

PROJECT: 32 - 42 Sally Port, Isles of Scilly, TR21 0JE

REF: 04119E

DATE: September 2020

MASONRY RETAINING WALL UP TO 1450mm

CALCULATIONS	PROJECT: 32-42 Sallyport, St Marys, Isles of Scilly, TR29 0JE	PROJECT No: 04119E
		DATE: September 2020
		CALCULATIONS BY: JSC

STRUCTURAL SUMMARY

The calculations prepared by structureHaus relate to the design of the masonry stepped to rear retaining walls at 32-42 Sallyport, St Marys, Isles of Scilly.

STRUCTURAL STABILITY

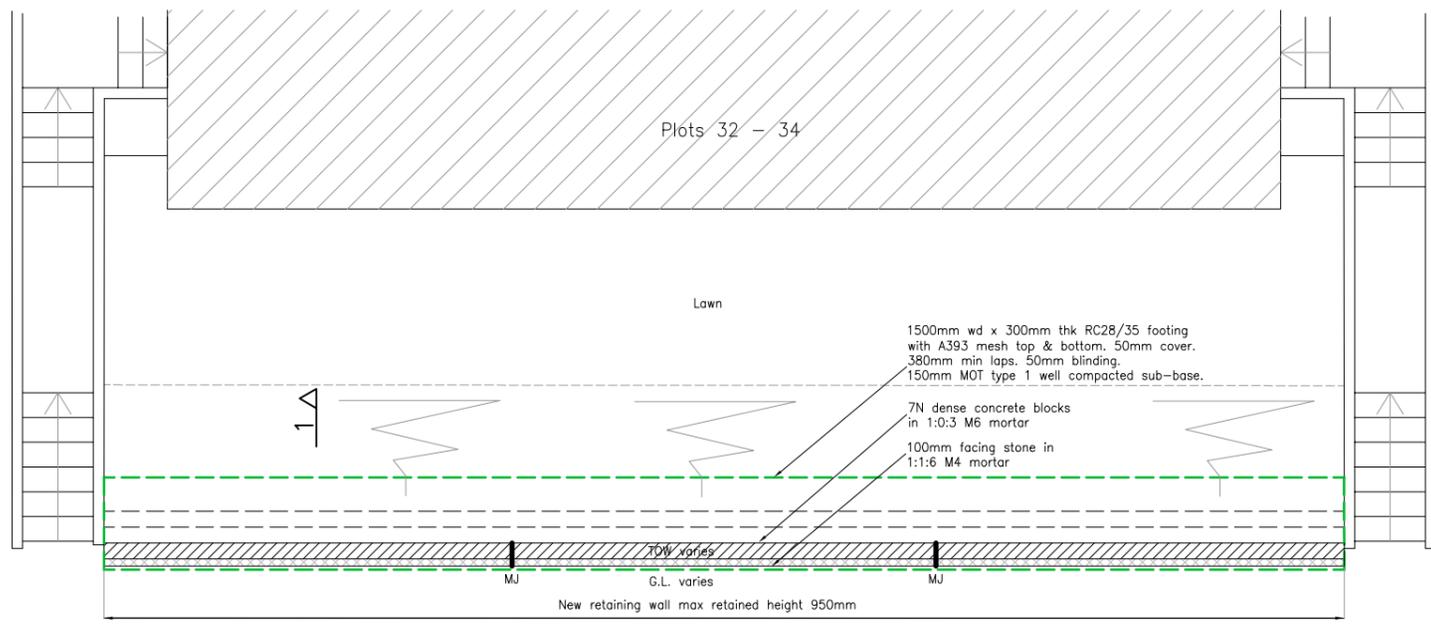
N/A

ASSUMPTIONS

100kN/m² ground bearing capacity
Surcharge = 2.5 kN/m²
Ground slope for 1450mm high wall = 10 degree
Ground slope for 950mm high wall = 25 degree
Ground water level conservatively assumed at 275mm from top of base.
Foundations drained – weepholes.

DESIGN REFERENCES

Eurocode 1: Actions on structures (EN 1991)
Eurocode 2: Design of concrete structures (EN 1992)
Eurocode 6: Design of masonry structures (EN 1996)
Eurocode 7: Geotechnical design (EN 1997)



PLAN ON PLOTS 32-34
Scale 1:50

GENERAL NOTES:-

All drawings/sketches are to be read in conjunction with all other relevant Architect's, Engineers & Specialist drawings, specifications, details and the relevant Health and Safety Plan and method statements (as appropriate).

DO NOT SCALE FROM THIS DRAWING. Use figured dimensions only. All dimensions are to be checked on site and are to be confirmed by the Architect prior to construction.

FOR ALL BUILDING NOTES PLEASE READ DWG NO. 04119E_SK100

For site setting out refer to the Architect's drawings.

