequences maintenance and inspection jobs. Ensures all material and equipment are indentified, gathered, and available prior to execution of maintenance and inspection work.

Maintains spare parts and tool/equipment inventory for projected inspection, maintenance and repair programs.

Ensures equipment is maintained and sent for PMI as required.

Performs the duties of the Roadway Worker in Charge (RWIC) to provide a safe Roadway work environment for crews and/or contractors.

Subject to 24-hour call-in for emergency or unusual conditions.

Operates WMATA non-revenue vehicles.

**The above duties and responsibilities are not intended to limit specific duties and responsibilities of any particular position. It is not intended to limit in any way the right of supervisors to assign, direct and control the work of employees under their supervision.**

**KNOWLEDGE, SKILLS AND ABILITIES:**

Must comply with WMATA license policy for operation of WMATA non-revenue vehicles. Must maintain license as a condition of continued employment.

Must have analytical skills to solve highly complex mechanical, electrical, and technical problems.

Ability to demonstrate effective communication and interpersonal skills including the ability to communicate by radio and other electronic means.

Proficient using PC and software applications.

Knowledge of structural or construction related maintenance including the correct use of tools and equipment.

Knowledge of structural design principles and the problems associated with steel and reinforced concrete structures is required.

General knowledge of construction practices such as concrete reinforcement and repair methods, structural leak repair methods, perimeter fence installation and expansion joint repair.

A thorough knowledge of safety rules and the rules governing protection of traffic during

periods of track repair.

Broad knowledge of the operation of track and structure maintenance equipment.

Knowledge of or the ability to rapidly attain knowledge of the Authority's rail operation and maintenance procedures.

Ability to supervise and train personnel in structural maintenance.

Ability to complete required reports utilizing computer based programs.

Ability to distinguish specific colors.

Ability to communicate effectively both written and orally.

Ability to deal tactfully and effectively with associated personnel.

Ability to work in an environment where there is exposure to dust, noise, or temperature. May be exposed to unpleasant working conditions to include dust, noise, temperature, weather, petroleum products, and chemicals while visiting WMATA's operating facilities, assuming incumbent is observing all policies and procedures, safety precautions and regulations, and using all protective clothing and devices provided.

Physical capability to frequently spend 50% to 70% of time in the field , exert moderate physical effort while standing, walking, or lifting materials/tools/objects weighing up to 100 pounds.

**MINIMUM QUALIFICATIONS:**

Graduation from an accredited college or university with an Associate's Degree in Business Administration, or a certification from an approved technical program Facility Management/Engineering, Construction Management, Mechanical, or related field. Or a high school diploma, or GED with five (5) years experience in structure inspection, maintenance and repairs on a Class I railroad or on an electrified rail transit system, or related experience in the construction industry performing facility or bridge new construction and/or rehabilitation.

Incumbents subject to the federal testing regulations of safety sensitive positions, which include random alcohol and drug testing as a condition of continued employment.

Incumbents are required to maintain qualification for access to Roadway as a condition of continued employment.

Incumbents required to maintain qualification for access to Roadway Worker Protection Level IV certification as condition of continued employment.

**LICENSE:**

Possess a valid motor vehicle operator's license from jurisdiction of residence.

**MEDICAL GROUP:**

Ability to satisfactorily complete the medical examination for this position. The incumbent must be able to perform the essential functions of this position either with or without reasonable accommodations.

## 8 REFERENCE DOCUMENTS

## **8.1 Reference 1: Report for Van Dorn Station IB Platform Edge Concrete Shoring**

**Assessment for IB Platform Edge Concrete Shoring Installation  
at Van Dorn Street Station**

(Prepared by [REDACTED] March 14, 2017)

The temporary shoring issue for supporting the platform edge concrete on inbound side at Van Dorn Street Station was raised by [REDACTED] of QA group on March 9, 2014. TSFE engineer [REDACTED] inspected the site at Van Dorn Street Station on March 10, 2014. The findings on this edge concrete show that there are approximately fifteen locations of concrete deterioration and rebar corrosion. Among them, the one near the east end of the platform canopy (Figure 1) is the worst case, as shown in Figure 2. This location is at approximately Chain Marker 690+00 (Figure 5).

Figure 2 shows an approximately 18 feet long edge concrete deterioration with an excessive amount of rebars installed during construction. Based on the design (Figure 3), the longitudinal rebar at the end of the platform edge is located at the top corner inside bent of the top transverse rebar. The existing condition (Figures 2, 5 and 6) shows at least 6 longitudinal rebars at the platform edge. These longitudinal exposed rebars are redundant and not placed properly.

Due to protection of the top transverse rebar as shown in Figure 5, approximately 5” to 6” concrete slab depth is in good condition and this top transverse rebar is well protected. Secondly, concrete deterioration at the underside of the slab extends 10” at most, as shown in Figure 4. Thirdly, from the top of the platform there is no apparent settlement of granite stones. Therefore, there is no immediate impact on the structural safety and no tripping hazards to customers. No shoring posts are required for this location (approximately Chain Marker 690+00) at this time.

However, for displaced rebars A, B and C (Figures 5 and 6) which intrude into the IB track bed should be addressed. Cutoff of rebar A, B and C and their cutoff limits are shown in Figure 6. Rebars A and B should remain some portions not cut off in order to overlap with a new rebar in the future repair. The cutoff limits may be adjusted on the site by site supervisor. The cutoff limits should keep all rebars not go beyond the edge of the platform concrete.

For more information related to reinforcing details in Figure 3, refer to As-built drawings in Figures 7 and 8.

Deteriorations for the rest of the locations are not considered to cause potential problems on the platform structure and customers. Therefore, no shoring posts are required at this time.

**Recommendations:**

1. Immediate cutoff of rebars A, B and C at Chain Marker 290+00 as stated above.
2. Platform edge concrete repair at Chain Marker 290+00 on the inbound side shall be performed as soon as possible.





Figure 1: The location as marked is where the worst deterioration (approximately Chain Marker 690+00) is located.



Figure 2: Side view of concrete deterioration and rebar corrosion/separation.

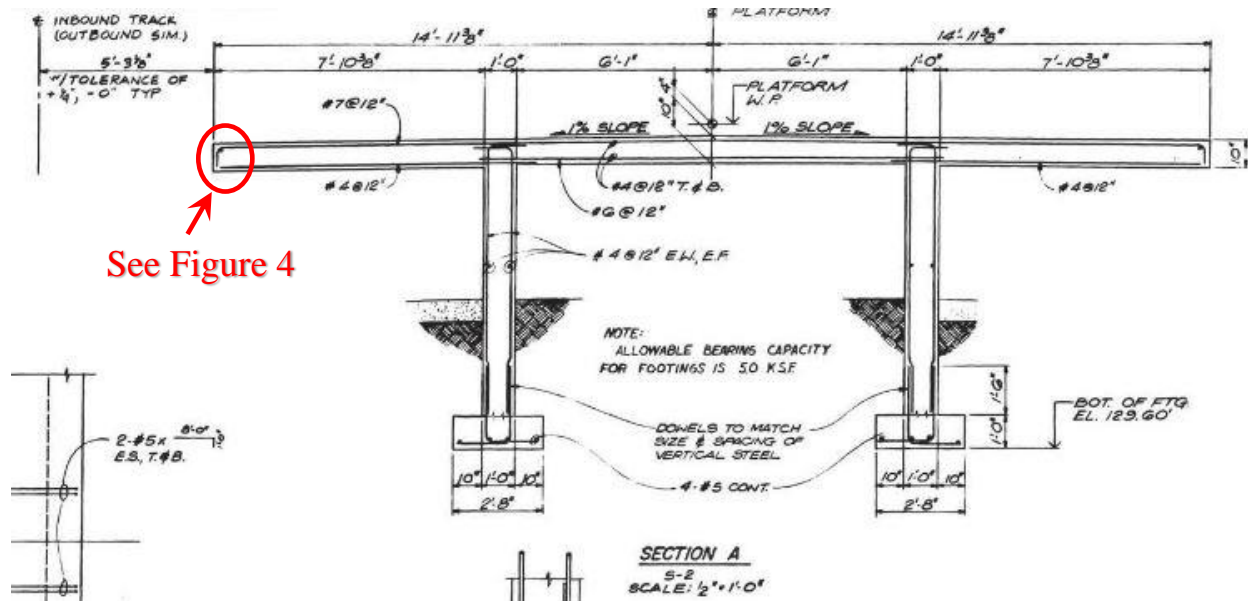


Figure 3: The section shows reinforcing details where Figure 2 existing condition is located.



The surface damage indicated in photos does not pose an immediate risk to pedestrian traffic on the platform.

Figure 4: Close-up view from underside of platform edge. Most of spalls are within 5” from the edge of concrete. 10” is the limit for existing deterioration condition.



