HERTS & ESSEX SITE INVESTIGATIONS

The Old Post Office, Wellpond Green, Standon, Ware, Herts, SG11 1NJ
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Appendix No. 2
Sheet No. 5
Job No. 12138
Date Aug 2014

277a Grays Inn Road, London WC1X 8QF

Borehole D ..... continued

Description of Strata	Depth	Thickness (m)	Legend	Installation installed	Water Level	Samples No.	Samples Type	Samples Depth (m)	S.P.T N–Value or Vane Strength	Casing Depth (m)
As above		0.05		50 mmø Slotted Pipework / Pea Shingle Gravel		7	U	11.00		
		8.05				8	U	12.50		
	15.00					9	U	14.00		
Borehole closed at 15.00m										

Remarks:

Scale 1:50

Key : U–Undisturbed Sample (100mm diameter) B –Bulk Sample ▼–Water Struck D –Disturbed Sample ▽–Water Standing W–Water Sample P–Piston Sample N–S.P.T. N–Value V–Vane Strength (kN/m²)

HERTS & ESSEX SITE INVESTIGATIONS

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Appendix No. 2
Sheet No. 6
Job No. 12138
Date Aug 2014

277a Grays Inn Road, London WC1X 8QF

Borehole E

Description of Strata	Depth	Thickness (m)	Legend	Installation installed	Water Level	Samples No.	Samples Type	Samples Depth (m)	S.P.T N–Value or Vane Strength	Casing Depth (m)
Concrete reinforced	0.20	0.20								
Brown sandy topsoil FILL much brick and flint gravel FILL	0.80	0.60		Bentonite Seal						
Sandy brick rubble FILL	3.20	2.40		Solid Pipework						
Firm becoming stiff brown slightly silty CLAY	6.00	2.80		50 mmø Slotted Pipework / Response Zone	DRY	1	U	3.20		
						2	U	4.00		
						3	U	5.00		
Stiff grey slightly silty CLAY		9.00				4	U	6.50		
						5	U	8.00		
						6	U	9.50		

Remarks:

Scale 1:50

Key : U–Undisturbed Sample (100mm diameter) B –Bulk Sample ▼–Water Struck D –Disturbed Sample ▽–Water Standing W–Water Sample P–Piston Sample N–S.P.T. N–Value V–Vane Strength (kN/m²)

HERTS & ESSEX SITE INVESTIGATIONS

The Old Post Office, Wellpond Green, Standon, Ware, Herts, SG11 1NJ
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Appendix No. 2
Sheet No. 7
Job No. 12138
Date Aug 2014

277a Grays Inn Road, London WC1X 8QF

Borehole E ..... continued

Description of Strata	Depth	Thickness (m)	Legend	Installation installed	Water Level	Samples No.	Samples Type	Samples Depth (m)	S.P.T N-Value or Vane Strength	Casing Depth (m)
As above		9.00		50 mmø Slotted Pipework / Pea Shingle Gravel		7	U	11.00		
						8	U	12.50		
	15.00					9	U	14.00		
Borehole closed at 15.00m										

Remarks:

Scale 1:50

Key : U–Undisturbed Sample (100mm diameter) B –Bulk Sample ▼–Water Struck D –Disturbed Sample ▽–Water Standing W–Water Sample P–Piston Sample N–S.P.T. N–Value V–Vane Strength (kN/m²)

HERTS & ESSEX SITE INVESTIGATIONS

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Appendix No. 3
Sheet No. 1
Job No. 12138
Date Sept 2014

LOCATION 277a Grays Inn Road, London WC1X 8QF

UNDRAINED COMPRESSION TEST RESULTS

Borehole	Depth (m)	Sample	Natural Moisture Content (%)	Bulk Density (Mg/m³)	Lateral Pressure (kN/m²)	Deviator Stress (kN/m²)	Apparent Cohesion (kN/m²)	Angle of Shearing Resistance	Remarks
D	3.00	U	40	1.99	60	44	22		
D	4.00	U	44	1.99	80	56	28		
D	5.00	U	30	2.00	100	158	79		
D	6.50	U	34	2.04	130	142	121		
D	8.00	U	22	2.05	160	300	150		
D	9.50	U	28	2.05	190	360	180		
D	11.00	U	28	2.08	220	372	186		
D	12.50	U	32	2.10	250	292	146		
D	14.00	U	25	2.10	280	324	162		
E	3.20	U	33	2.02	64	152	76		
E	4.00	U	29	2.03	80	172	86		
E	5.00	U	31	2.04	100	238	119		
E	6.50	U	30	2.04	130	222	111		
E	8.00	U	31	2.06	160	278	139		
E	9.50	U	26	2.06	190	324	162		
E	11.00	U	29	2.08	220	280	140		
E	12.50	U	27	2.10	250	340	170		
E	14.00	U	23	2.11	280	332	166		

