

HERTS & ESSEX SITE INVESTIGATIONS
 Warren House, Bells Hill, Bishop's Stortford, Herts. CM23 2NN
 Telephone: Bishops Stortford (01279) 506725
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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

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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) : 2.75
Dry Weight of Sample (g) : 105.9
Diameter of Ring (mm) : 75.00
Initial Thickness of sample (mm) : 19.00
Dry Density (Mg/m³) : 1.262
Void Ratio (e₀) : 1.179

Voids Ratio Change Factor : 0.1147058613

Pressure P (kPa)	Height H (mm)	Change in Voids ratio Δe	Voids Ratio e_1
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

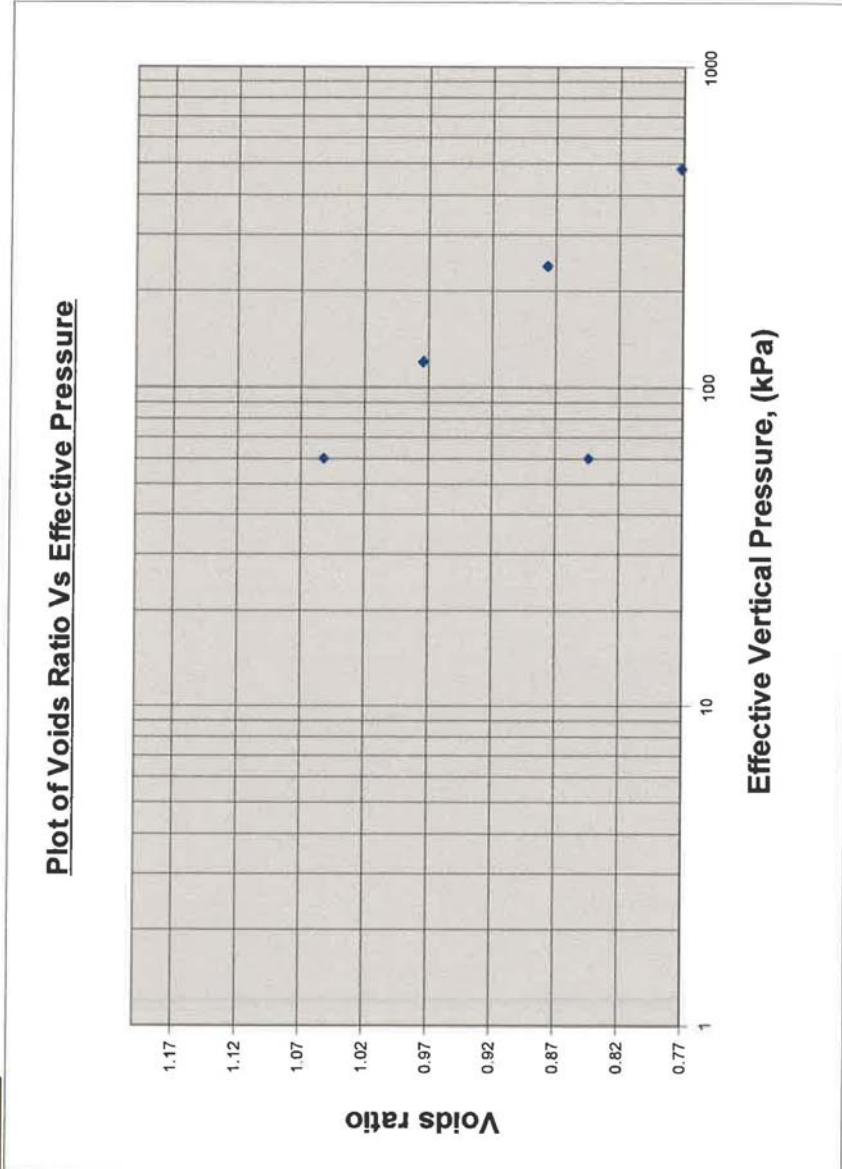
ONE DIMENSIONAL CONSOLIDATION TESTING

Project Address : Grays Inn Road
Job No. 12138

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

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

Pressure kPa	Coefficient of Consolidation $m^2/year$	Coefficient of Compressibility $m^2/$
0	0.258	0.9950
60	0.185	0.6317
120	0.221	0.4116
240	0.205	0.2325
480	0.453	0.0968
60		



