



Project Preface

<i>Project name:</i>	Calculation package for steel beam and retaining wall in the proposed rear extension
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<i>Client name:</i>	Jenna Lewis
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<u><i>Construction site address:</i></u>	
<i>House no, Street:</i>	17 Mitchell Crescent,
<i>City/Town:</i>	Penydarren, Merthyr Tydfil
<i>Postcode:</i>	CF47 9JB

<i>Document prepared by:</i>	Marcin Krawucki BSc (Hons) GMICE ICE Membership: 92007313
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<i>Address:</i>	50 Quarry Row, Merthyr Tydfil, CF47 8PS
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<i>Date of preparation:</i>	04/04/2023
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<i>Job reference number:</i>	AUX132
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<i>Revision number:</i>	C01
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Project:	Calculation package for steel beam and retaining wall in the proposed rear		
Address:	17 Mitchell Crescent, Penydarren, Merthyr Tydfil		
Job No.	AUX205	Sheet	1
Date:	27/05/2022	Rev.	C1

Design content

1 Introduction

1.1 Instructions

In accordance with instructions received from the client I have carried out a Structural calculations for the steel beams for the new extension and retaining walls

1.2 Brief

I have been requested to carry out a Structural calculation for the extension in the house at:

**17 Mitchell Crescent,
Penydarren, Merthyr Tydfil
CF47 9JB**

The new steel beams will be located as per the attached plan

The house comprises of ground floor and first floor.

2 Construction works

All the construction works must be done by experienced builder or contractor.

During installation, the beam might need to be temporary supported.

Beam B01

The new beams **2 no 203x102x23UB S275** will be installed below the first floor wall

The beam will be sitting on both sides on new concrete padstones:

330 x 215 x 100 mm

The size of the padstone is dictated by the strength of the wall and the reaction from the beam.

Then the plaster boards from the ceiling needs to be removed, where necessary for installing props

Acrow No. 2 (SWL for 2.75m is 23kN and for 3.00m is 19kN per one prop) or similar.

Please contact supplier for double checking. Then the props can be installed with spacing not more than 1.0m apart. When all the plasterboards are removed, the holes for supporting beam can be done.

During installation, the beam might need to be temporary supported.

The Acrow propos have to support the existing slab.

After this is done the next step is to check if the props are properly installed.

Before installation of the new beams the old wall will have to be removed.

After confirming that the beam is installed properly the Acrow props can be slowly removed.

Please ensure that nothing unusual is happening during this process.

When the supports finally are removed the last step is to install plaster boards on the ceiling.



Project:	Calculation package for steel beam and retaining wall in the proposed rear		
Address:	17 Mitchell Crescent, Penydarren, Merthyr Tydfil		
Job No.	AUX205	Sheet	2
Date:	27/05/2022	Rev.	C1

Design content

There are two types of the retaining walls in the design RW01 & RW02.

The proposed retaining wall RW01 have to be part of the extension. This retaining wall is 1100mm high nad it is 350mm grouted cavity retainig wall. The RW01 is partly creating an external wall of the extension. The rear retaining wall RW02 is slightly higher with max hight of the ground behind 1500mm, Spec of both retaining walls as follows:

GROUTED RETAINING WALL - SPECIFICATION:

- Concrete grade: C30
- Base thickness: 300mm
- Stem thickness: 300mm / 350mm
- Outer skin: 100mm blockwork
- Cavity: 100mm/150mm grouted cavity
- Rear skin: 100mm blockwork
- Stem reinforcement: 10mm dia. (1x mesh A393)
- Base reinforcement: A393 T&B
- Cover to top reinforcement: 50mm
- Cover to the bottom and sides: 50mm
- GBP (assumed): 75kN/m²
- Blinding: 50mm

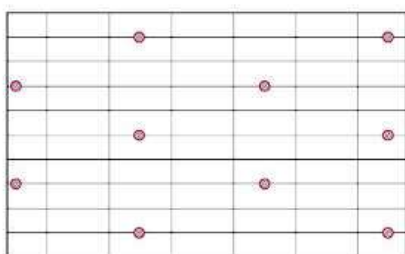
During the excavations works for the side retaining walls the ground close to the neighbor boundary has to be secured.

Spacers should be either concrete blocks (no more than 50 x 50mm) or ready-made of steel or plastic.

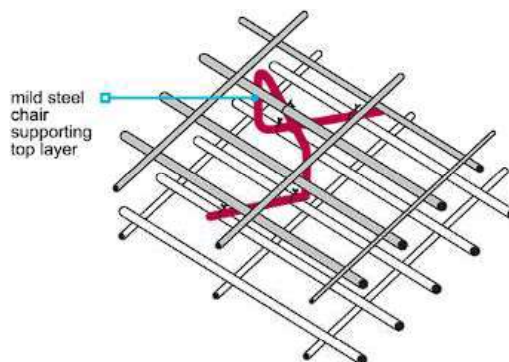
Supports should be placed no more than one metre apart, or closer where necessary.

Spacers for parallel bars should be staggered to avoid creating a plane of weakness in the concrete.

Supports for top steel should be chairs, or other proprietary products.



spacers staggered to avoid planes of weakness



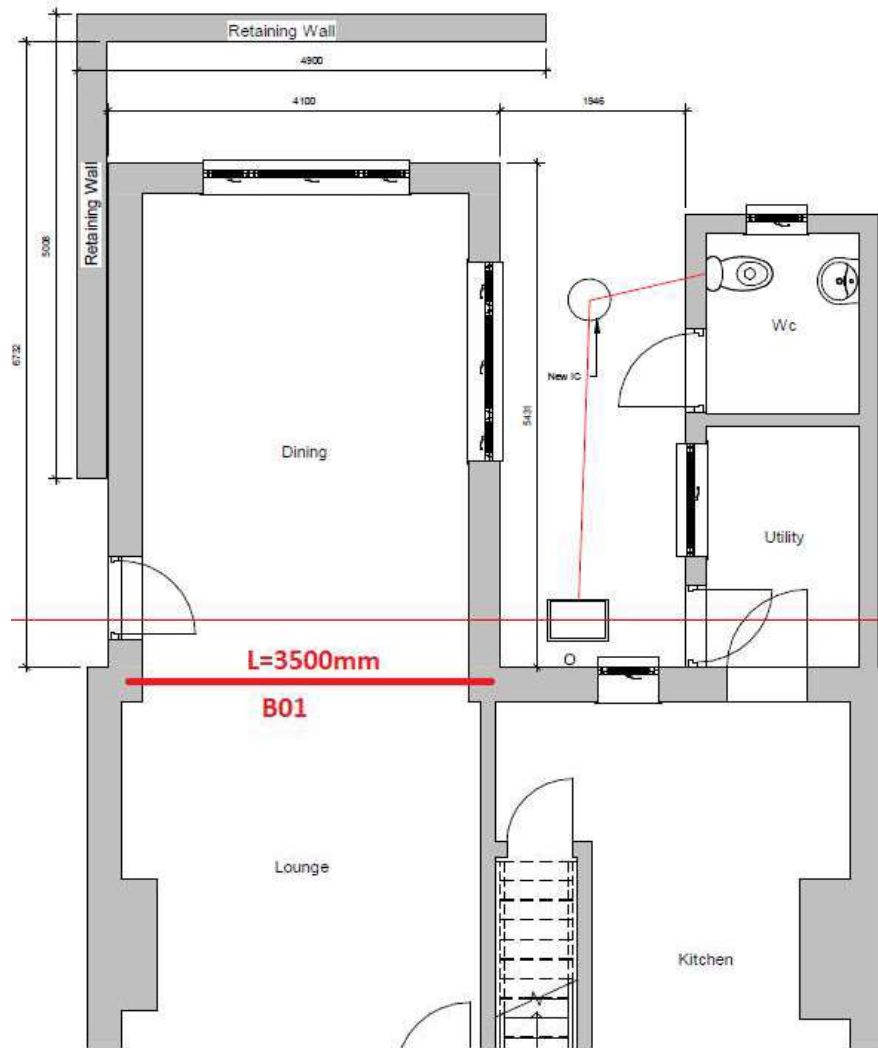
If the builder/contractor has any queries regarding the above-mentioned works during the installation process, please contact me.

Marcin Krawucki
BSc (Hons) MICE
ICE Membership: 92007313



Project:	Calculation package for steel beam and retaining wall in the proposed rear		
Address:	17 Mitchell Crescent, Penydarren, Merthyr Tydfil		
Job No.	AUX132	Sheet	1
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Ground floor Plan

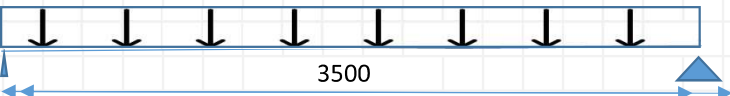


		Project: Calculation package for steel beam and retaining wall in the proposed rear	
		Address: 17 Mitchell Crescent, Pen-y-darren, Merthyr Tydfil	
		Job No. AUX132	Sheet 1
		Date: 03/06/2022	Rev. C1

Calculation for:	Loadings on beam B01
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Loadings on the beam:									
Dead load:									
PITCH ROOF - Yes Slope									
Concrete tiles	0.75	kN/m ²	on slope	45	1.061	kN/m ²	on plan		
Battens+felt	0.05	kN/m ²	on slope	45	0.071	kN/m ²	on plan		
Insulation					0.10	kN/m ²	on plan		
Ceiling					0.15	kN/m ²	on plan		
Rafters self weight					0.10	kN/m ²	on plan		
Pitch roof total					1.48	kN/m²			
Flat roof/Lower roof					0.75	kN/m²			
SLAB									
				Qty of floors					
timber slab	0.75	kN/m ²	x	0	=	0.00	kN/m ²		
partitions	0.50	kN/m ²	x	0	=	0.00	kN/m ²		
SLAB T1 total						0.00	kN/m²		
Wall above beam									
				Height		Thickness			
Cavity wall	20	kN/m ³	x	5.4	m	x	0.2	m	21.60 kN/m
								*stud part.=0kN/m ³	
*Single skin of cavity wall per beam								as it is included above	
Imposed load									
Residential	1.50	kN/m ²	x	0				0.00	kN/m²
Snow								0.43	kN/m²
Wind (down)	1.10	kN/m ²						1.10	kN/m²
Wind (uplift)	1.60	kN/m ²						1.60	kN/m²
				Joists		Roof		Flat roof	
Joist on left:				0.000	m	5.500	m	0.000	m
Joist on right:				0.000	m	0.000	m	0.000	m

