Public Works and
Government Services
Canada

2018 COMPREHENSIVE DETAILED ANNUAL INSPECTION

BURLINGTON CANAL LIFT BRIDGE

Contract No. EQ754-181509/001/PWL

Project No. R.090046.001

Burlington Canal Lift Bridge

December 2019

(Rev .00)

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December 9, 2019 Project No: R.090046.001

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Dear Madam,

RE: Burlington Canal Lift Bridge
2018 Comprehensive Detailed Annual Inspection
Final Report

We are pleased to submit the final report for the 2018 Annual Inspection for the Burlington Canal Lift Bridge for your records. An electronic version has been uploaded to our FTP server.

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EXECUTIVE SUMMARY

The 2018 Annual Comprehensive Detailed Inspection (CDI) of the Burlington Canal Lift Bridge, including structural/civil, mechanical, and electrical components, has been undertaken in accordance with the requirements of Public Works and Government Services Canada (PWGSC) Bridge Inspection Manual (BIM), December 2010 version. This report represents the key findings of the 2018 Comprehensive Detailed Annual Inspection.

The structure is a tower-driven vertical lift bridge constructed in 1958, with an overall lift span of 116 meters. The bridge is located in Hamilton, Ontario and carries 4 lanes of Eastport Drive traffic over the Burlington Canal, with a posted speed limit of 50 km/hr. The bridge is normally only in service during the navigable season from mid-March to the end of December. Advantage is taken of the winter shutdown of the bridge to perform annual maintenance and repairs.

The movable span is a tower drive vertical lift span with independent span drive machinery located at the top of each tower. The span drive machinery in each tower is driven by two electric motors which power a drivetrain that consists of shafts, bearings, and gearing, culminating with pinions that mate with ring gears attached to the counterweight sheaves. Motor rotation results in rotation of the counterweight sheaves, enabling the lift span to be raised and the counterweight lowered as the wire ropes pass over the sheaves.

The motors are driven and controlled by state-of-the-art variable frequency drives. The bridge is operated using a single motor in each tower with the second motor used as back up. In addition to the normal span drive machinery, each tower is provided with an auxiliary drive that is capable of operating the bridge in the event of normal span drive failure. The bridge control system consists of redundant programmable logic controllers that provide semi-automatic operation of the bridge and also control of skew of the moving span.

The vertical lift span is balanced by two counterweights located at opposite ends of the span. The ropes extend vertically from the fixed terminations at the lift span, up and over the counterweight sheaves and terminate in connections on top of the counterweight. The ropes transmit the entire dead weight of the lift span and counterweights to the structural tower through the main counterweight sheaves and trunnion bearings.

Each counterweight is equipped with an auxiliary balance system to offset the weight transfer of the unsupported length of the main counterweight ropes during span operation.

Other provided systems include: guides to control the position of the lift span and both counterweights during operation, live load supports to transmit imbalance load and traffic loads to the rest piers, span locks that hold the bridge in the seated position, and tower and span air buffers that are intended to absorb the energy of the lift span should it approach the fully raised or fully lowered position without proper control.

STRUCTURAL

The structural components of the bridge were inspected as per the Scope of Work listed in PWGSC's Terms of Reference, Section 3. The overall structural material condition of the bridge members range from **Very Severe (1) to Good (5)** condition. Severe defects were noted on several primary elements below the bridge deck at the approach and tower spans. The severe defects on the approach and tower spans included severe corrosion on the structural steel stringers, diaphragms, towers' floor beams, towers' column anchorages, severe delamination and spalling of the concrete deck slabs. Severe defects found at the lift span were primarily cracks on the open steel deck grating. There are a few isolated small areas of light to medium defects on the bridge structure above the deck, including the steel trusses, steel plates, bolts, etc. for the towers and the lift span.

The primary causes of the severe defects on the bridge components at and below the decks of the approach and tower spans were evidently due to water leakage through the deck expansion joints and the concrete bridge decks. The primary cause of the cracks on the open steel deck grating at the lift span is due to an inadequate carrying capacity of the existing deck grating as noted in the structural evaluation completed as part of the emergency replacement of a failed deck panel in 2014. The increase in traffic volume, particularly heavy trucks, on the bridge deck due to frequent closures of the adjacent QEW highway bridges (Burlington Skyway Bridges), has likely accelerated the deterioration rate on the Burlington Canal Lift Bridge lift span. It is well known that a larger traffic volume would result in more contamination on structure (i.e. fall off debris/salt/chemicals etc from vehicles/trucks) and an increase in the overall frequency of loads and vibration on the structure.

Severe leakage through the deck expansion joints has evidently led to the observed severe deterioration on the bridge components below the decks at the approach and tower spans. These joints should be retrofitted or replaced in the near future. It is also evident that the existing compression seal expansion joint system in the concrete deck slabs between the approach and the tower spans is considered redundant or in-appropriate. The steel stringers below the deck joints were effectively found to be continuous over the joint gap in the concrete bridge deck. The stringers under the approach and the tower spans are rigidly connected to a common diaphragm and floor beam at the tower which effectively eliminates any differential or relative movement of the structural steel and concrete bridge decks between the spans.

It is evident that significant deterioration on the structural steel at the lift span has been stabilized as a result of the 2010 and 2011 recoating contracts. The re-painted areas on the lift span steel, including all below deck steel stringers, floor beams, bracing, and truss members below and within the splash zone areas of the deck are in **Good (5)** condition.

The need to stabilize the structural deteriorations resulting from the development of corrosion and local, severe rust jacking at key locations still remains. There is an increasing need to re-coat the other remaining areas of the bridge, including the upper section of the lift span, the steel towers and particularly the steel below the approach and tower span of the bridge decks. The re-coating will alleviate the more extensive failures of the painting system and subsequent development of corrosion at critical locations.

It should be noted that the previous report, Inspection Report and Concept Repair Design, Project # R.081864.001, dated April 2017, indicated that the structural evaluation completed as part of the urgent replacement of a failed deck panel in 2014 reported that the existing lift span gratings have insufficient flexural capacity when compared against the CL625 ONT truck loading. However, provided that the ongoing repairs to the lift span grating continually occurs, the deck grating at the lift span should be in serviceable condition.

Overall Structural Condition Rating

The overall structural condition rating, which reflects a structures material condition and performance relative to current standards/codes and is given as per requirements of the Public Works and Government Services Canada (PWGSC) Bridge Inspection Manual (BIM), December 2010 version, which allows a degree of engineering judgment in addition to consideration of the lowest rating of individual components.

The overall structural condition rating is **Poor (3)**, which represents the condition of the steel deck grating on the lift span and several primary elements on the approach and tower spans, including the structural steel stringers, diaphragms, towers' floor beams, towers' column anchorages, concrete deck slabs, and deck expansion joints. This rating is based on the section loss measurements and significant defects on the deck grating, tower bases, and approach spans from the 2018 comprehensive detailed inspection. It should be noted, although primary elements such as the stringers have a material condition rating of Very Severe (1), which reflects worst possible condition at a particular measured location. It does not truly represent the condition of the element's cross sectional area along its length. Rather, the very severe conditions were often found to be concentrated in local areas with no evidence of structural distress (cracks, deformation etc. of structural steel).

Overall Bridge Functional Rating

The overall bridge functional rating reflects a structures material condition and performance relative to functional standards and is given as per requirements of the Public Works and

Government Services Canada (PWGSC) Bridge Inspection Manual (BIM), December 2010 version.

The overall bridge functional rating is **Fair (4)**. This rating is based on the fact that the bridge elements are still able to perform its intended function as per BIM standards, except for the expansion joint seals at the expansion joint between the approach and tower spans, which are leaking.

It should be noted the remaining capacity of structural steel cannot be known precisely from a visual inspection. Given that the severity of the section loss is quite extensive in local areas, it is recommended that a structural evaluation of bridge is performed within the next year to determine the remaining capacity of the structural steel precisely.

All other observed significant defects on the bridge elements including recommendations and cost estimates for the recommended remedial measures are presented in detail in the ensuing sections of this report.

MECHANICAL

The mechanical machinery on the Burlington Canal Lift Bridge was inspected per the scope of inspection outlined in this report. Note that, since 2016, the high-speed machinery was replaced with new components that include new floating shaft couplings, enclosed reducers, motors, motor brakes, and previously used machinery brakes with new machinery brake wheel couplings.

During the current inspection the mechanical machinery was found to be in fair condition and there were no conditions that are currently resulting in operational problems. The majority of the deficiencies found during the inspection are relatively minor and can be corrected by the capable PWGSC maintenance staff. Minor paint deterioration and corrosion was common in spots at all of the machinery systems. Many of the new components for the span drive machinery were unpainted and were starting to corrode. Unpainted and corroded components should be painted for future protection. Apart from the inadequate paint, the span drive machinery components were found in good condition with only minor issues noted within the body of this report.

The counterweight sheave trunnions and trunnion bearings were in fair condition externally however, based on vibration testing, SKF noted potential issues at three bearings in the south tower and one bearing in the north tower. SKF recommends a visual inspection of the noted bearing raceways as the impacts noted from the vibration testing are consistent with damage to the raceway. This should be performed during a shutdown period and coincide with re-lubrication of all trunnion bearings. Periodic vibration testing is continued to be recommended on a yearly basis. This effort should be prioritized as the trunnion bearings are critical components for the reliable operation of the bridge.

The span air buffers have required significant maintenance attention since infiltration during span painting years ago. The air buffers are being flushed with oil periodically, but are not functioning reliably. Only one of the four span air buffers was noted to descend properly as the span raised. The tower air buffers remain functional. Failure of the span buffers could create a hazard during operation of the span near the fully seated position if the buffer was stuck in an extended position. Given the new control system, failure of the buffers does not present a risk of damage to the systems from an out of control span. Consideration may be given to removing the span and tower air buffers in their entirety.

The lubrication of the main counterweight ropes and sheave grooves were found to be fair at the time of the inspection. The main counterweight ropes exhibit areas along the length of the ropes where the lubricant has been displaced by contact with the sheave indicating that the ropes have been lubricated. However, based on the conditions observed during the inspection, the frequency of lubrication remains inadequate. Wear measurements show that the ropes have only experienced a light reduction in capacity, though it can be expected that the wire ropes will corrode and wear at an accelerated rate if they are not properly lubricated. The wire ropes are critical components for the operation of the bridge. It is strongly suggested that they be lubricated in accordance with the mechanical maintenance and lubrication manual to mitigate wear.

Accumulated old lubricant at the north auxiliary ropes and sheaves should be removed. The south auxiliary ropes and sheaves were not lubricated and there is fretting and noise during operation. Without proper lubrication practice of these ropes, accelerated wear is expected. Wear flat measurements at the north auxiliary ropes represent an approximate capacity reduction of 17%. An in-depth inspection of the auxiliary counterweight ropes should be included in the next inspection. As a minimum, consideration should be given to replacing these ropes within the next five years, though this may be adjusted based on the results of the in-depth inspection.

Overall, the mechanical machinery systems are expected to be serviceable in the long term provided that the noted deficiencies, which primarily include lubrication and corrosion issues, are addressed. The largest risk to the reliable operation of the bridge is possible damage at the main counterweight trunnion bearings, which was noted by SKF from their vibration testing. The trunnion bearings should be provided with the recommended internal inspection, re-lubricated and vibration testing periodically performed.

ELECTRICAL

An electrical inspection of the Burlington Canal Bridge was performed as part of the annual inspection cycle for the bridge. The electrical inspection was performed in accordance with the scope of work but also included an evaluation of the recent rehabilitation which included a replacement of a major part of the electrical power and control system for the bridge which took place over a three-year period and was concluded in 2017. This inspection included an evaluation of the replaced systems and an assessment of their reliability and appropriateness in operating and controlling the bridge-imposed duty. The inspection was in sufficient depth to determine the status of the bridge electrical operating systems and the adequacy of these systems to perform their intended function.

The present bridge electrical systems consist of a service and distribution equipment that was installed some 25 years ago and having been modified several times including modifications made during as part of the recent rehabilitation project, replacement and upgraded bridge operating drives and control systems.

The electric service and distribution equipment consist of a main electric service provided by the local utility, two (2) standby diesel generators used to provide backup power for bridge operation and bridge facilities and electric power distribution equipment. The electric service and distribution equipment, although mostly over 25-years old, remains in good serviceable and operating condition, having been well maintained, and continues to provide reliable sources of power to the bridge. A number of deficiencies were identified with the electric service equipment as noted and itemized as follows:

- Live wires in the switchgear metering cabinet have not been terminated after the rehabilitation project which was concluded during 2017.
- There are no alarm devices in the main transformer to alarm potential failures.
- The main transformer is an outdoor oil filled transformer without any type oil containment to protect against an environmental spill of oil.
- There is no interlock in place to prevent an attempt being made to parallel the electric utility service with the standby generators. If an attempt was made to parallel these difference electric sources, it could lead to a catastrophic failure and injury to personnel. It is strongly recommended that both mechanical and electrical interlocks be provided between the main and the generator breakers in Switchboard #1.
- Phase loss and phase failure relays are not provided for the incoming main and generator breaker.
- Environmental protection of the battery chargers and alarm equipment in the generator room should be provided or the equipment relocated to avoid water damage.

The bridge drive and control system replacement project were completed in early 2017. The newly installed replacement and upgraded bridge operating drives and control systems consist of a replacement PLC bridge control system, operator control devices, tower Motor Control Centres (MCC's), main drive motors and variable frequency drives (VFD's) and associated instrumentation, brakes, auxiliary drive motors, bridge operating, alarm and monitoring field devices, new bridge power and control cable installation, replacement aerial cables and bridge vehicular/pedestrian and marine traffic control systems. Although the newly installed systems are operational, effectively control, protect and monitor the bridge status, they are still deficient in a number of areas as described below:

- The main drive motor nameplates are misleading and should be changed to reflect the actual design parameters of the motors. This would enable tuning of the motor drives to be performed in a time effective manner.
- A spare main motor has been furnished but it only conforms to two of the four installed motors. An additional spare motor should be procured to provide complete spares coverage for the main motors.
- The electrical upgrade scope included being able to operate the auxiliary motors located in each tower from one location. Presently this functionality is incomplete and requires input from PWGSC Engineer of Record to finalize.
- The electrical upgrade scope included providing a system that would self-correct in the event of a span skew occurring. Although the bridge control system does control skew, the skew control is disabled when the bridge is lowering below the nearly closed or raising above nearly raised position. The skew early warning and trip functions were found to be triggered frequently. Additionally, resolver errors were occurring and are not automatically re-calibrated or zeroed by the PLC. This deficiency causes a cumulative effect in creating a false skew conditions that presently has to be physically re-zeroed by bridge personnel every 2 to 3 weeks. The bridge control system should be modified to correct this deficiency.
- The designed and specified primary span skew monitoring device is unable to monitor skew with any useful accuracy and has been disconnected from the control system. A workable solution to this problem should be provided to ensure the bridge has a reliable and redundant form of skew monitoring.
- Evidence of a leaking roof exists in both tower machinery spaces that could cause system failure in the future if not addressed. These leaks should be repaired as soon as possible to protect the electrical equipment in the tower.
- Failures to elements of the traffic control system were found and reported in the inspection report. These were all of a minor nature and should all be addressed in the near term.

- Although the newly installed aerial cable custom designed fiberglass spacers appear to provide sufficient stability to the aerial cables, it is recommended that the aerial cable installation be monitored visually utilizing site video cameras or from the lift span in the raised position over an extended period to verify the long-term durability of the installation and its capability to continue to damp out oscillations in the aerial cable during times of high wind.

Based on the findings of this electrical inspection, assuming that the above deficiencies are satisfactorily addressed, and with appropriate regular maintenance, it is expected that the bridge electrical systems will provide reliable service in the long term.

1.0 INTRODUCTION

Morrison Hershfield (MH) has been retained by Public Works and Government Services Canada (PWGSC) to provide engineering services for the 2018 Annual Comprehensive Detailed Inspection (CDI) for the Burlington Canal Lift Bridge. The engineering services include inspections of the structural, mechanical, and electrical systems. This work is performed under the Call-up Contract No. EQ754-191844/001/PWL for Bridge Engineering Services relating to the Burlington Canal Lift Bridge in Hamilton, Ontario.

This report covers the inspection of components (structural, mechanical, and electrical) for the Burlington Canal Lift Bridge as required in the PWGSC's Terms of Reference entitled "Burlington Canal Lift Bridge – Annual Comprehensive Detailed Inspection" dated September 10, 2018. The mechanical and electrical inspections were undertaken for MH by Stafford Bandlow Engineering Inc. (SBE).

1.1 DESCRIPTION OF STRUCTURE

Constructed circa 1958 to carry a railway track and 2 traffic lanes roadway, the BLB is a tower-driven vertical lift bridge fabricated from built-up steel sections. In 1982, the railway track was removed and the bridge was modified to carry a 4 traffic lanes roadway bridge (2 NB and 2 SB lanes of Eastport Drive traffic) over the navigation water channel linking Hamilton Harbour with Lake Ontario.

The bridge, a 161.2m total length, consists of 2 short spans (approximately 12.60m long approach span and 9.75m long tower span) at each end and a 115.9m long central lift span over the water channel. The bridge decks at the north and south sides of the main lift span are reinforced concrete slabs on steel stringers that are supported by conventional concrete abutments and steel floor beams at the tower sections. The main span bridge deck is an open steel deck grating on a two-sided Warren Truss with built-up steel members of plate and rolled steel sections.

1.2 SCOPE OF ANNUAL INSPECTION

The 2018 Comprehensive Detailed Inspection was performed in accordance with the PWGSC Bridge Inspection Manual (BIM, 2010 edition), AASHTO Moveable Bridge Inspection Manual (2017 edition), the Ontario Structure Inspection Manual (OSIM, 2008 edition), and the MTO Structure Rehabilitation Manual (2007 revision).

As specified in the PWGSC's Terms of Reference entitled "Burlington Canal Lift Bridge – Annual Comprehensive Detailed Inspection" dated September 10, 2018, field inspections of the bridge included the following:

Structural Components

- Structural steel below the deck section and up to the limit of the splash zone areas at the above deck section (approach spans, tower spans, towers, lift span);
- NDT testing for structural steel members found to be exhibiting severe defects.
- Deck grating;
- Bearings;
- Expansion joints;
- Sidewalk;
- Visible concrete substructures;
- Approach roadways;
- Asphalt wearing surface;
- Concrete bridge deck (soffit);

Mechanical Components

Perform an inspection of the machinery systems in accordance with the established scope of inspection. Inspect every component of the mechanical system for adequacy of lubrication/lubricant, leakage, cracks, unusual noise, corrosion and wear. All components shall have mounting bolts, machinery supports and anchorages inspected. Inspection of the drive system will include, but will not necessarily be limited to, the items listed in the following table.

MECHANICAL INSPECTION TABLE

ITEM	***DESCRIPTION OF INSPECTION***
Open Gearing	Visually observe; lubrication and wear patterns, backlash, and clearance. Listen for any unusual or excessive noises.
Enclosed Gearing	Perform visual inspection through the inspection port(s). Listen for any unusual or excessive noises. Oil samples will be obtained and submitted for analysis.
Shafts	Inspect for cracks and distortion with particular attention paid to keyway areas.

Couplings	Observe leakage and condition of seals for all gear-type and grid-type couplings. Visually observe alignment.
Journal (Sleeve) Bearings	Visually and audibly observe bushings and housings during operation.
Anti-Friction Bearings	Perform visual inspection and closely monitor for noise during operation. Obtain bearing vibration measurements at the trunnion bearings as part of this inspection.
Trunnion and Trunnion Bearings	Perform visual inspection and closely monitor for noise during operation. Obtain bearing vibration measurements by SKF as part of this inspection.
Traffic Gates	Inspect warning and barrier gates for smooth operation. Check reducers for proper oil levels where accessible. Check integrity of brakes, anchor bolts, and gate arm hardware.
Wire Ropes and Sheaves	Visually inspect wire ropes, rope sockets, and rope sheaves for proper lubrication and signs of wear or damage.
Brakes	Inspection shall include verifying smooth operation, condition of brakewheels, rotors, pads, thrusters, hand releases, linkages, and spring length settings.
Auxiliary Drive	Visually inspect components. Witness operation of the auxiliary drive during a span lift. Operation of the lift span using the auxiliary system will be coordinated with the Bridgemaster.
Open Gearing	Visually observe; lubrication and wear patterns, backlash, and clearance. Listen for any unusual or excessive noises.
Enclosed Gearing	Perform visual inspection through the inspection port(s). Listen for any unusual or excessive noises. Oil samples will be obtained and submitted for analysis.

The mechanical components that stabilize the movable span when it is in motion and at rest will be visually inspected. In general, the components to be inspected include but are not limited to: span locks and drives, counterweight and span guides, centering devices, live load supports, trunnions and trunnion bearings, strike plates, and buffer cylinders.

Electrical Components

Every component of the electrical system will be visually inspected for condition and adequacy to perform its intended function. The following table describes the extent of the proposed electrical inspection services.

ELECTRICAL INSPECTION TABLE

ITEM	***DESCRIPTION OF INSPECTION***
Traffic Signals, Gates & Barriers	Visually observe operation. Check for: proper sequencing, all lamps lighted, physical condition of enclosures, gate arms, hardware, wiring, conduits, mounting bolts, internal dirt & debris, corrosion, etc.
Navigational Lights	Visually observe operation. Check for: all lamps lighted, physical condition of housings, lenses, conduit & wiring, attachment bolts & hardware, corrosion.
Conduit, Wiring, Junction Boxes and Enclosures	Visually check for: corrosion, adequacy of mounting/ attachments, bolts and hardware, spare conductors, weathering of cable jackets and Overload, overheating, or insulation breakdown (corona ortracking) grounding, water-tightness, etc.
Drive Motors (Both AC & DC)	Visually check: mounting bolts, frame movement, noise & vibration, shaft end play during operation, coupling/pulley/sprocket bolts, ventilation openings, dirt & debris buildup, cable connections, brushes, commutators/slip rings. The drive motor current, voltage and power parameters will be monitored and recorded during operation.
General Purpose Motors	Visually check: mounting bolts, frame movement, noise & vibration, shaft end play during operation, coupling/pulley/ sprocket bolts, ventilation openings, dirt & debris buildup, cable connections (when visible).
Brakes	Visually check: overall operation, noise & vibration, wiring, limit switches, corrosion and dirt/debris buildup on electrical components, mounting hardware.
Locks	Visually check: overall operation, noise & vibration, wiring, limit switches, corrosion and dirt/debris buildup on electrical components, mounting hardware.
Limit Switches	Visually check: overall operation, free movement of lever arms & plungers, wiring, sprockets/chains/gears/couplings, corrosion, mounting bolts & hardware, condition of contacts (when visible) and verify engagement during operation.
Control System (Console, Relay/PLC Cabinets, Speed Controls)	Visually check for: condition of enclosures and cabinets, wiring and internal components mountings, dirt debris accumulation, noise, heat, safety (exposed terminals, etc.), grounding, functioning of indicator lights, switches, pushbuttons, and metering. Control System interlocking shall be tested. The emergency stop buttons should all be tested as

	well.
Aerial Cables between Towers	Visual inspection with binoculars will be undertaken from either the ground, towers, or the lift span. If more detailed inspection information is available then that will be placed into the report.
Bridge Operation	Visually observe: proper bridge operation, acceleration & deceleration, braking, drive motor current draw during operation, seating.
Auxiliary Drive	Inspect components. Operation of the lift span using the auxiliary system will be coordinated with the Bridgemaster.

1.2.1 Inspection Personnel

Structural

Inspection of the bridge's structural component was performed by Scott Quach, P.Eng., Paul Locham, C.E.T., and Myles Williams of Morrison Hershfield; and Alex Boone, and William Field of Domson Engineering & Inspection Ltd. for Morrison Hershfield from December 11 to 20, 2018.

Mechanical

The detailed mechanical inspection was completed by Ralph Giernacky, P.E. and Alvaro Yanes, E.I.T. of Stafford Bandlow Engineering (SBE) on December 12, 13, and 14, 2018. Assistance to the mechanical inspection was provided by PWGSC bridge operating and maintenance staff.

Christopher Ramos, Service Technician of SKF performed vibration measurements under the supervision of SBE on December 12 and 13, 2018.

Electrical

The detailed electrical inspection was completed by Gareth Rees, P.Eng. and Lin Xu, P.E. of Stafford Bandlow Engineering (SBE) on December 12 and 13, 2018.

1.2.2 Background Information

Information on the bridge structure was obtained from the available previous inspection report and drawings. The following provided information forms the base for this 2018 Detailed Comprehensive Annual Inspection of the structure:

- 2017 Comprehensive Detailed Annual Inspection by Morrison Hershfield;

- 2016 Comprehensive Detailed Annual Inspection by Parsons;
- 2014 drawings for replacement of controls, drives and overhead cables;
- 2013 drawings for replacement of one bridge deck grating panel, Morrison Hershfield;
- 2013 drawings for replacement of controls, drive and overhead cables, Parsons Brinckerhoff;
- 1999 New Deck Grating drawing, PWGSC;
- 1982 Framing Plane-Lift Span drawing, C.C. Parker Consultants Limited;
- 1980 drawings for modication of bridge deck, Parker Consultants;
- 1958 construction shop drawings for Burlington Canal Lift Bridge, Bridge & Tank Company of Canada Limited;
- Operation and Maintenance Manual.

As identified in the 2016 Comprehensive Detailed Annual Inspection Report, a number of remedial repairs were completed on the bridge in 2015 and 2016. These included:

- Lubrication of the main counterweight ropes;
- Freeing the north live load support rockers;
- Replace the aerial cables as part of the current rehabilitation contract;
- Patch repair holes on the roof membrane at the North Tower;

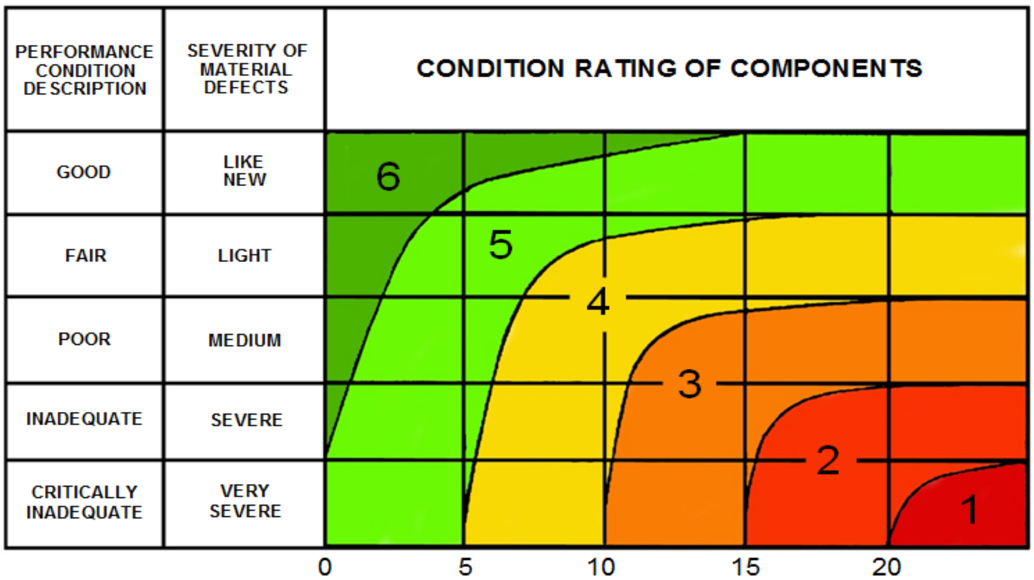
It is understood that the current rehabilitation contract to repair and upgrade the security, mechanical and electrical control systems is in its final phase at the time of this report. The rehabilitation work included the replacement of the aerial cables, the bridge control and drive systems, the high-speed machinery, the auxiliary drive system, and the warning and barrier gates.

Welding repairs of the deck grating at the lift span have also been recently completed as part of an on-going general maintenance for the bridge.

1.2.3 Component Condition Ratings

The inspection was performed in accordance with the PWGSC Bridge Inspection Manual (BIM), 2010 edition. Material and performance condition ratings for all accessible components were updated using the results of the 2018 Detailed Comprehensive Annual Inspection. Ratings were compiled based on the observed defects criteria specified in the BIM. Results of the inspection were summarized in the standard forms enclosed in Appendices “A3” to “A5”.

The overall general condition rating for the structure is derived from the ratings of individual components as presented in the BIM. The condition ratings for each component are based on the BIM scale from 1 to 6 as shown below:



% Loss of Component Cross-Section, Surface Area or Length Affected and/or % Reduction in Performance Capacity

The priority code assigned to each component is in accordance with Section 2.3 of the BIM:

Code	Description
U	Urgent, requires immediate attention and remedial measures to ensure public safety
M	Required work to be done as part of routine annual maintenance
S	Further study/investigations required prior to initiating repair programme
A	Repair and/or replacement to be done in less than 1 year
B	Repair and/or replacement to be done in less than 3 year
C	Repair and/or replacement to be done in less than 5 year
D	Condition to be re-assessed at the next inspection

2.0 STRUCTURAL INSPECTION

2.1 GENERAL

Detailed visual inspections were performed in accordance with element and condition classifications as prescribed in the BIM. Non-destructive means were used to establish the scale of deterioration (e.g. by hammer sounding and ultrasonic equipment), where possible. For those components where drawings were available, site measurements were also performed to verify whether the structure was built in accordance with the existing available information.

For consistency and simplicity, a key plan showing identification number on various components of the bridge, similar to the previous report, are shown in Figure 1 to 4 in Appendix “A1”. General views and close-ups of defects on the inspected components are presented in the site photographs enclosed in Appendix “A2” of this report. A summary of field observations, as well as the condition ratings and repair priority codes for the individual components of the bridge are included on the inspection form in Appendices “A3”.

2.2 NORTH AND SOUTH APPROACH SPANS

The approach spans at the north and south ends of the bridge, are made up of a reinforced concrete slab on eight steel stringers; the stringers are identified from east to west as Stringer 1 to Stringer 8 as shown in Figure 1 in Appendix “A1”. The stringers, supporting the concrete bridge decks on the approaches, are supported on a conventional concrete abutments and on steel floor beams at the rear end of the steel towers. A concrete curtain wall, constructed as part of the concrete bases for the bridge towers, is present below the deck at the south and north side of the north and south approach spans, respectively. General views of the bridge and the approach spans are shown in Photos 1 to 6 in Appendix “A2”.

2.2.1 Concrete Abutments and Ballast Walls

The north and south concrete abutments are generally in **fair to good** condition with an MCR of 4. Where accessible, the concrete abutments and ballast walls were hammer sounded to detect any loose concrete or delamination areas. Significant defects, observed on the concrete abutments, are shown in Sketch SK-1 in Appendix “A1”. The abutment walls are largely wet stained and with several large areas of anti-graffiti paint (Photos 7 and 8). There are a few large concrete patches, medium-to-wide vertical cracks, and several large delamination areas on both abutment walls (Photos 9 to 11 and 13 to 15). The concrete patches and delamination areas were found mostly on the upper portion of the concrete walls. A wide vertical crack with rust stains and delamination areas was noted on the east section of the south abutment wall (Photo 9). There is a wide diagonal crack with efflorescence stains at the top west corner area of the south wall (Photo 12). There are large accumulations of sediment, concrete, and rust scales debris on the top bearing seat surface of the concrete abutments (Photo 16).

The concrete ballast walls at the north and south abutments are largely wet stained with several narrow cracks and a few medium vertical cracks. Heavy rust stains, cracks, and small spalled areas were also evident on the interior section of the ballast walls (Photos 17 to 20). A severely corroded steel bar was noted in a local spalled area adjacent to a vertical expansion joint near mid-section of the north ballast wall (Photo 20). There is a large delamination area on the south ballast wall between Stringers 6 and 7 (Photo 18).

2.2.2 Abutment Bearings

Bearings under the east Stringers 1 to 3 were reported to have been installed in 1982 as part of the deck modification from the original railway track to vehicular traffic. The west bearings under stringers 4 to 8 at both north and south abutments were subsequently replaced in 1998.

All bearings observed at the north and south abutments are elastomeric laminated bearing type (Photos 21 to 25). The bearings are in good condition with no significant defects, except for some minor cracks and light bulging on the rubber surface of the east bearings under Stringers 1 to 3 at the south and north abutments (Photos 24 and 25). It should be noted that oversized shoe plate, approximately 571.5mm wide x 647.7mm long x 8mm thick plate, was typically noted on the underside of the west stringers (Stringers 4 to 8) over the bearings at both abutments (Photo 21). It is likely that the shoe plates, typically galvanized steel finish, were installed on the stringers as part of the bearing replacement in 1998. The steel shoe plate typically act as a direct contact surface for the bearing as well as help stiffen the bottom flange for better and uniform load transfer distributed to the bottom surface to the bearing.

Bearing under Stringer 4 at the south abutment was reported to have tilted eastward. Tilting of the bearing was reported to be approximately 4mm in the previous 2007 to 2011 annual inspection reports and then increased to 6mm in 2012. The most recent inspection in 2016 and 2017 reported the tilt to have increased to 8mm. As part of the on-going monitoring of the reported tilting of the bearing at the south end of Stringer 4, the bearing height was measure on both west and east side of Stringer 4 as part of this 2018 inspection. A height difference between the measured values between the base grout pad and the shoe plate appeared to indicate an eastward tilting of the bearing at approximately 8mm which is similar to that previously reported in the 2016 and 2017 inspections; this tilt value is within tolerance for bearings. There were no signs of distress or significant defects evident on the bearing surface (Photo 22).

2.2.3 Concrete Curtain Walls

The concrete curtain walls under the north and south approach spans are in good condition (Photos 26 to 29). There are a few isolated narrow and medium cracks on the concrete walls (Photo 30). A small area of light shallow spall was evident adjacent to a vertical crack on southeast section of the south wall (Photo 31).

2.2.4 Concrete Wingwalls

The concrete wingwalls at each corner of north and south abutments are in good condition (Photos 32 to 35). The northeast and southeast retaining walls appeared to have been reconstructed under the recent rehabilitation contract (Project #R.012641.001) with cantilever slab for new gate barrier (Photos 32, 35, and 36). The concrete walls exhibit a few isolated narrow to medium vertical cracks. A local small area of concrete spalled and few narrow-to-medium stained cracks were noted on the top south corner of the northwest retaining wall (Photo 37).

2.2.5 Bridge Deck Wearing Surface

The deck asphalt surface on the concrete bridge decks at the approach spans are generally in good condition (Photos 38 to 43). Asphalt pavement on the concrete bridge deck was reported to have been repaved in 2011. There are a few isolated light unsealed cracks on the asphalt surface. Cracks on the deck asphalt surface were found mainly in areas adjacent to the concrete end-dam for the deck expansion joint with the adjacent tower spans (Photos 40 and 43). There is a small asphalt patched area adjacent to the concrete dam for the expansion joint at the south end of the north approach span near the southbound lane-marker (Photo 43). A light longitudinal unsealed crack was also noted extending from the asphalt patch along the southbound lane-marker.

2.2.6 Deck Underside and Stringers

There are eight steel stringers supporting the concrete bridge deck below the roadway traffic at the north and south approach spans; a ninth stringer with steel cross-framing for the support of a cantilever pedestrian sidewalk is present along the west side of the concrete bridge deck. The stringers are identified from east to west as Stringer 1 to

Stringer 8 as shown in Figure 2 in Appendix "A1". General views of the deck underside at the approach spans are shown in Photos 44 to 46 and 60 to 63 in Appendix "A2".

As noted in the 2016 Detailed Comprehensive Annual Inspection Report, a detailed condition survey of the concrete bridge decks was completed in 2004. The condition survey indicated that a high percentage of the concrete deck slabs are in active corrosion category areas and the concrete was also found to be highly chloride-contaminated.

Concrete Deck Soffit

Significant defects, observed on the concrete deck soffit at the approach and tower spans, are shown in Sketches SK-2 and SK-3 in Appendix "A1". The underside surface of the concrete deck slab at the north and south approach spans is generally in fair condition. The concrete deck soffit is typically wet stained at areas adjacent to the deck expansion joints at the abutments and the joints between the approaches and the adjacent tower spans, and at local areas in the interior section of the deck (Photos 47 to 49, 51, 55 to 57, 64 to 67, and 71 to 75). Several large delaminated concrete areas were found on the south and the east interior sections on the south approach span soffit and in places at the northwest and southwest end sections of the north approach span (Photos 47 to 51, 73, 74, and 79). There are several medium cracks with rust and efflorescent stains on the deck underside surface at both approach spans (Photos 47, 48, 50, 61, 67, and 68); large wet and severe delamination areas were noted on the soffit at a few of the cracks (Photos 48 and 50). The end soffit at the north and south abutments were typically found to be sloping towards the stringers and the end diaphragms causing water leakage through the abutment joints to run towards the structural steel (Photos 52 to 54, 69, and 70); heavy corrosions were typically noted at the stringers' ends and the back face of the end diaphragms.

Steel Stringers and Diaphragms

The structural steel on the underside of the bridge decks at the approach spans is in **poor to good** condition with a MCR ranging from 1 to 5. Rating and observation comments of each individual stringer are presented in the inspection forms in Appendix "A3". Overall, the paint coating on the steel has lightly faded and peeled in places exposing a light surface corrosion on the structural steel. The coating was found largely peeled from steel stringers and diaphragms at areas below the deck expansion joints, particularly at the north and south abutment ends.

General views of the structural steel below the approach spans are shown in Photos 44 to 49 and 60 to 64 in Appendix "A2". Significant defects on the structural steel under the bridge deck at the south and north approach spans were mainly found at areas below the deck expansion joints where there is leakage through the expansion joint seals at the abutments and the joint with the adjacent tower spans (Photos 51, 55, 71 to 75, 78 to 81, 83 to 85, 90 to 94, and 96 to 98). The steel corrosion is more pronounced on the back side and bottom surface of the diaphragms and the stringers at the abutments (Photos 52, 54, and 80 to 82). The gusset plates for the connection of the diaphragms and stringers at the abutments were generally found severely corroded and perforated (Photos 80, 81, and 93). Severe corrosion was also noted in places along the top and bottom surfaces of Stringer 8 (Photos 44, 60, 86 to 89, 99, and 100). There is a bent steel curb plate at the top of Stringer 8; leakage through the joint between the steel curb plate and the stringer has evidently led to severe corrosion on the stringer, particularly on the north approach span.

The severity of the corrosion on the stringers and diaphragms were measured using tapes and ultrasonic instrument. There were no evidence or suspected cracks in the welded areas of the steel; thus, the non-destructive tests were performed mainly to determine the severity of the corrosion. The non-destructive test, performed by Domson Engineering & Inspection Ltd., was completed as part of the 2018 Comprehensive Detailed Annual Inspection. Details on the ultrasonic thickness measurements are presented in Domson's report attached in Appendix "A4".

At the south approach span, section loss due to corrosion was found to range from 25% (Stringer 4) to over 66% (Stringer 6) at the south abutment end and up to 16% (Stringer 4) below the deck joint at the tower end. Local severe section loss on Stringer 8 at the south approach span ranges from approximately 2.5% at the tower end to over 47% at northern section over the curtain wall. The section loss on the steel diaphragm ranges between 14% (diaphragm between Stringers 6 and 7) to over 65% (diaphragm between Stringers 7 and 8) at the south abutment and from 0% (diaphragm between Stringers 1 and 2) to over 65% (diaphragm between Stringers 7 and 8) below the deck joint at the tower end. Details of section loss on the diaphragms and each stringer are presented in the Inspection Form in Appendix "A3".

At the north approach span, the section loss on the stringers ranges from under 1% (Stringer 5) to over 57% (Stringer 1) at the north abutment end and from 0% to 44% (Stringer 4) at the south end below the expansion joint with the adjacent tower span. The section loss on the diaphragms ranges from 9% to over 55% at the north abutment and up to 23% on the diaphragms at the south end of the span. Details of the section loss on the diaphragms and each stringer are presented in the Inspection Form in Appendix "A3".

2.3 North and South Tower Spans

Bridge deck at the north and south tower spans bridge decks consist of a reinforced concrete slab on eight steel stringers; the stringers are identified from east to west as Stringer 1 to Stringer 8 as shown in Figure 2 in Appendix "A1". The concrete bridge decks and stringers are supported on steel floor beams at the front (facing the lift span) and at the rear (facing the approach span) of the steel tower structures. General views of the bridge decks at the tower spans are shown in Photos 101 to 103 and 106 to 108 in Appendix "A2".

2.3.1 Bridge Deck Wearing Surface

The deck asphalt surface on the tower spans bridge decks are generally in good condition (Photos 104 and 109). The deck asphalt was reported to have been repaved in 2011. Small areas of light unsealed pattern cracks were noted on the deck asphalt surface on both south and north tower spans (Photos 105 and 110 to 112). The cracks on the north tower span were found mainly in areas adjacent to the deck expansion joints at the north and south ends of the span.

2.3.2 Deck Underside and Stringers

There are eight steel stringers supporting the concrete bridge deck below the roadway traffic at the north and south tower spans; a ninth stringer with steel cross-framing for the support of a cantilever pedestrian sidewalk is present along the west side of the concrete bridge deck. The stringers are identified from east to west as Stringer 1 to Stringer 8 as shown in Figure 2 in Appendix "A1". General views of the deck underside at the spans are shown in Photos 113 to 116, 126, and 127 in Appendix "A2".

It is understood that a detailed condition survey of the concrete bridge decks (approach and tower spans) was completed in 2004. The condition survey indicated that a high percentage of the concrete deck slabs are in active corrosion category areas and the concrete was also found to be highly chloride-contaminated.

<u>Concrete Deck Soffit</u>

Significant defects, observed on the concrete deck soffit at the tower spans, are shown in Sketch SK-3 in Appendix "A1". The underside surface of the concrete deck slab is generally in fair to good condition. Extensive wet areas was typically noted on the soffit at areas below the deck expansion joints between the towers and the adjacent approach spans and at the joint with the lift span (Photos 118, 119, and 128 to 130). Large wet areas were also noted on the interior areas of the north tower span. Several small shallow spall pockets were noted on the southern section of the south tower span at areas adjacent to Stringers 2, 4, and 8; a small local delamination area was also found at the southeast corner area of the Stringer 4 at the south tower span (Photo 120). The north tower span soffit exhibits several narrow-medium stained cracks and a few localized delamination areas. Cracks with rust and efflorescent stained were found mainly on the soffit at area between Stringers 3 and 4 (Photos 131 and 132). A large delamination area was also noted on the soffit between Stringers 3 and 4 at the north end of the span (Photo 133).

Steel Stringers and Diaphragms

The structural steel on the underside of the bridge decks at tower spans is in **poor to good** condition with a MCR rating ranging from 1 to 5. Overall, the paint coating on the steel towers below the decks has lightly faded and peeled in places exposing a light surface corrosion on the structural steel.

General views of the structural steel below the bridge deck at the tower spans are shown in Photos 113 to 117 and 126 to 130 in Appendix "A2". Significant defects on the steel stringers and diaphragms under the bridge deck at the north and south tower spans were mainly found at local areas below the deck expansion joints between the towers and the adjacent approaches and the lift spans (Photos 119 to 125 and 135 to 138). The severity of the corrosion on the stringers and diaphragms were measured using tapes and ultrasonic instrument. The non-destructive test, performed by Domson Engineering & Inspection Ltd., was completed as part of the 2018 Comprehensive Detailed Annual Inspection; Domson's report is attached in Appendix "A4". Details of the section loss on the stringers and diaphragms are presented in the Inspection Form in Appendix "A3"

Section loss due to corrosion on the stringers at the south tower span was found to range from 0% to over 29% (Stringer 4, Photo 122) at the south end below the joint with the adjacent south approach span and from 0% to over 9% (Stringers 2 and 3, Photo 125) at the north end below the joint with the lift span. Significant section loss, up to 50% and 30%, on the steel diaphragms at the south tower was noted on the diaphragm between Stringers 4 and 5 below the expansion joint with the south approach and between Stringers 3 and 4 at the north end below the joint with the lift span, respectively.

At the north tower span, the section loss on the stringers ranges from 0% (Stringers 1 and 2) to over 57% (Stringer 7) at the north end below the expansion joint with the north approach span and from under 5% (Stringer 2) to 17% (Stringers 3 and 4) at the south end below the expansion joint with the lift span. The section loss on the steel diaphragms ranges from 0% (diaphragm between Stringers 2 and 3) to over 23% (diaphragm between Stringers 6 and 7) below the north expansion joint and from 2% (diaphragm between Stringers 1 and 2) to 34% (diaphragm between Stringers 5 and 6) at the south end of the span.

2.3.3 North and South Steel Towers

The north and south steel towers, extending approximately 58.4m high from the concrete pier foundation to the equipment housing roof, consist of built-up steel truss members for the columns, horizontal, diagonal cross bracing, and sheave girders at the top. Each tower is equipped with an enclosed elevator steel shaft, an access ladder, a large concrete counter weight unit, upper catwalk with access hatches from the sheave room atop of the towers; an enclosed housing for the equipment and sheave rooms is present at the top of each tower. For identification, the towers are assigned as six panel heights starting with Panel 1 at deck level to Panel 6 at the top section below the equipment/sheave rooms as shown in Figure 1 in Appendix “A1”.

Under the scope of the 2018 Comprehensive Detailed Inspection, this inspection focuses on the towers’ components that are below the deck and within the splash zone from the deck level, i.e. the lower section of Panel 1 at the towers. For completeness, general observations on the upper section of the towers from ground level were also made at the time of the site inspection. General views of the towers are shown in Photos 1 to 4, 101, and 106 in Appendix “A2”.

<u>Below Deck Section</u>

The steel towers at the bottom below deck section are in **poor to fair** condition with a MCR ranging from 1 to 5. The tower section comprises of four built-up steel columns with anchorage assemblies (Photos 140 and 141), one front and one rear floor beam (Photos 142, 143, 160, and 161), two jacking girders spanning the front and rear columns (Photos 144, 145, 162, and 163), and lateral bracing members (Photos 113, 115, and 126).

The rear floor beams at the south and north towers, located below the deck expansion joint between the approach and tower spans bridge decks, generally exhibit local areas of light to medium corrosion (Photos 146 to 148, 150, 164, and 165). Large areas of severe corrosion were noted on the top flange and the web areas of the rear floor beams at both towers. The severe section loss areas, measured up to 40% and 20%, were noted on the top flange between Stringers 3 and 4 (Photo 149) and on the lower west section of the web plate at the south tower (Photos 147 to 149), respectively. At the north tower, large area of the severe corrosion with significant section loss ranging from 20%

to 53.3% was noted on the west lower web area below Stringer 6 to 8 of the rear floor beam (Photos 166 to 169). Severe corrosion on the top flange plate of the rear floor beam, noted at section from Stringer 6 and Stringer 7, was found to have a section loss of over 54% (Photos 149 and 168). Ponding of rain water leaked through the deck expansion joint was evident on the top beam surface near Stringer 4 (Photo 168).

The front floor beam of the towers, located below open gap expansion joint in the deck between the tower and the lift spans, typically exhibits light corrosion areas on the top and bottom flange areas (Photos 121, 125, 137, 151, 161, and 169). Local areas of light to medium corrosion, up to 10% section loss, were noted on the stiffener plate at the top and bottom corners at east connection of the front floor beam at the south tower and on the lower web area at bottom west end of the floor beam at the north tower (Photos 152, 153, and 170).

The jacking girders, spanning between the front and rear columns of the towers, typically exhibit light fading of the paint coating on the steel surface and a few isolated small areas of light surface corrosion. General views of the girders are shown in Photos 144, 145, 162, and 163 in Appendix “A2”. There are several local areas of peeled paint showing light surface corrosion on the girders surface (Photos 154, 155, 158, and 159). Light to medium rust jacking was generally noted on the lower north and south section of the girders (Photos 156, 157, 172, and 173). Severe corrosion was noted on a few isolated rivets on built-up members for the jacking girders at both north and south towers (Photos 158 and 174).

The tower columns section below the bridge deck are in good condition with a few local areas of light surface corrosion (Photos 143, 144, 161, 162, 175, and 176). Light corrosion with minor section loss on the tower columns were generally noted at the bottom section of the tower (Photo 176). Accumulation of sediment and local areas of medium corrosion were typically noted at the bottom interior surface of the front columns of both towers (Photo 177).

The lateral and wind bracing at the bottom of the towers are generally in good condition (Photos 113, 115, 126, and 178 to 180). Local areas of light to medium corrosion were noted in places at the end of the members at connection to the tower columns and rear floor beams (Photos 181 to 184).

The anchorage assembly for the tower columns consists of steel rocker on base plate blocks at the front columns and steel plates anchored into concrete at the rear columns (Photos 140 and 141). The steel rocker anchorage assembly at the front columns of the towers typically exhibits local areas of light corrosion on the exposed surface (Photos 185, 186, 189, 195, and 196). The steel plate anchorage assembly at the rear columns of the towers typically exhibits light rust on the exterior surface of the steel plates and local areas of light to medium corrosion, up to 10% section loss, on the interior surface of the steel plate assembly (Photos 190 to 192 and 197 to 199).

An original steel pedestal bearing is present at the eastern section of the rear and front floor beams of both towers (Photos 200 and 201); the pedestals are typically located below the original railway track (removed in the 1982 contract) on the deck. Light to medium rust jacking was typically noted on the shim plates at the top of the pedestal.

The concrete pier bases at the bottom of the north and south towers are generally in **fair to good** condition with a MCR ranging from 4 to 5 (Photos 202 and 203). Asphalt paving was typically noted on the pier surface at the location of the front tower columns (Photo 204). There is a large area of patched or resurfaced concrete at the location of the southwest column; a medium crack was noted on the patched concrete surface (Photo 205). A wide vertical crack with leakage was noted in the construction joint at central east face section of the north concrete pier (Photo 206). A few isolated shallow delaminated and spalled areas were noted on both concrete piers (Photo 207). A large area of shallow delamination and spall were evident at the southwest corner of the north pier (Photo 208).

As noted in the 2016 Detailed Comprehensive Annual Inspection Report, there are two equalization water tanks at areas between the tower columns at each of the tower piers. Internal inspection of the tanks are required every four years cycle. The tanks were last inspected in 2016 (refer to the 2016 report for the interior condition of the tank).

<u>Above Deck Section</u>

Above the deck, the steel towers are generally in good condition. General views of the towers at sections above the deck are shown in Photos 1 to 4, 101 to 103, 106 to 108, 209 to 214, 216 to 220, 223 and 224 in Appendix “A2”. Local small areas of light corrosion were noted in places steel towers (Photo 222). There was no apparent sign of any significant rust jacking at the time of the site inspection. Debris accumulation was noted on the internal horizontal plate in the west columns of the towers near the sidewalk level. There are three missing rivets on the upper built-up connection of the west Horizontal No. 4 near mid face section of the south tower (Photo 215); the missing rivets were also found on the opposite upper connection of the member, totaling six missing rivets on the horizontal member. The same missing rivets condition was also evident on the east Horizontal No. 4 of the tower, resulting in a total of twelve missing rivets on the south tower.

2.4 Lift Span

The lift span section of the bridge is a steel through truss with open steel grating deck structure. The lift span, approximately 115.9m long, extends over the navigation water channel at the Burlington Canal. The steel through truss, including floor beams, upper and lower lateral bracing, sway and portal bracing, and traction bracing at the lower level, are made up of built-up members from plate and rolled steel sections. Open steel deck grating is supported by twelve (12) steel stringers (WF section) which in turn connect to thirteen (13) steel floor beams.

The original east stringers supporting the railway track were partially removed as part of the deck modification to a four lane roadway in 1982; some end connections still remain on the floor beams. The lower section of the lift span (splash zone) was sandblasted to bare metal and re-coated during the winter shutdown period in 2010 and 2011.

For identification, the lift span is assigned as twelve bays starting with Bay 1 at south end (section between south two floor beams) to Bay 12 at the north end (section between north two floor beams). The connections along the bottom chord of the east truss are designated as node points, starting with Node A1 at the south end to A13 at the north end; similarly, node points on the west truss are designated as B1 to B13 from south to north. Designations of the truss, floor beams, and stringers on the lift span are shown on the key plan in Figure 1 in Appendix “A1”. General views of the lift span are shown in Photos 1, 2, 225, and 226 in Appendix “A2”.

2.4.1 Deck Grating

The lift span bridge deck is comprised of ninety-eight (98) open steel grating panels that were installed in 2000. Each panel is oriented transversely over the longitudinal stringers; a total of forty-nine (49) are used for the two northbound traffic lanes and forty-nine (49) on the two southbound lanes. General views of the lift span deck grating are shown in Photos 217, 226, and 227 in Appendix “A2”.

Following an extensive cracking on the hold-down weld between the grating panel and the stringers and welds at the intersection of bearing bars, a deck grating panel near the northwest corner of the lift span was completely replaced in 2014 (Photos 227 and 228). The replaced panel was intended to serve as a Test Panel for the possibility for similar future replacement of the remaining panels.

The deck grating at the lift span is in **poor to fair** condition with a MCR of 3. Numerous cracks were primarily noted at and near the factory plug weld area. The deck grating has been continually inspected and repaired over the last several years. PWGSC indicated that the deck grating inspection and repairs were continuously performed every two months in 2018. The steel grating was failing under traffic load in several modes including grating to stringer hold-down weld failures, button weld cracks and cracks in bearing bars. The grating inspection and remedial repairs indicated that there were as many as 3800 cracked locations on the steel grating surface. The majority of cracks were found mainly on the outer lanes in both traffic direction. Cracked or broken grating, particularly on the outer traffic lanes, is likely due to heavy wheel loads from truck vehicles. An evaluation completed as part of the urgent replacement of a failed deck panel in 2014 indicated that the spacing of the supporting bars that connect to the stringers were inadequate to carry the wheel loads.

The replaced sample test panel near the northwest corner of the lift span was found in good condition with no evidence of cracks or other significant defects. The new panel with main bars bearing on the stringers at every gridline (double that of the original panels) is evidently performing well on the lift span bridge deck.

A random close up inspection of the grating was also completed at the time of this 2018 annual inspection. Inspection of the grating was made during the brief lifting operations of the deck for boat passages. Cracks were noted on several of the original grating panels (Photos 230, 231, and 233). Cracks with broken or missing bearing bars were evident on the south portion of the northwest grating panel near the replaced panel at the northwest corner area of the lift span (Photos 232 and 233). Random observations of the hold-down weld between the grating and the supporting stringers (Photo 240) were made along the central section of the southbound traffic lane; cracks were noted at several locations along the length of stringers 8 and 9 (Photos 234 to 239). Light surface corrosion (no section loss) was typically noted on the underside surface of the deck grating (Photos 240 and 241). There is a wooden block form on the underside of the grating at central north end of the lift span deck (Photo 241).

2.4.2 Structural Steel below Deck

The steel stringers, floor beams, lateral bracing, and the bottom chords of the trusses are in **good condition** with an MCR of 5. Significant defects on the structural steel below the bridge deck were not apparent, except for some localized areas of light surface rust at the time of this inspection. All steel surfaces, including interior surface of the truss bottom chords, were found covered in a thick layer of paint coating; as previously noted, all structural steel at the lower section of the lift span was sandblasted to bare metal and re-coated during the winter shutdown in 2010 and 2011. General views of the structural steel below the lift span deck are shown in Photos 242 to 262 in Appendix “A2”.

Light surface rust on the new coating layer was noted in places on the stringers, the floor beams, the bracing, and the bottom chords (Photos 263 to 270). Light to medium pitting of the steel below the paint coating layers was apparent in places on the steel members below the deck (Photos 271 to 275). There are two missing rivets or bolts on a steel plate connecting lift span structure to a span lock mechanism device behind the east corner of the south floor beam (Photo 276). The shoe plate for the original railway live load support was found removed from bottom flange at the north and south floor beams; light surface rust was typically noted on the bottom flange surface and the rivet holes at the removed shoe plate areas. There is an enclosed lower guide roller assembly at the bottom each corner of the lift span (Photo 257 and 277); severe corrosion was noted on the bottom of a railing post at the north end of the southeast assembly (Photo 278).

2.4.3 Structural Steel above Deck

The steel trusses and bracing above the deck are in **good** condition with an MCR of 5. General views of the lift span structure above the deck are shown in Photos 225, 226, 279, and 280 in Appendix “A2”. A visual inspection of the inside and outside surfaces of the built-up steel members within the splash zone was performed. The lower section of the truss members, including verticals and diagonals appeared to have been recoated as part of the recoating contracts on the steel below deck in 2010 and 2011. The original paint coating has largely faded with several localized failures; light rust stains and spots of light corrosion on the steel were generally noted at the failed coating areas (Photos 281 to 286). Several localized areas of light corrosion were found in places on the upper truss members and connection areas (Photos 283 to 286). Several bird nests and a few areas with large accumulation of bird guano were noted on the upper members of the trusses, particularly in areas near the north and south towers (Photo 286).

2.4.4 Lift Span Bearings

There are three steel bearings at the north and south ends of the lift span bridge structure (Photos 287 and 288). All bearings are in good condition with no significant defects evident. There are two steel saddle bearings and a steel pedestal centering bearing at the south end of the lift span (Photos 289 and 293). An air cushion unit is located at the corner areas of the lift span near the saddle bearings (Photo 290). A cast steel base assembly anchored onto the south concrete pier is noted below the saddle bearing. All anchor bolts on the steel base assembly are secured onto the concrete pier with additional locking nuts. There were no observable significant defects on the bearings.

Bearings at the north end consists of two pinned steel rocker bearings and a steel pedestal centering bearing (Photos 291, 292, and 294). The rocker bearing is connected to a large pivot pin with steel bracket attached to the underside corner of the truss bottom chord and the end floor beam; an air cushion unit was typically noted at the inside corner of the truss and the beam near the rocker bearing (Photo 292). A steel base plate anchored into the north concrete pier serves as the base for the steel rocker and the air cushion unit. There were no significant defects evident on the rocker bearing assembly, except for some peeled paint and grease staining on the steel rocker surface.

2.5 EXPANSION JOINTS

2.5.1 Abutment Joints

Deck expansion joints at the north and south abutments are paved-over joint type (Photos 295 and 296). The joints were reported to have been installed as part of the deck asphalt re-surfacing in 2011. There were pattern unsealed cracks on the asphalt at the south and north approach road surfaces adjacent to the abutment joints (Photos 297 and 298). Active wet areas on the concrete and severe corrosion structural steel were evident at areas below the abutment joints (Photos 51 to 54, 69, 70, 82, and 95), indicating severe leakage through the paved-over abutment joints.

2.5.2 Expansion Joints between Approach and Tower Spans

A compression seal deck expansion joint system with concrete end-dams and steel angles is present at the joint between the north and south approach and tower spans of the bridge (Photos 299 and 300). The concrete end-dams typically exhibit light to medium scaling. Localized small areas of shallow spalls and few patch-repairs, previous concrete patches and recent asphalt patches, were noted on the concrete end-dam surface (Photos 301 and 302). Abrasion marks from plow blades were generally noted on the top surface of the joint steel angles. Severe abrasions and dents were noted on the west section of the north steel angle for the expansion joint between the north approach and north tower spans (Photo 303). A few local patch repairs with welded sections were noted on the joint steel angles at the north expansion joint (Photo 302). Loose expansion joint seal was evident on the west section of the north expansion joint (Photo 304).

Active wet areas and severe defects on the concrete and structural steel noted below the deck expansion joints (Photos 57, 58, 72 to 75, 85, 90, 96, 97, 119, 120, 122, 124, 129, and 168) indicate severe leakage through the deck expansion joints. It should be noted that the steel stringers below the joints were effectively found to be continuous over the joint gap in the concrete bridge deck; the bottom flange of the stringers for the approach span and the tower span were found rigidly bolted to the same rear floor beam at the tower; and the stringers' webs appear to have been bolt-connected through a single steel channel diaphragm, a common channel for both spans' stringers (Photos 83, 85, 90, 96, 97, 122, and 136). These connections effectively eliminated any differential or relative movement of the structural steel and the concrete bridge decks between the spans, thus, rendering any intended useful function of the deck expansion joint system.

2.5.3 Expansion Joints between Tower and Lift Spans

Open gap with steel end armour angles and open gap steel finger plate are noted at joints between the south and north towers with the main span lift section, respectively (Photos 305 and 306). The open gap steel joints were found in good condition with no evidence of any significant defects, except for some abrasion marks from plow blades on the top surface of the armour plate at east section of the joint between the south tower and the lift span (Photo 307). There were no evidence of any impeding or rubbing steel at the joint locations.

2.6 BRIDGE COMPONENTS

2.6.1 Bridge Railings

The east and west railings for the traffic at the bridge include a single steel beam guiderail at the approach spans, a steel beam guiderail and two hollow structural steel rails at the towers, and three steel hollow structural steel rails at the lift span. The bridge railings are typically mounted on steel posts. General views of the railings for the traffic are shown in Photos 308 to 311 in Appendix "A2". All bridge railings for the traffic were found in good condition with no significant defects.

Pedestrian railing on the west sidewalk includes a horizontal handrail above the traffic railing in the lift span and an aluminum railing system along the west edge of the bridge. The east handrail, galvanized hollow steel section, is attached along the east face of the truss members above the west traffic railing at the lift span (Photo 310). A short galvanized steel pipe railing is present on the sidewalk at the north and south openings between the north and south towers' column and the lift span (Photo 312). The aluminum railing on the west side of the bridge was reported to have been installed in 2007 (Photos 313 and 317 to 320). The pedestrian railings on the west side of the bridge are generally in good condition, except for a few localized defects on the aluminum railing. A spindle on the railing was found broken-off at the bottom rail on the lift span in central south section of the sidewalk (Photo 314). A missing nut was noted on a splice bolt for the top handrail and post near mid section of the lift span (Photo 315). There are loose anchor bolts on several aluminum railing posts at the south and north approach sidewalks: two posts at the south approach and two at the approach sidewalks (Photo 316).

2.6.2 Sidewalks and Curbs

As indicated in the previous reports, the west sidewalk on the bridge, extending from the north approach to the south approach over the towers and lift spans, was reconstructed in 2007. The sidewalk, consisting of a concrete filled steel grate, is supported transversely by inverted steel tee sections embedded in concrete. A steel cover plate is typically present on the sidewalk surface over the expansion joint gap between the towers and the lift spans (Photos 319 and 320). A galvanized steel deck sheet is present on the underside surface of the sidewalk (Photos 44, 60, 76, 242, and 243). General views of the sidewalk on the deck surface are shown in Photos 41, 220, and 317 to 320 in Appendix "A2". The concrete sidewalk is in good condition with a few isolated narrow to medium cracks. Local small areas of light surface corrosion were noted at a few locations on the steel deck sheet below the sidewalk at the approach and tower spans (Photos 59 and 321). At the lift span, the steel sheet under the sidewalk was completely covered with a layer of paint coating (Photo 242). All structural steel supporting the sidewalk, including Stringer 9, stand-off bracket supports at abutments and tower columns and at node points in lift span, and steel bracing members, are in good condition with no obvious significant defects evident (Photos 44, 76, and 321 to 323). Bracing for the sidewalk is typically connected to a steel bracket along the west side of Stringer 8 at the approach and tower spans; light to severe corrosion was generally noted on the brackets (Photos 86, 87, 89, 99, and 100).

A bent steel curb plate is present on the east and west sides of the traffic lanes at the north and south approach and tower spans (Photos 308 and 324). The curb plate is supported along the top of Stringer 8 with stand-off brackets on the underside of the bridge deck at the approach and tower spans (Photos 44, 76, and 116). The steel curb plate is generally in fair condition with light surface corrosion and localized medium corrosion on the top surface. Local severe corrosion with perforation holes were noted on the underside surface of the bent curb plate in areas along the top of the supporting Stringer 8 and near the deck expansion joints at the abutments and the joints between the approach and the tower spans (Photos 60, 76, 86, 88, 99, 100, and 325).

2.6.3 Approach Roadways, Sidewalks, and Curbs

The north and south approach roads are in good condition with few isolated light unsealed pattern cracks (Photo 327). As noted in the previous report, the roadways were repaved in 2011. A single steel beam guiderail is typically present on the approach roads in the vicinity of the bridge. The northwest and southwest guiderails adjacent to the southbound roadway are equipped with an extruder end treatment (Photos 326 and 328); there is no hazard marker or paint marking on the northwest extruder facing the on-coming traffic. Severe damages from vehicular impacts were noted at the north end of the northeast approach guiderail (Photo 329).

The approach sidewalks are generally in fair to good condition. The concrete sidewalk is lightly scaled with a few isolated narrow and medium cracks.

2.6.4 Approach Walkways and Stairs

A concrete staircase, linking the sidewalk at the street level to pathway below the approach spans of the bridge, is present at the northwest and southwest approaches (Photos 330 and 331). There are galvanized steel railings and bike trays on the stairs. A concrete retaining wall is present on the lower section of the southwest stairs (north and south sides, Photos 336 and 337). The concrete stairs and the retaining walls are in fair to good condition. There are a few small areas of spalled concrete on the concrete stairs (Photos 332 and 333). There were no significant defects noted on the steel railings and bike trays at both stairs, except for some settlement of the walkway under the bottom of the bike rails at the northwest stairs; sharp edge protrusion was noted at the bottom of the bike rails at the bottom of the northwest stairs (Photo 334). There are a few isolated wide cracks with leakage on the concrete wall below the lower section of the southwest concrete stairs (Photo 335).

Both north and south towers are typically enclosed in chain-link with barbed wire fences. There is a concrete parapet wall along the north side of the shoreline. At the north tower, the concrete wall is situated inside the fenced compound of the tower. The section of the wall at the tower compound exhibit several large areas of delaminated concrete and severe spalls (Photo 338).

2.7 FALL ARREST SYSTEMS

All fall protection system items (harnesses and lanyards) were separately inspected by W.S. Safety Technologies prior to the 2018 Annual Inspection. The fall arrest report by W.S Safety Technologies, supplied by PWGSC is attached in Appendix “A6” of this report.

3.0 MECHANICAL INSPECTION

3.1 INSPECTION FINDINGS

The following sections of this report provide: identification of the primary machinery systems and an explanation of the scope of work at each system, a brief description of each mechanical system, documentation and discussion of the conditions found at each system, conclusions summarizing the current condition of the mechanical systems and recommendations for repairs.

Figures of the span drive machinery and span lock machinery are presented in Appendix B1.

Span drive bearing and gear measurement tables are presented in Appendix B2

Color photographs were taken of mechanical conditions of interest during the inspection. Color copies of the photographs with detailed captions are presented in Appendix B3.

A SKF report summarizing vibration testing at the main counterweight support bearings is presented in Appendix B4.

Oil samples were taken from several enclosed reducers to be analyzed for indications of wear or contaminants. Oil analysis reports are included in Appendix B5.

Where appropriate, inspection findings shall be referenced to the Canadian Highway Bridge Design Code CAN/CSA-S6-14, Section 13, which shall hereafter be designated CHBDC.

3.1.1 Span Drive Machinery

The movable span is a tower drive vertical lift span with independent span drive machinery located at the top of each tower. The machinery at each tower is the same with the exception of specific electrical control equipment that is only located at the south tower.

The span drive machinery in each tower is driven by two electric motors. Each motor is coupled to an input shaft of the enclosed gear reducer via brake wheel couplings that are provided for the machinery brake mounted between each motor and reducer input. A motor brake wheel is mounted on the non-driven end of each motor for a total of four brakes associated with each span drive. The output shafts of the reducer are coupled to transverse shafts that extend east and west to second reduction open gearsets that contain open bevel gear differentials. At each corner the differential provides load sharing between the two pinions that engage spur ring gears that are mounted to each of two counterweight sheaves. Rotation of the motor causes the sheaves to rotate and results in the bridge raising or lowering. Skew control is provided electrically.

Auxiliary span drive machinery is provided in the event of a failure of the high speed main span drive machinery. The auxiliary span drive machinery is comprised of an electric motor face mounted directly to a single input shaft at the opposite end of each reducer. A spline coupling internal to the reducer is used to engage the auxiliary drive.

Figures 1 and 2, Appendix B1 are schematics of the span drive machinery. Figure 3, Appendix B1 is a schematic of the span lock machinery. The nomenclature used in this report is consistent with the component identification used in Figures 1, 2, and 3.

3.1.1.1 Bearings

The span drive machinery at each tower has 12 bearings, not including the bearings that are associated with the differential and the drives for the electrical control equipment. All of the bearings are sleeve type pillow block type bearings with bronze bushings. All of the bearings are grease lubricated.

All of the bearings were in good external condition. Lubrication at each of the bearings was found to be recent and adequate.

Each bearing mounting bolt and bushing flange bolt was checked and found to be tight.

As has been historically noted, there is typically a poor fit between the sides of the bearing caps and the bases. In some cases, whole or partial shims have been installed in the gaps. Each of the bearings was inspected closely for evidence of relative movement between the bearing cap and the base. Where accessible, the bearings were also checked during operation for movement. There was no evidence of movement at any of the bearings.

3.1.1.2 Brakes

There are four brakes for the span drive machinery in each tower, including two previously used machinery brakes and two new motor brakes. The motor brakes have been installed as part of the recent motor and control upgrades and the machinery brakes are relatively new but have been in service for at least ten years. All of the brake assemblies are in as-new condition. The brake wheel for each machinery brake is installed as part of a brake wheel coupling at the driven end of each motor. See Photo

M1, Appendix B2. The brake wheel for each motor brake is mounted on the non-driven end of a span drive motor. See Photo M2, Appendix B2. See Figures 1 and 2 in Appendix B3.

All brakes are thrustor released, spring set, shoe-type brakes. The motor brakes are 15 inch diameter and set to provide 475 ft. lb. of torque. The machinery brakes are 19 inch diameter and are set to provide 950 ft. lb. of torque. The brakes are released when power is applied to the thrustor and spring set when power is removed from the thrustor.

The brakes were inspected to verify proper functionality of the thrustor and release mechanism, the condition of the brake wheel and shoes, and proper contact between the shoes and wheel to provide braking torque. All of the brakes were found in good condition. The oil level was acceptable in all thrustors, all thrustors had sufficient reserve stroke to allow for lining wear, linings were 3/8 inch thick at all brakes (for reference, new lining thickness is 3/8 inch), all hand release mechanisms were functional, all limit switches were mechanically functional and the assemblies were in good condition. In addition, the time delays for machinery and motor brake setting are appropriately staggered to minimize impact loads on the machinery during brake setting. The previously noted paint on the SE and SW motor brake friction surfaces has been removed. See Photo M3, Appendix B2. The friction surface should remain unpainted to allow the brake shoes to provide proper braking torque. The paint condition for each brake assembly was fair with areas that were poor and starting to corrode. The brake wheel hubs and mounting bolts were unpainted for the all brakes with corrosion noted on several of the brakes. See Photos M2 and M3, Appendix B2.

With the brakes released, clearance was verified between the shoes and brake wheel. With the brakes set, contact was evaluated between the shoes and brake wheel. There are intermittent gaps between the brake shoes and the brake wheels, though the contact was greater than the minimum 60% recommended by the brake wheel manufacturer.

3.1.1.3 Couplings

Each span drive assembly includes six couplings, excluding those associated with the drives for the electrical control equipment. The motor shafts are coupled to the reducer input shafts using grid type brake wheel couplings (C3) that also support the machinery brake wheels. The two output shafts of the reducer are coupled to floating shafts using single engagement gear couplings (C2). These floating shafts are then coupled to the P2 pinion shafts using another set of single engagement gear couplings (C1). See Figures 1 and 2, Appendix B1.

All of the couplings were inspected externally for lubrication leakage or signs of distress. All flange bolts were checked for looseness, which is critical because the bolts are responsible for transmitting torque. None of the couplings were opened for internal inspection. There is no significant lubricant leakage at any of the couplings. The external condition of the couplings was fair. The C1 and C2 coupling assemblies were unpainted. Light corrosion was forming on the C2 couplings. See Photo M4, Appendix B2.

3.1.1.4 Motors

There are three motors associated with each span drive: an auxiliary drive motor and two span drive motors. The auxiliary motor is face mounted to the auxiliary drive shaft of the reducer. The auxiliary motors were not used to operate the lift span during the inspection at the direction of PWGSC based on-going skew control troubleshooting.

The motors appeared to be in good mechanical condition. All of the mounting bolts were checked for tightness and the span drive motors were observed during operation with no issues noted. The paint condition was poor. The mounting bolts and support anchor bolts were unpainted and there was light corrosion forming. The top of the support for the south motors were also unpainted with light corrosion. See Photo M5, Appendix B2.

3.1.1.5 Open Gearing

There are six open spur gearsets associated with each span drive. Each G2 gear is provided with an open bevel differential (equalizer) that is not included in the gearset count. In the recent rehabilitation, the G3 high speed gearsets were replaced with enclosed reducers.

Several teeth from each gear were cleaned to bare to inspect the condition of each gear. The selected teeth on all open gearsets were in the accelerating zone where the highest loading is experienced during operation. Each open gearset was witnessed during operation, with no abnormal noises noted. See Photo M6, Appendix B2.

Based on the cleaned surfaces of the gear teeth and the contact patterns in the gear lubrication, the gear tooth contact was generally good on the opening face of the inspected gear teeth. The contact on the closing face of the gear teeth varied from good to poor. The poor contact on the closing face is primarily due to the fact that the inspected gear teeth are lightly loaded during closing and have experienced negligible wear. This is typical for vertical lift bridges that are maintained in a span heavy condition. Light abrasive wear was present on the majority of gear teeth and is typical for open gearing.

The 2003 inspection report documented a problem with debris entrapment in the G1/P1 gearsets for the north tower stemming from power tool cleaning of the sheave grooves circa February 2003. Removal of the metal wires was an ongoing issue for years following the contamination, however no wires were found in the gear mesh during this inspection. All areas of prior gear tooth damage due to wire intrusion appeared to be wearing in and decreasing in significance. See Photo M7, Appendix B2.

The previously noted damage at the tip of the G1/P1-SE-OB gearset has been repaired by removing damaged areas of the tooth. The repair to the teeth has mitigated rough edges, effectively correcting the damaged areas, and does not negatively impact gear operation.

The differential gears were in good condition with good contact and minimal wear. There was corrosion on some differential gear teeth due to inadequate lubrication. See Photo M8, Appendix B2. The thrust clearance at the differential gearsets are similar at all locations and no movement of the bearings for the differential pinions was noted during the current inspection. However, many of the components are not accessible for inspection. No corrective action is required at this time to maintain the integrity of the components, however in-depth inspection should be considered to evaluate the internal components for condition and wear based on long term planning for the structure. There is not timeframe recommended for the in-depth inspection consideration.

There is an accumulation of old lubricant within the support frame under each G1 and G2 gear. There is a risk of lubricant contamination as the G2 gear passes through the old lubricant during operation. See Photo M9, Appendix B2.

3.1.1.6 Reducer

The new reducer, installed as part of the recent rehabilitation project, has two main input shafts, two output shafts, and a single auxiliary drive input shaft. The gearing and bearings are oil lubricated and the shaft seals are grease lubricated. The span drive machinery drive train is single reduction with a 6.2382:1 ratio. The span drive machinery internal gearing is separated into two independent drive paths. The separate drive paths are normally locked together preventing any differential movement between the east and west halves of the drive train. To index the east and west halves, a spline can be disengaged to rotate the east half of the machinery relative to the west half of the machinery. The auxiliary drive internal gearing is a triple reduction with a

153.007:1 ratio with a singular drive path that can be engaged via a spline inside the reducer housing.

The overall condition of each reducer is good. The inspection covers were removed to inspect the condition of the internal gears. All of the gears were found to be in good condition, with the north tower reducer gears exhibiting full face contact with no evidence of wear or damage. The south reducer gear teeth exhibit full face contact, but some teeth have minor damage that may be from particles passing through the mesh. The visible indications did not have any depth and do not warrant a concern. See Photos M10 and M11, Appendix B2.

Both the north and south reducers have multiple inspection cover screws with damaged threads. Removing and reinstalling the screws took multiple attempts to fully seat the screws. See Photo M12, Appendix B2.

The mounting bolts and support anchor bolts for both reducers are not painted. See Photo M13, Appendix B2.

The north reducer had evidence of two small oil leaks, one at the drain valve and one at the north index spline lower limit switch mounting bracket, see Photo M14, Appendix B2.

An oil sample was taken from each reducer during the inspection and sent for analysis. The oil sample reports are included in Appendix B4. Both the north and south reducer oil was found to be in good condition with normal wear particles present.

3.1.1.7 Shafts

There are two transverse shafts associated with each span drive. No cracks or distortion were noted in the keyway areas.

3.1.1.8 Speed Control and Span Position Indicating Equipment

Two encoders are motor shaft driven. The encoders provide feedback for drive speed control and also provide inputs to the PLC for span position control. Span position indicating and skew control equipment is bevel gear driven off the end of the east outboard P1 pinion shaft in each tower.

The south parallel shaft reducer had a light accumulation of oil around the reducer. See Photo M15, Appendix B2. No other mechanical issues were noted at the speed control and span position indicating equipment.

3.1.1.9 Span Drive Operation

The span was operated numerous times throughout the course of the inspection with no operational issues. Maintenance personnel did not report any reliability issues related to the mechanical operating machinery since the previous inspection.

3.1.1.10 Auxiliary Span Drive Machinery

The auxiliary drive, installed as part of the recent rehabilitation project, consists of a 20hp, 1800rpm motor with an integral solenoid actuated brake mounted to the non-driven end of the motor. The motor is face mounted to each reducer auxiliary drive input shaft.

Each reducer auxiliary drive engagement lever is secured in position with a threaded positioning bolt and a pad lock. The positioning bolt is threaded through the lever and engages a hole in the reducer. At the south auxiliary drive engagement lever, with the engagement lever locked with a pad lock in the disengaged position, the positioning bolt does not line up with the hole in the reducer, preventing the bolt from being inserted in the hole with the lever in the disengaged position. See Photos M16 and M17, Appendix B1.

Both auxiliary motor brakes were verified to provide torque when set and were free when released with no issues noted.

3.1.2 Span Support Systems

Each end of the lift span and one of the main counterweights is supported by eight trunnion bearings in each tower. Two trunnion bearings straddle mount each of the main counterweight sheaves. Each main sheave has 10 grooves for the wire ropes used to connect the span to the main counterweight. An auxiliary counterweight system is provided to compensate for the transfer of the weight of the counterweight ropes from the movable span side of the main sheaves to the counterweight side as the span is raised.

When the lift span is seated, the live load and imbalance is carried by the live load supports. There are two rocker supports located at the north end of the span to allow for thermal expansion of the span. Two saddle supports are provided at the south end of the bridge that serve to locate the span longitudinally when the span is seated.

A span air buffer is provided at each corner of the lift span to assist with seating. Two tower air buffers are provided per tower to assist in stopping the span at the full open position.

Guides are provided for the lift span, main counterweights, and auxiliary counterweights.

3.1.2.1 Main and Auxiliary Counterweight Ropes

All main counterweight ropes were replaced circa February 2003. A visual inspection of the main and auxiliary counterweight ropes was performed during the current inspection. This main counterweight rope inspection focused on those areas most prone to wear including those portions of the ropes that are in contact with the sheaves with the bridge in the seated position.

The main counterweight ropes are generally in fair condition with corrosion in spots. The ropes have light wear with the exception of the portions of the ropes that come into contact with lift span splay castings, where moderate wear was noted. During the 2016 inspection, these areas were inspected thoroughly and were found to not have exhibited appreciable wear since the 2009 inspection. There was light fretting evident at the lift span splay castings. See Photo M18, Appendix B2.

The lubrication of the main counterweight ropes was found to be light in certain areas at the time of the inspection. The contacting crowns of the wires had inadequate lubricant and exhibited surface corrosion on the running length of rope. See Photo M19, Appendix B2. Maintenance personnel indicated in the 2016 inspection that the application of lubricant to the main counterweight ropes remains an on-going concern due to the fact that the established method of applying lubricant results in some degree of environmental contamination, which is prohibited by Canadian law. It can be expected that the wire ropes will corrode and wear at an accelerated rate if they are not properly lubricated.

The main counterweight ropes experience wear on the running length of rope due to contact between the ropes and sheave during operation. The wear is apparent in the form of elliptical flats on the crowns of the wires. See Figure 5, Appendix B1. Typically ropes experience the greatest wear at the portion of rope which contacts the span side tangent point of the sheave when the span is seated. The largest wear flats observed along the running length of the ropes was approximately 5/8”. See Photo M20, Appendix B2. Based on a table taken from the Roebling Wire Rope Handbook, the measured wear equated to a reduction of rope capacity of approximately 5% (95% remaining strength), which is not a significant concern. See Figure 6, Appendix B1.

There is a noted problem with the size and/or location of the splay castings at the lift girder such that the counterweight ropes are generally not well seated in the lift span splay casting grooves. This condition predates the 2003 rope replacement and can likely be attributed to original construction. As a result of this issue, the center pair of ropes do not bear firmly on the splay castings and tend to oscillate under wind load resulting in wear of the ropes. Maintenance has mitigated the oscillation of the center pair of ropes through the installation of a U-bolt to pull the ropes into contact with the splay casting grooves. The other ropes in the group are more securely seated, but the splay casting grooves appear to be offset from the ropes resulting in side loading. The U-bolts were not removed during the current inspection. The U-bolts were removed in the 2016 inspection and it was found that the ropes had not deteriorated significantly since the 2009 inspection.

Continued use of the of the U-bolt clamps is recommended to secure the rope against the splay casting and prevent the formation of the elliptical wear flats. However, the area where the clamp contacts the rope prevents wire rope dressing from reaching the rope. Annual removal of the clamps and dressing the ropes underneath the clamps is important to ensure proper lubrication at these locations. Upon assembly of the clamps, ensure that the U-bolt clamp bolts do not contact the outer strands of the wire rope.

At the northwest outboard lift girder splay casting for the main counterweight ropes, the middle nut is not fully seated. See Photo M21, Appendix B2.

It is recommended that a complete in-depth inspection of the main counterweight ropes, including the counterweight and lift span connections, be performed on a five-year cycle.

The auxiliary counterweight ropes were found to be in fair condition with moderate wear and with inadequate lubrication. The north auxiliary ropes have built up old lubricant and should be cleaned and re-lubricated. See Photo M22, Appendix B2. The south auxiliary counterweight ropes and sheaves are devoid of lubricant. The ropes and sheave grooves are corroded and the metal-on-metal contract results in fretting and noise during operation. Without lubrication, the south auxiliary counterweight ropes will wear at an accelerated rate. See Photo M23, Appendix B2.

The south auxiliary counterweight ropes, which have been in service for approximately five years, were found to have minimal damage or wear. At the north auxiliary counterweight ropes, no broken wires were found and the maximum wear flats were measured to be 7/16”. See Figure 6, Appendix B2. This amount of wear represents a capacity reduction of approximately 17%. This degree of wear is normal considering the length of time the ropes have been in service (approximately 23 years).

Consideration should be given to replacing these ropes within a five-year time frame and an in-depth inspection be performed within two years to evaluate the auxiliary counterweight ropes for deterioration underneath the old lubricant and any further reduction in strength. If the in-depth inspection reveals a deterioration in the condition of the north auxiliary counterweight ropes or broken wires, replacement sooner may be warranted.

3.1.2.2 Main and Auxiliary Counterweight Sheaves

The main counterweight sheaves continuously support the dead weight of the span and counterweights and experience cyclical loading during operation. The inspection of the main counterweight sheaves included a careful visual inspection to evaluate the integrity of the castings and an evaluation of the wire rope grooves.

The main counterweight sheave castings are generally in fair condition with no cracks found, though there is widespread paint deterioration and light corrosion. See Photo M24, Appendix B2. Significant section loss that would compromise the sheaves was not noted, though the deteriorating paint and corrosion may obscure more significant issues such as cracking. It is recommended that the sheaves be cleaned and painted.

The counterweight sheave grooves have many sections that are devoid of lubricant and exhibit surface corrosion. See Photo M25, Appendix B2. It is recommended that the sheave grooves be lubricated as part of routine maintenance. A small portion of a groove from a representative number of sheaves was cleaned to bare metal to evaluate the condition. The grooves were generally in good condition with light impressions or indentations from the crowns of the wires. The indentations have not increased in severity since 2009 and are not currently problematic, but should be monitored as part of future inspections.

The sheave grooves were spot checked for proper radius with a groove gage. As depicted in Figure 4, Appendix B2, the groove gage should seat in the root of a properly sized groove, whereas clearance between the gage and the root of the groove indicates an undersized and/or worn groove.

The check of the grooves found that the gage did not seat properly in the grooves: contact occurs along the sides of the groove while clearance exists at the root, which is an indication of sheave groove wear. This condition was noted in the 2009 wire rope inspection report and the wear has not significantly increased. The Roebling Wire Rope Handbook and other respected rope authorities suggest that groove wear in excess of the gage tolerance is basis for replacement or re-machining of sheave grooves on the basis that new ropes operating in undersized grooves will result in accelerated wear due to heightened abrasion of the internal wires and strands which are forced into the smaller grooves. Therefore, a prudent action to maximize rope life is to ensure that the ropes remain well lubricated to mitigate abrasive wear. Additionally, the ropes should continue to be monitored as part of future inspections for wire breakage, accelerated wear, and/or distortion.

The auxiliary counterweight sheaves are in fair condition. As noted during previous inspections, there is a heavy buildup of old lubricant in the north sheaves' rope grooves. See Photo M22, Appendix B2. The rope grooves at both north auxiliary counterweight sheaves should be thoroughly cleaned to prevent side contact of the ropes on the buildup of old lubricant. Minor paint deterioration and corrosion was noted at the south auxiliary counterweight sheaves.

3.1.2.3 Auxiliary Counterweights

The auxiliary counterweights are in fair condition with no issues noted during operation. The assemblies have areas of paint deterioration and light corrosion on the counterweight blocks and the counterweight frames. See Photo M26, Appendix B2. There was corrosion noted on the bolts and bottom plate of the NE and counterweight. Areas with corrosion should be cleaned and painted.

3.1.2.4 Trunnion and Trunnion Bearings

There are eight trunnion bearings at the top of each tower. The bearings are pillow block mounted roller bearings manufactured by SKF. All of the bearings are grease lubricated.

As in past inspections, NDT of the bearings was performed by SKF. SKF has developed vibration analysis technology for bearings of this type that is non-invasive. According to SKF, it can be used to accurately predict bearing failures by examining the high frequency vibrations and Spectrally Emitted Energy (SEE®) that occur within the bearing during operation. This inspection method is preferable to visual inspection through partial disassembly of the bearing since it eliminates the risk of contamination of the bearing, which is one of the greatest risks to the reliability of roller bearings. However, during re-lubrication of the trunnion bearing the bearing cover plate is removed, gaining access for inspection of the internal components.

SKF's report is presented in Appendix B3.

Periodic impacts, indicative of a possible race fault, were recorded at the following trunnion bearings during the 2018 testing are:

- South Tower - SE-IB trunnion, inboard bearing (Bearing #4, South Tower)
- North Tower - NW-IB trunnion, outboard bearing (Bearing #6, North Tower)

Periodic impacts, indicative of a possible race fault, that were not recorded during the 2018 inspection, but were recorded during the 2017 testing are:

- South Tower - SE-OB trunnion, outboard bearing (Bearing #3, South Tower)
- South Tower - SW-OB trunnion, outboard bearing (Bearing #8, South Tower)

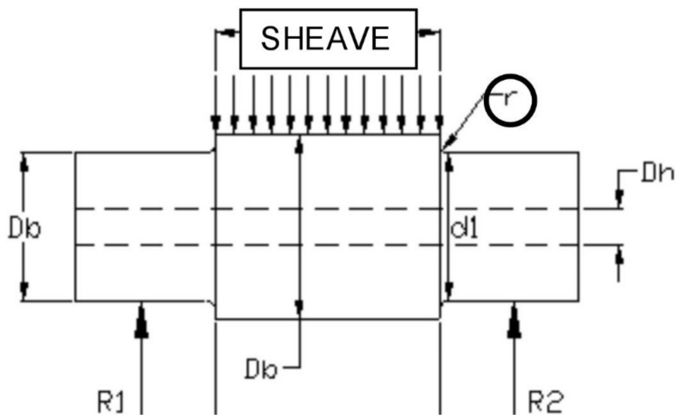
SKF recommends visual inspection of the noted bearing raceways to confirm if damage to the raceway exists and to evaluate the severity. Based on these findings, further corrective action may be the periodic vibration analysis should be continued and also performed during mechanical inspections.

Multiple bearings were noted to have impacts that were recorded at a frequency that are not indicative of a bearing raceway fault and may be related to open gearing contact frequency. SKF recommends continued periodic vibration analysis of the following bearings:

- South Tower - SW-IB trunnion, outboard bearing (Bearing #6, South Tower)
- North Tower - NE-IB trunnion, inboard bearing (Bearing #4, North Tower)

All of the bearings were found in good condition externally. The bearings are generally well-painted though there are isolated spots of corrosion on some mounting bolts. The level of corrosion is not significant, though consideration should be given to painting the area to prevent further deterioration.

The visible portions of the trunnions are in fair condition with no issues noted. Fatigue cracking at the trunnions is sometimes a concern for vertical lift bridges. Calculations performed as part of the 2012 inspection demonstrated that the trunnions have an infinite fatigue life (i.e., the calculations show that the stresses are low relative to the material endurance limit and that fatigue cracking is not expected). However, given the critical nature of this support, it is important to inspect the high stress fillet areas of the trunnions for cracks, “r” in the following trunnion figure. No issues were noted as part of this current inspection.



