

## SECTION 03100

### CONCRETE FORMWORK

#### PART 1 - GENERAL

##### 1.1 Summary

A. This Section includes formwork for cast-in-place concrete.

##### B. Related Work Specified Elsewhere

Concrete Reinforcement .....Section 03200  
Concrete.....Section 03300  
Concrete Curb, Gutter, Sidewalk, and Driveways.....Section 03310

##### 1.2 Quality Assurance

##### A. Reference Standards and Specifications

##### 1. American Concrete Institute (ACI)

ACI 301 - Specifications for Structural Concrete for Buildings.

ACI 318 - Building Code Requirements for Reinforced Concrete.

ACI 347 - Recommended Practice for Concrete Formwork.

##### 2. American Society for Testing and Materials (ASTM)

ASTM C31 - Making and Curing Concrete Test Specimens in the Field.

#### PART 2 - MATERIALS

##### 2.1 Materials for Facing

##### A. Where concrete will be exposed to view after construction:

1. Smooth finish, Exterior grade plywood at least 5/8 inch thick.
2. Steel.

**B. Where concrete will not be exposed to view after construction:**

1. Exterior grade plywood at least 5/8 inch thick.
2. Steel.
3. Wood fiberboard.
4. Dressed lumber free of loose knots.

**C.** Treat forms with lacquer, form oil, or other acceptable material to prevent bonding to concrete. Material shall not stain, cause injury to exposed concrete surfaces, or affect bonding of specified surface finishes. Bond breaker shall be VOC compliant with maximum 600 g/L (5 lbs/gal) or less where area restrictions are more stringent.

**D.** Clean forms of sawdust, dust, dirt, and other foreign materials.

**2.2 Form Ties**

- A.** Break-back, coil, or screw-type, except where otherwise specified.
- B.** Water-seal coil type or break-back water-seal type in walls below grade and walls of water-bearing structures.
- C.** All types shall leave conical depression in concrete.
- D.** Removable tapered tie system shall not be used.
- E.** Space as required against pressure of fresh concrete.

**2.3 Chamfer Strips**

- A.** Chamfer: 3/4-inch except where otherwise indicated.
- B.** Place in all forms to provide chamfer where concrete will have exposed projecting corners.

## **PART 3 - EXECUTION**

### **3.1 Form Construction**

- A.** Conform to ACI 301, 318, and 347, except Shop Drawings for formwork, shoring, and reshoring shall not be submitted to the Engineer for approval.
- B.** Adequately brace, stiffen, and support forms to prevent perceptible deflection or settlement, and to hold plumb, level, and true to line.
- C.** Construct and maintain forms to the tolerances given in ACI 301, Section 4.
- D.** Construct sufficiently tight to prevent mortar leakage.
- E.** Avoid offsets between adjacent forms and construct so that shores, braces, and stiffening members are in line with those below.
- F.** Space studs and stringers as required to support facing against concrete pressure, but not more than 12 inches for 5/8-inch plywood or 16 inches for 3/4-inch plywood.
- G.** Use wales, strongbacks, shores, and bracing as required.
- H.** Form all necessary openings where indicated or as required for the Work.
- I.** Construct forms to be removable in sections without marring concrete surface.
- J.** Surface of forms shall provide smooth, dense, plane surface to finished concrete where exposed to view.
- K.** Contractor shall be responsible for structural adequacy, design, engineering, and construction of the formwork.

### **3.2 Time-in-Place for Forms**

- A.** No shores, bracing, supports, or other formwork shall be loosened or removed until the concrete members supported thereby have acquired sufficient strength to support safely their own weight and any other possible loads.

- B. The minimum time between concrete placement and form removal shall be determined either by field-cured, test-cylinder specimens or in accordance with the time specified for the member involved.
- C. If **CONTRACTOR** elects to determine the required time by means of test specimens, all costs in connection therewith shall be his responsibility.
- D. Test specimens shall be made, field-cured, and tested as specified in ASTM C31. No forms or supports shall be loosened or removed until tests indicate strength of members as follows:

<u>Percent of Design</u>	<u>Compressive Strength</u>
<u>Structural Member</u>	
Unshored slab and beam forms or forms which can be removed without disturbing shores .....	70
Slab or beam shoring .....	85
Wall, column, and beam side forms .....	40

- E. If field-cured test cylinders are not used as the basis for determination of time-in-place for formwork, the following criteria shall apply:

<u>Structural Member</u>	<u>Time-in-Place for Forms*</u>
Slab or beam shoring .....	12 days
Slab forms or beam soffits .....	7 days
Wall, column, and beam side forms .....	18 hours

\*These periods are a cumulative number of days or fractions thereof, not necessarily consecutive, during which the temperature of the concrete surface is above 50°F.

**3.3 Removal of Forms:** Remove forms in a manner to avoid damage to the structure, with particular care for corners and edges.

**PART 4 - MEASUREMENT AND PAYMENT – Not Applicable**

\*\*END OF SECTION\*\*