

ITEM 564.1016 10 M - REPAIR OF STEEL MEMBERS, HAWKINS AVE. OVER LIE
ITEM 564.1017 10 M - REPAIR OF STEEL MEMBERS, HSP OVER NY27

DESCRIPTION

The work shall consist of repairing steel members in place on the above structures at the locations indicated on the plans in accordance with the plans, specifications and as directed by the Engineer.

MATERIALS

Materials for this work shall conform to the following:

1. Steel - This shall meet the requirements of ASTM A36 M and Section 715-01 of the Standard Specifications. Certified copies of the mill test reports shall be given to the Engineer prior to the beginning of work.
2. Heating Torches - These shall be approximately 25 mm diameter, multi-orifice (rosebud) type. They shall operate on approximately 170 KPa propane - 850 KPa oxygen. Torches and tips proposed for use are subject to the approval of the Engineer.
3. Welding Electrodes - Welding electrodes shall be 4 mm diameter; AWS classification E7018. They shall be furnished in hermetically sealed containers. Immediately upon container opening, the electrodes shall be placed into an electrode drying oven. They shall be dried for at least two hours, but no longer than four hours, at a temperature held between 230°C and 260°C. After drying, the oven temperature shall be lowered to 120°C. The electrodes shall be kept at 120°C continuously until they are used in the work. Electrodes removed from the oven shall be subject to the following time restrictions based upon relative humidity conditions:

<u>Relative Humidity</u>	<u>Time to Use</u>
Up to 70%	4 hours
70% and above	2 hours

Electrodes not used within the times allowed shall be discarded. Redrying of electrodes will not be permitted.

4. Equipment Maintenance - All equipment shall be maintained in good working condition for the duration of this work. Malfunctioning equipment shall be repaired, or replaced, without delay.

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CONSTRUCTION DETAILS

- A. Heat Straightening - Compressive stresses will be permitted up to a maximum of 138 MPa. This stress limit will apply to all steel covered by this specification. Jacks may be used to produce these stresses prior to and during heating. Any method of handling, supporting, or loading that causes the member to distort permanently (yield without the application of heat) will result in rejection of the member.

Members rejected by the Engineer due to permanent distortion shall be repaired by methods approved by the DCES. The Contractor shall submit a proposed repair procedure to the DCES for approval. The DCES will approve or modify the submitted procedure, or will substitute a repair procedure for the Contractor to follow. No work of any nature shall be done to a rejected member until the DCES's approval, or substitute repair procedure has been received by the Contractor. All work performed for reasons of permanent distortion, including nondestructive tests performed by the DCES to evaluate the limit and extent of damage, will be done at the expense of the Contractor. Delays to the Contractor's operations resulting from permanent distortion damage will be at his expense. No request for extensions of time will be considered.

Heating shall be confined to the locations described on the plans for repair procedure and shall be conducted so as to bring the steel within the planned area to a temperature between 565°C and 650°C as rapidly as possible without overheating the steel. All existing paint shall be removed to a distance of at least 300 mm from all work locations. No paint shall be subjected to temperature in excess of 540°C. All workers shall be equipped with protective clothing and properly fitting respirators utilizing a separate, fully independent air supply as required by OSHA. No worker, not equipped as required by the foregoing, will be permitted at the work locations.

Prior to the beginning of heating operations, the Contractor shall provide the Engineer with temperature-indicating crayons manufactured for 315°C, 540°C, 600°C, and 675°C.

The heating torches shall be manipulated to guard against general and surface overheating. When heating thick plates, it may be necessary to occasionally interrupt heating for periods of less than one minute to allow the heat to soak into the flange and avoid surface overheating.

Quenching with water or water and air will not be permitted. Cooling with dry compressed air will be permitted after the steel has cooled to 315°C.

Any heating procedure which causes a portion of the steel to be heated to a temperature greater than 675°C shall be considered destructive heating. Destructive heating shall automatically cause rejection of the work.

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Work rejected due to destructive heating shall be subject to the same restrictions and procedures as previously noted for permanent distortion of steel members by the Contractor. All repair, test, and delay costs shall be borne by the Contractor.

- B. Oxygen Cutting - Oxygen cutting shall be done in accordance with the requirements of the SCM, Section 6.
- C. Welding - Welding shall be done in accordance with the requirements of the SCM, Section 7 by NYSDOT Certified Welders and shall conform to the Welding Procedure Specifications.
- D. Non-Destructive Testing - This shall be done as required by the procedure for Magnetic Particle Inspection in accordance with the requirements of Section 18 of the SCM, and by the procedure for Dye Penetrant Inspection in accordance with the requirements of Section 19 of the SCM. In addition, all complete penetration groove welds in tension zones shall be inspected in accordance with Section 17 of the SCM. The testing shall be performed by a New York State Certified technician provided by the Contractor.
- E. Inspection - In addition to non-destructive testing, visual inspection shall be done to all welds and base metal of the repaired members. Should the welds not meet the acceptance criteria of the SCM or if cracks are found in the base metal, the DCES will be immediately notified by the Engineer.

The Contractor shall submit a proposed repair procedure based upon the inspection findings. The proposal shall be subject to the approval, modification, and substitution requisites given previously for the repair of permanently distorted members. No work of any nature shall be done to, or in the near vicinity of, the unacceptable welds or cracked base metal prior to the repair procedure being approved.

- F. Tolerances - After heat straightening, welding, and welding repair operations are completed, the stringer shall be measured in the presence of the Engineer for the tolerance of sweep, warpage and tilt of flanges. The tolerance shall meet the requirements of Section 12 of the SCM or as shown elsewhere on the plans.
- G. Reconnection - All steel to be reconnected shall be reconnected after repair work has been completed.
- H. Details - Repair procedures on the plans are part of this specification and are to be followed in making the repairs under this item. Due to the nature of steel repair work, the exact content of work cannot always be accurately determined prior to the commencement of work. These contract documents have been prepared based on field inspection and other available information. Actual field condition may require modifications to work quantities. The Contractor shall perform the work in accordance with field condition.

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METHOD OF MEASUREMENT

Payment will be made at the lump sum price bid for this work as shown on the plans and in the repair procedures.

BASIS OF PAYMENT

The lump sum price bid for each bridge shall include the cost of all labor, materials, equipment and testings necessary to complete the work at the locations indicated on the plans.

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Payment for the repair of previously existing defects which are not indicated on the plans, but are subsequently discovered by inspection during construction will be paid for as indicated in Section 109-05, extra and force account work. No payment will be made for the repair of defects caused by the Contractor's operations. No additional payment will be made for repairs indicated on the plans, which upon field inspection are found to be more extensive, but still require the type of repair indicated on the plans. For example, an anticipated 75 mm long crack may be found to be 175 mm long.

No payment will be made for work specifically disallowed payment by the specification terms.

DISAPPROVED