

51 Calthorpe Street

Summary of differences between Versions 3 and 5 of Revision C of the BIA

1. The plans have been annotated to note that the proposed piles will be a minimum 1500 mm off-set from the boundary of 49 Calthorpe Street (thereby reducing the footprint of the building, as recommended by Jenkins & Potter in their letter dated 10 February 2017). The ground movements have been recalculated accordingly.
2. The horizontal strain has been recalculated under more conservative assumptions. Specifically, the strain at each increment along the building has been assessed and the maximum strain used for the purposes of the assessment.
3. Appendix P has been annotated to note that the ground movement assessment is based on a curve relating to a contiguous piled walls in clay, on the basis that the curve for settlements due to excavation in sand is too pessimistic (being based on data from a wide range of wall construction types including king post, which do not accurately represent a high stiffness contiguous piled wall). It is noted that case studies for stiff wall systems in sand produce comparable settlements to those for clay.
4. Damage categories have also been calculated for spine walls within the adjacent terrace, to ensure that the assessment is made on a worst case basis.
5. The damage category graphs have been re-plotted.

51 CALTHORPE STREET LONDON, WC1X 0HH

Basement Impact Assessment

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Reference: RM/CS/P12-385/22 Rev C FINAL

Date: May 2015

Registration of Amendments

Revision	Amendment Details	Revision Prepared By	Revision Approved By
Rev A Final 25/04/16	Updated following BIA audit review and further ground investigation, desk study and design progression.	JM, CB ¹ , MS	MS ² & AH
Rev B Final 12/08/16	Updated following further comments and BIA audit review.	CB, NT ³	PO ⁴ & AH
Rev C Final 19/09/16	Updated following correction of ground movement calculations.	PO, NT ³	PO ⁴ & AH
Rev C Version 2	Updated following updates resulting from using contiguous piled wall.	PO	CB
Rev C Version 3 23/03/17	Updates on ground movement assessment calculations.	PO	CB
Rev C Version 4 29/03/17	Updated ground assessment calculations and revised pile offset from No.49 party wall.	PO	CB
Rev C Version 5 06/04/17	Basement sketch (S-SK011) amended to show minimum offset to Number 49 Calthorpe St. No other changes.	PO	CB

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- 8.206 This assessment has used empirical means as set out in CIRIA C580 Embedded Retaining Walls: Guidance for Economic Design. The relevant calculations are included in Appendix P.

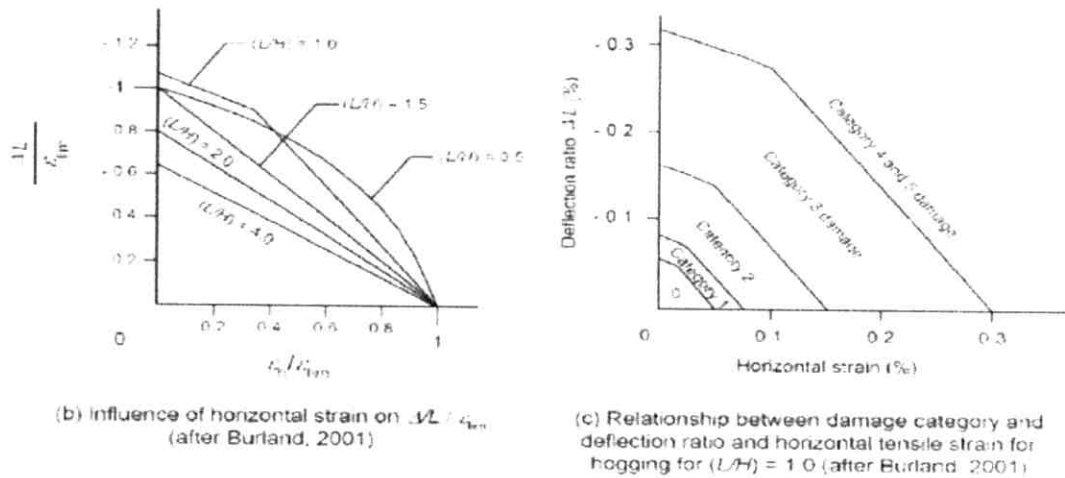
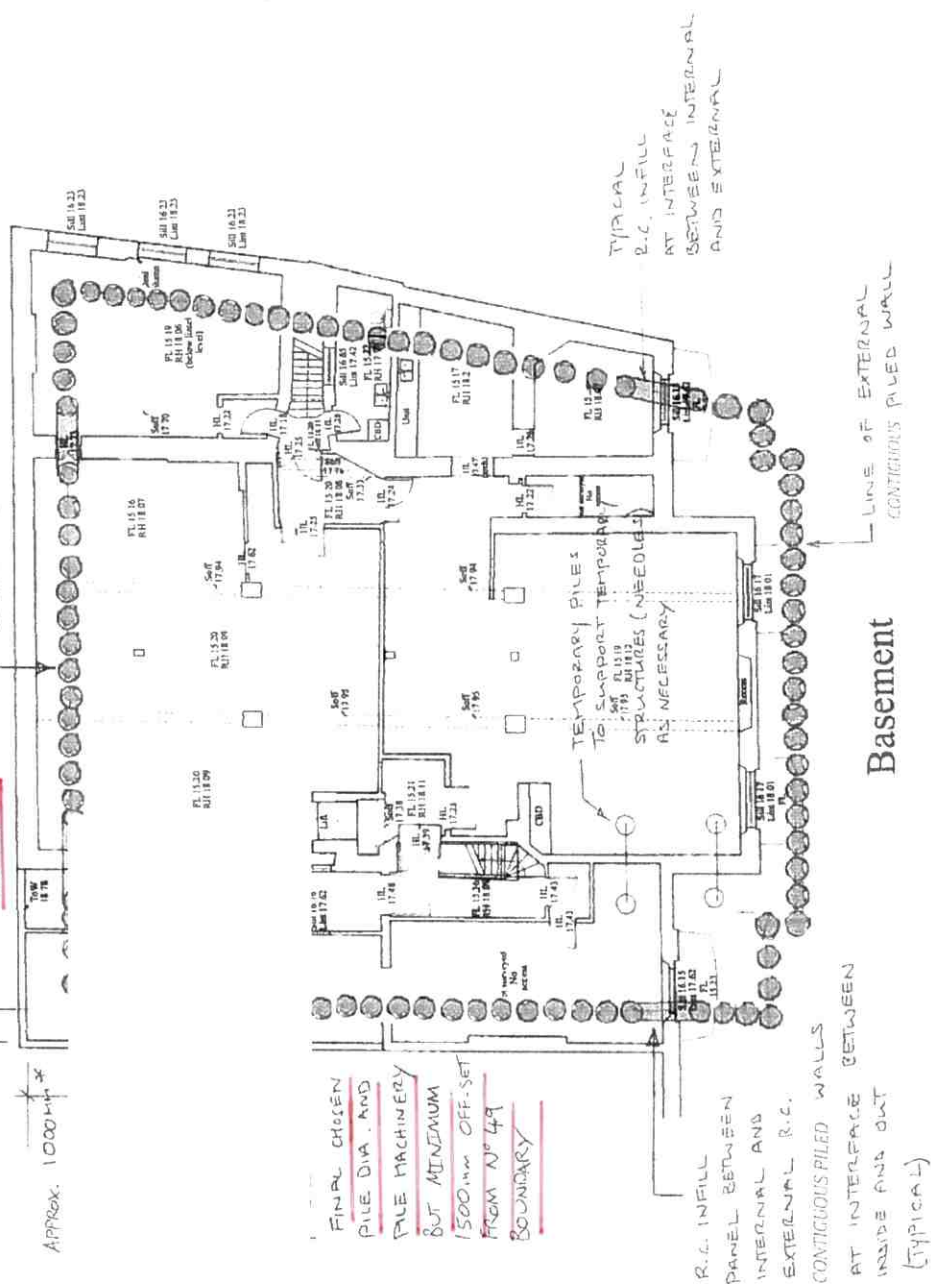


Figure 8.15: Predicted Ground Movement after Burland 2001

- 8.207 Calculation of predictive ground movements and category of damage is in accordance with CIRIA C580 has been assessed as summarised below.-
- 8.208 The calculated ground movement and thus anticipated cracking for the basement works falls within Category 1 Very slight in CIRIA C580 (classification of visible damage to walls after Burland). Refer to pages 1 -2 in Appendix P.
- 8.209 The calculated ground movement and thus anticipated cracking for the neighbouring property, Holiday Inn, falls within Category 0 Negligible in CIRIA C580 (classification of visible damage to walls after Burland). Refer to page 17 in Appendix P.
- 8.210 The assessed ground movement and thus anticipated cracking for the adjacent road is considered to be within the tolerance levels for a roadway and therefore considered to be negligible. Refer to page 18 in Appendix P.
- 8.211 Therefore the maximum level of cracking anticipated is fine (internal) cracking, which is acceptable in accordance with the Party Wall Act and can generally be repaired with decorative coverings/filler. To mitigate this risk, the Party Wall Act is to be followed and a Party Wall Surveyor will be appointed.
- 8.212 Figures 8.16 and 8.17 are extracts from 'Guidance on Subsidence of Low-rise Buildings by the Institution of Structural Engineers and the BRE document 'Subsidence Damage to Domestic Buildings'. Both tables indicate the level of cracking and repair with particular reference to type of repair, and rectification and indicate where the predicted movement/damage sits in the hierarchy of damage classification.



