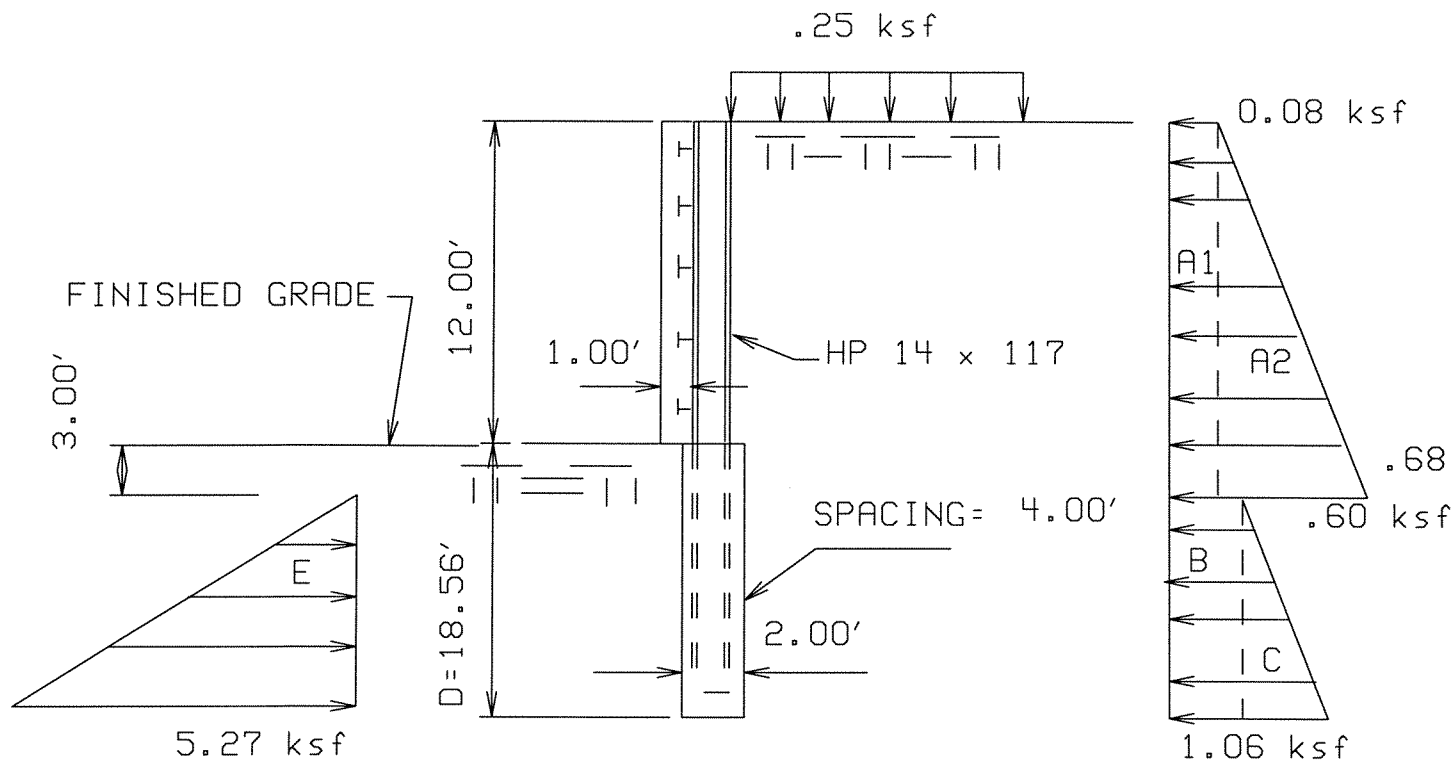


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SOLDIER PILE WALL DESIGN:



DESIGN DATA:

Design Specification: 1996 AASHTO, Section 5.6

Allowable stress in steel pile, $F_b = 21.60$ ksi

Soil properties above finished grade:

Soil weight = .119 kcf, Internal angle of friction = 30.000 degrees

$$K_{a1} = \frac{1 - \sin(30.000)}{1 + \sin(30.000)} = .3333$$

Soil properties below finished grade:

Soil type: Medium sand

Soil weight = .100 kcf, Internal angle of friction = 33.000 degrees

$$K_{a2} = \frac{1 - \sin(33.000)}{1 + \sin(33.000)} = .2948$$

$$K_{p2} = 1/K_{a2} = 1/.2948 = 3.392$$

FIRM:Your Firm
 MADE BY:KJH DATE:05-24-2006
 TITLE:Example PILEWALL calculation

JOB NO.
 CHECKED BY:

SHEET NO: 2
 DATE:

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SOLDIER PILE WALL DESIGN:

COMPUTE PRESSURES:

Consider 3.00 ft below finished grade as ineffective in providing passive pressure (see AASHTO Fig. 5.6.2A).

At top of wall,

$$P = .250 \text{ ksf} * .333 = 0.083 \text{ ksf}$$

Behind wall at 3.00 ft below finished grade,

$$P = 0.083 \text{ ksf} + .119 \text{ kcf} * 15.00 \text{ ft} * .333 = .600 \text{ ksf}$$

Infront of pile at D=18.56 ft below finished grade,

$$P = 3.392 * .100 \text{ kcf} * 15.561 \text{ ft} = 5.278 \text{ ksf}$$

Behind pile at 3.00 ft below finished grade,

$$P = .294 * (.119 \text{ kcf} * 15.000 \text{ ft} + .250 \text{ ksf}) = .604 \text{ ksf}$$

Behind pile at D=18.56 ft below finished grade,

$$P = .294 * (.119 \text{ kcf} * 15.000 \text{ ft} + .100 \text{ kcf} * 15.561 \text{ ft} + .250 \text{ ksf}) = 1.063 \text{ ksf}$$

Pile pressures are effective over a width equal to 4.00 ft (pile spacing)

CHECK STABILITY:

By trial and error, minimum required penetration for stability,
 D= 18.561 ft below finished grade.

Taking moments about the bottom of the pile,

Item	Force (k)	Arm (ft)	Moment (k*ft)
A1: 0.083 * 4.000 * 15.000	5.000	23.061	115.30
A2: 1/2* .600* 4.000* 15.000	18.000	20.561	370.10
B: .604 * 4.000 * 15.561	37.617	7.780	292.68
C: 1/2* .458* 4.000* 15.561	14.277	5.187	74.05
E: 1/2* 5.278* 4.000* 15.561	-164.279	5.187	-852.12
Totals	-89.385		0.01

Moment at base is approximately zero, therefore stability checks.

Maximum moment in pile= 283.60 k*ft occurring at 23.349 ft from top of wall.

For HP 14 x 117 , S= 170.59 in³ (calculated - may vary from tables)
 $f_b = 12 * 283.60 / 170.59 = 19.94 \text{ ksi} < 21.60 \text{ ksi (OK)}$

Note that there is a concentrated pressure at the bottom which is not shown in the diagram. Shear at the bottom = -89.38 k