Lifecare Residencies Limited

Gondar Gardens, West Hampstead, NW6 1QF

Land Stability Assessment

371487-R03 (00)

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RSK GENERAL NOTES

Report No.: 371487-R03 (00)

Title: Land Stability Assessment for Gondar Gardens, West Hampstead, London, NW6 1QF

Client: Lifecare Residencies Limited

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NON-TECHNICAL SUMMARY – Land Stability	
Site description	The site is located on Gondar Gardens, West Hampstead, London and is centred at Grid Reference 524838, 185309. The site fronts onto Gondar Gardens to the west and is bordered by residential properties and their associated gardens, to the north, east and south. The site covers an area of approximately 1.2 hectares at an elevation of approximately 80m above Ordnance Datum (AOD) and is rectangular. It comprises a former Thames Water buried reservoir of masonry construction, built in circa 1890, which occupies approximately two thirds of the site footprint. The site lies within a natural hill slope setting, which descends in a general south-easterly direction. Original ground levels in the proximity of the site are anticipated to be approximately 80m AOD to the northwest and 72m AOD to the southeast. The site appears to have been historically cut to allow for the construction of the buried reservoir, with the excavated material used to construct the existing eastern and southern flank slopes, considerably raising the natural ground levels in these parts. The placement of the capping material over the reservoir has resulted in a slightly raised ground level relative to the land to western and northern boundaries.
Proposed development	The proposed development will comprise the construction of six apartment blocks, consisting of 4 storeys above ground plus 2 levels of basement. The existing reservoir retaining walls will be retained on three sides, (north, west and south), and partly incorporated into the scheme, with the basement and lower basement boxes being constructed within the footprint of the existing reservoir, albeit with the lower (2nd) part basement level being excavated a further 1.4m below the existing slab level (~71.6m AOD). The first basement level will occupy the entire internal area of the reservoir. The lower basement level will only occupy the eastern half of the existing reservoir footprint, and house residential apartments that will open out to landscaped gardens across the easternmost part of the site. Because of the limited area occupied by the lower basement level, there will be a significant up-filling across the western extent of the reservoir footprint to raise the existing level to the formation level of the first basement (~75m AOD). The existing site surface level will be lowered to be consistent with street level to the west such that the new ground floor is level with the existing street level to the west at ~77.5 to 78m AOD. The six blocks will appear separate from ground level up, but will be joined by a common basement and lower basement level. The development will include areas of soft landscaping, including construction of a substantial reinforced earth slope along the northern boundary in the eastern part of the site, and significant cut slopes to the eastern and south-eastern boundaries. The development will include the general reduction of surface level across

	the site from the existing level of approximately 79.5m AOD to 80.0m AOD, to level with the adjacent road on Gondar Gardens at approximately 78m AOD. The lowering of the second basement level will see the level drop from 72.4m AOD to 71.0m AOD across the eastern extent of the development.
Ground / Groundwater conditions	The RSK exploratory holes encountered made ground across the site, ranging from 3.20m bgl to 10.50m bgl (76.70m AOD to 69.54m AOD). Outside of the footprint of the reservoir the made ground generally comprised brown clay (reworked London Clay). Within the footprint of the reservoir window samples were terminated at shallow depths upon encountering the roof structure. The made ground generally comprised reworked London Clay, but with occasional layers of brick rubble particularly over the reservoir structure. In one location to the north of the reservoir, structure the made ground was found to comprise predominantly brick rubble with occasional layers of very soft clay sandy gravelly silt and sandy clay and extended to a depth of 10.50m bgl (69.54m AOD). Despite lying in an area of 'Head propensity', no deposits were encountered that could unambiguously be described as 'Head' deposits. The underlying London Clay was encountered in BH1, BH2, BH3, WS5 and WS6, beneath the made ground, and was proved to the terminal depth in each location of between 7.00m bgl (72.80m AOD) and 50.00mbgl (29.84m AOD). This was found to initially comprise a firm, becoming stiff, medium strength, brown and slightly mottled pale brown silty clay, with frequent medium gravel sized selenite crystals and pockets of orange brown silt, typical of the weathered portion of the London Clay Formation, extending to the base of WS5 and WS6 in the eastern part of the site and to depths of 5.00 mbgl (74.90 m AOD) in BH1 and 8.00 mbgl (71.84 m AOD) in BH2. Underlying the weathered clay was stiff, becoming very stiff, high to very high strength, dark brownish grey and greyish brown silty clay with traces of pyrite, mica and occasional pockets/partings of grey silt and sand extending to the full depth investigated in BH1, BH2 and BH3 of up to 50.00m bgl (29.84m AOD). Groundwater monitoring undertaken within BH1 and BH2 in April and May 2017 indicate a standing water level of between 6.62m bgl (73.22 m AOD) and 7.37m bgl (72.53m AOD). This suggest the London Clay is saturated to an elevation of approximately 73.2m AOD)
Screening and scoping	**Land stability:** Potential impacts identified relate to ground stability associated with: Retaining wall installation and ground excavation; and Slope instability associated with temporary works during basement excavation and in the permanent case for the proposed cut slopes in the eastern part of the site; and Elastic heave of the London Clay due to the proposed construction

	Potential building damage of neighbouring properties due to ground movements associated with the proposed development. .
Impact Assessment	The following nearby structures were identified for assessment relating to potential ground movements: • Chase Mansions, located along the western extent of the northern boundary of the site; and • South Mansions, located along the western extent of the southern boundary; **Structural stability of adjacent structures from ground movements associated with the proposed construction** Numerical modelling has been undertaken to determine the conditions at key stages in the construction process, namely: • Unloading due to demolition of the existing building and excavation for the lowered section of basement and loading from upfilling; and • Full loading following construction of the new building. In both cases, no potentially damaging vertical movements are predicted beyond the site's boundary. Movement analyses have been undertaken in accordance with CIRIA C580. All building structures fall into 'Category 0' (Negligible). The results fulfil the requirements of CPG4 in that they do not exceed the damage category of 'slight' (Category 2) and reflect categories of cosmetic rather than structural damage. The predicted movements associated with the road/pavement of Gondar Gardens indicate short term movements of less than 1mm and long term movements of maximum 10.5mm settlement and as such the development is not considered likely to have a significant impact on the adjacent highway. Numerical modelling was also undertaken to assess the stability of the proposed slopes in the eastern part of the site. For the analysis three critical slope profiles have been considered, Section 1, Section 2 and Section 3 from drawing Reference 525-S-00-001 (Rev P05). The analysis was conducted using the Oasys SLOPE computer package developed by Arup, using an EC7 approach. The analysis undertaken to assess permanent slope stability of the proposed new slopes in the eastern part of the site has revealed that in the long term condition the proposed slope angles are acceptable, with Over-Design Factor (ODF) of greater than 1 in each case. However, it is

	noted that some concern remains over the constructability of the reinforced earth slope (Section 2 in the analysis), due to the limited space available, and consideration may be required to using soil nailing or an alternative material type for the slope construction.
Cumulative Impacts	No potential cumulative impacts have been identified for the proposed development in relation to stability.

1 INTRODUCTION

1.1 Instructions

On the instructions of Waterman Structures Ltd, on behalf of Lifecare Residencies Limited (the 'Client'), RSK Environment Limited (RSK) have produced a Land Movement and Stability Assessment for a proposed development at Gondar Gardens, West Hampstead, NW6 1QF, located within the Fortune Green Ward of the London Borough of Camden.

This assessment has been undertaken to provide information for inclusion in a Basement Impact Assessment (BIA) to be submitted to the London Borough of Camden. Waterman Structures Ltd have completed an overarching BIA summary report, (reference STR13472/BIA, dated June 2017) which should be referenced in conjunction with this report.

In particular this report assesses the potential ground movements associated with the proposed development, including an assessment of potential damage to adjacent structures located close to the northern and southern boundaries of the site. In addition to this, the report includes a stability assessment of the proposed slopes in the eastern part of the development beneath the site for use in the compilation of the BIA.

A Hydrology and Hydrogeology assessment is covered under the scope of a separate RSK Report Ref 371487-R04(00).

1.2 Background

By way of background to the current project, a desk study and intrusive site investigation have been undertaken at the site by RSK, as detailed in the report 'Gondar Gardens, West Hampstead, North West London, Geo-Environmental & Geotechnical Site Investigation Report', reference no.371487-R02 (00), dated May 2017. In addition, a Flood Risk Assessment Report (reference 371487-R01 (02), dated May 2017), has been completed for the proposed scheme. This assessment draws on the results of these reports. For full details reference should be made to the original report. A copy of these reports are appended in the Waterman BIA Report ref. STR13472/BIA.

In addition, a site investigation was previously undertaken at the site by RSK, when the site was under different ownership and for a different proposed scheme, report reference 23283-1 (00), dated December 2009. This report was made available to RSK for review as part of this study.

A letter report was also produced by RSK, 'Summary of Hydrogeology Letter Report', reference 25113-01L, dated April 2015, again for the previous proposed scheme. This report was also made available to RSK for review as part of this study.

Together these reports provide comprehensive site specific information and are compliant with the data requirements as set out in Appendix G of 'Camden Geological, Hydrogeological and Hydrological Study' produced for Camden by ARUP in November 2010. The conditions at the site have not changed since these reports were

commissioned and, therefore, the information within these reports is wholly relevant to the proposed scheme described herein.

1.3 Standards and Limitations

This report is based on information available at the time of writing. This report should be considered in the light of any changes in legislation, statutory requirement or industry practices that may have occurred subsequent to the date of issue.

The opinions and recommendations expressed in this report are based on the ground conditions encountered during the previous site work, the results of field and laboratory testing and interpretation between exploratory holes.

This report is subject to the RSK service constraints given in **Appendix A**

2 SITE DETAILS

2.1 Site description

The site is located on Gondar Gardens, West Hampstead, London and is centred at Grid Reference 524838, 185309, as shown on **Figure 1.** The area around the site is primarily residential as detailed in **Table 1**.

Table 1: Site setting

To the north:	Terraced houses and their associated rear gardens occupy the full extent of the northern boundary. The western end of the northern border is occupied by southern wall of a residential mansion block.
To the east:	The eastern boundary is marked by a slope leading down to rear gardens of terraced houses.
To the south:	The majority of the southern boundary comprises a slope leading down to the rear gardens of terraced houses. At the western end of the southern boundary is a residential mansion block
To the west:	Immediately to the west of the site is Gondar Gardens road, which slopes down to the south.

The site covers an area of approximately 1.2 hectares at an elevation of approximately 80m above Ordnance Datum (AOD) and is rectangular. It comprises a former Thames Water buried reservoir of masonry construction, built in circa 1890, which occupies approximately two thirds of the site footprint. The surface of the site comprises an open grassed field, designated as a conservation area.

The eastern boundary of the site is marked by an approximately 17-22° slope, which reduces the level from 79m AOD to 75m AOD, down to rear gardens of residential terraced houses. Visual inspection of the existing slopes was limited at the time of the site walkover due to the heavy vegetation. However, based on the inspection possible no obvious signs of instability were noted.

The southern boundary is marked by an approximately 17-18° slope at the eastern end, which reduces level from approximately 78.5m AOD to 72.5m AOD, down to rear gardens of residential terraced houses. The slope reduces in height from east to west along the southern boundary, to adjacent to the mansion block at the western end of the southern boundary, where the slope is reduced in height to approximately 1m, reducing levels from approximately 80.0m AOD to 79.0m AOD. Topographical information is not available for the private rear gardens to the north of the site, but from observations made during the site walkover, it is apparent the gardens are approximately 1-2m lower than the surface elevation across the site. Visual inspection of the existing slopes was limited at the time of the site walkover due to the heavy vegetation. However, based on the inspection possible no obvious signs of instability were noted and the slopes are known to have been in place for over 100 years.

Gondar Gardens to the west of the site, itself at an elevation of approximately between 78m AOD and 78.6m OAD, slopes down away from the south-western corner of the site towards Mill Lane.

The site lies within a natural hill slope setting, which descends in a general south-easterly direction. Original ground levels in the proximity of the site are anticipated to be approximately 80m AOD to the northwest and 72m AOD to the southeast. The site appears to have been historically cut to allow for the construction of the buried reservoir, with the excavated material used to construct the existing eastern and southern flank slopes, considerably raising the natural ground levels in these parts. The placement of the capping material over the reservoir has resulted in a slightly raised ground level relative to the land to western and northern boundaries.

There are no surface water features within 250m of the site. The only water feature within 0.5km of the site is a small unnamed pond located 464m to the northwest, uphill of the site.

The site comprises the following main attributes (some of which are shown on **Figure 2**):

- A series of vent pipes and box covers are present along the western and northern boundaries of the site, just outside the line of the reservoir walls.
- A small brick building and access hatch into the reservoir is located in the south-western corner of the site.
- A brick retaining wall of approximately 1.1m in height is located in the south-west corner of the site. To the west and downside of the wall is a small area of concrete hardstanding, which extends to the only entrance to the site from Gondar Gardens.
- Various semi mature and mature trees run alongside the western, southern and eastern site boundaries, mostly within the sloping areas.
- Areas of thick brambles are present along the northern boundary and west/north-western boundary of the site.

The only buildings adjoining the site boundary are a residential mansion block (Chase Mansions) at the far western end of the northern boundary and another residential mansion block (South Mansions) at the far western end of the southern boundary, although the northern elevation wall to this site is set slightly back from the site boundary by a few metres. No other buildings directly adjoin the site's boundaries.

A search of publicly available planning records (dating back to 1927) on Camden's planning website revealed records of granted permissions for basement/lower ground floor development/extension or other subterranean development (e.g. swimming pool accommodation space) at twenty-four properties in the site area, as indicated on **Figure 3**.

It is noted that many other buildings along these roads appear to have basement / subterranean structures, although these do not appear in the planning history.

2.2 Ground / Groundwater Conditions

2.2.1 British Geological Survey Data

The published 1:50,000 scale geological map (Sheet No. 256 'North London') and 1:10,560 scale geological map (TQ28NE) of the area indicate that the immediate site area is underlain by the London Clay Formation (**Figure 4**).

The London Clay Formation is divided by the British Geological Survey (BGS) into five informal units. The lowest four, denoted A to D, are not mapped, whereas the top part of the formation is mapped as the Claygate Member. The site lies approximately 250m southwest, and topographically below, a dissected outlier comprising the Claygate Member and the overlying Bagshot Formation (**Figure 4**). It is therefore considered that the site area likely lies within Unit D of the London Clay Formation.

No superficial deposits are shown in the site area, but the 1:50,000 scale geological map indicates that the site lies within an area of 'Head Propensity' ('Head' is a slope related solifluction deposit), which is based on the geotechnical properties of the London Clay.

2.2.2 Site Specific Intrusive Investigation Data

2.2.2.1 RSK Investigations

Two intrusive site investigations have been completed by RSK at the site.

A Geo-environmental and geotechnical assessment was carried out by RSK for the former site owner, (ref 23283-1 (00), dated December 2009), to which the reader is referred. A summary of the pertinent information regarding ground conditions is below.

This RSK investigation comprised the drilling of seven window sample boreholes to a depth of 4.0m and a single cable percussion borehole advanced to a depth 20m bgl. The boreholes encountered a nominal thickness of topsoil to a maximum depth of 0.3 mbgl. This was underlain by made ground, comprising silty sandy clay with fragments of brick, stone, concrete, mudstone, tarmac and roots, extending to a depth of 4.0m bgl. In several locations the material is described as reworked London Clay, likely associated with the construction of the reservoir. Beneath the made ground, London Clay was encountered and proved to the full depth investigated of 20.0m bgl. The London Clay was found to comprise firm becoming stiff and very stiff silty, clay with occasional pockets of sand. In four of the window sample boreholes the clay appeared to be desiccated to depths of up to 3.0m bgl.

A single groundwater seepage was noted in the cable percussion borehole at a depth of 13.0m bgl.

A further intrusive site investigation was undertaken at the site by RSK in March 2017, details of which are provided within RSK report no.371487-02 (0), dated May 2017. Two cable percussive boreholes were advanced to depths of 50.00m bgl and a further cable percussion borehole advanced to depth of 15.00m bgl. Six drive-in sampler boreholes were advanced to depths of depths of up to 7.00m bgl across the site.

The RSK exploratory holes confirmed the ground conditions as described by the original RSK investigation and encountered made ground across the site, ranging from

3.20m bgl to 10.50m bgl (76.70m AOD to 69.54m AOD). This increased thickness of made ground in this area is believed to be related to the possible presence of a partially built second reservoir structure close to the northern boundary of the site, with BH3 located in a position between the northern retaining wall of the known reservoir and to the south of wall of the possible second reservoir.

Outside of the footprint of the reservoir the made ground generally comprised brown clay (reworked London Clay). Within the footprint of the reservoir window samples were terminated at shallow depths upon encountering the roof structure. The made ground here generally comprised reworked London Clay, but with occasional layers of brick rubble. In one location to the north of the reservoir, structure the made ground was found to comprise predominantly brick rubble with occasional layers of very soft clay sandy gravelly silt and sandy clay and extended to a depth of 10.50m bgl (69.54m AOD).

Despite lying in an area of 'Head propensity', no deposits were encountered that could unambiguously be described as 'Head' deposits.

The underlying London Clay was encountered in BH1, BH2, BH3, WS5 and WS6, beneath the made ground, and was proved to the terminal depth in each location of between 7.00m bgl (72.80m AOD) and 50.00mbgl (29.84m AOD).

Based on the site descriptions and in-situ and laboratory testing carried out this stratum can be described as initially comprising a firm, becoming stiff, medium strength, brown and slightly mottled pale brown silty clay, with frequent medium gravel sized selenite crystals and pockets of orange brown silt, typical of the weathered portion of the London Clay Formation, extending to the base of WS5 and WS6 in the eastern part of the site and to depths of 5.00 mbgl (74.90 m AOD) in BH1 and 8.00 mbgl (71.84 m AOD) in BH2.

Underlying the weathered clay was stiff, becoming very stiff, high to very high strength, dark brownish grey and greyish brown silty clay with traces of pyrite, mica and occasional pockets/partings of grey silt and sand extending to the full depth investigated in BH1, BH2 and BH3 of up to 50.00m bgl (29.84m AOD).

Fine to medium gravel sized selenite crystals were noted to depths of between 13.00m bgl (66.84m AOD) and 19.50mbgl (60.40m AOD). Traces of pyrite and bioturbation markings, were common through the un-weathered portion of the London Clay and occasional pyritised fossil fragments and phospatic nodules were present at various depths throughout. The clay became fissured from a depth of 5.00mbgl (74.90m AOD) in BH1 and 7.00m bgl (72.84 m AOD) in BH2.

Plasticity classification testing indicates that the clays are of high to very high plasticity, typical of the London Clay.

The locations of the RSK boreholes are shown on **Figure 2 and 2a**.

2.2.2.2 Hydrological/Hydrogeological Conditions Determined by the Site Investigations

RSK Environment Ltd were instructed by the previous owner to provide a summary of the hydrogeology beneath the site in order to inform the preparation of a basement impact assessment. The reader is referred to Section 4 for full information. However, a summary of the hydrogeological and hydrological conditions determined from the aforementioned site investigations is provided below.

The site investigations were reviewed to confirm the anticipated absence of any continuous body of shallow groundwater. There are no known ponds, streams or drainage ditches on or adjacent to the site.

During the original RSK investigation a single groundwater seepage was encountered at a 13.00m bgl.

Observations made during RSKs recent site works and subsequent groundwater monitoring indicates that water is present at the site in the following settings:

- Perched water was locally encountered during the site works within BH3 at a depth of 4.30m bgl (75.84m AOD) and may represent a perched body of water behind the existing reservoir wall and between a secondary / additional reservoir buttress.

- Minor seepages were encountered within WS5 and WS6, in the Made Ground at depths of between 3.25m bgl (76.75m AOD) and 3.80m bgl (76.00m AOD). On completion of drilling these were at 2.60m bgl (77.30 m AOD) and 6.02m bgl (73.78m AOD), respectively.

- Groundwater was encountered at depth in the London Clay in BH1 at 29.50m bgl (50.40m AOD), as a seepage, associated with the presence of a claystone at that depth. Groundwater was not encountered during drilling of BH2, although slurry was noted in the base of the borehole on the morning of the third day of drilling. The borehole was dry on completion.

- Groundwater monitoring undertaken within BH1 and BH2 in April and May 2017 indicate a standing water level of between 6.62m bgl (73.22 m AOD) and 7.37m bgl (72.53m AOD). This suggest the London Clay is saturated to an elevation of approximately 73.2m AOD)

3 PROPOSED DEVELOPMENT

The proposed development will comprise the construction of six apartment blocks, consisting of 4 storeys above ground plus 2 levels of basement. The second level of part basement will include the excavation of a further 1.4m of soil over the eastern portion, below the existing reservoir floor slab level.

The existing reservoir retaining walls will be retained on three sides, (north, west and south), and partly incorporated into the scheme, with the basement and lower basement boxes being constructed within the footprint of the existing reservoir, albeit with the lower (2nd) part basement level being excavated a further 1.4m below the existing slab level (~71.6m AOD). The first basement level will occupy the entire internal area of the reservoir, and house a fitness centre, plant room, communal entertainment rooms across the western half, and residential apartments across the central and eastern extent. The lower basement level will only occupy the eastern half of the existing reservoir footprint, and house residential apartments that will open out to landscaped gardens across the easternmost part of the site. Because of the limited area occupied by the lower basement level, there will be a significant up-filling across the western extent of the reservoir footprint to raise the existing level to the formation level of the first basement (~75m AOD). The existing site surface level will be lowered to be consistent with street level to the west such that the new ground floor is level with the existing street level to the west at ~77.5 to 78m AOD.

The six blocks will appear separate from ground level up, but will be joined by a common basement and lower basement level.

The development will include areas of soft landscaping, including construction of a substantial reinforced earth slope along the northern boundary in the eastern part of the site, and significant cut slopes to the eastern and south-eastern boundaries. These cut slopes will extend to lower (2nd) basement level. There will be an open outdoor communal landscaped area to the east of the buildings at this level. The proposed slopes will include toe and crest drainage to control surface and groundwater flow through the slopes.

The new structures will be supported on piled foundations. Column loads for the proposed development range from 1500kN to 3500kN. Final pile loads are anticipated to be in the region of 1200kN to 1800kN.

The development will include the general reduction of surface level across the site from the existing level of approximately 79.5m AOD to 80.0m AOD, to level with the adjacent road on Gondar Gardens at approximately 78m AOD. The lowering of the second basement level will see the level drop from 72.4m AOD to 71.0m AOD across the eastern extent of the development.

Proposed engineering plans and sections for the development are included in the aforementioned BIA report by Waterman Group Ltd.

The upper (1st) basement level will be constructed within the confines of the existing retaining walls to reservoirs and it is proposed to prop these in the temporary condition and construct a concrete liner wall in board to provide support in the permanent condition. Three retained courtyard areas are also proposed where the existing brick retaining wall

to the former reservoir will be left exposed. Ground anchors will be installed to provide support to the former reservoir wall in the permanent condition in these locations. The inclusion of reinforced concrete slabs at basement level will form additional rigid propping arrangement in the permanent condition to the existing retaining wall.

In order to facilitate construction of the lower (2nd) basement level, which will include the removal of significant volumes soil, it is proposed to construct new retaining walls along the northern, western and southern elevations of the part basement. It may be possible to construct the retaining walls in an open cut, particularly on the western elevation, but given the presence of groundwater above the basement it is considered likely that some form of embedded wall will be required unless reasonably shallow cut slopes (i.e. 1v:2h) can be accommodated due to the presence of groundwater.

4 STAGE 1 - SCREENING

This section of the report provides information for the purpose of screening in accordance with CPG4 and addresses all questions raised within the relevant sections of that document. The Table summarising the screening flowchart for Land Stability Screening is shown as **Table 2**. In accordance with procedure, where a 'yes' or 'unknown' response is returned, the potential issue is taken to the scoping stage in **Section 5**.

Table 2: Land Stability Screening

Question		Answer	Evidence/Comment
1	Does the existing site include slopes, natural or manmade, greater than 7°?	Yes	See Section 5 (Scoping)
2	Will the proposed re-profiling of landscaping at the site change slopes at the property boundary to more than 7°?	No	The existing slope in the eastern boundary of the slope will be retained in its current configuration, with no re-profiling/landscaping. The existing slope to the southern boundary will be reduced in height by approximately 2m from a current elevation of approximately 79m AOD, down to an elevation of 77m AOD, but no re-profiling of the remaining section of slope will be completed as part of the work.
3	Does the development neighbour land, including railway cuttings and the like, with a slope greater than 7°?	No	The existing slopes in the east and southern parts of the site, slopping down to the eastern and southern site boundaries respectively, fall within the confines of the site boundary. The neighbouring land beyond these slopes does not contain slopes of greater than 7°,
4	Is the site within a wider hillside setting in which the general slope is greater than 7°?	No	Figure 16 of the ARUP guidance document (Ref: 213923) which supports CPG4, indicates that slopes in the site area are locally in the range 7° to 10°, although the regional slope in the site area is generally <7°. The wider site area is urbanised and as such the regional slope in the site's vicinity is likely to have been cut or altered historically due to development and landscaping.
5	Is the London Clay the shallowest stratum at the site?	Yes	See Section 5 (Scoping)
6	Will any tree/s be felled as part of the proposed development and/or are any works proposed within any tree protection zones where trees are to be retained?	Yes	See Section 5 (Scoping)
7	Is there a history of seasonal shrink-swell subsidence in the local area, and/or evidence of such effects at the site?	No	There is no immediate or direct evidence of seasonal shrink-swell effects on site. However, given that the underlying natural ground is high volume change potential London Clay there is potential for such effects, but it is not known whether there are any structures that have been affected in the wider area, and in any case, these would be unrelated to the subject site

Question		Answer	Evidence/Comment
			and proposed development.
8	Is the site within 100m of a watercourse or a potential spring line?	No	There are no watercourses within 100m of the site. The Claygate Member/London Clay boundary is a potential spring line, but this boundary is up-gradient of the site and cannot, therefore, be affected by the site itself.
9	Is the site within an area of previously worked ground?	Yes	See Section 5 (Scoping)
10	Is the site within an aquifer? If so, will the proposed basement extend beneath the water table such that dewatering may be required during construction?	No	The site is underlain by generally between 3.20m and 6.00m (locally 10.30m) Made Ground and a significant thickness of the London Clay Formation. The latter is classified as a non-aquifer (non-productive stratum). Therefore, the site does not lie above an aquifer. Perched water seepages have been encountered locally within the Made Ground, with water ponding on top of the impermeable London Clay, and seepages within the London Clay have also locally been recorded. Monitoring of standpipe piezometers indicates that the London Clay is saturated from an elevation of ~73.20m AOD. Although this groundwater may constitute ground a 'water table', given the very low permeability of the London Clay, any seepage of this water is likely be minimal and any likely requirement to control groundwater in excavations should be easily done with sump pumping during the temporary works. In the permanent case toe drainage will be included in the proposed slopes in the eastern part of the site at lower (2nd) basement level to control groundwater flow. The temporary control and subsequent permanent exclusion from the basement excavation is likely to cause only a very localised draw down of the groundwater table, and will be unlikely to have any effect on either the short-term or long-term groundwater regime or ground stability in the wider area.
11	Is the site within 50m of the Hampstead Heath ponds?	No	
12	Is the site within 5m of a highway or pedestrian right of way?	Yes	See Section 5 (Scoping)
13	Will the proposed basement significantly increase the	Yes	The proposed structure is detached and separated from neighbouring

Question		Answer	Evidence/Comment
	differential depth of foundations relative to neighbouring properties?		properties and foundations to the nearest neighbouring properties of South Mansions and Chase Mansions have been shown to be outside of the 45° active wedge behind the retaining wall. (See aforementioned BIA report for developments plans). Thus, although foundation depths are likely to be variable within nearby properties (both in terms of elevation differences and different types of foundations) it is considered that there will be no impact in relation to differential foundation depths from the proposed development. Notwithstanding the above, potential damaging movements could occur due to proposed construction. These latter issues are addressed in Section 5 (Scoping).
14	Is the site over (or within the exclusion zone of) any tunnels?	No	There are no known tunnels, tunnel exclusion zones, or other buried infrastructure directly beneath the site that could be affected by the proposed redevelopment of the site.

5 STAGE 2 – SCOPING

As defined in CPG4, the scoping stage is used to identify the potential impacts of the proposed scheme for each of the matters of concern identified in the previous screening stage (i.e. those questions answered with a “yes” or “unknown” response). The section below presents statements that define further the matters of concern identified at the screening stage, with respect to Land Stability only. Matters of concern, identified in the screening stage, regarding hydrogeological and hydrological matters is dealt with in a separate report. The data summarised in **Section 2** and **Section 3** has been used to develop a conceptual ground model to carry out the scoping stage.

5.1 Land Stability Scoping

5.1.1 QUESTION: Does the existing site include slopes, natural or manmade, greater than 7^{o}?

POTENTIAL IMPACT: Local slope stability within the site.

The eastern boundary of the sites is marked by an approximately 22° slope, which reduces the level from 79 m AOD to 75 m AOD, down to rear gardens of residential terraced houses.

The southern boundary is marked by an approximately 17° slope at the eastern end, which reduces level from approximately 78.5 m AOD to 72.5 m AOD, down to rear gardens of residential terraced houses. The slope reduces in height from east to west along the southern boundary, to adjacent to the mansion block at the western end of the southern boundary, where the slope is reduced in height to approximately 1 m, reducing levels from approximately 80.0 m AOD to 79.0 m AOD.

These slopes are currently heavily vegetated with mature and semi-mature trees and bushes of a variety of species. The eastern slope is to be maintained in its current configuration as part of the proposed development. Whilst the eastern end of the southern slope will be reduced in height by up to 2m. The retained section of the southern slope will not be re-profiled as part of the development and none of the existing vegetation removed.

Observations made at the site have not revealed any significant issues associated with the stability of the existing slopes and the slopes have been in place for more than 100 years, although it is acknowledged that given the slope angle and the formative soils the slope is likely to be close to its limiting state of equilibrium. However, it is highly likely that the roots of the mature vegetation on this slope are playing a beneficial role in maintaining slope stability through their binding effect.

Under the proposed development plans no works are proposed for these areas and the trees on the slope are to be retained, with a suitable root protection zone and tree protection area provided, which will protect the slope from any potentially damaging vehicle movements and within which ‘no dig’ construction activities are prescribed.

In order to facilitate the construction of the basement box for the lower (2nd) level basement, it is proposed to batter back the excavation down to formation level with slopes of some 26° in the temporary condition.

New cut slopes are proposed in the eastern part of the site, which will include the construction of a substantial reinforced earth slope with a gradient of 1:1.4 along the northern boundary, and significant cut slopes to the eastern and south-eastern boundaries with gradients of 1:3 and 1:2 respectively. These will be designed to ensure stability in both the short term and long term case.

The implications associated with these proposals are further discussed in Section 7.0.

In addition, it should be ensured in the detailed design that there are no landscaping or groundworks activities in the vicinity of the slope that might potentially steepen the slope or remove its toe, or otherwise reduce the factor of safety on stability.

5.1.2 QUESTION: Does the development neighbour land, including railway cuttings and the like, with a slope greater than 7°?

POTENTIAL IMPACT: Slope stability within neighbouring site(s).

Figure 16 of the ARUP guidance document (ref: 213923) which supports CPG4, indicates that slopes in the site area are locally in the range 7° to 10°, although the regional slope in the site area is generally <7°. The site area is urbanised and as such the slopes in the site's vicinity are likely to have been cut or altered historically due to development and landscaping.

With reference to topographical site plans, there are no identified significant slopes across the sites boundaries to the west, or north. This entire area generally follows the local trend of sloping towards the southeast at angle ≤7°, albeit locally modified by landscaping within individual plots.

Therefore, it is considered that there are no significant slopes in neighbouring land that could potentially be affected by the proposed works at this site.

5.1.3 QUESTION: Is the London Clay the shallowest stratum at the site?

POTENTIAL IMPACT: The London Clay is prone to seasonal shrink-swell (subsidence and heave)

The existing reservoir building on site and the proposed development are detached from any adjacent structures and do not share any party walls or foundations. The new structure will have basement levels and will be supported on a piled foundation and the foundations will not, therefore, be at any risk from seasonal shrink-swell.

Similarly, given the wide separation between adjacent properties, it is considered highly unlikely that the proposed development could affect changes to the 'shrink-swell' regime at the site that could extend beyond the site boundary to affect other structures in the area.

5.1.4 QUESTION: Will any tree/s be felled as part of the proposed development and/or are any works proposed within any tree protection zones where trees are to be retained?

POTENTIAL IMPACT: The soil moisture deficit associated with felled trees will gradually recover. In high plasticity clay soils (such as the London Clay and the Made Ground comprising reworked London Clay) this will lead to gradual swelling of the ground until it reaches a new value. This may reduce the soil strength which could affect ground stability.

Eleven trees and / or mature shrubs are to be removed in the south-western corner of the site as part of the development. Several of these trees are located within the footprint of the proposed development and as such will require removal. There is no basement excavation works in this part of the site, as the new basement structure will be constructed within the existing reservoir structure, therefore, any soils that are desiccated due to tree-related soil moisture deficit will remain after construction and, therefore, could present a risk outwith the site boundary. The effects of potential lateral pressures on retaining walls in the proposed development should be considered should any desiccated soils remain, however, given that the trees postdate the construction of the reservoir, the soils may simply return to equilibrium levels with little or no swelling pressure imparted on the retaining walls.

In addition, tree ID's T12 (unidentified - ~6m high), T14 (Elder - ~6m high) and T9(unidentified - ~6m high) and shrub ID's S10, S16 (unidentified - ~4m high) are all located within very close proximity to the northern elevation of Chase Mansion, and thus any swelling of the clay may present a risk to the property's foundations.

An assessment of the influence of this tree (based on worst case conditions of high volume change potential, high water demand and the mature heights of the identified species, from NHBC Chapter 4.2) demonstrates that removal of this tree could have an impact on the foundations of Chase Mansions. However, at this stage we do not consider it to be a significant risk, on the basis that the trees postdate the construction of the reservoir and no damage is noted within the property due to shrinkage effects.

Access to the adjacent properties was not permitted at the time of the ground investigation, however, prior to any works access will need to be agreed with neighbouring properties in order to carry out additional investigation works to determine the foundations to these properties and allow for an assessment of the potential impacts of tree removal.

It is therefore considered that proposed tree removal is unlikely to significantly impact neighbouring structures, and any potential influence may be easily mitigated and should be assessed following confirmation of the adjacent buildings foundation make up.

5.1.5 QUESTION: Is the site within 5m of a highway or pedestrian right of way?

POTENTIAL IMPACT: Excavation for a basement may result in damage to the road, pavement or any underground services buried in trenches beneath the road or pavement.

The western boundary of the site lies immediately adjacent to the pavement along Gondar Gardens.

There is the potential for ground movements associated with development to impact the adjacent road, although these will be minimal given the new basement will be constructed within the existing reservoir structure, and that no additional excavation is planned in the western end of the site, with only upfilling occurring in this part of the reservoir. An impact assessment addressing this issue is reported in **Section 7**.

5.1.6 QUESTION: Will the proposed basement significantly increase the differential depth of foundations relative to neighbouring properties?

POTENTIAL IMPACT: Excavation for a basement may result in structural damage to neighbouring properties/structures if there is a significant differential depth between adjacent foundations.

The proposed structure is detached and separated from neighbouring properties and foundations to the nearest neighbouring properties of South Mansions and Chase Mansions have been shown to be outside of the 45° active wedge behind the retaining wall. Thus, although foundation depths are likely to be variable within nearby properties (both in terms of elevation differences and different types of foundations) it is considered that there will be no impact in relation to differential foundation depths from the proposed development.

Notwithstanding the above, potential damaging movements could occur due to proposed construction. These latter issues are addressed in Section 7 (Scoping Assessment).

As part of this assessment the following nearby structures have been identified as being potentially at risk from damaging ground movements:

The highway of Gondar Gardens beyond the western boundary;

South Mansions, located along the western extent of the southern boundary of the site.

Chase Mansions, located along the western extent of the northern boundary of the site.

An impact assessment addressing these issues is reported in **Section 7**.

6 STAGE 3 – SITE INVESTIGATION AND STUDY

As previously noted, a full desk study, and two intrusive site investigations and monitoring programmes was undertaken at the site by RSK between December 2009 and March 2017, as detailed in the report 'Gondar Gardens Geo-environmental and Geotechnical Assessment, (ref 23283-1 (00), dated December 2009), and Gondar Gardens Geo-Environmental / Geotechnical Site Investigation Report (ref 371487-02(01), dated May 2017). The investigations are compliant with the data requirements as set out in Appendix G of 'Camden Geological, Hydrogeological and Hydrological Study' produced for Camden by ARUP in November 2010

The results of reports have been utilised to inform the scoping stage of the BIA and the current assessment draws on the results of that report. For full details, reference should be made to the original report, a copy of which is provided in the aforementioned Waterman Structures Limited BIA report.

7 STABILITY ASSESSMENT

As part of this report the client has requested that an assessment is undertaken to estimate the likely magnitude of ground movements associated with the proposed development and potential resulting damage to the adjacent properties of Chase Mansions to the north and South Mansions to the south. In addition to this we have been asked to complete a slope stability analysis to assess the stability of the proposed cut slopes in the eastern part of the site. This information is required as part of the planning submission for the proposed development. This sections details the findings of this work.

7.1 Summary of Modelling Approaches

7.1.1 Assessment of Vertical Ground Movements

To assess the magnitude of vertical ground movements associated with the proposed development a settlement / heave analysis has been completed using the OASYS PDISP 19.3 software produced by ARUP to assess the likely ground movements to be expected from the proposed development activities.

The PDISP computer package adopts the Boussinesq method of elastic analysis to calculate the stresses and strains generated within the soil, due to an applied loading and determines the associated displacements by integrating the vertical strains. Settlements are defined as positive movements and heave as negative movements.

The loads applied in the PDISP model are split into two elements; negative loads to represent unloading (demolition of existing structures and / or basement excavation) and positive loads to represent reloading or construction. The negative loads have been applied at a level at which they are considered to be acting; at the existing reservoir slab level, at the new proposed deeper basement excavation, at the base of the proposed foundations, and at levels at ground surface to represent the reduction in levels associated with lower the site surface elevation to level with the adjacent road. More information into the construction sequence modelled in contained in Section 5.3.

7.1.2 Assessment of Potential Building Damage

Likely ground movements and building strains associated with basement construction can be estimated in two ways: by using empirical information contained in CIRIA C580 Embedded Retaining Wall using the OASYS XDISP 19.4.0.4 software, or using computer analysis employed to model the basement excavation and the basement and building construction to determine vertical ground movements associated with the various stages of construction. The XDISP programme can then be used to combine the ground displacements determined from the numerical analyses in PDISP to with those from the CIRIA C580 assessment, and using the resulting displacements determine the strains that are likely to be induced in neighbouring buildings to derive a likely damage classification.

For this project in light of the fact that the proposed new basement will constructed within the existing reservoir retaining walls, it is not considered appropriate to complete an empirical assessment of likely building damage due to the installation of an embedded retaining and subsequent excavation in front of the wall, as the existing reservoir retaining walls and excavation have long been completed. In addition, reference to drawing No.STR-SA-03-0092-A01, showing the relationship between the existing foundations of neighbouring properties and the reservoir / basement retaining wall, indicates that the foundations fall outside of a 45^{o} wedge behind the retaining wall.

In this case, the results of numerical modelling for various construction stages have been imported into the XDISP software and an assessment of potential damage for each stage has been completed using the C580 approach of assessing lateral strain and deflection ratio to determine potential damage category.

7.1.3 Slope Stability Assessment

The development will include the construction of a substantial reinforced earth slope along the northern boundary in the eastern part of the site, and significant cut slopes to the eastern and south-eastern boundaries. For this analysis three critical slope profiles have been considered, Section 1, Section 2 and Section 3 from drawing Reference 525-S-00-001 (Rev P05), a copy of which is included in Appendix A of the Watermans Structures Limited BIA report.

To assess the stability of these slopes RSK have conducted slope stability analyses for the aforementioned slope cross-sections using the Oasys SLOPE computer package developed by Arup, using an EC7 approach.

7.2 Ground Model and Soil Parameters Used in the Assessment

The soil parameters used for the analyses are summarised in **Table 3.** These have been assessed by a combination of laboratory testing and a comparison of the borehole in-situ testing results with available published data. Furthermore, where parameters could not be derived directly, engineering judgement has been used to assign suitable values

Table 3: Soil Parameters for Analyses

Material	Strength Characteristics		Poissons Ratio ν		Undrained and Drained Stiffness		Long Term Strength Characteristics	
	SPT N Values	C_u (kN/m^2)	Undrained	Drained	E_u (kN/m^2)	E' (kN/m^2)	c' (kN/m^3)	ϕ' (°)
Fill	N/A	N/A	0.5	0.2	20000	16,000	0	25
Made Ground (Cohesive)	8 - 21	36 – 94.5	0.5	0.2	20000	16,000	1	25

Material	Strength Characteristics		Poissons Ratio ν		Undrained and Drained Stiffness		Long Term Strength Characteristics	
	SPT N Values	C_u (kN/m^2)	Undrained	Drained	E_u (kN/m^2)	E' (kN/m^2)	c' (kN/m^3)	ϕ' (°)
London Clay (Cohesive)	16 – 81*	60 + 6.6z kN/m^2,	0.5	0.2	24,000 + 2640z	19,200 +2109z	5**	25**

* Extrapolated SPT N value

** Based on results of back analysis of existing slopes and a single Consolidated Undrained Triaxial Test. NB: Three CU TXL tests are currently outstanding and results of analysis will be reviewed once testing results are available.

The undrained Young's Modulus (E_u) has been obtained using the relationship of $E_u = 400c_u$ (for Taplow Gravel - cohesive) . The drained Young's Modulus (E') has been obtained using the relationship of $E' = 0.8E_u$.

The ground model used in the PDisp and SlopeW is outlined below:

- GL (78.5m AOD) to 4.5mbgl (74m AOD) = Made Ground (Cohesive)
- 4.5m (74m AOD) to 50mbgl (28.5m AOD) = London Clay (Cohesive)
- Groundwater conditions for the slope analysis have been taken to be hydrostatic within the London Clay and an adopted Ru = 0.15 for the cohesive Made Ground to make some allowance for perched water.

7.3 PDISP Modelling

7.3.1 Construction Stages

1. **Demolition – Short Term**. This has been carried out by calculating the deflections at the existing ground level, and existing reservoir slab level, that would result from unloading the existing reservoir foundations assuming undrained soil parameters. Deflections have also been assessed at the locations of the southern and northern elevations of Chase Mansions and South Mansions respectively.

2. **Demolition and Basement Excavation – Short Term.** This has been calculated by the removal of an overburden pressure equal to 20kN/m^2 (1 x 20 = 20, where 20kN/m^3 is unit weight of soil) over the area of the proposed lowering to formation level of the second level basement area using undrained soil parameters. Where uplifting is required to form the formation level of the 1st level basement, a load of 50kN/m^2 (2.5 x 20 = 50, where 20kN/m^3 is unit weight of the placed soil) has been applied acting over

the existing reservoir slab level. Two further areas of removal of overburden have been included to represent the lowering of surface ground level by 1.5m. The additional removal of overburden pressures are equal to 30kN/m2 (1.5 x 20 = 30, where 20kN/m^3 is unit weight of soil) has been applied.

3. **Future Construction – Long Term**. This stage considers stages 1 and 2 along with loading of the new piles. The pile loads were modeled as equivalent circular areas located at a depth of 2/3 the length of the piles with a 1 in 4 load spread. Drained soil parameters have been adopted for this analysis.

7.3.2 Results

The results of the PDISP analysis are summarised within **Table 4**. The values quoted in the tables represent the maximum heave / settlement values recorded at the relevant elevation of each of the listed features.

Plots (also provided in Appendix B) have also been provided showing maximum vertical displacements across the basement area. The sign convention adopted in both the plots and tables below is that a negative vertical displacement denotes heave.

Table 4: PDISP Analysis of the proposed structure & Gondar Gardens

Analysis Cases	Existing Reservoir Slab Level – 72.4m AOD Movement (mm)		Ground Level Movement (mm)		Proposed 2nd Lower Basement Level – 71.0mAOD Movement (mm)		Proposed 1st Basement Level – 75m AOD Movement (mm)		Gondar Gardens Road – 78m AOD	
	Short Term	Long Term	Short Term	Long Term	Short Term	Long Term	Short Term	Long Term	Short Term	Long Term
Demolition	-10.50	N/A**	-2.5	N/A**	N/A	N/A	N/A	N/A	<-1	N/A**
Demotion & Excavation	9*	N/A**	-10.75	N/A**	-18	N/A**	N/A	N/A**	<-1	N/A**
Future Construction	N/A	44	N/A	20 (W)*** 9 (NW)*** -8 (NE)*** 7 (SW)*** -14 (SE)***	N/A	-20	N/A	38	N/A	10.5

* Settlement under uplift material
** Included in net results of Future Construction long term model results
*** Position around Perimeter of basement
Short Term – generally during construction (< 1 year)
Long Term - generally 10 to 20 years
Negative sign annotation indicates heave; Positive sign annotation indicates settlement

7.4 Assessment of Damage to Adjacent Properties

CIRIA 580 provides a methodology to assess the potential damage to properties within the zone of influence of the basement excavation. Figures 2.16 and 2.18 of CIRIA 580 summarise this approach. This methodology uses the relationship between Damage Category, lateral strain and deflection ratio developed by Boscardin and Cording (1989) and Burland (2001).

The definition of the categories is presented in **Table 5** below. The categories assume brick masonry with cement mortar and as such represent a conservative estimate of likely damage that will occur at these properties.

Table 5: Classification of damage category (from Table 2.5, CIRIA C580)

Category of damage	Description of typical damage	Approximate crack width (mm)	Limiting tensile strain ε_{lim} (%)
0 Negligible	Hairline cracks of less than about 0.1mm are classed as negligible.	<0.1	0.0- 0.05
1 Very slight	Fine cracks that can easily be treated during normal decoration. Cracks in external brickwork visible on inspection.	<1	0.05–0.075
2 Slight	Cracks easily filled. Redecoration probably required. Cracks are visible externally and some repointing may be required externally to ensure watertightness. Doors and windows may stick slightly.	<5	0.075 – 0.15
3 Moderate	The cracks require some opening up and can be patched by a mason. Repointing of external brickwork and possibly a small amount of brickwork to be replaced. Doors and windows sticking. Service pipes may fracture. Weathertightness often impaired.	5 – 15 or a number of cracks >3	0.15 – 0.3
4 Severe	Extensive repair work involving breaking-out and replacing sections of walls, especially over doors and windows. Windows and frames distorted, floor sloping noticeably. Walls leaning or bulging noticeably, some loss of bearing in beams. Service pipes disrupted.	15 – 25 but also depends on number of cracks	>0.3
5 Very severe	This requires a major repair involving partial or complete rebuilding. Beams lose bearings, walls lean badly and require shoring. Windows broken with distortion. Danger of instability.	Usually >25 but depends on number of cracks	

For this project in light of the fact that the proposed new basement will constructed within the existing reservoir retaining walls, and that the existing foundations to adjacent properties are considered to be outside of the zone of influence of the active wedge behind the retaining wall it is not considered appropriate to complete an empirical assessment of likely building damage due to the installation of an embedded retaining and subsequent excavation in front of the wall, as the existing reservoir retaining walls and excavation have long been completed. In this case the results of numerical modelling for various construction stages have been imported into the XDISP software

and an assessment of potential damage for each stage has been completed using the C580 approach of assessing lateral strain and deflection ratio to determine potential damage category.

From the development drawings supplied by Waterman Group Ltd and details known about the former development construction we are able to derive a suite of parameters to assist in the completion of this portion of the assessment. Where site specific information is not known then conservative assumptions have been made. For the purpose of the modelling the proposed basement shape is included for the model to determine the distance from the basement to the face of the property, but no empirically derived impact from wall installation or excavation is included in the calculation of lateral strain and deflection ration.

On the basis of the available information, a summary of the specific dimensions and construction details used for these analyses are presented in **Table 6** and **Table** 7 below.

Table 6: Specific dimensions used for analyses

Adjacent Property	Adopted Excavation Depth (m.bgl)	Approximate Distance to Face of Property (m)	Approximate Length of Property Perpendicular to Basement (m)
Chase Mansions	3.50*	5.00	12.00
South Mansions	3.50*	9.80	13.00 (W) 6.00 (E)
* Depth of 1st level basement adjacent to properties.			

Table 7: Specific construction details

Adjacent Property	Building Material*	Building Height * (m)	Foundation Type*	Foundation Depth* (m.bgl)
Chase Mansions	Masonry	9	Strip	1.00
South Mansions	Masonry	9	Strip	1.00
Notes: *) Assumed values				

These parameters have then been used to determine the displacements and horizontal tensile strains and deflection ratios for the adjacent properties in the way described below.

7.4.1 Results of Empirical Assessment of Ground Movements and Building Strains

A summary of estimated ground movements at the front and rear of the adjacent properties and the calculated horizontal strains and deflection ratios for each property during the key stages of construction are presented in Tables 8 to 13.

7.4.1.1 Demolition of Existing Building

A summary of the estimated ground movements likely to be experienced during the demolition stage are presented in **Table 8**.

Table 8: Ground Movements Resulting from Demolition

Adjacent Property	Ground Movement at Front of Adjacent Property		Ground Movement at Rear of Adjacent Property	
	Lateral (mm)	Vertical (mm)	Lateral (mm)	Vertical (mm)
Chase Mansions	0	-0.54	0	-0.15
South Mansions	0	-0.15	0	0.23
Notes: • Lateral displacement recorded as movement along the line. • Positive lateral displacement values indicate ground movement towards the excavation. • Negative vertical displacement values indicate ground heave.				

The resulting horizontal strains and deflection ratios are presented in **Table 9**.

Table 9: Calculated Horizontal Strains and Deflection Ratios

Adjacent Building	Horizontal Strain (%)	Deflection Ratio (%)	Damage Category
Chase Mansions	0.000	0.002	Negligible
South Mansions	0.000	0.001	Negligible

7.4.1.2 Basement Excavation

For this stage the imported deflections from PDISP were calculated including unloading associated excavation down to the 2nd lower basement level, the uplifting associated with raising the levels in the area for the 1st basement level and the lowering of surface levels to the north and south of the site.

A summary of the estimated ground movements likely to be experienced following completion of the basement excavation are presented in **Table 10**.

Table 10: Ground Movements Resulting from Basement Excavation

Adjacent Property	Ground Movement at Front of Adjacent Property		Ground Movement at Rear of Adjacent Property	
	Lateral (mm)	Vertical (mm)	Lateral (mm)	Vertical (mm)
Chase Mansions	0.0	-3.64	0.0	-0.56
South Mansions	0.0	-0.99	0.0	-0.70
Notes: • Lateral displacement recorded as movement along the line. • Positive lateral displacement values indicate ground movement towards the excavation. • Negative vertical displacement values indicate ground heave.				

The resulting horizontal strains and deflection ratios are presented in **Table 11** overleaf.

Table 11: Calculated Horizontal Strains and Deflection Ratios

Adjacent Building	Horizontal Strain (%)	Deflection Ratio (%)	Damage Category
Chase Mansions	0.000	0.011	Negligible
South Mansions	0.000	0.002	Negligible

7.4.1.3 Long Term Proposed Loading

A summary of the estimated ground movements likely to be experienced following completion of the development are presented in **Table 12**.

Table 12: Ground Movements Resulting from Long Term Loading

Adjacent Property	Ground Movement at Front of Adjacent Property		Ground Movement at Rear of Adjacent Property	
	Lateral (mm)	Vertical (mm)	Lateral (mm)	Vertical (mm)
Chase Mansions	0.000	-0.40	0.0	4.37
South Mansions	0.000	2.93	0.0	2.55
Notes: • Lateral displacement recorded as movement along the line. • Positive lateral displacement values indicate ground movement towards the excavation. • Negative vertical displacement values indicate ground heave.				

The resulting horizontal strains and deflection ratios are presented in **Table 13** below.

Table 13: Calculated Horizontal Strains and Deflection Ratios

Adjacent Building	Horizontal Strain (%)	Deflection Ratio (%)	Damage Category
Chase Mansions	0.000	0.185	Negligible
South Mansions	0.000	0.0034	Negligible

7.4.2 Conclusions

From the assessment above, it is evident that damage categories exhibited for each of the adjacent structures during the various phases of development are largely confined to Category 0 (Negligible) and as such, there does not appear to be any due cause for concern.

In order to reduce the potential for any movement over and above that expected, the following methods of safe practice should be considered prior to and during construction:

- Any temporary propping of the existing reservoir retaining walls should be installed as early as possible in the construction sequence to avoid the potential for destabilising the existing reservoir walls before support from the permanent structure is applied.

7.5 Slope Stability Assessment

7.5.1 Temporary Slopes

In order to facilitate construction of the lower (2nd) basement level, which will include the removal of significant volumes soil, it is proposed to construct new retaining walls along the northern, western and southern elevations of the part basement. It may be possible to construct the retaining walls in an open cut, particularly on the western elevation, but given the presence of groundwater above the basement it is considered likely that some form of embedded wall will be required, unless reasonably shallow cut slopes (i.e. 1v:2h) can be accommodated due to the presence of groundwater.

For temporary slopes the following should apply:

- Excavations and construction should ideally occur during periods to favourable weather;
- Loading or stockpiling of soils up slope should be avoided;
- No excavations or localised deepening should be undertaken at the base of the slope;
- Water should be channelled or drained away from the slope through the implementation and construction of temporary drainage systems where required;
- Daily inspections of the slope should be undertaken to assess any potential signs of instability or water seepages;
- Should any signs of slope instability be noted works should cease immediately; and
- Consideration may need to be given to sequencing the construction works to maintain a suitable level of stability if it is considered that the excavation cannot be undertaken in a single phase.

7.5.2 Permanent Slopes

The purpose of the slope stability analysis is to provide a check on the stability of the proposed slope profiles within the eastern part of the site. The development will include the construction of a substantial reinforced earth slope along the northern boundary in the eastern part of the site (Slope Section 2), and significant cut slopes to the eastern and south-eastern boundaries (Slope Sections 1 and 3 respectively). For this analysis three critical slope profiles have been considered, Section 1, Section 2 and Section 3 from drawing Reference 525-S-00-001 (Rev P05), a copy of which can be found in the aforementioned BIA report (reference STR13472/BIA, dated June 2017).

The soil parameters used in the slope stability analysis are summarised in Table 2 above. These have been assessed by a combination of back analysis of existing slopes, laboratory testing and comparison of the borehole in-situ testing results with available published data. Furthermore, where direct parameters could not be derived, engineering judgement was required to determine suitable values.

To assess the stability of these slopes RSK have conducted slope stability analyses for the aforementioned slope cross-sections using the Oasys SLOPE computer package developed by Arup, using an EC7 approach.

Based on the design drawings it is clear that there will be no vehicular or plant access to the top of the slopes, and on that basis no allowance has been made for the inclusion of surcharge at the crest in the models.

The cross sections analysed, together with critical circles and their respective Over-Design Factor (ODF) are shown in **Appendix D**. The results are summarised in **Table 14**.

Table 14: Analysed Slope Stability Results

Model Scenario	Slope height (m)	Slope Gradient	ODF
Proposed Section 1 (Global Stability Check)	7.1	1:3	1.121
Proposed Section 2 (Reinforced Slope) (Global Stability Check)	7.1	1:1.4	1.01
Proposed Section 3 (Global Stability Check)	4.1	1:2.3	1.024

Based upon the results of the analyses, the global stability of slopes 1 and 2 and 3, exceed the required ODF (>1.0) and it is considered these will be stable in the long term. However, the design will need to be confirmed by a specialist subcontractor and analysis revisited once a detailed design is finalised. In particular it is noted that, in the absence of a detailed specialist design, the analysis of the proposed reinforced earth slope assumed 8m lengths for the reinforcing geo-grid, which may not be practicable from a construction perspective, given the limited available space between the top of the slope and northern site boundary. It may be possible to utilise shorter lengths if a granular material is used to construct the slope, instead of reusing the excavated London Clay material. Alternatively consideration could be given to the use of soil nailing, which would negate the need to excavate and replace and may allow for cutting the slope at a steeper angle than currently proposed, although this will need to be confirmed by further analysis and detailed design by a specialist subcontractor.

It is recommended that cut slopes do not exceed a gradient of 1:2.5 or 1:3 where greater than 5m in height in the permanent case, beyond which engineered solutions should be included in the design to ensure long term stability. This assumes that there is adequate drainage provided to ensure that water does not build up in the slope, which could potential destabilise the slope.

Excavations and construction should ideally occur during periods of favourable weather and construction of the proposed slopes should be undertaken in the main earthworks season from April to September.

8 CUMMULATIVE IMPACTS

A requirement of CPG4 is to consider the aggregate (cumulative) potential for impacts associated with basement construction.

A search of publicly available planning records (dating back to 1924) on Camden's planning website revealed records of granted permissions for basement/lower ground floor development/extension or other subterranean development (e.g. swimming pool accommodation space) at twenty-four properties in the site area, as indicated on **Figure 4.**

8.1 Land Stability

From the results of the elastic displacement analyses it is indicated that in both the short-term and long-term (once building loads are applied) net movements beyond the site boundary will be negligible.

For cumulative ground movements associated with the development resultant horizontal strains and deflection ratios are very small / negligible and are unlikely to be damaging to the identified features.

The analysis undertaken to assess permanent slope stability of the proposed new slopes in the eastern part of the site has revealed that in the long term condition the proposed slope angles are acceptable.

It should be noted that the calculations undertaken as part of this assessment are necessarily preliminary and these calculations should be re-checked at the detailed design stage to ensure that more detailed predicted movements are within tolerable limits and safety factors are sufficiently high.

8.1.1 Control of ground movements

In order to reduce the potential for any movement over and above that expected, the following methods of safe practice should be considered prior to and during construction:

- Any temporary propping of the existing reservoir retaining walls should be installed as early as possible in the construction sequence to avoid the potential for destabilising the existing reservoir walls before support from the permanent structure is applied.
- Stability of cut slopes should be carefully monitored throughout the works.

FIGURES

RSK	**SITE LOCATION PLAN**	**Client:**	Lifecare Residencies Ltd	**Figure No:**	1
		Site:	Gondar Gardens, West Hampstead	**Job No:**	371487
		Scale:	NTS	**Source:**	

LEGEND

- Site Boundary
- Borehole Location
- Window Sample Location
- Trial Pit Location

Rev.	Date	Amendment	Drawn	Chkd.	Appd.

RSK

18 Frogmore Road
Hemel Hempstead
Hertfordshire
HP3 9RT
United Kingdom

Tel: +44 (0) 1442 437500
Fax: +44 (0) 1442 437550
Email: info@rsk.co.uk
Web: www.rsk.co.uk

Client

LIFE CARE RESIDENCES LIMITED

Project Title

GONDOR GARDENS,
CAMDEN,
LONDON

Drawing Title

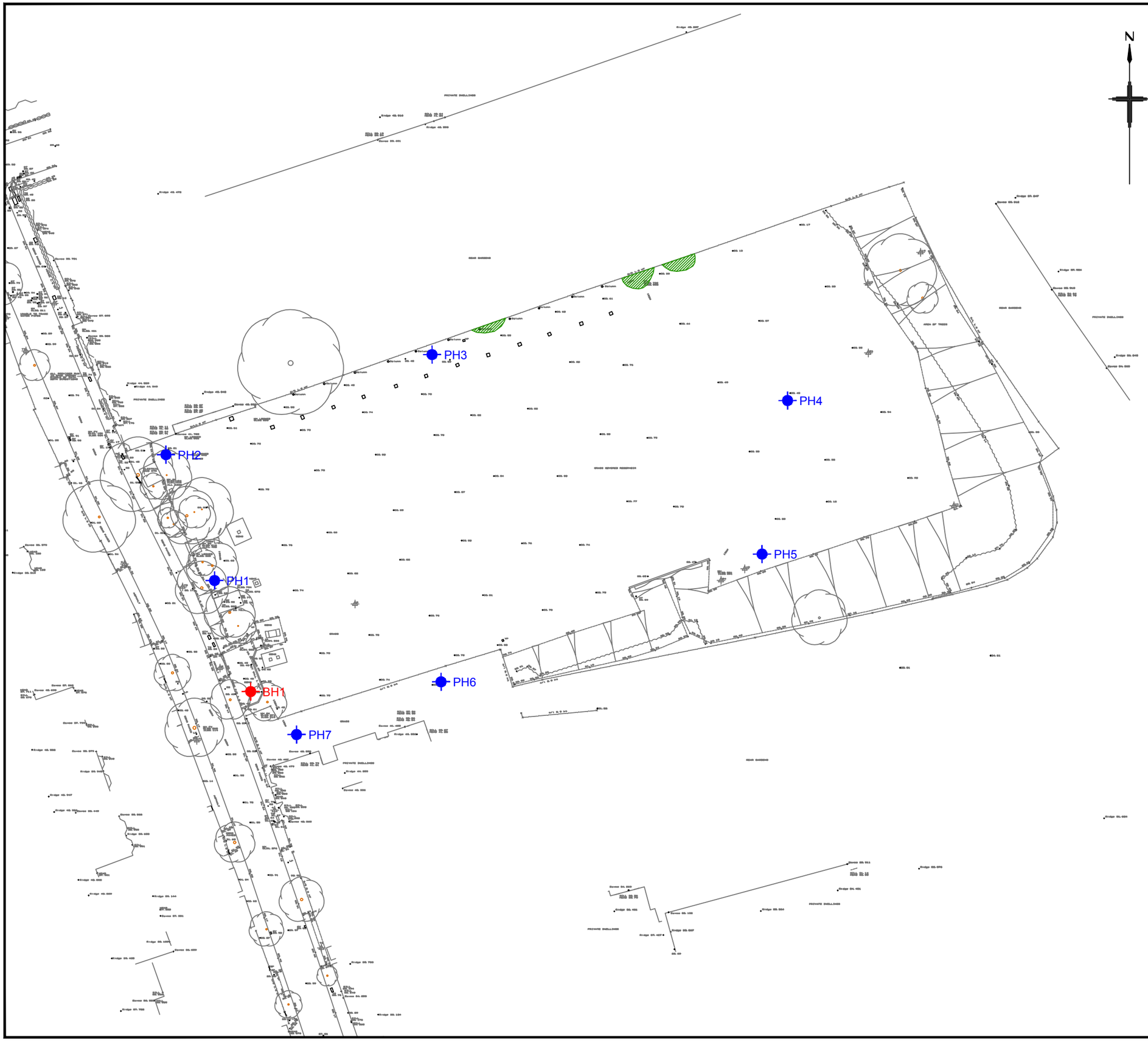
EXPLORATORY HOLE
LOCATION PLAN

Drawn	Date	Checked	Date	Approved	Date
ASC	04.05.17	MK	04.05.17	MK	04.05.17

Scale	Orig Size	Dimensions
1:600	A3	m

Project No.	Drawing File
371487 - R01 (00)	371487 (R01-00) Fig 2.dwg

Drawing No.	Rev.
FIGURE 2	P1



LEGEND

- Borehole Location
- Probehole Location
- Japanese Knotweed Identified

Rev.	Date	Amendment	Drawn	Chkd.	Appd.
P1	23.11.09	FIRST ISSUE	MDW	NT	NT

RSK GROUP PLC

18 Frogmore Road
Hemel Hempstead
Hertfordshire
HP3 9RT
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Tel: +44 (0) 1442 437500
Fax: +44 (0) 1442 437550
Email: info@rsk.co.uk
Web: www.rsk.co.uk

Client

LINDEN WATES LIMITED

Project Title

GONDAR GARDENS,
LONDON

Drawing Title

SITE PLAN

Drawn	Date	Checked	Date	Approved	Date
MDW	23.11.09	NT	23.11.09	NT	23.11.09

Scale	Orig Size	Dimensions
1:750	A3	m

Project No.	Drawing File
23283 (L01)	23283 (L01).dwg

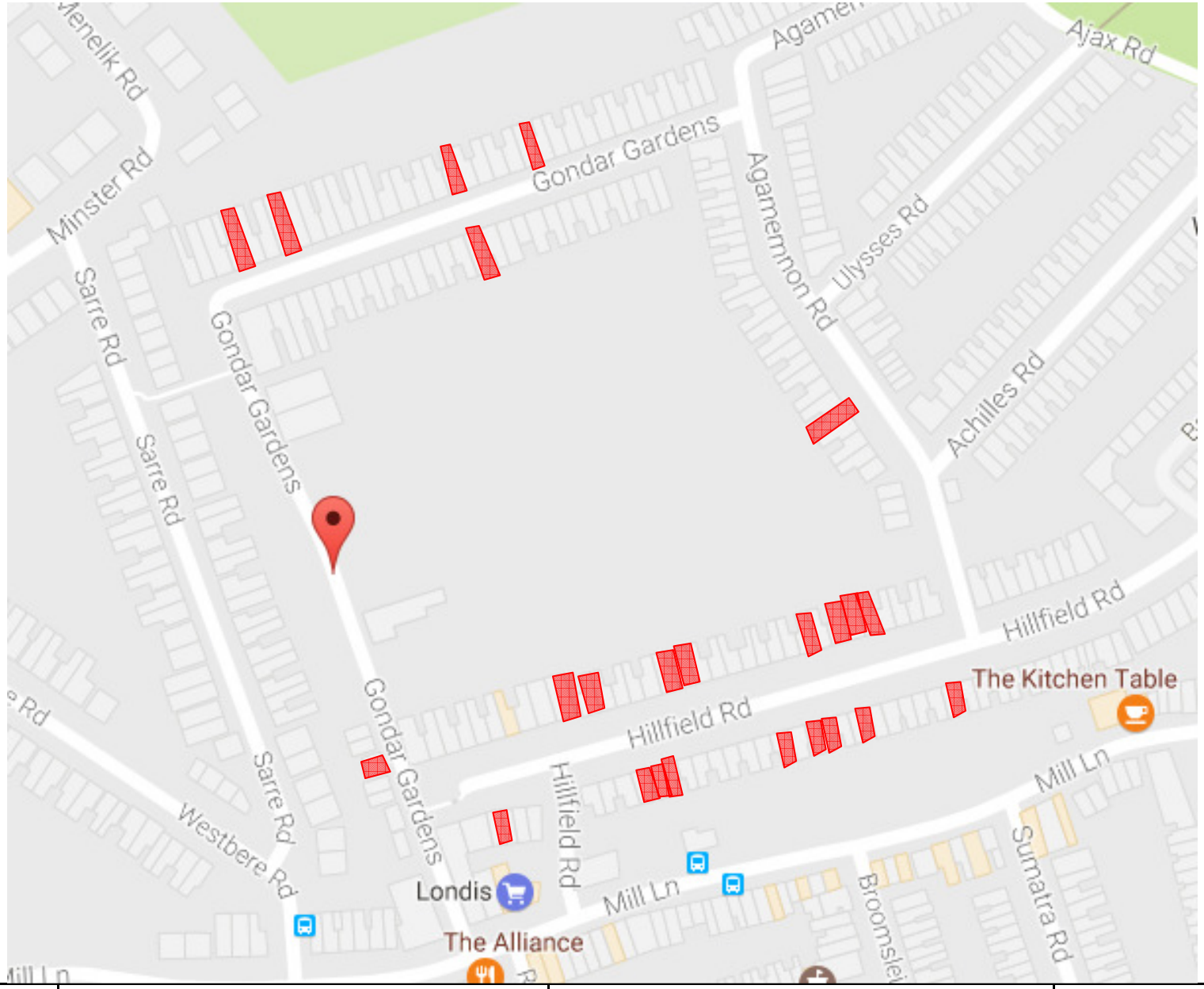
Drawing No.	Rev.
FIGURE 2a	P1

Scale 1 : 750

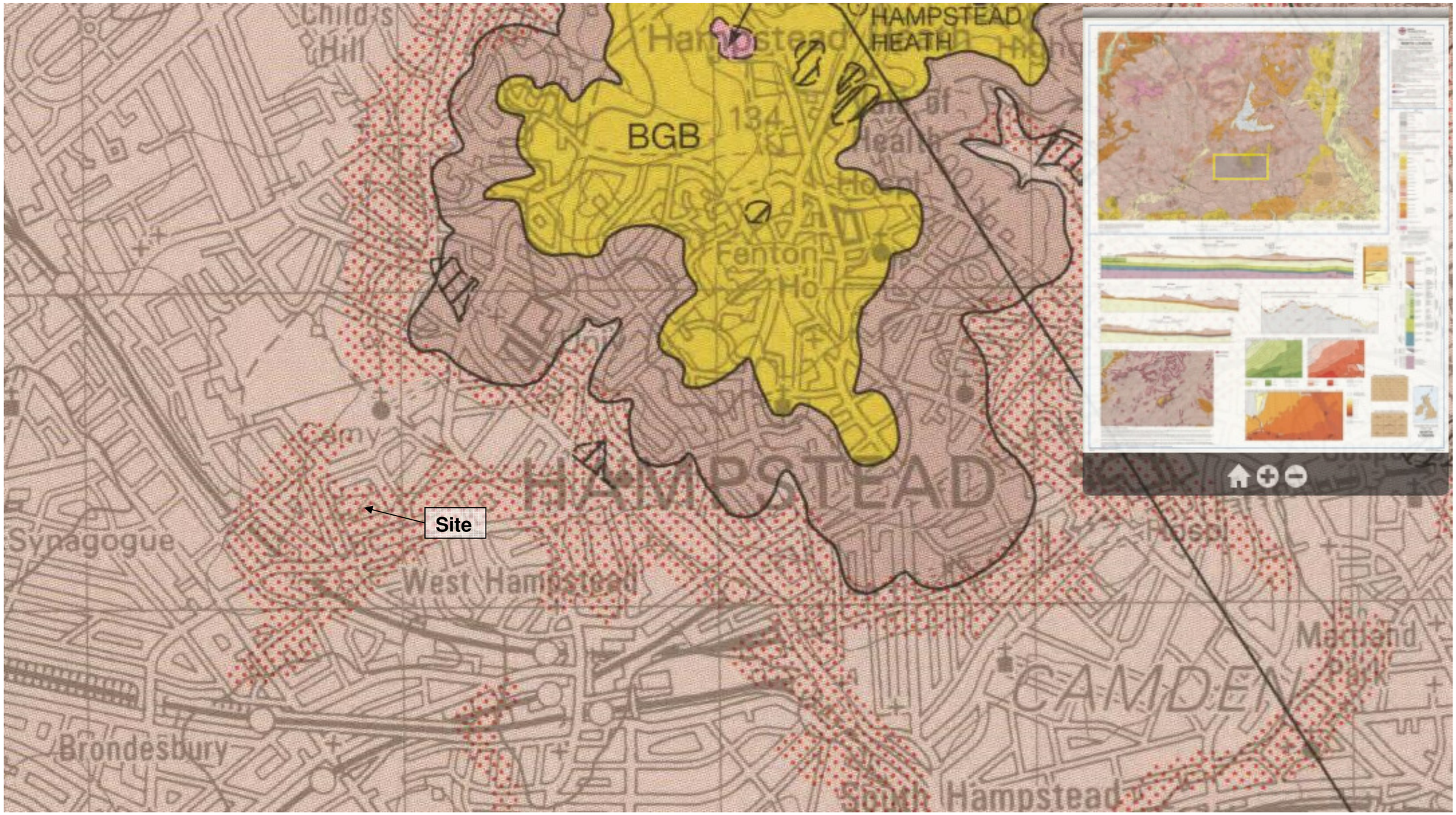
0 10 20 30 40 50m

Buildings with historical planning approvals for alterations to existing basements or new basements /subterranean structures

NB: many more buildings along all local roads have basements but that do not have planning history records



RSK	**SITE AREA PLAN – Buildings with Basement Planning History**	**Client:**	Lifecare Residencies Ltd	**Figure No:**	3
		Site:	Gondar Gardens	**Job No:**	371487
		Scale:	NTS	**Source:**	Google Mapping



GEOLOGICAL MAP EXTRACT

Client:	Lifecare Residencies Limited	**Figure No:**	4
Site:	Gondar Gardens	**Job No:**	371487-03 (00)
Scale:	NTS	**Source:**	BGS 1:10560 Sheet TQ28NE

APPENDIX A
SERVICE CONSTRAINTS

1. This report and the site investigation carried out in connection with the report (together the "Services") were compiled and carried out by RSK Environment Limited (RSK) for Lifecare Residencies Limited the "client") in accordance with the terms of a contract between RSK and the "client", dated 30th September 2015. The Services were performed by RSK with the skill and care ordinarily exercised by a reasonable environmental consultant at the time the Services were performed. Further, and in particular, the Services were performed by RSK taking into account the limits of the scope of works required by the client, the time scale involved and the resources, including financial and manpower resources, agreed between RSK and the client.

2. Other than that expressly contained in paragraph 1 above, RSK provides no other representation or warranty whether express or implied, in relation to the Services.

3. Unless otherwise agreed in writing the Services were performed by RSK exclusively for the purposes of the client. RSK is not aware of any interest of or reliance by any party other than the client in or on the Services. Unless expressly provided in writing, RSK does not authorise, consent or condone any party other than the client relying upon the Services. Should this report or any part of this report, or otherwise details of the Services or any part of the Services be made known to any such party, and such party relies thereon that party does so wholly at its own and sole risk and RSK disclaims any liability to such parties. **Any such party would be well advised to seek independent advice from a competent environmental consultant and/or lawyer.**

4. It is RSK's understanding that this report is to be used for the purpose described in the introduction to the report. That purpose was a significant factor in determining the scope and level of the Services. Should the purpose for which the report is used, or the proposed use of the site change, this report may no longer be valid and any further use of or reliance upon the report in those circumstances by the client without RSK 's review and advice shall be at the client's sole and own risk. Should RSK be requested to review the report after the date of this report, RSK shall be entitled to additional payment at the then existing rates or such other terms as agreed between RSK and the client.

5. The passage of time may result in changes in site conditions, regulatory or other legal provisions, technology or economic conditions which could render the report inaccurate or unreliable. The information and conclusions contained in this report should not be relied upon in the future without the written advice of RSK. In the absence of such written advice of RSK, reliance on the report in the future shall be at the client's own and sole risk. Should RSK be requested to review the report in the future, RSK shall be entitled to additional payment at the then existing rate or such other terms as may be agreed between RSK and the client.

