

SECTION 13 1203 – WATER FEATURE CONCRETE FORM WORK

PART 1 - GENERAL

1.1 SUMMARY

- A. This section includes the following:
 - 1. Formwork Materials
 - 2. Formwork Accessories
 - 3. Concrete Waterstops
- B. Related Sections:
 - 1. SECTION 13 1202 – WATER FEATURE STEEL REINFORCEMENT
 - 2. SECTION 13 1204 – WATER FEATURE CAST IN PLACE CONCRETE
 - 3. SECTION 13 1205 – WATER FEATURE SHOTCRETE
 - 4. SECTION 13 1305 – WATER FEATURE ACCESSORIES
 - 5. SECTION 13 1401 – WATER FEATURE PIPE AND FITTINGS
 - 6. SECTION 13 1403 – WATER FEATURE PIPE HANGERS, SUPPORTS, AND ANCHORS
 - 7. SECTION 13 1404 – WATER FEATURE WHITE GOODS
- C. References:
 - 1. ACI 117 – SPECIFICATIONS FOR TOLERANCES FOR CONCRETE CONSTRUCTION AND MATERIALS
 - 2. ACI 301 – SPECIFICATIONS FOR STRUCTURAL CONCRETE FOR BUILDINGS
 - 3. ACI 318 – BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE
 - 4. ACI 347 – GUIDE TO FORMWORK FOR CONCRETE
 - 5. PS 1 – CONSTRUCTION AND INDUSTRIAL PLYWOOD

1.2 SUBMITTALS FOR REVIEW

- A. SECTION 01 3300 – SUBMITTAL PROCEDURES
- B. Product Data: Submit Manufacturer's product data, materials, specifications, installation recommendations, and maintenance data for Waterstops and expansion joint material.
- C. Shop Drawings: Provide engineered and stamped shop drawings for shoring and bracing, including details, member sizes, and sequencing instructions, when required.

1.3 QUALITY ASSURANCE

- A. Perform Work in accordance with ACI 347, 318, and the latest edition of the Building Code adopted by the governing agency.
- B. Design Formwork under direct supervision of a Licensed Professional Engineer experienced in design of this Work.
- C. Safety: Assume responsibility for safety of Formwork and provide necessary design construction, materials, and maintenance to produce required concrete work safely.
- D. All work to be performed in accordance with local Building Code Regulations and OSHA guidelines.

PART 2 - PRODUCTS

2.1 FORMWORK MATERIALS

- A. Conform to ACI 347, Chapter 4 – Materials for Formwork, ACI Special Publication No. 4 – Formwork for Concrete, and as herein specified.
- B. Lumber