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/m ³)	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

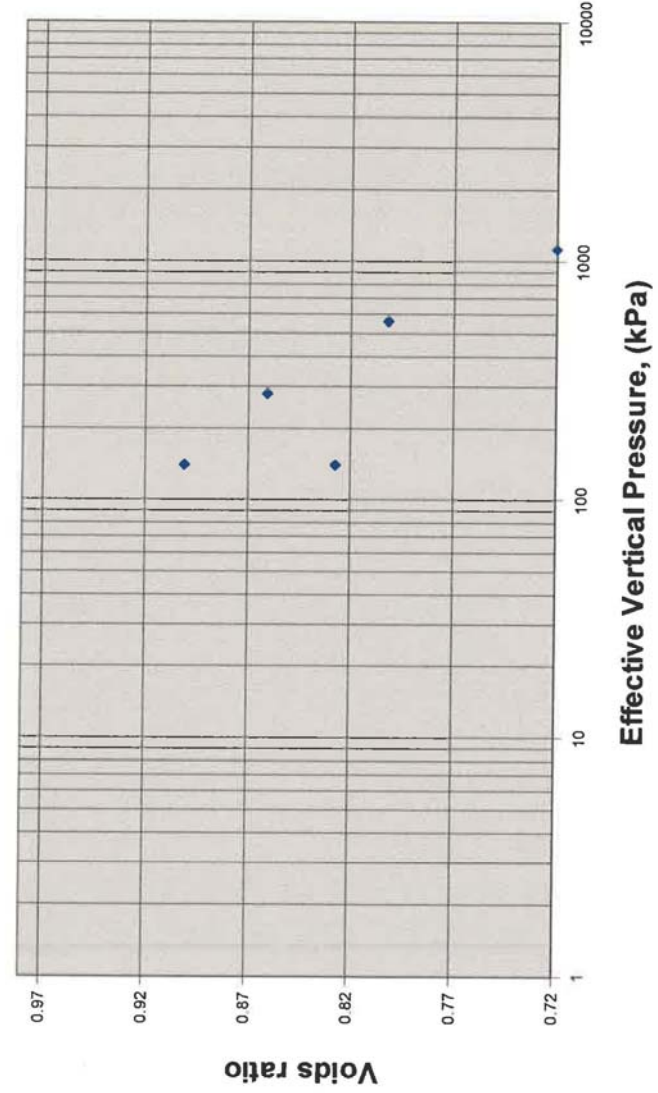
Project Address : Grays Inn Road
Job No. 12350

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

Description		
Very stiff dark brown CLAY		
Specific Gravity	Moisture Content, (%)	Dry Density (Mg/m ³)
2.73	31.7	1.379
Measured	End	29

Pressure kPa	Coefficient of Consolidation m ² /year	Coefficient of Compressibility m ² /
0	1.540	0.2836
140	1.788	0.1507
280	0.644	0.1131
560	0.367	0.0811
1120	0.286	0.0636
140		

Plot of Voids Ratio Vs Effective Pressure



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/m ³)	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

