

AFA Consulting LLC

1601 NE 110th ST
Miami, FL, 33161
AFACSLTG@gmail.com

STRUCTURAL CALCULATIONS

Project: New Fountain

Owner: Casa Robales

Address: 6545 SW 131st ST, Pinecrest, FL, 33156

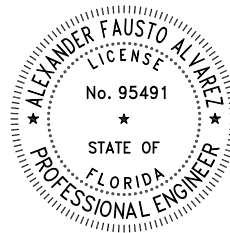
Prepared For: Gray Dolphin Pools & Construction, Inc.

4/6/2026

Pages 1-5

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FBC 2023
ASCE 7-16

Fountain Details and Properties

Pool Details and Properties

Coping Elevation	8.33 Elev. ft
Water Line Elevation	8.33 Elev. ft
Flood Zone Elevation	10.00 Elev. ft
Bottom Slab Elevation	6.66 Elev. ft
Maximum Depth	1.17 ft
Wall Height	1.67 ft
Wall Thickness	6.00 in
Slab Thickness	6.00 in
Unsupported Slab Length	13.00 ft
Total Slab Area	156.00 sf
Perimeter	50.00 ft
Volume Stairs +/- Bench	0.00 cf
Surcharge	100.00 psf

Material Properties

Concrete Design Strength	3500.00 psi
Steel Design Strength	60000.00 psi
Weight of Rein. Concrete	150.00 pcf

Soil Properties

C Soil	30.00 Degrees
Soil Density	110.00 pcf
Water Density	62.40 pcf
Soil Friction Force	30.00 psf
Soil Bearing Capacity	2000.00 psf

Reinforcement (sqin)	Single	Double
#3@6" o.c.	0.22	0.44
#3@7" o.c.	0.19	0.38
#3@8" o.c.	0.17	0.33
#3@9" o.c.	0.15	0.29
#3@10" o.c.	0.13	0.26
#4@6" o.c.	0.40	0.80
#4@7" o.c.	0.34	0.69
#4@8" o.c.	0.30	0.60
#4@9" o.c.	0.27	0.53
#4@10" o.c.	0.24	0.48

Reinforcement Details

Slab Reinforcement (Double-Mat)	#3@9" o.c. sqin
Wall Reinforcement	#3@9" o.c. sqin
Reinforcement Cover	3.00 in

Single
Single

Buoyancy Calculations

Downward Forces

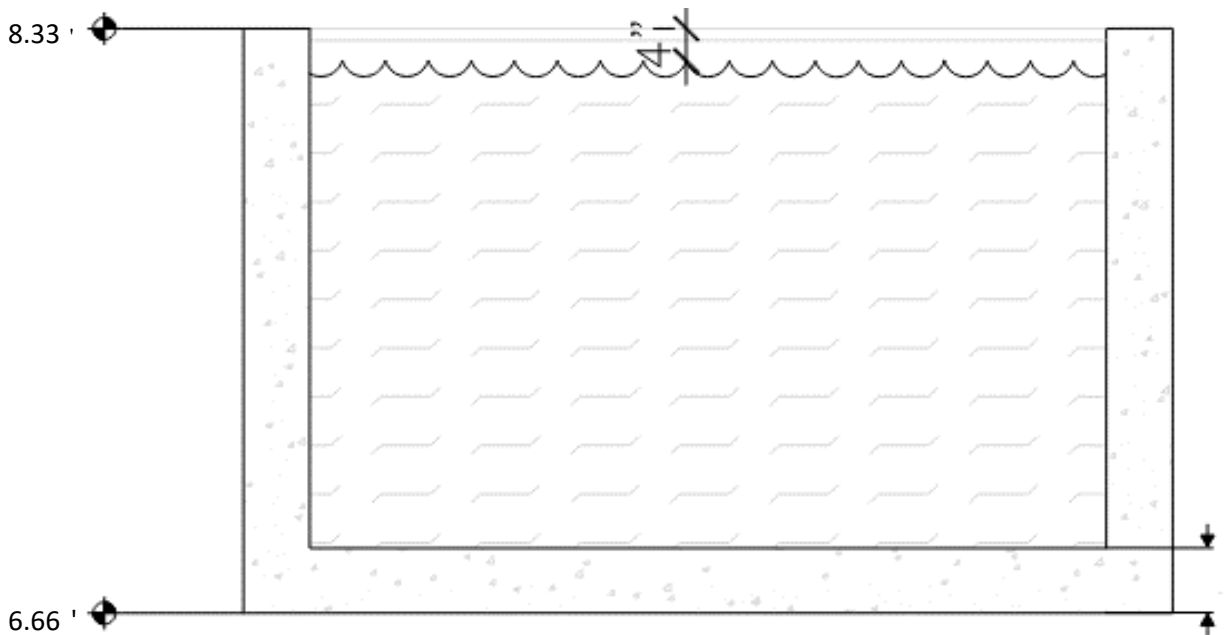
Bottom Slab	$= \text{Area Slab} \times \text{Slab Thickness}$ $\times \text{Density of Concrete} =$	11,700 lbs
Walls	$= \text{Fountain Perimeter} \times \text{Avg. Wall Height} \times$ $\text{Wall Thickness} \times \text{Density of Concrete} =$	4,052 lbs
Total Downward	$\Sigma \text{ Dead Loads}$	15,752 lbs