All setting out of brickwork, blockwork, service holes and all waterproofing details to architect drawings and specifications. Finishes to the Architect's requirements.

The main contractor shall design, supply and fix all temporary works unless otherwise agreed. Temporary works are defined as:

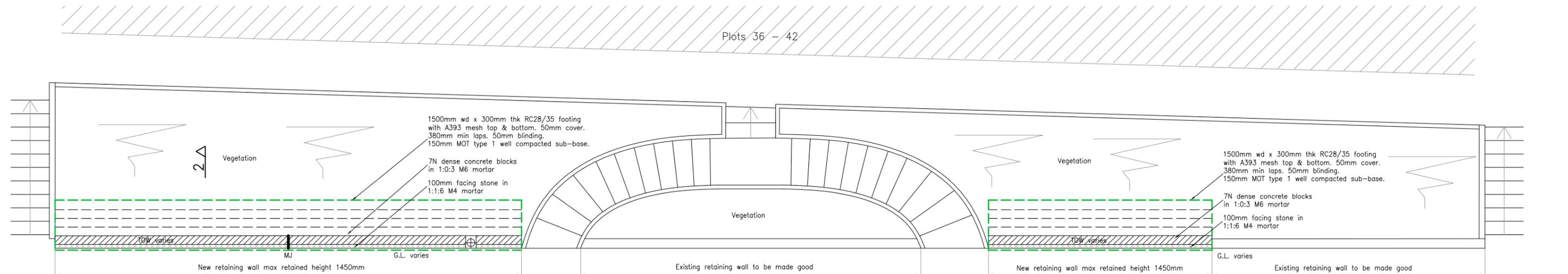
- Load Takedown
- Scaffolding
- Propping & Shoring
- Formwork
- Construction Method Statements

All temporary works to be in accordance with latest version of BS5975:2008

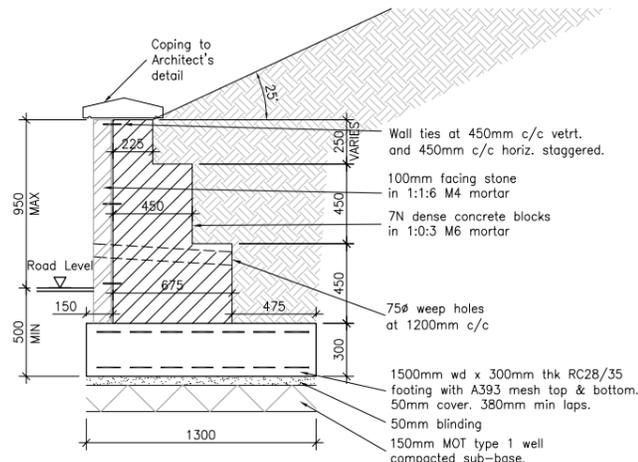
Part A3 Section V of the current Building Regulations.

This structure is in class 1 regarding Disproportionate collapse. The following measures are to be taken : No special measures required.

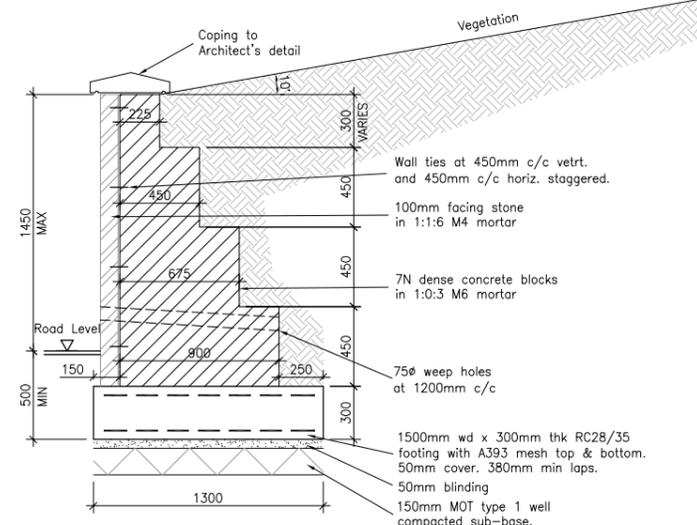
MJ - Movement joint - 25mm thk continuous aeorofil joint with 25 x 12mm polysulphide sealant and 225mm lg ANCON s/s PPS ties (or equivalent)at 300mm c/c vertically, one end de-bonded, staggered.