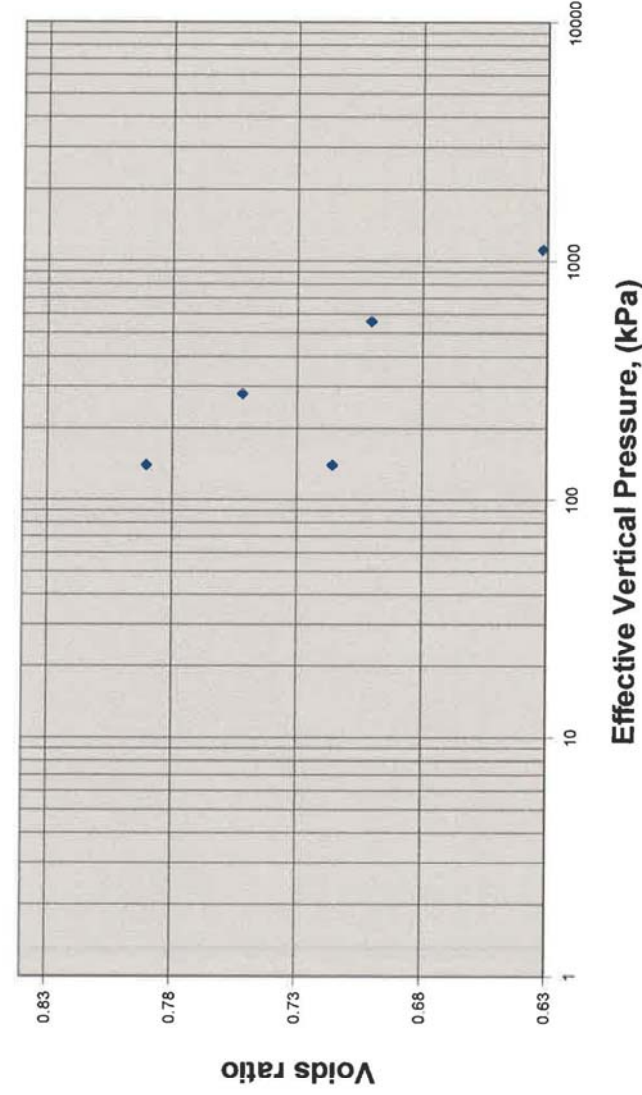
Project Address : Grays Inn Road
Job No. 12350

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

Description		
Very stiff dark brown CLAY		
Specific Gravity	Moisture Content, (%)	Dry Density (Mg/m ³)
2.73 Measured	Start 29.3 End 27	1.486

Pressure kPa	Coefficient of Consolidation m ² /year	Coefficient of Compressibility m ² /
0	2.324	0.1823
140	0.662	0.1527
280	0.812	0.1054
560	0.619	0.0719
1120	0.411	0.0524
140		

Plot of Voids Ratio Vs Effective Pressure



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) : 2.75
Dry Weight of Sample (g) : 129.2
Diameter of Ring (mm) : 76.00
Initial Thickness of sample (mm) : 19.00
Dry Density (Mg/m³) : 1.498
Void Ratio e_0 : 0.835

Void Ratio Change Factor : 0.0965899216

Pressure P (kPa)	Height H (mm)	Change in Voids ratio Δe	Voids Ratio e_1
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

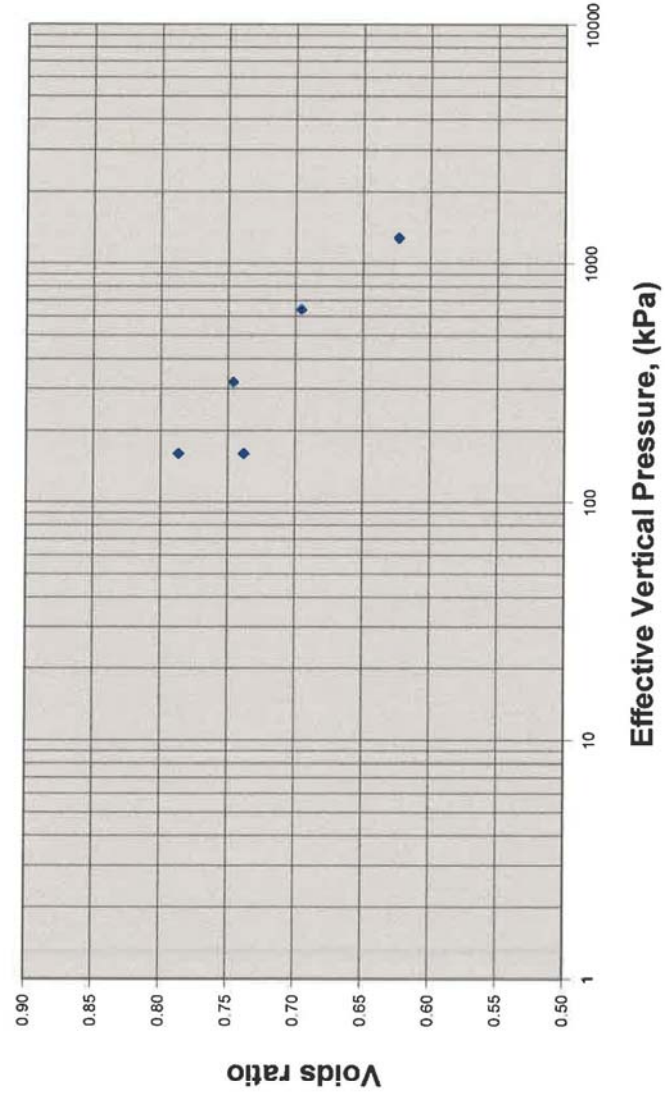
Project Address : Grays Inn Road
Job No. 12138

