



October 29, 2024

Re: 1st Baptist Church Restroom Bldg Buoyancy Calcs

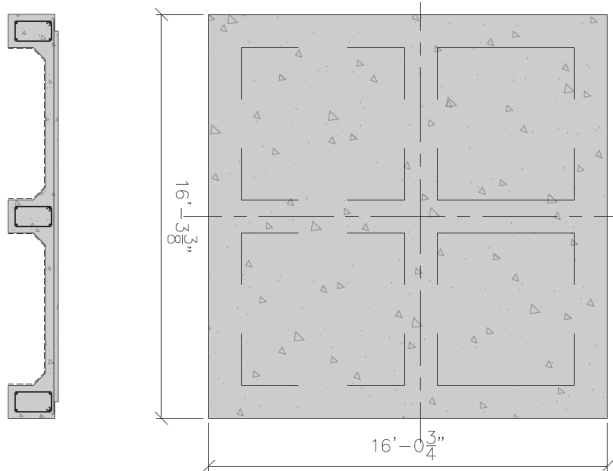
Assumptions:

Density of concrete = 150 #/ft³

Density of water(ρ)= 62.4 #/ft³

$g = 32.2 \text{ft/s}^2$

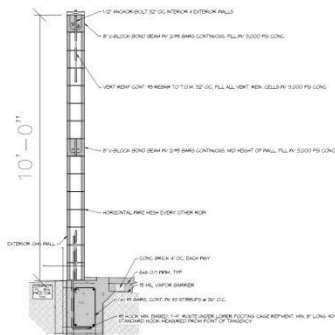
Estimate the weight of the building



The foundation weight is estimated:

$$14.47 \text{ s.f.} \times 16 \text{lf} = 231.5 \text{ cu ft} \times 150 \text{ \#/cu ft of CONCRETE} = \underline{34,728 \#}$$

$$+ 2.68 \text{ s.f.} \times (16.25 \times 3) = 130.65 \text{ cu ft} \times 150 \text{ \#/cu ft of CONCRETE} = \underline{19,597.5\#}$$



The weight of the CMU filled walls are estimated:

$$6.65 \text{ s.f.} \times (84.7-9 \text{ (doors)}) \text{ lf} = 503.4 \text{ cu ft} \times 150 \text{ \#/cu ft of CONCRETE} = \underline{75,510.75\#}$$

The total weight of the concrete building is estimated :

$$34,728\# + 19,597.5\# + 75,510.75\# = 129,836.25\#$$

buoyancy :

Volume of the building below static water level (BFE) :

Natural Grade = 8.4 ft

BFE = 14.0 ft

Depth of building below BFE = $14 - 8.4 = 5.6$ ft

Area of building = $16.25 \times 16 = 260$ ft²

Volume of displaced water = 260 ft² x 5.6 ft = $1,456$ ft³

Displacement Force: 1456 cuft X 62.2 #/cuft = $90,854$ #

Since the weight of the concrete bldg is greater than the buoyancy force the bldg will not float.

$$129,836.25\# > 90,854\#$$

Thank You,



David Dammon