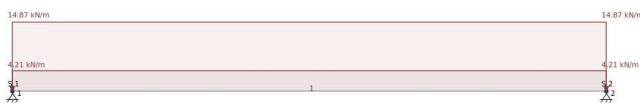
UDL loading on the beam										Left	Right
Dead G _k	Pitchroof	1.48	kN/m ²	x	(5.500 m + 0.000 m)/ 2 =	4.07	kN/m			4.07	0.00
	Flat roof	0.75	kN/m ²	x	(0.000 m + 0.000 m)/ 2 =	0.00	kN/m			0.00	0.00
	Floor slab	0.00	kN/m ²	x	(0.000 m + 0.000 m)/ 2 =	0.00	kN/m			0.00	0.00
	Wall				=	21.60	kN/m			10.8	10.8
Imposed	Residential	0.00	kN/m ²	x	(0.000 m + 0.000 m)/ 2 =	0.00	kN/m			0.00	0.00
	Snow	0.43	kN/m ²	x	(5.500 m + 0.000 m)/ 2 =	1.18	kN/m			1.18	0.00
	Wind (down)	1.10	kN/m ²	x	(5.500 m + 0.000 m)/ 2 =	3.03	kN/m			3.03	0.00
	Wind (uplift)	1.60	kN/m ²	x	(5.500 m + 0.000 m)/ 2 =	4.40	kN/m			4.40	0.00

										G _k =	25.67	kN/m,	-	-
										Q _k =	4.21	kN/m	-	-
When the thickness of the existing wall which is to be removed is greater than 200mm then min. 2 beams required:													14.87	-
From the calculations the proposed size of the new beam is:													4.21	-
Beam size: 2no 203x102x23UB Grade: S275													-	10.80
Padstones size if req.: 330 x 215 x 100 mm													-	0.00



AUX205 Beam B01 SkyCiv Report

Tue Apr 04 2023 22:19:05 GMT+0100 (British Summer Time)



File Name: AUX205 Beam B01
Software: SkyCiv Structural 3D v6.0.1
Analysis Type: Linear Static & Buckling Analysis

Included in this Report:

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Member Buckling Results

Job Setup

AUX205 Beam B01 SkyCiv Report

SkyCiv Structural 3D v6.0.1

Date: Tue Apr 04 2023 22:19:05 GMT+0100 (British Summer Time)

Analysis Type: LINEAR STATIC & BUCKLING ANALYSIS

File Name	AUX205 Beam B01
Job Name	AUX205 17 Mitchell Crescent, Penydarren, Merthyr Tydfil
Designer	Marcin Krawucki BSc (Hons) GMICE
Job Description	Calculations for beam B01

Length Units	m
Section Length Units	mm
Force Units	kN
Moment and Torsion Units	kN-m
Pressure Units	kPa
Material Strength Units	MPa
Material Density Units	kg/m ³
Mass Units	kg
Temperature Units	degC
Translation Units	mm
Stress Units	MPa
Nodes	2
Members	1
Plates	0
Meshed Plates	0
Supports	2
Sections	1
Point Loads	0
Distributed Loads	2
Moments	0
Member Prestress Loads	0
Thermal Loads	0
Pressures	0
Area Loads	0
Self Weight	ON
User Defined Nodal Masses	0
Auto Defined Nodal Masses	0
Spectral Loads	0
Member Evaluation Points	9
Extrapolate Plate Results From Gauss Points	YES
General Constraint	RRRRRR
Total Degrees of Freedom	4

NODE COORDINATES (m)

	X	Y	Z
ID	Coordinate	Coordinate	Coordinate
1	0.00	0.00	0.00
2	3.50	0.00	0.00

MEMBERS (deg, m, mm, m, kN)

F=Fixed, R=Released, S=Spring

ID	Node A	Node B	Length	Type	Section ID	Rotation Angle	Node A Fixity	Node B Fixity
1	1	2	3.50	Normal	1	0.00	FFFFF	FFFFF

	Node A Offsets	Node B Offsets	Offset Axis	Node A Rot Stiff Y	Node A Rot Stiff Z	Node B Rot Stiff Y	Node B Rot Stiff Z	Cable Length	T/C Limit	Mirror	Disable Non-Linear
1	0, 0, 0	0, 0, 0	Local	-	-	-	-	-	-	No	No

SUPPORTS (kN/m, kN-m/rad)

F=Fixed, R=Released, S=Spring

B=Both Axes Restraint, N=Negative-Axis Restraint Only, P=Positive-Axis Restraint Only

ID	Node ID	Restraint Code	Direction Code	X Trans Stiffness	Y Trans Stiffness	Z Trans Stiffness	X Rot Stiffness	Y Rot Stiffness	Z Rot Stiffness	Source
1	1	FFFFRR	BBBBBB	-	-	-	-	-	-	User Defined Nodal Support
2	2	FFFFRR	BBBBBB	-	-	-	-	-	-	User Defined Nodal Support

MATERIALS (MPa, kg/m³, 10⁻⁶/degC)

Shear Modulus is used for members only.

Ex, Ey, Gxy, Gxz, Gyz are used for orthotropic plates only.

ID	Name	Young's Modulus	Shear Modulus	Density	Poisson's Ratio	Thermal Exp. Coeff.	Young's Modulus _x	Young's Modulus _y	Shear Modulus _{xy}	Shear Modulus _{xz}	Shear Modulus _{yz}	Poisson's Ratio _{xy}
9	European Standard (EN) - EN 10025 - Grade S275JR, S275J0, S275J2G3, S275J2G4 - 3mm ≤ Thickness ≤ 16mm	200000.00	Auto	7850.00	0.29	12.00	-	-	-	-	-	Auto

SECTIONS (mm, mm², mm⁴, deg)

ID	Name	Shape	Material ID	Depth	Width	Shear Area _z (STRESS)	Shear Area _y (STRESS)	Shear Area _z (TIMO)	Shear Area _y (TIMO)	Torsion Radius
1	203x102 UB 23	203x102 UB 23	9	203.20	101.80	1675.16	1058.97	-	-	13.97

ID	Centroid _y	Centroid _z	Area (A)	y-Axis Mol (I _y)	z-Axis Mol (I _z)	Torsion Constant (J)	Principal Angle	Non Prismatic
1	101.60	50.90	2940.00	1640000.00	21050000.00	70200.00	0.00	N

ID	Area Red. Factor	I _y Red. Factor	I _z Red. Factor	Torsion Constant Red. Factor	Shear Area _y Red. Factor	Shear Area _z Red. Factor
1	-	-	-	-	-	-

MEMBER DISTRIBUTED LOADS (kN/m)

ID	Load Group	Start Position (%)	End Position (%)	Member	Axes	X Start/End	Y Start/End	Z Start/End
1	DL	0%	100%	1	Global	0.00	-14.87	0.00
						0.00	-14.87	0.00
2	LL	0%	100%	1	Global	0.00	-4.21	0.00
						0.00	-4.21	0.00

SELF WEIGHT (g's)

Load Group	X Gravity	Y Gravity	Z Gravity
SW1	0.00	-1.00	0.00

LOAD COMBINATIONS

ID	Name	DL Factor	LL Factor	SW1 Factor
1	ULS: STR (Unfavourable)	1.35	1.50	1.35
2	SLS: Characteristic	1.00	1.00	1.00

Bill of Materials

BILL OF MATERIALS FOR MEMBERS (m, kg)

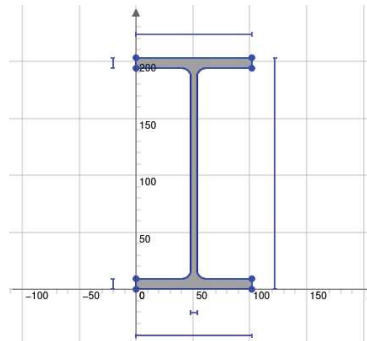
Section	Material	Quantity	Unit Length	Total Length	Unit Mass	Total Mass
1	9	1	3.50	3.50	80.78	80.78
						80.78

Member 1: LC1 (ULS: STR (Unfavourable))

Member Summary Table	
Member Number	1
Node A	1 (0, 0, 0)
Node B	2 (3,5, 0, 0)
Member Length	3.50 m
Section Name	203x102 UB 23
Section No	1
Member Rotation	0 degrees
Fixity A	FFFFF
Fixity B	FFFFF
Buckling	Not Buckling
Reaction A (kN,kN-m)	X: 0,00 Y: 46,72 Z: 0,00 Mx: 0,00 My: 0,00 Mz: 0,00
Reaction B (kN,kN-m)	X: 0,00 Y: 46,72 Z: 0,00 Mx: 0,00 My: 0,00 Mz: 0,00

Result	Max Location and Result (m,MPa)	Min Location and Result (m,MPa)
Shear Stress in Y	0,00 48,18	3,50 -48,18
Shear Stress in Z	0,00 16,17	3,50 -16,17
Shear Stress Total	0,00 48,18	1,75 0,00
Bending Stress (Bottom) in Y	0,00 0,00	0,00 0,00
Bending Stress (Bottom) in Z	0,00 0,00	1,75 -197,30
Bending Stress (Top) in Y	0,00 0,00	0,00 0,00
Bending Stress (Top) in Z	1,75 197,30	0,00 0,00
Axial Stress	0,00 0,00	0,00 0,00
Torsion Stress	0,00 0,00	0,00 0,00
Max Combined Normal Stress	1,75 197,30	0,00 0,00
Min Combined Normal Stress	0,00 0,00	1,75 -197,30

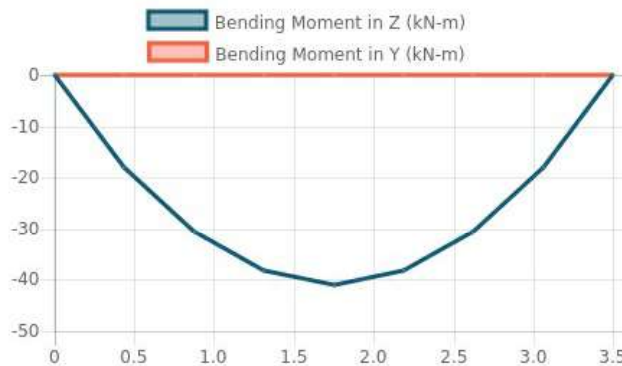
LC1: ULS STR (Unfavourable)