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

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

Pressure kPa	Coefficient of Consolidation $m^2/year$	Coefficient of Compressibility $m^2/$
0	0.566	0.1660
160	0.479	0.1419
320	0.390	0.0902
640	0.423	0.0664
1280	0.288	0.0630
160		

Plot of Voids Ratio Vs Effective Pressure



CONSOLIDATION SETTLEMENT beneath a flexible rectangular loaded area

(after Fadum)

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

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

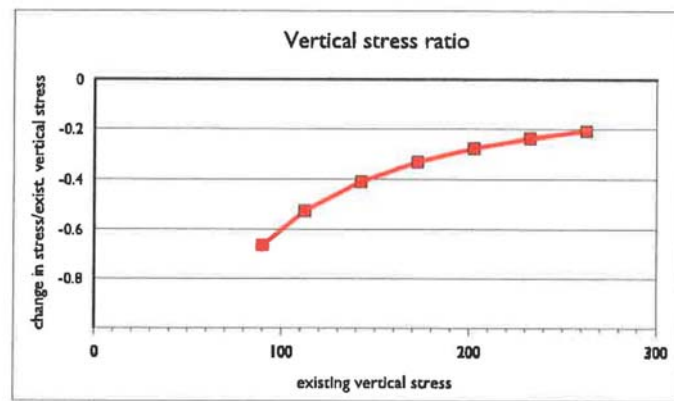
No soft clay layer

layer no.	thickness	z	m	n	Ir	sigma z = 4Ir*q	existing effective vert. stress sigma v'	sigma v' + 1/2 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	breadth	applied stress
2L	2B	q
94.0	29.00	-60

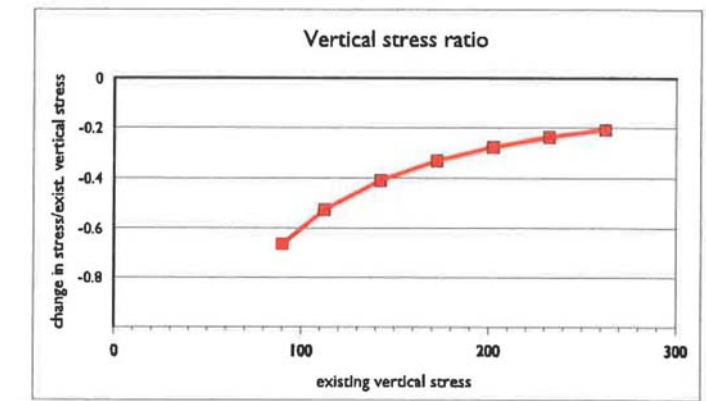
Soft clay layer

layer no.	thickness	z	m	n	Ir	sigma z = 4Ir*q	existing effective vert. stress sigma v'	sigma v' + 1/2 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%



