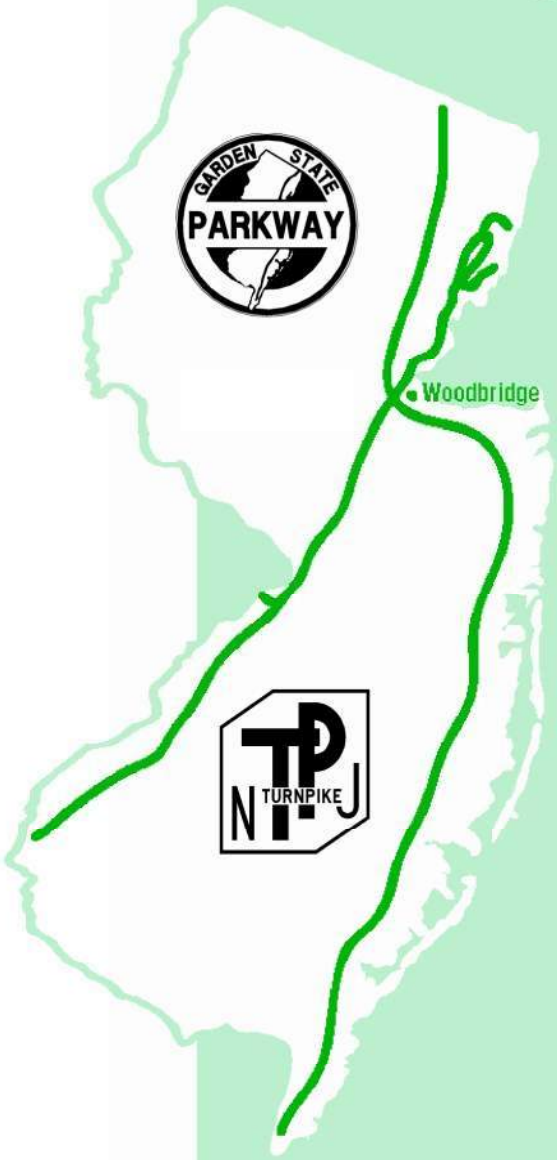
NEW JERSEY TURNPIKE AUTHORITY

GARDEN STATE PARKWAY

NEW JERSEY TURNPIKE



BRIDGE INSPECTION PROGRAM

MANUAL FOR SIGN STRUCTURE INSPECTION

VERSION 1.3
MARCH 2025

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SUMMARY OF VERSION 1.3 REVISIONS (MARCH 2025)

The Manual for Sign Structure Inspection, Version 1.2, November 2022 has been updated to Version 1.3, March 2025. The major changes are as follows:

- Removed Sections 4.f, 4.k, 8.f, 8.k, (Three Chord Sign Bridge and Canopy Mounted respectively) since these sign structures have been removed from the Authority's inventory. Removed references to these sign structure types throughout.
- Updated Section 8.l (General Provisions) to include inspection of retaining walls supporting sign structure foundation embankments and referenced Authority's Manual for Retaining Wall and Noise Barrier Inspection and Bridge Inspection Program Quality Management Plan.
- Updated Section 8.m (Minimum Required Photographs) to include inspection of retaining walls supporting sign structure foundation embankments.
- Updated Section 9.a (Inspection Elements) to include retaining walls when present.
- Updated Section 9.c (Repair Categories) to include definition for Category A1 and E, and added thresholds for Category A1 through E.
- Updated photo descriptions included in Section 8.m. (Minimum Required Photographs) for consistency.
- Previous Section 13 (Sign Structure Inventory) removed.

Please review the entire Manual for Sign Structure Inspection for additional revisions not listed above but included as part of the Version 1.3 revisions.

SUMMARY OF VERSION 1.2 REVISIONS (NOVEMBER 2022)

The Manual for Sign Structure Inspection, Version 1.1, November 2021 has been updated to Version 1.2, November 2022. The major changes are as follows:

- Updated Section 5 Inspection Planning and Preparation to include Schedule Management, AssetWise Inspection (AWI) Access Request Forms, and Project Specific QA/QC Plan.
- Updated Section 6 Types of Inspection to include Damage and Interim Inspections.
- Updated Section 7 MPT Requirements to include the email notification for Team Leader (BILOC).
- Updated Section 8.n General Provisions to include AssetWise guideline for signed Anchor Bolt Ultrasonic Testing Report.
- Removed Section 12 Inspection Report Templates due to redundancy with the Sample Report.
- Updated Section 12 (Formerly Section 13) Sample Report to include the most recent report.
- Updated Section 13 (Formerly Section 14) Sign Structure Inventory to include the latest Turnpike and Parkway sign structure inventories (as of 08/02/2022).

Please review the entire Manual for Sign Structure Inspection for additional revisions not listed above but included as part of the Version 1.2 revisions.

SUMMARY OF VERSION 1.1 REVISIONS (NOVEMBER 2021)

The Manual for Sign Structure Inspection, Version 1.0, December 2020 has been updated to Version 1.1, November 2021. The major changes are as follows:

- Updated Section 3 (Definitions) to include definition of Sign Structure, expanded definition of Support Staff, and eliminated Bridge, Culvert and Nonredundant configuration.
- Updated Section 4 (Types of Sign Structures) to include Mast Arm Sign and Mono-Tube and updated write up on each type of sign structure.
- Updated Section 8. o. (General Provisions) to include the anchor bolt Ultrasonic Testing requirement discussion.
- Updated Section 8. p. (Minimum Required Photographs) to include 3 and 4 chord signs and Vierendeel.
- Updated Section 9. d. (Inspection Elements) to include additional common/typical deficiencies.
- Updated Section 12 (Inspection Report Template) to include minor revisions to existing forms (See Section 12 for details) and new forms (Sign Anchor Bolt Ultrasonic Testing Report Forms, Chord Splice Sheet, and Clearance).
- Updated Section 14 to include the latest Turnpike and Parkway sign structure inventories (as of 06/01/2021).
- Added Section 15 which includes the FHWA Ultrasonic Anchor Inspection Procedure.

Please review the entire Manual for Sign Structure Inspection for additional revisions not listed above but included as part of the Version 1.1 revisions.

1. PURPOSE

The purpose of the New Jersey Turnpike Authority's (Authority) Bridge Inspection Program is to inventory and document the physical characteristics, conditions and emergency/priority findings of all Authority owned structures including bridges, culverts, sign structures, noise barriers/ retaining walls, high mast light poles (HMLP), and communication towers. The data and information collected in the field during sign structure inspections is utilized for the purpose of managing, maintaining, repairing, replacing, and monitoring the Authority's sign structure inventory. There is currently no federal mandate for the inventory and inspection of sign structures.

The Authority's current sign structure inventory includes various types such as overhead span (sign bridges), cantilever, and butterfly. Recent widenings along both roadways have increased the sign structure inventory, particularly at interchanges, in addition to construction of new Vierendeel VMS sign structures along both roadways. Due to their typically nonredundant configuration and close proximity to the roadway, sign structures have the potential to directly impact the safety and welfare of the travelling public and it is imperative they remain in a state of good repair. Therefore, the Authority's sign structure inspections focus primarily on structural evaluation and functionality.

This Sign Structure Inspection Manual provides guidance to performing structural condition inspections of sign structures owned by the Authority. This manual details procedure to properly document the inventory and inspection data utilizing standard inspection and report forms in the Authority's AssetWise Inspection (AWI) database, supplemented by field notes, sketches and photographs, as required. This manual does not address safety and work zone traffic control requirements which are specified in the Authority's Manual for Traffic Control in Work Zones (https://www.njta.com/doing-business/professional-services/publications/manuals/traffic-control). Authority safety and work zone traffic control standards must be applied for all fieldwork which in turn must be performed by qualified and experienced engineering personnel and staff.

The Authority's Bridge Inspection Program does not specifically include the inspection of ground mounted signs within the Authority's Right of Way. However, these signs may be inspected in accordance with the requirements outlined in this manual.

2. ROLES AND RESPONSIBILITIES

Refer to Section 4 of the Authority's Bridge Inspection Program Quality Management Plan (latest version) for specific roles and responsibilities of the Authority, the Bridge Inspection Program Technical Manager, and the Inspection Consultant, as they pertain to the inspection of sign structures. Refer to Section 3 of this manual (Definitions) for the specific definitions, roles, and responsibilities of the Team Leader (TL), Assistant Team Leader (ATL) and Support Staff (SS) performing inspection of the Authority's sign structures.

3. DEFINITIONS

Refer to Section 3 of the Authority's Bridge Inspection Program Quality Management Plan (QMP) (latest version) for bridge inspection program definitions (2024-11-08-bi-program-quality-management-plan_v16-final.pdf).

The following definitions are specific to sign structure inspections (and definitions for TL and ATL in the QMP have been expanded upon):

Team Leader (TL) – An individual of the Inspection Consultant trained and certified and in charge of an inspection team who is ultimately responsible for planning, preparing, and performing field inspections, and can accurately evaluate and document findings of a given sign structure (Refer to New Jersey Turnpike Authority Bridge Inspection Program Qualifications of Key Bridge Inspection Personnel). During the inspections, the Team Leader must be accompanied by at least one other team member which may include an ATL or SS.

Assistant Team Leader (ATL) – An individual of the Inspection Consultant assisting the Team Leader with planning, preparation and performing field inspection of a given sign structure. (Refer to New Jersey Turnpike Authority Bridge Inspection Program Qualifications of Key Bridge Inspection Personnel).

Support Staff (SS) – An individual of the Inspection Consultant supporting the Team Leader with the field inspection of a given structure. The support staff assists the TL performing inspections and can assist in the following inspection related tasks: taking and logging photographs, vertical under clearance measurements and movement of various inspection equipment (TMA or bucket truck) but is not considered qualified to perform any inspections. Support staff may act as a spotter to observe the individuals performing the climbing of overhead sign structures on the Turnpike.

Sign Structure – A structure that supports sign panels above the roadway and is supported on tower/posts or structural frames. Sign structure types include span (sign bridge), cantilever, butterfly, bridge fascia mounted, art deco and monotube type sign support.

4. TYPES OF SIGN STRUCTURES

a. SINGLE PLANE VIERENDEEL SIGN BRIDGE

Single Plane Vierendeel Sign Bridges (SPV) are located along the Parkway. These sign structures typically:

- Carry standard sign panels and/or VMS sign panels without any maintenance walkways or lighting
- Consist of a weathering steel single plane Vierendeel style truss (two main horizontal chords (one lower chord and one upper chord) with welded vertical struts with or without intermediate flange sets or spliced vertical members)
- Are supported by one weathering steel tower/post at each end with the truss sitting within the tower/post. The truss is mechanically fastened to the tower/posts, and the tower/post are mounted on reinforced concrete pedestals or drilled shaft foundations

Front Elevation

Rear Elevation

b. DOUBLE PLANE VIERENDEEL SIGN BRIDGE

Double Plane Vierendeel Sign Bridges (DPV) are located along the Parkway. These sign structures typically:

- Carry standard sign panels and/or VMS sign panels without any maintenance walkways or lighting
- Consist of a weathering steel dual plane Vierendeel style truss (four main horizontal chords (two lower chords and two upper chords) with welded vertical and horizontal struts with or without intermediate flange sets or spliced vertical members)
- Are supported by two weathering steel tower/posts at each end with the truss sitting within the tower/posts. Horizontal struts span between the tower/posts at each end. The truss is mechanically fastened to the tower/posts, and the tower/posts are mounted on reinforced concrete pedestals or drilled shaft foundations

Front Elevation

Rear Elevation

c. VIERENDEEL VMS/VSLS SIGN BRIDGE

Vierendeel VMS/VSLS Sign Bridges are located on both the Parkway and Turnpike. These sign structures typically:

- Carry VMS (Variable Message Sign) / VSLS (Variable Speed Limit Sign) sign panels and/or standard sign panels
- Include an enclosed maintenance walkway within the truss
- Consist of a weathering steel dual plane Vierendeel style truss (four main horizontal chords (two lower chords and two upper chords) with welded vertical and horizontal struts with or without intermediate flange sets or spliced vertical members)
- Are supported by two weathering steel end frames consisting of two tower/posts at each end with diagonal and horizontal struts spanning between the tower/posts in an A type frame. The truss sits on top and is mechanically fastened to the end frame. The tower/posts are mounted on reinforced concrete pedestals or drilled shaft foundations

Front Elevation

Rear Elevation

d. VIERENDEEL CANTILEVER

Vierendeel Cantilever Sign Structures are located on the Parkway. These cantilever sign structures typically:

- Carry a standard sign panel and/or VMS sign panel
- Consist of a weathering steel single plane Vierendeel style truss (two main horizontal chords (one lower chord and one upper chord) with welded vertical struts with or without spliced vertical members)
- Are supported by one weathering steel tower/post with the truss mechanically fastened by the flange sets to the tower/post or fastened directly through the tower/post within a sleeve. The tower/post is mounted on reinforced concrete pedestals or drilled shaft foundation

Front Elevation

Rear Elevation

e. VIERENDEEL BUTTERFLY

Vierendeel Butterfly Sign Structures are located on the Parkway. These butterfly sign structures typically:

- Carry a standard sign panel and/or VMS sign panel
- Consist of a weathering steel single plane Vierendeel style truss on each side of the tower/post (two or more main horizontal chords with welded vertical struts with or without spliced vertical members)
- Are supported by one weathering steel tower/post with each truss mechanically fastened by flange sets to the tower/post or fastened directly through the tower/post within a sleeve. The tower/post is mounted on a reinforced concrete pedestal or drilled shaft foundation

Front Elevation

Rear Elevation

f. FOUR CHORD SIGN BRIDGE

Four Chord Sign Bridges are located along the Turnpike and Parkway roadways. There is only one four chord sign bridge located at Parkway MP 146.4N along the Parkway roadway. These sign structures typically:

- Carry standard sign panels, VMS, and/or changeable message signs
- May or may not include a maintenance walkway and lighting
- Consist of a weathering steel, aluminum, or galvanized steel dual plane truss (four main horizontal chords; two lower chords and two upper chords) with welded diagonals and verticals with or without intermediate flange sets
- Are supported by two weathering steel, aluminum, or galvanized steel end frames consisting of two tower/posts at each end with intermediate bracing. The truss rests on top of two horizontal struts at each end frame and is secured in place by mechanical fasteners. The tower/posts are mounted on reinforced concrete pedestals or drilled shafted or other foundations

Front Elevation

Rear Elevation

g. CANTILEVER

Cantilever Sign Structures are located on the Turnpike. These cantilever sign structures typically:

- Carry standard sign panels with or without lighting
- Consist of a weathering steel or galvanized steel single plane truss (two main horizontal chords (one lower chord and one upper chord) with welded verticals and diagonals)
- Are supported by one weathering steel or galvanized tower/post with the truss mechanically fastened by the flange sets to the tower/post. The tower/post is mounted on a reinforced pedestal or drilled shaft foundation

Front Elevation

Rear Elevation

h. BUTTERFLY

Butterfly Sign Structures are located along the Turnpike. These butterfly sign structures typically:

- Carry standard sign panels with or without lighting
- Consist of a weathering steel or galvanized steel single plane truss (two main horizontal chords (one lower and one upper chord) with welded verticals and diagonals)
- Are supported by one weathering steel, aluminum or galvanized tower/post with the truss mechanically fastened by flange sets to the tower/post. The tower/post is mounted on a reinforced concrete pedestal or drilled shaft foundation

Front Elevation

Rear Elevation

i. BRIDGE FASCIA MOUNTED

Bridge Fascia Mounted Sign Structures are located along both the Parkway and Turnpike. These sign structures typically:

- Carry standard sign panels and may include lighting
- Are supported by galvanized steel or aluminum hangers and horizontal wind-beams
- Are mechanically fastened directly to the bridge fascia parapet, bridge deck and/or adjacent fascia girders

Note: These sign structures are typically inspected during the biennial bridge inspections and are not included in the sign structure inspections. Deficiencies are coded in a section of the bridge inspection forms and documented in the Element Level Inspection.

