ne Old Post Office, Wellpond Green, Standon, We elephone: Ware (01920) 822233 Fax: Ware (01920) 822200 277a Grays Inn Road, London WC1X 8QF					0	ate			Aug 2	2014	The Old Post Office, Wellpond Green, Standon, W Telephone: Ware (01920) 822233 Fax: Ware (01920) 822200 277a Grays Inn Road, London WC1X 8QF
Borehole D continued		1	r	c							Borehole E
Description of Strata	Depth	Thickness (m)	Legend	Installation installed	Water Level	No.	Type Bawb	Depth	S.P.T N-Value or Vane Strength	Casing Depth (m)	Description of Strata
As above		0.05		0 - 0			F	(11)			Concrete reinforced
											Brown sandy topsoil FILL much brick and fli gravel FILL
						7	U	11.00			Sandy brick rubble FILL
,		8.05				8	υ	12.50			
				Slotted Pipework OT							Firm becoming stiff brown slightly silty CLAY
				00000000000000000000000000000000000000		9	U	14.00			
Borehole closed at 15.00m	15.00										
											Stiff grey slightly silty CLAY
3.											
Remarks:								Sco			Remarks:

TIGATIONS , Herts, SG11 1NJ

Appendix No. Sheet No. Job No. Date

2 6 12138

Aug 2014

) ess	end	lation		el		Samp	les	S.P.T N-Value	5÷~
Thickness (m)	Legend	Installation		Water Level	No.	Type	Depth (m)	or Vane Strength	Casing Depth (m)
0.20		-							
0.60			Bentonite						
2.40		Pipev							
	0000				1	U	3.20		
2.80			000000000000000000000000000000000000000		2	U	4.00		
2.00			Zone	DRY	3	U	5.00		
			00000000000000000000000000000000000000		4	U	6.50		
9.00		čt lä	000000000000000000000000000000000000000		5	U	8.00		
	0000000		000000000000000000000000000000000000000		6	U	9.50		
							Scal	e 1:50	
	W-Water S P-Piston	Sample Sample			N-S.P. V-Vane	Stren	/alue ngth (kN/	m²)	

Old Post Office, Wellpond Green, Standor phone: Ware (01920) 822233 Fax: Ware (01920) 822200						ob N Date	10.		12138 Aug 2014	HER	TS &		EX SI	TE IN	VEST
77a Grays Inn Road, London WC1X 8QF	-									Telephor	House, Be ne: Bishop ax: Bishop	s Stortfo	rd (01279	 50672 50672 	
orehole E continued		1	1 1	5	1									,	
Description of Strata	Depth	Thickness (m)	Legend	Installation installed	Water Level	No.	Samp	Depth (m)	S.P.T N-Value or Vane Strength	UNDRAI			rays Inn DN		Londor
s above					4										
						7	υ	11.00		Borehole	Depth (m)	Sample	Natural Moisture Content (%)	Bulk Density (Mg/m³)	Lateral Pressure (kN/m [*])
											3. 00	U	40	1, 99	60
					>					D	4. 00	U	44	1, 99	80
		9.00)	8	U	12.50		D	5. 00	U	30	2, 00	100
					5			12.00		D	6. 50	U	34	2. 04	130
				velo	>					D	8. 00	U	22	2. 05	160
				0 0						D	9. 50	U	28	2. 05	190
				Slotted 		9	U	14.00		D	11.00	U	28	2. 08	220
				0 50 mms Si						D	12. 50	U	32	2. 10	250
	15.00									D	14.00	U	25	2. 10	280
prehole closed at 15.00m															
										E	3. 20	U	33	2. 02	64
										E	4.00	U	29	2. 03	80
										E	5. 00	U	31	2. 04	100
										E	6. 50	U	30	2. 04	130
										E	8. 00	U	31	2, 06	160
										ε	9, 50	U	26	2, 06	190
										E	11.00	U	29	2. 08	220
										Ε	12. 50	U	27	2. 10	250
										E	14.00	U	23	2. 11	280
Remarks:															
Key : U-Undisturbed Sample B -Bulk Sample D	-Disturbed Sampl		Water	Sample		N-S.P.	TN		ale 1:50						

IONS	Appendix No.		3
IN	Sheet No.		1
	Job No.		12138
X 8QF	Date S	Sept	2014

ator ss 'm)	Apparent Cohesion (kN/m [®])	Angle of Shearing Resistance	Remarka
4	22		
6	28		
58	79		
42	121		
00	150		
50	180		
72	186		
92	146		
24	162		
52	76		
72	86		
88	119		
22	111		
8	139		
24	162		
	140		
0	170		
2	166		

