Calculations

for

Basement

at

Flat 1, 190 Goldhurst Terrace
London

Revised August 2016

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Calculations by:
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Job No. ***4013***

Date: *Feb. 2016*

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Job **Flat 1, 190 Goldhurst Terrace London** Job No. **4013**

Client Sheet **1**

By S.C.Green Date: Feb. 2016

Loading

Flat Roof		*kN/m²*						
Dead Loads	*chippings*	*0.19*						
	felt	*0.04*						
	decking	*0.14*						
	joists	*0.10*						
	plaster	*0.13*						
	insulation	*0.05*						
	Total Load	*0.65*	*x*	*1.4*	*(g_f) =*	***0.91***		
Imposed Loads	*Roof*	***0.65***	*x*	*1.6*	*(g_f) =*	***1.04***		
	TOTAL	***1.30***				***1.95***		
Dead Load =	***0.7 kN/m² service and***			***0.9 kN/m² ultimate***			*g_f =*	*1.50*
							Ser =	*1.3 kN/m²*
Total Load =	***1.3 kN/m² service and***			***2.0 kN/m² ultimate***			*Ult =*	*2.0 kN/m²*

Cavity Walls		*kN/m²*						
Dead Loads	*Bricks*	*1.80*						
	Blocks	*1.20*						
	plaster	*0.16*						
		3.16	*x*	*1.4*	*(g_f) =*	***4.42***		
total per storey		***7.27***	*x*	*1.4*	*(g_f) =*	***10.18***	*g_f =*	*1.40*
							Ser =	*7.3 kN/m*
Total Load =	***7.3 kN/m service and***			***10.2 kN/m ultimate***			*Ult =*	*10.2 kN/m*

Ceiling		*kN/m²*						
Dead Loads	*Joists*	*0.12*						
	Insulation	*0.05*						
	Plasterboard	*0.13*						
		0.30	*x*	*1.4*	*(g_f) =*	***0.42***		
Imposed Loads	*IL*	***0.25***	*x*	*1.6*	*(g_f) =*	***0.40***	*g_f =*	*1.49*
							Ser =	*0.6 kN/m²*
Total Load =	***0.55 kN/m² service and***			***0.8 kN/m² ultimate***			*Ult =*	*0.8 kN/m²*

Floor		*kN/m²*						
Dead Loads	*boards*	*0.14*						
	joists	*0.12*						
	Insulation	*0.05*						
	plaster	*0.15*						
	Total Load	*0.46*	*x*	*1.4*	*(g_f) =*	***0.64***		
Imposed Loads	*Floor*	***1.50***	*x*	*1.6*	*(g_f) =*	***2.40***		
	TOTAL	***1.96***				***3.04***		
Dead Load =	***0.5 kN/m² service and***			***0.6 kN/m² ultimate***			*g_f =*	*1.55*
							Ser =	*2.0 kN/m²*
Total Load =	***2.0 kN/m² service and***			***3.0 kN/m² ultimate***			*Ult =*	*3.0 kN/m²*

Stud Partitions		*kN/m²*						
Dead Loads	*100 Studs*	*0.08*						
	insulation	*0.05*						
	plaster	*0.15*						
	plaster	*0.15*						
		0.43	*x*	*1.4*	*(g_f) =*	***0.60***		
total per storey		***1.03***	*x*	*1.4*	*(g_f) =*	***1.44***	*g_f =*	*1.40*
							Ser =	*1.0 kN/m*
Total Load =	***1.0 kN/m service and***			***1.4 kN/m ultimate***			*Ult =*	*1.4 kN/m*

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Job	**Flat 1, 190 Goldhurst Terrace London**	Job No.	**4013**
Client		Sheet	**2**
By	S.C.Green	Date:	Feb. 2016

Loading

Ashlar Partitions		kN/m²						
Dead Loads	studs	0.08						
	insultaion	0.05						
	plaster	0.13						
		0.26	x	1.4	(g_f) =	**0.36**		
total per storey		**0.26**	x	1.4	(g_f) =	**0.36**	g_f =	1.40
							Ser =	0.3 kN/m
Total Load =	**0.3 kN/m service and**		**0.4 kN/m ultimate**				Ult =	0.4 kN/m

Roof - plastered		kN/m²				pitch, q =	30 °	
Dead Loads	Tiles	0.65						
	Battens	0.01						
	Rafters	0.08						
	Felt	0.04						
	Insulation	0.05						
	Plasterboard	0.16						
		0.99	/ cos q ‘	30				
	Plan Load	1.14						
		1.14	x	1.4	(g_f) =	**1.60**		
Imposed Loads	Roof	**0.60**	x	1.6	(g_f) =	**0.96**		
	TOTAL	**1.74**				**2.56**		
Dead Load =	**1.1 kN/m² service and**		**1.6 kN/m² ultimate**				g_f =	1.47
							Ser =	1.7 kN/m²
Total Load =	**1.7 kN/m² service and**		**2.6 kN/m² ultimate**				Ult =	2.6 kN/m²

Roof		kN/m²				pitch, q =	30 °	
Dead Loads	Tiles	0.65						
	Battens	0.01						
	Rafters	0.08						
	Felt	0.04						
		0.78	/ cos q ‘	30				
	Plan Load	0.90						
		0.90	x	1.4	(g_f) =	**1.26**		
Imposed Loads	Roof	**0.60**	x	1.6	(g_f) =	**0.96**		
	TOTAL	**1.50**				**2.22**		
Dead Load =	**0.9 kN/m² service and**		**1.3 kN/m² ultimate**				g_f =	1.48
							Ser =	1.5 kN/m²
Total Load =	**1.5 kN/m² service and**		**2.2 kN/m² ultimate**				Ult =	2.2 kN/m²

Dormer		kN/m²						
Dead Loads	tiles	0.60						
	ply	0.08						
	studs	0.08						
	plaster	0.13						
	insulation	0.05						
		0.94	x	1.4	(g_f) =	**1.32**		
total per storey		**1.88**	x	1.4	(g_f) =	**2.63**	g_f =	1.40
							Ser =	1.9 kN/m
Total Load =	**1.9 kN/m service and**		**2.6 kN/m ultimate**				Ult =	2.6 kN/m

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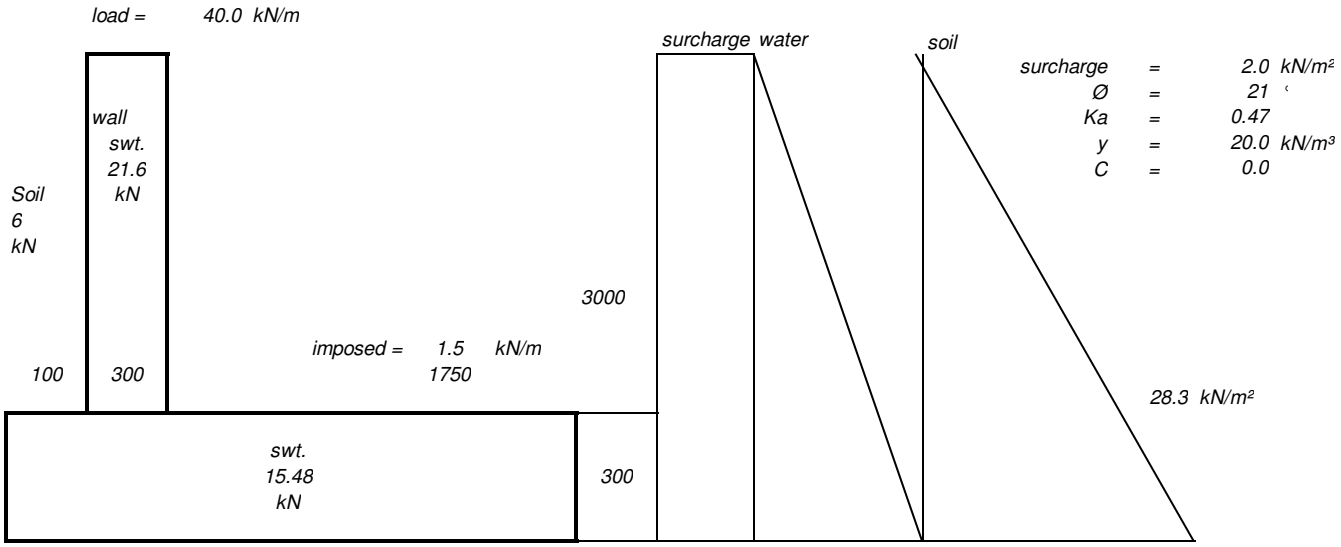
Job	**Flat 1, 190 Goldhurst Terrace London**	Job No.	**4013**
Client		Sheet	**3**
By	S.C.Green	Date:	Feb. 2016

