

SECTION 13 11 10

SWIMMING POOL SHELL CONSTRUCTION - ALTERNATE NO. 1

PART 1 - GENERAL

1.1 STANDARDS

- A. All construction shall be in accordance with standard industry practices, using new materials to produce a quality finished product.

PART 2 - EXCAVATION, GRADING, BACKFILLING

2.1 DESCRIPTION

- A. The work of this section includes the provision of supervision and co-ordination during the excavation process. The swimming pool bulk excavation is not included in the work of this section and is specified elsewhere.
- B. Prior to the start of the pool layout and/or excavation, the site shall be properly prepared, cleared of all existing encumbrances, and topsoil stripped and stored or removed. Such work is not included in the work of this section and is specified elsewhere.
- C. Before any excavation or construction of pool shall be commenced, the Pool Contractor shall place batter boards permanently locating the perimeter of the pool structures at the required elevation
- D. The Pool Contractor shall then supervise the pool excavation, coordinating and overseeing the work performed by other trades so as to maintain quality control; all in accordance with the excavation specifications in Division 2.
- E. If soil conditions are not sufficiently stable for the earthen banks of the excavation to serve as a backform for pneumatic concrete placement, then the swimming pool envelope shall be over-excavated a minimum of 3'0" from inside face of pool waterline to allow sufficient space for Pool Contractor to erect a full perimeter backform. If necessary, the earthen banks of the excavation shall be sloped and/or stepped to ensure no sidewall cave-ins during the perimeter back-forming process. The Pool Contractor shall provide a competent person to judge suitability of soil conditions with respect its suitability as a backform.
- F. The Excavation Contractor shall, under the direction and supervision of Pool Contractor, place and grade a sub-base of crushed stone under the pool floor to depth of approximately six inches (6").
- G. The rough grading around pool shall be controlled so that ground is pitched to prevent water running into the excavated area of the pool.
- H. Dewatering of pool and pool site is not included in the work of this section.
- I. Backfilling behind the completed concrete pool structure necessitated by over-excavation and pool wall backforming is not

included in scope of work of this section except to note that any backfill material must offer the same or better structural qualities as the original earth.

- J. Machine excavation, trenching, and backfilling of any description and disposal of excavated material are not included in scope of work of this section.
- K. The construction of the pool shall be concurrent or preliminary to the construction of the building foundations. In no event is the construction of the pool to take place after the building walls are erected without a thorough review of the prevailing soil conditions, the proximity of the pool to building foundations and the risks of the pool excavation undermining the building foundations.

PART 3 - POOL WALL FORMING

3.1 DESCRIPTION

- A. The Pool Contractor shall furnish a perimeter screed which shall serve to delineate the top and back of the pool wall. If necessary due to unstable soil conditions the Pool Contractor shall furnish and erect a full perimeter wall backform against which the pneumatic concrete shell shall be placed. Form shall in any case properly designate the outline of the pool including the beam section of the wall. Full perimeter wall forming, if required, shall not be considered "extra work".
- B. The Pool Contractor shall take all necessary measures and precautions to ensure the integrity of the perimeter backform to ensure no movement or deflection during the concrete placement process.
- C. Wooden materials utilized for any portion of the backform that will remain in place subsequent to concrete placement shall be pressure treated.

PART 4 - PLACEMENT OF FITTINGS

4.1 DESCRIPTION

- A. Before commencing the steel and/or concrete shell work, the Contractor shall place all special pool fittings and receptacles that are to be embedded in the concrete structure and shall be responsible for their positioning in accordance with the drawings.

PART 5 - STEEL REINFORCEMENT

5.1 DESCRIPTION

- A. Steel reinforcing shall be placed accurately in position as noted on project drawings, and securely fastened and supported to prevent displacement before or during concrete placement. Cleaning, bending, placing and splicing of reinforcement shall be done in accordance to American Concrete Institute Building Code. Minimum lap for spliced bar reinforcing shall be thirty (30) bar diameters. No splicing shall be made except where supported. Metal

chairs or concrete blocks shall be used to support steel away from the earth in place.

- B. After reinforcing has been placed and supported, no wheeling of materials shall be done across steel except over proper run-ways bearing on forms rather than reinforcing. Lifting reinforcement by estimate as concrete structure is placed will not be allowed.
- C. All reinforcing steel shall be standard sizes of deformed bars equal to the requirements of the "Standard Specifications for New Billet Steel, Concrete Reinforcement", Intermediate Grade, Serial Designation ASTM A-615, Grade 40, latest revision, as adopted by the American Society for Testing Materials.
- D. Reinforcing steel shall be sized and positioned as noted on drawings.
- E. Steel reinforcing placement schedule is predicated on the following:

Method of analysis: ACI-31B, ultimate strength method
concrete pump mix: 4000 psi
fr = 600 psi
reinforcing: fy = 40 ksi
soil backfill @ walls: 120 pcf
angle internal friction of soil = 34 degrees
soil/subbase: 6" compacted crushed stone K = 300 pci

Steel schedule that may be required other than as noted on project drawings, or any additional structural design analysis that may be required for conditions other than as above noted, will be an extra to the contract.