6. The observations and conclusions described in this report are based solely upon the Services which were provided pursuant to the agreement between the client and RSK. RSK has not performed any observations, investigations, studies or testing not specifically set out or required by the contract between the client and RSK. RSK is not liable for the existence of any condition, the discovery of which would require performance of services not otherwise contained in the Services. For the avoidance of doubt, unless otherwise expressly referred to in the introduction to this report, RSK did not seek to evaluate the presence on or off the site of asbestos, electromagnetic fields, lead paint, heavy metals, radon gas or other radioactive or hazardous materials.

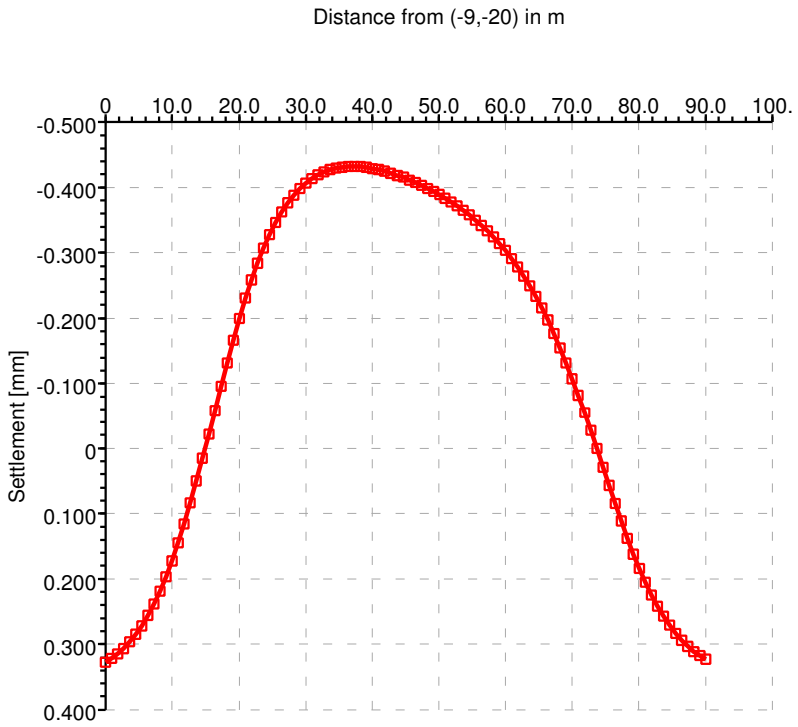
7. The Services are based upon RSK's observations of existing physical conditions at the Site gained from a walk-over survey of the site together with RSK's interpretation of information including documentation, obtained from third parties and from the client on the history and usage of the site. The Services are also based on information and/or analysis provided by independent testing and information services or laboratories upon which RSK was reasonably entitled to rely. The Services clearly are limited by the accuracy of the information, including documentation, reviewed by RSK and the observations possible at the time of the walk-over survey. Further RSK was not authorised and did not attempt to independently verify the accuracy or completeness of information, documentation or materials received from the client or third parties, including laboratories and information services, during the performance of the Services. RSK is not liable for any inaccurate information or conclusions, the discovery of which inaccuracies required the doing of any act including the gathering of any information which was not reasonably available to RSK and including the doing of any independent investigation of the information provided to RSK save as otherwise provided in the terms of the contract between the client and RSK.

8. The intrusive environmental site investigation aspects of the Services is a limited sampling of the site at pre-determined borehole and soil vapour locations based on the operational configuration of the site. The conclusions given in this report are based on information gathered at the specific test locations and can only be extrapolated to an undefined limited area around those locations. The extent of the limited area depends on the soil and groundwater conditions, together with the position of any current structures and underground facilities and natural and other activities on site. In addition chemical analysis was carried out for a limited number of parameters [as stipulated in the contract between the client and RSK] [based on an understanding of the available operational and historical information,] and it should not be inferred that other chemical species are not present.

9. Any site drawing(s) provided in this report is (are) not meant to be an accurate base plan, but is (are) used to present the general relative locations of features on, and surrounding, the site. Features (boreholes, trial pits etc) annotated on site plans are not drawn to scale but are centred over the approximate location. Such features should not be used for setting out and should be considered indicative only.

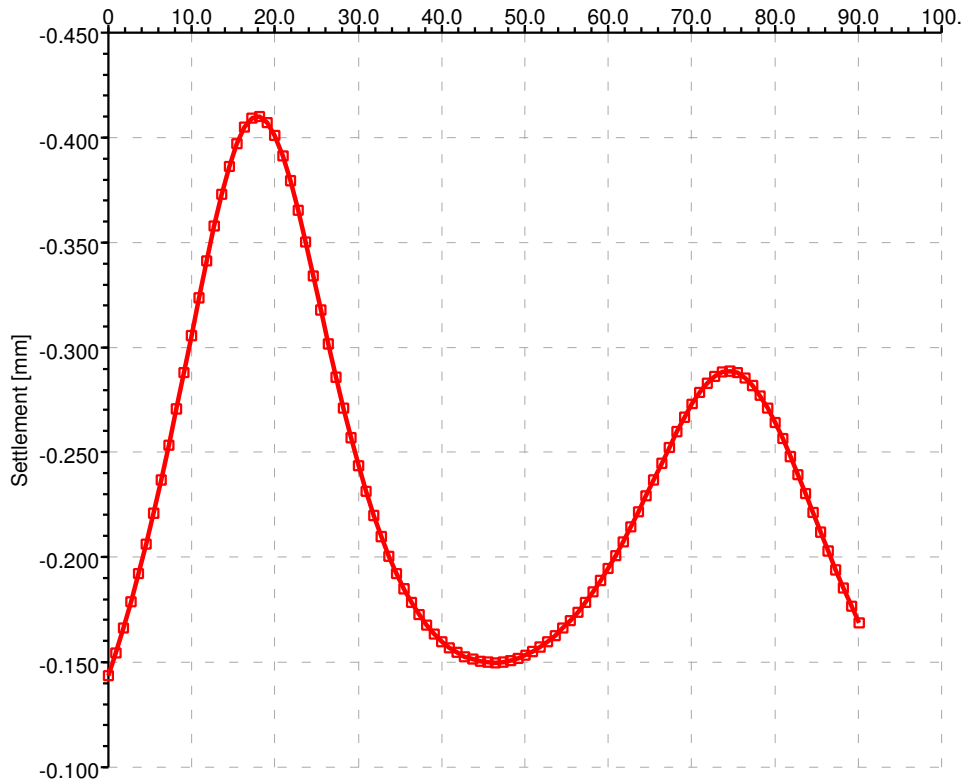
APPENDIX B
PDISP MODELLING OUTPUTS

Displacement for gondar Gardens Road



Displacement for gondar Gardens Road

Distance from (-9,-20) in m

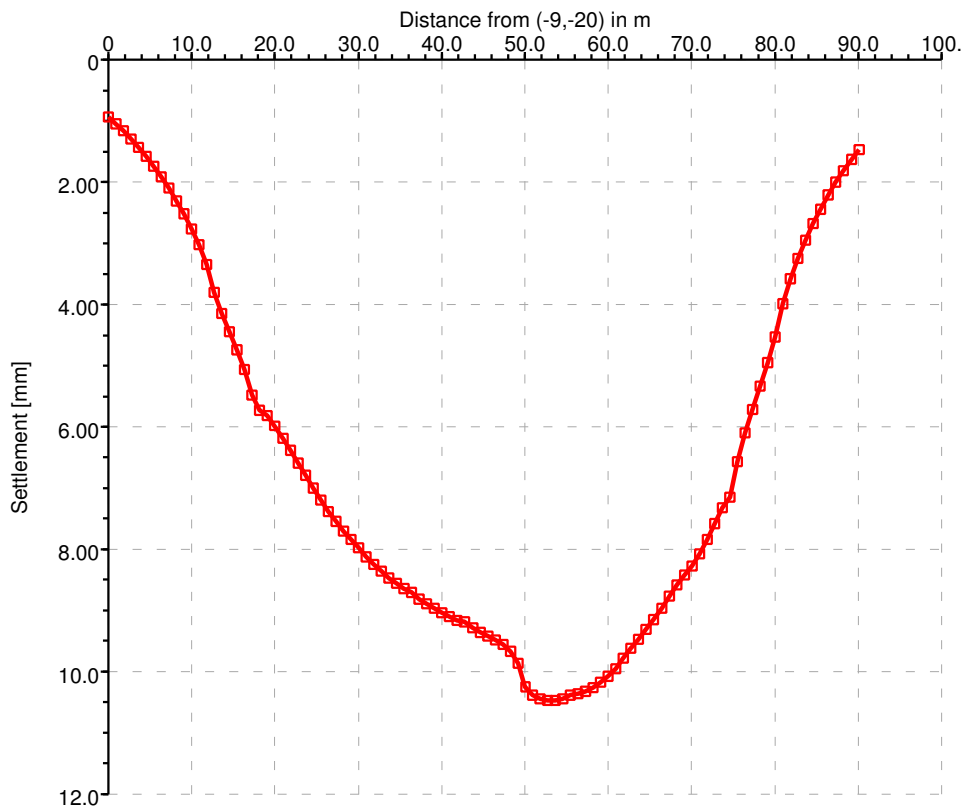


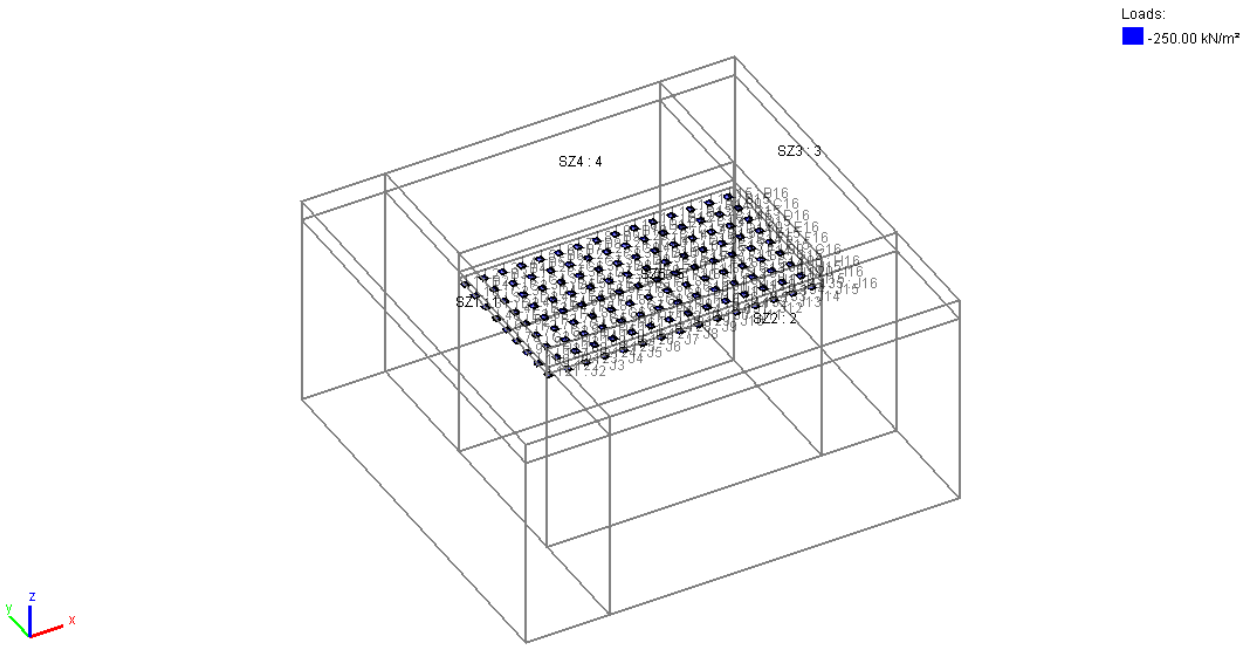
Oasys

Gondar Gardens
Future Construction - LT

Job No.	Sheet No.	Rev.
371487		
Drg. Ref.		
Made by MK	Date	Checked

Displacement for gondar Gardens Road

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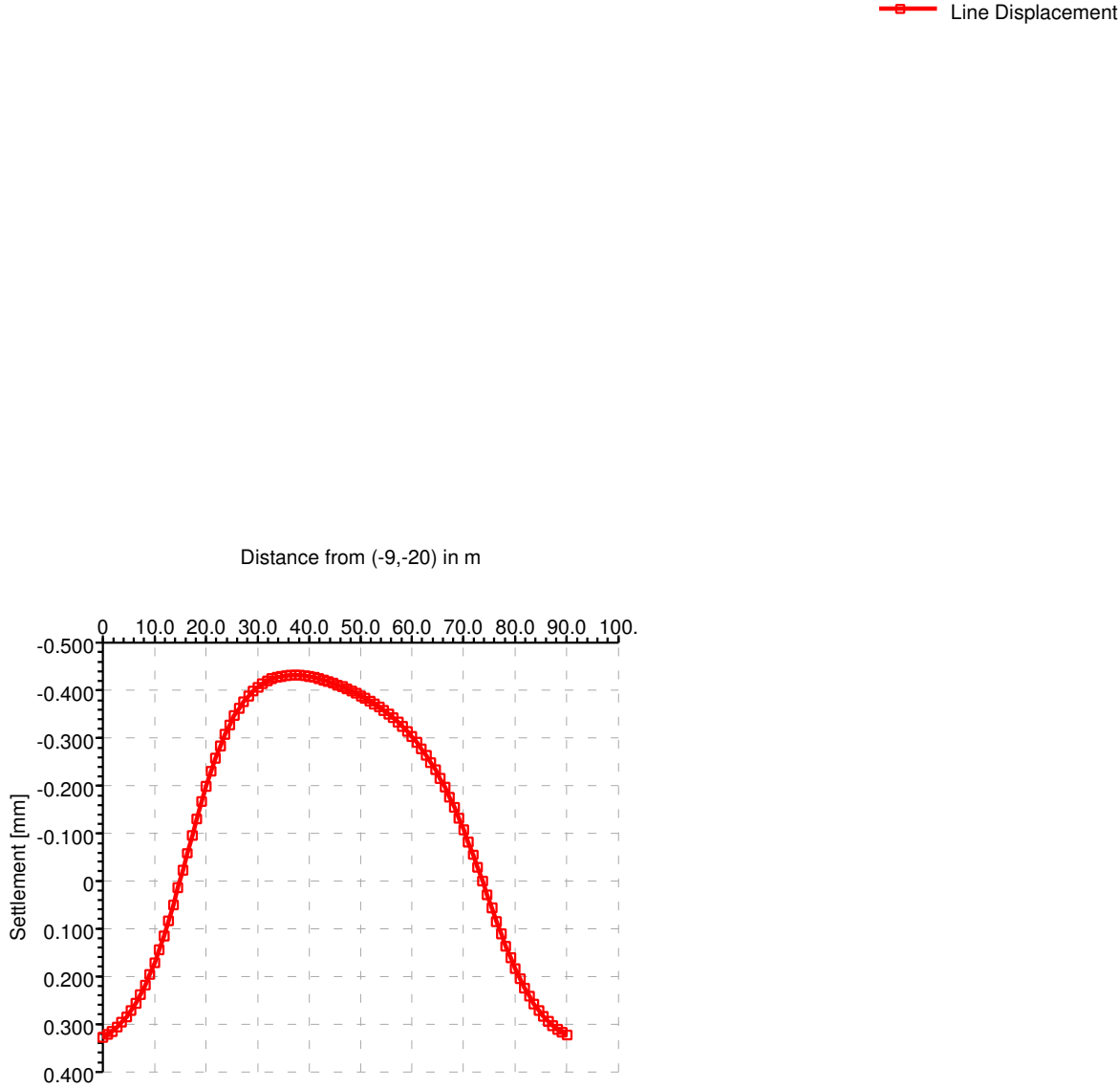
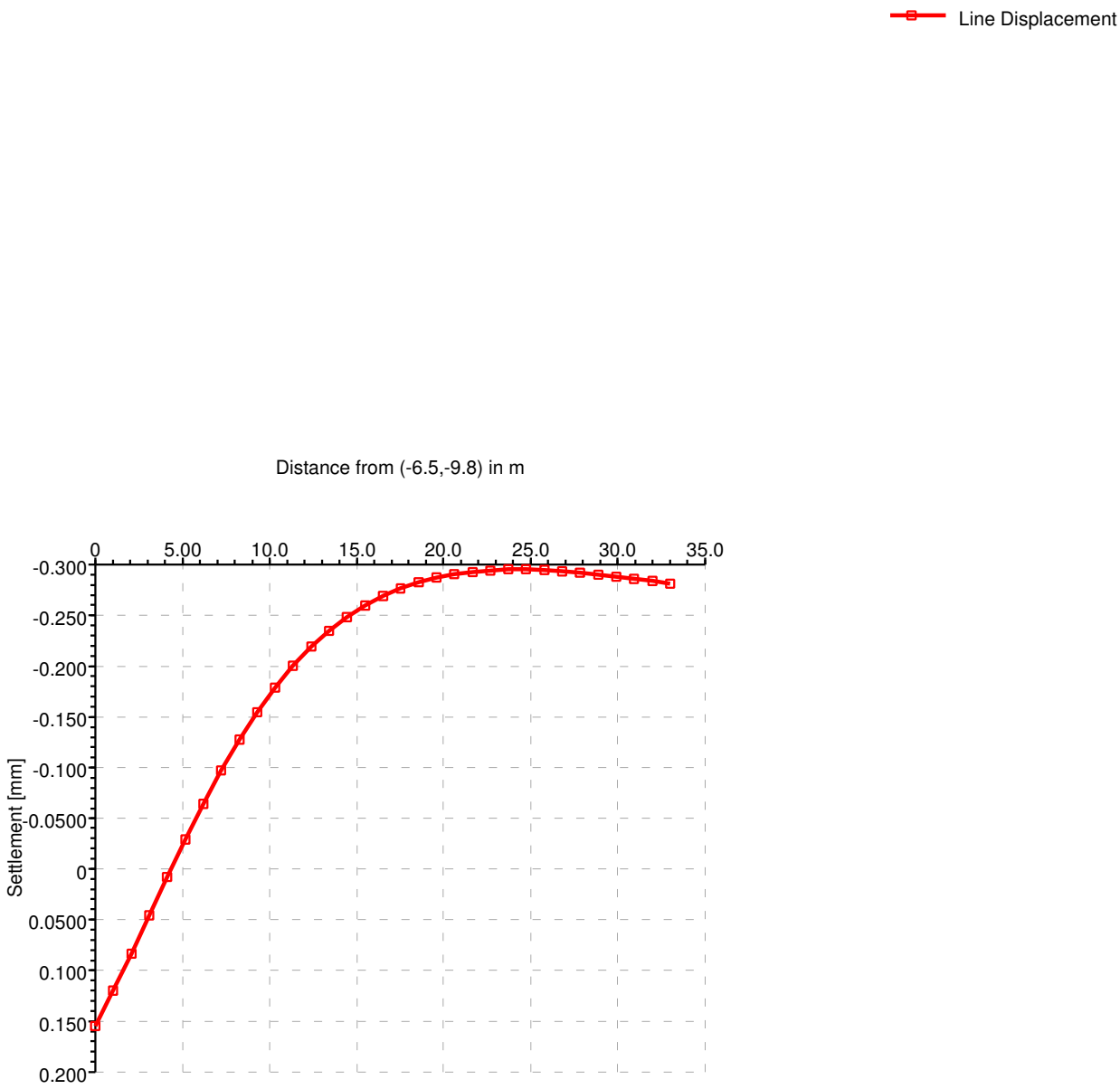
SZ2 : 2
SZ1 : 1
z
y
x

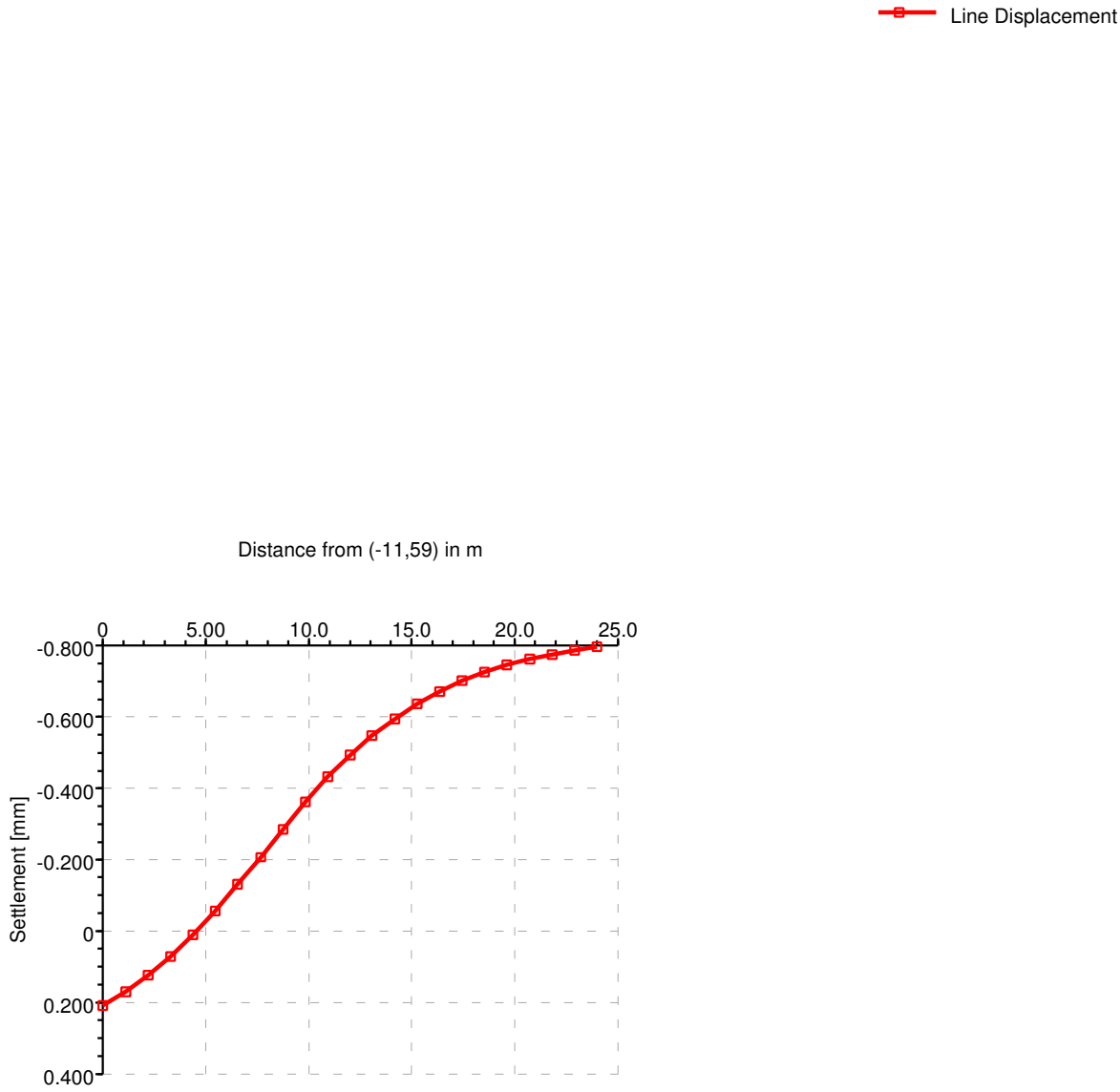
Displacement for gondar Gardens Road

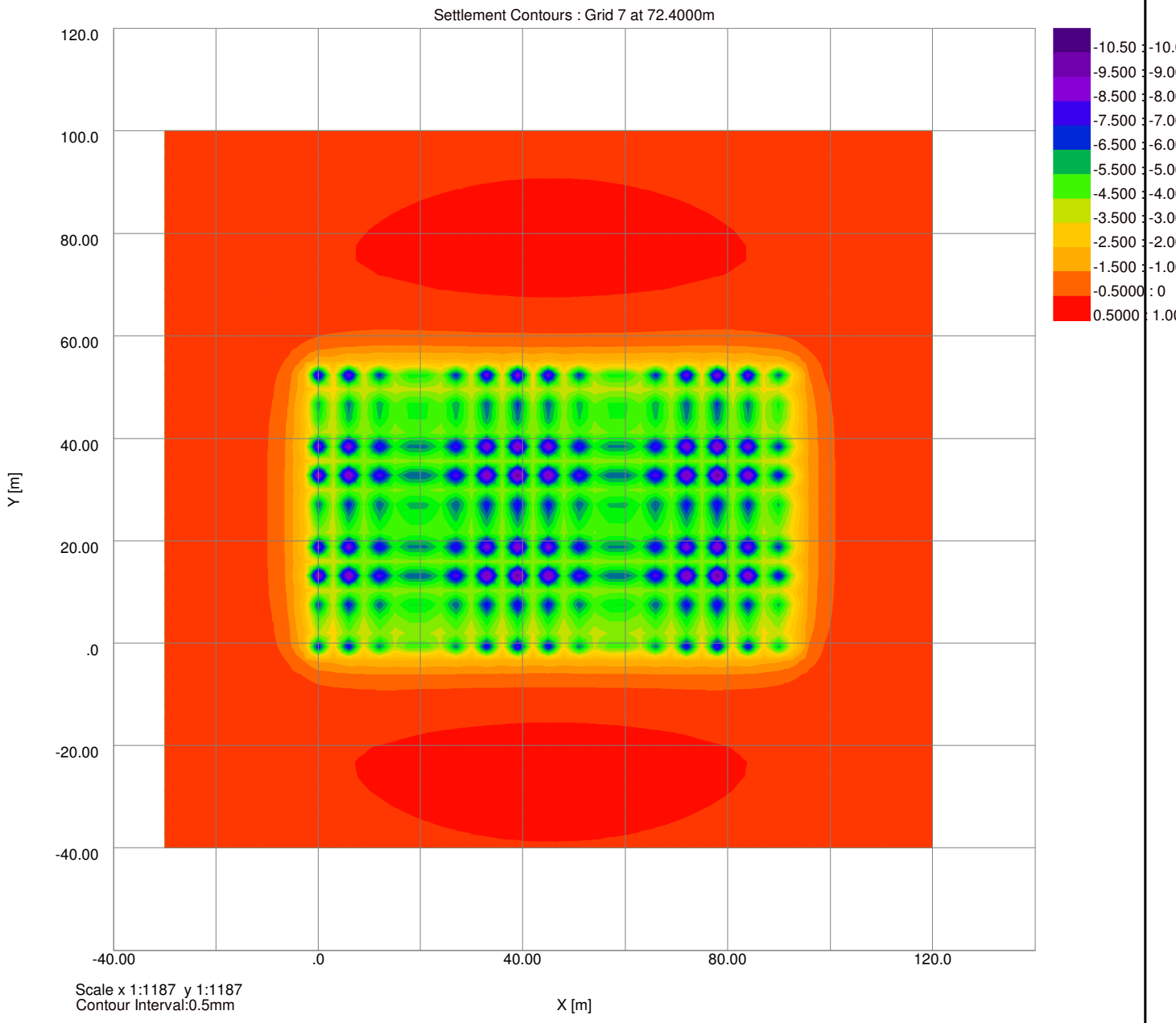


Displacement for South Mansions North



Displacement for Chase Gardens South

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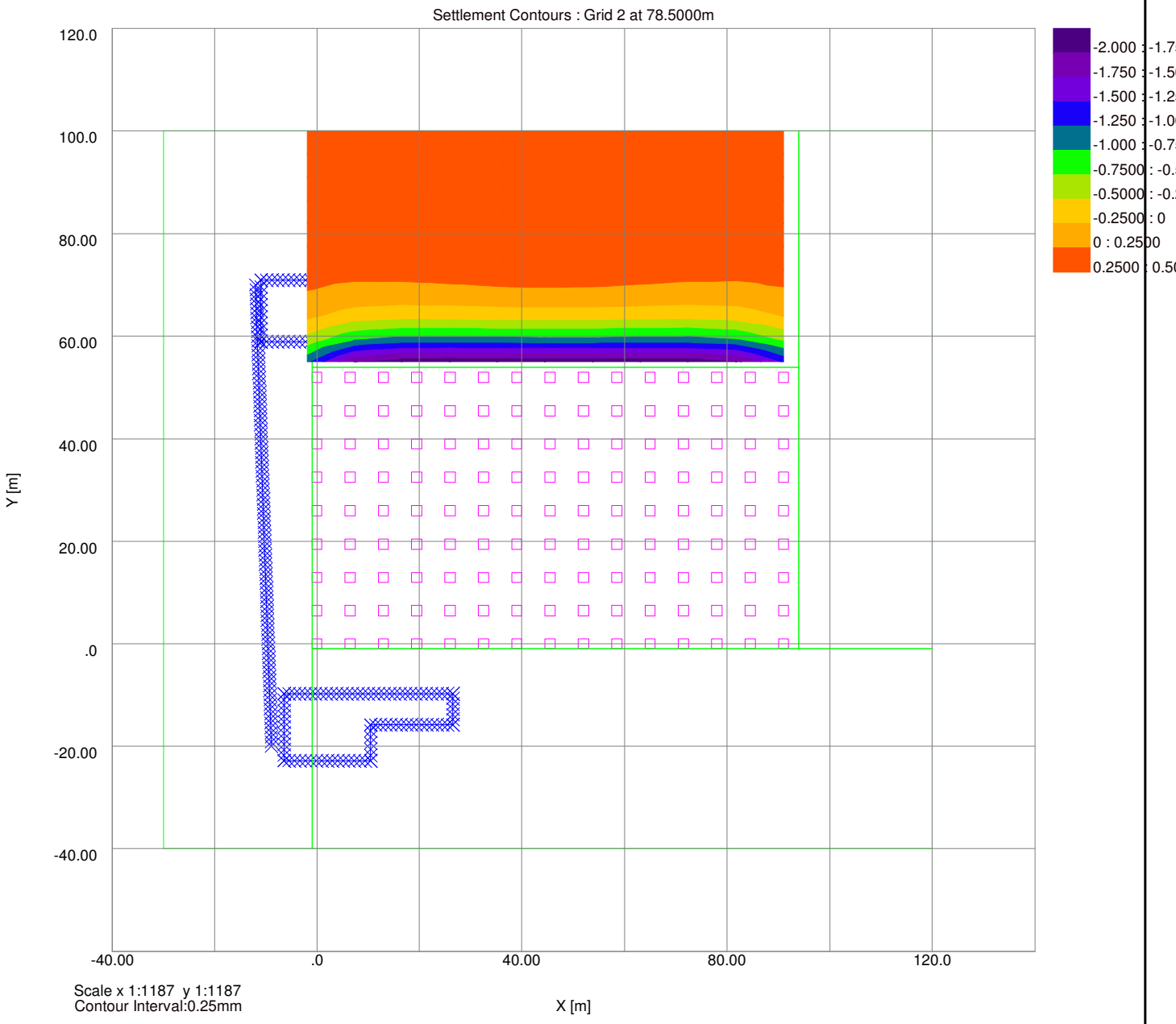
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.0
40.00
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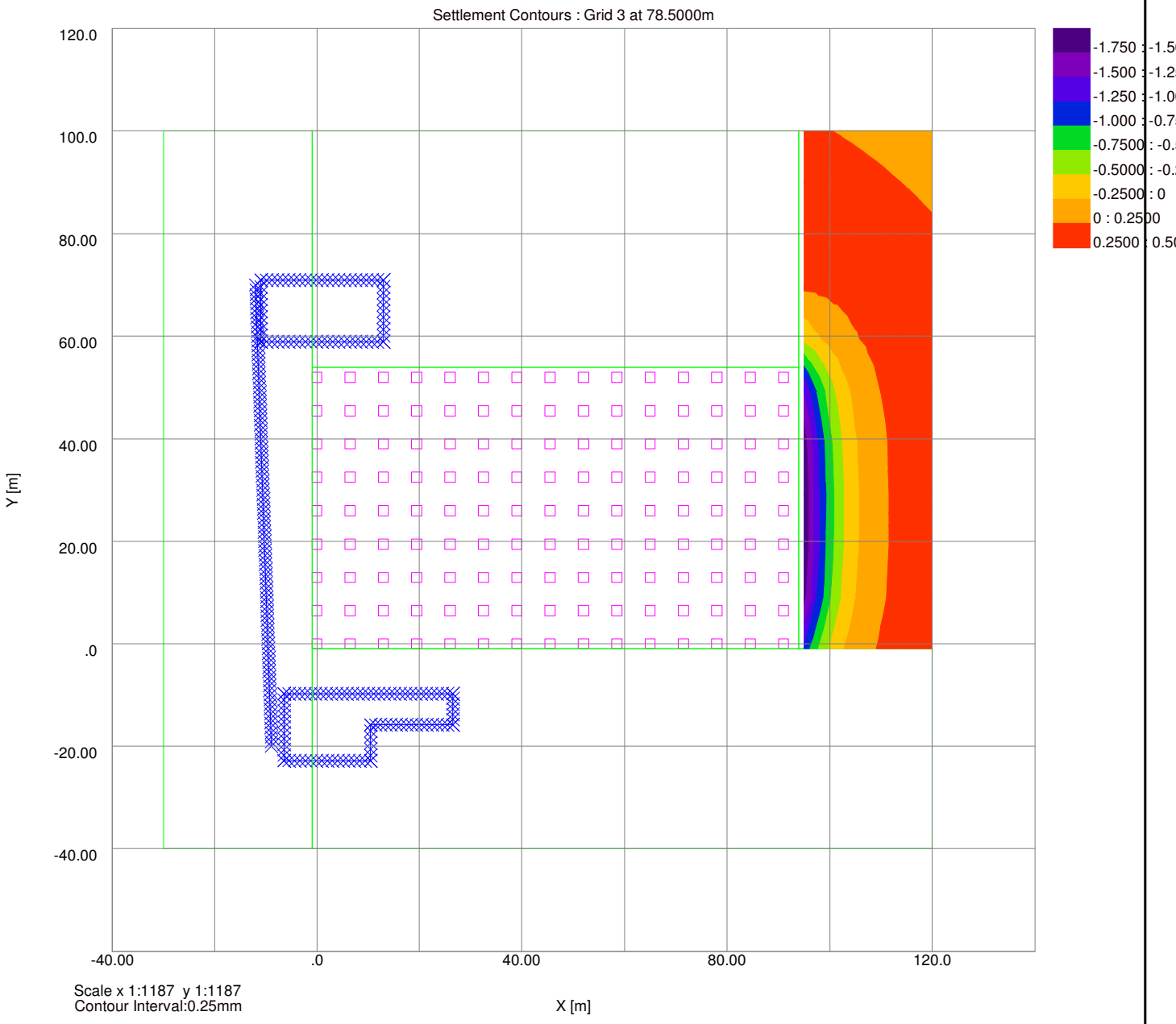
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40.00
80.00
120.0
X [m]
-1.750 : -1.5
-1.500 : -1.2
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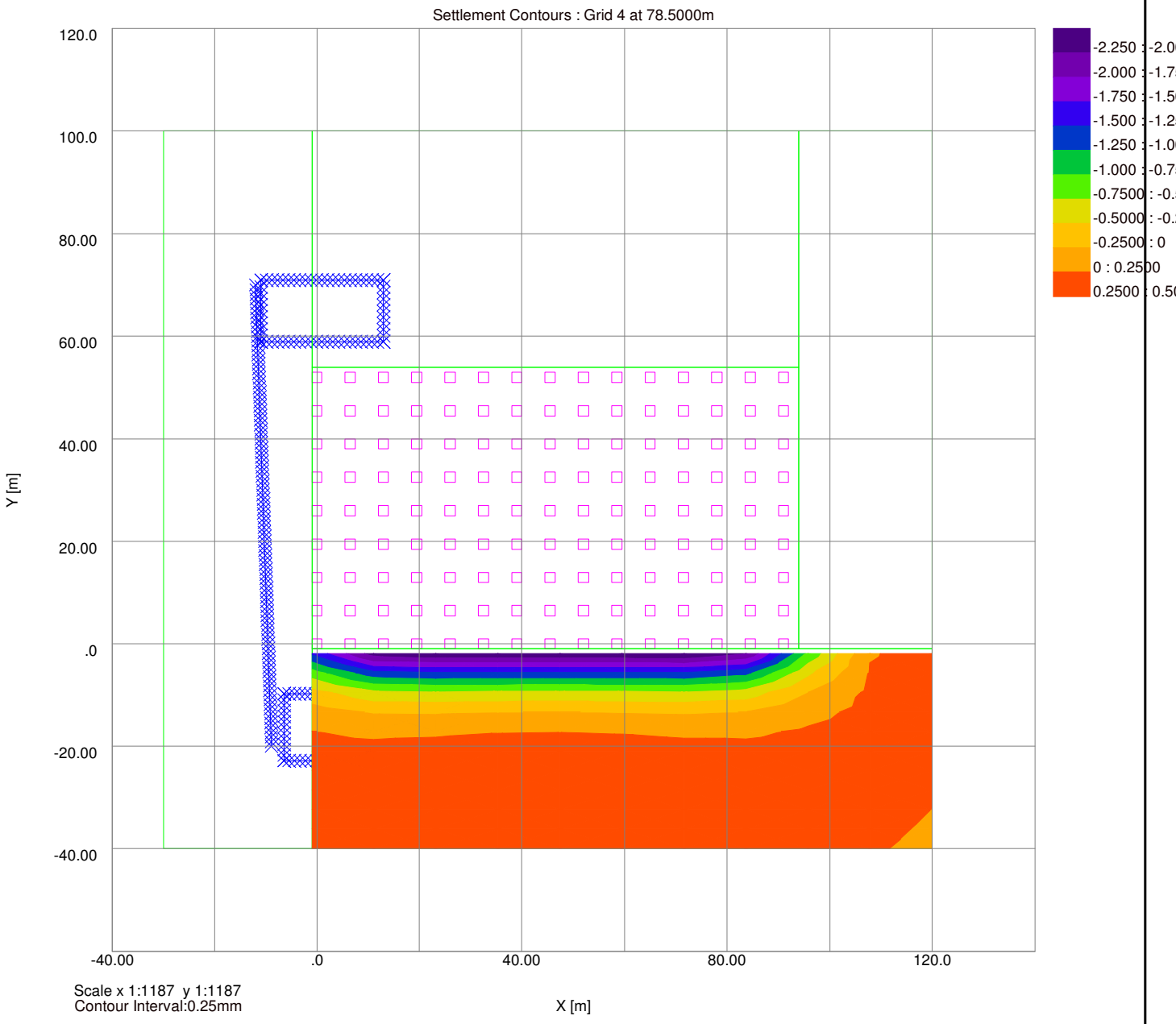
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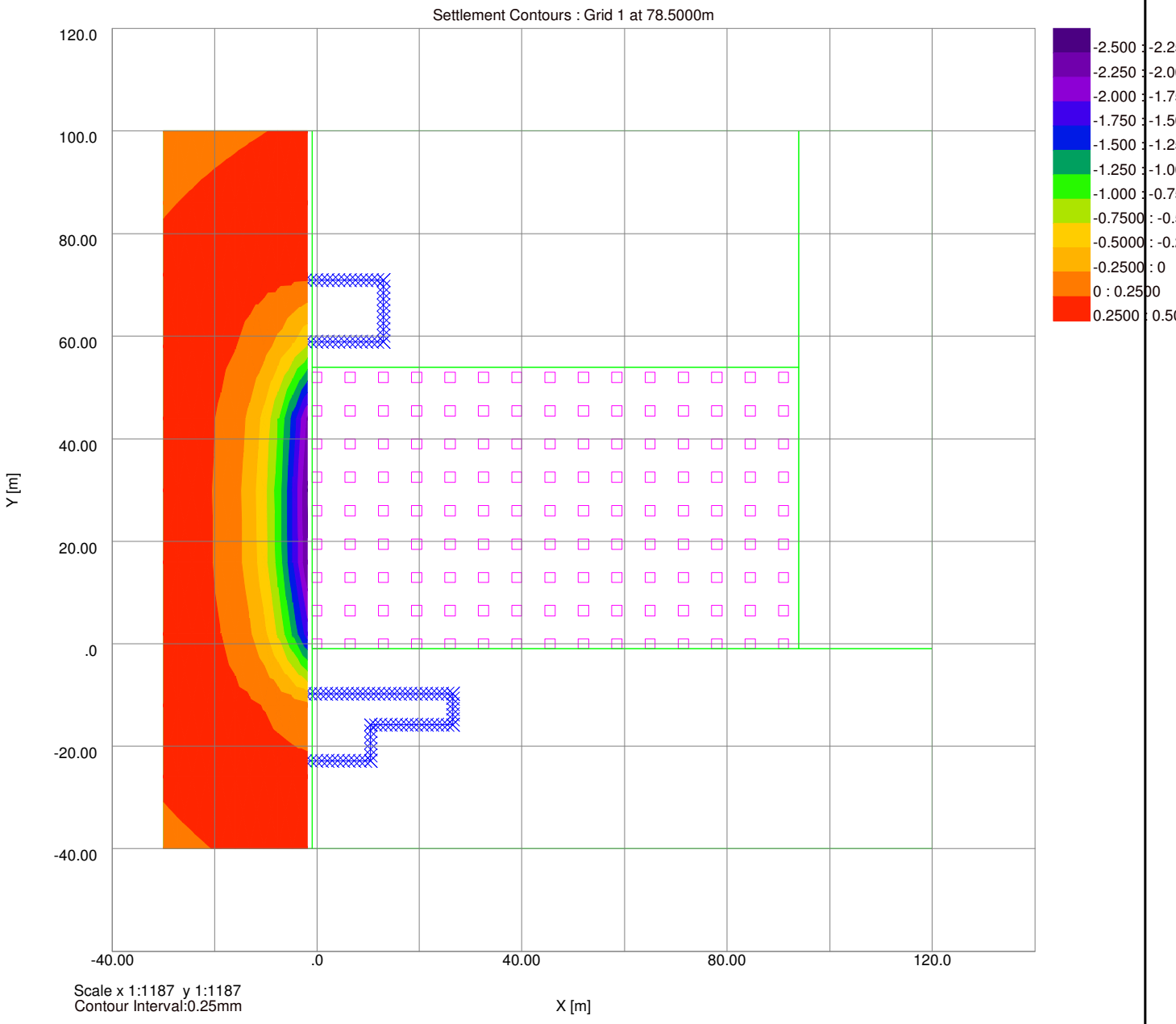
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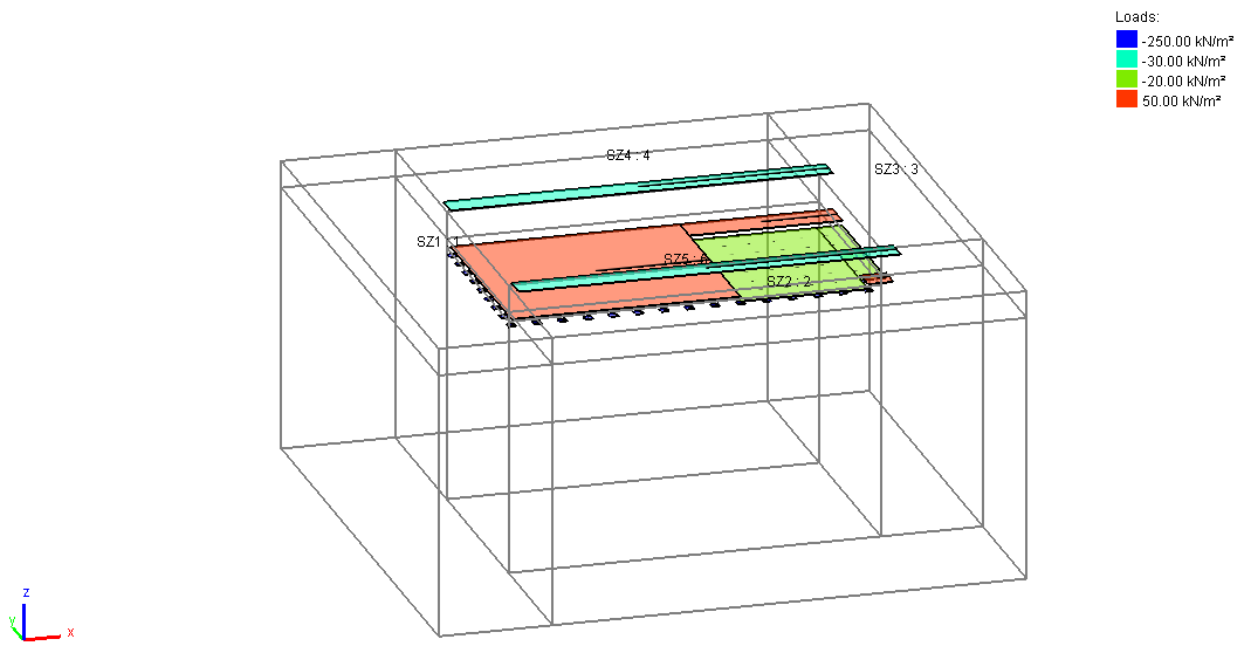
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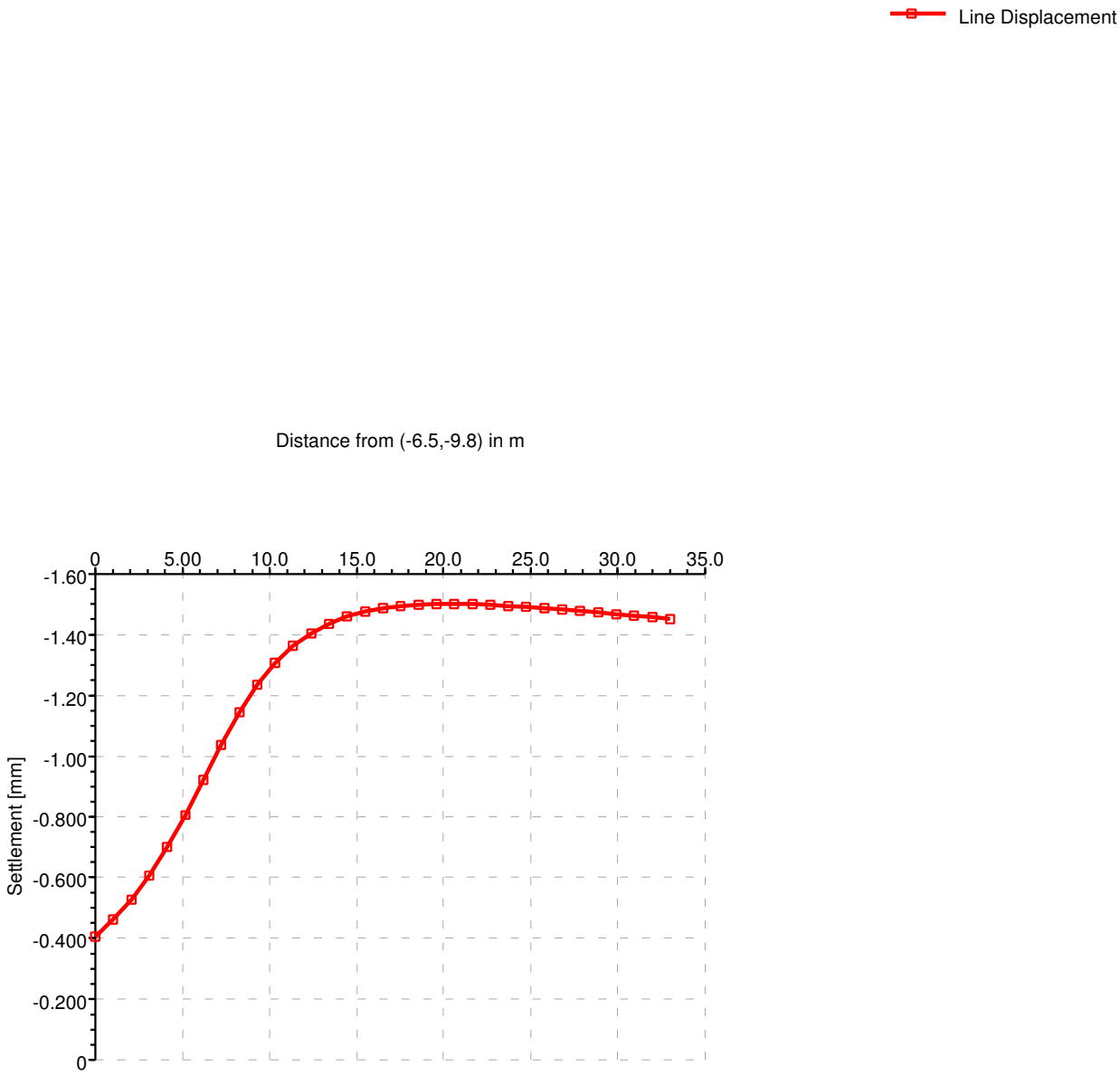
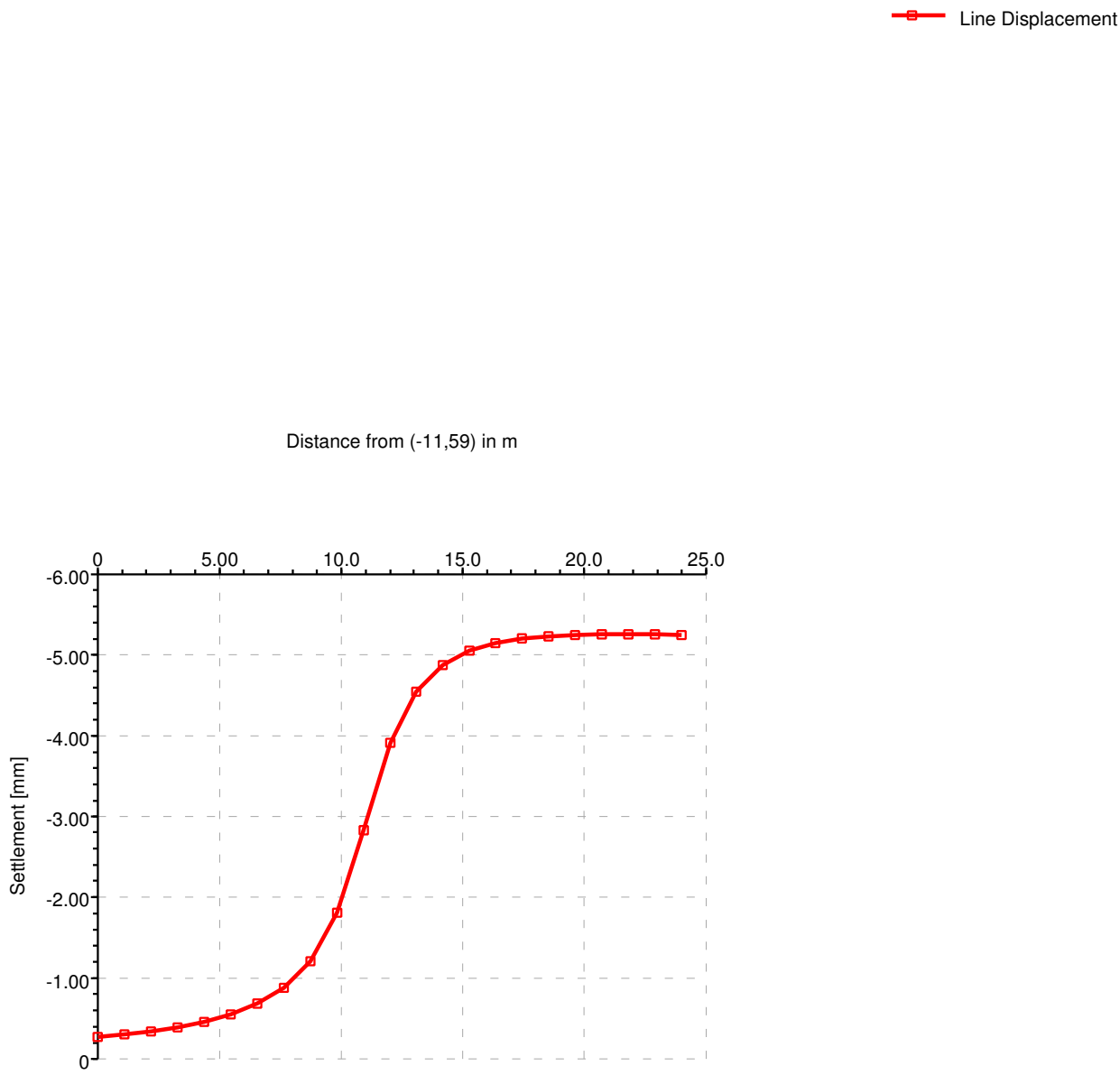
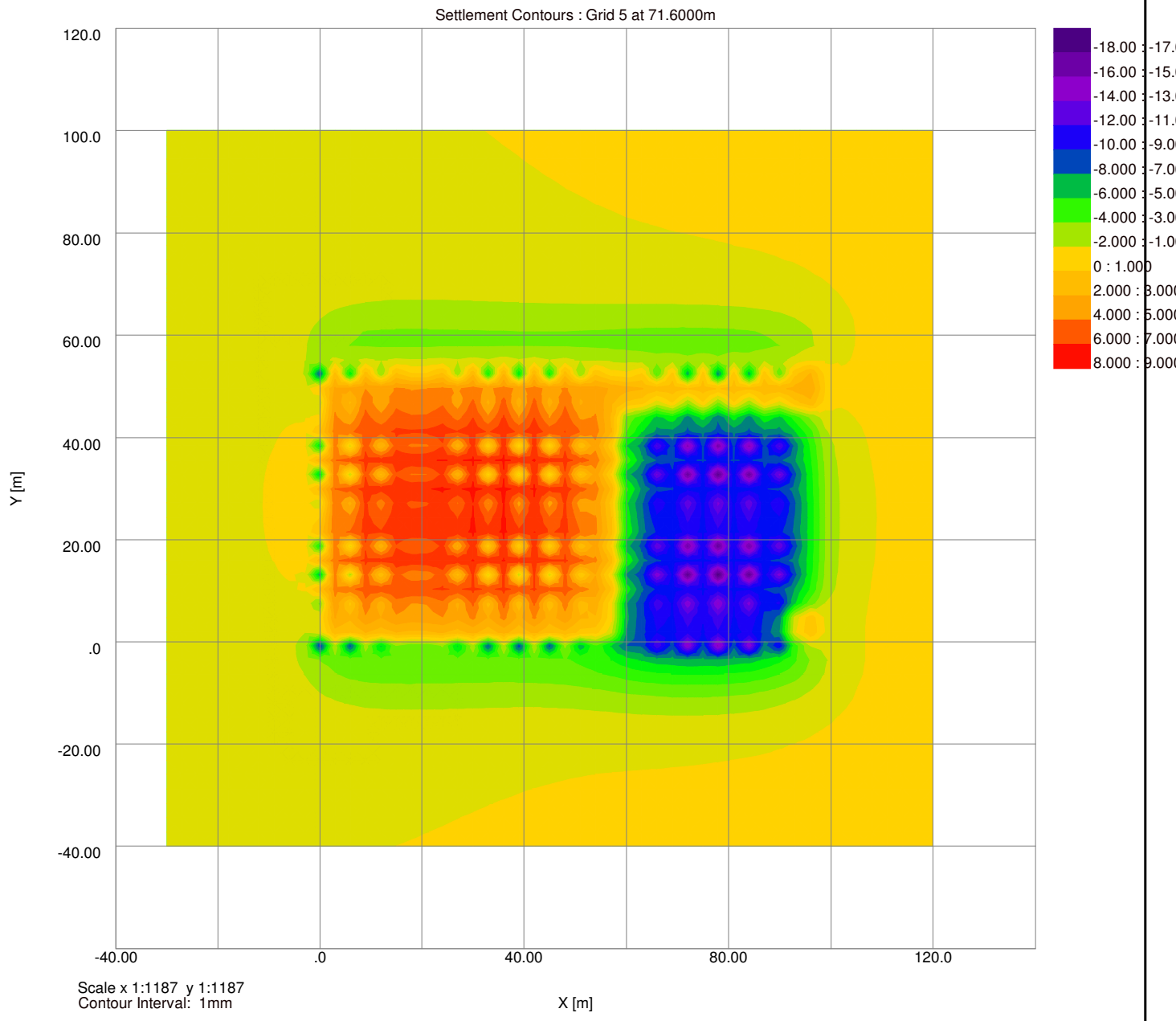
SZ1 : 1
SZ5 : 5
SZ2 : 2
Z
Y
X

Displacement for South Mansions North



Displacement for Chase Gardens South

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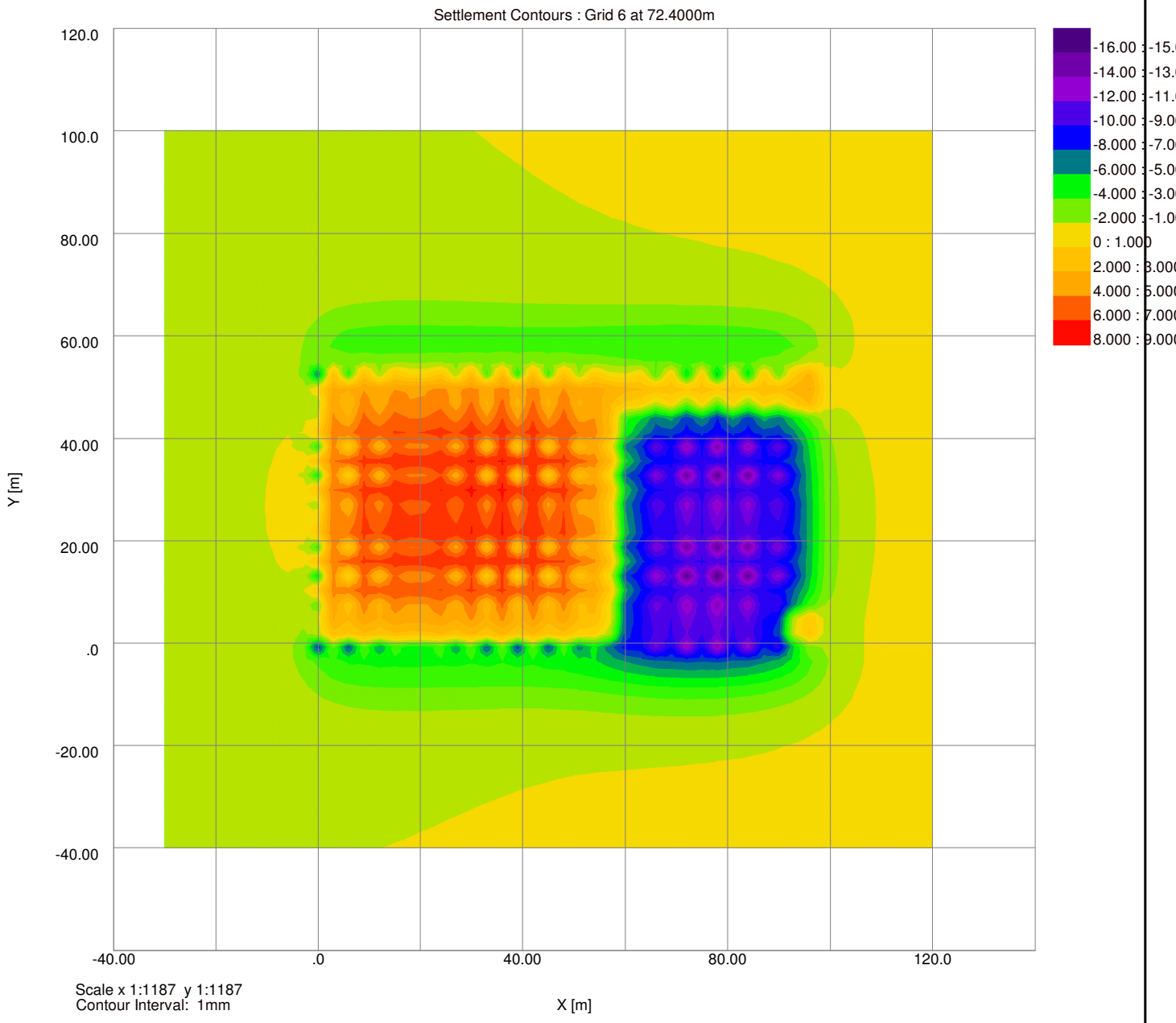
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80.00
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X [m]
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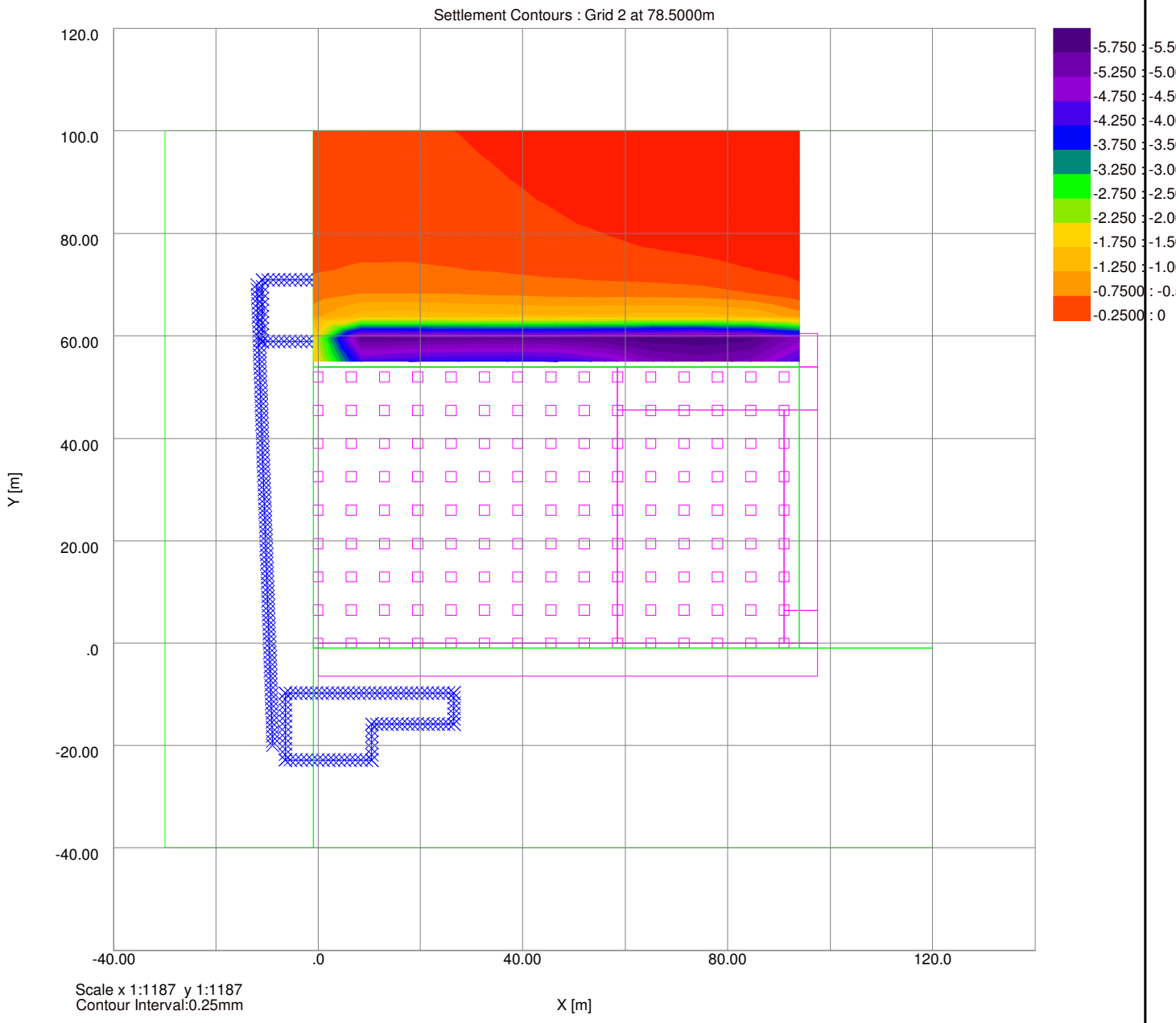
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Y [m]
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80.00
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X [m]
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-3.250 : -3.0
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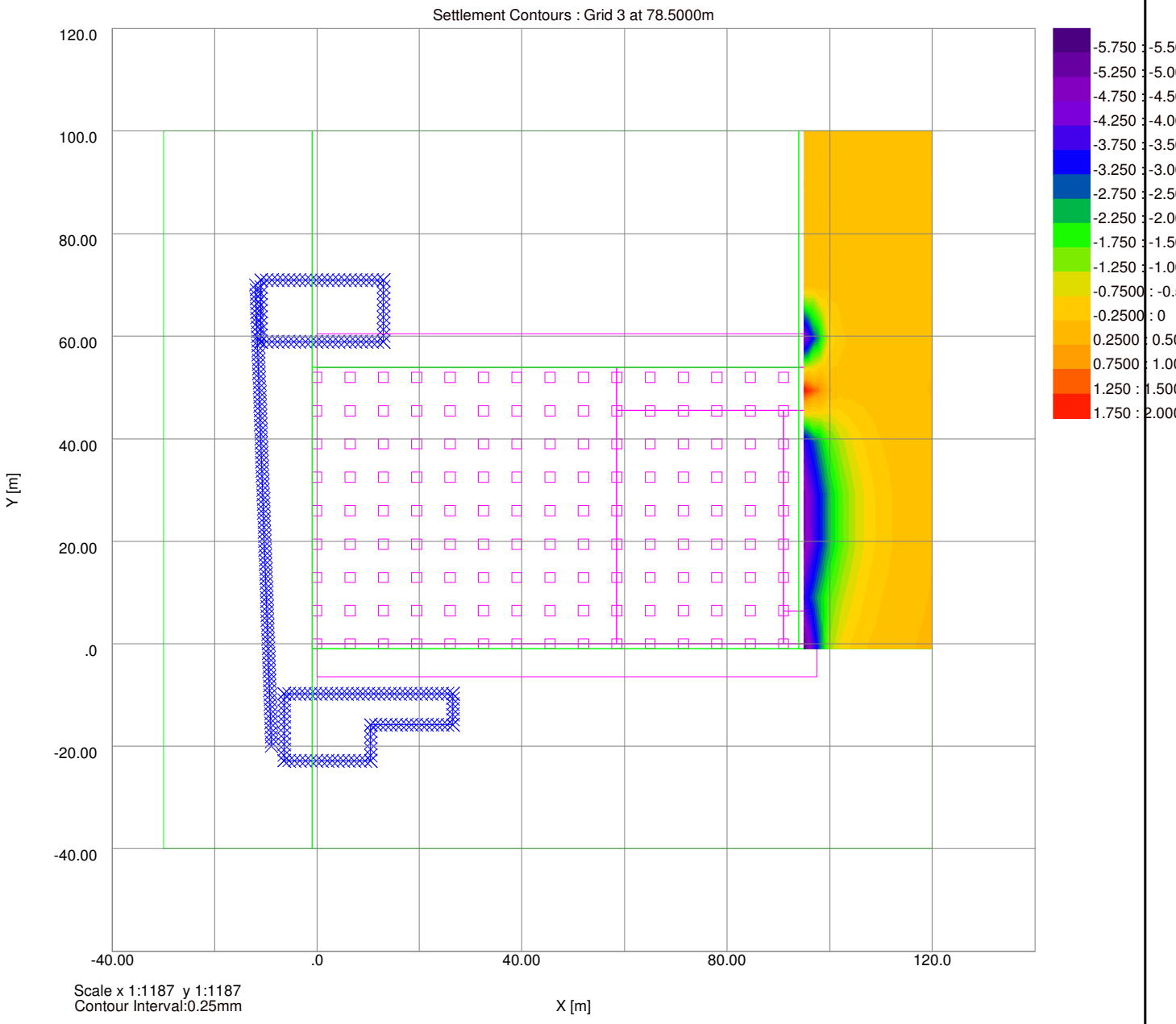
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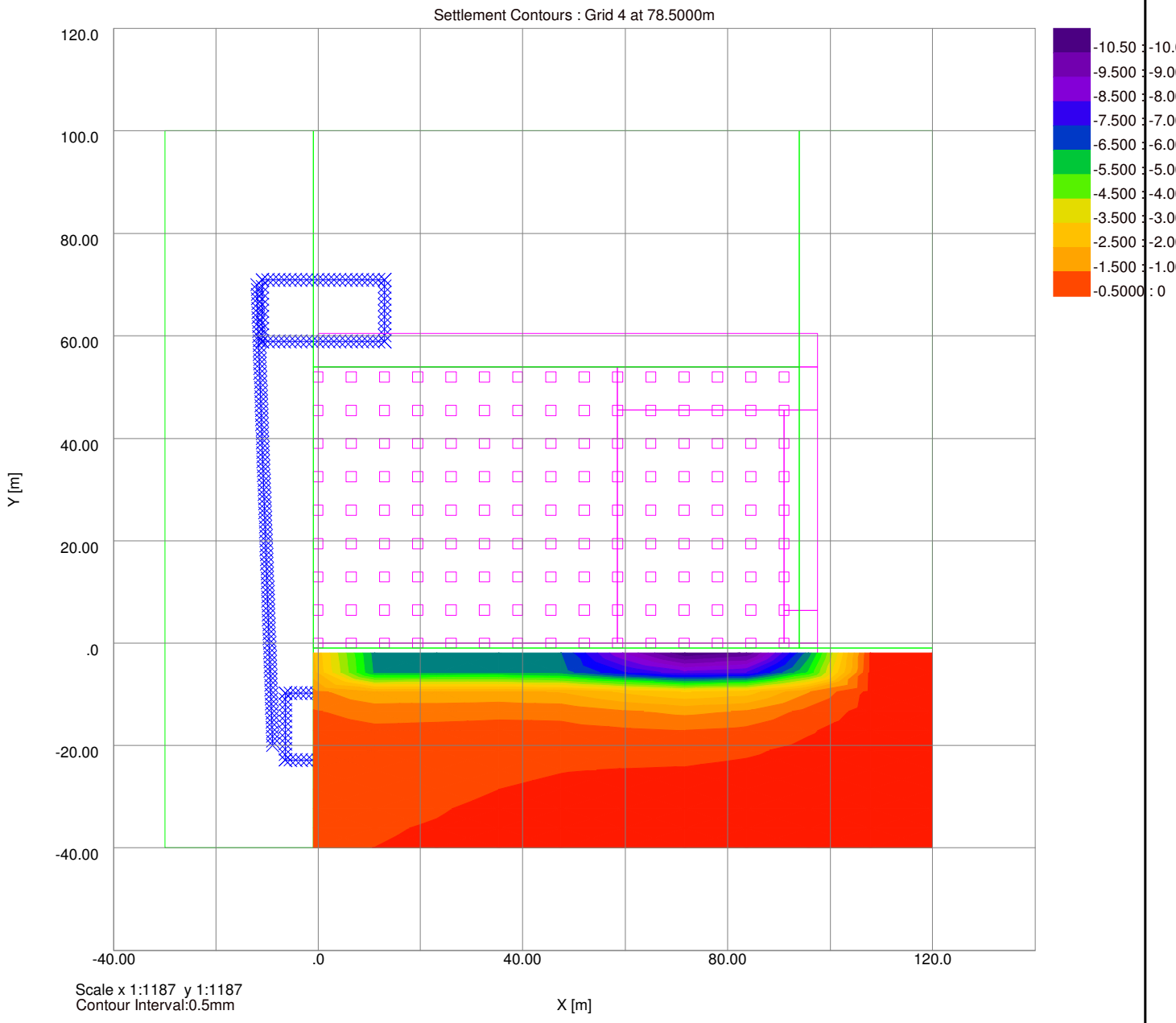
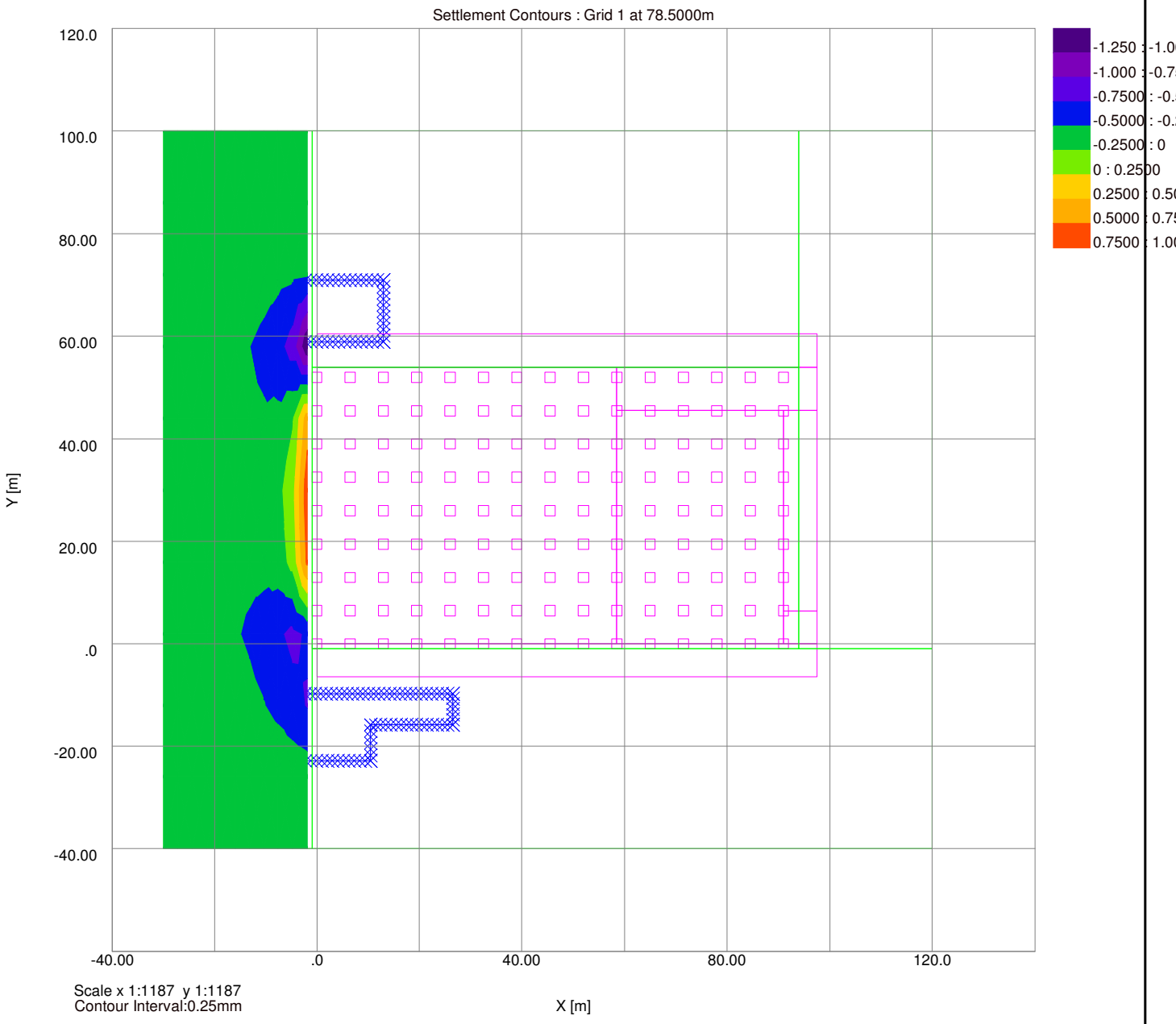
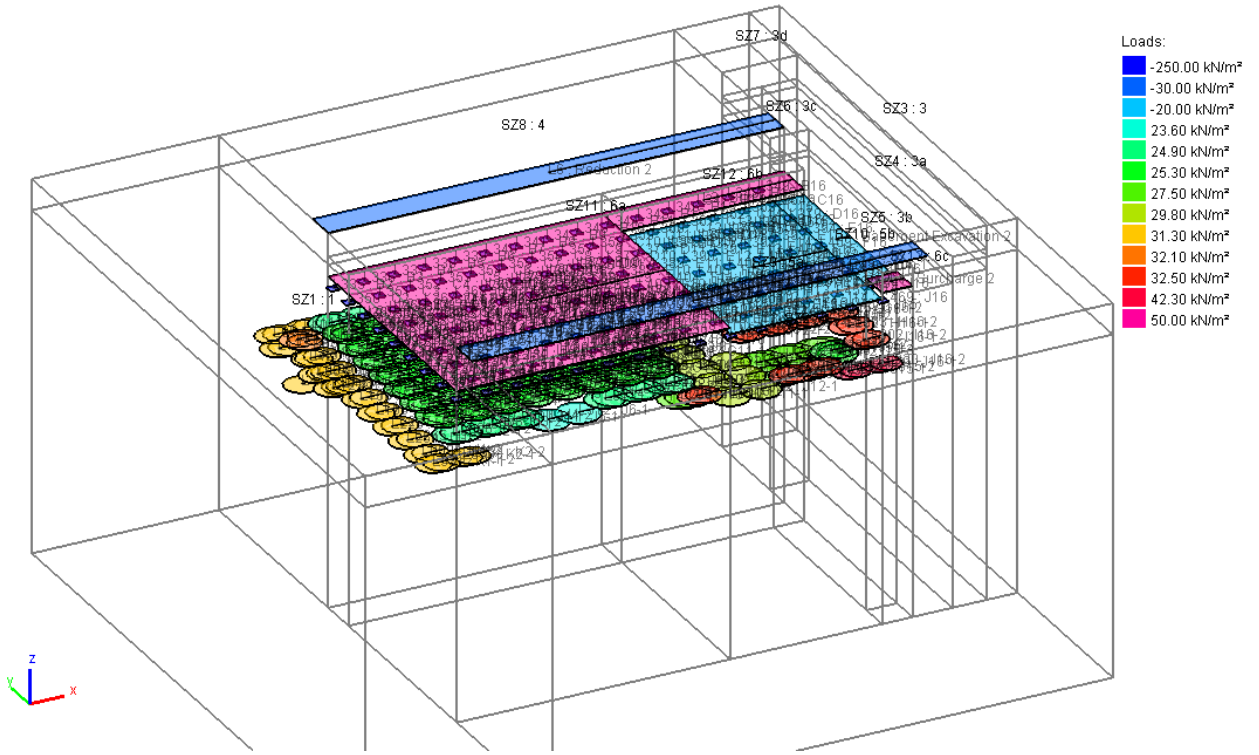
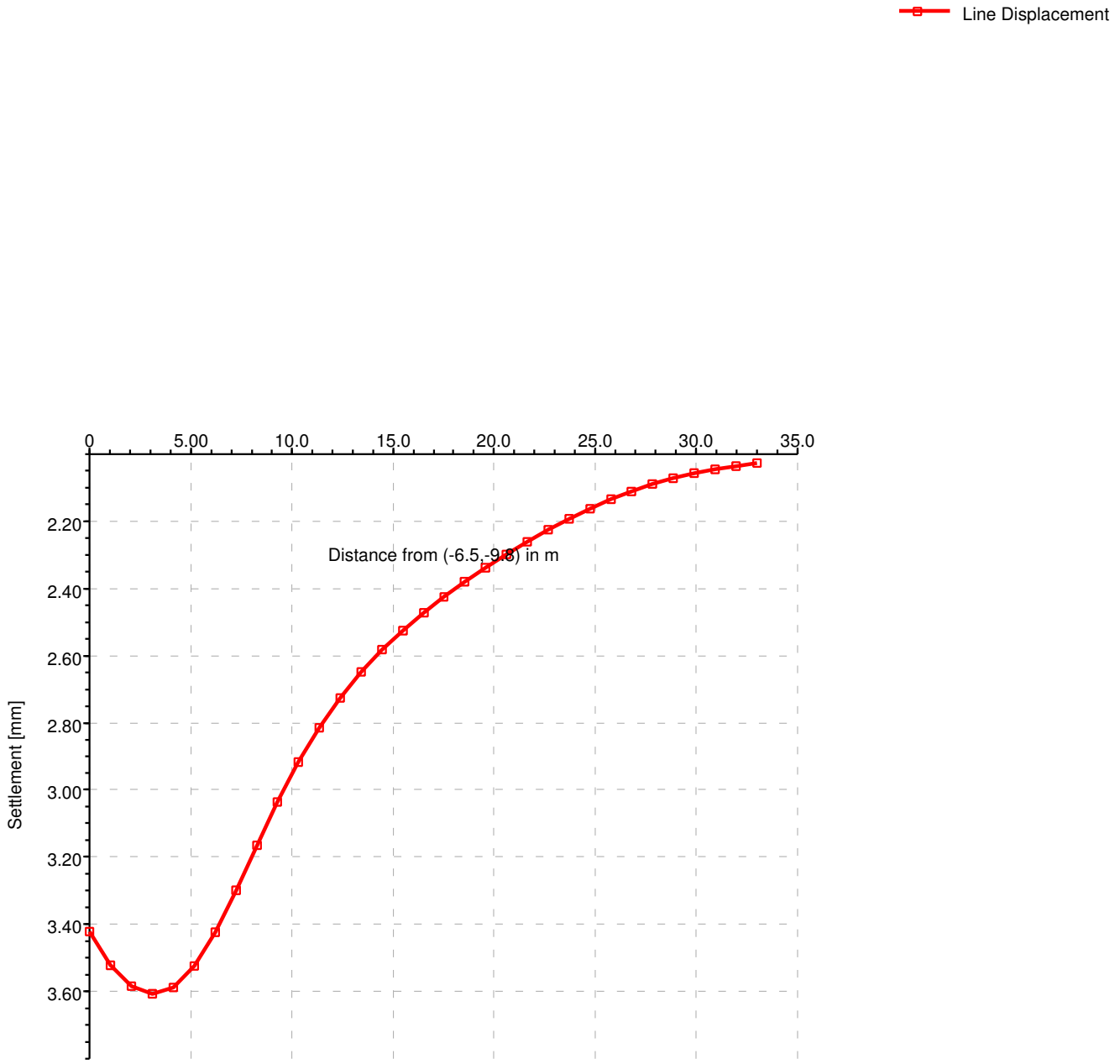
.0
-20.00
-40.00
Y [m]
-40.00
.0
40.00
80.00
120.0
X [m]
-5.750 : -5.5
-5.250 : -5.0
-4.750 : -4.5
-4.250 : -4.0
-3.750 : -3.5
-3.250 : -3.0
-2.750 : -2.5
-2.250 : -2.0
-1.750 : -1.5
-1.250 : -1.0
-0.7500 : -0.
-0.2500 : 0
0.2500 : 0.5
0.7500 : 1.0
1.250 : 1.50
1.750 : 2.00
Scale x 1:1187 y 1:1187
Contour Interval:0.25mm


