APPENDIX 3

Chord Environmental Groundwater Impact Report

59 Maresfield Gardens

Groundwater Impact Assessment

59 Maresfield Gardens
London
NW3 5TE

Site NGR: TQ 264 851

Prepared for:

Stefanie Drews & Colin Rowat

Chord Environmental Ltd

Report no. 1102/R1

November 2012

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59 Maresfield Gardens Groundwater Impact Assessment

Site Address

59 Maresfield Gardens

London

NW3 5TE

Site NGR: TQ 264 851

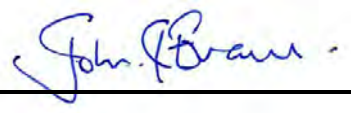
Document Control Sheet

This report has been prepared with all reasonable skill, care and diligence within the terms of the contract with Stefanie Drews & Colin Rowat incorporating Terms of Agreed work and taking account of the manpower and resources devoted to it by agreement with the client.

Chord Environmental Ltd. disclaims any responsibility to the client and others in respect of any matter outside the scope of the above.

The report is confidential to Stefanie Drews & Colin Rowat. Chord Environmental Ltd. accepts no responsibility of any nature to any third party to whom this report or any part thereof is made known.

Chord Environmental Ltd

Prepared by:	John Evans MSc FGS CGeol	

Report no:	1102/R1	**Issue no:**	3	**Date:**	12th November 2012

Chord Environmental Ltd.

47 Clifford Street, Chudleigh, Newton Abbot, Devon. TQ13 0LE

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Contents

1 Introduction

1.1 Background

Stefanie Drews and Colin Rowat are applying for Planning Consent to demolish the existing end terrace, split level two-storey house at 59 Maresfield Gardens and construct a new detached two-storey building with a double level basement and additional swimming pool level. Formation level for the proposed basement is understood to be at an approximate level of 76.5 m OD, c.6.5m below existing site levels adjacent to the house.

Site investigation works have been undertaken by Ian Farmer Associates (IFA) in 2008[1] and Geotechnical and Environmental Associates (GEA) Ltd in 2011[2]. The work comprised detailed Ground Investigations and this assessment should be read in conjunction with both the IFA and GEA site investigation reports.

Chord Environmental has been commissioned by Elliott Wood Partnership on behalf of Stefanie Drews & Colin Rowat, to carry out a groundwater assessment for the proposed development at 59 Maresfield Gardens, London, NW3 5TE, to meet the requirements of London Borough of Camden's "Guidance for Subterranean Development"[3].

1.2 Scope and Approach

This report reviews the proposed development at 59 Maresfield Gardens within the context of the conceptual understanding of its site setting which has been informed through both desk study and review of site investigation findings. The report will identify potential groundwater impacts the development may have. Appropriate mitigating measures can then be developed and adopted to avoid or minimise these affects where identified.

This report is limited to the groundwater flow component of the Basement Impact Assessment, as specified by the London Borough of Camden's "Guidance for Subterranean Development". The Author of this report is a qualified Hydrogeologist, Chartered Geologist and Fellow of the Geological Society of London, as required by the Guidance.

[1] Report on Phase 2 Site Investigation – 59 Maresfield Gardens, London NW3 5TE. Ian Farmer Associates. July 2008.

[2] Site Investigation and Impact Assessment Report – 59 Maresfield Gardens, London NW3. Geotechnical and Environmental Associates Ltd. May 2012.

[3] Camden Geological, Hydrogeological and Hydrological study - Guidance for Subterranean Development. Ove Arup & Partners Ltd., November 2010

1.3 Limitations

The conclusions and recommendations made in this report are limited to those that can be made on the basis of the site information obtained from the client or other third parties and the results of the work should be viewed in the context of the range of data sources consulted. No liability can be accepted for information in other data sources or conditions not revealed by the information provided. There may be conditions prevailing at the Site which have not been disclosed by the site investigations undertaken. Any comments made on the basis of information obtained from the client or other third parties are given in good faith on the assumption that the information is accurate; no independent validation of such information has been made by Chord Environmental Ltd.

2 Proposed Development

The Site occupied by 59 Maresfield Gardens, South Hampstead, London (National Grid Reference TQ 264 851) is a residential property approximately rectangular in shape and 30m by 8m in area. The existing split level, two-storey, end terraced house is located on the middle part of the site. The property fronts on to Maresfield Gardens to the east and is bounded by the adjoining terrace of No.57 Maresfield Gardens to the south. There is a driveway, garden and courtyard to the front of the property and small garden to the rear. The elevation of the site drops sharply by 3.5m from c.85.5m above Ordnance Datum (OD) at the front of the property to c.81.75m OD within the front courtyard and rear garden areas.

The proposal is to demolish the existing house at 59 Maresfield Gardens and construct a new detached two-storey house with double level basement and additional swimming pool level. The basement formation level will extend to a depth of up to 8m below existing lower site levels and be approximately double the existing building footprint in area. A secant pile wall foundation would be constructed around the proposed basement with female piles extending to 72.5m OD (c.9.5m below ground level) and male piles extending to 67m OD (c.15m bgl). Areas of hard standing will increase by approximately 35% from 106m^2 to 130m^2.

3 Site Setting

The Site is located on the northern end of Maresfield Gardens in the South Hampstead area of London, NW3 5TE and National Grid Reference TQ 2642 8517.

3.1 Topography

The majority of the Site lies at an elevation of approximately c.82m OD rising sharply to c.85.5m OD to the east of the site fronting on to Maresfield Gardens. Locally the topography falls away to the southwest across the site to c.40m OD at the River Thames, c.2km to the south and rising to an elevation of 134m OD on Hampstead Heath, c.1.5km north of the site. Within the Site itself the ground from the rear garden through to the front courtyard is relatively level and is c.3.5m below the level of Maresfield Gardens and the eastern part of the site comprising a garden area and driveway.

3.2 Hydrology and Drainage

The Site lies within the surface water catchment of the upper Westbourne stream, a tributary of the River Thames, and outside of the catchment of the Hampstead Heath chain of ponds. The Westbourne is entirely covered and culverted and forms part of the surface water sewerage system, running beneath South Hampstead to where it discharges into the Thames to the west of Chelsea Bridge. According to historic maps[4],[5] (1870-71) a small headwater tributary of the Westbourne flowed across the north-western corner of the Site which rose from a pond 20m north of the Site. The area was undeveloped at this time. By 1896 the area is shown to be developed with the current road infrastructure in place and the pond and headwater tributary entirely removed.

There are no surface water features marked on current Ordnance Survey mapping (1:25,000 scale) within 1km of the Site. The site is not located within a Flood Zone as defined by the Environment Agency and Maresfield Gardens has not been identified as a street at risk of surface water flooding as a result of sewer surcharging within the London Borough of Camden.

3.3 Geology

According to the British Geological Survey (BGS) 1:50,000 scale sheet for the area (Sheet 256, North London. 2006) and the associated geological memoir, The Geology of London (BGS 2004), the Site is underlain by the clays, silts and fine grained sands of the Eocene Claygate Member, the upper unit of the London Clay Formation. The Eocene silty clay of the London Clay outcrops c.30m down gradient to the west of the Site and the sands of the

[4] The Lost Rivers of London: a study of their effects upon London and Londoners, and the effects of London and Londoners upon them. N. Barton. 1962.

[5] Report on Phase 1 Desk Study – 59 Maresfield Gardens, London NW3 5TE. Ian Farmer Associates. June 2008.

Bagshot Formation outcrop up topographic gradient, 300m north beneath Hampstead village.

The Site lies 30m to the east of an area denoted by the BGS as likely to be covered by Quaternary Head deposits. This is disturbed material which has been mobilised from higher ground.

The London Clay is underlain by the Cretaceous Chalk at a depth of over 100m beneath the Site.

Site specific geological data from the IFA and GEA site investigations[1, 2], have established the presence of between 0.2m and 3.0m thickness of made ground beneath the Site locally. Claygate Member silty, sandy clay was proved to depths of 8.3m (73.4m OD) and 12.0m (72.5m OD) and stiff dark grey silty London Clay was then proved to a depth of 20m below ground level (61.7m OD). A thin layer of sand (0.15m) was present within one borehole in the east of the site however this was not established in any of the other boreholes.

Alluvium comprising silty clayey sand over sandy clay was established beneath made ground in the western part of the site. This corresponds with the location of the headwater stream on the 1871 historic map.

A geological cross section of the site showing the existing building and proposed basement in relation to the ground conditions encountered has been prepared by GEA[2] and is included as an appendix to this report.

3.4 Hydrogeology

The Environment Agency classifies the Claygate Member and overlying Bagshot Beds as Secondary A Aquifer, which have permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers.

Although the Claygate Member is classified a Secondary Aquifer, a majority of the springs in the area (arising on Highgate and Hampstead Heath) occur at the boundary between the sands of the Bagshot Formation and the lower permeability clay rich Claygate Member. The Claygate Member's Secondary Aquifer classification is due to the presence of beds of glauconitic silty fine sand; however as these have been proved to be absent beneath the site, the silty clays encountered can be considered as Non-Productive strata.

London Clay is classified as Non-Productive Strata (formerly Non Aquifer), i.e. not capable of providing useable quantities of water. The Cretaceous Chalk is classified as a Principal (formerly Major) Aquifer however it is highly confined and not generally used for drinking water supply in the central London area due to its poor water quality.

The Site lies approximately 600m north of a Source Protection Zone as designated by the Environment Agency. This is for a licensed public water supply abstraction from the Chalk.

Groundwater Levels

During the GEA site investigation, groundwater was generally encountered as seepages within the Claygate Member at depths of between 2.0 m (80.0 m OD) and 6.0 m (79.3 m OD), whilst a slow inflow was recorded in Borehole No 1 at a depth of 4.5 m (77.2 m OD), rising to 4.3 m (77.4 m OD) after a period of 20 minutes.

Monitoring undertaken within installed boreholes across the Site is summarised in the table below.

Location	BH1		BH2		BH3	
Water Level	**mbgl**	**m OD**	**mbgl**	**m OD**	**mbgl**	**m OD**
December 2011	1.96	79.74	3.56	80.94	4.40	80.90
October 2012	1.90	79.80	3.53	80.97	4.51	80.79

There is very little change in groundwater levels despite winter 2011 being a period of very limited rainfall leading to drought conditions be the spring of 2012 followed by over six months of exceptionally wet conditions. Recharge through the Claygate Member and London Clay Formation strata is expected to be limited to approximately 50mm per annum where clay strata dominates, severely limiting vertical flow and groundwater levels are anticipated to vary by less than 0.5m annually.

Groundwater Flow

Groundwater within the Claygate Member is considered to be dominated by intergranular flow through the thin horizons of fine silty sand (where present) and fissure flow through silty clay beds. Groundwater present within the Claygate Member will be confined by the very low vertical permeability clay beds which separate the more permeable silty and sandy clays.

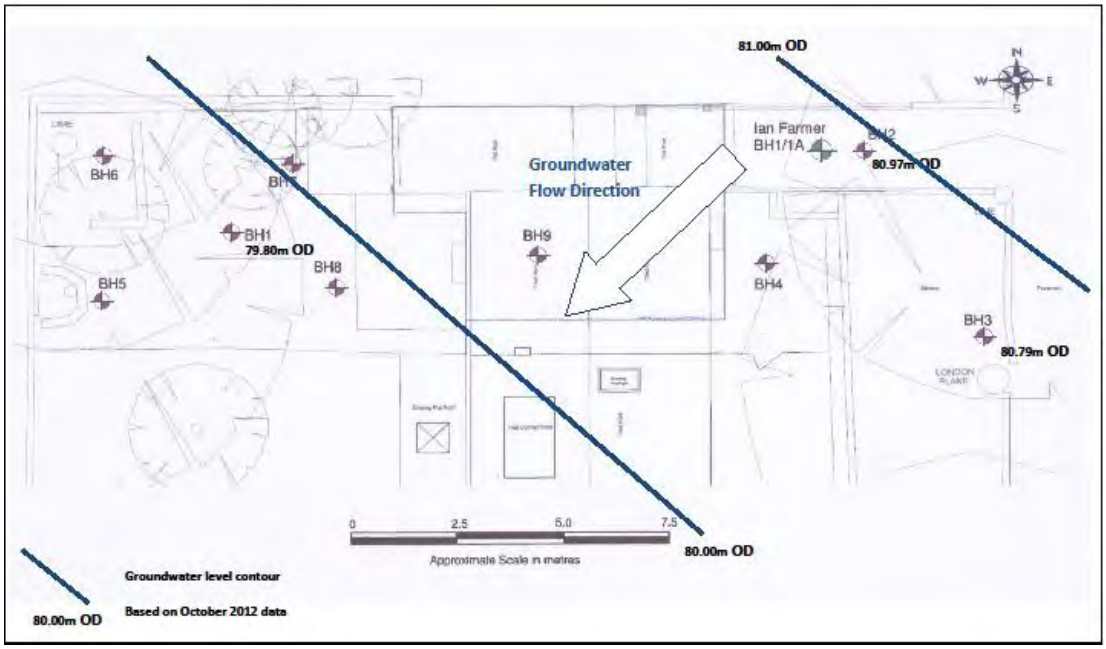
Rising head tests were undertaken by GEA during October 2012 to estimate the permeability of the Claygate Member strata beneath the site. The results and analysis of the rising head tests are appended to this report and summarised in the table below.

Borehole	Test Section (m bgl)	Permeability (ms^{-1})
BH1	1.90 – 7.84	2.07×10^{-8}
BH2	3.53 – 10.22	2.19×10^{-8}
BH3	4.51 – 8.65	6.66×10^{-8}

These results are consistent with published permeabilities for London Clay Formation strata and represent the highest permeability encountered throughout each borehole. It is highly unlikely that any excavation beneath the Site will encounter any saturated high permeability strata as none was encountered within the ten boreholes drilled across the site. Any such strata would not be laterally continuous and would have very limited water bearing potential.

IFA also undertook rising head tests within one borehole (BH1/BH1A) which yielded permeabilities of between 4.8 x 10^{-7} ms^{-1} and 2.9 x 10^{-7} ms^{-1}. However the test results presented show that the water level in BH1A stopped recovering after 15 minutes placing some doubt on the borehole's hydraulic continuity with the aquifer. The rising head tests for BH1 were not analysed within the IFA report however subsequent analysis indicates a permeability of c.8.0 x 10^{-9} ms^{-1} for strata between 6 and 12m below ground level.

A groundwater contour plan prepared using groundwater monitoring data collected during October 2012 is presented below.



Monitored groundwater levels and interpreted groundwater level contours indicate a groundwater flow direction to the southwest. This coincides with the local topographic gradient as would be expected. The hydraulic gradient across the Site is approximately 0.1.

The Westbourne stream and its associated headwater tributary, which historically crossed the northwest part of the site, are considered to rise from springs and seepages from the Bagshot Formation sands on Hampstead Heath and to be perched on the Claygate Member and London Clay. Alluvium associated with this tributary was found to comprise 1m of desiccated silty clayey sand within BH6 indicating that the flow path has most likely been collected by surface water drainage up gradient of the Site.

4 Screening

The London Borough of Camden's "Guidance for subterranean development" states that any development proposal which includes a subterranean basement should be screened in order to determine whether there is a requirement for a BIA to be carried out.

4.1 Screening Assessment

Appendix E of the guidance document details six Basement Impact Assessment screening questions, each of which is stated and answered below:

- **Question 1a: Is the site located directly above an aquifer?**
- Yes. The Site is underlain by the Claygate Member which is designated as Secondary Aquifer by the Environment Agency and considered capable of supporting local water supplies and baseflow to watercourses. However, site investigation information shows the Claygate Member to comprise silty sandy clays and to have a very low permeability exhibiting the hydraulic properties of Non Productive strata.
- **Question 1b: Will the proposed basement extend beneath the water table surface?**

  Based on the findings of the site investigation, the basement would extend beneath the water table surface (i.e. saturated Claygate Member). The proposed basement would extend to a depth of approximately 6.5m below existing ground level. An 8m deep secant pile wall foundation would be constructed. The monitoring standpipes installed during the site investigation indicated groundwater within the Claygate Member to be 1.90m below ground level during October 2012 following a very wet summer and autumn. Groundwater levels are not expected to vary by more than 0.5m throughout the year. Refer to Section 3.4.
- **Question 2: Is the site within 100m of a watercourse, well (used/disused) or potential spring line?**

  No. According to historic maps[4,5], a headwater tributary of the Westbourne flowed across the northwest of the Site, rising from a pond c.20m north of the site. This stream is not present at surface and is considered to have been culverted to form part of the local surface water sewer up stream of the Site. Site investigation findings established the presence of dry alluvium in the west of the Site however no shallow flow was encountered in this area. The low permeability of the Claygate Member and London Clay strata does not support groundwater flows to the headwater tributary and are effectively hydraulically isolated from it. The Site is not within a street which has been identified as being at risk of surface water flooding as a result of sewer surcharging within the London Borough of Camden. Refer to Section 3.2 and 3.4.

- **Question 3: Is the site within the catchment of the pond chains on Hampstead Heath?**

  No. The Site is outside the catchment of Hampstead Heath ponds. Refer to Section 3.2.

- **Question 4: Will the proposed development result in a change in the proportion of hard surfaced / paved area?**

  Yes. Areas of hard standing will increase by 35% from 106m^2 to 130m^2.

- **Question 5: As part of the site drainage, will more surface water (e.g. rainfall and run-off) than at present be discharged to ground (e.g. via soakaways and/or SUDS)?**

  No. The low permeability nature of the Claygate Member strata is unsuitable for receiving significant surface water discharge to ground.

- **Is the lowest point of the proposed excavation (allowing for any drainage and foundation space under the basement floor) close to, or lower than, the mean water level in any local pond (not just the pond chains on Hampstead Heath) or spring line?**

- No. There are no ponds or spring lines present within 100m of the Site.

4.2 Screening Conclusions

The screening exercise has identified the following potential issue which should be assessed:

1. The Site is underlain by the Claygate Member, classified a Secondary Aquifer by the Environment Agency, capable of supporting local water supplies and baseflow to watercourses.
2. The basement structure would extend into saturated Claygate Member and London Clay Formation strata.
3. The proposal will increase the hardstanding area by 35% from 106m^2 to 130m^2.

5 Scoping and Site Investigation

Scoping is the activity of defining in further detail the matters to be investigated as part of the impact assessment. Potential impacts should be ascertained for each of the matters of concern identified during the screening process.

The investigation of the potential impacts is undertaken through a site investigation. In this instance, a desk study and site investigation has been undertaken to establish ground conditions for geotechnical assessment purposes. The investigation included the installation of three groundwater monitoring installations to depths between 8m and 12m below ground level. This assessment relies upon the findings of the desk study and site investigation.

5.1 Potential Impacts

The following potential impacts have been identified:

Potential Impact	**Relevant Site Investigation conclusions**
The basement structure would extend into saturated ground. The groundwater flow regime may be altered by the proposed basement. Change in flow regime could potentially cause the groundwater level within the zone encompassed by the new flow route to increase (causing up hydraulic gradient mounding) or decrease down gradient locally. For existing nearby structures the degree of dampness or seepage may potentially increase as a result of changes in groundwater level.	The ground investigation has confirmed the presence of Claygate Member and London Clay beneath the Site. It has also identified confined groundwater levels within the Claygate Member and London Clay formation, and the basement would extend beneath this piezometric groundwater level. The Claygate Member is classified as a Secondary Aquifer however site investigation findings have has established it to be predominantly comprised of very low permeability silty sandy clay exhibiting the hydraulic properties of Non Productive strata.
The Site is underlain by a Secondary Aquifer. The proposed development may reduce baseflow to watercourses or reduce the supply of local water supplies.	The Claygate Member is considered to be a Secondary Aquifer however site investigation findings have has established it to be predominantly comprised of silty sandy clay. Groundwater encountered during the site investigations entered boreholes very slowly reflecting low permeability (c.5 x 10^{-8} ms^{-1}). The silty sandy clays encountered cannot store or transmit significant quantities of groundwater and exhibit hydraulic properties of Non Productive strata which cannot support baseflow to springs or streams.

