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Structural Design Services
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663 OLDHAM ROAD
ROCHDALE
OL16 4PE

Calculations

Project no. H1860

Introduction:

These structural calculations are prepared for building regulations' approval and are limited to the design of the masonry retaining wall between the client property number 663 Oldham Road, Rochdale and the neighbor property number 661 Oldham Road, Rochdale.
The retaining wall is already built and after checking its capability to support the retained ground, there is a need for amendments to the ground levels (see attached sketches).

Address of the site:

663 Oldham Road, Rochdale, OL16 4PE.

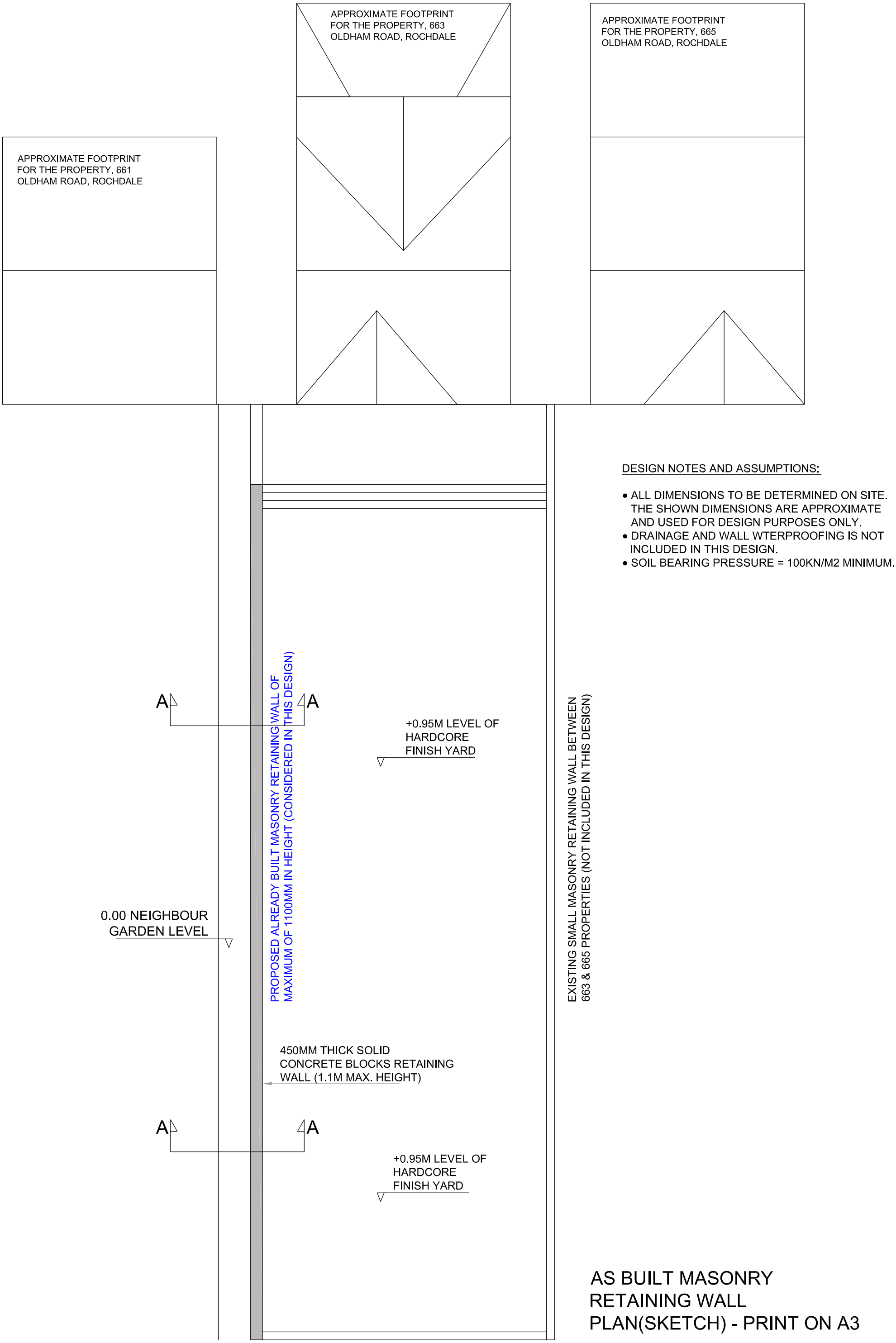
Notes:

- The calculations should be approved by the building control engineer and all details should be agreed with the building inspector prior to any work's start.
- The design is limited to the elements considered and the duties of principle designer are not included.
- In the event of Discrepancy, refer to Homestead SDS Ltd.

Drawings References:

Drawings nos: As per the attached sketches.

Calculations Date: May 2018



DESIGN NOTES AND ASSUMPTIONS:

- ALL DIMENSIONS TO BE DETERMINED ON SITE. THE SHOWN DIMENSIONS ARE APPROXIMATE AND USED FOR DESIGN PURPOSES ONLY.
- DRAINAGE AND WALL WTERPROOFING IS NOT INCLUDED IN THIS DESIGN.
- SOIL BEARING PRESSURE = 100KN/M2 MINIMUM.

AS BUILT MASONRY RETAINING WALL PLAN(SKETCH) - PRINT ON A3

APPROXIMATE FOOTPRINT
FOR THE PROPERTY, 663
OLDHAM ROAD, ROCHDALE

APPROXIMATE FOOTPRINT
FOR THE PROPERTY, 665
OLDHAM ROAD, ROCHDALE

APPROXIMATE FOOTPRINT
FOR THE PROPERTY, 661
OLDHAM ROAD, ROCHDALE

B

B

THE GROUND LEVEL OF THIS AREA TO BE LOWERED BY 250MM AND THE DIFERENCE OF LEVEL BETWEEN THE SIDES OF THE RETAINING WALL MUST BE RESTRICTED TO BELOW 0.7M. THE AREA TO BE USED AS A GRASS GARDEN AND NO PARKING TO BE ALLOWED FOR ANY VEIHCLE TYPE.

PROPOSED ALREADY BUILT
MASONRY RETAINING WALL
(CONSIDERED IN THIS DESIGN)

1500

0.00 NEIGHBOUR
GARDEN LEVEL

+0.70M LEVEL OF
GRASSED
GARDEN AREA

+0.95M LEVEL OF
HARDCORE
FINISH YARD

B

B

THE GROUND LEVEL OF THIS AREA TO BE LOWERED BY 250MM AND THE DIFERENCE OF LEVEL BETWEEN THE SIDES OF THE RETAINING WALL MUST BE RESTRICTED TO BELOW 0.7M. THE AREA TO BE USED AS A GRASS GARDEN AND NO PARKING TO BE ALLOWED FOR ANY VEIHCLE TYPE.

EXISTING SMALL MASONRY RETAINING WALL BETWEEN
663 & 665 PROPERTIES (NOT INCLUDED IN THIS DESIGN)

