

SCOPE OF WORK

ATTACHMENT A SCOPE OF WORK SERVICES – PIN/HANGER ASSEMBLIES

I. Mobilization:

Prior to field inspection, the following items will be undertaken:

1. The Consultant will gather and review as-built plans and maintenance history; determine special equipment/maintenance of traffic needs; and solicit bids and coordinate with the selected inspection equipment/traffic control vendors.
2. A detailed scope of work for nondestructive testing requirements will be developed and distributed to at least three (3) testing firms. The firms approved by the Department will be selected for performing ultrasonic testing. A detailed scope of work may also be distributed to vendors for air monitoring and/or structural services (ironworker), if required (minimum of three firms per service).
3. This task will also include the general management of the project and QA/QC functions.
4. For structures over active rail lines, this task will include the procurement of right-of-entry permits, scheduling and coordination of flag person(s), and obtaining the waiver of protective liability insurance.
5. Also included as part of this task will be quantity take-offs from as-built plans for Pontis implementation.
6. The plans will be carefully reviewed to identify pin/hanger details and components.

II. Field Inspection:

Field inspection will include a 100% hands-on, visual inspection of Pin and Hanger systems and Wind Bracings. Pin and Hanger inspections will comply with the requirements set forth in the AASHTO Manual for Bridge Evaluation, 2011 with 2013 interims, Article 4.8.3.11 as well as the FHWA-IP-86-26, "Inspection of Fracture Critical Bridge Members." and "Manual for Inspecting Bridges for Fatigue Damage Conditions" Report No. FHWA-PA-89-022+85-02, Non-destructive evaluation will be performed using Ultrasonic Testing (UT) on Pins and Magnetic Particle Testing (MT) or Dye Penetrant Testing on Hanger Plates, where a crack is observed or suspected.

Access to achieve a hands-on inspection of the Pin/Hanger assemblies will be obtained using boats, ladders, man-lifts, crane-mounted barge, and truck-mounted snoopers (MOOG and Reach-All Underbridge units).

Traffic control will be performed strictly in accordance with NJDOT's lane and shoulder closing guidelines. The appropriate Regional Traffic Operations office will be notified and Traffic

Interference Reports submitted at least 72 hours in advance of any proposed lane or shoulder closings.

The NJTA will be contacted and procedures followed in accordance with their strict requirements for any proposed lane or shoulder closings on any structure over the Garden State Parkway or the New Jersey Turnpike.

The following is the inspection procedure to be followed:

Pin and Hanger Assemblies

1. Perform hands on visual inspection of hanger straps (expansion joint) or girder web (fixed joint). Inspector shall look for cracks, pack rust, warping of the hanger straps and evidence that joint is frozen.
2. Remove paint from ends of all pins, if required, to perform Ultrasonic Testing. Remove pin nut, remove paint from the exposed hanger strap behind the pin nut, as required, and perform Magnetic Particle or Dye Penetrant Testing, on the hanger strap where cracks are suspected. An assumed number of pin nut removals will be specified at SOW meeting; however, at least two locations are mandatory. Locations for testing should be different than the previous inspection. Check the hanger straps for misalignment or bowing.
3. Qualified technician to perform ultrasonic testing of cleaned ends of all pins. The ultrasonic testing will identify possible cracks or wear grooves in the pin. Determine the actual size of these flaws using sample calibration pins (available at the Department). Ultrasonic pulse-echo straight and angle-beam examination contact methods will be applied.
4. Refer to "Paint Removal and Painting Procedure".

Paint Removal and Painting Procedures

1. Paint will be removed in the immediate areas where the Dye Penetrant Tests are to be performed.
2. The areas where the paint has been removed and cleaned will be spray coated, by the inspectors, with a rust-inhibitor in order to stop any flash rusting that may occur to the exposed base metal. Full restoration of the paint with a three coat paint system is not included.

