



Iowa Department of Transportation

SPECIAL PROVISIONS FOR PRECAST CONCRETE APPROACH SLAB ELEMENTS

Pottawattamie County
BRF-006-1(114)--38-78

Effective Date
February 15, 2011

THE STANDARD SPECIFICATIONS, SERIES 2009, ARE AMENDED BY THE FOLLOWING MODIFICATIONS AND ADDITIONS. THESE ARE SPECIAL PROVISIONS AND THEY SHALL PREVAIL OVER THOSE PUBLISHED IN THE STANDARD SPECIFICATIONS.

090109.01 DESCRIPTION.

- A. Furnish, erect, and install precast concrete approach slab elements including interior and exterior approach slabs and sleeper slab, herein referred to as precast element(s). This work includes all necessary materials and equipment to complete the work as shown on the plans. The use of cast-in-place concrete will not be considered for substitution.
 - 1. **Interior Approach Slab.**
Includes precast concrete approach slabs, epoxy-coated reinforcing, UHPC closure pours, steel rods, resilient joint fillers, pressure relief joint Type CF, lifting anchors, and polyethylene sheet.
 - 2. **Exterior Approach Slab.**
Includes precast concrete approach slabs, epoxy-coated reinforcing, steel rods, resilient joint fillers, pressure relief joint Type CF, lifting anchors, and polyethylene sheet.
 - 3. **Sleeper Slab.**
Includes precast concrete sleeper slab, epoxy-coated reinforcing, and lifting anchors.
- B. Apply Sections 2403, 2404, 2407, and Divisions 11 and 41 of the Standard Specifications with the following modifications.
- C. **Submittals.**
The submittals requiring written approval from the Engineer are as follows:
 - 1. **Assembly Plan.**
 - a. Prepare the assembly plan under the seal of a Professional Engineer licensed in the State of Iowa. Place the title block with project information (similar to plans title block) in the lower right-hand corner of each sheet. Submit 7 sets of half-size, 11 inch by 17 inch sheets with a 1 1/2 inch blank margin on the left-hand edge, for approval 28 days before fabrication.

- b. The assembly plan shall include, but not necessarily be limited to, the following:
 - A work area plan, depicting utilities overhead and below the work area, drainage inlet structures, protective measures, etc.
 - Details of all equipment that will be employed for the assembly of the approach slab.
 - Details of all equipment to be used to lift precast elements including cranes, excavators, lifting slings, sling hooks, jacks, etc. Include crane locations, operation radii, lifting calculations, etc.
 - Detailed sequence of construction and a CPM schedule for all operations. Account for setting and cure time for concrete closure pours.
 - Methods of providing temporary support of the precast elements. Include methods of adjusting and securing the element after placement.
 - Procedures for controlling tolerance limits both horizontal and vertical.
 - Methods of forming closure pours.
 - Methods for curing closure pour concrete.
 - Method for diamond grinding to achieve roadway profile and longitudinal grooving.

2. Shop Drawings for Precast Elements.

- a. Prepare shop drawings under the seal of a Professional Engineer licensed in the State of Iowa. Place the title block with project information (similar to plans title block) in the lower right-hand corner of each sheet. Submit 7 sets of half-size, 11 inch by 17 inch sheets with a 1 1/2 inch blank margin on the left-hand edge, for approval 28 days before fabrication.
- b. The shop drawings shall include, but not necessarily be limited to, the following:
 - Show all lifting inserts, hardware, or devices and locations on the shop drawings for Engineer's approval.
 - Show locations and details of the lifting devices, including supporting calculations, type, and amount of any additional reinforcing required for lifting.
 - Show minimum compressive strength attained prior to handling the precast elements.
 - Show details of vertical adjusting hardware, if any.
- c. Do not order materials or begin work until receiving final approval of the shop drawings. The Contracting Authority will reject any precast element fabricated before receiving written approval, or any precast elements that deviate from the approved drawings. The Contractor shall be responsible for costs incurred due to faulty detailing or fabrication.

3. Concrete Requirements.

For alternate concrete mix, self-consolidating concrete shall comply with Material I.M. 445, Appendix D. Alternate mix designs will be approved by the District Materials Engineer. For closure pour concrete, submit ultra-high performance concrete mix designs to the engineer for approval.

4. Defects and Breakage of Precast Elements.

Submit proposed written repair procedures for approval.

