## DISTRICT DEPARTMENT OF TRANSPORTION

# BRIDGE INSPECTION MANUAL

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GOVERNMENT OF THE DISTRICT OF COLUMBIA
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# 1.0 GENERAL

## 1.1. INTRODUCTION/PURPOSE/LIVING DOCUMENT STATEMENT

The District of Columbia is home to a complex highway network of bridges and structures that residents, visitors, businesses, military forces, government agencies, emergency services and other members of the traveling public depend on every day. The structures in the District of Columbia Department of Transportation (DDOT) inventory include vehicular and pedestrian bridges and tunnels owned by the District. Bridges owned by the National Park Service (NPS), and the railroads are shown for reference only. As these structures deteriorate over time, a thorough condition assessment of each structure is essential to providing safe and functioning transportation throughout the District of Columbia. It should be noted that DDOT does not perform NBI inspections on privately owned bridges, bridges owned by NPS, or bridges owned by the railroads. DDOT conducts safety inspections on privately owned pedestrian bridges and railroad bridges that pass over District streets. These bridges are included in DDOT's bridge inventory for reference only. DDOT is not responsible for submitting annual bridge performance information on NPS and railroad bridges to the Federal Highway Administration (FHWA).

This manual has been prepared to assist the DDOT and its Consultants in the inventory, inspection, appraisal, and load rating of bridges under the District's jurisdiction in accordance with the Manual for Bridge Evaluation published by the American Association of State Highway and Transportation Officials (AASHTO). The program detailed in this manual will help implement the National Bridge Inspection Standards (NBIS) as issued by FHWA.

To keep pace with the ever-evolving nature of industry practices, this manual will be considered a "living document" and will be updated over time as standards are created and modified. Updates to this manual will be documented and approved by the Bridge Inspection Engineer (BIE) and distributed as deemed necessary.

## 1.2. OBJECTIVES

The objectives of this Manual include the following:

1. Maintain an up-to-date inventory of DDOT's bridges and their condition.
2. Define proper inspection procedures.
3. Create consistent condition reporting practices.
4. Establish guidelines for load rating and posting of bridges.
5. Implement a reliable quality control/quality assurance program.
6. Ensure that all bridges in the District's bridge inventory are assessed thoroughly and safely. Therefore providing motorists, pedestrians, and cyclists with continued connectivity and safe passage when traversing the bridges in the District of Columbia.

## 1.3. DEFINITIONS AND ABBREVIATIONS

***AASHTO:*** American Association of State Highway and Transportation Officials

***BIRM:*** Bridge Inspector's Reference Manual, FHWA

***BIE:*** Bridge Inspection Engineer - The BIE is the individual in charge of overseeing DDOT's bridge Inspection program and serves as DDOT's Bridge Inspection Program Manager as defined in the NBIS. Refer to Section 2.3 for qualification requirements.

***Bridge Preventive Maintenance Engineer:*** The Bridge Preventive Maintenance Engineer is the individual in charge of managing the Preventive Maintenance Contract and directing the repair activities that focus on improvement of bridge rating conditions.

***BME:*** Bridge Management Elements

***Bridge:*** A structure, including supports, erected over a depression of an obstruction, such as water, highway or railway, and having a track or passageway for carrying traffic or other moving loads and having an opening measured along the center of the roadway, track or passageway, of 20 feet or more between undercopings of abutments or backwalls, or spring lines of arches, or extreme ends of openings for multiple boxes. This definition also includes pipes having an inside diameter of 20 feet or greater.

***BrM:*** AASHTOWare Bridge Management Software

***Complex Bridge:*** Structures with unusual characteristics or components such as suspension, cable-stayed and movable bridges.

***CF:*** Critical Findings - Critical findings are conditions that pose immediate danger to the traveling public and could jeopardize the safety and integrity of a structure, if left unaddressed. As defined by Federal regulation, 23 CFR 650 Subpart C, a critical finding is "a structural or safety related deficiency that requires immediate follow-up inspection or action."

***Culvert:*** Small structure under the roadway, usually for drainage. This term is limited to buried structures where the clear span or spans is less than 20 feet. Exceptions include corrugated metal pipe culverts, which are still defined as culverts with clear spans measuring up to 40 feet.

***DDOT:*** District of Columbia Department of Transportation

***FHWA:*** Federal Highway Administration

***Fracture Critical Bridge:*** A bridge that contains one or more fracture-critical members.

***Fracture Critical Member (FCM):*** A steel bridge member in tension, or with a tension element, the failure of which would cause a portion of a bridge or the entire bridge to collapse.

***LOC:*** Letter of Concern

***LRE:*** Load Rating Engineer – The LRE is the engineer responsible for overseeing the load rating analysis of a bridge. The LRE may perform the analysis; however, at a minimum they are required to oversee, stamp, and sign the load rating analysis report/calculations. Refer to Section 2.3 for qualification requirements.

***MUTCD:*** Manual on Uniform Traffic Control Devices, FHWA

***NBE:*** National Bridge Element

***NBI:*** National Bridge Inventory is the database of structure inventory and appraisal data collected to fulfill the requirements of the National Bridge Inspection Standards.

***NBI Coding Guide:*** Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation's Bridges, FHWA

***NBIP:*** National Bridge Inspection Program – FHWA program that was developed in 1968 to ensure that all state departments of transportation adhere to the requirements set forth in the NBIS.

***NBIS:*** National Bridge Inspection Standards - Federal regulations establishing requirements for inspection procedures, frequency of inspections, qualifications of personnel, inspection reports, and preparation and maintenance of a state bridge inventory. The NBIS applies to all structures defined as bridges located on all public roads.

***NDE:*** Non-Destructive Evaluation – NDE is the means of evaluating structural components of bridges without evaluating them. Examples of NDE include ultrasonic testing, Eddy current method, radiographic testing, sounding, ground penetrating radar, impact echo, dye penetrant testing, etc.

***NHS:*** National Highway System - The National Highway System is a network of strategic highways within the United States, including the Interstate Highway System and other roads serving major airports, ports, rail or truck terminals, railway stations, pipeline terminals and other strategic transport facilities.

***NTIS:*** National Tunnel Inspection Standards Defines a tunnel as "an enclosed roadway for motor vehicle traffic with vehicle access limited to portals, regardless of type of structure or method of construction, that requires, based on the owner's determination, special design considerations to include lighting, ventilation, fire protection systems, and emergency egress capacity". The term "tunnel" does not include bridges or culverts inspected under the National Bridge Inspection Standards.

***OSHA:*** Occupational Safety & Health Administration

***PE:*** Professional Engineer

***PM:*** Program Manager. Refer to Section 2.3 for qualification requirements.

***PPE:*** Personal Protective Equipment

***Public Road:*** A road open to public travel that is maintained by a public authority.

***QA/QC:*** Quality Assurance / Quality Control

***QA:*** Quality Assurance - QA is defined as a measurement of the level of consistency of the overall program in achieving and ensuring that a certain level of quality has been met. QA involves the use of random sampling and other measures to assure the adequacy of QC procedures in order to verify or measure the level of quality for the entire Bridge Inspection Program.

***QAM:*** Quality Assurance Manager – A QAM is the DDOT or consultant engineer responsible for performing the Quality Assurance Inspection Field Reviews and Report Reviews and making sure that the DDOT and consultant bridge inspection program's Quality Assurance Plan are being executed properly.

***QA-IFRC:*** Quality Assurance – Inspection Field Review Checklist – This form is to be used during the QA of the field review as outlined in Section 12.3.1.2

***QA-IFRR:*** Quality Assurance – Inspection Field Review Report – This form is to be to prepare the report for the QA of the field review as outlined in Section 12.3.1.2

***QA-IRR:*** Quality Assurance – Inspection Review Report – This form is to be used by the BIE during the QA of the office and field review as outline in section 12.3.1.1.

***QC-BIRC:*** Quality Control – Bride Inspection Report Checklist – This form is to be used by the inspection consultant when preparing and submitting the inspection reports as outlined in Section 12.2.1.3.

***QC-IPC:*** Quality Control – Inspection Preparation Checklist – This form is to be used by the inspection consultant when preparing and performing the inspections as outlined in Section 12.2.1.1.

***QC-IRRF:*** Quality Control – Inspection Report Review Form – This form is to be used by the BIE when performing the QC reviews of the inspection reports as outlined in Section 12.2.2.1

***QC:*** Quality Control - QC is defined as the enforcement of procedures that are intended to maintain the quality and consistency of bridge inspection procedures and documentation in accordance with the NBIS. The responsibility of QC is shared among different personnel within DDOT's Asset Management Branch.

***QCM:*** Quality Control Manager – A QCM is the DDOT or consultant engineer responsible for performing the Quality Control Inspection Field Reviews and Report Reviews and making sure that the DDOT and consultant bridge inspection program's Quality Control Plan are being executed properly.

***SI&A:*** Structural Inventory and Appraisal – SI&A is the graphic representation of the data recorded and stored for each NBI record in accordance with FHWA criteria.

***SPRAT:*** Society of Professional Rope Access Technicians

***Thalweg:*** A line connecting the lowest points of cross sections of a waterway.

***TL:*** Team Leader - The TL is the individual in charge of the actual inspection, assigning inspection tasks to other members of the inspection team, must be on-site at all times during the inspection, and is responsible for signing off on the finalized inspection report. Refer to Section 2.3 for qualification requirements.

***TM:*** Team Member - The TM is an inspector assisting the TL with the inspection. It is possible for an individual to serve as a TM and be a qualified TL as per the NBIS. However, they would not be designated as the TL for that inspection. Refer to Section 2.3 for qualification requirements.

***UBIV:*** Under Bridge Inspection Vehicle

***USACE:*** United States Army Corps of Engineers

***UT:*** Ultrasonic Testing – UT is a non-destructive testing technique that sends ultrasonic waves through an object or material to determine to detect a flaw.

## 1.4. BRIDGE FILE

To organize the bridge condition inventory, DDOT will maintain a bridge file for each structure in their database. This file should include the following, if applicable:

- Current and historical inspection reports
- Waterway information – channel cross-sections, soundings, stream profiles, underwater inspection documents
- Special inspection procedures or requirements
- Load rating documentation, including load testing results
- Load Posting documentation
- Critical findings and actions taken
- Scour assessment
- Scour Plan of Action (POA) (for scour critical bridges and those with unknown foundations) and documentation of post-event inspection or follow-up
- Inventory and evaluation data and collection/verification forms
- Significant correspondence
- Per the NBIS, bridge files must also contain maintenance records. Channel cross-sections must be included in the bridge file per section 4.8.7 of the AASHTO MBE.
- Construction and/or rehabilitation plans
- Maintenance history

To help ensure consistency between inspection cycles, these files should be made available to inspection teams to reference during future inspections, whether through a sharefile or document sharing system, which can also maintain security and reduce duplications or access by unauthorized users. Complex bridges may require additional documentation including, but not limited to:

- Electrical and Mechanical plans and inspection documents
- Hydraulic and Hydrological analyses
- Complex load ratings
- Other related records

Bridge files should be maintained in accordance with the AASHTO Manual for Bridge Evaluation.

## 1.5. ORGANIZATION CHART

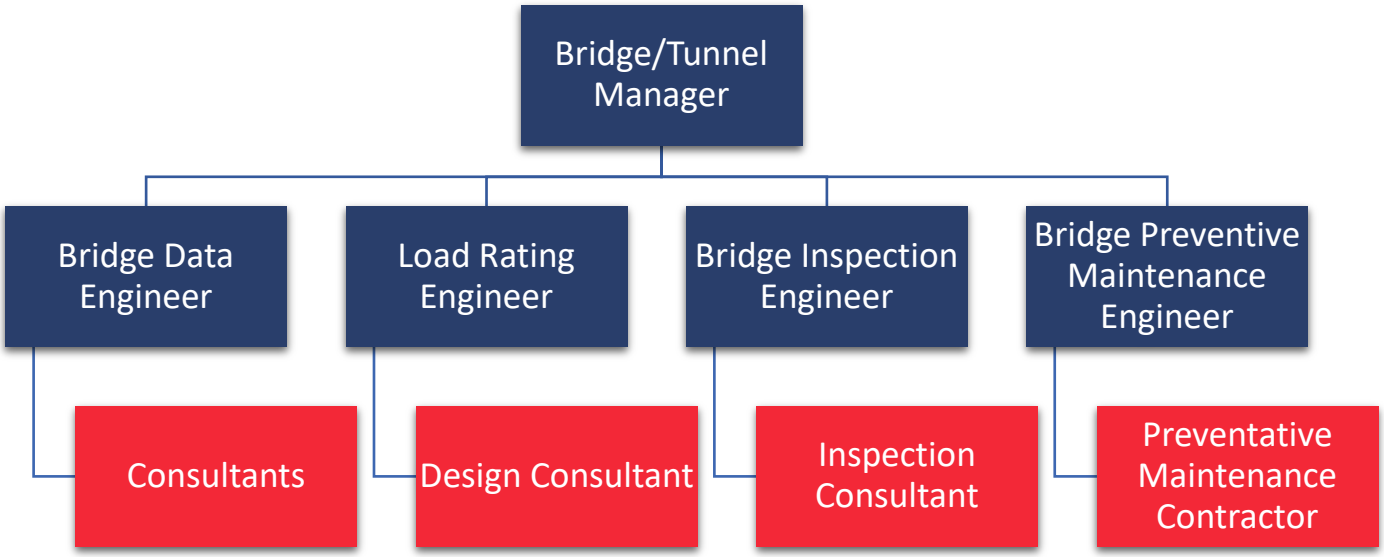


**Figure 1-1: Organization of DDOT's Asset Management Branch.**

# 1.6. REFERENCES

**Note:** When utilizing the references below, always refer to the most current edition. References that may be used are not limited to the ones listed below.

*American Society for Nondestructive Testing (ASNT)*
*Bridge Inspectors Reference Manual (BIRM), FHWA*
*Culvert Inspection Manual, FHWA*
*DDOT Standard Specifications for Highway and Structures*
*HEC 18 – Evaluating Scour at Bridges, FHWA*
*HEC 20 – Stream Stability at Highway Structures, FHWA*
*HEC 23 – Bridge Scour and Stream Instability Counter Measures: Experience, Selection and Design Guidance, FHWA*
*Inspection and Maintenance of Ancillary Highway Structures, FHWA*
*Inspection of Fracture-Critical Members (FCM)/Clarification Memorandum of Requirements for FMCS, FHWA*
*LRFD Bridge Design Specifications, AASHTO*
*Manual for Bridge Element Inspection, AASHTO*
*Manual for Bridge Evaluation (MBE), AASHTO*
*Manual on Uniform Traffic Control Devices (MUTCD), FHWA*
*Metric for the Oversight of the National Bridge Inspection Program*
*Movable Bridge Inspection, Evaluation, and Maintenance Manual, AASHTO*
*National Bridge Inspection Standards (NBIS), 23CFR Part 650 subpart C, Code of Federal Regulations, FHWA*
*National Fire Protection Association Manual NFPA 25*
*Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation's Bridges, FHWA*
*Technical Advisory T5140.23 – Evaluating Scour at Bridges, FHWA*
*Tunnel Operations, Maintenance, Inspection and Evaluation (TOMIE) Manual, FHWA*
*Underwater Inspection Manual, FHWA*
*Underwater Bridge Repair, Rehabilitation and Countermeasures, FHWA*

# 2.0 INSPECTION PROCEDURES

## 2.1. INTRODUCTION

This chapter is an overview of the procedures necessary to document the condition of the bridges accurately and consistently in DDOT's inventory. This chapter also provides an understanding of the different bridge inspection types, and defines the qualifications necessary for bridge inspection personnel.

## 2.2. GENERAL

Visual and hands-on techniques are important skills that apply to all inspection types. Visual inspections are performed at more than one arms-length away from an element, and can be performed from the ground, bridge deck surface or via access equipment. Visual inspection requires a clear line of sight to the portions of the bridge and may require hands-on access to remove debris, vegetation, rust, or other items which obstruct the inspector's ability to clearly identify defects. Visual inspections are often used to identify and confirm previously noted defects, identify overall conditions within the bridge, and identify problem areas which could require a closer visual investigation or hands-on inspection.

The *BIRM* defines hands-on as within one arms-length away from an element. Hands-on techniques should be used to inspect areas of advanced deterioration, distortion, impact damage, and previous rehabilitation in addition to the full-length of all fracture-critical members. Hands-on inspection can be performed from the ground or bridge deck but often times requires ladders, rigging, or specialized access equipment such as a UBIV, manlift, bucket truck, or boat to allow the inspector to obtain the required arms-length access to the required areas or elements. This close-up inspection allows for the inspection of deteriorated elements in greater detail than visual inspections and can be assisted by using NDE.

Inspectors should record their observations of defects in the manner described by the *BIRM* for the appropriate element, including but not limited to the following:

- Member identification and orientation
- Type, location and dimensions of defect
- Size of original section, if necessary, to help track deterioration

Obstructions blocking the inspector's assessment, such as dirt, debris, vegetation, rust, or spalled concrete should be removed if it is practical and safe to do so. The inspectors should consider the possible impacts to the environment, pedestrians, traffic, buildings, parked vehicles, private property and the safety of themselves before removing obstructions from the structure. The inspector should also keep in mind that removing significant amounts of bridge material may alarm the public and therefore should be discreet about collecting and disposing of the material at the completion of each workday. Notify the BIE if the removal may trigger a possible public report of damage or advanced deterioration to the bridge. If bearing grease is located on the bearing, the grease should not be removed. If the inspector determines that the bearing grease must be removed to accurately identify the condition of the bearing, contact the BIE.

When feasible, mark the defining measurements on the element so future inspectors can easily find the defect and document any growth progression. After sounding for hollow sounding concrete areas, markings should be added to the concrete to delineate the limits of the delamination. If the deterioration is significant, hand sketches can be helpful to document deterioration through visual representation, and the inspector should refer to the sketch in the element notes. When bridge elements have condition states of 2 to 4, sketches should be provided to help support the condition state. When reporting section loss, the inspector should take detailed notes on the size of the original section and the size of the section loss to calculate the percentage of loss/section remaining and to track future deterioration relative to the prior inspection.

# 2.3. QUALIFICATIONS OF BRIDGE INSPECTION AND LOAD RATING PERSONNEL

The NBIS mandates that bridge inspection personnel meet certain minimum requirements before they can be qualified to perform bridge inspections. Qualifications for each member of the team are listed below. Further qualifications of bridge inspection personnel as it pertains to the QA/QC program can be found in Chapter 12.0.

## 2.3.1. *Program Manager/Bridge Inspection Engineer*

The Project Manager (PM)/Bridge Inspection Engineer (BIE) shall be responsible for the supervision of the Consultant staff, attend meetings, responsible for the overall project that includes, but is not limited to, bridge inspection, load rating analysis, testing, investigation, and shall have the necessary expertise and experience required to supervise and exercise a degree of control of all types of work under the Contract. The individual shall become familiar with the District's structures and be capable of answering questions/inquiries relevant to the bridges and the project, avoiding and resolving disputes, coordinating and obtaining the needed permits, and coordinate any required public outreach and public meetings, and manage the project budget and schedule.

The PM/ BIE should, at minimum:

1. Be a registered professional engineer registered in the District of Columbia or another state in the United States; AND
2. Have at least 3 years of bridge inspection experience; AND
3. Have a Bachelor of Science Degree in Civil Engineering with a minimum of 10 years of experience as a Project Manager
4. Have successfully completed a FHWA approved comprehensive bridge inspection training course.
5. Complete a cumulative total of 18 hours of FHWA-approved bridge inspection refresher training over each 60-month period.
6. Maintain documentation supporting the satisfaction of the requirements numbered 1-5 above.

## 2.3.2. *Team Leader*

The TL should, at minimum, have all of the following qualifications:

1. Successfully completed an FHWA approved comprehensive bridge inspection training course; AND
2. Complete a cumulative total of 18 hours of FHWA-approved bridge inspection refresher training over each 60-month period; AND
3. Have one or more of the following four qualifications:
    a. Be a registered professional engineer registered in the District of Columbia and have 6 months of inspection experience; OR
    b. Have five (5) years of bridge inspection experience; Successfully passed the National Council of Examiners for Engineering and Surveying Fundamentals; OR
    c. Have all of the following:
        i. A Bachelor's degree in engineering or engineering technology from a college or university accredited by or determined as substantially equivalent by the Accreditation Board for Engineering and Technology; AND
        ii. Successfully passed the National Council of Examiners for Engineering and Surveying Fundamentals of Engineering examination; AND
        iii. Two years of bridge inspection experience; OR
    d. Have all of the following:
        i. An associate degree in engineering or engineering technology from a college or university accredited by or determined as substantially equivalent by the Accreditation Board for Engineering and Technology; AND
        ii. Four years of bridge inspection experience.
4. Maintain documentation supporting the satisfaction of the requirements numbered 1-3 above.

## 2.3.3. *Team Member*

It is required that the TM successfully complete an FHWA approved comprehensive bridge inspection training course and refresher training.

## 2.3.4. *FCM Team Leader*

The FCM TL should, at minimum, have all of two of the following qualifications:

1. Have the qualifications of the TL; AND
2. Successfully complete an FHWA approved fracture critical member inspection training course.

## 2.3.5. *Underwater Inspection Personnel*

The qualifications of underwater inspection personnel are broken down into two categories: the diving operation and the inspection operation. The underwater consultant and all inspection personnel assigned to the project must meet these requirements in order to be approved to perform the inspection of any DDOT-owned bridge.

### 2.3.5.1. ***Diving Operations***

In regard to the diving operation, each diver assigned to the project shall receive certification from a commercial diving school or organization. All divers must satisfy requirements for training and medical examinations in accordance with the OSHA's Commercial Diving Standards. In addition, the consultant is to maintain a Safe Dive Practices Manual as per OSHA.

### 2.3.5.2. ***Inspection Operations***

The qualifications for the inspection operation are as follows:

1. All diver inspection personnel are to have taken and successfully passed the four-day NHI Underwater Bridge Inspection Course.
2. The underwater inspection team shall have a PE diver registered in the District of Columbia that also qualifies as a TL on site during each underwater bridge inspection. This individual does not necessarily have to be the diving inspector, but should be available to assess, evaluate, and confirm inspection findings, if necessary.

For additional information on underwater bridge inspections, refer to Chapter 7.0.

## 2.3.6. *Load Rating Engineer*

The LRE should, at a minimum, have all of the following qualifications:

1. Possess a bachelor's degree or higher in Civil Engineering; AND
2. Be a registered professional engineer in the District of Columbia; AND
3. Have at least five (5) years of experience with structural analysis.

## 2.3.7. *NDE Inspector*

The governing association for training and certifying inspectors for use in NDE is the American Society for Nondestructive Testing (ASNT). Likewise, the Certification for Welding Inspection (CWI) is issued through the American Welding Society (AWS). There are different requirements and certification levels within ASNT for identifying the qualifications of a NDE technician or inspector.

The first requirement is that the NDE Technician must have CWI certification. Additional requirements, specific to each type of NDE method, are listed below. For radiography testing, the Industrial Radiography and Radiation Safety Personnel (IRRSP) certification is offered through the ASNT program.

- Dye-Penetrant Testing - ASNT Level II Certification or have been trained by a ASNT Level II Certified Technician or have attended and successfully passed a training course involving Dye-Penetrant Testing

- Ultrasonic Testing - ASNT Level II Certification for straight beam and shear wave
- Magnetic Particle Testing - ASNT Level II Certification or have been trained by a ASNT Level II Certified Technician
- Eddy Current Testing - ASNT Level II Certification
- Radiography Testing - IRRSP certification as an ASNT Level II

## 2.4. INSPECTION TYPES

The *BIRM* from FHWA identifies the different types of bridge inspections and outlines the appropriate situations to perform them. This information is also contained in the AASHTO MBE, Section 4.2.3. DDOT adheres to these guidelines with a few augmentations to cover the different types of bridges in the inventory. The details and requirements for each inspection type are listed below.

The inspection process may need to start a few weeks in advance to ensure a safe and efficient inspection. The following pre-inspection activities apply to all inspection types include, but are not limited to:

- Reviewing any existing documentation, such as as-built drawings or previous reports.
- Investigation of the area surrounding the bridge in advance of the inspection. This includes identifying traffic patterns, potential safety hazards or access issues. The TL should inform the PM of any issues and should come to a resolution before scheduling inspection equipment.
- Ordering inspection access equipment for structure elements that cannot be reached on foot.
- Coordinating lane or road closures necessary to complete the inspection, including the acquisition permits.
- Notifying the Coast Guard when the inspection will be conducted from the waterway.
- Obtaining tide charts or water levels for structures over water.
- Coordinating access to the bridge during construction activities.

### 2.4.1. *Inventory Inspections*

The inventory inspection, also referred to as the initial inspection, is performed after new bridge construction or after completed rehabilitation where the configuration, material or design of the bridge have been permanently modified and a new baseline appraisal of the structure's condition is required. An inventory inspection should be completed within 90 days of the completion of work. During inventory inspections for bridges that have been rehabilitated, inspectors should identify key members and details that have been repaired, retrofitted, replaced, or require special attention and make note of them for future inspections, especially members that are fracture critical.

DDOT will update and report SI&A data in accordance with the NBIS for every NBI length bridge owned by DDOT. Data items on the SI&A are listed and defined in the FHWA NBI Coding Guide. All applicable SI&A data shall be recorded and populated during the inventory inspection and shall be reviewed by the BIE. DDOT collects and updates SI&A data for non-NBI bridges, including pedestrian bridges as well as the one District-owned and maintained railroad bridge, but does not report this data to the FHWA. DDOT also conducts safety inspections of the under portions of railroad owned bridges that pass over District-owned streets and retains a file on each. Culverts are inspected and maintained by another office in DDOT. The BIE is responsible for assigning bridge numbers.

An inventory inspection should include the following items:

- **Identification:** Bridge ID, feature carried, feature crossed, location information
- **Structure Type and Material:** Bridge design and materials, including wearing surface
- **Classification:** Classification of both the structure and the feature carried
- **Age and Service:** Year built, traffic information, number of travel lanes, detour length
- **Geometric Data:** Dimensions of the bridge, roadway and underclearances (from plans, may require a field verification)
- **Load Capacity:** The trucks used to analyze load carrying capacity are detailed in the DDOT Design and Engineering Manual in Section 14.2

- **Navigational Data:** Clearance for vessels on the waterway below the structure, if applicable

Refer to the FHWA's Recording and Coding Guide for the SI&A of the NBI for proper SI&A data selection. Questions pertaining to NBI or agency data field should be brought to the attention of the PM.

In addition to procuring the SI&A data, the inventory inspection should include an initial element-level inspection which establishes a baseline condition for the bridge. An inventory inspection can be accomplished visually, but hands-on inspection techniques should be used at important locations such as along the entire length of a fracture critical member, at fatigue prone details in Categories D, E and E', at complex or unique details, and at noted/observed construction defects. Details on visual and hands-on inspection techniques for fracture critical bridges are covered in Chapter 8.4. Specific photographs are required for the inventory inspection to properly document the full structure. Photograph requirements are outlined in Chapter 4.2.12. Prior to starting the inventory inspection, the inspection team should define the elements appropriate for that bridge and the total quantities of each element based on the as-built drawings or available drawings. The as-built drawings or available drawings should be reviewed while performing the inventory inspection and discrepancies brought to the attention of the BIE upon completion of the inspection. If the proper element identification cannot be established via the *AASHTO Manual for Bridge Element Inspection*, consult with the BIE for how to assign an element to the specific bridge element in question.

## 2.4.2. *Routine Inspections*

A routine inspection is performed at a regular DDOT-established inspection cycle interval. The dates of each inspection are governed by the DDOT-maintained Inspection Schedule. NBI structures are typically inspected every 24 months. Non-NBI structures are also inspected every 24 months. The inspection interval can be reduced based on the condition rating. Should Items 58 (Deck), 59 (Superstructure), 60 (Substructure) or 62 (Culvert) for a structure have a condition rating of 4 (Poor) or less, then the routine inspection should occur at a maximum interval of 12 months. For additional information on routine inspection intervals, see Chapter 3.0.

The exposed elements of the structure should be inspected to determine the physical and functional condition of the bridge. The routine inspection should clearly identify changes from the condition noted in the inventory or previous routine inspection and ensure that the structure continues to satisfy present safety requirements. If during inspection, the inspection team finds a condition that warrants a structural evaluation, affects the safety of vehicular, pedestrian, or waterway vessel traffic on or around the bridge, or can be deemed an immediate concern for the stability of the bridge, that condition should be considered a critical finding and be immediately reported to DDOT. Protocol for critical finding reporting is further outlined in Chapter 5.4.3.

Similar to the inventory inspection, routine inspections are typically performed visually with hands-on techniques at important locations such as along the entire length of a fracture critical member, at fatigue prone details in Categories D, E and E', at complex or unique details, at previously noted defects, defects discovered during the current inspection, and members governing load posting restrictions, if applicable. See Chapter 4.2 for details on inspection procedures and visual and hands-on inspection techniques. Ladders, UBIVs, bucket trucks, manlifts, boats, rigging and other equipment may be used to assist the inspection team to access areas that cannot be inspected successfully from the ground.

For bridges over water, inspection of the underwater elements must be completed but is typically limited to observations during low-flow and probing to check for substructure undermining. If the water level is low enough to wade through, the inspection may proceed visually with assistance from a probing rod. If the water level is too deep or the water current is too strong to safely wade through, a boat may be necessary to continue the inspection assuming sufficient underclearance is available and the water depth at the substructure units does not exceed 4-feet. If wading or boat options are not possible, the structure may require an underwater inspection, which is covered later in this chapter.

## 2.4.3. *Fracture Critical Inspections*

Bridges with observed fracture critical members are subject to fracture critical inspections. Fracture critical inspections requires hands-on inspection to the full-length of fracture critical members and associated fatigue prone details that are rated in Fatigue Categories D, E or E'. Non-destructive evaluation may be used to further identify defects in the field, confirm previously noted defects, or confirm the existence of and/or limits of suspected defects such as cracking. Previously noted cracks on fracture critical members should be identified, measured and the end clearly marked on the member with the date of inspection to establish a history of propagation. A fracture critical inspection is usually part of a routine inspection, but the condition of the fracture critical members may require more frequent inspections. In order to minimize the possibility of a catastrophic fracture, a fracture critical inspection plan must be followed. This fracture critical inspection plan is needed to increase the level of inspection in proportion to the potential for catastrophic failure. The fracture critical inspection plan is detailed in Section 8.2. See Chapter 3.0 for inspection intervals. Additional qualifications, outlined in Section 2.3, are required for FCM inspection team leader assigned to inspect fracture critical structures.

## 2.4.4. *Underwater Inspections*

As mentioned above, an underwater inspection may be necessary where water level and flow rate inhibit a thorough inspection of the condition of underwater bridge elements. In addition to capturing the condition of these elements, the underwater inspection should also note the condition of the channel bottom and scour locations. In water greater than 4-feet deep, diving or other appropriate underwater techniques may be necessary. The specific inspection procedures and techniques for underwater inspections are outlined in Chapter 7.0. Additional qualifications are required for underwater inspection teams assigned to complete underwater inspections, which are outlined in Section 2.3. Underwater inspections are completed on a 60-month interval. Certain underwater elements may need to be inspected more frequently. See Chapter 3.0 for inspection intervals and see Chapter 7.0 for additional details on underwater inspections.

## 2.4.5. *Special Inspections*

Special inspections, when directed by DDOT, are performed when it is necessary to monitor known or suspected defects that could affect the overall function of a bridge, especially if the deficiencies result in the closure of the bridge. Areas to monitor can range from a single member connection to areas of critical scour. The scheduling and interval of special inspections are at the discretion of the BIE, and therefore are independent of the routine inspection. Although special inspections are not sufficiently comprehensive to meet NBIS requirements as routine inspections, they may be performed at the same time as the routine inspection if scheduled accordingly. For special inspection interval information, see Chapter 3.0. The BIE will determine the inspection team qualifications and reporting guidelines on a case-by-case basis, considering the bridge type, elements to be inspected, and the nature of the deficiency. Special inspections include flood response bridge inspections, see Section 7.4 of this manual.

## 2.4.6. *Complex Bridges*

NBIS defines complex bridges as "moveable, suspension, cable stayed, and other bridges with unusual characteristics." DDOT currently has one bridge that can be classified as complex (Bridge No. 1450, South Capitol Street over Anacostia River). Refer to the South Capitol Street Bridge Access and Maintenance Manual for information on how this bridge should be inspected.

## 2.4.7. *Closed Bridges*

Bridges that are closed to vehicular and pedestrian traffic do not require an inspection if they are closed because of deterioration or damage and are not under staged construction. The BIE can determine that an inspection is necessary under special circumstances, such as bridges that are closed to vehicular traffic but remain open to pedestrian traffic, or bridges that are closed to vehicular and pedestrian traffic but have vehicular and/or pedestrian traffic passing under the bridge. In these cases, the BIE will determine the inspection interval, procedures, and reporting requirements on a case-by-case basis.

## 2.4.8. *Bridges Under Construction*

If a bridge is open to traffic while under construction (under staged construction), the portion open to traffic is required to be inspected as scheduled (routine, special inspection, etc.), and the inspection should be reported in the NBI database. The presence of construction activity may necessitate extra caution and coordination with DDOT and construction staff in order to proceed safely with the inspection and may also require the BIE to make adjustments to the standard inspection procedures. For staged construction, the portion of the bridge that is under construction will not be inspected. If possible, it would be beneficial for the Team Leader (TL) to coordinate with the Construction Inspector to identify additional defects or other bridge-related issues observed by the construction team. If the configuration of the bridge was changed during construction, upon reopening, the bridge may be subject to an inventory inspection to properly document the changes to the original bridge. The inspection team should use construction plans and field observations to verify the relevancy of the SI&A and make the appropriate updates.

The BIE should review and approve the updates to the SI&A prior to finalizing the inspection report. The inspection report should clearly delineate the areas of the bridge which were inspected as part of the routine inspection as well as areas which were inaccessible due to construction activities, or in the progress of being rehabilitated/replaced. If necessary, use sketches to better illustrate areas inspected/not inspected due to construction. Clearances to roadways (above or below the bridge) or waterways (below the bridge) should be measured and documented in SI&A. If the roadway being measured to for the clearance is an old roadway/structure, an additional clearance will need to be taken when the new roadway is completed.

Bridges that are completely closed while under construction will require an intermediate inspection in order to maintain the appropriate inspection frequencies. This must be done in order to stay current with FHWA requirements.

In unique circumstances, the BIE may direct the inspection team to establish a baseline monitoring of known construction defects to facilitate future deterioration tracking. Monitoring techniques may include Light Detection and Ranging (LIDAR) and Structural Health Monitoring (SHM) such as vibration monitoring, strain-gauge monitoring, and acoustic emission technology. These testing techniques should be used when construction techniques or material properties do not meet the requirements outlined in the contract plans and specifications.

# 3.0 INSPECTION INTERVALS

This chapter establishes DDOT's procedures for bridge inspection intervals for different types of inspections depending on such factors as age, traffic characteristics, bridge configuration or known deficiencies. The NBIS has established certain minimum intervals for several bridge inspection types as outlined in *AASHTO Manual for Bridge Evaluation,* Section 4.2.4. These minimum intervals and shorter inspection intervals based on documented overall or specific member conditions are discussed below. Pedestrian bridges and vehicular tunnels are not included in these procedures although the NTIS has similar inspection guidelines for tunnels.

It is DDOT's policy that all bridge inspections should be started no later than the inspection start date on the DDOT-maintained Inspection Schedule but not earlier than 14 calendar days prior to the inspection start date. Barring unusual circumstances, no inspection should be even one day later than the inspection start date. The finalized bridge inspection reports are due within 60 of the inspection ending date. The bridge inspection consultant must notify DDOT in advance if an inspection will be delayed, the circumstances causing the delay, and how long the delay will be. To maintain consistency of the inspection scheduling, the bridge should be visited on or prior to the start date to collect preliminary information if a delay is expected. DDOT will determine if the reported circumstances for delay are valid. The reason for the delay shall be included in the comments section of the bridge inspection report. In the event the inspection report will be delayed, the SI&A, NBE, and BME data must be submitted in advance of the finalized report.

The types of bridge inspections and their associated inspection intervals are listed below and shown in the tables:

## 3.1. INVENTORY INSPECTIONS

An inventory inspection shall be conducted upon completion of construction and the opening of all travel lanes to traffic for a new bridge or major bridge rehabilitation. If the bridge is constructed under staged construction and the completed stage is open to traffic, the completed portion of the bridge should be inspected. After each stage is completed and opened to traffic, the inventory inspection files should be updated. FHWA requires that an initial inspection is to be completed and all NBI and element level data developed or updated in the bridge management software within 90 days of the completion of construction and when all travel lanes are open to traffic. For additional information on inventory inspections, See Section 2.4.1.

## 3.2. ROUTINE INSPECTIONS (NBI ITEM #91)

Routine inspections shall not exceed a 24 month interval. Should an NBI Item 58 (Deck), 59 (Superstructure), 60 (Substructure) or 62 (Culvert) for a structure have a condition rating of 4 (poor condition) or less, then this type inspection shall be performed at 12-month intervals as directed by DDOT. Additionally, inspection intervals shall be reduced to 12-month intervals if the scour condition rating is 4 or less.

## 3.3. FRACTURE-CRITICAL MEMBER INSPECTIONS (NBI ITEM #92A)

Fracture-critical member (FCM) inspections must not exceed a 24 month interval in accordance with the NBIS. These inspections involve a hands-on inspection of all or portions of members defined as FCM. Nondestructive evaluation of FCM members should be included in this type of inspection, if warranted and approved by DDOT. NDE methods may include ultrasonic, liquid penetrant, magnetic particle or other methods. If the bridge NBI Item 59 (Superstructure) condition rating is a 5 or less, based on the FCM member condition, the inspection interval shall not exceed 12 months. NDT of FCM such as pins, hinges pin and hanger components, catch system connections shall be performed at 48-month intervals unless age and visual defects warrant a decrease in the interval as determined by DDOT. Approximately 25% of the FCM components on the bridge shall be tested during that inspection cycle. IF there is more that one type of FCM element, each element shall have approximately 25% of all elements of that type tested. See Chapter 8.0 of this manual for more details regarding FCM inspections.

## 3.4. UNDERWATER INSPECTIONS (NBI ITEM #92B)

Underwater inspection of structural elements of bridges over major waterways (rivers) must not exceed a 60 month interval in accordance with the NBIS. Should the NBI Item 60 (Substructure), 62 (Culvert), or 113 (Scour) have a condition rating 5 on the underwater portions, the inspection interval should not exceed 24 months. If the NBI Item 60 (Substructure), 62 (Culvert), or 113 (Scour) have a condition rating equal to or less than 4 on the underwater portions, the inspection interval should not exceed 12 months. See *Appendix C – Reference Documents* for the list of bridges over major waterways.

Certain underwater structural elements may be inspected at greater than 60-month intervals, but not exceeding 72 months. Written FHWA approval is required for greater than 60-month intervals. This may be appropriate when past inspection findings and analysis justifies the increased inspection interval.

Other factors that can prompt an underwater inspection at less than 60-month intervals are:

1. When above water inspection indicates that serious problems exist below water.
2. When submerged portions of the substructure are susceptible to deterioration that may not be evident through a visual inspection of areas near the waterline at low tide or periods of low water. In salt, brackish or corrosive waters, underwater portions of the substructure are susceptible to hidden deterioration when there is a change in the type, configuration or protection of material in the area from the splash zone to the mud line. In fresh or noncorrosive waters, susceptibility is generally limited to bridges where material changes occur near the low water level.
3. When plans are not available and there is possibly a material change as described in the preceding paragraph.

See Chapter 7.0 of this manual for more details regarding underwater inspections.

## 3.5. SPECIAL INSPECTIONS (NBI ITEM #92C)

Special inspections are scheduled at the discretion of DDOT and thus do not normally have a minimum interval; however, in some cases an Interval can be established between routine inspections. It is used to monitor specific known member deficiencies or conditions that if they become worse could affect the overall function of the structure. Deficiency examples which may warrant a special inspection include foundation settlement, scour, fatigue cracking, and controlling members on load posted bridges. The special inspection should be implemented when the NBI Item 67 (Structure Evaluation) has a rating of 3 or less.

**Table 3-1: Inspection Interval Guidance for NBI Bridges**

<table>
<tr><th colspan="2">Routine Inspection Interval (NBI Item # 91)</th><th colspan="2">Fracture Critical Inspection Interval (NBI Item # 92A)</th><th colspan="2">Underwater Inspection Interval (NBI Item # 92B)</th><th colspan="2">Special Inspection Interval (NBI Item # 92C)</th></tr>
<tr><td>Condition Ratings (NBI Items 58, 59, 60, 62, or 113)</td><td>Inspection Interval (months)</td><td>Super-structure Rating (NBI Item 59)</td><td>Inspection Interval (months)</td><td>Sub-structure or Culvert Rating (NBI Items 60, 62, or 113)</td><td>Inspection Interval (months)</td><td>Structural Evaluation (NBI Item 67)</td><td>Inspection Interval (months)</td></tr>
<tr><td>≥ 5</td><td>24</td><td>≥ 6</td><td>24</td><td>≥ 6</td><td>60</td><td>≤ 3</td><td>12</td></tr>
<tr><td>≤ 4</td><td>12</td><td>≤ 5</td><td>12</td><td>= 5</td><td>24</td><td colspan="2" rowspan="3">Note 2</td></tr>
<tr><td colspan="2" rowspan="2">Notes 1 and 2</td><td colspan="2" rowspan="2">Note 1</td><td>≤ 4</td><td>12</td></tr>
<tr><td colspan="2">Note 1</td></tr>
</table>

**Inspection Interval Guidance Notes:**

1. *In general, the tables above are used for inspection Interval selection. However, for some situations the BIE may select differing inspection intervals and will provide justification within the structure notes.*

2. *If the structure is not a culvert and the NBI Item # 67 is a 2 or a 3, then a Special Inspection of specific elements may be implemented at the decreased inspection interval. Special Inspections include inspection of a single member or connection that is cracked or severely deteriorated. It may also include inspection of extensive scour affecting the substructure. In general, a Special Inspection would be required for any deficiency causing an NBI condition rating of a 3 or less but may be used for an NBI condition rating of a 4 if the defect/deterioration is localized and inspecting the entire bridge at an increased routine inspection Interval is not cost effective or feasible. It may be possible that a special inspection is required by the BIE to monitor a specific location, element, or detail that is causing the bridge to be posted, but the condition may be in a fair or good condition due to non-structural repairs that were made. If the structure is a culvert and the NBI Item # 67 is a 2 or a 3, then the bridge will be placed on a 6-month routine inspection Interval.*

5. *Pin and hanger ultrasonic testing is performed in the same year as the routine inspection, unless the BIE determines that an increased interval is needed. For hangers and false chord pins, 25% of them shall be tested every 2 years, rotating locations, resulting in 100% of subject pins completed every 6 years. Any pins with significant results should be re-tested the next cycle, in addition to the 25%.*

6. *Non-NBI bridges, like pedestrian bridges and safety inspections of the under portions of railroad-owned bridges passing over District streets, are inspected under the inspection program detailed in this manual.*

7. *Ultrasonic testing of bolts for bolted on/through parapets will be considered as part of the routine inspection, and 2% of the bolts (including at least one hold-down per parapet per span) will be tested during the routine inspection. If defective bolts are found, the BIE may require testing of additional bolts. This requirement applies only to permanent barrier and not temporary barriers used to facilitate construction.*

# 4.0 INSPECTION REPORT FORMAT

## 4.1. GENERAL

The Routine Inspection Report shall consist of the following parts (an example Routine inspection report with the prescribed order of respective forms or parts is shown in APPENDIX B – EXAMPLE BRIDGE INSPECTION REPORTS).

- Bridge Inventory Cover Sheet (4.2.1)
- Bridge Inspection Summary Report (4.2.2)
- Bridge Location Map (4.2.3)
- Bridge Plans (4.2.4)
- Bridge Inspection Summary Form – BrM and NBI Ratings (4.2.5)
- Bridge Inspection Report– Inspection Comments (4.2.6)
- Bridge Inspection Report–NBI Ratings (4.2.7)
- Bridge Appraisal Worksheet (4.2.8)
- Soundings & Channel Bed Cross Section (4.2.9)
- Bridge Maintenance and Repair/Rehabilitation Recommendations (4.2.10)
- Load Rating Summary Form (4.2.11)
- Photograph Summary Sheet (4.2.12)
- Structure Inventory and Appraisal Sheet (SI&A) (4.2.13)

The inspection report furnished for the previous inspection cycle is retained in the bridge folder as an inspection history source data package. The previous inspection report will be provided to the inspector when performing the new field inspections. The inspection history source data package will include Microsoft Word files, Microsoft Excel spreadsheets and .pdf files.

Several forms have been developed to comply with Federal guidelines and to furnish additional information on maintenance needs and load posting requirements. Electronic files of all current bridge inspection forms shall be provided to the consultant inspection team. The forms shall be modified and saved electronically for printing and later reference. Submission of a hard copy of field inspection reports and a .pdf copy is to be submitted to DDOT 45 days after the initial start date of the inspection. The guidelines for using the forms and worksheets to complete the inspection report are described in the sections below. To aid in the explanation of the inspection report format, an example DDOT inspection report is included in APPENDIX B – EXAMPLE BRIDGE INSPECTION REPORTS. Microsoft Word copies of blank forms can be provided upon request.

## 4.2. ROUTINE INSPECTION FORMS

### 4.2.1. *Bridge Inventory Cover Sheet*

This sheet provides a general description of the bridge through its inventory data. The information to be included is listed below.

A. **INSPECTION CYCLE:** Enter 24 months unless the bridge is placed on a different inspection cycle. See Chapter 3.0 for the different types of inspections and their associated inspection intervals.
B. **INSPECTION DATE:** Enter month, day, and year (e.g. 09/26/2011) of the first day of the inspection.
C. **INSPECTION TYPE:** Indicate the type of inspection (e.g., Inventory, Routine, Fracture Critical, Underwater, Special, Complex, Closed). See Chapters 2.0 and 3.0 for the different types of inspections and their associated inspection intervals.
D. **BRIDGE NO.:** Enter the DDOT bridge number.
E. **HIGHWAY:** Enter the name of the highway carried by the structure.
F. **OVER:** Enter the name of the feature crossed by the structure.
G. **MILEPOST:** Enter to the tenth of a mile the location of the structure to the nearest State System road.

H. **ADT (% Truck):** Enter the current average daily traffic and the corresponding truck traffic percentage. (ADT percentages may be found at the following web address. https://ddot.dc.gov/page/traffic-volume-maps)
I. **DESCRIPTION:** Enter a brief description of the structure. When space permits, give number of spans, type of deck, type of superstructure and substructure (e.g., three-span concrete deck bridge on prestressed I-beams, intermediate concrete piers, and concrete abutments).
J. **CLEAR WIDTH BETWEEN CURBS:** Enter the clear width between curbs in feet from the bridge inventory (verify in the field as necessary).
K. **APPROACH ROADWAY WIDTH EXCLUDING SHOULDER:** Enter the width in feet of the approach roadway from the bridge inventory. Do not include shoulders.
L. **TYPE OF DECK AND SURFACING:** Enter the deck material and the type of wearing surface.
M. **NUMBER OF SPANS:** Enter the number of spans.
N. **PRESENT POSTING:** Enter posting recommendation from the bridge inventory. If no posting was recommended, enter NONE.
O. **BRIDGE SUFFICIENCY RATING:** Enter the bridge sufficiently rating of the structure generated from the previous cycle inspection data and provided by DDOT on the preprinted SI&A form and enter the month and year of the previous inspection. (e.g., 85.0% (03/18))
P. **YEAR BUILT:** Enter the year of the original construction.
Q. **DATE OF MAJOR REHABILITATION:** Enter the last date (year) the structure was subject to a major rehabilitation. (e.g., 1997)
R. **PHOTOGRAPH:** Attach one new 4½ " x 6" photograph taken at the time of the inspection. The photo used should be an elevation view of the bridge. Place a check mark for the direction in which the photograph was taken.

## 4.2.2. *Bridge Inspection Summary Report*

This form provides a summary report of the bridge inspection. The information to be included is listed below. The form shall be signed and sealed by the consulting firm's project manager.

A. **BRIDGE NO.:** Enter the DDOT bridge number.
B. **BRIDGE NAME:** Enter the name of the highway carried by the structure and the name of the feature crossed by the structure.
C. **REPORT PREPARED BY:** Enter the name of the consulting firm that prepared the inspection report.
D. **REPORT REVIEWED AND SUBMITTED BY:** Enter the name of the consulting firm that reviewed and the submitted the inspection report.
E. **PROJECT MANAGER:** Enter the name of the project manager responsible for overseeing the consulting firm's inspection activities.
F. **TEAM LEADER:** Enter the name of TL and add the TL's signature.
G. **DATE OF INSPECTION:** Enter month, day, and year (e.g. 09/26/2011) of the first day of the inspection.
H. **REDUNDANT/NON-REDUNDANT:** Enter if the bridge is Redundant or Non-Redundant.
I. **FRACTURE-CRITICAL:** Enter if the bridge has fracture-critical elements (e.g., Yes/No).
J. **PIN/HANGER UT INSPECTION:** Enter if the bridge requires a pin/hanger UT inspection (e.g., Yes/No).
K. **UNDERWATER INSPECTION:** Enter if the bridge requires an underwater inspection (e.g., Yes/No).
L. **WEIGHT POSTED:** Enter if the bridge is posted for weight restrictions (e.g., Yes/No).
M. **RATING RECOMMENDED:** Enter if it is recommended for the bridge to be load rated based on the observations encountered during the current inspection (e.g., Yes/No).
N. **DATE OF LAST LOAD RATING:** Enter the month, day, and year (e.g. 09/26/2011) of the last load rating.
O. **REVIEW EXISTING SOUNDING AND PROFILE DATA:** Compare the results of the current sounding/scour data with the most recent sounding/scour data.

P. **RECOMMENDED MAINTENANCE REPAIR/REHABILITATION:** Enter the inspector's recommendation if maintenance or rehabilitation of the bridge needs to be performed (e.g., Yes/No).
Q. **LETTER OF CONCERN & SUBMISSION DATE:** Enter if a Letter of Concern was submitted for the current inspection (e.g., Yes/No), and if one was submitted provide the date it was submitted (e.g., 06/05/2016).
R. **FOLLOW-UP REQUIREMENTS:** Describe if there are any follow-up requirements. If there are no follow-up requirements, enter 'None'.

## 4.2.3. *Bridge Location Map*

This sheet provides an 8-1/2" x 11" detailed location map of the bridge. In the case of multiple structures (ramps, overpasses) the location map should clearly indicate the structure to be inspected. The information to be included on the sheet is listed below:

A. **BRIDGE NO.:** Enter the DDOT bridge number.
B. **HIGHWAY:** Enter the name of the highway carried by the structure.
C. **OVER**: Enter the name of the feature crossed by the structure.
D. A satellite image or map of the bridge and its surrounding vicinity (e.g., street names, waterway names, landmarks, etc.) shall be included on this sheet. A north arrow should be included on the image. The image should be oriented that true north is up.

## 4.2.4. *Bridge Plans*

Existing plan and elevation sheets, a cross-section sheet, framing plans, and other miscellaneous details shall be provided from the previous inspection report; as appropriate, other plan or detail sheets may be added especially if the bridge was rehabilitated or replaced. Drawing sheets for medium to large bridges shall be 11" x 17" in size. Add the following structure data information on all drawing sheets.

A. **BRIDGE NO.:** Enter the DDOT bridge number.
B. **HIGHWAY:** Enter the name of the highway carried by the structure.
C. **OVER:** Enter the name of the feature crossed by the structure.

Additionally, include the following structure data information to the first sheet.

A. **TOTAL STRUCTURE LENGTH:** Enter total structure length measured in feet and inches.
B. **OUT-TO-OUT WIDTH:** Enter the out-to-out width of the bridge measured in feet and inches.
C. **CURB-TO-CURB WIDTH:** Enter the curb-to-curb width of the bridge measure in feet and inches.
D. **MINIMUM VERTICAL UNDERCLEARNACE:** Enter the minimum vertical underclearance of the bridge, as measured in the field, measured in feet and inches. Provide details on where the minimum underclearance was taken (e.g., Edge of Asphaltic Pavement of Anacostia Drive beneath the East Fascia Girder).
E. **LATITUDE & LONGITUDE FOR BEGINNING/END OF BRIDGE:** Enter the latitude and longitude at the beginning and end of the structure (e.g., 38° 52' 15.12"). The latitude and longitude should be taken from the approximate intersection of the centerline/baseline of the bridge and the bridge joint. It is recommended that these values be determined using GIS or similar software.

   For new bridges, if bridge plans with stations are available, the beginning of the bridge should be identified by the up-stationing on the plans. Therefore, the up-stationing direction defines the direction of the bridge. the joint intersection with the lowest station value. If bridge plans are not available or no stations are provided on the plans, the beginning of the bridge should be taken at the joint intersection at the north or west side of the bridge, and the end of the bridge should be taken at the joint intersection of the south and east side of the bridge. Once the orientation is established and marked on the plans, it should not be changed.

If existing plans or sketches for the bridge inspected are unavailable, include a sheet stating "Existing Plans are Not Available" in their place; plans shall be considered unavailable if after one request of DDOT they are not located. The above structure data shall be included on this sheet and be consistent with what is reported in the SI&A. Refer to the example bridge inspection report in APPENDIX B – EXAMPLE BRIDGE INSPECTION REPORTS for a visual representation of how the structure data should be added to the plan sheets.

## 4.2.5. *Bridge Inspection Summary Form – BrM and NBI Ratings*

This sheet consists of element level inspection data and NBI condition rating summaries for deck, superstructure, substructure, channel, and culverts. The ratings are included regardless of whether they are applicable or not to the current inspection. If the element is not applicable, then it is coded 'N'. The *AASHTO Manual for Bridge Element Inspection* shall be used as the reference for the recording the element data. The element level data provided should include the following for each individual element: environment, total quantity, breakdown of quantity by condition state, and breakdown of each applicable defect and the associated condition state quantities for each. The NBI condition ratings are taken from the Bridge Inspection Report – NBI Ratings Form (see Section 4.2.7) and summary descriptions are provided. At the bottom of this form, information on the special equipment used (e.g., snooper, bucket boat, bucket truck, manlift, maintenance of traffic, etc.), the number of man-hours used (to the nearest hour) for the team inspection and report, inspection date and initials of the inspectors are given similar to that presented at the bottom of the NBI Ratings form. Refer to Section 5.2.1.1 for additional information on condition ratings.

## 4.2.6. *Bridge Inspection Report – BrM and Inspection Comments*

This form is used to describe the condition of the components rated on the Bridge Inspection Report – NBI Ratings sheet (see Section 4.2.7). All components with a rating of 6 or below must be clearly documented in this form. Each comment must be referenced to an element number from the *AASHTO Manual for Bridge Element Inspection*. Entries do not need to be in sequence as shown in the Bridge Inspection Report – NBI Ratings Sheet. Enough information must be provided to justify the rating given and to provide a clear understanding of the condition state observed during the inspection. Documentation must be given to explain why the condition rating has changed for a particular element from the previous inspection. Numbering of spans and bents follows a North-South or East-West direction unless otherwise noted in the plans. Specifics of what needs to be included in each section of the Inspections Comment form are detailed in the sections below.

Typical defects such as cracks, spalls, delamination, efflorescence, rust staining, exposed reinforcement, corrosion, impact damage, etc. should be summarized in all sections of the form. Photographs of typical defects should be referenced in the commentary. Referenced photographs should correspond to photos listed on the Photograph Summary Sheet explained in section 4.2.12.

### 4.2.6.1. ***General Comments***

The general description of the bridge should be described. General information should include the bridge number, bridge name, superstructure type, number of lanes, year of construction and rehabilitation, total structure length, out-to-out bridge width, and the curb-to-curb bridge width. The minimum vertical and horizontal underclearances shall be provided for the traveled roadways below. For divided highways, the minimum underclearance for both directions shall be included. If the minimum vertical underclearance for the structure, above the traveled roadway is 13'-6" or less, clearance posting shall be recommended with an assigned Priority Code of 1 unless there is a severe hazard, and a Priority Code E is justified. Minimum vertical and horizontal underclearances shall be provided at any railway tracks. The DDOT Bridge Inspection Project Manager must be notified in writing within 24 hours if incorrect clearance signage or no sign is present, signage is not or only partially visible, or its condition has deteriorated.

The general description section should note any issues encountered during the inspection, such as unauthorized encampments, delays in obtaining permits, problems with scheduling inspection equipment, etc.

This section should detail if any repairs have been made to the structure since the prior inspection was conducted.

All organizations and/or persons contacted to gain access to the site or for safety purposes shall be identified and contact phone numbers shall be provided in the General portion of the report. Examples of potential access and safety contacts include Railroads, NPS, NHS, Coast Guard, Harbor Patrol, etc.

The name of all inspectors involved in the inspection shall be listed. If the inspector has a P.E. or E.I.T. certification it should be listed after their name.

### 4.2.6.2. *Deck Comments*

The deck comments section shall include detailed information on the following deck components.

A. **DECK TYPE:** Describe the type of deck on the structure (e.g., monolithic reinforced concrete deck, wooden, steel grid, etc.).
B. **WEARING SURFACE:** Describe the condition of the asphalt wearing surface (e.g., map cracking, cracks, potholes, sealed cracks, open cracks, etc.).
C. **PARAPET/BARRIER TYPE:** Describe the parapet/bridge type (e.g., F-shaped concrete barrier, reinforced concrete parapet wall, etc.) and its condition.
D. **BRIDGE RAILING TYPE:** Describe the bridge railing type (e.g., w-beam guide rail, steel tube, etc.)
E. **SOFFIT:** Describe the condition of the soffit. Note if there is a stay-in-place form on the soffit. The bridge overhangs should also be described in detail.
F. **BRIDGE JOINTS:** Describe the condition and type of joints on the bridge (e.g., modular joint assembly, sliding plate joints, finger joints, compression seals, etc.)
G. **DECK DRAINAGE SYSTEM:** Describe the condition and type of the deck drainage system. Note if drains are clogged with debris and if the scuppers are connected and/or clogged with debris.
H. **LANE MARKINGS:** Describe the condition of the lane markings on the bridge deck. Note if they are peeling or missing.

### 4.2.6.3. *Superstructure Comments*

The superstructure comments section shall include detailed information on the following superstructure components.

A. **SUPERSTRUCTURE TYPE:** Describe the superstructure type (e.g., steel plate girder, prestressed concrete beam, etc.), the number of girders, floorbeam/stringer types (if present).
B. **SUPERSTRUCTURE CONDITION:** Describe the condition of the superstructure components (e.g., peeling paint, corrosion, spalls, exposed prestressing strands, etc.).
C. **DIAPHRAGM CONDITIONS:** Describe the condition and material type of the diaphragms.
D. **BEARING TYPE AND CONDITION:** Describe the type of bearings (e.g., expansion vs. fixed locations, pot bearings, rocker bearings, etc.) and the bearing condition. Note if anchor bolts are missing or misaligned. For expansion bearings, note the temperature on the inspection date, the angle of rotation of rocker bearings or length of overhang for sliding bearings.

### 4.2.6.4. *Substructure Comments*

The substructure comments section shall include detailed information on the following substructure components.

A. **SUBSTRUCTURE TYPE:** Describe the substructure type detailing the materiel and support type (e.g., reinforced concrete stub abutment on H-piles, pier columns, concrete pier bents, etc.), the number of piers, and if they are skewed.

B. **SUBSTRUCTURE CONDITION:** Describe the condition of the substructure components (e.g., graffiti, peeling paint, corrosion, spalls, exposed prestressing strands, debris accumulation, clogged weepholes, etc.). Make sure to note the condition of the cheek walls and backwalls.
C. **WINGWALLS:** Describe the type of wing wall and its conditions. Note if wall is rotating out of plumb, scour is present, undermining of the footing, missing joint material, clogged weep holes, etc.

### 4.2.6.5. *Channel Comments*

The waterway channel comments section shall include detailed information on the following channel components.

A. **CHANNEL ALIGNMENT:** Describe the alignment of the channel (e.g., between pier no. 1 and pier no. 2, etc.).
B. **CHANNEL BOTTOM MATERIAL:** Describe the channel bed material (e.g., silty sand and stone, large rocks, etc.).
C. **WATER DEPTH CONDITIONS:** Describe any significant changes in water depth since the prior inspection. Detail and scour locations and their depths.
D. **FENDER TYPE (if present):** Describe the type of fender system and its condition.

### 4.2.6.6. *Approach Comments*

The approach comments section shall include detailed information on the following bridge approach components.

A. **APPROACH SLABS (if present):** Describe the condition of the approach slab. Note any settlement of the pavement and record the depth.
B. **PAVEMENT:** Describe the type of pavement and if there are any potholes, settlement, cracks, rutting, missing lane markings, etc.
C. **GUIDE RAILS:** Describe the type of guide rails along the approach (e.g., W-beam guide rail, timber guide rail, etc.). Note any missing bolts, posts out of alignment, impact damage, erosion around posts, etc. The bridge rail type, the approach guiderail transitions, the approach guide rail and the approach guide rail end treatments must be identified as either non-existent, obsolete, non-standard, or standard. Verify the guide rail height and post spacing.
D. **DRAINAGE:** Note any areas of ponding water or clogged drainage inlets along the approach.
E. **SIDEWALKS:** Describe the condition of the sidewalks. Note any pedestrian tripping hazards. If tripping hazards are observed, prepare a Letter of Concern when applicable.