PLAN ON PLOTS 36-42
Scale 1:50



SECTION 1-1
Scale 1:20



SECTION 2-2
Scale 1:20

FOR CONSTRUCTION

REV.	DATE	CONSTRUCTION ISSUE	DETAILS	JSC	MH
-	04.09.2020	CONSTRUCTION ISSUE		JSC	MH
<p>consulting . engineering . designing LONDON OFFICE 020 8940 7810 EXETER OFFICE 01392 363497 info@structurehaus.com www.structurehaus.com</p>					
<p>32-42 Sallyport St Marys Isles of Scilly</p>					
<p>Retaining Walls Plots 32-34 and 36-42 Structural GA and Details</p>					
<p>As shown @ A1</p>					
DRAWING NUMBER				REVISION	
04119E_01				-	
Drawn by			Checked by		
Date			Date		
JSC			MH		
04.09.2020			04.09.2020		





Project Sally Port, Isles of Scilly				Job no. 04119E	
Calcs for Retaining wall up to 1450mm high				Start page no./Revision 1	
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RETAINING WALL ANALYSIS

In accordance with EN1997-1:2004 incorporating Corrigendum dated February 2009 and the UK National Annex incorporating Corrigendum No.1

Tedds calculation version 2.9.10

Retaining wall details

Stem type	Cantilever with stepped rear face		
Stem height	$h_{\text{stem}} = 1650$ mm		
Number of steps	$N_{\text{steps}} = 4$		
Height step 1	$h_{s1} = 450$ mm	Thickness step 1	$t_{s1} = 900$ mm
Height step 2	$h_{s2} = 450$ mm	Thickness step 2	$t_{s2} = 675$ mm
Height step 3	$h_{s3} = 450$ mm	Thickness step 3	$t_{s3} = 450$ mm
Height step 4	$h_{s4} = 300$ mm	Thickness step 4	$t_{s4} = 225$ mm
Angle to rear face of stem	$\alpha = 90$ deg		
Stem density	$\gamma_{\text{stem}} = 22$ kN/m ³		
Toe length	$l_{\text{toe}} = 150$ mm		
Heel length	$l_{\text{heel}} = 450$ mm		
Base thickness	$t_{\text{base}} = 300$ mm		
Base density	$\gamma_{\text{base}} = 25$ kN/m ³		
Height of retained soil	$h_{\text{ret}} = 1450$ mm	Angle of soil surface	$\beta = 10$ deg
Depth of cover	$d_{\text{cover}} = 200$ mm		
Depth of excavation	$d_{\text{exc}} = 200$ mm		
Height of water	$h_{\text{water}} = 75$ mm		
Water density	$\gamma_w = 9.8$ kN/m ³		

Retained soil properties

Soil type	Medium dense well graded sand and gravel	
Moist density	$\gamma_{\text{mr}} = 20$ kN/m ³	
Saturated density	$\gamma_{\text{sr}} = 22.3$ kN/m ³	
Characteristic effective shear resistance angle		$\phi'_{r,k} = 30$ deg
Characteristic wall friction angle		$\delta_{r,k} = 15$ deg

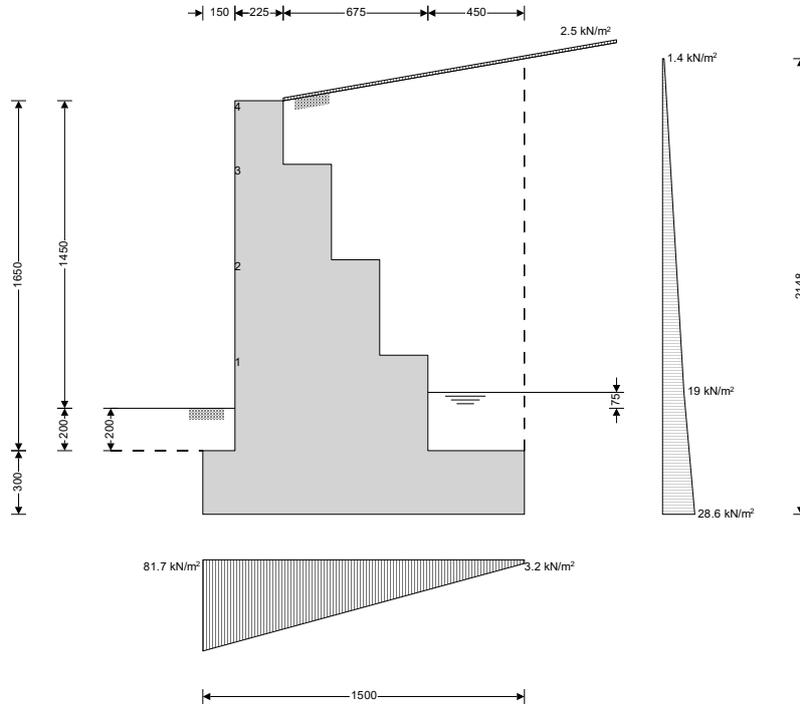
Base soil properties

Soil type	Medium dense well graded sand and gravel	
Soil density	$\gamma_b = 20$ kN/m ³	
Characteristic effective shear resistance angle		$\phi'_{b,k} = 36$ deg
Characteristic wall friction angle		$\delta_{b,k} = 18$ deg
Characteristic base friction angle		$\delta_{bb,k} = 36$ deg
Presumed bearing capacity	$P_{\text{bearing}} = 100$ kN/m ²	

