

ITEM 564.8501XX25 - REPAIR OF STRUCTURAL STEEL (LS FOR EACH STRUCTURE)

1. DESCRIPTION:

1.01 The work shall include repair of damage to structural steel components of primary and secondary structural members resulting from impact, corrosion loss, fatigue cracks, etc., including repairs to stringers, girders, floor beams, columns, bents, steel pier caps, diaphragms, cross frames, etc. as identified and as located on the plans or other contract documents.

1.02 **General Requirements**

- A. All work must be performed in accordance with the New York State Steel Construction Manual (NYSSCM), with current addenda, except as modified herein.
- B. All repairs to impact damaged structures must be done using the guidelines provided in the **Federal Highway Administration Report No. FHWA-IF-99-004 Heat-Straightening Repairs of Damaged Steel Bridges A Technical Guide and Manual of Practice**, except as modified herein. This publication is available from:

**U. S. Department of Transportation
Federal Highway Administration**

**Bridge Office
Office of Infrastructure
Federal Highway Administration
400-7th St. N.W.
Washington, DC 20590**

OR

http://www.fhwa.dot.gov/bridge/steel/heat_guide.pdf

In general, only flame straightening procedures may be used, as described in the above document unless otherwise modified by the Contract Documents. Exceptions may be made to allow hot mechanical straightening subject to approval of the Engineer. Cold mechanical straightening will not be allowed.

- C. In general, the manual shielded metal arc welding (SMAW) process should be used for all repair welding. The flux cored arc welding process with external gas shielding or the submerged arc welding process may be used as appropriate, subject to approval of the Engineer, and subject to qualification as required by the NYS Steel Construction Manual.
- D. Heating, including preheating, maintenance of interpass temperature, post-heating, flame straightening, etc. shall be controlled by the use of temperature indicating crayons. Crayons manufactured for [REDACTED] shall be available at the work site. Any heating procedure that causes a portion of the steel to be heated in excess of [REDACTED] shall be considered destructive heating and shall be cause for repair or replacement of the steel at the Contractor's expense.

ITEM 564.8501XX25 - REPAIR OF STRUCTURAL STEEL (LS FOR EACH STRUCTURE)

- E. All welding shall be performed by New York State certified welders, qualified for the position to be performed in the work.
 - F. All new welds in tension areas of main members must be tested for soundness using the appropriate test method, as shown in the contract documents. Existing welds in tension areas; welds in compression areas of main members; base metal; and secondary members may be tested, as shown in the contract documents. Tests must be performed in accordance with the following specifications:
 - 1. Radiographic inspection, when required, shall be performed in accordance with the provisions of Section 16 of the NYSSCM.
 - 2. Ultrasonic testing, when required, shall be performed in accordance with the provisions of Section 17 of the NYSSCM.
 - 3. Magnetic particle inspection, when required, must be performed in accordance with the provisions of Section 18 of the NYSSCM using the yoke technique, except that separate tests must be performed using both AC output current to inspect for surface discontinuities and half wave rectified DC output current to inspect for near surface discontinuities. The yoke must be capable of producing a field strength of [REDACTED]'s minimum for alternating current and [REDACTED] minimum for direct current at the maximum pole spacing to be used in the work.
 - 4. Dye penetrant inspection, when required, must be performed in accordance with Section 19 of the NYSSCM.
- 1.03 Standards: Unless noted otherwise in this specification, the latest edition of the following standards and regulations form a part of this specification:
- A. Current New York State Department of Transportation Standard Specifications for Highway Bridges with all interim specifications and modifications.
 - B. Current New York State Department of Transportation Standard Specifications Construction and Materials, and as amended by NYSTA Addendum TA(09), and all Special Notes and Errata contained in this contract's Proposal Documents.
 - C. New York State Steel Construction Manual dated March 2008 with all current Addenda.
 - D. SSPC – Society for Protective Coatings, SSPC Painting Manual Volume 1, "Good Painting Practices".
 - E. SSPC – Society for Protective Coatings, SSPC Painting Manual Volume 2, "Systems and Specifications":
 - "Shop, Field and Maintenance Painting of Steel," (SSPC-PA1)
 - "Measurement of Dry Paint Thickness with Magnetic Gauges," (SSPC-PA2)
 - SSPC- Society for Protective Coatings, SSPC-SP 10, "Near White Metal Blast"
 - SSPC – Society for Protective Coatings, SSPC-SP 11, "Power Tool Cleaning to Bare Metal"
 - SSPC – Society for Protective Coatings, SSPC-SP 6, "Commercial Blast"