Typical Retaining Wall - against external wall



Stem

Forces	Soil	=	28.3	x	3.0	/	2.0	=	42.51 kN
	surcharge	=	2.8						
	water	=	45.0						
			76.2	kN		γf			
Moments	Soil	=	63.8	x	1.4	=	89.3		
	surcharge	=	8.5	x	1.6	=	13.6		
	water	=	67.5	x	1.4	=	94.5		
			139.8				197.4	kNm	

Shear V = 42.5 kN x 1.5 = ***63.8 kN***

Design

concrete grade	=	35	N/mm²
reinforcement grade	=	460	N/mm²
cover	=	35	mm
effective depth	=	255	mm

Bending

K	=	M / b d^2 fcu	=	0.09			
z	=		=	227	check	0.95 * d =	242 mm
		worst case	=	227			
As	=		=	1986	mm²		
Minimum As	=	0.13 Ac / 100	=	390	mm²		

Use	***T 20***	***@***	***150 c/c***	***A =***	***2094***	***mm²/m B***
Use	***T 10***	***@***	***200 c/c***	***A =***	***393***	***mm²/m dist***

Shear v = V / b d = 0.25 N/mm²

to find vc: 100 As / b d = 0.82

vc = 0.74 v - vc = -0.49 N/mm²

Shear satisfactory

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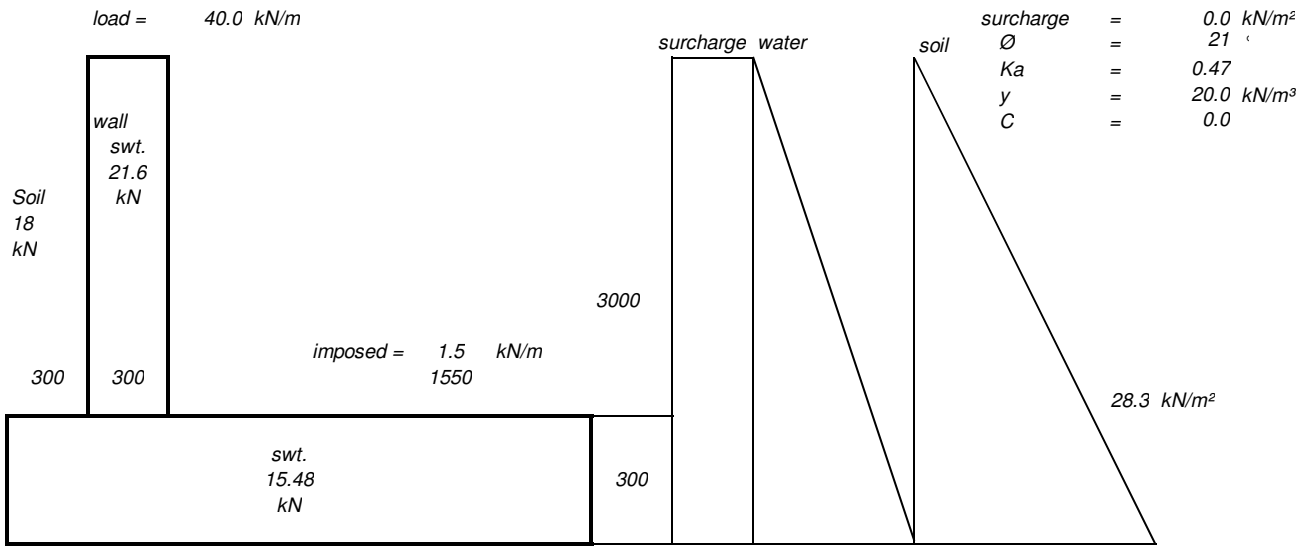
Job	***Flat 1, 190 Goldhurst Terrace London***	*Job No.*	***4013***
Client		*Sheet*	***4***
By	*S.C.Green*	*Date:*	*Feb. 2016*

Typical Retaining Wall - against internal wall



Stem

Forces	*Soil*	=	*51.4*	
	Ka	=	*0.0*	
	water	=	*54.5*	
			105.9	*kN*
Overturning Moments	*Soil*	=	*56.6*	
	Ka	=	*0.0*	
	water	=	*59.9*	
			116.5	

									lever arm
Righting Moments	*soil*	=	*36.0*	***Total Weight***	*soil*	=	*18.0*		*2.00*
	wall	=	*36.7*		*wall*	=	*21.6*		*1.70*
	imposed	=	*1.8*		*imposed*	=	*2.3*		*0.78*
	wall load	=	*68.0*		*wall load*	=	*40.0*		*1.70*
	base	=	*16.6*		*base*	=	*15.5*		*1.08*
	surcharge	=	*0.0*		*surcharge*	=	*0.0*		
			159.2						
					Total Load	=	*97.4*	*kN*	

lever arm = *1.20* *m*

eccentricity = *0.121* *m*

$$P = \frac{97.4}{2.15} \pm \frac{97.4 \times 6 \times 0.121}{2.150 \times 2.150}$$

P = *45* *+ / -* *15*

P = *61* *kN/m²* *or* *30.0* *kN/m²*

OR *P* = *4W/3AB(1-2e/A)*

P = *68* *kN/m²*

Safe Bearing pressure = *150* *kN/m²*

Factor of Safety *against overturning*

Overturning moment = *116.5*

Righting moment = *159.2*

Factor of Safety = *1.37* *Acceptable*

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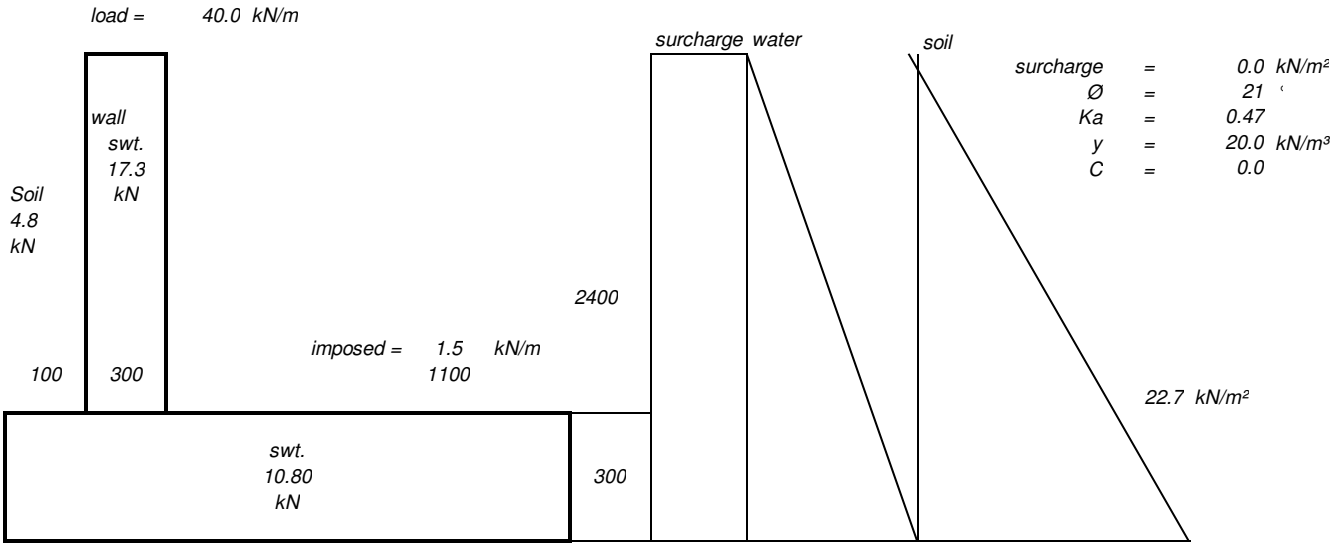
Job	**Flat 1, 190 Goldhurst Terrace London**	Job No.	**4013**
Client		Sheet	**5**
By	S.C.Green	Date:	Feb. 2016

Typical Retaining Wall - against internal wall



1500 P = 0.00 27.00 25.5 kN/m²

Stem

Forces	Soil	=	22.7	x	2.4	/	2.0	=	27.21 kN
	surcharge	=	0.0						
	water	=	28.8						
			51.5	kN		γf			
Moments	Soil	=	32.6	x	1.4	=	45.7		
	surcharge	=	0.0	x	1.6	=	0.0		
	water	=	34.6	x	1.4	=	48.4		
			67.2				94.1	kNm	

Shear V = 27.2 kN x 1.5 = ***40.8 kN***

Design

concrete grade	=	35	N/mm²
reinforcement grade	=	460	N/mm²
cover	=	35	mm
effective depth	=	257	mm