1. Softwood Framing Lumber: In accordance with AFPA – National Design Specification for Wood Construction, with Supplement. Provide Lumber with a moisture content of 19-percent or less.
 2. Grade marked by grading rules agency listed in National Design Specification for Wood Construction.
 3. Light framing or studs for board or plywood form: 2-inch to 4-inch (50 to 100mm) and larger in nominal width and thickness. Construction Grade.
 4. Boards for basic forms and form liners: Construction Grade.
 5. Board Pattern: Square Edge.
 6. Board Surface: Surfaced Four Sides (S4S).
- C. Plywood:
1. For exposed concrete surfaces: HD Overlay Plyform, B-B Grade, Class I or II (exterior) APA stamped, 5/8-inch (16mm) thick minimum.
 2. All other locations: Plyform, B-B Grade, Class I or II (exterior) APA stamped, 5/8-inch (16mm) thick minimum.
 3. Furnish in largest practicable sizes to minimize the number of joints.
- D. Round Column Forms: S
1. Single-use Fiber/Tubes with separate plastic liner, "Spiral Stop" as manufactured by Greenstreak.
 2. Single-use Fiber/Tubes with integral plastic liner, "Smooth Tube" as manufactured by Burke.
- E. Fiberglass, plastic, and metal forms:
1. May be used, subject to approval by Engineer, if they produce concrete surfaces equivalent to those resulting from the use of plywood forms, in the judgment of the Engineer.
- F. Chamfer Strips:
1. 3/4-inch (19mm) Type VE-2 PVC Strips by Vulcan Metal Products, Inc.
 2. Approved equal
- G. Wire Mesh Pool Forms:
1. Steeltex Wire Mesh with waterproof backing and tri-direction fiberglass reinforcing fibers as manufactured by Ivy Steel & Wire.
 2. Approved equal.
- H. Pool Gutter Forms:
1. High Density Styrofoam with Polyurethane Coating, custom cut to the pool design geometry as manufactured by Lawson Aquatics.
- 2.2 FORMWORK ACCESSORIES
- A. Form Ties:
1. Removable or Snap-off type, galvanized metal, fixed length, cone type, with waterproofing washer, and free of defects
 2. Form Release Agent:
 - a. Approved Manufacturers
 - i. Crete-Lease 727 or 20-VOC by Cresset Chemical Company
 - ii. CleanStrip (J-1 or J-3 VOC) by Dayton Superior
 - iii. DEBOND Form Coating by L&M Construction Chemicals
 - iv. Duogard or Duogard II by W. R. Meadows
 - v. Approved equal that will provide CCS-2 surface minimum as approved by Engineer.
 - b. Non-staining clear coating that does not contain oil or wax and will not prevent proper adhesion of applied finish.

- c. Release Agents shall be compatible with forming materials.
 - 3. Pressure Sensitive Tape:
 - a. Approved Manufacturers
 - i. 3M
 - ii. Approved Equal
 - b. Polyurethane or Mylar faced adhesive backed paper tape, 1-inch (25mm) wide, used for all Formwork joints.
 - 4. Nails, Spikes, Lag Bolts, Through Bolts, Anchors:
 - a. Sized as required, of sufficient strength and character to maintain Formwork in place while placing concrete.

2.3 CONCRETE WATERSTOPS

- A. Rubber Waterstops:
 - 1. Approved Manufacturers
 - a. Sika Greenstreak
 - b. Williams Everlastic Waterstop System
 - c. BF Goodrich Industrial Products, BFG Vinyl Waterstops
 - d. W. R. Meadows, Incorporated, Sealtight
 - e. Earth Shield TPE, PVC
 - 2. Extruded ribbed or dumbbell type, 4-inch (100mm) minimum length, tensile strength equal to concrete design strength.
 - 3. Splice by means of thermal butt fusion.
 - 4. Center bulb styles shall not be used, unless specifically approved by the Engineer.
- B. Bentonite/Butyl Rubber Waterstops:
 - 1. Acceptable Manufacturers:
 - a. Waterstops RX
 - b. Sika Sikaswell 2
 - c. Parastop II
 - 2. Waterstop shall be 75-percent Bentonite and 25-percent butyl rubber blended to form a rope material having sectional dimension of 1-inch (25mm) by 3/4-inch (19mm).
 - 3. Bentonite/Butyl Rubber Waterstops shall only be approved for use in conjunction with sealing existing concrete to new concrete joints.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify lines, levels, and centers before proceeding with Formwork. Ensure all dimensions agree with Contract Documents, notify the Engineer of any discrepancies.

3.2 ERECTION – FORMWORK

- A. Earth forms are only permitted where pre-approved by the Engineer or Architect.
- B. Erect formwork, shoring, and bracing to achieve design requirements in accordance with ACI 301.
- C. Provide bracing to ensure stability of Formwork. Shore to strengthen Formwork subject to overstressing by construction loads.

- D. Arrange and assemble Formwork to permit dismantling and stripping. Do not damage concrete during stripping. Permit removal of remaining principal shores.
- E. Arrange Formwork, aligning joints, lock forms in place making joints water tight. Tape inside of joints. Keep form joints to a minimum.
- F. Provide 3/4-inch (19mm) tooled edges or chamfer strips on external corners of all exposed concrete, except as noted on Contract Documents. Outside corners of all pool edges shall have a minimum 2-inch (50mm) tooled edge
- G. Maintain required clear cover between reinforcing bars and Formwork.

