PHILOSOPHY & DESIGN OVERVIEW

QED STRUCTURES
Consulting Structural & Civil Engineers
7 Hove Manor Parade, Hove Street, Hove, East Sussex, BN3 2DF
T: 01273 358035: **F:** 01273 207451**: W** www.qedstructures.co.uk

Project: 205 Albany Street					
Project No: 20-186	Date: Mar 20	Engineer: BS	Checked By: SHL	Sheet No: G3	

Introduction

The proposed works at 205 Albany Street comprise of the extension of the existing lower ground floor and reducinf the existing lower ground floor level.

Ground Conditions

A soil investigation report carried out by ASL showed the ground build up to be approximately 2.0m overlaying London Clay. An allowable ground bearing pressure of 125kN/m2 has been recomended

Foundations

Foundations to be in the form of mass concrete underpinning of the existing walls at lower ground floor with reinforced concrete retaining walls underpinning the existing ground floor walls

Stability

N/A

Loadings

All proposed loads are in line with Eurocodes.

Fire Protection

By others

205 Albany Street

2.0 PROJECT LOADINGS

Date: Mar 20
Project Number: 20-186
Revision Number: BR1

CALCULATION SHEET

2.1 VERTICAL LOADINGS

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Project:	205 Albany Street								
Project No:	20-186	Date:	Mar 20	Engineer:	BS	Checked:	SHL	Sheet No.	G4

Loadings

Flat Roof

Permanent Loads

Flat Roof Finishes		0.45
Joists (200)		0.15
Plywood (12mm)		0.09
insulation		0.02
Plasterboard (12.5mm)		0.09
		0.80 kN/m2

Imposed Loads

0.75 Imposed Load		**0.75 kN/m2**

Glazed Roof

Permanent Loads

Glazing		0.50
		0.50 kN/m2

Imposed Loads

0.75 Imposed Load		**0.75 kN/m2**

Ground floor

Permanent Loads

RC Slab (200mm)		5.00
Screed (75mm)		1.80
Finishes + insulation		0.20
Total =	**SAY**	**7.00 kN/m2**

CALCULATION SHEET

2.1 VERTICAL LOADINGS

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Imposed Loads

1.5 Imposed Load	**1.50 kN/m2**

Pitched Roof Pitch = 28.00 °

Permanent Loads

Slate Tiles		0.30
Joists (100)		0.08
Batterns		0.05
insulation		0.02
Plasterboard (12.5mm)		0.09
	ON SLOPE = SAY	**0.55 kN/m2**
	ON PLAN = 0.55/COS 28 = SAY	**0.70 kN/m2**

Imposed Loads

0.6 Imposed Load	**0.60 kN/m2**

Timber floor

Permanent Loads

Services		0.05
Joists (200)		0.15
Floor boards/Ply		0.15
insulation		0.02
Plasterboard (12.5mm)		0.09
	SAY	**0.50 kN/m2**

Imposed Loads

1.5 Imposed + partitions	**2.00 kN/m2**

CALCULATION SHEET

2.1 VERTICAL LOADINGS

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215 Solid wall

Permanent Loads

215mm Brickwork		4.30
Plasterboard (12.5mm)		0.09
	SAY	**4.40 kN/m2**

330 Solid wall

Permanent Loads

330mm brickwork		6.60
Plasterboard (12.5mm)		0.09
Plasterboard (12.5mm)		0.09
	SAY	**6.80 kN/m2**

100 Solid wall

Permanent Loads

100mm brickwork		2.00
Plasterboard (12.5mm)		0.09
Plasterboard (12.5mm)		0.09
	SAY	**2.20 kN/m2**

CALCULATION SHEET

2.1 VERTICAL LOADINGS

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Project:	205 Albany Street						
Project No:	20-186	Date:	Mar 20	Engineer:	BS	Checked: SHL	Sheet No. G4

Roof space Pitch = 40.00 °

Permanent Loads

Services	0.05
Joists (100)	0.08
insulation	0.02
Plasterboard (12.5mm)	0.09
SAY	**0.25 kN/m2**

Imposed Loads

0.6 Imposed Load	**0.60 kN/m2**

205 Albany Street

3.0 MEMBER LOADS

Date: Aug 20
Project Number: 19-045
Revision Number: BR1

CALCULATION SHEET

3.1 MEMBER LOADINGS

QED STRUCTURES
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T: 01273 358035: **F:** 01273 207451**: W** www.qedstructures.co.uk

Project:	205 Albany Street						
Project No:	20-186	Date:	Mar 20	Engineer:	BS	Checked By:	SHL

Ref.	Calculations

RT1

Retaining wall at rear

UDL on top of wall

	Dead (kN/m2)	Live (kN/m2)	length /height	DL	LL
Ground floor	7.00	1.50	0.80	5.60	1.20
Glazed roof	0.50	0.75	2.00	1.00	1.50
215 Solid wall	4.40	0.00	3.00	13.20	0.00
				19.80	**2.70**

205 Albany Street

4.0 MEMBER DESIGN

Date: Mar 20
Project Number: 20-186
Revision Number: BR1

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 2.9.11

Retaining wall details

Stem type	Cantilever		
Stem height	h_{stem} = **2900** mm		
Stem thickness	t_{stem} = **350** mm		
Angle to rear face of stem	α = **90** deg		
Stem density	γ_{stem} = **25** kN/m^3		
Toe length	l_{toe} = **1450** mm		
Base thickness	t_{base} = **250** mm		
Base density	γ_{base} = **25** kN/m^3		
Height of retained soil	h_{ret} = **2600** mm	Angle of soil surface	β = **0** deg
Depth of cover	d_{cover} = **0** mm		
Height of water	h_{water} = **2600** mm		
Water density	γ_w = **9.8** kN/m^3		

Retained soil properties

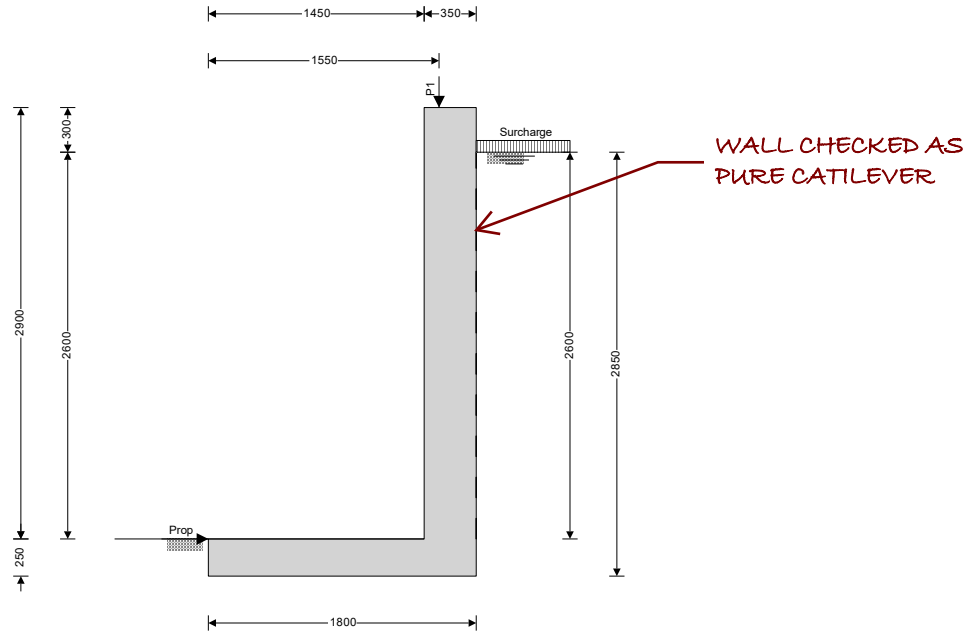
Soil type	Stiff clay	
Moist density	γ_{mr} = **21** kN/m^3	
Saturated density	γ_{sr} = **21** kN/m^3	
Characteristic effective shear resistance angle		$\phi'_{r.k}$ = **21** deg
Characteristic wall friction angle		$\delta_{r.k}$ = **10.5** deg

Base soil properties

Soil type	Stiff clay	
Soil density	γ_b = **21** kN/m^3	
Characteristic effective shear resistance angle		$\phi'_{b.k}$ = **21** deg
Characteristic wall friction angle		$\delta_{b.k}$ = **10.5** deg
Characteristic base friction angle		$\delta_{bb.k}$ = **14** deg
Presumed bearing capacity	$P_{bearing}$ = **125** kN/m^2	

Loading details

Variable surcharge load	$Surcharge_Q$ = **10** kN/m^2
Vertical line load at 1550 mm	P_{G1} = **19.8** kN/m
	P_{Q1} = **2.7** kN/m



General arrangement

Calculate retaining wall geometry

Base length	l_{base} = **1800** mm		
Saturated soil height	h_{sat} = **2600** mm		
Moist soil height	h_{moist} = **0** mm		
Length of surcharge load	l_{sur} = **0** mm		
Vertical distance	x_{sur_v} = **1800** mm		
Effective height of wall	h_{eff} = **2850** mm		
Horizontal distance	x_{sur_h} = **1425** mm		
Area of wall stem	A_{stem} = **1.015** m^2	Vertical distance	x_{stem} = **1625** mm
Area of wall base	A_{base} = **0.45** m^2	Vertical distance	x_{base} = **900** mm

Using Rankine theory

At rest pressure coefficient	K_0 = **0.642**	Passive pressure coefficient	K_P = **2.117**

Bearing pressure check

Vertical forces on wall

Total $F_{total\_v} = F_{stem} + F_{base} + F_{P\_v} + F_{water\_v}$ = **59.1** kN/m

Horizontal forces on wall

Total $F_{total\_h} = F_{sur\_h} + F_{sat\_h} + F_{water\_h} + F_{pass\_h}$ = **85.9** kN/m

Moments on wall

Total $M_{total} = M_{stem} + M_{base} + M_{sur} + M_P + M_{sat} + M_{water}$ = **-5.4** kNm/m

Check bearing pressure

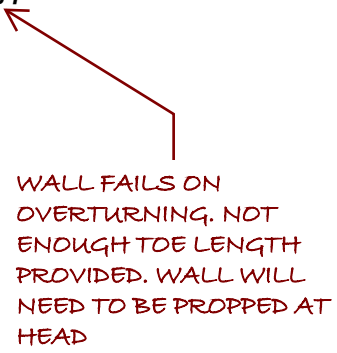
Propping force F_{prop_base} = **85.9** kN/m

Bearing pressure at toe q_{toe} = **0** kN/m^2 Bearing pressure at heel q_{heel} = **0** kN/m^2

FAIL - Reaction acts outside base area

Factor of safety FoS_{bp} = **0**

FAIL - Maximum applied bearing pressure exceeds allowable bearing pressure



Tekla Tedds	Project				Job no.	
	205 Albany Street				20-186	
	Calcs for				Start page no./Revision	
	Retaining wall with top prop				1	
	Calcs by	Calcs date	Checked by	Checked date	Approved by	Approved date
	BS	12/03/2021	SHL	12/03/2021	SHL	12/03/2021

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 2.9.11

Retaining wall details

Stem type	Propped cantilever		
Stem height	h_{stem} = **2900** mm		
Prop height	h_{prop} = **2800** mm		
Stem thickness	t_{stem} = **350** mm		
Angle to rear face of stem	α = **90** deg		
Stem density	γ_{stem} = **25** kN/m^3		
Toe length	l_{toe} = **1450** mm		
Base thickness	t_{base} = **250** mm		
Base density	γ_{base} = **25** kN/m^3		
Height of retained soil	h_{ret} = **2600** mm	Angle of soil surface	β = **0** deg
Depth of cover	d_{cover} = **0** mm		
Height of water	h_{water} = **2600** mm		
Water density	γ_w = **9.8** kN/m^3		

