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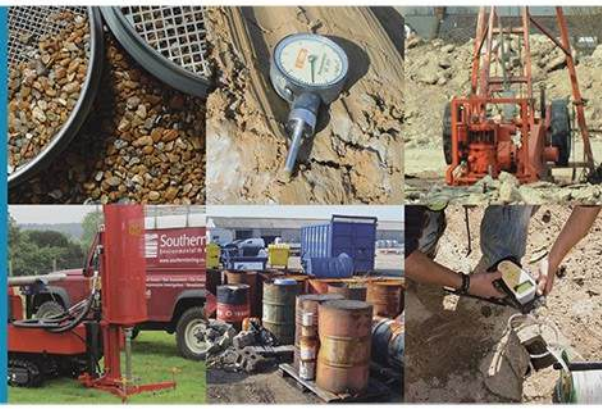
Ground Movement Assessment and Building Damage Assessment Report



Project Name: 17 Courthope Road

Location: London, NW3 2LE

Client: Mr J Markham

Project ID: J15878

Report Ref: J15878-GMA

Report Date: 12th March 2025

Report Issue: 1

REVISIONS AND ADDITIONAL MATERIAL

1 Document History and Status

Revision	Date	Purpose/Status	File Ref	Author	Check	Review
1	12/03/2025	First Issue	J15878-GMA	VF	JNR	MS

2 Document Details

Last saved	12/03/2025
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STL Project Number	J15878
STL Project Name	17 Courthope Road, London

For and on behalf of Southern Testing Laboratories Ltd.

3 Additional Supporting Documents

Document	Date	Version	Producer
Ground Investigation Report (Ref. J15878-S3)	18 February 2025	1	Southern Testing Laboratories Ltd.
Construction Method Statement (Ref. 3421)	January 2025	n/a	Concept Consultancy Structural Designers Ltd.
General Arrangement Site location, block plan, cellar, ground & first floor plans as existing (ref. 0350-F-04-P1)	September 2024	P1	STAC Architecture Limited.
General Arrangement Elevations and sections as existing. (ref. 0350-F-06-P1)	September 2024	P1	STAC Architecture Limited.
General Arrangement Site location, block plan, cellar, ground & first floor plans as proposed (ref. 0350-D-06-P1)	November 2024	P1	STAC Architecture Limited.
General Arrangement Elevations and sections A-A, B-B as proposed. (ref. 0350-D-07-P1)	November 2024	P1	STAC Architecture Limited.
Proposed Ground Floor Plan (Ref. 3422-01-A)	22 November 2024	A	Concept Consultancy Structural Designers Ltd.
Proposed underpinning sequence plan (Ref. 3422-810-A)	22 November 2024	A	Concept Consultancy Structural Designers Ltd.
Proposed underpinning propping sequence sheet 1 (Ref. 3422-811-A)	22 November 2024	A	Concept Consultancy Structural Designers Ltd.
Proposed underpinning propping sequence sheet 1 (Ref. 3422-812-A)	22 November 2024	A	Concept Consultancy Structural Designers Ltd.

TABLE OF CONTENTS

TABLE OF APPENDICES

A NON-TECHNICAL SUMMARY

This report comprises a Ground Movement Assessment for the proposed basement construction at this site. The report includes a Building Damage Assessment for the neighbouring buildings.

This report refers to information contained within the Ground Investigation Report, undertaken separately by Southern Testing Laboratories Ltd. Other plans, including structural designs, were provided by the Client.

The Ground Movement Assessment and Building Damage Assessment was undertaken using the OASYS PDisp and XDisp software and following the guidance contained within CIRIA C760, and incorporates the net changes in soil loadings resulting from the proposed development.

The maximum estimated category of damage to the neighbouring buildings, in both the short and long-term conditions, are as follows:

- 15 Courthope Road: Category 1 (Very Slight)
- 19 Courthope Road: Category 1 (Very Slight)

In the long-term conditions, for the adjacent footway and highway, the ground movements are estimated to be 2.8mm (heave) at the boundary between the subject site and the footway, with peak vertical movements about 2.9mm (heave) at a distance of about 0.4m away from the site boundary. The vertical movements would be about 2.2mm (heave) at the nearest edge of the highway, reducing to 0.03mm (heave) at the far side of the highway. Horizontal movements at the site boundary with the footway and at the nearest edge of the highway (Courthope Road) are estimated to be about 5mm and 3.5mm, respectively, reducing to 0.9mm at the far side of the highway.

The investigation was conducted and this report has been prepared for the sole internal use and reliance of Mr J Markham and their appointed Engineers. This report shall not be relied upon or transferred to any other parties without the express written authorisation of Southern Testing Laboratories Ltd. If an unauthorised third party comes into possession of this report they rely on it at their peril and the authors owe them no duty of care and skill.

The findings and opinions conveyed via this report are based on information obtained from a variety of sources as detailed within this report, and which Southern Testing Laboratories Ltd. believes are reliable. Nevertheless, Southern Testing Laboratories Ltd. cannot and does not guarantee the authenticity or reliability of the information it has obtained from others.

B INTRODUCTION

4 Authority

Our authority for carrying out this work is contained in a signed STL Project Order Form from Mr D Snaith of STAC Architecture, on behalf of Mr J Markham (the Client). This is in relation to our quotation, Q241436, dated 30th October 2024.

5 Proposed Construction

It is proposed to construct a basement level extending beneath the entire building footprint of this terraced property. Proposed development plans are provided in Appendix A. It is understood that the proposed basement excavation will extend to approximately 3.4mbgl.

It is understood that the new retaining walls will be formed using hit-and-miss underpinned foundations. Structural loads will be supported by the retaining walls.

It is understood that robust propping is to be installed in both the temporary and permanent conditions.

6 Object

This is a Ground Movement Assessment and Building Damage Assessment undertaken as part of the Structural Method Statement, undertaken by the Client's engineers for the proposed development at this site.

The purpose of this report is to enable the local planning authorities (London Borough of Camden) and their auditors, and the project's Party Wall Surveyors, to assess whether any estimated damage to the properties in the vicinity of the proposed basement development is acceptable, or could be satisfactorily ameliorated by the developer.

7 Scope

This report presents our Ground Movement Assessment results, and an estimate of the Category of Damage to the nearby buildings. The assessment was undertaken using PDisp and XDisp software packages. The methods used for estimating the horizontal and vertical displacements are in accordance with CIRIA C760 'Guidance on embedded retaining wall design' (Ref [1]).

The estimated category of damage is assessed based on the results of the modelling, and following the limiting tensile strain approach (Refs [2] [3] [4]).

This report is not an engineering design and the figures and calculations contained in the report should be used by the Engineer, taking note that variations will apply, according to variations in design loading, in techniques used, and in site conditions. Our figures therefore should not supersede the Engineer's design.

Detailed information on the proposed development, such as detailed final layout, loadings and serviceability limits was provided by the Client's engineers.

8 Report Authors and Contributors

This report has been checked by a geologist holding Chartered Geologist (CGeol) status with the Geological Society of London, and reviewed by a Chartered Engineer (CEng) holding MICE status with the Institution of Civil Engineers.

C GROUND MOVEMENT ASSESSMENT

9 Site Layout and Loadings

All levels and layouts of the existing and proposed structures, along with ground loadings, have been supplied by the Client's structural engineers. The formation level of the proposed basement is understood to be around 3.4m.

The neighbouring terraced buildings have small cellars at the following relative levels:

- 15 and 19 Courthope road cellars are understood to be formed at a level of 1.8mbgl.

Drawings provided by the client's structural engineers showing the proposed layout and ground loadings are included within Appendix A.

10 Sources of vertical and horizontal ground movements

Ground movements will be generated in several ways:

- **Vertical changes in stress** will lead to vertical movements (heave and/or settlement). The net changes in loading are considered, including the demolition the existing structures, excavation unload of the proposed basement, and new structural loads. These movements are modelled using the OASYS PDisp software as outlined in the sections below.
- **Construction of the retaining walls, and subsequent deflection of the walls when soil is excavated in front of them to form the basement**, will lead to horizontal and vertical movements. Horizontal movements will generally be in towards the excavated material; vertical movements associated with this element will generally comprise settlements. These movements are modelled using OASYS XDisp software as outlined in the sections below.

In order to assess the potential Category of Damage to neighbouring buildings it is necessary to consider the combined effect of both of these sources of ground movements. This is discussed, along with estimates of the ground movements, in the following sections.

11 General Sequence of Modelling

Based on the understood sequence of works (both historic and proposed) the following stages of analysis adopted for the Ground Movement Assessment:

- Stage 0: Baseline condition (current condition, before start of proposed construction works).
- Stage 1: Short-term movements (immediately post-construction).
- Stage 2: Long-term condition after completion of new structures.

It should be noted that within the methodology adopted for this Ground Movement Assessment (which is based on guidance contained within CIRIA C760 Ref [1]) it is not possible to assess the long-term movements associated with installation and subsequent deflection of retaining walls.

At all stages a review of the estimated Category of Damage to the subject and neighbouring buildings is conducted using the XDisp software.

The stages are discussed in greater detail in the following sections of this report.

D GROUND MOVEMENTS

12 Ground movements due to vertical stress change

12.1 Overview of PDisp assessment

Vertical soil displacements are typically modelled as comprising a short-term (undrained) response, followed by a long-term (drained) response. These displacements are caused by the net changes in vertical stress due to the excavation of the basement and new/altered structural loadings. The magnitude of the displacements is related to the geotechnical properties of the underlying soils. It is assumed that there will be no delay between the excavation of the basement, and construction of the structural elements.

The estimated vertical ground movements were modelled using the OASYS program PDisp. This program assumes a linear elastic soil behaviour, and flexible structure for the existing and adjacent buildings. However, it is likely that the stiffness of the structures will not be fully flexible; rather, the structures will have a finite value of flexibility. As a result of this finite flexibility the displacements would tend to be smoothed out or redistributed when compared to those estimated by PDisp. The estimated movements are, therefore, likely to be conservative, and the actual movements affecting the structures would likely be less than those estimated by PDisp.

Based on the information within the Ground Investigation Report (ref. STL J15878-S3), the following ground profile and geotechnical parameters have been assumed for the PDisp (vertical movements) analysis:

Soil Type	Level at Base (mbgl)	Bulk Unit Weight (γ_b) (kN/m^2)	Poisson's Ratio (ν)		Undrained Young's Modulus (E_u) (MN/m^2)		Drained Young's Modulus (E_d) (MN/m^2)	
			Undrained	Drained	Top of stratum	Base of stratum	Top of stratum	Base of stratum
Made Ground (silty sandy gravelly Clays)	0.8m	18	0.5	0.2	5.0	5.0	3.75	3.75
Superficial Head (silty/gravelly Clay)	2.3m	19	0.5	0.2	6.4	34	5.1	27.2
London Clay Formation (silty Clay)	30m	20	0.5	0.2	10	154	7.5	115.5

Table 1: Summary of ground model.

(1) An arbitrary rigid boundary has been assumed at 30m below the existing site level for the purposes of this analysis.

(2) For the superficial clay materials, the stiffness parameters were derived based on Burland and Kalra as follows:

Undrained Young's Modulus (Eu) = 425 x Cu

Drained Young's Modulus (Ed) = 0.8 x Eu.

(3) For the London Clay Formation, the stiffness parameters were derived based on Burland and Kalra as follows:

Undrained Young's Modulus (Eu) = 10 + 5.2z (MN/m2)

Drained Young's Modulus (Ed) = 7.5 + 3.9z (MN/m2)

Where z is taken as the depth below the surface of the London Clay Formation, in metres.

Groundwater levels at the site have been taken as 1.26mbgl, which is the highest groundwater level recorded during the monitoring period.

It should be noted that the drained (long-term) analysis from PDisp includes the undrained (short-term) movements.

12.2 Net changes in vertical loading

The Client's engineers provided drawings showing the layout and loadings of the proposed foundations, these can be found in Appendix A. The information was used to estimate the net changes in vertical loadings due to the new foundation loadings, and unloading effect cause by the removal of soil to form the basement.

Unload pressures due to the removal of soils to form the basement are estimated to be 86 kN/m^2.

In order to illustrate the likely displacements occurring beneath the neighbouring properties and the existing property displacement lines were drawn along particular structural elements of these buildings. The locations of the displacement lines are shown in Figures S1 (Appendix B) and S2 (Appendix C). The table below shows a summary of the displacement lines and the structure to which they relate:

Structure	Displacement Line
15 Courthope Road	Line 1
19 Courthope Road	Line 2
Courthope Road (highway)	Line 3

Table 2: Summary of displacement lines and associated structures

The locations of the displacement lines have been selected to provide a credible worst-case condition, based upon the layout of the proposed basement and the results of the analysis.

13 Movements due to retaining wall construction

13.1 Overview of XDisp assessment

CIRIA C760 (Ref [1]) provides guidance on the horizontal and vertical movements of the soil adjacent to an embedded retaining wall for both high support stiffness (propped) and low stiffness (cantilevered) walls.

It is understood that robust structural propping will be installed in the temporary condition to provide support for the new retaining walls during construction. It is understood that the basement floor slab will provide permanent propping at the base of the retaining walls, and lower ground floor slab (i.e. basement ceiling) will provide permanent propping at the top of the retaining walls. Therefore, the walls would be considered to be 'high support-stiffness' walls in accordance with CIRIA C760.

The OASYS XDisp software was used to undertake the assessment of the vertical and horizontal displacements caused by the construction of the basement walls and new retaining walls. It should be noted that it is not possible to model failure of the retaining walls, in terms of toppling, settlement, sliding etc. within the XDisp software. The XDisp assessment is purely focussed on ground movements associated to deflection of embedded retaining walls, and due to the installation of the walls.

Ground movements resulting from the construction of the proposed retaining walls (to be formed as hit-and-miss underpins) are modelled in accordance with the guidance contained within CIRIA C760.

There is no specific guidance concerning modelling of ground movements related to the installation of underpinned foundations. In this assessment, to model the movements due to installation of the underpins, these walls have been treated as being a run of low-height (i.e. short pile length) contiguous bored piled retaining walls. It is likely that, where underpins are carried out with good quality workmanship and construction controls (e.g. robust propping), ground movements would be very small.

The empirical guidance within CIRIA C760 is assumed to include any short-term (undrained) displacements that arise due to net changes in vertical stress (i.e. those caused by the net vertical changes in stress). Furthermore, as data was collected over a relatively short period following construction, it is unlikely that the data includes any long-term (drained) displacements.

13.1.1 Movements due to construction of retaining walls ("Installation Movements")

CIRIA C760 indicates empirical relationships for the movements produced by the construction of contiguous bored pile wall as follows:

- Peak horizontal movements will be 0.04% of the pile length ("wall depth") at the interface between the wall and retained soil. The movements will reduce in a non-linear fashion to a distance of 1.5 times the wall depth away from this interface.
- Peak vertical movements will be 0.04% of the wall depth at the interface between the wall and retained soil. The movements will reduce in a linear fashion to a distance of 2 times the walls depth away from this interface.

It will be necessary to include the above (contiguous wall) ground movement descriptions for an underpinned retaining wall.

13.1.2 Movements due to excavation of ground in front of retaining walls ("Deflection Movements")

CIRIA C760 indicates empirical relationships for the movements produced by excavation in front of a high support-stiffness wall as follows:

- Peak horizontal movements will be 0.15% of the total excavation depth, and will occur at the wall. These movements will extend to a distance of four times the excavation depth away from the wall. The magnitude of these movements will decrease linearly.
- Peak vertical movements will be 0.07% of the total excavation depth, and will occur at a distance of half the excavation depth away from the wall. The vertical movements at the wall/soil interface will be about 0.04% of the excavation depth. The movements will diminish in a non-linear fashion such that there are no vertical movements at a distance of about 3.5 times the excavation depth away from the wall.

14 Modelling Sequence

14.1 Model - Stage 0 (current condition, prior to onset of construction)

This is taken as the baseline condition for the Ground Movement Assessment. No ground movements are modelled.

14.2 Model – Stage 1 (immediately post-construction)

In this stage, vertical and horizontal ground movements are considered that arise from the following components:

- Installation of the underpinned retaining wall
- Deflection of the new retaining walls due to excavation of the soils to form the basement
- Net changes in vertical stress across the site (e.g. unloads due to excavation and application of new structural loads).

The new retaining walls are modelled as high support-stiffness walls, as discussed in previous sections of this report.

As noted, it is assumed that the XDisp software analysis includes the vertical ground movements associated with net changes in vertical stress (Figure S1), and therefore includes the net changes in vertical stress associated with the excavation of the basement and new foundation loads (i.e. the movements estimated within Figure S1 are already included within the XDisp assessment for this stage).

A plan produced in PDisp showing the distribution of estimated vertical movements related to the net changes in vertical stress in the short-term (undrained) condition is included within Appendix B (Figure S1). The PDisp analysis indicates peak undrained displacements of about 10mm heave occurring beneath the centre of the proposed basement.

Charts showing the ground movements affecting each structure are showing in Appendix B (Figures S1-L1 to S1-L3).

A table showing the model parameters and outputs for this stage is included in Appendix B (Table 3).

Estimated building damages at the end of this stage are discussed in Section E.

14.3 Model - Stage 2 (long-term condition after completion of proposed works)

The net changes in vertical stress will lead to an imbalance in the effective stress regime in the soils surrounding the proposed development. Over time, as changes in pore water pressures equilibrate, ground movements will continue. This stage represents the long-term condition, after differential pore pressures within the underlying and surrounding soils have equilibrated.

A plan produced in PDisp showing the distribution of estimated vertical movements related to the net changes in vertical stress in the long-term (drained) condition is included within Appendix C (Figure S2). The PDisp analysis indicates peak drained displacements of about 15.5mm heave occurring beneath the centre of the proposed basement.

As noted, the XDisp assessment is considered to include the undrained movements caused by net changes in vertical stress. OASYS PDisp software was used to determine the ground response resulting from the net changes in vertical stress in the long-term (drained) condition. As noted, the long-term analysis from PDisp includes the short-term ground movements resulting from changes in the soil loading (i.e. Figure S1). Therefore, to assess the impact of the long-term (drained) ground movements the following process is taken:

Step 1 (Figure S1)	Step 2 (Figure S2)	Step 3
Calculate short-term (undrained) ground response due to net changes in soil loading. The components include: • Unload due to excavation of basement and demolition of the existing building • Loads applied to new foundations.	As step one, but use the long-term (drained) soil parameters. This includes the movements generated at Step 1.	Subtract Step 1 from Step 2 (Figure S2 minus Figure S1) to provide the 'drained-only' movements. These movements are then combined with those calculated in XDisp for installation of, and deflection of, the new walls, which are assumed to include any undrained movements due to net changes in vertical stress (see Stage 1).

Table 4: Steps in determination of drained movements due to vertical changes in stress only.

The data on which the guidance within CIRIA C760 is based was collected during and shortly after various construction projects. It is considered unlikely, therefore, that the guidance provides sufficient information to make an assessment of the long-term (drained) ground movements related to embedded retaining walls, i.e. it is not possible within the XDisp software to estimate the long-term (drained) horizontal and vertical ground movements associated with deflection of the new retaining walls.

Charts showing the ground movements affecting each structure are showing in Appendix C (Figures S2-L1 to S2-L3).

A table showing the model parameters and outputs for this stage is included in Appendix C (Table 5).

Estimated building damages at the end of this stage are discussed in Section E.

E IMPACT ASSESSMENT

15 Scale for Category of Damage

Based on the analysis in this section of the Basement Impact Assessment, and assessment has been made of the estimated potential damage to the nearby structures. The following sections show the estimated categories of damage. The general categories of damage, based on the limiting tensile strain approach (Refs [2] [3] [4]) are summarised in the table below:

Category	Description
0 (Negligible)	Negligible – hairline cracks.
1 (Very Slight)	Fine cracks that can easily be treated during normal decoration (crack width <1mm)
2 (Slight)	Cracks easily filled, redecoration probably required. Some repointing may be required externally (crack width <5mm).
3 (Moderate)	The cracks require some opening up and can be patched by a mason. Recurrent cracks can be masked by suitable linings. Repointing of external brickwork and possibly a small amount of brickwork to be replaced (crack width 5 to 15mm, or a number of cracks >3mm).
4 (Severe)	Extensive repair work involving breaking-out and replacing sections of walls, especially over doors and windows (crack width 15 to 25mm but also depends on number of cracks).
5 (Very Severe)	This requires a major repair involving partial or complete re-building (crack width usually >25mm but depends on number of cracks).

Table 6: General categories of damage

16 Summary of Damage Categories

A summary of the estimated damage categories caused by the excavation of the basement at the subject site is shown in the table below.

Structure	Displacement Line	Maximum Estimated Category of Damage(1)	
		Stage 1 (Table 3, Appendix B)	Stage 2 (Table 5, Appendix C)
15 Courthope Road	Line 1	Very Slight	Very Slight
19 Courthope Road	Line 2	Very Slight	Very Slight
Courthope Road (Highway)	Line 3	See Section 17	See Section 17

Table 7: Summary of estimated category of damage to nearby structures.

(1) 0 = Negligible, 1 = Very Slight, 2 = Slight, 3 = Moderate, 4 = Severe, 5 = Very Severe
(2) This analysis is based on the guidance on CIRIA C760, which assumes that all structures are of masonry construction. The tolerance of other structures to ground movements will likely be different, but are beyond the scope of this assessment.

17 Highways and Utilities

Displacement Line 3 shows the estimated ground movements in the short-term (Figure S1-L3, Appendix B) and long-term (Figure S2-L3, Appendix C) across the adjacent footway and highway (Courthope Road).

In the long-term condition, the ground movements are estimated to be as follows:

- Vertical movements would be about 2.8mm (heave) at the boundary between the subject site and the footway, and would peak at about 2.9mm (heave) at a distance of about 0.4m away from the site boundary.
- The vertical movements would be about 2.2mm (heave) at the nearest edge of the highway, reducing to 0.03mm (heave) at the far side of the highway.
- Horizontal movements at the site boundary with the footway and at the nearest edge of the highway (Courthope Road) are estimated to be about 5mm and 3.5mm, respectively, reducing to 0.9mm at the far side of the highway.

It is recommended that discussions are held with the local authority and any affected utility asset owners to determine whether these movements are acceptable.

18 Conclusion

The Ground Movement Analysis indicates maximum estimated Category of Damage of Very Slight to both 15 and 19 Courthope Road, in both the short-term and long-term conditions.

REFERENCES

[1] CIRIA, C760 Guidance on embedded retaining wall design, London: CIRIA, 2017.

[2] J. R. Boscardin and E. J. Cording, "Building response to excavation-induced settlement," *Journal of geotechnical engineering,* vol. 115, no. 1, pp. 1-21, 1989.

[3] J. B. Burland, "Assessment methods used in design," in *Building response to tunnelling: case studies from the construction of the Jubilee Line Extension, London. Volume 1: Projects and methods*, London, CIRIA and Thomas Telford, 2001, pp. 23-43.

[4] J. B. Burland and R. Hancock, "Underground car park at the House of Commons, London: geotechnical aspects," *The Structural Engineer,* vol. 55, no. 2, pp. 87-100, 1977.

[5] J. B. Burland and E. J. Kalra, "Queen Elizabeth II Conference Centre; Geotechnical Aspects," *Proceedings of Institution of Civil Engineers,* vol. 80, pp. 1479 - 1503, 1986.

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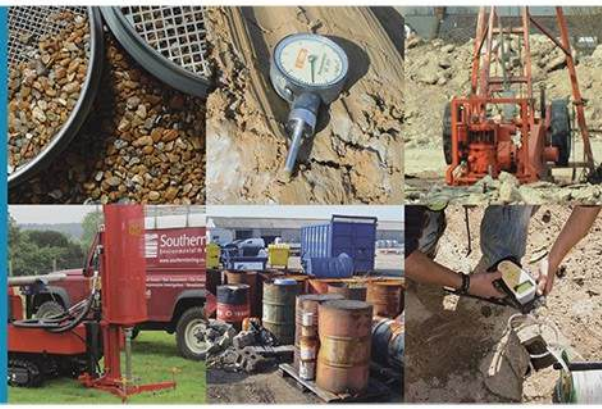
APPENDIX A

Site Plans and Drawings



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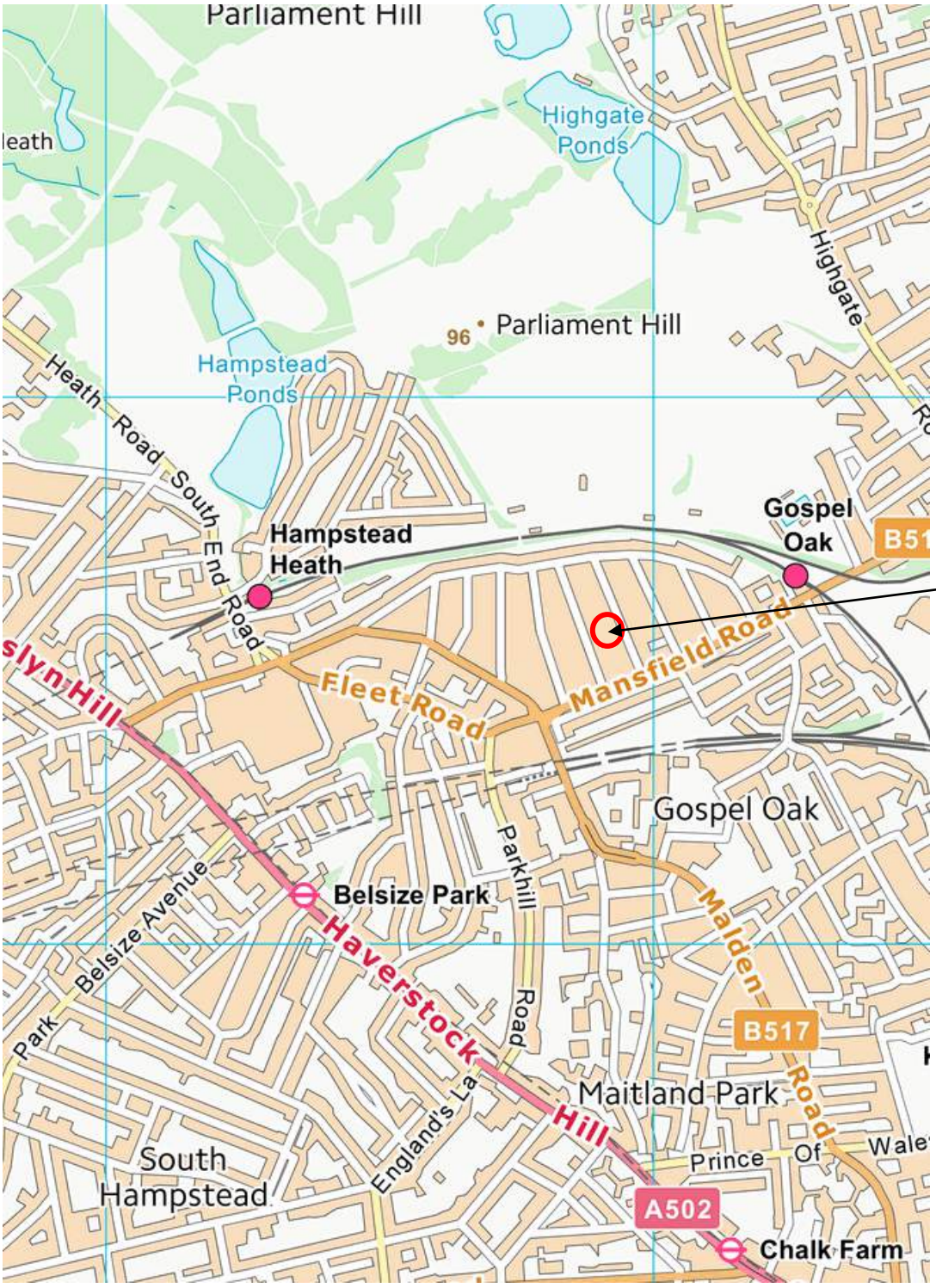
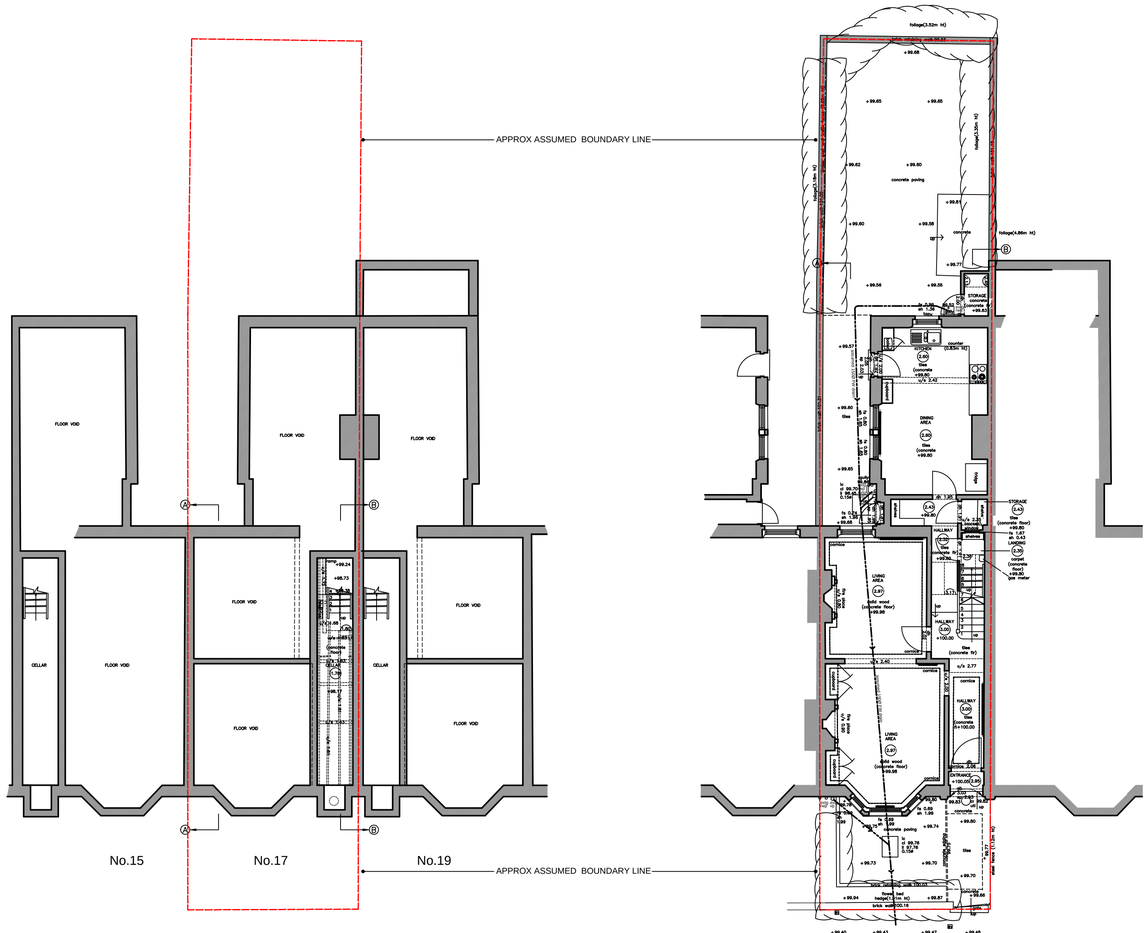
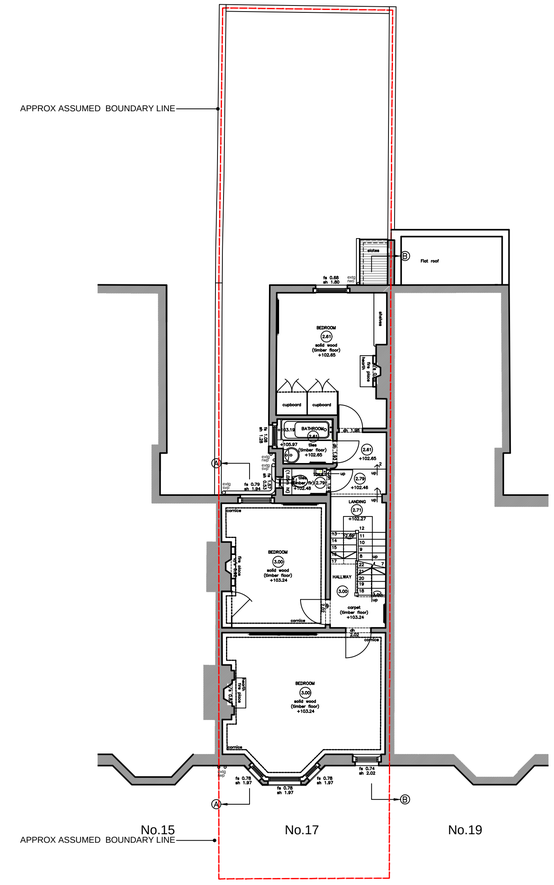