Loading details

Variable surcharge load	Surcharge _Q = 2.5 kN/m ²
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General arrangement

Calculate retaining wall geometry

Base length	$l_{base} = 1500 \text{ mm}$
Saturated soil height	$h_{sat} = 275 \text{ mm}$
Moist soil height	$h_{moist} = 1375 \text{ mm}$
Length of surcharge load	$l_{sur} = 1125 \text{ mm}$
Vertical distance	$x_{sur_v} = 938 \text{ mm}$
Effective height of wall	$h_{eff} = 2148 \text{ mm}$
Horizontal distance	$x_{sur_h} = 1074 \text{ mm}$
Area of wall stem	$A_{stem} = 0.979 \text{ m}^2$
Area of wall base	$A_{base} = 0.45 \text{ m}^2$
Area of saturated soil	$A_{sat} = 0.124 \text{ m}^2$
Area of water	$A_{water} = 0.124 \text{ m}^2$
Area of moist soil	$A_{moist} = 1.237 \text{ m}^2$
Area of base soil	$A_{pass} = 0.03 \text{ m}^2$

Vertical distance	$x_{stem} = 495 \text{ mm}$
Vertical distance	$x_{base} = 750 \text{ mm}$
Vertical distance	$x_{sat_v} = 1275 \text{ mm}$
Horizontal distance	$x_{sat_h} = 192 \text{ mm}$
Vertical distance	$x_{water_v} = 1275 \text{ mm}$
Uplift distance	$x_{water_u} = 1000 \text{ mm}$
Horizontal distance	$x_{water_h} = 192 \text{ mm}$
Vertical distance	$x_{moist_v} = 1068 \text{ mm}$
Horizontal distance	$x_{moist_h} = 757 \text{ mm}$
Vertical distance	$x_{pass_v} = 75 \text{ mm}$
Horizontal distance	$x_{pass_h} = 167 \text{ mm}$

Using Coulomb theory

At rest pressure coefficient	$K_0 = 0.578$	Passive pressure coefficient	$K_P = 8.022$
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Bearing pressure check

Vertical forces on wall

Total $F_{total_v} = F_{stem} + F_{base} + F_{sur_v} + F_{sat_v} + F_{water_v} + F_{moist_v} + F_{pass_v} = 63.7 \text{ kN/m}$

Horizontal forces on wall

Total $F_{total_h} = \max(F_{sur_h} + F_{sat_h} + F_{water_h} + F_{moist_h} + F_{pass_h} - F_{total_v} \times \tan(\delta_{bb,k}), 0 \text{ kN/m}) = 0 \text{ kN/m}$

Moments on wall

Total $M_{total} = M_{stem} + M_{base} + M_{sur} + M_{sat} + M_{water} + M_{moist} + M_{pass} = 33 \text{ kNm/m}$

Check bearing pressure

Bearing pressure at toe $q_{toe} = 81.7 \text{ kN/m}^2$ Bearing pressure at heel $q_{heel} = 3.2 \text{ kN/m}^2$

Factor of safety $FoS_{bp} = 1.224$

PASS - Allowable bearing pressure exceeds maximum applied bearing pressure

Design approach 1

Partial factors on actions - Table A.3 - Combination 1

Partial factor set A1

Permanent unfavourable action $\gamma_G = 1.35$ Permanent favourable action $\gamma_{Gf} = 1.00$

Variable unfavourable action $\gamma_Q = 1.50$ Variable favourable action $\gamma_{Qf} = 0.00$

Partial factors for soil parameters – Table A.4 - Combination 1

Soil parameter set M1

Angle of shearing resistance $\gamma_{\psi} = 1.00$ Effective cohesion $\gamma_c = 1.00$

Weight density $\gamma_r = 1.00$

Library item Partial factors summary

Water properties

Design water density $\gamma_w' = 9.8 \text{ kN/m}^3$

Retained soil properties

Design moist density $\gamma_{mr}' = 20 \text{ kN/m}^3$ Design saturated density $\gamma_{sr}' = 22.3 \text{ kN/m}^3$

Des. eff. shear resist. angle $\phi'_{r,d} = 30 \text{ deg}$ Design wall friction angle $\delta_{r,d} = 15 \text{ deg}$

Base soil properties

Design soil density $\gamma_b' = 20 \text{ kN/m}^3$ Des. eff. shear resist. angle $\phi'_{b,d} = 36 \text{ deg}$

Design wall friction angle $\delta_{b,d} = 18 \text{ deg}$ Design base friction angle $\delta_{bb,d} = 36 \text{ deg}$

Design effective cohesion $c'_{b,d} = 0 \text{ kN/m}^2$

Using Coulomb theory

At rest pressure coefficient $K_0 = 0.578$ Passive pressure coefficient $K_P = 8.022$