Retained soil properties

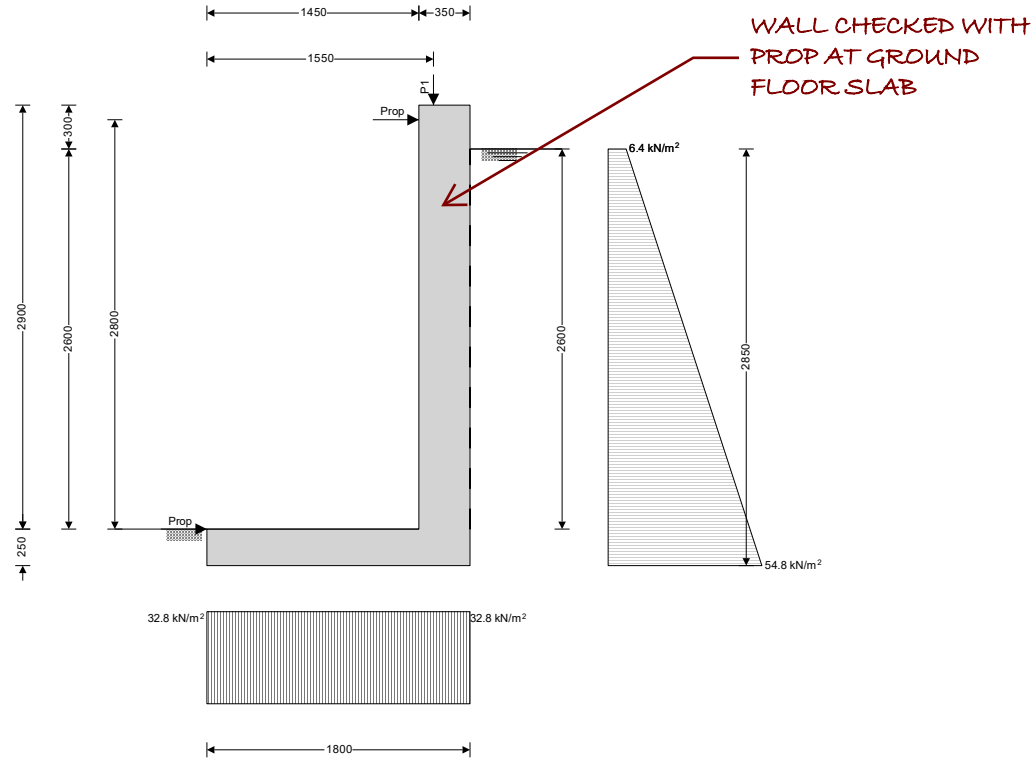
Soil type	Stiff clay	
Moist density	γ_{mr} = **21** kN/m^3	
Saturated density	γ_{sr} = **21** kN/m^3	
Characteristic effective shear resistance angle		$\phi'_{r.k}$ = **21** deg
Characteristic wall friction angle		$\delta_{r.k}$ = **10.5** deg

Base soil properties

Soil type	Stiff clay	
Soil density	γ_b = **21** kN/m^3	
Characteristic effective shear resistance angle		$\phi'_{b.k}$ = **21** deg
Characteristic wall friction angle		$\delta_{b.k}$ = **10.5** deg
Characteristic base friction angle		$\delta_{bb.k}$ = **14** deg
Presumed bearing capacity	$P_{bearing}$ = **125** kN/m^2	

Loading details

Variable surcharge load	$Surcharge_Q$ = **10** kN/m^2
Vertical line load at 1550 mm	P_{G1} = **19.8** kN/m
	P_{Q1} = **2.7** kN/m



General arrangement

Calculate retaining wall geometry

Base length	l_{base} = **1800** mm		
Saturated soil height	h_{sat} = **2600** mm		
Moist soil height	h_{moist} = **0** mm		
Length of surcharge load	l_{sur} = **0** mm		
Vertical distance	x_{sur_v} = **1800** mm		
Effective height of wall	h_{eff} = **2850** mm		
Horizontal distance	x_{sur_h} = **1425** mm		
Area of wall stem	A_{stem} = **1.015** m²	Vertical distance	x_{stem} = **1625** mm
Area of wall base	A_{base} = **0.45** m²	Vertical distance	x_{base} = **900** mm

Using Rankine theory

At rest pressure coefficient	K_0 = **0.642**	Passive pressure coefficient	K_P = **2.117**

Bearing pressure check

Vertical forces on wall

Total $F_{total\_v} = F_{stem} + F_{base} + F_{P\_v} + F_{water\_v}$ = **59.1** kN/m

Horizontal forces on wall

Total $F_{total\_h} = F_{sur\_h} + F_{sat\_h} + F_{water\_h} + F_{pass\_h}$ = **85.9** kN/m

Moments on wall

Total $M_{total} = M_{stem} + M_{base} + M_{sur} + M_P + M_{sat} + M_{water}$ = **-5.4** kNm/m

Check bearing pressure

Propping force to stem	F_{prop_stem} = **19.2** kN/m	Propping force to base	F_{prop_base} = **66.7** kN/m

Bearing pressure at toe q_{toe} = **32.8** kN/m^2 Bearing pressure at heel q_{heel} = **32.8** kN/m^2

Factor of safety FoS_{bp} = **3.805**

PASS - Allowable bearing pressure exceeds maximum applied bearing pressure

RETAINING WALL DESIGN

In accordance with EN1992-1-1:2004 incorporating Corrigendum dated January 2008 and the UK National Annex incorporating National Amendment No.1

Tedds calculation version 2.9.11

Concrete details - Table 3.1 - Strength and deformation characteristics for concrete

Concrete strength class C32/40

Char.comp.cylinder strength f_{ck} = **32** N/mm^2 Mean axial tensile strength f_{ctm} = **3.0** N/mm^2

Secant modulus of elasticity E_{cm} = **33346** N/mm^2 Maximum aggregate size h_{agg} = **20** mm

Design comp.concrete strength f_{cd} = **18.1** N/mm^2 Partial factor γ_C = **1.50**

Reinforcement details

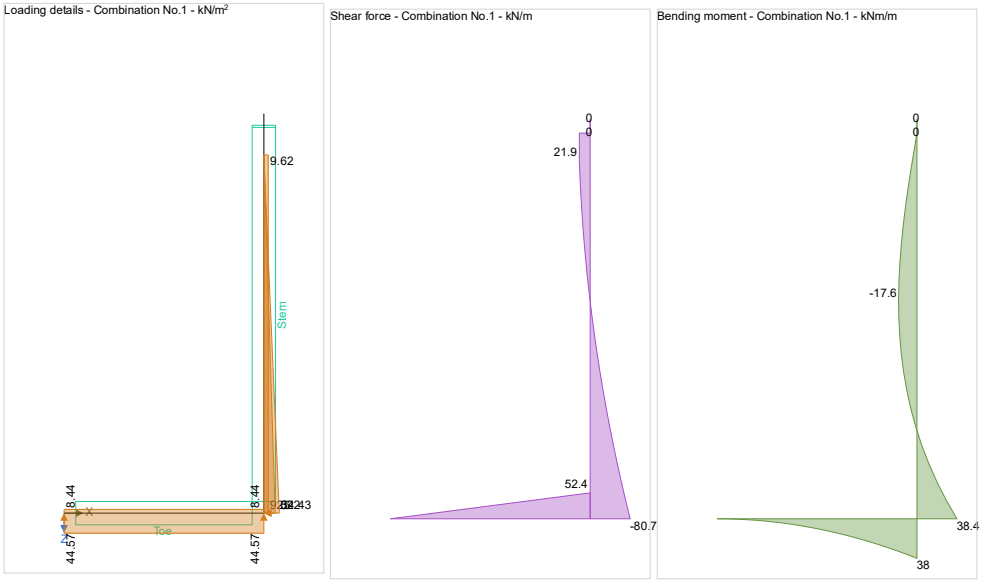
Characteristic yield strength f_{yk} = **500** N/mm^2 Modulus of elasticity E_s = **200000** N/mm^2

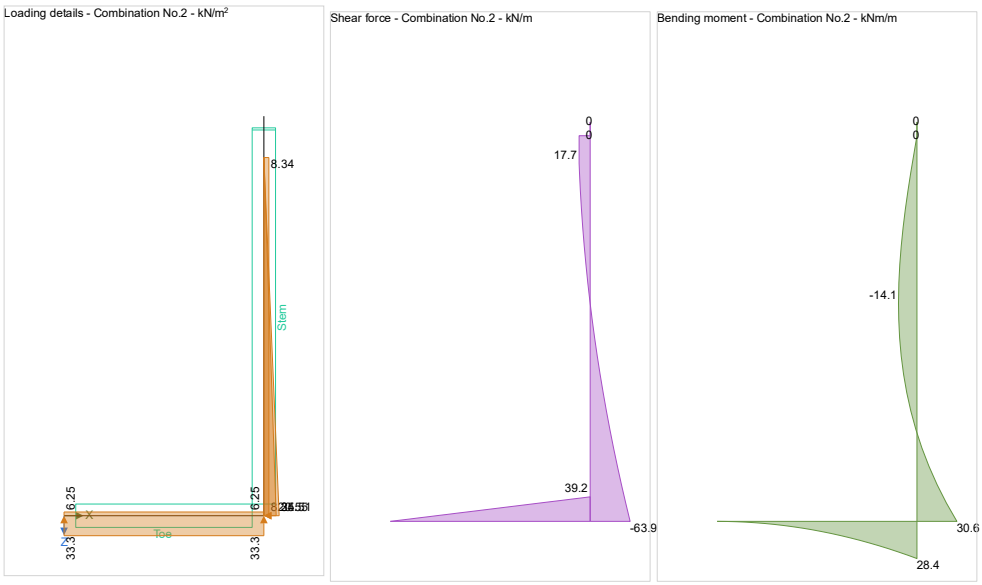
Design yield strength f_{yd} = **435** N/mm^2 Partial factor γ_S = **1.15**

Cover to reinforcement

Front face of stem c_{sf} = **35** mm Rear face of stem c_{sr} = **75** mm

Top face of base c_{bt} = **35** mm Bottom face of base c_{bb} = **75** mm





Check stem design at 1576 mm

Depth of section h = **350** mm

Rectangular section in flexure - Section 6.1

Design bending moment M = **17.6** kNm/m K = **0.006** K' = **0.207**

K' > K - No compression reinforcement is required

Tens.reinforcement required $A_{sfM.req}$ = **143** mm²/m

Tens.reinforcement provided 12 dia.bars @ 200 c/c Tens.reinforcement provided $A_{sfM.prov}$ = **565** mm²/m

Min.area of reinforcement $A_{sfM.min}$ = **470** mm²/m Max.area of reinforcement $A_{sfM.max}$ = **14000** mm²/m

PASS - Area of reinforcement provided is greater than area of reinforcement required

Library item: Rectangular single summary

Deflection control - Section 7.4

Limiting span to depth ratio 40 Actual span to depth ratio 9.4

PASS - Span to depth ratio is less than deflection control limit

Crack control - Section 7.3

Limiting crack width w_{max} = **0.2** mm Maximum crack width w_k = **0.105** mm

PASS - Maximum crack width is less than limiting crack width

Check stem design at base of stem

Depth of section h = **350** mm

Rectangular section in flexure - Section 6.1

Design bending moment M = **38.4** kNm/m K = **0.017** K' = **0.207**

K' > K - No compression reinforcement is required

Tens.reinforcement required $A_{sr.req}$ = **346** mm²/m

Tens.reinforcement provided 12 dia.bars @ 100 c/c Tens.reinforcement provided $A_{sr.prov}$ = **1131** mm²/m