The proposal will increase areas of hard standing by 35% from 106m^2 to 130m^2. The sealing of the ground surface to rainfall will result in decreased recharge to the underlying ground. In areas underlain by an aquifer, this may impact upon groundwater flow or levels. In areas of non-aquifer or Unproductive Strata (i.e. the London Clay), this may mean changes in the degree of wetness which in turn may affect stability.	The ground investigation has confirmed the presence of Claygate Member and London Clay beneath the Site, designated a Secondary Aquifer and Non Productive Strata or a "non-aquifer" respectively. The lithological logs and site investigation findings indicate that soakaway drainage is not appropriate for the Site due to the very low permeability clayey nature of the soils beneath the site.

6 Groundwater Impact Assessment

The screening process identified three potential impacts. The results of the desk study and site investigation have been used below to address these concerns and assess the likelihood of a negative impact occurring. These are:

1. Altering of the groundwater flow regime as a result of the proposed basement development.

Long Term Built Impact

The proposed basement formation level will extend to a depth of up to 8m below existing lower site levels. A secant pile wall foundation would be constructed around the proposed basement with female piles extending to 72.5m OD (c.9.5m below ground level) and male piles extending to 67m OD (c.15m bgl).

It has been established that the basement would extend beneath the piezometric surface (or confined groundwater level) within the Claygate Member and London Clay Formation strata. Once constructed, the proposed basement and its secant pile wall foundation would not allow the flow of groundwater beneath the site to the depth of the female piles. The potential impact of this is that the groundwater could potentially mound against the basement structure as groundwater is prevented from flowing along its natural path.

The site investigation has established that the geological formation into which the basement would be constructed comprises very low permeability silty sandy clay. The hydrogeological properties of the Claygate Member and London Clay present beneath the Site are such that free flowing groundwater is not present in significant quantities and is flowing at very low rates.

Additionally, based on the groundwater levels available, groundwater flows from northeast to southwest across the site. The proposed basement would therefore present a c.10m wide blockage to groundwater flow in this direction. When considering the width of the proposed basement, it is considered very unlikely that the structure would cause a significant damming of groundwater to occur.

Using established numerical tools it can be shown that the radius of influence to a change in groundwater level within low permeability strata is very small (Sichardt and Bear unconfined and confined respectively, radius of influence solutions[6]). Given a permeability of 5×10^{-8} ms^{-1} based on site specific tests, a change (increase or decrease) in groundwater level of 2m due to a potential damming affect adjacent to the proposed basement would not affect the groundwater level at a distance beyond 10mnd any change would decay rapidly away from the basement structure. The calculations using Sichardt's and Bear's solutions are appended to this report.

Additionally, groundwater within the Claygate Member is confined by numerous interbedded low permeability clay beds and any increase in hydraulic pressure (piezometric surface) would be at a depth of several metres. On this basis, it is highly

[6] Hydrogeological impact appraisal for dewatering abstractions. Science Report SC040020. Environment Agency. 2007.

unlikely that there would be any adverse affects from a local change in groundwater level resulting from the proposed basement development.

There are no adjacent neighbouring basement structures which could be affected by a small local rise in groundwater level. A swimming pool is located on higher ground within 40 Netherhall Gardens beyond the Site's northern boundary. The pool is approximately 2.0 m from the site boundary and has a basal elevation of c.81.5m OD, similar to the existing ground level of the Site. It would not be affected by and changes to groundwater level or flow beneath the Site as a result of the proposed basement development.

Short Term Construction Impact

During construction, groundwater has the potential to enter the excavation. As measured permeability is of the order of 5×10^{-8} ms^{-1}, inflow rates are expected to be slow but prolonged whilst the excavation remains open. Given the depth and breadth of the site investigation, it is considered unlikely that significant higher permeable layers will be encountered, however it is possible that saturated pockets or inter-connected layers of groundwater could be encountered resulting in higher inflow rates.

On this basis, we agree with the GEA report that if the adopted method of temporary support during excavations is not watertight, it would be prudent for the chosen contractor to have a contingency plan in place to deal with more significant inflows as a precautionary measure. We also agree with GEA's recommendation that it would also be prudent to carry out a number of trial excavations, to depths as close to the full basement depth as possible, to provide an indication of the likely groundwater inflow conditions.

Based on the findings of the site investigation and subsequent data analysis, it is considered highly unlikely that the proposed development would result in significant changes to the groundwater flow regime surrounding the Site.

2. Reducing flow to watercourses and groundwater supplies developing within an Aquifer.

Although the Claygate Member is classified a Secondary Aquifer due to the presence of water bearing sand horizons, the site investigations have established that the Claygate Member beneath the site of the proposed basement is comprised of silty sandy clay and no significant water bearing sandy beds were encountered. It is apparent from the site investigation findings that groundwater is not present in significant quantities within the geological formations into which the basement would be constructed due to their lowly permeable hydrogeological properties. No groundwater abstractions have been identified within 500m and the Westbourne stream and the headwater stream identified on the historic map are fed by discharge from the Bagshot Beds outcrop 300m to the north of the site and are no flow near to the Site.

It is therefore considered highly unlikely that the proposed development will result in reduced groundwater flow to watercourses and abstractions.

Altering of the rate of groundwater recharge or changes in the degree of wetness through the creation of additional hard surfaces.

Due to the clayey nature of the soils, recharge to the lower Claygate Member and London Clay is likely to be negligible (of the order of c.50mm/a) due to the very low ($<1 \times 10^{-9}$ m/s) vertical permeability of the underlying clay dominated strata. In addition, the lowly permeable properties of these strata negate the possibility of significant discharging of surface water drainage to ground.

As the ground is unsuitable for a soakaway system, surface water drainage from the Site would by via existing surface water drains to the mains sewerage system.

Due to the nature of the soils beneath the site and the relatively small area of development, groundwater recharge (which is naturally highly restricted due to the low permeability of the Claygate Member and London Clay present beneath the site) would not be significantly affected by the proposed development.

7 Conclusions

A groundwater impact assessment of the proposed development has been undertaken. The assessment has been based on information and guidance published by the London Borough of Camden[3] and on site investigation information[1,2,3].

Detailed site investigation information has established the presence of low permeability clays beneath the Site. Rates of groundwater flow are therefore very low (estimated at c.3m/a) and the underlying strata are incapable of supporting flow to water features such as streams or spring lines down gradient of the Site.

Changes in groundwater level due to potential damming effect adjacent to the proposed basement development would not occur beyond a few metres because of the very lowly permeable Claygate Member and London Clay Formation strata present beneath the Site.

It is concluded that the proposed basement development is unlikely to result in significant changes to the groundwater regime beneath or adjacent to the Site. No potential adverse impacts have been identified as a result of the groundwater impact assessment.

Site	**59 Maresfield Gardens**	**Job Number**	1102
Client	**Stefanie Drews & Colin Rowat**	**Drawing Date**	09-11-12
Engineer	**Elliott Wood**		

Chord Environmental Ltd

47 Clifford St
Chudleigh
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Devon TQ13 0LE

Groundwater Contour Plan

GEA Geotechnical & Environmental Associates

Tyttenhanger House
Coursers Road
St Albans
Herts AL4 0PG

Cross-Section

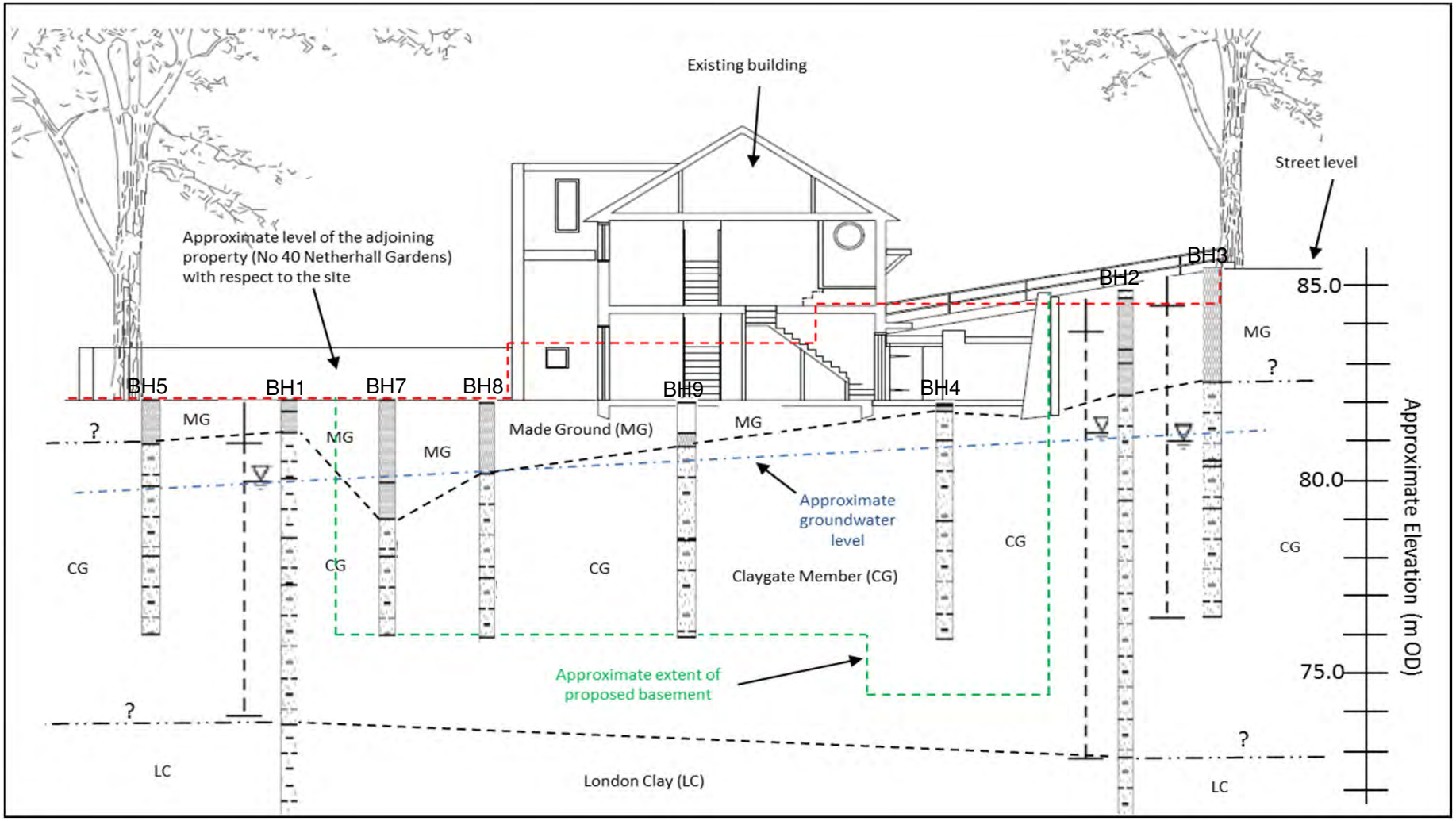
Site 59 Maresfield Gardens, London, NW3 5TE

Client Stefanie Drews & Colin Rowat

Engineer Elliott Wood

Job Number J11251

Sheet 1 / 1



Geotechnical & Environmental Associates

Tyttenhanger House
Coursers Road
St Albans
Herts AL4 0PG

Borehole Permeability Test

Site	59 Maresfield Gardens, London, NW3 5TE
Client	Stefanie Drews & Colin Rowat
Engineer	Elliott Wood

Job Number J11251

Sheet 1/3

Rising Head Permeabilty Test.

BOREHOLE No	BH1
TEST NO	1
DATE	22/10/2012

AT START OF TEST	
BH Depth	7.84
Casing Depth	
Water Level (m)	1.90

TIME	*WATER LEVEL (m)*
0 min	5.22
1 min	4.94
2 min	4.80
3 min	4.71
4 min	4.64
5 min	4.57
10 min	4.33
15 min	4.14
20 min	4.01
25 min	3.91
30 min	3.82
45 min	3.57
1 hr	3.35
1 hr 30 min	3.18
2 hr	3.13

Borehole Depth at End of Test (m)	7.82

REMARKS

GEA Geotechnical & Environmental Associates

Tyttenhanger House
Coursers Road
St Albans
Herts AL4 0PG

Borehole Permeability Test

Site	59 Maresfield Gardens, London, NW3 5TE
Client	Stefanie Drews & Colin Rowat
Engineer	Elliott Wood

Job Number J11251

Sheet 2/3

Rising Head Permeabilty Test.

BOREHOLE No	BH2
TEST NO	1
DATE	22/10/2012

AT START OF TEST	
BH Depth	10.22
Casing Depth	
Water Level (m)	3.53

TIME	*WATER LEVEL (m)*
0 min	3.87
1 min	3.87
2 min	3.87
3 min	3.86
4 min	3.86
5 min	3.86
10 min	3.85
15 min	3.84
20 min	3.83
25 min	3.82
30 min	3.81
45 min	3.79
1 hr	3.77

Borehole Depth at End of Test (m)	10.34

REMARKS

An obstruction or kink in the standpipe results in the 50 mm diameter bailer being obstructed and therefore a 19 mm diameter bailer must be used.

GEA Geotechnical & Environmental Associates

Tyttenhanger House
Coursers Road
St Albans
Herts AL4 0PG

Borehole Permeability Test

Site	59 Maresfield Gardens, London, NW3 5TE
Client	Stefanie Drews & Colin Rowat
Engineer	Elliott Wood

Job Number J11251

Sheet 3/3

Rising Head Permeabilty Test.

BOREHOLE No	BH3
TEST NO	1
DATE	22/10/2012

AT START OF TEST	
BH Depth	8.65
Casing Depth	
Water Level (m)	4.51

TIME	*WATER LEVEL (m)*
0 min	8.30
1 min	8.26
2 min	8.23
3 min	8.20
4 min	8.17
5 min	8.14
10 min	8.00
15 min	7.85
20 min	7.69
25 min	7.57
30 min	7.44
45 min	7.05
1 hr	6.68
1 hr 30 min	6.00
2 hr	5.41

Borehole Depth at End of Test (m)	8.70

REMARKS

Chord Environmental

Rising Head Data - Calculations using Horslev Test (1951)

Client: Geotechnical and Environmental Associates
Project: 59 Maresfield Gardens
Project No.: 1102
Borehole No. BH1

Abbreviations

L	Length of test section
D	Borehole diameter
d	Stand Pipe diameter
m	Permeability transformation ratio
h0 =	excess head at time t0 (m)
h =	excess head at time t (m)
t1 =	time at t1 (minutes)
h1 =	excess head at time t1 (m)
t2 =	time at t2 (minutes)
h2 =	excess head at time t2 (m)
K =	hydraulic conductivity (m/d)

All depths in metres below datum (borehole cover).

Calculations

FORMULA APPLIED = k = d**2*ln(2mL/D)*ln(h1/h2)/8*L(t2-t1)

NB Only applicable when mL/D>4 See Horslev 1951, pg 44 equation G.

Analysis

BH1	Section Tested	1.90 - 7.84	mBD
	Borehole Depth	7.84	mBD
	Length of test section (L)	5.94	m
	Borehole diameter (D)	0.1	m
	Standpipe diameter (d)	0.05	m
	Transformation ratio (m)	1	
	Depth to rest water level	1.90	mBD
	Water level at test start (mbd)	3.69	mBD

Selected Values

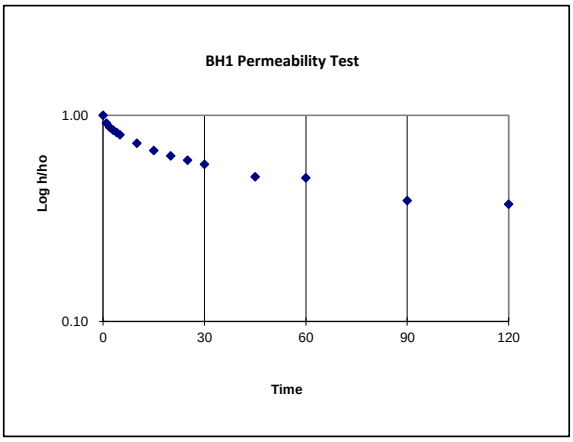
t1=	30.00	minutes
h1=	1.92	m
t2=	120.00	minutes
h2=	1.23	m

PERMEABILITY OF BOREHOLE SECTION: **0.001791 m/day** **2.07E-08 m/sec**

Prepared by: John Evans **Date** 30-Oct-12

Reference: Horslev 1951
Time Lag and Soil Permeability in Groundwater Observations
Bulletin No. 36, Waterways Experiment Station, Mississippi.

Time (seconds)	TIME (minutes)	h (metres)	h/h0
0	0.00	3.32	1.00
60	1.00	3.04	0.92
120	2.00	2.9	0.87
180	3.00	2.81	0.85
240	4.00	2.74	0.83
300	5.00	2.67	0.80
600	10.00	2.43	0.73
900	15.00	2.24	0.67
1200	20.00	2.11	0.64
1500	25.00	2.01	0.61
1800	30.00	1.92	0.58
2700	45.00	1.67	0.50
3600	60.00	1.65	0.50
5400	90.00	1.28	0.39
7200	120.00	1.23	0.37



Chord Environmental

Rising Head Data - Calculations using Horslev Test (1951)

Client: Geotechnical and Environmental Associates
Project: 59 Maresfield Gardens
Project No.: 1102
Borehole No. BH2

Abbreviations

L	Length of test section
D	Borehole diameter
d	Stand Pipe diameter
m	Permeability transformation ratio
h0 =	excess head at time t0 (m)
h =	excess head at time t (m)
t1 =	time at t1 (minutes)
h1 =	excess head at time t1 (m)
t2 =	time at t2 (minutes)
h2 =	excess head at time t2 (m)
K =	hydraulic conductivity (m/d)

All depths in metres below datum (borehole cover).

Calculations

FORMULA APPLIED = k = d**2*ln(2mL/D)*ln(h1/h2)/8*L(t2-t1)

NB Only applicable when mL/D>4 See Horslev 1951, pg 44 equation G.

Analysis

BH2	Section Tested	3.53 - 10.22	mBD
	Borehole Depth	10.22	mBD
	Length of test section (L)	6.69	m
	Borehole diameter (D)	0.1	m
	Standpipe diameter (d)	0.05	m
	Transformation ratio (m)	1	
	Depth to rest water level	3.53	mBD
	Water level at test start (mbd)	3.87	mBD

Selected Values

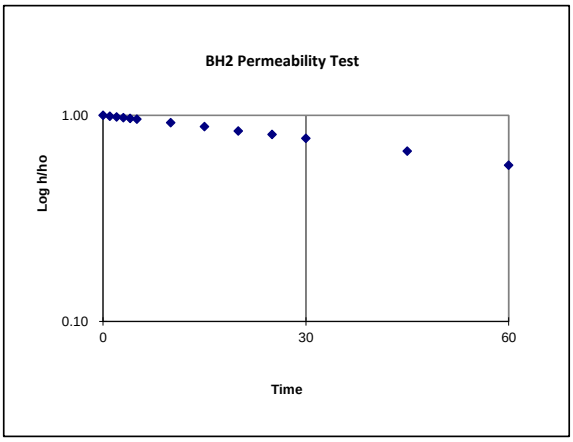
t1=	10.00	minutes
h1=	0.32	m
t2=	60.00	minutes
h2=	0.24	m

PERMEABILITY OF BOREHOLE SECTION: **0.001895 m/day** **2.19E-08 m/sec**

Prepared by: John Evans **Date** 30-Oct-12

Reference: Horslev 1951
Time Lag and Soil Permeability in Groundwater Observations
Bulletin No. 36, Waterways Experiment Station, Mississippi.

