



Structural report for:

Proposed gabion wall behind existing retaining wall

<i>Client name:</i>	Jose Galea
<i>Construction site address:</i>	25 Heol Corn Du Merthyr Tydfil CF48 1BW

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<i>Job reference number:</i>	AUX251
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1 ***Introduction***

1.1. Instructions

In accordance with instructions received from the client I have carried out a Structural Survey/Inspection in relation to the proposed gabion retaining wall which will be built close to the existing retaining wall at the back of the property at 25 Hoel Corn Du in Merthyr Tydfil. The existing retaining wall separates my client`s property which is at the higher level from the 15 Clos Cribyn property which is at the lower level. The inspection was carried out on 19/07/2023. All comments are based on visual inspection, siter measurements and architectural drawings.

2 ***General Description of Property***

The property is situated at 25 Hoel Corn Du in Merthyr Tydfil. The above mentioned retaining wall and the proposed gabion retaining wall are at the northern border of the plot. See below the satellite view from Google Maps. I indicated with the red line the location of the proposed gabion retaining wall.





3 *Existing and proposed state*

The existing terrain at the back of the 25 Hoel Corn Du is sloping towards the properties below. The slope is quite significant as indicated on the architectural drawings especially sections (2-2 to 5-5). At the border between 25 Hoel Corn Du and 15 Clos Cribyn is a retaining wall which is 1.4m high and the retaining height is 1.2m. During my site visit I was able to get to the 15 Clos Cribyn property to see the retaining wall. I spoke to the owner and she said that she doesn't have any documentation for the existing retaining wall. In this case I am not able to check what type of the retaining wall it is. For checking the existing wall I used grouted cavity retaining wall with RC concrete base. The slope behind I used 16° but it might be even slightly more. That gave the most probably shape of the existing retaining wall. At the back of the existing retaining wall are posts and timber fence. From the back of the retaining wall to my client's side of the fence is 900mm

The proposed gabion retaining wall will be placed at the back of the existing wall. The top level of the proposed wall will be slightly higher than the existing retaining wall (c.a. 0.5m). From the sections it looks that only section 4-4 and 5-5 are problematic and the other sections indicate that the difference in level between my client's side of the property and the property behind is very small. I did additional calculations for the same existing retaining wall with the proposed higher level at the back but reduced slope to just 2° and the result is slightly above the limit. Looking at the section 4-4 and 5-5 it looks that the gabion retaining wall is lower than on the other sections. I would say that it will have to be confirmed by the structural engineer or civil engineer if the depth of the retaining wall is enough. I probably would use the same depth of the gabion cages as per sections 2-2 and 3-3 and then there wouldn't be any issue with the load transfer as the retained height will be lower than it is now.



5 Conclusions

After the site visit and after receiving architectural drawings I would suggest to increase the depth of the gabions on the sections 4-4 and 5-5 to match sections 2-2 and 3-3 unless the proposed gabion retaining wall designer will confirm that with the depth of the proposed gabion retaining wall is sufficient and there is no additional load transfer from the proposed retaining wall on the existing retaining wall greater than existing from the slope. If the height of the proposed wall is the same as per sections 2-2&3-3 then the retained height of the existing retaining wall will be lower than it is currently. In this case I am happy with the proposed gabion retaining wall.

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END OF REPORT

Marcin Krawucki

BSc (Hons) GMICE

ICE Membership: 92007313

Figure 10.10: Design of retaining wall. The figure includes a cross-section of a retaining wall and three associated diagrams. The wall cross-section has a base width of 2000 mm, a stem width of 300 mm, and a heel width of 1600 mm. The stem height is 1200 mm, and the heel height is 650 mm. The wall is subjected to a surcharge of 1.0 kN/m² at the top, soil pressure of 3.356 kN/m² at the stem face, and a wall weight of 27.72 kN acting at 1360 mm from the stem face. The soil pressure is 12.528 kN/m² at the heel face. The passive pressure diagram shows a triangular distribution with a maximum value of 33.48 kN/m² at the base. The pressure diagram shows a triangular distribution with a maximum value of 5.00 kN/m² at the top and a minimum value of 21.32 kN/m² at the base. The bending moment diagram shows a maximum value of 17.41 kN.m at the base.

