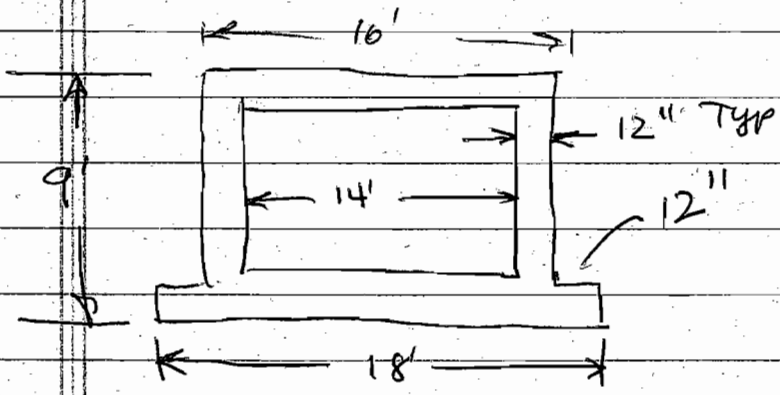
Event Site Bouyancy

1-30-03

Vault Box is 16' x 32' x 9'



Box is 32' Long out to out

Slab 18' x 34' x 1' = 612 ft³ = 22.7 yd³

To thicken slab, add: (see next sheet)

18' x 34' x ~~1.8'~~ 2.8' = ~~918~~ 1714 ft³ = ~~34~~ 63.5 yd³

63.5 ~~34~~ yd³ extra rock excavation

63.5 ~~34~~ yd³ additional concrete

Bouyancy Event Site Vault 1-30-03

Downward forces (weight)

Ends	16' x 8' x 2'	256 ft³ concrete
Sides	32' x 8' x 2'	512 ft³
Bottom Slab		612 ft³
		1380 ft³ concrete

~~51 yd³ @ 130~~

$1380\ ft^3 \left(130\ \#/ft^3 - 62.4\ \#/ft\ water \right) = 93{,}150\ lbs \downarrow$

(67.6)

Volume inside Vault

$14' \times 8' \times 30' = 3{,}360\ ft^3$

$3360\ ft^3 \times 62.4 = 209{,}644\ lbs \uparrow$

→ 116,514 lbs more downward force needed

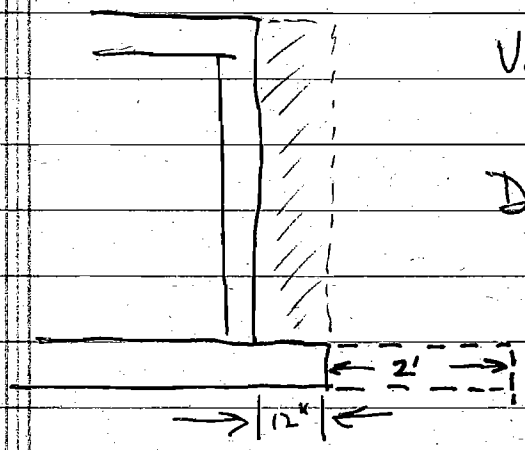
$$\frac{116{,}514\ lbs\ ft^3}{67.6\ lbs} = 1723\ ft^3 \text{ concrete needed}$$

$$\frac{1723}{18 \times 34} = 2.8'$$

2.8 ft of additional concrete needed

Grant Site Bouyancy

Consider weight of soils on footing edge:



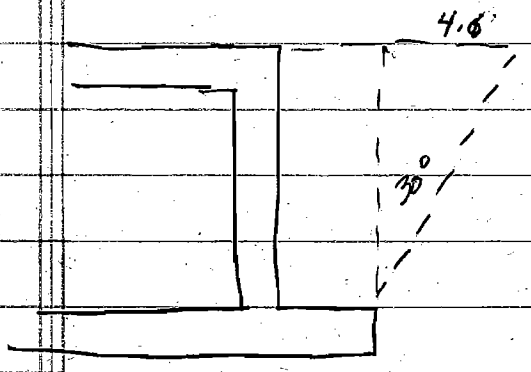
Volume of soil = $1' \times (16+16+32+32) \times 8'$
$= 768\ ft^3$

Downward weight
$\left(115 \frac{lb}{ft^3} - 62.4\ lb/ft^3\right) = 52.5\ lb/ft^3$

$768 \times 52.5 = 40,320\ \#_s$

∴ Adding 2' to footing would provide downward force needed

Consider additional soils @ 30° angle



$\tan 30° = \frac{y}{8'}$ $y = 8' \times \tan 30$
$= 4.6'$

Area $= \frac{1}{2} \times 4.6 \times 8 = 18.4\ ft^2$

$18.4\ ft^2 \times 96' = 1766\ ft^3$ additional

$1766 \times 52.5 = 92,715$ addl lbs

92715
$+ 40320$
$133,035$ lbs

∴ Adding 1' to footing should be sufficient