

Structural Design Check
for
2.0m Gabion Basket Wall
at
Former Clun Primary School
Clyne, Neath
SA11 4BW

Chris Meredith Designs
8 Beech Grove
Ebbw Vale
NP23 8WQ

FORMER CLUN PRIMARY SCHOOL, CLYNE, NEATH

PROJECT	2.0m GABION WALL	PREPARED BY	SM	DATE	AUG 19
JOB No.	JS/SM/03	DRG No.		PAGE No.	1 OF 4
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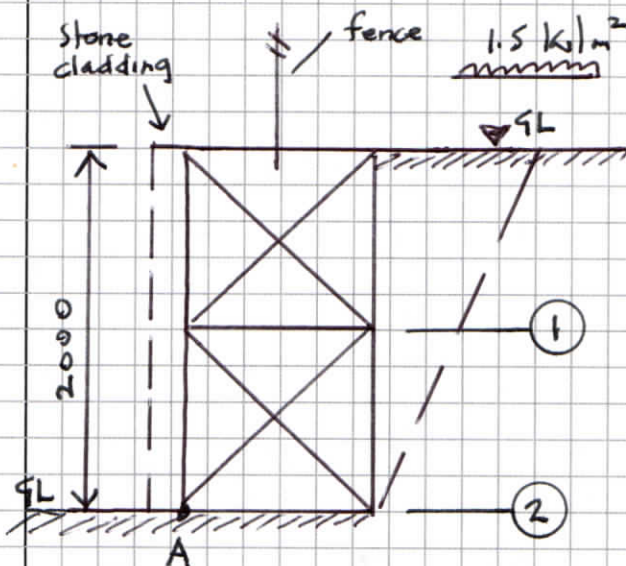
REF

CALCULATIONS

(1) DESIGN

Check new gabion basket retaining walls required to new access and infill to existing openings. Walls will incorporate a stone 'cladding' to match the existing retaining walls but this is ignored in the analysis.

(2) DESIGN CRITERIA.



WALL SECTION

$$\text{Granular b-fill} = 16 \text{ kN/m}^3$$

$$\phi = 38^\circ \text{ (granular fill)}$$

$$K_a = 0.24$$

$$\text{Stone fill basket} = 20 \text{ kN/m}^3$$

$$\text{Bearing capacity} = \frac{120 \text{ kN/m}^2}{\text{(from clay)}}$$

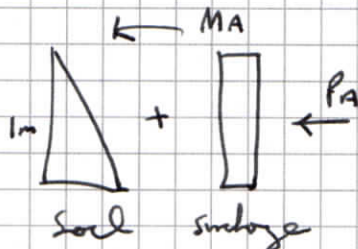
(3) WALL STABILITY CHECK

LEVEL 1

$$\text{Density basket (80\% stone)} = 20 \times 0.8 = 16 \text{ kN/m}^3$$

Take moments about toe 'A'

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1m
Soil surcharge

$$P_{A, \text{soil}} = \frac{K_a \gamma h^2}{2} = \frac{0.24 \times 16 \times 1^2}{2} = 1.92 \text{ k/m} \leftarrow$$

$$P_{A, \text{sur}} = K_a q h = 0.24 \times 1.5 \times 1 = 0.36 \text{ k/m} \leftarrow$$

$$M_{A, \text{soil}} = 1.92 \times 1/3 = 0.64 \text{ kNm/m} \leftarrow$$

$$M_{A, \text{sur}} = 0.36 \times 1/2 = 0.18 \text{ kNm/m} \leftarrow$$

Total applied $\Sigma P = 1.92 + 0.36 = 2.28 \text{ k/m} \leftarrow$

Total applied $\Sigma M = 0.64 + 0.18 = 0.82 \text{ kNm/m} \leftarrow$

Restoring moment $M_{R2} = 0.5 \times (1 \times 1 \times 16) = 8.00 \text{ kNm/m} \downarrow$

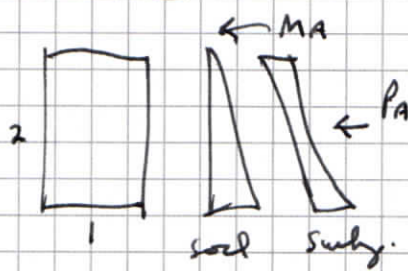
$W_A = (1 \times 1 \times 16) = 16.00 \text{ k/m} \downarrow$

$FOS_{OT} = 8.00 / 0.82 = 9.76 > 2 \text{ — o.k}$

Sliding $F_R = 2/3 \tan \phi \omega = 2/3 \times \tan 38 \times 16 = 8.33 \text{ k/m} \downarrow$

