

APPENDIX G

GWALL Output

REPORT NOTES

Equipment Used

Hand tools, Mechanical Concrete Breaker and Spade, Hand Augers, 100mm/150mm diameter Mechanical Flight Auger Rig, GEO205 Flight Auger Rig, Window Sampling Rig, and Large or Limited Access Shell & Auger Rig upon request and/or access permitting.

On Site Tests

By Pilcon Shear-Vane Tester (Kn/m^2) in clay soils, and/or Mackintosh Probe in granular soils or made ground and/or upon request Continuous Dynamic Probe Testing and Standard Penetration Testing.

Note:

Details reported in trial-pits and boreholes relate to positions investigated only as instructed by the client or engineer on the date shown.

We are therefore unable to accept any responsibility for changes in soil conditions not investigated i.e. variations due to climate, season, vegetation and varying ground water levels.

Full terms and conditions are available upon request.

Chelmer Site Investigations

Unit 15 East Hanningfield Industrial Estate
Old Church Road, East Hanningfield, Essex CM3 8AB
Telephone: 01245 400930 Fax: 01245 400933

Email: info@siteinvestigations.co.uk Website: www.siteinvestigations.co.uk

Client: Cranbrook Basements		Scale: N.T.S.		Sheet No: 1 of 1		Weather: Fine		Date: 19.10.11	
Site: 4 Hampstead Square, London NW3		Job No: 2829		Borehole No: 1		Boring method: Hand auger			
Depth Mtrs.	Description of Strata	Thick-ness	Legend	Sample	Test Type	Result	Root Information	Depth to Water	Depth Mtrs
G.L. 0.1	Turf over TOPSOIL	0.1							
0.7	MADE GROUND: medium compact mid brown clayey silty fine and medium sand with brick and clinker fragments and lenses of clay.	0.6		D			Hair and fibrous roots to 1.1m.		0.5
	Medium dense light to mid brown clayey silty fine and medium SAND with lenses of clay.	1.1		D	M	14 16 16 18	No roots observed below 1.1m.		1.0
D				M	18 20 20 23	1.5			
1.8				D	M	21 23 23 27			2.0
				D	M	27 28 30 32			2.5
4.3	Medium dense light brown/beige clayey silty fine SAND.	2.5		D	M	28 30 31 33			3.0
		D		M	30 32 33 35			3.5	
4.3				D	M	32 34 35 38		4.3	4.0
	Medium dense wet as above.	0.5		D	M	34 37 40 42			4.5
4.8				D	M	40 42 44 44			5.0
	Stiff/medium dense to dense mid brown/orange laminated CLAY SILT and fine SAND.	2.5		D	M	42 44 46 46			5.5
6.0				D	M	44 46 48 49			6.0
	Borehole ends at 6.0m								
Drawn by: JG		Approved by: ME		Key: T.D.T.D. Too Dense to Drive					
Remarks: Water seepage at 4.3m. Borehole moist at base and open on completion.				D Small Disturbed Sample		J Jar Sample			
				B Bulk Disturbed Sample		V Pilcon Vane (kPa)			
				U Undisturbed Sample (U100)		M Mackintosh Probe			
				W Water Sample		N Standard Penetration Test Blow Count			

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Client: Cranbrook Basements	Scale: N.T.S.	Sheet: 1 of 1	Date: 19.10.11	
Location: 4 Hampstead Square, London NW3	Job No: 2829	Weather: Fine	Drawn by: JG	Checked by: ME

The site plan shows a property layout with the following features and dimensions:

