

SECTION 03 10 00

CONCRETE FORMING AND ACCESSORIES

PART 1 GENERAL

1.1 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.
- E. Refer to Structural Engineering drawings for additional notes and requirements. These requirements supersede requirements in this section.

1.2 RELATED SECTIONS

- A. Section 03200 - Concrete Reinforcement.
- B. Section 03300 - Cast-In-Place Concrete.

1.3 REFERENCES

- A. ACI 301 - Specifications for Structural Concrete for Buildings; American Concrete Institute International.
- B. ACI 318 - Building Code Requirements for Reinforced Concrete and Commentary; American Concrete Institute International.
- C. ACI 347R - Guide to Formwork for Concrete; American Concrete Institute International.

1.4 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.

PART 2 PRODUCTS

2.1 FORM MATERIALS

Unless otherwise shown on the Drawings or otherwise specified herein, construct forms of the following materials.

- A. Forms for Exposed Concrete: Plywood complying with U.S. Standards PS-1, "B-B (Concrete Form) Plywood" Class 1, Exterior Grade or better, mill-oiled and edge-sealed, with each piece bearing the legible trademark of an approved inspection agency.
- B. Forms for Unexposed Concrete: Plywood, lumber, metal or other acceptable materials. Provide lumber that is dressed on at least two (2) edges and one (1) side for tight fit.

- C. Forms for Textured Finish Concrete: Units of face design, size, arrangement, and configuration to match Architect's control sample. Provide solid backing and form supports to ensure stability of textured form liners.
- D. Forms for Cylindrical Columns and Supports: Metal, fiberglass-reinforced plastic (FRP), or paper or fiber tubes. Provide paper or fiber tubes of laminated plies with water-resistant adhesive and wax-impregnated exterior for weather and moisture protection. Provide units with sufficient wall thickness to resist wet concrete loads without deformation.

2.2 FORMWORK ACCESSORIES

- A. Form Release Agent: Colorless mineral oil that will not stain concrete.
- B. Form Coatings: Commercial formulated form coating compounds that will not bond with, stain, nor adversely affect concrete surfaces, and will not impair subsequent treatment of concrete surfaces requiring bond adhesion, nor impede the wetting of surfaces to be cured with water or curing compounds.
- C. Sleeves: Schedule 40 steel pipe.
- D. Corners: Filleted, rigid plastic type; 3/4 x 3/4 inch (mm) size; maximum possible lengths.
- E. Form Ties: Factory-fabricated, adjustable-length, removable or snap-off metal form ties, designed to prevent form deflection and to prevent spalling concrete upon removal. Provide units that will leave no metal closer than 1-1/2 inches to exposed surface. Provide ties that, when removed, will leave no holes larger than 1-inch in diameter.
- F. Flashing Reglets: Galvanized steel, 22 gage (0.8 mm) thick, longest possible lengths, with alignment splines for joints, non-filled, release tape sealed slots, anchors for securing to concrete formwork.
- G. 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

3.1 EXAMINATION

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

3.2 EARTH FORMS

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

3.3 ERECTION - FORMWORK

- A. Erect formwork, shoring and bracing to achieve design requirements, in accordance with requirements of ACI 301.
- B. Provide bracing to ensure stability of formwork. Shore or strengthen formwork subject to overstressing by construction loads.

- C. Align joints and make watertight. Keep form joints to a minimum.
- D. Obtain approval before framing openings in structural members that are not indicated on drawings.
- E. Provide fillet strips on external corners of beams, joists, and columns.
- F. Coordinate this section with other sections of work that require attachment of components to formwork.

3.4 APPLICATION - FORM RELEASE AGENT

- A. Apply form release agent on formwork in accordance with manufacturer's recommendations.

3.5 INSERTS, EMBEDDED PARTS, AND OPENINGS

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

3.6 FORMWORK TOLERANCES

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

3.7 FIELD QUALITY CONTROL

- A. Not used.

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.

END OF SECTION

*****End of Section 02 32 00*****

SECTION 03 20 00

CONCRETE REINFORCEMENT

PART 1 GENERAL

1.1 SUMMARY

- A Includes furnishing all materials, equipment, transportation and facilities, and performing all labor necessary for preparation and submittal of shop drawings, furnishing and placing reinforcing steel.

1.2 SUBMITTALS

- A. Shop Drawings: Submit shop and installation drawings of steel reinforcement. Shop fabricator shall produce sufficient diagrams, notes, etc., to insure proper placing of reinforcing steel and submit it with each set of shop drawings for field use. Submit a placement plan and elevation for all walls.
- B. Mill Test Reports: Certified copies, evidencing compliance with the requirements of these Specifications, shall be delivered to the Architect with all deliveries of reinforcing steel.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Reinforcing Bars: Meet requirements shown on the drawings.
- B. Welded Wire Mesh: Conform to requirements shown on the drawings.
- C. Concrete Accessories: Bar supports, chairs, spacers, etc., shall be cold-drawn wire and shall be fabricated in accordance with ACI Detailing Manual, SP-66, with heights as required.