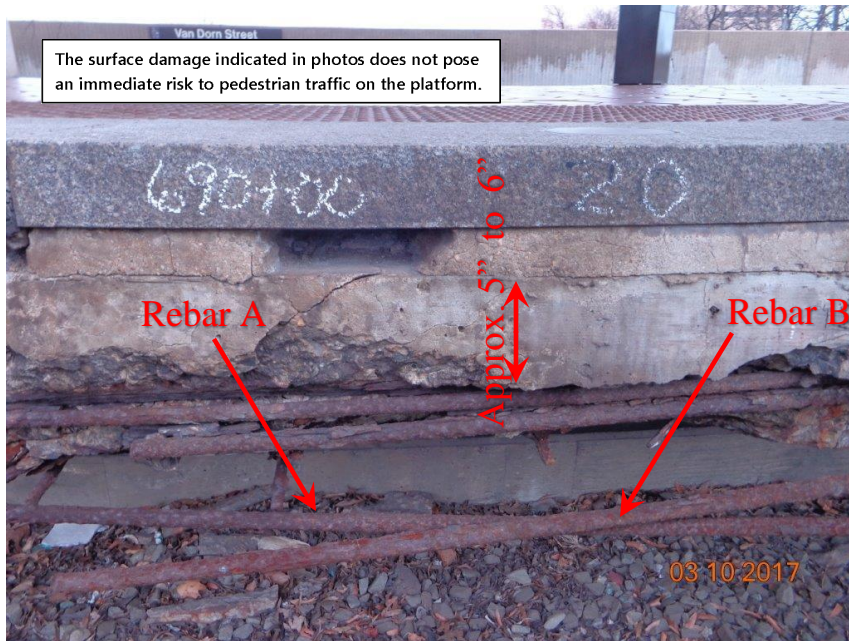


Figure 5: Close-up view of the surface as shown in Figure 2. The rebars as marked intrude into the track bed area and should be truncated for safety.

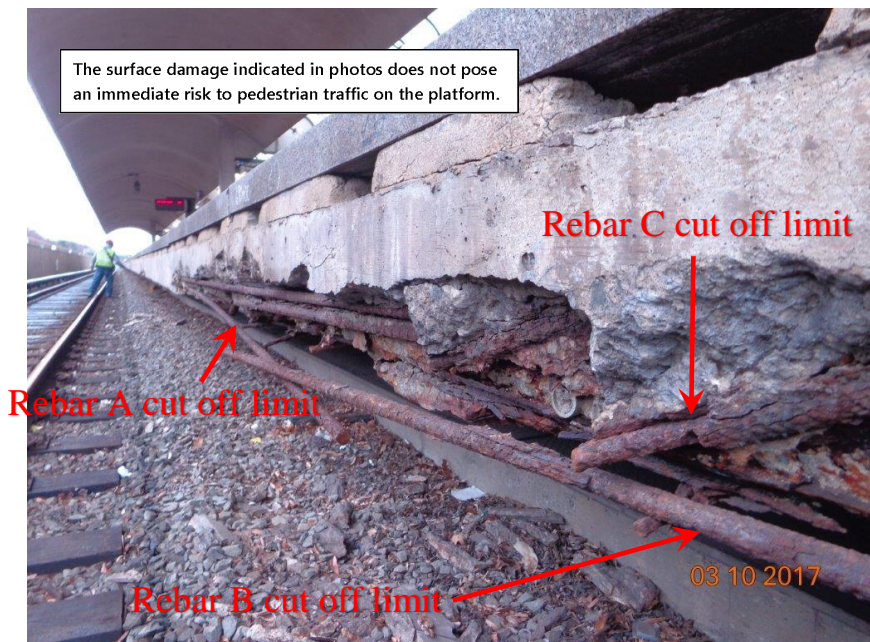


Figure 6: Close-up view of the surface as shown in Figure 2. The rebars (A, B and C) as marked intrude into the track bed area and should be cut off for safety.

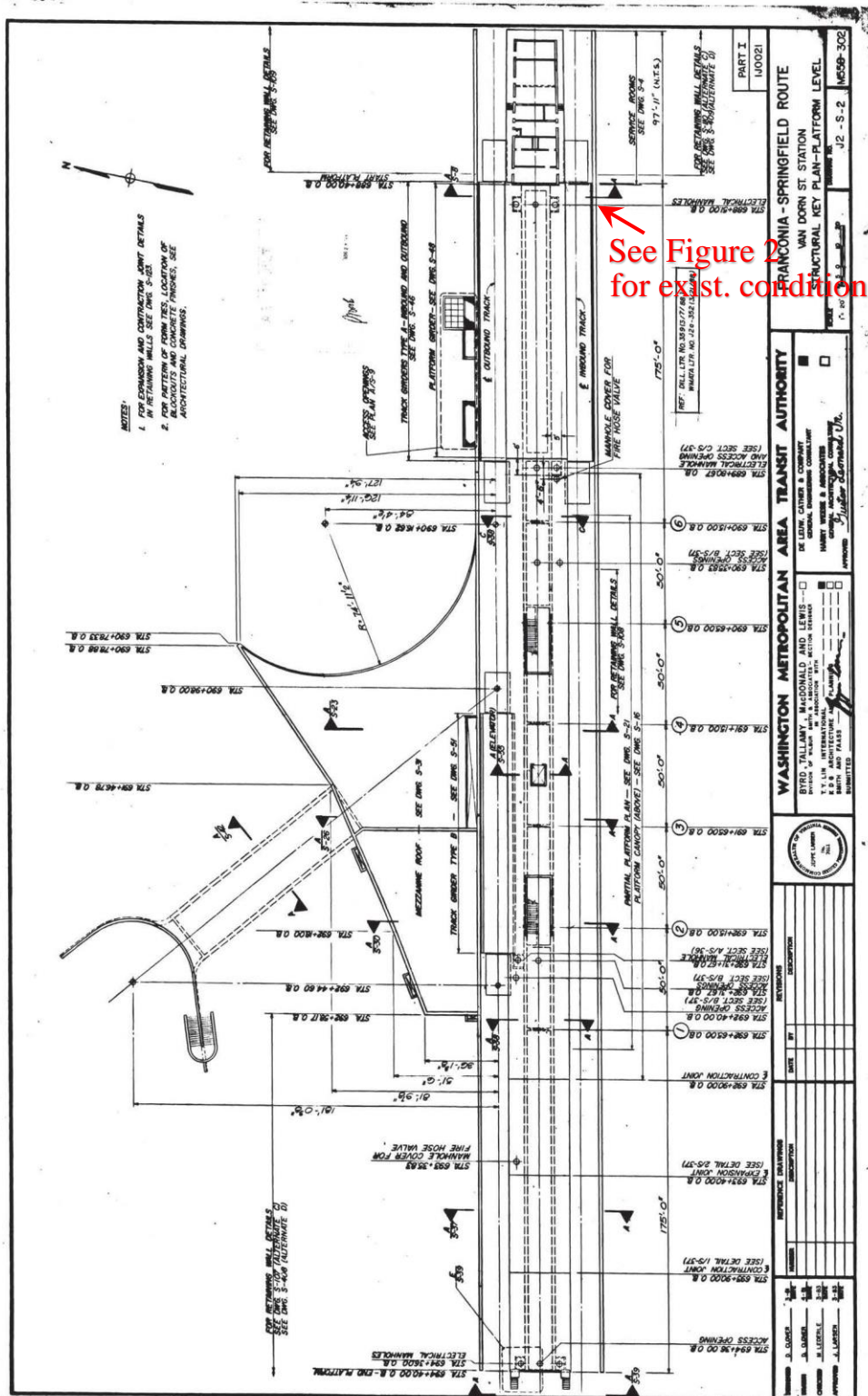


Figure 7: Plan of Van Dorn Street Station shows worst deterioration location. See Figure 8 for section details.