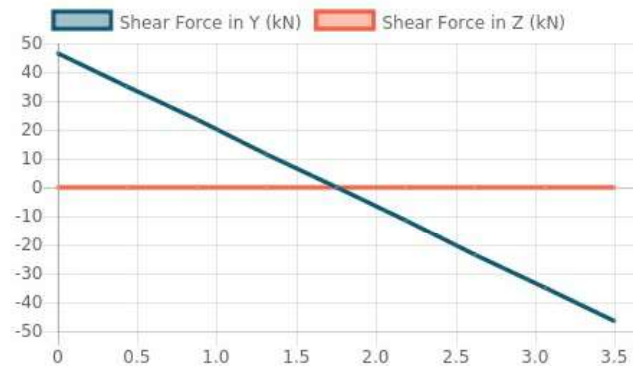
Geometric Properties		
A	2940	mm ²
C _z	50,9	mm
C _y	101,6	mm
Bending Properties		
I _z	21050000	mm ⁴
I _y	1640000	mm ⁴
α	0	°
Shear Properties		
A _z	1675,156	mm ²
A _y	1058,968	mm ²
	mm	
	mm	
Torsion Properties		
J	70200	mm ⁴
r	13,974	mm

Shape	Material	E (MPa)	ν	ρ (kg/m ³)
203x102 UB 23	European Standard (EN) - EN 10025 - Grade S275JR, S275J0, S275J2G3, S275J2G4 - 3mm ≤ Thickness ≤ 16mm	2000000,29		7850

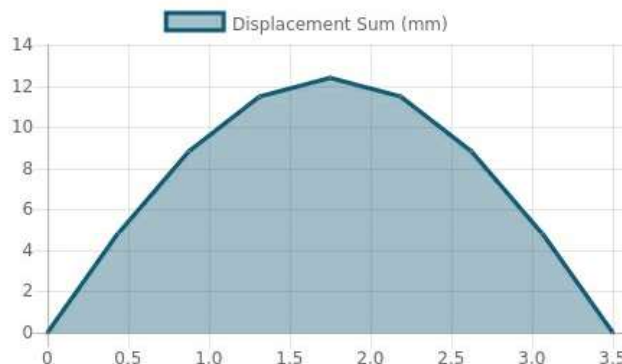
Member 1, ULS: STR (Unfavourable)



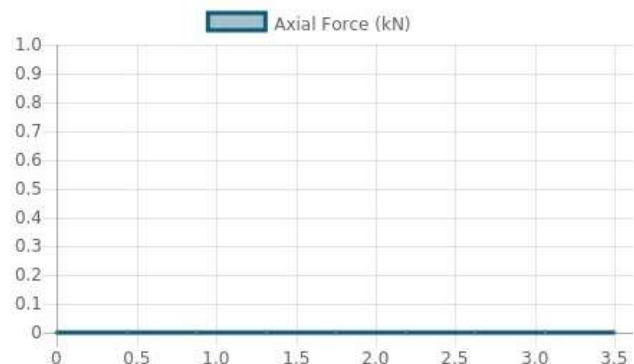
Member 1, ULS: STR (Unfavourable)



Member 1, ULS: STR (Unfavourable)



Member 1, ULS: STR (Unfavourable)

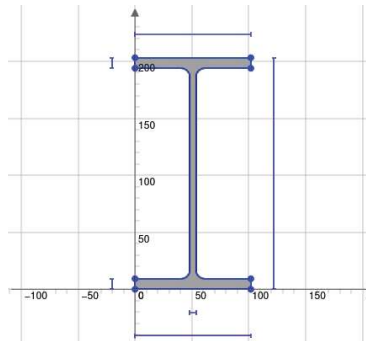


Member 1: LC2 (SLS: Characteristic)

Member Summary Table	
Member Number	1
Node A	1 (0, 0, 0)
Node B	2 (3,5, 0, 0)
Member Length	3.50 m
Section Name	203x102 UB 23
Section No	1
Member Rotation	0 degrees
Fixity A	FFFFF
Fixity B	FFFFF
Buckling	Not Buckling
Reaction A (kN,kN-m)	X: 0,00 Y: 33,79 Z: 0,00 Mx: 0,00 My: 0,00 Mz: 0,00
Reaction B (kN,kN-m)	X: 0,00 Y: 33,79 Z: 0,00 Mx: 0,00 My: 0,00 Mz: 0,00

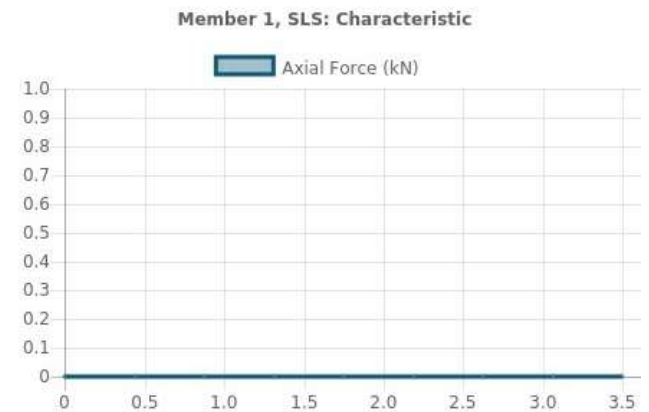
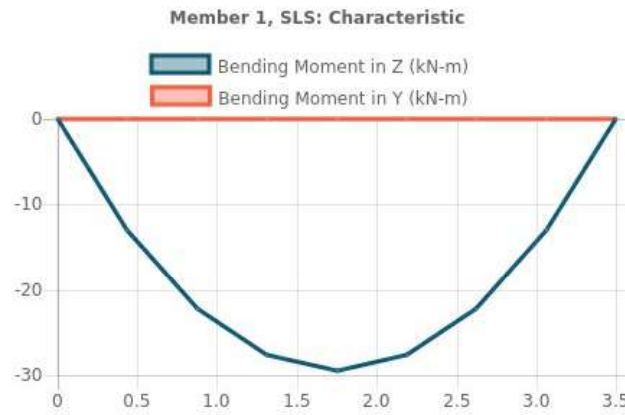
Result	Max Location and Result (m,MPa)	Min Location and Result (m,MPa)
Shear Stress in Y	0,00 34,84	3,50 -34,84
Shear Stress in Z	0,00 11,70	3,50 -11,70
Shear Stress Total	0,00 34,84	1,75 0,00
Bending Stress (Bottom) in Y	0,00 0,00	0,00 0,00
Bending Stress (Bottom) in Z	0,00 0,00	1,75 -142,69
Bending Stress (Top) in Y	0,00 0,00	0,00 0,00
Bending Stress (Top) in Z	1,75 142,69	0,00 0,00
Axial Stress	0,00 0,00	0,00 0,00
Torsion Stress	0,00 0,00	0,00 0,00
Max Combined Normal Stress	1,75 142,69	0,00 0,00
Min Combined Normal Stress	0,00 0,00	1,75 -142,69

LC 002: 27/08/2018



Geometric Properties		
A	2940	mm ²
C _z	50,9	mm
C _y	101,6	mm
Bending Properties		
I _z	21050000	mm ⁴
I _y	1640000	mm ⁴
α	0	°
Shear Properties		
A _z	1675,156	mm ²
A _y	1058,968	mm ²
	mm	
	mm	
Torsion Properties		
J	70200	mm ⁴
r	13,974	mm

Shape	Material	E (MPa)	ν	ρ (kg/m ³)
203x102 UB 23	European Standard (EN) - EN 10025 - Grade S275JR, S275J0, S275J2G3, S275J2G4 - 3mm ≤ Thickness ≤ 16mm	2000000,29		7850



Nodal Results

Load Combination #1: ULS: STR (Unfavourable)
= 1.35×(DL) + 1.5×(LL) + 1.35×(SW1)

NODE REACTIONS (kN, kN-m)

Support ID	Node	X Force	Y Force	Z Force	X Moment	Y Moment	Z Moment
1	1	0.00	46.72	0.00	0.00	0.00	0.00
2	2	0.00	46.72	0.00	0.00	0.00	0.00
	Reaction Sum	0.00	93.43	0.00			
	Load Sum	0.00	-93.43	0.00			
	Equilibrium	0.00	0.00	0.00			

MEMBER END FORCES AND MOMENTS (kN, kN-m)

Member	Node	Axial Force	Y Shear	Z Shear	X Torsion	Y Moment	Z Moment
1	1	0.00	46.72	0.00	0.00	0.00	0.00
	2	0.00	-46.72	0.00	0.00	0.00	0.00

NODAL DISPLACEMENTS (mm)

Node	X Translation	Y Translation	Z Translation	Total Translation
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00

Load Combination #2: SLS: Characteristic
= 1×(DL) + 1×(LL) + 1×(SW1)

NODE REACTIONS (kN, kN-m)

Support ID	Node	X Force	Y Force	Z Force	X Moment	Y Moment	Z Moment
1	1	0.00	33.79	0.00	0.00	0.00	0.00
2	2	0.00	33.79	0.00	0.00	0.00	0.00
	Reaction Sum	0.00	67.57	0.00			
	Load Sum	0.00	-67.57	0.00			
	Equilibrium	0.00	-0.00	0.00			

MEMBER END FORCES AND MOMENTS (kN, kN-m)

Member	Node	Axial Force	Y Shear	Z Shear	X Torsion	Y Moment	Z Moment
1	1	0.00	33.79	0.00	0.00	0.00	0.00
	2	0.00	-33.79	0.00	0.00	0.00	0.00

NODAL DISPLACEMENTS (mm)

Node	X Translation	Y Translation	Z Translation	Total Translation
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00

Member Results

Load Combination #1: ULS: STR (Unfavourable)
= 1.35×(DL) + 1.5×(LL) + 1.35×(SW1)

INTERNAL MEMBER FORCES AND MOMENTS (m, kN, kN-m)

= Maximum value of a result in the member/plate.
 = Minimum value of a result in the member/plate.

Member	Section	Station Location	Axial Force	Y Shear	Z Shear	X Torsion	Y Moment	Z Moment
1	1	0.00	0.00	46.72	0.00	0.00	0.00	0.00
1	1	0.44	0.00	35.04	0.00	0.00	0.00	17.88
1	1	0.88	0.00	23.36	0.00	0.00	0.00	30.66
1	1	1.31	0.00	11.68	0.00	0.00	0.00	38.32
1	1	1.75	0.00	0.00	0.00	0.00	0.00	40.88
1	1	2.19	0.00	-11.68	0.00	0.00	0.00	38.32
1	1	2.63	0.00	-23.36	0.00	0.00	0.00	30.66
1	1	3.06	0.00	-35.04	0.00	0.00	0.00	17.88
1	1	3.50	0.00	-46.72	0.00	0.00	0.00	0.00

GROUPS SUMMARY - INTERNAL MEMBER FORCES AND MOMENTS (kN, kN-m)

Group Name	Type	Axial Force	Y Shear	Z Shear	X Torsion	Y Moment	Z Moment
N/A							

MEMBER DISPLACEMENTS (m, mm, rad)

= Maximum value of a result in the member/plate.
 = Minimum value of a result in the member/plate.

