

**SECTION 03 37 14
SHOTCRETE FOR POOLS**

PART 1 - GENERAL

1.1 SUMMARY

- A. Section relates to all New Construction
- B. Related work items include:
 - 1. Swimming Pool structures.
 - 2. Preparation of surfaces to receive shotcrete.
 - 3. Forms and ground wires.
 - 4. Furnishing and placing reinforcing steel for shotcrete.
 - 5. Mixing, delivery, placing, finishing and curing of shotcrete.
 - 6. Protection and cleaning of adjacent surfaces.
- C. Related Sections:
 - 1. 07 14 17 – Cold Fluid-Applied Waterproofing for Pools
 - 2. 09 30 14 – Tiling for Pools
 - 3. 09 97 27 – Cementitious Coating for Pools
 - 4. 13 11 33 – Elevated Swimming Pools

1.2 SUBMITTALS

- A. Information Submittals
 - 1. Aqua Design is providing Stamped and Sealed Engineered Plans and Calculations.
 - 2. Aqua Design directly submitting for Health Permit, and submitting to Building Department via Project Architect.
 - 3. Separate Fabricated Shop Plans: If Contractor chooses to submit their own fabricated engineered plans and calculations, they must adhere to the following steps:
 - a. Notify Project Architect and General Contractor of intent to submit separate shop plans.
 - b. Submit shop drawings for complete pool structure including complete and detailed reinforcing steel bending and layout diagrams.
 - c. Structural plans approved for commercial pools and carrying approval and stamp of Structural Engineer registered in the State of California.

- d. Contractor will need to submit their own stamped and sealed shop drawing to local jurisdiction for Building and Health Permits.
- 4. ACI Certified Nozzle man (Vertical Placement) required placing shotcrete. Submit copy of certification with bid to General Contractor and Aquatics Consultant.
- 5. ACI Certified Shotcrete Nozzleman Examiner.

1.3 QUALITY ASSURANCE

- A. Qualifications of shotcrete subcontractor: proposed subcontractor shall have at least 5 years experience in structural shotcrete construction and have constructed at least 20 significant structural shotcrete swimming pools which, on investigation, have been found to be completed in satisfactory manner.
- B. Reference standards: Except as modified by requirements of contract documents, shotcrete work shall conform to current requirements of ACI 506.
- C. ACI Shotcrete Nozzleman Examiner required for this project. Contractor shall provide "Inspection of Record" detailing shotcrete placement and reinforcement verification. Rebound or spoils not permitted in any area of the pool. Submit copy of certification and contact information of examiner with bid to General Contractor and Aquatics Consultant.

PART 2 - PRODUCTS

2.1 PRODUCT TYPE

- A. Shotcrete (Wet Mix Process)

2.2 FORMING MATERIALS

- A. Form lumber: WCLIB "Construction" grade or better, WWPA No. 1 or better.
- B. Form plywood: PS 1-83, Group 1, Exterior grade B_B ply form or better, minimum 5 ply and 5/8 inch thickness.
- C. Form Ties: Prefabricated rod, flat band, wire, internally threaded disconnecting type or equal, not leaving metal within 1 1/2" of shotcrete surface.
- D. Form coatings: Resin-type coating free of oil, silicone, wax, and non-drying material.

2.3 REINFORCING STEEL

- A. Reinforcing bars, ASTM A615, including supplementary requirement (S1), Grade 40, deformed.
- B. Welded wire fabric: ASTM A185, wire fabric size and gauge as shown. 60 ksi minimum tensile strength.
- C. Tie Wire: annealed copper-bearing steel, 16-gauge minimum.

- D. Welding electrodes: AWS D1.4, Table 5.1, low hydrogen electrodes, E9018 for grade 40 steel.

2.4 SHOTCRETE MATERIALS

A. Cement

1. Approved Wet Mix Shotcrete Distributer:
 - a. CEMEX
2. Mix shall be at least minimum, equal to:

Material	Description	ASTM	Spec. Grav.	Vol. (CF)
Cement	Type II-V	C 150	3.15	2.78
Fly Ash	Class F	C 618	2.17	1.35
Course Aggregate	3/8 CR AGG	C 33	2.63	3.98
Fine Aggregate	Conc Sand	C 33	2.63	11.94
Water reducer	Type A/D	C 494	1.00	0.00
Air Entrainer	AEA	C 260	1.00	0.00
Viscosity Modifier	VMAR3		1.00	0.00
Potable Water	Water	C 94	1.00	5.61
Air				1.35
Specified F'c	4000 PSI			
Specified Slump	1.00 To 3.00 in.			
Designed Air	5.0 %			
Designed Volume	27.00 cu. ft.			

2.5 QUALITY ASSURANCE/CONTROL

A. Test Panels

1. Concrete design strength is based on cast concrete cylinders. Shotcrete design strength, however, is based on cores or sawed cubes taken from sample test panel. Core sample strength, however, is expected to be 0.85 of cast cylinder strength (ACI 318 paragraph 5.6) since core samples are disturbed due to coring or cutting process. Testing should be done in accordance with ASTM C 1140-98 Preparing and Testing Specimens from Shotcrete Test Panels.

PART 3 - EXECUTION

3.1 PREPARATION OF SURFACES

- A. If sloughing or caving of earth banks occurs, fill resulting voids with shotcrete at no extra cost to owner, back-filling voids with earth is not permitted. Dampen concrete and earth surfaces before shotcrete is deposited, but not so wet as to overcome suction.

3.2 PROTECTION

- A. Protect surfaces not receiving shotcrete from over spray. Repair damages as required by owner at no cost to owner.

3.3 SHOTCRETE QUALITY

- A. Accurately control proportion of water to Portland cement to produce thorough and uniform hydration of shotcrete that, when shot, forms homogeneous mass containing neither sags nor dry sand formation.
- B. Strength: Minimum 4,000 psi 28-day compressive strength unless otherwise indicated.
- C. Slump: Measured at point of discharge from mixer shall be minimum 1 ½ inches and maximum 2 ½ inches.

3.4 CURING

- A. Provide moisture cure. Apply constant water coating in fog-mist spray without damage to surface texture. Keep shotcrete continuously moist for not less than 7 days after placing. Use sealed curing sheeting or other approved curing method where water curing is not feasible. Use of curing compounds is prohibited.

3.5 DEFECTIVE SHOTCRETE

- A. Cut out and replace defective shotcrete including rebound, sand pockets, sags, sloughing, and other defects at no extra cost to owner.

END OF SECTION