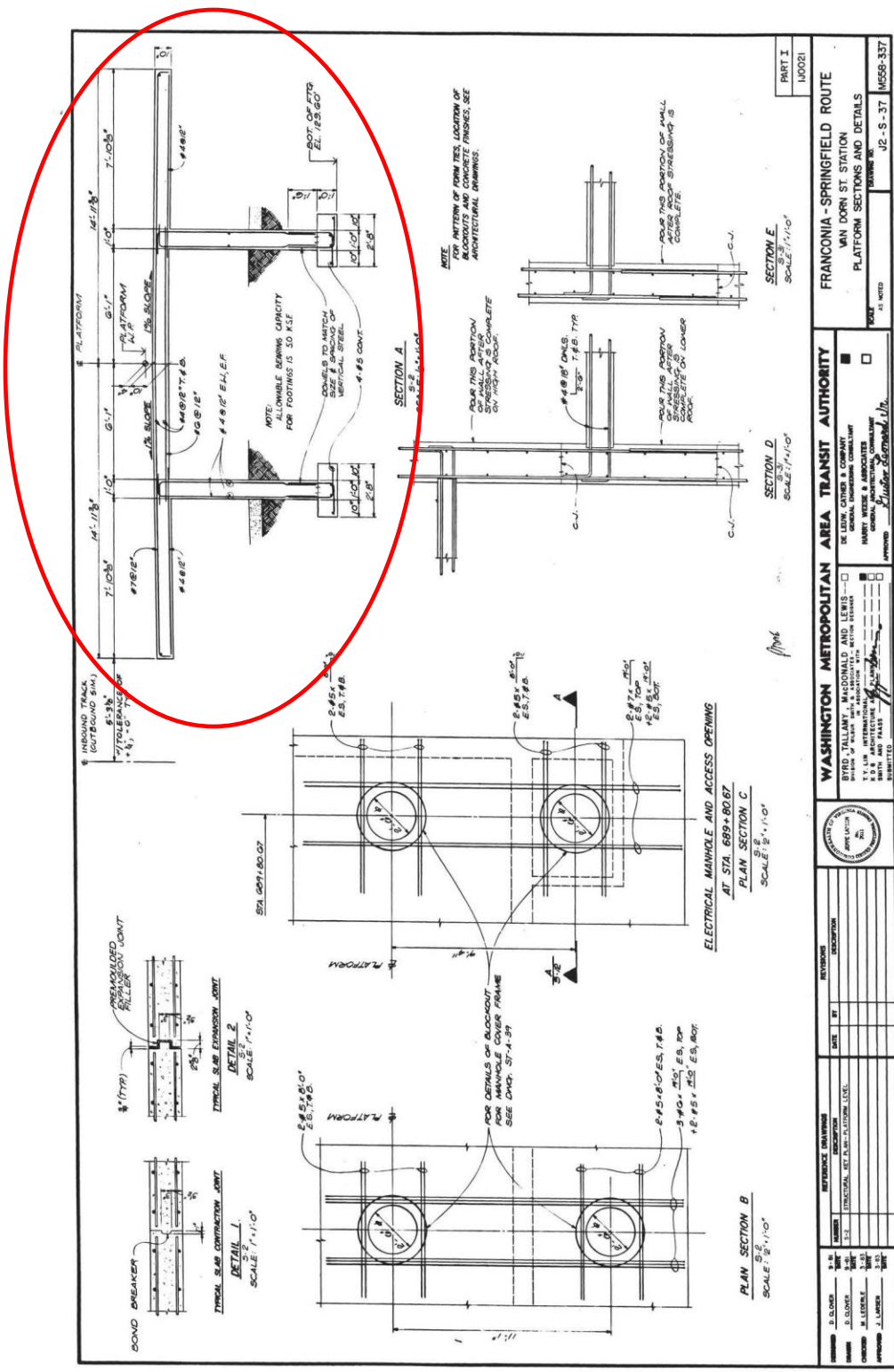


Figure 8: Section A shows reinforcing details which reflects redundant existing longitudinal rebars in Figure 2. Refer to Figure 7 for the location.

## **8.2 Reference 2: Structural Inspection Report for Van Dorn Platform**



# Structural Inspection Reports Audit

## Van Dorn Metro Station Platform Inspection

By [REDACTED], March 20, 2017

The platform for Track 1 and 2 was inspected on March 20, 2017.

As shown in Figure 1, the majority of the concrete platform's edge has deteriorated (see Figure 1). Deteriorations include spalls, cracks and exposed reinforcing steel with section loss. Also, there are cracks with efflorescence under the deck around the light fixtures (see Figure 2). Based on field observation, heavier concrete deterioration was noted under the canopies. Spalls with exposed reinforcing steel have been observed at several locations throughout the platform including:

- Chain Marker 690+70 (Track 1)
- Chain Marker 691+25 (Track 1) – Figure 5
- Chain Marker 691+40 (Track 1)
- Chain Marker 691+50 (Track 1)
- Chain Marker 691+60 (Track 1)
- Chain Marker 691+90 (Track 1) – Figure 6
- Chain Marker 692+50 (Track 1) – Figure 7
- Chain Marker 692+60 (Track 1)
- Chain Marker 692+15 (Track 2)
- Chain Marker 691+80 (Track 2) – Figure 8
- Chain Marker 691+15 (Track 2)
- Chain Marker 691+50 (Track 2) – Figure 9
- Chain Marker 690+05 (Track 2)

Near Chain Marker 690+00 (Track 1), a portion of the concrete platform edge, approximately 18' in length is heavily deteriorated. The deterioration consists of large spalls and multiple exposed reinforcing steel bars as shown in Figures 3 and 4. Exposed reinforcing bars are horizontally deformed, which may be a safety hazard since there is very limited clearance between the train and platform at this location. It is necessary to cut the exposed longitudinal reinforcing steel at these locations. Also, considering the depth of concrete section loss at the platform edge, it is necessary to install a temporary support system under the platform edge (i.e. lally columns or similar support systems) until concrete repair is completed.

### **Recommendations:**

1. Cut the exposed longitudinal reinforcing steel and install a temporary support system under the platform edge at Track 1 near Chain Marker 690+00.
2. Repair the edge and bottom of the platform concrete. The existing rebar shall be exposed and cleaned prior to forming the concrete repair. New reinforcing steel shall be adequately lapped with the existing bars or adequately embedded in the existing concrete. Proper drainage and waterproofing shall be provided between the granite veneer and the new concrete at repair areas.



The surface damage indicated in photos does not pose an immediate risk to pedestrian traffic on the platform.

**Figure 1:** General condition of existing platforms (track 2 shown). Existing concrete edge is generally deteriorated.



The surface damage indicated in photos does not pose an immediate risk to pedestrian traffic on the platform.

**Figure 2:** Typical deterioration at bottom of the slab with cracks and efflorescence near the lights





The surface damage indicated in photos does not pose an immediate risk to pedestrian traffic on the platform.

**Figure 3:** Large spall with exposed reinforcing steel at the edge of Track 1 platform, Chain Marker 690+00



The surface damage indicated in photos does not pose an immediate risk to pedestrian traffic on the platform.

**Figure 4:** Large spall with exposed reinforcing steel at the edge of Track 1 platform, Chain Marker 690+00





The surface damage indicated in photos does not pose an immediate risk to pedestrian traffic on the platform.

**Figure 5:** Large spall with exposed reinforcing steel at the edge of Track 1 platform, Chain Marker 691+25



The surface damage indicated in photos does not pose an immediate risk to pedestrian traffic on the platform.

**Figure 6:** Large spall with exposed reinforcing steel at the edge of Track 1 platform, Chain Marker 691+90





**Figure7:** Large spall with exposed reinforcing steel at the edge of Track 1 platform, Chain Marker 692+50



**Figure 8:** Large spall with exposed reinforcing steel at the edge of Track 2 platform, Chain Marker 691+80



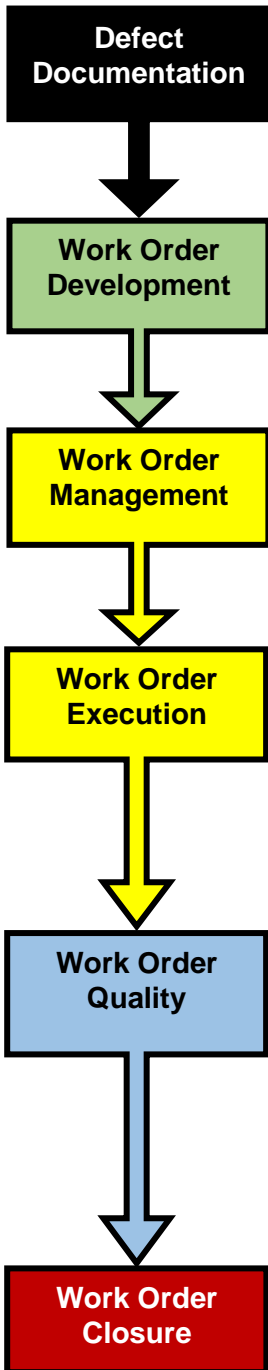
**Figure 9:** Large spall with exposed reinforcing steel at the edge of Track 2 platform, Chain Marker 691+50

## **8.3 Reference 3: WMATA-2000-TRST Work Order Process**



# TRST Production/Maintenance/Inspection Work Order Process

## Defect Driven Work Orders



Defects entered by Track Walkers or Structural Evaluation Technician (SETS); entered by analytical group (Supervisors) for third party contractors (i.e. Lateral Load) or TGV team. WO/defect status will be "Waiting on Approval". Defects will appear on the track walker daily report.

Maintenance Managers will develop large scale production type WOs as parent WOs and will attach all defect WOs to the parent WO as child WOs utilizing the "maintenance alert" function. Status of parent WO and child WOs will be changed to "Approved" at this stage.

WOs are then scheduled and assigned by Asst. Superintendent.

