CONCRETE FORMWORK

1. GENERAL

1.1 Work Included

.1 Forms and supporting falsework design.

.2 Wood or steel forms for all cast-in-place concrete.

.3 Shoring, bracing and anchorage.

.4 Form openings for other trades.

.5 Coordinate installation of concrete accessories.

.6 Set anchor bolts, anchors, sleeves, frames and other items supplied by other trades.

.7 Clean and oil erected formwork prior to concrete placement.

.8 Remove forms and supporting falsework.

1.2 Design Standards, Code Requirements

.1 Design, construct, and erect supporting formwork and falsework in accordance with the National Building Code of Canada, CSA-A23.1, CSA S269.1, ACI 347R, and applicable construction safety regulations

1.3 Quality Assurance

.1 Construct and erect concrete formwork in accordance with CSA-A23.1, CSA-S269.3, ACI 347R, and all applicable construction safety regulations for the place of work.

2. PRODUCTS

2.1 Materials

.1 For exposed surfaces: Square-edged, smooth-surfaced panels, true in plane and free of holes, surface markings, or defects.

.2 For Unexposed Surfaces: Square-edged plywood suitable to retain concrete without leakage or distortion.

.3 Wood Materials:

.1 Plywood: Douglas Fir, conforming to CSA O121-M, solid one side select sheathing-tight face grade. Sound, undamaged sheets with clean true edges.

.2 Lumber: Conforming to CSA O141-M.

.3 Nails, Spikes and Staples: galvanized or phosphatized; conforming to CSA B111.

.4 Prefabricated Forms:

.1 Steel Type: Minimum 1.6 mm steel thickness; well matched, tight fitting and adequately stiffened to support the weight of concrete without deflection detrimental to structural tolerance and appearance of finished concrete surface.

.5 Accessories:

.1 Form Ties: Plastic cone type fixed or adjustable length; minimum working strength of 13 kN. Wire ties are not permitted. Form ties shall be subject to acceptance by Contract Administrator.

.2 Form Release Agent: Colourless mineral oil, which will not stain concrete or impair natural bonding of quarry tile or colour characteristics of coating intended for use on concrete.

.3 Corner or Chamfer Fillets: Extruded plastic or mill finish pine, 25 mm width, maximum possible lengths, mitre ends.

.4 Sealing Tape: Reinforced, self-adhesive polyvinyl-chloride.

3. EXECUTION

3.1 Erection

.1 Verify lines, levels and centres before proceeding with formwork. Ensure dimensions agree with the Drawings.

.2 Construct formwork and falsework to meet design and regulatory requirements and to produce finished concrete conforming to surfaces, shapes, lines and dimensions indicated on the Drawings. Ensure visible lines follow smooth profile both vertically and horizontally.

.3 Arrange and assemble formwork to permit removal without damage to concrete.

.4 Align joints and make watertight to prevent leakage of cement paste and disfiguration of concrete. Keep form joints to a minimum.

.5 Provide falsework to ensure stability of formwork. Prop or strengthen all previously constructed parts liable to be overstressed by construction loads.

.6 Position form joints to suit any expressed lines required in exposed concrete. Arrange form board panels in a regular symmetrical pattern to the acceptance of the Contract Administrator.

.7 Provide chamfer, sizes to match existing chamfers, on all internal and external corners and edges, vertical and horizontal, of exposed concrete unless shown otherwise.

.8 Form chases, slots, openings, drips and recesses as detailed on the Drawings.

.9 Set screeds with top edge level to required elevations.

.10 Check and re-adjust formwork to required lines and levels during placing of concrete.

3.2 Tolerances

.1 Construct formwork and all supporting or bracing members to produce concrete with dimensions, lines, and levels within tolerances specified in ACI 347.

.2 Construct formwork to produce concrete with dimensions, lines, and levels within the following tolerances. Tolerances are not cumulative.

.1 Deviation from Vertical Line, for Supports and Thrust Blocks: 6 mm in 3 m, 9 mm in 6 m; 10 mm maximum.

.2 Deviation from Flat Surface for Equipment Pads: 3 mm in 3 m; maximum 6 mm.

.3 Deviation from Horizontal Line: 6 mm in 3 m; maximum 10 mm.

.4 Deviation in Cross-sectional Dimensions of Columns, Piers, and Walls or Thickness of Slabs: +6 mm /-0 mm.

.3 If tolerances are exceeded, remove, replace or modify placed concrete as directed by the Contract Administrator at no cost to the City.

3.3 Embedded Items

.1 Provide formed openings where required for pipes, conduits, sleeves and other work to be embedded in and passing through the concrete members.

.2 Accurately locate and set in place, items which are to be cast directly into concrete.

.3 Coordinate the work of other Sections and cooperate with trades involved in forming openings, slots, recesses, chases and setting sleeves, bolts, anchors and other inserts.

.4 Coordinate installation of concrete accessories specified in Section 03250.

.5 Set anchor bolts, sleeves and inserts accurately at the positions designated. Secure in position by means of wooden templates and ties to prevent shifting and floating during concrete placement.

.6 Do not set anchor bolts, sleeves and inserts into placed concrete.

3.4 Field Quality Control

.1 Inspect and check complete formwork, falsework, shoring and bracing to ensure that the work is in accordance with formwork design and that supports, fastenings, wedges, ties and parts are secure.

.2 Inform the Contract Administrator when the formwork is complete and has been cleaned to allow for review. The Contract Administrator's review will be for verification that forms are clean and free from debris.

.3 Allow the Contract Administrator to inspect each section of formwork prior to reuse. Formwork may be reused if accepted by the Contract Administrator.

3.5 Preparation

.1 Apply form release agent in accordance with the manufacturer's recommendations prior to placing reinforcing steel, anchoring devices and embedded parts.

.2 Do not apply form release agent on construction joints or where concrete surfaces are to receive special finishes or applied coverings, which are affected by the agent. Soak inside surfaces of untreated forms with clean water. Keep surfaces moist prior to placing the concrete.

3.6 Form Removal

.1 Notify the Contract Administrator prior to removing the formwork.

.2 Do not remove forms and falsework until the concrete has gained sufficient strength to carry its own weight, plus construction loads or design loads which are liable to be imposed. Verify strength of concrete by compression tests to satisfaction of Contract Administrator.

.3 Removal of forms allowed after a minimum of 3 days and after the concrete has reached a minimum of 70% of the 28-day strength.

.4 Loosen forms carefully. Do not apply tools to exposed concrete surfaces.

.5 Leave forms loosely in place for protection until complete removal is acceptable to the Contract Administrator.

END OF SECTION