HERTS & ESSEX SITE INVESTIGATIONS
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Appendix No. 3
Sheet No. 2
Job No. 12138
Date September 2014

LOCATION 277a Grays Inn Road, London WC1X 8QF

LIQUID AND PLASTIC LIMIT TEST RESULTS

Borehole	Depth (m)	Sample	Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Group Symbol	Desiccation Profile	Percentage Retained 425 Micron Sieve (%)
D	3.00	U	40	73	25	48	CV		0
D	5.00	U	30	69	24	45	CH		0
D	8.00	U	22	50	22	28	CI/CH		0
D	12.50	U	32	84	27	57	CV		0
E	4.00	U	29	69	25	44	CH		0
E	6.50	U	30	73	26	47	CV		0
E	9.50	U	26	69	31	38	CH		0
E	14.00	U	23	66	30	36	CH		0

HERTS & ESSEX SITE INVESTIGATIONS
Warren House, Bells Hill, Bishop's Stortford, Herts. CM23 2NN
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Appendix No. 3
Sheet No. 3
Job No. 12138
Date Sept 2014

LOCATION 277a Grays Inn Road, London WC1X 8QF

SULPHATE ANALYSIS TEST RESULTS

Borehole	Depth (m)	Sample	Concentrations of Soluble Sulphate			Classification	pH
			Soil		Groundwater		
			Total SO_4 (%)	SO_4 in 2:1 water:soil (g/l)			
D	3.00	U		0.49			7.84
D	8.00	U		0.21			7.72
E	6.50	U		0.18			7.84
E	14.00	U		0.09			7.78

CALCULATION OF VOID RATIO

Project Address : **Grays Inn Road**
Job No. 12138

Borehole No. : 1
Sample No. : U1
Depth, (m) : 3.20m

Specific Gravity (measured)	Dry Weight of Sample (g)	Diameter of Ring (mm)	Initial Thickness of sample (mm)	Dry Density (Mg/m³)	eo
2.75	105.9	75.00	19.00	1.262	1.179

Voids Ratio Change Factor 0.1147058613

Pressure P (kPa)	Height H (mm)	Change in Voids ratio de	Voids Ratio e1
0	19.000	-	1.17941
60	17.888	0.127553	1.05186
120	17.210	0.205323	0.97409
240	16.360	0.302823	0.87659
480	15.447	0.407550	0.77186
60	16.075	0.335515	0.84390

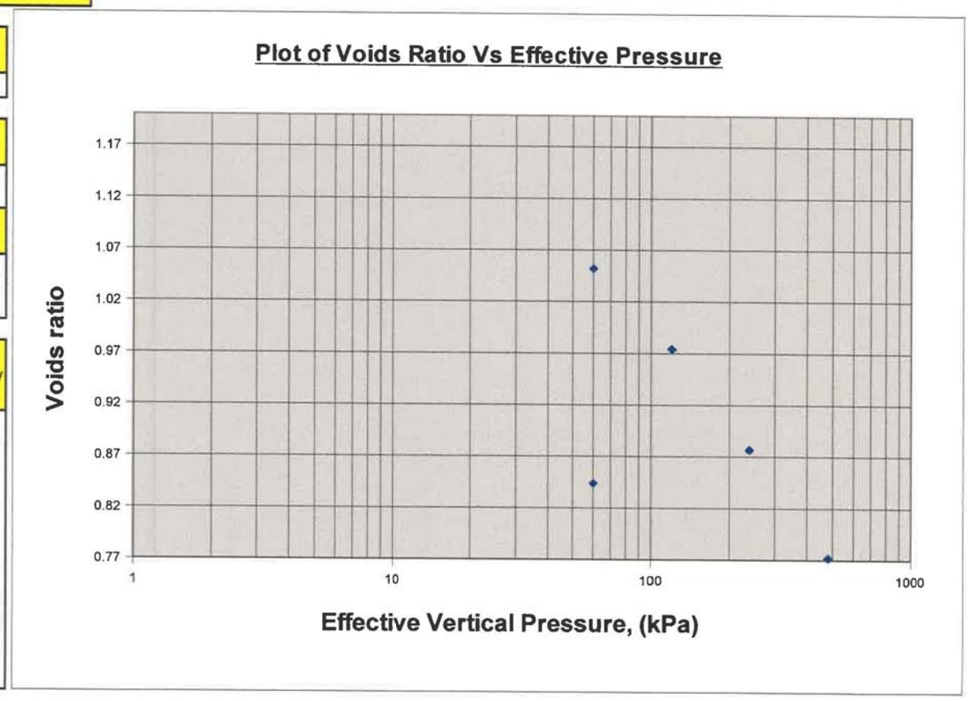
ONE DIMENSIONAL CONSOLIDATION TESTING

Project Address : **Grays Inn Road**
Job No. **12138**

BH	Sample No.	Depth, (m)
1	U1	3.20m

Description		
Soft dark brown slightly silty CLAY		
Specific Gravity	Moisture Content, (%)	Dry Density (Mg/m³)
2.75 Measured	Start 42 End 36	1.262