Sliding check

Vertical forces on wall

Total $F_{total_v} = F_{stem} + F_{base} + F_{sat_v} + F_{water_v} - F_{water_u} + F_{moist_v} = 56 \text{ kN/m}$

Horizontal forces on wall

Total $F_{total_h} = F_{sur_h} + F_{sat_h} + F_{water_h} + F_{moist_h} = 40.5 \text{ kN/m}$

Check stability against sliding

Resistance to sliding $F_{rest} = 47.6 \text{ kN/m}$ Factor of safety $FoS_{sl} = 1.174$

PASS - Resistance to sliding is greater than sliding force



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Overtuning check

Vertical forces on wall

Total $F_{total_v} = F_{stem} + F_{base} + F_{sat_v} + F_{water_v} - F_{water_u} + F_{moist_v} = 56 \text{ kN/m}$

Horizontal forces on wall

Total $F_{total_h} = F_{sur_h} + F_{sat_h} + F_{water_h} + F_{moist_h} + F_{exc_h} = 33.7 \text{ kN/m}$

Overtuning moments on wall

Total $M_{total_OT} = M_{sur_OT} + M_{sat_OT} + M_{water_OT} + M_{moist_OT} = 34.2 \text{ kNm/m}$

Restoring moments on wall

Total $M_{total_R} = M_{stem_R} + M_{base_R} + M_{sat_R} + M_{water_R} + M_{moist_R} + M_{exc_R} = 49.7 \text{ kNm/m}$

Check stability against overturning

Factor of safety $FoS_{ot} = 1.453$

PASS - Maximum restoring moment is greater than overturning moment

Design approach 1

Partial factors on actions - Table A.3 - Combination 2

Partial factor set A2

Permanent unfavourable action $\gamma_G = 1.00$ Permanent favourable action

action $\gamma_{Gf} = 1.00$

Variable unfavourable action $\gamma_Q = 1.30$ Variable favourable action $\gamma_{Qf} = 0.00$

Partial factors for soil parameters – Table A.4 - Combination 2

Soil parameter set M2

Angle of shearing resistance $\gamma_{\psi} = 1.25$ Effective cohesion $\gamma_{c'} = 1.25$

Weight density $\gamma_{\gamma} = 1.00$

Library item Partial factors summary

Water properties

Design water density $\gamma_w' = 9.8 \text{ kN/m}^3$

Retained soil properties

Design moist density $\gamma_{mr}' = 20 \text{ kN/m}^3$ Design saturated density $\gamma_{sr}' = 22.3 \text{ kN/m}^3$

Des. eff. shear resist. angle $\phi_{r,d}' = 24.8 \text{ deg}$ Design wall friction angle $\delta_{r,d} = 12.1 \text{ deg}$

Base soil properties

Design soil density $\gamma_b' = 20 \text{ kN/m}^3$ Des. eff. shear resist. angle $\phi_{b,d}' = 30.2 \text{ deg}$

Design wall friction angle $\delta_{b,d} = 14.6 \text{ deg}$ Design base friction angle $\delta_{bb,d} = 30.2 \text{ deg}$

Design effective cohesion $c'_{b,d} = 0 \text{ kN/m}^2$

Using Coulomb theory

At rest pressure coefficient $K_0 = 0.671$ Passive pressure coefficient $K_P = 4.938$

Sliding check

Vertical forces on wall

Total $F_{total_v} = F_{stem} + F_{base} + F_{sat_v} + F_{water_v} - F_{water_u} + F_{moist_v} = 56 \text{ kN/m}$

Horizontal forces on wall

Total $F_{total_h} = F_{sur_h} + F_{sat_h} + F_{water_h} + F_{moist_h} = 35.7 \text{ kN/m}$

Check stability against sliding

Resistance to sliding $F_{rest} = 36.9 \text{ kN/m}$ Factor of safety $FoS_{sl} = 1.034$

PASS - Resistance to sliding is greater than sliding force



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Overturning check

Vertical forces on wall

Total $F_{total_v} = F_{stem} + F_{base} + F_{sat_v} + F_{water_v} - F_{water_u} + F_{moist_v} = 56 \text{ kN/m}$

Horizontal forces on wall

Total $F_{total_h} = F_{sur_h} + F_{sat_h} + F_{water_h} + F_{moist_h} + F_{exc_h} = 31.4 \text{ kN/m}$

Overturning moments on wall

Total $M_{total_OT} = M_{sur_OT} + M_{sat_OT} + M_{water_OT} + M_{moist_OT} = 31 \text{ kNm/m}$

Restoring moments on wall

Total $M_{total_R} = M_{stem_R} + M_{base_R} + M_{sat_R} + M_{water_R} + M_{moist_R} + M_{exc_R} = 49.5 \text{ kNm/m}$