PART 3 EXECUTION

3.1 MATERIAL STORAGE

- A. Reinforcing steel shall be stacked in tiers. Care shall be exercised to maintain all reinforcement free of dirt, mud, paint, rust, etc.

3.2 GENERAL

- A. Reinforcing steel of the sizes, shapes, lengths, spacing and other dimensions shown shall be placed where shown on the Drawings. Details of reinforcing shall conform to requirements shown on the drawings.

3.3 MARKING

- A. Plainly mark bars. Limit bundles to one size and one length.
- B. Tag each bundle with durable tags.

3.4 CLEANING

Thoroughly clean reinforcement of rust, mill scale, dirt, oil or other coatings which might tend to reduce the bonding to the concrete.

3.5 BENDING

- A. Bend bars cold. Do not heat reinforcement.
- B. Do not handle reinforcement by makeshift methods.
- C. Do not use bars having kinks or bends not shown on the Contract Drawings.

3.5 PLACING

- A. Accurately place and securely saddle tie reinforcement with No. 18 gage black annealed wire to prevent displacement during concrete placement.
- B. Hold reinforcement rigidly in place during the placing of the concrete by means of metal chairs or spacers.
- C. Hold bars in concrete walls in position, and to proper clearance, by means of concrete or metal spacers made especially for the locations where spacers are required.
- D. Hold bars in beams and slabs to exact location during placing of concrete by spacers, chairs, or other necessary supports.

3.7 CONCRETE COVERAGE

- A. Provide concrete coverage for reinforcing steel as shown on the Drawings.
- B. Place reinforcement to conform to ACI 301 tolerances.

3.8 WELDING

- A. Do not weld reinforcing steel except where specifically indicated on the drawings.
- B. For all bars indicated to be welded, provide bars which conform to ASTM A 706.
- C. Conform welding of reinforcing steel to AWS D1.4.

END OF SECTION

SECTION 03 30 00

CAST IN PLACE CONCRETE

PART 1 GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE:

- A. CONCRETE FORMWORK AND ACCESSORIES: Section 03100
- B. CONCRETE REINFORCEMENT: Section 03200

1.2 QUALITY ASSURANCE

- A. Comply with the provisions of the following latest codes, specifications and standards, except as otherwise shown or specified:
 - 1. ACI 301 "Specifications for Structural Concrete for Buildings".
 - 2. ACI 311 "Recommended Practice for Concrete Inspection".
 - 3. ACI 318 "Building Code Requirements for Reinforced Concrete".
 - 4. ACI 347 "Recommended Practice for Concrete Formwork".
 - 5. ACI 304 "Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete".
 - 6. Concrete Reinforcing Steel Institute, "Manual of Standard Practice".
- B. The Contractor is responsible for correction of concrete work which does not conform to the specified requirements, including strength, tolerances and finishes. Correct deficient concrete as directed by the Architect/Engineer.

1.3 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.
- B. Comply with applicable portions of ACI SP-66 (88), "ACI Detailing Manual."
- C. Show bar schedules, bending and placement, stirrup spacing, diaphragms of bent bars, arrangements of concrete reinforcement.
- D. Shop drawings for formwork for fabrication and erection of forms for specific finished concrete surfaces. Show form construction including jointing, special form joint or reveals, location and pattern of form tie placement, and other items that affect exposed concrete visually.
 - 1. Architect's review is for general architectural applications and features only. Design of formwork for structural stability and efficiency is Contractor's responsibility.
 - 2. Provide location of construction joint(s) for review and acceptance.
 - 3. Provide shop drawings and design calculations for temporary shoring and reshoring. Shoring/re-shoring shop drawings shall bear the seal and signature of the responsible Professional Engineer registered in the State of Texas.
- E. All Shop Drawings shall be reviewed and approved by Contractor before submitting to Architect/Engineer.