$FOS_{slid} = 8.33 / 2.28 = 3.65 > 2 \text{ — o.k}$

LEVEL (2)



2
1
Soil surcharge

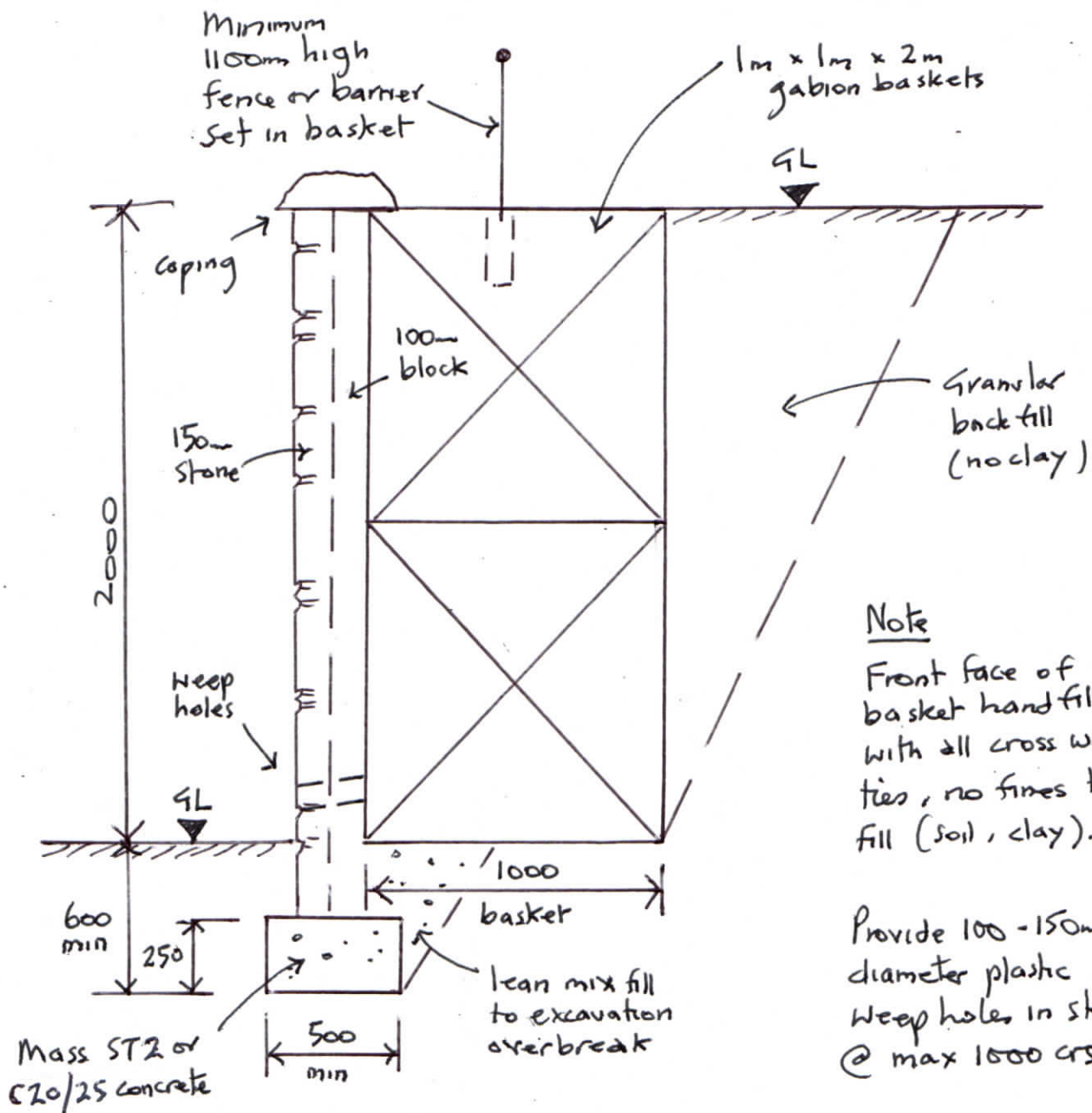
$$P_{2A} = \left(0.24 \times 16 \times \frac{2^2}{2} \right) + \left(0.24 \times 1.5 \times 2 \right)$$

$$= 7.68 + 0.72 = 8.4 \text{ k/m} \leftarrow$$

$$M_{2A} = \left(7.68 \times \frac{2}{3} \right) + \left(0.72 \times \frac{2}{2} \right) = 5.84 \text{ kNm/m} \leftarrow$$

