MICHIGAN

DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION

FOR

**PRECAST CONCRETE FASCIA PANELS**

BRG:JST 1 of 6 APPR:TEB:MJF:06-02-22

**a. Description.** This work consists of the manufacture, furnishing, and erection of precast concrete fascia panels as shown on the plans, per the standard specifications, and as contained herein.

The following definitions apply when used herein and on the plans:

1.Precast Concrete Fascia Panel. A decorative concrete facing panel that is structurally attached to a bridge superstructure. At a minimum, the system includes precast concrete panels, steel reinforcement, connecting hardware, bearings, and panel joint materials.

2.Manufacturer. The individual or legal entity that performs part of the work through a contract agreement with the Contractor. This includes an individual or legal entity that supplies materials for construction of the precast concrete fascia panels. This also includes an individual or legal entity that fabricates components of the precast concrete fascia panels.

3.Lift Designer. The individual who is a Professional Engineer licensed in the State of Michigan, is employed by a company that is a subcontractor to the Contractor and is responsible for the design and working drawings for lifting the panel required herein.

4.Lift Checker. A Professional Engineer licensed in the State of Michigan who is employed by the same company as the Lift Designer and is responsible for verifying and checking the design and working drawings developed by or under supervision of the Lift Designer.

5.LRFD. The AASHTO LRFD Bridge Design Specifications, which the design must satisfy unless otherwise specified herein.

**b. Design.** The Lift Designer is responsible for the design, procedures, and details for the lifting assembly of the precast concrete fascia panels. In the event coil threaded or ferrule loop inserts as specified, they must meet *ASTM B633, SC 1*.

**c. Submittals.** Shop drawings are required as specified in subsection 104.02 of the Standard Specifications for Construction with the modification that PDF files are required for the submittal in lieu of paper copies. The following submittals are required in connection with the precast concrete fascia panels.

1. Shop drawings indicating size, section details, inserts connections, anchorage, elevations, materials and hardware. An assembly drawing showing assembled lengths will be required.

2. Lifting Calculations. Furnish detailed design calculations, and notes on 8.5 inch by 11 inch sheets and include the Department’s project designations (control section and job number), page number, date of preparation and initials of the Lift Designer and Lift Checker.

3. Erection drawings indicating hoisting requirements, installation location and procedures.

**d. Materials.** The precast concrete fascia panel will be accepted based on “Fabrication Inspection” per the *MQAP manual*.

1. Precast Concrete Fascia Panel. Fabricate and cure panels in accordance with sections 706, 901 and 1004 of the Standard Specifications for Construction, except as specified below:

A. Concrete. Use PCC meeting the requirements for Grade 4000 concrete in accordance with section 1004 of the Standard Specifications for Construction, except as modified herein. Use coarse aggregate originating only from geologically natural sources meeting physical requirements of Michigan Class 6AAA. The nominal maximum aggregate particle size will be in accordance with *AASHTO LRFD* standards.

B. Steel Reinforcement. Use Grade 60 epoxy coated steel reinforcement in accordance with section 905 of the Standard Specifications for Construction.

C. Lifting Devices. Galvanize in accordance with *AASHTO M111M/M111*. If coil threaded or ferrule loop inserts are used then they must meet *ASTM B633, SC 1*.

D. Plates and Shims. Furnish plates and shims that are *ASTM A36/A36M* steel and are hot-dipped galvanized in accordance with *ASTM A123/A123M*. Ensure assemblies are furnished, fabricated, and installed in accordance with sections 906 and 707 of the Standard Specifications for Construction.

E. Ensure concrete inserts are either Richmond, Dayton Superior, or approved equal and should be similar to those specified for prestressed concrete box beam inserts. Ensure concrete inserts are either hot dip galvanized in accordance with *ASTM A153/A153M* or electroplate galvanized in accordance with *ASTM B633, SC 4*.

F. Ensure shear connector studs meet the requirements specified in subsection 906.09 of the Standard Specifications for Construction.

G. Acceptance of PCC for facing panels will be based upon 20SP-708A - Quality Control and Acceptance of Structural Precast Concrete, except as specified herein:

(1) Production Lot. Acceptance of concrete panels will be determined on the basis of production lots. A production lot is defined as a group of panels that will be represented by a single average compressive strength consisting of the average 28-day compressive strength of two test cylinders and will consist of either 30 panels or a single day’s production, whichever is less.

Acceptance of a production lot will be made if the compressive strength test result is greater than or equal to 4000 psi.

(2) Rejection. Units will be rejected because of failure to meet any of the requirements specified above. In addition, any, or all of the following defects, determined by the Engineer, will be sufficient cause for rejection:

(a) Defects that indicate imperfect molding.

(b) Defects indicating honeycombed or open texture concrete.

(c) Cracks or severely chipped panels.

(d) Color variation on front face of panel due to excess form oil or other reasons.

(e) Excessive surface distortion.

(f) Tolerance violation.

2.Bolts. Use galvanized high strength bolts in accordance with subsection 906.07 of the Standard Specifications for Construction. Ensure bolts are threaded or blanks that are threaded to meet the threading requirement of the insert.

3.Concrete Fascia Panel Joint Bearings. Fabricate bearings from one of the following:

A. Rubber meeting the requirements of *ASTM D2000, Grade 2, Type A, Class A, Durometer Hardness 80 ±5, Tensile Strength 7 MPa*.

B. Neoprene elastomeric pads having a durometer hardness of 55 ±5.

C. High-density polyethylene with a minimum density of 59 pcf in accordance with *ASTM D1505*.

4.Non-Shrink Grout. Use non-shrinking grout in accordance with subsection 1005.02 of the Standard Specifications for Construction.