Once assigned and scheduled, supervisors will change the status of the WO to "In-Progress" and will execute WOs, enter "Actuals" and complete WO to TRST standards and conditions set by management. Once complete, Supervisor will change the status of the WO to "Finished". Supervisors are required to perform random quality checks to assure compliance with track standards and document them as separate tasks within the selected work orders utilizing the "407-Quality Control" code in the "When Discovered" field in the work order; a minimum of four (4) quality checks per month is required

Asst. Superintendent or Maintenance Manager will QC work with the status of "Finished". If work is satisfactory, status will be changed to "Completed". If the work is not within standards, status will be changed back to "In Progress" and the work order reassigned back to the Supervisor for action. The QC Process will continue until the work is completed to standards. Asst. Superintendents and Maintenance Managers are also required to perform random quality checks to assure compliance with track standards and document them as separate tasks within the selected work orders utilizing the "407-Quality Control" code in the "When Discovered" field in the work order; a minimum of one (1) quality check per month is required

Each quarter, the department Superintendents will perform random quality inspections to assure compliance with track standards and document them as separate tasks within the selected work orders utilizing the "407-Quality Control" code in the "When Discovered" field in the work order as a task prior to closing the WO.

## **8.4 Reference 4: Platform Edge Concrete Deterioration and Repair Summary**

## Platform Edge Concrete Deterioration and Repair Summary

(Prepared by ██████████, May 24, 2016)

| Priority | Line | Asset Name                     | Permanent Repairs | Temporary Repairs | Remarks |
|----------|------|--------------------------------|-------------------|-------------------|---------|
| 1        | C    | C13 King Street Station        | Contractor        | TRST              |         |
| 2        | G    | G03 Addison Road Station       | Contractor        | TRST              |         |
| 3        | C    | C12 Braddock Road Station      | Contractor        | TRST              |         |
| 4        | C    | C10 National Airport Station   | Contractor        | TRST              |         |
| 5        | D    | D13 New Carrollton Station     | Contractor        | TRST              |         |
| 6        | E    | E07 West Hyattsville Station   | TRST              |                   |         |
| 7        | D    | D11 Cheverly Station           | TRST              |                   |         |
| 8        | K    | K08 Vienna Station             | TRST              |                   |         |
| 9        | D    | D12 Landover Station           | TRST              |                   |         |
| 10       | C    | C06 Arlington Cemetery Station | TRST              |                   |         |
| 11       | K    | K05 East Falls Church Station  | TRST              |                   |         |
| 12       | J    | J02 Van Dorn Street Station    | TRST              |                   |         |
| 13       | K    | K07 Dunn Loring Station        | TRST              |                   |         |
| 14       | E    | E09 College Park Station       | TRST              |                   |         |
| 15       | A    | A11 Grosvenor Station          | TRST              |                   |         |



**\*Below are photos of platform defects. The list goes according to the engineering priorities, starting with King Street and ending with Grosvenor.**

**\*The engineer has identified 5 stations where permanent repairs need to be completed by contractors due to the severity of defects.**

**STRC has been working with PLNT DEPT. rehabbing Addison Rd TRK 1 and New Carrollton TRK 2. The work is being done under a single tracking from FRI night into Monday morning. This time allows minimal production with removal and placement of about 100' of platform edge. At this rate we will need 6 single trackings just to complete one side of a platform**

**\*Under SAFETRACK, STRC has made repairs to the granite edge support at K07 track 2 and K05 track 1.**

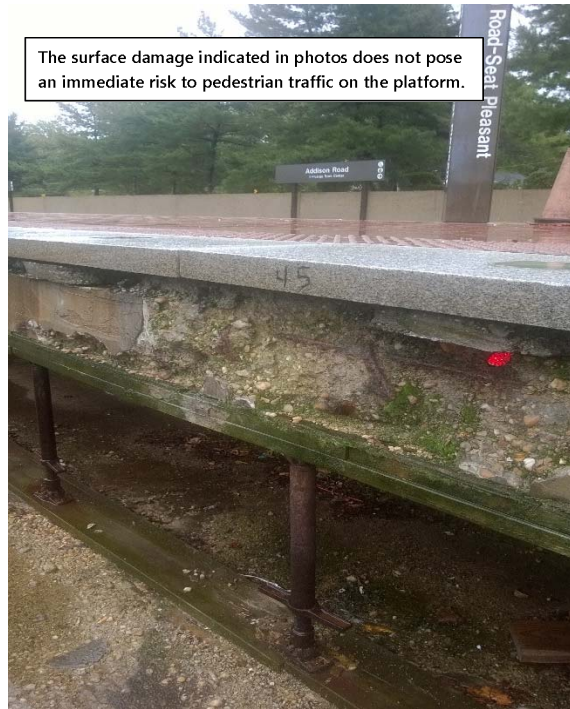
**In order to bring these 15 stations to a state of good repairs in a timetable fashion STRC needs:**

**FUNDING and TRACK ALLOCATION (e.g. extended single tracking and extended shutdowns)**

**King Street. TYP defects encountered on both tracks within the platform**



**Addison Rd platform. Track 2 TYP defects. TRK 1 we have corrected 25% of the platform.**

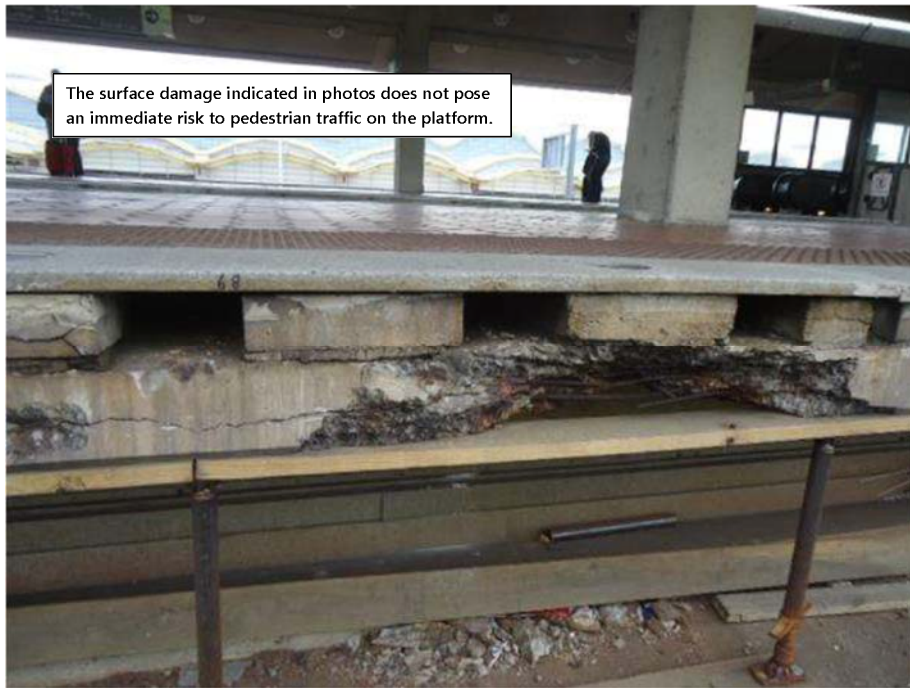


**Braddock Rd. Station TYP platform defects both tracks**





**National Airport. TYP platform defects TRK 1-2-3.**



**National Airport. TYP platform defects TRK 1-2-3.**



National Airport. TYP platform defects TRK 1-2-3.





**NC platform. TRK 1-2 TYP defects**





### NC platform. TRK 1-2 TYP defects



West Hyattsville platform. TYP defects TRK 1-2



**West Hyattsville platform. TYP defects TRK 1-2**



The surface damage indicated in photos does not pose an immediate risk to pedestrian traffic on the platform.



The surface damage indicated in photos does not pose an immediate risk to pedestrian traffic on the platform.



**Cheverly platform. TYP defects TRK 1-2**



**Vienna platform. TYP defects TRK 1-2**





**Vienna platform. TYP defects TRK 1-2**



**Landover platform. TYP defects TRK 1-2**





**Arlington Cemetery platform. TYP defects TRK 1-2**





**East Falls Church platform. TYP defects TRK 2**

**STRC rehabbed TRK 1 during surge 11**



The surface damage indicated in photos does not pose an immediate risk to pedestrian traffic on the platform.



The surface damage indicated in photos does not pose an immediate risk to pedestrian traffic on the platform.

**East Falls Church platform. TYP defects TRK 2**

**STRC rehabbed TRK 1 during surge 11**



The surface damage indicated in photos does not pose an immediate risk to pedestrian traffic on the platform.



The surface damage indicated in photos does not pose an immediate risk to pedestrian traffic on the platform.



**Van Dorn Station platform. TYP defects TRK 1-2**



**Van Dorn Station platform. TYP defects TRK 1-2**





**Dunn Loring Station platform. TYP defects TRK 1-2**

**STRC corrected TRK 2 during surge 9**



The surface damage indicated in photos does not pose an immediate risk to pedestrian traffic on the platform.