HERTS & ESSEX SITE INVESTIGATIONS
Warren House, Bells Hill, Bishop's Stortford, Herts. CM23 2NN
Telephone: Bishops Stortford (01279) 506725
Fax: Bishops Stortford (01279) 506724

Appendix I	No. 3	
Sheet No.	2	
Job No.	121	38
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 (%)	Plantic 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	СН		o
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	СН		0
E	6. 50	U	30	73	26	47	CV		0
ε	9, 50	U	26	69	31	38	СН		0
E	14.00	U	23	66	30	36	сн		0

HERTS & ESSEX SITE INVESTIGATI Warren House, Bells Hill, Bishop's Stortford, Herts. CM23 2NM Telephone: Bishops Stortford (01279) 506725 Fax: Bishops Stortford (01279) 506724

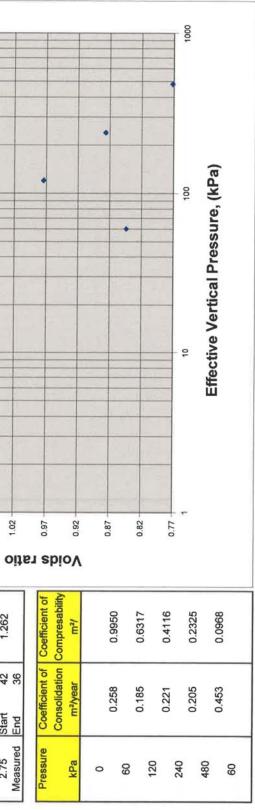
LOCATION 277a Grays Inn Road, London WC1X 8QF

SULPHATE ANALYSIS TEST RESULTS

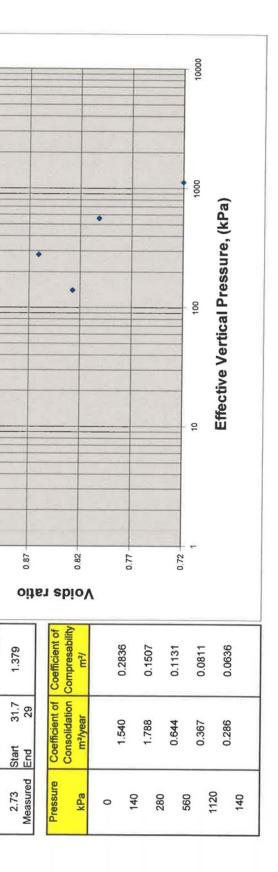
				ntrations of Solub	le Sulphate	-	
Borehole	Depth (m)	Sample	Total SO 4 (%)	Soil SO in 2:1 water:soil (g/l)	Groundwater	Classification	рН
D	3.00	U		0.49			7.84
D	8.00	U		0.21			7.72
E	6.50	U		0.18			7.84
E	14.00	U		0.09			7.78