Bending

K	=	M / b d^2 fcu	=	0.04			
z	=		=	245	check	0.95 * d =	244 mm
		worst case	=	244			
As	=		=	882	mm²		
Minimum As	=	0.13 Ac / 100	=	390	mm²		

Use T 16 @ 200 c/c A = 1005 mm²/m B
Use T 10 @ 200 c/c A = 393 mm²/m dist

Shear

v	=	V / b d	=	0.16	N/mm²		
to find vc		100 As / b d	=	0.39			
		vc	=	0.58		v - vc =	-0.42 N/mm²

Shear satisfactory

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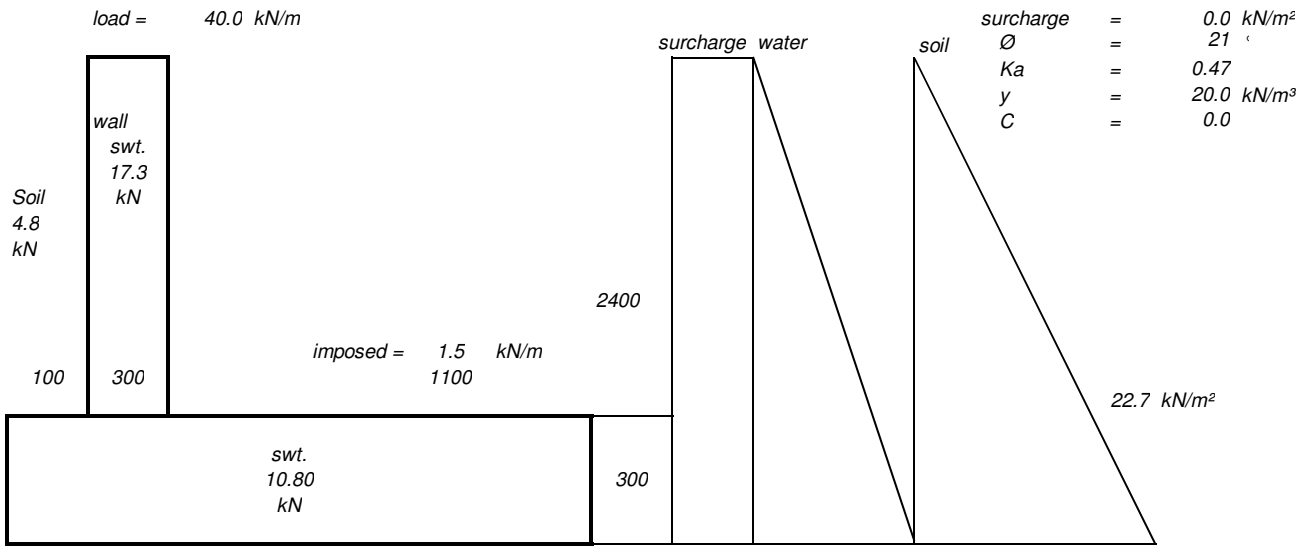
Job ***Flat 1, 190 Goldhurst Terrace London*** *Job No.* ***4013***

Client *Sheet* ***6***

By *S.C.Green* *Date:* *Feb. 2016*

Typical Retaining Wall - against internal wall



Stem

Forces	*Soil*	=	*34.4*	
	Ka	=	*0.0*	
	water	=	*36.5*	
			70.9	*kN*
Overturning Moments	*Soil*	=	*31.0*	
	Ka	=	*0.0*	
	water	=	*32.8*	
			63.8	

								lever arm
Righting Moments	*soil*	=	*7.0*	***Total Weight***	*soil*	=	*4.8*	*1.45*
	wall	=	*21.6*		*wall*	=	*17.3*	*1.25*
	imposed	=	*0.9*		*imposed*	=	*1.7*	*0.55*
	wall load	=	*50.0*		*wall load*	=	*40.0*	*1.25*
	base	=	*8.1*		*base*	=	*10.8*	*0.75*
	surcharge	=	*0.0*		*surcharge*	=	*0.0*	
			87.6					
					Total Load	=	*74.5*	*kN*

lever arm = *0.86* *m*

eccentricity = *0.106* *m*

$$P = \frac{74.5}{1.50} \pm \frac{74.5 \times 6 \times 0.106}{1.500 \times 1.500}$$

P = *50* *+ / -* *21*

P = *71* *kN/m²* *or* *28.6* *kN/m²*

OR *P* = *4W/3AB(1-2e/A)*

P = *77* *kN/m²*

Safe Bearing pressure = *150* *kN/m²*

Factor of Safety *against overturning*

Overturning moment = *63.8*

Righting moment = *87.6*

Factor of Safety = *1.37* *Acceptable*

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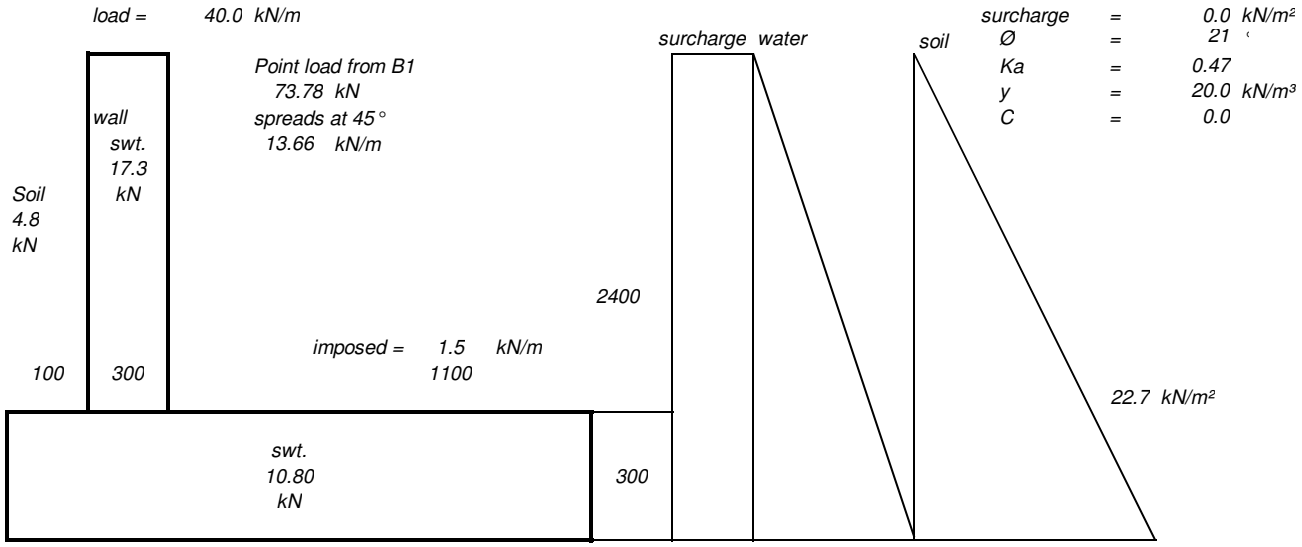
Job **Flat 1, 190 Goldhurst Terrace London** Job No. **4013**

Client Sheet **7**

By S.C.Green Date: Feb. 2016

Retaining Wall F2 Base 1200 wide



Stem

Forces	Soil	=	34.4	
	Ka	=	0.0	
	water	=	36.5	
			70.9	kN
Overturning Moments	Soil	=	31.0	
	Ka	=	0.0	
	water	=	32.8	
			63.8	

					lever arm
Righting Moments	soil	=	7.0	**Total Weight** soil = 4.8	1.45
	wall	=	21.6	wall = 17.3	1.25
	imposed	=	0.9	imposed = 1.7	0.55
	wall load	=	50.0	wall load = 40.0	1.25
	base	=	8.1	base = 10.8	0.75
	Beam B1	=	15.7	Beam B1 = 13.7	1.15
	surcharge	=	0.0	surcharge = 0.0	
			103.3		

Total Load = 88.2 kN

lever arm = 0.72 m

eccentricity = 0.027 m

$$P = \frac{88.2}{1.50} \pm \frac{88.2 \times 6 \times 0.027}{1.500 \times 1.500}$$

P = 59 +/- 6

P = 65 kN/m² or 52.5 kN/m²

OR P = 4W/3AB(1-2e/A)

P = 81 kN/m²

Safe Bearing pressure = 150 kN/m²

Factor of Safety against overturning

Overturning moment = 63.8

Righting moment = 103.3

Factor of Safety = 1.62 Acceptable

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Job **Flat 1, 190 Goldhurst Terrace London** Job No. **4013**

