

SECTION 01245 - ELIMINATE ELECTRICAL DISCONTINUITIES IN REINFORCING

(Follow all instructions and make all edits with "Track Changes" turned on. This Section is not published in the Oregon Standard. If there are no instructions [purple text] above a subsection, paragraph, sentence, or bullet, then include it in the Project, unless the item(s) that are included in the subsection, paragraph, sentence, or bullet are not required on the Project and then they should be deleted. In general do not re-number or re-letter subsections when item(s) are deleted. Delete all purple text before preparing the final document. All other modifications to this Section will require ODOT Technical Resource and State Specifications Engineer approval.)

Section 01245, ~~which~~ is not a Standard Specification and, is included in this Project by Special Provision.

Description

01245.00 Scope - In addition to the requirements of Section 01201, Section 01210, Section 01235, Section 01240, and Section 01270, locate areas where sufficient electrical continuity between reinforcement elements is not provided by direct contact, provide electrical continuity between all reinforcing steel in each CP zone except the top deck mat, and install rebar terminals for king bar connections to CP power supplies. The majority of reinforcing bars in the Bridge are expected to be sufficiently interconnected by direct contact.

01245.01 Timing - Check continuity of embedded steel after all excavations and rebar replacements have been made, and before replacing damaged concrete.

Inspect each rebar terminal installation and do not begin encapsulation until the installation is approved.

01245.02 Submittals - Submit descriptions of proposed Materials according to 00150.37. Identify all relevant constituents and properties of each Material and the Specifications with ~~which~~ where it complies. Data published by the manufacturer is acceptable except when certifications of Materials' characteristics are required by the Specifications.

Submit detailed procedures for performing this Work according to 00150.37 at least 21 Calendar Days before Work is scheduled to start. Include the manufacturer's specifications, operating instructions, and calibration certifications for all Equipment and:

- Welder certifications according to AWS D1.4.
- Pre-approved Welding Procedure Specification (WPS) or Procedure Qualification Record / Welding Procedure Specification (PQR/WPS).
- Detailed procedure for electrode control measures.
- Detailed procedure for achieving, maintaining and monitoring pre-heat and inter-pass temperatures.

- A map in an approved electronic format detailing the locations of all continuity repairs and rebar terminals within plus or minus 3 inches according to 00150.37.

Submit a complete rebar terminal specimen according to 00150.37.

01245.03 Installation Acceptance Criteria - The Work performed under this Section is acceptable if the resistance between each individual reinforcing bar and the king bar is less than 6.0 ohms.

Welds are acceptable if they meet the requirements of AWS D1.4 criteria.

Materials

01245.10 Patching Material - ~~Provide~~ Furnish hand patching Material conforming to 01201.10.

01245.11 Welding Materials - Use weld Materials ~~conforming~~ according to the current version of AWS D1.4, "Structural Welding code - Reinforcing Steel". When using shielded metal arc welding (SMAW), ~~provide~~ use low-hydrogen electrodes.

01245.12 Brazing - ~~Provide~~ Furnish brazing filler designed for fabrication applications on steel and copper alloys according to AWS A5.8 RCuZn-C with the manufacturer's recommended flux. Remove flux residue by the method recommended by manufacturer.

01245.13 Brass Threaded Rod - ~~Provide~~ Furnish 1/4-inch diameter brass threaded rod according to ASTM F468, UNS number C27000, C46200 or C46400, or approved equal.

01245.14 Non-Conductive Resin - Provide non-conductive resin ~~conforming~~ according to 01201.11.

Labor

01245.30 Welders - Provide an AWS Certified Welding Inspector (CWI).

Construction

01245.40 Basic Continuity Check - Perform a basic continuity check on exposed reinforcing bars and 50 covered bars in each zone.

Measure the resistance using a resistivity meter ~~conforming~~ according to 01240.20.

Start continuity checks with longitudinal bars that contact multiple stirrups, hoops, or transverse bars. Complete the electrical connection of longitudinal bars before any testing on stirrup and hoop bars.

Test continuity of concrete-covered bars at locations selected by the Engineer. Find these bars using the ~~furnished~~ provided original construction drawings and a rebar locator. Use a rotary impact drill with a maximum 1-inch diameter bit to access the rebar.