1.4 TESTING

- A. Concrete Testing Service: The Owner shall engage a testing laboratory acceptable to the Architect to perform the material evaluation tests. The concrete supplier shall submit concrete mix designs per the contract documents for review.
- B. Submit one (1) copy each of test reports to Architect, to the Structural Engineer, and the contractor.
- C. The Owner will select a testing laboratory to perform all other tests and submit test reports to the Architect and the Consulting Engineers. Concrete shall be sampled and tested for quality control during the placement of concrete as follows:
 - 1. Sampling Fresh Concrete: ASTM C-172, except modified for slump to comply with ASTM C-94.
 - 2. Slump: ASTM C-143: One test for each concrete load at point of discharge; and one for each set of compressive strength test specimens.
 - 3. Air Content: ASTM C-231, pressure method, one for each set of compressive strength test specimens.
 - 4. Compressive Test Specimen: ASTM C-31, two sets of 3 standard cylinders for each compressive strength test unless otherwise directed. Mold and store one set of cylinders for laboratory cured test and if requested by the Architect/Engineer, one set for field-cure test.
 - 5. Concrete Temperature: One test for each concrete load discharged and/or as needed when air temperature is 80 degrees F. and above and each time a set of compression test specimens are made.
 - 6. Compressive Strength Tests: ASTM C-39; one test for each 100 cu.yds. or fraction thereof, of each concrete class placed in any one day and for each 5,000 sq.ft. of surface area placed; one laboratory cured and one field cured specimen tested at 7 days, and at 28 days, with one laboratory cured, and one specimen retained in reserve for later testing if required.
 - 7. When the frequency of testing will provide less than 5 strength tests for a given class of concrete, conduct testing from at least 5 randomly selected batches or from each batch if fewer than 5 are used.
 - 8. When the total quantity of a given class of concrete is less than 50 cu.yds., the strength tests may be waived by the Architect/Engineer, if in his judgment, adequate evidence of satisfactory strength is provided.
 - 9. When the strength of field-cured cylinders is less than 85% of companion laboratory-cured cylinders, evaluate current operations and provide corrective procedures for protection and curing the in-place concrete.
- D. Report test results in writing to the Architect, Engineer and the Contractor on the same day that tests are made. Reports of compressive strength tests shall contain the project identification name and number, date of concrete placement, name of contractor, name of concrete supplier and truck number, name of concrete testing service, concrete type and class, location of concrete batch in the structure, design compressive strength at 28 days, concrete mix proportions and materials. Compressive breaking strength and type of break for both 7 day tests and 28 day tests.
- E. Additional Tests: The testing service will make additional tests of in-place concrete when test results indicate the specific concrete strengths and other characteristics have not been attained in the structure, as directed by the Architect/Engineer. The testing service shall conduct tests to determine the adequacy of concrete by cored cylinders complying with ASTM C-42 or by other methods as directed.
- F. Pre Construction Conference: Conduct conference at project site to comply with Requirements of Division 1 Section "Project Meetings" and the following.

- G. At least 35 days prior to the start of concrete construction schedule, the contractor shall conduct a meeting to review the proposed mix designs, and to determine procedures for satisfactory concrete operations. Review requirements for submittals, status of coordinating work, and availability of materials. Establish preliminary work progress schedule and procedures for materials inspection, testing, and certifications. Request that representatives of each entity directly concerned with cast-in-place concrete attend conference, including, but not limited to, the following: Contractors Superintendent, Laboratory responsible for concrete mixes, Laboratory responsible for field quality control, Ready-mix concrete producer, Concrete Subcontractor, Primary admixture manufacturer's, and Architect/Engineer or Owner's representative.

PART 2 PRODUCTS

2.1 CONCRETE MATERIALS

- A. Cement: Portland Cement ASTM C-150, Type 1 unless otherwise acceptable to Architect/Engineer. Use only one brand of approved cement throughout the project unless use of more than one approved brand is acceptable to Architect/Engineer.
- B. Supplemental Cementitious Materials:
 - 1. Silica Fume (Microsilica): "Eucon MSA" by the Euclid Chemical Co., "Emsac F 100"; Elkem Chemical Inc., or "Force 10,000"; W.R. Grace. Microsilica shall be dry densified and shall come from the same source throughout the project. If a single source cannot be maintained, laboratory testing of each new source shall be required before acceptance by the Engineer at no cost to the Owner.
 - 2. Ground Granulated Blast Furnace Slag: ASTM C989, Grade 120. The ratio of the amount of the ground granulated blast-furnace slag to the total amount of ground granulated blast furnace slag and cement in the mix not to exceed 40 percent of cementitious content and based on a successful test slab placement.
 - 3. Fly Ash: ASTM C618, Type C or Type F. The ratio of the amount of the fly ash to the total amount of fly ash and cement in the mix not to exceed 25 percent of cementitious content and based on a successful test slab placement. Color of test slab shall be verified by the Architect, for exposed areas, prior to construction.
- B. Normal Weight Aggregates:
 - 1. Fine Aggregate: Complying with ASTM C-33.
 - 2. Coarse Aggregate: Complying with ASTM C-33.
- C. Water: Potable.
- D. Admixtures, General: Provide admixtures for concrete that contains not more than 0.05 percent chloride ions.
- E. Air-Entraining Admixtures: ASTM C260, certified by manufacturer to be compatible with other required admixtures.
- F. Water-Reducing Admixtures: ASTM C494, Type A. The admixture shall not contain more chloride ions than are present in municipal drinking water.
- G. High-Range Water-Reducing Admixtures (Superplasticizers): ASTM C494, Type F or Type G. the admixture shall not contain more chloride ions than are present in municipal drinking water.

