

SECTION 031100 – CONCRETE FORMING

Scope:

Contractor shall furnish all labor, equipment and materials to install the concrete formwork as required by the concrete outlines shown and indicated on the Drawings and specified in this Section.

Submittals:

- A. Provide manufacturer's product data sheets fully describing the form releasing agent to be used in the work.
- B. Provide Certification that the plywood panels used in the work meet the specified standard.

Products:

- A. **Forms:** Formwork shall comply with ANSI A10.9 and OSHA Construction Standards, Part 1926, Subpart Q, Concrete, Concrete Forms and Shoring. In addition, the form designs shall meet the requirements of ACI 347.
 - (1) **Smooth Form Finish:** Forms shall produce a smooth, dense, uniform texture on the concrete. Form facing shall be plywood meeting the requirements of the U.S. Department of Commerce Product Standard (PS), PS 1 – Construction and Industrial Plywood, B-B Concrete Form Panels. The arrangement of the facing material shall be orderly with the number of seams kept to a practical minimum. Alternatively, patented forms may be used, subject to acceptance by the Owner, provided they produce a smooth, even surface. This acceptance is for the finish these forms will leave on the contact surfaces and will not relieve the Contractor of the responsibility for the design and structural soundness of the forms. Patented forms shall be lined with the specified plywood. Plywood panels and form liners shall not be used more than three times unless further use is acceptable to Owner.
 - (2) **Rough Form Finish:** Forms used for this finish may be the same as those used for the smooth form finish or may be constructed of used plywood panels, unlined steel forms or straight dressed lumber.
- B. **Form Releasing Agent:** Form releasing agent shall be non-staining mineral oil or equivalent product.
- C. **Form Ties:** Form ties shall be of the cone nut threaded rod, or standard snap-tie type, and designed so that when removed no metal will be left closer than 1-1/2 inch from the finished wall face. The cavities left in faces of concrete work by the form ties shall be at least 1-inch in diameter so that they may be pointed-up with non-shrink mortar. Form ties shall have a minimum working strength of not less than 3,000 lbs or as required by the patented form design where patented forms are used, when fully assembled, and shall be as approved by the Owner.

Implementation:

- A. **Storage and Protection of Forms:** All form materials and accessories shall be stored above ground on framework or blocking, shall be protected from precipitation and shall have adequate air circulation and ventilation.
- B. **Building of Forms:** Form work shall be built to conform to the shape, lines, and dimensions of the concrete work as shown. Forms shall be set to line and grade, and shall be braced, tied, and secured in a manner which will withstand placing of the concrete, and which will

maintain shape and position. Forms shall be tight, and be substantially assembled to prevent bulging and the leaking of concrete. Construct forms so that they can be removed readily without hammering or prying against concrete. Joints shall be arranged vertically or horizontally and shall be butted tight. Temporary openings shall be arranged, where required, at the bottoms of wall forms and elsewhere, to facilitate cleaning and inspecting. Lumber used once in forms shall have nails removed and surfaces in contact with concrete work thoroughly cleaned before reuse. Wall sleeves, inserts, and openings required in concrete work shall be properly set in form work. The use of reinforcing steel, partially embedded in concrete, as toe pins or form spacers is prohibited.

- C. Chamfer Strips:** Forms shall be chamfered 1-inch for all exterior corners of concrete including top of walls.
- D. Shoring:** Shores shall be used where necessary. If adequate foundations for shores cannot be obtained, trussed supports shall be provided. Structural members and other work, which will be subject to additional loads during construction, shall be adequately shored to protect that work from distortion and damage.
- E. Form Coating:** Prior to placing of reinforcing steel, faces of all forms to be in contact with the concrete shall receive a thorough coating of the form release agent, applied in compliance with the manufacturer's recommendations.
- F. Tolerances:** Variation in the final placed concrete from the drawings will be no more than the following:
 - (1) Variation of the linear building lines from established positions shown in plans shall not vary by more than 1/2 inch in any 20 foot length and 1 inch for the entire length of the structure.
 - (2) Variation in sizes and locations of openings shall not exceed 1/4 inch.
 - (3) Variation in slab and wall thickness shall not exceed -1/4 inch and +1/2 inch.
 - (4) Variations in footings shall not exceed -1/2 inch or +2 inches. Misplacement or eccentricity shall not exceed two percent of the footing width or 2 inches overall. No decrease in footing thickness will be allowed.
- G. Form Removal:** Forms shall not be removed until the member supported thereby has acquired sufficient strength to safely support its own weight, and the load imposed on it. Tie rod clamps, which are to be entirely removed from walls, shall be loosened 24 hours after concrete has been placed. Standard snap ties shall be removed when forms are stripped; care shall be taken to avoid spoiling concrete surfaces. Do not leave ties protruding from the wall. Under normal conditions, the time elapsing before the forms may be stripped shall be not less than that shown in the following schedule. If additional test cylinders are taken, forms for work not supporting loads can be removed when the compressive strength of the cylinders broken reaches 1200 psi. The use of the schedule for early breaks shall not relieve the Contractor from his responsibility for the safety of the structure. Wood forms shall be completely removed from all portions of the work so that no material will remain for termite infestation.

Table 3-1 Form Stripping Table	Cold Weather	Normal Weather
Beams and Slabs (Suspended not on Grade)	14 Days	14 Days
Columns and Pedestals and Walls Supporting Other Work	7 Days	7 Days
Walls and Vertical Faces not Supporting Other Work	3 Days	2 Days

END OF SECTION