Site:	17 Courthope Road, London	Project ID	J15878
Figure 1	Site Location Plan	Date:	11/03/2024

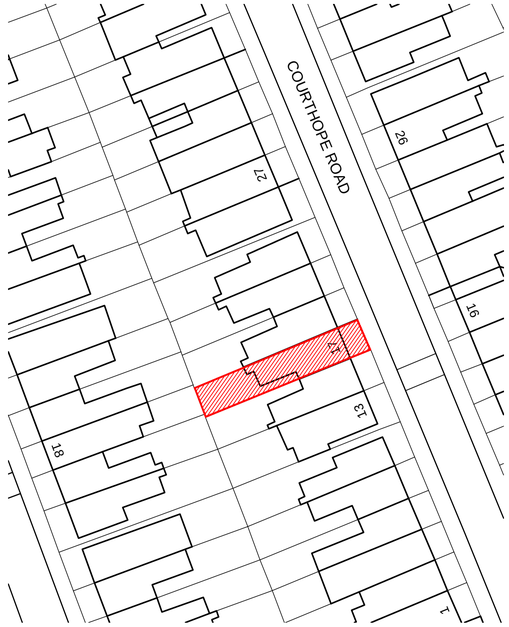


Cellar Floor Plan

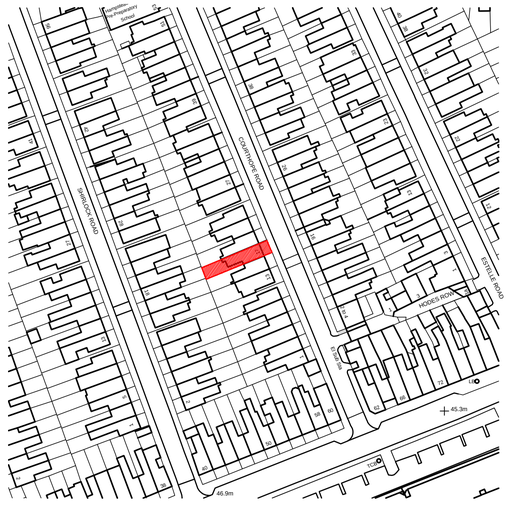
Ground Floor Plan



First Floor Plan



Block Plan 1:500 0 5m 10m 20m 30m 40m



Site Location Plan 1:1250 0 5m 10m 20m 30m 40m 50m

Plans North

Scale Bar for Plans & Elevations 0 0.5m 1m 2m 3m 4m 5m

Site Plans North

STAC architecture SNAITH+THRUSH ARCHITECT COLLABORATION

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Client
Mr & Mrs Markham

Project
Basement Extension
17 Courthope Road, London. NW3 2LE

General Notes:

All dimensions to be checked on site prior to commencement of any works, and/or preparation of any shop drawings.

Sizes of and dimensions to any structural elements are indicative only. See structural engineers drawings for actual sizes / dimensions.

Sizes of and dimensions to any service elements are indicative only. See service engineers drawings for actual sizes and dimensions

DO NOT SCALE FROM THIS DRAWING

This drawing is to be read in conjunction with all other architects drawings, specifications and all other consultants' information.

All proprietary systems shown on this drawing are to be installed strictly in accordance with the manufacturers / suppliers recommended details.

Any discrepancies between information shown on this drawing and any other contract information or manufacturers / suppliers recommendations is to be brought to the attention of the architect.

Drawing Notes:

Status	Revision	Date
P1	ISSUED FOR PLANNING	28.02.25

Drawing Status
FOR PLANNING

Drawing
GENERAL ARRANGEMENT
SITE LOCATION, BLOCK PLAN, CELLAR, GROUND & FIRST FLOOR PLANS AS EXISTING

Drawn	Checked	Date	Scale
DS		Sept' 24	as shown & 1:100@A1

Project	Reference	Number	Revision
0350	F	04	P1

MATERIALS KEY

1. BROWN CONCRETE ROOF TILES
2. NATURAL BLUE/ GREY SLATE
3. LONDON STOCK BRICKWORK
4. WHITE PAINTED STONE DETAILING
5. TIMBER DOUBLE GLAZED SASH WINDOW WITH WHITE PAINTED STONE CILLS
6. TIMBER DOOR
7. TIMBER FASCIA AND BLACK uPVC GUTTERS AND DOWNPIPES

No.15 No.17 No.19

Front Elevation

No.19 No.17 No.15

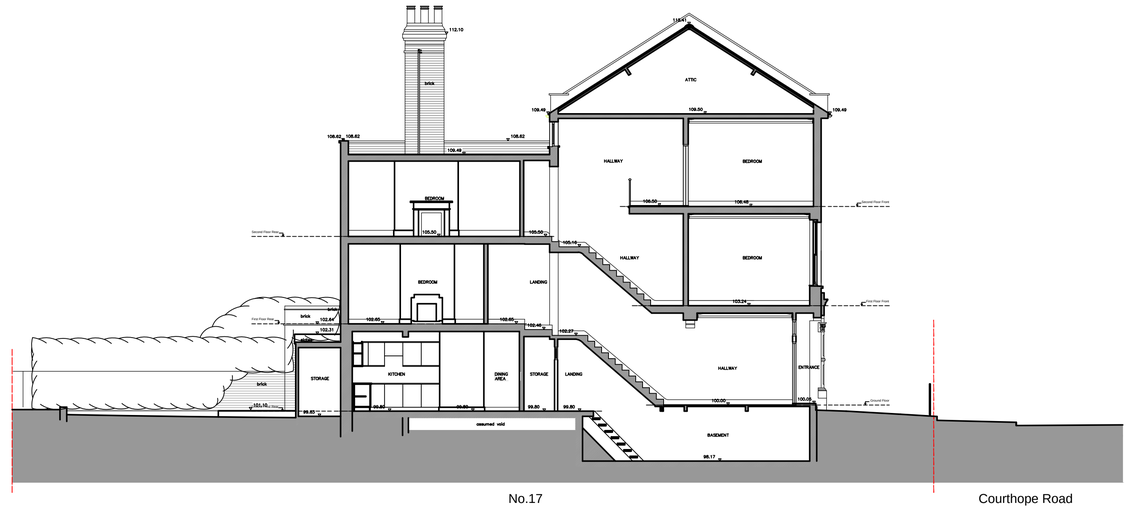
Rear Elevation

No.17 Courthope Road

Side Elevation

Courthope Road No.17

Section A-A



No.17 Courthope Road

Section B-B

0 0.5m 1m 2m 3m 4m 5m

Scale Bar for Plans & Elevations

STAC architecture SNAITH+THRUSH ARCHITECT COLLABORATION

STAC Architecture Limited
www.stac-architecture.com
info@stac-architecture.com

Client: Mr & Mrs Markham

Project: Rear Extension, Loft Extension and Internal Alterations
17 Courthope Road, London. NW3 2LE

General Notes:

All dimensions to be checked on site prior to commencement of any works, and/or preparation of any shop drawings.

Sizes of and dimensions to any structural elements are indicative only. See structural engineers drawings for actual sizes / dimensions.

Sizes of and dimensions to any service elements are indicative only. See service engineers drawings for actual sizes and dimensions

DO NOT SCALE FROM THIS DRAWING

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All proprietary systems shown on this drawing are to be installed strictly in accordance with the manufacturers / suppliers recommended details.

Any discrepancies between information shown on this drawing and any other contract information or manufacturers / suppliers recommendations is to be brought to the attention of the architect.

Drawing Notes:

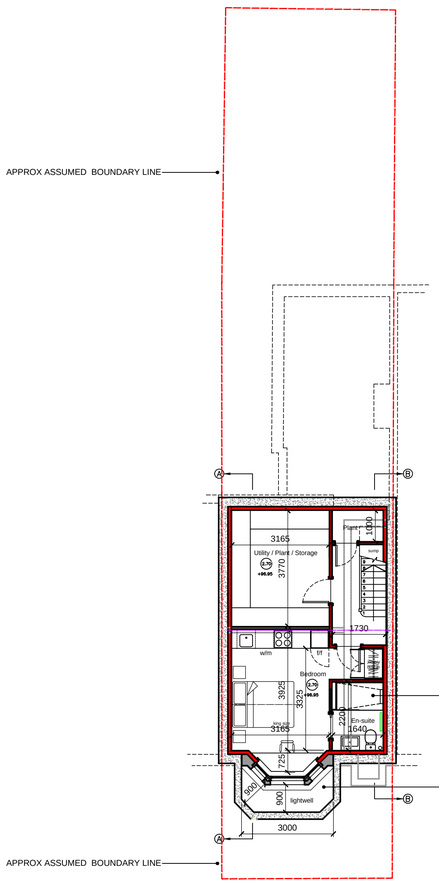
Status	Revision	Date
P1	ISSUED FOR PLANNING	28.02.25

Drawing Status: FOR PLANNING

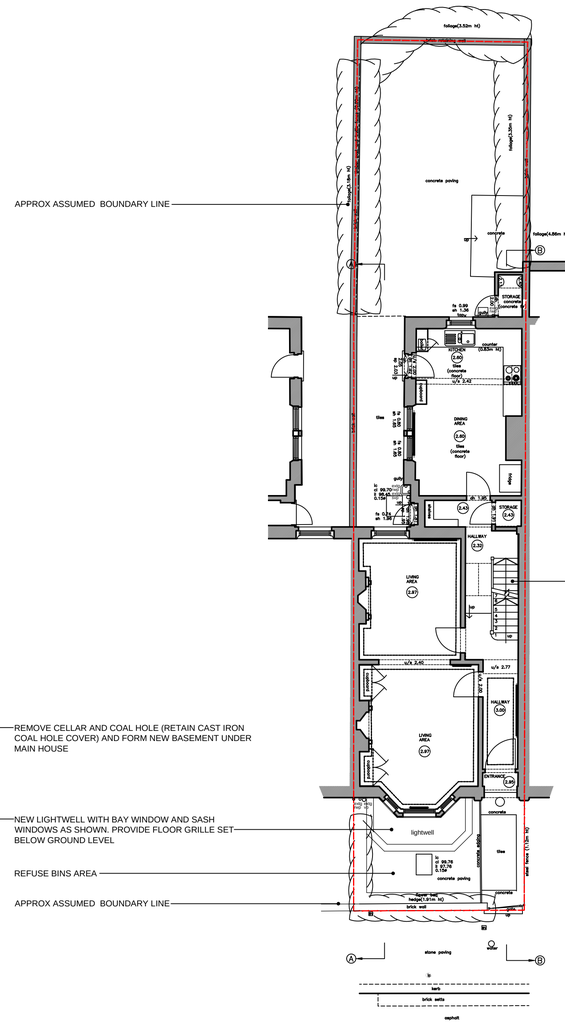
Drawing: GENERAL ARRANGEMENT ELEVATIONS AND SECTIONS AS EXISTING

Drawn	Checked	Date	Scale
DS		Sept' 24	1:100@A1

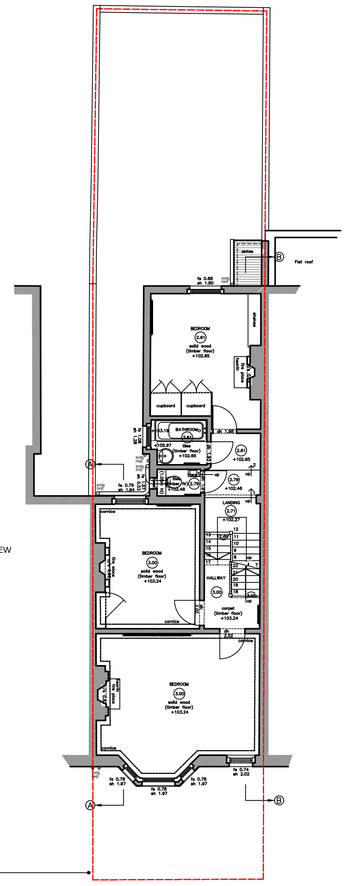
Project	Reference	Number	Revision
0350	F	06	P1



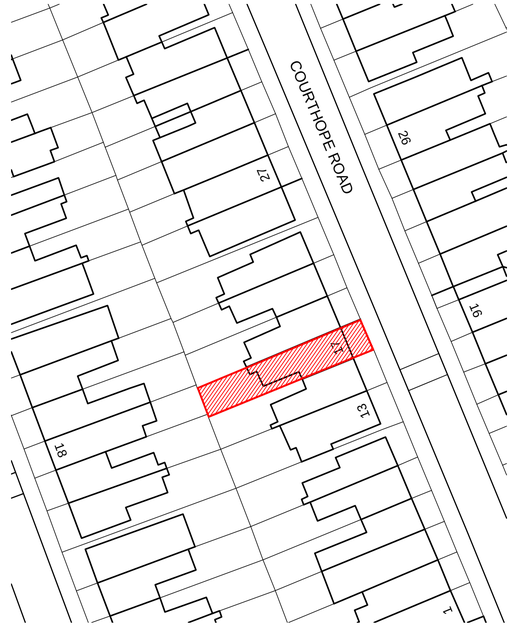
Cellar Floor Plan



Ground Floor Plan



First Floor Plan



Block Plan 1:500 0 5m 10m 20m 30m 40m

Site Location Plan 1:1250 0 5m 10m 20m 30m 40m 50m

Plans North

Scale Bar for Plans & Elevations 0 0.5m 1m 2m 3m 4m 5m

Site Plans North

STAC architecture SNAITH+THRUSH ARCHITECT COLLABORATION

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Client
Mr & Mrs Markham

Project
Basement Extension
17 Courthope Road, London. NW3 2LE

General Notes:

All dimensions to be checked on site prior to commencement of any works, and/or preparation of any shop drawings.

Sizes of and dimensions to any structural elements are indicative only. See structural engineers drawings for actual sizes / dimensions.

Sizes of and dimensions to any service elements are indicative only. See service engineers drawings for actual sizes and dimensions

[illegible]

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Drawing Notes:

Status	Revision	Date
P1	ISSUED FOR PLANNING	28.02.25

Drawing Status: FOR PLANNING

Drawing: GENERAL ARRANGEMENT
SITE LOCATION, BLOCK PLAN, CELLAR, GROUND & FIRST FLOOR PLANS AS PROPOSED

Drawn	Checked	Date	Scale
DS		Nov'24	as shown@A1

Project	Reference	Number	Revision
0350	D	06	P1

0 1m 2m 3m 4m 5m
0.2m

Scale Bar for Plans, Elevations & Sections

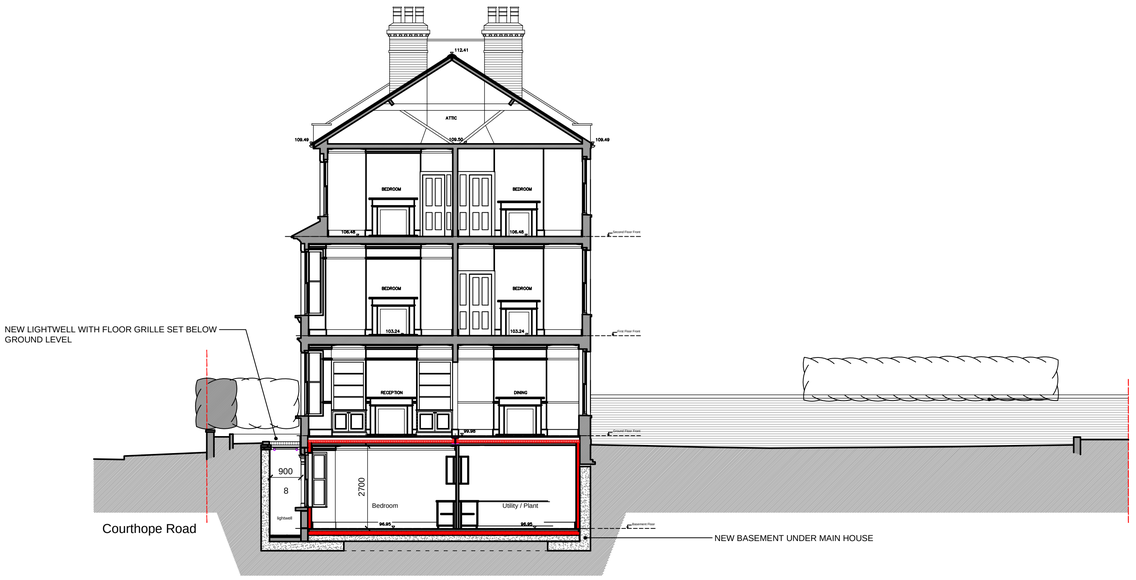
MATERIALS KEY

1. BROWN CONCRETE ROOF TILES
2. NATURAL BLUE/ GREY SLATE
3. LONDON STOCK BRICKWORK
4. WHITE PAINTED STONE DETAILING
5. TIMBER DOUBLE GLAZED SASH WINDOW WITH WHITE PAINTED STONE CILLS
6. TIMBER DOOR
7. TIMBER FASCIA AND BLACK uPVC GUTTERS AND DOWNPIPES
8. RENDER, PAINTED

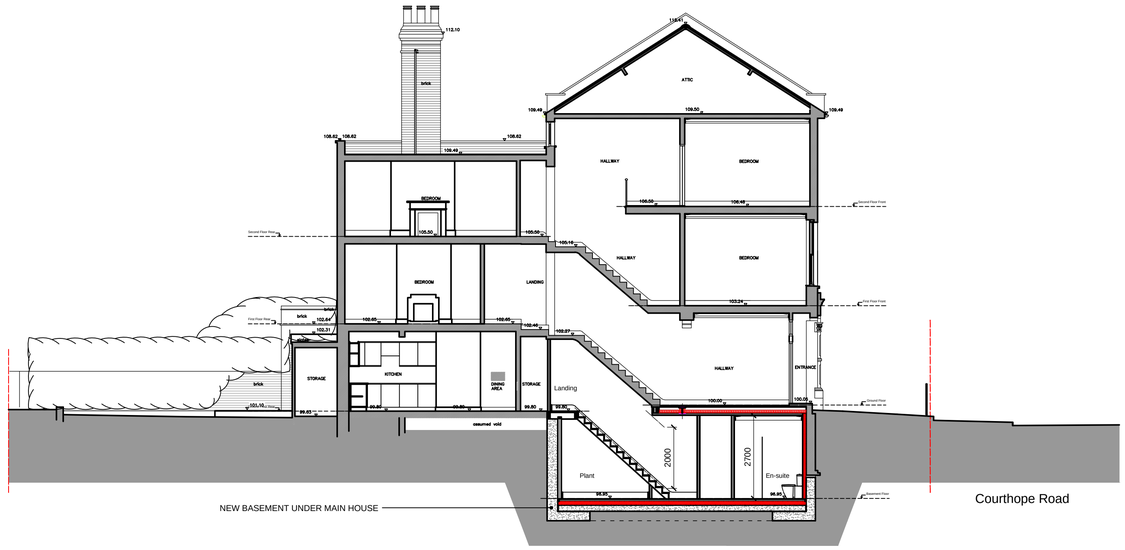
Front Elevation

Front Lightwell Section

Side Elevation



Section A-A



Section B-B

STAC architecture
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SNAITH+THRUSH ARCHITECT COLLABORATION

Client: Mr & Mrs Markham

Project: Basement Extension
17 Courthope Road, London. NW3 2LE

General Notes:

All dimensions to be checked on site prior to commencement of any works, and/or preparation of any shop drawings.

Sizes of and dimensions to any structural elements are indicative only. See structural engineers drawings for actual sizes / dimensions.

Sizes of and dimensions to any service elements are indicative only. See service engineers drawings for actual sizes and dimensions

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Any discrepancies between information shown on this drawing and any other contract information or manufacturers / suppliers recommendations is to be brought to the attention of the architect.

Drawing Notes:

Status	Revision	Date
P1	ISSUED FOR PLANNING	28.02.25

Drawing Status: FOR PLANNING

Drawing: GENERAL ARRANGEMENT
ELEVATIONS AND SECTIONS A-A & B-B AS PROPOSED

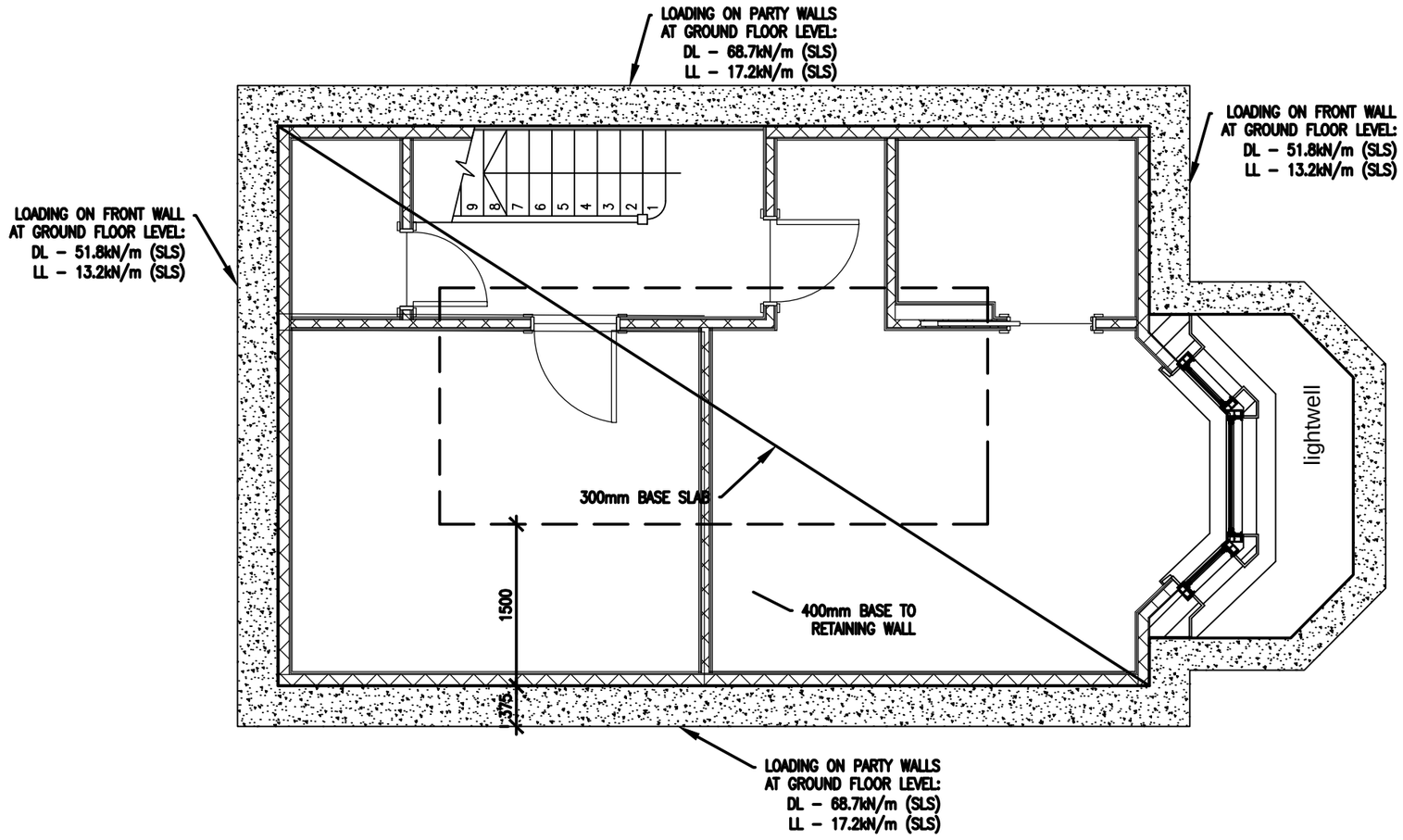
Drawn	Checked	Date	Scale
DS		Nov'24	1:100@A1

Project	Reference	Number	Revision
0350	D	07	P1

STRUCTURAL MEMBER SCHEDULE	
REF.	MEMBER SIZE
	BEAMS
B1	xx
	COLUMNS
C1	xx

NOTES:

1. All timbers to be C16 unless noted otherwise.
2. Non-loadbearing stud partitions to be constructed with 100mm x 50mm studs at 400mm centres.
3. Provide 2 rows of noggings on all stud partitions.
4. Ensure legs of hangers turned over back of wall plate before fixing.
5. Use 30x5x1200 straps at 1500 c/c to all roof timbers and roof joists.
6. Timber beams to be bolted together as required with M10 bolts @ min 600 c/c.
7. All concrete to be grade C35N20 UNO.
8. All steel to be grade S275 UNO.



LEGEND

- EXISTING WALL
- EXISTING STRUCTURAL WALL UNDER
- EXISTING WALL TO BE DEMOLISHED
- NEW STRUCTURAL WALL
- NEW STUD PARTITIONS

CONCEPT CONSULTANCY
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Tel: 020 76256106; Mob: 07955 919824; ~ e-mail: info@conceptconsultancy.eu

Client: TBC

Project: 17 Courthope Road
LONDON, NW3 2LE

Title: Proposed Ground Floor Plan

Revision	Date	Made by	Amendments
A	xx/xx/2024	GW.	xxxxx

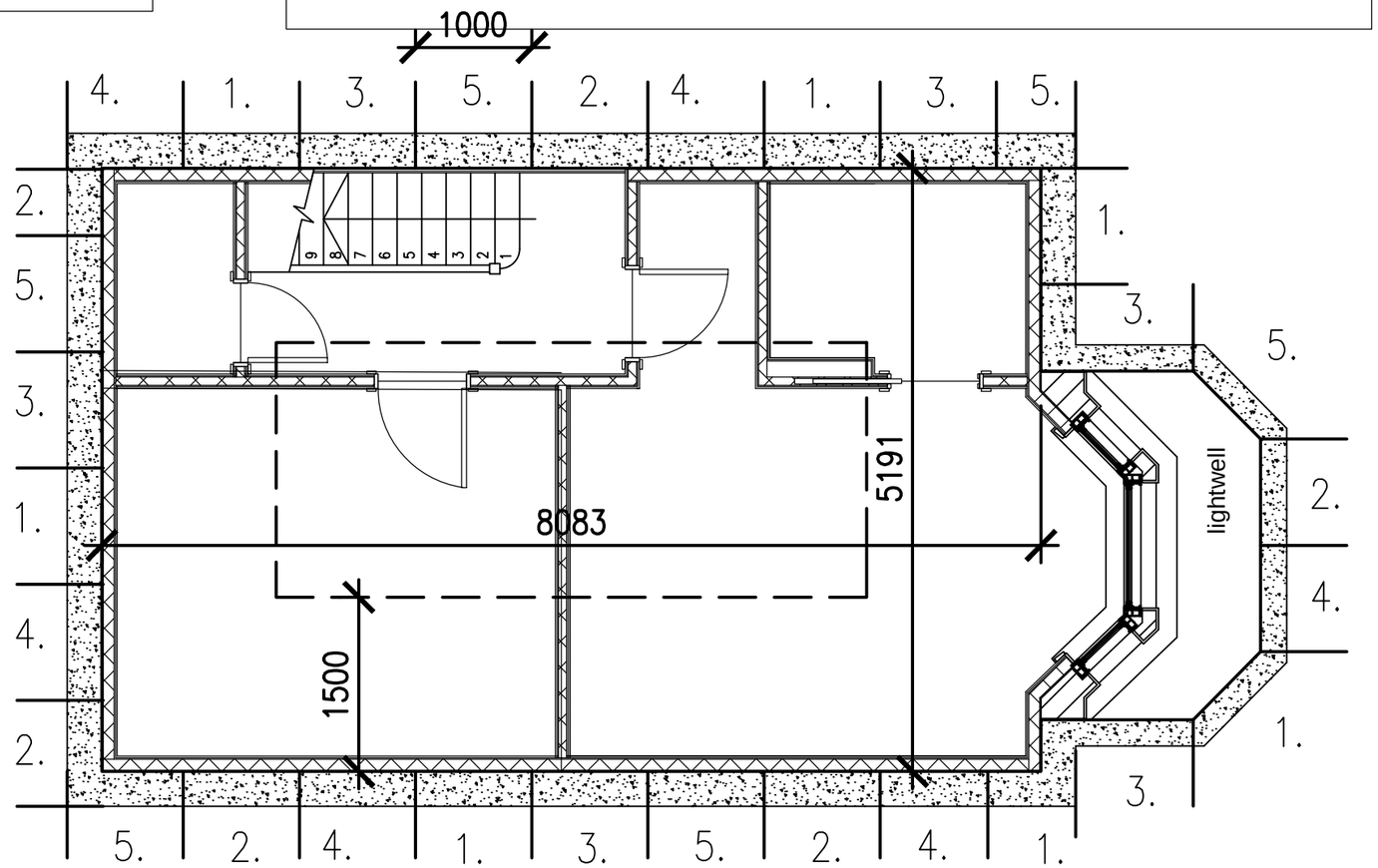
Date	Drawn by	Checked
22-11-2024	GW	CG

Scales	Job No.	Drawing No.	Revision
1:100@A3	3422	01	A

NOTE:
NO MORE THEN 2 PINS TO BE LEFT INCOMPLETE AND ANY ONE TIME.