Time (seconds)	TIME (minutes)	h (metres)	h/h0
0	0.00	0.34	1.00
60	1.00	0.34	1.00
120	2.00	0.34	1.00
180	3.00	0.33	0.97
240	4.00	0.33	0.97
300	5.00	0.33	0.97
600	10.00	0.32	0.94
900	15.00	0.31	0.91
1200	20.00	0.30	0.88
1500	25.00	0.29	0.85
1800	30.00	0.28	0.82
2700	45.00	0.26	0.76
3600	60.00	0.24	0.71



Chord Environmental

Rising Head Data - Calculations using Horslev Test (1951)

Client: Geotechnical and Environmental Associates
Project: 59 Maresfield Gardens
Project No.: 1102
Borehole No. BH3

Abbreviations

L	Length of test section
D	Borehole diameter
d	Stand Pipe diameter
m	Permeability transformation ratio
h0 =	excess head at time t0 (m)
h =	excess head at time t (m)
t1 =	time at t1 (minutes)
h1 =	excess head at time t1 (m)
t2 =	time at t2 (minutes)
h2 =	excess head at time t2 (m)
K =	hydraulic conductivity (m/d)

All depths in metres below datum (borehole cover).

Calculations

FORMULA APPLIED = k = d**2*ln(2mL/D)*ln(h1/h2)/8*L(t2-t1)

NB Only applicable when mL/D>4 See Horslev 1951, pg 44 equation G.

Analysis

BH3	Section Tested	4.51 - 8.65	mBD
	Borehole Depth	8.65	mBD
	Length of test section (L)	4.14	m
	Borehole diameter (D)	0.1	m
	Standpipe diameter (d)	0.05	m
	Transformation ratio (m)	1	
	Depth to rest water level	4.51	mBD
	Water level at test start (mbd)	8.30	mBD

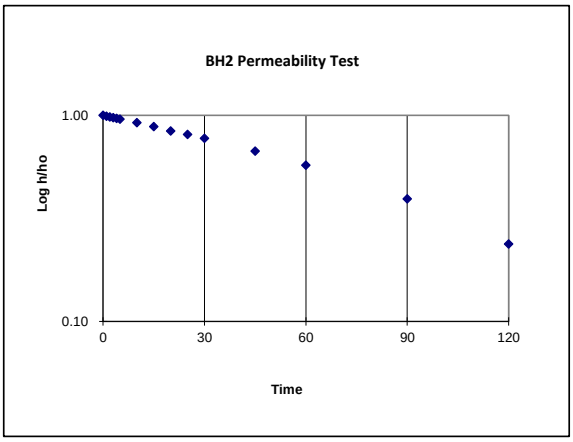
Selected Values

t1=	0.00	minutes
h1=	3.79	m
t2=	120.00	minutes
h2=	0.90	m

PERMEABILITY OF BOREHOLE SECTION: **0.005751 m/day** **6.66E-08 m/sec**

Prepared by: John Evans **Date** 30-Oct-12
Reference: Horslev 1951
Time Lag and Soil Permeability in Groundwater Observations
Bulletin No. 36, Waterways Experiment Station, Mississippi.

Time (seconds)	TIME (minutes)	h (metres)	h/h0
0	0.00	3.79	1.00
60	1.00	3.75	0.99
120	2.00	3.72	0.98
180	3.00	3.69	0.97
240	4.00	3.66	0.97
300	5.00	3.63	0.96
600	10.00	3.49	0.92
900	15.00	3.34	0.88
1200	20.00	3.18	0.84
1500	25.00	3.06	0.81
1800	30.00	2.93	0.77
2700	45.00	2.54	0.67
3600	60.00	2.17	0.57
5400	90.00	1.49	0.39
7200	120.00	0.9	0.24



Radius of influence (Sichardt)

$$R_0 = Cs\sqrt{K}$$

Essential input

Optional input

Calculated

Empirical equation based on drawdown and permeability

		expected		min	max	
Drawdown in well	s	2	m	1	5	m
Hydraulic conductivity	K	5E-08	m/s	5E-09	5E-07	m/s
		0.00432	m/d	0.000432	0.0432	m/d
Factor	C	1750		3000 for radial flow 1500-2000 for line flow to trenches or wellpoints		
Radius of influence	R_0	0.8	m	0.1	6.2	m

The following assumptions apply to this equation
- the aquifer is unconfined
- the aquifer has infinite areal extent
- the aquifer is homogeneous, isotropic and of uniform thickness
- flat initial water table
- the aquifer is pumped at a constant discharge rate
- the pumping well is fully penetrating, therefore receiving water from the entire saturated thickness of the aquifer
- the flow to the well is in a steady state

Data sources (to complete an audit trail)

Drawdown in well	s	Assumed - increase close to existing ground level
Hydraulic conductivity	K	Calculated from site specific rising head tests
Factor	C	Linear nature of structure.

Radius of influence (Bear)

Radius of influence for a pumping well in an infinite confined aquifer

$$R_0(t) = 1.5\sqrt{\left(\frac{Tt}{S}\right)}$$

Essential input

Optional input

Calculated

		expected		min	max	
Transmissivity of aquifer	T	0.04	m^2/d	0	0	m^2/d
Storage coefficient	S	0.2		0.2	0.2	
Time from start of abstraction	t	182	d	182	182	d
Radius of influence at time t	R_0	9.0	m	0.6	20.2	m

The following assumptions apply to this equation
- the aquifer is confined
- the aquifer has infinite areal extent
- the aquifer is homogeneous, isotropic and of uniform thickness

Data sources (to complete an audit trail)

Transmissivity of aquifer	T	Calculated permeability multiplied by assumed 10m effective aquifer thickness
Storage coefficient	S	Assumed intergranular storage through sandier horizons
Time from start of abstraction	t	Assume six month period

APPENDIX 4

Summary Sheets from Retaining Wall Design Calculations

Units: kN,m

INPUT DATA

SOIL PROFILE

Stratum no.	Elevation of top of stratum	Soil types Active side	Passive side
1	84.00	1 Made Ground / Alluv	1 Made Ground / Alluv
2	76.00	2 Claygate Beds	2 Claygate Beds
3	73.50	3 London Clay	3 London Clay

SOIL PROPERTIES

-- Soil type -- No.	Description (Datum elev.)	Bulk density kN/m3	Young's Modulus Eh,kN/m2 (dEh/dy)	At rest coeff. Ko (dKo/dy)	Consol state. NC/OC (Nu)	Active limit Ka (Kac)	Passive limit Kp (Kpc)	Cohesion kN/m2 (dc/dy)
1	Made Ground / Alluv	17.00	12500	0.500	NC (0.490)	1.000 (2.570)	1.000 (2.571)	25.00u
2	Claygate .. (76.00)	18.00	37500 (3000)	0.500	OC (0.490)	1.000 (2.000)	1.000 (2.390)	75.00u (6.000)
3	London Clay (73.50)	19.00	45000 (2608)	1.000	OC (0.490)	1.000 (2.476)	1.000 (2.477)	90.00u (5.200)
4	MG /Alluv Drained	18.00	7500	0.500	NC (0.250)	0.324 (1.327)	3.601 (5.104)	0.0d
5	Claygate .. (76.00)	18.00	22500 (1800)	1.000	OC (0.200)	0.351 (1.391)	3.253 (4.831)	0.0d
6	London Cl.. (73.50)	19.00	27000 (1565)	1.000	OC (0.200)	0.351 (1.391)	3.440 (5.233)	0.0d

Additional soil parameters associated with Ka and Kp

------- Soil type ------- No.	Description	--- parameters for Ka --- Soil friction angle	Wall adhesion coeff.	Back-fill angle	--- parameters for Kp --- Soil friction angle	Wall adhesion coeff.	Back-fill angle
1	Made Ground / Alluv	0.00	1.000	0.00	0.00	1.000	0.00
2	Claygate Beds	0.00	0.000	0.00	0.00	0.500	0.00
3	London Clay	0.00	0.670	0.00	0.00	0.670	0.00
4	MG /Alluv Drained	27.00	0.641	0.00	27.00	0.471	0.00
5	Claygate Drained	25.00	0.670	0.00	25.00	0.500	0.00
6	London Clay Drained	25.00	0.670	0.00	25.00	0.670	0.00

GROUND WATER CONDITIONS

Density of water = 10.00 kN/m3

	Active side	Passive side
Initial water table elevation	81.00	81.00

Automatic water pressure balancing at toe of wall : No

Water press. profile no.	Active side Point no.	Elev. m	Piezo elev. m	Water press. kN/m2	Passive side Point no.	Elev. m	Piezo elev. m	Water press. kN/m2	
1	1	81.00	81.00	0.0	1	77.50	77.50	0.0	MC
2	1	82.00	82.00	0.0	1	77.00	77.00	0.0	WC
3	1	81.00	81.00	0.0	1	73.00	73.00	0.0	MC
4	1	82.00	82.00	0.0	1	73.20	73.20	0.0	WC

WALL PROPERTIES

Type of structure = Fully Embedded Wall
Elevation of toe of wall = 70.00
Maximum finite element length = 0.80 m
Youngs modulus of wall E = 2.8000E+07 kN/m2
Moment of inertia of wall I = 7.0700E-03 m4/m run
E.I = 197960 kN.m2/m run
Yield Moment of wall = Not defined

STRUTS and ANCHORS

Strut/ anchor no.	Elev.	Strut spacing m	X-section area of strut sq.m	Youngs modulus kN/m2	Free length m	Inclin -ation (degs)	Pre- stress /strut kN	Tension allowed
1	84.40	6.00	0.010000	2.000E+08	5.00	0.00	0	No
2	82.00	6.00	0.010000	2.000E+08	5.00	0.00	0	No
3	78.00	6.00	0.010000	2.000E+08	1.00	0.00	0	No
4	74.75	1.00	0.350000	3.000E+07	1.00	0.00	0	No
5	79.50	6.00	0.100000	2.000E+08	5.00	0.00	0	No
6	78.90	1.00	0.250000	3.000E+07	1.00	0.00	0	No
7	81.65	1.00	0.250000	3.000E+07	1.00	0.00	0	No
8	76.30	6.00	0.010000	2.000E+08	5.00	0.00	0	No

SURCHARGE LOADS

Surch -arge no.	Elev.	Distance from wall	Length parallel to wall	Width perpend. to wall	Surcharge ----- kN/m2 ----- Near edge	Far edge	Equiv. soil type	Partial factor/ Category
1	84.00	0.00(A)	8.00	20.00	5.00	=	N/A	1.00 Var
2	84.00	5.00(A)	8.00	15.00	5.00	=	N/A	1.00 Var
3	84.00	1.00(A)	8.00	4.00	0.00	17.00	N/A	1.00 P/U
4	73.20	-0.00(P)	8.00	10.00	70.00	=	N/A	1.00 -
5	74.00	-0.00(P)	10.00	10.00	70.00	=	N/A	1.00 -
6	84.00	5.00(A)	10.00	15.00	17.00	=	N/A	1.00 P/U
7	83.00	5.00(A)	2.00	2.00	25.00	=	N/A	1.00 P/U

Note: A = Active side, P = Passive side
A trapezoidal surcharge is defined by two values:
N = at edge near to wall, F = at edge far from wall
Limit State Categories P/U = Permanent Unfavourable
P/F = Permanent Favourable
Var = Variable (unfavourable)

CONSTRUCTION STAGES

Construction stage no.	Stage description
1	Apply surcharge no.1 at elevation 84.00 No analysis at this stage
2	Apply surcharge no.2 at elevation 84.00 No analysis at this stage
3	Apply surcharge no.3 at elevation 84.00 No analysis at this stage
4	Apply surcharge no.6 at elevation 84.00 No analysis at this stage
5	Apply surcharge no.7 at elevation 83.00 No analysis at this stage
6	Install strut or anchor no.1 at elevation 84.40
7	Excavate to elevation 81.50 on PASSIVE side
8	Install strut or anchor no.2 at elevation 82.00
9	Apply water pressure profile no.1 (Mod. Conserv.)
10	Excavate to elevation 77.50 on PASSIVE side
11	Install strut or anchor no.3 at elevation 78.00
12	Apply water pressure profile no.3 (Mod. Conserv.)
13	Excavate to elevation 74.00 on PASSIVE side
14	Install strut or anchor no.4 at elevation 74.75
15	Apply surcharge no.4 at elevation 73.20
16	Install strut or anchor no.5 at elevation 79.50
17	Remove strut or anchor no.3 at elevation 78.00
18	Install strut or anchor no.6 at elevation 78.90
19	Remove strut or anchor no.5 at elevation 79.50
20	Install strut or anchor no.7 at elevation 81.65
21	Remove strut or anchor no.2 at elevation 82.00
22	Remove strut or anchor no.1 at elevation 84.40
23	Change properties of soil type 1 to soil type 4 Ko pressures will be reset
24	Change properties of soil type 2 to soil type 5 Ko pressures will be reset
25	Change properties of soil type 3 to soil type 6 Ko pressures will be reset

FACTORS OF SAFETY and ANALYSIS OPTIONS

Limit State options: Serviceability Limit State
All loads and soil strengths are unfactored

Stability analysis:
Method of analysis - Strength Factor method
Factor on soil strength for calculating wall depth = 1.00

Parameters for undrained strata:
Minimum equivalent fluid density = 5.00 kN/m3
Maximum depth of water filled tension crack = 0.00 m

Bending moment and displacement calculation:
Method - Subgrade reaction model using Influence Coefficients
Open Tension Crack analysis? - No
Non-linear Modulus Parameter (L) = 20.00 m

Boundary conditions:
Length of wall (normal to plane of analysis) = 6.00 m

Width of excavation on active side of wall = 20.00 m
Width of excavation on passive side of wall = 10.00 m

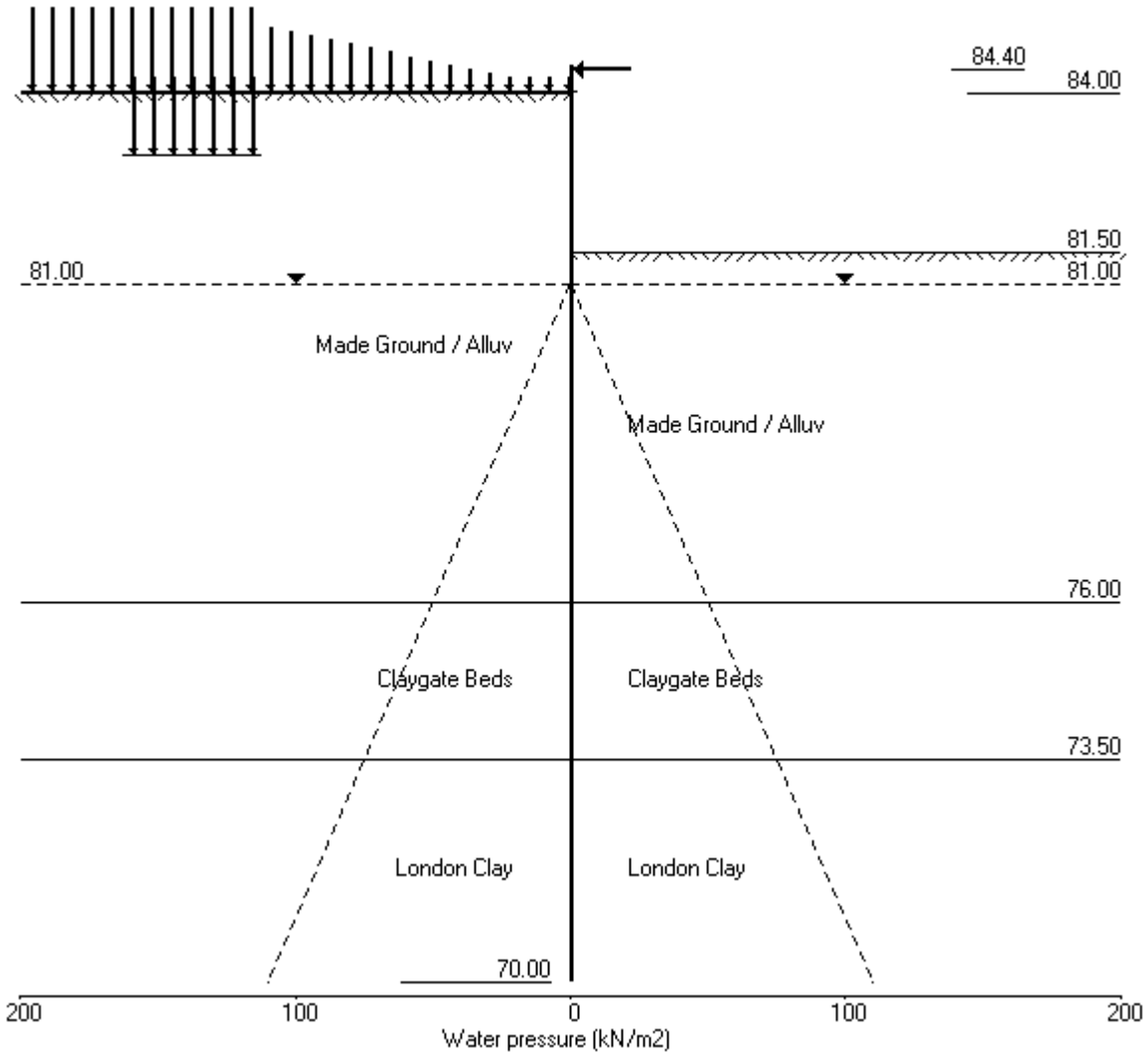
Distance to rigid boundary on active side = 20.00 m
Distance to rigid boundary on passive side = 20.00 m

OUTPUT OPTIONS

Stage no.	Stage description	Output options: Displacement Bending mom. Shear force	Active, Passive pressures	Graph. output
1	Apply surcharge no.1 at elev. 84.00	No	No	No
2	Apply surcharge no.2 at elev. 84.00	No	No	No
3	Apply surcharge no.3 at elev. 84.00	No	No	No
4	Apply surcharge no.6 at elev. 84.00	No	No	No
5	Apply surcharge no.7 at elev. 83.00	No	No	No
6	Install strut no.1 at elev. 84.40	No	No	No
7	Excav. to elev. 81.50 on PASSIVE side	Yes	No	Yes
8	Install strut no.2 at elev. 82.00	No	No	No
9	Apply water pressure profile no.1	No	No	No
10	Excav. to elev. 77.50 on PASSIVE side	Yes	No	Yes
11	Install strut no.3 at elev. 78.00	No	No	No
12	Apply water pressure profile no.3	No	No	No
13	Excav. to elev. 74.00 on PASSIVE side	Yes	No	Yes
14	Install strut no.4 at elev. 74.75	No	No	No
15	Apply surcharge no.4 at elev. 73.20	No	No	No
16	Install strut no.5 at elev. 79.50	No	No	No
17	Remove strut no.3 at elev. 78.00	No	No	No
18	Install strut no.6 at elev. 78.90	No	No	No
19	Remove strut no.5 at elev. 79.50	No	No	No
20	Install strut no.7 at elev. 81.65	No	No	No
21	Remove strut no.2 at elev. 82.00	No	No	No
22	Remove strut no.1 at elev. 84.40	No	No	No
23	Change soil type 1 to soil type 4	No	No	No
24	Change soil type 2 to soil type 5	No	No	No
25	Change soil type 3 to soil type 6	No	No	No
*	Summary output	Yes	-	Yes

Units: kN,m

Stage No.7 Excav. to elev. 81.50 on PASSIVE side



Units: kN,m

Stage No. 7 Excavate to elevation 81.50 on PASSIVE side

STABILITY ANALYSIS of Fully Embedded Wall according to Strength Factor method

Factor of safety on soil strength

Stage No.	--- G.L. --- Act.	Pass.	Strut Elev.	FoS for toe elev. = 70.00 Factor of Safety	Moment equilib. at elev.	Toe elev. for FoS = 1.000 Toe elev.	Wall Penetr -ation
7	84.00	81.50	84.40	7.328	n/a	81.31	0.19

BENDING MOMENT and DISPLACEMENT ANALYSIS of Fully Embedded Wall

Analysis options

Length of wall perpendicular to section = 6.00m
Subgrade reaction model - Boussinesq Influence coefficients
Soil deformations are elastic until the active or passive limit is reached
Open Tension Crack analysis - No

Rigid boundaries: Active side 20.00 from wall
Passive side 20.00 from wall

Limit State: Serviceability Limit State

Calculated Bending Moments and Strut Forces are to be multiplied by a factor of 1.35 to obtain values for structural design. See summary for factored values.