Front Elevation

j. ART DECO

Art Deco Sign Structures are located at three locations along the Hudson County Extension of the Turnpike. The term Art Deco refers to a pre-1950 architectural style characterized by bold outlines, geometric designs, and zigzag forms. These sign structures are some of the oldest sign structures owned by the Authority and have been preserved and even relocated in some cases for their heritage. These sign structures:

- Carry standard overhead sign panels and may include a maintenance walkway between the supporting members
- Are supported by painted steel riveted or welded primary members fastened to painted steel or concrete end frames

Front Elevation (Turnpike MP N8.12WR)

Rear Elevation (Turnpike MP N8.12WR)

Front Elevation (Turnpike MP N8.25)

Rear Elevation (Turnpike MP N8.25)

k. MONOTUBE TYPE SIGN SUPPORT

There are two Monotube Type Sign Structures (Turnpike MP 91.32E and Parkway MP 136.1 135NBX) one of which utilizes fixed sign panels and the other utilizes Lane Control Signs. These sign structures typically:

- Carry standard or LED sign panels
- Are supported by a single galvanized steel mast with the arm mechanically fastened by the flange set to the tower/post. The mast is mounted on a reinforced concrete pedestal or drilled shaft foundation

Front Elevation (Turnpike MP 91.32E)

Rear Elevation (Turnpike MP 91.32E)

Front Elevation (Parkway MP 136.1 135NBX)

Rear Elevation (Parkway MP 136.1 135NBX)

5. INSPECTION PLANNING AND PREPARATION

a. QUALIFICATIONS

Key project personnel shall possess relevant training and experience demonstrating:

i. Successful completion of National Bridge Inspection Standards (NBIS) inspections of sign structures, effective inspection scheduling, and report preparation and submission.

ii. TL performing sign structure inspections must meet the following requirements for experience in addition to the requirements outlined in the document within "Qualifications of Key Bridge Inspection Personnel" on the Authority's website at http://www.njta.com/doing-business/njta-bridge-inspect-program under the heading "Bridge Inspection Program" and as summarized on the NJTA Bridge Inspection Qualification Summary Form QAF3 - Quality Assurance Audit.

TL who are registered professional engineers shall have a minimum of one year of sign structure inspection experience. A minimum of two years of prior inspection experience is required without a PE. The TL must be physically and mentally capable of climbing through the truss while over live traffic to allow for the performance of a hands-on inspection of the Turnpike four chord truss signs and the Parkway and Turnpike Vierendeel VMS signs.

iii. ATL performing sign structure inspections must meet the following requirements for experience in addition to the requirements outlined in the document within "Qualifications of Key Bridge Personnel" on the Authority's website at http://www.njta.com/doing-business/njta-bridge-inspect-program under the heading "Bridge Inspection Program" and as summarized on the NJTA Bridge Inspection Qualification Summary Form QAF3 - Quality Assurance Audit.

ATL shall have one year of prior sign inspection experience.

iv. The TL, ATL and SS of the awarded Inspection Consultant shall attend a field demonstration provided by the Authority which shows inspection access and methods including the proper use of an articulating bucket truck. See **Section 8** for additional details.

v. There are no qualification requirements for SS.

b. TEAM COMPOSITION

All inspection teams must consist of a minimum two-person crew and include a TL, and an ATL and/or SS. An inspection team may consist of any of the following three combinations: TL with ATL, TL with ATL and SS, and TL with SS.

A team comprised of a three-person crew (TL, ATL and SS or other) is required when the TL and ATL are performing climbing inspections over traffic. The SS remains on the ground to observe the climbing operation and have quick access to the TMA in the event of a fall.

c. INSPECTION DOCUMENTATION REQUIREMENTS

A successful sign structure inspection requires that the inspection team have on-hand all available design and inspection documents such as construction contract plans (if available), and previous inspection reports related to the structure being inspected. These documents will aid the inspection team in determining as-built conditions and any changes in previously reported conditions or deficiencies. Refer to the standard sign structure inspection forms and the sample report included in Section 9. These documents show the fields and supplemental sketches needed to collect data and information to be included in the inspection reports.

d. STANDARD SIGN STRUCTURE INSPECTION EQUIPMENT

The inspection team is required to have any or all of the following equipment on hand when performing sign structure inspections, depending on the details and location of the sign structure being inspected:

- Refer to the work zone traffic control requirements which are specified in the Authority's Manual for Traffic Control in Work Zones (https://www.njta.com/doing-business/professional-services/publications/manuals/traffic-control) and includes discussion of the proper use of Truck Mounted Attenuators, signs, traffic cones and flags, flashing amber lights on vehicles on the roadway, and identification for vehicles located within the Authority's Right of Way.
- Bucket truck
    - Articulating bucket truck for the cantilever and butterfly signs.
- Personal Protective Equipment including hard hats, reflective high visibility vests, eye protection, gloves, safety harnesses and lanyards.
- Basic access equipment such as a step ladders, extension ladders and ropes.
- Tools for cleaning including whisk brooms, wire brushes, scrapers, and shovels.
- Tools for inspection including chipping hammers, pocketknives, screwdrivers, or awls, magnifying glass, dye-penetrant test kit, borescope, high power binoculars, flashlights, mirrors, and magnets.
- Tools for measuring including plumb bobs, protractors, levels, folding rulers, calipers, measuring tapes, thickness gauges, D-meters, clearance measuring rods or laser measuring devices.

- Tethers for all equipment used, especially when located over live traffic (while climbing).
- Digital camera.
- Wrenches or screwdrivers for removing and reattaching access covers.
- Marking utensils such as keel or lumber crayons.
- First Aid kit.

e. SCHEDULE MANAGEMENT

The inspection consultant shall submit a general schedule showing the dates for the milestone tasks in the project to the Authority at the beginning of the project. A comprehensive schedule (master inspection and report submission schedule) showing anticipated dates for inspection, data input, preliminary and final report submission, comments received, QA/QC dates along with additional comments shall be created by the inspection consultant and will be used to track the progress of the project. In addition, an updated version of the comprehensive schedule shall be submitted to the Authority and BIPTM monthly before the 7th day of each month.

f. ASSETWISE INSPECTION (AWI) ACCESS REQUEST FORMS

The inspection consultant shall complete the AssetWise Inspection access request forms provided by BIPTM via email and submit to BIPTM (AWI administrator) for project staff to obtain access to AssetWise.

g. PROJECT SPECIFIC QA/QC PLAN

A project specific QA/QC plan, as defined in the Authority's Bridge Inspection Program Quality Management Plan, shall be submitted to the Authority for review and approval.

6. TYPES OF INSPECTION

a. INVENTORY

This initial inspection shall be performed during the next regularly scheduled sign structure group inspection assignment following construction completion. Since the Authority's maximum sign structure inspection frequency is six years, an Inventory inspection of a new sign structure could be performed up to six years after construction completion.

These inspections are intended to facilitate entering the structure into the Authority inventory and will serve as the baseline for the as-built condition of the structure. This inspection type involves locating the structure, recording all general information from review of the plans or field collection including but not limited to structure type, mounting type, coatings, length, number of truss sections/chord splices and a first cycle inspection of all structure components, attachments, and safety features.

b. ROUTINE

The frequency for sign structure inspections is not mandated by FHWA since these are considered ancillary structures. The Authority has elected to routinely inspect the in-service sign structures at the following frequencies based on structure type/materials:

- Two years for:
    - Parkway MP 146.4N (aluminum four chord sign bridge) and Parkway MP 148.9N (aluminum butterfly sign structure)
    - bridge fascia mounted signs (inspected during NBIS bridge inspection)
- Six years (All other signs)

These inspections consist of verifying all basic structure data recorded during the initial Inventory inspection or prior routine inspection and performing an inspection of all visible and accessible structural components. The components are inspected for changes in previously reported conditions and development of new conditions. For this inspection the previous cycle inspection report shall be on-hand for referencing purposes.

c. SPECIAL

A special inspection is a unique inspection effort targeted at special situations or conditions and may be performed to study a unique or unusual structural feature in greater detail than would have normally occurred during a routine inspection. Special inspections encompass a 100% hands-on inspection of specific components, details, or deficiencies which need special monitoring and/or evaluation. In planning a special inspection, the TL shall understand the goal of the inspection to help determine the equipment and traffic control needed to obtain the necessary condition information for the elements requiring

inspection. Examples of special inspections, and their definitions, include, but are not limited to the following:

- *Post Storm Inspection*: Inspection of a structure subsequent to extreme weather conditions such as a hurricane or high wind events in order to determine the onset or advancement of any documented damage
- *Structural Detail Inspections*: Inspection of structural details, components and/or materials that have been previously or recently identified to exhibit advanced corrosion, cracking, or other signs of distress, which may result in potential failure and warrant additional inspections

d. DAMAGE

This is an unscheduled inspection of a sign structure that has been damaged by an event such as a motor vehicle accident (MVA), including but not limited to vehicular impact to a foundation, tower/post, or end frame or overheight vehicle impact to the truss members, sign panels, walkways, or lighting assemblies.

e. INTERIM

This is an inspection scheduled at the discretion of the individual in responsible charge of sign structure inspection activities. An Interim Inspection is used to monitor a particular known or suspected deficiency (e.g., foundation settlement or scour, member condition, etc.) and can be performed by a qualified person familiar with the sign structure. The determination of an appropriate Interim Inspection frequency should consider the severity of the known deficiency.

7. MPT REQUIREMENTS

a. LANE/SHOULDER CLOSURE

All closures along the Turnpike and Parkway must be approved by the Authority's Operations Department. Sign structure inspections performed along the Turnpike and Parkway shall be performed behind guide rail or other existing roadside barriers, where feasible. When work must be conducted in a closed lane or shoulder, the Inspection Consultant shall provide traffic control in accordance with the current edition of the Authority's Manual for Traffic Control in Work Zones. The Inspection Consultant shall also provide traffic control on local and state roads in accordance with the governing agency's requirements.

b. TRAFFIC PERMIT

A Traffic Permit is required for any work within the Authority Right of Way. The Traffic Permit Application form and instructions can be found online at the Authority's website: https://www.njta.com/about/traffic-permits. Applicants for the Traffic Permit will be required to attend a meeting and view a training video conducted by the State Police in conjunction with the Authority to learn lane/shoulder closure and work zone procedures. Note, the Authority requires that a daily shoulder closure be installed by Maintenance or an approved vendor for any inspections which require more than 1-hour duration along the mainline and for any ramps. Maintenance will accommodate a closure up to 5 miles long depending on location and other work being performed on the roadway.

For additional information refer to the Authority's Manual for Traffic Control in Work Zones at https://www.njta.com/media/1501/njta_traffic_control_manual_in_work-zones_122016.pdf

c. DAILY LOCATION NOTIFICATION

Team Leaders are required to email a Bridge Inspection Location (BILOC) notification to the BIPTM and the Authority daily and before commencing field work. The BILOC shall consist of the following information:

OPS: XXXX
Sign Structure
Roadway: Parkway or Turnpike
Structure No. (use exact structure number in anticipated order):
Team Leader last name:
Phone Number:
MPT (indicate location where equipment or ladder or closing is):

8. SIGN STRUCTURE INSPECTION PROCEDURE

The procedure for inspection of sign structures varies by sign type and location. Inspection of all sign structures listed in **Sections 8.a. through 8.k.** may require the use of a daytime short duration shoulder closure (one hour of work allowed within a two-hour window in accordance with Drawing TP-7). Inspection of sign structures listed in **Sections 8.a., 8.b., and 8.c.** require the use of a bucket truck for an 8-point binocular inspection. Additionally, sign structures listed in **Sections 8.a. through 8.k**. may require the use of an articulating bucket truck. Climbing over live traffic is required for hands-on inspection of four chord sign bridges on the Turnpike only. **See Section 8.l.** Climbing over live traffic is not permitted when inspecting Vierendeel sign bridges on the Parkway. Coordination with the Authority's Operations Department for any maintenance or vendor installed daily closures or short duration shoulder closures is required and is needed for State Police assisted slow downs in order to perform hands-on inspections of any areas of concern found during the visual inspection of the sign structures in **Sections 8.a through 8.c. and 8.k.** on both roadways. An initial "Tool box" meeting is required for each new project and prior to any activity taking place on the Authority's roadways. The consultant shall refer to their traffic permit for details, and shall schedule this necessary meeting directly with Operations.

a. SINGLE PLANE VIERENDEEL SIGN BRIDGE

These sign structures require inspection of both end frames and an eight-point binocular inspection at the high and low vantage points from all four corners (front and rear) viewing the upper/lower chord, members of the entire truss, chord flanges when present and all sign panel/structure attachments. The inspection of the end frame nearest to the median may need to be conducted utilizing the shoulder of the adjacent roadway if the sign spans a roadway with a left shoulder narrower than 10' in width.

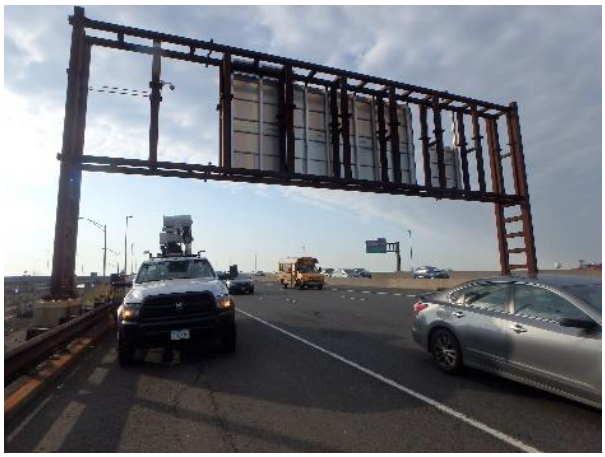
Front Elevation

Rear Elevation

b. DOUBLE PLANE VIERENDEEL SIGN BRIDGE

Refer to the inspection procedure listed in Section 8.a. for the inspection procedure to be used for these sign structures.