ITEM 564.8501XX25 - REPAIR OF STRUCTURAL STEEL (LS FOR EACH STRUCTURE)

2. MATERIALS:

2.01 Materials for this work must conform to the designated subsections of the latest edition of the NYSDOT Standard Specifications, except as otherwise shown in the contract documents or otherwise described herein, as follows:

- A. ***Structural Steel*** 715-01
Two copies of certified mill test reports must be provided to the Engineer. The direction of rolling must be parallel to the direction of primary stress. Main member material subject to tensile stress must have a minimum Charpy V-notch impact strength of [REDACTED] except as otherwise required by the contract documents.
- B. ***High Strength Bolts, Nuts and Washers*** 715-14
When installing galvanized fasteners, the galvanized nuts should be tapped out and should be lubricated prior to use. If the nut has not been waxed by the manufacturer or supplier, stick wax must be used under elements turned to prevent galling of the components. Unless specifically approved by the Authority, only the nut, and not the head, must be turned to tighten the fastener.
- C. ***Stainless Steel Connecting Products*** 715-16
- D. ***Paint:*** Unless otherwise specified in the Contract Documents, all paint must be exterior grade, abrasion resistant, lead and chromate free, and compatible with the existing paint system. Further the paint and paint system must be selected from the latest NYSDOT Materials Bureau Approved List, and approved by the Engineer in the field. The Contractor shall provide the Engineer with two (2) copies of the manufacturer's certification stating that the paint meets the above requirements, and that it is appropriate for the intended application. In addition, the Contractor must provide a written procedure prepared by the manufacturer describing the proper surface preparation, application and curing of the new paint system, plus any necessary inspection equipment as recommended by the paint manufacturer.
- E. ***Galvanizing*** 719-01
- F. ***Anchor Bolts (Non-Stainless Steel)*** 723-60

2.02 When the manual shielded metal arc welding (SMAW) process is used, it shall be done by careful low hydrogen practice, using properly dried E7016, E7018 or E7028 electrodes. All welding electrodes must conform to the requirements of the latest edition of AWS A5.1, *Specification for Mild Steel Covered Arc Welding Electrodes*. All welding shall be done with [REDACTED] diameter electrodes, except when the specification allows [REDACTED] diameter electrodes for welds made in the flat and horizontal positions. Electrodes smaller than [REDACTED] diameter will not be permitted in this work.

Properly dried electrodes shall be defined as follows: All SMAW electrodes shall be furnished in hermetically sealed containers and shall be dried at least two (2) hours, but not to exceed four (4) hours, between 450°F and 500°F before they are used. After drying, electrodes shall immediately be placed in a storage oven held continuously at 250°F until they are used in the work. One (1) oven may be used providing proper temperature controls are maintained. The time that the electrodes may be kept from the oven before use will be as described in Article 711 of the NYSSCM.

ITEM 564.8501XX25 - REPAIR OF STRUCTURAL STEEL (LS FOR EACH STRUCTURE)

2. MATERIALS: (cont'd)

- 2.03 Other welding consumables must conform to the requirements of the latest edition of the AWS A5.5, *Specification for Low Alloy Steel Covered Arc Welding Electrodes*; AWS A5.17, *Specification for Carbon Steel Electrodes and Fluxes for Submerged Arc Welding*; AWS A5.20, *Specification for Carbon Steel Electrodes for Fluxed Cored Arc Welding*; AWS A5.23, *Specification for Low Alloy Steel Electrodes and Fluxes for Submerged Arc Welding*; AWS A5.29, *Specification for Low Alloy Steel Electrodes for Fluxed Cored Arc Welding*; or other specifications as appropriate and as approved by the Authority.
- 2.04 Preheat and interpass temperatures must be 400°F, except as otherwise noted or except as approved by the Engineer for specific applications. Heat measurements shall be made at least 3 inches both laterally and in advance of the welding.