1500 mm MIN FROM
No. 49 PARTY WALL

PROJECT	DATE	DRAWING STATUS	 create CONSULTING ENGINEERS LTD
51 CALTHORPE STREET B1A BASEMENT PILED RET. WALL	04/16 SCALE(S) N1:3 C/S 1:10	PLANNING M/S M/S C/E	
DRAWING TITLE	DATE	DRAWING NO	BY/CHKD
		PZ - 3/E	3
CLIENT	MR. S. FRENCH		

Project: 51 CALTHORPE STREET	Sheet no. of	Job No: P12-385
	Calc. no: P/3	Checked by:
Subject: GROUND MOVEMENT ASSESSMENT	Made by: PMO	Date:
	Date:	

GROUND MOVEMENT ASSESSMENT

THE CIRIA GUIDE C580 HAS BEEN USED TO ESTIMATE GROUND MOVEMENTS FOLLOWING THE METHODOLOGY OUTLINED IN SECTION 2.5.4. THIS IS SUMMARISED IN BOX 2.5 BELOW.

Box 2.5 *Procedure for stage 2 damage category assessment*

The following steps should be undertaken in making a stage 2 assessment of the damage to a structure:

- (i) establish L and H for the structure (see Figure 2.18(a) for definitions of L and H)
- (ii) determine (L/H)
- (iii) determine relationship between (Δ/L) and ϵ_h for the required (L/H) from Figure 2.18(b) for ϵ_{lim} values from Table 2.5
- (iv) estimate vertical and horizontal ground surface movements in the vicinity of the structure from Figure 2.14
- (v) determine (Δ/L) and $\epsilon_h (= \delta_h/L)$ where δ_h is the horizontal movement
- (vi) estimate damage category from the relationship between (Δ/L) and ϵ_h established from step (iii) above.

GROUND MOVEMENTS DUE TO PILE INSTALLATION

THE WALL COMPRISES A CONTIGUOUS PILE WALL WITH REINFORCED CONCRETE LINER WALL. THE DEPTH OF PILES IS 10m. HORIZONTAL AND VERTICAL MOVEMENTS ARE CALCULATED USING THE TABLES AND FIGURES IN SECTION 2.5 OF CIRIA C580.

GROUND MOVEMENTS FROM EXCAVATION IN FRONT OF WALL

CIRIA C580 GIVES GUIDANCE ON ESTIMATING GROUND MOVEMENTS DUE TO EXCAVATION IN FRONT OF A WALL IN SAND ON FIGURE 2.12. HOWEVER, MOST OF THE DATA FOR THIS GRAPH COMES FROM EITHER KING POST OR SHEET PILED WALLS. IN THE CASE OF 51 CALTHORPE STREET, WHICH HAS CONTIGUOUS PILED WALLS AND UTILISES TOP-DOWN CONSTRUCTION, EXAMINING THE DATA FOR THE DIAPHRAGM WALL CASE, WHICH BEST MATCHES WITH THE CASE AT 51 CALTHORPE ST, THE CURVE OF GROUND MOVEMENTS ACTUALLY FITS VERY CLOSELY TO THOSE ASSOCIATED WITH EXCAVATING IN STIFF CLAY, AS PER FIGURE 2.11. THEREFORE, THE VERTICAL MOVEMENTS DUE TO EXCAVATING IN FRONT OF THE WALL HAVE BEEN ASSESSED USING ONLY FIG. 2.11, I.E. ASSUMING EXCAVATING IN STIFF CLAY. REFER TO PAGE P/7 FOR FURTHER DETAILS.

CALCULATION SHEET



Project:	51 CALTHORPE STREET	Sheet no. of	Job No: P12-385
		Calc. no:	Checked by:
Subject:	GROUND MOVEMENT	Made by:	Date:
		REV. MARCH 2017	

HORIZONTAL MOVEMENT - CIRIA C580 EMBEDDED RETAINING WALL

GROUND SURFACE MOVEMENT DUE TO EMBED PILES

PROPOSED BASEMENT DEPTH =
DEPTH - 3.0m BELOW EXISTING B1MENT / NEW LOWER GROUND LEVEL.
DEPTH OF EXCAVATION - 10m APPROX.

TABLE 2.2

CONTIG. WALL
HORIZ. SURFACE MOVEMENT 0.04%
 $S_h = 4.0mm$
DIST. TO NEAR. MOVEMENT $1.5 \times 10 = 15m$
VERT. SURFACE MOVEMENT 0.04%
 $S_v = 4mm$
DIST. TO NEAR. MOVEMENT $2 \times 10 = 20m$

POTENTIAL MOVEMENT DUE TO WALL EXCAVATION

TABLE 2.3

HIGH SUPPORT STIFFNESS - TOP DOWN CONSTRUCTION
DEPTH OF EXCAVATION = 3
HORIZONTAL
SURFACE MOVEMENT 0.15% - HIGH STIFFNESS
TOP-DOWN CONSTRUCTION

FIG. 2.12

VERTICAL
SURFACE MOVEMENT AT 1.5m $= 0.071\% \times 3m = 2.13mm$
DIST. TO NEAR. MOVEMENT 6m

↳ CONSERVATIVE SINCE EXCAVATION AT TOP
OF WALL SHOULD BE EXTREMELY LOW.