Front Elevation



Rear Elevation

c. VIERENDEEL VMS/VSLS SIGN BRIDGE

For these types of sign structures, accessing the structure by parking behind the guide rail is preferred. Inspection of these sign structures may require the use of a short duration shoulder closure to access the fully enclosed maintenance walkway and inspect the end frames. In addition, utilize an eight-point inspection at the high and low vantage points from all four corners (front and rear) viewing the upper and lower chords, members of the entire truss, and all sign structure attachments. The inspection of the far end frame may need to be conducted utilizing the shoulder of the adjacent roadway if the structure spans a roadway with a shoulder narrower than 10' at the median, else a lane closure is required. The inspection shall include the use of the fully contained maintenance inspection walkway, utilizing the 8' step ladder (stored flat on the walkway) at all cross-beam locations and to assist in the inspection of the upper chords. When chord flange sets are present, a small handheld telescopic stick mirror shall be utilized from and through the maintenance walkway to inspect any hard to reach or closely spaced areas.

Front Elevation

Rear Elevation

d. VIERENDEEL CANTILEVER

Inspection of these sign structures requires the use of an articulating bucket truck preferably parked off roadway and behind guide rail. If access to the area behind the guide rail is not viable then it will require the use of a short duration shoulder closure (daytime preferred). Inspection of these structures requires the use of an articulating bucket truck in order to access the portion of the truss over the travel lanes allowing the bucket/arm to stay within the profile of the sign while reaching over the travel lane. At no point in time shall the bottom of the bucket or arm protrude beyond the bottom of the sign panel when over live traffic.

Front Elevation

Rear Elevation

e. VIERENDEEL BUTTERFLY

Refer to the inspection procedure listed in Section 8.d. for the inspection procedure to be used for these sign structures.

Front Elevation

Rear Elevation

f. FOUR CHORD SIGN BRIDGE

Inspection of these sign structures on the Turnpike Roadway shall be performed during daytime hours utilizing a Maintenance installed right shoulder, lane or ramp closure to access the truss members via climbing and facilitate inspection of the nearest end frame. A short duration right shoulder closure shall be utilized in the adjacent roadway to access the far end frame. A TMA shall be utilized to protect the bucket truck and inspection team at all times. Climbing is not permitted over the Parkway roadway and therefore Parkway MP 146.4N (aluminum four chord sign bridge) shall be inspected using daytime and/or nighttime vendor installed lane closures to facilitate inspection of both end frames and sign truss using a bucket truck and TMA.

Front Elevation

Rear Elevation

For the purpose of inspecting the truss of these sign structures over the Turnpike roadway, the fully tethered TL will climb through the entire truss over live traffic, from the near end frame to the far end frame, providing hands-on inspection of the truss, including all truss member welds on all sides of the truss and the attached signs. The climbing inspection performed by the TL may be supplemented with concurrent climbing inspection by the ATL for longer spans, but cannot be supplemented with climbing inspection by the SS. All inspection equipment shall be fully tethered. The welds include connections between cross members (vertical, horizontal, and diagonal) to the chord, and connections from the chord(s) to flanges. A small handheld telescopic stick mirror shall be utilized to view any welds which are on outside faces of members and not easily visible while climbing. All attachments including end frame to chord, flange to flange, chord to hanger, hanger to stringer, stringer to sign panel, and sign panel to sign panel shall also receive a hands-on inspection.

Inspection of the sign walkway shall also be performed during this shoulder closure, when there is one present. This shall involve the fully tethered TL walking the full length of the walkway while raising/pinning sections of the Speed Rail railings.

Access to the far end frame and foundation may be achieved after climbing through the length of the truss and down the far end frame, but not when the far end frame is located along or atop a median where the TL or ATL is in close proximity to the travelling vehicles.

A short duration shoulder closure may be used to inspect the foundation and far end frame when climbing down is not possible but can only be utilized if the shoulder width is 10' or greater, else a lane closure is required.

An overnight or off-peak Maintenance installed lane closure may be required for sign structures where insufficient width is present (typically at toll plazas). These closures will need to be approved by the Authority's Operations Department.

A TMA must be present on the roadway for all overhead sign structure inspections for the full duration of the inspection while the TL is climbing across the roadway regardless of how the truss is accessed. If an ATL is providing support to the TL by also climbing the truss, then a third team member (SS or other) shall be included in the team to operate the TMA. Refer to the Section 5.b. for additional details about team composition.

g. CANTILEVER

Refer to the inspection procedure listed in Section 8.d. for the inspection procedure to be used for these sign structures.

Front Elevation

Rear Elevation

h. BUTTERFLY

Refer to the inspection procedure listed in Section 8.d. for the inspection procedure to be used for these sign structures.

Front Elevation

Rear Elevation

i. BRIDGE FASCIA MOUNTED

Inspection of these sign structures shall be performed during the biennial NBIS inspection of the subject bridge. The inspection of these signs may require various closures or State Police Assisted Slow Downs for hands-on inspection of all components of the sign. All members and attachments of the sign shall receive a hands-on inspection.

Front Elevation

j. ART DECO

There are three art deco sign structures (Turnpike MP N2.35, MP N8.12WR and MP N8.25). The inspection of Turnpike MP N8.12WR and MP N8.25 require the use of the interior of the box girder and inspection walkway between members, respectively. Refer to the inspection procedure listed in Section 8.a. for the inspection procedure to be used for Turnpike MP N2.35, MP N8.12WR and MP N8.25.

Front Elevation

Rear Elevation

k. MONOTUBE TYPE SIGN SUPPORT

These sign structures require a hands-on inspection of the mast, cantilever arm, flange set (attachment to mast arm) and pedestal except for the portion of the roadway, and an eight-point binocular inspection at the high and low vantage points from all four corners (front and rear) viewing the cantilever arm and attached signs.

Front Elevation

Rear Elevation

I. GENERAL PROVISIONS

Hands-on inspection of elevated components of all Sign Structures shall include the following:

Inspection of bolted connections/welds including:

- All cross member (vertical, horizontal, and diagonal) to truss chord connections
- All chord to flange connections
- All truss to end frame and truss to flange splice connections
- All sign structure attachments which shall include end frame to chord and flange to flange connection details, etc.

Inspection of the sign panels including:

- hanger to chord connections
- hanger to stringer connections
- stringer to sign panel connections
- sign panel to sign panel connections
- Mechanical connection of truss to tower
- Plumbness of posts and chords

  - Legibility and facing

- For hands-on climbing inspection of four chord trusses along the Turnpike, fully tethered shall mean use of an approved dual lanyard harness which is continuously tied off to the top chord of the truss using one or both of the attached lanyards. When inspecting the truss over live traffic, all clothing, safety equipment, inspection equipment, and other materials shall be securely tethered to the team member to prevent anything falling onto the active roadway below
- Climbing over live traffic is allowed over the Turnpike roadway ONLY
- No lanyard more than 6' long is allowed
- Anchor bolts, nuts, and washers shall be visually inspected for corrosion, loose or missing lock nuts, leveling nuts and washers, bent bolts, and nuts not fully engaged/threaded. The top of the anchor bolts shall be tapped with a standard inspection hammer to reveal dull or hollow sounds, which could indicate a loose anchor bolt or a possible fatigue crack in the bolt shaft
- Ultrasonic testing of anchor bolts is required to determine the overall length of each anchor bolt and if cracks, breaks or other discontinuities exist within the bolts. Refer to Section 14 for FHWA Ultrasonic Anchor Inspection Procedure. The consultant shall submit a “Procedure for Ultrasonic Testing of Anchor Bolts” to the Authority for approval in advance of the testing in the field
- The ultrasonic testing shall be performed by a qualified NDT technician (ASNT Level II or higher)
- Any anchor bolt section losses shall be noted on the foundation sketch and deficiencies shall be recorded within AssetWise Inspection (AWI) in the anchor bolts subsection of the Foundations grouping on the inspection form entitled “Foundations and Protection Features”. Refer to the Sample Routine, Interim and Damage Inspection Reports in Section 12
- The information and results obtained during the ultrasonic testing are to be recorded and submitted to the Authority using the "Anchor Bolt Ultrasonic Testing Report” form available in the AssetWise Inspection (AWI) inspection module. Refer to the Sample Routine Inspection Report found in Section 12
- The final sign structure inspection reports shall include a signed Sign-Anchor Bolt Ultrasonic Testing Report Section. Guidelines on including this section in AssetWise are as follows:
  - Un-check “Print” for all of the Sign-Anchor Bolt Ultrasonic Testing Report Sections in AssetWise to exclude from the PDF
  - Print each report and have the UT inspector sign each of the Sign-Anchor Bolt Ultrasonic Testing Report pages (up to 4 reports)
  - Scan and combine individual signed reports into one PDF and add the PDF attachment to the Report Sections

- Title the PDF attachment section “Sign-Anchor Bolt Ultrasonic Testing Report”

- For access via shoulder closure: shoulder width must be at least 10' in order to provide adequate clearance for any TMA or bucket truck used during the inspection
- Vertical underclearance shall be measured at all available locations from within closed shoulders and/or lanes
- Inspection of overhead, butterfly or cantilever signs performed by parking the articulating bucket truck off roadway/behind the guide rail is preferred to minimize exposure of inspection equipment and MPT vehicles to the travelling public. As mentioned earlier, any kind of climbing over live traffic will require the use of a daily shoulder or lane closure, and a TMA in the roadway at all times with an operator in the vehicle. For sign structures that are inspected via an eight point binocular inspection, the use of a TMA is not warranted if access can be gained from behind guide rail or off-roadway
- Lengths of daily shoulder/lane closures can be between 3 to 5 miles (3-mile closure are the preferred limit) in order to inspect as many structures as possible in a single closure and minimize the number of closures
- Retaining walls that support an embankment at sign structure equipment platforms shall be included as part of the sign structure inspection and findings shall be included in the ‘Foundations and Protective Features’ input form in the Foundation grouping under Embankment. For inspection procedures refer to the Authority’s Manual for Retaining Wall and Noise Barrier Inspection https://www.njta.com/media/7585/2023-07-28-retaining-wall-and-noise-barrier-inspection-manual_final.pdf

m. MINIMUM REQUIRED PHOTOGRAPHS

Cantilever/Butterfly:

- General view of the Front of the sign structure (looking in direction of traffic)
- General view of the Rear of the sign structure (looking in opposing direction of traffic)
- Close-up view of the sign panel(s) (front face of each panel)
- General view of the tower/post (showing foundation, base plate, protective features, and any electrical equipment)
- Close-up of tower/post base plate anchorage to pedestal or foundation
- Retaining wall supporting foundation or equipment platform embankment (when present)

- General view of the truss chord flange and/or slip joint connection to the post or tower
- General view of UT testing or special inspection equipment
- Equipment used for access/maintenance and protection of traffic
- Defects (in order of field notes)
- Work done (included with defect photos in the order of field notes)

Four Chord Sign Bridge:

- General view of the Front of the sign structure (looking in direction of traffic or increasing milepost when panels are on both faces of the sign structure)
- General view of the Rear of the sign structure (looking in the direction of decreasing milepost when panels are on both faces of the sign structure)
- Close-up view of the sign panel(s) (front face of each panel)
- Close-up view of the truss connection to end frame
- General view of the truss and furthest end frame
- General view of the end frame foundation (showing foundation base plate, protective features, and electrical equipment)
- Retaining wall supporting foundation or equipment platform embankment (when present)
- General view of UT testing or special inspection equipment
- Equipment used for access/ maintenance and protection of traffic
- Defects (in order of field notes)
- Work done (included with defect photos in the order of field notes)

Vierendeel Sign Bridge:

- General view of the Front of the sign structure (looking in direction of traffic or increasing milepost when panels are on both faces of the sign structure)
- General view of the Rear of the sign structure (looking in the direction of decreasing milepost when panels are on both faces of the sign structure)
- Close-up view of the sign panel(s) (front face of each panel)
- General view of the top chord(s) and connection to end frame
- General view of the lower chord(s) and connection to end frame

- General view of the end frame foundation (showing foundation base plate, protective features, and electrical equipment including and/or other attachments)
- Retaining wall supporting foundation or equipment platform embankment (when present)
- General view of the inspection walkway (A-frame type only)
- General view of UT testing or special inspection equipment
- Equipment used for access/maintenance and protection of traffic
- Defects (in order of field notes)
- Work done (included with defect photos in the order of field notes)

9. INSPECTION ELEMENTS AND OVERALL SIGN STRUCTURE CONDITION ASSESSMENT

a. INSPECTION ELEMENTS

Based on the type of sign structure, the element defects, quantity, and location of defects should be recorded in the inspection report along with a photo reference for all repairable defects (Category A or B) or defects requiring monitoring (Category E). The elements of a typical sign structure are divided into seven sections in the Authority's sign structure inspection report. Common/typical deficiencies documented in these sections are briefly noted below. Each of the following elements is discussed in **Section 9.b.** and assigned to a repair category as noted in **Section 9.c.**

Foundations:

Includes the concrete cast in place or drilled shaft foundation(s), anchor bolts, base plates/stiffeners/welds, embankments/retaining walls, and other related elements.

- Reinforced concrete foundation deficiencies include cracking, abrasion/wear, spalls (with or without exposure of reinforcing), delamination, patched areas, defects associated with alkali-silica reactivity (ASR), protective coating defects, efflorescence, rust staining, fire damage, rotation (vertical or horizontal) settlement and undermining
- Anchor bolt deficiencies include corrosion/section loss, cracked, sheared, or damaged bolts, hollow sounding or dull anchor bolts, and loose and/or missing anchor bolts, nuts, locking nuts, leveling nuts and washers
- Base plate deficiencies include missing or damaged wire mesh, corrosion, section loss, cracking, damage, and weld defects
- Embankment deficiencies include settlement, scour and erosion
- Retaining wall deficiencies include abrasion/wear, alkali-silica reactivity (ASR), bulging, cracking/scaling/fractures, debris accumulation, delamination/patched area, distortion, efflorescence/rust staining, erosion, freeze-thaw damage, grade settlement along the wall, graffiti, horizontal rotation, leaching, leakage, scour, separation, settlement, spalling with or without exposed rebar, vegetation growth and vertical rotation
- Other deficiencies include foundation related defects not included above

Protective Features:

Includes guide rail/attenuator, barrier, and other related safety elements.

- Guide rail/attenuator deficiencies include corrosion to rail and posts, impact

damage to rails, posts or end treatments, and loose and/or missing fasteners

- Barrier deficiencies include cracking, abrasion/wear, delamination, patched areas, defects associated with alkali-silica reactivity (ASR), efflorescence, rust staining, rotation (vertical or horizontal) and settlement
- Other deficiencies include protective features related defects not included above

Structure Elements:

Includes end frames/towers, end frame/tower to truss connections and bearings, truss and chords, chord splices, welds, coating, end caps, handhole covers and other related elements.