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Job Ref : AUX251**Sheet** : 01 /**Made by** : MK**Date** : 30 July 2023 / Ver. 2022.13.18**Checked** :**Approved** :**Structural Design****Wall Design (Inner Steel)**

Critical Section	Critical @ 0 mm from base, Case 2		
Steel Provided (Cover)	Main H16@150 (30 mm) Dist. H12@175 (46 mm)	1340 mm ²	OK
Compression Steel Provided (Cover)	Main H12@250 (30 mm) Dist. H12@175 (42 mm)	452 mm ²	
Leverarm $z = \text{fn}(d, b, A_s, f_y, F_{cu})$	262 mm, 1000 mm, 1340 mm ² , 500 N/mm ² , 30.0 N/mm ²	240 mm	
$M_r = \text{fn}(\text{above}, A_s', d', x, x/d)$	452 mm ² , 36 mm, 48 mm, 0.18	140.1 kN.m	
Moment Capacity Check (M/Mr)	M 17.4 kN.m, Mr 140.1 kN.m	0.124	OK
Shear Capacity Check	F 20.3 kN, vc 0.597 N/mm ² , Fvr 156.4 kN	0.13	OK

Base Top Steel Design

Steel Provided (Cover)	Main H16@150 (50 mm) Dist. H12@175 (66 mm)	1340 mm ²	OK
Compression Steel Provided (Cover)	Main H12@150 (50 mm) Dist. H12@175 (62 mm)	754 mm ²	
Leverarm $z = \text{fn}(d, b, A_s, f_y, F_{cu})$	242 mm, 1000 mm, 1340 mm ² , 500 N/mm ² , 30 N/mm ²	220 mm	
$M_r = \text{fn}(\text{above}, A_s', d', x, x/d)$	754 mm ² , 56 mm, 48 mm, 0.20	128.4 kN.m	
Moment Capacity Check (M/Mr)	M 0.3 kN.m, Mr 128.4 kN.m	0.002	OK
Shear Capacity Check	F 5.1 kN, vc 0.625 N/mm ² , Fvr 151.3 kN	0.03	OK

Base Bottom Steel Design

Steel Provided (Cover)	Main H12@150 (50 mm) Dist. H12@175 (62 mm)	754 mm ²	OK
Compression Steel Provided (Cover)	Main H16@150 (50 mm) Dist. H12@175 (66 mm)	1340 mm ²	
Leverarm $z = \text{fn}(d, b, A_s, f_y, F_{cu})$	244 mm, 1000 mm, 754 mm ² , 500 N/mm ² , 30 N/mm ²	232 mm	
$M_r = \text{fn}(\text{above}, A_s', d', x, x/d)$	1340 mm ² , 58 mm, 27 mm, 0.11	76.0 kN.m	
Moment Capacity Check (M/Mr)	M 19.3 kN.m, Mr 76.0 kN.m	0.254	OK
Shear Capacity Check	F 19.7 kN, vc 0.514 N/mm ² , Fvr 125.4 kN	0.16	OK

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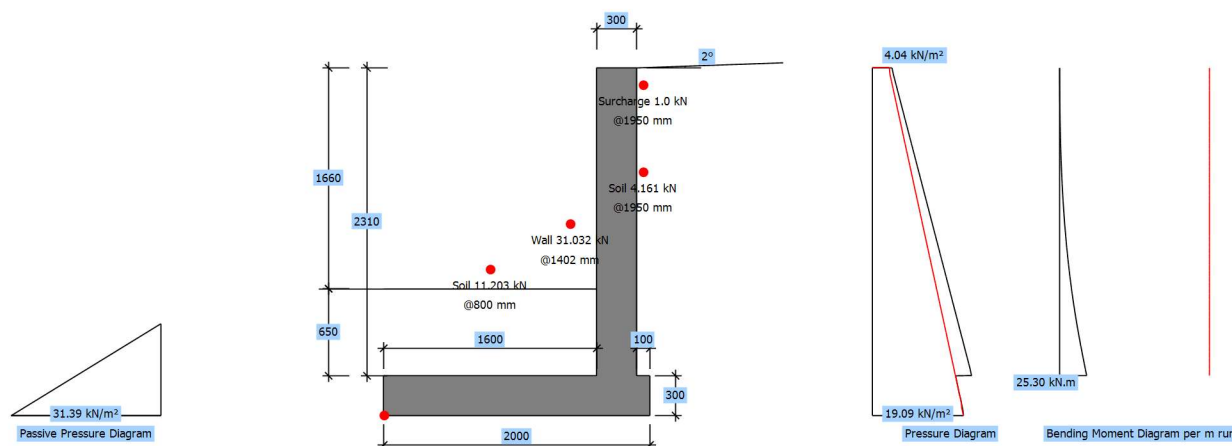
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Checked :