METHOD STATEMENT FOR UNDERPINNING:

1. Underpinning to be carried out in the sequence shown, in bays 1000mm width max.Bays with the same number to be excavated simultaneously with concreting carried out immediately after exposure to avoid deterioration.
2. Excavate out by hand all bays No. 1 to the depth & width specified. Ensure that ground is level, clean and rammed if necessary. Should any ground water be encountered this may be pumped out.
3. Dowel bars to be inserted into surrounding ground on both sides as required to provide a key for the adjoining base section as per Detail X below.
4. Pour concrete to 75mm of underside of existing wall.
5. The day after concreting fill the 75mm gap with 3:1 dry pack mortar and backfill excavation.
6. Excavate by hand for base of pin ensure that ground is level, clean and rammed if necessary. Should any ground water be encountered this may be pumped out.
7. Pour concrete base.
8. Excavation of bays No. 2 of underpinning shall not be commenced until at least 48 hours after previous bay has been dry packed.
9. Continue remaining bays as per above until all underpinning is complete.
10. Any discrepancy between details indicated on the drawing and those conditions actually encountered on site should be highlighted by the main contractors site supervisory personnel.
11. Upon completion of all upper sections of pins. repeat steps 2 to 8 to construct lower section of pin.



PROPOSED BASEMENT UNDERPINNING SEQUENCE PLAN

CONCEPT CONSULTANCY
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Tel: 020 76256106; Mob: 07955 919824; ~ e-mail: info@conceptconsultancy.eu

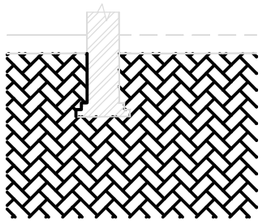
Client: TBC

Project: 17 Courthope Road
LONDON, NW3 2LE

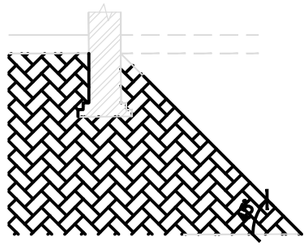
Title: Proposed Underpinning Sequence Plan

Revision	Date	Made by	Amendments
A	xx/xx/2024	GW.	xxxxx

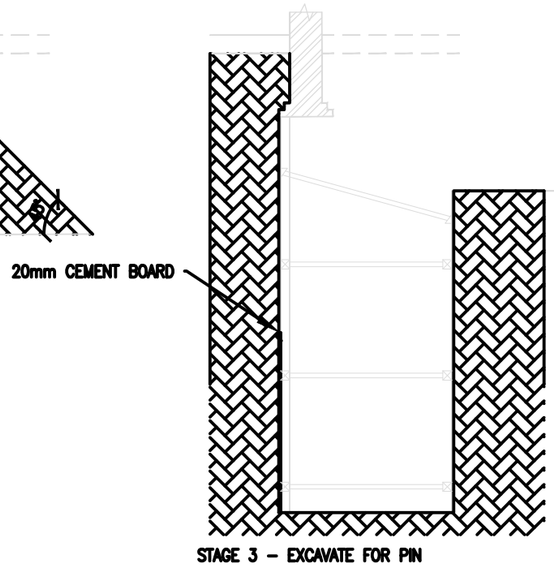
Date	Drawn by	Checked	
22-11-2024	GW	CG	
Scales	Job No.	Drawing No.	Revision
1:100@A3	3422	810	A



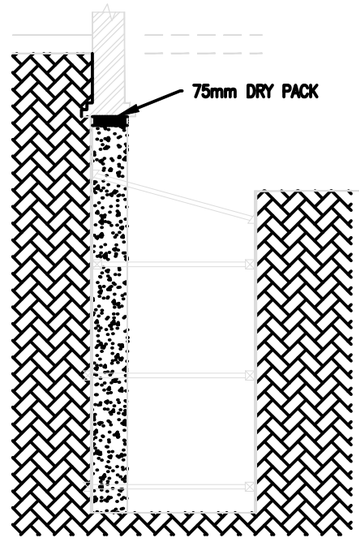
STAGE 1 – EXISTING



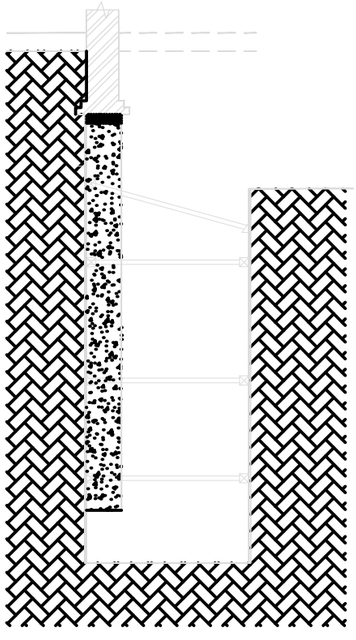
STAGE 2



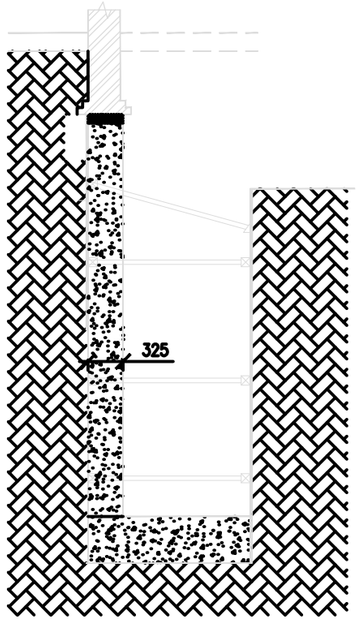
STAGE 3 – EXCAVATE FOR PIN



STAGE 4 – CONCRETE PIN



STAGE 4 – EXCAVATE FOR BASE OF PIN



STAGE 5 – CONCRETE BASE OF PIN

METHOD STATEMENT FOR BASEMENT CONSTRUCTION:

1. Excavate for underpinning (see sequence on drawing 810), stages 1–3.
2. Install concrete underpinning (stage 4).
3. Install part of base slab (stage 5). Leaving center of basement unexcavated.
4. Install new ground floor beams to prop base of existing party walls (stage 6).
5. Reduce level of center section of basement and install temporary propping as per stage 7.
6. Complete excavation of centre section of basement (stage 8).
7. Install center section of basement floor slab (stage 8).
8. Remove temporary propping (stage 9).

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Client: TBC

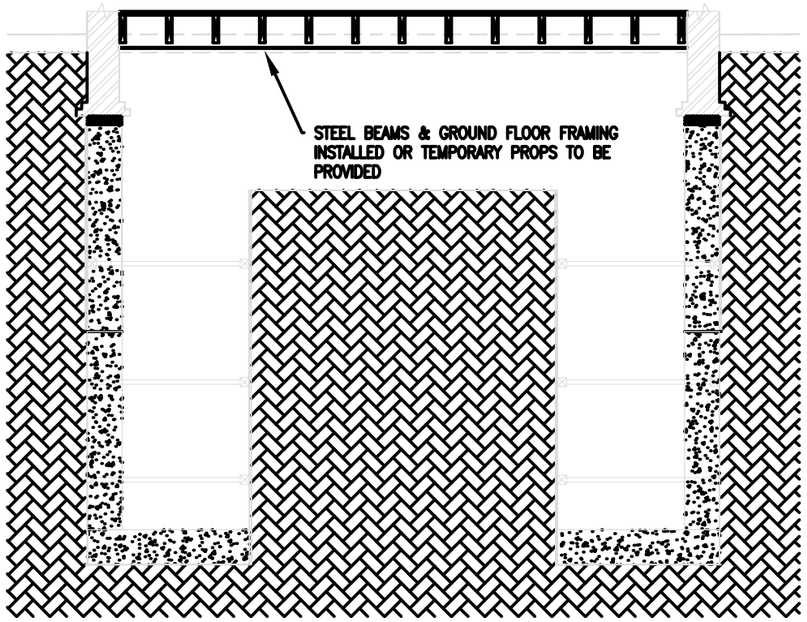
Project: 17 Courthope Road
LONDON, NW3 2LE

Title: Proposed Underpinning
Propping Sequence Sheet 1

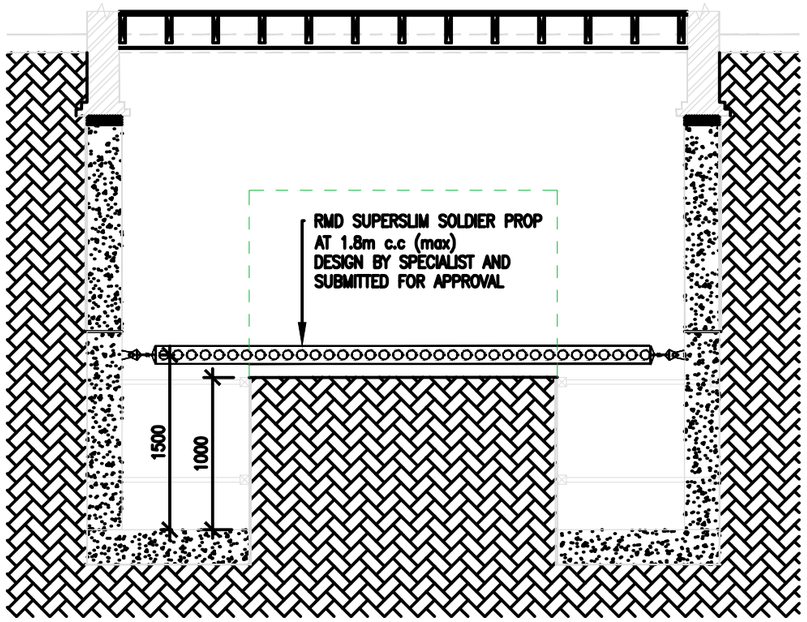
Revision	Date	Made by	Amendments
A	xx/xx/2024	GW.	xxxxx

Date	Drawn by	Checked
22-11-2024	GW	CG

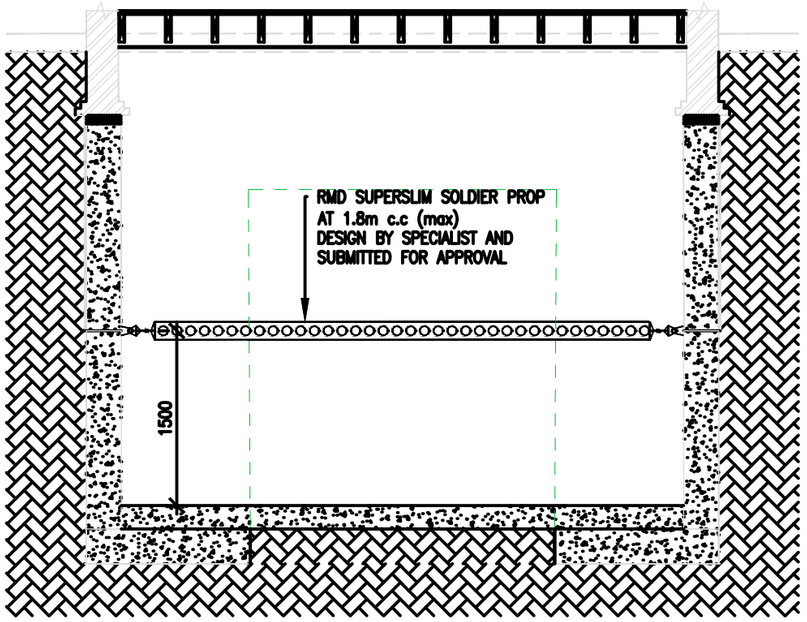
Scales	Job No.	Drawing No.	Revision
1:50@A3	3422	811	A



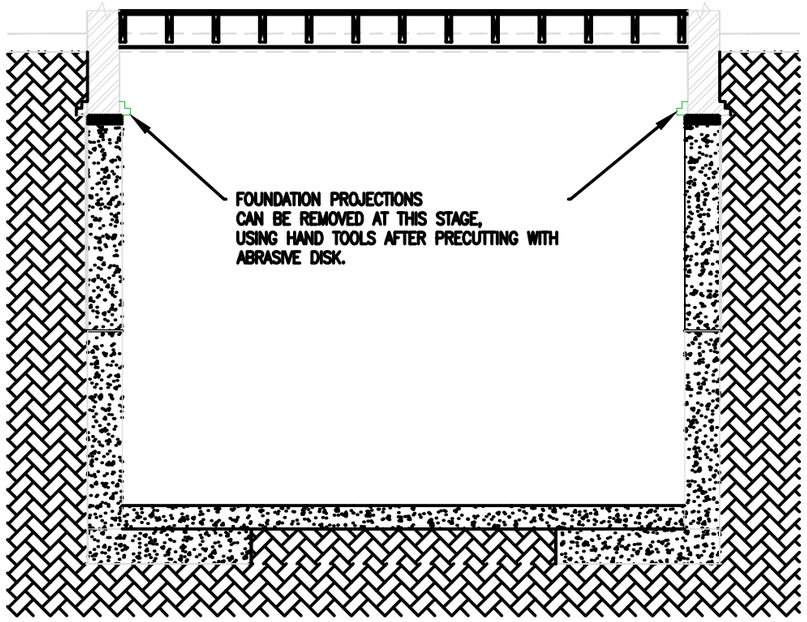
STAGE 6 – PROP UPPER SECTON



STAGE 7 – REDUCE GROUND AND INSTALL LOWER PROP



STAGE 8 – COMPLETE BASE



STAGE 9 –REMOVE PROPS

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STRUCTURAL DESIGNERS LTD
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Tel: 020 76256106; Mob: 07955 919824; ~ e-mail: info@conceptconsultancy.eu

Client: TBC

Project: 17 Courthope Road
LONDON, NW3 2LE

Title: Proposed Underpinning
Propping Sequence Sheet 1

Revision	Date	Made by	Amendments
A	xx/xx/2024	GW.	xxxxx

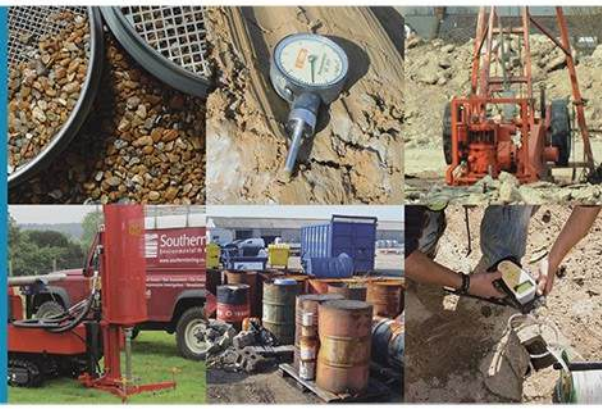
Date	Drawn by	Checked	
22-11-2024	GW	CG	
Scales	Job No.	Drawing No.	Revision
1:50@A3	3422	812	A

Southern Testing
Environmental & Geotechnical

ST Consult
Environmental & Geotechnical

APPENDIX B

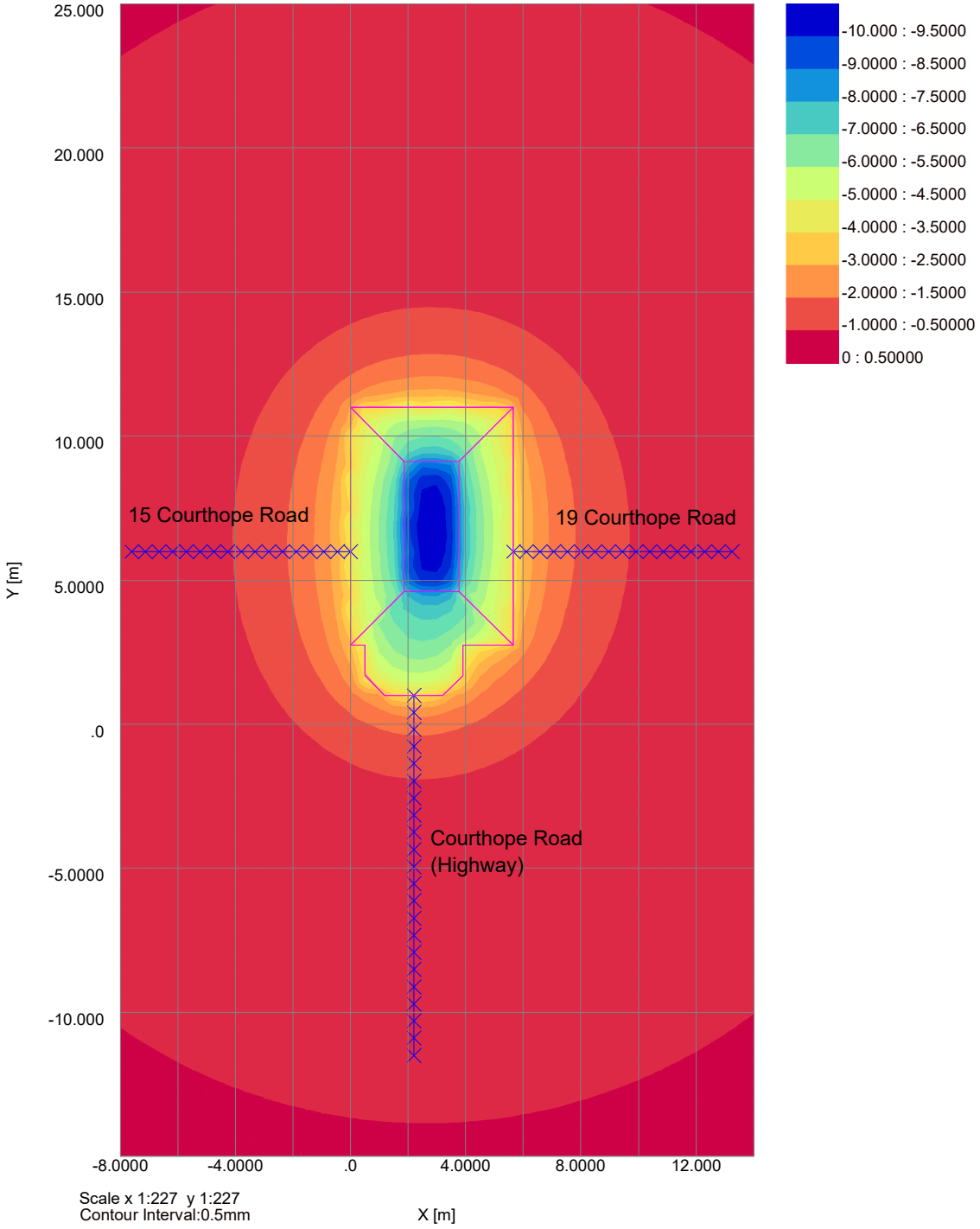
Stage 1 Undrained Movements



B

Oasys	**SOUTHERN TESTING LTD**	Job No.	Sheet No. / Rev.
17 Courthope Road, London		STL J15878	
Undrained Vertical Movements		Drg. Ref. S1	
		Made by VF / Date 06/03/2025	Checked / Date

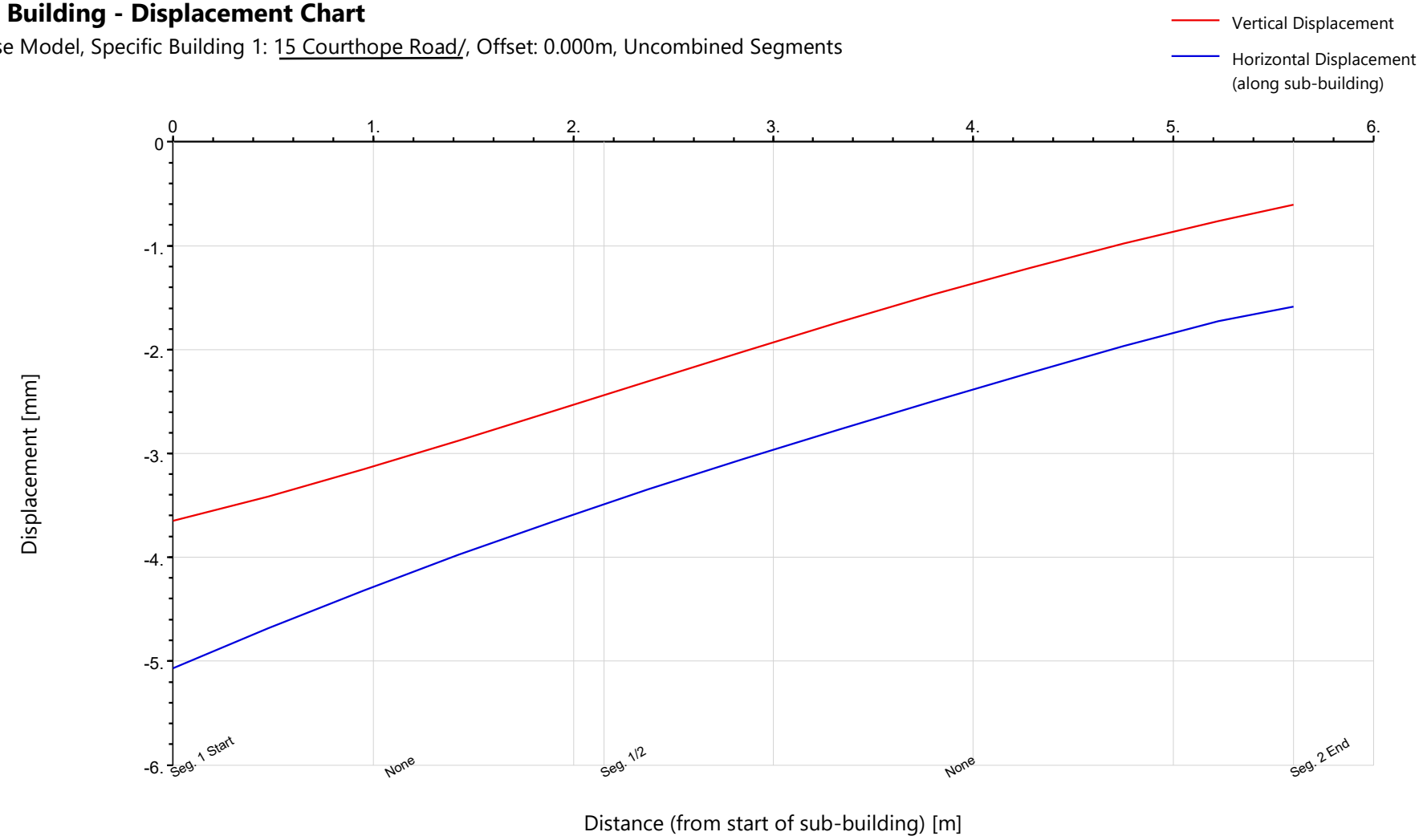
Settlement Contours : Grid 1 at 0.00000m



Scale x 1:227 y 1:227
Contour Interval:0.5mm

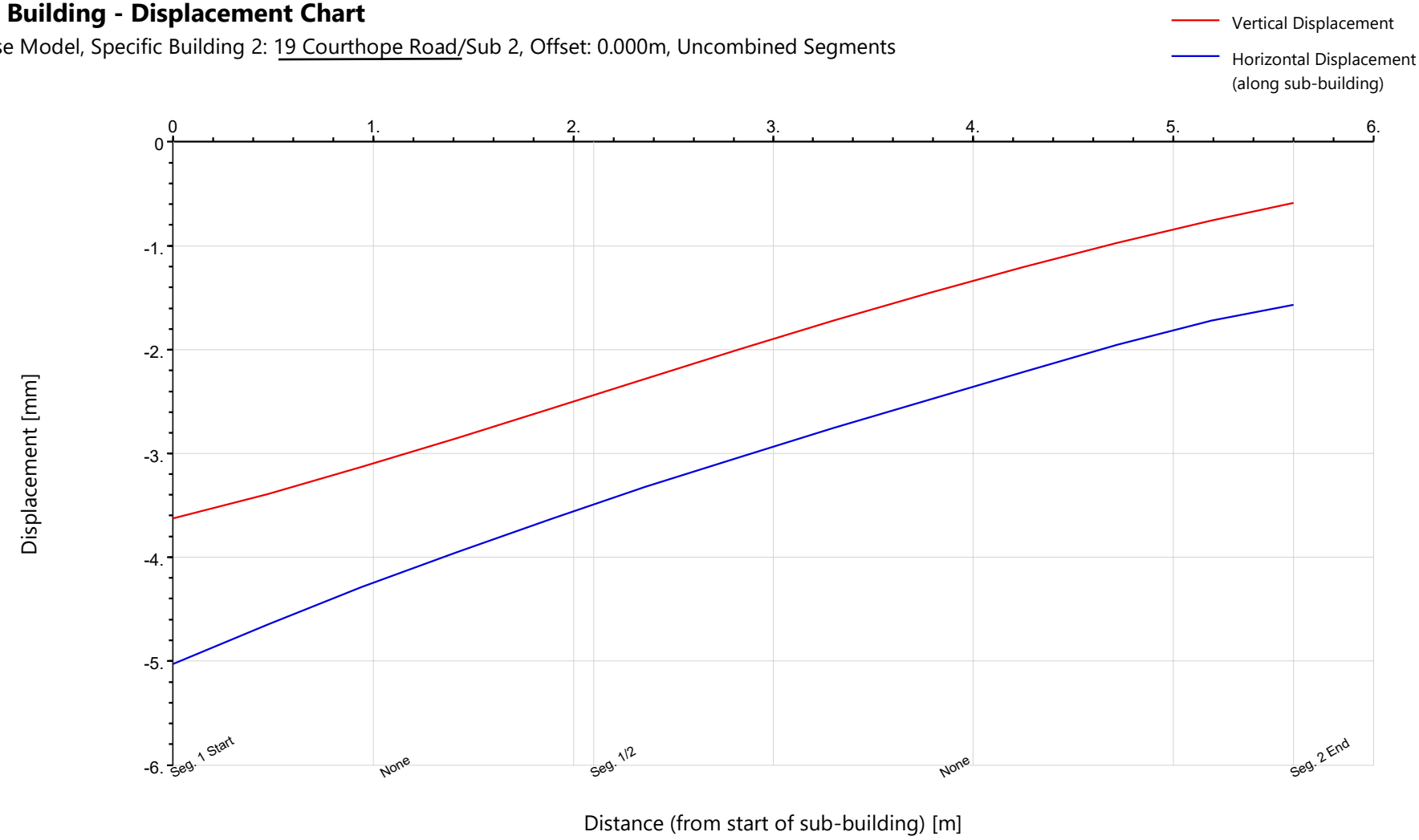
Specific Building - Displacement Chart

Stage: Base Model, Specific Building 1: 15 Courthope Road/, Offset: 0.000m, Uncombined Segments



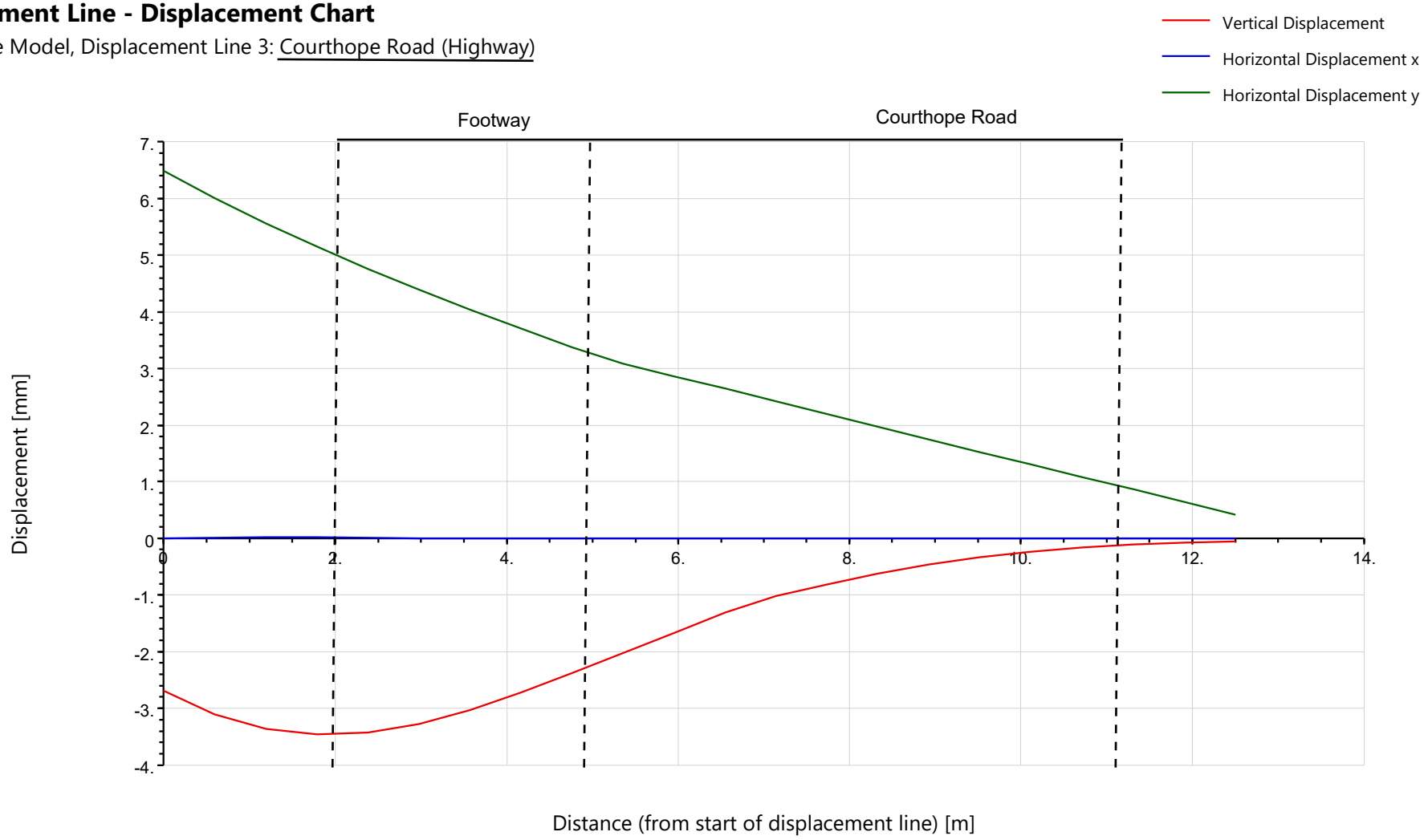
Specific Building - Displacement Chart

Stage: Base Model, Specific Building 2: 19 Courthope Road/Sub 2, Offset: 0.000m, Uncombined Segments