### 4.2.6.7. *Miscellaneous Comments*

The miscellaneous comments section shall include information on the following components.

A. **BRIDGE POSTING SIGNS:** If the bridge should be posted, note if all load posting and advanced load posting signs are present and in good condition.
B. **STORED MATERIALS UNDER BRIDGE:** Describe if there is the presence of stored materials and or homeless encampments located under, around, or within the enclosed areas of the bridge. Indicate the nature of the material and whether it should be considered a hazard or combustible. Document any homeless encampments observed at the site. Provide a Critical Finding or Letter of Concern if such material will affect the structures stability or the public safety.
C. **DRAINAGE PIPES & UTILITY CONDUITS:** Describe the condition of the drainage pipes and conduit. Note any missing handhold covers or exposed wires.
D. **LIGHT STANDARDS (if present):** Describe the condition of the lighting standards (e.g., missing anchor bolts, out of plumb, vibrating under live load, etc.).

E. **SIGN STRUCTURES (if present):** Describe if signs are bent, out of plumb, faded, obstructed by vegetation, or missing.
F. **FIRE PROTECTION SYSTEM (if present):** Describe the condition of the fire protection system.

If the bridge contains fracture-critical details as described in Section 8.3, the members and their condition shall be on this form. The fracture-critical inspection report cover sheet, included in APPENDIX A – FORMS & REPORTS, shall be completed, signed by the consultant project manager, and provided at the end of this form.

## 4.2.7. *Bridge Inspection Report - NBI Ratings*

This form is used to detail the NBI condition ratings for all major bridge components (SI&A Items 58 through 62). The NBI Rating Form can be found in APPENDIX A – FORMS & REPORTS. A condition rating is used to describe the existing, in-place bridge as compared to the as-built condition. Condition ratings are used appropriately when they describe the general condition of the component being rated. For more information on NBI condition ratings refer to the NBI Coding Guide. The information to be included on this sheet includes:

A. **BRIDGE NUMBER:** Enter the DDOT number assigned to the bridge being inspected (e.g., 0036, 1011 and 1303A).
B. **HIGHWAY:** Indicate the name used to identify the bridge (e.g., K Street Bridge, South Capitol Street (NB), Potomac River Freeway [Ramps 1 and 4]).
C. **OVER:** Indicate the name of the feature being crossed.
D. **SI&A ITEM 58, DECK:** Identify the type of material used for decking. The general condition rating (dark boxes) for this item should be a condition evaluation that reflects on all spans in the structure and not necessarily one span having the worst condition rating. The condition rating of elements listed under deck such as (wearing surface, joints, curbs, sidewalks, parapets, railing, scuppers, etc.) shall not be considered in the overall SI&A deck rating; however, their condition should be included on the inspection form.
    D.1. ***Wearing Surface*** – Rate only the current condition of the wearing surface (integral or non-integral). If a wearing surface is not present, rate N.
    D.2. ***Joints*** – Show each type (e.g., open, sealed, other, etc.) used in the structure and apply a condition grade for each type that best reflects the entire structure. If the joint type is unknown, provide photos and a description that will facilitate its identification in the office.
    D.3. ***Drainage System*** – Rate the condition of the deck drainage system. The deck drainage system may include downspouts, scuppers, drainage connections, drainage troughs, etc.
    D.4. ***Curbs, Sidewalks, Parapets, Median Barriers and Delineations*** – Rate only their current condition. If not applicable, rate as N.
    D.5. ***Railings*** – Identify the type of material used for the railing, the type of railing and rate only its current condition (the fact that a railing does not meet current standards should not have a bearing on the condition rating). When the type of railing cannot be identified, provide photos for further identification (necessary for the appraisal of the bridge safety features).
    D.6. ***Railing Protective Coating*** – Rate the current condition of the railing protective coating. If not applicable, rate N.
    D.7. ***Soffit*** - Rate the condition of the deck soffit. This element will primarily control the overall deck rating, especially for reinforced concrete decks.
E. **SI&A ITEM 59, SUPERSTRUCTURE:** – Listed elements are used for evaluating the condition rating for SI&A Item 59. The condition of bearings, joints, paint system, etc. shall not be included in this rating, but should be noted on the inspection form. Secondary members should not control the overall SI&A rating of Item 59. Only in extreme situations will secondary members and bearings affect the overall SI&A rating. If the structure is a culvert, this condition rating shall be coded as N.

E.1. ***Main Members*** – Select the material type and rate the current conditions of the main superstructure element (e.g., girders, beams, spandrel bents, cables on cable support bridges). Different spans may have different main members and material types.

E.2. ***Floor Systems*** – Rate the current condition of the members comprising the floor system. Under a separate item, rate the condition of the corresponding connections (e.g., stringer-to-floorbeam, floorbeam-to-girder, truss, connections to bracing, etc.). If not applicable, rate as N.

E.3. ***Secondary Members*** – Rate the current conditions of secondary members such as intermediate diaphragms or cross bracings. If not applicable, rate as N.

E.4. ***Machinery (Movable Spans)*** – The rating shown should be the overall rating resulting from a special inspection and using a form for movable spans. If not applicable, rate as N.

E.5. ***Bearings*** – Determine if the bearing was initially intended to be fixed or expansion and report the current condition in the appropriate box. Indicate the type of bearing being inspected (e. g., sliding, rocker, roller). Bearings will not influence the superstructure condition rating except in extreme situations.

E.6. ***Steel Protective Coating*** – If there are steel members, rate the condition of the protective coating system. If not applicable, rate as N.

E.7. ***Pin and Hanger Assemblies*** – If there are pin and hanger assemblies, rate the overall conditions of visible components including pins, bushings, and hanger plates. Include alignment of components, effects of corrosion product and condition of paint protection. Include condition of auxiliary support systems if present. If not applicable, rate as N.

F. **SI&A ITEM 60, SUBSTRUCTURE:** Listed elements are used for evaluating the condition rating for SI&A Item 60. All these items except for backwalls, wingwalls, collision protection system and steel protective coating can significantly affect the overall evaluation of SI&A Item 60. Scour conditions should be thoroughly investigated and detailed in the report (refer to FHWA Technical Advisory T5140.23 and HEC 18). Scour conditions affecting the overall condition of the substructure (SI&A Item 113 is 4 or less) will affect the overall condition rating for SI&A Item 60. Integral abutment wingwalls to the first construction or expansion joint shall be included in the evaluation. For non-integral superstructure and substructure units, the substructure shall be considered as the portion below the bearings. For structures where the substructure and superstructure are integral, the substructure shall be considered as the portion below the superstructure. If the structure is a culvert, this condition rating shall be coded as N.

F.1. ***Bearing Area/Caps*** – Rate the current condition of the beam seats and pier caps. When inspecting an abutment, this category is for the top 1’ of the abutment immediately below the beam seat.

F.2. ***Above Ground Substructure Elements*** – Rate the current conditions of all visible substructure elements above the ground level to 1’ immediately below the beam seat.

F.3. ***Foundation (Footing, Piles, Piers)*** – If possible, rate the current condition of below ground substructure footings, sills, piles, piers. Make a best judgment rating on unseen below ground items and state either "not visible" or "unable to inspect". In the case of bridges over waterways that have an underwater inspection, assign NBI ratings for the substructure elements from the most recent underwater inspection report and incorporate the results into future routine inspection reports.

F.4. ***Backwalls*** - Rate the current conditions of the backwalls based on the degree of cracks, spalling, rotation, evidence of water leakage, etc.

F.5. ***MSE Wingwalls*** – Rate the current condition of the wingwalls. The condition should account for cracks, spalls, settlement, rotation, undermining, etc.

F.6. ***Slope Protection, Riprap, Drainage*** – Rate the current condition of the slope protection surrounding. The condition should consider any cracks, settlement, displacement, clogged weepholes, washed out areas, etc. If not applicable, rate as N.

F.7. ***Embankment*** – Rate the current condition of the embankment surrounding the wingwalls and substructure. If not applicable, rate as N.

G. **SI&A ITEM 61, CHANNEL AND CHANNEL PROTECTION:** Conditions to be rated under this SI&A Item are associated with the flow of water through the bridge. Drift along the channel and/or under the structure should be considered when making the evaluation. The definition and rating scales used for this SI&A Item are found in the *FHWA Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation's Bridges*.

G.1. ***Channel Banks*** – Rate the current condition of the channel banks approximately 100' upstream and 100' downstream of the bridge. Slope erosion caused by roadway drainage should not be rated under this group of elements but as slope protection, riprap, drainage under abutment or slop protection under approaches. If slope erosion is caused by channel flow then the condition should affect both elements, the abutment slope protection, and the channel banks, and will have an impact on SI&A Item 61.

G.2. ***Channel Bed*** – The current condition of the channel bed including any scour effects should be rated under this element. If not applicable, rate as N.

G.3. ***Waterway Opening*** – Rate the current condition of the waterway opening at the bridge site. Drift under the structure should be considered when making this evaluation. If not applicable, rate as N.

G.4. ***Riprap, Toe Walls, Aprons, Dikes Jetties*** – The existing current condition of these elements should also be evaluated. However, they should not have a significant effect on the overall rating of SI&A Item 61. If not applicable, rate as N.

H. **SI&A ITEM 62, CULVERTS:** Listed elements are used for evaluating the condition rating for SI&A Item 62. This item evaluates the alignment, settlement, joints, structural condition, and other items associated with the culvert. Integral wingwalls to the first construction or expansion joint shall be included in the evaluation. If the structure is not a culvert, this condition rating shall be coded as N.

H.1. ***Barrel - Top Slab/Walls/Bottom Slab*** – The current condition of the reinforced concrete box culvert should be rated under this element. Separate ratings should be included for the top slab, bottom slab, and walls. The condition should account for spalls, cracks, delamination, rust staining, efflorescence, exposed reinforcement, etc.

H.2. ***Barrel Joints*** – The current condition of the culvert joints should be rated under this element. The condition should account for joint leakage, missing joint material, efflorescence, displacement, etc.

H.3. ***Corrugated Metal Pipe (CMP)*** – The current condition of the CMP should be rated under this element. The condition should account for corrosion, section loss, punctures, exposed backfill, etc.

H.4. ***Reinforced Concrete Pipe (RCP)*** – The current condition of the RCP should be rated under this element. The condition should account for cracks, spalls, delamination, staining, efflorescence, exposed reinforcement, etc.

H.5. ***Other Pipe*** – This element should account for the rating of a pipe material type other than an CMP or RCP. Identify the type of pipe on the form.

H.6. ***Arch*** – The current condition of the culvert arch structure should be rated under this element. This type of culvert can be constructed of metal, stone masonry, reinforced concrete, etc. The condition should account for corrosion, section loss, exposed backfill, spalls, cracks, delamination, rust staining, exposed reinforcement, etc.

H.7. ***Headwall*** - The current condition of the headwall should be rated under this element. The condition should account for impact damage, spalls, cracks, delamination, rust staining, efflorescence, exposed reinforcement, etc.

H.8. ***Apron*** - The current condition of the concrete culvert apron should be rated under this element. The condition should account for undermining, settlement, spalls, cracks, exposed reinforcement, etc.

H.9. ***Wingwalls*** - The current condition of the wingwall should be rated under this element. The condition should account for undermining, settlement, rotation, spalls, cracks, delamination, rust staining, efflorescence, exposed reinforcement, etc.

H.10. ***Barrel Adequacy Opening*** - Rate the current condition of the waterway opening at the bridge site. Drift under the structure should be considered when making this evaluation. If not applicable, rate as N.

I. **APPROACHES:** The current condition should be rated according to the general SI&A conditions ratings. The rating code should include among others the effects of settlement, rippling, stability, roughness, broken surfacing. The elements listed under this Item will have a condition rating but there will not be an overall rating for the approaches.

I.1. ***Embankments*** – Rate the current condition of the embankments and embankment retaining walls.

I.2. ***Slope Protection*** – This refers to the current condition of the embankment or the cut slopes. If not applicable, rate as N.

I.3. ***Roadway*** – Rate the current condition of the pavement structures no more than 100' from the bridge at both approaches. If there is an approach slab, the 100' starts where the approach slab meets the pavement.

I.4. ***Relief Joints*** – Rate the current condition of any joints provided to accommodate pavement deformations. If not applicable, rate as N.

I.5. ***Approach Slabs*** – Rate the current condition of the approach slabs. The condition should consider settlement, spalling, cracking, etc. of the approach slab. This element will furnish a condition rating only for structures with an approach slab to the bridge. If not applicable, rate as N.

I.6. ***Drainage*** – Rate the current condition of the approach roadway drainage taking into consideration any clogged drainage inlets, cracked drainage grates, etc.

I.7. ***Guide Rail*** – Rate the current condition of the guide rail considering any impact damage, missing posts, missing bolts, etc. The fact that the guide rail does not meet current standards should not have a bearing on the condition rating.

I.8. ***Delineation*** – Rate the current condition of delineators used in the approach roadway taking into consideration any missing or broken delineators.

I.9. ***Sight Distance*** – Rate the sight distance condition for the bridge.

J. **MISCELLANEOUS:** Miscellaneous items rated are any bridge signs (specify the type being rated, e.g., posting sign, warning sight), existing lighting, warning devices, utility lines on or under the bridge. In the case of utilities identify the type of utility when recognizable and give details by sketches or photographs on how it is attached to the structure.

K. **SPECIAL EQUIPMENT USED:** List any non-routine means of access to the bridge such as snoopers, bucket trucks, climbing gear, scaffolding, rigging, etc.

L. **NO. HOURS:** Enter the total Inspection Team man-hours and report preparation time (to the nearest one hour). Field time should include travel. If other help is needed such as flagman and rigging personnel, enter their total man-hours and specify the type of help.

M. **INSPECTION DATE:** Enter the date the field inspection was completed. If the inspection takes multiple days, provide the range of dates for the inspection.

N. **INSPECTED BY:** The report is considered a legal document and must be initialed by all members of the inspection team.

## 4.2.8. *Bridge Appraisal Worksheet*

This worksheet is provided to aid the appraiser in documenting the appraisal values required for the following SI&A items:

- SI&A ITEM 67: "Structural Evaluation"

- SI&A ITEM 68: "Deck Geometry"
- SI&A ITEM 69: "Underclearances"
- SI&A ITEM 70: "Bridge Posting"
- SI&A ITEM 71: "Waterway Adequacy"
- SI&A ITEM 72: "Approach Roadway Alignment"

Also, provided in the worksheet is space to discuss and rate the different components of the Traffic Safety Features (SI&A Item 36).

## 4.2.9. *Soundings & Bridge Channel Profiles*

These two worksheets are provided for bridges over waterways. The information shown provides detailed water depths, scour locations, channel obstructions, channel bed aggradation, etc. If the bridge is not over a waterway, these two sheets may be omitted from the inspection report.

A. **BRIDGE INSPECTION SOUNDING SHEET:** The sheet provides the sounding depths for the area beneath the bridge and 30' upstream and downstream from the bridge.
   - A.1. ***Bridge No.*** – Enter the DDOT bridge number.
   - A.2. ***Date*** – Enter the start date of the bridge inspection
   - A.3. ***Inspector:*** Enter the initials of the inspectors.
   - A.4. ***Highway*** – Enter the name of the highway carried by the structure.
   - A.5. ***Over*** – Enter the name of the waterway crossed by the structure.
   - A.6. ***Clearance Location*** – Describe the location to where the clearance location is taken from (e.g., bottom of bottom flange of girder 1 at mid-span). Clearance locations should not be on a portion of the bridge where its elevation can change throughout the lifetime of the bridge.
   - A.7. ***Clearance Measurement*** – Enter the clearance measurement in feet.
   - A.8. ***Sounding Chart*** – Sounding Depths should be entered in the chart. The soundings should be taken at four equidistant locations along the center of the waterway and in front of each abutment or pier. In addition to these measurements the channel depths 10 ft, 20 ft, and 30ft upstream and downstream of the bridge. Structures over large bodies of water or fast currents may require special equipment to obtain the bed profiles. Make the request for the special equipment on the "Bridge Inspection Record" form. Debris, fallen trees, and sediment deposition should also be noted on the sounding sheet.

B. **BRIDGE CHANNEL PROFILES:** Table of Depth Values & Graphical Representation – This sheet provides the current and historical information for the channel bed profile along the east fascia, west fascia, and centerline of the bridge. The channel profile should reflect the entire bed elevation profile of the structure and include any significant changes in the bed profiles from previous inspections. Refer to Section 6.5 for further explanation on how to obtain channel profile measurements.
   - B.1. ***Bridge No.*** – Enter the DDOT bridge number.
   - B.2. ***Date*** – Enter the start date of the bridge inspection.
   - B.3. ***Highway*** – Enter the name of the highway carried by the structure.
   - B.4. ***Over*** – Enter the name of the waterway crossed by the structure.
   - B.5. ***Clearance Location*** – Describe the location to where the clearance location is taken from (e.g., bottom of bottom flange of girder 1 at mid-span). Clearance locations should not be on a portion of the bridge where its elevation can change throughout the lifetime of the bridge.
   - B.6. ***Clearance at High Water Line*** – Enter the clearance in feet from the clearance location to the top of the high-water line. The high-water line is indicated by a high-water mark on the surrounding abutment, piers, wingwall, stream banks, etc. A high-water mark is defined as a line or mark left upon the bridge substructure, superstructure, or stream banks indicating the elevation of the intrusion of high water. The mark may be a line of stained concrete near the waterline, oil, or scum.

B.7. ***Clearance Measurement*** – Clearance measurement should be entered for the current inspection year and the years of the prior two inspection cycles channel measurements.

B.8. ***Table of Channel Profile Depth Values*** – Channel profile depths should be entered in the chart. Channel profile measurements should be taken along the east fascia, west fascia, and centerline of the bridge. The readings should be taken immediately next to the footing or approximately one foot beyond the face of abutment or pier if the footings are not exposed. Readings should also be taken at the center of the span.

B.9. ***Graphical Representation of Profile Measurements*** – Channel profiles shall be shown depicting all values in the Table of Channel Profile Depth Values for all years provided. See the example Routine Inspection Report in APPENDIX B – EXAMPLE BRIDGE INSPECTION REPORTS.

## 4.2.10. *Bridge Maintenance and Repair/Rehabilitation Recommendations*

This form should be updated for each inspection and included in each inspection report even when no recommendations for maintenance and repairs are needed. The information to be included on the sheet is listed below:

A. **BRIDGE NO.:** Enter the DDOT bridge number.
B. **DATES:** Enter the dates of the bridge inspection.
C. **HIGHWAY:** Enter the name of the highway carried by the structure.
D. **OVER:** Enter the name of the feature crossed by the structure.
E. **INSPECTORS:** Enter the initials of all the inspectors who inspected the structure.
F. **MAINTENANCE RECOMMENDATIONS:** This form consists of four columns. In the first column, enter the name and element number for which recommendations are being made (see Bridge Inspection Record and Summary Form for element descriptions). If an element number is not available, enter the name of the component or item. In the second column, describe the recommended maintenance or repair action. In the third column, provide a photograph, if available, of the deficiency. And in the fourth column, indicate a priority code (PC) for the recommended action. The priority codes are as followed:
    - E – Emergency (Notify D.C. immediately; follow-up with a critical finding report within 24 hours)
    - 1 – First (Items to be repaired first – addressed within one year)
    - 2 – High (Potential to become serious – addressed within 2 years)
    - 3 – Medium (Serviceability related – repair after high priority items)
    - 4 – Low (Minor repairs needed – schedule as part of rehabilitation program)
    - 5 – No repairs needed at this time

Quantities shall be provided for all maintenance and repair/rehabilitation recommendations (i.e., LF, SF, CF, EA, etc.) so that DDOT can plan for the magnitude of the work. The units of measure shall align with the measurement and payment units in the *DDOT Standard Specifications for Highway and Structures* for that construction/repair item.

## 4.2.11. *Load Rating Summary Form*

This form is used by DDOT to provide a summary of all the inventory and operating rating calculations and the recommended posting actions for their in-house bridge ratings. This form is signed, dated, and sealed by the Engineer making the posting recommendations. The Engineer shall be registered professional engineer in the District of Columbia. Enter the bridge number (BRIDGE No.) and the highway name and the road, railroad, or waterway it crosses over (BRIDGE NAME). In the table provided, the critical bridge member being rated, the corresponding inventory and operating HS loadings, the software used for the analysis, the controlling location, and the controlling force are entered. Below the table, the controlling load ratings and the associated NBI code are summarized. The recommended load rating and the recommended new posting are also detailed. A blank Load Rating Summary form is provided in APPENDIX A – FORMS & REPORTS of this manual.

## 4.2.12. *Photograph Summary Sheet & Photographs*

This form has been developed to aid in the identification and sorting of the photographs taken during the inspection. All photos must be referenced in the inspection report. The following information needs to be included:

A. **BRIDGE NO.:** Enter the DDOT bridge number.
B. **DATES:** Enter the dates of the bridge inspection.
C. **INSPECTORS:** Enter the initials of all the inspectors who inspected the structure.
D. **HIGHWAY:** Enter the name of the highway carried by the structure.
E. **OVER:** Enter the name of the feature crossed by the structure.
F. **PHOTOGRAPH LOG TABLE:** This table has two columns. The first column provides the photograph number. The second column provides the title of the photograph, the location, and the photograph was taken (e.g., looking west). All general and specific defect photographs shall have a title briefly describing the photo (e.g., Spall at the East Face of the Cap on Bent 3). Scales (such as rulers, measuring tapes, stick rules) shall be used in photographs that show a specific defect. If sketches are needed to explain a structure defect more clearly, the sketch should be referenced in this table. Photos can vary in size to fit two photos on a sheet, but generally no less than 3-1/2" x 5" and no larger than 4" x 6". If defects are typical to a particular element, such as hairline cracking, edge spalling, minor rust staining, honeycombing, painted over peeling paint, etc., only one or two representative photos of the typical defect are required.

Photographs shall be arranged in the following general order:

- **GENERAL:** Elevation views of the bridge, approach photos (looking towards and away from the bridge) and photos looking upstream and downstream of the bridge. If a bridge is over a railroad or roadway, photos looking in each direction of the railroad/roadway shall be provided.
- **DECK:** Typical photos include deck joints, deck condition, parapet condition, guiderail, fence, deck drains, deck soffit and any photos depicting deterioration of the deck. Observed defects such as spalls, cracks, potholes, exposed reinforcement, efflorescence, delamination, impact damage, etc. should be included.
- **SUPERSTRUCTURE:** Typical superstructure photos, typical bearings and any photos depicting deterioration of the superstructure. Observed defects such as spalls, cracks, efflorescence, delamination, rust staining, corrosion, exposed reinforcement, impact damage, rotting wood, checks, missing bolts, etc. should be included.
- **SUBSTRUCTURE:** Typical substructure photos including wingwall elevations and any photos depicting deterioration of the substructure. Observed defects such as spalls, cracks, efflorescence, delamination, rust staining, corrosion, exposed reinforcement, impact damage, clogged weepholes, etc. should be included.
- **STREAM CHANNEL/SLOPE PROTECTION:** Typical channel and slope protection photos should include bank erosion, exposed tree roots in the bank, debris blocking the waterway opening, fallen trees, settlement, scour, etc.
- **APPROACHES:** Typical approach photos should include guiderails, guide rail transitions, guide rail end treatments, impact damage, potholes, pavement damage, pavement settlement, posting signs and advanced posting signs, etc.
- **MISCELLANEOUS:** Miscellaneous photo items may include utilities, light standards, utility conduit, sign structure, fire protection standpipe system, etc.

## 4.2.13. *Structure Inventory and Appraisal Sheet (SI&A)*

A marked-up printout of the latest structure inventory and appraisal sheet must be included in the report package. The SI&A sheet will be provided by DDOT from the BrM database. Any bridge data changes must be clearly marked on this sheet in red. In most cases, the changes will be due to new condition and appraisal ratings, and a new date of inspection. All data changes approved in this form should be updated in the bridge inventory database.

# 5.0 INSPECTION GUIDELINES

## 5.1. INTRODUCTION

DDOT is responsible for the inventory, inspection, appraisal, and load rating of bridges under the District of Columbia's jurisdiction. From the initial inspection throughout the entire lifespan of a bridge, it is necessary to routinely record and document the bridge's condition to ensure the safety of the traveling public and to properly invest in the District's infrastructure. Along with this chapter, the inspector should reference and follow inspection reporting guidelines in Chapter 4 of FHWA's *Bridge Inspector's Reference Manual* (*BIRM*).

## 5.2. RECORDING FIELD INFORMATION

The bridge inspectors shall record both element level data and NBI coding and condition ratings for the bridge components. Scour and underwater evaluation, as well as fracture-critical inspection information shall also be recorded when applicable. Inspection notes can be documented in a variety of ways, utilizing sketches, tables, checklists and/or markup of the previous cycle's inspection report. Element comment fields, as shown in the Inspection Comments section of the bridge inspection report (see example Bridge Inspection Report in Appendix C), are always to be used to record inspection findings; however, forms and sketch sheets may be required to thoroughly depict the condition of the bridge and its surroundings at the time of the inspection. For specific inspection forms and procedures, refer to Chapters 4.0, 5.0, 7.0, and 8.0. Inspection field notes should clearly indicate the date of inspection and the inspection team leader and team members should initial and add their full names to the note sheets they complete.

### 5.2.1. *NBI Coding and Condition Rating Data*

NBI coding and condition rating data shall be collected and recorded or confirmed during each inspection. Guidance on NBI coding and condition ratings can be found in *FHWA's Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation's Bridges*. Specific guidance is also included below:

#### 5.2.1.1. ***Condition Ratings***

Items 58, 59, 60, 61, and 62 pertaining to the overall condition of the structure and channel are to be confirmed or updated by the inspection team. For guidance in coding condition ratings for concrete decks, superstructures, substructures, and corrugated metal pipe culverts, reference the FHWA *Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation's Bridges*.

New NBI Condition Ratings of 4 (poor) or lower must be brought to the attention of DDOT within 24 hours of the inspection. Any reduction to NBI Condition Ratings already rated 4 or lower must also be brought to the attention of DDOT in a similar timeframe. Any recommended changes to the condition rating data should be added in red text to the SI&A .pdf file and updated on the Bridge Inspection Summary Form – BrM and NBI Ratings and the Bridge Inspection Report - NBI Ratings sheet in the bridge inspection report. For an example of these sheets, see the example Bridge Inspection Report in APPENDIX B – EXAMPLE BRIDGE INSPECTION REPORTS.

**Table 5-1: Criteria for rating Items 58, 59, 60, 61, and 62, per the FHWA NBI Coding Guide**

| General Recommendations for Rating Items 58, 59, 60, 61, and 62 | |
|---|---|
| **RATING** | **DESCRIPTION** |
| **0** | FAILED CONDITION – out of service – beyond corrective action. |
| **1** | "IMMINENT" FAILURE CONDITION – major deterioration or section loss present in critical structural components or obvious vertical or horizontal movement affecting structure stability. Bridge is closed to traffic, but corrective action may put back in light service. |
| **2** | CRITICAL CONDITION – advanced deterioration of primary structural elements. Fatigue cracks in steel or shear cracks in concrete may be present or scour may have been removed substructure support. Unless closely monitored it may be necessary to close the bridge until corrective action is taken. |
| **3** | SERIOUS CONDITION – loss of section, deterioration, spalling or scour have seriously affected primary structural components. Local failures are possible. Fatigue cracks in steel or shear cracks in concrete may be present. |
| **4** | POOR CONDITION – advanced section loss, deterioration, spalling or scour. |
| **5** | FAIR CONDITION – all primary structural elements are sound but may have minor section loss, cracking, spalling or scour. |
| **6** | SATISFACTORY CONDITION – structural elements show some minor deterioration. |
| **7** | GOOD CONDITION – some minor problems. |
| **8** | VERY GOOD CONDITION – no problems noted. |
| **9** | EXCELLENT CONDITION |
| **N** | NOT APPLICABLE |

### 5.2.1.2. *Appraisal Data*

Items 36A, 36B, 36C, and 36D pertaining to guardrail and railings are the only ratings to be confirmed or updated by the inspection team after an inventory inspection has occurred for a replacement or modification of the rail system. Items 67-69 are calculated automatically when the Bridge Sufficiency Rating (BSR) is calculated. Items 71, 72, and 113 are updated only when a change has been made to the bridge, approach roadway, or waterway. Appraisal rating changes deemed necessary by the Bridge Inspector should be communicated to DDOT for further direction and approval. Any recommended changes to the appraisal data should be added in red text to the SI&A .pdf file and updated on the Bridge Appraisal Worksheet in the bridge inspection report. For an example of the Bridge Appraisal Worksheet, see the example Bridge Inspection Report in APPENDIX B – EXAMPLE BRIDGE INSPECTION REPORTS.

### 5.2.1.3. *Inventory Data*

The NBI Inventory Forms, included in APPENDIX A – FORMS & REPORTS, shall be updated and submitted to DDOT upon completion of an inventory inspection. This includes the inventory and appraisal data items along with the condition ratings. DDOT is responsible for providing FHWA with the data. This form should be completed for new bridges and shall be updated for rehabilitated or replaced bridges.

The inspection team shall refer to the NBI Deck Items Reference Table (See Appendix C – Reference Documents) for assistance with the proper selection and data coding for various NBI items related to the bridge deck and structure type.

For guidance on coding each inventory item, reference the NBI Coding Guide. Information regarding the Recent ADT, Recent ADT Year, and Truck Percentage (Items 029, 030, and 109) can be found in the previous cycle's inspection report, available bridge plans, or at the following website ( https://ddot.dc.gov/page/traffic-volume-maps). When the inspector must interpolate the ADT due to entrance or exit ramps or insufficient available data, the Bridge Inspector shall include a brief explanation of the calculation in the Inspection Notes.

Items 29, 30, and 109 pertaining to ADT and truck traffic are the only coding to be updated by the inspection team in inspections subsequent to an inventory inspection. All other coding changes deemed necessary by the Bridge Inspector should be communicated to DDOT for further direction and approval. Any recommended changes to the inventory data should be added in red text to the SI&A .pdf file.

## 5.2.2. *Element Level Data*

Element level data shall be collected and recorded or confirmed during each inspection. Guidance on element selection, condition rating, quantities, scale factors, bridge orientation, and span numbering can be found in the *AASHTO Manual for Bridge Element Inspection*. Significant changes in element condition ratings shall include justification and be highlighted in the inspection report in the General Notes section. A repair recommendation shall be provided for elements with condition states CS3 and CS4.

## 5.2.3. *Photograph Requirements*

Photographs are a vital part of all bridge inspections. Along with appropriate captioning and associated condition notes, photographs help document bridge configuration and conditions in more detail than words alone and are often essential to understanding a condition as it exists in the field.

DDOT requires standard and condition photographs. Guidelines for photographs shown in an inspection report include:

- Photographs must be digital and at a suitable size and good quality to clearly present the subject while maintaining reasonable file sizes.
- Date stamps should be shown on all photographs
- Inspectors should use a scale (such as rulers, measuring tapes, stick rules) when photographing specific elements or defects. Other objects such as pens, pencils, or hammers without a graduated scale should not be used for this purpose.
- Lighting in the photographs should be adequate so the subject and nearby elements are clearly presented.
- Multiple photographs may be required to convey both the significance of the defect and how it relates to the element and the overall structure. This may include one photograph showing the general area and an additional photograph to show the defect in detail.
- Photographs should be presented in landscape orientation.
- Captions should identify the element(s) shown, indicate the location on the bridge, and include a brief description. When space permits, the direction that the photo was taken may also be useful in orienting the reader.
- Photographs are required for defects that are condition states CS3 and CS4, and general conditions of 5 or less. Photographs for specific priority recommendations are also required.

Photographs should be preceded by a Photograph Summary Sheet, as discussed in Chapter 4.0, that will list the title of the photograph and indicate the location and direction the photograph was taken. All general and specific defect photographs should have a title giving a brief description of what each photo is showing (e.g., Crack at the South End of the West Parapet in Span 2).

Photographs shall be generally included in the following order:

- **General** – This includes approach photos looking toward and away from the bridge, elevation views of the bridge, and photos looking in a direction perpendicular to the bridge from the top of the bridge (looking upstream and downstream for waterways).
- **Deck –** This includes typical photos of the general condition of the deck, wearing surface, deck joints, parapets, guardrails, fences, drains, and soffit as well as defect photos depicting the deterioration of the deck.

- **Superstructure –** This includes typical superstructure photos, typical bearing photos, and defect photos depicting deterioration of the superstructure.
- **Substructure –** This includes typical substructure photos including abutment, pier, and wingwall elevations as well as defect photos depicting deterioration of the substructure.
- **Miscellaneous –** This may include general stream channel photos, slope protection photos, at least one standpipe typical photo (if applicable), approach and guardrail defects, lighting and utility photos, or photos of posting signs, along with associated defects.

## 5.2.4. *Other Sketches and Miscellaneous Documentation*

Inspectors should create additional sketches, sheets, or tables as needed to accurately and fully document the bridge condition. Examples may include joint measurement and tracking tables or beam elevation sketches to detail numerous defects. Channel profile measurements and sketches should be utilized for bridges over waterways (see Chapter 6.0 for details). In all cases, inspectors shall ensure that the sketch thoroughly documents the defects, their extents, and their severity. Any abbreviations that may not be readily understood should be defined in a legend on the sketch. Tabulation sheets may be necessary for more efficient documentation and tracking of severe defects occurring at multiple locations on a bridge, such as steel cracking. All sketch sheets shall show the location, size, and type of defect observed in the field. These sketch sheets should also be included in the inspection report if they are necessary to convey the defects or conditions of relevant bridge members. Sketch sheets from previous cycle inspection reports may be reused and updated with revision marks to indicate changes to measurements or conditions. If field sketches created using these forms are illegible, they may need to be redrawn before including the form in the final inspection report. Types of sketches that may be necessary include:

- **Concrete Beam Sketch** – record detailed defect information on concrete beams such as cracks, spalls, exposed reinforcement, delamination, efflorescence, etc.
- **Steel Girder Sketch** - record detailed defect information on steel girder beams such as, steel corrosion and section loss, cracking, impact damage, suspect or poor-quality welds, etc.
- **Prestressed Box Beam Sketch** – record detailed defect information on prestressed box beams such as cracks, spalls, exposed prestressing strands, exposed reinforcement, delamination, rust stains, efflorescence, etc.
- **Rocker Bearing Measurement** – record detailed information on the rocker bearings such as span location, abutment/pier location, rocker bearing angle, temperature at the time of measurement, expansion vs. contraction, and any defects on the bearing.
- **Joint Measurement** – record detailed information on the bridge joints such as span location, temperature at the time of measurement, joint displacement measurement, and any defects at the joint (missing joint material, broken joint armor plating, debris in joint, etc.). The horizontal joint displacement measurement should be taken at each curb line and at the center of the roadway if it is closed to vehicular traffic. If the bridge does not have a curb line, the measurement should be taken along the shoulder pavement striping. Measurements shall always be taken perpendicular to the joint.
- **Waterway Sketch** – record specifics on the waterway such as direction of flow, high water level, Waterway clearance location and measurement, debris in the waterway, outline of the waterway banks, etc.
- **Miscellaneous and Other Sketches** – If bridge defects are numerous, it may be beneficial to create a sketch to facilitate defect locations in future inspections or rehabilitations. This may include bridge decks, soffits, loss of bearing, impact damage, weld cracks, etc.

## 5.2.5. *Load Ratings and Posting Sign Placement Verification*

Bridges are typically not load rated as a part of a routine inspection. However, discovery of significant loss of section, continued deterioration, or suspected loss of capacity during an inspection may warrant a load rating

analysis based on the observed conditions. If the inspection consultant team recommends to DDOT that a load rating is warranted, the consultant teams shall discuss this with DDOT and receive direction from DDOT prior to performing any load rating analysis. The BIE has the final say on whether or not a load rating will be performed. Additional information on load rating policies can be found in Chapter 11.0 of this manual, Chapter 14 of DDOT's MED, and the current version of the MBE.

If NBI Item 41 is coded as "P", the Inspection Team must verify the presence of posting and advance signs and that signage is in good condition and is located correctly without visual obstructions. The Inspection Team must also confirm that the restrictions posted on the sign(s) match that of the most recent load rating. The DDOT Bridge Inspection Project Manager must be notified in writing within 24 hours if incorrect signage or no sign is present, signage is not or only partially visible, or its condition has deteriorated.

## 5.3. BRIDGE RECORDS

DDOT will maintain a bridge file for each structure under their jurisdiction. The bridge files include electronic copies of inspection reports, load ratings, posting resolutions, plans, maintenance history, and correspondence for each bridge. This material must be available to inspectors upon request to assist in the successful continuation of the inspection program. Bridge information is most commonly stored in .pdf format. Hard copies of files should be scanned and stored electronically for more secure storage and ease of accessibility.

Depending on the age, size, and functional classification of each structure, some records listed below may not be available. Records should be stored in chronological order and should include the following information, if applicable:

- **Inspection Reports** from all available inspection cycles and types of inspections (inventory, routine, fracture critical, underwater, special, complex)
- **Complex, Fracture Critical, and Underwater Inspection Procedures**
- **Photographs** to aid the Asset Management Branch in identifying the bridge when looking through records (plan photo, elevation photos, waterway or roadway below bridge, etc.)
- **Correspondence** related to the bridge that occurred within the last three inspection cycles, including memorandums of agreement, critical bridge findings, and results of special and emergency inspections
- **Plans** such as construction plans, shop and working drawings, and as-built drawings
- **Technical Specifications** used during construction or structure rehabilitation
- **Materials and Testing Data**, including material certification, material test data, and load test data
- **Maintenance and Repair History**
- **Critical Findings**, including records of actions taken
- **Letters of Concern,** including records of actions taken
- **Coating History** for coatings such as paint, timber sealant, etc.
- **Accident Records**, including fires, vehicular or boat collision, pedestrian injury
- **Posting** information such as the date of posting and description of the signage used
- **Permit Loads** documenting the permit loads that have travelled across the bridge, including any available calculations
- **Flood and Scour Data** such as history of major flooding events, high water marks, scour evaluations, or scour plan of actions
- **Traffic Data** such as ADT, ADTT, speed limit, traffic studies
- **Inspection Requirements** such as access needs, necessary inspection equipment, inspection methods, inspection personnel qualifications, safety concerns, important contacts, etc.
- **Structure Inventory & Appraisal Sheets**
- **Load Rating Analysis Calculations**

# 5.4. CRITICAL FINDINGS (CF)

## 5.4.1. *Criteria*

Critical findings (CF) are conditions that pose immediate danger to the traveling public and could jeopardize the safety and integrity of a structure, if left unaddressed. As defined by Federal regulation, 23 CFR 650.305 Subpart C, a critical finding is "a structural or safety related deficiency that requires immediate follow-up inspection or action." The discovery of a critical finding could warrant an NBI Condition Rating of 3 or less and an element rating of CS4. The conditions reported are typically given Priority E in the Maintenance and Repair/Rehabilitation Recommendations section of the inspection report. It should be noted that there are some bridge elements that are not rated, such as signage, but can still have critical finding because of the potential danger a defect can present to the traveling public. DDOT should be notified of all critical findings following the procedures herein.

## 5.4.2. *Notification*

Upon discovery of a critical finding, the Team Leader (TL) shall *immediately* notify DDOT's Bridge Inspection Project Manager via phone call or email from the field. Recommendations for load posting, traffic or speed restrictions, and/or temporary lane or complete bridge closure should be made. If warranted, DDOT will take emergency action to mitigate the dangerous condition. All verbal contact with DDOT regarding critical findings shall be followed with an email with details, including location, photographs, and recommendations as well as the contact information for the verbal communications. A Critical Finding Report Form (CFRF), shown in APPENDIX A – FORMS & REPORTS, shall be completed for reporting emergency conditions and submitted to the BIE within 24 hours of observing the critical finding. DDOT is responsible for notifying FHWA about bridge critical findings within two (2) weeks of being notified by the inspection consultant.

## 5.4.3. *Critical Finding Report Form and Documentation*

It is imperative to maintain proper documentation of a critical finding to:

1. Record the current condition of the finding in the inspection file.
2. Effectively and thoroughly convey the condition to DDOT and FHWA personnel.
3. Provide information to be utilized in decision making and to initiate a plan of action.
4. Ensure proper and prompt repairs.
5. Use as a reference for comparison to future damage and repairs.

Critical findings discovered during the inspection of a bridge structure are documented through the Critical Finding Report Form (CFRF), shown in Appendix A. This form provides a plan of action and ensures:

1. Proper measures are put in place to protect the immediate safety of the traveling public.
2. Timely and proper repairs to the damaged, deteriorated, or hazardous areas are performed.
3. All necessary parties are informed.

The information regarding the critical finding should be noted in the corresponding incident and inspection report.

## 5.4.4. *Examples of Critical Findings*

Examples of critical findings may include, but are not limited to the following:

- Any situation where the structural integrity of the bridge has been compromised, which could lead to partial or complete bridge failure or conditions that create significant hazards to public safety, such as:
    - Distress in primary members where the members may not be capable of safely carrying the imposed or designed loads.
    - Extensive scour at or under a substructure unit such that significant movement or instability is possible.
    - Distress in the substructure that may limit its capability of supporting the superstructure.

- Confirmed or suspected cracks in fracture critical members.
- Exposed electrical wires.
- Loose concrete over roadways or pedestrian walkways.
- Missing, damaged, incorrect, or visually obstructed posting or weight restriction signs.

### 5.4.5. *Additional Testing and Analysis*

If deemed necessary by DDOT, additional testing and/or analysis of a critical finding shall be performed to determine the extent, existence, or severity of the critical finding. Consultant teams shall receive direction from DDOT prior to performing additional testing that requires specialized equipment, personnel, or analysis. Testing may include non-destructive evaluation and/or materials testing. Structural analysis of a critical finding may be necessary to determine the load carrying capacity of the member/structure in question.

If, in the engineering judgment of the TL, a condition is observed on a main load carrying member that may significantly impact the structure capacity, the TL must submit this as a critical finding to the BIE within 24 hours with the findings clearly documented with sketches and photos. Areas of deterioration should be given special attention during the field inspection and the inspection team shall produce detailed sketches documenting the deficiencies. The field measurements that differ from the plans shall be used to update the load rating to determine if the load carrying capacity has been compromised. For guidance on load ratings refer to Chapter 11.0 of this manual and the *MBE*.

## 5.5. LETTERS OF CONCERN (LOC)

During inspection, a structural deficiency or condition may be discovered that does not require immediate attention or a critical finding designation, but that has the potential of developing into a serious condition and subsequently should be monitored. In this situation, a Letter of Concern (LOC) shall be prepared and forwarded to DDOT's Bridge Inspection Project Manager within 24 hours. If an LOC was submitted for the previous cycle's inspection and the condition has not been mitigated, a new LOC shall be provided noting the condition and any changes. The conditions reported are typically given Priority 1 in the Maintenance and Repair/Rehabilitation Recommendations section of the inspection report. Conditions coded as Priority 2 may also require an LOC. The definitions of the repair priority codes are shown in Section 4.2.10 of this manual.

Any LOC issued during an inspection cycle should be included in the appendix of the current cycle's inspection report. If an LOC from the previous cycle report has been addressed, it may be removed from the current cycle's inspection report.

### 5.5.1. *Examples of Conditions Warranting Letters of Concern*

Examples of conditions warranting letters of concern may include, but are not limited to the following:

- Any condition that creates a significant hazard to public safety, such as:
  - Missing, damaged, incorrect, or visually obstructed vertical clearance signs.
  - Missing or severely damaged guardrails, parapets, or barriers.
  - Spalls, cracking, settlement, or other conditions which pose hazards to pedestrians and/or bicyclists.

## 5.6. INSPECTIONS USING DRONES

The use of unmanned aerial systems (UAS), also referred to as drones, to inspect bridges should only be used for emergency situations and under the direction and approval of the BIE. For underwater inspections, underwater remote operated vehicles (ROV), also known as underwater drones, should only be used under emergency situations and under the direction and approval of the BIE. All federal aviation regulations must be followed when using drones. In no way does the use of drones to inspect bridges replace the hand-on inspection performed by the inspection teams.

# 6.0 SCOUR EVALUATIONS

## 6.1. GENERAL

Scour evaluation is an engineering assessment of existing and potential problems around the substructure of a bridge over waterways and making a sound judgment on what steps can be taken to eliminate or minimize future damage, potential for scour, undermining of the substructure, or failure of a bridge due to the effects of water. The relationship between the bridge, the waterway, and the floodplain surrounding the bridge is an important one. Problems arise when the configuration of the channel, obstructions, and/or flooding causes turbulence around the bridge foundations, creating conditions for local scour, contraction scour, aggradation, degradation, and lateral stream migration to occur.

All bridges over waterways should have a documented evaluation of scour vulnerability on file. The following criteria are intended to provide guidance on determining if a bridge is scour critical, therefore requiring a scour critical Plan of Action (POA). The scour evaluation assists in determining the scour critical rating for Item 113 of the SIA/NBI. If existing bridge conditions change, the scour critical rating for the bridge should be updated.

## 6.2. SCOUR EVALUATION

The FHWA NBI Coding Guide requires all bridges over stream crossings to be rated for Item 113, Scour Critical Bridges. FHWA Technical Advisory T5140.23, HEC 18 – Evaluating Scour at Bridges, HEC 20 – Stream Stability at Highway Structures, and HEC 23 – Bridge Scour and Stream Instability Counter Measures: Experience, Selection and Design Guidance provide guidance on developing and implementing a scour evaluation program.

During the routine inspection, review the previous scour evaluation and any scour critical POAs for that bridge to determine if the field information (e.g., sounding depths, scour holes, aggradation/degradation, bank erosion, or channel migration) collected for that evaluation reflects current field conditions. If the field conditions have changed, notify the BIE to determine the necessary steps needed. A new scour evaluation or analysis may be warranted. If an existing bridge over a waterway does not have a scour evaluation available for review by the inspection consultant, it will be necessary for the BIE to schedule a scour evaluation to be conducted by a consultant team.

The scour evaluation process is a screening investigation that identifies bridges over stream crossings as scour susceptible or non-scour susceptible and assesses the scour potential of scour susceptible bridges. The information collected during the field inspection should in most cases serve as the basis for the scour critical rating of Item 113 of the SIA/NBI. For the cases where a conclusive Item 113 rating cannot be determined (e.g., unknown foundation), a detailed scour analysis calculation must be performed. A scour analysis calculation shall be performed by a multidiscipline team that includes hydraulic, geotechnical, and structural engineers. Scour calculation has to be signed and sealed by PE licensed in the District of Columbia.

The scour evaluation team should conduct an office review and a field visit to aid in determining the Item 113 rating. A scour evaluation report shall be prepared to detail the methodology, site conditions, engineering judgment, flood history, etc. used to develop the recommended scour critical rating for Item 113. For specific details on the procedures to be used for scour evaluations, see Chapter 10 of *HEC 18 – Evaluating Scour at Bridges.* For general procedures for scour evaluation see the office review and field review lists below.

The following tasks should be conducted during the scour evaluation Office Review:

A. **EXISTING BRIDGE PLANS:** If available, the existing bridge plans, including as-builts, rehabilitation drawings, and repair drawings, shall be reviewed to determine the type of bridge foundations at the bridge. Bridge information such as type of footing, pile tip elevations, and the subsurface and stream bed soil conditions.
B. **EXISTING BRIDGE INSPECTION REPORTS:** All available bridge inspection reports should be reviewed to determine the sounding history, flood history, stream migration history, undermining, scour hole progression, debris, damaged scour countermeasures, etc. for the bridge.
C. **EQUIPMENT NEEDS:** Review the existing documentation and photos to determine what type of equipment is needed (rods, poles, sounding lines, sonar, etc.) to measure the water depths so that a cross section and channel profile sketch can be prepared.
D. **SPECIAL CONDITIONS:** If the water depths are greater than 4 feet or if channel velocities are too fast to access via wading, underwater inspection techniques using boats, divers, specialize cameras, etc., may be needed for the site visit. It is critical to determine this beforehand for the safety of the scour evaluation team and to allow time to obtain the proper equipment.

The condition of the following items shall be conducted during the scour evaluation Field Visit:

A. **ITEM 60 -SUBSTRUCTURE:** Look for evidence of movement (e.g., rotation, settlement, etc.) of abutment and piers, exposed footing or piles, undermining of footings.
B. **ITEM 61 -CHANNEL AND CHANNEL PROTECTION:** Look for evidence of changes in the streambed cross section at the bridge, areas of turbulent water flow, damage to scour countermeasure (e.g., riprap, sheet piling, grout bags, gabion baskets etc.), evidence of aggradation/degradation, channel instability, heavy debris accumulation, the presence of other waterways contributing to the channel, bank erosion, etc. The channel profile measurements and cross section shall be taken during the scour evaluation field visit. Refer to Section 6.5 for information on how to take these measurements. If the waterway is greater than 4 feet, the scour evaluation team should consult with the BIE to determine if obtaining the sounding depths can wait until the next underwater inspection or if the scour issues at the bridge warrant a separate mobilization effort to obtain the soundings without delay.
C. **ITEM 71 – WATERWAY ADEQUACY:** Is the waterway opening large enough to accommodate the volume of water flow? Does the size and configuration of the waterway increase the potential for scour at the bridge? Is there evidence of overtopping by flood water on the superstructure or channel banks?
D. **ITEMS 92 & 93 – CRITICAL FEATURE INSPECTION & CRITICAL FEATURE INSPECTION DATE:** These items are used to bring attention to elements that require special attention (e.g., scour countermeasures, monitoring devices, etc.)
E. **ITEM 113 – SCOUR CRITICAL BRIDGES:** For more detailed information on what to look for when assessing the scour potential of bridges, refer to the *HEC 18 – Evaluating Scour at Bridges* publication.

**Table 6-1: Criteria for rating Item 113, per the FHWA NBI Coding Guide**

| General Recommendations for Rating Item 113 | |
|---|---|
| **RATING** | **DESCRIPTION** |
| **0** | Bridge is scour critical. Bridge has failed and is closed to traffic. |
| **1** | Bridge is scour critical; field review indicates that failure of piers/abutments is imminent. Bridge is closed to traffic. Failure is imminent based on:<br>- a comparison of calculated and observed scour during the bridge inspection, or<br>- an engineering evaluation of the observed scour condition reported by the bridge inspector in Item 60. |
| **2** | Bridge is scour critical; field review indicates that extensive scour has occurred at bridge foundations, which are determined to be unstable by:<br>- a comparison of calculated scour and observed scour during the bridge inspection, or<br>- an engineering evaluation of the observed scour condition reported by the bridge inspector in Item 60. |
| **3** | Bridge is scour critical; bridge foundations determined to be unstable for assessed or calculated scour conditions:<br>- Scour within limits of footing or piles.<br>- Scour below spread-footing base or pile tips. |
| **4** | Bridge foundations determined to be stable for assessed or calculated scour conditions; field review indicates action is required to protect exposed foundations (see HEC 23). |
| **5** | Bridge foundations determined to be stable for assessed or calculated scour condition. Scour is determined to be within the limits of footing or piles by assessment (i.e., bridge foundations are on rock formations that have been determined to resist scour within the service life of the bridge), by calculations or by installation of properly designed countermeasures (see HEC 23). |
| **6** | Scour calculation/evaluation has not been made. (Use only to describe case where bridge has not yet been evaluated for scour potential. |
| **7** | Countermeasures have been installed to mitigate an existing problem with scour and to reduce the risk of bridge failure during a flood event. Instructions contained in a plan of action have been implemented to reduce the risk to users from a bridge failure during or immediately after a flood event. |
| **8** | Bridge foundations determined to be stable for the assessed or calculated scour condition. Scour is determined to be above top of footing by assessment (i.e., bridge foundations are on rock formations that have been determined to resist scour within the service life of the bridge), by calculation or by installation of properly designed countermeasures (see HEC 23). |
| **9** | Bridge foundations (including piles) on dry land well above flood water elevations. |
| **T** | Bridge over "tidal" waters that has not been evaluated for scour but considered low risk. Bridge will be monitored with regular inspection cycle and with appropriate underwater inspections until an evaluation is performed ("Unknown" foundations in "tidal" waters should be coded U.) |
| **U** | Bridge with "unknown" foundation that has not been evaluated for scour. Until risk can be determined, a plan of action should be developed and implemented to reduce the risk to users from a bridge failure during and immediately after a flood event (see HEC 23). |
| **N** | Bridge not over waterway. |

## 6.3. SCOUR PLAN OF ACTION

If the Item 113 rating is rated 3 or less or is rated 'U', a scour critical POA shall be developed. The POA is needed to provide guidance to the bridge owner, inspectors, and engineers that this bridge has plans that need to be implemented before, during, and after flood events. The POA should be kept with the bridge files and it should be updated as needed to account for changes in the waterway, personnel changes at DDOT, or installation of scour countermeasure. At a minimum, the POA should be reviewed and updated as necessary every 48 months. The POA should have the following sections:

A. **GENERAL INFORMATION:** Provide general information about the bridge such as bridge name, route carried, name of waterway under bridge, year built, ADT, bridge type and overall geometry, etc.)
B. **POA AUTHOR INFORMATION:** Include the author of the document and the author of any subsequent updates. Include the agency contacts (e.g., names, phone numbers, emails).
C. **SCOUR VULNERABILITY:** Provide the current Item 113 rating, description of the scour evaluation performed that generated the information in the POA, and the scour and flooding history for the bridge.
D. **RECOMMENDED ACTIONS:** Provide recommendations for scour countermeasures, increased inspection frequency, flood monitoring program, and/or monitoring devices (e.g., visual monitoring, physical probes, sonar instruments, fixed monitoring devices, etc.).
E. **NBIS CODING INFORMATION:** Provide current and previous ratings for Items 60, 61 71, and 113.
F. **MONITORING PROGRAM:** Provide details and DDOT staff contact information for scour monitoring procedures, scour critical trigger conditions (e.g., floods), and actions required.
G. **COUNTERMEASURE RECOMMENDATIONS:** Provide information for the countermeasure type, cost estimate, and schedule for installation.
H. **BRIDGE CLOSURE PLAN:** Identify the conditions that require bridge closure and when it can be opened to traffic.
I. **DETOUR ROUTES:** Provide a detailed detour route. Include necessary traffic control equipment needed, notification procedures for other agencies and the public, and any other bridges along the detour route.
J. **ATTACHMENTS:** Include sketches, as-built drawings, maps, photos, scour calculations, etc.

## 6.4. FLOOD RESPONSE INSPECTION PROGRAM

Bridges identified as scour critical require special attention during severe weather events. If the National Weather Service (NWS) issues a Flood Warning for the District of Columbia, bridges on DDOT's scour critical list should be inspected during and after the storm event. DDOT is responsible for making the final call as to whether or not flood inspections should be performed and they will notify the inspection consultant as to which specific bridges should be inspected. Bridges that have frequent overtopping but are not rated as scour crucial should also be monitored during a flood inspection. If it can be done safely, the bridge should be visually inspected for structural movement and scour conditions during the storm. As soon as possible after the storm event, the bridge should be inspected a second time. During the after-storm inspection, the following tasks should be completed:

A. **SUPERSTRUCTURE:** The superstructure gets a cursory visual inspection to check for rotation, movement, or debris impacts.
B. **SUBSTRUCTURE:** The substructure should be inspected for undermining, settlement, rotation, and any defects that may have been caused by the storm.
C. **CHANNEL AND CHANNEL PROTECTION:** The channel should be inspected for scour, bank erosion, fallen trees, debris, stream migration, etc.
D. **SOUNDINGS:** Soundings shall be taken after the storm event using wading, probing, diving, etc.

The flood inspection may be performed by DDOT personnel or the inspection consultant. Regardless of who performs the flood inspection, during the flood inspection the inspector shall inform the BIE immediately of any critical findings that may pose hazardous conditions to motorists or pedestrians.

After the flood inspection is complete, the flood inspection team shall provide DDOT with a report that includes the type of follow-up needed. Follow-up tasks may include bridge closure, installation of scour countermeasures, and/or performing a scour evaluation or analysis. The flood inspection report shall be performed within 24 hours of the end of the storm event. The flood inspection report shall be submitted to DDOT within 72 hours of the completion of the storm event. Please note that a flood inspection is categorized as a special inspection as discussed in Section 2.4.5 of this manual. The flood inspection report checklist shall be used for these inspections and shall be attached to the special inspection report. This flood inspection report checklist can be found in APPENDIX A – FORMS & REPORTS.

## 6.5. CHANNEL PROFILE MEASUREMENTS

All bridges over waterways should have a channel profile and channel cross section sheet which is updated by re-measuring the channel depths on a regular basis, usually during the biennial inspection. If the inspection frequency has been increased to once a year, the channel measurements should also be taken every year. Design plans will usually show the channel profile as it existed at the time of construction. Updated channel sounding data will be superimposed over data from previous inspection reports to track changes in the profile/cross section and to detect recent scour. The data shall be recorded on a sketch which clearly locates each sounding point, and identifies the reference used for the readings. Acceptable reference points are the top of the railing or parapet, and the top of the deck. If the top of railing or parapet is used as the reference point, the dimension from the top of the railing to the sidewalk or top of the deck should be recorded so that the reference is not lost in the case the railing is replaced. Each profile or cross section line will be clearly identified by date, color, or line type. These updated measurements should also be accompanied by an evaluation of observed changes and recommendations for action, if needed, within the scour evaluation report or inspection report (e.g., routine, underwater, complex, etc.). Past and current channel measurements should be shown on the sketch in order to detect recent scour. Measurements from the last three inspections should be shown in the sketch.

The channel cross sections shall be determined by taking readings along each fascia of the bridge. The streambed cross sections should reflect the entire bed elevation profile of the structure and include any significant changes in the streambed profiles from previous inspections. If readings were taken during a previous inspection, then new readings should be taken at the same locations from the same reference point on the bridge. If previous readings are not available, then readings should be taken starting adjacent to the beginning abutment and proceeding at spacings less or equal to 10 feet to the end abutment. An additional reading should be taken in front of each intermediate pier.

For bridge substructure units that are submerged in the channel, appropriate inspection techniques should be used to obtain channel depth measurements. If water currents and channel depths are moderate, then the bridge inspector would ordinarily take measurements with a drop line or sounding rod. The drop line method does not work for bridges over large bodies of water or fast currents (e.g., bridges over the Potomac River or over the Anacostia River). These bridges will need special equipment (e.g., electronic depth finder, hydrographic survey, etc.) to obtain the streambed profile and cross sections. Since these bridges are inspected in detail through the underwater inspection program, no attempt should be made during routine NBI inspections to obtain the streambed elevation measurements, and the criteria in Table 6-2 should be followed. The need for special equipment and problems observed due to scour or erosion should be noted in the Bridge Inspection Summary Form. For bridges with water depths greater than 4 feet, underwater inspection techniques are required to obtain the channel bottom measurements. See Chapter 7.0 for further discussion of underwater inspection techniques.

**Table 6-2: Criteria for Channel Profile Measurement**

| CRITERIA | RECOMMENDED FREQUENCY |
|---|---|
| The channel is active and channel activity currently endangers one or more substructure elements. | Every 24 months, plus or minus six months. |
| The channel is active and continued channel activity may endanger one or more substructure elements even though none are currently endangered. | Every 48 months, plus or minus 12 months or during an underwater inspection. |
| The channel is active, but the magnitude of channel activity has little potential to cause substructure problems or the channel is not active. | Every 60 months, plus or minus 24 months or during an underwater inspection. |

# 7.0 UNDERWATER INSPECTIONS

## 7.1. GENERAL

For bridges built over waterways, some water depths are too deep to access and view the conditions of the channel bottom, areas of potential scour, and substructure elements. In these cases, an underwater inspection requiring diving or other appropriate techniques is needed. Scour is the source of most bridge failures, making underwater inspection critical to maintaining a safe bridge inventory. If an examination of submerged portions of the substructure is warranted, then the use of a diver is generally recommended. See Section 7.6 below for further discussion of underwater inspection techniques.

## 7.2. BRIDGES IN THE UNDERWATER INSPECTION PROGRAM

The bridges listed in APPENDIX C – REFERENCE DOCUMENTS have been identified by DDOT personnel as requiring specialized underwater inspection (i.e., divers and sounding equipment). The list includes all bridges over major waterways (Potomac and Anacostia Rivers).

## 7.3. UNDERWATER INSPECTIONS

An underwater inspection is intended to capture the condition and depths of the channel bottom, scour locations, and condition of bridge components below the high waterline. In water depths greater than 4 feet, an underwater inspection may require diving or other appropriate techniques. Underwater inspections are typically completed on an interval of no more than 60-months, as specified by the NBIS, but may require a shorter interval due to the substructure condition rating if that rating is based upon the underwater portions of the substructure element. The inspection reports on file for each bridge provide guidance on which substructure components are to be assessed during the underwater inspection along with inspection procedures specific to the structure. Chapter 3.0 defines DDOT's underwater inspection intervals.

Underwater inspection reports should always note the past and current channel profile measurements needed to detect recent scour. More information on channel profile measurements is provided in Section 6.5 of this manual.