Node no.	Y coord	Nett pressure kN/m2	Wall disp. m	Wall rotation rad.	Shear force kN/m	Bending moment kN.m/m	Strut forces kN/m
1	84.40	0.00	0.001	-1.37E-03	-26.3	0.0	26.3
2	84.00	0.00	0.002	-1.36E-03	-26.3	-10.5	
3	83.50	2.50	0.003	-1.32E-03	-25.7	-23.6	
4	83.00	5.00	0.003	-1.25E-03	-23.8	-36.0	
5	82.50	7.50	0.004	-1.14E-03	-20.7	-47.2	
6	82.00	10.00	0.004	-1.01E-03	-16.3	-56.5	
7	81.65	11.77	0.005	-9.10E-04	-12.5	-61.3	
8	81.50	12.79	0.005	-8.63E-04	-10.7	-63.0	
		0.10	0.005	-8.63E-04	-10.7	-63.0	
9	81.00	2.34	0.005	-6.97E-04	-10.1	-68.1	
10	80.25	4.09	0.006	-4.27E-04	-7.6	-74.6	
11	79.50	9.48	0.006	-1.37E-04	-2.6	-78.5	
12	78.90	12.36	0.006	1.00E-04	4.0	-78.2	
13	78.45	12.89	0.006	2.74E-04	9.7	-75.1	
14	78.00	13.83	0.006	4.39E-04	15.7	-69.5	
15	77.50	15.32	0.005	6.02E-04	23.0	-59.9	
16	76.75	18.27	0.005	7.88E-04	35.6	-38.4	
17	76.00	21.71	0.004	8.74E-04	50.6	-6.7	
		-35.84	0.004	8.74E-04	50.6	-6.7	
18	75.38	-29.25	0.004	8.56E-04	30.2	17.8	
19	74.75	-22.36	0.003	7.79E-04	14.1	31.0	
20	74.00	-14.63	0.003	6.54E-04	0.2	35.2	
21	73.50	-10.10	0.002	5.67E-04	-6.0	33.4	
22	73.20	-7.53	0.002	5.18E-04	-8.6	31.1	
23	73.00	-5.94	0.002	4.88E-04	-10.0	29.3	
24	72.50	-2.36	0.002	4.21E-04	-12.0	23.5	
25	72.00	0.75	0.002	3.70E-04	-12.4	17.2	
26	71.20	5.15	0.001	3.20E-04	-10.1	7.3	
27	70.60	8.34	0.001	3.06E-04	-6.0	2.2	
28	70.00	11.72	0.001	3.03E-04	0.0	0.0	

Strut force at elev. 84.40 = 26.32 kN/m run = 157.89 kN/strut

(continued)

Stage No.7 Excavate to elevation 81.50 on PASSIVE side

Node no.	Y coord	ACTIVE side						
		Water press. kN/m2	Effective stresses Vertic -al kN/m2	Active limit kN/m2	Passive limit kN/m2	Earth pressure kN/m2	Total earth pressure kN/m2	Soil stiffness coeff. kN/m3
1	84.40	0.00	0.00	0.00	0.00	0.00	0.00	0.0
2	84.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
		Total> 5.00	0.00	69.28	0.00	0.00a	3265	
3	83.50	Total> 13.59	2.50m	77.87	2.50	2.50a	3265	
4	83.00	Total> 22.49	5.00m	86.77	5.00	5.00a	3265	
5	82.50	Total> 31.59	7.50m	95.87	7.50	7.50a	3265	
6	82.00	Total> 40.74	10.00m	105.02	10.00	10.00a	3265	
7	81.65	Total> 47.13	11.75m	111.41	11.77	11.77	3265	
8	81.50	Total> 49.85	12.50m	114.13	12.79	12.79	3265	
9	81.00	Total> 58.88	15.00m	123.16	16.31	16.31	3265	
10	80.25	Total> 72.26	18.75m	136.54	25.71	25.71	3265	
11	79.50	Total> 85.46	22.50m	149.73	35.60	35.60	3265	
12	78.90	Total> 95.88	31.62	160.16	43.91	43.91	3265	
13	78.45	Total> 103.64	39.38	167.92	50.38	50.38	3265	
14	78.00	Total> 111.35	47.09	175.63	57.06	57.06	3265	
15	77.50	Total> 119.87	55.61	184.15	64.69	64.69	3265	
16	76.75	Total> 132.57	68.31	196.85	76.50	76.50	3265	
17	76.00	Total> 145.19	80.93	209.47	88.57	88.57	3265	
		Total> 145.19	40.00m	324.43	60.97	60.97	9796	
18	75.38	Total> 156.29	43.13m	344.50	73.18	73.18	10286	
19	74.75	Total> 167.36	46.25m	364.53	85.54	85.54	10776	
20	74.00	Total> 180.62	50.00m	388.54	100.14	100.14	11364	
21	73.50	Total> 189.45	52.50m	404.54	109.57	109.57	11756	
		Total> 189.45	52.50m	412.37	162.57	162.57	11756	
22	73.20	Total> 195.04	54.00m	421.83	169.66	169.66	11960	
23	73.00	Total> 198.77	55.00m	428.13	174.33	174.33	12096	
24	72.50	Total> 208.09	57.50m	443.89	185.81	185.81	12437	
25	72.00	Total> 217.40	60.00m	459.65	197.06	197.06	12778	
26	71.20	Total> 232.31	64.00m	484.85	214.77	214.77	13323	
27	70.60	Total> 243.49	67.00m	503.76	228.01	228.01	13732	
28	70.00	Total> 254.67	70.00m	522.67	241.33	241.33	14140	

Node no.	Y coord	PASSIVE side						
		Water press. kN/m2	Effective stresses Vertic -al kN/m2	Active limit kN/m2	Passive limit kN/m2	Earth pressure kN/m2	Total earth pressure kN/m2	Soil stiffness coeff. kN/m3
1	84.40	0.00	0.00	0.00	0.00	0.00	0.00	0.0
2	84.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
3	83.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
4	83.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
5	82.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
6	82.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
7	81.65	0.00	0.00	0.00	0.00	0.00	0.00	0.0
8	81.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
		Total> 0.00	0.00	64.28	12.70	12.70	3431	
9	81.00	Total> 8.50	2.50m	72.78	13.97	13.97	3431	
10	80.25	Total> 21.28	6.25m	85.56	21.62	21.62	3431	
11	79.50	Total> 34.14	10.00m	98.42	26.12	26.12	3431	
12	78.90	Total> 44.49	13.00m	108.77	31.55	31.55	3431	
13	78.45	Total> 52.31	15.25m	116.59	37.49	37.49	3431	
14	78.00	Total> 60.17	17.50m	124.45	43.23	43.23	3431	
15	77.50	Total> 68.97	20.00m	133.24	49.37	49.37	3431	
16	76.75	Total> 82.26	23.75m	146.54	58.23	58.23	3431	

(continued)

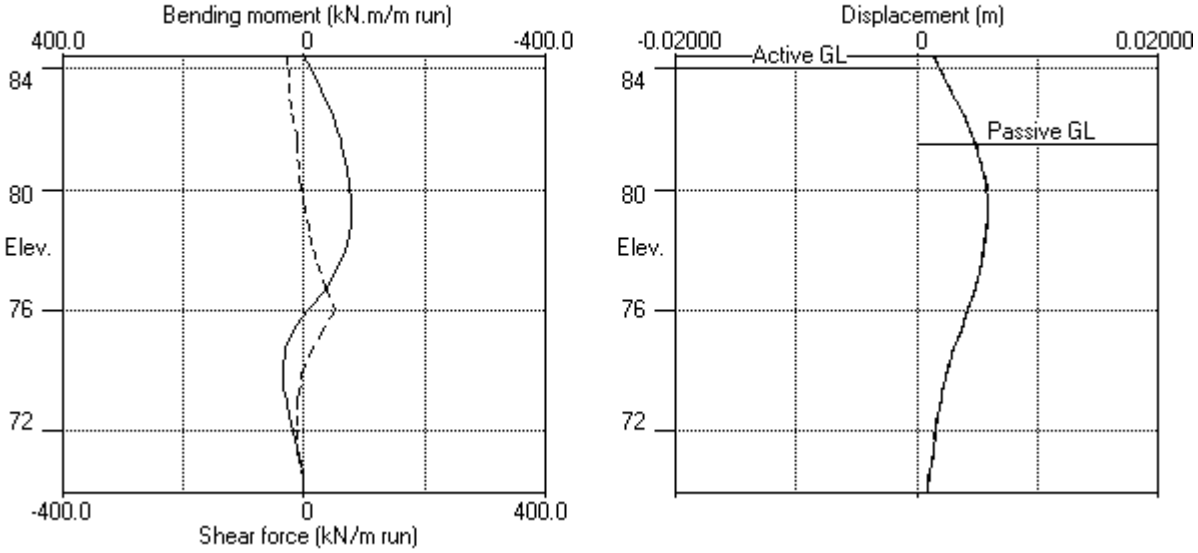
Stage No.7 Excavate to elevation 81.50 on PASSIVE side

Node no.	Y coord	PASSIVE side						
			Effective stresses				Total earth pressure	Soil stiffness coeff.
		Water press.	Vertic -al	Active limit	Passive limit	Earth pressure		
		kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m3
17	76.00	Total>	95.68	31.42	159.96	66.86	66.86	3431
		Total>	95.68	27.50m	274.93	96.81	96.81	10293
18	75.38	Total>	107.57	30.63m	295.78	102.43	102.43	10808
19	74.75	Total>	119.52	33.75m	316.69	107.90	107.90	11322
20	74.00	Total>	133.92	37.50m	341.85	114.77	114.77	11940
21	73.50	Total>	143.56	40.00m	358.65	119.67	119.67	12351
		Total>	143.56	40.00m	366.48	172.67	172.67	12351
22	73.20	Total>	149.65	41.50m	376.43	177.19	177.19	12566
23	73.00	Total>	153.71	42.50m	383.07	180.27	180.27	12709
24	72.50	Total>	163.87	45.00m	399.68	188.16	188.16	13067
25	72.00	Total>	174.05	47.50m	416.29	196.30	196.30	13425
26	71.20	Total>	190.33	51.50m	442.87	209.62	209.62	13998
27	70.60	Total>	202.54	54.50m	462.81	219.67	219.67	14427
28	70.00	Total>	214.74	57.50m	482.74	229.61	229.61	14857

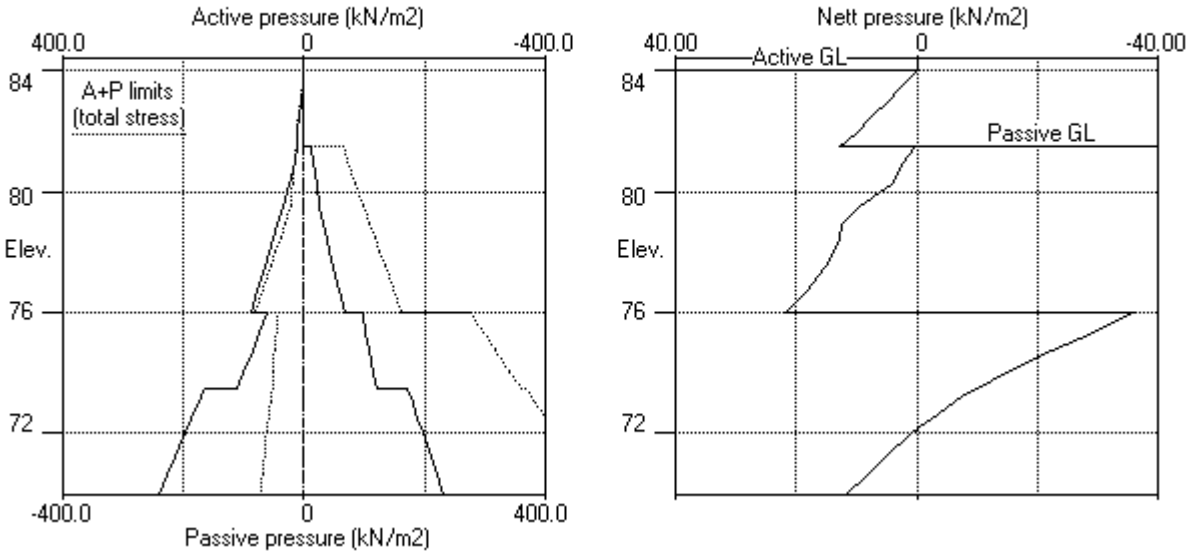
Note: 10.00a Soil pressure at active limit
123.45p Soil pressure at passive limit

Units: kN,m

Stage No.7 Excav. to elev. 81.50 on PASSIVE side

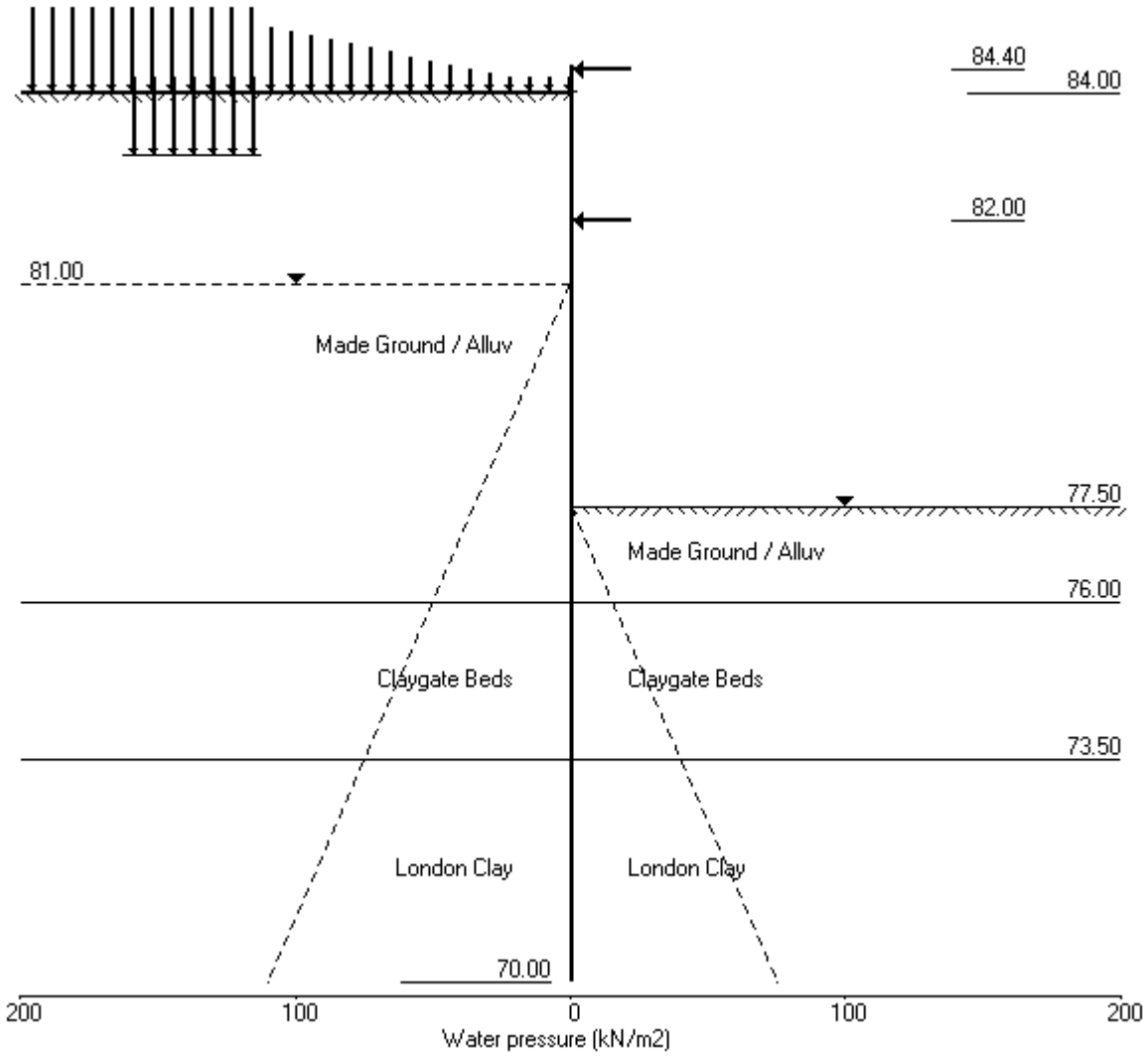


Stage No.7 Excav. to elev. 81.50 on PASSIVE side



Units: kN,m

Stage No.10 Excav. to elev. 77.50 on PASSIVE side



Units: kN,m

Stage No. 10 Excavate to elevation 77.50 on PASSIVE side

STABILITY ANALYSIS of Fully Embedded Wall according to Strength Factor method

Factor of safety on soil strength

Stage No.	--- G.L. --- Act.	Pass.	Strut Elev.	FoS for toe elev. = 70.00 Factor of Safety	Moment equilib. at elev.	Toe elev. for FoS = 1.000 Toe elev.	Wall Penetr -ation
10	84.00	77.50		More than one strut			

BENDING MOMENT and DISPLACEMENT ANALYSIS of Fully Embedded Wall

Analysis options

Length of wall perpendicular to section = 6.00m
Subgrade reaction model - Boussinesq Influence coefficients
Soil deformations are elastic until the active or passive limit is reached
Open Tension Crack analysis - No

Rigid boundaries: Active side 20.00 from wall
Passive side 20.00 from wall

Limit State: Serviceability Limit State

Calculated Bending Moments and Strut Forces are to be multiplied by a factor of 1.35 to obtain values for structural design. See summary for factored values.