Trunnion Figure – "r" – Fillet Radius

3.1.2.5 Live Load Supports

All live load supports were in fair condition. The anchor bolts for all live load supports were lightly corroded. There are areas of section loss on some anchor bolts at both ends of the lift span. It is recommended that the assemblies be cleaned and painted. Several of the saddle screws were found to be hand loose. See Photo M27, Appendix B2. The live load supports were observed under traffic loading for movement. No movement was noted under live loads. At the time of the inspection, neither north end rocker could be rotated freely by hand. These rockers should be checked periodically to ensure the rockers are lubricated and rotate as designed for thermal expansion. See Photo M28, Appendix B2.

3.1.3 Guides and Centering Devices

The lift span is provided with upper and lower guide rollers at each corner to maintain the position of the span during operation. Both longitudinal and transverse rollers are provided at the south (fixed) end of the span at the lower location. The other six locations only have transverse guide rollers. The rollers engage guide rails mounted to the towers.

Each counterweight has an upper and lower guide at each end (east and west). The main counterweight guides are u-shaped steel castings that travel along guide rails mounted to the tower to prevent the counterweight from swinging during span travel. The auxiliary counterweight guides are grooved wheels located at each corner of each counterweight that travel along guide rails mounted to the towers.

In addition to the span and counterweight guides, span centering devices are provided at each end of the lift span to locate the bridge in the transverse direction when the lift span is in the seated position.

3.1.3.1 Span Guides

The span guides and guide rails were visually inspected and found to be in fair condition. The bearings for the rollers are inaccessible for clearance measurements, though all of the rollers were rotated by hand or were observed to rotate during operation.

There is evidence of previous hard contact at multiple locations, based on wear and fins on the rollers and guide rails. The evidence of hard contact appears to be from an old operating condition as there was no evidence of recent hard contact at the rollers during operation at the time of this inspection.

3.1.3.2 Main and Auxiliary Counterweight Guides

The main counterweight guides and guide rails were visually inspected and found to be in fair condition. The guides and rails were witnessed for contact and wear during operation for the full length of the rail at each location. Contact of the guides with the rail was intermittent throughout operation and the rails and guides did not exhibit excessive wear that would affect the ability of the guides to restrain the counterweight. The main counterweight guide mounting bolts that secure it to the counterweight were covered with lubrication and were inaccessible. The lubrication should be removed to facilitate inspection of the bolts.

All of the auxiliary counterweight guide system components were in good condition. Significant portions of the rails are lightly corroded, though this has not caused operational problems of the guides and no corrective action is recommended.

3.1.3.3 Centering Devices

A span centering device is provided at each end of the lift span. The device consists of a socket mounted on the bridge and a tongue located on the pier. As the bridge approaches the fully seated position the socket engages the tongue and centers the bridge in the transverse direction. Wear plates are provided on the west and east sides of the tongue. Loose fasteners have been noted at these wear plates in past inspections. As a result, maintenance personnel periodically check and tighten the fasteners. At the time of the inspection, several loose fasteners were found; these were tightened at the time of the inspection.

Lubrication at the centering devices was adequate at the time of the inspection. In past inspections, it has been noted that contact at the centering device has shifted the lift span. During the current inspection movement of the span was not noted, though the pattern in the grease provides an indication that there is periodic contact at the centering devices.

There is minor debris accumulation on the support for the centering device tongues which are mounted to the piers. There is also paint failure and section loss of the anchor bolts. See Photo M29, Appendix B2. It is recommended that these components be cleaned and painted.

3.1.3.4 Span Air Buffers

The span air buffers are in fair condition overall. The most significant concern regarding the buffers is the possibility of internal damage due to blast intrusion from painting of the splash zone of the lift span during the 2010/2011 winter closures. During the current inspection, three of the four buffers were stuck closed upon raising the bridge and had to be manually actuated for the buffers to descend. Historically maintenance has periodically flushed oil through the buffers resulting reliable buffer operation. Continued lubricating efforts are required to maintain operability. Disassembly of the buffers would be recommended to properly clean the interior and inspect for damage however this work may be difficult to accomplish given their removal may require some modifications to the lift span structural steel.

The northwest buffer exhaust valve handle is broken, though it can still be turned with an adjustable wrench or pliers. See Photo M30, Appendix B2.

Note that the two span buffers at a given end operate independently. It is preferable to install piping to connect the two so that a transverse differential in load provided by the buffers is not possible. The air piping system should include a pressure gage that can be connected via a gate valve to periodically verify the pressure that is developed in the system during seating.

Consideration may be given to Article 13.7.11 of the CHBDC, which notes that a control system that is "capable of performing smooth seating in a positive manner" and "capable of limiting the span lift in a positive manner" may be used in lieu of air buffers. The contract for the replacement of the control system is in progress and the new control system has the capabilities as described in the CHBDC. If desired, consideration may be given to removing the buffers from service following the successful commissioning of the new control system.

If the continued use of air buffers is desired and they are to be retained long term, then consideration should be given to rehabilitating the buffers to ensure that they function as intended. The rehabilitation should include re-boring the buffers, re-bushing them, and piping the two buffers at a given end together to assist in load sharing in the event of their use.

3.1.3.5 Tower Air Buffers

The air buffers that are mounted to the towers are in fair condition externally with minor paint deterioration and corrosion and with some minor debris accumulation. At the northwest buffer, the span side mounting bolts are not painted and are corroded.

Maintenance personnel regularly clean the exposed piston rods, lubricate and rotate the pistons. All buffers functioned satisfactorily during the inspection: the rods descend when lowering from full open and the exhaust and check valves appear to be functional. It is recommended that air filters be installed on the inlet of each tower buffer in order to prevent the ingress of foreign material into the cylinder.

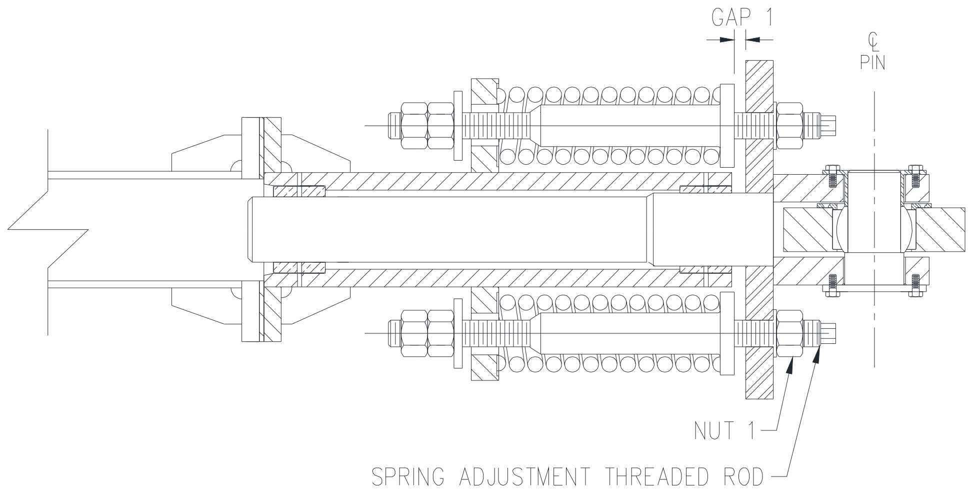
Consideration may be given to Article 13.7.11 of the CHBDC, which notes that a control system that is "capable of performing smooth seating in a positive manner" and "capable of limiting the span lift in a positive manner" may be used in lieu of air buffers. The contract for the replacement of the control system is in progress and the new control system has the capabilities as described in the CHBDC. If desired, consideration may be given to removing the buffers from service following the successful commissioning of the new control system.

If the continued use of air buffers is desired and they are to be retained long term, then consideration should be given to installing piping to connect the two tower buffers at each tower to assist in load sharing in the event of their use.

3.1.4 Span Lock Machinery

A span lock assembly is provided at each end of the bridge. See Figure 3, Appendix B1. Both span lock assemblies are in good condition overall and operated without incident during the inspection.

The span locks were noted to correlate to seating issues during high wind events following the 2017 CDI inspection. Corrective action was taken by SBE personnel to address these issues on September 18, 2018. The southwest corner of the span was noted to occasionally fail to seat. To correct this issue, the southwest span lock spring preload was adjusted to ensure there was an equivalent load being applied by each of the four locks against the lift span to hold the bridge in the seated position. Measurements were taken at the spring assembly gap 1 (See Spring Lock Assembly Figure) following the adjustments. These gaps were remeasured at all four corners during the 2018 detailed inspection to ensure the preload has not changed since adjustment. All four corners were found to have remained the same.



Span Lock Spring Assembly Figure

Span Lock Spring Gap Table		
Location	Gap 1 September 2018	Gap 1 December 2018
SW	7/8”	7/8”
SE	7/8”	7/8”
NW	5/8”	5/8”
NE	5/8”	5/8”

The painting of the machinery located inside the enclosure for the high-speed end of the lock machinery is incomplete. Several components, including shafts and bolts are not fully painted. There is some minor corrosion in spots, though generally the components are covered with a rust inhibitor. See Photo M31, Appendix B2. No additional corrective action is warranted so long as this coating of rust inhibitor is maintained.

Outside of the spring assembly enclosure, the components are typically painted, however there were areas where the paint has failed and corrosion was present. The southeast and southwest span lock spring assemblies and bearing B2 mounting bolts were found to have moderate corrosion. See Photo M32, Appendix B2. The north span lock springs, center crank, and bearing B2 mounting bolts were found to have moderate corrosion. All span lock components should be spot-cleaned and painted where corrosion is present.

The lubrication for all of the span lock components, including bearings, gears and reducers, was good with proper lubrication procedures implemented by maintenance personnel. Oil samples were taken from both span lock reducers for analysis. During the 2015 inspection both span lock reducer oil samples analyses were provided with a wear designation as “Watch” given the level of wear particles. The oil sample analyses reports from the 2018 inspection are included in Appendix B4. The analyses from the current inspection show that there are no significant contaminants or wear particles that warrant corrective action. This is consistent with the oil sample analysis conducted in as part of the 2017 inspection. The north reducer oil analysis was found to contain traces of friction polymer, indicating lubricant degradation, several organic amorphous bodies were also found including lacquer and what could be an organic contaminant. Due to these findings the oil is designated a “Watch” condition. The south reducer oil sample is designated “Normal” with noted large and smaller organic particles that are not significantly affecting the condition of the lubrication. It has been noted the oil in the reducers has not been changed since installation. It is recommended that the oil be flushed and replaced. Consideration should be given to coordinating the oil selection with the selection of the oil for the span drive reducers.

3.1.5 Traffic Gate Machinery

There is a single barrier gate at each approach to the lift span. There are two warning gates for each approach to the lift span. There is also a pedestrian warning gates at each sidewalk approach. All barrier and warning gates were replaced in the recent rehabilitation project.

3.1.5.1 Warning Gates

All warning gates were found to have at least one latch for the doors that could not be locked/unlocked. The north warning gates each had a nonfunctional latch on the front door that could not be unlocked, preventing access to several components for inspection. See Photo M33, Appendix B2.

3.1.5.2 Barrier Gates

The south barrier gate emitted a groaning sound during each operation. The source of the noise was not identified during the inspection. However, this source of the noise should be determined and addressed. See Photo M34, Appendix B2.

At the south barrier, the southeast anchor bolt is loose. See Photo M35, Appendix B2.

The north bearing gate arm counterweights each have a bolt that is not fully seated at the east side of the counterweight. See Photo M36, Appendix B2.

Each barrier gate arm engages a receiver on the west side of the bridge in the lowered position. During operation, when the gate engages the receiver, the gate arm contacts the receiver with an impact. A neoprene insulator at the end of the arm has been installed to reduce the noise during contact. The north barrier gate arm neoprene insulator is deteriorated. See Photo M37, Appendix B2.

3.1.5.3 Pedestrian Warning Gates

The pedestrian warning gates were found in good condition with no significant issues noted. The north pedestrian gate back door latches were both nonfunctional and stuck in either the locked or unlocked position. See the recommended corrective action in the electrical recommendations section 5.3.1.10

3.1.6 Generators

There are two generators provided for the facility. One main generator is provided to operate the span in the event of a power failure. A second, smaller facilities generator is provided to operate the facilities buildings in the event of a power failure. The generators were inspected mechanically for oil level, coolant level, leaks and condition of components. The generator fuel storage tanks are relatively new and are inspected and maintained as part of a separate maintenance contract.

The larger main generator was in good condition with one noted mechanical deficiency. A coolant hose exhibited dry rot and was starting to crack. See Photo M38, Appendix B2.

The smaller facilities generator was in good condition with no noted mechanical deficiencies.

3.1.7 Winter Shutdown

The bridge is normally available for opening 24/7 during the navigable channel operating season from mid-March thru December 31 each year. Over the winter shutdown maintenance personnel perform routine maintenance on the mechanical and electrical systems in accordance with existing operating and maintenance manuals. During the 2018/2019 winter shutdown internal inspection of the trunnion bearings and grease replacement was planned for each trunnion bearing. The existing grease installed in the trunnion bearings is no longer in production. The spare grease on-site was over ten years old and was not of sufficient quantity to complete the grease replacement. For these reasons, the planned work at the trunnion bearings was not performed during the winter shutdown. A suitable grease to replace the existing grease is in the process of being selected. Internal inspection of the trunnion bearings and grease replacement should be scheduled during the 2019/2020 winter shutdown.

4.0 ELECTRICAL INSPECTION

4.1 INSPECTION FINDINGS

The electrical inspection of the Burlington Canal Lift Bridge was part of the annual comprehensive detailed inspection of the bridge that included a structural/civil, electrical and mechanical inspection.

The electrical inspection was performed in accordance with the scope of work. Part of the inspection also included an evaluation of the recent rehabilitation. Rehabilitation consisted of the replacement and upgrade of a major part of the electrical power and control system for the bridge and took place over a three-year period. These replacements were concluded during 2017. This inspection included an evaluation of the replaced systems and an assessment of their reliability and appropriateness for the imposed bridge operating duty.

The inspection consisted of a visual inspection that was sufficient in depth to determine the status of the bridge electrical power and control system, the quality of its installation and the adequacy of the system to perform its intended function. This included verification of the replacement systems to meet the operating criteria for the bridge and to flag any installed equipment and systems that were found to be deficient.

The inspection work included:

- Information gathering and the review of gathered information in support of the inspection.
- Planning, scheduling of the inspection work with all parties and participation in a worker safety plan including necessary Health and Safety Plan preparation.
- Inspection of all newly installed control and power equipment associated with the bridge operating and auxiliary systems. This included a determination of the completeness and operating functionality of the newly installed control and power system and the status and life expectancy of the existing electric service equipment, its installation, and the effectiveness of the inherent design features to enable the bridge to operate in a safe and reliable manner.
- Testing of the operating electrical systems to determine their condition, operating status and motor loadings with respect to motor ratings and bridge operating duty.
- The inspection was concluded with the submission of this report which defines the findings, provides conclusions, and makes recommendations of any actions necessary to meet operating reliability and safety requirements as well as adherence to all prevailing statutory codes and to ensure that the newly installed

bridge electrical control and power system meets the specified design and operating criteria.

The electrical inspection and assessment describe all items of equipment defined in the Terms of Reference Electrical Inspection Table. The report has been arranged in the order of the inspection that begins with the incoming 13.8 kV electric utility service for the bridge.

4.1.1 Main Electrical Service

The main electric service is comprised of an existing 13.8kV, 3-phase, 60Hz utility service and a 1,000kVA ONAN outdoor transformer with necessary primary and secondary protective and switching devices to provide electric service to the bridge. A 1,000-kVA transformer of the pad mounted type forms part of a unit substation that provides 600 volt, 3-phase, Wye connected, 3-wire, resistance grounded service to the bridge. See Photo E2, Appendix C.

The bridge incoming electric service equipment consists of an existing indoor 2,000-amp switchboard. See Photo E3, Appendix C. The configuration of this 2,000-amp switchboard has not been changed except some minor modification to its metering/signal wiring as part of the recently completed electrical replacement project. The switchboard #2 was modified during the recently completed electrical replacement project with the addition of:

- North Tower MCC 600-amp Feeder Breaker
- North Tower MCC Back-up 600-amp Feeder Breaker
- South Tower MCC 600-amp Feeder Breaker

A 600-kW emergency diesel generator provides backup standby operational power for the 2,000 Amp indoor switchboard and the bridge operating. See Photo E4, Appendix C. The 600-kW generator is provided with an outdoor load bank that is used to exercise the generator under load and maintain its operational and reliable status as an emergency source of electric service for the bridge. Additionally, a 40kW diesel generator is provided in the same room as the 600-kW generator as a backup for bridge essential services. This 40-kW generator is not capable of operating the bridge but does provide facilities power for the bridge in the event of electric utility failure.

The main electric service generator is provided with the capability of being operated from the main control desk (control house 3rd floor) and this functionality is taken advantage of to exercise the generator.

No corrective action is required at this time.

4.1.2 Electrical Drawings

One-line electrical diagrams have been updated by the electrical contractor responsible for the bridge electrical replacements to reflect the new as-built condition and have been posted on the walls at various locations. The one-line diagrams were found at the following locations:

- Second Floor Electrical Room (posted)
- North Tower Machinery Space (posted)
- South Tower Machinery Space (posted)

The one-line diagrams indicate useful operational and troubleshooting information regarding the bridge power distribution system and service isolation. See Photo E1, Appendix C.

No corrective action is required at this time.

4.1.3 Protective Device Coordination Study Verification

A coordination study was completed as part of the recent control and power system replacements and upgrades at the bridge. This coordination study included the rehabilitated system and also the existing electric service, standby generators, and the existing 2,000 Amp switchboard.

It is considered that the protective relay devices and fuse ratings in the study are appropriate and that the recent prepared coordination study is accurate and a true reflection of the installed system it confirms that the bridge is provided with an appropriately coordinated electrical distribution system.

No corrective action is required at this time.

4.1.4 1,000-kVA Outdoor Transformer

The main transformer has been in service since 1994. Maintenance and testing, which includes insulating oil testing for both dielectric properties and dissolved gas analysis, has been performed on this device annually by the utility with no concerns noted.

The 1,000-kVA transformer is of the pad mounted type and forms part of a unit substation that provides the bridge with its 600-volt, 3-phase, resistance grounded, 3-

wire service. The unit substation has been well installed and is considered to be appropriately sized for the prevailing bridge operating duty.

Phase	Phase to Phase Voltage (Volts)
A-B	604V
B-C	607V
A-C	610V

The bridge no-load voltages were recorded during daytime as indicated in the above table and were within +2% of the nominal system voltage. This is an indication that the bridge electrical service is properly sized and external standing loads are not adversely affecting the electric service to the bridge. It is concluded that the 1,000-kVA transformer tap settings are appropriate for maintaining the 600-volt nominal bridge voltage during times of maximum utility loads.

A previous report recommended taking alarm points from the transformer to the operator's house to alert of high transformer oil temperature or low oil level. This recommendation has not been implemented. Given the proximity and criticality of this utility distribution transformer, as was described in the previous inspection report, it is considered that this proposed additional functionality would be beneficial to the reliability of the electric service and sas a means of mitigating the possibility of a catastrophic oil spill. Note no oil containment has been provided for the transformer in the event of a transformer tank rupture.

Corrective action is required to:

- Install high temperature and low oil level alarm devices for the main transformer to alarm at the control house.
- Consideration should be given to providing some form of oil containment to eliminate a potential environmental hazard in the event of a transformer tank rupture or oil spill.

4.1.5 Main Fused Disconnect

A main fused disconnect switch that provides the 600-volt, 3-phase service to the bridge is part of the electric service entrance equipment and located inside the outdoor tamperproof metal-clad 1,000 kVA transformer/unit substation enclosure. This electric service entrance equipment was reported as receiving regular maintenance on an annual basis. The unit substation enclosure is provided with space heaters and these were verified as being operational during the inspection. The electric service main fused disconnect switch was not inspected due to the electric utility enclosure door being locked.

No corrective action is required at this time.

4.1.6 600-KW and 40-KW Emergency Generators

The emergency generator equipment is located in the standby generator and electrical distribution room located in the Control House on the 1st floor. Two (2) diesel driven generators are located in this room:

- A 600-kW, 1800 RPM, 3-phase unit manufactured by Cummins that provides a backup source of power to operate the bridge in the event of electric utility failure. See Photo E4, Appendix C.
- A 40-kW, 1800 RPM, 3-phase unit manufactured by Perkins. This is defined as an auxiliary generator and is used to power facility loads in the event of electric utility failure. See Photo E5, Appendix C.

The Cummins 600-kW emergency generator was installed in 1994 as part of a rehabilitation and upgrade of the main electric service to the bridge. The Perkins 40-kW emergency generator was installed in 1996 and provides the bridge facility with essential back up power but is not capable or able to be connected to operate the bridge drive system.

Records indicate that PWGSC operators test the 600-kW unit on a monthly basis. This testing was performed under load with the use of the provided load bank to comply with CSA-C282-05, this testing as described also complies with CSA-C282-09 as the generator is a life safety item required to keep a building's essential services operational in an emergency. It is understood that monthly testing consists of both load bank testing as well as performing a number of bridge test lifts using the generator. A record of these monthly tests is documented and maintained at the operator's desk. The load bank disconnect switch has been replaced. Both load bank and disconnect switch are still in as-new condition. See Photos E8 and E9, Appendix C.

The Perkins 40-kW generator is tested weekly under load and a record is kept of the test results. Testing of both standby generators meets the requirements of CSA 28.2.5. The associated automatic transfer switch is in good serviceable condition. See Photo E6, Appendix C.

Per the operator and electrical maintenance contractor, both generator units are performing well and are both reliable sources of backup power under all bridge and bridge facility operating conditions.

The generator room has been well laid out and contains all necessary equipment and safety features for such a facility in accordance with CSA requirements. These include:

- Appropriate automatic louvers for ventilation and diesel air intake
- Thermostatically controlled ceiling mounted radiant heaters
- Fuel oil alarm panel
- Fuel oil pumps and fuel oil pump controls
- Eye wash station
- Emergency lighting
- Access control system

All generator room equipment is operational and has a record of receiving good and regular routine maintenance which ensures the reliable and safe operation of the generators in the long term with the exceptions noted below. Additionally, a new generator fuel tank and pump system was installed in 2012-2013. This fuel tank and pump system allows automatic refueling of the day tank from the main tank located within the control house compounded area. See Photo E7, Appendix C.

A concern regarding the Cummins 600-kW Diesel Generator, is that the automatic louvers are located over the battery chargers and alarm equipment. This could cause water damage to them when the louvers are opened during conditions of blowing rain.

Additionally, not all automatic louvers were found to be operational at the time of the inspection

Corrective action is required to:

- Protect the battery chargers and alarm equipment from adverse weather conditions when the louvers above them are opened.
- The electrical maintenance contractor should be tasked with testing and repairing the defective generator automatic louvers.

4.1.7 Main Indoor Switchboard #1 and #2

The Main Indoor 2,000-Amp Switchboard #1 is located in the Control House on the 1st floor in the generator and electric distribution room and was installed in 1994. The switchboard is of modular construction and provided complete with main and distribution air circuit breakers and a ground alarm relay. All protective devices and ratings associated with the switchboard conform to those described in the recently completed coordination study that was part of the bridge power and control replacement project. It was reported by the bridge operators and the electrical maintenance contractor that operation of this switchboard has been continuous and without concern since its installation in 1994.

As observed during previous inspections, no phase loss or phase reversal protection is provided for the bridge electric service. A loss of a phase would not only make the bridge inoperable, but if left for a prolonged time could cause damage to the operating electrical equipment. A phase reversal of either the standby generator or the utility electric service would cause motors to operate in reverse and lead to a catastrophic failure of the bridge operating system. It is strongly recommended that phase loss/reversal protection be added to the main incoming breaker and that this addition be given priority.

The main electric service and generator air circuit breakers located in Switchboard #1 are described on "As Built" documentation for the bridge as being mechanically and electrically interlocked for safety. There is no evidence in the switchboard to indicate that these breakers are or had ever been mechanically interlocked and this finding was reported as part of previous inspection reports.

Switchboard #2 is located in the Control House 2nd Floor and has been modified to power the new bridge electrical system. Note that additional feeder breakers were added to the switchboard as part of the recently completed bridge control and power replacement and upgrade project. Also note that the original motor feeder breaker which is no longer required has been disabled and locked out. The switchboard is configured as described in the recently completed coordination study that was part of the bridge power and control replacement project. See Photo E10, Appendix C.

Unterminated live wires were found by the bridge electrical contractor in the switchgear metering compartment. The problem compartment has been taped and tagged by the electrical contractor. See Photo E3, Appendix C.

Corrective action is required to:

- Add phase loss/phase reversal protective relaying for the incoming main breaker and generator.
- Kirk key interlocks and electrical interlocks should be added between the Main and Generator circuit breakers to prevent simultaneous closure of these breakers and the possibility of paralleling the electric utility and standby generator.

- Live wires inside the metering compartment should be terminated.
- Provide proper breaker labels. Properly remove the wires for the breakers that are not in service and remove pad locks on Switchboard 2.

4.2 BRIDGE DRIVE AND OPERATING SYSTEM

The newly installed bridge drive system consists of variable frequency flux vector speed and torque-controlled drives that are configured for redundant operation. Auxiliary drives motors were replaced as part of the recent drive and control system upgrade. The auxiliary drive systems that was installed in 2010 has not been replaced and appears in almost as-new condition. The operating system was upgraded to the modem PLC with network communication utilizing PROFINET as part of the recent rehabilitation and upgrade project.

4.2.1 Main Motors

The main drive motors are of the squirrel cage induction type. There are four main drive motors. See Photo E24, Appendix C. All main drive motors have identical ratings and only differ in the motor pecker head cable termination arrangement.

Each tower drive is provided with two (2) drive motors coupled one on each side of the gearbox. One main drive motor in each tower is used to operate the bridge with the second being used as back up. The duty and back up motor being an operator selection from the control desk in the operator’s house or automatically via the newly installed PLC. The motors were installed during 2016 and 2017 and are part of the recently completed bridge power and control system replacement and upgrade project. The motors are 250 hp at 900 rpm synchronous speed motors at a frequency of 60Hz. The motors are being operated with a horse power output of 150 hp and at a maximum speed of 555 rpm. The variable frequency drives (VFD’s) are used to achieve the desired speed of 555 rpm by reducing the operating frequency to the motors to 37 Hz.

Note that tuning of the drives requires that the original design characteristics of the motor (250hp, 900 rpm, 60 Hz) be understood and utilized. It should be noted that the nameplate data on the motors does not truly reflect the characteristics of the motor and this was an impediment to the required tuning of the replacement drive/motor combinations during their commissioning.

It is also noted that the electrical characteristics of the motors are not identical. These differences in characteristics does not prevent the motors from operating in combination with the drives but does mean that when a motor is changed out, their associated drive has to be re-tuned.

Additionally, and due to the specified characteristics of the new motors, the motors have been installed with blowers to dissipate excessive heat generated during their operation. This is considered appropriate with respect to motor thermal protection but does introduce an additional point of motor failure.

A disconnect switch is provided for each drive motor in front of each motor for means of disconnecting them locally in accordance with the Canadian Electrical Code. See Photo E23, Appendix C.

All motors and their associated installation are in as-new condition. Note that the nameplate for the northeast motor blower has fallen off and needs to be re-affixed to the blower motor. See Photo E25, Appendix C.

Motor nameplate data was collected and was recorded as follows:

Specification	**Main Span Drive Motor**
Type:	Squirrel cage induction
Manufacturer:	REULAND
S.N.:	N-15-H0117B-1
Type:	A000
Frame:	449TZ
Enclosure:	A-TEFC
Insulation System:	HHH
Phase:	3
Hz:	37
Volts:	600 MAX
Amps:	150
Horsepower:	150
Duty:	30 MIN
Speed:	555 RPM

One new spare motor provided as part of the replacement project is held at the bridge to be used in the event of a motor failure. Note that two different motor pecker head cable termination configurations have been specified for the newly installed motors and therefore this spare motor can only be used as a replacement motor for two of the four (4) main drive motors installed.

Corrective action is required to:

- Replace the existing motor nameplates with factual data of the motor characteristics based on 60 Hz standard and ensure that this same data is posted in each of the motor drive enclosures and in the O&M Manual for the motors. This data should be obtained from the motor manufacturer and approved by the Engineer of Record for the replacement project.
- Add a description in the O&M Manual indicating the electrical characteristic differences between the motors and describing the necessary re-tuning process if a motor is changed out.
- Consider procuring a spare motor with opposite hand packer head to provide a replacement for each type of motor provided.
- Re-affix the blower nameplate on the northeast blower motor.

4.2.2 Auxiliary Motors

The bridge is provided with an auxiliary drive system. This auxiliary drive system was commissioned in early 2010 and modified as part of the recently replacement and upgrade work at the bridge. The modifications included replacing the auxiliary drive motor, its operating machinery and modify the existing AUX drive control panel so that the operator can operate both AUX drive motor from a single location with the installation of the second pendant and aid of the span height readouts for both towers. The auxiliary drive in each tower consists of a squirrel cage motor with a Stearns brake which is coupled to the new main span drive gear reducer. See Photo E26, Appendix C. An auxiliary drive engage/disengage operating lever is provided with control and interlock limit switches to indicate the position of the aux drive lever. The lever operates such that when auxiliary drive is engaged, the main drive system will be disabled. See Photo E27, Appendix C. Each auxiliary drive is controlled from a reduced voltage starter mounted in a freestanding NEMA1 enclosure with a pendent control station. Note that a second pendant although installed in the South tower has not been electrically connected to control both auxiliary drives from this one location. Due to an incorrectly specified aerial cable, the required span height reading for the opposite tower cannot be displayed on the South auxiliary drive panel meter and thus has been disabled. See Photo E28, Appendix C. The auxiliary drive system currently can only be operated with independent controls in each tower using radio communications between the towers and the bridge control house to monitor and control span longitudinal skew.

Motor nameplate data was collected and was recorded as follows:

Specification	**Auxiliary Drive Motor**
Type:	Squirrel Cage Induction

Manufacturer:	REULAND
S.N.:	15-0563B-1
Type:	C0S0
Phase:	3
Hz:	60
Volts:	600 MAX
Amps:	18.4
Horsepower:	20
Speed:	1800 RPM
Frame:	284TZC
Style:	ACR

Brake nameplate data was collected and was recorded as follows:

Specification	**Auxiliary Drive Motor Brake**
Manufacturer:	Stearns
S.N.:	97017M001-2
Phase:	1
Hz:	60
Volts:	120
Amps:	1.2
Torque lb-ft:	125 Horizontal
Amp Inrush:	17.6

The auxiliary drive system was not operated as part of the 2018 inspection. Visual inspection yields no signs of significant deficiencies. Both the auxiliary drive controllers and the drive motor appear to be in as-new condition.

Corrective action is required to:

- Resolve the cabling issues and provide auxiliary drive operation from the south tower as per the scope of the rehabilitation design.

4.2.3 Span Brakes

Each tower drive system was provided with two (2) main drive machinery brakes, and two (2) motor brakes.

The new motor brakes and the two (2) existing machinery brakes in each tower are modern electro-hydraulic thrustor brakes. See Photo E24, Appendix C. All four brakes are presently operational and electrically in excellent serviceable condition. The brakes are capable of being hand released for maintenance and troubleshooting purposes and the control system has been configured such that the bridge is allowed to continue to operate with one failed brake in each tower machinery space hand released. The brakes are provided with three limit switches as per code:

- Brake released – permissive with drive controller
- Brake set – status indication
- Brake hand released – Interlock to prevent bridge operation with more than one brake hand released

Motor nameplate data was collected and was recorded as follows:

Specification	Machinery Brakes
Manufacturer:	Mondel Engineering
S.N.:	03/582992-4
Size:	19MST/E-ED80/12SH
Supply:	332/575/3/60HZ
Amps:	0.96
Torque:	950 lb-ft

Specification	Motor Brakes
Manufacturer:	EMC
S.N.:	393278-00031320
Size:	500 N
Duty:	60 min
Volt:	332/575 +/- 5%
Amps:	0.64/0.37
Frequency:	60
Power:	260 W

No corrective action is required at this time.

4.2.4 Main Motor Drives

As part of the recent replacements and upgrades to the bridge power and control system, the existing legacy technology motor drives (amplidyne/saturable reactor and switched rotor resistors) were replaced with variable frequency flux vector drives of Danfoss manufacture with dynamic braking resistors and encoder feedback. The drive and motor configuration in each tower are such that one drive and its motor combination is used as the duty drive system, while the second is used as back up. The control system is configured such that the duty and standby units can be manually or automatically switched by the bridge operator or PLC system. The drives provide both speed and torque control and utilize encoders connected to the motor shafts for speed feedback and shaft positional data. The drive control system provides both driving and dynamic braking torque over the full range of the bridge operational needs. The drives are configured for safe torque mode operation and, in conjunction with the mechanical brakes, provide torque proving of drive torque output prior to releasing them for bridge operation. See Photos E21 and E22, Appendix C.

The duty drives in each tower are kept synchronized with each other and their rotational position automatically matched through the high-speed counter in the bridge control PLC. This control function eliminates and corrects for span longitudinal skew. The drives are appropriately rated for normal and contingency operating duty of the bridge and accurately control speed and driving and braking torque in accordance with the requirements for bridge operation. Due to the accumulative resolver errors in the PLC system, early skew warning alarms and skew trips occur when the bridge is lowering below the nearly closed position and when the bridge is raising above the nearly raised position. The resolver errors are currently under investigation and should be resolved in the near future. It was noted during the inspection that both towers have roof leaks. White plastic covers have been placed over the top of the drives/resistors in both towers, south tower MCC, auxiliary drive and CP-3 to protect them. See Photos E20, E21, E28 and E29, Appendix C.

On one occasion when switching to the generator power during the inspection, all drives faulted and could only be reset locally in each tower. It is recommended that the drive behavior be observed during the future generator exercise, further investigation is necessary and changes made if similar fault conditions occur in the future.

The drive pre-charge delay timers have been installed to remediate fuse blown issues during drive input power switching. However, during the inspection the NW drive pre-charge fuses blew. This occurred as part of the generator/utility power transfer test. The pre-charge fuses were replaced but no determination was made during the inspection of the cause of the drive pre-charge fuse failure and further investigation is considered necessary.

Corrective action is required to:

- Repair the roof leaks in both towers.

- NW drive pre-charge circuit to be investigated for the correct time delay setup during the power transfer.

4.2.5 Bridge Control System

The bridge control system was replaced as part of the bridge power and control system replacement project. The replacements included a form of PLC distributed control with PLC and remote I/O control panels installed at the following locations:

- Bridge Control House 2nd Floor (CP-2)
- Bridge Control House Operators Location 3rd Floor (HMI)
- South Tower Machinery Room (CP-3)
- North Tower Machinery Room (CP-4)
- South MCC (Ethernet Switch)
- North MCC (Ethernet Switch)

Communications for the distributed control system consists of a redundant fiber optic loop system configured with ring topology that incorporates the above control panels and the new main drive motor VFD's that are located in each tower machinery space. The communications system has been well installed and provides a redundant network for continued operation of the bridge in the event of a single fiber optic cable failure. It should be noted that although the network is setup in the ring topology and does provide the required redundancy, it does not allow for the possibility of turning off one drives in each tower at the same time to maintain communications, as it will break the ring at two locations. If this occurs, the bridge will not be operational due to this network communications error. Moreover, in the event of one of the drives being powered down, the bridge will continue to be functional but the network will not have the redundancy of the ring setup. In both failure conditions, it will require manual coupling of the network connections within the disabled drive cabinet or cabinets in order to return the control system to a functional state.

The PLC system consists of redundant CPU's with shared rack mounted I/O's but with no relay logic provided as a secondary form of bridge control. Relay logic, if installed would provide back-up for operation of the bridge in the event of a PLC or communications failure. See Photo E11, Appendix C.

The replacement control system was designed such that, for the most part, the changes and the additions of the replacement control system would appear transparent to the operator and require minimal changes to the bridge operating procedures.

The new system includes maintaining the appearance of existing operator's control desk but with a new operating top panel added to the control desk. The layout of control switches, indication lights and instrumentation have purposely been kept similar to the original control system being replaced to simplify operator transition to the new system. See Photo E14, Appendix C.

The form of control for the bridge and the bridge drive system has been completely revised with additions such as encoders, resolvers and inclinometers that provide inputs to the PLC for enhanced control functionality. These inputs, along with conventional limit switches and position programmable rotary limit switches, are used to provide control for span operation including speed and skew control, seating, end of travel limits as well as bridge operating protection and troubleshooting diagnostic aids. The new system also provides control redundancy for greater operating reliability as well as enhanced protection for the operating system which includes additional monitoring and trip functionality.

Two new resolvers have been installed in each tower as part of the recent rehabilitation and upgrade project, one a single turn resolver and one a multi turn resolver. Each resolver functions as designed and specified and both are in as-new condition. See Photo E31, Appendix C. The new resolvers are connected to existing gearboxes. It was noted during the inspection that the single turn resolvers, one in each tower, although are displaying span position values on the HMI screen, have not been utilized for any control function and do not serve any useful purpose. During the inspection, bridge operating personnel noted that the bridge operating system had an inherent issue of gradually increasing skew indication over time. This cumulative skew condition requires the drive shaft inputs to the resolvers have to be manually adjusted periodically. This adjustment was reported as being performed once every two to three weeks. The adjustment consists of uncoupling and zeroing the system with the bridge in the seated position. The accumulation of resolver error readings is mainly due to rope slippage during operation and errors within the resolver signal circuits. Many resolver signal cable splices and signal conversions presently take place within the resolver loop before reaching PLC input which not only causes large fluctuations of readouts but also causes susceptibility to electromagnetic interference (EMI) generated by the nearby utility high voltage transmission line. SBE was tasked with investigating the resolver issues in the fall 2018 and to develop a solution for the ongoing bridge skew control issues.

An installed wireless inclinometer which was designed and specified as part of the replacement project to provide a measure, indication and control of both longitudinal and transverse skew does not function as designed and has been disconnected. It was determined during commissioning of the replacement system that the inclinometers could not achieve the required accuracy to measure skew due to the very small angular displacement of the moving span that takes place during a span skew condition. The inclinometer was moved several times during commissioning of the replacement system as directed by the Engineer of Record but with no success and was finally disabled. See Photos E39 and E40, Appendix C. The use of the inclinometer as a measure of longitudinal skew was replaced with span height resolvers and motor encoders' feedback to PLC in each tower and the PLC reprogrammed to achieve the desired skew functionality. The skew monitoring functionality includes ultimate skew protection. If either encoder or resolver differential value is excessive, a warning and trip condition will occur and if the bridge operation is tripped by the bridge ultimate skew protection, the control system will be inhibited and locked out. If this ultimate skew trip occurs, the operator must use the auxiliary drives to level the bridge before automatic operation via PLC can be re-enabled.

Overspeed protection was also been implemented as part of the control system replacement and upgrade. One overspeed switch was installed in each tower to monitor the driving shaft speed during the bridge operation. See Photo E34, Appendix C. The control system has been arranged to stop span operation when the speed switch triggers high or low over-speed conditions.

Two network switches have been installed inside the south tower aerial cable control termination box to complete the required network loop configuration and fibre network setup. See Photo E32, Appendix C.

Corrective action is required to:

- Further evaluate and implement a fix for the bridge skew control issues.
- Second means of the skew detection shall be implemented for the safety reasons.

4.2.6 Motor Control Centres

Motor Control Centres (MCC's) are located in the North and South Towers. The MCC's were installed as part of the recently completed replacement and upgrade project.

The MCC's are used to power and control the motor and machinery brakes, traffic control warning gates, resistance barriers and pedestrian gates, span drive motor blowers and span locks, heating and lighting in their respective tower machinery spaces, as well as providing feeders for the span drives and auxiliary drive motor starter.

The MCC's are intelligent MCC's and the starters are controlled and monitored from the bridge control system via Ethernet switches located inside the MCC's. The overload devices in each starter are solid state communicating devices and have been fully integrated into the bridge control system.

The MCC's are in as-new condition, have been specified to support the required power, control of all connected devices, and are provided with protective devices that have been set to protect the operating system in accordance with code. Note the South MCC was covered with PVC sheet at the time of inspection to protect it from a roof leak. See Photo E20, Appendix C.

Corrective action is required to:

- Repair the Tower roof leaks.

4.2.7 Motor Control Centre Feeders

The feeders for the tower MCC's are run from the switchboard located on the 2nd Floor of the bridge operator's house. The feeder breakers in the switchboard have been adequately sized for the prevailing duties and the breakers have been set in accordance with the latest protective coordination study.

The south tower MCC feeder has been directly cabled from the switchboard utilizing cable trough and cable racks running up the tower to the south machinery space. The north MCC feeders consist of duplicate feeders utilizing the aerial cable installation between the south and north towers and an automatic switch transfer located in the north tower machinery space. The routing of these duplicate feeders has been split, one set of feeders is run in each of the two aerial cable bundles which are run on each side of the towers to transition between the two towers, See Photo E63, Appendix C.

An automatic transfer switch (ATS) was installed in the north tower to provide the termination point for the redundant aerial cable power feeds from south tower to north tower. This ATS also automatically transfers from the duty (west side) aerial cable to backup (east side) feeders. The ATS is the break-before-make type with time delay for switching. See Photo E33, Appendix C.

The feeder installation for both towers has been appropriately sized and the duplicate feeders for the north tower MCC provides enhanced redundancy for the north tower operating system.

No corrective action is required at this time.

4.2.8 Span Lock

The span locks consist of two locking devices at each end of the moving structure. Each locking device consists of two lock jaws that are driven by a common span lock motor with associated machinery.

The bridge span lock system was replaced/refurbished approximately six years ago and is in good serviceable condition. The span lock motors were re-wound as part of the span lock replacement and refurbishment project and are in fair condition. See Photo E43, Appendix C. The lock motors are provided with local disconnect switches in accordance with the Canadian Electrical Code. The north disconnect switch cover is moderately corroded. See Photo E44, Appendix C.

The original span lock rotary cam limit switch (RCLS) that is used for control, indication and interlock of the span lock motor has been disabled and replaced with a pair of lever arm limit switches located on the center of the span lock rotary shaft. These limit switches are used for the span lock end of travel control. Additionally, a pair of lock bar engaged and disengaged limit switches are installed at each span lock area near the span lock pocket. Each limit switch has a feedback to PLC I/O for the span lock status. See Photos E45 and E46, Appendix C.

Corrective action is required to:

- Replace the north span lock disconnect switch with a stainless steel NEMA 4X disconnect.

4.2.9 Load Measurement

In an effort to determine the operating characteristics of the main span drive motors, their operating load characteristics were measured and recorded. Each drive output parameters (load current, voltage power, and power factor) was measured during the complete opening and closing operating cycles of the bridge. Figures documenting the recordings and summary Table E1 are provided below.

	Phase A (Amps) Max./Avg.	Phase B (Amps) Max./Avg.	Phase C (Amps) Max./Avg.	Voltage (V) Max Load	Real Power (kW) Max./Avg.	Power Factor Max./Avg.
SW Drive Output	212/87	250/87	251/89	631	74/41	0.68/0.31
NW Drive Output	285/101	304/102	308/100	610	79/42	0.64/0.34

SE Drive Output	244/86	230/92	287/91	616	90/45	0.62/0.31
NE Drive Output	283/90	296/90	312/89	610	78/44	0.63/0.33
NW Drive Output on Gen	279/98	304/100	299/97	609	73/42	0.62/0.32
Generator Output	174/141	169/136	166/131	596	166/91	0.96/0.92

Table E1 – Drive and Generator Output Parameters.

From the above results, it can be seen that the average load currents of the main span drive motors are within the nameplate rating of the motor (150 Amps). The average real power (kW) recorded for the main drive motors are well within the horsepower rating (<50%) from the nameplate data. These are an indication that the rating of the main drive motors and its controllers have been correctly sized for the prevailing duty. However, the power factor is low indicating that the motors and the controllers operate at low efficiency due to the low frequency/speed. Span operation under generator power was also tested. The operating characteristics of each drive did not change and the generator is considered properly sized to operate the bridge.

Compared to the chart recordings taken in November 2017 inspection, to operate the bridge, the loading for all drives have increased slightly with higher voltage spikes being recorded. There was a lower temperature in December compared to November and this could have contributed to the loading increase. Note that unstable resolver readings might also be part the reason for these recorded higher voltage spikes.

The auxiliary drive was not tested at the time of inspection.

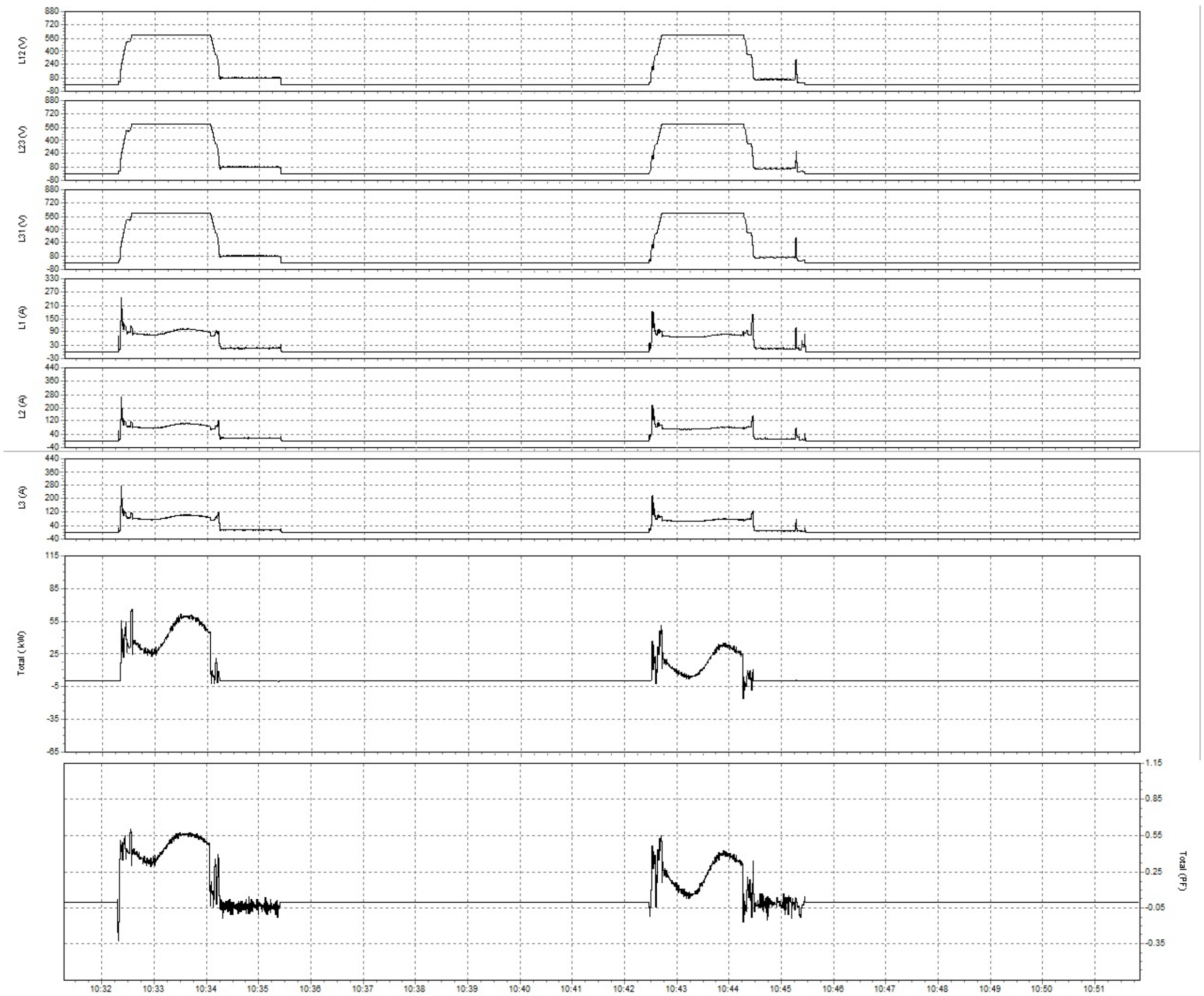


Figure E1: Voltage, Current, and Power Parameters (North Tower West Span Drive Motor – Normal Power).

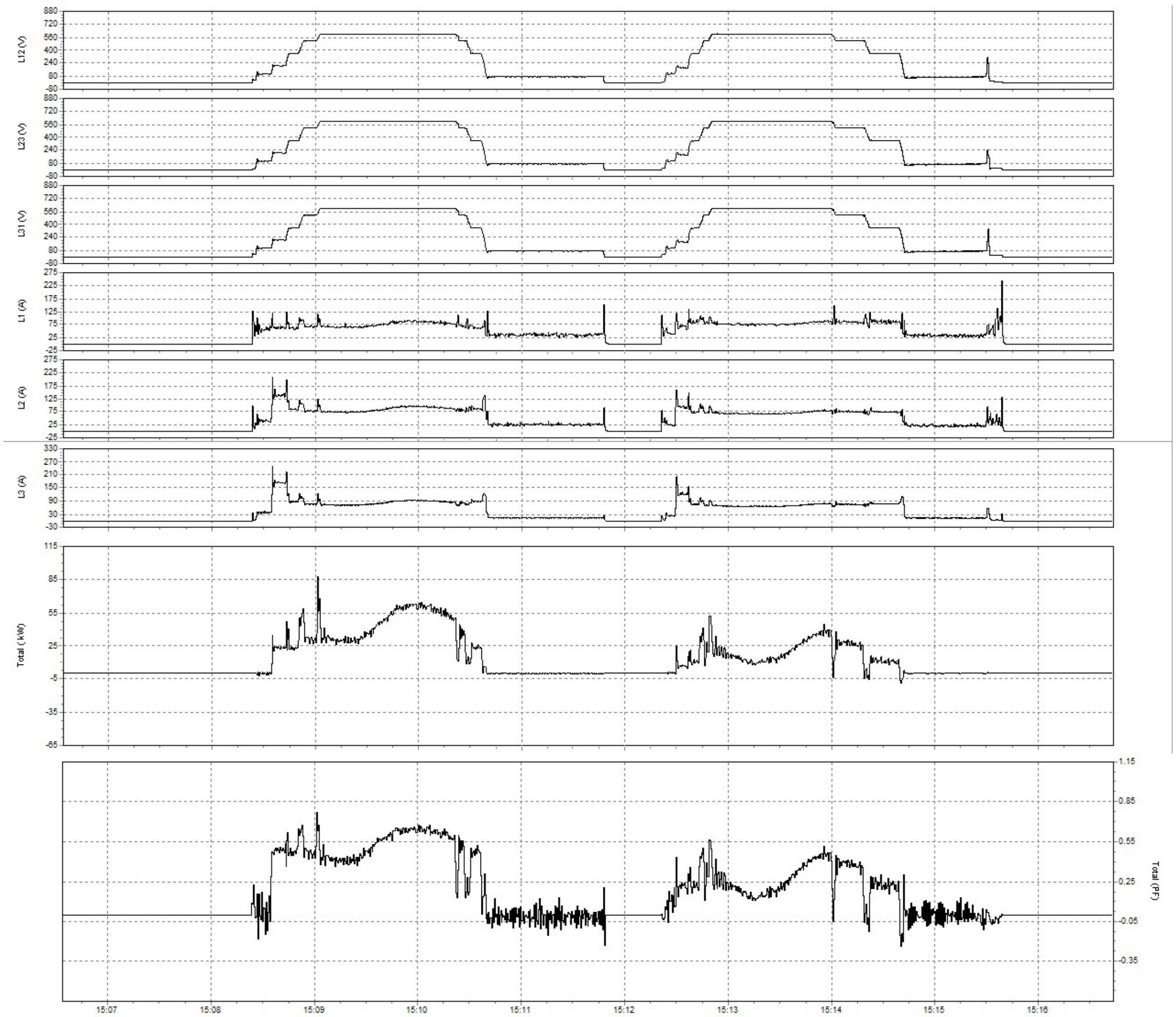


Figure E2: Voltage, Current, and Power Parameters (South Tower East Span Drive Motor – Normal Power).

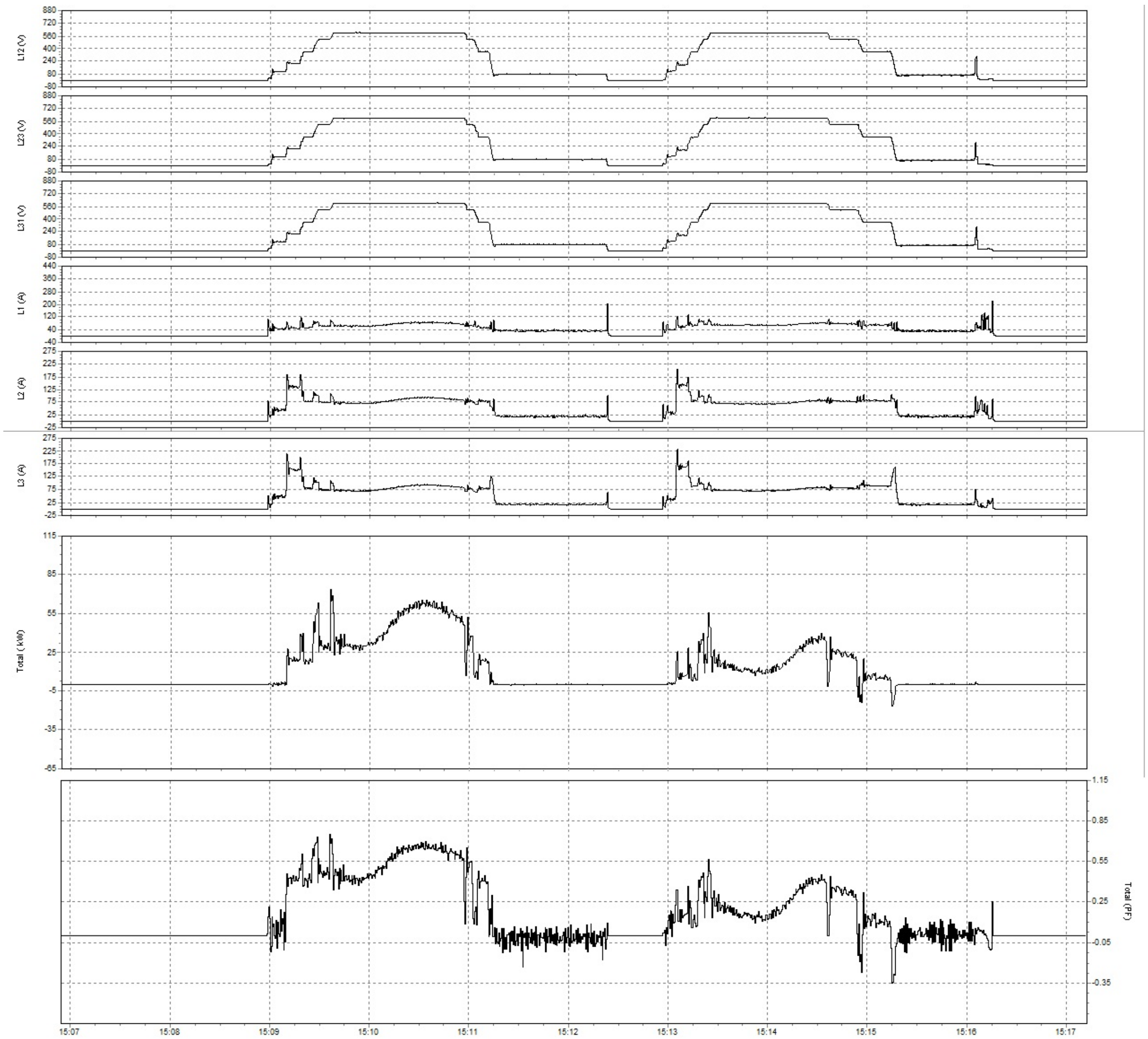


Figure E3: Voltage, Current, and Power Parameters (North Tower East Span Drive Motor – Normal Power).

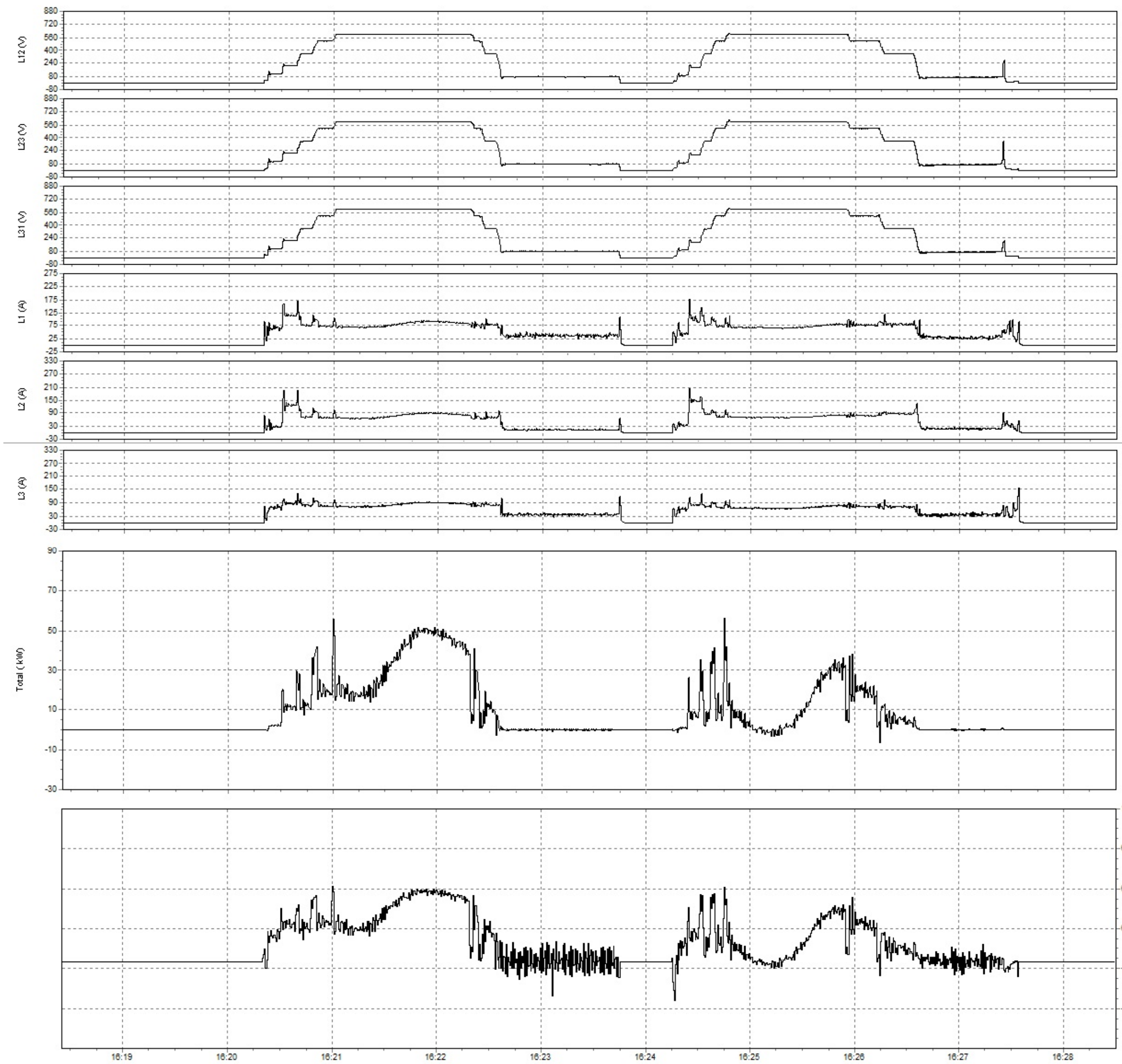


Figure E4: Voltage, Current, and Power Parameters (South Tower West Span Drive Motor – Normal Power).

Further investigation was performed to determine the load characteristics of the main span drive motors under emergency power, which means operating the bridge solely on the emergency diesel generator. Measurements were recorded for a complete operating cycle on the west drive motor as well as the generator total output. Measurement data are summarized in Table E1 above and in the figures that follow.

Figure E5: Voltage, Current, and Power Parameters (North Tower West Span Drive Motor – Generator Power).

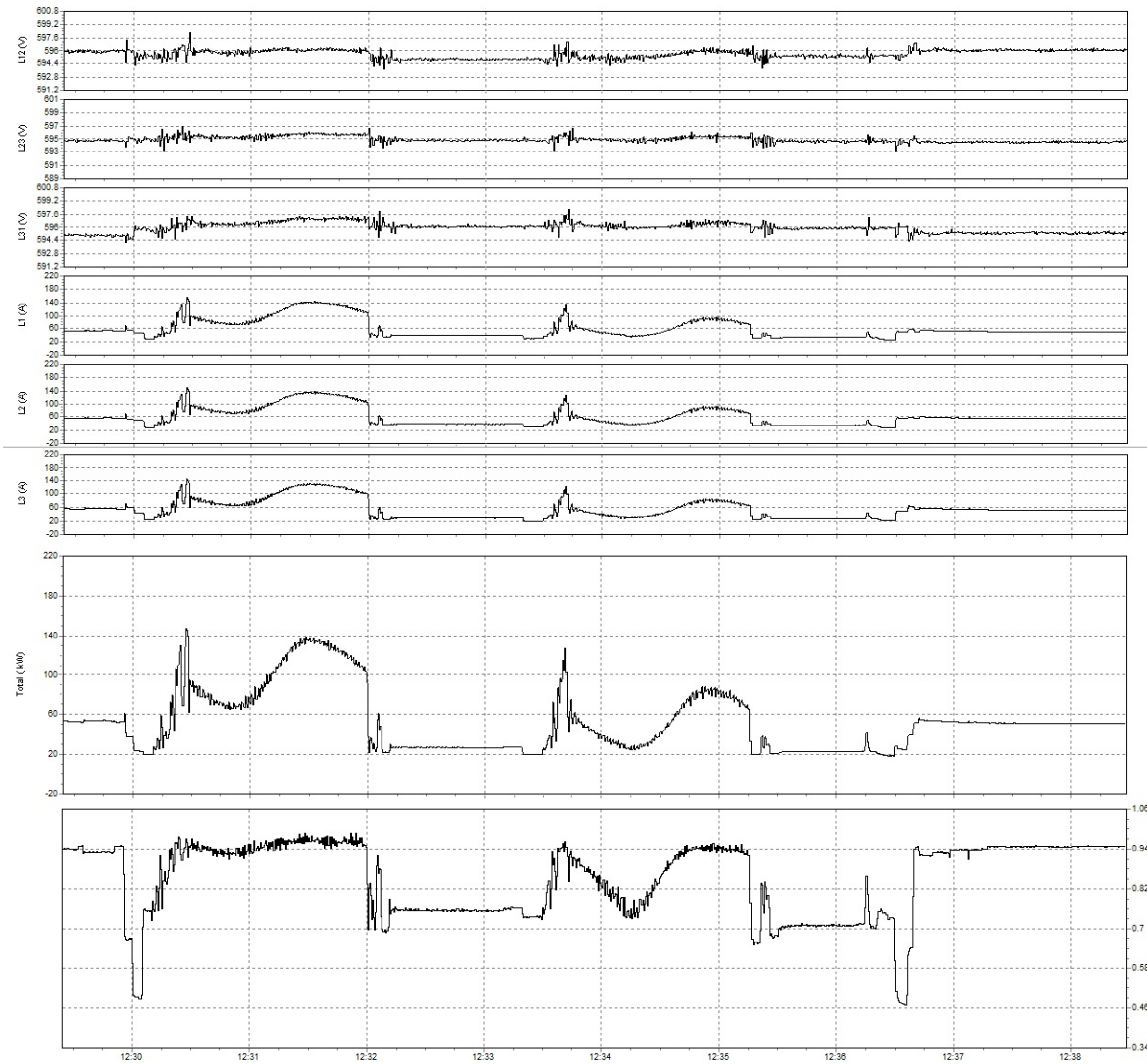


Figure E6: Voltage, Current, and Power Parameters (Generator Output).

Comparing the drive output under generator power with the measurements recorded for operations with normal utility power, the two sets of data are almost identical. This confirms that the generator is adequately sized for the prevailing duty, and is a stable and reliable source of power for the operation of the bridge. Moreover, the generator loading is less than 50% of its rating throughout the bridge operating cycle, per Figure E6.

4.3 BRIDGE CONTROL SYSTEM

4.3.1 Traffic Control Panel

The traffic control panel is a standalone unit that provides traffic control operating and annunciating functionality. The console top along with all operating devices (indicator lights and push buttons) were upgraded during the recent drive rehabilitation and upgrade project. The traffic control panel has been well laid out ergonomically and located, in conjunction with the installed CCTV system to optimize the operator's sight of roadway and pedestrian traffic. See Photo E15, Appendix C. An additional keyed bypass switch has been installed on the side of the cabinet to switch the traffic control to all relay operation such that it can be operated independently of the PLC. Note that this "Maintenance" mode of operation does not provide any interlocks and is for maintenance or troubleshooting purposes only. See Photo E16, Appendix C.

No corrective action is required at this time.

4.3.2 Navigation Control

The operating devices (indicator lights and push buttons) have been upgraded and are located on the traffic control panel. All specified functions associated with navigation control were operational at the time of the inspection and the installation is in good serviceable condition. With continued routine maintenance this navigation control system should continue to provide reliable operation in the long term. The marine traffic navigation lights are located at each end of the pier and were found to be in good serviceable condition. See Photo E49, Appendix C.

The lift span is provided with span navigation lights, one light faces each approaching waterway. See Photo E48, Appendix C. These lights are used to indicate bridge position to marine traffic. The lights automatically switch from "Red" to "Green" when the bridge is fully raised. Both span navigation lights were found to be in good serviceable condition at the time of inspection.

Two small craft navigation lights are installed at the bridge, one on each side of the bridge axis on the south pier. Both small craft lights were operational at the time of the inspection but with moderate corrosion on the fixtures and poles. See Photo E50, Appendix C.

Air horns are installed on the control house facing both side the channel to signal the marine traffic. The air horns were part of the original installation and not part of the recent rehabilitation and upgrade project. The air horns exhibit paint deterioration but were found to be in good operational condition at the time of the inspection. See Photo E69, Appendix C.

No corrective action is required at this time.

4.3.3 PLC

The bridge logic control was originally a relay logic control system when the bridge was first placed into service in the 1950's. The relays were replaced with a Programmable Logic Controller (PLC) in 1989. The PLC was an Allen Bradley Model 5/20, which was powered from a UPS to ensure a conditioned and reliable and uninterruptible source of supply for the PLC. The PLC system was replaced and upgraded during 2016 and 2017 as part of the recent bridge drive replacement and control system upgrade project. The replacement PLCs are of GE manufacture. See Photo E11, Appendix C. The PLC memory is in the form of an embedded memory module of adequate capacity to satisfy bridge control functionality including all specified enhancements. The PLC and all peripherals have been configured for cold backup redundancy with watchdog detection to automatically switch to the healthy PLC if the running PLC alarms an alarm state. The bridge control logic has been configured to operate the new VFD drives and to automatically switch over the duty drives to back up drives in the event of a drive failure. Numerous safety features have been programmed into the PLC logic to enhance bridge operational safety including redundant overspeed trips, redundant skew control and trip functions, redundant bridge end of travel, redundant brake failure alarms drive monitoring as well as traffic control system monitoring and alarming a failure.

No corrective action is required at this time.

4.3.4 Control Panels in Tower

There are several control panels installed in each tower to take care of bridge operation and interface needs.

CP-3 (South Tower) and CP-4 (North Tower) are the main interfacing control panels in the towers with HMI's with each control panel. Each control panel and its peripherals consist of:

- PLC remote I/O rack
- PLC network module
- Resolver interfacing module
- PLC encoder interfacing module

- Speed switch module on the door
- Breakers for sub control circuits
- Relays
- Terminals
- Aerial cable transfer switch

Note that the panels appear to be undersized based on their wire fill. See Photos E29 and E30, Appendix C.

The control power for panels CP-3 and CP-44 are individually fed from the existing panels' circuit #1 in their respective towers. The power source in CP3 and CP4 is not identified on the control panel enclosure.

Corrective action is required to:

- Provide labels of the enclosure power source on CP-3 and CP-4.

4.3.5 Uninterruptible Power Supply

To assure control system and essential communication links are maintained during short durations of power outages and that the power supplies are conditioned and free from transients or harmonics, the bridge has been provided with a 10 kVA Uninterruptible Power Supply (UPS). The UPS is located on the second floor of the operator's house next to the main control panel (CP-2) and provided with a sub UPS distribution panel. The UPS and its distribution panel was installed as part of the recently completed replacement and upgrade project. The UPS has been provided with status and failure monitoring devices that alarm on the bridge operator's HMI in the event of UPS trouble. Additionally, routine maintenance of the UPS is being performed by maintenance staff in accordance with the current bridge O&M Manual. See Photo E12, Appendix C. The following critical loads has been connected to the UPS:

- PLC
- Control Power
- Radar
- Marine Radio
- Main Office
- Emergency Receptacles

The UPS is sufficiently sized to maintain power to the critical devices in the event of a utility power failure until transferring to the standby generator emergency power. However, bridge control system in the towers are not connected to the UPS system. As such, a network communication failure occurs every time power is transferred between the generator and utility power source. Although the control system recovers from the communication errors after a successful power transfer, the PLC completely losses its monitoring capability to every networked device and remains in error mode for a few minutes. Due to the drive units being part of the communications network loop, the power transfer/switching turns off the drives and thus the network ring will remain broken, see communications network description above. However, if all the network devices were backed up with UPS power, the system recovery would be much faster with timing depended only on the reconnection of the drive units after power transfer.

Corrective action is required to:

- Provide UPS power for the control systems in both towers.

4.4 OPERATIONAL DEVICES

Operational devices are defined as all electrical devices that contribute and are part of the bridge operating system.

The operational devices group includes the following items:

- Motor Overloads
- Safety Interlocks
- Limit Switches
- Resolvers
- Encoders
- Speed Switches

4.4.1 Motor Overloads

The main motor overloads were visually inspected as part of the inspection. The overloads are part of the MCC starter assembly. Two type of motor overloads have been installed in the MCC's: networked solid-state overload and thermal magnetic overload protectors. All thermal overloads are in as-new condition.

No corrective action is required at this time.

4.4.2 Safety Interlocks

The bridge and traffic control safety interlocks were functionally observed as part of this inspection. The bridge operating sequence is defined in the bridge operator's manual and is considered appropriate for bridge operation and was followed by the bridge operator during the inspection. The safety interlocks are also described in the manual and ensure that the bridge operator is prevented from operating the bridge out of sequence. The control circuit interlocks disable and prevent out of sequence operation of the bridge that could potential damage the bridge equipment or harm the public. The interlock functions were verified as part of this inspection. All code required interlocks were found to be incorporated into the bridge control system and perform their intended function.

No corrective action is required at this time.

4.4.3 Limit Switches

Limit switches were inspected as part of the inspection. The following devices were visually inspected and functioned as intended:

- Seated limit switches
- Span position limit switches
- Programmable limit switches (PLS) with resolver
- Span lock safety limit switches
- Auxiliary drive clutch limit switches
- Main spline gear clutch limit switches

All limit switches were in as new operational condition at the time of the inspection and all were operating reliably and as intended.

No corrective action is required at this time.

4.4.3.1 Seated Limit Switches

The bridge is provided with four (4) span seated limit switches, one at each corner of the moving structure. The switches are of the plunger type and detect the presence of the span at the bridge seated position. The switches are new and were installed as part of the bridge control system replacement and upgrade project. The switches were in good operational condition at the time of the inspection and perform their intended function reliably and have been well installed. See Photo E38, Appendix C.

No corrective action is required at this time.

4.4.3.2 Span Position Limit Switches

Three (3) span position limit switches have been installed on the south tower along the travel path of the south span counter weight. Two limit switches were installed on the lower level of the tower near the staircase for span near open and full open detection and one limit switch installed on the top for the span near seated detection. The switches were in good operational condition at the time of the inspection, perform their intended function reliably and have been well installed.

No corrective action is required at this time.

4.4.3.3 Programmable Rotary Limit Switches (PLS) with Resolvers

One resolver based programmable rotary limit switch was installed in each tower. The triggering parameters were set in the PLS to provide a second mean of span limit switch functionality for the bridge. Each relay output from PLS has been arranged in series with the equivalent span position limit switch to provide failsafe span/drive positional control. The PLS's were installed in CP-8 (south Tower) and CP-9 (North Tower), but only the south tower PLS is in service. The CP-9 South Tower PLS only serves as a display unit in CP-9 and for PLC readout purposes. Note that the PLS resolver signals were also split to provide the PLC with analog signals in the form of shield twisted pairs for span height readings. These span height readings have been utilized by PLC for the span height display and for skew control purposes. Note that an output from the PLS in south tower has also been used to control the span navigation lights. Due to hardware resolver decoding from these PLS, the bridge PLC system is presently unable to automatically reset/re-zero any resolver errors at the span seated position without encountering errors between span limit switch positions and resolver readings.

No corrective action is required at this time. The resolver setup for the bridge control will need to be modified in the near future as part of the proposed bridge skew control modification work.

4.4.3.4 Span Lock Safety Limit Switch

The span lock system is provided with two disengaged limit switches, one mounted on the each of the span lock bars for positive indication of the span lock status. These limit switches have been wired in series with the span lock end of travel limit switches at the center of the span lock rotating machinery. These switches are in good operational condition, perform their intended function reliably and have been well installed.

No corrective action is required at this time.

4.4.3.5 Auxiliary Drive Clutch Limit Switch

The auxiliary drive system is provided with two interlock limit switches on the reducer operating lever to prevent powering of the main drive system when the auxiliary drive lever is engaged. These auxiliary drive limit switches are in good operational condition, perform their intended function reliably, and have been well installed. See Photo E27, Appendix C.

No corrective action is required at this time.

4.4.3.6 Main Spline Gear Clutch Limit Switch

The reducer is provided with a main drive clutch lever with two interlock limit switches to prevent powering of the main drive system when the main clutch lever is disengaged. This provides the permissive to enable transverse skew correction to be made and to provide for machinery indexing. The main drive interlock limit switches were in good operational condition at the time of the inspection, perform their intended function reliably, and have been well installed.

No corrective action is required at this time.

4.4.3.7 Reducer Manual Crank Limit Switch

Two reducer manual crank limit switches have been installed under the manual crank cover on the speed reducer. When the cover is opened, both main and auxiliary drive operation is disabled. The reducer manual crank limit switches are in good operational condition, perform their intended function reliably and have been well installed.

No corrective action is required at this time.

4.5 TRAFFIC CONTROL

The Traffic Control group contains the Traffic Lights, Gates and Pedestrian Control.

4.5.1 Traffic Lights

All the traffic light fixtures have been replaced with LED type luminaries as part of the recently completed replacement and upgrade project. All traffic lights are operational and function in accordance with the prevailing bridge operating control requirements. See Photo E51, Appendix C.

No corrective action is required at this time.

4.5.2 Gates

The warning gates, barrier gates and pedestrian gates were all replaced as part of the recently completed electrical replacement and upgrade project. The warning gates are of B&B Roadway manufacture, are in as new condition and have been well installed. See Photos E53 and E55, Appendix C.

A warning gong is mounted on top of the oncoming warning gates and barrier gates. All gongs are in like new condition. See Photo E54, Appendix C.

There are two barrier gates, one on each of the roadway approach. The barrier gates are of B&B Roadway Manufacture and are of their VR-6 type. Each barrier gate is single armed and spans across the width of the roadway. The barrier arm is approximately 55 ft. in length and, although exhibiting little movement in the wind when in its vertical position, it does exert stresses on the machinery. This may result in a fatigue issue in the long term. See Photo E59 Appendix C. A steel receiver pocket has been installed on the opposite of the roadway such that the barrier gate tip end will be locked in the receiver to provide a physical stop for vehicular traffic when the barrier is lowered. Metal railings have been recently installed around the barrier gate receivers are in as new condition. See Photo E60, Appendix C. The barrier gates have been well installed and all components inside the gate enclosure were in as-new condition. However, the enclosure lock on the North barrier gate enclosure found broken and left on the floor during the inspection. See Photo E61, Appendix C.

Pedestrian gates were installed on the walkway approaches to the bridge span. A small and short armed B&B roadway gate was installed to stop the pedestrian traffic. The gate is in as-new condition inside and outside and has been well installed. See Photo E57, Appendix C. Note that the length of wires inside the gate is excessive in such a small enclosure and an improper wire splice using unsecured terminal block was found in the enclosure at the time of inspection. See Photo E58, Appendix C.

All gates come with door limit switches and hand crank limit switches for safe operation of the gates. See E56, Appendix C.

Many manufacturer supplied gate enclosure locks were found to be defective and fail to operate with their keys at the time of the inspection. It is recommended that padlocks be used instead of the manufacturer supplied locks and use of the original lock handle only be used for latching purposes.

Corrective action is required to:

- Replace North barrier enclosure door lock assembly.
- Replace all the defective enclosure locks or install padlocks for all gates and only utilize the manufacturer's lock handle for latching.
- Properly terminate the wires inside the South Pedestrian gate enclosure.
- Perform an inspection of the barriers and barrier arms on a 6-monthly cycle, concentrating on the barrier gate machinery, bearings and barrier arm fatigue.

4.5.3 Pedestrian Control

Pedestrian control devices have been installed to signal bridge operation to pedestrians. The control consists of pedestrian signals and a bell at both the North and South sidewalk approaches to the bridge. The north pedestrian bell was removed from the pedestrian signal post. But apart from this defect, the pedestrian control system was in almost as-new condition and functioned as intended. See Photo E52, Appendix C.

Corrective action is required to:

- Install a new north pedestrian bell.

4.6 Bridge Auxiliary Sub Systems

Bridge auxiliary sub systems include the power distribution panelboard, marine radio, radar system, elevator control and lighting.

4.6.1 Bridge Distribution Panel Boards

Most of the distribution panelboards on the bridge are existing and their replacement was not part of the recent electrical replacement and upgrade project except for one panelboard in each tower which was installed as part of the rehabilitation and upgrade project. The new and original panelboards were all found to be in good operating condition. The panelboards in the electrical room had been modified during the recent replacement and upgrade work with additional circuits and designations added. Note that the panel lock/lever on the Distribution Panel A and Panel EA were broken at the time of the inspection. See Photo E13, Appendix C.

Heater distribution panels in both towers are existing and are in good operating condition. See Photo E35, Appendix C.

One new lighting panel was installed in each tower at the elevator landing. The required additional power is fed from the new MCC's via disconnect switches, step down transformers and 42 circuit panelboards. See Photo E36, Appendix C.

A separate panelboard is located on the north pier at the foot of the north tower together with its lighting transformer, disconnect switch and lighting contactor. The equipment in this area is mostly in good condition exhibiting only minor signs of corrosion. See Photo E47, Appendix C.

Corrective action is required to:

- Repair or replace panel lock/levers on Distribution Panel A and Panel EA.

4.6.2 Marine Radio

The marine radio is of the long-range multi-channel radio system. It is in good condition and is operational. See Photo E19, Appendix C.

No corrective action is required at this time.

4.6.3 Radar System

The radar system was installed some years ago to aid the bridge scheduling and operation. Note that the radar system can also detect and record the wind speed and direction data in real time on the bridge. See Photo E18, Appendix C.

No corrective action is required at this time.

4.6.4 Bridge Elevators

The elevators were part of the bridge original installation. The existing elevator machinery was installed approximately twenty years ago. Although functional, both elevators require periodic maintenance. The elevator controllers have been modified several times and are approaching the end of their service lives. New steel cages have been installed in the elevator's room over the elevator machinery along with new paints for both elevator machinery and cages. See Photos E41 and E42, Appendix C.

Corrective action is required to:

- Refurbish or upgrade the elevator machinery and controllers.

4.7 Conduits, Junction Boxes, Cable Trays and Suspension Cables

The outdoor locations contain numerous conduits and junction boxes. Most of the raceway installation are new with PVC coated rigid steel conduits and stainless-steel junction/pull boxes. Only a few of the existing conduits and junction boxes remain after the recent rehabilitation. See Photo E74, Appendix C.

4.7.1 Conduits

The bridge conduit installation consists of a combination of conduits that were installed when the bridge was originally constructed and conduits that have been replaced as part of recent upgrade project. All newly installed outdoor conduits are of PVC coated rigid steel. The conduit installation is generally in good serviceable condition and should provide reliable service in the long term.

No corrective action is required at this time.

4.7.2 Junction Boxes

All of the failed and badly corroded junction boxes were replaced during the recently completed electrical replacement and upgrade project. The junction boxes and their installation are generally in good serviceable condition and should provide reliable service in the long term. Note that many wires/cables are not completely removed during the recent project. See Photo E37, Appendix C.

Corrective action is required to:

- Completely remove the abandoned and no longer used cabling.

4.7.3 Cable Trays

Cable trays run vertically up each tower and are installed under the tower machinery rooms to feed the equipment in the machinery spaces. Concerns existed with the horizontal runs under each tower machinery rooms accumulating bird waste. Lightweight steel covers have been installed over the trays to alleviate the problem. The overall condition of the bridge cable tray system is in good condition and no major issues were evident during the inspection.

Additional curved cable trays were installed on the tower wings to route the new aerial cables into the machinery room. See Photo E66, Appendix C.

No corrective action is required at this time.

4.7.4 Cable Reel

Cable reels have been installed at the bridge to provide power and control for the electrical equipment located on the movable span such as the span navigation lights and roadway heaters. The cable reel on the north pier has been removed recently. The south cable reel is in good serviceable condition and no significant deficiencies at the time of inspection. See Photo E62, Appendix C. With continued routine maintenance the cable reel should continue to provide reliable service in the long term.

No corrective action is required at this time.

4.7.5 Aerial Cables

Arial suspension cables have been provided to electrically connect the South to the North towers. These cables carry all power feeders and control conductors for the North tower drive system. The cables were replaced and added to as part of the recent electrical replacement and upgrade project. The aerial cables installation has been routed from the wings of the towers to the machinery spaces in cable trays with code compliant bending radii, and terminated in the tower machinery spaces. Aerial able spacers were custom designed with fiberglass struts to fit the installed aerial cable to remediate the aerial cable design defects. The aerial suspension cables and spacers were visually inspected from the cable support structure, from the ground and from the moving span. The cables, spacers and the installation appear to be in generally good condition.

See Photos E63 through E66, Appendix C. Although the spacers should address the dynamic effects of the wind and ice on the aerial cable system, continued monitoring and inspection of the installation is recommended over a period of time to ensure the integrity and performance of the system.

Corrective action is required to:

- Develop a means of video recording the aerial cable system and use the gathered data to monitor the performance of the installation.

4.8 Grounding and Bonding

The inspection included a visual inspection of the bridge grounding and bonding installation. The installation appears to be complete with the structure and the electrical installation grounded and bonded in accordance with Canadian Highway Bridge Design Code and Canadian Electrical Code.

All newly installed raceway, power and control systems are properly grounding and bonded. See Photo E70, Appendix C.

Corrective action is required to:

- Ensure that the ground integrity is maintained throughout the bridge structural steel and electrical system. This should take the form of ground resistance and continuity testing and should be performed annually.

4.8.1 Lightning Protection

In addition to the grounding and bonding improvements made to the bridge, additional surge suppressors have been added to the bridge electrical distribution system. It is considered that, as installed, the surge suppressors provide adequate protection. These combined additions improve the protection of the bridge structure and sensitive electronic equipment from lightning energy discharges.

No corrective action is required at this time.

4.9 ACCESS CONTROL SYSTEM

The bridge is provided with access control system to prevent unauthorized access to the bridge facilities. The access control system was operational at the time of the inspection and provides an effective means of ensuring that only authorized personnel can gain access to the facility. See Photo E67, Appendix C.

No corrective action is required at this time.

4.10 CCTV SYSTEM

The bridge is provided with a CCTV system. The CCTV cameras are strategically located throughout the bridge to monitor the roadway approaches, waterway approaches and main access areas to the bridge. The operator is able to monitor these locations from the operator’s room via a CCTV monitor. The camera installation was found to provide good visual information and had been well installed and was operating reliably at the time of the inspection. See Photos E17 and E68, Appendix C.

No corrective action is required at this time.

4.11 SAFETY LOCKOUT

Considerable effort has been put forth to install lockable disconnect devices in order to facilitate Lockout and Tagout Procedures. Recently, the following devices have been installed or replaced to provide lockable disconnects:

- Main drive breakers and disconnect (North and South)
- North and south roadway gates or from the MCC starters
- Span lock disconnects (North and South)
- Main drive motors (8 locations in total)
- Second floor lighting panels
- Machinery room lighting panel disconnects (North and South)
- Auxiliary drive control panel disconnects (North and South)
- Brake starter disconnects on MCC (North and South)
- LP-4 local disconnect

No corrective action is required at this time.

4.12 Bridge Lighting

Bridge lighting is generally in good condition and is sufficient for the workplace. Exit lights installed in varies paths of egress in accordance with the prevailing fire code.

No corrective action is required at this time.

4.13 Fire Alarm System

A fire alarm system has been installed on the bridge and is in serviceable condition. The fire alarm devices consist of the smoke detectors, stokes, speakers, pull stations and annunciator. See Photo E73, Appendix C.

No corrective action is required at this time.

4.14 Local Portable Emergency Generator Receptacles

Portable emergency generators receptacles have been installed at the roadway level of each tower. The receptacles have been installed to provide emergency backup power for the bridge auxiliary drive system and emergency lighting in the tower machinery spaces. The receptacles and disconnect combination units are in good serviceable condition but bridge operating personnel reported that they have never been used to operate the bridge auxiliary drive system. See Photo E72, Appendix C.

Corrective action is required to:

- Consideration should be given to testing this portable means of powering the auxiliary drive motors using generators.

5.0 RECOMMENDATIONS FOR REMEDIAL ACTION

5.1 STRUCTURAL RECOMMENDATIONS

The following recommendations have been categorized according to the time frame within which they should be implemented:

5.1.1 This Year (2018) – Priority Code (A)

5.1.1.1 Approach Roadways, Sidewalks, Platforms and Curbs

- Repair broken sidewalk railing spindle and tighten loose bolts on rail posts on the sidewalk.

5.1.1.2 North and South Towers – (Priority Code (A))

- Complete structural evaluation of the North and South Towers.

5.1.1.3 Lift Span – (Priority Code (A))

- Repair/replace severely corroded railing post at north end of southeast assembly

5.1.2 Routine Maintenance and Review Yearly (Ongoing) –Priority Code (M)

5.1.2.1 Lift Span

- Repair broken welds between lift span steel grating and stringers, as well as deck grating butt welds as ongoing maintenance, pending grating replacement.
- Replace missing bolt of the north face of the floor beam at panel point 1, above the west centering device.

5.1.2.2 North and South Towers

Clean and recoat steel members at corroded locations:

- North tower span: jacking girder, column and floor beams.
- North and south tower spans: front and rear floor beam, and gusset plates connecting the lateral bracing to the tower floor beams.

5.1.2.3 Bridge Accessories

Clean and touch-up the paint for steel members at corroded locations:

- North and South sidewalk expansion joint plates.

5.1.2.4 Steel Structural Members (Entire Bridge)

- Clean accessible areas of loose rust, debris, grease and bird guano.

5.1.2.5 Expansion Joints

- Replace compression seal at the expansion joint between the north approach and north tower span and remove debris/clean seal between south approach and south tower span.

Monitor the condition of:

- Concrete end dam and armouring angle at the north/south expansion joint;
- Rivets on lift span;

5.1.3 1 to 3 Years – Priority Code (B)

5.1.3.1 Abutment and Retaining Walls

- Repair or replace the corroded and perforated stiffener and gusset plates at the south abutment.
- Repair the corroded sole plate and gusset plate at the north abutment.
- Repair the concrete spalls and delamination of the north and south ballast walls and abutments.

5.1.3.4 North and South Approach and Tower Spans

- Replace or repair the concrete decks and expansion joint systems in the north and south approach tower spans.
- Replace or repair steel stringers beneath both north and south approach/tower spans.
- Strengthen the rear/front floor beams and tower anchorage in areas with the most section loss.

5.1.3.5 North and South Towers

- Replace the missing 12 rivets with high strength bolts on the west and east horizontal member at the south tower (6 on the west member and 6 on the east member). Clean and recoat the area.

5.1.4 6 to 10 Years

5.1.4.1 Lift Span

Clean and recoat steel members at corroded locations:

- Above the splash zone.

5.1.5.2 North and South Towers

Clean and recoat steel members:

- Entire North and South Towers.

5.2 Mechanical Recommendations

The following recommendations have been categorized according to the time frame within which they should be implemented.

5.2.1 WITHIN 2 YEARS (2019 & 2020)

5.2.1.1 Span Drive Bearings

- No corrective action is required.

5.2.1.2 Span Drive Brakes

- All Brake Assemblies – Clean areas of corrosion and paint the unpainted areas on the brake assemblies, included, but not limited to the mounting bolts, brake wheel hubs and top support surfaces.

5.2.1.3 Span Drive Couplings

- All Couplings - clean corrosion from the couplings and paint.

5.2.1.4 Span Drive Motors

- All Motors – clean areas of corrosion from the motor supports and bolts and paint the motor supports and mounting bolts.

5.2.1.5 Span Drive Open Gearing

- All G2/P2 gearsets - remove old lubricant accumulation from under all G2 gears.
- All G2/P2 gearsets - lubricate the G2 differential assembly bevel gears.

5.2.1.6 Reducers

- Replace all reducer housing inspection cover bolts. Repair damaged threads in the reducer housings as needed.
- Paint all reducer mounting and base bolts.
- North Reducer – Eliminate light oil leaks at the drain valve and indexing spline limit switch mounting bracket bolts.

5.2.1.7 Span Drive Shafts

- No corrective action is required.

5.2.1.8 Speed Control and Span Position Indicating Equipment

- South Tower - clean up accumulation of oil around the reducer.