3. CONSTRUCTION DETAILS:

- 3.01 The Contractor must conform to all Federal, State and Local laws, rules and regulations during performance of the work.
- 3.02 All equipment to be used in the work must be in good operating condition and must be approved by the Engineer prior to placing it in service.
- 3.03 Certain specialty work may require specific personnel qualification, as identified in the contract documents.

3.04 Localized Cleaning of Existing Steel:

A. Definitions for localized cleaning of existing steel:

- 1. *Existing Paint and Paint Chips:* Be advised that all existing paint and paint chips may contain lead, unless specifically stated otherwise in the Contract Documents. The following regulations shall apply as appropriate.
 - a. Federal regulations for transport, treatment and disposal of hazardous waste include 40CFR 263, 264, 265 and 268.
 - b. New York State regulations for transport, treatment and disposal of hazardous waste include 6NYCRR, 364, 370 through 374 and 376.
- 2. *Hazardous waste materials* shall include existing paint, old paint chips, corrosion residue, and spent abrasives that result from blasting, power tool cleaning, and other cleaning and coating operations performed in the field, unless stated otherwise in the Contract Documents.
- 3. *Commercial blast cleaning* shall mean that all surfaces must be cleaned in accordance with standards and specifications for Commercial Blast Cleaning, SSPC-SP 6, as published by the Steel Structures Painting Council.

- B. The Contractor must conform to all Federal, State and local laws, rules and regulations during performance of the work.

ITEM 564.8501XX25 - REPAIR OF STRUCTURAL STEEL (LS FOR EACH STRUCTURE)

3. CONSTRUCTION DETAILS: (cont'd)

3.04 Localized Cleaning of Existing Steel:

- C. All equipment to be used in the work must be in good operating condition and must be approved by the Engineer prior to placing it in service.
 - D. All paint, dirt, corrosion, oil, grease and other foreign material must be removed within 6 inches of steel designated to be repaired or replaced, as identified in the Contract Documents, by commercial blast cleaning or other approved means prior to beginning the repair work.
 - 1. The cleaning method must be dry abrasive blasting using a closed cycle, recirculating, abrasive system with compressed air blast nozzle and abrasive, with a vacuum for dust, paint waste and abrasive recovery. Commercial blast cleaned surfaces must conform to SSPC-SP 6/ SSPC Vis. 1-89 specifications. Alternately, vacuum power tool may be used in lieu of the dry abrasive blast system, providing the cleaned surfaces conform to SSPC-SP 11/SSPC Vis. 3 Specifications for Power Tool Cleaning to Bare Metal.
 - 2. All abrasives shall be free of corrosion producing contaminants, oil, grease, soluble salts, or other deleterious contaminants. Silica sand will not be allowed for blast cleaning purposes. The abrasive must be of such size as to produce a uniform surface profile that is suitable for the application of the specified paint. The abrasive may be recycled a maximum of five (5) times.
 - 3. The Contractor may select the type of abrasive material providing all of the above requirements are met.
 - 4. The vacuum blast cleaning must remove all existing coatings; capture a minimum of 95% of the abrasive; recycle the abrasive; produce a clean surface in accordance with this specification; and meet current EPA regulations.
 - 5. Potential hazardous waste generated during cleaning operations shall be collected and stored in re-sealable, 55 gallon barrels. The barrels shall be properly labeled indicating "Possible Lead Content" in accordance with Federal DOT regulations. Once filled, the Contractor shall transport the filled barrels to the designated storage facility established by the Thruway Authority. The Contractor shall notify the Engineer once a barrel is full or if no more waste will be added to a barrel. The Contractor shall officially record the amount of waste generated. The Thruway Authority will arrange for transportation and disposal of the waste from that location under the provisions of a separate contract.
- 3.05 The Contractor must submit a complete description of their proposed plans and procedures for accomplishing the work shown on the Contract Documents to the Authority for prior review and approval for each repair to be made. The submittal must be prepared on full size drawings as defined by the NYS Steel Construction Manual in accordance with the above specifications. Once approved, the Contractor shall not deviate from same without specific approval of the Engineer. All drawing submittals must be made in accordance with the shop drawing submittal procedure defined in this contract. These drawings must show specific information, including:

