MICHIGAN
DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION
FOR
STRUCTURAL STEEL DIAPHRAGMS FOR PRESTRESSED CONCRETE BEAMS

STR:MJF 1 of 2 APPR:JAB:POJ:03-18-20
FHWA:APPR:03-18-20

a. Description. This work consists of furnishing, fabricating, galvanizing, delivering, and erecting structural steel diaphragms and supports for prestressed concrete beams. Work must be in accordance with section 707 of the Standard Specifications for Construction, as detailed on the plans, and as specified herein.

b. Materials. Use structural steel in accordance with section 906 of the Standard Specifications for Construction. Galvanize structural steel in accordance with subsection 707.03.D.20 of the Standard Specifications for Construction.

Use hardware in accordance with subsection 906.07 of the Standard Specifications for Construction. Provide lock washers that are steel, regular, helical spring washers meeting the requirements of *ANSI B18.21.1* and galvanized in accordance with *ASTM A153*. Ensure coil bolts are fabricated from blanks meeting *ASTM F3125, Type 1, Grade A325* and galvanized in accordance with *ASTM A153*. Ensure concrete inserts (coil or ferrule) are electroplate galvanized in accordance with *ASTM B633, Service Condition 4*.

Use a structural adhesive anchor system that is in accordance with subsection 712.03.J of the Standard Specification for Construction.

Acceptance of fabricated elements will be based on “Fabrication Inspection” per the *Materials Quality Assurance Procedures Manual (MQAP)*. Acceptance of bolts, nuts, and washers will be based on “Test” per the *MQAP* manual.

c. Fabrication. Fabricator must possess a valid *American Institute of Steel Construction (AISC)* Certified Bridge Fabricator - Simple (SBR) certification.

Submit structural steel shop drawings for approval in accordance with subsection 707.03.A of the Standard Specifications for Construction, except files must be portable document format (PDF) files. Do not start fabrication until the drawings have been approved by the Department.

The Department will provide shop inspection in accordance with subsections 707.03.B of the Standard Specifications for Construction.

d. Construction. Use templates and pre-assembly as necessary, to ensure proper fit up of the concrete inserts and steel diaphragms. Ensure diaphragm supports are in full contact with the concrete. If holes in the supports do not line up with the concrete inserts, or the plates do not fully bear on the concrete, do not install the diaphragms. Tightening of bolts to draw the steel into place is prohibited. Modification of the diaphragm supports is required to accommodate any misalignment or lack of full bearing on the concrete. If any bolts are out-of-plumb more than 1:40, use beveled washers to reduce out-of-plumb to less than 1:40. Any bending, cutting, drilling or

other modifications made to the diaphragm supports or diaphragms requires repair of damaged galvanized surfaces in accordance with subsection 716.03.E of the Standard Specification for Construction. Notify the Engineer of any modifications and allow the Engineer to inspect modifications for approval before installation.

As an alternative to modification of the diaphragm supports to correct improper fit up, and if approved by the Engineer, new holes may be drilled in the internal beam diaphragm of box beams or the web of I and bulb-tee beams for connecting the steel diaphragms with adhesive anchors. Submit a detailed plan for approval and must include, but not necessarily be limited to, the following:

1. Location, hole diameter, and hole depth of the proposed drilling. (Ensure anchor embedment is a minimum of nine times the diameter of the anchor.)

2. A structural adhesive anchor system, along with the manufacturer's specifications for edge distance and spacing of anchors.

3. The method of locating reinforcement in the beam using non-destructive testing.

4. The method of locating the limits of the box beam internal diaphragms using non-destructive testing.

Map the location of strands, reinforcement, limits of internal diaphragms and bottom flange of the box beam on the beam along with the proposed hole locations. This is to demonstrate that reinforcement and prestressing strands will not be cut, and that the location of the diaphragm supports will not affect anchor capacity. If anchor edge distance is determined insufficient, perform and submit calculations for approval, demonstrating the diaphragm supports will have sufficient capacity. Ensure non-destructive testing technician is qualified based on experience testing the same material and depth required for the project. Obtain written approval of the plan from the Engineer prior to drilling into beams and provide the Engineer with 3 working days notification prior to drilling to allow Department representatives to inspect if needed.

Repair damage to beams as a result of field drilling holes by a method approved by the Engineer. Damage to prestressing strands will result in overall rejection of impacted beams for use.

e. Testing. Proof test and field test any installation of structural adhesive anchors in accordance with subsection 712.03.J of the Standard Specification for Construction.

f. Measurement and Payment. The completed work, as described, will be measured and paid for at the contract unit price using the following pay items:

Pay Item	**Pay Unit**
Steel Diaphragm, Prest Conc Beam, Furn and Fab	Pound
Steel Diaphragm, Prest Conc Beam, Erect	Pound

Steel Diaphragm, Prest Conc Beam, Erect will be paid for in accordance with subsection 707.04 of the Standard Specifications for Construction including approved modifications as described herein.