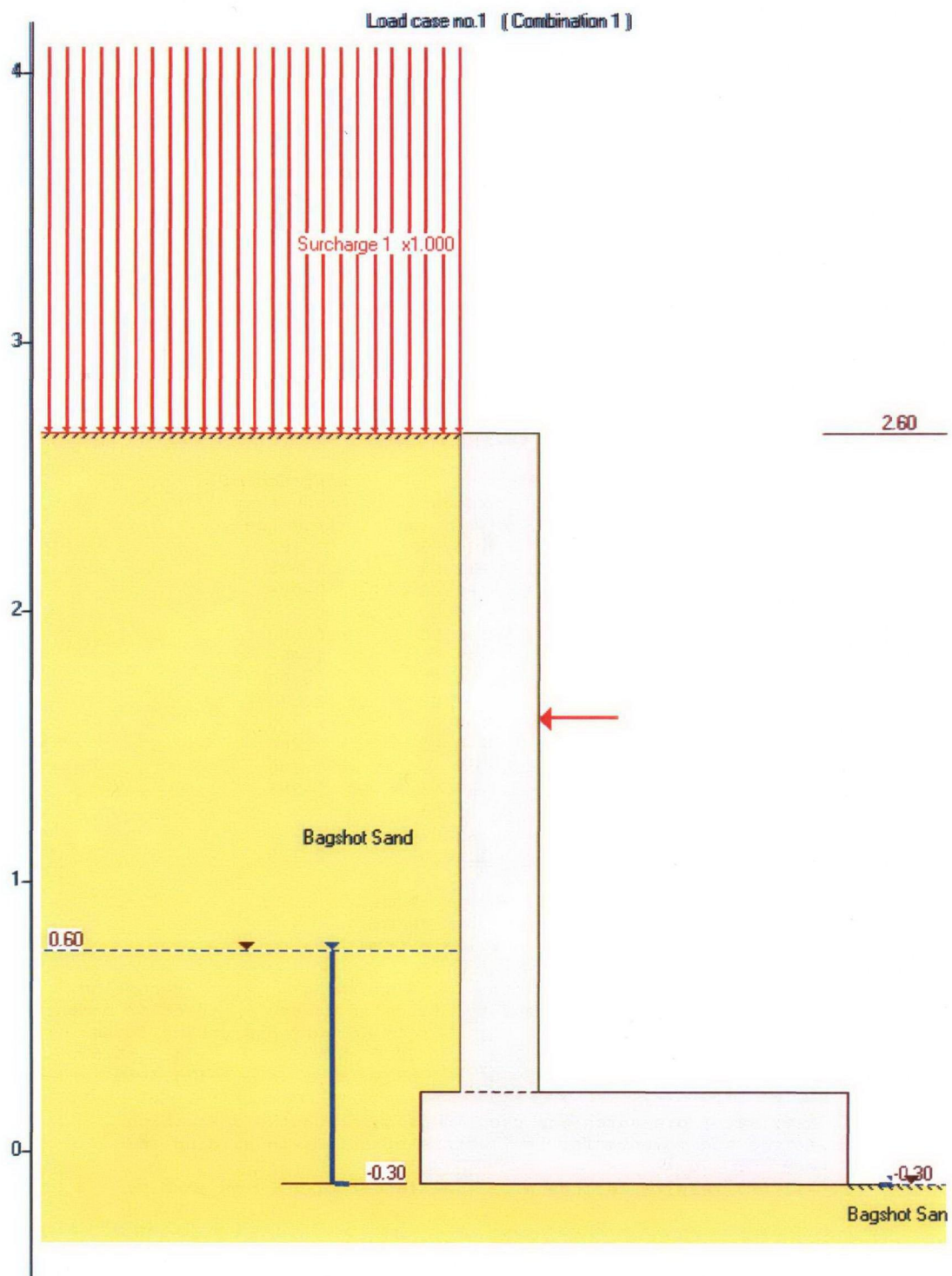
- NO.4 X2**: Located in the upper central part of the plan.
- S/S**: Two soakaway locations, one in the upper right and one in the middle right.
- PORCH**: A rectangular feature in the middle left.
- DECKING**: A feature in the middle right, adjacent to the soakaway.
- PAVED PATH**: A curved path on the left side.
- SYCAMORE (Ht.22m)**: A tree located on the far left, connected to the paved path by a line.
- BH1**: A borehole located in the middle right, with dimensions of 2.5m and 1.5m indicated.
- FRONT LAWN**: A large area at the bottom of the plan.
- 11m**: A dimension line connecting the sycamore tree to the borehole.

Notes:	Key:
On site tree identification for guidance only. Not authenticated.	Tree/Shrub
	Borehole
	Trial Pit
	Gully
	Tree Stump
	Rain Water/Soil Pipe
	Manhole

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Program: GWALL Version 3.01 Revision A02.B02.R35
Licensed from GEOSOLVE
Run ID. Party Wall
4 Hampstead Square
Party Wall - Wall F Underpin D

Sheet No.
Job No. CG5919
Made by : RDB
Date: 27-02-2012
Checked :

Units: kN,m



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Run ID: Party Wall
 4 Hampstead Square
 Party Wall - Wall F Underpin D

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Ultimate Limit State Analysis - STABILITY

Load Case No.1

Load case description: Combination 1

Surcharge Nos. 1 apply with a Partial factor = 1.00
 Partial factor on Anchor force = 1.00

Horizontal forces

	Force kN/m run	Moment kN.m/m run	Height above base	Elevation
Active soil	37.95	47.71	1.257	0.957
Active water	4.05	1.22	0.300	-0.000
Passive soil	0.00	0.00	0.000	-0.300
Passive water	0.00	0.00	0.000	-0.300
Load on top of wall	0.00	0.00	2.900	2.600
Anchor force	-50.00	-90.00	1.800	1.500
Nett horizontal load	-8.00	-41.07	5.137	4.837
Base shear resistance	-24.72	0.00		
Shear key resistance	0.00	0.00		
Total sliding resistance	-24.72	0.00		

Vertical forces

	Force kN/m run	Moment kN.m/m run	Distance of resultant from toe
Wall weight	33.56	-37.73	1.124
Fill above heel	7.73	-12.18	1.575
Fill above toe	0.00	-0.00	0.000
Water above heel	0.00	-0.00	0.000
Water above toe	0.00	-0.00	0.000
Active wall friction	17.15	-28.30	1.650
Passive wall friction	0.00	0.00	0.00
Surcharges	4.50	-7.09	1.575
Load on top of wall	0.00	-0.00	1.350
Anchor force	0.00	-0.00	1.200
Uplift water pressure	-7.43	8.17	1.100
Nett vertical load	55.52	-77.13	1.389
Moment applied to wall		0.00	
Moment of horiz. loads		-41.07	
Soil reaction on base	-55.52	118.20	2.129

Soil contact pressure at toe -125.9 kN/m²
 Soil contact pressure at X = 1.650 193.2 kN/m²
 Line of action of resultant 2.129 m from toe

	Factor of safety	Disturbing force or moment	Restoring force or moment
Sliding stability (base shear)		*** No nett disturbing force	
Sliding stability (base+passive)	1.779	42.0 kN/m	-74.7 kN/m
Overturning stability	3.070	57.1 /m	-175.3 /m

- Notes
1. Nett water pressures are used in calculating the disturbing forces and moments for the factors of safety on sliding and overturning.
 2. All ULS results include a partial factor of 1.00 on passive.