ITEM 564.8501XX25 - REPAIR OF STRUCTURAL STEEL (LS FOR EACH STRUCTURE)

3. CONSTRUCTION DETAILS: (cont'd)

3.05 (cont'd)

- A. The existing condition of the damaged members.
- B. The location of paint or coating removal.
- C. Initial nondestructive tests to be performed, if required.
- D. Lifting and temporary support details, if applicable.
- E. Details of components to be straightened, if applicable.
- F. Details of components to be replaced, if applicable.
- G. Welding processes and welding procedure specifications to be used, if applicable.
- H. Details for complete penetration groove welding, or partial penetration groove welding, if applicable, including the Contractor's preferred joint designation.
- I. Final nondestructive tests.
- J. Final protective coatings.
- K. For repair of impact damaged structures, details of heating procedures, including areas to be heated and method of heating must be shown.
- L. For impact damaged structures, or when required by the contract documents, the proposed repair drawings must be signed by a Professional Engineer licensed in New York State, unless this requirement is excluded in the plans or by special note.

3.06 Perform general repairs to the structural steel as located and/or as shown in the contract documents and on the approved repair drawings.

3.07 **Repair Tolerances:**

- A. The final straightness, tilt of flange, web flatness, etc., of the damaged member must conform to the provisions of Section 12, *Dimensional Tolerances*, of the New York State Steel Construction Manual, except at specific locations such as points of impact, web punctures, etc., these tolerances may be exceeded subject to approval of the Engineer.
- B. Scrapes and gouges in components of steel members may be repaired by grinding to a slope of 1 on 10, and blending in smoothly to adjacent base metal, providing:
 - 1. The thickness of the material is not reduced by more than ■ of the original nominal thickness.
 - 2. The width of the flange or cover plate is not reduced by more than ■ of the original nominal width.
 - 3. The gouge does not reduce the nominal cross sectional area of the component by more than ■ of the original nominal cross section. A component is defined as a web or flange of a plate girder, a web or flange of a rolled beam girder, a cover plate exclusive of welds, a leg of an angle, etc.
- C. Scrapes and gouges that exceed the above limits must be repaired using an approved procedure similar to the following:

ITEM 564.8501XX25 - REPAIR OF STRUCTURAL STEEL (LS FOR EACH STRUCTURE)

3. CONSTRUCTION DETAILS: (cont'd)

3.07 Repair Tolerances: (cont'd)

1. Prepare the surface by grinding.
 2. Weld with approved procedures to completely fill the gouge.
 3. Grind flush and smooth with the adjacent base metal.
 4. Ultrasonic test the repair weld.
- D. All final grinding must be parallel to the direction of applied stress in the member unless the surface roughness meets or exceeds an ANSI 125 finish.

3.08 The Contractor shall employ the services of qualified personnel to perform inspection and testing of the work. The type of inspection and the location where it is required shall be as shown in the Contract Documents. The following are considered acceptable qualifications:

A. Visual Inspection:

1. Current certification as an AWS Certified Welding Inspector (CWI) in accordance with the provisions of AWS QC1, *Standard and Guide for Qualification and Certification of Welding Inspectors*, or
2. Current qualification by the Canadian Welding Bureau (CWB) to the requirements of the *Canadian Standard Association (CSA) Standard W178.2, Certification of Welding Inspectors*, or
3. An Engineer or technician who, by training or experience, or both, in metals fabrication, inspection and testing, is competent to perform inspection of the work, as determined by the Engineer.