Displacement Line - Displacement Chart

Stage: Base Model, Displacement Line 3: Courthope Road (Highway)



Titles

Job No.: STL J15878
Job Title: 17 Courthope Road, London
Sub-title:
Calculation Heading: Undrained Installation & Excavation Movements
Initials: VF
Checker:
Date Saved: 10-Mar-2025
Date Checked:
Notes:
File Name: Undrained Installation & Excavation Movements.xdd
File Path: S:\SI Data\Job\J15878 London\GMA\Undrained

History

Date	Time	By	Notes
05-Mar-2025	15:30	vfrancis	New
05-Mar-2025	15:59	vfrancis	
05-Mar-2025	16:07	vfrancis	
05-Mar-2025	16:10	vfrancis	
05-Mar-2025	16:22	vfrancis	
05-Mar-2025	16:24	vfrancis	
05-Mar-2025	16:35	vfrancis	
06-Mar-2025	14:00	vfrancis	
06-Mar-2025	14:38	vfrancis	
06-Mar-2025	14:40	vfrancis	
10-Mar-2025	14:15	vfrancis	
10-Mar-2025	14:21	vfrancis	Open

Displacement Lines

Ref.	Name	x1 [m]	y1 [m]	z1 [m]	x2 [m]	y2 [m]	z2 [m]	Intervals [No.]	Surface type for tunnels	Interpolate imported displacements	Calculate
1	15 Courthope Road	0.00000	6.00000	0.00000	-7.60000	6.00000	0.00000	16	Surface	Yes	Yes
2	19 Courthope Road	5.70000	6.00000	0.00000	13.25000	6.00000	0.00000	16	Surface	Yes	Yes
3	Courthope Road (Highway)	2.20000	1.00000	0.00000	2.20000	-11.50000	0.00000	21	Surface	Yes	Yes

Imported Displacements

Set: Ref.	Set: Name	Result: Ref.	Coordinates: x [m]	Coordinates: y [m]	Coordinates: z [m]	Displacements: x [mm]	Displacements: y [mm]	Displacements: z [mm]	
1	Installation Movements	1	0.00000	6.00000	0.00000	1.38478	0.00000	1.36000	2,6
		2	-0.47500	6.00000	0.00000	1.17751	0.00000	1.26500	2,6
		3	-0.95000	6.00000	0.00000	0.99322	0.00000	1.17000	2,6
		4	-1.42500	6.00000	0.00000	0.82954	0.00000	1.07500	2,6
		5	-1.90000	6.00000	0.00000	0.68412	0.00000	0.98000	2,6
		6	-2.37500	6.00000	0.00000	0.55460	0.00000	0.88500	2,6
		7	-2.85000	6.00000	0.00000	0.43860	0.00000	0.79000	2,6
		8	-3.32500	6.00000	0.00000	0.33376	0.00000	0.69500	2,6
		9	-3.80000	6.00000	0.00000	0.23772	0.00000	0.60000	2,6
		10	-4.27500	6.00000	0.00000	0.14812	0.00000	0.50500	2,6
		11	-4.75000	6.00000	0.00000	0.06260	0.00000	0.41000	2,6
		12	-5.22500	6.00000	0.00000	0.00000	0.00000	0.31500	2,6
		13	-5.70000	6.00000	0.00000	0.00000	0.00000	0.22000	2,6
		14	-6.17500	6.00000	0.00000	0.00000	0.00000	0.12500	2,6
		15	-6.65000	6.00000	0.00000	0.00000	0.00000	0.03000	2,6
		16	-7.12500	6.00000	0.00000	0.00000	0.00000	0.00000	2,6
		17	-7.60000	6.00000	0.00000	0.00000	0.00000	0.00000	2,6
		18	5.70000	6.00000	0.00000	-1.36181	0.00000	1.35000	2,6
		19	6.17188	6.00000	0.00000	-1.15834	0.00000	1.25562	2,6
		20	6.64375	6.00000	0.00000	-0.97732	0.00000	1.16125	2,6
		21	7.11562	6.00000	0.00000	-0.81643	0.00000	1.06688	2,6
		22	7.58750	6.00000	0.00000	-0.67335	0.00000	0.97250	2,6
		23	8.05937	6.00000	0.00000	-0.54578	0.00000	0.87813	2,6
		24	8.53125	6.00000	0.00000	-0.43138	0.00000	0.78375	2,6
		25	9.00313	6.00000	0.00000	-0.32785	0.00000	0.68937	2,6
		26	9.47500	6.00000	0.00000	-0.23287	0.00000	0.59500	2,6
		27	9.94688	6.00000	0.00000	-0.14411	0.00000	0.50062	2,6
		28	10.41875	6.00000	0.00000	-0.05927	0.00000	0.40625	2,6
		29	10.89063	6.00000	0.00000	0.00000	0.00000	0.31188	2,6
		30	11.36250	6.00000	0.00000	0.00000	0.00000	0.21750	2,6
		31	11.83437	6.00000	0.00000	0.00000	0.00000	0.12312	2,6

Set: Ref.	Set: Name	Result: Ref.	Coordinates: x [m]	Coordinates: y [m]	Coordinates: z [m]	Displacements: x [mm]	Displacements: y [mm]	Displacements: z [mm]	
		32	12.30625	6.00000	0.00000	0.00000	0.00000	0.02875	2,6
		33	12.77812	6.00000	0.00000	0.00000	0.00000	0.00000	2,6
		34	13.25000	6.00000	0.00000	0.00000	0.00000	0.00000	2,6
		35	2.20000	1.00000	0.00000	0.00000	1.38478	1.36000	
		36	2.20000	0.40476	0.00000	0.00484	1.12878	1.25067	
		37	2.20000	-0.19048	0.00000	0.01596	0.90793	1.15989	
		38	2.20000	-0.78571	0.00000	0.01622	0.71757	1.05598	
		39	2.20000	-1.38095	0.00000	0.00942	0.55306	0.94786	
		40	2.20000	-1.97619	0.00000	0.00000	0.40975	0.82434	
		41	2.20000	-2.57143	0.00000	0.00000	0.28299	0.68867	
		42	2.20000	-3.16667	0.00000	0.00000	0.16811	0.54444	
		43	2.20000	-3.76190	0.00000	0.00000	0.06049	0.40762	
		44	2.20000	-4.35714	0.00000	0.00000	0.00000	0.28857	
		45	2.20000	-4.95238	0.00000	0.00000	0.00000	0.16952	
		46	2.20000	-5.54762	0.00000	0.00000	0.00000	0.05048	
		47	2.20000	-6.14286	0.00000	0.00000	0.00000	0.00000	
		48	2.20000	-6.73810	0.00000	0.00000	0.00000	0.00000	
		49	2.20000	-7.33333	0.00000	0.00000	0.00000	0.00000	
		50	2.20000	-7.92857	0.00000	0.00000	0.00000	0.00000	
		51	2.20000	-8.52381	0.00000	0.00000	0.00000	0.00000	
		52	2.20000	-9.11905	0.00000	0.00000	0.00000	0.00000	
		53	2.20000	-9.71429	0.00000	0.00000	0.00000	0.00000	
		54	2.20000	-10.30952	0.00000	0.00000	0.00000	0.00000	
		55	2.20000	-10.90476	0.00000	0.00000	0.00000	0.00000	
		56	2.20000	-11.50000	0.00000	0.00000	0.00000	0.00000	
2	Excavation Movements	1	0.00000	6.00000	0.00000	3.68438	0.00000	2.29233	2,6
		2	-0.47500	6.00000	0.00000	3.50625	0.00000	2.15083	2,6
		3	-0.95000	6.00000	0.00000	3.32813	0.00000	1.98478	2,6
		4	-1.42500	6.00000	0.00000	3.15000	0.00000	1.80225	2,6
		5	-1.90000	6.00000	0.00000	2.97187	0.00000	1.61050	2,6
		6	-2.37500	6.00000	0.00000	2.79375	0.00000	1.41597	2,6
		7	-2.85000	6.00000	0.00000	2.61563	0.00000	1.22428	2,6
		8	-3.32500	6.00000	0.00000	2.43750	0.00000	1.04021	2,6
		9	-3.80000	6.00000	0.00000	2.25937	0.00000	0.86773	2,6
		10	-4.27500	6.00000	0.00000	2.08125	0.00000	0.71000	2,6
		11	-4.75000	6.00000	0.00000	1.90312	0.00000	0.56934	2,6
		12	-5.22500	6.00000	0.00000	1.72500	0.00000	0.44724	2,6
		13	-5.70000	6.00000	0.00000	1.54688	0.00000	0.34440	2,6
		14	-6.17500	6.00000	0.00000	1.36875	0.00000	0.26066	2,6
		15	-6.65000	6.00000	0.00000	1.19063	0.00000	0.19507	2,6
		16	-7.12500	6.00000	0.00000	1.01250	0.00000	0.14584	2,6
		17	-7.60000	6.00000	0.00000	0.83437	0.00000	0.11035	2,6
		18	5.70000	6.00000	0.00000	-3.66562	0.00000	2.27885	2,6
		19	6.17188	6.00000	0.00000	-3.48867	0.00000	2.13540	2,6
		20	6.64375	6.00000	0.00000	-3.31172	0.00000	1.96854	2,6
		21	7.11562	6.00000	0.00000	-3.13477	0.00000	1.78611	2,6
		22	7.58750	6.00000	0.00000	-2.95781	0.00000	1.59517	2,6
		23	8.05937	6.00000	0.00000	-2.78086	0.00000	1.40194	2,6
		24	8.53125	6.00000	0.00000	-2.60391	0.00000	1.21189	2,6
		25	9.00313	6.00000	0.00000	-2.42695	0.00000	1.02964	2,6
		26	9.47500	6.00000	0.00000	-2.25000	0.00000	0.85904	2,6
		27	9.94688	6.00000	0.00000	-2.07305	0.00000	0.70313	2,6
		28	10.41875	6.00000	0.00000	-1.89609	0.00000	0.56416	2,6
		29	10.89063	6.00000	0.00000	-1.71914	0.00000	0.44355	2,6
		30	11.36250	6.00000	0.00000	-1.54219	0.00000	0.34195	2,6
		31	11.83437	6.00000	0.00000	-1.36523	0.00000	0.25920	2,6
		32	12.30625	6.00000	0.00000	-1.18828	0.00000	0.19432	2,6
		33	12.77812	6.00000	0.00000	-1.01133	0.00000	0.14556	2,6
		34	13.25000	6.00000	0.00000	-0.83437	0.00000	0.11035	2,6
		35	2.20000	1.00000	0.00000	0.00000	5.10000	1.32567	
		36	2.20000	0.40476	0.00000	0.00000	4.87679	1.85516	
		37	2.20000	-0.19048	0.00000	0.00000	4.65357	2.20520	
		38	2.20000	-0.78571	0.00000	0.00000	4.43036	2.40392	
		39	2.20000	-1.38095	0.00000	0.00000	4.20714	2.47745	
		40	2.20000	-1.97619	0.00000	0.00000	3.98393	2.44988	
		41	2.20000	-2.57143	0.00000	0.00000	3.76071	2.34327	
		42	2.20000	-3.16667	0.00000	0.00000	3.53750	2.17767	
		43	2.20000	-3.76190	0.00000	0.00000	3.31429	1.97109	
		44	2.20000	-4.35714	0.00000	0.00000	3.09107	1.73950	
		45	2.20000	-4.95238	0.00000	0.00000	2.86786	1.49686	
		46	2.20000	-5.54762	0.00000	0.00000	2.64464	1.25510	
		47	2.20000	-6.14286	0.00000	0.00000	2.42143	1.02412	
		48	2.20000	-6.73810	0.00000	0.00000	2.19821	0.81178	
		49	2.20000	-7.33333	0.00000	0.00000	1.97500	0.62393	
		50	2.20000	-7.92857	0.00000	0.00000	1.75179	0.46438	
		51	2.20000	-8.52381	0.00000	0.00000	1.52857	0.33492	
		52	2.20000	-9.11905	0.00000	0.00000	1.30536	0.23532	
		53	2.20000	-9.71429	0.00000	0.00000	1.08214	0.16329	
		54	2.20000	-10.30952	0.00000	0.00000	0.85893	0.11455	
		55	2.20000	-10.90476	0.00000	0.00000	0.63571	0.08276	
		56	2.20000	-11.50000	0.00000	0.00000	0.41250	0.05959	

2 - Data point coincident with horizontal movement calculation point for a specific building. Its displacement has been added before performing building damage calculations.
6 - Data point coincident with vertical movement calculation point for a specific building. Its displacement has been added before performing building damage calculations.

Imported Displacements

Set:	Set:	Result:	Coordinates:	Coordinates:	Coordinates:	Displacements:	Displacements:	Displacements:

Ref.	Name	Ref.	x [m]	y [m]	z [m]	x [mm]	y [mm]	z [mm]	
1	Installation Movements	1	0.00000	6.00000	0.00000	1.38478	0.00000	1.36000	2,6
		2	-0.47500	6.00000	0.00000	1.17751	0.00000	1.26500	2,6
		3	-0.95000	6.00000	0.00000	0.99322	0.00000	1.17000	2,6
		4	-1.42500	6.00000	0.00000	0.82954	0.00000	1.07500	2,6
		5	-1.90000	6.00000	0.00000	0.68412	0.00000	0.98000	2,6
		6	-2.37500	6.00000	0.00000	0.55460	0.00000	0.88500	2,6
		7	-2.85000	6.00000	0.00000	0.43860	0.00000	0.79000	2,6
		8	-3.32500	6.00000	0.00000	0.33376	0.00000	0.69500	2,6
		9	-3.80000	6.00000	0.00000	0.23772	0.00000	0.60000	2,6
		10	-4.27500	6.00000	0.00000	0.14812	0.00000	0.50500	2,6
		11	-4.75000	6.00000	0.00000	0.06260	0.00000	0.41000	2,6
		12	-5.22500	6.00000	0.00000	0.00000	0.00000	0.31500	2,6
		13	-5.70000	6.00000	0.00000	0.00000	0.00000	0.22000	2,6
		14	-6.17500	6.00000	0.00000	0.00000	0.00000	0.12500	2,6
		15	-6.65000	6.00000	0.00000	0.00000	0.00000	0.03000	2,6
		16	-7.12500	6.00000	0.00000	0.00000	0.00000	0.00000	2,6
		17	-7.60000	6.00000	0.00000	0.00000	0.00000	0.00000	2,6
		18	5.70000	6.00000	0.00000	-1.36181	0.00000	1.35000	2,6
		19	6.17188	6.00000	0.00000	-1.15834	0.00000	1.25562	2,6
		20	6.64375	6.00000	0.00000	-0.97732	0.00000	1.16125	2,6
		21	7.11562	6.00000	0.00000	-0.81643	0.00000	1.06688	2,6
		22	7.58750	6.00000	0.00000	-0.67335	0.00000	0.97250	2,6
		23	8.05937	6.00000	0.00000	-0.54578	0.00000	0.87813	2,6
		24	8.53125	6.00000	0.00000	-0.43138	0.00000	0.78375	2,6
		25	9.00313	6.00000	0.00000	-0.32785	0.00000	0.68937	2,6
		26	9.47500	6.00000	0.00000	-0.23287	0.00000	0.59500	2,6
		27	9.94688	6.00000	0.00000	-0.14411	0.00000	0.50062	2,6
		28	10.41875	6.00000	0.00000	-0.05927	0.00000	0.40625	2,6
		29	10.89063	6.00000	0.00000	0.00000	0.00000	0.31188	2,6
		30	11.36250	6.00000	0.00000	0.00000	0.00000	0.21750	2,6
		31	11.83437	6.00000	0.00000	0.00000	0.00000	0.12312	2,6
		32	12.30625	6.00000	0.00000	0.00000	0.00000	0.02875	2,6
		33	12.77812	6.00000	0.00000	0.00000	0.00000	0.00000	2,6
		34	13.25000	6.00000	0.00000	0.00000	0.00000	0.00000	2,6
		35	2.20000	1.00000	0.00000	0.00000	1.38478	1.36000	
		36	2.20000	0.40476	0.00000	0.00484	1.12878	1.25067	
		37	2.20000	-0.19048	0.00000	0.01596	0.90793	1.15989	
		38	2.20000	-0.78571	0.00000	0.01622	0.71757	1.05598	
		39	2.20000	-1.38095	0.00000	0.00942	0.55306	0.94786	
		40	2.20000	-1.97619	0.00000	0.00000	0.40975	0.82434	
		41	2.20000	-2.57143	0.00000	0.00000	0.28299	0.68867	
		42	2.20000	-3.16667	0.00000	0.00000	0.16811	0.54444	
		43	2.20000	-3.76190	0.00000	0.00000	0.06049	0.40762	
		44	2.20000	-4.35714	0.00000	0.00000	0.00000	0.28857	
		45	2.20000	-4.95238	0.00000	0.00000	0.00000	0.16952	
		46	2.20000	-5.54762	0.00000	0.00000	0.00000	0.05048	
		47	2.20000	-6.14286	0.00000	0.00000	0.00000	0.00000	
		48	2.20000	-6.73810	0.00000	0.00000	0.00000	0.00000	
		49	2.20000	-7.33333	0.00000	0.00000	0.00000	0.00000	
		50	2.20000	-7.92857	0.00000	0.00000	0.00000	0.00000	
		51	2.20000	-8.52381	0.00000	0.00000	0.00000	0.00000	
		52	2.20000	-9.11905	0.00000	0.00000	0.00000	0.00000	
		53	2.20000	-9.71429	0.00000	0.00000	0.00000	0.00000	
		54	2.20000	-10.30952	0.00000	0.00000	0.00000	0.00000	
		55	2.20000	-10.90476	0.00000	0.00000	0.00000	0.00000	
		56	2.20000	-11.50000	0.00000	0.00000	0.00000	0.00000	
2	Excavation Movements	1	0.00000	6.00000	0.00000	3.68438	0.00000	2.29233	2,6
		2	-0.47500	6.00000	0.00000	3.50625	0.00000	2.15083	2,6
		3	-0.95000	6.00000	0.00000	3.32813	0.00000	1.98478	2,6
		4	-1.42500	6.00000	0.00000	3.15000	0.00000	1.80225	2,6
		5	-1.90000	6.00000	0.00000	2.97187	0.00000	1.61050	2,6
		6	-2.37500	6.00000	0.00000	2.79375	0.00000	1.41597	2,6
		7	-2.85000	6.00000	0.00000	2.61563	0.00000	1.22428	2,6
		8	-3.32500	6.00000	0.00000	2.43750	0.00000	1.04021	2,6
		9	-3.80000	6.00000	0.00000	2.25937	0.00000	0.86773	2,6
		10	-4.27500	6.00000	0.00000	2.08125	0.00000	0.71000	2,6
		11	-4.75000	6.00000	0.00000	1.90312	0.00000	0.56934	2,6
		12	-5.22500	6.00000	0.00000	1.72500	0.00000	0.44724	2,6
		13	-5.70000	6.00000	0.00000	1.54688	0.00000	0.34440	2,6
		14	-6.17500	6.00000	0.00000	1.36875	0.00000	0.26066	2,6
		15	-6.65000	6.00000	0.00000	1.19063	0.00000	0.19507	2,6
		16	-7.12500	6.00000	0.00000	1.01250	0.00000	0.14584	2,6
		17	-7.60000	6.00000	0.00000	0.83437	0.00000	0.11035	2,6
		18	5.70000	6.00000	0.00000	-3.66562	0.00000	2.27885	2,6
		19	6.17188	6.00000	0.00000	-3.48867	0.00000	2.13540	2,6
		20	6.64375	6.00000	0.00000	-3.31172	0.00000	1.96854	2,6
		21	7.11562	6.00000	0.00000	-3.13477	0.00000	1.78611	2,6
		22	7.58750	6.00000	0.00000	-2.95781	0.00000	1.59517	2,6
		23	8.05937	6.00000	0.00000	-2.78086	0.00000	1.40194	2,6
		24	8.53125	6.00000	0.00000	-2.60391	0.00000	1.21189	2,6
		25	9.00313	6.00000	0.00000	-2.42695	0.00000	1.02964	2,6
		26	9.47500	6.00000	0.00000	-2.25000	0.00000	0.85904	2,6
		27	9.94688	6.00000	0.00000	-2.07305	0.00000	0.70313	2,6
		28	10.41875	6.00000	0.00000	-1.89609	0.00000	0.56416	2,6
		29	10.89063	6.00000	0.00000	-1.71914	0.00000	0.44355	2,6
		30	11.36250	6.00000	0.00000	-1.54219	0.00000	0.34195	2,6

Set: Ref.	Set: Name	Result: Ref.	Coordinates: x [m]	Coordinates: y [m]	Coordinates: z [m]	Displacements: x [mm]	Displacements: y [mm]	Displacements: z [mm]	
		31	11.83437	6.00000	0.00000	-1.36523	0.00000	0.25920	2,6
		32	12.30625	6.00000	0.00000	-1.18828	0.00000	0.19432	2,6
		33	12.77812	6.00000	0.00000	-1.01133	0.00000	0.14556	2,6
		34	13.25000	6.00000	0.00000	-0.83437	0.00000	0.11035	2,6
		35	2.20000	1.00000	0.00000	0.00000	5.10000	1.32567	
		36	2.20000	0.40476	0.00000	0.00000	4.87679	1.85516	
		37	2.20000	-0.19048	0.00000	0.00000	4.65357	2.20520	
		38	2.20000	-0.78571	0.00000	0.00000	4.43036	2.40392	
		39	2.20000	-1.38095	0.00000	0.00000	4.20714	2.47745	
		40	2.20000	-1.97619	0.00000	0.00000	3.98393	2.44988	
		41	2.20000	-2.57143	0.00000	0.00000	3.76071	2.34327	
		42	2.20000	-3.16667	0.00000	0.00000	3.53750	2.17767	
		43	2.20000	-3.76190	0.00000	0.00000	3.31429	1.97109	
		44	2.20000	-4.35714	0.00000	0.00000	3.09107	1.73950	
		45	2.20000	-4.95238	0.00000	0.00000	2.86786	1.49686	
		46	2.20000	-5.54762	0.00000	0.00000	2.64464	1.25510	
		47	2.20000	-6.14286	0.00000	0.00000	2.42143	1.02412	
		48	2.20000	-6.73810	0.00000	0.00000	2.19821	0.81178	
		49	2.20000	-7.33333	0.00000	0.00000	1.97500	0.62393	
		50	2.20000	-7.92857	0.00000	0.00000	1.75179	0.46438	
		51	2.20000	-8.52381	0.00000	0.00000	1.52857	0.33492	
		52	2.20000	-9.11905	0.00000	0.00000	1.30536	0.23532	
		53	2.20000	-9.71429	0.00000	0.00000	1.08214	0.16329	
		54	2.20000	-10.30952	0.00000	0.00000	0.85893	0.11455	
		55	2.20000	-10.90476	0.00000	0.00000	0.63571	0.08276	
		56	2.20000	-11.50000	0.00000	0.00000	0.41250	0.05959	

2 - Data point coincident with horizontal movement calculation point for a specific building. Its displacement has been added before performing building damage calculations.
6 - Data point coincident with vertical movement calculation point for a specific building. Its displacement has been added before performing building damage calculations.

Polygonal Excavations

Ref. 1
Excavation Name: Underpin 1
Surface level [m]: 0.0
Contribution: Positive

Corner	x [m]	y [m]	Base Level [m]	Arc Enabled	Stiffened	Prev. Side: d [m]	Prev. Side: p1 [%]	Prev. Side: p2* [%]	Next Side: d [m]	Next Side: p1 [%]	Next Side: p2* [%]
1	0.0	2.7500	-3.4000	Yes	No	-	-	-	-	-	-
2	0.50000	2.7500	-3.4000	Yes	No	-	-	-	-	-	-
3	0.50000	1.7000	-3.4000	Yes	No	-	-	-	-	-	-
4	1.2000	1.0000	-3.4000	Yes	No	-	-	-	-	-	-
5	3.2000	1.0000	-3.4000	Yes	No	-	-	-	-	-	-
6	3.9000	1.7000	-3.4000	Yes	No	-	-	-	-	-	-
7	3.9000	2.7500	-3.4000	Yes	No	-	-	-	-	-	-
8	5.6500	2.7500	-3.4000	Yes	No	-	-	-	-	-	-
9	3.7750	4.6250	-3.4000	Yes	No	-	-	-	-	-	-
10	1.8750	4.6250	-3.4000	Yes	No	-	-	-	-	-	-
11	0.0	2.7500	-3.4000	Yes	No	-	-	-	-	-	-

Side	x1 [m]	y1 [m]	x2 [m]	y2 [m]	G.M. Curve: Vertical	G.M. Curve: Horizontal
1	0.0	2.7500	0.50000	2.7500	No vertical ground movement	No horizontal ground movement
2	0.50000	2.7500	0.50000	1.7000	No vertical ground movement	No horizontal ground movement
3	0.50000	1.7000	1.2000	1.0000	No vertical ground movement	No horizontal ground movement
4	1.2000	1.0000	3.2000	1.0000	No vertical ground movement	No horizontal ground movement
5	3.2000	1.0000	3.9000	1.7000	No vertical ground movement	No horizontal ground movement
6	3.9000	1.7000	3.9000	2.7500	No vertical ground movement	No horizontal ground movement
7	3.9000	2.7500	5.6500	2.7500	No vertical ground movement	No horizontal ground movement
8	5.6500	2.7500	3.7750	4.6250	No vertical ground movement	No horizontal ground movement
9	3.7750	4.6250	1.8750	4.6250	No vertical ground movement	No horizontal ground movement
10	1.8750	4.6250	0.0	2.7500	No vertical ground movement	No horizontal ground movement
11	0.0	2.7500	0.0	2.7500	No vertical ground movement	No horizontal ground movement

Ref. 2
Excavation Name: Underpin 2
Surface level [m]: 0.0
Contribution: Positive

Corner	x [m]	y [m]	Base Level [m]	Arc Enabled	Stiffened	Prev. Side: d [m]	Prev. Side: p1 [%]	Prev. Side: p2* [%]	Next Side: d [m]	Next Side: p1 [%]	Next Side: p2* [%]
1	0.0	2.7500	-3.4000	Yes	No	-	-	-	-	-	-
2	0.0	11.000	-3.4000	Yes	No	-	-	-	-	-	-
3	1.8750	9.1250	-3.4000	Yes	No	-	-	-	-	-	-
4	1.8750	4.6250	-3.4000	Yes	No	-	-	-	-	-	-
5	0.0	2.7500	-3.4000	Yes	No	-	-	-	-	-	-

Side	x1 [m]	y1 [m]	x2 [m]	y2 [m]	G.M. Curve: Vertical	G.M. Curve: Horizontal

1	0.0	2.7500	0.0	11.000	No vertical ground movement	No horizontal ground movement
2	0.0	11.000	1.8750	9.1250	No vertical ground movement	No horizontal ground movement
3	1.8750	9.1250	1.8750	4.6250	No vertical ground movement	No horizontal ground movement
4	1.8750	4.6250	0.0	2.7500	No vertical ground movement	No horizontal ground movement
5	0.0	2.7500	0.0	2.7500	No vertical ground movement	No horizontal ground movement

Ref. 3
Excavation Name: Underpin 3
Surface level [m]: 0.0
Contribution: Positive

Corner	x [m]	y [m]	Base Level [m]	Arc Enabled	Stiffened	Prev. Side: d [m]	Prev. Side: p1 [%]	Prev. Side: p2* [%]	Next Side: d [m]	Next Side: p1 [%]	Next Side: p2* [%]
1	0.0	11.000	-3.4000	Yes	No	-	-	-	-	-	-
2	5.6500	11.000	-3.4000	Yes	No	-	-	-	-	-	-
3	3.7750	9.1250	-3.4000	Yes	No	-	-	-	-	-	-
4	1.8750	9.1250	-3.4000	Yes	No	-	-	-	-	-	-
5	0.0	11.000	-3.4000	Yes	No	-	-	-	-	-	-

Side	x1 [m]	y1 [m]	x2 [m]	y2 [m]	G.M. Curve: Vertical	G.M. Curve: Horizontal
1	0.0	11.000	5.6500	11.000	No vertical ground movement	No horizontal ground movement
2	5.6500	11.000	3.7750	9.1250	No vertical ground movement	No horizontal ground movement
3	3.7750	9.1250	1.8750	9.1250	No vertical ground movement	No horizontal ground movement
4	1.8750	9.1250	0.0	11.000	No vertical ground movement	No horizontal ground movement
5	0.0	11.000	0.0	11.000	No vertical ground movement	No horizontal ground movement