- End frame/tower deficiencies include corrosion, section loss, cracking, impact damage, bulging and lack of plumbness
- End frame/tower to truss connection deficiencies include corrosion, section loss, cracking, impact damage, loose and/or missing fasteners, loss of support, shifting of truss, disconnected ground wire, bent or jammed cotter pins, and bird nesting
- Bearing deficiencies include crushing, cracking, splitting, rotation, displacement or bulging of the elastomeric pads
- Truss and chord deficiencies include corrosion, section loss, cracking, impact damage, and bulging
- Weld deficiencies (which can be visually inspected) include fabrication (as-built) flaws such as incomplete weld penetration, porosity, undercutting, overlapping and flame cuts or missing welds, as well as deficiencies which can occur due to time in service or materials used such as weld cracking
- Coating deficiencies include loss of galvanizing, loss of patina and coating deterioration
- End caps and hole cover deficiencies include loose, missing, or damaged truss chord end caps, end frame caps, post caps, and handhole covers
- Other deficiencies include structural elements related defects not included above

Sign Panels and Connections

Includes sign panel and fastener/connections including panel to panel fasteners, panel to stringer fastener, stringer to hanger fasteners, fasteners to chords and trusses, and other related elements.

- Sign panel deficiencies include legibility, reflectivity, impact damage, wear, and text/placard defects
- Sign panel fastener deficiencies include corrosion, section loss, cracking, damage,

and loose and/or missing fasteners

- LED/VMS/VSLS sign panel deficiency such as panels not working properly
- Other deficiencies include sign panels and connections related defects not included above

Inspection Walkway/Access:

Includes walkway grating and fasteners, walkway screening (Walk through-Vierendeel VMS/Hybrid Signs), handrail, access ladders and other related elements.

- Walkway grating deficiencies include corrosion, section loss, cracking, damage, loose and missing fasteners, and damaged or missing sections of grating
- Walkway screening deficiencies include corrosion, section loss, and cracking to support members, damage, loose and missing fasteners at connections, and damaged/missing sections of the screening
- Walkway deficiencies including missing walkway grating clips and missing screen attachments
- Handrail and access ladder deficiencies include corrosion, section loss, cracking, damage, loose and missing fasteners, and sections
- Security feature deficiencies include unsecured, missing, or unauthorized locks
- Other deficiencies include inspection walkway/access elements related defects not included above

Electrical Equipment:

Includes luminaires, cabinets, conduits/junction boxes, ITSS equipment and other related elements (such as radio attachments, antenna vertical masts, camera mounting brackets, ITSS attachments, etc.).

- Luminaire deficiencies include corrosion, damage, loose and missing fasteners, non-functioning or missing light fixtures and cracked lenses
- Cabinet deficiencies included corrosion, damage, loose and missing fasteners, exposed electrical wiring, unsecured and unlocked covers
- Conduit and junction box deficiencies include damage, loose and missing fasteners, exposed electrical wiring, loose/broken or missing sections of conduit, unsecured and unlocked covers and open access panels
- ITSS deficiencies include corrosion, damage, loose and missing fasteners, exposed electrical wiring, disconnected units, unsecured and unlocked units
- Other deficiencies include electrical equipment related defects not included above

Housekeeping:

Includes overgrown vegetation, vandalism, and other related elements.

- Overgrown vegetation deficiencies include vegetation growth along the foundation, towers and tower/posts and obstruction of sign panel visibility
- Vandalism deficiencies include graffiti
- Other deficiencies include debris accumulation

b. CONDITION ASSESSMENT OF ELEMENTS AND QUANTITY ESTIMATES

The deficiencies listed in **Section 9.a.** are provided in this manual for general understanding during inspection. The definitions are referenced from the Bridge Materials of Bridge Inspector's Reference Manual. For the detailed description of each definition, it is recommended to refer to Chapter 6 (Bridge Materials) of the Bridge Inspector's Reference Manual. Also refer to the Guidelines for Installation, Inspection, Maintenance, and Repair of Structural Supports for Highway Signs, Luminaires and Traffic Signals Manual (2005) for additional details.

TABLE 1: DEFICIENCIES AND DEFINITIONS

Deficiency	Definition
Abrasion/Wear	Abrasion damage is the result of external forces acting on the surface of concrete member and is similar to wear. Wear is the gradual removal of surface mortar due to friction and occurs to concrete surfaces. Advanced wear exhibits polished aggregate,
Alkali-Silica Reactivity (ASR)	It is an expansive reaction forming a gel, which will result in the swelling and expansion of concrete. The process involves a reaction between potassium and sodium alkalis and silica. Alkali found in soils, deicers and chemical treatments could also contribute to ASR.
Bulging	A rounded protrusion or bend in a section.
Damage	A vehicular impact or other structural damage that occurs due to environmental or human actions.
Corrosion	Corrosion is the primary cause of section loss in steel members and is commonly caused by the wet-dry cycles of exposed steel. When deicing chemicals are present, the effect of corrosion is accelerated
Cracking	A crack is a linear fracture in structural material. Structural cracks are caused by dead load and live load stresses.
Debris Accumulation	Accumulation of material including construction debris, trash, or sediment.

Deficiency	Definition
Delamination	Delamination occurs when layers of concrete separate at or near the level of the outermost layer of reinforcing steel.
Efflorescence	The process of cracking permits moisture absorption and increased flow within the concrete that is evidenced by dirty-white surface deposits called efflorescence.
Erosion	Wearing away of soil by flowing water.
Exposed Electrical Wiring	Any uncovered or unprotected luminaire, conduit and/or conduit wiring.
Fasteners	All connections should be closely inspected for tightness, cracks at fasteners connecting members and/or for missing connection.
Fire Damage	Extreme heat will damage concrete. High temperatures will cause a weakening in the cement paste and lead to cracking
Graffiti	Any form of paint vandalism that is added after construction has been completed.
Horizontal Rotation	The movement of any element where it is angled from a certain point length wise.
Missing Section	Denotes absent portions of the sign structure inspection walkway, handrail, and access ladder.
Non-functioning unit	Denotes non-operating VMS signs and/or sign structure mounted luminaires.
Paint-peeling	When the paint is starting to wear away, exposing the material underneath.
Patched area	Patched area refers to previously repaired portions of the sign structure.
Rust Staining	An elimination of the protective coating of reinforcing steel by formation of iron oxide layer due to the intrusion of chlorides.
Scaling	Scaling is the gradual and continuing loss of surface mortar and aggregate over an area due to the chemical breakdown of the cement bond.
Scour	The removal of sediment such as sand and rocks from around bridge abutments and piers caused by swift of moving water.
Section Loss	Reduction of structural material reducing the load carrying capacity of structural member.
Spalling/ Delamination	A spall is a depression in the concrete caused by corroding reinforcement, friction from thermal movement and overstress. Spalls result from the separation and removal of a portion of the surface concrete, revealing a fracture roughly parallel to the surface.

Deficiency	Definition
Undermining	Scour can cause undermining which is the removal or scouring away of supporting foundation material from beneath the substructure unit when streams or rivers flow adjacent to them.
Vegetation Growth	Vegetation growth around the structure and on the surface of a structure that obstructs the visual inspection shall be removed.
Vertical movement or Settlement	Vertical movement can occur in the form of uniform or differential settlement. Differential settlement can produce severe distress which varies in magnitude based upon the length of structure. Common causes of vertical movement are soil bearing failure, consolidation of soil and undermining causing the structure to drop deeper into the ground.
Weld defects	Cracking and fabrication flaws such as incomplete weld penetration; porosity; undercutting; overlapping and flame cuts. For additional details refer to the Chapter 6.4. of the Bridge Materials section of Bridge Inspector's Reference Manual (2015).
Graffiti	Any form of paint vandalism that is added after construction has been completed.

c. REPAIR CATEGORIES

The elements of the sign structure are assigned a repair category based on their as-inspected condition in the following table. Also refer to the Authority's Manual for Retaining Wall and Noise Barrier Inspection for repair categories and descriptions for retaining walls supporting sign structure foundation embankments linked below:

https://www.njta.com/media/7585/2023-07-28-retaining-wall-and-noise-barrier-inspection-manual_final.pdf

TABLE 2. REPAIR CATEGORIES OF STRUCTURE

Category	Description
N/A	Component does not exist.
N/R	No contract repair required.
A	Category A – Deficiencies that require prioritized attention with prompt notification given to the Authority.
	Category A1 Emergency defects include: – Sign panel attachment or fastener failure (resulting in loss of redundancy). – Main structural member failure.

Category	Description
	– Severe impact damage. – Instability due to cracks in the welds connecting structural members of a sign structure truss and end frame base plate welds. – Severe section loss (30% or greater) to base plate anchor bolts (one or more). Any anchor bolts that are broken, sheared or cracked.
	<u>Category A2 Priority defects include:</u> – Loose anchor bolt nuts, leveling nuts, lock nuts (2 of 4, 2 of 6, 3 of 8 or greater) and sign structure fasteners in a critical area such as panel to panel, panel to stringer, stringer to hanger and hanger to truss chord, walkway and handrail. – Gaps in the truss to tower connection for cantilever sign structures that result in flange connection(s) not being in contact. – Significant spalls impacting the concrete pedestals and anchor bolts supporting sign structures (more than 25 percent of the bearing surface). – Cracks present in structural members. – Movement of foundations, pedestals, or retaining walls. – Slope washout affecting guide rail posts or pavement.
	<u>Category A3 Non-structural defects include:</u> – Slope washout not affecting guide rail posts or pavement. – Damage/failure in the structure's security features. – Significant damage to sign panel attachments. – Significant quantities of missing and/or loose connection bolt nut(s) including to ladders or security features.
B	Contract work Deficiencies noted that are recommended for repair by an annual Bridge Repair Contract or Specialized Repair Contract as part of the Authority's Capital Budget Program.
	Defects that may be considered for inclusion in an annual repair contract: – Cracked sign truss chord splice connection. – Undermined sign structure base plates/pedestal(s). – Missing end caps and hand hole covers. Loose connection bolts especially at cantilever chord splices.

Category	Description
E	Monitor Deficiencies or conditions that are considered actively developing and may be recommended for contract work, but require monitoring until the condition has been remedied. This monitoring would involve an increased inspection frequency and/or level of detail through routine or interim inspections.
	Defects considered for monitoring include: – Bulging or misalignment of retaining wall panels. Significant concrete/grout pad shrinkage cracks and surface scaling, spalling, deterioration of foundations.

Based on the degree of deterioration noted to the structural elements of the sign structures, a repair Category is assigned for each element exhibiting details requiring a recommendation.

Repair categories which apply to sign structures are as follows:

For additional details refer to the Authority's Deficiency Category Document (ADCD) at

https://www.njta.com/media/5394/authority-deficiency-category-definitions-v20-6-2020.pdf

d. OVERALL SIGN STRUCTURE CONDITION

The overall condition evaluation implemented for sign structures was derived from the Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation's Bridges (FHWA). Based on the inspection findings, the following four condition states are to be used when evaluating the overall condition of the sign structure.

TABLE 3. OVERALL CONDITION RATING OF STRUCTURE

Rating		Description
1	Good	Sign structure performs intended function with high degree of reliability and/or effectiveness. Includes deficiencies at non-structural elements such as inspection walkways, electrical equipment, sign panels, fasteners and housekeeping items or minor deficiencies of structural elements including foundations, base plates, end frames, end tower(s), and truss components that do not affect the strength and/or serviceability of the sign structure. **Contract repairs may be necessary.** Examples of Deficiencies: – Minor delamination, spalling and cracking at reinforced concrete foundations. – Minor corrosion and section loss at the base plate and anchor bolts. – Missing sign panel, connection, and inspection access fasteners (less than 10 percent).
2	Fair	Sign structure performs intended function with small reduction in reliability and/or effectiveness. Includes minor to moderate deficiencies of structural elements such as foundations, base plates, end frames, end tower(s,) truss components,. that do not significantly affect the strength and/or serviceability of the sign structure. **Contract repairs may be necessary.** Examples of Deficiencies: – Minor to moderate delamination, spalling and cracking at reinforced concrete foundations. – Minor to moderate corrosion and section loss at the base plate and anchor bolts.
3	Poor	Sign structure performs intended function with signification reduction in reliability and/or effectiveness. Moderate to severe deficiencies of structural elements including foundations, base plates, end frames, end tower(s), truss components which may warrant analysis to determine the impact of the strength and/or serviceability of the sign structure. **Repair or replacement may be required.**

Rating		Description
		Close monitoring (Category E) is recommended at deteriorated structural elements until repairs are completed. Examples of Deficiencies: – Substantial amount of anchor bolts missing or severely corroded (less than 50 percent). – Moderate to severe delamination, spalling and cracking at concrete foundations. – Moderate to severe corrosion and section loss at the base plate and anchor bolts.
4	Critical	Sign structure does not perform intended function at an acceptable level of reliability and/or effectiveness. Deficiencies which may result in failure/collapse of the sign structure. **Requires Immediate repair or removal and the issuance of a Category A Report.** Examples of Deficiencies: – Substantial amount of anchor bolts missing or severely corroded (greater than 50 percent). – Full perimeter cracks in base plate welds. – Significant impact damage to structural supports.

10. QUALITY CONTROL AND QUALITY ASSURANCE REVIEWS

Refer to Appendix A of the Authority's Bridge Inspection Program Quality Management Plan (QMP) for quality control and quality assurance reviews and Sign Structure Inspection Checklists.

https://www.njta.com/media/8677/2024-11-08-bi-program-quality-management-plan_v16-final.pdf

11. REPORTING OF EMERGENCY AND PRIORITY DEFICIENCIES

Refer to the Authority Deficiency Category Definitions document to identify the severity of deficiencies noted in sign structure inspection reports which help in future planning of Maintenance and Contract Improvements.

https://www.njta.com/media/5394/authority-deficiency-category-definitions-v20-6-2020.pdf

12. SAMPLE ROUTINE, INTERIM AND DAMAGE INSPECTION REPORTS

a. ROUTINE INSPECTION REPORT

Sign Structure Inspection Report

Sign Structure No.

125.7N

Double Plane Vierendeel Sign Bridge

over

Parkway N

10/10/2023

Prepared By:

Van Cleef Engineering Associates, LLC

TABLE OF CONTENTS

NEW JERSEY TURNPIKE AUTHORITY

CONTRACT HISTORY

TYPE	CONTRACT NO.	DESCRIPTION OF WORK	YEAR
Original Construction	104-1212	Original Construction (Fabricated)	2004
Original Construction	104-1213	Foundation Installed and Truss and End Frames Erected	2007
Interchange Improvement	P300.229	Sign panels replaced	2017

GENERAL INFORMATION

Structure No.:	125.7N
Structure Location:	Parkway N
Maintenance District:	Parkway Maintenance District 6
Latitude:	40.48704 Degrees
Longitude:	-74.30235 Degrees

Erected By:

Contract:	104-1213
Year:	2007
Note:	104-1212 Fabricated (OH Span Sign Structure No. 1), 104-1213 Relocated truss and end frames (Sheet 290/301). P300.229 Sign Panels Replaced.