Settlement Contours : Grid 4 at 78.5000m
120.0
100.0
80.00
60.00
40.00
20.00
.0
-20.00
-40.00
Y [m]
-40.00
.0
40.00
80.00
120.0
X [m]
-10.50 : -10.
-9.500 : -9.0
-8.500 : -8.0
-7.500 : -7.0
-6.500 : -6.0
-5.500 : -5.0
-4.500 : -4.0
-3.500 : -3.0
-2.500 : -2.0
-1.500 : -1.0
-0.5000 : 0
Scale x 1:1187 y 1:1187
Contour Interval:0.5mm

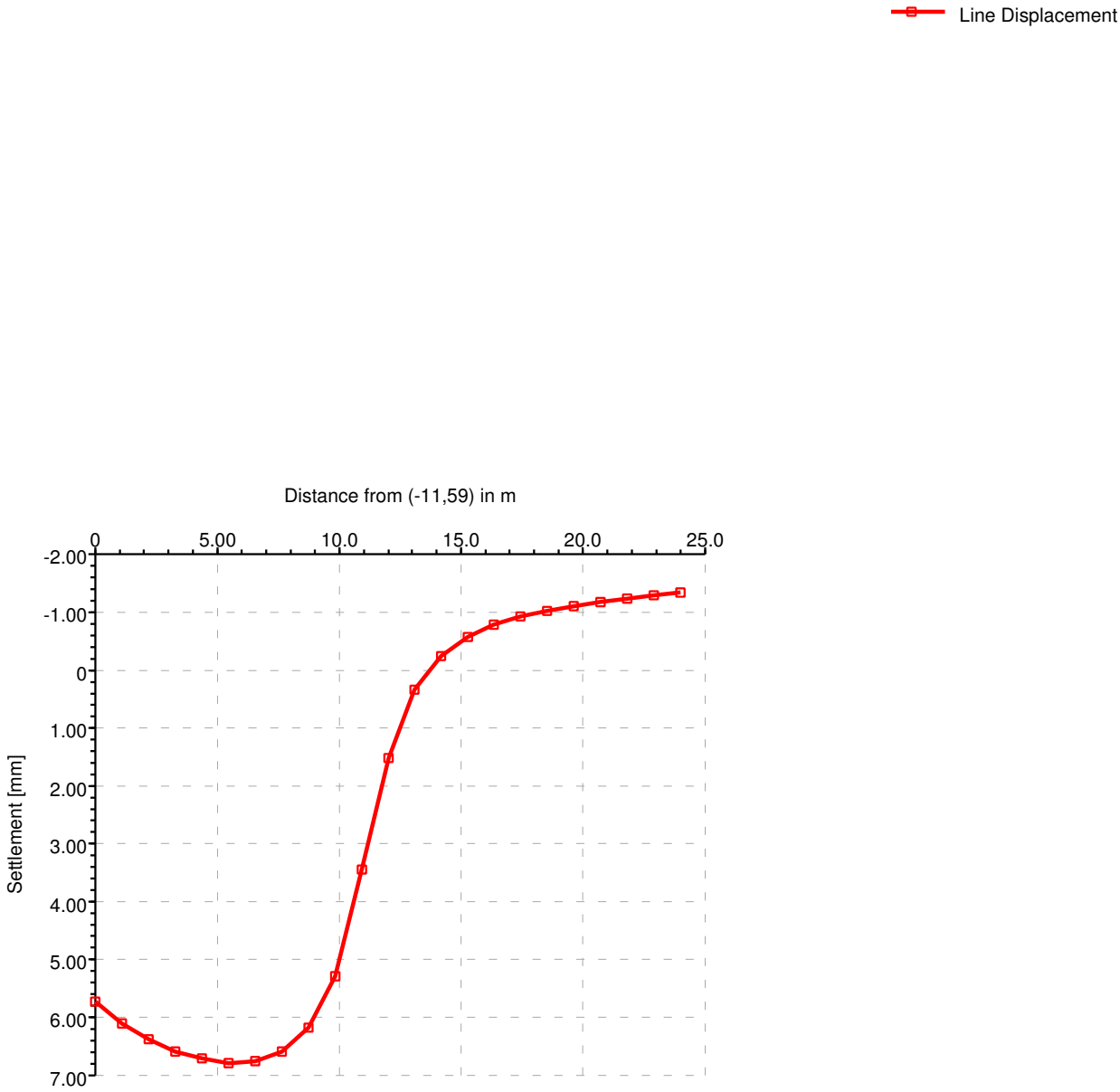

Settlement Contours : Grid 1 at 78.5000m
120.0
100.0
80.00
60.00
40.00
20.00
.0
-20.00
-40.00
Y [m]
-40.00
.0
40.00
80.00
120.0
X [m]
-1.250 : -1.0
-1.000 : -0.7
-0.7500 : -0.
-0.5000 : -0.
-0.2500 : 0
0 : 0.2500
0.2500 : 0.5
0.5000 : 0.7
0.7500 : 1.0
Scale x 1:1187 y 1:1187
Contour Interval:0.25mm

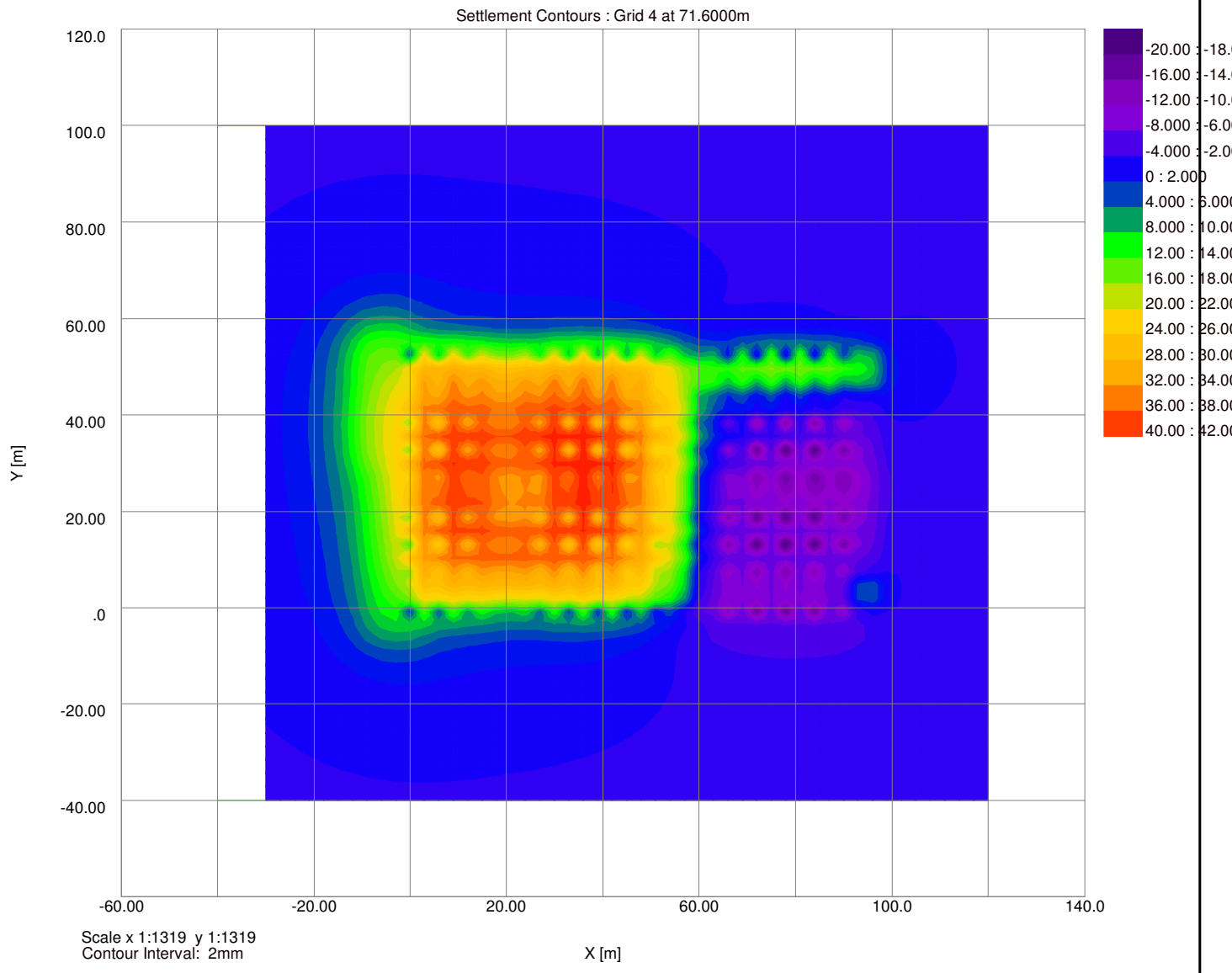

SZ7 : 3d
SZ6 : 3c
SZ3 : 3
SZ8 : 4
SZ4 : 3a
SZ12 : 6b
SZ11 : 6a
SZ5 : 3b
SZ10 : 5b
SZ9 : 5a
SZ2 : 6c
SZ1 : 1
Loads:
-250.00 kN/m²
-30.00 kN/m²
-20.00 kN/m²
23.60 kN/m²
24.90 kN/m²
25.30 kN/m²
27.50 kN/m²
29.80 kN/m²
31.30 kN/m²
32.10 kN/m²
32.50 kN/m²
42.30 kN/m²
50.00 kN/m²
Z
Y
X

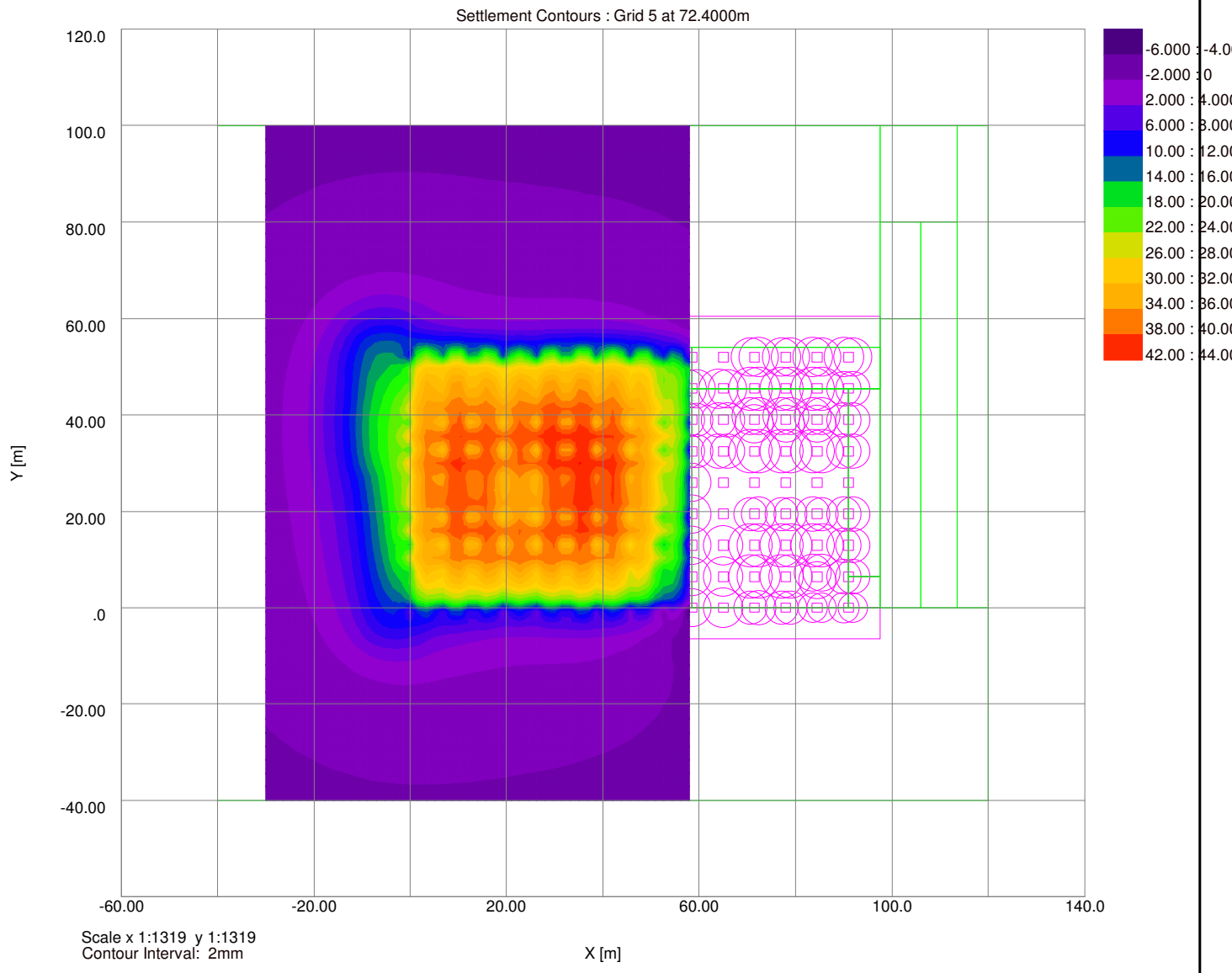
Displacement for South Mansions North

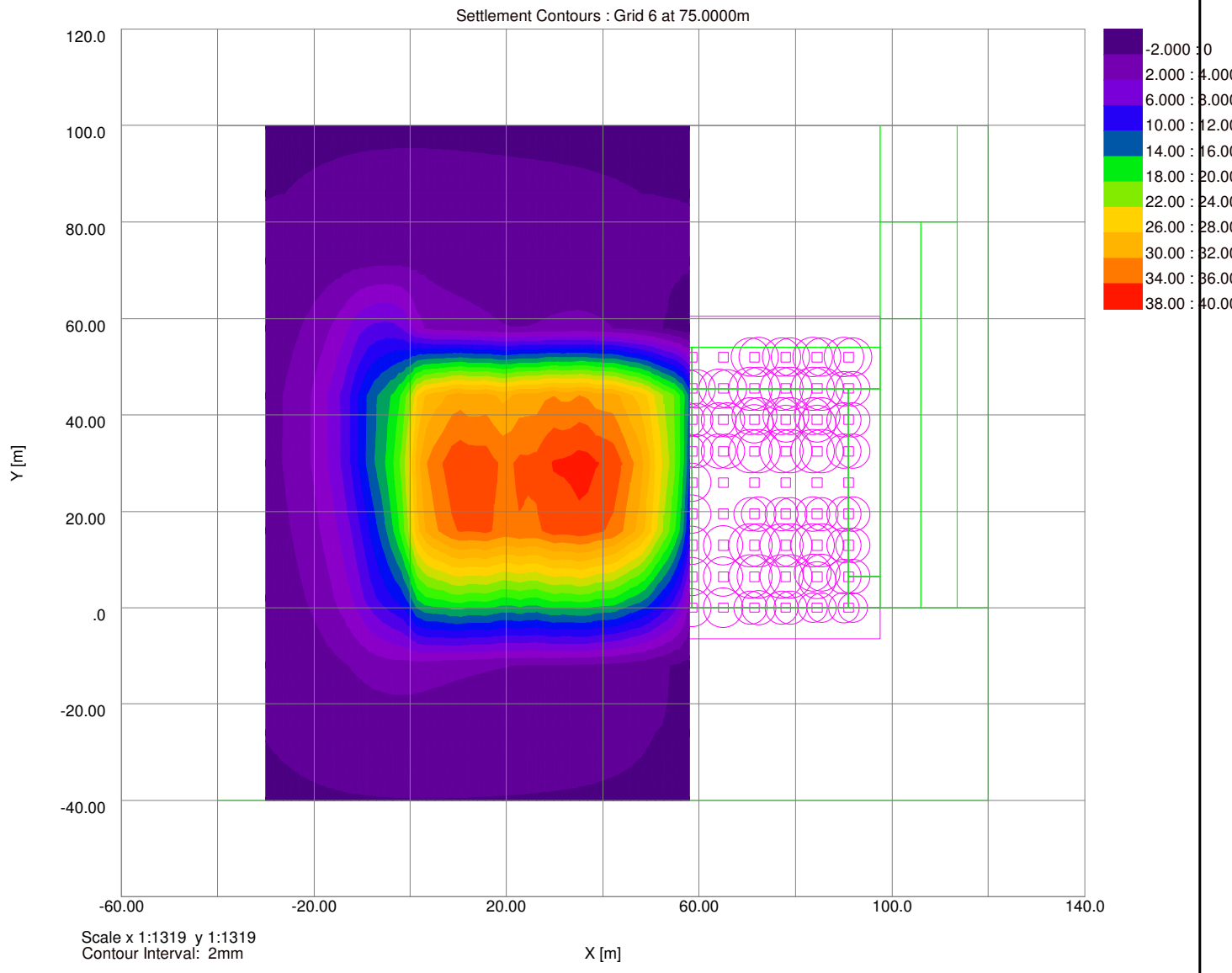


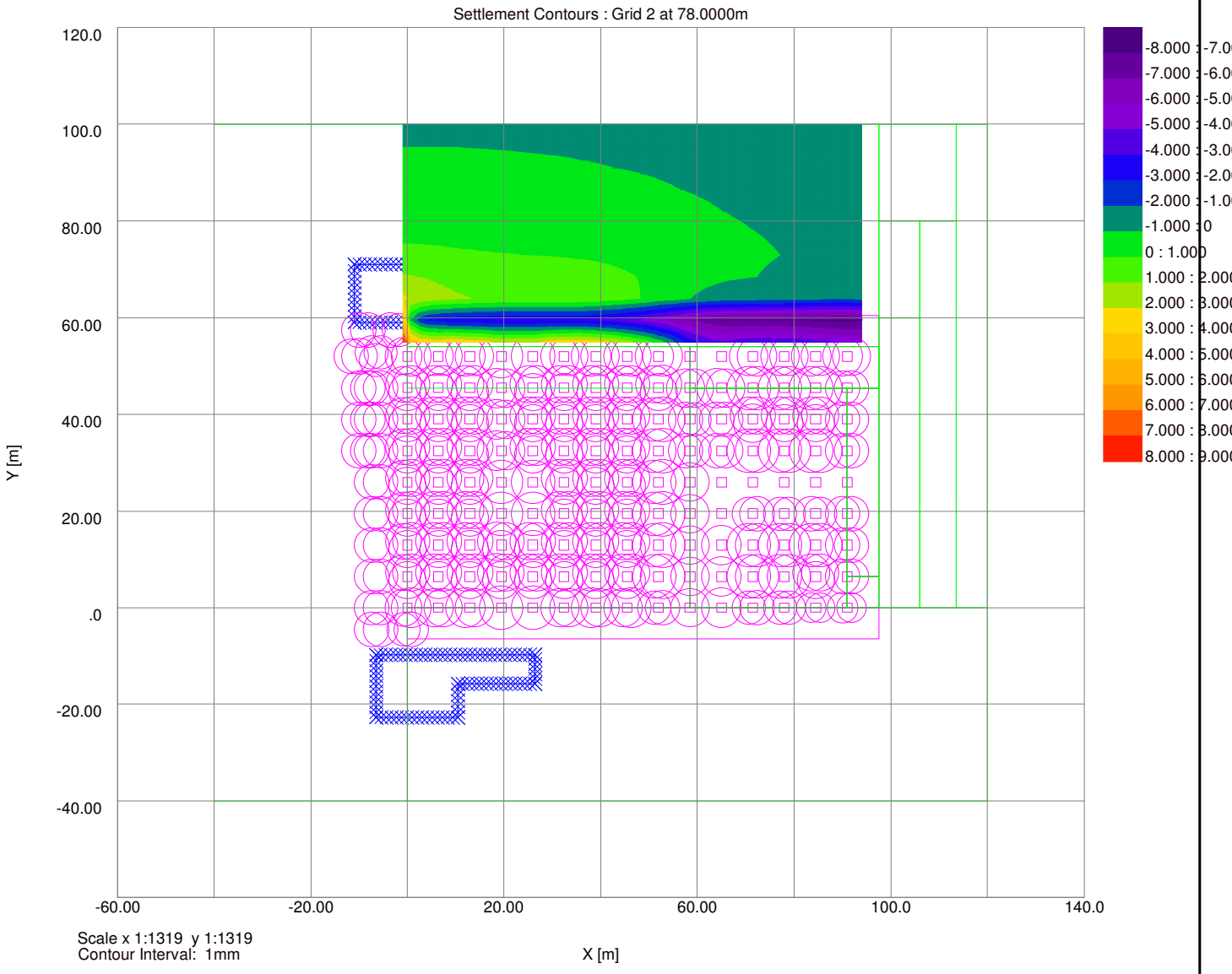
Displacement for Chase Gardens South

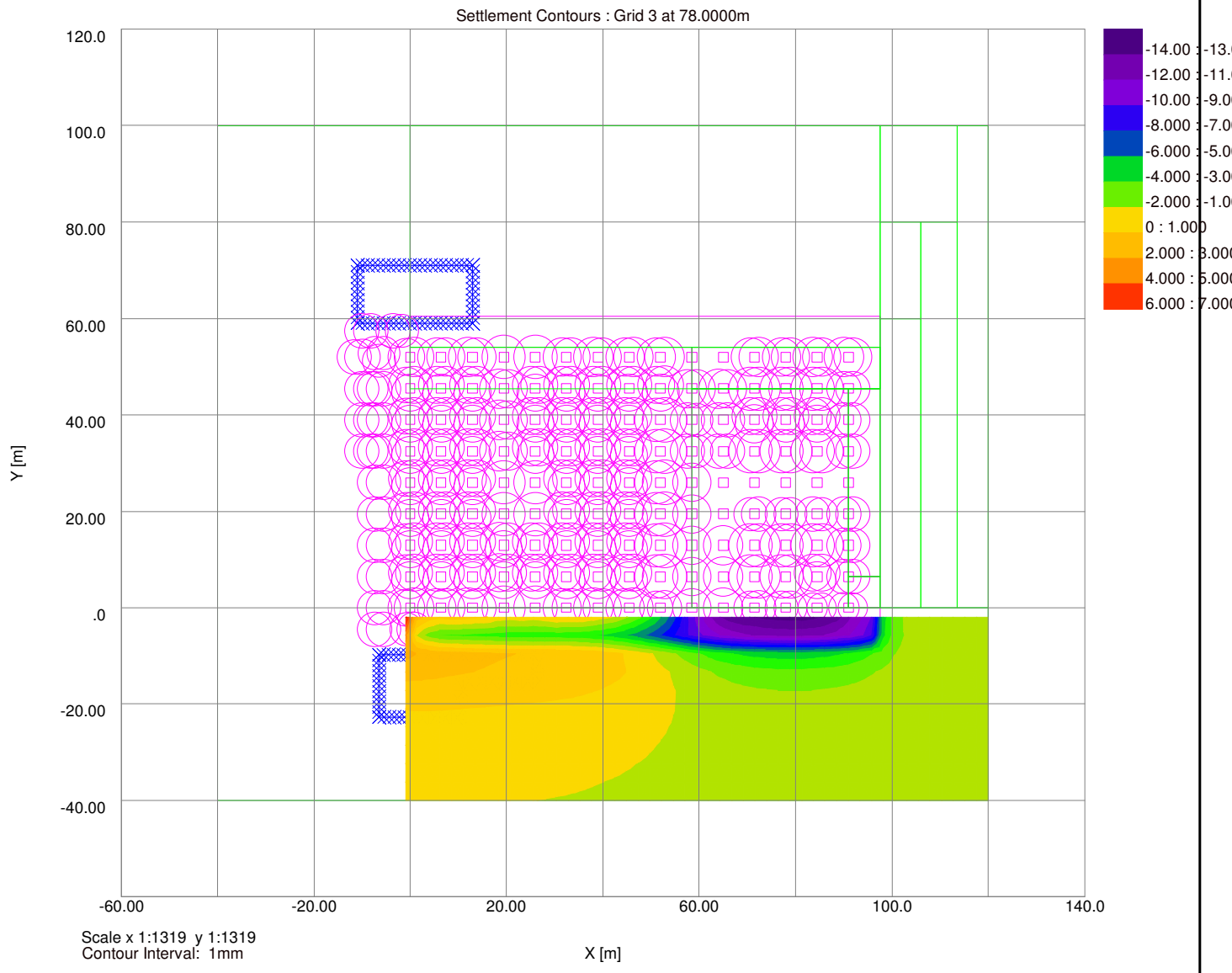


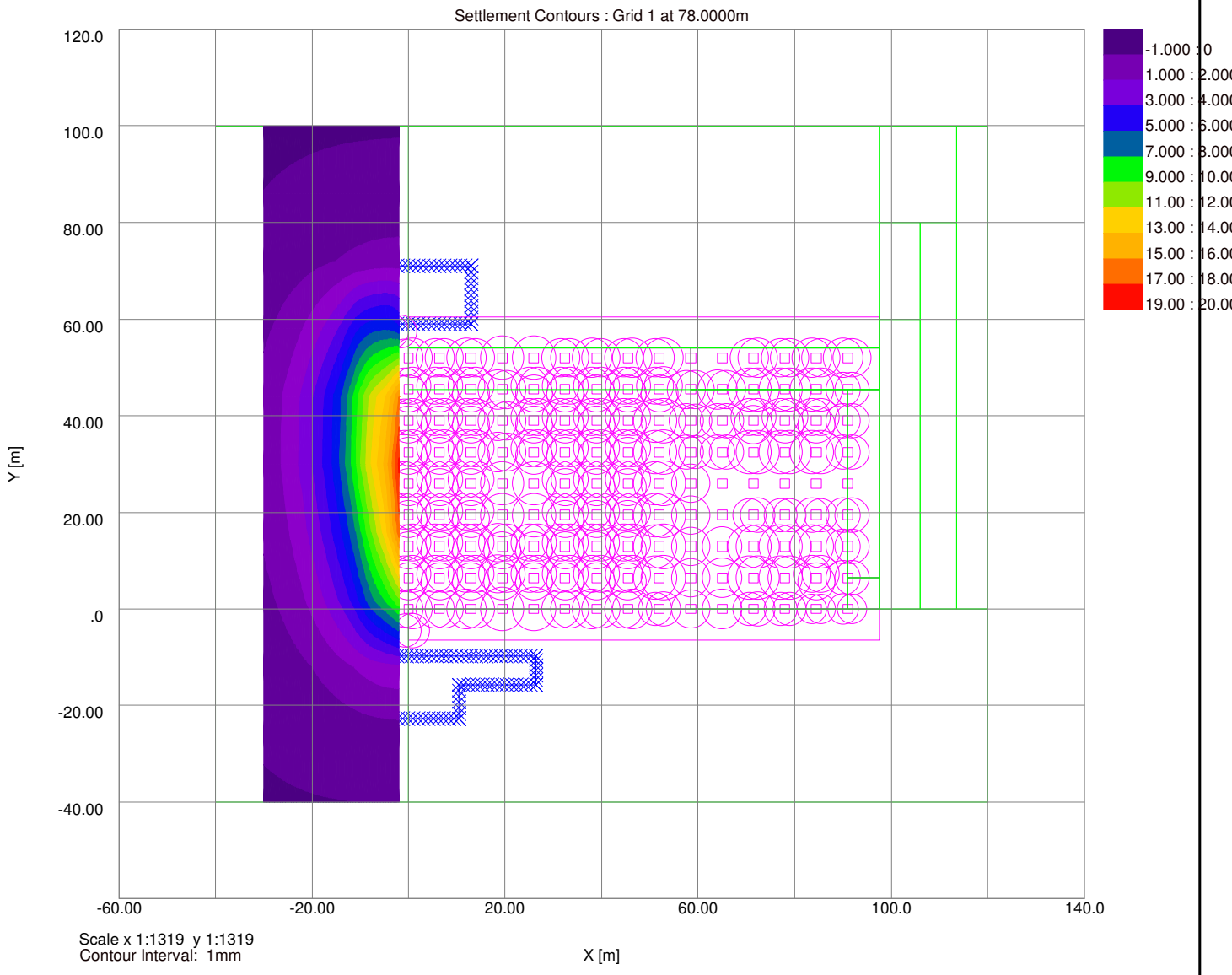

Settlement Contours : Grid 4 at 71.6000m
120.0
100.0
80.00
60.00
40.00
20.00
.0
-20.00
-40.00
Y [m]
-60.00
-20.00
20.00
60.00
100.0
140.0
X [m]
-20.00 : -18.
-16.00 : -14.
-12.00 : -10.
-8.000 : -6.0
-4.000 : -2.0
0 : 2.000
4.000 : 6.000
8.000 : 10.00
12.00 : 14.00
16.00 : 18.00
20.00 : 22.00
24.00 : 26.00
28.00 : 30.00
32.00 : 34.00
36.00 : 38.00
40.00 : 42.00
Scale x 1:1319 y 1:1319
Contour Interval: 2mm


Settlement Contours : Grid 5 at 72.4000m
120.0
100.0
80.00
60.00
40.00
20.00
.0
-20.00
-40.00
Y [m]
-60.00
-20.00
20.00
60.00
100.0
140.0
X [m]
-6.000 : -4.0
-2.000 : 0
2.000 : 4.000
6.000 : 8.000
10.00 : 12.00
14.00 : 16.00
18.00 : 20.00
22.00 : 24.00
26.00 : 28.00
30.00 : 32.00
34.00 : 36.00
38.00 : 40.00
42.00 : 44.00
Scale x 1:1319 y 1:1319
Contour Interval: 2mm


Settlement Contours : Grid 6 at 75.0000m
120.0
100.0
80.00
60.00
40.00
20.00
.0
-20.00
-40.00
Y [m]
-60.00
-20.00
20.00
60.00
100.0
140.0
X [m]
-2.000 : 0
2.000 : 4.000
6.000 : 8.000
10.00 : 12.00
14.00 : 16.00
18.00 : 20.00
22.00 : 24.00
26.00 : 28.00
30.00 : 32.00
34.00 : 36.00
38.00 : 40.00
Scale x 1:1319 y 1:1319
Contour Interval: 2mm

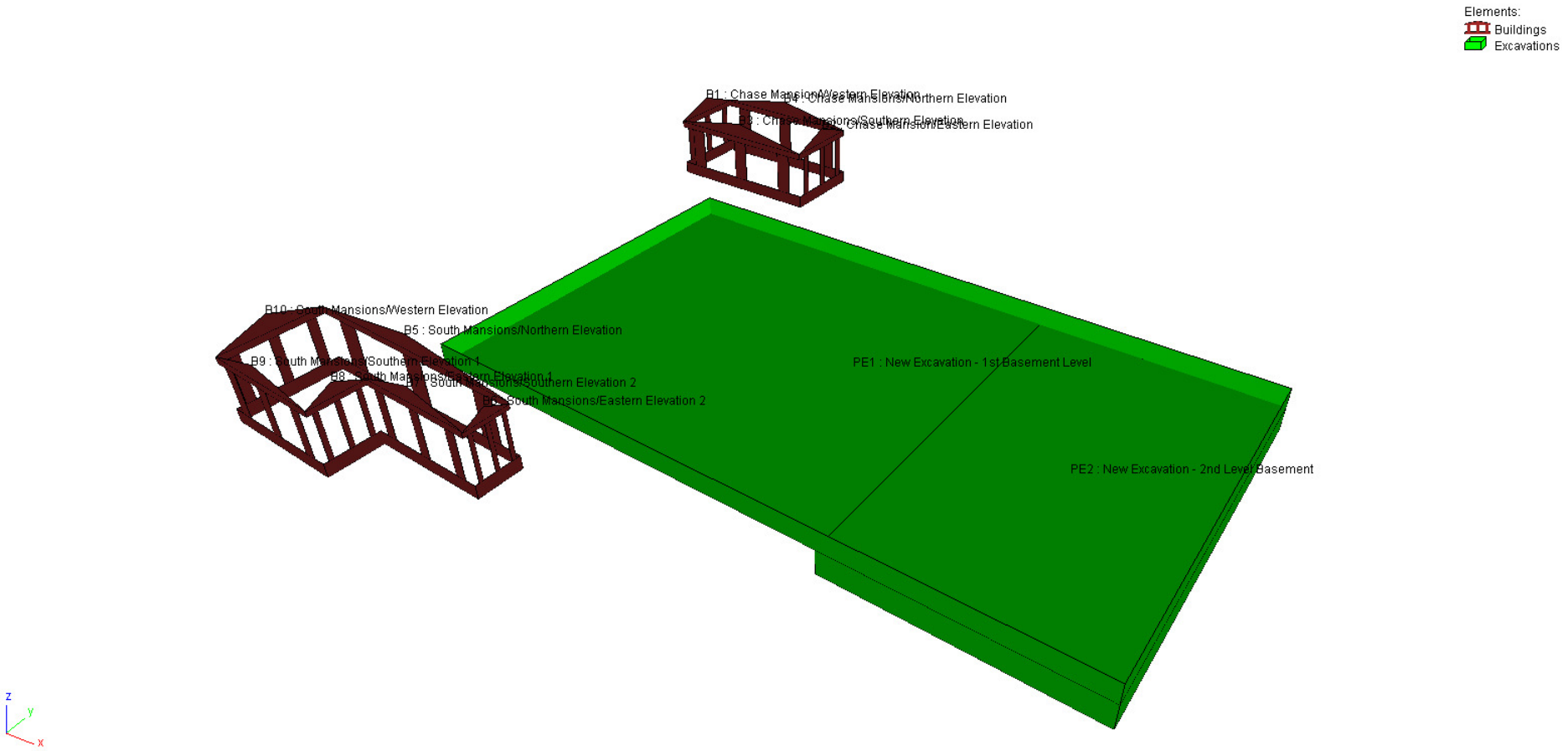

Settlement Contours : Grid 2 at 78.0000m
120.0
100.0
80.00
60.00
40.00
20.00
.0
-20.00
-40.00
Y [m]
-60.00
-20.00
20.00
60.00
100.0
140.0
X [m]
-8.000 : -7.0
-7.000 : -6.0
-6.000 : -5.0
-5.000 : -4.0
-4.000 : -3.0
-3.000 : -2.0
-2.000 : -1.0
-1.000 : 0
0 : 1.000
1.000 : 2.000
2.000 : 3.000
3.000 : 4.000
4.000 : 5.000
5.000 : 6.000
6.000 : 7.000
7.000 : 8.000
Scale x 1:1319 y 1:1319
Contour Interval: 1mm

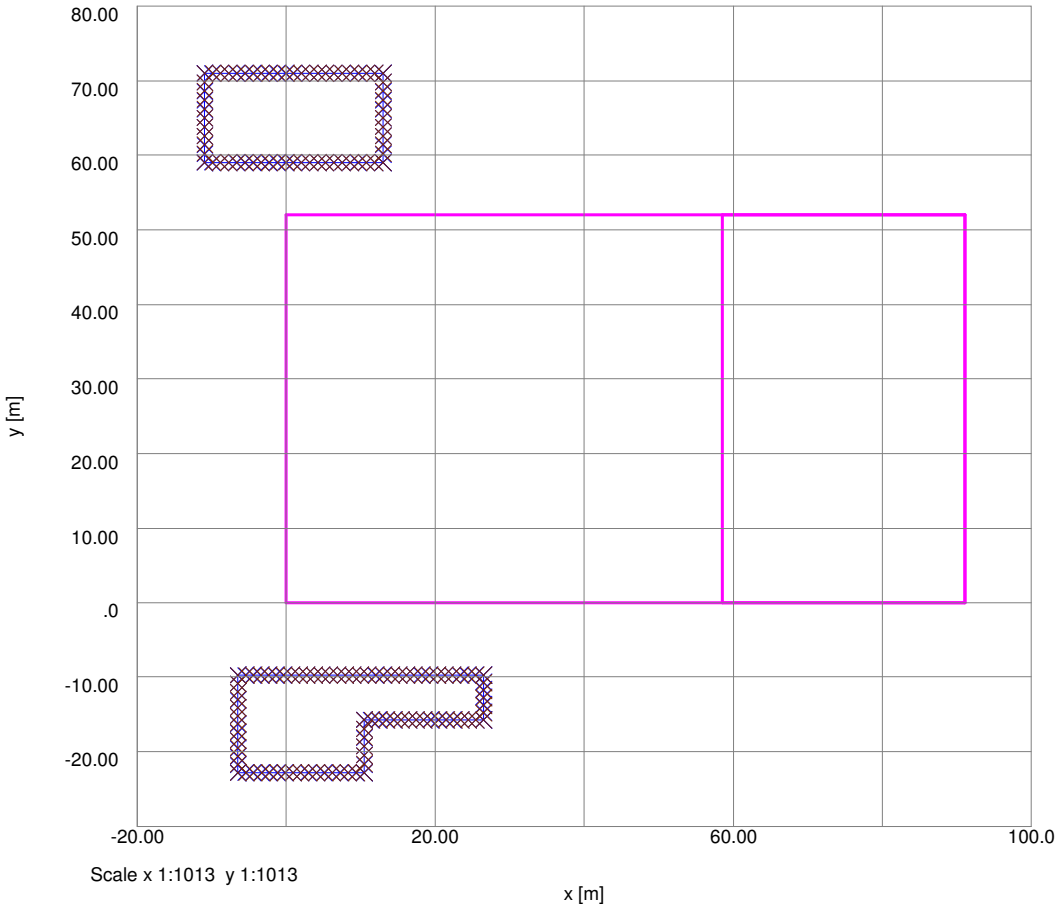

Settlement Contours : Grid 3 at 78.0000m
120.0
100.0
80.00
60.00
40.00
20.00
.0
-20.00
-40.00
Y [m]
-60.00
-20.00
20.00
60.00
100.0
140.0
X [m]
-14.00 : -13.
-12.00 : -11.
-10.00 : -9.0
-8.000 : -7.0
-6.000 : -5.0
-4.000 : -3.0
-2.000 : -1.0
0 : 1.000
2.000 : 3.000
4.000 : 5.000
6.000 : 7.000
Scale x 1:1319 y 1:1319
Contour Interval: 1mm


Settlement Contours : Grid 1 at 78.0000m
120.0
100.0
80.00
60.00
40.00
20.00
.0
-20.00
-40.00
Y [m]
-60.00
-20.00
20.00
60.00
100.0
140.0
X [m]
-1.000 : 0
1.000 : 2.000
3.000 : 4.000
5.000 : 6.000
7.000 : 8.000
9.000 : 10.00
11.00 : 12.00
13.00 : 14.00
15.00 : 16.00
17.00 : 18.00
19.00 : 20.00
Scale x 1:1319 y 1:1319
Contour Interval: 1mm

APPENDIX C
XDISP MODELLING OUTPUTS

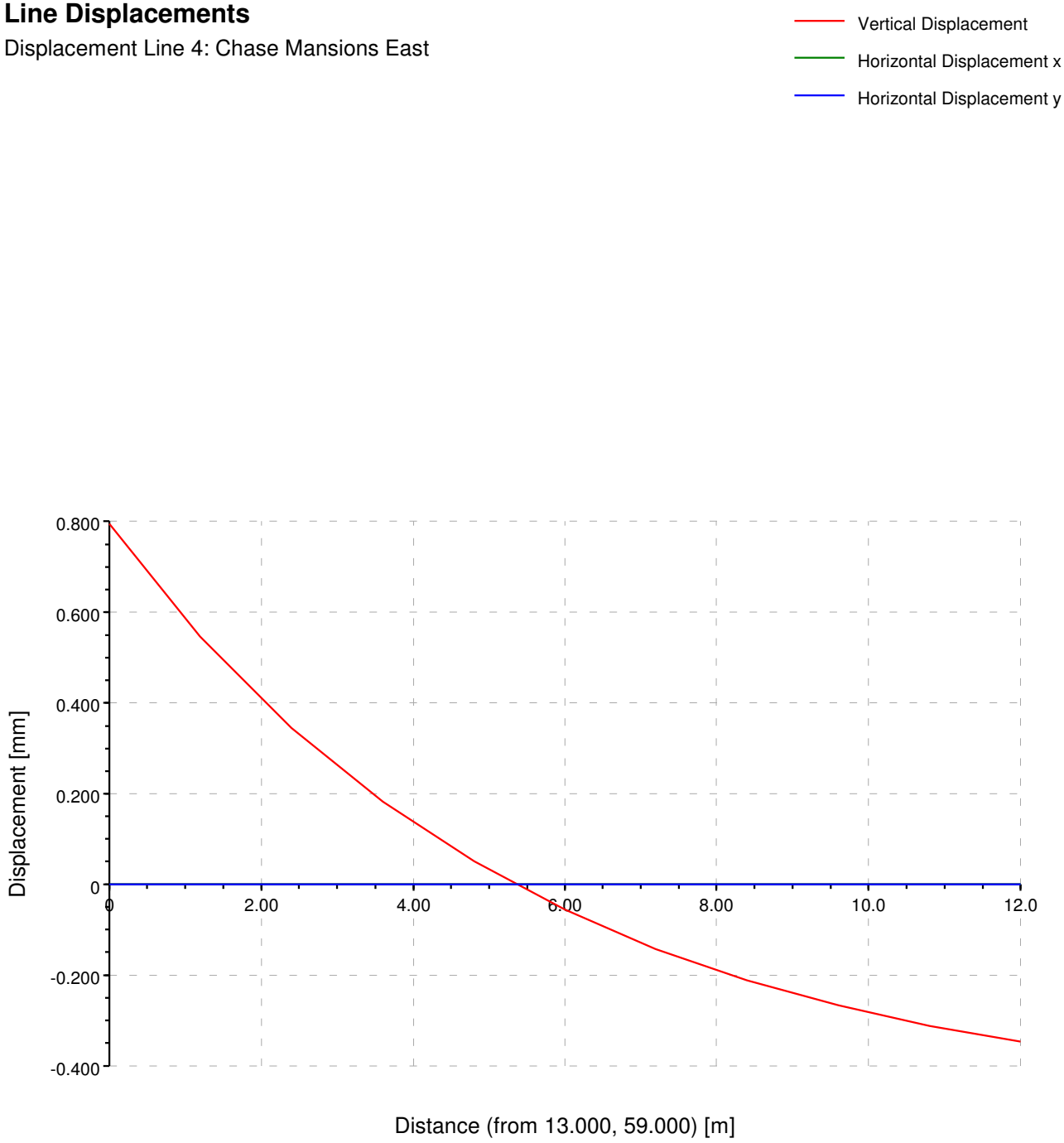
Graphics Display




80.00
70.00
60.00
50.00
40.00
30.00
20.00
10.00
.0
-10.00
-20.00
y [m]
-20.00
20.00
60.00
100.0
Scale x 1:1013 y 1:1013
x [m]

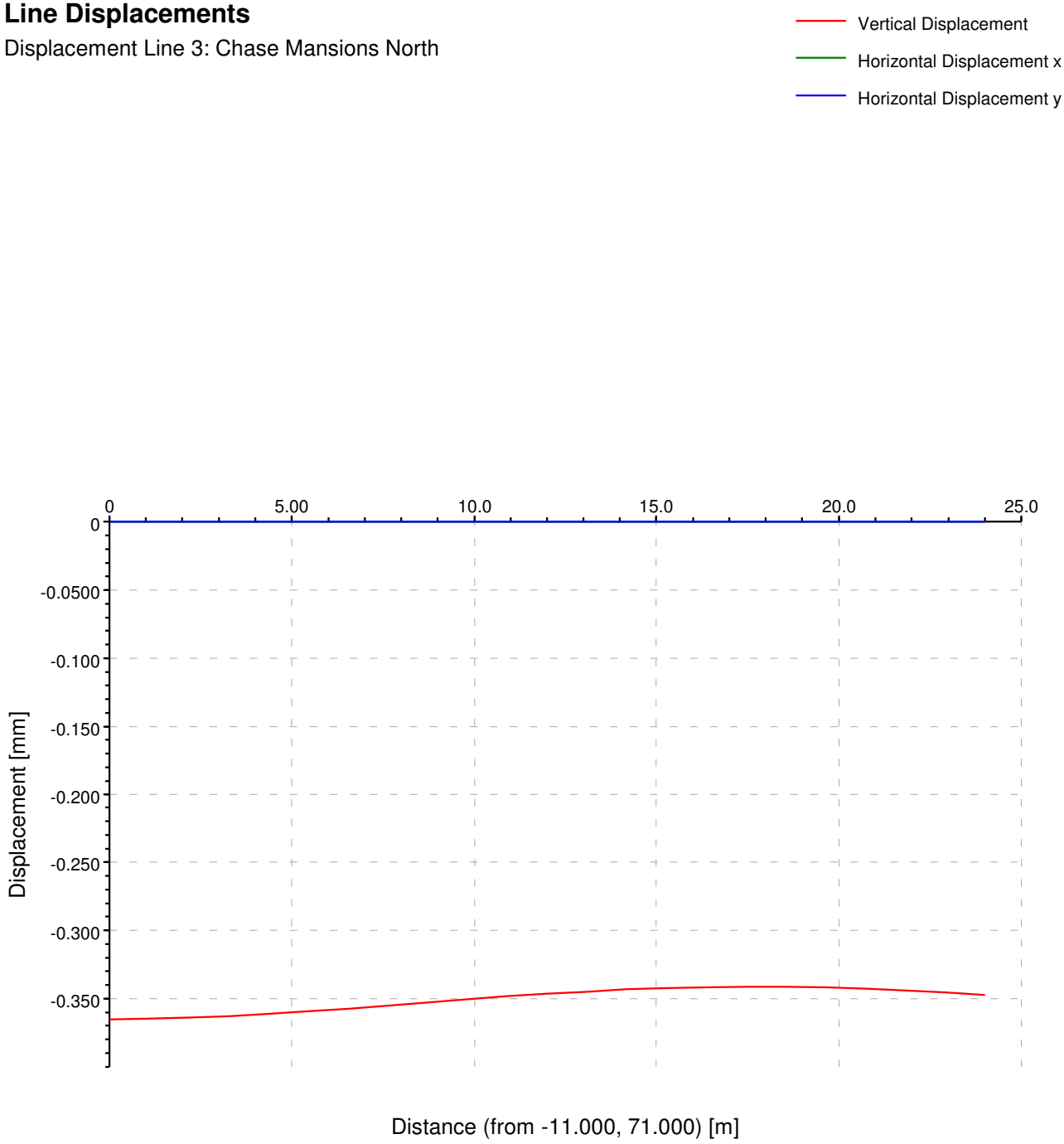
Line Displacements

Displacement Line 4: Chase Mansions East



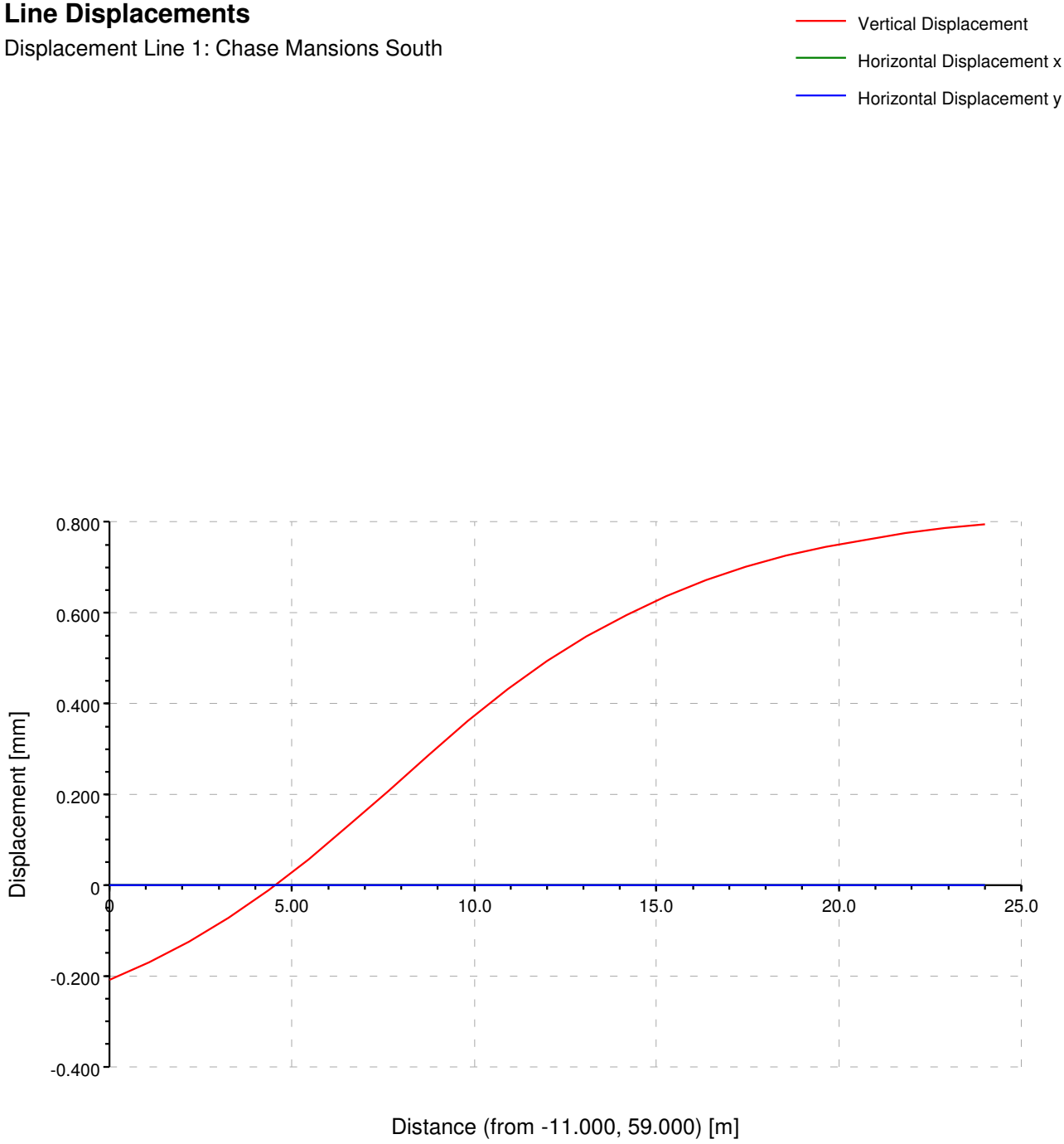
Line Displacements

Displacement Line 3: Chase Mansions North



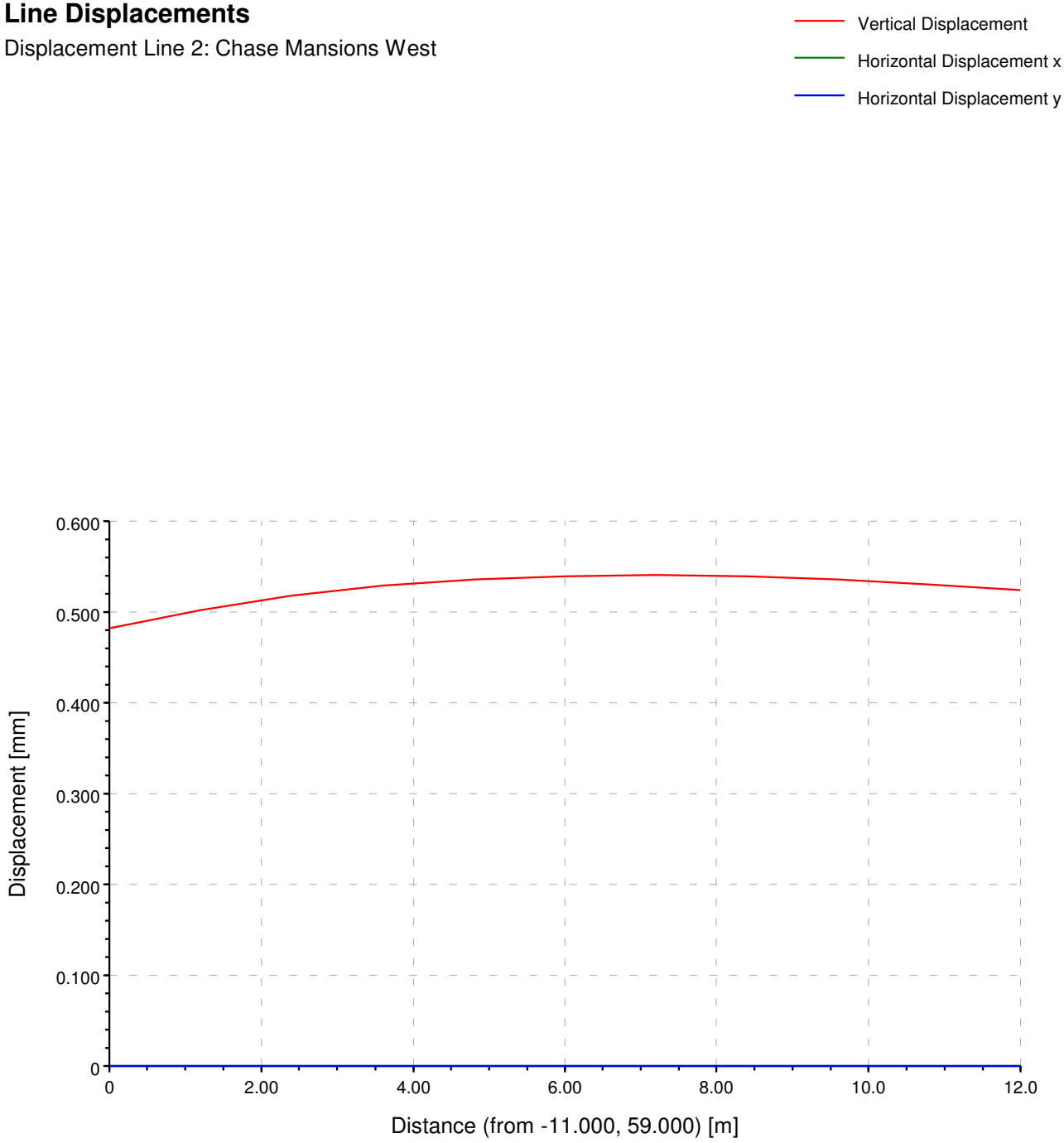
Line Displacements

Displacement Line 1: Chase Mansions South



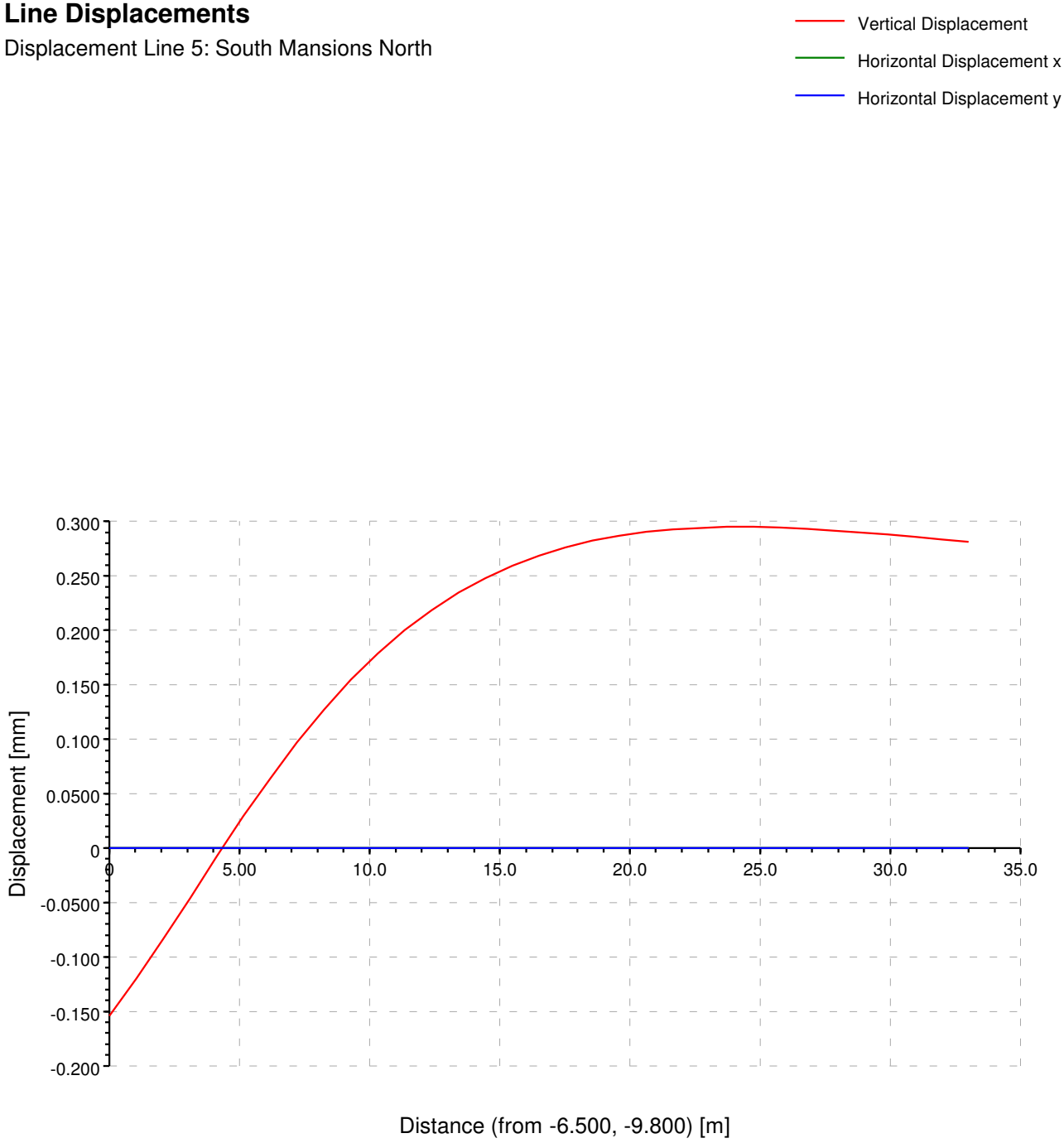
Line Displacements

Displacement Line 2: Chase Mansions West



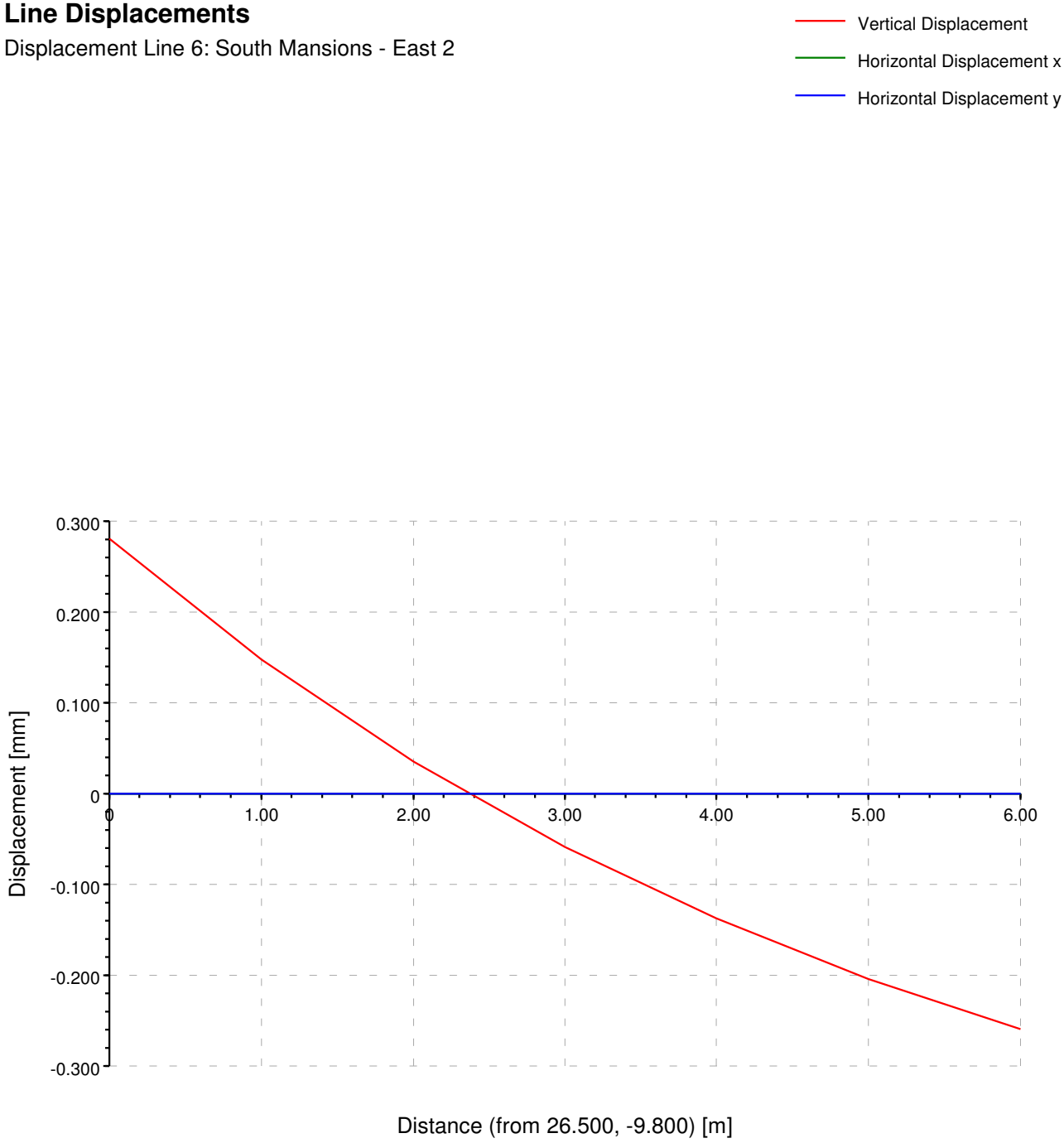
Line Displacements

Displacement Line 5: South Mansions North



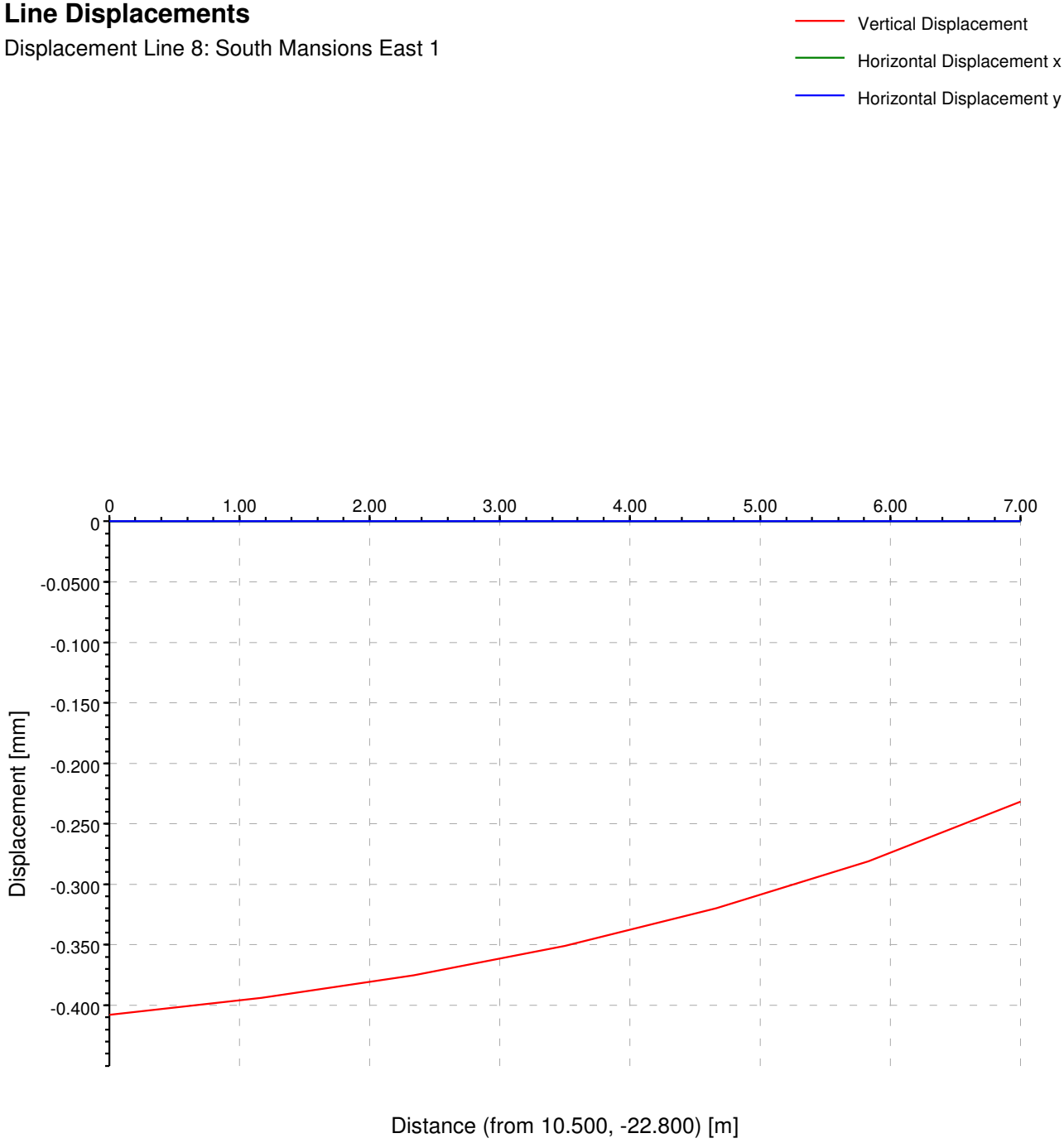
Line Displacements

Displacement Line 6: South Mansions - East 2



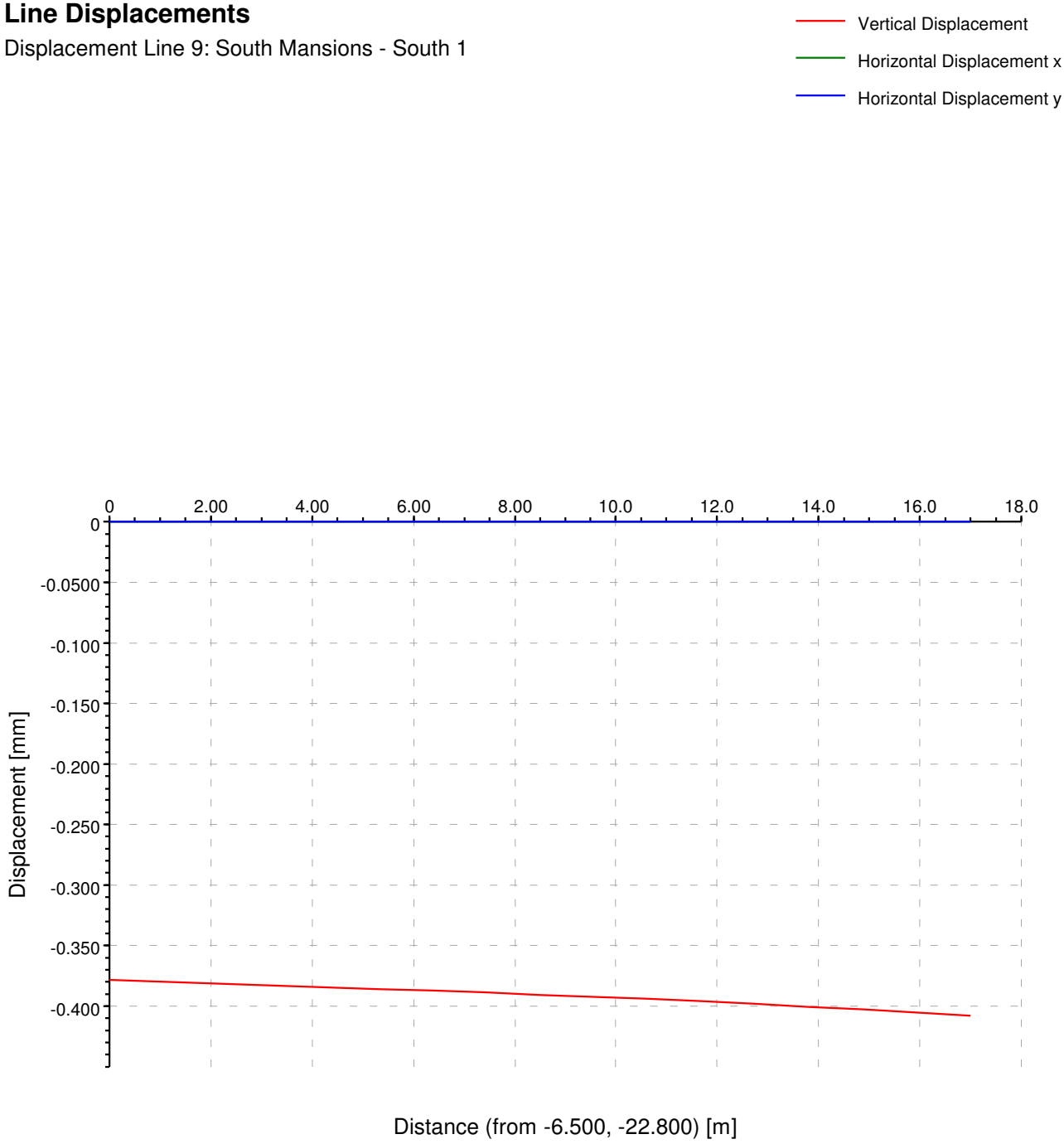
Line Displacements

Displacement Line 8: South Mansions East 1



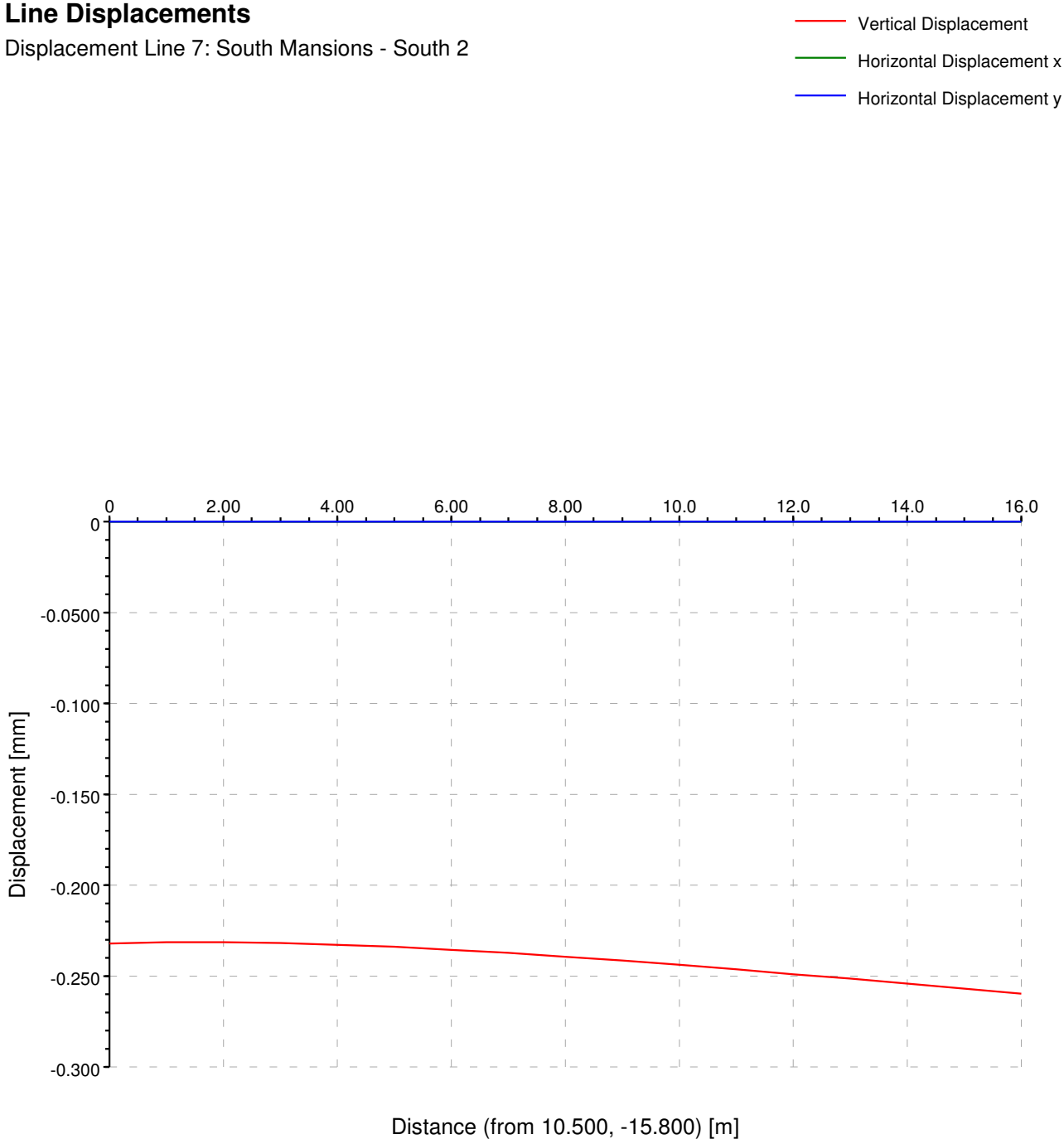
Line Displacements

Displacement Line 9: South Mansions - South 1



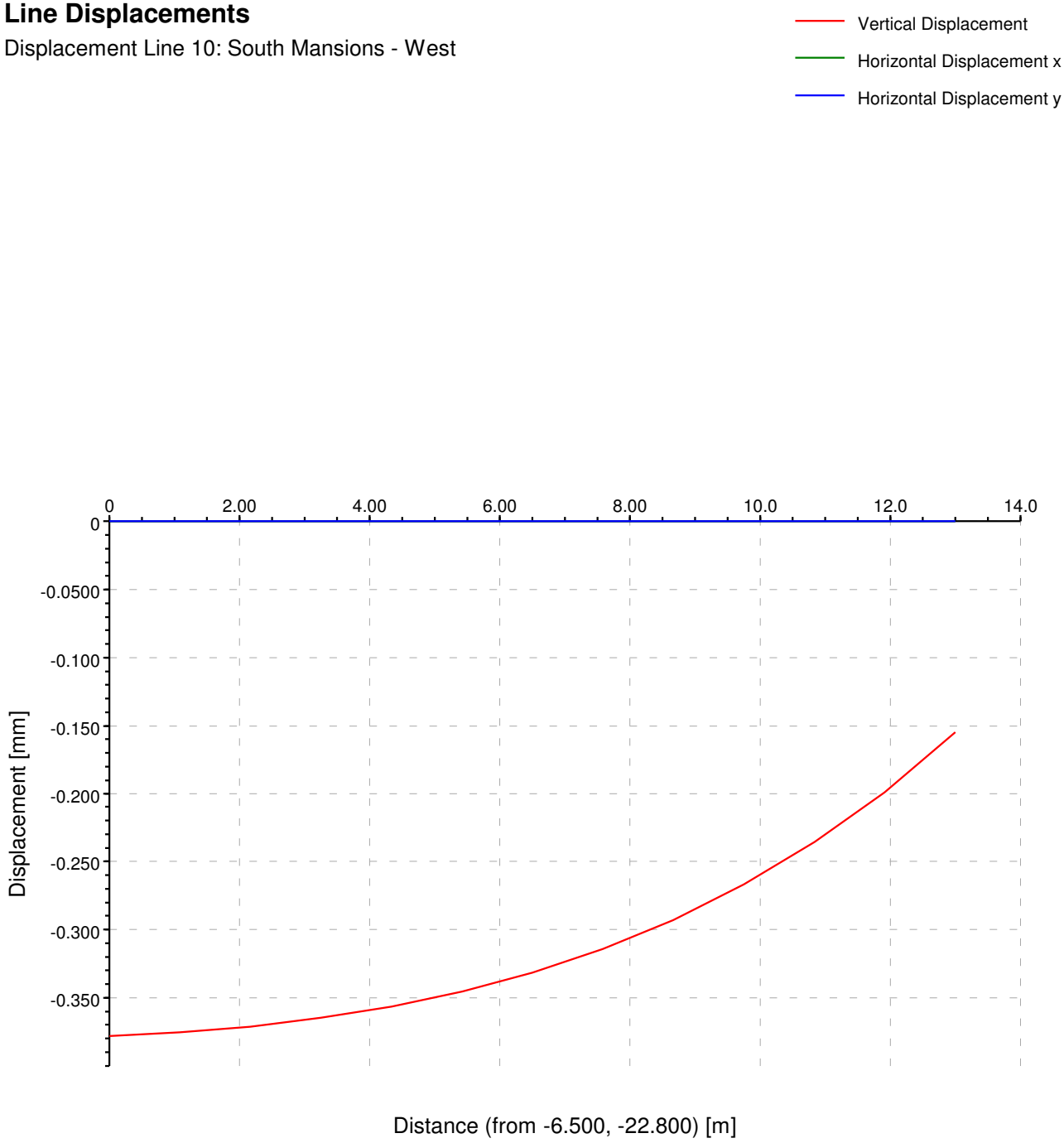
Line Displacements

Displacement Line 7: South Mansions - South 2



Line Displacements

Displacement Line 10: South Mansions - West



Notes

No wall installation or excavation as basement walls (reservoir) already constructed. Assessment is from displacements from Demo PDISP