**e. Manufacture.** Ensure the plant is certified by the PCI for Category B1 (Non-Prestressed Bridge Products). Ensure shop inspection, including fabrication notification, is in accordance with subsection 708.03.B of the Standard Specifications for Construction.

Manufacture precast concrete fascia panels in accordance with the approved working drawings and as specified below:

1.Ensure panel concrete is Grade 4000 as specified in section 1004 per subsection d.1.A of this special provision.

2. The panel fabricator must propose and submit a mix design for approval by the Engineer, 2 weeks prior to casting concrete.

3. Cast panels on a level surface and fully support them until the concrete reaches a minimum compressive strength specified by the Lift Designer. The units may be shipped after reaching a minimum compressive strength of 4000 psi.

4. Do not allow galvanized connection elements and hardware to come in contact with steel reinforcement. Furnish a minimum of 0.5 inches of clearance between galvanized elements (connections, hardware, etc) and steel reinforcement for the concrete panel. The use of spacers to achieve the 0.5 inch minimum clearance is permitted if the spacer material is HDPE or PVC.

5. Furnish a smooth surface with curved reveals for the front face of panels as indicated on the plans. Screed the rear face of panels to eliminate honeycombing and surface distortions in excess of 0.25 inches. Cast panels with the exterior face of the panel at the bottom of the pour so that entrapped air bubbles will move away from the surface during casting. Major air holes and/or honeycombed areas will be cause for rejection of the panel.

6. Clearly scribe the date of manufacture, the production lot number, and the wall panel designation on an unexposed face.

7. Manufacture all panels within the following tolerances:

A. Dimensions.

(1) The width of individual panel sections must be within ±1/2 inch of the dimension shown on the approved shop drawings. Additionally, ensure the assembled length of the panels for any span are within ±1 inch of the fascia arch panel length. For proper fit-up, the fabrication shop drawings panel dimensions must consider the prestressed box beam camber at time of erection, the beam deflection due to weight of panels and deck slab.

(2) Ensure panel thickness is within ±1/4 inch of dimension shown on the approved shop drawings.

(3) Ensure panel height is within ±1/2 inch of the dimension shown on the approved shop drawings.

(4) Ensure positioning of forms to create the smooth arch shape are within ±1/4 inch of the position shown on the approved shop drawings. Ensure alignment of architectural features and lines on each panel are within ±1/4 inch of the corresponding features and lines of an adjacent panel.

B. Squareness. Do not allow the difference between the two diagonals to exceed 0.5 inches.

C. Surface Finish. Do not allow surface defects on smooth formed surfaces to exceed 0.125 inches per foot.

8. Upon completion of casting, repair all form defects and these areas must be given grout cleaned finish as described in the *ACI’s Standard Specification for Structural Concrete for Building (ACI-301)*.

9. Test two random panels from every batch load to ensure the 150 pcf weight of panel is not exceeded.

10. Design the panels for loadings and forces which will be applied after the panels have been erected and structurally connected to the bridge superstructure. The manufacturer is required to develop a handling procedure to ensure that the panels are not overstressed during handling, shipping and/or erection. Ensure any additional reinforcing steel and/or special hoisting points which may be required are designed and furnished by the manufacturer.

11. Handle, store, and ship panels in such a manner as to minimize the risk of chipping, discoloration, cracks, fractures, and excessive bending stresses. Support panels in storage on firm blocking to protect the panel connection devices and the exposed exterior finish.

Prevent damage to panels in handling, shipping and erecting activities. Either structural damage or architectural damage (such as chips, scrapes, etc.) may be cause for rejection of the panels. The Engineer will review all damages which may occur and will approve or reject panels before, during and after they are structurally connected to the superstructure.

**f. Construction.** Furnish an on-site technical representative from the Manufacturer, as necessary or as requested by the Engineer, during the wall erection to assist the Contractor and Engineer. Furnish the Engineer with a copy of the Manufacturer’s construction manual prior to erection. Ensure construction is in accordance with the approved working drawings and as specified herein.

1.Position fascia panels to align the architectural elements of adjacent panels within 1/4 inch of assumed true lines (or curves) shown on the approved shop drawings. Unless otherwise permitted by the Engineer, erection must begin at the center of each span and proceed toward the ends to minimize the accumulation of permitted tolerances.

2. Connect fascia panels to fascia beams by threaded rods in accordance with the details shown on the plans. Maintain the alignment and position of the panels. The Contractor is responsible for designing and installing all braces, ties and hardware necessary to avoid displacing the panels while making this structural connection.

3. Tighten hex nuts to a snug tight fit in accordance with subsection 707.03.E.6.c of the Standard Specifications for Construction.

4. Ensure panels which are damaged during shipping, erecting or other manufacture or construction activities, and which are not rejected by the Engineer, are repaired by methods approved by the Engineer.

5. Ensure any portion of the completed work that does not match the workmanship, color and detail of the other panels are removed and replaced. All costs associated with this removal and replacement will be borne by the Contractor.

**g. Measurement and Payment.** The completed work, as described, will be measured as a lump sum and paid for at the contract price using the following pay items:

**Pay Item Pay Unit**

Precast Conc Fascia Panels, Furn (Structure Identification) Lump Sum

Precast Conc Fascia Panels, Erect (Structure Identification) Lump Sum

1. **Precast Conc Fascia Panels, Furn** **(Structure Identification)** includes manufacturing the panels, including bolts and hardware, shear connector studs, concrete inserts, shims, plates, concrete, and steel reinforcement. Delivery of panels to the project site is included with this pay item.

2. **Precast Conc Fascia Panels, Erect** **(Structure Identification)** includes setting the panels to the correct line and grade.