Assume no shear stress

$F_{f_{max}} = \mu N$

$F_{OS} = \frac{\text{resisting}}{\text{driving}} = \frac{\mu N}{\Sigma F_x'}$

$X_N =$ $\frac{M_O - m_O}{N}$ see if falls in "middle 1/3"

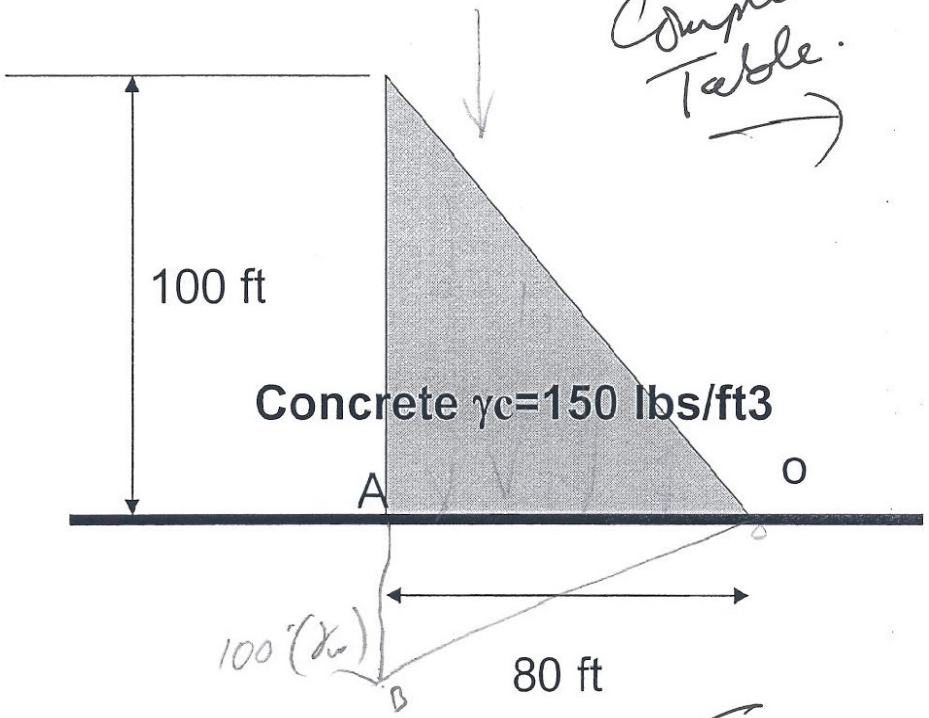
1. Check the stability of this dam under normal loads as shown.
   Assume friction factor = 0.7

Donald Jerolleman

Complete Table.

Load	F_x (±)	F_z (↑+)	m arm	Uplighting (+)	overturning
F_h	+	−			
U	N/A	+			
W	N/A	−			
$\Sigma F_x'$				M_O	M_O

(take neg)



1. Fos ot = 1.35
2. Fos sl = 0.79
3. xN = 23.65 ft and tension (exists) (does not exist)

0/10

0/5

0/10

1) $F_h = A_v \gamma_w \bar{y}_{A_v} = 100^h ft (1^w ft)(62.4\ lb/ft^3)\left(\frac{100 ft}{2}\right) = 312^K$

$W = A_c w \gamma_c = \left(\frac{1}{2}\right)80'(100')(1')(150\ lb/ft^3) = 600^K$

$U = A_{ABO} w = \frac{1}{2}(\gamma_w)(100')(80')(1') = 249.6^K$ @ X_u from $O = 53.3'$

	$\rightarrow^+$ F_x	$\uparrow^+$ F_z	M_{arm} a/b/o	W/R ↺	O/T ↻
F_h	312 K	∅	$\frac{100}{3} = 33.3'$		10390 ft-K
U	∅	249.6 K	$\frac{80(2)}{3} = 53.3'$	13304	13304 ft-K
W	∅	600 K	$= U = 53.3'$	31980 ft-K	
Σ	312 →	350.4 ↓		31980 ft-K ↺	23694 ft-K ↻

$$F_{OS_{OT}} = \frac{\circlearrowleft}{\circlearrowright_{OT}} = \frac{31980}{23694} = 1.35$$

$$F_{OS_{SL}} = \frac{U(N)}{\Sigma F'_x} = \frac{0.7(350.4^K)}{312^K} = 0.79$$

$$X_N = \frac{31980 - 23694}{350.4} = 23.65\ ft$$ middle ⅓ = 26.7 → 53.33

∴ Less than middle ⅓

2) $F_h = 312^K$, $W = 600^K$, $U = \gamma_w 2000' = 124.8^K$

	$F_x \rightarrow^+ (K)$	$F_z \uparrow^+ (K)$	M_{arm} a/b/o	U/R ↺	O/T ↻
F_h	312		33.3		10390 ft-K
U		124.8	53.3		6652 ft-K
W		-600	53.3	31980 ft-K	
Σ	312 →	475.2 ↓		31980 ↺	17042

$F_{OS_{OT}} = 1.88$

$F_{OS_{SL}} = \frac{0.7(475.2)}{312} = 1.07$

$X_N = 31.4\ ft$ middle ⅓ = 26.7 → 53.33 OKAY