

2 CARN GWILYM GOCH
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REINFORCED CONCRETE RETAINING WALL

STRUCTURAL CALCULATIONS

PROJECT NO. 1809-5

APRIL 2023

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ASSOCIATES**

Consulting Engineers

Ref Calculation

Comments

1.0 PROPOSALS

A reinforced concrete retaining wall is to be provided on this project.

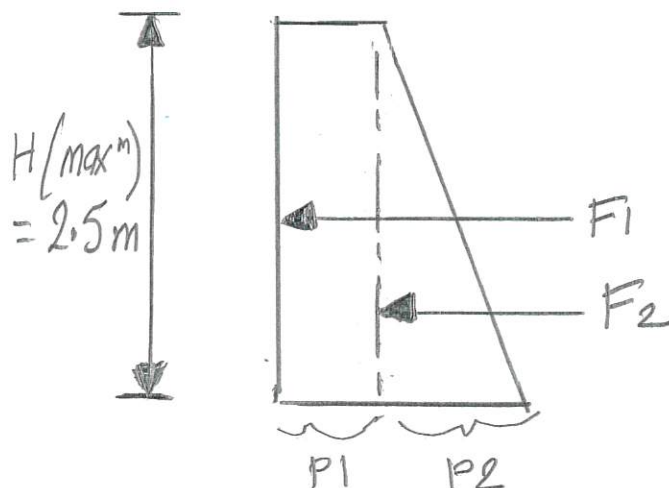
The proposals are shown on our drawing 1809-S/SK1. These calculations justify the structural adequacy of the proposals.

2.0 LOADINGS

Assume the soil has a saturated density of 18 kN/m^3

$$K_a = \frac{1 - \sin \alpha}{1 + \sin \alpha} = 0.33$$

$$\text{Surcharge for temporary traffic} = 5.0 \text{ kN/m}^2$$



Ref

Calculation

Comments

$$P_1 = 0.33 \times 5.0 = 1.7 \text{ kN/m}^2$$

$$P_2 = 0.33 \times 18.0 \times 2.5 = 14.9 \text{ kN/m}^2$$

$$F_1 = 1.7 \times 2.5 = 4.3 \text{ kN/m}^2$$

$$F_2 = 14.9 \times \frac{2.5}{2} = 18.6 \text{ kN/m}^2$$

$$M_1 = 4.3 \times \frac{2.5}{2} = 5.4 \text{ kN/m}^2$$

$$M_2 = 18.6 \times \frac{2.5}{3} = 15.5 \text{ kN/m}^2$$

$$\text{Max ult BM} = 1.4 (5.4 + 15.5) = 29.3 \text{ kNm}$$

3.0

RETAINING WALL:

provide 100 bwk/150 RC cavity/100.7N/mm² bwk

$$d = 250 - 50 = 200 \text{ mm}$$

$$f_k = 7.0 \text{ N/mm}^2, f_k/8m = 7.0/2.0 = 3.5$$

$$\text{put } c = 0.85 \quad \therefore Q = 0.90$$

$$M_d = 0.90 \times 10^3 \times 200^2 \times 10^{-6} = 36.0 \text{ kNm} > 29.3 \text{ kNm}$$

Ref

Calculation

$$\text{max shear frame} = 1.4(4.3 + 18.6) = 32.1 \text{ kN}$$

$$v = \frac{32.1 \times 10^3}{350 \times 1000} = 0.09 \text{ N/mm}^2$$

$$\text{design shear strength} = \frac{0.35}{2.0} = 0.175 \text{ N/mm}^2$$

Reinforcement

$$A_s = \frac{29.3 \times 10^6}{0.87 \times 460 \times 0.85 \times 200} = 43 \text{ mm}^2/\text{m}$$

Provide H12 bars @ 200 c/c
($A_s = 565 \text{ mm}^2/\text{m}$)

By inspection sliding and overturning
will not occur due to relatively modest
imposed loadings.

OK.

— OK.