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Run ID. South section

4 Hampstead Square

South Section - Wall G Underpin E

| Sheet No.

|

| Job No. CG5919

| Made by : RDB

| Date:27-02-2012

| Checked :

Units: kN,m

INPUT DATA

SOIL PROFILE

----- Active side -----			----- Passive side -----		
Stratum no.	Elevation of top of stratum	Soil type	Stratum no.	Elevation of top of stratum	Soil type
1	2.60	1	1	-0.30	1

SOIL PROPERTIES

----- Soil type -----		Bulk unit wt.		Strength parameters		Active
No.	Description	above GWL kN/m3	below GWL kN/m3	Phi deg.	Cohesion kN/m2	pressure due to compaction kN/m2
1	Bagshot Sand	20.00	21.00	34.00	0.00	0.00
2	Passive soil	18.00	20.00	30.00	0.00	0.00
3	Foundation soil	20.00	21.00	34.00	10.00	0.00

----- Active earth pressure coefficients -----						
----- ULS parameters -----			----- SLS parameters -----			
---- for Stability calcs. ---			---- for Moment calcs. ----			
-- Soil type --			Wall friction		Wall friction	
No.	Description	Ka	Kac	coefficient	Ka	Kac
1	Bagshot Sand	0.237	1.131	0.67	0.500	0.000
2	Passive soil	0.292	1.226	0.50	0.500	0.000
3	Foundation..	0.245	1.119	0.50	0.500	0.000

----- Passive earth pressure coefficients -----						
----- ULS parameters -----			----- SLS parameters -----			
---- for Stability calcs. ---			---- for Moment calcs. ----			
-- Soil type --			Wall friction		Wall friction	
No.	Description	Kp	Kpc	coefficient	Kp	Kpc
1	Bagshot Sand	3.537	3.761	0.00	1.500	0.000
2	Passive soil	4.701	6.411	0.67	1.500	0.000
3	Foundation..	6.204	7.715	0.67	1.500	0.000

GROUND WATER CONDITIONS

Density of water = 10.00 kN/m3

	Active side	Passive side
Water table elevation	0.60	-0.30
Piezometric elevation at base elev.	0.60	-0.30

WALL PROPERTIES

Backfill angle behind wall =	0.00 degs
Unit weight of wall =	25.00 kN/m3
Elevation of base of wall =	-0.300
Elevation of top of wall =	2.600
Width of base of stem =	0.330 m
Width of top of stem =	0.330 m
Batter angle of back of wall =	0.00 degs
Thickness of base of wall =	0.350 m
Width of heel of wall =	0.000 m
Width of toe of wall =	1.520 m
Depth of shear key =	0.000 m
Width of shear key =	0.000 m
Distance from toe to front of shear key =	0.000 m
Friction on base of wall =	24.00 degs
Adhesion on base of wall =	0.00 kN/m2

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Run ID. Party Wall

4 Hampstead Square

Party Wall - Wall F Underpin D

| Sheet No.

| Job No. CG5919

| Made by : RDB

| Date:27-02-2012

| Checked :

Units: kN,m

SUMMARY RESULTS

Load Case No.	Sliding stability (base shear) FoS	Sliding stability (base + passive) Fos	Overturning stability Fos	Contact press. at toe kN/m2	Distance of resultant from toe m
1	-----	1.779	3.070	-125.90	2.13

- Notes
1. Nett water pressures are used in calculating the disturbing forces and moments for the factors of safety on sliding and overturning.
 2. All ULS results include a partial factor of 1.00 on passive.

----- Stem -----				----- Base -----			
Load - Bending moment-		-- Shear force --		- Bending moment-		-- Shear force --	
Case No.	maximum kN.m/m	minimum kN.m/m	maximum kN/m	minimum kN/m	maximum kN.m/m	minimum kN.m/m	maximum kN/m
1	10.12	-4.76	22.40	-27.60	1.58	-2.79	18.88

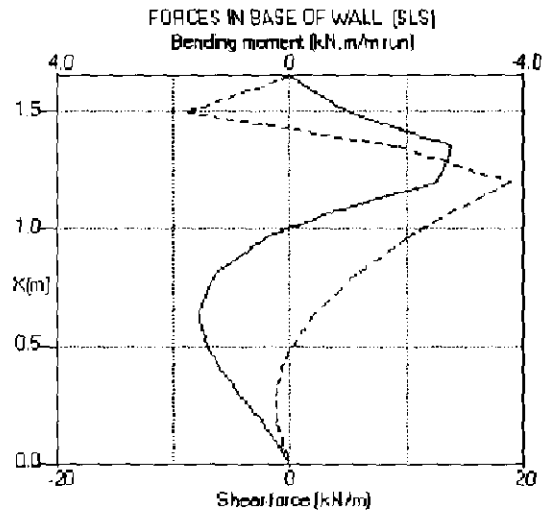
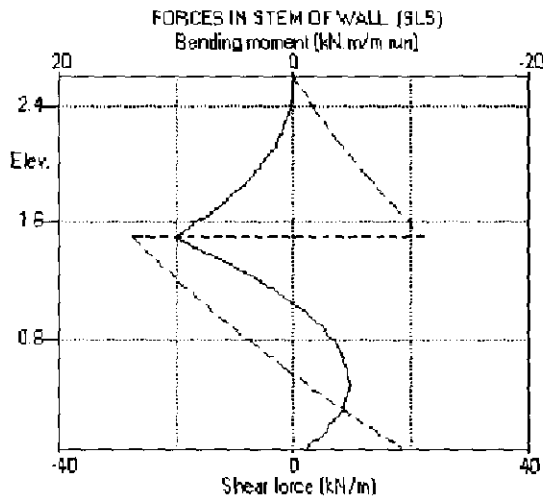
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Run ID: Party Wall
4 Hampstead Square
Party Wall - Wall F Underpin D