- H. Water Reducing, Non-corrosive, Non-chloride Accelerating Admixture: ASTM C494, Type C or Type E. The admixture shall not contain more chloride ions than are present in municipal drinking water. The admixture manufacturer must have long-term non-corrosive test data from an independent testing laboratory (of at least one year's duration) using an acceptable accelerated corrosion test method such as that using electrical potential measures.
- I. Water-Reducing, Retarding Admixture: ASTM C494, Type D. The admixture shall not contain more chloride ions than are present in municipal drinking water.
- J. Prohibited Admixtures: Calcium chloride, thiocyanates or admixtures containing more than 0.05% chloride ions are not permitted. No admixture shall cause an increase in shrinkage when tested in accordance with ASTM C 494 and ASTM C 157.
- K. Certification: Written conformance to the above mentioned requirements and the chloride ion content of the admixture will be required from the admixture manufacturer prior to mix design review.

2.2 REINFORCING MATERIALS

- A. Deformed Reinforcing: Complying with ASTM A-615; of domestic manufacture, Grade 60.
- B. Bar Supports: In compliance with Detailing Manual ACI SP-66, unless detailed otherwise on the Drawings. Bar supports for exposed concrete to have plastic coated feet.
- C. Headed Anchors: ASTM A 108, Grades C-1010 through C-1020.
- D. Steel Wire: ASTM A 82, plain, cold-drawn steel.
- E. Welded Wire Fabric: ASTM A185, welded steel wire fabric.
- F. Tie Wire: No. 18 gage soft, annealed wire.

2.3 FORM MATERIALS

- A. Refer to Section 03100.

2.4 RELATED MATERIALS

- A. Moisture Retaining Cover: Provide moisture retaining cover for curing concrete of any of the following:
 - 1. Waterproof paper complying with ASTM C-171.
 - 2. Polyethylene sheeting complying with ASTM C-171.
 - 3. Polyethylene coated burlap.
 - 4. Liquid Membrane-forming Compounds: Curing compound complying with ASTM C-309, Type 1, warranted by manufacturer not to deter bond of floor covering materials. Do not use liquid membrane-forming compounds when bond is required between hardened concrete in place and fresh concrete to be applied.

The following are approved manufacturers:

- 1. Sonneborn-Contech
- 2. A.C. Horn/W.R. Grace
- 3. Hillyard Chemical

- B. Moisture Barrier: ASTM E1745 Class B, not less than 10 mils thick, overlapped and continuously taped in accordance with manufacturer's instructions.

The following are approved manufacturers:

1. STEGO WRAP VAPOR BARRIERS (15 mil) by STEGO Industries, LLC, San Juan Capistrano, CA (877) 464-7834.
 2. Premolded Membrane with Plasmatic Core by W.R. Meadows.
 3. Griffolyn Vaporguard by Reef Industries.
 4. Viper VaporCheck, or Viper VaporCheck II, 10 Mil vapor barrier, by Insulation Solutions, Inc., 401 Truck Haven Road, East Peoria, IL, 306-698-0062.
- C. Chemical Bonding Agent: Film-Forming, Freeze-thaw resistant compound suitable for brush or spray application complying with Mil-B-19235, and conforming to ASTM C 932.

2.5 JOINT MATERIALS

- A. Interior Concrete Slabs: Stree-lock, zip-cap, zip-strip or approved equal.
- B. Exterior Walkways: Asphalt saturated cane fiber, full depth of slab, 1/2" thickness minimum.

PART 3 EXECUTION

3.1 FORM CONSTRUCTION

- A. Construct forms to comply with ACI 347, to the exact dimensions shown, and as required to obtain accurate alignment, location, grades and level and plumb work in finished structures. Build forms mortar-tight and with sufficient strength and rigidity to prevent bulging between supports or other deformation. Provide for openings, offsets, sinkages, keyways, recesses, reglets, chamfers, blocking, screeds, bulkheads, anchorages and inserts, and other features required.
- B. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Kerf wood inserts for forming keyways, reglets, recesses and the like, to prevent swelling and to assure ease of removal.
- C. Provide openings in forms to accommodate other work, including mechanical and electrical work. Accurately place and securely support items to be built into forms.
- D. Form exposed corners and edges as shown, with PVC or rubber strips fabricated to produce uniform smooth lines and tight joints.
- E. Erect falsework and support, brace and maintain it to safely support vertical, lateral and asymmetrical loads applied until such loads can be supported by in-place concrete structures. Construct false work so that adjustments can be made for take-up and settlement.
- F. Earth sides may be used for forming beams below finish grade if conditions are such that accurate size and shape may be obtained.
- G. Provide wedges, jacks or camber strips to facilitate vertical adjustments. Carefully inspect falsework and formwork during and after concrete placement operations to determine abnormal deflection or signs of failure, make necessary adjustment to produce work of required dimensions.
- H. Set and build into the work anchorage devices and other embedded items required for other work that is attached to, or supported by cast-in-place concrete. Use setting drawings, diagrams, instructions and directions provided by suppliers of embedded items.