Problem Type

Problem Type : Tunnelling and Embedded Wall Excavations

Displacement Data

Type	Name	Direction of extrusion	Point/Line/Line for extrusion						No. of intervals across extrusion/line	Extrusion depth	No. of intervals along extrusion	Calculate	Surface type for tunnels
			First point			Second point							
			X [m]	Y [m]	Z(level) [m]	X [m]	Y [m]	Z(level) [m]		[m]			
Line	Chase Mansions South	-	-11.00000	59.00000	77.00000	13.00000	59.00000	77.00000	22	-	-	Yes	Surface
Line	Chase Mansions West	-	-11.00000	59.00000	77.00000	-11.00000	71.00000	77.00000	10	-	-	Yes	Surface
Line	Chase Mansions North	-	-11.00000	71.00000	77.00000	13.00000	71.00000	77.00000	22	-	-	Yes	Surface
Line	Chase Mansions East	-	13.00000	59.00000	77.00000	13.00000	71.00000	77.00000	10	-	-	Yes	Surface
Line	South Mansions North	-	-6.50000	-9.80000	77.00000	26.50000	-9.80000	77.00000	32	-	-	Yes	Surface
Line	South Mansions - East 2	-	26.50000	-9.80000	77.00000	26.50000	-15.80000	77.00000	6	-	-	Yes	Surface
Line	South Mansions - South 2	-	10.50000	-15.80000	77.00000	26.50000	-15.80000	77.00000	16	-	-	Yes	Surface
Line	South Mansions East 1	-	10.50000	-22.80000	77.00000	10.50000	-15.80000	77.00000	6	-	-	Yes	Surface
Line	South Mansions - South 1	-	-6.50000	-22.80000	77.00000	10.50000	-22.80000	77.00000	16	-	-	Yes	Surface
Line	South Mansions - West	-	-6.50000	-22.80000	77.00000	-6.50000	-9.80000	77.00000	12	-	-	Yes	Surface

Imported Displacements

The following data points and displacements were found in the import file Demolition stage ST 20.06.17 2.csv.

Ref.	Coordinates			Displacements			
	x [m]	y [m]	z [m]	x [mm]	y [mm]	z [mm]	
1	-11.00000	59.00000	77.00000	0.00000	0.00000	0.20921	1,2,6
2	-9.90909	59.00000	77.00000	0.00000	0.00000	0.17044	1,2,6
3	-8.81818	59.00000	77.00000	0.00000	0.00000	0.12490	1,2,6
4	-7.72727	59.00000	77.00000	0.00000	0.00000	0.07203	1,2,6
5	-6.63636	59.00000	77.00000	0.00000	0.00000	0.01159	1,2,6
6	-5.54545	59.00000	77.00000	0.00000	0.00000	-0.05613	1,2,6
7	-4.45455	59.00000	77.00000	0.00000	0.00000	-0.13001	1,2,6
8	-3.36364	59.00000	77.00000	0.00000	0.00000	-0.20788	1,2,6
9	-2.27273	59.00000	77.00000	0.00000	0.00000	-0.28657	1,2,6
10	-1.18182	59.00000	77.00000	0.00000	0.00000	-0.36242	1,2,6
11	-0.09091	59.00000	77.00000	0.00000	0.00000	-0.43224	1,2,6
12	1.00000	59.00000	77.00000	0.00000	0.00000	-0.49425	1,2,6
13	2.09091	59.00000	77.00000	0.00000	0.00000	-0.54834	1,2,6
14	3.18182	59.00000	77.00000	0.00000	0.00000	-0.59548	1,2,6
15	4.27273	59.00000	77.00000	0.00000	0.00000	-0.63660	1,2,6
16	5.36364	59.00000	77.00000	0.00000	0.00000	-0.67200	1,2,6
17	6.45455	59.00000	77.00000	0.00000	0.00000	-0.70160	1,2,6
18	7.54545	59.00000	77.00000	0.00000	0.00000	-0.72562	1,2,6
19	8.63636	59.00000	77.00000	0.00000	0.00000	-0.74506	1,2,6
20	9.72727	59.00000	77.00000	0.00000	0.00000	-0.76128	1,2,6
21	10.81818	59.00000	77.00000	0.00000	0.00000	-0.77517	1,2,6
22	11.90909	59.00000	77.00000	0.00000	0.00000	-0.78680	1,2,6
23	13.00000	59.00000	77.00000	0.00000	0.00000	-0.79574	1,2,6
24	-11.00000	60.20000	77.00000	0.00000	0.00000	0.23802	1,2,6
25	-11.00000	61.40000	77.00000	0.00000	0.00000	0.26377	1,2,6
26	-11.00000	62.60000	77.00000	0.00000	0.00000	0.28631	1,2,6
27	-11.00000	63.80000	77.00000	0.00000	0.00000	0.30566	1,2,6
28	-11.00000	65.00000	77.00000	0.00000	0.00000	0.32196	1,2,6
29	-11.00000	66.20000	77.00000	0.00000	0.00000	0.33539	1,2,6
30	-11.00000	67.40000	77.00000	0.00000	0.00000	0.34620	1,2,6
31	-11.00000	68.60000	77.00000	0.00000	0.00000	0.35464	1,2,6
32	-11.00000	69.80000	77.00000	0.00000	0.00000	0.36094	1,2,6
33	-11.00000	71.00000	77.00000	0.00000	0.00000	0.36535	1,2,6
34	-9.90909	71.00000	77.00000	0.00000	0.00000	0.36495	1,2,6
35	-8.81818	71.00000	77.00000	0.00000	0.00000	0.36411	1,2,6
36	-7.72727	71.00000	77.00000	0.00000	0.00000	0.36287	1,2,6
37	-6.63636	71.00000	77.00000	0.00000	0.00000	0.36128	1,2,6
38	-5.54545	71.00000	77.00000	0.00000	0.00000	0.35941	1,2,6
39	-4.45455	71.00000	77.00000	0.00000	0.00000	0.35733	1,2,6
40	-3.36364	71.00000	77.00000	0.00000	0.00000	0.35511	1,2,6
41	-2.27273	71.00000	77.00000	0.00000	0.00000	0.35284	1,2,6
42	-1.18182	71.00000	77.00000	0.00000	0.00000	0.35060	1,2,6
43	-0.09091	71.00000	77.00000	0.00000	0.00000	0.34847	1,2,6
44	1.00000	71.00000	77.00000	0.00000	0.00000	0.34653	1,2,6
45	2.09091	71.00000	77.00000	0.00000	0.00000	0.34483	1,2,6
46	3.18182	71.00000	77.00000	0.00000	0.00000	0.34344	1,2,6
47	4.27273	71.00000	77.00000	0.00000	0.00000	0.34238	1,2,6
48	5.36364	71.00000	77.00000	0.00000	0.00000	0.34170	1,2,6
49	6.45455	71.00000	77.00000	0.00000	0.00000	0.34140	1,2,6
50	7.54545	71.00000	77.00000	0.00000	0.00000	0.34149	1,2,6
51	8.63636	71.00000	77.00000	0.00000	0.00000	0.34197	1,2,6
52	9.72727	71.00000	77.00000	0.00000	0.00000	0.34281	1,2,6
53	10.81818	71.00000	77.00000	0.00000	0.00000	0.34401	1,2,6
54	11.90909	71.00000	77.00000	0.00000	0.00000	0.34554	1,2,6
55	13.00000	71.00000	77.00000	0.00000	0.00000	0.34736	1,2,6
56	13.00000	60.20000	77.00000	0.00000	0.00000	-0.54688	1,2,6
57	13.00000	61.40000	77.00000	0.00000	0.00000	-0.34500	1,2,6
58	13.00000	62.60000	77.00000	0.00000	0.00000	-0.18181	1,2,6
59	13.00000	63.80000	77.00000	0.00000	0.00000	-0.04999	1,2,6
60	13.00000	65.00000	77.00000	0.00000	0.00000	0.05650	1,2,6
61	13.00000	66.20000	77.00000	0.00000	0.00000	0.14249	1,2,6
62	13.00000	67.40000	77.00000	0.00000	0.00000	0.21182	1,2,6
63	13.00000	68.60000	77.00000	0.00000	0.00000	0.26753	1,2,6
64	13.00000	69.80000	77.00000	0.00000	0.00000	0.31206	1,2,6
65	-6.50000	-9.80000	77.00000	0.00000	0.00000	0.15456	1,2,6
66	-5.46875	-9.80000	77.00000	0.00000	0.00000	0.12010	1,2,6
67	-4.43750	-9.80000	77.00000	0.00000	0.00000	0.08366	1,2,6
68	-3.40625	-9.80000	77.00000	0.00000	0.00000	0.04603	1,2,6
69	-2.37500	-9.80000	77.00000	0.00000	0.00000	0.00818	1,2,6
70	-1.34375	-9.80000	77.00000	0.00000	0.00000	-0.02889	1,2,6
71	-0.31250	-9.80000	77.00000	0.00000	0.00000	-0.06427	1,2,6
72	0.71875	-9.80000	77.00000	0.00000	0.00000	-0.09727	1,2,6
73	1.75000	-9.80000	77.00000	0.00000	0.00000	-0.12747	1,2,6
74	2.78125	-9.80000	77.00000	0.00000	0.00000	-0.15472	1,2,6
75	3.81250	-9.80000	77.00000	0.00000	0.00000	-0.17899	1,2,6
76	4.84375	-9.80000	77.00000	0.00000	0.00000	-0.20036	1,2,6
77	5.87500	-9.80000	77.00000	0.00000	0.00000	-0.21891	1,2,6
78	6.90625	-9.80000	77.00000	0.00000	0.00000	-0.23479	1,2,6
79	7.93750	-9.80000	77.00000	0.00000	0.00000	-0.24821	1,2,6
80	8.96875	-9.80000	77.00000	0.00000	0.00000	-0.25943	1,2,6
81	10.00000	-9.80000	77.00000	0.00000	0.00000	-0.26873	1,2,6
82	11.03125	-9.80000	77.00000	0.00000	0.00000	-0.27633	1,2,6

Ref.	Coordinates x [m]	y [m]	z [m]	Displacements x [mm]	y [mm]	z [mm]	
83	12.06250	-9.80000	77.00000	0.00000	0.00000	-0.28240	1,2,6
84	13.09375	-9.80000	77.00000	0.00000	0.00000	-0.28706	1,2,6
85	14.12500	-9.80000	77.00000	0.00000	0.00000	-0.29046	1,2,6
86	15.15625	-9.80000	77.00000	0.00000	0.00000	-0.29277	1,2,6
87	16.18750	-9.80000	77.00000	0.00000	0.00000	-0.29420	1,2,6
88	17.21875	-9.80000	77.00000	0.00000	0.00000	-0.29491	1,2,6
89	18.25000	-9.80000	77.00000	0.00000	0.00000	-0.29498	1,2,6
90	19.28125	-9.80000	77.00000	0.00000	0.00000	-0.29445	1,2,6
91	20.31250	-9.80000	77.00000	0.00000	0.00000	-0.29339	1,2,6
92	21.34375	-9.80000	77.00000	0.00000	0.00000	-0.29188	1,2,6
93	22.37500	-9.80000	77.00000	0.00000	0.00000	-0.29006	1,2,6
94	23.40625	-9.80000	77.00000	0.00000	0.00000	-0.28804	1,2,6
95	24.43750	-9.80000	77.00000	0.00000	0.00000	-0.28587	1,2,6
96	25.46875	-9.80000	77.00000	0.00000	0.00000	-0.28355	1,2,6
97	26.50000	-9.80000	77.00000	0.00000	0.00000	-0.28108	1,2,6
98	26.50000	-10.80000	77.00000	0.00000	0.00000	-0.14764	1,2,6
99	26.50000	-11.80000	77.00000	0.00000	0.00000	-0.03553	1,2,6
100	26.50000	-12.80000	77.00000	0.00000	0.00000	0.05867	1,2,6
101	26.50000	-13.80000	77.00000	0.00000	0.00000	0.13780	1,2,6
102	26.50000	-14.80000	77.00000	0.00000	0.00000	0.20420	1,2,6
103	26.50000	-15.80000	77.00000	0.00000	0.00000	0.25981	1,2,6
104	10.50000	-15.80000	77.00000	0.00000	0.00000	0.23220	1,2,6
105	11.50000	-15.80000	77.00000	0.00000	0.00000	0.23166	1,2,6
106	12.50000	-15.80000	77.00000	0.00000	0.00000	0.23162	1,2,6
107	13.50000	-15.80000	77.00000	0.00000	0.00000	0.23203	1,2,6
108	14.50000	-15.80000	77.00000	0.00000	0.00000	0.23286	1,2,6
109	15.50000	-15.80000	77.00000	0.00000	0.00000	0.23404	1,2,6
110	16.50000	-15.80000	77.00000	0.00000	0.00000	0.23555	1,2,6
111	17.50000	-15.80000	77.00000	0.00000	0.00000	0.23734	1,2,6
112	18.50000	-15.80000	77.00000	0.00000	0.00000	0.23936	1,2,6
113	19.50000	-15.80000	77.00000	0.00000	0.00000	0.24157	1,2,6
114	20.50000	-15.80000	77.00000	0.00000	0.00000	0.24395	1,2,6
115	21.50000	-15.80000	77.00000	0.00000	0.00000	0.24645	1,2,6
116	22.50000	-15.80000	77.00000	0.00000	0.00000	0.24905	1,2,6
117	23.50000	-15.80000	77.00000	0.00000	0.00000	0.25171	1,2,6
118	24.50000	-15.80000	77.00000	0.00000	0.00000	0.25441	1,2,6
119	25.50000	-15.80000	77.00000	0.00000	0.00000	0.25712	1,2,6
120	10.50000	-22.80000	77.00000	0.00000	0.00000	0.40789	1,2,6
121	10.50000	-21.63333	77.00000	0.00000	0.00000	0.39387	1,2,6
122	10.50000	-20.46667	77.00000	0.00000	0.00000	0.37518	1,2,6
123	10.50000	-19.30000	77.00000	0.00000	0.00000	0.35090	1,2,6
124	10.50000	-18.13333	77.00000	0.00000	0.00000	0.31993	1,2,6
125	10.50000	-16.96667	77.00000	0.00000	0.00000	0.28092	1,2,6
126	-6.50000	-22.80000	77.00000	0.00000	0.00000	0.37813	1,2,6
127	-5.43750	-22.80000	77.00000	0.00000	0.00000	0.37983	1,2,6
128	-4.37500	-22.80000	77.00000	0.00000	0.00000	0.38142	1,2,6
129	-3.31250	-22.80000	77.00000	0.00000	0.00000	0.38295	1,2,6
130	-2.25000	-22.80000	77.00000	0.00000	0.00000	0.38443	1,2,6
131	-1.18750	-22.80000	77.00000	0.00000	0.00000	0.38590	1,2,6
132	-0.12500	-22.80000	77.00000	0.00000	0.00000	0.38740	1,2,6
133	0.93750	-22.80000	77.00000	0.00000	0.00000	0.38894	1,2,6
134	2.00000	-22.80000	77.00000	0.00000	0.00000	0.39056	1,2,6
135	3.06250	-22.80000	77.00000	0.00000	0.00000	0.39227	1,2,6
136	4.12500	-22.80000	77.00000	0.00000	0.00000	0.39410	1,2,6
137	5.18750	-22.80000	77.00000	0.00000	0.00000	0.39605	1,2,6
138	6.25000	-22.80000	77.00000	0.00000	0.00000	0.39814	1,2,6
139	7.31250	-22.80000	77.00000	0.00000	0.00000	0.40037	1,2,6
140	8.37500	-22.80000	77.00000	0.00000	0.00000	0.40274	1,2,6
141	9.43750	-22.80000	77.00000	0.00000	0.00000	0.40525	1,2,6
142	-6.50000	-21.71667	77.00000	0.00000	0.00000	0.37551	1,2,6
143	-6.50000	-20.63333	77.00000	0.00000	0.00000	0.37123	1,2,6
144	-6.50000	-19.55000	77.00000	0.00000	0.00000	0.36504	1,2,6
145	-6.50000	-18.46667	77.00000	0.00000	0.00000	0.35662	1,2,6
146	-6.50000	-17.38333	77.00000	0.00000	0.00000	0.34564	1,2,6
147	-6.50000	-16.30000	77.00000	0.00000	0.00000	0.33169	1,2,6
148	-6.50000	-15.21667	77.00000	0.00000	0.00000	0.31430	1,2,6
149	-6.50000	-14.13333	77.00000	0.00000	0.00000	0.29296	1,2,6
150	-6.50000	-13.05000	77.00000	0.00000	0.00000	0.26704	1,2,6
151	-6.50000	-11.96667	77.00000	0.00000	0.00000	0.23585	1,2,6
152	-6.50000	-10.88333	77.00000	0.00000	0.00000	0.19863	1,2,6

1 - Data point coincident with displacement data. Its displacement has been added to those calculated by Xdisp.
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.

Vertical Ground Movement Curves (Excavations)

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:	-2147483648.E+2147483647

Horizontal Ground Movement Curves (Excavations)

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:	-2147483648.E+2147483647

Polygonal Excavations

Excavation Name:	**New Excavation - 1st Basement Level**
Surface level [m]:	77.800
Contribution:	Positive
Enabled:	Yes
Surface movement curves which are selected are applied between surface and [m]:	75.000

Corner	x [m]	y [m]	Base Level [m]	Stiffened	Previous Side d [m]	Previous Side p1 [%]	Previous Side p2* [%]	Next Side d [m]	Next Side p1 [%]	Next Side p2* [%]
1	0.0	0.0	75.000	Yes	0.0	67.000	25.000	0.0	67.000	25.000
2	91.000	0.0	75.000	Yes	0.0	67.000	25.000	0.0	67.000	25.000
3	91.000	52.000	75.000	Yes	0.0	67.000	25.000	0.0	67.000	25.000
4	0.0	52.000	75.000	Yes	0.0	67.000	25.000	0.0	67.000	25.000

Side	Corner 1 x [m]	Corner 1 y [m]	Corner 2 x [m]	Corner 2 y [m]	Ground Movement Curve Vertical	Ground Movement Curve Horizontal
1	0.0	0.0	91.000	0.0	No vertical ground movement	No horizontal ground movement
2	91.000	0.0	91.000	52.000	No vertical ground movement	No horizontal ground movement
3	91.000	52.000	0.0	52.000	No vertical ground movement	No horizontal ground movement
4	0.0	52.000	0.0	0.0	No vertical ground movement	No horizontal ground movement

Side	Corner 1 x [m]	Corner 1 y [m]	Corner 2 x [m]	Corner 2 y [m]	Ground Movement Curve Vertical	Ground Movement Curve Horizontal

Excavation Name: New Excavation - 2nd Level Basement
Surface level [m]: 75.000
Contribution: Positive
Enabled: Yes
Surface movement curves which are selected are applied between surface and [m]: 71.600

Corner	x [m]	y [m]	Base Level [m]	Stiffened	Previous Side d [m]	Previous Side p1 [%]	Previous Side p2* [%]	Next Side d [m]	Next Side p1 [%]	Next Side p2* [%]
1	58.500	0.0	71.600	Yes	0.0	67.000	25.000	0.0	67.000	25.000
2	91.000	0.0	71.600	Yes	0.0	67.000	25.000	0.0	67.000	25.000
3	91.000	52.000	71.600	Yes	0.0	67.000	25.000	0.0	67.000	25.000
4	58.500	52.000	71.600	Yes	0.0	67.000	25.000	0.0	67.000	25.000

Side	Corner 1 x [m]	Corner 1 y [m]	Corner 2 x [m]	Corner 2 y [m]	Ground Movement Curve Vertical	Ground Movement Curve Horizontal
1	58.500	0.0	91.000	0.0	No vertical ground movement	No horizontal ground movement
2	91.000	0.0	91.000	52.000	No vertical ground movement	No horizontal ground movement
3	91.000	52.000	58.500	52.000	No vertical ground movement	No horizontal ground movement
4	58.500	52.000	58.500	0.0	No vertical ground movement	No horizontal ground movement

Damage Category Strains

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

Specific Structures - Geometry

Structure Name	Sub-Structure Name	Displacement Line	Start Distance Along Line [m]	End Distance Along Line [m]	Vertical Offsets from Line for Vertical Movement Calculations [m]	Vertical Displacement Limit Sensitivity [mm]	Damage Category Strains	Poisson's Ratio	E/G
Chase Mansion	Western Elevation	Chase Mansions West	0.00000	12.00000	0.0	0.10000	Burland Strain Limits	0.20000	2.6000
Chase Mansion	Eastern Elevation	Chase Mansions East	0.00000	12.00000	0.0	0.10000	Burland Strain Limits	0.20000	2.6000
Chase Mansions	Southern Elevation	Chase Mansions South	0.00000	24.00000	0.0	0.10000	Burland Strain Limits	0.20000	2.6000
Chase Mansions	Northern Elevation	Chase Mansions North	0.00000	24.00000	0.0	0.10000	Burland Strain Limits	0.20000	2.6000
South Mansions	Northern Elevation	South Mansions North	0.00000	33.00000	0.0	0.10000	Burland Strain Limits	0.20000	2.6000
South Mansions	Eastern Elevation 2	South Mansions - East 2	0.00000	6.00000	0.0	0.10000	Burland Strain Limits	0.20000	2.6000
South Mansions	Southern Elevation 2	South Mansions - South 2	0.00000	16.00000	0.0	0.10000	Burland Strain Limits	0.20000	2.6000
South Mansions	Eastern Elevation 1	South Mansions East 1	0.00000	7.00000	0.0	0.10000	Burland Strain Limits	0.20000	2.6000
South Mansions	Southern Elevation 1	South Mansions - South 1	0.00000	17.00000	0.0	0.10000	Burland Strain Limits	0.20000	2.6000
South Mansions	Western Elevation	South Mansions - West	0.00000	13.00000	0.0	0.10000	Burland Strain Limits	0.20000	2.6000

Specific Structures - Bending Parameters

Structure Name	Sub-Structure Name	Height [m]	Default Properties	Hogging 2nd Moment of Area (per unit width) [m³]	Hogging Distance of Bending Strain from N.A. [m]	Hogging Distance of N.A. from Edge of Beam in Tension [m]	Sagging 2nd Moment of Area (per unit width) [m³]	Sagging Distance of Bending Strain from N.A. [m]	Sagging Distance of N.A. from Edge of Beam in Tension [m]
Chase Mansion	Western Elevation	9.0000	Yes	243.00	9.0000	9.0000	60.750	4.5000	4.5000
Chase Mansion	Eastern Elevation	9.0000	Yes	243.00	9.0000	9.0000	60.750	4.5000	4.5000
Chase Mansions	Southern Elevation	9.0000	Yes	243.00	9.0000	9.0000	60.750	4.5000	4.5000
Chase Mansions	Northern Elevation	9.0000	Yes	243.00	9.0000	9.0000	60.750	4.5000	4.5000
South Mansions	Northern Elevation	9.0000	Yes	243.00	9.0000	9.0000	60.750	4.5000	4.5000
South Mansions	Eastern Elevation 2	9.0000	Yes	243.00	9.0000	9.0000	60.750	4.5000	4.5000
South Mansions	Southern Elevation 2	9.0000	Yes	243.00	9.0000	9.0000	60.750	4.5000	4.5000
South Mansions	Eastern Elevation 1	9.0000	Yes	243.00	9.0000	9.0000	60.750	4.5000	4.5000
South Mansions	Southern Elevation 1	9.0000	Yes	243.00	9.0000	9.0000	60.750	4.5000	4.5000
South Mansions	Western Elevation	9.0000	Yes	243.00	9.0000	9.0000	60.750	4.5000	4.5000

Building Segment Combinations

Structure Name	Sub-Structure Name	Vertical Offset from Line for Vertical Movement Calculations [m]	Segment Start [m]	Length [m]	Curvature	Combined Segment

No structures have segments combined.

Utility Strain Calculation Options

Neglect beneficial contribution of axial strains : No

Displacement and Strain Results

Name	Type/No.	Dist. [m]	x [m]	y [m]	z [m]	x [mm]	y [mm]	z [mm]	Displacements Horizontal displacement along Line [mm]	Displacements Horizontal displacement perpendicular to Line [mm]	Angle of Line to x Axis [°]	
Chase Mansions South	Line 1	-11.00000	59.00000	77.00000	0.0	0.0	0.20921	0.0	0.0	0.0	*	
		1.0909	-9.90909	59.00000	77.00000	0.0	0.0	0.17044	0.0	0.0	0.0	*
		2.1818	-8.81818	59.00000	77.00000	0.0	0.0	0.12490	0.0	0.0	0.0	*
		3.2727	-7.72727	59.00000	77.00000	0.0	0.0	0.072027	0.0	0.0	0.0	*
		4.3636	-6.63636	59.00000	77.00000	0.0	0.0	0.011588	0.0	0.0	0.0	*
		5.4545	-5.54545	59.00000	77.00000	0.0	0.0	-0.056132	0.0	0.0	0.0	*
		6.5455	-4.45455	59.00000	77.00000	0.0	0.0	-0.13001	0.0	0.0	0.0	*
		7.6364	-3.36364	59.00000	77.00000	0.0	0.0	-0.20788	0.0	0.0	0.0	*
		8.7273	-2.27273	59.00000	77.00000	0.0	0.0	-0.28657	0.0	0.0	0.0	*
		9.8182	-1.18182	59.00000	77.00000	0.0	0.0	-0.36242	0.0	0.0	0.0	*
		10.909	-0.09091	59.00000	77.00000	0.0	0.0	-0.43224	0.0	0.0	0.0	*
		12.000	1.00000	59.00000	77.00000	0.0	0.0	-0.49425	0.0	0.0	0.0	*

Type/No. Name	Dist.	Coordinates x	y	z	Displacements x	y	z	Horizontal displacement	Horizontal displacement	Angle of Line to x Axis	
	13.091	2.09091	59.00000	77.00000	0.0	0.0	-0.54834	0.0	0.0	0.0	*
	14.182	3.18182	59.00000	77.00000	0.0	0.0	-0.59548	0.0	0.0	0.0	*
	15.273	4.27273	59.00000	77.00000	0.0	0.0	-0.63660	0.0	0.0	0.0	*
	16.364	5.36364	59.00000	77.00000	0.0	0.0	-0.67200	0.0	0.0	0.0	*
	17.455	6.45455	59.00000	77.00000	0.0	0.0	-0.70160	0.0	0.0	0.0	*
	18.545	7.54545	59.00000	77.00000	0.0	0.0	-0.72562	0.0	0.0	0.0	*
	19.636	8.63636	59.00000	77.00000	0.0	0.0	-0.74506	0.0	0.0	0.0	*
	20.727	9.72727	59.00000	77.00000	0.0	0.0	-0.76128	0.0	0.0	0.0	*
	21.818	10.81818	59.00000	77.00000	0.0	0.0	-0.77517	0.0	0.0	0.0	*
	22.909	11.90909	59.00000	77.00000	0.0	0.0	-0.78680	0.0	0.0	0.0	*
	24.000	13.00000	59.00000	77.00000	0.0	0.0	-0.79574	0.0	0.0	0.0	*
Chase Mansions West	Line 2	-11.00000	59.00000	77.00000	0.0	0.0	0.20921	0.0	0.0	90.000	*
	1.2000	-11.00000	60.20000	77.00000	0.0	0.0	0.23802	0.0	0.0	90.000	*
	2.4000	-11.00000	61.40000	77.00000	0.0	0.0	0.26377	0.0	0.0	90.000	*
	3.6000	-11.00000	62.60000	77.00000	0.0	0.0	0.28631	0.0	0.0	90.000	*
	4.8000	-11.00000	63.80000	77.00000	0.0	0.0	0.30566	0.0	0.0	90.000	*
	6.0000	-11.00000	65.00000	77.00000	0.0	0.0	0.32196	0.0	0.0	90.000	*
	7.2000	-11.00000	66.20000	77.00000	0.0	0.0	0.33539	0.0	0.0	90.000	*
	8.4000	-11.00000	67.40000	77.00000	0.0	0.0	0.34620	0.0	0.0	90.000	*
	9.6000	-11.00000	68.60000	77.00000	0.0	0.0	0.35464	0.0	0.0	90.000	*
	10.800	-11.00000	69.80000	77.00000	0.0	0.0	0.36094	0.0	0.0	90.000	*
	12.000	-11.00000	71.00000	77.00000	0.0	0.0	0.36535	0.0	0.0	90.000	*
Chase Mansions North	Line 3	-11.00000	71.00000	77.00000	0.0	0.0	0.36535	0.0	0.0	0.0	*
	1.0909	-9.90909	71.00000	77.00000	0.0	0.0	0.36495	0.0	0.0	0.0	*
	2.1818	-8.81818	71.00000	77.00000	0.0	0.0	0.36411	0.0	0.0	0.0	*
	3.2727	-7.72727	71.00000	77.00000	0.0	0.0	0.36287	0.0	0.0	0.0	*
	4.3636	-6.63636	71.00000	77.00000	0.0	0.0	0.36128	0.0	0.0	0.0	*
	5.4545	-5.54545	71.00000	77.00000	0.0	0.0	0.35941	0.0	0.0	0.0	*
	6.5455	-4.45455	71.00000	77.00000	0.0	0.0	0.35733	0.0	0.0	0.0	*
	7.6364	-3.36364	71.00000	77.00000	0.0	0.0	0.35511	0.0	0.0	0.0	*
	8.7273	-2.27273	71.00000	77.00000	0.0	0.0	0.35284	0.0	0.0	0.0	*
	9.8182	-1.18182	71.00000	77.00000	0.0	0.0	0.35060	0.0	0.0	0.0	*
	10.909	-0.09091	71.00000	77.00000	0.0	0.0	0.34847	0.0	0.0	0.0	*
	12.000	1.00000	71.00000	77.00000	0.0	0.0	0.34653	0.0	0.0	0.0	*
	13.091	2.09091	71.00000	77.00000	0.0	0.0	0.34483	0.0	0.0	0.0	*
	14.182	3.18182	71.00000	77.00000	0.0	0.0	0.34344	0.0	0.0	0.0	*
	15.273	4.27273	71.00000	77.00000	0.0	0.0	0.34238	0.0	0.0	0.0	*
	16.364	5.36364	71.00000	77.00000	0.0	0.0	0.34170	0.0	0.0	0.0	*
	17.455	6.45455	71.00000	77.00000	0.0	0.0	0.34140	0.0	0.0	0.0	*
	18.545	7.54545	71.00000	77.00000	0.0	0.0	0.34149	0.0	0.0	0.0	*
	19.636	8.63636	71.00000	77.00000	0.0	0.0	0.34197	0.0	0.0	0.0	*
	20.727	9.72727	71.00000	77.00000	0.0	0.0	0.34281	0.0	0.0	0.0	*
	21.818	10.81818	71.00000	77.00000	0.0	0.0	0.34401	0.0	0.0	0.0	*
	22.909	11.90909	71.00000	77.00000	0.0	0.0	0.34554	0.0	0.0	0.0	*
	24.000	13.00000	71.00000	77.00000	0.0	0.0	0.34736	0.0	0.0	0.0	*
Chase Mansions East	Line 4	13.00000	59.00000	77.00000	0.0	0.0	-0.79574	0.0	0.0	90.000	*
	1.2000	13.00000	60.20000	77.00000	0.0	0.0	-0.54688	0.0	0.0	90.000	*
	2.4000	13.00000	61.40000	77.00000	0.0	0.0	-0.34500	0.0	0.0	90.000	*
	3.6000	13.00000	62.60000	77.00000	0.0	0.0	-0.18181	0.0	0.0	90.000	*
	4.8000	13.00000	63.80000	77.00000	0.0	0.0	-0.049990	0.0	0.0	90.000	*
	6.0000	13.00000	65.00000	77.00000	0.0	0.0	0.056502	0.0	0.0	90.000	*
	7.2000	13.00000	66.20000	77.00000	0.0	0.0	0.14249	0.0	0.0	90.000	*
	8.4000	13.00000	67.40000	77.00000	0.0	0.0	0.21182	0.0	0.0	90.000	*
	9.6000	13.00000	68.60000	77.00000	0.0	0.0	0.26753	0.0	0.0	90.000	*
	10.800	13.00000	69.80000	77.00000	0.0	0.0	0.31206	0.0	0.0	90.000	*
	12.000	13.00000	71.00000	77.00000	0.0	0.0	0.34736	0.0	0.0	90.000	*
South Mansions North	Line 5	-6.50000	-9.80000	77.00000	0.0	0.0	0.15456	0.0	0.0	0.0	*
	1.0313	-5.46875	-9.80000	77.00000	0.0	0.0	0.12010	0.0	0.0	0.0	*
	2.0625	-4.43750	-9.80000	77.00000	0.0	0.0	0.083657	0.0	0.0	0.0	*
	3.0938	-3.40625	-9.80000	77.00000	0.0	0.0	0.046034	0.0	0.0	0.0	*
	4.1250	-2.37500	-9.80000	77.00000	0.0	0.0	0.0081839	0.0	0.0	0.0	*
	5.1563	-1.34375	-9.80000	77.00000	0.0	0.0	-0.028887	0.0	0.0	0.0	*
	6.1875	-0.31250	-9.80000	77.00000	0.0	0.0	-0.064268	0.0	0.0	0.0	*
	7.2188	0.71875	-9.80000	77.00000	0.0	0.0	-0.097269	0.0	0.0	0.0	*
	8.2500	1.75000	-9.80000	77.00000	0.0	0.0	-0.12747	0.0	0.0	0.0	*
	9.2813	2.78125	-9.80000	77.00000	0.0	0.0	-0.15472	0.0	0.0	0.0	*
	10.313	3.81250	-9.80000	77.00000	0.0	0.0	-0.17899	0.0	0.0	0.0	*
	11.344	4.84375	-9.80000	77.00000	0.0	0.0	-0.20036	0.0	0.0	0.0	*
	12.375	5.87500	-9.80000	77.00000	0.0	0.0	-0.21891	0.0	0.0	0.0	*
	13.406	6.90625	-9.80000	77.00000	0.0	0.0	-0.23479	0.0	0.0	0.0	*
	14.438	7.93750	-9.80000	77.00000	0.0	0.0	-0.24821	0.0	0.0	0.0	*
	15.469	8.96875	-9.80000	77.00000	0.0	0.0	-0.25943	0.0	0.0	0.0	*
	16.500	10.00000	-9.80000	77.00000	0.0	0.0	-0.26873	0.0	0.0	0.0	*
	17.531	11.03125	-9.80000	77.00000	0.0	0.0	-0.27633	0.0	0.0	0.0	*
	18.563	12.06250	-9.80000	77.00000	0.0	0.0	-0.28240	0.0	0.0	0.0	*
	19.594	13.09375	-9.80000	77.00000	0.0	0.0	-0.28706	0.0	0.0	0.0	*
	20.625	14.12500	-9.80000	77.00000	0.0	0.0	-0.29046	0.0	0.0	0.0	*
	21.656	15.15625	-9.80000	77.00000	0.0	0.0	-0.29277	0.0	0.0	0.0	*
	22.688	16.18750	-9.80000	77.00000	0.0	0.0	-0.29420	0.0	0.0	0.0	*
	23.719	17.21875	-9.80000	77.00000	0.0	0.0	-0.29491	0.0	0.0	0.0	*
	24.750	18.25000	-9.80000	77.00000	0.0	0.0	-0.29498	0.0	0.0	0.0	*
	25.781	19.28125	-9.80000	77.00000	0.0	0.0	-0.29445	0.0	0.0	0.0	*
	26.813	20.31250	-9.80000	77.00000	0.0	0.0	-0.29339	0.0	0.0	0.0	*
	27.844	21.34375	-9.80000	77.00000	0.0	0.0	-0.29188	0.0	0.0	0.0	*
	28.875	22.37500	-9.80000	77.00000	0.0	0.0	-0.29006	0.0	0.0	0.0	*
	29.906	23.40625	-9.80000	77.00000	0.0	0.0	-0.28804	0.0	0.0	0.0	*
	30.938	24.43750	-9.80000	77.00000	0.0	0.0	-0.28587	0.0	0.0	0.0	*
	31.969	25.46875	-9.80000	77.00000	0.0	0.0	-0.28355	0.0	0.0	0.0	*
	33.000	26.50000	-9.80000	77.00000	0.0	0.0	-0.28108	0.0	0.0	0.0	*
South Mansions - East 2	Line 6	26.50000	-9.80000	77.00000	0.0	0.0	-0.28108	0.0	0.0	270.00	*
	1.0000	26.50000	-10.80000	77.00000	0.0	0.0	-0.14764	0.0	0.0	270.00	*
	2.0000	26.50000	-11.80000	77.00000	0.0	0.0	-0.035532	0.0	0.0	270.00	*
	3.0000	26.50000	-12.80000	77.00000	0.0	0.0	0.058669	0.0	0.0	270.00	*
	4.0000	26.50000	-13.80000	77.00000	0.0	0.0	0.13780	0.0	0.0	270.00	*
	5.0000	26.50000	-14.80000	77.00000	0.0	0.0	0.20420	0.0	0.0	270.00	*
	6.0000	26.50000	-15.80000	77.00000	0.0	0.0	0.25981	0.0	0.0	270.00	*
South Mansions - South 2	Line 7	10.50000	-15.80000	77.00000	0.0	0.0	0.23220	0.0	0.0	0.0	*
	1.0000	11.50000	-15.80000	77.00000	0.0	0.0	0.23166	0.0	0.0	0.0	*
	2.0000	12.50000	-15.80000	77.00000	0.0	0.0	0.23162	0.0	0.0	0.0	*
	3.0000	13.50000	-15.80000	77.00000	0.0	0.0	0.23203	0.0	0.0	0.0	*
	4.0000	14.50000	-15.80000	77.00000	0.0	0.0	0.23286	0.0	0.0	0.0	*
	5.0000	15.50000	-15.80000	77.00000	0.0	0.0	0.23404	0.0	0.0	0.0	*
	6.0000	16.50000	-15.80000	77.00000	0.0	0.0	0.23555	0.0	0.0	0.0	*
	7.0000	17.50000	-15.80000	77.00000	0.0	0.0	0.23734	0.0	0.0	0.0	*
	8.0000	18.50000	-15.80000	77.00000	0.0	0.0	0.23936	0.0	0.0	0.0	*
	9.0000	19.50000	-15.80000	77.00000	0.0	0.0	0.24157	0.0	0.0	0.0	*
	10.000	20.50000	-15.80000	77.00000	0.0	0.0	0.24395	0.0	0.0	0.0	*
	11.000	21.50000	-15.80000	77.00000	0.0	0.0	0.24645	0.0	0.0	0.0	*
	12.000	22.50000	-15.80000	77.00000	0.0	0.0	0.24905	0.0	0.0	0.0	*
	13.000	23.50000	-15.80000	77.00000	0.0	0.0	0.25171	0.0	0.0	0.0	*
	14.000	24.50000	-15.80000	77.00000	0.0	0.0	0.25441	0.0	0.0	0.0	*
	15.000	25.50000	-15.80000	77.00000	0.0	0.0	0.25712	0.0	0.0	0.0	*
	16.000	26.50000	-15.80000	77.00000	0.0	0.0	0.25981	0.0	0.0	0.0	*
South Mansions East 1	Line 8	10.50000	-22.80000	77.00000	0.0	0.0	0.40789	0.0	0.0	90.000	*
	1.1667	10.50000	-21.63333	77.00000	0.0	0.0	0.39387	0.0	0.0	90.000	*
	2.3333	10.50000	-20.46667	77.00000	0.0	0.0	0.37518	0.0	0.0	90.000	*
	3.5000	10.50000	-19.30000	77.00000	0.0	0.0	0.35090	0.0	0.0	90.000	*
	4.6667	10.50000	-18.13333	77.00000	0.0	0.0	0.31993	0.0	0.0	90.000	*
	5.8333	10.50000	-16.96667	77.00000	0.0	0.0	0.28092	0.0	0.0	90.000	*
	7.0000	10.50000	-15.80000	77.00000	0.0	0.0	0.23220	0.0	0.0	90.000	*
South Mansions - South 1	Line 9	-6.50000	-22.80000	77.00000	0.0	0.0	0.37813	0.0	0.0	0.0	*
	1.0625	-5.43750	-22.80000	77.00000	0.0	0.0	0.37983	0.0	0.0	0.0	*
	2.1250	-4.37500	-22.80000	77.00000	0.0	0.0	0.38142	0.0	0.0	0.0	*
	3.1875	-3.31250	-22.80000	77.00000	0.0	0.0	0.38295	0.0	0.0	0.0	*
	4.2500	-2.25000	-22.80000	77.00000	0.0	0.0	0.38443	0.0	0.0	0.0	*

Name	Type/No.	Dist.	Coordinates x	y	z	Displacements x	y	z	Horizontal displacement	Horizontal displacement	Angle of Line to x Axis	
		5.3125	-1.18750	-22.80000	77.00000	0.0	0.0	0.38590	0.0	0.0	0.0	*
		6.3750	-0.12500	-22.80000	77.00000	0.0	0.0	0.38740	0.0	0.0	0.0	*
		7.4375	0.93750	-22.80000	77.00000	0.0	0.0	0.38894	0.0	0.0	0.0	*
		8.5000	2.00000	-22.80000	77.00000	0.0	0.0	0.39056	0.0	0.0	0.0	*
		9.5625	3.06250	-22.80000	77.00000	0.0	0.0	0.39227	0.0	0.0	0.0	*
		10.625	4.12500	-22.80000	77.00000	0.0	0.0	0.39410	0.0	0.0	0.0	*
		11.688	5.18750	-22.80000	77.00000	0.0	0.0	0.39605	0.0	0.0	0.0	*
		12.750	6.25000	-22.80000	77.00000	0.0	0.0	0.39814	0.0	0.0	0.0	*
		13.813	7.31250	-22.80000	77.00000	0.0	0.0	0.40037	0.0	0.0	0.0	*
		14.875	8.37500	-22.80000	77.00000	0.0	0.0	0.40274	0.0	0.0	0.0	*
		15.938	9.43750	-22.80000	77.00000	0.0	0.0	0.40525	0.0	0.0	0.0	*
		17.000	10.50000	-22.80000	77.00000	0.0	0.0	0.40789	0.0	0.0	0.0	*
South Mansions - West	Line 10		-6.50000	-22.80000	77.00000	0.0	0.0	0.37813	0.0	0.0	90.000	*
		1.0833	-6.50000	-21.71667	77.00000	0.0	0.0	0.37551	0.0	0.0	90.000	*
		2.1667	-6.50000	-20.63333	77.00000	0.0	0.0	0.37123	0.0	0.0	90.000	*
		3.2500	-6.50000	-19.55000	77.00000	0.0	0.0	0.36504	0.0	0.0	90.000	*
		4.3333	-6.50000	-18.46667	77.00000	0.0	0.0	0.35662	0.0	0.0	90.000	*
		5.4167	-6.50000	-17.38333	77.00000	0.0	0.0	0.34564	0.0	0.0	90.000	*
		6.5000	-6.50000	-16.30000	77.00000	0.0	0.0	0.33169	0.0	0.0	90.000	*
		7.5833	-6.50000	-15.21667	77.00000	0.0	0.0	0.31430	0.0	0.0	90.000	*
		8.6667	-6.50000	-14.13333	77.00000	0.0	0.0	0.29296	0.0	0.0	90.000	*
		9.7500	-6.50000	-13.05000	77.00000	0.0	0.0	0.26704	0.0	0.0	90.000	*
		10.833	-6.50000	-11.96667	77.00000	0.0	0.0	0.23585	0.0	0.0	90.000	*
		11.917	-6.50000	-10.88333	77.00000	0.0	0.0	0.19863	0.0	0.0	90.000	*
		13.000	-6.50000	-9.80000	77.00000	0.0	0.0	0.15456	0.0	0.0	90.000	*

* Result includes imported displacement(s).

Specific Building Damage Results - Horizontal Displacements

Structure: Chase Mansion | Sub-structure: Western Elevation

Dist.	Coordinates x	y	z	Displacements x	y	Horizontal displacement along the Line	Horizontal displacement perpendicular to Line	
[m]	[m]	[m]	[m]	[mm]	[mm]	[mm]	[mm]	
0.0	-11.00000	59.00000	77.00000	0.0	0.0	0.0	0.0	d
1.2000	-11.00000	60.20000	77.00000	0.0	0.0	0.0	0.0	d
2.4000	-11.00000	61.40000	77.00000	0.0	0.0	0.0	0.0	d
3.6000	-11.00000	62.60000	77.00000	0.0	0.0	0.0	0.0	d
4.8000	-11.00000	63.80000	77.00000	0.0	0.0	0.0	0.0	d
6.0000	-11.00000	65.00000	77.00000	0.0	0.0	0.0	0.0	d
7.2000	-11.00000	66.20000	77.00000	0.0	0.0	0.0	0.0	d
8.4000	-11.00000	67.40000	77.00000	0.0	0.0	0.0	0.0	d
9.6000	-11.00000	68.60000	77.00000	0.0	0.0	0.0	0.0	d
10.800	-11.00000	69.80000	77.00000	0.0	0.0	0.0	0.0	d
12.000	-11.00000	71.00000	77.00000	0.0	0.0	0.0	0.0	d

d - Displacements include imported displacements.

Structure: Chase Mansion | Sub-structure: Eastern Elevation

Dist.	Coordinates x	y	z	Displacements x	y	Horizontal displacement along the Line	Horizontal displacement perpendicular to Line	
[m]	[m]	[m]	[m]	[mm]	[mm]	[mm]	[mm]	
0.0	13.00000	59.00000	77.00000	0.0	0.0	0.0	0.0	d
1.2000	13.00000	60.20000	77.00000	0.0	0.0	0.0	0.0	d
2.4000	13.00000	61.40000	77.00000	0.0	0.0	0.0	0.0	d
3.6000	13.00000	62.60000	77.00000	0.0	0.0	0.0	0.0	d
4.8000	13.00000	63.80000	77.00000	0.0	0.0	0.0	0.0	d
6.0000	13.00000	65.00000	77.00000	0.0	0.0	0.0	0.0	d
7.2000	13.00000	66.20000	77.00000	0.0	0.0	0.0	0.0	d
8.4000	13.00000	67.40000	77.00000	0.0	0.0	0.0	0.0	d
9.6000	13.00000	68.60000	77.00000	0.0	0.0	0.0	0.0	d
10.800	13.00000	69.80000	77.00000	0.0	0.0	0.0	0.0	d
12.000	13.00000	71.00000	77.00000	0.0	0.0	0.0	0.0	d

d - Displacements include imported displacements.

Structure: Chase Mansions | Sub-structure: Southern Elevation

Dist.	Coordinates x	y	z	Displacements x	y	Horizontal displacement along the Line	Horizontal displacement perpendicular to Line	
[m]	[m]	[m]	[m]	[mm]	[mm]	[mm]	[mm]	
0.0	-11.00000	59.00000	77.00000	0.0	0.0	0.0	0.0	d
1.0909	-9.90909	59.00000	77.00000	0.0	0.0	0.0	0.0	d
2.1818	-8.81818	59.00000	77.00000	0.0	0.0	0.0	0.0	d
3.2727	-7.72727	59.00000	77.00000	0.0	0.0	0.0	0.0	d
4.3636	-6.63636	59.00000	77.00000	0.0	0.0	0.0	0.0	d
5.4545	-5.54545	59.00000	77.00000	0.0	0.0	0.0	0.0	d
6.5455	-4.45455	59.00000	77.00000	0.0	0.0	0.0	0.0	d
7.6364	-3.36364	59.00000	77.00000	0.0	0.0	0.0	0.0	d
8.7273	-2.27273	59.00000	77.00000	0.0	0.0	0.0	0.0	d
9.8182	-1.18182	59.00000	77.00000	0.0	0.0	0.0	0.0	d
10.909	-0.09091	59.00000	77.00000	0.0	0.0	0.0	0.0	d
12.000	1.00000	59.00000	77.00000	0.0	0.0	0.0	0.0	d
13.091	2.09091	59.00000	77.00000	0.0	0.0	0.0	0.0	d
14.182	3.18182	59.00000	77.00000	0.0	0.0	0.0	0.0	d
15.273	4.27273	59.00000	77.00000	0.0	0.0	0.0	0.0	d
16.364	5.36364	59.00000	77.00000	0.0	0.0	0.0	0.0	d
17.455	6.45455	59.00000	77.00000	0.0	0.0	0.0	0.0	d
18.545	7.54545	59.00000	77.00000	0.0	0.0	0.0	0.0	d
19.636	8.63636	59.00000	77.00000	0.0	0.0	0.0	0.0	d
20.727	9.72727	59.00000	77.00000	0.0	0.0	0.0	0.0	d
21.818	10.81818	59.00000	77.00000	0.0	0.0	0.0	0.0	d
22.909	11.90909	59.00000	77.00000	0.0	0.0	0.0	0.0	d
24.000	13.00000	59.00000	77.00000	0.0	0.0	0.0	0.0	d

d - Displacements include imported displacements.

Structure: Chase Mansions | Sub-structure: Northern Elevation

Dist.	Coordinates x	y	z	Displacements x	y	Horizontal displacement along the Line	Horizontal displacement perpendicular to Line	
[m]	[m]	[m]	[m]	[mm]	[mm]	[mm]	[mm]	
0.0	-11.00000	71.00000	77.00000	0.0	0.0	0.0	0.0	d
1.0909	-9.90909	71.00000	77.00000	0.0	0.0	0.0	0.0	d
2.1818	-8.81818	71.00000	77.00000	0.0	0.0	0.0	0.0	d
3.2727	-7.72727	71.00000	77.00000	0.0	0.0	0.0	0.0	d
4.3636	-6.63636	71.00000	77.00000	0.0	0.0	0.0	0.0	d
5.4545	-5.54545	71.00000	77.00000	0.0	0.0	0.0	0.0	d
6.5455	-4.45455	71.00000	77.00000	0.0	0.0	0.0	0.0	d
7.6364	-3.36364	71.00000	77.00000	0.0	0.0	0.0	0.0	d
8.7273	-2.27273	71.00000	77.00000	0.0	0.0	0.0	0.0	d
9.8182	-1.18182	71.00000	77.00000	0.0	0.0	0.0	0.0	d
10.909	-0.09091	71.00000	77.00000	0.0	0.0	0.0	0.0	d
12.000	1.00000	71.00000	77.00000	0.0	0.0	0.0	0.0	d
13.091	2.09091	71.00000	77.00000	0.0	0.0	0.0	0.0	d
14.182	3.18182	71.00000	77.00000	0.0	0.0	0.0	0.0	d
15.273	4.27273	71.00000	77.00000	0.0	0.0	0.0	0.0	d
16.364	5.36364	71.00000	77.00000	0.0	0.0	0.0	0.0	d
17.455	6.45455	71.00000	77.00000	0.0	0.0	0.0	0.0	d
18.545	7.54545	71.00000	77.00000	0.0	0.0	0.0	0.0	d
19.636	8.63636	71.00000	77.00000	0.0	0.0	0.0	0.0	d
20.727	9.72727	71.00000	77.00000	0.0	0.0	0.0	0.0	d

Dist.	Coordinates x	y	z	Displacements x	y	Horizontal displacement along the Line	Horizontal displacement perpendicular to Line	
21.818	10.81818	71.00000	77.00000	0.0	0.0	0.0	0.0	d
22.909	11.90909	71.00000	77.00000	0.0	0.0	0.0	0.0	d
24.000	13.00000	71.00000	77.00000	0.0	0.0	0.0	0.0	d

d - Displacements include imported displacements.

Structure: South Mansions | Sub-structure: Northern Elevation

Dist.	Coordinates x	y	z	Displacements x	y	Horizontal displacement along the Line	Horizontal displacement perpendicular to Line	
[m]	[m]	[m]	[m]	[mm]	[mm]	[mm]	[mm]	
0.0	-6.50000	-9.80000	77.00000	0.0	0.0	0.0	0.0	d
1.0313	-5.46875	-9.80000	77.00000	0.0	0.0	0.0	0.0	d
2.0625	-4.43750	-9.80000	77.00000	0.0	0.0	0.0	0.0	d
3.0938	-3.40625	-9.80000	77.00000	0.0	0.0	0.0	0.0	d
4.1250	-2.37500	-9.80000	77.00000	0.0	0.0	0.0	0.0	d
5.1563	-1.34375	-9.80000	77.00000	0.0	0.0	0.0	0.0	d
6.1875	-0.31250	-9.80000	77.00000	0.0	0.0	0.0	0.0	d
7.2188	0.71875	-9.80000	77.00000	0.0	0.0	0.0	0.0	d
8.2500	1.75000	-9.80000	77.00000	0.0	0.0	0.0	0.0	d
9.2813	2.78125	-9.80000	77.00000	0.0	0.0	0.0	0.0	d
10.313	3.81250	-9.80000	77.00000	0.0	0.0	0.0	0.0	d
11.344	4.84375	-9.80000	77.00000	0.0	0.0	0.0	0.0	d
12.375	5.87500	-9.80000	77.00000	0.0	0.0	0.0	0.0	d
13.406	6.90625	-9.80000	77.00000	0.0	0.0	0.0	0.0	d
14.438	7.93750	-9.80000	77.00000	0.0	0.0	0.0	0.0	d
15.469	8.96875	-9.80000	77.00000	0.0	0.0	0.0	0.0	d
16.500	10.00000	-9.80000	77.00000	0.0	0.0	0.0	0.0	d
17.531	11.03125	-9.80000	77.00000	0.0	0.0	0.0	0.0	d
18.563	12.06250	-9.80000	77.00000	0.0	0.0	0.0	0.0	d
19.594	13.09375	-9.80000	77.00000	0.0	0.0	0.0	0.0	d
20.625	14.12500	-9.80000	77.00000	0.0	0.0	0.0	0.0	d
21.656	15.15625	-9.80000	77.00000	0.0	0.0	0.0	0.0	d
22.688	16.18750	-9.80000	77.00000	0.0	0.0	0.0	0.0	d
23.719	17.21875	-9.80000	77.00000	0.0	0.0	0.0	0.0	d
24.750	18.25000	-9.80000	77.00000	0.0	0.0	0.0	0.0	d
25.781	19.28125	-9.80000	77.00000	0.0	0.0	0.0	0.0	d
26.813	20.31250	-9.80000	77.00000	0.0	0.0	0.0	0.0	d
27.844	21.34375	-9.80000	77.00000	0.0	0.0	0.0	0.0	d
28.875	22.37500	-9.80000	77.00000	0.0	0.0	0.0	0.0	d
29.906	23.40625	-9.80000	77.00000	0.0	0.0	0.0	0.0	d
30.938	24.43750	-9.80000	77.00000	0.0	0.0	0.0	0.0	d
31.969	25.46875	-9.80000	77.00000	0.0	0.0	0.0	0.0	d
33.000	26.50000	-9.80000	77.00000	0.0	0.0	0.0	0.0	d

d - Displacements include imported displacements.

Structure: South Mansions | Sub-structure: Eastern Elevation 2

Dist.	Coordinates x	y	z	Displacements x	y	Horizontal displacement along the Line	Horizontal displacement perpendicular to Line	
[m]	[m]	[m]	[m]	[mm]	[mm]	[mm]	[mm]	
0.0	26.50000	-9.80000	77.00000	0.0	0.0	0.0	0.0	d
1.0000	26.50000	-10.80000	77.00000	0.0	0.0	0.0	0.0	d
2.0000	26.50000	-11.80000	77.00000	0.0	0.0	0.0	0.0	d
3.0000	26.50000	-12.80000	77.00000	0.0	0.0	0.0	0.0	d
4.0000	26.50000	-13.80000	77.00000	0.0	0.0	0.0	0.0	d
5.0000	26.50000	-14.80000	77.00000	0.0	0.0	0.0	0.0	d
6.0000	26.50000	-15.80000	77.00000	0.0	0.0	0.0	0.0	d

d - Displacements include imported displacements.

Structure: South Mansions | Sub-structure: Southern Elevation 2

Dist.	Coordinates x	y	z	Displacements x	y	Horizontal displacement along the Line	Horizontal displacement perpendicular to Line	
[m]	[m]	[m]	[m]	[mm]	[mm]	[mm]	[mm]	
0.0	10.50000	-15.80000	77.00000	0.0	0.0	0.0	0.0	d
1.0000	11.50000	-15.80000	77.00000	0.0	0.0	0.0	0.0	d
2.0000	12.50000	-15.80000	77.00000	0.0	0.0	0.0	0.0	d
3.0000	13.50000	-15.80000	77.00000	0.0	0.0	0.0	0.0	d
4.0000	14.50000	-15.80000	77.00000	0.0	0.0	0.0	0.0	d
5.0000	15.50000	-15.80000	77.00000	0.0	0.0	0.0	0.0	d
6.0000	16.50000	-15.80000	77.00000	0.0	0.0	0.0	0.0	d
7.0000	17.50000	-15.80000	77.00000	0.0	0.0	0.0	0.0	d
8.0000	18.50000	-15.80000	77.00000	0.0	0.0	0.0	0.0	d
9.0000	19.50000	-15.80000	77.00000	0.0	0.0	0.0	0.0	d
10.000	20.50000	-15.80000	77.00000	0.0	0.0	0.0	0.0	d
11.000	21.50000	-15.80000	77.00000	0.0	0.0	0.0	0.0	d
12.000	22.50000	-15.80000	77.00000	0.0	0.0	0.0	0.0	d
13.000	23.50000	-15.80000	77.00000	0.0	0.0	0.0	0.0	d
14.000	24.50000	-15.80000	77.00000	0.0	0.0	0.0	0.0	d
15.000	25.50000	-15.80000	77.00000	0.0	0.0	0.0	0.0	d
16.000	26.50000	-15.80000	77.00000	0.0	0.0	0.0	0.0	d

d - Displacements include imported displacements.

Structure: South Mansions | Sub-structure: Eastern Elevation 1

Dist.	Coordinates x	y	z	Displacements x	y	Horizontal displacement along the Line	Horizontal displacement perpendicular to Line	
[m]	[m]	[m]	[m]	[mm]	[mm]	[mm]	[mm]	
0.0	10.50000	-22.80000	77.00000	0.0	0.0	0.0	0.0	d
1.1667	10.50000	-21.63333	77.00000	0.0	0.0	0.0	0.0	d
2.3333	10.50000	-20.46667	77.00000	0.0	0.0	0.0	0.0	d
3.5000	10.50000	-19.30000	77.00000	0.0	0.0	0.0	0.0	d
4.6667	10.50000	-18.13333	77.00000	0.0	0.0	0.0	0.0	d
5.8333	10.50000	-16.96667	77.00000	0.0	0.0	0.0	0.0	d
7.0000	10.50000	-15.80000	77.00000	0.0	0.0	0.0	0.0	d

d - Displacements include imported displacements.

Structure: South Mansions | Sub-structure: Southern Elevation 1

Dist.	Coordinates x	y	z	Displacements x	y	Horizontal displacement along the Line	Horizontal displacement perpendicular to Line	
[m]	[m]	[m]	[m]	[mm]	[mm]	[mm]	[mm]	
0.0	-6.50000	-22.80000	77.00000	0.0	0.0	0.0	0.0	d
1.0625	-5.43750	-22.80000	77.00000	0.0	0.0	0.0	0.0	d
2.1250	-4.37500	-22.80000	77.00000	0.0	0.0	0.0	0.0	d
3.1875	-3.31250	-22.80000	77.00000	0.0	0.0	0.0	0.0	d
4.2500	-2.25000	-22.80000	77.00000	0.0	0.0	0.0	0.0	d
5.3125	-1.18750	-22.80000	77.00000	0.0	0.0	0.0	0.0	d
6.3750	-0.12500	-22.80000	77.00000	0.0	0.0	0.0	0.0	d
7.4375	0.93750	-22.80000	77.00000	0.0	0.0	0.0	0.0	d
8.5000	2.00000	-22.80000	77.00000	0.0	0.0	0.0	0.0	d
9.5625	3.06250	-22.80000	77.00000	0.0	0.0	0.0	0.0	d
10.625	4.12500	-22.80000	77.00000	0.0	0.0	0.0	0.0	d
11.688	5.18750	-22.80000	77.00000	0.0	0.0	0.0	0.0	d
12.750	6.25000	-22.80000	77.00000	0.0	0.0	0.0	0.0	d
13.813	7.31250	-22.80000	77.00000	0.0	0.0	0.0	0.0	d
14.875	8.37500	-22.80000	77.00000	0.0	0.0	0.0	0.0	d
15.938	9.43750	-22.80000	77.00000	0.0	0.0	0.0	0.0	d
17.000	10.50000	-22.80000	77.00000	0.0	0.0	0.0	0.0	d

Dist.	Coordinates x	y	z	Displacements x	y	Horizontal displacement along the Line	Horizontal displacement perpendicular to Line	
[m]	[m]	[m]	[m]	[mm]	[mm]	[mm]	[mm]	
0.0	-6.50000	-22.80000	77.00000	0.0	0.0	0.0	0.0	d
1.0833	-6.50000	-21.71667	77.00000	0.0	0.0	0.0	0.0	d
2.1667	-6.50000	-20.63333	77.00000	0.0	0.0	0.0	0.0	d
3.2500	-6.50000	-19.55000	77.00000	0.0	0.0	0.0	0.0	d
4.3333	-6.50000	-18.46667	77.00000	0.0	0.0	0.0	0.0	d
5.4167	-6.50000	-17.38333	77.00000	0.0	0.0	0.0	0.0	d
6.5000	-6.50000	-16.30000	77.00000	0.0	0.0	0.0	0.0	d
7.5833	-6.50000	-15.21667	77.00000	0.0	0.0	0.0	0.0	d
8.6667	-6.50000	-14.13333	77.00000	0.0	0.0	0.0	0.0	d
9.7500	-6.50000	-13.05000	77.00000	0.0	0.0	0.0	0.0	d
10.833	-6.50000	-11.96667	77.00000	0.0	0.0	0.0	0.0	d
11.917	-6.50000	-10.88333	77.00000	0.0	0.0	0.0	0.0	d
13.000	-6.50000	-9.80000	77.00000	0.0	0.0	0.0	0.0	d

d - Displacements include imported displacements.

Structure: South Mansions | Sub-structure: Western Elevation

Dist.	Coordinates x	y	z	Displacements x	y	Horizontal displacement along the Line	Horizontal displacement perpendicular to Line	
[m]	[m]	[m]	[m]	[mm]	[mm]	[mm]	[mm]	
0.0	-6.50000	-22.80000	77.00000	0.0	0.0	0.0	0.0	d
1.0833	-6.50000	-21.71667	77.00000	0.0	0.0	0.0	0.0	d
2.1667	-6.50000	-20.63333	77.00000	0.0	0.0	0.0	0.0	d
3.2500	-6.50000	-19.55000	77.00000	0.0	0.0	0.0	0.0	d
4.3333	-6.50000	-18.46667	77.00000	0.0	0.0	0.0	0.0	d
5.4167	-6.50000	-17.38333	77.00000	0.0	0.0	0.0	0.0	d
6.5000	-6.50000	-16.30000	77.00000	0.0	0.0	0.0	0.0	d
7.5833	-6.50000	-15.21667	77.00000	0.0	0.0	0.0	0.0	d
8.6667	-6.50000	-14.13333	77.00000	0.0	0.0	0.0	0.0	d
9.7500	-6.50000	-13.05000	77.00000	0.0	0.0	0.0	0.0	d
10.833	-6.50000	-11.96667	77.00000	0.0	0.0	0.0	0.0	d
11.917	-6.50000	-10.88333	77.00000	0.0	0.0	0.0	0.0	d
13.000	-6.50000	-9.80000	77.00000	0.0	0.0	0.0	0.0	d

d - Displacements include imported displacements.