Min.area of reinforcement $A_{sr.min}$ = **423** mm²/m Max.area of reinforcement $A_{sr.max}$ = **14000** mm²/m

PASS - Area of reinforcement provided is greater than area of reinforcement required

Library item: Rectangular single summary

Deflection control - Section 7.4

Limiting span to depth ratio 40 Actual span to depth ratio 10.4

PASS - Span to depth ratio is less than deflection control limit

Crack control - Section 7.3

Limiting crack width w_{max} = **0.2** mm — Maximum crack width w_k = **0.117** mm

PASS - Maximum crack width is less than limiting crack width

Rectangular section in shear - Section 6.2

Design shear force V = **80.7** kN/m — Design shear resistance $V_{Rd.c}$ = **143** kN/m

PASS - Design shear resistance exceeds design shear force

Check stem design at prop

Depth of section h = **350** mm

Rectangular section in shear - Section 6.2

Design shear force V = **21.9** kN/m — Design shear resistance $V_{Rd.c}$ = **135.3** kN/m

PASS - Design shear resistance exceeds design shear force

Horizontal reinforcement parallel to face of stem - Section 9.6

Min.area of reinforcement $A_{sx.req}$ = **350** mm²/m — Max.spacing of reinforcement s_{sx_max} = **400** mm

Trans.reinforcement provided 10 dia.bars @ 200 c/c — Trans.reinforcement provided $A_{sx.prov}$ = **393** mm²/m

PASS - Area of reinforcement provided is greater than area of reinforcement required

Check base design at toe

Depth of section h = **250** mm

Rectangular section in flexure - Section 6.1

Design bending moment M = **38** kNm/m — K = **0.042** — K' = **0.207**

K' > K - No compression reinforcement is required

Tens.reinforcement required $A_{bb.req}$ = **544** mm²/m

Tens.reinforcement provided 12 dia.bars @ 100 c/c — Tens.reinforcement provided $A_{bb.prov}$ = **1131** mm²/m

Min.area of reinforcement $A_{bb.min}$ = **266** mm²/m — Max.area of reinforcement $A_{bb.max}$ = **10000** mm²/m

PASS - Area of reinforcement provided is greater than area of reinforcement required

Library item: Rectangular single summary

Crack control - Section 7.3

Limiting crack width w_{max} = **0.2** mm — Maximum crack width w_k = **0.181** mm

PASS - Maximum crack width is less than limiting crack width

Rectangular section in shear - Section 6.2

Design shear force V = **52.4** kN/m — Design shear resistance $V_{Rd.c}$ = **112.6** kN/m

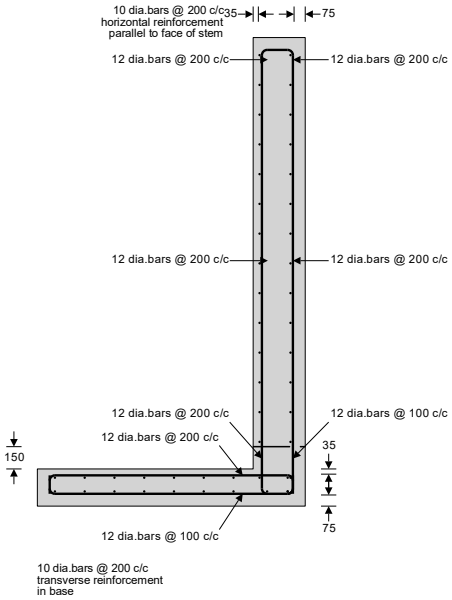
PASS - Design shear resistance exceeds design shear force

Secondary transverse reinforcement to base - Section 9.3

Min.area of reinforcement $A_{bx.req}$ = **226** mm²/m — Max.spacing of reinforcement s_{bx_max} = **450** mm

Trans.reinforcement provided 10 dia.bars @ 200 c/c — Trans.reinforcement provided $A_{bx.prov}$ = **393** mm²/m

PASS - Area of reinforcement provided is greater than area of reinforcement required



Reinforcement details

Tekla Tedds	Project				Job no.	
	205 Albany Street				20-186	
	Calcs for				Start page no./Revision	
	Retaining wall - Top section check				1	
	Calcs by	Calcs date	Checked by	Checked date	Approved by	Approved date
	BS	12/03/2021	SHL	12/03/2021	SHL	12/03/2021

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 2.9.11

Retaining wall details

Stem type	Propped cantilever		
Stem height	h_{stem} = **2900** mm		
Prop height	h_{prop} = **2800** mm		
Stem thickness	t_{stem} = **150** mm		
Angle to rear face of stem	α = **90** deg		
Stem density	γ_{stem} = **25** kN/m^3		
Toe length	l_{toe} = **1450** mm		
Base thickness	t_{base} = **250** mm		
Base density	γ_{base} = **25** kN/m^3		
Height of retained soil	h_{ret} = **2600** mm	Angle of soil surface	β = **0** deg
Depth of cover	d_{cover} = **0** mm		
Height of water	h_{water} = **2600** mm		
Water density	γ_w = **9.8** kN/m^3		

Retained soil properties

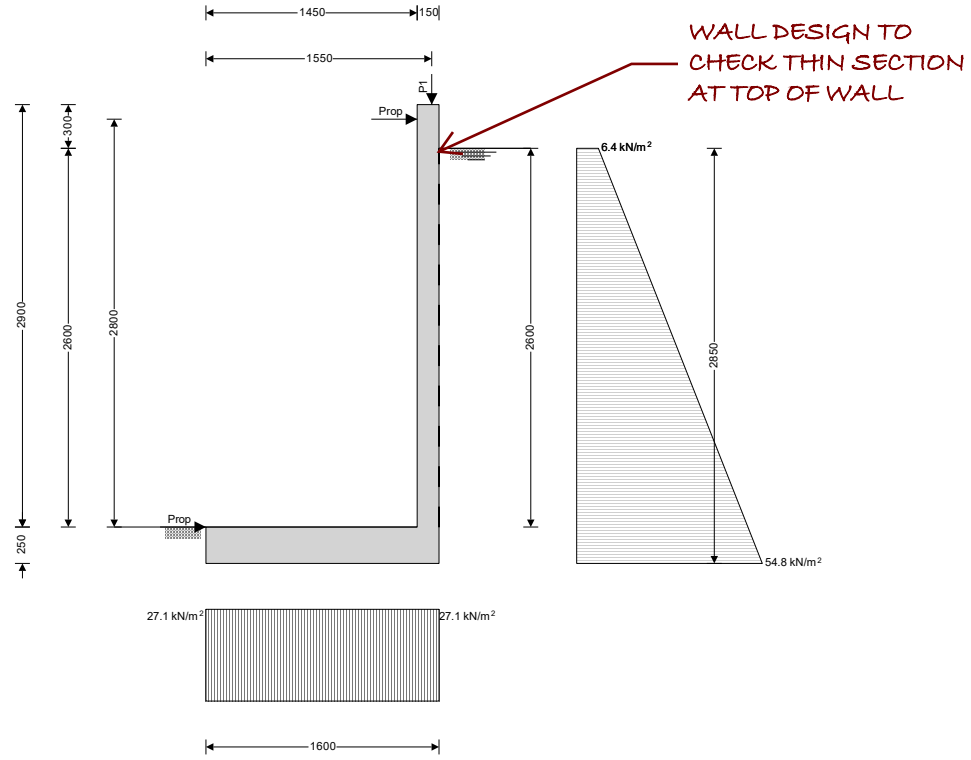
Soil type	Stiff clay	
Moist density	γ_{mr} = **21** kN/m^3	
Saturated density	γ_{sr} = **21** kN/m^3	
Characteristic effective shear resistance angle		$\phi'_{r.k}$ = **21** deg
Characteristic wall friction angle		$\delta_{r.k}$ = **10.5** deg

Base soil properties

Soil type	Stiff clay	
Soil density	γ_b = **21** kN/m^3	
Characteristic effective shear resistance angle		$\phi'_{b.k}$ = **21** deg
Characteristic wall friction angle		$\delta_{b.k}$ = **10.5** deg
Characteristic base friction angle		$\delta_{bb.k}$ = **14** deg
Presumed bearing capacity	$P_{bearing}$ = **125** kN/m^2	

Loading details

Variable surcharge load	$Surcharge_Q$ = **10** kN/m^2
Vertical line load at 1550 mm	P_{G1} = **19.8** kN/m
	P_{Q1} = **2.7** kN/m



General arrangement

Calculate retaining wall geometry

Base length	l_{base} = **1600** mm		
Saturated soil height	h_{sat} = **2600** mm		
Moist soil height	h_{moist} = **0** mm		
Length of surcharge load	l_{sur} = **0** mm		
Vertical distance	x_{sur_v} = **1600** mm		
Effective height of wall	h_{eff} = **2850** mm		
Horizontal distance	x_{sur_h} = **1425** mm		
Area of wall stem	A_{stem} = **0.435** m²	Vertical distance	x_{stem} = **1525** mm
Area of wall base	A_{base} = **0.4** m²	Vertical distance	x_{base} = **800** mm

Using Rankine theory

At rest pressure coefficient	K_0 = **0.642**	Passive pressure coefficient	K_P = **2.117**

Bearing pressure check

Vertical forces on wall

Total $F_{total\_v} = F_{stem} + F_{base} + F_{P\_v} + F_{water\_v}$ = **43.4** kN/m

Horizontal forces on wall

Total $F_{total\_h} = F_{sur\_h} + F_{sat\_h} + F_{water\_h} + F_{pass\_h}$ = **85.9** kN/m

Moments on wall

Total $M_{total} = M_{stem} + M_{base} + M_{sur} + M_P + M_{sat} + M_{water}$ = **-32.1** kNm/m

Check bearing pressure

Propping force to stem	F_{prop_stem} = **21.9** kN/m	Propping force to base	F_{prop_base} = **64** kN/m

Bearing pressure at toe q_{toe} = **27.1** kN/m^2 Bearing pressure at heel q_{heel} = **27.1** kN/m^2

Factor of safety FoS_{bp} = **4.611**

PASS - Allowable bearing pressure exceeds maximum applied bearing pressure

RETAINING WALL DESIGN

In accordance with EN1992-1-1:2004 incorporating Corrigendum dated January 2008 and the UK National Annex incorporating National Amendment No.1

Tedds calculation version 2.9.11

Concrete details - Table 3.1 - Strength and deformation characteristics for concrete

Concrete strength class C32/40

Char.comp.cylinder strength f_{ck} = **32** N/mm^2 Mean axial tensile strength f_{ctm} = **3.0** N/mm^2

Secant modulus of elasticity E_{cm} = **33346** N/mm^2 Maximum aggregate size h_{agg} = **20** mm

Design comp.concrete strength f_{cd} = **18.1** N/mm^2 Partial factor γ_C = **1.50**