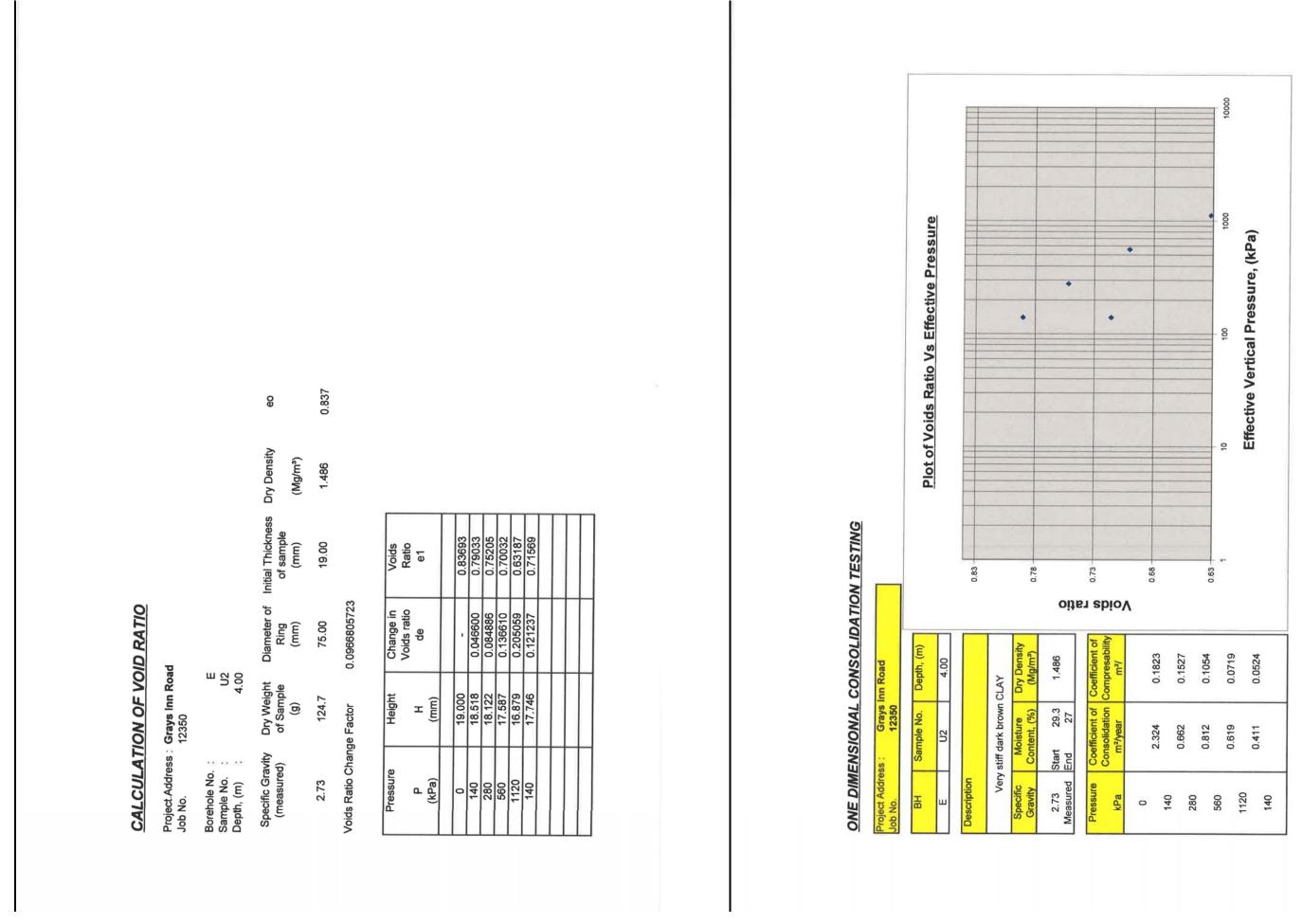
TIONS	Appendix No.	3
NN	Sheet No.	3
	Job No.	12138
	Date	Sept 2014

ON OF VOID RATIO Grays Inn Road 12138 12138 12138 12138 12138 12138 12138 12138 12138 1320m 1320m 1320m 1320m 101 105 105.9 117.210 10000 117.210 117.210 117.210 117.210 116.075 0.3335515 117.210 116.075 0.3335515 115.447 0.127553 116.075 0.3335515 115.447 0.127553 116.075 0.3335515 116.075 116.075 116.075 116.075 116.075 116.075 116.075 116.075 117.313 118.1		
ON OF VOID RATIO Grass Inn Road 12138 12138 12138 12139 12130 12131 12131 12131 12131 12131 12131 12131 12131 12132 12131 12131 12132 12131 12131 12131 12131 12131 12131 12147 1215613 1215613 1215613 1215613 1215613 1215613 1215613 1215613 121593 121593 121593 121593 1217210 12181 12181 12181 12181 12181 12181 121911 121911 121911 12100000000000000000000000000000000000		
ON OF VOID RATIO Grays Inn Road 12138 12138 Dry Weight Diameter of (mm) 01 3.20m Dry Weight 01 3.20m 105.9 75.00 105.9 75.00 105.9 75.00 105.9 75.00 105.9 75.00 105.9 75.00 105.9 75.00 105.9 75.00 105.9 75.00 105.9 75.00 105.9 75.00 105.9 75.00 105.9 75.00 1147058613 1147058613 115861 115861 115861 115881 11588 117.210 0.335515 0.335515 0.335515 15.447 15.447 15.447 15.447 15.447 16.050 15.447 17.210 0.335515 0.4056		
ON OF VOID RATIO Grays Inn Road 12138 12138 12138 12138 12138 12138 12138 12138 12138 1320m 1320m 1320m 105.9 75.00 105.9 75.00 105.9 75.00 105.9 75.00 105.9 75.00 119.000 119.000 119.000 119.000 119.000 119.000 117.210 0.1335515 117.210 0.1335515 119.000 119.000 119.000 119.000 119.000 119.000 119.000 119.000 119.000 119.000 119.000 111.1210 111.1210 111.1210 111.1210 111.1210 111.1210 111.1210 111.1210 111.1320 111.1320		1.17
ON OF VOID Grays Inn Road 12138 12138 12138 12138 12138 12138 1000 117.210 117.210 117.210 117.388 117.388 117.388 117.310 117.310 117.310 117.310 117.310 117.310 117.310 117.310 117.310 117.313 mple No. Depth.	OITAG	sity
		U1 3.20m 3.20m brown slightly silty CLAY Moisture Dry Density
CALCULATION Of Dob No. CALCULATION Of 12138 Project Address : Gravity Job No. 12138 Job No. 12138 Job No. 12138 Berth, (m) 12138 Cold Stavity 105 Pressure Heig P 177.2 Cold Stavity 177.8 Pressure Heig P 177.2 Cold Statio Change Factor 16.0 ONE DIMENSIONAL 16.0 P 16.0 BH Sample No. BH Sample No. BH Sample No.		+

