

St. Anthony's Multi-Purpose Building

SECTION 03100

CONCRETE FORMWORK

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Formwork for cast-in place concrete, with shoring, bracing and anchorage.
- B. Openings for other work.
- C. Form accessories.
- D. Form stripping.

1.02 DESIGN REQUIREMENTS

- A. Design, engineer and construct formwork, shoring and bracing to conform to design and code requirements; resultant concrete to conform to required shape, line and dimension.

1.03 QUALITY ASSURANCE

- A. Perform Work in accordance with ACI 347, 301 and 318, latest revisions.

1.04 REGULATORY REQUIREMENTS

- A. Conform to Standard Building Code for design, fabrication, erection and removal of formwork.

1.05 COORDINATION

- A. Coordinate this section with other sections of work which require attachment of components to formwork.
- B. If formwork placement results in insufficient concrete cover over reinforcement, request instructions from Architect before proceeding.

1.06 PRE-INSTALLATION CONFERENCE

- A. Convene a pre-installation conference one week prior to commencing work of this section, and notify Architect of date and time of meeting.
- B. Require attendance of parties directly affecting work of this section.
- C. Review installation procedures and coordination required with related work.

PART 2 PRODUCTS

2.01 WOOD FORM MATERIALS

- A. Plywood: Douglas Fir species; select sheathing, tight face grade; sound, undamaged sheets with straight edges.
- B. Lumber: Douglas Fir species; Standard grade; with grade stamp clearly visible.

2.02 FORMWORK ACCESSORIES

- A. Form Ties: Snap-off type, galvanized metal, adjustable length, cone type, free of defects that could leave holes larger than 1 inch in concrete surface.
- B. Form Release Agent: Colorless mineral oil which will not stain concrete, or absorb moisture, or impair natural bonding or color characteristics of coating intended for use on concrete.

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- C. Nails, Spikes, Lag Bolts, Through Bolts, Anchorages: Sized as required, of sufficient strength and character to maintain formwork in place while placing concrete.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify lines, levels and centers before proceeding with formwork. Ensure that dimensions agree with Drawings.

3.02 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.

3.03 EARTH FORMS

- A. Hand trim sides and bottom of earth forms. Remove loose soil prior to placing concrete.

3.04 ERECTION - FORMWORK

- A. Erect formwork, shoring and bracing to achieve design requirements, in accordance with requirements of ACI 301, latest revision.
- B. Provide bracing to ensure stability of formwork. Shore or strengthen formwork subject to over stressing by construction loads.
- C. Arrange and assemble formwork to permit dismantling and stripping. Do not damage concrete during stripping. Permit removal of remaining principal shores.
- D. Align joints and make watertight. Keep form joints to a minimum.
- E. Obtain approval before framing openings in structural members which are not indicated on Drawings.
- F. Install void forms in accordance with manufacturer's recommendations. Protect forms from moisture or crushing.

3.05 APPLICATION - FORM RELEASE AGENT

- A. Apply form release agent on formwork in accordance with manufacturer's recommendations.
- B. Apply 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 which are affected by agent. Soak inside surfaces of untreated forms with clean water. Keep surfaces coated prior to placement of concrete.

3.06 INSERTS, EMBEDDED PARTS, AND OPENINGS

- A. Provide formed openings where required for items to be embedded in or passing through concrete work.
- B. Locate and set in place items which will be cast directly into concrete.
- C. Coordinate work of other sections in forming and placing openings, slots, reglets, recesses, chases, sleeves, bolts, anchors, and other inserts.
- D. Install accessories in accordance with manufacturer's instructions, straight, level, and plumb. Ensure items are not disturbed during concrete placement.

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- E. 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.
- F. 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.

3.07 FORM CLEANING

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

3.08 FORMWORK TOLERANCES

- A. Construct formwork to maintain tolerances required by ACI 301.

3.09 FORM REMOVAL

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

END OF SECTION

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SECTION 03200

CONCRETE REINFORCEMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Reinforcing steel bars, wire fabric and accessories for cast-in-place concrete.
- B. Reinforcing steel bars and accessories for CMU walls.

1.02 SUBMITTALS

- A. Submit shop drawings, prior to fabrication.
- B. Shop Drawings: Indicate bar sizes, spacings, locations, and quantities of reinforcing steel and wire fabric, bending and cutting schedules, and supporting and spacing devices.

1.03 QUALITY ASSURANCE

- A. Perform Work in accordance with CRSI 63, 65 and Manual of Practice, ACI 301 and ACI 318, latest revisions.

1.04 COORDINATION

- A. Coordinate with placement of formwork, formed openings and other Work.