## 7.4. UNDERWATER INSPECTOR QUALIFICATIONS

The qualifications of underwater inspection personnel are detailed in Section 2.3.5. To effectively use the time spent underwater, a diver must know what to look for and must be able to evaluate the significance of what is observed. For this reason, DDOT policy is that divers meet the qualifications of an Inspection Team Leader or be directly supervised at the site by a qualified Professional Engineer.

## 7.5. LEVEL SELECTION PROTOCOL

The appropriate level of inspection will depend on such factors as age, construction material, type of design, stream bed material, presence of corrosion pollution, depth and velocity of flood flows, maintenance history and numerous other factors, and especially condition rating from past inspections and known deficiencies. Refer to Section 12.3.2 in the *BIRM* for additional information on underwater inspection procedures.

The FHWA and NHI break down the level of efforts of underwater inspections as follows:

- **Level I:** Visual, tactile inspection
- **Level II:** Detailed inspection with partial cleaning
- **Level III:** Highly detailed inspection with nondestructive testing

### 7.5.1. *Level I*

Level I inspection consists of a close visual inspection at arm's length with minimal cleaning to remove marine growth. Although the Level I inspection is referred to as a "swim-by" inspection, it must be detailed enough to detect obvious major damage or deterioration. A Level I inspection is normally conducted over the total 100% exterior surface of each underwater element, involving a visual and tactile inspection with limited probing of the substructure and adjacent streambed.

The results of the Level I inspection provide a general overview of the substructure condition and verification of the as-built drawings. The Level I inspection can also indicate the need for Level II or Level III inspections and aid in determining the extent and selecting the location of more detailed inspections.

### 7.5.2. *Level II*

Level II inspection is a detailed inspection that requires that portions of the structure be cleaned of marine growth. It is intended to detect and identify damaged and deteriorated areas that may be hidden by surface growth. A Level II inspection is typically performed on at least 10% of all underwater elements. In some cases, cleaning is time consuming and should be restricted to critical areas of the structure. The thoroughness of cleaning should be governed by what is necessary to determine the condition of the underlying material. Commonly, the critical areas are near the low waterline/splash zone, near the mud line, and midway between the low waterline and the mud line. On pile structures, horizontal bands, approximately 6 to 12 inches in height, should be cleaned at the three critical locations. Below is the minimum number of sides and/or circumference need to be cleaned based on pile shape.

- **Rectangular piles** – the cleaning should include at least three faces
- **Octagonal piles** – at least six faces
- **Round piles** – at least three-fourths of the perimeter
- **H-piles** – at least the outside faces of the flanges and one side of the web

On large elements, such as piers and abutments, areas at least one square foot in size should be cleaned at three or more levels on each face of the element. Deficient areas should be measured, and the extent and severity of the damage documented.

### 7.5.3. *Level III*

A Level III inspection is a highly detailed inspection of a critical structure or structural element, or a member where extensive repair or possible replacement is contemplated. The purpose of this type of inspection is to detect hidden or interior damage and loss in cross-sectional area. This level of inspection includes extensive cleaning, detailed measurements and selected nondestructive and partially destructive testing techniques such as ultrasonics, sample coring or boring, physical material sampling and in-situ hardness testing. The use of testing techniques is generally limited to key structural areas, areas that are suspect, or areas that may be representative of the entire bridge element in question.

## 7.6. UNDERWATER INSPECTION PROCEDURES

### 7.6.1. *Use of Divers*

The use of divers is generally recommended for underwater inspections and may be advisable for scour investigations when water depths are greater than 4 feet. Diving operations must comply with 29 CFR Part 1910, Subpart T - Commercial Diving Operations, and divers shall be properly trained in best industry practices, practice good judgement, and utilize well-maintained equipment which must include a diver communication system.

In accordance with OSHA regulations, all diving operations are required to have a safe practices manual on location (e.g., in the inspector's vehicle or inspection bag located on-site) that outlines the OSHA standards and the employer's policies for executing the requirements of the standards. The manual must include:

- Safety procedures and checklists for diving operations
- Assignments and responsibilities of the dive team members
- Equipment procedures and checklists
- Emergency procedures

A site-specific dive plan with an activity hazard analysis and locations of the closest hospital and hyperbaric chamber should be on -site at the dive location and available to the divers. The divers shall make themselves familiar with the safety plan before the diving operation.

## 7.6.2. *Underwater Inspections*

Below is the assigned level of underwater inspection versus the type of inspection being performed.

**Table 7-1: Level of Inspection for the Type of Underwater Inspection being Performed**

| Underwater Inspection Type | Level of Underwater Inspection |
|---|---|
| **Initial** | Level I on 100% of underwater portions to determine obvious problems. Level II on 10% of the underwater units selected as determined by Level I inspection. |
| **Routine** | Level I on 100% of underwater portions to determine obvious problems. Level II on 10% of the underwater units selected as determined by Level I inspection. |
| **Damage** | The scope of the inspection shall be sufficient to determine the need for emergency load restrictions or bridge closure. Level II inspection, and possibly a Level III, inspection should be used on affected portions of the underwater members to determine the extent of damage to the substructure element with certainty. |
| **Special (Interim)** | Level I on 100% of the portions of the underwater elements that need to be monitored. Level II and Level III inspection, as needed, in order to determine the structural condition of any submerged portion of the substructure with certainty. |

## 7.6.3. *Sounding Techniques*

Soundings should be obtained whenever a bridge is over water. For shallow water, less than 4 feet, the inspectors can wade the stream and collect the sounding measurements around the pier and abutment footings and the channel profiles. For more detailed information on soundings and channel profile measurements, see Section 6.5. There are several different recommended methods for obtaining soundings:

A. **Sounding rod.** A typical sounding rod is a 4 to 6 feet graduated pole that can be folded up or taken apart like a fishing pole. A sounding rod is suitable for channel profile measurements and scour investigations in shallow water.
B. **Drop line.** A typical drop line consists of a weight secured to the end of a 50-feet tape measure. A drop line is suitable for channel profile measurements and scour investigations in shallow or moderately deep water. However, high stream velocities will cause the drop line to drift downstream making it difficult to take accurate measurements.
C. **Electronic depth finder.** The typical electronic depth finder is a portable, battery-operated, 10 lb unit called a fish finder or fathometer. Other versions include a fathometer mounted on a floating foam

board. An electronic depth finder is suitable for channel profile measurements and scour investigations in deep water and faster moving streams.

D. **Pneumofathometer.** For underwater inspections performed by divers, the diver can obtain mudline depths around footings with the pneumofathometer that every diver wears.

Soundings and channel profiles should be referenced to a static point noted on a pier or abutment and the mudline depths should be adjusted relative to the water depth in order to provide measurements that can be compared accurately over time.

## 7.6.4. *Underwater Photography and Video Equipment*

Underwater photo of the substructure must be included in the underwater inspection report. Underwater cameras come with a variety of lens and flash units. Often, visibility is limited, and the camera must be placed close to the subject. Wide-angle lenses are, therefore, most often used. Suspended particles often dilute the light reaching the subject and can reflect light back into the lens. When visibility is very low, clear water boxes can be used. The boxes are constructed of clear plastic and can be filled with clean water. By placing the box against the subject area, the dirty water is displaced, and the camera shot can be taken through the clear water.

Video equipment is available either as self-contained, submersible units or as submersible cameras having cable connection to the surface monitor and controls. Diver-mounted cameras are also available and can record the communications with the diver from the surface.

Remotely operated vehicles (ROV) can also be employed when safety for the diver is in question, after high water events and in the presence of excessive debris. However, an ROV cannot typically perform cleaning operations prior to photos being taken.

## 7.6.5. *Underwater Condition Rating Guidance*

Determination of NBI condition ratings for underwater portions of the substructure should follow the same guidance for the above water portions of the substructure. Refer to Section 4.2.7 of this manual. The substructure condition rating provided in the underwater inspection report should be the rating determined during the underwater inspection.

The overall condition rating of the substructure in the latest routine inspection report should not be updated based on the underwater condition rating. If the condition rating based on the underwater inspection is different from the condition rating recorded in the latest routine inspection report, the lower of the two condition ratings should control when DDOT updates the SI&A in AASHTOWare BrM.

# 8.0 FRACTURE CRITICAL INSPECTIONS

## 8.1. GENERAL

A fracture critical inspection focuses on bridges with fracture critical members as described in Section 8.3. While conducting the fracture critical inspection, inspectors should also inspect any fatigue prone details located on the bridge. DDOT maintains a list of bridges that require inspection of fracture-critical members. The list may be revised as inspections proceed and new locations are identified or new bridges with fracture critical members are constructed. The list includes a location and copy of the specific fracture-critical and fracture prone details and their inspection interval.

A fracture is not always catastrophic, but in situations where non-redundant members are affected, a crack in one element could result in a partial or total collapse of the bridge. The problem of where, when, and how to look for that one crack is best approached in a systematic manner by means of a Fracture Critical Inspection Plan.

The NBIS defines a fracture-critical member (FCM) as a steel bridge member in tension, or with a tension element, with lack of redundancy whose failure would cause a portion or the entire bridge to collapse. Generally, a fracture in an existing bridge or span will begin with a small crack which grows slowly until it reaches its critical size. The critical size depends on the type of steel, the stress in the steel, and the temperature of the steel. Upon reaching the critical size, a crack will grow instantaneously across the remainder of the cross-sectional element. This instantaneous crack growth is what bridge engineers call a fracture.

A fatigue prone detail is a detail on a primary tension component that is susceptible to cracking of the primary component, usually at the connection. Fatigue prone details are a Fatigue Category D, E, or E'. It should be noted that fatigue prone details can also be located on non-fracture critical bridges. For non-fracture critical bridges, any fatigue prone details should be noted in the inspection report and their condition should be noted during each routine inspection.

## 8.2. FRACTURE CRITICAL INSPECTION PLAN

The purpose of a Fracture Critical Inspection Plan is to minimize the possibility of missing potentially catastrophic cracks in members by identifying fracture critical members and increasing the level and types of inspection for those members. The following factors increase the potential for catastrophic fracture:

1. Low redundancy or non-redundancy of bending or tension members
2. Structural details that cause high stress concentrations
3. High design stresses
4. Low standards of fabrication and construction
5. High volumes of truck traffic
6. Heavy overloads
7. Low temperature
8. Deterioration or damage at critical details

When there is a high potential for catastrophic fracture, considerable resources and technical expertise should be brought to bear to detect defects that could develop into cracks or monitor cracks before they reach critical size. A good quality Fracture Critical Inspection Plan will allocate the appropriate resources and technical expertise for the FCM bridge inspection. The following steps are recommended for developing a Fracture Critical Inspection Plan for existing bridges:

1. Identify all FCMs and fatigue-prone details.
2. Identify the critical areas of these members.
3. Identify the critical details within these areas.

4. Evaluate the critical details by considering design, fabrication and construction practices, and detail geometry.
5. Evaluate service conditions by considering truck traffic, overloads and existing deterioration or drainage.
6. Allocate available resources and technical expertise according to the potential for catastrophic fracture as determined in Steps 4 and 5.
7. Clearly identify and address the condition of each fracture critical member and fatigue-prone detail and show their locations on the plans using sketches as needed. Provide a detailed description of any defect identified and recommendations for action.

Steps 1, 2 and 3 are accomplished as explained below in Section 8.4 and in Chapter 10 of the *BIRM*. The AASHTO *MBE*, Sections 6 and 7 provide guidance for Steps 4 and 5.

The Fracture Critical Inspection Plan should be reviewed by the inspection team prior to performing the FCM inspection. After the FCM inspection, if new conditions of the fracture-critical members or fatigue prone details warrant changes to the fracture critical plan, the inspection TL should notify the BIE and recommend that they update the fracture critical inspection plan.

### 8.2.1. *FCM Inspector Qualifications and FCM Inspection Intervals*

The following requirements must be met when conducting FCM inspections of a fracture-critical bridge.

- **Inspector Qualifications.** FCM inspections will be led by a FCM TL. For qualifications of the FCM TL, refer to Section 2.3 of this manual.
- **Inspection Intervals.** All FCMs are to be inspected at intervals not-to-exceed 24 months. Certain FCMs may require inspection at less than 24 months depending on the age of the bridge, equivalent daily fatigue cycles, remaining estimated fatigue life, condition of the FCMs and the stress category of the member. For specifics on whether a FCM inspection should coincide with a routine inspection, refer to Section 2.4.3 of this manual.

## 8.3. FRACTURE CRITICAL MEMBERS

The FHWA has a policy statement Memorandum dated June 20, 2012 entitled “Clarification of Requirements for Fracture-Critical Members”. In summary, this document clarifies the definitions of FCM and their reporting. The Memorandum states that Internal Member Redundancy is not recognized in the classification of FCM. Therefore, a member constructed of built-up plates and angles, such as a riveted girder, it is not eliminated from being an FCM in certain configurations. In addition, the Memorandum states that in the case of Structural Redundancy, a "Refined Structural Analysis" is formally recognized as a means to demonstrate that all or part of a structure is not fracture-critical.

The following examples describe FCM identification and fracture critical areas of bridges:

**Two-Girder Systems.** Steel bridges or spans with only two main girders are fracture critical. Each of the critical areas of a riveted plate girder, i.e., the flanges, consists of several angles and plates all of which must fracture before the flange fails which provides potential added safety benefits, however, the member is still considered an FCM. Steel bridges, or spans with only two main girders, will have a fracture-critical area on each girder at the lower flange in the mid-span region of each span and at the upper flange in the region over each continuous support. The upper flanges near the end supports do not constitute fracture-critical areas.

**Box Girder Bridges, Single Box Design.** The single box design of a steel box girder is fracture-critical. The bottom plate is welded to two or sometimes three web plates, each of which has a flange plate welded to its upper edge. The upper flange plates will be fracture-critical areas in the regions over each continuous support except where the plans show a substantial amount of additional reinforcing steel parallel to the flanges. In this case, the

additional reinforcing steel provides a high degree of redundancy that guards against a sudden catastrophic fracture.

**Steel Box Beam Caps.** Where supports cannot be located directly under the bridge, bridge designers may use a steel box beam cap to span between widely spaced columns. The superstructure is then supported in the mid-span region of the cap. In these cases, there is one fracture-critical area at the lower flange in the mid-span region.

**Truss Bridges.** When a steel truss bridge has only two main trusses, those members in tension are considered FCM until a Refined Structural Analysis is performed to show otherwise. The fracture-critical member could be single-element tension member such as an eyebar or I-beam tension member for multiple eyebars or built-up, riveted tension members. Each fracture-critical tension member would count as one fracture-critical area.

**Suspended Span Bridges, Two-Girder Bridges.** The same criteria apply that were discussed for two-girder systems. In addition, pin and hanger assemblies which may support a two-girder suspended span are considered fracture-critical. If auxiliary support systems (catcher beams) are in place at pin and hanger assemblies, these are considered fracture-critical details.

**Steel Floorbeams.** Floorbeams may be considered fracture critical if it meets one or more of these conditions; floorbeam spacing is greater than 14’-0”; flexible or hinged connections to the support at the girder/floor beam connection; no stringers supporting the deck; and/or stringers are configured as simple beams.

Once the critical areas have been identified, the critical details are identified by referring to Table 6.6.1.2.3-1 of the *AASHTO LRFD Bridge Design Specifications (AASHTO LRFD Specification)*. The *AASHTO LRFD Specification* identifies structural details and assigns each detail to a category which indicates its relative severity. Category "A" details are the best details because they can withstand repeated loading better than the other details which become progressively worse for Categories B, C and so on. Categories E and E' are the worst details.

## 8.4. FRACTURE-CRITICAL INSPECTION TECHNIQUES

Inspection of FCMs are visual, hands-on and within arm’s length, as required by the NBIS. Additional cleaning, clearing, or access methods prior to or during the inspection to ensure that all elements are inspected at an arm’s length may be required.

If the visual, hands-on inspection reveals cracks or suspected cracks, additional nondestructive evaluation (NDE) methods such as ultrasonic, dye penetrant, magnetic particle or other methods should be performed as needed, as approved by DDOT. Previously identified crack locations must be checked, measured, and marked on the member with permanent marker noting the end of the crack and date of inspection. All defects must be documented in the inspection report.

Ultrasonic inspection of pins in pin and hanger systems must be performed to detect internal defects in these components. All NDE tests must be conducted by certified NDE personnel. NDE qualifications are described in Section 2.3.7 of this manual.

## 8.5. FRACTURE-CRITICAL INSPECTION REPORT

The fracture-critical inspection report should be included with the routine inspection report. The fracture-critical inspection report should include at least the following sections:

- Fracture-Critical cover sheet (see APPENDIX A – FORMS & REPORTS)
- Inspection Findings (narrative style)
- Summary and Conclusions
- Sketches and Photographs

### 8.5.1. *Cover Sheet*

The cover sheet shown in APPENDIX A – FORMS & REPORTS is divided into four parts:

1. **General Information:** Under General Information, type the bridge number, bridge name, facility carried, feature crossed, ADT, percent truck in ADT and ADT date.
2. **Equipment Used:** Check all applicable equipment. If the special equipment used is not listed, fill in the blank spaces provided. More than one box can be checked.
3. **Inspection Team/Inspection Date:** Write in the names of the inspectors, the reviewer of the report and the date of the inspection.
4. **Repairs Needed:** Check all that applies. If no repairs are needed, check the "NONE" box; if there are deficiencies needing immediate attention to preserve the life of the bridge, check the "URGENT" box; if the repairs needed can be performed during a normal maintenance schedule, check the “PROGRAMMED" box. More than one box can be checked.

### 8.5.2. *Inspection Findings*

The fracture critical inspection report should include a detailed narrative on the condition of the fracture critical elements inspected. Sketches and photographs should be included and properly referenced in the text. Minor deficiencies or defects should be reported since they might evolve into critical deficiencies or defects. Fracture-critical elements with no notable problems should also be described in the report. Defects should be clearly identified. The type of defect, location and cause should be included in the narrative.

### 8.5.3. *Summary and Recommendations*

The summary should include a listing of deficiencies, recommendations, and the priority of the repairs. Recommendations should focus on reducing the risk of failure.

### 8.5.4. *Plan Sheets, Sketches and Photographs*

The locations of the fracture critical details will be shown on the 11”x17” or 8 ½”x11” plans at the beginning of the fracture-critical inspection report. The sketches and photographs can be included in an appendix or within the text. They serve to enhance and clarify the inspection report. Pictures should illustrate the current condition of the fracture-critical element and should also include defects. See Section 5.2.3 and 5.2.4 for photograph and sketch requirements.

# 9.0 SAFETY INSPECTIONS OF RAILROAD-OWNED BRIDGES

## 9.1. DDOT BRIDGES OVER RAILROAD

In addition to the NBIS inspection of bridges and tunnels in the District, DDOT is responsible for the safety of the traveling public, and therefore performs safety inspections of any railroad-owned bridges crossing over public streets and highways within the District. The intent of these examinations is to perform a cursory visual inspection of the bridge superstructure and substructure and the traffic safety features associated with the roadway beneath the railroad bridge to determine if there are deficiencies that could affect the safe passage of vehicles or pedestrians below. These deficiencies could include loose and delaminated concrete which could fall onto DDOT's facilities below, severe section loss in members, loose or missing connection fasteners, extreme rotations or displacement of bearings, over height vehicle impact damage, and the lack of proper signs and/or hazard markers or the damage of such items. Detailed vertical underclearances are also obtained during each inspection in both directions of traffic at curblines, mid-span or at other points of interest such as high points in the roadway below or low points on the structure above (attachments, splices, etc..) to establish the minimum underclearance and the need for posting. Minimum left and right lateral clearances at each face of the bridge should also be documented. If minimum underclearances below 13'-6" are identified and are not posted, DDOT shall be notified within 24 hours and it shall also be included in the report.

At no time during the safety inspection of railroad-owned bridges should inspectors enter onto railroad property or foul the tracks. If conditions are observed which pose safety concerns and would require access to railroad property to further investigate, the DDOT Project Manager should be notified immediately. The DDOT Project Manager will subsequently notify the respective railroad company to have the condition investigated further. Safety inspections shall be limited to spans crossing over areas accessible to or owned by DDOT, such as roadways or sidewalks. Spans over areas which are fenced off by the railroad company or other private entities shall not be inspected. For multi-span railroad bridges, only those spans over areas accessible to the public shall be included as part of this inspection. These areas include public roadways, pedestrian and other multi-modal facilities, and public parking areas.

The safety inspections are performed at 24-month intervals. The inspection is performed from the ground, sidewalk or roadway below and could utilize a ladder. Maintenance of traffic may also be required to inspect the structure safely. A report is prepared similar to the routine inspection report that is outlined in Chapter 4.0 of this manual; however, it does not include all the forms of the routine inspection report. A sample Safety Inspection Report is included in Appendix B – Example Bridge Inspection Reports with the prescribed order of the respective forms or parts. The following sheets, sketches or forms are included in a Safety Inspection Report and are described in more detail in Chapter 4.0:

- **Bridge Inventory Cover Sheet**
- **Bridge Inspection Summary Report**
- **Bridge Location Map**
- **Sketch of Vertical Underclearances** – A plan view of all obtained underclearances
- **Bridge Inspection Report–Inspection Comments** – This form contains an abbreviated narrative of the structure condition and observed deficiencies
- **Bridge Appraisal Worksheet** – This form generally only contains the ADT, if known, on the roadway below the structure and the minimum vertical and horizontal under clearances
- **Bridge Maintenance and Repair/Rehabilitation Recommendations**
- **Photograph Summary Sheet & Photographs**

DDOT will notify the railroad or agency owning the bridge of any critical deficiencies or required maintenance items noted during the inspection for which the railroad or agency is responsible. Since inspections are not performed within the railroad right-of-way, inspectors do not need to obtain permits from the railroad or railroad specific safety training to complete safety inspections of railroad-owned bridges.

# 10.0 BRIDGE STANDPIPE INSPECTIONS

## 10.1. VISUAL INSPECTION

Where a standpipe or standpipe system is present, all piping, connections, and valves should be visually inspected as part of the routine bridge safety inspection. The visual inspection should be in accordance with the latest version of the *National Fire Protection Association Manuals (NFPA 14, NFPA 25, and NFPA 502)*, and cover defects including corrosion and missing or damaged piping, pipe support hardware, caps, valve handles, and signage. The components that need to be visually inspected include, but are not limited to, the following items:

A. **SIGNAGE:** Note if the standpipe/fire connection signage is visible, not obstructed by vegetation, not missing, leaning, or faded.
B. **STANDPIPE:** Note if the standpipe is present and properly supported by connection brackets. Note if there are defects such as cracks, holed, or corrosion on the standpipe. Note If there are visual obstructions such as vegetation.
C. **SUPPORT/CONNECTION BRACKETS or CLAMPS:** Note if the standpipe support brackets or clamps that are attached to the bridge are in good condition. Look for defects such as missing anchor bolts, corrosion, bent brackets or bolts, missing connections, etc.

Provide repair recommendations for any defects observed to the standpipe or standpipe system within the bridge inspection report. Provide at least one typical photo of the standpipe system within the bridge inspection report.

## 10.2. HYDROSTATIC AND FLOW TESTING

In accordance with *National Fire Protection Association Manual NFPA 25,* hydrostatic and flow tests on each standpipe or standpipe system are to be performed at regular intervals, not to exceed five years. Coordinate testing with the D.C. Fire and Emergency Medical Service Department (DC FEMS). The contact information is shown below.

**DC FEMS Contact Information:**
Office of Risk Management
Safety Battalion
2531 Sherman Avenue, N.W.
Washington, D.C. 20009
202-277-1889 (Direct No.)
202-673-3320 (General Office No.)

Note: The contact information is subject to change at any time.

The testing should also include a visual inspection as described in Section 10.1. A standalone report document should be submitted to DDOT for their records. The report should include, but not be limited to, the following information:

- Inspection/testing contractor name and applicable licenses and certifications
- Executive summary with description of standpipe system and method of testing
- Visual Inspection Findings, including representative photographs of standpipe system and defects
- Hydrostatic Test Report
- Flow Test Report
- Contractor's Materials and Test Certificates
- Recommendations for Repair

# 11.0 LOAD RATINGS & STRUCTURAL ANALYSIS

## 11.1. LOAD RATINGS

This chapter provides guidance in the development of bridge load ratings. Additional information on load rating policies can be found in Section 14 of the DDOT Design and Engineering Manual and the current version of the MBE.

Typically, bridges are not load rated as a part of a routine inspection. However, during the inspection, discovery of significant loss of section, continued deterioration, or suspected loss of capacity may prompt the TL to recommend a load rating analysis as approved by the BIE. Conditions that may trigger the need to analyze the load carrying capacity may include:

- Steel - Significant loss of section to web areas in high shear areas
- Steel - Significant loss of section to flange areas in high moment areas
- Steel - Significant distortion that was not noted in or has worsened since the previous inspection
- Reinforced Concrete – Wide shear cracks in high shear areas or transverse cracks in high moment areas
- Prestressed Concrete – Large spalled areas with exposed stirrups in high shear areas or longitudinal steel/prestressing strands in high moment areas, especially if reinforcement is no longer developed
- Impact damage that potentially affects structural capacity
- Any condition not noted above that the inspector considers affecting structural capacity

Any structural element that has a element condition state that contains the phrase “warrants analysis” (i.e Condition State 4) will have the load ratings evaluated. The evaluation can be calculated or can be based on engineering judgment by the BIE, Bridge Preventive Maintenance Engineer, or the LRE based on the condition of the structure, assumptions, or past experience and knowledge. Engineering judgment should be reserved for structures where limited information is available from as-built plans and for where the structure’s performance in-place can demonstrate its structural capacity, such as large reinforced concrete structures or structures under fill.

Load rating analysis will not be performed without direction from the BIE.

### 11.1.1. *Verification of Section Properties*

The as-built or previously documented load rating and member section property assumptions should be compared to the current as-inspected section properties to justify a new load rating analysis. If existing section properties have not deteriorated since the completion of the previous load rating, a new rating will not be warranted. If existing section properties have deteriorated, re-evaluation of the capacity of the bridge will be required. Consult the BIE if there are questions as to whether a load rating will be recommended based on findings from the inspection.

### 11.1.2. *Inspector Generated Load Ratings*

If after verification of the existing load rating data an updated analysis is recommended by the Team Leader and approved for analysis by the BIE, a load rating analysis shall be performed by a qualified LRE at DDOT’s contracted design consultant firm. For LRE qualifications, refer to Section 2.3.6 of this manual.

All load ratings and submissions must follow the guidelines set forth in this Manual, the DDOT Design and Engineering Manual, and the MBE.

### 11.1.3. *Load Posting Sign Placement Verification*

Refer to Section 14.6 of the DDOT Design and Engineering Manual for guidance on load posting signage and refer to Section 2B.59 of the MUTCD for guidance on placement. Verify the restriction posted on the sign at the bridge matches that of the most recent load rating and the values found in SI&A. The BIE must be notified with a critical finding if the incorrect load posting signage or no sign is present, signage is not visible due to obstructions, or signage requires repair/replacement.

### 11.1.4. *Additional Testing and Structural Analysis*

If deemed necessary by the BIE, additional testing and/or analysis of a critical finding that may affect the load carrying capacity of the bridge shall be performed in order to determine the extent, existence, or severity of the critical finding. For additional testing methods and procedures refer to Chapter 15 of the BIRM. For guidance on load ratings refer to Section 6 of the MBE and Section 14 of the DDOT Design and Engineering Manual. Consultant teams shall receive direction and approval from the BIE prior to performing additional testing, that requires specialized equipment or personnel, and structural analysis as a result of a critical finding. If the structural analysis results in the need for a repair or emergency retrofit, the consultant may be directed by the BIE to provide repair details for the defect in question.

# 12.0 QUALITY CONTROL/QUALITY ASSURANCE

## 12.1. INTRODUCTION

Quality Control (QC) and Quality Assurance (QA) procedures are required to maintain a high degree of accuracy and consistency for the inspection program. The NBIS requires bridge owners establish a Quality Control and Assurance Program as part of their bridge inspection program to assist in carrying out the following responsibilities:

1. Maintain public safety and confidence
2. Protect public investment
3. Maintain a desired level of service
4. Provide bridge inspection program support
5. Provide accurate bridge records
6. Fulfill legal responsibilities as defined in the Code of Federal Regulations

This section presents the Quality Control and Quality Assurance (QC/QA) procedures and policies related to the bridge inspection program and is a subsection to the Department's Bridge Inspection Manual. It is applicable to DDOT staff and consultant bridge inspection staff.

### 12.1.1. *Purpose and Benefits of the QC/QA Program*

DDOT has established a bridge inspection program to meet the NBIS requirements. Consultant bridge inspectors collect inventory and condition data for each bridge, and the information is updated in the inspection reports. The accuracy and consistency of the inspection and associated documentation are vital to public safety and also impact prioritization, work recommendations, programming, and funding appropriations. In recognition of the importance of this information, DDOT has established QC and QA procedures to ensure a high quality and consistent inspection program.

The QC/QA procedures are integrated into all aspects of the bridge inspection. The procedures include the essential requirements which demonstrate and emphasize that adequate care, skill, and thoroughness be utilized during the inspection and in the preparation of bridge inspection reports. The Asset Management Branch will put in place those management tools needed to define, implement, and assess the effectiveness of the bridge inspection program. The bridge inspection program needs to allow feedback to occur to improve performance and institute actions to address areas where inspectors or the inspection program are deficient and to prevent errors from reoccurring in the future. One tool for accomplishing this is through the use of a successful QC/QA program. The QC/QA program, along with other initiatives presented throughout this Manual, ensures the following:

1. Inspection personnel have the appropriate qualifications, tools, information, and resources available to adequately perform bridge inspections.
2. Inspection personnel understand clearly DDOT's defined, processes, and procedures as a basis for performing bridge inspections and preparing reports.
3. Inspection personnel are sufficiently trained and certified to ensure acceptable work performance.
4. Appropriate management oversight is allocated for work performance and to identify, and correct problems as they are encountered.

To be effective, the QC/QA procedures must be followed by all personnel, and the procedures must be evaluated and updated on a regular basis or as needed. The program shall be flexible and updated routinely by memos and directives from the BIE.

### 12.1.2. *Definitions*

The terms Quality Control and Quality Assurance are not interchangeable. The definitions detailed in Section 1.3 of this manual describe the distinction between the two terms as they are used in this manual.

## 12.2. QUALITY CONTROL PLAN

DDOT's QC Plan consists of four key components that are necessary for successful implementation and compliance with the NBIS. The four components are as follows:

1. QC Inspection Review Procedures
2. QC Roles and Responsibilities
3. Qualification of Inspection Personnel
4. Resolution of Data Errors

### 12.2.1. *QC Inspection Review Procedures*

The first component of the QC Plan pertains to Quality Control Inspection Review Procedures. This has been separated into three areas where proper review procedures are necessary to implement an effective QC Plan. The QC review procedures are as follows:

1. QC of Inspection Operations
2. QC of Documentation
3. QC of the Inspection Report

These procedures ensure that bridge inspectors are submitting and reporting inspection data correctly and to a consistent standard. All three QC review procedures are performed throughout different phases of the inspection and reporting process.

#### 12.2.1.1. ***QC of Inspection Operations***

QC of inspection operations includes tasks during the inspection and pre-inspection stages.

The pre-inspection activities primarily involve the inspection planning and reconnaissance aspects and may involve both office and field work to properly prepare for the inspection. The pre-inspection activities include the following:

1. Perform general reconnaissance prior to the date of inspection to properly prepare for the upcoming inspection including the following:
   - Assess access requirements and equipment needs
   - Assess traffic control needs
   - Assess any special inspection equipment or evaluation needs
   - Check tide charts (if bridge is over tidal waterway)
   - Verify the status of any on-going construction or repair work
   - Perform brief site visit if deemed necessary
2. Assure that the inspection vehicle includes all required inspection tools and equipment, and all applicable inspection coding/reference manuals.
3. Coordinate necessary traffic control in accordance with this Manual.
4. Assign various inspection duties amongst the inspection team.
5. Review prior inspection report(s), available plans, and maintenance history.

During the inspection, the inspection team shall comply with the established protocol, as outlined in this Manual, including the following items:

1. Proper PPE is worn by all inspection personnel.
2. Proper selection and use of access equipment (UBIV, Bucket Truck, ladders, boats, and hip/chest waders, etc.) are being utilized.
3. Confirm appropriate measuring devices and inspection tools are being utilized.
4. Ensure that any identified defect or deterioration locations are given adequate attention and that sufficient measurements are obtained.
5. If applicable, assure that proper fracture critical bridge inspection procedures are followed as per the bridge inspection file and in accordance with Chapter 9.0 of this manual.
6. If applicable, assure that proper complex bridge inspection procedures are followed as per the bridge inspection file.

The Quality Control – Inspection Preparation Checklist (QC-IPC) will be completed by the inspection TL to assist in preparation of the inspection and to use as a reference and safety/equipment check during the inspection. See Appendix A – Forms & reports of this manual for the QC-IPC checklist.

### 12.2.1.2. *QC of Documentation*

The QC of Documentation includes the review of each individual component of the inspection report in accordance with this Manual. The quality of the documentation review is accomplished with efforts from members of the consultant inspection team. The QC review process includes the review of all inspection documentation by other inspection member(s) participating on a particular inspection. If the individual performing the review is not the TL, then the TL should review all documentation as well. The QC review of the inspection documentation is to include the following:

1. Proper recording of field conditions with clear, clean, and complete field notes.
2. Ensure that standard photographs along with photos of deficient areas have been obtained in accordance with this Manual.
3. Review applicable inspection forms listed in Section 4.1 for compliance with this Manual. Complex bridges may have additional forms or documentation that are required and identified in the Complex Bridge Inspection Procedures for that particular bridge.
4. Review sketches or marked-up drawings to confirm that sufficient detail has been provided to properly illustrate defects or deterioration observed during the inspection. If applicable, confirm that adequate documentation for inspection findings warranting analysis has been obtained in accordance with this Manual.
5. Ensure that documentation of access required for inspection has been provided, if applicable.
6. Review and confirm NBI data updates based upon observed inspection findings, recent rehabilitation, or modifications to the bridge (ex. bridge widening).
7. Review and confirm that appropriate maintenance and repair needs have been identified and called out within the inspection notes.
8. Review and confirm that assigned element and NBI condition ratings match conditions observed during the inspection.
9. Confirm that appropriate NBI inventory data have been successfully updated such as year of ADT, ADT and the truck percentage. Verify that all NBI data is collected during an inventory or initial inspection of a bridge.
10. If applicable, confirm that documentation for further investigation/evaluation needs, such as NDE, to identify, clarify and/or resolve observed deficiencies found during the inspection has been identified.
11. Identify Critical Findings.

### 12.2.1.3. *QC of Reports*

QC of reports involves reviewing the inspection report to ensure that all documentation has been cross-referenced successfully and that the report is checked for overall completeness. This is accomplished in two phases. The first phase pertains to review procedures carried out by the inspection team, while the second phase occurs once the inspection team is ready to submit the inspection report to DDOT. The consultant QCM will perform the second phase review prior to submittal to DDOT. DDOT requires that the Quality Control - Bridge Inspection Report Checklist (QC-BIRC) be completed by the QCM and submitted to DDOT with the completed inspection report. See APPENDIX A – FORMS & REPORTS of this manual for the Quality Control - Bridge Inspection Report Checklist.

The QC review of the inspection report includes the following:

1. Check for overall completeness of the report.
2. Compliance of inspection reporting procedures in accordance with this Manual.
3. Cross-reference of element quantities to that of the inspection comments.
4. Cross-reference inspection documentation to confirm assigned element condition-state ratings and comments. This includes the photo report, Waterway Sketch & Scour Sounding Sheet, Beam Sketch Sheet, and any other pertinent sketches.
5. Confirm that the inspection team members and the designated TL have been identified within the report.
6. Cross-reference and confirm that the current load rating in the bridge inspection report matches the load rating data in the most current load rating report or summary and that of any posting signs at bridge. If posting signs exist, confirm that all posting signs are in place as per DDOT policy.
7. Confirm that the report has been signed and dated by the TL.
8. Confirm that Critical Findings have been documented and communicated properly.
9. Acknowledge that the QC procedures outlined in this chapter are being followed. This should be done by adding the signature/date of the consultant QCM within the final report.

## 12.2.2. *QC Roles and Responsibilities*

The primary responsibility of enforcing the QC Plan is the responsibility of the BIE; however, all inspection personnel share some part of implementing, enforcing, and/or performing the duties of the QC Plan. Consultants performing inspections shall designate an engineer that meets the requirements in the NBIS for that of a consultant QCM and has primary responsibility for overseeing the QC/QA program for assigned inspection tasks. The roles and responsibilities for all inspection personnel have been broken out for each QC Inspection Review Procedure.

### 12.2.2.1. ***Bridge Inspection Engineer (BIE)***

The BIE serves an important role in the QC Plan. Responsibilities extend into all four QC review procedures. The BIE is the individual in charge of updating and enforcing the QC Plan. Tasks associated with this include the following:

1. Coordinate and implement basic training programs for staff and specialized instruction on aspects of the work requiring special attention, e.g., fatigue and/or fracture critical details, complex bridges, scour evaluation, etc.
2. Provide staff with access to the latest applicable standards and training of proper use of inspection tools and equipment.
3. Coordinate and communicate the DDOT's QC Plan to bridge inspection personnel and consultants.

BIE Duties for the QC of Reports

The duties of the BIE, in regard to QC of reports for consultant bridge inspections, have been broken down into three general areas: report review, resolution of data errors and verification of follow-up actions.

1. **Report review**
   The BIE is to review each inspection report for the items discussed in Section 12.2.1.3. In performing QC report reviews, the BIE is required to fill out the Quality Control - Inspection Report Review Form (QC-IRRF) for each bridge upon completion of the review. More discussion about the form can be found in Section 12.2.4 and a copy of the template can be found in APPENDIX A – FORMS & REPORTS.

2. **Resolution of data errors**
   Upon the review of the inspection report, the BIE is responsible for working with the consultant to clarify any data or condition rating errors or discrepancies. This includes errors or clarifications that need to be addressed for the various inspection forms, photo report, and sketches. A more comprehensive discussion of the types of data and errors and procedures for addressing them are presented in Section 12.2.4.

3. **Verification of any follow-up inspection related action**
   Any additional inspection, evaluation or testing that was recommended by the inspection team shall be verified and approved by the BIE. Once approved, the BIE shall take the necessary steps in coordinating the work. This could include working with consultants and performing a deck survey or taking concrete core samples, utilizing inspection consultant(s) to provide NDE services or underwater inspection services, and reaching out to the FHWA or specialty contractors/vendors on an as needed basis. Also, if any posting signs were found to be missing or incorrect, then necessary measures are to be taken to have the situation corrected.

## 12.2.2.2. *Consultant QCM*

The consultant QCM serves an important role in the consultant's QC plan. Their responsibilities are as follows:

1. Perform the QC inspection report review. The consultant QCM is required to fill out the Quality Control – Bridge Inspection Report Checklist (QC-BIRC) for each bridge upon completion of the review. More discussion about the form can be found in Section 12.2.1.3 and a copy of the template can be found in APPENDIX A – FORMS & REPORTS.
2. Coordinate and implement basic training programs for consultant staff and specialized instruction on aspects of the work requiring special attention, e.g., fatigue and/or fracture critical details, complex bridges, scour evaluation, etc.
3. Provide consultant staff with access to the latest applicable standards and training of proper use of inspection tools and equipment.
4. Coordinate and communicate DDOT's and the consultant's QC Plan to bridge inspection personnel.

## 12.2.2.3. *Bridge Inspection Team Leader*

**TL Duties for the QC of Inspection Operations**

The TL holds the majority of the responsibility when it comes to performing and assuring that activities during the pre-inspection stage and the actual inspection stage are completed in accordance with this manual. It is the TL's responsibility to verify assigned tasks, as identified in Section 12.2.1.1, have been completed successfully.

**TL Duties for the QC of Documentation**

The TL is ultimately responsible for all the inspection documentation regardless of which TM performs the inspection. As a result, the TL is required to review all inspection documentation for completeness, clarity, accuracy, and compliance with established protocol presented throughout this manual. Specific items to be reviewed during the QC of documentation are presented in Section 12.2.1.2. Regarding fracture critical and/or

complex bridge inspections, emphasis shall be placed on following the procedures identified within the bridge inspection file for those bridges and throughout this manual.

**TL Duties for the QC of Reports**
The TL is ultimately responsible for the inspection report regardless of which TM actually performed the inspection. As a result, the TL is required to review the report in its entirety for completeness, clarity, accuracy, and compliance with established protocol presented throughout this manual.

### 12.2.2.4. *Bridge Inspection Team Member*

**TM Duties for the QC of Inspection Operations**
The main responsibility of the TM, in the pre-inspection activities, is to assist the TL with evaluating access issues and equipment and safety needs for the upcoming inspection. The TM shall review the portions of the inspection report related to assigned activities prior to performing those tasks.

The role of the TM in the actual inspection operation is determined by which responsibilities are assigned by the TL. The roles and duties assigned to the TM could include any of the following and should be performed in accordance with the policies and procedures established in this manual:

- Performing the actual inspection
- Taking photograph documentation during the inspection
- Taking under clearance and/or scour measurements
- Completing various inspection forms including the Waterway Sketch Sheet, Sounding Sheet, Beam Sheet and any other sketch deemed necessary during the inspection to adequately document deterioration and inspection findings

In regard to safety, it is the TM's responsibility to make sure they are wearing the appropriate safety gear and follow proper safety procedures in accordance with this manual and/or consultant protocol. The TM should be familiar with their surroundings during the inspection and constantly evaluate and update their approach to the inspection as needed to accommodate changes in traffic, weather and other factors.

**TM Duties for the QC of Documentation**
In regard to tasks assigned to the TM during the inspection, the main responsibility will consist of performing those tasks in accordance with this manual.

The TM may be assigned the task of reviewing various inspection documentation generated by the TL or another inspection member. Activities associated with this are presented in Section 12.2.1.2. This review is performed prior to the TL reviewing the report and finalizing everything prior to submitting the report to the BIE.

**TM Duties for the QC of Reports**
If the TM is assigned the task of creating the inspection report, then their main responsibility will consist of writing the inspection report and verifying that the photos and associated forms and sketches are properly cross-referenced within the report in accordance with this manual.

The TM may be assigned the task of reviewing reports for inspections that were performed by the TL or another inspection member. Activities associated with this are presented in Section 12.2.1.3. This review is performed prior to the TL reviewing the report and finalizing everything prior to submitting the report to the BIE.

## 12.2.3. *QC of Inspection Personnel*

QC of inspection personnel consists of ensuring that all inspection staff meet the qualifications as defined in Section 2.3. The responsibility of ensuring that qualified personnel are inspecting DDOT's bridges belongs to the consultant QCM. The consultant QCM will verify that the TL and all TM's for each inspection have the

appropriate qualifications. The BIE has the responsibility to verify that the consultant QCM has verified that all their TL's and TM's have the appropriate qualifications.

Inspector qualifications shall be documented, verified and tracked by the inspection consultant and shall be provided to the BIE to maintain a master list of all approved inspection personnel for participating on DDOT-owned bridge inspections. Although the BIE is also required to verify and update information for all previously approved inspection personnel on a yearly basis, the inspection consultant firm bears the responsibility of verifying the qualification of their staff to fulfill the NTIS/FHWA requirements. Copies of certifications and registrations are stored in electronic format for each inspector along with a spreadsheet. Items that are to be updated and/or verified include the following:

- Years of Experience
- Certifications and Registrations
- Training and Refresher Training

This information, as well as the addition of new inspection personnel, may be updated during the course of the inspection year as information is submitted to the BIE. It is the responsibility of the consultant's Bridge Inspection Program Manager to provide this updated personnel information to the BIE.

## 12.2.4. *Resolution of Data Errors*

Throughout the QC process, data errors may be encountered that will need to be addressed. These errors can stem from the quality of the documentation or from that of the report itself. The errors may be detected during any phase of the inspection or review process. Errors will generally fall under one of the following categories:

- NBI Inventory Data
- Element Selection and Condition Rating Data
- NBI Condition Rating Data
- Inspection Forms and Sketches
- Photographic Documentation

The process to resolve any data error found should follow these general guidelines:

1. Any missing or indiscernible data or information from the report, form, or sketch should be brought to the attention of the inspection consultant if the error is found by the BIE through the use of the QC-IRRF (refer to APPENDIX A – FORMS & REPORTS). It will then ultimately be the responsibility of the inspection consultant to acquire the missing data or clarify the data as necessary before the BIE accepts the report as final.
2. Discrepancies in inventory data or assigned element and/or NBI condition rating data in regard to established procedures and protocol presented within this manual should be brought to the attention of the inspection consultant. The discrepancy should be discussed and, if determined necessary, additional measurements, sketches or photos will be obtained to resolve the issue. This could also result in the original inspection team revisiting the bridge.
3. Ultimately, the BIE has final say and has the authority to supersede the NBI condition assignments made by the inspection team that performed the inspection. If this occurs, the BIE will provide proper documentation for inclusion in the report to justify the BIE's rating decision and document the difference in the provided ratings between the Inspection Team and the BIE. DDOT must keep all records of QA/QC in the respective bridge files so that they can be made available for review at any time.

All data errors found by the BIE should be included in the QC-IRRF that is filled out as inspection reports are submitted to DDOT. The form includes the date that the BIE performed the review as well as the initials of the inspection team members. The first initials are that of the designated TL for that particular inspection. Once the

error has been corrected or the discrepancy resolved, the BIE shall update the form to identify that the error(s) have been resolved and the final report has been received and reviewed.

## 12.3. QUALITY ASSURANCE PROCEDURES

To comply with the NBIS, bridge owners are required to have a bridge inspection program that includes QA procedures. QA procedures are important to maintain a high degree of accuracy and consistency in the inspection program. Accuracy and consistency of the bridge inspection data are the foundation of the bridge management systems and operations. The accuracy and consistency of the inspection and documentation is vital because it impacts programming and funding appropriations, and public safety.

The next few pages present DDOT's QA Procedures which have been broken down into five separate areas:

1. Bridge Inspection Review Processes
2. Inspection Program Review Process
3. Sampling Protocol
4. Inspector Disqualification Procedures
5. Roles and Responsibilities of the QA Team

### 12.3.1. *QA Bridge Inspection Review Procedures*

This section provides guidelines and procedures for administering QA reviews for the field inspection, documentation, reports, and bridge inspection files in regard to the inspection process. The QA review has been organized into three separate components to address all areas listed above. The QA Inspection Review process proceeds through all three components sequentially. First, the inspection file review is completed, then the office review, and finally the field reviews are conducted.

All three procedures are performed for the same group of selected bridges. However, it does not involve underwater inspections that only assess the substructure, channel, and waterway conditions. A QA review of underwater bridge elements must be conducted if observable field conditions do not align with what is in the inspection report, or if there are concerns about defects to the underwater bridge elements. The documentation provided within the underwater inspection report is reviewed to verify that the underwater inspection findings justify the NBI condition ratings.

The bridges are randomly selected by the BIE as inspection schedules are being established and assigned to consultants. The random selection encompasses various types of bridges including the following: routine, fracture critical, complex, and posted bridges. Prescriptive sampling protocol details can be found in Section 12.3.3. The BIE can modify their selection requirements as to the type of bridges that the quality review will incorporate and emphasis may change from year to year depending on general inspection results, observed problems, inconsistencies in reporting, or the desire to monitor new or critical evaluation items. As part of the QA Inspection Review process, the Quality Assurance - Inspection Review Report (QA-IRR) reporting template has been established. A sample QA-IRR can be found in APPENDIX A – FORMS & REPORTS.

The goals of the QA Inspection Review procedures are two-fold. The first goal is to identify deviations or discrepancies that are associated with a particular consultant and to bring it to their attention so the issue(s) can be resolved. The second goal is to highlight improvements that may need to be made to the bridge inspection program to address and resolve issues found throughout the QA review process. This may include setting up special training on specific items, issuance of clarifying memorandums or directives, or meetings with staff and/or consultant inspection teams.

#### 12.3.1.1. ***QA Office Review Procedures***

The QA Office Review Procedures involve reviewing all documentation and the entire inspection report for accuracy and conformance to procedures and protocol presented throughout this manual. Essentially, this

portion of the QA Inspection Review is similar to the review performed during the QC Inspection Review process for the documentation and reports. Tasks associated with this portion of the QA process can be found in Sections 12.2.1.2and 12.2.1.3. The one additional task involved with the QA procedure involves confirming that all items identified on the QC-IRRF (see APPENDIX A – FORMS & REPORTS) have been addressed and that there is a corresponding sign-off date for each item. Anything found during the QA Office Review process shall be recorded by the BIE on the Quality Assurance – Inspection Review Report (QA-IRR): Office Review form. See Appendix A - Forms & Reports of this manual for the QA-IRR form.

### 12.3.1.2. *QA Field Review (Audit Inspection) Procedures*

An independent audit consultant shall conduct independent field reviews of inspection findings and inspection reports on a sampling basis to confirm or measure the level of the bridge inspection program. The sampling bases shall constitute of at least 5% of the bridges in DDOT's inventory. The sampling of bridges for the field review should represent a variety of structure types, sizes and complexity contained in the inventory, and other factors that are specified in the bridge inspection manual. Other factors used for sampling of bridges are as follows:

1. Subconsultant inspections
2. Whether the bridge is posted or not
3. Bridge deficiency status
4. Whether the bridge is programmed for rehabilitation or replacement
5. Whether the bridge has had critical findings/LOC and the status of any follow-up action
6. Bridges with unusable changes in condition or appraisal ratings since the last inspection
7. Bridges that require special inspections (underwater, fracture-critical or other)

An inspection team from the independent audit consultant participate in performing a field review, also known as an audit inspection, visiting each bridge that was randomly selected by the BIE.

The audit inspection will consist of a visual inspection only, unless a critical defect or deterioration is observed, and that was not found or reported during the original inspection. In this case, the necessary steps shall be taken by the independent audit consultant inspection team to obtain traffic control and/or equipment access to gain hands-on access of the area in question. Regarding a critical defect or deterioration that was noted during the inspection, if feasible those areas shall be accessed by the independent audit consultant inspection team to confirm the severity and that adequate documentation of the defect was obtained.

The tasks of the independent audit consultant inspection team that are associated with QA Field Review include the following:

1. Verify NBI inventory data
2. Verify the element selection for the bridge
3. Verify element and NBI condition ratings through performing an independent, cursory inspection of the bridge
4. Verify measurements of section loss, bearing loss and/or sketches denoting significant deterioration
5. Verify load posting and signage
6. Verify any identified maintenance recommendation selections
7. Verify/spot check scour/soundings and/or under clearance measurements

See Appendix A – Forms & Reports of this Manual for a sample form of the Quality Assurance – Inspection Field Review Checklist (QA-IFRC). The QA-IFRC shall be completed prior and during the field review effort by the audit inspection team. The checklist is meant to assist the reviewer with the field review.

A Quality Assurance – Inspection Field Review Report (QA-IFRR) report will be prepared by the audit consultant. The report shall specify the time, date, bridge number, and location of each field review visit. The report shall

state the TL's name, title, and duties assigned of all inspection team members performing the field review. Discrepancies between the original inspection and the field review shall be documented via written description and photograph in the QA-IFRR. The QA-IFRR report will include the QA-IFRCs as backup documents. Positive attributes of the reviewed inspections will also be documented. See Appendix A – Forms & Reports of this manual for a sample form of the QA-IFRR and QA-IFRC.

All findings from the independent audit consultant inspection team's QA-IFRR will be backchecked by the BIE and recorded by the BIE on the Quality Assurance – Inspection Review Report (QA-IRR): Field Review form. See Appendix A - Forms & Reports of this manual for the QA-IRR form. After the BIE completes their review, it is possible that some of the findings will require additional action from that of the inspection consultant, such as additional maintenance/repair items or sketching additional or missed deterioration. Likewise, some findings may not require action, but will need to be discussed or clarified with the inspection consultant.

Any major finding during the field review shall be discussed immediately with the BIE so that they ay relay the information to the inspection consultant TL and have them correct the information in the inspection report. The QA-IFRR and the QA-IFRC for each field review will be sent to the inspection consultant TL within one week of the actual field visit so that they can make any necessary updates to the inspection report.

## 12.3.2. *Inspection Program Review Procedures*

A QA program would be incomplete without procedures for assessing and reviewing the bridge inspection program to assure that the NBIS requirements are being met. To get an unbiased, independent review of the inspection program and how it complies with the NBIS, inspection program review procedures have been incorporated into the QA process.

### 12.3.2.1. ***NBIP Compliance Review of DDOT-Owned Bridges***

The inspection program review procedure for DDOT's bridge inspection program consists entirely of the FHWA's National Bridge Inspection Program (NBIP) Compliance Review procedures. Activities associated with the NBIP Compliance review are performed by the FHWA Division Engineer and therefore, serves as an independent review of the inspection program. The NBIP Compliance Review process has been broken into 23 metrics that address all significant areas of an inspection program. The 23 metrics relate directly to the wording and subsections in the Code of Federal Regulations, 23 CFR 650 Subpart C. Each metric has multiple requirements and is evaluated on a yearly basis. Further details and discussion regarding the FHWA compliance review process can be viewed in the NBIP Compliance Review document accessible from the FHWA's website.

The NBIP Compliance Review process involves all District-owned bridges on the bridge inventory. In accordance with the compliance review process, if the FHWA finds DDOT's bridge inspection program to be "Substantially Compliant" for a particular metric, then an Improvement Plan would be initiated requiring for the deficiency pertaining to that metric to be addressed. Likewise, a Plan of Corrective Action (PCA) would be initiated for a particular metric that was found to be "Non-Compliant". For metric(s) originally receiving a "Non-Compliant" rating, a "Conditional Compliant" classification will be assigned upon the FHWA approval of the PCA. It is the responsibility of the Asset Management Branch to address any deficiency found during the NBIP Compliance Review and to ensure that all PCA(s) and Improvement Plan(s) be adequately addressed and in the timeframe agreed upon with the FHWA. The BIE serves in the primary role for accomplishing.

As part of evaluating the bridge inspection program, the NBIP Compliance Review process involves a random sampling of DDOT's NBI bridge inventory. Different random selections are made to evaluate the bridge inspection files, inspection reports, and to perform a field review consisting of a cursory inspection. This is similar to, and in addition to, that of the QA Inspection Review Procedures that DDOT performs on a yearly basis. For details as to how the random selection generation is made, refer to the FHWA NBIP Compliance Review document.

#### 12.3.2.2. *Other Bridge Owners*

DDOT does not inspect privately-owned bridges within the city; however, if the bridge spans over a public road or highway, a safety inspection is performed to detect any portion of the underside of the bridge that may fall and impact pedestrian or vehicular traffic below. If a privately owned bridge carries public traffic or goes over a public road, it has to be included in the bridge inventory reported to NBI. The private-owned bridge inventory primarily consists of railroad bridges and at least one privately owned pedestrian bridge as identified by DDOT. Since these bridges are not part of DDOT's bridge inventory, they do not require a comprehensive compliance review to be performed. DDOT's BIE will, however, confirm the qualifications of the consultant's inspection staff performing the safety inspections to confirm they meet the requirements of the NBIS.

### 12.3.3. *QA Sampling Protocol*

This section presents the sampling protocol that is incorporated into the random bridge selection as part of the QA Process for a particular inspection year. The bridges are randomly selected during the beginning of the inspection year to filter out bridges that may be under construction or bridges that have complex access restrictions. The random selection percentages are carried out for all NBI bridges due for inspection in a given inspection year.

#### 12.3.3.1. *Routine Inspections*

The sampling parameter for all NBI bridge inspections for a given inspection year is 5% of the bridges to be inspected that year, regardless of the design or material type. This is applied to assigned bridge inspections for all consultants.

#### 12.3.3.2. *Fracture Critical Inspections*

The sampling parameter for all NBI Fracture Critical bridge inspections for a given inspection year is 25% of the fracture critical bridges to be inspected that year. In the case that a particular team has less than four (4) fracture critical bridge inspections assigned to them, a minimum of one (1) bridge shall be selected. The selected fracture critical bridges may be included with the 5% of the routine inspection random selection. This means, that it is possible that a fracture critical bridge may be randomly selected for the routine inspection portion and selected for the fracture critical inspection as well.

#### 12.3.3.3. *Complex Bridge Inspections*

The sampling parameter for all NBI Complex bridge inspections for a given inspection year is 25% of the complex bridges to be inspected that year. The selected complex bridges will be included with the 5% of the routine inspection random selection. In the case that a particular team has less than four complex bridge inspections assigned to them, a minimum of one bridge shall be selected. It should be noted that the entirety of the complex bridge does not need to be inspected as part of the QA. A single span or portions of several spans may be reviewed during the QA.

**Note:** The complex Frederick Douglas Memorial Bridge over the Anacostia River will have a separate operations and maintenance manual.

#### 12.3.3.4. *Posted Bridges*

The sampling parameter for all NBI load posted bridges for a given inspection year is 25% of the posted bridges to be inspected that year. The selected load posted bridges will be included in with the 5% of the routine inspection random selection. In the case that a particular team has less than four posted bridges assigned to them, a minimum of one bridge shall be selected.

## 12.3.4. *Disqualification Process of Inspection Staff*

The last component of the inspection QA program involves the disqualification and the requalification requirements for inspection staff that lose their TL status. This process is applicable for all consultant inspection personnel participating in the inspection of a DDOT-owned bridge. There are two ways that a TL can be disqualified: delinquency of training certification or unsatisfactory performance. Examples of unsatisfactory performance include failing to follow safety procedures in the field, being under the influence of illegal substances while on the job, etc. The disqualification process only addresses inspection related deficiencies.

### 12.3.4.1. ***Refresher Training***

**Disqualification Trigger**

The first way for disqualifying a TL involves becoming delinquent in training requirements. Per the qualification requirements, all inspection personnel are required to take and successfully pass the three-day NHI Bridge Inspection Refresher Training Course every 60 months upon completion of the NHI Comprehensive Bridge Safety Inspection Course. In the event that an inspector does not successfully pass the three-day refresher course, or the inspector does not take the refresher course within the 60 month time frame, that inspector will be considered disqualified and will lose their TL status. A score of less than 70% constitutes unsuccessful completion of the course.

## 12.3.5. *QA Roles & Responsibilities*

The roles and responsibilities involved with the QA Procedures for DDOT's bridge inspection program are spread among the BIE and the audit inspection consultant. The BIE will procure the assistance of an independent audit inspection consultant to handle the tasks associated with the field review portion of the QA Procedures. The audit inspection team's function is to monitor the inspection program by independently field visiting and inspecting a representative sample of bridges previously inspected by consultant inspection teams, and preparing a report comparing findings for consistency and accuracy. All members of the audit inspection team should have knowledge of the DDOT bridge inventory and bridge maintenance procedures.

As a result of their extensive experience and broad spectrum of background in the bridge related field, the audit inspection consultant will be able to provide the technical expertise necessary for assuring that the bridge inspection program is efficient, consistent and is maintaining a high level of quality. The BIE will perform an annual review in order to measure the quality and uniformity of the inspections and documentation, and to identify specific items or procedures in the bridge inspection program where clarification, revision, or additional training is needed.

### 12.3.5.1. ***QA Role - Bridge Inspection Engineer***

The BIE has a majority of the responsibility for QA and has oversight of the QA initiative. There are two separate areas of the QA review process: the QA Inspection Review and QA Inspection Program Review.

**QA Inspection Review Process**

The tasks associated with the QA Inspection Review process are as follows:

1. Randomly select bridges to be reviewed.
2. Perform QA review of the inspection report.
3. Start completing the first two sections of the QA-IRR based upon the findings of the previous two items.
4. Schedule dates with the audit inspection consultant team to conduct the field reviews for each of the bridges selected.
5. Evaluate how the load ratings and maintenance repair recommendations get incorporated into the inspection report.
6. Complete the last portion of the QA-IRR based upon the findings of the audit inspection for each of the bridges selected.

7. Schedule dates to meet with each consultant Project Manager to discuss the QA-IRRs. This allows for the BIE to reinforce the value of the QC/QA process and assist with communicating among the inspection staff any concerns or additional needs that could improve the inspection program.
8. Finalize each QA-IRR by collecting the required signatures and dates, save documents electronically, and submit to each inspection consultant by email for them to include with their records.
9. Follow-up on any process or program issues that surface as a result of the QA review process. This could involve an issue that needs clarification for the inspectors and how to accomplish a certain task or an additional process that needs to be incorporated into an existing procedure to resolve the issue. The issue could be something affecting either the Bridge Inspection, Bridge Maintenance, or Load Rating programs.

More detailed discussion of these processes can be found in Section 12.3.1.

**QA Inspection Program Review Process**
The QA Inspection Program Review only involves bridges that are District-owned. The role of the BIE for participating in this review process includes the following:

1. Coordinate with FHWA during the NBIP Compliance Review Process.
2. Participate in meetings with the FHWA.
3. Provides insight and takes the lead on load rating and maintenance issues involved with the compliance review process.

More detailed discussion of these processes can be found in Section 12.3.2.

### 12.3.5.2. *QA Role – Audit Inspection Team*

The audit inspection team consists of TLs and TMs from the independent audit inspection consulting firm. This team is responsible with assisting the BIE with the following tasks:

1. Assist in QA review of the randomly selected bridges and their inspection reports and provide comments to the BIE.
2. Perform the field reviews (audit inspections) of the selected bridges.
3. Submit QA-IFRR and QA-IFRC to the BIE after the completion of the field reviews.
4. If requested by the BIE, attend the meeting with the inspection consultant to discuss the QA-IRRs .