Node no.	Y coord	Nett pressure kN/m2	Wall disp. m	Wall rotation rad.	Shear force kN/m	Bending moment kN.m/m	Strut forces kN/m
1	84.40	0.00	0.001	-2.05E-03	0.0	0.0	-0.0
2	84.00	0.00	0.002	-2.05E-03	0.0	-0.0	
		8.14	0.002	-2.05E-03	0.0	-0.0	
3	83.50	2.50	0.003	-2.05E-03	2.7	1.1	
4	83.00	5.00	0.004	-2.06E-03	4.5	2.9	
5	82.50	7.50	0.005	-2.07E-03	7.7	5.9	
6	82.00	10.00	0.006	-2.09E-03	12.0	10.8	93.0
		10.00	0.006	-2.09E-03	-81.0	10.8	
7	81.65	11.75	0.006	-2.08E-03	-77.2	-16.7	
8	81.50	12.50	0.007	-2.07E-03	-75.4	-28.1	
9	81.00	15.00	0.008	-1.95E-03	-68.5	-64.1	
10	80.25	18.75	0.009	-1.62E-03	-55.9	-110.6	
11	79.50	22.50	0.010	-1.13E-03	-40.4	-146.8	
12	78.90	31.62	0.011	-6.60E-04	-24.2	-166.4	
13	78.45	39.38	0.011	-2.74E-04	-8.2	-173.8	
14	78.00	47.09	0.011	1.20E-04	11.3	-173.3	
15	77.50	55.61	0.011	5.43E-04	37.0	-161.5	
		34.61	0.011	5.43E-04	37.0	-161.5	
16	76.75	43.94	0.010	1.08E-03	66.4	-123.5	
17	76.00	54.10	0.009	1.43E-03	103.2	-60.9	
		-46.53	0.009	1.43E-03	103.2	-60.9	
18	75.38	-46.82	0.008	1.53E-03	74.0	-6.1	
19	74.75	-46.00	0.007	1.49E-03	45.0	30.4	
20	74.00	-36.53	0.006	1.33E-03	14.1	54.7	
21	73.50	-26.83	0.006	1.19E-03	-1.8	57.1	
22	73.20	-21.10	0.005	1.11E-03	-9.0	55.4	
23	73.00	-17.50	0.005	1.05E-03	-12.8	53.2	
24	72.50	-9.24	0.005	9.33E-04	-19.5	44.5	
25	72.00	-1.90	0.004	8.35E-04	-22.3	33.5	
26	71.20	8.62	0.003	7.37E-04	-19.6	14.8	

(continued)

Stage No.10 Excavate to elevation 77.50 on PASSIVE side

Node no.	Y coord	Nett pressure kN/m2	Wall disp. m	Wall rotation rad.	Shear force kN/m	Bending moment kN.m/m	Strut forces kN/m
27	70.60	16.26	0.003	7.08E-04	-12.2	4.5	
28	70.00	24.25	0.003	7.01E-04	0.0	0.0	

The strut at elev. 84.40 is slack
Strut force at elev. 82.00 = 93.05 kN/m run = 558.30 kN/strut

ACTIVE side

Node no.	Y coord	Effective stresses: Water press. kN/m2	Vertic -al kN/m2	Active limit kN/m2	Passive limit kN/m2	Earth pressure kN/m2	Total earth pressure kN/m2	Soil stiffness coeff. kN/m3
1	84.40	0.00	0.00	0.00	0.00	0.00	0.00	0.0
2	84.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
		Total> 5.00	0.00	69.28	8.14	8.14		29967
3	83.50	Total> 13.59	2.50m	77.87	2.50	2.50a		3262
4	83.00	Total> 22.49	5.00m	86.77	5.00	5.00a		3262
5	82.50	Total> 31.59	7.50m	95.87	7.50	7.50a		3262
6	82.00	Total> 40.74	10.00m	105.02	10.00	10.00a		3262
7	81.65	Total> 47.13	11.75m	111.41	11.75	11.75a		3262
8	81.50	Total> 49.85	12.50m	114.13	12.50	12.50a		3262
9	81.00	Total> 58.88	15.00m	123.16	15.00	15.00a		3262
10	80.25	Total> 72.26	18.75m	136.54	18.75	18.75a		3262
11	79.50	Total> 85.46	22.50m	149.73	22.50	22.50a		3262
12	78.90	Total> 95.88	31.62	160.16	31.62	31.62a		3262
13	78.45	Total> 103.64	39.38	167.92	39.38	39.38a		3262
14	78.00	Total> 111.35	47.09	175.63	47.09	47.09a		3262
15	77.50	Total> 119.87	55.61	184.15	55.61	55.61a		3262
16	76.75	Total> 132.57	68.31	196.85	68.31	68.31a		3262
17	76.00	Total> 145.19	80.93	209.47	80.93	80.93a		3262
		Total> 145.19	40.00m	324.43	40.00	40.00a		9785
18	75.38	Total> 156.29	43.13m	344.50	43.13	43.13a		10274
19	74.75	Total> 167.36	46.25m	364.53	46.25	46.25a		10763
20	74.00	Total> 180.62	50.00m	388.54	58.32	58.32		11350
21	73.50	Total> 189.45	52.50m	404.54	70.18	70.18		11742
		Total> 189.45	52.50m	412.37	123.18	123.18		11742
22	73.20	Total> 195.04	54.00m	421.83	131.77	131.77		11946
23	73.00	Total> 198.77	55.00m	428.13	137.41	137.41		12082
24	72.50	Total> 208.09	57.50m	443.89	151.20	151.20		12422
25	72.00	Total> 217.40	60.00m	459.65	164.62	164.62		12762
26	71.20	Total> 232.31	64.00m	484.85	185.61	185.61		13307
27	70.60	Total> 243.49	67.00m	503.76	201.32	201.32		13715
28	70.00	Total> 254.67	70.00m	522.67	217.23	217.23		14123

PASSIVE side

Node no.	Y coord	Effective stresses: Water press. kN/m2	Vertic -al kN/m2	Active limit kN/m2	Passive limit kN/m2	Earth pressure kN/m2	Total earth pressure kN/m2	Soil stiffness coeff. kN/m3
1	84.40	0.00	0.00	0.00	0.00	0.00	0.00	0.0
2	84.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
3	83.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
4	83.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
5	82.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
6	82.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
7	81.65	0.00	0.00	0.00	0.00	0.00	0.00	0.0
8	81.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
9	81.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0

(continued)

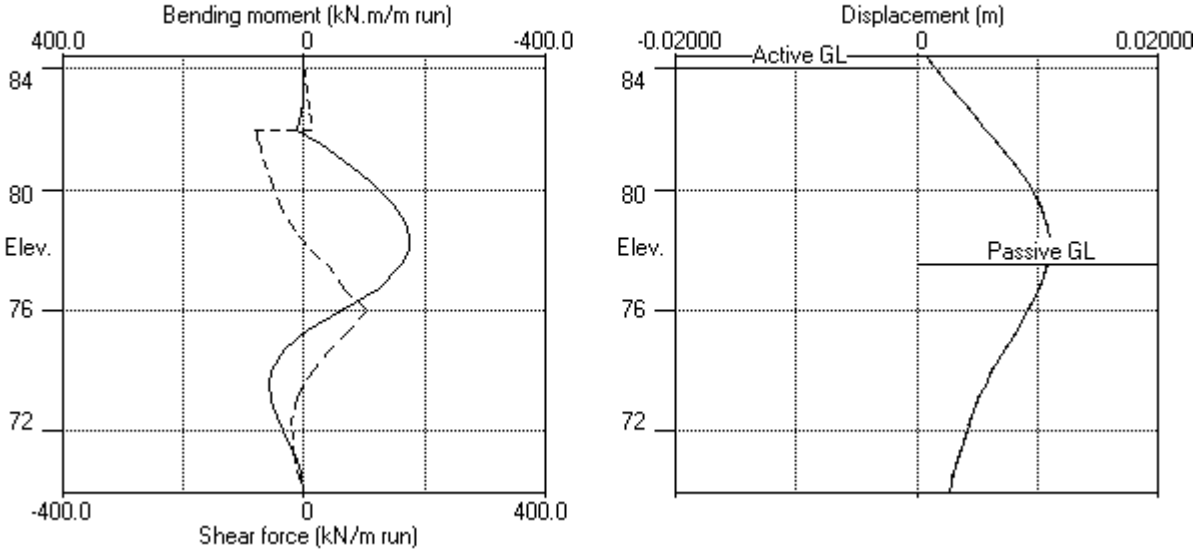
Stage No.10 Excavate to elevation 77.50 on PASSIVE side

Node no.	Y coord	PASSIVE side						
		Effective stresses					Total earth pressure	Soil stiffness coeff.
		Water press.	Vertic -al	Active limit	Passive limit	Earth pressure		
		kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m3
10	80.25	0.00	0.00	0.00	0.00	0.00	0.00	0.0
11	79.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
12	78.90	0.00	0.00	0.00	0.00	0.00	0.00	0.0
13	78.45	0.00	0.00	0.00	0.00	0.00	0.00	0.0
14	78.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
15	77.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
		Total>	0.00	0.00	64.28	21.00	21.00	3859
16	76.75	Total>	12.77	3.75m	77.05	24.36	24.36	3859
17	76.00	Total>	25.65	7.50m	89.93	26.83	26.83	3859
		Total>	25.65	7.50m	204.90	86.53	86.53	11578
18	75.38	Total>	37.18	10.63m	225.39	89.94	89.94	12157
19	74.75	Total>	48.89	13.75m	246.06	92.25	92.25	12735
20	74.00	Total>	63.25	17.50m	271.17	94.85	94.85	13430
21	73.50	Total>	73.01	20.00m	288.11	97.01	97.01	13893
		Total>	73.01	20.00m	295.93	150.01	150.01	13893
22	73.20	Total>	79.24	21.50m	306.03	152.88	152.88	14135
23	73.00	Total>	83.42	22.50m	312.78	154.92	154.92	14296
24	72.50	Total>	93.98	25.00m	329.78	160.45	160.45	14698
25	72.00	Total>	104.67	27.50m	346.91	166.52	166.52	15101
26	71.20	Total>	122.02	31.50m	374.57	176.99	176.99	15745
27	70.60	Total>	135.20	34.50m	395.48	185.05	185.05	16228
28	70.00	Total>	148.50	37.50m	416.50	192.98	192.98	16711

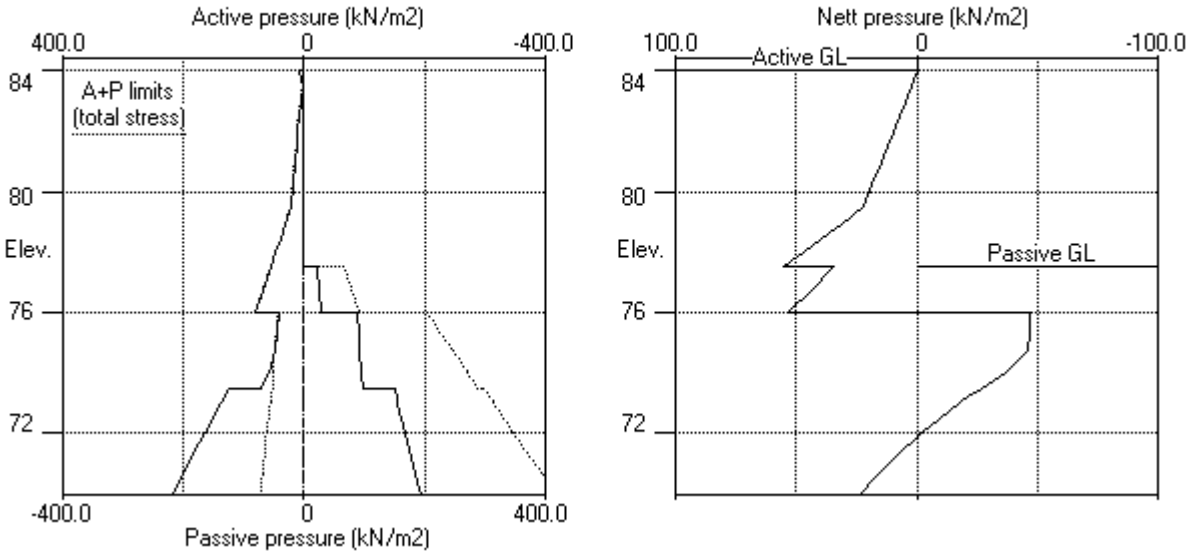
Note: 46.25a Soil pressure at active limit
123.45p Soil pressure at passive limit

Units: kN,m

Stage No.10 Excav. to elev. 77.50 on PASSIVE side

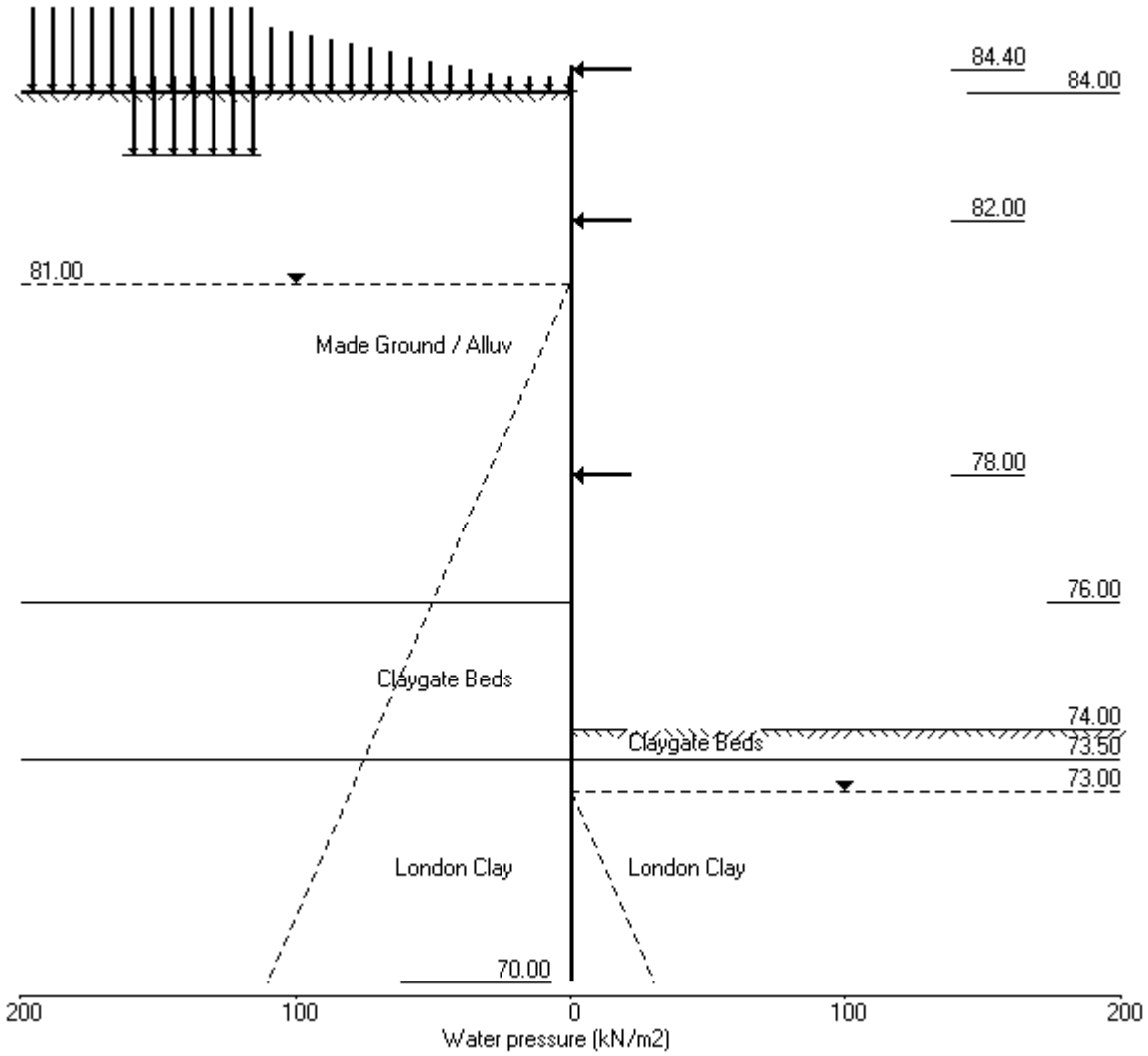


Stage No.10 Excav. to elev. 77.50 on PASSIVE side



Units: kN,m

Stage No.13 Excav. to elev. 74.00 on PASSIVE side



Units: kN,m

Stage No. 13 Excavate to elevation 74.00 on PASSIVE side

STABILITY ANALYSIS of Fully Embedded Wall according to Strength Factor method

Factor of safety on soil strength

Stage No.	--- G.L. --- Act.	Pass.	Strut Elev.	FoS for toe elev. = 70.00 Factor of Safety	Moment equilib. at elev.	Toe elev. for FoS = 1.000 Toe elev.	Wall Penetr -ation
13	84.00	74.00		More than one strut			

BENDING MOMENT and DISPLACEMENT ANALYSIS of Fully Embedded Wall

Analysis options

Length of wall perpendicular to section = 6.00m
Subgrade reaction model - Boussinesq Influence coefficients
Soil deformations are elastic until the active or passive limit is reached
Open Tension Crack analysis - No

Rigid boundaries: Active side 20.00 from wall
Passive side 20.00 from wall

Limit State: Serviceability Limit State

Calculated Bending Moments and Strut Forces are to be multiplied by a factor of 1.35 to obtain values for structural design. See summary for factored values.

Node no.	Y coord	Nett pressure kN/m2	Wall disp. m	Wall rotation rad.	Shear force kN/m	Bending moment kN.m/m	Strut forces kN/m
1	84.40	0.00	0.001	-1.85E-03	0.0	0.0	-0.0
2	84.00	0.00	0.002	-1.85E-03	0.0	-0.0	
		8.07	0.002	-1.85E-03	0.0	-0.0	
3	83.50	2.93	0.003	-1.85E-03	2.8	1.1	
4	83.00	5.88	0.003	-1.86E-03	5.0	3.0	
5	82.50	8.83	0.004	-1.87E-03	8.6	6.3	
6	82.00	11.77	0.005	-1.89E-03	13.8	11.8	67.1
		11.77	0.005	-1.89E-03	-53.3	11.8	
7	81.65	13.82	0.006	-1.90E-03	-48.9	-5.8	
8	81.50	14.70	0.006	-1.89E-03	-46.7	-13.0	
9	81.00	17.53	0.007	-1.83E-03	-38.7	-34.3	
10	80.25	21.44	0.009	-1.66E-03	-24.0	-57.8	
11	79.50	24.66	0.010	-1.42E-03	-6.8	-69.3	
12	78.90	32.65	0.010	-1.21E-03	10.4	-68.4	
13	78.45	39.38	0.011	-1.06E-03	26.6	-60.1	
14	78.00	47.09	0.011	-9.49E-04	46.1	-43.9	164.4
		47.09	0.011	-9.49E-04	-118.3	-43.9	
15	77.50	55.61	0.012	-7.71E-04	-92.6	-96.9	
16	76.75	68.31	0.012	-3.03E-04	-46.2	-149.9	
17	76.00	80.93	0.012	2.92E-04	9.8	-164.6	
		40.00	0.012	2.92E-04	9.8	-164.6	
18	75.38	43.13	0.012	7.90E-04	35.8	-151.1	
19	74.75	46.25	0.011	1.21E-03	63.7	-120.8	
20	74.00	50.00	0.010	1.55E-03	99.8	-56.9	
		-46.76	0.010	1.55E-03	99.8	-56.9	
21	73.50	-44.88	0.009	1.64E-03	76.9	-13.2	
		-76.85	0.009	1.64E-03	76.9	-13.2	
22	73.20	-68.04	0.009	1.65E-03	55.2	6.4	
23	73.00	-61.90	0.009	1.63E-03	42.2	16.0	
24	72.50	-46.22	0.008	1.58E-03	15.1	29.4	

(continued)

Stage No.13 Excavate to elevation 74.00 on PASSIVE side

Node no.	Y coord	Nett pressure kN/m2	Wall disp. m	Wall rotation rad.	Shear force kN/m	Bending moment kN.m/m	Strut forces kN/m
25	72.00	-30.29	0.007	1.50E-03	-4.0	31.1	
26	71.20	-4.73	0.006	1.40E-03	-18.0	18.1	
27	70.60	14.79	0.005	1.36E-03	-15.0	6.4	
28	70.00	35.14	0.004	1.35E-03	0.0	0.0	

The strut at elev. 84.40 is slack
Strut force at elev. 82.00 = 67.12 kN/m run = 402.72 kN/strut
Strut force at elev. 78.00 = 164.40 kN/m run = 986.41 kN/strut

ACTIVE side

Node no.	Y coord	Effective stresses: Water press. kN/m2	Vertic -al kN/m2	Active limit kN/m2	Passive limit kN/m2	Earth pressure kN/m2	Total earth pressure kN/m2	Soil stiffness coeff. kN/m3
1	84.40	0.00	0.00	0.00	0.00	0.00	0.00	0.0
2	84.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
		Total> 5.00	0.00	69.28	8.07	8.07		18040
3	83.50	Total> 13.59	2.50m	77.87	2.93	2.93		4556
4	83.00	Total> 22.49	5.00m	86.77	5.88	5.88		4556
5	82.50	Total> 31.59	7.50m	95.87	8.83	8.83		4556
6	82.00	Total> 40.74	10.00m	105.02	11.77	11.77		4556
7	81.65	Total> 47.13	11.75m	111.41	13.82	13.82		4556
8	81.50	Total> 49.85	12.50m	114.13	14.70	14.70		4556
9	81.00	Total> 58.88	15.00m	123.16	17.53	17.53		4556
10	80.25	Total> 72.26	18.75m	136.54	21.44	21.44		4556
11	79.50	Total> 85.46	22.50m	149.73	24.66	24.66		4556
12	78.90	Total> 95.88	31.62	160.16	32.65	32.65		4556
13	78.45	Total> 103.64	39.38	167.92	39.38	39.38a		3573
14	78.00	Total> 111.35	47.09	175.63	47.09	47.09a		3573
15	77.50	Total> 119.87	55.61	184.15	55.61	55.61a		3573
16	76.75	Total> 132.57	68.31	196.85	68.31	68.31a		3573
17	76.00	Total> 145.19	80.93	209.47	80.93	80.93a		3573
		Total> 145.19	40.00m	324.43	40.00	40.00a		10718
18	75.38	Total> 156.29	43.13m	344.50	43.13	43.13a		11254
19	74.75	Total> 167.36	46.25m	364.53	46.25	46.25a		11789
20	74.00	Total> 180.62	50.00m	388.54	50.00	50.00a		12432
21	73.50	Total> 189.45	52.50m	404.54	52.50	52.50a		12861
		Total> 189.45	52.50m	412.37	73.54	73.54		12861
22	73.20	Total> 195.04	54.00m	421.83	83.21	83.21		13085
23	73.00	Total> 198.77	55.00m	428.13	89.79	89.79		13234
24	72.50	Total> 208.09	57.50m	443.89	106.45	106.45		13607
25	72.00	Total> 217.40	60.00m	459.65	123.25	123.25		13979
26	71.20	Total> 232.31	64.00m	484.85	150.30	150.30		14576
27	70.60	Total> 243.49	67.00m	503.76	170.90	170.90		15023
28	70.00	Total> 254.67	70.00m	522.67	192.01	192.01		15470