B. Nondestructive Testing:

1. Personnel performing dye penetrant, magnetic particle or radiographic inspection shall be qualified in accordance with the current edition of the *American Society for Nondestructive Testing* Recommended Practice No. SNT-TC-1A. Only individuals qualified for NDT Level I and working under the supervision of an individual qualified to NDT Level II, or an individual qualified for NDT Level II may perform nondestructive testing.
2. Personnel performing ultrasonic testing must be certified by tests administered by NYSDOT.
3. Personnel performing nondestructive tests need not be qualified and certified under the provisions of AWS QC1.

ITEM 564.8501XX25 - REPAIR OF STRUCTURAL STEEL (LS FOR EACH STRUCTURE)

3. CONSTRUCTION DETAILS: (cont'd)

3.08 (cont'd)

C. Reports:

Discontinuities found as a result of visual inspection or nondestructive testing should be located, evaluated and reported in accordance with the appropriate sections of the NYSSCM upon completion of the inspection. Indications of cracks must also be reported to a representative of the Authority immediately. Two (2) copies of the report should be submitted to the Engineer.

3.09 Recoat the entire area that was previously cleaned or damaged during repair operations as follows:

- A. Surface preparation and recoating must be done as described in the manufacturer's written procedure unless otherwise required by the contract documents.
- B. All recoating must be done in a neat, workmanlike manner with no runs, sags or drips.
- C. Recoating systems requiring multiple coats must have a different color for each coat, with the final coat matching the color of the existing coating system.

4. METHOD OF MEASUREMENT:

4.01 **LUMP SUM:** Measurement will be taken as the aggregate cost of each steel repair made based on the agreed price or force account summary submitted by the contractor and approved by the Engineer.

5. BASIS OF PAYMENT:

5.01 The unit price bid for each repair location, or each structure repaired, shall include the cost of all labor, materials, equipment and access necessary to perform all initial cleaning, repair and testing.

5.02 No payment will be made for repair of, or replacement of damaged material which was made necessary due to the Contractor's operations.

5.03 All costs associated with cleaning, painting, coating repair, and/or containment shall be included in this item unless otherwise indicated on the plans.

5.04 The lump sum price bid for each structure repaired shall include the cost of all labor, materials, equipment and access necessary to perform all initial cleaning, repairs and testing. Payment will be made at the lump sum bid price for each structure as follows:

Twenty-five (25%) percent upon completion of paint removal and initial non-destructive testing.
Fifty (50%) percent upon completion of necessary steel repairs.
Twenty-five (25%) percent upon final non-destructive testing and application of protective coatings.

5.05 Payment will be made under:

<u>ITEM NO.</u>	<u>DESCRIPTION</u>	<u>UNITS</u>
564.85011725	REPAIR OF STRUCTURAL STEEL AT MP 278.93 SYRACUSE INTERCHANGE BRIDGE OVER THE NYS THRUWAY	LUMP SUM

ITEM 564.8501XX25 - REPAIR OF STRUCTURAL STEEL (LS FOR EACH STRUCTURE)

5. BASIS OF PAYMENT: (cont'd)

5.05 Payment will be made under: (cont'd)

564.85011825	REPAIR OF STRUCTURAL STEEL AT MP 283.79 ELECTRONICS PARKWAY INTERCHANGE BRIDGE OVER THE NYS THRUWAY	LUMP SUM
564.85011925	REPAIR OF STRUCTURAL STEEL AT MP 337.47 PORT GIBSON RD. (CR7) OVER THE NYS THRUWAY	LUMP SUM
564.85012925	REPAIR OF STRUCTURAL STEEL AT MP 415.92 NYS THRUWAY OVER HARRIS HILL RD.	LUMP SUM
564.85013025	REPAIR OF STRUCTURAL STEEL AT MP 416.94 NYS THRUWAY OVER TRANSIT RD. ROUTE 78	LUMP SUM