5.2.1.9 Auxiliary Span Drive Machinery

- South Reducer, Auxiliary Engagement Lever - enlarge the disengaged positioning bolt hole in the reducer to enable the hole to receive the positioning bolt with the engagement lever locked in the disengaged position with a pad lock.

5.2.1.10 Main and Auxiliary Counterweight Ropes

- Increase the frequency of lubricating the main counterweight wire ropes to a minimum of every 6 months. Ensure the U-bolt clamps installed at the lift girder are removed and the wire rope section under the clamps are lubricated as part of the wire rope lubrication work. Consider the use of environmentally friendly lubricants to address environmental concerns.
- NW Outboard Lift Girder Splay Casting – tighten the nut that is not fully seated.
- Clean old rope lubricant from the north auxiliary counterweight ropes and lubricate all auxiliary counterweight ropes. Consider the use of environmentally friendly lubricants to address environmental concerns.

5.2.1.12 Main and Auxiliary Counterweight Sheaves

- Remove excess lubricant from the north auxiliary counterweight sheave grooves.
- Spot clean and paint corroded areas at the main counterweight sheaves.
- Spot clean and paint corroded components at the south auxiliary counterweights sheave assemblies.

- Lubricate the main and auxiliary counterweight sheave grooves.

5.2.1.13 Auxiliary Counterweights

- Clean and paint areas of corrosion on the auxiliary counterweights.

5.2.1.14 Trunnion and Trunnion Bearings

- Schedule an internal visual inspection of trunnion bearings #8, south tower (outboard bearing supporting sheave-SW-OB), #3, south tower (outboard bearing supporting sheave SE-OB), #4, south tower (inboard bearing supporting sheave SE-IB), and #6, north tower (outboard bearing supporting sheave NW-IB) to evaluate the raceways for damage. Continue to perform vibration testing as part of annual inspections.
- Re-lubricate the trunnion bearings with a compatible lubricant at all 16 trunnion bearings in conjunction with the internal inspection recommended at bearings #3 and #8 in the south tower and bearing #6 in the north tower in accordance with SKF recommendations.
- Spot clean and paint corroded mounting bolts.

5.2.1.15 Live Load Supports

- Clean and paint the live load supports and anchor bolts.
- Lubricate and verify free movement of the NE and NW live load rockers.

5.2.1.16 Span Guides

- No corrective action is required.

5.2.1.17 Main and Auxiliary Counterweight Guides

- Remove excess lubricant and inspect main counterweight guide bolts.

5.2.1.18 Centering Devices

- Clean and paint the centering devices.

5.2.1.19 Span Air Buffers

- Flush the buffer assemblies to ensure that they operate properly. Ensure buffers descend properly during operation.

- Repair or replace the damaged northwest span buffer valve.

5.2.1.20 Tower Air Buffers

- Clean and paint corroded portions of the tower air buffers.

5.2.1.21 Span Lock Machinery

- Spot clean and paint component areas with corrosion. Components include, but are not limited to, the span lock spring assemblies, Bearing B2 mounting bolts, and the center crank.
- Flush and replace the oil in both span lock reducers.

5.2.1.22 Warning Gates

- No corrective action is required.

5.2.1.23 Barrier Gates

- South Barrier Gate – Determine the source of the noise during operation and correct as needed.
- South Barrier Gate – Tighten the southeast anchor bolt.
- North Barrier Gate – Tighten the west counterweight bolts.
- North Barrier Gate – Replace the neoprene gate arm insulator.

5.2.1.24 Main Generator

- Main Generator – Replace the cracked coolant hose.

5.2.2 2 TO 5 YEARS

5.2.2.1 Main and Auxiliary Counterweight Ropes

- Conduct an in-depth inspection of the main counterweight and auxiliary counterweight ropes.
- Replace the north auxiliary counterweight ropes.

5.2.2.2 Span Air Buffers and Tower Air Buffers

- Remove the span air buffers and tower air buffers from service based on a review of the new control system and the CHBDC requirements.

- If the span air buffers and tower air buffers are retained, consider rehabilitating the buffers to ensure that they function as intended by installing piping to connect the two buffers at each end of the span and incorporate a pressure gage that can be connected via a gate valve to perform adjustments and periodically verify the pressure that is developed in the system during seating.

5.2.3 6 TO 10 YEARS

- No corrective action is required.

5.3 ELECTRICAL RECOMMENDATIONS

The following electrical recommendations are based on the findings of the present inspection, previous bridge inspections and knowledge of the bridge electrical systems including the electrical inspectors' involvement in the recently completed electrical replacement and upgrade project. The recommendations have been prioritized into the following categories.

5.3.1 WITHIN 2 YEARS (2019 & 2020)

The following recommendations are considered critical and should be addressed within this year to assure continued safe and reliable operation of the bridge.

5.3.1.2 Main Electric Service

- Additional protective and alarm devices should be installed in the electric utility transformer to protect the transformer and alarm in the event of trouble or failure conditions.

5.3.1.3 600-kW and 40-kW Emergency Generators

- Provide protection for the battery chargers and alarm equipment exposed to the adverse weather conditions when the air intake louvers for the standby generator are open.
- The electrical maintenance contractor should be tasked with testing and repairing the defective generator automatic louvers.

5.3.1.4 Main Indoor Switchboard #1 and #2

- Add phase loss and phase failure relays to Switchboard #1 Main and Generator breakers.

- No interlocks presently exist to prevent the electric utility service being paralleled with the standby generator. Priority should be given to installing both a form of mechanical interlock (Kirk Key) and electrical interlocks in the main and generator circuit breakers as is indicated on the existing One Line Diagram.
- Terminate live wires in the metering compartment.
- Provide proper breaker labels. Properly remove the wires for the breakers that are not in service and remove pad locks on Switchboard 2.

5.3.1.5 Main Motors

- Replace main motor nameplates with nameplates that accurately describe the parameters and rating of the motors and also include this information in the motor O&M Manual.
- Add a description in the O&M Manual indicating the electrical characteristic differences between the motors and describing the necessary re-tuning process if a motor is changed out.
- Re-affix blower nameplate to the northeast blower motor.

5.3.1.6 Auxiliary Motors

- Fully commission the new bridge auxiliary drive system such that the bridge can be operated from one location using the auxiliary motors.

5.3.1.7 Main Motor Drives

- NW drive pre-charge circuit to be investigated for the correct time delay setup during the power transfer.

5.3.1.8 South Tower Machinery Space Roof

- Repair the leak and/or leaks in both tower machinery space roof.

5.3.1.9 Bridge Control System

- Provide labels of the enclosure power source on CP-3 and CP-4.
- Provide UPS power for the control systems in both towers.
- Develop a plan to resolve bridge skew control issue.

5.3.1.10 Gates

- Replace North barrier enclosure door lock assembly.

- Replace all the defective enclosure locks or install padlocks for all gates and only utilize the manufacturer's lock handle for latching.
- Properly terminate the wires inside the South Pedestrian gate enclosure.
- Perform an inspection of the barriers and barrier arms on a 6-monthly cycle concentrating on barrier machinery, bearings and barrier arm fatigue.

5.3.1.11 Pedestrian Control

- Install new North pedestrian bell.

5.3.1.12 Bridge Auxiliary Power Distribution

- Repair or replace panel lock/levers on Distribution Panel A and Panel EA.

5.3.1.13 Junction Boxes

- Completely remove the abandoned and no longer used cabling.

5.3.1.14 Aerial Cables

- Develop a means of video recording the aerial cable system and use the gathered data to monitor the performance of the installation.

5.3.1.13 Grounding and Bonding

- Perform ground resistance and continuity testing to prove the integrity of the bridge grounding and bonding system on an annual basis.

5.3.1.14 Bridge Lighting

- Repair the exit light above the generator room entrance door.

5.3.1.15 Fire Alarm System

- No corrective action is required.

5.3.1.16 Local Portable Emergency Generator Receptacles

- Rent portable generators and perform a test to prove that the portable generators can operate the bridge using the existing auxiliary drive motors.

5.3.2 2 to 5 Years

The following recommendations are not considered critical but should be addressed within the next five years.

5.3.2.1 Main Electric Service

- A containment basin to protect the surrounding environment against a transformer tank rupture and subsequent oil spill should be installed.

5.3.2.2 Main Motors

- Procurement of a second spare main motor with opposite hand cable termination is recommended to provide a spare for both hand motors installed.

5.3.2.3 Gates

- Perform an inspection of the barriers and barrier arms on a 6-month cycle concentrating on barrier machinery, bearings and barrier arm fatigue.

5.3.2.4 Span Lock

- Replace the corroded North span lock motor disconnect switch.

5.3.2.5 Bridge Elevators

- Replace the existing bridge elevator motors and controls.

5.3.2.6 Grounding and Bonding

- Perform ground resistance and continuity testing to prove the integrity of the bridge grounding and bonding system on an annual basis.

5.3.3 6 to 10 years

The following recommendations are for inspections that are considered beyond the scope of routine inspections and maintenance required for the bridge electrical systems.

5.3.3.1 Gates

- Perform an inspection of the barriers and barrier arms on a 6-month cycle concentrating on barrier machinery, bearings and barrier arm fatigue.

5.3.3.2 Grounding and Bonding

- Perform ground resistance and continuity testing to prove the integrity of the bridge grounding and bonding system on an annual basis

The following recommendations are for inspections that are considered beyond the scope of routine inspections and maintenance required for the bridge electrical systems.

5.3.3.1 Gates

Perform an inspection of the barriers and barrier arms on a 6-month cycle concentrating on barrier machinery, bearings and barrier arm fatigue.

5.3.3.2 Grounding and Bonding

- Perform ground resistance and continuity testing to prove the integrity of the bridge grounding and bonding system on an annual basis

6.0 COST ESTIMATES

6.1 STRUCTURAL ESTIMATES

Basic construction cost estimates, including engineering and construction administration are presented in Tables 6.1.1 and 6.1.2 below. All dollar values are shown as present value.

TABLE 6.1.1: CONSTRUCTION COSTS WITHIN 1-5 YEARS (2020-2024)

	STRUCTURAL RECOMMENDATIONS	PRIORITY CODE	ESTIMATED COST (TOTAL)	2020 1	2021 2	2022 3	2023 4	2024 5
1.	**Deck at approach and tower spans.**							
	1a. Concrete deck replacement (including stringers, abutment bearings and expansion joints)	B	**$4,319,000**	***$3,473,000****	--	--	--	--
	1b. Repair steel at tower base (below deck)	B		$420,000	--	--	--	--
	1c. Clean and coat steel at tower base (below deck)	B		$415,000	--	--	--	--
	1d. Repair concrete abutments and piers.	B		$11,000	--	--	--	--
	1e. Structural evaluation of Towers due to severe section loss.	A	**$25,000**	**$25,000**				
2.	**Deck at Lift Span**							
	2a. Replace steel deck grating on northbound lane.	B	**$15,848,000**	--	**$7,803,000***	--	--	--
	2b. Replace steel deck grating on southbound lane.	B		--	--	**$8,045,000***	--	--
3.	**Miscellaneous Repairs**							
	3a. Replace the missing 12 rivets with high strength bolts on the south tower Horizontal No. 4 (6 on the west member and 6 on the east	B	**$7,000**	$5,000	--	--	--	--

	member), and replace the improperly installed rivet at the top angle connection for the top flange of the 6th longitudinal sheave girder from west with a high strength bolt. Clean and repaint the area.							
	3b. Repair broken spindle on sidewalk railing and tighten the loose bolts on rail posts on the sidewalk.	A		$2,000	--	--	--	--
	3c. Repair/replace severely corroded railing post at north end of southeast assembly	A		$2,000				
TOTAL ESTIMATED COSTS WITHIN NEXT 5 YEARS			**$20,201,000**	**$4,353,000**	**$7,803,000**	**$8,045,000**	--	--

TABLE 6.1.1: CONSTRUCTION COSTS WITHIN 6-10 YEARS (2025-2029)								
STRUCTURAL RECOMMENDATIONS		PRIORITY CODE	ESTIMATED COST (TOTAL)	2025 6	2026 7	2027 8	2028 9	2029 10
4.	**Structural Steel Coatings (Excluding Tower Sections Below Deck)**							
	4a. Clean and recoat main deck truss	N/A	**$4,252,000**	***$2,126,000****	***$2,126,000****	--	--	--
	4b. Clean and recoat tower sections above splash zone.	N/A	**$6,309,000**	--	--	***$2,098,000****	***$2,098,000****	***$2,113,000****
ESTIMATED COSTS FOR YEARS 6-10			**$10,561,000**	**$2,126,000**	**$2,126,000**	**$2,098,000**	**$2,098,000**	**$2,113,000**

Refer to Appendix "A5" for itemized estimates of the recommended work.

6.2 Mechanical Estimates

MECHANICAL RECOMMENDATION	ESTIMATED COST	2019 0	2020 1	2021 2	2022 3	2023 4	2024 5	2025 6	2026 7	2027 08	2028 09	2029 10
ESTIMATED COSTS FOR THIS YEAR (IMMEDIATE)												
1. All Brake Assemblies – Clean areas of corrosion and paint the unpainted areas on the brake assemblies, included, but not limited to the mounting bolts, brake wheel hubs and top support surfaces.	Maintenance											
2. All Couplings - clean corrosion from the couplings and paint.	Maintenance											
3. All Motors – clean areas of corrosion from the motor supports and bolts and paint the motor supports and mounting bolts.	Maintenance											
4. All G2/P2 gearsets - remove old lubricant accumulation from under all G2 gears.	Maintenance											
5. All G2/P2 gearsets - lubricate the G2 differential assembly bevel gears.	Maintenance											
6. Replace all reducer housing inspection cover bolts. Repair damaged threads in the reducer housings as needed	$4,000											
7. Paint all reducer mounting and base bolts.	Maintenance											
8. North Reducer – Eliminate light oil leaks at the drain valve and indexing spline limit switch mounting bracket bolts.	$2,000											
9. South Tower Span Positioning Equipment - clean up accumulation of oil around the reducer.	Maintenance											
10. South Reducer, Auxiliary Engagement Lever - enlarge the disengaged positioning bolt hole in the reducer to enable the hole to receive the positioning bolt with the engagement lever locked in the disengaged position with a pad lock.	$600											
11. Increase the frequency of lubricating the main counterweight wire ropes. Consider the use of	Maintenance											

environmentally friendly lubricants to address environmental concerns.												
12. NW Outboard Lift Girder Splay Casting – tighten the nut that is not fully seated.	$600											
13. Clean old rope lubricant from the north auxiliary counterweight ropes and lubricate all auxiliary counterweight ropes. Consider the use of environmentally friendly lubricants to address environmental concerns.	$6,000											
14. Remove excess lubricant from the north auxiliary counterweight sheave grooves.	$2,000											
15. Spot clean and paint corroded areas at the main counterweight sheaves.	Maintenance											
16. Spot clean and paint corroded components at the south auxiliary counterweights sheave assemblies.	Maintenance											
17. Lubricate the main and auxiliary counterweight sheave grooves.	Maintenance											
18. Clean and paint areas of corrosion on the auxiliary counterweights.	Maintenance											
19. Schedule an internal visual inspection of trunnion bearings #8, south tower (outboard bearing supporting sheave-SW-OB), #3, south tower (outboard bearing supporting sheave SE-OB), #4, south tower (inboard bearing supporting sheave SE-IB), and #6, north tower (outboard bearing supporting sheave NW-IB) to evaluate the raceways for damage. Continue to perform vibration testing as part of annual inspections. Re-lubricate the trunnion bearings with a compatible lubricant at all 16 trunnion bearings in conjunction with the internal inspection recommended at bearings #3 and #8 in the south tower and bearing #6 in the north tower in accordance with SKF recommendations.	$100,000											
20. Trunnion Bearings - Spot clean and paint corroded mounting bolts.	Maintenance											

21. Clean and paint the live load supports and anchor bolts.	Maintenance											
22. Lubricate and verify free movement of the NE and NW live load rockers**.**	Maintenance											
23. Remove excess lubricant and inspect main counterweight guide bolts.	$20,000											
24. Clean and paint the centering devices.	Maintenance											
25. Flush the buffer assemblies to ensure that they operate properly. Ensure buffers descend properly during operation.	$800											
26. Repair or replace the damaged northwest span buffer valve.	$200											
27. Clean and paint corroded portions of the tower air buffers.	Maintenance											
28. Spot clean and paint component areas with corrosion. Components include, but are not limited to, the span lock spring assemblies, Bearing B2 mounting bolts, and the center crank.	Maintenance											
29. Flush and replace the oil in both span lock reducers.	$5,000											
30. South Barrier Gate – Determine the source of the noise during operation and correct as needed.	$2,000											
31. South Barrier Gate – Tighten the southeast anchor bolt.	Maintenance											
32. North Barrier Gate – Tighten the west counterweight bolts.	Maintenance											
33. North Barrier Gate – Replace the neoprene gate arm insulator.	$250											
34. Main Generator – Replace the cracked coolant hose.	$250											
ESTIMATED COSTS FOR THIS YEAR (IMMEDIATE)	$143,700											

YEARS 2 - 5												
1. Conduct an in-depth inspection of the main counterweight and auxiliary counterweight ropes.	$75,000											
2. Replace the north auxiliary counterweight ropes.	$125,000											
Remove the span and tower air buffers from service based on review of the new control system and the CHBDC requirements. If the span air buffers and tower air buffers are retained, consider rehabilitating the buffers to ensure that they function as intended by installing piping to connect the two buffers at each end of the span and incorporate a pressure gage that can be connected via a gate valve to perform adjustments and periodically verify the pressure that is developed in the system during seating.	$250,000											
ESTIMATED COSTS FOR YEARS 2-5	$450,000											
YEARS 6-10												
ESTIMATED COSTS FOR YEARS 6-10												

6.3 ELECTRICAL ESTIMATES

ELECTRICAL RECOMMENDATION	ESTIMATED COST	2019 0	2020 1	2021 2	2022 3	2023 4	2024 5	2025 6	2026 7	2027 08	2028 09	2029 10
ESTIMATED COSTS FOR YEAR 1 (IMMEDIATE)												
1. Add mechanical and Electrical interlocks to main and generator breakers in Switchboard #1.	$24,000											
2. Add main transformer protection and alarm monitoring equipment.	$11,000											
3. Test and repair the defective generator automatic louvers.	Maintenance											
4. Provide environmental protection for battery chargers and alarm equipment in bridge generator room.	Maintenance											
5. Add phase loss and phase failure relay to main and generator breaker in Switchboard #1.	$8,000											
6. Terminate live wires inside the switchboard.	Maintenance											
7. Properly terminate breakers that are not in service. Remove padlocks and properly label breakers on Switchboard 2.	Maintenance											
8. Replace main motor nameplates with factual nameplate data.	Maintenance											
9. Re-affix motor blower nameplate.	Maintenance											
10. Fully commission Bridge auxiliary drives (single location control).	$9,500											
11. Investigate and troubleshoot NW drive pre-charge timer circuit.	Maintenance											
12. Repair roof leaks for both towers.	$5,000											

13. Implement the fix for the bridge skew control issues.	Ongoing Contract											
14. Provide power source labels for CP-3 and CP-4	Maintenance											
15. Replace defective gate enclosure locks.	$3,000											
16. Properly terminate wires inside the North pedestrian gate enclosure.	Maintenance											
17. Install new North pedestrian bell.	Maintenance											
18. Repair or replace panel lock/levers on Distribution Panel A and Panel EA.	Maintenance											
19. Completely remove the abandoned and no longer used cabling.	Maintenance											
20. Develop a mean of video monitoring of the aerial cable installation and inspect installation.	Maintenance											
21. Perform grounding and bonding testing.	Maintenance											
22. Repair the exit light above the generator room entrance door.	Maintenance											
23. Test portable generator operation of bridge auxiliary drives.	Maintenance											
ESTIMATED COSTS FOR THIS YEAR (IMMEDIATE)	$60,500											
YEARS 2 - 5												
1. Install an oil containment basin for the main Electric transformer.	$26,000											
2. Procure a second spare main motor (opposite hand)	$35,000											
3. Perform 6-monthly inspection of barrier gate arms and machinery.	Maintenance											
4. Replace corroded North span lock motor disconnect switch.	$6,600											

5. Provide UPS power for the control systems in both towers.	$12,000											
6. Replace elevator motors and controls in both towers	$74,000											
7. Completely remove all abandoned and not used cabling.	Maintenance											
8. Perform grounding and bonding testing.	Maintenance											
ESTIMATED COSTS FOR YEARS 2-5	$153,600											
YEARS 6-10												
1. Perform 6-monthly inspection of barrier gate arms and machinery.	Maintenance											
2. Perform grounding and bonding testing.	Maintenance											
ESTIMATED COSTS FOR YEARS 6-10	Maintenance											

7.0 CONCLUSIONS

7.1 STRUCTURAL CONCLUSIONS

Inspection of the Burlington Canal Lift Bridge revealed severe deterioration on the primary structural elements on the reinforced concrete bridge decks at the approach and tower spans, the open steel grating at the lift span deck, the deck expansion joints between the spans, and the structural steel below the bridge deck at the approach and tower spans. Defects in other areas of the bridges were found to range from light to medium and highly localized where present. The primary causes of the severe defects on the bridge components at and below the decks were evidently due to water leakage through the deck expansion joints and the concrete bridge decks at the approach and tower spans as well as the inadequate capacity (2014 grating evaluation as part of the failed panel replacement) of the original deck grating at the lift span. The increase in volume of traffic, particularly heavy trucks, on the bridge due to frequent closures of the adjacent QEW highway bridges (Burlington Skyway Bridges), has likely accelerated the deterioration rate on the Burlington Canal Lift Bridge structure.

Based on the criteria specified in BIM, an overall structural condition rating of Poor (3) is assigned to the bridge due to the extensive deteriorations on the structural steel below the bridge deck at the approach and tower spans. Considering the ongoing maintenance and repair program being completed on the bridge, the overall bridge functional rating is Fair (4) as all elements, including those exhibiting defects, appeared to adequately function under the current service. Several elements of the bridges, particularly those structural steel members and bridge deck at the approach and tower spans and the deck grating at the lift span, will require major repair or replacement in the near future. In the interim, local temporary repairs such as the welding repairs of cracks in the deck grating panels at the lift span and temporary repair or reinforcing of the severely corroded steel members, will need to be continually completed for the bridge.

Severe leakage through the deck expansion joints has evidently led to the observed severe deterioration on the bridge components below the decks at the approach and tower spans. These joints should be retrofitted or replaced in the near future. It is also evident that the existing compression seal expansion joint system in the concrete deck slabs between the approach and the tower spans is considered redundant or in-appropriate. The steel stringers below the deck joints were effectively found to be continuous over the joint gap in the concrete bridge deck. The stringers under the approach and the tower spans are rigidly connected to a common diaphragm and floor beam at the tower which effectively eliminates any differential or relative movement of the structural steel and concrete bridge decks between the spans. A proper deck expansion joint system should be determined as part of the bridge deck rehabilitation or replacement.

It is evident that significant deterioration on the structural steel at the lift span has been stabilized as a result of the 2010 and 2011 recoating contracts. The re-painted areas on the lift span steel, including all below deck steel stringers, floor beams, bracing, and truss members below and within the splash zone areas of the deck are in good condition. The need to stabilize the structural deteriorations resulting from the development of corrosion and local severe rust jacking at key locations will always remain. There is an increasing need to re-coat the other remaining areas of the bridges, including the upper section of the lift span, the steel towers and the approach spans, particularly the steel below the bridge deck. Re-coating will alleviate a more extensive failures of the painting system and subsequent development of corrosion at critical locations.

7.2 MECHANICAL CONCLUSIONS

The mechanical machinery on the Burlington Canal Lift Bridge was inspected per the scope of inspection listed in the Scope of Annual Inspection section of this report. The span drive mechanical machinery was found to be in good condition. All other mechanical machinery, including the span drive, span guides, sheaves, counterweight guides, traffic gates, and span locks were found to be in fair condition. The majority of the deficiencies found during the inspection are minor issues such as paint deterioration and corrosion and can easily be corrected by maintenance.

Apart from the inadequate paint, the span drive machinery components were found in good condition with only minor issues. Some minor marks were noted on the south reducer gear teeth, though they did not appear to have significant depth and corrective action is not required. These should be monitored during future inspections.

The counterweight sheave trunnions and trunnion bearings were in fair condition externally however, based on vibration testing, SKF noted potential issues at three bearings in the south tower and one bearing in the north tower. SKF recommends a visual inspection of the noted bearing raceways as the impacts are consistent with damage to the raceway. This should be performed during a shutdown period and coincide with relubrication of all trunnion bearings. Periodic vibration testing is continued to be recommended on a yearly basis. This effort should be prioritized as the trunnion bearings are critical components for the reliable operation of the bridge.

The lubrication of the main counterweight ropes and sheave grooves were found to be fair at the time of the inspection. The main counterweight ropes exhibit areas along the length of the ropes where the lubricant has been displaced by contact with the sheave indicating that the ropes have been lubricated. However, based on the conditions observed during the inspection, the frequency of lubrication remains inadequate. Wear measurements show that the ropes have only experienced a light reduction in capacity, though it can be expected that the wire ropes will corrode and wear at an accelerated rate if they are not properly lubricated. The wire ropes are critical components for the operation of the bridge. It is strongly suggested that they be lubricated periodically to mitigate wear.

Accumulated old lubricant at the north auxiliary ropes and sheaves should be removed. The south auxiliary ropes and sheaves were not lubricated and there is fretting and noise during operation. Without proper lubrication practice of these ropes, accelerated wear is expected. Wear flat measurements at the north auxiliary ropes represent an approximate capacity reduction of 17%. An in-depth inspection of the auxiliary counterweight ropes should be included in the next inspection. As a minimum, consideration should be given to replacing these ropes within the next five years, though this may be adjusted based on the results of the in-depth inspection.

The span air buffers have required significant maintenance attention since infiltration during span painting years ago. The air buffers are being flushed with oil periodically, but are not functioning reliably. Only one of the four span air buffers was noted to descend properly as the span raised. The tower air buffers remain functional. Failure of the span buffers could create a hazard during operation of the span near the fully seated position if the buffer was stuck in an extended position. Given that a new modern control system is in place, consideration may be given to removing the span and tower air buffers in their entirety as this acceptable per Article 13.7.11 of the CHBDC which notes that a control system that is “capable of performing smooth seating in a positive manner" and "capable of limiting the span lift in a positive manner" may be used in lieu of air buffers.

If the continued use of air buffers is desired and they are to be retained long term, then consideration should be given to rehabilitating the air buffers to ensure that they function as intended. For both the span and tower buffers, if they are to be maintained long term, it is recommended that the two buffers on a given end be piped together to equalize loads.

Overall, the mechanical machinery systems are expected to be serviceable in the long term provided that the noted deficiencies, which primarily include lubrication and corrosion issues, are addressed. The largest risk to the reliable operation of the bridge is possible damage at the main counterweight trunnion bearings, which was noted by SKF from their vibration testing. The trunnion bearings internal inspection and re-lubricating should be re-scheduled for the 2019/2020 winter shutdown.

7.3 ELECTRICAL CONCLUSIONS

The bridge is provided with a dedicated unit substation which received its feed from the local electric utility. The utility service provides a reliable source of power for the bridge that has been adequately sized to operate the bridge under all normal and contingency conditions. Additionally, two (2) standby diesel generators have been installed at the bridge to provide backup power in the event of electric utility failure. It is considered appropriate that two (2) standby generators have been installed at the bridge. One (1) has been sized to be capable of operating the bridge, while the second is much smaller and only used to provide electric service for the bridge facilities. Normally only the facilities generator is used under electric utility failure with the main generator only used when the bridge is operated. It is concluded that with both the electric utility service and the two (2) standby generators that the bridge is provided with fully redundant electric service.

The electrical power and control systems have been upgrades to the modern drive and PLC technology. For the most part, the installed replacement systems achieve these goals but a number of control issues remain that should be resolved to ensure that the goal of providing a reliable operating system is achieved. The current resolver setup per designed have significant draw back such that PLC cannot perform automatic offset when bridge is seated. Moreover, the span height reading from the resolvers are creeping up overtime as are not stable due to many signal splices and conversions. As a result, bridge maintenance will need to perform manual calibration frequently. SBE is tasked to develop the solution to address the bridge skew control issues to address this shortcoming of the design.

Traffic control equipment operation is generally satisfactory. Manufacturer supplied gate enclosure locks are failing. It is suggested to only use the lock handle for latching of the enclosure doors. These doors to be secured by padlocks.

Aerial cables and spacers are generally in good condition. It is recommended to install video monitoring system to monitor the aerial cables and their spacers under severe weather condition to ensure reliability of the aerial cable system in the long term.

Span lock limit switches installed although functional as design, they are not preferred method for the end of travel control for the span locks. The currently installed roller arm limit switches are inaccurate and difficult for fine adjustment compare to the original rotary cam limit switch. It is recommended to install new rotary cam switches for span lock control in the near future.

Bridge auxiliary drive system could perform better than current configuration. Most of the control upgrades to the auxiliary drive system have been disabled due to the twisted pair wiring issues in the aerial cables.

Roof leaks in both tower machinery space will create hazard condition. The intruded water has created damage to the drive system in the past. Properly repair the roof is critical for personnel safety and bridge operation reliability.

APPENDIX A

Structural Inspection Data

APPENDIX A1

Figures

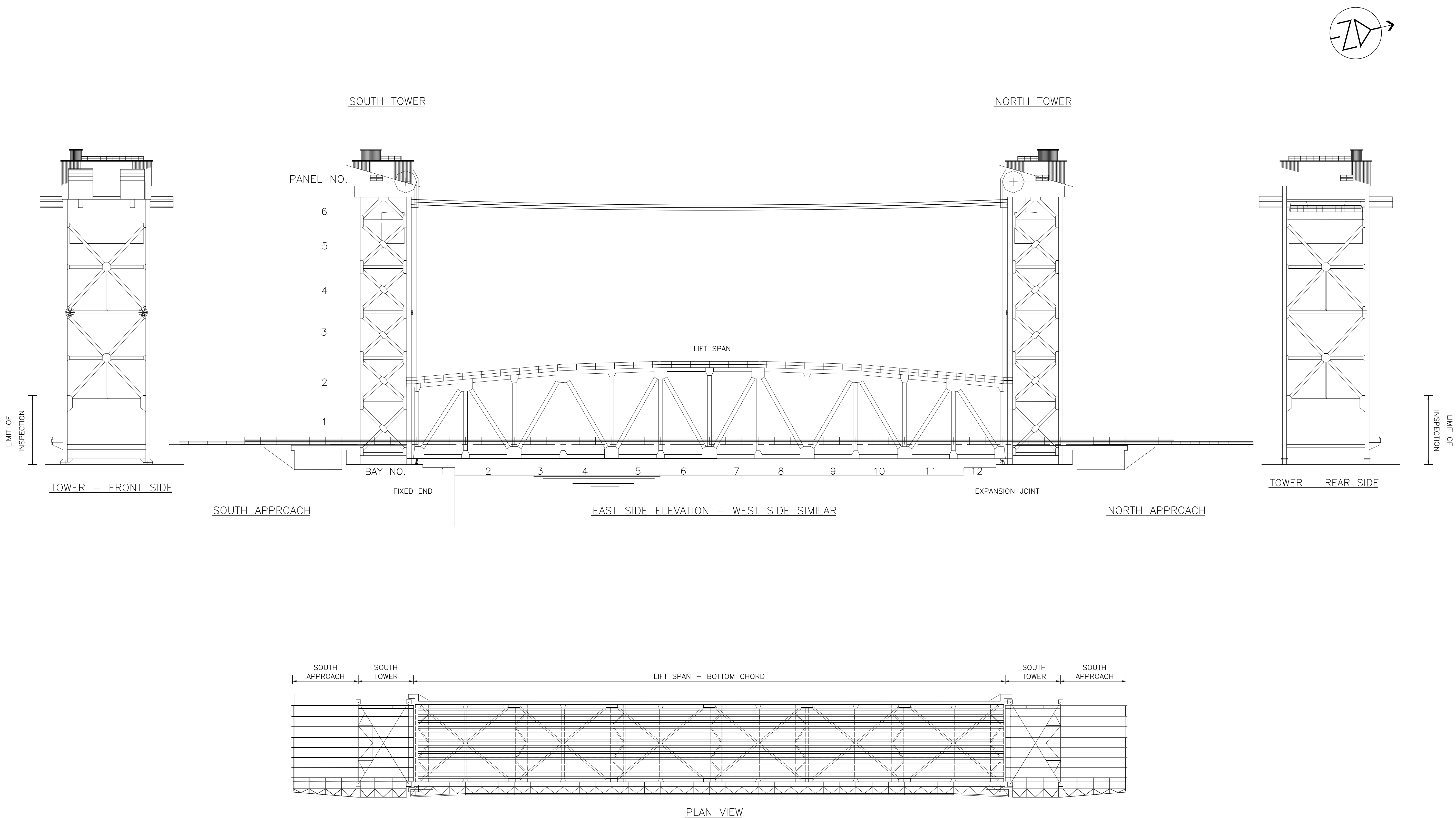
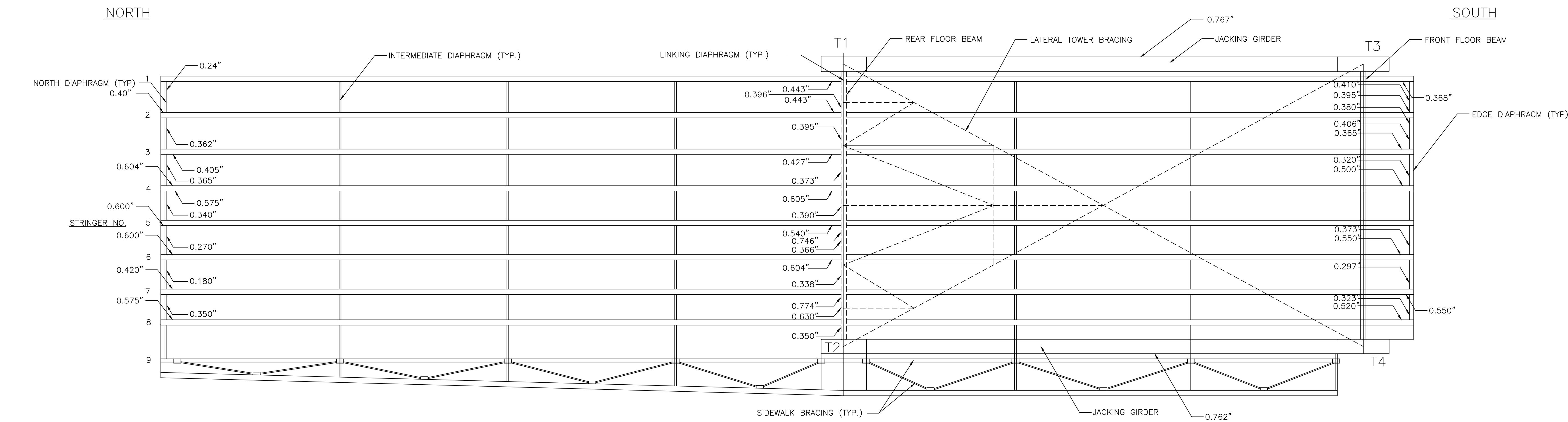
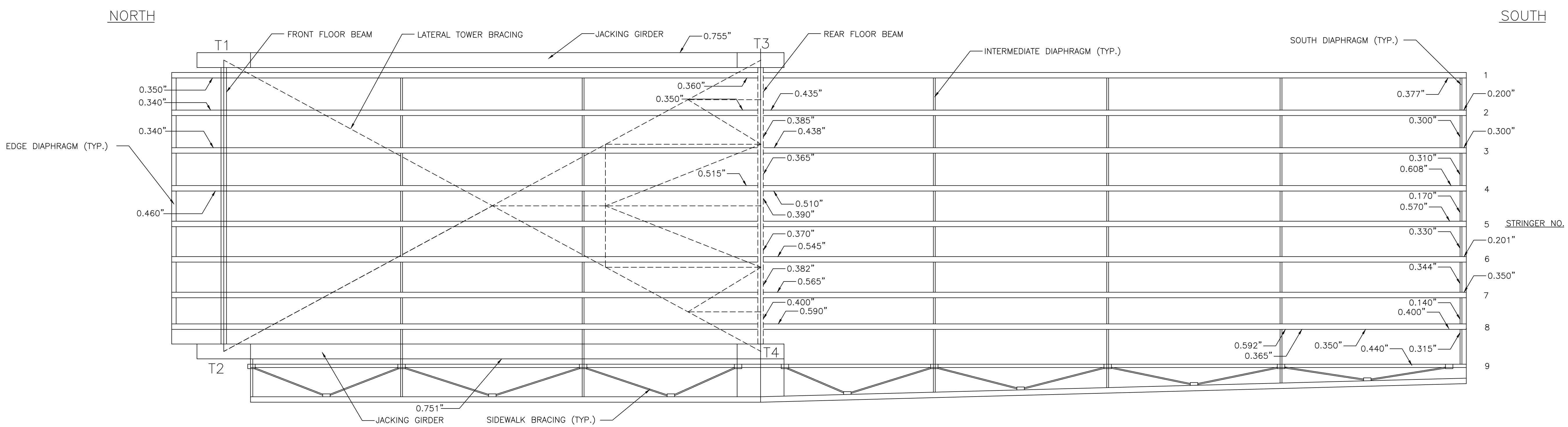


FIG. 1 BURLINGTON CANAL LIFT BRIDGE – TOWERS



NORTH APPROACH SPAN – PLAN VIEW

NORTH TOWER SPAN – PLAN VIEW



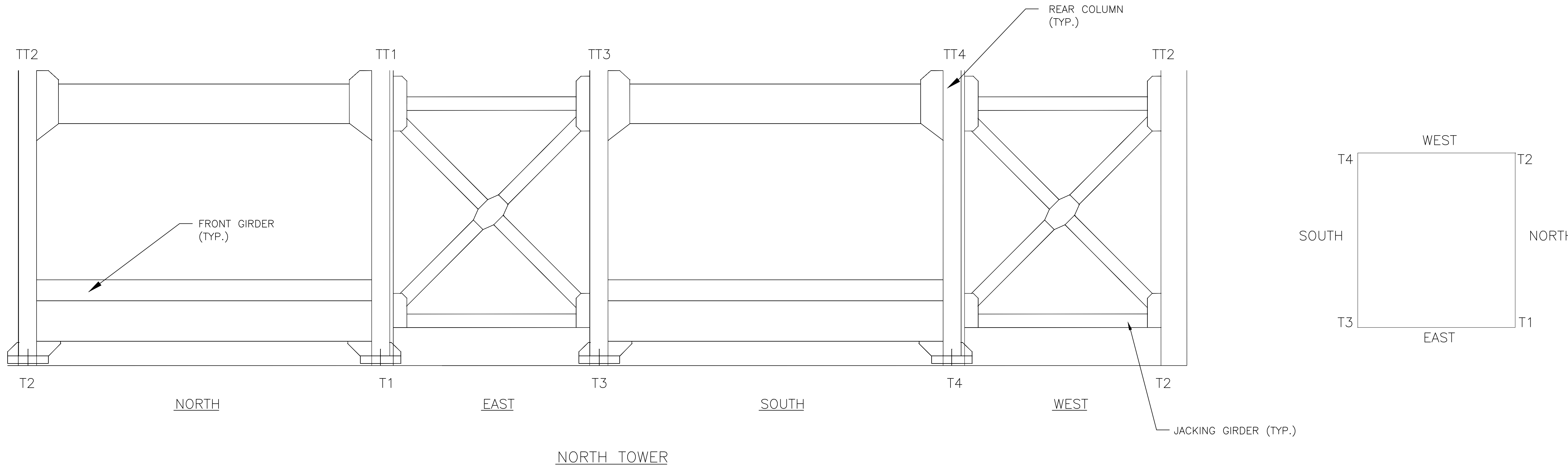
SOUTH TOWER SPAN – PLAN VIEW

SOUTH APPROACH SPAN – PLAN VIEW

LEGEND:

0.40" NDT THICKNESS MEASUREMENT (In Inches)

BURLINGTON CANAL LIFT BRIDGE – APPROACH & TOWER SPAN (NDT THICKNESS MEASUREMENTS)



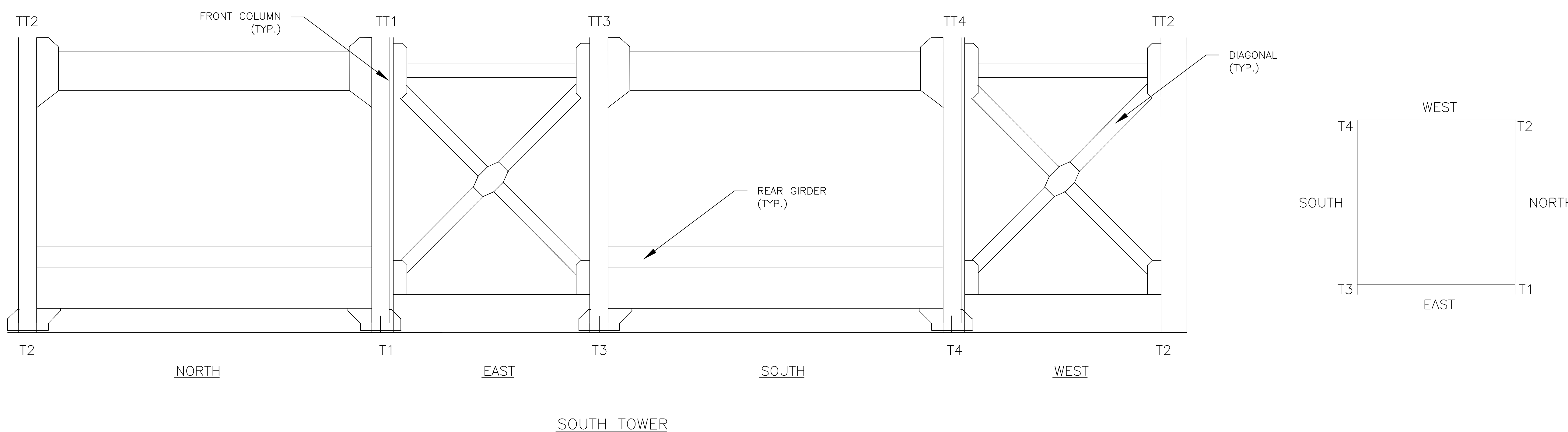


FIG. 3 BURLINGTON CANAL LIFT BRIDGE – TOWERS

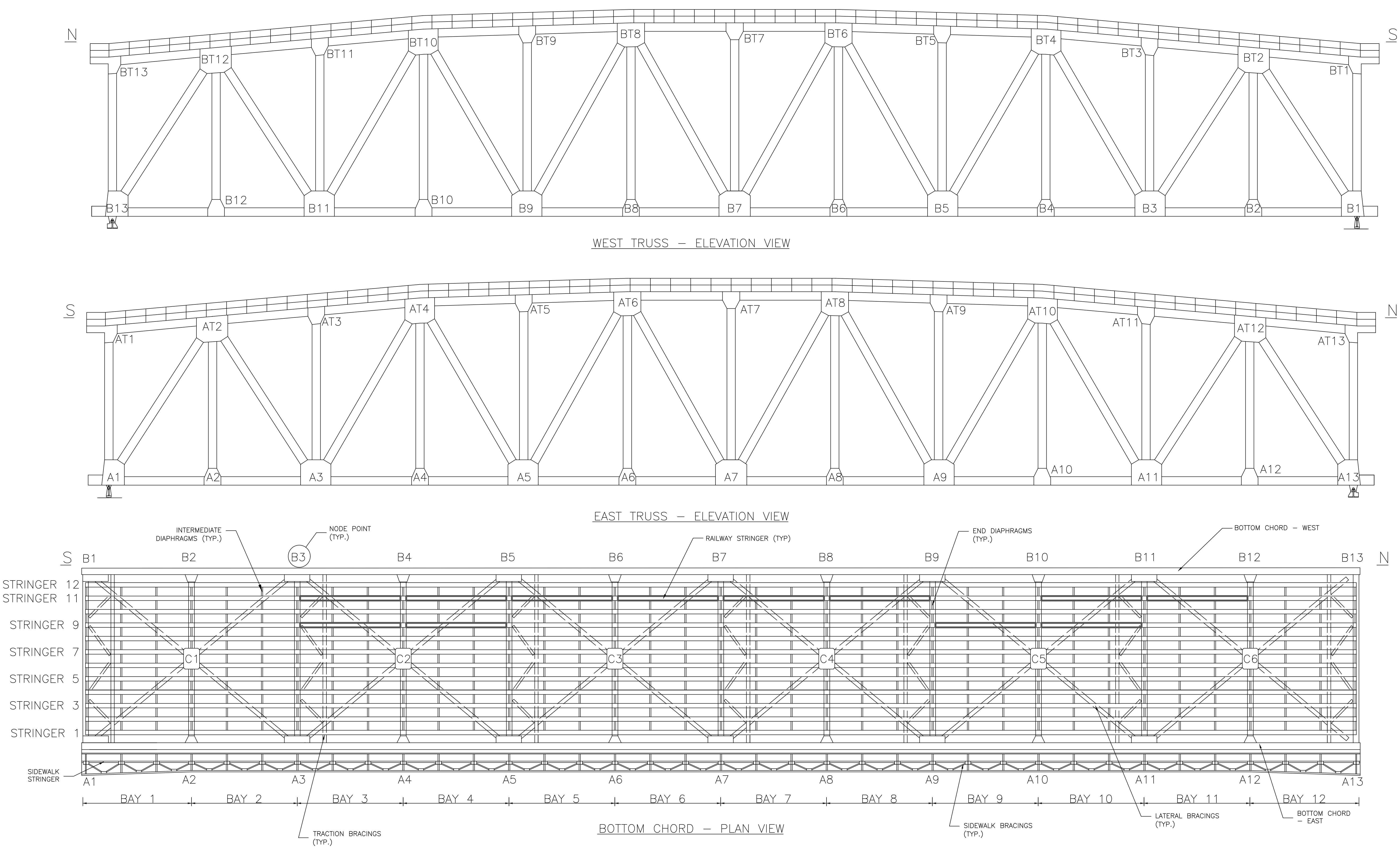
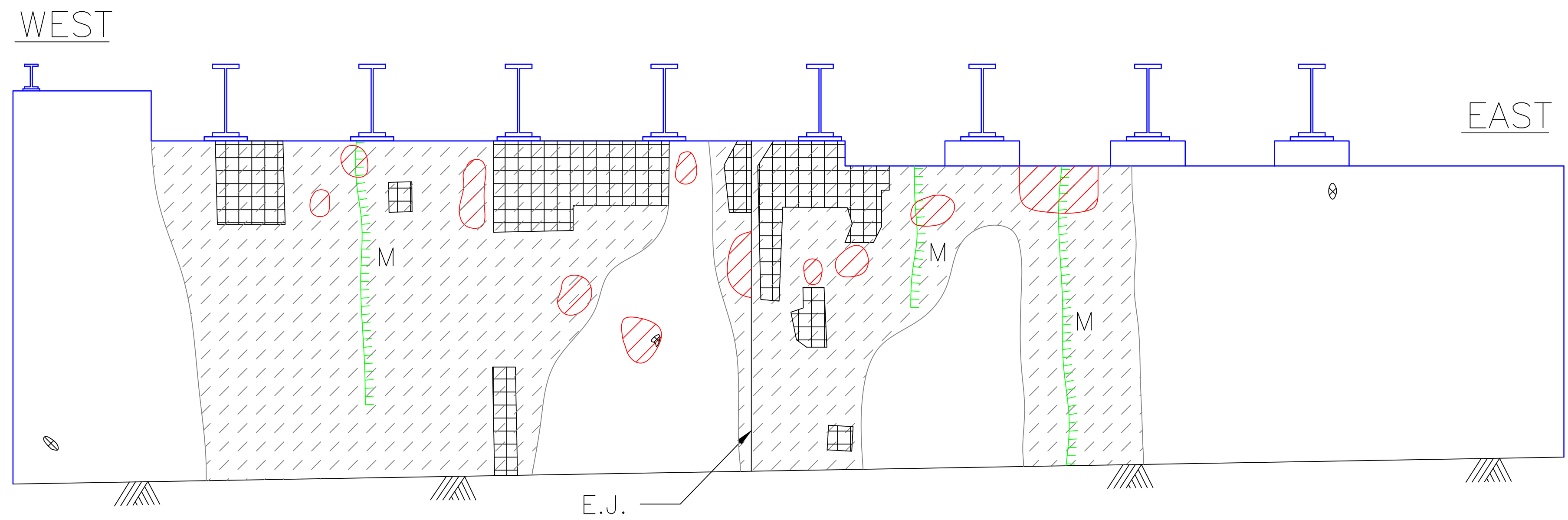
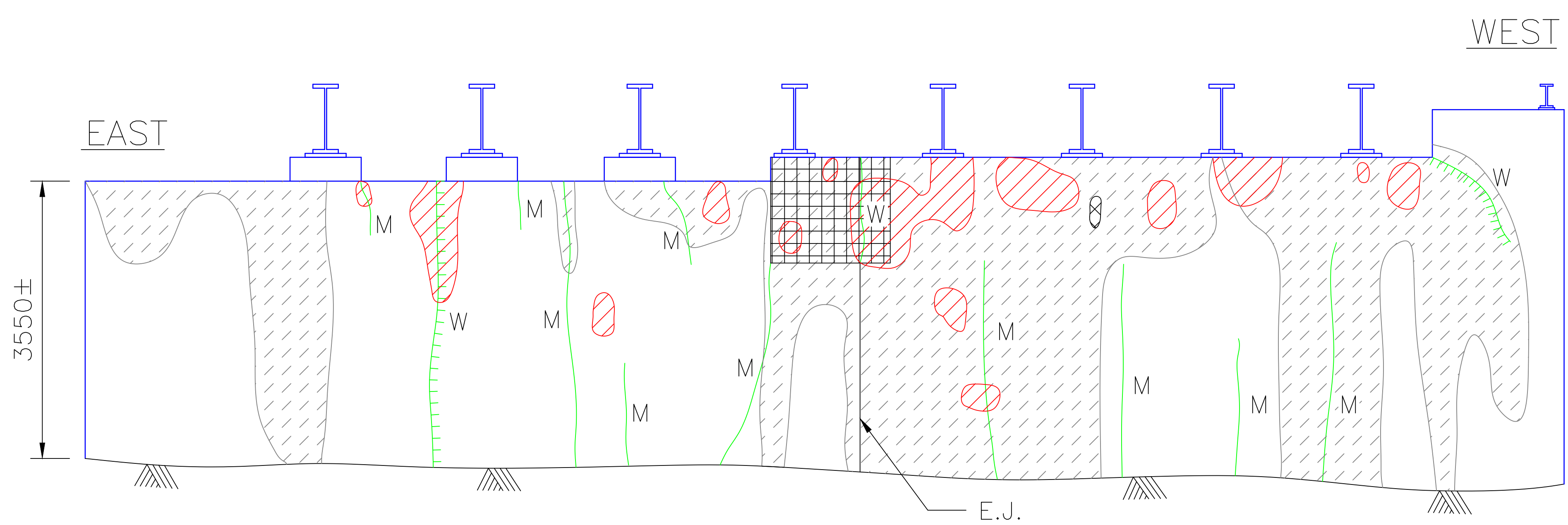


Fig. 4 Burlington Canal Lift Bridge – Lift Span



NORTH ABUTMENT



SOUTH ABUTMENT

LEGEND

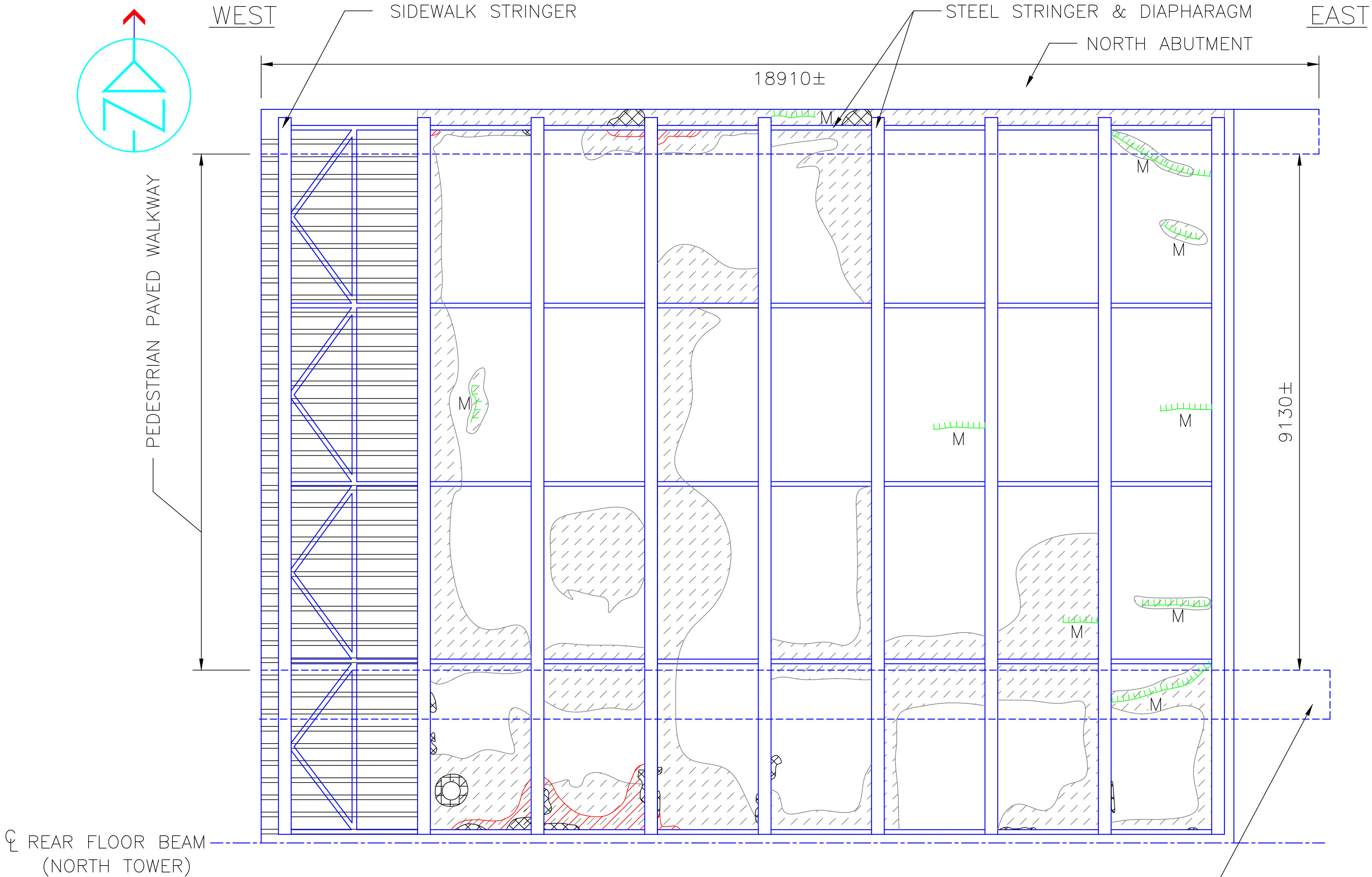
- M — MEDIUM CRACK
- M — STAINED MEDIUM CRACK
- W — WIDE CRACK
- DELAMINATION
- SPALLS
- WET AREAS
- PATCHED AREAS

MORRISON HERSHFIELD

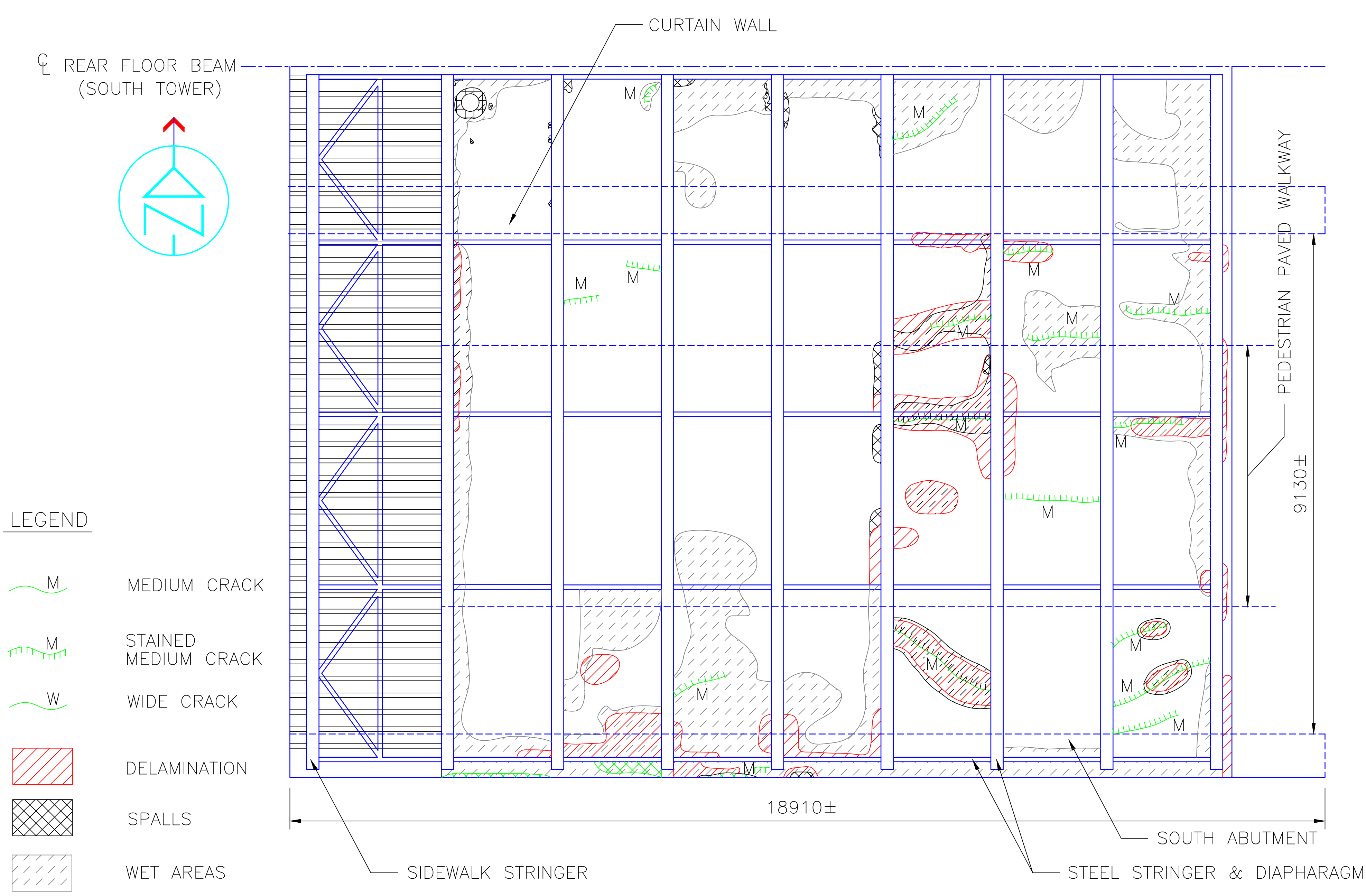
DESIGNED:	S.S.Q.
DRAWN:	P.L.
SKETCH:	SK-1

BURLINGTON LIFT BRIDGE – NORTH & SOUTH APPROACH SPANS

SURFACE DETERIORATION – ABUTMENTS



NORTH APPROACH SOFFIT



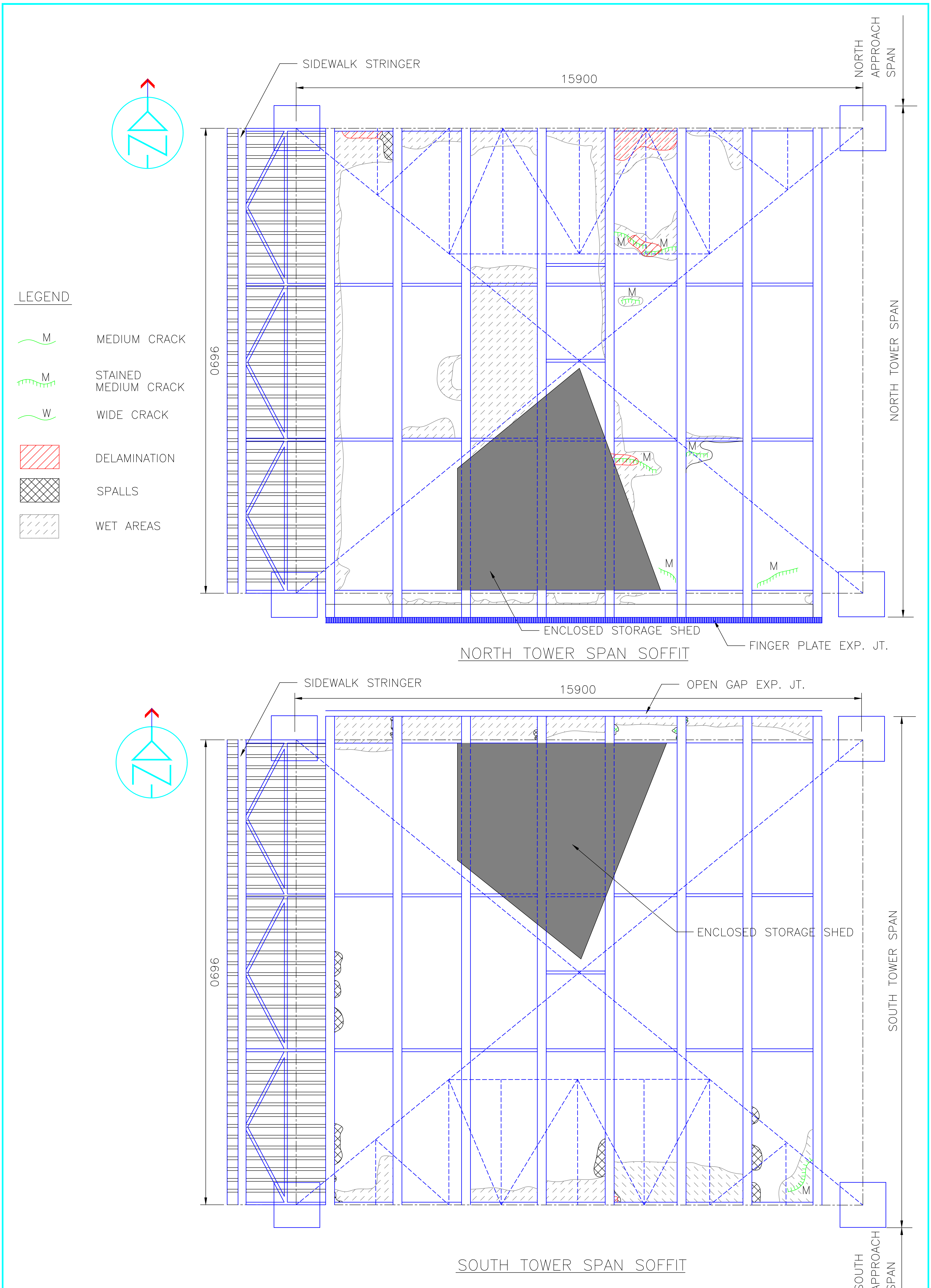
SOUTH APPROACH SOFFIT

MORRISON HERSHFIELD

DESIGNED:	S.S.Q.
DRAWN:	P.L.
DRAWING No.:	SK-2

BURLINGTON LIFT BRIDGE – NORTH & SOUTH APPROACH SPANS

SOFFIT DETERIORATION



MORRISON HERSHFIELD

DESIGNED:	S.S.Q.
DRAWN:	P.L.
DRAWING No.:	SK-3

BURLINGTON LIFT BRIDGE – NORTH & SOUTH TOWER SPANS

SOFFIT DETERIORATION

APPENDIX A2

Site Photographs

01 West Elevation

02 East Elevation

03 General View of Bridge from South Approach Road

04 General View of Bridge from North Approach

05 South Approach Span, East Elevation

06 North Approach Span, West Elevation

07 South Abutment, South Approach Span

08 North Abutment, North Approach Span

09 South Abutment, Wide Vertical Crack with Rust & Delamination on Wall between Stringers 1&2

10 South Abutment, Large Concrete Patch with Wide Vertical Crack & Delamination below Stringers 4&5

11 South Abutment, Stained Cracks & Local Delamination on Upper West Section of Wall

12 South Abutment, Wide Diagonal Crack with Wet & Efflorescence @ Top West Corner Area of Wall

13 North Abutment, Heavy wet-Rust Stains, Medium-Wide Vertical Crack, and Local Delam on West Section of Wall

14 North Abutment, Large Patches and Delamination Areas on Upper Central Section of Wall

15 Local Severe Delamination Areas on Upper East Section of Wall

16 Typical Debris and Wet Area on Abutment Bearing Seat, North Abutment between Stringer 6&7 Shown

17 South Ballast Wall, Large Patch & Local Spall behind Diaphragm between Stringer 4&5

18 South Ballast Wall, Local Severe Delamination with Spall between Stringer 6&7

19 North Ballast Wall, Cracks with Heavy Rust Stains between Stringer 3&4

20 North Ballast Wall, Large Spall at Joint behind Stringers 4 & 5

21 Typical Laminated Bearing & Oversized Shoe Plate at Abutments, Stringer 8 at South Abutment Shown

22 Laminated Bearing under Stringer 4 at South Abutment (TYP)

23 Laminated Bearing under Stringer 7 at North Abutment (TYP)

24 Minor Cracks & Bulging of Bearing Surface under Stringer 3 at South Abutment

25 Minor Bulging of Bearing under Stringer 2 at North Abutment (TYP)

26 South Elevation of South Curtain Wall, looking West

27 North Elevation of South Curtain Wall, looking East

28 North Elevation of North Curtain Wall, looking East

29 South Elevation of North Curtain Wall, looking East

30 Typical Narrow-Medium Vertical Cracks on Curtain Wall, Central Section of North Wall Shown

31 Local Minor Spall on East Section of South Curtain Wall

32 Southeast Wingwall

33 Southwest Wingwall

34 Northwest Wingwall

35 Northeast Wingwall

36 New Cantilevered Slab at top of Southeast Wingwall (TYP)

37 Local Minor Spalled and Stained Cracks at Top South Corner of Northwest Wingwall

38 General View of South Approach Span from SE Corner

39 South Approach Span, Bridge Deck from SW Corner

40 South Approach Span, Deck Wearing Surface from NW Corner

41 General View of North Approach Span from NW Corner


42 North Approach Span, Bridge Deck from NE Corner

43 North Approach Span, Deck Wearing Surface from SW Corner

44 South Approach Span, Underside of Deck from SW Corner

45 South Approach Span, Deck Underside from East

46 South Approach Span, Deck Underside at South Tower Section from West

47 Large Wet with Stained Cracks and Local Severe Delamination on East Section of South Approach Soffit, looking S

48 Large Wet Area with Stained Crack & Severe Delam on South Section of South Span between Stringers 3&4, looking

49 Wet Areas with Local Severe Delamination on SW Section of South Approach Soffit, looking South

50 Wet with Rust Stains and Large Delam Areas on Central Soffit of South Span between Stringers 3&4, looking South

51 Heavy Wet with Local Severe Delamination at South Abutment End of Soffit between Stringers 4&5 (TYP)

52 Heavy Wet Area with Large Delamination & Spalls at South Abutment End Soffit, East of Stringer 5

53 Wet Area & Spalls on South Abutment End Soffit between Stringers 6&7

54 Large Delam with Local Severe Spall & Exposed Torn Joint Seal at South Abutment End of Soffit between Stringer 7&8

55 Typical Wet Area on North End of South Approach Span Soffit, Section between Stringers 2&3 Shown

56 Large Wet Area with Stained Crack on North Section of South Approach Soffit between Stringers 3&4, looking West

57 Typical Wet & Heavy Corrosion on Steel Angle at North End of South Span Soffit, Stringers 1&2 Section Shown

58 Local Spall on Soffit Adjacent to Expansion Joint between South Approach & South Tower Spans near Stringer 6 (TYP)

59 Local Light Surface Rust on Steel Decking under Sidewalk at NW Section of South Approach Span

60 North Approach Span Soffit from SW Corner

61 North Approach Span Soffit from SE Corner

62 General View of Interior Soffit at North Approach Span, looking South

63 North Approach Span, Soffit at North Tower Section looking East

64 Large Wet Areas on West Section of North Approach Span Soffit, looking South

65 Heavy Wet Area on Soffit adjacent to West Stringer 8 at North Abutment (TYP)

66 Wet Area on Central North End of North Approach Span Soffit

67 Cracks with Wet and Efflorescent Stains on NE Section of North Approach Span Soffit

68 Crack with Wet & Rust Stains on South Central Section of North Approach Span Soffit

69 Stained Cracks & Large Delamination on North Abutment End Soffit between Stringers 4&5

70 Heavy Wet and Large Severe Delamination on North Abutment End Soffit between Stringers 5&6

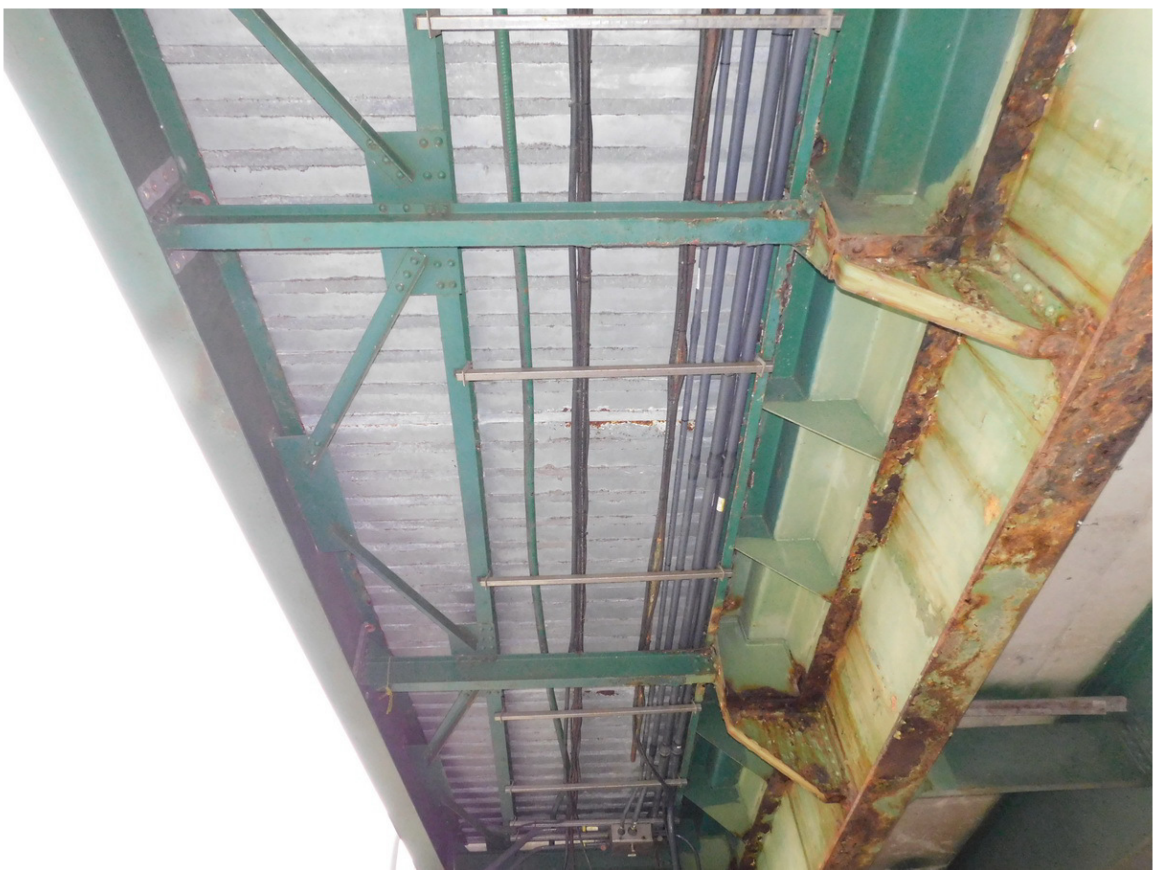
71 Large Wet Areas on South Section of North Span Soffit between Stringers 5&6, looking East

72 Heavy Wet Area on SW Section of North Span Soffit between Stringers 6&7

73 Large Wet with Local Severe Spall on North Span between Stringers 7&8

74 Severe Delamination in Wet Area at South End of North Span Soffit between Stringers 5&6

75 Local Severe Delamination on South End of North Span Soffit between Stringers 6&7



76 Local Light Rust on Steel Decking under West Sidewalk at North Approach Span, looking North

77 Local Peeled Paint showing Light Rust Surface Rust on Exterior Face at South End of Stringer 1

78 S Approach Span, Stringer 1, Local Medium-Severe Corrosion on Top Flange at South Abutment

79 S Approach Span, Typical Heavy Corrosion on Interior Stringers & Diaphragm at South Abutment, Stringers 5&6 Shown

80 S Approach Span, Local Severe Corrosion on Bottom of Stringer 4, Gusset Plate, & Diaphragm at South Abutment

81 S Approach Span, Perforated Gusset & Severe Corrosion on Bottom Web & Flange at S Abutment End of Stringer 8

82 S Approach Span, Typical Severe Corrosion on Back Face of Diaphragm at South Abutment, Stringers 7&8 Shown

83 S Approach Span, Wet with Heavy Corrosion on Stringers & Diaphragm at North End of Span, Stringer 3 Shown

84 S Approach Span, Medium Corrosion on bottom North End of Stringer 3 (TYP)

85 S Approach Span, Typical Heavy Wet with Local Severe Corrosion on Diaphragm under Exp Joint with S Tower Span

86 S Approach Span, Heavy Corrosion on Outside Face of Stringer 8 @ Central Section of Span, looking South

87 S Approach Span, Wet with Local Severe Corrosion on Stringer 8 at South Abutment End

88 S Approach Span, Perforated Curb Plate atop South End of Stringer 8

89 S Approach Span, Severe Corrosion on Top Flange of Stringer 8 at Central North Section of Span

90 S Approach Span, Severe Leakage of Deck Exp Joint with Sediment Slurry on Structural Steel @ North End of Stringer

91 N Approach Span, Typical Heavy Corrosion on Stringers & Diaphragm at North Abutment, Stringers 7&8 Shown

92 N Approach Span, Very Severe Corrosion on Web Section of Stringer 1 behind Bearing at North Abutment

93 N Approach Span, Severe Corrosion on Lower Web and Flange at Stringer 4 & Perforated Gusset Plate at North Abut

94 N Approach Span, Severe Corrosion on Bottom Flange of Stringer 8 at North Abutment End (TYP)

95 N Approach Span, Typical Severe Corrosion on Back Face of Diaphragm at North Abutment, Stringers 3&4 Shown

96 N Approach Span, Typical Wet with Heavy Corrosion on Stringers & Diaphragm at South End of Span, Stringer 6

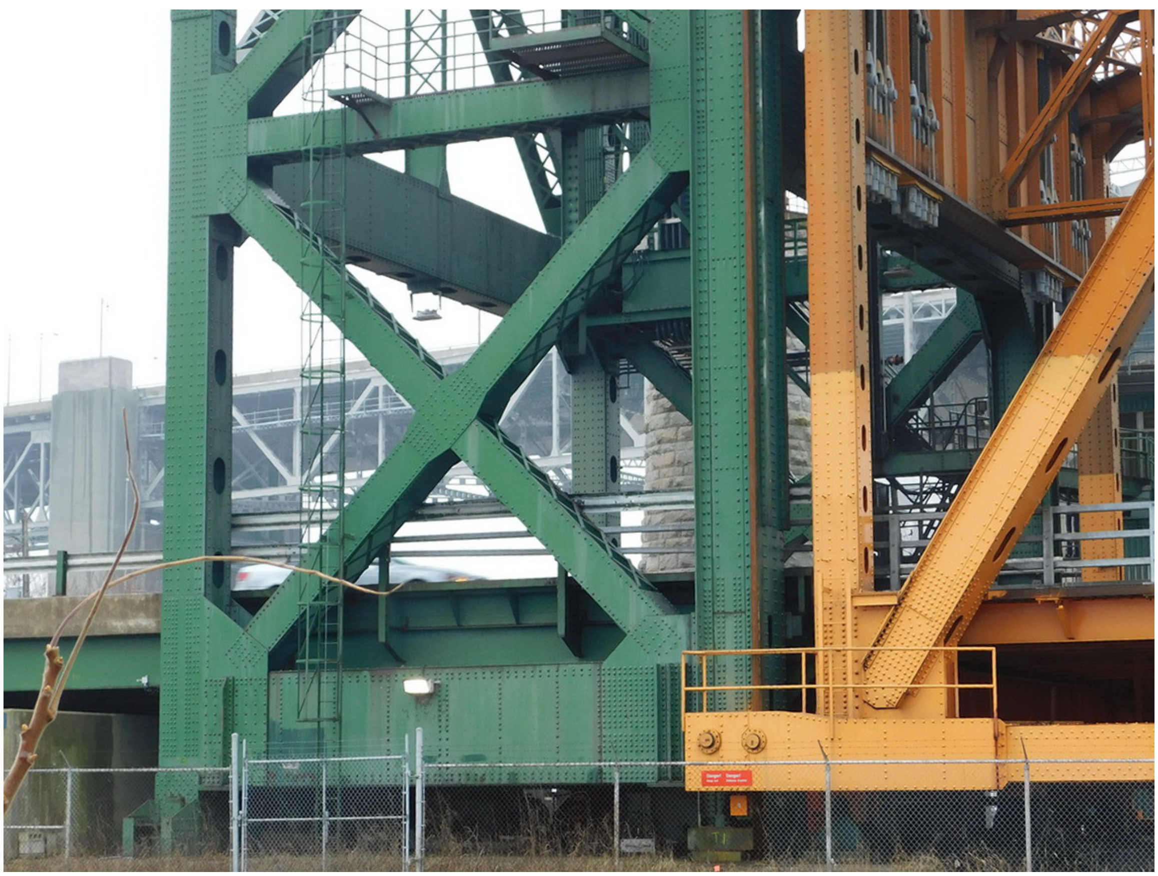
97 N Approach Span, Heavy Wet and Severe Corrosion on Diaphragm @ Stringers 6&7 under Exp Joint with N Tower

98 N Approach Span, Severe Corrosion on Bottom Flange at South End of Stringer 8 (TYP)

99 N Approach Span, Heavy Corrosion on Outside Face of Stringer 8 @ Central Section of Span, looking South

100 N Approach Span, Severe Corrosion on Top Flange & Perforation Hole on Curb Plate atop Exterior Section of Stringer 8


101 South Tower Span, East Elevation


102 South Tower Span, General View of Deck from East

103 South Tower Span Deck from SW Corner


104 South Tower Span Deck from NW Corner

105 South Tower Span, Local Small Area of Light asphalt Depression with Few Light Pattern Unsealed Cracks on SBL

106 North Tower Span, West Elevation


107 North Tower Span, General View of Deck from East

108 North Tower Span from NW Corner

109 North Tower Span, Bridge Deck from SW Corner

110 North Approach Span, Light Asphalt Depression with Local Unsealed Pattern Cracks on NW Corner of Deck

111 North Approach Span, Large Unsealed Pattern Cracks on Central North End of Deck

112 Noth Approach Span, Unsealed Pattern Cracks & Small Asphalt Patch on Central South End of Span

113 South Tower Span, General View of Deck Underside from NE Corner

114 South Tower Span, General View of East Soffit Section looking South

115 South Tower Span, Soffit at Central Deck Section looking South

116 South Tower Span, Soffit at West Section of Deck looking North

117 South Tower Span, General View of Soffit at North End of Deck looking West

118 South Tower Span, Typical Heavy Wet Areas at South End of Soffit at Expansion Joint wth South Approach Deck

119 South Tower Span, Heavy Wet with Isolated Light Stained Crack at SE Corner of Deck Soffit


120 South Tower Span, Isolated Local Delam at South End of Stringer 4 & Exp Joint with adjacent South Approach Span

121 South Tower Span, Local Light Wet Area on Central North End of Soffit

122 South Tower Span, Heavy Corrosion on Top & Bottom Section of Stringer 4 @ South End of Span (TYP)

123 South Tower Span, Heavy Corrosion at North End Section of Stringer 1 (TYP)

124 South Tower Span, Typical Heavy Corrosion on Linking Diaphragm with adjacent South Approach Span

125 South Tower Span, Typical Heavy Corrosion on North Edge Diaphragm at Joint with Lift Span

126 North Tower Span, East Section of Soffit from North

127 North Tower Span, West Section of Soffit from North

128 North Tower Span, Large Wet Areas on Soffit at NW Section of Deck, Stringers 6 to 8

129 North Tower Span, Heavy Wet Area at north End of Deck Span, looking East

130 North Tower Span, Large Wet Area on SW Section of Soffit looking South

131 North Tower Span, Stained Crack with Wet and Rust Stains on North Central Section of Soffit between Stringers 3&4

132 North Tower Span, Local Wet Area with Stained Crack on Soffit in Central Section of Deck between Stringers 3&4

133 North Tower Span, Large Delamination Area at North End of Soffit between Stringers 3&4

134 North Tower Span, Large Shallow Spalls in Wet Area at North End of Stringer 7

135 North Tower Span, Heavy Wet & Severe Corrosion on Stringer 4 at North End below Exp Joint with N Approach Span

136 North Tower Span, Local Severe Corrosion on Diaphragm & Stringer 6 under Expansion Joint at North End of Span

137 North Tower Span, Local Medium-Severe Corrosion on Stringer 4 and Diaphragm near Exp Joint with Lift Span

138 North Tower Span, Typical Wet & Heavy Corrosion on Diaphragm Linking North Tower & North Approach Span

139 North Tower Span, Local Light-Medium Corrosion on Exterior Face of Stringer 8, looking North

140 Typical Rocker Block on Base Plate Anchorage Assembly @ Front Column at Towers, NW Column at South Tower

141 Typical Anchorage Assembly @ Rear Tower Column, NE Column at North Tower Shown

142 South Tower Span, Rear Floor under Expansion Joint in South Approach & South Tower Decks, looking West

143 South Tower, Front Floor under North End of South Tower Deck looking West

144 South Tower, East Jacking Girder from Southeast

145 South Tower, West Jacking Girder looking South

146 South Tower Span, Heavy Corrosion on Lower Section of Rear Floor Beam below Exp. Joint at North End of Span

147 South Tower, Heavy Rust Stains on Bottom SW Section of Rear Floor Beam, looking West

148 South Tower, Heavy Corrosion on Lower NW Section of Rear Floor Beam near SW Tower Leg T4

149 South Tower, Heavy Corrosion on Top Flange of Rear Floor Beam below South Exp Joint with South Approach Span


150 South Tower, Peeled Paint & Light-Medium Corrosion on Underside West Section of Rear Floor Beam

151 South Tower, Light Surface Rust on bottom Flange Section of Front Floor Beam (TYP)

152 South Tower, Local Light-Medium Corrosion on Stiffener Plate at Top East Corner of Front Floor Beam

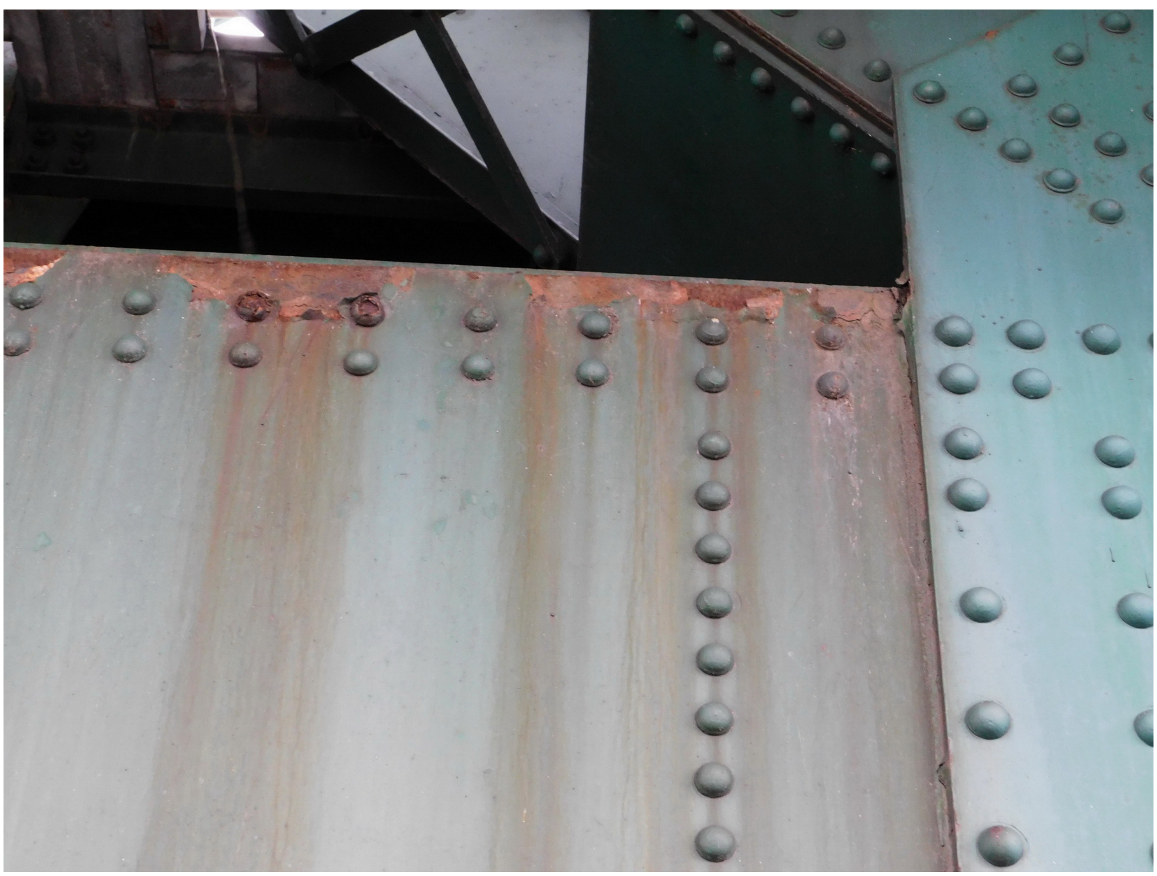
153 South Tower, Local Light-Medium- Corrosion on Stiffener Plate at Bottom East Corner of Front Floor Beam

154 South Tower, Light Corrosion on Top West Corner of East Jacking Girder looking North

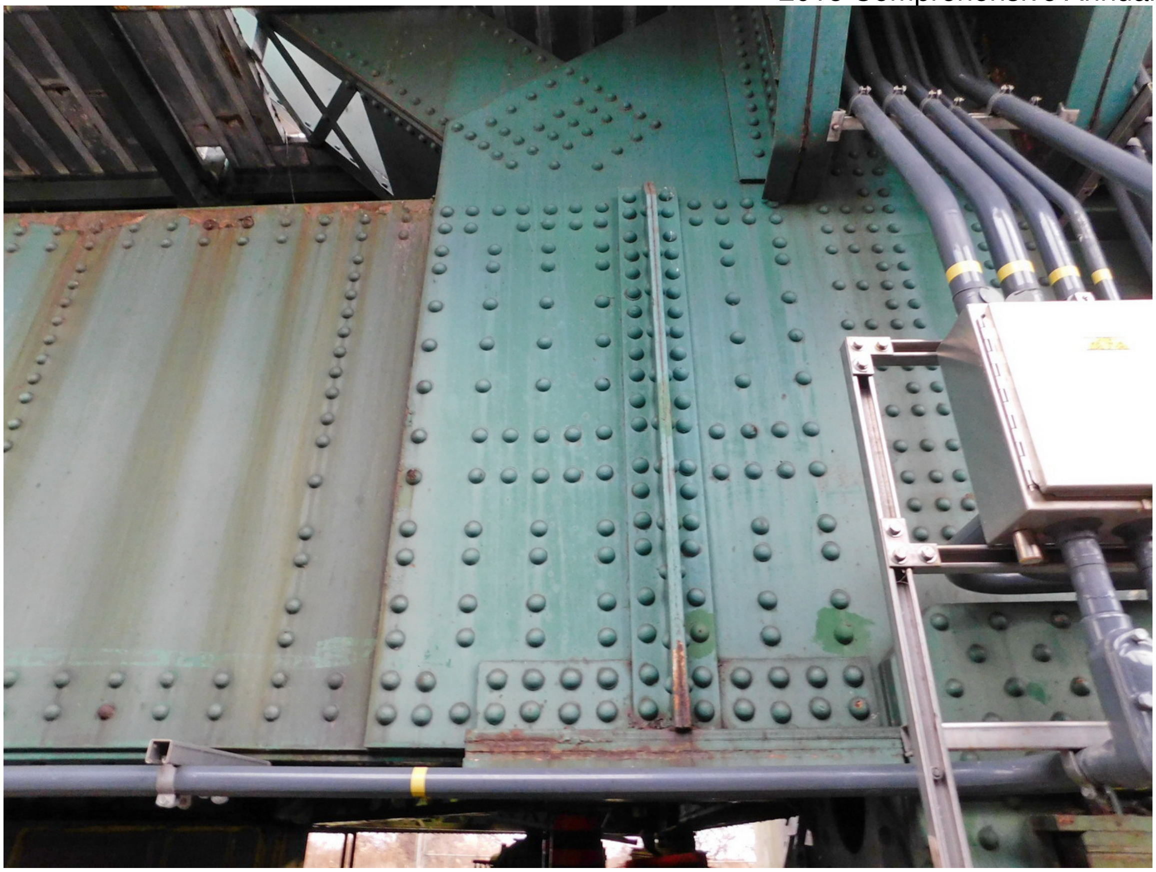
155 South Tower, Local Peeled Paint with Light Surface Rust on Bottom South Section of East Jacking Girder