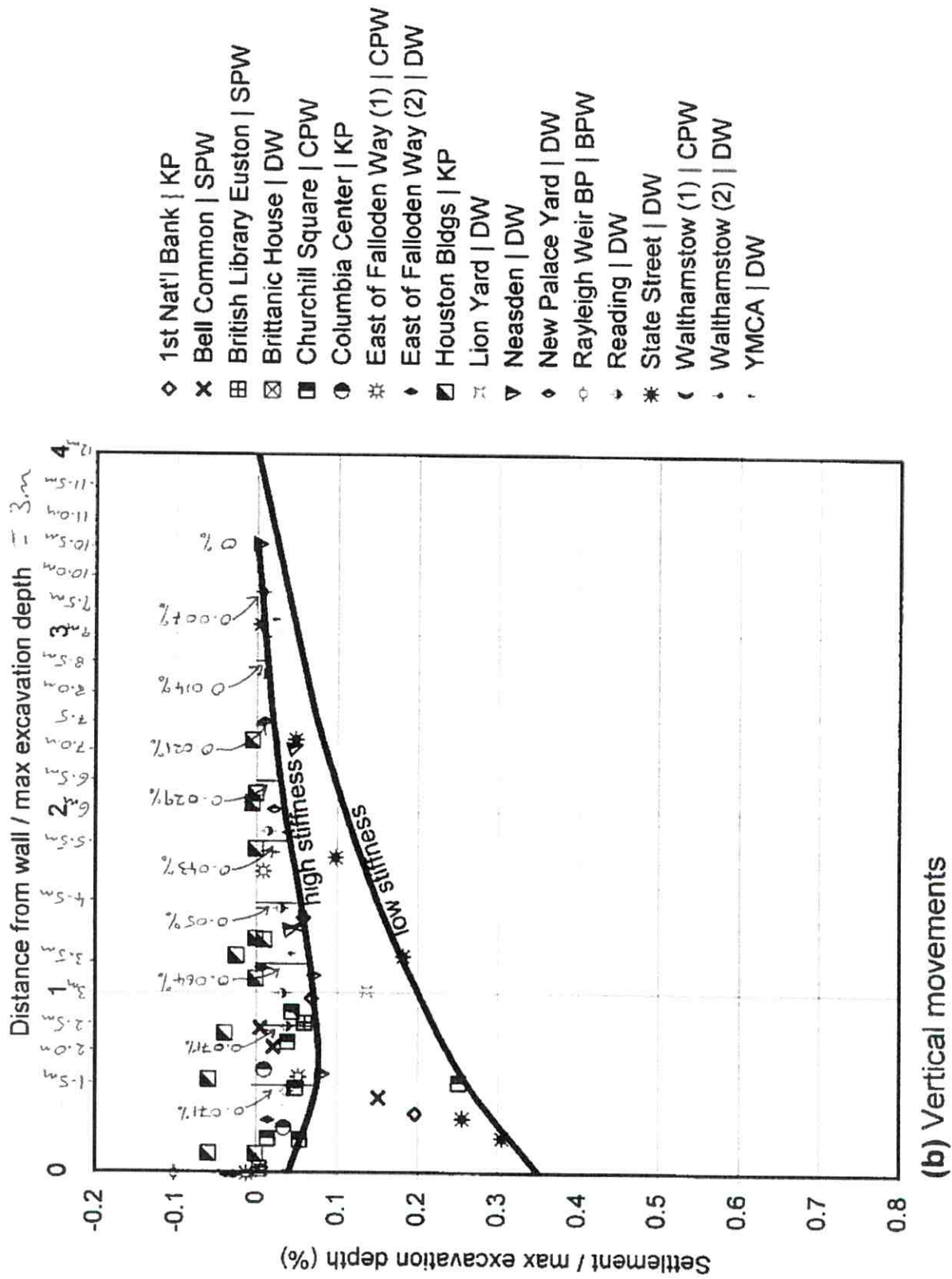
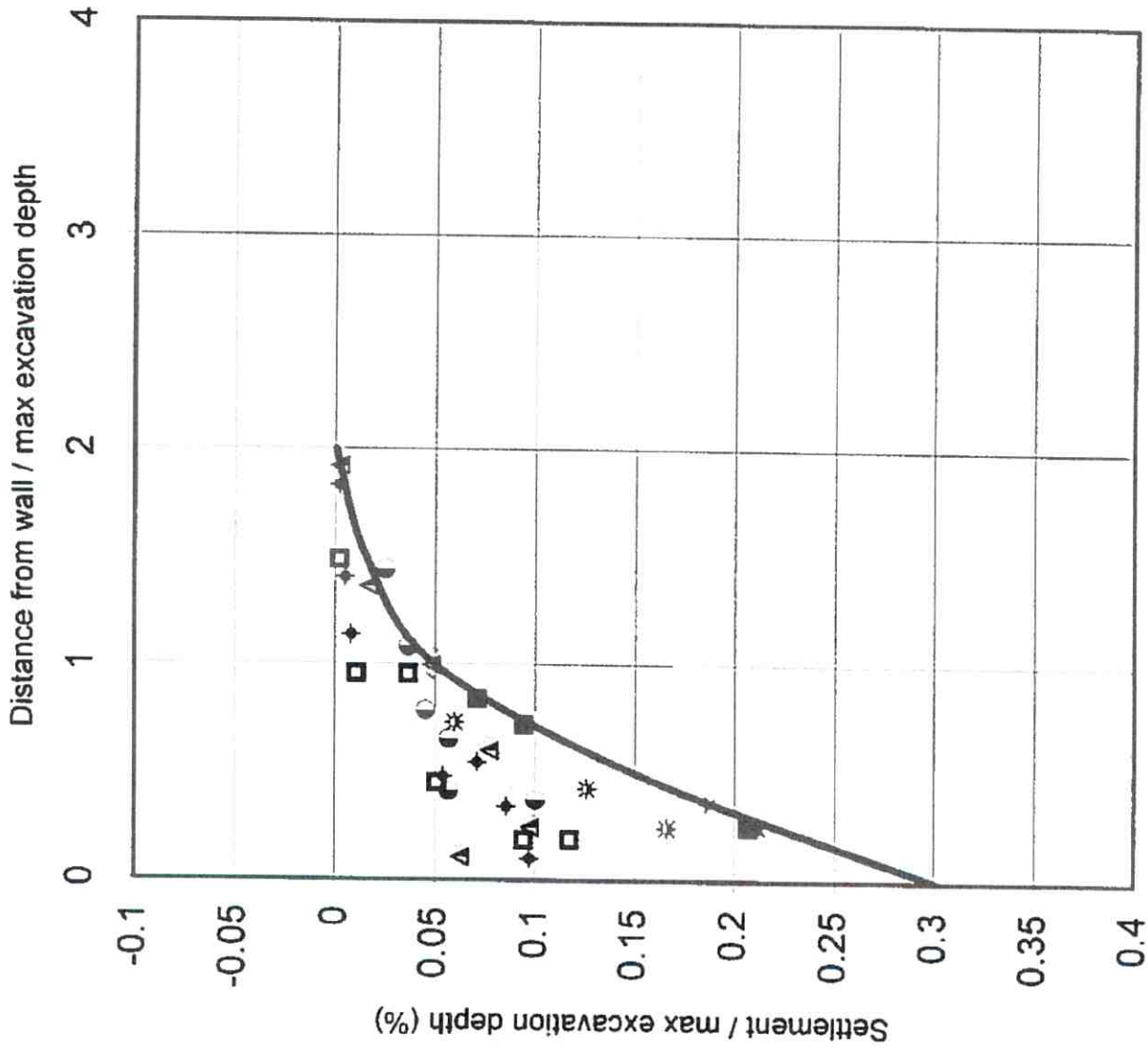


Figure 2.11 Ground surface movements due to excavation in front of wall in stiff clay



Key:

Site | Wall Type

SHP: Sheet pile wall — N/A
 KP: King post wall — N/A
 DW: Diaphragm wall

} VERY FLEXIBLE WALLS - NOT APPLICABLE

See Appendix 2 for details of case histories

- 7th & 8th G-Sts | KP
- 8th & 8th G-St | KP
- ★ Bergshamra | SHP
- ▲ Chater Station | DW
- * G-St Test Site | KP
- ◆ Hatfield | SHP
- OCC Bldg | KP

EXCLUDING KING POST & SHEET PILE WALLS
 FROM GRAPH LEAVING ONLY DIAPHRAGM WALL DATA:

→ REMAINING DATA CLOSELY MATCHES
 CURVE ON FIG. 2.11 - GROUND SURFACE
 SETTLEMENT DUE TO EXCAVATION IN
 FRONT OF WALL IN STIFF CLAY

Figure 2.12 Ground surface settlement due to excavation in front of wall in sand

Ground Surface Movement due to Installation of Piles

Contiguous Piles
Depth of Piles

	10 m		At		18 m	
	Horizontal	Vertical	Horizontal	Vertical	Horizontal	Vertical
Horizontal surface movement Distance to neg. movement	4 mm 15 m 0.27 mm/m		3.60 mm		0 mm	
Vertical surface movement Distance to neg. movement	4 mm 20 m 0.20 mm/m		3.70 mm			0.40 mm
Horizontal surface movement Distance to neg. movement	4.5 mm 12 m 0.375 mm/m		3.94 mm			
Vertical surface movement Distance to neg. movement	3 mm 10.5 m 0.29 mm/m		2.57 mm			0.00 mm
			7.54 mm		0.00 mm	0.40 mm

Table 2.2

Ground Surface Movement due to Excavation in front of Wall

Depth of Excavation

Horizontal surface movement Distance to neg. movement	4.5 mm 12 m 0.375 mm/m
Vertical surface movement Distance to neg. movement	3 mm 10.5 m 0.29 mm/m