Clearly label bars having more than 6.0 ohms resistance relative to the king bar, with their resistance, and mark them for connection to the nearest bar that is continuous with the king bar.

Classify as continuous any group of two or more bars in a zone with resistance values greater than 6.0 ohm with respect to the king bar but less than 6.0 ohm with respect to one bar in the group. Mark only one bar of a continuous group for connection to a bar that is continuous with the king bar.

Verify resistance after welding and provide results to the Engineer according to 01245.02.

01245.41 Additional Continuity Checks - Perform additional continuity checks as directed if the basic continuity check finds non-continuous reinforcing bars in a zone. Follow procedures outlined in 01245.40 for exposing reinforcing bars and testing continuity.

01245.42 Select King Bar - Select the king bar connection locations in each zone to minimize the length of conduit runs. Select a major reinforcing bar as the king bar, not a stirrup or hoop. If practical, select an existing spall or excavation. The connection location can be excavated to accommodate the rebar stub and allow the rebar weld.

01245.43 Electrical Connection - Electrically connect all steel components that have been marked as non-continuous to a component that is electrically continuous with the king bar.

Provide electrical connection of steel components by welding two adjacent or crossing bars together according to the current version of AWS D1.4 "Structural Welding Code - Reinforcing Steel". Since carbon content of existing reinforcement is unknown, assume that preheating is required under ANSI/AWS D1.4. Limit the temperature of reinforcing bar at concrete interface to 500 °F or less, verified using an infrared thermometer.

Remove slag from all completed welds and clean the weld and adjacent rebar by brushing or other approved means. Visually inspect all weld connections at least 48 hours after welding. Do not patch over weld connections until they have been inspected and accepted by the Engineer.

Repair excavations made for connections using hand patching Material ~~conforming according~~ to 01201.10. Follow all manufacturer's recommendations for placement. Hand patching Material may not be used for connections in areas marked as damaged concrete under 01235.41.

In zones with multiple king bars, install a rebar terminal on each king bar and ~~provide~~ furnish connecting jumpers between king bars according to Section 01270.

Demonstrate to the Engineer continuity checks according to 01245.40 for completed continuity welds when required by the Engineer.

01245.44 Rebar Terminal - ~~Provide~~ Furnish a rebar terminal at each king bar connection and adjacent to each reference cell installation.

The rebar terminal consists of a 1/4-inch-diameter brass threaded rod that is brazed to an eight-inch No. 4 rebar stub. After excavating sufficient concrete for access to the king bar at

the selected area for the system negative connection, clean the king bar to bright metal and weld the rebar stub to the king bar as shown.

Inspect each rebar terminal installation by visual examination.

Verify resistance after welding and provide results to the Engineer according to 01245.02.

Completely encapsulate the brazed joint and the portion of threaded rod below the concrete surface with non-conductive resin.

Allow non-conductive resin to completely cure according to the manufacturer's recommended schedule. Backfill the excavation with repair mortar ~~conforming~~ according to 01235.10 and according to 01235.44.

Measurement

01245.80 Measurement - No measurement of quantities will be made for basic continuity checks.

The quantities of additional continuity checks, excavate for continuity welds, establishing continuity, and rebar terminals will be measured on the unit basis.

Payment

01245.90 Payment - The accepted quantities of Work performed under this Section will be paid for at the Contract unit price, per unit of measurement, for the following items:

Pay Item	Unit of Measurement
(a) Basic Continuity Check	Lump Sum
(b) Additional Continuity Check	Each
(c) Excavate for Continuity Welds	Each
(d) Establish Continuity	Each
(e) Rebar Terminals	Each

Payment will be payment in full for furnishing and placing all Materials, and for ~~furnishing~~ providing all Equipment, labor and Incidentals necessary to complete the Work as specified.

Item (a) includes basic continuity checks on exposed reinforcing bars and 50 covered bars in each zone.

Item (b) includes payment for additional continuity checks resulting from finding non-continuous reinforcing bars during basic continuity checks. Additional continuity checks in excess of those specified in 01245.40 will only be paid for if directed by the Engineer.

In items (c) and (d) no separate or additional payment will be made for additional excavation required in delaminated areas to establish continuity.