Ref. 4
Excavation Name: Underpin 4
Surface level [m]: 0.0
Contribution: Positive

Corner	x [m]	y [m]	Base Level [m]	Arc Enabled	Stiffened	Prev. Side: d [m]	Prev. Side: p1 [%]	Prev. Side: p2* [%]	Next Side: d [m]	Next Side: p1 [%]	Next Side: p2* [%]
1	5.6500	11.000	-3.4000	Yes	No	-	-	-	-	-	-
2	5.6500	2.7500	-3.4000	Yes	No	-	-	-	-	-	-
3	3.7750	4.6250	-3.4000	Yes	No	-	-	-	-	-	-
4	3.7750	9.1250	-3.4000	Yes	No	-	-	-	-	-	-
5	5.6500	11.000	-3.4000	Yes	No	-	-	-	-	-	-

Side	x1 [m]	y1 [m]	x2 [m]	y2 [m]	G.M. Curve: Vertical	G.M. Curve: Horizontal
1	5.6500	11.000	5.6500	2.7500	No vertical ground movement	No horizontal ground movement
2	5.6500	2.7500	3.7750	4.6250	No vertical ground movement	No horizontal ground movement
3	3.7750	4.6250	3.7750	9.1250	No vertical ground movement	No horizontal ground movement
4	3.7750	9.1250	5.6500	11.000	No vertical ground movement	No horizontal ground movement
5	5.6500	11.000	5.6500	11.000	No vertical ground movement	No horizontal ground movement

Circular Excavations

Vertical Ground Movement Curves

Curve Name: **No vertical ground movement**
Coordinates: [Distance from wall / wall depth or max. excavation depth (x), Depth / wall depth or max. excavation depth (y), Settlement / wall depth or max. excavation depth (z)(%)]

[0.000,0.000,0.000][1.000,0.000,0.000][0.000,1.000,0.000][1.000,1.000,0.000]

Curve Fitting Method: Polynomial
x Order: 1
y Order: 0
Polynomial: z = 0.0x + 0.0
Coeff. of Determination:

Horizontal Ground Movement Curves

Curve Name: **No horizontal ground movement**
Coordinates: [Distance from wall / wall depth or max. excavation depth (x), Depth / wall depth or max. excavation depth (y), Horizontal movement / wall depth or max. excavation depth (z)(%)]
[0.000,0.000,0.000][1.000,0.000,0.000][0.000,1.000,0.000][1.000,1.000,0.000]
Curve Fitting Method: Polynomial
x Order: 0

Side	x1 [m]	y1 [m]	x2 [m]	y2 [m]	G.M. Curve: Vertical	G.M. Curve: Horizontal

y Order: 0
Polynomial: z = 0.0
Coeff. of Determination:

Damage Category Strains

Ref.	Name	0 (Negligible) to 1 (Very Slight)	1 (Very Slight) to 2 (Slight)	2 (Slight) to 3 (Moderate)	3 (Moderate) to 4 (Severe)
1	Burland Strain Limits	0.0	500.00E-6	750.00E-6	0.0015000

Specific Buildings - Geometry

Ref.	Building Name	Sub-Building Name	Displacement Line	Distance Along Line: Start [m]	Distance Along Line: End [m]	Vertical Offsets from Line for Vertical Movement Calculations [m]	Vertical Displacement Limit Sensitivity [mm]	Damage Category Strains	Poisson's Ratio	E/G
1	15 Courthope Road		15 Courthope Road	0.00000	5.60000	0.0	0.10000	Burland Strain Limits	0.20000	2.6000
2	19 Courthope Road	Sub 2	19 Courthope Road	0.00000	5.60000	0.0	0.10000	Burland Strain Limits	0.20000	2.6000

Specific Buildings - Bending Parameters

Ref.	Building Name	Sub-Building Name	Height [m]	Default	Hogging: 2nd Mom. of Area (per unit width) [m³]	Hogging: Dist. of Bending Strain from N.A. [m]	Hogging: Dist. of N.A. from Edge of Beam in Tension [m]	Sagging: 2nd Mom. of Area (per unit width) [m³]	Sagging: Dist. of Bending Strain from N.A. [m]	Sagging: Dist. of N.A. from Edge of Beam in Tension [m]
1	15 Courthope Road		12.000	Yes	576.00	12.000	12.000	144.00	6.0000	6.0000
2	19 Courthope Road	Sub 2	12.000	Yes	576.00	12.000	12.000	144.00	6.0000	6.0000

Warnings

1 Multiple excavations have been specified. Displacements resulting from each excavation are summed with no account taken of the interactions between excavations (e.g. overlapping zones of influence or 'shielding' of one excavation by another).

2 Embedded Wall Excavation PE1 : Underpin 1 intersects PE2 : Underpin 2, and PE4 : Underpin 4.

3 Embedded Wall Excavation PE2 : Underpin 2 intersects PE1 : Underpin 1, and PE3 : Underpin 3.

4 Embedded Wall Excavation PE3 : Underpin 3 intersects PE2 : Underpin 2, and PE4 : Underpin 4.

5 Embedded Wall Excavation PE4 : Underpin 4 intersects PE1 : Underpin 1, and PE3 : Underpin 3.

6 The following polygonal excavations have one or more re-entrant corners: 1. The use of re-entrant corners is permitted but not recommended. CIRIA C580/C760, on which XDisp's method for modelling ground movements behind walls of excavations is based, considers only movements for points lying at right angles behind single walls. It does not consider how movements should be calculated within the zone of influence of re-entrant corners, i.e. where movements would be influenced by two walls adjacent to the re-entrant corner. By default, XDisp will merely sum the effects from both walls, making no allowance for interaction or stiffening of the corner. Please refer to help manual for artificial smoothing options. Re-entrant corners should be used with caution. Results in their vicinity should be validated independently.

Errors

None

Displacement Results - Displacement Lines

Stage: Ref.	Stage: Name	Disp. Line: Ref.	Disp. Line: Name	Chainage [m]	x [m]	y [m]	z [m]	δx [mm]	δy [mm]	δz [mm]	δH// [mm]	δHperp. [mm]	Angle [°]	
0	Base Model 1	15 Courthope Road		0.0	0.00000	6.00000	0.00000	5.0692	0.0	3.6523	-5.0692	0.0	180.00	*
				0.47500	-0.47500	6.00000	0.00000	4.6838	0.0	3.4158	-4.6838	0.0	180.00	*
				0.95000	-0.95000	6.00000	0.00000	4.3213	0.0	3.1548	-4.3213	0.0	180.00	*
				1.4250	-1.42500	6.00000	0.00000	3.9795	0.0	2.8772	-3.9795	0.0	180.00	*
				1.9000	-1.90000	6.00000	0.00000	3.6560	0.0	2.5905	-3.6560	0.0	180.00	*

Stage: Ref.	Stage: Name	Disp. Line: Ref.	Disp. Line: Name	Chainage [m]	x [m]	y [m]	z [m]	δx [mm]	δy [mm]	δz [mm]	δH// [mm]	δHperp. [mm]	Angle [°]	
				2.3750	-2.37500	6.00000	0.00000	3.3483	0.0	2.3010	-3.3483	0.0	180.00	*
				2.8500	-2.85000	6.00000	0.00000	3.0542	0.0	2.0143	-3.0542	0.0	180.00	*
				3.3250	-3.32500	6.00000	0.00000	2.7713	0.0	1.7352	-2.7713	0.0	180.00	*
				3.8000	-3.80000	6.00000	0.00000	2.4971	0.0	1.4677	-2.4971	0.0	180.00	*
				4.2750	-4.27500	6.00000	0.00000	2.2294	0.0	1.2150	-2.2294	0.0	180.00	*
				4.7500	-4.75000	6.00000	0.00000	1.9657	0.0	0.97934	-1.9657	0.0	180.00	*
				5.2250	-5.22500	6.00000	0.00000	1.7250	0.0	0.76224	-1.7250	0.0	180.00	*
				5.7000	-5.70000	6.00000	0.00000	1.5469	0.0	0.56440	-1.5469	0.0	180.00	*
				6.1750	-6.17500	6.00000	0.00000	1.3687	0.0	0.38566	-1.3687	0.0	180.00	*
				6.6500	-6.65000	6.00000	0.00000	1.1906	0.0	0.22507	-1.1906	0.0	180.00	*
				7.1250	-7.12500	6.00000	0.00000	1.0125	0.0	0.14584	-1.0125	0.0	180.00	*
				7.6000	-7.60000	6.00000	0.00000	0.83437	0.0	0.11035	-0.83437	0.0	180.00	*
		2	19 Courthope Road	0.0	5.70000	6.00000	0.00000	-5.0274	0.0	3.6288	-5.0274	0.0	0.0	*
				0.47187	6.17188	6.00000	0.00000	-4.6470	0.0	3.3910	-4.6470	0.0	0.0	*
				0.94375	6.64375	6.00000	0.00000	-4.2890	0.0	3.1298	-4.2890	0.0	0.0	*
				1.4156	7.11562	6.00000	0.00000	-3.9512	0.0	2.8530	-3.9512	0.0	0.0	*
				1.8875	7.58750	6.00000	0.00000	-3.6312	0.0	2.5677	-3.6312	0.0	0.0	*
				2.3594	8.05937	6.00000	0.00000	-3.3266	0.0	2.2801	-3.3266	0.0	0.0	*
				2.8312	8.53125	6.00000	0.00000	-3.0353	0.0	1.9956	-3.0353	0.0	0.0	*
				3.3031	9.00313	6.00000	0.00000	-2.7548	0.0	1.7190	-2.7548	0.0	0.0	*
				3.7750	9.47500	6.00000	0.00000	-2.4829	0.0	1.4540	-2.4829	0.0	0.0	*
				4.2469	9.94688	6.00000	0.00000	-2.2172	0.0	1.2038	-2.2172	0.0	0.0	*
				4.7187	10.41875	6.00000	0.00000	-1.9554	0.0	0.97041	-1.9554	0.0	0.0	*
				5.1906	10.89063	6.00000	0.00000	-1.7191	0.0	0.75543	-1.7191	0.0	0.0	*
				5.6625	11.36250	6.00000	0.00000	-1.5422	0.0	0.55945	-1.5422	0.0	0.0	*
				6.1344	11.83437	6.00000	0.00000	-1.3652	0.0	0.38232	-1.3652	0.0	0.0	*
				6.6063	12.30625	6.00000	0.00000	-1.1883	0.0	0.22307	-1.1883	0.0	0.0	*
				7.0781	12.77812	6.00000	0.00000	-1.0113	0.0	0.14556	-1.0113	0.0	0.0	*
				7.5500	13.25000	6.00000	0.00000	-0.83437	0.0	0.11035	-0.83437	0.0	0.0	*
		3	Courthope Road (Highway)	0.0	2.20000	1.00000	0.00000	0.0	6.4848	2.6857	-6.4848	0.0	270.00	*
				0.59524	2.20000	0.40476	0.00000	0.0048404	6.0056	3.1058	-6.0056	0.0048404	270.00	*
				1.1905	2.20000	-0.19048	0.00000	0.015956	5.5615	3.3651	-5.5615	0.015956	270.00	*
				1.7857	2.20000	-0.78571	0.00000	0.016217	5.1479	3.4599	-5.1479	0.016217	270.00	*
				2.3810	2.20000	-1.38095	0.00000	0.0094224	4.7602	3.4253	-4.7602	0.0094224	270.00	*
				2.9762	2.20000	-1.97619	0.00000	0.0	4.3937	3.2742	-4.3937	0.0	270.00	*
				3.5714	2.20000	-2.57143	0.00000	0.0	4.0437	3.0319	-4.0437	0.0	270.00	*
				4.1667	2.20000	-3.16667	0.00000	0.0	3.7056	2.7221	-3.7056	0.0	270.00	*
				4.7619	2.20000	-3.76190	0.00000	0.0	3.3748	2.3787	-3.3748	0.0	270.00	*
				5.3571	2.20000	-4.35714	0.00000	0.0	3.0911	2.0281	-3.0911	0.0	270.00	*
				5.9524	2.20000	-4.95238	0.00000	0.0	2.8679	1.6664	-2.8679	0.0	270.00	*
				6.5476	2.20000	-5.54762	0.00000	0.0	2.6446	1.3056	-2.6446	0.0	270.00	*
				7.1429	2.20000	-6.14286	0.00000	0.0	2.4214	1.0241	-2.4214	0.0	270.00	*
				7.7381	2.20000	-6.73810	0.00000	0.0	2.1982	0.81178	-2.1982	0.0	270.00	*
				8.3333	2.20000	-7.33333	0.00000	0.0	1.9750	0.62393	-1.9750	0.0	270.00	*
				8.9286	2.20000	-7.92857	0.00000	0.0	1.7518	0.46438	-1.7518	0.0	270.00	*
				9.5238	2.20000	-8.52381	0.00000	0.0	1.5286	0.33492	-1.5286	0.0	270.00	*
				10.119	2.20000	-9.11905	0.00000	0.0	1.3054	0.23532	-1.3054	0.0	270.00	*
				10.714	2.20000	-9.71429	0.00000	0.0	1.0821	0.16329	-1.0821	0.0	270.00	*
				11.310	2.20000	-10.30952	0.00000	0.0	0.85893	0.11455	-0.85893	0.0	270.00	*
				11.905	2.20000	-10.90476	0.00000	0.0	0.63571	0.082763	-0.63571	0.0	270.00	*
				12.500	2.20000	-11.50000	0.00000	0.0	0.41250	0.059587	-0.41250	0.0	270.00	*

* Result includes imported displacement(s).

Specific Building Damage Results - Horizontal Displacements

Stage: Ref.	Stage: Name	Specific Building: Ref.	Specific Building: Name	Sub-building Name	Dist. [m]	x [m]	y [m]	z [m]	δx [mm]	δy [mm]	δH// [mm]	δHperp. [mm]	
0	Base Model	1	15 Courthope Road		0.0	0.00000	6.00000	0.00000	5.0692	0.0	-5.0692	0.0	d
					0.47500	-0.47500	6.00000	0.00000	4.6838	0.0	-4.6838	0.0	d
					0.95000	-0.95000	6.00000	0.00000	4.3213	0.0	-4.3213	0.0	d
					1.4250	-1.42500	6.00000	0.00000	3.9795	0.0	-3.9795	0.0	d
					1.9000	-1.90000	6.00000	0.00000	3.6560	0.0	-3.6560	0.0	d
					2.3750	-2.37500	6.00000	0.00000	3.3483	0.0	-3.3483	0.0	d
					2.8500	-2.85000	6.00000	0.00000	3.0542	0.0	-3.0542	0.0	d
					3.3250	-3.32500	6.00000	0.00000	2.7713	0.0	-2.7713	0.0	d
					3.8000	-3.80000	6.00000	0.00000	2.4971	0.0	-2.4971	0.0	d
					4.2750	-4.27500	6.00000	0.00000	2.2294	0.0	-2.2294	0.0	d
					4.7500	-4.75000	6.00000	0.00000	1.9657	0.0	-1.9657	0.0	d
					5.2250	-5.22500	6.00000	0.00000	1.7250	0.0	-1.7250	0.0	d
					5.7000	-5.70000	6.00000	0.00000	1.5469	0.0	-1.5469	0.0	d
					6.1750	-6.17500	6.00000	0.00000	1.3687	0.0	-1.3687	0.0	d
					6.6500	-6.65000	6.00000	0.00000	1.1906	0.0	-1.1906	0.0	d
					7.1250	-7.12500	6.00000	0.00000	1.0125	0.0	-1.0125	0.0	d
					7.6000	-7.60000	6.00000	0.00000	0.83437	0.0	-0.83437	0.0	d
		2	19 Courthope Road	Sub 2	0.0	5.70000	6.00000	0.00000	-5.0274	0.0	-5.0274	0.0	d
					0.47187	6.17188	6.00000	0.00000	-4.6470	0.0	-4.6470	0.0	d
					0.94375	6.64375	6.00000	0.00000	-4.2890	0.0	-4.2890	0.0	d
					1.4156	7.11562	6.00000	0.00000	-3.9512	0.0	-3.9512	0.0	d
					1.8875	7.58750	6.00000	0.00000	-3.6312	0.0	-3.6312	0.0	d
					2.3594	8.05937	6.00000	0.00000	-3.3266	0.0	-3.3266	0.0	d
					2.8312	8.53125	6.00000	0.00000	-3.0353	0.0	-3.0353	0.0	d
					3.3031	9.00313	6.00000	0.00000	-2.7548	0.0	-2.7548	0.0	d
					3.7750	9.47500	6.00000	0.00000	-2.4829	0.0	-2.4829	0.0	d
					4.2469	9.94688	6.00000	0.00000	-2.2172	0.0	-2.2172	0.0	d
					4.7187	10.41875	6.00000	0.00000	-1.9554	0.0	-1.9554	0.0	d
					5.1906	10.89063	6.00000	0.00000	-1.7191	0.0	-1.7191	0.0	d

Stage Ref.	Stage Name	Specific Building Ref.	Specific Building Name	Sub-building Name	Dist. [m]	x [m]	y [m]	z [m]	δx [mm]	δy [mm]	δH// [mm]	δHperp. [mm]	
					5.6625	11.36250	6.00000	0.00000	-1.5422	0.0	-1.5422	0.0	d
					6.1344	11.83437	6.00000	0.00000	-1.3652	0.0	-1.3652	0.0	d
					6.6063	12.30625	6.00000	0.00000	-1.1883	0.0	-1.1883	0.0	d
					7.0781	12.77812	6.00000	0.00000	-1.0113	0.0	-1.0113	0.0	d
					7.5500	13.25000	6.00000	0.00000	-0.83437	0.0	-0.83437	0.0	d

d - Displacements include imported displacements.

Specific Building Damage Results - Vertical Displacements

Stage Ref.	Stage Name	Specific Building Ref.	Specific Building Name	Sub-building Name	Vertical Offset [m]	Dist. [m]	x [m]	y [m]	z [m]	δz [mm]	
0	Base Model	1	15 Courthope Road		0.0	0.0	0.00000	6.00000	0.00000	3.6523	d
						0.47500	-0.47500	6.00000	0.00000	3.4158	d
						0.95000	-0.95000	6.00000	0.00000	3.1548	d
						1.4250	-1.42500	6.00000	0.00000	2.8772	d
						1.9000	-1.90000	6.00000	0.00000	2.5905	d
						2.3750	-2.37500	6.00000	0.00000	2.3010	d
						2.8500	-2.85000	6.00000	0.00000	2.0143	d
						3.3250	-3.32500	6.00000	0.00000	1.7352	d
						3.8000	-3.80000	6.00000	0.00000	1.4677	d
						4.2750	-4.27500	6.00000	0.00000	1.2150	d
						4.7500	-4.75000	6.00000	0.00000	0.97934	d
						5.2250	-5.22500	6.00000	0.00000	0.76224	d
						5.7000	-5.70000	6.00000	0.00000	0.56440	d
						6.1750	-6.17500	6.00000	0.00000	0.38566	d
						6.6500	-6.65000	6.00000	0.00000	0.22507	d
						7.1250	-7.12500	6.00000	0.00000	0.14584	d
						7.6000	-7.60000	6.00000	0.00000	0.11035	d
		2	19 Courthope Road	Sub 2	0.0	0.0	5.70000	6.00000	0.00000	3.6288	d
						0.47187	6.17188	6.00000	0.00000	3.3910	d
						0.94375	6.64375	6.00000	0.00000	3.1298	d
						1.4156	7.11562	6.00000	0.00000	2.8530	d
						1.8875	7.58750	6.00000	0.00000	2.5677	d
						2.3594	8.05937	6.00000	0.00000	2.2801	d
						2.8312	8.53125	6.00000	0.00000	1.9956	d
						3.3031	9.00313	6.00000	0.00000	1.7190	d
						3.7750	9.47500	6.00000	0.00000	1.4540	d
						4.2469	9.94688	6.00000	0.00000	1.2038	d
						4.7187	10.41875	6.00000	0.00000	0.97041	d
						5.1906	10.89063	6.00000	0.00000	0.75543	d
						5.6625	11.36250	6.00000	0.00000	0.55945	d
						6.1344	11.83437	6.00000	0.00000	0.38232	d
						6.6063	12.30625	6.00000	0.00000	0.22307	d
						7.0781	12.77812	6.00000	0.00000	0.14556	d
						7.5500	13.25000	6.00000	0.00000	0.11035	d

d - Displacements include imported displacements.

Specific Building Damage Results - Detail

Stage Ref.	Stage Name	Specific Building Ref.	Specific Building Name	Sub-building Name	Vertical Offset from Line for Vertical Movement Calculations [m]	Segment	Start [m]	Length [m]	Curvature	Deflection Ratio [%]	Average Horizontal Strain [%]	Max Tensile Strain [%]	Max Gradient of Horizontal Displacement Curve	Max Gradient of Vertical Displacement Curve	Min Radius of Curvature [m]	Damage Category
0	Base Model	1	15 Courthope Road		0.0	1	0.0	2.1534	None	0.0018062	0.073246	0.073741	-810.70E-6	609.14E-6	8498.6	1 (Very Slight)
						2	2.1534	3.4466	None	0.0027398	0.055344	0.056530	-647.27E-6	609.14E-6	10204.	1 (Very Slight)
		2	19 Courthope Road	Sub 2	0.0	1	0.0	2.1030	None	0.0017110	0.073008	0.073465	-805.55E-6	609.09E-6	8785.2	1 (Very Slight)
						2	2.1030	3.4970	None	0.0027941	0.055089	0.056315	-644.94E-6	609.09E-6	10722.	1 (Very Slight)

Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Specific Building Damage Results - Critical Values for All Segments within Each Sub-Building

Stage Ref.	Stage Name	Specific Building Ref.	Specific Building Name	Sub-building Name	Vertical Offset from Line for Vertical Movement Calculations [m]	Deflection Ratio [%]	Average Horizontal Strain [%]	Max Slope	Max Settlement [mm]	Max Tensile Strain [%]	Max Gradient of Horizontal Displacement Curve	Max Gradient of Vertical Displacement Curve	Min Radius of Curvature (Hogging) [m]	Min Radius of Curvature (Sagging) [m]	Damage Category
0	Base Model	1	15 Courthope Road		0.0	0.0027398	0.073246	609.14E-6	3.6523	0.073741	-810.70E-6	609.14E-6	-	-	1 (Very Slight)
		2	19 Courthope Road	Sub 2	0.0	0.0027941	0.073008	609.09E-6	3.6288	0.073465	-805.55E-6	609.09E-6	-	-	1 (Very Slight)

Specific Building Damage Results - Critical Segments within Each Building

Stage Ref.	Stage Name	Specific Building Ref.	Specific Building Name	Parameter	Critical Sub-Building	Critical Segment	Start [m]	End [m]	Curvature	Max Slope	Max Settlement [mm]	Max Tensile Strain [%]	Min Radius of Curvature (Hogging) [m]	Min Radius of Curvature (Sagging) [m]	Damage Category

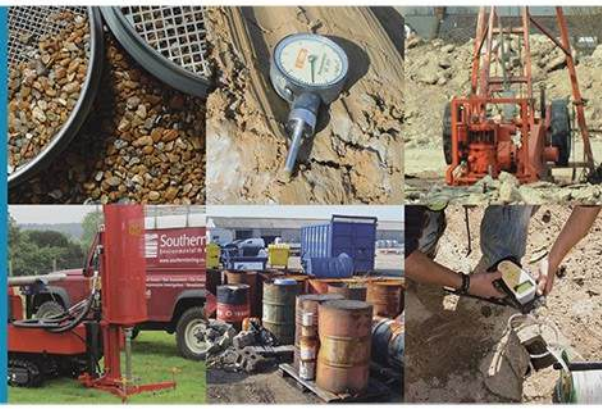
0	Base Model	0	15 Courthope Road	Max Slope		1	0.0	2.1534	None	**609.14E-6**	3.6523	0.073741	-	-	1	(Very Slight)
				Max Settlement		1	0.0	2.1534	None	609.14E-6	**3.6523**	0.073741	-	-	1	(Very Slight)
				Max Tensile Strain		1	0.0	2.1534	None	609.14E-6	3.6523	**0.073741**	-	-	1	(Very Slight)
				Min Radius of Curvature (Hogging)		-	-	-	-	-	-	-	-	-	-	
				Min Radius of Curvature (Sagging)		-	-	-	-	-	-	-	-	-	-	
		0	19 Courthope Road	Max Slope	Sub 2	1	0.0	2.1030	None	**609.09E-6**	3.6288	0.073465	-	-	1	(Very Slight)
				Max Settlement	Sub 2	1	0.0	2.1030	None	609.09E-6	**3.6288**	0.073465	-	-	1	(Very Slight)
				Max Tensile Strain	Sub 2	1	0.0	2.1030	None	609.09E-6	3.6288	**0.073465**	-	-	1	(Very Slight)
				Min Radius of Curvature (Hogging)		-	-	-	-	-	-	-	-	-	-	
				Min Radius of Curvature (Sagging)		-	-	-	-	-	-	-	-	-	-	

Southern Testing
Environmental & Geotechnical

ST Consult
Environmental & Geotechnical

APPENDIX C

Stage 2 Drained Movements



C

Oasys

SOUTHERN TESTING LTD

17 Courthope Road, London

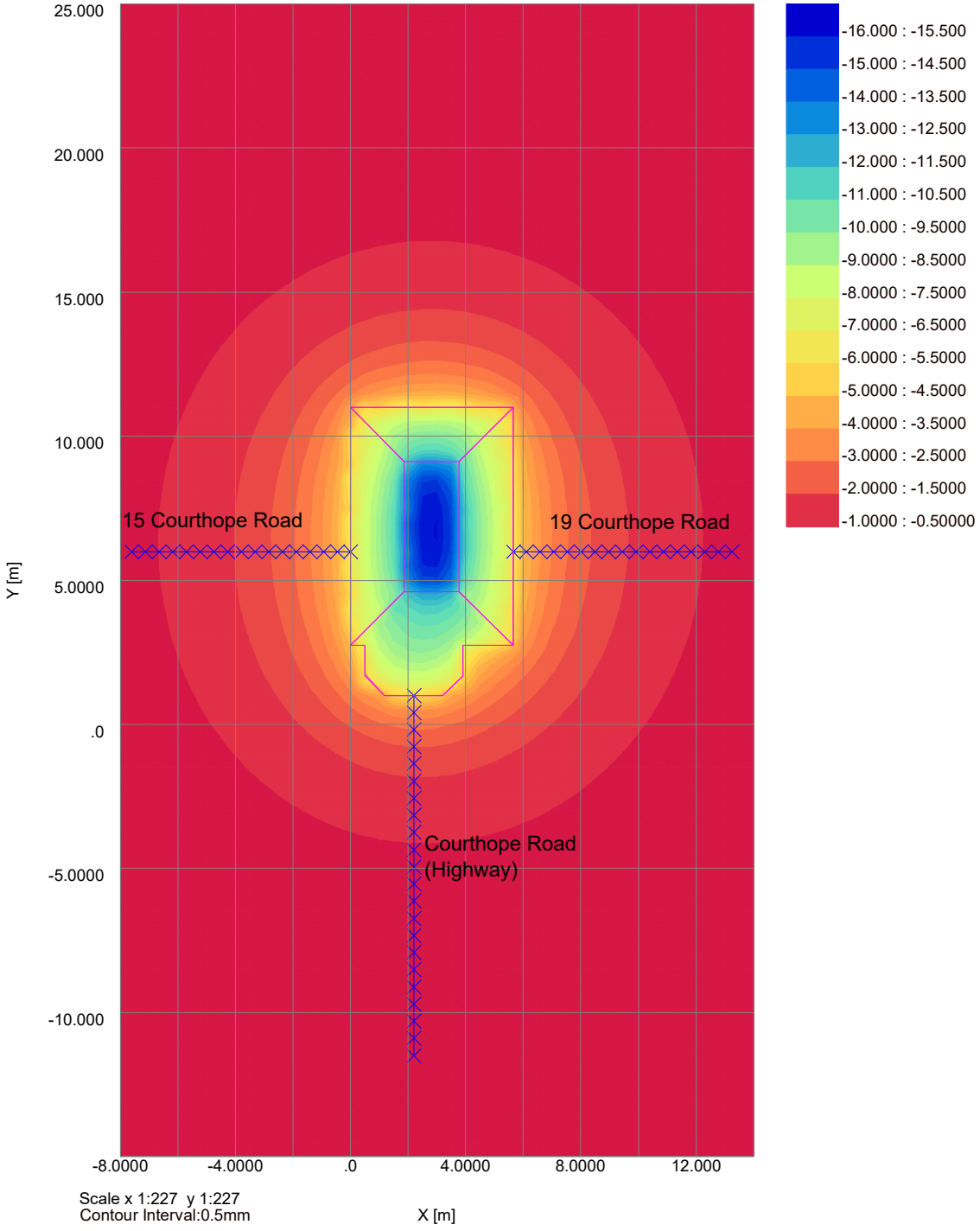
Drained Vertical Movements

Job No.	Sheet No.	Rev.
STL J15878		

Drg. Ref. S2

Made by	Date	Checked	Date
VF	06/03/2025		

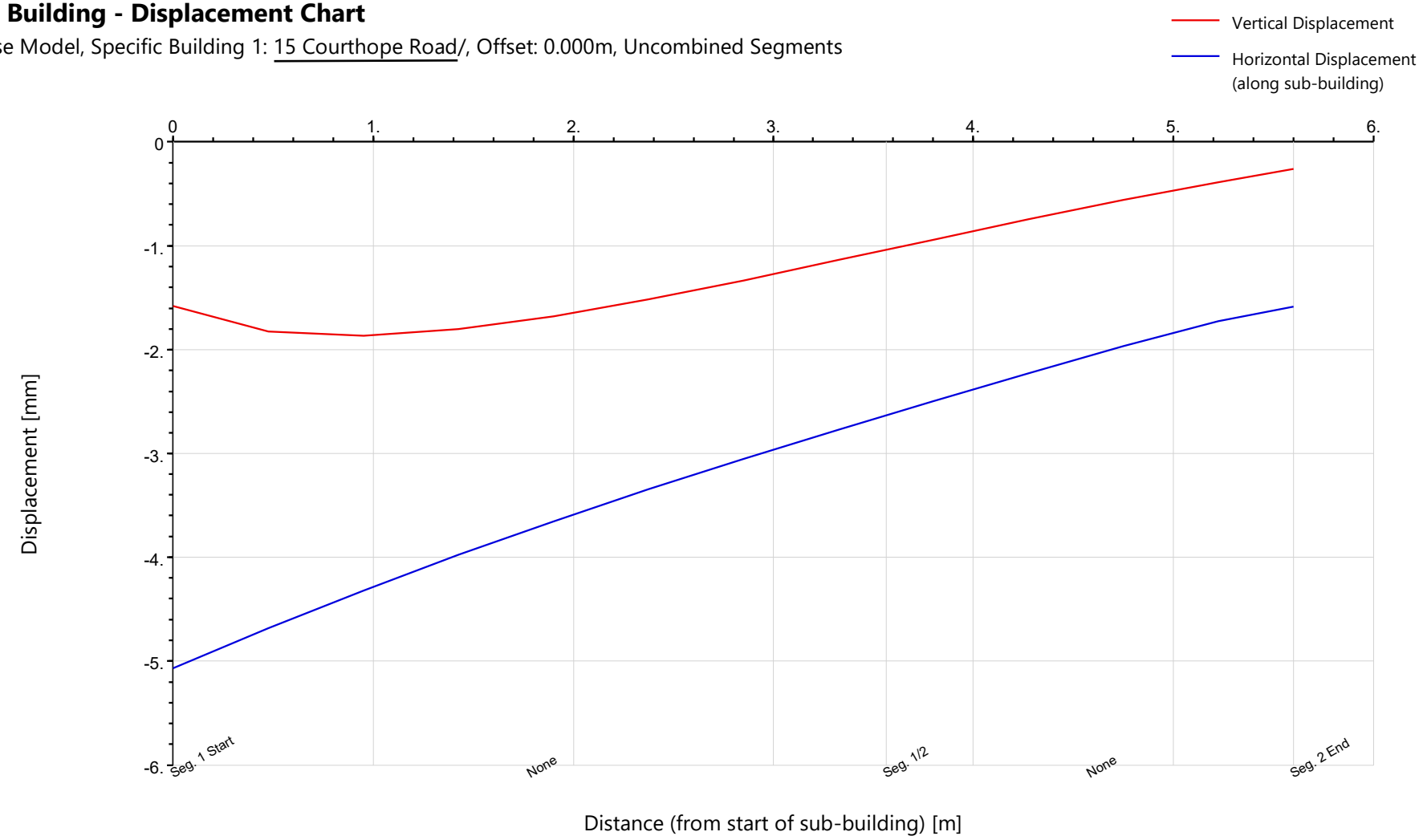
Settlement Contours : Grid 1 at 0.00000m