156 South Tower, Local Light-Medium Corrosion on East Jacking Girder at Connecting Angle to NE Tower Leg T1

157 South Tower, Local Rust Jacking at Jacking Pad Plate at Bottom SE Section of East Jacking Girder



158 South Tower, Local Light Rust on top South Corner of West Jacking Girder



159 South Tower, Local Light Surface Rust on South End of West Jacking Girder

160 North Tower Section, Rear Floor Beam under Expansion at North End of Deck looking West

161 North Tower Span, Front Floor Beam under South End of Deck Span, looking East

162 North Tower, East Jacking Girder looking North

163 North Tower, West Jacking Girder from North

164 North Tower, Local Severe Corrosion on Bottom North Face at West Section of Rear Floor Beam, looking West

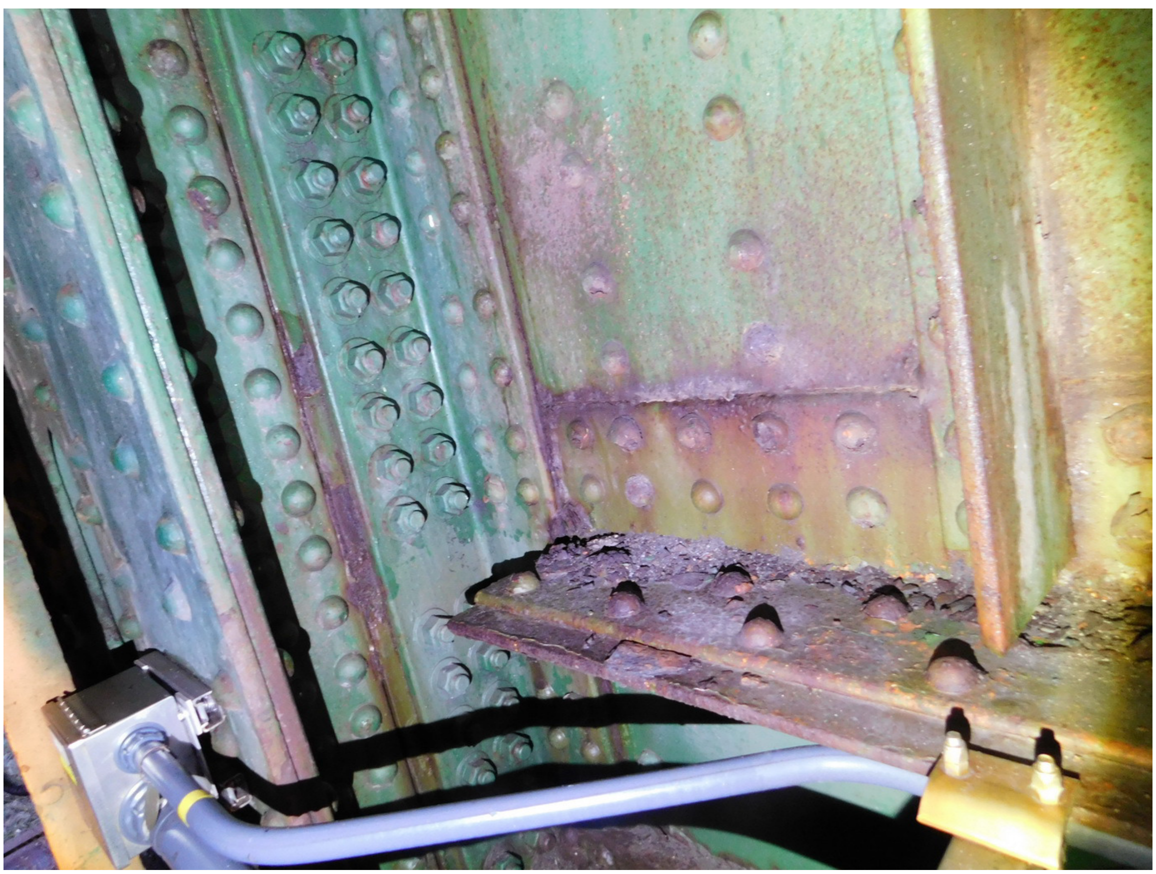
165 North Tower, Local Light-Medium Corrosion on Bottom East Section of Rear Floor Beam

166 North Tower, Large Area of Severe Corrosion on North Face West Section of Rear Floor Beam below Stringers 7&8

167 North Tower, Large Severe Corrosion Area on lower South Face of Rear Floor Beam below Stringers 7&8

168 North Tower, Heavy Corrosion & Ponding of Rain Water on Top Rear Floor Beam Surface between Stringers 3&4

169 North Tower, Light Surface Rust on Central Section of Front Floor Beam looking East (TYP)



170 North Tower, Rust Stains with Local Light-Medium Rust Jacking at Bottom West Section of Front Floor Beam

171 North Tower, Severe Corrosion on Top of Front Floor Beam at Stringer 8 (TYP)

172 North Tower, Local Medium Corrosion Areas on Lower North Section of East Jacking Girder

173 North Tower, Local Medium Corrosion on Bottom North Section of West Jacking Girder (TYP)

174 Typical Corroded or Damaged Rivet on Tower, West Jacking Girder at North Tower Shown

175 Typical Local Peeled Paint showing Light Rust on Tower Column, SE Column T3 at South Tower Shown

176 Typical Light Rust with Local Light-Medium Corrosion at Bottom of Tower Column, NE Column at S Tower Shown

177 Typical Sediment & Local Medium Corrosion on Bottom Interior Surface of Front Columns, NE Column at S Tower

178 Typical Lateral Bracing below Central Section of Deck Span, South Tower looking East Shown

179 Wind Bracing at Bottom Rear Section of South Tower, looking East

180 Wind Bracing at Bottom Rear Section of North Tower, looking West


181 Typical Light Rust on Bracing Members at Connection to Tower Members, South Tower at SW Column Shown


182 Light-Medium Corrosion on Wind Bracing at Connection Rear Floor Beam near NW Column at North Tower

183 Light Corrosion on Wind Bracing at Connection to Rear Floor Beam at South Tower (TYP)

184 Typical Light Rust on Gusset Plate at Bracing Connection to Tower Column, NW Column at North Tower Shown

185 South Tower, Anchorage Assembly on Northeast Front Column (T1) looking South

186 South Tower, Anchorage Assembly @ NW Front Tower Column (T2), looking North

187 South Tower, Anchorage Assembly @ SE Rear Tower Column (T3) looking North

188 South Tower, Anchorage Assembly @ SW Rear Tower Column (T4) looking West

189 South Tower, Local Light Surface Rust on Top Surface of NE Column Anchorage Assembly (TYP)

190 South Tower, Local Corrosion on Top Exposed Surface of Anchor Assembly at T4

191 South Tower, Local Light Corrosion on interior Surface of T3 Anchorage Assembly

192 South Tower, Local Medium-Severe Corrosion on Interior T4 Anchorage Assembly

193 North Tower, Anchor Assembly @ NE Rear Column (T1) looking South

194 North Tower, Anchor Assembly @ NW Rear Column (T2) looking West

195 North Tower, Anchor Assembly @ SE Front Column (T3) looking North

196 North Tower, Anchor Assembly @ SW Rear Column (T4) looking West

197 North Tower, Typical Local Corrosion on Top Exterior Surface Anchor Assembly, NW Rear Column T3 Shown

198 North Tower, Local Light Corrosion on Interior Surface of Anchor Assembly @ T1

199 North Tower, Local Medium-Severe Corrosion on Interior Surface of Anchor Assembly @ T2 NW Rear Column

200 Typical Interior Steel Pedestal Bearing under East Section of Front Floor Beam, South Tower looking East Shown

201 Typical Interior Steel Pedestal Bearing under East Section of Rear Floor Beam, North Tower looking West Shown

202 Concrete Pier @ South Tower (Lift Span Down) from NW

203 Concrete Pier @ North Tower (Lift Span Up) from SW Corner

204 Typical Asphalt Paving on Pier Surface at Front Column, NE Column at South Pier Shown

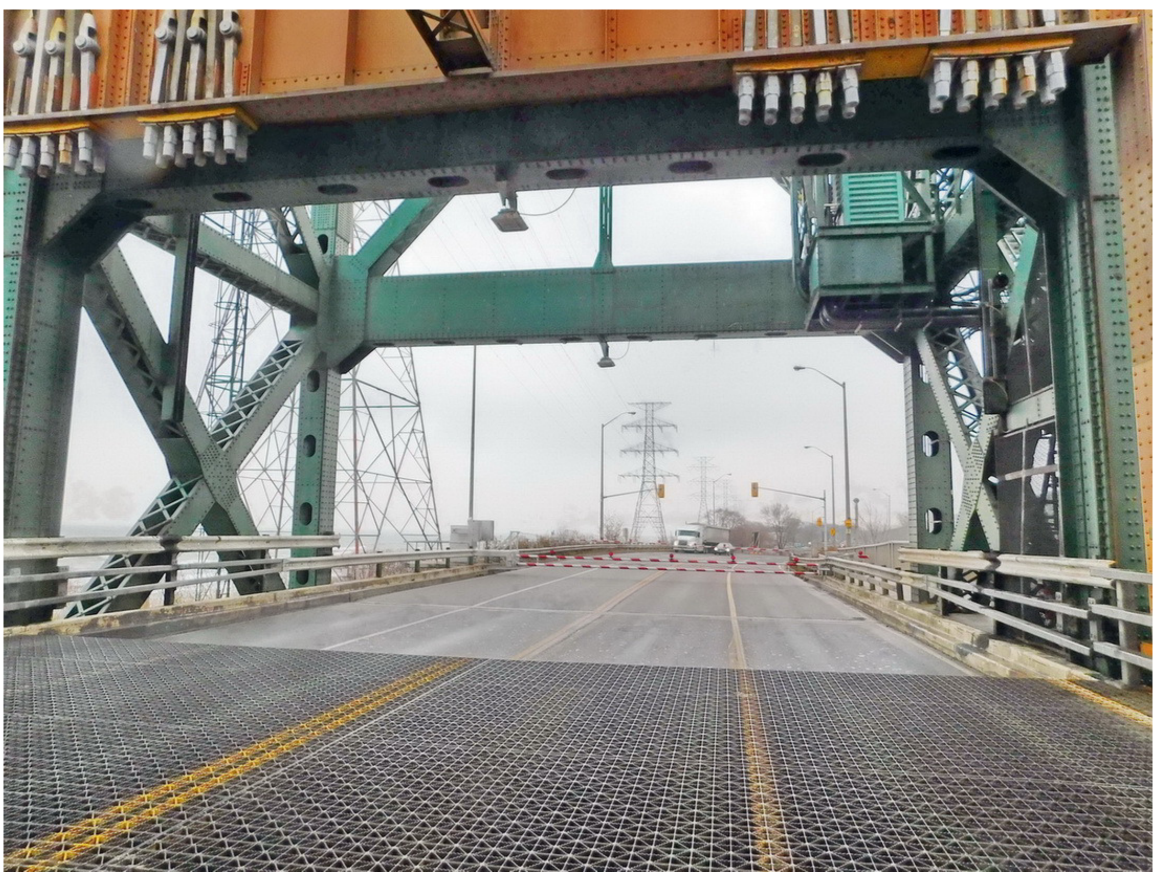
205 South Tower, Medium Crack on Resurfaced Concrete @ SW Column

206 Wide Crack with Leakage at Construction Joint in North Concrete Pier (TYP)

207 Local Delamination & Light Spall on Northeast Face of South Pier

208 Large Delamination & Local Severe Spalls on SW Corner of Pier

209 General View of South Tower @ Upper Section from Bottom SE Corner



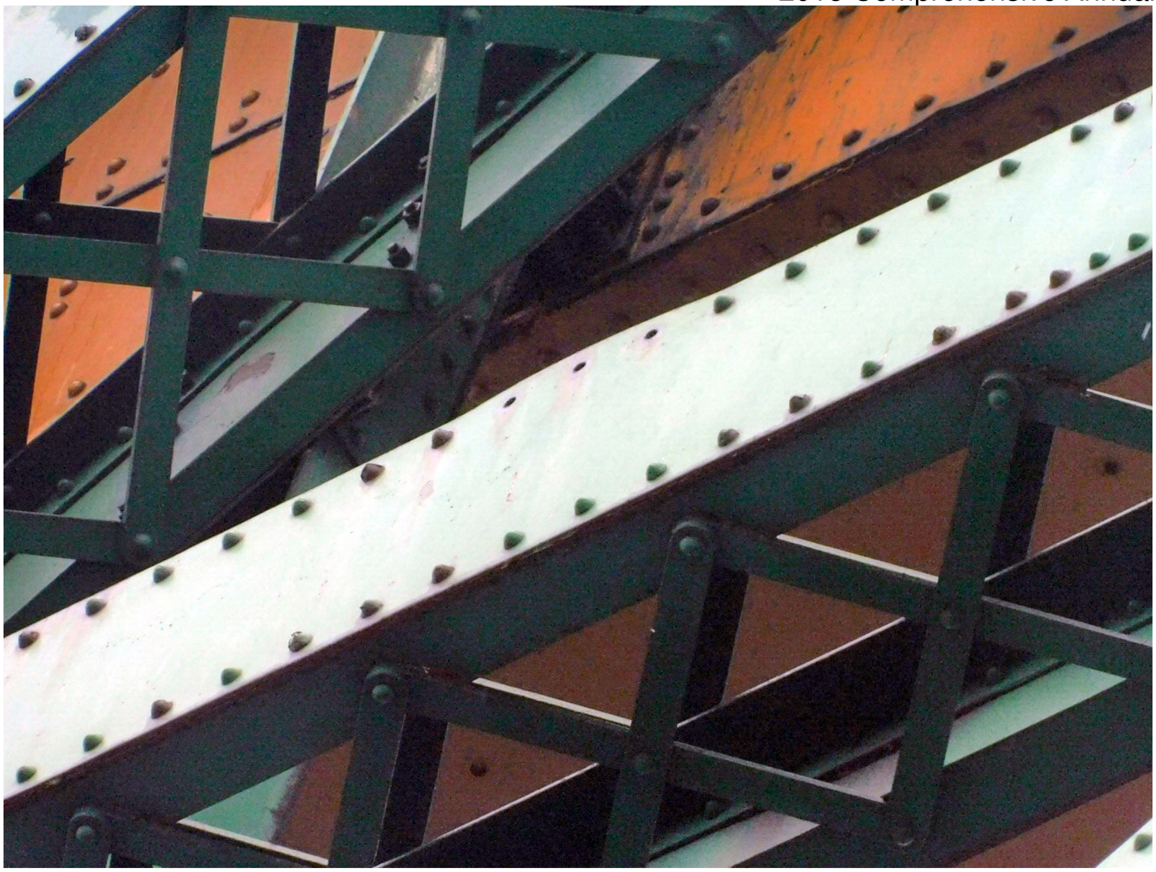
210 South Tower @ Deck Level, looking South

211 South Tower, East Truss @ Deck Level (Panel 1), looking East

212 South Tower, West Truss @ Deck Level (Panel 1) on West Sidewalk, looking North

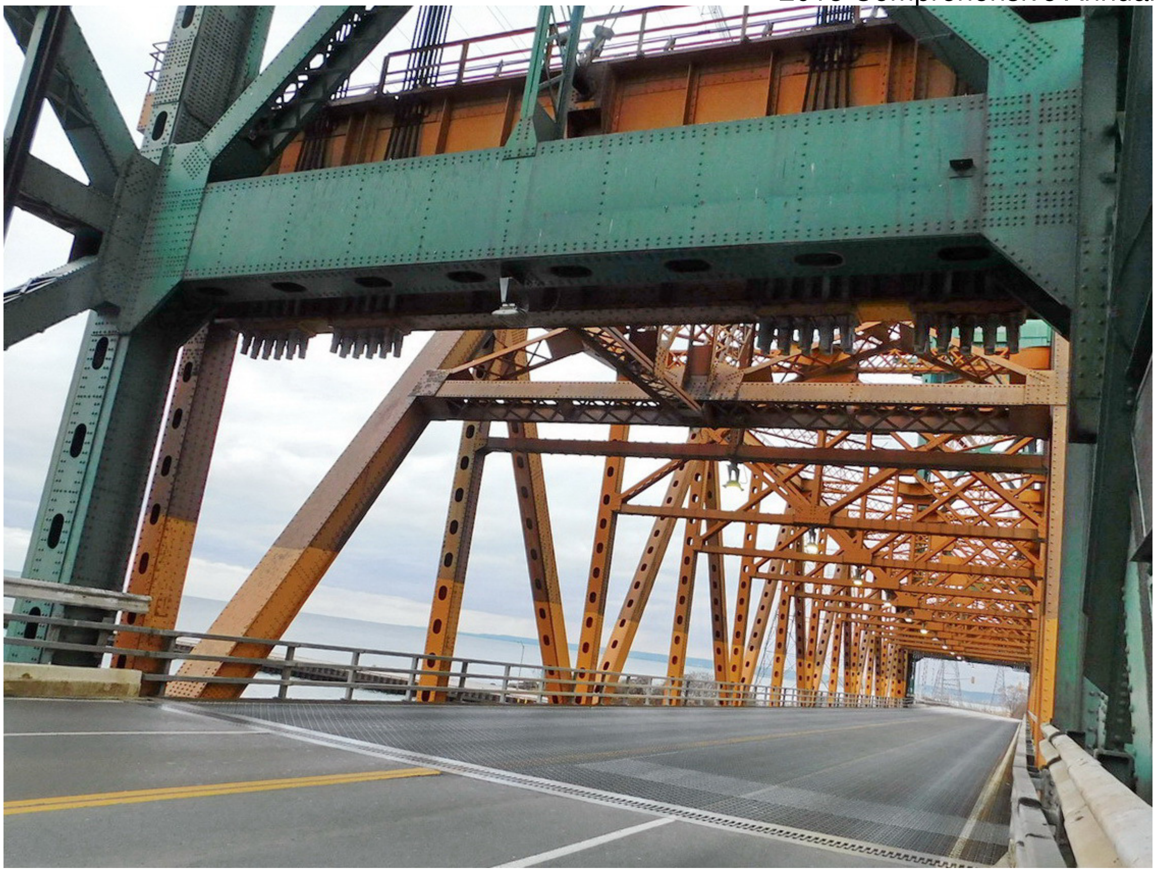
213 South Tower, Interior View from Bottom

214 South Tower, Upper Panels from Bottom SW Corner

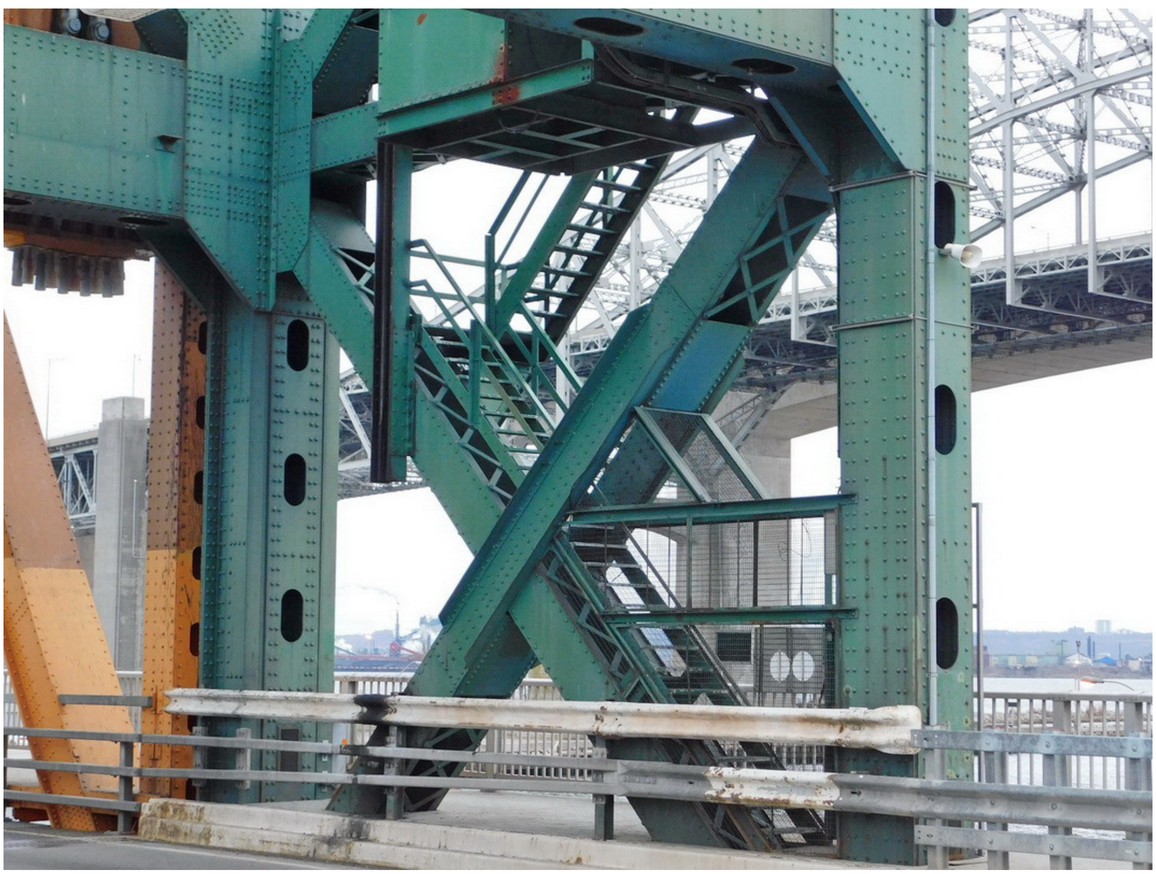


215 South Tower, Missing Rivets on Mid-Section of West Horizontal Member between Panel 5&6 West Face

216 General View of North Tower @ Upper Panels from Bottom NW Corner



217 North Tower @ Deck Level looking South



218 North Tower, West Truss @ Deck Surface looking West

219 North Tower, East Truss @ Deck Surface (Panel 1), looking East

220 North Tower, West Truss @ Sidewalk level, looking North

221 Typical Debris on Interior Plate below West Sidewalk at North Tower

222 North Tower, Local Light Rust on Gusset Plate at top NE Corner of Panel 1, looking East

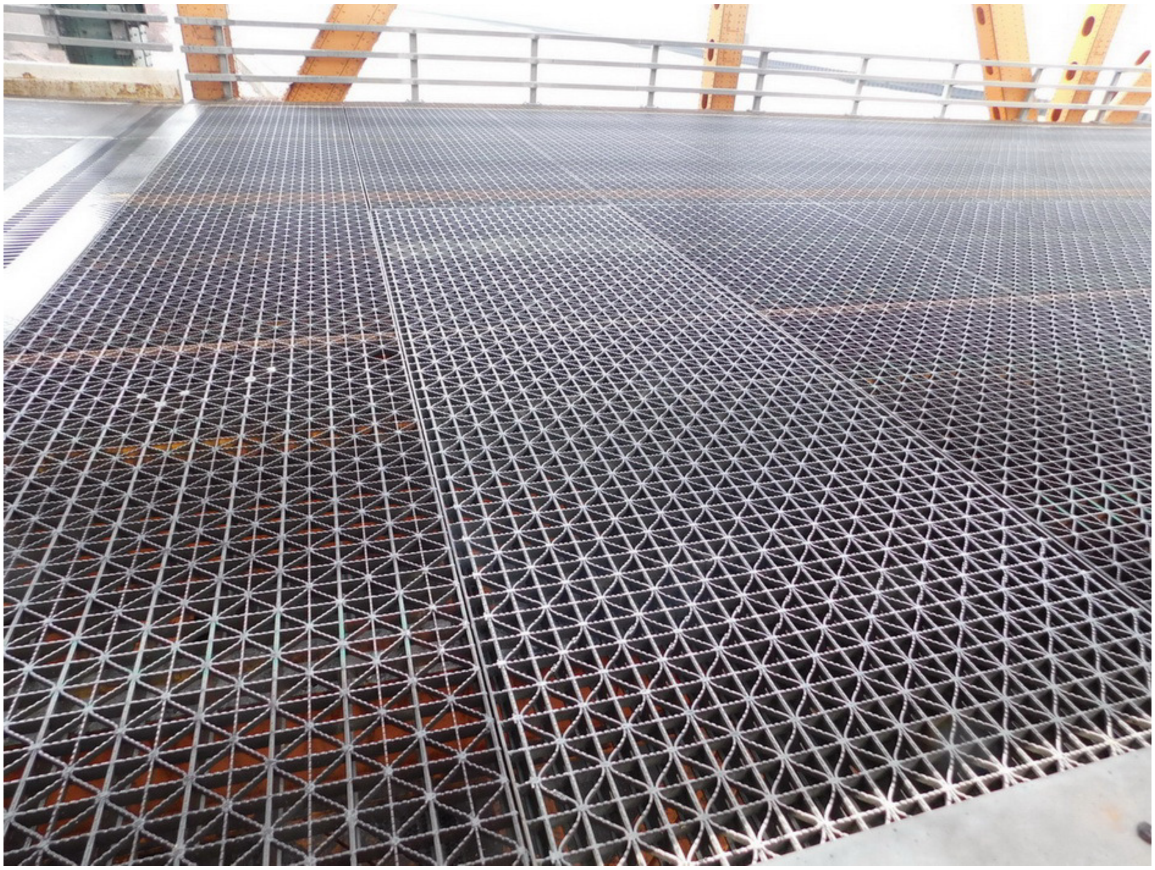
223 North Tower, Interior View @ Upper Panels from Bottom

224 North Tower, Upper Panel from Bottom NE Corner

225 General View of Lift Span from NW Corner

226 General View of Lift Span Bridge Deck from SW Corner

227 Deck Grating @ Lift Span from NW Corner

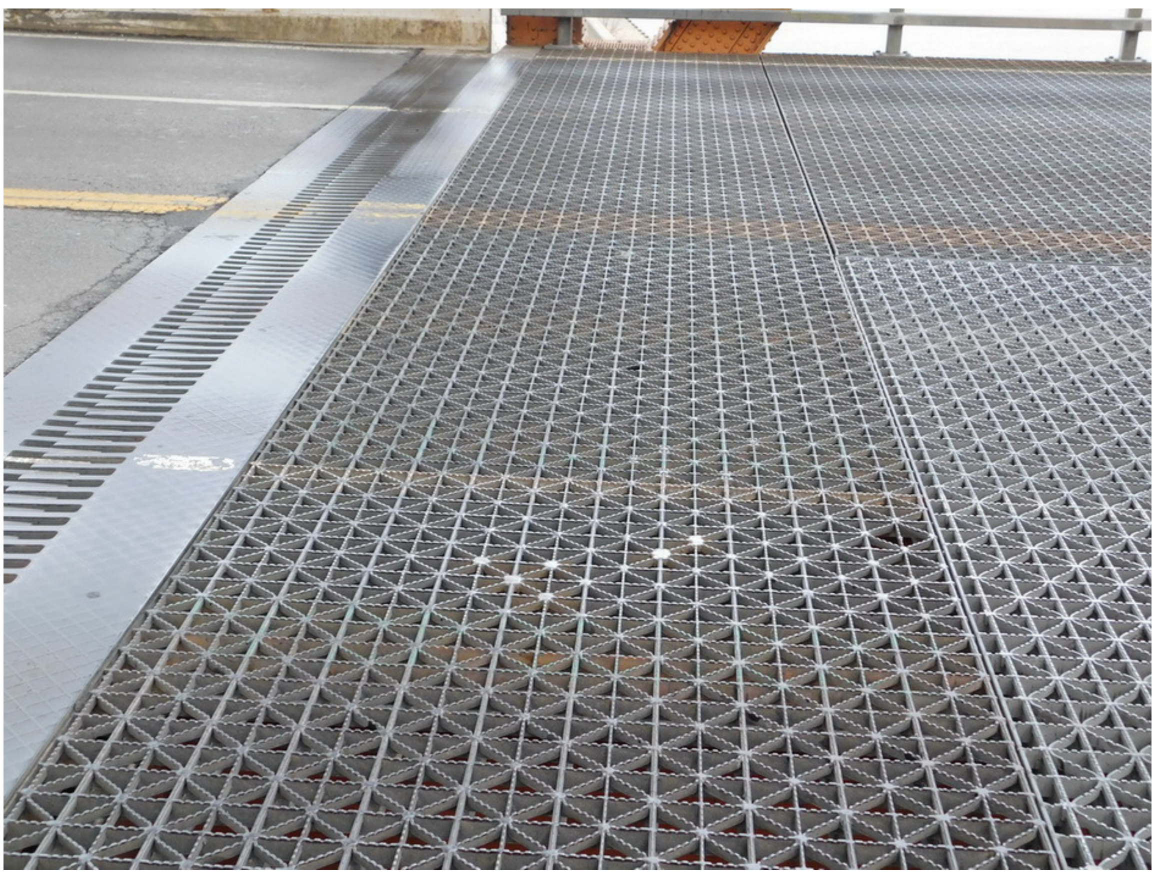


228 Replaced Deck Grating Panel at NW Section of Lift Span, looking East

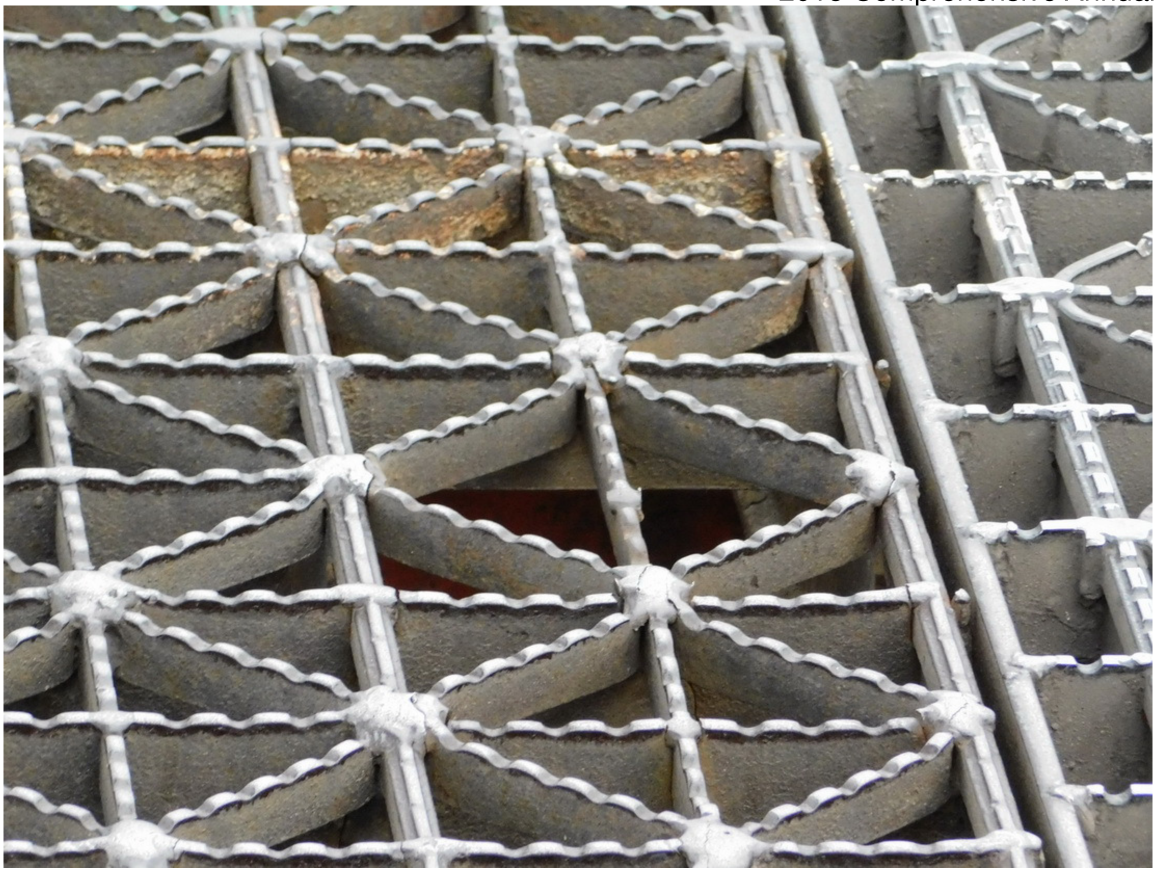

229 Typical Deck Grating & Visible Top Surface of Steel Stringer on Lift Span Bridge Deck


230 Cracked Grating @ Previous Repaired Weld on Stringer 11 near NW Corner of Lift Span

231 Cracked Grating at Central Section of Lift Span, Stringer 7 south of Floor Beam A7-B7



232 North Grating Panel at Lift Span, looking East



233 Several Cracked Grating & Broken Bearing Bar at North Panel near Stringer 9 and Replaced Panel, looking East

234 Cracked Hold-down Weld @ Grating to Stringer 8 South of 3rd Floor Beam from South (Beam A3-B3)


235 Cracked Hold-down Weld @ Grating to Stringer 9 South of 4th Floor Beam from South (Beam A4-B4)


236 Cracked Hold-down Weld @ Grating to Stringer 9 in Central Section of 4th Bay from South

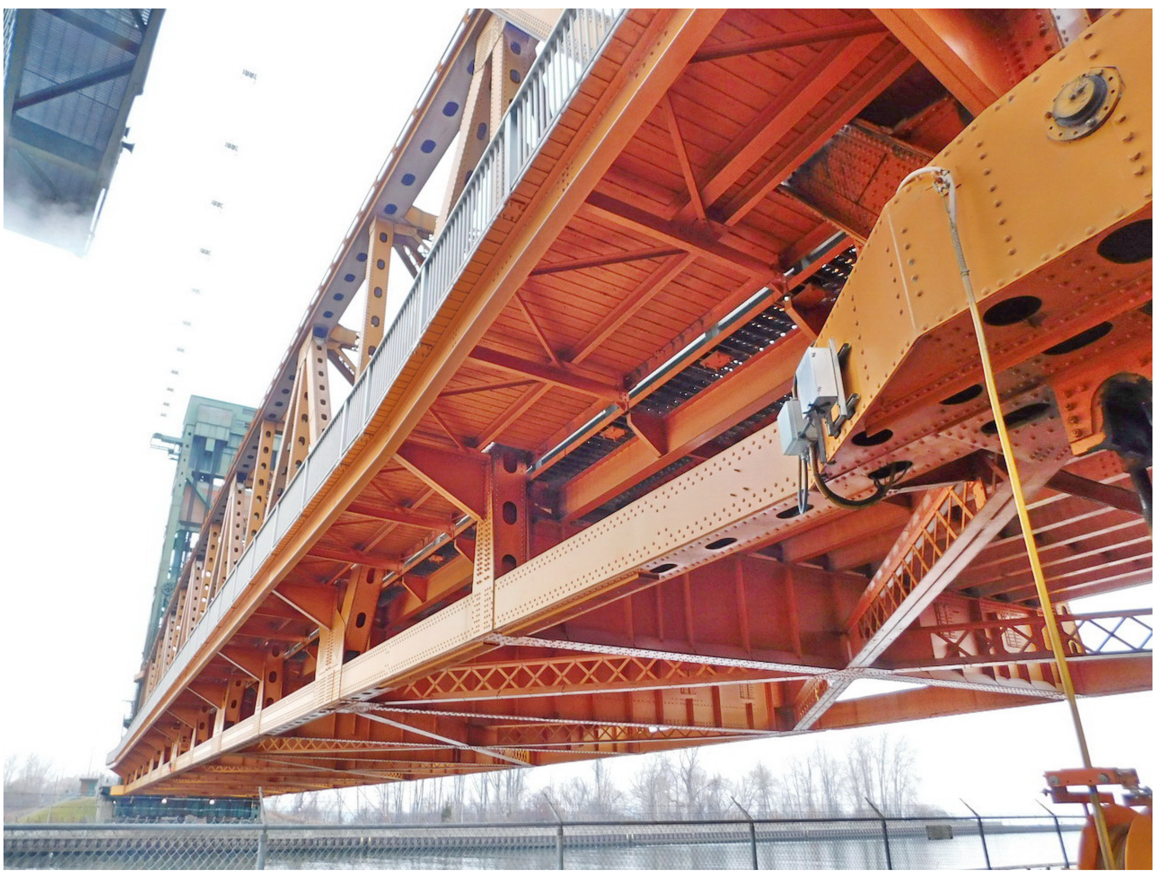
237 Cracked Hold-down Weld @ Grating to Stringer 9 in North Section of 4th Bay from South near Floor Beam A5-B5

238 Cracked Hold-down Weld @ Grating to Stringer 9 South of Floor Beam A6-B6

239 Cracked Hold-down Weld @ Grating to Stringer 8 South Floor Beam A8-B8

240 Typical Hold-down Weld between Deck Grating to Steel Stringers

241 Wooden Blocks on Underside of Deck Grating at Central North End of Lift Span, between Stringers 6 & 7



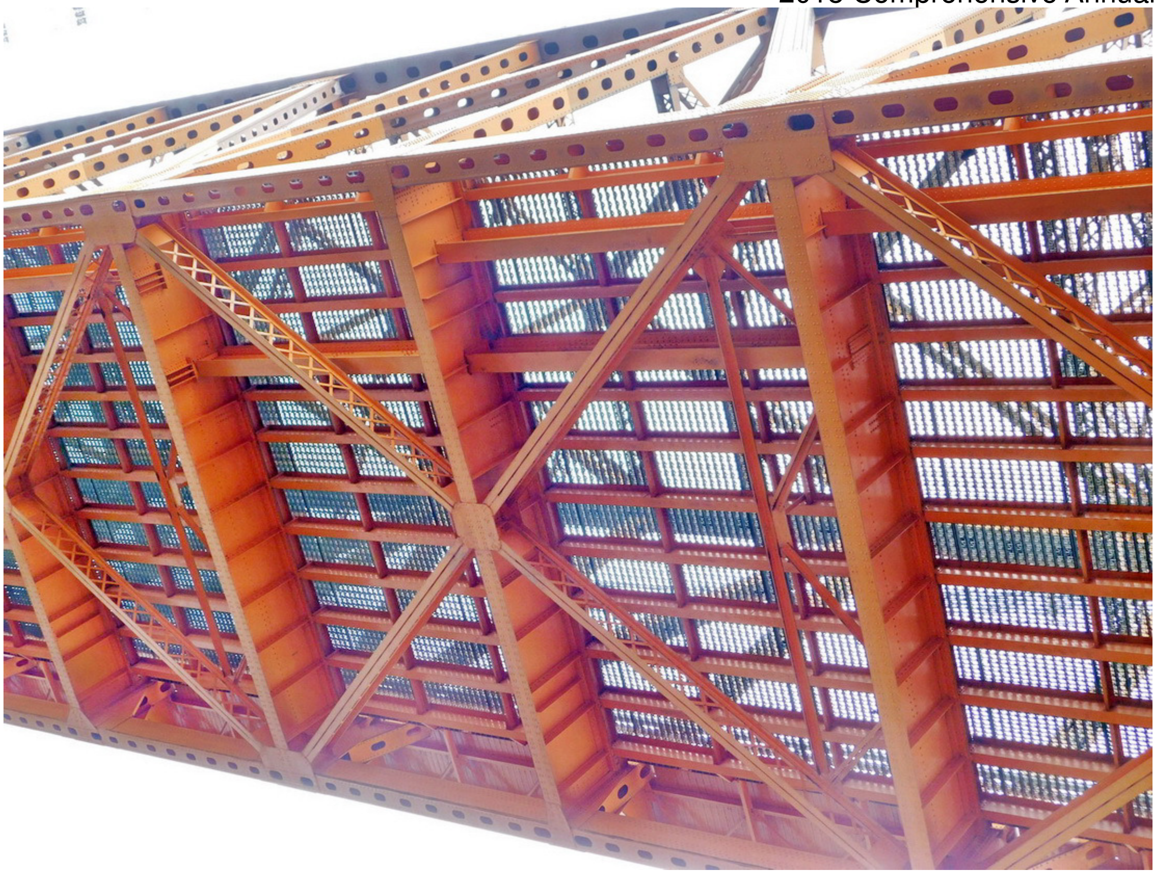
242 General View of Lift Span Underside from SW Corner

243 General Underside View of Lift Span from NW Corner

244 Underside of Lift Span at South Section (Bay 1 & 2) from SW

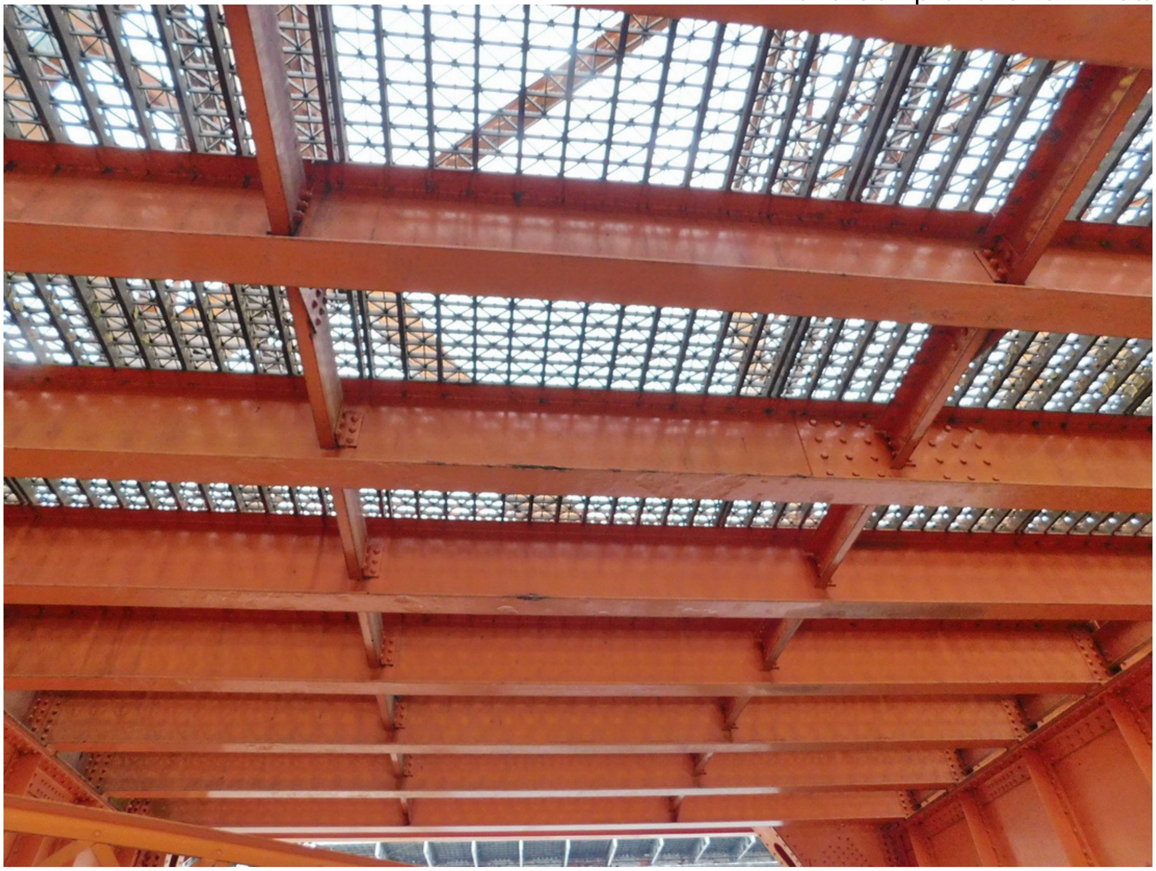
245 Underside of Lift Span at South Central Section (Bay 3 to 5), looking North

246 Underside of Lift Span at Central Section (Bay 5 to 8), looking North



247 Underside of Lift Span at North Central Section (Bay 8 to 11) looking South

248 Underside of Lift Span at North Section (Bay 12 & 13), looking West



249 Steel Stringers in Bay 2 below Deck Grating in Lift Span, looking West (TYP)

250 End Floor Beam at South Tower (Beam A1-B1), looking West

251 End Floor Beam @ North Tower (Beam A13-B13), looking West

252 Typical Main Steel Floor Beam on underside of Lift Span, Beam A3-B3 looking West Shown

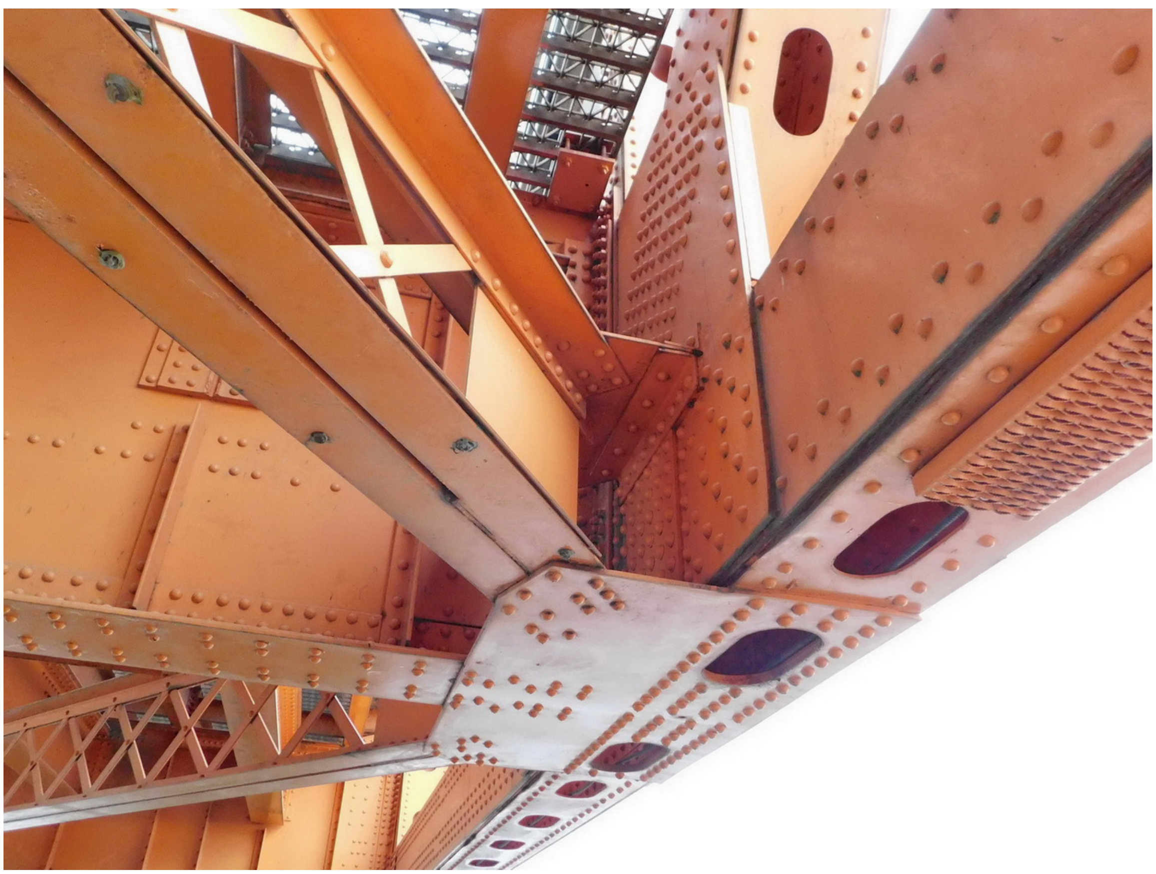
253 Intermediate Floor Beam A2-B2 and Stringers in Lift Span Bay 1, looking North (TYP)

254 Intermediate Floor Beam A12-B12 and Stringers in Bay 13 of Lift Span, looking Southwest (TYP)

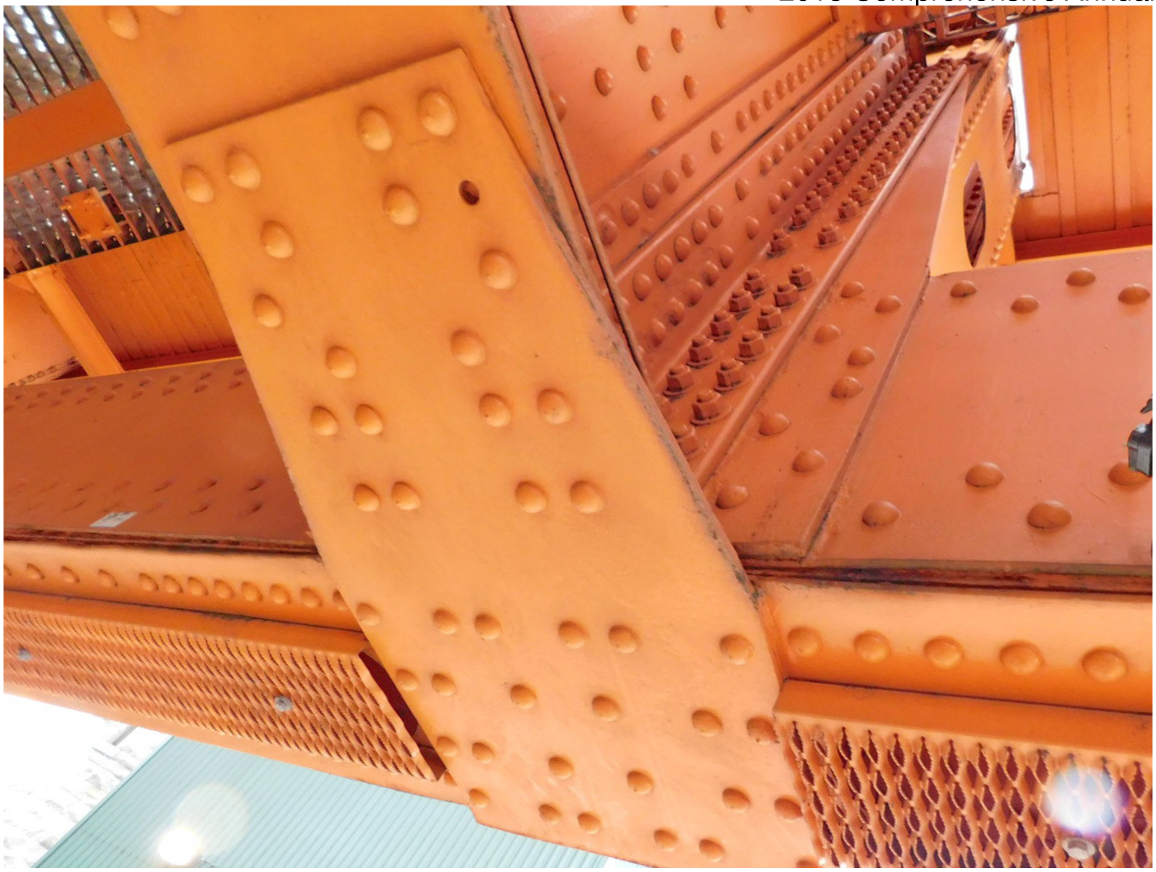
255 East Truss Bottom Chord from South

256 West Truss Bottom Chord from North

257 Truss Connection at Node Point B1, South End Floor Beam (TYP)



258 Typical Truss Bottom Chord Connection @ Main Floor Beam, Node Point A2 Shown



259 Typical Truss Bottom Chord Connection at Intermediate Floor Beam, Node Point B2 Shown

260 East Truss Bottom Chord Connection at Mid Section of lift Span, Node Points A7 & A8 looking West

261 West Truss Bottom Chord Connections at Central Section of Lift Span, Node Points B6 to B9 looking North

262 Typical Sway Bracing at Main Floor Beam, North Bracing at Floor Beam A13-B13 looking West Shown

263 Typical Lateral Bracing at Intermediate Floor Beam, Beam A2-B2 looking West Shown

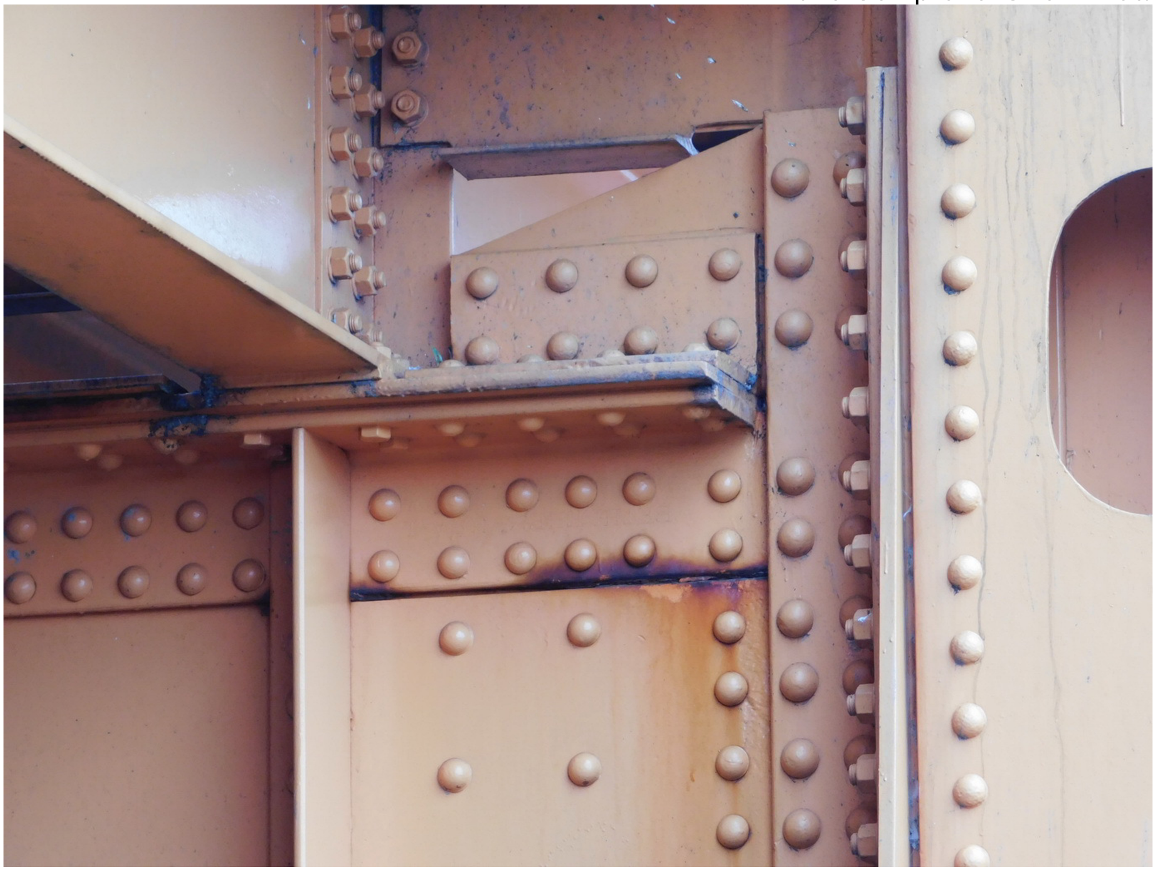
264 Local Light Surface Rust on Stringer 4 in Bay 1

265 Local Light Surface Rust on Stringer 7 in Bay 12

266 Local Light Rust Jacking on Gusset Plate & Centering Shoe at Bottom of South Floor Beam A1-B1

267 Localized Rust Jacking on Stiffener Angles on North Floor Beam A13-B13 (TYP)

268 Local Light Surface Rust on Bottom of North Floor Beam A13-B 13 @ Centering Shoe



269 Typical Localized Area of Surface Rust on Steel Floor Beam, Beam A2-B2 looking North Shown

270 Typical Localized Light Corrosion on Truss Bottom Chord

271 Typical Painted-over Pitted Stringer Surface at Lift Span, Stringer 6 in Bay 12 Shown

272 Typical Painted-over Pitted Diaphragm Surface at Stringer Connection, Stringer 9 at Bay 1 Shown

273 Painted-over Pitted West Section of Floor Beam A12-B12 Surface (TYP)

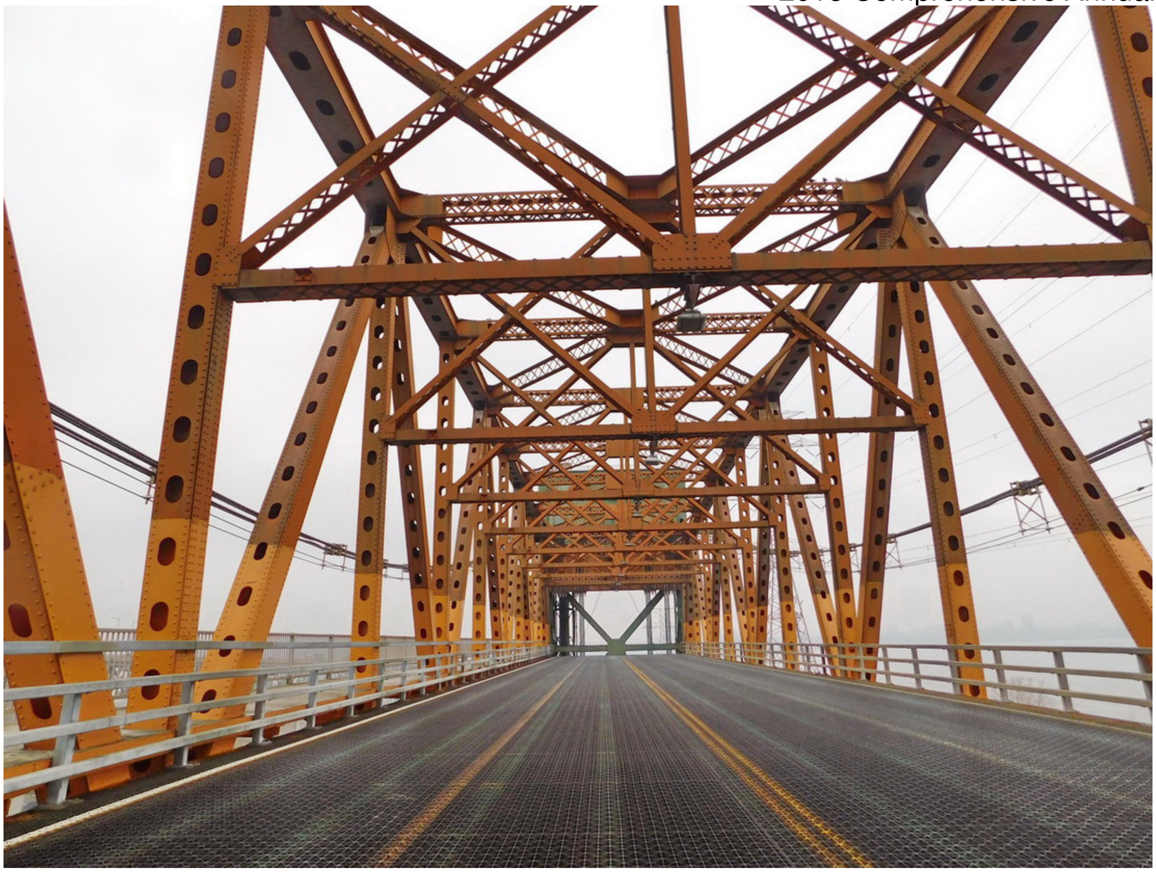
274 Painted-over Pitted Bottom Surface of Lateral Bracing in Bay 12 (TYP)

275 Painted-over Pitted Gusset Plate Surface at North Centering Shoe (TYP)

276 Missing Bolt & Rivet on Steel Plate for Span Lock behind East Corner of South Floor Beam (Node A1)

277 Southeast Lower Guide Roller Assembly at Lift Span

278 Severe Corrosion on North Railing Post atop SE Lower Guide Roller Assembly



279 General View of Steel Truss above Deck at Lift Span, looking North

280 Typical Lifting Girder, South Girder Shown


281 Typical Rust Stains & Light Corrosion on Portal Strut & Bracing, North Portal Shown


282 Typical Faded Coating & Light Surface Rust on Steel Truss above Deck


283 Peeled Coating & Light Corrosion on Gusset Plate @ South Portal Bracing (TYP)


284 Peeled Coating & Light Corrosion on Lower East Gusset at North Portal Truss

285 Typical Peeled Paint Coating at Upper Truss Connection, North BT10 Shown

286 Large Built-up of Bird Guano in Vertical Member & Peel Coating of West Truss below Node BT12

287 General View of Steel Bearings at South End of Lift Span, looking East

288 General View of Bearings at North End of Lift Span, looking West

289 Steel Saddle Bearing @ Southwest Corner of Lift Span, looking East

290 Saddle Bearing & Air Cushion @ Southeast Corner of Lift Span, looking East

291 Steel Rocker Bearing @ Northwest Corner of Lift Span

292 Rocker Bearing & Air Cushion at Northeast Corner of Lift Span

293 Steel Centering Bearing under Central South End of Lift Span

294 North Centering Bearing at North End of Lift Span, looking West

295 Paved-over South Abutment Joint, looking East

296 Paved-over North Abutment Joint, looking East

297 South Abutment Joint, Pattern Unsealed Cracks on Approach Asphalt at Joint, looking East

298 North Abutment Joint, Unsealed Pattern Crack adjacent to Joint on NBL looking East

299 Compression Seal Expansion Joint at South Approach & South Tower Spans, looking East

300 Compression Seal Expansion Joint at North Approach & North Tower Spans, looking East

301 Typical Rough & Local Spalls on Concrete End-dams for Compression Seal Expansion Joint, South Joint Shown

302 Typical Concrete-Asphalt Patches & Minor Spalls on End-Dams, Joint between North Approach & Tower Spans

303 Deformed & Abrasion Marks on Joint Steel Angle @ Expansion Joint @ North Approach & North Tower Span

304 Loose Compression Seal in West Section of Expansion Joint between North Approach & North Tower Span

305 Open Gap Expansion Joint @ South Tower & Lift Span Decks, looking East

306 Open Gap Finger Plate Expansion Joint @ North Tower & Lift Span Decks, looking East

307 Severe Abrasions on Top East Section of End Plate for Open Gap Expansion Joint @ South Tower & Lift Span

308 Typical Steel Beam Guiderail on Approach Span, East Guiderail on North Approach looking South Shown

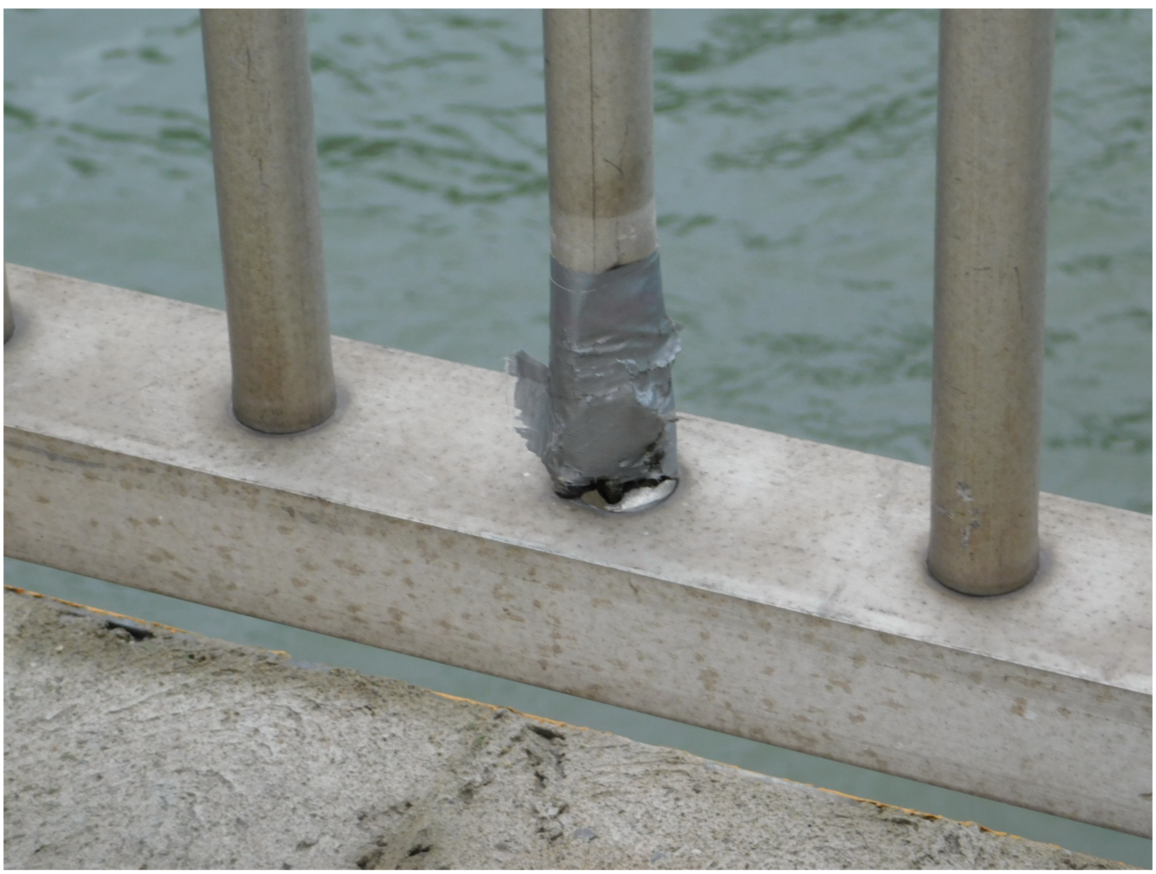

309 Typical Traffic Guiderail @ Tower Span, West Rail at South Tower Span Shown


310 Typical Traffic Railing on West Side of Lift Span

311 Typical Traffic Railing on East Side of Lift Span

312 Pedestrian Pipe Railing on West Sidewalk @ South Tower Column and Lift Span (TYP)

313 Pedestrian Railing on West Sidewalk from South Approach


314 Broken Spindle at Bottom Rail on West Pedestrian Railing in Lift Span near Node Point B5

315 Missing Nut on Splice Bolt for Top Handrail @ Post near Mid Section of Lift Span

316 Typical Loose Anchor Bolts on Pedestrian Railing Post, South Post of West Railing Shown

317 General View of West Sidewalk at Bridge from North Approach

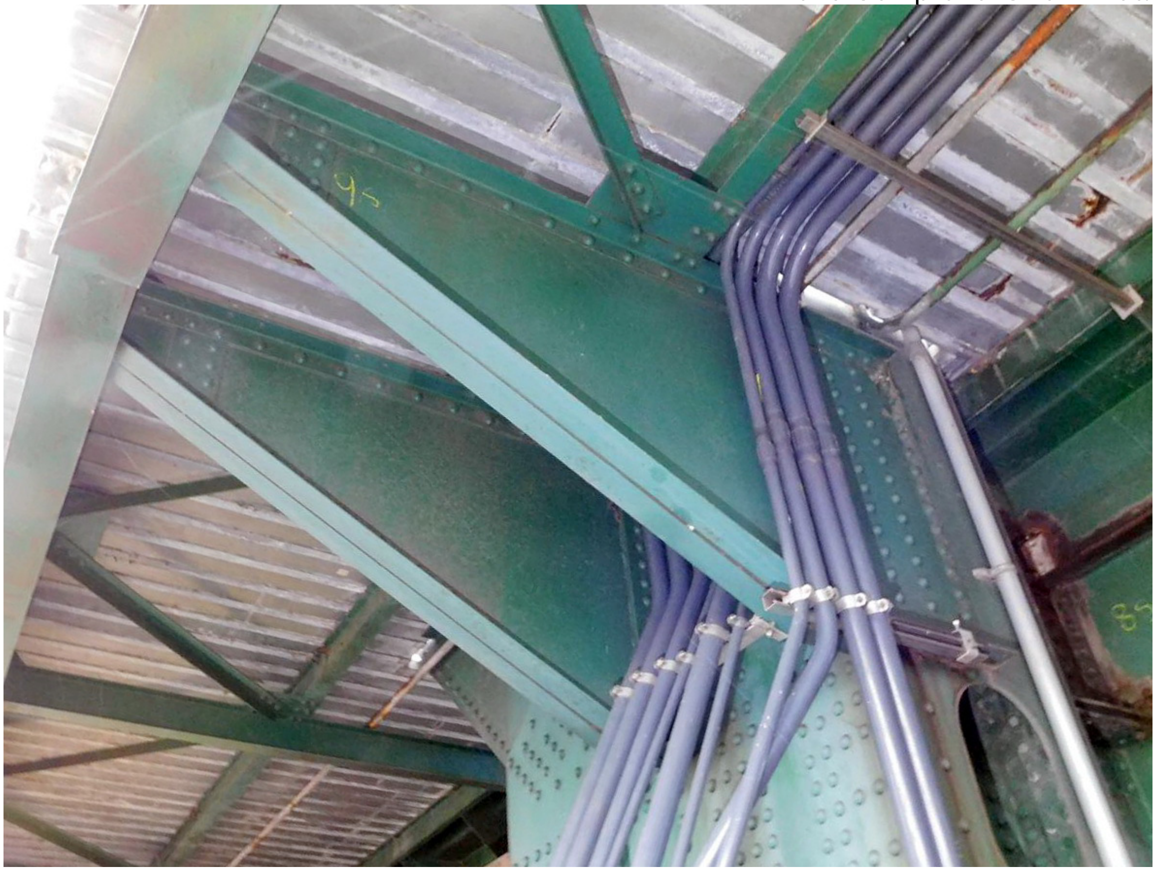
318 West Sidewalk & Pipe Railing for Swing Gate at South Approach, looking North

319 West Sidewalk at Lift Span, looking North

320 West Sidewalk at Lift Span, looking South

321 Typical Stringer 9 & Bracing at West Edge of West Sidewalk

322 Laminated Bearing @ South Abutment End of Stringer 9 (TYP)



323 Typical Stand-off Brackets Supporting Sidewalk at South Tower Column

324 Typical Bent Steel Plate on South Tower & South Approach, looking South

325 Typical Local Severe Corrosion on lower Section of Bent Curb Plate atop Stringer 8, North Abutment End Shown

326 North Approach Road & Sidewalk from North

327 Typical Unsealed Pattern Cracks on Approach Road Surface, South Approach Road looking East Shown

328 Extruder End-Treatment at End of SW Approach Guiderail, looking North

329 Severe Impact Damages on NE Approach Guiderail from Vehicular Impacts, looking South

330 Northwest Stairs, looking East

331 Southwest Stairs, looking East

332 Local Shallow Spalls on Northwest Stairs (TYP)

333 Stained Cracks & Local Shallow Spalls on Southwest Stairs (TYP)

334 Puncture Hazard from Settled Walkway at bottom of Bike Rail at NW Stairs

335 Wide Crack with Leakage on Lower Southwest Staircase Section near Retaining Wall

336 Retaining Wall & Stairs @ Southwest Corner of Bridge, looking South

337 Southwest Retaining Wall at South Section of Stairs

338 Severe Delamination & Spalls on Concrete Parapet Wall on South Perimeter @ North Tower Compound

APPENDIX A3

Inspection Forms

ELEMENT	PHOTO	MEMBER	PREV MCR	PREV PCR	NEW MCR	NEW PCR	COMMENTS	PRIORITY PREV	PRIORITY NEW
SOUTH APPROACH SPAN									
Wearing Surface	38 TO 40, 295, 297		N/A	N/A	5	5	The approach is in good condition. Few isolated light transverse cracks were observed near the expansion joint between the south approach and south tower span. Few light unsealed pattern cracks were observed at the paved over joint at the south end of the approach.	N/A	D
Curb	88		N/A	N/A	4	5	The curbs were found to be in fair to good condition. The steel plates exhibited light corrosion with local areas of light to medium corrosion. A local area of severe corrosion with perforation on bent curb was noted near the deck expansion joint near the south abutment and joint between approach and tower span.	N/A	D
Sidewalk	318		N/A	N/A	5	5	The concrete sidewalk is in good condition with few isolated narrow to medium cracks. Local small areas of light surface corrosion were noted at few locations on the steel deck sheet below the sidewalk at the south approach spans.	N/A	D
Guiderail	38 TO 40		N/A	N/A	5	5	Guiderails were found to be in good condition with no significant defects.	N/A	D
Railing	313 TO 314		N/A	N/A	5	5	The railing was found to be in good condition with no significant defects.	N/A	D
Railing Posts	313 TO 314		N/A	N/A	5	5	The railing posts were found to be in good condition with no significant defects except for a loose bolt at the south end of the railing.	N/A	D
Approach Walkway & Stairs	331, 333, 335		N/A	N/A	4	5	The concrete staircase is in fair to good condition, with local spalls on the north face of the staircase, adjacent to the west retaining wall, and on the 8th step from the bottom. An isolated wide crack with leakage was noted on the lower southwest section near the retaining wall	N/A	D
Drainage	40		5	5	5	5	The approach drains were found to be free of debris with no significant defects.	D	D
Soffit	47 TO 58, 79		N/A	N/A	4	5	The concrete deck soffit is in fair condition. Active wet areas were noted in the vicinity of the paved over joint between the south end diaphragms and the abutment wall. Delamination and few medium diagonal stained cracks were noted at wet stained areas, along the east edge on the interior soffit between stringers 1 and 2, and along the length of the soffit between stringers 3 and 4. Delaminated and spalled areas were noted at heavy active wet areas on both ends between stringers 4 and 8. Few medium diagonal cracks with efflorescence and wet stains were noted near the curtain wall between stringers 1 and 4, and stringers 7 and 8.	N/A	B

ELEMENT	PHOTO	MEMBER	PREV MCR	PREV PCR	NEW MCR	NEW PCR	COMMENTS	PRIORITY PREV	PRIORITY NEW
Stringer 1	77, 78	1	N/A	N/A	1	3	Up to 31.8% section loss on the web at the south abutment. No section loss on the web at the north end of the stringer. Local area of medium to severe corrosion (up to 15% section loss) on top flange at south abutment. Light corrosion with no section loss observed on the bottom flange at the south end of the stringer.	N/A	S-A
Stringer 1 Coating	77, 78	1	N/A	N/A	3	4	Overall, the paint coating has lightly faded and light peeling along the bottom flange. The coating was found largely peeled at the south end of the stringer, below the expansion joint area and at the north end of the stringer at the longitudinal stiffeners.	N/A	A
Stringer 2		2	N/A	N/A	1	3	Up to 54.6% section loss on the web at the south abutment. Up to 2.3% section loss on the web at the north end of the stringer. Up to 3.8% section loss on the bottom flange at the north end of the stringer. Light corrosion with no section loss observed on the bottom flange at the south end of the stringer.	N/A	S-A
Stringer 2 Coating		2	N/A	N/A	3	4	Overall, the paint coating has lightly faded and light peeling along the bottom flange. The coating was found largely peeled at the south end of the stringer, below the expansion joint area and at the north end of the stringer at the longitudinal stiffener.	N/A	A
Stringer 3	83, 84	3	N/A	N/A	1	3	Up to 25.0% section loss on the web at the south abutment. Up to 2.7% section loss on the web at the north end of the stringer. Up to 3.8% section loss on the bottom flange at the north end of the stringer. Light corrosion with no section loss observed on the bottom flange at the south end of the stringers.	N/A	S-A
Stringer 3 Coating	83, 84	3	N/A	N/A	3	4	Overall, the paint coating has lightly faded and light peeling along the bottom flange. The coating was found largely peeled at the south end of the stringer, below the expansion joint area and at the north end of the stringer at the longitudinal stiffeners.	N/A	A
Stringer 4	78	4	N/A	N/A	1	3	Up to 25.6% section loss on the web at the south abutment. Up to 15.7% section loss on the web at the north end of the stringer. Up to 4.8% section loss on the bottom flange at the north end of the stringer. Up to 4.8% section loss on the bottom flange at the south end of the stringer.	N/A	S-A
Stringer 4 Coating		4	N/A	N/A	2	4	Overall, the paint coating has lightly faded and light peeling along the bottom flange. The coating was found largely peeled at the south end of the stringer, below the expansion joint area and at the north end of the stringer at the longitudinal stiffeners.	N/A	A

ELEMENT	PHOTO	MEMBER	PREV MCR	PREV PCR	NEW MCR	NEW PCR	COMMENTS	PRIORITY PREV	PRIORITY NEW
Stringer 5		5	N/A	N/A	1	3	Up to 33.9% section loss on the web at the south abutment. No section loss on the web at the north end of the stringer. No section loss observed along the bottom flange. Light paint flaking with no section loss observed on the bottom flange at north end of the stringer.	N/A	S-A
Stringer 5 Coating		5	N/A	N/A	4	4	Overall, the paint coating has lightly faded and light peeling of paint noted at the south end of stringer, below the deck expansion joint area and on the longitudinal stiffeners at the north end of the stringer.	N/A	A
Stringer 6		6	N/A	N/A	1	2	Up to 66.9% section loss on the web at the south abutment. Up to 9.9% section loss on the web at the north end of the stringer. Up to 14.3% section loss on the bottom flange at the north end of the stringer. Up to 4.8% section loss on the bottom flange at the south end of the stringer.	N/A	S-A
Stringer 6 Coating		6	N/A	N/A	3	4	Overall, the paint coating has lightly faded and light peeling along the bottom flange. The coating was found largely peeled at the south and north ends of the stringer, below the expansion joint area.	N/A	A
Stringer 7		7	N/A	N/A	1	2	Up to 42.2% section loss on the web at the south abutment. Up to 6.6% section loss on the web at the north end of the stringer. Up to 14.3% section loss on the bottom flange at the north end of the stringer. Up to 7.1% section loss on the bottom flange at the south end of the stringer.	N/A	S-A
Stringer 7 Coating		7	N/A	N/A	3	4	Overall, the paint coating has lightly faded and light peeling along the bottom flange. The coating was found largely peeled at the south and north ends of the stringer, below the expansion joint area.	N/A	A
Stringer 8	81, 86, 89, 90	8	N/A	N/A	1	2	Up to 33.9% section loss on the web at the south abutment. Up to 2.5% section loss on the web at the north end of the stringer. Up to 47.6% section loss on the top flange at the 1st standoff bracket from the south tower. Up to 9.5% section loss on the bottom flange at the north end of the stringer. Up to 33.3% section loss on the bottom flange at the south end of the stringer.	N/A	S-A
Stringer 8 Coating	81, 86, 89, 90	8	N/A	N/A	2	4	Overall, the paint coating has lightly faded and light to medium peeling along the top and bottom flange. The coating was found largely peeled at the south and north ends of the stringer, below the expansion joint area.	N/A	A

ELEMENT	PHOTO	MEMBER	PREV MCR	PREV PCR	NEW MCR	NEW PCR	COMMENTS	PRIORITY	
								PREV	NEW
Sidewalk Stringer (Stringer 9)		9	N/A	N/A	5	5	Overall, the stringer is in good condition with local areas of light paint peeling. Local areas of light surface corrosion with no observed section loss was noted at the bottom flange near the south end of the stringer. Left over holes were noted on the web from construction of the sidewalk and railing.	N/A	D
Sidewalk Stringer Coating (Stringer 9)		9	N/A	N/A	5	5	Overall, the paint coating has lightly faded and peeled at local areas along the bottom and top flange.	N/A	D
Sidewalk Bracing			N/A	N/A	5	5	The sidewalk bracings are in good condition overall with exception to local areas of light paint peeling.	N/A	D
Sidewalk Bracing Coating			N/A	N/A	5	5	Local areas of paint coating has lightly faded with local areas of light paint peeling.	N/A	D
South Abutment Diaphragms	79, 81, 82, 92		N/A	N/A	1	2	The south abutment diaphragms exhibit very severe corrosion with severe section loss on the web sections. Up to 45.2% section loss was observed between stringers 1&2. Up to 25.3% section loss was observed between stringers 2&3. Up to 22.8% section loss was observed between stringers 3&4. Up to 57.7% section loss was observed between stringers 4&5. Up to 17.8% section loss was observed between stringers 5&6. Up to 14.3% section loss was observed between stringers 6&7. Up to 65.1% section loss was observed between stringers 7&8. Gusset plate for connection of the diaphragm and stringers at diphragm 7-8SA was found heavily corroded and perforated.	N/A	S-A
South Abutment Diaphragms Coating	79, 81, 82, 92		N/A	N/A	2	3	The south abutment diaphragms coating is lightly faded and largely peeled along both the front and back faces of the diaphragm webs and along the top and bottom flanges. Worse peeling of coating is evident on the back faces of all south abutment diaphragms.	N/A	S-A
Intermediate Diaphragm	47 TO 49		N/A	N/A	5	5	Overall, the intermediate diaphragms are in good condition with no observable section loss. Local areas of light surface corrosion was noted at areas where light paint peeling has occurred.	N/A	D
Intermediate Diaphragms Coating	47 TO 49		N/A	N/A	5	5	Local areas of paint coating has lightly faded with local areas of light paint peeling.	N/A	D

ELEMENT	PHOTO	MEMBER	PREV MCR	PREV PCR	NEW MCR	NEW PCR	COMMENTS	PRIORITY PREV	PRIORITY NEW
Linking Diaphragms	55, 85		N/A	N/A	1	2	The linking diaphragms are located under the expansion joint between the approach and tower spans, as the bottom flange of the stringers for the approach span and tower span were found rigidly bolted to the same rear floor beam. The linking diaphragms and their respective stiffener plates were found to exhibit local areas of light to very severe corrosion, with up to 50.1% section loss found on the web at the lower east side of diaphragm 4-5. No observable section loss on the web between stringer 1&2. Up to 4.9% section loss on the web between stringer 2&3. Up to 9.9% section loss on the web between stringer 3&4. Up to 50.1% section loss on the web between stringer 4&5. Up to 8.6% section loss on the web between stringer 5&6. Up to 5.7% section loss on the web between stringer 6&7. Up to 1.2% section loss on the web between stringer 7&8.	N/A	S-A
Linking Diaphragms Coating	55, 85		N/A	N/A	1	2	Overall, the painting coating was found to be lightly faded and largely peeled along the diaphragm flanges and both web faces.	N/A	S-A
South Abutment Bearings	21, 22, 24		5	4	5	4	The east bearings under stringers 1 to 3 were exhibiting light bulging. Light to medium corrosion was noted on the bearing shoe plates. Bearing under stringer number 4 was found to exhibit eastward tilting of approximately 8mm.	D	D
South Abutment Wall	7, 9 TO 12		3	4	4	4	The south concrete abutment exhibits a few large concrete patches and several medium and wide vertical cracks. A crack showing wet and rust stains and delaminated areas were noted on the east section of the south abutment wall. There is a wide diagonal crack with wet (seepage of water) and efflorescence stains at the top west corner area of the south wall.	B	B
South Ballast Wall	17, 18		3	3	3	3	The south ballast wall is largely wet stained with several narrow cracks and a few medium vertical cracks. Heavy rust stains, cracks, and small spalled areas were also evident on the interior section of the ballast walls. There is a large delamination area on the south ballast wall near Stringer 7.	B	B
East Wingwall	32		N/A	N/A	5	5	Few narrow to medium vertical cracks were noted on the southeast wingwall.	N/A	D
West Wingwall	33		N/A	N/A	5	5	Few narrow to medium vertical cracks were noted on the southwest wingwall.	N/A	D
East Retaining Wall			N/A	N/A	5	5	Few narrow to medium vertical cracks were noted on the east retaining wall.	N/A	D
West Retaining Wall			N/A	N/A	5	5	A medium vertical crack and few small areas of concrete patches were noted near midsection of the southwest retaining wall.	N/A	D

ELEMENT	PHOTO	MEMBER	PREV MCR	PREV PCR	NEW MCR	NEW PCR	COMMENTS	PRIORITY PREV	PRIORITY NEW
Curtain Wall	26 TO 27, 31		N/A	N/A	5	5	Local light shallow spall was observed on the east section. Few narrow to medium vertical cracks were noted on the south curtain wall.	N/A	D
SOUTH TOWER SPAN									
Wearing Surface	103 TO 105		N/A	N/A	5	5	The approach is in good condition with exception to a local small area of light depression with few light pattern unsealed cracks on the southbound lanes.	N/A	D
Concrete End Dams	299, 301		N/A	N/A	4	5	The concrete end-dams are in fair condition. The concrete end-dams exhibit light to medium scaling. Localized small areas of shallow spalls and few patch-repairs. Previous concrete patches and recent asphalt patches were noted on the concrete end-dam surface.	N/A	D
Steel Armouring	40, 299, 307		N/A	N/A	4	5	The steel armouring is in fair to good condition with exception to severe abrasions at the end plates on the northbound lanes near the open gap expansion joint.	N/A	D
Seals	90, 299		N/A	N/A	1	1	Active wet areas and severe defects on the structural steel below indicates that the expansion joint is leaking.	N/A	B
Curb	213		N/A	N/A	4	5	The curbs were found to be in fair to good condition. The steel plates exhibited light corrosion with local areas of light to medium corrosion.	N/A	D
Sidewalk	212		N/A	N/A	5	5	The concrete sidewalk is in good condition with few isolated narrow to medium cracks.	N/A	D
Guiderail	309		N/A	N/A	5	5	Guiderails were found to be in good condition with no significant defects.	N/A	D
Railing	318		N/A	N/A	5	5	The railing was found to be in good condition with no significant defects.	N/A	D
Railing Posts	318		N/A	N/A	5	5	The railing posts were found to be in good condition with no significant defects.	N/A	D
Soffit	114 TO 121		N/A	N/A	4	5	The concrete soffit is in fair condition. Wet stained areas were noted below the deck expansion joints at the linking diaphragms, and in the vicinity of the open gap joint between the north end and edge diaphragms. An isolated light stained diagonal crack was noted on the heavy wet area at the southeast end between stringers 1 and 2. Local areas of delamination were noted on the southend between stringers 1 and 2, and along the edge of stringer 8. An isolated delamination on the soffit at the linking diaphragm of stringer 4.	N/A	B
Stringer 1	123	1	N/A	N/A	2	3	Up to 4.0% section loss on the web at the south end of the stringer. Up to 6.7% section loss on the web at the north end of the stringer. Up to 9.5% section loss on the top and bottom flanges at the north end of the stringer. Up to 17.6% section loss on the bottom flange at the south end of the stringer.	N/A	S-A

ELEMENT	PHOTO	MEMBER	PREV MCR	PREV PCR	NEW MCR	NEW PCR	COMMENTS	PRIORITY PREV	PRIORITY NEW
Stringer 1 Coating	123	1	N/A	N/A	2	4	Overall, the paint coating has lightly faded and light peeling along the bottom flange. The coating was found largely peeled at the bottom flange of both ends and the top flange on the north end of the stringer.	N/A	A
Stringer 2	118	2	N/A	N/A	4	5	Up to 6.7% section loss on the web at the south end of the stringer. Up to 9.3% section loss on the web at the north end of the stringer. Up to 9.5% section loss on the bottom flange at both ends of the stringer.	N/A	S-A
Stringer 2 Coating	118	2	N/A	N/A	3	5	Overall, the paint coating has lightly faded and light peeling along the bottom flange. The coating was found largely peeled on the bottom flange of both ends of the stringer.	N/A	A
Stringer 3	118	3	N/A	N/A	4	5	Up to 9.3% section loss on the web at the north end of the stringer. Up to 3.8% section loss on the bottom flange at the north end of the stringer. Up to 4.8% section loss on the bottom flange at the south end of the stringer.	N/A	S-A
Stringer 3 Coating	118	3	N/A	N/A	3	5	Overall, the paint coating has lightly faded and light peeling along the bottom flange. The coating was found largely peeled on the bottom flange at both ends of the stringer.	N/A	A
Stringer 4	122	4	N/A	N/A	1	2	Up to 6.4% section loss on the web at the south end of the stringer. Up to 16.4% section loss on the web at the north end of the stringer. Up to 29.5% section loss on the bottom flange at the south end of the stringer. Heavy corrosion with no section loss was observed on the top flanges at both ends and bottom flange at the north end of the stringer.	N/A	S-A
Stringer 4 Coating	122	4	N/A	N/A	3	5	Overall, the paint coating has lightly faded at local areas between the south floor beam and north floor beam, and light peeling on the web at both ends. The coating was found largely peeled on the top and bottom flanges at the both ends of the stringers.	N/A	A
Stringer 5		5	N/A	N/A	5	5	Overall, the stringer is in good condition with local areas of light paint peeling. Local areas of light surface corrosion with no observed section loss was noted on bottom flange at the north end of the stringer.	N/A	D
Stringer 5 Coating		5	N/A	N/A	5	5	Overall, the paint coating has lightly faded and light peeling along the bottom flange.	N/A	D
Stringer 6		6	N/A	N/A	5	5	Overall, the stringer is in good condition with local areas of light paint peeling. Local areas of light surface corrosion with no observed section loss was noted on the bottom flange at the south end of the stringer.	N/A	D
Stringer 6 Coating		6	N/A	N/A	5	5	Overall, the paint coating has lightly faded at both ends. The south end exhibits light peeling along the bottom flange.	N/A	D