Removed By

Contract:	
Year:	
Note:	

Structure Type:	Double Plane Vierendeel Sign Bridge
Mounting Configuration:	Ground
Structure Coating:	Weathering Steel
Structure Length:	136.0 Feet
Truss Sections:	4
Post Tensioned:	No
Chord Sets/Splices:	12

Chord Splice Locations

Span over Roadway:	Parkway N	Lane:	Right lane
Span over Roadway:	Parkway N	Lane:	3rd lane from right
Span over Roadway:	Parkway N	Lane:	6th lane from right
Span over Roadway:		Lane:	
Span over Roadway:		Lane:	

Chord Splice Stiffening

Category: D Weathering Steel

Stiffened: ☐

Unstiffened: ☑

No. of Sign Panels

Notes:	3 Sign Panels with 2 Exit Panels
Standard:	5
VMS:	
VSLS:	

Vertical Underclearance

Minimum Vertical Underclearance:	20.67	Feet
Location of Minimum Vertical Underclearance:	Left Shoulder Line	
Vertical Underclearance Notes:	Minimum vertical underclearance measured using a laser device from the bottom of the lower chord to the pavement. Minimum vertical clearance may be at locations not measured.	

INSPECTION INFORMATION

Inspection Group:	GSP Sign Group 3
Inspection Date:	10/10/2023
Previous Inspection Date:	10/16/2015
Inspection Frequency:	72 Months
OPS No.:	P3937
Firm:	Van Cleef Engineering Associates, LLC
Team Leader:	Jason Cancila, PE
Assistant Team Leader:	
Support Staff:	Sarah Madison
Weather:	Sunny
Temperature:	65 Degrees F

Equipment

Description:	Articulating Bucket Truck and TMA
Photo:	2, 23

MPT

Description:	Short Duration Right and Left Shoulder Closures
Photo:	23

ND Testing

Description:	Ultrasonic testing of all foundation anchor bolts, D-meter readings at tower base
Photo:	22

CONCLUSIONS

Overall Condition: Overall Rating: 2

The structure is in fair condition due to the gaps/pack rust at the vertical strut splices and bulging of the vertical struts. Six (of 16) vertical strut splices at the north plane and five (of 16) vertical strut splices at the south plane have a gap and/or pack rust. Fifteen (of 32) vertical struts exhibit bulging between the splice plates and bottom flange. Contract repairs are recommended for these defects. See Photos 16 to 18 and the Vertical Strut Splice Defects Sketch. All other minor defects noted during this inspection do not warrant contract repairs.

Condition Upgrade/Downgrade:

The overall condition of the structure has been downgraded from good to fair due to bulging at several vertical struts.

Scheduled, Ongoing, or Completed Work:

This structure has no scheduled or ongoing work. Since the previous inspection, all sign panels have been replaced under Contract No. P300.229. See Photos 3 to 5.

Category A:

N/A

Category E:

The following conditions warrant continued monitoring:

- Vertical Truss Struts and Splices: Six (of 16) members at the north plane and five (of 16) members at the south plane have a 1/16" gap and/or pack rust between the flange splice plates. Fifteen (of 32) members have a bulge (up to 3/8") between the splice plate and the bottom chord. All vertical struts should be monitored for worsening conditions such as cracking, additional bulging and/or splice defects.

Other:

N/A

Rating	*Description*
1	*Good: Performs intended function with high degree of reliability and/or effectiveness.*
2	*Fair: Performs intended function with small reduction in reliability and/or effectiveness.*
3	*Poor: Performs intended function with significant reductions in reliability and/or effectiveness. Repair or replacement may be required.*
4	*Critical: Does not perform intended function at an acceptable level of reliability and/or effectiveness. Repair or replacement is required.*

Repair	*Description*
N/A:	*Component does not exist*
NR:	*No contract repair required*
A:	*Category A*
B:	*Contract work*

This legend relates to the field note pages in the next section.

☑ FOUNDATIONS AND PROTECTIVE FEATURES

☑ FOUNDATIONS

N/A NR A B | B QTY | PHOTO

☐ ☑ ☐ ☐ Foundations

East: Edge spall (<1 SF) at the west and north faces of the south pedestal. Shallow spall at the northwest and northeast corners of the north pedestal. Minor scattered peeling of epoxy coating at top of pedestal.
West: Minor peeling (10%) of epoxy coating.

☐ ☑ ☐ ☐ Anchor Bolts

West Tower: Loose lower washers at anchor bolts 3 and 4 at the north post.
East Tower: No deficiencies noted.

☐ ☑ ☐ ☐ Base Plates/Stiffeners/Welds

No deficiencies noted.

☐ ☑ ☐ ☐ Embankment ☐ Retaining Wall Present

No deficiencies noted.

☑ ☐ ☐ ☐ Other

Notes:

☑ PROTECTIVE FEATURES

N/A NR A B

☐ ☑ ☐ ☐ Guide Rail/Attenuator

No deficiencies noted.

☑ ☐ ☐ ☐ Barrier

☑ ☐ ☐ ☐ Other

Notes: W-beam guide rail with composite spacers in front of both towers.

NEW JERSEY TURNPIKE AUTHORITY

Str.: 125.7N Date: 10/10/2023

ANCHOR BOLT ULTRASONIC TESTING REPORT 1

Structure Type:	Double Plane Vierendeel Sign Bridge	Instrument:	Olympus Epoch 600
Number of Bolts per Baseplate:	12	db Reference Level:	46
Bolt Diameter (in.):	1.25	db Scanning Level:	60
Base Plate Shape:	Rectangular	Transducer Diameter (in.):	1
Base Plate Location:	Northeast Corner	Transducer Frequency:	2.2 fMHz

Notes: *(1) ND = Not Detected*
(2) NRI = No Relevant Indication
(3) CNT = Could Not Test (include reason in "Comments")
(4) __% FSH (Full Screen Height); __dB (report only if reject criteria is met)
(5) Any indication above 10% FSH at scanning level
Refer to foundation sketch for anchor bolt numbering

Comments:

UT Firm: PTL Testing Laboratory, Inc. Date of UT: 11/07/2023

UT Inspector: Blair McCloskey UT Inspector Signature:

Anchor Bolt	Approx. Anchor Bolt Length (in.) (1)	Anchor Bolt Projection (in.)	Depth of Indication (in.) (2-3)	Indication Rating (%) (4)	Accept	Reject (5)
1	35.7	9.5	NRI		Yes	
2	35.7	9.5	NRI		Yes	
3	35.7	9.5	NRI		Yes	
4	35.7	9.5	NRI		Yes	
5	35.7	9.5	NRI		Yes	
6	35.7	9.5	NRI		Yes	
7	35.7	9.5	NRI		Yes	
8	35.7	9.5	NRI		Yes	
9	35.7	9.5	NRI		Yes	
10	35.7	9.5	NRI		Yes	
11	35.7	9.5	NRI		Yes	
12	35.7	9.5	NRI		Yes	

NEW JERSEY TURNPIKE AUTHORITY

Str.: 125.7N Date: 10/10/2023

ANCHOR BOLT ULTRASONIC TESTING REPORT 2

Structure Type: Double Plane Vierendeel Sign Bridge Base Plate Location: Southeast Corner

Notes: *(1) ND = Not Detected*
(2) NRI = No Relevant Indication
(3) CNT = Could Not Test (include reason in "Comments")
(4) __% FSH (Full Screen Height); __dB (report only if reject criteria is met)
(5) Any indication above 10% FSH at scanning level
Refer to foundation sketch for anchor bolt numbering

Comments:

UT Firm: PTL Testing Laboratory, Inc. Date of UT: 11/07/2023

UT Inspector: Blair McCloskey UT Inspector Signature:

Anchor Bolt	Approx. Anchor Bolt Length (in.) (1)	Anchor Bolt Projection (in.)	Depth of Indication (in.) (2-3)	Indication Rating (%) (4)	Accept	Reject (5)
1	35.7	9.5	NRI		Yes	
2	35.7	9.5	NRI		Yes	
3	35.7	9.5	NRI		Yes	
4	35.7	9.5	NRI		Yes	
5	35.7	9.5	NRI		Yes	
6	35.7	9.5	NRI		Yes	
7	35.7	9.5	NRI		Yes	
8	35.7	9.5	NRI		Yes	
9	35.7	9.5	NRI		Yes	
10	35.7	9.5	NRI		Yes	
11	35.7	9.5	NRI		Yes	
12	35.7	9.5	NRI		Yes	

NEW JERSEY TURNPIKE AUTHORITY

Str.: 125.7N Date: 10/10/2023

ANCHOR BOLT ULTRASONIC TESTING REPORT 3

Structure Type: Double Plane Vierendeel Sign Bridge Base Plate Location: Northwest Corner

Notes: *(1) ND = Not Detected*
(2) NRI = No Relevant Indication
(3) CNT = Could Not Test (include reason in "Comments")
(4) __% FSH (Full Screen Height); __dB (report only if reject criteria is met)
(5) Any indication above 10% FSH at scanning level
Refer to foundation sketch for anchor bolt numbering

Comments:

UT Firm: PTL Testing Laboratory, Inc. Date of UT: 01/05/2024

UT Inspector: Blair McCloskey UT Inspector Signature:

Anchor Bolt	Approx. Anchor Bolt Length (in.) (1)	Anchor Bolt Projection (in.)	Depth of Indication (in.) (2-3)	Indication Rating (%) (4)	Accept	Reject (5)
1	35.7	9.5	NRI		Yes	
2	35.7	9.5	NRI		Yes	
3	35.7	9.5	NRI		Yes	
4	35.7	9.5	NRI		Yes	
5	35.7	9.5	NRI		Yes	
6	35.7	9.5	NRI		Yes	
7	35.7	9.5	NRI		Yes	
8	35.7	9.5	NRI		Yes	
9	35.7	9.5	NRI		Yes	
10	35.7	9.5	NRI		Yes	
11	35.7	9.5	NRI		Yes	
12	35.7	9.5	NRI		Yes	

NEW JERSEY TURNPIKE AUTHORITY

Str.: 125.7N Date: 10/10/2023

ANCHOR BOLT ULTRASONIC TESTING REPORT 4

Structure Type: Double Plane Vierendeel Sign Bridge Base Plate Location: Southwest Corner

Notes: *(1) ND = Not Detected*
(2) NRI = No Relevant Indication
(3) CNT = Could Not Test (include reason in "Comments")
(4) __% FSH (Full Screen Height); __dB (report only if reject criteria is met)
(5) Any indication above 10% FSH at scanning level
Refer to foundation sketch for anchor bolt numbering

Comments:

UT Firm: PTL Testing Laboratory, Inc. Date of UT: 01/05/2024

UT Inspector: Blair McCloskey UT Inspector Signature:

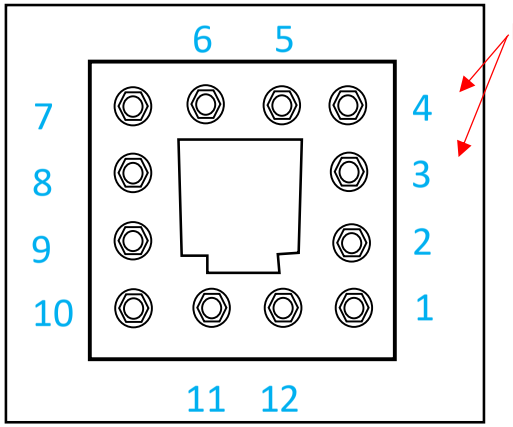
Anchor Bolt	Approx. Anchor Bolt Length (in.) (1)	Anchor Bolt Projection (in.)	Depth of Indication (in.) (2-3)	Indication Rating (%) (4)	Accept	Reject (5)
1	35.7	9.5	NRI		Yes	
2	35.7	9.5	NRI		Yes	
3	35.7	9.5	NRI		Yes	
4	35.7	9.5	NRI		Yes	
5	35.7	9.5	NRI		Yes	
6	35.7	9.5	NRI		Yes	
7	35.7	9.5	NRI		Yes	
8	35.7	9.5	NRI		Yes	
9	35.7	9.5	NRI		Yes	
10	35.7	9.5	NRI		Yes	
11	35.7	9.5	NRI		Yes	
12	35.7	9.5	NRI		Yes	

NEW JERSEY TURNPIKE AUTHORITY

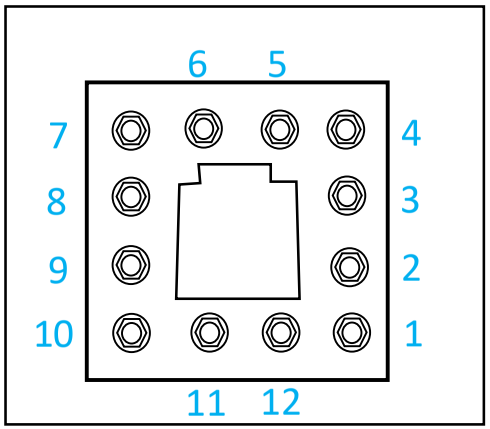
Foundation Diagram

Sign Structure:	**125.7N**	**Baseplate Material:**	**Weathering Steel**	**Date of Inspection:**	**10/10/2023 (west)**
Baseplate Dimensions:	**32" x 26"**	**Anchor Bolt Diameter:**	**1.25"**		**10/10/2023 (east)**
Baseplate Thickness:	**3.25"**				

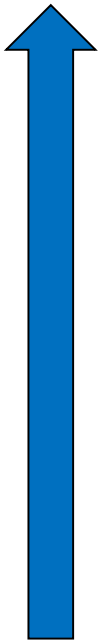
West End Frame



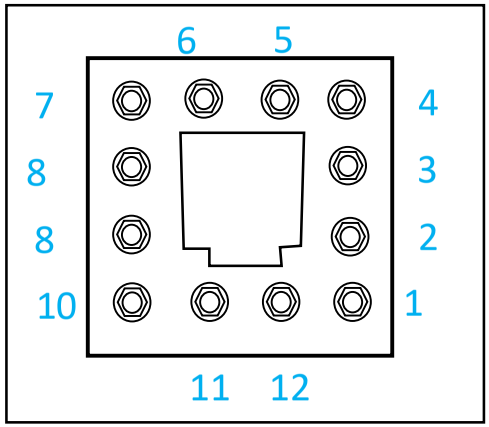
LOOSE LOWER WASHERS

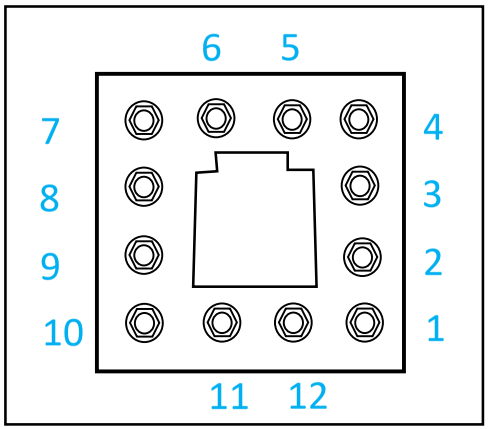


Parkway N



East End Frame





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☑ **STRUCTURE ELEMENTS**

Plumb: Degrees Notes:

Level: Degrees Notes:

N/A	NR	A	B		B QTY	PHOTO
☐	☑	☐	☐	End Frames/Tower		

No deficiencies noted.