III. Ratings:

Fatigue Analysis shall be calculated based on the AASHTO Manual for Bridge Evaluation, 2011 with 2013 interims. For fatigue life evaluation of existing steel bridges, a generalized procedure per AASHTO LRFR specifications is recommended that begins with the simplified approach using the specification load distribution factor and then determines the need for refined analysis for these complex structures as well as risk and reliability assessment of bridge details, structural conditions; and fracture mechanics-based approaches. Fatigue evaluation of the structure will include the following:

1. Estimated remaining fatigue life and
2. Acceptable remaining fatigue life.

IV. Pin and Hanger Special Inspection Report Sections:

The Pin and Hanger reports shall contain the following sections:

1. Table of Contents
2. Structure Data Sheet including Work Done, Team Leader initials, and Certifying Engineer signature and P.E. Seal
3. Conclusion and Recommendations, including: overall condition; changes since the previous cycle; findings for each Pin and Hanger assembly; Pin and Hanger assemblies description at each span; field inspection procedure; findings of defects at each location with photograph reference; findings of all NDT testing results; overall recommendations; and recommendations for any special inspection frequency.
4. Summary of Fatigue Life
5. Sketches to depict General Plan and Elevation (GP&E), Bridge Cross Section, Framing Plan indicating locations of Pin and Hangers, Elevation of each Girder with Pin and Hanger assemblies, and all details of Pin and Hanger assemblies.
6. Photographs with captions (elevation and roadway approach photographs required). Photographs should be in sufficient number to present overall condition of Pin and Hanger assemblies. Photographs of all special MPT/equipment/manpower used shall also be included.
7. Field Notes
8. Non-Destructive Testing Results

SCOPE OF WORK SERVICES – FCM BRIDGES (WELDED)

I. Mobilization:

Prior to the filed inspection, the following items will be undertaken:

1. Collection and review of as-built plans and shop/fabrication drawings and maintenance history where available.
2. Confirm the location of the tension zones of all fracture critical members, member components and fatigue sensitive details. Fracture critical members are as defined in the FHWA Manual "Inspection of Fracture Critical Members" (FHWA-IP-86-26).
3. Establish maintenance and protection of traffic requirements and solicit bids.
4. Secure access permits, where necessary.
5. Establish inspection procedures.
6.
 - a. Establish methods of access for in-depth condition inspection and field measurements.
 - b. Solicit bids for special access equipment.
7. Establish work schedule and report submission schedule.
8. Quantity take off from plans for Pontis implementation.

II. Field Inspection:

This work will include a 100% hands-on, visual inspection of fracture critical members. The FCM inspection will comply with the requirements set forth in the AASHTO Manual for Bridge Evaluation, 2011 with 2013 interims, Article 4.8.3.11 as well as the FHWA-IP-86-26, "Inspection of Fracture Critical Bridge Members." and "Manual for Inspecting Bridges for Fatigue Damage Conditions" Report No. FHWA-PA-89-022+85-02, Non-destructive evaluation will be performed using Ultrasonic Testing (UT) on Pins and Magnetic Particle Testing (MT) or Dye Penetrant Testing on Hanger Plates, where a crack is observed or suspected.

Inspection team shall also include an engineer certified by American Welding Society with expertise in bridge weld inspection.

Access to perform the hands-on inspection will be accomplished in one of the following manners:

- a. Extension ladders
- b. Bucket truck or manlift
- c. Snooper or other type of underbridge units
- d. Boat (if accessible over waterway)

Traffic control required to use any special equipment will be established and performed strictly in accordance with the NJDOT guidelines for lane and shoulder closings.

The following inspection procedures will be followed for each of the basic type structures identified for this project.

1. **Steel Boxbeam Pier Caps (Welded)**

- a. Perform hands-on, visual inspection of the outside of the box. Inspectors will specifically check the tension zones as identified on the record plans of the webs and flanges for cracks, pitting and section loss.
- b. Perform hands-on, visual inspection of the inside of the box. Inspectors will check the fillet/groove welds along the tension flange and around all transverse stiffeners. Web and flange plates will be inspected for cracks and weld strikes. Provision for air testing, respirators and ventilation to be included as required.
- c. Paint will be removed from areas (inside and outside the box) of suspected cracks and a Dye Penetrant Test or if necessary UT will be performed on a sampling basis (an assumed number of locations will be specified in the proposal, but at least two locations are mandatory).
- d. Refer to “Paint Removal and Painting Procedures”.
- e. The Consultant will be responsible for unlocking/locking access doors.