Member	Station Location	Global X Translation	Global Y Translation	Global Z Translation	Total Translation	Global X Rotation	Global Y Rotation	Global Z Rotation
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.01
1	0.44	0.00	-4.81	0.00	4.81	0.00	0.00	-0.01
1	0.88	0.00	-8.83	0.00	8.83	0.00	0.00	-0.01
1	1.31	0.00	-11.47	0.00	11.47	0.00	0.00	-0.00
1	1.75	0.00	-12.39	0.00	12.39	0.00	0.00	0.00
1	2.19	0.00	-11.47	0.00	11.47	0.00	0.00	0.00
1	2.63	0.00	-8.83	0.00	8.83	0.00	0.00	0.01
1	3.06	0.00	-4.81	0.00	4.81	0.00	0.00	0.01
1	3.50	0.00	0.00	0.00	0.00	0.00	0.00	0.01

MEMBER LOCAL DISPLACEMENTS (m, mm, rad)

= Maximum value of a result in the member/plate.
 = Minimum value of a result in the member/plate.

Member	Station Location	Local X Translation	Local Y Translation	Local Z Translation	Local X Rotation	Local Y Rotation	Local Z Rotation
1	0.00	0.00	0.00	0.00	0.00	0.00	-0.01
1	0.44	0.00	-4.81	0.00	0.00	0.00	-0.01
1	0.88	0.00	-8.83	0.00	0.00	0.00	-0.01
1	1.31	0.00	-11.47	0.00	0.00	0.00	-0.00
1	1.75	0.00	-12.39	0.00	0.00	0.00	0.00
1	2.19	0.00	-11.47	0.00	0.00	0.00	0.00
1	2.63	0.00	-8.83	0.00	0.00	0.00	0.01
1	3.06	0.00	-4.81	0.00	0.00	0.00	0.01
1	3.50	0.00	0.00	0.00	0.00	0.00	0.01

MEMBER DISPLACEMENT SPAN CHECK (m, mm)

Member	Length	Max Relative Displacement	Span Method 1	Span Method 2
1	3.50	12.39	L/282	L/282

MEMBER STRESSES (m, MPa)

= Maximum value of a result in the member/plate.
= Minimum value of a result in the member/plate.

Member	Section	Station Location	Axial Torsion	Top Mom Z Btm Mom Z	Top Mom Y Btm Mom Y	Max Combined Normal Min Combined Normal	Shear Y Shear Z	Shear Total
1	1	0.00	0.00	0.00	0.00	0.00	48.18	48.18
			0.00	0.00	0.00	0.00	16.17	
1	1	0.44	0.00	86.32	0.00	86.32	36.13	36.13
			0.00	-86.32	0.00	-86.32	12.13	
1	1	0.88	0.00	147.97	0.00	147.97	24.09	24.09
			0.00	-147.97	0.00	-147.97	8.09	
1	1	1.31	0.00	184.97	0.00	184.97	12.04	12.04
			0.00	-184.97	0.00	-184.97	4.04	
1	1	1.75	0.00	197.30	0.00	197.30	0.00	0.00
			0.00	-197.30	0.00	-197.30	0.00	
1	1	2.19	0.00	184.97	0.00	184.97	-12.04	12.04
			0.00	-184.97	0.00	-184.97	-4.04	
1	1	2.63	0.00	147.97	0.00	147.97	-24.09	24.09
			0.00	-147.97	0.00	-147.97	-8.09	
1	1	3.06	0.00	86.32	0.00	86.32	-36.13	36.13
			0.00	-86.32	0.00	-86.32	-12.13	
1	1	3.50	0.00	0.00	0.00	0.00	-48.18	48.18
			0.00	0.00	0.00	0.00	-16.17	

Load Combination #2: SLS: Characteristic
= 1x(DL) + 1x(LL) + 1x(SW1)

INTERNAL MEMBER FORCES AND MOMENTS (m, kN, kN-m)

= Maximum value of a result in the member/plate.
= Minimum value of a result in the member/plate.

Member	Section	Station Location	Axial Force	Y Shear	Z Shear	X Torsion	Y Moment	Z Moment
1	1	0.00	0.00	33.79	0.00	0.00	0.00	0.00
1	1	0.44	0.00	25.34	0.00	0.00	0.00	12.93
1	1	0.88	0.00	16.89	0.00	0.00	0.00	22.17
1	1	1.31	0.00	8.45	0.00	0.00	0.00	27.72
1	1	1.75	0.00	0.00	0.00	0.00	0.00	29.56
1	1	2.19	0.00	-8.45	0.00	0.00	0.00	27.72
1	1	2.63	0.00	-16.89	0.00	0.00	0.00	22.17
1	1	3.06	0.00	-25.34	0.00	0.00	0.00	12.93
1	1	3.50	0.00	-33.79	0.00	0.00	0.00	0.00

GROUPS SUMMARY - INTERNAL MEMBER FORCES AND MOMENTS (kN, kN-m)

Group Name	Type	Axial Force	Y Shear	Z Shear	X Torsion	Y Moment	Z Moment
N/A							

MEMBER DISPLACEMENTS (m, mm, rad)

= Maximum value of a result in the member/plate.
= Minimum value of a result in the member/plate.

Member	Station Location	Global X Translation	Global Y Translation	Global Z Translation	Total Translation	Global X Rotation	Global Y Rotation	Global Z Rotation
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.01
1	0.44	0.00	-3.48	0.00	3.48	0.00	0.00	-0.01
1	0.88	0.00	-6.38	0.00	6.38	0.00	0.00	-0.01
1	1.31	0.00	-8.30	0.00	8.30	0.00	0.00	-0.00
1	1.75	0.00	-8.96	0.00	8.96	0.00	0.00	0.00
1	2.19	0.00	-8.30	0.00	8.30	0.00	0.00	0.00
1	2.63	0.00	-6.38	0.00	6.38	0.00	0.00	0.01
1	3.06	0.00	-3.48	0.00	3.48	0.00	0.00	0.01
1	3.50	0.00	0.00	0.00	0.00	0.00	0.00	0.01

MEMBER LOCAL DISPLACEMENTS (m, mm, rad)

= Maximum value of a result in the member/plate.

= Minimum value of a result in the member/plate.

Member	Station Location	Local X Translation	Local Y Translation	Local Z Translation	Local X Rotation	Local Y Rotation	Local Z Rotation
1	0.00	0.00	0.00	0.00	0.00	0.00	-0.01
1	0.44	0.00	-3.48	0.00	0.00	0.00	-0.01
1	0.88	0.00	-6.38	0.00	0.00	0.00	-0.01
1	1.31	0.00	-8.30	0.00	0.00	0.00	-0.00
1	1.75	0.00	-8.96	0.00	0.00	0.00	0.00
1	2.19	0.00	-8.30	0.00	0.00	0.00	0.00
1	2.63	0.00	-6.38	0.00	0.00	0.00	0.01
1	3.06	0.00	-3.48	0.00	0.00	0.00	0.01
1	3.50	0.00	0.00	0.00	0.00	0.00	0.01

MEMBER DISPLACEMENT SPAN CHECK (m, mm)

Member	Length	Max Relative Displacement	Span Method 1	Span Method 2
1	3.50	8.96	L/390	L/390

MEMBER STRESSES (m, MPa)

= Maximum value of a result in the member/plate.

= Minimum value of a result in the member/plate.

Member	Section	Station Location	Axial Torsion	Top Mom Z Btm Mom Z	Top Mom Y Btm Mom Y	Max Combined Normal Min Combined Normal	Shear Y Shear Z	Shear Total
1	1	0.00	0.00	0.00	0.00	0.00	34.84	34.84
			0.00	0.00	0.00	0.00	11.70	
1	1	0.44	0.00	62.43	0.00	62.43	26.13	26.13
			0.00	-62.43	0.00	-62.43	8.77	
1	1	0.88	0.00	107.02	0.00	107.02	17.42	17.42
			0.00	-107.02	0.00	-107.02	5.85	
1	1	1.31	0.00	133.77	0.00	133.77	8.71	8.71
			0.00	-133.77	0.00	-133.77	2.92	
1	1	1.75	0.00	142.69	0.00	142.69	0.00	0.00
			0.00	-142.69	0.00	-142.69	0.00	
1	1	2.19	0.00	133.77	0.00	133.77	-8.71	8.71
			0.00	-133.77	0.00	-133.77	-2.92	
1	1	2.63	0.00	107.02	0.00	107.02	-17.42	17.42
			0.00	-107.02	0.00	-107.02	-5.85	
1	1	3.06	0.00	62.43	0.00	62.43	-26.13	26.13
			0.00	-62.43	0.00	-62.43	-8.77	
1	1	3.50	0.00	0.00	0.00	0.00	-34.84	34.84
			0.00	0.00	0.00	0.00	-11.70	

Member Buckling Results

Simplified Analysis Report

Project Name: AUX205 Beam B01

Date: Tue Apr 04 2023 22:18:06 GMT+0100 (British Summer Time)

Username: marcinkrawucki@gmail.com

Analysis: Buckling Analysis



Result Summary

Check	Limit ⓘ	Governing Result	Utility ⓘ	Comments
Deflection/Span	L/250	L/390 Member 1 LC#2 - SLS: Characteristic	0.641	Only checked the Load Combinations with 'Serviceability' criteria.
Custom Stress Limit	250 MPa	197.296 MPa Member 1 LC#1 - ULS: STR (Unfavourable) Min Combined Normal Stress	0.789	Checked member stresses for any stress values above 250 MPa.
Material Yield	275 MPa	197.296 MPa Member 1 LC#1 - ULS: STR (Unfavourable)	0.717	Checked if each individual member exceeds its Material Yield (275 MPa). 1 members checked in 9 Load Combination(s).
Material Strength	485 MPa	197.296 MPa Member 1 LC#1 - ULS: STR (Unfavourable)	0.407	Checked if each individual member exceeds its Material Strength (485 MPa). 1 members checked in 9 Load Combination(s).

Load Summary

Load Combination Name	criteria	DL (Dead: Unfavourable)	LL (Dead: Unfavourable)	SW1 (Dead: Unfavourable)
ULS: STR (Unfavourable)	strength	1.35	1.5	1.35
SLS: Characteristic	serviceability	1	1	1

Note: (Brackets) are the load case names linked to EN standards

Envelope results were also generated, based on the worst result in each member.