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MasterKey : Retaining Wall Design to BS 8002 : 1994 and BS 8110 : 1997**Basic RC Retaining Wall****Reinforced Concrete Retaining Wall with Reinforced Base****Summary of Design Data**

Notes

Material Densities (kN/m³)

Angles

Concrete grade

Concrete covers (mm)

Reinforcement design

Surcharge and Water Table

Unplanned excavation depth

† The Engineer must satisfy him/herself to the reinforcement detailing requirements of the relevant codes of practice

All dimensions are in mm and all forces are per metre run

Soil 18.00, Concrete 24.00

Embankment 2°

fcu 30 N/mm², Permissible tensile stress 0.250 N/mm²

Wall inner cover 30 mm, Wall outer cover 30 mm, Base cover 50 mm

fy 500 N/mm² designed to BS 8110: 1997

Surcharge 10.00 kN/m², Fully drained

Front of wall 261 mm

Soil Properties

Bearing pressure

Back Soil Friction and Cohesion

Base Friction and Cohesion

Front Soil Friction and Cohesion

Premissable service pressure @ front 100.00 kN/m², @ back 100.00 kN/m²

 $\phi = \text{Atn}(\tan(30)/1.2) = 25.69^\circ$ $\delta = \text{Atn}(0.75 \times \tan(\text{Atn}(\tan(30)/1.2))) = 19.84^\circ$ $\phi = \text{Atn}(\tan(30)/1.2) = 25.69^\circ$ **Loading Cases** G_{Soil} - Soil Self Weight, G_{Wall} - Wall & Base Self Weight, F_{VHeel} - Vertical Loads over Heel, P_a - Active Earth Pressure, $P_{\text{surcharge}}$ - Earth pressure from surcharge, P_p - Passive Earth PressureCase 1: Geotechnical Design $1.00 G_{\text{Soil}} + 1.00 G_{\text{Wall}} + 1.00 F_{\text{VHeel}} + 1.00 P_a + 1.00 P_{\text{surcharge}} + 1.00 P_p$ Case 2: Structural Ultimate Design $1.40 G_{\text{Soil}} + 1.40 G_{\text{Wall}} + 1.60 F_{\text{VHeel}} + 1.00 P_a + 1.00 P_{\text{surcharge}} + 1.00 P_p$ **Geotechnical Design****Wall Stability - Virtual Back Pressure**

Case 1 Overturning/Stabilising 29.613/62.532

0.474 OK

Wall Sliding - Virtual Back Pressure $F_x / (R_{\text{Friction}} + R_{\text{Passive}})$ 29.527/(17.103+10.829)1.057 **Warning****Soil Pressure**

Virtual Back (No uplift)

Max(45.413/100, 1.983/100) kN/m²

0.454 OK

Wall Back

50.181/100 kN/m², Length under pressure 1.889 m

0.502 OK

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$M_r = \text{fn}(\text{above}, A_s', d', x, x/d)$	452 mm ² , 36 mm, 48 mm, 0.18	140.1 kN.m	
Moment Capacity Check (M/Mr)	M 25.3 kN.m, Mr 140.1 kN.m	0.181	OK
Shear Capacity Check	F 25.3 kN, vc 0.597 N/mm ² , Fvr 156.4 kN	0.16	OK

Base Top Steel Design

Steel Provided (Cover)	Main H16@150 (50 mm) Dist. H12@175 (66 mm)	1340 mm ²	OK
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$M_r = \text{fn}(\text{above}, A_s', d', x, x/d)$	754 mm ² , 56 mm, 48 mm, 0.20	128.4 kN.m	
Moment Capacity Check (M/Mr)	M 0.3 kN.m, Mr 128.4 kN.m	0.003	OK
Shear Capacity Check	F 6.7 kN, vc 0.625 N/mm ² , Fvr 151.3 kN	0.04	OK

Base Bottom Steel Design

Steel Provided (Cover)	Main H12@150 (50 mm) Dist. H12@175 (62 mm)	754 mm ²	OK
Compression Steel Provided (Cover)	Main H16@150 (50 mm) Dist. H12@175 (66 mm)	1340 mm ²	
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$M_r = \text{fn}(\text{above}, A_s', d', x, x/d)$	1340 mm ² , 58 mm, 27 mm, 0.11	76.0 kN.m	
Moment Capacity Check (M/Mr)	M 27.3 kN.m, Mr 76.0 kN.m	0.359	OK
Shear Capacity Check	F 26.9 kN, vc 0.514 N/mm ² , Fvr 125.4 kN	0.21	OK