PASSIVE side

Node no.	Y coord	Effective stresses: Water press. kN/m2	Vertic -al kN/m2	Active limit kN/m2	Passive limit kN/m2	Earth pressure kN/m2	Total earth pressure kN/m2	Soil stiffness coeff. kN/m3
1	84.40	0.00	0.00	0.00	0.00	0.00	0.00	0.0
2	84.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
3	83.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
4	83.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
5	82.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
6	82.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0

(continued)

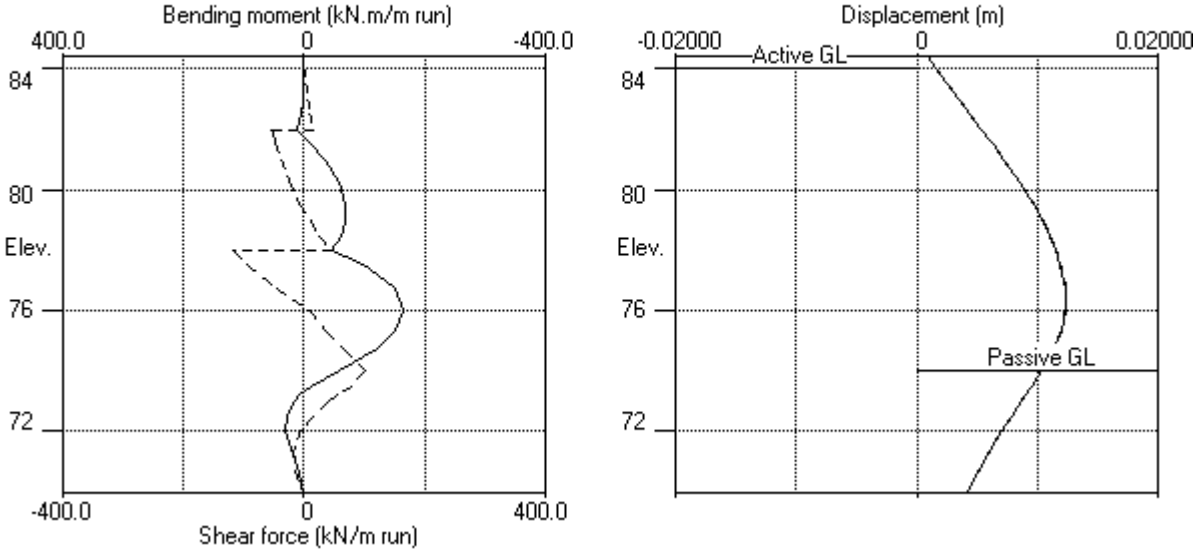
Stage No.13 Excavate to elevation 74.00 on PASSIVE side

Node no.	Y coord	PASSIVE side						
			Effective stresses				Total earth pressure	Soil stiffness coeff.
		Water press. kN/m2	Vertic -al kN/m2	Active limit kN/m2	Passive limit kN/m2	Earth pressure kN/m2	kN/m2	kN/m3
7	81.65	0.00	0.00	0.00	0.00	0.00	0.00	0.0
8	81.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
9	81.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
10	80.25	0.00	0.00	0.00	0.00	0.00	0.00	0.0
11	79.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
12	78.90	0.00	0.00	0.00	0.00	0.00	0.00	0.0
13	78.45	0.00	0.00	0.00	0.00	0.00	0.00	0.0
14	78.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
15	77.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
16	76.75	0.00	0.00	0.00	0.00	0.00	0.00	0.0
17	76.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
18	75.38	0.00	0.00	0.00	0.00	0.00	0.00	0.0
19	74.75	0.00	0.00	0.00	0.00	0.00	0.00	0.0
20	74.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
		Total>	0.00	0.00	207.93	96.76	96.76	15938
21	73.50	Total>	9.01	2.50m	224.10	97.38	97.38	16488
		Total>	9.01	2.50m	231.93	150.38	150.38	16488
22	73.20	Total>	14.74	4.00m	241.52	151.26	151.26	16775
23	73.00	Total>	18.57	5.00m	247.94	151.68	151.68	16966
24	72.50	Total>	28.24	7.50m	264.04	152.67	152.67	17444
25	72.00	Total>	38.06	10.00m	280.30	153.54	153.54	17921
26	71.20	Total>	54.16	14.00m	306.71	155.03	155.03	18686
27	70.60	Total>	66.62	17.00m	326.89	156.11	156.11	19259
28	70.00	Total>	79.41	20.00m	347.41	156.88	156.88	19832

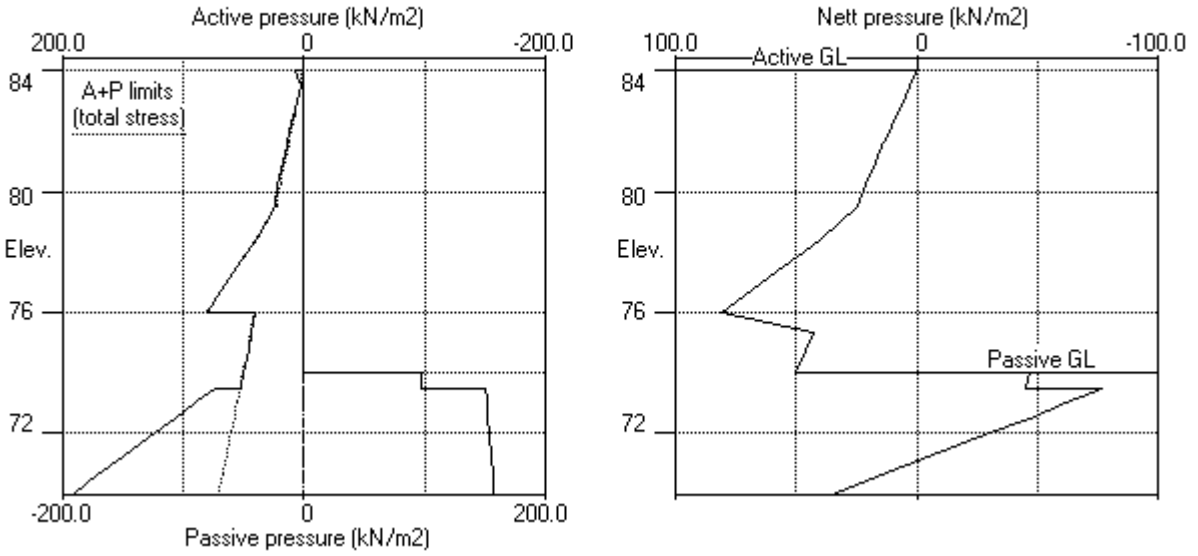
Note: 52.50a Soil pressure at active limit
123.45p Soil pressure at passive limit

Units: kN,m

Stage No.13 Excav. to elev. 74.00 on PASSIVE side

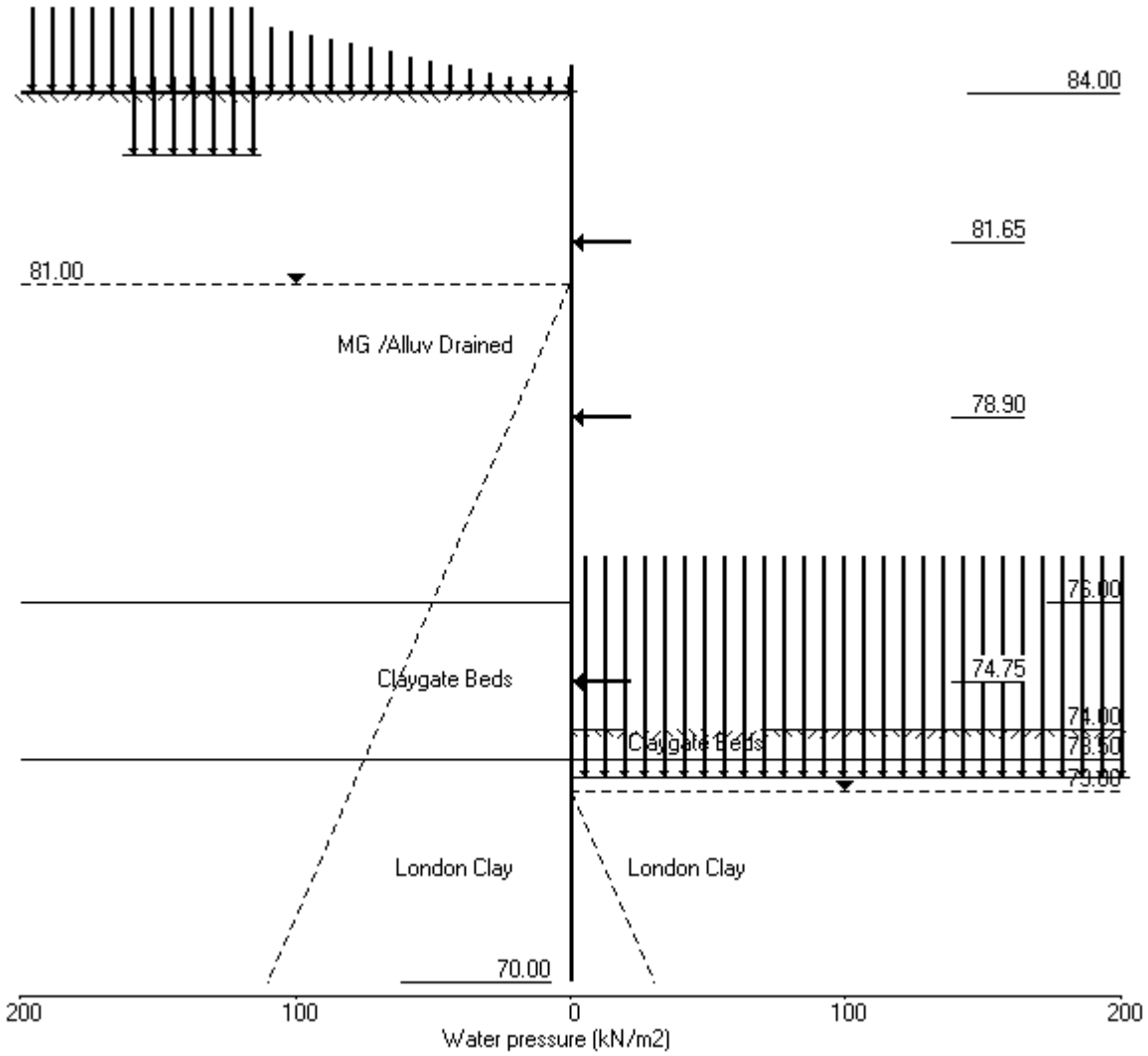


Stage No.13 Excav. to elev. 74.00 on PASSIVE side



Units: kN,m

Stage No.23 Change soil type 1 to soil type 4



Units: kN,m

Stage No. 23 Change properties of soil type 1 to soil type 4
Ko pressures will be reset

STABILITY ANALYSIS of Fully Embedded Wall according to Strength Factor method
Factor of safety on soil strength

Stage No.	--- G.L. --- Act.	Pass.	Strut Elev.	FoS for toe elev. = 70.00 Factor of Safety	Moment equilib. at elev.	Toe elev. for FoS = 1.000 Toe elev.	Wall Penetr -ation
23	84.00	74.00		More than one strut			

BENDING MOMENT and DISPLACEMENT ANALYSIS of Fully Embedded Wall
Analysis options
Length of wall perpendicular to section = 6.00m
Subgrade reaction model - Boussinesq Influence coefficients
Soil deformations are elastic until the active or passive limit is reached
Open Tension Crack analysis - No

Rigid boundaries: Active side 20.00 from wall
Passive side 20.00 from wall
Limit State: Serviceability Limit State
Calculated Bending Moments and Strut Forces are to be multiplied by a factor of 1.35 to obtain values for structural design. See summary for factored values.

Node no.	Y coord	Nett pressure kN/m2	Wall disp. m	Wall rotation rad.	Shear force kN/m	Bending moment kN.m/m	Strut forces kN/m
1	84.40	0.00	0.001	-1.84E-03	0.0	-0.0	
2	84.00	0.00	0.002	-1.84E-03	0.0	-0.0	
		7.76	0.002	-1.84E-03	0.0	-0.0	
3	83.50	6.64	0.002	-1.84E-03	3.6	1.2	
4	83.00	11.46	0.003	-1.85E-03	8.1	4.1	
5	82.50	16.38	0.004	-1.87E-03	15.1	9.7	
6	82.00	21.31	0.005	-1.90E-03	24.5	19.5	
7	81.65	24.72	0.006	-1.95E-03	32.6	29.7	99.6
		24.72	0.006	-1.95E-03	-67.1	29.7	
8	81.50	26.17	0.006	-1.97E-03	-63.2	19.9	
9	81.00	30.95	0.007	-1.98E-03	-49.0	-8.1	
10	80.25	41.77	0.009	-1.90E-03	-21.7	-34.8	
11	79.50	52.49	0.010	-1.76E-03	13.6	-38.1	
12	78.90	60.97	0.011	-1.67E-03	47.7	-20.0	221.7
		60.97	0.011	-1.67E-03	-174.0	-20.0	
13	78.45	67.28	0.012	-1.55E-03	-145.2	-91.9	
14	78.00	73.55	0.012	-1.27E-03	-113.5	-150.3	
15	77.50	80.51	0.013	-8.36E-04	-75.0	-197.6	
16	76.75	90.96	0.013	-2.54E-05	-10.7	-230.6	
17	76.00	101.45	0.013	8.14E-04	61.5	-212.6	
		47.89	0.013	8.14E-04	61.5	-212.6	
18	75.38	50.92	0.012	1.41E-03	92.3	-165.3	
19	74.75	54.35	0.011	1.82E-03	125.2	-97.9	72.2
		54.35	0.011	1.82E-03	53.0	-97.9	
20	74.00	64.80	0.010	2.08E-03	97.7	-39.8	
		-32.73	0.010	2.08E-03	97.7	-39.8	
21	73.50	-18.40	0.009	2.13E-03	84.9	4.6	
		-50.36	0.009	2.13E-03	84.9	4.6	
22	73.20	-34.64	0.008	2.10E-03	72.2	27.8	
		-101.89	0.008	2.10E-03	72.2	27.8	

(continued)

Stage No.23 Change properties of soil type 1 to soil type 4
Ko pressures will be reset

Node no.	Y coord	Nett pressure kN/m2	Wall disp. m	Wall rotation rad.	Shear force kN/m	Bending moment kN.m/m	Strut forces kN/m
23	73.00	-91.38	0.008	2.07E-03	52.8	40.2	
24	72.50	-66.01	0.007	1.95E-03	13.5	55.2	
25	72.00	-41.79	0.006	1.81E-03	-13.5	53.6	
26	71.20	-3.40	0.004	1.64E-03	-31.5	29.6	
27	70.60	25.96	0.003	1.58E-03	-24.8	10.1	
28	70.00	56.67	0.002	1.57E-03	0.0	0.0	
Strut force at elev.		81.65 =	99.62 kN/m run =			99.62 kN/strut	
Strut force at elev.		78.90 =	221.73 kN/m run =			221.73 kN/strut	
Strut force at elev.		74.75 =	72.24 kN/m run =			72.24 kN/strut	

Node no.	Y coord	ACTIVE side: Water press. kN/m2	Effective stresses: Vertic -al kN/m2	Active limit kN/m2	Passive limit kN/m2	Earth pressure kN/m2	Total earth pressure kN/m2	Soil stiffness coeff. kN/m3
1	84.40	0.00	0.00	0.00	0.00	0.00	0.00	0.0
2	84.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
		0.00	5.00	1.62	18.00	7.76	7.76	4144
3	83.50	0.00	14.09	4.56	50.72	6.64	6.64	4144
4	83.00	0.00	23.49	7.61	84.57	11.46	11.46	4144
5	82.50	0.00	33.09	10.72	119.16	16.38	16.38	4144
6	82.00	0.00	42.74	13.85	153.90	21.31	21.31	4144
7	81.65	0.00	49.48	16.03	178.14	24.72	24.72	4144
8	81.50	0.00	52.35	16.96	188.50	26.17	26.17	4144
9	81.00	0.00	61.88	20.05	222.81	30.95	30.95	3141
10	80.25	7.50	68.51	22.20	246.69	34.27	41.77	3141
11	79.50	15.00	74.96	24.29	269.89	37.49	52.49	3141
12	78.90	21.00	79.98	25.92	287.99	39.97	60.97	1510
13	78.45	25.50	83.69	27.12	301.35	41.78	67.28	1510
14	78.00	30.00	87.35	28.30	314.53	43.55	73.55	1510
15	77.50	35.00	91.37	29.61	328.99	45.51	80.51	1510
16	76.75	42.50	97.32	31.53	350.40	48.46	90.96	1510
17	76.00	50.00	103.19	33.44	371.54	51.45	101.45	1510
		Total>	153.19	40.00m	332.43	47.89	47.89	9966
18	75.38	Total>	164.29	43.13m	352.50	50.92	50.92	10464
19	74.75	Total>	175.36	46.25m	372.53	54.35	54.35	10962
20	74.00	Total>	188.62	50.00m	396.54	64.80	64.80	11560
21	73.50	Total>	197.45	52.50m	412.54	71.81	71.81	11959
		Total>	197.45	52.50m	420.37	92.84	92.84	11959
22	73.20	Total>	203.04	54.00m	429.83	105.18	105.18	12167
23	73.00	Total>	206.77	55.00m	436.13	113.48	113.48	12306
24	72.50	Total>	216.09	57.50m	451.89	134.40	134.40	12652
25	72.00	Total>	225.40	60.00m	467.65	155.25	155.25	12999
26	71.20	Total>	240.31	64.00m	492.85	187.96	187.96	13553
27	70.60	Total>	251.49	67.00m	511.76	212.47	212.47	13969
28	70.00	Total>	262.67	70.00m	530.67	237.48	237.48	14385

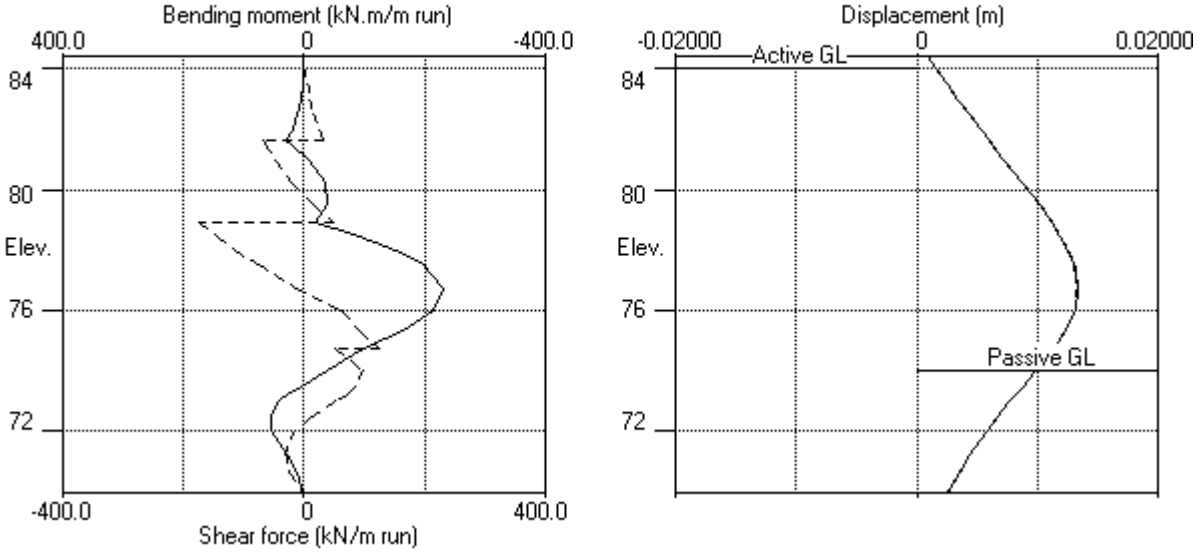
(continued)