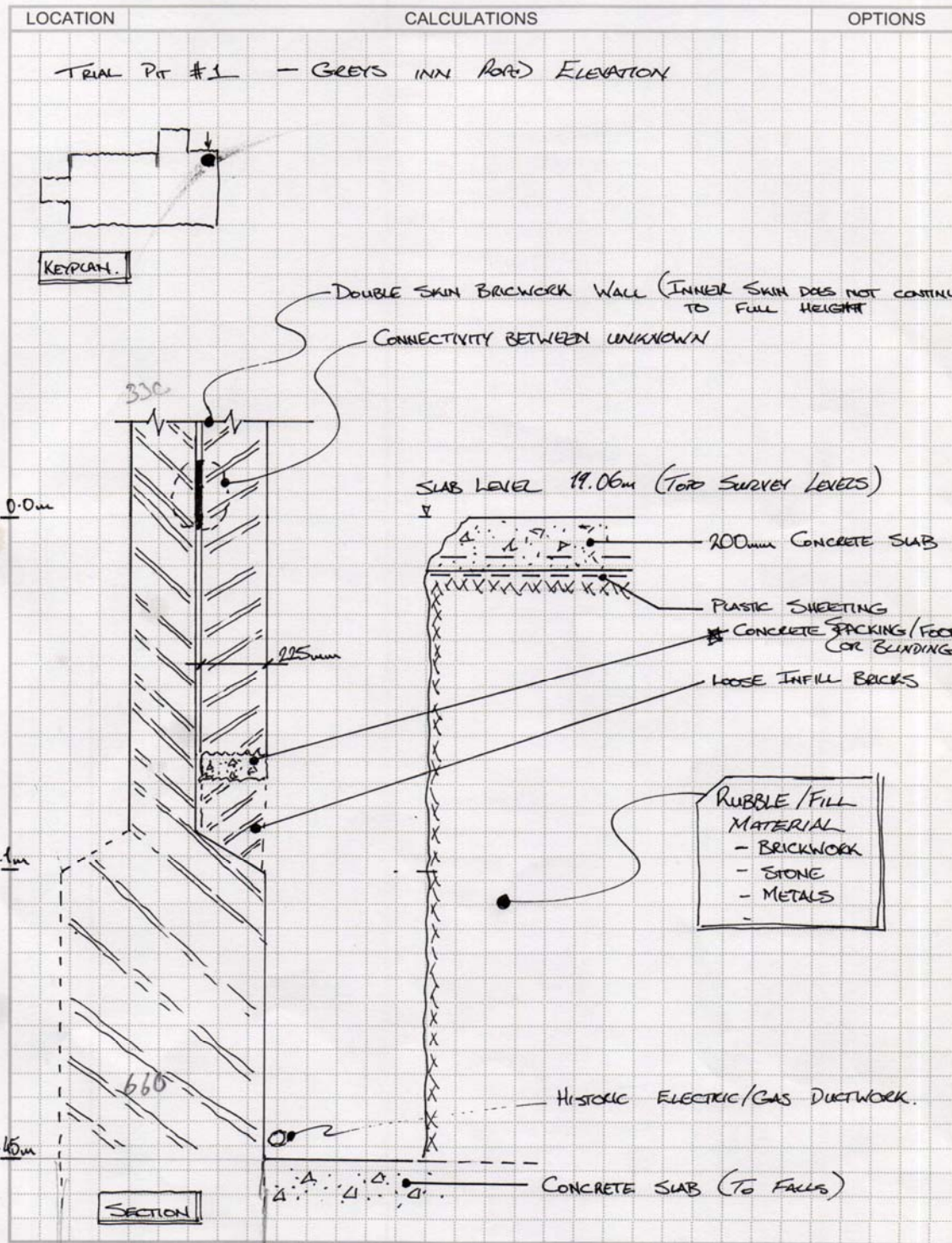
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Sheet No : TP#1 (A)
Date : JUN 2014
By : C.C.

