FIRM:Your Firm JOB NO.2002-0060 SHEET NO: 1
MADE BY:KJH DATE:05-13-2006 CHECKED BY: DATE:
TITLE:Example MSE wall output

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MSE WALL DESIGN:EXISTING WALL 3N - MSE - WITH 2.5 H:1V SLOPE

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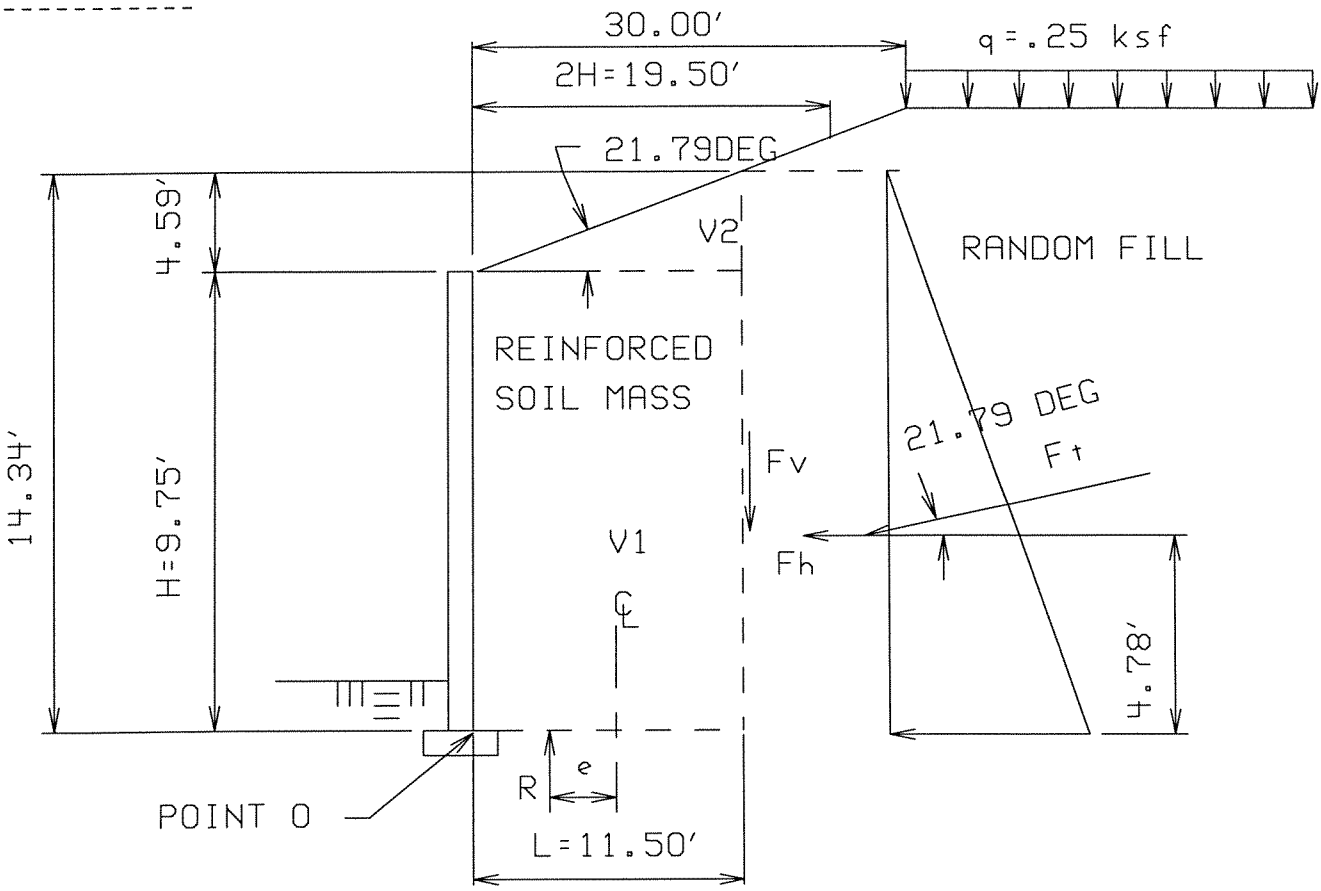