Table 2.4

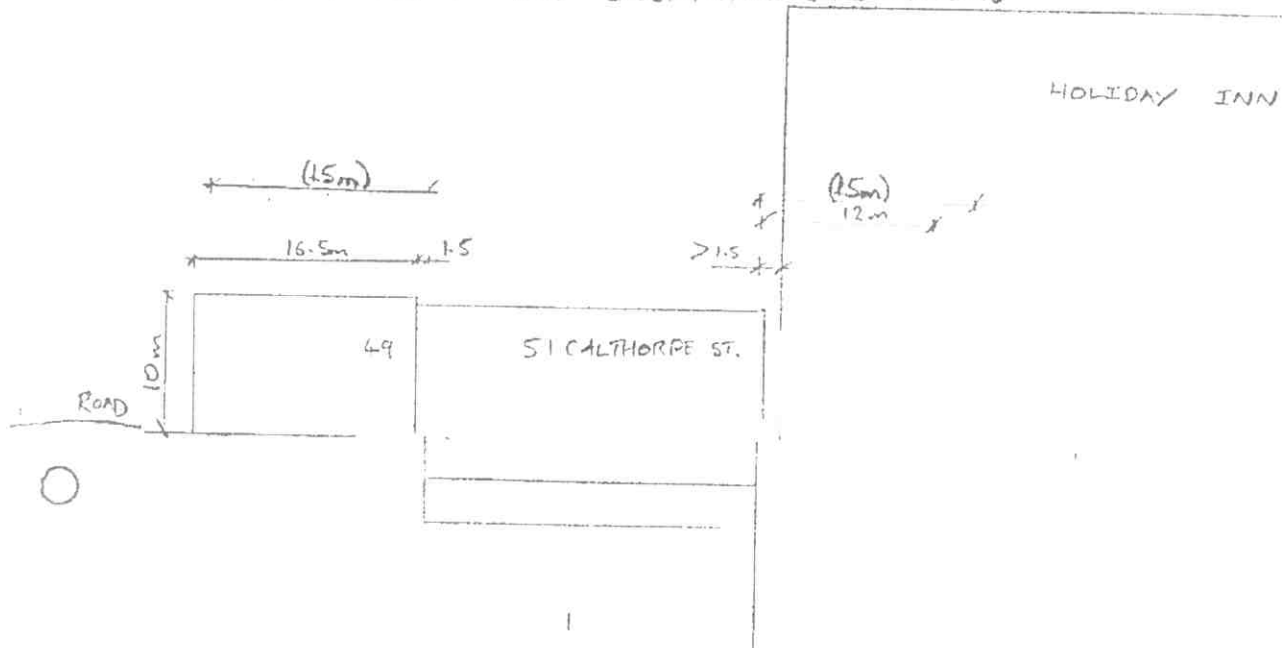
Fig. 2.12

Vertical Settlements along Building						Horizontal			
Pile Depth	Excavation Depth		10 m		3 m				
Distance from Piles	Pile install movement (mm)	Distance/ excavation depth	Fig. 2.11 (%)		(mm)	Total (mm)	Straight line along Elevation	Δv (mm)	$\Delta v/L$
0	0	4	0	0.050%	1.5	5.50			
1.5	3.70	0.50	0.070%		2.1	5.80	5.80	0.00	0.000%
2.5	3.50	0.83	0.071%		2.13	5.63	5.47	0.16	0.001%
3.5	3.30	1.17	0.064%		1.92	5.22	5.15	0.07	0.000%
4.5	3.10	1.50	0.050%		1.5	4.60	4.82	-0.22	0.001%
5.5	2.90	1.83	0.043%		1.29	4.19	4.49	-0.30	0.002%
6.5	2.70	2.17	0.029%		0.87	3.57	4.16	-0.59	0.004%
7.5	2.50	2.50	0.021%		0.63	3.13	3.84	-0.71	0.004%
8.5	2.30	2.83	0.014%		0.42	2.72	3.51	-0.79	0.005%
9.5	2.10	3.17	0.007%		0.21	2.31	3.18	-0.87	0.005%
10.5	1.90	3.50	0.000%		0	1.90	2.85	-0.95	0.006%
11.5	1.70	3.83	0.000%		0	1.70	2.53	-0.83	0.005%
12.5	1.50	4.17	0.000%		0	1.50	2.20	-0.70	0.004%
13.5	1.30	4.50	0.000%		0	1.30	1.87	-0.57	0.003%
14.5	1.10	4.83	0.000%		0	1.10	1.55	-0.45	0.003%
15.5	0.90	5.17	0.000%		0	0.90	1.22	-0.32	0.002%
16.5	0.70	5.50	0.000%		0	0.70	0.89	-0.19	0.001%
17.5	0.50	5.83	0.000%		0	0.50	0.56	-0.06	0.000%
18	0.40	6.00	0.000%		0	0.40	0.40	0.00	0.000%
18.5	0.30	6.17	0.000%		0	0.30	0.24	0.06	0.000%
19	0.20	6.33	0.000%		0	0.20	0.07	0.13	0.001%
20	0.00	6.67	0.000%		0	0.00	-0.25	0.25	0.002%
						Max $\Delta v/L$		Max $\Delta v/L$	
						δ_{lim}		δ_{lim}	
						Max		Max	
						$(\Delta v/L)/\delta_{lim}$		δ_{H}/δ_{lim}	
						0.077		0.856	
						0.006%		0.064%	
						0.075% Cat 1 Very slight		0.075% Cat 1 Very slight	

HORIZONTAL MOVEMENTS

AFFECTED BY CONSTRUCTION ONLY SINCE TOP-DOWN CONSTRUCTION PROVIDES RIGID PROP AT TOP OF PILES

mm MOVEMENT DUE TO PILE INSTALLATION + EXCAVATION



TOTAL = 7.54mm @ 1.5m

AFFECTED ZONE = 15m FROM PILES

49 CALTHORPE: $E_h = \frac{7.54\text{mm}}{(15-1.5)\text{m}} = 0.056$ OVER 'ACTIVE' LENGTH AS WHOLE

$E_{h\text{max}} = 0.064$

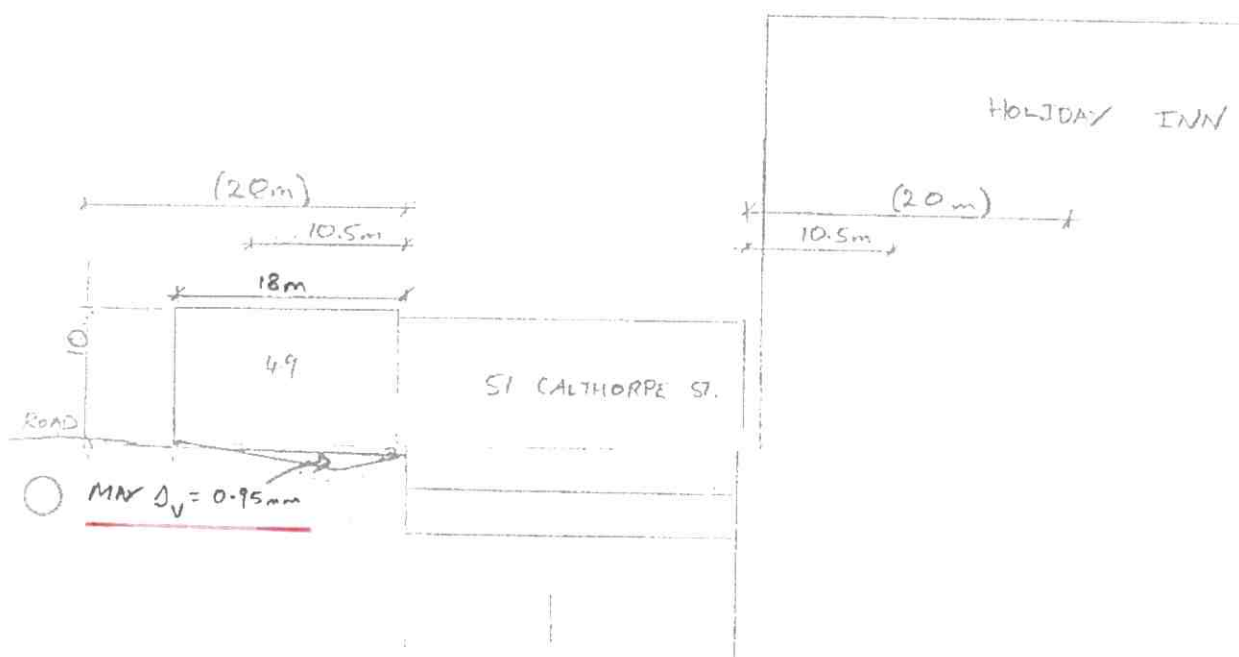
$E_{\text{Lim}} = 0.075$ - VERY SLIGHT (CATEGORY 1)