Client Sheet **8**

By S.C.Green Date: Feb. 2016

Beam B1 Clear Span = 2.500 m Beam length = 2.700 m
crosswall Left Bearing = 100 mm Right Bearing = 100 mm
Design Span = 2.600 m

try 1 / **203 x 203 x 46 UC** Le = 2.600 m E = 205 kN/mm²
s = 497.4 cm³ I = 4564 cm^4 r = 51.1 mm
Py = 275 N/mm² x = 17.7 A = 5880 mm²
D = 203 mm t = 7.3 mm Zy = 151.5 cm³
Iyy = 1539 cm^4

Load							
	Roof (plaster)	5.0	x	1.8	=	8.8	kN/m
	Ground Floor	0.0	x	2.1	=	0.0	
	First Floor	5.0	x	2.1	=	10.5	
	Second Floor	5.0	x	2.1	=	10.5	
	Wall	5.5	x	4.5	=	24.8	
	Second F Part	2.5	x	0.5	=	1.3	
	Swt				=	1.0	
				Total	=	56.75	kN/m
		56.8	kN/m				

73.78 73.78

Moment = wl²/8 = **48.0 kNm** x 1.5 = **71.9 kNm**

Shear = wl/2 = **73.8 kN** x 1.5 = **110.7 kN**

Bending **Mc** = **136.8 kNm**

slenderness = Le / r = 50.9 Pb = 275.0 N/mm²

Mb = Pb x s = **136.8 kNm** **bending OK**

Shear capacity = 0.6 x Py x d x t = **245 kN** **shear OK**

deflection Equivalent UDL = 56.75 kN/m

total deflection = 5w l^4 / 384 E I = **3.6 mm**

allowable values deflection = span / 360 = **7.2 mm** **deflection OK**

Beam B1	**Use**	**203 x 203 x 46 UC**

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Client Sheet **9**

By S.C.Green Date: Feb. 2016

Beam B2 Clear Span = 3.200 m Beam length = 3.400 m
crosswall Left Bearing = 100 mm Right Bearing = 100 mm
Design Span = 3.300 m

try 1 / **203 x 203 x 46 UC** Le = 3.300 m E = 205 kN/mm²
s = 497.4 cm³ I = 4564 cm^4 r = 51.1 mm
Py = 275 N/mm² x = 17.7 A = 5880 mm²
D = 203 mm t = 7.3 mm Zy = 151.5 cm³
Iyy = 1539 cm^4

Load						
Roof (plaster)	4.0	x	1.8	=	7.0	kN/m
Ground Floor	0.0	x	2.1	=	0.0	
First Floor	4.0	x	2.1	=	8.4	
Second Floor	4.0	x	2.1	=	8.4	
Wall	5.5	x	2.3	=	12.7	
Second F Part	2.5	x	0.5	=	1.3	
Swt				=	1.0	
			Total	=	38.70	kN/m
	38.7	kN/m				

63.86 63.86

Moment = wl²/8 = **52.7 kNm** x 1.5 = **79.0 kNm**

Shear = wl/2 = **63.9 kN** x 1.5 = **95.8 kN**

Bending **Mc** = **136.8 kNm**

slenderness = Le / r = 64.6 Pb = 275.0 N/mm²

Mb = Pb x s = **136.8 kNm** **bending OK**

Shear capacity = 0.6 x Py x d x t = **245 kN** **shear OK**

deflection Equivalent UDL = 38.70 kN/m

total deflection = 5w l^4 / 384 E I = **6.4 mm**

allowable values deflection = span / 360 = **9.2 mm** **deflection OK**

Beam B2	**Use**	**203 x 203 x 46 UC**

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Client Sheet **10**

By S.C.Green Date: Feb. 2016

Beam B3 Clear Span = 2.500 m Beam length = 2.700 m

Left Bearing = 100 mm Right Bearing = 100 mm

Design Span = 2.600 m

try 1 / 203 x 203 x 46 UC Le = 1.300 m E = 205 kN/mm²

s = 497.4 cm³ I = 4564 cm^4 r = 51.1 mm

Py = 275 N/mm² x = 17.7 A = 5880 mm²

D = 203 mm t = 7.3 mm Zy = 151.5 cm³

Iyy = 1539 cm^4

Load						
Roof (plaster)	0.0	x	1.8	=	0.0	kN/m
Ground Floor	3.7	x	2.1	=	7.8	
First Floor	0.0	x	2.1	=	0.0	
Second Floor	0.0	x	2.1	=	0.0	
Wall	5.5	x	2.3	=	12.7	
Second F Part	2.5	x	0.5	=	1.3	
Swt				=	1.0	
			Total	=	22.67	kN/m

Beam B2 = 63.86 kN

Moment = wl²/8 + PL/4 = **60.7 kNm** x 1.5 = **91.0 kNm**

Shear = wl/2 + P/2 = **61.4 kN** x 1.5 = **92.1 kN**

Bending **Mc** = **136.8 kNm**

slenderness = Le / r = 25.4 Pb = 275.0 N/mm²

Mb = Pb x s = **136.8 kNm** **bending OK**

Shear capacity = 0.6 x Py x d x t = **245 kN** **shear OK**

deflection Equivalent UDL = 71.79 kN/m

total deflection = 5w l^4 / 384 E I = **4.6 mm**

allowable values deflection = span / 360 = **7.2 mm** **deflection OK**

Beam B3	**Use**	**203 x 203 x 46 UC**

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Job **Flat 1, 190 Goldhurst Terrace London** Job No. **4013**

Client Sheet **11**

By S.C.Green Date: Feb. 2016

Beam B4

Clear Span	=	2.500	m	Beam length	=	2.700	m
Left Bearing	=	100	mm	Right Bearing	=	100	mm
Design Span	=	2.600	m				

try 1 / 203 x 203 x 46 UC

Le	=	2.600	m					E	=	205	kN/mm²
s =	497.4	cm³		I =	4564	cm^4		r	=	51.1	mm
Py =	275	N/mm²		x =	17.7			A	=	5880	mm²
D =	203	mm		t =	7.3	mm		Zy	=	151.5	cm³
Iyy =	1539	cm^4									

Load

Roof (plaster)	0.0	x	1.8	=	0.0	kN/m
Ground Floor	3.7	x	2.1	=	7.8	
First Floor	0.0	x	2.1	=	0.0	
Second Floor	0.0	x	2.1	=	0.0	
Wall	5.5	x	2.3	=	12.7	
Second F Part	2.5	x	0.5	=	1.3	
Swt				=	1.0	
			Total	=	22.67	kN/m

22.7 kN/m

29.47 29.47

Moment	=	wl²/8	=	**19.2**	**kNm**	x 1.5	=	**28.7**	**kNm**
Shear	=	wl/2	=	**29.5**	**kN**	x 1.5	=	**44.2**	**kN**

Bending **Mc** = **136.8 kNm**

slenderness	=	Le / r	=	50.9		Pb =	275.0	N/mm²
Mb	=	Pb x s	=	**136.8**	**kNm**			**bending OK**
Shear capacity	=	0.6 x Py x d x t	=	**245**	**kN**			**shear OK**

deflection Equivalent UDL = 22.67 kN/m

total deflection	=	5w l^4 / 384 E I	=	**1.4**	**mm**
allowable values deflection	=	span / 360	=	**7.2**	**mm** **deflection OK**

Beam B4 **Use** **203 x 203 x 46 UC**

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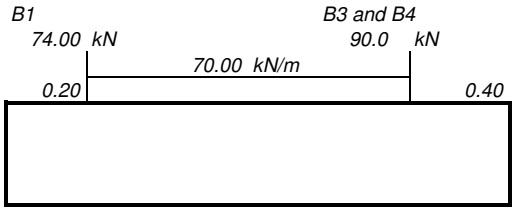
Job	***Flat 1, 190 Goldhurst Terrace London***	*Job No.*	***4013***
Client		*Sheet*	***12***
By	*S.C.Green*	*Date:*	*Feb. 2016*

Foundation F4

M = 0 kNm



Size 1.2 x 2.6 x 0.75

0.75

1.300 *1.300*
2.600

Self weight = 56.2 kN

P = 115 kN/m²

Safe Bearing pressure = 150 kN/m²

Foundation satisfactory

Foundation F4
Use: 2.6m x 2.6m x 0.75m

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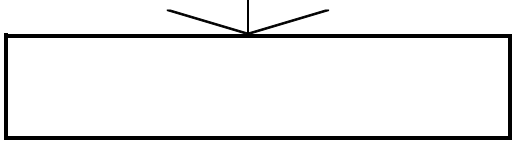
Job	***Flat 1, 190 Goldhurst Terrace London***	*Job No.*	***4013***
Client		*Sheet*	***13***
By	*S.C.Green*	*Date:*	*Feb. 2016*