# 13.0 SAFETY

## 13.1. INTRODUCTION

Bridge inspection is inherently dangerous and requires continual awareness on the part of each member of the inspection team. This chapter provides individuals and organizations involved with bridge inspection information aimed at ensuring the safe completion of inspection activities on DDOT bridges. Additional information provided in this chapter includes relevant regulations, requirements, and procedures for personal equipment, access equipment, site conditions, and responses to on-site emergencies. In addition to the information presented in this manual, the safety regulations and guidelines set forth in the Bridge Inspector's Reference Manual (2012), Chapter 2, should also be followed.

## 13.2. SAFETY ROLES & RESPONSIBILITIES

Safety for oneself and others is the responsibility of all involved in the inspection process. All participants should have the appropriate training for their assigned tasks and the equipment they will use. Types of safety training may include Confined Space Entry training, Fall Protection training, American Red Cross CPR, American Red Cross Frist Aid, OSHA 10-Hour Construction Safety & Health training, etc. The following is a list of key personnel involved in bridge inspections and their roles and responsibilities regarding safety.

### 13.2.1. *Team Member*

Bridge Inspection Team Members (TM) are responsible for the condition of their own equipment, removing unsuitable equipment from service, and reporting unsafe conditions. Inspectors should recognize their own limitations and comfort level and communicate them with their supervisor and team members.

### 13.2.2. *Team Leader*

The Bridge Inspection Team Leader (TL) shall be familiar with applicable safety laws, able to recognize potential health concerns, ensure compliance when performing inspection tasks, and include safety in the planning process including an analysis of conditions at the bridge site such as potential confined spaces and environmental hazards. The TL is responsible for ensuring that the appropriate equipment is available and enforcing its proper use. The TL shall conduct safety meetings and complete the Job Safety Analysis (JSA) document when starting a new inspection task, site conditions change, new team members are present, and before unfamiliar work is performed in order to:

- Review new or different tasks to be performed
- Identify potential hazards and discuss solutions to mitigate or remove hazards
- Identify unusual conditions associated with the bridge site
- Discuss traffic control procedures
- Verify equipment condition and use
- Discuss emergency contacts and emergency response procedures

### 13.2.3. *BIE/Consultant Project Manager*

The BIE and consultant project managers shall be familiar with applicable safety and health laws, enforce safety policies, and ensure that inspectors have the appropriate training and equipment necessary to safely perform their jobs. Project managers shall ensure that training certificates are kept on file and current, review incidents as they occur, and facilitate discussion to periodically review safety practices. Refer to Section 13.5 for incident reporting requirements.

The BIE is additionally responsible for distribution of this manual and communication of updated DDOT policies to consultant project managers. All consultant project managers are responsible for disseminating new or updated information to their inspectors.

### 13.2.4. *DDOT Safety Officer*

The DDOT Safety Officer will review incident reports and maintain documentation pertinent to on-site accidents. The Safety Officer is responsible for periodically reviewing safety practices and altering current standards or augmenting training to foster a safe working environment. Refer to Section 13.5 for incident reporting requirements.

## 13.3. SAFETY REGULATIONS & GUIDANCE

When inspecting DDOT bridges, consultant inspectors shall be bound to the safety standards set forth in the BIRM, OSHA Safety & Health Regulations for the Construction Industry (29 CFR 1926), and the FHWA's Manual on Uniform Traffic Control Devices (MUTCD). The following sections refer to specific subparts and articles of those documents and provide guidance where necessary, but inspectors should be familiar with and follow pertinent standards.

### 13.3.1. *Personal Protective and Life Saving Equipment*

29 CFR 1926 Subpart E governs the use and minimum requirements for most PPE. Foot, head, hearing, eye, and respiratory protection standards are covered there. Remaining PPE such as high-visibility safety apparel is governed by the MUTCD in Section 6D.03. While in many cases it is the employer's responsibility to supply PPE to the inspector, it is the individual's responsibility to maintain and inspect the equipment. Expired, damaged, and defective PPE should be reported and replaced immediately.

Inspection activities involving access equipment will present the danger of head injury due to accidental impact with bridge components; therefore, hardhats or other approved head protection should be worn at all times during these activities. Eye protection becomes necessary when particles become airborne, such as sounding concrete or brushing or scraping an element.

Respiratory protection may be necessary at any time based on the surrounding environment and conditions at the bridge site. Many types are available for various atmospheric hazards. Inspectors (TLs and TMs) should carefully assess potential hazards and select the appropriate protection. Respiratory protection should especially be considered when cleaning, working in areas of significant animal debris (e.g., pigeon droppings), entering enclosed box members, disturbing lead-based paint, and working near construction.

Subpart E also governs work over or near water and the use of U.S. Coast Guard-approved life jackets or buoyant work vests, life (ring) buoys, and safety boats. All three are considerations when working over or near water where there is a drowning hazard present. Safety boats may be used when conditions warrant and will be determined on a case-by-case basis. Clarifications to the OSHA standards state that life jackets may not be necessary when fall protection systems are suitable to alleviate the drowning hazard; however, life (ring) buoys and a safety boat should still be available.

### 13.3.2. *Access Methods*

This subpart covers safe practices for the use of most means of access required for bridge inspection.

#### 13.3.2.1. ***Lift Vehicle Access Equipment***

29 CFR 1926 Subpart L governs the use, maintenance, and condition of aerial lifts. Subpart O governs motor vehicle and mechanized equipment usage on jobsites.

All access equipment, including bucket trucks, aerial lifts, and under bridge inspection vehicles (UBIV), must be erected, deployed, and maintained by trained and, if applicable, certified personnel. Inspectors shall ensure that all access equipment has been correctly maintained and is in good working condition prior to its use by running basic checks of mechanical equipment to verify that the system is working properly. Equipment requiring maintenance shall be put out of service immediately and reported to the appropriate individual for repair or replacement.

Inspectors shall refrain from using or operating equipment with which they are not familiar. Inspectors shall understand and follow the limitations and usage cases defined by the manufacturer. Bucket trucks, aerial lifts, and UBIVs should have documentation available on the vehicle stating the safe working envelope and appropriate environmental conditions. High winds, soft or wet soils, and steep slopes may preclude the safe operation of certain access equipment. Modern equipment may include safety checks (limit switches) that prevent the operator from maneuvering the equipment outside of the safe working envelope; however, inspectors should not rely on these to prevent unsafe situations. Such equipment may also include system overrides allowing potentially unsafe positions, but only trained personnel should utilize this feature.

### 13.3.2.2. *Ladder & Scaffolding*

29 CFR 1926 Subpart L governs the use, maintenance, and condition of work platforms. Subpart X governs stairways and ladders.

All access equipment, including ladders and scaffolding, must be erected, deployed, and maintained by trained and, if applicable, certified personnel. Inspectors (TLs and TMs) shall ensure that all access equipment has been correctly maintained and is in good working condition prior to its use by performing a visual check. Equipment requiring maintenance shall be put out of service immediately and reported to the appropriate individual for repair or replacement.

Care should be taken when loading and unloading ladders from vehicles and transporting them on-site, especially up and down slopes. When leaving the job site, inspectors should verify that all equipment is stowed and secure for transportation.

### 13.3.2.3. *Working Adjacent to Traffic*

When working either on foot or in inspection access equipment adjacent to live traffic, inspectors must wear the appropriate high-visibility safety apparel as governed by the MUTCD in Section 6D.03. Inspectors shall refrain from entering live traffic lanes for any reason.

### 13.3.2.4. *Working over or Near Water*

29 CFR 1926 Subparts E and O govern work performed over or near water. Typical inspector activities over or near water include when walking or climbing on catwalks or bridge elements, when using a UBIV or manlift, and when working from boats or barges. When walking or working near unguarded edges, a U.S. Coast Guard-approved life jacket or buoyant work vest shall be worn. A lifesaving skiff or safety boat shall be immediately available.

### 13.3.2.5. *Boat Safety*

The District of Columbia Harbor Master governs the education and certification requirements for operation of a motorized waterborne vessel on DC waterways. The District of Columbia Boater Education Certificate (or equivalent) must be obtained prior to operating the safety boat. Vessel operators who are required to have a Boater Education Card must carry the card on board the vessel and have it available for inspection by an enforcement officer. Each person working from a boat shall be provided with a U.S. Coast Guard-approved life jacket or buoyant work vest.

Care should be taken when loading and unloading boats and equipment from vehicles and trailers. When leaving the job site, inspectors should verify that the boat and equipment are properly stowed and secure for transportation.

### 13.3.2.6. ***Climbing & Rope Access***

Assisted free climbing and industrial rope access to towers, cables, and other bridge elements are governed by the Society of Professional Rope Access Technicians (SPRAT). SPRAT provides standards through their Safe Practices for Rope Access Work and Bridge Inspection-Typical Rope Access Techniques documents. These access methods shall be erected, maintained, and utilized by personnel professionally trained and certified in SPRAT techniques.

## 13.3.3. *Fall Protection*

29 CFR 1926 Subpart M governs the design, use, and maintenance of various fall protection systems. In general, fall protection shall be used when working at heights of 6-feet and higher and with lifts, bucket trucks, UBIVs, and other similar access equipment. The most frequently used fall protection for inspections is a personal fall arrest system made up of a harness, lanyard, and anchor point. While potentially acceptable for some purposes, inspectors should be aware that belt systems are no longer acceptable for most inspection activities. Instead, a full body harness shall be used. Refer to Subpart M and the OSHA Standard Interpretations for guidance.

## 13.3.4. *Confined Spaces*

29 CFR 1926 Subpart AA governs confined space entry, permitting, training, and equipment. OSHA defines a permit-required confined space as a confined space that has one or more of the following characteristics:

1. Contains or has a potential to contain a hazardous atmosphere;
2. Contains a material that has the potential for engulfing an entrant;
3. Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross-section; or
4. Contains any other recognized serious safety or health hazard.

Confined spaces in DDOT bridge inspections can include the interiors of steel box girders or long or full culverts. In the case of culverts not deemed to be a confined space where access or maneuverability is not restricted, use of an air meter shall still be used to confirm that adequate air conditions exist for inspection personnel.

All participants in a confined space entry shall be trained in OSHA permit-required confined space entry procedures; however, the TL will determine the appropriate permit requirements, equipment, and controls for a safe entry per OSHA standards.

## 13.3.5. *Diving Operations*

29 CFR 1910 Subpart T provides the regulations for commercial diving operations. Divers shall be properly trained in best industry practices, practice good judgement, and utilize well-maintained equipment in good working order which must include a diver communication system, regardless of diving method.

In accordance with OSHA regulations, all diving operations must have a safe practice manual available at the dive location outlining the OSHA standards and the employer's policies for implementing the requirements of the standards. The manual must include:

- Safety procedures and checklists for diving operations
- Assignments and responsibilities of the dive team members
- Equipment procedures and checklists
- Emergency procedures

Divers should also have a site-specific dive plan available at the dive location with an activity hazard analysis and locations of the closest hospital and hyperbaric chamber.

### 13.3.6. *Bridges over Railroad*

When inspecting within the right-of-way of railroads or other agencies, inspectors shall follow the appropriate agency standards. This may include additional permitting procedures, training for agency-specific regulations, and safety programs not included in this manual. Contact the applicable agency for details and lead times on the appropriate measures. AMTRAK, CSX, and the Washington Metropolitan Area Transit Authority (WMATA) require additional safety training and certification through their courses. No bridge inspection personnel shall enter onto AMTRAK, CSX, or WMATA property without approval from the agency in question.

## 13.4. PERSONAL SAFETY

### 13.4.1. *Clothing*

In addition to PPE, proper clothing should be worn that is appropriate for the weather and anticipated activities. Inspectors should be aware of the signs of heat and cold stress in themselves and others and cease work activities when symptoms present themselves.

Long pants and sleeves, as well as gloves, can help to prevent many hazards inherent in bridge inspection such as cuts, poisonous plants, sunburn, and insect bites. Clothing and equipment should not be loose-fitting or hanging from the body in a manner that presents a snagging or tripping hazard when performing inspection activities.

### 13.4.2. *Waders*

When waders are worn for inspection purposes, inspectors must be aware to avoid conditions that could cause the waders to fill with water and drag the inspector under. Slipping, stepping in a scour hole or other deep area, and quick moving currents can cause waders to overtop and fill. Even in calm weather conditions, storms upstream of the inspection site may generate high flows or flash flooding in culverts and streams. Inspectors shall use caution when in the waterway, utilizing a scour pole or rod to probe the channel bottom, confirm water depth, help identify hazards, and provide stability while moving about the waterway. Inspectors may wear a personal flotation device depending on his or her comfort level or the presence of a drowning hazard. Never use waders without another qualified person present.

## 13.5. INJURY, ACCIDENT, AND EQUIPMENT DAMAGE

### 13.5.1. *Personal Injury*

In the event of a serious accident or injury, contact emergency medical personnel immediately by calling 911 or another approved emergency contact outlined in the JSA. When reporting, be clear and accurate, providing exact location for emergency responders. Do not move the injured person while waiting for medical assistance unless it is essential to prevent further injury.

Assist the injured person and stay with them while waiting for medical assistance, but first aid should not be administered by non-medical personnel except in the case of severe bleeding or cessation of breathing.

As soon as time permits, notify the BIE and consultant project manager of the incident. The BIE shall contact DDOT's Traffic Management Department to make them aware of the situation and to coordinate assistance from the Traffic Section, if needed. A full account will be issued to the DDOT Safety Officer for investigation and analysis. Additionally, the injured personnel (or TL/supervisor) will complete an Incident Report form and submit it to the BIE, their supervisor, and consultant Human Resources (HR) representative within 24-hours, if possible. The Incident Report form is available in Appendix A – Forms & Reports of this manual.

## 13.5.2. *Traffic Accident*

When a work or access vehicle is involved in a traffic accident, general information must be obtained and reported to the BIE and DDOT Safety Officer. The following information should be sent via email to the BIE and DDOT Safety Officer within 24 hours of the incident:

- The make and license number of each vehicle involved in the accident
- Photographs of damage and location of the accident
- The name, telephone number, and insurance information for all drivers involved in the accident
- The names and phone numbers of any witnesses to the accident, including inspection team members
- If the assistance of police is necessary, request a copy of the official police report

Use the Incident Report form, if available to facilitate documenting the info needed. The Incident Report form is available in APPENDIX A – FORMS & REPORTS of this manual.

## 13.5.3. *Equipment Damage*

Equipment such as the UBIV, bucket truck, work trucks, ladders, or boats damaged when in use shall be reported immediately to the TL and appropriate consultant personnel so the problem can be rectified, and the safety of future inspection personnel is not in jeopardy. Document the cause and known extent of the damage with photographs to accompany the description.

# APPENDIX TABLE OF CONTENTS

D.C. Department of Transportation
Operations Administration
Asset Management Branch
Bridges and Tunnels

# Fracture-Critical Inspection

BRIDGE NO.: _____ HIGHWAY: _____ INSPECTION
OVER: _____ DATE:

DESCRIPTION _____

_____

PRESENT POSTING: _____ SUFFICIENCY RATING: _____

YEAR BUILT: _____ DATES OF MAJOR REHABILITATION: _____

NUMBER OF SPANS: _____

CLEAR WIDTH BETWEEN CURBS: _____

APPROACH ROADWAY WIDTH INCLUDING SHOULDERS: _____

TYPE OF DECK AND SURFACING: _____

MILEPOST: _____ ADT (% TRUCK): _____ YEAR ADT: _____

EQUIPMENT USED: _____

_____

_____

FRACTURE CRITICAL TYPE:

| | | | |
|---|---|---|---|
| _____ | TWO GIRDER SYSTEM | _____ | PIN & LINK ASSEMBLY |
| _____ | CROSS GIRDER SYSTEM | _____ | SUSPENDED SPANS |
| _____ | HANGER ROD SYSTEM | _____ | SWING SPAN |
| _____ | CURVED STEEL BOX GIRDER | _____ | BASCULE SPAN |

INSPECTION TEAM LEADER: _____

INSPECTION TEAM MEMBERS: _____

_____

_____

_____

_____

_____

REVIEWED BY: _____

REPAIRS NEEDED: _____ NONE _____ PROGRAMMED _____ URGENT

**2019 Edition**

D.C. Department of Transportation
Operations Administration
Asset Management Branch
Bridges and Tunnels

**Bridge #** _____

**Bridge Name:** _____

## LOAD RATING SUMMARY-

| Load Type | GVW (TONS) | Controlling Rating | Software Used | Critical Members | Controlling Location | Controlling Force |
|---|---|---|---|---|---|---|
| **Design Trucks** | | **Factor** | | | | |
| HL-93 (INV) | | | | | | |
| HL-93 (OPER) | | | | | | |
| | | **Tons** | | | | |
| Deck (INV) | | | | | | |
| Deck (OPER) | | | | | | |
| | | **Tons** | | | | |
| HS-20 (INV) | 36 | | | | | |
| HS-20 (OPER) | 36 | | | | | |
| **Legal Trucks** | | **Tons** | | | | |
| Type 3 | 25 | | | | | |
| Type 3S2 | 36 | | | | | |
| Type 3-3 | 40 | | | | | |
| NRL | 40 | | | | | |
| SU4 | 27 | | | | | |
| SU5 | 31 | | | | | |
| SU6 | 34.75 | | | | | |
| SU7 | 38.75 | | | | | |
| **Permit Trucks** | | **Tons** | | | | |
| DC-90 | 45 | | | | | |
| DC-147 | 73.5 | | | | | |
| **Emergency Vehicles** | | **Tons** | | | | |
| EV2 | 28.75 | | | | | |
| EV3 | 43 | | | | | |
| SU6TV | 67.5 | | | | | |

**Recommended Load Rating:**

| NBI Code | Inventory Rating, (Item 66) Tons | Operating Rating, (Item 64) |
|---|---|---|
| | | |

**Recommended New Posting:**

**Calculated By:** _____

**Checked By:** _____

**Signature:** _____

**Date:** _____

**Seal:**

**Bridge #** _____

**Bridge Name:** _____

## LOAD RATING COMMENTS/ASSUMPTIONS

D.C. Department of Transportation
Operations Administration
Asset Management Branch
Bridges and Tunnels

# 2020 BRIDGE INSPECTION REPORT
## NBI RATINGS

**BRIDGE NO.:** _____ **HIGHWAY:** _____
**OVER:** _____

NBI Coding: 0-2 Critical, 3 & 4 Poor, 5 & 6 Fair, 7-9 Good, N Not Applicable, NV Not Visible

| | Rating | | Rating | | Rating |
|---|---|---|---|---|---|
| **SI & A ITEM 58 DECK (MATERIALS: CONCRETE)** | | | | | |
| Wearing Surface | | Curbs | | Railings Protective Coating | |
| Joints, Expansion, Open | | Sidewalks | | Delineation (Curve Markers) | |
| Joints, Expansion, Sealed | | Parapets | | Soffit | |
| Joints, Other | | Median barrier | | Fence | |
| Drainage System | | Railings | | S.I.P. Forms | |
| **SI & A ITEM 59 SUPERSTRUCTURE** | | | | | |
| Main Member – Steel | | Floor System Connections | | Fixed Pot Bearings | |
| Main Member – Concrete | | Secondary Members | | Steel Protective Coating | |
| Main Member – Timber | | Secondary Member Connections | | Hanger Assemblies | |
| Main Member – Connections | | Machinery (Moveable Spans) | | | |
| Floor System Members | | Expansion Pot Bearings | | | |
| **SI & A ITEM 60 SUBSTRUCTURE** | | | | | |
| **ABUTMENT** | | | | | |
| Bearing Area/Caps | | Backwalls | | Embankment | |
| Above Ground | | MSE Wingwalls | | | |
| Foundation (Footing, Piles, Piers) | | Slope Protection, Riprap, Drainage | | | |
| **INTERMEDIATE SUPPORT** | | | | | |
| Caps – Concrete | | Above Ground – Steel | | Collision Protection System | |
| Caps – Steel | | Above Ground – Timber | | Concrete Protective Coating | |
| Underwater (2016 Diving Report) | | Above Ground – Masonry | | | |
| Above Ground/Water - Concrete | | Foundation (Footing, Piles, Piers) | | | |
| **SI & A ITEM 61 CHANNEL & CHANNEL PROTECTION** | | | | | |
| Channel Banks | | Riprap | | Vegetation | |
| Channel Bed (Scour) | | Dikes | | Stream Alignment | |
| Waterway Opening | | Jetties | | Drift | |
| **SI & A ITEM 62 CULVERTS** | | | | | |
| **STRUCTURE** | | | | | |
| Barrel – Top Slab | | Corrugated Metal Pipe (CMP) | | Headwall | |
| Barrel - Walls | | Reinforced Concrete Pipe (RCP) | | Apron | |
| Barrel - Bottom Slab | | Other Pipe | | Wingwalls | |
| Barrel - Joints | | Arch | | Barrel - Adequacy of Opening | |
| **APPROACHES** | | | | | |
| Embankments | | Relief Joints | | Delineation | |
| Embankment Retaining Walls | | Approach Slab | | Sight Distance | |
| Slope Protection | | Drainage | | Sidewalks | |
| Roadway Beyond Approach Slab | | Guide Rail | | Traffic Barriers | |
| **MISCELLANEOUS** | | | | | |
| Signs | | Warning Devices | | Grounding Cables | |
| Illumination | | Utility Conduits | | Fire Protection System Water Pipes | |

**Special Equipment Used:** _____ **Inspection Dates:** _____
**No. Hours (Field & Report):** _____
**Inspection Team:** _____ **Inspected By:** _____

**D.C. DEPARTMENT OF TRANSPORTATION**
**OPERATIONS ADMINISTRATION – MAINTENANCE DIVISION**
**CRITICAL FINDING REPORT FORM**

**BRIDGE NO._____**

This form shall be used by the NBIS Inspection Team Leader for any bridge which requires immediate action due to one of the following reasons:

- Bridges with deficiencies in primary or fracture-critical members; or
- Bridges with scour and/or hydraulic problems; or
- Bridges with Condition Ratings of 3 or less for the superstructure or substructure or an appraisal rating of 3 or less for waterway adequacy; or
- Bridges with deficiencies which have already or will soon result in a substantial reduction in safe load capacity or a danger to the traveling public.

In case where the deficiency may pose immediate danger to public safety, the Team Leader shall immediately notify the Chief, Bridge Maintenance Branch of a "Critical Finding" and request one of the following actions (check the appropriate box) to be taken by DDOT:

☐ **An immediate load posting of ___ tons.**
☐ **An immediate closure of one or more traffic lanes.**
☐ **An immediate closure of the bridge to all traffic.**
☐ **Other**

Requested By:_____
NBIS Inspection Team Leader Date

Brief Description of Critical Finding: See attached documents

_____

For all cases, the team leader shall note the Critical Finding in the NBIS Inspection Report with recommendations for needed maintenance, strengthening or replacement and submit it to the NBIS Bridge Engineer of the Asset Management Division. The NBIS Engineer shall evaluate the condition of the bridge and recommend a course of action to the Manager, Bridges and Tunnels Asset Management Branch.

Review/Evaluation:_____
NBIS Bridge Engineer Date

Recommended Action:

_____

_____

_____

Approved: _____
DDOT Chief, Bridges and Structures, Maintenance Division Date

Corrective Action Completed: _____ Restrictions: _____

D.C. Department of Transportation
Operations Administration
Asset Management Branch
Bridges and Tunnels

# FLOOD RESPONSE BRIDGE INSPECTION CHECKLIST

BRIDGE NO.: _____ DATE: _____

HIGHWAY: _____ OVER: _____

INSPECTORS: _____

## SUMMARY

- ☐ Initial Flood Inspection
- ☐ Return Flood Inspection (inspection #____ for this flood event)

BRIDGE STATUS:
- ☐ Bridge may remain open
- ☐ Bridge should be closed

*Reason for Inspection:*
- ☐ Scour Critical List
- ☐ Requested by DDOT

*Inspection Type:*
- ☐ Visual (inaccessible)
- ☐ Wading/Probings
- ☐ Diver

INSPECTION STATUS:
- ☐ Bridge may remain open
- ☐ Bridge should be closed
- ☐ Bridge should be closed

## FINDINGS:

*Superstructure Condition (cursory visual inspection):*
- ☐ Superstructure Rotation
- ☐ Superstructure Movement
- ☐ Debris on Superstructure (Evidence of overtopping)

RECOMMENDATIONS:
- ☐ No repairs required
- ☐ Maintenance needed
- ☐ Evaluation for repairs

*Substructure Condition:*
- ☐ Undermining/Footing Exposure
- ☐ Settlement
- ☐ Rotation

***CALL BIE IMMEDIATELY WITH SAFETY ISSUES OR EMERGENCY REPAIRS***

*Channel & Channel Protection:*
- ☐ Channel Scour
- ☐ Bank Erosion
- ☐ Fallen Trees/Debris Jam
- ☐ Stream Mitigation
- ☐ Damage/Relocation to Existing Countermeasures

*Perform soundings and attach sounding sheets to the Flood Response Bridge Inspection Report*

Notes: _____

D.C. Department of Transportation
Operations Administration
Asset Management Branch
Bridges and Tunnels

# QUALITY CONTROL - INSPECTION PREPARATION CHECKLIST (QC-IPC)

| | | | | | |
|---|---|---|---|---|---|
| **DATE OF FIELD REVIEW:** | | **BRIDGE NUMBER:** | | **BRIDGE INSPECTION TEAM LEADER:** | |
| **TYPE OF ACCESS EQUIPMENT USED:** | | **TRAFFIC CONTROL REQUIRED:** | | **INSPECTION TEAM MEMBERS:** | |

**SAFETY CHECKLIST**

| | |
|---|---|
| Safety Vest Worn | |
| Light Bar on Truck Activated | |
| Hard Hats Worn (If Applicable) | |
| Truck Parked Safely | |
| Any Safety Concerns Noted | |

**COMPLIANCE WITH APPLICABLE INSPECTION PROCEDURES**

**TOOL CHECKLIST FOR INSPECTION TRUCK/VEHICLE**

| | |
|---|---|
| Camera | |
| Laser Measuring Meter | |
| Portable Fathometer | |
| 6' Rule | |
| 25' Measuring Tape | |
| 100' Measuring Tape | |
| Wire Brush | |
| Digital Caliper | |
| Pick Hammer | |
| Flashlight | |
| Short Scour Pole | |
| Long Scour Pole | |
| Torpedo Level | |
| 2' Level | |
| 6' Level | |
| Binoculars | |
| Pick | |
| Trowel/Scraper | |

**DOCUMENTATION OF DETERIORATION OR DEFECTS**

**RECONNAISSANCE ISSUES PROPERLY ADDRESSED**

**PROPER SELECTION & USE OF INSPECTION TOOLS & EQUIPMENT**

**OTHER MISCELLANEOUS ISSUES OR CONCERNS**

D.C. Department of Transportation
Operations Administration
Asset Management Branch
Bridges and Tunnels

# DDOT - Quality Control - Bridge Inspection Report Checklist (QC-BIRC)

| | | | |
|---|---|---|---|
| Bridge Number/ID: | | Inspection Date: | |
| Inspection frequency: | | Reporting Date: | |
| Bridge Carries: | | Feature Crossed: | |
| Ward | | OR Local Agency: | |
| Team Leader: | | TL Organization: | |
| QA/QC Reviewer: | | QA/QC Review Date: | |
| Load Rating Performed? | Yes / No | Last Load Rating Date: | |
| U/W Insp. Performed? | Yes / No | Last U/W Insp. Date: | |
| Diving Inspector: | | NHS/Non-NHS/Local | |

| Y | N | N/A | |
|---|---|---|---|
| ☐ | ☐ | ☐ | Team Leader meets NBIS requirements. |
| ☐ | ☐ | ☐ | Load Rating Engineer meets NBIS requirements and is licensed in the District of Columbia. |
| ☐ | ☐ | ☐ | Diving Inspector meets NBIS requirements and has completed an FHWA approved comprehensive bridge inspection or underwater diver bridge inspection training course. |
| ☐ | ☐ | ☐ | Inspection completed by required inspection date. |
| ☐ | ☐ | ☐ | Inspection interval(s) conform to DDOT Guidelines for Bridge Inspection Frequencies |
| ☐ | ☐ | ☐ | Inspection report submitted in a timely manner. |
| ☐ | ☐ | ☐ | Bridge identification number is correct. |
| ☐ | ☐ | ☐ | Condition ratings are in accordance with DDOT and NBIS NBI Rating Guidelines. |
| ☐ | ☐ | ☐ | SI&A data is correct. |
| ☐ | ☐ | ☐ | Condition notes support condition ratings. |
| ☐ | ☐ | ☐ | Representative photographs of both general and poor conditions are included with photo log. |
| ☐ | ☐ | ☐ | Bridge elevation, deck, approach and superstructure photographs are included. |
| ☐ | ☐ | ☐ | Work recommendations and priorities are appropriate for conditions. |
| ☐ | ☐ | ☐ | Bridge Element list captures all bridge components present. |
| ☐ | ☐ | ☐ | Element quantities appear to be accurate. |
| ☐ | ☐ | ☐ | Element condition states are appropriate and reflect overall bridge conditions. |
| ☐ | ☐ | ☐ | Requests for Action have been submitted (as needed). |

☐☐☐ Channel cross-section/sounding measurements are recorded and filed (as needed).

☐☐☐ Scour Plan of Action information is correct (as needed).

☐☐☐ Fracture critical members and fatigue sensitive details are inventoried (as needed).

☐☐☐ Critical Findings/LOC were reported in a timely manner to Bridge Inspection Engineer.

Any areas of the bridge inaccessible? Y / N If so, what areas and why?

_____

_____

Additional special inspection reports reviewed as part of QC:

| | | | |
|---|---|---|---|
| ☐ | Initial Inspection Report | ☐ | Other Special Inspection Reports |
| ☐ | Bridge Diving Inspection Report | ☐ | Damage Inspection Reports |
| ☐ | Fracture Critical Inspection Reports | ☐ | Scoping Reports |
| ☐ | Fatigue Sensitive Inspection Reports | ☐ | Request for Action forms |
| ☐ | Bridge Plans and/or Sketches | ☐ | Correspondence |
| ☐ | Maintenance Records | ☐ | Scour Evaluation |
| ☐ | Scour Plan of Action | ☐ | Channel Cross Sections |
| ☐ | Others | | |

Comments:

_____

_____

_____

_____

PE Stamp of QC/QA Manager

_____
Signature, QC/QA Manager

_____
Printed name, QC/QA Manager

D.C. Department of Transportation
Operations Administration
Asset Management Branch
Bridges and Tunnels

# QUALITY CONTROL – INSPECTION REPORT REVIEW FORM (QC-IRRF)

**DATE OF BRIDGE INSPECTION ENGINEER REVIEW:** _____ **REVIEWED BY:** _____

**BRIDGE NUMBER:** _____ **INSPECTION DATE:** _____ **INSPECTION TEAM:** _____

| ITEM | DESCRIPTION | RESOLUTION DATE |
|---|---|---|
| PONTIS ELEMENTS | | |
| PONTIS CONDITION STATES | | |
| NBI ITEMS #58, 59, 60, 61 & 62 | | |
| NBI RATING OF A '4' | | |
| NBI DATA | | |
| WRITTEN REPORT PORTION OF UNDERWATER REPORT | | |
| UNDERWATER REPORT SOUNDING PLAN | | |
| SCOUR SKETCH SHEET | | |
| SOUNDING SHEET | | |
| UNDER RECORD SKETCH | | |
| BEAM SKETCH SHEET(S) | | |
| PHOTOS | | |
| MISC. | | |
| FOLLOW-UP ACTIONS IDENTIFIED | | |

**LEGEND:**

- SIGNIFIES THAT ACTION IS STILL NEEDED AS A RESULT OF MISSING DATA OR ERRORS THAT NEED TO BE ADDRESSED BY THE BRIDGE INSPECTION TEAM AND/OR TEAM LEADER
- SIGNIFIES THAT AN ERROR WAS FOUND DURING THE QC REPORT REVIEW AND WAS CORRECTED DURING THE REVIEW
- SIGNIFIES THAT SOME CLARIFICATION OR DISCUSSION NEEDS TO TAKE PLACE TO CONFIRM THE ISSUE (NOT NECESSARILY A NEGATIVE THING)
- SIGNIFIES THAT ACTION IS NEEDED BY THE BRIDGE INSPECTION TEAM AND/OR TEAM LEADER, BUT IS NOT THE RESULT OF AN ERROR OR MISSING DATA

**Note: Text entered in the Description column shall be in the text color identified in the above legend.**

D.C. Department of Transportation
Operations Administration
Asset Management Branch
Bridges and Tunnels

# DDOT - Quality Assurance - Inspection Field Review Checklist (QA-IFRC)

Bridge Number: _____
Facility Carried: _____
Feature Intersected: _____
QA-IFR Team Leader: _____ Field Review Date: _____
QA-IFR Team Member: _____ NBIS Inspection Date: _____
Portions reviewed: _____

| Y | N | N/A | |
|---|---|---|---|
| | | | Bridge matches general description from report (type, material, geometry, etc.). |
| | | | Condition ratings from report match. |

| General Condition Ratings | | |
|---|---|---|
| **Item** | **QA-Insp. Field Review Rating** | **Original Inspection Rating** |
| **Deck** | | |
| **Superstructure** | | |
| **Substructure** | | |
| **Channel** | | |
| **Culvert** | | |
| **Safety Features** | --- | --- |
| **Bridge Railing** | | |
| **Transition** | | |
| **Approach Guardrail** | | |
| **Approach Terminal** | | |

| | | | |
|---|---|---|---|
| | | | Report comments are appropriate and clear. |
| | | | Poor condition components properly identified. |
| | | | Any additional poor condition components identified during field review. |

# DDOT - Quality Assurance - Inspection Field Review Checklist (QA-IFRC)

Additional Comments (*All documented inspection findings in the original report are located and described accurately with the exception of the discrepancies as noted below. Identify discrepancy element, location, original report page number, discrepancy, etc.*): _____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

PE Stamp of QC/QA Manager

_____
Signature, QA-IFR Team Leader

_____
Printed name, QA-IFR Team Leader

_____
Signature, QC/QA Manager

_____
Printed name, QC/QA Manager

D.C. Department of Transportation
Operations Administration
Asset Management Branch
Bridges and Tunnels

# DDOT – Quality Assurance – Inspection Field Review Report (QA-IFRR)

| | |
|---|---|
| **Bridge Number:**<br>**Facility Carried by Structure:**<br>**Feature Intersected:** | |
| **QA-IFRR Team Leader:** | **QA-IFRR Inspection Date:** |
| **QA-IFRR Team Member:** | **NBIS Inspection Date:** |

**GENERAL CONDITION RATINGS**

| Item | QA-IFRR Inspection | Original Inspection |
|---|---|---|
| **Deck** | | |
| **Superstructure** | | |
| **Substructure** | | |
| **Channel** | | |
| **Culvert** | | |
| **Safety Features:** | | |
| **Bridge Railing** | | |
| **Transition** | | |
| **Approach Guardrail** | | |
| **Approach Terminal** | | |

**Summary:**

**Note if the following has been verified:**

1. Verify NBI inventory data
2. Verify the element selection for the bridge
3. Verify element and NBI condition ratings through performing an independent, cursory inspection of the bridge. If necessary, mark up any recommended changes to the *Bridge Inspection Summary Form – BrM and NBI Ratings* from the original inspection report.
4. Verify measurements of section loss, bearing loss and/or sketches denoting significant deterioration
5. Verify load posting and signage
6. Verify any identified maintenance recommendation selections
7. Verify/spot check scour/soundings and/or under clearance measurements

**Follow-Up Actions:**

D.C. Department of Transportation
Operations Administration
Asset Management Branch
Bridges and Tunnels

# DDOT – Quality Assurance – Inspection Field Review Report (QA-IFRR)

**QC-IFRR Comments:** *The undersigned has verified all documented inspection findings in the original report and Bridge Inspection Report Quality Assurance checklist and found that findings and checklist are located and described accurately* ***with the exception*** *of the discrepancies noted below (with justification and supporting documentation). Identify discrepancy element, location, original report page number, discrepancy, etc.:*

All QC-IFR inspection findings were discussed with the original inspectors and appropriate changes will be made to the Inspection Report.

_____
Signature of QC/QA Manager Date

_____
Signature of QA-IFRR Team Leader Date

_____
Signature of QA-IFRR Team Member Date

Page ___ of ___

# DDOT – Quality Assurance – Inspection Field Review Report (QA-IFRR)

**Discrepancy Photos:**

Page ___ of ___

D.C. Department of Transportation
Operations Administration
Asset Management Branch
Bridges and Tunnels

# QUALITY ASSURANCE - INSPECTION REVIEW REPORT (QA-IRR): OFFICE REVIEW

**DATE OF BRIDGE INSPECTION ENGINEER REVIEW:** _____ **REVIEWED BY:** _____

**BRIDGE NUMBER:** _____ **INSPECTION DATE:** _____ **INSPECTION TEAM:** _____

## INSPECTION REPORT REVIEW

| INSPECTION REPORT | | INSPECTION FILE | |
|---|---|---|---|
| **ITEM** | **INCLUDED** | **ITEM** | **INCLUDED** |
| FINALIZED SDR: | | PLANS: | |
| PONTIS MSPE SHEETS: | | LOAD RATING: | |
| BEAM SKETCH SHEETS: | | LOAD POSTING RESOLUTION: | |
| OTHER SKETCHES OR TABLES: | | VERT. CLEARANCE POSTING RESOLUTION: | |
| NDT INSPECTION REPORT: | | INSPECTION REPORTS: | |
| UNDER RECORD SUMMARY & SKETCH: | | SCOUR PLAN OF ACTION: | |
| SOUNDING INFO & WATERWAY SKETCH: | | HYDROLOGIC & HYDRAULIC ANALYSIS: | |
| SOUNDING PROFILES: | | LATEST UNDERWATER INSP. REPORT: | |
| PHOTO REPORT: | | UNDERWATER INSPECTION PROCEDURES: | |
| REPAIR/MAINTENANCE HISTORY: | | FRACTURE CRITICAL INSP. PROCEDURES: | |
| BRIDGE REHAB PROJECT SUMMARY: | | FRACTURE CRITICAL DETAIL SHEET(S): | |
| TEAM LEADER SIGNATURE & DATE: | | COMPLEX BRIDGE INSP. PROCEDURES: | |
| REPORT ASSEMBLED CORRECTLY: | | FILE ASSEMBLED CORRECTLY: | |
| INSPECTION REPORT & FILE COMMENTS: | | | |

## INSPECTION REPORT REVIEW

| ITEM | DESCRIPTION | RESOLUTION DATE |
|---|---|---|
| **PONTIS ELEMENTS** | | |
| **PONTIS CONDITION STATES** | | |
| **NBI ITEMS #58, 59, 60, 61 & 62** | | |
| **NBI RATING OF A '4'** | | |
| **NBI DATA** | | |
| **WRITTEN REPORT PORTION OF UNDERWATER REPORT** | | |
| **UNDERWATER REPORT SOUNDING PLAN** | | |
| **SCOUR SKETCH SHEET** | | |
| **SOUNDING SHEET** | | |
| **UNDER RECORD SKETCH** | | |
| **BEAM SKETCH SHEET(S)** | | |
| **PHOTOS** | | |
| **MISC.** | | |
| **FOLLOW-UP ACTIONS IDENTIFIED** | | |

**OFFICE QA REVIEWER SIGNATURE:** _____ DATE: _____

D.C. Department of Transportation
Operations Administration
Asset Management Branch
Bridges and Tunnels

# QUALITY ASSURANCE - INSPECTION REVIEW REPORT (QA-IRR): FIELD REVIEW

**DATE OF QA TEAM FIELD REVIEW:** _____ **REVIEWED BY:** _____

**BRIDGE NUMBER:** _____ **INSPECTION DATE:** _____ **INSPECTION TEAM:** _____

| ITEM | DESCRIPTION | RESOLUTION DATE |
|---|---|---|
| PONTIS ELEMENTS | | |
| PONTIS CONDITION STATES | | |
| NBI ITEMS #58, 59, 60, 61 & 62 | | |
| NBI RATING OF A '4' | | |
| NBI DATA | | |
| WRITTEN REPORT PORTION OF UNDERWATER REPORT | | |
| UNDERWATER REPORT SOUNDING PLAN | | |
| SCOUR SKETCH SHEET | | |
| SOUNDING SHEET | | |
| UNDER RECORD SKETCH | | |
| BEAM SKETCH SHEET(S) | | |
| PHOTOS | | |
| MISC. | | |
| FOLLOW-UP ACTIONS IDENTIFIED | | |

**LEGEND:**

- SIGNIFIES THAT ACTION IS STILL NEEDED AS A RESULT OF MISSING DATA OR ERRORS THAT NEED TO BE ADDRESSED BY THE BRIDGE INSPECTION TEAM AND/OR TEAM LEADER
- SIGNIFIES THAT AN ERROR WAS FOUND DURING THE QA FIELD REVIEW AND WAS CORRECTED DURING THE REVIEW
- SIGNIFIES THAT SOME CLARIFICATION OR DISCUSSION NEEDS TO TAKE PLACE TO CONFIRM THE ISSUE (NOT NECESSARILY A NEGATIVE THING)
- SIGNIFIES THAT ACTION IS NEEDED BY THE BRIDGE INSPECTION TEAM AND/OR TEAM LEADER, BUT IS NOT THE RESULT OF AN ERROR OR MISSING DATA

**Note: Text entered in the Description column shall be in the text color identified in the above legend.**

**OFFICE QA REVIEWER SIGNATURE:** _____ DATE: _____

D.C. Department of Transportation
Operations Administration
Asset Management Branch
Bridges and Tunnels

# INCIDENT REPORT FORM: PERSONAL INJURY/VEHICLE ACCIDENT

**To be completed by staff within 12 hours of incident/accident**

**INCIDENT TYPE (CIRCLE ALL THAT APPLY):**
Personal Injury
Vehicle Accident
Vehicular Impact to Bridge
Marine Vessel Impact to Bridge
High Winds
Earthquake
Flood

**INCIDENT DATE:** _____

**INCIDENT TIME:** _____ **INCIDENT ADDRESS:** _____

Injured Person Name: _____
Address: _____
Phone Number: _____ Identified Gender: _____ Date of Birth: _____
Details on Injury: _____

Does injury require hospital/physician? Yes _____ No _____
Hospital Name: _____ Hospital Phone Number: _____
Hospital Address: _____
Injured Party Signature: Date:

**Vehicle Involved:** Color: _____
Make: _____ Model: _____ License Plate No.: _____
Insurance Company: _____ Policy Number: _____
Details of Vehicle Damage: _____

**Marine Vessel Involved:**
Vessel Type: _____ Vessel Name: _____ Vessel No.: _____
Color: _____ Insurance Carrier: _____ Policy Number: _____
Details of Vessel Damage: _____

Were Police Called? Yes _____ No _____
Was Police Report Filed? Yes _____ Report No.: _____ No _____
Name of Officers at Scene: _____

**Contact Information for Drivers, Passengers, & Witnesses**

| Name | Role | Phone Number |
|---|---|---|
| | | |
| | | |
| | | |
| | | |
| | | |

Was the Bridge Damaged? Yes _____ No _____
Describe Damage:

**Weather/Natural Disaster Related Incident:**

Describe weather event: _____ Temperature: _____

Max. Wind Speed: _____ Earthquake Magnitude: _____ Duration of Weather Event: _____

Describe Weather Damage to Bridge: _____

_____

Provide Photos of Damage to Vehicles, DDOT Bridge, Personal Property/Other DDOT Property

Important Notes and Instructions:

**Prepared By:** _____ **Prepared Date:** _____

**Name of Approver:** _____

**Signature:** _____ **Approved Date:** _____

1. As soon as possible after the incident occurs, the DDOT Bridge Inspection Engineer (BIE) should be notified.
2. This form shall be submitted to the DDOT BIE within 24 hours of the incident.

# Appendix B.1

# Example Routine Inspection Report

**Bridge No.:** 1109 **D.O.I.:** 07/15/2020
**Name:** Southeast Freeway over CSXT Railroad, New Jersey Avenue and Virginia Avenue

D.C. Department of Transportation
Transportation Operations Administration
Asset Management Division

# 2020 BRIDGE INVENTORY

**BRIDGE NO.:** 1109 **HIGHWAY:** Southeast Freeway
**OVER:** CSXT Railroad, New Jersey Avenue and Virginia Avenue
**INSPECTION START DATE:** 07/15/2020 **INSPECTION END DATE:** 10/02/2020
**INSPECTION CYCLE:** 24 mo. **INSPECTION TYPE:** Routine
**DESCRIPTION:** Steel Multi-Girder and Cross Girder Spans on Reinforced Concrete Columns, Bents, Piers and Abutments
**PRESENT POSTING:** Open, No Restriction **SUFFICIENCY RATING:** 70.0% (08/18)
**YEAR BUILT:** 1964 **DATE OF MAJOR REHABILITATION:** 1991
**NUMBER OF SPANS:** 12 Eastbound; 13 Westbound
**CLEAR WIDTH BETWEEN CURBS:** 122.0 ft.
**APPROACH ROADWAY WIDTH INCLUDING SHOULDERS:** 122.0 ft.
**TYPE OF DECK AND SURFACING:** Reinforced Concrete Deck with Monolithic Wearing Surface
**MILEPOST:** 0.00 **ADT (% TRUCK):** 95,800 (5%) **YEAR ADT:** 2007

**LOOKING:** **NORTH** _____ **SOUTH** X **EAST** _____ **WEST** _____

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Experience great bridges.

Bridge No.: 1109 D.O.I.: 07/15/2020
Name: Southeast Freeway over CSXT Railroad, New Jersey Avenue and Virginia Avenue

D.C. Department of Transportation
Transportation Operations Administration
Asset Management Division

# 2020 District of Columbia Bridge Inspections
# Summary Report

| | | |
|---|---|---|
| **Bridge No:** | 1109 | |
| **Name:** | Southeast Freeway over CSXT Railroad, New Jersey Avenue and Virginia Avenue | |
| **Report Prepared by:** | Modjeski and Masters, Inc. | |
| **Report Reviewed and Submitted by:** | Modjeski and Masters, Inc. | |
| **Project Manager:** | Richard A. Little, P.E. | |
| **Team Leader:** | William R. Bolt, P.E. William R. Bolt | |
| **Date of Inspection:** | 07/15/2020 | |
| **Redundant/Non-Redundant:** | Redundant | |
| **Fracture-Critical:** | Yes | Pin and Hanger Assembly and Steel Cross Girders |
| **Pin/Hanger UT Inspection:** | No | |
| **Underwater Inspection:** | Not Applicable | |
| **Weight Posted:** | No | |
| **Rating Recommended:** | No | |
| **Date of Last Load Rating:** | 01/06/2010 | |
| **Review Existing Sounding and Profile Sheets:** | Not Applicable | |
| **Recommended Maintenance Repairs/Rehabilitation:** | Yes | |
| **Letter of Concern & Repairs/Rehabilitation:** | No | |
| **Follow-Up Requirements** | No | |

DISTRICT OF COLUMBIA
RICHARD A. LITTLE
No. 904411
REGISTERED
PROFESSIONAL ENGINEER

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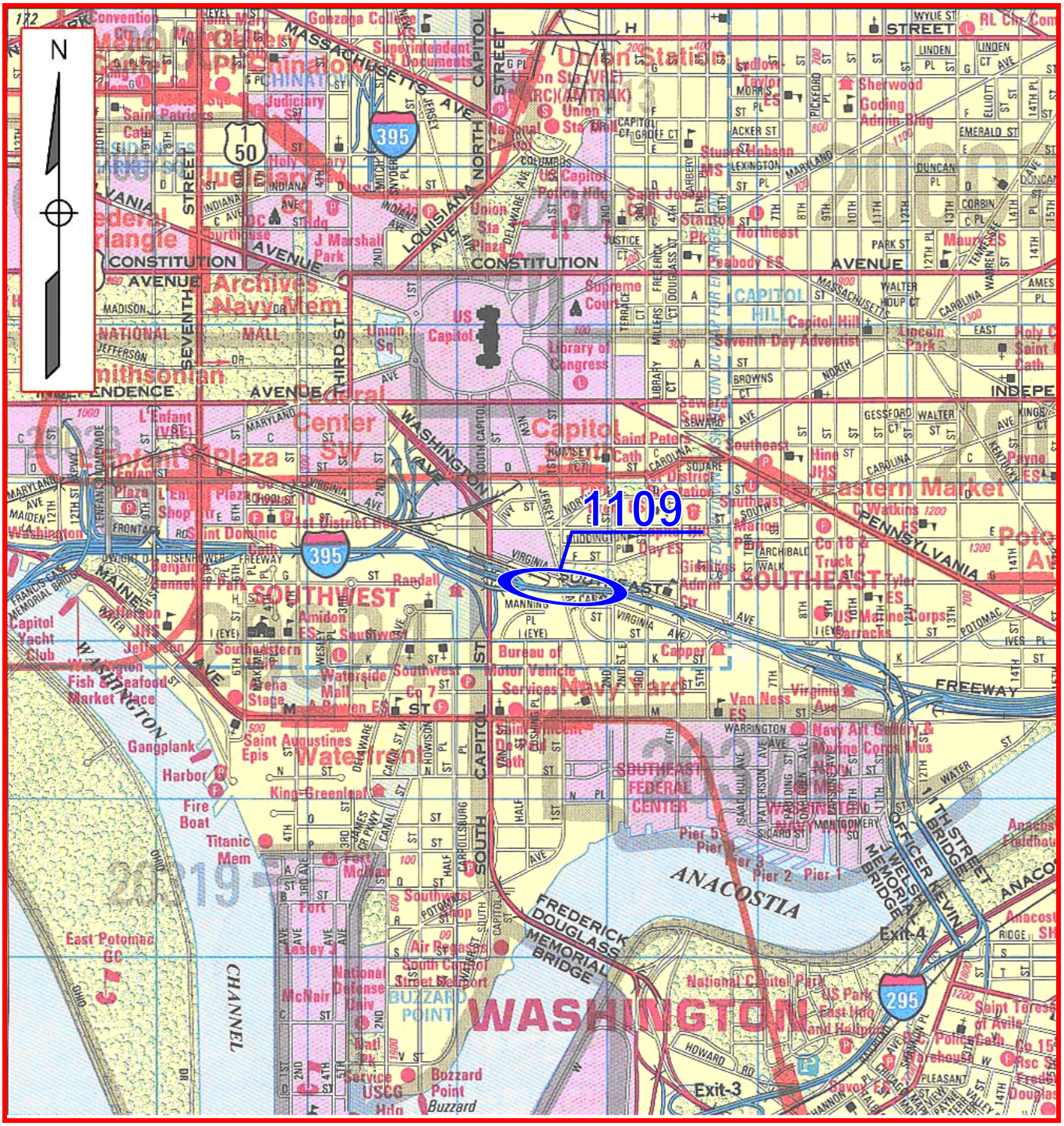
Transportation Operations Administration
Asset Management Division

# 2020 BRIDGE LOCATION MAP

**BRIDGE NO.:** 1109 **HIGHWAY:** Southeast Freeway

**OVER:** CSXT Railroad, New Jersey Avenue and Virginia Avenue

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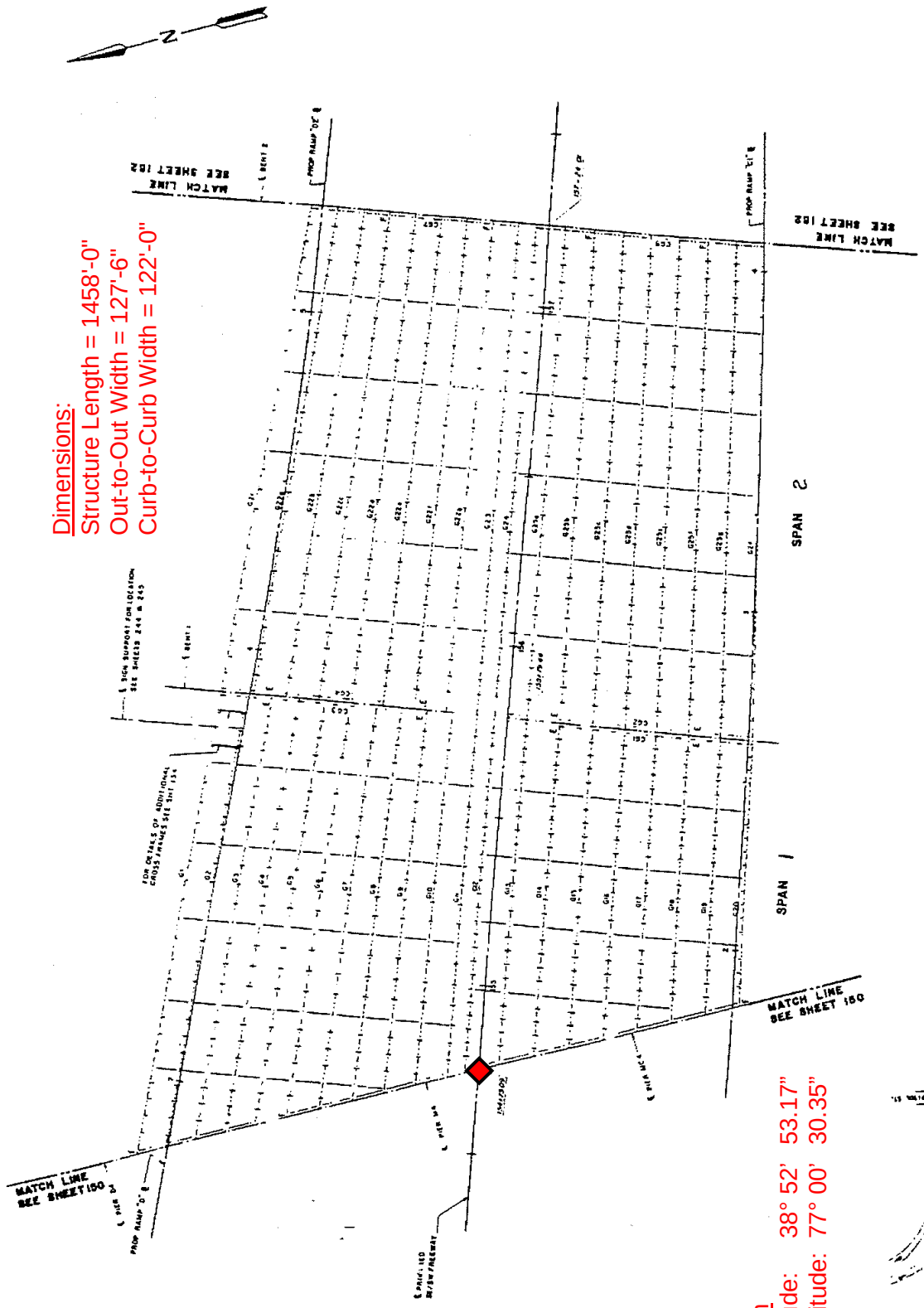
Asset Management Division

**BRIDGE NO.:** 1109 **HIGHWAY:** Southeast Freeway

**OVER:** CSXT Railroad, New Jersey Avenue and Virginia Avenue




Dimensions:
Structure Length = 1458'-0"
Out-to-Out Width = 127'-6"
Curb-to-Curb Width = 122'-0"

Begin
Latitude: 38° 52' 53.17"
Longitude: 77° 00' 30.35"

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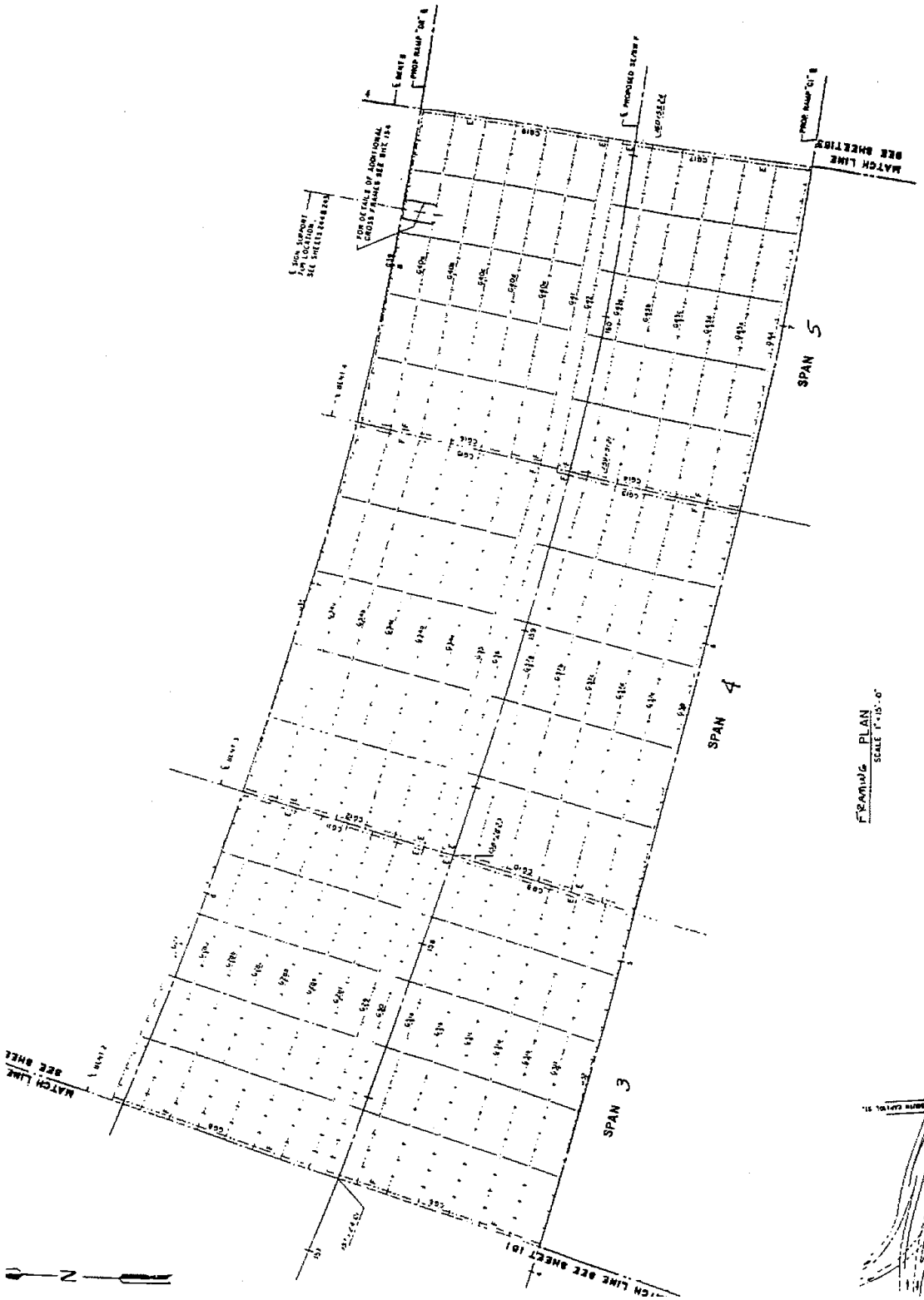
Asset Management Division

**BRIDGE NO.:** 1109 **HIGHWAY:** Southeast Freeway

**OVER:** CSXT Railroad, New Jersey Avenue and Virginia Avenue

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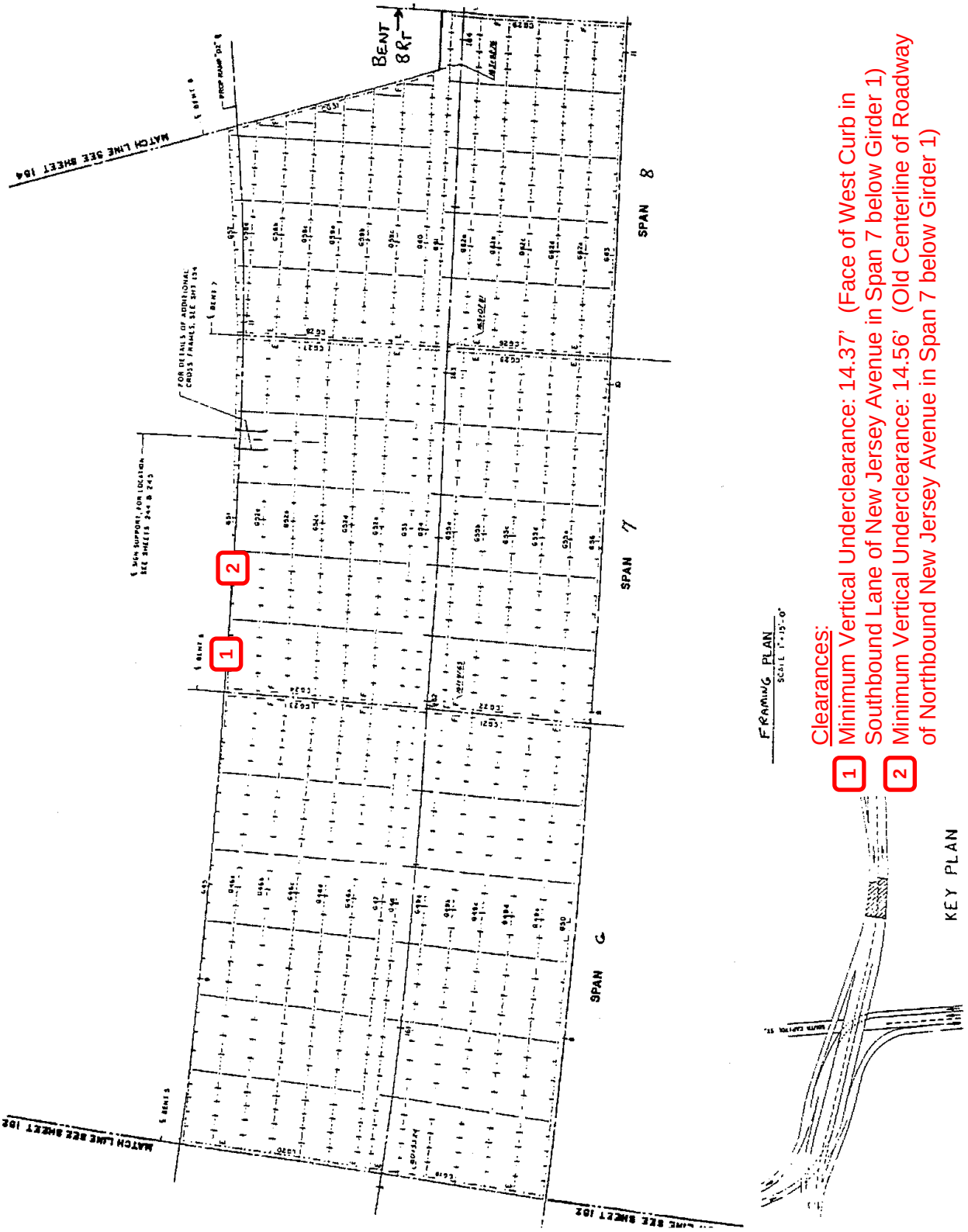
**BRIDGE NO.:** 1109 **HIGHWAY:** Southeast Freeway