$\frac{E_h}{E_{\text{Lim}}} = \frac{0.064}{0.075} = 0.85$

VERTICAL MOVEMENTS

P/11

REV. MARCH 2017



TOTAL CONSTRUCTION RELATED MOVEMENTS = 5.8mm

AFFECTED ZONE = 20m

BUILDINGS > 1.5m FROM PILES:

DISPLACEMENTS AT 1.5m = 5.80mm

WORSE-CASE $\Delta_v = 0.95\text{mm}$

$$\Delta_v = \underline{0.95\text{mm}}$$

$$L = 16.5\text{m}$$

$$\rightarrow \frac{\Delta}{L} = \frac{0.95}{16500} = 0.006\%$$

FOR CATEGORY 1 V. SLIGHT: $\epsilon_{\text{lim}} = 0.075\%$

$$\frac{0.006}{0.075} = \underline{0.077}$$

49 CALTHORPE STREETFRONT & REAR ELEVATIONS

$$\frac{L}{H} = \frac{16.5}{10} = 1.65$$

INTERPOLATING LINES: POINT ON $\frac{A}{L} \text{ @ } \frac{E_h}{E_{lim}} = 0 = 0.74$

$$\therefore \text{LINE} = 0.74 - 0.94 \times \frac{E_h}{E_{lim}}$$

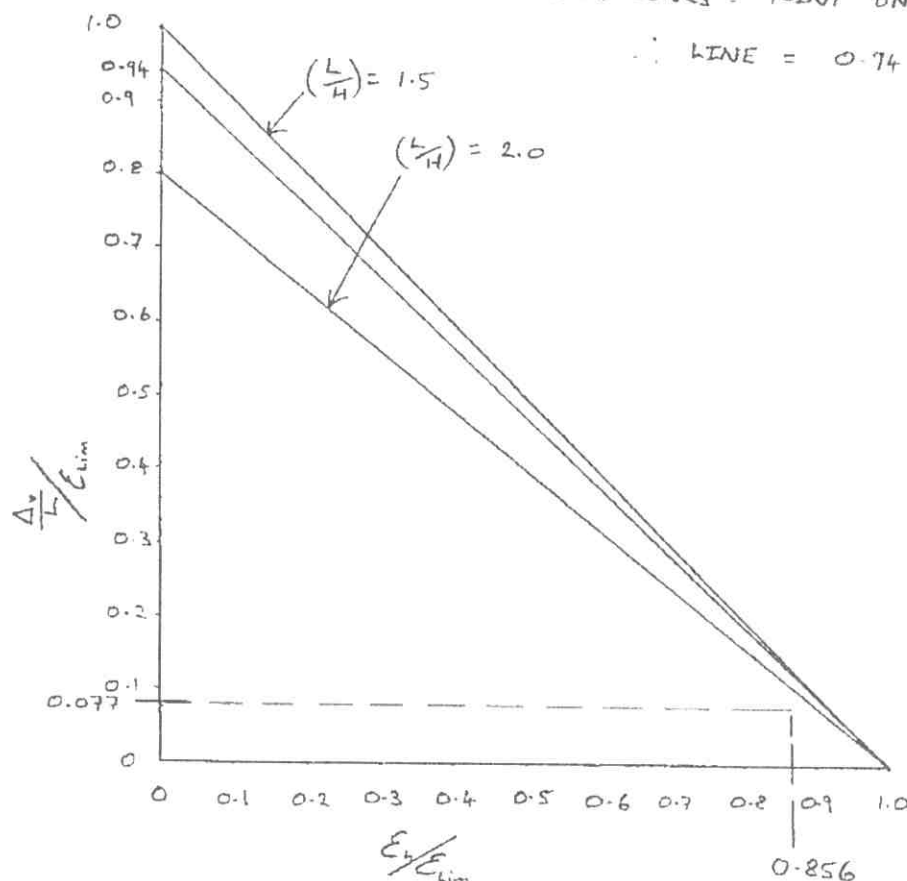


FIG. 2.18(b)

$$\frac{A}{L} / E_{lim} = 0.077$$

$$\frac{E_h}{E_{lim}} = 0.856$$

CHECK COMBINED STRAINS ARE UNDER LINE:

$$\text{MAX. } \frac{A}{L} / E_{lim} = 0.74 - 0.94 \times 0.856 = 0.135$$

$$\text{ACTUAL} = 0.077 \quad \therefore \text{O.K.}$$

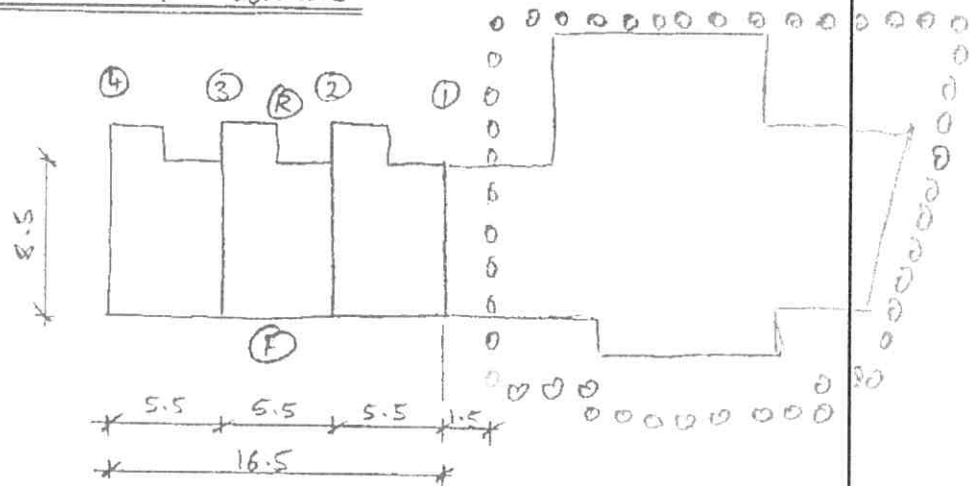
CATEGORY 1 - VERY SLIGHT

CALCULATION SHEET



Project: 51 CALTHORPE STREET	Sheet no. of	Job No:
	Calc. no: P/15a	Checked by:
Subject: 49 CALTHORPE ST- DIV. WALL CHECK	Made by: PMO	Date:
	Date: 28/03/2017	

DIVIDING WALLS



WALL ON ①

DIST. FROM PILES = 1.5m

$$L = 8.5m$$

$$H = 10m$$

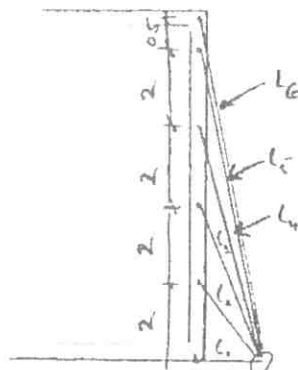
$$\frac{L}{H} = 0.85$$

GEN. MOVEMENT CONSISTENT ALONG WALL EXPECTED. FOR CONSERVATISM CHECK CASES WITH LOCALISED SETTLEMENT ONLY:

CASE 1

MOVEMENT TO GROUND AT FRONT (①) END ONLY,
NEG. MOVEMENT AT (④):

DIST
MAX. EXCAVATION DEPTH



$L_1 = 1.5m$	0.5
$L_2 = 2.5m$	0.83
$L_3 = 4.3m$	1.43
$L_4 = 6.2m$	2.1
$L_5 = 8.14m$	2.71
$L_6 = 8.63m$	2.88