Foundation F3

M = 0 kNm

59 kN



0.450 *0.900* *0.450*

Size 0.9 x 0.9 x 0.75

0.75

Self weight = 14.6 kN

P = 91 kN/m²

Safe Bearing pressure = 150 kN/m²

Foundation satisfactory

Foundation F3
Use: 0.9m x 0.9m x 0.75m

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Job **Flat 1, 190 Goldhurst Terrace London** Job No. **4013**

Client Sheet **14**

By S.C.Green Date: Feb. 2016

Foundations

01 Rear Flank Wall - rear part (two storey portion)

roof	2.00	x	1.5	=	3.0	kN/m
ceiling	0.00	x	0.6	=	0.0	
3rd floor	0.00	x	2.1	=	0.0	
2nd floor	0.00	x	2.1	=	0.0	
1st floor	0.00	x	2.1	=	0.0	
ground floor	0.00	x	6.2	=	0.0	
walls	5.30	x	4.5	=	23.9	
Ground Beam	0.00	x	9.0	=	0.0	
Total load				**=**	**26.9**	**kN/m**

02 Rear Flank Wall - front part (three storey portion)

roof	2.00	x	1.5	=	3.0	kN/m
ceiling	0.00	x	0.6	=	0.0	
3rd floor	0.00	x	2.1	=	0.0	
2nd floor	0.00	x	2.1	=	0.0	
1st floor	0.00	x	2.1	=	0.0	
ground floor	0.00	x	6.2	=	0.0	
walls	7.80	x	4.5	=	35.1	
Ground Beam	0.00	x	9.0	=	0.0	
Total load				**=**	**38.1**	**kN/m**

03 Rear Wall - main building

roof	3.00	x	1.5	=	4.5	kN/m	
ceiling	2.50	x	0.6	=	1.5		
3rd floor	2.50	x	2.1	=	5.3		
2nd floor	2.50	x	2.1	=	5.3		
1st floor	2.50	x	2.1	=	5.3		
ground floor	0.00	x	6.2	=	0.0		
walls	10.00	x	4.5	=	36.0		20% reveals
Ground Beam	0.00	x	9.0	=	0.0		
Total load				**=**	**57.8**	**kN/m**	

Load on central pier

			on pier	
bay window	=	1.2	0.6	
pier	=	1.1	1.1	
corridor	=	1.00	0.5	
			2.2	m
Load	=		127.1	
flank wall	=	1.60	0.8	
Load	=		30.48	
total load	=		157.5	kN

04 Rear Wall - over rear projection

roof	3.00	x	1.5	=	4.5	kN/m	
ceiling	2.50	x	0.6	=	1.5		
3rd floor	2.50	x	2.1	=	5.3		
2nd floor	2.50	x	2.1	=	5.3		
1st floor	2.50	x	2.1	=	5.3		
ground floor	0.00	x	6.2	=	0.0		
walls	7.80	x	4.5	=	28.1		20% reveals
Ground Beam	0.00	x	9.0	=	0.0		
Total load				**=**	**49.8**	**kN/m**	

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Job **Flat 1, 190 Goldhurst Terrace London** | Job No. **4013**

Client | Sheet **15**

By S.C.Green | Date: Feb. 2016

Temporary Beam TB1

Clear Span	=	3.500	m	Beam length	=	3.500	m
Left Bearing	=	0	mm	Right Bearing	=	0	mm
Design Span	=	3.500	m				

try 1 / 305 x 165 x 46 UB

Le	=	3.500	m				E	=	205 kN/mm²
s =	722.7	cm³		I =	9948	cm^4	r	=	39.0 mm
Py =	275	N/mm²		x =	27.1		A	=	5890 mm²
D =	307	mm		t =	6.7	mm	Zy	=	108.3 cm³
Iyy =	897	cm^4							

Load						
Roof (plaster)	0.0	x	1.8	=	0.0	kN/m
Ground Floor	0.0	x	2.1	=	0.0	
First Floor	0.0	x	2.1	=	0.0	
Second Floor	0.0	x	2.1	=	0.0	
Wall	0.0	x	2.3	=	0.0	
Second F Part	0.0	x	0.5	=	0.0	
Swt				=	1.0	
			Total	=	1.00	kN/m
Pier load				=	78.77	

1.0 kN/m

1.8 1.75

39.4

41.1

Moment	=	wl²/8 + PL/4	=	**70.5**	**kNm**	x 1.5	=	**105.7 kNm**
Shear	=	wl/2 + P/2	=	**41.1**	**kN**	x 1.5	=	**61.7 kN**

Bending **Mc** = **198.7 kNm**

slenderness	=	Le / r	=	89.7		Pb =	275.0	N/mm²
Mb	=	Pb x s	=	**198.7**	**kNm**			**bending OK**
Shear capacity	=	0.6 x Py x d x t	=	**339**	**kN**			**shear OK**

deflection Equivalent UDL = 46.01 kN/m

total deflection = 5w l^4 / 384 E I = **4.4 mm**

allowable values deflection = span / 360 = **9.7 mm** **deflection OK**

Temporary Beam TB1 Use 305 x 165 x 46 UB

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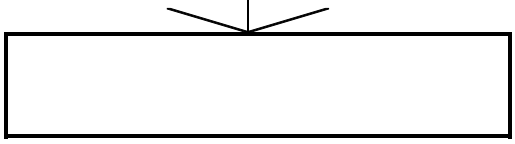
Job	**Flat 1, 190 Goldhurst Terrace London**	Job No.	**4013**
Client		Sheet	**16**
By	S.C.Green	Date:	Feb. 2016

Foundation P1

M = 0 kNm

187 kN



0.750 *0.750*

1.500

Size 1.5 x 1.5 x 0.60

0.60

Self weight = 32.4 kN

P = 98 kN/m²

Safe Bearing pressure = 150 kN/m²

Foundation satisfactory

Foundation P1
Use: 1.5m x 1.5m x 0.6m

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Job ***Flat 1, 190 Goldhurst Terrace London*** *Job No.* ***4013***

Client *Sheet* ***17***

By *S.C.Green* *Date:* *Feb. 2016*

Temporary Beam TB2 *Clear Span* = 3.000 m *Beam length* = 3.000 m
Left Bearing = 0 mm *Right Bearing* = 0 mm
Design Span = 3.000 m

try 1 / ***254 x 146 x 31 UB*** *Le* = 3.000 m *E* = 205 kN/mm²
s = 395.6 cm³ *I* = 4439 cm^4 *r* = 33.5 mm
Py = 275 N/mm² *x* = 29.4 *A* = 4000 mm²
D = 251 mm *t* = 6.1 mm *Zy* = 61.5 cm³
Iyy = 449 cm^4

Load							
	Roof (plaster)	0.0	x	1.8	=	0.0	kN/m
	Ground Floor	0.0	x	2.1	=	0.0	
	First Floor	0.0	x	2.1	=	0.0	
	Second Floor	0.0	x	2.1	=	0.0	
	Wall	0.0	x	2.3	=	0.0	
	Second F Part	0.0	x	0.5	=	0.0	
	Swt				=	1.0	
				Total	=	1.00	kN/m
	wall load				=	30.00	
		1.0	kN/m				

1.5 1.50
15.0
16.5

Moment = wl²/8 + PL/4 = ***23.6 kNm*** x 1.5 = ***35.4 kNm***

Shear = wl/2 + P/2 = ***16.5 kN*** x 1.5 = ***24.8 kN***

Bending ***Mc*** = ***108.8 kNm***

slenderness = Le / r = 89.6 *Pb* = 275.0 N/mm²

Mb = Pb x s = ***108.8 kNm*** ***bending OK***

Shear *capacity* = 0.6 x Py x d x t = ***253 kN*** ***shear OK***

deflection *Equivalent UDL* = 21.00 kN/m

total deflection = 5w l^4 / 384 E I = ***2.4 mm***

allowable values *deflection* = span / 360 = ***8.3 mm*** ***deflection OK***

Temporary Beam TB2 ***Use*** ***254 x 146 x 31 UB***

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Job **Flat 1, 190 Goldhurst Terrace London** Job No. **4013**

Client Sheet **18**

By S.C.Green Date: Feb. 2016

Beam B5 Clear Span = 3.000 m Beam length = 3.200 m
Left Bearing = 100 mm Right Bearing = 100 mm
Design Span = 3.100 m

try 2 / 203 x 203 x 46 UC Le = 3.100 m E = 205 kN/mm²
s = 497.4 cm³ I = 4564 cm^4 r = 51.1 mm
Py = 275 N/mm² x = 17.7 A = 5880 mm²
D = 203 mm t = 7.3 mm Zy = 151.5 cm³
Iyy = 1539 cm^4