Thickness at Base

Southeast End Frame/Tower		Northeast End Frame/Tower		Southwest End Frame/Tower		Northwest End Frame/Tower	
North:	in.	North: 0.466	in.	North:	in.	North: 0.472	in.
South: 0.466	in.	South: 0.475	in.	South: 0.466	in.	South:	in.
East: 0.470	in.	East:	in.	East: 0.468	in.	East:	in.
West:	in.	West:	in.	West:	in.	West: 0.465	in.

Retrofit bracket installed ☐

New connection (post 2009) ☐

Vertical Splice Present ☑

☐	☑	☐	☐	End Frames/Tower to Truss Connections and Bearings		

Gap (up to1/4") at north edge of the north lower chord at the west tower (bearing on the south edge).
Gap (1/8") at the south edge of the south lower chord at the east tower (bearing on the north edge).

☐	☑	☐	☐	Truss and Chords		

Vertical Strut Splices: Six (of 16) members at the north plane and 5 of 16 members at the south plane have a 1/16" gap and/or pack rust between the flange splice plates. Vertical Struts: Fifteen (of 32) members have a bulge (up to 3/8") between the splice plate and the bottom chord. See the Vertical Strut Splice Defects Sketch for more information.

☐	☑	☐	☐	Chord Splices		

No deficiencies noted.

☐	☑	☐	☐	Welds		

No deficiencies noted.

☐	☑	☐	☐	Coating		

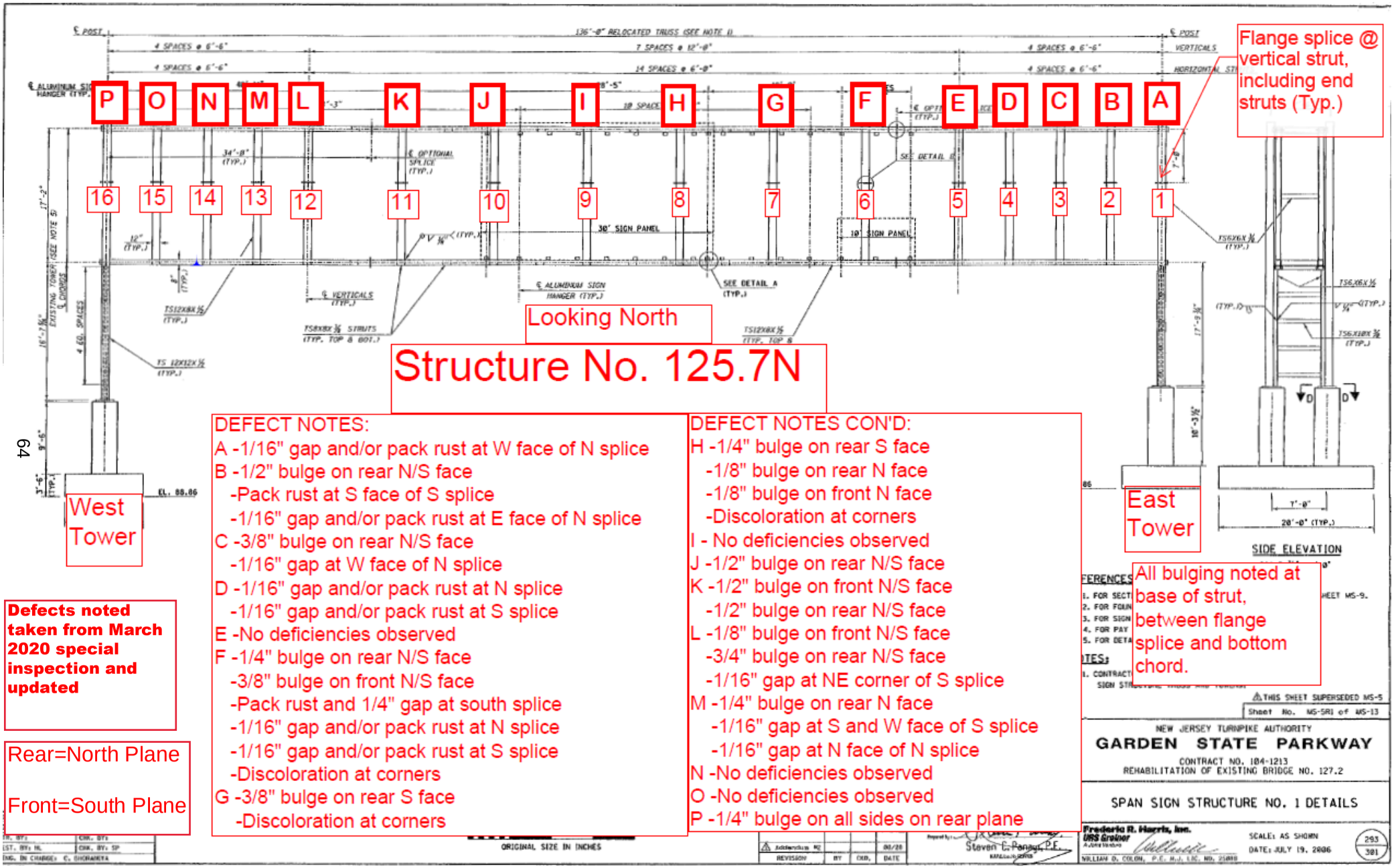
Minor isolated areas of light patina flaking or loss throughout the truss.

☐	☑	☐	☐	Caps and Handhole Covers		

No deficiencies noted.

☑	☐	☐	☐	Other		

Notes: Sixteen (16) vertical strut splices at each truss plane (32 total).



VERTICAL STRUT SPLICE DEFECTS

☑ **SIGN PANELS, CONNECTIONS, AND INSPECTION ACCESS**

☑ **SIGN PANELS AND CONNECTIONS**

N/A	NR	A	B		B QTY	PHOTO
☐	☑	☐	☐	Sign Panel/Legibility No deficiencies noted.		
☐	☑	☐	☐	Panel Fasteners No deficiencies noted.		
☐	☑	☐	☐	Fasteners to Stringers Left Sign Panel: Missing splices (discontinuous) at Stringer 2 and 4 (from the bottom) between Hanger 4 and 5 (from the left).		
☐	☑	☐	☐	Fasteners to Hangers No deficiencies noted.		
☐	☑	☐	☐	Fasteners to Truss Chords No deficiencies noted.		
☑	☐	☐	☐	Other		

Notes: Work Done: Sign panels replaced under Contract No. P300.229. See Photos 3 to 5.

☐ **INSPECTION WALKWAY/ACCESS**

Walkway retrofit installed ☐

N/A	NR	A	B		B QTY	PHOTO
☐	☐	☐	☐	Walkway Grating and Fasteners		
☐	☐	☐	☐	Walkway Screening (A Frame)		
☐	☐	☐	☐	Handrail		
☐	☐	☐	☐	Access Ladders		

☐ ☐ ☐ ☐ Security Features

☐ ☐ ☐ ☐ Other

Notes:

☑ **ELECTRICAL EQUIPMENT AND HOUSEKEEPING**

☐ **ELECTRICAL EQUIPMENT**

N/A	NR	A	B		B QTY	PHOTO
☐	☐	☐	☐	Luminaires		
☐	☐	☐	☐	Cabinets		
☐	☐	☐	☐	Conduits/Junction Boxes		
☐	☐	☐	☐	ITSS Equipment		
☐	☐	☐	☐	Other		

Notes:

☑ **HOUSEKEEPING**

N/A	NR	A	B		B QTY	PHOTO
☐	☑	☐	☐	Overgrown Vegetation		
				No deficiencies noted.		
☐	☑	☐	☐	Vandalism		
				No deficiencies noted.		
☑	☐	☐	☐	Other		

Notes:

10/10/2023

Photograph No. 1

General view of the south (front) elevation, looking north.

10/10/2023

Photograph No. 2

General view of the north (rear) elevation, looking south. Note the 40' articulating bucket truck used for inspection.

10/10/2023

Photograph No. 3

Close up view of the right sign panels, looking northwest. Work Done: Sign panels have been replaced under Contract No. P300.229.

10/10/2023

Photograph No. 4

Close up view of the center sign panels, looking northwest. Work Done: Sign panels have been replaced under Contract No. P300.229.

03/19/2024

Photograph No. 5

Close up view of the left sign panel, looking north. Work Done: Sign panel has been replaced under Contract No. P300.229.

10/10/2023

Photograph No. 6

General view of the upper chords, looking east.

10/10/2023

Photograph No. 7

General view of the lower chords, looking east.

10/10/2023

Photograph No. 8

General view of the east end frame, looking southeast.

10/10/2023

Photograph No. 9

General view of the west end frame, looking southwest.

10/10/2023

Photograph No. 10

General view of the east foundation, baseplates, and anchor bolts, looking east.

10/10/2023

Photograph No. 11

General view of the west foundation, baseplates, and anchor bolts, looking west.

10/10/2023

Photograph No. 12

Edge spall (<1 SF) at the west face of the south pedestal at the east tower, looking east. Similar at the north face.

10/10/2023

Photograph No. 13

Loose lower washers at anchor bolts 3 and 4 at the north post of the west tower, looking west. Note the minor peeling (10%) of epoxy coating.

10/10/2023

Photograph No. 14

Gap (up to 1/4") at the north edge of the north lower chord at the west tower, looking southeast. Note the chord is bearing at the south edge.

10/10/2023

Photograph No. 15

Gap (1/8") at the south edge of the south lower chord bearing at the east tower, looking east.

10/10/2023

Photograph No. 16

Gap (1/16") and minor pack rust between the flange plates at the south and west face of vertical strut splice 13 from the east at the south plane, looking northeast.

10/10/2023

Photograph No. 17

Gap (1/16" to 1/8") between the flange plates at the west face of vertical strut splice 3 from the east at the north plane, looking east. Similar at multiple locations.

01/05/2024

Photograph No. 18

1/2" bulge in the north face of vertical strut 2 from the right at the north truss, looking down and south. Similar at multiple locations.

10/10/2023

Photograph No. 19

Missing splices (discontinuous) at Stringer 2 and 4 (from the bottom) between Hanger 4 and 5 (from the left) at the left sign panel, looking southeast.

01/05/2024

Photograph No. 20

General view of anchor bolt UT Testing and tower base D-meter readings in progress at the east foundation, looking southeast.

10/10/2023

Photograph No. 21

General view of the TMA in a short duration right shoulder closure used for inspection at the east tower, looking southwest. Similar in the left shoulder.

Sign Structure No. 125.7N
Double Plane Vierendeel Sign Bridge over Parkway N

Van Cleef Engineering Associates, LLC
10/10/2023

b. INTERIM INSPECTION REPORT

Interim Inspection Report

For

Spliced Vertical Truss Members

Structure No.

152.85N

Double Plane Vierendeel Sign

over

Parkway N

Monitoring No.

5

01/10/2023

Prepared By:

PKB in Association with HNTB Corporation

TABLE OF CONTENTS

NEW JERSEY TURNPIKE AUTHORITY

INTERIM INSPECTION HISTORY

MONITORING NO.	DATE	NEXT INTERIM INSPECTION DATE
1	9/16/2020	3/16/2021
2	3/16/2021	9/16/2021
3	10/14/2021	4/14/2022
4	6/27/2022	12/27/22
5	01/10/2023	N/A

INTERIM GENERAL INFORMATION

NAME:	Double Plane Vierendeel Sign over Parkway N		
STRUCTURE NO.:	152.85N		
OPS NO.:	A3785		
FIRM:	PKB in Association with HNTB Corporation		
TEAM LEADER:	John Paul; John Lupo		
ASSISTANT TEAM LEADER:	Sean Marko, Christian Vargas		
SUPPORT STAFF:	Greg Baron		
PREVIOUS INSPECTION DATE:	03/03/2020		
WEATHER:	Clear		
AIR TEMPERATURE:	40 DEGREES F		
SPECIAL EQUIPMENT:	Drone and TMA	PHOTO:	1 and 2
MPT:	3 State Police Slowdowns and Short Duration Left Shoulder Closing	PHOTO:	1

INTERIM INSPECTION FINDINGS

MONITORING NO.: 5

DATE OF INTERIM INSPECTION: 01/10/2023

CURRENT FREQUENCY OF INSPECTION: 6 MONTHS

MEMBERS REQUIRING INTERIM INSPECTION: Spliced Vertical Truss Members

REASON FOR INTERIM INSPECTION:

The spliced vertical members exhibit varying degrees of bulging / bowing and cracking by potential intrusion and accumulation of water in the TS section.

FINDINGS:

PKB performed Monitoring #1 of the Sign Structure No. 152.85N on 9/16/2020 at 12:30pm utilizing two PKB personnel and two State Troopers in a one - five minute slowdown of the Parkway N Roadway. PKB performed a visual inspection of Verticals 1 to 10 (verticals are numbered west to east) along both the north and south planes of the Vierendeel truss from the ground. PKB performed this visual inspection by having each inspector look at four sides of each vertical tubular member for both the north and south planes of the entire truss from the ground during the slowdown. This was reinforced by the use of binoculars and a bucket truck from the left shoulder of the Parkway N Roadway. No additional cracks to the vertical members were observed and no visible changes were noted to the one existing vertical crack at Vertical 3 of the north truss plane and of the bulging noted at the Vertical 2 of the south truss plane and Vertical 9 of the north truss plane. No other significant deficiencies were noted to this structure at this time.

PKB performed the second monitoring inspection of Sign Structure No. 152.85N on 3/16/2021 at 10am utilizing one HNTB personnel, two PKB personnel, one member of the Operations Department and four State Troopers in three five to ten minute slowdowns of the Parkway N Roadway. HNTB performed a drone inspection of the lower half of Verticals 1 to 10 (verticals are numbered west to east) along both the north and south planes of the Vierendeel truss (Photos 1 and 2). Each vertical tubular member was looked at straight on and at a 45 degree angle along both sides (except at the sign panel locations along the south plane of the truss) during the slowdown. Binoculars were also used to view the vertical members from the median grass between the Parkway N & S Roadways as a supplement to the ground inspection. No additional visible cracks to the vertical members were observed and no changes were noted to the location (Vertical 3 of the north truss) with a pre-existing crack. The bulging noted at Vertical 2 of the south truss plane and Vertical 9 of the north truss plane have remained unchanged however we did observe bulging at Vertical 3 of the south truss on the south and north sides of the tubular member. No other significant deficiencies were noted to this structure at this time.