Uplift Forces

Hydr.Uplift Elev. $= \text{Depth of concrete below flood elevation} =$ 3.34 ft

Total Uplift $= \text{Area Slab} \times \text{Water Density} =$ 13,015 lbs

Safety Factor $= \frac{\text{Total Downward Forces}}{\text{Total Uplift Forces}} =$ 1.21 O.K.



Wall Design

$$K_A = \tan^2 \left(45^\circ - \frac{\phi}{2} \right) = 0.33$$

$$R_A = \frac{1}{2} K_A \gamma H^2 = 8.2 \text{ plf}$$

$$R_H = \frac{1}{2} K_A \gamma_w h^2 = 115.8 \text{ plf}$$

$$R_S = K_A q H = 38.9 \text{ plf}$$

$$M_u = 1.4 \left(\frac{H}{3} R_A + \frac{h}{3} R_H + \frac{H}{2} R_S \right) = 119 \text{ lbs-ft}$$

Where:

K_A = coefficient of active earth pressure

R_A = Lateral Earth Pressure

R_H = Lateral Hydrostatic Pressure

R_S = Uniform Surcharge Load

M_u = Ultimate Bending Moment

ϕ = Angle of Internal Friction

H = Height of Fountain Wall

h = Hydrostatic Uplift Elevation

γ = Soil Density

Area of Steel Required

$$R_n = \frac{M_u}{\phi b d^2} = 14.7 \text{ plf}$$

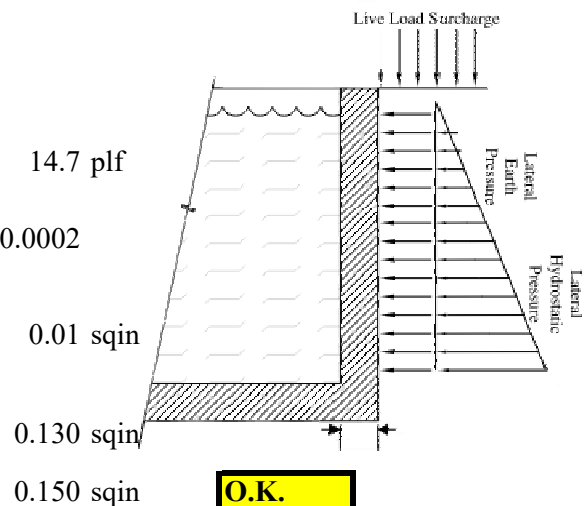
$$p = \frac{0.85 f'_c}{f_y} \times \left[1 - \sqrt{1 - \frac{2 \times R_n}{0.85 \times f'_c}} \right] = 0.0002$$

$$A_{sreq} = p b d = 0.01 \text{ sqin}$$

Minimum Reinforcement per ACI 318-19 24.4.3.2

$$A_{smin} = 0.0018 b d = 0.130 \text{ sqin}$$

Area Steel Provided



Assuming Critical Loading at Service

Bearing Pressure Calculations

Max Bearing Pressure (At base of Walls)

$$= (\text{Wall Height} + \text{Slab Thickness}) \times \text{Weight of Concrete} = 250.05 \text{ psf}$$

$$\text{Safety Factor} = \frac{\text{Soil Bearing Capacity}}{\text{Max Bearing Pressure}} = 8.0$$

O.K.