Load							
	roof	3.00	x	1.5	=	4.5	kN/m
	ceiling	2.50	x	0.6	=	1.5	
	3rd floor	2.50	x	2.1	=	5.3	
	2nd floor	2.50	x	2.1	=	5.3	
	1st floor	2.50	x	2.1	=	5.3	
	walls	7.80	x	4.5	=	28.1	
	Swt				=	1.0	
				Total	=	50.83	kN/m
		50.8	kN/m				

78.79 78.79

Moment = wl²/8 = **61.1 kNm** x 1.5 = **91.6 kNm**

Shear = wl/2 = **78.8 kN** x 1.5 = **118.2 kN**

Bending **Mc** = **136.8 kNm**

slenderness = Le / r = 60.7 Pb = 275.0 N/mm²

Mb = Pb x s = **136.8 kNm** **bending OK**

Shear capacity = 0.6 x Py x d x t = **245 kN** **shear OK**

deflection Equivalent UDL = 50.83 kN/m

total deflection = 5w l^4 / 384 E I = **3.3 mm**

allowable values deflection = span / 360 = **8.6 mm** **deflection OK**

Beam B5 **Use 2/ 203 x 203 x 46 UC**

Bearing on Wall

Reaction = 118.2 kN Beam bearing = 100 mm

Masonry fk = 6.40 N/mm² local bearing factor = 1.50 γ_m = 3.5

max allowable on masonry = 2.74 N/mm²

padstone 100 mm wide = 431 mm wide

Padstone **450 long** **100 mm wide**
150 high

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Job **Flat 1, 190 Goldhurst Terrace London** | Job No. **4013**

Client | Sheet **19**

By S.C.Green | Date: Feb. 2016

Temporary Beam TB3 Clear Span = 3.000 m | Beam length = 3.000 m
Left Bearing = 0 mm | Right Bearing = 0 mm
Design Span = 3.000 m

try 2 / 254 x 146 x 31 UB Le = 3.000 m | E = 205 kN/mm²
s = 395.6 cm³ | I = 4439 cm^4 | r = 33.5 mm
Py = 275 N/mm² | x = 29.4 | A = 4000 mm²
D = 251 mm | t = 6.1 mm | Zy = 61.5 cm³
Iyy = 449 cm^4

Load						
Roof (plaster)	0.0	x	1.8	=	0.0	kN/m
Ground Floor	0.0	x	2.1	=	0.0	
First Floor	0.0	x	2.1	=	0.0	
Second Floor	0.0	x	2.1	=	0.0	
Wall	0.0	x	2.3	=	0.0	
Second F Part	0.0	x	0.5	=	0.0	
Swt				=	1.0	
			Total	=	1.00	kN/m

wall load = 111.26

1.0 kN/m

1.5 1.50

55.6
57.1

Moment = wl²/8 + PL/4 = **84.6 kNm** x 1.5 = **126.9 kNm**

Shear = wl/2 + P/2 = **57.1 kN** x 1.5 = **85.7 kN**

Bending **Mc** = **108.8 kNm**

slenderness = Le / r = 89.6 Pb = 275.0 N/mm²

Mb = Pb x s = **108.8 kNm** **bending OK**

Shear capacity = 0.6 x Py x d x t = **253 kN** **shear OK**

deflection Equivalent UDL = 75.17 kN/m

total deflection = 5w l^4 / 384 E I = **4.4 mm**

allowable values deflection = span / 360 = **8.3 mm** **deflection OK**

Temporary Beam TB3 Use 2/ 254 x 146 x 31 UB

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Job **Flat 1, 190 Goldhurst Terrace London** Job No. **4013**

Client Sheet **20**

By S.C.Green Date: Feb. 2016

Foundations

01 Front Wall

roof	3.00	x	1.5	=	4.5	kN/m	
ceiling	3.00	x	0.6	=	1.8		
3rd floor	0.00	x	2.1	=	0.0		
2nd floor	3.00	x	2.1	=	6.3		
1st floor	3.00	x	2.1	=	6.3		
ground floor	0.00	x	6.2	=	0.0		
walls	5.30	x	4.5	=	23.9		
Ground Beam	0.00	x	9.0	=	0.0		
Total load				***=***	***42.8***	***kN/m***	

Load on central pier

			on pier		load
bay window	=	2.8	1.4		25.99
pier	=	1.1	1.1		44.89
hall	=	1.80	0.9		17.01
			3.3	m	
Load	=				87.9
Beam B4	=		29.47		
total load	=		117.4	kN	

Load on left pier

			on pier		load
bay window	=	2.8	1.4		25.99
pier	=	0.5	0.5		21.38
			1.9	m	47.4
Load	=				
total load	=		47.4	kN	

02 Bay Wall

roof	1.00	x	1.5	=	1.5	kN/m	
ceiling	0.00	x	0.6	=	0.0		
3rd floor	0.00	x	2.1	=	0.0		
2nd floor	3.30	x	2.1	=	6.9		
1st floor	3.30	x	2.1	=	6.9		
ground floor	0.00	x	6.2	=	0.0		
walls	5.30	x	4.5	=	16.7		30% voids
Ground Beam	0.00	x	9.0	=	0.0		
Total load				***=***	***32.1***	***kN/m***	

Load on corner piers	1.80	x	32.1	=	57.7	kN

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Job **Flat 1, 190 Goldhurst Terrace London** Job No. **4013**

Client Sheet **21**

By S.C.Green Date: Feb. 2016

Temporary Beam TB4

Clear Span	=	2.500	m	Beam length	=	2.500	m
Left Bearing	=	0	mm	Right Bearing	=	0	mm
Design Span	=	2.500	m				

try 1 / 254 x 146 x 31 UB

Le	=	2.500	m				E	=	205 kN/mm²
s =	395.6	cm³		I =	4439	cm^4	r	=	33.5 mm
Py =	275	N/mm²		x =	29.4		A	=	4000 mm²
D =	251	mm		t =	6.1	mm	Zy	=	61.5 cm³
Iyy =	449	cm^4							

Load

Roof (plaster)	0.0	x	1.8	=	0.0	kN/m
Ground Floor	0.0	x	2.1	=	0.0	
First Floor	0.0	x	2.1	=	0.0	
Second Floor	0.0	x	2.1	=	0.0	
Wall	0.0	x	2.3	=	0.0	
Second F Part	0.0	x	0.5	=	0.0	
Swt				=	1.0	
			Total	=	1.00	kN/m

Pier load = 58.68

1.0 kN/m

1.3	1.75	0.75	1.3
17.6			41.1
18.9			42.3

Moment = = **31.5 kNm** x 1.5 = **47.2 kNm**

Shear = = **42.3 kN** x 1.5 = **63.5 kN**

Bending **Mc** = **108.8 kNm**

slenderness = Le / r = 74.6 Pb = 275.0 N/mm²

Mb = Pb x s = **108.8 kNm** **bending OK**

Shear capacity = 0.6 x Py x d x t = **253 kN** **shear OK**

deflection Equivalent UDL = 40.27 kN/m

total deflection = 5w l^4 / 384 E I = **2.3 mm**

allowable values deflection = span / 360 = **6.9 mm** **deflection OK**

Temporary Beam TB4 Use 254 x 146 x 31 UB

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Job **Flat 1, 190 Goldhurst Terrace London** Job No. **4013**

Client Sheet **22**

By S.C.Green Date: Feb. 2016

Temporary Beam TB5

Clear Span	=	2.400	m		Beam length	=	2.400	m
Left Bearing	=	0	mm		Right Bearing	=	0	mm
Design Span	=	2.400	m					

try 1 / 203 x 133 x 25 UB

Le	=	2.400	m					E	=	205	kN/mm²
s =	259.8	cm³		I =	2356	cm^4		r	=	31.0	mm
Py =	275	N/mm²		x =	25.4			A	=	3230	mm²
D =	203	mm		t =	5.8	mm		Zy	=	46.4	cm³
Iyy =	310	cm^4									

Load

Roof (plaster)	0.0	x	1.8	=	0.0	kN/m
Ground Floor	0.0	x	2.1	=	0.0	
First Floor	0.0	x	2.1	=	0.0	
Second Floor	0.0	x	2.1	=	0.0	
Wall	0.0	x	2.3	=	0.0	
Second F Part	0.0	x	0.5	=	0.0	
Swt				=	1.0	
			Total	=	1.00	kN/m
Pier load				=	57.70	