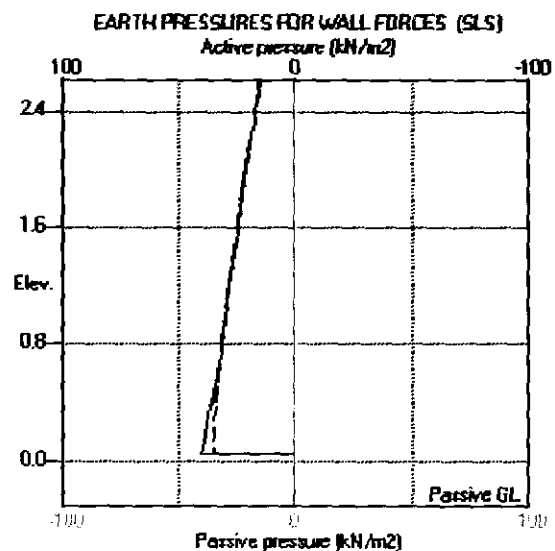
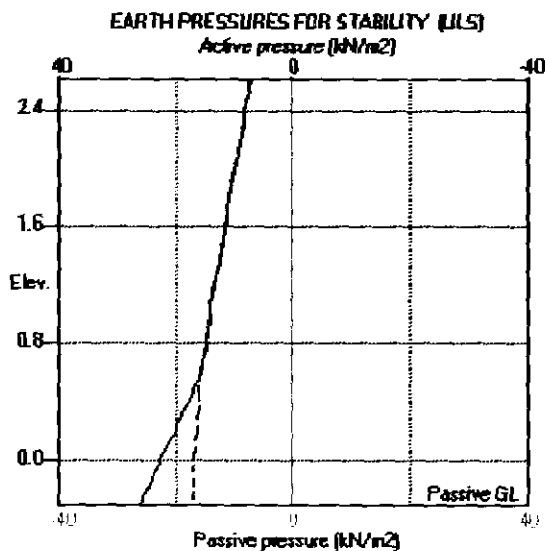
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Load case no.1



Load case no.1



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4 Hampstead Square
Party Wall - Wall F Underpin D

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Serviceability Limit State Analysis - BENDING MOMENTS

Load Case No.1

Forces in stem of wall

Elevation	Shear force kN/m run	Axial force kN/m run	Bending moment kN.m/m run
2.600	0.00	0.00	0.00
2.380	3.54	2.84	0.20
2.160	7.56	5.85	1.21
1.920	12.49	9.31	3.36
1.710	17.24	12.49	6.23
1.500	22.40	15.80	10.12
	-27.60	15.80	10.12
1.350	-23.67	18.25	6.08
1.200	-19.55	20.77	2.63
0.960	-12.57	24.92	-1.59
0.780	-7.01	28.15	-3.64
0.600	-1.20	31.46	-4.68
0.463	3.48	34.07	-4.76
0.325	8.40	36.76	-4.20
0.188	13.59	39.54	-2.95
0.050	19.03	42.40	-0.98

Forces along base of wall

Distance from toe m	Shear force kN/m run	Bending moment kN.m/m run
1.650	0.00	0.00
1.500	-8.84	-0.98
1.350	9.44	-2.79
1.200	18.88	-2.52
1.080	14.12	-0.79
0.960	10.00	0.41
0.800	5.49	1.31
0.640	2.13	1.58
0.480	-0.11	1.40
0.320	-1.21	0.96
0.160	-1.17	0.43
0.000	0.00	0.00

*** SLS results do NOT include a partial factor on passive.

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 4 Hampstead Square
 Party Wall - Wall F Underpin D

| Sheet No.
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 | Job No. CG5919
 | Made by : RDB
 | Date:27-02-2012
 | Checked :

Units: kN,m

Serviceability Limit State Analysis - BENDING MOMENTS **Load Case No.1**
Load case description: Combination 1

Surcharge Nos. 1 apply with a Partial factor = 1.00
 Partial factor on Anchor force = 1.00

Forces on Base for Calculating Bending Moments

Horizontal forces	Force	Moment	Height	Elevation
-----	kN/m run	kN.m/m run	above base	
Shear on heel	0.00	0.00	0.35	0.05
Shear on toe	0.00	0.00	0.35	0.05
Shear at base of stem	19.03	6.66	0.35	0.05
Nett horizontal force	19.03	6.66	0.35	0.05

Components of sliding resistance	
Base shear	-22.00
Shear key	0.00
Total sliding resistance	-22.00

Vertical forces	Force	Moment	Distance of
-----	kN/m run	kN.m/m run	resultant
Components of dead load			from toe
Weight on heel	0.00	-2.57	0.00
Weight on toe	0.00	0.00	0.00
Stem load	42.40	-57.25	1.35
Weight of base	14.44	-11.91	0.83
Total dead load	56.84	-69.16	1.22
Uplift water pressure	-7.43	8.17	1.10
Nett vertical force	49.42	-60.99	1.23
Moment at base of stem		-0.98	
Moment of horiz. forces		6.66	
Soil reaction on base	-49.42	55.31	1.12

Base contact pressures

Soil contact pressure at toe	-2.1 kN/m2
Soil contact pressure at X = 1.65	62.0 kN/m2
Line of action of resultant	1.12 m from toe

*** SLS results do NOT include a partial factor on passive.

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 4 Hampstead Square
 Party Wall - Wall F Underpin D

| Sheet No.
 |
 | Job No. CG5919
 | Made by : RDB
 | Date: 27-02-2012
 | Checked :