**OVER:** CSXT Railroad, New Jersey Avenue and Virginia Avenue




Clearances:

1 Minimum Vertical Underclearance: 14.37' (Face of West Curb in Southbound Lane of New Jersey Avenue in Span 7 below Girder 1)

2 Minimum Vertical Underclearance: 14.56' (Old Centerline of Roadway of Northbound New Jersey Avenue in Span 7 below Girder 1)

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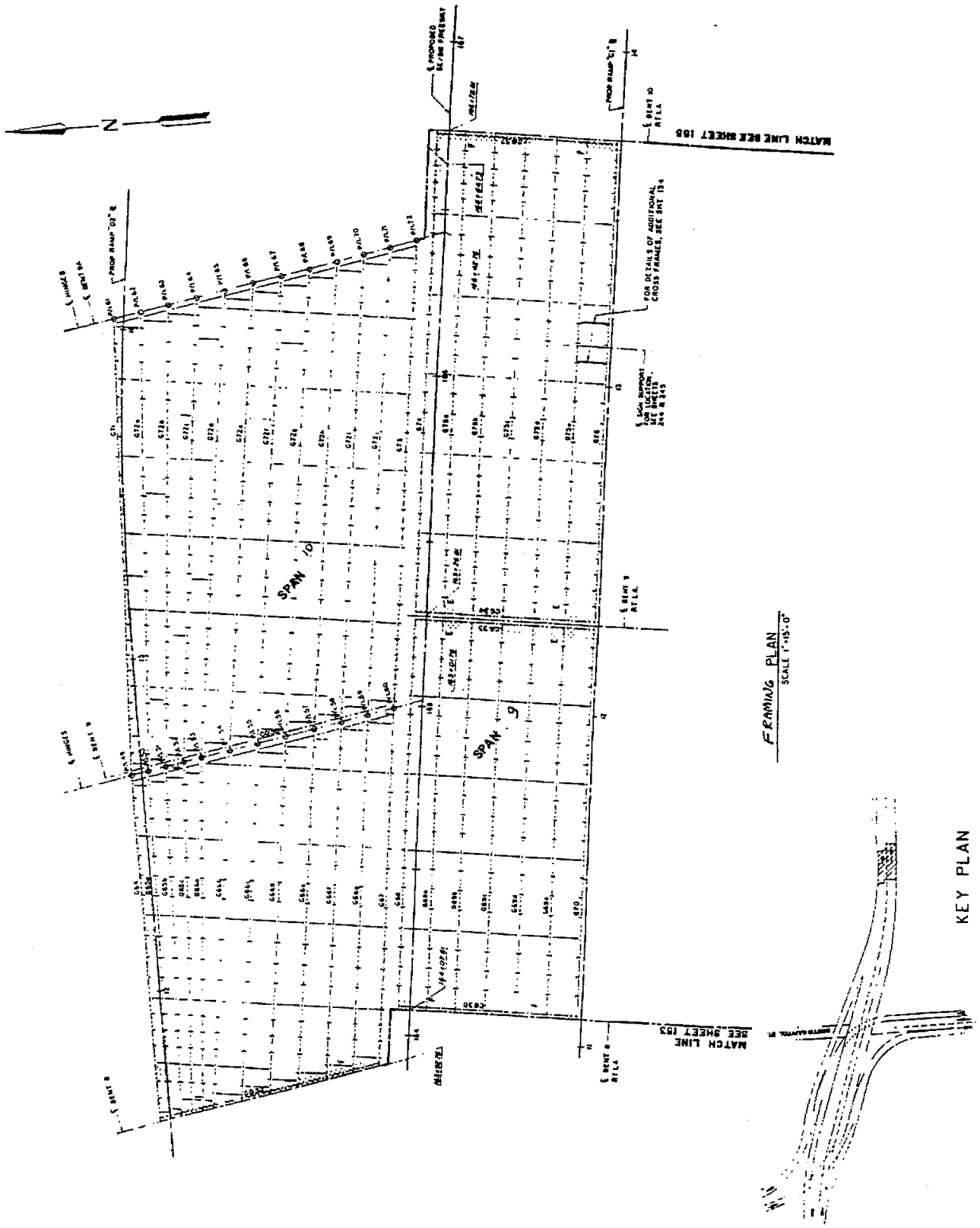
Asset Management Division

**BRIDGE NO.:** 1109 **HIGHWAY:** Southeast Freeway

**OVER:** CSXT Railroad, New Jersey Avenue and Virginia Avenue

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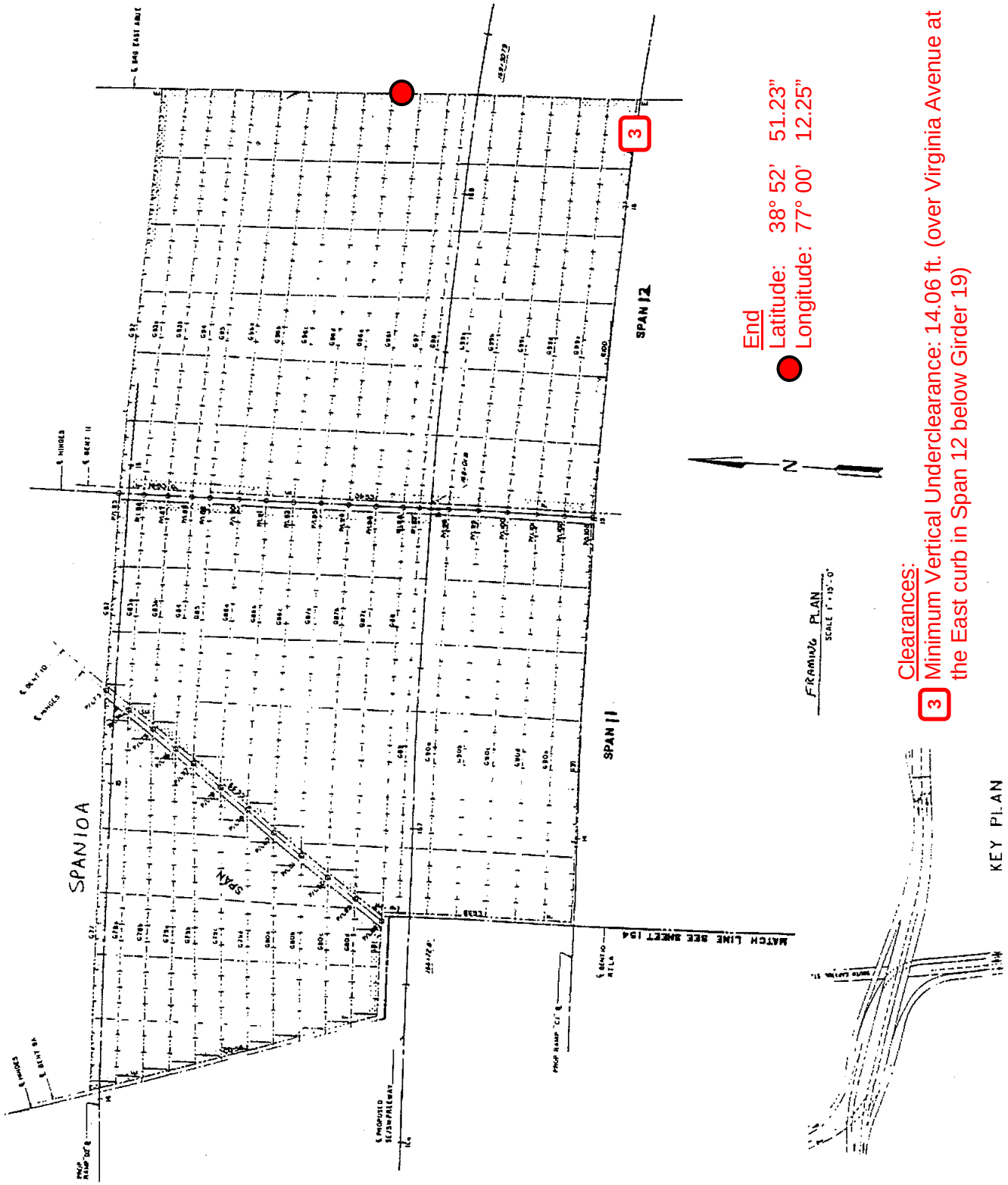
D.C. Department of Transportation
Transportation Operations Administration
Asset Management Division

**BRIDGE NO.:** 1109 **HIGHWAY:** Southeast Freeway

**OVER:** CSXT Railroad, New Jersey Avenue and Virginia Avenue




End
Latitude: 38° 52' 51.23"
Longitude: 77° 00' 12.25"

Clearances:
3 Minimum Vertical Underclearance: 14.06 ft. (over Virginia Avenue at the East curb in Span 12 below Girder 19)

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D.C. Department of Transportation
Transportation Operations Administration
Asset Management Division

# 2020 BRIDGE INSPECTION SUMMARY FORM
## BrM AND NBI RATINGS

**BRIDGE NO.:** 1109 **HIGHWAY:** Southwest Freeway (I-395)
**OVER:** CSXT Railroad, New Jersey Avenue and Virginia Ave

### BrM

| Element No. | Element Name | | Environment | Total Quantity | Quantity by State 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|
| **National Bridge Elements (NBEs)** | | | | | | | | |
| 12 | Reinforced Concrete Deck | SF | 2 | 181,345 | 181,280 | 17 | 48 | -- |
| *1080* | *Delamination/Spall/Patched Area* | *SF* | | *38* | -- | *17* | *21* | -- |
| *1090* | *Exposed Rebar* | *SF* | | *27* | -- | -- | *27* | -- |
| 107 | Steel Open Girder | LF | 2 | 23,895 | 21,450 | 2,095 | 350 | -- |
| *1000* | *Corrosion* | *LF* | | *2,445* | -- | *2,095* | *350* | -- |
| 152 | Steel Floorbeam (Cross Girder) | LF | 2 | 2,548 | 1,270 | 766 | 512 | -- |
| *1000* | *Corrosion* | *LF* | | *1,278* | -- | *766* | *512* | -- |
| 161 | Steel Pin and Hanger Assembly | EA | 2 | 55 | 44 | 11 | -- | -- |
| *1000* | *Corrosion* | *EA* | | *11* | -- | *11* | -- | -- |
| 205 | Reinforced Concrete Column | EA | 2 | 40 | 6 | 13 | 20 | 1 |
| *1080* | *Delamination/Spall/Patched Area* | *EA* | | *17* | -- | *13* | *3* | *1* |
| *1090* | *Exposed Rebar* | *EA* | | *13* | -- | -- | *13* | -- |
| *1130* | *Cracking (RC and Other)* | *EA* | | *4* | -- | -- | *4* | -- |
| 215 | Reinforced Concrete Abutment | LF | 2 | 144 | 92 | 38 | 14 | -- |
| *1080* | *Delamination/Spall/Patched Area* | *LF* | | *26* | -- | *26* | -- | -- |
| *1120* | *Efflorescence/Rust Staining* | *LF* | | *12* | -- | *12* | -- | -- |
| *1130* | *Cracking (RC and Other)* | *LF* | | *14* | -- | -- | *14* | -- |
| 234 | Reinforced Concrete Pier Cap | LF | 2 | 178 | 22 | 21 | 135 | -- |
| *1080* | *Delamination/Spall/Patched Area* | *LF* | | *20* | -- | *16* | *4* | -- |
| *1090* | *Exposed Rebar* | *LF* | | *124* | -- | -- | *124* | |
| *1120* | *Efflorescence/Rust Staining* | *LF* | | *5* | -- | *5* | -- | -- |
| *1130* | *Cracking (RC and Other)* | *LF* | | *7* | -- | -- | *7* | -- |
| 311 | Movable Bearing | EA | 2 | 55 | -- | 47 | 8 | -- |
| *1000* | *Corrosion* | *EA* | | *48* | -- | *47* | *1* | -- |
| *1020* | *Connection* | *EA* | | *1* | -- | -- | *1* | -- |
| *2210* | *Movement* | *EA* | | *6* | -- | -- | *6* | -- |
| 313 | Fixed Bearing | EA | 2 | 60 | -- | 57 | 3 | -- |
| *1000* | *Corrosion* | *EA* | | *57* | -- | *57* | -- | -- |
| *1020* | *Connection* | *EA* | | *3* | -- | -- | *3* | -- |
| 331 | Concrete Bridge Railing | LF | 2 | 4,374 | 4,240 | 88 | 46 | -- |
| *1080* | *Delamination/Spall/Patched Area* | *LF* | | *48* | -- | *2* | *46* | -- |
| *1130* | *Cracking (RC and Other)* | *LF* | | *86* | -- | *86* | -- | -- |
| **Bridge Management Elements (BMEs)** | | | | | | | | |
| 300 | Strip Seal Expansion Joint | LF | 2 | 1,591 | -- | 1,591 | -- | -- |
| *2310* | *Leakage* | *LF* | | *200* | -- | *200* | -- | -- |
| *2350* | *Debris Impaction* | *LF* | | *1,391* | -- | *1,391* | -- | -- |
| | | | | | | | | |



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D.C. Department of Transportation
Transportation Operations Administration
Asset Management Division

# 2020 BRIDGE INSPECTION SUMMARY FORM
## BrM AND NBI RATINGS

**BRIDGE NO.:** 1109 **HIGHWAY:** Southwest Freeway (I-395)
**OVER:** CSXT Railroad, New Jersey Avenue and Virginia Ave

## BrM (CONTINUED)

| Element No. | Element Name | | Environment | Total Quantity | Quantity by State 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|
| **Bridge Management Elements (BMEs) (Continued)** | | | | | | | | |
| 302 | Compression Joint Seal | LF | 2 | 554 | -- | 552 | 2 | -- |
| *2330* | *Seal Damage* | *LF* | | *2* | -- | -- | 2 | -- |
| *2350* | *Debris Impaction* | *LF* | | *552* | -- | *552* | -- | -- |
| 303 | Assembly Joint | LF | 2 | 49 | 49 | -- | -- | -- |
| 321 | Concrete Approach Slab | SF | 2 | 2,475 | 2,432 | 42 | 1 | -- |
| *1080* | *Delamination/Spall/Patched Area* | *SF* | | *43* | -- | *42* | 1 | -- |
| 515 | Steel Protective Coating (107) | SF | 2 | 394,267 | 334,133 | 43,369 | 15,770 | 995 |
| *3420* | *Peeling/Bubbling/Cracking* | *SF* | | *60,134* | -- | *43,369* | *15,770* | *995* |
| 515 | Steel Protective Coating (152) | SF | 2 | 47,559 | 40,425 | 4,995 | 1,664 | 475 |
| *3420* | *Peeling/Bubbling/Cracking* | *SF* | | *7,134* | -- | *4,995* | *1,664* | *475* |
| 515 | Steel Protective Coating (161) | SF | 2 | 440 | 363 | 70 | 5 | 2 |
| *3420* | *Peeling/Bubbling/Cracking* | *SF* | | *77* | -- | *70* | *5* | *2* |
| 515 | Steel Protective Coating (311) | SF | 2 | 393 | 73 | 240 | 60 | 20 |
| *3420* | *Peeling/Bubbling/Cracking* | *SF* | | *320* | -- | *240* | *60* | *20* |
| 515 | Steel Protective Coating (313) | SF | 2 | 393 | 73 | 240 | 60 | 20 |
| *3420* | *Peeling/Bubbling/Cracking* | *SF* | | *320* | -- | *240* | *60* | *20* |
| 520 | Deck Protection System (Coated Bars) | SF | 2 | 181,345 | 181,333 | -- | -- | 12 |
| *3600* | *Effectiveness* | *SF* | | *12* | -- | -- | -- | *12* |
| 521 | Concrete Protective Coating (205) | SF | 2 | 19,557 | 17,499 | -- | 1,080 | 978 |
| *3540* | *Effectiveness* | *SF* | | *2,058* | -- | -- | *1,080* | *978* |
| 521 | Concrete Protective Coating (215) | SF | 2 | 939 | 939 | -- | -- | -- |
| 521 | Concrete Protective Coating (331) | SF | 2 | 34,250 | 13,700 | 3,425 | 3,425 | 13,700 |
| *3540* | *Effectiveness* | *SF* | | *20,550* | -- | *3,425* | *3,425* | *13,700* |
| | | | | | | | | |

## NBI Rating

| NBI Item No. | Name | Rating | Descriptions |
|---|---|---|---|
| 58 | Deck | 7 | Isolated spalls in soffit and potholes in wearing surface. |
| 59 | Superstructure | 6 | Steel section loss and areas of moderate to severe corrosion. |
| 60 | Substructure | 5 | Significant amount of cracking, spalls and unsound concrete throughout pier cap and columns. |
| 61 | Channel | N | |
| 62 | Culverts | N | |



**Special Equipment Used:** UB62, 35' JLG, Bucket Truck, M.O.T., 24' Ladder, CSX Flagman
**Inspection Dates:** 07/15, 23-25, 27-28/2020, 08/03, 18/2020, 10/02/2020
**No. Hours (Field & Report):** 58/105 Hrs.
**Inspection Team:** 2 - Person
**Inspected By:** WRB/SAY/KAF/MJF/NDT/ JTM/NRD

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# 2020 BRIDGE INSPECTION REPORT
## INSPECTION COMMENTS

**BRIDGE NO.:** 1109 **HIGHWAY:** Southeast Freeway
**OVER:** CSXT Railroad, New Jersey Avenue and Virginia Avenue

| ELEMENT NO. | COMMENTS |
|---|---|
| | **General:**<br>Bridge No. 1109 starts at the East end of Bridge No. 1104 and extends to 2nd Street, S.E., carrying traffic on the Southeast Freeway (Interstate 695) over a U.S. Government railroad spur, New Jersey Avenue, CSXT Railroad tracks and Virginia Avenue, S.E. There are three Eastbound travel lanes for through traffic and two lanes of traffic from an on-ramp at the West end of the bridge which merge into one lane of traffic for an off-ramp at the East end of the bridge. There are four Westbound travel lanes for through traffic, one lane of traffic that merges into the existing travel lanes from an on-ramp from 3rd Street beyond the East end of the bridge, and one lane that becomes an off-ramp at the West end of the bridge. A second Westbound ramp, which merges with Bridge No. 1109 on the North side, has two spans which carry traffic over 2nd Street. These two spans are designated as Bridge No. 1109-1 and have a separate condition report. The bridge consists of twelve Eastbound spans numbered 1 through 12 from the West, and thirteen Westbound spans that are numbered 1 through 12 from the West with Span 10A being the thirteenth span.<br><br>The superstructure of Bridge No. 1109 consists of painted steel plate girders that frame into painted steel cross girders supported by reinforced concrete columns. The West end of the bridge is supported by a reinforced concrete pier bent and the East end is supported by a reinforced concrete abutment. There are two types of steel cross girders that transfer the superstructure load to the reinforced concrete substructure. The main cross girder configuration is a double welded plate girder at the bents where the longitudinal girders frame into the exterior side of each girder. The secondary configuration is a single welded plate cross girder at a bent with longitudinal girders framing into both sides of the cross girder; the longitudinal girders are connected to the West side of the cross girder at four bents by pin and hanger assemblies (see Framing Plan Sketches).<br><br>Bridge No. 1109 was originally constructed in 1964 with a major rehabilitation conducted in 1991 that included deck replacement, pin and hanger rehabilitation, and the post tensioning of several girders. The structural steel was cleaned and repainted in 1997. The total structure length is 1458.0'. The structure is 127.5' wide out-to-out and 122.0' wide curb-to-curb.<br><br>The following repairs have been performed to the structure since the 2018 Inspection:<br>• Spalls in the wearing surface in the Westbound lanes were repaired with asphaltic material.<br>• The damaged/leaning light standard on the South parapet in Span 9 was replaced.<br>• The light standard with two corrosion holes at the base in Span 10 was replaced.<br>• The broken lens for one light fixture in Bay 9 in Span 12 over Virginia Avenue was replaced.<br><br>The minimum vertical underclearance over New Jersey Avenue in Span 7 is 14.37' at the face of the West curb (Southbound lane) below the North girder (Girder 1). The minimum vertical underclearance over Virginia Avenue is 14.06' at the East curbline of Virginia Avenue to the horizontal conduit below Girder 19 in Span 12.<br><br>A UB62 Snooper, a 35' JLG, a bucket truck, a 24' ladder, Maintenance of Traffic (M.O.T.) and a CSX flagman were used to perform the inspection. For reference purposes, girders and columns are numbered in ascending order from North to South and spans and bents from West to East. General views of the structure, approaches, and roadways and railroad below the structure are shown in Photograph Nos. 1 through 13. The bridge was inspected by William R. Bolt, P.E. (Team Leader), Kenneth A. Fabian, P.E., Shawn A. Yinger, P.E., John Van Riper, P.E., Maxwell J. Fyrster, E.I.T., Nicholas D. Theofanis, E.I.T., Jeffrey T. McIlhenny, E.I.T., and Nicholas R. DiNardo. The delay |

# 2020 BRIDGE INSPECTION REPORT
## INSPECTION COMMENTS

**BRIDGE NO.:** 1109 **HIGHWAY:** Southeast Freeway
**OVER:** CSXT Railroad, New Jersey Avenue and Virginia Avenue

| ELEMENT NO. | COMMENTS |
|---|---|
| | **General (Continued):**<br>between starting and completing the inspection was caused by coordinating equipment and a CSX flagman, and adjacent construction activities. |
| **12**<br>**300**<br>**302**<br>**303**<br>**331**<br>**520** | **Deck:**<br>The reinforced concrete deck is in good condition. The monolithic wearing surface, which shows some normal wear of the grooves and isolated minor potholes, is in satisfactory condition (see Photograph No. 14). The lane markings on the deck are moderately worn, except for the new markings on the Eastbound lanes of Spans 1 and 2. Approximately 180 roadway reflectors in the deck surface are broken or missing. Typically, there are minor accumulations of debris on the deck along the concrete bridge railings/parapets. In the Eastbound lanes of Span 12, the roadway exhibits a 24" wide x 5'-0" long x 1/2" deep spall/area of scaling at the right edge of the right lane. Spalls with exposed corroded reinforcing steel in the Westbound lanes were noted at the following locations:<br>• Minor spall near the East Abutment joint<br>• Span 7, right edge of 2nd lane from left, 2'-2" long x 24" wide has been **repaired.**<br>• Span 8, ramp lane, 7" x 3" x 1" deep pothole; right edge of left lane, 18" long x 18" wide x up to 1" deep spall and 2'-8" long x 24" wide x up to 1" deep spall have been **repaired.**<br>• Span 10, right edge of the left lane, two spalls have been repaired.<br>• Span 12, right edge of middle left lane, 18" long x 24" wide x up to 4" deep spall<br><br>Overall, the soffit is in good condition. The majority of the underside of the deck is covered with stay-in-place forms that are in good condition except for a few isolated areas of minor corrosion and several buckled sections which probably occurred at the time of construction (see Photograph No. 15). The fascia overhangs are in good condition with several transverse hairline cracks in the underside. In Span 6, there is a 3'-0" x 3'-0" spall with exposed corroded reinforcing steel in the soffit in Bay 5 and 1 SF of honeycombing along the construction joint near mid-span in Bay 6. In Span 2, there is a 21" long x 4" wide x 4" deep spall with exposed corroded reinforcing steel in the South overhang at Bent 1. There is a 3'-1" long x 13" wide x 6" high spall with exposed reinforcing steel in the South overhang adjacent to Bent 2. A spall is also present in the North overhang at Bent 7 and there is a 5'-6" long x 12" wide x up to 5" deep spall in the North overhang at Bent 9. There are numerous spalls in the soffit surrounding the joints between the parallel cross girders of Bents 7 through 10 (see Photograph No. 16). A 12" x 24" spall is in the soffit in Span 11 adjacent to Bridge No. 1109-1.<br><br>The armored joints with compression seals and strip seals are in satisfactory condition. Several areas exhibit bulging of the joint angles, moderate corrosion and evidence of moisture leakage. The ends of the of the joint armor on all joints typically exhibit minor to moderate corrosion and minor isolated edge spalling. The joint seal near Column 1 of Bent 1 is bulged outward. There are random areas of minor tearing in the joint seals throughout the bridge. There is evidence of moisture penetration at Bents 2, 4 and 11 which has caused moderate corrosion of the joint armor and metalwork below (see Photograph No. 17). At Bent 3, there is 2 LF of torn joint seal in the right Westbound lane. There is an isolated area of moderate corrosion of the Bent 5 joint near the centerline of the bridge. At Bent 7 in the Westbound lanes, the joint plate on the North parapet is missing. There is a longitudinal joint the Westbound lanes extending from Span 8 to 11. The joints for Bents 8 and 9 exhibit moderate corrosion of the joint armor with evidence of moisture penetration. |

# 2020 BRIDGE INSPECTION REPORT
## INSPECTION COMMENTS

**BRIDGE NO.:** 1109 **HIGHWAY:** Southeast Freeway
**OVER:** CSXT Railroad, New Jersey Avenue and Virginia Avenue

| ELEMENT NO. | COMMENTS |
|---|---|
| 12<br>300<br>302<br>303<br>331<br>520 | **Deck (Continued):**<br>The West side of the joint at Bent 9 is up to 1/2" higher than the East side at the right edge of the Eastbound right lane. The joint at Bent 11 exhibits moderate delamination and corrosion at the leftend of the Eastbound lanes, and evidence of leakage in Bay 15. The East Abutment joint narrows to 7/16" in the Eastbound lanes while all other joints are 1" or wider throughout the deck. The joints in the Eastbound and Westbound lanes exhibit minor to moderate accumulations of debris in the seals; however, the seals do not show evidence of cracking (see Photograph Nos. 18 and 19).<br><br>The reinforced concrete bridge railings/parapets along both sides of the bridge and the median barrier exhibit minor vertical hairline cracks and hairline map cracking, but are sound and in good condition. Minor gouges and scrape marks (impact damage) are present in the railings/parapets at intermittent locations across the bridge (see Photograph No. 20). Approximately 80 of the roadway reflectors installed on the parapets and along the median barriers are broken or missing (see Photograph No. 21). The barriers typically exhibit minor paint deterioration (refer to Photograph Nos. 20 and 21, and see Photograph No. 22). At the top of the parapets, the sign structure column bases exhibit moderate scaling of the mortar material up to 1" deep (see Photograph No. 23). In Span 5, there is a hole in the mortar base of the sign structure at the North parapet that is up to 15" deep (see Photograph No. 24). The metal railing/screen on top of the parapets for the spans over the railroad property is in good condition (see Photograph No. 25); the Easternmost panel has been removed.<br><br>There are isolated minor spalls in the parapets throughout the bridge, and there is a 4'-9" long x 2'-10" high area of scaling in the South face of the median barrier in Span 4; a similar 24" long area is in the North face. Spalls exist in the parapets and the median barriers at the following locations:<br>• North parapet (South face), Span 6, 7" long x 4" wide x 4 1/2" deep spall<br>• North parapet (top face), Span 12, 19" long x 6" high x up to 6" deep spall<br>• Median barrier (South face), Bent 4, 20" long x 19" high x up to 2" deep spall at joint<br>• Median barrier (South face), Span 4, shallow spalling 20' East of Bent 3<br>• Median barrier (South face), Span 9, 8" long x 4" high x up to 3" deep spall and 12' long x 10" high x 1" deep spall at the West end<br>• Median barrier (South face), East Abutment, 16" long x 13" high x up to 6" deep spall<br>• South parapet, Span 4, 15" long x 4 1/2" wide x up to 1" deep spall<br>• South parapet, Span 6, 12" long x 12" wide x up to 5" deep spall in the top of the parapet (see Photograph No. 26) and a 24" wide x 10" high delaminated area below the light pole<br>• South parapet, Span 7, 5" wide x 8" high x 1 1/2" deep spall at base adjacent to joint plate<br>• South parapet, Span 8, 3'-0" long x 9" high x 1" deep spall at the base<br>• South parapet, Span 12, 20" long x 3" high x up to 1/2" deep spall<br><br>The drainage system on the bridge is in poor condition. Nine scuppers along the North parapet, three scuppers along the South parapet, ten scuppers along the North face of the median barrier and thirteen scuppers along the South face of the median barrier are completely or partially clogged with debris (see Photograph No. 27). Due to the clogged scuppers, water is ponding on the deck along the parapets and median at several locations. Three of the scupper grates along the North parapet in Spans 2, 3 and 8 are broken (see Photograph No. 28). The downspouts typically exhibit minor to severe surface corrosion and corrosion staining at locations where the paint has failed (see Photograph No. 29). The drainage grates are typically missing one or more hold-down bolts, but none of the grates were loose. An 8" high x 4" wide corrosion hole is in the downspout at Column 2 of Bent 3. There is a 6" long x up to 2" wide split/hole in the bottom of a horizontal drain pipe at Bent |

# 2020 BRIDGE INSPECTION REPORT
## INSPECTION COMMENTS

**BRIDGE NO.:** 1109 **HIGHWAY:** Southeast Freeway
**OVER:** CSXT Railroad, New Jersey Avenue and Virginia Avenue

| ELEMENT NO. | COMMENTS |
|---|---|
| **12**<br>**300**<br>**302**<br>**303**<br>**331**<br>**520** | **Deck (Continued):**<br>4 South of Column 2; at this location, the vertical downspout was completely clogged with debris and the downspout was overflowing at the time of inspection (see Photograph No. 30). The downspouts at Column 2 of Bent 4, Columns 1 and 2 of Bent 5, and at Column 3 of Bent 8 are completely clogged with debris (see Photograph No. 31). The middle downspout connections to Column 2 of Bent 3 and to Column 1 of Bent 6, and the top downspout strap connection to Column 2 of Bent 5 are broken. On the West side of Bent 8 on the South side of Girder 13, a cap for a horizontal section of drain pipe is missing. |
| **107**<br>**311**<br>**313**<br>**515** | **Superstructure:**<br>The steel superstructure is in satisfactory condition (see Photograph No. 32). There are intermittent areas of minor surface corrosion and isolated areas of debris accumulation throughout the bridge. There are some areas of section loss and some corrosion holes; however, most of these areas are inactive at this time. Spans 1, 2 and the West half Span 3, did not receive a hands-on inspection between Girders 4 to 12 (areas unreached by a snooper) due to the lack of access to the site. The steel cross girders and pin and hanger assemblies are Fracture-Critical Members (FCM). Specific findings concerning these members are included in the Fracture-Critical Members portion of this report.<br><br>Vegetation is encroaching onto the superstructure on the South side of the bridge at Pier 4, on the North side of the bridge in Span 2 and at the East end of the bridge adjacent to Bridge No. 1109-1.<br><br>The diaphragms comprised of channels and cross-bracing to provide lateral support are in satisfactory condition with a few vertical cracks and loose bolts in the connection plates (see Photograph No. 33). In Span 2, there are two (2) up to 14" long vertical cracks in the cross-frame connection plates in connections to Girder 13 in Bay 13; the first is in the 2nd cross frame connection plate East of Bent 1 and the second is in the third cross-frame connection plate East of Bent 1 (see Photograph No. 34). In Span 2 on the South side of Girder 4, a stiffener is bent at the first diaphragm from Bent 3. In Span 5, there is a loose nut in the diaphragm connection to the North face of Girder 7 at the third diaphragm East of Pier 8. In Span 6, one bolt is missing in the cross-bracing connection to the South side of Girder 10 at the 4th brace East of Pier 5. In Span 9, the missing bolt in the diaphragm connection to the South side of Girder 6 at the 2nd diaphragm West of Pier 9, noted in the previous inspection report, was not observed during this inspection. In Span 10A, the cross-brace connection to the North side of Girder 4 exhibits severe corrosion and significant section loss with only 7/8" of the connection remaining (see Photograph No. 35); this corrosion is being caused by leakage through a gap between the parapets. In Span 11, the South face of Girder 18 exhibits five loose bolts and an up to 7/8" wide gap between the connection plate and stiffener of the cross-frame connection at mid-span (see Photograph No. 36).<br><br>Notable girder deflections due to live load were observed in Spans 2, 4 and 6. Girder top flange connection fasteners are missing above the pin and hanger connections in Spans 9, 10A and 11 which may have been abandoned during the 1991 rehabilitation (see Photograph No. 37). Specific deficiencies noted in the girders include the following:<br><br>Span 1:<br>• At the West pier, the underside to the bottom flanges of Girders 16 to 20 exhibits minor corrosion with minor section loss. |

# 2020 BRIDGE INSPECTION REPORT
## INSPECTION COMMENTS

**BRIDGE NO.:** 1109 **HIGHWAY:** Southeast Freeway
**OVER:** CSXT Railroad, New Jersey Avenue and Virginia Avenue

| ELEMENT NO. | COMMENTS |
|---|---|
| **107**<br>**311**<br>**313**<br>**515** | **Superstructure (Continued):**<br>Girder Deficiencies (Continued):<br><br>Span 2:<br>• At Bent 2, the Girder 16 connection to the cross girder is missing three bolts where the alignment erection pins are still in place.<br>• At Bent 2, the bottom flange of the cross girder exhibits up to 1/8" section loss between Girders 2 through 4, between Girders 14 through 18, and above Column 3.<br>Span 4:<br>• In Span 4 on the South face of Girder 4, the base of the third stiffener from Bent 4 is bent.<br><br>Span 5:<br>• At Bent 4, Girder 1 exhibits a 4" high x 1" wide corrosion hole in the web end between the parallel cross girders (see Photograph No. 38).<br><br>Span 6:<br>• At Bent 6, one bolt in the North connection of Girder 5 is loose.<br><br>Span 7:<br>• There are abandoned light fixture supports welded to girders between Girders 1 and 2, Girders 3 and 4, Girders 5 and 6, and Girders 9 and 10 (see Photograph No. 39).<br>• At Girders 1 and 2, there are three missing fasteners for the horizontal light fixture support member above New Jersey Avenue (see Photograph No. 40).<br>• At Girders 1 and 2 above New Jersey Avenue, there are impact marks on the bottom flanges above the Northbound and Southbound lanes.<br>• The North face of Girder 1 was spot painted above the Southbound lane of New Jersey Avenue. The painting appears to be new.<br>• The bolts in the light fixture support connection in Bay 1 to Girder 1 are missing and only one bolt is present in the connection to Girder 2.<br><br>Span 8:<br>• At Bent 7, there are loose bolts in both Girder 3 connections to the cross girder.<br>• There are loose bolts in the Easternmost cross-frame connection plate on the South side of Girder 12.<br><br>Span 10:<br>• Girder 4 has up to 50% section loss of the bottom flange at the connection to the cross girder.<br>• There are abandoned light fixture supports welded to Girders 3, 4 and 5.<br><br>Span 10A:<br>• The North face of Girder 1 exhibits moderate corrosion to the web and bottom flange at the East end of the girder for approximately 3 LF.<br>• Under the previously mentioned corroded cross-bracing connection at the North side of Girder 4, there is a 7" wide x 3" high hole in the bottom of the stiffener below the connection plate. |

# 2020 BRIDGE INSPECTION REPORT
## INSPECTION COMMENTS

**BRIDGE NO.:** 1109 **HIGHWAY:** Southeast Freeway
**OVER:** CSXT Railroad, New Jersey Avenue and Virginia Avenue

| ELEMENT NO. | COMMENTS |
|---|---|
| **107**<br>**311**<br>**313**<br>**515** | **Superstructure (Continued):**<br>Span 10A (Continued):<br>• At Bent 10, on the South side of Girder 4, there is severe section loss for the full-width of the bottom flange for 4'-0" with an up to 20" long x up to 2" wide hole (see Photograph No. 41).<br>• At Bent 10, Girder 5 exhibits moderate corrosion and 1/8" deep pitting.<br><br>The expansion and fixed bearings are in fair condition. The bearings typically exhibit chipped paint and minor to moderate surface corrosion. Several of the expansion bearings exhibit crevice corrosion beneath the rocker, possibly restricting easy rotation of the bearing (see Photograph No. 42). In Span 1 at the West pier, the following fixed bearing anchor bolts are broken/missing: the South bolt for Girder 12, the North bolt for Girder 13, and the South bolt for Girder 20 (see Photograph No. 43). There is necking and minor section loss for the North bearing anchor bolt nut for Girder 19 at the West pier. The bearings on Column 1 of Bents 2, 3 and 4 exhibit moderate corrosion without section loss. The rocker bearings on Column 2 of Bents 3 and 5 exhibit moderate to severe corrosion (see Photograph No. 44). The East rocker bearing at Column 3 of Bent 5 appears to have slightly greater than normal lean to the East (see Photograph No. 45). At Bent 8, the fixed bearings on Column 4 exhibit moderate corrosion with minor section loss on the anchor bolt nuts (see Photograph No. 46). At Bent 9A, Bearing 1 is overgrown by vegetation (see Photograph No. 47). Several anchor bolt nuts on the bearings at the East Abutment are raised up to 1/2". Bearing 1 at the East Abutment exhibits minor corrosion on the North face and on the anchor bolt nuts. Bearing 3 at the East Abutment exhibits a loose horizontal shoulder rod with the nut on the South side backed off 3/4" (see Photograph No. 48). At the East Abutment, Bearings 11 through 15 are leaning toward the East; the North anchor bolt of Bearing 15 is broken/missing (see Photograph No. 49).<br><br>During the 1991 rehabilitation, several girders were strengthened by the addition of post-tensioning rods to the bottom flange (see Photograph No. 50). One girder in Spans 3, 6, 7, and 9 and two girders in Spans 1, 4, 5, and 12 have post-tensioning rods. In Span 6 on the North side of Girder 8, a transverse stiffener near Bent 5 appears to have been bent to a 1" deflection to accommodate a bolt placement in the bottom flange for a rod support. The post-tension reinforcement located on Girder 1 of Span 4 has sustained impact damage to the 4th intermediate support from the West and to rod sheathing (see Photograph No. 51); the support is bent 4 1/2" out of plane to the West and upward 1" and there is a 1 3/4" long crack at the top of the support web (see Photograph No. 52); to the West of the damaged support, the sheathing is dented upward 1" over a 24" length and the impact area is 3" x 9" with an adjacent 6" long gouge in the South bottom flange of Girder 1 (see Photograph No. 53). The post-tension reinforcement located on Girder 1 of Span 5 has sustained impact damage to the 3rd intermediate support from the West and to the rod sheathing (see Photograph No. 54); the support is rotated counterclockwise, bent 4" out of plane to the East and upward 1", and there is a 1 1/8" long crack at top of the support web (see Photograph No. 55); to the West of the damaged support, the sheathing is dented upward 1/4" over 18" length and the impact area is 2 1/2" x 2 1/2" (refer to Photograph No. 55). Corrosion caused by bouncing rods was observed at the supports of the post-tension reinforcement on Girder 1 in Span 5 and on a girder in Span 7 near Bent 7. Fretting corrosion is present at all of the sheathing support connections. All the post-tensioning systems appear to be functioning properly. |

# 2020 BRIDGE INSPECTION REPORT
## INSPECTION COMMENTS

**BRIDGE NO.:** 1109 **HIGHWAY:** Southeast Freeway
**OVER:** CSXT Railroad, New Jersey Avenue and Virginia Avenue

| ELEMENT NO. | COMMENTS |
|---|---|
| 205<br>215<br>234 | **Substructure:**<br>The substructure consists of a pier bent at the West end consisting of reinforced concrete columns and a cap beam, reinforced concrete columns supporting steel cross girders, and a reinforced concrete abutment at the East end. Bents 1, 2, 6, 7, 8 and 9 have four columns each and Bents 3, 4, 5 and 10 have three columns each. Bents 9A and 11 are comprised of two columns each. The columns and downspouts of Bents 4, 5, 6, and 7, Columns 2, 3 and 4 of Bent 8, and Column 4 of Bent 9 were painted blue prior to the 2014 Inspection.<br><br>The reinforced concrete substructure is in fair condition with hairline cracking, unsound areas and spalls present throughout. The West pier bent cap beam is in poor condition. Approximately 60% of the East face of the cap exhibits delaminated areas of concrete and spalls with exposed corroded reinforcing steel (see Photograph No. 56). Portions of the bearing pedestals for Girders 3 and 5 are spalled and unsound, and the pedestal for Girder 16 is spalled on the Northeast corner 23" (E) x 5" (N) x 6 3/4" high with exposed corroded reinforcing steel and undermining up to 1 1/2" wide x 19" long (see Photograph No. 57). Several pedestals exhibit hairline cracks. Refer to the table below for specific deficiencies regarding the East face of the West pier. Deficiencies regarding the West face of the West pier are discussed in the Bridge No. 1104 Inspection Report. |

**West Pier Deficiencies (East Face)**

| Location | Description |
|---|---|
| Below G2 | Unsound/Delaminated 4'-0" Wide x 6" High x 6" Under Section of Bottom Corner. 6'-6" Long x Up to 1/4" Wide Horizontal Crack below Girder 2 |
| Between G2 & G3 | 12" Diameter x Up to 1" Deep Spall with Exposed Corroded Reinforcing Steel near Top of Cap |
| Below G3 | 12" x 12" Unsound Area near Top of Cap |
| Between G3 & G5 | Horizontal 1/8" Wide Crack with a 14'-6" Wide x 12" High x 3'-0" Under Edge Spall/Delamination with Exposed Corroded Reinforcing Steel at the Bottom of Cap with Three Reinforcing Bars with 100% S.L. (see Photograph No. 58) |
| Below G4 | 24" Diameter x 1 1/2" Deep Spall with Exposed Corroded Reinforcing Steel |
| Below G6 | 9" High x 2'-4" Wide x Up to 1" Deep Spall within a 24" High x 4'-0" Wide Area of Unsound Concrete |
| Between G6 & G7 | 3'-0" Wide x 4'-0" High x 2 1/2" Deep Spall with Exposed Corroded Reinforcing Steel; 24" Diameter Unsound Area with Cracks and Efflorescence |
| Between G7 & G8 | 24" Wide x 11" High x Up to 1 1/2" Deep Spall with Exposed Corroded Reinforcing Steel within a 4'-0" x 4'-0" Unsound Area |
| Between G8 & G9 | 15" Wide x 12" High x Up to 2" Deep Spall |
| Below Girder 9 | 2'-7" Wide x 3'-6" High Spall/Delaminated Area with a 16" Wide x 3'-6" High x 2" Deep Spall with Exposed Corroded Reinforcing Steel |

# 2020 BRIDGE INSPECTION REPORT
## INSPECTION COMMENTS

**BRIDGE NO.:** 1109 **HIGHWAY:** Southeast Freeway
**OVER:** CSXT Railroad, New Jersey Avenue and Virginia Avenue

| ELEMENT NO. | COMMENTS |
|---|---|
| 205<br>215<br>234 | **Substructure (Continued):** |

**West Pier Deficiencies (East Face)**

| Location | Description |
|---|---|
| Between G9 & G10 | 5'-0" Wide x Up to 4'-6" High Delaminated/Cracked Area of Concrete with two Spalls with Exposed Corroded Reinforcing Steel; 6" Long x 2'-5" High x Up to 1" Deep and 17" Wide x 9" High x Up to 1" Deep |
| Below G10 | 5'-7" Wide x 5'-2" High x Up to 3 1/2" Deep Spall/Delamination with Exposed Corroded Reinforcing Steel; One Reinforcing Bar with 100% S.L. |
| Between G10 & G11 | 3'-4" Wide x 24" High x 3" Deep Spall/Delamination with Exposed Corroded Reinforcing Steel; 5'-9" Wide x 2'-4" High x Up to 8" Deep Edge Spall with Exposed Corroded Reinforcing Steel at Bottom of Cap |
| Below G11 | 4'-6" Wide x 3'-10" High x 2" Deep Spall/Delamination with Exposed Corroded Reinforcing Steel near the Top |
| Below G12 | 18" Diameter x 1" Deep Spall with Exposed Reinforcing Steel and a 3'-0" Wide x 24" High Unsound/Spalled Area with Exposed Corroded Reinforcing Steel |
| Between G12 & G13 | 17" Wide x 21" High x Up to 2" Deep Spall with Exposed Corroded Reinforcing Steel |
| Below G13 | 3'-0" Wide x 2'-6" High x 2 1/2" Deep Spall with Exposed Corroded Reinforcing Steel at Top of Cap; One Reinforcing Bar with 100% S.L. |
| Between G13 & G14 | 5'-6" Wide x 21" High x 2" Deep Spall/Delamination at Top and Two 18" Diameter x 1" Deep Spalls/Delaminations Below; 4'-0" Long x 3'-6" High x 3 1/2" Deep Spall with Exposed Corroded Reinforcing Steel; One Reinforcing Bar with 100% S.L. |
| Between G14 & G15 | 9'-0" Wide x 5'-3" High x Up to 6" Deep Spall/Delamination with Exposed Corroded Reinforcing Steel at Bottom of Cap; Three Reinforcing Bars with 100% S.L. |
| Between G14 & G16 | 11'-8" Wide x 2'-6" High x Up to 10" Deep Spall with Exposed Corroded Reinforcing Steel at Top (see Photograph No. 59) |
| Below G16 | Up to 9'-0" Wide x Up to 6'-0" High x Up to 2" Deep Spall with Exposed Corroded Reinforcing Steel (refer to Photograph No. 59) |
| Below G17 | Up to 12'-6" Wide x 4'-2" High x Up to 3" Deep Spall with Exposed Corroded Reinforcing Steel Extending 13" across the Top of the Cap |
| Between G18 and G19 | 6'-0" Wide x Up to 16" High Partially Spalled Unsound Area; 9" x 13" x 2" Deep Spall with Exposed Corroded Reinforcing Steel |
| Between G19 & G20 | 2'-6" Long Horizontal Crack with Corrosion Staining and an Up to 3'-9" Long x 24" Wide x 2" Deep Spall with Exposed Corroded Reinforcing Steel; 4'-0" Wide x 15" High x Up to 8" Under Spall with Exposed Corroded Reinforcing Steel; 24" Wide x 6" High x 1/2" Deep Spall/Incipient Spall |
| Below G20 | 6'-6" Wide x Up to 24" High x Up to 3" Deep Spall with Exposed Corroded Reinforcing Steel and 2'-10" Wide x 2'-1" High x 2" Deep Spall with Exposed Corroded Reinforcing Steel (see Photograph No. 60) |

# 2020 BRIDGE INSPECTION REPORT
## INSPECTION COMMENTS

**BRIDGE NO.:** 1109 **HIGHWAY:** Southeast Freeway
**OVER:** CSXT Railroad, New Jersey Avenue and Virginia Avenue

| ELEMENT NO. | COMMENTS |
|---|---|
| 205<br>215<br>234 | **Substructure (Continued):**<br>The columns for the west pier bent are in good condition. The reinforced concrete columns for Bents 1 through 11 are in poor condition. Refer to the table below for specific defects regarding these bent columns. |

**Reinforced Concrete Column Deficiencies**

| Bent | Column | Description |
|---|---|---|
| 1 | 1 | Unsound Concrete along a 1/8" Wide Crack in the South Face; Upper 4'-0" of the North Face Unsound with 24" x 10" Spall, Map Cracking and Corrosion Staining; Upper 4'-0" of West Face Unsound - Delaminated with Cracks; 18" Wide x 10" High x 1" Deep Spall in West Face |
| 1 | 3 | Full-Height Vertical Cracking Up to 1/8" Wide; 24" Wide x 10'-0" High Spalled/Unsound Area in West Face at Bottom and Mid-section |
| 1 | 4 | 10'-0" of Horizontal and Vertical Cracking Up to 1/4" Wide with Severe Efflorescence and a 4'-0" Wide x 3'-0" High Area of Unsound Concrete at Top and 5'-0" Wide x 3'-6" High Spall/Delamination at Mid-height in the South Face |
| 2 | 2 | Failed Repair on the South Face with Cracking and Unsound Concrete at Top; 3'-0" Wide x 8'-0" High and 4'-0" High x 18" Wide Delaminations in the West Face; Up to 1/16" Wide Minor Cracking along Top 6' |
| 2 | 3 | 5'-6" High x 3'-0" Wide Delamination Approximately 6'-0" Above the Ground |
| 2 | 4 | 7'-0" of Cracking Up to 1/8" Wide and Unsound Concrete Along the Upper 12" of the North and East Faces; 15" Long x 7" High x 8" Deep Spall at the Top of the East Face with an Adjacent 24" High x 3'-0" Wide Area of Unsound Concrete; 26'-0" High x Up to 4'-6" Wide x Up to 1 1/2" Deep Area of Delamination and Spalling in the South Face; 9' of Vertical Cracking in the Top of the South Face with Corrosion Staining (see Photograph No. 61) |
| 3 | 1 | Unsound Concrete Along the Upper 2'-0" to 4'-0" on All Sides with a 4'-0" High x 5'-0" Wide x Up to 4 1/2" Deep Spall with Exposed Corroded Reinforcing Steel with Up to 50% Section Loss in the Southeast Corner and 10' Long x 1/4" Wide Horizontal Crack in the North Face; 3'-6" Wide x 4'-0" High Delamination at Base of Column on the North Face |
| 3 | 2 | 14'-0" High x 5'-0" Wide Unsound Area with Full-Height Vertical Hairline Cracks in the East Face at Base; 10'-0" High x 3'-0" Wide Unsound Area in the Base and 6'-0" Wide x 2'-8" High x Up to 2" Deep Spalled/Delaminated Area with Associated Map Cracking at the Top of the West Face; Up to 4'-0" Wide x 10'-0" High Unsound Area with an Up to 3/16" Wide Vertical Crack in the Southeast Corner Extending Down from the Top of the Column |
| 3 | 3 | Full-Height 1/8"-1/4" Wide Cracks Associated with Delaminated Concrete Over the Majority of the South Face; Up to 5'-6" Wide x 11'-0" High x Up to 8" Deep Spall with Exposed Corroded Reinforcing Steel at the Top of the South Face (see Photograph No. 62); 6'-0" High x Up to 3'-0" Wide x Up to 2" Deep Spall/Delaminated Area along the Base in the South Face (see Photograph No. 63); 9'-0" High Area of Up to 1/4" Wide Cracking at the Top of the North Face |

# 2020 BRIDGE INSPECTION REPORT
## INSPECTION COMMENTS

**BRIDGE NO.:** 1109 **HIGHWAY:** Southeast Freeway
**OVER:** CSXT Railroad, New Jersey Avenue and Virginia Avenue

| ELEMENT NO. | COMMENTS |
|---|---|
| 205<br>215<br>234 | **Substructure (Continued):** |

**Reinforced Concrete Column Deficiencies (Continued)**

| Bent | Column | Description |
|---|---|---|
| 4 | 1 | 3'-0" x 3'-0" and 12" Wide x 3'-0" High Spalled/Unsound Areas in the West Face at the Top of the Column (see Photograph No. 64); 2'-3" High x 10" Wide x 1 1/2" Deep Spall with an Adjacent Horizontal 3' Long x 1/8" Wide Crack and Vertical 6' x 1/16" Wide Crack in Northwest Quadrant near Mid-Height; Paint Deteriorated Throughout |
| 4 | 2 | 6'-0" High x 24" Wide Spall with Exposed Corroded Reinforcing Steel with Two 1/8" Wide Cracks for the Full-Height of the Delamination near the Drain Pipe Attached to the East Face (see Photograph No. 65); 24" High x 3'-0" Wide Area of Unsound Concrete in the Northwest Face along the Base; Honeycombing and Cracks in Top 5'-0" to 10'-0". 4'-0" High x Up to 1/8" Wide Vertical Crack in the Top of the Southwest Corner; 8'-0" High x 3'-0" Wide Area with up to 1/4" Wide Cracks with Significant Efflorescence and a 10'-0" High x Up to 3'-0" Wide Unsound Area at the Top of the North Face |
| 4 | 3 | Up to 3'-0" Wide x 17'-0" High Delamination with Up to 3/16" Wide Cracks in the Northwest Quadrant; 3'-6" Wide x 8'-6" High Delamination with Up to 1/8" Wide Cracks in the Southeast Quadrant near the Top of the Column |
| 5 | 1 | 4'-0" Wide x 4'-0" High Unsound Area near the Top of the Column in the Southeast Quadrant with Up to 1/8" Wide Map Cracking; 6'-0" Wide x Up to 18" High Spalled/Delaminated Area at the Base in the Southwest Face |
| 5 | 2 | 12'-0" Wide x 5'-0" High x Up to 4" Deep Spall with Exposed Corroded Reinforcing Steel in the North Face (see Photograph No. 66) with Adjacent 8'-0" Wide x 5'-0" High Unsound Areas in the East and West Faces. 12" Wide x 3'-6" High x Up to 3" Deep Spall with Exposed Corroded Reinforcing Steel in the South Face at the Base with 15'-0" Long x 1/8" Wide Vertical Crack Extending from the Base and 2'-6" Wide x 12'-0" High Delamination; 3'-0" Wide x 3'-6" High x 2" Deep Spall/Delamination in the West Face near the Base |
| 5 | 3 | Up to 4'-0" Wide x 8'-6" High Delamination at the Top of the Northeast Quadrant |
| 6 | 1 | 4'-6" Wide x 18" High x Up to 5" Deep Delamination/Spall with Exposed Corroded Reinforcing Steel in the Top of the West Face; 4'-0" Wide x 2'-6" High Delamination in the North Face 6' from the Top; Graffiti on Northeast Face. Top 24" in Southeast Corner Delaminated with a 10' Long x Up to 1/8" Wide Crack with Severe Corrosion Staining |
| 6 | 2 | 24" High x 3'-6" Wide Delamination in the North Face 4'-0" below the Top; 24" Wide x 12" High Delamination at Top of the West Face; Graffiti on East Face |
| 6 | 3 | Graffiti on East Face |

# 2020 BRIDGE INSPECTION REPORT
## INSPECTION COMMENTS

**BRIDGE NO.:** 1109 **HIGHWAY:** Southeast Freeway
**OVER:** CSXT Railroad, New Jersey Avenue and Virginia Avenue

| ELEMENT NO. | COMMENTS |
|---|---|
| 205<br>215<br>234 | **Substructure (Continued):** |

**Reinforced Concrete Column Deficiencies (Continued)**

| Bent | Column | Description |
|---|---|---|
| 6 | 4 | Full-width x 10'-0" High Delamination and 4'-6" Wide x 2'-10" High x Up to 5" Deep Spall with Exposed Corroded Reinforcing Steel at Top of South Face; 5'-8" High x 3'-8" Wide x 3 1/2" Spall with Exposed Corroded Reinforcing Steel with Surrounding Delamination near the Top of the Northeast Quadrant; 12" High x 4" Wide x 1/4" Deep Spall and 3'-0" High x 6" Wide x 1" Deep Spall with Adjacent 3'-0" High x 2'-6" Wide Area of Delamination in the Southwest Quadrant |
| 7 | 1 | 4'-0" Wide x 7'-0" High x Up to 4" Deep Spalled/Unsound Area with Exposed Corroded Reinforcing Steel in the North Face at the Top of the Column (See Photograph No. 67) |
| 7 | 2 | Top 3' Delaminated on North and West Faces with 3/8" Wide x 5'-2" Long Horizontal Crack |
| 7 | 3 | 4'-0" Wide x 3'-0" High Unsound Area at the Top of the Southeast Face with a 24" Wide x 7" High x 3" Deep Spall with Exposed Reinforcing Steel (see Photograph No. 68) |
| 8 | 1 | 2'-10" Wide x 5'-3" High x Up to 4" Deep Spall with Exposed Corroded Reinforcing Steel within a 6'-0" Wide x Up to 20'-0" High Area of Unsound Concrete and Up to 1/8" Wide Cracking in the Southeast Face |
| 8 | 3 | Unsound Concrete along the Upper 24" of the West Face; 3'-2" Long x up to 1/16" Wide Crack in the West Face |
| 8 | 4 | Unsound Concrete along the Upper 24" of the North and South Faces; 2'-6" Wide x 12" High x Up to 5" Deep Spall in the North Face |
| 8 | 2-4 | Areas of Deteriorated Paint Protection |
| 9 | 1 | Vegetation Encroachment on the North and West Faces |
| 9 | 3 | 3'-0" Wide x 24" High Spall with Exposed Corroded Reinforcing Steel in Northeast Quadrant at the Top of the Column |
| 9 | 4 | 2'-6" High x 2'-6" Wide x Up to 5" Deep Spall with Exposed Corroded Reinforcing Steel in the South Face. 20" High x 21" Wide x Up to 2" Deep Spall in the East Face; 8'-0" High x 3'-0" Wide Area of Delamination in the Top of the Southeast Quadrant; 6'-0" High x 24" Wide Area of Delamination at the Bottom of the Southeast Quadrant |
| 9A | 1 | Vegetation Encroachment and 3'-0" x Half of the Column Circumference Unsound Area at Mid-height on Northwest Face |
| 10 | 1 | 8'-0" Wide x 4'-0" High Unsound Area with Vertical Up to 1/4" Wide Cracks in the Southwest Face; Map Cracking near Top of Column; The Vegetation Encroaching on All Four Sides of the Column was Removed; Delamination along Top 12" of the Southwest Quadrant |
| 10 | 3 | Vegetation Encroachment and 5'-0" of Up to 3/16" Wide Cracking in the Southwest Face |

# 2020 BRIDGE INSPECTION REPORT
## INSPECTION COMMENTS

**BRIDGE NO.:** 1109 **HIGHWAY:** Southeast Freeway
**OVER:** CSXT Railroad, New Jersey Avenue and Virginia Avenue

<table>
<tr><th>ELEMENT NO.</th><th>COMMENTS</th></tr>
<tr><td>205<br>215<br>234</td><td>
Substructure (Continued):
<table>
<tr><th colspan="3">Reinforced Concrete Column Deficiencies (Continued)</th></tr>
<tr><th>Bent</th><th>Column</th><th>Description</th></tr>
<tr><td>11</td><td>1</td><td>Spalled Concrete Up to 10” Deep with Exposed Corroded Reinforcing Steel 12’-0” Around the Upper 3’-6” of the Column with Adjacent Unsound Areas (see Photograph No. 69); Column Covered in Graffiti</td></tr>
<tr><td>11</td><td>2</td><td>3’-9” High x 21” Wide x Up to 3” Deep Spalled/Delaminated Area with Exposed Corroded Reinforcing Steel in West Face at Base; 24” Wide x 3’-10” High Spall with Exposed Corroded Reinforcing Steel at Top of North Face; Homeless Encampment at Base of Column</td></tr>
</table>
<br>The East Abutment stem is in satisfactory condition with some isolated hairline cracks, map cracking and hollow areas (see Photograph No. 70). The East Abutment remains completely covered with graffiti mural. Specific defects are listed below:<br>
• Under Bay 2, full-height x 24” wide hollow area at vertical construction joint<br>
• Under Bay 5, top of stem, 11’-3” long x 1/8” wide horizontal crack with a 4’-0” long x 8” high delamination<br>
• Under Bay 9, 2’-9” long x up to 1/4" wide vertical crack extending from the stem into the abutment seat below Beam 9 for 4”<br>
• Under Bay 12, 4’-6” high x 3’-0” wide hollow area<br>
• Under Bays 12 and 13, 11’-0” long x 12” high delamination at the top of the stem and a 12” x 12” unsound area on top of the bridge seat along the edge<br>
• Under Bay 14, 5’-0” x 5’-0” hollow area<br><br>
The abutment backwall is in good condition with (11) bays exhibiting full-height vertical hairline cracks with efflorescence (see Photograph No. 71). A full-height x 1/16” crack is in the backwall in Bay 13.<br><br>
The abutment bearing areas are in satisfactory condition. There are minor to significant accumulations of debris on the bridge seat (see Photograph No. 72). Hairline cracks are visible in the repaired areas in the pedestals (see Photograph No. 73). An 8” high x 6” wide delamination is in the Northeast corner of the pedestal for Girder 4. The pedestal for Girder 9 exhibits cracking in the South face. A 3” wide x 3” long x 4” high spall is in the Northeast corner of the pedestal for Girder 11.<br><br>
The reinforced concrete wingwalls are in good condition. There is an 18” high x 9” wide x 10” deep spall at the top of the Southeast wingwall just behind the abutment backwall (see Photograph No. 74); there is an up to a 1” gap between the wingwall and the vertical joint filler material adhered to the abutment backwall at this location.
</td></tr>
<tr><td>321</td><td>Approaches:<br>The West Approach roadway for Bridge No. 1109 is the Easternmost span of Bridge No. 1104 and any deficiencies related to the roadway are noted in the Bridge No. 1104 Report. The East Approach roadway is a reinforced concrete roadway supported by an embankment and is in good condition with minor map cracking.</td></tr>
</table>

# 2020 BRIDGE INSPECTION REPORT
## INSPECTION COMMENTS

**BRIDGE NO.:** 1109 **HIGHWAY:** Southeast Freeway
**OVER:** CSXT Railroad, New Jersey Avenue and Virginia Avenue

| ELEMENT NO. | COMMENTS |
|---|---|
| 321 | **Approaches (Continued):**<br>The East Approach Eastbound slab is in good condition with several longitudinal hairline cracks. There is a 24" wide x 20'-0" long area of cracking and deterioration in the East Approach Westbound slab in the North wheel lane on the ramp. A 12" long x 18" wide cracked/delaminated area is in the second lane from the left at the East end of the East Approach in the Westbound lanes. There is an 18" x 3 1/2" x 2" deep spall in the approach roadway in the left Westbound lane near the East Approach slab.<br><br>The transverse joint between the East Approach slab and the East Abutment backwall is not sealed and is filled with minor debris and vegetation.<br><br>The reinforced concrete barrier continues at the centerline of the roadway and on either side of both approaches and is in good condition. The barriers typically exhibit hairline to 1/16" wide cracks, scrapes and missing/broken reflectors. |
| | **Miscellaneous:**<br>The drain pipes attached to the outside of many columns exhibit minor surface corrosion. The downspout at the South end of the East Abutment appears to be clogged and is retaining water (see Photograph No. 75). There is a broken abandoned scupper pipe at the South end of the West pier in Span 1. There is a broken pipe support in Bay 15 of Span 11 at Bent 11 (Photograph No. 76).<br><br>There are four overhead sign structures on the bridge; one over the Eastbound roadway in Span 10 with a vertical clearance in the right lane of 18.57', and three over the Westbound roadway in Spans 1, 5 and 7 with vertical clearances in the left lane of 17.59', 18.46' and 18.16', respectively. All four overhead sign structures appear to be in good condition (see Photograph No. 77). In Span 7, there is impact damage to one of the sign structure vertical supports on the North parapet of the Westbound lanes. All four electrical access panel covers in the median barrier adjacent to the sign structures are either broken or missing (three on the North side of the median barrier and one on the South side of the median barrier (see Photograph No. 78). Several additional electrical access panel covers in the median barrier are missing away from the sign structures and screws attaching the covers are missing at random locations throughout the length of the bridge. Exposed wires are hanging over the outside of the parapet at the base of the Eastbound sign structure.<br><br>A speed limit sign for the Eastbound traffic in Span 5 is loose.<br><br>Between Girders 9 and 10 in Span 12 over Virginia Avenue, S.E., an electrical box cover is missing exposing wires.<br><br>The electrical box and conduit attached to the abutment are in good condition. The lock for the electrical box attached to the South end of the East Abutment is broken and the box is open.<br><br>Two light fixtures attached to the Span 12 superstructure which illuminate the basketball court below the structure are broken and debris is hanging from conduit. The light fixtures attached to the superstructure in Spans 10, 10A, 11 and 12 over Virginia Avenue were all functioning during the inspection and appeared to be in good condition. The broken lens for one light fixture in Bay 9 in Span 12 over Virginia Avenue, noted in the previous inspection report, has been repaired. |

# 2020 BRIDGE INSPECTION REPORT
## INSPECTION COMMENTS

**BRIDGE NO.:** 1109 **HIGHWAY:** Southeast Freeway
**OVER:** CSXT Railroad, New Jersey Avenue and Virginia Avenue

| ELEMENT NO. | COMMENTS |
|---|---|
| | **Miscellaneous (Continued):**<br>The roadway lighting along each parapet is in good condition. At the time of inspection, the lights were not illuminated. Light standards on the South parapet in Spans 2 and 3 vibrate excessively under truck traffic. The open handhole for a light standard along the North parapet of the Westbound roadway in Span 4 has been covered by duct tape (see Photograph No. 79). Handhole covers for light standards in Spans 8 and 9 along the North parapet for the Westbound roadway are missing with exposed wires. In Span 10, there is a 1" wide x 1/4" high hole in the North face of a light standard pole on the South parapet near the base. The light standard on the North parapet in Span 11 has a missing cover and the area where the cover is missing is covered with a thin galvanized steel sheet secured with electrical tape. Two handhole covers on the Westbound side of the roadway are not securely attached. In Span 9, the light standard for the Eastbound traffic with collision damage, noted in the previous inspection report, has been replaced. The light standard in Span 10 with two corrosion holes in the base at the South parapet of the Eastbound lanes, noted in the previous inspection report, was replaced.<br><br>Electrical access panel covers in the parapets adjacent to light standards typically have loose or missing fasteners; all 12 fasteners for the access cover attached to the South parapet of the East Approach are missing. The electrical box cover located along the North parapet in Span 6 is missing. The electrical box on the North parapet in Span 3 is missing 6 of 12 screws, and the electrical box on the North parapet in Span 4 is missing 8 of 12 screws. The electrical box located along the South parapet in Span 2 is missing 6 of 12 screws; the electrical box in Span 3 is missing 5 of 12 screws; the electrical box in Span 4 is missing 5 of 12 screws; the electrical box in Span 5 is missing 3 of 12 screws; the electrical box in Span 6 is missing 8 of 12 screws and the electrical box in Span 9 is missing 5 of 12 screws All the screws in the electrical box in Span 10 along the South parapet are missing. On the South face of the median barrier on the East Approach slab, all 12 fasteners for the access cover are missing and the cover is displaced.<br><br>The 12 LED light fixtures on the underside of the bridge in Span 7 above New Jersey Avenue are in satisfactory condition (see Photograph No. 80). None of the lights were functioning at the time of the inspection, and covers for seven light fixtures are missing. The metal brackets and cables attached to the cross-frame members and stay-in-place deck forms that support the lighting system are in satisfactory condition overall. One nut is missing in a light fixture support connection to the South face of Girder 8 between the first and second diaphragm East of Pier 6, and two nuts are loose in a light fixture support connection to the South face of Girder 12 between the second and third diaphragm East of Pier 6. A non-functioning unused light fixture is present in Bay 11. Two bolts are missing from a light fixture support connection between the third and fourth diaphragms on the South face of Girder 13. |

D.C. Department of Transportation
Transportation Operations Administration
Asset Management Division

# 2020 Fracture-Critical Inspection Report

**BRIDGE NO.:** 1109 **HIGHWAY:** Southeast Freeway **INSPECTION**
**OVER:** CSXT Railroad, New Jersey Avenue and Virginia Avenue **DATE:** 07/15/2020

**DESCRIPTION:** Steel Multi-Girder and Cross Girder Spans on Reinforced Concrete Columns, Bents, Piers and Abutments

**INSPECTION CYCLE:** 24 Months

**PRESENT POSTING:** Open, No Restriction **SUFFICIENCY RATING:** 70.0% (08/18)

**YEAR BUILT:** 1964 **DATES OF MAJOR REHABILITATION:** 1991

**NUMBER OF SPANS:** 12 Eastbound, 13 Westbound

**CLEAR WIDTH BETWEEN CURBS:** 122.0 ft.

**APPROACH ROADWAY WIDTH INCLUDING SHOULDERS:** 122.0 ft.

**TYPE OF DECK AND SURFACING:** Reinforced Concrete Deck with Monolithic Wearing Surface

**MILEPOST:** 0.00 **ADT (% TRUCK):** 95,800 (5%) **YEAR ADT:** 2007

**EQUIPMENT USED:** Maintenance of Traffic, UB-62, 35' JLG, Bucket Truck, 24' Ladder, CSX Flagman

**FRACTURE-CRITICAL TYPE:**

| | | | |
|---|---|---|---|
| | TWO GIRDER SYSTEM | X | PIN & LINK ASSEMBLY |
| X | CROSS GIRDER SYSTEM | | SUSPENDED SPANS |
| | HANGER ROD SYSTEM | | SWING SPAN |
| | CURVED STEEL BOX GIRDER | | BASCULE SPAN |

**INSPECTION TEAM LEADER:** William R. Bolt, P.E.
**INSPECTION TEAM MEMBERS:** Kenneth A. Fabian, P.E.
Maxwell J. Fyrster, E.I.T.
John E. Van Riper, E.I.T.
Jeffrey T. McIlhenny, E.I.T.
Nicholas D. Theofanis, E.I.T.
Nicholas R. DiNardo
**REVIEWED BY:** Richard A. Little, P.E.