Slab Deck Design

Loads

Positive Dead Load Due to Self Weight:

$$DL_{sw} = 1.2 * \text{Weight of Conc.} \times \text{Slab Thickness} = 90.0 \quad \text{plf}$$

Negative Live Load Due to Uplift:

$$LL_w = 1.6 * \text{Water Density} \times \text{Hydro. Uplift} = -133.5 \quad \text{plf}$$

Net Load on Slab

$$T_w = DL - LL = -43.5 \quad \text{plf}$$

Assuming Critical Loading at Service (Fountain Empty - Max Water Table)

Area Steel Required

$$M_u = \frac{wl^2}{8} = 918.6 \quad \text{lbs-ft}$$

$$R_n = \frac{M_u}{\phi b d^2} = 113.4 \quad \text{plf}$$

$$p = \frac{0.85 f'_c}{f_y} \times \left[1 - \sqrt{1 - \frac{2 \times R_n}{0.85 \times f'_c}} \right] = 0.002$$

$$A_{sreq} = p b d = 0.07 \quad \text{sqin}$$

Minimum Reinforcement per ACI 318-19 24.4.3.2

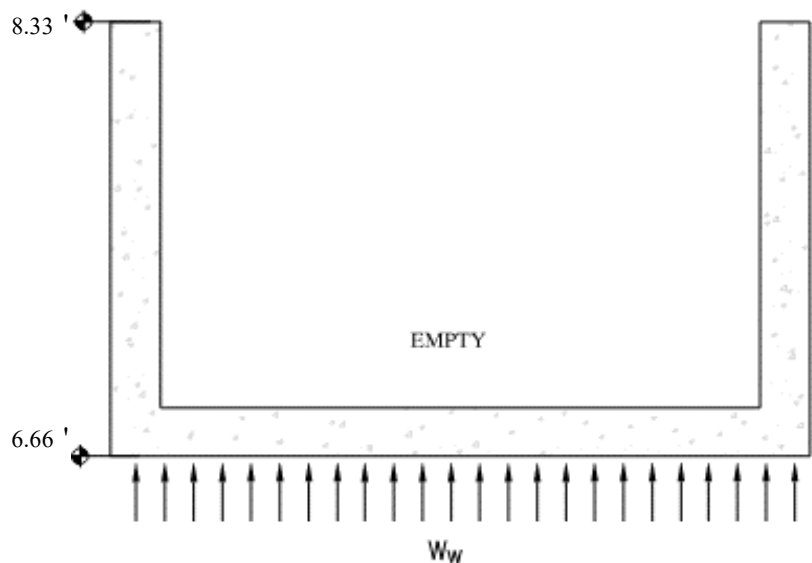
$$A_{smin} = 0.0018 b d = 0.13 \quad \text{sqin}$$

Area Steel Provided

$$0.15 \quad \text{sqin}$$

Steel Check

O.K.



Slab Deck Design

Assuming Load When Fountain Filled W/ Water No Water Uplift to Resist Loads

Loads

Dead Load Due to Self Weight:

$$DL_{sw} = 1.2 \times \text{Weight of Conc.} \times \text{Slab Thickness} = 90.0 \quad \text{plf}$$

Dead Load Due to Water:

$$DL_w = 1.2 \times \text{Weight Water} \times \text{Pond Water Elev.} = 87.4 \quad \text{plf}$$

Total Dead Load (At tributary width of 12"):

$$T_{DL} = \text{Self weight} + \text{Water} = 177.4 \quad \text{psf}$$

Soil Bearing Capacity=

$$2000.00 \quad \text{psf}$$

$$\text{Safety Factor} = \frac{\text{Soil Bearing Capacity}}{\text{Total Dead Load}} =$$

$$11.3 \quad \text{O.K.}$$

Fountain Loads Resisted by Soil: Design For Minimum Steel

Minimum Reinforcement per ACI 318-19 24.4.3.2

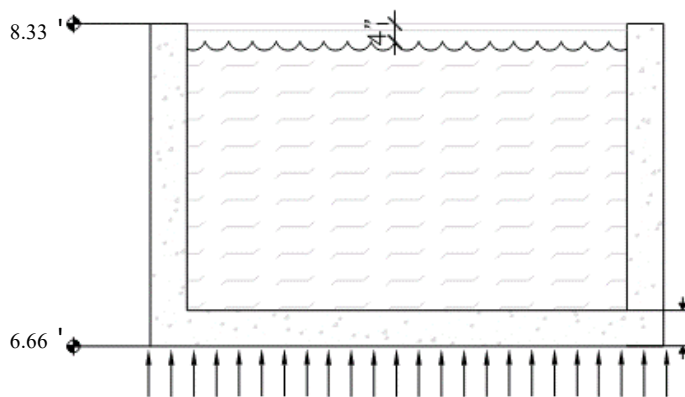
$$A_{smin} = 0.0018bd = 0.13 \quad \text{sqin}$$

Area Steel Provided

$$0.15 \quad \text{sqin}$$

Steel Check

O.K.



Resisted by Soil