Reinforcement details

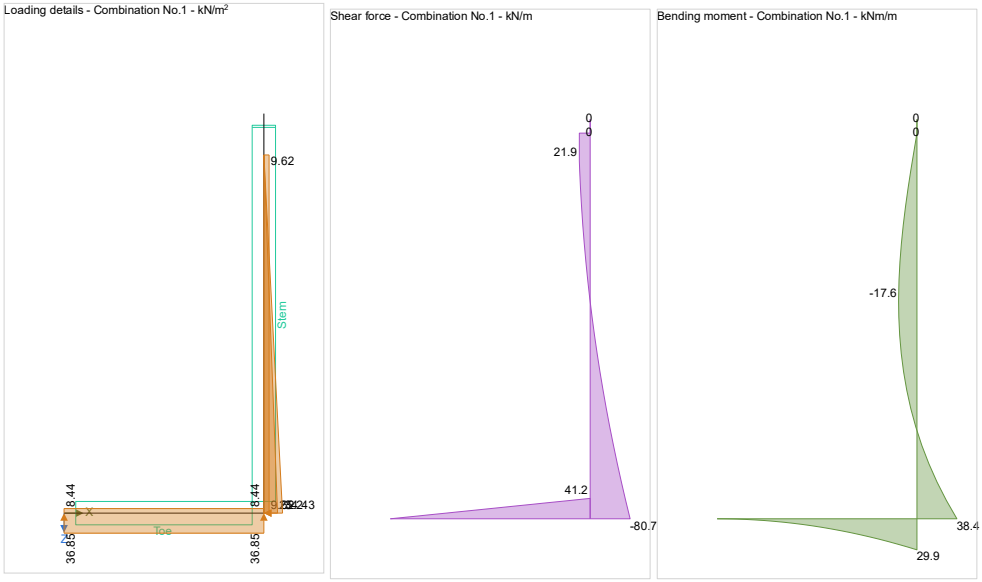
Characteristic yield strength f_{yk} = **500** N/mm^2 Modulus of elasticity E_s = **200000** N/mm^2

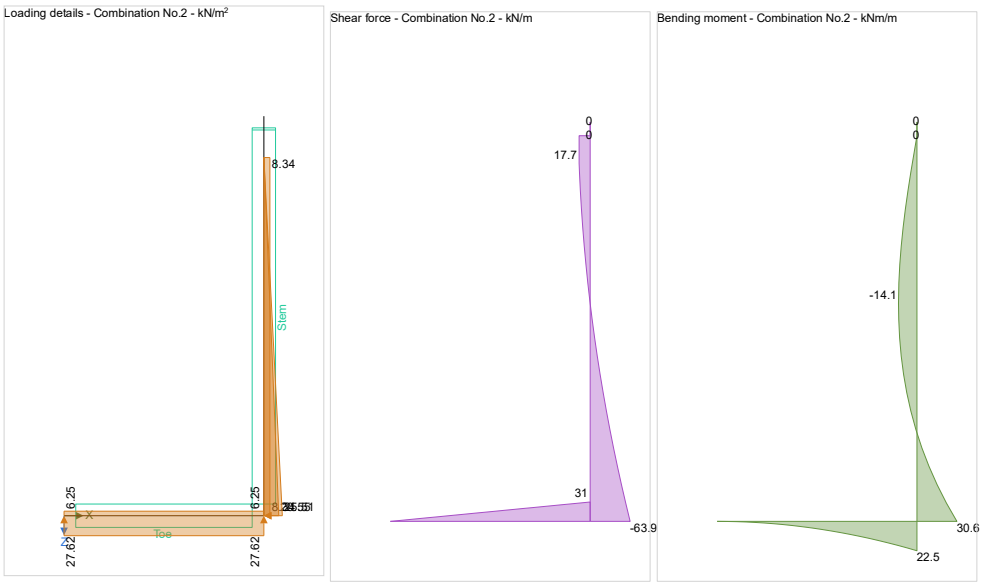
Design yield strength f_{yd} = **435** N/mm^2 Partial factor γ_S = **1.15**

Cover to reinforcement

Front face of stem c_{sf} = **35** mm Rear face of stem c_{sr} = **35** mm

Top face of base c_{bt} = **35** mm Bottom face of base c_{bb} = **75** mm





Check stem design at 1576 mm

Depth of section h = **150** mm

Rectangular section in flexure - Section 6.1

Design bending moment M = **17.6** kNm/m K = **0.056** K' = **0.207**

K' > K - No compression reinforcement is required

Tens.reinforcement required $A_{sfM.req}$ = **433** mm²/m

Tens.reinforcement provided 12 dia.bars @ 200 c/c Tens.reinforcement provided $A_{sfM.prov}$ = **565** mm²/m

Min.area of reinforcement $A_{sfM.min}$ = **156** mm²/m Max.area of reinforcement $A_{sfM.max}$ = **6000** mm²/m

PASS - Area of reinforcement provided is greater than area of reinforcement required

Library item: Rectangular single summary

Deflection control - Section 7.4

Limiting span to depth ratio 32.5 Actual span to depth ratio 28.3

PASS - Span to depth ratio is less than deflection control limit

Crack control - Section 7.3

Limiting crack width w_{max} = **0.2** mm Maximum crack width w_k = **0.182** mm

PASS - Maximum crack width is less than limiting crack width

Check stem design at base of stem

Depth of section h = **150** mm

Rectangular section in flexure - Section 6.1

Design bending moment M = **38.4** kNm/m K = **0.101** K' = **0.207**

K' > K - No compression reinforcement is required

Tens.reinforcement required $A_{sr.req}$ = **900** mm²/m

Tens.reinforcement provided 12 dia.bars @ 100 c/c Tens.reinforcement provided $A_{sr.prov}$ = **1131** mm²/m

Min.area of reinforcement $A_{sr.min}$ = **171** mm²/m Max.area of reinforcement $A_{sr.max}$ = **6000** mm²/m

PASS - Area of reinforcement provided is greater than area of reinforcement required

Library item: Rectangular single summary

Deflection control - Section 7.4

Limiting span to depth ratio 21.1 Actual span to depth ratio 25.7

FAIL - Span to depth ratio exceeds deflection control limit

Crack control - Section 7.3

Limiting crack width w_{max} = **0.2** mm — Maximum crack width w_k = **0.17** mm

PASS - Maximum crack width is less than limiting crack width

Rectangular section in shear - Section 6.2

Design shear force V = **80.7** kN/m — Design shear resistance $V_{Rd.c}$ = **84.1** kN/m

PASS - Design shear resistance exceeds design shear force

Check stem design at prop

Depth of section h = **150** mm

Rectangular section in shear - Section 6.2

Design shear force V = **21.9** kN/m — Design shear resistance $V_{Rd.c}$ = **66.7** kN/m

PASS - Design shear resistance exceeds design shear force

Horizontal reinforcement parallel to face of stem - Section 9.6

Min.area of reinforcement $A_{sx.req}$ = **283** mm²/m — Max.spacing of reinforcement s_{sx_max} = **400** mm

Trans.reinforcement provided 10 dia.bars @ 200 c/c — Trans.reinforcement provided $A_{sx.prov}$ = **393** mm²/m

PASS - Area of reinforcement provided is greater than area of reinforcement required

Check base design at toe

Depth of section h = **250** mm

ONLY THIS CHECK REQUIRED

Rectangular section in flexure - Section 6.1

Design bending moment M = **29.9** kNm/m — K = **0.033** — K' = **0.207**

K' > K - No compression reinforcement is required

Tens.reinforcement required $A_{bb.req}$ = **428** mm²/m

Tens.reinforcement provided 12 dia.bars @ 100 c/c — Tens.reinforcement provided $A_{bb.prov}$ = **1131** mm²/m

Min.area of reinforcement $A_{bb.min}$ = **266** mm²/m — Max.area of reinforcement $A_{bb.max}$ = **10000** mm²/m

PASS - Area of reinforcement provided is greater than area of reinforcement required

Library item: Rectangular single summary

Crack control - Section 7.3

Limiting crack width w_{max} = **0.2** mm — Maximum crack width w_k = **0.142** mm

PASS - Maximum crack width is less than limiting crack width

Rectangular section in shear - Section 6.2

Design shear force V = **41.2** kN/m — Design shear resistance $V_{Rd.c}$ = **112.6** kN/m

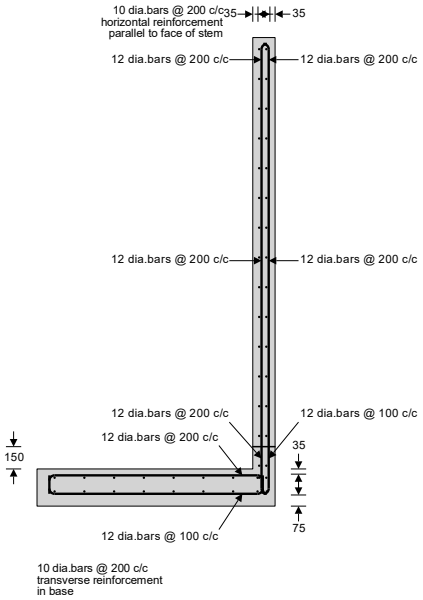
PASS - Design shear resistance exceeds design shear force

Secondary transverse reinforcement to base - Section 9.3

Min.area of reinforcement $A_{bx.req}$ = **226** mm²/m — Max.spacing of reinforcement s_{bx_max} = **450** mm

Trans.reinforcement provided 10 dia.bars @ 200 c/c — Trans.reinforcement provided $A_{bx.prov}$ = **393** mm²/m

PASS - Area of reinforcement provided is greater than area of reinforcement required



Reinforcement details

Tekla Tedds	Project				Job no.	
	205 Albany Street				20-186	
	Calcs for				Start page no./Revision	
	Ret wall - reduced level check				1	
	Calcs by	Calcs date	Checked by	Checked date	Approved by	Approved date
	BS	26/03/2021	SHL	29/03/2021	SHL	29/03/2021

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 2.9.11

Retaining wall details

Stem type	Propped cantilever		
Stem height	h_{stem} = **3000** mm		
Prop height	h_{prop} = **2800** mm		
Stem thickness	t_{stem} = **350** mm		
Angle to rear face of stem	α = **90** deg		
Stem density	γ_{stem} = **25** kN/m^3		
Toe length	l_{toe} = **1450** mm		
Base thickness	t_{base} = **250** mm		
Base density	γ_{base} = **25** kN/m^3		
Height of retained soil	h_{ret} = **3000** mm	Angle of soil surface	β = **0** deg
Depth of cover	d_{cover} = **0** mm		
Height of water	h_{water} = **3000** mm		
Water density	γ_w = **9.8** kN/m^3		

Retained soil properties

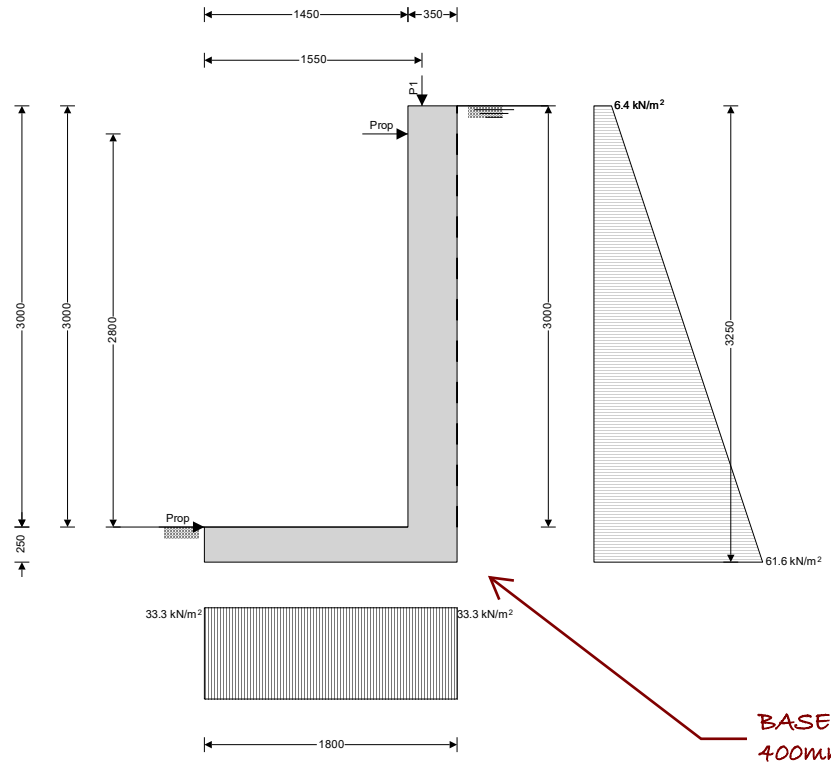
Soil type	Stiff clay	
Moist density	γ_{mr} = **21** kN/m^3	
Saturated density	γ_{sr} = **21** kN/m^3	
Characteristic effective shear resistance angle		$\phi'_{r.k}$ = **21** deg
Characteristic wall friction angle		$\delta_{r.k}$ = **10.5** deg