**REPAIRS NEEDED:** NONE X PROGRAMMED URGENT

The fracture-critical members are in satisfactory condition. Clean and paint areas of corrosion on members.



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# 2020 FCM INSPECTION COMMENTS

**BRIDGE NO.:** 1109 **HIGHWAY:** Southeast Freeway
**OVER:** CSXT Railroad, New Jersey Avenue and Virginia Avenue

| ELEMENT NO. | COMMENTS |
|---|---|
| | **General:**<br>Bridge No. 1109 starts at the East end of Bridge No. 1104 and extends to 2nd Street, S.E., carrying traffic on the Southeast Freeway (Interstate 695) over a U.S. Government railroad spur, New Jersey Avenue, CSXT Railroad tracks and Virginia Avenue, S.E. (see Photograph No. 1). The bridge consists of twelve Eastbound spans numbered 1 through 12 from the West, and thirteen Westbound spans that are numbered 1 through 12 from the West with Span 10A being the thirteenth span. The steel cross girders and pin and hanger assemblies are Fracture-Critical Members (FCM). For the location of Fracture-Critical Members (FCM), see attached Sketch Nos. 1 through 6. |
| 152 | **Steel Cross Girders:**<br>**The fracture-critical steel cross girders are in satisfactory condition.** There are intermittent areas of minor surface corrosion and isolated areas of debris accumulation on the girders throughout the length of the bridge. There are some areas of section loss and some corrosion holes; however, most of these areas are inactive at this time. Broken fasteners noted in the top flange of the cross girders at the joint metalwork appear to have been abandoned during the rehabilitation (see Photograph No. 2). The cantilevered ends of the cross girders have tapered webs, and each cross girder has a 10" diameter hole cut in the web with plates welded on either side where scupper drain pipes were previously located. None of the welds showed evidence of cracking and section loss to the welded plates was inactive (see Photograph No. 3). Specific deficiencies noted in the cross girders are listed below:<br>• Bent 1: near Column 3, there are two 1" diameter corrosion holes and a 3/16" diameter corrosion hole at the base of the West cross girder stiffener (see Photograph No. 4); just North of Column 2, there are two corrosion holes measuring 1/2" x 1" and 2 1/2" x 1" at the base of the East cross girder stiffener on the West face (see Photograph No. 5).<br>• Bent 2: the top flanges of the cross girders exhibit up to 3/16" section loss. The Southernmost stiffener for the East cross girder is bowed, most likely caused during construction. Areas of missing paint and moderate corrosion are present on the cross girder over Column 3.<br>• Bent 4: the underside of the parallel cross girders exhibits moderate surface corrosion.<br>• Bent 6: the underside of the parallel cross girders exhibits moderate surface corrosion.<br>• Bent 7: minor to moderate corrosion with some delamination is present along the edges of the girder bottom flanges facing the deck joint especially at Girders 9 and 10.<br>• Bent 8: there is moderate corrosion on the top and bottom flanges and interior webs of the cross girders at Column 3 and 4 (see Photograph No. 6) and minor surface corrosion is present on the underside at the North end of the cross girder bottom flanges. There is a 1/2" diameter corrosion hole in the East cross girder stiffener at Girder 13.<br>• Bent 9: At Column 2, two stiffeners exhibit 30 missing fasteners total on the Southwest end of the girder (one with 12 missing and one with 18 missing), but the fasteners are not needed (see Photograph No. 7). Between the cross girders, there is a 3" diameter corrosion hole and a 1" diameter corrosion hole in the base of the East cross girder stiffener near Column 4 (see Photograph No. 8), and a 1" diameter corrosion hole is in the base of the East cross girder stiffener near Column 3 (see Photograph No. 9). Up to 3/16" section loss was noted in the lower web of the East cross girder near Column 3 between the parallel cross girders. There is up to 1/8" section loss to the top side of the West cross girder West bottom flange. |

## 2020 FCM INSPECTION COMMENTS

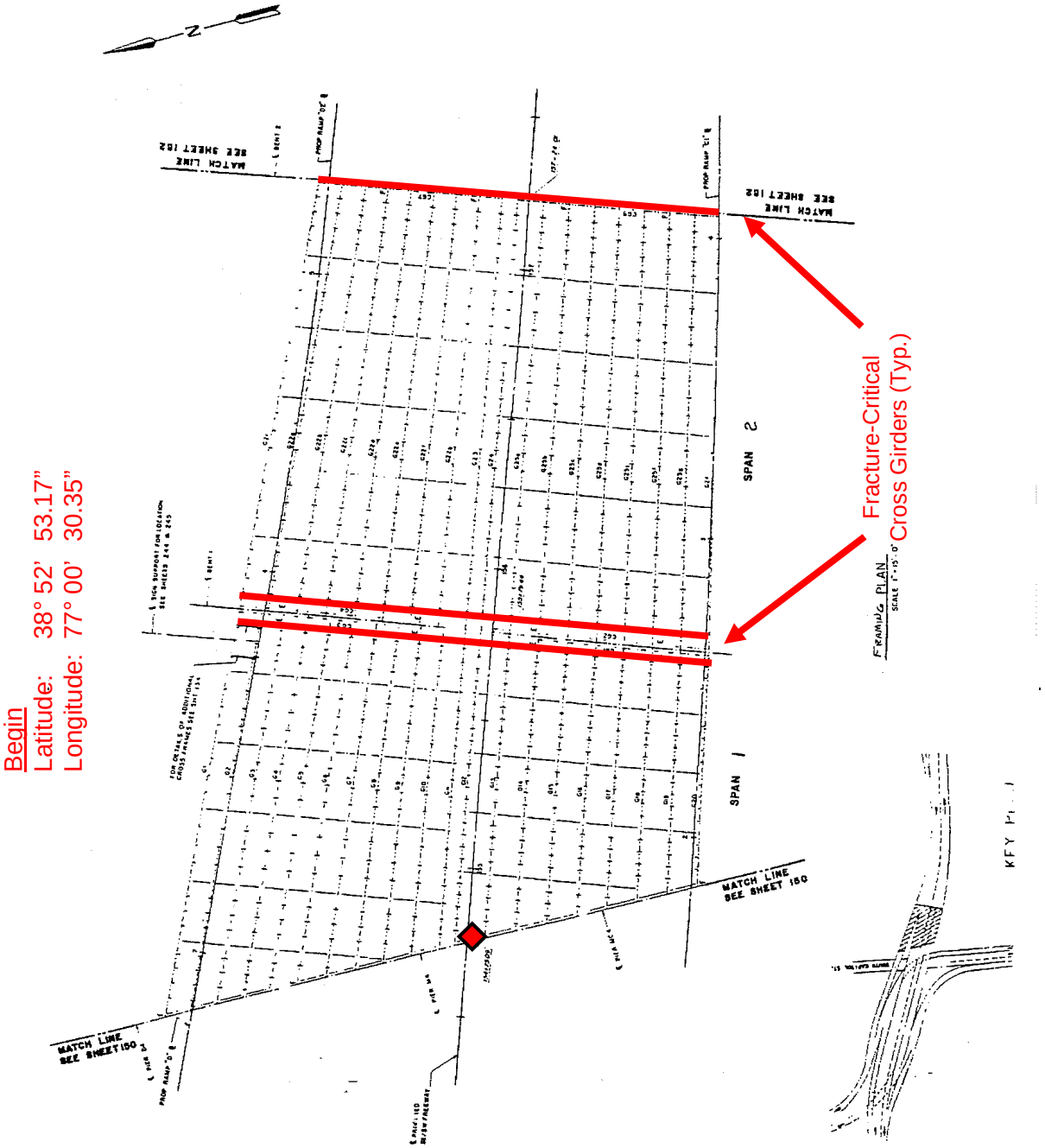
**BRIDGE NO.:** 1109 **HIGHWAY:** Southeast Freeway
**OVER:** CSXT Railroad, New Jersey Avenue and Virginia Avenue

| EMENT NO. | COMMENTS |
|---|---|
| **152** | **Steel Cross Girders**<br>Cross Girder Deficiencies (Continued):<br>• Bent 10: The top flange, lower web and top of the bottom flange of the cross girders above Columns 2 and 3 exhibit moderate corrosion and minor section loss; the West cross girder stiffener has an active 3" diameter corrosion hole near Column 2 (see Photograph No. 10); the area of the deck above Column 2 is the centerline joint of the bridge; A stiffener North of Girder 1 is missing 29 fasteners; these fasteners were abandoned during the 1991 rehabilitation (see Photograph No. 11).<br>• Bent 10 in Span 10A: 1/4" thick crevice corrosion has developed at the bottom of a stiffener at Girder 1 (see Photograph No. 12)<br>• Bent 11: the West girder exhibits minor corrosion on the bottom flange, vertical stiffener and bottom of the web. |
| **161** | **Pin and Hangers:**<br>**The fracture-critical pin and hanger assemblies are in satisfactory condition**. The pin and hanger connections are typically clean and appear to be functioning properly although several assemblies exhibit minor to moderate surface corrosion (see Photograph Nos. 13 and 14). |
| | **Summary of Conclusions:**<br>Overall, the fracture-critical steel cross girders and pin and hanger assemblies are in satisfactory condition. The most active corrosion is occurring below locations of failing joint seals. The next maintenance/repair contract should address the deteriorated joint seals, and include cleaning and painting of the cross girders, and pin and hangar assemblies. Nondestructive testing was not needed for inspection of the FCM members. |

## 2020 FCM INSPECTION COMMENTS

**BRIDGE NO.:** 1109 **HIGHWAY:** Southeast Freeway

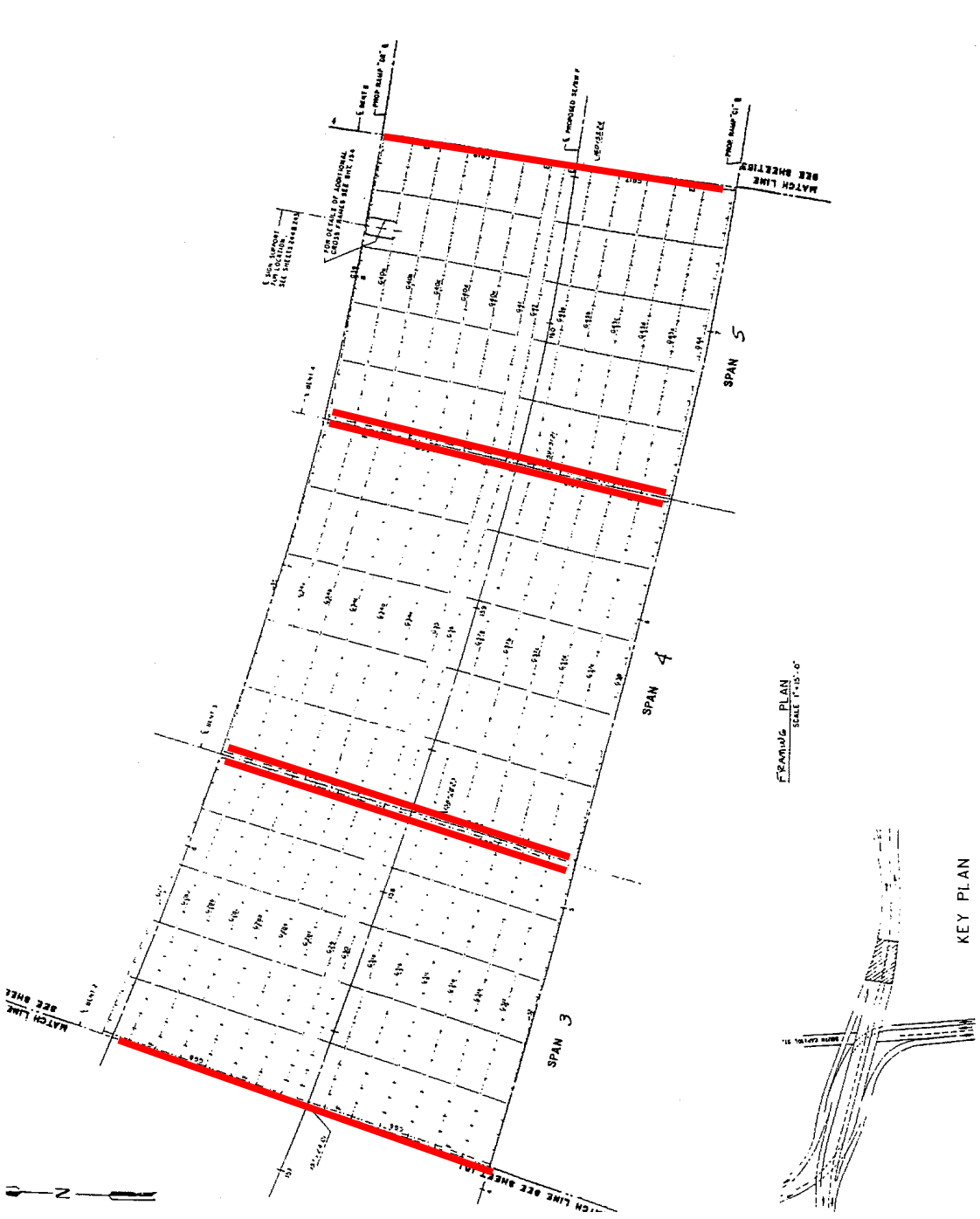
**OVER:** CSXT Railroad, New Jersey Avenue and Virginia Avenue




SKETCH NO. 1 – SPANS 1 AND 2

## 2020 FCM INSPECTION COMMENTS

**BRIDGE NO.:** 1109 **HIGHWAY:** Southeast Freeway
**OVER:** CSXT Railroad, New Jersey Avenue and Virginia Avenue




SKETCH NO. 2 – SPANS 3, 4 AND 5



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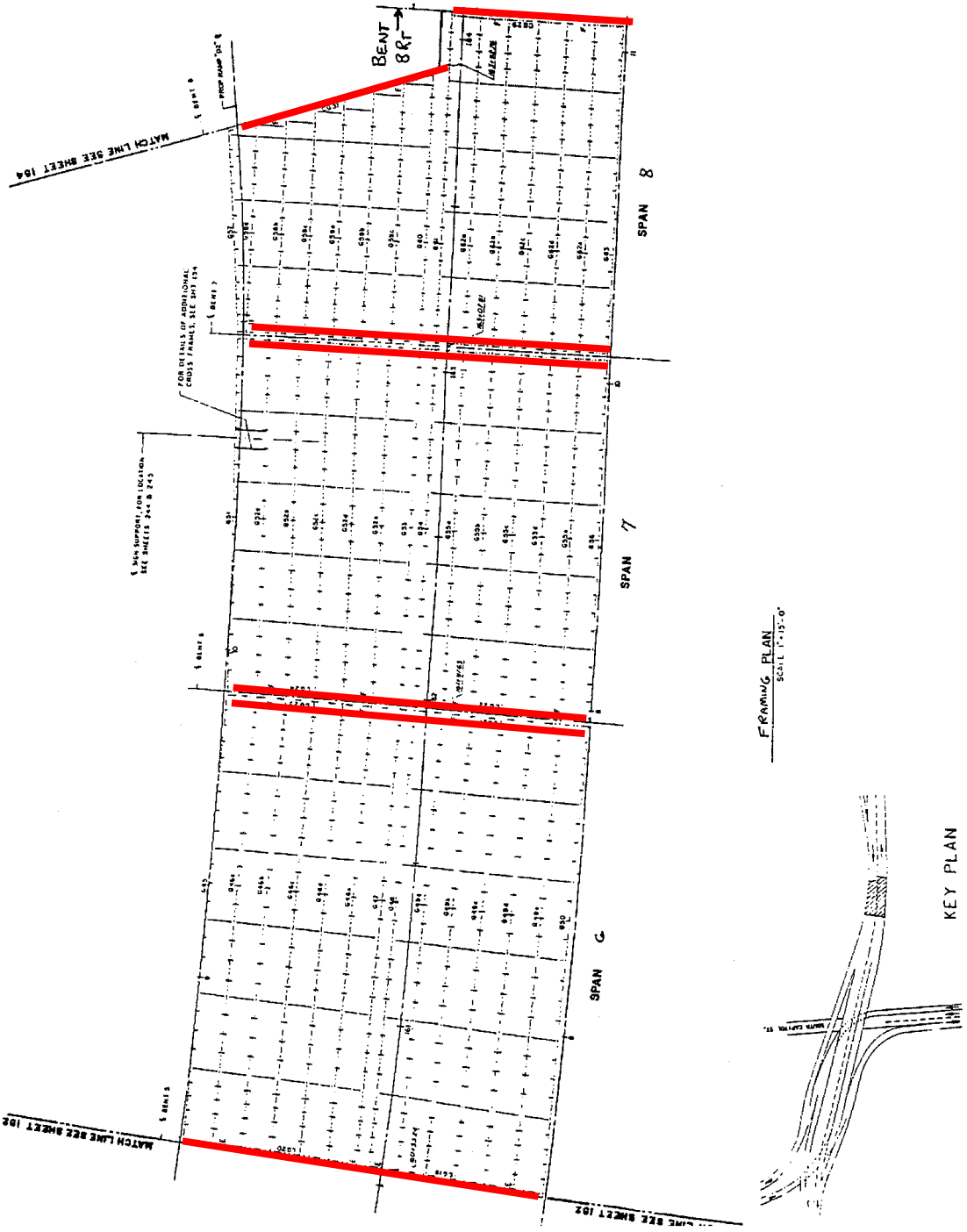
## 2020 FCM INSPECTION COMMENTS

**BRIDGE NO.:** 1109 **HIGHWAY:** Southeast Freeway

**OVER:** CSXT Railroad, New Jersey Avenue and Virginia Avenue

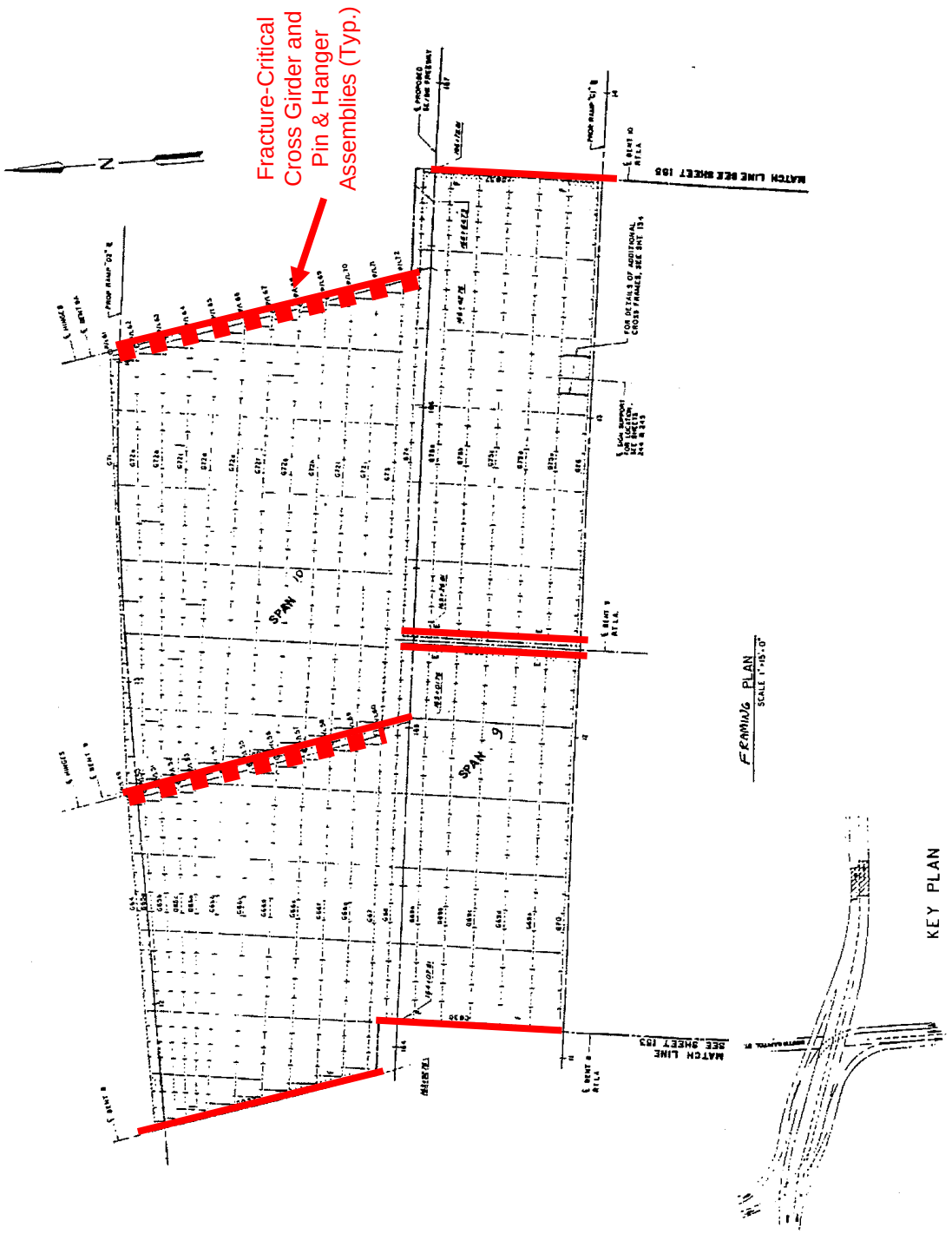



SKETCH NO. 3 – SPANS 6, 7 AND 8

## 2020 FCM INSPECTION COMMENTS

**BRIDGE NO.:** 1109 **HIGHWAY:** Southeast Freeway

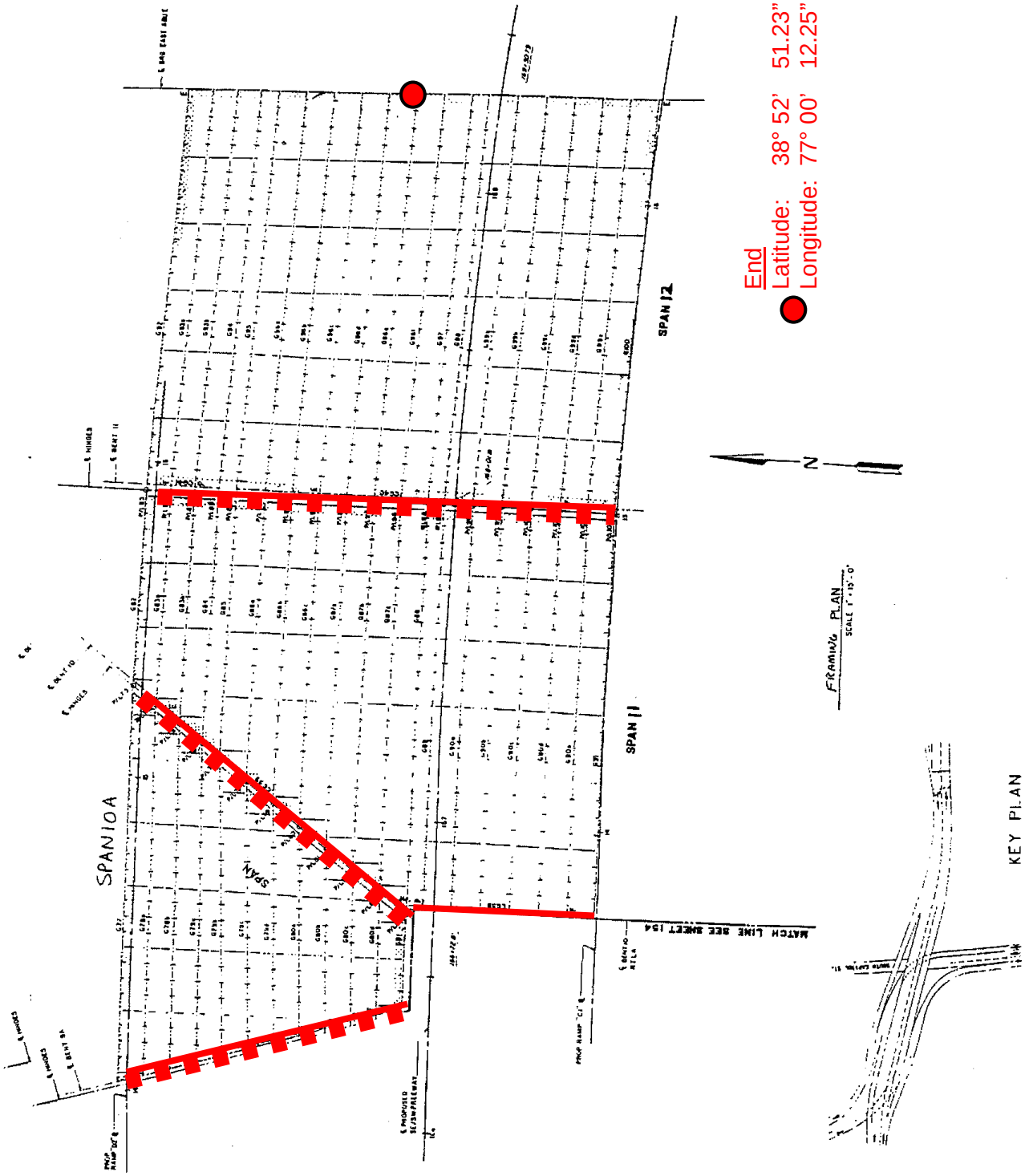
**OVER:** CSXT Railroad, New Jersey Avenue and Virginia Avenue




SKETCH NO. 4 – SPANS 9 AND 10

## 2020 FCM INSPECTION COMMENTS

**BRIDGE NO.:** 1109 **HIGHWAY:** Southeast Freeway
**OVER:** CSXT Railroad, New Jersey Avenue and Virginia Avenue




SKETCH NO. 5 – SPANS 10A, 11 AND 12



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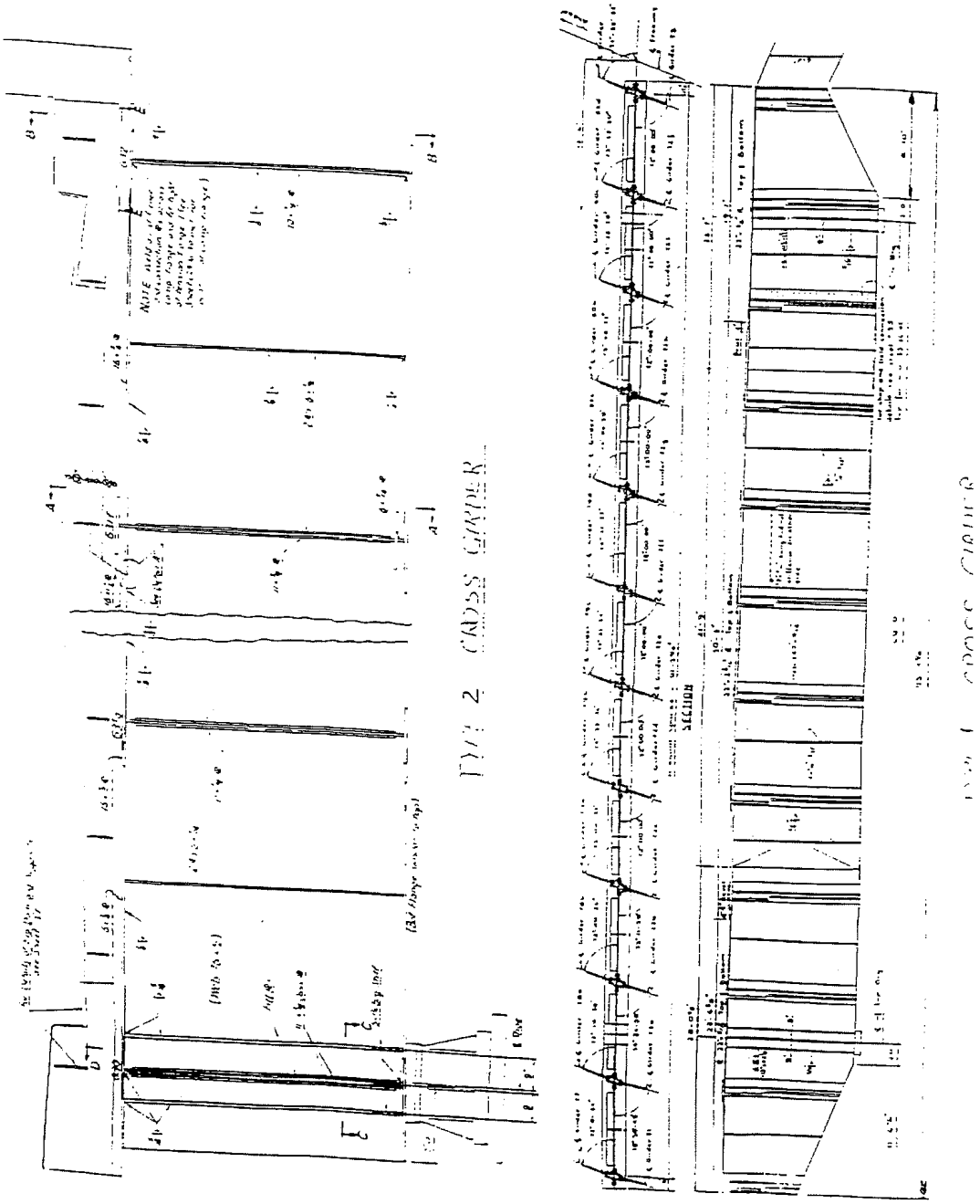
## 2020 FCM INSPECTION COMMENTS

**BRIDGE NO.:** 1109 **HIGHWAY:** Southeast Freeway
**OVER:** CSXT Railroad, New Jersey Avenue and Virginia Avenue



SKETCH NO. 6 – FRACTURE CRITICAL CROSS GIRDER

## 2020 FCM INSPECTION COMMENTS

**BRIDGE NO.:** 1109 **HIGHWAY:** Southeast Freeway
**OVER:** CSXT Railroad, New Jersey Avenue and Virginia Avenue

**Photograph No. 1** – Partial South Elevation, Looking Northwest at Spans 9 through 12

**Photograph No. 2** – Typical Abandoned Joint Attachment Fasteners, Cross Girder at Bent 2 Shown

## 2020 FCM INSPECTION COMMENTS

**BRIDGE NO.:** 1109 **HIGHWAY:** Southeast Freeway
**OVER:** CSXT Railroad, New Jersey Avenue and Virginia Avenue

**Photograph No. 3** – Typical Welded Plates at Location of Old Scupper Drain Pipe. Note Section Loss in Cross Girder Webs adjacent to the Welded Plates (Arrow)

**Photograph No. 4** – Two 1" Diameter Corrosion Holes and a 3/16" Diameter Corrosion Hole (Arrow) in a West Cross Girder Stiffener at Bent 1 near Column 3. Note Section Loss in Girder Web

## 2020 FCM INSPECTION COMMENTS

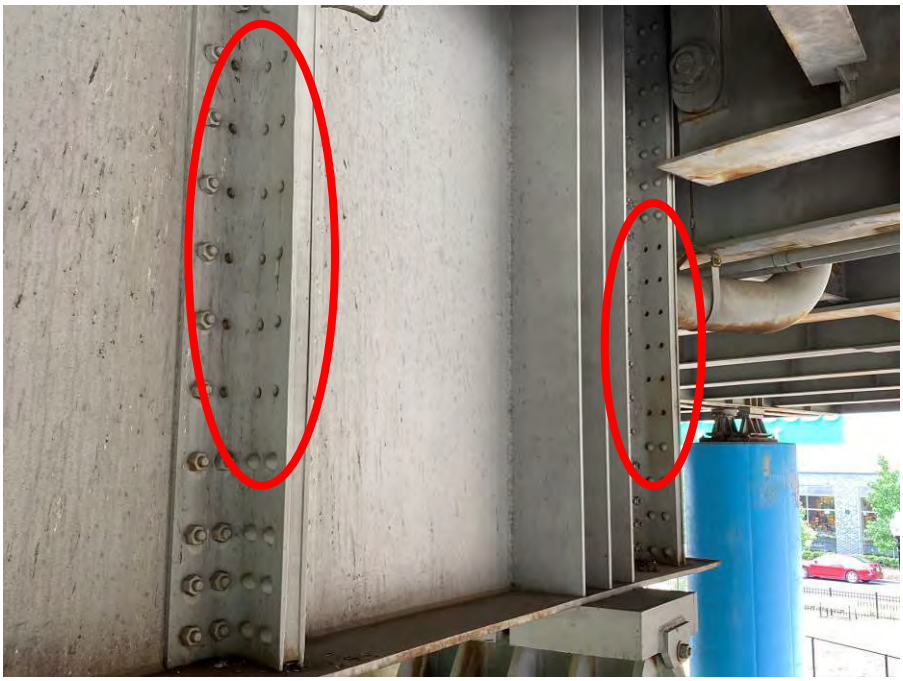
**BRIDGE NO.:** 1109 **HIGHWAY:** Southeast Freeway
**OVER:** CSXT Railroad, New Jersey Avenue and Virginia Avenue

**Photograph No. 5** – Two Corrosion Holes (1/2" x 1" and 2 1/2" x 1") at the Base of the East Cross Girder Stiffener at Bent 1

**Photograph No. 6** – Moderate Corrosion on the Cross Girder Bottom Flanges at Column 3 of Bent 8

## 2020 FCM INSPECTION COMMENTS

**BRIDGE NO.:** 1109 **HIGHWAY:** Southeast Freeway
**OVER:** CSXT Railroad, New Jersey Avenue and Virginia Avenue



**Photograph No. 7**– Cross Girder for Bent 9 with Two Stiffeners Missing 30 Fasteners Total at Column 2 (Encircled)

**Photograph No. 8** – 3" Diameter (Red Arrow) and 1" Diameter (Yellow Arrow) Corrosion Holes in the Base of the East Cross Girder Stiffener (West Face) at Bent 9 near Column 4

## 2020 FCM INSPECTION COMMENTS

**BRIDGE NO.:** 1109 **HIGHWAY:** Southeast Freeway
**OVER:** CSXT Railroad, New Jersey Avenue and Virginia Avenue

**Photograph No. 9** – Corrosion Hole in the Base of the East Cross Girder Stiffener (West Face) at Bent 9 near Column 3. Note Section Loss in the Girder Web

**Photograph No. 10** – Active Up to 3" Diameter Corrosion Hole in West Cross Girder Stiffener at Bent 10 near Column 2

## 2020 FCM INSPECTION COMMENTS

**BRIDGE NO.:** 1109 **HIGHWAY:** Southeast Freeway
**OVER:** CSXT Railroad, New Jersey Avenue and Virginia Avenue

**Photograph No. 11** – 29 Fasteners Missing in Stiffener North of Girder 1 at Bent 10

**Photograph No. 12** – 1/4" Crevice Corrosion at Bottom of Stiffener at Connection to Girder 1 at Bent 10 in Span 10A

## 2020 FCM INSPECTION COMMENTS

**BRIDGE NO.:** 1109 **HIGHWAY:** Southeast Freeway
**OVER:** CSXT Railroad, New Jersey Avenue and Virginia Avenue

**Photograph No. 13** – Typical Pin and Hanger Assembly. Note Areas of Minor Corrosion (North Side of Girder 3 of Span 9 at Bent 9 Shown)

**Photograph No. 14** – Minor Corrosion on the Pin and Hangar Assembly at Girder 6 in Span 9, Looking South

D.C. Department of Transportation
Transportation Operations Administration
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# 2020 BRIDGE INSPECTION REPORT
## NBI RATINGS

**BRIDGE NO.:** 1109 **HIGHWAY:** Southeast Freeway
**OVER:** CSXT Railroad, New Jersey Avenue and Virginia Avenue

NBI Coding: 0-2 Critical, 3 & 4 Poor, 5 & 6 Fair, 7-9 Good, N Not Applicable, NV Not Visible

| | Rating | | Rating | | Rating |
|---|---|---|---|---|---|
| **SI & A ITEM 58 DECK (MATERIALS: CONCRETE)** | | | | | **7** |
| Wearing Surface | 6 | Curbs | N | Railings Protective Coating | 6 |
| Joints, Expansion, Open | N | Sidewalks | N | Delineation | N |
| Joints, Expansion, Sealed | 6 | Railings/Parapets | 7 | Soffit | 7 |
| Joints, Assembly | 6 | Median Barrier | 7 | S.I.P. Forms | 7 |
| Drainage System | 4 | Railings (Railroad Shielding) | 7 | | |
| **SI & A ITEM 59 SUPERSTRUCTURE** | | | | | **6** |
| Main Member - Steel | 6 | Floor System Connections | N | Fixed Bearings | 5 |
| Main Member - Concrete | N | Secondary Members | 6 | Steel Protective Coating | 6 |
| Main Member - Timber | N | Secondary Member Connections | 6 | Pin and Hanger Assembly | 6 |
| Main Member - Connections | 7 | Machinery (Movable Spans) | N | | |
| Floor System Members | N | Expansion Bearings | 5 | | |
| **SI & A ITEM 60 SUBSTRUCTURE** | | | | | **5** |
| **ABUTMENT** | | | | | |
| Bearing Area/Caps | 6 | Backwalls | 7 | Concrete Protective Coating | 7 |
| Above Ground | 6 | Wingwalls (Stone Fascia) | 7 | | |
| Foundation (Footing, Piles) | NV | Slope Protection, Riprap, Drainage | N | | |
| **INTERMEDIATE SUPPORT** | | | | | |
| Caps - Concrete | 4 | Above Ground - Steel | N | Collision Protection System | N |
| Caps - Steel | N | Above Ground - Timber | N | Concrete Protective Coating | 6 |
| Caps - Timber | N | Above Ground - Masonry | N | | |
| Above Ground - Concrete | 4 | Foundation (Footing, Piles) | NV | | |
| **SI & A ITEM 61 CHANNEL & CHANNEL PROTECTION** | | | | | **N** |
| Channel Banks | N | Riprap, Toe Walls & Aprons | N | Canal Wall | N |
| Channel Bed (Scour) | N | Dikes | N | | |
| Waterway Opening | N | Jetties | N | | |
| **SI & A ITEM 62 CULVERTS** | | | | | **N** |
| **APPROACHES** | | | | | |
| Embankments | N | Relief Joints | N | Delineation | N |
| Embankment Retaining Walls | N | Approach Slab | 7 | Sight Distance | 8 |
| Slope Protection | N | Drainage | 6 | Concrete Barrier | 7 |
| Roadway | 7 | Guide Rail | N | | |
| **MISCELLANEOUS** | | | | | |
| Signs | 7 | Warning Devices | N | Sign Structures | 7 |
| Illumination | 6 | Utility Lines | N | | |

**Special Equipment Used:** UB62, 35' JLG, M.O.T., 24' Ladder, Bucket Truck, CSX Flagman
**No. Hours (Field & Report):** 58/105 Hrs. **Inspection Dates:** 07/15, 23-25, 27-28/2020, 08/03, 18/2020, 10/02/2020
**Inspection Team:** 2 - Person **Inspected By:** KAF/WRB/SAY/MJF/NDT/NRD

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# 2020 BRIDGE APPRAISAL WORKSHEET

**BRIDGE NO.:** 1109 **HIGHWAY:** Southeast Freeway
**OVER:** CSXT Railroad, New Jersey Avenue and Virginia Avenue

**TRAFFIC SAFETY FEATURES (ITEM 36)**

F-shape Barrier, Conforms to AASHTO Requirements

| BRIDGE RAILING (1st Digit) | RATING | 1 |
|---|---|---|

Railing - Continuous

| TRANSITIONS (2nd Digit) | RATING | N |
|---|---|---|

West Approach: Barriers Continues to Bridge 1104
East Approach: Barriers - Continuous

| APPROACH GUIDE RAIL (3rd Digit) | RATING | 1 |
|---|---|---|

Continues to Adjacent Structure

| GUIDE RAIL TERMINAL (4th Digit) | RATING | N |
|---|---|---|

Date:

**UNDERCLEARANCES (ITEM 69)**

Minor Collector – Two Way Traffic
Vertical Underclearance = 14.06'
Table 3A Rating = 4

Right Lateral Clearance = 2'-0"
Table 3B Rating = 3

RATING **3**

**STRUCTURAL EVALUATION (ITEM 67)**

Superstructure Rating = 6
Substructure Rating = 5

ADT = 95,800 (2007)
Inventory Rating = HS 26.1 (From DDOT Load Rating Tabulation 03/30/2018)
Table 1 Rating = 8

RATING **5**

**BRIDGE POSTING (ITEM 70)**

Operating Rating = HS 43.3 (From DDOT Load Rating Tabulation 03/30/2018)

RATING **5**

**WATERWAY ADEQUACY (ITEM 71)**

Not Applicable – Bridge Not Over a Waterway

RATING **N**

**DECK GEOMETRY (ITEM 68)**

Divided – 8 Lanes, Divided Freeway
Bridge Roadway Width = 122 ft.
Bridge Length = 1,458 ft.
Table 2C Rating = 9

Vertical Clearance Unrestricted
Table 2E Rating = 9

RATING **9**

**APPROACH ROADWAY ALIGNMENT (ITEM 72)**

No Speed Reduction Required

RATING **8**

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# 2020 BRIDGE MAINTENANCE AND REPAIR/REHABILITATION RECOMMENDATIONS

**BRIDGE NO.:** 1109
**DATES:** 07/15, 23-25, 27-28/2020 08/03, 18/2020, 10/02/2020
**HIGHWAY:** Southeast Freeway
**OVER:** CSXT Railroad, New Jersey Avenue and Virginia Avenue
**INSPECTORS:** WRB/KAF/MJF/JVR/SAY/JTM/NRD/NDT

## MAINTENANCE RECOMMENDATIONS

| BRIDGE ELEMENT | RECOMMENDED ACTION | | PC |
|---|---|---|---|
| **Reinforced Concrete Deck (12)** | Replace the worn lane markings on the roadway in the Eastbound lanes in Spans 3 through 12 and in the Westbound lanes throughout the length of the bridge. |  | **3** |
| | Clean and paint exposed reinforcing steel and repair spalls in the Westbound lanes (< 1 CF). | | **2** |
| | Replace the missing or broken roadway reflectors (approximately 180 EA). |  | **4** |
| **Concrete Bridge Railing (331)** | Replace broken and missing reflectors attached to the faces of the parapets and median barrier (approximately 80 EA). |  | **2** |
| | Repair the spalls in the North and South parapets and median barrier in Spans 4, 6, 7, 9 and 12 (approximately 5 CF). |  | **4** |
| **Drainage Devices** | Remove dirt and debris from clogged deck drainage scuppers along the North and South parapets and median barrier (35 EA). |  | **1** |
| | Repair broken scupper grates adjacent to the North parapet in Spans 2, 3 and 8 (3 EA). |  | **2** |



PRIORITY CODE (PC):
E – EMERGENCY (NOTIFY D.C. IMMEDIATELY; FOLLOW-UP WITH LETTER REPORT)
1 - FIRST (ITEMS TO BE REPAIRED FIRST – ADDRESSED WITHIN ONE YEAR)
2 – HIGH (POTENTIAL TO BECOME SERIOUS – ADDRESSED WITHIN 2 YEARS)
3 – MEDIUM (SERVICEABILITY RELATED – REPAIR AFTER HIGH PRIORITY ITEMS)
4 – LOW (MINOR REPAIRS NEEDED – SCHEDULE AS PART OF REHABILITATION PROGRAM)
5 – NO REPAIRS NEEDED AT THIS TIME

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## 2020 BRIDGE MAINTENANCE AND REPAIR/REHABILITATION RECOMMENDATIONS

**BRIDGE NO.:** 1109 **HIGHWAY:** Southeast Freeway
**DATES:** 07/15, 23-25, 27-28/2020, 08/03, 18/2020, 10/02/2020 **OVER:** CSXT Railroad, New Jersey Avenue and Virginia Avenue
**INSPECTORS:** WRB/KAF/MJF/JVR/SAY/JTM/NRD/NDT

### MAINTENANCE RECOMMENDATIONS (CONTINUED)

| BRIDGE ELEMENT | RECOMMENDED ACTION | | PC |
|---|---|---|---|
| **Strip Seal Expansion Joint (300) Compression Joint Seal (302)** | Remove debris from all deck joint seals (2,145 LF). |  | **3** |
| **Lighting** | Replace missing overhead electrical box cover between Girders 9 and 10 in Span 12 (1 EA). | | **3** |
| | Replace the missing light standard handhole covers (2 EA) and reattach unsecure covers (2 EA) in the Westbound lanes. |  | **3** |
| | Replace missing fasteners (3 EA), replace missing nut (1 EA) and tighten loose nuts (2 EA) in horizontal light fixture support connections above New Jersey Avenue (3 EA).<br><br>Repair the non-functioning underbridge light fixtures in Span 7 above New Jersey Avenue; replace the missing light covers (7 EA). |  | **3** |
| | Replace missing and tighten loose fasteners for the electrical access panel covers in the railings/parapets and median barrier.<br><br>Replace missing electrical access panel cover in the North parapet in Span 6 (1 EA). |  | **3** |
| | Repair the light fixtures attached to the Span 12 superstructure for the basketball court below the structure (2 EA) | | **4** |
| **Sign Structures** | Replace the broken/missing electrical access panel covers in the median barrier adjacent to the sign structures (4 EA). |  | **3** |



PRIORITY CODE (PC): E – EMERGENCY (NOTIFY D.C. IMMEDIATELY; FOLLOW-UP WITH LETTER REPORT) 1 - FIRST (ITEMS TO BE REPAIRED FIRST – ADDRESSED WITHIN ONE YEAR) 2 – HIGH (POTENTIAL TO BECOME SERIOUS – ADDRESSED WITHIN 2 YEARS)
3 – MEDIUM (SERVICEABILITY RELATED – REPAIR AFTER HIGH PRIORITY ITEMS) 4 – LOW (MINOR REPAIRS NEEDED – SCHEDULE AS PART OF REHABILITATION PROGRAM) 5 – NO REPAIRS NEEDED AT THIS TIME

## 2020 BRIDGE MAINTENANCE AND REPAIR/REHABILITATION RECOMMENDATIONS

**BRIDGE NO.:** 1109 **HIGHWAY:** Southeast Freeway
**DATES:** 07/15, 23-25, 27-28/2020, 08/03, 18/2020, 10/02/2020 **OVER:** CSXT Railroad, New Jersey Avenue and Virginia Avenue
**INSPECTORS:** WRB/KAF/MJF/JVR/SAY/JTM/NRD/NDT

### MAINTENANCE RECOMMENDATIONS (CONTINUED)

| BRIDGE ELEMENT | RECOMMENDED ACTION | | PC |
|---|---|---|---|
| **Soffit** | Clean the corroded reinforcing steel and repair the spalls in the soffit in Span 6 between Girders 5 and 6 (approximately 9 SF). Repair the spalls in the soffit adjacent to Bridge No. 1109-1 in Span 11, in the South overhang adjacent to Bents 1 and 2, and in the North overhang at Bent 9 (approximately 12 SF). |  | **3** |
| **Steel Open Girder (107) Reinforced Concrete Columns (205)** | Trim back encroaching vegetation along the South side of the bridge at Pier 4, along the North side of the bridge in Span 2 and at the East end of the bridge adjacent to Bridge No. 1109-1.<br>Remove vegetation from the concrete columns (4 EA). |  | **2** |
| **Signs** | Tighten the loose speed limit sign for the Eastbound traffic in Span 5 (1 EA). | | **3** |
| **Reinforced Concrete Abutment (215)** | Remove debris from the top of the East Abutment bridge seat. |  | **1** |
| **Miscellaneous** | Seal the joint between the East Abutment backwall and East Approach slab (approximately 122 LF). |  | **3** |



PRIORITY CODE (PC): E – EMERGENCY (NOTIFY D.C. IMMEDIATELY; FOLLOW-UP WITH LETTER REPORT) 1 - FIRST (ITEMS TO BE REPAIRED FIRST – ADDRESSED WITHIN ONE YEAR) 2 – HIGH (POTENTIAL TO BECOME SERIOUS – ADDRESSED WITHIN 2 YEARS)
3 – MEDIUM (SERVICEABILITY RELATED – REPAIR AFTER HIGH PRIORITY ITEMS) 4 – LOW (MINOR REPAIRS NEEDED – SCHEDULE AS PART OF REHABILITATION PROGRAM) 5 – NO REPAIRS NEEDED AT THIS TIME

# 2020 BRIDGE MAINTENANCE AND REPAIR/REHABILITATION RECOMMENDATIONS

**BRIDGE NO.:** 1109 **HIGHWAY:** Southeast Freeway
**DATES:** 07/15, 23-25, 27-28/2020, 08/03, 18/2020, 10/02/2020 **OVER:** CSXT Railroad, New Jersey Avenue and Virginia Avenue
**INSPECTORS:** WRB/KAF/MJF/JVR/SAY/JTM/NRD/NDT

## REPAIR/REHABILITATION RECOMMENDATIONS

| BRIDGE ELEMENT | RECOMMENDED ACTION | | PC |
|---|---|---|---|
| **Pin and Hanger (161)** | Clean and paint the areas on the pin and hangers which exhibit signs of paint failure and corrosion (77 SF). |  | **3** |
| **Reinforced Concrete Columns (205)**<br>**Reinforced Concrete Abutment (215)**<br>**Reinforced Concrete Pier Cap (234)** | Seal all cracks in the columns and abutment backwall (1,000 LF). |  | **3** |
| | Remove all delaminated concrete, clean and paint exposed reinforcing steel and repair all spalls (approximately 2,000 SF). |  | **2** |
| **Movable Bearings (311)**<br>**Fixed Bearings (313)** | Replace broken/missing anchor bolts (4 EA), tighten loose anchor bolt nuts (2 EA) and shoulder rod nut (1 EA), and monitor the East bearing at Column 3 of Bent 5 (1 EA). |  | **3** |
| | Clean and paint the movable and fixed bearings (105 EA). |  | **3** |
| **Drainage** | Clear the downspout at the South end of the East Abutment (1 EA) and remove debris from downspouts at Bents 4, 5 and 8 (4 EA).<br><br>Repair split/holes in the downspout at Column 2 of Bent 3 and in the horizontal drain pipe at Bent 4, South of Column 2 (2 EA), and repair the broken straps for the downspouts at Bents 3 and 6 (3 EA).<br><br>Remove the abandoned scupper pipe at the South end of the West pier (1 EA) and replace the missing cap for the drain pipe on the West side of Bent 8 at Girder 13 (1 EA). |  <br>  | **2** |



PRIORITY CODE (PC):
E – EMERGENCY (NOTIFY D.C. IMMEDIATELY; FOLLOW-UP WITH LETTER REPORT)
1 - FIRST (ITEMS TO BE REPAIRED FIRST – ADDRESSED WITHIN ONE YEAR)
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3 – MEDIUM (SERVICEABILITY RELATED – REPAIR AFTER HIGH PRIORITY ITEMS)
4 – LOW (MINOR REPAIRS NEEDED – SCHEDULE AS PART OF REHABILITATION PROGRAM)
5 – NO REPAIRS NEEDED AT THIS TIME

## 2020 BRIDGE MAINTENANCE AND REPAIR/REHABILITATION RECOMMENDATIONS

**BRIDGE NO.:** 1109 **HIGHWAY:** Southeast Freeway
**DATES:** 07/15, 23-25, 27-28/2020, 08/03, 18/2020, 10/02/2020 **OVER:** CSXT Railroad, New Jersey Avenue and Virginia Avenue
**INSPECTORS:** WRB/KAF/MJF/JVR/SAY/JTM/NRD/NDT

### REPAIR/REHABILITATION RECOMMENDATIONS (CONTINUED)

| BRIDGE ELEMENT | RECOMMENDED ACTION | | PC |
|---|---|---|---|
| **Steel Open Girder (107) Steel Floorbeam (Cross Girder) (152)** | Clean and paint all structural steel that exhibits signs of paint failure and corrosion (approximately 67,268 SF). |  | **3** |
| | Monitor existing corrosion holes and section loss; clean and paint, as needed (60 SF). |  | **5** |
| | In Span 8, tighten the loose bolts in both Girder 3 connections to the cross girder at Bent 7 (2 EA). | | **3** |
| **Secondary Members** | Repair the cross-frame connection to the North side of Girder 4 at Bent 9A (1 EA). |  | **2** |
| | Replace the cracked cross-frame connection plates to Girder 13 at the 2nd and 3rd cross-frames East of Bent 1 in Bay 13 of Span 2 (2 EA). |  | **2** |
| | Tighten the loose bolts between the connection plate and stiffener of the cross-frame connection on the South side of Girder 18 at mid-span of Span 11 (4 EA). |  | **3** |
| | Tighten the loose bolt in the Easternmost cross-frame connection plate on the South side of Girder 12 in Span 8 (1 EA). | | **3** |