2. **Steel Girder Pier Caps**

- a. Perform hands-on, visual inspections of girders and bearing connections. Inspectors will check for cracks and pitting section loss with special attention to fatigue sensitive details (i.e. transverse groove welds, transverse stiffeners, connection plates, longitudinal fillet welds, bolted splices and tack welds).

3. **Steel Girder Systems (Welded) 2 Girder-Truss Load Path Non-Redundant**

- a. Perform hands-on, visual inspection of girders. Inspectors will check for cracks and pitting section loss with special attention to fatigue sensitive details. Inspectors will measure flange thicknesses in area of heavy corrosion.
- b. Paint will be removed from areas where cracks are suspected and a Dye Penetrant Test will be performed on a sampling basis (an assumed number of locations will be specified in the proposal, but at least two locations are mandatory).
- c. Refer to “Paint Removal and Painting Procedure”.

Paint Removal and Painting ProcedureS

1. Paint will be removed in the immediate areas where the Dye Penetrant Tests are to be performed.
2. The areas where the paint has been removed and cleaned will be spray coated, by the inspectors, with a rust-inhibitor in order to stop any flash rusting that may occur to the exposed base metal. Full restoration of the paint with a three coat paint system is not included.

Weldments and Base Metal Inspection

Weldments and base metal, in the immediate vicinity of the weldments, will be inspected following ANSI/AWS Structural Welding Code D.1.1. Standards by an inspector certified by the American Welding Society. Properly assessing the condition of a defective weld or damaged material is critical in recommending any corrective action, i.e., a retrofit detail.

Considering the weldments are covered with paint, the following procedure will be followed in order to effectively evaluation the weldments:

1. Refer to “Paint Removal and Painting Procedure”
2. Visual inspection to determine surface discontinuities and problems.
3. Magnetic particle test (MT) will be performed in order to detect surface cracks. Take photos of cracks for inclusion in the report.
4. After removing the paint, ultrasonic test (UT) will be performed in order to determine subsurface and deep flaws. Use UT with recording capabilities so that documentation can be provided in the report.

Note:

- a. The areas to be dye-penetrant/ultrasonic tested will be determined on a sampling basis by the inspectors at the time of inspection and coordinated with testing personnel. The testing will include AASHTO fatigue category D, E and E' details in the tension area of the FCM's.
- b. The reference standard and calibration method in order to perform the UT will be established by the testing personnel.

Pontis Inspection

Pontis inspection and input forms will be completed for fracture-critical members. All Core Elements, Non-core Elements, Sub-Elements and Smart Flags will be identified for fracture-critical members.

III. Fatigue Ratings:

Fatigue Analysis shall be calculated based on the AASHTO Manual for Bridge Evaluation, 2011 with 2013 interims in conjunction with the LRFR bridge ratings. For fatigue life evaluation of existing steel bridges, a generalized procedure per AASHTO LRFR specifications is recommended that

begins with the simplified approach using the specification load distribution factor and then determines the need for refined analysis for these complex structures as well as risk and reliability assessment of bridge details, structural conditions; and fracture mechanics-based approaches. Fatigue evaluation of the structure will include the following:

1. Estimated remaining fatigue life and
2. Acceptable remaining fatigue life.

IV. FCM Special Inspection Report:

The Welded FCM reports shall contain the following sections:

1. Table of Contents
2. Structure Data Sheet including Work Done, Team Leader initials, and Certifying Engineer signature and P.E. Seal
3. Conclusion and Recommendations, including: overall condition; changes since the previous cycle; findings for each Fracture Critical Member (FCM); FCM description; field inspection procedure; findings of defects at each location with photograph reference; findings of all NDT testing results; overall recommendations; and recommendations for any special inspection frequency
4. Summary of Fatigue Life
5. Sketches to depict General Plan and Elevation (GP&E), Bridge Cross Section, Framing Plan indicating locations of FCM's, Elevation of each Girder with FCM, and all weld details and FCM details
6. Photographs with captions (elevation and roadway approach photographs required). Photographs should be in sufficient number to present overall condition of FCM's. Photographs of all special MPT/equipment/manpower used shall also be included
7. Field Notes
8. Non-Destructive Testing Results