PART 6 - PNEUMATIC CONCRETE

6.1 DESCRIPTION

- A. The pool structural design is based on the use of pneumatically applied concrete, utilizing either dry-nozzle (gunite) or wet mix (shotcrete) delivery equipment. There are no expansion joints required or allowed in the pool structure. All pneumatically applied concrete shall meet 4000-psi design requirements tested in accordance with the procedures outlined herein. The pool structure is designed as a monolithic unit and all concrete for pool walls and floor, shall be placed in one unit of construction, insofar as possible, in one continuous operation or on consecutive days. Set surfaces against which new concrete is to be placed shall be thoroughly cleaned and slushed with neat cement. Structural designs as shown on the pool drawings shall govern.
- B. Crew qualifications including foreman - A foreman who normally has proficiency at all crew positions and should have a minimum of 3000 hours experience and the nozzleman who should have certification (refer to ACI 506.3R) or a minimum of 3000 hours experience as a nozzleman. He should be able to demonstrate, by test, his ability to satisfactorily perform his duties and to apply pneumatically applied concrete as required by these specifications.
- C. Wet-nozzle gunite (shotcrete) must test in place 4000 psi after 28 days. Testing and certification shall be the Pool Contractor's

responsibility unless a provision has been made otherwise elsewhere in these specifications.

- D. At the end of a day's shooting or any similar stopping point the work shall be tapered to a thin edge. Before shooting the next day, the tapered portion shall be thoroughly cleaned and wetted. No square joints will be allowed.
- E. Taunt cutting wires shall be established and anchored to insure dimensions integrity of the shotcrete structure. Cutting wires shall be placed at all intersections of pool radius and vertical walls and on floor elevation pins to insure dimensional accuracy of the structure.
- F. Protect in-place material against frost and rapid drying and keep moist for at least six (6) days after placing; during this period shotcrete shall be maintained above 32 degrees F for at least five (5) days.
- G. All cement shall conform to the requirements of the "Standard Specifications for Portland Cement" serial designation C-150 of the ASTM and shall be Type I or Type II, and shall be delivered to the job site in original packages and well protected from weather and moisture during storage.
- H. The design of wet-mix shotcrete shall be as noted below. The mix design may be modified to address the specific characteristics of the local aggregate or to address weather conditions. Modified mix designs must be submitted for approval prior to placement.

Sand	1,750 lbs.
Cement	750 lbs.
3/8" Stone	950 lbs.
Air	7 %
Slump	3"

Non-metallic mesh fibers in accordance with mfg. recommendations if indicated by field or weather conditions.

I. EQUIPMENT, DRY MIX PROCESS (GUNITED)

- 1. Batching and Mixing Equipment: Batch by weighing, use rotating mixer or adequate capacity for dry-mixing aggregate and cement for continuous supply of material to gun, all conforming to ACI 506R, Paragraph 3.5.
- 2. B. Delivery equipment: Gun and Nozzle: Premixing type conforming to the requirements of ACI 506R, Paragraphs 3.2 and 3.7 designed for material delivery and water injection.
- 3. Air Compressor and Hoses: Standard type, of capacity to provide without interruption, pressures and volume of air necessary for longest hose delivery; conform to ACI 506R, Table 3.1. Make allowances for air consumed by separate blow pipe in blowing away rebound, cleaning reinforcing and incidental uses.
- 4. Water Supply: Conform to ACI 506R, Paragraph 3.8.1 with adequate capacity to maintain water pressure approximately 65 N

(15 pounds) higher than highest air pressure required, both air and water pressure uniformly steady, non-pulsating.

J. The design of dry-nozzle gunite shall be as noted below.

Portland Cement: ASTM C150, Type I or II.

Aggregate: ASTM C33, Gradation Table 2.1

GRADATION LIMIT FOR COMBINED AGGREGATES

Sieve Size, U.S. standard square mesh	Percent by Weight Passing Individual Sieves		
	Gradation No. 1	Gradation No. 2	Gradation No. 3
20 mm 3/4 inch	---	---	100
13 mm 1/2 inch	---	100	80-95
10 mm 3/8 inch	100	90-100	70-90
No. 4	95-100	70-85	50-70
No. 8	80-100	50-70	35-55
No. 16	50-85	35-55	20-40
No. 30	25-60	20-35	10-30
No. 50	10-30	8-20	5-17
No. 100	2-10	2-10	2-10

Chemical Admixtures: ASTM C494.

Air-entraining Admixture: ASTM C260.