Stage No.23 Change properties of soil type 1 to soil type 4
Ko pressures will be reset

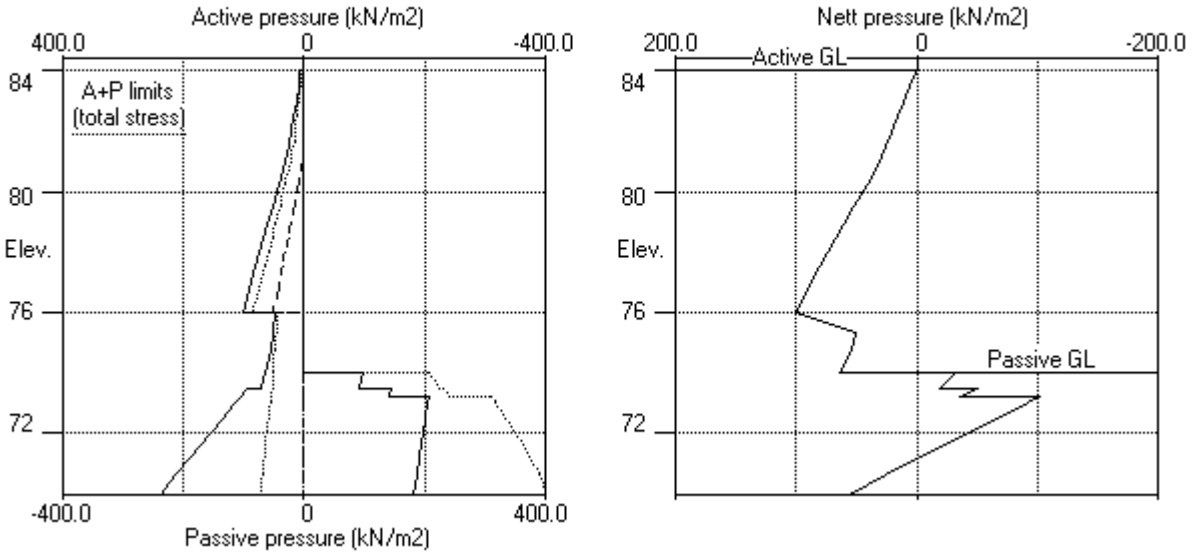
Node no.	Y coord	PASSIVE side						
		Effective stresses					Total earth pressure	Soil stiffness coeff.
		Water press.	Vertic -al	Active limit	Passive limit	Earth pressure		
		kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m3
1	84.40	0.00	0.00	0.00	0.00	0.00	0.00	0.0
2	84.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
3	83.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
4	83.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
5	82.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
6	82.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
7	81.65	0.00	0.00	0.00	0.00	0.00	0.00	0.0
8	81.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
9	81.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
10	80.25	0.00	0.00	0.00	0.00	0.00	0.00	0.0
11	79.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
12	78.90	0.00	0.00	0.00	0.00	0.00	0.00	0.0
13	78.45	0.00	0.00	0.00	0.00	0.00	0.00	0.0
14	78.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
15	77.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
16	76.75	0.00	0.00	0.00	0.00	0.00	0.00	0.0
17	76.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
18	75.38	0.00	0.00	0.00	0.00	0.00	0.00	0.0
19	74.75	0.00	0.00	0.00	0.00	0.00	0.00	0.0
20	74.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
		Total> 0.00	0.00	207.93	97.52	97.52	20859	
21	73.50	Total> 9.01	2.50m	224.10	90.21	90.21	21579	
		Total> 9.01	2.50m	231.93	143.21	143.21	21579	
22	73.20	Total> 14.74	4.00m	241.52	139.82	139.82	21954	
		Total> 84.74	4.00m	311.52	207.07	207.07	21954	
23	73.00	Total> 88.56	5.00m	317.93	204.86	204.86	22204	
24	72.50	Total> 98.08	7.50m	333.88	200.41	200.41	22829	
25	72.00	Total> 107.31	10.00m	349.55	197.04	197.04	23455	
26	71.20	Total> 121.23	14.00m	373.78	191.37	191.37	24455	
27	70.60	Total> 131.10	17.00m	391.37	186.51	186.51	25205	
28	70.00	Total> 140.73	20.00m	408.73	180.81	180.81	25956	

Units: kN,m

Stage No.23 Change soil type 1 to soil type 4

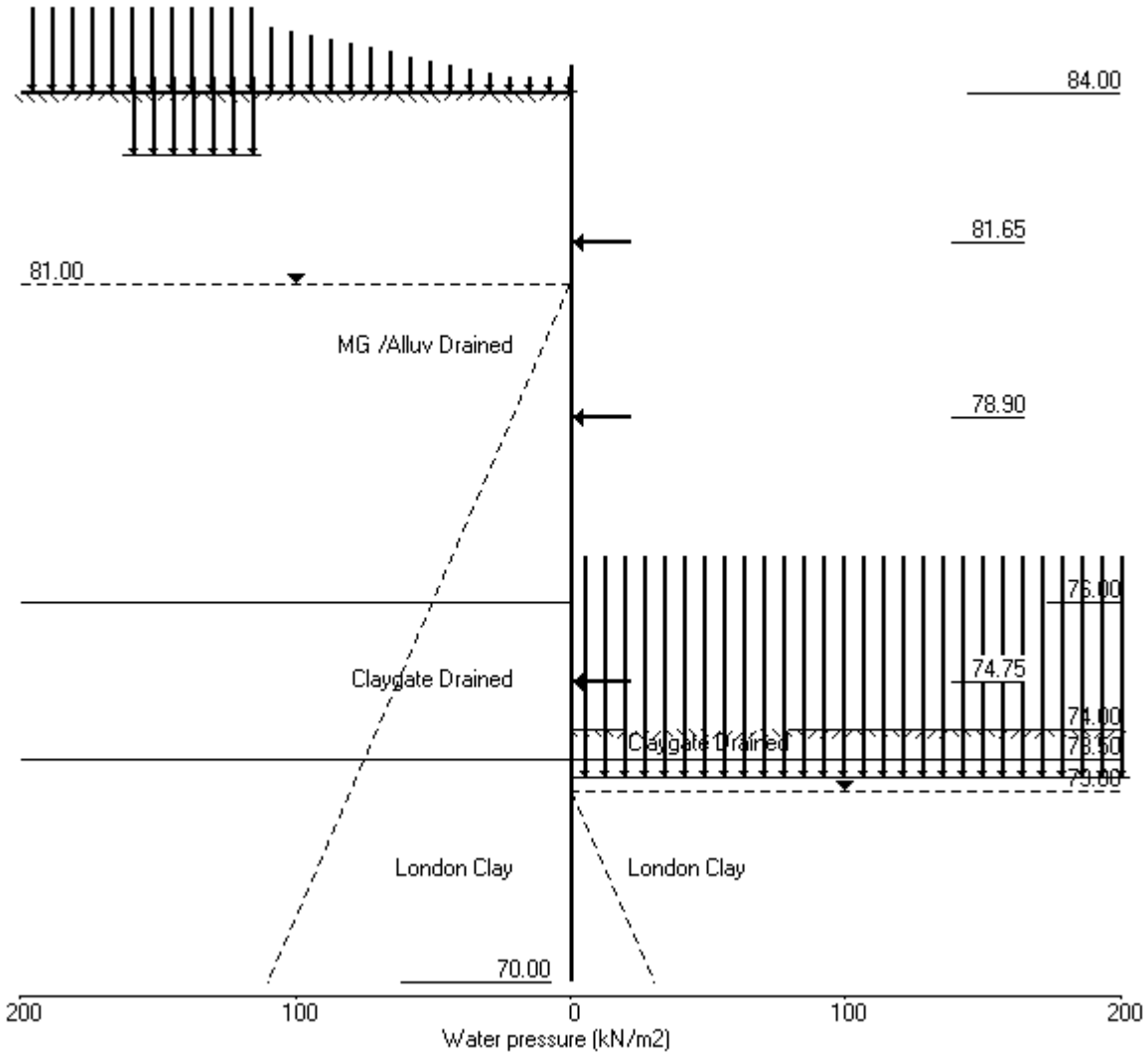


Stage No.23 Change soil type 1 to soil type 4



Units: kN,m

Stage No.24 Change soil type 2 to soil type 5



Units: kN,m

Stage No. 24 Change properties of soil type 2 to soil type 5
Ko pressures will be reset

STABILITY ANALYSIS of Fully Embedded Wall according to Strength Factor method
Factor of safety on soil strength

Stage No.	--- G.L. --- Act.	Pass.	Strut Elev.	FoS for toe elev. = 70.00 Factor of Safety	Moment equilib. at elev.	Toe elev. for FoS = 1.000 Toe elev.	Wall Penetr -ation
24	84.00	74.00		More than one strut			

BENDING MOMENT and DISPLACEMENT ANALYSIS of Fully Embedded Wall
Analysis options
Length of wall perpendicular to section = 6.00m
Subgrade reaction model - Boussinesq Influence coefficients
Soil deformations are elastic until the active or passive limit is reached
Open Tension Crack analysis - No

Rigid boundaries: Active side 20.00 from wall
Passive side 20.00 from wall
Limit State: Serviceability Limit State
Calculated Bending Moments and Strut Forces are to be multiplied by a factor of 1.35 to obtain values for structural design. See summary for factored values.

Node no.	Y coord	Nett pressure kN/m2	Wall disp. m	Wall rotation rad.	Shear force kN/m	Bending moment kN.m/m	Strut forces kN/m
1	84.40	0.00	0.001	-1.83E-03	0.0	-0.0	
2	84.00	0.00	0.002	-1.83E-03	0.0	-0.0	
		7.69	0.002	-1.83E-03	0.0	-0.0	
3	83.50	6.58	0.003	-1.83E-03	3.6	1.2	
4	83.00	11.42	0.003	-1.84E-03	8.1	4.0	
5	82.50	16.36	0.004	-1.86E-03	15.0	9.7	
6	82.00	21.30	0.005	-1.90E-03	24.4	19.4	
7	81.65	24.72	0.006	-1.94E-03	32.5	29.5	98.0
		24.72	0.006	-1.94E-03	-65.5	29.5	
8	81.50	26.17	0.006	-1.96E-03	-61.7	20.0	
9	81.00	30.97	0.007	-1.97E-03	-47.4	-7.3	
10	80.25	41.80	0.009	-1.90E-03	-20.1	-32.8	
11	79.50	52.51	0.010	-1.77E-03	15.2	-34.9	
12	78.90	60.97	0.011	-1.69E-03	49.3	-15.8	228.3
		60.97	0.011	-1.69E-03	-179.1	-15.8	
13	78.45	67.25	0.012	-1.57E-03	-150.2	-90.0	
14	78.00	73.50	0.013	-1.30E-03	-118.5	-150.6	
15	77.50	80.43	0.013	-8.60E-04	-80.0	-200.5	
16	76.75	90.86	0.013	-3.15E-05	-15.8	-237.3	
17	76.00	101.36	0.013	8.40E-04	56.3	-223.2	
		152.93	0.013	8.40E-04	56.3	-223.2	
18	75.38	164.15	0.012	1.44E-03	155.4	-158.1	
19	74.75	175.17	0.011	1.73E-03	261.4	-28.6	377.2
		175.17	0.011	1.73E-03	-115.8	-28.6	
20	74.00	187.56	0.010	1.91E-03	20.2	-62.9	
21	73.50	166.53	0.009	2.02E-03	108.8	-31.2	
		-57.59	0.009	2.02E-03	108.8	-31.2	
22	73.20	-42.76	0.008	2.05E-03	93.7	-1.1	
		-110.01	0.008	2.05E-03	93.7	-1.1	

(continued)

Stage No.24 Change properties of soil type 2 to soil type 5
Ko pressures will be reset

Node no.	Y coord	Nett pressure kN/m2	Wall disp. m	Wall rotation rad.	Shear force kN/m	Bending moment kN.m/m	Strut forces kN/m
23	73.00	-99.85	0.008	2.04E-03	72.7	15.4	
24	72.50	-74.70	0.007	1.97E-03	29.1	39.3	
25	72.00	-49.95	0.006	1.87E-03	-2.1	44.5	
26	71.20	-9.81	0.005	1.72E-03	-26.0	26.9	
27	70.60	21.29	0.004	1.67E-03	-22.5	9.6	
28	70.00	53.90	0.003	1.65E-03	0.0	0.0	
Strut force at elev.		81.65 =	97.99 kN/m run =			97.99 kN/strut	
Strut force at elev.		78.90 =	228.33 kN/m run =			228.33 kN/strut	
Strut force at elev.		74.75 =	377.18 kN/m run =			377.18 kN/strut	

Node no.	Y coord	ACTIVE side: Water press. kN/m2	Effective stresses: Vertic -al kN/m2	Active limit kN/m2	Passive limit kN/m2	Earth pressure kN/m2	Total earth pressure kN/m2	Soil stiffness coeff. kN/m3
1	84.40	0.00	0.00	0.00	0.00	0.00	0.00	0.0
2	84.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
		0.00	5.00	1.62	18.00	7.69	7.69	3884
3	83.50	0.00	14.09	4.56	50.72	6.58	6.58	3884
4	83.00	0.00	23.49	7.61	84.57	11.42	11.42	3884
5	82.50	0.00	33.09	10.72	119.16	16.36	16.36	3884
6	82.00	0.00	42.74	13.85	153.90	21.30	21.30	3884
7	81.65	0.00	49.48	16.03	178.14	24.72	24.72	2987
8	81.50	0.00	52.35	16.96	188.50	26.17	26.17	2987
9	81.00	0.00	61.88	20.05	222.81	30.97	30.97	2987
10	80.25	7.50	68.51	22.20	246.69	34.30	41.80	2987
11	79.50	15.00	74.96	24.29	269.89	37.51	52.51	2987
12	78.90	21.00	79.98	25.92	287.99	39.97	60.97	2081
13	78.45	25.50	83.69	27.12	301.35	41.75	67.25	2081
14	78.00	30.00	87.35	28.30	314.53	43.50	73.50	2081
15	77.50	35.00	91.37	29.61	328.99	45.43	80.43	2081
16	76.75	42.50	97.32	31.53	350.40	48.36	90.86	2081
17	76.00	50.00	103.19	33.44	371.54	51.36	101.36	2081
		50.00	103.19	36.25	335.65	102.93	152.93	6058
18	75.38	56.25	108.04	37.95	351.42	107.90	164.15	6361
19	74.75	62.50	112.86	39.64	367.11	112.67	175.17	6664
20	74.00	70.00	118.62	41.67	385.84	117.56	187.56	7027
21	73.50	75.00	122.45	43.01	398.29	120.84	195.84	7270
		Total> 197.45	52.50m	420.37	89.26	89.26	16165	
22	73.20	Total> 203.04	54.00m	429.83	101.16	101.16	16447	
23	73.00	Total> 206.77	55.00m	436.13	109.29	109.29	16634	
24	72.50	Total> 216.09	57.50m	451.89	130.10	130.10	17102	
25	72.00	Total> 225.40	60.00m	467.65	151.21	151.21	17571	
26	71.20	Total> 240.31	64.00m	492.85	184.80	184.80	18320	
27	70.60	Total> 251.49	67.00m	511.76	210.15	210.15	18882	
28	70.00	Total> 262.67	70.00m	530.67	236.11	236.11	19445	

(continued)

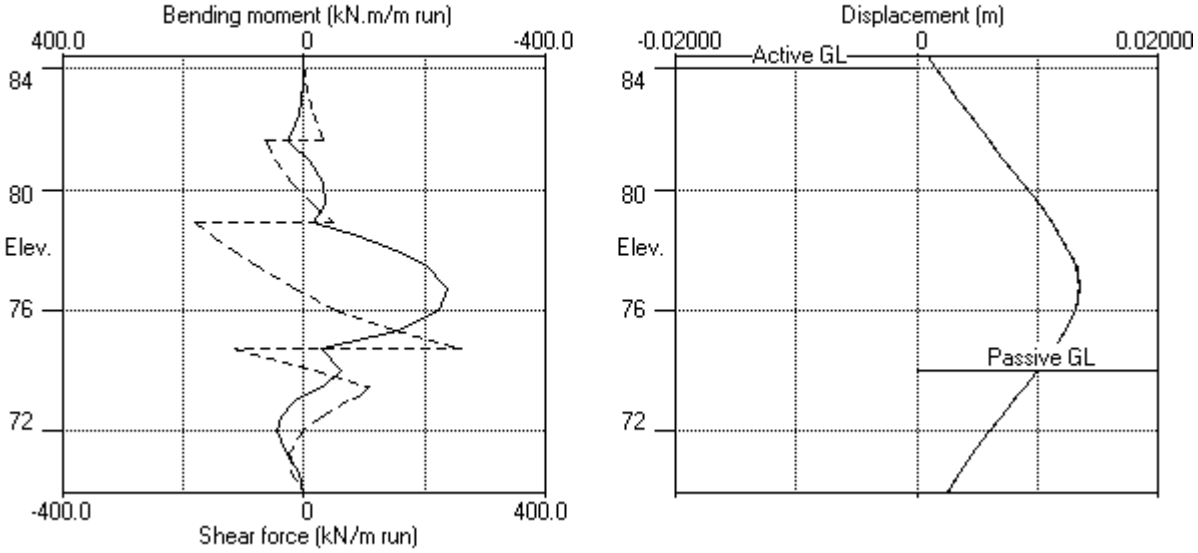
Stage No.24 Change properties of soil type 2 to soil type 5
Ko pressures will be reset

Node no.	Y coord	PASSIVE side						
		Effective stresses					Total earth pressure	Soil stiffness coeff.
		Water press.	Vertic -al	Active limit	Passive limit	Earth pressure		
		kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m3
1	84.40	0.00	0.00	0.00	0.00	0.00	0.00	0.0
2	84.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
3	83.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
4	83.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
5	82.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
6	82.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
7	81.65	0.00	0.00	0.00	0.00	0.00	0.00	0.0
8	81.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
9	81.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
10	80.25	0.00	0.00	0.00	0.00	0.00	0.00	0.0
11	79.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
12	78.90	0.00	0.00	0.00	0.00	0.00	0.00	0.0
13	78.45	0.00	0.00	0.00	0.00	0.00	0.00	0.0
14	78.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
15	77.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
16	76.75	0.00	0.00	0.00	0.00	0.00	0.00	0.0
17	76.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
18	75.38	0.00	0.00	0.00	0.00	0.00	0.00	0.0
19	74.75	0.00	0.00	0.00	0.00	0.00	0.00	0.0
20	74.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
		0.00	0.00	0.00	0.00	0.00	0.00	7178
21	73.50	0.00	9.01	3.16	29.30	29.30	29.30p	7426
		Total>	9.01	2.50m	231.93	146.86	146.86	16498
22	73.20	Total>	14.74	4.00m	241.52	143.92	143.92	16785
		Total>	84.74	4.00m	311.52	211.17	211.17	16785
23	73.00	Total>	88.56	5.00m	317.93	209.14	209.14	16976
24	72.50	Total>	98.08	7.50m	333.88	204.80	204.80	17454
25	72.00	Total>	107.31	10.00m	349.55	201.16	201.16	17932
26	71.20	Total>	121.23	14.00m	373.78	194.60	194.60	18697
27	70.60	Total>	131.10	17.00m	391.37	188.87	188.87	19271
28	70.00	Total>	140.73	20.00m	408.73	182.21	182.21	19844