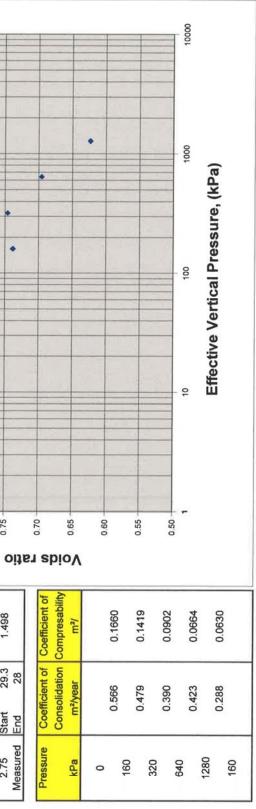


VOLD RATIO	CALCULATION OF VOID RATIO Project Address: Grays Inn Road
Mad	Job No. :: 12350 Project Address: Grays Inn Road
Mad	Job No. :: 12350 13 Borehole No. :: 12350 13 Borehole No. :: 12350 13 Specific Gravity
Mad	(mm) Dry Weight
Mad	(mm) Dimmeter of Initial This
Mad	(mm) Specific Gravity
Mad	(measured) Dry Weight
Mad	(mm) Dimmeter of Initial This
Mad	(mm) 2.73 115.8 75.00 19.0 Voids Ratio Change Factor 0.1041576053 0.007 2.01 17.366 0.118115 0.800 280 17.366 0.118115 0.800 280 17.366 0.117068 0.800 140 17.544 0.151633 0.801 151 17.544 0.151633 0.801 150 17.366 0.177068 0.801 14120 17.544 0.151663 0.801 150 17.366 0.177068 0.801 150 17.366 0.177068 0.801 150 17.544 0.151663 0.801 150 17.544 0.161663 0.801 150 17.544 0.161663 0.801 160 17.544 0.151663 0.801 <td< td=""></td<>





ION OF VOID RATIO Grays lin Road 12138		Dry Weight Diameter of Initial Thickness Dry Density eo of Sample Ring of sample (g) (mm) (mm) (Mg/m³)	2 76.00 19.00 1.498 0.835 0.0965899216	ssure Height Change in Voids P H de e1 (Pa) (mm) de e1	0 19.000 - 0.83521 60 18.498 0.048488 0.73672 520 18.078 0.048488 0.74615 540 17.556 0.139476 0.69573 280 16.810 0.211532 0.62368 60 17.996 0.096976 0.73823		ONE DIMENSIONAL CONSOLIDATION TESTING Project Address: Grays inn Road Job No. 12138	Sample No. Depth, (m) U4 6.50m	dark grey slightly slity CLAY Moisture Dry Density Content, (%) (Mg/m ³) Start 29.3 1.498 End 28
CALCULATIO	Borehole No. Sample No. Depth, (m)	Specific Gravity E (measured)	2.75 129. Voids Ratio Change Factor	Pressure P (kPa)	0 160 320 640 1280 160		ONE DIMENSIO		Very stiff dark grey Specific Moist Gravity Content 2.75 Start Messured End



CONSOLIDATION SETTLEMENT beneath a flexible rectangular loaded area

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

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

layer

no.