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	Resting moment $M_R = 0.5 \times (2 \times 1 \times 16) = \underline{16 \text{ Km/m}} \downarrow$ $W_A = (2 \times 1 \times 16) = \underline{32 \text{ kN/m}} \downarrow$ $FOS_{OT} = 16.0 / 5.84 = \underline{2.74} > 2 \text{ --- o.k.}$ <u>Sliding</u> $F_R = 2/3 \times \tan 38 \times 32 = \underline{16.67 \text{ kN/m}} \downarrow$ $FOS_{sliding} = 16.67 / 8.4 = 1.98 \approx 2$ (ignores bottom effect of wall/blockwork). <u>o.k</u> <u>Beam Pressure</u> $W = \underline{32 \text{ kN}}$ $b = \underline{1.00 \text{ m}}$ $M = \underline{5.84 \text{ Km/m}}$ $p_{max/min} = \frac{W}{b} \pm \frac{M}{Z} \quad Z = \frac{b^2}{6} = 1/6$ $p_{max} = \frac{32}{1} + \left(\frac{5.84 \times 6}{1} \right) = \underline{67.04 \text{ kN/m}^2}$ $p_{min} = \frac{32}{1} - \left(\frac{5.84 \times 6}{1} \right) = \underline{-3.04 \text{ kN/m}^2}$ $< \underline{120} \text{ --- o.k}$

DO NOT SCALENote

Front face of basket hand filled with all cross wire ties, no fines to fill (soil, clay).

Provide 100-150mm diameter plastic weep holes in stone @ max 1000 c/s

WALL SECTION

150 average thickness stone facing fixed to 100 - (7N/m²) dense blockwork secured with 5/8" steel wall ties.

NOTES

PROVIDE TEMPORARY SUPPORT TO EXCAVATION UNTIL WALL BACKFILLED
REMOVE ANY SOFT SPOTS FROM WALL FORMATION AND FILL WITH LEAN MIX CONC
BASKETS LAID TO MANUFACTURERS SPECIFICATION AND X-BONDED

Project Title

2m GABION BASKET WALL AT
FORMER CLUN PRIMARY SCHOOL

Drawn CM

Date AUG 19

Drg.

GW/JS/01

Rev.

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for
2.5m Gabion Basket Wall
at
Former Clun Primary School
Clyne, Neath
SA11 4BW

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Ebbw Vale
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FORMER CLUN PRIMARY SCHOOL, CLYNE, NEATH

PROJECT	2.5m GABION WALL	PREPARED BY	SM	DATE	AUG 19
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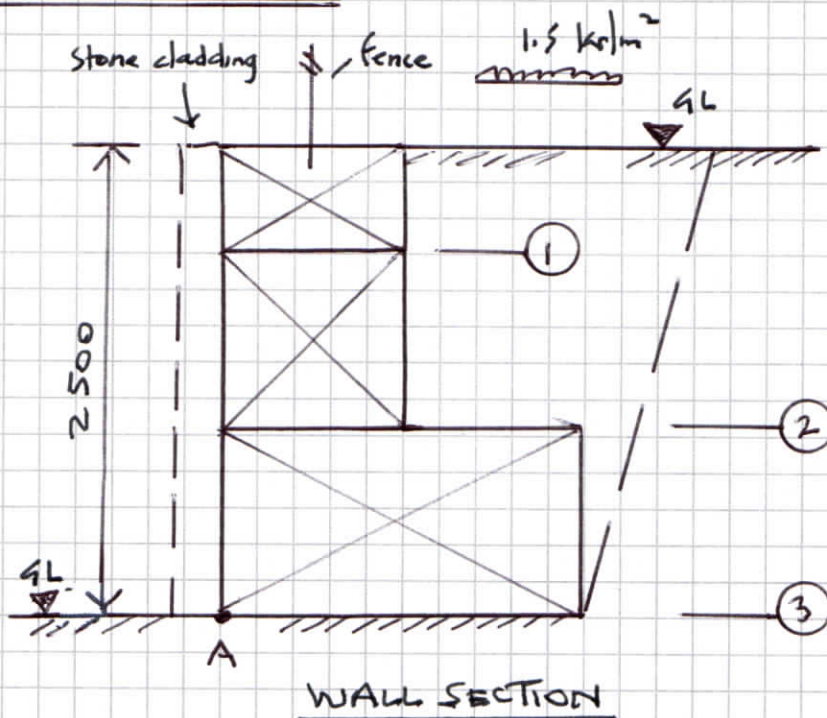
REF