Units: kN,m

Ultimate Limit State Analysis - STABILITY

Load Case No.1

Earth pressures on vertical planes through heel and toe of wall

Elevation	---- Active pressures ----				---- Passive pressures ----			
	Soil type	Water kN/m2	Vert. kN/m2	Active kN/m2	Soil type	Water kN/m2	Vert. kN/m2	Passive kN/m2
2.600	1	0.00	30.00	7.12	0	0.00	0.00	0.00
2.380	1	0.00	34.39	8.16	0	0.00	0.00	0.00
2.160	1	0.00	38.72	9.19	0	0.00	0.00	0.00
1.920	1	0.00	43.33	10.28	0	0.00	0.00	0.00
1.710	1	0.00	47.24	11.21	0	0.00	0.00	0.00
1.500	1	0.00	51.02	12.11	0	0.00	0.00	0.00
1.350	1	0.00	53.65	12.73	0	0.00	0.00	0.00
1.200	1	0.00	56.22	13.34	0	0.00	0.00	0.00
0.960	1	0.00	60.23	14.29	0	0.00	0.00	0.00
0.780	1	0.00	63.18	14.99	0	0.00	0.00	0.00
0.600	1	0.00	66.10	15.69	0	0.00	0.00	0.00
0.463	1	1.37	67.07	15.92	0	0.00	0.00	0.00
0.325	1	2.75	68.03	16.14	0	0.00	0.00	0.00
0.188	1	4.13	68.99	16.37	0	0.00	0.00	0.00
0.050	1	5.50	69.95	16.60	0	0.00	0.00	0.00
-0.125	1	7.25	71.18	16.89	0	0.00	0.00	0.00
-0.300	1	9.00	72.41	17.18	0	0.00	0.00	0.00

Serviceability Limit State Analysis - BENDING MOMENTS

Earth pressures normal to the stem of the wall

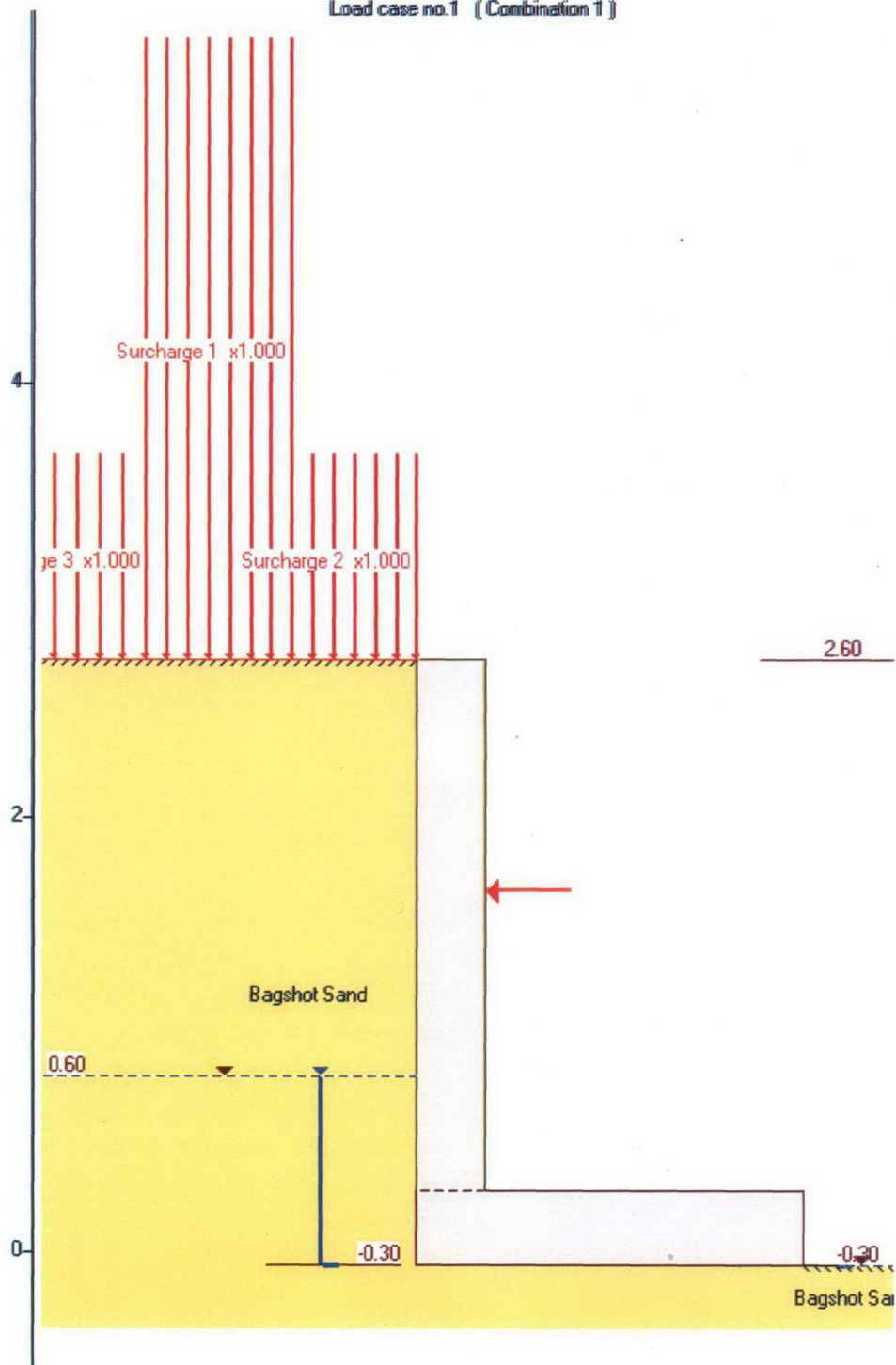
Elevation	---- Active pressures ----				---- Passive pressures ----			
	Soil type	Water kN/m2	Vert. kN/m2	Active kN/m2	Soil type	Water kN/m2	Vert. kN/m2	Passive kN/m2
2.600	1	0.00	30.00	15.00	0	0.00	0.00	0.00
2.380	1	0.00	34.39	17.19	0	0.00	0.00	0.00
2.160	1	0.00	38.72	19.36	0	0.00	0.00	0.00
1.920	1	0.00	43.33	21.67	0	0.00	0.00	0.00
1.710	1	0.00	47.24	23.62	0	0.00	0.00	0.00
1.500	1	0.00	51.02	25.51	0	0.00	0.00	0.00
1.350	1	0.00	53.65	26.82	0	0.00	0.00	0.00
1.200	1	0.00	56.22	28.11	0	0.00	0.00	0.00
0.960	1	0.00	60.23	30.12	0	0.00	0.00	0.00
0.780	1	0.00	63.18	31.59	0	0.00	0.00	0.00
0.600	1	0.00	66.10	33.05	0	0.00	0.00	0.00
0.463	1	1.37	67.07	33.54	0	0.00	0.00	0.00
0.325	1	2.75	68.03	34.02	0	0.00	0.00	0.00
0.188	1	4.13	68.99	34.50	0	0.00	0.00	0.00
0.050	1	5.50	69.95	34.98	0	0.00	0.00	0.00