Specific Building Damage Results - Vertical Displacements

Structure: Chase Mansion | Sub-structure: Western Elevation

Dist.	Coordinates x	y	z	Displacements z	
[m]	[m]	[m]	[m]	[mm]	
Vertical Offset 1					
0.0	-11.00000	59.00000	77.00000	0.20921	d
1.2000	-11.00000	60.20000	77.00000	0.23802	d
2.4000	-11.00000	61.40000	77.00000	0.26377	d
3.6000	-11.00000	62.60000	77.00000	0.28631	d
4.8000	-11.00000	63.80000	77.00000	0.30566	d
6.0000	-11.00000	65.00000	77.00000	0.32196	d
7.2000	-11.00000	66.20000	77.00000	0.33539	d
8.4000	-11.00000	67.40000	77.00000	0.34620	d
9.6000	-11.00000	68.60000	77.00000	0.35464	d
10.800	-11.00000	69.80000	77.00000	0.36094	d
12.000	-11.00000	71.00000	77.00000	0.36535	d

d - Displacements include imported displacements.

Structure: Chase Mansion | Sub-structure: Eastern Elevation

Dist.	Coordinates x	y	z	Displacements z	
[m]	[m]	[m]	[m]	[mm]	
Vertical Offset 1					
0.0	13.00000	59.00000	77.00000	-0.79574	d
1.2000	13.00000	60.20000	77.00000	-0.54688	d
2.4000	13.00000	61.40000	77.00000	-0.34500	d
3.6000	13.00000	62.60000	77.00000	-0.18181	d
4.8000	13.00000	63.80000	77.00000	-0.049990	d
6.0000	13.00000	65.00000	77.00000	0.056502	d
7.2000	13.00000	66.20000	77.00000	0.14249	d
8.4000	13.00000	67.40000	77.00000	0.21182	d
9.6000	13.00000	68.60000	77.00000	0.26753	d
10.800	13.00000	69.80000	77.00000	0.31206	d
12.000	13.00000	71.00000	77.00000	0.34736	d

d - Displacements include imported displacements.

Structure: Chase Mansions | Sub-structure: Southern Elevation

Dist.	Coordinates x	y	z	Displacements z	
[m]	[m]	[m]	[m]	[mm]	
Vertical Offset 1					
0.0	-11.00000	59.00000	77.00000	0.20921	d
1.0909	-9.90909	59.00000	77.00000	0.17044	d
2.1818	-8.81818	59.00000	77.00000	0.12490	d
3.2727	-7.72727	59.00000	77.00000	0.072027	d
4.3636	-6.63636	59.00000	77.00000	0.011588	d
5.4545	-5.54545	59.00000	77.00000	-0.056132	d
6.5455	-4.45455	59.00000	77.00000	-0.13001	d
7.6364	-3.36364	59.00000	77.00000	-0.20788	d
8.7273	-2.27273	59.00000	77.00000	-0.28657	d
9.8182	-1.18182	59.00000	77.00000	-0.36242	d
10.909	-0.09091	59.00000	77.00000	-0.43224	d
12.000	1.00000	59.00000	77.00000	-0.49425	d
13.091	2.09091	59.00000	77.00000	-0.54834	d
14.182	3.18182	59.00000	77.00000	-0.59548	d
15.273	4.27273	59.00000	77.00000	-0.63660	d
16.364	5.36364	59.00000	77.00000	-0.67200	d
17.455	6.45455	59.00000	77.00000	-0.70160	d
18.545	7.54545	59.00000	77.00000	-0.72562	d
19.636	8.63636	59.00000	77.00000	-0.74506	d
20.727	9.72727	59.00000	77.00000	-0.76128	d
21.818	10.81818	59.00000	77.00000	-0.77517	d
22.909	11.90909	59.00000	77.00000	-0.78680	d
24.000	13.00000	59.00000	77.00000	-0.79574	d

d - Displacements include imported displacements.

Structure: Chase Mansions | Sub-structure: Northern Elevation

Dist.	Coordinates x	y	z	Displacements z	
[m]	[m]	[m]	[m]	[mm]	
Vertical Offset 1					
0.0	-11.00000	71.00000	77.00000	0.36535	d
1.0909	-9.90909	71.00000	77.00000	0.36495	d
2.1818	-8.81818	71.00000	77.00000	0.36411	d
3.2727	-7.72727	71.00000	77.00000	0.36287	d
4.3636	-6.63636	71.00000	77.00000	0.36128	d
5.4545	-5.54545	71.00000	77.00000	0.35941	d
6.5455	-4.45455	71.00000	77.00000	0.35733	d
7.6364	-3.36364	71.00000	77.00000	0.35511	d
8.7273	-2.27273	71.00000	77.00000	0.35284	d
9.8182	-1.18182	71.00000	77.00000	0.35060	d
10.909	-0.09091	71.00000	77.00000	0.34847	d
12.000	1.00000	71.00000	77.00000	0.34653	d
13.091	2.09091	71.00000	77.00000	0.34483	d
14.182	3.18182	71.00000	77.00000	0.34344	d
15.273	4.27273	71.00000	77.00000	0.34238	d
16.364	5.36364	71.00000	77.00000	0.34170	d
17.455	6.45455	71.00000	77.00000	0.34140	d
18.545	7.54545	71.00000	77.00000	0.34149	d
19.636	8.63636	71.00000	77.00000	0.34197	d
20.727	9.72727	71.00000	77.00000	0.34281	d
21.818	10.81818	71.00000	77.00000	0.34401	d
22.909	11.90909	71.00000	77.00000	0.34554	d
24.000	13.00000	71.00000	77.00000	0.34736	d

d - Displacements include imported displacements.

Structure: South Mansions | Sub-structure: Northern Elevation

Dist.	Coordinates x [m]	y [m]	z [m]	Displacements z [mm]

Dist.	Coordinates x [m]	y [m]	z [m]	Displacements z [mm]

Vertical Offset 1

0.0	-6.50000	-9.80000	77.00000	0.15456 d
1.0313	-5.46875	-9.80000	77.00000	0.12010 d
2.0625	-4.43750	-9.80000	77.00000	0.083657 d
3.0938	-3.40625	-9.80000	77.00000	0.046034 d
4.1250	-2.37500	-9.80000	77.00000	0.0081839 d
5.1563	-1.34375	-9.80000	77.00000	-0.028887 d
6.1875	-0.31250	-9.80000	77.00000	-0.064268 d
7.2188	0.71875	-9.80000	77.00000	-0.097269 d
8.2500	1.75000	-9.80000	77.00000	-0.12747 d
9.2813	2.78125	-9.80000	77.00000	-0.15472 d
10.313	3.81250	-9.80000	77.00000	-0.17899 d
11.344	4.84375	-9.80000	77.00000	-0.20036 d
12.375	5.87500	-9.80000	77.00000	-0.21891 d
13.406	6.90625	-9.80000	77.00000	-0.23479 d
14.438	7.93750	-9.80000	77.00000	-0.24821 d
15.469	8.96875	-9.80000	77.00000	-0.25943 d
16.500	10.00000	-9.80000	77.00000	-0.26873 d
17.531	11.03125	-9.80000	77.00000	-0.27633 d
18.563	12.06250	-9.80000	77.00000	-0.28240 d
19.594	13.09375	-9.80000	77.00000	-0.28706 d
20.625	14.12500	-9.80000	77.00000	-0.29046 d
21.656	15.15625	-9.80000	77.00000	-0.29277 d
22.688	16.18750	-9.80000	77.00000	-0.29420 d
23.719	17.21875	-9.80000	77.00000	-0.29491 d
24.750	18.25000	-9.80000	77.00000	-0.29498 d
25.781	19.28125	-9.80000	77.00000	-0.29445 d
26.813	20.31250	-9.80000	77.00000	-0.29339 d
27.844	21.34375	-9.80000	77.00000	-0.29188 d
28.875	22.37500	-9.80000	77.00000	-0.29006 d
29.906	23.40625	-9.80000	77.00000	-0.28804 d
30.938	24.43750	-9.80000	77.00000	-0.28587 d
31.969	25.46875	-9.80000	77.00000	-0.28355 d
33.000	26.50000	-9.80000	77.00000	-0.28108 d

d - Displacements include imported displacements.

Structure: South Mansions | Sub-structure: Eastern Elevation 2

Dist.	Coordinates x [m]	y [m]	z [m]	Displacements z [mm]

Vertical Offset 1

0.0	26.50000	-9.80000	77.00000	-0.28108 d
1.0000	26.50000	-10.80000	77.00000	-0.14764 d
2.0000	26.50000	-11.80000	77.00000	-0.035532 d
3.0000	26.50000	-12.80000	77.00000	0.058669 d
4.0000	26.50000	-13.80000	77.00000	0.13780 d
5.0000	26.50000	-14.80000	77.00000	0.20420 d
6.0000	26.50000	-15.80000	77.00000	0.25981 d

d - Displacements include imported displacements.

Structure: South Mansions | Sub-structure: Southern Elevation 2

Dist.	Coordinates x [m]	y [m]	z [m]	Displacements z [mm]

Vertical Offset 1

0.0	10.50000	-15.80000	77.00000	0.23220 d
1.0000	11.50000	-15.80000	77.00000	0.23166 d
2.0000	12.50000	-15.80000	77.00000	0.23162 d
3.0000	13.50000	-15.80000	77.00000	0.23203 d
4.0000	14.50000	-15.80000	77.00000	0.23286 d
5.0000	15.50000	-15.80000	77.00000	0.23404 d
6.0000	16.50000	-15.80000	77.00000	0.23555 d
7.0000	17.50000	-15.80000	77.00000	0.23734 d
8.0000	18.50000	-15.80000	77.00000	0.23936 d
9.0000	19.50000	-15.80000	77.00000	0.24157 d
10.000	20.50000	-15.80000	77.00000	0.24395 d
11.000	21.50000	-15.80000	77.00000	0.24645 d
12.000	22.50000	-15.80000	77.00000	0.24905 d
13.000	23.50000	-15.80000	77.00000	0.25171 d
14.000	24.50000	-15.80000	77.00000	0.25441 d
15.000	25.50000	-15.80000	77.00000	0.25712 d
16.000	26.50000	-15.80000	77.00000	0.25981 d

d - Displacements include imported displacements.

Structure: South Mansions | Sub-structure: Eastern Elevation 1

Dist.	Coordinates x [m]	y [m]	z [m]	Displacements z [mm]

Vertical Offset 1

0.0	10.50000	-22.80000	77.00000	0.40789 d
1.1667	10.50000	-21.63333	77.00000	0.39387 d
2.3333	10.50000	-20.46667	77.00000	0.37518 d
3.5000	10.50000	-19.30000	77.00000	0.35090 d
4.6667	10.50000	-18.13333	77.00000	0.31993 d
5.8333	10.50000	-16.96667	77.00000	0.28092 d
7.0000	10.50000	-15.80000	77.00000	0.23220 d

d - Displacements include imported displacements.

Structure: South Mansions | Sub-structure: Southern Elevation 1

Dist.	Coordinates x [m]	y [m]	z [m]	Displacements z [mm]

Vertical Offset 1

0.0	-6.50000	-22.80000	77.00000	0.37813 d
1.0625	-5.43750	-22.80000	77.00000	0.37983 d
2.1250	-4.37500	-22.80000	77.00000	0.38142 d
3.1875	-3.31250	-22.80000	77.00000	0.38295 d
4.2500	-2.25000	-22.80000	77.00000	0.38443 d
5.3125	-1.18750	-22.80000	77.00000	0.38590 d
6.3750	-0.12500	-22.80000	77.00000	0.38740 d
7.4375	0.93750	-22.80000	77.00000	0.38894 d
8.5000	2.00000	-22.80000	77.00000	0.39056 d
9.5625	3.06250	-22.80000	77.00000	0.39227 d
10.625	4.12500	-22.80000	77.00000	0.39410 d
11.688	5.18750	-22.80000	77.00000	0.39605 d
12.750	6.25000	-22.80000	77.00000	0.39814 d
13.813	7.31250	-22.80000	77.00000	0.40037 d
14.875	8.37500	-22.80000	77.00000	0.40274 d
15.938	9.43750	-22.80000	77.00000	0.40525 d
17.000	10.50000	-22.80000	77.00000	0.40789 d

d - Displacements include imported displacements.

Structure: South Mansions | Sub-structure: Western Elevation

Dist.	Coordinates x [m]	y [m]	z [m]	Displacements z [mm]

Vertical Offset 1

0.0	-6.50000	-22.80000	77.00000	0.37813 d
1.0833	-6.50000	-21.71667	77.00000	0.37551 d
2.1667	-6.50000	-20.63333	77.00000	0.37123 d

Dist.	Coordinates x	y	z	Displacements z
[m]	[m]	[m]	[m]	[mm]	
3.2500	-6.50000	-19.55000	77.00000	0.36504 d
4.3333	-6.50000	-18.46667	77.00000	0.35662 d
5.4167	-6.50000	-17.38333	77.00000	0.34564 d
6.5000	-6.50000	-16.30000	77.00000	0.33169 d
7.5833	-6.50000	-15.21667	77.00000	0.31430 d
8.6667	-6.50000	-14.13333	77.00000	0.29296 d
9.7500	-6.50000	-13.05000	77.00000	0.26704 d
10.833	-6.50000	-11.96667	77.00000	0.23585 d
11.917	-6.50000	-10.88333	77.00000	0.19863 d
13.000	-6.50000	-9.80000	77.00000	0.15456 d

d - Displacements include imported displacements.

Specific Building Damage Results - All Segments

Structure: Chase Mansion | Sub-structure: Western Elevation

Vertical Offset from Line for Vertical Movement Calculations	Segment	Start	Length	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	Damage Category
[m]		[m]	[m]		[%]	[%]	[%]			[m]	
0.0	1	0.0	12.000	Sagging	288.65E-6	0.0	406.73E-6	0.0	-24.010E-6	454760.	0 (Negligible)

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

Structure: Chase Mansion | Sub-structure: Eastern Elevation

Vertical Offset from Line for Vertical Movement Calculations	Segment	Start	Length	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	Damage Category
[m]		[m]	[m]		[%]	[%]	[%]			[m]	
0.0	1	0.0	12.000	Sagging	0.0024016	0.0	0.0033838	0.0	-207.39E-6	29350.	0 (Negligible)

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

Structure: Chase Mansions | Sub-structure: Southern Elevation

Vertical Offset from Line for Vertical Movement Calculations	Segment	Start	Length	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	Damage Category
[m]		[m]	[m]		[%]	[%]	[%]			[m]	
0.0	1	0.0	7.8586	Sagging	549.39E-6	0.0	617.37E-6	0.0	72.130E-6	160100.	0 (Negligible)
	2	7.8586	16.141	Hogging	928.41E-6	0.0	0.0010619	0.0	72.130E-6	155880.	0 (Negligible)

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

Structure: Chase Mansions | Sub-structure: Northern Elevation

Vertical Offset from Line for Vertical Movement Calculations	Segment	Start	Length	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	Damage Category
[m]		[m]	[m]		[%]	[%]	[%]			[m]	
0.0	1	0.0	8.3202	Sagging	25.277E-6	0.0	29.504E-6	0.0	2.0817E-6	2.6776E+6	0 (Negligible)
	2	8.3202	15.680	Hogging	55.721E-6	0.0	62.478E-6	0.0	2.0817E-6	3.0774E+6	0 (Negligible)

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

Structure: South Mansions | Sub-structure: Northern Elevation

Vertical Offset from Line for Vertical Movement Calculations	Segment	Start	Length	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	Damage Category
[m]		[m]	[m]		[%]	[%]	[%]			[m]	
0.0	1	0.0	3.3215	Sagging	55.033E-6	0.0	53.179E-6	0.0	36.703E-6	487910.	0 (Negligible)
	2	3.3215	29.679	Hogging	561.41E-6	0.0	839.17E-6	0.0	36.703E-6	360490.	0 (Negligible)

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

Structure: South Mansions | Sub-structure: Eastern Elevation 2

Vertical Offset from Line for Vertical Movement Calculations	Segment	Start	Length	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	Damage Category
[m]		[m]	[m]		[%]	[%]	[%]			[m]	
0.0	1	0.0	6.0000	Sagging	0.0011529	0.0	0.0010615	0.0	-133.43E-6	45097.	0 (Negligible)

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

Structure: South Mansions | Sub-structure: Southern Elevation 2

Vertical Offset from Line for Vertical Movement Calculations	Segment	Start	Length	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	Damage Category
[m]		[m]	[m]		[%]	[%]	[%]			[m]	
0.0	1	0.0	14.699	Hogging	44.066E-6	0.0	47.243E-6	0.0	-2.7098E-6	1.9534E+6	0 (Negligible)
	2	14.699	1.3013	Sagging	0.0	0.0	0.0	0.0	-2.7098E-6	59.324E+6	0 (Negligible)

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

Structure: South Mansions | Sub-structure: Eastern Elevation 1

Vertical Offset from Line for Vertical Movement Calculations	Segment	Start	Length	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	Damage Category
[m]		[m]	[m]		[%]	[%]	[%]			[m]	
0.0	1	0.0	7.0000	Sagging	440.05E-6	0.0	455.87E-6	0.0	41.762E-6	134410.	0 (Negligible)

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

Structure: South Mansions | Sub-structure: Southern Elevation 1

Vertical Offset from Line for Vertical Movement Calculations	Segment	Start	Length	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	Damage Category
[m]		[m]	[m]		[%]	[%]	[%]			[m]	
0.0	1	0.0	4.5868	Sagging	3.4269E-6	0.0	3.1829E-6	0.0	-1.5960E-6	10.340E+6	0

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
											(Negligible)
	2	4.5868	12.413	Hogging	16.103E-6	0.0	15.199E-6	0.0	-2.4855E-6	8.0587E+6	0
											(Negligible)

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

Structure: South Mansions | Sub-structure: Western Elevation

Vertical Offset from Line for Vertical Movement Calculations	Segment	Start	Length	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	Damage Category
[m]		[m]	[m]		[%]	[%]	[%]			[m]	
0.0	1	0.0	13.000	Sagging	511.58E-6	0.0	740.61E-6	0.0	40.684E-6	166250.	0
											(Negligible)

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

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

Structure: Chase Mansion | Sub-structure: Western Elevation

Vertical Offset from Line for Vertical Movement Calculations	Deflection Ratio	Average Horizontal Strain	Max Slope	Max Settlement	Max Tensile Strain	Max Gradient of Horizontal Displacement Curve	Max Gradient of Vertical Displacement Curve	Min Radius of Curvature (Hogging)	Min Radius of Curvature (Sagging)	Damage Category
[m]	[%]	[%]		[mm]	[%]			[m]	[m]	
0.0	288.65E-6	0.0	-24.010E-6	0.36535	406.73E-6	0.0	-24.010E-6	-	454760.	0 (Negligible)

Structure: Chase Mansion | Sub-structure: Eastern Elevation

Vertical Offset from Line for Vertical Movement Calculations	Deflection Ratio	Average Horizontal Strain	Max Slope	Max Settlement	Max Tensile Strain	Max Gradient of Horizontal Displacement Curve	Max Gradient of Vertical Displacement Curve	Min Radius of Curvature (Hogging)	Min Radius of Curvature (Sagging)	Damage Category
[m]	[%]	[%]		[mm]	[%]			[m]	[m]	
0.0	0.0024016	0.0	-207.39E-6	0.79574	0.0033838	0.0	-207.39E-6	-	29350.	0 (Negligible)

Structure: Chase Mansions | Sub-structure: Southern Elevation

Vertical Offset from Line for Vertical Movement Calculations	Deflection Ratio	Average Horizontal Strain	Max Slope	Max Settlement	Max Tensile Strain	Max Gradient of Horizontal Displacement Curve	Max Gradient of Vertical Displacement Curve	Min Radius of Curvature (Hogging)	Min Radius of Curvature (Sagging)	Damage Category
[m]	[%]	[%]		[mm]	[%]			[m]	[m]	
0.0	928.41E-6	0.0	72.130E-6	0.79574	0.0010619	0.0	72.130E-6	155880.	160100.	0 (Negligible)

Structure: Chase Mansions | Sub-structure: Northern Elevation

Vertical Offset from Line for Vertical Movement Calculations	Deflection Ratio	Average Horizontal Strain	Max Slope	Max Settlement	Max Tensile Strain	Max Gradient of Horizontal Displacement Curve	Max Gradient of Vertical Displacement Curve	Min Radius of Curvature (Hogging)	Min Radius of Curvature (Sagging)	Damage Category
[m]	[%]	[%]		[mm]	[%]			[m]	[m]	
0.0	55.721E-6	0.0	2.0817E-6	0.36535	62.478E-6	0.0	2.0817E-6	3.0774E+6	2.6776E+6	0 (Negligible)

Structure: South Mansions | Sub-structure: Northern Elevation

Vertical Offset from Line for Vertical Movement Calculations	Deflection Ratio	Average Horizontal Strain	Max Slope	Max Settlement	Max Tensile Strain	Max Gradient of Horizontal Displacement Curve	Max Gradient of Vertical Displacement Curve	Min Radius of Curvature (Hogging)	Min Radius of Curvature (Sagging)	Damage Category
[m]	[%]	[%]		[mm]	[%]			[m]	[m]	
0.0	561.41E-6	0.0	36.703E-6	0.29497	839.17E-6	0.0	36.703E-6	360490.	487910.	0 (Negligible)

Structure: South Mansions | Sub-structure: Eastern Elevation 2

Vertical Offset from Line for Vertical Movement Calculations	Deflection Ratio	Average Horizontal Strain	Max Slope	Max Settlement	Max Tensile Strain	Max Gradient of Horizontal Displacement Curve	Max Gradient of Vertical Displacement Curve	Min Radius of Curvature (Hogging)	Min Radius of Curvature (Sagging)	Damage Category
[m]	[%]	[%]		[mm]	[%]			[m]	[m]	
0.0	0.0011529	0.0	-133.43E-6	0.28108	0.0010615	0.0	-133.43E-6	-	45097.	0 (Negligible)

Structure: South Mansions | Sub-structure: Southern Elevation 2

Vertical Offset from Line for Vertical Movement Calculations	Deflection Ratio	Average Horizontal Strain	Max Slope	Max Settlement	Max Tensile Strain	Max Gradient of Horizontal Displacement Curve	Max Gradient of Vertical Displacement Curve	Min Radius of Curvature (Hogging)	Min Radius of Curvature (Sagging)	Damage Category
[m]	[%]	[%]		[mm]	[%]			[m]	[m]	
0.0	44.066E-6	0.0	-2.7098E-6	0.25981	47.243E-6	0.0	-2.7098E-6	1.9534E+6	59.324E+6	0 (Negligible)

Structure: South Mansions | Sub-structure: Eastern Elevation 1

Vertical Offset from Line for Vertical Movement Calculations	Deflection Ratio	Average Horizontal Strain	Max Slope	Max Settlement	Max Tensile Strain	Max Gradient of Horizontal Displacement Curve	Max Gradient of Vertical Displacement Curve	Min Radius of Curvature (Hogging)	Min Radius of Curvature (Sagging)	Damage Category
[m]	[%]	[%]		[mm]	[%]			[m]	[m]	
0.0	440.05E-6	0.0	41.762E-6	0.40789	455.87E-6	0.0	41.762E-6	-	134410.	0 (Negligible)

Structure: South Mansions | Sub-structure: Southern Elevation 1

Vertical Offset from Line for Vertical Movement Calculations	Deflection Ratio	Average Horizontal Strain	Max Slope	Max Settlement	Max Tensile Strain	Max Gradient of Horizontal Displacement Curve	Max Gradient of Vertical Displacement Curve	Min Radius of Curvature (Hogging)	Min Radius of Curvature (Sagging)	Damage Category
[m]	[%]	[%]		[mm]	[%]			[m]	[m]	
0.0	16.103E-6	0.0	-2.4855E-6	0.40789	15.199E-6	0.0	-2.4855E-6	8.0587E+6	10.340E+6	0 (Negligible)

Structure: South Mansions | Sub-structure: Western Elevation

Vertical Offset from Line for	Deflection Ratio	Average Horizontal Strain	Max Slope	Max Settlement	Max Tensile Strain	Max Gradient of Horizontal	Max Gradient of Vertical Displacement	Min Radius of Curvature	Min Radius of Curvature	Damage Category

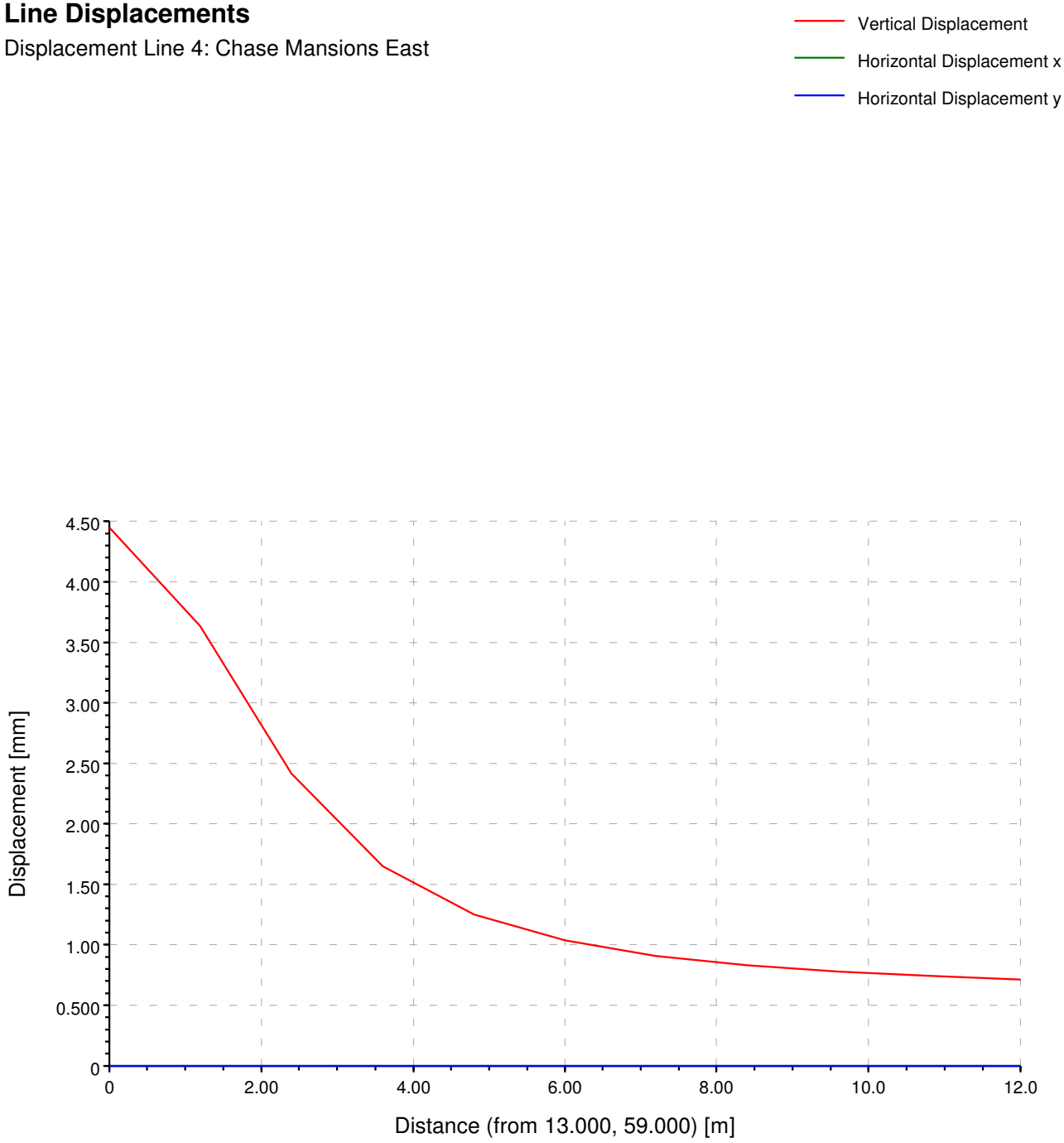
Vertical Movement Calculations				Displacement Curve		Curve	(Hogging)	(Sagging)	
[m]	[%]	[%]		[mm]	[%]			[m]	[m]
0.0	511.58E-6	0.0	40.684E-6	0.37813	740.61E-6	0.0	40.684E-6	-	166250. 0 (Negligible)

Specific Building Damage Results - Critical Segments within Each Structure

Structure Name	Parameter	Critical Sub-Structure	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
Chase Mansion	Max Slope	Eastern Elevation	1	0.0	12.000	Sagging	**207.39E-6**	0.79574	0.0033838	-	29350. 0	(Negligible)
	Max Settlement	Eastern Elevation	1	0.0	12.000	Sagging	207.39E-6	**0.79574**	0.0033838	-	29350. 0	(Negligible)
	Max Tensile Strain	Eastern Elevation	1	0.0	12.000	Sagging	207.39E-6	0.79574	**0.0033838**	-	29350. 0	(Negligible)
	Min Radius of Curvature (Hogging)		-	-	-	-	-	-	-	-	- -	
	Min Radius of Curvature (Sagging)	Eastern Elevation	1	0.0	12.000	Sagging	207.39E-6	0.79574	0.0033838	-	**29350.** 0	(Negligible)
Chase Mansions	Max Slope	Southern Elevation	1	0.0	7.8586	Sagging	**72.130E-6**	0.22391	617.37E-6	-	160100. 0	(Negligible)
	Max Settlement	Southern Elevation	2	7.8586	24.000	Hogging	72.130E-6	**0.79574**	0.0010619	155880.	- 0	(Negligible)
	Max Tensile Strain	Southern Elevation	2	7.8586	24.000	Hogging	72.130E-6	0.79574	**0.0010619**	155880.	- 0	(Negligible)
	Min Radius of Curvature (Hogging)	Southern Elevation	2	7.8586	24.000	Hogging	72.130E-6	0.79574	0.0010619	**155880.**	- 0	(Negligible)
	Min Radius of Curvature (Sagging)	Southern Elevation	1	0.0	7.8586	Sagging	72.130E-6	0.22391	617.37E-6	-	**160100.** 0	(Negligible)
South Mansions	Max Slope	Eastern Elevation 2	1	0.0	6.0000	Sagging	**133.43E-6**	0.28108	0.0010615	-	45097. 0	(Negligible)
	Max Settlement	Eastern Elevation 1	1	0.0	7.0000	Sagging	41.762E-6	**0.40789**	455.87E-6	-	134410. 0	(Negligible)
	Max Tensile Strain	Eastern Elevation 2	1	0.0	6.0000	Sagging	133.43E-6	0.28108	**0.0010615**	-	45097. 0	(Negligible)
	Min Radius of Curvature (Hogging)	Northern Elevation	2	3.3215	33.000	Hogging	36.703E-6	0.29497	839.17E-6	**360490.**	- 0	(Negligible)
	Min Radius of Curvature (Sagging)	Eastern Elevation 2	1	0.0	6.0000	Sagging	133.43E-6	0.28108	0.0010615	-	**45097.** 0	(Negligible)

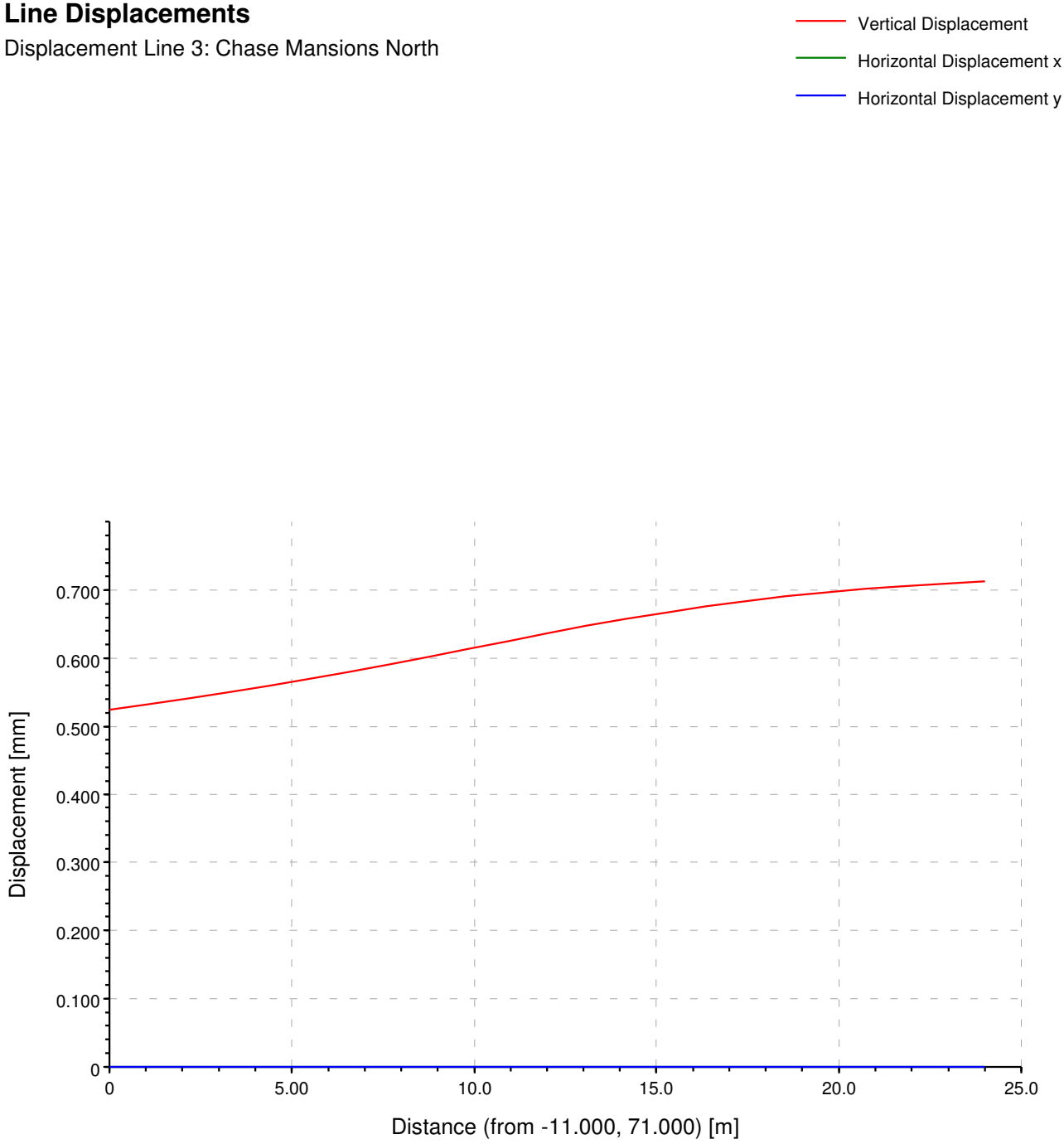
Line Displacements

Displacement Line 4: Chase Mansions East



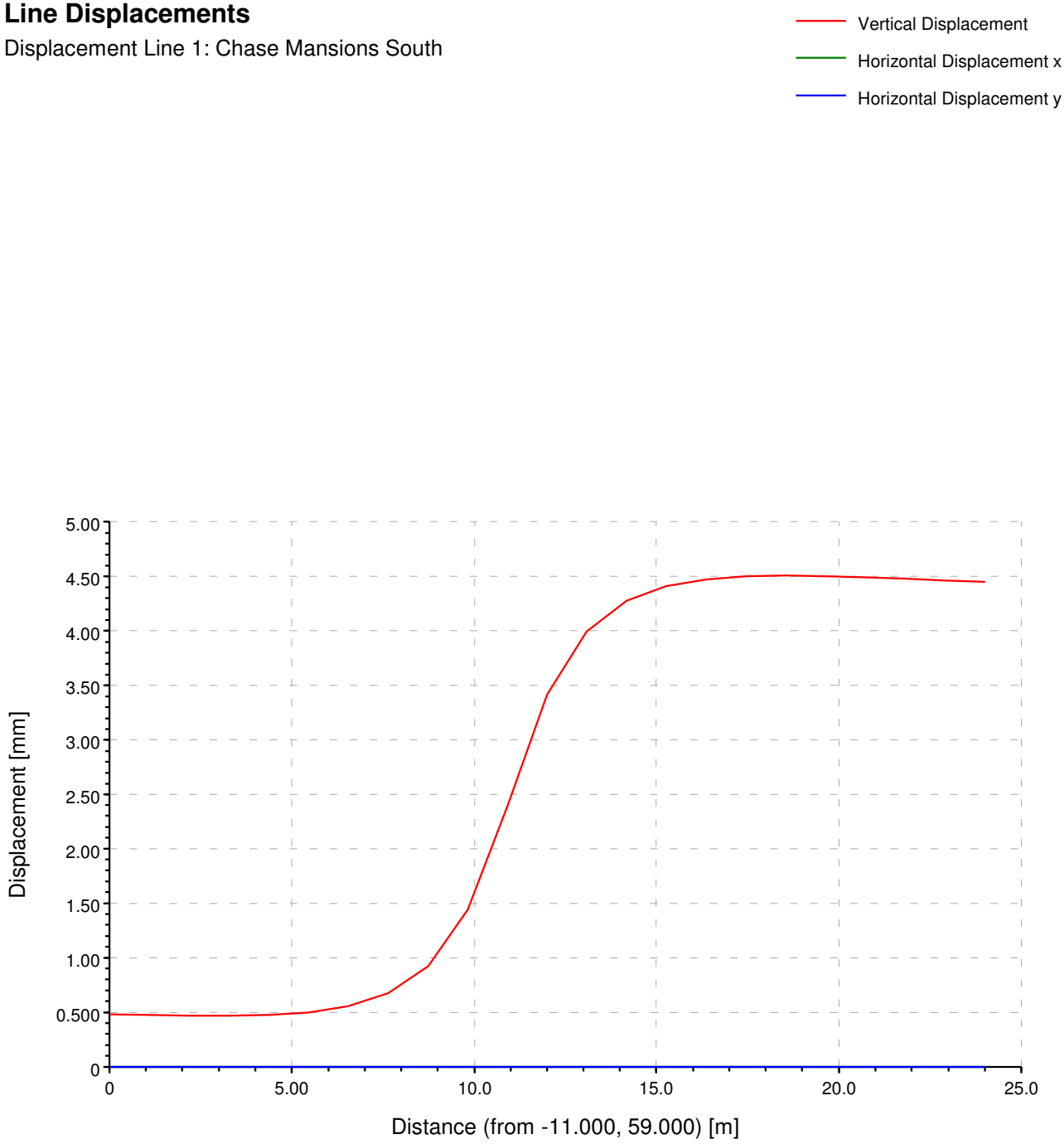
Line Displacements

Displacement Line 3: Chase Mansions North



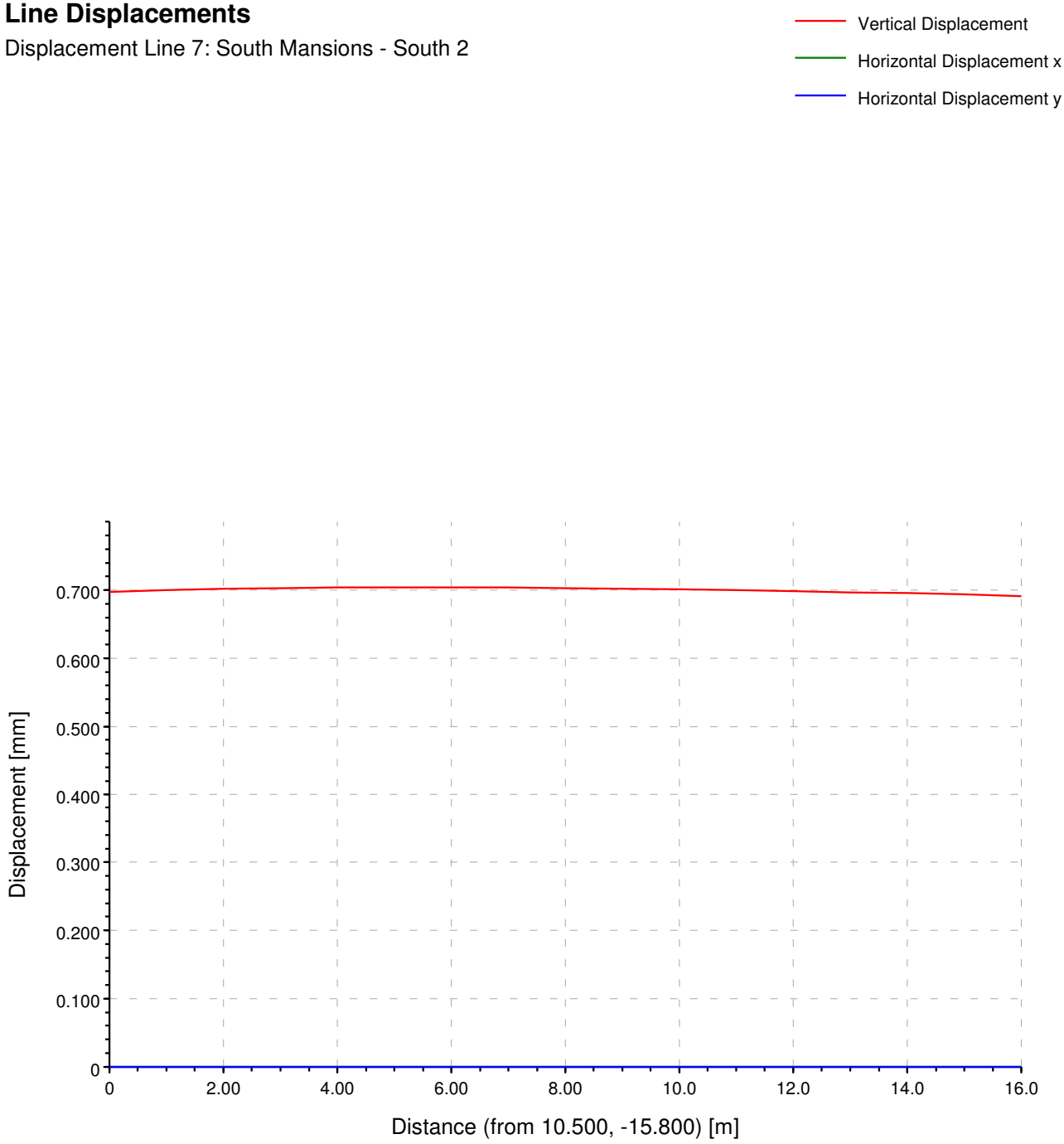
Line Displacements

Displacement Line 1: Chase Mansions South



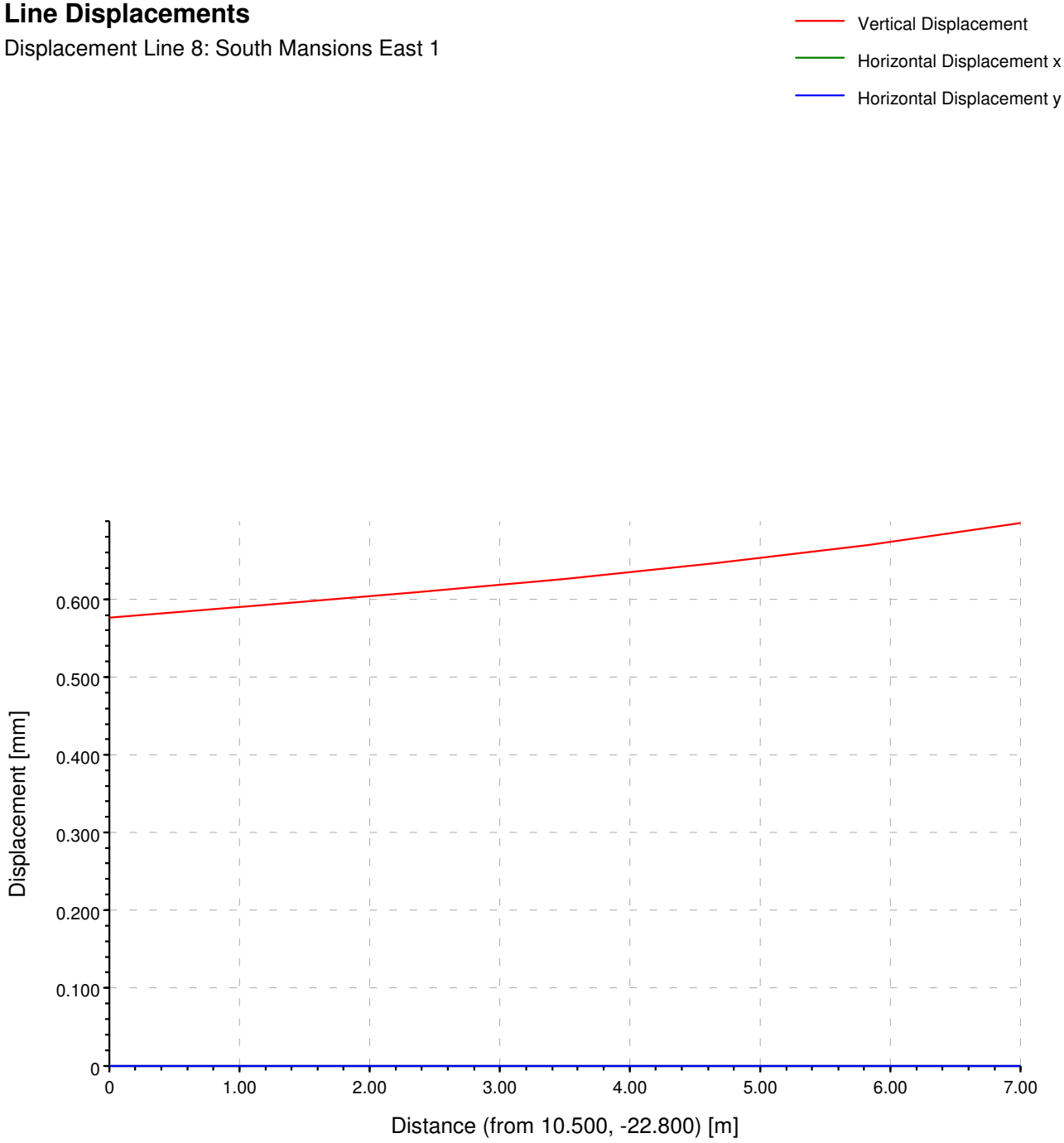
Line Displacements

Displacement Line 7: South Mansions - South 2



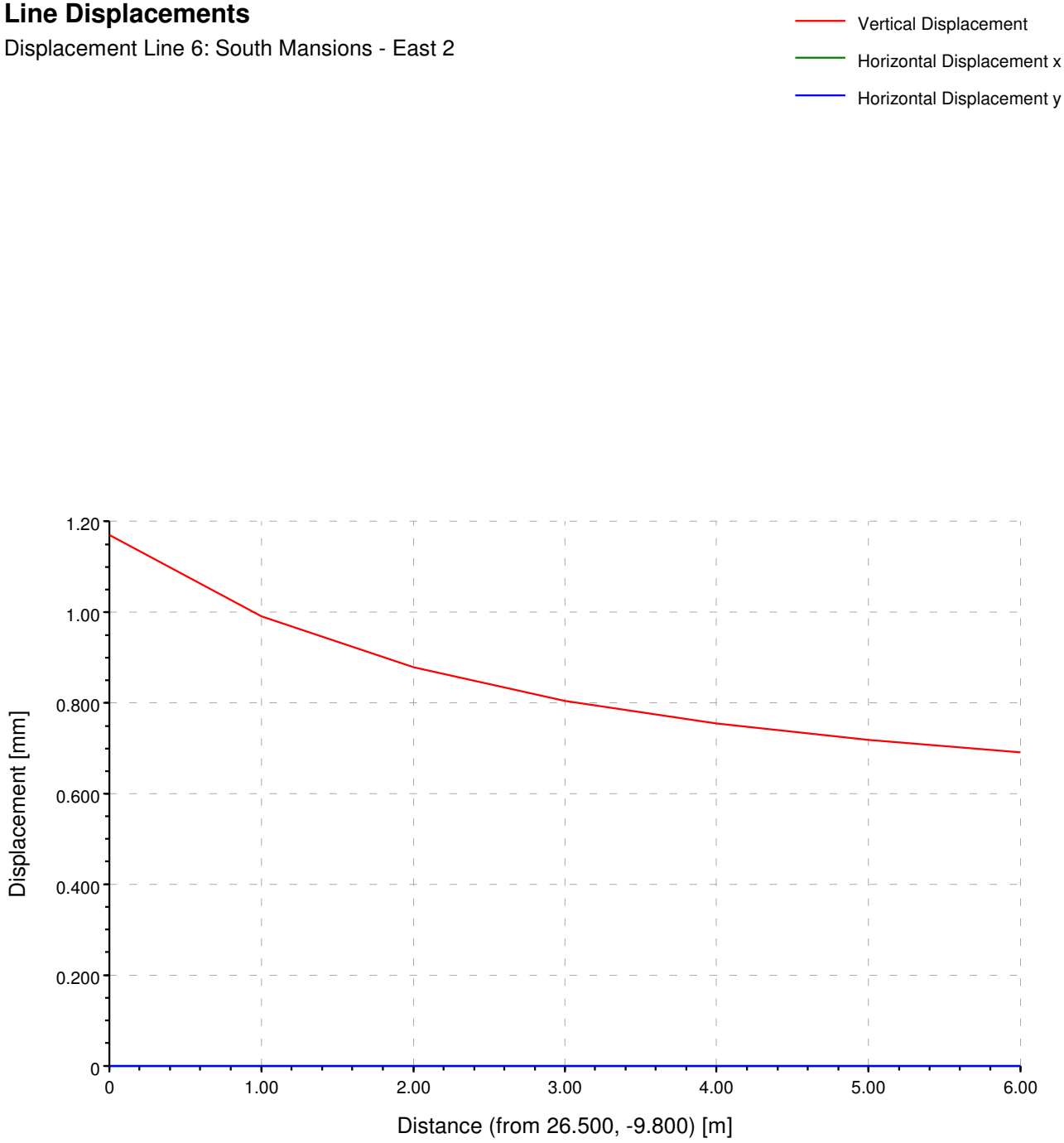
Line Displacements

Displacement Line 8: South Mansions East 1



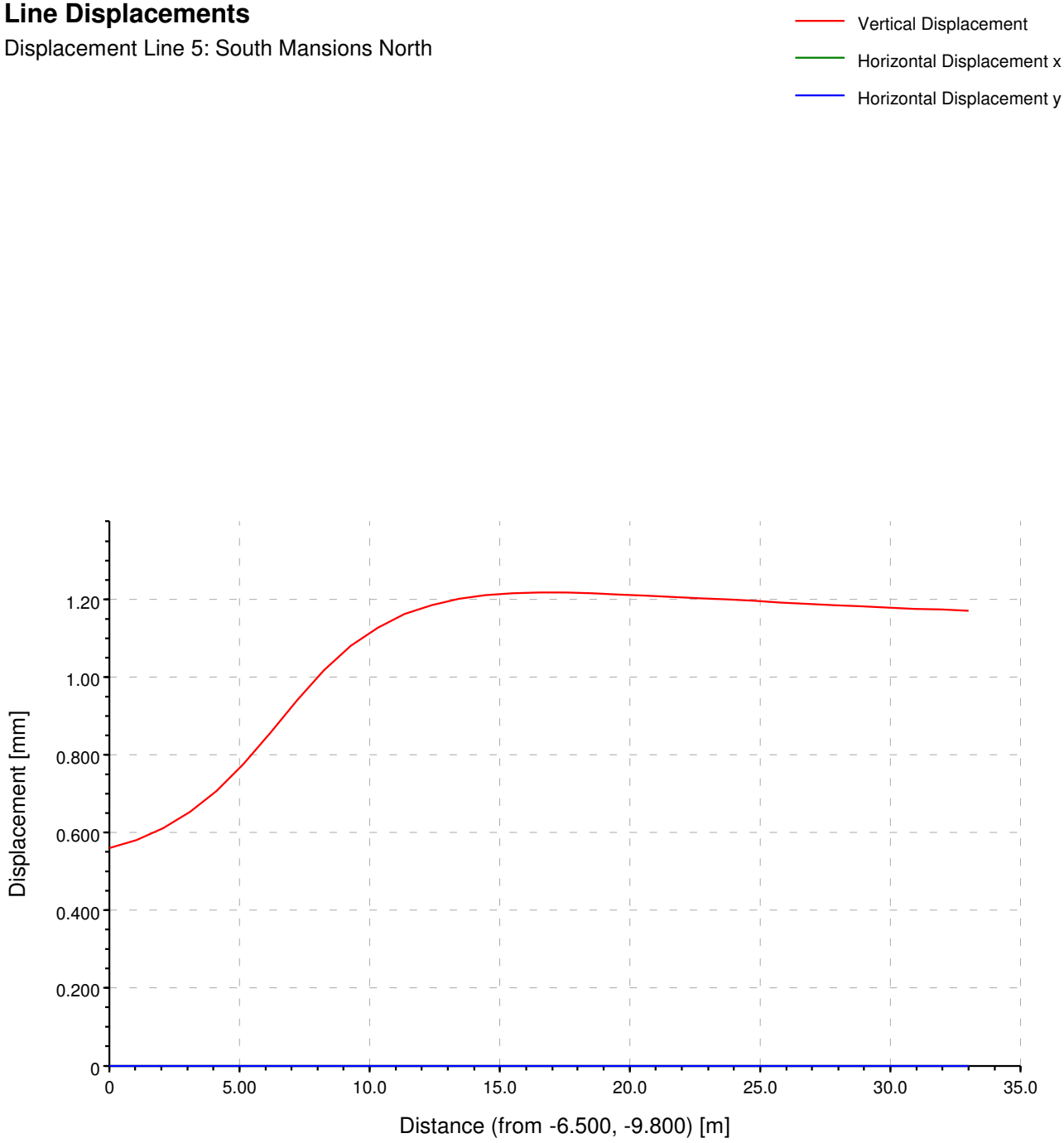
Line Displacements

Displacement Line 6: South Mansions - East 2



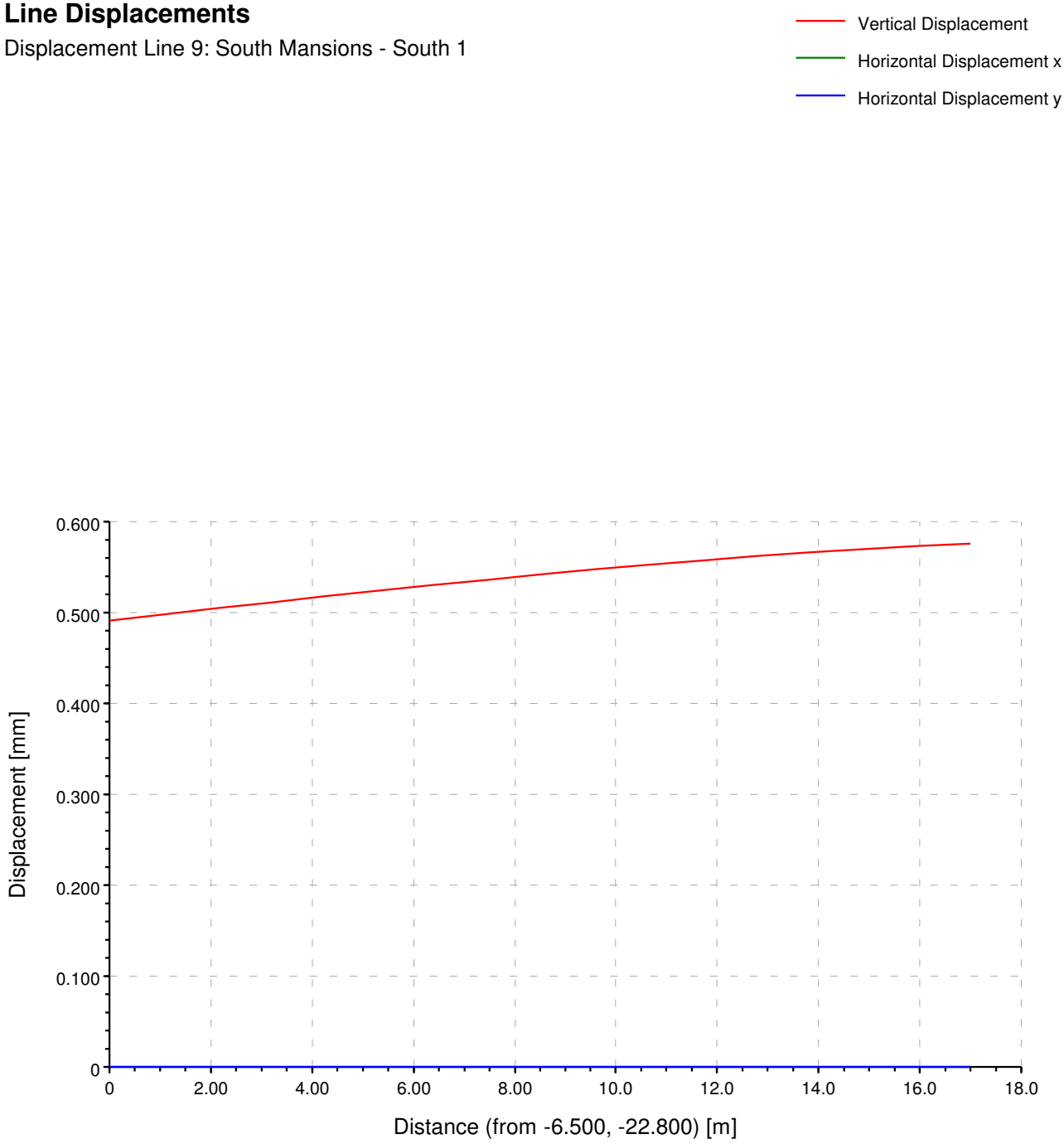
Line Displacements

Displacement Line 5: South Mansions North



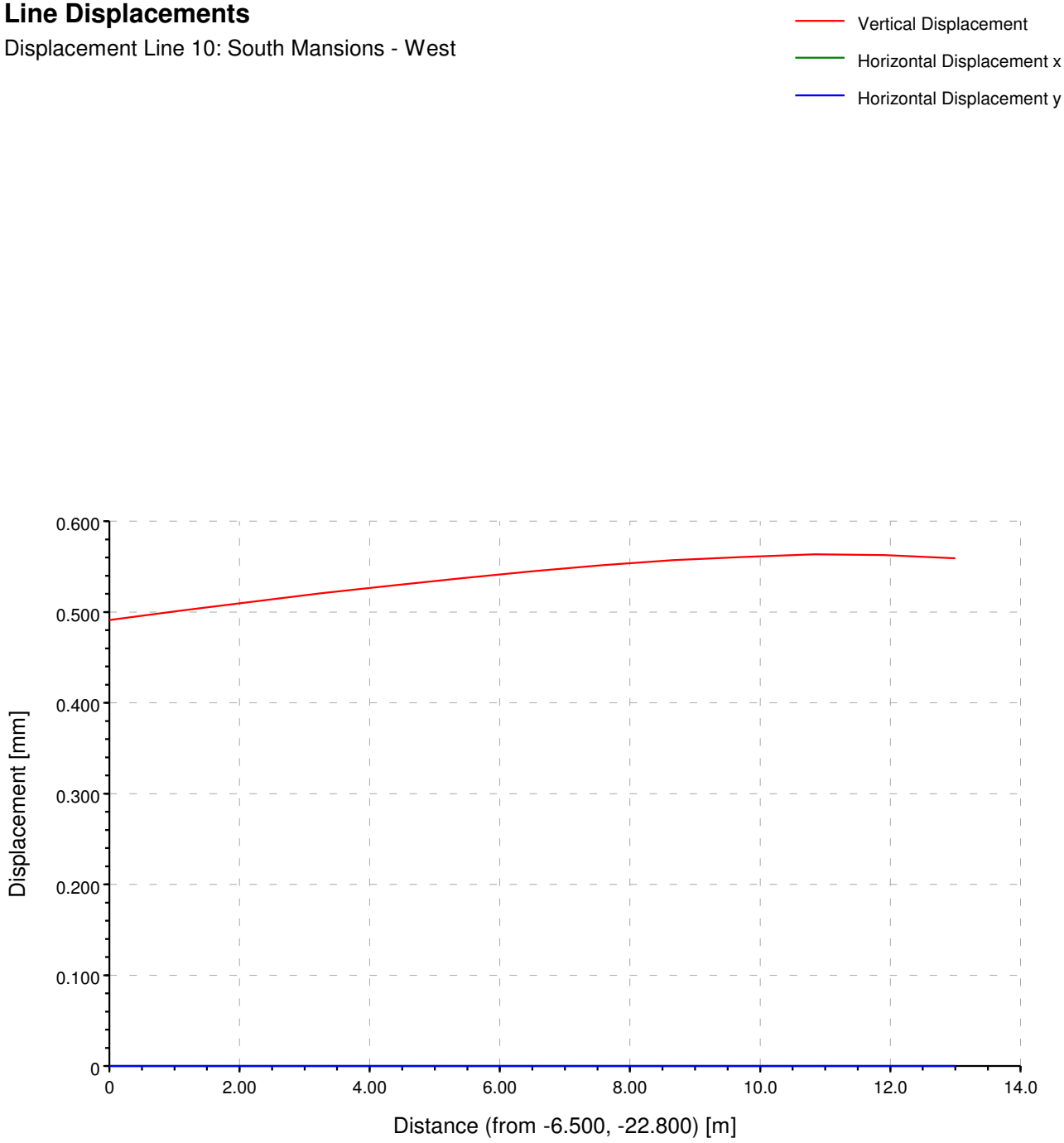
Line Displacements

Displacement Line 9: South Mansions - South 1



Line Displacements

Displacement Line 10: South Mansions - West



Gondar Gardens

Excavation of Proposed Lower Basement & Uplift of Existing Slab to Form 1st Basement

Notes

No wall installation or excavation as basement walls (reservoir) already constructed. Assessment is displacements from New Basement Excavation and Uplifting Earthworks from PDISP

Problem Type

Problem Type : Tunnelling and Embedded Wall Excavations

Displacement Data

Type	Name	Direction of extrusion	Point/Line/Line for extrusion						No. of intervals across extrusion/line	Extrusion depth	No. of intervals along extrusion	Calculate	Surface type for tunnels
			First point			Second point							
			X	Y	Z(level)	X	Y	Z(level)					
			[m]	[m]	[m]	[m]	[m]	[m]		[m]			
Line	Chase Mansions South	-	-11.00000	59.00000	77.00000	13.00000	59.00000	77.00000	22	-	-	Yes	Surface
Line	Chase Mansions West	-	-11.00000	59.00000	77.00000	-11.00000	71.00000	77.00000	10	-	-	Yes	Surface
Line	Chase Mansions North	-	-11.00000	71.00000	77.00000	13.00000	71.00000	77.00000	22	-	-	Yes	Surface
Line	Chase Mansions East	-	13.00000	59.00000	77.00000	13.00000	71.00000	77.00000	10	-	-	Yes	Surface
Line	South Mansions North	-	-6.50000	-9.80000	77.00000	26.50000	-9.80000	77.00000	32	-	-	Yes	Surface
Line	South Mansions - East 2	-	26.50000	-9.80000	77.00000	26.50000	-15.80000	77.00000	6	-	-	Yes	Surface
Line	South Mansions - South 2	-	10.50000	-15.80000	77.00000	26.50000	-15.80000	77.00000	16	-	-	Yes	Surface
Line	South Mansions East 1	-	10.50000	-22.80000	77.00000	10.50000	-15.80000	77.00000	6	-	-	Yes	Surface
Line	South Mansions - South 1	-	-6.50000	-22.80000	77.00000	10.50000	-22.80000	77.00000	16	-	-	Yes	Surface
Line	South Mansions - West	-	-6.50000	-22.80000	77.00000	-6.50000	-9.80000	77.00000	12	-	-	Yes	Surface

Imported Displacements

The following data points and displacements were found in the import file Basement Excavation stage ST 20.06.17 3.csv.

Ref.	Coordinates			Displacements			
	x	y	z	x	y	z	
	[m]	[m]	[m]	[mm]	[mm]	[mm]	
1	-11.00000	59.00000	77.00000	0.00000	0.00000	-0.48256	1,2,6
2	-9.90909	59.00000	77.00000	0.00000	0.00000	-0.47476	1,2,6
3	-8.81818	59.00000	77.00000	0.00000	0.00000	-0.46846	1,2,6
4	-7.72727	59.00000	77.00000	0.00000	0.00000	-0.46629	1,2,6
5	-6.63636	59.00000	77.00000	0.00000	0.00000	-0.47291	1,2,6
6	-5.54545	59.00000	77.00000	0.00000	0.00000	-0.49674	1,2,6
7	-4.45455	59.00000	77.00000	0.00000	0.00000	-0.55351	1,2,6
8	-3.36364	59.00000	77.00000	0.00000	0.00000	-0.67417	1,2,6
9	-2.27273	59.00000	77.00000	0.00000	0.00000	-0.92366	1,2,6
10	-1.18182	59.00000	77.00000	0.00000	0.00000	-1.44095	1,2,6
11	-0.09091	59.00000	77.00000	0.00000	0.00000	-2.39852	1,2,6
12	1.00000	59.00000	77.00000	0.00000	0.00000	-3.41690	1,2,6
13	2.09091	59.00000	77.00000	0.00000	0.00000	-3.99850	1,2,6
14	3.18182	59.00000	77.00000	0.00000	0.00000	-4.27888	1,2,6
15	4.27273	59.00000	77.00000	0.00000	0.00000	-4.41326	1,2,6
16	5.36364	59.00000	77.00000	0.00000	0.00000	-4.47552	1,2,6
17	6.45455	59.00000	77.00000	0.00000	0.00000	-4.50051	1,2,6
18	7.54545	59.00000	77.00000	0.00000	0.00000	-4.50578	1,2,6
19	8.63636	59.00000	77.00000	0.00000	0.00000	-4.50064	1,2,6
20	9.72727	59.00000	77.00000	0.00000	0.00000	-4.49025	1,2,6
21	10.81818	59.00000	77.00000	0.00000	0.00000	-4.47749	1,2,6
22	11.90909	59.00000	77.00000	0.00000	0.00000	-4.46403	1,2,6
23	13.00000	59.00000	77.00000	0.00000	0.00000	-4.45077	1,2,6
24	-11.00000	60.20000	77.00000	0.00000	0.00000	-0.50259	1,2,6
25	-11.00000	61.40000	77.00000	0.00000	0.00000	-0.51797	1,2,6
26	-11.00000	62.60000	77.00000	0.00000	0.00000	-0.52903	1,2,6
27	-11.00000	63.80000	77.00000	0.00000	0.00000	-0.53619	1,2,6
28	-11.00000	65.00000	77.00000	0.00000	0.00000	-0.53997	1,2,6
29	-11.00000	66.20000	77.00000	0.00000	0.00000	-0.54088	1,2,6
30	-11.00000	67.40000	77.00000	0.00000	0.00000	-0.53938	1,2,6
31	-11.00000	68.60000	77.00000	0.00000	0.00000	-0.53588	1,2,6
32	-11.00000	69.80000	77.00000	0.00000	0.00000	-0.53075	1,2,6
33	-11.00000	71.00000	77.00000	0.00000	0.00000	-0.52428	1,2,6
34	-9.90909	71.00000	77.00000	0.00000	0.00000	-0.53256	1,2,6
35	-8.81818	71.00000	77.00000	0.00000	0.00000	-0.54115	1,2,6
36	-7.72727	71.00000	77.00000	0.00000	0.00000	-0.55013	1,2,6
37	-6.63636	71.00000	77.00000	0.00000	0.00000	-0.55957	1,2,6
38	-5.54545	71.00000	77.00000	0.00000	0.00000	-0.56952	1,2,6
39	-4.45455	71.00000	77.00000	0.00000	0.00000	-0.57997	1,2,6
40	-3.36364	71.00000	77.00000	0.00000	0.00000	-0.59088	1,2,6
41	-2.27273	71.00000	77.00000	0.00000	0.00000	-0.60218	1,2,6
42	-1.18182	71.00000	77.00000	0.00000	0.00000	-0.61371	1,2,6
43	-0.09091	71.00000	77.00000	0.00000	0.00000	-0.62526	1,2,6
44	1.00000	71.00000	77.00000	0.00000	0.00000	-0.63663	1,2,6
45	2.09091	71.00000	77.00000	0.00000	0.00000	-0.64757	1,2,6
46	3.18182	71.00000	77.00000	0.00000	0.00000	-0.65790	1,2,6
47	4.27273	71.00000	77.00000	0.00000	0.00000	-0.66744	1,2,6
48	5.36364	71.00000	77.00000	0.00000	0.00000	-0.67611	1,2,6
49	6.45455	71.00000	77.00000	0.00000	0.00000	-0.68385	1,2,6
50	7.54545	71.00000	77.00000	0.00000	0.00000	-0.69067	1,2,6
51	8.63636	71.00000	77.00000	0.00000	0.00000	-0.69661	1,2,6
52	9.72727	71.00000	77.00000	0.00000	0.00000	-0.70174	1,2,6
53	10.81818	71.00000	77.00000	0.00000	0.00000	-0.70611	1,2,6
54	11.90909	71.00000	77.00000	0.00000	0.00000	-0.70982	1,2,6
55	13.00000	71.00000	77.00000	0.00000	0.00000	-0.71294	1,2,6
56	13.00000	60.20000	77.00000	0.00000	0.00000	-3.63852	1,2,6
57	13.00000	61.40000	77.00000	0.00000	0.00000	-2.41736	1,2,6
58	13.00000	62.60000	77.00000	0.00000	0.00000	-1.64662	1,2,6
59	13.00000	63.80000	77.00000	0.00000	0.00000	-1.25070	1,2,6
60	13.00000	65.00000	77.00000	0.00000	0.00000	-1.03560	1,2,6
61	13.00000	66.20000	77.00000	0.00000	0.00000	-0.90978	1,2,6
62	13.00000	67.40000	77.00000	0.00000	0.00000	-0.83111	1,2,6
63	13.00000	68.60000	77.00000	0.00000	0.00000	-0.77868	1,2,6
64	13.00000	69.80000	77.00000	0.00000	0.00000	-0.74136	1,2,6
65	-6.50000	-9.80000	77.00000	0.00000	0.00000	-0.55965	1,2,6
66	-5.46875	-9.80000	77.00000	0.00000	0.00000	-0.58090	1,2,6
67	-4.43750	-9.80000	77.00000	0.00000	0.00000	-0.61084	1,2,6
68	-3.40625	-9.80000	77.00000	0.00000	0.00000	-0.65212	1,2,6
69	-2.37500	-9.80000	77.00000	0.00000	0.00000	-0.70714	1,2,6
70	-1.34375	-9.80000	77.00000	0.00000	0.00000	-0.77661	1,2,6
71	-0.31250	-9.80000	77.00000	0.00000	0.00000	-0.85724	1,2,6
72	0.71875	-9.80000	77.00000	0.00000	0.00000	-0.94073	1,2,6
73	1.75000	-9.80000	77.00000	0.00000	0.00000	-1.01709	1,2,6
74	2.78125	-9.80000	77.00000	0.00000	0.00000	-1.07988	1,2,6
75	3.81250	-9.80000	77.00000	0.00000	0.00000	-1.12766	1,2,6
76	4.84375	-9.80000	77.00000	0.00000	0.00000	-1.16205	1,2,6
77	5.87500	-9.80000	77.00000	0.00000	0.00000	-1.18567	1,2,6
78	6.90625	-9.80000	77.00000	0.00000	0.00000	-1.20108	1,2,6
79	7.93750	-9.80000	77.00000	0.00000	0.00000	-1.21045	1,2,6
80	8.96875	-9.80000	77.00000	0.00000	0.00000	-1.21547	1,2,6
81	10.00000	-9.80000	77.00000	0.00000	0.00000	-1.21743	1,2,6
82	11.03125	-9.80000	77.00000	0.00000	0.00000	-1.21726	1,2,6

Ref.	Coordinates x [m]	y [m]	z [m]	Displacements x [mm]	y [mm]	z [mm]	
83	12.06250	-9.80000	77.00000	0.00000	0.00000	-1.21566	1,2,6
84	13.09375	-9.80000	77.00000	0.00000	0.00000	-1.21312	1,2,6
85	14.12500	-9.80000	77.00000	0.00000	0.00000	-1.21001	1,2,6
86	15.15625	-9.80000	77.00000	0.00000	0.00000	-1.20656	1,2,6
87	16.18750	-9.80000	77.00000	0.00000	0.00000	-1.20296	1,2,6
88	17.21875	-9.80000	77.00000	0.00000	0.00000	-1.19930	1,2,6
89	18.25000	-9.80000	77.00000	0.00000	0.00000	-1.19568	1,2,6
90	19.28125	-9.80000	77.00000	0.00000	0.00000	-1.19212	1,2,6
91	20.31250	-9.80000	77.00000	0.00000	0.00000	-1.18867	1,2,6
92	21.34375	-9.80000	77.00000	0.00000	0.00000	-1.18533	1,2,6
93	22.37500	-9.80000	77.00000	0.00000	0.00000	-1.18212	1,2,6
94	23.40625	-9.80000	77.00000	0.00000	0.00000	-1.17905	1,2,6
95	24.43750	-9.80000	77.00000	0.00000	0.00000	-1.17612	1,2,6
96	25.46875	-9.80000	77.00000	0.00000	0.00000	-1.17335	1,2,6
97	26.50000	-9.80000	77.00000	0.00000	0.00000	-1.17075	1,2,6
98	26.50000	-10.80000	77.00000	0.00000	0.00000	-0.99121	1,2,6
99	26.50000	-11.80000	77.00000	0.00000	0.00000	-0.87893	1,2,6
100	26.50000	-12.80000	77.00000	0.00000	0.00000	-0.80538	1,2,6
101	26.50000	-13.80000	77.00000	0.00000	0.00000	-0.75496	1,2,6
102	26.50000	-14.80000	77.00000	0.00000	0.00000	-0.71873	1,2,6
103	26.50000	-15.80000	77.00000	0.00000	0.00000	-0.69136	1,2,6
104	10.50000	-15.80000	77.00000	0.00000	0.00000	-0.69786	1,2,6
105	11.50000	-15.80000	77.00000	0.00000	0.00000	-0.70018	1,2,6
106	12.50000	-15.80000	77.00000	0.00000	0.00000	-0.70188	1,2,6
107	13.50000	-15.80000	77.00000	0.00000	0.00000	-0.70305	1,2,6
108	14.50000	-15.80000	77.00000	0.00000	0.00000	-0.70376	1,2,6
109	15.50000	-15.80000	77.00000	0.00000	0.00000	-0.70408	1,2,6
110	16.50000	-15.80000	77.00000	0.00000	0.00000	-0.70405	1,2,6
111	17.50000	-15.80000	77.00000	0.00000	0.00000	-0.70372	1,2,6
112	18.50000	-15.80000	77.00000	0.00000	0.00000	-0.70312	1,2,6
113	19.50000	-15.80000	77.00000	0.00000	0.00000	-0.70228	1,2,6
114	20.50000	-15.80000	77.00000	0.00000	0.00000	-0.70123	1,2,6
115	21.50000	-15.80000	77.00000	0.00000	0.00000	-0.69998	1,2,6
116	22.50000	-15.80000	77.00000	0.00000	0.00000	-0.69855	1,2,6
117	23.50000	-15.80000	77.00000	0.00000	0.00000	-0.69696	1,2,6
118	24.50000	-15.80000	77.00000	0.00000	0.00000	-0.69522	1,2,6
119	25.50000	-15.80000	77.00000	0.00000	0.00000	-0.69335	1,2,6
120	10.50000	-22.80000	77.00000	0.00000	0.00000	-0.57625	1,2,6
121	10.50000	-21.63333	77.00000	0.00000	0.00000	-0.59221	1,2,6
122	10.50000	-20.46667	77.00000	0.00000	0.00000	-0.60888	1,2,6
123	10.50000	-19.30000	77.00000	0.00000	0.00000	-0.62673	1,2,6
124	10.50000	-18.13333	77.00000	0.00000	0.00000	-0.64654	1,2,6
125	10.50000	-16.96667	77.00000	0.00000	0.00000	-0.66956	1,2,6
126	-6.50000	-22.80000	77.00000	0.00000	0.00000	-0.49168	1,2,6
127	-5.43750	-22.80000	77.00000	0.00000	0.00000	-0.49833	1,2,6
128	-4.37500	-22.80000	77.00000	0.00000	0.00000	-0.50494	1,2,6
129	-3.31250	-22.80000	77.00000	0.00000	0.00000	-0.51149	1,2,6
130	-2.25000	-22.80000	77.00000	0.00000	0.00000	-0.51794	1,2,6
131	-1.18750	-22.80000	77.00000	0.00000	0.00000	-0.52427	1,2,6
132	-0.12500	-22.80000	77.00000	0.00000	0.00000	-0.53043	1,2,6
133	0.93750	-22.80000	77.00000	0.00000	0.00000	-0.53640	1,2,6
134	2.00000	-22.80000	77.00000	0.00000	0.00000	-0.54214	1,2,6
135	3.06250	-22.80000	77.00000	0.00000	0.00000	-0.54760	1,2,6
136	4.12500	-22.80000	77.00000	0.00000	0.00000	-0.55277	1,2,6
137	5.18750	-22.80000	77.00000	0.00000	0.00000	-0.55760	1,2,6
138	6.25000	-22.80000	77.00000	0.00000	0.00000	-0.56208	1,2,6
139	7.31250	-22.80000	77.00000	0.00000	0.00000	-0.56619	1,2,6
140	8.37500	-22.80000	77.00000	0.00000	0.00000	-0.56993	1,2,6
141	9.43750	-22.80000	77.00000	0.00000	0.00000	-0.57328	1,2,6
142	-6.50000	-21.71667	77.00000	0.00000	0.00000	-0.50173	1,2,6
143	-6.50000	-20.63333	77.00000	0.00000	0.00000	-0.51144	1,2,6
144	-6.50000	-19.55000	77.00000	0.00000	0.00000	-0.52075	1,2,6
145	-6.50000	-18.46667	77.00000	0.00000	0.00000	-0.52956	1,2,6
146	-6.50000	-17.38333	77.00000	0.00000	0.00000	-0.53776	1,2,6
147	-6.50000	-16.30000	77.00000	0.00000	0.00000	-0.54522	1,2,6
148	-6.50000	-15.21667	77.00000	0.00000	0.00000	-0.55179	1,2,6
149	-6.50000	-14.13333	77.00000	0.00000	0.00000	-0.55725	1,2,6
150	-6.50000	-13.05000	77.00000	0.00000	0.00000	-0.56131	1,2,6
151	-6.50000	-11.96667	77.00000	0.00000	0.00000	-0.56354	1,2,6
152	-6.50000	-10.88333	77.00000	0.00000	0.00000	-0.56330	1,2,6

1 - Data point coincident with displacement data. Its displacement has been added to those calculated by Xdisp.
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.