Reaction Summary (Envelope Results)

Node ID	Fixity	X (kN)	Y (kN)	Z (kN)	M _x (kN-m)	M _y (kN-m)	M _z (kN-m)
1	FFFFRR	0	46.71632	0	0	0	0
2	FFFFRR	0	46.71632	0	0	0	0

Materials

Name	Database	Density (kg/m ³)	v	F _y (MPa)	F _u (MPa)
European Standard (EN) - EN 10025 - Grade S275JR, S275J0, S275J2G3, S275J2G4 - 3mm ≤ Thickness ≤ 16mm	Metric, Steel, European Standard (EN), EN 10025, Grade S275JR, S275J0, S275J2G3, S275J2G4, 3mm ≤ Thickness ≤ 16mm	7850	0.29	275	485

Member Stresses (Envelope Results)

Mem. ID	Max Stress (MPa)	Min Stress (MPa)	Material	F _y (MPa)	F _u (MPa)	Custom (MPa)	Utility
1	197.29602	-197.29602	European Standard (EN) - EN 10025 - Grade S275JR, S275J0, S275J2G3, S275J2G4 - 3mm ≤ Thickness ≤ 16mm	275	485	false	0.717

Utility calcs are based on Member Stress / Material Strength, where:

Material Strength = min(F_y, F_u, Custom Stress Limit)

Member Stress = max(abs(min), abs(max))



Project:	Calculation package for steel beam and retaining wall in the proposed rear		
Address:	17 Mitchell Crescent, Penydarren, Merthyr Tydfil		
Job No.	AUX132	Sheet	6.1
Date:	31/05/2022	Rev.	C1

Calculation for: **Padstone check under beam B01**

Beam End Reaction = **46.70** kN (factored)
Factored Load at End of Beam

Variable Load Safety Factor = 1.5
Permanent Load Safety Factor = 1.35

Characteristic strength of masonry = **4.2** N/mm²

(Brickwork usually = 4.5 N/mm²)
(3.6N Blockwork usually = 2.6 N/mm²)
(A Engineering Brick = 13.2 N/mm²)
(B Engineering Brick = 10.5 N/mm²)
(Weak Brickwork = approx 2.8 N/mm²)
(**7.3N Blockwork usually = 4.2 N/mm²**)
(10.4N Blockwork usually = 5.4 N/mm²)

Width of beam end bearing = **102** mm
Length of beam end bearing = **100** mm

$\gamma_m = 3.0$

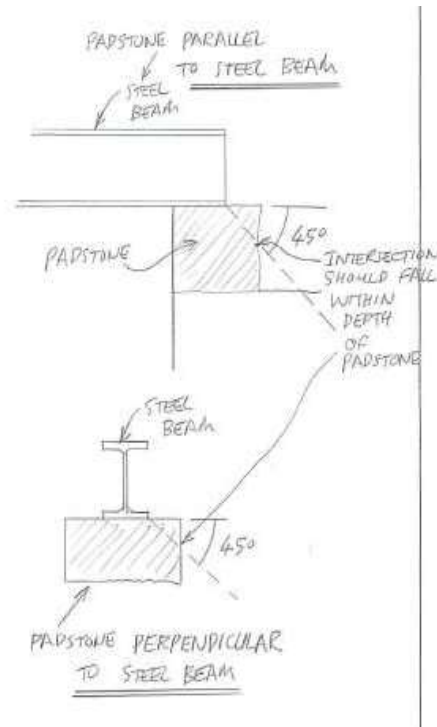
(for stonework with weak mortar assumed 1N/mm²)

Bearing Factor = **1.25**

Results

Maximum Bearing Stress = **1.75** N/mm²
Actual Bearing Stress = **4.58** N/mm²

Padstone Required



Padstone Results

Characteristic strength of Padstone = **30.0** N/mm²

(A Engineering Brick = 13.2 N/mm²)
(B Engineering Brick = 10.5 N/mm²)
(Concrete C15 = 15 N/mm²)
(Concrete C30 = 30 N/mm²)
(Concrete C40 = 40 N/mm²)
(Steel Plate = 275 N/mm²)

Width of Padstone = **100** mm
Length of Padstone = **330** mm

Allowable padstone stress = **12.50** N/mm²
Stress under beam end bearing = **4.58** N/mm²
Allowable masonry stress = **1.75** N/mm²
Stress under padstone = **1.42** N/mm²

Therefore Padstone Stress OK

Therefore Masonry Stress OK

		Project:		Calculation package for steel beam and retaining wall in the proposed rear			
		Address:		17 Mitchell Crescent, Penydarren, Merthyr Tydfil			
		Job No.		AUX205		Sheet	7
		Date:		31/05/2022		Rev.	C1
Calculation for:		Loadings on retaining wall RW01 (along extension)					
Loadings on the beam:							
Dead load:							
<u>PITCH ROOF</u> - Yes Slope							
Concrete tiles		0.75	kN/m2	on slope	45	1.061	kN/m2 on plan
Battens+felt		0.05	kN/m2	on slope	45	0.071	kN/m2 on plan
Insulation						0.10	kN/m2 on plan
Ceiling						0.15	kN/m2 on plan
Rafters self weight						0.10	kN/m2 on plan
Pitch roof total						1.48	kN/m2
Flat roof/Lower roof						0.75	kN/m2
<u>SLAB</u>							
Qty of floors							
First floor	0.75	kN/m2	x	1	=	0.75	kN/m1
partitions	0.50	kN/m2	x	1	=	0.50	kN/m2
SLAB Total						1.25	kN/m2
<u>Wall above beam</u>							
Cavity	20	kN/m3	x	5.4	m x	0.2	m 21.60 kN/m
<u>Imposed load</u>							
Residential	1.50	kN/m2	x	1		1.50	kN/m2
Snow						0.43	kN/m2
Wind (down)	1.10	kN/m2				1.10	kN/m2
Wind (uplift)	1.60	kN/m2				1.60	kN/m2
				Joists	Roof	Flat roof	
Room 1 joists length (L3):				4.100 m	4.100 m	0.000 m	
Room 2 joists length (L4):				0.000 m	0.000 m	0.000 m	
UDL loading on the raft edge							
Dead G _k	Pitchroof	1.48	kN/m2	x	(4.100 m + 0.000 m)/ 2	=	3.04 kN/m
	Flat roof	0.75	kN/m2	x	(0.000 m + 0.000 m)/ 2	=	0.00 kN/m
	Floor slab	1.25	kN/m2	x	(4.100 m + 0.000 m)/ 2	=	2.56 kN/m
	Wall					=	21.60 kN/m
Imposed	Residential	1.50	kN/m2	x	(4.100 m + 0.000 m)/ 2	=	3.08 kN/m
	Snow	0.43	kN/m2	x	(4.100 m + 0.000 m)/ 2	=	0.88 kN/m
	Wind (down)	1.10	kN/m2	x	(4.100 m + 0.000 m)/ 2	=	2.26 kN/m
	Wind (uplift)	1.60	kN/m2	x	(4.100 m + 0.000 m)/ 2	=	3.28 kN/m
						G _k =	27.20 kN/m,
						Q _k =	6.21 kN/m
Inner leaf loading: DL = 16.4 kN/m LL= 6.21 kN/m							
Outer leaf loading: DL = 10.8 kN/m							

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and CAD Services

50 Quarry Row

Merthyr Tydfil CF47 8PS

T: 07465819500

Job Ref : AUX205

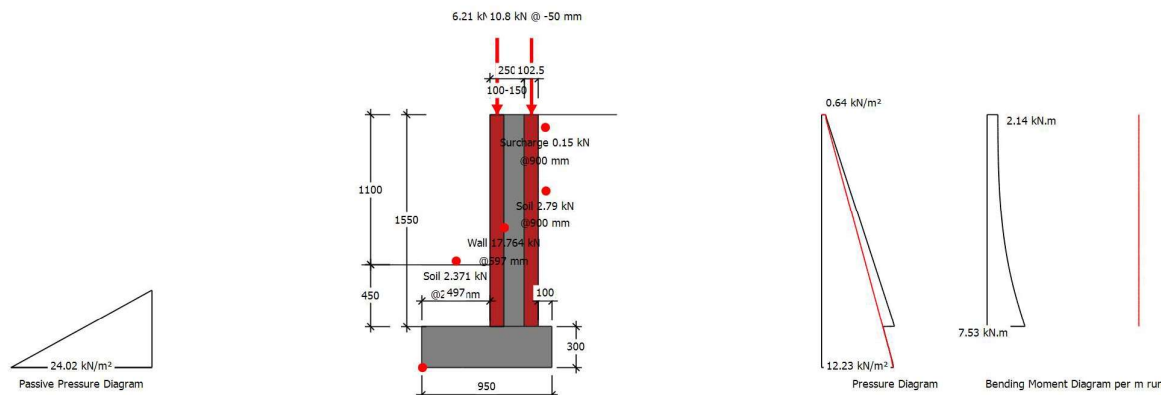
Sheet : 1100mm high RW /

Made by : MK

Date : 21 April 2023 / Ver. 2022.13.18

Checked :

Approved :

MasterKey : Retaining Wall Design to BS 8002 : 1994, BS EN 1996-1-1:2005+A1:2012 and BS 8110 : 1997**Basic RC Retaining Wall****Reinforced Masonry Cavity Filled Retaining Wall with Reinforced Concrete Base****Summary of Design Data**

EC6 National Annex

Notes

Material Densities (kN/m³)

Concrete grade and steel 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

UK

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

Soil 18.00, Concrete 24.00, Masonry 20.00

fcu 30 N/mm², Cavity inner cover 35, Cavity outer cover 107, Base cover 50

fy 500 N/mm², fyb 500 N/mm² designed to BS 8110: 1997

Surcharge 1.50 kN/m², Fully drained

Front of wall 185 mm

Additional Loads

Vertical Line Loads

16.4 kN/m @ X -300 mm and Y 0 mm - Load type Dead

6.21 kN/m @ X -300 mm and Y 0 mm - Load type Live

10.8 kN/m @ X -50 mm and Y 0 mm - Load type Dead

† Dimensions

Ties, line loads and partial loads are measured from the inner top edge of the wall

Soil Properties

Bearing pressure

Back Soil Friction and Cohesion

Base Friction and Cohesion

Front Soil Friction and Cohesion

Premissable service pressure @ front 75.00 kN/m², @ back 75.00 kN/m²

 $\alpha = \text{Atn}(\tan(28)/1.2) = 23.9^\circ$ $\delta = \text{Atn}(0.75 \times \tan(\text{Atn}(\tan(28)/1.2))) = 18.38^\circ$ $\phi = \text{Atn}(\tan(28)/1.2) = 23.9^\circ$ **Loading Cases**G_{Soil}- Soil Self Weight, G_{Wall}- Wall & Base Self Weight, F_{Heel}- Vertical Loads over Heel,P_a- Active Earth Pressure, P_{surcharge}- Earth pressure from surcharge, P_p- Passive Earth PressureCase 1: Geotechnical Design 1.00 G_{Soil}+1.00 G_{Wall}+1.00 F_{Heel}+1.00 P_a+1.00 P_{surcharge}+1.00 P_pCase 2: Structural Ultimate Design 1.40 G_{Soil}+1.40 G_{Wall}+1.60 F_{Heel}+1.00 P_a+1.00 P_{surcharge}+1.00 P_p**Geotechnical Design****Wall Stability - Virtual Back Pressure**