Pressure kPa	Coefficient of Consolidation m²/year	Coefficient of Compresability m²/
0		
60	0.258	0.9950
120	0.185	0.6317
240	0.221	0.4116
480	0.205	0.2325
60	0.453	0.0968



CALCULATION OF VOID RATIO

Project Address : **Grays Inn Road**
Job No. 12350

Borehole No. : 1
Sample No. : U3
Depth, (m) : 5.00

Specific Gravity (measured)	Dry Weight of Sample (g)	Diameter of Ring (mm)	Initial Thickness of sample (mm)	Dry Density (Mg/m³)	eo
2.73	115.8	75.00	19.00	1.379	0.979

Voids Ratio Change Factor 0.1041576053

Pressure P (kPa)	Height H (mm)	Change in Voids ratio de	Voids Ratio e1
0	19.000	-	0.97899
140	18.251	0.078014	0.90098
280	17.866	0.118115	0.86088
560	17.300	0.177068	0.80193
1120	16.514	0.258936	0.72006
140	17.544	0.151653	0.82734

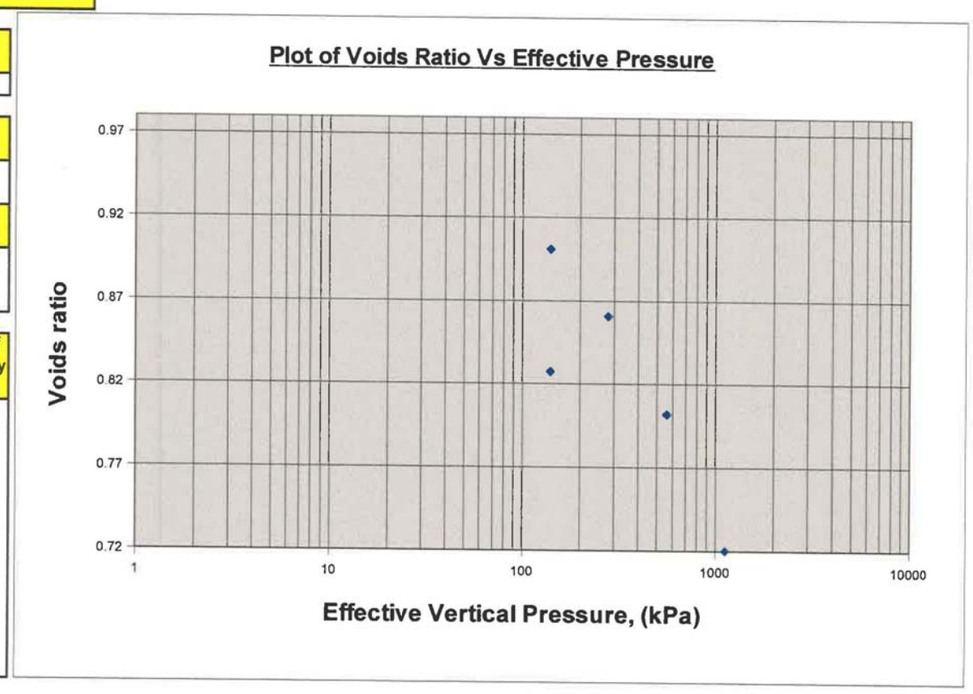
ONE DIMENSIONAL CONSOLIDATION TESTING

Project Address : **Grays Inn Road**
Job No. **12350**

BH	Sample No.	Depth, (m)
1	U3	5.00

Description		
Very stiff dark brown CLAY		
Specific Gravity	Moisture Content, (%)	Dry Density (Mg/m³)
2.73 Measured	Start 31.7 End 29	1.379

Pressure kPa	Coefficient of Consolidation m²/year	Coefficient of Compresability m²/
0		
140	1.540	0.2836
280	1.788	0.1507
560	0.644	0.1131
1120	0.367	0.0811
140	0.286	0.0636



CALCULATION OF VOID RATIO

Project Address : **Grays Inn Road**
Job No. 12350

Borehole No. : E
Sample No. : U2
Depth, (m) : 4.00

Specific Gravity (measured)	Dry Weight of Sample (g)	Diameter of Ring (mm)	Initial Thickness of sample (mm)	Dry Density (Mg/m³)	eo
2.73	124.7	75.00	19.00	1.486	0.837

Voids Ratio Change Factor 0.0966805723

Pressure P (kPa)	Height H (mm)	Change in Voids ratio de	Voids Ratio e1
0	19.000	-	0.83693
140	18.518	0.046600	0.79033
280	18.122	0.084886	0.75205
560	17.587	0.136610	0.70032
1120	16.879	0.205059	0.63187
140	17.746	0.121237	0.71569