Vertical Ground Movement Curves (Excavations)

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: -2147483648.E+2147483647

Horizontal Ground Movement Curves (Excavations)

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: -2147483648.E+2147483647

Polygonal Excavations

Excavation Name: **New Excavation - 1st Basement Level**
Surface level [m]: 77.500
Contribution: Positive
Enabled: Yes
Surface movement curves which are selected are applied between surface and [m]: 75.000

Corner	x [m]	y [m]	Base Level [m]	Stiffened	Previous Side d [m]	Previous Side p1 [%]	Previous Side p2* [%]	Next Side d [m]	Next Side p1 [%]	Next Side p2* [%]
1	0.0	0.0	75.000	Yes	0.0	67.000	25.000	0.0	67.000	25.000
2	91.000	0.0	75.000	Yes	0.0	67.000	25.000	0.0	67.000	25.000
3	91.000	52.000	75.000	Yes	0.0	67.000	25.000	0.0	67.000	25.000
4	0.0	52.000	75.000	Yes	0.0	67.000	25.000	0.0	67.000	25.000

Side	Corner 1 x [m]	Corner 1 y [m]	Corner 2 x [m]	Corner 2 y [m]	Ground Movement Curve Vertical	Horizontal
1	0.0	0.0	91.000	0.0	No vertical ground movement	No horizontal ground movement
2	91.000	0.0	91.000	52.000	No vertical ground movement	No horizontal ground movement
3	91.000	52.000	0.0	52.000	No vertical ground movement	No horizontal ground movement
4	0.0	52.000	0.0	0.0	No vertical ground movement	No horizontal ground movement

Side	Corner 1 x [m]	Corner 1 y [m]	Corner 2 x [m]	Corner 2 y [m]	Ground Movement Curve Vertical	Ground Movement Curve Horizontal
1	58.500	0.0	91.000	0.0	No vertical ground movement	No horizontal ground movement
2	91.000	0.0	91.000	52.000	No vertical ground movement	No horizontal ground movement
3	91.000	52.000	58.500	52.000	No vertical ground movement	No horizontal ground movement
4	58.500	52.000	58.500	0.0	No vertical ground movement	No horizontal ground movement

Excavation Name: New Excavation - 2nd Level Basement
Surface level [m]: 75.000
Contribution: Positive
Enabled: Yes
Surface movement curves which are selected are applied between surface and [m]: 71.600

Corner	x [m]	y [m]	Base Level [m]	Stiffened	Previous Side d [m]	Previous Side p1 [%]	Previous Side p2* [%]	Next Side d [m]	Next Side p1 [%]	Next Side p2* [%]
1	58.500	0.0	71.600	Yes	0.0	67.000	25.000	0.0	67.000	25.000
2	91.000	0.0	71.600	Yes	0.0	67.000	25.000	0.0	67.000	25.000
3	91.000	52.000	71.600	Yes	0.0	67.000	25.000	0.0	67.000	25.000
4	58.500	52.000	71.600	Yes	0.0	67.000	25.000	0.0	67.000	25.000

Damage Category Strains

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

Specific Structures - Geometry

Structure Name	Sub-Structure Name	Displacement Line	Start Distance Along Line [m]	End Distance Along Line [m]	Vertical Offsets from Line for Vertical Movement Calculations [m]	Vertical Displacement Limit Sensitivity [mm]	Damage Category Strains	Poisson's Ratio	E/G
Chase Mansion	Western Elevation	Chase Mansions West	0.00000	12.00000	0.0	0.10000	Burland Strain Limits	0.20000	2.6000
Chase Mansion	Eastern Elevation	Chase Mansions East	0.00000	12.00000	0.0	0.10000	Burland Strain Limits	0.20000	2.6000
Chase Mansions	Southern Elevation	Chase Mansions South	0.00000	24.00000	0.0	0.10000	Burland Strain Limits	0.20000	2.6000
Chase Mansions	Northern Elevation	Chase Mansions North	0.00000	24.00000	0.0	0.10000	Burland Strain Limits	0.20000	2.6000
South Mansions	Northern Elevation	South Mansions North	0.00000	33.00000	0.0	0.10000	Burland Strain Limits	0.20000	2.6000
South Mansions	Eastern Elevation 2	South Mansions - East 2	0.00000	6.00000	0.0	0.10000	Burland Strain Limits	0.20000	2.6000
South Mansions	Southern Elevation 2	South Mansions - South 2	0.00000	16.00000	0.0	0.10000	Burland Strain Limits	0.20000	2.6000
South Mansions	Eastern Elevation 1	South Mansions East 1	0.00000	7.00000	0.0	0.10000	Burland Strain Limits	0.20000	2.6000
South Mansions	Southern Elevation 1	South Mansions - South 1	0.00000	17.00000	0.0	0.10000	Burland Strain Limits	0.20000	2.6000
South Mansions	Western Elevation	South Mansions - West	0.00000	13.00000	0.0	0.10000	Burland Strain Limits	0.20000	2.6000

Specific Structures - Bending Parameters

Structure Name	Sub-Structure Name	Height [m]	Default Properties	Hogging 2nd Moment of Area (per unit width) [m³]	Hogging Distance of Bending Strain from N.A. [m]	Hogging Distance of N.A. from Edge of Beam in Tension [m]	Sagging 2nd Moment of Area (per unit width) [m³]	Sagging Distance of Bending Strain from N.A. [m]	Sagging Distance of N.A. from Edge of Beam in Tension [m]
Chase Mansion	Western Elevation	9.0000	Yes	243.00	9.0000	9.0000	60.750	4.5000	4.5000
Chase Mansion	Eastern Elevation	9.0000	Yes	243.00	9.0000	9.0000	60.750	4.5000	4.5000
Chase Mansions	Southern Elevation	9.0000	Yes	243.00	9.0000	9.0000	60.750	4.5000	4.5000
Chase Mansions	Northern Elevation	9.0000	Yes	243.00	9.0000	9.0000	60.750	4.5000	4.5000
South Mansions	Northern Elevation	9.0000	Yes	243.00	9.0000	9.0000	60.750	4.5000	4.5000
South Mansions	Eastern Elevation 2	9.0000	Yes	243.00	9.0000	9.0000	60.750	4.5000	4.5000
South Mansions	Southern Elevation 2	9.0000	Yes	243.00	9.0000	9.0000	60.750	4.5000	4.5000
South Mansions	Eastern Elevation 1	9.0000	Yes	243.00	9.0000	9.0000	60.750	4.5000	4.5000
South Mansions	Southern Elevation 1	9.0000	Yes	243.00	9.0000	9.0000	60.750	4.5000	4.5000
South Mansions	Western Elevation	9.0000	Yes	243.00	9.0000	9.0000	60.750	4.5000	4.5000

Building Segment Combinations

Structure Name	Sub-Structure Name	Vertical Offset from Line for Vertical Movement Calculations [m]	Segment Start [m]	Length [m]	Curvature	Combined Segment

No structures have segments combined.

Utility Strain Calculation Options

Neglect beneficial contribution of axial strains : No

Displacement and Strain Results

Name	Type/No. Dist. [m]	Coordinates x [m]	y [m]	z [m]	Displacements x [mm]	y [mm]	z [mm]	Horizontal displacement along Line [mm]	Horizontal displacement perpendicular to Line [mm]	Angle of Line to x Axis [°]	
Chase Mansions South	Line 1	-11.00000	59.00000	77.00000	0.0	0.0	-0.48256	0.0	0.0	0.0	*
	1.0909	-9.90909	59.00000	77.00000	0.0	0.0	-0.47476	0.0	0.0	0.0	*
	2.1818	-8.81818	59.00000	77.00000	0.0	0.0	-0.46846	0.0	0.0	0.0	*
	3.2727	-7.72727	59.00000	77.00000	0.0	0.0	-0.46629	0.0	0.0	0.0	*
	4.3636	-6.63636	59.00000	77.00000	0.0	0.0	-0.47291	0.0	0.0	0.0	*
	5.4545	-5.54545	59.00000	77.00000	0.0	0.0	-0.49674	0.0	0.0	0.0	*
	6.5455	-4.45455	59.00000	77.00000	0.0	0.0	-0.55351	0.0	0.0	0.0	*
	7.6364	-3.36364	59.00000	77.00000	0.0	0.0	-0.67417	0.0	0.0	0.0	*
	8.7273	-2.27273	59.00000	77.00000	0.0	0.0	-0.92366	0.0	0.0	0.0	*
	9.8182	-1.18182	59.00000	77.00000	0.0	0.0	-1.4410	0.0	0.0	0.0	*
	10.909	-0.09091	59.00000	77.00000	0.0	0.0	-2.3985	0.0	0.0	0.0	*
	12.000	1.00000	59.00000	77.00000	0.0	0.0	-3.4169	0.0	0.0	0.0	*

Type/No. Name	Dist.	Coordinates x	y	z	Displacements x	y	z	Horizontal displacement	Horizontal displacement	Angle of Line to x Axis	
	13.091	2.09091	59.00000	77.00000	0.0	0.0	-3.9985	0.0	0.0	0.0	*
	14.182	3.18182	59.00000	77.00000	0.0	0.0	-4.2789	0.0	0.0	0.0	*
	15.273	4.27273	59.00000	77.00000	0.0	0.0	-4.4133	0.0	0.0	0.0	*
	16.364	5.36364	59.00000	77.00000	0.0	0.0	-4.4755	0.0	0.0	0.0	*
	17.455	6.45455	59.00000	77.00000	0.0	0.0	-4.5005	0.0	0.0	0.0	*
	18.545	7.54545	59.00000	77.00000	0.0	0.0	-4.5058	0.0	0.0	0.0	*
	19.636	8.63636	59.00000	77.00000	0.0	0.0	-4.5006	0.0	0.0	0.0	*
	20.727	9.72727	59.00000	77.00000	0.0	0.0	-4.4902	0.0	0.0	0.0	*
	21.818	10.81818	59.00000	77.00000	0.0	0.0	-4.4775	0.0	0.0	0.0	*
	22.909	11.90909	59.00000	77.00000	0.0	0.0	-4.4640	0.0	0.0	0.0	*
	24.000	13.00000	59.00000	77.00000	0.0	0.0	-4.4508	0.0	0.0	0.0	*
Chase Mansions West	Line 2	-11.00000	59.00000	77.00000	0.0	0.0	-0.48256	0.0	0.0	90.000	*
	1.2000	-11.00000	60.20000	77.00000	0.0	0.0	-0.50259	0.0	0.0	90.000	*
	2.4000	-11.00000	61.40000	77.00000	0.0	0.0	-0.51797	0.0	0.0	90.000	*
	3.6000	-11.00000	62.60000	77.00000	0.0	0.0	-0.52903	0.0	0.0	90.000	*
	4.8000	-11.00000	63.80000	77.00000	0.0	0.0	-0.53619	0.0	0.0	90.000	*
	6.0000	-11.00000	65.00000	77.00000	0.0	0.0	-0.53997	0.0	0.0	90.000	*
	7.2000	-11.00000	66.20000	77.00000	0.0	0.0	-0.54088	0.0	0.0	90.000	*
	8.4000	-11.00000	67.40000	77.00000	0.0	0.0	-0.53938	0.0	0.0	90.000	*
	9.6000	-11.00000	68.60000	77.00000	0.0	0.0	-0.53588	0.0	0.0	90.000	*
	10.800	-11.00000	69.80000	77.00000	0.0	0.0	-0.53075	0.0	0.0	90.000	*
	12.000	-11.00000	71.00000	77.00000	0.0	0.0	-0.52428	0.0	0.0	90.000	*
Chase Mansions North	Line 3	-11.00000	71.00000	77.00000	0.0	0.0	-0.52428	0.0	0.0	0.0	*
	1.0909	-9.90909	71.00000	77.00000	0.0	0.0	-0.53256	0.0	0.0	0.0	*
	2.1818	-8.81818	71.00000	77.00000	0.0	0.0	-0.54115	0.0	0.0	0.0	*
	3.2727	-7.72727	71.00000	77.00000	0.0	0.0	-0.55013	0.0	0.0	0.0	*
	4.3636	-6.63636	71.00000	77.00000	0.0	0.0	-0.55957	0.0	0.0	0.0	*
	5.4545	-5.54545	71.00000	77.00000	0.0	0.0	-0.56952	0.0	0.0	0.0	*
	6.5455	-4.45455	71.00000	77.00000	0.0	0.0	-0.57997	0.0	0.0	0.0	*
	7.6364	-3.36364	71.00000	77.00000	0.0	0.0	-0.59088	0.0	0.0	0.0	*
	8.7273	-2.27273	71.00000	77.00000	0.0	0.0	-0.60218	0.0	0.0	0.0	*
	9.8182	-1.18182	71.00000	77.00000	0.0	0.0	-0.61371	0.0	0.0	0.0	*
	10.909	-0.09091	71.00000	77.00000	0.0	0.0	-0.62526	0.0	0.0	0.0	*
	12.000	1.00000	71.00000	77.00000	0.0	0.0	-0.63663	0.0	0.0	0.0	*
	13.091	2.09091	71.00000	77.00000	0.0	0.0	-0.64757	0.0	0.0	0.0	*
	14.182	3.18182	71.00000	77.00000	0.0	0.0	-0.65790	0.0	0.0	0.0	*
	15.273	4.27273	71.00000	77.00000	0.0	0.0	-0.66744	0.0	0.0	0.0	*
	16.364	5.36364	71.00000	77.00000	0.0	0.0	-0.67611	0.0	0.0	0.0	*
	17.455	6.45455	71.00000	77.00000	0.0	0.0	-0.68385	0.0	0.0	0.0	*
	18.545	7.54545	71.00000	77.00000	0.0	0.0	-0.69067	0.0	0.0	0.0	*
	19.636	8.63636	71.00000	77.00000	0.0	0.0	-0.69661	0.0	0.0	0.0	*
	20.727	9.72727	71.00000	77.00000	0.0	0.0	-0.70174	0.0	0.0	0.0	*
	21.818	10.81818	71.00000	77.00000	0.0	0.0	-0.70611	0.0	0.0	0.0	*
	22.909	11.90909	71.00000	77.00000	0.0	0.0	-0.70982	0.0	0.0	0.0	*
	24.000	13.00000	71.00000	77.00000	0.0	0.0	-0.71294	0.0	0.0	0.0	*
Chase Mansions East	Line 4	13.00000	59.00000	77.00000	0.0	0.0	-4.4508	0.0	0.0	90.000	*
	1.2000	13.00000	60.20000	77.00000	0.0	0.0	-3.6385	0.0	0.0	90.000	*
	2.4000	13.00000	61.40000	77.00000	0.0	0.0	-2.4174	0.0	0.0	90.000	*
	3.6000	13.00000	62.60000	77.00000	0.0	0.0	-1.6466	0.0	0.0	90.000	*
	4.8000	13.00000	63.80000	77.00000	0.0	0.0	-1.2507	0.0	0.0	90.000	*
	6.0000	13.00000	65.00000	77.00000	0.0	0.0	-1.0356	0.0	0.0	90.000	*
	7.2000	13.00000	66.20000	77.00000	0.0	0.0	-0.90978	0.0	0.0	90.000	*
	8.4000	13.00000	67.40000	77.00000	0.0	0.0	-0.83111	0.0	0.0	90.000	*
	9.6000	13.00000	68.60000	77.00000	0.0	0.0	-0.77868	0.0	0.0	90.000	*
	10.800	13.00000	69.80000	77.00000	0.0	0.0	-0.74136	0.0	0.0	90.000	*
	12.000	13.00000	71.00000	77.00000	0.0	0.0	-0.71294	0.0	0.0	90.000	*
South Mansions North	Line 5	-6.50000	-9.80000	77.00000	0.0	0.0	-0.55965	0.0	0.0	0.0	*
	1.0313	-5.46875	-9.80000	77.00000	0.0	0.0	-0.58090	0.0	0.0	0.0	*
	2.0625	-4.43750	-9.80000	77.00000	0.0	0.0	-0.61084	0.0	0.0	0.0	*
	3.0938	-3.40625	-9.80000	77.00000	0.0	0.0	-0.65212	0.0	0.0	0.0	*
	4.1250	-2.37500	-9.80000	77.00000	0.0	0.0	-0.70714	0.0	0.0	0.0	*
	5.1563	-1.34375	-9.80000	77.00000	0.0	0.0	-0.77661	0.0	0.0	0.0	*
	6.1875	-0.31250	-9.80000	77.00000	0.0	0.0	-0.85724	0.0	0.0	0.0	*
	7.2188	0.71875	-9.80000	77.00000	0.0	0.0	-0.94073	0.0	0.0	0.0	*
	8.2500	1.75000	-9.80000	77.00000	0.0	0.0	-1.0171	0.0	0.0	0.0	*
	9.2813	2.78125	-9.80000	77.00000	0.0	0.0	-1.0799	0.0	0.0	0.0	*
	10.313	3.81250	-9.80000	77.00000	0.0	0.0	-1.1277	0.0	0.0	0.0	*
	11.344	4.84375	-9.80000	77.00000	0.0	0.0	-1.1621	0.0	0.0	0.0	*
	12.375	5.87500	-9.80000	77.00000	0.0	0.0	-1.1857	0.0	0.0	0.0	*
	13.406	6.90625	-9.80000	77.00000	0.0	0.0	-1.2011	0.0	0.0	0.0	*
	14.438	7.93750	-9.80000	77.00000	0.0	0.0	-1.2105	0.0	0.0	0.0	*
	15.469	8.96875	-9.80000	77.00000	0.0	0.0	-1.2155	0.0	0.0	0.0	*
	16.500	10.00000	-9.80000	77.00000	0.0	0.0	-1.2174	0.0	0.0	0.0	*
	17.531	11.03125	-9.80000	77.00000	0.0	0.0	-1.2173	0.0	0.0	0.0	*
	18.563	12.06250	-9.80000	77.00000	0.0	0.0	-1.2157	0.0	0.0	0.0	*
	19.594	13.09375	-9.80000	77.00000	0.0	0.0	-1.2131	0.0	0.0	0.0	*
	20.625	14.12500	-9.80000	77.00000	0.0	0.0	-1.2100	0.0	0.0	0.0	*
	21.656	15.15625	-9.80000	77.00000	0.0	0.0	-1.2066	0.0	0.0	0.0	*
	22.688	16.18750	-9.80000	77.00000	0.0	0.0	-1.2030	0.0	0.0	0.0	*
	23.719	17.21875	-9.80000	77.00000	0.0	0.0	-1.1993	0.0	0.0	0.0	*
	24.750	18.25000	-9.80000	77.00000	0.0	0.0	-1.1957	0.0	0.0	0.0	*
	25.781	19.28125	-9.80000	77.00000	0.0	0.0	-1.1921	0.0	0.0	0.0	*
	26.813	20.31250	-9.80000	77.00000	0.0	0.0	-1.1887	0.0	0.0	0.0	*
	27.844	21.34375	-9.80000	77.00000	0.0	0.0	-1.1853	0.0	0.0	0.0	*
	28.875	22.37500	-9.80000	77.00000	0.0	0.0	-1.1821	0.0	0.0	0.0	*
	29.906	23.40625	-9.80000	77.00000	0.0	0.0	-1.1791	0.0	0.0	0.0	*
	30.938	24.43750	-9.80000	77.00000	0.0	0.0	-1.1761	0.0	0.0	0.0	*
	31.969	25.46875	-9.80000	77.00000	0.0	0.0	-1.1734	0.0	0.0	0.0	*
	33.000	26.50000	-9.80000	77.00000	0.0	0.0	-1.1707	0.0	0.0	0.0	*
South Mansions - East 2	Line 6	26.50000	-9.80000	77.00000	0.0	0.0	-1.1707	0.0	0.0	270.00	*
	1.0000	26.50000	-10.80000	77.00000	0.0	0.0	-0.99121	0.0	0.0	270.00	*
	2.0000	26.50000	-11.80000	77.00000	0.0	0.0	-0.87893	0.0	0.0	270.00	*
	3.0000	26.50000	-12.80000	77.00000	0.0	0.0	-0.80538	0.0	0.0	270.00	*
	4.0000	26.50000	-13.80000	77.00000	0.0	0.0	-0.75496	0.0	0.0	270.00	*
	5.0000	26.50000	-14.80000	77.00000	0.0	0.0	-0.71873	0.0	0.0	270.00	*
	6.0000	26.50000	-15.80000	77.00000	0.0	0.0	-0.69136	0.0	0.0	270.00	*
South Mansions - South 2	Line 7	10.50000	-15.80000	77.00000	0.0	0.0	-0.69786	0.0	0.0	0.0	*
	1.0000	11.50000	-15.80000	77.00000	0.0	0.0	-0.70018	0.0	0.0	0.0	*
	2.0000	12.50000	-15.80000	77.00000	0.0	0.0	-0.70188	0.0	0.0	0.0	*
	3.0000	13.50000	-15.80000	77.00000	0.0	0.0	-0.70305	0.0	0.0	0.0	*
	4.0000	14.50000	-15.80000	77.00000	0.0	0.0	-0.70376	0.0	0.0	0.0	*
	5.0000	15.50000	-15.80000	77.00000	0.0	0.0	-0.70408	0.0	0.0	0.0	*
	6.0000	16.50000	-15.80000	77.00000	0.0	0.0	-0.70405	0.0	0.0	0.0	*
	7.0000	17.50000	-15.80000	77.00000	0.0	0.0	-0.70372	0.0	0.0	0.0	*
	8.0000	18.50000	-15.80000	77.00000	0.0	0.0	-0.70312	0.0	0.0	0.0	*
	9.0000	19.50000	-15.80000	77.00000	0.0	0.0	-0.70228	0.0	0.0	0.0	*
	10.000	20.50000	-15.80000	77.00000	0.0	0.0	-0.70123	0.0	0.0	0.0	*
	11.000	21.50000	-15.80000	77.00000	0.0	0.0	-0.69998	0.0	0.0	0.0	*
	12.000	22.50000	-15.80000	77.00000	0.0	0.0	-0.69855	0.0	0.0	0.0	*
	13.000	23.50000	-15.80000	77.00000	0.0	0.0	-0.69696	0.0	0.0	0.0	*
	14.000	24.50000	-15.80000	77.00000	0.0	0.0	-0.69522	0.0	0.0	0.0	*
	15.000	25.50000	-15.80000	77.00000	0.0	0.0	-0.69335	0.0	0.0	0.0	*
	16.000	26.50000	-15.80000	77.00000	0.0	0.0	-0.69136	0.0	0.0	0.0	*
South Mansions East 1	Line 8	10.50000	-22.80000	77.00000	0.0	0.0	-0.57625	0.0	0.0	90.000	*
	1.1667	10.50000	-21.63333	77.00000	0.0	0.0	-0.59221	0.0	0.0	90.000	*
	2.3333	10.50000	-20.46667	77.00000	0.0	0.0	-0.60888	0.0	0.0	90.000	*
	3.5000	10.50000	-19.30000	77.00000	0.0	0.0	-0.62673	0.0	0.0	90.000	*
	4.6667	10.50000	-18.13333	77.00000	0.0	0.0	-0.64654	0.0	0.0	90.000	*
	5.8333	10.50000	-16.96667	77.00000	0.0	0.0	-0.66956	0.0	0.0	90.000	*
	7.0000	10.50000	-15.80000	77.00000	0.0	0.0	-0.69786	0.0	0.0	90.000	*
South Mansions - South 1	Line 9	-6.50000	-22.80000	77.00000	0.0	0.0	-0.49168	0.0	0.0	0.0	*
	1.0625	-5.43750	-22.80000	77.00000	0.0	0.0	-0.49833	0.0	0.0	0.0	*
	2.1250	-4.37500	-22.80000	77.00000	0.0	0.0	-0.50494	0.0	0.0	0.0	*
	3.1875	-3.31250	-22.80000	77.00000	0.0	0.0	-0.51149	0.0	0.0	0.0	*
	4.2500	-2.25000	-22.80000	77.00000	0.0	0.0	-0.51794	0.0	0.0	0.0	*

Type/No. Name	Dist.	Coordinates x	y	z	Displacements x	y	z	Horizontal displacement	Horizontal displacement	Angle of Line to x Axis	
	5.3125	-1.18750	-22.80000	77.00000	0.0	0.0	-0.52427	0.0	0.0	0.0	*
	6.3750	-0.12500	-22.80000	77.00000	0.0	0.0	-0.53043	0.0	0.0	0.0	*
	7.4375	0.93750	-22.80000	77.00000	0.0	0.0	-0.53640	0.0	0.0	0.0	*
	8.5000	2.00000	-22.80000	77.00000	0.0	0.0	-0.54214	0.0	0.0	0.0	*
	9.5625	3.06250	-22.80000	77.00000	0.0	0.0	-0.54760	0.0	0.0	0.0	*
	10.625	4.12500	-22.80000	77.00000	0.0	0.0	-0.55277	0.0	0.0	0.0	*
	11.688	5.18750	-22.80000	77.00000	0.0	0.0	-0.55760	0.0	0.0	0.0	*
	12.750	6.25000	-22.80000	77.00000	0.0	0.0	-0.56208	0.0	0.0	0.0	*
	13.813	7.31250	-22.80000	77.00000	0.0	0.0	-0.56619	0.0	0.0	0.0	*
	14.875	8.37500	-22.80000	77.00000	0.0	0.0	-0.56993	0.0	0.0	0.0	*
	15.938	9.43750	-22.80000	77.00000	0.0	0.0	-0.57328	0.0	0.0	0.0	*
	17.000	10.50000	-22.80000	77.00000	0.0	0.0	-0.57625	0.0	0.0	0.0	*
South Mansions - West	Line 10	-6.50000	-22.80000	77.00000	0.0	0.0	-0.49168	0.0	0.0	90.000	*
	1.0833	-6.50000	-21.71667	77.00000	0.0	0.0	-0.50173	0.0	0.0	90.000	*
	2.1667	-6.50000	-20.63333	77.00000	0.0	0.0	-0.51144	0.0	0.0	90.000	*
	3.2500	-6.50000	-19.55000	77.00000	0.0	0.0	-0.52075	0.0	0.0	90.000	*
	4.3333	-6.50000	-18.46667	77.00000	0.0	0.0	-0.52956	0.0	0.0	90.000	*
	5.4167	-6.50000	-17.38333	77.00000	0.0	0.0	-0.53776	0.0	0.0	90.000	*
	6.5000	-6.50000	-16.30000	77.00000	0.0	0.0	-0.54522	0.0	0.0	90.000	*
	7.5833	-6.50000	-15.21667	77.00000	0.0	0.0	-0.55179	0.0	0.0	90.000	*
	8.6667	-6.50000	-14.13333	77.00000	0.0	0.0	-0.55725	0.0	0.0	90.000	*
	9.7500	-6.50000	-13.05000	77.00000	0.0	0.0	-0.56131	0.0	0.0	90.000	*
	10.833	-6.50000	-11.96667	77.00000	0.0	0.0	-0.56354	0.0	0.0	90.000	*
	11.917	-6.50000	-10.88333	77.00000	0.0	0.0	-0.56330	0.0	0.0	90.000	*
	13.000	-6.50000	-9.80000	77.00000	0.0	0.0	-0.55965	0.0	0.0	90.000	*

* Result includes imported displacement(s).

Specific Building Damage Results - Horizontal Displacements

Structure: Chase Mansion | Sub-structure: Western Elevation

Dist.	Coordinates x	y	z	Displacements x	y	Horizontal displacement along the Line	Horizontal displacement perpendicular to Line	
[m]	[m]	[m]	[m]	[mm]	[mm]	[mm]	[mm]	
0.0	-11.00000	59.00000	77.00000	0.0	0.0	0.0	0.0	d
1.2000	-11.00000	60.20000	77.00000	0.0	0.0	0.0	0.0	d
2.4000	-11.00000	61.40000	77.00000	0.0	0.0	0.0	0.0	d
3.6000	-11.00000	62.60000	77.00000	0.0	0.0	0.0	0.0	d
4.8000	-11.00000	63.80000	77.00000	0.0	0.0	0.0	0.0	d
6.0000	-11.00000	65.00000	77.00000	0.0	0.0	0.0	0.0	d
7.2000	-11.00000	66.20000	77.00000	0.0	0.0	0.0	0.0	d
8.4000	-11.00000	67.40000	77.00000	0.0	0.0	0.0	0.0	d
9.6000	-11.00000	68.60000	77.00000	0.0	0.0	0.0	0.0	d
10.800	-11.00000	69.80000	77.00000	0.0	0.0	0.0	0.0	d
12.000	-11.00000	71.00000	77.00000	0.0	0.0	0.0	0.0	d

d - Displacements include imported displacements.

Structure: Chase Mansion | Sub-structure: Eastern Elevation

Dist.	Coordinates x	y	z	Displacements x	y	Horizontal displacement along the Line	Horizontal displacement perpendicular to Line	
[m]	[m]	[m]	[m]	[mm]	[mm]	[mm]	[mm]	
0.0	13.00000	59.00000	77.00000	0.0	0.0	0.0	0.0	d
1.2000	13.00000	60.20000	77.00000	0.0	0.0	0.0	0.0	d
2.4000	13.00000	61.40000	77.00000	0.0	0.0	0.0	0.0	d
3.6000	13.00000	62.60000	77.00000	0.0	0.0	0.0	0.0	d
4.8000	13.00000	63.80000	77.00000	0.0	0.0	0.0	0.0	d
6.0000	13.00000	65.00000	77.00000	0.0	0.0	0.0	0.0	d
7.2000	13.00000	66.20000	77.00000	0.0	0.0	0.0	0.0	d
8.4000	13.00000	67.40000	77.00000	0.0	0.0	0.0	0.0	d
9.6000	13.00000	68.60000	77.00000	0.0	0.0	0.0	0.0	d
10.800	13.00000	69.80000	77.00000	0.0	0.0	0.0	0.0	d
12.000	13.00000	71.00000	77.00000	0.0	0.0	0.0	0.0	d

d - Displacements include imported displacements.

Structure: Chase Mansions | Sub-structure: Southern Elevation

Dist.	Coordinates x	y	z	Displacements x	y	Horizontal displacement along the Line	Horizontal displacement perpendicular to Line	
[m]	[m]	[m]	[m]	[mm]	[mm]	[mm]	[mm]	
0.0	-11.00000	59.00000	77.00000	0.0	0.0	0.0	0.0	d
1.0909	-9.90909	59.00000	77.00000	0.0	0.0	0.0	0.0	d
2.1818	-8.81818	59.00000	77.00000	0.0	0.0	0.0	0.0	d
3.2727	-7.72727	59.00000	77.00000	0.0	0.0	0.0	0.0	d
4.3636	-6.63636	59.00000	77.00000	0.0	0.0	0.0	0.0	d
5.4545	-5.54545	59.00000	77.00000	0.0	0.0	0.0	0.0	d
6.5455	-4.45455	59.00000	77.00000	0.0	0.0	0.0	0.0	d
7.6364	-3.36364	59.00000	77.00000	0.0	0.0	0.0	0.0	d
8.7273	-2.27273	59.00000	77.00000	0.0	0.0	0.0	0.0	d
9.8182	-1.18182	59.00000	77.00000	0.0	0.0	0.0	0.0	d
10.909	-0.09091	59.00000	77.00000	0.0	0.0	0.0	0.0	d
12.000	1.00000	59.00000	77.00000	0.0	0.0	0.0	0.0	d
13.091	2.09091	59.00000	77.00000	0.0	0.0	0.0	0.0	d
14.182	3.18182	59.00000	77.00000	0.0	0.0	0.0	0.0	d
15.273	4.27273	59.00000	77.00000	0.0	0.0	0.0	0.0	d
16.364	5.36364	59.00000	77.00000	0.0	0.0	0.0	0.0	d
17.455	6.45455	59.00000	77.00000	0.0	0.0	0.0	0.0	d
18.545	7.54545	59.00000	77.00000	0.0	0.0	0.0	0.0	d
19.636	8.63636	59.00000	77.00000	0.0	0.0	0.0	0.0	d
20.727	9.72727	59.00000	77.00000	0.0	0.0	0.0	0.0	d
21.818	10.81818	59.00000	77.00000	0.0	0.0	0.0	0.0	d
22.909	11.90909	59.00000	77.00000	0.0	0.0	0.0	0.0	d
24.000	13.00000	59.00000	77.00000	0.0	0.0	0.0	0.0	d

d - Displacements include imported displacements.

Structure: Chase Mansions | Sub-structure: Northern Elevation

Dist.	Coordinates x	y	z	Displacements x	y	Horizontal displacement along the Line	Horizontal displacement perpendicular to Line	
[m]	[m]	[m]	[m]	[mm]	[mm]	[mm]	[mm]	
0.0	-11.00000	71.00000	77.00000	0.0	0.0	0.0	0.0	d
1.0909	-9.90909	71.00000	77.00000	0.0	0.0	0.0	0.0	d
2.1818	-8.81818	71.00000	77.00000	0.0	0.0	0.0	0.0	d
3.2727	-7.72727	71.00000	77.00000	0.0	0.0	0.0	0.0	d
4.3636	-6.63636	71.00000	77.00000	0.0	0.0	0.0	0.0	d
5.4545	-5.54545	71.00000	77.00000	0.0	0.0	0.0	0.0	d
6.5455	-4.45455	71.00000	77.00000	0.0	0.0	0.0	0.0	d
7.6364	-3.36364	71.00000	77.00000	0.0	0.0	0.0	0.0	d
8.7273	-2.27273	71.00000	77.00000	0.0	0.0	0.0	0.0	d
9.8182	-1.18182	71.00000	77.00000	0.0	0.0	0.0	0.0	d
10.909	-0.09091	71.00000	77.00000	0.0	0.0	0.0	0.0	d
12.000	1.00000	71.00000	77.00000	0.0	0.0	0.0	0.0	d
13.091	2.09091	71.00000	77.00000	0.0	0.0	0.0	0.0	d
14.182	3.18182	71.00000	77.00000	0.0	0.0	0.0	0.0	d
15.273	4.27273	71.00000	77.00000	0.0	0.0	0.0	0.0	d
16.364	5.36364	71.00000	77.00000	0.0	0.0	0.0	0.0	d
17.455	6.45455	71.00000	77.00000	0.0	0.0	0.0	0.0	d
18.545	7.54545	71.00000	77.00000	0.0	0.0	0.0	0.0	d
19.636	8.63636	71.00000	77.00000	0.0	0.0	0.0	0.0	d
20.727	9.72727	71.00000	77.00000	0.0	0.0	0.0	0.0	d

Dist.	Coordinates					Displacements	
	x	y	z	x	y	Horizontal displacement along the Line	Horizontal displacement perpendicular to Line
21.818	10.81818	71.00000	77.00000	0.0	0.0	0.0	0.0 d
22.909	11.90909	71.00000	77.00000	0.0	0.0	0.0	0.0 d
24.000	13.00000	71.00000	77.00000	0.0	0.0	0.0	0.0 d

d - Displacements include imported displacements.

Structure: South Mansions | Sub-structure: Northern Elevation

Dist.	Coordinates					Displacements	
	x	y	z	x	y	Horizontal displacement along the Line	Horizontal displacement perpendicular to Line
[m]	[m]	[m]	[m]	[mm]	[mm]	[mm]	[mm]
0.0	-6.50000	-9.80000	77.00000	0.0	0.0	0.0	0.0 d
1.0313	-5.46875	-9.80000	77.00000	0.0	0.0	0.0	0.0 d
2.0625	-4.43750	-9.80000	77.00000	0.0	0.0	0.0	0.0 d
3.0938	-3.40625	-9.80000	77.00000	0.0	0.0	0.0	0.0 d
4.1250	-2.37500	-9.80000	77.00000	0.0	0.0	0.0	0.0 d
5.1563	-1.34375	-9.80000	77.00000	0.0	0.0	0.0	0.0 d
6.1875	-0.31250	-9.80000	77.00000	0.0	0.0	0.0	0.0 d
7.2188	0.71875	-9.80000	77.00000	0.0	0.0	0.0	0.0 d
8.2500	1.75000	-9.80000	77.00000	0.0	0.0	0.0	0.0 d
9.2813	2.78125	-9.80000	77.00000	0.0	0.0	0.0	0.0 d
10.313	3.81250	-9.80000	77.00000	0.0	0.0	0.0	0.0 d
11.344	4.84375	-9.80000	77.00000	0.0	0.0	0.0	0.0 d
12.375	5.87500	-9.80000	77.00000	0.0	0.0	0.0	0.0 d
13.406	6.90625	-9.80000	77.00000	0.0	0.0	0.0	0.0 d
14.438	7.93750	-9.80000	77.00000	0.0	0.0	0.0	0.0 d
15.469	8.96875	-9.80000	77.00000	0.0	0.0	0.0	0.0 d
16.500	10.00000	-9.80000	77.00000	0.0	0.0	0.0	0.0 d
17.531	11.03125	-9.80000	77.00000	0.0	0.0	0.0	0.0 d
18.563	12.06250	-9.80000	77.00000	0.0	0.0	0.0	0.0 d
19.594	13.09375	-9.80000	77.00000	0.0	0.0	0.0	0.0 d
20.625	14.12500	-9.80000	77.00000	0.0	0.0	0.0	0.0 d
21.656	15.15625	-9.80000	77.00000	0.0	0.0	0.0	0.0 d
22.688	16.18750	-9.80000	77.00000	0.0	0.0	0.0	0.0 d
23.719	17.21875	-9.80000	77.00000	0.0	0.0	0.0	0.0 d
24.750	18.25000	-9.80000	77.00000	0.0	0.0	0.0	0.0 d
25.781	19.28125	-9.80000	77.00000	0.0	0.0	0.0	0.0 d
26.813	20.31250	-9.80000	77.00000	0.0	0.0	0.0	0.0 d
27.844	21.34375	-9.80000	77.00000	0.0	0.0	0.0	0.0 d
28.875	22.37500	-9.80000	77.00000	0.0	0.0	0.0	0.0 d
29.906	23.40625	-9.80000	77.00000	0.0	0.0	0.0	0.0 d
30.938	24.43750	-9.80000	77.00000	0.0	0.0	0.0	0.0 d
31.969	25.46875	-9.80000	77.00000	0.0	0.0	0.0	0.0 d
33.000	26.50000	-9.80000	77.00000	0.0	0.0	0.0	0.0 d

d - Displacements include imported displacements.

Structure: South Mansions | Sub-structure: Eastern Elevation 2

Dist.	Coordinates					Displacements	
	x	y	z	x	y	Horizontal displacement along the Line	Horizontal displacement perpendicular to Line
[m]	[m]	[m]	[m]	[mm]	[mm]	[mm]	[mm]
0.0	26.50000	-9.80000	77.00000	0.0	0.0	0.0	0.0 d
1.0000	26.50000	-10.80000	77.00000	0.0	0.0	0.0	0.0 d
2.0000	26.50000	-11.80000	77.00000	0.0	0.0	0.0	0.0 d
3.0000	26.50000	-12.80000	77.00000	0.0	0.0	0.0	0.0 d
4.0000	26.50000	-13.80000	77.00000	0.0	0.0	0.0	0.0 d
5.0000	26.50000	-14.80000	77.00000	0.0	0.0	0.0	0.0 d
6.0000	26.50000	-15.80000	77.00000	0.0	0.0	0.0	0.0 d

d - Displacements include imported displacements.

Structure: South Mansions | Sub-structure: Southern Elevation 2

Dist.	Coordinates					Displacements	
	x	y	z	x	y	Horizontal displacement along the Line	Horizontal displacement perpendicular to Line
[m]	[m]	[m]	[m]	[mm]	[mm]	[mm]	[mm]
0.0	10.50000	-15.80000	77.00000	0.0	0.0	0.0	0.0 d
1.0000	11.50000	-15.80000	77.00000	0.0	0.0	0.0	0.0 d
2.0000	12.50000	-15.80000	77.00000	0.0	0.0	0.0	0.0 d
3.0000	13.50000	-15.80000	77.00000	0.0	0.0	0.0	0.0 d
4.0000	14.50000	-15.80000	77.00000	0.0	0.0	0.0	0.0 d
5.0000	15.50000	-15.80000	77.00000	0.0	0.0	0.0	0.0 d
6.0000	16.50000	-15.80000	77.00000	0.0	0.0	0.0	0.0 d
7.0000	17.50000	-15.80000	77.00000	0.0	0.0	0.0	0.0 d
8.0000	18.50000	-15.80000	77.00000	0.0	0.0	0.0	0.0 d
9.0000	19.50000	-15.80000	77.00000	0.0	0.0	0.0	0.0 d
10.000	20.50000	-15.80000	77.00000	0.0	0.0	0.0	0.0 d
11.000	21.50000	-15.80000	77.00000	0.0	0.0	0.0	0.0 d
12.000	22.50000	-15.80000	77.00000	0.0	0.0	0.0	0.0 d
13.000	23.50000	-15.80000	77.00000	0.0	0.0	0.0	0.0 d
14.000	24.50000	-15.80000	77.00000	0.0	0.0	0.0	0.0 d
15.000	25.50000	-15.80000	77.00000	0.0	0.0	0.0	0.0 d
16.000	26.50000	-15.80000	77.00000	0.0	0.0	0.0	0.0 d

d - Displacements include imported displacements.

Structure: South Mansions | Sub-structure: Eastern Elevation 1

Dist.	Coordinates					Displacements	
	x	y	z	x	y	Horizontal displacement along the Line	Horizontal displacement perpendicular to Line
[m]	[m]	[m]	[m]	[mm]	[mm]	[mm]	[mm]
0.0	10.50000	-22.80000	77.00000	0.0	0.0	0.0	0.0 d
1.1667	10.50000	-21.63333	77.00000	0.0	0.0	0.0	0.0 d
2.3333	10.50000	-20.46667	77.00000	0.0	0.0	0.0	0.0 d
3.5000	10.50000	-19.30000	77.00000	0.0	0.0	0.0	0.0 d
4.6667	10.50000	-18.13333	77.00000	0.0	0.0	0.0	0.0 d
5.8333	10.50000	-16.96667	77.00000	0.0	0.0	0.0	0.0 d
7.0000	10.50000	-15.80000	77.00000	0.0	0.0	0.0	0.0 d

d - Displacements include imported displacements.

Structure: South Mansions | Sub-structure: Southern Elevation 1

Dist.	Coordinates					Displacements	
	x	y	z	x	y	Horizontal displacement along the Line	Horizontal displacement perpendicular to Line
[m]	[m]	[m]	[m]	[mm]	[mm]	[mm]	[mm]
0.0	-6.50000	-22.80000	77.00000	0.0	0.0	0.0	0.0 d
1.0625	-5.43750	-22.80000	77.00000	0.0	0.0	0.0	0.0 d
2.1250	-4.37500	-22.80000	77.00000	0.0	0.0	0.0	0.0 d
3.1875	-3.31250	-22.80000	77.00000	0.0	0.0	0.0	0.0 d
4.2500	-2.25000	-22.80000	77.00000	0.0	0.0	0.0	0.0 d
5.3125	-1.18750	-22.80000	77.00000	0.0	0.0	0.0	0.0 d
6.3750	-0.12500	-22.80000	77.00000	0.0	0.0	0.0	0.0 d
7.4375	0.93750	-22.80000	77.00000	0.0	0.0	0.0	0.0 d
8.5000	2.00000	-22.80000	77.00000	0.0	0.0	0.0	0.0 d
9.5625	3.06250	-22.80000	77.00000	0.0	0.0	0.0	0.0 d
10.625	4.12500	-22.80000	77.00000	0.0	0.0	0.0	0.0 d
11.688	5.18750	-22.80000	77.00000	0.0	0.0	0.0	0.0 d
12.750	6.25000	-22.80000	77.00000	0.0	0.0	0.0	0.0 d
13.813	7.31250	-22.80000	77.00000	0.0	0.0	0.0	0.0 d
14.875	8.37500	-22.80000	77.00000	0.0	0.0	0.0	0.0 d
15.938	9.43750	-22.80000	77.00000	0.0	0.0	0.0	0.0 d
17.000	10.50000	-22.80000	77.00000	0.0	0.0	0.0	0.0 d

Dist.	Coordinates x	y	z	Displacements x	y	Horizontal displacement along the Line	Horizontal displacement perpendicular to Line
[m]	[m]	[m]	[m]	[mm]	[mm]	[mm]	[mm]
0.0	-6.50000	-22.80000	77.00000	0.0	0.0	0.0	0.0 d
1.0833	-6.50000	-21.71667	77.00000	0.0	0.0	0.0	0.0 d
2.1667	-6.50000	-20.63333	77.00000	0.0	0.0	0.0	0.0 d
3.2500	-6.50000	-19.55000	77.00000	0.0	0.0	0.0	0.0 d
4.3333	-6.50000	-18.46667	77.00000	0.0	0.0	0.0	0.0 d
5.4167	-6.50000	-17.38333	77.00000	0.0	0.0	0.0	0.0 d
6.5000	-6.50000	-16.30000	77.00000	0.0	0.0	0.0	0.0 d
7.5833	-6.50000	-15.21667	77.00000	0.0	0.0	0.0	0.0 d
8.6667	-6.50000	-14.13333	77.00000	0.0	0.0	0.0	0.0 d
9.7500	-6.50000	-13.05000	77.00000	0.0	0.0	0.0	0.0 d
10.833	-6.50000	-11.96667	77.00000	0.0	0.0	0.0	0.0 d
11.917	-6.50000	-10.88333	77.00000	0.0	0.0	0.0	0.0 d
13.000	-6.50000	-9.80000	77.00000	0.0	0.0	0.0	0.0 d

d - Displacements include imported displacements.

Specific Building Damage Results - Vertical Displacements

Structure: Chase Mansion | Sub-structure: Western Elevation

Dist.	Coordinates x	y	z	Displacements z
[m]	[m]	[m]	[m]	[mm]
Vertical Offset 1				
0.0	-11.00000	59.00000	77.00000	-0.48256 d
1.2000	-11.00000	60.20000	77.00000	-0.50259 d
2.4000	-11.00000	61.40000	77.00000	-0.51797 d
3.6000	-11.00000	62.60000	77.00000	-0.52903 d
4.8000	-11.00000	63.80000	77.00000	-0.53619 d
6.0000	-11.00000	65.00000	77.00000	-0.53997 d
7.2000	-11.00000	66.20000	77.00000	-0.54088 d
8.4000	-11.00000	67.40000	77.00000	-0.53938 d
9.6000	-11.00000	68.60000	77.00000	-0.53588 d
10.800	-11.00000	69.80000	77.00000	-0.53075 d
12.000	-11.00000	71.00000	77.00000	-0.52428 d

d - Displacements include imported displacements.

Structure: Chase Mansion | Sub-structure: Eastern Elevation

Dist.	Coordinates x	y	z	Displacements z
[m]	[m]	[m]	[m]	[mm]
Vertical Offset 1				
0.0	13.00000	59.00000	77.00000	-4.4508 d
1.2000	13.00000	60.20000	77.00000	-3.6385 d
2.4000	13.00000	61.40000	77.00000	-2.4174 d
3.6000	13.00000	62.60000	77.00000	-1.6466 d
4.8000	13.00000	63.80000	77.00000	-1.2507 d
6.0000	13.00000	65.00000	77.00000	-1.0356 d
7.2000	13.00000	66.20000	77.00000	-0.90978 d
8.4000	13.00000	67.40000	77.00000	-0.83111 d
9.6000	13.00000	68.60000	77.00000	-0.77868 d
10.800	13.00000	69.80000	77.00000	-0.74136 d
12.000	13.00000	71.00000	77.00000	-0.71294 d

d - Displacements include imported displacements.

Structure: Chase Mansions | Sub-structure: Southern Elevation

Dist.	Coordinates x	y	z	Displacements z
[m]	[m]	[m]	[m]	[mm]
Vertical Offset 1				
0.0	-11.00000	59.00000	77.00000	-0.48256 d
1.0909	-9.90909	59.00000	77.00000	-0.47476 d
2.1818	-8.81818	59.00000	77.00000	-0.46846 d
3.2727	-7.72727	59.00000	77.00000	-0.46629 d
4.3636	-6.63636	59.00000	77.00000	-0.47291 d
5.4545	-5.54545	59.00000	77.00000	-0.49674 d
6.5455	-4.45455	59.00000	77.00000	-0.55351 d
7.6364	-3.36364	59.00000	77.00000	-0.67417 d
8.7273	-2.27273	59.00000	77.00000	-0.92366 d
9.8182	-1.18182	59.00000	77.00000	-1.4410 d
10.909	-0.09091	59.00000	77.00000	-2.3985 d
12.000	1.00000	59.00000	77.00000	-3.4169 d
13.091	2.09091	59.00000	77.00000	-3.9985 d
14.182	3.18182	59.00000	77.00000	-4.2789 d
15.273	4.27273	59.00000	77.00000	-4.4133 d
16.364	5.36364	59.00000	77.00000	-4.4755 d
17.455	6.45455	59.00000	77.00000	-4.5005 d
18.545	7.54545	59.00000	77.00000	-4.5058 d
19.636	8.63636	59.00000	77.00000	-4.5006 d
20.727	9.72727	59.00000	77.00000	-4.4902 d
21.818	10.81818	59.00000	77.00000	-4.4775 d
22.909	11.90909	59.00000	77.00000	-4.4640 d
24.000	13.00000	59.00000	77.00000	-4.4508 d

d - Displacements include imported displacements.

Structure: Chase Mansions | Sub-structure: Northern Elevation

Dist.	Coordinates x	y	z	Displacements z
[m]	[m]	[m]	[m]	[mm]
Vertical Offset 1				
0.0	-11.00000	71.00000	77.00000	-0.52428 d
1.0909	-9.90909	71.00000	77.00000	-0.53256 d
2.1818	-8.81818	71.00000	77.00000	-0.54115 d
3.2727	-7.72727	71.00000	77.00000	-0.55013 d
4.3636	-6.63636	71.00000	77.00000	-0.55957 d
5.4545	-5.54545	71.00000	77.00000	-0.56952 d
6.5455	-4.45455	71.00000	77.00000	-0.57997 d
7.6364	-3.36364	71.00000	77.00000	-0.59088 d
8.7273	-2.27273	71.00000	77.00000	-0.60218 d
9.8182	-1.18182	71.00000	77.00000	-0.61371 d
10.909	-0.09091	71.00000	77.00000	-0.62526 d
12.000	1.00000	71.00000	77.00000	-0.63663 d
13.091	2.09091	71.00000	77.00000	-0.64757 d
14.182	3.18182	71.00000	77.00000	-0.65790 d
15.273	4.27273	71.00000	77.00000	-0.66744 d
16.364	5.36364	71.00000	77.00000	-0.67611 d
17.455	6.45455	71.00000	77.00000	-0.68385 d
18.545	7.54545	71.00000	77.00000	-0.69067 d
19.636	8.63636	71.00000	77.00000	-0.69661 d
20.727	9.72727	71.00000	77.00000	-0.70174 d
21.818	10.81818	71.00000	77.00000	-0.70611 d
22.909	11.90909	71.00000	77.00000	-0.70982 d
24.000	13.00000	71.00000	77.00000	-0.71294 d

d - Displacements include imported displacements.

Structure: South Mansions | Sub-structure: Northern Elevation

Dist.	Coordinates x [m]	y [m]	z [m]	Displacements z [mm]	
Vertical Offset 1					
0.0	-6.50000	-9.80000	77.00000	-0.55965	d
1.0313	-5.46875	-9.80000	77.00000	-0.58090	d
2.0625	-4.43750	-9.80000	77.00000	-0.61084	d
3.0938	-3.40625	-9.80000	77.00000	-0.65212	d
4.1250	-2.37500	-9.80000	77.00000	-0.70714	d
5.1563	-1.34375	-9.80000	77.00000	-0.77661	d
6.1875	-0.31250	-9.80000	77.00000	-0.85724	d
7.2188	0.71875	-9.80000	77.00000	-0.94073	d
8.2500	1.75000	-9.80000	77.00000	-1.0171	d
9.2813	2.78125	-9.80000	77.00000	-1.0799	d
10.313	3.81250	-9.80000	77.00000	-1.1277	d
11.344	4.84375	-9.80000	77.00000	-1.1621	d
12.375	5.87500	-9.80000	77.00000	-1.1857	d
13.406	6.90625	-9.80000	77.00000	-1.2011	d
14.438	7.93750	-9.80000	77.00000	-1.2105	d
15.469	8.96875	-9.80000	77.00000	-1.2155	d
16.500	10.00000	-9.80000	77.00000	-1.2174	d
17.531	11.03125	-9.80000	77.00000	-1.2173	d
18.563	12.06250	-9.80000	77.00000	-1.2157	d
19.594	13.09375	-9.80000	77.00000	-1.2131	d
20.625	14.12500	-9.80000	77.00000	-1.2100	d
21.656	15.15625	-9.80000	77.00000	-1.2066	d
22.688	16.18750	-9.80000	77.00000	-1.2030	d
23.719	17.21875	-9.80000	77.00000	-1.1993	d
24.750	18.25000	-9.80000	77.00000	-1.1957	d
25.781	19.28125	-9.80000	77.00000	-1.1921	d
26.813	20.31250	-9.80000	77.00000	-1.1887	d
27.844	21.34375	-9.80000	77.00000	-1.1853	d
28.875	22.37500	-9.80000	77.00000	-1.1821	d
29.906	23.40625	-9.80000	77.00000	-1.1791	d
30.938	24.43750	-9.80000	77.00000	-1.1761	d
31.969	25.46875	-9.80000	77.00000	-1.1734	d
33.000	26.50000	-9.80000	77.00000	-1.1707	d

d - Displacements include imported displacements.

Structure: South Mansions | Sub-structure: Eastern Elevation 2

Dist.	Coordinates x [m]	y [m]	z [m]	Displacements z [mm]	
Vertical Offset 1					
0.0	26.50000	-9.80000	77.00000	-1.1707	d
1.0000	26.50000	-10.80000	77.00000	-0.99121	d
2.0000	26.50000	-11.80000	77.00000	-0.87893	d
3.0000	26.50000	-12.80000	77.00000	-0.80538	d
4.0000	26.50000	-13.80000	77.00000	-0.75496	d
5.0000	26.50000	-14.80000	77.00000	-0.71873	d
6.0000	26.50000	-15.80000	77.00000	-0.69136	d

d - Displacements include imported displacements.

Structure: South Mansions | Sub-structure: Southern Elevation 2

Dist.	Coordinates x [m]	y [m]	z [m]	Displacements z [mm]	
Vertical Offset 1					
0.0	10.50000	-15.80000	77.00000	-0.69786	d
1.0000	11.50000	-15.80000	77.00000	-0.70018	d
2.0000	12.50000	-15.80000	77.00000	-0.70188	d
3.0000	13.50000	-15.80000	77.00000	-0.70305	d
4.0000	14.50000	-15.80000	77.00000	-0.70376	d
5.0000	15.50000	-15.80000	77.00000	-0.70408	d
6.0000	16.50000	-15.80000	77.00000	-0.70405	d
7.0000	17.50000	-15.80000	77.00000	-0.70372	d
8.0000	18.50000	-15.80000	77.00000	-0.70312	d
9.0000	19.50000	-15.80000	77.00000	-0.70228	d
10.000	20.50000	-15.80000	77.00000	-0.70123	d
11.000	21.50000	-15.80000	77.00000	-0.69998	d
12.000	22.50000	-15.80000	77.00000	-0.69855	d
13.000	23.50000	-15.80000	77.00000	-0.69696	d
14.000	24.50000	-15.80000	77.00000	-0.69522	d
15.000	25.50000	-15.80000	77.00000	-0.69335	d
16.000	26.50000	-15.80000	77.00000	-0.69136	d

d - Displacements include imported displacements.

Structure: South Mansions | Sub-structure: Eastern Elevation 1

Dist.	Coordinates x [m]	y [m]	z [m]	Displacements z [mm]	
Vertical Offset 1					
0.0	10.50000	-22.80000	77.00000	-0.57625	d
1.1667	10.50000	-21.63333	77.00000	-0.59221	d
2.3333	10.50000	-20.46667	77.00000	-0.60888	d
3.5000	10.50000	-19.30000	77.00000	-0.62673	d
4.6667	10.50000	-18.13333	77.00000	-0.64654	d
5.8333	10.50000	-16.96667	77.00000	-0.66956	d
7.0000	10.50000	-15.80000	77.00000	-0.69786	d

d - Displacements include imported displacements.

Structure: South Mansions | Sub-structure: Southern Elevation 1

Dist.	Coordinates x [m]	y [m]	z [m]	Displacements z [mm]	
Vertical Offset 1					
0.0	-6.50000	-22.80000	77.00000	-0.49168	d
1.0625	-5.43750	-22.80000	77.00000	-0.49833	d
2.1250	-4.37500	-22.80000	77.00000	-0.50494	d
3.1875	-3.31250	-22.80000	77.00000	-0.51149	d
4.2500	-2.25000	-22.80000	77.00000	-0.51794	d
5.3125	-1.18750	-22.80000	77.00000	-0.52427	d
6.3750	-0.12500	-22.80000	77.00000	-0.53043	d
7.4375	0.93750	-22.80000	77.00000	-0.53640	d
8.5000	2.00000	-22.80000	77.00000	-0.54214	d
9.5625	3.06250	-22.80000	77.00000	-0.54760	d
10.625	4.12500	-22.80000	77.00000	-0.55277	d
11.688	5.18750	-22.80000	77.00000	-0.55760	d
12.750	6.25000	-22.80000	77.00000	-0.56208	d
13.813	7.31250	-22.80000	77.00000	-0.56619	d
14.875	8.37500	-22.80000	77.00000	-0.56993	d
15.938	9.43750	-22.80000	77.00000	-0.57328	d
17.000	10.50000	-22.80000	77.00000	-0.57625	d

d - Displacements include imported displacements.

Structure: South Mansions | Sub-structure: Western Elevation

Dist.	Coordinates x [m]	y [m]	z [m]	Displacements z [mm]	
Vertical Offset 1					
0.0	-6.50000	-22.80000	77.00000	-0.49168	d
1.0833	-6.50000	-21.71667	77.00000	-0.50173	d
2.1667	-6.50000	-20.63333	77.00000	-0.51144	d

Dist.	Coordinates x	y	z	Displacements z
[m]	[m]	[m]	[m]	[mm]
3.2500	-6.50000	-19.55000	77.00000	-0.52075 d
4.3333	-6.50000	-18.46667	77.00000	-0.52956 d
5.4167	-6.50000	-17.38333	77.00000	-0.53776 d
6.5000	-6.50000	-16.30000	77.00000	-0.54522 d
7.5833	-6.50000	-15.21667	77.00000	-0.55179 d
8.6667	-6.50000	-14.13333	77.00000	-0.55725 d
9.7500	-6.50000	-13.05000	77.00000	-0.56131 d
10.833	-6.50000	-11.96667	77.00000	-0.56354 d
11.917	-6.50000	-10.88333	77.00000	-0.56330 d
13.000	-6.50000	-9.80000	77.00000	-0.55965 d

d - Displacements include imported displacements.