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Run ID. South section
4 Hampstead Square
South Section - Wall G Underpin E

| Sheet No.
|
| Job No. CG5919
| Made by : RDB
| Date:27-02-2012
Checked :

Units: kN,m

Load case no.1 (Combination 1)



SURCHARGE LOADS

Surcharge no.	Elevation	Distance from wall	Width perpend. to wall	Length parallel to wall	Surcharge magnitude kN/m2
1	GL	0.60	0.70	9.00	60.00
2	GL	0.00	0.60	13.00	20.00
3	GL	1.30	10.00	9.00	20.00

LOADS APPLIED TO THE WALL

Horizontal line load on top of wall = 0.00
Vertical line load on top of wall = 0.00
Distance of line load from front edge of wall = 0.15
Moment applied to top of wall = 0.00 kN.m/m run

Magnitude of anchor load = 110.00 kN/m
Elevation of anchor load = 1.50
Inclination of anchor load = 0.00 degs

LOAD CASES

Load Case no.	Selected surcharges (Load case description)	Surcharge load factor	Vertical load factor	Horizontal load factor	Moment load factor	Anchor load factor
1	1,2,3 (Combination 1)	1.00	1.00	1.00	1.00	1.00

FACTOR OF SAFETY AND ANALYSIS OPTIONS

Minimum Equivalent Fluid Density = 5.00 kN/m3
Maximum depth of water filled tension crack = 0.00
Partial FoS on Drained Cohesion and Phi' = 1.00
Partial FoS on Undrained Cohesion = 1.00
Partial factor of safety on passive (ULS only) = 1.00
Include base shear in base bending moments? - Yes

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Ultimate Limit State Analysis - STABILITY

Load Case No.1

Load case description: Combination 1

Surcharge Nos. 1,2,3 apply with a Partial factor = 1.00
 Partial factor on Anchor force = 1.00

Horizontal forces

	Force kN/m run	Moment kN.m/m run	Height above base	Elevation
Active soil	38.77	46.20	1.192	0.892
Active water	4.05	1.22	0.300	-0.000
Passive soil	0.00	0.00	0.000	-0.300
Passive water	0.00	0.00	0.000	-0.300
Load on top of wall	0.00	0.00	2.900	2.600
Anchor force	-110.00	-198.00	1.800	1.500
Nett horizontal load	-67.18	-150.58	2.242	1.942
Base shear resistance	-20.67	0.00		
Shear key resistance	0.00	0.00		
Total sliding resistance	-20.67	0.00		

Vertical forces

	Force kN/m run	Moment kN.m/m run	Distance of resultant from toe
Wall weight	37.22	-50.42	1.355
Fill above heel	0.00	-0.00	0.000
Fill above toe	0.00	-0.00	0.000
Water above heel	0.00	-0.00	0.000
Water above toe	0.00	-0.00	0.000
Active wall friction	17.52	-32.42	1.850
Passive wall friction	0.00	0.00	0.00
Surcharges	0.00	-0.00	0.000
Load on top of wall	0.00	-0.00	1.670
Anchor force	0.00	-0.00	1.520
Uplift water pressure	-8.32	10.27	1.233
Nett vertical load	46.42	-72.57	1.563
Moment applied to wall		0.00	
Moment of horiz. loads		-150.58	
Soil reaction on base	-46.42	223.15	4.807

Soil contact pressure at toe -290.8 kN/m²
 Soil contact pressure at X = 1.850 341.0 kN/m²
 Line of action of resultant 4.807 m from toe

	Factor of safety	Disturbing force or moment	Restoring force or moment
Sliding stability (base shear)		*** No nett disturbing force	
Sliding stability (base+passive)	3.051	42.8 kN/m	-130.7 kN/m
Overturning stability	4.868	57.7 /m	-280.8 /m

- Notes
1. Nett water pressures are used in calculating the disturbing forces and moments for the factors of safety on sliding and overturning.
 2. All ULS results include a partial factor of 1.00 on passive.