1.05 PRE-INSTALLATION CONFERENCE

- A. Convene a pre-installation conference one week prior to commencing work of this section, and notify Architect of date and time of meeting.
- B. Require attendance of parties directly affecting work of this section.
- C. Review installation procedures and coordination required with related work.

PART 2 PRODUCTS

2.01 REINFORCEMENT

- A. Reinforcing Steel: ASTM A615, 60 ksi yield grade; deformed billet steel bars.
- B. Welded Steel Wire Fabric: ASTM A185 Plain Type; in flat sheets; plain finish.
- C. Slip Dowels: Size and length indicated, smooth surface, hot dipped galvanized finish.

2.02 ACCESSORY MATERIALS

- A. Tie Wire: Minimum 16 gage annealed type.
- B. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for strength and support of reinforcement during concrete placement conditions including load bearing pad on bottom to prevent vapor barrier puncture.

2.03 FABRICATION

- A. Fabricate concrete reinforcing in accordance with CRSI Manual of Practice and ACI 318.
- B. Locate reinforcing splices not indicated on Drawings, at point of minimum stress. Indicate location of splices on shop drawings.

PART 3 EXECUTION

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3.01 PLACEMENT

- A. Clean reinforcement of foreign matter prior to placement.
- B. Place, support and secure reinforcement against displacement. Do not deviate from required position.
- C. Do not displace or damage vapor barrier.
- D. Accommodate placement of formed openings.

END OF SECTION

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SECTION 03300

CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Slab-on-ground foundation.
- B. Site concrete.
- C. Equipment pads, housekeeping pads, and site concrete work.
- D. Concrete floor liquid sealing compound.

1.02 SUBMITTALS

- A. Submit Product Data: Provide data on joint devices, accessories and admixtures.
- B. Submit Record Documents: Show actual locations of embedded utilities and components which are concealed from view.
- C. Submit proposed mix design for approval of each class of concrete prior to commencement of work.

1.03 REGULATORY REQUIREMENTS

- A. Conform to applicable code for concrete work.

1.04 TESTING

- A. Follow 01410.

1.05 COORDINATION

- A. Coordinate the placement of joint devices and embed items with erection of formwork and placement of form accessories.

1.06 PRE-INSTALLATION CONFERENCE

- A. Convene a pre-installation conference one week prior to commencing work of this section, and notify Architect of date and time of meeting.
- B. Require attendance of parties directly affecting work of this section.
- C. Review installation procedures and coordination required with related work.

PART 2 PRODUCTS

2.01 CONCRETE MATERIALS

- A. Cement: ASTM C150, normal - Type I, portland type; grey color.
- B. Fine and Coarse Aggregates: ASTM C33.
- C. Water: Clean and not detrimental to concrete.

2.02 ADMIXTURES

- A. Air Entrainment: ASTM C260.
- B. Fly Ash: (Not allowed).

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- C. Chemical Admixture: ASTM C494 Type A - Water Reducing, Type B - Retarding, Type C - Accelerating, Type D - Water Reducing and Retarding, Type E - Water Reducing and Accelerating, Type F - Water Reducing, High Range Admixture and Type G - Water Reducing, High Range and Retarding; admixture.

2.03 ACCESSORIES

- A. Vapor Barrier: 10 mil thick polyethylene film. Type recommended for below grade application.
- B. Curing Compound: Membrane curing compound; acrylic type; clear finish; Kure-N-Seal by Sonneborn or 2100-Clear by W.R. Meadows, Inc.
- C. Bonding Agent: Two-component modified epoxy resin.
- D. Non-Shrink Grout: Premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents; capable of developing minimum compressive strength of 7,000 psi in 28 days.
- E. Concrete Floor Liquid Sealing Compound: Euclid "Eucosil".

2.04 CONCRETE MIX

- A. Mix concrete in accordance with ACI 304. Deliver concrete in accordance with ASTM C94.
- B. Provide concrete to the characteristics indicated. Concrete strength; 3,000psi minimum @ 28 days
- C. Use accelerating admixtures in cold weather only when approved by Architect. Use of admixtures will not relax cold weather placement requirements.
- D. Use set retarding admixtures during hot weather only when approved by Architect.
- E. Add air entraining agent to concrete mix for work exposed to exterior.
- F. Use of fly ash is prohibited unless approved in writing by Engineer

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify requirements for concrete cover over reinforcement.
- B. Verify anchors, seats, plates, reinforcement and other items to be cast into concrete are accurately placed, held securely, and will not cause hardship in placing concrete.