1

increase in

vertical

stress

sigma z

kPa

-60

-59

-58 -57 -56

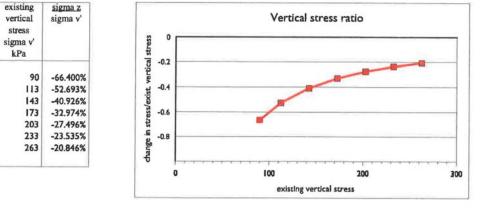
-55 -55

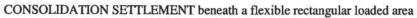
la	ayer	Z	m	n	lr	sigma z	existing	sigma v'	mv	settlement	heave
no.	thickness		L z	B z		= 4Ir*q	effective vert. stress sigma v'	+ ½ sigma z	(estimated)	(mm)	(mm) to 20% cut-off
1	1.5	3.00	15.67	4.83	0.249	-60	90	60	0.132	-12	-12
2	3.0	5.25	8.95	2.76	0.247	-59	113	83	0.125	-22	-22
3	3.0	8.25	5.70	1.76	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		-117	
					L/B	3.2		fox's dept	o correction	0.91	
				D/r	oot(2L*2B)	0.23		geol	geological factor 0.5		
	root(2L*2B)/D 4.35 actual settlement								-53		

No soft clay layer

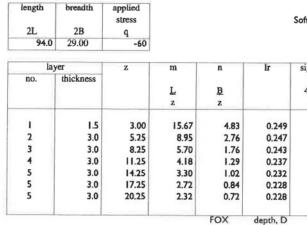
-53 (negative value represents heave)

(after Fadum)





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



L/B D/root(2L*2B) root(2L*2B)/D

5

5 -0.2

-0.4

-0.6

·E -0.8

0

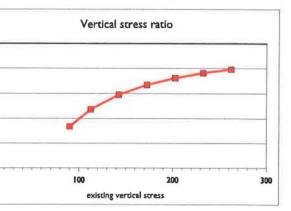
f

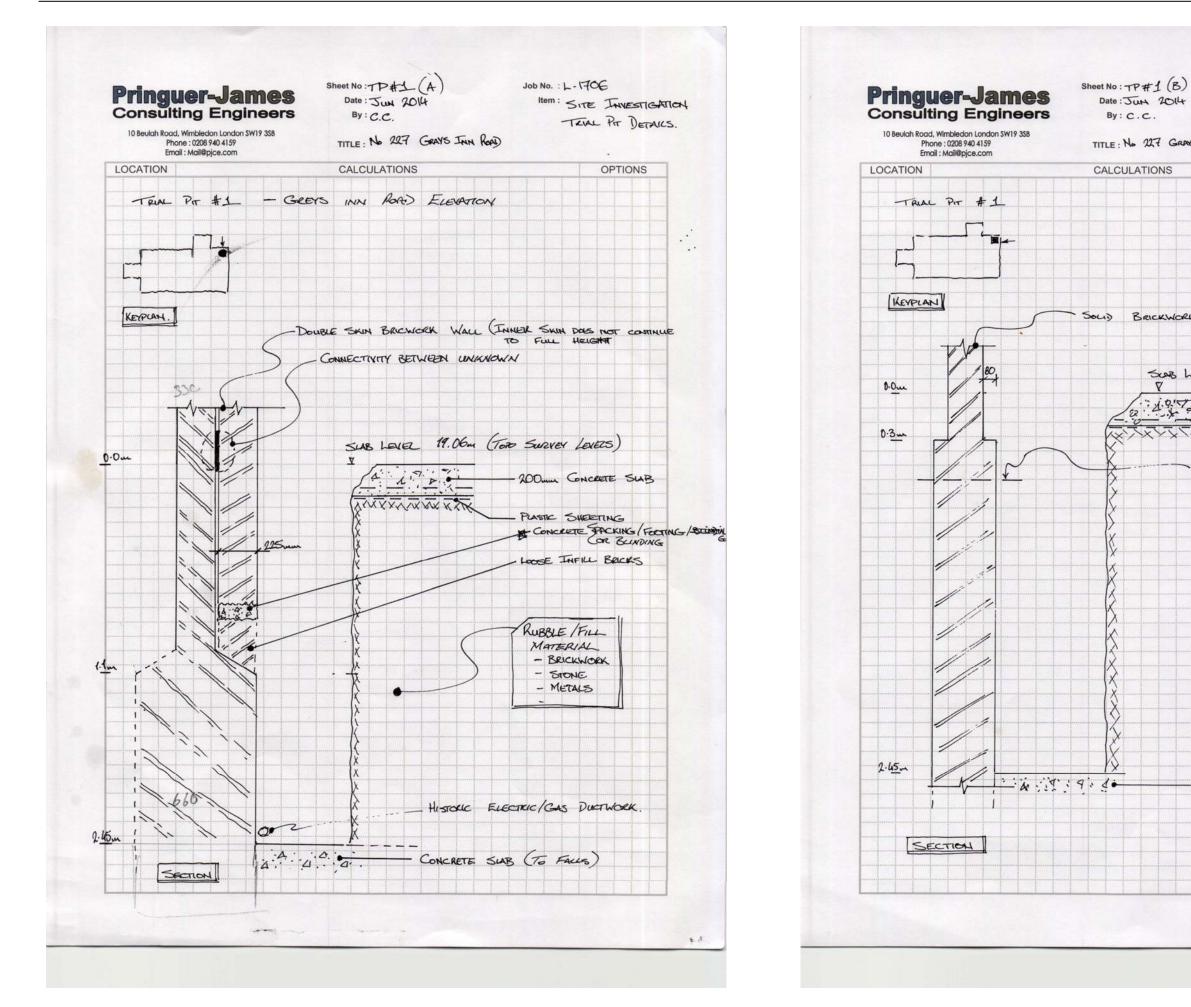
layer по.	increase in vertical stress sigma z kPa	existing vertical stress sigma v' kPa	<u>sigma z</u> sigma v'
1	-60	90	-66.400%
2	-59	113	-52.693%
3	-58	143	-40.926%
4	-57	173	-32.974%
5	-56	203	-27.496%
5	-55	233	-23.535%
5	-55	263	-20.846%