DIVIDING WALL ON LINE 1

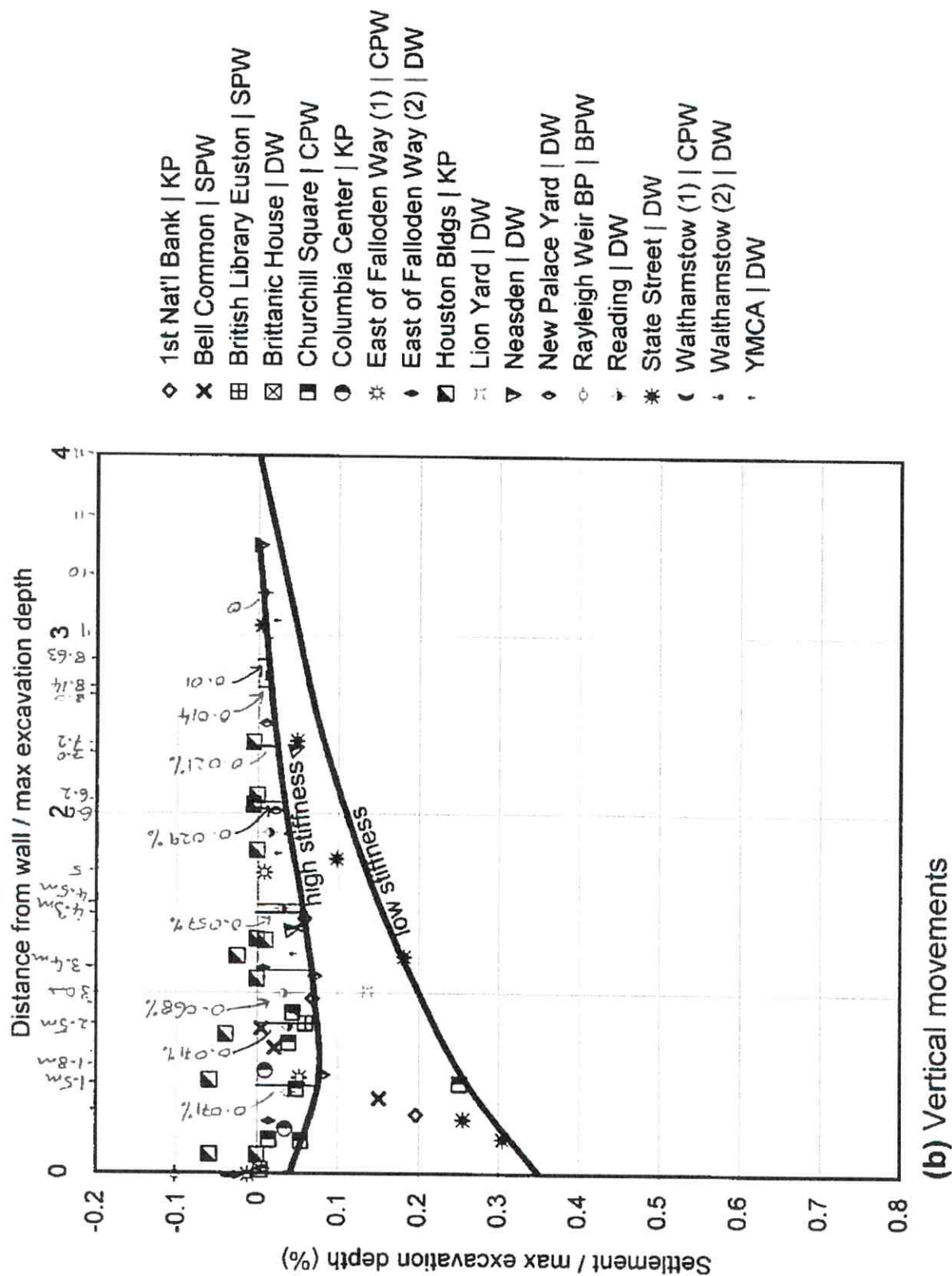


Figure 2.11 Ground surface movements due to excavation in front of wall in stiff clay

Vertical Settlements Dividing Wall - Case 1										Horizontal			
Pile Depth		10 m		3 m									
Excavation Depth		Distance/		Fig. 2.11 (%)									
from Piles		excavation		depth									
Distance from Piles		Pile install		movement									
		(mm)		(mm)									

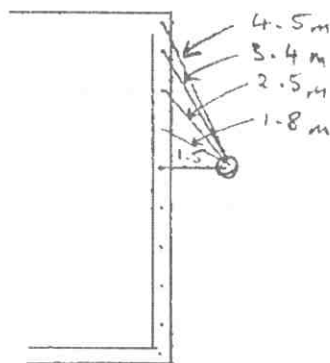
CALCULATION SHEET



Project:	51 CALTHORPE STREET	Sheet no. of	Job No:
		Calc. no: F/17	Checked by:
Subject:	49 CALTHORPE ST - DIV. WALL CHECK	Made by: PMO	Date:
		Date: 28/03/2015	

CASE 2

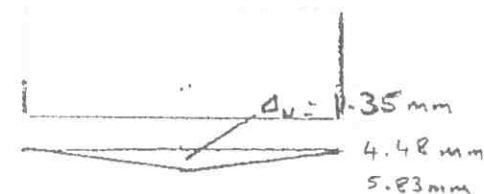
CENTRAL DEFLECTION, NO MOVEMENT AT ENDS



MOVEMENT DUE TO EXCAVATION:

$$\begin{aligned}
 L_1 &= 1.5 = 0.071\% \\
 L_2 &= 1.8 = 0.078 \\
 L_3 &= 2.5 = 0.071 \\
 L_4 &= 3.4 = 0.064 \\
 L_5 &= 4.5 = 0.05 \\
 L_6 &= 1.8 = 0.078 \\
 L_7 &= 2.5 = 0.071 \\
 L_8 &= 3.4 = 0.064 \\
 L_9 &= 4.5 = 0.05
 \end{aligned}$$

VERTICAL MOVEMENTS



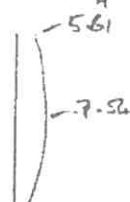
$$\frac{\Delta_v}{L} = \frac{1.35}{8500} = 0.016\%$$

FOR CATEGORY 1: $\frac{0.016}{0.075} = 0.21$

HORIZONTAL MOVEMENTS

MOVEMENT IS OUT-OF-PLANE

MAX. $\Delta_H = 7.54 \text{ mm} - 5.61 \text{ mm}$



$$\Delta_H = 1.93 \text{ mm}$$

$$E_H = \frac{1.93}{8500} = 0.023\%$$

$$\frac{E_H}{E_{lim}} = \frac{0.023}{0.075} = 0.3$$

49 Calthorpe Street Ground Movement Assessment

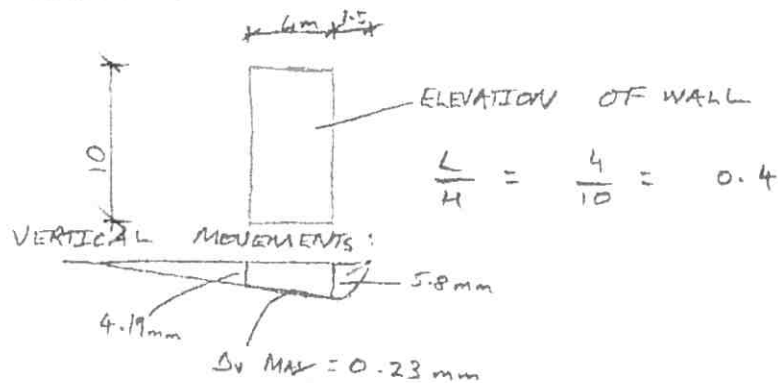
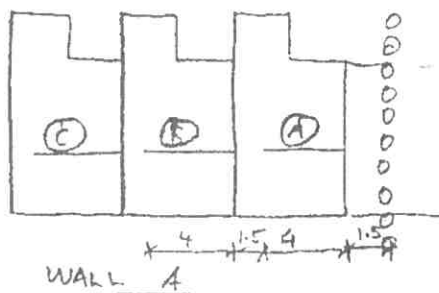
Vertical Settlements Dividing Wall - Case 2													Horizontal	
Pile Depth		10 m		3 m										
Excavation Depth		Distance/		Fig. 2.11 (%)										
Distance from Piles	Pile install movement (mm)	excavation depth	(mm)	(mm)	Total (mm)	Straight line along Elevation	Δv (mm)	$\Delta v/L$	Pile install movement (mm)	Fig. 2.11 (a) (mm)	Total (mm)	Horizontal Strain ϵ_H		
0	4	0	0	0.050%	1.5	5.50			4	4.5	8.5			
1.5	3.70	0.50	2.13	0.071%	5.83	5.83	0.00		3.60	3.94	7.54		B D	
1.8	3.64	0.60	2.34	0.078%	5.98	5.69	0.29		3.52	3.83	7.35		U I	
2.5	3.50	0.83	2.13	0.071%	5.63	5.38	0.25		3.33	3.56	6.90		I N	
3.4	3.32	1.13	1.92	0.064%	5.24	4.97	0.27		3.09	3.23	6.32		L G	
4.5	3.10	1.50	1.5	0.050%	4.60	4.48	0.12		2.80	2.81	5.61			
5	3.00	1.67	1.2	0.040%	4.20				2.67	2.63	5.29			
6	2.80	2.00	1.05	0.035%	3.85				2.40	2.25	4.65			
7	2.60	2.33	0.75	0.025%	3.35				2.13	1.88	4.01			
8	2.40	2.67	4.2	0.140%	6.60				1.87	1.50	3.37			
9	2.20	3.00	0.3	0.010%	2.50				1.60	1.13	2.73			
10	2.00	3.33	0	0.000%	2.00				1.33	0.75	2.08			
11	1.80	3.67	0	0.000%	1.80				1.07	0.38	1.44			
12	1.60	4.00	0	0.000%	1.60				0.80	0.00	0.80			
13	1.40	4.33	0	0.000%	1.40				0.53	0.00	0.53			
14	1.20	4.67	0	0.000%	1.20				0.27	0.00	0.27			
15	1.00	5.00	0	0.000%	1.00				0.00	0.00	0.00			
16	0.80	5.33	0	0.000%	0.80				0.00	0.00	0.00			
18.4	0.32	6.13	0	0.000%	0.32				0.00	0.00	0.00			
18.5	0.30	6.17	0	0.000%	0.30				0.00	0.00	0.00			
19	0.20	6.33	0	0.000%	0.20				0.00	0.00	0.00			
20	0.00	6.67	0	0.000%	0.00				0.00	0.00	0.00			