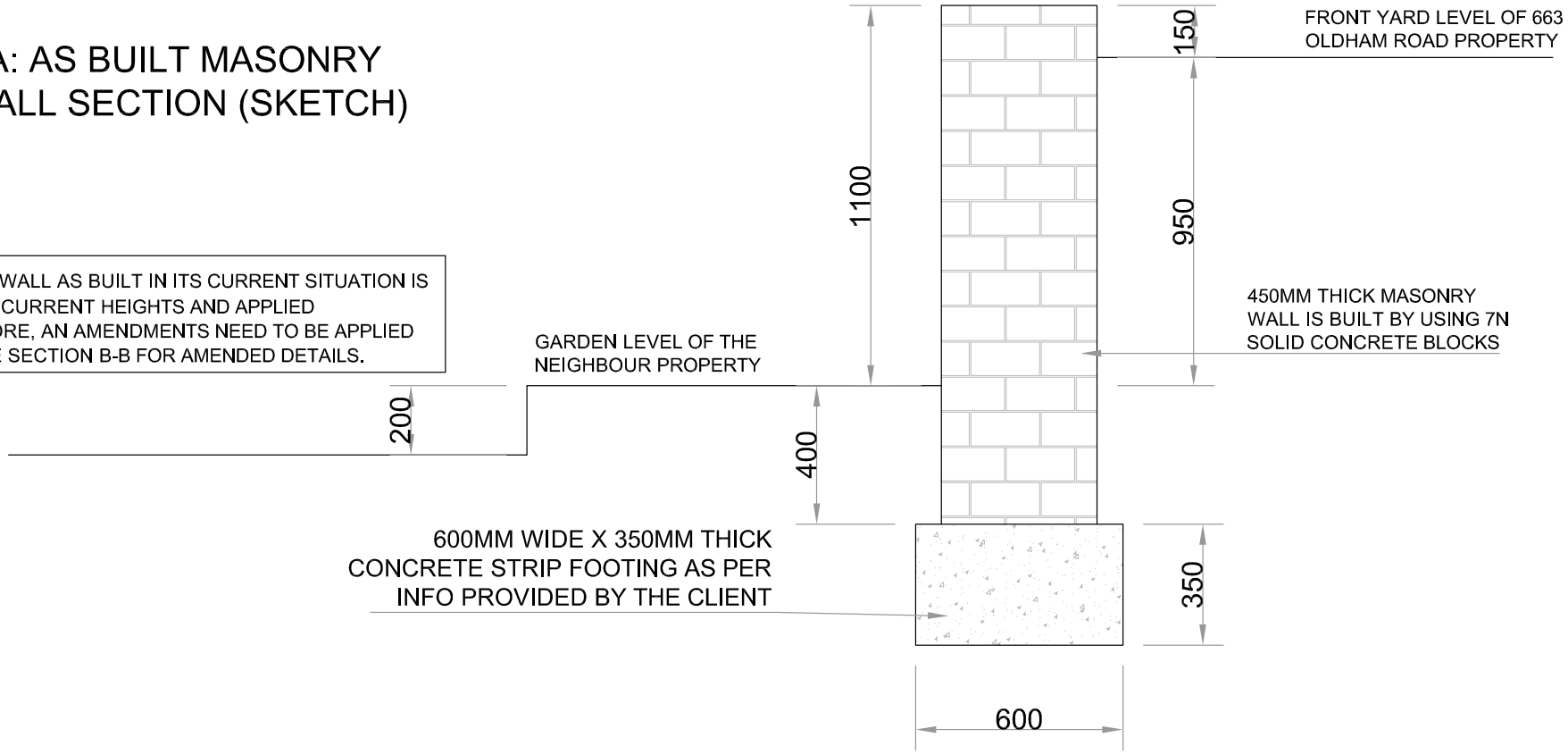
DESIGN NOTES AND ASSUMPTIONS:

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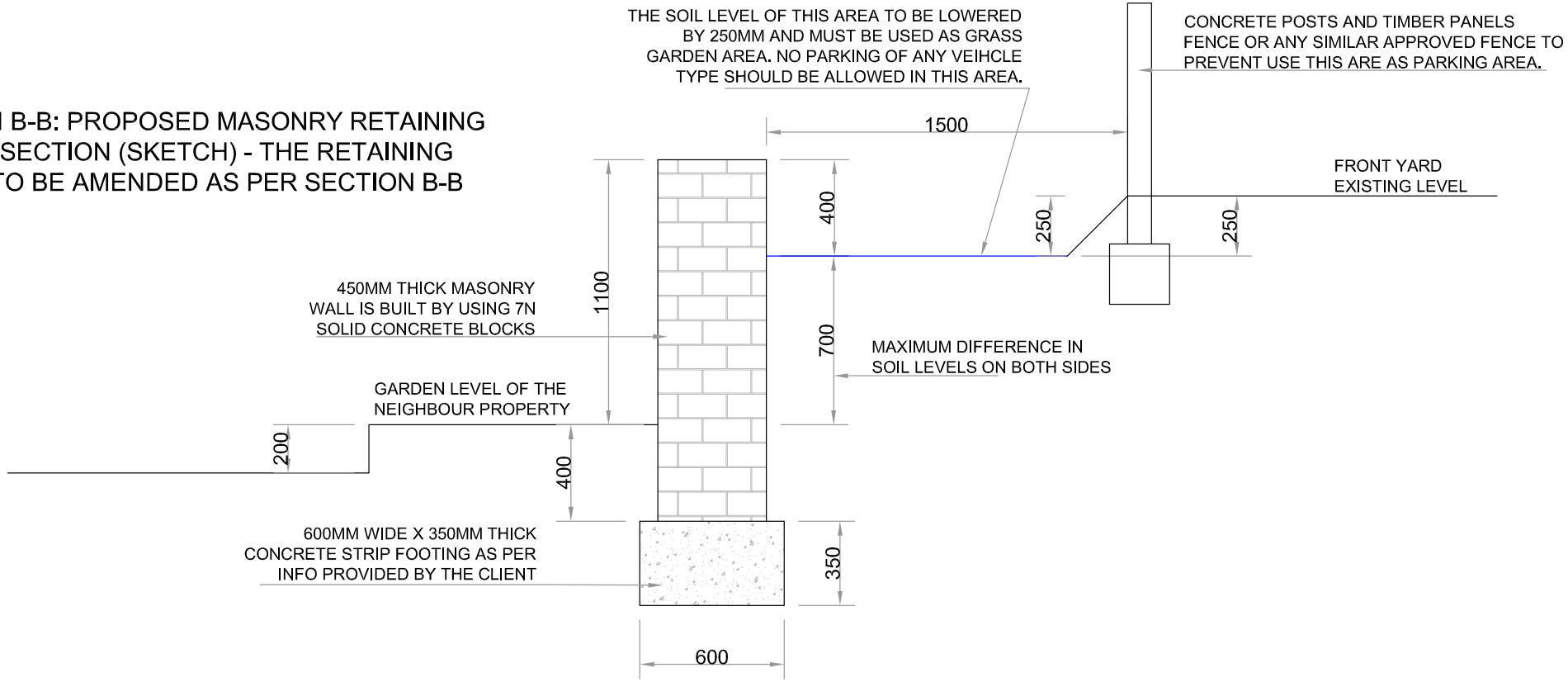
PROPOSED AMENDED
MASONRY RETAINING WALL
PLAN(SKETCH) - PRINT ON A3

SECTION A-A: AS BUILT MASONRY RETAINING WALL SECTION (SKETCH)

NOTE: THE RETAINING WALL AS BUILT IN ITS CURRENT SITUATION IS FAILED TO RESIST THE CURRENT HEIGHTS AND APPLIED SURCHARGE, THEREFORE, AN AMENDMENTS NEED TO BE APPLIED TO MAKE IT WORK, SEE SECTION B-B FOR AMENDED DETAILS.



SECTION B-B: PROPOSED MASONRY RETAINING WALL SECTION (SKETCH) - THE RETAINING WALL TO BE AMENDED AS PER SECTION B-B



MASONRY WALL OF HEIGHT 0.7M (MAX.) SECTION B-B
LOADING ON THE RETAINING WALL

Soil Density	18.00 kN/m3	Soil Height=Hs=	0.70 m
Surcharge	5.00 kN/m2		
Angle of Internal friction, φ	30.00 degrees		
Sinφ = 0.5			
K_2 = (1-SINφ) / (1+SINφ)	0.333 (Taken from Reynold 10)		

Notes: 1. The surchare is considered as 5.0 kN/m2 (Garden Area).