Water: Fresh, Clean, and Potable

6.2 APPLICABLE PUBLICATIONS

- A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by basic designation only.
- B. American Concrete Institute (ACI):
- 304R-00(2009).....Guide for Measuring, Mixing, Transporting, and Placing Concrete
- 506R-05.....Guide to Shotcrete
- 506.2-95.....Specification for Shotcrete
- 506.4R(R2004).....Guide for the Evaluation of Shotcrete
- C. American Society for Testing and Materials (ASTM):

A185/A185M-07.....Steel Welded Wire Reinforcement, Plain,
for Concrete
A615/A615M-09.....Deformed and Plain Carbon Steel Bars for
Concrete Reinforcement
C33/C33M-11.....Concrete Aggregates
C94/C94M-10.....Ready-Mixed Concrete
C150/C150M-09.....Portland Cement
C260/C260M-10.....Air-Entraining Admixtures for Concrete
C494/C494-10.....Chemical Admixtures for Concrete

6.3 CONSTRUCTION TESTING

- A. For dry-nozzle gunite, make one test panel 450 mm (18 inches) square and 75 mm (3 inches) thick for each half-day's work or portion thereof. Provide test panels to a testing laboratory approved by Resident Engineer and reimbursed by the contractor. Five compressive strength specimens will be obtained from each panel and tested for compressive strength in accordance with ASTM C42. Two (2) samples are to be tested at 7 days and 28 days after application. The fifth sample should be retained for 56 days should additional testing be required. Strength test results are to be reported to the Resident Engineer 24 hours after completion of test.
- B. For wet-mix shotcrete, take one conventional test cylinder for every twenty cubic yards of concrete placed. Samples are to be tested at 7 days and 28 days after application. Strength test results are to be reported to the Resident Engineer 24 hours after completion of test.

PART 7 - PRECAST CONCRETE COPING

7.1 DESCRIPTION

- A. The pool wall shall be topped with a precast, bullnose, slip-resistant concrete coping, set and dimensioned as shown on the drawings.
- B. Transition pieces at the ramp shall be factory-cast, not field fabricated
- C. The slip-resistant surface shall be sand-blasted exposed aggregate. Smooth coping is not acceptable.
- D. Coping color shall be either gray or white, submit samples for architect approval.
- E. Thirty-inch pieces shall be used over all skimmers.

- F. All corners shall be factory-cast, field-mitered corners are not acceptable.
- G. Pointing grout shall match or compliment the coping color.
- H. Approved coping suppliers include Custom Pool Coping, Hatfield, PA or Federal Stone Industries, Thurmont Maryland.

PART 8 - INTERIOR FINISH OF SWIMMING POOL

8.01 QUARTZ AGGREGATE PLASTER POOL FINISH

- A. The Contractor shall furnish and install a permanent, quartz aggregate plaster interior coating as shown on the project drawings. Coating shall include a blend of quartz aggregate and polymer-modified white cement.
- B. Quartz aggregate plaster coating shall be "Diamond Brite" as manufactured by Southern Grouts and Marble, 1502 S.W 2nd Place, Pompano Beach, FL 33069 800-641-9247, 954-943-2288, "Sunstone" or approved equal. Color to be "Cool Blue" or such other color as may be selected by the Owner.
- C. The finish shall be $\frac{3}{8}$ " to $\frac{1}{2}$ " thick and shall be troweled to a smooth, dense, impervious surface.
- D. Extreme care shall be taken to avoid staining the surface of the finish during troweling operations. Application of plaster shall be in accordance with the manufacturer's recommendations and with National Plaster's Council Technical Manual, which shall serve to establish industry standard practice and professional requirements.
- E. Prior to application of the finish, the surfaces to be coated shall be thoroughly cleaned of dust, oil, paint, loose materials and any foreign matter.
- F. Interior finish shall be applied by mechanics having at least three (3) years' experience in the application of this finish to gunite swimming pool interiors and shall be certified by the finish manufacturer in the application of their product.

8.02 CERAMIC TILE

- A. Ceramic tile work shall be installed in conjunction with plaster interior and as indicated on the drawings.
- B. The Contractor shall furnish and install 1" x 1", or 2" x 2" ceramic tile work within the pool shell as indicated on the drawings. The Owner/Architect shall select color.
- C. Tile shall be certified by the Tile Council of America (TCA) to be equal to or in excess of standard grade requirements of ANSI A-1237.1. Grouting and setting materials shall be as manufactured under TCA criteria.
- D. Tile shall be ceramic mosaic "Standard Grade" porcelain units, cushion edge.
- E. Ramp entry tile, bench/step edge markings, and any other tile trim in plaster pools shall be installed in a "thin-set" bed of mortar in accordance with the specifications of the American National Standards Institute.

- F. Deck depth markings shall be 6" X 6" slip-resistant tile with 4" characters as manufactured by *Inlays* or equal.
- G. Each depth marker location on the pool deck and in the waterline shall include an international-style "No Diving" symbol.
- H. All setting and laying of tile shall be by experienced tile mechanics who can supply evidence that they have been steadily employed in the installation of the pool tile work during the past three (3) years.