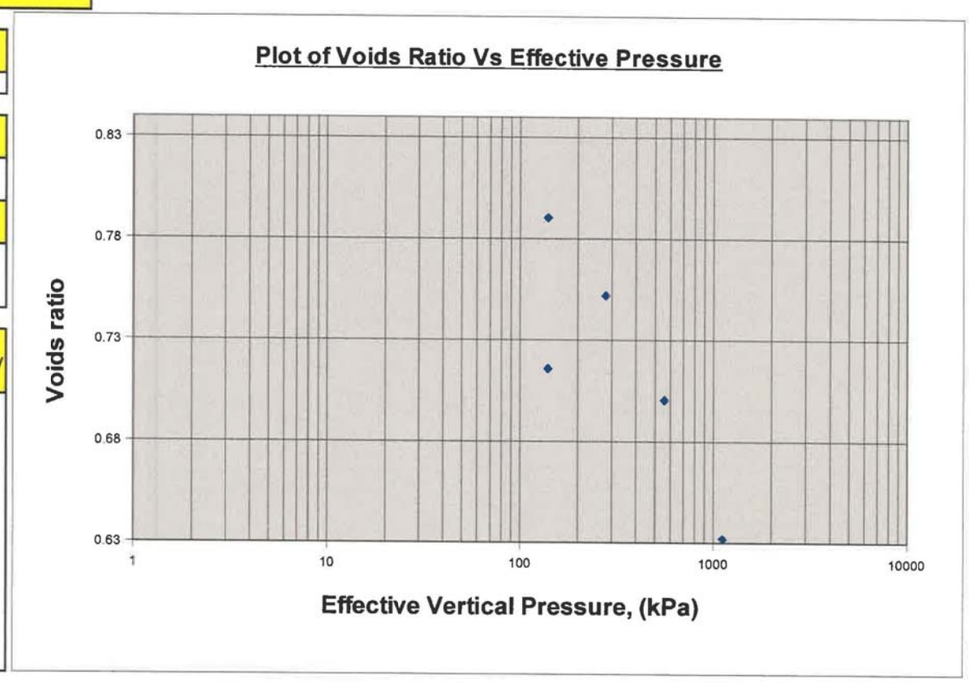
ONE DIMENSIONAL CONSOLIDATION TESTING

Project Address : **Grays Inn Road**
Job No. **12350**

BH	Sample No.	Depth, (m)
E	U2	4.00

Description		
Very stiff dark brown CLAY		
Specific Gravity	Moisture Content, (%)	Dry Density (Mg/m³)
2.73 Measured	Start 29.3 End 27	1.486

Pressure kPa	Coefficient of Consolidation m²/year	Coefficient of Compresability m²/
0		
140	2.324	0.1823
280	0.662	0.1527
560	0.812	0.1054
1120	0.619	0.0719
140	0.411	0.0524



CALCULATION OF VOID RATIO

Project Address : **Grays Inn Road**
Job No. 12138

Borehole No. : E
Sample No. : U4
Depth, (m) : 6.50m

Specific Gravity (measured)	Dry Weight of Sample (g)	Diameter of Ring (mm)	Initial Thickness of sample (mm)	Dry Density (Mg/m³)	eo
2.75	129.2	76.00	19.00	1.498	0.835

Voids Ratio Change Factor 0.0965899216

Pressure P (kPa)	Height H (mm)	Change in Voids ratio de	Voids Ratio e1
0	19.000	-	0.83521
160	18.498	0.048488	0.78672
320	18.078	0.089056	0.74615
640	17.556	0.139476	0.69573
1280	16.810	0.211532	0.62368
160	17.996	0.096976	0.73823