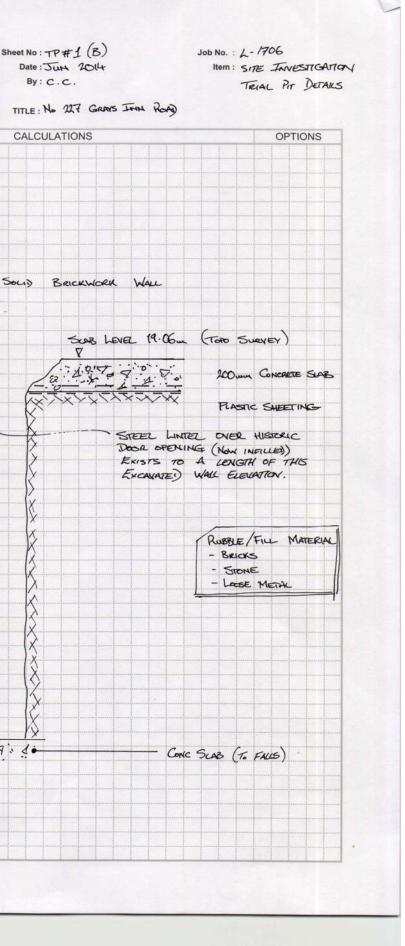


Soft clay layer

(mm)	(estimated)	+ ½ sigma z	effective vert. stress sigma v'	= 4Ir*q
-19	0.210	60	90	-60
-22	0.125	83	113	-59
-20	0.115	113	143	-58
-18	0.107	144	173	-57
-16	0.095	175	203	-56
-15	0.092	205	233	-55
-14	0.085	235	263	-55
	settlement	oedometer		12.00
0.91	correction	fox's depth	1	3.2
0.5	ogical factor	geolo		0.23
	settlement	actual		4.35
2 0 8 6 5 4	-2: -20 -14 -14 -19 -14 -14 0.9 0.9	0.125 -2: 0.115 -20 0.107 -14 0.095 -16 0.092 -19 0.085 -14 settlement correction 0.9 ogical factor 0.5	60 0.210 -1' 83 0.125 -2' 113 0.115 -2' 144 0.107 -1i 175 0.095 -10 205 0.092 -11 235 0.085 -14 fox's depth correction geological factor 0.9 actual settlement 0.9	sigma v' 0 0.210 -19 90 60 0.210 -19 113 83 0.125 -22 143 113 0.115 -20 173 144 0.107 -11 203 175 0.095 -10 233 205 0.092 -11 263 235 0.085 -14 oedometer settlement fox's depth correction 0.9 geological factor 0.3 actual settlement 0.19







Pringuer-James Consulting Engineers