DESIGN DATA:

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Design Specification: 2002 AASHTO Standard Specifications
Reinforced soil weight = 120 pcf
Random fill weight = 120 pcf
Random soil angle of internal friction, $\phi$ =30.000 degrees
(Refer to AASHTO Figure 5.8.2C. The distance to top of slope= 30.0 ft > 2*H= 19.5 ft, therefore the reduced angle "I" cannot be used to compute Ka.)

Using coulomb pressure theory (see AASHTO Fig. 5.5.2A), the active coefficient of pressure to be used for horizontal component is,

$$Ka = \frac{\cos\beta \ * \sin^2(\theta + \phi')}{\sin^2\theta \ * \sin(\theta - \delta) * \left|1 + \left[\sin(\phi' + \delta)*\sin(\phi' - \beta) / (\sin(\theta - \delta)*\sin(\theta + \beta))\right]^{.5}\right|^2}$$

$$= \frac{\cos(21.79) * \sin^2(90.00+30.00)}{\sin^2(90.00)*\sin(90.00-21.79) * \left|1 - \left[\sin(30.00+21.79)*\sin(30.00-21.79) / (\sin(90.00-21.79)*\sin(90.00+21.79))\right]^{.5}\right|^2}$$

$$= .405$$

Also, the effects of surcharge will be ignored because the surcharge load falls outside a 1H:2V envelope measured from the back of anchorage (refer to AASHTO Fig. 5.8.12.1 for vertical surcharge distribution)

MSE WALL DESIGN:EXISTING WALL 3N - MSE - WITH 2.5 H:1V SLOPE

DESIGN DATA (Cont'd):

For sliding check (see '91 AASHTO Table 5.5.5B):
Interface:Clean gravel,gravel-sand mixtures,coarse sand
Friction factor= .550
Adhesion = 0.000 ksf

COMPUTE WALL STABILITY (Refer to AASHTO Figure 5.8.2C):

Equivalent fluid earth pressure = .405 * .119 kcf = 0.048 kcf
V1 = 11.50' * 9.75' * .119 kcf = 13.4 k/ft
V2 = 0.5 * 4.59' * 11.50' * .119 kcf = 3.1 k/ft
Fh = 0.5 * $(14.34')^2$ * 0.048 kcf = 5.0 k/ft
Fv = 5.0 k/ft * Tan(21.79) = 1.9 k/ft

Safety Factor Against Overturning (Moments About Point O):
Mr = 13.4 k/ft * 5.75' + 3.1 k/ft * 7.66' + 1.9 k/ft * 11.50'
= 100.3 k*ft/ft
Mo = 5.0 k/ft * 4.78 ft = 23.9 k*ft/ft
S.F.(O) = 100.3/ 23.9 = 4.19> 2 (OK)

Safety Factor Against Sliding:
Fresisting = ( .550) * ( 13.4 k/ft + 3.1 k/ft + 1.9 k/ft) + 0.000 ksf * 11.50 ft
= 10.2 k/ft
Fdriving = 5.0 k/ft
S.F.(S) = 10.2/ 5.0 = 2.04> 1.5 (OK)

Compute bearing pressure:
R = 13.4 k/ft + 3.1 k/ft + 1.9 k/ft = 18.6 k/ft
e = L/2 - (Mr - Mo)/R
= 11.50'/2 - ( 100.3 k*ft/ft - 23.9 k*ft/ft)/ 18.6 k/ft
= 1.64< L/6 = 11.50'/6 = 1.91' (OK)

The width of soil pressure in bearing is,
L - 2*e = 11.50 ft - 2*( 1.64 ft)
= 8.20 ft

Bearing pressure, $\sigma_V$ = R/(L - 2*e)
= 18.62/(11.50 - 2*1.64)
= 2.269 ksf