Scale x 1:227 y 1:227
Contour Interval:0.5mm

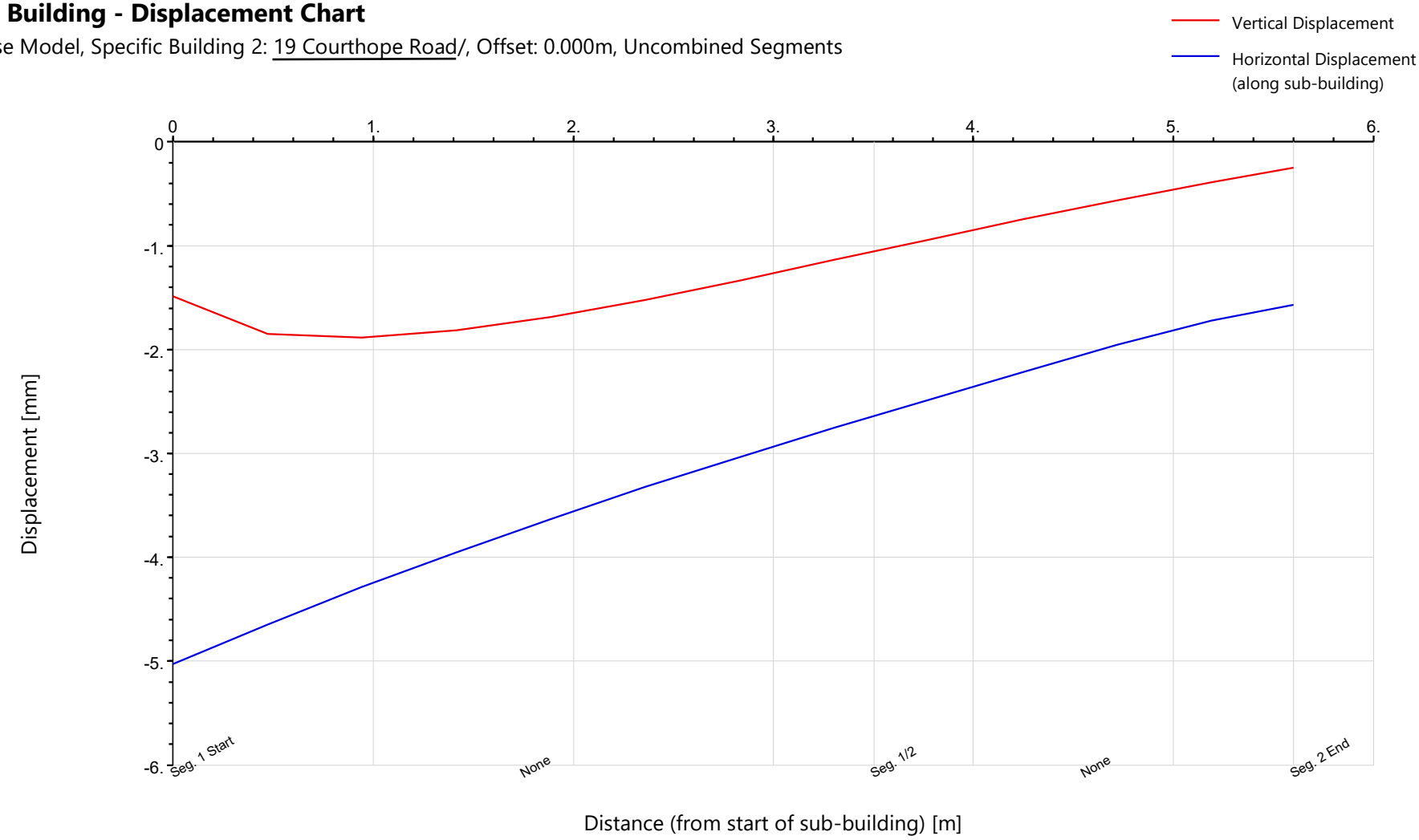
Specific Building - Displacement Chart

Stage: Base Model, Specific Building 1: 15 Courthope Road/, Offset: 0.000m, Uncombined Segments



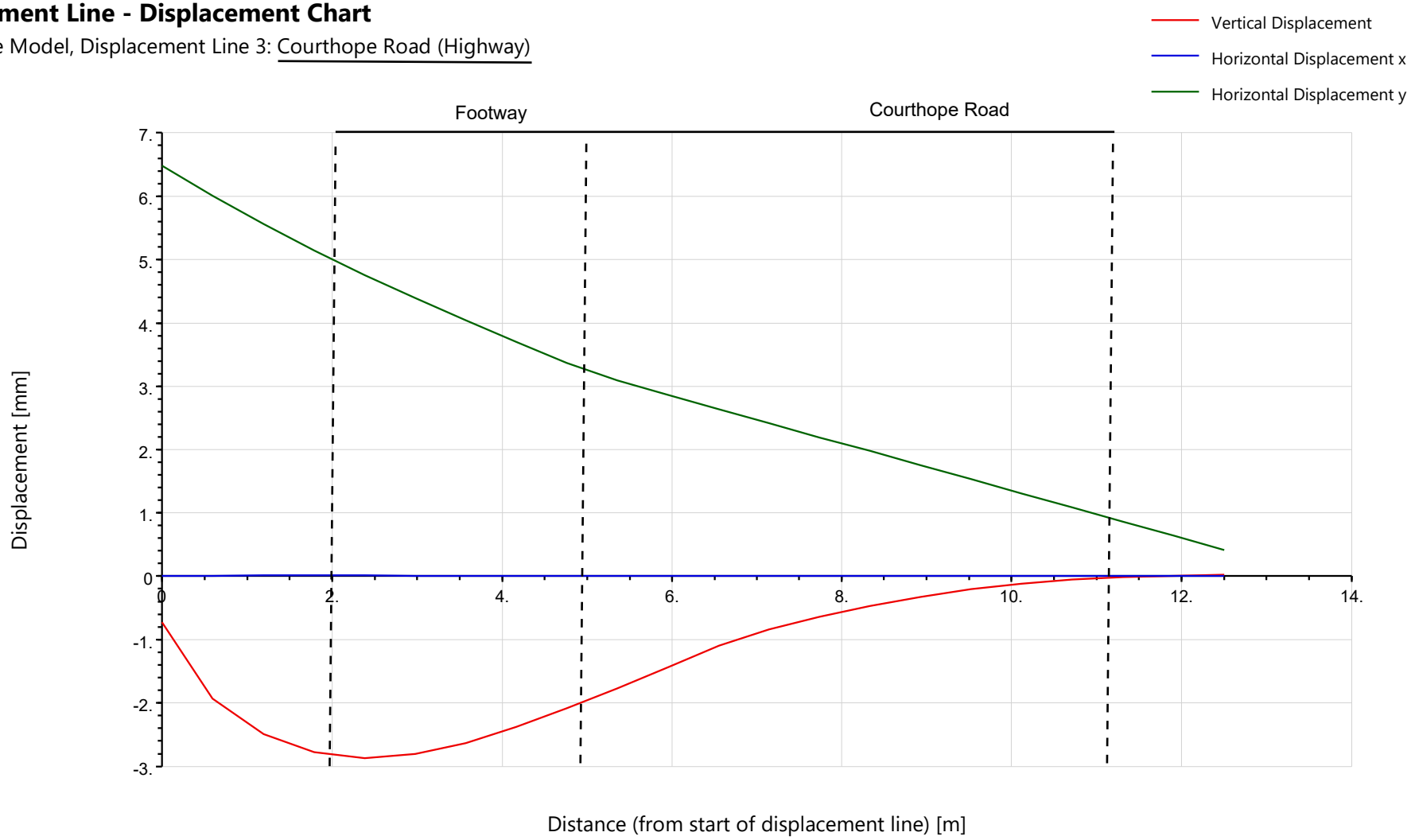
Specific Building - Displacement Chart

Stage: Base Model, Specific Building 2: 19 Courthope Road/, Offset: 0.000m, Uncombined Segments



Displacement Line - Displacement Chart

Stage: Base Model, Displacement Line 3: Courthope Road (Highway)



Titles

Job No.: STL J15878
Job Title: 17 Courthope Road, London
Sub-title:
Calculation Heading: Drained Installation & Excavation Movements
Initials: VF
Checker:
Date Saved: 10-Mar-2025
Date Checked:
Notes:
File Name: Drained Installation & Excavation Movements.xdd
File Path: S:\SI Data\Job\J15878 London\GMA\Drained

History

Date	Time	By	Notes
05-Mar-2025	15:30	vfrancis	New
05-Mar-2025	15:59	vfrancis	
05-Mar-2025	16:07	vfrancis	
05-Mar-2025	16:10	vfrancis	
05-Mar-2025	16:22	vfrancis	
05-Mar-2025	16:24	vfrancis	
05-Mar-2025	16:35	vfrancis	
06-Mar-2025	14:00	vfrancis	
06-Mar-2025	14:38	vfrancis	
06-Mar-2025	14:40	vfrancis	
06-Mar-2025	15:16	vfrancis	
06-Mar-2025	15:27	vfrancis	
06-Mar-2025	15:46	vfrancis	
06-Mar-2025	16:51	vfrancis	
10-Mar-2025	14:21	vfrancis	
10-Mar-2025	14:32	vfrancis	

Displacement Lines

Ref.	Name	x1 [m]	y1 [m]	z1 [m]	x2 [m]	y2 [m]	z2 [m]	Intervals [No.]	Surface type for tunnels	Interpolate imported displacements	Calculate
1	15 Courthope Road	0.00000	6.00000	0.00000	-7.60000	6.00000	0.00000	16	Surface	Yes	Yes
2	19 Courthope Road	5.70000	6.00000	0.00000	13.25000	6.00000	0.00000	16	Surface	Yes	Yes
3	Courthope Road (Highway)	2.20000	1.00000	0.00000	2.20000	-11.50000	0.00000	21	Surface	Yes	Yes

Imported Displacements

Set: Ref.	Set: Name	Result: Ref.	Coordinates: x [m]	Coordinates: y [m]	Coordinates: z [m]	Displacements: x [mm]	Displacements: y [mm]	Displacements: z [mm]	
1	Installation Movements	1	0.00000	6.00000	0.00000	1.38478	0.00000	1.36000	2,6
		2	-0.47500	6.00000	0.00000	1.17751	0.00000	1.26500	2,6
		3	-0.95000	6.00000	0.00000	0.99322	0.00000	1.17000	2,6
		4	-1.42500	6.00000	0.00000	0.82954	0.00000	1.07500	2,6
		5	-1.90000	6.00000	0.00000	0.68412	0.00000	0.98000	2,6
		6	-2.37500	6.00000	0.00000	0.55460	0.00000	0.88500	2,6
		7	-2.85000	6.00000	0.00000	0.43860	0.00000	0.79000	2,6
		8	-3.32500	6.00000	0.00000	0.33376	0.00000	0.69500	2,6
		9	-3.80000	6.00000	0.00000	0.23772	0.00000	0.60000	2,6
		10	-4.27500	6.00000	0.00000	0.14812	0.00000	0.50500	2,6
		11	-4.75000	6.00000	0.00000	0.06260	0.00000	0.41000	2,6
		12	-5.22500	6.00000	0.00000	0.00000	0.00000	0.31500	2,6
		13	-5.70000	6.00000	0.00000	0.00000	0.00000	0.22000	2,6
		14	-6.17500	6.00000	0.00000	0.00000	0.00000	0.12500	2,6
		15	-6.65000	6.00000	0.00000	0.00000	0.00000	0.03000	2,6
		16	-7.12500	6.00000	0.00000	0.00000	0.00000	0.00000	2,6
		17	-7.60000	6.00000	0.00000	0.00000	0.00000	0.00000	2,6
		18	5.70000	6.00000	0.00000	-1.36181	0.00000	1.35000	2,6
		19	6.17188	6.00000	0.00000	-1.15834	0.00000	1.25562	2,6
		20	6.64375	6.00000	0.00000	-0.97732	0.00000	1.16125	2,6
		21	7.11562	6.00000	0.00000	-0.81643	0.00000	1.06688	2,6
		22	7.58750	6.00000	0.00000	-0.67335	0.00000	0.97250	2,6
		23	8.05937	6.00000	0.00000	-0.54578	0.00000	0.87813	2,6
		24	8.53125	6.00000	0.00000	-0.43138	0.00000	0.78375	2,6
		25	9.00313	6.00000	0.00000	-0.32785	0.00000	0.68937	2,6
		26	9.47500	6.00000	0.00000	-0.23287	0.00000	0.59500	2,6
		27	9.94688	6.00000	0.00000	-0.14411	0.00000	0.50062	2,6

Set: Ref.	Set: Name	Result: Ref.	Coordinates: x [m]	Coordinates: y [m]	Coordinates: z [m]	Displacements: x [mm]	Displacements: y [mm]	Displacements: z [mm]	
		28	10.41875	6.00000	0.00000	-0.05927	0.00000	0.40625	2,6
		29	10.89063	6.00000	0.00000	0.00000	0.00000	0.31188	2,6
		30	11.36250	6.00000	0.00000	0.00000	0.00000	0.21750	2,6
		31	11.83437	6.00000	0.00000	0.00000	0.00000	0.12312	2,6
		32	12.30625	6.00000	0.00000	0.00000	0.00000	0.02875	2,6
		33	12.77812	6.00000	0.00000	0.00000	0.00000	0.00000	2,6
		34	13.25000	6.00000	0.00000	0.00000	0.00000	0.00000	2,6
		35	2.20000	1.00000	0.00000	0.00000	1.38478	1.36000	
		36	2.20000	0.40476	0.00000	0.00484	1.12878	1.25067	
		37	2.20000	-0.19048	0.00000	0.01596	0.90793	1.15989	
		38	2.20000	-0.78571	0.00000	0.01622	0.71757	1.05598	
		39	2.20000	-1.38095	0.00000	0.00942	0.55306	0.94786	
		40	2.20000	-1.97619	0.00000	0.00000	0.40975	0.82434	
		41	2.20000	-2.57143	0.00000	0.00000	0.28299	0.68867	
		42	2.20000	-3.16667	0.00000	0.00000	0.16811	0.54444	
		43	2.20000	-3.76190	0.00000	0.00000	0.06049	0.40762	
		44	2.20000	-4.35714	0.00000	0.00000	0.00000	0.28857	
		45	2.20000	-4.95238	0.00000	0.00000	0.00000	0.16952	
		46	2.20000	-5.54762	0.00000	0.00000	0.00000	0.05048	
		47	2.20000	-6.14286	0.00000	0.00000	0.00000	0.00000	
		48	2.20000	-6.73810	0.00000	0.00000	0.00000	0.00000	
		49	2.20000	-7.33333	0.00000	0.00000	0.00000	0.00000	
		50	2.20000	-7.92857	0.00000	0.00000	0.00000	0.00000	
		51	2.20000	-8.52381	0.00000	0.00000	0.00000	0.00000	
		52	2.20000	-9.11905	0.00000	0.00000	0.00000	0.00000	
		53	2.20000	-9.71429	0.00000	0.00000	0.00000	0.00000	
		54	2.20000	-10.30952	0.00000	0.00000	0.00000	0.00000	
		55	2.20000	-10.90476	0.00000	0.00000	0.00000	0.00000	
		56	2.20000	-11.50000	0.00000	0.00000	0.00000	0.00000	
2	Excavation Movements	1	0.00000	6.00000	0.00000	3.68438	0.00000	2.29233	2,6
		2	-0.47500	6.00000	0.00000	3.50625	0.00000	2.15083	2,6
		3	-0.95000	6.00000	0.00000	3.32813	0.00000	1.98478	2,6
		4	-1.42500	6.00000	0.00000	3.15000	0.00000	1.80225	2,6
		5	-1.90000	6.00000	0.00000	2.97187	0.00000	1.61050	2,6
		6	-2.37500	6.00000	0.00000	2.79375	0.00000	1.41597	2,6
		7	-2.85000	6.00000	0.00000	2.61563	0.00000	1.22428	2,6
		8	-3.32500	6.00000	0.00000	2.43750	0.00000	1.04021	2,6
		9	-3.80000	6.00000	0.00000	2.25937	0.00000	0.86773	2,6
		10	-4.27500	6.00000	0.00000	2.08125	0.00000	0.71000	2,6
		11	-4.75000	6.00000	0.00000	1.90312	0.00000	0.56934	2,6
		12	-5.22500	6.00000	0.00000	1.72500	0.00000	0.44724	2,6
		13	-5.70000	6.00000	0.00000	1.54688	0.00000	0.34440	2,6
		14	-6.17500	6.00000	0.00000	1.36875	0.00000	0.26066	2,6
		15	-6.65000	6.00000	0.00000	1.19063	0.00000	0.19507	2,6
		16	-7.12500	6.00000	0.00000	1.01250	0.00000	0.14584	2,6
		17	-7.60000	6.00000	0.00000	0.83437	0.00000	0.11035	2,6
		18	5.70000	6.00000	0.00000	-3.66562	0.00000	2.27885	2,6
		19	6.17188	6.00000	0.00000	-3.48867	0.00000	2.13540	2,6
		20	6.64375	6.00000	0.00000	-3.31172	0.00000	1.96854	2,6
		21	7.11562	6.00000	0.00000	-3.13477	0.00000	1.78611	2,6
		22	7.58750	6.00000	0.00000	-2.95781	0.00000	1.59517	2,6
		23	8.05937	6.00000	0.00000	-2.78086	0.00000	1.40194	2,6
		24	8.53125	6.00000	0.00000	-2.60391	0.00000	1.21189	2,6
		25	9.00313	6.00000	0.00000	-2.42695	0.00000	1.02964	2,6
		26	9.47500	6.00000	0.00000	-2.25000	0.00000	0.85904	2,6
		27	9.94688	6.00000	0.00000	-2.07305	0.00000	0.70313	2,6
		28	10.41875	6.00000	0.00000	-1.89609	0.00000	0.56416	2,6
		29	10.89063	6.00000	0.00000	-1.71914	0.00000	0.44355	2,6
		30	11.36250	6.00000	0.00000	-1.54219	0.00000	0.34195	2,6
		31	11.83437	6.00000	0.00000	-1.36523	0.00000	0.25920	2,6
		32	12.30625	6.00000	0.00000	-1.18828	0.00000	0.19432	2,6
		33	12.77812	6.00000	0.00000	-1.01133	0.00000	0.14556	2,6
		34	13.25000	6.00000	0.00000	-0.83437	0.00000	0.11035	2,6
		35	2.20000	1.00000	0.00000	0.00000	5.10000	1.32567	
		36	2.20000	0.40476	0.00000	0.00000	4.87679	1.85516	
		37	2.20000	-0.19048	0.00000	0.00000	4.65357	2.20520	
		38	2.20000	-0.78571	0.00000	0.00000	4.43036	2.40392	
		39	2.20000	-1.38095	0.00000	0.00000	4.20714	2.47745	
		40	2.20000	-1.97619	0.00000	0.00000	3.98393	2.44988	
		41	2.20000	-2.57143	0.00000	0.00000	3.76071	2.34327	
		42	2.20000	-3.16667	0.00000	0.00000	3.53750	2.17767	
		43	2.20000	-3.76190	0.00000	0.00000	3.31429	1.97109	
		44	2.20000	-4.35714	0.00000	0.00000	3.09107	1.73950	
		45	2.20000	-4.95238	0.00000	0.00000	2.86786	1.49686	
		46	2.20000	-5.54762	0.00000	0.00000	2.64464	1.25510	
		47	2.20000	-6.14286	0.00000	0.00000	2.42143	1.02412	
		48	2.20000	-6.73810	0.00000	0.00000	2.19821	0.81178	
		49	2.20000	-7.33333	0.00000	0.00000	1.97500	0.62393	
		50	2.20000	-7.92857	0.00000	0.00000	1.75179	0.46438	
		51	2.20000	-8.52381	0.00000	0.00000	1.52857	0.33492	
		52	2.20000	-9.11905	0.00000	0.00000	1.30536	0.23532	
		53	2.20000	-9.71429	0.00000	0.00000	1.08214	0.16329	
		54	2.20000	-10.30952	0.00000	0.00000	0.85893	0.11455	
		55	2.20000	-10.90476	0.00000	0.00000	0.63571	0.08276	
		56	2.20000	-11.50000	0.00000	0.00000	0.41250	0.05959	
3	Drained Vertical Movements	1	0.00000	6.00000	0.00000	0.00000	0.00000	-2.07440	2,6
		2	-0.47500	6.00000	0.00000	0.00000	0.00000	-1.59435	2,6
		3	-0.95000	6.00000	0.00000	0.00000	0.00000	-1.29161	2,6
		4	-1.42500	6.00000	0.00000	0.00000	0.00000	-1.07552	2,6
		5	-1.90000	6.00000	0.00000	0.00000	0.00000	-0.91209	2,6

Set: Ref.	Set: Name	Result: Ref.	Coordinates: x [m]	Coordinates: y [m]	Coordinates: z [m]	Displacements: x [mm]	Displacements: y [mm]	Displacements: z [mm]	
		6	-2.37500	6.00000	0.00000	0.00000	0.00000	-0.78396	2,6
		7	-2.85000	6.00000	0.00000	0.00000	0.00000	-0.68102	2,6
		8	-3.32500	6.00000	0.00000	0.00000	0.00000	-0.59682	2,6
		9	-3.80000	6.00000	0.00000	0.00000	0.00000	-0.52695	2,6
		10	-4.27500	6.00000	0.00000	0.00000	0.00000	-0.46829	2,6
		11	-4.75000	6.00000	0.00000	0.00000	0.00000	-0.41854	2,6
		12	-5.22500	6.00000	0.00000	0.00000	0.00000	-0.37598	2,6
		13	-5.70000	6.00000	0.00000	0.00000	0.00000	-0.33928	2,6
		14	-6.17500	6.00000	0.00000	0.00000	0.00000	-0.30743	2,6
		15	-6.65000	6.00000	0.00000	0.00000	0.00000	-0.27960	2,6
		16	-7.12500	6.00000	0.00000	0.00000	0.00000	-0.25515	2,6
		17	-7.60000	6.00000	0.00000	0.00000	0.00000	-0.23357	2,6
		18	5.70000	6.00000	0.00000	0.00000	0.00000	-2.14268	2,6
		19	6.17188	6.00000	0.00000	0.00000	0.00000	-1.54085	2,6
		20	6.64375	6.00000	0.00000	0.00000	0.00000	-1.24953	2,6
		21	7.11562	6.00000	0.00000	0.00000	0.00000	-1.04202	2,6
		22	7.58750	6.00000	0.00000	0.00000	0.00000	-0.88469	2,6
		23	8.05937	6.00000	0.00000	0.00000	0.00000	-0.76118	2,6
		24	8.53125	6.00000	0.00000	0.00000	0.00000	-0.66190	2,6
		25	9.00313	6.00000	0.00000	0.00000	0.00000	-0.58066	2,6
		26	9.47500	6.00000	0.00000	0.00000	0.00000	-0.51322	2,6
		27	9.94688	6.00000	0.00000	0.00000	0.00000	-0.45657	2,6
		28	10.41875	6.00000	0.00000	0.00000	0.00000	-0.40849	2,6
		29	10.89063	6.00000	0.00000	0.00000	0.00000	-0.36733	2,6
		30	11.36250	6.00000	0.00000	0.00000	0.00000	-0.33181	2,6
		31	11.83437	6.00000	0.00000	0.00000	0.00000	-0.30095	2,6
		32	12.30625	6.00000	0.00000	0.00000	0.00000	-0.27397	2,6
		33	12.77812	6.00000	0.00000	0.00000	0.00000	-0.25024	2,6
		34	13.25000	6.00000	0.00000	0.00000	0.00000	-0.22928	2,6
		35	2.20000	1.00000	0.00000	0.00000	0.00000	-1.95979	
		36	2.20000	0.40476	0.00000	0.00000	0.00000	-1.17817	
		37	2.20000	-0.19048	0.00000	0.00000	0.00000	-0.86915	
		38	2.20000	-0.78571	0.00000	0.00000	0.00000	-0.68327	
		39	2.20000	-1.38095	0.00000	0.00000	0.00000	-0.55708	
		40	2.20000	-1.97619	0.00000	0.00000	0.00000	-0.46540	
		41	2.20000	-2.57143	0.00000	0.00000	0.00000	-0.39577	
		42	2.20000	-3.16667	0.00000	0.00000	0.00000	-0.34119	
		43	2.20000	-3.76190	0.00000	0.00000	0.00000	-0.29735	
		44	2.20000	-4.35714	0.00000	0.00000	0.00000	-0.26148	
		45	2.20000	-4.95238	0.00000	0.00000	0.00000	-0.23166	
		46	2.20000	-5.54762	0.00000	0.00000	0.00000	-0.20656	
		47	2.20000	-6.14286	0.00000	0.00000	0.00000	-0.18520	
		48	2.20000	-6.73810	0.00000	0.00000	0.00000	-0.16687	
		49	2.20000	-7.33333	0.00000	0.00000	0.00000	-0.15099	
		50	2.20000	-7.92857	0.00000	0.00000	0.00000	-0.13716	
		51	2.20000	-8.52381	0.00000	0.00000	0.00000	-0.12502	
		52	2.20000	-9.11905	0.00000	0.00000	0.00000	-0.11432	
		53	2.20000	-9.71429	0.00000	0.00000	0.00000	-0.10483	
		54	2.20000	-10.30952	0.00000	0.00000	0.00000	-0.09638	
		55	2.20000	-10.90476	0.00000	0.00000	0.00000	-0.08883	
		56	2.20000	-11.50000	0.00000	0.00000	0.00000	-0.08206	

2 - Data point coincident with horizontal movement calculation point for a specific building. Its displacement has been added before performing building damage calculations.
6 - Data point coincident with vertical movement calculation point for a specific building. Its displacement has been added before performing building damage calculations.

