



Needville, TX
888-331-5871

Flotation Calculations

Model: B-1500 & B-1500NR
Description: NuWater 1500 GPD Aerobic Treatment & Nitrogen Reduction Units

Given

Weight of Structure w/ Slab Top: 17,570 lbs.
Weight of Water: 62.4 pcf
Weight of Soil: 110 pcf
Volume of Structure at Flow Line: Aeration Compartment # 1= 639 gal.
Aeration Compartment # 2 = 1,121 gal.
Clarifier Compartment = 326 gal.

A. Weight of unit at operating condition "Down Forces":

- I. Structure Weight w/ Liquid: $\text{Unit weight} + (\text{total volume} / 7.48 \text{ gals/cu ft}) \times 62.4 \text{ lb/ft}^3$
 $17,570 \text{ lbs} + (2,086 / 7.48) \times 62.4 = 34,980 \text{ lbs.}$
- II. Weight of soil: (2" overburden) $(L \times W \times H) \times 110 \text{ pcf}$
 $(12.167' \times 5.833' \times 2/12) \times 110 \text{ lb/ft}^3 = 1,303 \text{ lbs.}$
- III. Total Weight: $\text{Structure weight w/ Liquid} + \text{Total Soil Weight}$
 $34,980 \text{ lb} + 1,303 \text{ lb} = 35,110 \text{ lbs.}$

B. Weight of water displacement "Up Forces": $(L \times W \times H) \times 62.4$
(at 81" depth of bury) $(12.167' \times 5.833' \times 6.75') \times 62.4 \text{ lb/ft}^3 = 29,893 \text{ lbs.}$

C. Factor of Safety (FS): Required FS: ≥ 1

Down Forces/Up Forces
 $34,980 / 29,893 = 1.17$

When the FS = 1 the "down forces" will equal the "up force" and the structure will be in equilibrium.

When the FS is less than 1 the "up force" will be greater than the "down forces" and floating will occur.

X When the FS is greater than 1 the "up force" will be less than the "down forces" and floating will not occur.

Conclusion:

Total unit weight at operating condition "down Forces" of **34,980 lbs.** is greater than the weight of water displacement "up forces" **29,893 lbs.** therefore the upward forces causing flotation will not control.

Minimum burial depth:

For functional purposes the structure must be buried 2" below grade.

Approved By: _____

Date: _____

"Providing Concrete Environmental Solutions"

Seal:

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