090109.02 MATERIALS.

A. Concrete.

- 1. Precast elements: High performance concrete shall conform to Section 2407 in the Standard Specifications and as required in the plans. Site-casting shall conform to the Alternate Site Casting provisions listed in the plans and materials must be approved by the District Materials Engineer prior to any concrete casting.
- 2. Closure Pour and Lifting Hole Concrete: Conform to Special Provisions for Ultra High Performance Concrete.

B. Reinforcing Steel.

1. Conform to Section 2404 of the Standard Specifications.
2. Use epoxy coated reinforcing steel in all precast elements.

C. Polyethylene Sheet Bond Breaker Material.

Provide low density polyethylene sheet meeting the requirements of ASTM D 4635 that will allow for sliding of the structural concrete after placement. Supply sheets that are a minimum of 4 mil thick.

090109.03 CONSTRUCTION.**A. Quality Assurance.**

The following requirements for precast elements shall be met:

1. Provide precast elements produced in a plant for which equipment, procedures and quality of concrete have been approved by the Contracting Authority prior to letting per Materials I.M. 445. Site-casting shall conform to the Alternate Site Casting provisions listed in the plans and procedures must be approved by the District Materials Engineer prior to any concrete casting.
2. Permanently mark each precast element with date of casting and supplier identification. Stamp markings in fresh concrete.
3. Prevent cracking or damage of precast elements during handling and storage.
4. Replace defects and breakage of precast elements according to the following:
 - Precast elements that sustain damage or surface defects during fabrication, handling, storage, hauling, or erection are subject to review or rejection.
 - Obtain approval before performing repairs.
 - Repair work must reestablish the precast elements' structural integrity, durability, and aesthetics to the satisfaction of the Engineer.
 - Determine the cause when damage occurs and take corrective action.
 - Failure to take corrective action, leading to similar repetitive damage, can be cause for rejection of the damaged precast element.
 - Cracks that extend to the nearest reinforcement plane and fine surface cracks that do not extend to the nearest reinforcement plane but are numerous or extensive are subject to review and rejection.
 - Full depth cracking and breakage greater than one foot are cause for rejection.
5. Construct precast elements to tolerances in conformance with Section 2407 of the Standard Specifications and as shown on the plans.
6. The plant (or fabricator) will document all test results. The quality control file will contain at least the following information:
 - Precast element identification
 - Date and time of cast
 - Concrete cylinder test results
 - Quantity of used concrete and the batch printout
 - Form-stripping date and repairs if applicable
 - Location/number of blockouts and lifting inserts
 - Temperature and moisture of curing period
 - Document lifting device details, requirements, and inserts

B. Fabrication.

1. Precast elements shall conform to Section 2407 of the Standard Specifications. Site-casting shall conform to the Alternate Site Casting provisions listed in the plans and materials and procedures must be approved by the District Materials Engineer prior to any concrete casting.
2. Do not place concrete in the forms until the Engineer has inspected the form and has approved all materials in the precast elements and the placement of the materials in the form.
3. Provide the Engineer a tentative casting schedule at least two weeks in advance to make inspection and testing arrangements. A similar notification is required for the shipment of precast elements to the job site.
4. Removal of forms shall conform to Section 2407 of the Standard Specifications. Minimum compressive strength prior to moving unit shall be 4500 psi.
5. Continuously wet cure the precast elements for 7-days commencing immediately after final finishing with all exposed surfaces covered. The precast elements will have a minimum cure of 14 days prior to placement.
6. Supply test data such as slump, air voids, or unit weight for the fresh concrete and compressive strengths for the hardened concrete after 7, 14, and 28 days, if applicable
7. Finish the precast elements according to Section 2407 of the Standard Specifications. The top surface (wearing surface) of the approach slab precast elements shall have a texture applied conforming to Section 2301.03, H, 2, of the Standard Specifications.