The surface damage indicated in photos does not pose an immediate risk to pedestrian traffic on the platform.



College Park platform TRK 2



The surface damage indicated in photos does not pose an immediate risk to pedestrian traffic on the platform.



The surface damage indicated in photos does not pose an immediate risk to pedestrian traffic on the platform.

Grosvenor Station platform. TYP defects TRK 1-2





Grosvenor Station platform. TYP defects TRK 1-2



**Grosvenor Station platform. TYP defects TRK 1-2**



## **8.5 Reference 5: Structure Priority List (Rev March 2017)**



### Structures Priority List

| Line        | Structure   | Issues  |  |   | Track Rights | Permits | Design    | Possible Procurement | Temporary Remediation   |  |  |
|-------------|---|---|--|---|--------------|---------|-----------|----------------------|---|--|--|
| B           | Rhode Island Avenue Aerial Structure  | Spalls and delaminations on under side of the deck. Previous repairs showing signs of distress. Delaminated areas over Rhode Island Avenue and other areas where pedestrian safety are a concern. Retrofit required for precast panel connection between aerial structure and station structure.  |  | ■ | Yes          | No      | Yes       | IFB                  |   |  |  |
| D           | Cheverly Aerial Structure   | Concrete spalls at bridge deck under running rails/possible Stray Current issues and corrosion mitigation   |  | ■ | No           | No      | Completed | JOC                  |   |  |  |
| A           | VA 02 - Vent Shaft Grating Repair at 17th Street (Farragut North Station)   | Section losses due to serious corrosion on support beams, grating warped up and loose, impact of traffic on grating and support beam has worn out sections of support beam. Some of the grates are upto 1 inch higher and causing safety concerns to passing traffic.   |  | ■ | No           |         | Completed |                      |   |  |  |
| F           | FF01 IB, FF01 OB, VF 02, FF 02 IB, FF02 OB  | Concrete beams have spall/delaminations/cracks and they have insufficient capacity the design HS-20 loading. These beam need to be replaced/repared since they are located on sidewalk.   |  | ■ | No           |         |           |                      |   |  |  |
| D           | New Carrolton Station Amtrak Wall   | The retaining wall supporting WMATA Parking lot adjacent to AMTRAK tracks has severe cracking and spalling in the top 2 ft of the wall. Any falling concrete can land in AMTRAK tracks or over passing trains and therefore is posing a serious safety issue.   |  | ■ | No           | No      | No        |                      |   |  |  |
| B, D&G      | Grosvenor Aerial Structure and Minnesota Avenue Aerial Structure (D&G)  | Ultrasonic Testing of Anchor Bolts  |  | ■ | Yes          | No      | No        | Engineering Task     |   |  |  |
| ALL         | <u>SHAFTS</u><br>FA 03, VC 09, VA 04, VC 10, FG 03, VC 14, VC 08, FC 09, VD 06 IB, FG 01, VA 11, FA 11, VA 19, FB 08, FA 04, FA 05, VA 18,  | Section losses due to serious corrosion, structural elements failure and safety concerns, concrete spalls with exposed rebars.. Drainage and leaks are the root cause of most of these issues and shall be fixed prior to other repairs. Temporary repair details are prepared for most structures, however significant repairs including lateral supports are required in the near future. |  | ■ | No           | No      | -         | JOC                  |   |  |  |
| C           | King Street Station   | Platform Edges on temorary supports-Platform Rehab  |  | ■ | Yes          | No      | Yes       | IFB                  | Some areas already on temporary support. Additional areas require temporary supports.     |  |  |
| G           | Addison Road Station  | Platform Edges on temorary supports-Platform Rehab and canopy repairs   |  | ■ | Yes          | No      | Yes       | IFB                  | Some areas already on temporary support. Additional areas may require temporary supports. |  |  |
| B           | Rockville Station   | Progressive corrosion and spalling of canopy cantiliver beams, leaks through roof and post tensioned beams, roofing membrane failure.   |  | ■ | Yes          | Yes     | Yes       | IFB                  |   |  |  |
| J           | Bush Hill Aerial Structure (J Line)   | Post-Tensioning rehab, straddle bent, concrete crack repairs  |  | ■ | Yes          | Yes     | Yes       | IFB                  |   |  |  |
| J, F, E & N | Branch Avenue A Bridge (F Line)<br>Branch Avenue B Bridge (F Line)<br>Eisenhower Avenue Bridge (J Line)<br>South Van Dorn Street Bridge (J Line)<br>Cameron Run Bridge (J Line)<br>West Hyattsville Aerial Structure (E Line)<br>Naylor Road Aerial Structure (F Line)<br>Springhill Guideway Aerial (N Line)<br>Tysons East Guideway Aerial (N Line) | <b>Segmental Bridges:</b> West Hyattsville is a dual structure i.e. I/B and O/B.Post-Tensioning rehab.  |  | ■ | Yes          | No      | Yes       | IFB                  |   |  |  |

## Structures Priority List

| Line | Structure  | Issues  |  |   | Track Rights          | Permits | Design    | Possible Procurement | Temporary Remediation   |  |  |  |
|------|--|---|--|---|-----------------------|---------|-----------|----------------------|---|--|--|--|
| K    | Vienna Parking Garage (North)  | Failed areas of Double Tee flanges at roof level are temporarily covered by plywood/steel plates, deck surface deteriorations, concrete spalling, leaks and drainage issues throughout the garage.                  |  | ■ | No                    | No      | No        |                      |   |  |  |  |
| C    | Huntington Parking Garage (Upper)-South                                  | Spalls, delaminations, expansion joints, rebar corrosion, drainage, faulty repairs  |  | ■ | Under another Program |         |           |                      |   |  |  |  |
| D    | Cheverly Aerial Structure  | Bearing replacement required at several locations.  |  | ■ | No                    | No      | No        |                      |   |  |  |  |
| C    | Eisenhower Avenue Aerial Structure                                       | Relocate High Voltage Cables to facilitate structural inspections   |  | ■ | Yes                   | No      | Yes       | IFB                  |   |  |  |  |
| D    | New Carrolton Amtrak Station Bridge                                      | Gutter system failure inside the spans is causing active leaks inside Amtrak Station  |  | ■ |                       |         |           |                      |   |  |  |  |
| G    | Addison Road Aerial Structure  | Analysis and design for Soil Stability Issue  |  | ■ | No                    | No      | Yes       | Engineering Task     |   |  |  |  |
| E    | Berwyn Road Pedestrian Bridge  | Double T span on temporary supports needs replacement, hollow cored ramp repairs, drainage, concrete spalls and cracks on piers and columns.  |  | ■ | No                    | No      | Yes       | IFB                  |   |  |  |  |
| C    | Eisenhower Avenue Aerial Structure                                       | Weld repairs, Drawings were prepared by TSFA  |  | ■ | Yes                   | No      | Completed | JOC                  |   |  |  |  |
| K    | K Line 495 Aerial Structure  | Weld and anchor rods repairs, drawings prepared by TSFA in 2012   |  | ■ | Yes                   | No      | Completed | JOC                  |   |  |  |  |
| A    | Grosvenor Aerial Structure   | Crossbox Grout pads needs to be repaired ASAP, excessive deflection at piers/crossbox.  |  | ■ | Yes                   | Yes     | Completed | IFB                  |   |  |  |  |
| D    | CSX Bridge @ D397+00 Cheverly  | East Wingwall Erosion, drainage at CSX tracks and brick manhole failure issues.   |  | ■ | Yes                   | Yes     | Yes       | IFB                  |   |  |  |  |
| E    | College Park Station   | Unequal Settlement at North End of Platform. Remove tripping hazard, replace expansion joint and restore pavers on settled side.  |  | ■ | Yes                   | No      | Yes       | IFB                  |   |  |  |  |
| All  | Scour Critical Bridges   | Recommendation from 2010 Scour Reports shall be followed before the next inspection cycle in 2015/2016  |  | ■ | Yes                   |         | Yes       | IFB                  |   |  |  |  |
| B    | Union Station TPSS   | Brick ceiling repair over offices   |  | ■ | Under another Program |         |           |                      |   |  |  |  |
| All  | Expansion Joints at Aerial Structures                                    | Systemwide the corrosion issue is due to expansion joint failures   |  | ■ | Yes                   | No      | Yes       | IFB                  |   |  |  |  |
| D    | Minnesota Avenue Aerial Structure  | Bolts area overstressed. Pier Cap Retrofit to allow better distribution of forces with revised bolt configuration.  |  | ■ | Yes                   | No      | Yes       | IFB                  |   |  |  |  |
| A    | Grosvenor Aerial structure   | Excessive vibrations at Crossbox Piers requires Pier Cap retrofit to allow better distribution of forces and minimize excessive vibrations.   |  | ■ | YES                   |         |           |                      |   |  |  |  |
| All  | Steel Tunnel Liner Leaks   | As a result of the recent tunnel smoke incident on the outbound L-Line, a detailed systemwide tunnel leak inspection was performed. The inspections have revealed a large number of Category-1 (Active Leaks).      |  | ■ | Yes                   |         | Yes       |                      |   |  |  |  |
| All  | Eisenhower, Grosvenor, Twinbrook, Addison Road, National Airport Station | Failure of waterproofing membranes over post-tensioned station canopy structures is causing water infiltration through cracks resulting in leaching and advanced corrosion and reducing the life of the structures. |  | ■ | No                    | No      | No        |                      |   |  |  |  |
| All  | Flooding of tunnel segments during severe weather                        | An Engineering Evaluation of tunnel segments/portals is required to evaluate the capacity of existing drainage system b/w Braddock Rd. to Potomac Yard, White Flint to Twinbrook Portal, Farragut North Station     |  | ■ | Yes                   |         | Yes       |                      |   |  |  |  |
| E    | Greenbelt Station Outer Loop Ramp Bridge                                 | Broken Anchor Bolts at three bearings   |  | ■ | No                    |         | Yes       | IFB                  |   |  |  |  |
| A    | Rockville Pedestrian Bridge  | Roofing membrane/EPDM failure, expansion joints, leaks at glass panels etc.   |  | ■ | No                    | No      | Yes       | IFB                  |   |  |  |  |
| C    | National Airport Station   | Platform Edge on temporary supports requires Platform Rehab   |  | ■ | Under another Program |         |           |                      |   |  |  |  |
| D    | New Carrolton Station  | Platform Rehab, roofing membrane failure, Canopy repairs  |  | ■ | Yes                   | No      | Yes       | IFB                  | Some areas already on temporary support. Additional areas may require temporary supports. |  |  |  |