Base soil properties

Soil type	Stiff clay	
Soil density	γ_b = **21** kN/m^3	
Characteristic effective shear resistance angle		$\phi'_{b.k}$ = **21** deg
Characteristic wall friction angle		$\delta_{b.k}$ = **10.5** deg
Characteristic base friction angle		$\delta_{bb.k}$ = **14** deg
Presumed bearing capacity	$P_{bearing}$ = **125** kN/m^2	

Loading details

Variable surcharge load	$Surcharge_Q$ = **10** kN/m^2
Vertical line load at 1550 mm	P_{G1} = **19.8** kN/m
	P_{Q1} = **2.7** kN/m



General arrangement

Calculate retaining wall geometry

Base length	l_{base} = **1800** mm		
Saturated soil height	h_{sat} = **3000** mm		
Moist soil height	h_{moist} = **0** mm		
Length of surcharge load	l_{sur} = **0** mm		
Vertical distance	x_{sur_v} = **1800** mm		
Effective height of wall	h_{eff} = **3250** mm		
Horizontal distance	x_{sur_h} = **1625** mm		
Area of wall stem	A_{stem} = **1.05** m²	Vertical distance	x_{stem} = **1625** mm
Area of wall base	A_{base} = **0.45** m²	Vertical distance	x_{base} = **900** mm

Using Rankine theory

At rest pressure coefficient	K_0 = **0.642**	Passive pressure coefficient	K_P = **2.117**

Bearing pressure check

Vertical forces on wall

Total $F_{total\_v} = F_{stem} + F_{base} + F_{P\_v} + F_{water\_v}$ = **60** kN/m

Horizontal forces on wall

Total $F_{total\_h} = F_{sur\_h} + F_{sat\_h} + F_{water\_h} + F_{pass\_h}$ = **109.2** kN/m

Moments on wall

Total $M_{total} = M_{stem} + M_{base} + M_{sur} + M_P + M_{sat} + M_{water}$ = **-43.4** kNm/m

Check bearing pressure

Propping force to stem	F_{prop_stem} = **31.9** kN/m	Propping force to base	F_{prop_base} = **77.2** kN/m

Bearing pressure at toe q_{toe} = **33.3** kN/m^2 Bearing pressure at heel q_{heel} = **33.3** kN/m^2

Factor of safety FoS_{bp} = **3.75**

PASS - Allowable bearing pressure exceeds maximum applied bearing pressure

RETAINING WALL DESIGN

In accordance with EN1992-1-1:2004 incorporating Corrigendum dated January 2008 and the UK National Annex incorporating National Amendment No.1

Tedds calculation version 2.9.11

Concrete details - Table 3.1 - Strength and deformation characteristics for concrete

Concrete strength class C32/40

Char.comp.cylinder strength f_{ck} = **32** N/mm^2 Mean axial tensile strength f_{ctm} = **3.0** N/mm^2

Secant modulus of elasticity E_{cm} = **33346** N/mm^2 Maximum aggregate size h_{agg} = **20** mm

Design comp.concrete strength f_{cd} = **18.1** N/mm^2 Partial factor γ_C = **1.50**

Reinforcement details

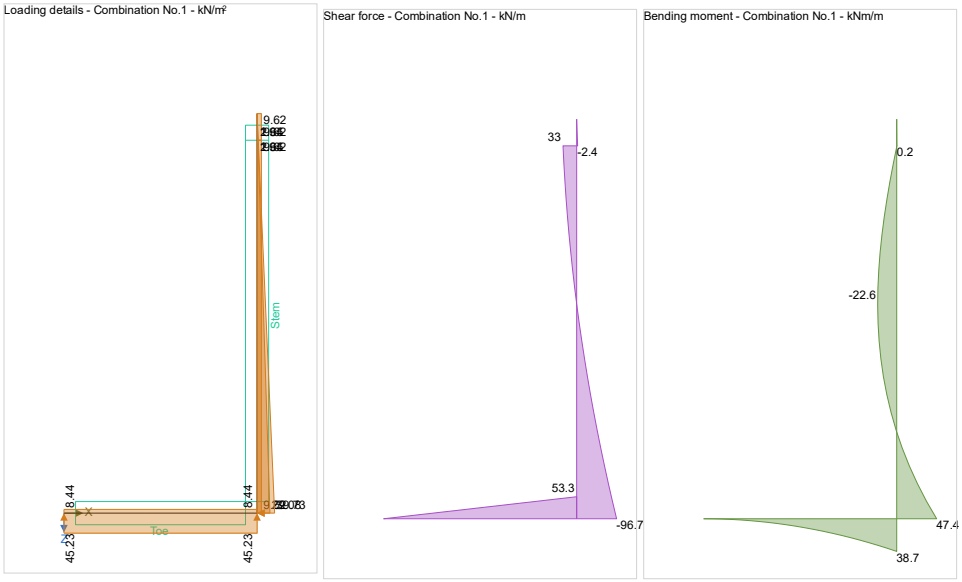
Characteristic yield strength f_{yk} = **500** N/mm^2 Modulus of elasticity E_s = **200000** N/mm^2

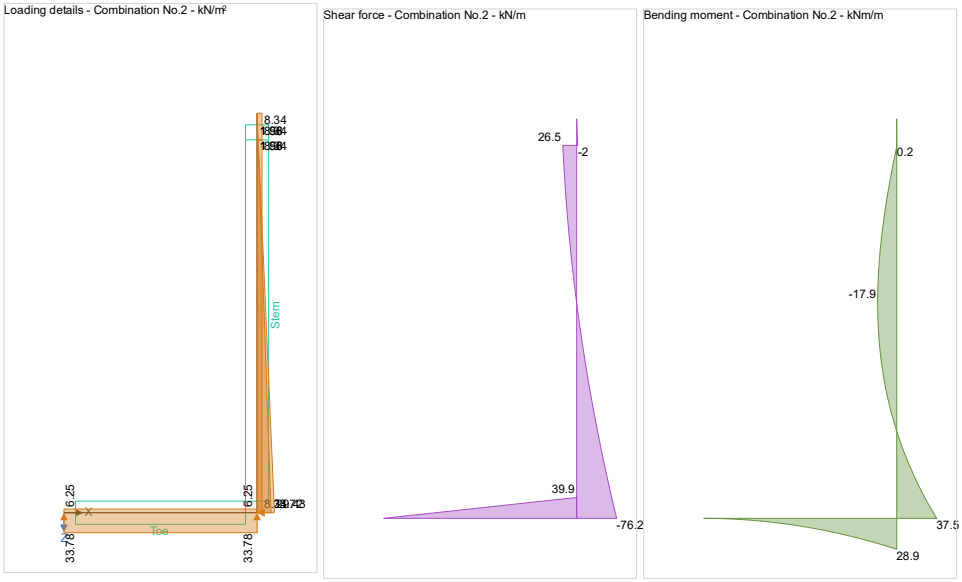
Design yield strength f_{yd} = **435** N/mm^2 Partial factor γ_S = **1.15**

Cover to reinforcement

Front face of stem c_{sf} = **35** mm Rear face of stem c_{sr} = **75** mm

Top face of base c_{bt} = **35** mm Bottom face of base c_{bb} = **75** mm





Check stem design at 1613 mm

Depth of section h = **350** mm

Rectangular section in flexure - Section 6.1

Design bending moment M = **22.6** kNm/m K = **0.008** K' = **0.207**

K' > K - No compression reinforcement is required

Tens.reinforcement required $A_{sfM.req}$ = **183** mm²/m

Tens.reinforcement provided 12 dia.bars @ 200 c/c Tens.reinforcement provided $A_{sfM.prov}$ = **565** mm²/m

Min.area of reinforcement $A_{sfM.min}$ = **470** mm²/m Max.area of reinforcement $A_{sfM.max}$ = **14000** mm²/m

PASS - Area of reinforcement provided is greater than area of reinforcement required

Library item: Rectangular single summary

Deflection control - Section 7.4

Limiting span to depth ratio 40 Actual span to depth ratio 9.4

PASS - Span to depth ratio is less than deflection control limit

Crack control - Section 7.3

Limiting crack width w_{max} = **0.2** mm Maximum crack width w_k = **0.138** mm

PASS - Maximum crack width is less than limiting crack width

Check stem design at base of stem

Depth of section h = **350** mm

Rectangular section in flexure - Section 6.1

Design bending moment M = **47.4** kNm/m K = **0.020** K' = **0.207**

K' > K - No compression reinforcement is required

Tens.reinforcement required $A_{sr.req}$ = **426** mm²/m

Tens.reinforcement provided 12 dia.bars @ 100 c/c Tens.reinforcement provided $A_{sr.prov}$ = **1131** mm²/m

Min.area of reinforcement $A_{sr.min}$ = **423** mm²/m Max.area of reinforcement $A_{sr.max}$ = **14000** mm²/m

PASS - Area of reinforcement provided is greater than area of reinforcement required

Library item: Rectangular single summary

Deflection control - Section 7.4

Limiting span to depth ratio 40 Actual span to depth ratio 10.4

PASS - Span to depth ratio is less than deflection control limit

Crack control - Section 7.3

Limiting crack width w_{max} = **0.2** mm — Maximum crack width w_k = **0.147** mm

PASS - Maximum crack width is less than limiting crack width

Rectangular section in shear - Section 6.2

Design shear force V = **96.7** kN/m — Design shear resistance $V_{Rd.c}$ = **143** kN/m

PASS - Design shear resistance exceeds design shear force

Check stem design at prop

Depth of section h = **350** mm

Rectangular section in flexure - Section 6.1

Design bending moment M = **0.2** kNm/m — K = **0.000** — K' = **0.207**

K' > K - No compression reinforcement is required

Tens.reinforcement required $A_{sr1.req}$ = **2** mm²/m

Tens.reinforcement provided 12 dia.bars @ 200 c/c — Tens.reinforcement provided $A_{sr1.prov}$ = **565** mm²/m

Min.area of reinforcement $A_{sr1.min}$ = **423** mm²/m — Max.area of reinforcement $A_{sr1.max}$ = **14000** mm²/m

PASS - Area of reinforcement provided is greater than area of reinforcement required

Library item: Rectangular single summary

Deflection control - Section 7.4

Limiting span to depth ratio 16 — Actual span to depth ratio 0.7

PASS - Span to depth ratio is less than deflection control limit

Crack control - Section 7.3

Limiting crack width w_{max} = **0.2** mm — Maximum crack width w_k = **0.001** mm

PASS - Maximum crack width is less than limiting crack width

Rectangular section in shear - Section 6.2

Design shear force V = **33** kN/m — Design shear resistance $V_{Rd.c}$ = **135.3** kN/m