Case 1 Overturning/Stabilising 7.664/34.897

0.220

OK

Wall Sliding - Virtual Back PressureF_x/(R_{xFriction}+ R_{xPassive}) 11.901/(18.771+6.798)

0.465

OK

Soil Pressure

Virtual Back (No uplift)

Max(56.715/75, 62.264/75) kN/m²

0.830

OK

Wall Back (No uplift)

Max(57.328/75, 61.651/75) kN/m²

0.822

OK

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T: 07465819500

Job Ref : AUX205**Sheet** : 1100mm high RW /**Made by** : MK**Date** : 21 April 2023 / Ver. 2022.13.18**Checked** :**Approved** :**Structural Design****Outer Leaf Details**

Partial Safety Factor (γ_{mc}/γ_{mf})	Units Category I, Execution Control Class 2	2.7/2.7	Table NA.1
Material	Concrete blocks, $\gamma = 20 \text{ kN/m}^3$		
Units and Mortar Strength	7.3 N/mm ² , Mortar designation M4/(iii)		
Blocks Ratio	Unit height=215, Least horizontal dimensions=100	2.15	
Compressive Strength (f_k)	Group 1	4.57 N/mm ²	Table NA.6

Inner Leaf Details

Partial Safety Factor (γ_{mc}/γ_{mf})	Units Category I, Execution Control Class 2	2.7/2.7	Table NA.1
Material	Concrete blocks, $\gamma = 20 \text{ kN/m}^3$		
Units and Mortar Strength	7.3 N/mm ² , Mortar designation M4/(iii)		
Blocks Ratio	Unit height=215, Least horizontal dimensions=100	2.15	
Compressive Strength (f_k)	Group 1	4.57 N/mm ²	Table NA.6

Wall Design (Inner Steel)

Critical Section	Critical @ 0 mm from base, Case 2		
Steel Provided (Cover)	Dist. H8@200 (30 mm in cavity)		
	Main H8@100 (35 mm in cavity)	503 mm ²	OK
Leverarm $z = f_{in}(d, b, A_s, f_y, f_{yk})$	211 mm, 1000 mm, 503 mm ² , 500 N/mm ² , 4.6 N/mm ²	146 mm	
$M_r = f_{in}(\text{above}, \gamma_{mf}, \gamma_{ms})$	2.70, 1.15	30.1 kN.m	
Moment Capacity Check (M/M _r)	M 7.5 kN.m, M _r 30.1 kN.m	0.250	OK
Shear Capacity Check	F 8.6 kN, f_{yk} 0.281 N/mm ² , F _{vr} 23.7 kN	0.36	OK

Base Top Steel Design

Steel Provided (Cover)	Main H10@200 (50 mm) Dist. H10@125 (60 mm)	393 mm ²	OK
Compression Steel Provided (Cover)	Main H10@200 (50 mm) Dist. H10@125 (60 mm)	393 mm ²	
Leverarm $z = f_{in}(d, b, A_s, f_y, F_{cu})$	245 mm, 1000 mm, 393 mm ² , 500 N/mm ² , 30 N/mm ²	233 mm	
$M_r = f_{in}(\text{above}, A_s', d', x, x/d)$	393 mm ² , 55 mm, 14 mm, 0.06	39.8 kN.m	
Moment Capacity Check (M/M _r)	M 0.0 kN.m, M _r 39.8 kN.m	0.000	OK
Shear Capacity Check	F 0.3 kN, v_c 0.412 N/mm ² , F _{vr} 101.0 kN	0.00	OK

Base Bottom Steel Design

Steel Provided (Cover)	Main H10@200 (50 mm) Dist. H10@125 (60 mm)	393 mm ²	OK
Compression Steel Provided (Cover)	Main H10@200 (50 mm) Dist. H10@125 (60 mm)	393 mm ²	
Leverarm $z = f_{in}(d, b, A_s, f_y, F_{cu})$	245 mm, 1000 mm, 393 mm ² , 500 N/mm ² , 30 N/mm ²	233 mm	
$M_r = f_{in}(\text{above}, A_s', d', x, x/d)$	393 mm ² , 55 mm, 14 mm, 0.06	39.8 kN.m	
Moment Capacity Check (M/M _r)	M 11.9 kN.m, M _r 39.8 kN.m	0.299	OK
Shear Capacity Check	F 34.4 kN, v_c 0.412 N/mm ² , F _{vr} 101.0 kN	0.34	OK

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Job Ref : AUX205

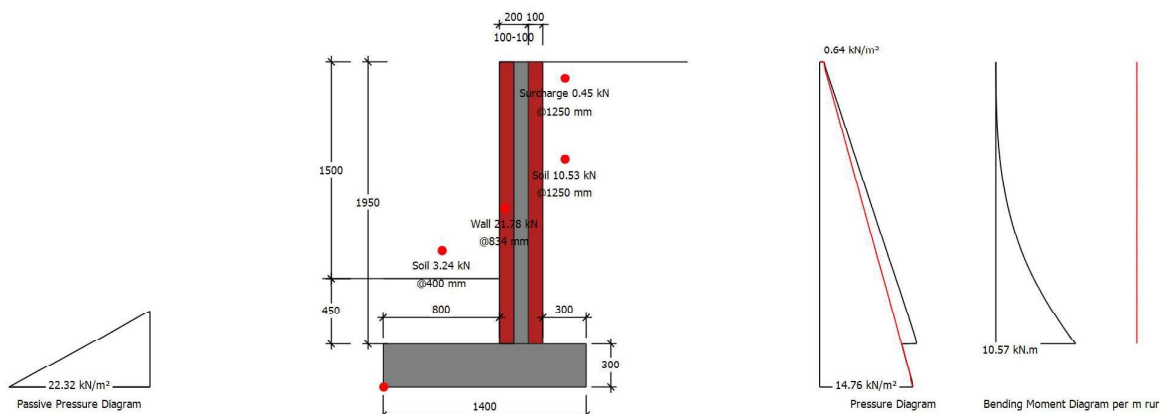
Sheet : 1500mm high RW /

Made by : MK

Date : 21 April 2023 / Ver. 2022.13.18

Checked :

Approved :

MasterKey : Retaining Wall Design to BS 8002 : 1994, BS EN 1996-1-1:2005+A1:2012 and BS 8110 : 1997
Basic RC Retaining Wall**Reinforced Masonry Cavity Filled Retaining Wall with Reinforced Concrete Base****Summary of Design Data**

EC6 National Annex

Notes

Material Densities (kN/m³)

Concrete grade and steel 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

UK

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

Soil 18.00, Concrete 24.00, Masonry 20.00

f_{cu} 30 N/mm², Cavity inner cover 30, Cavity outer cover 62, Base cover 50f_y 460 N/mm², f_{yb} 460 N/mm² designed to BS 8110: 1997

Surcharge 1.50 kN/m², Fully drained

Front of wall 225 mm

Soil Properties

Bearing pressure

Back Soil Friction and Cohesion

Base Friction and Cohesion

Front Soil Friction and Cohesion

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

 $\alpha = \text{Atn}(\tan(28)/1.2) = 23.9^\circ$ $\delta = \text{Atn}(0.75 \times \tan(\text{Atn}(\tan(28)/1.2))) = 18.38^\circ$ $\phi = \text{Atn}(\tan(28)/1.2) = 23.9^\circ$ **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_{surcharge}- Earth pressure from surcharge, P_p- Passive Earth PressureCase 1: Geotechnical Design 1.00 G_{Soil}+1.00 G_{Wall}+1.00 F_{VHeel}+1.00 P_a+1.00 P_{surcharge}+1.00 P_pCase 2: Structural Ultimate Design 1.40 G_{Soil}+1.40 G_{Wall}+1.60 F_{VHeel}+1.00 P_a+1.00 P_{surcharge}+1.00 P_p**Geotechnical Design****Wall Stability - Virtual Back Pressure**

Case 1 Overturning/Stabilising 13.498/33.192 0.407 OK

Wall Sliding - Virtual Back PressureF_x/(R_{xFriction}+ R_{xPassive}) 17.346/(11.963+5.870) 0.973 OK**Soil Pressure**

Virtual Back (No uplift) Max(42.568/100, 8.861/100) kN/m² 0.426 OK

Wall Back (No uplift) Max(47.002/100, 4.426/100) kN/m² 0.470 OK

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Job Ref : AUX205**Sheet** : 1500mm high RW /**Made by** : MK**Date** : 21 April 2023 / Ver. 2022.13.18**Checked** :**Approved** :**Structural Design****Outer Leaf Details**

Partial Safety Factor (γ_{mc}/γ_{mf})	Units Category I, Execution Control Class 2	2.7/2.7	Table NA.1
Material	Concrete blocks, $\gamma = 20 \text{ kN/m}^3$		
Units and Mortar Strength	7.3 N/mm ² , Mortar designation M4/(iii)		
Blocks Ratio	Unit height=215, Least horizontal dimensions=100	2.15	
Compressive Strength (f_k)	Group 1	4.57 N/mm ²	Table NA.6

Inner Leaf Details

Partial Safety Factor (γ_{mc}/γ_{mf})	Units Category I, Execution Control Class 2	2.7/2.7	Table NA.1
Material	Concrete blocks, $\gamma = 20 \text{ kN/m}^3$		
Units and Mortar Strength	7.3 N/mm ² , Mortar designation M4/(iii)		
Blocks Ratio	Unit height=215, Least horizontal dimensions=100	2.15	
Compressive Strength (f_k)	Group 1	4.57 N/mm ²	Table NA.6

Wall Design (Inner Steel)

Critical Section	Critical @ 0 mm from base, Case 2		
Steel Provided (Cover)	Dist. B8@200 (30 mm in cavity)		
	Main B8@100 (30 mm in cavity)	503 mm ²	OK
Leverarm $z = \text{fn}(d, b, A_s, f_y, f_{tk})$	166 mm, 1000 mm, 503 mm ² , 460 N/mm ² , 4.6 N/mm ²	107 mm	
$M_r = \text{fn}(\text{above}, \gamma_{mf}, \gamma_{ms})$	2.70, 1.15	18.7 kN.m	
Moment Capacity Check (M/M _r)	M 10.6 kN.m, M _r 18.7 kN.m	0.566	OK
Shear Capacity Check	F 14.6 kN, f_{vk} 0.287 N/mm ² , F _{vr} 19.0 kN	0.77	OK