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Project: 51 CALTHORPE ST.	Sheet no. of	Job No:
	Calc. no: P/186	Checked by:
Subject: 49 CALTHORPE ST - SPINE WALL	Made by: PMO	Date:
	Date: 29/03/2017	

INTERNAL SPINE WALLS

WALLS PERP. TO DIVIDING WALL.
LENGTH ~ 4m



$$\frac{0.23}{4000} = 0.006\%$$

HORIZONTAL MOVEMENTS

$$\text{MAX. } \epsilon_H = 0.064\%$$

REFERING TO PAGE P/19 GRAPH:

$$\frac{\epsilon_H}{\epsilon_{lim}} = \frac{0.064}{0.075} = 0.856$$

$$\frac{\Delta_v / L}{\epsilon_{lim}} = \frac{0.006}{0.075} = 0.08$$

49 Calthorpe Street Ground Movement Assessment

Vertical Settlements along Spine Walls										Horizontal													
Pile Depth		10 m		3 m																			
Excavation Depth		Pile install movement (mm)		Distance/ excavation depth		Fig. 2.11 (%)		(mm)		Straight line along Elevation		Δv (mm)		$\Delta v/L$		Pile install movement (mm)		Fig. 2.11 (a) (mm)		Total (mm)		Horizontal Strain ϵ_H	
Distance from Piles																							
0		4	0	0.050%	1.5	5.50	5.80	5.80	5.80	0.00	0.000%	3.60	4	4.5	8.5								
1.5	3.70	0.50	0.070%	2.1	5.80	5.80	5.80	5.80	5.80	0.00	0.000%	3.60	3.94	7.54									
2.5	3.50	0.83	0.071%	2.13	5.63	5.63	5.63	5.63	5.63	0.23	0.006%	3.33	3.56	6.90									
3.5	3.30	1.17	0.064%	1.92	5.22	5.00	5.00	5.00	5.00	0.23	0.006%	3.07	3.19	6.25									
4.5	3.10	1.50	0.050%	1.5	4.60	4.59	4.59	4.59	4.59	0.01	0.000%	2.80	2.81	5.61									
5.5	2.90	1.83	0.043%	1.29	4.19	4.19	4.19	4.19	4.19	0.00	0.000%	2.53	2.44	4.97									
6.5	2.70	2.17	0.029%	0.87	3.57	4.16	4.16	4.16	4.16	0.00	0.000%	2.27	2.06	4.33									
7	2.60	2.33	0.025%	0.75	3.35	3.35	3.35	3.35	3.35	0.00	0.000%	2.13	1.88	4.01									
8	2.40	2.67	0.014%	0.42	2.82	2.96	2.96	2.96	2.96	-0.14	0.004%	1.87	1.50	3.37									
9	2.20	3.00	0.007%	0.21	2.41	2.58	2.58	2.58	2.58	-0.17	0.004%	1.60	1.13	2.73									
10	2.00	3.33	0.000%	0	2.00	2.19	2.19	2.19	2.19	-0.19	0.005%	1.33	0.75	2.08									
11	1.80	3.67	0.000%	0	1.80	1.80	1.80	1.80	1.80	0.00	0.000%	1.07	0.38	1.44									
12	1.60	4.00	0.000%	0	1.60	2.36	2.36	2.36	2.36	0.00	0.000%	0.80	0.00	0.80									
12.5	1.50	4.17	0.000%	0	1.50	1.50	1.50	1.50	1.50	0.00	0.000%	0.67	0.00	0.67									
13.5	1.30	4.50	0.000%	0	1.30	1.30	1.30	1.30	1.30	0.00	0.000%	0.40	0.00	0.40									
14.5	1.10	4.83	0.000%	0	1.10	1.10	1.10	1.10	1.10	0.00	0.000%	0.13	0.00	0.13									
15.5	0.90	5.17	0.000%	0	0.90	0.90	0.90	0.90	0.90	0.00	0.000%	0.00	0.00	0.00									
16.5	0.70	5.50	0.000%	0	0.70	0.70	0.70	0.70	0.70	0.00	0.000%	0.00	0.00	0.00									
18	0.40	6.00	0.000%	0	0.40							0.00	0.00	0.00									
18.5	0.30	6.17	0.000%	0	0.30							0.00	0.00	0.00									
19	0.20	6.33	0.000%	0	0.20							0.00	0.00	0.00									
20	0.00	6.67	0.000%	0	0.00							0.00	0.00	0.00									