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 Run ID. South section
 4 Hampstead Square
 South Section - Wall G Underpin E

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 |
 | Job No. CG5919
 | Made by : RDB
 | Date:27-02-2012
 | Checked :

Ultimate Limit State Analysis - STABILITY

Units: kN,m
 Load Case No.1

Earth pressures on vertical planes through heel and toe of wall

Elevation	---- Active pressures ----				---- Passive pressures ----			
	Soil type	Water kN/m2	Vert. kN/m2	Active kN/m2	Soil type	Water kN/m2	Vert. kN/m2	Passive kN/m2
2.600	1	0.00	20.00	4.75	0	0.00	0.00	0.00
2.380	1	0.00	25.04	5.94	0	0.00	0.00	0.00
2.160	1	0.00	32.18	7.64	0	0.00	0.00	0.00
1.920	1	0.00	40.71	9.66	0	0.00	0.00	0.00
1.710	1	0.00	47.40	11.25	0	0.00	0.00	0.00
1.500	1	0.00	53.11	12.60	0	0.00	0.00	0.00
1.350	1	0.00	56.69	13.45	0	0.00	0.00	0.00
1.200	1	0.00	59.94	14.22	0	0.00	0.00	0.00
0.960	1	0.00	64.68	15.35	0	0.00	0.00	0.00
0.780	1	0.00	67.98	16.13	0	0.00	0.00	0.00
0.600	1	0.00	71.14	16.88	0	0.00	0.00	0.00
0.463	1	1.37	72.26	17.15	0	0.00	0.00	0.00
0.325	1	2.75	73.34	17.40	0	0.00	0.00	0.00
0.188	1	4.13	74.40	17.66	0	0.00	0.00	0.00
0.050	1	5.50	75.44	17.90	0	0.00	0.00	0.00
-0.125	1	7.25	76.75	18.21	0	0.00	0.00	0.00
-0.300	1	9.00	78.06	18.52	0	0.00	0.00	0.00

Serviceability Limit State Analysis - BENDING MOMENTS

Earth pressures normal to the stem of the wall

Elevation	---- Active pressures ----				---- Passive pressures ----			
	Soil type	Water kN/m2	Vert. kN/m2	Active kN/m2	Soil type	Water kN/m2	Vert. kN/m2	Passive kN/m2
2.600	1	0.00	20.00	10.00	0	0.00	0.00	0.00
2.380	1	0.00	25.04	12.52	0	0.00	0.00	0.00
2.160	1	0.00	32.18	16.09	0	0.00	0.00	0.00
1.920	1	0.00	40.71	20.35	0	0.00	0.00	0.00
1.710	1	0.00	47.40	23.70	0	0.00	0.00	0.00
1.500	1	0.00	53.11	26.56	0	0.00	0.00	0.00
1.350	1	0.00	56.69	28.34	0	0.00	0.00	0.00
1.200	1	0.00	59.94	29.97	0	0.00	0.00	0.00
0.960	1	0.00	64.68	32.34	0	0.00	0.00	0.00
0.780	1	0.00	67.98	33.99	0	0.00	0.00	0.00
0.600	1	0.00	71.14	35.57	0	0.00	0.00	0.00
0.463	1	1.37	72.26	36.13	0	0.00	0.00	0.00
0.325	1	2.75	73.34	36.67	0	0.00	0.00	0.00
0.188	1	4.13	74.40	37.20	0	0.00	0.00	0.00
0.050	1	5.50	75.44	37.72	0	0.00	0.00	0.00

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Serviceability Limit State Analysis - BENDING MOMENTS **Load Case No.1**
Load case description: Combination 1

Surcharge Nos. 1,2,3 apply with a Partial factor = 1.00
 Partial factor on Anchor force = 1.00

Forces on Base for Calculating Bending Moments

Horizontal forces	Force	Moment	Height	Elevation
-----	kN/m run	kN.m/m run	above base	
Shear on heel	0.00	0.00	0.35	0.05
Shear on toe	0.00	0.00	0.35	0.05
Shear at base of stem	-40.23	-14.08	0.35	0.05
Nett horizontal force	-40.23	-14.08	0.35	0.05

Components of sliding resistance	
Base shear	-23.34
Shear key	0.00
Total sliding resistance	-23.34

Vertical forces	Force	Moment	Distance of
-----	kN/m run	kN.m/m run	resultant
Components of dead load			from toe
Weight on heel	0.00	-0.00	0.00
Weight on toe	0.00	0.00	0.00
Stem load	44.57	-75.10	1.69
Weight of base	16.19	-14.97	0.93
Total dead load	60.76	-90.07	1.48
Uplift water pressure	-8.32	10.27	1.23
Nett vertical force	52.43	-79.80	1.52
Moment at base of stem		-91.98	
Moment of horiz. forces		-14.08	
Soil reaction on base	-52.43	185.87	3.54

Base contact pressures	

Soil contact pressure at toe	-212.5 kN/m2
Soil contact pressure at X = 1.85	269.2 kN/m2
Line of action of resultant	3.54 m from toe

*** SLS results do NOT include a partial factor on passive.

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 Load Case No.1

Serviceability Limit State Analysis - BENDING MOMENTS

Forces in stem of wall

Elevation	Shear force kN/m run	Axial force kN/m run	Bending moment kN.m/m run
2.600	0.00	0.00	0.00
2.380	2.48	2.65	0.12
2.160	5.62	5.53	0.83
1.920	10.00	8.98	2.44
1.710	14.62	12.27	4.75
1.500	19.90	15.79	8.07
	-90.10	15.79	8.07
1.350	-85.98	18.41	-5.37
1.200	-81.61	21.12	-18.18
0.960	-74.13	25.63	-37.30
0.780	-68.16	29.12	-50.44
0.600	-61.90	32.72	-62.50
0.463	-56.88	35.55	-70.95
0.325	-51.59	38.47	-78.70
0.188	-46.04	41.47	-85.73
0.050	-40.23	44.57	-91.98