Check stability against overturning

Factor of safety $FoS_{ot} = 1.596$

PASS - Maximum restoring moment is greater than overturning moment



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RETAINING WALL ANALYSIS

In accordance with EN1997-1:2004 incorporating Corrigendum dated February 2009 and the UK National Annex incorporating Corrigendum No.1

Tedds calculation version 2.9.10

Retaining wall details

Stem type	Cantilever with stepped rear face		
Stem height	$h_{\text{stem}} = 1150$ mm		
Number of steps	$N_{\text{steps}} = 3$		
Height step 1	$h_{s1} = 450$ mm	Thickness step 1	$t_{s1} = 675$ mm
Height step 2	$h_{s2} = 450$ mm	Thickness step 2	$t_{s2} = 450$ mm
Height step 3	$h_{s3} = 250$ mm	Thickness step 3	$t_{s3} = 225$ mm
Angle to rear face of stem	$\alpha = 90$ deg		
Stem density	$\gamma_{\text{stem}} = 22$ kN/m ³		
Toe length	$l_{\text{toe}} = 150$ mm		
Heel length	$l_{\text{heel}} = 375$ mm		
Base thickness	$t_{\text{base}} = 300$ mm		
Base density	$\gamma_{\text{base}} = 25$ kN/m ³		
Height of retained soil	$h_{\text{ret}} = 950$ mm	Angle of soil surface	$\beta = 25$ deg
Depth of cover	$d_{\text{cover}} = 200$ mm		
Height of water	$h_{\text{water}} = 75$ mm		
Water density	$\gamma_w = 9.8$ kN/m ³		

Retained soil properties

Soil type	Medium dense well graded sand and gravel	
Moist density	$\gamma_{\text{mr}} = 20$ kN/m ³	
Saturated density	$\gamma_{\text{sr}} = 22.3$ kN/m ³	
Characteristic effective shear resistance angle		$\phi'_{r,k} = 30$ deg
Characteristic wall friction angle		$\delta_{r,k} = 15$ deg

Base soil properties

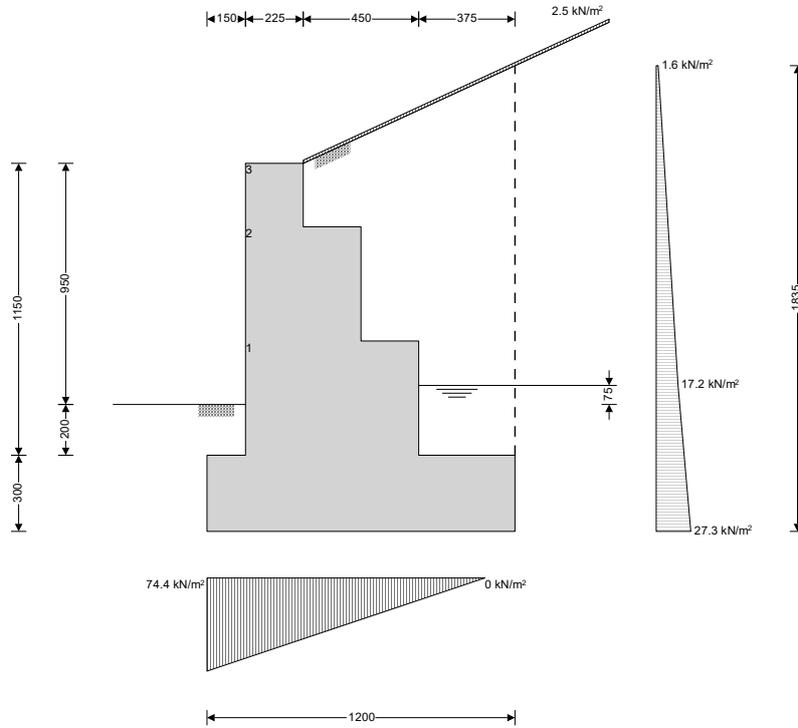
Soil density	$\gamma_b = 18$ kN/m ³	
Characteristic effective shear resistance angle		$\phi'_{b,k} = 37$ deg
Characteristic wall friction angle		$\delta_{b,k} = 18.5$ deg
Characteristic base friction angle		$\delta_{bb,k} = 37$ deg
Presumed bearing capacity	$P_{\text{bearing}} = 100$ kN/m ²	

Loading details

Variable surcharge load	Surcharge _Q = 2.5 kN/m ²
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General arrangement