CALCULATIONS

(1) DESIGN

Check new gabion basket retaining walls required to new access and infill to existing openings. Walls will incorporate a stone 'cladding' to match the existing retaining walls, ignored in analysis

(2) DESIGN CRITERIA



Granular b. fill = 16 kN/m³ (no clay)

$\phi = 38^\circ$ (granular fill) $K_a = 0.24$

Stone fill basket = 20 kN/m³

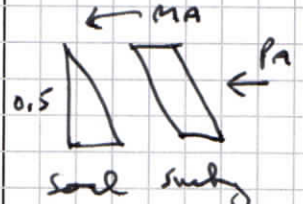
Bearing capacity = 120 kN/m² (firm clay)

Basket density = $20 \times 0.8 = \underline{\underline{16 \text{ kN/m}^3}}$

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(3) WALL STABILITY CHECK

LEVEL ①



0.5
soil surty

$$P_{1A} = \left(0.24 \times 16 \times \frac{0.5^2}{2} \right) + \left(0.24 \times 1.5 \times 0.5 \right)$$
$$= 0.48 + 0.18 = \underline{0.66 \text{ kN/m}} \leftarrow$$
$$M_{1A} = \left(0.48 \times \frac{0.5}{3} \right) + \left(0.18 \times \frac{0.5}{2} \right) = \underline{0.13 \text{ kNm/m}} \curvearrowright$$

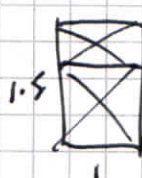
Restoring moment $M_R = (0.5 \times 1 \times 16) \times 0.5 = \underline{4.00 \text{ kNm/m}}$

$$FOS_{OT} = \frac{4.0}{0.13} = \underline{30.8} > 2 \text{ — o.k}$$

Sliding $F_R = \frac{2}{3} \tan 38^\circ \times (0.5 \times 1 \times 16) = \underline{4.17 \text{ kN}} \downarrow$

$$FOS_{slay} = \frac{4.17}{0.66} = \underline{6.32} > 2 \text{ — o.k}$$

LEVEL ②

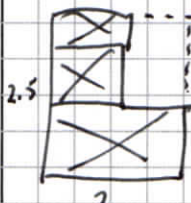


1.5

$$P_{2A} = \left(0.24 \times 16 \times \frac{1.5^2}{2} \right) + \left(0.24 \times 1.5 \times 1.5 \right)$$
$$= 4.32 + 0.54 = \underline{4.86 \text{ kN/m}} \leftarrow$$
$$M_{2A} = \left(4.32 \times \frac{1.5}{3} \right) + \left(0.54 \times \frac{1.5}{2} \right) = \underline{2.57 \text{ kNm/m}} \curvearrowright$$

Restoring moment $M_R = (1.5 \times 1 \times 0.5 \times 16) = \underline{12.00} \curvearrowright$

$$FOS_{OT} = \frac{12}{2.57} = \underline{4.67} > 2 \text{ — o.k}$$

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	<u>Sliding</u> $F_R = \frac{2}{3} \tan \phi_w = \frac{2}{3} \tan 38^\circ \times 24 = \underline{12.51 \text{ kN}} \downarrow$ $FOS_{\text{sliding}} = \frac{12.5}{4.86} = \underline{2.57} > 2 \text{ — o.k}$ <u>LEVER ③</u>  $P_3 A = \left(0.24 \times 16 \times \frac{2.5^2}{2} \right) + \left(0.24 \times 1.5 \times 2.5 \right)$ $= 12.0 + 0.9 = \underline{12.9 \text{ kN/m}} \leftarrow$ $M_{3A} = \left(12 \times \frac{2.5}{3} \right) + \left(0.9 \times \frac{2.5}{2} \right) = \underline{11.13 \text{ kNm}} \uparrow$ Resting moment $M_R = \left(2.5 \times 2 \times 16 \right) \times \frac{2}{2} = \underline{80.0 \text{ kNm}} \downarrow$ $FOS_{\text{ST}} = \frac{80}{11.13} = \underline{7.19} > 2 \text{ — o.k}$ <u>Sliding</u> $F_R = \frac{2}{3} \tan 38^\circ (2.5 \times 2 \times 16) = \underline{41.67 \text{ kN}} \downarrow$ $FOS_{\text{sliding}} = \frac{41.67}{12.9} = \underline{3.23} > 2 \text{ — o.k}$					