Base Top Steel Design

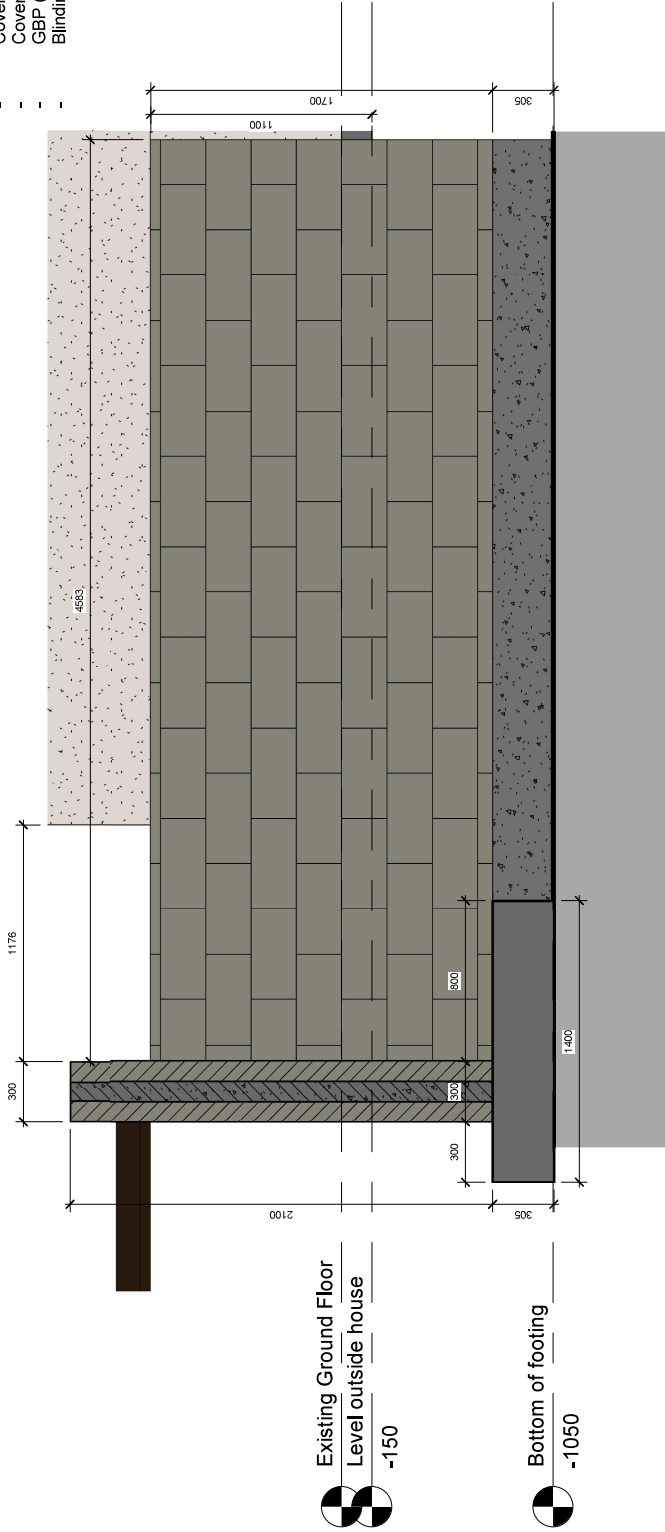
Steel Provided (Cover)	Main B10@200 (50 mm) Dist. B10@200 (60 mm)	393 mm ²	OK
Compression Steel Provided (Cover)	Main B10@200 (50 mm) Dist. B10@200 (60 mm)	393 mm ²	
Leverarm $z = \text{fn}(d, b, A_s, f_y, F_{cu})$	245 mm, 1000 mm, 393 mm ² , 460 N/mm ² , 30 N/mm ²	233 mm	
$M_r = \text{fn}(\text{above}, A_s', d', x, x/d)$	393 mm ² , 55 mm, 14 mm, 0.06	39.9 kN.m	
Moment Capacity Check (M/M _r)	M 2.8 kN.m, M _r 39.9 kN.m	0.070	OK
Shear Capacity Check	F 13.8 kN, v_c 0.412 N/mm ² , F _{vr} 101.0 kN	0.14	OK

Base Bottom Steel Design

Steel Provided (Cover)	Main B10@200 (50 mm) Dist. B10@200 (60 mm)	393 mm ²	OK
Compression Steel Provided (Cover)	Main B10@200 (50 mm) Dist. B10@200 (60 mm)	393 mm ²	
Leverarm $z = \text{fn}(d, b, A_s, f_y, F_{cu})$	245 mm, 1000 mm, 393 mm ² , 460 N/mm ² , 30 N/mm ²	233 mm	
$M_r = \text{fn}(\text{above}, A_s', d', x, x/d)$	393 mm ² , 55 mm, 14 mm, 0.06	39.9 kN.m	
Moment Capacity Check (M/M _r)	M 11.4 kN.m, M _r 39.9 kN.m	0.286	OK
Shear Capacity Check	F 20.1 kN, v_c 0.412 N/mm ² , F _{vr} 101.0 kN	0.20	OK

GROUTED RETAINING WALL - SPECIFICATION:

- Concrete grade: C30
- Base thickness: 300mm
- Stem thickness: 300mm / 350mm
- Outer skin: 100mm blockwork
- Cavity: 100mm/150mm grouted cavity
- Rear skin: 100mm blockwork
- Stem reinforcement: 10mm dia. (1x mesh A393)
- Base reinforcement: A393 T&B
- Cover to top reinforcement: 50mm
- Cover to the bottom and sides: 50mm
- GBP (assumed): 75kN/m2
- Blinding: 50mm

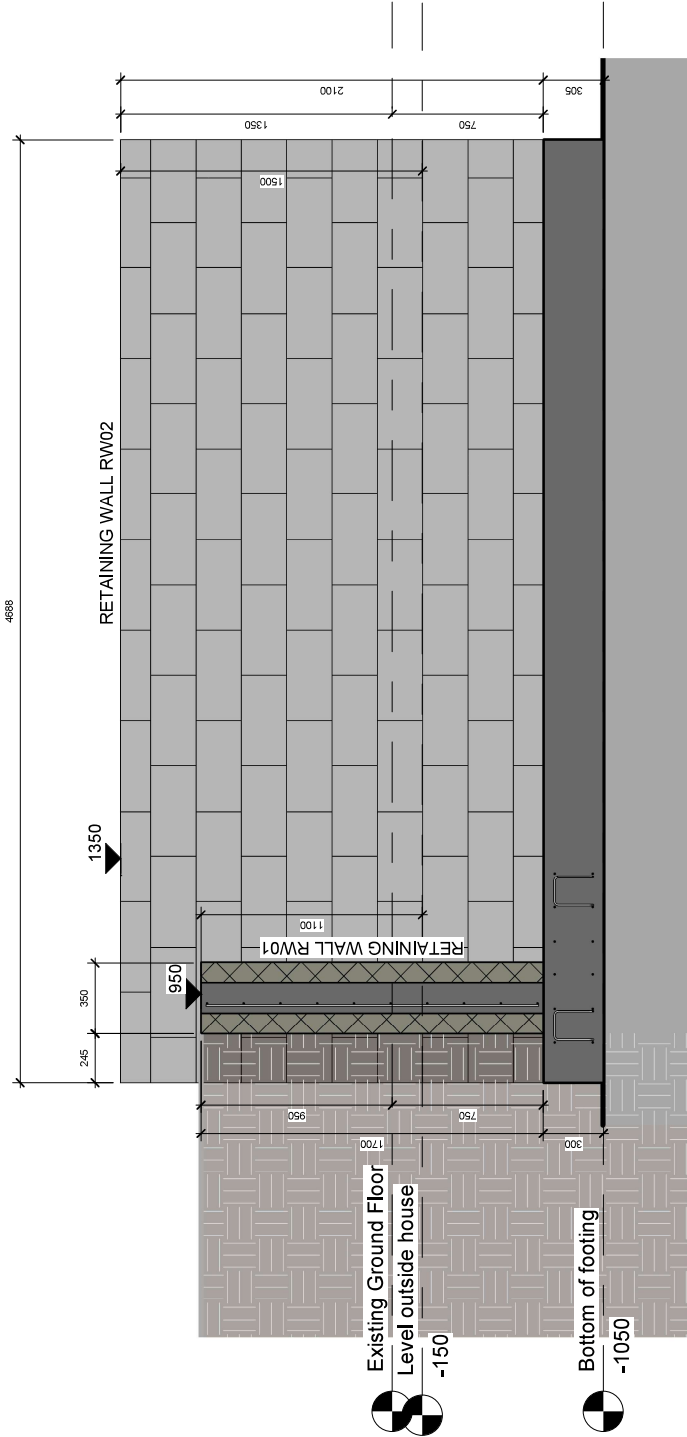


1 RW01 elevation
1 : 25

	No.		Description	Date	PROJECT	CLIENT	17 Mitchell Crescent, Merthyr Tydfil				
	C01	First issue		22/04/23			Two storey Extension to Rear		Date	Project number	Scale (@ A3)
									Apr 2023	AUX205	As indicated
									Drawn by	DRWAING NUMBER	REV
							SHEET		Checked by	200	C01
							Proposed Elevation RW01		Checker		

GROUTED RETAINING WALL - SPECIFICATION:

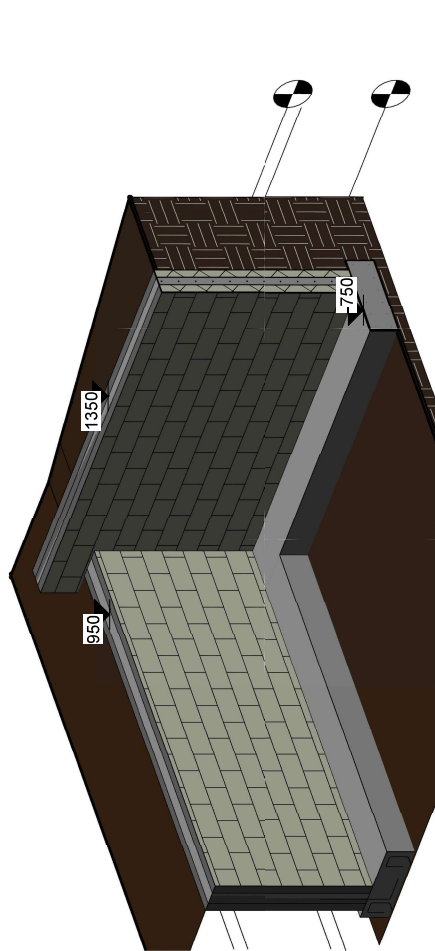
- Concrete grade: C30
- Base thickness: 300mm
- Stem thickness: 300mm / 350mm
- Outer skin: 100mm blockwork
- Cavity: 100mm/150mm grouted cavity
- Rear skin: 100mm blockwork
- Stem reinforcement: 10mm dia. (1x mesh A393)
- Base reinforcement: A393 T&B
- Cover to top reinforcement: 50mm
- Cover to the bottom and sides: 50mm
- GBP (assumed): 75kN/m2
- Blinding: 50mm