3.3 APPLICATION – FORM RELEASE AGENT

- A. Apply Form Release Agent on Formwork in accordance with the Manufacturer's recommendations.
- B. Apply Form Release Agent prior to placement of reinforcing steel, anchoring devices, and embedded items.
- C. Do not apply Form Release Agent where concrete surfaces will receive special finishes or applied coverings that are affected by Form Release Agents. Soak inside surfaces of untreated forms with clean water. Keep surfaces coated prior to placement of concrete.
- D. Do not allow Form Release Agent on reinforcing steel or concrete surfaces where bonding is intended to occur or at locations of cold joints.

3.4 INSERTS, EMBEDDED PARTS, AND OPENINGS

- A. Provide formed openings where required for items embedded in or passing through concrete Work.
- B. Locate and set in place items that will be cast directly into concrete. Coordinate with all other trades to ensure all items to be embedded into concrete are installed and set prior to placing concrete.
- C. Locate and coordinate all pipe penetrations as shown on the Contract Documents. Notify Structural Engineer of any penetrations not shown on the Contract Documents where the structural members are shown, obtain approval from the Engineer prior to placing concrete. Install any additional reinforcement as directed by the Structural Engineer.
- D. Install Waterstop Flanges for all water feature pipe penetrations into water holding structures and Link Seals for penetrations into non-water holding structures.
- E. Coordinate with other trades in forming and placing openings, slots, reglets, recesses, sleeves, bolts, anchors, other inserts, and components of other trades.
- F. Install accessories in accordance with the Manufacturer's instructions. Accessories shall be straight, level, and plumb. Ensure items are not disturbed during concrete placement.
- G. Install Concrete Waterstops in accordance with the Manufacturer's instructions continuous without displacing reinforcement. Joints shall be watertight.
- H. Bentonite/Butyl Rubber Waterstops shall be applied at all below grade construction joints a minimum of 2-inches (50mm) from the exterior face of concrete. To prevent movement, attach water stop to the concrete with harden nails every 12- to 18-inches (300 to 450mm) or use approved epoxy continuous along Waterstop. Prevent damage to Waterstop while placing concrete
- I. Provide temporary ports or openings in Formwork where required to facilitate cleaning and inspection. Locate openings at bottom of forms to allow flushing water to drain.
- J. Close temporary openings with tight fitting panels, flush with inside face of forms, and neatly fitted so joints will not be apparent in exposed concrete surfaces.

3.5 FORM CLEANING

- A. Clean forms as erection proceeds, to remove foreign matter within forms.
- B. Clean formed cavities of debris prior to placing concrete.
- C. Flush with water or use compressed air to remove foreign matter. Ensure that water and debris drain to exterior through temporary openings or clean-out ports.

3.6 FORMWORK TOLERANCES

- A. Construct Formwork to maintain tolerances required by ACI 301.
- B. Camber slabs and beams in accordance with ACI 301.

3.7 FIELD QUALITY CONTROL

- A. Inspect erected Formwork, shoring, and bracing to ensure that Work is in accordance with Formwork design, and that supports, fastenings, wedges, ties, and items are secure.
- B. Do not reuse plywood Formwork more than three (3) times for concrete surfaces to be exposed to view or Formwork that has become split, frayed, delaminated, or otherwise damaged. Do not patch Formwork.

3.8 FORM REMOVAL

- A. Do Not remove forms or bracing until concrete has gained sufficient strength to carry its own weight and imposed loads.
- B. Loose forms carefully. Do not wedge pry bars, hammers, or tools against finished concrete surfaces scheduled for exposure to view.
- C. Store removed forms in a manner that surfaces to be in contact with fresh concrete will not be damaged. Discard damaged forms.

END OF SECTION