1.0 kN/m

1.2	1.75	0.65	1.2
15.6			42.1
16.8			43.3

Moment = = **27.9 kNm** x 1.5 = **41.9 kNm**

Shear = = **43.3 kN** x 1.5 = **64.9 kN**

Bending **Mc** = **71.4 kNm**

slenderness = Le / r = 77.4 Pb = 275.0 N/mm²

Mb = Pb x s = **71.4 kNm** **bending OK**

Shear capacity = 0.6 x Py x d x t = **194 kN** **shear OK**

deflection Equivalent UDL = 38.77 kN/m

total deflection = 5w l^4 / 384 E I = **3.5 mm**

allowable values deflection = span / 360 = **6.7 mm** **deflection OK**

Temporary Beam TB5 Use 203 x 133 x 25 UB

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Job **Flat 1, 190 Goldhurst Terrace London** Job No. **4013**

Client Sheet **23**

By S.C.Green Date: Feb. 2016

Temporary Beam TB6

Clear Span	=	2.500	m	Beam length	=	2.500	m
Left Bearing	=	0	mm	Right Bearing	=	0	mm
Design Span	=	2.500	m				

try 1 / 254 x 146 x 31 UB

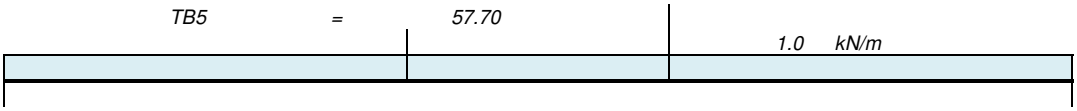
Le	=	2.500	m				E	=	205 kN/mm²
s =	395.6	cm³		I =	4439	cm^4	r	=	33.5 mm
Py =	275	N/mm²		x =	29.4		A	=	4000 mm²
D =	251	mm		t =	6.1	mm	Zy	=	61.5 cm³
Iyy =	449	cm^4							

Load

Roof (plaster)	0.0	x	1.8	=	0.0	kN/m
Ground Floor	0.0	x	2.1	=	0.0	
First Floor	0.0	x	2.1	=	0.0	
Second Floor	0.0	x	2.1	=	0.0	
Wall	0.0	x	2.3	=	0.0	
Second F Part	0.0	x	0.5	=	0.0	
Swt				=	1.0	
			Total	=	1.00	kN/m

Pier load = 58.68

TB5 = 57.70



1.3	0.75	1.00	0.75	1.3
40.4				17.3
17.6				41.1
59.2				59.6

Moment	=		=	**44.4 kNm**	x 1.5	=	**66.7 kNm**	
Shear	=		=	**59.6 kN**	x 1.5	=	**89.5 kN**	

Bending **Mc** = **108.8 kNm**

slenderness = Le / r = 74.6 Pb = 275.0 N/mm²

Mb = Pb x s = **108.8 kNm** **bending OK**

Shear capacity = 0.6 x Py x d x t = **253 kN** **shear OK**

deflection Equivalent UDL = 56.89 kN/m

total deflection = 5w l^4 / 384 E I = **3.2 mm**

allowable values deflection = span / 360 = **6.9 mm** **deflection OK**

Temporary Beam TB6 Use 254 x 146 x 31 UB

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Job **Flat 1, 190 Goldhurst Terrace London** Job No. **4013**

Client Sheet **24**

By S.C.Green Date: Feb. 2016

Temporary Beam TB7

Clear Span	=	3.800	m	Beam length	=	3.800	m
Left Bearing	=	0	mm	Right Bearing	=	0	mm
Design Span	=	3.800	m				

try 1 / 305 x 165 x 46 UB

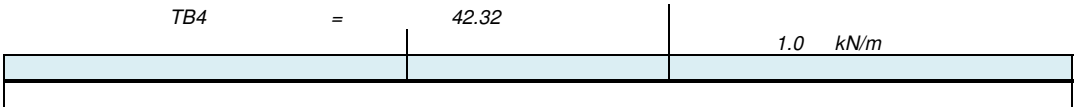
Le	=	1.950	m				E	=	205 kN/mm²
s =	722.7	cm³		I =	9948	cm^4	r	=	39.0 mm
Py =	275	N/mm²		x =	27.1		A	=	5890 mm²
D =	307	mm		t =	6.7	mm	Zy	=	108.3 cm³
Iyy =	897	cm^4							

Load

Roof (plaster)	0.0	x	1.8	=	0.0	kN/m
Ground Floor	0.0	x	2.1	=	0.0	
First Floor	0.0	x	2.1	=	0.0	
Second Floor	0.0	x	2.1	=	0.0	
Wall	0.0	x	2.3	=	0.0	
Second F Part	0.0	x	0.5	=	0.0	
Swt				=	1.0	
			Total	=	1.00	kN/m

TB6 = 59.63

TB4 = 42.32



1.9	1.20	0.65	1.95	1.9
29.0				13.4
30.6				29.0
61.5				44.3

Moment = = **84.5 kNm** x 1.5 = **126.7 kNm**

Shear = = **44.3 kN** x 1.5 = **66.4 kN**

Bending **Mc** = **198.7 kNm**

slenderness = Le / r = 50.0 Pb = 275.0 N/mm²

Mb = Pb x s = **198.7 kNm** **bending OK**

Shear capacity = 0.6 x Py x d x t = **339 kN** **shear OK**

deflection Equivalent UDL = 46.80 kN/m

total deflection = 5w l^4 / 384 E I = **6.2 mm**

allowable values deflection = span / 360 = **10.6 mm** **deflection OK**

Temporary Beam TB7 Use 305 x 165 x 46 UB

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Job **Flat 1, 190 Goldhurst Terrace London** Job No. **4013**

Client Sheet **25**

By S.C.Green Date: Feb. 2016

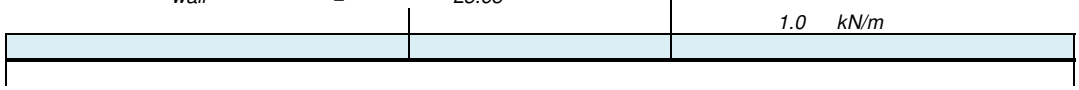
Temporary Beam TB8

Clear Span	=	3.850	m	Beam length	=	3.850	m
Left Bearing	=	0	mm	Right Bearing	=	0	mm
Design Span	=	3.850	m				

try 1 / 305 x 165 x 46 UB

Le	=	1.350	m				E	=	205 kN/mm²
s =	722.7	cm³		I =	9948	cm^4	r	=	39.0 mm
Py =	275	N/mm²		x =	27.1		A	=	5890 mm²
D =	307	mm		t =	6.7	mm	Zy	=	108.3 cm³
Iyy =	897	cm^4							

Load						
Roof (plaster)	0.0	x	1.8	=	0.0	kN/m
Ground Floor	0.0	x	2.1	=	0.0	
First Floor	0.0	x	2.1	=	0.0	
Second Floor	0.0	x	2.1	=	0.0	
Wall	0.0	x	2.3	=	0.0	
Second F Part	0.0	x	0.5	=	0.0	
Swt				=	1.0	
			Total	=	1.00	kN/m
bay pier				=	28.85	
wall	=	23.68				



1.9	1.60	0.90	1.35	1.9
13.8				9.8
10.1				18.7
25.9				30.5

Moment	=		=	**40.3 kNm**	x 1.5	=	**60.4 kNm**	
Shear	=		=	**30.5 kN**	x 1.5	=	**45.8 kN**	
Bending		**Mc**	=	**198.7 kNm**				
slenderness	=	Le / r	=	34.6	Pb =	275.0	N/mm²	
Mb	=	Pb x s	=	**198.7 kNm**			**bending OK**	
Shear capacity	=	0.6 x Py x d x t	=	**339 kN**			**shear OK**	
deflection Equivalent UDL	=	21.73 kN/m						
total deflection	=	5w l^4 / 384 E I	=	**3.0 mm**				
allowable values deflection	=	span / 360	=	**10.7 mm**			**deflection OK**	

Temporary Beam TB8 Use 305 x 165 x 46 UB

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Job **Flat 1, 190 Goldhurst Terrace London** Job No. **4013**

Client Sheet **26**

By S.C.Green Date: Feb. 2016

Temporary Beam TB9

Clear Span	=	3.850	m	Beam length	=	3.850	m
Left Bearing	=	0	mm	Right Bearing	=	0	mm
Design Span	=	3.850	m				

try 1 / 254 x 146 x 31 UB

Le	=	3.850	m				E	=	205 kN/mm²
s =	395.6	cm³		I =	4439	cm^4	r	=	33.5 mm
Py =	275	N/mm²		x =	29.4		A	=	4000 mm²
D =	251	mm		t =	6.1	mm	Zy	=	61.5 cm³
Iyy =	449	cm^4							