Specific Building Damage Results - All Segments

Structure: Chase Mansion | Sub-structure: Western Elevation

Vertical Offset from Line for Vertical Movement Calculations	Segment	Start	Length	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	Damage Category
[m]		[m]	[m]		[%]	[%]	[%]			[m]	
0.0	1	0.0	12.000	Hogging	307.73E-6	0.0	283.35E-6	0.0	16.689E-6	305370.	0 (Negligible)

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

Structure: Chase Mansion | Sub-structure: Eastern Elevation

Vertical Offset from Line for Vertical Movement Calculations	Segment	Start	Length	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	Damage Category
[m]		[m]	[m]		[%]	[%]	[%]			[m]	
0.0	1	0.0	1.7670	Hogging	0.0073998	0.0	0.0073815	0.0	-0.0010176	2308.6	0 (Negligible)
	2	1.7670	10.233	Sagging	0.010860	0.0	0.014267	0.0	-0.0010176	4210.1	0 (Negligible)

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

Structure: Chase Mansions | Sub-structure: Southern Elevation

Vertical Offset from Line for Vertical Movement Calculations	Segment	Start	Length	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	Damage Category
[m]		[m]	[m]		[%]	[%]	[%]			[m]	
0.0	1	0.0	11.019	Sagging	0.010939	0.0	0.014884	0.0	933.51E-6	3944.1	0 (Negligible)
	2	11.019	11.933	Hogging	0.010516	0.0	0.0096388	0.0	933.51E-6	4021.4	0 (Negligible)
	3	22.952	1.0482	Sagging	0.0	0.0	0.0	0.0	-12.150E-6	2.6781E+6	0 (Negligible)

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

Structure: Chase Mansions | Sub-structure: Northern Elevation

Vertical Offset from Line for Vertical Movement Calculations	Segment	Start	Length	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	Damage Category
[m]		[m]	[m]		[%]	[%]	[%]			[m]	
0.0	1	0.0	9.9442	Sagging	45.742E-6	0.0	59.187E-6	0.0	10.594E-6	2.4005E+6	0 (Negligible)
	2	9.9442	14.056	Hogging	117.32E-6	0.0	121.92E-6	0.0	10.594E-6	1.3048E+6	0 (Negligible)

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

Structure: South Mansions | Sub-structure: Northern Elevation

Vertical Offset from Line for Vertical Movement Calculations	Segment	Start	Length	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	Damage Category
[m]		[m]	[m]		[%]	[%]	[%]			[m]	
0.0	1	0.0	6.4773	Sagging	937.04E-6	0.0	915.85E-6	0.0	80.960E-6	79084.	0 (Negligible)
	2	6.4773	16.981	Hogging	0.0011408	0.0	0.0013481	0.0	80.960E-6	75244.	0 (Negligible)
	3	23.458	9.5416	Sagging	14.333E-6	0.0	18.132E-6	0.0	-3.5438E-6	6.0785E+6	0 (Negligible)

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

Structure: South Mansions | Sub-structure: Eastern Elevation 2

Vertical Offset from Line for Vertical Movement Calculations	Segment	Start	Length	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	Damage Category
[m]		[m]	[m]		[%]	[%]	[%]			[m]	
0.0	1	0.0	6.0000	Sagging	0.0022003	0.0	0.0020259	0.0	-179.54E-6	13441.	0 (Negligible)

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

Structure: South Mansions | Sub-structure: Southern Elevation 2

Vertical Offset from Line for Vertical Movement Calculations	Segment	Start	Length	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	Damage Category
[m]		[m]	[m]		[%]	[%]	[%]			[m]	
0.0	1	0.0	16.000	Hogging	54.329E-6	0.0	61.762E-6	0.0	2.3152E-6	1.5743E+6	0 (Negligible)

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

Structure: South Mansions | Sub-structure: Eastern Elevation 1

Vertical Offset from Line for Vertical Movement Calculations	Segment	Start	Length	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	Damage Category
[m]		[m]	[m]		[%]	[%]	[%]			[m]	
0.0	1	0.0	7.0000	Sagging	154.13E-6	0.0	159.68E-6	0.0	24.259E-6	234880.	0 (Negligible)

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

Structure: South Mansions | Sub-structure: Southern Elevation 1

Vertical Offset from Line for Vertical	Segment	Start	Length	Curvature	Deflection Ratio	Average Horizontal Strain	Max Tensile Strain	Max Gradient of Horizontal	Max Gradient of Vertical Displacement	Min Radius of Curvature	Damage Category

Movement Calculations							Displacement Curve				
[m]		[m]	[m]		[%]	[%]	[%]		[m]		
0.0	1	0.0	17.000	Hogging	49.080E-6	0.0	58.043E-6	0.0	6.2602E-6	2.9456E+6	0 (Negligible)

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

Structure: South Mansions | Sub-structure: Western Elevation

Vertical Offset from Line for Vertical Movement Calculations	Segment	Start	Length	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	Damage Category
[m]		[m]	[m]		[%]	[%]	[%]			[m]	
0.0	1	0.0	13.000	Hogging	157.35E-6	0.0	154.17E-6	0.0	9.2706E-6	321340.	0 (Negligible)

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

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

Structure: Chase Mansion | Sub-structure: Western Elevation

Vertical Offset from Line for Vertical Movement Calculations	Deflection Ratio	Average Horizontal Strain	Max Slope	Max Settlement	Max Tensile Strain	Max Gradient of Horizontal Displacement Curve	Max Gradient of Vertical Displacement Curve	Min Radius of Curvature (Hogging)	Min Radius of Curvature (Sagging)	Damage Category
[m]	[%]	[%]		[mm]	[%]			[m]	[m]	
0.0	307.73E-6	0.0	16.689E-6	0.54084	283.35E-6	0.0	16.689E-6	305370.	- 0	(Negligible)

Structure: Chase Mansion | Sub-structure: Eastern Elevation

Vertical Offset from Line for Vertical Movement Calculations	Deflection Ratio	Average Horizontal Strain	Max Slope	Max Settlement	Max Tensile Strain	Max Gradient of Horizontal Displacement Curve	Max Gradient of Vertical Displacement Curve	Min Radius of Curvature (Hogging)	Min Radius of Curvature (Sagging)	Damage Category
[m]	[%]	[%]		[mm]	[%]			[m]	[m]	
0.0	0.010860	0.0	-0.0010176	4.4508	0.014267	0.0	-0.0010176	2308.6	4210.1	0 (Negligible)

Structure: Chase Mansions | Sub-structure: Southern Elevation

Vertical Offset from Line for Vertical Movement Calculations	Deflection Ratio	Average Horizontal Strain	Max Slope	Max Settlement	Max Tensile Strain	Max Gradient of Horizontal Displacement Curve	Max Gradient of Vertical Displacement Curve	Min Radius of Curvature (Hogging)	Min Radius of Curvature (Sagging)	Damage Category
[m]	[%]	[%]		[mm]	[%]			[m]	[m]	
0.0	0.010939	0.0	933.51E-6	4.5055	0.014884	0.0	933.51E-6	4021.4	3944.1	0 (Negligible)

Structure: Chase Mansions | Sub-structure: Northern Elevation

Vertical Offset from Line for Vertical Movement Calculations	Deflection Ratio	Average Horizontal Strain	Max Slope	Max Settlement	Max Tensile Strain	Max Gradient of Horizontal Displacement Curve	Max Gradient of Vertical Displacement Curve	Min Radius of Curvature (Hogging)	Min Radius of Curvature (Sagging)	Damage Category
[m]	[%]	[%]		[mm]	[%]			[m]	[m]	
0.0	117.32E-6	0.0	10.594E-6	0.71294	121.92E-6	0.0	10.594E-6	1.3048E+6	2.4005E+6	0 (Negligible)

Structure: South Mansions | Sub-structure: Northern Elevation

Vertical Offset from Line for Vertical Movement Calculations	Deflection Ratio	Average Horizontal Strain	Max Slope	Max Settlement	Max Tensile Strain	Max Gradient of Horizontal Displacement Curve	Max Gradient of Vertical Displacement Curve	Min Radius of Curvature (Hogging)	Min Radius of Curvature (Sagging)	Damage Category
[m]	[%]	[%]		[mm]	[%]			[m]	[m]	
0.0	0.0011408	0.0	80.960E-6	1.2174	0.0013481	0.0	80.960E-6	75244.	79084.	0 (Negligible)

Structure: South Mansions | Sub-structure: Eastern Elevation 2

Vertical Offset from Line for Vertical Movement Calculations	Deflection Ratio	Average Horizontal Strain	Max Slope	Max Settlement	Max Tensile Strain	Max Gradient of Horizontal Displacement Curve	Max Gradient of Vertical Displacement Curve	Min Radius of Curvature (Hogging)	Min Radius of Curvature (Sagging)	Damage Category
[m]	[%]	[%]		[mm]	[%]			[m]	[m]	
0.0	0.0022003	0.0	-179.54E-6	1.1707	0.0020259	0.0	-179.54E-6	-	13441.	0 (Negligible)

Structure: South Mansions | Sub-structure: Southern Elevation 2

Vertical Offset from Line for Vertical Movement Calculations	Deflection Ratio	Average Horizontal Strain	Max Slope	Max Settlement	Max Tensile Strain	Max Gradient of Horizontal Displacement Curve	Max Gradient of Vertical Displacement Curve	Min Radius of Curvature (Hogging)	Min Radius of Curvature (Sagging)	Damage Category
[m]	[%]	[%]		[mm]	[%]			[m]	[m]	
0.0	54.329E-6	0.0	2.3152E-6	0.70408	61.762E-6	0.0	2.3152E-6	1.5743E+6	- 0	(Negligible)

Structure: South Mansions | Sub-structure: Eastern Elevation 1

Vertical Offset from Line for Vertical Movement Calculations	Deflection Ratio	Average Horizontal Strain	Max Slope	Max Settlement	Max Tensile Strain	Max Gradient of Horizontal Displacement Curve	Max Gradient of Vertical Displacement Curve	Min Radius of Curvature (Hogging)	Min Radius of Curvature (Sagging)	Damage Category
[m]	[%]	[%]		[mm]	[%]			[m]	[m]	
0.0	154.13E-6	0.0	24.259E-6	0.69786	159.68E-6	0.0	24.259E-6	-	234880.	0 (Negligible)

Structure: South Mansions | Sub-structure: Southern Elevation 1

Vertical Offset from Line for Vertical Movement Calculations	Deflection Ratio	Average Horizontal Strain	Max Slope	Max Settlement	Max Tensile Strain	Max Gradient of Horizontal Displacement Curve	Max Gradient of Vertical Displacement Curve	Min Radius of Curvature (Hogging)	Min Radius of Curvature (Sagging)	Damage Category
[m]	[%]	[%]		[mm]	[%]			[m]	[m]	
0.0	49.080E-6	0.0	6.2602E-6	0.57625	58.043E-6	0.0	6.2602E-6	2.9456E+6	- 0	(Negligible)

Structure: South Mansions | Sub-structure: Western Elevation

Vertical	Deflection	Average	Max Slope	Max	Max	Max Gradient	Max Gradient	Min	Min	Damage Category

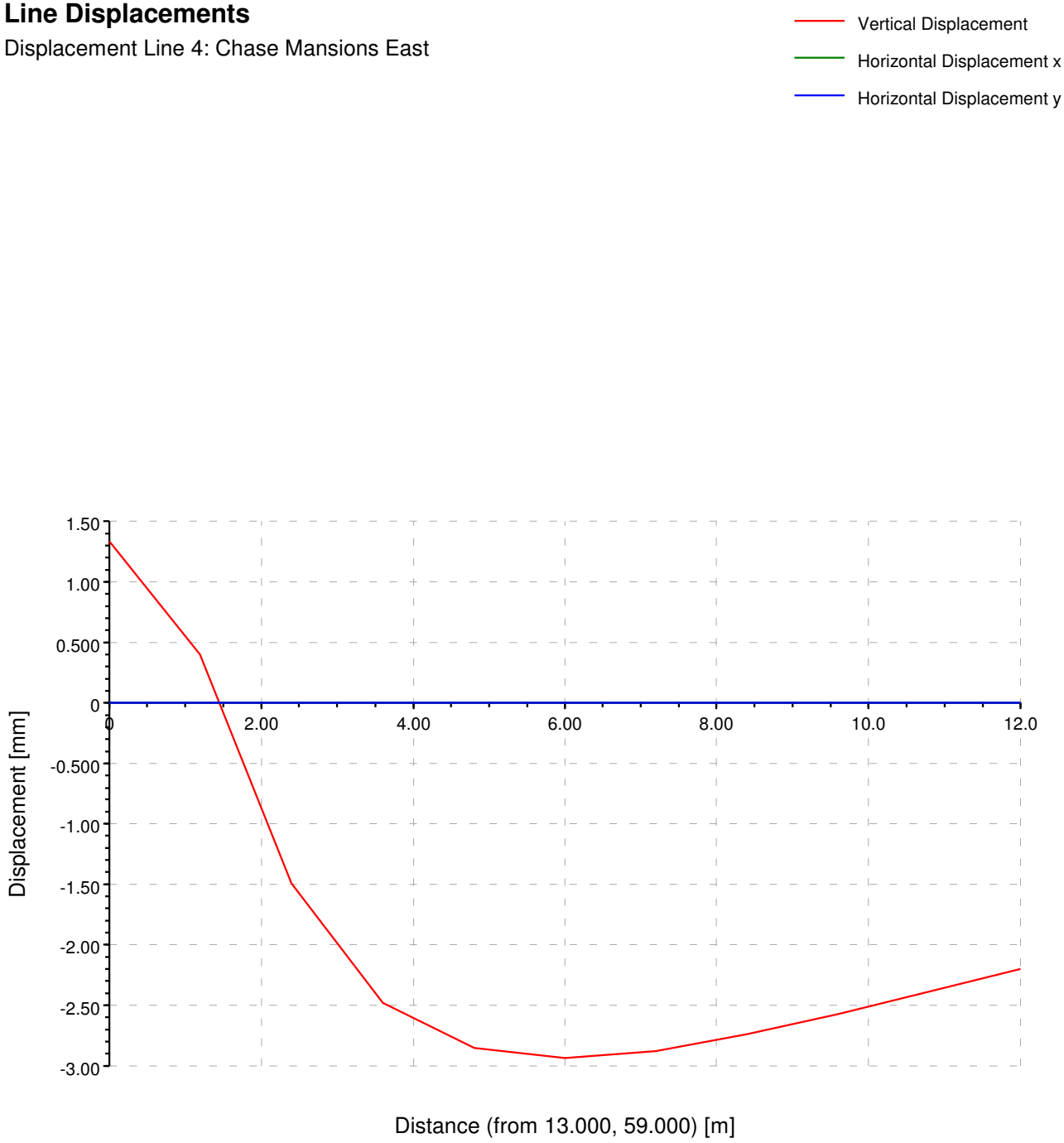
Offset from Line for Vertical Movement Calculations	Ratio	Horizontal Strain		Settlement	Tensile Strain	of Horizontal Displacement Curve	of Vertical Displacement Curve	Radius of Curvature (Hogging)	Radius of Curvature (Sagging)	
[m]	[%]	[%]		[mm]	[%]			[m]	[m]	
0.0	157.35E-6	0.0	9.2706E-6	0.56352	154.17E-6	0.0	9.2706E-6	321340.	-	0 (Negligible)

Specific Building Damage Results - Critical Segments within Each Structure

Structure Name	Parameter	Critical Sub-Structure	Critical Segment	Start	End	Curvature	Max Slope	Max Settlement	Max Tensile Strain	Min Radius of Curvature (Hogging)	Min Radius of Curvature (Sagging)	Damage Category
				[m]	[m]			[mm]	[%]	[m]	[m]	
Chase Mansion	Max Slope	Eastern Elevation	1	0.0	1.7670	Hogging	**0.0010176**	4.4508	0.0073815	2308.6	-	0 (Negligible)
	Max Settlement	Eastern Elevation	1	0.0	1.7670	Hogging	0.0010176	**4.4508**	0.0073815	2308.6	-	0 (Negligible)
	Max Tensile Strain	Eastern Elevation	2	1.7670	12.000	Sagging	0.0010176	3.0616	**0.014267**	-	4210.1	0 (Negligible)
	Min Radius of Curvature (Hogging)	Eastern Elevation	1	0.0	1.7670	Hogging	0.0010176	4.4508	0.0073815	**2308.6**	-	0 (Negligible)
	Min Radius of Curvature (Sagging)	Eastern Elevation	2	1.7670	12.000	Sagging	0.0010176	3.0616	0.014267	-	**4210.1**	0 (Negligible)
Chase Mansions	Max Slope	Southern Elevation	1	0.0	11.019	Sagging	**933.51E-6**	2.5014	0.014884	-	3944.1	0 (Negligible)
	Max Settlement	Southern Elevation	2	11.019	22.952	Hogging	933.51E-6	**4.5055**	0.0096388	4021.4	-	0 (Negligible)
	Max Tensile Strain	Southern Elevation	1	0.0	11.019	Sagging	933.51E-6	2.5014	**0.014884**	-	3944.1	0 (Negligible)
	Min Radius of Curvature (Hogging)	Southern Elevation	2	11.019	22.952	Hogging	933.51E-6	4.5055	0.0096388	**4021.4**	-	0 (Negligible)
	Min Radius of Curvature (Sagging)	Southern Elevation	1	0.0	11.019	Sagging	933.51E-6	2.5014	0.014884	-	**3944.1**	0 (Negligible)
South Mansions	Max Slope	Eastern Elevation 2	1	0.0	6.0000	Sagging	**179.54E-6**	1.1707	0.0020259	-	13441.	0 (Negligible)
	Max Settlement	Northern Elevation	2	6.4773	23.458	Hogging	80.960E-6	**1.2174**	0.0013481	75244.	-	0 (Negligible)
	Max Tensile Strain	Eastern Elevation 2	1	0.0	6.0000	Sagging	179.54E-6	1.1707	**0.0020259**	-	13441.	0 (Negligible)
	Min Radius of Curvature (Hogging)	Northern Elevation	2	6.4773	23.458	Hogging	80.960E-6	1.2174	0.0013481	**75244.**	-	0 (Negligible)
	Min Radius of Curvature (Sagging)	Eastern Elevation 2	1	0.0	6.0000	Sagging	179.54E-6	1.1707	0.0020259	-	**13441.**	0 (Negligible)

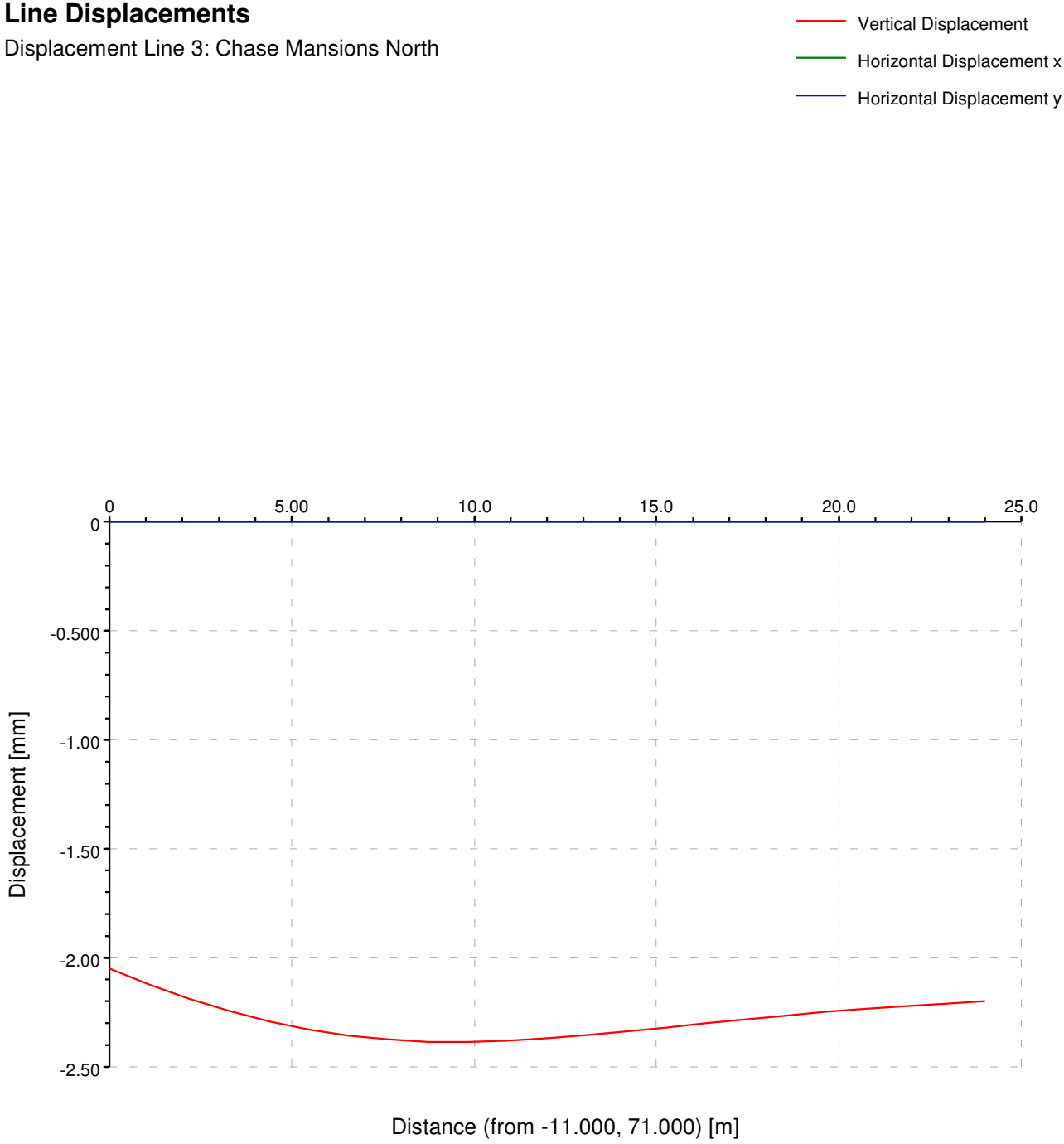
Line Displacements

Displacement Line 4: Chase Mansions East



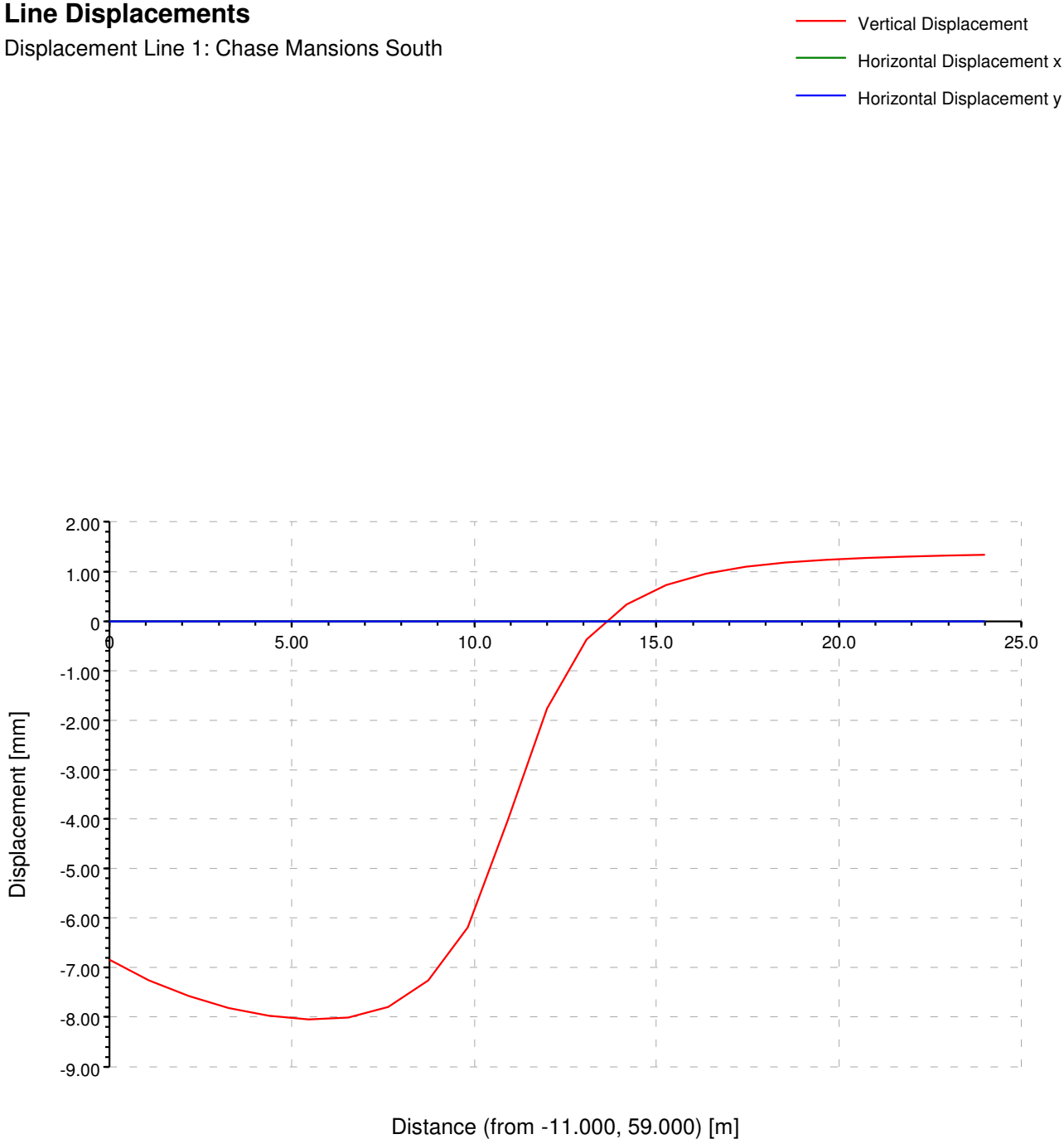
Line Displacements

Displacement Line 3: Chase Mansions North



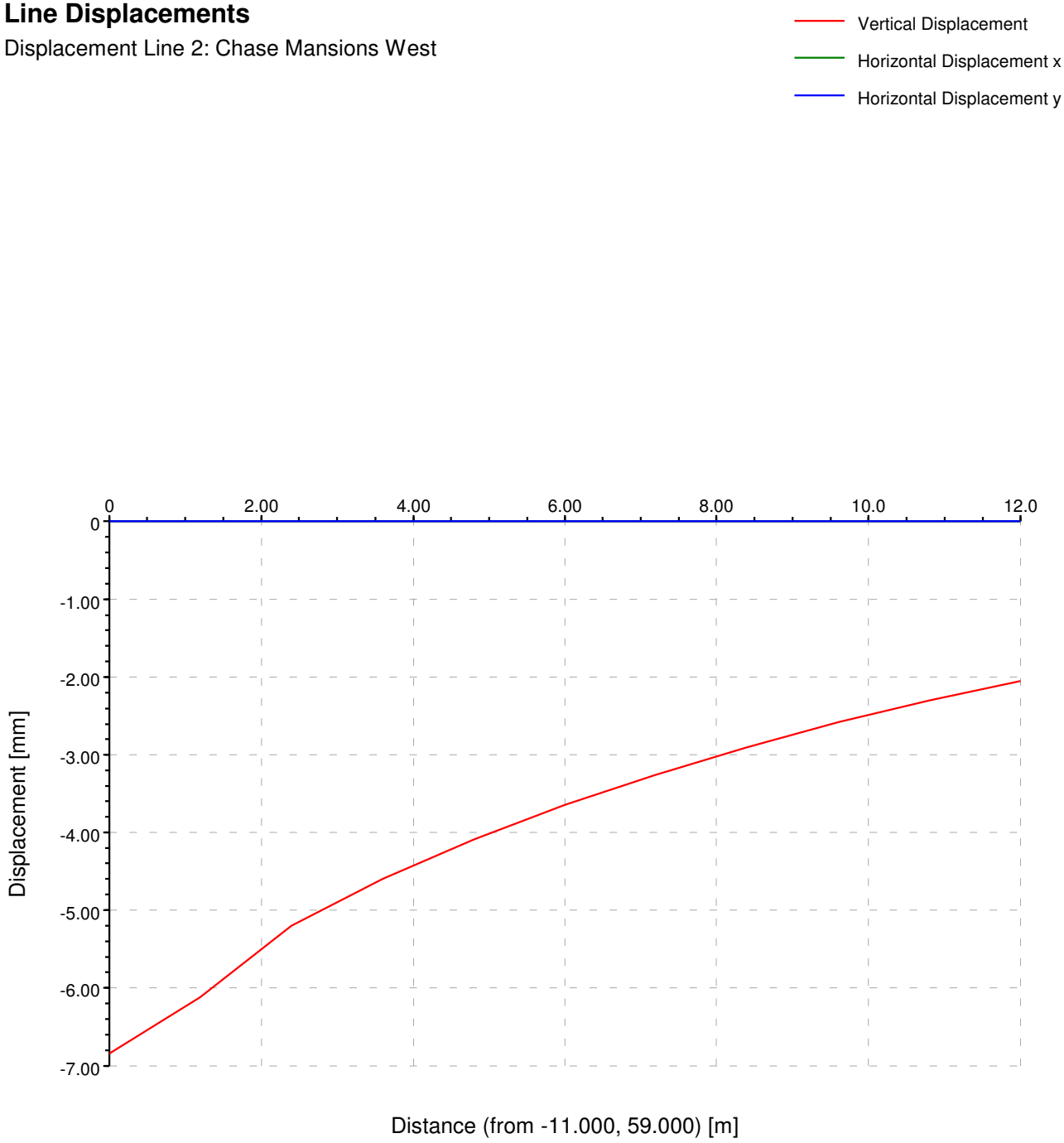
Line Displacements

Displacement Line 1: Chase Mansions South



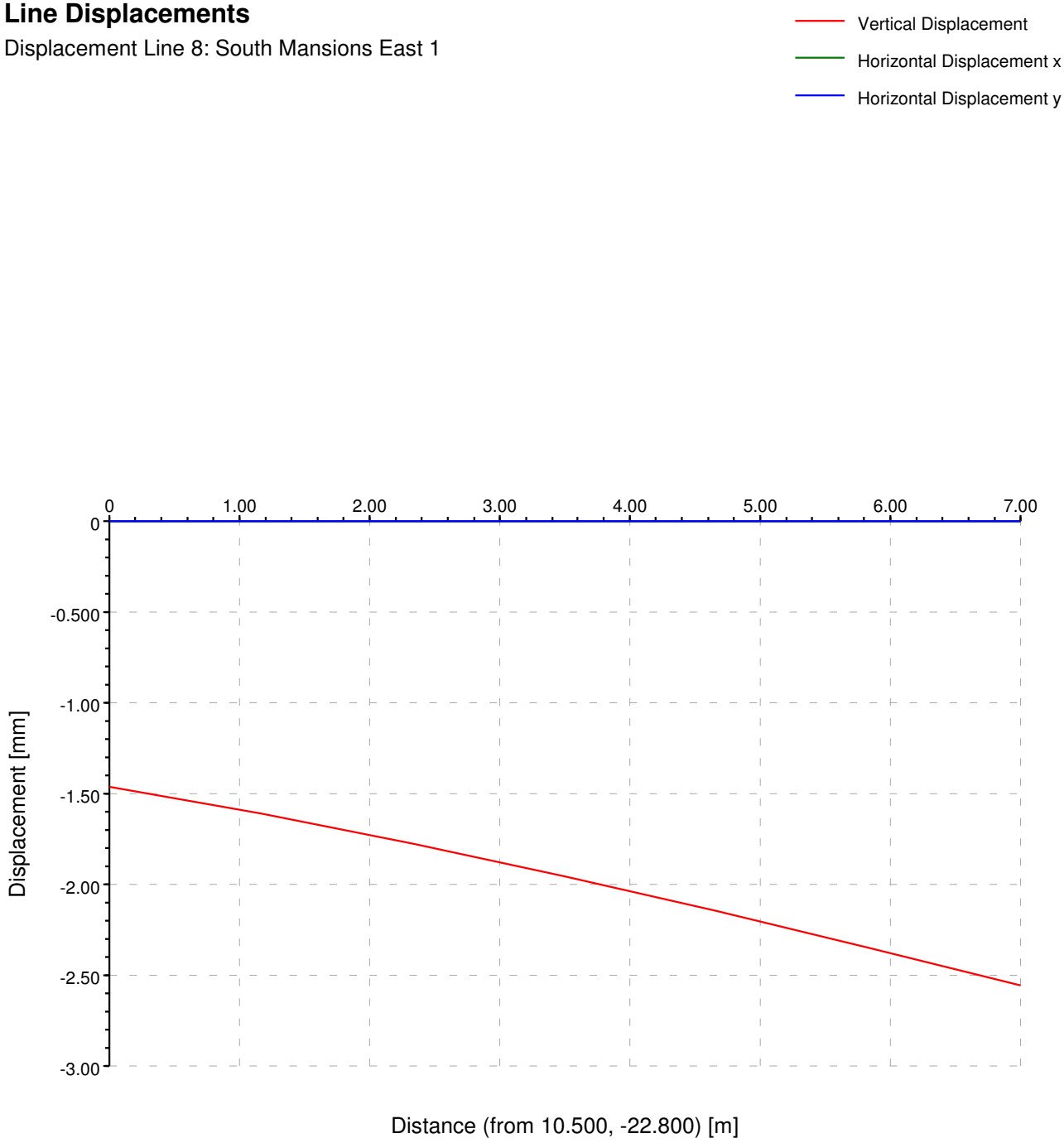
Line Displacements

Displacement Line 2: Chase Mansions West



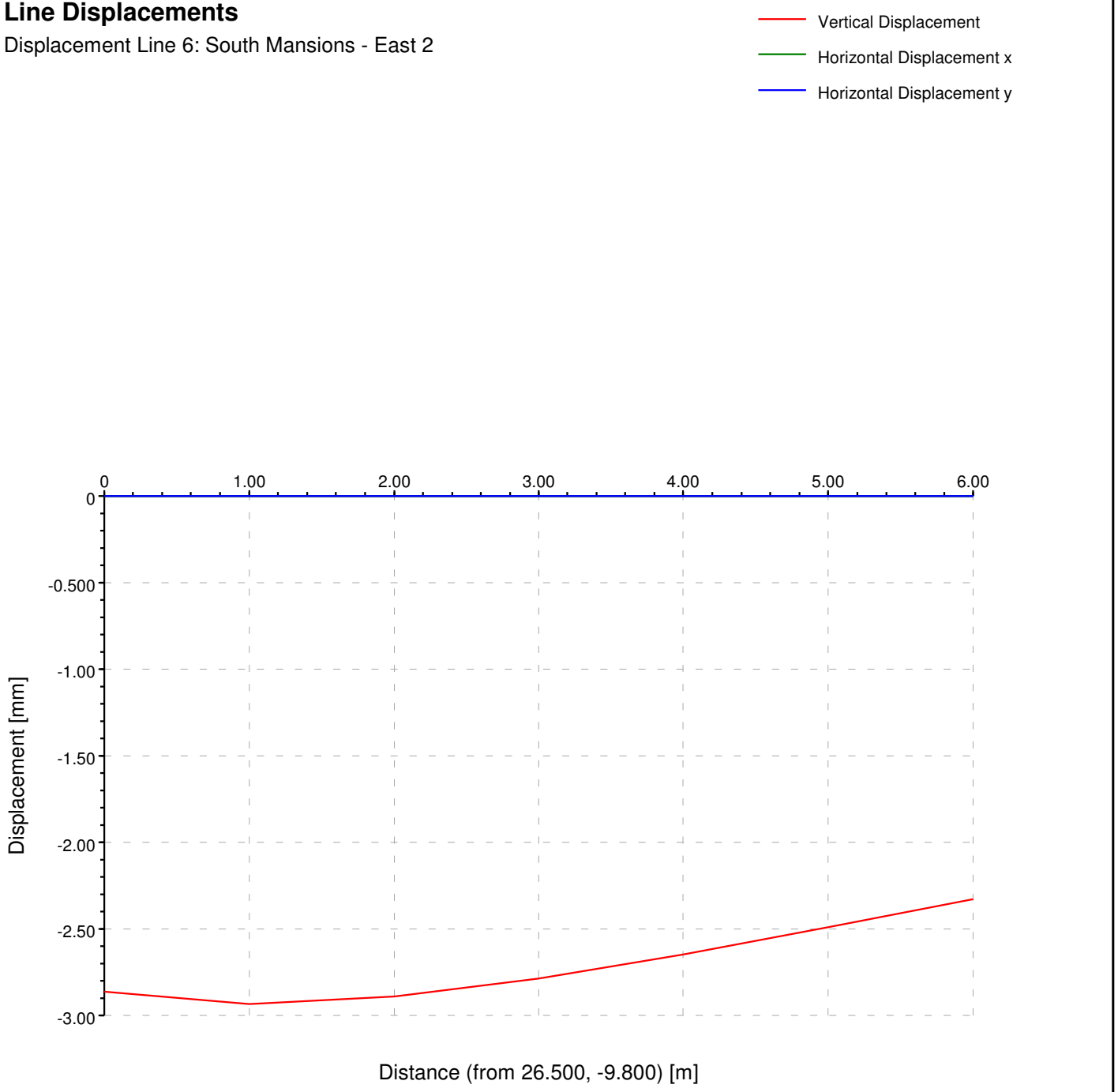
Line Displacements

Displacement Line 8: South Mansions East 1



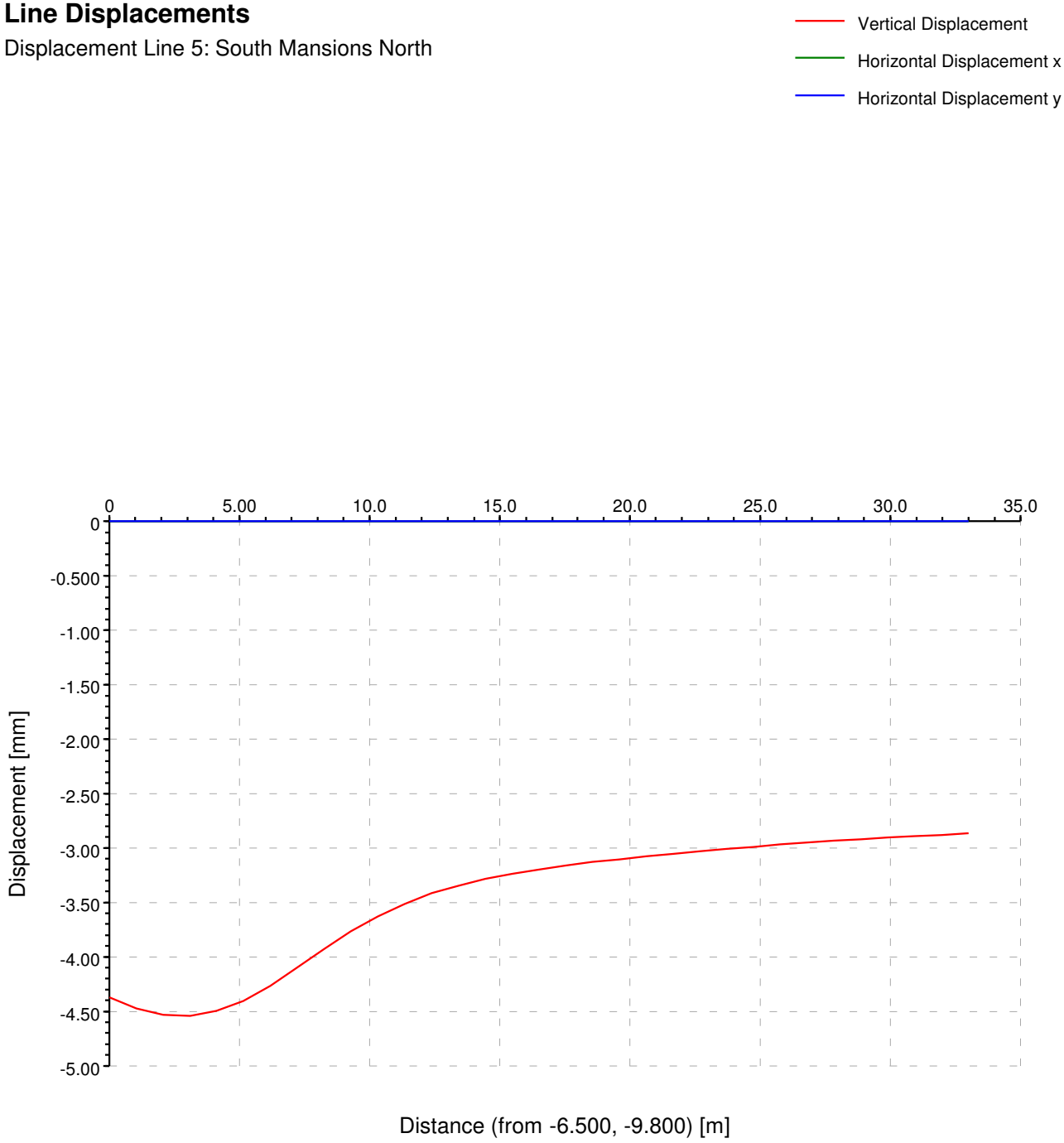
Line Displacements

Displacement Line 6: South Mansions - East 2



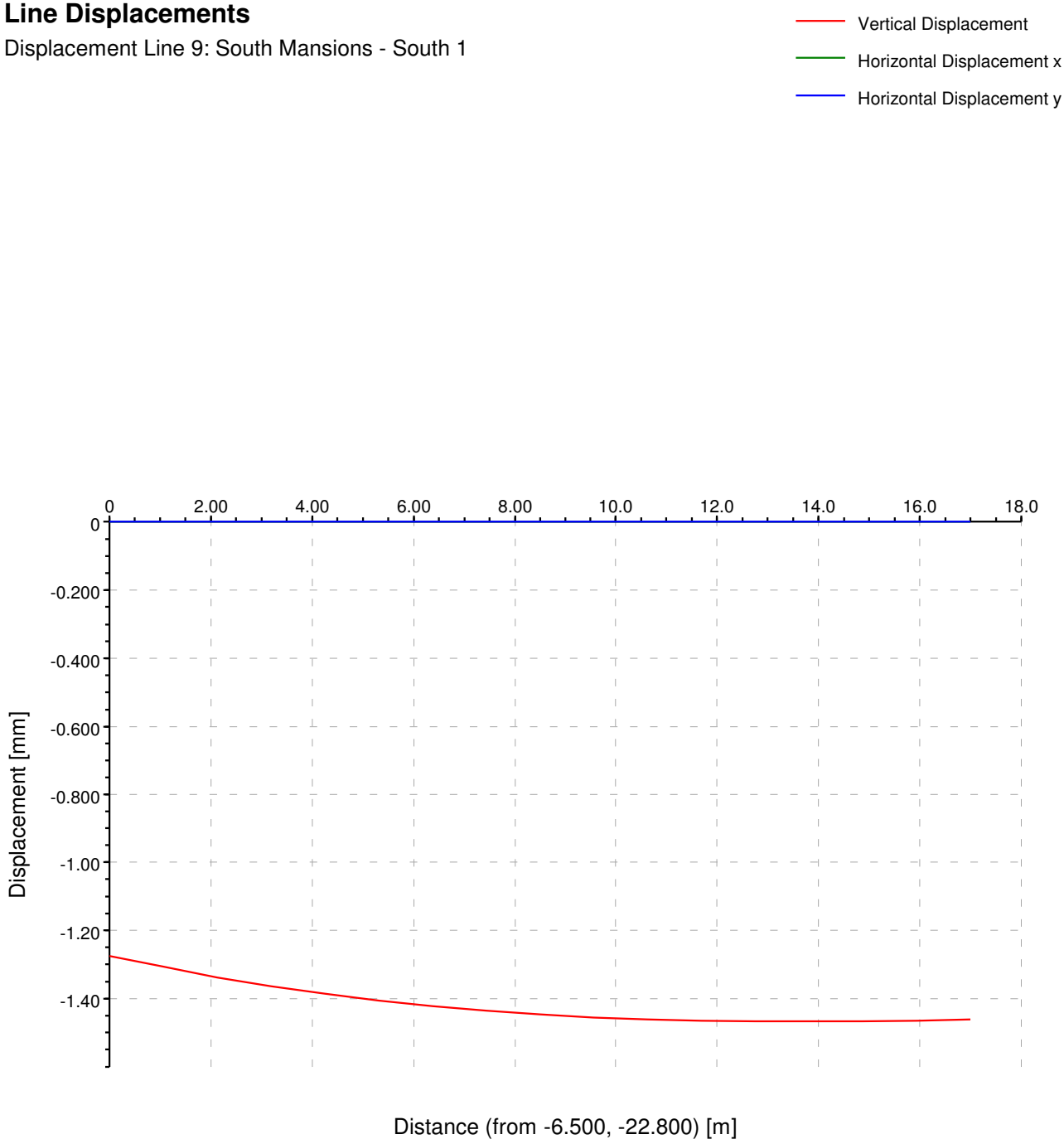
Line Displacements

Displacement Line 5: South Mansions North



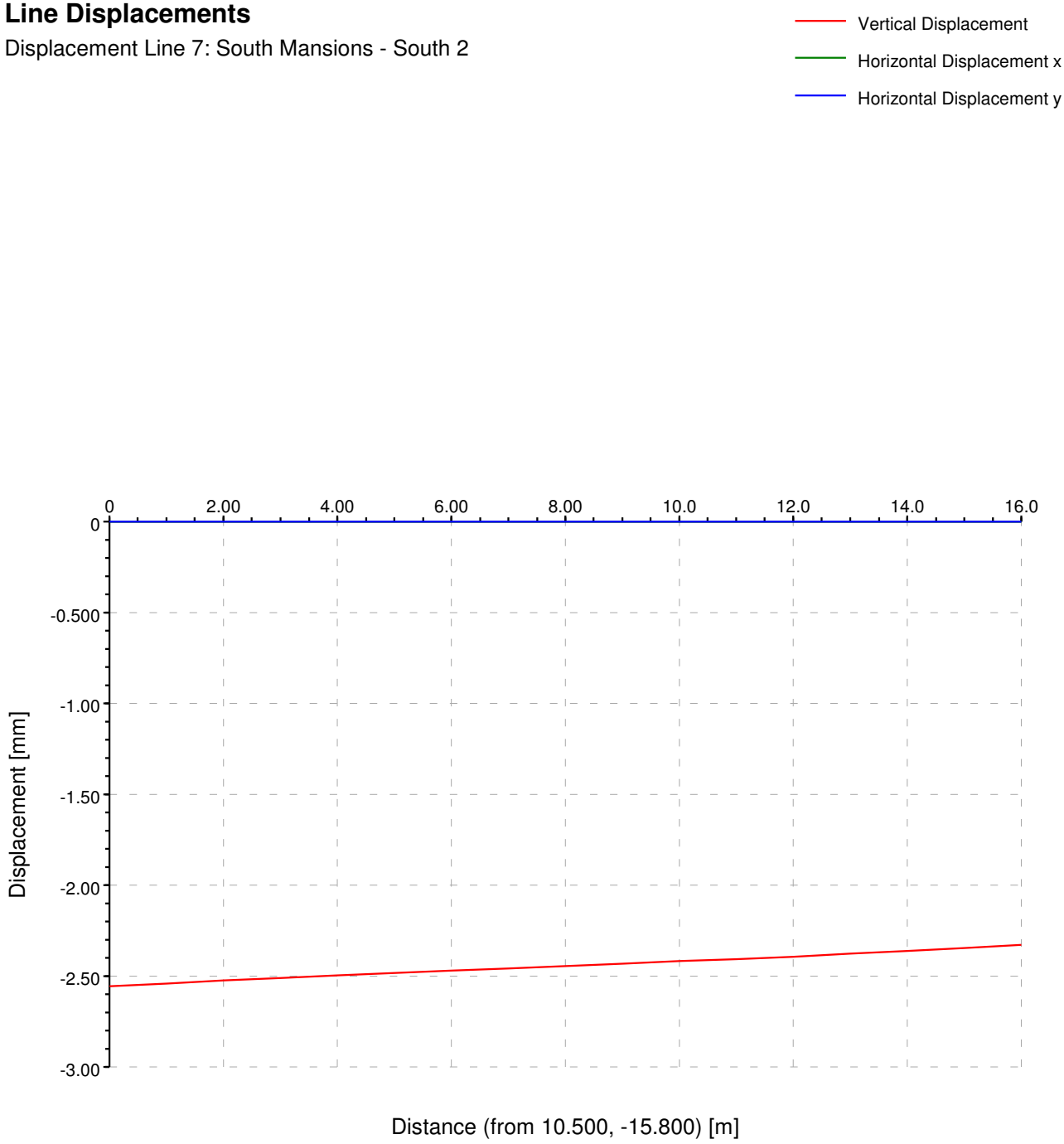
Line Displacements

Displacement Line 9: South Mansions - South 1



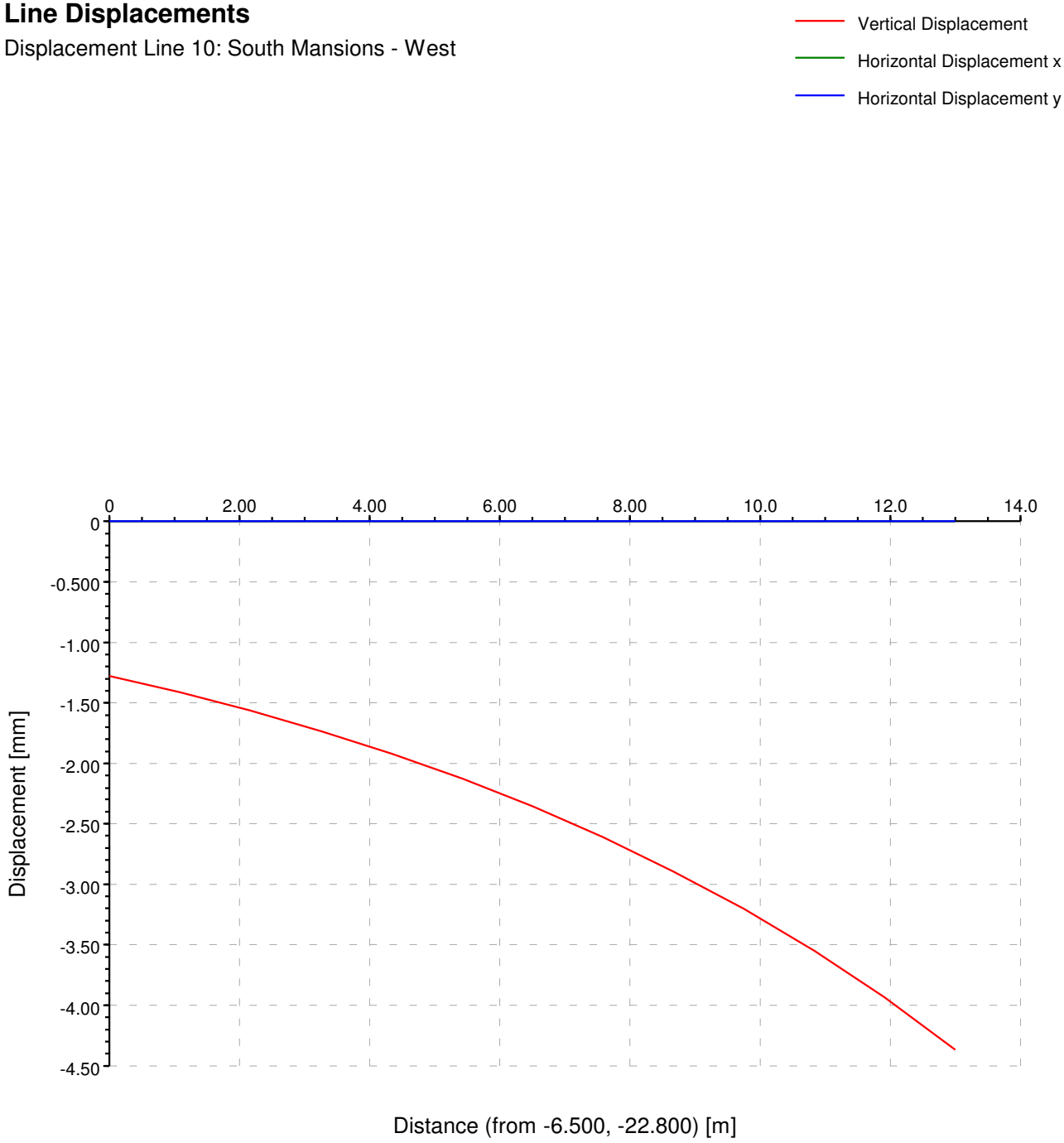
Line Displacements

Displacement Line 7: South Mansions - South 2



Line Displacements

Displacement Line 10: South Mansions - West



Notes

No wall installation or excavation as basement walls (reservoir) already constructed. Assessment is impacts of displacements from Future Construction from PDISP

Problem Type

Problem Type : Tunnelling and Embedded Wall Excavations

Displacement Data

Type	Name	Direction of extrusion	Point/Line/Line for extrusion						No. of intervals across extrusion/line	Extrusion depth	No. of intervals along extrusion	Calculate	Surface type for tunnels
			First point			Second point							
			X [m]	Y [m]	Z(level) [m]	X [m]	Y [m]	Z(level) [m]		[m]			
Line	Chase Mansions South	-	-11.00000	59.00000	77.00000	13.00000	59.00000	77.00000	22	-	-	Yes	Surface
Line	Chase Mansions West	-	-11.00000	59.00000	77.00000	-11.00000	71.00000	77.00000	10	-	-	Yes	Surface
Line	Chase Mansions North	-	-11.00000	71.00000	77.00000	13.00000	71.00000	77.00000	22	-	-	Yes	Surface
Line	Chase Mansions East	-	13.00000	59.00000	77.00000	13.00000	71.00000	77.00000	10	-	-	Yes	Surface
Line	South Mansions North	-	-6.50000	-9.80000	77.00000	26.50000	-9.80000	77.00000	32	-	-	Yes	Surface
Line	South Mansions - East 2	-	26.50000	-9.80000	77.00000	26.50000	-15.80000	77.00000	6	-	-	Yes	Surface
Line	South Mansions - South 2	-	10.50000	-15.80000	77.00000	26.50000	-15.80000	77.00000	16	-	-	Yes	Surface
Line	South Mansions East 1	-	10.50000	-22.80000	77.00000	10.50000	-15.80000	77.00000	6	-	-	Yes	Surface
Line	South Mansions - South 1	-	-6.50000	-22.80000	77.00000	10.50000	-22.80000	77.00000	16	-	-	Yes	Surface
Line	South Mansions - West	-	-6.50000	-22.80000	77.00000	-6.50000	-9.80000	77.00000	12	-	-	Yes	Surface

Imported Displacements

The following data points and displacements were found in the import file Future Construction Stage - LT 20.06.17.csv.

Ref.	Coordinates			Displacements			
	x [m]	y [m]	z [m]	x [mm]	y [mm]	z [mm]	
1	-11.00000	59.00000	77.00000	0.00000	0.00000	6.84085	1,2,6
2	-9.90909	59.00000	77.00000	0.00000	0.00000	7.26030	1,2,6
3	-8.81818	59.00000	77.00000	0.00000	0.00000	7.58058	1,2,6
4	-7.72727	59.00000	77.00000	0.00000	0.00000	7.81934	1,2,6
5	-6.63636	59.00000	77.00000	0.00000	0.00000	7.96741	1,2,6
6	-5.54545	59.00000	77.00000	0.00000	0.00000	8.05008	1,2,6
7	-4.45455	59.00000	77.00000	0.00000	0.00000	8.00686	1,2,6
8	-3.36364	59.00000	77.00000	0.00000	0.00000	7.78824	1,2,6
9	-2.27273	59.00000	77.00000	0.00000	0.00000	7.26545	1,2,6
10	-1.18182	59.00000	77.00000	0.00000	0.00000	6.18798	1,2,6
11	-0.09091	59.00000	77.00000	0.00000	0.00000	4.02705	1,2,6
12	1.00000	59.00000	77.00000	0.00000	0.00000	1.76605	1,2,6
13	2.09091	59.00000	77.00000	0.00000	0.00000	0.36559	1,2,6
14	3.18182	59.00000	77.00000	0.00000	0.00000	-0.33709	1,2,6
15	4.27273	59.00000	77.00000	0.00000	0.00000	-0.72803	1,2,6
16	5.36364	59.00000	77.00000	0.00000	0.00000	-0.95674	1,2,6
17	6.45455	59.00000	77.00000	0.00000	0.00000	-1.09424	1,2,6
18	7.54545	59.00000	77.00000	0.00000	0.00000	-1.17828	1,2,6
19	8.63636	59.00000	77.00000	0.00000	0.00000	-1.23120	1,2,6
20	9.72727	59.00000	77.00000	0.00000	0.00000	-1.26714	1,2,6
21	10.81818	59.00000	77.00000	0.00000	0.00000	-1.29465	1,2,6
22	11.90909	59.00000	77.00000	0.00000	0.00000	-1.31806	1,2,6
23	13.00000	59.00000	77.00000	0.00000	0.00000	-1.33901	1,2,6
24	-11.00000	60.20000	77.00000	0.00000	0.00000	6.12124	1,2,6
25	-11.00000	61.40000	77.00000	0.00000	0.00000	5.19967	1,2,6
26	-11.00000	62.60000	77.00000	0.00000	0.00000	4.59666	1,2,6
27	-11.00000	63.80000	77.00000	0.00000	0.00000	4.09233	1,2,6
28	-11.00000	65.00000	77.00000	0.00000	0.00000	3.64872	1,2,6
29	-11.00000	66.20000	77.00000	0.00000	0.00000	3.25275	1,2,6
30	-11.00000	67.40000	77.00000	0.00000	0.00000	2.89839	1,2,6
31	-11.00000	68.60000	77.00000	0.00000	0.00000	2.58176	1,2,6
32	-11.00000	69.80000	77.00000	0.00000	0.00000	2.29963	1,2,6
33	-11.00000	71.00000	77.00000	0.00000	0.00000	2.04888	1,2,6
34	-9.90909	71.00000	77.00000	0.00000	0.00000	2.12165	1,2,6
35	-8.81818	71.00000	77.00000	0.00000	0.00000	2.18694	1,2,6
36	-7.72727	71.00000	77.00000	0.00000	0.00000	2.24376	1,2,6
37	-6.63636	71.00000	77.00000	0.00000	0.00000	2.29134	1,2,6
38	-5.54545	71.00000	77.00000	0.00000	0.00000	2.32923	1,2,6
39	-4.45455	71.00000	77.00000	0.00000	0.00000	2.35728	1,2,6
40	-3.36364	71.00000	77.00000	0.00000	0.00000	2.37573	1,2,6
41	-2.27273	71.00000	77.00000	0.00000	0.00000	2.38519	1,2,6
42	-1.18182	71.00000	77.00000	0.00000	0.00000	2.38661	1,2,6
43	-0.09091	71.00000	77.00000	0.00000	0.00000	2.38121	1,2,6
44	1.00000	71.00000	77.00000	0.00000	0.00000	2.37041	1,2,6
45	2.09091	71.00000	77.00000	0.00000	0.00000	2.35566	1,2,6
46	3.18182	71.00000	77.00000	0.00000	0.00000	2.33838	1,2,6
47	4.27273	71.00000	77.00000	0.00000	0.00000	2.31981	1,2,6
48	5.36364	71.00000	77.00000	0.00000	0.00000	2.30098	1,2,6
49	6.45455	71.00000	77.00000	0.00000	0.00000	2.28265	1,2,6
50	7.54545	71.00000	77.00000	0.00000	0.00000	2.26536	1,2,6
51	8.63636	71.00000	77.00000	0.00000	0.00000	2.24943	1,2,6
52	9.72727	71.00000	77.00000	0.00000	0.00000	2.23502	1,2,6
53	10.81818	71.00000	77.00000	0.00000	0.00000	2.22215	1,2,6
54	11.90909	71.00000	77.00000	0.00000	0.00000	2.21075	1,2,6
55	13.00000	71.00000	77.00000	0.00000	0.00000	2.20070	1,2,6
56	13.00000	60.20000	77.00000	0.00000	0.00000	-0.40228	1,2,6
57	13.00000	61.40000	77.00000	0.00000	0.00000	1.49313	1,2,6
58	13.00000	62.60000	77.00000	0.00000	0.00000	2.48123	1,2,6
59	13.00000	63.80000	77.00000	0.00000	0.00000	2.85477	1,2,6
60	13.00000	65.00000	77.00000	0.00000	0.00000	2.93773	1,2,6
61	13.00000	66.20000	77.00000	0.00000	0.00000	2.87605	1,2,6
62	13.00000	67.40000	77.00000	0.00000	0.00000	2.74122	1,2,6
63	13.00000	68.60000	77.00000	0.00000	0.00000	2.57115	1,2,6
64	13.00000	69.80000	77.00000	0.00000	0.00000	2.38695	1,2,6
65	-6.50000	-9.80000	77.00000	0.00000	0.00000	4.36799	1,2,6
66	-5.46875	-9.80000	77.00000	0.00000	0.00000	4.47143	1,2,6
67	-4.43750	-9.80000	77.00000	0.00000	0.00000	4.53102	1,2,6
68	-3.40625	-9.80000	77.00000	0.00000	0.00000	4.54155	1,2,6
69	-2.37500	-9.80000	77.00000	0.00000	0.00000	4.49919	1,2,6
70	-1.34375	-9.80000	77.00000	0.00000	0.00000	4.40416	1,2,6
71	-0.31250	-9.80000	77.00000	0.00000	0.00000	4.26468	1,2,6
72	0.71875	-9.80000	77.00000	0.00000	0.00000	4.09856	1,2,6
73	1.75000	-9.80000	77.00000	0.00000	0.00000	3.92742	1,2,6
74	2.78125	-9.80000	77.00000	0.00000	0.00000	3.76784	1,2,6
75	3.81250	-9.80000	77.00000	0.00000	0.00000	3.62864	1,2,6
76	4.84375	-9.80000	77.00000	0.00000	0.00000	3.51265	1,2,6
77	5.87500	-9.80000	77.00000	0.00000	0.00000	3.41912	1,2,6
78	6.90625	-9.80000	77.00000	0.00000	0.00000	3.34480	1,2,6
79	7.93750	-9.80000	77.00000	0.00000	0.00000	3.28546	1,2,6
80	8.96875	-9.80000	77.00000	0.00000	0.00000	3.23723	1,2,6
81	10.00000	-9.80000	77.00000	0.00000	0.00000	3.19700	1,2,6
82	11.03125	-9.80000	77.00000	0.00000	0.00000	3.16245	1,2,6

Ref.	Coordinates x [m]	y [m]	z [m]	Displacements x [mm]	y [mm]	z [mm]	
83	12.06250	-9.80000	77.00000	0.00000	0.00000	3.13191	1,2,6
84	13.09375	-9.80000	77.00000	0.00000	0.00000	3.10424	1,2,6
85	14.12500	-9.80000	77.00000	0.00000	0.00000	3.07861	1,2,6
86	15.15625	-9.80000	77.00000	0.00000	0.00000	3.05449	1,2,6
87	16.18750	-9.80000	77.00000	0.00000	0.00000	3.03154	1,2,6
88	17.21875	-9.80000	77.00000	0.00000	0.00000	3.00968	1,2,6
89	18.25000	-9.80000	77.00000	0.00000	0.00000	2.98900	1,2,6
90	19.28125	-9.80000	77.00000	0.00000	0.00000	2.96970	1,2,6
91	20.31250	-9.80000	77.00000	0.00000	0.00000	2.95192	1,2,6
92	21.34375	-9.80000	77.00000	0.00000	0.00000	2.93562	1,2,6
93	22.37500	-9.80000	77.00000	0.00000	0.00000	2.92059	1,2,6
94	23.40625	-9.80000	77.00000	0.00000	0.00000	2.90652	1,2,6
95	24.43750	-9.80000	77.00000	0.00000	0.00000	2.89298	1,2,6
96	25.46875	-9.80000	77.00000	0.00000	0.00000	2.87947	1,2,6
97	26.50000	-9.80000	77.00000	0.00000	0.00000	2.86532	1,2,6
98	26.50000	-10.80000	77.00000	0.00000	0.00000	2.93481	1,2,6
99	26.50000	-11.80000	77.00000	0.00000	0.00000	2.89272	1,2,6
100	26.50000	-12.80000	77.00000	0.00000	0.00000	2.78777	1,2,6
101	26.50000	-13.80000	77.00000	0.00000	0.00000	2.64840	1,2,6
102	26.50000	-14.80000	77.00000	0.00000	0.00000	2.49182	1,2,6
103	26.50000	-15.80000	77.00000	0.00000	0.00000	2.32871	1,2,6
104	10.50000	-15.80000	77.00000	0.00000	0.00000	2.55770	1,2,6
105	11.50000	-15.80000	77.00000	0.00000	0.00000	2.54206	1,2,6
106	12.50000	-15.80000	77.00000	0.00000	0.00000	2.52706	1,2,6
107	13.50000	-15.80000	77.00000	0.00000	0.00000	2.51264	1,2,6
108	14.50000	-15.80000	77.00000	0.00000	0.00000	2.49873	1,2,6
109	15.50000	-15.80000	77.00000	0.00000	0.00000	2.48523	1,2,6
110	16.50000	-15.80000	77.00000	0.00000	0.00000	2.47204	1,2,6
111	17.50000	-15.80000	77.00000	0.00000	0.00000	2.45906	1,2,6
112	18.50000	-15.80000	77.00000	0.00000	0.00000	2.44617	1,2,6
113	19.50000	-15.80000	77.00000	0.00000	0.00000	2.43328	1,2,6
114	20.50000	-15.80000	77.00000	0.00000	0.00000	2.42024	1,2,6
115	21.50000	-15.80000	77.00000	0.00000	0.00000	2.40691	1,2,6
116	22.50000	-15.80000	77.00000	0.00000	0.00000	2.39310	1,2,6
117	23.50000	-15.80000	77.00000	0.00000	0.00000	2.37863	1,2,6
118	24.50000	-15.80000	77.00000	0.00000	0.00000	2.36326	1,2,6
119	25.50000	-15.80000	77.00000	0.00000	0.00000	2.34672	1,2,6
120	10.50000	-22.80000	77.00000	0.00000	0.00000	1.46136	1,2,6
121	10.50000	-21.63333	77.00000	0.00000	0.00000	1.61246	1,2,6
122	10.50000	-20.46667	77.00000	0.00000	0.00000	1.77712	1,2,6
123	10.50000	-19.30000	77.00000	0.00000	0.00000	1.95535	1,2,6
124	10.50000	-18.13333	77.00000	0.00000	0.00000	2.14642	1,2,6
125	10.50000	-16.96667	77.00000	0.00000	0.00000	2.34846	1,2,6
126	-6.50000	-22.80000	77.00000	0.00000	0.00000	1.27469	1,2,6
127	-5.43750	-22.80000	77.00000	0.00000	0.00000	1.30743	1,2,6
128	-4.37500	-22.80000	77.00000	0.00000	0.00000	1.33705	1,2,6
129	-3.31250	-22.80000	77.00000	0.00000	0.00000	1.36341	1,2,6
130	-2.25000	-22.80000	77.00000	0.00000	0.00000	1.38645	1,2,6
131	-1.18750	-22.80000	77.00000	0.00000	0.00000	1.40620	1,2,6
132	-0.12500	-22.80000	77.00000	0.00000	0.00000	1.42275	1,2,6
133	0.93750	-22.80000	77.00000	0.00000	0.00000	1.43625	1,2,6
134	2.00000	-22.80000	77.00000	0.00000	0.00000	1.44693	1,2,6
135	3.06250	-22.80000	77.00000	0.00000	0.00000	1.45502	1,2,6
136	4.12500	-22.80000	77.00000	0.00000	0.00000	1.46080	1,2,6
137	5.18750	-22.80000	77.00000	0.00000	0.00000	1.46455	1,2,6
138	6.25000	-22.80000	77.00000	0.00000	0.00000	1.46652	1,2,6
139	7.31250	-22.80000	77.00000	0.00000	0.00000	1.46698	1,2,6
140	8.37500	-22.80000	77.00000	0.00000	0.00000	1.46615	1,2,6
141	9.43750	-22.80000	77.00000	0.00000	0.00000	1.46422	1,2,6
142	-6.50000	-21.71667	77.00000	0.00000	0.00000	1.41020	1,2,6
143	-6.50000	-20.63333	77.00000	0.00000	0.00000	1.56121	1,2,6
144	-6.50000	-19.55000	77.00000	0.00000	0.00000	1.72941	1,2,6
145	-6.50000	-18.46667	77.00000	0.00000	0.00000	1.91661	1,2,6
146	-6.50000	-17.38333	77.00000	0.00000	0.00000	2.12471	1,2,6
147	-6.50000	-16.30000	77.00000	0.00000	0.00000	2.35562	1,2,6
148	-6.50000	-15.21667	77.00000	0.00000	0.00000	2.61131	1,2,6
149	-6.50000	-14.13333	77.00000	0.00000	0.00000	2.89381	1,2,6
150	-6.50000	-13.05000	77.00000	0.00000	0.00000	3.20551	1,2,6
151	-6.50000	-11.96667	77.00000	0.00000	0.00000	3.54982	1,2,6
152	-6.50000	-10.88333	77.00000	0.00000	0.00000	3.93289	1,2,6

1 - Data point coincident with displacement data. Its displacement has been added to those calculated by Xdisp.
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.

Vertical Ground Movement Curves (Excavations)

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: -2147483648.E+2147483647

Horizontal Ground Movement Curves (Excavations)

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: -2147483648.E+2147483647

Polygonal Excavations

Excavation Name: **New Excavation - 1st Basement Level**
Surface level [m]: 77.800
Contribution: Positive
Enabled: Yes
Surface movement curves which are selected are applied between surface and [m]: 75.000

Corner	x [m]	y [m]	Base Level [m]	Stiffened	Previous Side d [m]	Previous Side p1 [%]	Previous Side p2* [%]	Next Side d [m]	Next Side p1 [%]	Next Side p2* [%]
1	0.0	0.0	75.000	Yes	0.0	67.000	25.000	0.0	67.000	25.000
2	91.000	0.0	75.000	Yes	0.0	67.000	25.000	0.0	67.000	25.000
3	91.000	52.000	75.000	Yes	0.0	67.000	25.000	0.0	67.000	25.000
4	0.0	52.000	75.000	Yes	0.0	67.000	25.000	0.0	67.000	25.000

Side	Corner 1 x [m]	Corner 1 y [m]	Corner 2 x [m]	Corner 2 y [m]	Ground Movement Curve Vertical	Ground Movement Curve Horizontal
1	0.0	0.0	91.000	0.0	No vertical ground movement	No horizontal ground movement
2	91.000	0.0	91.000	52.000	No vertical ground movement	No horizontal ground movement
3	91.000	52.000	0.0	52.000	No vertical ground movement	No horizontal ground movement
4	0.0	52.000	0.0	0.0	No vertical ground movement	No horizontal ground movement

Side	Corner 1 x [m]	Corner 1 y [m]	Corner 2 x [m]	Corner 2 y [m]	Ground Movement Curve Vertical	Horizontal

Excavation Name: New Excavation - 2nd Level Basement
Surface level [m]: 75.000
Contribution: Positive
Enabled: Yes
Surface movement curves which are selected are applied between surface and [m]: 71.600

Corner	x [m]	y [m]	Base Level [m]	Stiffened	Previous Side d [m]	Previous Side p1 [%]	Previous Side p2* [%]	Next Side d [m]	Next Side p1 [%]	Next Side p2* [%]
1	58.500	0.0	71.600	Yes	0.0	67.000	25.000	0.0	67.000	25.000
2	91.000	0.0	71.600	Yes	0.0	67.000	25.000	0.0	67.000	25.000
3	91.000	52.000	71.600	Yes	0.0	67.000	25.000	0.0	67.000	25.000
4	58.500	52.000	71.600	Yes	0.0	67.000	25.000	0.0	67.000	25.000

Side	Corner 1 x [m]	Corner 1 y [m]	Corner 2 x [m]	Corner 2 y [m]	Ground Movement Curve Vertical	Horizontal
1	58.500	0.0	91.000	0.0	No vertical ground movement	No horizontal ground movement
2	91.000	0.0	91.000	52.000	No vertical ground movement	No horizontal ground movement
3	91.000	52.000	58.500	52.000	No vertical ground movement	No horizontal ground movement
4	58.500	52.000	58.500	0.0	No vertical ground movement	No horizontal ground movement

Damage Category Strains

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

Specific Structures - Geometry

Structure Name	Sub-Structure Name	Displacement Line	Start Distance Along Line [m]	End Distance Along Line [m]	Vertical Offsets from Line for Vertical Movement Calculations [m]	Vertical Displacement Limit Sensitivity [mm]	Damage Category Strains	Poisson's Ratio	E/G
Chase Mansion	Western Elevation	Chase Mansions West	0.00000	12.00000	0.0	0.10000	Burland Strain Limits	0.20000	2.6000
Chase Mansion	Eastern Elevation	Chase Mansions East	0.00000	12.00000	0.0	0.10000	Burland Strain Limits	0.20000	2.6000
Chase Mansions	Southern Elevation	Chase Mansions South	0.00000	24.00000	0.0	0.10000	Burland Strain Limits	0.20000	2.6000
Chase Mansions	Northern Elevation	Chase Mansions North	0.00000	24.00000	0.0	0.10000	Burland Strain Limits	0.20000	2.6000
South Mansions	Northern Elevation	South Mansions North	0.00000	33.00000	0.0	0.10000	Burland Strain Limits	0.20000	2.6000
South Mansions	Eastern Elevation 2	South Mansions - East 2	0.00000	6.00000	0.0	0.10000	Burland Strain Limits	0.20000	2.6000
South Mansions	Southern Elevation 2	South Mansions - South 2	0.00000	16.00000	0.0	0.10000	Burland Strain Limits	0.20000	2.6000
South Mansions	Eastern Elevation 1	South Mansions East 1	0.00000	7.00000	0.0	0.10000	Burland Strain Limits	0.20000	2.6000
South Mansions	Southern Elevation 1	South Mansions - South 1	0.00000	17.00000	0.0	0.10000	Burland Strain Limits	0.20000	2.6000
South Mansions	Western Elevation	South Mansions - West	0.00000	13.00000	0.0	0.10000	Burland Strain Limits	0.20000	2.6000

Specific Structures - Bending Parameters

Structure Name	Sub-Structure Name	Height [m]	Default Properties	Hogging 2nd Moment of Area (per unit width) [m³]	Hogging Distance of Bending Strain from N.A. [m]	Hogging Distance of N.A. from Edge of Beam in Tension [m]	Sagging 2nd Moment of Area (per unit width) [m³]	Sagging Distance of Bending Strain from N.A. [m]	Sagging Distance of N.A. from Edge of Beam in Tension [m]
Chase Mansion	Western Elevation	9.0000	Yes	243.00	9.0000	9.0000	60.750	4.5000	4.5000
Chase Mansion	Eastern Elevation	9.0000	Yes	243.00	9.0000	9.0000	60.750	4.5000	4.5000
Chase Mansions	Southern Elevation	9.0000	Yes	243.00	9.0000	9.0000	60.750	4.5000	4.5000
Chase Mansions	Northern Elevation	9.0000	Yes	243.00	9.0000	9.0000	60.750	4.5000	4.5000
South Mansions	Northern Elevation	9.0000	Yes	243.00	9.0000	9.0000	60.750	4.5000	4.5000
South Mansions	Eastern Elevation 2	9.0000	Yes	243.00	9.0000	9.0000	60.750	4.5000	4.5000
South Mansions	Southern Elevation 2	9.0000	Yes	243.00	9.0000	9.0000	60.750	4.5000	4.5000
South Mansions	Eastern Elevation 1	9.0000	Yes	243.00	9.0000	9.0000	60.750	4.5000	4.5000
South Mansions	Southern Elevation 1	9.0000	Yes	243.00	9.0000	9.0000	60.750	4.5000	4.5000
South Mansions	Western Elevation	9.0000	Yes	243.00	9.0000	9.0000	60.750	4.5000	4.5000

Building Segment Combinations

Structure Name	Sub-Structure Name	Vertical Offset from Line for Vertical Movement Calculations [m]	Segment Start [m]	Length [m]	Curvature	Combined Segment

No structures have segments combined.