PASS - Design shear resistance exceeds design shear force

Horizontal reinforcement parallel to face of stem - Section 9.6

Min.area of reinforcement $A_{sx.req}$ = **350** mm²/m — Max.spacing of reinforcement s_{sx_max} = **400** mm

Trans.reinforcement provided 10 dia.bars @ 200 c/c — Trans.reinforcement provided $A_{sx.prov}$ = **393** mm²/m

PASS - Area of reinforcement provided is greater than area of reinforcement required

Check base design at toe

Depth of section h = **250** mm

Rectangular section in flexure - Section 6.1

Design bending moment M = **38.7** kNm/m — K = **0.042** — K' = **0.207**

K' > K - No compression reinforcement is required

Tens.reinforcement required $A_{bb.req}$ = **554** mm²/m

Tens.reinforcement provided 12 dia.bars @ 100 c/c — Tens.reinforcement provided $A_{bb.prov}$ = **1131** mm²/m

Min.area of reinforcement $A_{bb.min}$ = **266** mm²/m — Max.area of reinforcement $A_{bb.max}$ = **10000** mm²/m

PASS - Area of reinforcement provided is greater than area of reinforcement required

Library item: Rectangular single summary

Crack control - Section 7.3

Limiting crack width w_{max} = **0.2** mm — Maximum crack width w_k = **0.185** mm

PASS - Maximum crack width is less than limiting crack width

Rectangular section in shear - Section 6.2

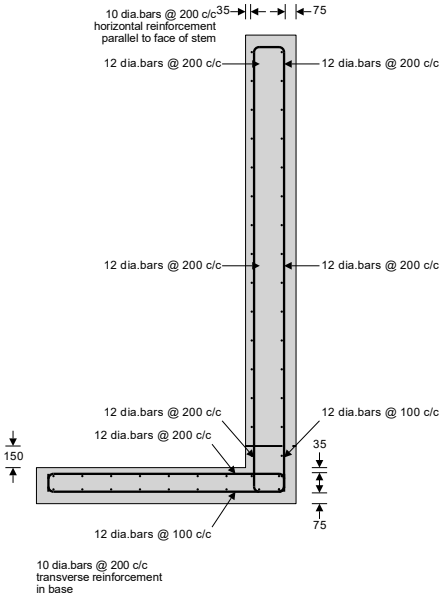
Design shear force V = **53.3** kN/m — Design shear resistance $V_{Rd.c}$ = **112.6** kN/m

PASS - Design shear resistance exceeds design shear force

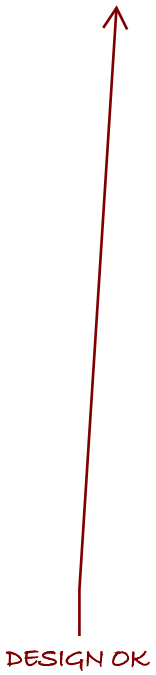
Secondary transverse reinforcement to base - Section 9.3

Min.area of reinforcement	$A_{bx.req}$ = **226** mm²/m	Max.spacing of reinforcement	s_{bx_max} = **450** mm
Trans.reinforcement provided	10 dia.bars @ 200 c/c	Trans.reinforcement provided	$A_{bx.prov}$ = **393** mm²/m

PASS - Area of reinforcement provided is greater than area of reinforcement required



Reinforcement details



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 2.9.11

Retaining wall details

Stem type	Propped cantilever		
Stem height	h_{stem} = **3200** mm		
Prop height	h_{prop} = **3100** mm		
Stem thickness	t_{stem} = **150** mm		
Angle to rear face of stem	α = **90** deg		
Stem density	γ_{stem} = **25** kN/m^3		
Toe length	l_{toe} = **1450** mm		
Base thickness	t_{base} = **250** mm		
Base density	γ_{base} = **25** kN/m^3		
Height of retained soil	h_{ret} = **3000** mm	Angle of soil surface	β = **0** deg
Depth of cover	d_{cover} = **0** mm		
Height of water	h_{water} = **3000** mm		
Water density	γ_w = **9.8** kN/m^3		

Retained soil properties

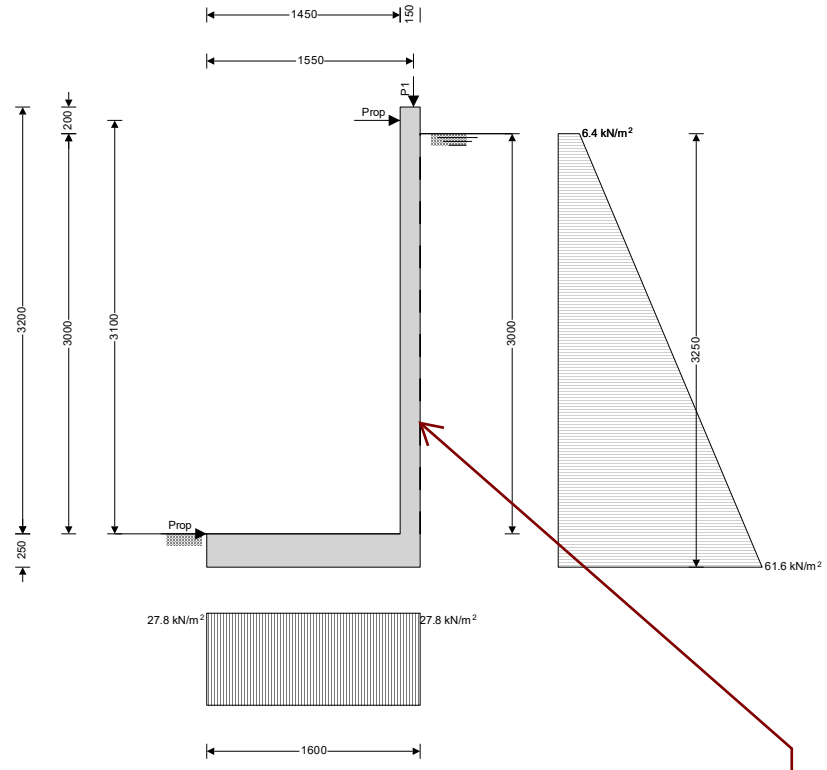
Soil type	Stiff clay	
Moist density	γ_{mr} = **21** kN/m^3	
Saturated density	γ_{sr} = **21** kN/m^3	
Characteristic effective shear resistance angle		$\phi'_{r.k}$ = **21** deg
Characteristic wall friction angle		$\delta_{r.k}$ = **10.5** deg

Base soil properties

Soil type	Stiff clay	
Soil density	γ_b = **21** kN/m^3	
Characteristic effective shear resistance angle		$\phi'_{b.k}$ = **21** deg
Characteristic wall friction angle		$\delta_{b.k}$ = **10.5** deg
Characteristic base friction angle		$\delta_{bb.k}$ = **14** deg
Presumed bearing capacity	$P_{bearing}$ = **125** kN/m^2	

Loading details

Variable surcharge load	$Surcharge_Q$ = **10** kN/m^2
Vertical line load at 1550 mm	P_{G1} = **19.8** kN/m
	P_{Q1} = **2.7** kN/m



General arrangement

CHECK SAME WALL FOR TOP REINFORCEMENT

Calculate retaining wall geometry

Base length	l_{base} = **1600** mm		
Saturated soil height	h_{sat} = **3000** mm		
Moist soil height	h_{moist} = **0** mm		
Length of surcharge load	l_{sur} = **0** mm		
Vertical distance	x_{sur_v} = **1600** mm		
Effective height of wall	h_{eff} = **3250** mm		
Horizontal distance	x_{sur_h} = **1625** mm		
Area of wall stem	A_{stem} = **0.48** m²	Vertical distance	x_{stem} = **1525** mm
Area of wall base	A_{base} = **0.4** m²	Vertical distance	x_{base} = **800** mm

Using Rankine theory

At rest pressure coefficient	K_0 = **0.642**	Passive pressure coefficient	K_P = **2.117**

Bearing pressure check

Vertical forces on wall

Total $F_{total\_v} = F_{stem} + F_{base} + F_{P\_v} + F_{water\_v}$ = **44.5** kN/m

Horizontal forces on wall

Total $F_{total\_h} = F_{sur\_h} + F_{sat\_h} + F_{water\_h} + F_{pass\_h}$ = **109.2** kN/m

Moments on wall

Total $M_{total} = M_{stem} + M_{base} + M_{sur} + M_P + M_{sat} + M_{water}$ = **-69.9** kNm/m

Check bearing pressure

Propping force to stem	F_{prop_stem} = **31.5** kN/m	Propping force to base	F_{prop_base} = **77.7** kN/m

Bearing pressure at toe q_{toe} = **27.8** kN/m^2 Bearing pressure at heel q_{heel} = **27.8** kN/m^2

Factor of safety FoS_{bp} = **4.494**

PASS - Allowable bearing pressure exceeds maximum applied bearing pressure

RETAINING WALL DESIGN

In accordance with EN1992-1-1:2004 incorporating Corrigendum dated January 2008 and the UK National Annex incorporating National Amendment No.1

Tedds calculation version 2.9.11

Concrete details - Table 3.1 - Strength and deformation characteristics for concrete

Concrete strength class C32/40

Char.comp.cylinder strength f_{ck} = **32** N/mm^2 Mean axial tensile strength f_{ctm} = **3.0** N/mm^2

Secant modulus of elasticity E_{cm} = **33346** N/mm^2 Maximum aggregate size h_{agg} = **20** mm

Design comp.concrete strength f_{cd} = **18.1** N/mm^2 Partial factor γ_C = **1.50**

Reinforcement details

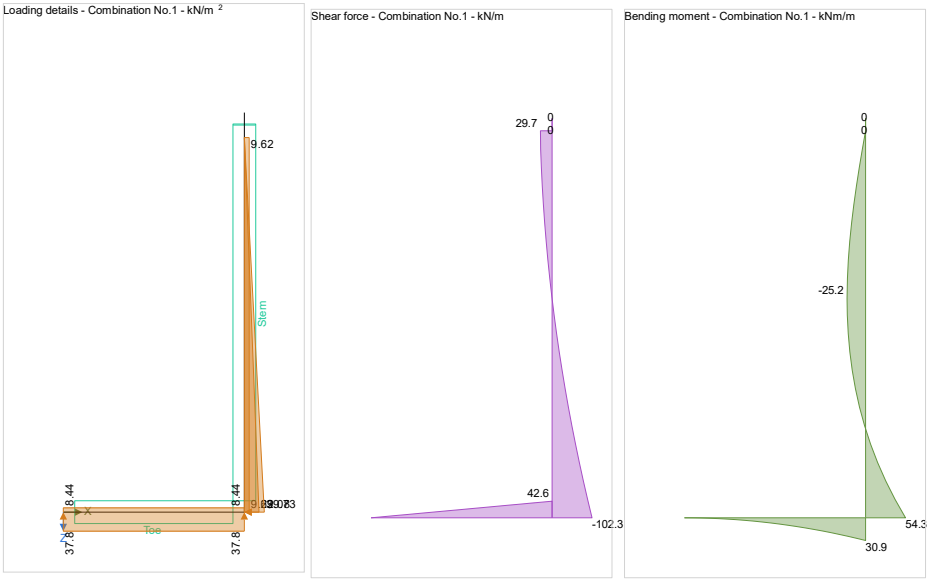
Characteristic yield strength f_{yk} = **500** N/mm^2 Modulus of elasticity E_s = **200000** N/mm^2