ELEMENT	PHOTO	MEMBER	PREV MCR	PREV PCR	NEW MCR	NEW PCR	COMMENTS	PRIORITY PREV	PRIORITY NEW
Stringer 7		7	N/A	N/A	4	5	Overall, the stringer is in good condition with local areas of light paint peeling. Light surface corrosion with no observed section loss was noted on the longitudinal stiffener at the south end of the stringer. Up to 9.5% section loss on the bottom flange at the south end of the stringer.	N/A	S-A
Stringer 7 Coating		7	N/A	N/A	4	5	Overall, the paint coating has lightly faded at local areas of the stringer. Partially peeled coating was noted on the bottom flange and longitudinal stiffeners at the south end of the stringer.	N/A	D
Stringer 8		8	N/A	N/A	3	5	Local areas of light surface corrosion with no observed section loss was noted on the longitudinal stiffener at the south end and on the top flange at both ends of the stringer. Up to 11.0% section loss on the bottom flange at the south end of the stringer.	N/A	S-A
Stringer 8 Coating		8	N/A	N/A	4	5	Overall, the paint coating has lightly faded and light peeling along the bottom flange. The coating was found largely peeled at the south end of the stringer below the expansion joint area.	N/A	D
Sidewalk Stringer (Stringer 9)		9	N/A	N/A	5	5	Overall, the stringer is in good condition with local areas of light paint peeling.	N/A	D
Sidewalk Stringer Coating (Stringer 9)		9	N/A	N/A	5	5	Overall, the paint coating has lightly faded and light peeling along the bottom flange.	N/A	D
Sidewalk Bracing			N/A	N/A	5	5	The sidewalk bracings are in good condition overall, with local areas of light paint peeling.	N/A	D
Sidewalk Bracing Coating			N/A	N/A	5	5	Local areas of paint coating has lightly faded with local areas of light paint peeling.	N/A	D
North Diaphragms	123		N/A	N/A	5	5	Overall, the north end diaphragms are in good condition with no observable section loss. Local areas of light corrosion with no section loss was noted on the vertical stiffener plate at both end diaphragms, and top and bottom flange at diaphragms between stringers 3&4.	N/A	D
North Diaphragms Coating	123		N/A	N/A	4	5	The north diaphragms coating is lightly faded with local areas of light peeling along the bottom flange with exception to the noted areas with light corrosion.	N/A	D

ELEMENT	PHOTO	MEMBER	PREV MCR	PREV PCR	NEW MCR	NEW PCR	COMMENTS	PRIORITY PREV	PRIORITY NEW
Intermediate Diaphragm	114 TO 116		N/A	N/A	5	5	Overall, the intermediate diaphragms are in good condition with no observable section loss.	N/A	D
Intermediate Diaphragms Coating	114 TO 116		N/A	N/A	5	5	Overall, the paint coating has lightly faded, with local areas of light paint peeling.	N/A	D
Linking Diaphragms	85, 124		N/A	N/A	1	2	The linking diaphragms are located under the expansion joint between the approach and tower spans, as the bottom flange of the stringers for the approach span and tower span were found rigidly bolted to the same rear floor beam. The linking diaphragms and their respective stiffener plates were found to exhibit local areas of light to very severe corrosion, with up to 50.1% section loss found on the web at the lower east side of diaphragm 4-5. No observable section loss on the web between stringer 1&2. Up to 4.9% section loss on the web between stringer 2&3. Up to 9.9% section loss on the web between stringer 3&4. Up to 50.1% section loss on the web between stringer 4&5. Up to 8.6% section loss on the web between stringer 5&6. Up to 5.7% section loss on the web between stringer 6&7. Up to 1.2% section loss on the web between stringer 7&8.	N/A	S-A
Linking Diaphragms Coating	85, 124		N/A	N/A	1	2	Overall, the painting coating was found to be lightly faded and largely peeled along the diaphragm flanges and both web faces.	N/A	A
Edge Diaphragms	125		N/A	N/A	1	2	The north edge diaphragms were found to exhibit medium to very severe corrosion. Up to 25.0% section loss on the web between stringers 1 and 2. Up to 9.1% section loss on the web between stringers 2 and 3. Up to 29.6% section loss on the web between stringers 3 and 4. Up to 20.0% section loss on the web between stringers 4 and 5. Up to 16.0% section loss on the web between stringers 5 and 6. No observable section loss on the web between stringers 6 and 7. Up to 6.7% section loss on the web between stringers 7 and 8.	N/A	S-A
Edge Diaphragms Coating	125		N/A	N/A	1	2	The edge diaphragms coating is lightly faded along the outside face of the diaphragm webs. The coating was noted as largely peeled along the inside face of the webs, and top and bottom flanges, between stringers 1&2 to 4&5.	N/A	A

ELEMENT	PHOTO	MEMBER	PREV MCR	PREV PCR	NEW MCR	NEW PCR	COMMENTS	PRIORITY PREV	PRIORITY NEW
Front Floor Beam	151 TO 153	T1-T2	N/A	N/A	1	2	The front floor beam exhibits local areas of light to medium corrosion on the web and large areas of medium to very severe corrosion on the flange. Large areas of corrosion were noted along multiple areas on the top and bottom flange (worst areas were found on the top flange). Up to 10% section loss on the stiffener plates at the top and bottom corners at east connection Up to 8.3% section loss on the top flange between stringers 2 and 3. Up to 25.0% section loss on the top flange between stringers 3 and 4.	N/A	S-A
Front Floor Beam Coating	152 TO 153	T1-T2	N/A	N/A	4	5	The front floor beam coating is lightly faded in local areas on the interior and exterior faces of the web, and along the entire bottom flange. Large local areas of paint peeling was noted on the top flange.	N/A	A
Rear Floor Beam	146 TO 150	T3-T4	N/A	NA	1	2	The rear floor beam exhibits large local areas of light to very severe corrosion. Heavy corrosion with up to 5.0% section loss was noted on the lower west section of the web and bottom flange. Large areas of severe to very severe corrosion were noted along multiple areas on the top and bottom flange (worst areas were found on the top flange). The max section loss being: 58.3% on the top flange between stringers 4&5. Up to 25.0% section loss on the top flange between stringers 1 and 2. No section loss was evident on the top flange between stringers 2 and 3. Up to 33.3% section loss on the top flange between stringers 3 and 4. Up to 58.3% section loss on the top flange between stringers 4 and 5. Up to 25.0% section loss on the top flange between stringers 5 and 6. Up to 16.7% section loss on the top flange between stringers 6 and 7. No section loss was evident on the top flange between stringers 7 and 8.	N/A	S-A
Rear Floor Beam Coating	146 TO 150	T3-T4	N/A	NA	3	5	The rear floor beam coating has local areas of lightly faded paint with large areas of peeling along the top and bottom flanges. Local large areas of paint peeling were evident on the web and bottom flange section of the beam at the west quadrant of the beam.	N/A	A
Jacking Girder	144, 154 TO 157	T1-T3	N/A	N/A	5	5	The jacking girder typically exhibits local areas of light to medium corrosion at the top section. No section loss was observed on the girder webs during NDT testing.	N/A	D
Jacking Girder Coating	144, 154 TO 157	T1-T3	N/A	N/A	5	5	Overall, the coating is in good condition with local areas of light paint peeling. Local areas of light rust jacking and light paint peeling was observed on the lower section of the girder.	N/A	D

ELEMENT	PHOTO	MEMBER	PREV MCR	PREV PCR	NEW MCR	NEW PCR	COMMENTS	PRIORITY PREV	PRIORITY NEW
Jacking Girder	145, 158 TO 159	T2-T4	N/A	N/A	5	5	The jacking girder typically exhibits local areas of light paint fading. No section loss was observed on the girder webs during NDT testing. Local areas of light to medium corrosion were noted at the connecting angle on the northeast end.	N/A	D
Jacking Girder Coating	145, 158 TO 159	T2-T4	N/A	N/A	5	5	Overall, the coating is in good condition with local areas of light surface rust at the south end of the girder.	N/A	D
Lateral Tower Bracing	113, 115	T1-T4	N/A	N/A	5	5	The lateral bracings were observed to be in good condition. No obvservable performance deficiencies were observed.	N/A	D
Lateral Tower Bracing Coating	113, 115	T1-T4	N/A	N/A	4	5	Localized areas of light to medium corrosion and paint peeling was observed. The coating was found to be largely peeled at the southwest corner.	N/A	D
Lateral Tower Bracing	113, 115	T2-T3	N/A	N/A	5	5	The lateral bracings were observed to be in good condition. No obvservable performance deficiencies were observed.	N/A	D
Lateral Tower Bracing Coating	113, 115	T2-T3	N/A	N/A	4	5	Localized areas of light to medium corrosion and paint peeling was observed.	N/A	D
Wind Bracing	179 TO 181, 183		N/A	N/A	5	5	The wind bracings is in fair to good condition with local areas of light to medium corrosion.	N/A	D
Wind Bracing Coating	179 TO 181, 183		N/A	N/A	5	5	The wind bracings coating is in good condition with local areas of light surface rust.	N/A	D
Tower Leg	102, 211	T1-TT1	N/A	N/A	5	5	The tower leg is in fair to good condition with local areas of light paint fading. .	N/A	D
Tower Leg Coating	102, 211	T1-TT1	N/A	N/A	5	5	The tower leg coating is in good condition with local areas of light paint fading.	N/A	D
Tower Leg		T2-TT2	N/A	N/A	5	5	The tower leg is in fair to good condition. Severe corrosion was observed on the anchor bolts at the bottom plate of the northwest column.	N/A	D
Tower Leg Coating		T2-TT2	N/A	N/A	4	5	The tower leg coating is in fair condition with local areas of paint fading and paint peeling. Local area of largely peeled paint was noted on the top face of the leg base at the west side.	N/A	D
Tower Leg	102, 211	T3-TT3	N/A	N/A	5	5	The tower leg is in good condition with local areas of light paint fading.	N/A	D

ELEMENT	PHOTO	MEMBER	PREV MCR	PREV PCR	NEW MCR	NEW PCR	COMMENTS	PRIORITY PREV	PRIORITY NEW
Tower Leg Coating	102, 211	T3-TT3	N/A	N/A	5	5	The tower leg coating is in good condition with local areas of light paint fading.	N/A	D
Tower Leg		T4-TT4	N/A	N/A	5	5	The tower leg is in good condition with local areas of light paint fading.	N/A	D
Tower Leg Coating		T4-TT4	N/A	N/A	5	5	The tower leg coating is in good condition with local areas of light paint fading.	N/A	D
Diagonal Bracing	102, 211	T1-TT3	N/A	N/A	5	5	The tower bracing is in good condition overall with local areas of light fading.	N/A	D
Diagonal Bracing Coating	102, 211	T1-TT3	N/A	N/A	5	5	The coating is in good condition overall with local areas of light fading.	N/A	D
Diagonal Bracing	102, 211	T3-TT1	N/A	N/A	5	5	The tower bracing is in good condition overall with local areas of light fading.	N/A	D
Diagonal Bracing Coating	102, 211	T3-TT1	N/A	N/A	5	5	The coating is in good condition overall with local areas of light fading.	N/A	D
Diagonal Bracing		T2-TT4	N/A	N/A	5	5	The tower bracing is in good condition overall with local areas of light fading.	N/A	D
Diagonal Bracing Coating		T2-TT4	N/A	N/A	5	5	The coating is in good condition overall with local areas of light fading.	N/A	D
Diagonal Bracing		T4-TT2	N/A	N/A	5	5	The tower bracing is in good condition overall with local areas of light fading.	N/A	D
Diagonal Bracing Coating		T4-TT2	N/A	N/A	5	5	The coating is in good condition overall with local areas of light fading.	N/A	D
Horizontal Bracing	102, 211	TT1-TT3	N/A	N/A	5	5	The horizontal bracing is in good condition overall with local areas of light fading. Bird guano stains were evident on the inside face of the bracing.	N/A	D
Horizontal Bracing Coating	102, 211	TT1-TT3	N/A	N/A	5	5	The coating is in good condition overall with local areas of light fading.	N/A	D
Horizontal Bracing		TT2-TT4	N/A	N/A	5	5	The tower bracing is in good condition overall with local areas of light fading.	N/A	D

ELEMENT	PHOTO	MEMBER	PREV MCR	PREV PCR	NEW MCR	NEW PCR	COMMENTS	PRIORITY PREV	PRIORITY NEW
Horizontal Bracing Coating		TT2-TT4	N/A	N/A	5	5	The coating is in good condition overall with local areas of light fading.	N/A	D
Tower Girder	214	TT1-TT2	N/A	N/A	5	5	The tower girder is in good condition overall with local areas of light fading.	N/A	D
Tower Girder Coating	214	TT1-TT2	N/A	N/A	5	5	The coating is in good condition overall with local areas of light fading.	N/A	D
Tower Girder	103	TT3-TT4	N/A	N/A	5	5	The tower girder is in good condition overall with local areas of light fading.	N/A	D
Tower Girder Coating	103	TT3-TT4	N/A	N/A	5	5	The coating is in good condition overall with local areas of light fading.	N/A	D
Tower Anchorage Assembly	185, 189	T1	N/A	N/A	5	5	The anchorage assembly is in good condition with local areas of light paint peeling.	N/A	D
Tower Anchorage Assembly Coating	185, 189	T1	N/A	N/A	5	5	The coating is in good condition with local areas of light surface rust.	N/A	D
Tower Anchorage Assembly	186	T2	N/A	N/A	5	5	The anchorage assembly is in good condition with local areas of light paint peeling.	N/A	D
Tower Anchorage Assembly Coating	186	T2	N/A	N/A	5	5	The coating is in good condition with local areas of light surface rust.	N/A	D
Tower Anchorage Assembly	187, 191	T3	N/A	N/A	4	5	The southeast tower anchorage is in fair condition overall. Local areas of light to medium corrosion, up to 10% section loss, was typically noted on the interior surface of the anchorage assmebly.	N/A	S-A
Tower Anchorage Assembly Coating	187, 191	T3	N/A	N/A	4	5	The tower anchorage assembly coating is in fair condition overall with local areas of light fading and peeling on the interior sections.	N/A	A
Tower Anchorage Assembly	188, 190, 192	T4	N/A	N/A	3	5	The southwest tower anchorage is in poor to fair condition overall. Light to medium corrosion with up to 10% section loss, was found on the interior surface of the anchorage assembly.	N/A	S-A

ELEMENT	PHOTO	MEMBER	PREV MCR	PREV PCR	NEW MCR	NEW PCR	COMMENTS	PRIORITY PREV	PRIORITY NEW
Tower Anchorage Assembly Coating	188, 190, 192	T4	N/A	N/A	3	5	The tower anchorage assembly coating is in fair condition overall with local areas of light fading and peeling. The coating was found largely peeled at the interior section of the anchorage assembly southeast section at the bottom .	N/A	A
Concrete Pier Base	202, 204, 205, 207		N/A	N/A	4	5	The concrete pier bases are in fair to good condition overall. Local areas of delaminations and spalls were noted on the front faces. A medium crack was noted on the resurfaced concrete surface at the southwest column.	N/A	D
NORTH APPROACH SPAN									
Wearing Surface	41 TO 43, 108, 296		N/A	N/A	5	5	Few light pattern cracks and small asphalt were observed adjacent to the expansion joint on the central south end of span between the north tower span and approach span on the southbound lanes.	D	D
Curb			N/A	N/A	4	5	The curbs were found to be in fair to good condition. The steel plates exhibited light corrosion with local areas of light to medium corrosion.	D	D
Sidewalk	317, 321		N/A	N/A	5	5	The concrete sidewalk is in good condition with few isolated narrow to medium cracks. Local small areas of light surface corrosion were noted at few locations on the steel deck sheet below the sidewalk at the north approach span.	D	D
Guiderail	308 TO 309		N/A	N/A	5	5	The guiderails were found to be in good condition, with no significant defects.	D	D
Railing	317		N/A	N/A	5	5	The railing were found to be in good condition, with no significant defects.	D	D
Railing Posts	317		N/A	N/A	5	5	The railing posts were found to be in good condition, with no significant defects.	D	D
Approach Walkway & Stairs	330, 332, 334		N/A	N/A	4	5	The concrete staircase is in fair to good condition, with exception to a local spall with exposed corroded bar on the 12th step from the bottom, and local delamination area on 22nd step from the bottom. Puncture hazard from settled walkway was observed at the northwest bottom of the bike rail.	N/A	D
Drainage			5	5	5	5	The approach drains were found to be free of debris, with no significant defects.	D	D

ELEMENT	PHOTO	MEMBER	PREV MCR	PREV PCR	NEW MCR	NEW PCR	COMMENTS	PRIORITY PREV	PRIORITY NEW
Soffit	60 TO 76		N/A	N/A	4	5	The concrete deck soffit is in fair condition. The concrete soffit are wet stained areas below the deck expansion joints at the north approach and north tower spans. Active wet areas noted in vicinity of deck expansion joints betweem tower and approach spans. Large wet stained areas were noted on the interior soffit at areas between stringers 4 to 6 and a delamination area noted on the thickened soffit over the north end-diaphragm near stringer 6. Spalls and delamination areas evident on soffit at wet areas between stringers 7 and 8 at the north side of the joint and between stringers 3 and 4 at the south side of the joint. Few medium diagonal cracks with efflorescence and wet stains on the east end of the soffit.	N/A	B
Stringer 1	77, 92	1	N/A	N/A	1	3	Up to 57.5% section loss on the web at the north abutment. No section loss on the web at the south end of the stringer. Light surface rust with no section loss on the bottom flange of the stringer.	N/A	S-A
Stringer 1 Coating		1	N/A	N/A	2	4	The paint coating is lightly faded and light peeling off the bottom flange of the stringer.The coating has been found to be largely peeled on the north end of the stringer.	N/A	A
Stringer 2		2	N/A	N/A	4	5	Up to 9.1% section loss on the web at the north abutment. Light surface corrosion with no section loss was observed on the web at the south end of the stringer. Up to 4.0% section loss at the bottom flange on the south end of the stringer.	N/A	S-A
Stringer 2 Coating		2	N/A	N/A	3	4	The paint coating is lightly faded and light peeling off the bottom flange of the stringer, and at both ends of the stringer.	N/A	A
Stringer 3		3	N/A	N/A	4	5	Up to 8.0% section loss on the web at the north abutment. Up to 3.0% section loss on the web at the south end of the stringer. Light corrosion with no section loss was observed on the bottom flange of the stringer.	N/A	S-A
Stringer 3 Coating		3	N/A	N/A	3	4	Overall, the paint coating Is lightly faded and light peeling off the bottom flange of the stringer, and at both ends of the stringer.	N/A	A
Stringer 4	93	4	N/A	N/A	1	3	Up to 33.1% of section loss on the web at the north abutment. Up to 44.6% of section loss on the web at the south end of the stringer. Up to 31.0% section loss on the bottom flange of the stringer at the north abutment.	N/A	S-A

ELEMENT	PHOTO	MEMBER	PREV MCR	PREV PCR	NEW MCR	NEW PCR	COMMENTS	PRIORITY PREV	PRIORITY NEW
Stringer 4 Coating		4	N/A	N/A	2	4	Overall, the paint coating is lightly faded and light to medium peeling off the top and bottom flange of the stringer. The coating has been found largerly peeled at the north and south ends, below the expansion joint area and the south end of the longitudinal stiffeners.	N/A	A
Stringer 5		5	N/A	N/A	3	4	Up to 0.8% section loss on the web at the north abutment. Up to 10.7% section loss on the web at the south end of the stringer. Up to 14.3% section loss on the bottom flange of the stringer at the south end.	N/A	S-A
Stringer 5 Coating		5	N/A	N/A	3	4	Overall, the paint coating is lightly faded and light peeling off the bottom flange of the stringer at both ends. The coating has been found to be largely peeled on the south end of the stringer.	N/A	A
Stringer 6	96	6	N/A	N/A	1	3	Up to 0.8% section loss on the web at the north abutment. Up to 7.4% section loss on the web at the south end of the stringer. Up to 19.0% section loss on the bottom flange of the stringer at the south end. Up to 28.6% section loss on the bottom flange of the stringer at the north abutment.	N/A	S-A
Stringer 6 Coating		6	N/A	N/A	2	4	Overall, the paint coating has lightly faded and light peeling along the top and bottom flange. The coating was found largely peeled at the north end of the stringer, below the expansion joint area and at the south end of the stringer at the longitudinal stiffener.	N/A	A
Stringer 7		7	N/A	N/A	1	3	Up to 30.6% section loss on the web at the north abutment. Up to 9.1% section loss on the web at the south end of the stringer. Up to 19.1% section loss on the bottom flange of the stringer at the south end. Up to 14.3% section loss on the bottom flange of the stringer at the north abutment.	N/A	S-A
Stringer 7 Coating	91	7	N/A	N/A	2	4	Overall, the paint coating has lightly faded and light peeling along the bottom flange. The coating was found largely peeled at the north end of the stringer, and below the expansion joint area.	N/A	A
Stringer 8	91, 94, 98, 99, 100	8	N/A	N/A	1	3	Up to 5.0% section loss on the web at the north abutment. Up to 35.5% section loss on the web at the south end of the stringer. Up to 28.6% section loss on the bottom flange of the stringer at the south end. Up to 38.1% section loss on the bottom flange of the stringer at the north abutment.	N/A	S-A

ELEMENT	PHOTO	MEMBER	PREV MCR	PREV PCR	NEW MCR	NEW PCR	COMMENTS	PRIORITY PREV	PRIORITY NEW
Stringer 8 Coating		8	N/A	N/A	2	4	Overall, the paint coating has lightly faded and light to medium peeling along the top and bottom flange. The coating was found to be largely peeled at both ends of the stringer, below the expansion joint area, and at the south end of the longitudinal stiffeners.	N/A	A
Sidewalk Stringer (Stringer 9)		9	N/A	N/A	5	5	Overall, the stringer is in good condition with local areas of light paint peeling. Local areas of light surface corrosion with no observed section loss was noted at the bottom flange near the north end of the stringer. Left over holes were noted on the web from construction of the sidewalk and railing.	N/A	D
Sidewalk Stringer Coating (Stringer 9)		9	N/A	N/A	5	5	Overall, the paint coating has lightly faded and light peeling at local areas of the top and bottom flange. The coating was found largely peeled at the north and south ends of the stringer, below the expansion joint area.	N/A	D
Sidewalk Bracing			N/A	N/A	5	5	The sidewalk bracings are in good condition ovreall, with local areas of light paint peeling.	N/A	D
Sidewalk Bracing Coating			N/A	N/A	5	5	Local areas of paint coating has lightly faded, with local areas of paint peeling.	N/A	D
North Abutment Diaphragms	93		N/A	N/A	1	3	The north abutment diaphragms exhibits medium to very severe corrosion with severe section loss on the web sections. The Gusset plate connection of the diaphragm and stringers between stringers 4 and 5 at the north abutment diaphragm was observed to be heavily corroded and perforated. Up to 40.2% section loss on the web between stringer 1&2 Up to 10.4% section loss on the web between stringer 2&3 Up to 9.1% section loss on the web between stringer 3&4 Up to 15.3% section loss on the web between stringer 4&5 Up to 32.8% section loss on the web between stringer 5&6 Up to 55.2% section loss on the web between stringer 6&7 Up to 12.8% section loss on the web between stringer 7&8	N/A	S-A
North Abutment Diaphragms Coating			N/A	N/A	1	3	The north abutment diaphragms coating is lightly faded and largely peeled along both the front and back faces of the diaphragm webs and along the top and bottom flanges. Worse peeling of coating is evident on the back faces of all north abutment diaphragms.	N/A	A

ELEMENT	PHOTO	MEMBER	PREV MCR	PREV PCR	NEW MCR	NEW PCR	COMMENTS	PRIORITY PREV	PRIORITY NEW
Intermediate Diaphragm			N/A	N/A	5	5	Overall, the intermediate diaphragms are in good condition with no observable section loss. Local areas of light surface corrosion noted at areas of light paint peeling.	N/A	D
Intermediate Diaphragms Coating			N/A	N/A	5	5	Overall, the paint coating has lightly faded, with local areas of light paint peeling.	N/A	D
Linking Diaphragms	91, 97		N/A	N/A	1	4	The linking diaphragms are located below the expansion joint between the approach and tower spans, as the bottom flange of the stringers for the approach span and tower span were found rigidly bolted to the same rear floor beam. The linking diaphragms and their respective stiffeners exhibits light to very severe corrosion. Up to 2.2% section loss on the web between stringer 1&2 Light surface corrosion with no observed section loss between stringer 2&3 Up to 7.4% section loss on the web between stringer 3&4 Up to 11.4% section loss on the web between stringer 4&5 Up to 16.8% section loss on the web between stringer 5&6 Up to 23.2% section loss on the web between stringer 6&7 Up to 10.2% section loss on the web between stringer 7&8	N/A	S-A
Linking Diaphragms Coating			N/A	N/A	1	3	Overall, the paint coating has lightly faded and large areas of paint peeling on the flanges and webs of the diaphragms.	N/A	A
North Abutment Bearings	23, 25		5	4	5	4	The north abument bearings are in good condition with exception to light bulging on the rubber surface of the east bearings unders stringers 1 to 3.	D	D
North Abutment Wall	8, 13 TO 16		4	4	4	4	The north concrete abutment walls exhibits several light to medium and few medium to severe delamination areas. There are few large concrete patches, and some areas of wet stains and few isolated medium to wide vertical cracks .	B	B
North Ballast Wall	19-20		3	3	3	3	The north ballast wall exhibited small spalls, several narrow cracks and few medium verticals. A severely corroded steel bar noted in local spalled area adjacent to vertical expansion joint between stringers 4 and 5. Heavy rust stains and wet stained areas were noted at the top of the ballast wall.	B	B
East Wingwall	35		N/A	N/A	4	5	Medium to wide vertical crack near the upper mid-section of the northeast wingwall.	D	D

ELEMENT	PHOTO	MEMBER	PREV MCR	PREV PCR	NEW MCR	NEW PCR	COMMENTS	PRIORITY PREV	PRIORITY NEW
West Wingwall	34, 37		N/A	N/A	4	4	A small shallow spall with exposed reinforcing steel with light rust stains were observed on the Northwest wingwall. Narrow to medium efflorescent stained cracks and local small spall on top south corner of wingwall. Local concrete patch noted near the bottom of the wingwall.	D	D
East Retaining Wall			N/A	N/A	5	5	A few narrow to medium vertical cracks were noted on the east retaining wall.	D	D
West Retaining Wall			N/A	N/A	5	5	A few narrow to medium vertical cracks were noted on the west retaining wall.	D	D
Curtain Wall	28 TO 30		N/A	N/A	5	5	A few narrow and narrow to medium vertical cracks were noted on the north curtain wall. Local area of wet staining was observed near stringer 8.	D	D
NORTH TOWER SPAN									
Wearing Surface	104, 105		N/A	N/A	5	5	The asphalt wearing surface is in good condition, a few unsealed light transverse cracks were noted in the southbound lanes and northbound lane 1, adjacent to the north expansion joint. A light unsealed transverse crack was noted adjacent to the south expansion joint in southbound lane 1.	N/A	D
Concrete End Dams	300, 302		N/A	N/A	3	5	The concrete end dams are in fair condition. Local areas of light to medium scaling was noted along the end dams. Minor spalling is noted adjacent to the steel armouring in southbound lane 1. Two concrete patch repairs were noted in northbound lane 1 adjacent to the steel armouring. A few asphalt patch repairs were noted on the concrete end dams in southbound lane 2 and northbound lane 1.	N/A	B
Steel Armouring	300, 303		N/A	N/A	4	5	The steel armouring is in fair to good condition overall. Local area of deformation and minor abrasions noted in southbound lane 2. Few local repairs noted in northbound lane 1.	N/A	B
Seals	300, 304		N/A	N/A	1	1	Active wet areas and severe defects on the structural steel below indicate that the expansion joint is leaking. Cracks in the rubber seal was evident at southbound lane 2.	N/A	B
Open Gap Finger Joint	109, 112, 137, 306		5	5	5	5	The open gap steel joints were found in good condition except for some abrasion marks from plow blades on the top surface of the armour plate at the east section of the joint.	N/A	D
Curb	308		N/A	N/A	4	5	A bent steel curb plate is present on the east and west side of the traffic lanes. The steel plate is in fair condition overall with light surface corrosion and localized areas of medium corrosion on the top surface.	N/A	D

ELEMENT	PHOTO	MEMBER	PREV MCR	PREV PCR	NEW MCR	NEW PCR	COMMENTS	PRIORITY PREV	PRIORITY NEW
Sidewalk			N/A	N/A	5	5	The sidewalk is in good condition overall with a few isolated narrow to medium cracks.	N/A	D
Guiderail	308, 309		N/A	N/A	5	5	Guiderails were found to be in good condition with no significant defects.	N/A	D
Railing			N/A	N/A	5	5	The railing was found to be in good condition with no significant defects.	N/A	D
Railing Posts			N/A	N/A	5	5	The railing posts were found to be in good condition with no significant defects.	N/A	D
Soffit	126 TO 135		N/A	N/A	4	5	The concrete soffit below is in fair condition overall. The soffit is wet stained at areas below the deck expansion joints, with active wet areas on the soffit in the vicinity of the deck expansion joint between the north approach and tower spans. Large wet staining areas were noted on the interior soffit at areas between stringers 4 to 6. Local spalled and delaminated areas were also noted in the wet areas on the soffit between stringers 7 and 8 at the south side of the joint. A few medium efflorescent stained transverse cracks was also noted on the interior soffit between stringers 3 and 4 near the intermediate diaphragms and near the south end of the tower span between stringers 1 and 2.	N/A	B
Stringer 1		1	N/A	N/A	2	4	Up to 16.4% section loss on the web at the south end of the stringer. Light surface corrosion with no section loss section was found on the web at the north end of the stringer. Light corrosion with no section loss was observed along the bottom flange.	N/A	S-A
Stringer 1 Coating		1	N/A	N/A	3	5	Overall, the paint coating has lightly faded and light peeling along the bottom flange. The coating was found largely peeled at the south end of the stringer and at the north end of the stringer at the longitudinal stiffeners.	N/A	A
Stringer 2		2	N/A	N/A	5	5	Overall, the stringer was found to exhibit light surface corrosion at both north and south ends of the girder. No section loss was found on the stringer webs during NDT testing. Up to 4.8% section loss was observed on the bottom flange at the south end of the stringer.	N/A	D
Stringer 2 Coating		2	N/A	N/A	5	5	Overall, the paint coating has lightly faded with light to medium paint peeling observed at both north and south ends of the stringers.	N/A	D
Stringer 3		3	N/A	N/A	2	3	Up to 17.1% section loss on the web at the south end of the stringer. Up to 18.2% section loss on the web at the north end of the stringer. Light corrosion was observed along the bottom flange, with up to 4.76% section loss at the south end of the stringer.	N/A	S-A

ELEMENT	PHOTO	MEMBER	PREV MCR	PREV PCR	NEW MCR	NEW PCR	COMMENTS	PRIORITY	
								PREV	NEW
Stringer 3 Coating		3	N/A	N/A	3	5	Overall, the paint coating has lightly faded and light peeling along the bottom flange. The coating was found largely peeled at the south end of the stringer and at the north end of the stringer at the longitudinal stiffeners.	N/A	A
Stringer 4	135, 137	4	N/A	N/A	1	2	Up to 17.4% section loss on the web at the south end of the stringer. Up to 13.2% section loss on the web at the north end of the stringer. Up to 28.6% section loss on the east side of the bottom flange near midspan of the stringer. Up to 28.6% section loss on the west side of the bottom flange near the north end of the stringer.	N/A	S-A
Stringer 4 Coating	135, 137	4	N/A	N/A	3	5	Overall, the paint coating has lightly faded and light peeling along the bottom flange. The coating was found largely peeled at the both the north and south ends of the stringer.	N/A	A
Stringer 5		5	N/A	N/A	2	4	Up to 9.1% section loss on the web at the south end of the stringer. Local light surface corrosion with no section loss found on the web at the north end of the stringer. Up to 19.1% section loss on the east side of the bottom flange near the north end of the stringer.	N/A	S-A
Stringer 5 Coating		5	N/A	N/A	3	4	Overall the paint coating has lightly faded and light peeling of coating along the bottom flange of the stringer. The coating was found largely peeled at the north end of the stringer at the longitudinal stiffener, and at the south end of the stringer.	N/A	A
Stringer 6	136	6	N/A	N/A	4	5	Up to 9.1% section loss on the web at the south end of the stringer. Light surface corrosion with no section loss was observed on the web at the north end of the stringer. Light corrosion with no section loss was observed on the bottom flange of the stringer.	N/A	S-A
Stringer 6 Coating	136	6	N/A	N/A	4	4	Overall the paint coating has lightly faded and light peeling along the bottom flange. The coating was found largely peeled at south end of the stringer and at the north end of the stringer at the longitudinal stiffener.	N/A	D

ELEMENT	PHOTO	MEMBER	PREV MCR	PREV PCR	NEW MCR	NEW PCR	COMMENTS	PRIORITY PREV	PRIORITY NEW
Stringer 7		7	N/A	N/A	1	3	Up to 14.9% section loss on the web at the south end of the stringer. Light surface corrosion with no section loss was observed on the web at the north end of the stringer. Up to 23.8% section loss on the east side of the bottom flange and up to 33.3% section loss on the west side of the bottom flange at the south end of the stringer. Up to 33.3% section loss on the east side of the bottom flange at the north end of the stringer. Up to 57.1% section loss on the west side of the bottom flange at the north end of the stringer.	N/A	S-A
Stringer 7 Coating		7	N/A	N/A	1	3	Overall the paint coating has lightly faded and light peeling on the top flange and bottom flange of the stringer. The coating was found largely peeled at the south end of the stringer and at the north end of the stringer at the longitudinal stiffener.	N/A	A
Stringer 8	127, 139	8	N/A	N/A	2	4	Up to 14.9% section loss on the web at the south end of the stringer. Light surface corrosion with no observed section loss was noted along the bottom flange near midspan. Light to medium surface corrosion on exterior face near the standoff brackets. Light surface corrosion with no section loss was observed on the web at the north end of the stringer. Up to 19.1% section loss on the west side of the bottom flange at the north end of the stringer.	N/A	S-A
Stringer 8 Coating	127, 139	8	N/A	N/A	2	4	Overall the paint coating has lightly faded and light to medium peeling on the top and bottom flange of the stringer. The coating was found largely peeled at local areas on the bottom flange, at the south end of the stringer, and at the north end of the stringer at the longitudinal stiffener.	N/A	A
Sidewalk Stringer (Stringer 9)		9	N/A	N/A	5	5	Overall, the stringer is in good condition with local areas of light paint peeling. Local areas of light surface corrosion with no observed section loss.	N/A	D
Sidewalk Stringer Coating (Stringer 9)		9	N/A	N/A	5	5	Overall the paint coating has lightly faded in local areas and local light peeling on the top and bottom flange of the stringer.	N/A	D

ELEMENT	PHOTO	MEMBER	PREV MCR	PREV PCR	NEW MCR	NEW PCR	COMMENTS	PRIORITY PREV	PRIORITY NEW
Sidewalk Bracing			N/A	N/A	5	5	The sidewalk bracings are in good condition overall, with local areas of light paint peeling.	N/A	D
Sidewalk Bracing Coating			N/A	N/A	5	5	Local areas of paint coating has lightly faded, with local areas of paint peeling.	N/A	D
South Diaphragms			N/A	N/A	1	4	The south end diaphragms, located at the front floor beam are in poor to good condition with no observable section loss except for the diaphragms between stringers 1&2 and stringers 3&4. Up to 2.5% section loss was observed on the web between stringers 1&2 Up to 21% section loss was observed on the web between stringers 3&4	N/A	S-A
South Diaphragms Coating			N/A	N/A	3	5	The south end diaphragms coating is lightly faded with local areas of light peeling along the bottom flange with the exception of diaphragm between stringer 3&4 which exhibits large areas of peeling on the bottom flange and web surface.	N/A	A
Intermediate Diaphragm			N/A	N/A	5	5	Overall, the intermediate diaphragms are in good condition with no observable section loss. Local areas of light surface corrosion was noted at areas where light paint peeling has occurred.	N/A	D
Intermediate Diaphragms Coating			N/A	N/A	5	5	Local areas of paint coating has lightly faded with local areas of light paint peeling.	N/A	D
Linking Diaphragms	133, 138		N/A	N/A	1	3	The linking diaphragms are located below the expansion joint between the approach and tower spans, as the bottom flange of the stringers for the approach span and tower span were found rigidly bolted to the same rear floor beam. The linking diaphragms and their respective stiffeners exhibits light to very severe corrosion. Up to 2.2% section loss on the web between stringer 1&2 Light surface corrosion with no observed section loss between stringer 2&3 Up to 7.4% section loss on the web between stringer 3&4 Up to 11.4% section loss on the web between stringer 4&5 Up to 16.8% section loss on the web between stringer 5&6 Up to 23.2% section loss on the web between stringer 6&7 Up to 10.2% section loss on the web between stringer 7&8	N/A	S-A
Linking Diaphragms Coating	133, 138		N/A	N/A	3	4	Overall, the paint coating has lightly faded and large areas of paint peeling on the flanges and webs of the diaphragms.	N/A	A

ELEMENT	PHOTO	MEMBER	PREV MCR	PREV PCR	NEW MCR	NEW PCR	COMMENTS	PRIORITY PREV	PRIORITY NEW
Edge Diaphragms			N/A	N/A	1	3	The edge diaphragms, located at the south end of the stringers were found to exhibit medium to very severe corrosion. Up to 6.8% section loss on the web between stringers 1&2 Up to 13.6% section loss on the web between stringers 2&3 Up to 29.6% section loss on the web between stringers 3&4 Up to 15.2% section loss on the web between stringers 4&5 Up to 34.1% section loss on the web between stringers 5&6 Up to 32.5% section loss on the web between stringers 6&7 Up to 26.6% section loss on the web between stringers 7&8	N/A	S-A
Edge Diaphragms Coating			N/A	N/A	3	4	The edge diaphragms coating is lightly faded and largely peeled along both the front and back faces of the diaphragm webs and along the top and bottom flanges.	N/A	A
Front Floor Beam	161, 168 TO 171	T1-T2	N/A	N/A	1	2	The front floor beam exhibits local areas of light to medium corrosion on the web and large areas of medium to very severe corrosion on the flanges. Large areas of corrosion were noted along multiple areas on the top and bottom flange (worst areas were found on the top flange). Up to 10% section loss on the stiffener plate on rth lower web area at the bottom west end. The max section loss being: Up to 16.7% on top flange between stringers 1 to 3 Up to 33.3% section loss on the top flange between stringers 6 to 8	N/A	S-A
Front Floor Beam Coating	161, 168 TO 171	T1-T2	N/A	N/A	4	4	The front floor beam coating is lightly faded in local areas on the interior and exterior faces of the web and along the entire top and bottom flanges. Large areas of paint peeling were noted at the east and west ends of beam at the top flange beneath stringers 1-3 and 6-8.	N/A	A

ELEMENT	PHOTO	MEMBER	PREV MCR	PREV PCR	NEW MCR	NEW PCR	COMMENTS	PRIORITY PREV	PRIORITY NEW
Rear Floor Beam	160, 164 TO 168	T3-T4	N/A	NA	1	2	The rear floor beam exhibits large areas of medium to very severe corrosion. Large areas of corrosion were noted on web areas of the beam with up to 53.3% section loss was found at the lower web section beneath stringer 7. Large areas of corrosion were noted along multiple areas on the top and bottom flange (worst areas were found on the top flange). The max section loss being: Up to 25% on top flange between stringers 1&2 Up to 16.7% section loss on the top flange between stringers 2&3 Up to 25.0% section loss on the top flange between stringers 3&5 Up to 33.3% section loss on the top flange between stringers 5&6 Up to 54.2% section loss on the top flange between stringers 6&7 Up to 25% section loss on the top flange at stringer 7 Up to 33.3% section loss on the top flange at stringer 8.	N/A	S-A
Rear Floor Beam Coating	160, 164 TO 168	T3-T4	N/A	NA	2	3	The rear floor beam coating is lightly faded with large areas of peeling along the top and bottom flanges. Local large areas of paint peeling were evident on the web section of the beam at the west quadrant of the beam.	N/A	A
Jacking Girder	107, 162, 172	T1-T3	N/A	N/A	5	5	The jacking girder typically exhibits local areas of light paint fading. No section loss was observed on the girder webs during NDT testing. Local areas of light to medium rust jacking are evident on the lower section of the girder near the north and south ends.	N/A	D
Jacking Girder Coating	107, 162, 172	T1-T3	N/A	N/A	5	5	Overall, the coating is in good condition with local areas of light paint fading.	N/A	D
Jacking Girder	163, 173, 174	T2-T4	N/A	N/A	5	5	The jacking girder typically exhibits local areas of light paint fading. No section loss was observed on the girder webs during NDT testing. Local areas of light to medium rust jacking are evident on the lower section of the girder near the north and south ends. A few corroded rivets were noted at the lower section of the exterior face.	N/A	D
Jacking Girder Coating	163, 173, 174	T2-T4	N/A	N/A	5	5	Overall, the coating is in good condition with local areas of light paint fading.	N/A	D
Lateral Tower Bracing	126	T1-T4	N/A	N/A	4	5	The lateral bracings are in fair to good condition overall, with local areas of light paint fading. Light to medium surface corrosion with up to 10% section loss was noted on lower gusset plate at the southwest end of the lateral bracing. Light surface corrosion with no section loss was noted at the northeast end.	N/A	D

ELEMENT	PHOTO	MEMBER	PREV MCR	PREV PCR	NEW MCR	NEW PCR	COMMENTS	PRIORITY PREV	PRIORITY NEW
Lateral Tower Bracing Coating	126	T1-T4	N/A	N/A	5	5	The lateral tower bracing coating is lightly faded and in good condition overall. Local area of minor paint peeling was noted at the southwest end.	N/A	D
Lateral Tower Bracing		T2-T3	N/A	N/A	4	5	The lateral bracings are in fair to good condition overall, with local areas of light paint fading. Light to medium surface corrosion with up to 10% section loss was noted on the lower gusset plate at the northwest end of the lateral bracing. Light surface corrosion with no section loss was noted at southeast end of the bracing.	N/A	D
Lateral Tower Bracing Coating		T2-T3	N/A	N/A	5	5	The lateral tower bracing coating is lightly faded and overall in good condition. Local area of minor paint peeling was noted at the northwest end.	N/A	D
Wind Bracing			N/A	N/A	4	5	The wind bracings are in fair to good condition overall with local areas of paint fading and paint peeling. The wind bracings exhibit light surface corrosion, with local areas of light to medium corrosion with up to 10% section loss at the west quadrant of the wind bracings.	N/A	D
Wind Bracing Coating			N/A	N/A	4	5	The wind tower bracing coating is lightly faded and in fair to good condition. Local area of paint peeling was noted at the west quadrant.	N/A	D
Tower Leg	107	T1-TT1	N/A	N/A	5	5	The tower leg is in good condition with local areas of light paint fading.	N/A	D
Tower Leg Coating	107	T1-TT1	N/A	N/A	5	5	The tower leg coating is in good condition, local areas of light fading was evident on the outside face of the tower leg.	N/A	D
Tower Leg		T2-TT2	N/A	N/A	5	5	The tower leg is in good condition with local areas of light paint fading.	N/A	D
Tower Leg Coating		T2-TT2	N/A	N/A	5	5	The tower leg coating is in good condition, local areas of light fading was evident on the outside face of the tower leg.	N/A	D
Tower Leg	107	T3-TT3	N/A	N/A	5	5	The tower leg coating is in fair to good condition. Local areas of light fading was evident on the outside face of the tower leg. A local area of light to medium corrosion was noted at the south face of the leg base.	N/A	D
Tower Leg Coating	107	T3-TT3	N/A	N/A	5	5	The tower leg coating is in good condition, local areas of light fading was evident on the outside face of the tower leg. A local area of paint peeling was noted at the south face of the leg base.	N/A	D
Tower Leg		T4-TT4	N/A	N/A	5	5	The tower leg is in good condition with local areas of light paint fading.	N/A	D
Tower Leg Coating		T4-TT4	N/A	N/A	5	5	The tower leg coating is in good condition with local areas of light fading was evident on the outside face of the tower leg.	N/A	D
Tower - Diagonal Bracing	107	T1-TT3	N/A	N/A	5	5	The tower bracing is in good condition overall with local areas of light paint fading.	N/A	D

ELEMENT	PHOTO	MEMBER	PREV MCR	PREV PCR	NEW MCR	NEW PCR	COMMENTS	PRIORITY	
								PREV	NEW
Tower -Diagonal Bracing Coating	107	T1-TT3	N/A	N/A	5	5	The coating is in good condition overall with local areas of light fading.	N/A	D
Tower - Diagonal Bracing	107	T3-TT1	N/A	N/A	5	5	The tower bracing is in good condition overall with local areas of light paint fading.	N/A	D
Tower - Diagonal Bracing Coating	107	T3-TT1	N/A	N/A	5	5	The coating is in good condition overall with local areas of light fading.	N/A	D
Tower - Diagonal Bracing		T2-TT4	N/A	N/A	5	5	The tower bracing is in good condition overall with local areas of light paint fading.	N/A	D
Tower - Diagonal Bracing Coating		T2-TT4	N/A	N/A	5	5	The coating is in good condition overall with local areas of light fading.	N/A	D
Tower - Diagonal Bracing		T4-TT2	N/A	N/A	5	5	The tower bracing is in good condition overall with local areas of light paint fading.	N/A	D
Tower - Diagonal Bracing Coating		T4-TT2	N/A	N/A	5	5	The coating is in good condition overall with local areas of light fading.	N/A	D
Tower - Horizontal Bracing		TT1-TT3	N/A	N/A	5	5	The tower bracing is in good condition overall with local areas of light paint fading.	N/A	D
Tower - Horizontal Bracing Coating		TT1-TT3	N/A	N/A	5	5	The coating is in good condition overall with local areas of light fading.	N/A	D

ELEMENT	PHOTO	MEMBER	PREV MCR	PREV PCR	NEW MCR	NEW PCR	COMMENTS	PRIORITY PREV	PRIORITY NEW
Tower - Horizontal Bracing		TT2-TT4	N/A	N/A	5	5	The tower bracing is in good condition overall with local areas of light paint fading.	N/A	D
Tower - Horizontal Bracing Coating		TT2-TT4	N/A	N/A	5	5	The coating is in good condition overall with local areas of light fading.	N/A	D
Tower Girder	108	TT1-TT2	N/A	N/A	5	5	The tower girder is in good condition overall with local areas of light paint fading.	N/A	D
Tower Girder Coating	108	TT1-TT2	N/A	N/A	5	5	The coating is in good condition overall with local areas of light fading.	N/A	D
Tower Girder	108	TT3-TT4	N/A	N/A	5	5	The tower girder is in good condition overall with local areas of light paint fading.	N/A	D
Tower Girder Coating	108	TT3-TT4	N/A	N/A	5	5	The coating is in good condition overall with local areas of light fading.	N/A	D
Tower Anchorage Assembly	141, 193, 198	T1	N/A	N/A	4	5	The northwest tower anchorage assembly is in fair condition. Local areas of light to medium corrosion, up to 10% section loss, was typically noted on the interior surface of the anchorage assembly at the bottom of the northeast column of the north tower.	N/A	S-A
Tower Anchorage Assembly Coating	141, 193, 198	T1	N/A	N/A	4	5	The tower anchorage assembly coating is in fair condition overall with local areas of light fading and peeling on the interior sections. Local areas of blistering was noted on the interior face of the top anchorage plate.	N/A	A
Tower Anchorage Assembly	194, 197, 199	T2	N/A	N/A	3	5	The northwest tower anchorage assembly is in poor to fair condition overall. Severe corrosion, over 10% section loss, was found on the interior section of the assembly at the northwest column.	N/A	S-A
Tower Anchorage Assembly Coating	194, 197, 199	T2	N/A	N/A	4	5	The tower anchorage assembly coating is in fair condition overall with local areas of light fading and peeling on the interior sections. Local areas of blistering was noted on the interior face of the top anchorage plate.	N/A	A
Tower Anchorage Assembly	195	T3	N/A	N/A	4	5	The anchorage assembly is in good condition with local areas of light paint peeling.	N/A	D

ELEMENT	PHOTO	MEMBER	PREV MCR	PREV PCR	NEW MCR	NEW PCR	COMMENTS	PRIORITY PREV	PRIORITY NEW
Tower Anchorage Assembly Coating	195	T3	N/A	N/A	4	5	The coating is in good condition with local areas of light paint peeling.	N/A	D
Tower Anchorage Assembly	196	T4	N/A	N/A	4	5	The anchorage assembly is in good condition with local areas of light paint peeling.	N/A	D
Tower Anchorage Assembly Coating	196	T4	N/A	N/A	4	5	The coating is in good condition with local areas of light paint peeling.	N/A	D
Concrete Pier Base	203, 206, 208		N/A	N/A	4	5	The concrete pier base is in fair to good condition overall. Local areas of delaminations and spalls were noted on the front faces of the pier. An isolated wide crack with leakage was noted at the construction joint on the east face of the pier.	N/A	D
LIFT SPAN									
Steel Grating	228 TO 241		3	3	3	3	The deck steel grating is in poor to fair condition. Numerous locations were observed to contain cracks on the grating including cracks on the button plug weld area and in the bearing bars. Multiple cracked welds were observed at the hold-down connection between the grating and stringer.	N/A	A
Open Gap Finger Joint	109, 112, 137, 306		5	5	5	5	The open gap steel joints were found in good condition except for some abrasion marks from plow blades on the top surface of the armour plate at the east section of the joint.	N/A	D
Sidewalk	319 TO 320		N/A	N/A	5	5	The sidewalk is in good condition, except for an isolated narrow to medium crack observed at the edge of the southeast section of the sidewalk. Local small areas of light surface corrosion at few locations on the steel deck sheet below the sidewalk.	N/A	D
Railing	315, 316		N/A	N/A	4	5	The pedestrian railings are in good condition overall. A missing nut was noted on a splice bolt for the top handrail near the midsection of the lift span.	N/A	D

ELEMENT	PHOTO	MEMBER	PREV MCR	PREV PCR	NEW MCR	NEW PCR	COMMENTS	PRIORITY PREV	PRIORITY NEW
Railing Posts	315, 316, 319, 320		N/A	N/A	4	5	The railing posts are in good condition overall with exception to a broken spindle at the bottom rail on the pedestrian sidewalk near node point B5.	N/A	D
Guiderail	310 TO 311		N/A	N/A	5	5	Guiderails were found to be in good condition with no significant defects.	N/A	D
Bottom Chord Bracing	255, 276	A1-A2	N/A	N/A	5	5	The bottom chord bracing is in good condition overall. Light surface rust was evident on the coating along the bottom flange. Local area of light to medium surface corrosion was noted at the lower section of the internal stiffener plate. Missing bolt and rivet was noted on the steel plate for span lock at southeast corner.	N/A	D
Bottom Chord Bracing Coating	255, 276	A1-A2	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition overall with local areas of light surface rust on the bottom flange.	N/A	D
Bottom Chord Bracing	255	A2-A3	N/A	N/A	5	5	The bottom chord bracing is in good condition overall with light surface rust evident on the coating along the bottom flange.	N/A	D
Bottom Chord Bracing Coating	255	A2-A3	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition overall with local areas of light surface rust on the bottom flange.	N/A	D
Bottom Chord Bracing		A3-A4	N/A	N/A	5	5	The bottom chord bracing is in good condition overall with local areas of paint fading.	N/A	D
Bottom Chord Bracing Coating		A3-A4	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition overall, with local areas of light fading.	N/A	D
Bottom Chord Bracing		A4-A5	N/A	N/A	5	5	The bottom chord bracing is in good condition overall with light surface rust evident on the coating along the bottom flange.	N/A	D
Bottom Chord Bracing Coating		A4-A5	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition overall with local areas of light surface rust on the bottom flange.	N/A	D
Bottom Chord Bracing	260	A5-A6	N/A	N/A	5	5	The bottom chord bracing is in good condition overall with no apparent significant defects.	N/A	D
Bottom Chord Bracing Coating	260	A5-A6	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition overall, with local areas of light fading.	N/A	D

ELEMENT	PHOTO	MEMBER	PREV MCR	PREV PCR	NEW MCR	NEW PCR	COMMENTS	PRIORITY	
								PREV	NEW
Bottom Chord Bracing	260	A6-A7	N/A	N/A	5	5	The bottom chord bracing is in good condition overall with no apparent significant defects.	N/A	D
Bottom Chord Bracing Coating	260	A6-A7	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition overall, with local areas of light fading.	N/A	D
Bottom Chord Bracing		A7-A8	N/A	N/A	5	5	The bottom chord bracing is in good condition overall with no apparent significant defects.	N/A	D
Bottom Chord Bracing Coating		A7-A8	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition overall, with local areas of light fading.	N/A	D
Bottom Chord Bracing		A8-A9	N/A	N/A	5	5	The bottom chord bracing is in good condition overall with no apparent significant defects.	N/A	D
Bottom Chord Bracing Coating		A8-A9	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition overall, with local areas of light fading.	N/A	D
Bottom Chord Bracing		A9-A10	N/A	N/A	5	5	The bottom chord bracing is in good condition overall with no apparent significant defects.	N/A	D
Bottom Chord Bracing Coating		A9-A10	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition overall, with local areas of light fading.	N/A	D
Bottom Chord Bracing		A10-A11	N/A	N/A	5	5	The bottom chord bracing is in good condition overall with local areas of paint fading.	N/A	D
Bottom Chord Bracing Coating		A10-A11	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition overall, with local areas of light fading.	N/A	D
Bottom Chord Bracing		A11-A12	N/A	N/A	5	5	The bottom chord bracing is in good condition overall with light surface rust evident on the coating along the bottom flange.	N/A	D
Bottom Chord Bracing Coating		A11-A12	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition overall with local areas of light surface rust on the bottom flange.	N/A	D
Bottom Chord Bracing		A12-A13	N/A	N/A	5	5	The bottom chord bracing is in good condition overall. Light surface rust was evident on the coating along the bottom flange.	N/A	D

ELEMENT	PHOTO	MEMBER	PREV MCR	PREV PCR	NEW MCR	NEW PCR	COMMENTS	PRIORITY PREV	PRIORITY NEW
Bottom Chord Bracing Coating		A12-A13	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition overall with local areas of light surface rust on the bottom flange.	N/A	D
Vertical Bracing		A1-AT1	N/A	N/A	5	5	Overall, the bracing is in good condition. No apparent significant defects were evident in the lower section, within the splash zone, of the bracing. Minor grease stains were noted along the entire member.	N/A	D
Vertical Bracing Coating		A1-AT1	N/A	N/A	5	5	The coating within the splash zone was recoated during the winter shutdown in 2010 and 2011. The coating within the splash zone was found to be in good condition with no apparent significant defects. The coating above the splash zone exhibits light fading and local areas of light surface rusting.	N/A	D
Diagonal Bracing		A1-AT2	N/A	N/A	5	5	Overall, the bracing is in good condition. No apparent significant defects were evident at the lower section within the splash zone of the bracing. Local areas of light surface corrosion and paint peeling was noted along the bracing.	N/A	D
Diagonal Bracing Coating		A1-AT2	N/A	N/A	5	5	The coating within the splash zone was recoated during the winter shutdown in 2010 and 2011. The coating within the splash zone was found to be in good condition with no apparent significant defects. The coating above the splash zone exhibits light fading and local areas of light surface rusting.	N/A	D
Vertical Bracing		A2-AT2	N/A	N/A	5	5	Overall, the bracing is in good condition. No apparent significant defects were evident at the lower section within the splash zone of the bracing. Local areas of light surface corrosion and paint peeling was noted along the bracing.	N/A	D
Vertical Bracing Coating		A2-AT2	N/A	N/A	5	5	The coating within the splash zone was recoated during the winter shutdown in 2010 and 2011. The coating within the splash zone was found to be in good condition with no apparent significant defects. The coating above the splash zone exhibits light fading and local areas of light surface rusting.	N/A	D
Diagonal Bracing		A3-AT2	N/A	N/A	5	5	Overall, the bracing is in good condition. No apparent significant defects were evident at the lower section within the splash zone of the bracing. Local areas of light surface corrosion and paint peeling was noted along the bracing.	N/A	D
Diagonal Bracing Coating		A3-AT2	N/A	N/A	5	5	The coating within the splash zone was recoated during the winter shutdown in 2010 and 2011. The coating within the splash zone was found to be in good condition with no apparent significant defects. The coating above the splash zone exhibits light fading and local areas of light surface rusting.	N/A	D
Vertical Bracing		A3-AT3	N/A	N/A	5	5	Overall, the bracing is in good condition. No apparent significant defects were evident at the lower section within the splash zone of the bracing. Local areas of light surface corrosion and paint peeling was noted along the bracing.	N/A	D

ELEMENT	PHOTO	MEMBER	PREV MCR	PREV PCR	NEW MCR	NEW PCR	COMMENTS	PRIORITY PREV	PRIORITY NEW
Vertical Bracing Coating		A3-AT3	N/A	N/A	5	5	The coating within the splash zone was recoated during the winter shutdown in 2010 and 2011. The coating within the splash zone was found to be in good condition with no apparent significant defects. The coating above the splash zone exhibits light fading and local areas of light surface rusting.	N/A	D
Diagonal Bracing		A3-AT4	N/A	N/A	5	5	Overall, the bracing is in good condition. No apparent significant defects were evident at the lower section within the splash zone of the bracing. Local areas of light surface corrosion and paint peeling was noted along the bracing.	N/A	D
Diagonal Bracing Coating		A3-AT4	N/A	N/A	5	5	The coating within the splash zone was recoated during the winter shutdown in 2010 and 2011. The coating within the splash zone was found to be in good condition with no apparent significant defects. The coating above the splash zone exhibits light fading and local areas of light surface rusting.	N/A	D
Vertical Bracing		A4-AT4	N/A	N/A	5	5	Overall, the bracing is in good condition. No apparent significant defects were evident at the lower section within the splash zone of the bracing. Local areas of light surface corrosion and paint peeling was noted along the bracing.	N/A	D
Vertical Bracing Coating		A4-AT4	N/A	N/A	5	5	The coating within the splash zone was recoated during the winter shutdown in 2010 and 2011. The coating within the splash zone was found to be in good condition with no apparent significant defects. The coating above the splash zone exhibits light fading and local areas of light surface rusting.	N/A	D
Diagonal Bracing		A5-AT4	N/A	N/A	5	5	Overall, the bracing is in good condition. No apparent significant defects were evident at the lower section within the splash zone of the bracing. Local areas of light surface corrosion and paint peeling was noted along the bracing. Bird guano stains were evident at the top north face of the bracing.	N/A	D
Diagonal Bracing Coating		A5-AT4	N/A	N/A	5	5	The coating within the splash zone was recoated during the winter shutdown in 2010 and 2011. The coating within the splash zone was found to be in good condition with no apparent significant defects. The coating above the splash zone exhibits light fading and local areas of light surface rusting.	N/A	D
Vertical Bracing		A5-AT5	N/A	N/A	5	5	Overall, the bracing is in good condition. No apparent significant defects were evident at the lower section within the splash zone of the bracing. Local areas of light surface corrosion and paint peeling was noted along the bracing.	N/A	D
Vertical Bracing Coating		A5-AT5	N/A	N/A	5	5	The coating within the splash zone was recoated during the winter shutdown in 2010 and 2011. The coating within the splash zone was found to be in good condition with no apparent significant defects. The coating above the splash zone exhibits light fading and local areas of light surface rusting.	N/A	D
Diagonal Bracing		A5-AT6	N/A	N/A	5	5	Overall, the bracing is in good condition. No apparent significant defects were evident at the lower section within the splash zone of the bracing. Local areas of light surface corrosion and paint peeling was noted along the bracing.	N/A	D

ELEMENT	PHOTO	MEMBER	PREV MCR	PREV PCR	NEW MCR	NEW PCR	COMMENTS	PRIORITY	
								PREV	NEW
Diagonal Bracing Coating		A5-AT6	N/A	N/A	5	5	The coating within the splash zone was recoated during the winter shutdown in 2010 and 2011. The coating within the splash zone was found to be in good condition with no apparent significant defects. The coating above the splash zone exhibits light fading and local areas of light surface rusting.	N/A	D
Vertical Bracing		A6-AT6	N/A	N/A	5	5	Overall, the bracing is in good condition. No apparent significant defects were evident at the lower section within the splash zone of the bracing. Local areas of light surface corrosion and paint peeling was noted along the bracing.	N/A	D
Vertical Bracing Coating		A6-AT6	N/A	N/A	5	5	The coating within the splash zone was recoated during the winter shutdown in 2010 and 2011. The coating within the splash zone was found to be in good condition with no apparent significant defects. The coating above the splash zone exhibits light fading and local areas of light surface rusting.	N/A	D
Diagonal Bracing		A7-AT6	N/A	N/A	5	5	Overall, the bracing is in good condition. No apparent significant defects were evident at the lower section within the splash zone of the bracing. Local areas of light surface corrosion and paint peeling was noted along the bracing. Bird guano stains were evident at the top north face of the bracing.	N/A	D
Diagonal Bracing Coating		A7-AT6	N/A	N/A	5	5	The coating within the splash zone was recoated during the winter shutdown in 2010 and 2011. The coating within the splash zone was found to be in good condition with no apparent significant defects. The coating above the splash zone exhibits light fading and local areas of light surface rusting.	N/A	D
Vertical Bracing		A7-AT7	N/A	N/A	5	5	Overall, the bracing is in good condition. No apparent significant defects were evident at the lower section within the splash zone of the bracing. Local areas of light surface corrosion and paint peeling was noted along the bracing.	N/A	D
Vertical Bracing Coating		A7-AT7	N/A	N/A	5	5	The coating within the splash zone was recoated during the winter shutdown in 2010 and 2011. The coating within the splash zone was found to be in good condition with no apparent significant defects. The coating above the splash zone exhibits light fading and local areas of light surface rusting.	N/A	D
Diagonal Bracing		A7-AT8	N/A	N/A	5	5	Overall, the bracing is in good condition. No apparent significant defects were evident at the lower section within the splash zone of the bracing. Local areas of light surface corrosion and paint peeling was noted along the bracing. Bird guano stains were evident at the top north face of the bracing.	N/A	D
Diagonal Bracing Coating		A7-AT8	N/A	N/A	5	5	The coating within the splash zone was recoated during the winter shutdown in 2010 and 2011. The coating within the splash zone was found to be in good condition with no apparent significant defects. The coating above the splash zone exhibits light fading and local areas of light surface rusting.	N/A	D
Vertical Bracing		A8-AT8	N/A	N/A	5	5	Overall, the bracing is in good condition. No apparent significant defects were evident at the lower section within the splash zone of the bracing. Local areas of light surface corrosion and paint peeling was noted along the bracing.	N/A	D

ELEMENT	PHOTO	MEMBER	PREV MCR	PREV PCR	NEW MCR	NEW PCR	COMMENTS	PRIORITY PREV	PRIORITY NEW
Vertical Bracing Coating		A8-AT8	N/A	N/A	5	5	The coating within the splash zone was recoated during the winter shutdown in 2010 and 2011. The coating within the splash zone was found to be in good condition with no apparent significant defects. The coating above the splash zone exhibits light fading and local areas of light surface rusting.	N/A	D
Diagonal Bracing		A9-AT8	N/A	N/A	5	5	Overall, the bracing is in good condition. No apparent significant defects were evident at the lower section within the splash zone of the bracing. Local areas of light surface corrosion and paint peeling was noted along the bracing.	N/A	D
Diagonal Bracing Coating		A9-AT8	N/A	N/A	5	5	The coating within the splash zone was recoated during the winter shutdown in 2010 and 2011. The coating within the splash zone was found to be in good condition with no apparent significant defects. The coating above the splash zone exhibits light fading and local areas of light surface rusting.	N/A	D
Vertical Bracing		A9-AT9	N/A	N/A	5	5	Overall, the bracing is in good condition. No apparent significant defects were evident at the lower section within the splash zone of the bracing. Local areas of light surface corrosion and paint peeling was noted along the bracing.	N/A	D
Vertical Bracing Coating		A9-AT9	N/A	N/A	5	5	The coating within the splash zone was recoated during the winter shutdown in 2010 and 2011. The coating within the splash zone was found to be in good condition with no apparent significant defects. The coating above the splash zone exhibits light fading and local areas of light surface rusting.	N/A	D
Diagonal Bracing		A9-AT10	N/A	N/A	5	5	Overall, the bracing is in good condition. No apparent significant defects were evident at the lower section within the splash zone of the bracing. Local areas of light surface corrosion and paint peeling was noted along the bracing. Bird guano stains were evident at the top north face of the bracing.	N/A	D
Diagonal Bracing Coating		A9-AT10	N/A	N/A	5	5	The coating within the splash zone was recoated during the winter shutdown in 2010 and 2011. The coating within the splash zone was found to be in good condition with no apparent significant defects. The coating above the splash zone exhibits light fading and local areas of light surface rusting.	N/A	D
Vertical Bracing		A10-AT10	N/A	N/A	5	5	Overall, the bracing is in good condition. No apparent significant defects were evident at the lower section within the splash zone of the bracing. Local areas of light surface corrosion and paint peeling was noted along the bracing.	N/A	D
Vertical Bracing Coating		A10-AT10	N/A	N/A	5	5	The coating within the splash zone was recoated during the winter shutdown in 2010 and 2011. The coating within the splash zone was found to be in good condition with no apparent significant defects. The coating above the splash zone exhibits light fading and local areas of light surface rusting.	N/A	D
Diagonal Bracing		A11-AT10	N/A	N/A	5	5	Overall, the bracing is in good condition. No apparent significant defects were evident at the lower section within the splash zone of the bracing. Local areas of light surface corrosion and paint peeling was noted along the bracing. Bird guano stains were evident at the top north face of the bracing.	N/A	D

ELEMENT	PHOTO	MEMBER	PREV MCR	PREV PCR	NEW MCR	NEW PCR	COMMENTS	PRIORITY PREV	PRIORITY NEW
Diagonal Bracing Coating		A11-AT10	N/A	N/A	5	5	The coating within the splash zone was recoated during the winter shutdown in 2010 and 2011. The coating within the splash zone was found to be in good condition with no apparent significant defects. The coating above the splash zone exhibits light fading and local areas of light surface rusting.	N/A	D
Vertical Bracing		A11-AT11	N/A	N/A	5	5	Overall, the bracing is in good condition. No apparent significant defects were evident at the lower section within the splash zone of the bracing. Local areas of light surface corrosion and paint peeling was noted along the bracing.	N/A	D
Vertical Bracing Coating		A11-AT11	N/A	N/A	5	5	The coating within the splash zone was recoated during the winter shutdown in 2010 and 2011. The coating within the splash zone was found to be in good condition with no apparent significant defects. The coating above the splash zone exhibits light fading and local areas of light surface rusting.	N/A	D
Diagonal Bracing		A11-AT12	N/A	N/A	5	5	Overall, the bracing is in good condition. No apparent significant defects were evident at the lower section within the splash zone of the bracing. Local areas of light surface corrosion and paint peeling was noted along the bracing.	N/A	D
Diagonal Bracing Coating		A11-AT12	N/A	N/A	5	5	The coating within the splash zone was recoated during the winter shutdown in 2010 and 2011. The coating within the splash zone was found to be in good condition with no apparent significant defects. The coating above the splash zone exhibits light fading and local areas of light surface rusting.	N/A	D
Vertical Bracing		A12-AT12	N/A	N/A	5	5	Overall, the bracing is in good condition. No apparent significant defects were evident at the lower section within the splash zone of the bracing. Local areas of light surface corrosion and paint peeling was noted along the bracing.	N/A	D
Vertical Bracing Coating		A12-AT12	N/A	N/A	5	5	The coating within the splash zone was recoated during the winter shutdown in 2010 and 2011. The coating within the splash zone was found to be in good condition with no apparent significant defects. The coating above the splash zone exhibits light fading and local areas of light surface rusting.	N/A	D
Diagonal Bracing		A13-AT12	N/A	N/A	5	5	Overall, the bracing is in good condition. No apparent significant defects were evident at the lower section within the splash zone of the bracing. Local areas of light surface corrosion and paint peeling was noted along the bracing. Bird guano stains were evident at the top north face of the bracing.	N/A	D
Diagonal Bracing Coating		A13-AT12	N/A	N/A	5	5	The coating within the splash zone was recoated during the winter shutdown in 2010 and 2011. The coating within the splash zone was found to be in good condition with no apparent significant defects. The coating above the splash zone exhibits light fading and local areas of light surface rusting.	N/A	D
Vertical Bracing Coating	284	A13-AT13	N/A	N/A	5	5	Overall, the bracing is in good condition. No apparent significant defects were evident at the lower section within the splash zone of the bracing. Local areas of light surface corrosion and paint peeling was noted along the bracing.	N/A	D

ELEMENT	PHOTO	MEMBER	PREV MCR	PREV PCR	NEW MCR	NEW PCR	COMMENTS	PRIORITY PREV	PRIORITY NEW
Vertical Bracing Coating	284	A13-AT13	N/A	N/A	5	5	The coating within the splash zone was recoated during the winter shutdown in 2010 and 2011. The coating within the splash zone was found to be in good condition with no apparent significant defects. The coating above the splash zone exhibits light fading and local areas of light surface rusting.	N/A	D
Vertical Bracing		B1-BT1	N/A	N/A	5	5	Overall, the bracing is in good condition. No apparent significant defects were evident at the lower section within the splash zone of the bracing. Local areas of light surface corrosion and paint peeling was noted along the bracing.	N/A	D
Vertical Bracing Coating		B1-BT1	N/A	N/A	5	5	The coating within the splash zone was recoated during the winter shutdown in 2010 and 2011. The coating within the splash zone was found to be in good condition with no apparent significant defects. The coating above the splash zone exhibits light fading and local areas of light surface rusting.	N/A	D
Diagonal Bracing		B1-BT2	N/A	N/A	5	5	Overall, the bracing is in good condition. No apparent significant defects were evident at the lower section within the splash zone of the bracing. Local areas of light surface corrosion and paint peeling was noted along the bracing.	N/A	D
Diagonal Bracing Coating		B1-BT2	N/A	N/A	5	5	The coating within the splash zone was recoated during the winter shutdown in 2010 and 2011. The coating within the splash zone was found to be in good condition with no apparent significant defects. The coating above the splash zone exhibits light fading and local areas of light surface rusting.	N/A	D
Vertical Bracing		B2-BT2	N/A	N/A	5	5	Overall, the bracing is in good condition. No apparent significant defects were evident at the lower section within the splash zone of the bracing. Local areas of light surface corrosion and paint peeling was noted along the bracing.	N/A	D
Vertical Bracing Coating		B2-BT2	N/A	N/A	5	5	The coating within the splash zone was recoated during the winter shutdown in 2010 and 2011. The coating within the splash zone was found to be in good condition with no apparent significant defects. The coating above the splash zone exhibits light fading and local areas of light surface rusting.	N/A	D
Diagonal Bracing		B3-BT2	N/A	N/A	5	5	Overall, the bracing is in good condition. No apparent significant defects were evident at the lower section within the splash zone of the bracing. Local areas of light surface corrosion and paint peeling was noted along the bracing. Bird guano stains were evident at the top north face of the bracing.	N/A	D
Diagonal Bracing Coating		B3-BT2	N/A	N/A	5	5	The coating within the splash zone was recoated during the winter shutdown in 2010 and 2011. The coating within the splash zone was found to be in good condition with no apparent significant defects. The coating above the splash zone exhibits light fading and local areas of light surface rusting.	N/A	D
Vertical Bracing		B3-BT3	N/A	N/A	5	5	Overall, the bracing is in good condition. No apparent significant defects were evident at the lower section within the splash zone of the bracing. Local areas of light surface corrosion and paint peeling was noted along the bracing.	N/A	D

ELEMENT	PHOTO	MEMBER	PREV MCR	PREV PCR	NEW MCR	NEW PCR	COMMENTS	PRIORITY	
								PREV	NEW
Vertical Bracing Coating		B3-BT3	N/A	N/A	5	5	The coating within the splash zone was recoated during the winter shutdown in 2010 and 2011. The coating within the splash zone was found to be in good condition with no apparent significant defects. The coating above the splash zone exhibits light fading and local areas of light surface rusting.	N/A	D
Diagonal Bracing		B3-BT4	N/A	N/A	5	5	Overall, the bracing is in good condition. No apparent significant defects were evident at the lower section within the splash zone of the bracing. Local areas of light surface corrosion and paint peeling was noted along the bracing. Bird guano stains were evident at the top north face of the bracing.	N/A	D
Diagonal Bracing Coating		B3-BT4	N/A	N/A	5	5	The coating within the splash zone was recoated during the winter shutdown in 2010 and 2011. The coating within the splash zone was found to be in good condition with no apparent significant defects. The coating above the splash zone exhibits light fading and local areas of light surface rusting.	N/A	D
Vertical Bracing		B4-BT4	N/A	N/A	5	5	Overall, the bracing is in good condition. No apparent significant defects were evident at the lower section within the splash zone of the bracing. Local areas of light surface corrosion and paint peeling was noted along the bracing.	N/A	D
Vertical Bracing Coating		B4-BT4	N/A	N/A	5	5	The coating within the splash zone was recoated during the winter shutdown in 2010 and 2011. The coating within the splash zone was found to be in good condition with no apparent significant defects. The coating above the splash zone exhibits light fading and local areas of light surface rusting.	N/A	D
Diagonal Bracing		B5-BT4	N/A	N/A	5	5	Overall, the bracing is in good condition. No apparent significant defects were evident at the lower section within the splash zone of the bracing. Local areas of light surface corrosion and paint peeling was noted along the bracing. Bird guano stains were evident at the top north face of the bracing.	N/A	D
Diagonal Bracing Coating		B5-BT4	N/A	N/A	5	5	The coating within the splash zone was recoated during the winter shutdown in 2010 and 2011. The coating within the splash zone was found to be in good condition with no apparent significant defects. The coating above the splash zone exhibits light fading and local areas of light surface rusting.	N/A	D
Vertical Bracing		B5-BT5	N/A	N/A	5	5	Overall, the bracing is in good condition. No apparent significant defects were evident at the lower section within the splash zone of the bracing. Local areas of light surface corrosion and paint peeling was noted along the bracing.	N/A	D
Vertical Bracing Coating		B5-BT5	N/A	N/A	5	5	The coating within the splash zone was recoated during the winter shutdown in 2010 and 2011. The coating within the splash zone was found to be in good condition with no apparent significant defects. The coating above the splash zone exhibits light fading and local areas of light surface rusting.	N/A	D

ELEMENT	PHOTO	MEMBER	PREV MCR	PREV PCR	NEW MCR	NEW PCR	COMMENTS	PRIORITY PREV	PRIORITY NEW
Diagonal Bracing		B5-BT6	N/A	N/A	5	5	Overall, the bracing is in good condition. No apparent significant defects were evident at the lower section within the splash zone of the bracing. Local areas of light surface corrosion and paint peeling was noted along the bracing. Bird guano stains were evident at the top north face of the bracing.	N/A	D
Diagonal Bracing Coating		B5-BT6	N/A	N/A	5	5	The coating within the splash zone was recoated during the winter shutdown in 2010 and 2011. The coating within the splash zone was found to be in good condition with no apparent significant defects. The coating above the splash zone exhibits light fading and local areas of light surface rusting.	N/A	D
Vertical Bracing		B6-BT6	N/A	N/A	5	5	Overall, the bracing is in good condition. No apparent significant defects were evident at the lower section within the splash zone of the bracing. Local areas of light surface corrosion and paint peeling was noted along the bracing.	N/A	D
Vertical Bracing Coating		B6-BT6	N/A	N/A	5	5	The coating within the splash zone was recoated during the winter shutdown in 2010 and 2011. The coating within the splash zone was found to be in good condition with no apparent significant defects. The coating above the splash zone exhibits light fading and local areas of light surface rusting.	N/A	D
Diagonal Bracing		B7-BT6	N/A	N/A	5	5	Overall, the bracing is in good condition. No apparent significant defects were evident at the lower section within the splash zone of the bracing. Local areas of light surface corrosion and paint peeling was noted along the bracing.	N/A	D
Diagonal Bracing Coating		B7-BT6	N/A	N/A	5	5	The coating within the splash zone was recoated during the winter shutdown in 2010 and 2011. The coating within the splash zone was found to be in good condition with no apparent significant defects. The coating above the splash zone exhibits light fading and local areas of light surface rusting.	N/A	D
Vertical Bracing		B7-BT7	N/A	N/A	5	5	Overall, the bracing is in good condition. No apparent significant defects were evident at the lower section within the splash zone of the bracing. Local areas of light surface corrosion and paint peeling was noted along the bracing.	N/A	D
Vertical Bracing Coating		B7-BT7	N/A	N/A	5	5	The coating within the splash zone was recoated during the winter shutdown in 2010 and 2011. The coating within the splash zone was found to be in good condition with no apparent significant defects. The coating above the splash zone exhibits light fading and local areas of light surface rusting.	N/A	D
Diagonal Bracing		B7-BT8	N/A	N/A	5	5	Overall, the bracing is in good condition. No apparent significant defects were evident at the lower section within the splash zone of the bracing. Local areas of light surface corrosion and paint peeling was noted along the bracing. Bird guano stains were evident at the top north face of the bracing.	N/A	D
Diagonal Bracing Coating		B7-BT8	N/A	N/A	5	5	The coating within the splash zone was recoated during the winter shutdown in 2010 and 2011. The coating within the splash zone was found to be in good condition with no apparent significant defects. The coating above the splash zone exhibits light fading and local areas of light surface rusting.	N/A	D

ELEMENT	PHOTO	MEMBER	PREV MCR	PREV PCR	NEW MCR	NEW PCR	COMMENTS	PRIORITY PREV	PRIORITY NEW
Vertical Bracing		B8-BT8	N/A	N/A	5	5	Overall, the bracing is in good condition. No apparent significant defects were evident at the lower section within the splash zone of the bracing. Local areas of light surface corrosion and paint peeling was noted along the bracing.	N/A	D
Vertical Bracing Coating		B8-BT8	N/A	N/A	5	5	The coating within the splash zone was recoated during the winter shutdown in 2010 and 2011. The coating within the splash zone was found to be in good condition with no apparent significant defects. The coating above the splash zone exhibits light fading and local areas of light surface rusting.	N/A	D
Diagonal Bracing		B9-BT8	N/A	N/A	5	5	Overall, the bracing is in good condition. No apparent significant defects were evident at the lower section within the splash zone of the bracing. Local areas of light surface corrosion and paint peeling was noted along the bracing.	N/A	D
Diagonal Bracing Coating		B9-BT8	N/A	N/A	5	5	The coating within the splash zone was recoated during the winter shutdown in 2010 and 2011. The coating within the splash zone was found to be in good condition with no apparent significant defects. The coating above the splash zone exhibits light fading and local areas of light surface rusting.	N/A	D
Vertical Bracing		B9-BT9	N/A	N/A	5	5	Overall, the bracing is in good condition. No apparent significant defects were evident at the lower section within the splash zone of the bracing. Local areas of light surface corrosion and paint peeling was noted along the bracing.	N/A	D
Vertical Bracing Coating		B9-BT9	N/A	N/A	5	5	The coating within the splash zone was recoated during the winter shutdown in 2010 and 2011. The coating within the splash zone was found to be in good condition with no apparent significant defects. The coating above the splash zone exhibits light fading and local areas of light surface rusting.	N/A	D
Diagonal Bracing		B9-BT10	N/A	N/A	5	5	Overall, the bracing is in good condition. No apparent significant defects were evident at the lower section within the splash zone of the bracing. Local areas of light surface corrosion and paint peeling was noted along the bracing. Bird guano stains were evident at the top north face of the bracing.	N/A	D
Diagonal Bracing Coating		B9-BT10	N/A	N/A	5	5	The coating within the splash zone was recoated during the winter shutdown in 2010 and 2011. The coating within the splash zone was found to be in good condition with no apparent significant defects. The coating above the splash zone exhibits light fading and local areas of light surface rusting.	N/A	D
Vertical Bracing		B10-BT10	N/A	N/A	5	5	Overall, the bracing is in good condition. No apparent significant defects were evident at the lower section within the splash zone of the bracing. Local areas of light surface corrosion and paint peeling was noted along the bracing.	N/A	D
Vertical Bracing Coating		B10-BT10	N/A	N/A	5	5	The coating within the splash zone was recoated during the winter shutdown in 2010 and 2011. The coating within the splash zone was found to be in good condition with no apparent significant defects. The coating above the splash zone exhibits light fading and local areas of light surface rusting.	N/A	D

ELEMENT	PHOTO	MEMBER	PREV MCR	PREV PCR	NEW MCR	NEW PCR	COMMENTS	PRIORITY PREV	PRIORITY NEW
Diagonal Bracing		B11-BT10	N/A	N/A	5	5	Overall, the bracing is in good condition. No apparent significant defects were evident at the lower section within the splash zone of the bracing. Local areas of light surface corrosion and paint peeling was noted along the bracing.	N/A	D
Diagonal Bracing Coating		B11-BT10	N/A	N/A	5	5	The coating within the splash zone was recoated during the winter shutdown in 2010 and 2011. The coating within the splash zone was found to be in good condition with no apparent significant defects. The coating above the splash zone exhibits light fading and local areas of light surface rusting.	N/A	D
Vertical Bracing		B11-BT11	N/A	N/A	5	5	Overall, the bracing is in good condition. No apparent significant defects were evident at the lower section within the splash zone of the bracing. Local areas of light surface corrosion and paint peeling was noted along the bracing.	N/A	D
Vertical Bracing Coating		B11-BT11	N/A	N/A	5	5	The coating within the splash zone was recoated during the winter shutdown in 2010 and 2011. The coating within the splash zone was found to be in good condition with no apparent significant defects. The coating above the splash zone exhibits light fading and local areas of light surface rusting.	N/A	D
Diagonal Bracing		B11-BT12	N/A	N/A	5	5	Overall, the bracing is in good condition. No apparent significant defects were evident at the lower section within the splash zone of the bracing. Local areas of light surface corrosion and paint peeling was noted along the bracing.	N/A	D
Diagonal Bracing Coating		B11-BT12	N/A	N/A	5	5	The coating within the splash zone was recoated during the winter shutdown in 2010 and 2011. The coating within the splash zone was found to be in good condition with no apparent significant defects. The coating above the splash zone exhibits light fading and local areas of light surface rusting.	N/A	D
Vertical Bracing	286	B12-BT12	N/A	N/A	5	5	Overall, the bracing is in good condition. No apparent significant defects were evident at the lower section within the splash zone of the bracing. Local areas of light surface corrosion and paint peeling was noted along the bracing. Large built-up of bird guano was noted in the openings on the vertical bracing.	N/A	D
Vertical Bracing Coating	286	B12-BT12	N/A	N/A	5	5	The coating within the splash zone was recoated during the winter shutdown in 2010 and 2011. The coating within the splash zone was found to be in good condition with no apparent significant defects. The coating above the splash zone exhibits light fading and local areas of light surface rusting.	N/A	D
Diagonal Bracing		B13-BT13	N/A	N/A	5	5	Overall, the bracing is in good condition. No apparent significant defects were evident at the lower section within the splash zone of the bracing. Local areas of light surface corrosion and paint peeling was noted along the bracing.	N/A	D
Diagonal Bracing Coating		B13-BT13	N/A	N/A	5	5	The coating within the splash zone was recoated during the winter shutdown in 2010 and 2011. The coating within the splash zone was found to be in good condition with no apparent significant defects. The coating above the splash zone exhibits light fading and local areas of light surface rusting.	N/A	D

ELEMENT	PHOTO	MEMBER	PREV MCR	PREV PCR	NEW MCR	NEW PCR	COMMENTS	PRIORITY PREV	PRIORITY NEW
Vertical Bracing		B13-BT13	N/A	N/A	5	5	Overall, the bracing is in good condition. No apparent significant defects were evident at the lower section within the splash zone of the bracing. Local areas of light surface corrosion and paint peeling was noted along the bracing.	N/A	D
Vertical Bracing Coating		B13-BT13	N/A	N/A	5	5	The coating within the splash zone was recoated during the winter shutdown in 2010 and 2011. The coating within the splash zone was found to be in good condition with no apparent significant defects. The coating above the splash zone exhibits light fading and local areas of light surface rusting.	N/A	D
Bottom Chord Bracing		B1-B2	N/A	N/A	5	5	The bottom chord bracing is in good condition overall. Light surface rust was evident on the coating along the bottom flange.	N/A	D
Bottom Chord Bracing Coating		B1-B2	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition overall with local areas of light surface rust on the bottom flange.	N/A	D
Bottom Chord Bracing		B2-B3	N/A	N/A	5	5	The bottom chord bracing is in good condition overall with light surface rust evident on the coating along the bottom flange.	N/A	D
Bottom Chord Bracing Coating		B2-B3	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition overall with local areas of light surface rust on the bottom flange.	N/A	D
Bottom Chord Bracing		B3-B4	N/A	N/A	5	5	The bottom chord bracing is in good condition overall with local areas of paint fading.	N/A	D
Bottom Chord Bracing Coating		B3-B4	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition overall, with local areas of light fading.	N/A	D
Bottom Chord Bracing		B4-B5	N/A	N/A	5	5	The bottom chord bracing is in good condition overall with light surface rust evident on the coating along the bottom flange.	N/A	D
Bottom Chord Bracing Coating		B4-B5	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition overall with local areas of light surface rust on the bottom flange.	N/A	D
Bottom Chord Bracing	261	B5-B6	N/A	N/A	5	5	The bottom chord bracing is in good condition overall with light surface rust evident on the coating along the bottom flange.	N/A	D
Bottom Chord Bracing Coating	261	B5-B6	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition overall with local areas of light surface rust on the bottom flange.	N/A	D
Bottom Chord Bracing	261	B6-B7	N/A	N/A	5	5	The bottom chord bracing is in good condition overall with no apparent significant defects.	N/A	D
Bottom Chord Bracing Coating	261	B6-B7	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition overall, with local areas of light fading.	N/A	D

ELEMENT	PHOTO	MEMBER	PREV MCR	PREV PCR	NEW MCR	NEW PCR	COMMENTS	PRIORITY PREV	PRIORITY NEW
Bottom Chord Bracing	261	B7-B8	N/A	N/A	5	5	The bottom chord bracing is in good condition overall with no apparent significant defects.	N/A	D
Bottom Chord Bracing Coating	261	B7-B8	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition overall, with local areas of light fading.	N/A	D
Bottom Chord Bracing	261	B8-B9	N/A	N/A	5	5	The bottom chord bracing is in good condition overall with light surface rust evident on the coating along the bottom flange.	N/A	D
Bottom Chord Bracing Coating	261	B8-B9	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition overall with local areas of light surface rust on the bottom flange.	N/A	D
Bottom Chord Bracing		B9-B10	N/A	N/A	5	5	The bottom chord bracing is in good condition overall with no apparent significant defects.	N/A	D
Bottom Chord Bracing Coating		B9-B10	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition overall, with local areas of light fading.	N/A	D
Bottom Chord Bracing		B10-B11	N/A	N/A	5	5	The bottom chord bracing is in good condition overall with local areas of paint fading.	N/A	D
Bottom Chord Bracing Coating		B10-B11	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition overall, with local areas of light fading.	N/A	D
Bottom Chord Bracing	256	B11-B12	N/A	N/A	5	5	The bottom chord bracing is in good condition overall with light surface rust evident on the coating along the bottom flange.	N/A	D
Bottom Chord Bracing Coating	256	B11-B12	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition overall with local areas of light surface rust on the bottom flange.	N/A	D
Bottom Chord Bracing	256	B12-B13	N/A	N/A	5	5	The bottom chord bracing is in good condition overall. Light surface rust was evident on the coating along the bottom flange. Minor accumulation of debris was evident on the top flange of the chord at node B12.	N/A	D
Bottom Chord Bracing Coating	256	B12-B13	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition overall with local areas of light surface rust on the bottom flange.	N/A	D
Bearings	287 TO 294		5	5	5	5	The bearings are in good condition with except for a missing bolt on the north connecting plate over the centering shoe at the north end, and painted-over pitted on cover plate.	N/A	D
Stringer 1	253	Bay 1	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no significant signs of deterioration noted.	N/A	D

ELEMENT	PHOTO	MEMBER	PREV MCR	PREV PCR	NEW MCR	NEW PCR	COMMENTS	PRIORITY PREV	PRIORITY NEW
Stringer 1 Coating	253	Bay 1	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Stringer 1	249	Bay 2	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no significant signs of deterioration noted.	N/A	D
Stringer 1 Coating	249	Bay 2	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Stringer 1		Bay 3	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D
Stringer 1 Coating		Bay 3	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Stringer 1		Bay 4	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D
Stringer 1 Coating		Bay 4	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Stringer 1		Bay 5	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D
Stringer 1 Coating		Bay 5	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Stringer 1		Bay 6	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D
Stringer 1 Coating		Bay 6	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Stringer 1		Bay 7	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D
Stringer 1 Coating		Bay 7	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for light paint fading.	N/A	D
Stringer 1		Bay 8	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D
Stringer 1 Coating		Bay 8	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for light paint fading.	N/A	D

ELEMENT	PHOTO	MEMBER	PREV MCR	PREV PCR	NEW MCR	NEW PCR	COMMENTS	PRIORITY PREV	PRIORITY NEW
Stringer 1		Bay 9	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D
Stringer 1 Coating		Bay 9	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for light paint fading.	N/A	D
Stringer 1		Bay 10	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D
Stringer 1 Coating		Bay 10	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for light paint fading.	N/A	D
Stringer 1		Bay 11	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D
Stringer 1 Coating		Bay 11	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Stringer 1	254	Bay 12	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating, except for painted-over pitted surface on the bottom flange.	N/A	D
Stringer 1 Coating	254	Bay 12	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for light paint fading.	N/A	D
Stringer 2	253	Bay 1	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no significant signs of deterioration noted.	N/A	D
Stringer 2 Coating	253	Bay 1	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Stringer 2	249	Bay 2	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no significant signs of deterioration noted.	N/A	D
Stringer 2 Coating	249	Bay 2	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Stringer 2		Bay 3	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no significant signs of deterioration noted.	N/A	D
Stringer 2 Coating		Bay 3	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Stringer 2		Bay 4	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D
Stringer 2 Coating		Bay 4	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D