C. Handling, Storing, and Transportation.

1. Handling and Storing.

- a. Follow Chapter 5 of the PCI Design Handbook for handling and erection bracing requirements.
- b. Precast elements damaged during handling and storage will be repaired or replaced at the Contract Authority's direction at no cost to the Contract Authority.
- c. Precast elements shall be lifted at the designated points by approved lifting devices embedded in the concrete and proper hoisting procedures. The Contractor is responsible for handling stresses in the precast elements and shall include all necessary precast element modifications to resist handling stresses on the shop drawings.
- d. Storage areas shall be smooth and well compacted to prevent damage due to differential settlement. Stacks of precast elements may be supported on the ground by means of continuous blocking located perpendicular to the strands at the ends. Intermediate blocking between precast elements shall be located directly over the blocking below.
- e. Precast elements shall be protected from freezing temperatures (0 deg C, 32 deg F) for 5 days or until attaining design compressive strength detailed on the plans, whichever comes first. Do not remove protection any time before the units attain the specified compressive strength when the surrounding air temperature is below 20°F.
- f. Precast elements may be loaded on a trailer as described above. Shock-absorbing cushioning material shall be used at all bearing points during transportation of the precast elements. Tie-down straps shall be located at the lines of blocking only.
- g. The precast elements shall not be subject to damaging torsional, dynamic, or impact stresses.

2. Transportation.

- a. A precast element shall not be transported from the casting yard until the minimum 28 day compressive strength specified on project plans has been attained as shown by test

cylinders cured in accordance with AASHTO T 23, and a minimum of 7 days has elapsed from casting of the precast elements.

- b. Material, quality and condition after shipment will be inspected after delivery to the construction site, with this and any previous inspections constituting only partial acceptance.

D. General Procedure for Installation of Precast Elements.

1. After properly backfilling, grading, and compacting approach roadway base material per project plans, establish working points, working lines, and benchmark elevations prior to placement of all precast elements.
2. Lift sleeper slab precast element using lifting devices as shown on the shop drawings.
3. Place sleeper slab precast elements as shown on the plans. Set sleeper slab in the proper horizontal location. Survey the top elevation of the sleeper slab. Check for proper alignment and grade within specified tolerances.
4. Install polyethylene sheeting (bond breaker) as shown on the plans.
5. Lift approach slab precast elements using lifting devices as shown on the shop drawings.
6. Set approach slab precast elements in the proper location. Survey the top elevation of the approach slab. Check for proper alignment and grade within specified tolerances.
7. Saturate surface dry (SSD) all closure pour surfaces prior to connecting the approach slab precast elements.
8. Set compression seal as shown on the plans.
9. Cast UHPC closure pours as shown on the plans. Cure closure.
10. Do not apply superimposed dead loads or live loads to the precast concrete approach slab until the compressive test result of the cylinders for the UHPC closure pour concrete has reached a minimum compressive strength of 14 KSI.

E. Diamond Grind Approach Slab.

1. Diamond grind the approach slab for profile improvement as required by the plans, in conformance with Section 2532 of the Standard Specifications. Diamond grinding of the precast concrete approach slab shall not begin until the UHPC closure pour concrete has reached the specified minimum compressive strength of 14 KSI.
2. Contractor to bid diamond grinding based on the type of coarse aggregate in the concrete mix for bridge decks. For plant precasting of ABC components, coarse aggregate shall be in accordance with Section 2407 of the Standard Specifications. For alternate fabrication of ABC components at a temporary casting facility, coarse aggregate shall be in accordance with the Developmental Specification for High Performance Concrete for Structures (Council Bluffs System).

F. Saw Cut Groove Texture Finish.

Saw cut longitudinal grooves into top of precast approach slab using a mechanical cutting device after diamond grinding is completed. Saw cutting grooves shall conform to Section 2412.03, D, 4, of the Standard Specifications.

090109.04 METHOD OF MEASUREMENT.

A. Interior Approach Slab.

The Engineer will determine the number of interior approach slabs from actual count (Each).

B. Exterior Approach Slab.

The Engineer will determine the number of exterior approach slabs from actual count (Each).

C. Sleeper Slab.

The Engineer will determine the number of sleeper slabs from actual count (Each).

090109.05 BASIS OF PAYMENT.

A. Interior Approach Slab.

Payment will be full compensation for the manufacturing, furnishing, and placement of each interior approach slab. All items required to assemble each interior approach slab into a precast concrete approach slab per the plans, including labor, materials and equipment, shall be considered incidental to this item and will not be paid for separately.

B. Exterior Approach Slab.

Payment will be full compensation for the manufacturing, furnishing, and placement of each exterior approach slab. All items required to assemble each exterior approach slab into a precast concrete approach slab per the plans, including labor, materials and equipment, shall be considered incidental to this item and will not be paid for separately.

C. Sleeper Slab.

Payment will be full compensation for the manufacturing, furnishing, and placement of each sleeper slab. All items required to assemble each sleeper slab into a precast concrete approach slab per the plans, including labor, materials and equipment, shall be considered incidental to this item and will not be paid for separately.