Utility Strain Calculation Options

Neglect beneficial contribution of axial strains : No

Displacement and Strain Results

Type/No. Name	Dist. [m]	Coordinates x [m]	y [m]	z [m]	Displacements x [mm]	y [mm]	z [mm]	Horizontal displacement along Line [mm]	Horizontal displacement perpendicular to Line [mm]	Angle of Line to x Axis [°]	
Chase Mansions South	Line 1	-11.00000	59.00000	77.00000	0.0	0.0	6.8409	0.0	0.0	0.0	*
	1.0909	-9.90909	59.00000	77.00000	0.0	0.0	7.2603	0.0	0.0	0.0	*
	2.1818	-8.81818	59.00000	77.00000	0.0	0.0	7.5806	0.0	0.0	0.0	*
	3.2727	-7.72727	59.00000	77.00000	0.0	0.0	7.8193	0.0	0.0	0.0	*
	4.3636	-6.63636	59.00000	77.00000	0.0	0.0	7.9674	0.0	0.0	0.0	*
	5.4545	-5.54545	59.00000	77.00000	0.0	0.0	8.0501	0.0	0.0	0.0	*
	6.5455	-4.45455	59.00000	77.00000	0.0	0.0	8.0069	0.0	0.0	0.0	*
	7.6364	-3.36364	59.00000	77.00000	0.0	0.0	7.7882	0.0	0.0	0.0	*
	8.7273	-2.27273	59.00000	77.00000	0.0	0.0	7.2654	0.0	0.0	0.0	*
	9.8182	-1.18182	59.00000	77.00000	0.0	0.0	6.1880	0.0	0.0	0.0	*
	10.909	-0.09091	59.00000	77.00000	0.0	0.0	4.0271	0.0	0.0	0.0	*
	12.000	1.00000	59.00000	77.00000	0.0	0.0	1.7660	0.0	0.0	0.0	*

Type/No. Name	Dist.	Coordinates x	y	z	Displacements x	y	z	Horizontal displacement	Horizontal displacement	Angle of Line to x Axis	
	13.091	2.09091	59.00000	77.00000	0.0	0.0	0.36559	0.0	0.0	0.0	*
	14.182	3.18182	59.00000	77.00000	0.0	0.0	-0.33709	0.0	0.0	0.0	*
	15.273	4.27273	59.00000	77.00000	0.0	0.0	-0.72803	0.0	0.0	0.0	*
	16.364	5.36364	59.00000	77.00000	0.0	0.0	-0.95674	0.0	0.0	0.0	*
	17.455	6.45455	59.00000	77.00000	0.0	0.0	-1.0942	0.0	0.0	0.0	*
	18.545	7.54545	59.00000	77.00000	0.0	0.0	-1.1783	0.0	0.0	0.0	*
	19.636	8.63636	59.00000	77.00000	0.0	0.0	-1.2312	0.0	0.0	0.0	*
	20.727	9.72727	59.00000	77.00000	0.0	0.0	-1.2671	0.0	0.0	0.0	*
	21.818	10.81818	59.00000	77.00000	0.0	0.0	-1.2947	0.0	0.0	0.0	*
	22.909	11.90909	59.00000	77.00000	0.0	0.0	-1.3181	0.0	0.0	0.0	*
	24.000	13.00000	59.00000	77.00000	0.0	0.0	-1.3390	0.0	0.0	0.0	*
Chase Mansions West	Line 2	-11.00000	59.00000	77.00000	0.0	0.0	6.8409	0.0	0.0	90.000	*
	1.2000	-11.00000	60.20000	77.00000	0.0	0.0	6.1212	0.0	0.0	90.000	*
	2.4000	-11.00000	61.40000	77.00000	0.0	0.0	5.1997	0.0	0.0	90.000	*
	3.6000	-11.00000	62.60000	77.00000	0.0	0.0	4.5967	0.0	0.0	90.000	*
	4.8000	-11.00000	63.80000	77.00000	0.0	0.0	4.0923	0.0	0.0	90.000	*
	6.0000	-11.00000	65.00000	77.00000	0.0	0.0	3.6487	0.0	0.0	90.000	*
	7.2000	-11.00000	66.20000	77.00000	0.0	0.0	3.2528	0.0	0.0	90.000	*
	8.4000	-11.00000	67.40000	77.00000	0.0	0.0	2.8984	0.0	0.0	90.000	*
	9.6000	-11.00000	68.60000	77.00000	0.0	0.0	2.5818	0.0	0.0	90.000	*
	10.800	-11.00000	69.80000	77.00000	0.0	0.0	2.2996	0.0	0.0	90.000	*
	12.000	-11.00000	71.00000	77.00000	0.0	0.0	2.0489	0.0	0.0	90.000	*
Chase Mansions North	Line 3	-11.00000	71.00000	77.00000	0.0	0.0	2.0489	0.0	0.0	0.0	*
	1.0909	-9.90909	71.00000	77.00000	0.0	0.0	2.1217	0.0	0.0	0.0	*
	2.1818	-8.81818	71.00000	77.00000	0.0	0.0	2.1869	0.0	0.0	0.0	*
	3.2727	-7.72727	71.00000	77.00000	0.0	0.0	2.2438	0.0	0.0	0.0	*
	4.3636	-6.63636	71.00000	77.00000	0.0	0.0	2.2913	0.0	0.0	0.0	*
	5.4545	-5.54545	71.00000	77.00000	0.0	0.0	2.3292	0.0	0.0	0.0	*
	6.5455	-4.45455	71.00000	77.00000	0.0	0.0	2.3573	0.0	0.0	0.0	*
	7.6364	-3.36364	71.00000	77.00000	0.0	0.0	2.3757	0.0	0.0	0.0	*
	8.7273	-2.27273	71.00000	77.00000	0.0	0.0	2.3852	0.0	0.0	0.0	*
	9.8182	-1.18182	71.00000	77.00000	0.0	0.0	2.3866	0.0	0.0	0.0	*
	10.909	-0.09091	71.00000	77.00000	0.0	0.0	2.3812	0.0	0.0	0.0	*
	12.000	1.00000	71.00000	77.00000	0.0	0.0	2.3704	0.0	0.0	0.0	*
	13.091	2.09091	71.00000	77.00000	0.0	0.0	2.3557	0.0	0.0	0.0	*
	14.182	3.18182	71.00000	77.00000	0.0	0.0	2.3384	0.0	0.0	0.0	*
	15.273	4.27273	71.00000	77.00000	0.0	0.0	2.3198	0.0	0.0	0.0	*
	16.364	5.36364	71.00000	77.00000	0.0	0.0	2.3010	0.0	0.0	0.0	*
	17.455	6.45455	71.00000	77.00000	0.0	0.0	2.2826	0.0	0.0	0.0	*
	18.545	7.54545	71.00000	77.00000	0.0	0.0	2.2654	0.0	0.0	0.0	*
	19.636	8.63636	71.00000	77.00000	0.0	0.0	2.2494	0.0	0.0	0.0	*
	20.727	9.72727	71.00000	77.00000	0.0	0.0	2.2350	0.0	0.0	0.0	*
	21.818	10.81818	71.00000	77.00000	0.0	0.0	2.2221	0.0	0.0	0.0	*
	22.909	11.90909	71.00000	77.00000	0.0	0.0	2.2107	0.0	0.0	0.0	*
	24.000	13.00000	71.00000	77.00000	0.0	0.0	2.2007	0.0	0.0	0.0	*
Chase Mansions East	Line 4	13.00000	59.00000	77.00000	0.0	0.0	-1.3390	0.0	0.0	90.000	*
	1.2000	13.00000	60.20000	77.00000	0.0	0.0	-0.40228	0.0	0.0	90.000	*
	2.4000	13.00000	61.40000	77.00000	0.0	0.0	1.4931	0.0	0.0	90.000	*
	3.6000	13.00000	62.60000	77.00000	0.0	0.0	2.4812	0.0	0.0	90.000	*
	4.8000	13.00000	63.80000	77.00000	0.0	0.0	2.8548	0.0	0.0	90.000	*
	6.0000	13.00000	65.00000	77.00000	0.0	0.0	2.9377	0.0	0.0	90.000	*
	7.2000	13.00000	66.20000	77.00000	0.0	0.0	2.8760	0.0	0.0	90.000	*
	8.4000	13.00000	67.40000	77.00000	0.0	0.0	2.7412	0.0	0.0	90.000	*
	9.6000	13.00000	68.60000	77.00000	0.0	0.0	2.5712	0.0	0.0	90.000	*
	10.800	13.00000	69.80000	77.00000	0.0	0.0	2.3870	0.0	0.0	90.000	*
	12.000	13.00000	71.00000	77.00000	0.0	0.0	2.2007	0.0	0.0	90.000	*
South Mansions North	Line 5	-6.50000	-9.80000	77.00000	0.0	0.0	4.3680	0.0	0.0	0.0	*
	1.0313	-5.46875	-9.80000	77.00000	0.0	0.0	4.4714	0.0	0.0	0.0	*
	2.0625	-4.43750	-9.80000	77.00000	0.0	0.0	4.5310	0.0	0.0	0.0	*
	3.0938	-3.40625	-9.80000	77.00000	0.0	0.0	4.5416	0.0	0.0	0.0	*
	4.1250	-2.37500	-9.80000	77.00000	0.0	0.0	4.4992	0.0	0.0	0.0	*
	5.1563	-1.34375	-9.80000	77.00000	0.0	0.0	4.4042	0.0	0.0	0.0	*
	6.1875	-0.31250	-9.80000	77.00000	0.0	0.0	4.2647	0.0	0.0	0.0	*
	7.2188	0.71875	-9.80000	77.00000	0.0	0.0	4.0986	0.0	0.0	0.0	*
	8.2500	1.75000	-9.80000	77.00000	0.0	0.0	3.9274	0.0	0.0	0.0	*
	9.2813	2.78125	-9.80000	77.00000	0.0	0.0	3.7678	0.0	0.0	0.0	*
	10.313	3.81250	-9.80000	77.00000	0.0	0.0	3.6286	0.0	0.0	0.0	*
	11.344	4.84375	-9.80000	77.00000	0.0	0.0	3.5126	0.0	0.0	0.0	*
	12.375	5.87500	-9.80000	77.00000	0.0	0.0	3.4191	0.0	0.0	0.0	*
	13.406	6.90625	-9.80000	77.00000	0.0	0.0	3.3448	0.0	0.0	0.0	*
	14.438	7.93750	-9.80000	77.00000	0.0	0.0	3.2855	0.0	0.0	0.0	*
	15.469	8.96875	-9.80000	77.00000	0.0	0.0	3.2372	0.0	0.0	0.0	*
	16.500	10.00000	-9.80000	77.00000	0.0	0.0	3.1970	0.0	0.0	0.0	*
	17.531	11.03125	-9.80000	77.00000	0.0	0.0	3.1625	0.0	0.0	0.0	*
	18.563	12.06250	-9.80000	77.00000	0.0	0.0	3.1319	0.0	0.0	0.0	*
	19.594	13.09375	-9.80000	77.00000	0.0	0.0	3.1042	0.0	0.0	0.0	*
	20.625	14.12500	-9.80000	77.00000	0.0	0.0	3.0786	0.0	0.0	0.0	*
	21.656	15.15625	-9.80000	77.00000	0.0	0.0	3.0545	0.0	0.0	0.0	*
	22.688	16.18750	-9.80000	77.00000	0.0	0.0	3.0315	0.0	0.0	0.0	*
	23.719	17.21875	-9.80000	77.00000	0.0	0.0	3.0097	0.0	0.0	0.0	*
	24.750	18.25000	-9.80000	77.00000	0.0	0.0	2.9890	0.0	0.0	0.0	*
	25.781	19.28125	-9.80000	77.00000	0.0	0.0	2.9697	0.0	0.0	0.0	*
	26.813	20.31250	-9.80000	77.00000	0.0	0.0	2.9519	0.0	0.0	0.0	*
	27.844	21.34375	-9.80000	77.00000	0.0	0.0	2.9356	0.0	0.0	0.0	*
	28.875	22.37500	-9.80000	77.00000	0.0	0.0	2.9206	0.0	0.0	0.0	*
	29.906	23.40625	-9.80000	77.00000	0.0	0.0	2.9065	0.0	0.0	0.0	*
	30.938	24.43750	-9.80000	77.00000	0.0	0.0	2.8930	0.0	0.0	0.0	*
	31.969	25.46875	-9.80000	77.00000	0.0	0.0	2.8795	0.0	0.0	0.0	*
	33.000	26.50000	-9.80000	77.00000	0.0	0.0	2.8653	0.0	0.0	0.0	*
South Mansions - East 2	Line 6	26.50000	-9.80000	77.00000	0.0	0.0	2.8653	0.0	0.0	270.00	*
	1.0000	26.50000	-10.80000	77.00000	0.0	0.0	2.9348	0.0	0.0	270.00	*
	2.0000	26.50000	-11.80000	77.00000	0.0	0.0	2.8927	0.0	0.0	270.00	*
	3.0000	26.50000	-12.80000	77.00000	0.0	0.0	2.7878	0.0	0.0	270.00	*
	4.0000	26.50000	-13.80000	77.00000	0.0	0.0	2.6484	0.0	0.0	270.00	*
	5.0000	26.50000	-14.80000	77.00000	0.0	0.0	2.4918	0.0	0.0	270.00	*
	6.0000	26.50000	-15.80000	77.00000	0.0	0.0	2.3287	0.0	0.0	270.00	*
South Mansions - South 2	Line 7	10.50000	-15.80000	77.00000	0.0	0.0	2.5577	0.0	0.0	0.0	*
	1.0000	11.50000	-15.80000	77.00000	0.0	0.0	2.5421	0.0	0.0	0.0	*
	2.0000	12.50000	-15.80000	77.00000	0.0	0.0	2.5271	0.0	0.0	0.0	*
	3.0000	13.50000	-15.80000	77.00000	0.0	0.0	2.5126	0.0	0.0	0.0	*
	4.0000	14.50000	-15.80000	77.00000	0.0	0.0	2.4987	0.0	0.0	0.0	*
	5.0000	15.50000	-15.80000	77.00000	0.0	0.0	2.4852	0.0	0.0	0.0	*
	6.0000	16.50000	-15.80000	77.00000	0.0	0.0	2.4720	0.0	0.0	0.0	*
	7.0000	17.50000	-15.80000	77.00000	0.0	0.0	2.4591	0.0	0.0	0.0	*
	8.0000	18.50000	-15.80000	77.00000	0.0	0.0	2.4462	0.0	0.0	0.0	*
	9.0000	19.50000	-15.80000	77.00000	0.0	0.0	2.4333	0.0	0.0	0.0	*
	10.000	20.50000	-15.80000	77.00000	0.0	0.0	2.4202	0.0	0.0	0.0	*
	11.000	21.50000	-15.80000	77.00000	0.0	0.0	2.4069	0.0	0.0	0.0	*
	12.000	22.50000	-15.80000	77.00000	0.0	0.0	2.3931	0.0	0.0	0.0	*
	13.000	23.50000	-15.80000	77.00000	0.0	0.0	2.3786	0.0	0.0	0.0	*
	14.000	24.50000	-15.80000	77.00000	0.0	0.0	2.3633	0.0	0.0	0.0	*
	15.000	25.50000	-15.80000	77.00000	0.0	0.0	2.3467	0.0	0.0	0.0	*
	16.000	26.50000	-15.80000	77.00000	0.0	0.0	2.3287	0.0	0.0	0.0	*
South Mansions East 1	Line 8	10.50000	-22.80000	77.00000	0.0	0.0	1.4614	0.0	0.0	90.000	*
	1.1667	10.50000	-21.63333	77.00000	0.0	0.0	1.6125	0.0	0.0	90.000	*
	2.3333	10.50000	-20.46667	77.00000	0.0	0.0	1.7771	0.0	0.0	90.000	*
	3.5000	10.50000	-19.30000	77.00000	0.0	0.0	1.9553	0.0	0.0	90.000	*
	4.6667	10.50000	-18.13333	77.00000	0.0	0.0	2.1464	0.0	0.0	90.000	*
	5.8333	10.50000	-16.96667	77.00000	0.0	0.0	2.3485	0.0	0.0	90.000	*
	7.0000	10.50000	-15.80000	77.00000	0.0	0.0	2.5577	0.0	0.0	90.000	*
South Mansions - South 1	Line 9	-6.50000	-22.80000	77.00000	0.0	0.0	1.2747	0.0	0.0	0.0	*
	1.0625	-5.43750	-22.80000	77.00000	0.0	0.0	1.3074	0.0	0.0	0.0	*
	2.1250	-4.37500	-22.80000	77.00000	0.0	0.0	1.3370	0.0	0.0	0.0	*
	3.1875	-3.31250	-22.80000	77.00000	0.0	0.0	1.3634	0.0	0.0	0.0	*
	4.2500	-2.25000	-22.80000	77.00000	0.0	0.0	1.3865	0.0	0.0	0.0	*

Name	Type/No. Dist.	Coordinates x	y	z	Displacements x	y	z	Horizontal displacement	Horizontal displacement	Angle of Line to x Axis	
	5.3125	-1.18750	-22.80000	77.00000	0.0	0.0	1.4062	0.0	0.0	0.0	*
	6.3750	-0.12500	-22.80000	77.00000	0.0	0.0	1.4227	0.0	0.0	0.0	*
	7.4375	0.93750	-22.80000	77.00000	0.0	0.0	1.4363	0.0	0.0	0.0	*
	8.5000	2.00000	-22.80000	77.00000	0.0	0.0	1.4469	0.0	0.0	0.0	*
	9.5625	3.06250	-22.80000	77.00000	0.0	0.0	1.4550	0.0	0.0	0.0	*
	10.625	4.12500	-22.80000	77.00000	0.0	0.0	1.4608	0.0	0.0	0.0	*
	11.688	5.18750	-22.80000	77.00000	0.0	0.0	1.4645	0.0	0.0	0.0	*
	12.750	6.25000	-22.80000	77.00000	0.0	0.0	1.4665	0.0	0.0	0.0	*
	13.813	7.31250	-22.80000	77.00000	0.0	0.0	1.4670	0.0	0.0	0.0	*
	14.875	8.37500	-22.80000	77.00000	0.0	0.0	1.4662	0.0	0.0	0.0	*
	15.938	9.43750	-22.80000	77.00000	0.0	0.0	1.4642	0.0	0.0	0.0	*
	17.000	10.50000	-22.80000	77.00000	0.0	0.0	1.4614	0.0	0.0	0.0	*
South Mansions - West	Line 10	-6.50000	-22.80000	77.00000	0.0	0.0	1.2747	0.0	0.0	90.000	*
	1.0833	-6.50000	-21.71667	77.00000	0.0	0.0	1.4102	0.0	0.0	90.000	*
	2.1667	-6.50000	-20.63333	77.00000	0.0	0.0	1.5612	0.0	0.0	90.000	*
	3.2500	-6.50000	-19.55000	77.00000	0.0	0.0	1.7294	0.0	0.0	90.000	*
	4.3333	-6.50000	-18.46667	77.00000	0.0	0.0	1.9166	0.0	0.0	90.000	*
	5.4167	-6.50000	-17.38333	77.00000	0.0	0.0	2.1247	0.0	0.0	90.000	*
	6.5000	-6.50000	-16.30000	77.00000	0.0	0.0	2.3556	0.0	0.0	90.000	*
	7.5833	-6.50000	-15.21667	77.00000	0.0	0.0	2.6113	0.0	0.0	90.000	*
	8.6667	-6.50000	-14.13333	77.00000	0.0	0.0	2.8938	0.0	0.0	90.000	*
	9.7500	-6.50000	-13.05000	77.00000	0.0	0.0	3.2055	0.0	0.0	90.000	*
	10.833	-6.50000	-11.96667	77.00000	0.0	0.0	3.5498	0.0	0.0	90.000	*
	11.917	-6.50000	-10.88333	77.00000	0.0	0.0	3.9329	0.0	0.0	90.000	*
	13.000	-6.50000	-9.80000	77.00000	0.0	0.0	4.3680	0.0	0.0	90.000	*

* Result includes imported displacement(s).

Specific Building Damage Results - Horizontal Displacements

Structure: Chase Mansion | Sub-structure: Western Elevation

Dist.	Coordinates x	y	z	Displacements x	y	Horizontal displacement along the Line	Horizontal displacement perpendicular to Line	
[m]	[m]	[m]	[m]	[mm]	[mm]	[mm]	[mm]	
0.0	-11.00000	59.00000	77.00000	0.0	0.0	0.0	0.0	d
1.2000	-11.00000	60.20000	77.00000	0.0	0.0	0.0	0.0	d
2.4000	-11.00000	61.40000	77.00000	0.0	0.0	0.0	0.0	d
3.6000	-11.00000	62.60000	77.00000	0.0	0.0	0.0	0.0	d
4.8000	-11.00000	63.80000	77.00000	0.0	0.0	0.0	0.0	d
6.0000	-11.00000	65.00000	77.00000	0.0	0.0	0.0	0.0	d
7.2000	-11.00000	66.20000	77.00000	0.0	0.0	0.0	0.0	d
8.4000	-11.00000	67.40000	77.00000	0.0	0.0	0.0	0.0	d
9.6000	-11.00000	68.60000	77.00000	0.0	0.0	0.0	0.0	d
10.800	-11.00000	69.80000	77.00000	0.0	0.0	0.0	0.0	d
12.000	-11.00000	71.00000	77.00000	0.0	0.0	0.0	0.0	d

d - Displacements include imported displacements.

Structure: Chase Mansion | Sub-structure: Eastern Elevation

Dist.	Coordinates x	y	z	Displacements x	y	Horizontal displacement along the Line	Horizontal displacement perpendicular to Line	
[m]	[m]	[m]	[m]	[mm]	[mm]	[mm]	[mm]	
0.0	13.00000	59.00000	77.00000	0.0	0.0	0.0	0.0	d
1.2000	13.00000	60.20000	77.00000	0.0	0.0	0.0	0.0	d
2.4000	13.00000	61.40000	77.00000	0.0	0.0	0.0	0.0	d
3.6000	13.00000	62.60000	77.00000	0.0	0.0	0.0	0.0	d
4.8000	13.00000	63.80000	77.00000	0.0	0.0	0.0	0.0	d
6.0000	13.00000	65.00000	77.00000	0.0	0.0	0.0	0.0	d
7.2000	13.00000	66.20000	77.00000	0.0	0.0	0.0	0.0	d
8.4000	13.00000	67.40000	77.00000	0.0	0.0	0.0	0.0	d
9.6000	13.00000	68.60000	77.00000	0.0	0.0	0.0	0.0	d
10.800	13.00000	69.80000	77.00000	0.0	0.0	0.0	0.0	d
12.000	13.00000	71.00000	77.00000	0.0	0.0	0.0	0.0	d

d - Displacements include imported displacements.

Structure: Chase Mansions | Sub-structure: Southern Elevation

Dist.	Coordinates x	y	z	Displacements x	y	Horizontal displacement along the Line	Horizontal displacement perpendicular to Line	
[m]	[m]	[m]	[m]	[mm]	[mm]	[mm]	[mm]	
0.0	-11.00000	59.00000	77.00000	0.0	0.0	0.0	0.0	d
1.0909	-9.90909	59.00000	77.00000	0.0	0.0	0.0	0.0	d
2.1818	-8.81818	59.00000	77.00000	0.0	0.0	0.0	0.0	d
3.2727	-7.72727	59.00000	77.00000	0.0	0.0	0.0	0.0	d
4.3636	-6.63636	59.00000	77.00000	0.0	0.0	0.0	0.0	d
5.4545	-5.54545	59.00000	77.00000	0.0	0.0	0.0	0.0	d
6.5455	-4.45455	59.00000	77.00000	0.0	0.0	0.0	0.0	d
7.6364	-3.36364	59.00000	77.00000	0.0	0.0	0.0	0.0	d
8.7273	-2.27273	59.00000	77.00000	0.0	0.0	0.0	0.0	d
9.8182	-1.18182	59.00000	77.00000	0.0	0.0	0.0	0.0	d
10.909	-0.09091	59.00000	77.00000	0.0	0.0	0.0	0.0	d
12.000	1.00000	59.00000	77.00000	0.0	0.0	0.0	0.0	d
13.091	2.09091	59.00000	77.00000	0.0	0.0	0.0	0.0	d
14.182	3.18182	59.00000	77.00000	0.0	0.0	0.0	0.0	d
15.273	4.27273	59.00000	77.00000	0.0	0.0	0.0	0.0	d
16.364	5.36364	59.00000	77.00000	0.0	0.0	0.0	0.0	d
17.455	6.45455	59.00000	77.00000	0.0	0.0	0.0	0.0	d
18.545	7.54545	59.00000	77.00000	0.0	0.0	0.0	0.0	d
19.636	8.63636	59.00000	77.00000	0.0	0.0	0.0	0.0	d
20.727	9.72727	59.00000	77.00000	0.0	0.0	0.0	0.0	d
21.818	10.81818	59.00000	77.00000	0.0	0.0	0.0	0.0	d
22.909	11.90909	59.00000	77.00000	0.0	0.0	0.0	0.0	d
24.000	13.00000	59.00000	77.00000	0.0	0.0	0.0	0.0	d

d - Displacements include imported displacements.

Structure: Chase Mansions | Sub-structure: Northern Elevation

Dist.	Coordinates x	y	z	Displacements x	y	Horizontal displacement along the Line	Horizontal displacement perpendicular to Line	
[m]	[m]	[m]	[m]	[mm]	[mm]	[mm]	[mm]	
0.0	-11.00000	71.00000	77.00000	0.0	0.0	0.0	0.0	d
1.0909	-9.90909	71.00000	77.00000	0.0	0.0	0.0	0.0	d
2.1818	-8.81818	71.00000	77.00000	0.0	0.0	0.0	0.0	d
3.2727	-7.72727	71.00000	77.00000	0.0	0.0	0.0	0.0	d
4.3636	-6.63636	71.00000	77.00000	0.0	0.0	0.0	0.0	d
5.4545	-5.54545	71.00000	77.00000	0.0	0.0	0.0	0.0	d
6.5455	-4.45455	71.00000	77.00000	0.0	0.0	0.0	0.0	d
7.6364	-3.36364	71.00000	77.00000	0.0	0.0	0.0	0.0	d
8.7273	-2.27273	71.00000	77.00000	0.0	0.0	0.0	0.0	d
9.8182	-1.18182	71.00000	77.00000	0.0	0.0	0.0	0.0	d
10.909	-0.09091	71.00000	77.00000	0.0	0.0	0.0	0.0	d
12.000	1.00000	71.00000	77.00000	0.0	0.0	0.0	0.0	d
13.091	2.09091	71.00000	77.00000	0.0	0.0	0.0	0.0	d
14.182	3.18182	71.00000	77.00000	0.0	0.0	0.0	0.0	d
15.273	4.27273	71.00000	77.00000	0.0	0.0	0.0	0.0	d
16.364	5.36364	71.00000	77.00000	0.0	0.0	0.0	0.0	d
17.455	6.45455	71.00000	77.00000	0.0	0.0	0.0	0.0	d
18.545	7.54545	71.00000	77.00000	0.0	0.0	0.0	0.0	d
19.636	8.63636	71.00000	77.00000	0.0	0.0	0.0	0.0	d
20.727	9.72727	71.00000	77.00000	0.0	0.0	0.0	0.0	d

Dist.	Coordinates					Displacements	
	x	y	z	x	y	Horizontal displacement along the Line	Horizontal displacement perpendicular to Line
	[m]	[m]	[m]	[mm]	[mm]	[mm]	[mm]
21.818	10.81818	71.00000	77.00000	0.0	0.0	0.0	0.0 d
22.909	11.90909	71.00000	77.00000	0.0	0.0	0.0	0.0 d
24.000	13.00000	71.00000	77.00000	0.0	0.0	0.0	0.0 d

d - Displacements include imported displacements.

Structure: South Mansions | Sub-structure: Northern Elevation

Dist.	Coordinates					Displacements	
	x	y	z	x	y	Horizontal displacement along the Line	Horizontal displacement perpendicular to Line
[m]	[m]	[m]	[m]	[mm]	[mm]	[mm]	[mm]
0.0	-6.50000	-9.80000	77.00000	0.0	0.0	0.0	0.0 d
1.0313	-5.46875	-9.80000	77.00000	0.0	0.0	0.0	0.0 d
2.0625	-4.43750	-9.80000	77.00000	0.0	0.0	0.0	0.0 d
3.0938	-3.40625	-9.80000	77.00000	0.0	0.0	0.0	0.0 d
4.1250	-2.37500	-9.80000	77.00000	0.0	0.0	0.0	0.0 d
5.1563	-1.34375	-9.80000	77.00000	0.0	0.0	0.0	0.0 d
6.1875	-0.31250	-9.80000	77.00000	0.0	0.0	0.0	0.0 d
7.2188	0.71875	-9.80000	77.00000	0.0	0.0	0.0	0.0 d
8.2500	1.75000	-9.80000	77.00000	0.0	0.0	0.0	0.0 d
9.2813	2.78125	-9.80000	77.00000	0.0	0.0	0.0	0.0 d
10.313	3.81250	-9.80000	77.00000	0.0	0.0	0.0	0.0 d
11.344	4.84375	-9.80000	77.00000	0.0	0.0	0.0	0.0 d
12.375	5.87500	-9.80000	77.00000	0.0	0.0	0.0	0.0 d
13.406	6.90625	-9.80000	77.00000	0.0	0.0	0.0	0.0 d
14.438	7.93750	-9.80000	77.00000	0.0	0.0	0.0	0.0 d
15.469	8.96875	-9.80000	77.00000	0.0	0.0	0.0	0.0 d
16.500	10.00000	-9.80000	77.00000	0.0	0.0	0.0	0.0 d
17.531	11.03125	-9.80000	77.00000	0.0	0.0	0.0	0.0 d
18.563	12.06250	-9.80000	77.00000	0.0	0.0	0.0	0.0 d
19.594	13.09375	-9.80000	77.00000	0.0	0.0	0.0	0.0 d
20.625	14.12500	-9.80000	77.00000	0.0	0.0	0.0	0.0 d
21.656	15.15625	-9.80000	77.00000	0.0	0.0	0.0	0.0 d
22.688	16.18750	-9.80000	77.00000	0.0	0.0	0.0	0.0 d
23.719	17.21875	-9.80000	77.00000	0.0	0.0	0.0	0.0 d
24.750	18.25000	-9.80000	77.00000	0.0	0.0	0.0	0.0 d
25.781	19.28125	-9.80000	77.00000	0.0	0.0	0.0	0.0 d
26.813	20.31250	-9.80000	77.00000	0.0	0.0	0.0	0.0 d
27.844	21.34375	-9.80000	77.00000	0.0	0.0	0.0	0.0 d
28.875	22.37500	-9.80000	77.00000	0.0	0.0	0.0	0.0 d
29.906	23.40625	-9.80000	77.00000	0.0	0.0	0.0	0.0 d
30.938	24.43750	-9.80000	77.00000	0.0	0.0	0.0	0.0 d
31.969	25.46875	-9.80000	77.00000	0.0	0.0	0.0	0.0 d
33.000	26.50000	-9.80000	77.00000	0.0	0.0	0.0	0.0 d

d - Displacements include imported displacements.

Structure: South Mansions | Sub-structure: Eastern Elevation 2

Dist.	Coordinates					Displacements	
	x	y	z	x	y	Horizontal displacement along the Line	Horizontal displacement perpendicular to Line
[m]	[m]	[m]	[m]	[mm]	[mm]	[mm]	[mm]
0.0	26.50000	-9.80000	77.00000	0.0	0.0	0.0	0.0 d
1.0000	26.50000	-10.80000	77.00000	0.0	0.0	0.0	0.0 d
2.0000	26.50000	-11.80000	77.00000	0.0	0.0	0.0	0.0 d
3.0000	26.50000	-12.80000	77.00000	0.0	0.0	0.0	0.0 d
4.0000	26.50000	-13.80000	77.00000	0.0	0.0	0.0	0.0 d
5.0000	26.50000	-14.80000	77.00000	0.0	0.0	0.0	0.0 d
6.0000	26.50000	-15.80000	77.00000	0.0	0.0	0.0	0.0 d

d - Displacements include imported displacements.

Structure: South Mansions | Sub-structure: Southern Elevation 2

Dist.	Coordinates					Displacements	
	x	y	z	x	y	Horizontal displacement along the Line	Horizontal displacement perpendicular to Line
[m]	[m]	[m]	[m]	[mm]	[mm]	[mm]	[mm]
0.0	10.50000	-15.80000	77.00000	0.0	0.0	0.0	0.0 d
1.0000	11.50000	-15.80000	77.00000	0.0	0.0	0.0	0.0 d
2.0000	12.50000	-15.80000	77.00000	0.0	0.0	0.0	0.0 d
3.0000	13.50000	-15.80000	77.00000	0.0	0.0	0.0	0.0 d
4.0000	14.50000	-15.80000	77.00000	0.0	0.0	0.0	0.0 d
5.0000	15.50000	-15.80000	77.00000	0.0	0.0	0.0	0.0 d
6.0000	16.50000	-15.80000	77.00000	0.0	0.0	0.0	0.0 d
7.0000	17.50000	-15.80000	77.00000	0.0	0.0	0.0	0.0 d
8.0000	18.50000	-15.80000	77.00000	0.0	0.0	0.0	0.0 d
9.0000	19.50000	-15.80000	77.00000	0.0	0.0	0.0	0.0 d
10.000	20.50000	-15.80000	77.00000	0.0	0.0	0.0	0.0 d
11.000	21.50000	-15.80000	77.00000	0.0	0.0	0.0	0.0 d
12.000	22.50000	-15.80000	77.00000	0.0	0.0	0.0	0.0 d
13.000	23.50000	-15.80000	77.00000	0.0	0.0	0.0	0.0 d
14.000	24.50000	-15.80000	77.00000	0.0	0.0	0.0	0.0 d
15.000	25.50000	-15.80000	77.00000	0.0	0.0	0.0	0.0 d
16.000	26.50000	-15.80000	77.00000	0.0	0.0	0.0	0.0 d

d - Displacements include imported displacements.

Structure: South Mansions | Sub-structure: Eastern Elevation 1

Dist.	Coordinates					Displacements	
	x	y	z	x	y	Horizontal displacement along the Line	Horizontal displacement perpendicular to Line
[m]	[m]	[m]	[m]	[mm]	[mm]	[mm]	[mm]
0.0	10.50000	-22.80000	77.00000	0.0	0.0	0.0	0.0 d
1.1667	10.50000	-21.63333	77.00000	0.0	0.0	0.0	0.0 d
2.3333	10.50000	-20.46667	77.00000	0.0	0.0	0.0	0.0 d
3.5000	10.50000	-19.30000	77.00000	0.0	0.0	0.0	0.0 d
4.6667	10.50000	-18.13333	77.00000	0.0	0.0	0.0	0.0 d
5.8333	10.50000	-16.96667	77.00000	0.0	0.0	0.0	0.0 d
7.0000	10.50000	-15.80000	77.00000	0.0	0.0	0.0	0.0 d

d - Displacements include imported displacements.

Structure: South Mansions | Sub-structure: Southern Elevation 1

Dist.	Coordinates					Displacements	
	x	y	z	x	y	Horizontal displacement along the Line	Horizontal displacement perpendicular to Line
[m]	[m]	[m]	[m]	[mm]	[mm]	[mm]	[mm]
0.0	-6.50000	-22.80000	77.00000	0.0	0.0	0.0	0.0 d
1.0625	-5.43750	-22.80000	77.00000	0.0	0.0	0.0	0.0 d
2.1250	-4.37500	-22.80000	77.00000	0.0	0.0	0.0	0.0 d
3.1875	-3.31250	-22.80000	77.00000	0.0	0.0	0.0	0.0 d
4.2500	-2.25000	-22.80000	77.00000	0.0	0.0	0.0	0.0 d
5.3125	-1.18750	-22.80000	77.00000	0.0	0.0	0.0	0.0 d
6.3750	-0.12500	-22.80000	77.00000	0.0	0.0	0.0	0.0 d
7.4375	0.93750	-22.80000	77.00000	0.0	0.0	0.0	0.0 d
8.5000	2.00000	-22.80000	77.00000	0.0	0.0	0.0	0.0 d
9.5625	3.06250	-22.80000	77.00000	0.0	0.0	0.0	0.0 d
10.625	4.12500	-22.80000	77.00000	0.0	0.0	0.0	0.0 d
11.688	5.18750	-22.80000	77.00000	0.0	0.0	0.0	0.0 d
12.750	6.25000	-22.80000	77.00000	0.0	0.0	0.0	0.0 d
13.813	7.31250	-22.80000	77.00000	0.0	0.0	0.0	0.0 d
14.875	8.37500	-22.80000	77.00000	0.0	0.0	0.0	0.0 d
15.938	9.43750	-22.80000	77.00000	0.0	0.0	0.0	0.0 d
17.000	10.50000	-22.80000	77.00000	0.0	0.0	0.0	0.0 d

Dist.	Coordinates x	y	z	Displacements x	y	Horizontal displacement along the Line	Horizontal displacement perpendicular to Line
[m]	[m]	[m]	[m]	[mm]	[mm]	[mm]	[mm]
0.0	-6.50000	-22.80000	77.00000	0.0	0.0	0.0	0.0 d
1.0833	-6.50000	-21.71667	77.00000	0.0	0.0	0.0	0.0 d
2.1667	-6.50000	-20.63333	77.00000	0.0	0.0	0.0	0.0 d
3.2500	-6.50000	-19.55000	77.00000	0.0	0.0	0.0	0.0 d
4.3333	-6.50000	-18.46667	77.00000	0.0	0.0	0.0	0.0 d
5.4167	-6.50000	-17.38333	77.00000	0.0	0.0	0.0	0.0 d
6.5000	-6.50000	-16.30000	77.00000	0.0	0.0	0.0	0.0 d
7.5833	-6.50000	-15.21667	77.00000	0.0	0.0	0.0	0.0 d
8.6667	-6.50000	-14.13333	77.00000	0.0	0.0	0.0	0.0 d
9.7500	-6.50000	-13.05000	77.00000	0.0	0.0	0.0	0.0 d
10.833	-6.50000	-11.96667	77.00000	0.0	0.0	0.0	0.0 d
11.917	-6.50000	-10.88333	77.00000	0.0	0.0	0.0	0.0 d
13.000	-6.50000	-9.80000	77.00000	0.0	0.0	0.0	0.0 d

d - Displacements include imported displacements.

Specific Building Damage Results - Vertical Displacements

Structure: Chase Mansion | Sub-structure: Western Elevation

Dist.	Coordinates x	y	z	Displacements z
[m]	[m]	[m]	[m]	[mm]
Vertical Offset 1				
0.0	-11.00000	59.00000	77.00000	6.8409 d
1.2000	-11.00000	60.20000	77.00000	6.1212 d
2.4000	-11.00000	61.40000	77.00000	5.1997 d
3.6000	-11.00000	62.60000	77.00000	4.5967 d
4.8000	-11.00000	63.80000	77.00000	4.0923 d
6.0000	-11.00000	65.00000	77.00000	3.6487 d
7.2000	-11.00000	66.20000	77.00000	3.2528 d
8.4000	-11.00000	67.40000	77.00000	2.8984 d
9.6000	-11.00000	68.60000	77.00000	2.5818 d
10.800	-11.00000	69.80000	77.00000	2.2996 d
12.000	-11.00000	71.00000	77.00000	2.0489 d

d - Displacements include imported displacements.

Structure: Chase Mansion | Sub-structure: Eastern Elevation

Dist.	Coordinates x	y	z	Displacements z
[m]	[m]	[m]	[m]	[mm]
Vertical Offset 1				
0.0	13.00000	59.00000	77.00000	-1.3390 d
1.2000	13.00000	60.20000	77.00000	-0.40228 d
2.4000	13.00000	61.40000	77.00000	1.4931 d
3.6000	13.00000	62.60000	77.00000	2.4812 d
4.8000	13.00000	63.80000	77.00000	2.8548 d
6.0000	13.00000	65.00000	77.00000	2.9377 d
7.2000	13.00000	66.20000	77.00000	2.8760 d
8.4000	13.00000	67.40000	77.00000	2.7412 d
9.6000	13.00000	68.60000	77.00000	2.5712 d
10.800	13.00000	69.80000	77.00000	2.3870 d
12.000	13.00000	71.00000	77.00000	2.2007 d

d - Displacements include imported displacements.

Structure: Chase Mansions | Sub-structure: Southern Elevation

Dist.	Coordinates x	y	z	Displacements z
[m]	[m]	[m]	[m]	[mm]
Vertical Offset 1				
0.0	-11.00000	59.00000	77.00000	6.8409 d
1.0909	-9.90909	59.00000	77.00000	7.2603 d
2.1818	-8.81818	59.00000	77.00000	7.5806 d
3.2727	-7.72727	59.00000	77.00000	7.8193 d
4.3636	-6.63636	59.00000	77.00000	7.9674 d
5.4545	-5.54545	59.00000	77.00000	8.0501 d
6.5455	-4.45455	59.00000	77.00000	8.0069 d
7.6364	-3.36364	59.00000	77.00000	7.7882 d
8.7273	-2.27273	59.00000	77.00000	7.2654 d
9.8182	-1.18182	59.00000	77.00000	6.1880 d
10.909	-0.09091	59.00000	77.00000	4.0271 d
12.000	1.00000	59.00000	77.00000	1.7660 d
13.091	2.09091	59.00000	77.00000	0.36559 d
14.182	3.18182	59.00000	77.00000	-0.33709 d
15.273	4.27273	59.00000	77.00000	-0.72803 d
16.364	5.36364	59.00000	77.00000	-0.95674 d
17.455	6.45455	59.00000	77.00000	-1.0942 d
18.545	7.54545	59.00000	77.00000	-1.1783 d
19.636	8.63636	59.00000	77.00000	-1.2312 d
20.727	9.72727	59.00000	77.00000	-1.2671 d
21.818	10.81818	59.00000	77.00000	-1.2947 d
22.909	11.90909	59.00000	77.00000	-1.3181 d
24.000	13.00000	59.00000	77.00000	-1.3390 d

d - Displacements include imported displacements.

Structure: Chase Mansions | Sub-structure: Northern Elevation

Dist.	Coordinates x	y	z	Displacements z
[m]	[m]	[m]	[m]	[mm]
Vertical Offset 1				
0.0	-11.00000	71.00000	77.00000	2.0489 d
1.0909	-9.90909	71.00000	77.00000	2.1217 d
2.1818	-8.81818	71.00000	77.00000	2.1869 d
3.2727	-7.72727	71.00000	77.00000	2.2438 d
4.3636	-6.63636	71.00000	77.00000	2.2913 d
5.4545	-5.54545	71.00000	77.00000	2.3292 d
6.5455	-4.45455	71.00000	77.00000	2.3573 d
7.6364	-3.36364	71.00000	77.00000	2.3757 d
8.7273	-2.27273	71.00000	77.00000	2.3852 d
9.8182	-1.18182	71.00000	77.00000	2.3866 d
10.909	-0.09091	71.00000	77.00000	2.3812 d
12.000	1.00000	71.00000	77.00000	2.3704 d
13.091	2.09091	71.00000	77.00000	2.3557 d
14.182	3.18182	71.00000	77.00000	2.3384 d
15.273	4.27273	71.00000	77.00000	2.3198 d
16.364	5.36364	71.00000	77.00000	2.3010 d
17.455	6.45455	71.00000	77.00000	2.2826 d
18.545	7.54545	71.00000	77.00000	2.2654 d
19.636	8.63636	71.00000	77.00000	2.2494 d
20.727	9.72727	71.00000	77.00000	2.2350 d
21.818	10.81818	71.00000	77.00000	2.2221 d
22.909	11.90909	71.00000	77.00000	2.2107 d
24.000	13.00000	71.00000	77.00000	2.2007 d

d - Displacements include imported displacements.

Structure: South Mansions | Sub-structure: Northern Elevation

Dist.	Coordinates x [m]	y [m]	z [m]	Displacements z [mm]

Dist.	Coordinates x [m]	y [m]	z [m]	Displacements z [mm]

Vertical Offset 1

0.0	-6.50000	-9.80000	77.00000	4.3680 d
1.0313	-5.46875	-9.80000	77.00000	4.4714 d
2.0625	-4.43750	-9.80000	77.00000	4.5310 d
3.0938	-3.40625	-9.80000	77.00000	4.5416 d
4.1250	-2.37500	-9.80000	77.00000	4.4992 d
5.1563	-1.34375	-9.80000	77.00000	4.4042 d
6.1875	-0.31250	-9.80000	77.00000	4.2647 d
7.2188	0.71875	-9.80000	77.00000	4.0986 d
8.2500	1.75000	-9.80000	77.00000	3.9274 d
9.2813	2.78125	-9.80000	77.00000	3.7678 d
10.313	3.81250	-9.80000	77.00000	3.6286 d
11.344	4.84375	-9.80000	77.00000	3.5126 d
12.375	5.87500	-9.80000	77.00000	3.4191 d
13.406	6.90625	-9.80000	77.00000	3.3448 d
14.438	7.93750	-9.80000	77.00000	3.2855 d
15.469	8.96875	-9.80000	77.00000	3.2372 d
16.500	10.00000	-9.80000	77.00000	3.1970 d
17.531	11.03125	-9.80000	77.00000	3.1625 d
18.563	12.06250	-9.80000	77.00000	3.1319 d
19.594	13.09375	-9.80000	77.00000	3.1042 d
20.625	14.12500	-9.80000	77.00000	3.0786 d
21.656	15.15625	-9.80000	77.00000	3.0545 d
22.688	16.18750	-9.80000	77.00000	3.0315 d
23.719	17.21875	-9.80000	77.00000	3.0097 d
24.750	18.25000	-9.80000	77.00000	2.9890 d
25.781	19.28125	-9.80000	77.00000	2.9697 d
26.813	20.31250	-9.80000	77.00000	2.9519 d
27.844	21.34375	-9.80000	77.00000	2.9356 d
28.875	22.37500	-9.80000	77.00000	2.9206 d
29.906	23.40625	-9.80000	77.00000	2.9065 d
30.938	24.43750	-9.80000	77.00000	2.8930 d
31.969	25.46875	-9.80000	77.00000	2.8795 d
33.000	26.50000	-9.80000	77.00000	2.8653 d

d - Displacements include imported displacements.

Structure: South Mansions | Sub-structure: Eastern Elevation 2

Dist.	Coordinates x [m]	y [m]	z [m]	Displacements z [mm]

Vertical Offset 1

0.0	26.50000	-9.80000	77.00000	2.8653 d
1.0000	26.50000	-10.80000	77.00000	2.9348 d
2.0000	26.50000	-11.80000	77.00000	2.8927 d
3.0000	26.50000	-12.80000	77.00000	2.7878 d
4.0000	26.50000	-13.80000	77.00000	2.6484 d
5.0000	26.50000	-14.80000	77.00000	2.4918 d
6.0000	26.50000	-15.80000	77.00000	2.3287 d

d - Displacements include imported displacements.

Structure: South Mansions | Sub-structure: Southern Elevation 2

Dist.	Coordinates x [m]	y [m]	z [m]	Displacements z [mm]

Vertical Offset 1

0.0	10.50000	-15.80000	77.00000	2.5577 d
1.0000	11.50000	-15.80000	77.00000	2.5421 d
2.0000	12.50000	-15.80000	77.00000	2.5271 d
3.0000	13.50000	-15.80000	77.00000	2.5126 d
4.0000	14.50000	-15.80000	77.00000	2.4987 d
5.0000	15.50000	-15.80000	77.00000	2.4852 d
6.0000	16.50000	-15.80000	77.00000	2.4720 d
7.0000	17.50000	-15.80000	77.00000	2.4591 d
8.0000	18.50000	-15.80000	77.00000	2.4462 d
9.0000	19.50000	-15.80000	77.00000	2.4333 d
10.000	20.50000	-15.80000	77.00000	2.4202 d
11.000	21.50000	-15.80000	77.00000	2.4069 d
12.000	22.50000	-15.80000	77.00000	2.3931 d
13.000	23.50000	-15.80000	77.00000	2.3786 d
14.000	24.50000	-15.80000	77.00000	2.3633 d
15.000	25.50000	-15.80000	77.00000	2.3467 d
16.000	26.50000	-15.80000	77.00000	2.3287 d

d - Displacements include imported displacements.

Structure: South Mansions | Sub-structure: Eastern Elevation 1

Dist.	Coordinates x [m]	y [m]	z [m]	Displacements z [mm]

Vertical Offset 1

0.0	10.50000	-22.80000	77.00000	1.4614 d
1.1667	10.50000	-21.63333	77.00000	1.6125 d
2.3333	10.50000	-20.46667	77.00000	1.7771 d
3.5000	10.50000	-19.30000	77.00000	1.9553 d
4.6667	10.50000	-18.13333	77.00000	2.1464 d
5.8333	10.50000	-16.96667	77.00000	2.3485 d
7.0000	10.50000	-15.80000	77.00000	2.5577 d

d - Displacements include imported displacements.

Structure: South Mansions | Sub-structure: Southern Elevation 1

Dist.	Coordinates x [m]	y [m]	z [m]	Displacements z [mm]

Vertical Offset 1

0.0	-6.50000	-22.80000	77.00000	1.2747 d
1.0625	-5.43750	-22.80000	77.00000	1.3074 d
2.1250	-4.37500	-22.80000	77.00000	1.3370 d
3.1875	-3.31250	-22.80000	77.00000	1.3634 d
4.2500	-2.25000	-22.80000	77.00000	1.3865 d
5.3125	-1.18750	-22.80000	77.00000	1.4062 d
6.3750	-0.12500	-22.80000	77.00000	1.4227 d
7.4375	0.93750	-22.80000	77.00000	1.4363 d
8.5000	2.00000	-22.80000	77.00000	1.4469 d
9.5625	3.06250	-22.80000	77.00000	1.4550 d
10.625	4.12500	-22.80000	77.00000	1.4608 d
11.688	5.18750	-22.80000	77.00000	1.4645 d
12.750	6.25000	-22.80000	77.00000	1.4665 d
13.813	7.31250	-22.80000	77.00000	1.4670 d
14.875	8.37500	-22.80000	77.00000	1.4662 d
15.938	9.43750	-22.80000	77.00000	1.4642 d
17.000	10.50000	-22.80000	77.00000	1.4614 d

d - Displacements include imported displacements.

Structure: South Mansions | Sub-structure: Western Elevation

Dist.	Coordinates x [m]	y [m]	z [m]	Displacements z [mm]

Vertical Offset 1

0.0	-6.50000	-22.80000	77.00000	1.2747 d
1.0833	-6.50000	-21.71667	77.00000	1.4102 d
2.1667	-6.50000	-20.63333	77.00000	1.5612 d

Dist.	Coordinates x	y	z	Displacements z
[m]	[m]	[m]	[m]	[mm]	
3.2500	-6.50000	-19.55000	77.00000	1.7294 d
4.3333	-6.50000	-18.46667	77.00000	1.9166 d
5.4167	-6.50000	-17.38333	77.00000	2.1247 d
6.5000	-6.50000	-16.30000	77.00000	2.3556 d
7.5833	-6.50000	-15.21667	77.00000	2.6113 d
8.6667	-6.50000	-14.13333	77.00000	2.8938 d
9.7500	-6.50000	-13.05000	77.00000	3.2055 d
10.833	-6.50000	-11.96667	77.00000	3.5498 d
11.917	-6.50000	-10.88333	77.00000	3.9329 d
13.000	-6.50000	-9.80000	77.00000	4.3680 d

d - Displacements include imported displacements.

Specific Building Damage Results - All Segments

Structure: Chase Mansion | Sub-structure: Western Elevation

Vertical Offset from Line for Vertical Movement Calculations	Segment	Start	Length	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	Damage Category
[m]		[m]	[m]		[%]	[%]	[%]			[m]	
0.0	1	0.0	1.6199	Sagging	0.0032166	0.0	0.0031901	0.0	767.98E-6	4336.1	0 (Negligible)
	2	1.6199	10.380	Hogging	0.0054626	0.0	0.0050334	0.0	767.98E-6	10043.	0 (Negligible)

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

Structure: Chase Mansion | Sub-structure: Eastern Elevation

Vertical Offset from Line for Vertical Movement Calculations	Segment	Start	Length	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	Damage Category
[m]		[m]	[m]		[%]	[%]	[%]			[m]	
0.0	1	0.0	1.8869	Hogging	0.018475	0.0	0.018423	0.0	-0.0015795	1010.4	0 (Negligible)
	2	1.8869	9.9228	Sagging	0.017301	0.0	0.022373	0.0	-0.0015795	2380.5	0 (Negligible)
	3	11.810	0.19029	None	0.0	0.0	0.0	0.0	155.22E-6	1.5048E+6	0 (Negligible)

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

Structure: Chase Mansions | Sub-structure: Southern Elevation

Vertical Offset from Line for Vertical Movement Calculations	Segment	Start	Length	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	Damage Category
[m]		[m]	[m]		[%]	[%]	[%]			[m]	
0.0	1	0.0	11.077	Sagging	0.028213	0.0	0.038477	0.0	0.0020726	1702.0	0 (Negligible)
	2	11.077	12.923	Hogging	0.021738	0.0	0.021207	0.0	0.0020726	1863.0	0 (Negligible)

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

Structure: Chase Mansions | Sub-structure: Northern Elevation

Vertical Offset from Line for Vertical Movement Calculations	Segment	Start	Length	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	Damage Category
[m]		[m]	[m]		[%]	[%]	[%]			[m]	
0.0	1	0.0	15.735	Sagging	0.0012662	0.0	0.0019093	0.0	-66.706E-6	122250.	0 (Negligible)
	2	15.735	8.2648	Hogging	120.18E-6	0.0	114.05E-6	0.0	17.267E-6	785680.	0 (Negligible)

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

Structure: South Mansions | Sub-structure: Northern Elevation

Vertical Offset from Line for Vertical Movement Calculations	Segment	Start	Length	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	Damage Category
[m]		[m]	[m]		[%]	[%]	[%]			[m]	
0.0	1	0.0	7.6261	Sagging	0.0041091	0.0	0.0045238	0.0	165.96E-6	20513.	0 (Negligible)
	2	7.6261	23.288	Hogging	0.0017723	0.0	0.0024682	0.0	165.96E-6	47792.	0 (Negligible)
	3	30.915	2.0854	Sagging	15.679E-6	0.0	15.485E-6	0.0	13.726E-6	1.2999E+6	0 (Negligible)

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

Structure: South Mansions | Sub-structure: Eastern Elevation 2

Vertical Offset from Line for Vertical Movement Calculations	Segment	Start	Length	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	Damage Category
[m]		[m]	[m]		[%]	[%]	[%]			[m]	
0.0	1	0.0	6.0000	Sagging	0.0034378	0.0	0.0031653	0.0	163.12E-6	8079.2	0 (Negligible)

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

Structure: South Mansions | Sub-structure: Southern Elevation 2

Vertical Offset from Line for Vertical Movement Calculations	Segment	Start	Length	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	Damage Category
[m]		[m]	[m]		[%]	[%]	[%]			[m]	
0.0	1	0.0	7.8451	Hogging	40.448E-6	0.0	38.588E-6	0.0	15.643E-6	1.5226E+6	0 (Negligible)
	2	7.8451	8.1549	Sagging	73.225E-6	0.0	84.293E-6	0.0	18.010E-6	649210.	0 (Negligible)

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

Structure: South Mansions | Sub-structure: Eastern Elevation 1

Vertical Offset from Line for Vertical Movement Calculations	Segment	Start	Length	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	Damage Category
[m]		[m]	[m]		[%]	[%]	[%]			[m]	
0.0	1	0.0	7.0000	Hogging	772.13E-6	0.0	743.33E-6	0.0	-179.35E-6	100320.	0 (Negligible)

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

Structure: South Mansions | Sub-structure: Southern Elevation 1

Vertical Offset from Line for Vertical Movement Calculations	Segment	Start	Length	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	Damage Category
[m]		[m]	[m]		[%]	[%]	[%]			[m]	
0.0	1	0.0	17.000	Sagging	469.41E-6	0.0	712.36E-6	0.0	-30.811E-6	342570.	0 (Negligible)

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

Structure: South Mansions | Sub-structure: Western Elevation

Vertical Offset from Line for Vertical Movement Calculations	Segment	Start	Length	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	Damage Category
[m]		[m]	[m]		[%]	[%]	[%]			[m]	
0.0	1	0.0	13.000	Hogging	0.0035971	0.0	0.0035252	0.0	-401.64E-6	21203.	0 (Negligible)

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

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

Structure: Chase Mansion | Sub-structure: Western Elevation

Vertical Offset from Line for Vertical Movement Calculations	Deflection Ratio	Average Horizontal Strain	Max Slope	Max Settlement	Max Tensile Strain	Max Gradient of Horizontal Displacement Curve	Max Gradient of Vertical Displacement Curve	Min Radius of Curvature (Hogging)	Min Radius of Curvature (Sagging)	Damage Category
[m]	[%]	[%]		[mm]	[%]			[m]	[m]	
0.0	0.0054626	0.0	767.98E-6	6.8409	0.0050334	0.0	767.98E-6	10043.	4336.1	0 (Negligible)

Structure: Chase Mansion | Sub-structure: Eastern Elevation

Vertical Offset from Line for Vertical Movement Calculations	Deflection Ratio	Average Horizontal Strain	Max Slope	Max Settlement	Max Tensile Strain	Max Gradient of Horizontal Displacement Curve	Max Gradient of Vertical Displacement Curve	Min Radius of Curvature (Hogging)	Min Radius of Curvature (Sagging)	Damage Category
[m]	[%]	[%]		[mm]	[%]			[m]	[m]	
0.0	0.018475	0.0	-0.0015795	2.9375	0.022373	0.0	-0.0015795	1010.4	2380.5	0 (Negligible)

Structure: Chase Mansions | Sub-structure: Southern Elevation

Vertical Offset from Line for Vertical Movement Calculations	Deflection Ratio	Average Horizontal Strain	Max Slope	Max Settlement	Max Tensile Strain	Max Gradient of Horizontal Displacement Curve	Max Gradient of Vertical Displacement Curve	Min Radius of Curvature (Hogging)	Min Radius of Curvature (Sagging)	Damage Category
[m]	[%]	[%]		[mm]	[%]			[m]	[m]	
0.0	0.028213	0.0	0.0020726	8.0490	0.038477	0.0	0.0020726	1863.0	1702.0	0 (Negligible)

Structure: Chase Mansions | Sub-structure: Northern Elevation

Vertical Offset from Line for Vertical Movement Calculations	Deflection Ratio	Average Horizontal Strain	Max Slope	Max Settlement	Max Tensile Strain	Max Gradient of Horizontal Displacement Curve	Max Gradient of Vertical Displacement Curve	Min Radius of Curvature (Hogging)	Min Radius of Curvature (Sagging)	Damage Category
[m]	[%]	[%]		[mm]	[%]			[m]	[m]	
0.0	0.0012662	0.0	-66.706E-6	2.3864	0.0019093	0.0	-66.706E-6	785680.	122250.	0 (Negligible)

Structure: South Mansions | Sub-structure: Northern Elevation

Vertical Offset from Line for Vertical Movement Calculations	Deflection Ratio	Average Horizontal Strain	Max Slope	Max Settlement	Max Tensile Strain	Max Gradient of Horizontal Displacement Curve	Max Gradient of Vertical Displacement Curve	Min Radius of Curvature (Hogging)	Min Radius of Curvature (Sagging)	Damage Category
[m]	[%]	[%]		[mm]	[%]			[m]	[m]	
0.0	0.0041091	0.0	165.96E-6	4.5414	0.0045238	0.0	165.96E-6	47792.	20513.	0 (Negligible)

Structure: South Mansions | Sub-structure: Eastern Elevation 2

Vertical Offset from Line for Vertical Movement Calculations	Deflection Ratio	Average Horizontal Strain	Max Slope	Max Settlement	Max Tensile Strain	Max Gradient of Horizontal Displacement Curve	Max Gradient of Vertical Displacement Curve	Min Radius of Curvature (Hogging)	Min Radius of Curvature (Sagging)	Damage Category
[m]	[%]	[%]		[mm]	[%]			[m]	[m]	
0.0	0.0034378	0.0	163.12E-6	2.9335	0.0031653	0.0	163.12E-6	-	8079.2	0 (Negligible)

Structure: South Mansions | Sub-structure: Southern Elevation 2

Vertical Offset from Line for Vertical Movement Calculations	Deflection Ratio	Average Horizontal Strain	Max Slope	Max Settlement	Max Tensile Strain	Max Gradient of Horizontal Displacement Curve	Max Gradient of Vertical Displacement Curve	Min Radius of Curvature (Hogging)	Min Radius of Curvature (Sagging)	Damage Category
[m]	[%]	[%]		[mm]	[%]			[m]	[m]	
0.0	73.225E-6	0.0	18.010E-6	2.5577	84.293E-6	0.0	18.010E-6	1.5226E+6	649210.	0 (Negligible)

Structure: South Mansions | Sub-structure: Eastern Elevation 1

Vertical Offset from Line for Vertical Movement Calculations	Deflection Ratio	Average Horizontal Strain	Max Slope	Max Settlement	Max Tensile Strain	Max Gradient of Horizontal Displacement Curve	Max Gradient of Vertical Displacement Curve	Min Radius of Curvature (Hogging)	Min Radius of Curvature (Sagging)	Damage Category
[m]	[%]	[%]		[mm]	[%]			[m]	[m]	
0.0	772.13E-6	0.0	-179.35E-6	2.5577	743.33E-6	0.0	-179.35E-6	100320.	-	0 (Negligible)

Structure: South Mansions | Sub-structure: Southern Elevation 1

Vertical Offset from Line for Vertical Movement Calculations	Deflection Ratio	Average Horizontal Strain	Max Slope	Max Settlement	Max Tensile Strain	Max Gradient of Horizontal Displacement Curve	Max Gradient of Vertical Displacement Curve	Min Radius of Curvature (Hogging)	Min Radius of Curvature (Sagging)	Damage Category
[m]	[%]	[%]		[mm]	[%]			[m]	[m]	
0.0	469.41E-6	0.0	-30.811E-6	1.4670	712.36E-6	0.0	-30.811E-6	-	342570.	0 (Negligible)

Vertical Offset from Line for Vertical	Deflection Ratio	Average Horizontal Strain	Max Slope	Max Settlement	Max Tensile Strain	Max Gradient of Horizontal Displacement	Max Gradient of Vertical Displacement Curve	Min Radius of Curvature (Hogging)	Min Radius of Curvature (Sagging)	Damage Category
Structure: South Mansions | Sub-structure: Western Elevation										
Vertical Offset from Line for Vertical Movement Calculations	Deflection Ratio	Average Horizontal Strain	Max Slope	Max Settlement	Max Tensile Strain	Max Gradient of Horizontal Displacement Curve	Max Gradient of Vertical Displacement Curve	Min Radius of Curvature (Hogging)	Min Radius of Curvature (Sagging)	Damage Category
[m]	[%]	[%]		[mm]	[%]			[m]	[m]	
0.0	0.0035971	0.0	-401.64E-6	4.3680	0.0035252	0.0	-401.64E-6	21203.	-	0 (Negligible)

Specific Building Damage Results - Critical Segments within Each Structure

Structure Name	Parameter	Critical Sub-Structure	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
Chase Mansion	Max Slope	Eastern Elevation	1	0.0	1.8869	Hogging	**0.0015795**	1.3390	0.018423	1010.4	-	0 (Negligible)
	Max Settlement	Western Elevation	1	0.0	1.6199	Sagging	767.98E-6	**6.8409**	0.0031901	-	4336.1	0 (Negligible)
	Max Tensile Strain	Eastern Elevation	2	1.8869	11.810	Sagging	0.0015795	2.9375	**0.022373**	-	2380.5	0 (Negligible)
	Min Radius of Curvature (Hogging)	Eastern Elevation	1	0.0	1.8869	Hogging	0.0015795	1.3390	0.018423	**1010.4**	-	0 (Negligible)
	Min Radius of Curvature (Sagging)	Eastern Elevation	2	1.8869	11.810	Sagging	0.0015795	2.9375	0.022373	-	**2380.5**	0 (Negligible)
Chase Mansions	Max Slope	Southern Elevation	1	0.0	11.077	Sagging	**0.0020726**	8.0490	0.038477	-	1702.0	0 (Negligible)
	Max Settlement	Southern Elevation	1	0.0	11.077	Sagging	0.0020726	**8.0490**	0.038477	-	1702.0	0 (Negligible)
	Max Tensile Strain	Southern Elevation	1	0.0	11.077	Sagging	0.0020726	8.0490	**0.038477**	-	1702.0	0 (Negligible)
	Min Radius of Curvature (Hogging)	Southern Elevation	2	11.077	24.000	Hogging	0.0020726	3.6782	0.021207	**1863.0**	-	0 (Negligible)
	Min Radius of Curvature (Sagging)	Southern Elevation	1	0.0	11.077	Sagging	0.0020726	8.0490	0.038477	-	**1702.0**	0 (Negligible)
South Mansions	Max Slope	Western Elevation	1	0.0	13.000	Hogging	**401.64E-6**	4.3680	0.0035252	21203.	-	0 (Negligible)
	Max Settlement	Northern Elevation	1	0.0	7.6261	Sagging	165.96E-6	**4.5414**	0.0045238	-	20513.	0 (Negligible)
	Max Tensile Strain	Northern Elevation	1	0.0	7.6261	Sagging	165.96E-6	4.5414	**0.0045238**	-	20513.	0 (Negligible)
	Min Radius of Curvature (Hogging)	Western Elevation	1	0.0	13.000	Hogging	401.64E-6	4.3680	0.0035252	**21203.**	-	0 (Negligible)
	Min Radius of Curvature (Sagging)	Eastern Elevation 2	1	0.0	6.0000	Sagging	163.12E-6	2.9335	0.0031653	-	**8079.2**	0 (Negligible)

APPENDIX D
OASYS SLOPE MODELLING OUTPUTS

Oasys

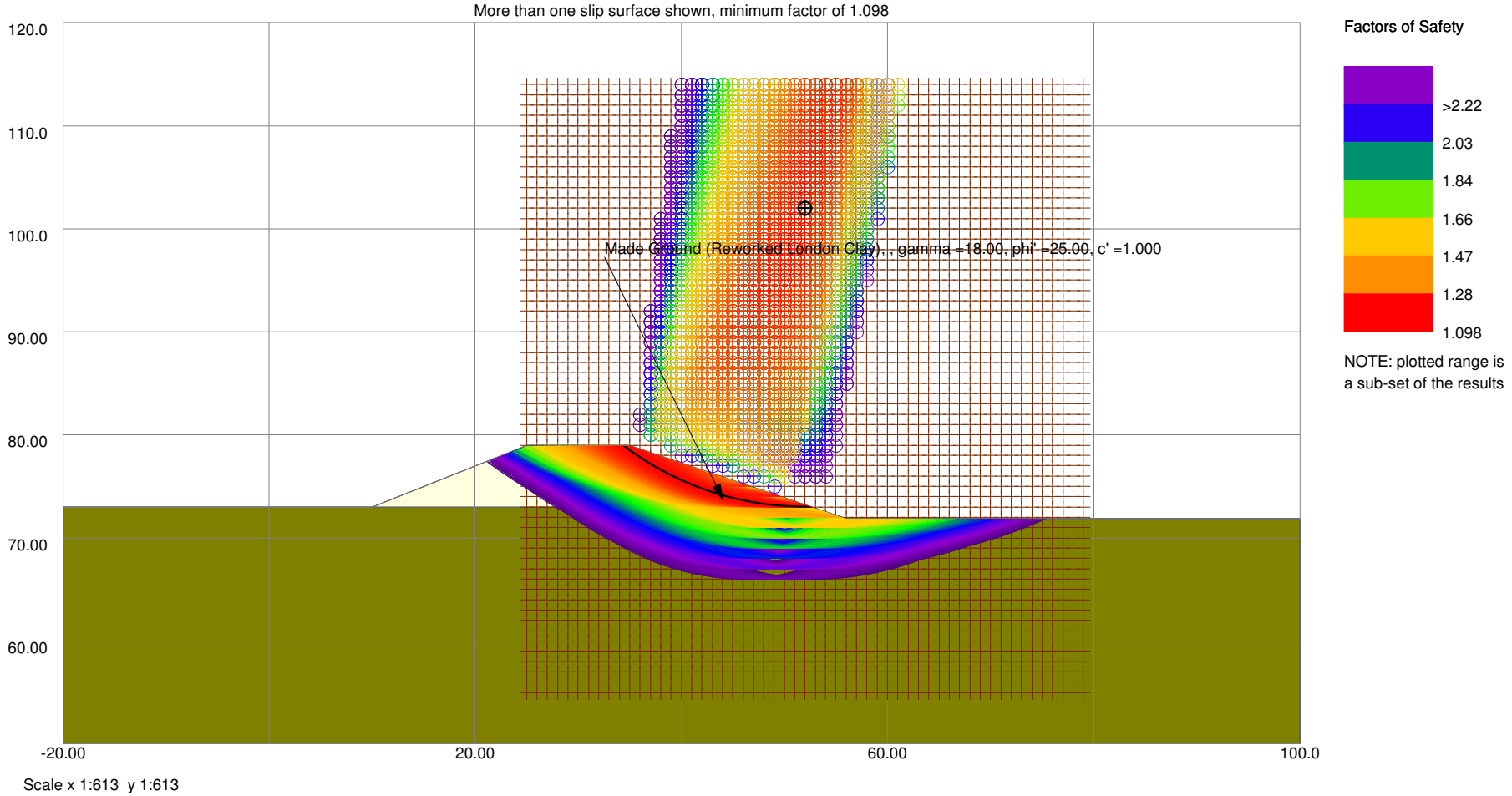
RSK GROUP

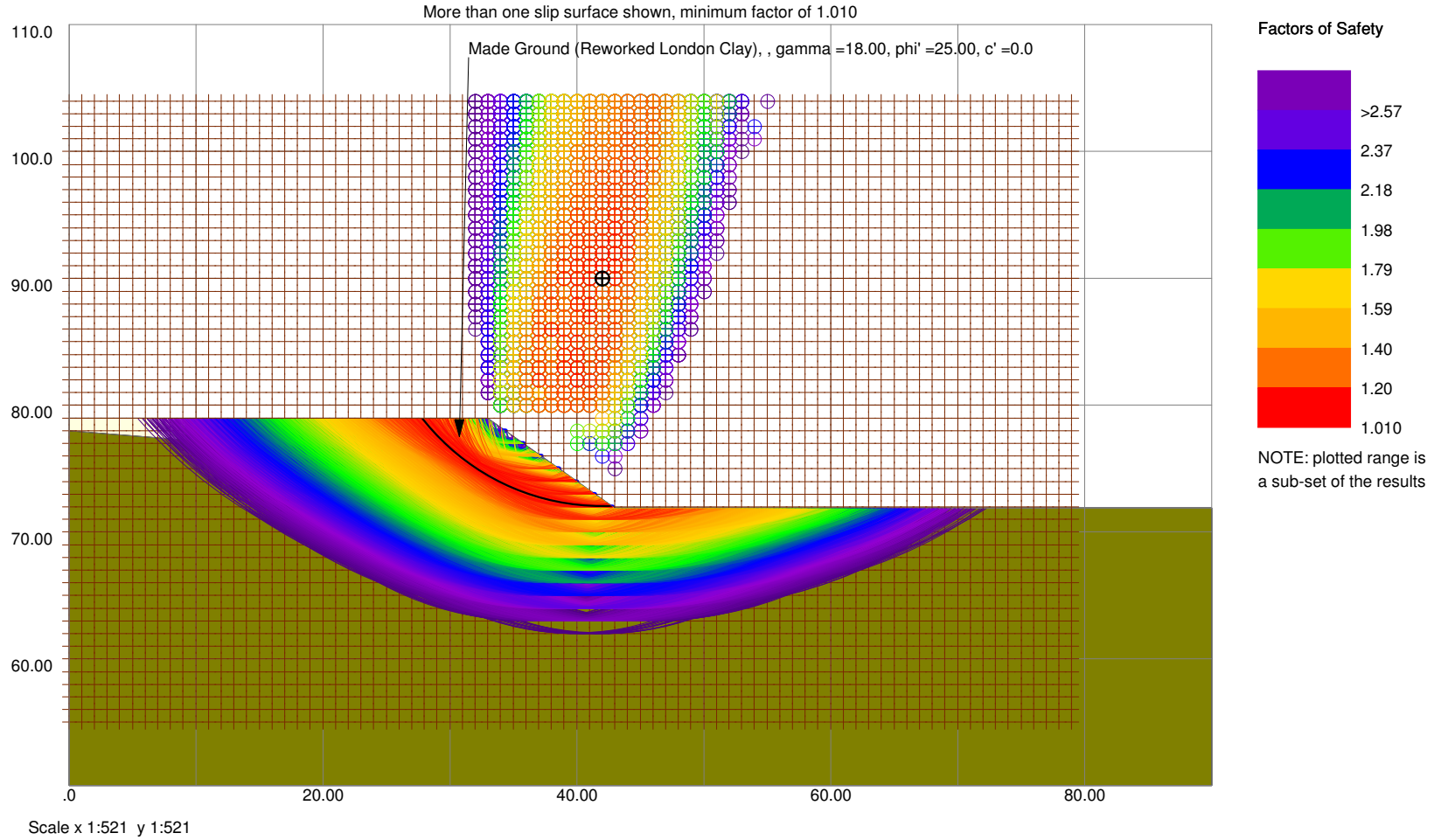
Job No.	Sheet No.	Rev.
371487		

Drg. Ref.

Made by	Date	Checked
MK		

Gondar Gardens
Proposed Section 1
EC7 DA2 - Long Term

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Made Ground (Reworked London Clay), , gamma =18.00, phi' =25.00, c' =0.0
110.0
100.0
90.00
80.00
70.00
60.00
.0
20.00
40.00
60.00
80.00
Scale x 1:521 y 1:521
Factors of Safety
>2.57
2.37
2.18
1.98
1.79
1.59
1.40
1.20
1.010
NOTE: plotted range is
a sub-set of the results

Oasys

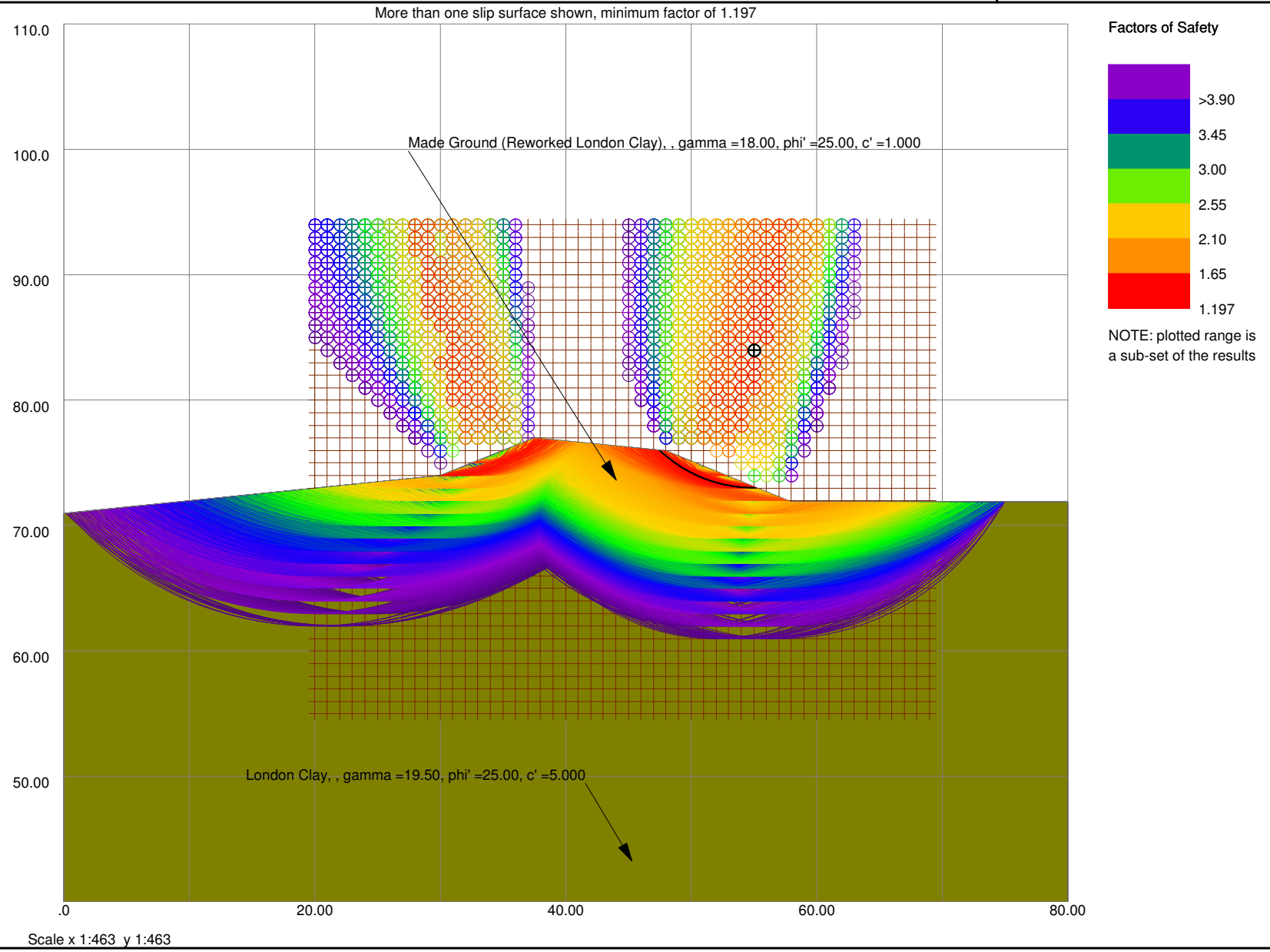
RSK GROUP

Job No.	Sheet No.	Rev.
371487		

Drg. Ref.

Made by	Date	Checked
MK		

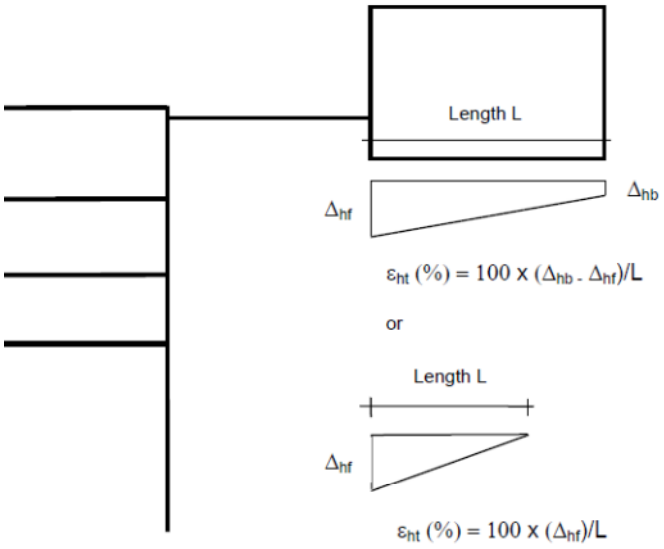
Gondar Gardens
Proposed Section 3
EC7 DA2 - Long Term



APPENDIX E
DETERMINATION OF HORIZONTAL TENSILE STRAINS AND DEFLECTION RATIOS

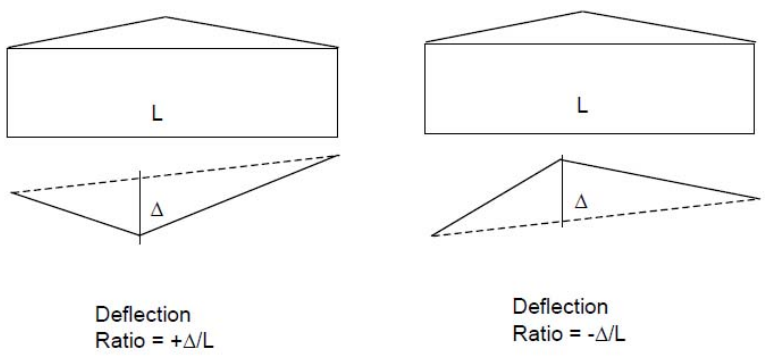
Horizontal Tensile Strain ε_{ht}

To determine the resulting horizontal tensile strain that will develop in the adjacent properties, the lateral displacement to the rear of the property (Δ_{hb}) is subtracted from the lateral displacement at the front of the property (Δ_{hf}). The resulting differential lateral displacement is then divided by the length of the property perpendicular to the basement wall to determine the horizontal tensile strain. Where the lateral displacement is zero at the rear of the property the lateral displacement at the front of the property is divided by the distance from the front of the property to the point of zero lateral displacement to determine the lateral strain. This approach is illustrated below and has been adopted for both the lateral displacements caused by wall installation and excavation.



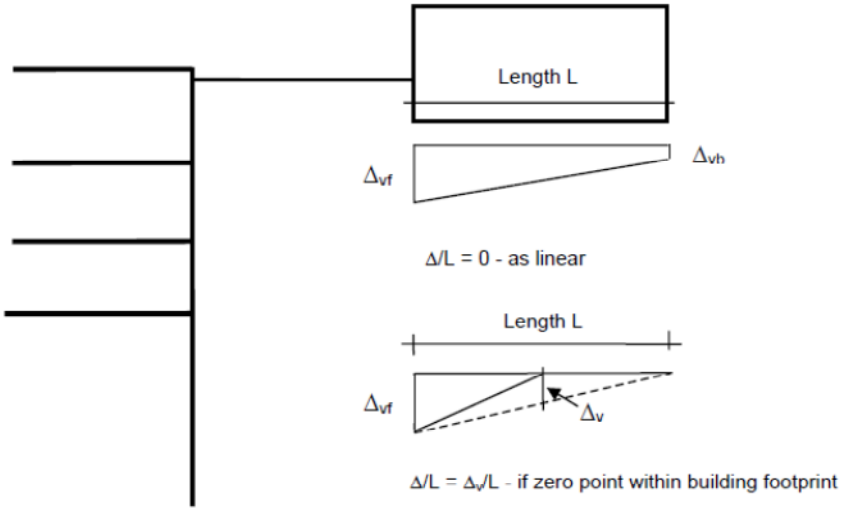
Deflection Ratio Δ/L

The deflection ratio is defined as the off linear vertical displacement across a structure as illustrated below.



A negative deflection ratio will result in greater damage to a property, as tension will be developed in the superstructure. Conversely with a positive deflection ratio compression will develop within the superstructure, which can be more easily resisted.

In the case of properties adjacent to a basement excavation the deflection ratio will depend on the distribution of vertical ground movement across its footprint. Reference to Figure 2.8 of CIRIA 580 in fact indicates a linear distribution of settlement due to wall installation with distance from the wall. As such the Deflection Ratio will be zero unless the point at which settlement ceases is within the footprint of the building as illustrated below.



Reference to Figure 2.11 of CIRIA 580 also indicates that the pattern of ground settlement due to basement excavation is relatively linear. As such the resulting Deflection Ratio is likely to be small. Within one excavation depth of the basement wall some non linearity is indicated however this would tend to result in a positive Deflection Ratio and as such be less likely to cause damage.

From the above discussion it is apparent that based on the empirical approach the vertical movements resulting from basement construction will only have a small influence on the damage to adjacent property compared to the lateral movements.