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

TITLE : No 227 GRAYS INN ROAD



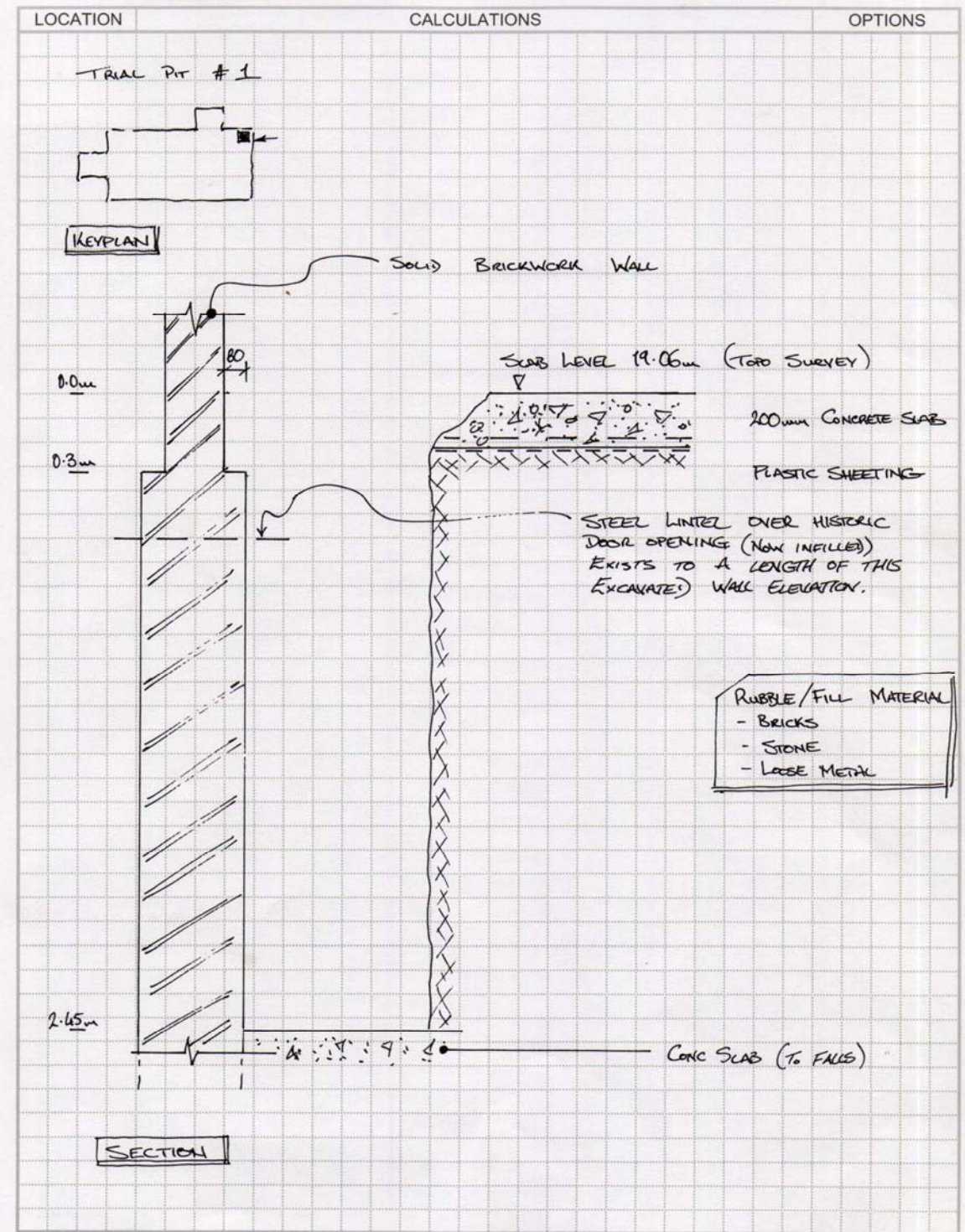
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Phone : 0208 940 4159
Email : Mail@pjce.com