Imported Displacements

Set: Ref.	Set: Name	Result: Ref.	Coordinates: x [m]	Coordinates: y [m]	Coordinates: z [m]	Displacements: x [mm]	Displacements: y [mm]	Displacements: z [mm]	
1	Installation Movements	1	0.00000	6.00000	0.00000	1.38478	0.00000	1.36000	2,6
		2	-0.47500	6.00000	0.00000	1.17751	0.00000	1.26500	2,6
		3	-0.95000	6.00000	0.00000	0.99322	0.00000	1.17000	2,6
		4	-1.42500	6.00000	0.00000	0.82954	0.00000	1.07500	2,6
		5	-1.90000	6.00000	0.00000	0.68412	0.00000	0.98000	2,6
		6	-2.37500	6.00000	0.00000	0.55460	0.00000	0.88500	2,6
		7	-2.85000	6.00000	0.00000	0.43860	0.00000	0.79000	2,6
		8	-3.32500	6.00000	0.00000	0.33376	0.00000	0.69500	2,6
		9	-3.80000	6.00000	0.00000	0.23772	0.00000	0.60000	2,6
		10	-4.27500	6.00000	0.00000	0.14812	0.00000	0.50500	2,6
		11	-4.75000	6.00000	0.00000	0.06260	0.00000	0.41000	2,6
		12	-5.22500	6.00000	0.00000	0.00000	0.00000	0.31500	2,6
		13	-5.70000	6.00000	0.00000	0.00000	0.00000	0.22000	2,6
		14	-6.17500	6.00000	0.00000	0.00000	0.00000	0.12500	2,6
		15	-6.65000	6.00000	0.00000	0.00000	0.00000	0.03000	2,6
		16	-7.12500	6.00000	0.00000	0.00000	0.00000	0.00000	2,6
		17	-7.60000	6.00000	0.00000	0.00000	0.00000	0.00000	2,6
		18	5.70000	6.00000	0.00000	-1.36181	0.00000	1.35000	2,6
		19	6.17188	6.00000	0.00000	-1.15834	0.00000	1.25562	2,6
		20	6.64375	6.00000	0.00000	-0.97732	0.00000	1.16125	2,6
		21	7.11562	6.00000	0.00000	-0.81643	0.00000	1.06688	2,6
		22	7.58750	6.00000	0.00000	-0.67335	0.00000	0.97250	2,6
		23	8.05937	6.00000	0.00000	-0.54578	0.00000	0.87813	2,6
		24	8.53125	6.00000	0.00000	-0.43138	0.00000	0.78375	2,6
		25	9.00313	6.00000	0.00000	-0.32785	0.00000	0.68937	2,6
		26	9.47500	6.00000	0.00000	-0.23287	0.00000	0.59500	2,6
		27	9.94688	6.00000	0.00000	-0.14411	0.00000	0.50062	2,6

Set: Ref.	Set: Name	Result: Ref.	Coordinates: x [m]	Coordinates: y [m]	Coordinates: z [m]	Displacements: x [mm]	Displacements: y [mm]	Displacements: z [mm]	
		28	10.41875	6.00000	0.00000	-0.05927	0.00000	0.40625	2,6
		29	10.89063	6.00000	0.00000	0.00000	0.00000	0.31188	2,6
		30	11.36250	6.00000	0.00000	0.00000	0.00000	0.21750	2,6
		31	11.83437	6.00000	0.00000	0.00000	0.00000	0.12312	2,6
		32	12.30625	6.00000	0.00000	0.00000	0.00000	0.02875	2,6
		33	12.77812	6.00000	0.00000	0.00000	0.00000	0.00000	2,6
		34	13.25000	6.00000	0.00000	0.00000	0.00000	0.00000	2,6
		35	2.20000	1.00000	0.00000	0.00000	1.38478	1.36000	
		36	2.20000	0.40476	0.00000	0.00484	1.12878	1.25067	
		37	2.20000	-0.19048	0.00000	0.01596	0.90793	1.15989	
		38	2.20000	-0.78571	0.00000	0.01622	0.71757	1.05598	
		39	2.20000	-1.38095	0.00000	0.00942	0.55306	0.94786	
		40	2.20000	-1.97619	0.00000	0.00000	0.40975	0.82434	
		41	2.20000	-2.57143	0.00000	0.00000	0.28299	0.68867	
		42	2.20000	-3.16667	0.00000	0.00000	0.16811	0.54444	
		43	2.20000	-3.76190	0.00000	0.00000	0.06049	0.40762	
		44	2.20000	-4.35714	0.00000	0.00000	0.00000	0.28857	
		45	2.20000	-4.95238	0.00000	0.00000	0.00000	0.16952	
		46	2.20000	-5.54762	0.00000	0.00000	0.00000	0.05048	
		47	2.20000	-6.14286	0.00000	0.00000	0.00000	0.00000	
		48	2.20000	-6.73810	0.00000	0.00000	0.00000	0.00000	
		49	2.20000	-7.33333	0.00000	0.00000	0.00000	0.00000	
		50	2.20000	-7.92857	0.00000	0.00000	0.00000	0.00000	
		51	2.20000	-8.52381	0.00000	0.00000	0.00000	0.00000	
		52	2.20000	-9.11905	0.00000	0.00000	0.00000	0.00000	
		53	2.20000	-9.71429	0.00000	0.00000	0.00000	0.00000	
		54	2.20000	-10.30952	0.00000	0.00000	0.00000	0.00000	
		55	2.20000	-10.90476	0.00000	0.00000	0.00000	0.00000	
		56	2.20000	-11.50000	0.00000	0.00000	0.00000	0.00000	
2	Excavation Movements	1	0.00000	6.00000	0.00000	3.68438	0.00000	2.29233	2,6
		2	-0.47500	6.00000	0.00000	3.50625	0.00000	2.15083	2,6
		3	-0.95000	6.00000	0.00000	3.32813	0.00000	1.98478	2,6
		4	-1.42500	6.00000	0.00000	3.15000	0.00000	1.80225	2,6
		5	-1.90000	6.00000	0.00000	2.97187	0.00000	1.61050	2,6
		6	-2.37500	6.00000	0.00000	2.79375	0.00000	1.41597	2,6
		7	-2.85000	6.00000	0.00000	2.61563	0.00000	1.22428	2,6
		8	-3.32500	6.00000	0.00000	2.43750	0.00000	1.04021	2,6
		9	-3.80000	6.00000	0.00000	2.25937	0.00000	0.86773	2,6
		10	-4.27500	6.00000	0.00000	2.08125	0.00000	0.71000	2,6
		11	-4.75000	6.00000	0.00000	1.90312	0.00000	0.56934	2,6
		12	-5.22500	6.00000	0.00000	1.72500	0.00000	0.44724	2,6
		13	-5.70000	6.00000	0.00000	1.54688	0.00000	0.34440	2,6
		14	-6.17500	6.00000	0.00000	1.36875	0.00000	0.26066	2,6
		15	-6.65000	6.00000	0.00000	1.19063	0.00000	0.19507	2,6
		16	-7.12500	6.00000	0.00000	1.01250	0.00000	0.14584	2,6
		17	-7.60000	6.00000	0.00000	0.83437	0.00000	0.11035	2,6
		18	5.70000	6.00000	0.00000	-3.66562	0.00000	2.27885	2,6
		19	6.17188	6.00000	0.00000	-3.48867	0.00000	2.13540	2,6
		20	6.64375	6.00000	0.00000	-3.31172	0.00000	1.96854	2,6
		21	7.11562	6.00000	0.00000	-3.13477	0.00000	1.78611	2,6
		22	7.58750	6.00000	0.00000	-2.95781	0.00000	1.59517	2,6
		23	8.05937	6.00000	0.00000	-2.78086	0.00000	1.40194	2,6
		24	8.53125	6.00000	0.00000	-2.60391	0.00000	1.21189	2,6
		25	9.00313	6.00000	0.00000	-2.42695	0.00000	1.02964	2,6
		26	9.47500	6.00000	0.00000	-2.25000	0.00000	0.85904	2,6
		27	9.94688	6.00000	0.00000	-2.07305	0.00000	0.70313	2,6
		28	10.41875	6.00000	0.00000	-1.89609	0.00000	0.56416	2,6
		29	10.89063	6.00000	0.00000	-1.71914	0.00000	0.44355	2,6
		30	11.36250	6.00000	0.00000	-1.54219	0.00000	0.34195	2,6
		31	11.83437	6.00000	0.00000	-1.36523	0.00000	0.25920	2,6
		32	12.30625	6.00000	0.00000	-1.18828	0.00000	0.19432	2,6
		33	12.77812	6.00000	0.00000	-1.01133	0.00000	0.14556	2,6
		34	13.25000	6.00000	0.00000	-0.83437	0.00000	0.11035	2,6
		35	2.20000	1.00000	0.00000	0.00000	5.10000	1.32567	
		36	2.20000	0.40476	0.00000	0.00000	4.87679	1.85516	
		37	2.20000	-0.19048	0.00000	0.00000	4.65357	2.20520	
		38	2.20000	-0.78571	0.00000	0.00000	4.43036	2.40392	
		39	2.20000	-1.38095	0.00000	0.00000	4.20714	2.47745	
		40	2.20000	-1.97619	0.00000	0.00000	3.98393	2.44988	
		41	2.20000	-2.57143	0.00000	0.00000	3.76071	2.34327	
		42	2.20000	-3.16667	0.00000	0.00000	3.53750	2.17767	
		43	2.20000	-3.76190	0.00000	0.00000	3.31429	1.97109	
		44	2.20000	-4.35714	0.00000	0.00000	3.09107	1.73950	
		45	2.20000	-4.95238	0.00000	0.00000	2.86786	1.49686	
		46	2.20000	-5.54762	0.00000	0.00000	2.64464	1.25510	
		47	2.20000	-6.14286	0.00000	0.00000	2.42143	1.02412	
		48	2.20000	-6.73810	0.00000	0.00000	2.19821	0.81178	
		49	2.20000	-7.33333	0.00000	0.00000	1.97500	0.62393	
		50	2.20000	-7.92857	0.00000	0.00000	1.75179	0.46438	
		51	2.20000	-8.52381	0.00000	0.00000	1.52857	0.33492	
		52	2.20000	-9.11905	0.00000	0.00000	1.30536	0.23532	
		53	2.20000	-9.71429	0.00000	0.00000	1.08214	0.16329	
		54	2.20000	-10.30952	0.00000	0.00000	0.85893	0.11455	
		55	2.20000	-10.90476	0.00000	0.00000	0.63571	0.08276	
		56	2.20000	-11.50000	0.00000	0.00000	0.41250	0.05959	
3	Drained Vertical Movements	1	0.00000	6.00000	0.00000	0.00000	0.00000	-2.07440	2,6
		2	-0.47500	6.00000	0.00000	0.00000	0.00000	-1.59435	2,6
		3	-0.95000	6.00000	0.00000	0.00000	0.00000	-1.29161	2,6
		4	-1.42500	6.00000	0.00000	0.00000	0.00000	-1.07552	2,6
		5	-1.90000	6.00000	0.00000	0.00000	0.00000	-0.91209	2,6

Set: Ref.	Set: Name	Result: Ref.	Coordinates: x [m]	Coordinates: y [m]	Coordinates: z [m]	Displacements: x [mm]	Displacements: y [mm]	Displacements: z [mm]	
		6	-2.37500	6.00000	0.00000	0.00000	0.00000	-0.78396	2,6
		7	-2.85000	6.00000	0.00000	0.00000	0.00000	-0.68102	2,6
		8	-3.32500	6.00000	0.00000	0.00000	0.00000	-0.59682	2,6
		9	-3.80000	6.00000	0.00000	0.00000	0.00000	-0.52695	2,6
		10	-4.27500	6.00000	0.00000	0.00000	0.00000	-0.46829	2,6
		11	-4.75000	6.00000	0.00000	0.00000	0.00000	-0.41854	2,6
		12	-5.22500	6.00000	0.00000	0.00000	0.00000	-0.37598	2,6
		13	-5.70000	6.00000	0.00000	0.00000	0.00000	-0.33928	2,6
		14	-6.17500	6.00000	0.00000	0.00000	0.00000	-0.30743	2,6
		15	-6.65000	6.00000	0.00000	0.00000	0.00000	-0.27960	2,6
		16	-7.12500	6.00000	0.00000	0.00000	0.00000	-0.25515	2,6
		17	-7.60000	6.00000	0.00000	0.00000	0.00000	-0.23357	2,6
		18	5.70000	6.00000	0.00000	0.00000	0.00000	-2.14268	2,6
		19	6.17188	6.00000	0.00000	0.00000	0.00000	-1.54085	2,6
		20	6.64375	6.00000	0.00000	0.00000	0.00000	-1.24953	2,6
		21	7.11562	6.00000	0.00000	0.00000	0.00000	-1.04202	2,6
		22	7.58750	6.00000	0.00000	0.00000	0.00000	-0.88469	2,6
		23	8.05937	6.00000	0.00000	0.00000	0.00000	-0.76118	2,6
		24	8.53125	6.00000	0.00000	0.00000	0.00000	-0.66190	2,6
		25	9.00313	6.00000	0.00000	0.00000	0.00000	-0.58066	2,6
		26	9.47500	6.00000	0.00000	0.00000	0.00000	-0.51322	2,6
		27	9.94688	6.00000	0.00000	0.00000	0.00000	-0.45657	2,6
		28	10.41875	6.00000	0.00000	0.00000	0.00000	-0.40849	2,6
		29	10.89063	6.00000	0.00000	0.00000	0.00000	-0.36733	2,6
		30	11.36250	6.00000	0.00000	0.00000	0.00000	-0.33181	2,6
		31	11.83437	6.00000	0.00000	0.00000	0.00000	-0.30095	2,6
		32	12.30625	6.00000	0.00000	0.00000	0.00000	-0.27397	2,6
		33	12.77812	6.00000	0.00000	0.00000	0.00000	-0.25024	2,6
		34	13.25000	6.00000	0.00000	0.00000	0.00000	-0.22928	2,6
		35	2.20000	1.00000	0.00000	0.00000	0.00000	-1.95979	
		36	2.20000	0.40476	0.00000	0.00000	0.00000	-1.17817	
		37	2.20000	-0.19048	0.00000	0.00000	0.00000	-0.86915	
		38	2.20000	-0.78571	0.00000	0.00000	0.00000	-0.68327	
		39	2.20000	-1.38095	0.00000	0.00000	0.00000	-0.55708	
		40	2.20000	-1.97619	0.00000	0.00000	0.00000	-0.46540	
		41	2.20000	-2.57143	0.00000	0.00000	0.00000	-0.39577	
		42	2.20000	-3.16667	0.00000	0.00000	0.00000	-0.34119	
		43	2.20000	-3.76190	0.00000	0.00000	0.00000	-0.29735	
		44	2.20000	-4.35714	0.00000	0.00000	0.00000	-0.26148	
		45	2.20000	-4.95238	0.00000	0.00000	0.00000	-0.23166	
		46	2.20000	-5.54762	0.00000	0.00000	0.00000	-0.20656	
		47	2.20000	-6.14286	0.00000	0.00000	0.00000	-0.18520	
		48	2.20000	-6.73810	0.00000	0.00000	0.00000	-0.16687	
		49	2.20000	-7.33333	0.00000	0.00000	0.00000	-0.15099	
		50	2.20000	-7.92857	0.00000	0.00000	0.00000	-0.13716	
		51	2.20000	-8.52381	0.00000	0.00000	0.00000	-0.12502	
		52	2.20000	-9.11905	0.00000	0.00000	0.00000	-0.11432	
		53	2.20000	-9.71429	0.00000	0.00000	0.00000	-0.10483	
		54	2.20000	-10.30952	0.00000	0.00000	0.00000	-0.09638	
		55	2.20000	-10.90476	0.00000	0.00000	0.00000	-0.08883	
		56	2.20000	-11.50000	0.00000	0.00000	0.00000	-0.08206	

2 - Data point coincident with horizontal movement calculation point for a specific building. Its displacement has been added before performing building damage calculations.
6 - Data point coincident with vertical movement calculation point for a specific building. Its displacement has been added before performing building damage calculations.

Imported Displacements

Set: Ref.	Set: Name	Result: Ref.	Coordinates: x [m]	Coordinates: y [m]	Coordinates: z [m]	Displacements: x [mm]	Displacements: y [mm]	Displacements: z [mm]	
1	Installation Movements	1	0.00000	6.00000	0.00000	1.38478	0.00000	1.36000	2,6
		2	-0.47500	6.00000	0.00000	1.17751	0.00000	1.26500	2,6
		3	-0.95000	6.00000	0.00000	0.99322	0.00000	1.17000	2,6
		4	-1.42500	6.00000	0.00000	0.82954	0.00000	1.07500	2,6
		5	-1.90000	6.00000	0.00000	0.68412	0.00000	0.98000	2,6
		6	-2.37500	6.00000	0.00000	0.55460	0.00000	0.88500	2,6
		7	-2.85000	6.00000	0.00000	0.43860	0.00000	0.79000	2,6
		8	-3.32500	6.00000	0.00000	0.33376	0.00000	0.69500	2,6
		9	-3.80000	6.00000	0.00000	0.23772	0.00000	0.60000	2,6
		10	-4.27500	6.00000	0.00000	0.14812	0.00000	0.50500	2,6
		11	-4.75000	6.00000	0.00000	0.06260	0.00000	0.41000	2,6
		12	-5.22500	6.00000	0.00000	0.00000	0.00000	0.31500	2,6
		13	-5.70000	6.00000	0.00000	0.00000	0.00000	0.22000	2,6
		14	-6.17500	6.00000	0.00000	0.00000	0.00000	0.12500	2,6
		15	-6.65000	6.00000	0.00000	0.00000	0.00000	0.03000	2,6
		16	-7.12500	6.00000	0.00000	0.00000	0.00000	0.00000	2,6
		17	-7.60000	6.00000	0.00000	0.00000	0.00000	0.00000	2,6
		18	5.70000	6.00000	0.00000	-1.36181	0.00000	1.35000	2,6
		19	6.17188	6.00000	0.00000	-1.15834	0.00000	1.25562	2,6
		20	6.64375	6.00000	0.00000	-0.97732	0.00000	1.16125	2,6
		21	7.11562	6.00000	0.00000	-0.81643	0.00000	1.06688	2,6
		22	7.58750	6.00000	0.00000	-0.67335	0.00000	0.97250	2,6
		23	8.05937	6.00000	0.00000	-0.54578	0.00000	0.87813	2,6
		24	8.53125	6.00000	0.00000	-0.43138	0.00000	0.78375	2,6
		25	9.00313	6.00000	0.00000	-0.32785	0.00000	0.68937	2,6
		26	9.47500	6.00000	0.00000	-0.23287	0.00000	0.59500	2,6
		27	9.94688	6.00000	0.00000	-0.14411	0.00000	0.50062	2,6

Set: Ref.	Set: Name	Result: Ref.	Coordinates: x [m]	Coordinates: y [m]	Coordinates: z [m]	Displacements: x [mm]	Displacements: y [mm]	Displacements: z [mm]	
		28	10.41875	6.00000	0.00000	-0.05927	0.00000	0.40625	2,6
		29	10.89063	6.00000	0.00000	0.00000	0.00000	0.31188	2,6
		30	11.36250	6.00000	0.00000	0.00000	0.00000	0.21750	2,6
		31	11.83437	6.00000	0.00000	0.00000	0.00000	0.12312	2,6
		32	12.30625	6.00000	0.00000	0.00000	0.00000	0.02875	2,6
		33	12.77812	6.00000	0.00000	0.00000	0.00000	0.00000	2,6
		34	13.25000	6.00000	0.00000	0.00000	0.00000	0.00000	2,6
		35	2.20000	1.00000	0.00000	0.00000	1.38478	1.36000	
		36	2.20000	0.40476	0.00000	0.00484	1.12878	1.25067	
		37	2.20000	-0.19048	0.00000	0.01596	0.90793	1.15989	
		38	2.20000	-0.78571	0.00000	0.01622	0.71757	1.05598	
		39	2.20000	-1.38095	0.00000	0.00942	0.55306	0.94786	
		40	2.20000	-1.97619	0.00000	0.00000	0.40975	0.82434	
		41	2.20000	-2.57143	0.00000	0.00000	0.28299	0.68867	
		42	2.20000	-3.16667	0.00000	0.00000	0.16811	0.54444	
		43	2.20000	-3.76190	0.00000	0.00000	0.06049	0.40762	
		44	2.20000	-4.35714	0.00000	0.00000	0.00000	0.28857	
		45	2.20000	-4.95238	0.00000	0.00000	0.00000	0.16952	
		46	2.20000	-5.54762	0.00000	0.00000	0.00000	0.05048	
		47	2.20000	-6.14286	0.00000	0.00000	0.00000	0.00000	
		48	2.20000	-6.73810	0.00000	0.00000	0.00000	0.00000	
		49	2.20000	-7.33333	0.00000	0.00000	0.00000	0.00000	
		50	2.20000	-7.92857	0.00000	0.00000	0.00000	0.00000	
		51	2.20000	-8.52381	0.00000	0.00000	0.00000	0.00000	
		52	2.20000	-9.11905	0.00000	0.00000	0.00000	0.00000	
		53	2.20000	-9.71429	0.00000	0.00000	0.00000	0.00000	
		54	2.20000	-10.30952	0.00000	0.00000	0.00000	0.00000	
		55	2.20000	-10.90476	0.00000	0.00000	0.00000	0.00000	
		56	2.20000	-11.50000	0.00000	0.00000	0.00000	0.00000	
2	Excavation Movements	1	0.00000	6.00000	0.00000	3.68438	0.00000	2.29233	2,6
		2	-0.47500	6.00000	0.00000	3.50625	0.00000	2.15083	2,6
		3	-0.95000	6.00000	0.00000	3.32813	0.00000	1.98478	2,6
		4	-1.42500	6.00000	0.00000	3.15000	0.00000	1.80225	2,6
		5	-1.90000	6.00000	0.00000	2.97187	0.00000	1.61050	2,6
		6	-2.37500	6.00000	0.00000	2.79375	0.00000	1.41597	2,6
		7	-2.85000	6.00000	0.00000	2.61563	0.00000	1.22428	2,6
		8	-3.32500	6.00000	0.00000	2.43750	0.00000	1.04021	2,6
		9	-3.80000	6.00000	0.00000	2.25937	0.00000	0.86773	2,6
		10	-4.27500	6.00000	0.00000	2.08125	0.00000	0.71000	2,6
		11	-4.75000	6.00000	0.00000	1.90312	0.00000	0.56934	2,6
		12	-5.22500	6.00000	0.00000	1.72500	0.00000	0.44724	2,6
		13	-5.70000	6.00000	0.00000	1.54688	0.00000	0.34440	2,6
		14	-6.17500	6.00000	0.00000	1.36875	0.00000	0.26066	2,6
		15	-6.65000	6.00000	0.00000	1.19063	0.00000	0.19507	2,6
		16	-7.12500	6.00000	0.00000	1.01250	0.00000	0.14584	2,6
		17	-7.60000	6.00000	0.00000	0.83437	0.00000	0.11035	2,6
		18	5.70000	6.00000	0.00000	-3.66562	0.00000	2.27885	2,6
		19	6.17188	6.00000	0.00000	-3.48867	0.00000	2.13540	2,6
		20	6.64375	6.00000	0.00000	-3.31172	0.00000	1.96854	2,6
		21	7.11562	6.00000	0.00000	-3.13477	0.00000	1.78611	2,6
		22	7.58750	6.00000	0.00000	-2.95781	0.00000	1.59517	2,6
		23	8.05937	6.00000	0.00000	-2.78086	0.00000	1.40194	2,6
		24	8.53125	6.00000	0.00000	-2.60391	0.00000	1.21189	2,6
		25	9.00313	6.00000	0.00000	-2.42695	0.00000	1.02964	2,6
		26	9.47500	6.00000	0.00000	-2.25000	0.00000	0.85904	2,6
		27	9.94688	6.00000	0.00000	-2.07305	0.00000	0.70313	2,6
		28	10.41875	6.00000	0.00000	-1.89609	0.00000	0.56416	2,6
		29	10.89063	6.00000	0.00000	-1.71914	0.00000	0.44355	2,6
		30	11.36250	6.00000	0.00000	-1.54219	0.00000	0.34195	2,6
		31	11.83437	6.00000	0.00000	-1.36523	0.00000	0.25920	2,6
		32	12.30625	6.00000	0.00000	-1.18828	0.00000	0.19432	2,6
		33	12.77812	6.00000	0.00000	-1.01133	0.00000	0.14556	2,6
		34	13.25000	6.00000	0.00000	-0.83437	0.00000	0.11035	2,6
		35	2.20000	1.00000	0.00000	0.00000	5.10000	1.32567	
		36	2.20000	0.40476	0.00000	0.00000	4.87679	1.85516	
		37	2.20000	-0.19048	0.00000	0.00000	4.65357	2.20520	
		38	2.20000	-0.78571	0.00000	0.00000	4.43036	2.40392	
		39	2.20000	-1.38095	0.00000	0.00000	4.20714	2.47745	
		40	2.20000	-1.97619	0.00000	0.00000	3.98393	2.44988	
		41	2.20000	-2.57143	0.00000	0.00000	3.76071	2.34327	
		42	2.20000	-3.16667	0.00000	0.00000	3.53750	2.17767	
		43	2.20000	-3.76190	0.00000	0.00000	3.31429	1.97109	
		44	2.20000	-4.35714	0.00000	0.00000	3.09107	1.73950	
		45	2.20000	-4.95238	0.00000	0.00000	2.86786	1.49686	
		46	2.20000	-5.54762	0.00000	0.00000	2.64464	1.25510	
		47	2.20000	-6.14286	0.00000	0.00000	2.42143	1.02412	
		48	2.20000	-6.73810	0.00000	0.00000	2.19821	0.81178	
		49	2.20000	-7.33333	0.00000	0.00000	1.97500	0.62393	
		50	2.20000	-7.92857	0.00000	0.00000	1.75179	0.46438	
		51	2.20000	-8.52381	0.00000	0.00000	1.52857	0.33492	
		52	2.20000	-9.11905	0.00000	0.00000	1.30536	0.23532	
		53	2.20000	-9.71429	0.00000	0.00000	1.08214	0.16329	
		54	2.20000	-10.30952	0.00000	0.00000	0.85893	0.11455	
		55	2.20000	-10.90476	0.00000	0.00000	0.63571	0.08276	
		56	2.20000	-11.50000	0.00000	0.00000	0.41250	0.05959	
3	Drained Vertical Movements	1	0.00000	6.00000	0.00000	0.00000	0.00000	-2.07440	2,6
		2	-0.47500	6.00000	0.00000	0.00000	0.00000	-1.59435	2,6
		3	-0.95000	6.00000	0.00000	0.00000	0.00000	-1.29161	2,6
		4	-1.42500	6.00000	0.00000	0.00000	0.00000	-1.07552	2,6
		5	-1.90000	6.00000	0.00000	0.00000	0.00000	-0.91209	2,6

Set: Ref.	Set: Name	Result: Ref.	Coordinates: x [m]	Coordinates: y [m]	Coordinates: z [m]	Displacements: x [mm]	Displacements: y [mm]	Displacements: z [mm]	
		6	-2.37500	6.00000	0.00000	0.00000	0.00000	-0.78396	2,6
		7	-2.85000	6.00000	0.00000	0.00000	0.00000	-0.68102	2,6
		8	-3.32500	6.00000	0.00000	0.00000	0.00000	-0.59682	2,6
		9	-3.80000	6.00000	0.00000	0.00000	0.00000	-0.52695	2,6
		10	-4.27500	6.00000	0.00000	0.00000	0.00000	-0.46829	2,6
		11	-4.75000	6.00000	0.00000	0.00000	0.00000	-0.41854	2,6
		12	-5.22500	6.00000	0.00000	0.00000	0.00000	-0.37598	2,6
		13	-5.70000	6.00000	0.00000	0.00000	0.00000	-0.33928	2,6
		14	-6.17500	6.00000	0.00000	0.00000	0.00000	-0.30743	2,6
		15	-6.65000	6.00000	0.00000	0.00000	0.00000	-0.27960	2,6
		16	-7.12500	6.00000	0.00000	0.00000	0.00000	-0.25515	2,6
		17	-7.60000	6.00000	0.00000	0.00000	0.00000	-0.23357	2,6
		18	5.70000	6.00000	0.00000	0.00000	0.00000	-2.14268	2,6
		19	6.17188	6.00000	0.00000	0.00000	0.00000	-1.54085	2,6
		20	6.64375	6.00000	0.00000	0.00000	0.00000	-1.24953	2,6
		21	7.11562	6.00000	0.00000	0.00000	0.00000	-1.04202	2,6
		22	7.58750	6.00000	0.00000	0.00000	0.00000	-0.88469	2,6
		23	8.05937	6.00000	0.00000	0.00000	0.00000	-0.76118	2,6
		24	8.53125	6.00000	0.00000	0.00000	0.00000	-0.66190	2,6
		25	9.00313	6.00000	0.00000	0.00000	0.00000	-0.58066	2,6
		26	9.47500	6.00000	0.00000	0.00000	0.00000	-0.51322	2,6
		27	9.94688	6.00000	0.00000	0.00000	0.00000	-0.45657	2,6
		28	10.41875	6.00000	0.00000	0.00000	0.00000	-0.40849	2,6
		29	10.89063	6.00000	0.00000	0.00000	0.00000	-0.36733	2,6
		30	11.36250	6.00000	0.00000	0.00000	0.00000	-0.33181	2,6
		31	11.83437	6.00000	0.00000	0.00000	0.00000	-0.30095	2,6
		32	12.30625	6.00000	0.00000	0.00000	0.00000	-0.27397	2,6
		33	12.77812	6.00000	0.00000	0.00000	0.00000	-0.25024	2,6
		34	13.25000	6.00000	0.00000	0.00000	0.00000	-0.22928	2,6
		35	2.20000	1.00000	0.00000	0.00000	0.00000	-1.95979	
		36	2.20000	0.40476	0.00000	0.00000	0.00000	-1.17817	
		37	2.20000	-0.19048	0.00000	0.00000	0.00000	-0.86915	
		38	2.20000	-0.78571	0.00000	0.00000	0.00000	-0.68327	
		39	2.20000	-1.38095	0.00000	0.00000	0.00000	-0.55708	
		40	2.20000	-1.97619	0.00000	0.00000	0.00000	-0.46540	
		41	2.20000	-2.57143	0.00000	0.00000	0.00000	-0.39577	
		42	2.20000	-3.16667	0.00000	0.00000	0.00000	-0.34119	
		43	2.20000	-3.76190	0.00000	0.00000	0.00000	-0.29735	
		44	2.20000	-4.35714	0.00000	0.00000	0.00000	-0.26148	
		45	2.20000	-4.95238	0.00000	0.00000	0.00000	-0.23166	
		46	2.20000	-5.54762	0.00000	0.00000	0.00000	-0.20656	
		47	2.20000	-6.14286	0.00000	0.00000	0.00000	-0.18520	
		48	2.20000	-6.73810	0.00000	0.00000	0.00000	-0.16687	
		49	2.20000	-7.33333	0.00000	0.00000	0.00000	-0.15099	
		50	2.20000	-7.92857	0.00000	0.00000	0.00000	-0.13716	
		51	2.20000	-8.52381	0.00000	0.00000	0.00000	-0.12502	
		52	2.20000	-9.11905	0.00000	0.00000	0.00000	-0.11432	
		53	2.20000	-9.71429	0.00000	0.00000	0.00000	-0.10483	
		54	2.20000	-10.30952	0.00000	0.00000	0.00000	-0.09638	
		55	2.20000	-10.90476	0.00000	0.00000	0.00000	-0.08883	
		56	2.20000	-11.50000	0.00000	0.00000	0.00000	-0.08206	

2 - Data point coincident with horizontal movement calculation point for a specific building. Its displacement has been added before performing building damage calculations.
6 - Data point coincident with vertical movement calculation point for a specific building. Its displacement has been added before performing building damage calculations.