- I. Install moisture barrier sheet according to manufacturer's recommendations after forms are in place.
- J. Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chip, wood, dirt or other debris just before concrete is placed. Retighten forms after concrete placement if required to eliminate mortar leaks.
- K. Coat and contact surfaces of forms with a form-coating compound before reinforcement is placed. Thin form-coating compound only as recommended by the form-coating manufacturer. Prevent excess accumulation of form-coating or contact with concrete surfaces against which fresh concrete will be placed. Apply in compliance with manufacturer's instructions.
- L. Provide factory-fabricated form ties of adjustable length that are removable or snap-off and that are designed to prevent form deflection and to prevent spalling concrete surfaces upon removal.

3.2 JOINTS

- A. Locate and install construction joints, which are not shown on the Drawings, so as not to impair the strength and appearance of the structure. Construction joints and their installation must be acceptable to Architect/Engineer.
- B. Provide keyways at least 1-1/2" deep in all construction joints in walls, and footings; accepted bulkheads designed for this purpose may be used for slabs and beams.
- C. Install bentonite waterstop strips in construction joints as indicated on the drawings. Install waterstops exterior to the water side of dowels (not in the keyway) to prevent water from reaching the reinforcement. Waterstops must be completely confined in concrete, with a minimum of 2 inches of concrete cover to all surfaces of the waterstop. Waterstop shall be applied to concrete surfaces which are smooth, clean and dry. Cut nails shall be used to hold the waterstop in place and proper care shall be taken during concrete placement to avoid displacing the waterstop. If material exhibits swelling prior to confinement in the joint due to moisture exposure, it must be replaced with new material.
- D. Place construction joints perpendicular to the main reinforcement. Continue all reinforcement across construction joints fifty (50) bar diameters minimum.
- E. Locate construction joints in grade beams at quarter points of span between piers.

3.3 PLACING REINFORCEMENT

- A. For details and methods of placement of reinforcement and supports, refer only to codes and standards herein specified and to Concrete Reinforcing Steel Institute's recommended practice for "Placing Reinforcing Bars".
- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other materials which reduce or destroy bond with concrete.
- C. Accurately position support and secure reinforcement against displacement by formwork, construction, or concrete placement operations. Locate and support reinforcing by metal chairs, runners, bolsters, spacers and hangers, as required.
- D. Place reinforcement to obtain at least the minimum coverages for concrete protection. Arrange, space and securely tie bars and bar supports to hold reinforcement in position during concrete

placement operations. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.

- E. Do not place reinforcing bars more than 2" beyond the last leg of continuous bar support. Do not use supports as bases for runways for concrete conveying equipment and similar construction loads.

3.4 CONCRETE

A. Proportioning:

1. Weight and volume measurements:
 - a. Cement: One cubic foot bag considered as 94 pounds.
 - b. Water: One gallon of water is considered 8.33 pounds.
 - c. Aggregate: Use aggregate in amount consistent with required workability. When moisture content changes, a redesign of mix will be necessary.
2. Determination of Maximum Content Allowable: The testing laboratory will establish strength of concrete proposed for use, by tests made on the design mix, and the quantity of admixture required.
3. Proportion materials to produce concrete that will have a minimum compressive strength at 28 days as indicated on structural drawings. Proportion for minimum strength of 3,000 psi for concrete not otherwise indicated.
4. Proportion generally for minimum slump of 3 inches and maximum slump of 5 inches.
5. Maximum Size of Coarse Aggregate as indicated on the structural drawings and as follows:
 - a. The nominal maximum size of the aggregate shall not be larger than one-fifth of the narrowest dimension between sides of form, one-third of the depth of slabs, nor three-fourths of the minimum clear distance between reinforcing bars or between bars and forms whichever is least. In columns, the nominal maximum size of the aggregate shall be limited as above but shall not be larger than two-thirds of the minimum clear distance between bars.
 - b. Coarse aggregates in concrete of normal weight may be of one size for all concrete placed in 1 day when quantities to be placed are too small to permit economical use of more than one mix design. When a single mix is so used, the maximum nominal size shall be as required for the most critical condition of concreting, in accordance with the requirements of the preceding section.

B. Mixing:

1. Concrete shall be ready-mixed in compliance with requirements of ASTM C-94. Furnish Architect/Engineer with duplicate delivery tickets for each truck load.
2. Arrange for continuity of supply. Do not change supplier of ready-mixed concrete without specific approval.

C. Air-Entraining Admixtures:

1. Air-entraining admixtures shall be used in accordance with the manufacturer's instructions except as otherwise specified herein.
2. All concrete exposed to the exterior must be air-entrained. The use of air-entrainment on interior concrete is a Contractor's option.

D. Placing:

1. Inform Architect/engineer of placing schedule to show sufficient time, without delaying work, for inspection prior to beginning of placement. Notify Architect/Engineer at least twenty-four (24) hours before placement.