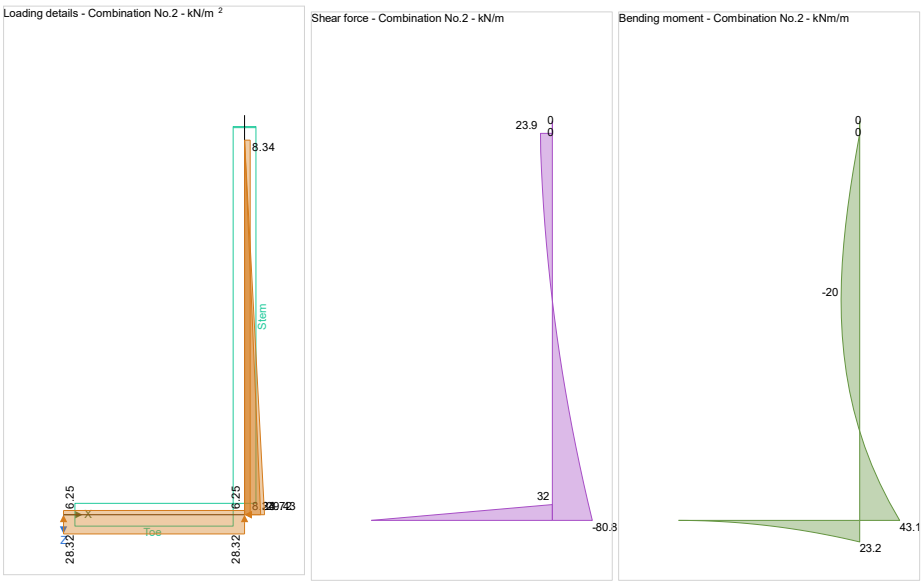
Design yield strength f_{yd} = **435** N/mm^2 Partial factor γ_S = **1.15**

Cover to reinforcement

Front face of stem c_{sf} = **35** mm Rear face of stem c_{sr} = **35** mm

Top face of base c_{bt} = **35** mm Bottom face of base c_{bb} = **75** mm





Check stem design at 1756 mm

Depth of section h = **150** mm

Rectangular section in flexure - Section 6.1

Design bending moment M = **25.2** kNm/m K = **0.080** K' = **0.207**

K' > K - No compression reinforcement is required

Tens.reinforcement required $A_{sfM.req}$ = **633** mm²/m

Tens.reinforcement provided 12 dia.bars @ 200 c/c Tens.reinforcement provided $A_{sfM.prov}$ = **565** mm²/m

Min.area of reinforcement $A_{sfM.min}$ = **156** mm²/m Max.area of reinforcement $A_{sfM.max}$ = **6000** mm²/m

FAIL - Area of reinforcement provided is less than area of reinforcement required

Library item: Rectangular single summary

Deflection control - Section 7.4

Limiting span to depth ratio 16.5 Actual span to depth ratio 31.3

FAIL - Span to depth ratio exceeds deflection control limit

Crack control - Section 7.3

Limiting crack width w_{max} = **0.2** mm Maximum crack width w_k = **0.302** mm

FAIL - Maximum crack width exceeds limiting crack width

Check stem design at base of stem

Depth of section h = **150** mm

Rectangular section in flexure - Section 6.1

Design bending moment M = **54.3** kNm/m K = **0.143** K' = **0.207**

K' > K - No compression reinforcement is required

Tens.reinforcement required $A_{sr.req}$ = **1346** mm²/m

Tens.reinforcement provided 12 dia.bars @ 100 c/c Tens.reinforcement provided $A_{sr.prov}$ = **1131** mm²/m

Min.area of reinforcement $A_{sr.min}$ = **171** mm²/m Max.area of reinforcement $A_{sr.max}$ = **6000** mm²/m

FAIL - Area of reinforcement provided is less than area of reinforcement required

Library item: Rectangular single summary

Deflection control - Section 7.4

Limiting span to depth ratio 12.5 Actual span to depth ratio 28.4

FAIL - Span to depth ratio exceeds deflection control limit

Crack control - Section 7.3

Limiting crack width w_{max} = **0.2** mm — Maximum crack width w_k = **0.277** mm

FAIL - Maximum crack width exceeds limiting crack width

Rectangular section in shear - Section 6.2

Design shear force V = **102.3** kN/m — Design shear resistance $V_{Rd.c}$ = **84.1** kN/m

FAIL - Design shear resistance is less than design shear force

Check stem design at prop

Depth of section h = **150** mm

Rectangular section in shear - Section 6.2

Design shear force V = **29.7** kN/m — Design shear resistance $V_{Rd.c}$ = **66.7** kN/m

PASS - Design shear resistance exceeds design shear force

Horizontal reinforcement parallel to face of stem - Section 9.6

Min.area of reinforcement $A_{sx.req}$ = **283** mm²/m — Max.spacing of reinforcement s_{sx_max} = **400** mm

Trans.reinforcement provided 10 dia.bars @ 200 c/c — Trans.reinforcement provided $A_{sx.prov}$ = **393** mm²/m

PASS - Area of reinforcement provided is greater than area of reinforcement required

Check base design at toe

Depth of section h = **250** mm

ONLY THIS CHECK REQUIRED

Rectangular section in flexure - Section 6.1

Design bending moment M = **30.9** kNm/m — K = **0.034** — K' = **0.207**

K' > K - No compression reinforcement is required

Tens.reinforcement required $A_{bb.req}$ = **442** mm²/m

Tens.reinforcement provided 12 dia.bars @ 100 c/c — Tens.reinforcement provided $A_{bb.prov}$ = **1131** mm²/m

Min.area of reinforcement $A_{bb.min}$ = **266** mm²/m — Max.area of reinforcement $A_{bb.max}$ = **10000** mm²/m

PASS - Area of reinforcement provided is greater than area of reinforcement required

Library item: Rectangular single summary

Crack control - Section 7.3

Limiting crack width w_{max} = **0.2** mm — Maximum crack width w_k = **0.147** mm

PASS - Maximum crack width is less than limiting crack width

Rectangular section in shear - Section 6.2

Design shear force V = **42.6** kN/m — Design shear resistance $V_{Rd.c}$ = **112.6** kN/m

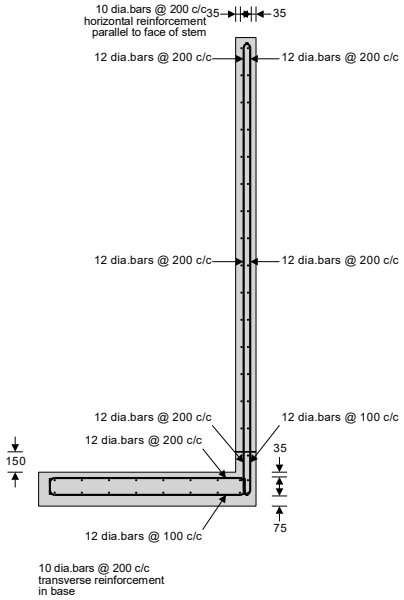
PASS - Design shear resistance exceeds design shear force

Secondary transverse reinforcement to base - Section 9.3

Min.area of reinforcement $A_{bx.req}$ = **226** mm²/m — Max.spacing of reinforcement s_{bx_max} = **450** mm

Trans.reinforcement provided 10 dia.bars @ 200 c/c — Trans.reinforcement provided $A_{bx.prov}$ = **393** mm²/m

PASS - Area of reinforcement provided is greater than area of reinforcement required