## Structures Priority List

| Line | Structure  | Issues  |  |  | Track Rights          | Permits | Design | Possible Procurement | Temporary Remediation |  |  |  |
|------|--|---|--|--|-----------------------|---------|--------|----------------------|-----------------------|--|--|--|
| A    | Dupont Circle and Tanleytown Stations  | Exterior coffer struts, tie back dywdag rods are failing.   |  |  | Yes                   | No      | Yes    | IFB                  |                       |  |  |  |
| G    | Addison Road Parking Garage  | Expansion Joints, leaks and cracked double tees   |  |  | Under another Program |         |        |                      |                       |  |  |  |
|      | Western Bus Garage   | Severe Cracks in load bearing walls, roof membrane failures, leaks and drainage issues affecting service rooms and hardware throughout the garage.  |  |  | No                    | No      | No     |                      |                       |  |  |  |
|      | Northern Bus Garage  | Replacement of Parking deck for Employee Parking area is recommended due to severe corrosion of rebars and spalling of concrete, roof membrane failures, leaks and drainage issues.   |  |  | No                    | No      | No     |                      |                       |  |  |  |
| L    | L Line Bridge  | Bearing replacement , expansion joints/leaking drains replacement   |  |  | Yes                   | No      | Yes    | IFB                  |                       |  |  |  |
| B    | B04 to B08 portal  | ROW fence damaged during tie replacements for approx. 50,000 ft. Effective height of fence reduced due to ballast placement.  |  |  | Yes                   | No      | Yes    | IFB                  |                       |  |  |  |
| A    | Twinbrook Portal   | ROW fence damaged near the portal on Track 2 side retaining wall due to corrosion. Approx. 1500 ft.   |  |  | Yes                   | No      | Yes    | IFB                  |                       |  |  |  |
| All  | SHAFTS<br>TA 01, VA 03 OB, VB 01 OB, VC 06 IB, VC 06 OB, TPS 518, VF 04 IB, VK 05, VE 15, EB 01, VD 09, VD 11, VG 03, FC 06, TA 02, VA 16, FA 08, VA 13, FB 05, VB 11, Cable Shaft Landsdowne Way (B Line Special Shaft), VF 07, VA-10 OB, VA 21, FA 09, VA 03 OB, FD 06, VA 08 IB, FB 02, FB 08, VA 06, FA 14, and VF 06. | Vent Shafts, Fan Shafts and Special Shafts have issues ranging from spalls, exposed rebars, corrosion and section losses on structural elements. Drainage and leaks are the root cause of most of these issues and shall be fixed prior to other repairs. |  |  | No                    | No      | Yes    | IFB                  |                       |  |  |  |
| All  | Deanwood, Minnesota Avenue, Huntington, Franconia-Springfield  | Failure of waterproofing membranes over post-tensioned station canopy structures is causing water infiltration through cracks resulting in leaching and advanced corrosion and reducing the life of the structures.                                       |  |  | No                    | No      | No     |                      |                       |  |  |  |
| K    | West Falls Church Station  | Platform rehab  |  |  | Yes                   | No      | Yes    | IFB                  |                       |  |  |  |
| D    | Cheverly Station   | Platform edge repairs   |  |  | Yes                   | No      | Yes    | IFB                  |                       |  |  |  |
| C    | Arlington Cemetary Station   | Platform edge repairs   |  |  | Yes                   | No      | Yes    | IFB                  |                       |  |  |  |
| B    | Wheaton Parking Garage Bridge  | North Abutment bearings, cracks, grout pads.  |  |  | Under another Program |         |        |                      |                       |  |  |  |
| K, D | Route 7 Bridge, Route 7 Ramp a Bridge, Dunn Loring Pedestrian Bridge, Nannie Helen Burroughs Avenue Bridge   | Issues with bearings including corrosion, broken or leaning anchor bolts. Bearings in need of replacement.  |  |  |                       |         |        |                      |                       |  |  |  |
| E    | Greenbelt Station Bridge # 1, Greenbelt Station Beltway Crossing Bridge  | Issues with bearings, expansion joints, wingwalls, approach slabs and erosion.  |  |  |                       |         |        |                      |                       |  |  |  |
| C    | Huntington station Bridge<br>King Street Station Aerial Bridge   | Issues with expansion joints, delaminations and spalls with exposed rebars, grout pads and deck drainage issues.  |  |  |                       |         |        |                      |                       |  |  |  |
| A    | Frederick Avenue Pedestrian Bridge   | Safety issues with ramps, cracks in concrete pedestals, concrete spalls and delaminations. Some minor repairs performed by TRST, more repairs required.   |  |  | No                    | No      |        |                      |                       |  |  |  |
| All  | Bridges require cyclic painting  | Some Structures have been painted, others are now peeling and require repainting.   |  |  | No                    | No      | No     | IFB                  |                       |  |  |  |

## **8.6 Reference 6: 2014 Addison Road Aerial Structure (excerpt)**



STRUCTURAL MAINTENANCE INSPECTION REPORT

Addison Road Aerial Structure

Pier 1 IB

Inspected By: [REDACTED]\*

Date Inspected: 9/16/2014 Report Generated:

|   |  |   |
|---|--|---|
| <p><u>Condition Rating</u></p> <p>N - Not Applicable      5 - Fair Condition      0 - Failed Condition</p> <p>9 - Excellent Condition      4 - Poor Condition</p> <p>8 - Very Good Condition      3 - Serious Condition</p> <p>7 - Good Condition      2 - Critical Condition</p> <p>6 - Satisfactory Condition      1 - Imminent Failure Condition</p> |  | <p>Inspection Frequency</p> <p>Annual</p> |
|---|--|---|

| ITEM                                      | NO. | REMARKS |
|---|-----|---------|
| d. Hand Rails.                            | N   |         |
| e. Safety Walk.                           | N   |         |
| f. Acoustical Panel / Barrier Wall.       | N   |         |
| g. Guardrails.                            | N   |         |
| h. Fencing.                               | N   |         |
| i. Joints (Expansion, Contraction, Cold). | N   |         |
| j. Drains, Scupper.                       | N   |         |
| 2. LIST UNUSUAL CONDITIONS.               | N   |         |

THINK SAFETY FIRST



WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY  
Addison Road Aerial Structure - Pier 1 IB



Photo 1

Erosion on the North side of the pier.



Photo 2

Frabreeka bearing

## **8.7 Reference 7: 2016 Congress Heights Station Inspection (excerpt)**

-



Photo 37

Cover plate for light post is missing.



Photo 38

North side walk between bus loops M8, M9 has sank 2.5".



-



Photo 39

Collision damage to the parapet wall on the north side entrance.



Photo 40

Cracked glass panel on the canopy on the north side.