Soil Pressur, Q1= Soil density x K2 x Height x Height x 0.5

Q1= 1.47 kN/m run SLS

Q1= 2.06 kN/m run ULS

Surcharge Pressure = Q2= Surcharge x K2 x Height

Q2= 1.17 kN/m run SLS

Q2= 1.87 kN/m run ULS

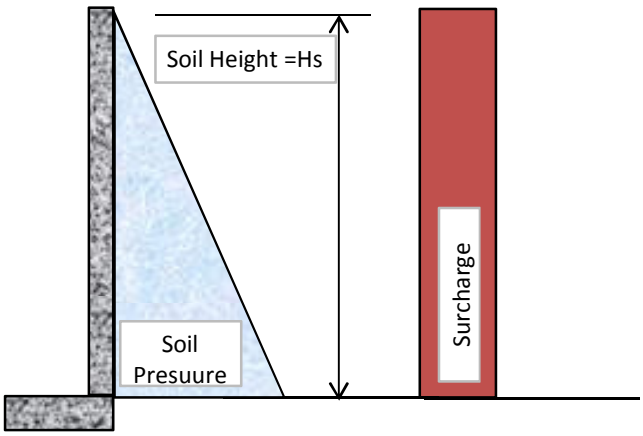
Total Q = 2.64 kN/m run SLS

Total Q = 3.92 kN/m run ULS

Max. Moment at the wall toe = Mu

Moment Mu = (Q1 x Hs/3) + (Q2 x Hs/2) + (Q3 x Hw/3)

Mu = **1.13** kN.m/m run ULS



MASONRY WALL OF HEIGHT 0.7M (MAX.) SECTION B-B

DESIGN OF THE MASONRY RETAINING WALL

NOTE: ALL DESIGN AS PER BS5628:1

Design Height = H	0.70	m
Wall friction angle = δ =	20	Degree
Tan δ =	0.36	
Design Width, B =	1000.00	mm
Wall Thickness, D =	**450.00**	mm

Factored overturning Moment, Mdes:

Overturning Moment due to earth presure = Ma =	0.48	kN.m
Overturning Moment due to surcharge = Msur =	0.65	kN.m
Soil Active pressure . Pa=	2.06	kn ULS
Surcharge Sur, =	1.87	kN ULS
Wall friction, Fr = Pa x Sur x tan δ =	1.43	kN ULS
Moment due to wall friction, Mfr = Fr x La =	0.32	kN.m ULS
La = D/2 =	225.00	mm
Total overturning moment , Mdes = Ma + Msur - Mfr =	**0.81**	kN.m ULS

Moment Resistance, Mr:

f_{kx} =	**0.27**	N/mm^2
Factor of safety for vertical Wall = SFV =	0.90	
Surcharge & Earth factor of safety = SFH =	1.40	
Material factor of safety = Ym=	3	
Masonry Wall Density = Dn	**22.00**	kN/m^3
Factored vertical load, Vw = SFV x H x L x Dn =	8.91	kN
Factored vertical load due to friction = Vfr = Fr x FSH	2.00	kN
Total V = Vfr + Vw =	10.91	kN
g = V/D =	0.024	N/mm^2
Zxx= BxD^2/6=	33750000.00	mm^3
Moment Resistance, Mr = ((fkx/Ym) + g) * z =	**3.86**	kN.m ULS
Total overturning moment , Mdes = Ma + Msur - Mfr =	**0.81**	kN.m ULS

Moment Resistance, Mr > Overturning Moment, Mdes **OK**

MASONRY WALL OF HEIGHT 0.7M (MAX.) SECTION B-B

Strip Footing Design

USE 600 mm WIDE x 350 mm THICK STRIP FOOTING

Allowable Ground Bearing Pressure = σ_{all}	100.00 kN/m2
Total concrete strip footing = B	600 mm
Total concrete strip footing thickness = t	350 mm
Masonry Self Weight = DL = H x D x Dn =	13.86 KN SLS
Wall friction = Vfr =	1.02 KN SLS
Strip footing self weight = FDL =	5.04 KN SLS
Total Vertical load =P = DL+Vfr+FDL =	19.92 KN SLS
Footing Zxx= BxD^2/6=	60000.00 cm^3
Total overturning moment , Mdes = Ma + Msur - Mfr =	0.81 kN.m ULS
Applied bearing pressure = $\sigma a = (P/A) + (M/Z)$	46.74 kN/m2

$\sigma a < \sigma all$ **OK**