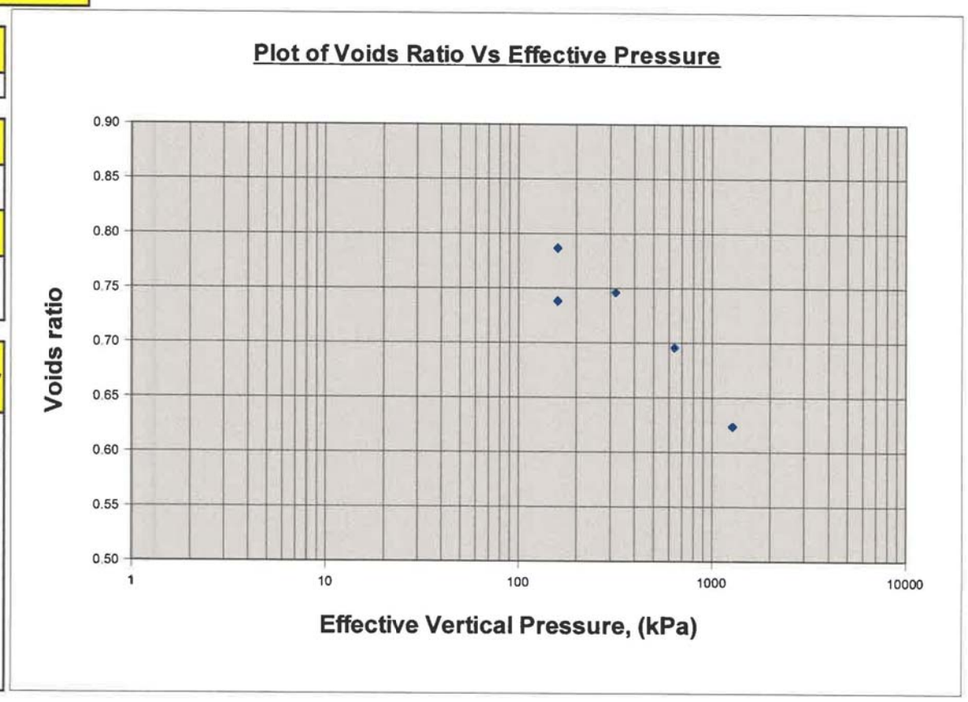
ONE DIMENSIONAL CONSOLIDATION TESTING

Project Address : **Grays Inn Road**
Job No. **12138**

BH	Sample No.	Depth, (m)
E	U4	6.50m

Description		
Very stiff dark grey slightly silty CLAY		
Specific Gravity	Moisture Content, (%)	Dry Density (Mg/m³)
2.75 Measured	Start 29.3 End 28	1.498

Pressure kPa	Coefficient of Consolidation m²/year	Coefficient of Compresability m²/
0		
160	0.566	0.1660
320	0.479	0.1419
640	0.390	0.0902
1280	0.423	0.0664
160	0.288	0.0630



CONSOLIDATION SETTLEMENT beneath a flexible rectangular loaded area (after Fadum)

Project: Grays Inn Road
Position: Centre of basement
Units: kN, m

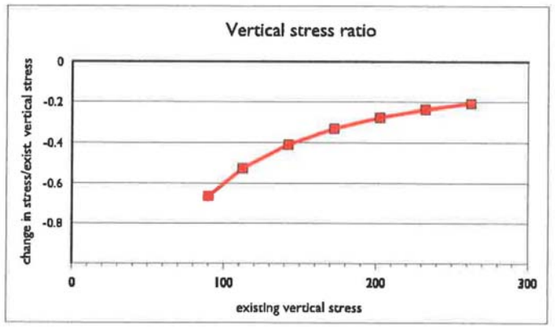
length 2L	breadth 2B	applied stress q
94.0	29.00	-60

No soft clay layer

layer no.	layer thickness	z	m = L/z	n = B/z	Ir	sigma z = 4Ir*q	existing effective vert. stress sigma v'	sigma v' + ½ sigma z	mv (estimated)	settlement (mm)	heave (mm) to 20% cut-off
1	1.5	3.00	15.67	4.83	0.249	-60	90	60	0.132	-12	-12
2	3.0	5.25	8.95	2.76	0.247	-59	113	83	0.125	-22	-22
3	3.0	8.25	5.70	1.76	0.243	-58	143	113	0.115	-20	-20
4	3.0	11.25	4.18	1.29	0.237	-57	173	144	0.107	-18	-18
5	3.0	14.25	3.30	1.02	0.232	-56	203	175	0.095	-16	-16
5	3.0	17.25	2.72	0.84	0.228	-55	233	205	0.092	-15	-15
5	3.0	20.25	2.32	0.72	0.228	-55	263	235	0.085	-14	-14
				FOX	depth, D	12.00		oedometer settlement			-117
					L/B	3.2		fox's depth correction		0.91	
					D/root(2L*2B)	0.23		geological factor		0.5	
					root(2L*2B)/D	4.35		**actual settlement**			**-53**

(negative value represents heave)

layer no.	increase in vertical stress sigma z kPa	existing vertical stress sigma v' kPa	sigma z / sigma v'
1	-60	90	-66.400%
2	-59	113	-52.693%
3	-58	143	-40.926%
4	-57	173	-32.974%
5	-56	203	-27.496%
5	-55	233	-23.535%
5	-55	263	-20.846%



CONSOLIDATION SETTLEMENT beneath a flexible rectangular loaded area (after Fadum)