WALL A
= WORSE CASE

49 CALTHORPE ST.
DIVIDING WALL

P/19

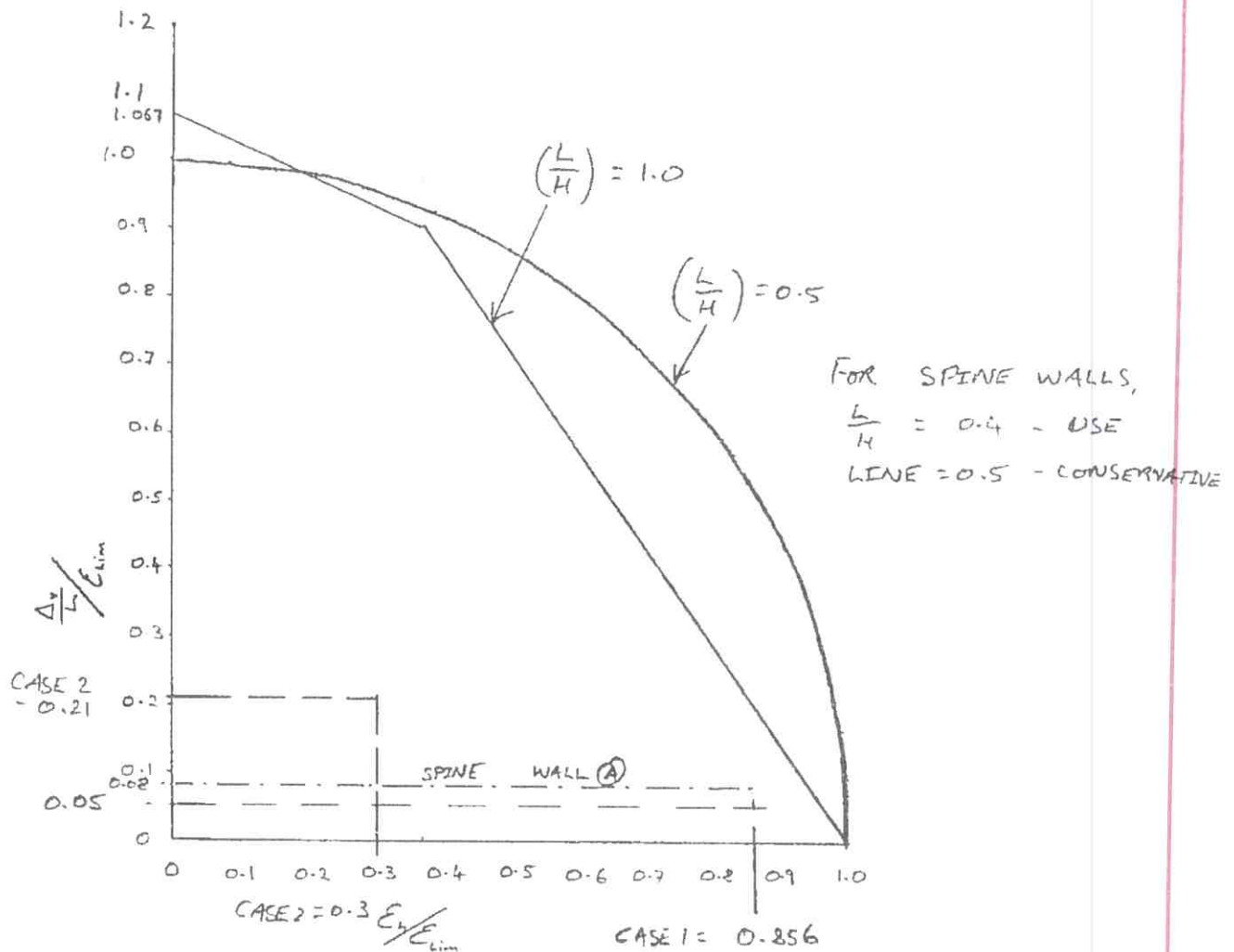


FIG. 2.18(b)
DIVIDING WALL:

CASE 1: $\frac{E_h}{E_{lim}} = 0.856$ $\frac{\Delta/L}{E_{lim}} = 0.05$
 $\therefore$ O.K. - CAT. 1 VERY SLIGHT

CASE 2: $\frac{E_h}{E_{lim}} = 0.3$ $\frac{\Delta/L}{E_{lim}} = 0.21$

$\therefore$ O.K. - CAT. 1 VERY SLIGHT

SPINE WALL (A): $\frac{E_h}{E_{lim}} = 0.856$, $\frac{\Delta/L}{E_{lim}} = 0.08 \rightarrow$ O.K. CAT 1.

DIVIDING WALLS ALL WITHIN
CATEGORY 1 - VERY SLIGHT

SPINE WALLS ALL WITHIN
CATEGORY 1 - VERY SLIGHT

CALCULATION SHEET



Project: SI CALTHORPE ST BIA	Sheet no. of Calc. no: P/20	Job No: P12-325 Checked by:
Subject: CLASSIFICATION OF VISIBLE DAMAGE CHECKS MIXED USE SCHEME	Made by: REV. MNRH Date: 01/9/16	Date:
<u>CHECK ON HOLIDAY INN</u> HOLIDAY INN HAS A BASEMENT OF SIMILAR SIZE / DEPTH TO THAT PROPOSED AT SI CALTHORPE ST. NO GROUND MOVEMENT DUE TO EXCAVATION WOULD BE EXPECTED. <u>3.60 mm</u> HORIZONTAL <u>3.73 mm</u> VERTICAL <u>DAMAGE CATEGORY</u> LENGTH OF BUILDING = 52m AKING STRAIN ONLY OVER : 15m HORIZ. 20m VERT. $\frac{L}{H} = \frac{52}{30} = 1.73$ HORIZONTAL STRAINS : $E_h : \frac{3.6}{15000} = 0.024\%$ FOR V. SLIGHT CATEGORY : $\frac{0.024}{0.075} = 0.32$ FOR NEG. : $\frac{0.024}{0.05} = 0.48$ VERTICAL $\frac{3.7}{20m} = 0.019\%$ FOR V. SLIGHT : $\frac{0.019}{0.075} = 0.25$ NEG. : $\frac{0.019}{0.05} = 0.38$ SEE PREVIOUS = NEGLIGIBLE CATEGORY		

Ground Surface Movement due to Installation of Piles

Contiguous Piles
Depth of Piles

	At 1.5 m	At 52 m	
	Horizontal	Vertical	Horizontal
Horizontal surface movement Distance to neg. movement	3.60 mm	0 mm	0.00 mm
Vertical surface movement Distance to neg. movement	3.70 mm	0.00 mm	0.00 mm

Table 2.2

Ground Surface Movement due to Excavation in front of Wall

Depth of Excavation

Horizontal surface movement Distance to neg. movement	0 mm
Vertical surface movement Distance to neg. movement	0 mm

Table 2.4

Fig. 2.12

HOLIDAY INN

$$L/H = \frac{52}{30} = 1.73$$

INTERPOLATING LINES: POINT ON $\frac{\Delta}{L}/\epsilon_{lim} = 0 = 0.85$

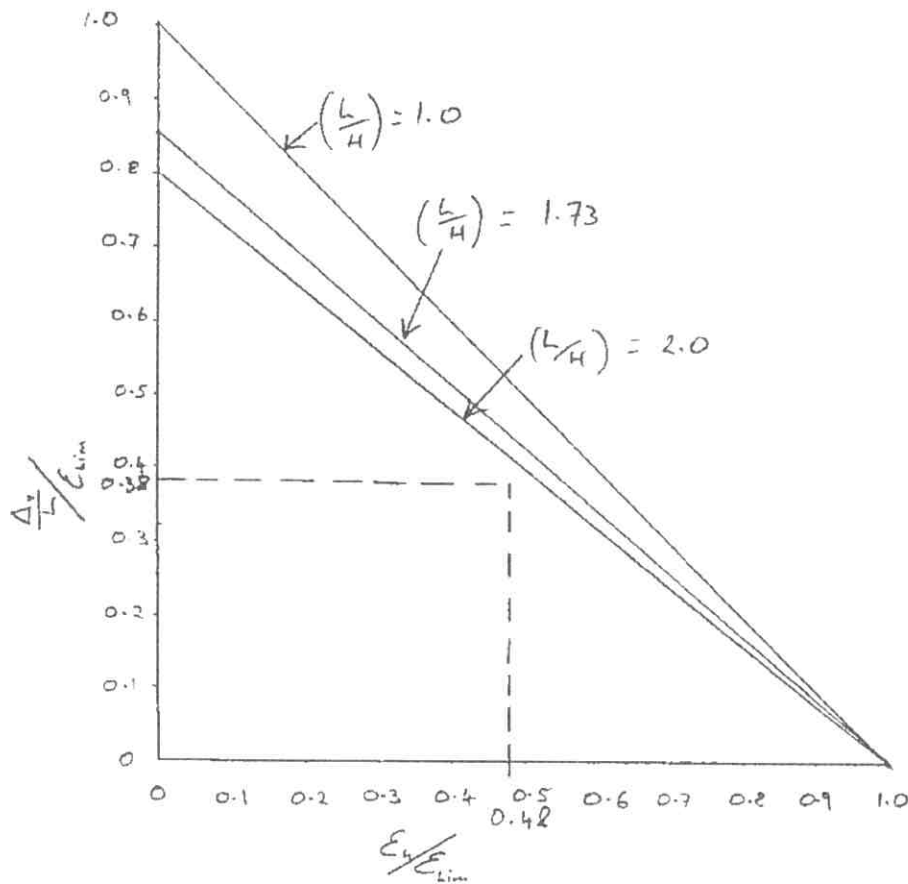


FIG. 2.18(b)

$$\frac{\Delta}{L}/\epsilon_{lim} = 0.38$$

$$\frac{\epsilon}{\epsilon_{lim}} = 0.48$$

CHECK COMBINED STRAINS ARE UNDER LINE:

$$\text{MAX. } \frac{\Delta}{L}/\epsilon_{lim} = 0.85 - 0.85 \times 0.32 = 0.578$$

ACTUAL = $\therefore$ O.K.

$\therefore$ CATEGORY 0 - NEGLIGIBLE