Calculate retaining wall geometry

Base length	$l_{base} = 1200$ mm	Vertical distance	$x_{stem} = 425$ mm
Saturated soil height	$h_{sat} = 275$ mm	Vertical distance	$x_{base} = 600$ mm
Moist soil height	$h_{moist} = 875$ mm	Vertical distance	$x_{sat_v} = 1013$ mm
Length of surcharge load	$l_{sur} = 825$ mm	Horizontal distance	$x_{sat_h} = 192$ mm
Vertical distance	$x_{sur_v} = 788$ mm	Vertical distance	$x_{water_v} = 1013$ mm
Effective height of wall	$h_{eff} = 1835$ mm	Uplift distance	$x_{water_u} = 800$ mm
Horizontal distance	$x_{sur_h} = 917$ mm	Horizontal distance	$x_{water_h} = 192$ mm
Area of wall stem	$A_{stem} = 0.563$ m ²	Vertical distance	$x_{moist_v} = 883$ mm
Area of wall base	$A_{base} = 0.36$ m ²	Horizontal distance	$x_{moist_h} = 657$ mm
Area of saturated soil	$A_{sat} = 0.103$ m ²	Vertical distance	$x_{pass_v} = 75$ mm
Area of water	$A_{water} = 0.103$ m ²	Horizontal distance	$x_{pass_h} = 167$ mm
Area of moist soil	$A_{moist} = 0.701$ m ²	Vertical distance	$x_{exc_v} = 75$ mm
Area of base soil	$A_{pass} = 0.03$ m ²	Horizontal distance	$x_{exc_h} = 167$ mm
Area of excavated base soil	$A_{exc} = 0.03$ m ²		



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Using Coulomb theory

At rest pressure coefficient $K_0 = 0.645$ Passive pressure coefficient $K_P = 8.777$

Bearing pressure check

Vertical forces on wall

Total $F_{total_v} = F_{stem} + F_{base} + F_{sur_v} + F_{sat_v} + F_{water_v} + F_{moist_v} + F_{pass_v} = 40.3$ kN/m

Horizontal forces on wall

Total $F_{total_h} = \max(F_{sur_h} + F_{sat_h} + F_{water_h} + F_{moist_h} + F_{pass_h} - F_{total_v} \times \tan(\delta_{bb,k}), 0$ kN/m) = 0 kN/m

Moments on wall

Total $M_{total} = M_{stem} + M_{base} + M_{sur} + M_{sat} + M_{water} + M_{moist} + M_{pass} = 14.5$ kNm/m

Check bearing pressure

Bearing pressure at toe $q_{toe} = 74.4$ kN/m² Bearing pressure at heel $q_{heel} = 0$ kN/m²

Factor of safety $FoS_{bp} = 1.344$

PASS - Allowable bearing pressure exceeds maximum applied bearing pressure

Design approach 1

Partial factors on actions - Table A.3 - Combination 1

Partial factor set A1

Permanent unfavourable action $\gamma_G = 1.35$ Permanent favourable action $\gamma_{Gf} = 1.00$

Variable unfavourable action $\gamma_Q = 1.50$ Variable favourable action $\gamma_{Qf} = 0.00$

Partial factors for soil parameters – Table A.4 - Combination 1

Soil parameter set M1

Angle of shearing resistance $\gamma_\psi = 1.00$ Effective cohesion $\gamma_c = 1.00$

Weight density $\gamma_r = 1.00$

Library item Partial factors summary

Water properties

Design water density $\gamma_w' = 9.8$ kN/m³

Retained soil properties

Design moist density $\gamma_{mr}' = 20$ kN/m³ Design saturated density $\gamma_{sr}' = 22.3$ kN/m³

Des. eff. shear resist. angle $\phi'_{r,d} = 30$ deg Design wall friction angle $\delta_{r,d} = 15$ deg

Base soil properties

Design soil density $\gamma_b' = 18$ kN/m³ Des. eff. shear resist. angle $\phi'_{b,d} = 37$ deg

Design wall friction angle $\delta_{b,d} = 18.5$ deg Design base friction angle $\delta_{bb,d} = 37$ deg

Design effective cohesion $c'_{b,d} = 0$ kN/m²

Using Coulomb theory

At rest pressure coefficient $K_0 = 0.645$ Passive pressure coefficient $K_P = 8.777$

Sliding check

Vertical forces on wall

Total $F_{total_v} = F_{stem} + F_{base} + F_{sat_v} + F_{water_v} - F_{water_u} + F_{moist_v} + F_{exc_v} = 34.8$ kN/m

Horizontal forces on wall

Total $F_{total_h} = F_{sur_h} + F_{sat_h} + F_{water_h} + F_{moist_h} = 33.7$ kN/m

Check stability against sliding

Resistance to sliding $F_{rest} = 45$ kN/m Factor of safety $FoS_{sl} = 1.334$

PASS - Resistance to sliding is greater than sliding force



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Overtuning check

Vertical forces on wall

Total $F_{total_v} = F_{stem} + F_{base} + F_{sat_v} + F_{water_v} - F_{water_u} + F_{moist_v} + F_{exc_v} = 34.8$ kN/m

Horizontal forces on wall

Total $F_{total_h} = F_{sur_h} + F_{sat_h} + F_{water_h} + F_{moist_h} + F_{exc_h} = 15$ kN/m