## **8.8 Reference 8: Addison Road Aerial Structure Inspection Report (QICO Review)**



# Structural Inspection Reports Audit

## Addison Road Aerial Structure

### Individual Report Audit Comments

In this audit, following structural elements of Addison Road Aerial Structure were reviewed (2014, 2015 and 2016):

- South Abutment IB/OB
- Span 1A OB
- Pier 1 IB
- Pier 2 OB
- Span 1C IB
- Span 1D OB

### 2014 Report

#### *The Good*

The report is clear and well organized and has a good amount of detail. Most of the remarks reference photos (especially for South Abutment and Span 1A). Photos have good captions that provide further clarification of the areas of concern.

#### *The Concerns*

There are remarks that do not reference a photo, this is a concern if the remark is the same as previous years. Some of the pictures were not properly labeled or referenced in the report. Some of the pictures are dated 2013 and possibly archived photos were used in the report. Based on pictures, there is potential for additional concrete deterioration and delamination at some locations including South Abutment. In the reports, it is not clear if the inspector sound the concrete to identify the deteriorations. The report contains misspelled words. In 2014 Span 1D OB report, there is no photo or description of defects and superstructure condition inside the concrete box. It is not clear if inside the box was inspected during this inspection.

### 2015 Report

#### *The Good*

The report is clear and well organized and has a good amount of detail. Most of the remarks reference photos. Photos have good captions that provide further clarification of the areas of concern.

#### *The Concerns*

There are remarks that do not reference a photo but state the defects are the same form the previous year. Some of the defects and areas of concern from 2014 inspection were not included. No photo or potential repair/work-order was documented in the report. Remarks that reference the previous report used the exact same remark, but in several occasions no photo is provided. Based on pictures, there is potential for additional concrete deterioration and delamination at some locations including South

Abutment. In the reports, it is not clear if the inspector sound the concrete to identify the deteriorations.

## 2016 Report

### *The Good*

The report is clear and well organized and has a good amount of detail. Some of the remarks reference photos. Photos have good captions that provide further clarification of the areas of concern. Most pictures in the report include date.

### *The Concerns*

There are remarks that do not reference a photo, this is a concern if the remark is the same as previous years. There were defects listed in the previous year's report that are not listed in this report but no mention is made of a repair either, this makes the condition of the structure unclear and no photo or potential repair/work-order was documented in the report. Remarks that reference the previous report used the exact same remark, but in several occasions no photo is provided. Based on pictures, there is potential for additional concrete deterioration and delamination at some locations including South Abutment. In the reports, it is not clear if the inspector sound the concrete to identify the deteriorations.

## Suggested Improvements

The reports should be reviewed for common errors such as spelling and improper references while being reviewed for content accuracy. If a defect is identified, even if it is carried over from previous year's inspections, a photo should be included in the report and referenced in the appropriate remarks. If remarks include defect's measurements then a corresponding photo should be included showing the measurement of the defect to verify defect stability. Defect description should be updated every year with photos and measurement, even if it states no change, in order to have a continuous log of the defects. If specific inspection procedures are performed, photo verification of procedure should be included in the report. If defects are listed in the previous year's report, but are not included in the current report, reference should be made to the repair of the defect, with an accompanying photo for verification.

## **8.9 Reference 9: MPLN Monthly Preventive Maintenance Summary (October 2016)**

MPLN Monthly Preventive Maintenance Summary  
 PM Scheduled in September, 2016  
 Reporting Date: October 10, 2016

| <b>TRST/STRC</b>   |                  |                  |                     |
|--|------------------|------------------|---------------------|
| <u>Branch/Type</u>   | <u>Scheduled</u> | <u>Completed</u> | <u>% Compliance</u> |
| Station/Pedestrian Tunnel Inspection   |                  |                  | N/A                 |
| Access Bridge Inspection   |                  |                  | N/A                 |
| Pedestrian Bridge Inspection   | 2                | 2                | 100.0%              |
| Station/Pedestrian Bridge Inspection   |                  |                  | N/A                 |
| Aerial Inspection  | 1                | 1                | 100.0%              |
| Bridge Inspection  | 8                | 7                | 87.5%               |
| Station Bridge Inspection  | 2                | 2                | 100.0%              |
| Station Inspection   | 13               | 13               | 100.0%              |
| Bus Garage Inspection  |                  |                  | N/A                 |
| Parking Garage Inspection  | 6                | 6                | 100.0%              |
| Elevator Pit Inspection  |                  |                  | N/A                 |
| Escalator Pit Inspection   |                  |                  | N/A                 |
| Row Fence Line Inspection  |                  |                  | N/A                 |
| Shaft Inspection   |                  |                  | N/A                 |
| Shoring Inspection   | 12               | 12               | 100.0%              |
| Retaining Wall Inspection  |                  |                  | N/A                 |
| S&I Shop Inspection  |                  |                  | N/A                 |
| <b>Total</b>   | <b>44</b>        | <b>43</b>        | <b>97.7%</b>        |
| <p>1 STRC PM Compliance Definition: An inspection is "Scheduled" if a PM Work Order has been created with a Target Start Date in the compliance reporting month and is "Complied" with if the work order status advances to COMP or CLOSE in the compliance reporting month and inclusive of respective grace periods 10 days.</p> |                  |                  |                     |

## **8.10 Reference 10: N-Line Tunnel Inspection Work Order (12967436)**





**Washington Metropolitan Area Transit Authority**  
**Maintenance and Material Management System**  
**Work Order Details**

12967436  
Type: PM

Status: PMPASS  
12/01/2016 11:04

**\*12967436\***

**Work Description: STRC,2YR,N-LINE TUNNEL STRUCTURAL,INSPECTION**

**Job Plan Description:**

**Asset was put in PM Pass due to our tunnel training class scheduled for December. A new WO will be created in January to inspect all the tunnels.**

**Work Information**

|                       |  |  |                                       |
|-----------------------|--|--|---------------------------------------|
| <b>Asset:</b> TRST-N  | N-LINE EQUIPMENT PARENT 488+18 - 1105+04 | <b>Owning Office:</b> TRST                                       | <b>Parent:</b>                        |
| <b>Asset Tag:</b>     |  | <b>Maintenance Office:</b> TRST-TRAK                             | <b>Create Date:</b> 09/02/2016 22:59  |
| <b>Location:</b> N    | ORIM N LINE TO DULLES                    | <b>Labor Group:</b> TRST-STIN-CTF                                | <b>Actual Start:</b> 12/01/2016 11:04 |
| <b>Work Location:</b> |  | <b>Crew:</b> STRCBOL   | <b>Actual Comp:</b> 12/01/2016 11:04  |
| <b>Failure Class:</b> |  | <b>GL Account:</b> WMATA-02-33630-50499360-042-*****-*****-OPR** | <b>Target Start:</b> 11/01/2016 00:00 |
| <b>Problem Code:</b>  |  | <b>Supervisor:</b>   | <b>Target Comp:</b> 11/01/2016 00:00  |
| <b>Requested By:</b>  |  | <b>Requestor Phone:</b>  | <b>Scheduled Start:</b>               |

**Failure Reporting**

| Cause | Remedy | Supervisor | Remark Date |
|-------|--------|------------|-------------|
|-------|--------|------------|-------------|

Remarks:

**Child Work Order**

| Wonum | Description | Asset | Failure Class | Problem Code | Start Marker | Start Offset | End Marker | End Offset |
|-------|-------------|-------|---------------|--------------|--------------|--------------|------------|------------|
|-------|-------------|-------|---------------|--------------|--------------|--------------|------------|------------|

## **8.11 Reference 11: Rhode Island Avenue Aerial Inspection Work Order (12705985) (excerpt)**



**Washington Metropolitan Area Transit Authority**  
**Maintenance and Material Management System**  
**Work Order Details**

12705985  
Type: PM

**\*12705985\***

**Status: INPRG**  
**05/10/2016 12:46**

**Work Description: STRC,1YR,RHODE ISLAND AVE AERIAL INSP**  
**Job Plan Description: TRST,STRC,Steel I-beam Superstructure,Inspection**

**Work Information**

|   |   |  |                                       |
|---|---|--|---------------------------------------|
| <b>Asset:</b> T80010                            | Rhode Island Avenue Aerial 141+43 to<br>173+64 B1 | <b>Owning Office:</b>  | <b>Parent:</b>                        |
| <b>Asset Tag:</b>                               |   | <b>Maintenance Office:</b> TRST-STRC                             | <b>Create Date:</b> 05/02/2016 20:06  |
| <b>Location:</b> B                              | ORIM, B Line, Glenmont                            | <b>Labor Group:</b> TRST-STIN-CTF                                | <b>Actual Start:</b> 05/10/2016 12:46 |
| <b>Work Location:</b>                           |   | <b>Crew:</b> STRCRL  | <b>Actual Comp:</b>                   |
| <b>Failure Class:</b> TRSTSTRC TRST, STRUCTURES |   | <b>GL Account:</b> WMATA-02-33630-50499360-042-*****-*****-OPR** | <b>Target Start:</b> 07/01/2016 00:00 |
| <b>Problem Code:</b>                            |   | <b>Supervisor:</b>   | <b>Target Comp:</b> 07/01/2016 00:00  |
| <b>Requested By:</b>                            |   | <b>Requestor Phone:</b>  | <b>Scheduled Start:</b>               |