3.02 PREPARATION

- A. Prepare previously placed concrete by cleaning with steel brush and applying bonding agent. Apply bonding agent in accordance with manufacturer's instructions.
- B. In locations where new concrete is doweled to existing work, drill holes in existing concrete, pack solid with non-shrink grout and insert steel dowels.
- C. Install vapor barrier under interior slabs on grade and as indicated. Lap joints minimum 6 inches and seal. Do not disturb or damage vapor barrier while placing concrete. Repair damaged vapor barrier.
- D. Obtain dimensions and other details for equipment bases from Divisions 15 and 16. Form

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bases, install cast-in items and place concrete equipment bases.

3.03 QUALITY ASSURANCE

- A. Perform Work in accordance with ACI 301.
- B. Obtain materials from same source throughout the work.
- C. Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.

3.04 PLACING CONCRETE

- A. Notify Architect and Owner minimum 24 hours prior to commencement of operations.
- B. Place concrete in accordance with ACI 301 and ACI 318.
- C. Hot Weather Placement: ACI 305R.
- D. Cold Weather Placement: ACI 306R.
- E. Ensure reinforcement, inserts, embedded parts, and formed joints are not disturbed during concrete placement.
- F. Maintain concrete cover as indicated.
- G. Place concrete continuously between predetermined construction and control joints. Do not break or interrupt successive pours such that cold joints occur.
- H. Place concrete for floor slabs as indicated.
- I. Separate exterior slabs on fill from vertical surfaces with joint filler as detailed.
- J. Excessive honey comb or embedded debris in concrete is not acceptable. Notify Engineer upon discovery.

3.05 TOLERANCES FOR FORMED SURFACES

- A. Conform to ACI 301.

3.06 FINISHING

- A. Provide finishing in accordance with ACI 301.
- B. Flatwork Finishes:
 - 1. Trowel Finish:
 - a. Use for interior slabs except where scratch finish is specified.
 - b. Level true to plane with 1/8 inch in 10 feet as determined by a 10 foot straightedge placed anywhere on the slab in any direction.
 - c. Float with power trowels and finish troweling with hand tools.
 - 2. Broom or Belt Finish:
 - a. Use for exterior slabs and sidewalks except where other finish is indicated.
 - b. Level true to plane within 1/4 inch in 10 feet as determined by 10 feet straightedge placed anywhere on slab in any direction.
 - c. Provide course transverse scored texture by drawing broom or burlap belt across surface.
 - 3. Accessible Ramp Surfaces:
 - a. Refer to drawing details.
- C. Formed Surface Finishes:
 - 1. Rough Form Finish:

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- a. For hidden from sight surfaces.
 - b. Patch tie holes and defects.
 - c. Chip off fins exceeding 1/4 inch height.
2. Rubbed Finish:
- a. For exposed to sight surfaces.
 - b. Wet and rub surfaces with carborundum brick until uniform color and texture are produced.
 - c. Do not apply additional cement grout.

3.07 CURING

- A. Apply curing compound in two coats with second coat at right angles to first.
- B. Apply in accordance with manufacturer's instructions.

3.08 PATCHING

- A. Notify Architect immediately upon removal of forms.
- B. Patch imperfections, as directed.

3.09 CONCRETE FLOOR SEALING COMPOUND

- A. Clean and prepare floor surface in accordance with manufacturer's instructions.
- B. Install with hand sprayer in continuous film. Brush out puddles or runs immediately.
- C. Provide minimum of two coats.
- D. Follow all manufacturer's instructions and recommendations.

3.10 DEFECTIVE CONCRETE

- A. Modify or replace concrete not conforming to required levels and lines, details, and elevations.
- B. Repair or replace concrete not properly placed or of the specified type.
- C. Rain damaged or blemished concrete is not acceptable.

3.11 FIELD QUALITY CONTROL

- A. Maintain records of placed concrete items. Record data, location of placement, quantity, ambient temperature, and test samples taken.

3.12 PROTECTION

- A. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.
- B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.
- C. Just prior to final inspection, clean and apply one coat of curing/sealing compound to exposed interior concrete floors not scheduled to receive additional finish.

END OF SECTION

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SECTION 03465

DRILLED SHAFT FOUNDATIONS
(Alternate Bid Item)

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Construction of foundations consisting of reinforced concrete drilled shafts.

1.02 MEASUREMENT AND PAYMENT

- A. Stipulated Price (Lump Sum). If the Contract is a Stipulated Price Contract, payment for Work in this Section is included in the total Stipulated Price.

1.03 REFERENCE STANDARDS

- A. ACI 336.1 - Standard Specification for Construction of Drilled Piers.
- B. TxDOT Standard Specification Item 416 - Drilled Shaft Foundations.