PRIORITY CODE (PC): E – EMERGENCY (NOTIFY D.C. IMMEDIATELY; FOLLOW-UP WITH LETTER REPORT) 1 - FIRST (ITEMS TO BE REPAIRED FIRST – ADDRESSED WITHIN ONE YEAR) 2 – HIGH (POTENTIAL TO BECOME SERIOUS – ADDRESSED WITHIN 2 YEARS)
3 – MEDIUM (SERVICEABILITY RELATED – REPAIR AFTER HIGH PRIORITY ITEMS) 4 – LOW (MINOR REPAIRS NEEDED – SCHEDULE AS PART OF REHABILITATION PROGRAM) 5 – NO REPAIRS NEEDED AT THIS TIME

## 2020 BRIDGE MAINTENANCE AND REPAIR/REHABILITATION RECOMMENDATIONS

**BRIDGE NO.:** 1109 **HIGHWAY:** Southeast Freeway
**DATES:** 07/15, 23-25, 27-28/2020, 08/03, 18/2020, 10/02/2020 **OVER:** CSXT Railroad, New Jersey Avenue and Virginia Avenue
**INSPECTORS:** WRB/KAF/MJF/JVR/SAY/JTM/NRD/NDT

### REPAIR/REHABILITATION RECOMMENDATIONS (CONTINUED)

| BRIDGE ELEMENT | RECOMMENDED ACTION | | PC |
|---|---|---|---|
| **Secondary Members** | In Span 6, replace the missing bolt in the cross-bracing connection to the South side of Girder 10 at the 4th brace East of Pier 5 (1 EA). | | **3** |
| | In Span 9, replace the missing bolt in the cross-bracing connection to the South side of Girder 6 at the 2nd diaphragm West of Pier 9 (1 EA). | | **3** |
| **Reinforced Concrete Approach Slab (321)** | Repair the area of deteriorated concrete in the East Approach Westbound slab in the North wheel lane on the ramp (40 SF). | | **3** |



PRIORITY CODE (PC): E – EMERGENCY (NOTIFY D.C. IMMEDIATELY; FOLLOW-UP WITH LETTER REPORT); 1 - FIRST (ITEMS TO BE REPAIRED FIRST – ADDRESSED WITHIN ONE YEAR); 2 – HIGH (POTENTIAL TO BECOME SERIOUS – ADDRESSED WITHIN 2 YEARS); 3 – MEDIUM (SERVICEABILITY RELATED – REPAIR AFTER HIGH PRIORITY ITEMS); 4 – LOW (MINOR REPAIRS NEEDED – SCHEDULE AS PART OF REHABILITATION PROGRAM); 5 – NO REPAIRS NEEDED AT THIS TIME

D.C. Department of Transportation
Transportation Operations Administration
Asset Management Division

# 2020 BRIDGE INSPECTION PHOTOGRAPH SUMMARY SHEET

**BRIDGE NO.:** 1109 **HIGHWAY:** Southeast Freeway
**DATES:** 07/15, 23-25, 27,28/2020, 08/03, 18/2020, 10/09/2020 **OVER:** CSXT Railroad, New Jersey Avenue and Virginia Avenue

| Photograph No. | Description |
|---|---|
| 1 | Partial South Elevation, Looking Northwest at Spans 9 through 12 |
| 2 | Partial North Elevation, Looking Southwest at Spans 1 through 6 |
| 3 | Westbound Lanes, West Approach, Looking Northwest |
| 4 | Westbound Lanes, West Approach, Looking East |
| 5 | Eastbound Lanes, West Approach, Looking West |
| 6 | Eastbound Lanes, West Approach, Looking East |
| 7 | Westbound Lanes, East Approach, Looking East |
| 8 | Westbound Lanes, East Approach, Looking West |
| 9 | Eastbound Lanes, East Approach, Looking East |
| 10 | Eastbound Lanes, East Approach, Looking West |
| 11 | Looking South from the Top of the Bridge over New Jersey Avenue |
| 12 | Looking Southeast from the Bridge at the CSX Railroad Tunnel near the East Abutment |
| 13 | Looking South from the Top of the Bridge in Span 12 |
| 14 | Typical Condition of the Wearing Surface. Note Missing/Broken Reflectors in Roadway |
| 15 | Minor Corrosion on Stay-In-Place Deck Form in Bay 5 of Span 9 |
| 16 | Moderate Corrosion of the Bent 10 Joint under the Eastbound Lanes. Note the Spalls in Each Side of the Joint (Arrows) |
| 17 | Typical Area of Moderate Corrosion and Evidence of Moisture Leakage – Bent 2 Joint Shown. Note Abandoned Joint Attachment Fasteners (Arrows) |
| 18 | Typical Deck Joint with Minor to Moderate Debris Accumulation in Seal, Eastbound Lanes at Bent 1 Shown, Looking North |
| 19 | Typical Deck Joint with Minor to Moderate Debris Accumulation in Seal**,** Westbound Lanes at Bent 7 Shown, Looking South |
| 20 | Minor Spalls, Scrapes and Gouges in the South Parapet – Span 4 Shown, Looking Southeast |
| 21 | Typical Broken Reflector Attached to Parapets and Median (South Parapet in Span 1 Shown, Looking Southeast) |
| 22 | Paint Deterioration on South Barrier of the North Ramp Section in Span 10, Looking Southwest |
| 23 | Up to 1” Deep Moderate Scaling in the Sign Structure Column Base Mortar on the Westbound North Parapet in Span 7 |
| 24 | Hole in Base Mortar Up to 15” Deep in Span 5 at the Support for the Sign Structure at the North Parapet |
| 25 | Typical Protective Railroad Screening (North Parapet of Westbound Lanes Shown, Looking Northwest) |
| 26 | 12” Long x 12” Wide x Up to 5” Deep Spall in the Top of the South Parapet in Span 6, Looking Southeast |
| 27 | Typical Clogged Scuppers – Spans 5 and 6 in the Westbound Lanes Shown, Looking West |
| 28 | Westbound Lanes – Broken Drainage Grate in Span 8. Scupper Completely Clogged with Debris |
| 29 | Typical Downspout Exhibiting Corrosion Staining with Corrosion Visible where Paint has Failed |



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# 2020 BRIDGE INSPECTION PHOTOGRAPH SUMMARY SHEET

**BRIDGE NO.:** 1109 **HIGHWAY:** Southeast Freeway
**DATES:** 07/15, 23-25, 27,28/2020, 08/03, 18/2020, 10/09/2020 **OVER:** CSXT Railroad, New Jersey Avenue and Virginia Avenue

| Photograph No. | Description |
|---|---|
| 30 | Minor to Severe Corrosion in the Horizontal Drain Pipe at Bent 4, Column 2 with a 6” Long x 2” Wide Corrosion Hole, Looking Northwest |
| 31 | Downspout at Bent 5, Column 2 Completely Clogged with Debris |
| 32 | General View of the Superstructure – Looking Northwest in Span 12 Shown |
| 33 | General View of Cross-Frames – Looking West in Bay 1 near the East Abutment |
| 34 | 14” Long Vertical Crack in Connection Plate to Girder 13 at Third Cross-Frame East of Bent 1 in Bay 15 of Span 2 |
| 35 | Cross-Frame Connection to the North Side of Girder 4 at Bent 9A – Significant Section Loss with Only 7/8” of Connection Remaining (Encircled). Note 5” Wide x 2” High Hole at Bottom of Stiffener |
| 36 | Five Loose Bolts and Up to 7/8” Gap between Connection Plate and Stiffener of Cross-frame Connection on South Side of Girder 18 at Mid-span of Span 11 |
| 37 | Girder Top Flange Connection Fasteners Missing above the Pin and Hanger Connections – Girder 16 at Bent 11 Shown, Looking North |
| 38 | Corrosion Hole in the Web End of Girder 1 between the Cross Girders at Bent 4, Looking North |
| 39 | Abandoned Light Fixture Supports in Span 7 at Girder 2 |
| 40 | Location of Missing Fasteners (Red Arrow) at Displaced Horizontal Light Fixture Support between Girders 1 and 2 in Span 7 above New Jersey Avenue |
| 41 | Bent 10A, South Side of Girder 4, Severe Section Loss for the Full-Width of the Girder Bottom Flange |
| 42 | Bent 7, Typical Painted Over Crevice Corrosion Possibly Restricting Normal Rotation of Bearings |
| 43 | Fixed Bearing Anchor Bolt for Girder 20 at the West Pier is Missing/Broken (Arrow) |
| 44 | Moderate Section Loss on Bearing and Anchor Bolt Nuts of the Rocker Bearings (Column 2 of Bent 3 Shown, Looking North |
| 45 | Rocker Bearing of Span 6 at Column 3 of Bent 5 – Slightly Greater than Normal Lean to the East, Looking South |
| 46 | Moderate Section Loss in Bearing and Anchor Bolt Nuts of the Fixed Bearings at Column 4 of Bent 8, Looking Northwest |
| 47 | Overgrown Vegetation on Bearing 1 at Bent 9A |
| 48 | Bearing 3 at the East Abutment – Loose Shoulder Rod with South Nut Backed Off 3/4" – North Nut Shown |
| 49 | Bearing 15 at the East Abutment – North Anchor Bolt Broken/Missing (Arrow) and Bearing Leaning Excessively to the East |
| 50 | General View of a Post-Tensioning Retrofit – Span 4 Shown, Looking West |
| 51 | Post-Tension Reinforcement on Girder 1 in Span 4 – Impact Damage to the 4th Intermediate Support from the West End |
| 52 | Girder 1, Span 4, Post-Tension Reinforcing System: 1 3/4" Long Crack in Vertical Portion of the 4th Intermediate Support from the West |
| 53 | Girder 1, Span 4, Post-Tension Reinforcing System: Impact Damage to Sheathing |
| 54 | Impact Damage to the 3rd Intermediate Support from the West of the Post-Tension Reinforcement on Girder 1 in Span 5. Note Damage to Rod Sheathing |

# 2020 BRIDGE INSPECTION PHOTOGRAPH SUMMARY SHEET

**BRIDGE NO.:** 1109 **HIGHWAY:** Southeast Freeway
**DATES:** 07/15, 23-25, 27,28/2020, 08/03, 18/2020, 10/09/2020 **OVER:** CSXT Railroad, New Jersey Avenue and Virginia Avenue

| | |
|---|---|
| 55 | Girder 1, Span 5, Post-Tension Reinforcing System: 1 1/8" Long Crack in Vertical Leg of the 3rd Intermediate Support from the West |
| **Photograph No.** | **Description** |
| 56 | East Face of the West Pier with Numerous Cracks and Spalls with Exposed Corroded Reinforcing Steel |
| 57 | 23” Long x 6 3/4” High x Up to 5” Deep Spall with Exposed Reinforcing Steel Undermining the Masonry Plate (Arrows) in the Northeast Corner of the Girder 16 Bearing Pedestal at the West Pier |
| 58 | 14’-6” Wide x 12” High x 3’-0” Under Delamination/Spall with Exposed Corroded Reinforcing Steel and a 1/8” Wide Horizontal Crack in the West Pier Cap at the North Ramp Section |
| 59 | Spalls with Exposed Corroded Reinforcing Steel in the East Face of the West Pier below Girders 15 through 17, Looking Northwest |
| 60 | Spalls with Exposed Corroded Reinforcing Steel in the East Face of the West Pier at the South End |
| 61 | Bent 2, Column 4, South Face – Cracking with Corrosion Staining near Top of Column |
| 62 | Bent 3, Column 3, South Face – Up to 3’-0” Wide x 10’-0” High x Up to 8” Deep Spall/Delamination with Exposed Corroded Reinforcing Steel |
| 63 | Bent 3, Column 3, South Face – 6’-0” High x 3’-0” Wide x Up to 2” Deep Spalled/Delaminated Area at Base |
| 64 | Bent 4, Column 1, West Face – Unsound/Spalled Area of Concrete at the Top of the Column |
| 65 | Bent 4, Column 2, 24” Wide x 6’-0” High x Up to 2 1/2" Deep Spall with Exposed Corroded Reinforcing Steel at the Base of the East Face behind the Drain Pipe |
| 66 | Bent 5, Column 2, North Face – 5’-0” High x 12’-0” Wide x Up to 4” Deep Area of Spalled/Delaminated Concrete with Exposed Corroded Reinforcing Steel |
| 67 | Bent 7, Column 1, 4’-0” Wide x 7’-0” High x Up to 4” Deep Spalled/Unsound Area with Exposed Corroded Reinforcing Steel in the North Face at the Top of the Column |
| 68 | Bent 7, Column 3, Southeast Face – Area of Unsound Concrete with a 24” Wide x 7” High x 3” Deep Spall |
| 69 | Bent 11, Column 1, South and West Faces – Unsound and Spalled Concrete with Exposed Corroded Reinforcing Steel |
| 70 | General View of the East Abutment |
| 71 | Typical Vertical Hairline Crack with Efflorescence in the East Abutment Backwall (Arrow), Bay 13 Shown |
| 72 | Significant Debris Accumulation on the East Abutment Bridge Seat in Bay 8 |
| 73 | Typical Hairline Cracks in Concrete Repairs to East Abutment Pedestals (Arrows) – West Side of Girder 2 Shown |
| 74 | 18” High x 9” Wide x Up to 10” Deep Spall at the Top of the Southeast Wingwall |
| 75 | Clogged Drain Pipe at the South End of the East Abutment |
| 76 | Broken Pipe Support in Bay 15 at Bent 11 |
| 77 | Overhead Sign Structure for Eastbound Traffic in Span 10 |
| 78 | Span 10, Broken Electrical Access Panel Cover in the North Face of the Median Beneath the Eastbound Sign Structure |
| 79 | North Light Standard in Span 4 – Duct Tape Used to Cover Handhole Opening |

# 2020 BRIDGE INSPECTION PHOTOGRAPH SUMMARY SHEET

**BRIDGE NO.:** 1109 **HIGHWAY:** Southeast Freeway
**DATES:** 07/15, 23-25, 27,28/2020, 08/03, 18/2020, 10/09/2020 **OVER:** CSXT Railroad, New Jersey Avenue and Virginia Avenue

| | |
|---|---|
| 80 | Typical LED Light Fixture in Span 7 above New Jersey Avenue. Note Impact Marks to Underside of Longitudinal Girder (Arrows) |

# 2020 BRIDGE INSPECTION PHOTOGRAPHS

**BRIDGE NO.:** 1109 **HIGHWAY:** Southeast Freeway
**OVER:** CSXT Railroad, New Jersey Avenue and Virginia Avenue

**Photograph No. 1** – Partial South Elevation, Looking Northwest at Spans 9 through 12

**Photograph No. 2** – Partial North Elevation, Looking Southwest at Spans 1 through 6

# 2020 BRIDGE INSPECTION PHOTOGRAPHS

**BRIDGE NO.:** 1109 **HIGHWAY:** Southeast Freeway
**OVER:** CSXT Railroad, New Jersey Avenue and Virginia Avenue

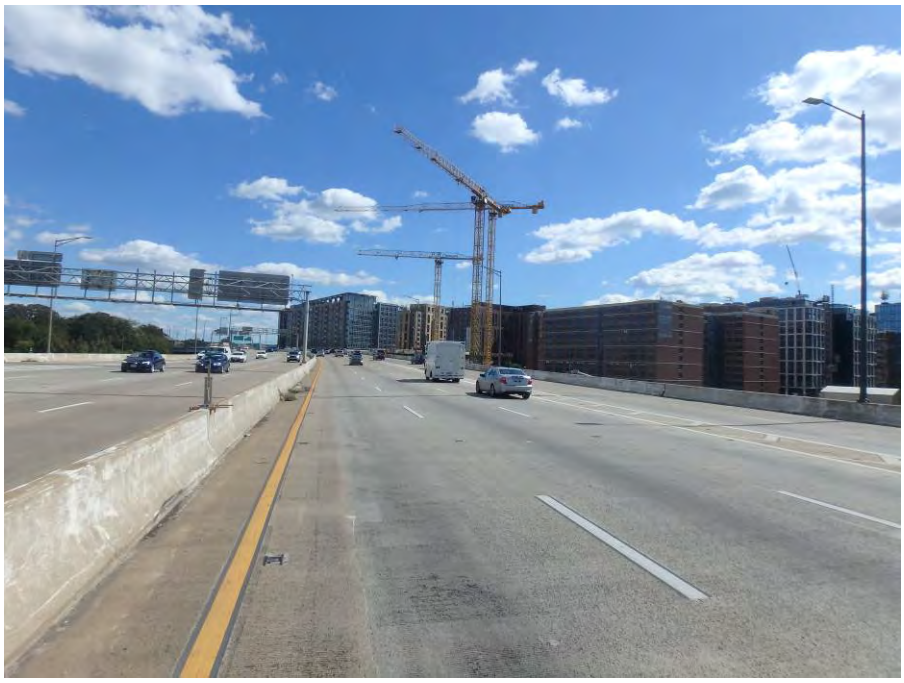
**Photograph No. 3** – Westbound Lanes, West Approach, Looking Northwest

**Photograph No. 4** – Westbound Lanes, West Approach, Looking East

# 2020 BRIDGE INSPECTION PHOTOGRAPHS

**BRIDGE NO.:** 1109 **HIGHWAY:** Southeast Freeway
**OVER:** CSXT Railroad, New Jersey Avenue and Virginia Avenue


**Photograph No. 5** – Eastbound Lanes, West Approach, Looking West



**Photograph No. 6** – Eastbound Lanes, West Approach, Looking East

# 2020 BRIDGE INSPECTION PHOTOGRAPHS

**BRIDGE NO.:** 1109 **HIGHWAY:** Southeast Freeway
**OVER:** CSXT Railroad, New Jersey Avenue and Virginia Avenue

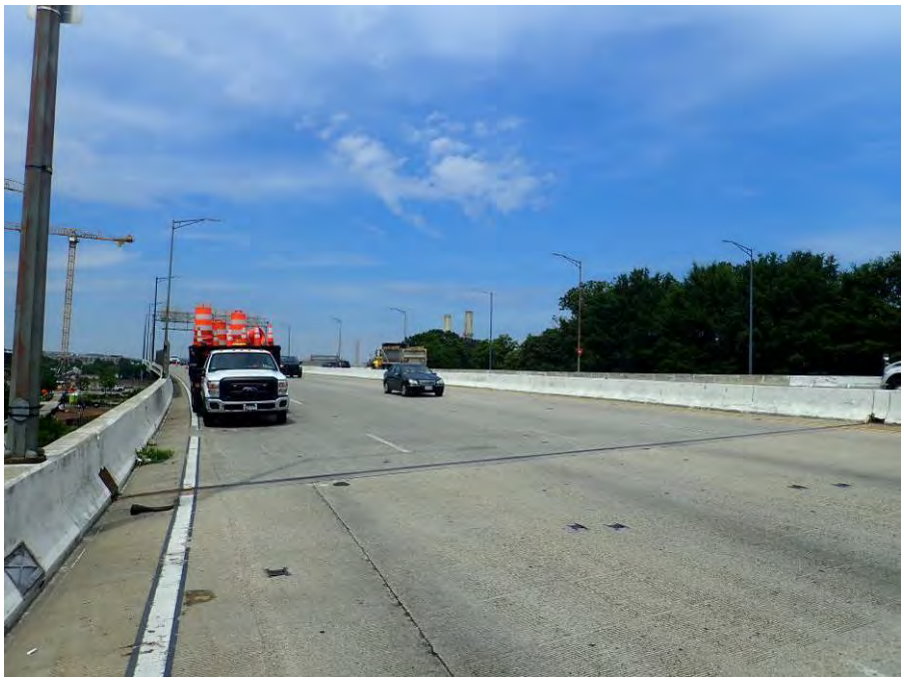
**Photograph No. 7** – Westbound Lanes, East Approach, Looking East

**Photograph No. 8** – Westbound Lanes, East Approach, Looking West

# 2020 BRIDGE INSPECTION PHOTOGRAPHS

**BRIDGE NO.:** 1109 **HIGHWAY:** Southeast Freeway
**OVER:** CSXT Railroad, New Jersey Avenue and Virginia Avenue

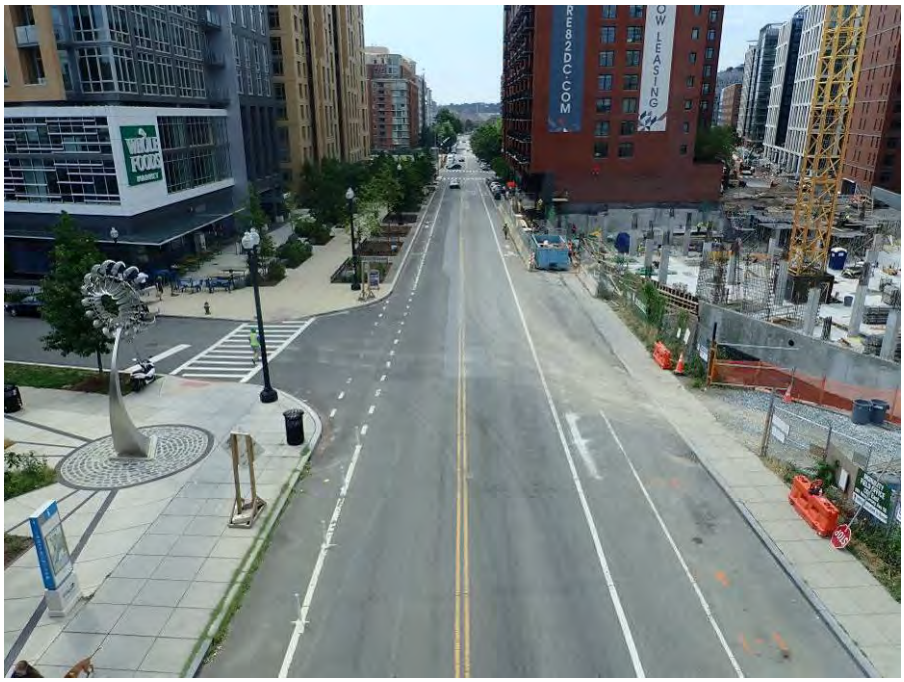
**Photograph No. 9** – Eastbound Lanes, East Approach, Looking East



**Photograph No. 10** – Eastbound Lanes, East Approach, Looking West

# 2020 BRIDGE INSPECTION PHOTOGRAPHS

**BRIDGE NO.:** 1109 **HIGHWAY:** Southeast Freeway
**OVER:** CSXT Railroad, New Jersey Avenue and Virginia Avenue



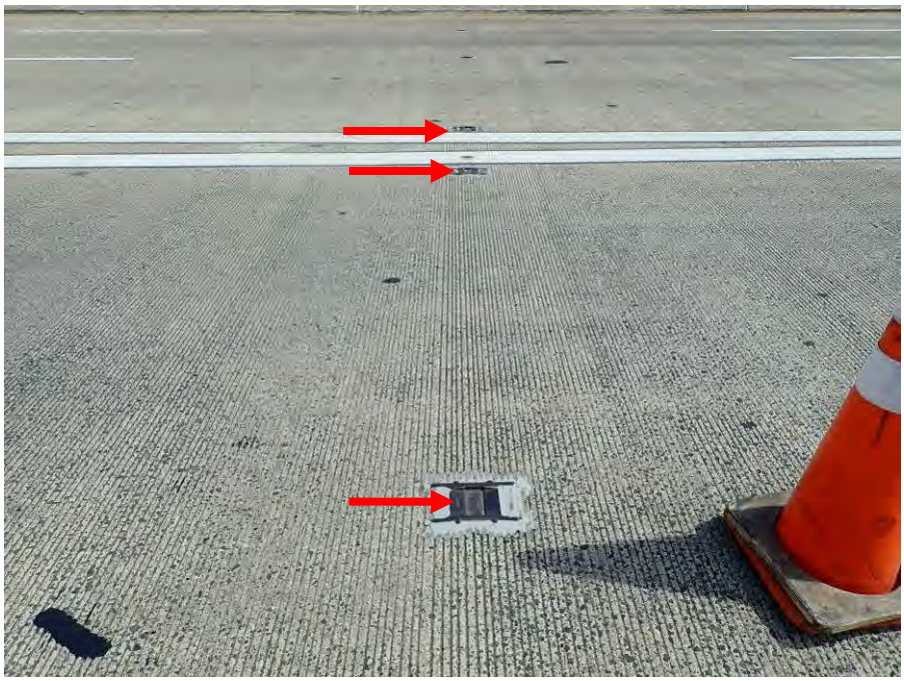

**Photograph No. 11** – Looking South from the Top of the Bridge over New Jersey Avenue

**Photograph No. 12** – Looking Southeast from the Bridge at the CSX Railroad Tunnel near the East Abutment

# 2020 BRIDGE INSPECTION PHOTOGRAPHS

**BRIDGE NO.:** 1109 **HIGHWAY:** Southeast Freeway
**OVER:** CSXT Railroad, New Jersey Avenue and Virginia Avenue


**Photograph No. 13** – Looking South from the Top of the Bridge in Span 12



**Photograph No. 14** – Typical Condition of the Wearing Surface.
Note Missing/Broken Reflectors in Roadway

# 2020 BRIDGE INSPECTION PHOTOGRAPHS

**BRIDGE NO.:** 1109 **HIGHWAY:** Southeast Freeway
**OVER:** CSXT Railroad, New Jersey Avenue and Virginia Avenue

**Photograph No. 15** – Minor Corrosion on Stay-In-Place Deck Forms in Bay 5 of Span 9

**Photograph No. 16** – Moderate Corrosion of the Bent 10 Joint under the Eastbound Lanes. Note the Spalls in Each Side of the Joint (Arrows)

# 2020 BRIDGE INSPECTION PHOTOGRAPHS

**BRIDGE NO.:** 1109 **HIGHWAY:** Southeast Freeway
**OVER:** CSXT Railroad, New Jersey Avenue and Virginia Avenue

**Photograph No. 17** – Typical Area of Moderate Corrosion and Evidence of Moisture Leakage – Bent 2 Joint Shown. Note Abandoned Joint Attachment Fasteners (Arrows)

**Photograph No. 18 –** Typical Deck Joint with Minor to Moderate Debris Accumulation in Seal, Eastbound Lanes at Bent 1 Shown, Looking North

# 2020 BRIDGE INSPECTION PHOTOGRAPHS

**BRIDGE NO.:** 1109 **HIGHWAY:** Southeast Freeway
**OVER:** CSXT Railroad, New Jersey Avenue and Virginia Avenue

**Photograph No. 19 –** Typical Deck Joint with Minor to Moderate Debris Accumulation in Seal**,** Westbound Lanes at Bent 7 Shown, Looking South

**Photograph No. 20** – Minor Spalls, Scrapes and Gouges in the South Parapet – Span 4 Shown, Looking Southeast

# 2020 BRIDGE INSPECTION PHOTOGRAPHS

**BRIDGE NO.:** 1109 **HIGHWAY:** Southeast Freeway
**OVER:** CSXT Railroad, New Jersey Avenue and Virginia Avenue

**Photograph No. 21** – Typical Broken Reflector Attached to Parapets and Median (South Parapet in Span 1 Shown, Looking Southeast)

**Photograph No. 22** – Paint Deterioration on South Barrier of the North Ramp Section in Span 10, Looking Southwest

# 2020 BRIDGE INSPECTION PHOTOGRAPHS

**BRIDGE NO.:** 1109 **HIGHWAY:** Southeast Freeway
**OVER:** CSXT Railroad, New Jersey Avenue and Virginia Avenue

**Photograph No. 23** – Up to 1" Deep Moderate Scaling in the Sign Structure Column Base Mortar on the Westbound North Parapet in Span 7

**Photograph No. 24** – Hole in Base Mortar Up to 15" Deep in Span 5 at the Support for the Sign Structure at the North Parapet

# 2020 BRIDGE INSPECTION PHOTOGRAPHS

**BRIDGE NO.:** 1109 **HIGHWAY:** Southeast Freeway
**OVER:** CSXT Railroad, New Jersey Avenue and Virginia Avenue

**Photograph No. 25** – Typical Protective Railroad Screening
(North Parapet of Westbound Lanes Shown, Looking Northwest)

**Photograph No. 26** – 12” Long x 12” Wide x Up to 5” Deep Spall in the Top of the South Parapet in Span 6, Looking Southeast

# 2020 BRIDGE INSPECTION PHOTOGRAPHS

**BRIDGE NO.:** 1109 **HIGHWAY:** Southeast Freeway
**OVER:** CSXT Railroad, New Jersey Avenue and Virginia Avenue

**Photograph No. 27** – Typical Clogged Scuppers –
Spans 5 and 6 in the Westbound Lanes Shown, Looking West

**Photograph No. 28** – Westbound Lanes – Broken Drainage Grate in Span 8.
Scupper Completely Clogged with Debris

# 2020 BRIDGE INSPECTION PHOTOGRAPHS

**BRIDGE NO.:** 1109 **HIGHWAY:** Southeast Freeway
**OVER:** CSXT Railroad, New Jersey Avenue and Virginia Avenue


**Photograph No. 29** – Typical Downspout Exhibiting Corrosion Staining with Corrosion Visible where Paint has Failed

**Photograph No. 30** – Minor to Severe Corrosion in the Horizontal Drain Pipe at Bent 4, Column 2 with a 6” Long x 2” Wide Corrosion Hole, Looking Northwest

# 2020 BRIDGE INSPECTION PHOTOGRAPHS

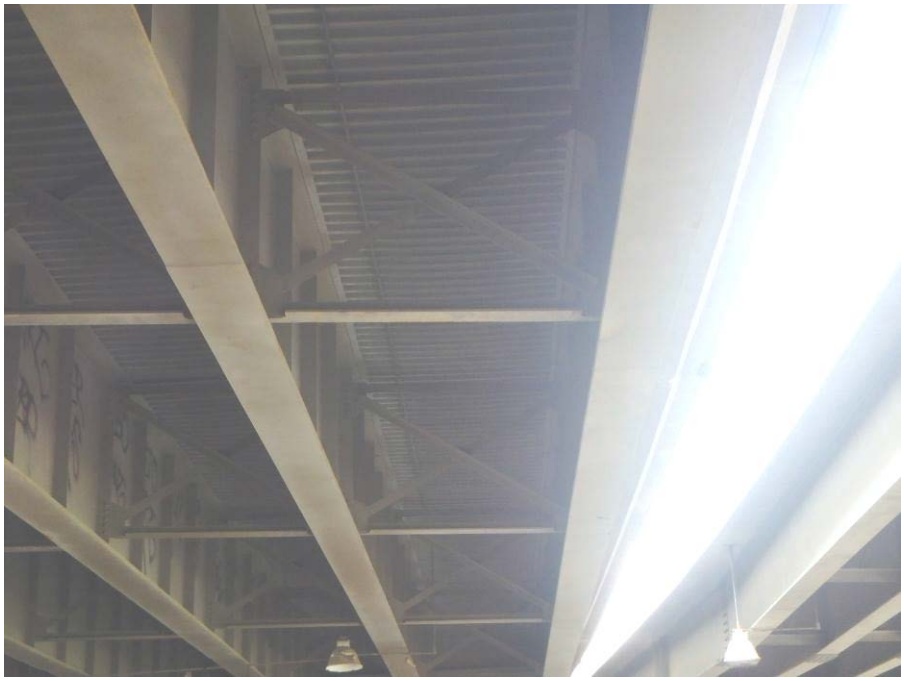
**BRIDGE NO.:** 1109 **HIGHWAY:** Southeast Freeway
**OVER:** CSXT Railroad, New Jersey Avenue and Virginia Avenue

**Photograph No. 31** – Downspout at Bent 5, Column 2 Completely Clogged with Debris

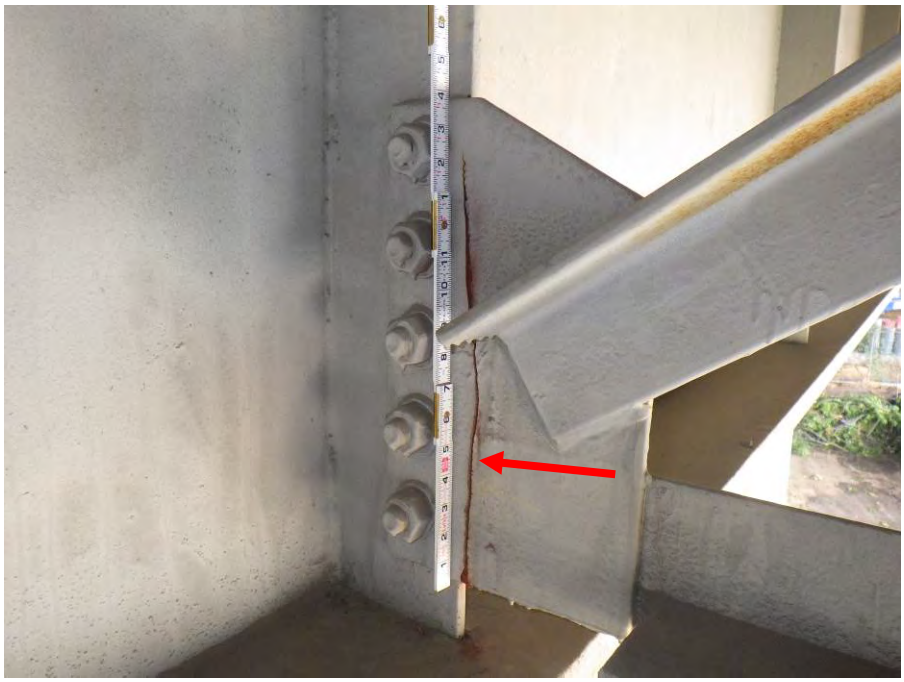
**Photograph No. 32** – General View of the Superstructure –
Looking Northwest in Span 12 Shown

# 2020 BRIDGE INSPECTION PHOTOGRAPHS

**BRIDGE NO.:** 1109 **HIGHWAY:** Southeast Freeway
**OVER:** CSXT Railroad, New Jersey Avenue and Virginia Avenue



**Photograph No. 33** – General View of Cross-Frames – Looking West in Bay 1 near the East Abutment



**Photograph No. 34** – 14" Long Vertical Crack in Connection Plate to Girder 13 at Third Cross-Frame East of Bent 1 in Bay 15 of Span 2

# 2020 BRIDGE INSPECTION PHOTOGRAPHS

**BRIDGE NO.:** 1109 **HIGHWAY:** Southeast Freeway
**OVER:** CSXT Railroad, New Jersey Avenue and Virginia Avenue

**Photograph No. 35** – Cross-Frame Connection to the North Side of Girder 4 at Bent 9A – Significant Section Loss with Only 7/8" of Connection Remaining (Encircled). Note 5" Wide x 2" High Hole at Bottom of Stiffener

**Photograph No. 36 –** Five Loose Bolts and Up to 7/8" Gap between Connection Plate and Stiffener of Cross-frame Connection on South Side of Girder 18 at Mid-span of Span 11

# 2020 BRIDGE INSPECTION PHOTOGRAPHS

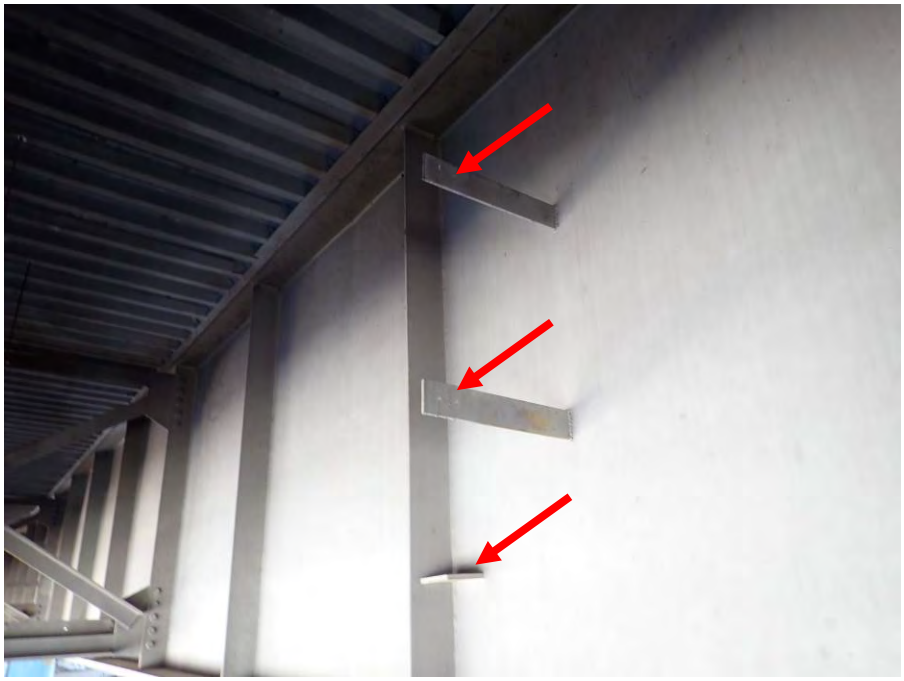
**BRIDGE NO.:** 1109 **HIGHWAY:** Southeast Freeway
**OVER:** CSXT Railroad, New Jersey Avenue and Virginia Avenue

**Photograph No. 37** – Girder Top Flange Connection Fasteners Missing above the Pin and Hanger Connections – Girder 16 at Bent 11 Shown, Looking North

**Photograph No. 38** – Corrosion Hole in the Web End of Girder 1 between the Cross Girders at Bent 4, Looking North

# 2020 BRIDGE INSPECTION PHOTOGRAPHS

**BRIDGE NO.:** 1109 **HIGHWAY:** Southeast Freeway
**OVER:** CSXT Railroad, New Jersey Avenue and Virginia Avenue



**Photograph No. 39** – Abandoned Light Fixture Supports in Span 7 at Girder 2

**Photograph No. 40** – Location of Missing Fasteners (Red Arrow) at Displaced Horizontal Light Fixture Support between Girders 1 and 2 in Span 7 above New Jersey Avenue

# 2020 BRIDGE INSPECTION PHOTOGRAPHS

**BRIDGE NO.:** 1109 **HIGHWAY:** Southeast Freeway
**OVER:** CSXT Railroad, New Jersey Avenue and Virginia Avenue

**Photograph No. 41** – Bent 10A, South Side of Girder 4, Severe Section Loss for the Full-Width of the Girder Bottom Flange

**Photograph No. 42** – Bent 7, Typical Painted Over Crevice Corrosion Possibly Restricting Normal Rotation of Bearings

# 2020 BRIDGE INSPECTION PHOTOGRAPHS

**BRIDGE NO.:** 1109 **HIGHWAY:** Southeast Freeway
**OVER:** CSXT Railroad, New Jersey Avenue and Virginia Avenue

**Photograph No. 43** – Fixed Bearing Anchor Bolt for Girder 20 at the West Pier is Broken/Missing (Arrow)

**Photograph No. 44** – Moderate Section Loss on Bearing and Anchor Bolt Nuts of the Rocker Bearings (Column 2 of Bent 3 Shown, Looking North)

# 2020 BRIDGE INSPECTION PHOTOGRAPHS

**BRIDGE NO.:** 1109 **HIGHWAY:** Southeast Freeway
**OVER:** CSXT Railroad, New Jersey Avenue and Virginia Avenue

**Photograph No. 45** – Rocker Bearing of Span 6 at Column 3 of Bent 5 – Slightly Greater than Normal Lean to the East, Looking South

**Photograph No. 46** – Moderate Section Loss in Bearing and Anchor Bolt Nuts of the Fixed Bearings at Column 4 of Bent 8, Looking Northwest

# 2020 BRIDGE INSPECTION PHOTOGRAPHS

**BRIDGE NO.:** 1109 **HIGHWAY:** Southeast Freeway
**OVER:** CSXT Railroad, New Jersey Avenue and Virginia Avenue

**Photograph No. 47** – Overgrown Vegetation on Bearing 1 at Bent 9A

**Photograph No. 48** – Bearing 3 at the East Abutment –
Loose Shoulder Rod with South Nut Backed Off 3/4" – North Nut Shown

# 2020 BRIDGE INSPECTION PHOTOGRAPHS

**BRIDGE NO.:** 1109 **HIGHWAY:** Southeast Freeway
**OVER:** CSXT Railroad, New Jersey Avenue and Virginia Avenue

**Photograph No. 49** – Bearing 15 at the East Abutment – North Anchor Bolt Broken/Missing (Arrow) and Bearing Leaning Excessively to the East


**Photograph No. 50** – General View of a Post-Tensioning Retrofit – Span 4 Shown, Looking West

## 2020 BRIDGE INSPECTION PHOTOGRAPHS

**BRIDGE NO.:** 1109 **HIGHWAY:** Southeast Freeway
**OVER:** CSXT Railroad, New Jersey Avenue and Virginia Avenue

**Photograph No. 51** – Post-Tension Reinforcement on Girder 1 in Span 4 – Impact Damage to the 4th Intermediate Support from the West End


**Photograph No. 52** – Girder 1, Span 4, Post-Tension Reinforcing System: 1 3/4" Long Crack in Vertical Portion of the 4th Intermediate Support from the West

# 2020 BRIDGE INSPECTION PHOTOGRAPHS

**BRIDGE NO.:** 1109 **HIGHWAY:** Southeast Freeway
**OVER:** CSXT Railroad, New Jersey Avenue and Virginia Avenue

**Photograph No. 53** – Girder 1, Span 4, Post-Tension Reinforcing System: Impact Damage to Sheathing

**Photograph No. 54** – Impact Damage to the 3rd Intermediate Support from the West of the Post-Tension Reinforcement on Girder 1 in Span 5. Note Damage to Rod Sheathing

# 2020 BRIDGE INSPECTION PHOTOGRAPHS

**BRIDGE NO.:** 1109 **HIGHWAY:** Southeast Freeway
**OVER:** CSXT Railroad, New Jersey Avenue and Virginia Avenue


**Photograph No. 55** – Girder 1, Span 5, Post-Tension Reinforcing System: 1 1/8" Long Crack in Vertical Leg of the 3rd Intermediate Support from the West

**Photograph No. 56** – East Face of the West Pier with Numerous Cracks and Spalls with Exposed Corroded Reinforcing Steel

# 2020 BRIDGE INSPECTION PHOTOGRAPHS

**BRIDGE NO.:** 1109 **HIGHWAY:** Southeast Freeway
**OVER:** CSXT Railroad, New Jersey Avenue and Virginia Avenue

**Photograph No. 57** – 23” Long x 6 3/4” High x Up to 5” Deep Spall with Exposed Reinforcing Steel Undermining the Masonry Plate (Arrows) in the Northeast Corner of the Girder 16 Bearing Pedestal at the West Pier

**Photograph No. 58** – 14’-6” Wide x 12” High x 3’-0” Under Delamination/Spall with Exposed Corroded Reinforcing Steel and a 1/8” Wide Horizontal Crack in the West Pier Cap at the North Ramp Section

# 2020 BRIDGE INSPECTION PHOTOGRAPHS

**BRIDGE NO.:** 1109 **HIGHWAY:** Southeast Freeway
**OVER:** CSXT Railroad, New Jersey Avenue and Virginia Avenue

**Photograph No. 59** – Spalls with Exposed Corroded Reinforcing Steel in the East Face of the West Pier below Girders 15 through 17, Looking Northwest

**Photograph No. 60** – Spalls with Exposed Corroded Reinforcing Steel in the East Face of the West Pier at the South End

# 2020 BRIDGE INSPECTION PHOTOGRAPHS

**BRIDGE NO.:** 1109 **HIGHWAY:** Southeast Freeway
**OVER:** CSXT Railroad, New Jersey Avenue and Virginia Avenue

**Photograph No. 61 –** Bent 2, Column 4 – Cracking with Corrosion Staining near Top of Column

**Photograph No. 62 –** Bent 3, Column 3, South Face – Up to 3'-0" Wide x 10'-0" High x Up to 8" Deep Spall/Delamination with Exposed Corroded Reinforcing Steel

# 2020 BRIDGE INSPECTION PHOTOGRAPHS

**BRIDGE NO.:** 1109 **HIGHWAY:** Southeast Freeway
**OVER:** CSXT Railroad, New Jersey Avenue and Virginia Avenue

**Photograph No. 63 –** Bent 3, Column 3, South Face – 6'-0" High x 3'-0" Wide x Up to 2" Deep Spalled/Delaminated Area at Base

**Photograph No. 64** – Bent 4, Column 1, West Face – Unsound /Spalled Area of Concrete at the Top of the Column

# 2020 BRIDGE INSPECTION PHOTOGRAPHS

**BRIDGE NO.:** 1109 **HIGHWAY:** Southeast Freeway
**OVER:** CSXT Railroad, New Jersey Avenue and Virginia Avenue

**Photograph No. 65** – Bent 4, Column 2, 24” Wide x 6’-0” High x Up to 2 1/2" Deep Spall with Exposed Corroded Reinforcing Steel at the Base of the East Face behind the Drain Pipe

**Photograph No. 66** – Bent 5, Column 2, North Face – 5’-0” High x 12’-0” Wide x Up to 4” Deep Area of Spalled/Delaminated Concrete with Exposed Corroded Reinforcing Steel

# 2020 BRIDGE INSPECTION PHOTOGRAPHS

**BRIDGE NO.:** 1109 **HIGHWAY:** Southeast Freeway
**OVER:** CSXT Railroad, New Jersey Avenue and Virginia Avenue

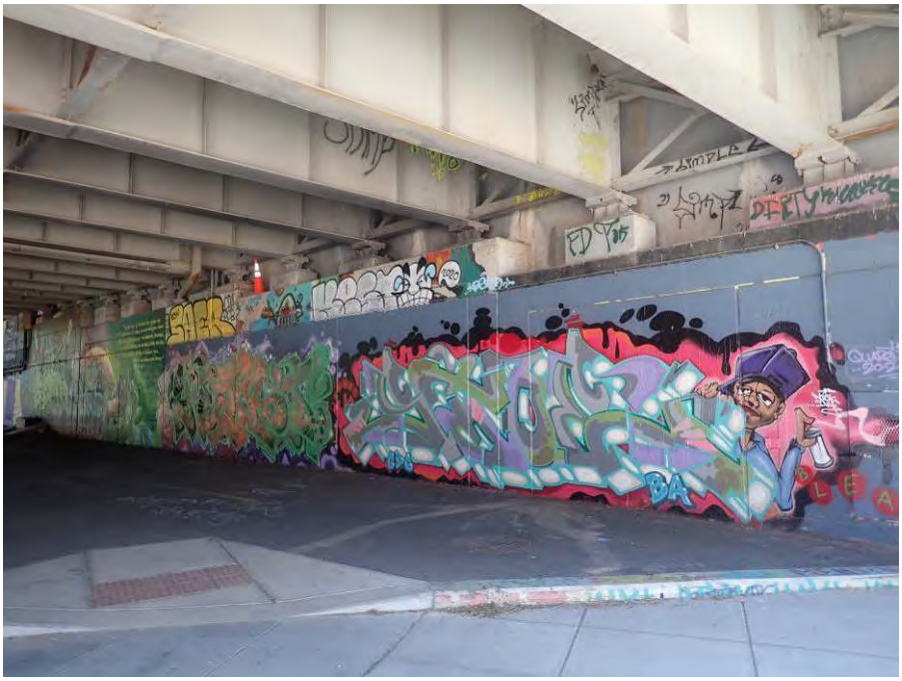
**Photograph No. 67** – Bent 7, Column 1, 4'-0" Wide x 7'-0" High x Up to 4" Deep Spalled/Unsound Area with Exposed Corroded Reinforcing Steel in the North Face at the Top of the Column

**Photograph No. 68** – Bent 7, Column 3, Southeast Face –
Area of Unsound Concrete with a 24" Wide x 7" High x 3" Deep Spall

# 2020 BRIDGE INSPECTION PHOTOGRAPHS

**BRIDGE NO.:** 1109 **HIGHWAY:** Southeast Freeway
**OVER:** CSXT Railroad, New Jersey Avenue and Virginia Avenue

**Photograph No. 69** – Bent 11, Column 1, South and West Faces – Unsound and Spalled Concrete with Exposed Corroded Reinforcing Steel



**Photograph No. 70** – General View of the East Abutment

# 2020 BRIDGE INSPECTION PHOTOGRAPHS

**BRIDGE NO.:** 1109 **HIGHWAY:** Southeast Freeway
**OVER:** CSXT Railroad, New Jersey Avenue and Virginia Avenue

**Photograph No. 71** – Typical Vertical Hairline Crack with Efflorescence in the East Abutment Backwall (Arrow), Bay 13 Shown

**Photograph No. 72** – Significant Debris Accumulation on the East Abutment Bridge Seat in Bay 8

# 2020 BRIDGE INSPECTION PHOTOGRAPHS

**BRIDGE NO.:** 1109 **HIGHWAY:** Southeast Freeway
**OVER:** CSXT Railroad, New Jersey Avenue and Virginia Avenue

**Photograph No. 73** – Typical Hairline Cracks in Concrete Repairs to East Abutment Pedestals (Arrows) – West Side of Girder 2 Shown

**Photograph No. 74** – 18” High x 9” Wide x Up to 10” Deep Spall at the Top of the Southeast Wingwall

# 2020 BRIDGE INSPECTION PHOTOGRAPHS

**BRIDGE NO.:** 1109 **HIGHWAY:** Southeast Freeway
**OVER:** CSXT Railroad, New Jersey Avenue and Virginia Avenue

**Photograph No. 75** – Clogged Drain Pipe at the South End of the East Abutment

**Photograph No. 76** – Broken Pipe Support in Bay 15 at Bent 11

# 2020 BRIDGE INSPECTION PHOTOGRAPHS

**BRIDGE NO.:** 1109 **HIGHWAY:** Southeast Freeway
**OVER:** CSXT Railroad, New Jersey Avenue and Virginia Avenue


**Photograph No. 77** – Overhead Sign Structure for Eastbound Traffic in Span 10

**Photograph No. 78** – Span 10, Broken Electrical Access Panel Cover in the North Face of the Median Beneath the Eastbound Sign Structure

## 2020 BRIDGE INSPECTION PHOTOGRAPHS

**BRIDGE NO.:** 1109 **HIGHWAY:** Southeast Freeway
**OVER:** CSXT Railroad, New Jersey Avenue and Virginia Avenue

**Photograph No. 79** – North Light Standard in Span 4 – Duct Tape Used to Cover Handhole Opening

**Photograph No. 80 –** Typical LED Light Fixture in Span 7 above New Jersey Avenue.
Note Impact Marks to Underside of Longitudinal Girder (Arrows)

# Structure Inventory and Appraisal Sheet (English Units)

Bridge Key: 1109 Agency ID: 1109 SR: 70.0 SD/FO: ND

## IDENTIFICATION

| | | | |
|---|---|---|---|
| State 1: | 11 D.C. | Struc Num 8: | 1109 |
| Facility Carried 7: | SOUTHEAST FRWY | Location 9: | SE FRWY OVER VIRGINIA AVE |
| Rte.(On/Under) 5A: | Route On Structure | Rte. Signing Prefix 5B: | 1 Interstate Hwy |
| Level of Service 5C: | 1 Mainline | Route Number 5D: | 00695 |
| Directional Suffix 5E: | 0 N/A (NBI) | % Responsibility: | |
| SHD District 2: | District 1 - Highway | County Code 3: | District of Columb |
| Place Code 4: | Unknown | Mile Post 11: | NA |
| Feature Intersected 6: | PB&W R.R.& VIRGI | | |
| Latitude 16: | 38° 52' 53" | Longitude 17 | 077° 00' 30" |
| Border Bridge Code 98 | Not Applicable (P) | | |
| Border Bridge Number 99 | | | |

## STRUCTURE TYPE AND MATERIALS

| | | | |
|---|---|---|---|
| Number of Approach Spans 46 | 0 | Number of Spans Main Unit 45: | 12 |
| 3 Steel | | 03 Girder-Floorbeam | |
| Deck Type 107: | 1 Concrete-Cast-in-Place | | |
| Wearing Surface 108A: | 1 Monolithic Concrete | | |
| Membrane 108B: | 0 None | | |
| Deck protection 108C | 1 Epoxy Coated Reinforci | | |

## AGE AND SERVICE

| | | | | | |
|---|---|---|---|---|---|
| Year Built 27: | 1964 | Year Reconstructed 106: | 1991 | | |
| Type of Service on 42A | 1 Highway | | | | |
| Type of Service under 42B | 1 Highway | | | | |
| Lanes on 28A: | 8 | Lanes under 28B: | 4 | Detour Length 19: | 2.0 mi |
| ADT 29: | 95,800 | Truck ADT 109: | 5% | Year of ADT 30: | 2007 |

## GEOMETRIC DATA

| | | | |
|---|---|---|---|
| Length Max Span 48: | 145.00 ft | Structure Length 49: | 1,458.00 ft |
| Curb/Sdwlk Width L 50A | 0.00 ft | Curb/Sidewalk Width R 50B | 0.00 ft |
| Width Curb to Curb 51: | 122.00 ft | Width Out to Out 52: | 127.50 ft |
| Approach Roadway width 32: (w/ shoulders) | 122.00 ft | Median 33: | 3 Closed Med |
| Deck Area: | 181,345.00 sq. ft | | |
| Skew 34: | 20.00° | Structure Flared 35 | 1 Yes, flared |
| Vertical Clearance 10 | 99.99 ft | Horizontal Clearance 47: | 48.00 ft |
| Minimum Vertical Clearance Over Bridge 53: | 99.99 ft | | |
| Minimum Vertical Underclearance Reference 54A | H Hwy beneath struct | | |
| Minimum Vertical Underclearance 54B: | 14.06 ft ~~13.28 ft~~ | | |
| Minimum Lateral Underclearance Reference R 55A: | H Hwy beneath struct | | |
| Minimum Lateral Underclearance R 55: | 2.00 ft | | |
| Minimum Lateral Underclearance L 56: | 99.99 ft ~~328.05 ft~~ | | |

## INSPECTION

| | | | | | |
|---|---|---|---|---|---|
| Frequency 91: | 24 months | Inspection Date 90: | 7/15/2020 ~~8/8/2018~~ | Next Inspection: | 7/15/2022 ~~8/8/2020~~ |
| FC Frequency 92A: | 24 months | FC Inspection Date 93A: | 7/15/2020 ~~8/8/2018~~ | Next FC Inspection: | 7/15/2022 ~~8/8/2020~~ |
| UW Frequency 92B: | NA | UW Inspection Date 93B: | NA | Next UW Inspection | NA |
| SI Frequency 92C: | NA | SI Date 93C: | NA | Next SI: | NA |
| Element Frequency: | 24 months | Element Insp. Date: | 7/15/2020 ~~8/8/2018~~ | Next Elem. Insp.: | 7/15/2022 ~~8/8/2020~~ |

## CLASSIFICATION

| | | | |
|---|---|---|---|
| Defense Highway 100: | 1 On Interstate STRAHNET | Parallel Structure 101: | No \|\| bridge exists |
| Direction of Traffic 102: | 2 2-way traffic | Temporary Structure 103: | Not Applicable (P) |
| Highway System 104: | 1 On the NHS | NBIS Length 112: | Long Enough |
| Toll Facility 20: | 3 On free road | Functional Class 26: | 11 Urban Interstate |
| Defense Hwy 110: | 1 On Interstate STRAHNET | Historical Significance 37 | 5 Not eligible for NRHP |
| Owner 22: | 1 State Highway Agency | | |
| Custodian 21: | 1 State Highway Agency | | |

## CONDITION

| | | | | | |
|---|---|---|---|---|---|
| Deck 58: | 7 Good | Super 59: | 6 Satisfactory | Sub 60: | 5 Fair |
| Culvert 62: | N N/A (NBI) | Channel/Channel Protection 61: | | N N/A (NBI) | |

## LOAD RATING AND POSTING

| | | | |
|---|---|---|---|
| Inventory Rating Method 65: | 1 LF Load Factor | Operating Rating Method 63: | 1 LF Load Factor |
| Inventory Rating 66: | HS26.1 ~~HS28.7~~ | Operating Rating 64: | HS43.3 ~~HS47.7~~ |
| Design Load 31: | 5 MS 18 (HS 20) | Posting 70: | 5 At/Above Legal Loads |
| Posting Status 41: | A Open, no restriction | | |

## APPRAISAL

| | | | |
|---|---|---|---|
| Bridge Rail 36A: | 1 Meets Standards | Approach Rail 36C: | 1 Meets Standards ~~N N/A or not required~~ |
| Transition 36B: | N N/A or not required | Approach Rail Ends 36D: | N N/A or not required ~~1 Meets Standards~~ |
| Str Evaluation 67: | 5 Above Min Tolerable | Deck Geometry 68: | 9 Above Desirable Crit |
| Underclearance, Vertical and Horizontal 69: | 3 Intolerable - Correct | | |
| Waterway Adequacy 71: | N Not applicable | Approach Alignment 72: | 8 Equal Desirable Crit |
| Scour Critical 113: | N Not Over Waterway | | |

## PROPOSED IMPROVEMENTS

| | | | |
|---|---|---|---|
| Bridge Cost 94: | $0 | Type of Work 75: | Unknown (P) |
| Roadway Cost 95: | $0 | Length of Improvement 76 | 0.0 ft |
| Total Cost 96: | $0 | Future ADT 114: | 100,000 |
| Year of Cost Estimate 9 | 2000 | Year of Future ADT 115 | 2027 |

## NAVIGATION DATA

| | | | |
|---|---|---|---|
| Navigation Control 38 | NA-no waterway | | |
| Vertical Clearance 39 | 0.0 ft | Horizontal Clearance 40: | 0.0 ft |
| Pier Protection 111: | Not Applicable (P) | Lift Bridge Vertical Clearance 116 | 0.0 ft |

Bridge Key: 1109 Agency ID: 1109 Sufficiency Rating: 70.0%

ELEMENT CONDITION STATE DATA

| Str Unit | Elm/Env | Description | Units | Total Qty | % in 1 | Qty. St. 1 | % in 2 | Qty. St. 2 | % in 3 | Qty. St. 3 | % in 4 | Qty. St. 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 12/2 | Reinforced Concrete Deck | SF | 181,345 | 100% | 181,280 | 0% | 17 | 0% | 48 | 0% | 0 |
| *0* | *1080* | *Delamination/Spall/Patched Area* | *SF* | *38* | *0%* | *0* | *45%* | *17* | *55%* | *21* | *0%* | *0* |
| *0* | *1090* | *Exposed Rebar* | *SF* | *27* | *0%* | *0* | *0%* | *0* | *100%* | *27* | *0%* | *0* |
| 0 | 107/2 | Steel Open Girder | LF | 23,895 | 90% | 21,450 | 9% | 2,095 | 1% | 350 | 0% | 0 |
| *0* | *1000* | *Corrosion* | *LF* | *2,445* | *0%* | *0* | *86%* | *2,095* | *14%* | *350* | *0%* | *0* |
| 0 | 152/2 | Steel Floorbeam (Cross Girder) | LF | 2,548 | 50% | 1,270 | 30% | 766 | 20% | 512 | 0% | 0 |
| *0* | *1000* | *Corrosion* | *LF* | *1,278* | *0%* | *0* | *60%* | *766* | *40%* | *512* | *0%* | *0* |
| 0 | 161/2 | Steel Pin & Hanger Assembly | EA | 55 | 80% | 44 | 20% | 11 | 0% | 0 | 0% | 0 |
| *0* | *1000* | *Corrosion* | *EA* | *11* | *0%* | *0* | *100%* | *11* | *0%* | *0* | *0%* | *0* |
| 0 | 205/2 | Reinforced Concrete Column | EA | 40 | 15% | 6 | 33% | 13 | 50% | 20 | 3% | 1 |
| *0* | *1080* | *Delamination/Spall/Patched Area* | *EA* | *17* | *0%* | *0* | *76%* | *13* | *18%* | *3* | *6%* | *1* |
| *0* | *1090* | *Exposed Rebar* | *EA* | *13* | *0%* | *0* | *0%* | *0* | *100%* | *13* | *0%* | *0* |
| *0* | *1130* | *Cracking (RC and Other)* | *EA* | *4* | *0%* | *0* | *0%* | *0* | *100%* | *4* | *0%* | *0* |
| 0 | 215/2 | Reinforced Concrete Abutment | LF | 144 | 64% | 92 | 26% | 38 | 10% | 14 | 0% | 0 |
| *0* | *1080* | *Delamination/Spall/Patched Area* | *LF* | *26* | *0%* | *0* | *100%* | *26* | *0%* | *0* | *0%* | *0* |
| *0* | *1120* | *Efflorescence/Rust Staining* | *LF* | *12* | *0%* | *0* | *100%* | *12* | *0%* | *0* | *0%* | *0* |
| *0* | *1130* | *Cracking (RC and Other)* | *LF* | *14* | *0%* | *0* | *0%* | *0* | *100%* | *14* | *0%* | *0* |
| 0 | 234/2 | Reinforced Concrete Pier Cap | LF | 178 | 12% | 22 | 12% | 21 | 76% | 135 | 0% | 0 |
| *0* | *1080* | *Delamination/Spall/Patched Area* | *LF* | *20* | *0%* | *0* | *80%* | *16* | *20%* | *4* | *0%* | *0* |
| *0* | *1090* | *Exposed Rebar* | *LF* | *124* | *0%* | *0* | *0%* | *0* | *100%* | *124* | *0%* | *0* |
| *0* | *1120* | *Efflorescence/Rust Staining* | *LF* | *5* | *0%* | *0* | *100%* | *5* | *0%* | *0* | *0%* | *0* |
| *0* | *1130* | *Cracking (RC and Other)* | *LF* | *7* | *0%* | *0* | *0%* | *0* | *100%* | *7* | *0%* | *0* |
| 0 | 300/2 | Strip Seal Expansion Joint | LF | 1,591 | 0% | 0 | 100% | 1,591 | 0% | 0 | 0% | 0 |
| *0* | *2310* | *Leakage* | *LF* | *200* | *0%* | *0* | *100%* | *200* | *0%* | *0* | *0%* | *0* |
| *0* | *2350* | *Debris Impaction* | *LF* | *1,391* | *0%* | *0* | *100%* | *1,391* | *0%* | *0* | *0%* | *0* |
| 0 | 302/2 | Compression Joint Seal | LF | 554 | 0% | 0 | 100% | 552 | 0% | 2 | 0% | 0 |
| 0 | *2330* | *Seal Damage* | *LF* | 2 | *100%* | *2* | *0%* | *0* | *100%* | *2* | *0%* | *0* |
| 0 | *2350* | *Debris Impaction* | *LF* | *552* | *0%* | *0* | *100%* | *552* | *0%* | *0* | *0%* | *0* |
| 0 | 303/2 | Assembly Joint | LF | 49 | 100% | 49 | 0% | 0 | 0% | 0 | 0% | 0 |
| 0 | 311/2 | Movable Bearing | EA | 55 | 0% | 0 | 85% | 47 | 15% | 8 | 0% | 0 |
| *0* | *1000* | *Corrosion* | *EA* | *48* | *0%* | *0* | *98%* | *47* | *2%* | *1* | *0%* | *0* |
| *0* | *1020* | *Connection* | *EA* | *1* | *0%* | *0* | *0%* | *0* | *100%* | *1* | *0%* | *0* |
| *0* | *2210* | *Movement* | *EA* | *6* | *0%* | *0* | *0%* | *0* | *100%* | *6* | *0%* | *0* |

Bridge Key: 1109 Agency ID: 1109 Sufficiency Rating: 70.0%

ELEMENT CONDITION STATE DATA

| Str Unit | Elm/Env | Description | Units | Total Qty | % in 1 | Qty. St. 1 | % in 2 | Qty. St. 2 | % in 3 | Qty. St. 3 | % in 4 | Qty. St. 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 313/2 | Fixed Bearing | EA | 60 | 0% | 0 | 95% | 57 | 5% | 3 | 0% | 0 |
| *0* | *1000* | *Corrosion* | *EA* | *57* | *0%* | *0* | *100%* | *57* | *0%* | *0* | *0%* | *0* |
| *0* | *1020* | *Connection* | *EA* | *3* | *0%* | *0* | *0%* | *0* | *100%* | *3* | *0%* | *0* |
| 0 | 321/2 | Reinforced Concrete Approach Slab | SF | 2,475 | 98% | 2,432 | 2% | 42 | 0% | 1 | 0% | 0 |
| *0* | *1080* | *Delamination/Spall/Patched Area* | *SF* | *43* | 0% | *0* | 98% | *42* | 2% | *1* | 0% | *0* |
| 0 | 331/2 | Concrete Bridge Railing | LF | 4,374 | 97% | 4,240 | 2% | 88 | 1% | 46 | 0% | 0 |
| *0* | *1080* | *Delamination/Spall/Patched Area* | *LF* | *48* | *0%* | *0* | *4%* | *2* | *96%* | *46* | *0%* | *0* |
| *0* | *1130* | *Cracking (RC and Other)* | *LF* | *86* | *0%* | *0* | *100%* | *86* | *0%* | *0* | *0%* | *0* |
| 0 | 515/2 | Steel Protective Coating (107) | SF | 394,267 | 85% | 334,133 | 11% | 43,369 | 4% | 15,770 | 0% | 995 |
| *0* | *3420* | *Peeling/Bubbling/Cracking* | *SF* | *60,134* | *0%* | *0* | *72%* | *43,369* | *26%* | *15,770* | *2%* | *995* |
| 0 | 515/2 | Steel Protective Coating (152) | SF | 47,559 | 85% | 40,425 | 11% | 4,995 | 3% | 1,664 | 1% | 475 |
| *0* | *3420* | *Peeling/Bubbling/Cracking* | *SF* | *7,134* | *0%* | *0* | *70%* | *4,995* | *23%* | *1,664* | *7%* | *475* |
| 0 | 515/2 | Steel Protective Coating (161) | SF | 440 | 83% | 363 | 16% | 70 | 1% | 5 | 0% | 2 |
| *0* | *3420* | *Peeling/Bubbling/Cracking* | *SF* | *77* | *0%* | *0* | *91%* | *70* | *6%* | *5* | *3%* | *2* |
| 0 | 515/2 | Steel Protective Coating (311) | SF | 393 | 19% | 73 | 61% | 240 | 15% | 60 | 5% | 20 |
| *0* | *3420* | *Peeling/Bubbling/Cracking* | *SF* | *320* | *0%* | *0* | *75%* | *240* | *19%* | *60* | *6%* | *20* |
| 0 | 515/2 | Steel Protective Coating (313) | SF | 393 | 19% | 73 | 61% | 240 | 15% | 60 | 5% | 20 |
| *0* | *3420* | *Peeling/Bubbling/Cracking* | *SF* | *320* | *0%* | *0* | *75%* | *240* | *19%* | *60* | *6%* | *20* |
| 0 | 520/2 | Deck Protection System (Coated Bars) | SF | 181,345 | 100% | 181,333 | 0% | 0 | 0% | 0 | 0% | 12 |
| *0* | *3600* | *Effectiveness* | *SF* | *12* | *0%* | *0* | *0%* | *0* | *0%* | *0* | *100%* | *12* |
| 0 | 521/2 | Concrete Protective Coating (205) | SF | 19,557 | 89% | 17,499 | 0% | 0 | 6% | 1,080 | 5% | 978 |
| *0* | *3540* | *Effectiveness* | *SF* | *2,058* | *0%* | *0* | *0%* | *0* | *52%* | *1,080* | *48%* | *978* |
| 0 | 521/2 | Concrete Protective Coating (215) | SF | 939 | 100% | 939 | 0% | 0 | 0% | 0 | 0% | 0 |
| 0 | 521/2 | Concrete Protective Coating (331) | SF | 34,250 | 40% | 13,700 | 10% | 3,425 | 10% | 3,425 | 40% | 13,700 |
| *0* | *3540* | *Effectiveness* | *SF* | *20,550* | *0%* | *0* | *17%* | *3,425* | *17%* | *3,425* | *67%* | *13,700* |

Department of Transportation
Operations Administration
Asset Management Branch
Bridges and Tunnels

# Appendix B.2

# Example Safety Inspection Report

D.C. Department of Transportation
Transportation Operations Administration
Asset Management Division

# 2020 BRIDGE INVENTORY

**BRIDGE NO.:** 0518 **HIGHWAY:** CSX Railroad
**OVER:** 9th Street Expressway, S.W.
**INSPECTION START DATE:** 01/08/2020 **INSPECTION END DATE:** 01/08/2020
**INSPECTION CYCLE:** 24 mo. **INSPECTION TYPE:** Safety
**DESCRIPTION:** One Span Steel Multi-Girder Superstructure with Reinforced Concrete Abutments with Granite Fascia
**PRESENT POSTING:** N/A **SUFFICIENCY RATING:** N/A
**YEAR BUILT:** Unknown **DATE OF MAJOR REHABILITATION:** Unknown
**NUMBER OF SPANS:** 01
**CLEAR WIDTH BETWEEN CURBS:** N/A
**APPROACH ROADWAY WIDTH EXCLUDING SHOULDERS:** N/A
**TYPE OF DECK AND SURFACING:** Railroad Tracks
**MILEPOST:** Unknown **ADT (% TRUCK):** N/A **YEAR ADT:** N/A


**LOOKING:** **NORTH** _____ **SOUTH** X **EAST** _____ **WEST** _____

"RR over" Safety Inspection – This report documents the partial condition inspection of this railroad owned bridge over a DC roadway. Conditions noted reflect traffic safety related visual observations from the underside of the bridge only. This is not a full NBIP report.