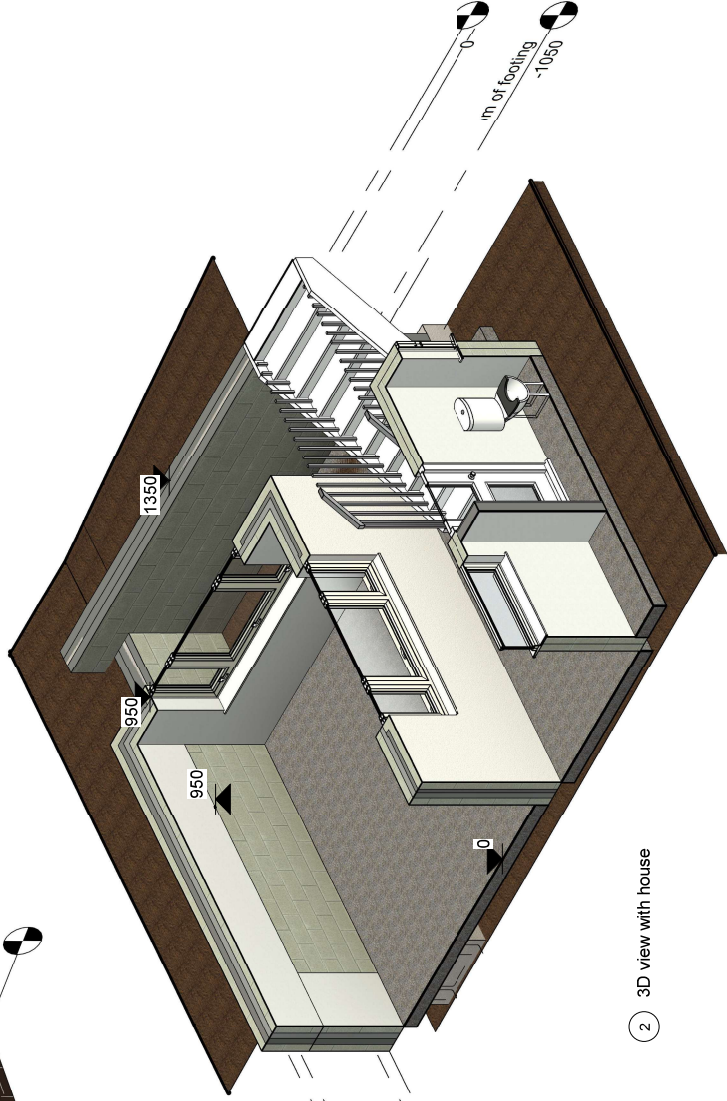
1 Section 2
1 : 25

No.	Description	Date
C01	First issue	22/04/23

AUXILIUM Structural Engineering and CAD Services 50 Quarry Row, Merthyr Tydfil, CF47 8PS		PROJECT		17 Mitchell Crescent, Merthyr Tydfil							
		Two storey Extension to Rear		Date Apr 2023 AUX205		Project number AUX205		Scale (@ A3) As indicated			
CODE	STATUS	SUITABILITY DESCRIPTION	PURPOSE OF ISSUE	SHEET		Drawn by Author		DRAWING NUMBER		REV	
				Proposed elevation RW02		201		C01			
				Checked by Checker							



1 3D view RW only



2 3D view with house

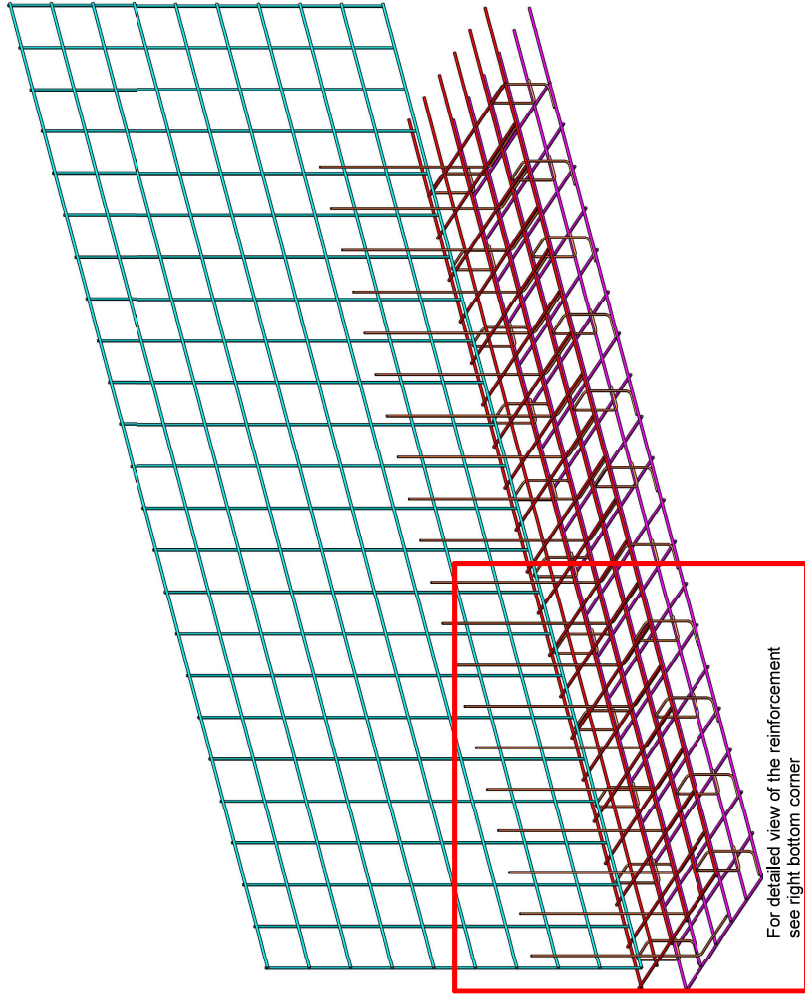
No.	Description	Date
C01	First issue	22/04/23



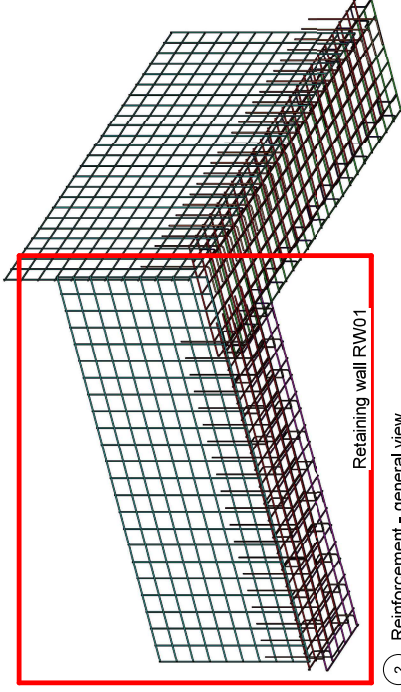
CODE	STATUS	SUITABILITY DESCRIPTION	PURPOSE OF ISSUE

PROJECT	SHEET
Two storey Extension to Rear	3D Views

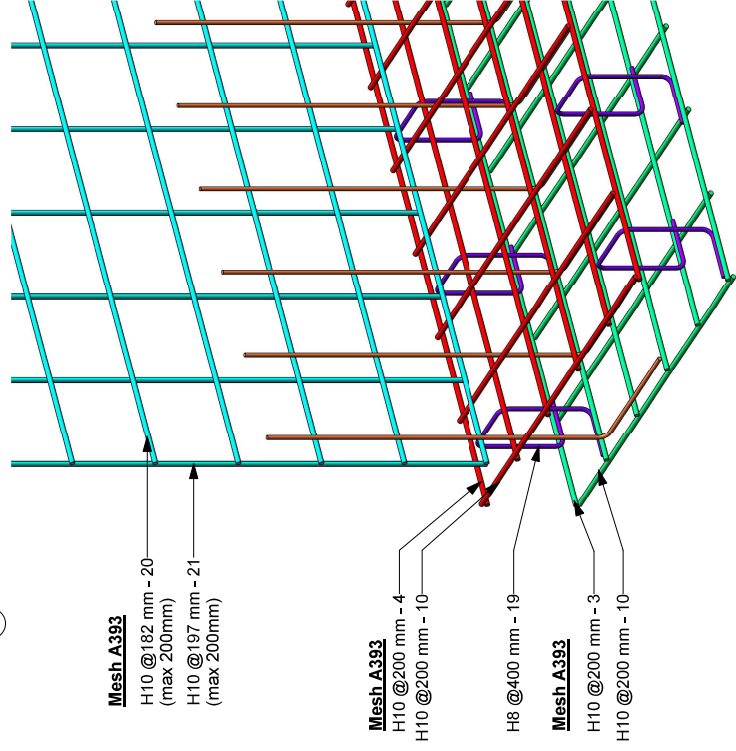
CLIENT	17 Mitchell Crescent, Merthyr Tydfil
Date	Apr 2023
Project number	AUX205
Scale (@ A3)	
Drawn by	Author
Checked by	Checker
DRWAING NUMBER	400
REV	C01



1 Reinforcement view RW01



2 Reinforcement - general view



3 Reinforcement view RW01 - detailed

No.	Description	Date
C01	First issue	22/04/23

AUXILIUM Structural Engineering and CAD Services 50 Quarry Row, Merthyr Tydfil, CF47 8PS			PURPOSE OF ISSUE	
CODE	STATUS	SUITABILITY DESCRIPTION		

PROJECT		CLIENT		17 Mitchell Crescent, Merthyr Tydfil	
Two storey Extension to Rear		Date		Apr 2023	Scale (@ A3)
SHEET		Project number		AUX205	REV
3D Views RW01 reinforcement		Drawing number		401	C01
		Drawn by		Author	Checked by
					Checker