PKB performed Monitoring #3 of the Sign Structure No. 152.85N on 10/14/2021 at 10am utilizing two PKB personnel and three State Troopers in one – five minute slowdown of the Parkway N Roadway. PKB performed a visual inspection of Verticals 1 to 10 (verticals are numbered west to east) along both the north and south planes of the Vierendeel truss from the ground. This was reinforced by the use of binoculars from the right shoulder / behind guide rail adjacent to the west end frame. No additional cracks to the vertical members were observed and no visible changes were noted to the one existing vertical crack at Vertical 3 of the north truss plane (Photo 3). The bulging noted at the Vertical 2 of the south truss plane (Photo 4), Vertical 9 of the north truss and Vertical 3 of the south truss plane have remained unchanged. No other significant deficiencies were noted to this structure at this time.

PKB performed Monitoring #4 of GSP Sign 126.7N utilizing a short duration northbound left shoulder closure. The spliced vertical members of both signs were inspected visually from the ground using binoculars. Since the previous 10/14/21 monitoring inspection #3, discoloration / staining was noted at the northwest corner of Vertical 7 at the south truss. No noticeable bulging of this member was noted, however access was limited to the northbound left shoulder and viewing this member from the underside was not performed. A photo from today's inspection showing Vertical 7 at the south truss (Photo 5) was compared to a photo from the 3/16/21 inspection (DJI_0081). Discoloration / staining can be seen in both photos. It appears the area has increased a bit closer to the lower chord.

PKB performed Monitoring #5 of the Sign Structure No. 152.85N on 1/10/2023 at 10 am utilizing two PKB personnel and two State Troopers in one – five minute slowdown of the Parkway N Roadway. PKB performed a visual inspection of Verticals 1 to 10 (verticals are numbered west to east) along both the north and south planes

of the Vierendeel truss from the ground. This was reinforced by the use of binoculars from the left shoulder / behind guide rail adjacent to the west end frame. No additional cracks to the vertical members were observed and no visible changes were noted to the one existing vertical crack at Vertical 3 of the north truss plane (Photo 6). The bulging noted at the Vertical 2 of the south truss plane, Vertical 9 of the north truss and Vertical 3 of the south truss plane have remained unchanged. The discoloration / staining noted at the northwest corner of Vertical 7 at the south truss remains the same. The north and south lower chords are fully bearing at the west end frame (Photo 7). No other significant deficiencies were noted to this structure at this time. Repairs to the cracked member is underway by P100.562 (Photo 8).

CONCLUSIONS AND RECOMMENDATIONS:

Continued monitoring at a 6 month frequency is recommended until the repairs are completed by a currently active / ongoing contract (Contract No. P100.562).

03/16/2021

Photograph No. 1

Monitoring Inspection #2 utilizing a drone in a State Police Assisted Slowdown, looking south.

03/16/2021

Photograph No. 2

Monitoring Inspection #2 utilizing a drone for thermal imagery in a State Police Assisted Slowdown, looking south.

10/14/2021

Photograph No. 3

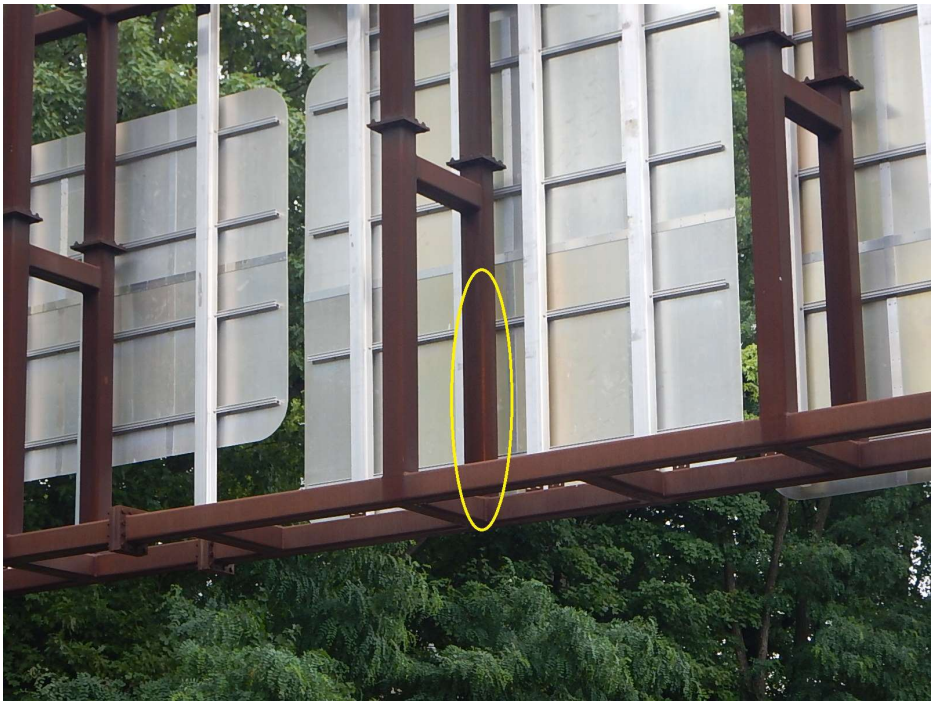
Monitoring Inspection #3, the crack in Vertical 3 of the north truss plane exhibits no visible changes, looking southeast.

10/14/2021

Photograph No. 4

Monitoring Inspection #3, Vertical 2 of the south truss plane exhibits bulging, looking north.

06/27/2022



Photograph No. 5

Monitoring Inspection #4, Vertical 7 at the south truss exhibits discoloration / staining, looking southeast.

01/10/2023

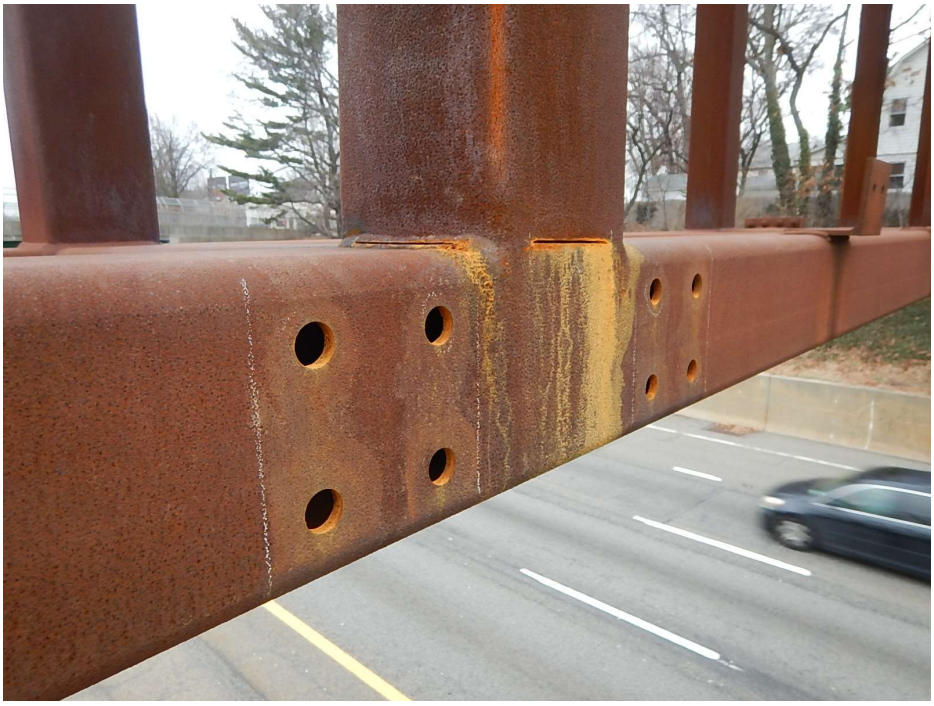
Photograph No. 6

Monitoring Inspection #5, the crack in Vertical 3 of the north truss plane exhibits no visible changes, looking southeast.

01/10/2023

Photograph No. 7

Monitoring Inspection #5, the north and south lower chords are fully bearing at the west end frame, looking northwest.



01/10/2023

Photograph No. 8

Monitoring Inspection #5, repairs to the cracked member is underway by P100.562, looking northeast.

Category A2 Report

Maintenance District: Parkway Maintenance District 7

Milepost: MP 152.85N

Structure Name: 152.85N

Priority Category: Category A2

Status: Completed **Date Completed:** 02/10/2023

Observed By: Van Cleef Engineering Associates, LLC **Date Observed:** 03/03/2020

Date of Follow Up:

Created By: Cancila, Jason **Date Created:** 03/05/2020

Updated By: Hall,Suzanne **Date Updated:** 02/16/2023

Type of Damage: Cracked Vertical Truss member

Description: Rear Plane, 3rd vertical from the left: There is a 23” long x 3/16" wide vertical crack at the northwest corner of the tube, originating 31” above the bottom chord. D-meter readings adjacent to the crack reveal no notable section loss to the original 3/8” thickness. The sides of the vertical exhibit 5/8” bowing on all sides for nearly the full length below the splice. We were able to probe about 15” down into the tube and could not observe any standing water. See attached sketch and Photo #s 1 through 8.
We recommend installing crack arrest holes at the beginning and end of the crack to prevent propagation.

This repair should be performed by Contract forces.

- [x] Beyond Resources of Maintenance
- [ ] Assigned to Maintenance IR Contractor

Maintenance Remarks:

- [ ] Responsibility of Outside Agency

Engineering Remarks: To be included in upcoming contract TBD (P100.520 20201 DR?).

Update May 2021: Scheduled to be included in Contract P100.562 for 2022 construction. sqh \5.24.21

December 2022 Update (VC): repairs ongoing by Contract No. P100.562

Completed Under Contract: P100.562 refer to photos in Cat A photos doc attached. sqh \2.16.23

Date of Temporary Repairs:

Temporary Repair Remarks:

Date of Permanent Repairs:

Permanent Repair Remarks:

NEW JERSEY TURNPIKE AUTHORITY

Str.: 152.85N Date: 01/10/2023 Monitoring No.: 5

REPORT CHECKLIST QCF 1.10 - INTERIM INSPECTION REPORT CHECKLIST

CONSULTANT REPORT QUALITY CONTROL REVIEW

QA/QC: John Paul

Date: 01/10/2023

General

Work Done	Y	Check for work done on the structure between inspections. Go to the Maintenance tab for Category A's, the Asset Info Tab for History/Notes, and the Quick View for Contract Information. Note: Only Open Category A Reports are shown on the Maintenance Tab you must check the box to show completed maintenance items and include any information for work completed since the previous inspection.
Attachment(s)	N/A	Additional report sections, as applicable, including but not limited to field notes, sketches, tables, plans, or other necessary documents to supplement the write up.
Specifications for the National Bridge Inventory	N/A	To be edited / updated when Special Inspection Date (B.IE.01) is coded to reflect the most recent inspection date or there is a change in inspection interval (B.IE.05).
Category A Report	Y	To be included when the deficiency being monitored warrants prioritized repair. To be created once and updated during subsequent inspections to reflect changes in condition or memorialize work done.
Photographs	Y	All photos taken should be uploaded to the Pics / Files page under Photographs. Select representative photos should be included in the report, the cover photo should reflect the typical element / deficiency.
Working Files	N/A	Upload all working files to their own File Type.
Final Report	N/A	Upload the Final Report PDF to "NBIS Report".

C. DAMAGE INSPECTION REPORT

Damage Inspection Report

08/07/2024

Structure No.

46.90S

Structure Type

Vierendeel VMS/Hybrid Sign Bridge

Structure Location

Turnpike NS Roadway

Prepared By:

PKB in association with HNTB Corporation

TABLE OF CONTENTS

NEW JERSEY TURNPIKE AUTHORITY

CONTRACT HISTORY

TYPE	CONTRACT NO.	DESCRIPTION OF WORK	YEAR
Original Construction	A600.102A	Original Construction	2009

ANCILLARY STRUCTURE INVENTORY INFORMATION

STRUCTURE NO.:	46.90S
STRUCTURE TYPE:	Vierendeel VMS/Hybrid Sign Bridge
STRUCTURE LOCATION:	Turnpike NS Roadway
MAINTENANCE DISTRICT:	Turnpike Maintenance District 2
YEAR BUILT:	2009
VERTICAL UNDERCLEARANCE:	19.06 Feet

DAMAGE INSPECTION INFORMATION

DATE OF INCIDENT:	08/07/2024
TIME OF INCIDENT:	1:31 pm
DAMAGE TYPE:	Vehicle Impact
IMPACT VEHICLE:	Pick up truck hauling a trailer
LOCATION/ROADWAY:	NS Roadway
LANE:	Left Shoulder @ SN/NS median
ON-CALL MAINTENANCE ENGINEER:	Michael Soriano
MAINTENANCE ENGINEER INSPECTION DATE:	08/07/2024

INITIAL NOTICE TO CONSULTANT

VIA:	Email
FROM: (NJTA)	Jean Laird
TO:	Scott Cavanaugh (HNTB)
DATE:	08/21/2024

PRELIMINARY INSPECTION FINDINGS

VIA:	Email
FROM: (CONSULTANT)	Scott Cavanaugh (HNTB)
TO:	Bill Wilson (NJTA), Jean Laird (NJTA), King Lee (NJTA), Oleem O'Garro (NJTA), Prayag Sayani (NJTA), Frank Yao (NJTA), Mark Bernard (NJTA), Sheri Malloy (NJTA), Peter Singhofen (NJTA), Suzanne Hall (HNTB), Brian Atkinson (HNTB), John Paul (PKB), Sean Marko (PKB), Michael Soriano (NJTA)
DATE:	08/24/2024

DAMAGE INSPECTION FINDINGS

INSPECTION CONSULTANT:	PKB in association with HNTB Corporation		
TEAM LEADER:	John Paul		
ASSISTANT TEAM LEADER:	Sean Marko		
SUPPORT STAFF:	Mike Thompson		
INSPECTION DATE(S):	08/23/2024		
WEATHER:	Sunny		
AIR TEMPERATURE:	80 DEGREES F		
SPECIAL EQUIPMENT:	30' Bucket Truck and TMA	PHOTO NO(S):	1
MPT:	Short Duration Left Shoulder Closing in the NS Roadway	PHOTO NO(S):	1

NJTA PERSONNEL PRESENT DURING INSPECTION:
None

SEQUENCE OF EVENTS:
Pickup truck pulling a 20 ft flatbed trailer loaded with scaffolding and concrete forms, struck a tractor trailer and overturned on it's side on the left shoulder. Per 897 and TPA 45, debris that fell off trailer onto left shoulder will need extensive cleanup and an emergency left lane was installed from MM 47.2 – 46.7 NS.

Michael Soriano: Pick up truck hauling a trailer hit left side barrier and support for over head digital sign, Southbound. See pictures. Clean up in progress, rebar seems to be secure, cosmetic damage.