Overtuning moments on wall

Total $M_{total_OT} = M_{sur_OT} + M_{sat_OT} + M_{water_OT} + M_{moist_OT} = 24.2$ kNm/m

Restoring moments on wall

Total $M_{total_R} = M_{stem_R} + M_{base_R} + M_{sat_R} + M_{water_R} + M_{moist_R} + M_{exc_R} = 28.5$ kNm/m

Check stability against overturning

Factor of safety $FoS_{ot} = 1.18$

PASS - Maximum restoring moment is greater than overturning moment

Design approach 1

Partial factors on actions - Table A.3 - Combination 2

Partial factor set A2

Permanent unfavourable action $\gamma_G = 1.00$ Permanent favourable action

action $\gamma_{Gf} = 1.00$

Variable unfavourable action $\gamma_Q = 1.30$ Variable favourable action $\gamma_{Qf} = 0.00$

Partial factors for soil parameters – Table A.4 - Combination 2

Soil parameter set M2

Angle of shearing resistance $\gamma_{\psi} = 1.25$ Effective cohesion $\gamma_{c'} = 1.25$

Weight density $\gamma_{\gamma} = 1.00$

Library item Partial factors summary

Water properties

Design water density $\gamma_w' = 9.8$ kN/m³

Retained soil properties

Design moist density $\gamma_{mr}' = 20$ kN/m³ Design saturated density $\gamma_{sr}' = 22.3$ kN/m³

Des. eff. shear resist. angle $\phi_{r,d}' = 24.8$ deg Design wall friction angle $\delta_{r,d} = 12.1$ deg

Base soil properties

Design soil density $\gamma_b' = 18$ kN/m³ Des. eff. shear resist. angle $\phi_{b,d}' = 31.1$ deg

Design wall friction angle $\delta_{b,d} = 15$ deg Design base friction angle $\delta_{bb,d} = 31.1$ deg

Design effective cohesion $c'_{b,d} = 0$ kN/m²

Using Coulomb theory

At rest pressure coefficient $K_0 = 0.749$ Passive pressure coefficient $K_P = 5.269$

Sliding check

Vertical forces on wall

Total $F_{total_v} = F_{stem} + F_{base} + F_{sat_v} + F_{water_v} - F_{water_u} + F_{moist_v} + F_{exc_v} = 34.8$ kN/m

Horizontal forces on wall

Total $F_{total_h} = F_{sur_h} + F_{sat_h} + F_{water_h} + F_{moist_h} = 29.7$ kN/m

Check stability against sliding

Resistance to sliding $F_{rest} = 32.5$ kN/m Factor of safety $FoS_{sl} = 1.092$

PASS - Resistance to sliding is greater than sliding force



Project Sally Port, Isles of Scilly				Job no. 04119E	
Calcs for Retaining wall up to 950mm high				Start page no./Revision 10	
Calcs by JSC	Calcs date 03/09/2020	Checked by	Checked date	Approved by	Approved date

Overturning check

Vertical forces on wall

Total $F_{total_v} = F_{stem} + F_{base} + F_{sat_v} + F_{water_v} - F_{water_u} + F_{moist_v} + F_{exc_v} = 34.8$ kN/m

Horizontal forces on wall

Total $F_{total_h} = F_{sur_h} + F_{sat_h} + F_{water_h} + F_{moist_h} + F_{exc_h} = 18.3$ kN/m

Overturning moments on wall

Total $M_{total_OT} = M_{sur_OT} + M_{sat_OT} + M_{water_OT} + M_{moist_OT} = 21.9$ kNm/m

Restoring moments on wall

Total $M_{total_R} = M_{stem_R} + M_{base_R} + M_{sat_R} + M_{water_R} + M_{moist_R} + M_{exc_R} = 27.3$ kNm/m

Check stability against overturning

Factor of safety $FoS_{ot} = 1.246$

PASS - Maximum restoring moment is greater than overturning moment

PROVIDE:

- 1) 1450mm high 7N dense concrete blocks in 1:1:6 M6 mortar - stepped to rear retaining wall.

75mm dia weepholes at 1200mm c/c.

Wall to be cladded with stone in 1:1:6 M4 mortar.

Base: 1300mm wd x 300mm thk RC28/35 with 393 mesh T & B, founded @ 500mm below G.L.

50mm cover, 380mm min laps, on 150 MOT type 1 well compacted sub-base.

- 2) 950mm high 7N dense concrete blocks in 1:1:6 M6 mortar - stepped to rear retaining wall.

75mm dia weepholes at 1200mm c/c.

Wall to be cladded with stone in 1:1:6 M4 mortar.

Base: 1300mm wd x 300mm thk RC28/35 with 393 mesh T & B, founded @ 500mm below G.L.

50mm cover, 380mm min laps, on 150 MOT type 1 well compacted sub-base.