MODJESKI and MASTERS
Experience great bridges.

Bridge No.: 0518 D.O.I.: 01/08/2020
Name: CSX Railroad over 9th Street, S.W.

D.C. Department of Transportation
Transportation Operations Administration
Asset Management Division

# 2020 District of Columbia Bridge Inspections
# Summary Report

| | |
|---|---|
| **Bridge No:** | 0518 |
| **Name:** | CSX Railroad over 9th Street, S.W. |
| **Report Prepared by:** | Modjeski and Masters, Inc. |
| **Report Reviewed and Submitted by:** | Modjeski and Masters, Inc. |
| **Project Manager:** | Richard A. Little, P.E. |
| **Team Leader:** | Kenneth A. Fabian, P.E. |
| **Date of Inspection:** | 01/08/2020 |
| **Redundant/Non-Redundant:** | Redundant |
| **Fracture-Critical:** | No |
| **Pin/Hanger UT Inspection:** | N/A |
| **Underwater Inspection:** | N/A |
| **Weight Posted:** | No |
| **Rating Recommended:** | No |
| **Date of Last Load Rating:** | Not Available |
| **Review Existing Scour Report:** | N/A |
| **Recommended Maintenance Repairs/Rehabilitation:** | Yes |
| **Letter of Concern & Submission Date:** | No |
| **Follow-Up Requirements:** | No |

DISTRICT OF COLUMBIA
RICHARD A. LITTLE
No. 904411
REGISTERED
PROFESSIONAL ENGINEER

"RR over" Safety Inspection – This report documents the partial condition inspection of this railroad owned bridge over a DC roadway. Conditions noted reflect traffic safety related visual observations from the underside of the bridge only. This is not a full NBIP report.

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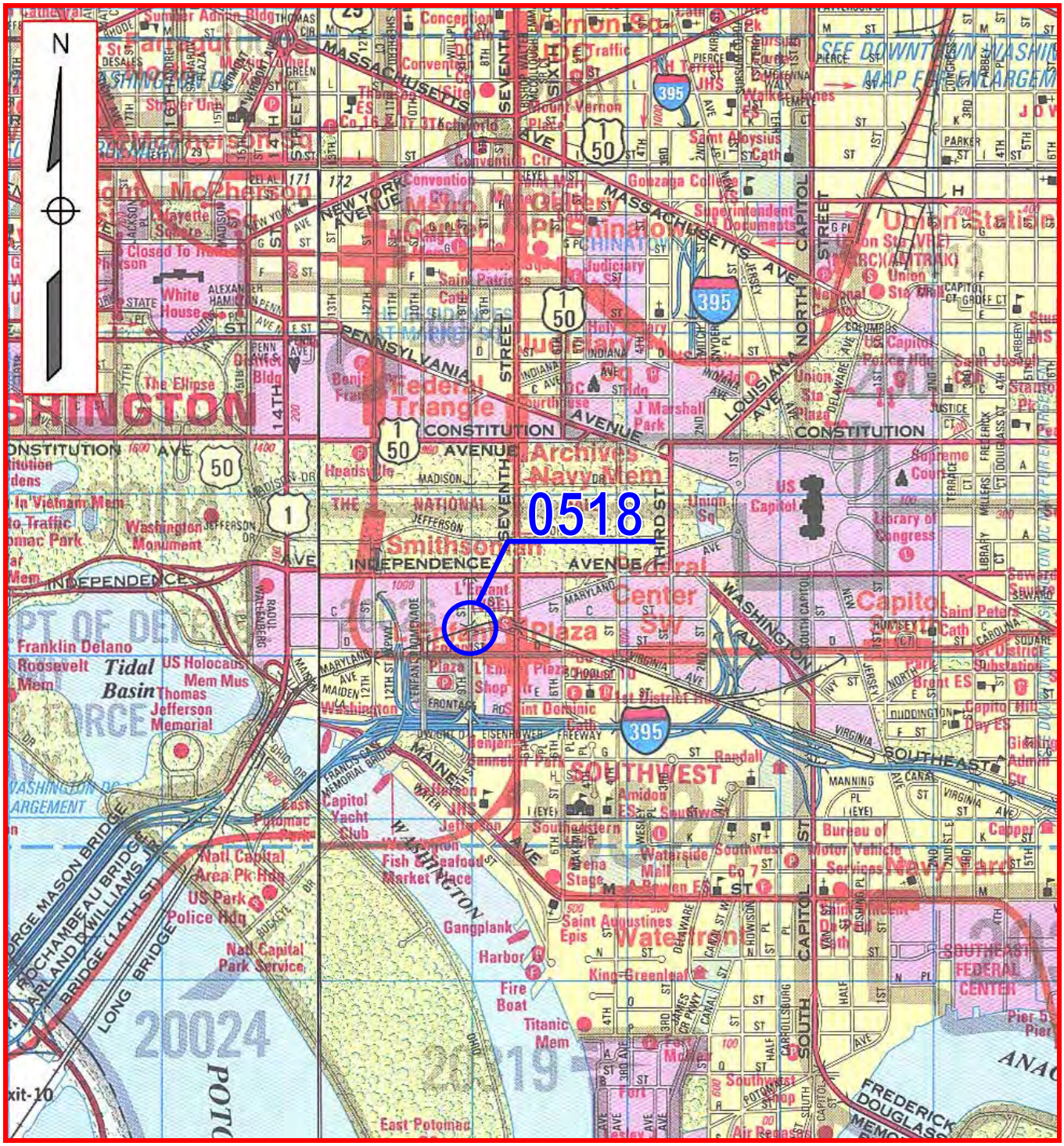
D.C. Department of Transportation
Transportation Operations Administration
Asset Management Division

# 2020 BRIDGE LOCATION MAP

**BRIDGE NO.:** 0518 **HIGHWAY:** CSX Railroad

**OVER:** 9th Street, S.W.



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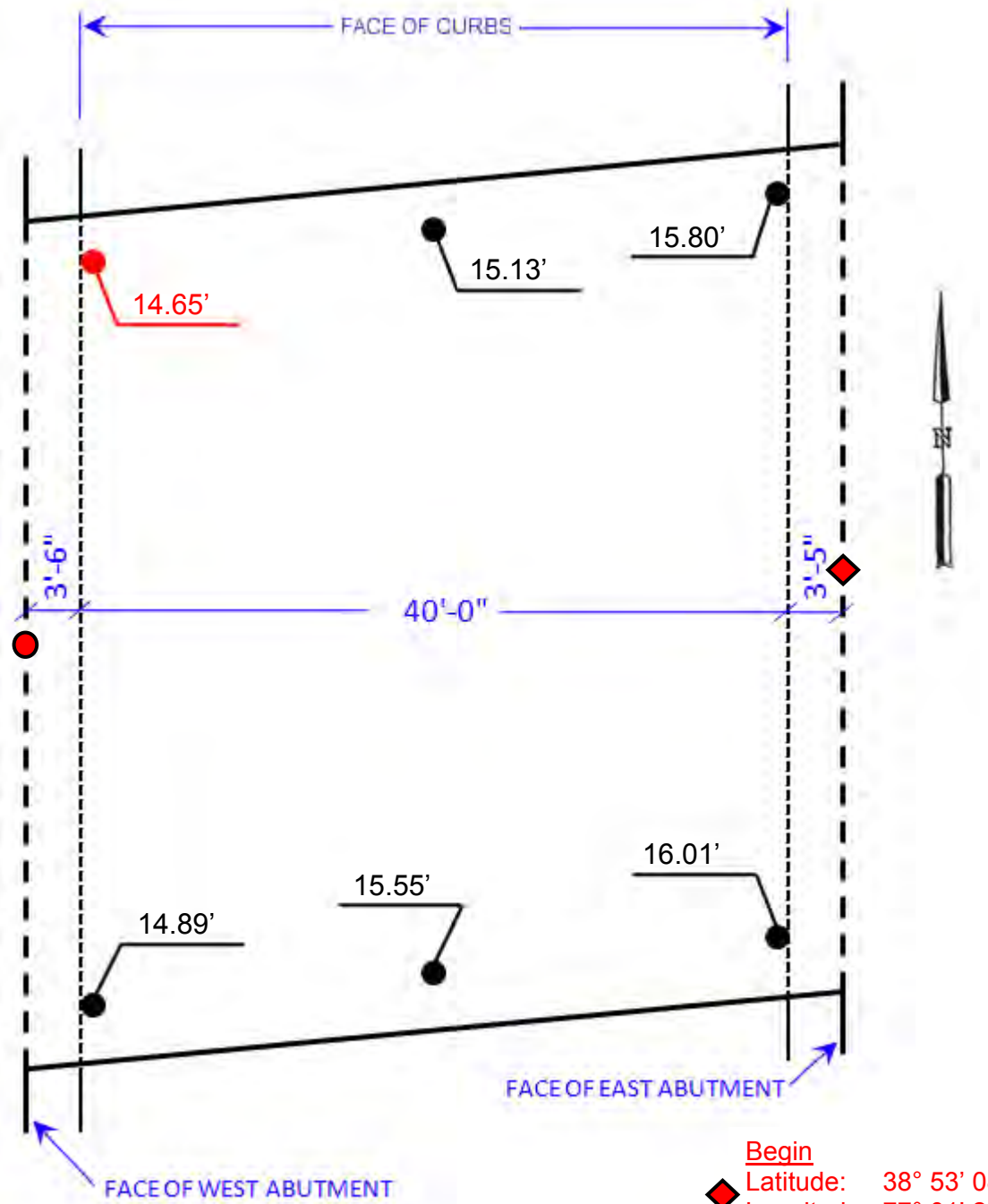
D.C. Department of Transportation
Transportation Operations Administration
Asset Management Division

**BRIDGE NO.:** 0518 **HIGHWAY:** CSX Railroad
**OVER:** 9th Street, S.W.




Begin
Latitude: 38° 53' 08.80"
Longitude: 77° 01' 26.13"

End
Latitude: 38° 53' 08.61"
Longitude: 77° 01' 26.83"

## TYPICAL PLAN VIEW
(NTS)

Note: Clearance measurements near abutments taken at edge of marked roadway (not at face of curb in gutter)

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# 2020 BRIDGE INSPECTION REPORT
## INSPECTION COMMENTS

**BRIDGE NO.:** 0518 **HIGHWAY:** CSX Railroad
**OVER:** 9th Street, S.W.

| COMMENTS |
|---|
| **General:**<br>Bridge No. 0518 carries three tracks of the CSX railroad over 9th Street, Southwest. The bridge consists of a one span steel multi-beam superstructure and reinforced concrete abutments with granite fascia. The roadway below the bridge consists of three Southbound lanes with concrete safety walks and granite curbs on each side.<br><br>The following repair has been performed to the bridge since the 2017 Inspection:<br>• The non-functioning light attached to the West Abutment has been repaired.<br><br>The minimum vertical underclearance is 14.65' located along the white roadway delineation line near the West abutment safety walk below Girder 1. The numbering convention for reporting purposes is from North to South (Beams) and from East to West (Abutments). General views of the bridge are shown in Photograph Nos. 1 through 5.<br><br>M.O.T. and a bucket truck were used to complete the inspection. The bridge was inspected by Kenneth A. Fabian, P.E. |
| **Deck:**<br>Portions of the deck plates are corroded/delaminated at the West Abutment. |
| **Superstructure:**<br>The superstructure consists of twenty-one simply supported painted welded steel beams. The beams were erected in sets of two to three welded beam sections with the sections bolted together. The paint on the superstructure is in poor condition with isolated areas of minor corrosion (see Photograph No. 6). Minor scrape marks are present on the bottom flanges due to vehicular impact (see Photograph No. 7). Moderate efflorescence with stalactites was observed on the bottom surface of the North and South granite fascias (see Photograph No. 8). There are approximately 2" long x 1" high cut holes in the bottom portions of the webs of the diaphragms to accommodate transverse welds in the diaphragm bottom flanges.<br><br>The bearings are in satisfactory condition exhibiting areas of deteriorated paint and minor corrosion (see Photograph Nos. 9 and 10). |
| **Substructure:**<br>The abutments including all four wingwalls are in satisfactory condition (see Photograph Nos. 11 through 16). The granite fascia on the abutments is stained throughout (refer to Photograph Nos. 11 and 12). Mortar cracking with moderate efflorescence is evident in the stone joints of both abutments and all four wingwalls (see Photograph Nos. 17 through 21).<br><br>Vertical and/or diagonal hairline cracks were found in the West Abutment backwall in Bays 1, 4, 6, 8, 11, 13, 16 and 18, and behind Beams 2 and 20 (see Photograph No. 22). In the East Abutment backwall, there is a vertical hairline crack behind Beams 6 and 16, and in Bays 8 and 18, diagonal hairline cracks are in Bays 1 and 2, and a horizontal hairline crack is present North of Beam 1 (see Photograph No. 23).<br><br>There is a 1/4" wide vertical crack with efflorescence in the North face of the Southeast wingwall adjacent to the East Abutment backwall (see Photograph No. 24). A 2'-4" high x 6" wide x up to 3 3/4" deep spall is present in the South face of the Northeast wingwall (see Photograph No. 25). |



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# 2020 BRIDGE INSPECTION REPORT
## INSPECTION COMMENTS

**BRIDGE NO.:** 0518 **HIGHWAY:** CSX Railroad
**OVER:** 9th Street, S.W.

### COMMENTS (CONTINUED)

**Substructure (Continued):**

The vertical joint material between the abutments and wingwalls is deteriorated, and the lower portions of the Northeast and Southeast joint material are missing (see Photograph No. 26).

Pigeon debris is present on both abutment bearing seats (see Photograph No. 27).

**Roadway Below Bridge:**

The granite curbs and safety walks below the bridge are in good condition with no significant defects noted.

Excessive pigeon debris is present on the safety walk along the West Abutment (see Photograph No. 28).

The roadway below the bridge is in fair condition. Four transverse cracks are present in the roadway below the bridge. There is an up to 1/4" wide transverse crack extending across the full-width of the roadway near the North end of the bridge (see Photograph No. 29). There is an approximately 30' long x up to 1/4" wide transverse crack through portions of the outside lanes and extending the entire width of the center lane, approximately 20 feet South of the crack near the North end of the bridge. There is an approximately 12' long x up to 3/16" wide transverse crack through the center lane, approximately 20 feet North of the crack near the South end of the bridge. At the South end of the bridge, an up to 1/4" wide transverse crack extends across the full-width of the roadway. There is an up to 1/4" wide longitudinal crack in the right lane for the full-length of the roadway below the bridge which extends North and South of the bridge (see Photograph No. 30). A 24" x 12" x 3" deep pothole is in the roadway 30' North of the bridge at the right edge of the right lane.

**Traffic Safety Features Below the Bridge:**

There are no traffic safety features below the bridge.

**Miscellaneous:**

Traffic signs are mounted to the North fascia (see Photograph No. 31). The signs and sign connections are in good condition overall (see Photograph No. 32). The 5th clip from the top of the middle support of the right sign is missing. Four clips for the left sign are either missing or detached.

A conduit junction box cover at Bearing 3 on the West Abutment is missing exposing wiring (see Photograph No. 33).

Four screws attaching a utility cover to the East Abutment stem below Bay 10 are missing.

There are four old utility conduits with exposed wiring projecting through the abutment stems near the top of the abutments; two on each abutment stem; one at the North end and one at the South end (see Photograph No. 34).

The light attached to the East Abutment was illuminated at the time of inspection and appears to be in good condition (refer to Photograph No. 12). The light attached to the West Abutment which was not functioning at the time of the previous inspection has been repaired (refer to Photograph No. 11).

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# 2020 BRIDGE APPRAISAL WORKSHEET

**BRIDGE NO.:** 0518 **HIGHWAY:** CSX Railroad
**OVER:** 9th Street, S.W.

| | | | | |
|---|---|---|---|---|
| **TRAFFIC SAFETY FEATURES (ITEM 36)** | | | Date: | |
| Not Applicable | | | | |
| BRIDGE RAILING (1st Digit) | RATING | **N** | | |
| Not Applicable | | | | |
| TRANSITIONS (2nd Digit) | RATING | **N** | **UNDERCLEARANCES (ITEM 69)** | |
| Not Applicable | | | Roadway Below = Principal Arterial<br>Three Southbound Lanes<br>Vertical Clearance = 14.65'<br>Table 3A Rating = 6 | |
| APPROACH GUIDE RAIL (3rd Digit) | RATING | **N** | Lateral Clearance = 3'-5"<br>Table 3B Rating = 3 | |
| Not Applicable | | | | |
| GUIDE RAIL TERMINAL (4th Digit) | RATING | **N** | RATING | **3** |
| **STRUCTURAL EVALUATION (ITEM 67)** | | | **BRIDGE POSTING (ITEM 70)** | |
| ADT = 20,000 (For Road Below the Railroad Bridge) | | | Not Applicable | |
| | | | RATING | **N** |
| | | | **WATERWAY ADEQUACY (ITEM 71)** | |
| | | | Bridge Not Over a Waterway | |
| RATING | **N** | | RATING | **N** |
| **DECK GEOMETRY (ITEM 68)** | | | **APPROACH ROADWAY ALIGNMENT (ITEM 72)** | |
| Vertical Clearance = Unrestricted | | | Not Applicable | |
| RATING | **N** | | RATING | **N** |

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# 2020 BRIDGE MAINTENANCE AND REPAIR/REHABILITATION RECOMMENDATIONS

**BRIDGE NO.:** 0518 **HIGHWAY:** CSX Railroad
**DATES:** 01/08/2020 **OVER:** 9th Street, S.W.
**INSPECTOR:** KAF

## MAINTENANCE RECOMMENDATIONS

| RECOMMENDED ACTION | | PC |
|---|---|---|
| Remove pigeon debris from both bearing seats. |  | 3 |
| Remove pigeon debris from the West safety walk below the bridge. |  | 3 |
| Replace missing conduit junction box cover at Bearing 3 on the West Abutment (1 EA). |  | 4 |
| Seal the transverse and longitudinal cracks in the roadway below the bridge. |  | 4 |
| Repair the pothole in the roadway below the bridge located 30' North of the bridge at the right edge of the right lane (< 1 CF). |  | 3 |
| Replace the missing clips and reconnect the disconnected clips on the left and right traffic signs attached to the North fascia (5 EA). |  | 3 |
| Replace the missing screws attaching the utility cover to the East Abutment stem below Bay 10 (4 EA). | | 4 |



PRIORITY CODE (PC):
E – EMERGENCY (NOTIFY D.C. IMMEDIATELY; FOLLOW-UP WITH LETTER REPORT)
1 – FIRST (ITEMS TO BE REPAIRED FIRST – ADDRESSED WITHIN ONE YEAR)
2 – HIGH (POTENTIAL TO BECOME SERIOUS – ADDRESSED WITHIN 2 YEARS)
3 – MEDIUM (SERVICEABILITY RELATED – REPAIR AFTER HIGH PRIORITY ITEMS)
4 – LOW (MINOR REPAIRS NEEDED – SCHEDULE AS PART OF REHABILITATION PROGRAM)
5 – NO REPAIRS NEEDED AT THIS TIME

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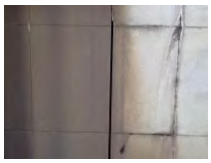
# 2020 BRIDGE MAINTENANCE AND REPAIR/REHABILITATION RECOMMENDATIONS

**BRIDGE NO.:** 0518 **HIGHWAY:** CSX Railroad
**DATES:** 01/08/2020 **OVER:** 9th Street, S.W.
**INSPECTOR:** KAF

## REPAIR/REHABILITATION RECOMMENDATIONS

| RECOMMENDED ACTION | | PC |
|---|---|---|
| Clean and paint the superstructure. |  | 4 |
| Replace the deteriorated joint material between the abutments and wingwalls (75 LF). |  | 4 |
| Repair the spall in the South face of the Northeast wingwall (< 1 CF). |  | 4 |
| Seal the vertical crack in the North face of the Southeast wingwall adjacent to the East Abutment backwall. |  | 4 |



PRIORITY CODE (PC):
E – EMERGENCY (NOTIFY D.C. IMMEDIATELY; FOLLOW-UP WITH LETTER REPORT)
1 – FIRST (ITEMS TO BE REPAIRED FIRST – ADDRESSED WITHIN ONE YEAR)
2 – HIGH (POTENTIAL TO BECOME SERIOUS – ADDRESSED WITHIN 2 YEARS)
3 – MEDIUM (SERVICEABILITY RELATED – REPAIR AFTER HIGH PRIORITY ITEMS)
4 – LOW (MINOR REPAIRS NEEDED – SCHEDULE AS PART OF REHABILITATION PROGRAM)
5 – NO REPAIRS NEEDED AT THIS TIME

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Transportation Operations Administration
Asset Management Division

# 2020 BRIDGE INSPECTION PHOTOGRAPH SUMMARY SHEET

**BRIDGE NO.:** 0518 **HIGHWAY:** CSX Railroad
**DATES:** 01/08/2020 **OVER:** 9th Street, S.W.

| Photograph No. | Description |
|---|---|
| 1 | South Elevation, Looking North |
| 2 | North Elevation, Looking Southeast |
| 3 | Looking North from Under the Bridge |
| 4 | Looking South from the Top of the Bridge |
| 5 | General View on Top of the Bridge, Looking Southwest |
| 6 | Typical Superstructure with Deteriorated Paint and Minor Corrosion |
| 7 | Typical Impact Scrapes on the Bottom Flanges of the Beams above the Center Lane, Looking Southeast |
| 8 | South Fascia. Note Efflorescence and Stalactites |
| 9 | Typical East Abutment Bearing. Note Deteriorated Paint and Minor Corrosion. Bearing 2 Shown |
| 10 | Typical West Abutment Bearing. Note Deteriorated Paint and Minor Corrosion. Bearing 1 Shown |
| 11 | General View of the West Abutment. Note Typical Staining |
| 12 | General View of the East Abutment. Note Typical Staining |
| 13 | General View of the Northeast Wingwall |
| 14 | General View of the Southeast Wingwall |
| 15 | General View of the Northwest Wingwall |
| 16 | General View of the Southwest Wingwall |
| 17 | Cracked Mortar with Efflorescence in the West Abutment Stem |
| 18 | Cracked Mortar with Efflorescence in the East Abutment Stem |
| 19 | Southeast Wingwall. Note Mortar Cracking with Efflorescence |
| 20 | Northwest Wingwall. Note Mortar Cracking with Efflorescence |
| 21 | Southwest Wingwall. Note Mortar Cracking with Efflorescence |
| 22 | Typical Hairline Cracks in the West Abutment Backwall. Bay 1 Shown |
| 23 | Diagonal Hairline Cracks in the East Abutment Backwall. Bay 1 Shown |
| 24 | 1/4” Wide Vertical Crack in the North Face of the Southeast Wingwall adjacent to the East Abutment Backwall |
| 25 | 2’-4” High x 6” Wide x Up to 3 3/4” Deep Spall in the South Face of the Northeast Wingwall |
| 26 | Typical Missing/Deteriorated Abutment to Wingwall Joint Material. Southeast Wingwall Shown |
| 27 | Typical Pigeon Debris on Both Bearing Seats – West Abutment Shown, Looking Southwest |
| 28 | Safety Walk along the West Abutment. Note Excessive Pigeon Debris |
| 29 | Up to 1/4” Wide Transverse Crack Spanning the Full-Width of the Roadway at the North End of the Bridge, Looking East |
| 30 | Up to 1/4" Wide Longitudinal Crack in the Right Lane of the Roadway below the Bridge |
| 31 | Traffic Signs on the North Fascia |
| 32 | North Fascia. Note Sign Supports |
| 33 | Missing Conduit Junction Box Cover Exposing Wiring at Bearing 3 on the West Abutment (Arrow) |
| 34 | West Abutment Stem, Old Utility Conduit with Exposed Wiring |



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# 2020 BRIDGE INSPECTION PHOTOGRAPHS

**BRIDGE NO.:** 0518 **HIGHWAY:** CSX Railroad
**OVER:** 9th Street, S.W.

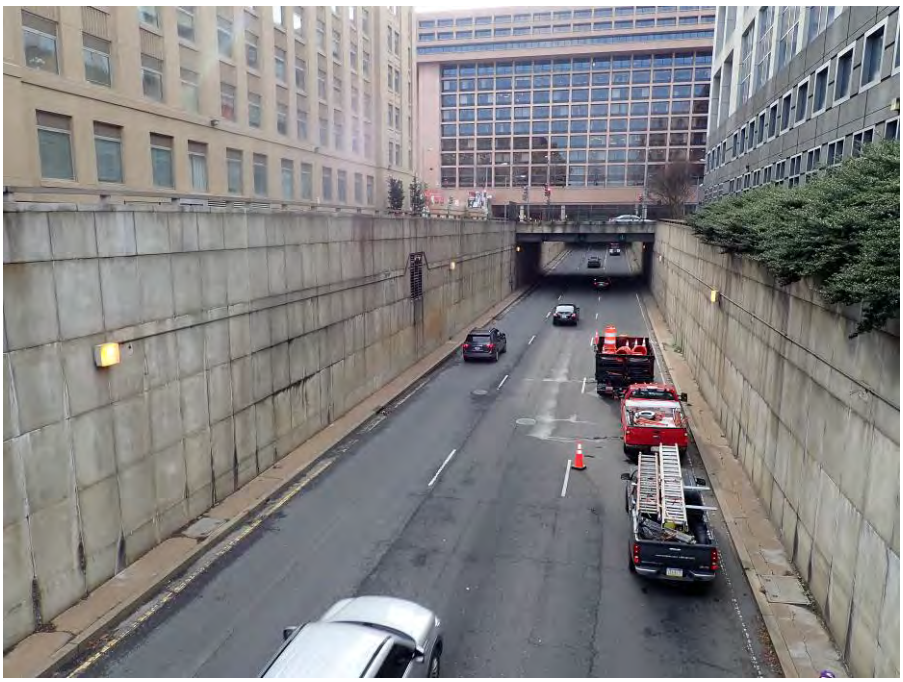
**Photograph No. 1** – South Elevation, Looking North


**Photograph No. 2** – North Elevation, Looking Southeast

# 2020 BRIDGE INSPECTION PHOTOGRAPHS

**BRIDGE NO.:** 0518 **HIGHWAY:** CSX Railroad
**OVER:** 9th Street, S.W.

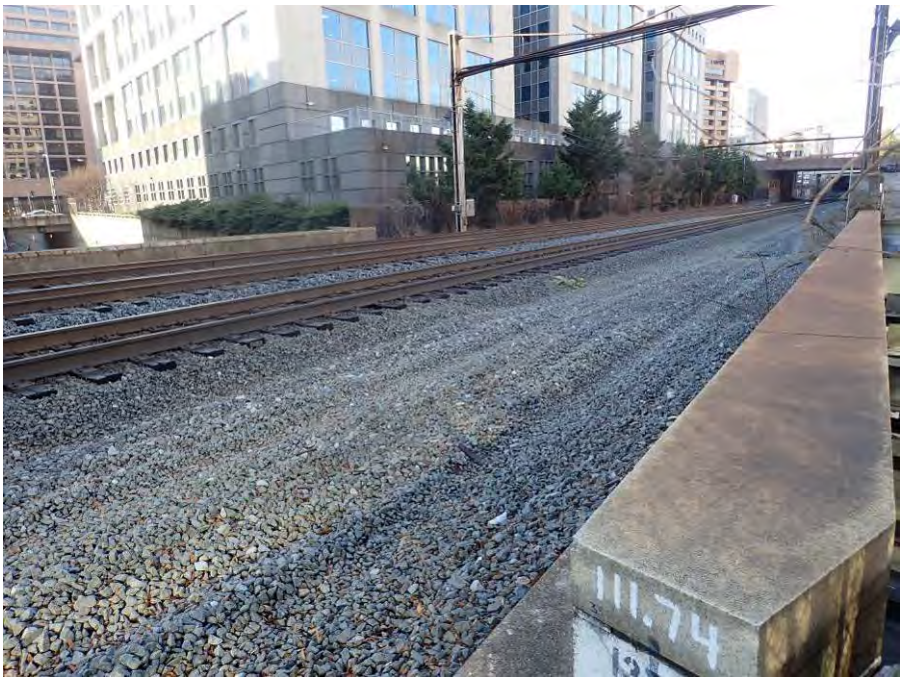
**Photograph No. 3** – Looking North from Under the Bridge



**Photograph No. 4** – Looking South from the Top of the Bridge

# 2020 BRIDGE INSPECTION PHOTOGRAPHS

**BRIDGE NO.:** 0518 **HIGHWAY:** CSX Railroad
**OVER:** 9th Street, S.W.




**Photograph No. 5** – General View on Top of the Bridge, Looking Southwest

**Photograph No. 6** – Typical Superstructure with Deteriorated Paint and Minor Corrosion

# 2020 BRIDGE INSPECTION PHOTOGRAPHS

**BRIDGE NO.:** 0518 **HIGHWAY:** CSX Railroad
**OVER:** 9th Street, S.W.

**Photograph No. 7** – Typical Impact Scrapes on the Bottom Flanges of the Beams above the Center Lane, Looking Southeast

**Photograph No. 8** – South Fascia. Note Efflorescence and Stalactites

# 2020 BRIDGE INSPECTION PHOTOGRAPHS

**BRIDGE NO.:** 0518 **HIGHWAY:** CSX Railroad
**OVER:** 9th Street, S.W.

**Photograph No. 9** – Typical East Abutment Bearing. Note Deteriorated Paint and Minor Corrosion. Bearing 2 Shown

**Photograph No. 10** – Typical West Abutment Bearing. Note Deteriorated Paint and Minor Corrosion. Bearing 1 Shown

# 2020 BRIDGE INSPECTION PHOTOGRAPHS

**BRIDGE NO.:** 0518 **HIGHWAY:** CSX Railroad
**OVER:** 9th Street, S.W.

**Photograph No. 11** – General View of the West Abutment. Note Typical Staining

**Photograph No. 12** – General View of the East Abutment. Note Typical Staining

# 2020 BRIDGE INSPECTION PHOTOGRAPHS

**BRIDGE NO.:** 0518 **HIGHWAY:** CSX Railroad
**OVER:** 9th Street, S.W.

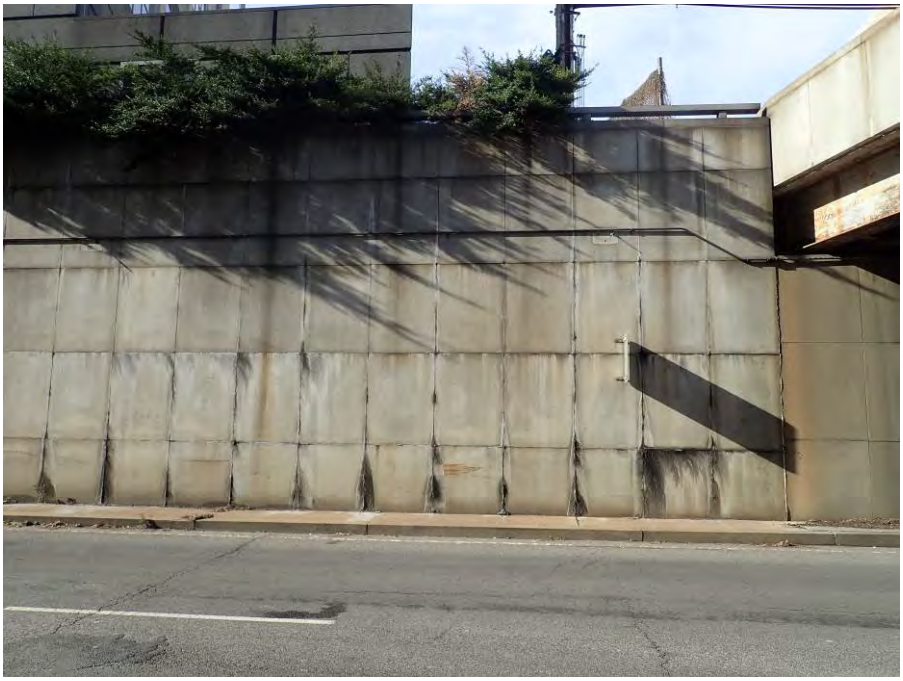
**Photograph No. 13** – General View of the Northeast Wingwall

**Photograph No. 14** – General View of the Southeast Wingwall

# 2020 BRIDGE INSPECTION PHOTOGRAPHS

**BRIDGE NO.:** 0518 **HIGHWAY:** CSX Railroad
**OVER:** 9th Street, S.W.

**Photograph No. 15** – General View of the Northwest Wingwall



**Photograph No. 16** – General View of the Southwest Wingwall

# 2020 BRIDGE INSPECTION PHOTOGRAPHS

**BRIDGE NO.:** 0518 **HIGHWAY:** CSX Railroad
**OVER:** 9th Street, S.W.

**Photograph No. 17** – Cracked Mortar with Efflorescence in the West Abutment Stem

**Photograph No. 18** – Cracked Mortar with Efflorescence in the East Abutment Stem

# 2020 BRIDGE INSPECTION PHOTOGRAPHS

**BRIDGE NO.:** 0518 **HIGHWAY:** CSX Railroad
**OVER:** 9th Street, S.W.


**Photograph No. 19** – Southeast Wingwall.
Note Mortar Cracking with Efflorescence

**Photograph No. 20** – Northwest Wingwall.
Note Mortar Cracking with Efflorescence

# 2020 BRIDGE INSPECTION PHOTOGRAPHS

**BRIDGE NO.:** 0518 **HIGHWAY:** CSX Railroad
**OVER:** 9th Street, S.W.

**Photograph No. 21** – Southwest Wingwall.
Note Mortar Cracking with Efflorescence

**Photograph No. 22** – Typical Hairline Cracks in the
West Abutment Backwall. Bay 1 Shown

# 2020 BRIDGE INSPECTION PHOTOGRAPHS

**BRIDGE NO.:** 0518 **HIGHWAY:** CSX Railroad
**OVER:** 9th Street, S.W.

**Photograph No. 23** – Diagonal Hairline Cracks in the East Abutment Backwall. Bay 1 Shown

**Photograph No. 24** – 1/4" Wide Vertical Crack in the North Face of the Southeast Wingwall adjacent to the East Abutment Backwall

# 2020 BRIDGE INSPECTION PHOTOGRAPHS

**BRIDGE NO.:** 0518 **HIGHWAY:** CSX Railroad
**OVER:** 9th Street, S.W.

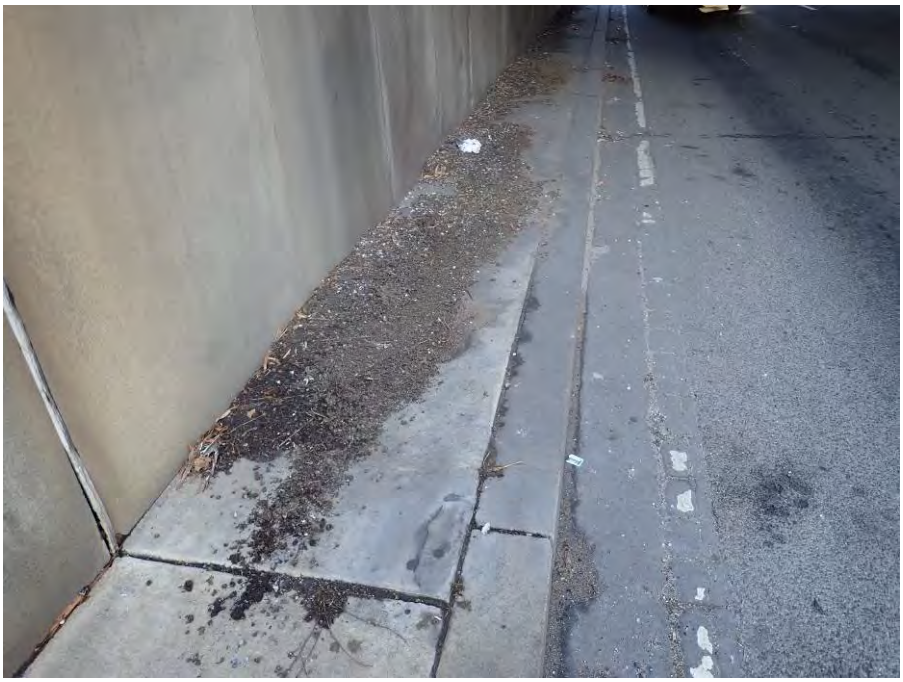
**Photograph No. 25** – 2'-4" High x 6" Wide x Up to 3 3/4" Deep Spall in the South Face of the Northeast Wingwall

**Photograph No. 26** – Typical Missing/Deteriorated Abutment to Wingwall Joint Material. Southeast Wingwall Shown

# 2020 BRIDGE INSPECTION PHOTOGRAPHS

**BRIDGE NO.:** 0518 **HIGHWAY:** CSX Railroad
**OVER:** 9th Street, S.W.

**Photograph No. 27** – Typical Pigeon Debris on Both Bearing Seats – West Abutment Shown, Looking Southwest



**Photograph No. 28** – Safety Walk along the West Abutment. Note Excessive Pigeon Debris

# 2020 BRIDGE INSPECTION PHOTOGRAPHS

**BRIDGE NO.:** 0518 **HIGHWAY:** CSX Railroad
**OVER:** 9th Street, S.W.

**Photograph No. 29** – Up to 1/4" Wide Transverse Crack Spanning the Full-Width of the Roadway at the North End of the Bridge, Looking East

**Photograph No. 30** – Up to 1/4" Wide Longitudinal Crack in the Right Lane of the Roadway below the Bridge

# 2020 BRIDGE INSPECTION PHOTOGRAPHS

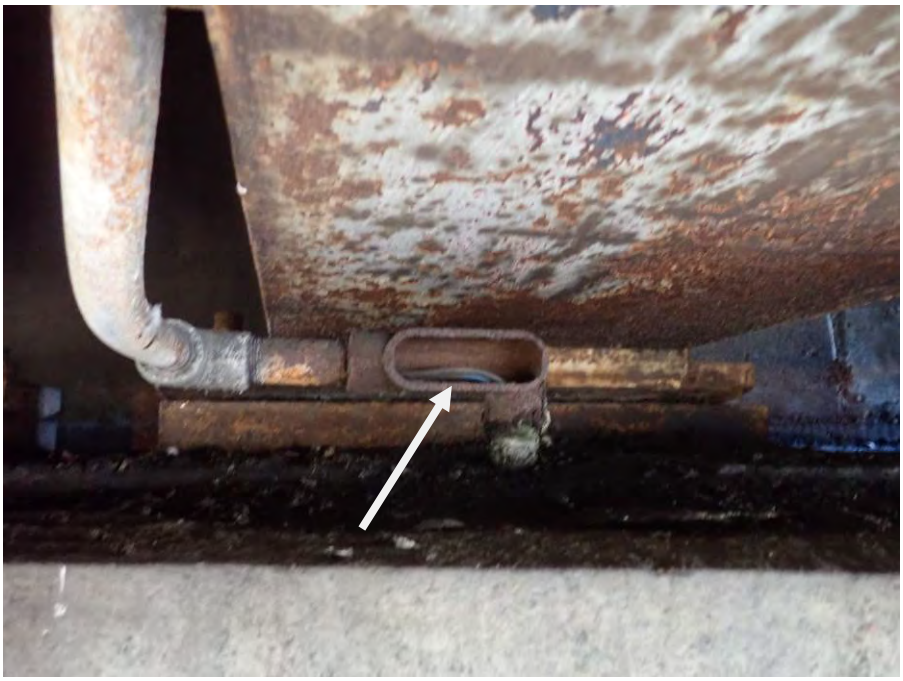
**BRIDGE NO.:** 0518 **HIGHWAY:** CSX Railroad
**OVER:** 9th Street, S.W.


**Photograph No. 31** – Traffic Signs on the North Fascia

**Photograph No. 32** – North Fascia. Note Sign Supports

# 2020 BRIDGE INSPECTION PHOTOGRAPHS

**BRIDGE NO.:** 0518 **HIGHWAY:** CSX Railroad
**OVER:** 9th Street, S.W.



**Photograph No. 33** – Missing Conduit Junction Box Cover Exposing Wiring at Bearing 3 on the West Abutment (Arrow)

**Photograph No. 34** – West Abutment Stem, Old Utility Conduit with Exposed Wiring

# Structure Inventory and Appraisal Sheet (English Units)

Bridge Key: 0518-RR  Agency ID: 0518  SR: ~~-1.0~~ NA  SD/FO:

## IDENTIFICATION

| | | | |
|---|---|---|---|
| State 1: | 11 D.C. | Struc Num 8: | 0518 |
| Facility Carried 7: | CSX Railroad | Location 9: | CSX RR over 9th Street |
| Rte.(On/Under) 5A: | Route On Structure | Rte. Signing Prefix 5B: | Not Applicable (P |
| Level of Service 5C: | 0 None of the below | Route Number 5D: | _ |
| Directional Suffix 5E: | Unknown (NBI) | % Responsibility: | |
| SHD District 2: | District 00 | County Code 3: | test county |
| Place Code 4: | Unknown | Mile Post 11: | NA |
| Feature Intersected 6: | 9TH STREET SW | | |
| Latitude 16: | 38° 53' 09" | Longitude 17 | 077° 01' 26" |
| Border Bridge Code 98 | Not Applicable (P) | | |
| Border Bridge Number 99 | | | |

## STRUCTURE TYPE AND MATERIALS

| | | | |
|---|---|---|---|
| Number of Approach Spans 46 | -1 | Number of Spans Main Unit 45: | 1 |
| 3 Steel | | 02 Stringer/Girder | |
| Deck Type 107: | Unknown (NBI) | | |
| Wearing Surface 108A: | Unknown (NBI) | | |
| Membrane 108B: | Unknown (NBI) | | |
| Deck protection 108C | Unknown (NBI) | | |

## AGE AND SERVICE

| | | | | | |
|---|---|---|---|---|---|
| Year Built 27: | 1907 | Year Reconstructed 106: | 1965 | | |
| Type of Service on 42A | 2 Railroad | | | | |
| Type of Service under 42B | 1 Highway | | | | |
| Lanes on 28A: | ~~-1~~ 0 | Lanes under 28B: | 3 | Detour Length 19: | 0.0 mi |
| ADT 29: | -1 | Truck ADT 109: | -1% | Year of ADT 30: | -1 |

## GEOMETRIC DATA

| | | | |
|---|---|---|---|
| Length Max Span 48: | 50.00 ft | Structure Length 49: | 53.00 ft |
| Curb/Sdwlk Width L 50A | 0.00 ft | Curb/Sidewalk Width R 50B | 0.00 ft |
| Width Curb to Curb 51: | -1.00 ft | Width Out to Out 52: | 0.00 ft |
| Approach Roadway width 32: (w/ shoulders) | -1.00 ft | Median 33: | Unknown (NBI) |
| Deck Area: | -2.00 sq. ft | | |
| Skew 34: | -1.00° | Structure Flared 35 | Unknown (NBI) |
| Vertical Clearance 10 | -1.00 ft | Horizontal Clearance 47: | -1.00 ft |
| Minimum Vertical Clearance Over Bridge 53: | | | |
| Minimum Vertical Underclearance Reference 54A | | H Hwy beneath struct | |
| Minimum Vertical Underclearance 54B: | | 14.65 ft | |
| Minimum Lateral Underclearance Reference R 55A: | | H Hwy beneath struct | |
| Minimum Lateral Underclearance R 55: | | 0.00 ft | |
| Minimum Lateral Underclearance L 56: | | 0.00 ft | |

## INSPECTION

| | | | | | |
|---|---|---|---|---|---|
| Frequency 91: | 24 months | Inspection Date 90: | ~~8/16/2017~~ 01/08/2020 | Next Inspection: | ~~8/16/2019~~ 01/08/2022 |
| FC Frequency 92A: | NA | FC Inspection Date 93A: | NA | Next FC Inspection: | NA |
| UW Frequency 92B: | NA | UW Inspection Date 93B: | NA | Next UW Inspection | NA |
| SI Frequency 92C: | NA | SI Date 93C: | NA | Next SI: | NA |
| Element Frequency: | NA | Element Insp. Date: | ~~1/22/2015~~ NA | Next Elem. Insp.: | ~~6/9/2017~~ NA |

## CLASSIFICATION

| | | | |
|---|---|---|---|
| Defense Highway 100: | Unknown (NBI) | Parallel Structure 101: | No \|\| bridge exists |
| Direction of Traffic 102: | Unknown (NBI) | Temporary Structure 103: | Not Applicable (P) |
| Highway System 104: | 0 Not on NHS | NBIS Length 112: | Long Enough |
| Toll Facility 20: | Unknown (NBI) | Functional Class 26: | Unknown |
| Defense Hwy 110: | Unknown (NBI) | Historical Significance 37 | 5 Not eligible for NRHP |
| Owner 22: | 27 27 Railroad | | |
| Custodian 21: | 27 27 Railroad | | |

## CONDITION

| | | | | | |
|---|---|---|---|---|---|
| Deck 58: | N N/A (NBI) | Super 59: | N N/A (NBI) | Sub 60: | N N/A (NBI) |
| Culvert 62: | N N/A (NBI) | Channel/Channel Protection 61: | | N N/A (NBI) | |

## LOAD RATING AND POSTING

| | | | |
|---|---|---|---|
| Inventory Rating Method 65: | Unknown (NBI) | Operating Rating Method 63: | Unknown (NBI) |
| Inventory Rating 66: | | Operating Rating 64: | |
| Design Load 31: | Unknown (NBI) | Posting 70: | Unknown (NBI) |
| Posting Status 41: | A Open, no restriction | | |

## APPRAISAL

| | | | |
|---|---|---|---|
| Bridge Rail 36A: | N N/A or not required | Approach Rail 36C: | N N/A or not required |
| Transition 36B: | N N/A or not required | Approach Rail Ends 36D: | N N/A or not required |
| Str Evaluation 67: | Unknown (NBI) | Deck Geometry 68: | N Not applicable (NBI) |
| Underclearance, Vertical and Horizontal 69: | | 3 Intolerable - Correct | |
| Waterway Adequacy 71: | N Not applicable | Approach Alignment 72: | Not Applicable |
| Scour Critical 113: | N Not Over Waterway | | |

## PROPOSED IMPROVEMENTS

| | | | |
|---|---|---|---|
| Bridge Cost 94: | $0 | Type of Work 75: | Unknown (P) |
| Roadway Cost 95: | $0 | Length of Improvement 76 | 0.0 ft |
| Total Cost 96: | $0 | Future ADT 114: | -1 |
| Year of Cost Estimate 9 | 2000 | Year of Future ADT 115 | -1 |

## NAVIGATION DATA

| | | | |
|---|---|---|---|
| Navigation Control 38 | NA-no waterway | | |
| Vertical Clearance 39 | 0.0 ft | Horizontal Clearance 40: | 0.0 ft |
| Pier Protection 111: | Not Applicable (P) | Lift Bridge Vertical Clearance 116 | 0.0 ft |

## ELEMENT CONDITION STATE DATA

| Str Unit | Elm/Env | Description | Unit | Total Qty | % in 1 | Qty. St. 1 | % in 2 | Qty. St. 2 | % in 3 | Qty. St. 3 | % in 4 | Qty. St. 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | |

| TYPE OF STRUCTURE | Headwalls, Rails, or curbs that are attached to the structure and affect the flow of traffic | NBI Deck-Related Item to be Recorded or Coded | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | #51: Curb-to-Curb | #52: Deck Width: Out-to-Out | #58: Deck | #59: Super-structure | #60: Sub-structure | #62: Culvert | #107: Deck Type | #108a: Deck Wearing Surface type | #108b: Deck Membrane Type | #108c: Deck Protection Type | DECK AREA |
| Steel Beam Bridge (Includes Box Beam) | N/A | Y | Y | Y | Y | Y | N | Y | Y | Y | Y | Y |
| Any Type of Thru-Truss | N/A | Y | Y | Y | Y | Y | N | Y | Y | Y | Y | Y |
| Any Type of Deck-Truss | N/A | Y | Y | Y | Y | Y | N | Y | Y | Y | Y | Y |
| Any Type of Thru-Arch | N/A | Y | Y | Y | Y | Y | N | Y | Y | Y | Y | Y |
| Any Type of Deck-Arch (excluding filled arch) | N/A | Y | Y | Y | Y | Y | N | Y | Y | Y | Y | Y |
| Filled Arch (R/C & Stone Masonry) (excluding "Arch-culverts") | N/A | Y | Y | N | Y | Y | N | N | N | N | N | Y |
| Covered Bridge | N/A | Y | Y | Y | Y | Y | N | Y | Y | Y | Y | Y |
| Prestressed-Concrete MultipleBox Beams w/ A/C Overlay (assume deck is pre-cast concrete) | N/A | Y | Y | Y | Y | Y | N | Y | Y | Y | Y | Y |
| Prestressed-Concrete MultipleBox Beams with R/C Deck | N/A | Y | Y | Y | Y | Y | N | Y | Y | Y | Y | Y |
| Prestressed-Concrete I-Beams | N/A | Y | Y | Y | Y | Y | N | Y | Y | Y | Y | Y |
| R/C Concrete T-Beams | N/A | Y | Y | Y | Y | Y | N | Y | Y | Y | Y | Y |
| Timber Slab | N/A | Y | Y | Y | Y | Y | N | Y | Y | Y | Y | Y |
| Timber Beams or Stringer-Floor Beam Configuration | N/A | Y | Y | Y | Y | Y | N | Y | Y | Y | Y | Y |
| *Pipe Culvert: Steel, Plastic or Concrete | Y<br>N | Y<br>N | Y<br>N | N<br>N | N<br>N | N<br>N | Y<br>Y | N<br>N | N<br>N | N<br>N | N<br>N | N<br>N |
| *R/C Slab (without fill) | Y<br>N | Y<br>N | Y<br>N | Y<br>Y | Y<br>Y | Y<br>Y | N<br>N | Y<br>N | Y<br>N | Y<br>N | Y<br>N | Y<br>Y |
| *R/C Slab (with fill) | Y<br>N | Y<br>N | Y<br>N | Y<br>Y | Y<br>Y | Y<br>Y | N<br>N | N<br>N | N<br>N | N<br>N | N<br>N | Y<br>Y |
| *R/C Frame Culvert w/ No Fill | Y<br>N | Y<br>N | Y<br>N | Y<br>Y | Y<br>Y | Y<br>Y | N<br>N | Y<br>N | Y<br>N | Y<br>N | Y<br>N | Y<br>Y |
| *R/C Frame Culverts (Under Fill) | Y<br>N | Y<br>N | Y<br>N | N<br>N | N<br>N | N<br>N | Y<br>Y | N<br>N | N<br>N | N<br>N | N<br>N | Y<br>Y |
| *R/C Box Culvert with or without Fill | Y<br>N | Y<br>N | Y<br>N | N<br>N | N<br>N | N<br>N | Y<br>Y | Y<br>N | Y<br>N | Y<br>N | Y<br>N | Y<br>Y |
| Any kind of Movable bridge | N/A | Y | Y | Y | Y | Y | N | Y | Y | Y | Y | Y |

*** Note: For slabs, pipes, box culverts or frame culverts where the headwalls, rails or curbs are attached to the structure, but are separated from the shoulder or roadway on the bridge with grass, the coding for NBI Items #51 & 52 are subject to the inspectors' determination of whether or not they affect the flow of traffic. If the inspector is not sure, consult either the BIE.**

## BRIDGES IN DDOT UNDERWATER INSPECTION PROGRAM

| BRIDGE NO. | LOCATION |
|---|---|
| 0001 | Chain Bridge over Potomac River, N. W. |
| 0007 | Francis Scott Key Memorial Bridge over Potomac River, S.W. |
| 0052 | Benning Road Bridge over Anacostia River, N. E. |
| 0053 | South Capitol Street Bridge over Anacostia River, S. E. (Frederick Douglas Memorial Bridge) |
| 0054 | Pennsylvania Avenue Bridge over Anacostia River, S. E. (John Philip Sousa Memorial Bridge) |
| 0076 | New York Avenue Bridge over Anacostia River, N. E. |
| 0077 | Benning Road Bridge over Kingman Lake, N. E. |
| 0169-1 | Center Highway Bridge over Potomac River, S. W. (Rochambeau Memorial Bridge) |
| 0170-1 | Northbound 14th Street Bridge over Potomac River, S. W. (Arland D. Williams Memorial Bridge) |
| 0171-2 | 14th Street Bridge over Tidal Basin Outlet, S. W. |
| 0233 | East Capitol Street Bridge over Anacostia River, N. E. |
| 1026 | Anacostia Freeway Bridge over Oxon Run Bay, S. W. |
| 1113 | Southwest Freeway Bridge over Washington Channel, S. W. (Francis Case Memorial Bridge) |
| 1133 | Southbound 14th Street Bridge over Potomac River, S. W. (George Mason Memorial Bridge) |
| 1200 | Theodore Roosevelt Memorial Bridge over Potomac River, N. W. (including Little River Crossing and Ramps C, D &E) |
| 1415 | 11th Street Bridge over Anacostia River, S. E. |
| 1416 | Southbound I-695 over Anacostia River, S. E. |
| 1417 | Northbound I-695 over Anacostia River, S. E. |
| 1424 | I-695 SB Ramp over I-295 Connecting Roadways |

d.