2. Notify other craftsmen of the placing schedule to permit the installation of their work; cooperate with other craftsmen in setting such work, as required.
 3. Where form coatings are not used, thoroughly wet wood forms without bending, immediately before placing concrete.
 4. Comply with ACI 304, and as herein specified.
 5. Deposit concrete continuously or in layers of such thickness that no concrete will be placed on concrete which has hardened sufficiently to cause the formation of seams or planes of weakness within the section.
 6. Handle concrete from mixer or transport vehicle to place of final deposit in continuous manner as rapidly as practicable until given operation is completed. Do not use vibrators to transport concrete inside of forms.
 7. Deposit concrete in forms in horizontal layers not deeper than 24" and in a manner to avoid inclined construction joints. Where placement consists of several layers, place each layer while preceding layer is still plastic to avoid cold joints.
 8. Consolidate placed concrete by mechanical vibrating equipment and procedures for consolidation of concrete in accordance with the recommended practices of ACI 309, to suit the type of concrete and project conditions.
 9. Deposit and consolidate concrete slabs in a continuous operation, within the limits of construction joints, until the placing of a panel or section is completed.
 10. Consolidate concrete during placing operations so that concrete is thoroughly worked around reinforcement and other embedded items and into corners. Bring slab surfaces to the correct level with a straight edge and strike-off. Use bull floats or darbies to smooth the surface, leaving it free of humps or hollows. Do not sprinkle water on the plastic surface. Do not disturb the slab surfaces prior to beginning finishing operations.
 12. Maintain reinforcing in the proper position during concrete placement operations.
- E. Weather Protection:
1. Protect concrete work from physical damage or reduced strength which could be caused by low temperatures, or winds in compliance with ACI 306. Do not place concrete when temperature is below 40 degrees F. except with specific approval.
 2. When hot weather conditions exist that would seriously impair the quality and strength of concrete, mix and place concrete in compliance with ACI 305 and as herein specified.
 - a. Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that the steel temperature will not exceed the ambient air temperature immediately before embedding in concrete.
 - b. Wet forms thoroughly before placing concrete.
 - c. Do not use retarding admixtures unless otherwise accepted in mix design.
 - d. Concrete at time of placement must be below 90 degrees F. Mixing water may be chilled, or chopped ice may be used to control concrete temperature.
- F. Finish of Formed Surfaces:
1. Form orderly, even, symmetrical surfaces with a minimum of seams.
 2. Form smooth finish on concrete surfaces to be exposed to view or covered with a coating covering material that is applied directly to the concrete or bonded to the concrete such as waterproofing, dampproofing, painting, etc.
 3. Rough finish may be formed on concrete surfaces not exposed to view unless otherwise shown on drawings or otherwise specified.
 4. Repair and patch defective areas of exposed formed concrete surfaces immediately after removal of forms. Cut out honeycombs, voids over 1/2" in diameter, and holes left by tie rods and bolts, down to solid concrete, but in no case to a depth of less than 1". Make edges of cuts perpendicular to the concrete surface. Thoroughly clean, dampen with water and brush with a coat of concrete bonding agent all surfaces to be patched. Patch with patching con-

crete of same type or class as the original adjacent concrete. Mix patching concrete with bonding agent in accordance with manufacturer's recommendations. Place concrete to blend with adjacent concrete. Cure in same manner as adjacent concrete.

5. Smooth form concrete surfaces shall receive grout finish. Combine portland cement, fine sand, water and bonding agent. Proportion mix in accordance with recommendations of bonding agent manufacturer. Blend standard portland cement and white cement to match color of formed concrete. Provide trial color samples for Architect's approval. Thoroughly wet concrete surface and apply grout uniformly by brushing or spraying immediately to wetted surfaces. Scrub surface with cork float or stone to coat surface and fill surface holes. Remove excess grout by scraping, followed by rubbing with clean burlap to remove any visible grout film. Complete any area in same day it is commenced, with the limits of any area being natural breaks in the finish surface.

G. Slab Finishes:

1. Apply trowel finish to all slab surfaces. Consolidate the concrete surface to the final hand troweling operation, free of trowel marks, uniform in texture and appearance, and with a surface plane tolerance of $F_f = 35$ and $f_i = 25$ when tested in accordance with ASTM E-1155 unless otherwise noted. The dusting of dry cement and/or sand to take up excess moisture will not be permitted. Grind smooth surface defects which would telegraph through applied floor covering system.
2. Apply non-slip broom finish to exterior concrete platforms, steps, ramps, and sidewalks and elsewhere as shown on Drawings. Immediately after trowel finishing, slightly roughen the concrete surface by brooming in direction perpendicular to the main traffic route.

3.5 CONCRETE CURING AND PROTECTION

- A. Protect concrete from premature drying and excessive hot temperature, and maintain without drying for a period of seven (7) days.
- B. Protect concrete surfaces not covered by forms from loss of moisture by one of the following methods:
 1. Moisture Retaining Cover: Cover all exposed concrete with moisture retaining cover. Lap sides at least 3" and seal with waterproof tape or adhesive. Keep cover sealed during curing period.
 2. Liquid Membrane: Apply two (2) coats of liquid membrane at the rate prescribed by manufacturer. Apply second coat at right angle to first coat.
- C. All concrete surfaces must be protected throughout the construction of the job to avoid discoloration or staining by other phases of the construction.