INSPECTION FINDINGS:
The pavement in the NS Roadway exhibits gouges 20' L x up to 1/8" D in the left lane and 80' L x up to 1/8" D in the left shoulder starting 100' and 80' north of the sign, respectively (Photos 2 and 3).

The west face of the median barrier exhibits scrape marks throughout starting 62' north of the sign and ending 26' south of the sign. The top west corner of the median barrier exhibits edge spalls (22" L x 2" W x up to 1/8" D and 60" L x 4" W x up to 1/8" D) starting 62' north of the sign structure (Photo 4).

The east foundation exhibits a spall with exposed rebar (14" W x 29" L x 12" H up to 3" D) at the northwest corner (Photo 5). The top of the east foundation exhibits edge spalls (8" L x 2" W x up to 1/8" D and 4" L x 1" W x up to 1/16" D) on the west side.

Anchor bolt No. 1 at the east foundation is tilted to the southwest 1/8" over 2" H (Photo 6).

The north column of the east end frame exhibits scrape marks up to 7'-3" above the base plate and the following gouges: 5/8" L x 3/8" H x up to 1/16" D at the northwest corner located 8-7/8" above the baseplate, 7/8" L x ¼" H x up to 1/16" D at the northeast corner located 4" above the baseplate, and ¾" L x 1/8" H x less than 1/16" D at the northwest corner located 20" above the base plate (Photos 7 to 9).

There is one damaged delineator on the median barrier 31' south of the sign structure (Photo 10).

The elastomeric bearing, pipe nipple, lock pin, bracket, and lower chord exhibit no defects (handhole cover was removed to observe the pipe nipple and lock pin sleeve) (Photo 11).

RECOMMENDATIONS:
It is recommended that the spall in the foundation be repaired and coated with waterproofing material. It is also recommended that the damaged delineator atop the median barrier be replaced.

MEMBERS REQUIRING INTERIM INSPECTION: None

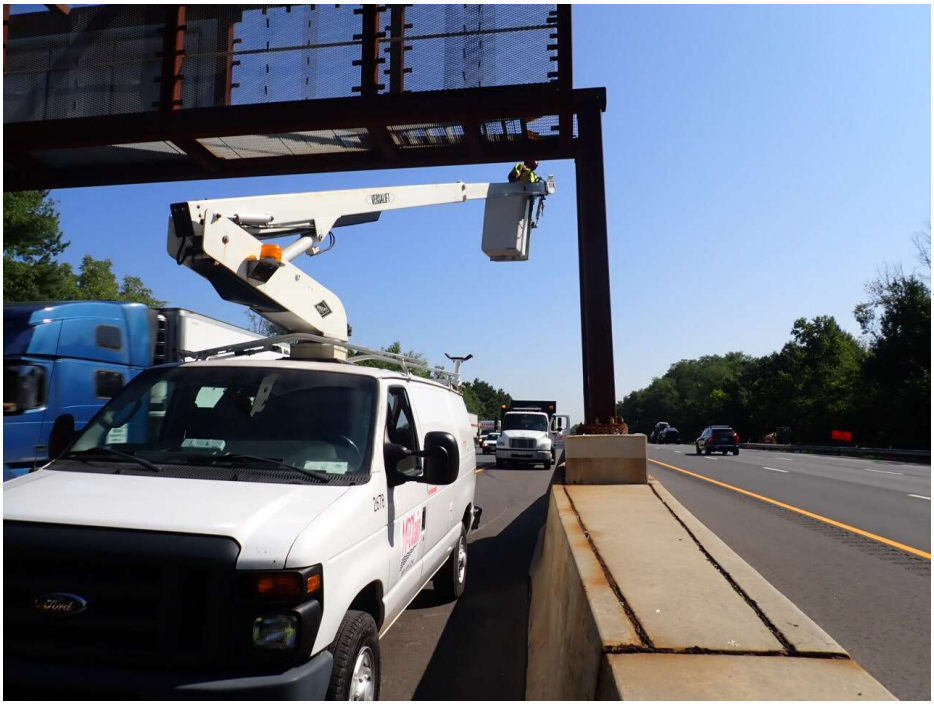
FREQUENCY OF INTERIM INSPECTION: N/A

FINAL DAMAGE INSPECTION REPORT SENT TO:

Bill Wilson, Jean Laird, Mark Bernard, Oleem O'Garro, Sheri Malloy, Peter Singhofen, King Lee, Prayag Sayani, Frank Yao, Scott Cavanaugh, Suzanne Hall, David Mykulak, Brian Atkinson, Alexander Lawrason, Ana Tatoris, Stella Bustos, Lucy Pavlik, John Paul, NJO_69953_NJTA-GCE_2021-2025@hntb.com, GCETechManager@HNTB.com

Photographs

MP 46.90S



08/26/2024

Photograph No. 1

Inspection in progress utilizing a 30' bucket truck and TMA in a short duration left shoulder closing in the NS Roadway, looking north.

08/26/2024

Photograph No. 2

The pavement in the NS Roadway exhibits gouges (20’ L x up to 1/8” D) in the left lane starting 100’ north of the sign, looking west.

08/26/2024

Photograph No. 3

The pavement in the NS Roadway exhibits gouges (80’ L x up to 1/8” D) in the left shoulder starting 80’ north of the sign, looking south.

08/26/2024

Photograph No. 4

The top west corner of the median barrier exhibits edge spalls (22” L x 2” W x up to 1/8” D and 60” L x 4” W x up to 1/8” D) starting 62' north of the sign structure, looking southeast.

08/26/2024

Photograph No. 5

The east foundation exhibits a spall with exposed rebar (14” W x 29” L x 12" H x up to 3” D) at the northwest corner, looking southeast.

08/26/2024

Photograph No. 6

Anchor bolt No. 1 at the east foundation is tilted to the southwest (1/8” over 2” H), looking down and south., looking southeast.

08/26/2024

Photograph No. 7

The north column of the east end frame exhibits a gouge (5/8” L x 3/8” H x up to 1/16” D) at the northwest corner located 8-7/8”above the baseplate, looking south. Note the scrape marks on the column.

08/26/2024

Photograph No. 8

The north column of the east end frame exhibits a gouge (7/8” L x 1/4” H x up to 1/16” D) at the northeast corner located 4” above the baseplate, looking south. Note: Anchor bolt No. 1 is tilted to the southwest.

Photographs

MP 46.90S

08/26/2024

Photograph No. 9

The north column of the east end frame exhibits a gouge (3/4" L x 1/8” H x less than 1/16” D) at the northeast corner located 20” above the baseplate, looking south.

08/26/2024

Photograph No. 10

There is one damaged delineator on the median barrier 31’ south of the sign structure, looking southeast.

08/26/2024

Photograph No. 11

The pipe nipple and lock pin sleeve exhibit no defects, looking southeast. Note the handhole cover at the north lower chord at the east end frame was removed for access.

13. FHWA ULTRASONIC ANCHOR INSPECTION PROCEDURE

ULTRASONIC ANCHOR INSPECTION PROCEDURE

Referenced from Appendix D of the FHWA Guidelines for the Installation, Inspection, Maintenance, and Repair of Structural Supports for Highway Signs, Luminaries, and Traffic Signals (Publication No. FHWA NHI 05-036, March 2005)

FISH INSPECTION AND TESTING LLC

ULTRASONIC ANCHOR BOLT INSPECTION PROCEDURE

Scope

This procedure when specified shall be the method used to ultrasonically examine bolts to locate fatigue cracks perpendicular to bolt length.

Reference Documents

ASME Section V
American Welding Society D1.1
Qualification and Certification of NDT Personnel
Control of Measuring and Test Equipment

Personnel Requirements

The personnel implementing this procedure shall be certified in accordance with Fish Inspection and Testing LLC NDE Quality Assurance Manual "Qualification and Certification of NDT Personnel," as either Level II or III to evaluate results, or Level I to perform the operational portion of the examination and record data while under the direct supervision of a Level II or III.

Equipment and Material

1. Equipment and materials used to implement this procedure will be calibrated and certified in accordance with Fish Inspection and Testing LLC NDE Quality Assurance Manual "Control of Measuring and Testing Equipment." A copy of the equipment and material certifications will be available at the request of the client.

    A. Instrumentation
    The ultrasonic instrument shall be a Pulse-Echo type unit equipped with an A scan presentation and capable of generating frequencies over the range of 1 MHz to 5 MHz. The instrument will also be equipped with a calibrated attenuator in one (1) or two (2) dB steps with an accuracy over its range of ± 2dB.

    B. Transducers
    1. Search units should be single element transducers.
    2. Transducers may be 1 MHz to 5 MHz in frequency.
    3. Search unit crystals may be 3/8 inch to 1/2 inch in diameter.

C. Calibration blocks shall be either International Institute of Welding (IIW) Type I or Type II or Distance and Sensitivity Calibration Block (DSC) used in conjunction with calibration standards of Paragraph D. At the option of the client, specific calibration standards can be prepared at their discretion to verify the adequacy of this procedure.

D. Calibration Standards
Calibration standards shall be made out of the same or similar material as the bolts being examined. The standard shall be made of material free of indications that may affect calibration. The optional standards should be of the same diameter, length, and material type as the bolts being examined. The standards shall be machined with a 1/8 inch deep saw cut below the root of the threads. The saw cut shall be located at 2 inches, 4 inches, 6 inches, and 8 inches from the threaded end of the bolt. The saw cut shall be located perpendicular to the end of the bolt. The end of the bolt shall be flat and smooth so as not to interfere with free movement of the search unit. The saw cuts shall be located in different quadrants so they do not mask the notch below.

Prerequisites, Precautions, and Limitations

A. The surface of the test material shall be flat, smooth, and in its final condition prior to the examination. This may require the use of hand grinders to facilitate search unit movement.

B. The same equipment used for calibration shall be the same as used for examination purposes. This includes the ultrasonic instrument, cables, search unit, and couplant. Any change in this equipment requires recalibration.

C. This procedure may be used for 1/2 inch to 3-inch diameter bolts. The area of interest shall be the first ten inches. If the area past the first ten inches is to be examined, further evaluation should be performed before using this procedure, with special attention to beam spread and mode conversion. This evaluation will be performed by Fish Inspection and Testing LLC level ultrasonic examiner, and results must be approved by the client prior to any examinations.

Procedure Requirements

A. The surface to be examined shall be smooth and free of roughness or other conditions that would interfere with free movement of the search unit or impair the transmission of ultrasonic waves. The nut should be fully threaded past the end of the bolt so as not to interfere with the search unit scanning area.

B. Examination Calibration

1. Calibration shall include the complete ultrasonic examination system. Any changes in search units, shoes, couplant, cables, instruments, or recording devices will result in a calibration check. The initial calibration must take place on the IIW, DSC, or optional calibration standards.
2. The CRT screen shall be calibrated for a 10-inch screen range using the approved calibration blocks in Paragraph 1. Then, place the search unit on the threaded end of the calibration standard. Locate the closest or 2-inch saw cut. Adjust the amplitude to 90 percent. Record the instrument setting on the examination sheet. Next, locate the 4-inch saw cut and note the peak amplitude on the examination sheet. Mark the screen with an erasable marker. Repeat for the remaining two saw cuts. Finally, connect the marks on the screen to create a Distance Amplitude Curve (DAC).

C. Straight Beam Examination of Bolts

1. With the CRT screen calibrated according to Paragraph B.2, position the search unit on the bolt to be examined. The entire surface of the bolt shall be scanned at 12 dB over reference.
2. Accept/reject standards - any indication within 20 percent DAC at reference level shall be recorded. If any indications exceed DAC at reference level, the bolt shall be rejected and recorded on the examination sheet. If no indications are found, the bolt shall be considered acceptable.

D. Length Measurement

1. Anchor bolt length may be verified if plans showing anchor bolt details are available. Caution: If anchor bolts have a bent hook at the ends, length measurement may not be possible.
2. Calibrate the instrument for the screen range required to analyze the full bolt length using the AWS IIW block. Take measurements of the total bolt length and record it on the examination sheet for each of the bolts.

E. System Calibration Check

1. A system calibration check that verifies the instrument's sensitivity and sweep range calibration shall be performed at the start and finish of each examination or with any change of examination personnel or at least every 4 hours during the examination
2. System recalibration shall take place when one or more of the following occur:
    a. Any change of examination personnel.
    b. Any change of examination equipment cables, transducers, or instruments.
    c. Any change or interruption in the power supply.
    d. When the operator doubts the validity of the calibration.

F. Post Cleaning

1. All excess couplant shall be removed after completing the examination.
2. If the original coating was removed for examination, the examination area shall be recoated with a rust-inhibitive coating approved by the client.

G. Corrective Actions

1. If any point on the DAC curve has decreased by 20% or 2 dB of its amplitude, all data sheets since the last calibration will be marked void. A new calibration sheet shall be completed. All areas examined since the last calibration shall be re-examined.
2. If any point on the DAC curve increases by 20% or 2 dB of its amplitude, the same corrective action as Paragraph G.1 shall be taken.
3. If any point on the DAC curve moves more than 10% of the horizontal sweep, all data taken since the last calibration shall be corrected.

H. Evaluation and Recording of Results

1. All defects or discontinuities revealed by the examination will be evaluated in accordance with Paragraph C2 and reported to the client.

FISH INSPECTION AND TESTING LLC ***Structural Material Analysis***
8964 Waterford Road Sauk City Wisconsin 53583 Phone: 608-643-6458
Fax: 608-643-0213

Ultrasonic Testing of Anchor Bolts

Distance Amplitude Correction Method (DAC)

General Information			
Structure ID:	Project No.	Report No.	Inspection Date & Time:

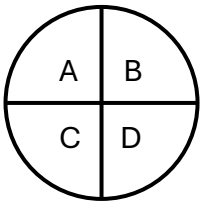
Testing Equipment Information		
UT Unit Make & Model:	Serial No:	Couplant Manf. & Grade:

Search Unit Manf., Dia., & Frequency:	Search Unit Beam Spread (sin Θ = 1.22 λ / d):

Search Unit Near Zone ($L = D^2/4\ \lambda$):	Smallest Detectable Defect (0.5λ):	**Typical Anchor Bolt Layout Sketch**

Calibration Settings	**% of Screen Height**
Amplitude of Notch at 2”	
Amplitude of Notch at 4”	
Amplitude of Notch at 6”	
Amplitude of Notch at 8”	
Visual Anchor Bolt Conditions:	

Number anchor bolts clockwise – designate location of starting point
Divide each anchor bolt into 4 quadrants (A, B, C, D) and report each quadrant in the evaluation



Ultrasonic Testing Evaluation

Anchor Bolt Number	Diameter	Measured Length	Evaluation *(N.S. = No Significant Indication)*				Remarks
			A	B	C	D	

Inspector Name (Print): _____

Inspector Signature: _____ ASNT Level: _____ Date: _____