Project: Grays Inn Road
Position: Centre of basement
Units: kN, m

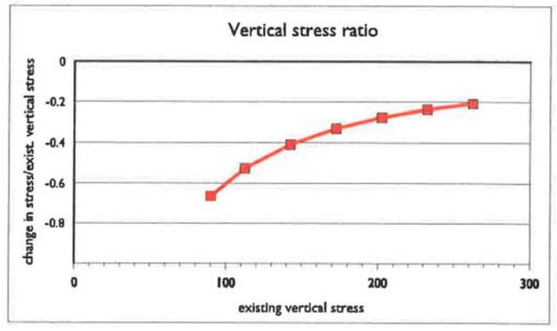
length 2L	breadth 2B	applied stress q
94.0	29.00	-60

Soft clay layer

layer no.	layer thickness	z	m = L/z	n = B/z	Ir	sigma z = 4Ir*q	existing effective vert. stress sigma v'	sigma v' + ½ sigma z	mv (estimated)	settlement (mm)	heave (mm) to 20% cut-off
1	1.5	3.00	15.67	4.83	0.249	-60	90	60	0.210	-19	-19
2	3.0	5.25	8.95	2.76	0.247	-59	113	83	0.125	-22	-22
3	3.0	8.25	5.70	1.76	0.243	-58	143	113	0.115	-20	-20
4	3.0	11.25	4.18	1.29	0.237	-57	173	144	0.107	-18	-18
5	3.0	14.25	3.30	1.02	0.232	-56	203	175	0.095	-16	-16
5	3.0	17.25	2.72	0.84	0.228	-55	233	205	0.092	-15	-15
5	3.0	20.25	2.32	0.72	0.228	-55	263	235	0.085	-14	-14
				FOX	depth, D	12.00		oedometer settlement			-124
					L/B	3.2		fox's depth correction		0.91	
					D/root(2L*2B)	0.23		geological factor		0.5	
					root(2L*2B)/D	4.35		**actual settlement**			**-57**

(negative value represents heave)

layer no.	increase in vertical stress sigma z kPa	existing vertical stress sigma v' kPa	sigma z / sigma v'
1	-60	90	-66.400%
2	-59	113	-52.693%
3	-58	143	-40.926%
4	-57	173	-32.974%
5	-56	203	-27.496%
5	-55	233	-23.535%
5	-55	263	-20.846%



Pringuer-James
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Email : Mail@pjce.com

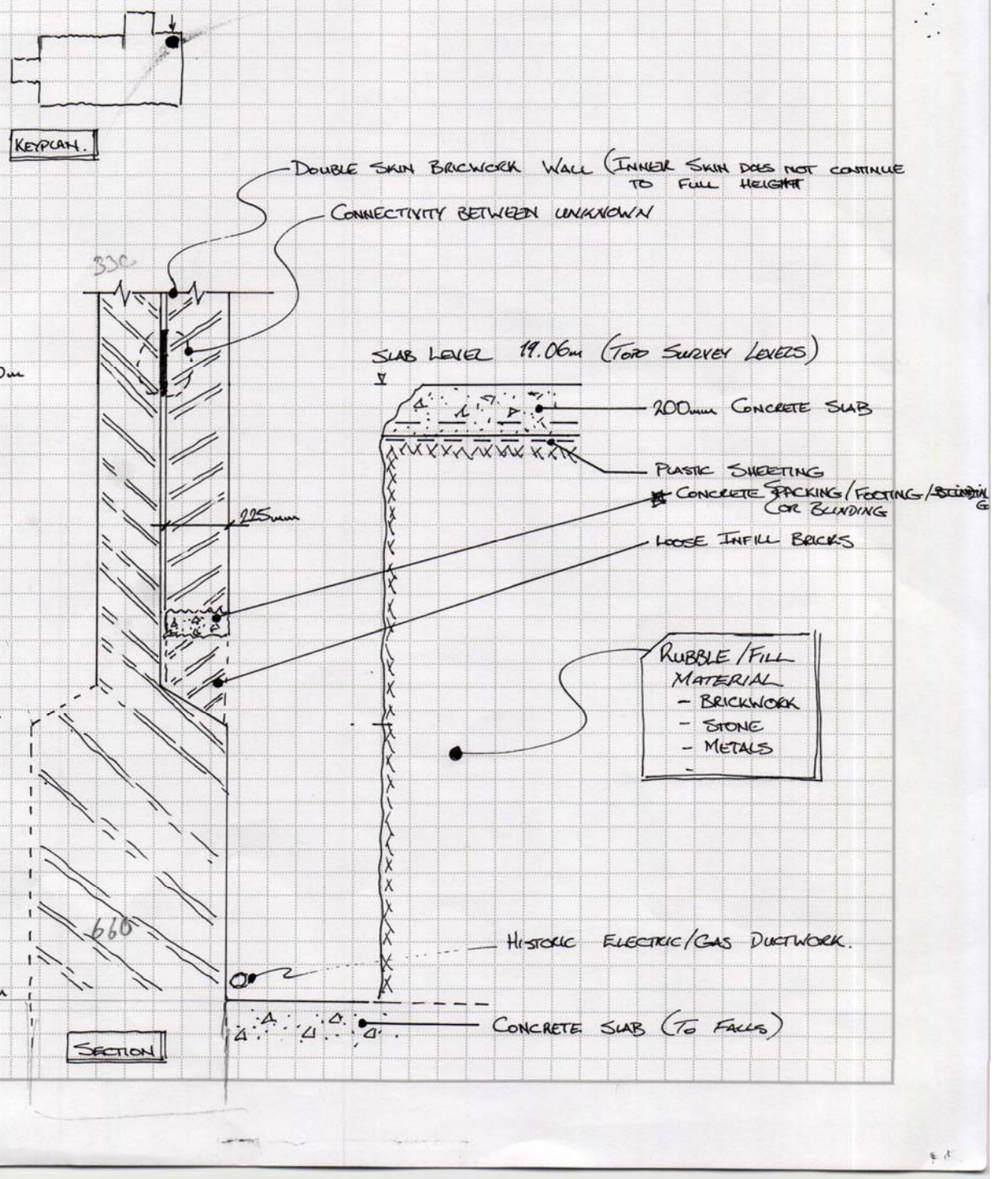
Sheet No : TP#1 (A)
Date : Jun 2014
By : C.C.