ELEMENT	PHOTO	MEMBER	PREV MCR	PREV PCR	NEW MCR	NEW PCR	COMMENTS	PRIORITY PREV	PRIORITY NEW
Stringer 2		Bay 5	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D
Stringer 2 Coating		Bay 5	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Stringer 2		Bay 6	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D
Stringer 2 Coating		Bay 6	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Stringer 2		Bay 7	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D
Stringer 2 Coating		Bay 7	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for light paint fading.	N/A	D
Stringer 2		Bay 8	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D
Stringer 2 Coating		Bay 8	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for light paint fading.	N/A	D
Stringer 2		Bay 9	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D
Stringer 2 Coating		Bay 9	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for light paint fading.	N/A	D
Stringer 2		Bay 10	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating except for local painted-over pitted surface on bottom flange.	N/A	D
Stringer 2 Coating		Bay 10	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for light paint fading.	N/A	D
Stringer 2		Bay 11	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating, except for local painted-over pitted surface on the bottom flange and light surface rust.	N/A	D
Stringer 2 Coating		Bay 11	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading and light paint peeling.	N/A	D
Stringer 2	254	Bay 12	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating, except for painted-over pitted surface on the bottom flange.	N/A	D
Stringer 2 Coating	254	Bay 12	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for light paint fading.	N/A	D

ELEMENT	PHOTO	MEMBER	PREV MCR	PREV PCR	NEW MCR	NEW PCR	COMMENTS	PRIORITY PREV	PRIORITY NEW
Stringer 3	253	Bay 1	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating, except for a few local painted-over pitted surface on the bottom flange.	N/A	D
Stringer 3 Coating	253	Bay 1	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Stringer 3	249	Bay 2	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no significant defects.	N/A	D
Stringer 3 Coating	249	Bay 2	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Stringer 3		Bay 3	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating, except for local area of painted-over pitted surface on the bottom flange.	N/A	D
Stringer 3 Coating		Bay 3	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Stringer 3		Bay 4	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D
Stringer 3 Coating		Bay 4	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Stringer 3		Bay 5	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D
Stringer 3 Coating		Bay 5	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Stringer 3		Bay 6	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D
Stringer 3 Coating		Bay 6	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Stringer 3		Bay 7	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D
Stringer 3 Coating		Bay 7	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for light paint fading.	N/A	D
Stringer 3		Bay 8	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D

ELEMENT	PHOTO	MEMBER	PREV MCR	PREV PCR	NEW MCR	NEW PCR	COMMENTS	PRIORITY PREV	PRIORITY NEW
Stringer 3 Coating		Bay 8	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for light paint fading.	N/A	D
Stringer 3		Bay 9	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D
Stringer 3 Coating		Bay 9	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for light paint fading.	N/A	D
Stringer 3		Bay 10	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating except for local painted-over pitted surface on bottom flange.	N/A	D
Stringer 3 Coating		Bay 10	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for light paint fading.	N/A	D
Stringer 3		Bay 11	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating except for local painted-over pitted surface on bottom flange.	N/A	D
Stringer 3 Coating		Bay 11	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for light paint fading.	N/A	D
Stringer 3	254	Bay 12	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating, except for painted-over pitted surface on the bottom flange.	N/A	D
Stringer 3 Coating	254	Bay 12	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for light paint fading.	N/A	D
Stringer 4	253, 264	Bay 1	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating, except for a few local painted-over pitted surface on the bottom flange.	N/A	D
Stringer 4 Coating	253, 264	Bay 1	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Stringer 4	249	Bay 2	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating, except for local painted-over pitted surface on the bottom flange.	N/A	D
Stringer 4 Coating	249	Bay 2	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Stringer 4		Bay 3	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating, except for local area of painted-over pitted surface on the bottom flange.	N/A	D
Stringer 4 Coating		Bay 3	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Stringer 4		Bay 4	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D

ELEMENT	PHOTO	MEMBER	PREV MCR	PREV PCR	NEW MCR	NEW PCR	COMMENTS	PRIORITY PREV	PRIORITY NEW
Stringer 4 Coating		Bay 4	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Stringer 4		Bay 5	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D
Stringer 4 Coating		Bay 5	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Stringer 4		Bay 6	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D
Stringer 4 Coating		Bay 6	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Stringer 4		Bay 7	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D
Stringer 4 Coating		Bay 7	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for light paint fading.	N/A	D
Stringer 4		Bay 8	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D
Stringer 4 Coating		Bay 8	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for light paint fading.	N/A	D
Stringer 4		Bay 9	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D
Stringer 4 Coating		Bay 9	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for light paint fading.	N/A	D
Stringer 4		Bay 10	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D
Stringer 4 Coating		Bay 10	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for light paint fading.	N/A	D
Stringer 4		Bay 11	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D
Stringer 4 Coating		Bay 11	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Stringer 4	254	Bay 12	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating, except for local area of painted-over pitted surface on the bottom flange.	N/A	D

ELEMENT	PHOTO	MEMBER	PREV MCR	PREV PCR	NEW MCR	NEW PCR	COMMENTS	PRIORITY PREV	PRIORITY NEW
Stringer 4 Coating	254	Bay 12	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading and light paint peeling.	N/A	D
Stringer 5	253	Bay 1	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating, except for painted-over pitted surface on the bottom flange.	N/A	D
Stringer 5 Coating	253	Bay 1	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Stringer 5	249	Bay 2	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating, except for painted-over pitted surface on the bottom flange and localized areas of light surface rust.	N/A	D
Stringer 5 Coating	249	Bay 2	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading and light paint peeling.	N/A	D
Stringer 5		Bay 3	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating, except for painted-over pitted surface on the bottom flange.	N/A	D
Stringer 5 Coating		Bay 3	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading and light paint peeling.	N/A	D
Stringer 5		Bay 4	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D
Stringer 5 Coating		Bay 4	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Stringer 5		Bay 5	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D
Stringer 5 Coating		Bay 5	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Stringer 5		Bay 6	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D
Stringer 5 Coating		Bay 6	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Stringer 5		Bay 7	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D

ELEMENT	PHOTO	MEMBER	PREV MCR	PREV PCR	NEW MCR	NEW PCR	COMMENTS	PRIORITY PREV	PRIORITY NEW
Stringer 5 Coating		Bay 7	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for light paint fading.	N/A	D
Stringer 5		Bay 8	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D
Stringer 5 Coating		Bay 8	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for light paint fading.	N/A	D
Stringer 5		Bay 9	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating, except for painted-over pitted surface on the bottom flange.	N/A	D
Stringer 5 Coating		Bay 9	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for light paint fading.	N/A	D
Stringer 5		Bay 10	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating, except for painted-over pitted surface on the bottom flange.	N/A	D
Stringer 5 Coating		Bay 10	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for light paint fading.	N/A	D
Stringer 5		Bay 11	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating, except for painted-over pitted surface on the bottom flange.	N/A	D
Stringer 5 Coating		Bay 11	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for light paint fading.	N/A	D
Stringer 5	254	Bay 12	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating, except for local area of painted-over pitted surface on the bottom flange.	N/A	D
Stringer 5 Coating	254	Bay 12	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading and light paint peeling.	N/A	D
Stringer 6	253	Bay 1	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent repainting, except for a few local painted-over pitted surface on the bottom flange with local light paint peeling and localized areas of light surface rust.	N/A	D
Stringer 6 Coating	253	Bay 1	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading and localized areas of light paint peeling.	N/A	D
Stringer 6	249	Bay 2	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating, except for painted-over pitted surface on the bottom flange and localized areas of light surface rust. Minor accumulation of debris on the top and bottom flange.	N/A	D
Stringer 6 Coating	249	Bay 2	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading and light paint peeling.	N/A	D

ELEMENT	PHOTO	MEMBER	PREV MCR	PREV PCR	NEW MCR	NEW PCR	COMMENTS	PRIORITY PREV	PRIORITY NEW
Stringer 6		Bay 3	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating, except for painted-over pitted surface on the bottom flange and localized areas of light surface rust.	N/A	D
Stringer 6 Coating		Bay 3	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading and light paint peeling.	N/A	D
Stringer 6		Bay 4	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D
Stringer 6 Coating		Bay 4	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Stringer 6		Bay 5	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D
Stringer 6 Coating		Bay 5	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Stringer 6		Bay 6	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D
Stringer 6 Coating		Bay 6	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Stringer 6		Bay 7	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D
Stringer 6 Coating		Bay 7	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for light paint fading.	N/A	D
Stringer 6		Bay 8	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D
Stringer 6 Coating		Bay 8	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for light paint fading.	N/A	D
Stringer 6		Bay 9	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating, except for painted-over pitted surface on the bottom flange.	N/A	D
Stringer 6 Coating		Bay 9	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for light paint fading.	N/A	D
Stringer 6		Bay 10	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating except for localized areas of light surface rust.	N/A	D

ELEMENT	PHOTO	MEMBER	PREV MCR	PREV PCR	NEW MCR	NEW PCR	COMMENTS	PRIORITY PREV	PRIORITY NEW
Stringer 6 Coating		Bay 10	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Stringer 6		Bay 11	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating, except for painted-over pitted surface on the bottom flange.	N/A	D
Stringer 6 Coating		Bay 11	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for light paint fading.	N/A	D
Stringer 6	254, 271	Bay 12	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating, except for local area of painted-over pitted surface on the bottom flange and light surface rust.	N/A	D
Stringer 6 Coating	254, 271	Bay 12	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading and light paint peeling.	N/A	D
Stringer 7	253	Bay 1	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating, except for painted-over pitted surface on the bottom flange and localized areas of light surface rust. Minor debris accumulation at local areas of the top flange.	N/A	D
Stringer 7 Coating	253	Bay 1	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Stringer 7	249	Bay 2	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating, except for painted-over pitted surface on the bottom flange and localized areas of light surface rust. Minor accumulation of debris on the top and bottom flange.	N/A	D
Stringer 7 Coating	249	Bay 2	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading and light paint peeling.	N/A	D
Stringer 7		Bay 3	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D
Stringer 7 Coating		Bay 3	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Stringer 7		Bay 4	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D
Stringer 7 Coating		Bay 4	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Stringer 7		Bay 5	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D

ELEMENT	PHOTO	MEMBER	PREV MCR	PREV PCR	NEW MCR	NEW PCR	COMMENTS	PRIORITY PREV	PRIORITY NEW
Stringer 7 Coating		Bay 5	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Stringer 7		Bay 6	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D
Stringer 7 Coating		Bay 6	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Stringer 7		Bay 7	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D
Stringer 7 Coating		Bay 7	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for light paint fading.	N/A	D
Stringer 7		Bay 8	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D
Stringer 7 Coating		Bay 8	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for light paint fading.	N/A	D
Stringer 7		Bay 9	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D
Stringer 7 Coating		Bay 9	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Stringer 7		Bay 10	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating except for localized areas of light surface rust.	N/A	D
Stringer 7 Coating		Bay 10	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Stringer 7		Bay 11	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D
Stringer 7 Coating		Bay 11	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Stringer 7	254, 265	Bay 12	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating, except for local areas of painted-over pitted surface on the bottom flange.	N/A	D
Stringer 7 Coating	254, 265	Bay 12	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D

ELEMENT	PHOTO	MEMBER	PREV MCR	PREV PCR	NEW MCR	NEW PCR	COMMENTS	PRIORITY PREV	PRIORITY NEW
Stringer 8	253	Bay 1	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating, except for painted-over pitted surface on the bottom flange.	N/A	D
Stringer 8 Coating	253	Bay 1	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Stringer 8	249	Bay 2	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating, except for painted-over pitted surface on the bottom flange and localized areas of light surface rust. Minor accumulation of debris on the top and bottom flange.	N/A	D
Stringer 8 Coating	249	Bay 2	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Stringer 8		Bay 3	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D
Stringer 8 Coating		Bay 3	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Stringer 8		Bay 4	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D
Stringer 8 Coating		Bay 4	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Stringer 8		Bay 5	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D
Stringer 8 Coating		Bay 5	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Stringer 8		Bay 6	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D
Stringer 8 Coating		Bay 6	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Stringer 8		Bay 7	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D
Stringer 8 Coating		Bay 7	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for light paint fading.	N/A	D
Stringer 8		Bay 8	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D

ELEMENT	PHOTO	MEMBER	PREV MCR	PREV PCR	NEW MCR	NEW PCR	COMMENTS	PRIORITY PREV	PRIORITY NEW
Stringer 8 Coating		Bay 8	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for light paint fading.	N/A	D
Stringer 8		Bay 9	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D
Stringer 8 Coating		Bay 9	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Stringer 8		Bay 10	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D
Stringer 8 Coating		Bay 10	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Stringer 8		Bay 11	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating except for local areas of light surface rust.	N/A	D
Stringer 8 Coating		Bay 11	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Stringer 8	254	Bay 12	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating, except for local areas of painted-over pitted surface on the bottom flange.	N/A	D
Stringer 8 Coating	254	Bay 12	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Stringer 9	253	Bay 1	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating, except for localized areas of light surface rust and local light paint peeling at north end of stringer.	N/A	D
Stringer 9 Coating	253	Bay 1	N/A	N/A	5	5	The coating was recoated during th winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading and local light paint peeling near the north end of the stringer at Bay 1.	N/A	D
Stringer 9	249	Bay 2	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating, except for painted-over pitted surface on the bottom flange.	N/A	D
Stringer 9 Coating	249	Bay 2	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Stringer 9		Bay 3	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no apparent significant defects. The bottom flange was not visible due to the original railway stringer.	N/A	D

ELEMENT	PHOTO	MEMBER	PREV MCR	PREV PCR	NEW MCR	NEW PCR	COMMENTS	PRIORITY PREV	PRIORITY NEW
Stringer 9 Coating		Bay 3	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Stringer 9		Bay 4	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no apparent significant defects. The bottom flange was not visible due to the original railway stringer.	N/A	D
Stringer 9 Coating		Bay 4	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Stringer 9		Bay 5	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D
Stringer 9 Coating		Bay 5	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Stringer 9		Bay 6	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D
Stringer 9 Coating		Bay 6	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Stringer 9		Bay 7	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D
Stringer 9 Coating		Bay 7	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for light paint fading.	N/A	D
Stringer 9		Bay 8	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D
Stringer 9 Coating		Bay 8	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for light paint fading.	N/A	D
Stringer 9		Bay 9	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no apparent significant defects. The bottom flange was not visible due to the original railway stringer.	N/A	D
Stringer 9 Coating		Bay 9	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for light paint fading.	N/A	D
Stringer 9		Bay 10	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no apparent significant defects. The bottom flange was not visible due to the original railway stringer.	N/A	D
Stringer 9 Coating		Bay 10	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for light paint fading.	N/A	D

ELEMENT	PHOTO	MEMBER	PREV MCR	PREV PCR	NEW MCR	NEW PCR	COMMENTS	PRIORITY PREV	PRIORITY NEW
Stringer 9		Bay 11	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D
Stringer 9 Coating		Bay 11	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Stringer 9	254	Bay 12	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating, except for local areas of painted-over pitted surface on the bottom flange.	N/A	D
Stringer 9 Coating	254	Bay 12	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading and light paint peeling.	N/A	D
Stringer 10	253	Bay 1	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating, except for some localized areas of light surface rust and light paint peeling at north end of stringer.	N/A	D
Stringer 10 Coating	253	Bay 1	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading and local light paint peeling near the north end of the stringer at Bay 1.	N/A	D
Stringer 10	249	Bay 2	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating, except for localized areas of light surface rust.	N/A	D
Stringer 10 Coating	249	Bay 2	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Stringer 10		Bay 3	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating, except for localized areas of local painted-over pitted surface on the bottom flange and light surface rust.	N/A	D
Stringer 10 Coating		Bay 3	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Stringer 10		Bay 4	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D
Stringer 10 Coating		Bay 4	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Stringer 10		Bay 5	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D
Stringer 10 Coating		Bay 5	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D

ELEMENT	PHOTO	MEMBER	PREV MCR	PREV PCR	NEW MCR	NEW PCR	COMMENTS	PRIORITY PREV	PRIORITY NEW
Stringer 10		Bay 6	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D
Stringer 10 Coating		Bay 6	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Stringer 10		Bay 7	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D
Stringer 10 Coating		Bay 7	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for light paint fading.	N/A	D
Stringer 10		Bay 8	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D
Stringer 10 Coating		Bay 8	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for light paint fading.	N/A	D
Stringer 10		Bay 9	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D
Stringer 10 Coating		Bay 9	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Stringer 10		Bay 10	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D
Stringer 10 Coating		Bay 10	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Stringer 10		Bay 11	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D
Stringer 10 Coating		Bay 11	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Stringer 10	254	Bay 12	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating, except for local areas of painted-over pitted surface on the bottom flange.	N/A	D
Stringer 10 Coating	254	Bay 12	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Stringer 11	253	Bay 1	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating, except for localized areas of light surface rust on the bottom flange.	N/A	D

ELEMENT	PHOTO	MEMBER	PREV MCR	PREV PCR	NEW MCR	NEW PCR	COMMENTS	PRIORITY PREV	PRIORITY NEW
Stringer 11 Coating	253	Bay 1	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Stringer 11	249	Bay 2	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D
Stringer 11 Coating	249	Bay 2	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Stringer 11		Bay 3	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no apparent significant defects. The bottom flange was not visible due to the original railway stringer.	N/A	D
Stringer 11 Coating		Bay 3	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading and local light paint peeling.	N/A	D
Stringer 11		Bay 4	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no apparent significant defects. The bottom flange was not visible due to the original railway stringer.	N/A	D
Stringer 11 Coating		Bay 4	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading and local light paint peeling.	N/A	D
Stringer 11		Bay 5	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no apparent significant defects. The bottom flange was not visible due to the original railway stringer.	N/A	D
Stringer 11 Coating		Bay 5	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Stringer 11		Bay 6	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no apparent significant defects. The bottom flange was not visible due to the original railway stringer.	N/A	D
Stringer 11 Coating		Bay 6	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Stringer 11		Bay 7	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no apparent significant defects. The bottom flange was not visible due to the original railway stringer.	N/A	D
Stringer 11 Coating		Bay 7	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for light paint fading.	N/A	D

ELEMENT	PHOTO	MEMBER	PREV MCR	PREV PCR	NEW MCR	NEW PCR	COMMENTS	PRIORITY PREV	PRIORITY NEW
Stringer 11		Bay 8	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no apparent significant defects. The bottom flange was not visible due to the original railway stringer.	N/A	D
Stringer 11 Coating		Bay 8	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for light paint fading.	N/A	D
Stringer 11		Bay 9	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D
Stringer 11 Coating		Bay 9	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Stringer 11		Bay 10	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no apparent significant defects. The bottom flange was not visible due to the original railway stringer.	N/A	D
Stringer 11 Coating		Bay 10	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for light paint fading.	N/A	D
Stringer 11		Bay 11	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D
Stringer 11 Coating		Bay 11	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for light paint fading.	N/A	D
Stringer 11	254	Bay 12	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with exception to local painted-over pitted surface on the bottom flange near the south end.	N/A	D
Stringer 11 Coating	254	Bay 12	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Stringer 12	253	Bay 1	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no significant defects noted at the time of inspection.	N/A	D
Stringer 12 Coating	253	Bay 1	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Stringer 12	249	Bay 2	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no apparent significant defects. Minor accumulation of debris on the bottom flange.	N/A	D
Stringer 12 Coating	249	Bay 2	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D

ELEMENT	PHOTO	MEMBER	PREV MCR	PREV PCR	NEW MCR	NEW PCR	COMMENTS	PRIORITY PREV	PRIORITY NEW
Stringer 12		Bay 3	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D
Stringer 12 Coating		Bay 3	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Stringer 12		Bay 4	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating except for local painted-over pitted surface.	N/A	D
Stringer 12 Coating		Bay 4	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Stringer 12		Bay 5	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D
Stringer 12 Coating		Bay 5	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Stringer 12		Bay 6	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D
Stringer 12 Coating		Bay 6	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Stringer 12		Bay 7	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D
Stringer 12 Coating		Bay 7	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for light paint fading.	N/A	D
Stringer 12		Bay 8	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D
Stringer 12 Coating		Bay 8	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Stringer 12		Bay 9	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D
Stringer 12 Coating		Bay 9	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Stringer 12		Bay 10	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D

ELEMENT	PHOTO	MEMBER	PREV MCR	PREV PCR	NEW MCR	NEW PCR	COMMENTS	PRIORITY PREV	PRIORITY NEW
Stringer 12 Coating		Bay 10	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Stringer 12		Bay 11	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D
Stringer 12 Coating		Bay 11	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Stringer 12	254	Bay 12	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D
Stringer 12 Coating	254	Bay 12	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Sidewalk Stringer		Bay 1	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with local light surface rust and light paint peeling at south end of the stringer.	N/A	D
Sidewalk Stringer Coating		Bay 1	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading and light paint peeling at south end of the stringer.	N/A	D
Sidewalk Stringer		Bay 2	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no apparent significant defects. Left over holes were noted on the web from construction of the sidewalk and railing.	N/A	D
Sidewalk Stringer Coating		Bay 2	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Sidewalk Stringer		Bay 3	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D
Sidewalk Stringer Coating		Bay 3	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Sidewalk Stringer		Bay 4	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D
Sidewalk Stringer Coating		Bay 4	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Sidewalk Stringer		Bay 5	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D

ELEMENT	PHOTO	MEMBER	PREV MCR	PREV PCR	NEW MCR	NEW PCR	COMMENTS	PRIORITY PREV	PRIORITY NEW
Sidewalk Stringer Coating		Bay 5	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Sidewalk Stringer		Bay 6	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D
Sidewalk Stringer Coating		Bay 6	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Sidewalk Stringer		Bay 7	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D
Sidewalk Stringer Coating		Bay 7	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Sidewalk Stringer		Bay 8	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D
Sidewalk Stringer Coating		Bay 8	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Sidewalk Stringer		Bay 9	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D
Sidewalk Stringer Coating		Bay 9	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Sidewalk Stringer		Bay 10	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D
Sidewalk Stringer Coating		Bay 10	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Sidewalk Stringer		Bay 11	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D
Sidewalk Stringer Coating		Bay 11	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Sidewalk Stringer		Bay 12	N/A	N/A	5	5	The stringer was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D

ELEMENT	PHOTO	MEMBER	PREV MCR	PREV PCR	NEW MCR	NEW PCR	COMMENTS	PRIORITY PREV	PRIORITY NEW
Sidewalk Stringer Coating		Bay 12	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
End Diaphragms	272	A1-B1	N/A	N/A	5	5	The diaphragms were observed to be in good condition with no significant defects. Minor gouging was observed at the connection between stringer 9 and bay 1.	N/A	D
End Diaphragms Coating	272	A1-B1	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition, with local areas of light paint fading.	N/A	D
End Diaphragms		A2-B2	N/A	N/A	5	5	The diaphragms were observed to be in good condition with no significant defects. Accumulation of debris was observed on the top and bottom flanges of the diaphragms.	N/A	D
End Diaphragms Coating		A2-B2	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
End Diaphragms		A3-B3	N/A	N/A	5	5	The diaphragms were observed to be in good condition with no significant defects after the recent recoating.	N/A	D
End Diaphragms Coating		A3-B3	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
End Diaphragms		A4-B4	N/A	N/A	5	5	The diaphragms was observed to be in good condition with no apparent significant defects.	N/A	D
End Diaphragms Coating		A4-B4	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
End Diaphragms		A5-B5	N/A	N/A	5	5	The diaphragms were observed to be in good condition with no significant defects after the recent recoating.	N/A	D
End Diaphragms Coating		A5-B5	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
End Diaphragms		A6-B6	N/A	N/A	5	5	The diaphragms was observed to be in good condition with no apparent significant defects.	N/A	D
End Diaphragms Coating		A6-B6	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
End Diaphragms		A7-B7	N/A	N/A	5	5	The diaphragms were observed to be in good condition with no significant defects after the recent recoating.	N/A	D

ELEMENT	PHOTO	MEMBER	PREV MCR	PREV PCR	NEW MCR	NEW PCR	COMMENTS	PRIORITY PREV	PRIORITY NEW
End Diaphragms Coating		A7-B7	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
End Diaphragms		A8-B8	N/A	N/A	5	5	The diaphragms was observed to be in good condition with no apparent significant defects.	N/A	D
End Diaphragms Coating		A8-B8	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
End Diaphragms		A9-B9	N/A	N/A	5	5	The diaphragms were observed to be in good condition with no significant defects after the recent recoating.	N/A	D
End Diaphragms Coating		A9-B9	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
End Diaphragms		A10-B10	N/A	N/A	5	5	The diaphragms was observed to be in good condition with no apparent significant defects.	N/A	D
End Diaphragms Coating		A10-B10	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
End Diaphragms		A11-B11	N/A	N/A	5	5	The diaphragms were observed to be in good condition with no significant defects after the recent recoating.	N/A	D
End Diaphragms Coating		A11-B11	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
End Diaphragms		A12-B12	N/A	N/A	5	5	The diaphragms was observed to be in good condition with no apparent significant defects.	N/A	D
End Diaphragms Coating		A12-B12	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
End Diaphragms		A13-B13	N/A	N/A	5	5	The diaphragm was observed to be in good condition with no significant defects. Accumulation of debris was observed on the top and bottom flanges of the diaphragm.	N/A	D
End Diaphragms Coating		A13-B13	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Intermediate Diaphragms		Bay 1	N/A	N/A	5	5	The diaphragms was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D

ELEMENT	PHOTO	MEMBER	PREV MCR	PREV PCR	NEW MCR	NEW PCR	COMMENTS	PRIORITY PREV	PRIORITY NEW
Intermediate Diaphragm Coatings		Bay 1	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Intermediate Diaphragms	249	Bay 2	N/A	N/A	5	5	The diaphragms was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D
Intermediate Diaphragm Coatings	249	Bay 2	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Intermediate Diaphragms		Bay 3	N/A	N/A	5	5	The diaphragms was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D
Intermediate Diaphragm Coatings		Bay 3	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Intermediate Diaphragms		Bay 4	N/A	N/A	5	5	The diaphragms was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D
Intermediate Diaphragm Coatings		Bay 4	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Intermediate Diaphragms		Bay 5	N/A	N/A	5	5	The diaphragms was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D
Intermediate Diaphragm Coatings		Bay 5	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Intermediate Diaphragms		Bay 6	N/A	N/A	5	5	The diaphragms was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D
Intermediate Diaphragm Coatings		Bay 6	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Intermediate Diaphragms		Bay 7	N/A	N/A	5	5	The diaphragms was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D
Intermediate Diaphragm Coatings		Bay 7	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Intermediate Diaphragms		Bay 8	N/A	N/A	5	5	The diaphragms was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D

ELEMENT	PHOTO	MEMBER	PREV MCR	PREV PCR	NEW MCR	NEW PCR	COMMENTS	PRIORITY PREV	PRIORITY NEW
Intermediate Diaphragm Coatings		Bay 8	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Intermediate Diaphragms		Bay 9	N/A	N/A	5	5	The diaphragms was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D
Intermediate Diaphragm Coatings		Bay 9	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Intermediate Diaphragms		Bay 10	N/A	N/A	5	5	The diaphragms was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D
Intermediate Diaphragm Coatings		Bay 10	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Intermediate Diaphragms		Bay 11	N/A	N/A	5	5	The diaphragms was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D
Intermediate Diaphragm Coatings		Bay 11	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Intermediate Diaphragms	254	Bay 12	N/A	N/A	5	5	The diaphragms was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D
Intermediate Diaphragm Coatings	254	Bay 12	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Sidewalk Bracings			N/A	N/A	5	5	The bracings was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D
Sidewalk Bracings Coatings			N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Floorbeam	250	A1-B1	N/A	N/A	5	5	The floorbeam was observed to be in good condition with local areas of light paint peeling. Light corrosion with no section loss was observed on the bottom flange near the south end.	N/A	D
Floorbeam Coating	250	A1-B1	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for light paint peeling at areas that exhibit light corrosion.	N/A	D
Floorbeam	253, 269	A2-B2	N/A	N/A	5	5	The floorbeam was observed to be in good condition with local areas of light paint peeling. Local area of light corrosion with no section loss and minor gouging was observed on the web at the southeast end.	N/A	D

ELEMENT	PHOTO	MEMBER	PREV MCR	PREV PCR	NEW MCR	NEW PCR	COMMENTS	PRIORITY PREV	PRIORITY NEW
Floorbeam Coating	253, 269	A2-B2	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Floorbeam	252	A3-B3	N/A	N/A	5	5	The floorbeam was observed to be in good condition with local areas of light paint fading.	N/A	D
Floorbeam Coating	252	A3-B3	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Floorbeam		A4-B4	N/A	N/A	5	5	The floorbeam was observed to be in good condition with local areas of light paint fading.	N/A	D
Floorbeam Coating		A4-B4	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Floorbeam		A5-B5	N/A	N/A	5	5	The floorbeam was observed to be in good condition with local areas of light paint peeling.	N/A	D
Floorbeam Coating		A5-B5	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Floorbeam		A6-B6	N/A	N/A	5	5	The floorbeam was observed to be in good condition with local areas of paint fading and light paint peeling.	N/A	D
Floorbeam Coating		A6-B6	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of paint fading and light paint peeling.	N/A	D
Floorbeam		A7-B7	N/A	N/A	5	5	The floorbeam was observed to be in good condition with local areas of light paint fading.	N/A	D
Floorbeam Coating		A7-B7	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Floorbeam		A8-B8	N/A	N/A	5	5	The floorbeam was observed to be in good condition with local areas of light paint fading.	N/A	D
Floorbeam Coating		A8-B8	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Floorbeam		A9-B9	N/A	N/A	5	5	The floorbeam was observed to be in good condition with local areas of light paint fading.	N/A	D

ELEMENT	PHOTO	MEMBER	PREV MCR	PREV PCR	NEW MCR	NEW PCR	COMMENTS	PRIORITY PREV	PRIORITY NEW
Floorbeam Coating		A9-B9	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Floorbeam		A10-B10	N/A	N/A	5	5	The floorbeam was observed to be in good condition with local areas of light paint fading.	N/A	D
Floorbeam Coating		A10-B10	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Floorbeam		A11-B11	N/A	N/A	5	5	The floorbeam was observed to be in good condition with local areas of light paint fading.	N/A	D
Floorbeam Coating		A11-B11	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Floorbeam	254, 273	A12-B12	N/A	N/A	5	5	The floorbeam was observed to be in good condition with local areas of light paint peeling. Minor gouging was observed on the web at the northwest end.	N/A	D
Floorbeam Coating	254, 273	A12-B12	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Floorbeam	262, 267 TO 268, 275	A13-B13	N/A	N/A	5	5	The floorbeam was observed to be in good condition with local areas of light paint peeling. Light corrosion with no section loss was observed on the bottom flange near the centre connection plate. Light gouging was noted on gusset plates at centering shoe.	N/A	D
Floorbeam Coating	262, 267 TO 268, 275	A13-B13	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint peeling.	N/A	D
Lateral Bracing		A1-B3	N/A	N/A	5	5	Overall, the bracing is in good condition. Local areas of light surface corrosion and paint peeling was noted along the bracing.	N/A	D
Lateral Bracing Coating		A1-B3	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition overall with exception to local areas of light surface rust on traction bracings connection plates.	N/A	D
Lateral Bracing		A3-B1	N/A	N/A	5	5	Overall, the bracing is in good condition. Local areas of light surface corrosion and paint peeling was noted along the bracing.	N/A	D
Lateral Bracing Coating		A3-B1	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition overall with exception to local areas of light surface rust on connection plates with the traction bracings.	N/A	D

ELEMENT	PHOTO	MEMBER	PREV MCR	PREV PCR	NEW MCR	NEW PCR	COMMENTS	PRIORITY PREV	PRIORITY NEW
Lateral Bracing		A3-B5	N/A	N/A	5	5	Overall, the bracing is in good condition with no apparent significant defects.	N/A	D
Lateral Bracing Coating		A3-B5	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition overall, with local areas of light fading.	N/A	D
Lateral Bracing		A5-B3	N/A	N/A	5	5	Overall, the bracing is in good condition with no apparent significant defects.	N/A	D
Lateral Bracing Coating		A5-B3	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition overall, with local areas of light fading.	N/A	D
Lateral Bracing		A5-B7	N/A	N/A	5	5	Overall, the bracing is in good condition with no apparent significant defects.	N/A	D
Lateral Bracing Coating		A5-B7	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition overall, with local areas of light fading.	N/A	D
Lateral Bracing		A7-B5	N/A	N/A	5	5	Overall, the bracing is in good condition with no apparent significant defects.	N/A	D
Lateral Bracing Coating		A7-B5	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition overall, with local areas of light fading.	N/A	D
Lateral Bracing		A7-B9	N/A	N/A	5	5	Overall, the bracing is in good condition with no apparent significant defects.	N/A	D
Lateral Bracing Coating		A7-B9	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition overall, with local areas of light fading.	N/A	D
Lateral Bracing		A9-B7	N/A	N/A	5	5	Overall, the bracing is in good condition with no apparent significant defects.	N/A	D
Lateral Bracing Coating		A9-B7	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition overall, with local areas of light fading.	N/A	D
Lateral Bracing		A9-B11	N/A	N/A	5	5	Overall, the bracing is in good condition with no apparent significant defects.	N/A	D
Lateral Bracing Coating		A9-B11	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition overall, with local areas of light fading.	N/A	D
Lateral Bracing		A11-B9	N/A	N/A	5	5	Overall, the bracing is in good condition with no apparent significant defects.	N/A	D

ELEMENT	PHOTO	MEMBER	PREV MCR	PREV PCR	NEW MCR	NEW PCR	COMMENTS	PRIORITY	
								PREV	NEW
Lateral Bracing Coating		A11-B9	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition overall, with local areas of light fading.	N/A	D
Lateral Bracing	274	A11-B13	N/A	N/A	5	5	Overall, the bracing is in good condition with no apparent significant defects. Local areas of minor gouging on bottom surface of the bracing.	N/A	D
Lateral Bracing Coating	274	A11-B13	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition overall, with local areas of light fading.	N/A	D
Lateral Bracing	274	A13-B11	N/A	N/A	5	5	Overall, the bracing is in good condition with no apparent significant defects. Local areas of minor gouging on bottom surface of the bracing.	N/A	D
Lateral Bracing Coating	274	A13-B11	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition overall, with local areas of light fading.	N/A	D
Traction Bracing		A1-B1	N/A	N/A	5	5	Overall, the bracing is in good condition. Local areas of light surface corrosion and paint peeling was noted along the bracing.	N/A	D
Traction Bracing Coating		A1-B1	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition overall with exception to local areas of light surface rust on the north face of the traction bracing connection plate.	N/A	D
Traction Bracing		A3-B3	N/A	N/A	5	5	Overall, the bracing is in good condition with exception to local areas of light paint fading.	N/A	D
Traction Bracing Coating		A3-B3	N/A	N/A	5	5	Overall, the coating is in good condition with exception to local areas of light paint fading.	N/A	D
Traction Bracing		A5-B5	N/A	N/A	5	5	Overall, the bracing is in good condition with exception to local areas of light paint fading.	N/A	D
Traction Bracing Coating		A5-B5	N/A	N/A	5	5	Overall, the coating is in good condition with exception to local areas of light paint fading.	N/A	D
Traction Bracing		A7-B7	N/A	N/A	5	5	Overall, the bracing is in good condition with exception to local areas of light paint fading.	N/A	D
Traction Bracing Coating		A7-B7	N/A	N/A	5	5	Overall, the coating is in good condition with exception to local areas of light paint fading.	N/A	D
Traction Bracing		A9-A9	N/A	N/A	5	5	Overall, the bracing is in good condition with exception to local areas of light paint fading.	N/A	D

ELEMENT	PHOTO	MEMBER	PREV MCR	PREV PCR	NEW MCR	NEW PCR	COMMENTS	PRIORITY PREV	PRIORITY NEW
Traction Bracing Coating		A9-A9	N/A	N/A	5	5	Overall, the coating is in good condition with exception to local areas of light paint fading.	N/A	D
Traction Bracing		A11-A11	N/A	N/A	5	5	Overall, the bracing is in good condition with exception to local areas of light paint fading.	N/A	D
Traction Bracing Coating		A11-A11	N/A	N/A	5	5	Overall, the coating is in good condition with exception to local areas of light paint fading.	N/A	D
Traction Bracing		A13-B13	N/A	N/A	5	5	Overall, the bracing is in good condition with exception to local areas of light paint fading.	N/A	D
Traction Bracing Coating		A13-B13	N/A	N/A	5	5	Overall, the coating is in good condition with exception to local areas of light paint fading.	N/A	D
Gusset Plate	266	A1	N/A	N/A	5	5	The gusset was obvserved to be in good condition after the recent recoating with minor signs of light paint peeling. Minor buildup of debris noted at corners.	N/A	D
Gusset Plate Coating	266	A1	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light rust jacking.	N/A	D
Gusset Plate	258	A2	N/A	N/A	5	5	The gusset was obvserved to be in good condition after the recent recoating with no apparent significant defects. Minor buildup of debris noted at corners.	N/A	D
Gusset Plate Coating	258	A2	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Gusset Plate		A3	N/A	N/A	5	5	The gusset plate was observed to be in good condiiton after the recent recoating with light surface rust.	N/A	D
Gusset Plate Coating		A3	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Gusset Plate		A4	N/A	N/A	5	5	The gusset plate was observed to be in good condiiton after the recent recoating with light surface rust.	N/A	D
Gusset Plate Coating		A4	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Gusset Plate		A5	N/A	N/A	5	5	The gusset plate was observed to be in good condiiton after the recent recoating with light surface rust.	N/A	D

ELEMENT	PHOTO	MEMBER	PREV MCR	PREV PCR	NEW MCR	NEW PCR	COMMENTS	PRIORITY PREV	PRIORITY NEW
Gusset Plate Coating		A5	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Gusset Plate		A6	N/A	N/A	5	5	The gusset plate was observed to be in good condiiton after the recent recoating with light surface rust.	N/A	D
Gusset Plate Coating		A6	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Gusset Plate	260	A7	N/A	N/A	5	5	The gusset plate was observed to be in good condiiton after the recent recoating with light surface rust.	N/A	D
Gusset Plate Coating	260	A7	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Gusset Plate	260	A8	N/A	N/A	5	5	The gusset plate was observed to be in good condiiton after the recent recoating with light surface rust.	N/A	D
Gusset Plate Coating	260	A8	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Gusset Plate		A9	N/A	N/A	5	5	The gusset plate was observed to be in good condiiton after the recent recoating with light surface rust.	N/A	D
Gusset Plate Coating		A9	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Gusset Plate		A10	N/A	N/A	5	5	The gusset plate was observed to be in good condiiton after the recent recoating with light surface rust.	N/A	D
Gusset Plate Coating		A10	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Gusset Plate		A11	N/A	N/A	5	5	The gusset plate was observed to be in good condiiton after the recent recoating with light surface rust.	N/A	D
Gusset Plate Coating		A11	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Gusset Plate		A12	N/A	N/A	5	5	The gusset plate was observed to be in good condiiton after the recent recoating with light surface rust.	N/A	D

ELEMENT	PHOTO	MEMBER	PREV MCR	PREV PCR	NEW MCR	NEW PCR	COMMENTS	PRIORITY	
								PREV	NEW
Gusset Plate Coating		A12	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Gusset Plate		A13	N/A	N/A	5	5	The gusset plate was observed to be in good condiiton after the recent recoating with light surface rust.	N/A	D
Gusset Plate Coating		A13	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Gusset Plate		B1	N/A	N/A	5	5	The gusset plate was observed to be in good condiiton after the recent recoating with light surface rust.	N/A	D
Gusset Plate Coating		B1	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light surface rust.	N/A	D
Gusset Plate	259	B2	N/A	N/A	5	5	The gusset plate connection is in good condition overall. One missing rivet was noted at the bottom face of the gusset plate.	N/A	D
Gusset Plate Coating	259	B2	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Gusset Plate		B3	N/A	N/A	5	5	The gusset plate was observed to be in good condiiton after the recent recoating with light surface rust.	N/A	D
Gusset Plate Coating		B3	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Gusset Plate		B4	N/A	N/A	5	5	The gusset plate was observed to be in good condiiton after the recent recoating with light surface rust.	N/A	D
Gusset Plate Coating		B4	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Gusset Plate		B5	N/A	N/A	5	5	The gusset plate was observed to be in good condiiton after the recent recoating with light surface rust.	N/A	D
Gusset Plate Coating		B5	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Gusset Plate	261	B6	N/A	N/A	5	5	The gusset plate was observed to be in good condiiton after the recent recoating with light surface rust.	N/A	D

ELEMENT	PHOTO	MEMBER	PREV MCR	PREV PCR	NEW MCR	NEW PCR	COMMENTS	PRIORITY PREV	PRIORITY NEW
Gusset Plate Coating	261	B6	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Gusset Plate	261	B7	N/A	N/A	5	5	The gusset plate was observed to be in good condiiton after the recent recoating with light surface rust.	N/A	D
Gusset Plate Coating	261	B7	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Gusset Plate	261	B8	N/A	N/A	5	5	The gusset plate was observed to be in good condiiton after the recent recoating with light surface rust.	N/A	D
Gusset Plate Coating	261	B8	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Gusset Plate	261	B9	N/A	N/A	5	5	The gusset plate was observed to be in good condiiton after the recent recoating with light surface rust.	N/A	D
Gusset Plate Coating	261	B9	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Gusset Plate		B10	N/A	N/A	5	5	The gusset plate was observed to be in good condiiton after the recent recoating with light surface rust.	N/A	D
Gusset Plate Coating		B10	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Gusset Plate		B11	N/A	N/A	5	5	The gusset plate was observed to be in good condiiton after the recent recoating with light surface rust.	N/A	D
Gusset Plate Coating		B11	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Gusset Plate		B12	N/A	N/A	5	5	The gusset plate connection is in good condition overall. One missing rivet was noted at the bottom face of the gusset plate.	N/A	D
Gusset Plate Coating		B12	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light surface rust.	N/A	D
Gusset Plate		B13	N/A	N/A	5	5	The gusset plate was observed to be in good condiiton after the recent recoating with light surface rust.	N/A	D

ELEMENT	PHOTO	MEMBER	PREV MCR	PREV PCR	NEW MCR	NEW PCR	COMMENTS	PRIORITY	
								PREV	NEW
Gusset Plate Coating		B13	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Gusset Plate		AT1	N/A	N/A	5	5	The gusset plate was observed to be in good condiiton after the recent recoating with light surface rust.	N/A	D
Gusset Plate Coating		AT1	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Gusset Plate		AT2	N/A	N/A	5	5	The gusset plate was observed to be in good condiiton after the recent recoating with light surface rust.	N/A	D
Gusset Plate Coating		AT2	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Gusset Plate		AT3	N/A	N/A	5	5	The gusset plate was observed to be in good condiiton after the recent recoating with light surface rust.	N/A	D
Gusset Plate Coating		AT3	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Gusset Plate		AT4	N/A	N/A	5	5	The gusset plate was observed to be in good condiiton after the recent recoating with light surface rust.	N/A	D
Gusset Plate Coating		AT4	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Gusset Plate		AT5	N/A	N/A	5	5	The gusset plate was observed to be in good condiiton after the recent recoating with light surface rust.	N/A	D
Gusset Plate Coating		AT5	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Gusset Plate		AT6	N/A	N/A	5	5	The gusset plate was observed to be in good condiiton after the recent recoating with light surface rust.	N/A	D
Gusset Plate Coating		AT6	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Gusset Plate		AT7	N/A	N/A	5	5	The gusset plate was observed to be in good condiiton after the recent recoating with light surface rust.	N/A	D

ELEMENT	PHOTO	MEMBER	PREV MCR	PREV PCR	NEW MCR	NEW PCR	COMMENTS	PRIORITY	
								PREV	NEW
Gusset Plate Coating		AT7	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Gusset Plate		AT8	N/A	N/A	5	5	The gusset plate was observed to be in good condiiton after the recent recoating with light surface rust.	N/A	D
Gusset Plate Coating		AT8	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Gusset Plate		AT9	N/A	N/A	5	5	The gusset plate was observed to be in good condiiton after the recent recoating with light surface rust.	N/A	D
Gusset Plate Coating		AT9	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Gusset Plate		AT10	N/A	N/A	5	5	The gusset plate was observed to be in good condiiton after the recent recoating with light surface rust.	N/A	D
Gusset Plate Coating		AT10	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Gusset Plate		AT11	N/A	N/A	5	5	The gusset plate was observed to be in good condiiton after the recent recoating with light surface rust.	N/A	D
Gusset Plate Coating		AT11	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Gusset Plate		AT12	N/A	N/A	5	5	The gusset plate was observed to be in good condiiton after the recent recoating with light surface rust.	N/A	D
Gusset Plate Coating		AT12	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Gusset Plate		AT13	N/A	N/A	5	5	The gusset plate was observed to be in good condiiton after the recent recoating with light surface rust.	N/A	D
Gusset Plate Coating		AT13	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Gusset Plate		BT1	N/A	N/A	5	5	The gusset plate was observed to be in good condiiton after the recent recoating with light surface rust.	N/A	D

ELEMENT	PHOTO	MEMBER	PREV MCR	PREV PCR	NEW MCR	NEW PCR	COMMENTS	PRIORITY PREV	PRIORITY NEW
Gusset Plate Coating		BT1	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Gusset Plate		BT2	N/A	N/A	5	5	The gusset plate was observed to be in good condiiton after the recent recoating with light surface rust.	N/A	D
Gusset Plate Coating		BT2	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Gusset Plate		BT3	N/A	N/A	5	5	The gusset plate was observed to be in good condiiton after the recent recoating with light surface rust.	N/A	D
Gusset Plate Coating		BT3	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Gusset Plate		BT4	N/A	N/A	5	5	The gusset plate was observed to be in good condiiton after the recent recoating with light surface rust.	N/A	D
Gusset Plate Coating		BT4	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Gusset Plate		BT5	N/A	N/A	5	5	The gusset plate was observed to be in good condiiton after the recent recoating with light surface rust.	N/A	D
Gusset Plate Coating		BT5	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Gusset Plate		BT6	N/A	N/A	5	5	The gusset plate was observed to be in good condiiton after the recent recoating with light surface rust.	N/A	D
Gusset Plate Coating		BT6	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Gusset Plate		BT7	N/A	N/A	5	5	The gusset plate was observed to be in good condiiton after the recent recoating with light surface rust.	N/A	D
Gusset Plate Coating		BT7	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Gusset Plate		BT8	N/A	N/A	5	5	The gusset plate was observed to be in good condiiton after the recent recoating with light surface rust.	N/A	D

ELEMENT	PHOTO	MEMBER	PREV MCR	PREV PCR	NEW MCR	NEW PCR	COMMENTS	PRIORITY	
								PREV	NEW
Gusset Plate Coating		BT8	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Gusset Plate		BT9	N/A	N/A	5	5	The gusset plate was observed to be in good condiiton after the recent recoating with light surface rust.	N/A	D
Gusset Plate Coating		BT9	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Gusset Plate	285	BT10	N/A	N/A	5	5	The gusset plate was observed to be in good condition after the recent recoating with light surface rust.	N/A	D
Gusset Plate Coating	285	BT10	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint peeling.	N/A	D
Gusset Plate		BT11	N/A	N/A	5	5	The gusset plate was observed to be in good condiiton after the recent recoating with light surface rust.	N/A	D
Gusset Plate Coating		BT11	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Gusset Plate		BT12	N/A	N/A	5	5	The gusset plate was observed to be in good condiiton after the recent recoating with light surface rust.	N/A	D
Gusset Plate Coating		BT12	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Gusset Plate		BT13	N/A	N/A	5	5	The gusset plate was observed to be in good condiiton after the recent recoating with light surface rust.	N/A	D
Gusset Plate Coating		BT13	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Gusset Plate		C1	N/A	N/A	5	5	The gusset plate was observed to be in good condition after the recent recoating with light surface rust.	N/A	D
Gusset Plate Coating		C1	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Gusset Plate	263	C2	N/A	N/A	5	5	The gusset plate was observed to be in good condition after the recent recoating with light surface rust and light paint peeling on the west side.	N/A	D

ELEMENT	PHOTO	MEMBER	PREV MCR	PREV PCR	NEW MCR	NEW PCR	COMMENTS	PRIORITY	
								PREV	NEW
Gusset Plate Coating	263	C2	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading and light paint peeling.	N/A	D
Gusset Plate		C3	N/A	N/A	5	5	The gusset plate was observed to be in good condition after the recent recoating with light surface rust and light paint peeling on the northwest side.	N/A	D
Gusset Plate Coating		C3	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading and local light paint peeling.	N/A	D
Gusset Plate		C4	N/A	N/A	5	5	The gusset plate was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D
Gusset Plate Coating		C4	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Gusset Plate		C5	N/A	N/A	5	5	The gusset plate was observed to be in good condition after the recent recoating with no apparent significant defects.	N/A	D
Gusset Plate Coating		C5	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D
Gusset Plate		C6	N/A	N/A	5	5	The gusset plate was observed to be in good condition after the recent recoating with no apparent significant defects. Minor buildup of debris noted at corners	N/A	D
Gusset Plate Coating		C6	N/A	N/A	5	5	The coating was recoated during the winter shutdown in 2010 and 2011. The coating was found to be in good condition except for local areas of light paint fading.	N/A	D

APPENDIX A4

Corrosion Survey Report by Domson

Domson Engineering & Inspection Ltd.
190 Wilkinson Road, Unit 2
Brampton ON, L6T 4W3
Tel: (905) 789-1326
Fax: (905) 789-1328

Project # R.090046.001

Corrosion Survey Report for:

Burlington Canal Lift Bridge

Report # 43729-Rev.0
Inspection Performed: December 17-20, 2018
Submitted to: Morrison Hershfield

Inspected By:
Alex Boone
CGSB Level 2
William Field
CGSB Level 2

Reviewed By:

CANADIAN WELDING BUREAU
18082
F. Rahiminia
Level 3
CSA W178.2
CERTIFIED WELDING INSPECTOR

Faramarz Rahiminia
CSA W178.2 Level 3
Project Engineer

INSPECTION REPORT

Morrison Hershfield Ltd.
125 Commerce Valley Drive, Suite 300
Markham, Ontario, L3T 7W4

Date: December 17-20, 2018
Job No.: 43729

TABLE OF CONTENTS

INSPECTION REPORT

Morrison Hershfield Ltd.
125 Commerce Valley Drive, Suite 300
Markham, Ontario, L3T 7W4

Date: December 17-20, 2018
Job No.: 43729

1. Scope of Inspection

Visual inspection and ultrasonic thickness testing of structural steel members of 2 towers located at the Burlington Canal Lift Bridge in Hamilton.

2. Inspection Method and Procedure

Visual inspection and ultrasonic thickness testing of structural steel members under the direction and supervision of a Morrison Hershfield engineer.

Ultrasonic inspection (UT) was completed as per details below:

Ultrasonic Instrument: Epoch 600 (UT16)
Date Calibrated: November 21, 2018
Surface Condition: Bare Metal
Surface Preparation: Wire Wheel
Instrument S/N: 120350805
Couplant: UT-X
Calibration Block: Step Wedge (4315-15)
Material: Carbon Steel

Scan	Angle	Size Inches	Frequency (MHz)	Serial Number	Velocity (In/µs)	Zero (µs)	Damping ohms	Reference Reflector	Reference Sensitivity	Scan Sensitivity	Range Inches
1	0	0.5	5	604844	0.233	0.821	50	Backwall	22	80% FSH	2

3. Corrosion Survey Details

On the days of December 17, 18, 19 and 20, our technicians conducted a corrosion survey on the Burlington Channel Lift Bridge.

The areas of focus were:

I. The webs of the main lower tower beams
II. The fixed main support girders
III. the connecting diaphragms, which span from the main abutments all the way across to the base of the towers

The degree of corrosion varies based on the location, but is generally most severe at the abutment locations as well as the portions directly beneath the barriers between the fixed bridge and the lift bridge.

The thickness results have been recorded in tables, separated by location. The tables can be found in the thickness testing results section of this report.

4. Notable observations

The backsides of the diaphragms located at the abutments have a large degree of general corrosion; anywhere from 0.100” to 0.200” material loss was recorded. Locations with severe corrosion on both sides of the web were recorded as low as ~0.140”.

The full height of the webs of the girders closest to the abutment walls were severely corroded/delaminated.

The flanges of all structures were heavily corroded/delaminated.

5. Acceptance Criteria

Thickness testing only.

6. Identification of Results Table Abbreviations

The letters “N” and “S” will change based on location.

Results Table	
Abbreviation	**Meaning**
NNC	No notable corrosion

Cardinal Abbreviations	
Abbreviation	**Meaning**
NA	North Abutment
NTNE	North Tower, North Exterior
NTNI	North Tower, North Interior
NTSE	North Tower, South Exterior
NTSI	North Tower, South Interior

.

7. North Side Thickness Testing Results

(*All thickness measurements are in inches*)

North Abutment Thickness Results (inches)					
Girder #	Low	Nominal	Diaphragm #	Low	Nominal
1N	0.187	0.440	1-2 NA	0.240	U/V
2N	0.400	0.440	2-3 NA	0.360	U/V
3N	0.405	0.440	3-4 NA	0.365	U/V
4N	0.405	0.605	4-5 NA	0.340	U/V
5N	0.600	0.605	5-6 NA	0.270	U/V
6N	0.600	0.605	6-7 NA	0.180	U/V
7N	0.420	0.605	7-8 NA	0.350	U/V
8N	0.575	0.605			

North Tower, North Exterior (inches)					
Girder #	Low	Nominal	Diaphragm #	Low	Nominal
1N	N/A	0.440	1-2 NTNE	0.396	0.405
2N	N/A	0.440	2-3 NTNE	0.405	0.405
3N	0.427	0.440	3-4 NTNE	0.375	0.405
4N	0.335	0.605	4-5 NTNE	0.390	0.440
5N	0.540	0.605	5-6 NTNE	0.366	0.440
6N	0.560	0.605	6-7 NTNE	0.338	0.440
7N	0.550	0.605	7-8 NTNE	0.395	0.440
8N	0.390	0.605			

North Tower, North Interior (inches)					
Girder #	Low	Nominal	Diaphragm #	Low	Nominal
1T	0.440	0.440	Shared with "North Exterior"		
2T	0.440	0.440			
3T	0.360	0.440			
4T	0.525	0.605			
5T	0.605	0.605			
6T	0.605	0.605			
7T	0.605	0.605			
8T	0.605	0.605			

North Tower, South Exterior (inches)								
Girder #	Low	Nominal	Diaphragm #	Low	Nominal	Diaphragm #	Low	Nominal
1T	0.368	0.440	1-2 NTSE	0.410	0.440	1-2 NTSI	0.395	0.405
2T	0.440	0.440	2-3 NTSE	0.380	0.440	2-3 NTSI	0.406	0.405
3T	0.365	0.440	3-4 NTSE	0.310	0.440	3-4 NTSI	0.320	0.405
4T	0.500	0.605	4-5 NTSE	0.373	0.440	4-5 NTSI	0.405	0.405
5T	0.550	0.605	5-6 NTSE	0.290	0.440	5-6 NTSI	0.405	0.405
6T	0.550	0.605	6-7 NTSE	0.297	0.440	6-7 NTSI	0.405	0.405
7T	0.515	0.605	7-8 NTSE	0.323	0.440	7-8 NTSI	0.405	0.405
8T	0.520	0.605						

8. South Side Thickness Testing Results

(All diaphragms at the south abutment have a generalized corrosion of ~0.100" to 0.200")

South Abutment Thickness Results (inches)					
Girder #	Low	Nominal	Diaphragm #	Low	Nominal
1S	0.300	0.440	1-2 SA	0.220	U/V
2S	0.200	0.440	2-3 SA	0.300	U/V
3S	0.330	0.440	3-4 SA	0.310	U/V
4S	0.450	0.605	4-5 SA	0.170	U/V
5S	0.400	0.605	5-6 SA	0.330	U/V
6S	0.200	0.605	6-7 SA	0.344	U/V
7S	0.350	0.605	7-8 SA	0.140	U/V
8S	0.400	0.605			

South Tower, South Exterior (inches)					
Girder #	Low	Nominal	Diaphragm #	Low	Nominal
1S	0.440	0.440	1-2 STSE	0.405	0.405
2S	0.435	0.445	2-3 STSE	0.385	0.405
3S	0.438	0.450	3-4 STSE	0.365	0.405
4S	0.510	0.605	4-5 STSE	0.202	0.405
5S	0.605	0.605	5-6 STSE	0.370	0.440
6S	0.545	0.605	6-7 STSE	0.382	0.440
7S	0.565	0.605	7-8 STSE	0.400	0.405
8S	0.590	0.605			

South Tower, South Interior (inches)					
Girder #	Low	Nominal	Diaphragm #	Low	Nominal
1T	0.360	0.375	Shared with "South Exterior"		
2T	0.350	0.375			
3T	0.375	0.375			
4T	0.515	0.550			
5T	0.605	0.605			
6T	0.605	0.605			
7T	0.605	0.605			
8T	0.605	0.605			

South Tower, North Exterior (inches)								
Girder #	Low	Nominal	Diaphragm #	Low	Nominal	Diaphragm #	Low	Nominal
1T	0.350	0.375	1-2 STNE	0.330	0.440	1-2 STNI	0.405	0.405
2T	0.340	0.375	2-3 STNE	0.400	0.440	2-3 STNI	0.405	0.405
3T	0.340	0.375	3-4 STNE	0.310	0.440	3-4 STNI	0.405	0.405
4T	0.460	0.550	4-5 STNE	0.300	0.375	4-5 STNI	0.405	0.405
5T	0.550	0.550	5-6 STNE	0.315	0.375	5-6 STNI	0.405	0.405
6T	0.550	0.550	6-7 STNE	0.375	0.375	6-7 STNI	0.405	0.405
7T	0.550	0.550	7-8 STNE	0.350	0.375	7-8 STNI	0.405	0.405
8T	0.550	0.550						

9. Miscellaneous Thickness Testing Results

NORTH TOWER, MAIN BEAM THICKNESSES		
TEST AREA	LOW	NOMINAL
NORTH BEAM	0.350	0.750
WEST BEAM	NNC	0.750
EAST BEAM	NNC	0.750

SOUTH TOWER, MAIN BEAM THICKNESSES		
TEST AREA	LOW	NOMINAL
NORTH BEAM	NNC	0.750
WEST BEAM	NNC	0.750
EAST BEAM	NNC	0.750

SOUTH ABUTMENT, MISC READINGS		
TEST AREA	LOW	NOMINAL
WALKWAY BEAM	NNC	0.440
OUTER STIFFENER	0.315	0.375

North Abutment Location

Example of a girder-to-diaphragm connection.
Small patches of corrosion can be seen. The most severe locations were tested and compared against what was measured to be “nominal”.

INSPECTION REPORT

Morrison Hershfield Ltd.
125 Commerce Valley Drive, Suite 300
Markham, Ontario, L3T 7W4

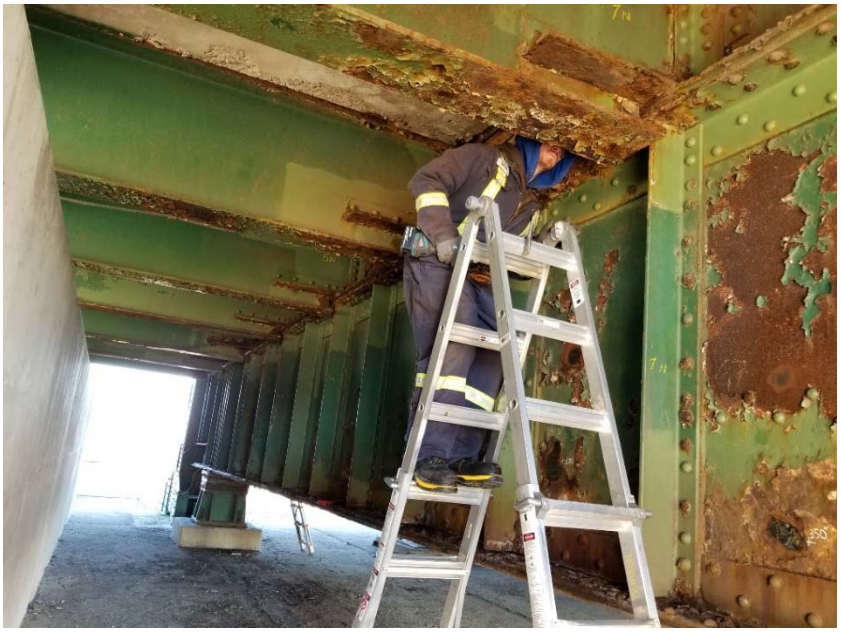
Date: December 17-20, 2018
Job No.: 43729

Girder web by abutment wall. Full height of the web is corroded/delaminated.
This degree of corrosion is typical for all girders.

Severe delamination on diaphragm flange

Delamination on diaphragm

Delamination on girder flanges



North tower main support beam.
Several severe patches of corrosion identified.

Lowest area found on the norther support beam

INSPECTION REPORT

Morrison Hershfield Ltd.
125 Commerce Valley Drive, Suite 300
Markham, Ontario, L3T 7W4

Girder 4S at the abutment wall - Severe corrosion

Girder 4S - Severe corrosion

APPENDIX A5

Itemized Estimates for Recommended Major Work

Improvement	Unit	Unit Cost	Qty	2019	2020	2021		2024	2025	2026	2027	2,028	TOTAL
1a. Concrete Deck Replacement (Deck at Approach and Tower Spans)													
Removal of Existing Deck and Stringers	LS	$383,300	1	$383,300.00									$383,300
New Concrete Deck on New Steel Stringers (included Expansion Joints, Bearings)	m^2	$2,850	700	$1,995,000.00									$1,995,000
Access & Protection (incl. Traffic Controls)	LS	$194,250	1	$194,250.00									$194,250
Subtotal:				**$2,573,000.00**									**$2,573,000**
Engineering & Contract Administration (20%)				$514,600.00									$514,600
Contingency (15%)				$385,950.00									$385,950
Total				**$3,474,000.00**									**$3,474,000**
2a. Replace Deck Grating on SB Lane (Lift Span- SB Deck, 48 Panels total)													
Traffic Controls	LS	$420,000	1		$420,000.00								$420,000
Access Platforms & Environmental Protection	LS	$703,500	1		$703,500.00								$703,500
Removal of Existing Grating Panels	LS	$735,000	1		$735,000.00								$735,000
Clean & Coat Structural Steel Subsrate for New Grating	m^2	$1,365	155		$211,575.00								$211,575
Supply & Install New Deck Grating (48 Panels)	t	$24,150	154		$3,709,440.00								$3,709,440
Subtotal:					**$5,780,000.00**								**$5,780,000**
Engineering & Contract Administration (20%)					$1,156,000.00								$1,156,000
Contingency (15%)					$867,000.00								$867,000
Total					**$7,803,000.00**								**$7,803,000**
2b. Replace Deck Grating on SB Lane (Lift Span- NB Deck, 49 Panels total)													
Traffic Controls	LS	$420,000	1			$420,000							$420,000
Access Platforms & Environmental Protection	LS	$714,000	1			$714,000							$714,000
Removal of Existing Grating Panels	LS	$819,000	1			$819,000							$819,000
Clean & Coat Structural Steel for New Grating	m^2	$1,365	160			$218,400							$218,400
Supply & Install New Deck Grating (49 Panels)	t	$24,150	157			$3,786,720							$3,786,720
Subtotal:						**$5,959,000**							**$5,959,000**
Engineering & Contract Administration (20%)						$1,191,800							$1,191,800
Contingency (15%)						$893,850							$893,850
Total						**$8,045,000**							**$8,045,000**
											TOTAL (2a & 2b)		**$15,848,000**
4a. Structural Steel Coating, Lift Span above Deck													
Traffic Controls	LS	$189,000	1					$94,500	$94,500				$189,000
Clean & Coat Structural Steel Truss in Lift Span (including access & environmental Protection)	LS	$2,961,000	1					$1,480,500	$1,480,500				$2,961,000
Subtotal:								**$1,575,000**	**$1,575,000**				**$3,150,000**
Engineering & Contract Administration (20%)								$315,000	$315,000				$630,000
Contingency (15%)								$236,250	$236,250				$472,500
Total								**$2,126,000**	**$2,126,000**				**$4,252,000**
4b. Structural Steel Coating, Towers (Section above Deck)													
Traffic Controls	LS	$231,525	1							$73,500	$73,500	$73,500	$220,500
Clean & Coat Structural Steel Towers above Deck (including access & environmental Protection)	LS	$4,674,600	1							$1,480,500	$1,480,500	$1,491,000	$4,452,000
Subtotal:										**$1,554,000**	**$1,554,000**	**$1,565,000**	**$4,673,000**
Engineering & Contract Administration (20%)										$310,800	$310,800	$313,000	$934,600
Contingency (15%)										$233,100	$233,100	$234,750	$700,950
Total										**$2,098,000**	**$2,098,000**	**$2,113,000**	**$6,309,000**
											TOTAL (4a & 4b)		**$10,561,000**

*Includes Traffic Control and Engineering

APPENDIX A6

Fall Arrest Inspection Report

Fall Protection System Inspection Report

W.S. SAFETY
W.S. Safety Technologies 623619 Ontario Inc.
221 Lawrence Ave. Orillia Ontario, Canada L3V 5M3
Email: mail@wssafety.com
Ph: (855) 227-5787
www.wssafety.com

Company:	**BURLINGTON LIFT-BRIDGE**
Attn:	**ABBAS KHAN**
Date:	**JUNE 2018**
Inspector:	**WARREN BENNETT**
Reviewed:	**PATRICK MICHELS**

NOTES:

This inspection certificate is a random indication on the date of the inspection. User and supervisor have to inspect and maintain the equipment prior to each use following standards and manufacturers manuals.

The results of this P.P.E. Visual Inspection are provided to you subject to the condition that the components to be inspected do not come into any falls, modifications, local pressure force or blow and are not used longer than the manufacturer described, any of which would require the rejection of the component.

This inspection report is no longer valid when the product has been subjected to any fall forces, has been used for other purposes than described in the user manual, has been used in combination with other components than described in the user manual, has been stored and/or maintained in a different way than described in the user manual.

Please note, the date for your next inspection is either one year from the date of completion for this inspection or sooner if an incident was to occur on the system.

Fall Protection System Inspection Report

W.S. SAFETY
W.S. Safety Technologies 623619 Ontario Inc.
221 Lawrence Ave. Orillia Ontario, Canada L3V 5M3
Email: mail@wssafety.com
Ph: (855) 227-5787
www.wssafety.com

COMPANY SITE: **BURLINGTON LIFT BRIDGE**		SITE CONTACT: **ABBAS KHAN**
ADDRESS: **Canal Road**		PHONE: FAX:
CITY: **BURLINGTON**	PROV./STATE: **ONTARIO**	INSPECTOR: **WARREN BENNETT**
INSPECTION DATE: **JUNE 2018**	TEMPERATURE: **(deg. C)**	SYSTEM LOCATION;
System MFR: 10 DBI Sala Lad-Saf systems AND 10 DBI Sala Anchor points at each access location, NORTH Tower		☒Pass ☐Pass w/Conditions ☐Fail (See Conditions)
Conditions (if any)/Comments: All systems were inspected and passed inspection, inspection tags were installed.		
Recommendations:		

SYSTEM TYPE

☐Horizontal Rigid Rail ☐Horizontal Cable ☒ Vertical Cable ☒ Anchor Point

ANCHOR POINT & FALL ARREST SYSTEM INSPECTION

☒ fasteners ☒ support structure ☒ end and intermediate supports

PICTURES:

Fall Protection System Inspection Report

W.S. SAFETY
W.S. Safety Technologies 623619 Ontario Inc.
221 Lawrence Ave. Orillia Ontario, Canada L3V 5M3
Email: mail@wssafety.com
Ph: (855) 227-5787
www.wssafety.com

COMPANY SITE: **BURLINGTON LIFT BRIDGE**		SITE CONTACT: **ABBAS KHAN**
ADDRESS: **Canal Road**		PHONE: FAX:
CITY: **BURLINGTON**	PROV./STATE: **ONTARIO**	INSPECTOR: **WARREN BENNETT**
INSPECTION DATE: **JUNE 2018**	TEMPERATURE: **(deg. C)**	SYSTEM LOCATION;
System MFR: 10 DBI Sala Lad-Saf systems AND 10 DBI Sala Anchor points at each access location, SOUTH Tower. Also includes 1 system on antenna tower.		☒ Pass ☐ Pass w/Conditions ☐ Fail (See Conditions)
Conditions (if any)/Comments:		
Recommendations:		

SYSTEM TYPE

☐ Horizontal Rigid Rail ☐ Horizontal Cable ☒ Vertical Cable ☒ Anchor Point

ANCHOR POINT INSPECTION & FALL ARREST SYSTEM INSPECTION

☒ fasteners ☒ support structure ☒ end and intermediate supports

PICTURES:

Fall Protection System Inspection Report

W.S. SAFETY
W.S. Safety Technologies 623619 Ontario Inc.
221 Lawrence Ave. Orillia Ontario, Canada L3V 5M3
Email: mail@wssafety.com
Ph: (855) 227-5787
www.wssafety.com

COMPANY SITE: **BURLINGTON LIFT BRIDGE**		SITE CONTACT: **ABBAS KHAN**
ADDRESS: **Canal Road**		PHONE: FAX:
CITY: **BURLINGTON**	PROV./STATE: **ONTARIO**	INSPECTOR: **WARREN BENNETT**
INSPECTION DATE: **JUNE 2018**	TEMPERATURE: **(deg. C)**	SYSTEM LOCATION;
System MFR: Sure-Rail systems, 2 systems, on bridge span, north and south ends.		☒Pass ☐Pass w/Conditions ☐Fail (See Conditions)
Conditions (if any)/Comments: Trolleys function as required.		
Recommendations:		

SYSTEM TYPE

☒Horizontal Rigid Rail ☐Horizontal Cable ☐ Vertical Cable ☐ Anchor Point

ANCHOR POINT INSPECTION & FALL ARREST SYSTEM INSPECTION

☒ fasteners ☒ support structure ☒ end and intermediate supports

PICTURES:

Fall Protection System Inspection Report

W.S. SAFETY
W.S. Safety Technologies 623619 Ontario Inc.
221 Lawrence Ave. Orillia Ontario, Canada L3V 5M3
Email: mail@wssafety.com
Ph: (855) 227-5787
www.wssafety.com

COMPANY SITE: **BURLINGTON LIFT BRIDGE**		SITE CONTACT: **ABBAS KHAN**
ADDRESS: **Canal Road**		PHONE: FAX:
CITY: **BURLINGTON**	PROV./STATE: **ONTARIO**	INSPECTOR: **WARREN BENNETT**
INSPECTION DATE: **JUNE 2018**	TEMPERATURE: **(deg. C)**	SYSTEM LOCATION;
System MFR: TS Rail systems, 2 systems, on bridge span, east and west ends.		☒Pass ☐Pass w/Conditions ☐Fail (See Conditions)
Conditions (if any)/Comments: Trolleys function as required.		
Recommendations:		

SYSTEM TYPE

☒Horizontal Rigid Rail ☐Horizontal Cable ☐ Vertical Cable ☐ Anchor Point

ANCHOR POINT INSPECTION & FALL ARREST SYSTEM INSPECTION

☒ fasteners ☒ support structure ☒ end and intermediate supports

PICTURES:

Fall Protection System Inspection Report

W.S. SAFETY
W.S. Safety Technologies 623619 Ontario Inc.
221 Lawrence Ave. Orillia Ontario, Canada L3V 5M3
Email: mail@wssafety.com
Ph: (855) 227-5787
www.wssafety.com

COMPANY SITE: **BURLINGTON LIFT BRIDGE**		SITE CONTACT: **ABBAS KHAN**
ADDRESS: **Canal Road**		PHONE: FAX:
CITY: **BURLINGTON**	PROV./STATE: **ONTARIO**	INSPECTOR: **WARREN BENNETT**
INSPECTION DATE: **JUNE 2018**	TEMPERATURE: **(deg. C)**	SYSTEM LOCATION;
System MFR: 6 FabEnCo safety gates in North and South towers		☒Pass ☐Pass w/Conditions
Conditions (if any)/Comments: Gates function as required.		☐Fail (See Conditions)
Recommendations:		

SYSTEM TYPE

☐Horizontal Rigid Rail ☐Horizontal Cable ☐ Vertical Cable ☐ Anchor Point

ANCHOR POINT INSPECTION & FALL ARREST SYSTEM INSPECTION

☒ fasteners ☒ support structure ☒ end and intermediate supports

PICTURES:



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ADDRESS: **Canal Road**		PHONE: FAX:
CITY: **BURLINGTON**	PROV./STATE: **ONTARIO**	INSPECTOR: **WARREN BENNETT**
INSPECTION DATE: **JUNE 2018**	TEMPERATURE: **(deg. C)**	SYSTEM LOCATION;
System MFR: 6 Anchor Points in Towers for SRLS		☒Pass ☐Pass w/Conditions ☐Fail (See Conditions)
Conditions (if any)/Comments:		
Recommendations:		

SYSTEM TYPE

☐Horizontal Rigid Rail ☐Horizontal Cable ☐ Vertical Cable ☒ Anchor Point

ANCHOR POINT INSPECTION & FALL ARREST SYSTEM INSPECTION

☒ fasteners ☒ support structure ☒ end and intermediate supports

PICTURES:






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Softgoods Inspection

Description	MFR	Part #	Serial #	Date	Pass/Fail
Lanyard	Sala	1246193C	New in bag		Pass
Lanyard	Sala	1246193C	New in bag		Pass
Lanyard	Sala		2261627		FAIL
SRL	MSA		FPG902002	05/2003	FAIL
Lad-Saf Sleeve	Sala		E00403500A6EF990		Pass
Lanyard	MSA	10035965	WL22789A05LS	06/2005	FAIL
Cable Grab	Sala	6160054	13705		Pass
Harness	MSA	SSA4083001	1060087	09/2008	Pass
Bypass Lanyard	MSA	10035965		06/2005	FAIL
Lanyard	MSA	WL226880SLS		02/2005	FAIL
Harness	MSA	SA4003001		04/2005	FAIL
Lanyard	MSA	WL226880SLS		02/2005	FAIL
Anchor cable	Protecta	AJ400G5			Pass
Harness	MSA	SA4003001		02/2005	FAIL
Bypass Lanyard	MSA	10035965		06/2005	FAIL
Cable Grab	Sala	6160054	13657		Pass
Cable Grab	Sala	6160054	13785		Pass
Harness	MSA	SH80920300		04/2005	FAIL
Harness	MSA	SH80920300	1063383	10/2008	Pass

Failed items were marked ‘failed’ directly on the items, and left with personnel at maintenance shed to dispose of.

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TYPICAL RIGID RAIL INSPECTION

- Complete visual and physical inspection of entire rail system
  - tab anchors
  - splice bars
  - anchorage bolts and spacers
  - endstop/entry devices
- Inspect Rail Tab Anchors
  - for cracking or deformation of anchor plates/connections that would indicate that a fall or near miss may have taken place
  - check torque of anchor bolts and other fall protection components
- Inspect Rail System
  - for track warping, alignment, and gap spacing
  - check dimensions of rail to evaluate the amount of acceptable wear against the original mill specifications.
  - check all Rail Tab Anchors welds
  - check anchorage bolt torque
  - check trolley motion on rail
- Inspect Personal Protective Equipment and Secondary Components
  - trolley/shuttle
    - bearings
    - cracking { indicates that a fall (or near miss) may have taken place}
    - rolling motion on the Rigid Rail system
  - carabiners/connecting devices
  - self-retracting lifelines
  - full body harnesses & softgoods

TYPICAL CABLE INSPECTION

- Complete visual and physical inspection of entire cable system -end anchors
  - intermediate connections
  - cable (kinks, damage)
- Inspect End Anchors
  - for cracking or deformation of anchor plates/connections that would indicate that a fall or near miss may have taken place
  - pull test to design specifications
  - check torque of anchor bolts and other fall protection components
  - retention cable to design specifications
  - check turnbuckles, swaged ends, shackles, bolts, and pins
- Inspect Cable System
  - cable tension
  - for cable fraying
  - check all intermediates and pull test if necessary
  - retention cable to design specifications
  - inspect energy absorber
- Inspect Personal Protective Equipment and Secondary Components
  - trolley/shuttle
  - carabiners/shackles
  - self-retracting lifelines
  - full body harnesses

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Certification

We hereby certify the following items to meet or exceed the appropriate CSA requirements or manufacturer's specifications as applicable to the products serviced.

COMPANY	MODEL NUMBER(S)	SERIAL NUMBER(S)
W.S. SAFETY TECHNOLOGIES 221 LAWRENCE AVENUE ORILLIA, ON L3V 5N3	**3504430C**	**17411, 17408, 17377, 17415, 22019, 22044,**
	3103208C	
	3400115C	**097866,**
	3403402C	**099992, 099332, 099440, 099442, 099512,**

NOTE: ANNUAL INSPECTION IS RECOMMENDED BY AN AUTHORIZED SERVICE CENTRE. EXTREME WORKING CONDITIONS MAY INDICATE THE NECESSITY TO INCREASE ANNUAL SERVICE. CONSULT YOUR OWNERS MANUAL FOR ADDITIONAL INFORMATION.

All certifications apply to new (or serviced) products. Certification void if manufacturer's instructions for use, care and maintenance are not followed. Alterations or misuse of this product will also void all certification.

Certificate Number **BR56917**

Peter Kotyra - Technical Services Supervisor   Date: June 2018

APPENDIX B

Mechanical Inspection Data

APPENDIX B Mechanical Inspection Data

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APPENDIX B1

Figures

APPENDIX B1 Figures

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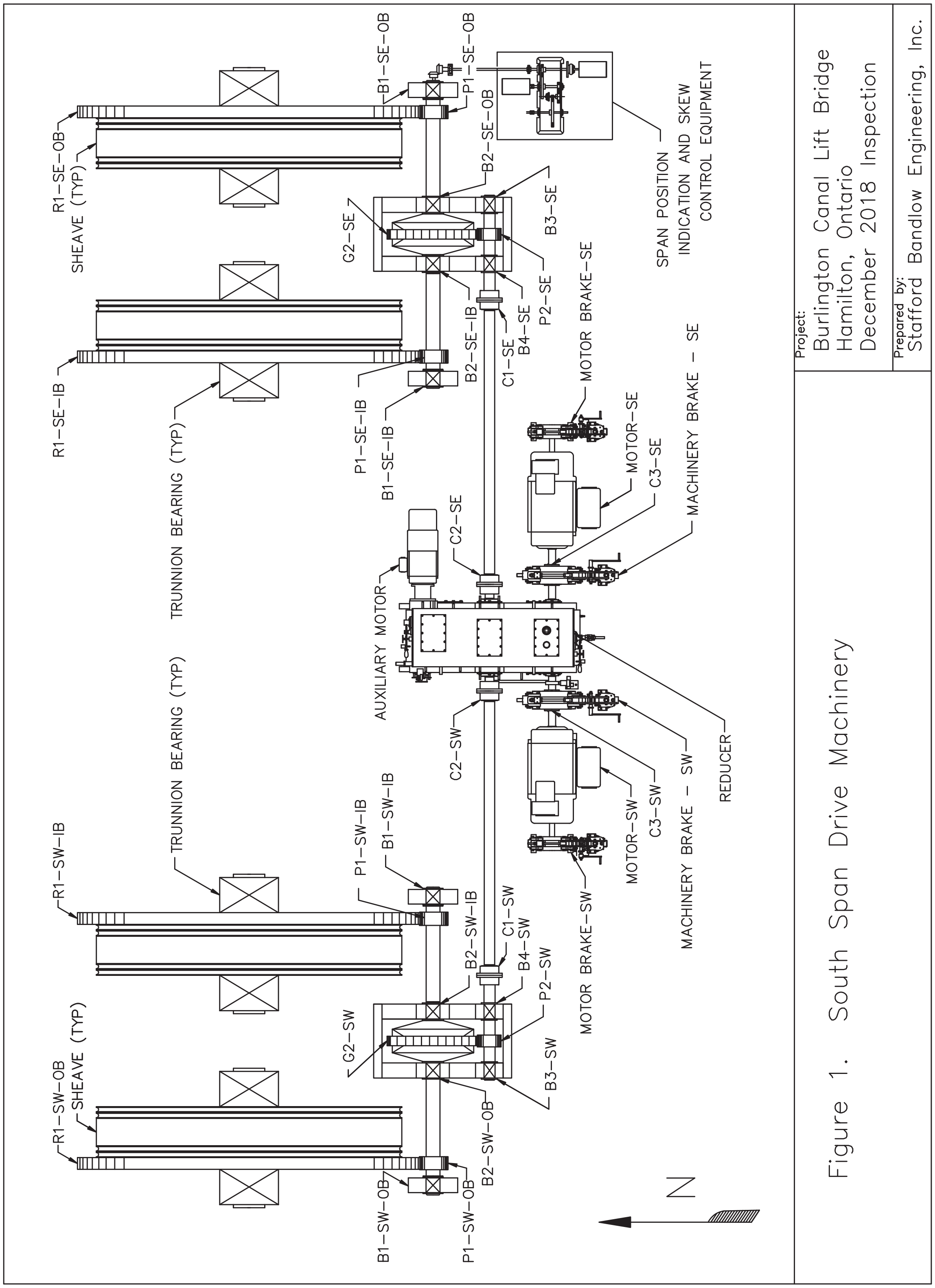

Figure 1. South Span Drive Machinery

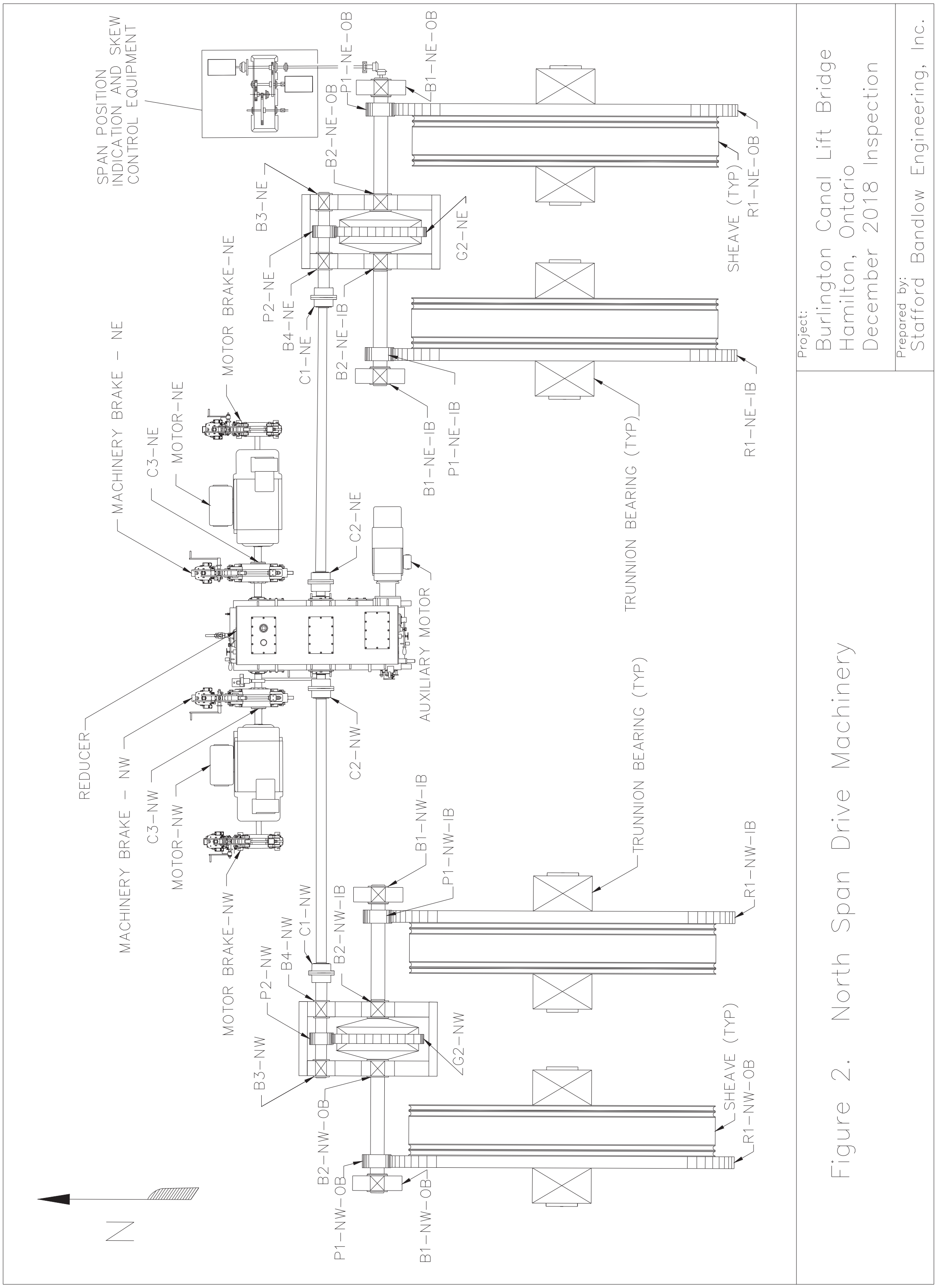

Figure 2. North Span Drive Machinery

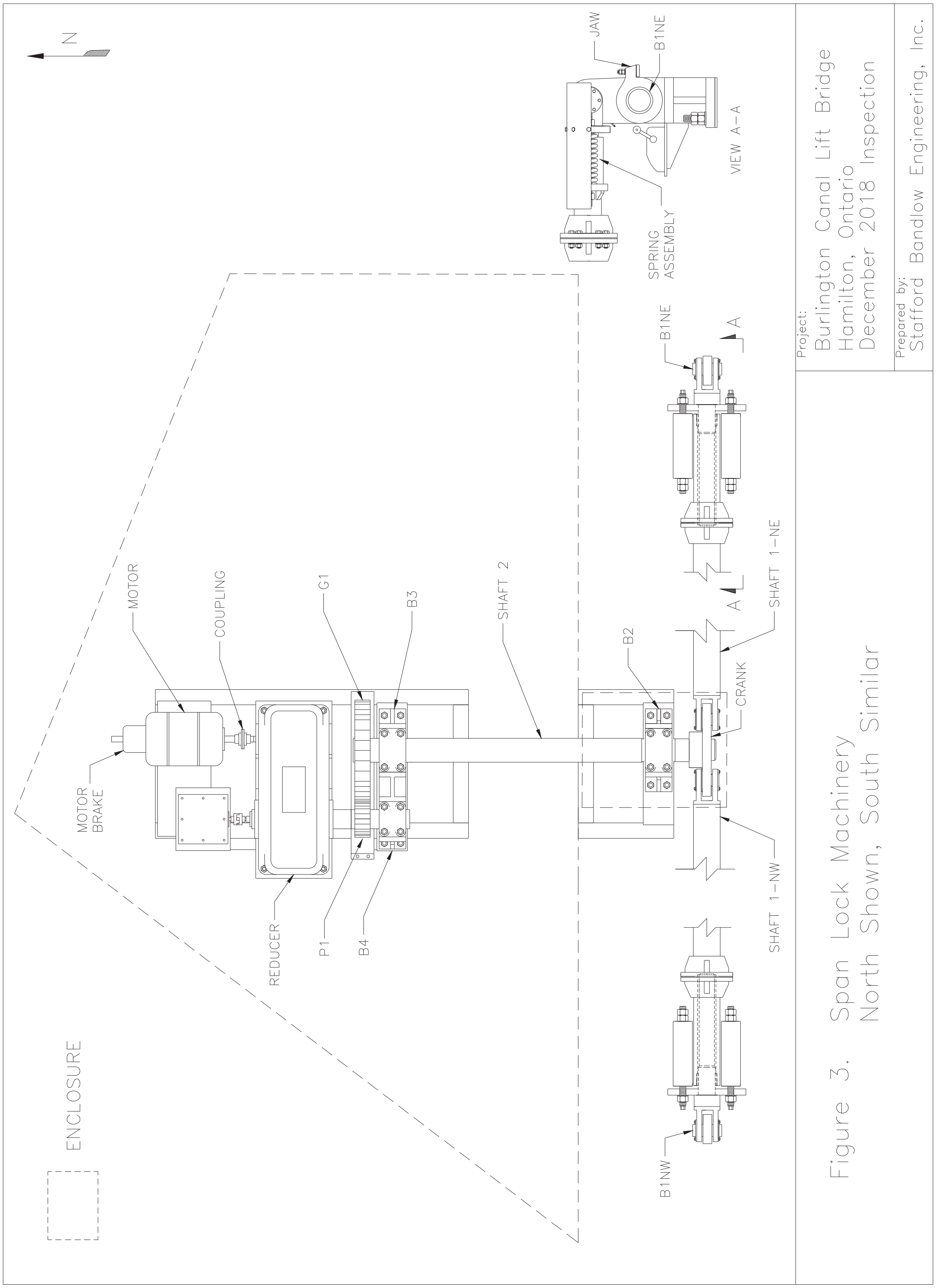

Figure 3. Span Lock Machinery
North Shown, South Similar

Nominal Rope Dia. (in)	Allowable Rope oversize (in)	1/2 Allowable Rope Oversize (in)
0 - 3/4	+ 1/32	+ 1/64
13/16 - 1-1/8	+3/64	+3/128
1-3/16 - 1-1/2	+ 1/16	+ 1/32
1-9/16 - 2-1/4	+3/32	+ 3/64
2-5/16 - and larger	+1/8	+1/16

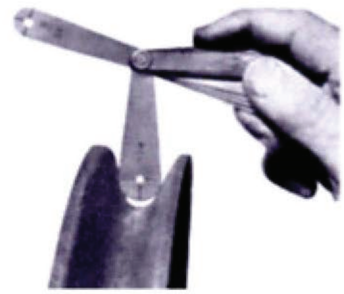

Photo shows new gauge and worn sheave. This new gauge is designed with one-half the allowable oversize (see table). Using the new gauge, when you do not see light, the sheave is okay. When you do see light under the new gauge, the sheave should be replaced.