Polygonal Excavations

Ref. 1
Excavation Name: Underpin 1
Surface level [m]: 0.0
Contribution: Positive

Corner	x [m]	y [m]	Base Level [m]	Arc Enabled	Stiffened	Prev. Side: d [m]	Prev. Side: p1 [%]	Prev. Side: p2* [%]	Next Side: d [m]	Next Side: p1 [%]	Next Side: p2* [%]
1	0.0	2.7500	-3.4000	Yes	No	-	-	-	-	-	-
2	0.50000	2.7500	-3.4000	Yes	No	-	-	-	-	-	-
3	0.50000	1.7000	-3.4000	Yes	No	-	-	-	-	-	-
4	1.2000	1.0000	-3.4000	Yes	No	-	-	-	-	-	-
5	3.2000	1.0000	-3.4000	Yes	No	-	-	-	-	-	-
6	3.9000	1.7000	-3.4000	Yes	No	-	-	-	-	-	-
7	3.9000	2.7500	-3.4000	Yes	No	-	-	-	-	-	-
8	5.6500	2.7500	-3.4000	Yes	No	-	-	-	-	-	-
9	3.7750	4.6250	-3.4000	Yes	No	-	-	-	-	-	-
10	1.8750	4.6250	-3.4000	Yes	No	-	-	-	-	-	-
11	0.0	2.7500	-3.4000	Yes	No	-	-	-	-	-	-

Side	x1 [m]	y1 [m]	x2 [m]	y2 [m]	G.M. Curve: Vertical	G.M. Curve: Horizontal
1	0.0	2.7500	0.50000	2.7500	No vertical ground movement	No horizontal ground movement
2	0.50000	2.7500	0.50000	1.7000	No vertical ground movement	No horizontal ground movement
3	0.50000	1.7000	1.2000	1.0000	No vertical ground movement	No horizontal ground movement
4	1.2000	1.0000	3.2000	1.0000	No vertical ground movement	No horizontal ground movement
5	3.2000	1.0000	3.9000	1.7000	No vertical ground movement	No horizontal ground movement
6	3.9000	1.7000	3.9000	2.7500	No vertical ground movement	No horizontal ground movement
7	3.9000	2.7500	5.6500	2.7500	No vertical ground movement	No horizontal ground movement

Side	x1 [m]	y1 [m]	x2 [m]	y2 [m]	G.M. Curve: Vertical	G.M. Curve: Horizontal
8	5.6500	2.7500	3.7750	4.6250	No vertical ground movement	No horizontal ground movement
9	3.7750	4.6250	1.8750	4.6250	No vertical ground movement	No horizontal ground movement
10	1.8750	4.6250	0.0	2.7500	No vertical ground movement	No horizontal ground movement
11	0.0	2.7500	0.0	2.7500	No vertical ground movement	No horizontal ground movement

Ref. 2
Excavation Name: Underpin 2
Surface level [m]: 0.0
Contribution: Positive

Corner	x [m]	y [m]	Base Level [m]	Arc Enabled	Stiffened	Prev. Side: d [m]	Prev. Side: p1 [%]	Prev. Side: p2* [%]	Next Side: d [m]	Next Side: p1 [%]	Next Side: p2* [%]
1	0.0	2.7500	-3.4000	Yes	No	-	-	-	-	-	-
2	0.0	11.000	-3.4000	Yes	No	-	-	-	-	-	-
3	1.8750	9.1250	-3.4000	Yes	No	-	-	-	-	-	-
4	1.8750	4.6250	-3.4000	Yes	No	-	-	-	-	-	-
5	0.0	2.7500	-3.4000	Yes	No	-	-	-	-	-	-

Side	x1 [m]	y1 [m]	x2 [m]	y2 [m]	G.M. Curve: Vertical	G.M. Curve: Horizontal
1	0.0	2.7500	0.0	11.000	No vertical ground movement	No horizontal ground movement
2	0.0	11.000	1.8750	9.1250	No vertical ground movement	No horizontal ground movement
3	1.8750	9.1250	1.8750	4.6250	No vertical ground movement	No horizontal ground movement
4	1.8750	4.6250	0.0	2.7500	No vertical ground movement	No horizontal ground movement
5	0.0	2.7500	0.0	2.7500	No vertical ground movement	No horizontal ground movement

Ref. 3
Excavation Name: Underpin 3
Surface level [m]: 0.0
Contribution: Positive

Corner	x [m]	y [m]	Base Level [m]	Arc Enabled	Stiffened	Prev. Side: d [m]	Prev. Side: p1 [%]	Prev. Side: p2* [%]	Next Side: d [m]	Next Side: p1 [%]	Next Side: p2* [%]
1	0.0	11.000	-3.4000	Yes	No	-	-	-	-	-	-
2	5.6500	11.000	-3.4000	Yes	No	-	-	-	-	-	-
3	3.7750	9.1250	-3.4000	Yes	No	-	-	-	-	-	-
4	1.8750	9.1250	-3.4000	Yes	No	-	-	-	-	-	-
5	0.0	11.000	-3.4000	Yes	No	-	-	-	-	-	-

Side	x1 [m]	y1 [m]	x2 [m]	y2 [m]	G.M. Curve: Vertical	G.M. Curve: Horizontal
1	0.0	11.000	5.6500	11.000	No vertical ground movement	No horizontal ground movement
2	5.6500	11.000	3.7750	9.1250	No vertical ground movement	No horizontal ground movement
3	3.7750	9.1250	1.8750	9.1250	No vertical ground movement	No horizontal ground movement
4	1.8750	9.1250	0.0	11.000	No vertical ground movement	No horizontal ground movement
5	0.0	11.000	0.0	11.000	No vertical ground movement	No horizontal ground movement

Ref. 4
Excavation Name: Underpin 4
Surface level [m]: 0.0
Contribution: Positive

Corner	x [m]	y [m]	Base Level [m]	Arc Enabled	Stiffened	Prev. Side: d [m]	Prev. Side: p1 [%]	Prev. Side: p2* [%]	Next Side: d [m]	Next Side: p1 [%]	Next Side: p2* [%]
1	5.6500	11.000	-3.4000	Yes	No	-	-	-	-	-	-
2	5.6500	2.7500	-3.4000	Yes	No	-	-	-	-	-	-
3	3.7750	4.6250	-3.4000	Yes	No	-	-	-	-	-	-
4	3.7750	9.1250	-3.4000	Yes	No	-	-	-	-	-	-
5	5.6500	11.000	-3.4000	Yes	No	-	-	-	-	-	-

Side	x1 [m]	y1 [m]	x2 [m]	y2 [m]	G.M. Curve: Vertical	G.M. Curve: Horizontal
1	5.6500	11.000	5.6500	2.7500	No vertical ground movement	No horizontal ground movement
2	5.6500	2.7500	3.7750	4.6250	No vertical ground movement	No horizontal ground movement
3	3.7750	4.6250	3.7750	9.1250	No vertical ground movement	No horizontal ground movement
4	3.7750	9.1250	5.6500	11.000	No vertical ground movement	No horizontal ground movement
5	5.6500	11.000	5.6500	11.000	No vertical ground movement	No horizontal ground movement

Circular Excavations

Side	x1 [m]	y1 [m]	x2 [m]	y2 [m]	G.M. Curve: Vertical	G.M. Curve: Horizontal

Vertical Ground Movement Curves

Curve Name: **No vertical ground movement**
Coordinates: [Distance from wall / wall depth or max. excavation depth (x), Depth / wall depth or max. excavation depth (y), Settlement / wall depth or max. excavation depth (z)(%)]

[0.000,0.000,0.000][1.000,0.000,0.000][0.000,1.000,0.000][1.000,1.000,0.000]

Curve Fitting Method: Polynomial
x Order: 1
y Order: 0
Polynomial: z = 0.0x + 0.0
Coeff. of Determination:

Horizontal Ground Movement Curves

Curve Name: **No horizontal ground movement**
Coordinates: [Distance from wall / wall depth or max. excavation depth (x), Depth / wall depth or max. excavation depth (y), Horizontal movement / wall depth or max. excavation depth (z)(%)]
[0.000,0.000,0.000][1.000,0.000,0.000][0.000,1.000,0.000][1.000,1.000,0.000]
Curve Fitting Method: Polynomial
x Order: 0
y Order: 0
Polynomial: z = 0.0
Coeff. of Determination:

Damage Category Strains

Ref.	Name	0 (Negligible) to 1 (Very Slight)	1 (Very Slight) to 2 (Slight)	2 (Slight) to 3 (Moderate)	3 (Moderate) to 4 (Severe)
1	Burland Strain Limits	0.0	500.00E-6	750.00E-6	0.0015000

Specific Buildings - Geometry

Ref.	Building Name	Sub-Building Name	Displacement Line	Distance Along Line: Start [m]	Distance Along Line: End [m]	Vertical Offsets from Line for Vertical Movement Calculations [m]	Vertical Displacement Limit Sensitivity [mm]	Damage Category Strains	Poisson's Ratio	E/G
1	15 Courthope Road		15 Courthope Road	0.00000	5.60000	0.0	0.10000	Burland Strain Limits	0.20000	2.6000
2	19 Courthope Road		19 Courthope Road	0.00000	5.60000	0.0	0.10000	Burland Strain Limits	0.20000	2.6000

Specific Buildings - Bending Parameters

Ref.	Building Name	Sub-Building Name	Height [m]	Default	Hogging: 2nd Mom. of Area (per unit width) [m³]	Hogging: Dist. of Bending Strain from N.A. [m]	Hogging: Dist. of N.A. from Edge of Beam in Tension [m]	Sagging: 2nd Mom. of Area (per unit width) [m³]	Sagging: Dist. of Bending Strain from N.A. [m]	Sagging: Dist. of N.A. from Edge of Beam in Tension [m]
1	15 Courthope Road		12.000	Yes	576.00	12.000	12.000	144.00	6.0000	6.0000
2	19 Courthope Road		12.000	Yes	576.00	12.000	12.000	144.00	6.0000	6.0000

Warnings

1 Multiple excavations have been specified. Displacements resulting from each excavation are summed with no account taken of the interactions between excavations (e.g. overlapping zones of influence or 'shielding' of one excavation by another).
2 Embedded Wall Excavation PE1 : Underpin 1 intersects PE2 : Underpin 2, and PE4 : Underpin 4.
3 Embedded Wall Excavation PE2 : Underpin 2 intersects PE1 : Underpin 1, and PE3 : Underpin 3.
4 Embedded Wall Excavation PE3 : Underpin 3 intersects PE2 : Underpin 2, and PE4 : Underpin 4.
5 Embedded Wall Excavation PE4 : Underpin 4 intersects PE1 : Underpin 1, and PE3 : Underpin 3.
6 The following polygonal excavations have one or more re-entrant corners: 1. The use of re-entrant corners is permitted but not recommended. CIRIA C580/C760, on which XDisp's method for modelling ground movements behind walls of excavations is based, considers only movements for points lying at right angles behind single walls. It does not consider how movements should be calculated within the zone of influence of re-entrant corners, i.e. where movements would be influenced by two walls adjacent to

Ref.	Building Name	Sub-Building Name	Height Default	Hogging: 2nd Mom. of Area	Hogging: Dist. of Bending	Hogging: Dist. of N.A. from	Sagging: 2nd Mom. of Area	Sagging: Dist. of Bending	Sagging: Dist. of N.A. from

the re-entrant corner. By default, XDisp will merely sum the effects from both walls, making no allowance for interaction or stiffening of the corner. Please refer to help manual for artificial smoothing options. Re-entrant corners should be used with caution. Results in their vicinity should be validated independently.

Errors

None

Displacement Results - Displacement Lines

Stage: Ref.	Stage: Name	Disp. Line: Ref.	Disp. Line: Name	Chainage [m]	x [m]	y [m]	z [m]	δx [mm]	δy [mm]	δz [mm]	δH// [mm]	δHperp. [mm]	Angle [°]	
0	Base Model	1	15 Courthope Road	0.0	0.00000	6.00000	0.00000	5.0692	0.0	1.5779	-5.0692	0.0	180.00	*
				0.47500	-0.47500	6.00000	0.00000	4.6838	0.0	1.8215	-4.6838	0.0	180.00	*
				0.95000	-0.95000	6.00000	0.00000	4.3213	0.0	1.8632	-4.3213	0.0	180.00	*
				1.4250	-1.42500	6.00000	0.00000	3.9795	0.0	1.8017	-3.9795	0.0	180.00	*
				1.9000	-1.90000	6.00000	0.00000	3.6560	0.0	1.6784	-3.6560	0.0	180.00	*
				2.3750	-2.37500	6.00000	0.00000	3.3483	0.0	1.5170	-3.3483	0.0	180.00	*
				2.8500	-2.85000	6.00000	0.00000	3.0542	0.0	1.3333	-3.0542	0.0	180.00	*
				3.3250	-3.32500	6.00000	0.00000	2.7713	0.0	1.1384	-2.7713	0.0	180.00	*
				3.8000	-3.80000	6.00000	0.00000	2.4971	0.0	0.94078	-2.4971	0.0	180.00	*
				4.2750	-4.27500	6.00000	0.00000	2.2294	0.0	0.74671	-2.2294	0.0	180.00	*
				4.7500	-4.75000	6.00000	0.00000	1.9657	0.0	0.56079	-1.9657	0.0	180.00	*
				5.2250	-5.22500	6.00000	0.00000	1.7250	0.0	0.38626	-1.7250	0.0	180.00	*
				5.7000	-5.70000	6.00000	0.00000	1.5469	0.0	0.22511	-1.5469	0.0	180.00	*
				6.1750	-6.17500	6.00000	0.00000	1.3687	0.0	0.078236	-1.3687	0.0	180.00	*
				6.6500	-6.65000	6.00000	0.00000	1.1906	0.0	-0.054526	-1.1906	0.0	180.00	*
				7.1250	-7.12500	6.00000	0.00000	1.0125	0.0	-0.10931	-1.0125	0.0	180.00	*
				7.6000	-7.60000	6.00000	0.00000	0.83437	0.0	-0.12322	-0.83437	0.0	180.00	*
		2	19 Courthope Road	0.0	5.70000	6.00000	0.00000	-5.0274	0.0	1.4862	-5.0274	0.0	0.0	*
				0.47187	6.17188	6.00000	0.00000	-4.6470	0.0	1.8502	-4.6470	0.0	0.0	*
				0.94375	6.64375	6.00000	0.00000	-4.2890	0.0	1.8803	-4.2890	0.0	0.0	*
				1.4156	7.11562	6.00000	0.00000	-3.9512	0.0	1.8110	-3.9512	0.0	0.0	*
				1.8875	7.58750	6.00000	0.00000	-3.6312	0.0	1.6830	-3.6312	0.0	0.0	*
				2.3594	8.05937	6.00000	0.00000	-3.3266	0.0	1.5189	-3.3266	0.0	0.0	*
				2.8312	8.53125	6.00000	0.00000	-3.0353	0.0	1.3337	-3.0353	0.0	0.0	*
				3.3031	9.00313	6.00000	0.00000	-2.7548	0.0	1.1384	-2.7548	0.0	0.0	*
				3.7750	9.47500	6.00000	0.00000	-2.4829	0.0	0.94082	-2.4829	0.0	0.0	*
				4.2469	9.94688	6.00000	0.00000	-2.2172	0.0	0.74719	-2.2172	0.0	0.0	*
				4.7187	10.41875	6.00000	0.00000	-1.9554	0.0	0.56192	-1.9554	0.0	0.0	*
				5.1906	10.89063	6.00000	0.00000	-1.7191	0.0	0.38810	-1.7191	0.0	0.0	*
				5.6625	11.36250	6.00000	0.00000	-1.5422	0.0	0.22765	-1.5422	0.0	0.0	*
				6.1344	11.83437	6.00000	0.00000	-1.3652	0.0	0.081376	-1.3652	0.0	0.0	*
				6.6063	12.30625	6.00000	0.00000	-1.1883	0.0	-0.050892	-1.1883	0.0	0.0	*
				7.0781	12.77812	6.00000	0.00000	-1.0113	0.0	-0.10468	-1.0113	0.0	0.0	*
				7.5500	13.25000	6.00000	0.00000	-0.83437	0.0	-0.11892	-0.83437	0.0	0.0	*
		3	Courthope Road (Highway)	0.0	2.20000	1.00000	0.00000	0.0	6.4848	0.72587	-6.4848	0.0	270.00	*
				0.59524	2.20000	0.40476	0.00000	0.0048404	6.0056	1.9277	-6.0056	0.0048404	270.00	*
				1.1905	2.20000	-0.19048	0.00000	0.015956	5.5615	2.4959	-5.5615	0.015956	270.00	*
				1.7857	2.20000	-0.78571	0.00000	0.016217	5.1479	2.7766	-5.1479	0.016217	270.00	*
				2.3810	2.20000	-1.38095	0.00000	0.0094224	4.7602	2.8682	-4.7602	0.0094224	270.00	*
				2.9762	2.20000	-1.97619	0.00000	0.0	4.3937	2.8088	-4.3937	0.0	270.00	*
				3.5714	2.20000	-2.57143	0.00000	0.0	4.0437	2.6362	-4.0437	0.0	270.00	*
				4.1667	2.20000	-3.16667	0.00000	0.0	3.7056	2.3809	-3.7056	0.0	270.00	*
				4.7619	2.20000	-3.76190	0.00000	0.0	3.3748	2.0814	-3.3748	0.0	270.00	*
				5.3571	2.20000	-4.35714	0.00000	0.0	3.0911	1.7666	-3.0911	0.0	270.00	*
				5.9524	2.20000	-4.95238	0.00000	0.0	2.8679	1.4347	-2.8679	0.0	270.00	*
				6.5476	2.20000	-5.54762	0.00000	0.0	2.6446	1.0990	-2.6446	0.0	270.00	*
				7.1429	2.20000	-6.14286	0.00000	0.0	2.4214	0.83891	-2.4214	0.0	270.00	*
				7.7381	2.20000	-6.73810	0.00000	0.0	2.1982	0.64491	-2.1982	0.0	270.00	*
				8.3333	2.20000	-7.33333	0.00000	0.0	1.9750	0.47294	-1.9750	0.0	270.00	*
				8.9286	2.20000	-7.92857	0.00000	0.0	1.7518	0.32722	-1.7518	0.0	270.00	*
				9.5238	2.20000	-8.52381	0.00000	0.0	1.5286	0.20990	-1.5286	0.0	270.00	*
				10.119	2.20000	-9.11905	0.00000	0.0	1.3054	0.12100	-1.3054	0.0	270.00	*
				10.714	2.20000	-9.71429	0.00000	0.0	1.0821	0.058460	-1.0821	0.0	270.00	*
				11.310	2.20000	-10.30952	0.00000	0.0	0.85893	0.018163	-0.85893	0.0	270.00	*
				11.905	2.20000	-10.90476	0.00000	0.0	0.63571	-0.0060713	-0.63571	0.0	270.00	*
				12.500	2.20000	-11.50000	0.00000	0.0	0.41250	-0.022474	-0.41250	0.0	270.00	*

* Result includes imported displacement(s).

Specific Building Damage Results - Horizontal Displacements

Stage: Ref.	Stage: Name	Specific Building: Ref.	Specific Building: Name	Sub-building Name	Dist. [m]	x [m]	y [m]	z [m]	δx [mm]	δy [mm]	δH// [mm]	δHperp. [mm]	
0	Base Model	1	15 Courthope Road		0.0	0.00000	6.00000	0.00000	5.0692	0.0	-5.0692	0.0	d
					0.47500	-0.47500	6.00000	0.00000	4.6838	0.0	-4.6838	0.0	d
					0.95000	-0.95000	6.00000	0.00000	4.3213	0.0	-4.3213	0.0	d

Stage: Ref.	Stage: Name	Specific Building: Ref.	Specific Building: Name	Sub-building Name	Dist. [m]	x [m]	y [m]	z [m]	δx [mm]	δy [mm]	δH// [mm]	δHperp. [mm]	
					1.4250	-1.42500	6.00000	0.00000	3.9795	0.0	-3.9795	0.0	d
					1.9000	-1.90000	6.00000	0.00000	3.6560	0.0	-3.6560	0.0	d
					2.3750	-2.37500	6.00000	0.00000	3.3483	0.0	-3.3483	0.0	d
					2.8500	-2.85000	6.00000	0.00000	3.0542	0.0	-3.0542	0.0	d
					3.3250	-3.32500	6.00000	0.00000	2.7713	0.0	-2.7713	0.0	d
					3.8000	-3.80000	6.00000	0.00000	2.4971	0.0	-2.4971	0.0	d
					4.2750	-4.27500	6.00000	0.00000	2.2294	0.0	-2.2294	0.0	d
					4.7500	-4.75000	6.00000	0.00000	1.9657	0.0	-1.9657	0.0	d
					5.2250	-5.22500	6.00000	0.00000	1.7250	0.0	-1.7250	0.0	d
					5.7000	-5.70000	6.00000	0.00000	1.5469	0.0	-1.5469	0.0	d
					6.1750	-6.17500	6.00000	0.00000	1.3687	0.0	-1.3687	0.0	d
					6.6500	-6.65000	6.00000	0.00000	1.1906	0.0	-1.1906	0.0	d
					7.1250	-7.12500	6.00000	0.00000	1.0125	0.0	-1.0125	0.0	d
					7.6000	-7.60000	6.00000	0.00000	0.83437	0.0	-0.83437	0.0	d
		2	19 Courthope Road		0.0	5.70000	6.00000	0.00000	-5.0274	0.0	-5.0274	0.0	d
					0.47187	6.17188	6.00000	0.00000	-4.6470	0.0	-4.6470	0.0	d
					0.94375	6.64375	6.00000	0.00000	-4.2890	0.0	-4.2890	0.0	d
					1.4156	7.11562	6.00000	0.00000	-3.9512	0.0	-3.9512	0.0	d
					1.8875	7.58750	6.00000	0.00000	-3.6312	0.0	-3.6312	0.0	d
					2.3594	8.05937	6.00000	0.00000	-3.3266	0.0	-3.3266	0.0	d
					2.8312	8.53125	6.00000	0.00000	-3.0353	0.0	-3.0353	0.0	d
					3.3031	9.00313	6.00000	0.00000	-2.7548	0.0	-2.7548	0.0	d
					3.7750	9.47500	6.00000	0.00000	-2.4829	0.0	-2.4829	0.0	d
					4.2469	9.94688	6.00000	0.00000	-2.2172	0.0	-2.2172	0.0	d
					4.7187	10.41875	6.00000	0.00000	-1.9554	0.0	-1.9554	0.0	d
					5.1906	10.89063	6.00000	0.00000	-1.7191	0.0	-1.7191	0.0	d
					5.6625	11.36250	6.00000	0.00000	-1.5422	0.0	-1.5422	0.0	d
					6.1344	11.83437	6.00000	0.00000	-1.3652	0.0	-1.3652	0.0	d
					6.6063	12.30625	6.00000	0.00000	-1.1883	0.0	-1.1883	0.0	d
					7.0781	12.77812	6.00000	0.00000	-1.0113	0.0	-1.0113	0.0	d
					7.5500	13.25000	6.00000	0.00000	-0.83437	0.0	-0.83437	0.0	d

d - Displacements include imported displacements.

Specific Building Damage Results - Vertical Displacements

Stage: Ref.	Stage: Name	Specific Building: Ref.	Specific Building: Name	Sub-building Name	Vertical Offset [m]	Dist. [m]	x [m]	y [m]	z [m]	δz [mm]	
0	Base Model	1	15 Courthope Road		0.0	0.0	0.00000	6.00000	0.00000	1.5779	d
						0.47500	-0.47500	6.00000	0.00000	1.8215	d
						0.95000	-0.95000	6.00000	0.00000	1.8632	d
						1.4250	-1.42500	6.00000	0.00000	1.8017	d
						1.9000	-1.90000	6.00000	0.00000	1.6784	d
						2.3750	-2.37500	6.00000	0.00000	1.5170	d
						2.8500	-2.85000	6.00000	0.00000	1.3333	d
						3.3250	-3.32500	6.00000	0.00000	1.1384	d
						3.8000	-3.80000	6.00000	0.00000	0.94078	d
						4.2750	-4.27500	6.00000	0.00000	0.74671	d
						4.7500	-4.75000	6.00000	0.00000	0.56079	d
						5.2250	-5.22500	6.00000	0.00000	0.38626	d
						5.7000	-5.70000	6.00000	0.00000	0.22511	d
						6.1750	-6.17500	6.00000	0.00000	0.078236	d
						6.6500	-6.65000	6.00000	0.00000	-0.054526	d
						7.1250	-7.12500	6.00000	0.00000	-0.10931	d
						7.6000	-7.60000	6.00000	0.00000	-0.12322	d
		2	19 Courthope Road		0.0	0.0	5.70000	6.00000	0.00000	1.4862	d
						0.47187	6.17188	6.00000	0.00000	1.8502	d
						0.94375	6.64375	6.00000	0.00000	1.8803	d
						1.4156	7.11562	6.00000	0.00000	1.8110	d
						1.8875	7.58750	6.00000	0.00000	1.6830	d
						2.3594	8.05937	6.00000	0.00000	1.5189	d
						2.8312	8.53125	6.00000	0.00000	1.3337	d
						3.3031	9.00313	6.00000	0.00000	1.1384	d
						3.7750	9.47500	6.00000	0.00000	0.94082	d
						4.2469	9.94688	6.00000	0.00000	0.74719	d
						4.7187	10.41875	6.00000	0.00000	0.56192	d
						5.1906	10.89063	6.00000	0.00000	0.38810	d
						5.6625	11.36250	6.00000	0.00000	0.22765	d
						6.1344	11.83437	6.00000	0.00000	0.081376	d
						6.6063	12.30625	6.00000	0.00000	-0.050892	d
						7.0781	12.77812	6.00000	0.00000	-0.10468	d
						7.5500	13.25000	6.00000	0.00000	-0.11892	d

d - Displacements include imported displacements.

Specific Building Damage Results - Detail

Stage: Ref.	Stage: Name	Specific Building: Ref.	Specific Building: Name	Sub-building Name	Vertical Offset from Line for Vertical Movement Calculations [m]	Segment	Start [m]	Length [m]	Curvature	Deflection Ratio [%]	Average Horizontal Strain [%]	Max Tensile Strain [%]	Max Gradient of Horizontal Displacement Curve	Max Gradient of Vertical Displacement Curve	Min Radius of Curvature [m]	Damage Category	
0	Base Model	1	15 Courthope Road		0.0	1	0.0	3.5680	None	0.012304	0.068334	0.073837	-810.70E-6	-512.33E-6	997.53	1	(Very Slight)
						2	3.5680	2.0320	None	0.0011645	0.051507	0.051808	-576.85E-6	415.78E-6	14366.	1	(Very Slight)
		2	19 Courthope Road		0.0	1	0.0	3.5068	None	0.014544	0.068153	0.074552	-805.55E-6	-770.78E-6	568.15	1	(Very Slight)

Stage: Ref.	Stage: Name	Specific Building: Ref.	Specific Building: Name	Sub-building Name	Vertical Offset from Line for Vertical Movement	Segment	Start	Length	Curvature	Deflection Ratio	Average Horizontal Strain	Max Tensile Strain	Max Gradient of Horizontal Displacement	Max Gradient of Vertical Displacement Curve	Min Radius of Curvature	Damage Category
					-	2	3.5068	2.0932	None	0.0012160	0.051204	0.051528	-575.96E-6	418.37E-6	14909.	1 (Very Slight)

Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Specific Building Damage Results - Critical Values for All Segments within Each Sub-Building

Stage: Ref.	Stage: Name	Specific Building: Ref.	Specific Building: Name	Sub-building Name	Vertical Offset from Line for Vertical Movement Calculations [m]	Deflection Ratio [%]	Average Horizontal Strain [%]	Max Slope	Max Settlement [mm]	Max Tensile Strain [%]	Max Gradient of Horizontal Displacement Curve	Max Gradient of Vertical Displacement Curve	Min Radius of Curvature (Hogging) [m]	Min Radius of Curvature (Sagging) [m]	Damage Category
0	Base Model	1	15 Courthope Road		0.0	0.012304	0.068334	-512.33E-6	1.8620	0.073837	-810.70E-6	-512.33E-6	-	-	1 (Very Slight)
		2	19 Courthope Road		0.0	0.014544	0.068153	-770.78E-6	1.8788	0.074552	-805.55E-6	-770.78E-6	-	-	1 (Very Slight)

Specific Building Damage Results - Critical Segments within Each Building

Stage: Ref.	Stage: Name	Specific Building: Ref.	Specific Building: Name	Parameter	Critical Sub-Building	Critical Segment	Start [m]	End [m]	Curvature	Max Slope	Max Settlement [mm]	Max Tensile Strain [%]	Min Radius of Curvature (Hogging) [m]	Min Radius of Curvature (Sagging) [m]	Damage Category
0	Base Model	0	15 Courthope Road	Max Slope	1	1	0.0	3.5680	None	**512.33E-6**	1.8620	0.073837	-	-	1 (Very Slight)
				Max Settlement	1	1	0.0	3.5680	None	512.33E-6	**1.8620**	0.073837	-	-	1 (Very Slight)
				Max Tensile Strain	1	1	0.0	3.5680	None	512.33E-6	1.8620	**0.073837**	-	-	1 (Very Slight)
				Min Radius of Curvature (Hogging)	-	-	-	-	-	-	-	-	-	-	-
				Min Radius of Curvature (Sagging)	-	-	-	-	-	-	-	-	-	-	-
		0	19 Courthope Road	Max Slope	1	1	0.0	3.5068	None	**770.78E-6**	1.8788	0.074552	-	-	1 (Very Slight)
				Max Settlement	1	1	0.0	3.5068	None	770.78E-6	**1.8788**	0.074552	-	-	1 (Very Slight)
				Max Tensile Strain	1	1	0.0	3.5068	None	770.78E-6	1.8788	**0.074552**	-	-	1 (Very Slight)
				Min Radius of Curvature (Hogging)	-	-	-	-	-	-	-	-	-	-	-
				Min Radius of Curvature (Sagging)	-	-	-	-	-	-	-	-	-	-	-

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