Forces along base of wall

Distance from toe m	Shear force kN/m run	Bending moment kN.m/m run
1.850	0.00	0.00
1.685	399.55	48.51
1.520	-29.90	94.55
1.390	-51.30	89.72
1.260	-68.22	82.40
1.080	-84.26	69.23
0.900	-91.70	53.95
0.720	-90.54	38.10
0.540	-80.80	23.24
0.360	-62.46	10.90
0.180	-35.52	2.64
0.000	0.00	0.00

*** SLS results do NOT include a partial factor on passive.

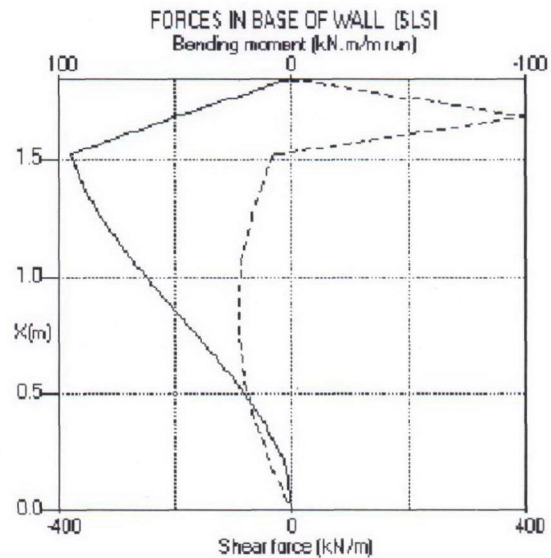
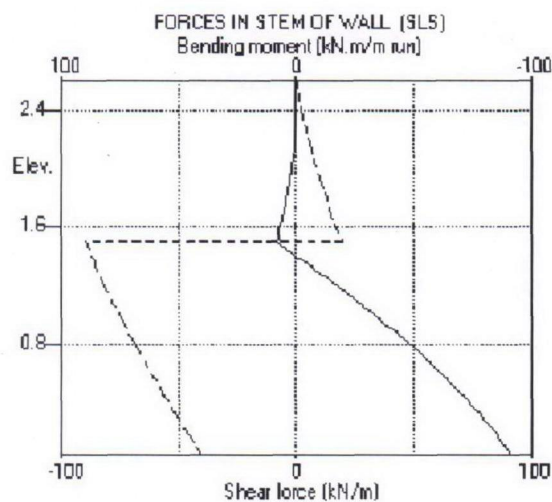
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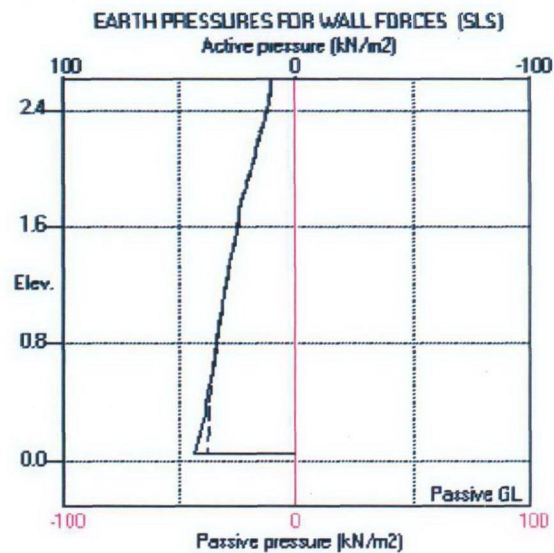
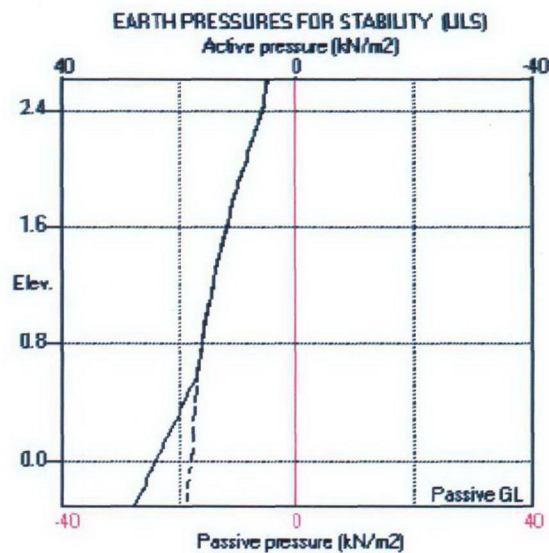
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Load case no.1



Load case no.1



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SUMMARY RESULTS

Load Case No.	Sliding stability (base shear)	Sliding stability (base + passive)	Overturning stability	Contact press. at toe	Distance of resultant from toe
	FoS	Fos	Fos	kN/m ²	m
1	-----	3.051	4.868	-290.84	4.81

- Notes
1. Nett water pressures are used in calculating the disturbing forces and moments for the factors of safety on sliding and overturning.
 2. All ULS results include a partial factor of 1.00 on passive.

	----- Stem -----				----- Base -----			
Load Case No.	- Bending moment- maximum	- Bending moment- minimum	-- Shear force -- maximum	-- Shear force -- minimum	- Bending moment- maximum	- Bending moment- minimum	-- Shear force -- maximum	-- Shear force -- minimum
	kN.m/m	kN.m/m	kN/m	kN/m	kN.m/m	kN.m/m	kN/m	kN/m
1	8.07	-91.98	19.90	-90.10	94.55	0.00	399.55	-91.70