Job No. : L-1706
Item : Site Investigation
Trial Pit Details.

TITLE : No 227 Grays Inn Road

LOCATION	CALCULATIONS	OPTIONS

Trial Pit #1 – Greys Inn Road Elevation



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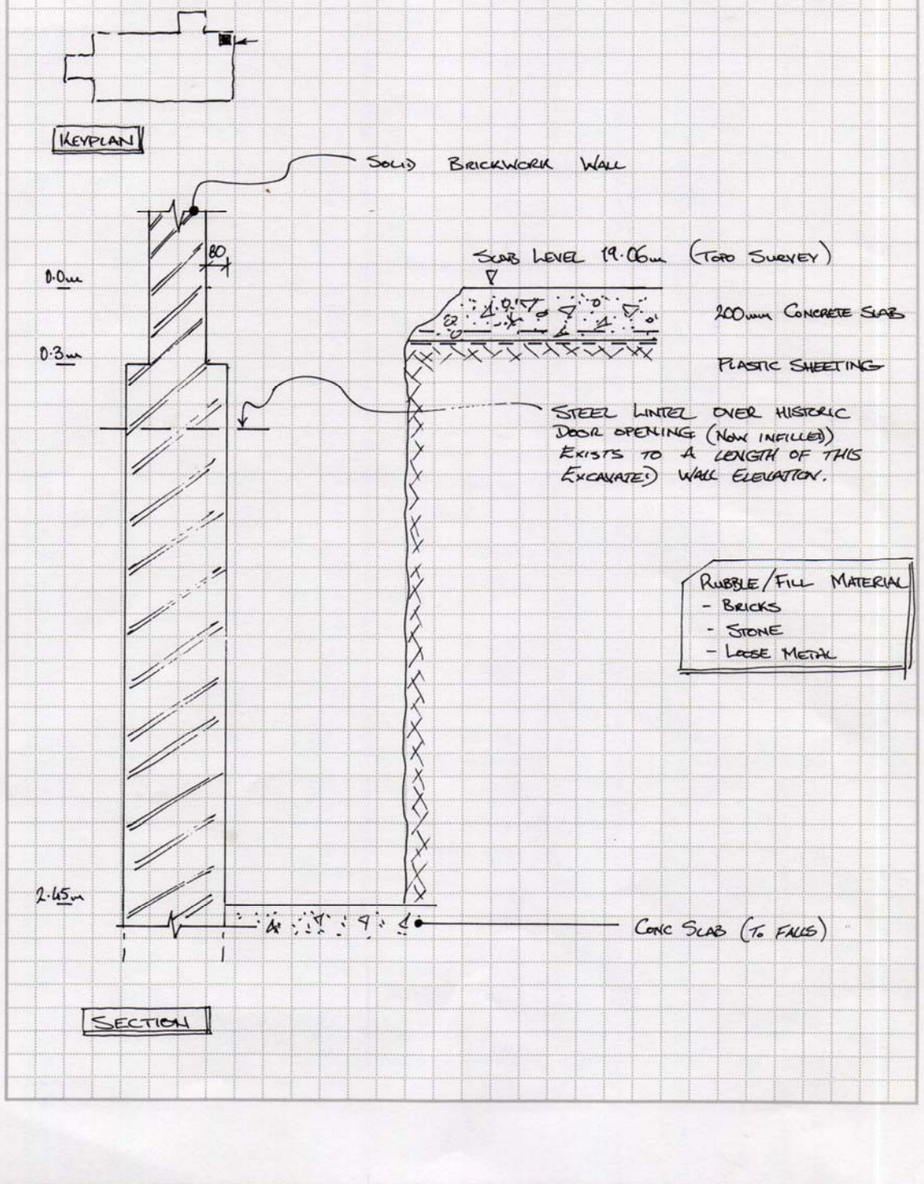
Sheet No : TP#1 (B)
Date : Jun 2014
By : C.C.