Load						
Roof (plaster)	0.0	x	1.8	=	0.0	kN/m
Ground Floor	0.0	x	2.1	=	0.0	
First Floor	0.0	x	2.1	=	0.0	
Second Floor	0.0	x	2.1	=	0.0	
Wall	0.0	x	2.3	=	0.0	
Second F Part	0.0	x	0.5	=	0.0	
Swt				=	1.0	
			Total	=	1.00	kN/m
Pier load				=	28.85	

1.0 kN/m

1.9	2.45		1.40	1.9
10.5				18.4
12.4				20.3

Moment	=		=	**27.4**	**kNm**	x 1.5	=	**41.1 kNm**
Shear	=		=	**20.3**	**kN**	x 1.5	=	**30.4 kN**

Bending			**Mc**	=	**108.8**	**kNm**		
	slenderness	=	Le / r	=	114.9		Pb = 275.0	N/mm²
	Mb	=	Pb x s	=	**108.8**	**kNm**		**bending OK**
Shear	capacity	=	0.6 x Py x d x t	=	**253**	**kN**		**shear OK**
deflection	Equivalent UDL	=	14.80	kN/m				
	total deflection	=	5w l^4 / 384 E I	=	**4.7**	**mm**		
allowable values	deflection	=	span / 360	=	**10.7**	**mm**		**deflection OK**

Temporary Beam TB9 Use 254 x 146 x 31 UB

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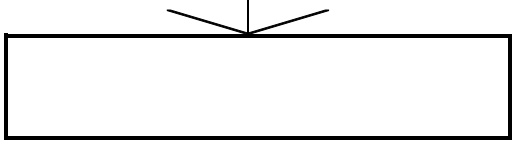
Job	***Flat 1, 190 Goldhurst Terrace London***	*Job No.*	***4013***
Client		*Sheet*	***27***
By	*S.C.Green*	*Date:*	*Feb. 2016*

Foundation P2

M = 0 kNm

117 kN



0.750 *0.750*
1.500

Size 0.9 x 1.5 x 0.60

0.60

Self weight = 19.4 kN

P = 101 kN/m²

Safe Bearing pressure = 150 kN/m²

Foundation satisfactory

Foundation P2
Use: 1.5m x 1.5m x 0.6m

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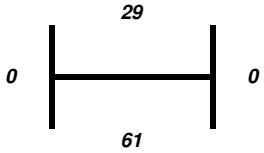
Job **Flat 1, 190 Goldhurst Terrace London** | Job No. **4013**

Client | Sheet **28**

By S.C.Green | Date: Feb. 2016

Column C4 Height 2.700

Loads



Column carries **1** **roof**

lowest Section	Moment Mx	0.05	x	0	=	**0.0**	**kNm**	x	1.5	=	0.0	kNm
	Moment My	0.08	x	47	=	**3.5**	**kNm**	x	1.5	=	5.2	kNm
	Axial				=	**92**	**kN**	x	1.5	=	137.8	kN
	length	=	2.700	m	to centre line of beams							

try 1 / **100 x 150 x 6** **RHS** Le = 0.000 m

Wt = 22.4 kg/m

s =	107.8	cm³	I =	466.3	cm^4	E =	205	kN/mm²
Py =	275	N/mm²	x =	0		r =	55.7	mm
D =	100	mm	t =	6.0	mm	A =	2856	mm²
sy =	144	cm³	Iyy =	885.2	cm^4	Zy =	93.26	cm³
			Mc =	**29.7**	**kNm**	B =	150	mm

check lowest section

for buckling	slenderness	=	0.5 Le / r	=	24.2		Pb =	275	N/mm^2			
for compression	slenderness	=	Le / r	=	48.5		pc =	251	N/mm^2			
	Mb	=	Pb x s	=	**30**	**kNm**						
	Pc	=	Pc x A	=	**717**	**kN**						

Combined Stress

$$\frac{138}{717} + \frac{1.00 \times 0}{30} + \frac{1.00 \times 5}{26} =$$

0.19 + 0.00 + 0.20 = 0.40 **combined stress OK**

Column C4	**Use 100 x 150 x 6**

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Job **Flat 1, 190 Goldhurst Terrace London** | Job No. **4013**

Client | Sheet **29**

By S.C.Green | Date: Feb. 2016

Temporary Beam TB2

Clear Span	=	1.400	m	Beam length	=	1.400	m
Left Bearing	=	0	mm	Right Bearing	=	0	mm
Design Span	=	1.400	m				

try 1 / 178 x 102 x 19 UB

Le	=	1.400	m				E	=	205 kN/mm²
s =	171	cm³		I =	1360	cm^4	r	=	23.9 mm
Py =	275	N/mm²		x =	23.9		A	=	2420 mm²
D =	178	mm		t =	4.7	mm	Zy	=	27.3 cm³
Iyy =	138	cm^4							

Load						
Roof (plaster)	0.0	x	1.8	=	0.0	kN/m
Ground Floor	0.0	x	2.1	=	0.0	
First Floor	0.0	x	2.1	=	0.0	
Second Floor	0.0	x	2.1	=	0.0	
Wall	0.0	x	2.3	=	0.0	
Second F Part	0.0	x	0.5	=	0.0	
Swt				=	1.0	
			Total	=	1.00	kN/m
wall load				=	50.00	

1.0 kN/m

0.7 0.70

25.0

25.7

Moment	=	wl²/8 + PL/4	=	**17.7**	**kNm**	x 1.5	=	**26.6 kNm**
Shear	=	wl/2 + P/2	=	**25.7**	**kN**	x 1.5	=	**38.6 kN**

Bending			**Mc**	=	**47.0**	**kNm**		
slenderness	=	Le / r	=	58.6		Pb =	275.0	N/mm²
Mb	=	Pb x s	=	**47.0**	**kNm**			**bending OK**
Shear capacity	=	0.6 x Py x d x t	=	**138**	**kN**			**shear OK**
deflection Equivalent UDL	=	72.43 kN/m						
total deflection	=	5w l^4 / 384 E I	=	**1.3**	**mm**			
allowable values deflection	=	span / 360	=	**3.9**	**mm**			**deflection OK**

Temporary Beam TB2 Use 178 x 102 x 19 UB

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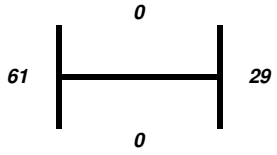
Job **Flat 1, 190 Goldhurst Terrace London** Job No. **4013**

Client Sheet **30**

By S.C.Green Date: Feb. 2016

Column C2 + C3 *Height 2.700*

Loads



lowest Section	*Moment Mx*	*0.05*	*x*	*61*	*=*	***3.1***	***kNm***	*x*	*1.5*	*=*	*4.6*	*kNm*
	Moment My	*0.05*	*x*	*0*	*=*	***0.0***	***kNm***	*x*	*1.5*	*=*	*0.0*	*kNm*
	Axial				*=*	***92***	***kN***	*x*	*1.5*	*=*	*137.8*	*kN*
	length	*=*	*2.700*	*m*	*to centre line of beams*							

try 1 / 100 x 100 x 4	***RHS***	*Le*	*=*	*0.000*	*m*			
Wt = 12.1 kg/m	*s =*	*55.3*	*cm³*	*I =*	*236.3*	*cm^4*	*E =*	*205*	*kN/mm²*
	Py =	*275*	*N/mm²*	*x =*	*0*		*r =*	*39.2*	*mm*
	D =	*100*	*mm*	*t =*	*4.0*	*mm*	*A =*	*1536*	*mm²*
	sy =	*55*	*cm³*	*Iyy =*	*236.3*	*cm^4*	*Zy =*	*47.27*	*cm³*
				Mc	*=*	***15.2*** ***kNm***	*B =*	*100*	*mm*

check lowest section

for buckling	*slenderness*	*=*	*0.5 Le / r*		*=*	*34.4*		*Pb =*	*275*	*N/mm^2*
for compression	*slenderness*	*=*	*Le / r*		*=*	*68.8*		*pc =*	*224*	*N/mm^2*
	Mb	*=*	*Pb x s*		*=*	***15***	***kNm***			
	Pc	*=*	*Pc x A*		*=*	***344***	***kN***			

Combined Stress

$$\frac{138}{344} + \frac{1.00 \times 5}{15} + \frac{1.00 \times 0}{13} =$$

0.40 + 0.30 + 0.00 = 0.70 ***combined stress OK***

Column C2 + C3 Use 100 x 100 x 4