## **8.12 Reference 12: Bush Hill Aerial Inspection Work Order (12362385) (excerpt)**



# Washington Metropolitan Area Transit Authority

## Maintenance and Material Management System

### Work Order Details

12362385  
Type: PM

# \*12362385\*

**Status: INPRG**  
03/16/2016 10:51

**Work Description:** STRC,1YR,BUSH HILL AERIAL INSP, J02c  
**Job Plan Description:** TRST,STRC,Concrete Superstructure Box Beams, Inspection

#### Work Information

|   |  |                                       |
|---|--|---------------------------------------|
| <b>Asset:</b> T80079    Bush Hill Bridge,658+18-667+83  | <b>Owning Office:</b>  | <b>Parent:</b>                        |
| <b>Asset Tag:</b>                                       | <b>Maintenance Office:</b> TRST-STRC                             | <b>Create Date:</b> 01/01/2016 20:32  |
| <b>Location:</b> J            ORIM, J Line, Springfield | <b>Labor Group:</b> TRST-STIN-CTF                                | <b>Actual Start:</b> 03/16/2016 10:51 |
| <b>Work Location:</b>                                   | <b>Crew:</b> STRCYGL   | <b>Actual Comp:</b>                   |
| <b>Failure Class:</b> TRSTSTRC TRST, STRUCTURES         | <b>GL Account:</b> WMATA-02-33630-50499360-042-*****-*****-OPR** | <b>Target Start:</b> 03/01/2016 00:00 |
| <b>Problem Code:</b>                                    | <b>Supervisor:</b>   | <b>Target Comp:</b> 04/22/2016 06:57  |
| <b>Requested By:</b>                                    | <b>Requestor Phone:</b>  | <b>Scheduled Start:</b>               |

**Task IDs**

| Task ID | Component:                           | Work Accomp:         | Reason:          | Status:                | Position:              | Warranty?:                      |
|---------|--------------------------------------|----------------------|------------------|------------------------|------------------------|---------------------------------|
| 10      | INSPECT BEAM FOR ABNORMAL CONDITIONS |                      |                  |                        |                        |                                 |
|         | <b>Start Marker:</b>                 | <b>Start Offset:</b> | <b>Quantity:</b> | <b>Linear Footage:</b> | <b>Square Footage:</b> | <b>Actual Start:</b> 03/16/2016 |
|         | <b>End Marker:</b>                   | <b>End Offset:</b>   |                  |                        |                        | <b>Actual Finish:</b>           |
| 20      | INSPECT BEAM FOR PROPER CAMBER       |                      |                  |                        |                        |                                 |
|         | <b>Start Marker:</b>                 | <b>Start Offset:</b> | <b>Quantity:</b> | <b>Linear Footage:</b> | <b>Square Footage:</b> | <b>Actual Start:</b> 03/16/2016 |
|         | <b>End Marker:</b>                   | <b>End Offset:</b>   |                  |                        |                        | <b>Actual Finish:</b>           |
| 30      | CHECK ACTION OF ADJACENT BOX BEAM    |                      |                  |                        |                        |                                 |
|         | <b>Start Marker:</b>                 | <b>Start Offset:</b> | <b>Quantity:</b> | <b>Linear Footage:</b> | <b>Square Footage:</b> | <b>Actual Start:</b> 03/16/2016 |
|         | <b>End Marker:</b>                   | <b>End Offset:</b>   |                  |                        |                        | <b>Actual Finish:</b>           |
| 40      | DOCUMENT APPEARANCE OF BEAM          |                      |                  |                        |                        |                                 |
|         | <b>Start Marker:</b>                 | <b>Start Offset:</b> | <b>Quantity:</b> | <b>Linear Footage:</b> | <b>Square Footage:</b> | <b>Actual Start:</b> 03/16/2016 |
|         | <b>End Marker:</b>                   | <b>End Offset:</b>   |                  |                        |                        | <b>Actual Finish:</b>           |
| 50      | INSPECT FOR FLEXURE AND SHEAR CRACKS |                      |                  |                        |                        |                                 |
|         | <b>Start Marker:</b>                 | <b>Start Offset:</b> | <b>Quantity:</b> | <b>Linear Footage:</b> | <b>Square Footage:</b> | <b>Actual Start:</b> 03/16/2016 |
|         | <b>End Marker:</b>                   | <b>End Offset:</b>   |                  |                        |                        | <b>Actual Finish:</b>           |





# Washington Metropolitan Area Transit Authority

## Maintenance and Material Management System

### Work Order Details

12362385  
Type: PM

Status: INPRG  
03/16/2016 10:51

# \*12362385\*

Work Description: STRC,1YR,BUSH HILL AERIAL INSP, J02c

Job Plan Description: TRST,STRC,Concrete Superstructure Box Beams, Inspection

#### Task IDs

| Task ID | Start Marker: | Start Offset: | Quantity: | Linear Footage: | Square Footage: | Actual Start: 03/16/2016 |
|---------|---------------|---------------|-----------|-----------------|-----------------|--------------------------|
|         | End Marker:   | End Offset:   |           |                 |                 | Actual Finish:           |

#### Actual Labor

| Task ID                    | Labor | Start Date | End Date   | Start Time | End Time | Regular Hours | Regular Line Cost | Premium Hours | Premium Line Cost | Total Line Cost |
|----------------------------|-------|------------|------------|------------|----------|---------------|-------------------|---------------|-------------------|-----------------|
|                            |       | 03/16/2016 | 03/16/2016 | 06:00      | 14:00    | 8.00          | \$288.98          | 0.00          | \$0.00            | \$288.98        |
|                            |       | 03/16/2016 | 03/16/2016 | 06:00      | 14:00    | 8.00          | \$288.98          | 0.00          | \$0.00            | \$288.98        |
|                            |       | 03/16/2016 | 03/16/2016 | 06:00      | 14:00    | 8.00          | \$288.98          | 0.00          | \$0.00            | \$288.98        |
|                            |       | 03/16/2016 | 03/16/2016 | 06:00      | 14:00    | 8.00          | \$288.98          | 0.00          | \$0.00            | \$288.98        |
|                            |       | 03/16/2016 | 03/16/2016 | 06:00      | 14:00    | 8.00          | \$288.98          | 0.00          | \$0.00            | \$288.98        |
|                            |       | 03/16/2016 | 03/16/2016 | 06:00      | 14:00    | 8.00          | \$288.98          | 0.00          | \$0.00            | \$288.98        |
|                            |       | 03/24/2016 | 03/24/2016 | 06:00      | 14:00    | 8.00          | \$288.98          | 0.00          | \$0.00            | \$288.98        |
|                            |       | 03/22/2016 | 03/22/2016 | 06:00      | 10:00    | 4.00          | \$144.49          | 0.00          | \$0.00            | \$144.49        |
|                            |       | 03/22/2016 | 03/22/2016 | 06:00      | 14:00    | 8.00          | \$288.98          | 0.00          | \$0.00            | \$288.98        |
|                            |       | 04/05/2016 | 04/05/2016 | 06:00      | 14:00    | 8.00          | \$288.98          | 0.00          | \$0.00            | \$288.98        |
|                            |       | 03/20/2016 | 03/20/2016 | 06:00      | 14:00    | 8.00          | \$288.98          | 0.00          | \$0.00            | \$288.98        |
|                            |       | 03/20/2016 | 03/20/2016 | 06:00      | 14:00    | 8.00          | \$288.98          | 0.00          | \$0.00            | \$288.98        |
|                            |       | 03/20/2016 | 03/20/2016 | 06:00      | 14:00    | 8.00          | \$288.98          | 0.00          | \$0.00            | \$288.98        |
|                            |       | 03/20/2016 | 03/20/2016 | 06:00      | 14:00    | 8.00          | \$288.98          | 0.00          | \$0.00            | \$288.98        |
|                            |       | 03/23/2016 | 03/23/2016 | 06:00      | 10:00    | 4.00          | \$144.49          | 0.00          | \$0.00            | \$144.49        |
|                            |       | 03/07/2017 | 03/07/2017 | 06:00      | 14:00    | 8.00          | \$310.66          | 0.00          | \$0.00            | \$310.66        |
|                            |       | 03/07/2017 | 03/07/2017 | 06:00      | 14:00    | 8.00          | \$301.99          | 0.00          | \$0.00            | \$301.99        |
| <b>Total Actual Labor:</b> |       |            |            |            |          |               | <b>\$4,658.38</b> | <b>\$0.00</b> | <b>\$4,658.38</b> |                 |

#### Failure Reporting

| Cause    | Remedy | Supervisor | Remark Date |
|----------|--------|------------|-------------|
| Remarks: |        |            |             |