END OF SECTION

SECTION 03 54 13 GYPSUM CEMENT UNDERLAYMENT

PART 1: GENERAL

1.01 Summary

- A. Description of Work: Work of this section includes underlayment for interior finish flooring and is not limited to, the following:
1. Maxxon Gyp-Crete Floor Underlayment covering normal project conditions and applications.
 2. Division 3 Section Concrete: "Gypsum Cement Underlayment"
 3. Division 9 Section Finishes: "Acoustic Treatment"

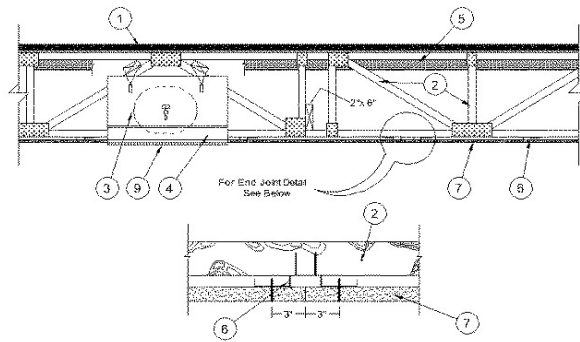
1.02 References

- A. Underwriters Laboratory Fire Resistance Volume 1
www.ul.com
- B. GREENGUARD Certified GREENGUARD and GREENGUARD Gold Certified
www.greenguard.org
- C. ASTM E336 and E1007 Field Sound Transmission Class (F-STC), Field Impact Insulation Class (F-IIC)
- D. ASTM E90 and E492 Sound Transmission Class (STC), Impact Insulation Class (IIC)
- E. ASTM C472M Compressive strength of gypsum concrete
- F. ASTM F2170 Standard Test Method for Determining Relative Humidity in Concrete Floor Slab
- G. ASTM F2419 Standard Test Method for Installation of Thick Poured Gypsum Concrete and Preparation of Surface to Receive Resilient Flooring
- H. ASTM F2678 Standard Practice for Preparing Panel Underlayments, Thick Poured Lightweight Cellular Concrete Underlayments, and Concrete Subfloors with Underlayment Patching Compounds to Receive Resilient Flooring
- I. TCNA F 180 Tile Council of North America Installation Handbook
www.tileusa.com
- J. NWFA National Wood Flooring Association Instructions
www.nwfa.org
- K. Finished Floor Goods Procedures: Maxxon Procedures for Attaching Finished Floor Goods to Maxxon Underlayments
www.maxxon.com

1.03 Submittals

- A. Product Data: Submit *Gyp-Crete 2000/3.2K sales sheet*, *Ultimate Sound Control Systems, Procedures for Attaching Finished Floor Goods to Maxxon Underlayments*, and *Maxxon's Building Conditions Guide* with project materials clearly identified for each required product or system.
- B. UL Directory Fire Resistance Volume 1 -

Rating	Underwriters Laboratory File Number
1 Hr Fire Rating	L563



[UL L563](#)

- C. Acoustical Data: Submit sound tests according to IBC code criteria ASTM E492 (IIC) and ASTM E90 (STC) or ASTM E1007 (F-IIC) and E336 (F-IIC).
- D. Code Approvals: See www.maxxon.com for the current list of code approvals.

1.04 System Requirements

- A. Performance Requirements:
 - 1. Gyp-Crete Floor Underlayment (Always a “Green” building material)
 - i) Compressive strength up to 2,200 (up to 15 MPa)
 - ii) Density 110 pounds per cubic foot (1,760 kg/m³)
 - 2. Sound Control – 2009 International Building Code: Section 1207.2 & .3
 - i) Minimum Sound Transmission Class, 50 STC (45 if field tested) – Section 1207.2
 - (1) ASTM E90 and E336
 - ii) Minimum Impact Insulation Class, 50 IIC (45 if field tested) – Section 1207.3
 - (1) ASTM E492 and E1007

1.05 Quality Assurance

- A. Performance Standards:
 - 1. All materials, unless otherwise indicated, shall be manufactured by Maxxon Corporation and shall be installed in accordance with its current printed directions and by Maxxon Corporation Authorized Applicator.
 - 2. Underlayment mix shall be tested for a slump using a 2" (i.d.) x 4" (50 mm x 101 mm) cylinder resulting in a patty size of 8 1/2" (216 mm) plus or minus 1 inch (25 mm) diameter.
 - 3. Compressive strength tested in accordance with ASTM C 472M.

1.06 Delivery, Storage and Handling

- A. All materials shall be delivered in their original unopened packages and protected from damage and exposure from the elements. Damaged or deteriorated materials shall be removed from the premises.

1.06 PROJECT CONDITIONS

- A. Before, during and after installation of product, building interior shall be enclosed, with adequate ventilation and heat maintained at a temperature above 50 °F (10 °C) to allow for drying of product.