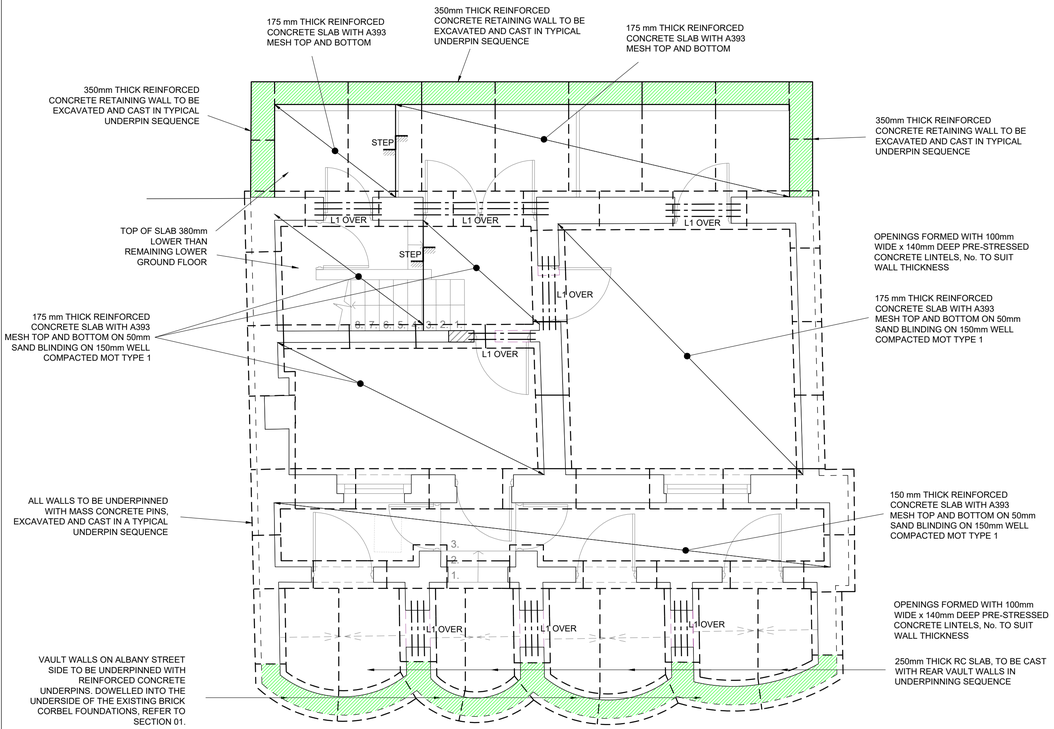


Reinforcement details

205 Albany Street

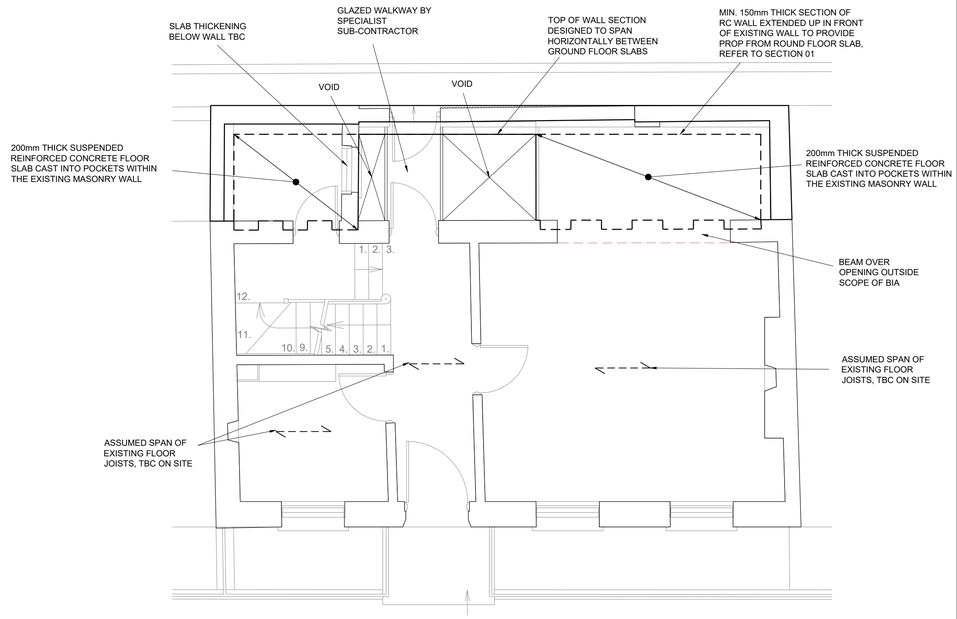
5.0 QED DRAWINGS

Date: Mar 20
Project Number: 20-186
Revision Number: BR1



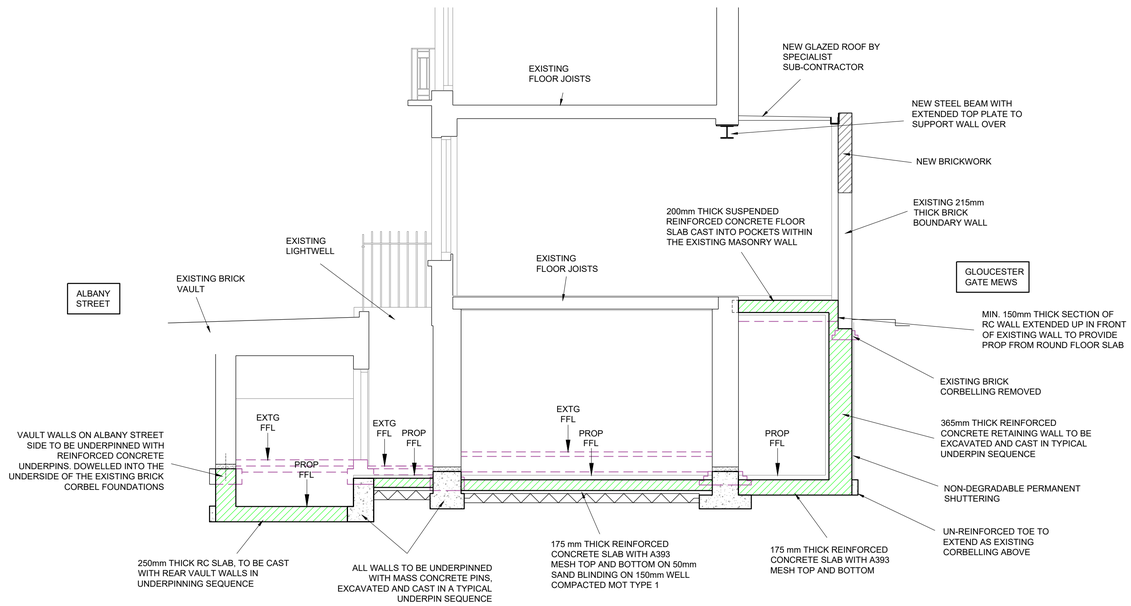
PROPOSED LOWER GROUND FLOOR PLAN

(1:50)



PROPOSED GROUND FLOOR PLAN

(1:50)



SECTION 01

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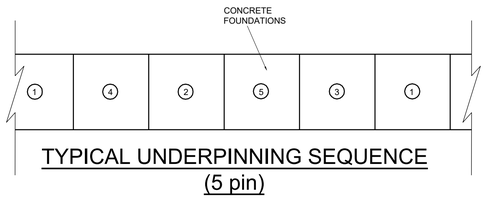

TYPICAL UNDERPINNING SEQUENCE (5 pin)

(NTS)

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SCAN QR CODE FOR ALL THE LATEST DRAWINGS ON THE PROJECT

Rev	Description	Date	By	Checked
P1	FOR BIA ONLY	12.03.21	BS	SHL
P2	FLOOR LEVELS REVISED	29.03.21	BS	SHL

FOR BASEMENT IMPACT ASSESSMENT ONLY

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Client
AFRIJANUS PROPERTY UK LIMITED

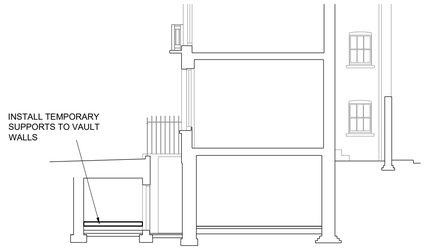
Project
205 ALBANY STREET
LONDON

Title
GENERAL ARRANGEMENT PLANS & SECTIONS

Date MAR 21	Drawn BS	Checked SHL
Distribution Office LONDON		
Scale AS INDICATED	Engineer BS	
Approved SHL	Status FOR BIA	

Project Number	Drawing Number	Revision
20-306	BIA 01	P2

ORIGINAL DRAWING SIZE A1



EXISTING
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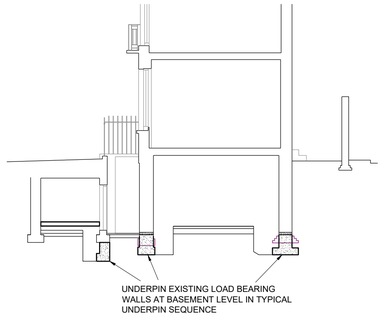

STAGE 1
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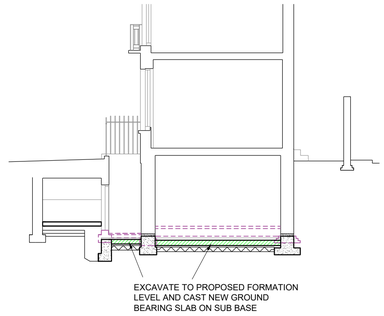

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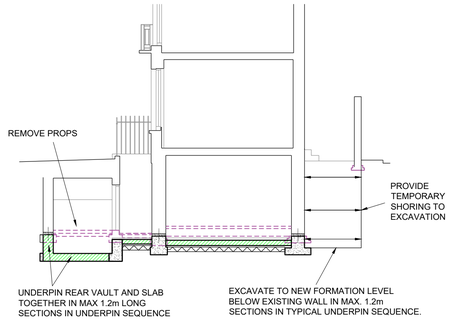

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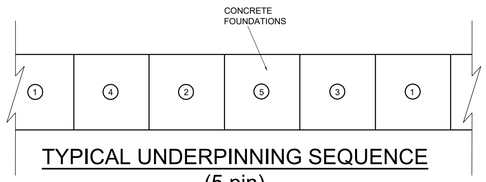
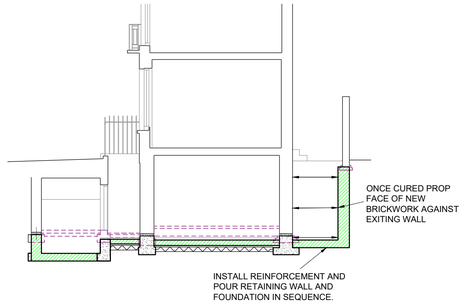


TYPICAL UNDERPINNING SEQUENCE (5 pin)
(NTS)



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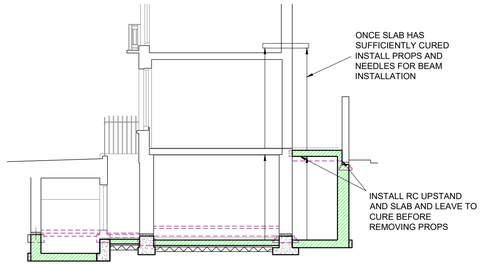

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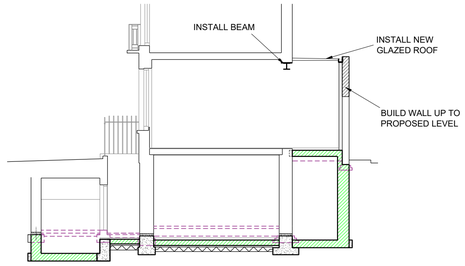

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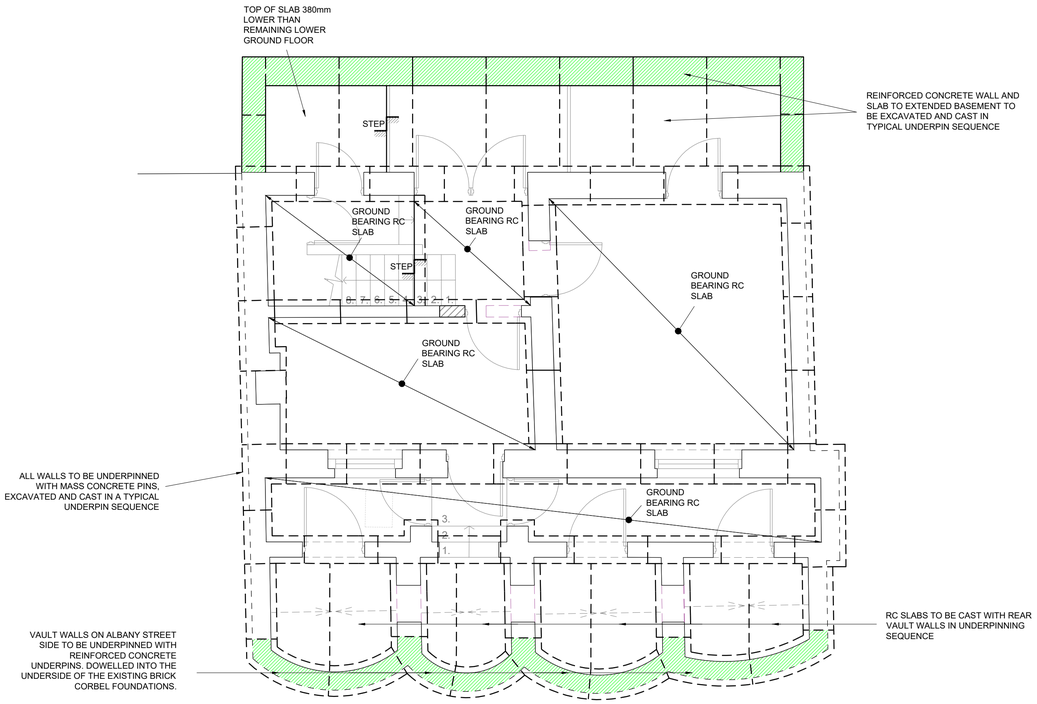
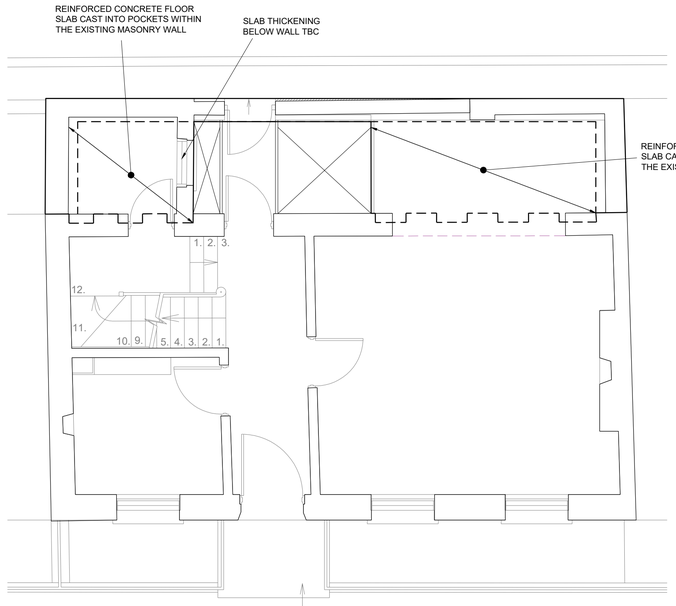


PROPOSED LOWER GROUND FLOOR PLAN
(SHOWING STRUCTURE UNDER)
(1:50)



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Client
AFRIJANUS PROPERTY UK LIMITED

Project
205 ALBANY STREET
RADLETT

Title
CONSTRUCTION METHOD STATEMENT

Date MAR 21	Drawn BS	Checked SHL
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Scale AS INDICATED	Engineer BS	
Approved SHL	Status FOR BIA	

Project Number	Drawing Number	Revision
20-306	BIA 02	P2

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