FIGURE 4 – Illustration of Sheave Groove Wear

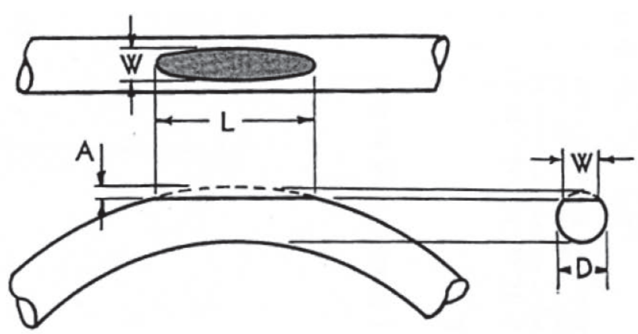

FIGURE 5 – Illustration of Elliptical Wear Area

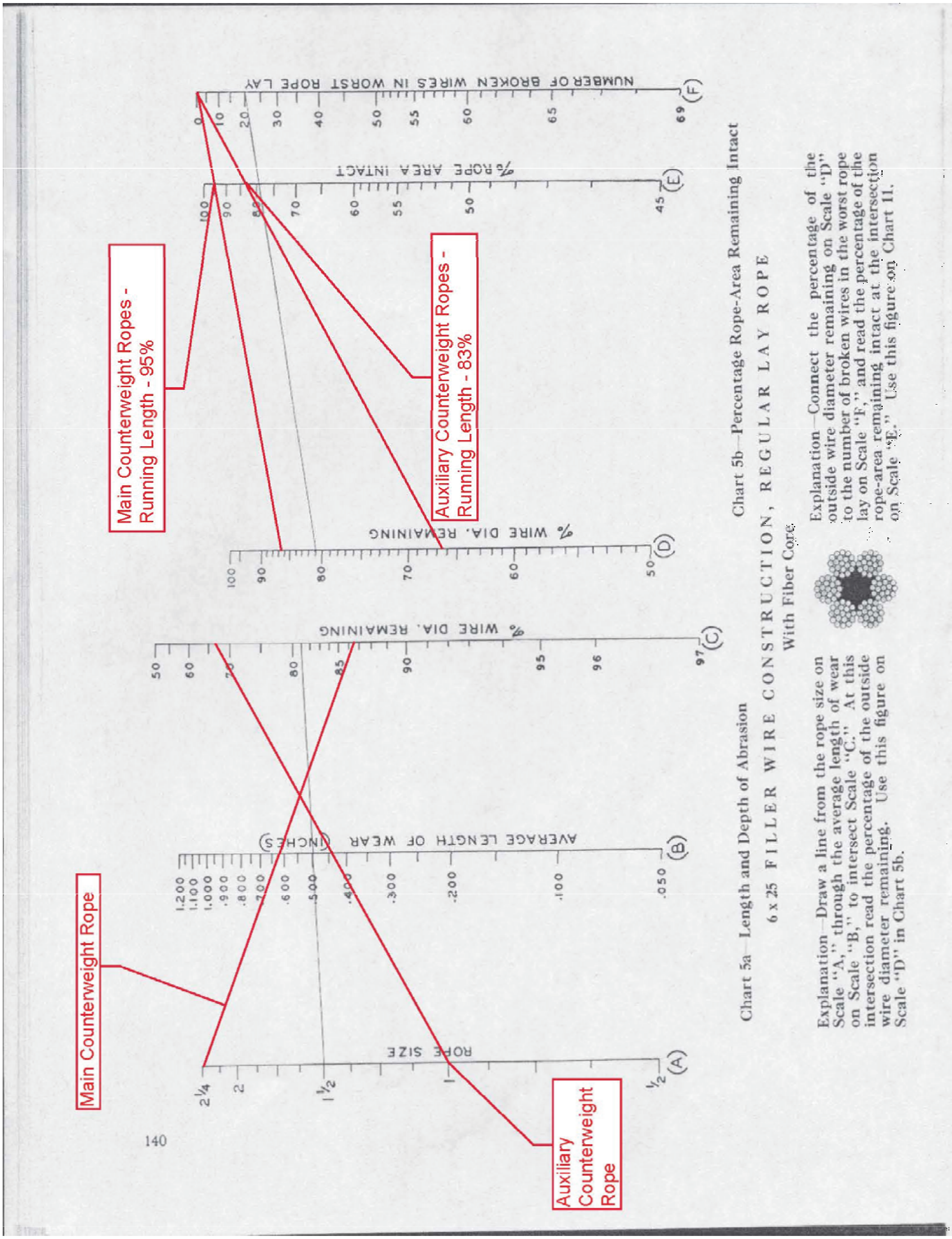

FIGURE 6. Estimate of Remaining Rope Area, Main Counterweight Ropes

APPENDIX B2

Photographs

APPENDIX B2 Mechanical Inspection Photographs

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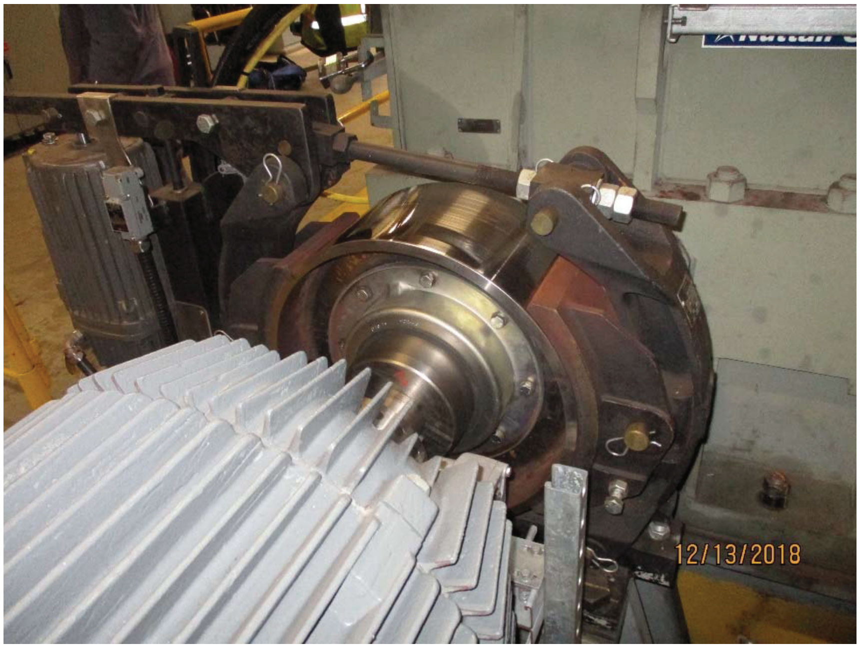


Photo M1 Machinery Brake - NW and Brake Wheel Coupling C3-NW. General view of the machinery brake assembly. Note the unpainted brake wheel coupling bolts.

Photo M2 Motor Brake-NW. General view of a typical motor brake assembly. The brake wheel hubs and fasteners are unpainted.

Photo M3 Motor Brake-SE. General view of the brake wheel friction surface. The brake wheel hub is unpainted.

Photo M4 Coupling C2-NW. There is light corrosion on the hubs and sleeves. Corrosion was noted at all C1 and C2 couplings.

Photo M5 Motor-SW. The motor mounting bolts and support anchor bolts are unpainted with light corrosion forming. The top of the support is also unpainted with light corrosion forming.

Photo M6 Pinion P2-SE-OB. The gear teeth in the acceleration zone were cleaned to bare metal for inspection.

Photo M7 P1-NW-OB. Damage to the gear tooth caused by wire intrusion is wearing in.

Photo M8 Gearset G2/P2-NW, Differential Gear. There was corrosion on some of the differential gear teeth due to inadequate lubricant

Photo M9 G2/P2-NE, Support Frame. There was an accumulation of old grease within the support frame under the G2 gear.

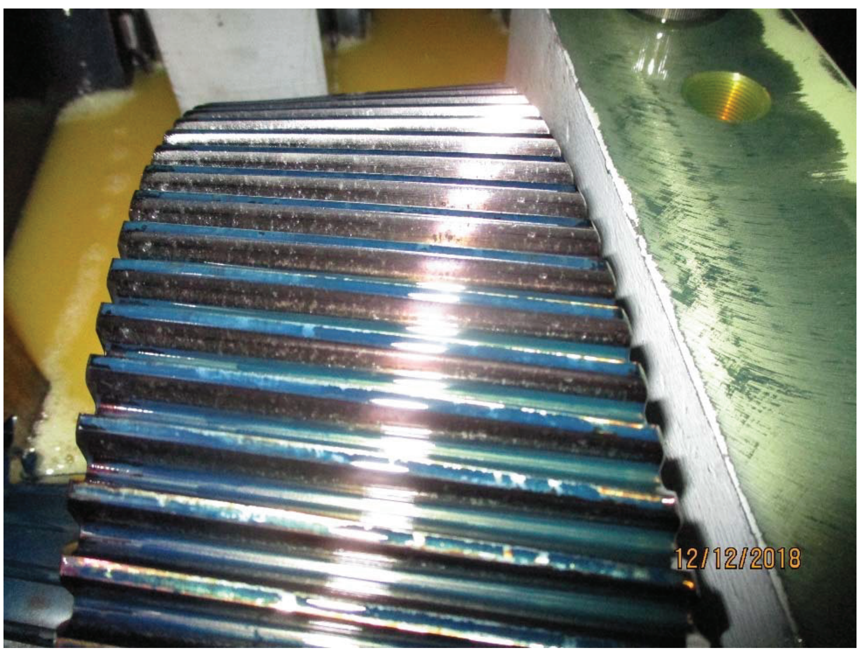


Photo M10 South Span Drive Reducer. The reducer gear teeth have minor damage that may be from particles passing through the mesh.

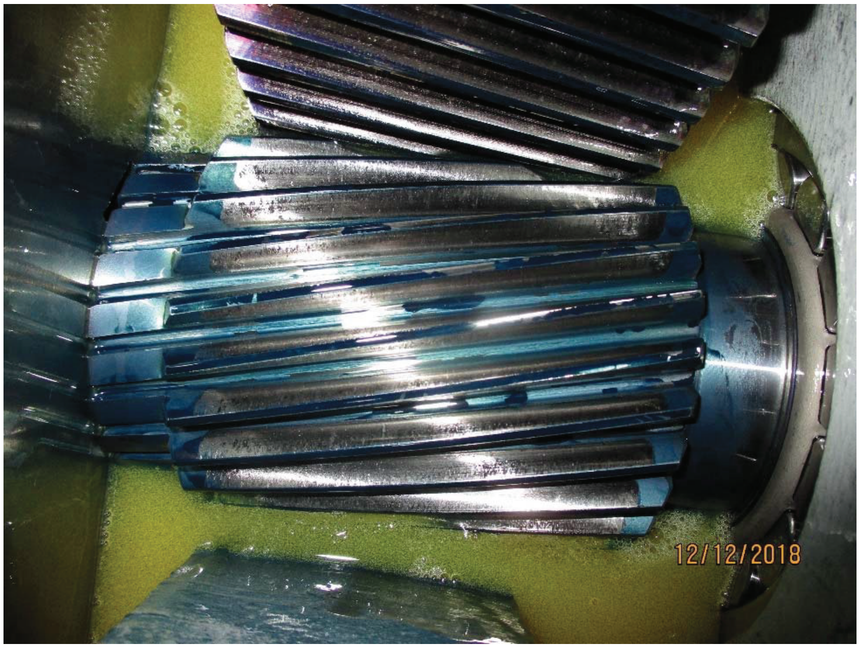


Photo M11 South Span Drive Reducer. The reducer gear teeth have minor damage that may be from particles passing through the mesh.

Photo M12 North Span Drive Reducer. The inspection cover screws have damaged threads.

Photo M13 North Span Drive Reducer. The reducer mounting bolts and support anchor bolts are unpainted.

Photo M14 North Span Drive Reducer. There is evidence of a small oil leak at the north index spline lower limit switch mounting bracket (upper arrow) and the drain valve (lower arrow).

Photo M15 South Span Position Parallel Shaft Reducer. Note the light accumulation of oil around the reducer.

Photo M16 South Primary Reducer Auxiliary Drive Engagement Lever. Note the lever (arrow) is shown in the locked disengaged position. See Photo M17 for a close-up of the positioning bolt intended to additionally secure the lever in the disengaged position.

Photo M17 South Primary Reducer Auxiliary Drive Engagement Lever. Note the positioning bolt used to secure the lever in the engaged and disengaged position does not line up with the hole (arrow), preventing the bolt from being inserted in the hole with the lever locked in the disengaged position.

Photo M18 NE-OB Counterweight Rope Connections. Fretting corrosion is present where the counterweight ropes rub against the counterweight splay casting.

Photo M19 NE-OB Counterweight Ropes. View of the section of the ropes that contact the sheave grooves. Note the surface corrosion due to inadequate lubricant.

Photo M20 NE-OB Counterweight Ropes. The maximum counterweight rope wear flats were measured to be 5/8”.

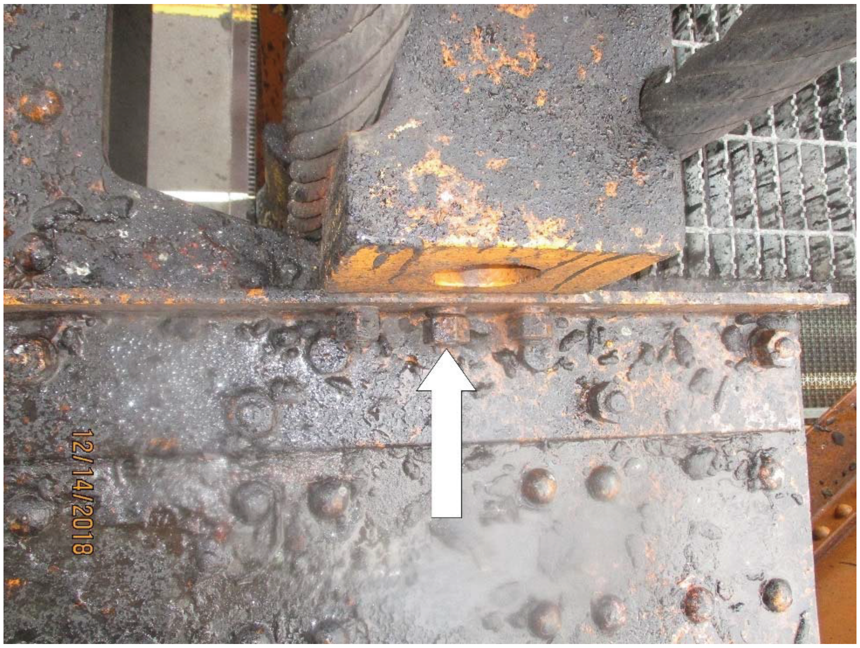


Photo M21 NW-OB Main Lift Girder Splay Casting. The middle nut is not fully seated at this location (arrow). Also note the light fretting at the rope/splay interface.

Photo M22 NW Auxiliary Counterweight Ropes. The auxiliary ropes and sheave have built up old lubricant.

Photo M23 SW Auxiliary Counterweight Ropes. The counterweight ropes and sheave are devoid of lubricant.

Photo M24 SW-OB Counterweight Sheave. There is paint deterioration and light corrosion on the sheave.

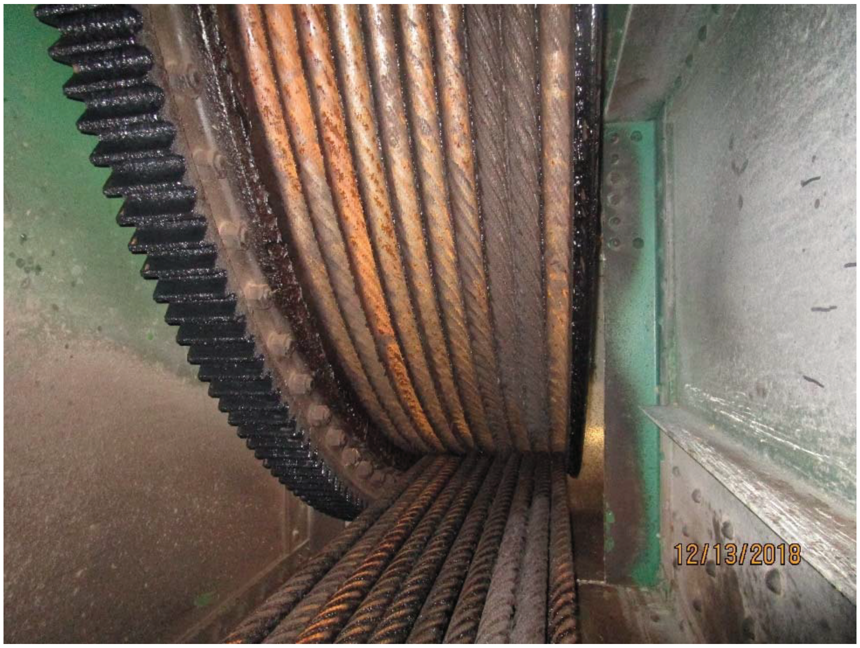


Photo M25 NE-OB Counterweight Sheave. The counterweight grooves have many sections that are devoid of lubricant and exhibit surface corrosion.

Photo M26 NE Auxiliary Counterweight. There is corrosion on the bottom support plate and bolts.

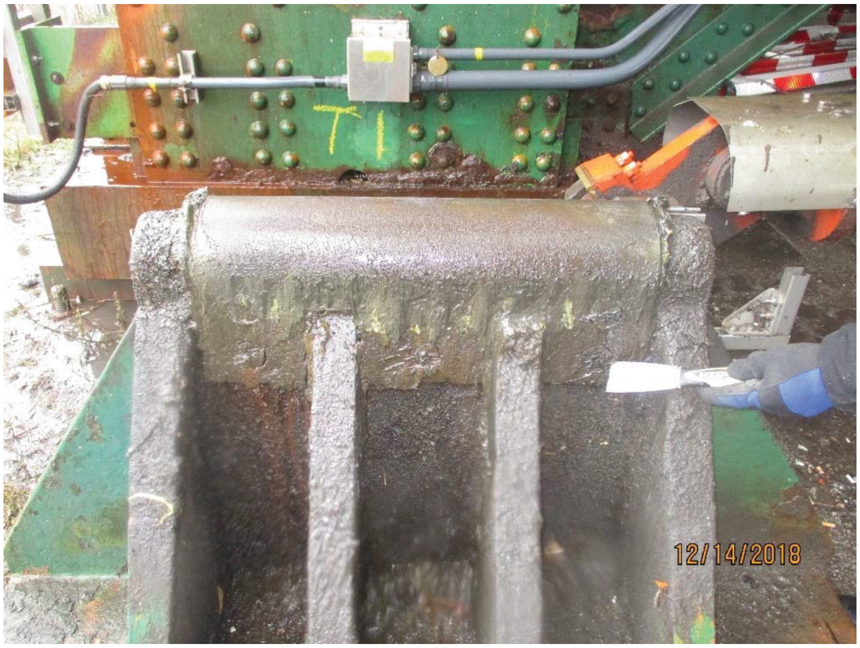


Photo M27 SE Live Load Support. The saddle screw identified by the scraper was found to be hand loose.

Photo M28 NW Live Load Rocker. The live load rocker was unable to be freely rotated. NE Live Load Rocker was similar.

Photo M29 South Centering Device. There is minor debris accumulation on the support. The anchor bolts have paint failure and section loss.

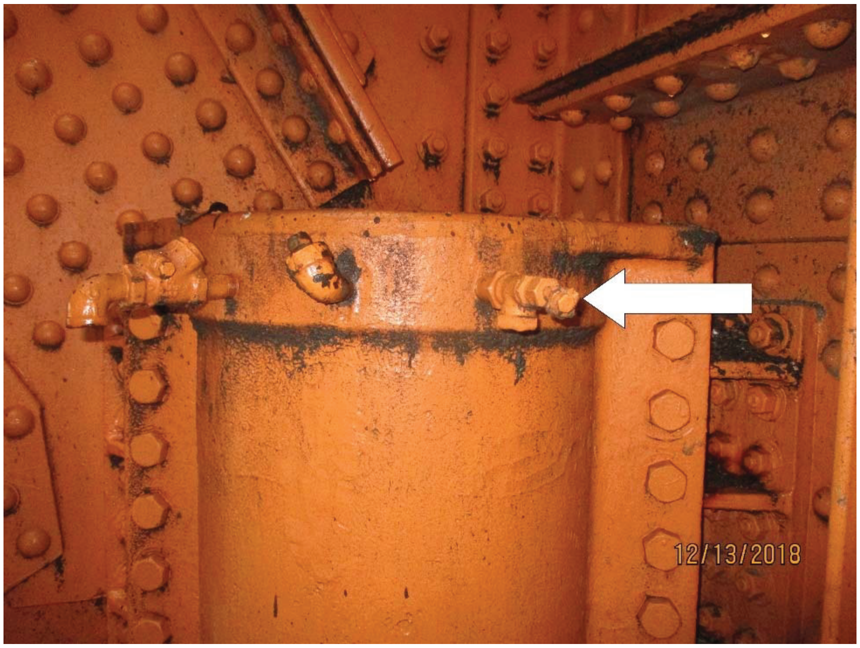


Photo M30 NW Span Air Buffer. The exhaust valve handle (arrow) is broken.

Photo M31 South Span Lock Machinery. The motor shaft, coupling hubs, and reducer input shaft is coated with a layer in rust inhibitor, which is protecting the components from corrosion.

Photo M32 SE Span Lock, Spring Assembly. The springs and bolts have moderate corrosion.

Photo M33 North Oncoming Warning Gate. The front door top latch (arrow) cannot be unlocked for inspection.

Photo M34 South Barrier Gate. The south barrier gate emitted a groaning sound during each operation.

Photo M35 South Barrier Gate. The southeast anchor bolt is loose.

Photo M36 North Barrier Gate. The gate arm counterweight has a bolt that is not fully seated at the east side of the counterweight.

Photo M37 North Barrier Gate. The neoprene insulator (arrow) at the end of the arm is deteriorated.

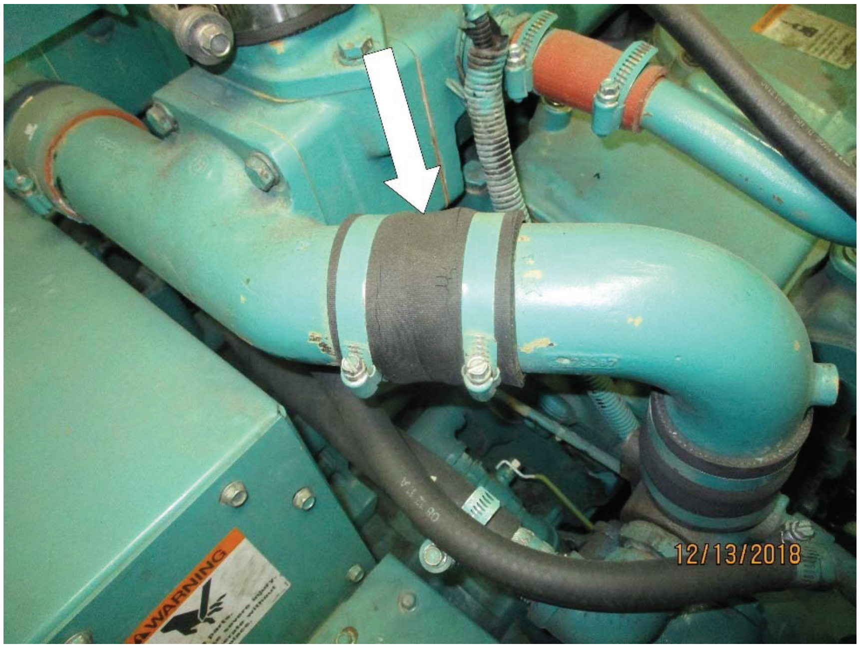


Photo M38 Main Generator. A coolant hose (arrow) exhibits dry rot and is cracked.

APPENDIX B3

SKF Vibration Report

APPENDIX B3 SKF Vibration Report

INDEX pages

Technical Note

Customer	Stafford Bandlow Engineering, Inc.	Date	January 24, 2019
Address	800 Hyde Park, Doylestown PA, USA 18902	Author	Christopher Ramos, SKF Service Technician
Phone	215 340 5830	TSR	Julian Victoria, SKF Account Manager
Contact	Ralph Giernacky Clare Lamont	CC	Francky Ramaroson, SKF Lead Reliability Como Specialist

Subject

Vibration Data Analysis/Report for Burlington Canal Lift Bridge

Introduction

Bridge Main Lift Support Bearings (16), Burlington Canal Lift Bridge, Ontario

This report covers the vibration analysis for the 16 main support bearings and primary reducers.

Vibration data were collected on December 12 and 13, 2018 at the bridge site.

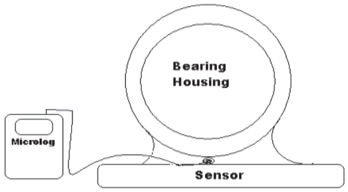
The reliability of the Burlington Canal Lift Bridge is important to surrounding industries and communities; replacing any of the 16 main support bearings would be very difficult and costly. SKF Reliability Systems had the opportunity to take vibration readings on all 16 bearings while in operation to:

1) Evaluate current running conditions from the vibration aspect.
2) Analyze vibration data to identify any existing defect (failure) and possible cause(s) for the defect(s), and to provide solutions.

All the main bearings are SKF 232/530 K.

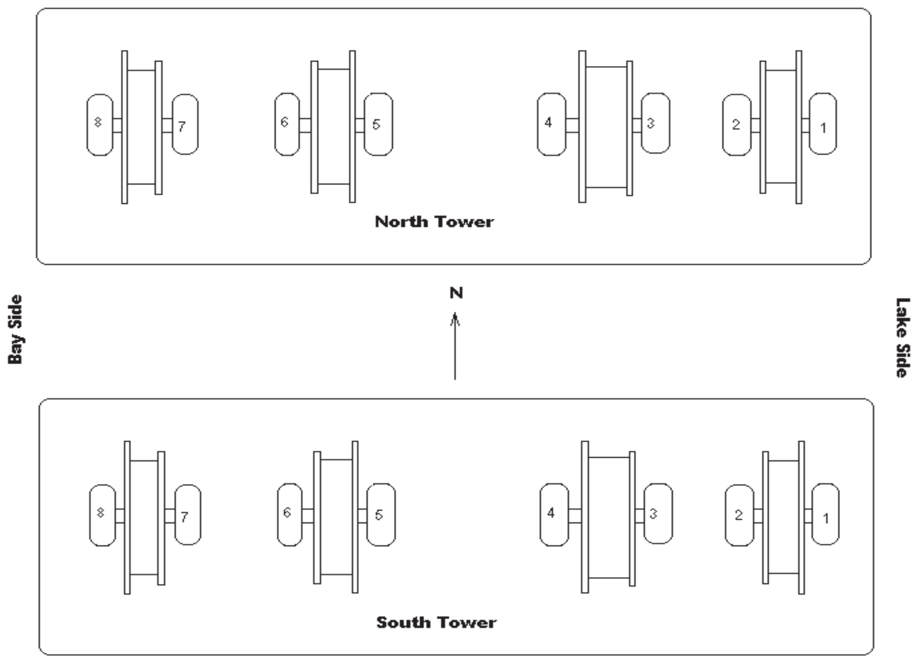
Methodology

The vibration sensors were attached using magnetic bases onto the bearing housing bottom (load zone) Axial (A) locations,



Vibration Measurement Schematics

Bearings are numbered from 1 to 8 as in the following plot.



Measurement types and units are:

Enveloped Acceleration (Env Filter 3), gE
Enveloped Acceleration (Env Filter 4), gE

The purpose of using Enveloped Acceleration technology is focused on detecting bearing defect(s).

Each type of measurement contains separate vibration readings for the bridge moving up and the bridge moving down at full operating speed. Under this operation, the related frequencies are as follows:

Bearing turning speed - about 1.27 RPM (47 seconds interval),
BPFO (outer race defect frequencies) – 10.52 CPM (5.70 seconds interval) and harmonics,
BPFI (inner race defect frequencies) – 13.60 CPM (4.41 seconds interval) and harmonics,
BSF (roller defect frequencies) – 4.76 CPM (12.60 seconds interval) and harmonics,
FTF (cage defect frequencies) - 0.55 CPM (108.33 seconds interval) and harmonics.

Analysis

SOUTH TOWER

Bearing 1.
Observed no signs of any impact or anomaly that would relate to the fault frequencies of the bearing. Overall, bearing appears to be in good condition.

Bearing 2.
Observed no signs of any impact or anomaly that would relate to the fault frequencies of the bearing. Overall, bearing appears to be in good condition.

Bearing 3.
Observed no signs of any impact or anomaly that would relate to the fault frequencies of the bearing. Overall, bearing appears to be in good condition.

Bearing 4.
High frequency gE3 time waveform at bridge lifting cycle shows a symmetrical pattern at approximately 10-11 CPM. Spectrum shows a predominant 10 CPM frequency. This pattern appears to closely coincide with the bearing outer race fault frequency. **See plot 1.**

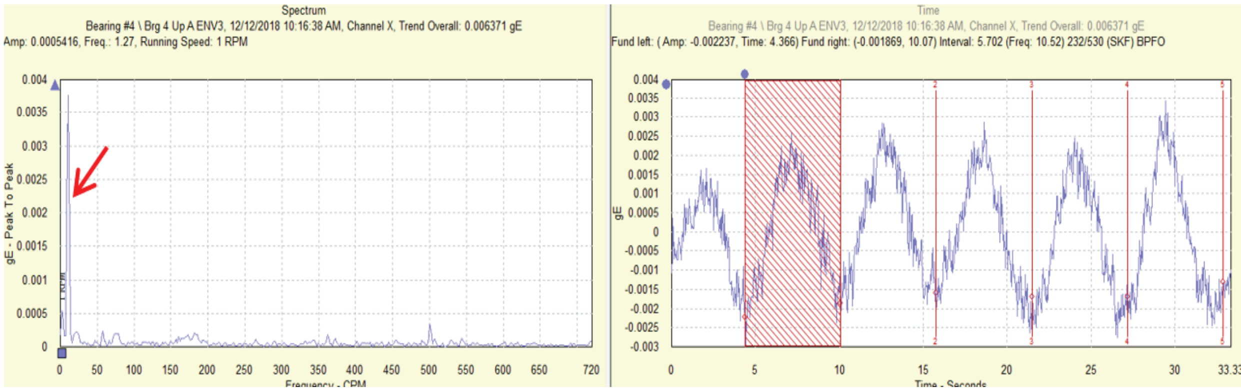
Bearing 5.
Observed no signs of any impact or anomaly that would relate to the fault frequencies of the bearing. Overall, bearing appears to be in good condition.

Bearing 6.
High frequency gE3 time waveform at bridge lifting cycle shows impacting at around 3 second interval, these impacts do not appear to be associated with any of the bearing frequencis, this is possibly gear related frequency. **See plot 2**

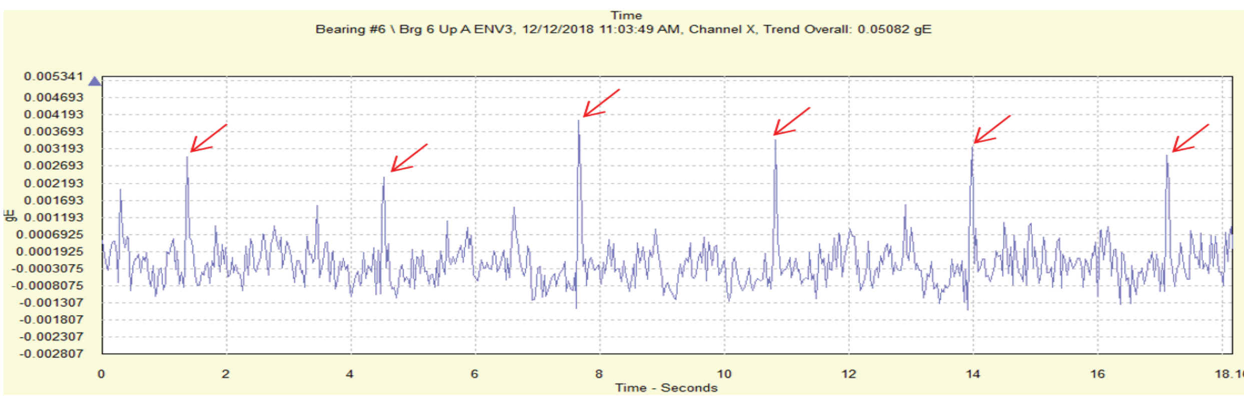
Bearing 7.
Observed no signs of any impact or anomaly that would relate to the fault frequencies of the bearing. Overall, bearing appears to be in good condition.

Bearing 8.
The spectrum readings during the bridge lift and lowering cycle shows harmonic activity of 19.8 CPM, possible gear related frequency. **See plot 3.** Observed no signs of bearing frequency previously indicated in 2017 report.

South Tower Plots

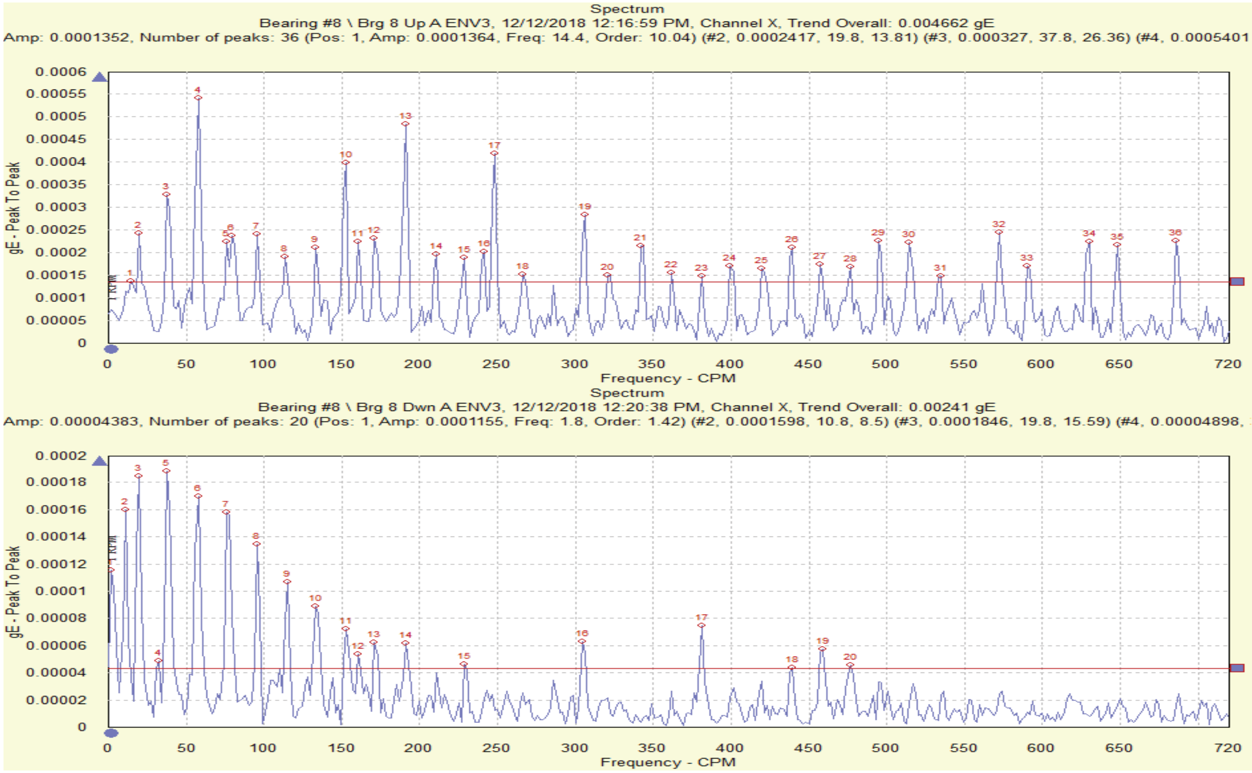


Plot 1.
South tower bearing #4, lifting cycle.



Plot 2.
South tower bearing #6, lifting cycle

SKF Canada Limited – Toronto
40 Executive Court, Scarborough, ON M1S 4N4 Phone: (416) 299 1220 Web: www.skf.ca



Plot 3.
South tower bearing #8, lifting and lowering

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40 Executive Court, Scarborough, ON M1S 4N4 Phone: (416) 299 1220 Web: www.skf.ca

NORTH TOWER

Bearing 1.
Observed no signs of any impact or anomaly that would relate to the fault frequencies of the bearing. Overall, bearing appears to be in good condition.

Bearing 2.
Observed no signs of any impact or anomaly that would relate to the fault frequencies of the bearing. Overall, bearing appears to be in good condition.

Bearing 3.
Observed no signs of any impact or anomaly that would relate to the fault frequencies of the bearing. Overall, bearing appears to be in good condition.

Bearing 4.
Observed harmonic activity of 37 CPM during bridge lowering cycle, which is possibly gear related. Observed no bearing related frequencies. **See plot 1.**

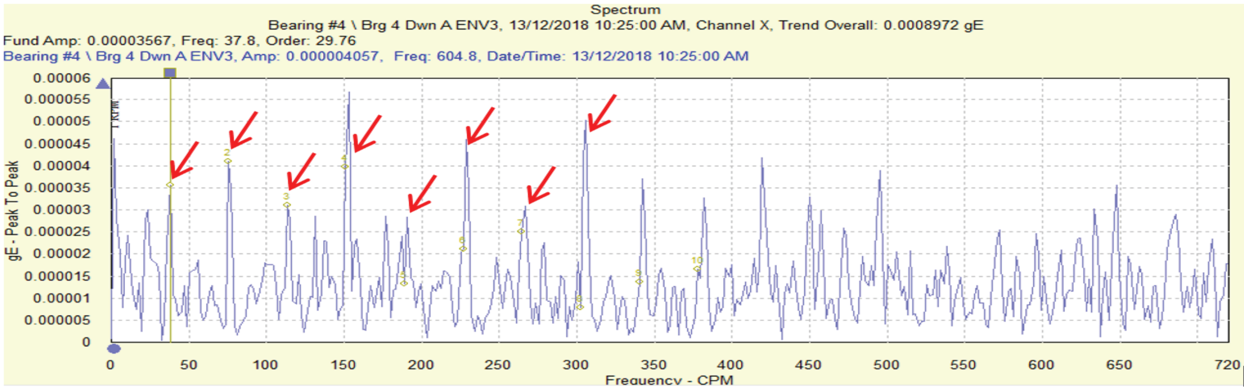
Bearing 5.
Observed no signs of any impact or anomaly that would relate to the fault frequencies of the bearing. Overall, bearing appears to be in good condition.

Bearing 6.
High frequency gE3 time waveform at bridge lowering cycle shows a symmetrical pattern at approximately 10-11 CPM. This interval appears to closely coincide with the bearing outer race fault frequency. **See plot 2.**

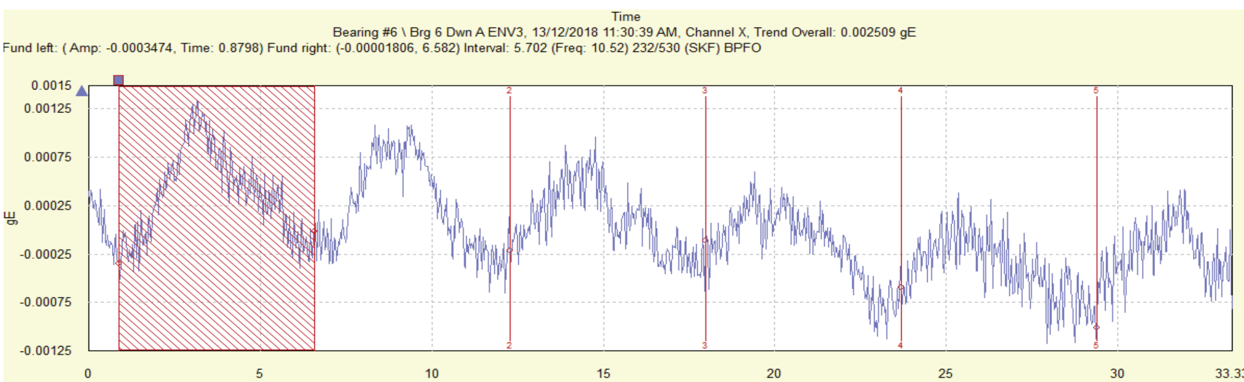
Bearing 7.
Observed no signs of any impact or anomaly that would relate to the fault frequencies of the bearing. Overall, bearing appears to be in good condition.

Bearing 8.
Observed no signs of any impact or anomaly that would relate to the fault frequencies of the bearing. Overall, bearing appears to be in good condition.

North Tower Plots



Plot 1.
North Tower bearing #4, lowering cycle



Plot 2.
North Tower bearing #6, lowering

Recommendation

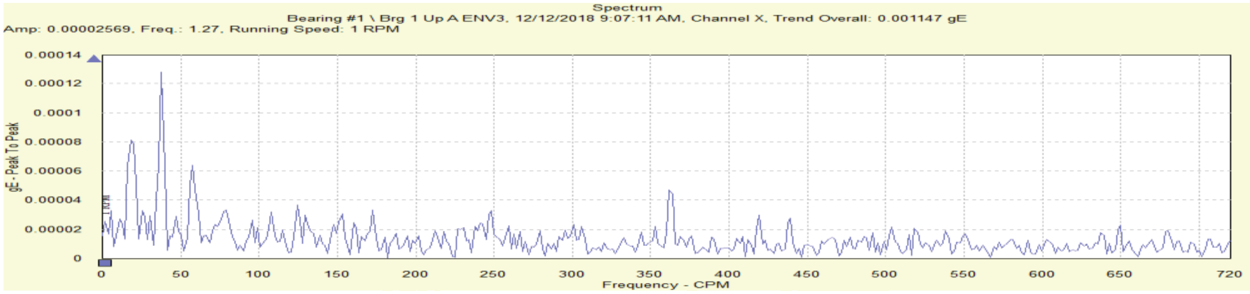
- On the next scheduled downtime, perform a visual inspection on the South Tower Main bearing #4, bearing #3 (reported 2017), bearing #8 (reported 2017) and North Tower bearing #6, by opening the bearing housing and carefully inspecting the condition of the bearing inboard and outboard raceway surfaces to correlate with vibration findings and to assess the severity. Care should be taken to prevent contamination from entering the bearing cavity.

- Continue to re-lubricate at scheduled intervals. In addition, while re-lubricating, take the opportunity to visually inspect the condition of the bearing running surfaces.

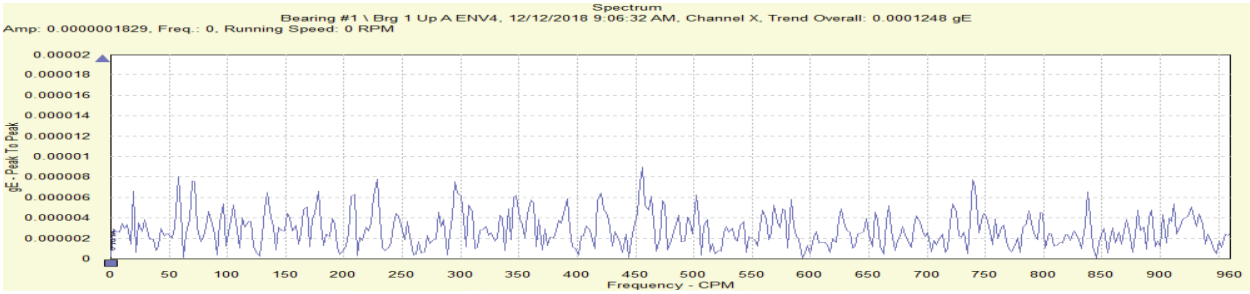
- If needed, contact SKF Application Engineering to verify proper lubrication interval.

- Continue to do periodic vibration analysis measurements.

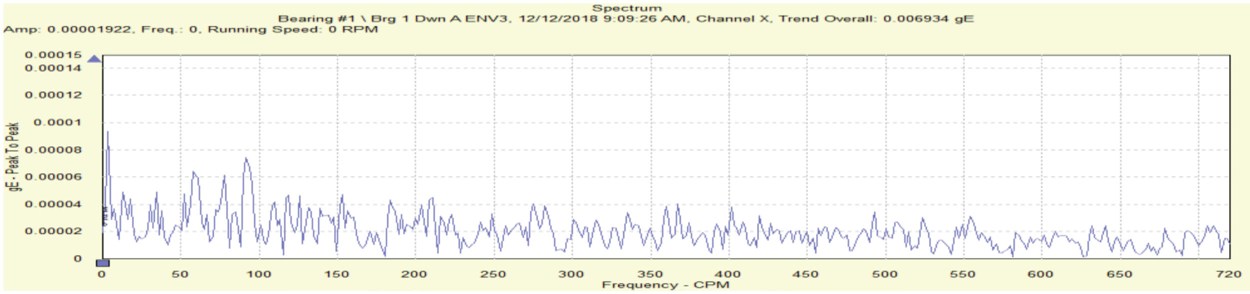
South Main Bearing #1



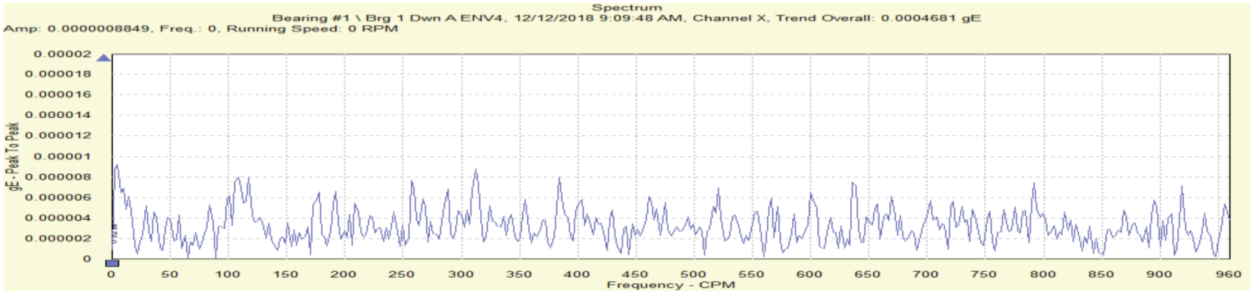
Bearing #1 – Envelope Acceleration gE3 spectrum – Up cycle.



Bearing #1 – Envelope Acceleration gE4 – Up cycle.



Bearing #1 – Envelope Acceleration gE3 spectrum – Down cycle.



Bearing #1 – Envelope Acceleration gE4 – Down cycle.

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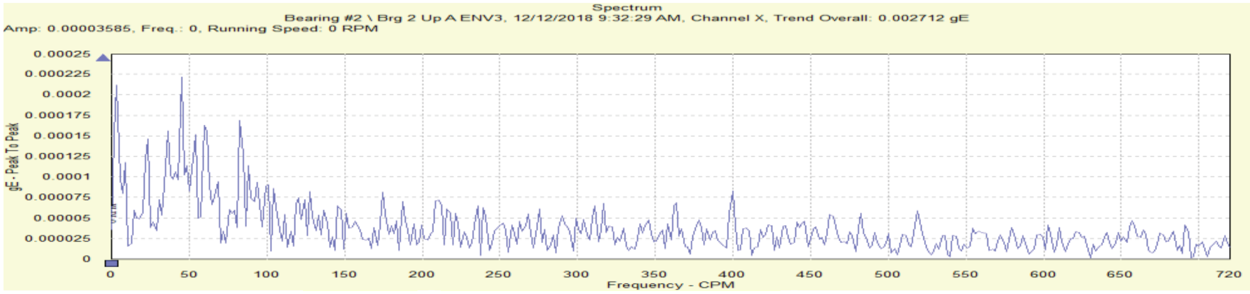
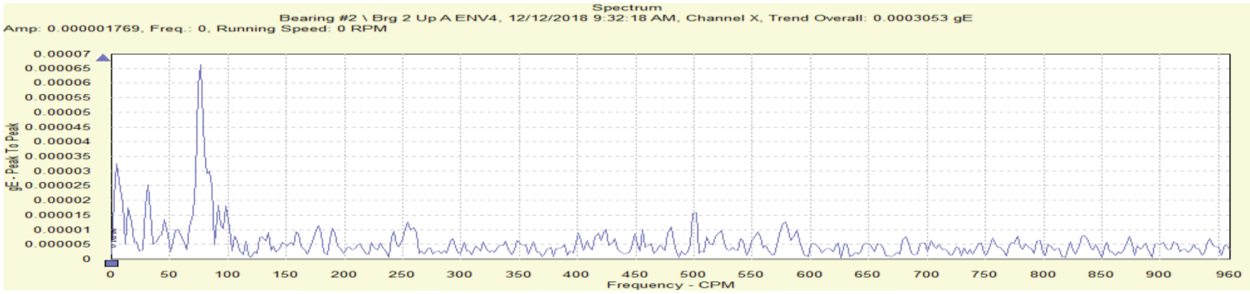
40 Executive Court, Scarborough, ON M1S 4N4 Phone: (416) 299 1220 Web: www.skf.ca

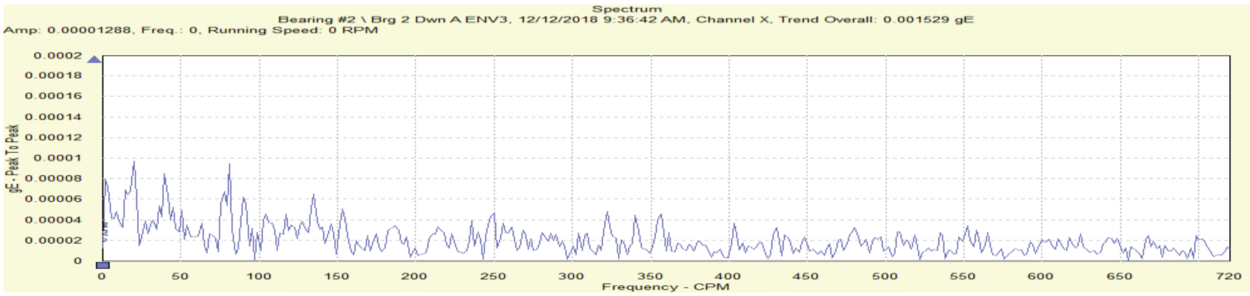
South Main Bearing #2



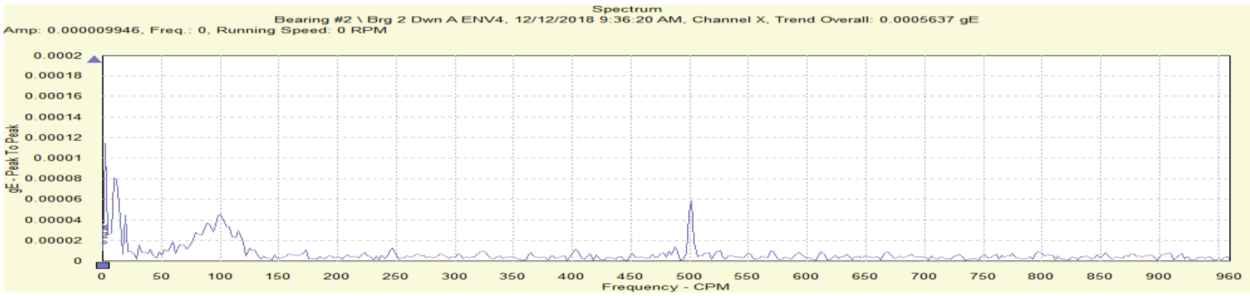
Bearing #2 – Envelope Acceleration gE3 spectrum – Up cycle.



Bearing #2 – Envelope Acceleration gE4 spectrum – Up cycle.



Bearing #2 – Envelope Acceleration gE3 spectrum – Down cycle.



Bearing #2 – Envelope Acceleration gE4 spectrum – Down cycle.

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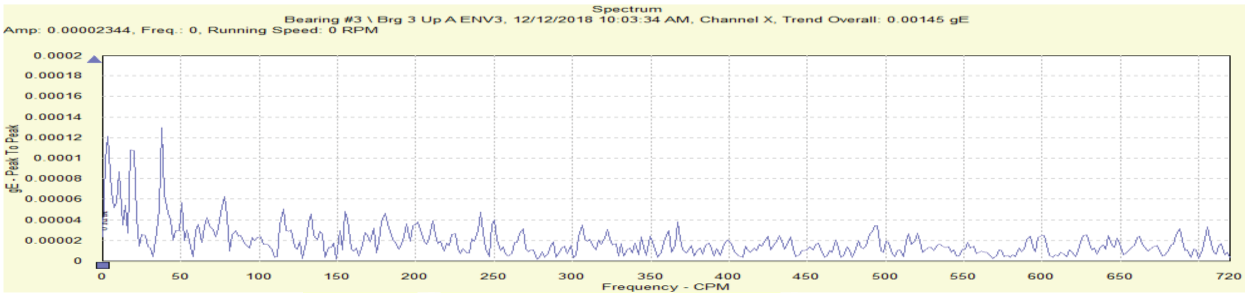
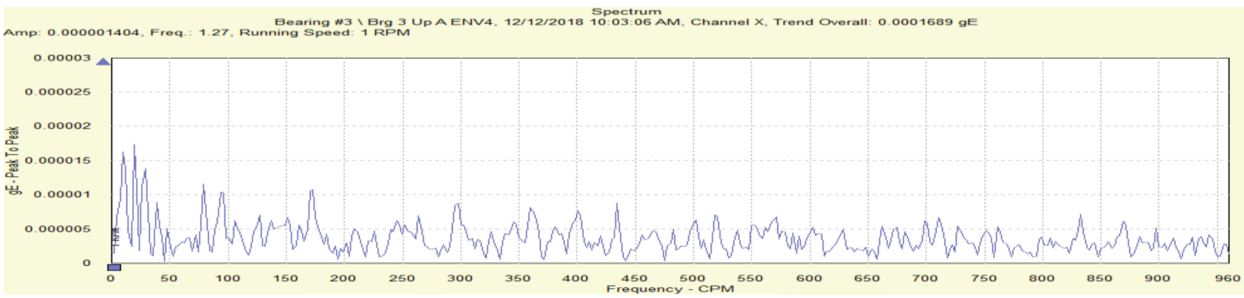
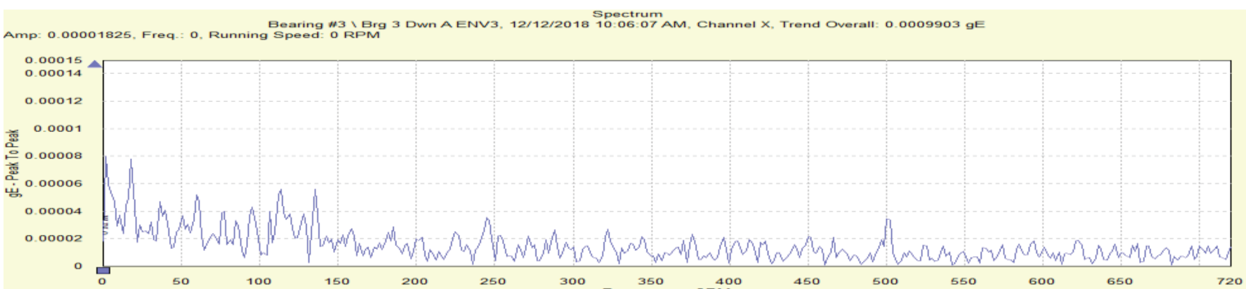
South Main Bearing #3



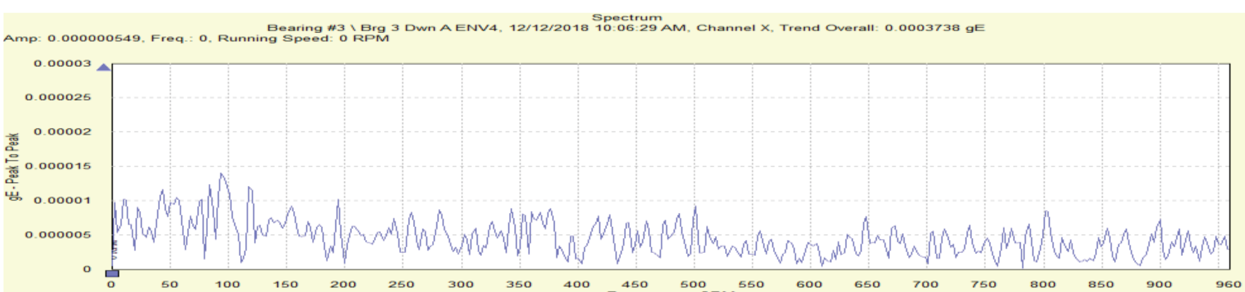
Bearing #3 – Envelope Acceleration gE3 spectrum – Up cycle.



Bearing #3 – Envelope Acceleration gE4 spectrum – Up cycle.



Bearing #3 – Envelope Acceleration gE3 spectrum – Down cycle.



Bearing #3 – Envelope Acceleration gE4 spectrum – Down cycle.

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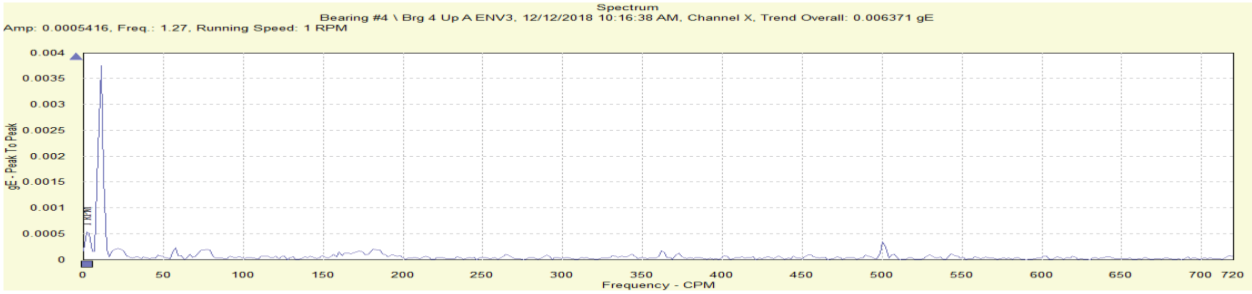
South Main Bearing #4



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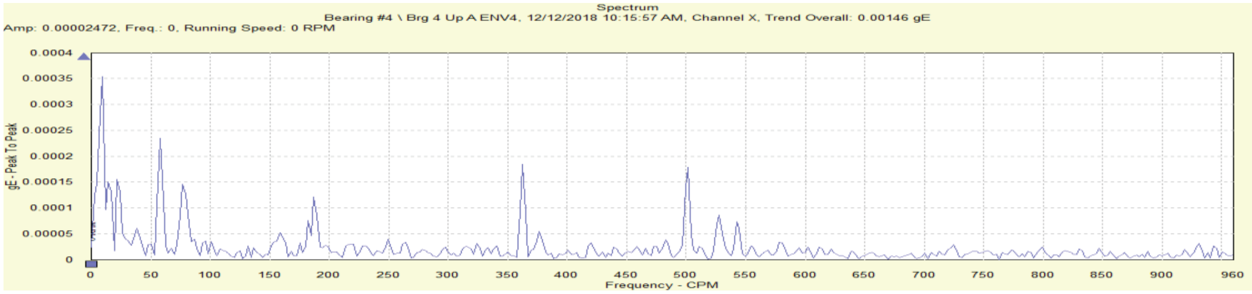

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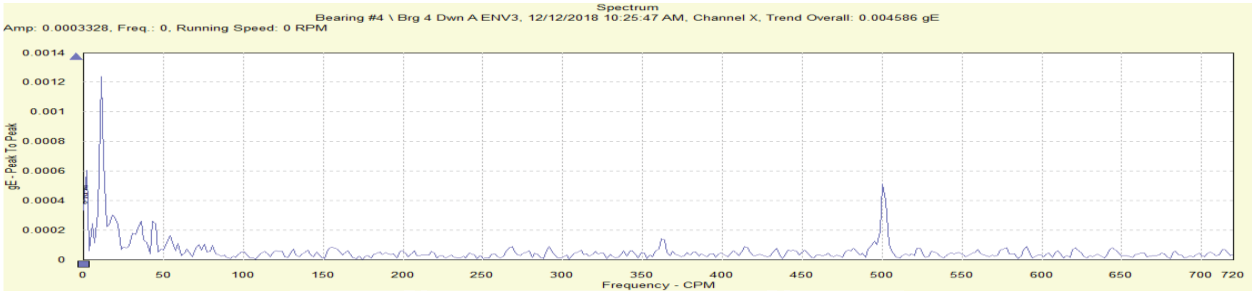

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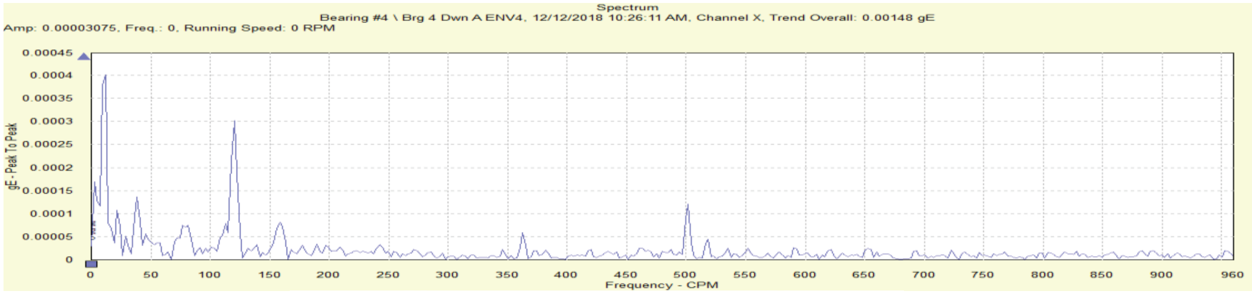

Bearing #4 – Envelope Acceleration gE4 spectrum – Down cycle.

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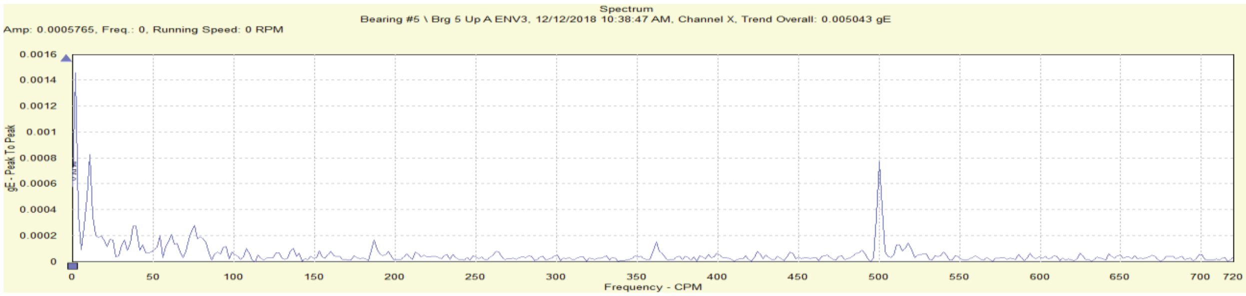

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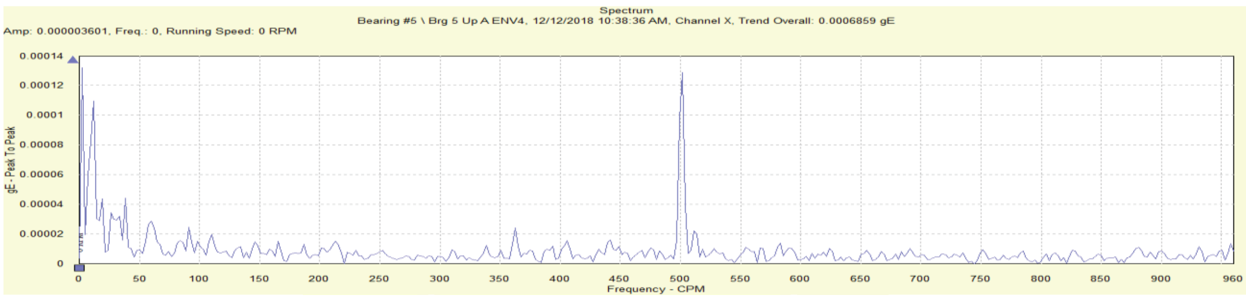
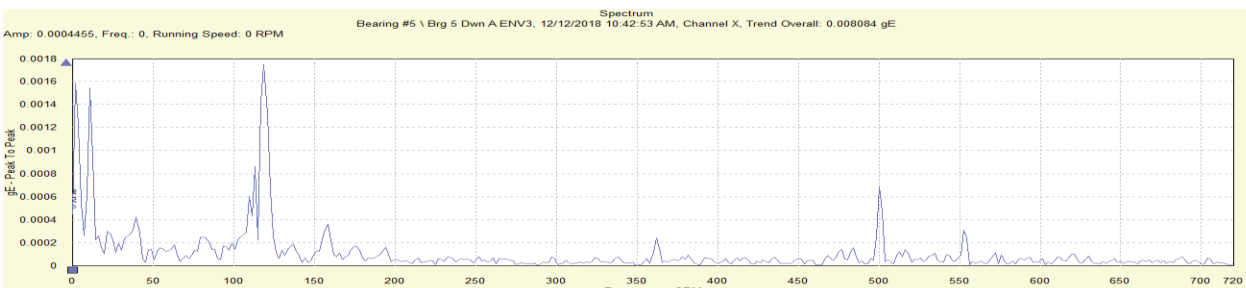
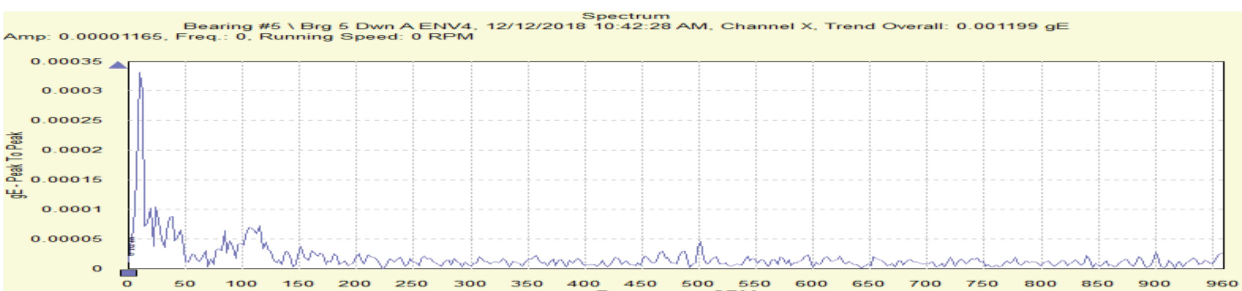


Bearing #5 – Envelope Acceleration gE4 spectrum – Up cycle.

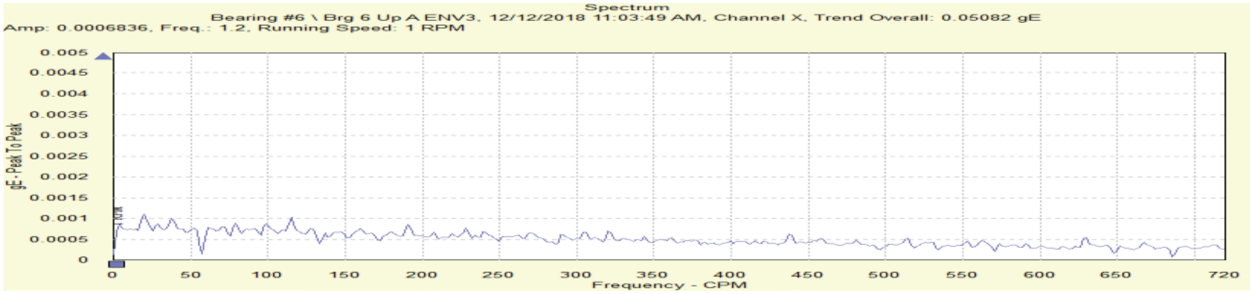


Bearing #5 – Envelope Acceleration gE3 spectrum – Down cycle.

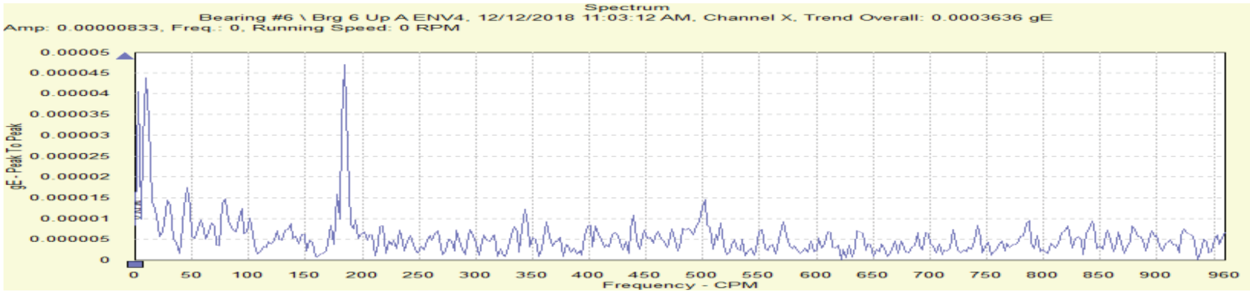


Bearing #5 – Envelope Acceleration gE4 spectrum – Down cycle.

South Main Bearing #6



Bearing #6 – Envelope Acceleration gE3 spectrum – Up cycle.



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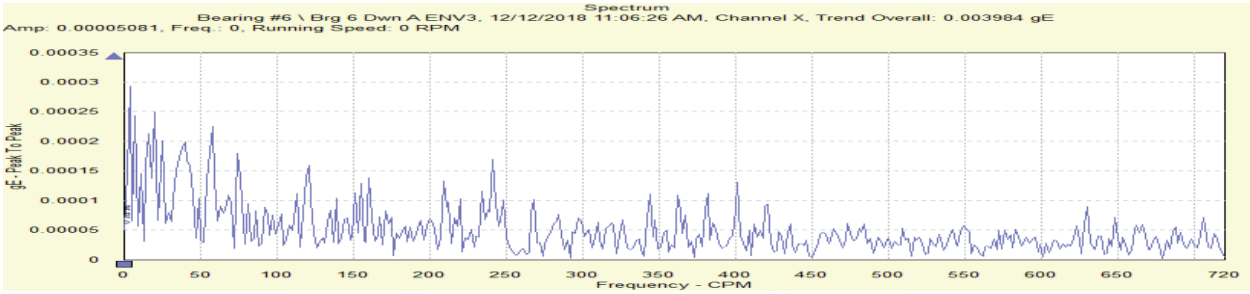
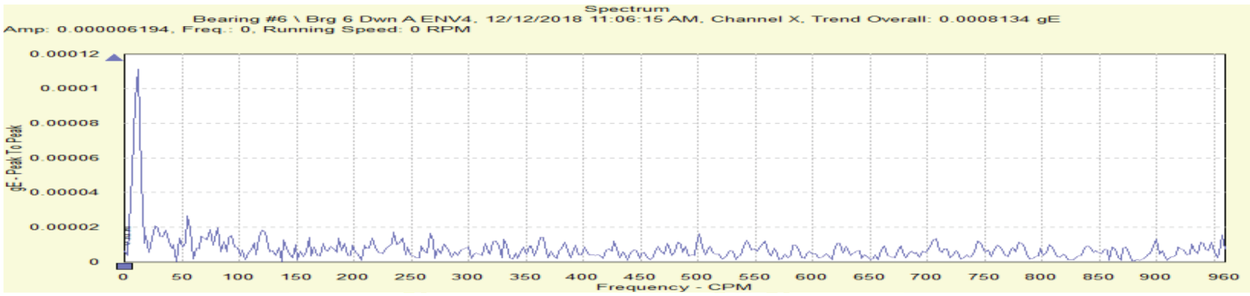
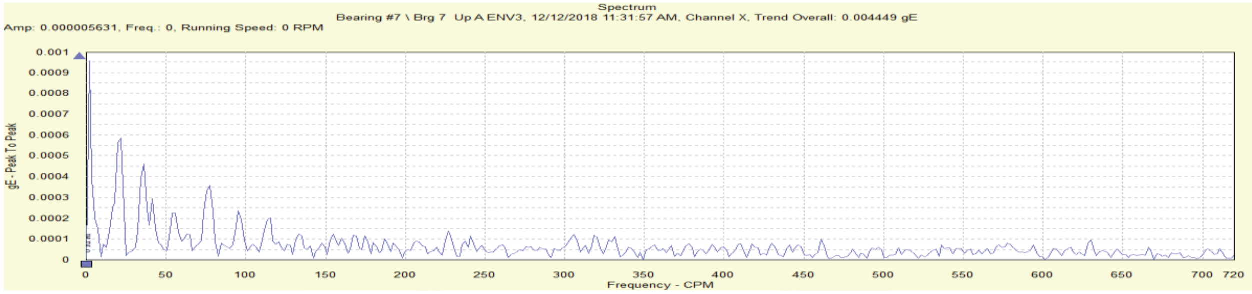


Bearing #6 – Envelope Acceleration gE3 spectrum – Down cycle.

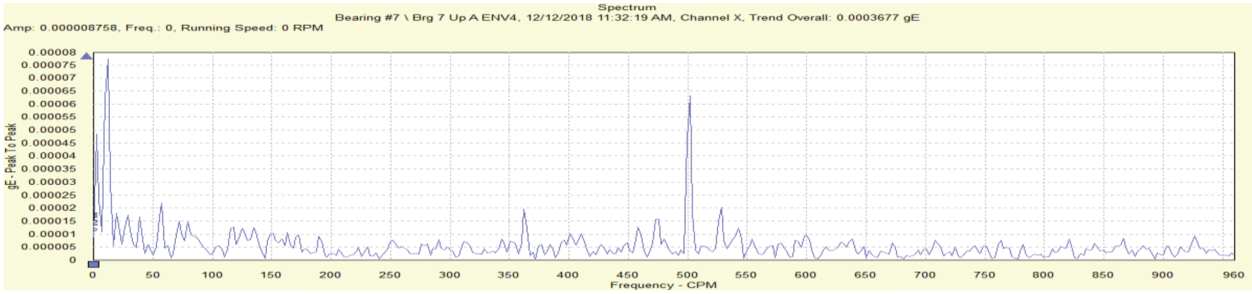


Bearing #6 – Envelope Acceleration gE4 spectrum – Down cycle.

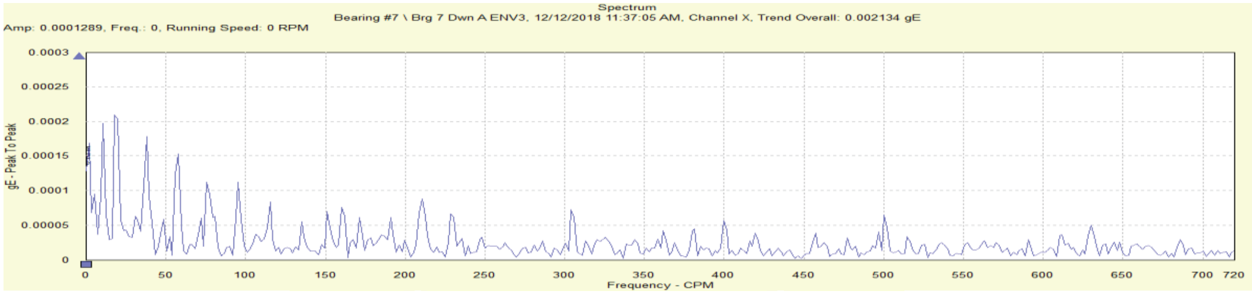
South Main Bearing #7



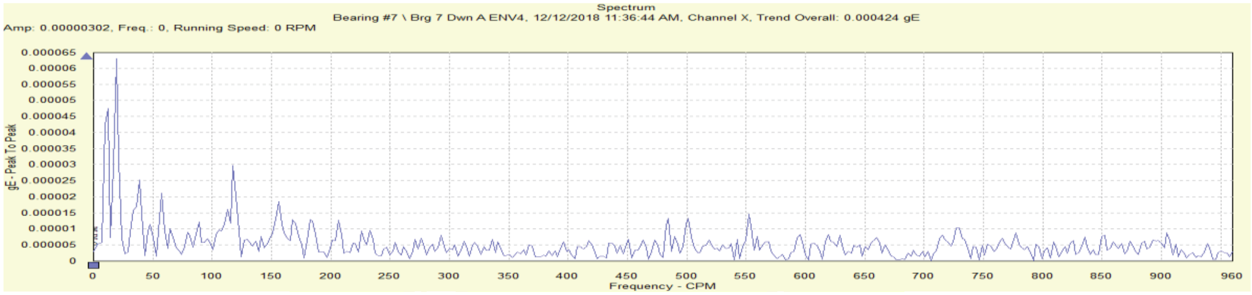
Bearing #7 – Envelope Acceleration gE3 spectrum – Up cycle.



Bearing #7 – Envelope Acceleration gE4 spectrum – Up cycle.

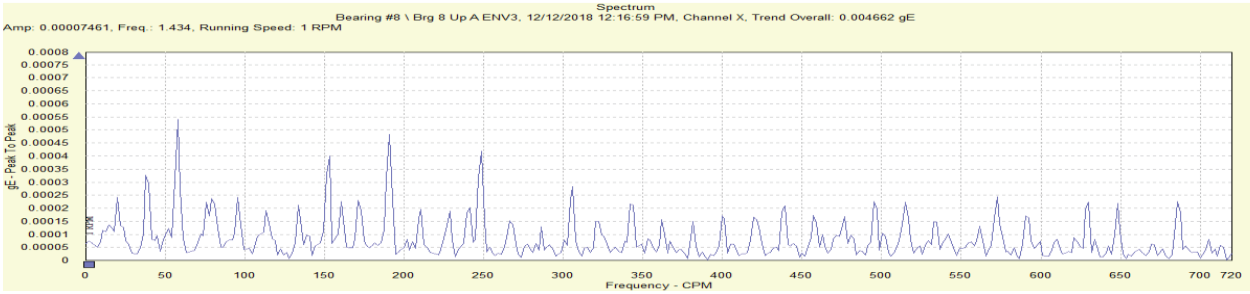


Bearing #7 – Envelope Acceleration gE3 spectrum – Down cycle.

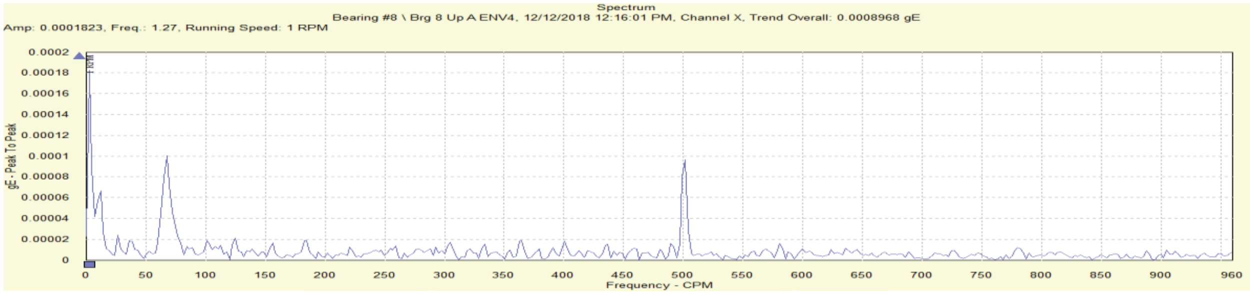


Bearing #7 – Envelope Acceleration gE4 spectrum – Down cycle.

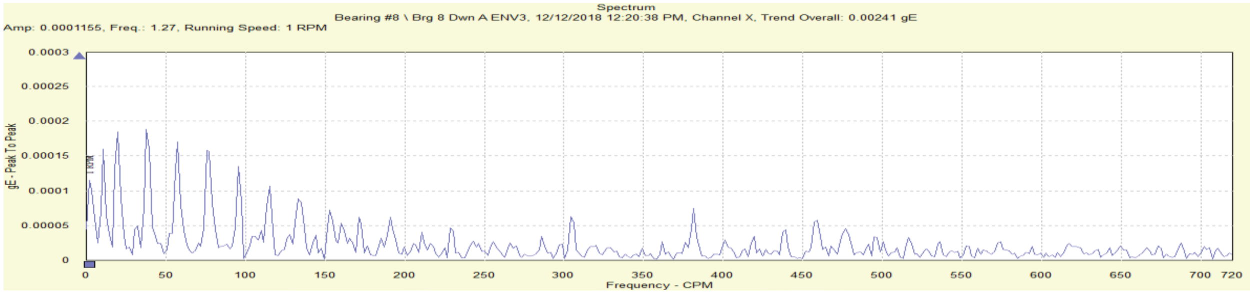
South Main Bearing #8



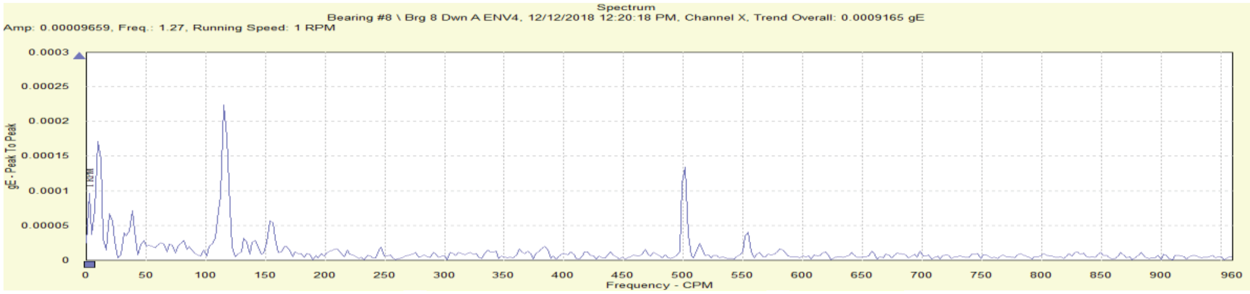
Bearing #8 – Envelope Acceleration gE3 spectrum – Up cycle.



Bearing #8 – Envelope Acceleration gE4 spectrum – Up cycle.



Bearing #8 – Envelope Acceleration gE3 spectrum – Down cycle.



Bearing #8 – Envelope Acceleration gE4 spectrum – Down cycle.

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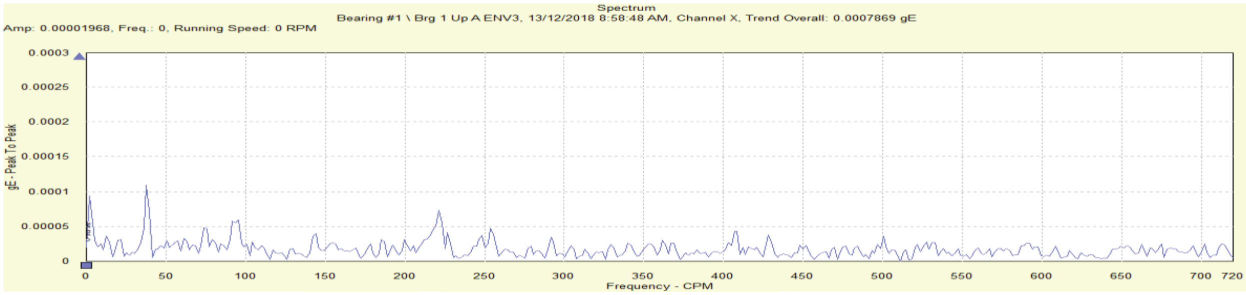
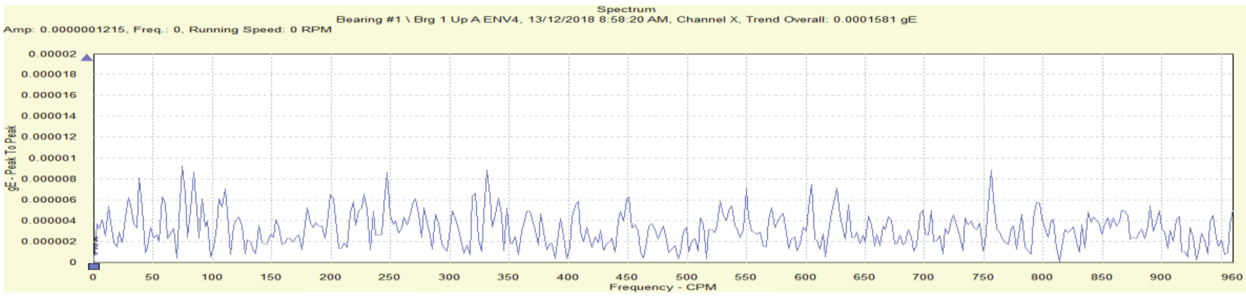
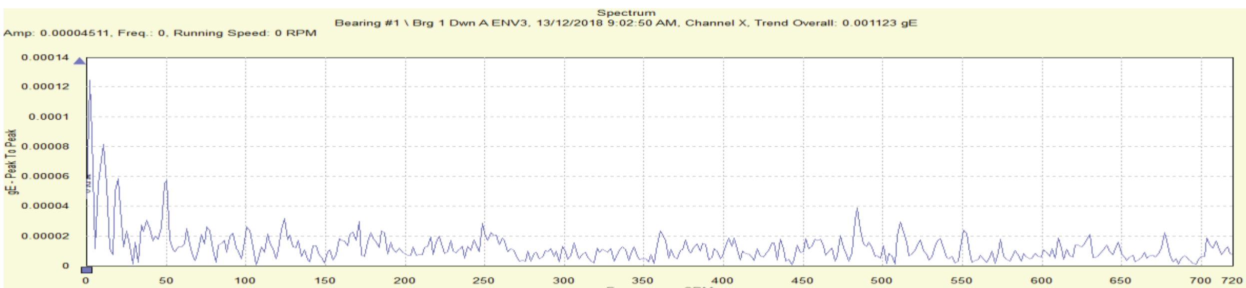
North Main Bearing #1



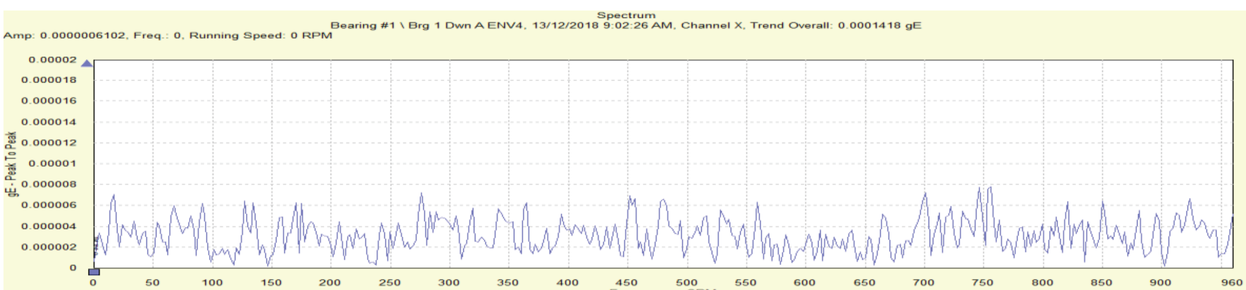
Bearing #1 – Envelope Acceleration gE3 spectrum – Up cycle.



Bearing #1 – Envelope Acceleration gE4 spectrum – Up cycle.

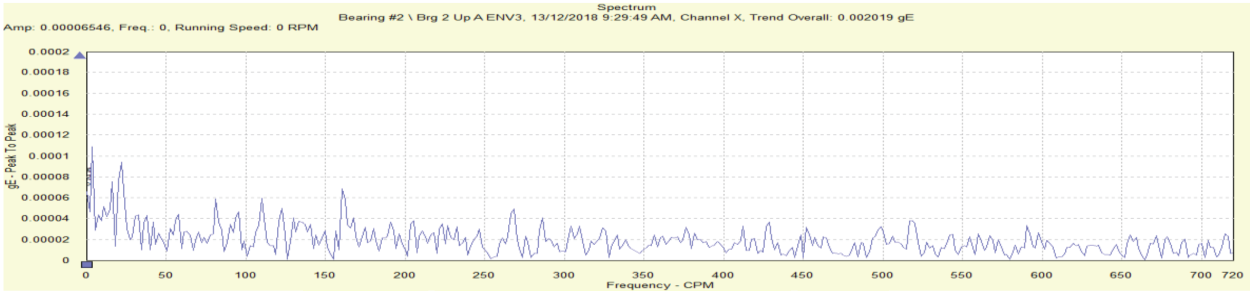


Bearing #1 – Envelope Acceleration gE3 spectrum – Down cycle.

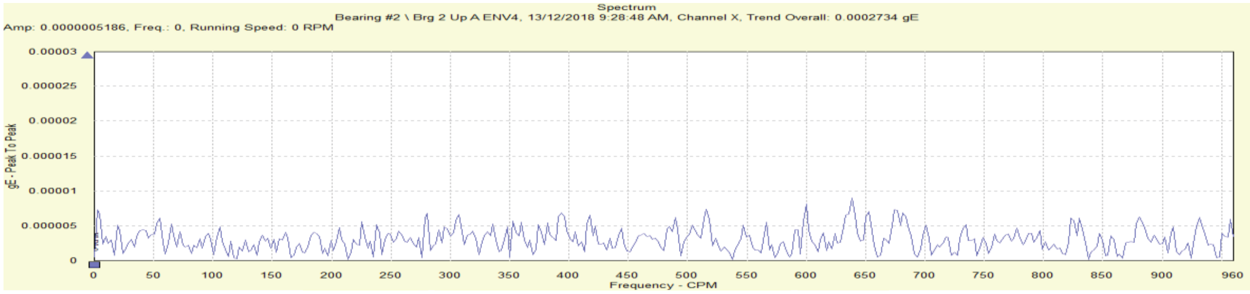


Bearing #1 – Envelope Acceleration gE4 spectrum – Down cycle.