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



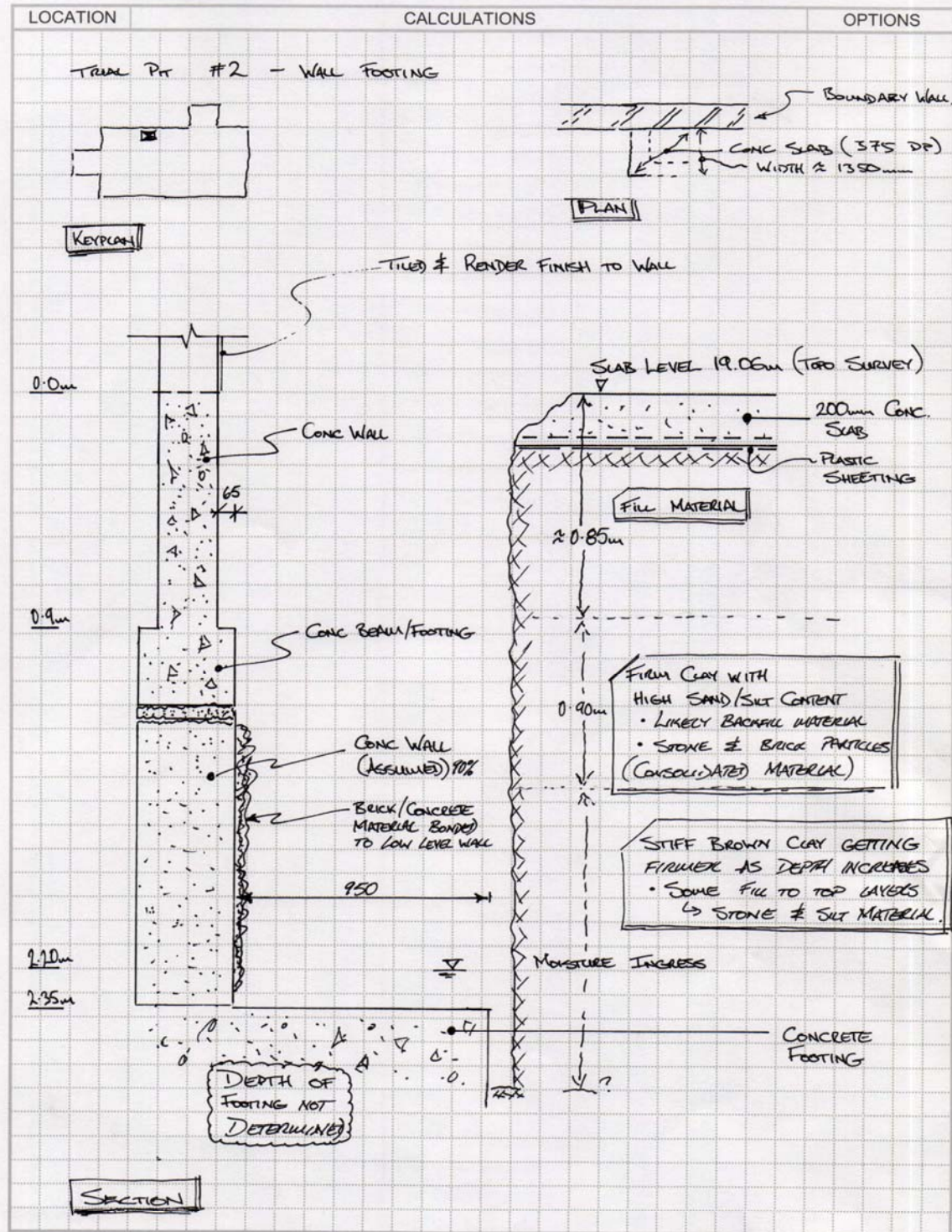
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Sheet No : TP # 2 (A)
Date : Jun 2014
By : C.C.

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

TITLE : No 227 Grays Inn Road



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

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

TITLE : No 227 Grays Inn Road