Job No. : L-1706
Item : Site Investigation
Trial Pit Details

TITLE : No 227 Grays Inn Road

LOCATION	CALCULATIONS	OPTIONS

Trial Pit #1



Pringuer-James
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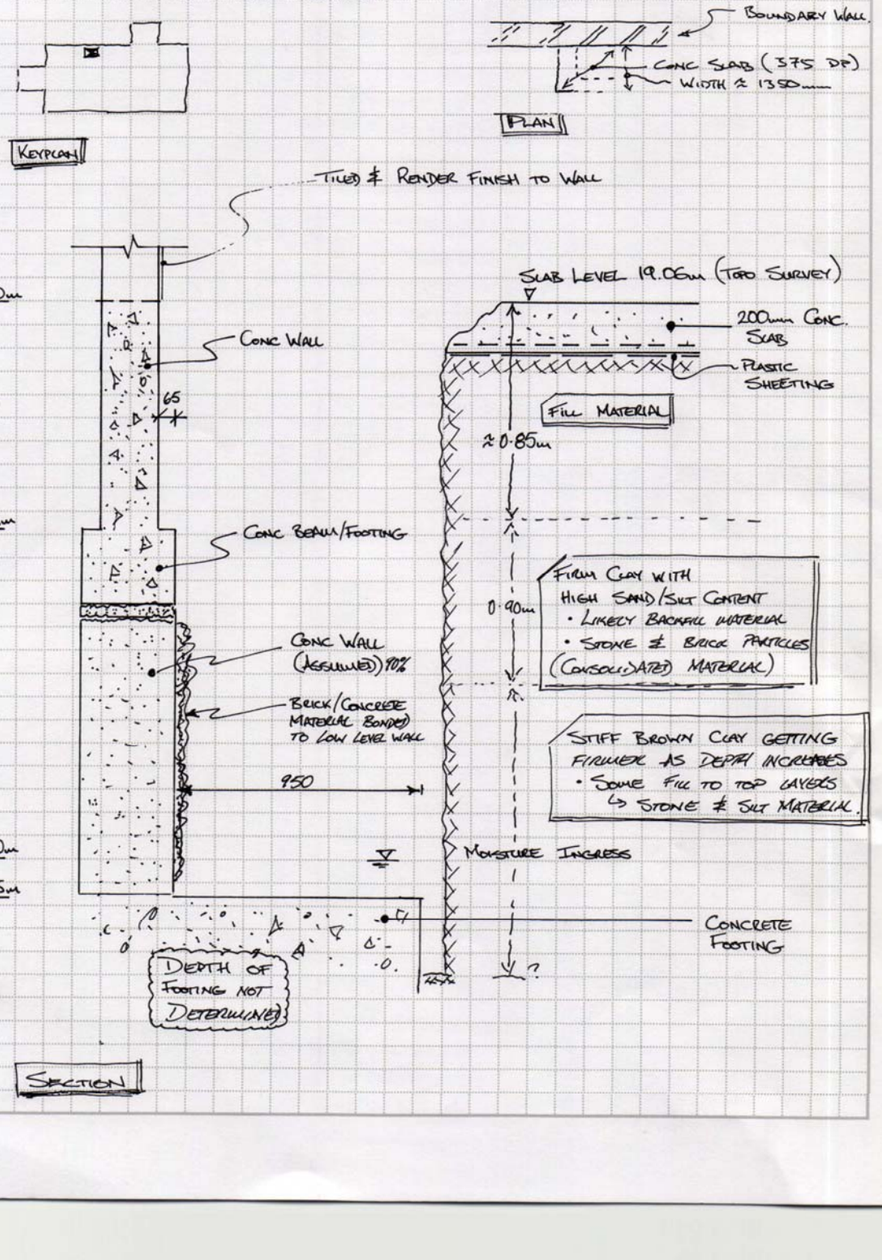
Sheet No : TP#2 (A)
Date : JUN 2014
By : C.C.

Job No. : L-1706
Item : SITE INVESTIGATION
TRIAL PIT DETAILS

TITLE : No 227 GRAYS INN ROAD

LOCATION | CALCULATIONS | OPTIONS

TRIAL PIT #2 – WALL FOOTING



Sheet No : TP # 2 (B)
Date : JUN 2014
By : C. G.

Job No. : L-1706
Item : SITE INVESTIGATION
TRIAL PIT DETAILS

TITLE : No 227 GRAYS INN ROAD

LOCATION | CALCULATIONS | OPTIONS

TRIAL PIT # 2 - PIER FOOTING.