

Kiewit Infrastructure West Co.  
Klamath River Renewal Project  
Technical Specifications

## 03 10 00 CONCRETE FORMING AND ACCESSORIES

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### REVISION INDEX

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### SECTION 03 10 00 – CONCRETE FORMING AND ACCESSORIES

#### PART 1 - GENERAL

##### 1.1 SUMMARY

- A. This Section applies to design, construction, erection, use and removal of forms, formwork and falsework required for Cast-In-Place Concrete shown or indicated on the Drawings or in the Specifications.

##### 1.2 RELATED SECTIONS

- A. Section 03 20 00 – Concrete Reinforcement.
- B. Section 03 30 00 – Cast-in-Place Concrete.
- C. Section 03 37 13 – Shotcrete.

##### 1.3 REFERENCE STANDARDS

- A. Applicable Federal or State Building Code.
- B. American Concrete Institute (ACI):
  - 1. ACI 301 - Specifications for Structural Concrete.
  - 2. ACI 347 - Guide to Formwork for Concrete.
  - 3. ACI SP-4 - Formwork for Concrete.

##### 1.4 SUBMITTALS

- A. Items listed in this section are to be submitted to the Engineer for information prior to the start of any Works.
- B. Submit formwork/lift drawings and structural design calculations for all formwork and falsework for which engineering design is required by a civil engineer registered in the applicable State. In general, the lift drawings should show:
  - 1. Type of forming materials.
  - 2. Falsework and formwork support system details.

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3. Maximum permitted vertical pour rate for the various concrete mixes.
  4. Methods of fixing reinforcing and conduit.
  5. Direction of form material.
  6. Location of tie rods and tie cones.
  7. Form joints, construction joints, blockouts, bulkheads.
  8. Locations of embedded plates and anchor bolts cast into concrete.
  9. Location of reveals, rustication strips and method of fixing to formwork.
  10. Form connection and corner details including sealing forms between construction joints.
  11. Locations and sizes of blockouts for mechanical ducts, sleeves, chases, etc.
- C. Review of formwork drawings will be for information and general conformance to the design intent and construction sequences only and will not constitute acceptance of structural adequacy of formwork. It is the sole responsibility of the Contractor to ensure the forms are designed and built to provide adequate strength, rigidity, and safety.

### 1.5 QUALITY ASSURANCE

- A. Formwork and Falsework Design:
1. Design formwork and falsework in accordance with ACI 347 and ACI SP-4.
  2. Design and engineering of formwork, shoring and falsework is the responsibility of the Contractor. Retain a civil engineer registered in the applicable State to provide complete designs, drawings and instructions for forms, falsework, shoring and re-shoring for the project.
  3. Make due provisions for the effects of various concrete mixes, in particular the effects for admixtures such as retarders, accelerators and plasticizers.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE AND DESIGN CRITERIA

- A. Design, engineer, and construct formwork, shoring, and bracing according to ACI 301, ACI 347 to conform to the design and applicable Code and Building Code requirements to achieve concrete shape, line, and dimension as indicated on Drawings.

### 2.2 FORMWORK MATERIALS

- A. Formwork Materials: shall be approved for the intended use.

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- B. Use a compatible forming hardware system to maintain specified tolerances for finished surfaces.

### 2.3 FORMWORK ACCESSORIES

#### A. Form Ties:

1. Designed to prevent form deflection and to prevent spalling concrete surfaces upon form removal.
2. Tie cones for exposed finishes: Plastic tapered cones 2 1/2 inch deep and 1 1/2 inch face.
3. The portion of ties remaining in concrete after removal (if any) to be at least 1 1/2 inch from the outer concrete surface. Fill resulting recesses as specified in Section 03 30 00 – Cast-in-Place Concrete.
4. Tie hole plugs for concealed finishes, including foundation walls and other elements below grade: For permanent concrete works, remove tie cones and patch tie holes flush with surrounding surface as specified in Section 03 30 00 – Cast-in-Place Concrete.

#### B. Form Release Agent:

1. Form Release Agent: Chemical non-staining release agent not affecting the concrete surface and not affecting the application of finish treatment. Use in strict accordance with the manufacturer's recommendations.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verify lines, levels, and centers before proceeding with formwork.

### 3.2 FORMWORK AND FALSEWORK

- A. Construct forms complying with ACI 347 to the exact sizes, shapes, lines, and dimensions shown and as required to obtain accurate alignment, location, grades, level and plumb work in finish structure.
- B. Fabricate forms for easy removal without hammering or prying against concrete surfaces.

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- C. Construct forms and falsework with sufficient strength to structurally support the Work, and withstand the pressure resulting from placement and vibration of the concrete and maintain them rigidly in position during concrete placement.
- D. Construct forms sufficiently tight to prevent loss of mortar from the concrete.
- E. Corner treatment:
  - 1. Form corners accurately to produce uniformly straight lines and tight edge joints on exposed concrete. Tape or caulk joints to prevent leakage at corners of walls, columns, and beams.
  - 2. All concrete corners (exposed, permanent works only) shall have a 1-inch chamfer formed from a 1 x 1 inch triangular timber, plastic or other approved material unless specified otherwise on the Drawings.
- F. The Contractor shall inspect formwork prior to placing concrete for purpose of reviewing cleanliness, and for general conformance with the Drawings. Third party inspection will not relieve the Contractor of his responsibility to construct and erect forms safely.

### 3.3 CONSTRUCTION JOINTS

- A. Locate construction joints only where shown and as detailed or where pre-approved by the Engineer.

### 3.4 INSERTS, BLOCKOUTS, CONDUIT AND OPENINGS

- A. Provide all openings and blockouts shown or otherwise required by civil, mechanical, electrical, and other trades.
- B. Openings not shown on the Drawings must be pre-approved by the Engineer. Approval of the size, type and position of any holes required by the Contractor must be obtained prior to installation of such items.
- C. Unless otherwise specified or approved, form all holes at the time of placing concrete. No part of the concrete walls or slabs may be drilled or cut away without prior approval by the Engineer.

### 3.5 EMBEDDED ITEMS

- A. Set all embedded items such as anchor bolts, and other such items required to be anchored in the concrete before the concrete is placed.

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### 3.6 FORMWORK REMOVAL

- A. Do not remove formwork and falsework supporting concrete, such as slabs and beams unless:
  - 1. The concrete has attained at least 70% of the specified compressive strength as verified by testing field cured concrete cylinders.
  - 2. The concrete has attained a compressive strength twice that which will be induced in any part of the structure due to self-weight and construction loads.
- B. Remove form ties carefully to avoid marking concrete and allow for patching or filling with tie plugs.

### 3.7 REUSE OF FORMS

- A. When forms are reused for successive concrete placement, thoroughly clean surfaces, remove fins and laitance, and tighten forms to close all joints.
- B. Replace split, frayed, de-laminated or otherwise damaged form facing material.

### 3.8 TOLERANCES

- A. The forms constructed tolerance and surface tolerances shall be in compliance with the requirements of Section 03 30 00 – Cast-in Place Concrete.

### 3.9 PROTECTION AND CLEAN-UP

- A. At completion and during progress of the work maintain premises in a neat and orderly manner. Dispose of all rubbish, construction debris and surplus materials at least on a weekly basis.
- B. Cover and protect the work from damage by work of other sections.
- C. Protect the work of other sections from damage resulting from the work of this section.

END OF SECTION 03 10 00