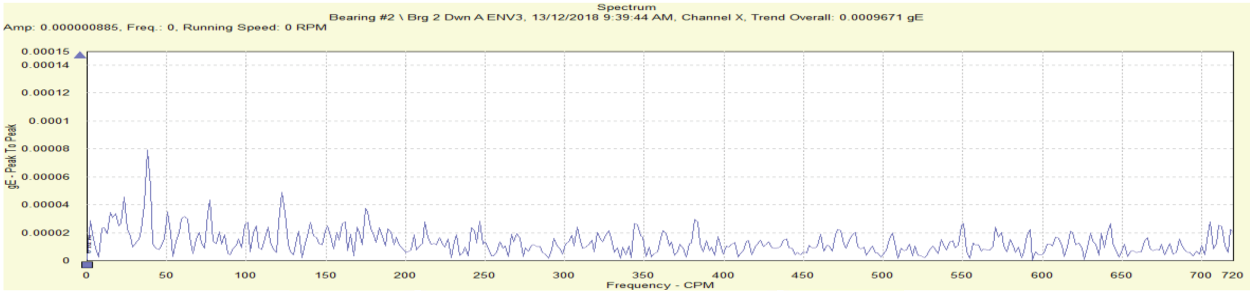
North Main Bearing #2



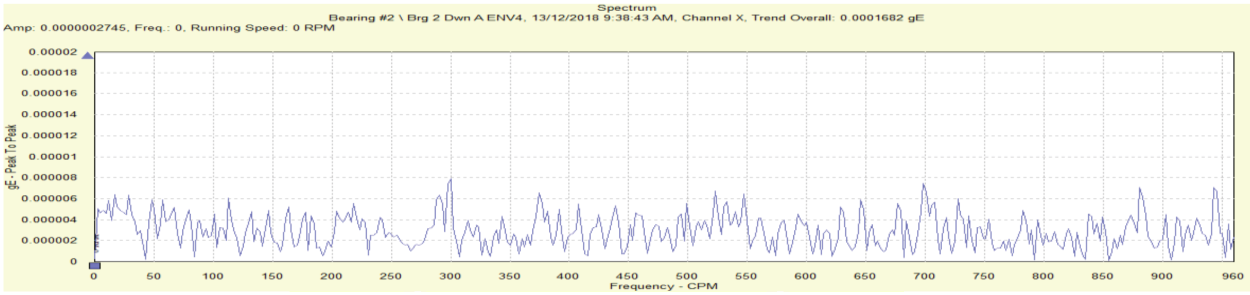
Bearing #2 – Envelope Acceleration gE3 spectrum – Up cycle.



Bearing #2 – Envelope Acceleration gE4 spectrum – Up cycle.



Bearing #2 – Envelope Acceleration gE3 spectrum – Down cycle.



Bearing #2 – Envelope Acceleration gE4 spectrum – Down cycle.

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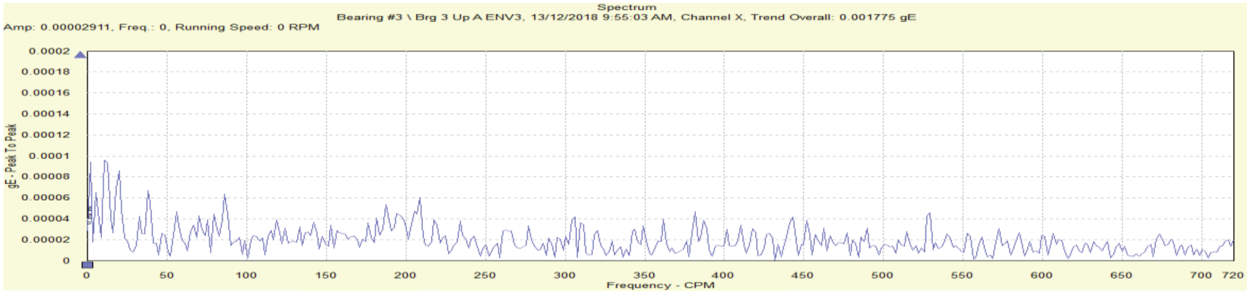
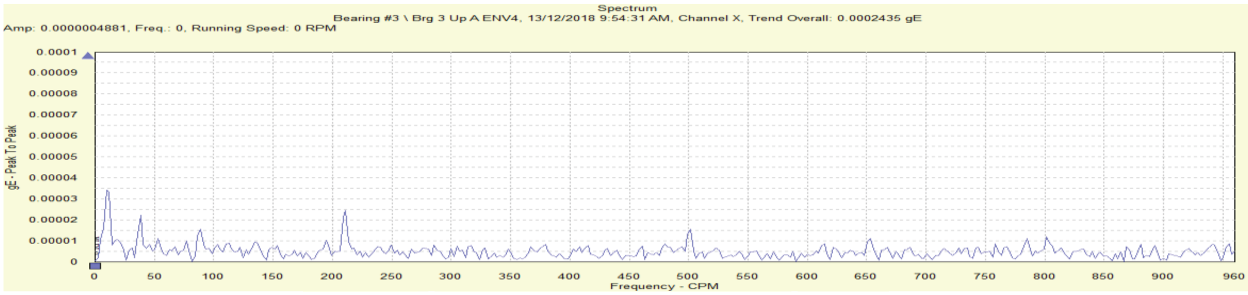
40 Executive Court, Scarborough, ON M1S 4N4   Phone: (416) 299 1220   Web: www.skf.ca

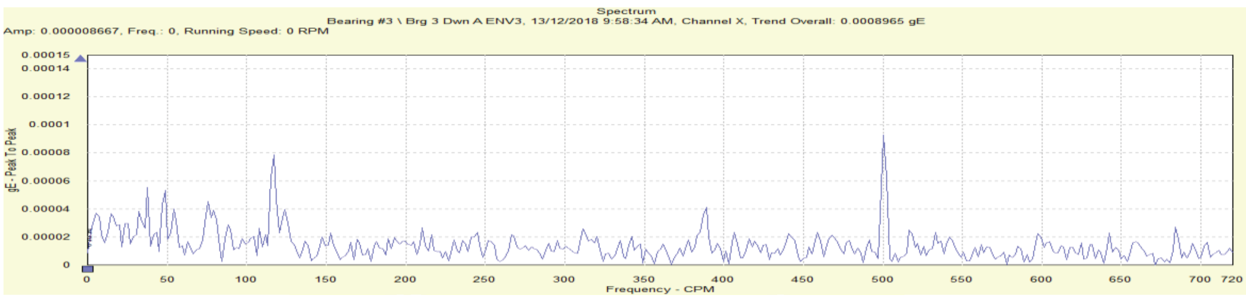
North Main Bearing #3



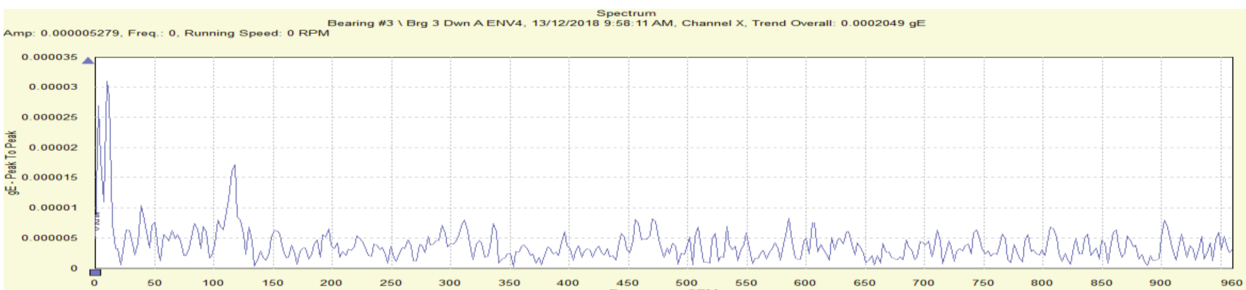
Bearing #3 – Envelope Acceleration gE3 spectrum – Up cycle.



Bearing #3 – Envelope Acceleration gE4 spectrum – Up cycle.

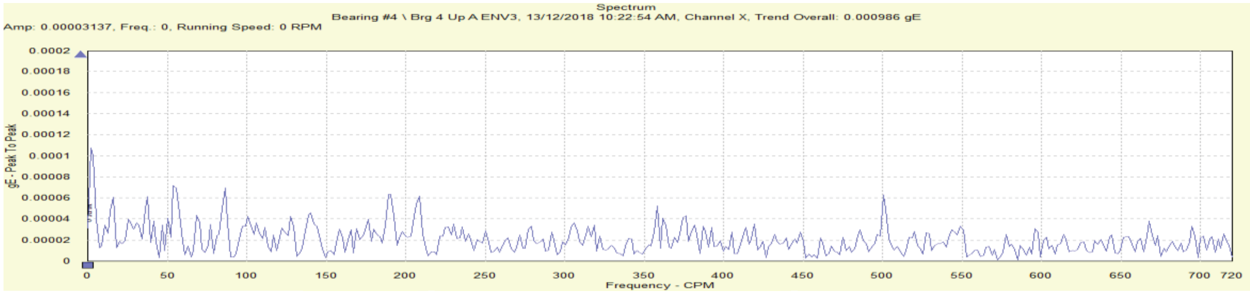


Bearing #3 – Envelope Acceleration gE3 spectrum – Down cycle.

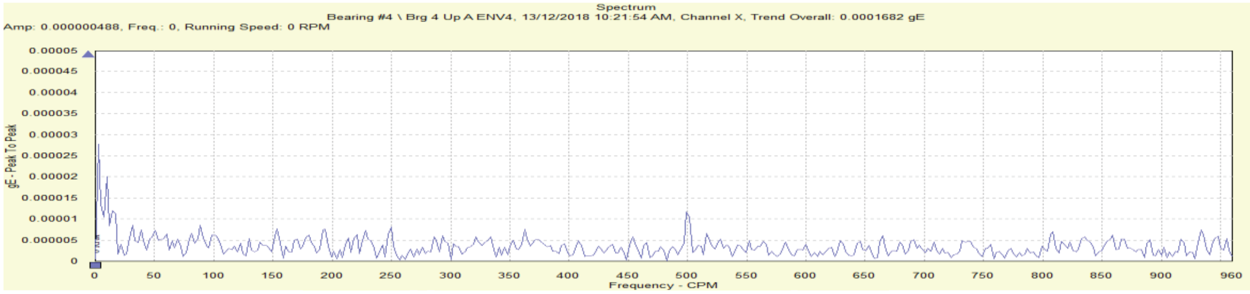


Bearing #3 – Envelope Acceleration gE4 spectrum – Down cycle.

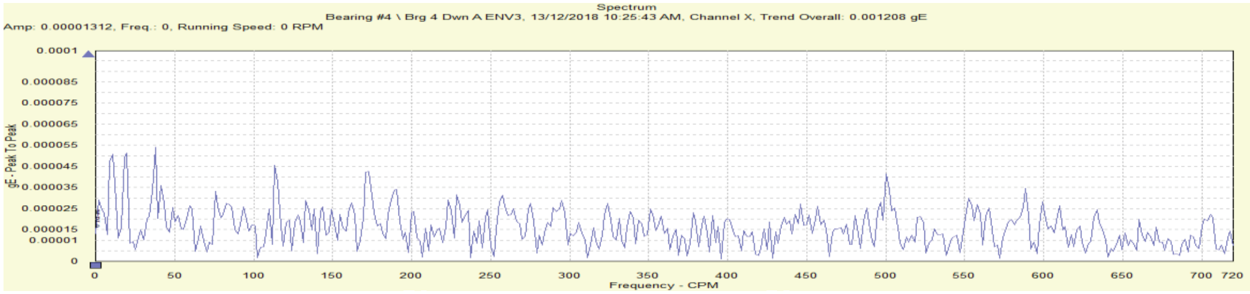
North Main Bearing #4



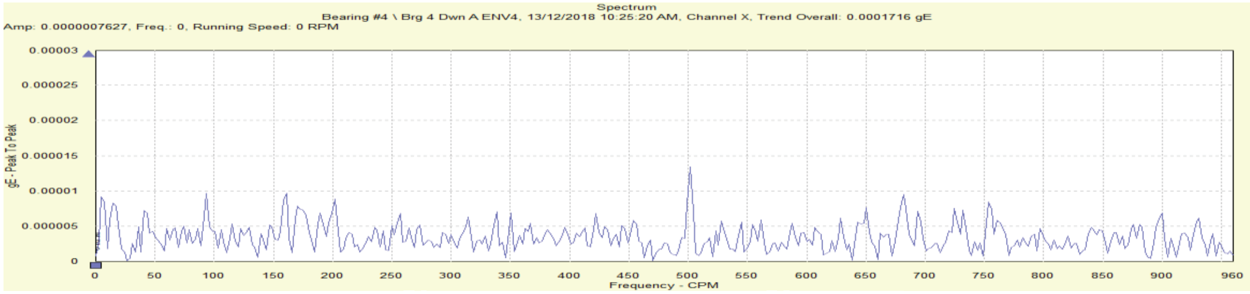
Bearing #4 – Envelope Acceleration gE3 spectrum – Up cycle.



Bearing #4 – Envelope Acceleration gE3 spectrum – Up cycle.

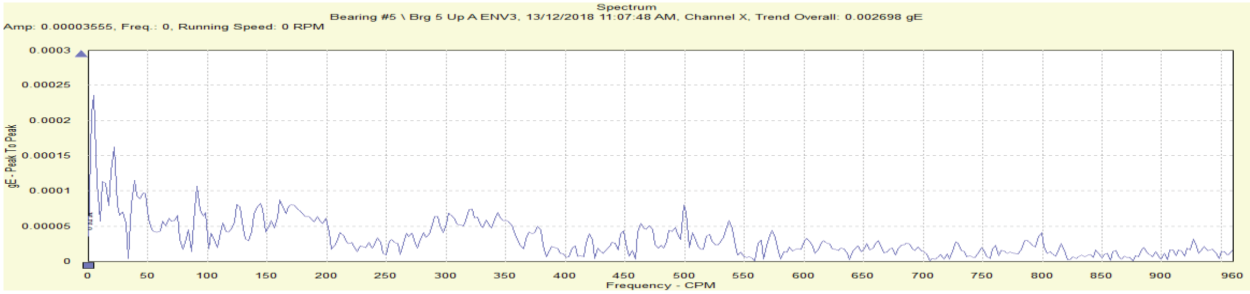


Bearing #4 – Envelope Acceleration gE3 spectrum – Down cycle.

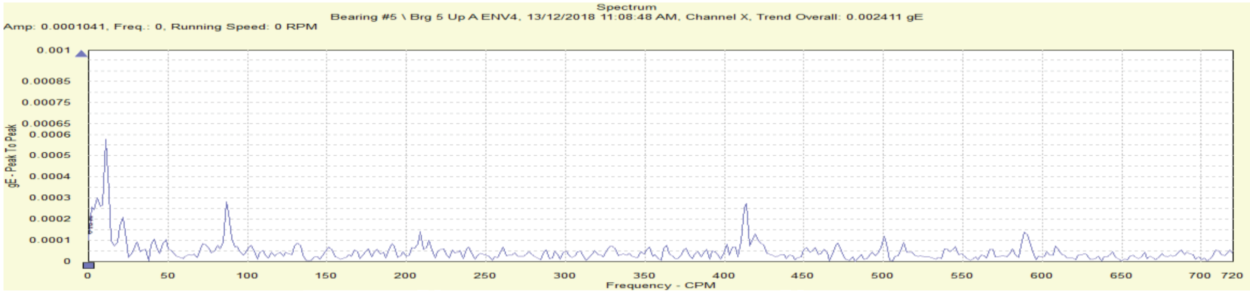


Bearing #4 – Envelope Acceleration gE4 spectrum – Down cycle.

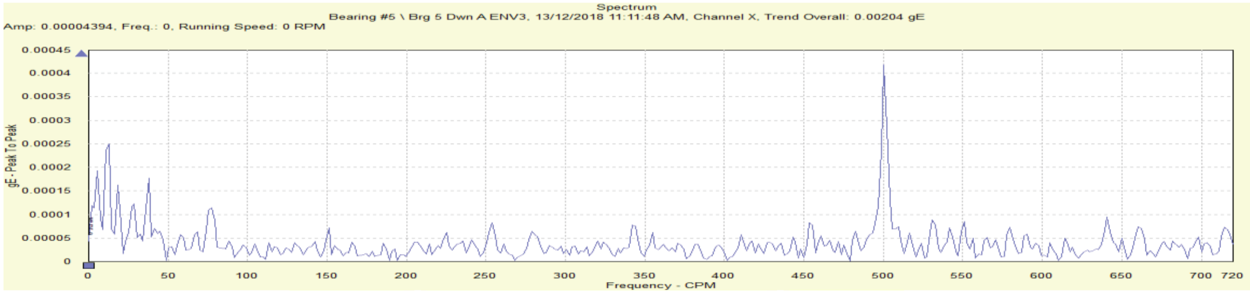
North Main Bearing #5



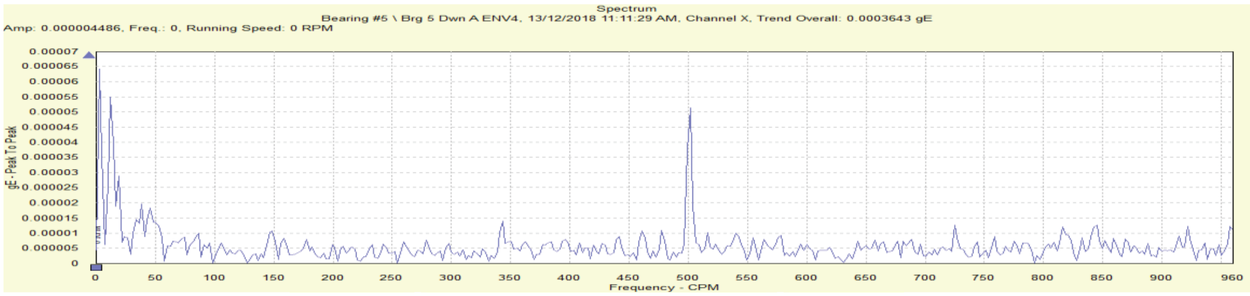
Bearing #5 – Envelope Acceleration gE3 spectrum – Up cycle.



Bearing #5 – Envelope Acceleration gE4 spectrum – Up cycle.

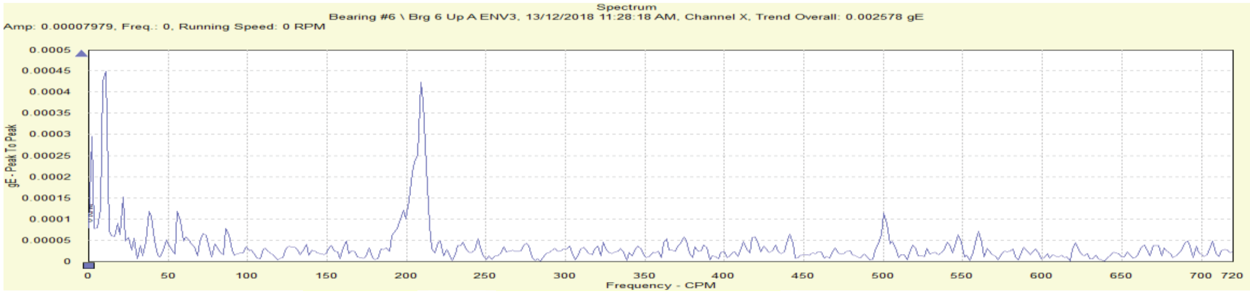


Bearing #5 – Envelope Acceleration gE3 spectrum – Down cycle.

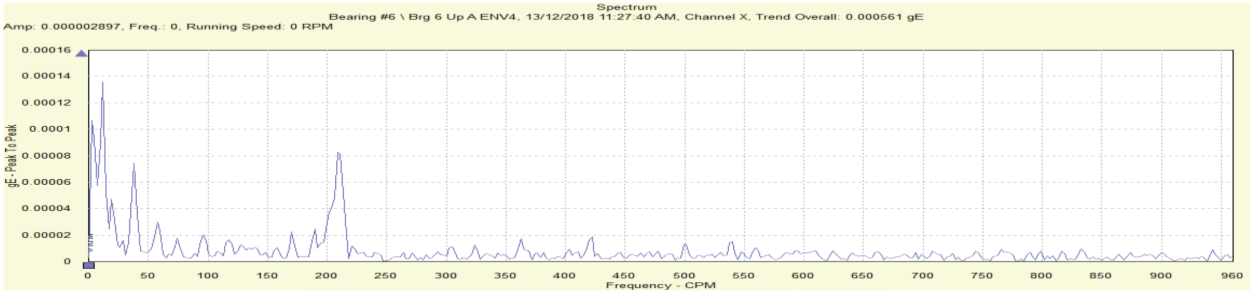


Bearing #5 – Envelope Acceleration gE4 spectrum – Down cycle.

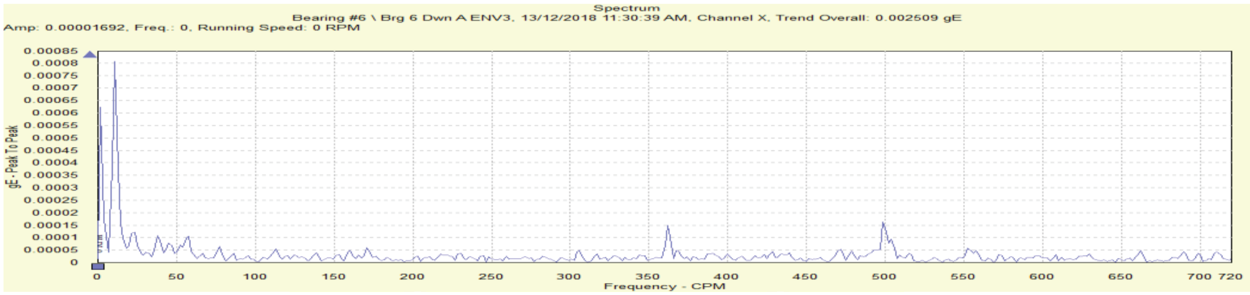
North Main Bearing #6



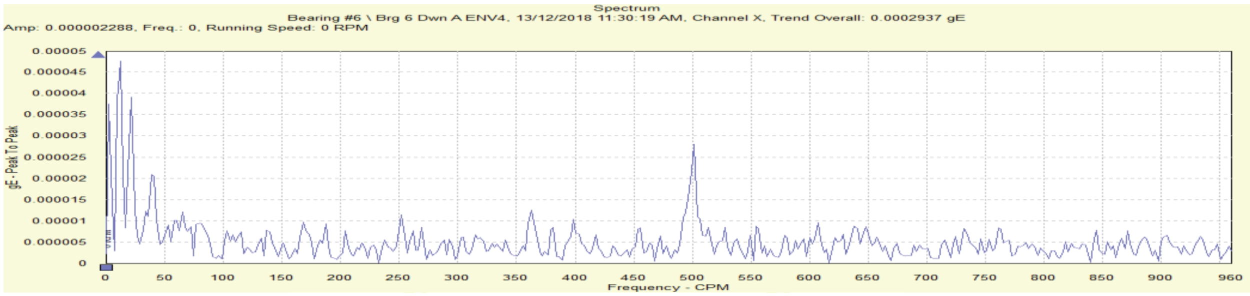
Bearing #6 – Envelope Acceleration gE3 spectrum – Up cycle.



Bearing #6 – Envelope Acceleration gE4 spectrum – Up cycle.

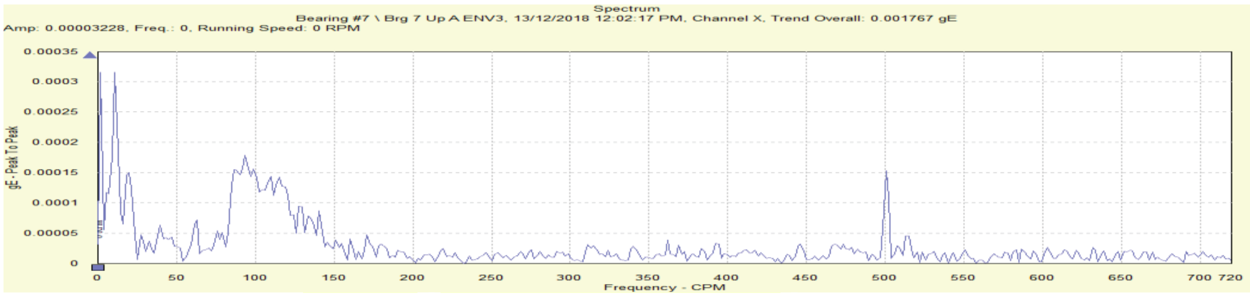


Bearing #6 – Envelope Acceleration gE3 spectrum – Down cycle.

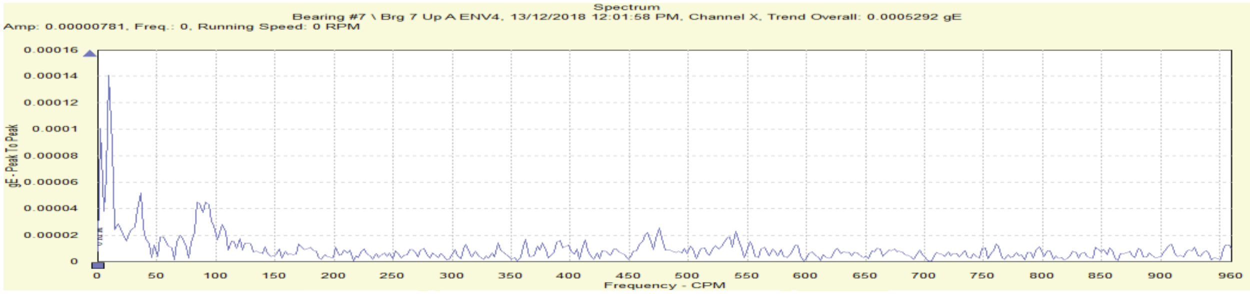


Bearing #6 – Envelope Acceleration gE4 spectrum – Down cycle.

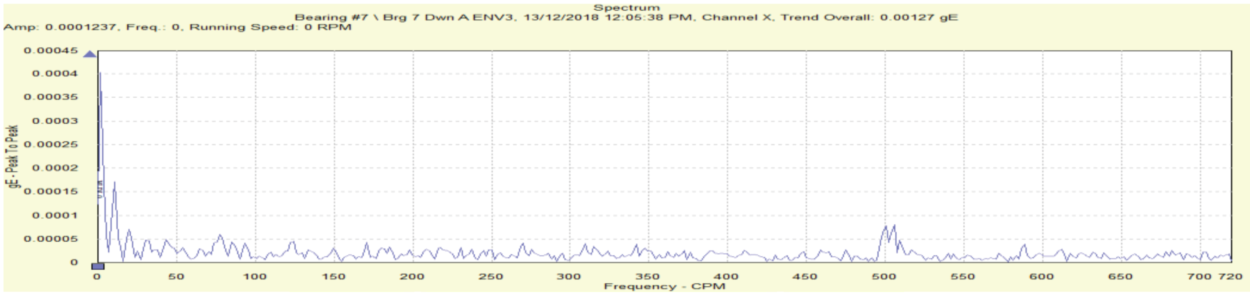
North Main Bearing #7



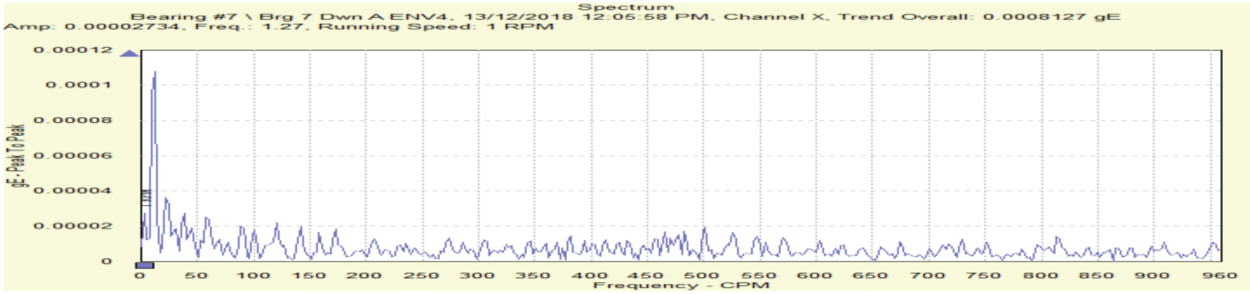
Bearing #7 – Envelope Acceleration gE3 spectrum – Up cycle.



Bearing #7 – Envelope Acceleration gE4 spectrum – Up cycle.

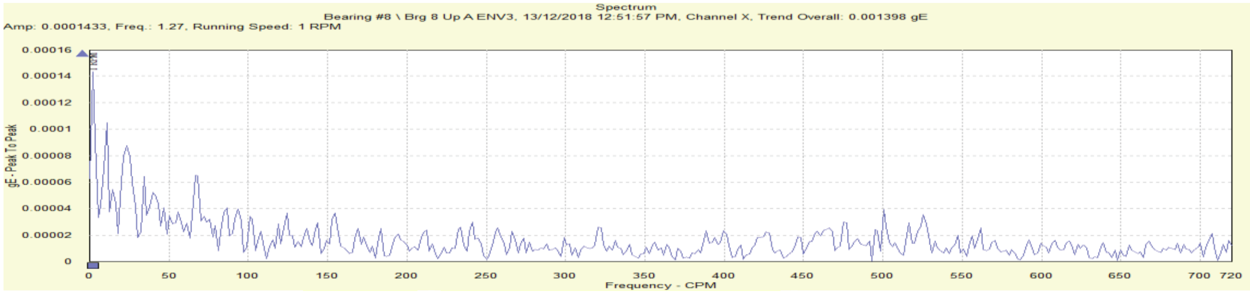


Bearing #7 – Envelope Acceleration gE3 spectrum – Down cycle.

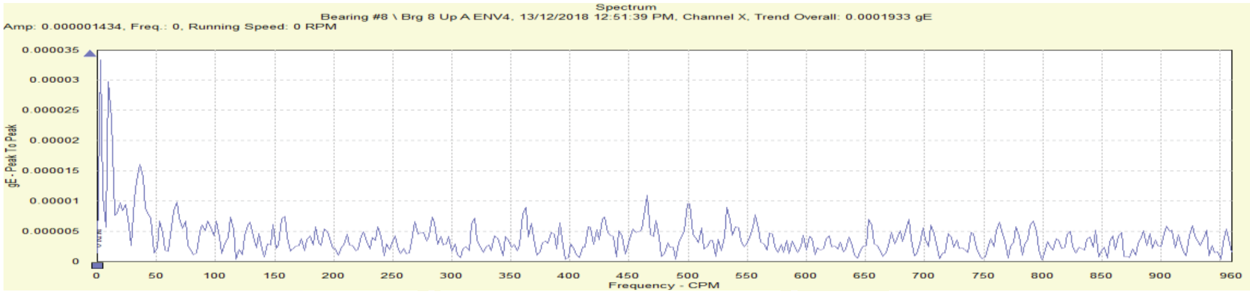


Bearing #7 – Envelope Acceleration gE4 spectrum – Down cycle.

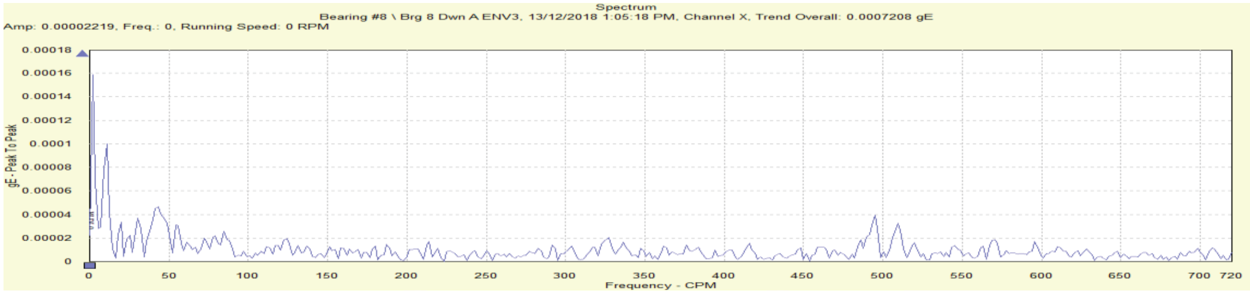
North Main Bearing #8



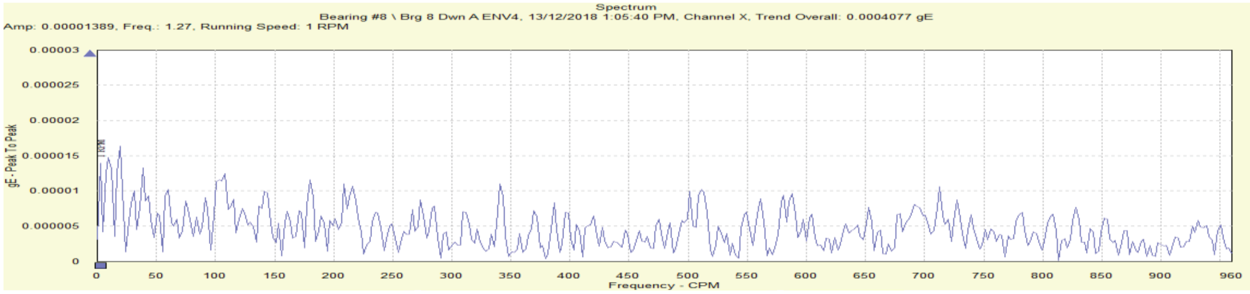
Bearing #8 – Envelope Acceleration gE3 spectrum – Up cycle.



Bearing #8 – Envelope Acceleration gE4 spectrum – Up cycle.



Bearing #8 – Envelope Acceleration gE3 spectrum – Down cycle.



Bearing #8 – Envelope Acceleration gE3 spectrum – Down cycle.

APPENDIX B4

Oil Analysis Reports

APPENDIX B4 Oil Analysis Reports (Southwest Sprectrochem Lab)

INDEX pages

Southwest Spectro-Chem Labs
1009 Louisiana St South Houston, TX 77587
(P)713.944.3694 (F)713.944.9881
www.weanalyzeoil.com

OVERALL WEAR JUDGEMENT
1-Normal

Analytical Ferrograph Report

SAMPLE INFORMATION			
CUSTOMER #:	234565	LAB SAMPLE #:	L1147
CUSTOMER:	STAFFORD BANDLOW ENG	OIL USED:	UNKNOWN
LOCATION:	BURLINGTON CANAL	TIME ON OIL:	N/A
UNIT:	LIFT BRIDGE	SAMPLE DATE:	12/12/18
DESCRIPTION:	NORTH SPAN DRIVE REDUCER	REPORT DATE:	12/31/18
SERIAL #:	N/A	ANALYST:	PLau
EQUIP NO:	0050		

PARTICLE ANALYSIS
1 - Normal; 2 - Watch; 3 - Alert; 4 - Critical

FERROUS METAL WEAR	SEVERITY
RUBBING	1
SEVERE WEAR	
CUTTING	
LAMINAR PARTICLES	
SPHERES	
CHUNKS	
RED OXIDES	1
DARK OXIDES	
ADHESION WEAR	
ABRASION WEAR	
SLIDING	
COPPER/COPPER ALLOY WEAR	**SEVERITY**
RUBBING	1
SEVERE WEAR	
CUTTING	
LAMINAR PARTICLES	
SPHERES	
FATIGUE CHUNKS	
ABRASION WEAR	
SLIDING	
OTHER NON-MAGNETIC PARTICLES	**SEVERITY**
INORGANIC/BIREFRINGENT	
WHITE METAL	
MOLYBDENUM DISULFIDE	
OTHER NON-METALLIC PARTICLES	**SEVERITY**
ORGANIC/BIREFRINGENT	1
SILICEOUS	1
FRICTION POLYMER	
FIBERS	
LACQUER	
AMORPHOUS	
CARBONACEOUS	

METAL CONTENT, ppm by Emission Spectroscopy

NOTE: Particles greater than 10-microns will probably not be measured in the emission spectrometer.

WEAR			
Iron	2	Tin	0
Copper	1	Nickel	0
Aluminum	0	Titanium	0
Chromium	0	Silver	0
Lead	0	Vanadium	0

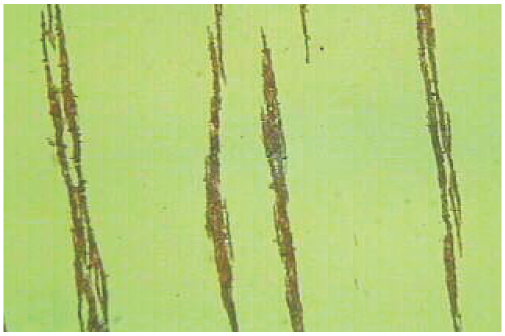
ADDITIVE	
Magnesium	0
Calcium	4
Barium	0
Phosphorous	208
Zinc	13

MULTI-SOURCE	
Molybdenum	0
Antimony	0
Boron	0

CONTAMINANT	
Silicon	0
Sodium	1
Potassium	0

PHYSICAL PROPERTIES		
Viscosity @ 40C	143.7	cSt
Ferro D.R, Small	10.2	
Ferro D.R, Large	35.8	
KF Water	49	ppm
TAN	0.45	mg/g

SAMPLE #: L1147



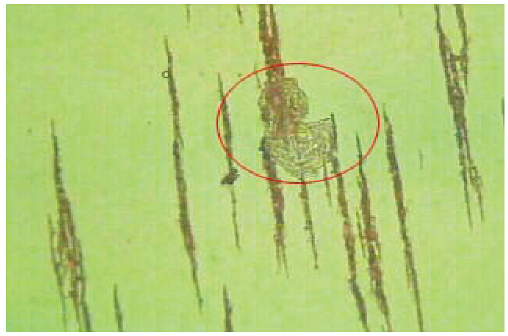


PHOTO-MICROGRAPH A @ 400 X
LIGHT FERRO-MAGNETIC BANDS AT FERROGRAM ENTRANCE.

PHOTO-MICROGRAPH B @ 400 X
ORGANIC AND SILICEOUS DEBRIS IS PRESENT; PARTICLE SIZE 5 TO 30 MICRONS.

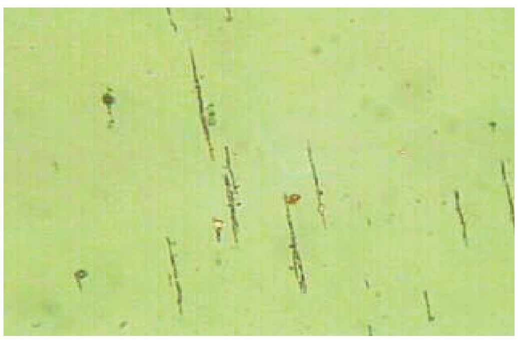


PHOTO-MICROGRAPH C @ 1000 X
SMALL COPPER-ALLOY WEAR OBSERVED.

PHOTO-MICROGRAPH D @ 1000 X
ORGANIC DEBRIS: APPEARS TO BE ALGAE (FRAGMENT).

SUMMARY:

Wear is minimal; no severe wear is indicated. Contamination concentration appears acceptable. Debris particles consist of siliceous debris and a few observed organic particles. Water contamination is low. The condition of the equipment and lubricant is normal.

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OVERALL WEAR JUDGEMENT
1-Normal

Analytical Ferrograph Report

SAMPLE INFORMATION			
CUSTOMER #:	234565	LAB SAMPLE #:	L1149
CUSTOMER:	STAFFORD BANDLOW ENG	OIL USED:	UNKNOWN
LOCATION:	BURLINGTON CANAL	TIME ON OIL:	N/A
UNIT:	LIFT BRIDGE	SAMPLE DATE:	12/12/18
DESCRIPTION:	SOUTH SPAN DRIVE REDUCER	REPORT DATE:	01/10/19
SERIAL #:	N/A	ANALYST:	PLau
EQUIP NO:	0051		

PARTICLE ANALYSIS

1 - Normal; 2 - Watch; 3 - Alert; 4 - Critical

FERROUS METAL WEAR	SEVERITY
RUBBING	1
SEVERE WEAR	
CUTTING	
LAMINAR PARTICLES	
SPHERES	
CHUNKS	
RED OXIDES	1
DARK OXIDES	
ADHESION WEAR	
ABRASION WEAR	
SLIDING	
COPPER/COPPER ALLOY WEAR	**SEVERITY**
RUBBING	
SEVERE WEAR	
CUTTING	
LAMINAR PARTICLES	
SPHERES	
FATIGUE CHUNKS	
ABRASION WEAR	
SLIDING	
OTHER NON-MAGNETIC PARTICLES	**SEVERITY**
INORGANIC/BIREFRINGENT	
WHITE METAL	
MOLYBDENUM DISULFIDE	
OTHER NON-METALLIC PARTICLES	**SEVERITY**
ORGANIC/BIREFRINGENT	1
SILICEOUS	1
FRICTION POLYMER	
FIBERS	1
LACQUER	
AMORPHOUS	
CARBONACEOUS	

METAL CONTENT, ppm by Emission Spectroscopy

NOTE: Particles greater than 10-microns will probably not be measured in the emission spectrometer.

WEAR			
Iron	1	Tin	0
Copper	1	Nickel	0
Aluminum	0	Titanium	0
Chromium	0	Silver	0
Lead	0	Vanadium	0

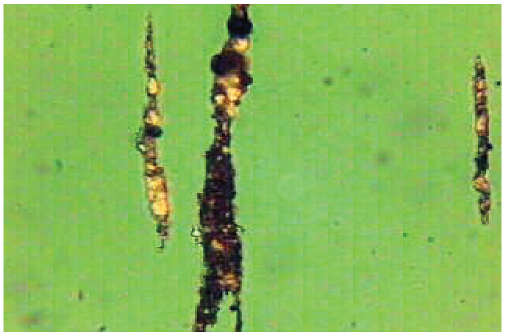
ADDITIVE	
Magnesium	0
Calcium	1
Barium	0
Phosphorous	197
Zinc	6

MULTI-SOURCE	
Molybdenum	0
Antimony	0
Boron	0

CONTAMINANT	
Silicon	0
Sodium	0
Potassium	0

PHYSICAL PROPERTIES		
Viscosity @ 40C	143.0	cSt
Ferro D.R, Small	6.3	
Ferro D.R, Large	25.2	
KF Water	55	ppm
TAN	0.48	mg/g

SAMPLE #: L1149



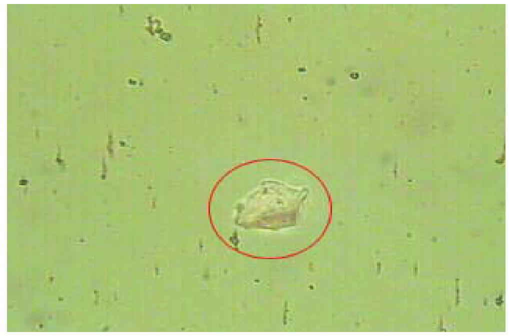
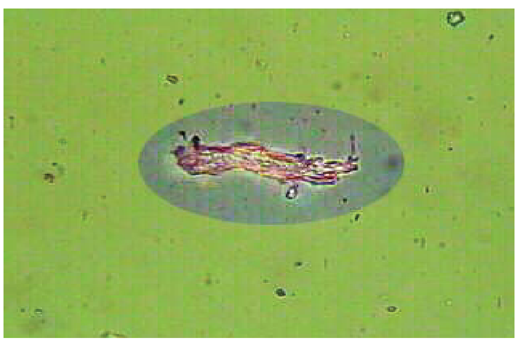


PHOTO-MICROGRAPH A @ 1000 X
FERRO-MAGNETIC BANDS AT FERROGRAM ENTRANCE INDICATE NORMAL RUBBING WEAR.

PHOTO-MICROGRAPH B @ 1000 X
sILICEOUS PARTICLE 5 TO 10 MICRONS IN SIZE.



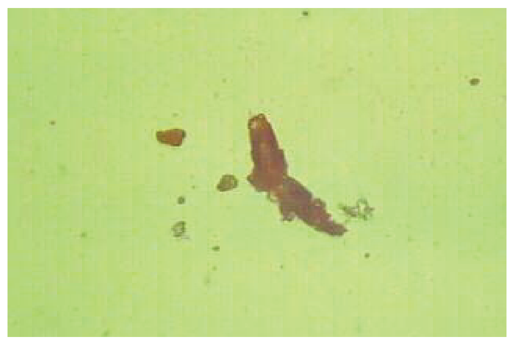


PHOTO-MICROGRAPH C @ 1000 X
ORGANIC DEBRIS CONSISTENT WITH AN ALGAE OR PLANT FRAGMENT.

PHOTO-MICROGRAPH D @ 400 X
RED OXIDES (RUST) AT FERROGRAM EXIT. APPEARS TO BE CONTAMINATION, NOT CORROSION WEAR.

SUMMARY:

Ferrous and copper alloy wear is minimal; no severe wear indicated. The contamination level is low. Overall, the equipment and lubricant conditions are appropriate and "NORMAL".

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OVERALL WEAR JUDGEMENT
2-Watch

Analytical Ferrograph Report

SAMPLE INFORMATION			
CUSTOMER #:	234565	LAB SAMPLE #:	L1148
CUSTOMER:	STAFFORD BANDLOW ENG	OIL USED:	UNKNOWN
LOCATION:	BURLINGTON CANAL	TIME ON OIL:	N/A
UNIT:	LIFT BRIDGE	SAMPLE DATE:	12/13/18
DESCRIPTION:	NORTH SPAN LOCK	REPORT DATE:	01/10/19
SERIAL #:	N/A	ANALYST:	PLau
EQUIP NO:	0079		

PARTICLE ANALYSIS

1 - Normal; 2 - Watch; 3 - Alert; 4 - Critical

FERROUS METAL WEAR	SEVERITY
RUBBING	1
SEVERE WEAR	
CUTTING	
LAMINAR PARTICLES	
SPHERES	
CHUNKS	
RED OXIDES	1
DARK OXIDES	
ADHESION WEAR	
ABRASION WEAR	
SLIDING	
COPPER/COPPER ALLOY WEAR	**SEVERITY**
RUBBING	1
SEVERE WEAR	
CUTTING	
LAMINAR PARTICLES	
SPHERES	
FATIGUE CHUNKS	
ABRASION WEAR	
SLIDING	
OTHER NON-MAGNETIC PARTICLES	**SEVERITY**
INORGANIC/BIREFRINGENT	1
WHITE METAL	
MOLYBDENUM DISULFIDE	
OTHER NON-METALLIC PARTICLES	**SEVERITY**
ORGANIC/BIREFRINGENT	2
SILICEOUS	1
FRICTION POLYMER	2
FIBERS	
LACQUER	2
AMORPHOUS	
CARBONACEOUS	

METAL CONTENT, ppm by Emission Spectroscopy

NOTE: Particles greater than 10-microns will probably not be measured in the emission spectrometer.

WEAR			
Iron	1	Tin	0
Copper	0	Nickel	0
Aluminum	0	Titanium	0
Chromium	0	Silver	0
Lead	1	Vanadium	0

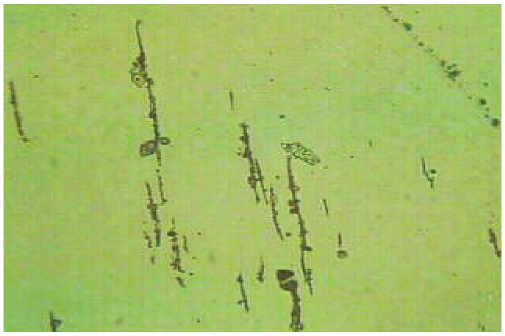
ADDITIVE	
Magnesium	1
Calcium	46
Barium	0
Phosphorous	161
Zinc	3

MULTI-SOURCE	
Molybdenum	0
Antimony	0
Boron	11

CONTAMINANT	
Silicon	0
Sodium	1
Potassium	0

PHYSICAL PROPERTIES		
Viscosity @ 40C	364.6	cSt
Ferro D.R, Small	6.3	
Ferro D.R, Large	24.3	
KF Water	133	ppm
TAN	0.44	mg/g

SAMPLE #: L1148



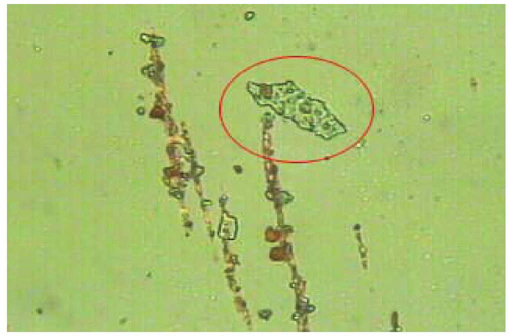
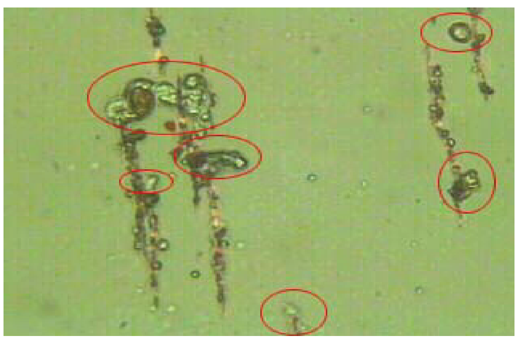


PHOTO-MICROGRAPH A @ 400 X
FINE MAGNETIC PARTICLES WITH LARGER NON-MAGNETIC PARTICLES.

PHOTO-MICROGRAPH B @ 1000 X
RED OXIDES AND SILICEOUS DEBRIS APPARENT. NOTE A LACQUER (LUBRICANT DEGRADATION PRODUCT) PARTICLE IS INDICATED.



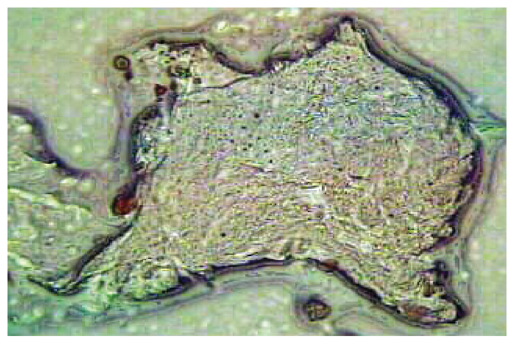


PHOTO-MICROGRAPH C @ 1000 X
AMORPHOUS BODIES ARE PRESENT; THESE ARE LIKELY FRICTION POLYMERS.

PHOTO-MICROGRAPH D @ 400 X
A LARGE AMORPHOUS BODY CONSISTENT WITH FRICTION POLYMER.

SUMMARY:

Ferrous and copper-alloy wear are minimal; no severe wear is indicated . The equipment condition is normal. There are several observations of organic amorphous bodies and what appears to be friction polymer. Friction polymer is a lubricant degradation product. The possibility also remains that these amorphous bodies may be an organic contaminant. The “WATCH” condition is due to these soft bodies. Otherwise the lubricant properties are acceptable.

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OVERALL WEAR JUDGEMENT
1-Normal

Analytical Ferrograph Report

SAMPLE INFORMATION			
CUSTOMER #:	234565	LAB SAMPLE #:	L1150
CUSTOMER:	STAFFORD BANDLOW ENG	OIL USED:	UNKNOWN
LOCATION:	BURLINGTON CANAL	TIME ON OIL:	N/A
UNIT:	LIFT BRIDGE	SAMPLE DATE:	12/12/18
DESCRIPTION:	SOUTH SPAN LOCK	REPORT DATE:	01/10/19
SERIAL #:	N/A	ANALYST:	PLau
EQUIP NO:	0052		

PARTICLE ANALYSIS

1 - Normal; 2 - Watch; 3 - Alert; 4 - Critical

FERROUS METAL WEAR	SEVERITY
RUBBING	1
SEVERE WEAR	
CUTTING	
LAMINAR PARTICLES	
SPHERES	
CHUNKS	
RED OXIDES	
DARK OXIDES	
ADHESION WEAR	
ABRASION WEAR	
SLIDING	
COPPER/COPPER ALLOY WEAR	**SEVERITY**
RUBBING	1
SEVERE WEAR	
CUTTING	
LAMINAR PARTICLES	
SPHERES	
FATIGUE CHUNKS	
ABRASION WEAR	
SLIDING	
OTHER NON-MAGNETIC PARTICLES	**SEVERITY**
INORGANIC/BIREFRINGENT	1
WHITE METAL	
MOLYBDENUM DISULFIDE	
OTHER NON-METALLIC PARTICLES	**SEVERITY**
ORGANIC/BIREFRINGENT	1
SILICEOUS	1
FRICTION POLYMER	
FIBERS	
LACQUER	
AMORPHOUS	
CARBONACEOUS	

METAL CONTENT, ppm by Emission Spectroscopy

NOTE: Particles greater than 10-microns will probably not be measured in the emission spectrometer.

WEAR			
Iron	0	Tin	0
Copper	1	Nickel	0
Aluminum	0	Titanium	0
Chromium	0	Silver	0
Lead	2	Vanadium	0

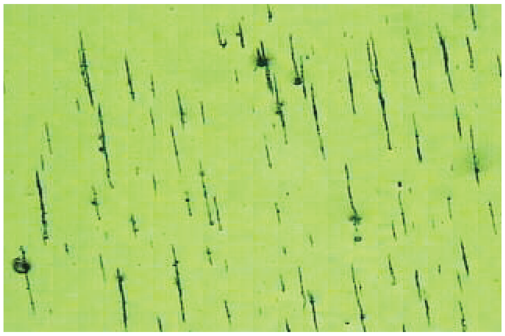
ADDITIVE	
Magnesium	0
Calcium	15
Barium	0
Phosphorous	139
Zinc	4

MULTI-SOURCE	
Molybdenum	0
Antimony	0
Boron	9

CONTAMINANT	
Silicon	0
Sodium	0
Potassium	0

PHYSICAL PROPERTIES		
Viscosity @ 40C	318.8	cSt
Ferro D.R, Small	4.6	
Ferro D.R, Large	17.8	
KF Water	174	ppm
TAN	0.48	mg/g

SAMPLE #: L1150



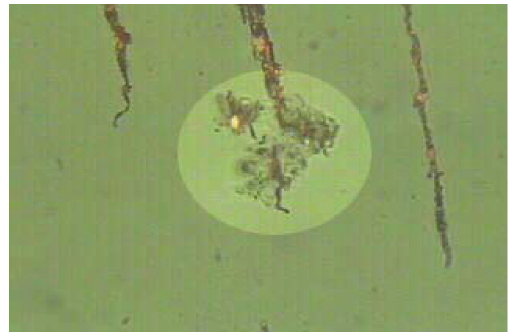


PHOTO-MICROGRAPH A @ 100 X	**PHOTO-MICROGRAPH B** @ 400 X
SLIDE ENTRANCE IS NORMAL FERROUS RUBBING WEAR WITH LARGER DEBRIS PARTICLES.	ORGANIC DEBRIS AND AMORPHOUS BODIES PRESENT.

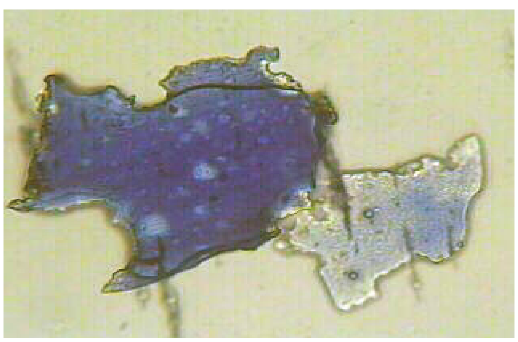


PHOTO-MICROGRAPH C @ 400 X	**PHOTO-MICROGRAPH D** @ 1000 X
NON-METALIC LAMINAR PARTICLES: PLASTIC? ORGANIC IN NATURE.	MINERAL AGLOMERATION: CRYSTALINE IN STRUCTURE, LIKELY DEBRIS CONTAMINANT.

SUMMARY:

In general, the condition of the equipment and lubr icant are appropriate and "Normal". Note photo micro-graph C: these are large organic particles that may be paint or plastic. Many smaller particles of the same type are present. Prevent the ingress of more contamination of this type.

APPENDIX C

Electrical Inspection Data

APPENDIX C1

Site Photographs

APPENDIX C Electrical Inspection Photographs

INDEX

Photo E1 One Line Diagrams in Electrical Room. Note that the “As Built” one-line diagrams were updated as part of the recent motor and drive replacement project and are posted throughout the bridge.

Photo E2 1,000KVA Outdoor Pad Mounted Incoming Service Transformer/Unit Substation. Note the primary service to the transformer is 13.8kV from the local utility overhead supply and the secondary of the transformer serves the bridge at 575volt, 3-phase, 60 Hz.

Photo E3 Switchboard #1. The switchboard was installed in approximately 1994 and is in good condition. Note the yellow tape on the metering compartment door. There are some unterminated live wires inside the metering compartment.

Photo E4 Main 600kW Standby Generator. Generator is used as an alternative source of power to operate the bridge. The standby generator has been well maintained and is tested monthly.

Photo E5 Auxiliary Standby Generator. Note auxiliary standby generator only provides power to bridge facility and auxiliaries in the event of a utility electric failure. It is not capable of providing power to operate the bridge. This generator is in acceptable and serviceable condition.

Photo E6 Automatic Transfer Switch (ATS). This ATS is used to transfer power from utility to auxiliary generator power. The ATS is configured to automatically start the auxiliary generator in the event of a power failure. The ATS is in good serviceable condition.

Photo E7 Generator Fuel Pump System. This pump system allows automatic refuelling of the day tank from the main tank located within the control house compounded area.

Photo E8 Main Standby Generator Load Bank. This load bank is located outside the control house and is appropriately sized to exercise the main (600kW) standby generator under load. Note the minor corrosion exhibited on the load bank enclosure.

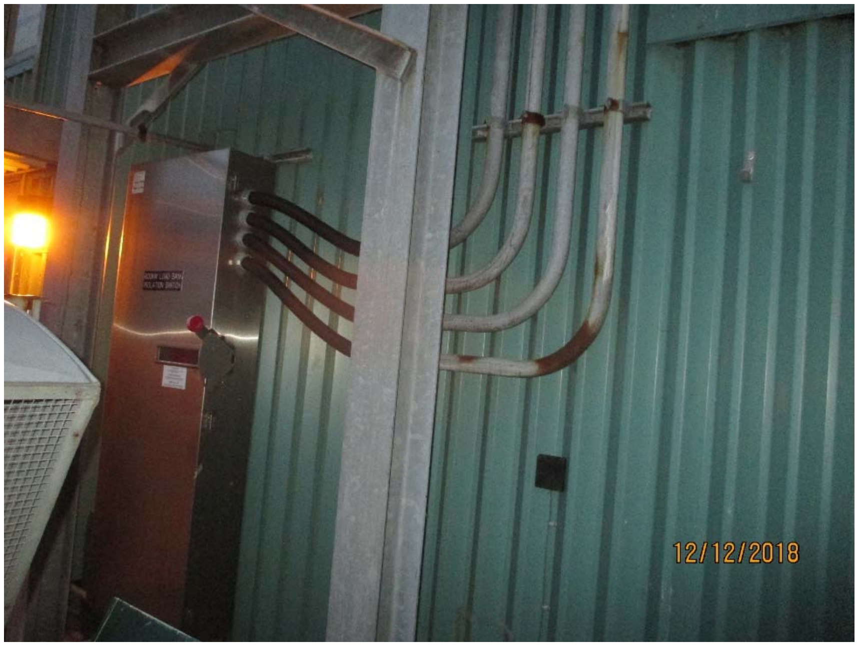


Photo E9 Load Bank Disconnect Switch. The disconnect switch is wall mounted outside the generator room facing the load bank. Note the as-new condition of the disconnect switch.

Photo E10 Main Switchboard No.2. This is the main distribution switchboard for the bridge electrical system. Note the yellow tapes and padlocks on the breakers. Some of the breakers are no longer in service and should be properly labeled as spare breakers and wires to the spare breakers removed.

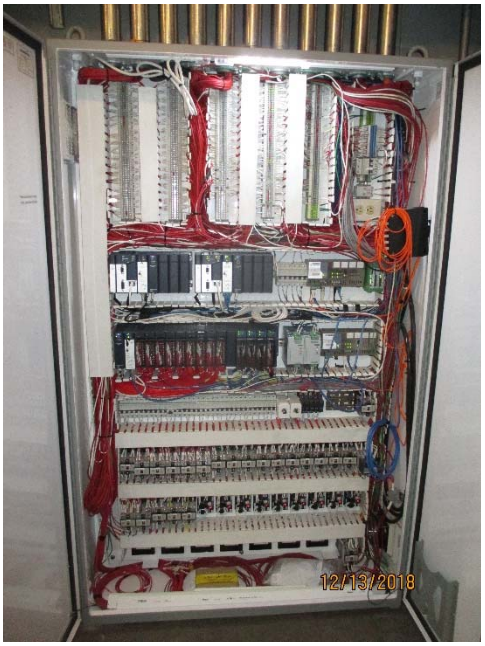


Photo E11 New CP-2 Control Panel. New free-standing control panel was installed as part of the recent bridge motor and drive replacement project. The redundant PLC system and control devices have been properly installed inside the panel. Note that the wireway cover cannot be mounted over the enclosure due to over filling of wires in the wireway in some area.

Photo E12 New UPS and UPS Distribution Panel. The UPS and its distribution panel is located next to the CP-2 and is in as new condition. Note the different type of laminated labels on the UPS distribution panel that are used to indicate the purposes of the breakers.

Photo E13 Broken Locks/levers on Panelboards. Note the indicated panel lock/levers were found to be broken on both Panel A and Panel EA inside the electrical room at the time of the inspection.

Photo E14 Main Control Console. New upgraded console top is provided during the recent motor and drive replacement project. The console is in excellent condition.

Photo E15 Traffic Control Panel. The new traffic control console top was recently installed and is in like new condition.

Photo E16 Traffic Control Bypass. A keyed selector switch for PLC and Maintenance select has been installed on the side of the console cabinet as part of the new control system. Note that relay mode for traffic control does not have any interlocks per the recent motor and drive replacement project design.

Photo E17 CCTV and Intercom. A CCTV monitor for new CCTV cameras is located next to the traffic control console. Note that both CCTV and intercom system are original and are functional. Also note that an original CCTV CRT monitor and original cameras that were installed prior to the recent motor and drive replacement project and remain in service. The intercom unit is located at the top right corner of the control console.

Photo E18 Bridge Radar System. A marine traffic radar system was installed to aid the bridge operation and schedule bridge openings for the boat traffic. It is also capable of displaying wind speed and direction and was found to be operational at the tie of the inspection

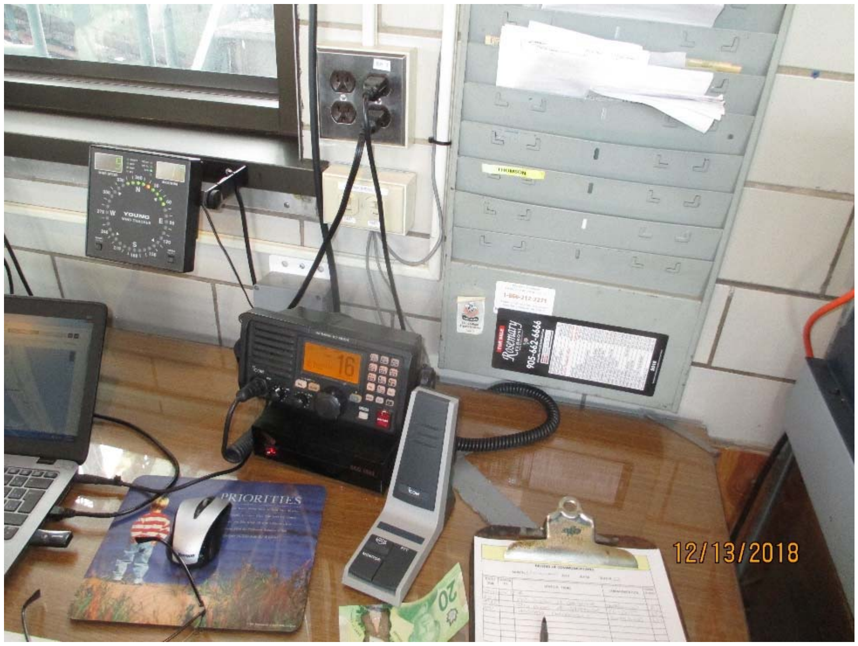


Photo E19 Wind Speed Indicator and Marine Radio. Both units were part of the bridge installation prior to the recent motor and drive replacement project and are in good serviceable condition.

Photo E20 Typical New Motor Control Centre. Note that similar to the findings of last years inspection, the white plastic sheets that cover the MCC which are an indication of a roof leak above the MCC.

Photo E21 Typical VFD Drives Enclosure with Braking Resistors. Two new drives with resistors were installed in each tower as part of the recent recent motor and drive replacement project. Both drives are in as new condition. Note two drives are providing redundancy for the main drive operation. Operator can select drives automatically or manually.

Photo E22 Typical VFD Drive System. The 200HP Danfoss VFD drive, 18 poles transformer and rectifier have been well installed inside the drive enclosure.

Photo E23 Typical Drive Motor Disconnect Switches. The drive motor disconnect switch was part of the original installation and have been reused to serve the new motors.

Photo E24 Typical Drive Machinery Arrangement. The span motors and motor brakes are in as-new condition. The machinery brakes were existing but have been provided with a new brake drum as part of the recent motor and drive replacement project.

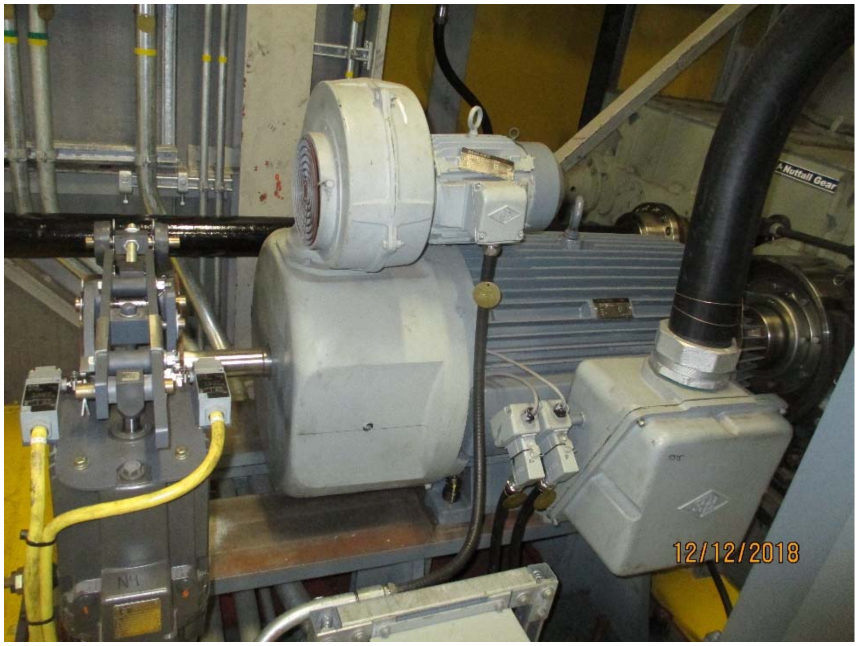


Photo E25 Northeast Motor Blower Nameplate. Similar to the last inspection, the blower nameplate was not affixed to the motor at the time of inspection.

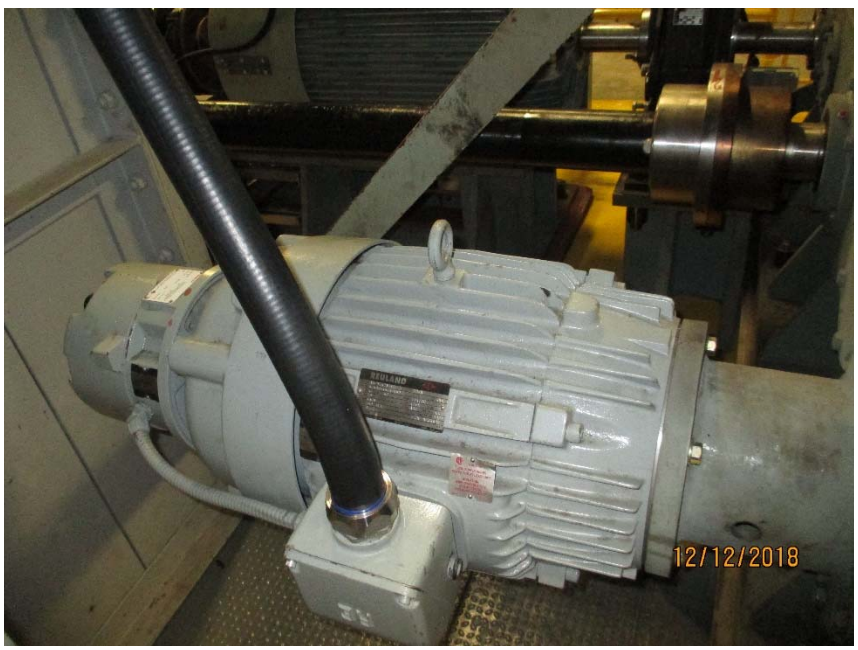


Photo E26 Typical Auxiliary Drive Motor. The new auxiliary motor with integral brake was installed during the recent motor and drive replacement project.. Note that the original chain drive aux. has been changed to the direct coupling to the reducer.

Photo E27 Lever Handle and Limit Switches on the Gear Reducer. Two handles are provided, one on each side the reducer for AUX drive operation and transverse skew adjustment. Many limit switches have been installed on the reducer box for the lever position indication and interlock.

Photo E28 South Auxiliary Drive Controller and Span Height Indication Panel. The auxiliary drive was relocated along with the MTS and emergency power panelboard. They are all in good serviceable condition. Note the white plastic sheet cover over the units which is an indication of the roof leak in the area.

Photo E29 Typical Pull Box and Control Cabinet (CP-3) in South Tower. The control cabinet with PLC display was installed as part of the recent motor and drive replacement project.. They were in as-new condition at the time of the inspection. Note the white plastic sheet cover used to protect enclosure from a roof leak.

Photo E30 Inside of Pull Box and CP-3 Cabinet. Although the pull box was installed in addition to the control cabinet, both enclosures are over filled in accordance with code.

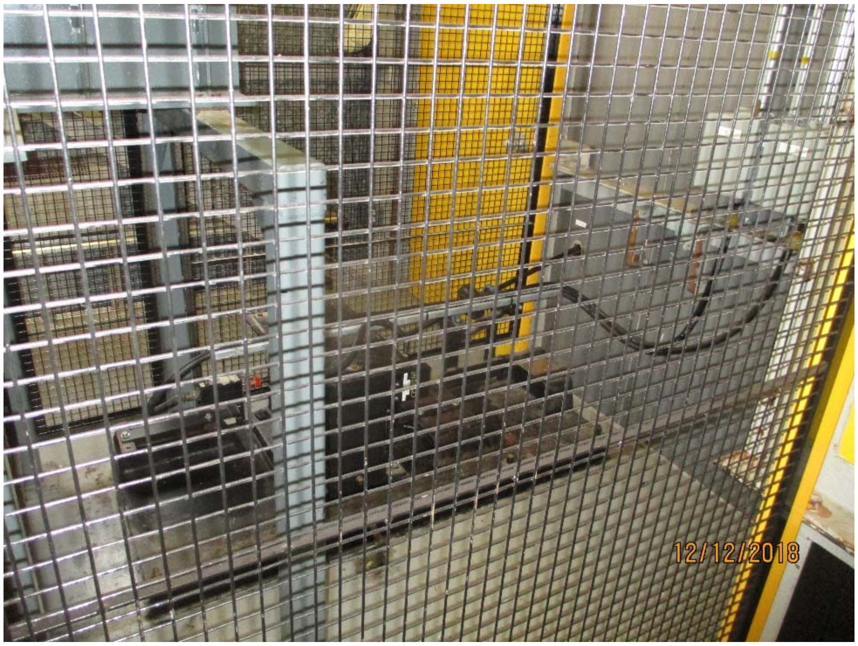


Photo E31 Span Resolvers. One single turn resolver and one multi-turn resolver have been connected to a gearbox which are attached to the tower pinion shaft. The resolvers and their junction box along with the gearbox are protected by a steel mesh cage as indicated.

Photo E32 South Tower Aerial Cable Control Termination Box. The network switches and fiber patch boxes are also installed inside the termination box as indicated. Note the looped cables inside the box which are the spare conductors and communication cables. Their condition has not changed from the 2017 inspection.

Photo E33 New Aerial Cable ATS in North Tower. The ATS was installed during the recent motor and drive replacement project.. It is used to automatically switch the aerial cable power feed between the east and west aerial installation. The ATS has been well installed and is in excellent operational condition.

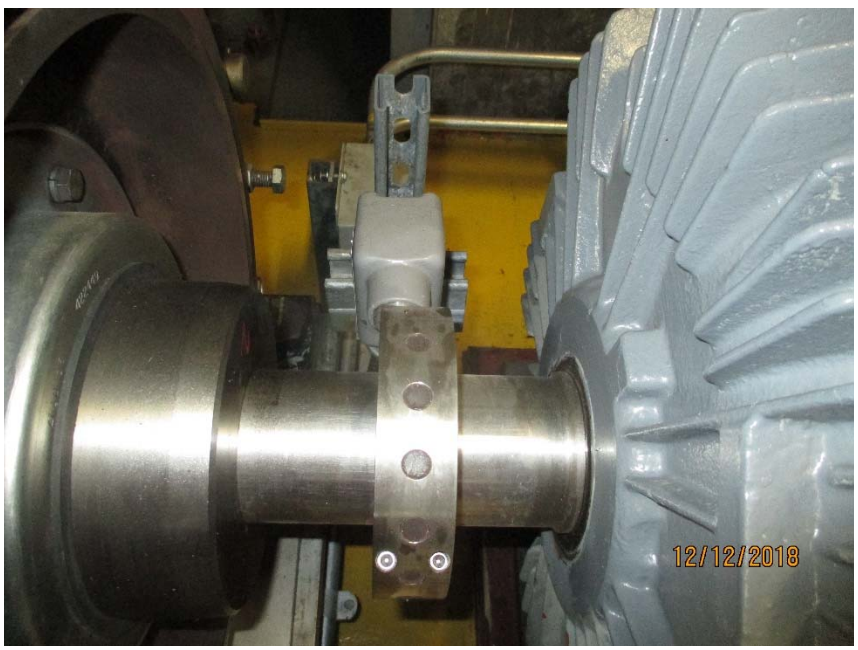


Photo E34 Typical Speed Switch Sensor. The speed switch sensor and pulse wrap have been installed between the motor and machinery brake for overspeed protection. The units are in good condition and the speed switch is operating as intended.

Photo E35 Typical Tower Heater Distribution Panel. This panel was part of the existing installation and was found to be in good operating condition at the time of the inspection.

Photo E36 Typical New Lighting Panel and Disconnect. A 45kVA transformer primary disconnect switch and associated lighting panel were installed as part of the recent motor and drive replacement project.. These components are in an as-new condition. Note the black electrical tape over the empty space. Breaker space fillers should be used in place of the tape.

Photo E37 Abandoned Cables (typical). Abandoned cables have not been completely removed from the junction boxes/raceway system but left in place.

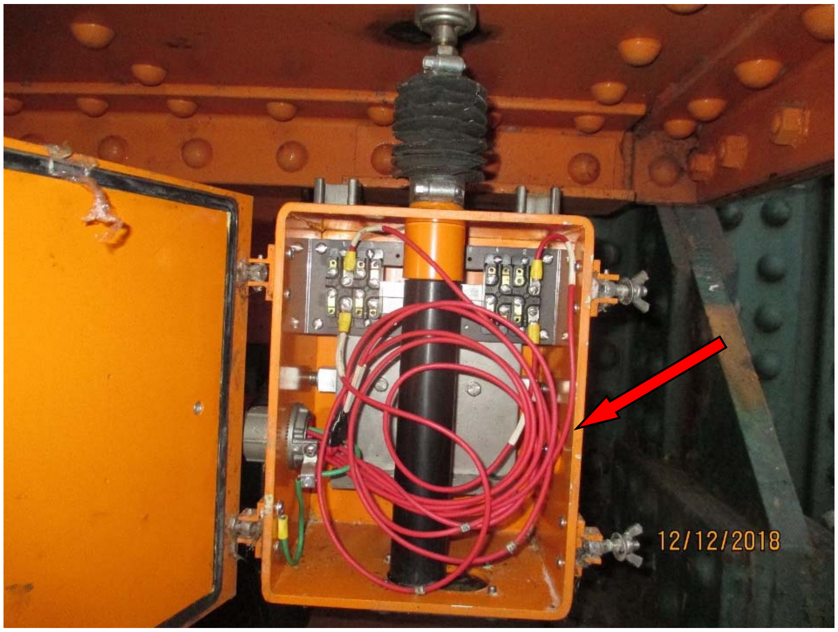


Photo E38 Typical New Span Seated Limit Switch. The switches are of the plunger type and provide indication that the span is fully seated. Note spare wires installed in the switch enclosure are missing cable ties.

Photo E39 Span Inclinometer Enclosure. Per the recent motor and drive replacement project design, the span inclinometer was to be installed in the enclosure and to communicate wirelessly with a transmitter located inside the CP-2 enclosure. The inclinometer was to be used for the span skew control but does not presently function as intended and has been disconnected.

Photo E40 Inclinometer Unit. The span inclinometer was moved several times under the direction of the Engineer during its commissioning without success. The function of the inclinometer has now been disabled. The multi-turn span height resolvers, one in each tower, are presently being used in place of the inclinometers. The bridge presently has no secondary or backup means of skew detection.

Photo E41 Typical Elevator Motor. The elevator motor is in good physical and operational condition.

Photo E42 Typical Elevator Control Cabinet. The elevator control is in working and fair condition but reportedly requires periodic maintenance.

Photo E43 Typical Span Lock Motor. Note the lock motor is in fair physical condition but exhibits moderate corrosion. The hand crank limit switch was been replaced during the recent motor and drive replacement project, to prevent electrical operation of the lock motor when the hand crank cover is removed.

Photo E44 Typical Span Lock Motor Disconnect Switch (North Disconnect Switch Shown). The disconnect switch is rated NEMA 3R and exhibits severe corrosion on the enclosure and on disconnect handle.

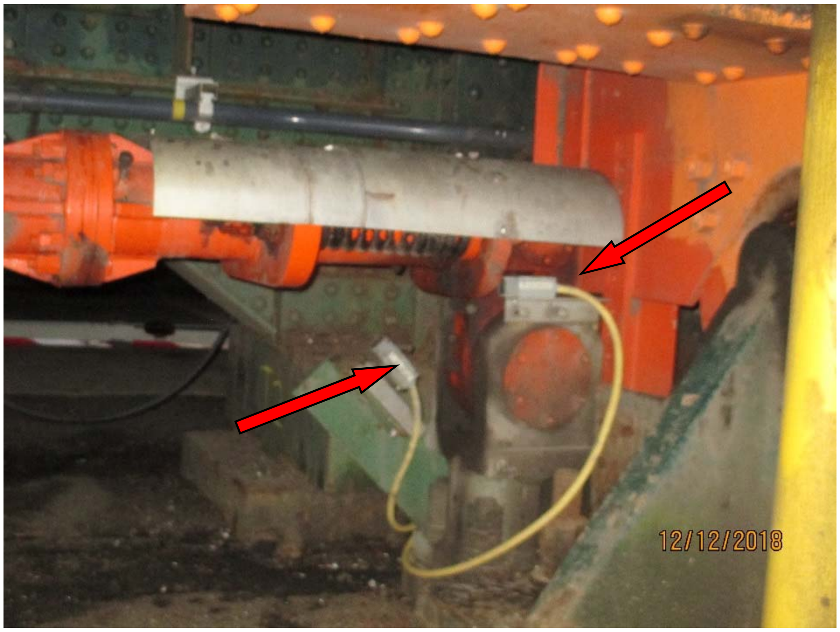


Photo E45 Typical Span Lock Limit Switches at the Lock Bar. These limit switches were installed as part of the recent motor and drive replacement project and were found to be in good physical and operational condition.

Photo E46 Typical Span Lock Limit Switches at the Center of Lock Machinery. A set of limit switches were installed at the center of the span lock rotation machinery. These limit switches were installed as part of the recent motor and drive replacement project and are now used in place of the original rotary cam limit switch installed to perform a similar function.

Photo E47 Lighting Panel on North Pier (LP-4). The disconnect switch, transformer, lighting panel and the lighting contactor are is in good physical condition. The lighting contactor has been modified to work with the current bridge control system.

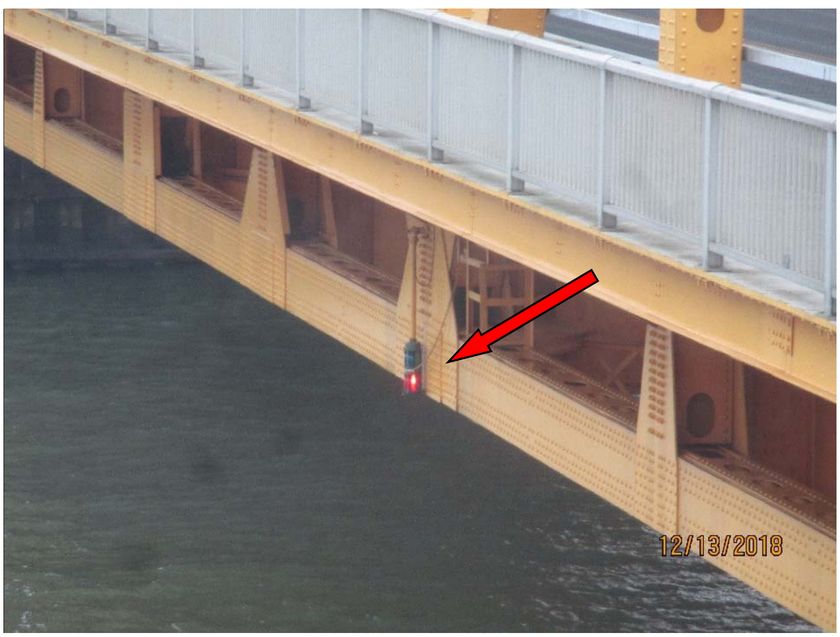


Photo E48 Typical Span Navigation Light. The bridge is provided with two span navigation lights, one facing each approaching navigable channel. These lights were found to be operational at the time of inspection and in good serviceable condition.

Photo E49 Typical Marine Traffic Navigation Light. The marine traffic lights are located at the tip end of the pier for signaling approaching vessels. The lights were operational at the time of the inspection and exhibit moderate corrosion on lighting fixture visors and poles.

Photo E50 Small Craft Navigation Light. The small craft navigation lights one light has been installed on each side of the canal. Note the minor corrosion on the light mounting post.

Photo E51 Traffic Signals (South Approach). Typically, traffic signals are in good physical and operational condition. The light bulbs are LED which extend the life of the bulbs.

Photo E52 North Pedestrian Light. The pedestrian light is LED type Walk and Halt light. The pedestrian lights functioned properly and were found to be in good condition at the time of the inspection. The North pedestrian bell (arrow) has been completely removed from the pole.

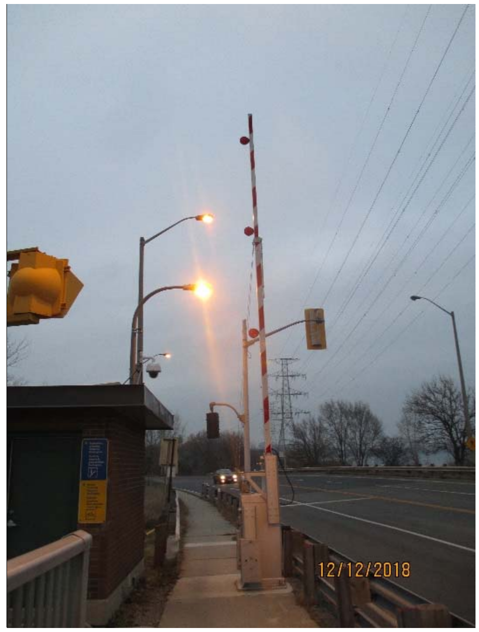


Photo E53 Typical Traffic Gate. The traffic gates are of the new construction and function as expected and in accordance with the defined bridge operating process.

Photo E54 Typical Gong. Gongs were generally found to be in like new condition at the time of the inspection.

Photo E55 Typical Traffic Gate Enclosure. The equipment inside the gate enclosure was found to be in as-new condition.

Photo E56 Typical Traffic Gate Motor and Hand Crank Limit Switch. The components were found to be in as-new condition. Note that the gate is provided with a hand crank limit switch (arrow) for interlocking prposes.

Photo E57 Typical Pedestrian Gate. The pedestrian gate is used to stop pedestrian traffic during the bridge operation. The Pedestrian gates were found to be in as-new condition. Note that the pedestrian gate and signal control are not included in the traffic control sequence. The operator is able to stop pedestrian traffic independently of bridge control system operation.

Photo E58 Typical Pedestrian Gate Enclosure. Note that the length of wires inside the gate are excessive and an improper wire splicing is used with unsecured terminal blocks at the time of inspection. Otherwise the gate is in as-new condition.

Photo E59 Typical Barrier Gate. Note the newly installed barrier gate, including arm light flasher and gong. The gate is in as-new operational condition.

Photo E60 Barrier Gate Receiver. Note the newly installed permanent railing has been provided to keep pedestrian traffic from the barrier receiver pocket.

Photo E61 Broken Lock on North Barrier Gate Enclosure. North barrier gate enclosure lock was broken at the handle and left on the floor as indicated.

Photo E62 South Cable Reel. Note the south cable reel is in as-new condition, it provides power and control for electrical equipment on the movable span.

Photo E63 Typical New Aerial Cables. The aerial cables were replaced during the recent motor and drive replacement project and was found to be in good condition.

Photo E64 Typical Aerial Cable Spacer (East Shown). Note the aerial cable spacers were in as-new condition at the time of the inspection.

Photo E65 Typical Aerial Suspension Cables Routing. Sufficient bending radius has been created for the aerial cable before routing into the cable tray.

Photo E66 Typical Aerial Suspension Cables on Cable Tray. The aerial cables are well supported and spaced inside the cable tray.

Photo E67 Bridge Access Control System. The bridge is provided with access control system to prevent unauthorized access to the bridge facilities. The access control system was operational at the time of inspection and provides an effective means of ensuring that only authorized personnel can gain access to the facility.

Photo E68 CCTV System. The CCTV cameras are strategically located throughout the bridge to monitor the roadway approaches, waterway approaches and main access areas to the bridge. The operation monitors all location from the operator's room via a CCTV monitor. The camera installation was found to provide good visual information and had been well installed.

Photo E69 Typical Air Horn. The air horn is operational and is in serviceable condition. Note the moderate corrosion on the air horn housing.

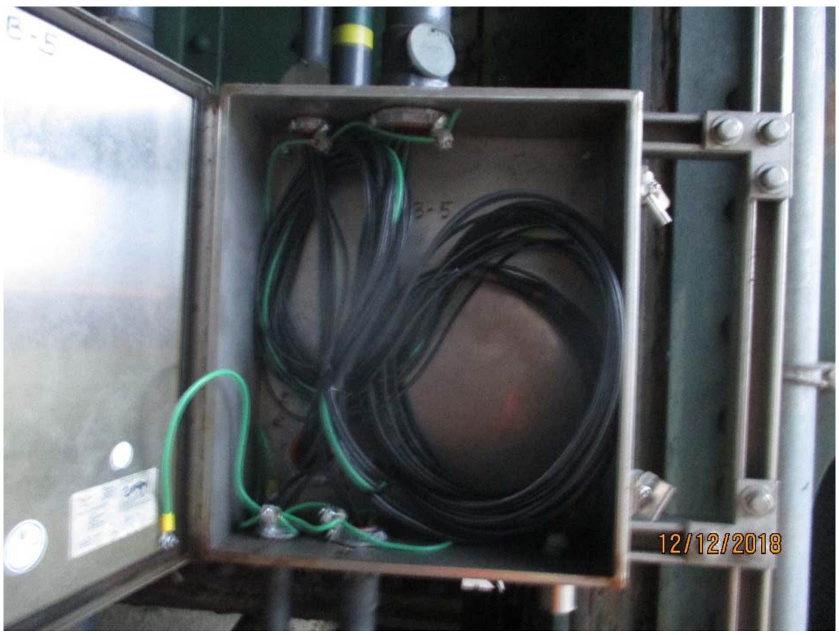


Photo E70 Typical Bonding. The raceway system bonding has been well installed and conforms to the CSA standard.

Photo E71 Exit Light. Typically, all exit lights are in working order and conform to code requirements.

Photo E72 Existing Mobile Generator Disconnect Switch. The disconnect switch and generator receptacle are located at the foot of each tower. They have never been used but are capable of hooking up a mobile generator to operate the auxiliary drive motor in the respective tower.

Photo E73 General Lighting and Smoke Detectors (South Tower Shown). The space lighting and fire system equipment have been adequately installed to provide a safe work place for inspection, maintenance and troubleshooting in the tower machinery spaces.

Photo E74 Typical Outdoor Raceway Installation. The newly installed conduit and stainless steel pull boxes are in as-new condition.