PART 2 PRODUCTS

2.01 EQUIPMENT

- A. Perform excavation with equipment suitable for achieving the requirements of this Specification.

2.02 MATERIAL

- A. For cast-in-place concrete, use 3500psi concrete strength at 28 days.
- B. For reinforcing steel, use grade 60 steel per ASTM A615

PART 3 EXECUTION

3.01 PREPARATION

- A. Conduct an inspection to determine condition and locations of existing structures and other permanent installations, prior to commencing work.

3.02 EXCAVATION

- A. Perform the excavation required for the drilled cylindrical shafts, at the locations shown on the Drawings through whatever materials encountered, to the dimensions and elevations shown or required by the site conditions. If satisfactory material is not encountered at the plan depth, the bottom of the shaft will be adjusted or the foundation altered, as determined by the City Engineer, to satisfactorily comply with the design requirements.
- B. Shaft excavations shall not be made within 3 shaft diameters (edge to edge) of shafts which have been concreted within the previous 24 hours.

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- C. Drilled shaft excavations shall be inspected for verticality and side sloughing. Verticality is specified at one inch in 10 feet of the shaft length, and shall be checked to the full depth of dry augering prior to introducing drilling mud. Any shafts not meeting the specified tolerance shall be straightened or shall have suitable reinforcing steel added.
- D. Slurry shall contain 4 to 8 percent by weight of bentonite additive and shall satisfy the slurry specifications set forth in ACI 336.1, Section 2.3.5.2e. These requirements are more stringent than TxDOT Standard Specification Item 416.3.1. The stricter slurry specifications are required to assure suspension of detritus from the drilling operations, and to ensure adequate cleaning of the slurry prior to concreting. Cleaning of the slurry is important to prevent deposition of detritus on reinforcement cages and ensure that inclusions of detritus will not be formed within the concrete mass.
- E. At final bearing elevation, the bottom of each shaft shall be cleaned and seepage water removed for examination by the City Engineer before reinforcing steel and concrete is placed. Suitable access and lighting for proper inspection of the completed excavation shall be provided. Reinforcing steel and concrete shall be placed in the drilled shaft without delay after approval of the excavation by the City Engineer.

3.03 DRILLED SHAFT CONSTRUCTION

- A. Drilled shaft construction and installation shall follow TxDOT Standard Specification Item 416 (with exceptions noted below) and ACI 336.1.
- B. Before placing concrete, the shaft bottom shall be cleaned out with a drilling bucket in order to remove any sediments which may not be displaced by the concrete. The shaft bottom shall be cleaned with a "clean-out" bucket until rotation on the bottom without crowd (i.e., penetration under force) produces little spoil. Probing after cleaning out is essential to verify the condition of the base of the shaft.
- C. Concrete shall conform to the requirements of ACI 336.1 Section 2.3.5.5.
- D. Concrete shall be placed continuously in the shaft to the construction joint indicated on the Drawings or shall be placed as directed in TxDOT Standard Specification Item 416.3.3. Concrete shall be placed through a suitable tube or tremie to prevent segregation of materials. The tremie pipe diameter shall be at least 8 times as large as the largest concrete aggregate size.
- E. A computation of the final concrete volume for each shaft shall be made. Shafts taking an unreasonably high or low volume of concrete shall be cored to check their integrity.
- F. If caving soil conditions or excessive groundwater is encountered, the use of temporary casing is permitted to prevent caving of the material around the shaft and to control the seepage of groundwater into the excavation.
- G. Casing material shall be metal of ample strength to withstand the handling stresses, the pressure of concrete and of the surrounding earth or backfill materials and shall be water-tight. The casing shall be smooth, clean and free of accumulations of hardened concrete. The outside diameter of the casing shall not be less than the specified diameter of the drilled shaft.
- H. The elapsed time from the beginning of concrete placement in the cased portion of the shaft, until extraction of the casing is begun, shall not exceed one hour.

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- I. Temporary casings shall be withdrawn as the shaft is filled with concrete, or immediately following the concreting operation. The bottom of the casing shall always remain at least one foot below the level of the concrete during placement to overcome hydrostatic pressure. Casing shall be extracted smoothly with a vibratory hammer. Casing extraction shall be at a slow, uniform rate with the pull in line with the vertical axis of the shaft. No casing shall be left in place.
 - J. If any upward movement of concrete or reinforcing steel occurs inside the casing at the beginning of the pulling operation or at any time during pulling, the pulling shall be stopped immediately and the casing left in place.
- 3.04 FIELD QUALITY CONTROL
- A. Testing will be performed under provisions of Section 01454 - Testing Laboratory Services.

END OF SECTION