PART 2 PRODUCTS

2.01 Products And Manufacturers

- A. Manufacturer: Maxxon Corporation, Hamel, MN. Telephone: (800) 356-7887

2.02 Materials

- A. Proprietary products/systems: Poured flooring underlayment and topping products, including the following:
 - 1. Gyp-Crete Floor Underlayment
- B. Proprietary products/systems: Sound Control that does not negate the fire rating and is specified in UL design. Acoustical performance is dependent on system design and construction.
 - 1. Acousti-Mat® I Sound Mat
- C. Maxxon® Floor Primer:
 - 1. Material Standard: Comply with specifications outlined in manufacturer's Design and Installation Guide for wood.
- D. Mix Water:
 - 1. Material Standard: Potable, free from impurities and from a domestic source.
- E. Sand Aggregate:
 - 1. Sand shall meet Maxxon Sand Specification 101.
- F. Maxxon® Overspray Primer Sealer:
 - 1. Seal all areas that receive glue down floor goods with Maxxon® Overspray according to manufacturer's specifications.
- G. Maxxon Reinforcement or Maxxon CSM (Crack Suppression Mat):
 - 1. Install approved reinforcement as per manufacturer recommendations. For reinforcement requirements see page 5.

PART 3 EXECUTION

3.01 Examination

- A. Site Verification of Conditions:
 - 1. Installation shall not begin until the building is enclosed, including roof, windows, doors, and any other apertures.
 - 2. Wood substrate shall be structurally sound, properly fastened, and dry. Contractor shall clean subfloor to remove mud, oil, grease, and other contaminating factors before arrival of the authorized applicator.

- 3. Wood substrate:
 - i) The wood subfloor must be adequate to withstand live and dead loads with a deflection limitation of L/360.
 - ii) Wood should be agency approved 23/32" (1.8 cm) T & G subfloor sheathing.

3.02 Requirements

- A. Leak Prevention:
 - 1. Fill cracks and voids in subfloor where leakage of slurry could occur.
- B. Priming subfloor:
 - 1. Prime substrate according to manufacturer's recommendations.
- C. Application:
 - 1. Install in accordance with reference standards and manufacturer's instructions.

3.03 General Installation Requirements

- A. Mixing Proportions:
 - 1. General Requirements: Mix proportions and methods shall be in strict accordance with product manufacturer recommendations.
- B. Application:
 - 1. (Optional) Acousti-Mat Installations: Install Acousti-Mat following manufacturer's recommendations and specifications.
 - 2. Pour floor topping to recommended thickness. Immediately spread and screed product to a smooth surface. Expansion joints in all types of work shall be brought through the underlayment.
 - i) Minimum Maxxon Underlayment Depth:

Substrate	Depth of Pour
Wood	1" (1.9 cm)
Acousti-Mat I	3/4" (1.9 cm)

- C. Drying:
 - 1. The general contractor must provide and maintain correct environmental conditions to keep the building clean and dry, and protect against infestation of moisture from a variety of potential sources. The general contractor must supply mechanical ventilation and heat if necessary to remove moisture from the area until the Gyp-Crete is dry.
 - 2. Protection from Heavy Loads: During construction, place temporary wood planking over Gyp-Crete wherever it will be subject to heavy wheeled or concentrated loads.

3.04 Preparation For Installation Of Glue Down Floor Goods

- A. Sealing:
 - 1. Seal all areas that receive glue down floor goods with Maxxon Overspray or Maxxon Acrylic according to the Maxxon Corporation's specifications. Any floor areas where the surface has been damaged shall be cleaned and sealed regardless of floor covering to be used. Where floor goods manufacturers require special adhesive or installation systems, their requirements supersede these recommendations.
 - 2. Maxxon UWR can be used over Maxxon underlayments in low traffic areas such as utility rooms, storage rooms and closets, as a protective surface.
- B. Moisture Testing:

1. Follow the respective floor goods manufacturers' recommendations for relative humidity requirements. When manufacturer does not have a relative humidity requirement, refer to Maxxon's "Procedures for Attaching Finished Floor Goods to Maxxon Underlayments" brochure.

C. Finished Floor Goods:

1. There are many reference standards for the installation procedures and recommendations for finished flooring applications over gypsum underlayments. These include instructions of the manufacturers of the finished flooring, adhesives and thin-set as well as national agency reference standards. The national standards are listed below:

Flooring Type	Reference Standard
Resilient	ASTM F2419
Ceramic Tile	TCNA F180
Wood	NWFA Instructions

See Maxxon Corporation's "Procedures for Attaching Finished Floor Goods to Maxxon Underlayments" brochure for guidelines for installing finished floor goods. This procedure is not a warranty and is to be used as a guideline only.

3.17: Protection of Floor Treatments

- A. Protect floor treatment from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by liquid floor treatments installer.

*****End of Section 03 54 13*****