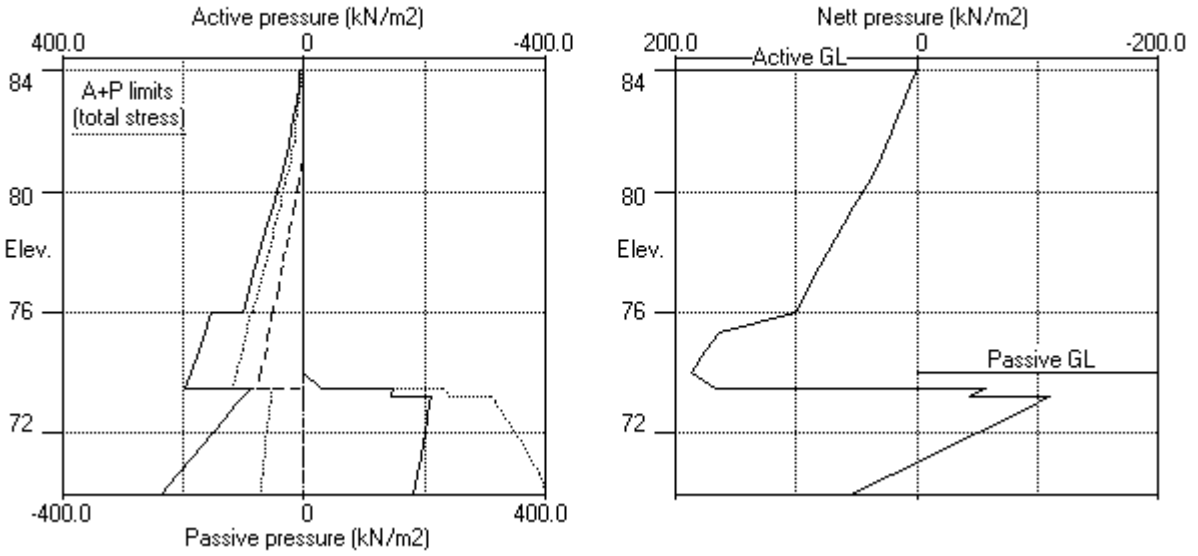
Note: 12.34a Soil pressure at active limit
29.30p Soil pressure at passive limit

Units: kN,m

Stage No.24 Change soil type 2 to soil type 5

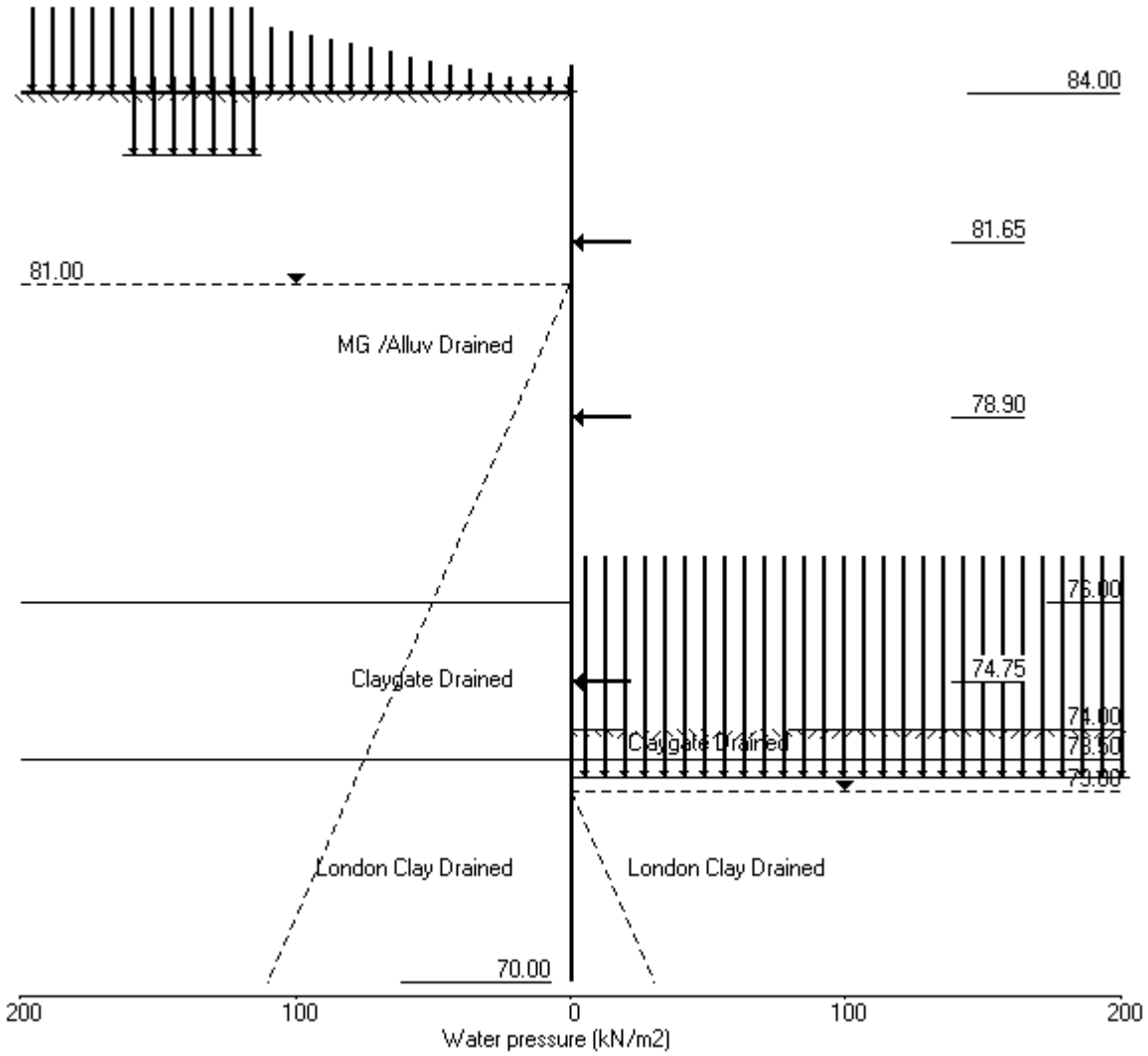


Stage No.24 Change soil type 2 to soil type 5



Units: kN,m

Stage No.25 Change soil type 3 to soil type 6



Units: kN,m

Stage No. 25 Change properties of soil type 3 to soil type 6
Ko pressures will be reset

STABILITY ANALYSIS of Fully Embedded Wall according to Strength Factor method
Factor of safety on soil strength

Stage No.	--- G.L. --- Act.	Pass.	Strut Elev.	FoS for toe elev. = 70.00 Factor of Safety	Moment equilib. at elev.	Toe elev. for FoS = 1.000 Toe elev.	Wall Penetr -ation
25	84.00	74.00		More than one strut			

BENDING MOMENT and DISPLACEMENT ANALYSIS of Fully Embedded Wall
Analysis options
Length of wall perpendicular to section = 6.00m
Subgrade reaction model - Boussinesq Influence coefficients
Soil deformations are elastic until the active or passive limit is reached
Open Tension Crack analysis - No

Rigid boundaries: Active side 20.00 from wall
Passive side 20.00 from wall
Limit State: Serviceability Limit State
Calculated Bending Moments and Strut Forces are to be multiplied by a factor of 1.35 to obtain values for structural design. See summary for factored values.

Node no.	Y coord	Nett pressure kN/m2	Wall disp. m	Wall rotation rad.	Shear force kN/m	Bending moment kN.m/m	Strut forces kN/m
1	84.40	0.00	0.001	-1.90E-03	0.0	-0.0	
2	84.00	0.00	0.001	-1.90E-03	0.0	-0.0	
		8.28	0.001	-1.90E-03	0.0	-0.0	
3	83.50	7.04	0.002	-1.90E-03	3.8	1.3	
4	83.00	11.76	0.003	-1.91E-03	8.5	4.3	
5	82.50	16.57	0.004	-1.92E-03	15.6	10.2	
6	82.00	21.38	0.005	-1.96E-03	25.1	20.3	
7	81.65	24.72	0.006	-2.01E-03	33.2	30.7	111.1
		24.72	0.006	-2.01E-03	-77.9	30.7	
8	81.50	26.14	0.006	-2.03E-03	-74.1	19.3	
9	81.00	30.83	0.007	-2.03E-03	-59.9	-14.3	
10	80.25	41.57	0.009	-1.91E-03	-32.7	-49.2	
11	79.50	52.34	0.010	-1.70E-03	2.5	-60.8	
12	78.90	60.99	0.011	-1.54E-03	36.5	-49.4	180.7
		60.99	0.011	-1.54E-03	-144.2	-49.4	
13	78.45	67.47	0.012	-1.36E-03	-115.3	-107.9	
14	78.00	73.96	0.012	-1.06E-03	-83.5	-152.8	
15	77.50	81.17	0.013	-6.41E-04	-44.7	-185.0	
16	76.75	91.91	0.013	7.90E-05	20.2	-195.1	
17	76.00	102.44	0.013	7.39E-04	93.1	-153.7	
		156.08	0.013	7.39E-04	93.1	-153.7	
18	75.38	166.43	0.012	1.08E-03	193.9	-65.0	
19	74.75	175.07	0.011	1.04E-03	300.6	89.0	517.2
		175.07	0.011	1.04E-03	-216.6	89.0	
20	74.00	182.33	0.011	9.18E-04	-82.6	-20.9	
21	73.50	156.94	0.010	9.96E-04	2.2	-41.3	
22	73.20	140.05	0.010	1.05E-03	46.7	-34.0	
		-32.73	0.010	1.05E-03	46.7	-34.0	
23	73.00	-30.55	0.010	1.08E-03	40.4	-25.3	

(continued)

Stage No.25 Change properties of soil type 3 to soil type 6
Ko pressures will be reset

Node no.	Y coord	Nett pressure kN/m2	Wall disp. m	Wall rotation rad.	Shear force kN/m	Bending moment kN.m/m	Strut forces kN/m
24	72.50	-25.53	0.009	1.12E-03	26.4	-9.4	
25	72.00	-20.61	0.009	1.13E-03	14.9	0.1	
26	71.20	-10.79	0.008	1.13E-03	2.3	3.5	
27	70.60	-2.12	0.007	1.12E-03	-1.6	2.1	
28	70.00	7.41	0.006	1.12E-03	0.0	0.0	
Strut force at elev.		81.65 =	111.11 kN/m run =			111.11 kN/strut	
Strut force at elev.		78.90 =	180.67 kN/m run =			180.67 kN/strut	
Strut force at elev.		74.75 =	517.24 kN/m run =			517.24 kN/strut	

Node no.	Y coord	ACTIVE side: Effective stresses: Water press. kN/m2	Vertic -al kN/m2	Active limit kN/m2	Passive limit kN/m2	Earth pressure kN/m2	Total earth pressure kN/m2	Soil stiffness coeff. kN/m3
1	84.40	0.00	0.00	0.00	0.00	0.00	0.00	0.0
2	84.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
		0.00	5.00	1.62	18.00	8.28	8.28	3883
3	83.50	0.00	14.09	4.56	50.72	7.04	7.04	3883
4	83.00	0.00	23.49	7.61	84.57	11.76	11.76	3883
5	82.50	0.00	33.09	10.72	119.16	16.57	16.57	3883
6	82.00	0.00	42.74	13.85	153.90	21.38	21.38	3883
7	81.65	0.00	49.48	16.03	178.14	24.72	24.72	2983
8	81.50	0.00	52.35	16.96	188.50	26.14	26.14	2983
9	81.00	0.00	61.88	20.05	222.81	30.83	30.83	2983
10	80.25	7.50	68.51	22.20	246.69	34.07	41.57	2983
11	79.50	15.00	74.96	24.29	269.89	37.34	52.34	2983
12	78.90	21.00	79.98	25.92	287.99	39.99	60.99	2401
13	78.45	25.50	83.69	27.12	301.35	41.97	67.47	2401
14	78.00	30.00	87.35	28.30	314.53	43.96	73.96	2401
15	77.50	35.00	91.37	29.61	328.99	46.17	81.17	2401
16	76.75	42.50	97.32	31.53	350.40	49.41	91.91	2401
17	76.00	50.00	103.19	33.44	371.54	52.44	102.44	2401
		50.00	103.19	36.25	335.65	106.08	156.08	6996
18	75.38	56.25	108.04	37.95	351.42	110.18	166.43	7346
19	74.75	62.50	112.86	39.64	367.11	112.57	175.07	7486
20	74.00	70.00	118.62	41.67	385.84	112.33	182.33	7895
21	73.50	75.00	122.45	43.01	398.29	111.25	186.25	8167
		75.00	122.45	43.01	421.21	112.86	187.86	8167
22	73.20	78.00	125.04	43.92	430.13	112.74	190.74	8309
23	73.00	80.00	126.77	44.53	436.08	112.68	192.68	8404
24	72.50	85.00	131.09	46.05	450.93	112.68	197.68	8640
25	72.00	90.00	135.40	47.56	465.78	112.98	202.98	8877
26	71.20	98.00	142.31	49.99	489.53	114.06	212.06	9256
27	70.60	104.00	147.49	51.81	507.34	115.12	219.12	9540
28	70.00	110.00	152.67	53.63	525.17	116.14	226.14	9824

Node no.	Y coord	PASSIVE side: Effective stresses: Water press. kN/m2	Vertic -al kN/m2	Active limit kN/m2	Passive limit kN/m2	Earth pressure kN/m2	Total earth pressure kN/m2	Soil stiffness coeff. kN/m3
1	84.40	0.00	0.00	0.00	0.00	0.00	0.00	0.0
2	84.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
3	83.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
4	83.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0

(continued)

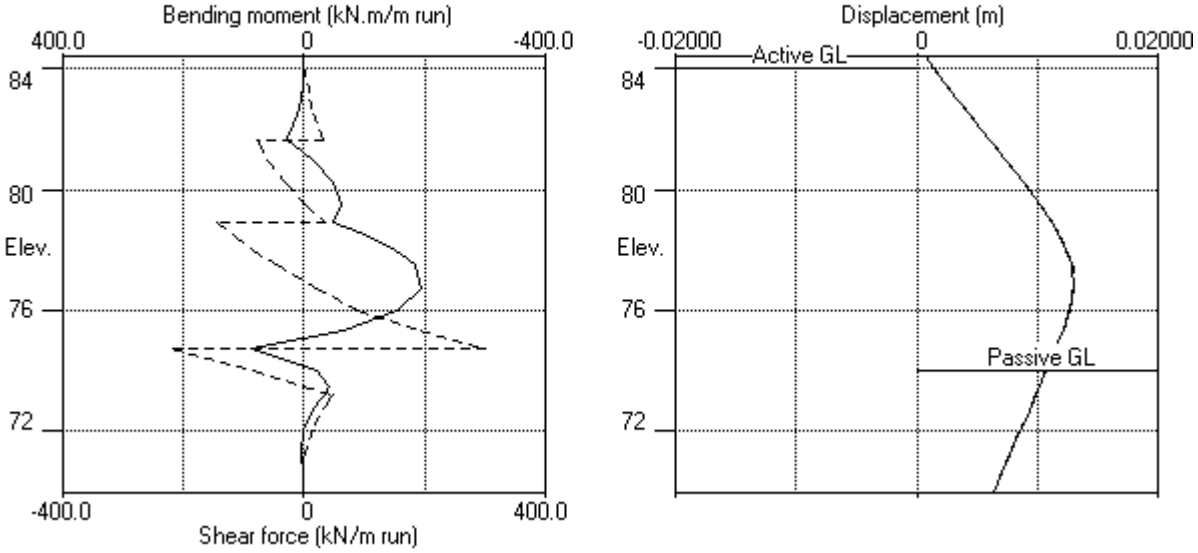
Stage No.25 Change properties of soil type 3 to soil type 6
Ko pressures will be reset

Node no.	Y coord	PASSIVE side						
		Effective stresses					Total earth pressure	Soil stiffness coeff.
		Water press. kN/m2	Vertic -al kN/m2	Active limit kN/m2	Passive limit kN/m2	Earth pressure kN/m2		kN/m3
5	82.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
6	82.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
7	81.65	0.00	0.00	0.00	0.00	0.00	0.00	0.0
8	81.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
9	81.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
10	80.25	0.00	0.00	0.00	0.00	0.00	0.00	0.0
11	79.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
12	78.90	0.00	0.00	0.00	0.00	0.00	0.00	0.0
13	78.45	0.00	0.00	0.00	0.00	0.00	0.00	0.0
14	78.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
15	77.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
16	76.75	0.00	0.00	0.00	0.00	0.00	0.00	0.0
17	76.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
18	75.38	0.00	0.00	0.00	0.00	0.00	0.00	0.0
19	74.75	0.00	0.00	0.00	0.00	0.00	0.00	0.0
20	74.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
		0.00	0.00	0.00	0.00	0.00	0.00	7895
21	73.50	0.00	9.01	3.16	29.30	29.30	29.30p	8167
		0.00	9.01	3.16	30.99	30.99	30.99p	8167
22	73.20	0.00	14.74	5.18	50.69	50.69	50.69p	8309
		0.00	84.74	29.77	291.49	223.47	223.47	8309
23	73.00	0.00	88.56	31.11	304.65	223.23	223.23	8404
24	72.50	5.00	93.08	32.70	320.19	218.21	223.21	8640
25	72.00	10.00	97.31	34.18	334.75	213.59	223.59	8877
26	71.20	18.00	103.23	36.26	355.12	204.85	222.85	9256
27	70.60	24.00	107.10	37.62	368.41	197.24	221.24	9540
28	70.00	30.00	110.73	38.90	380.91	188.74	218.74	9824

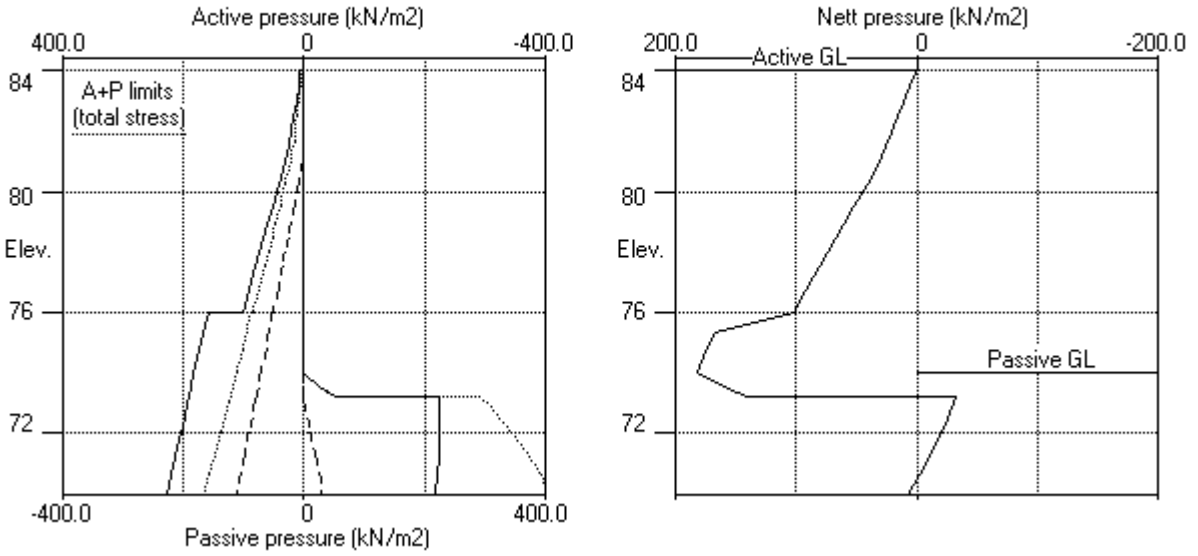
Note: 12.34a Soil pressure at active limit
50.69p Soil pressure at passive limit

Units: kN,m

Stage No.25 Change soil type 3 to soil type 6



Stage No.25 Change soil type 3 to soil type 6



Units: kN,m

Summary of results

LIMIT STATE PARAMETERS

Limit State: Serviceability Limit State

All loads and soil strengths are unfactored

STABILITY ANALYSIS of Fully Embedded Wall according to Strength Factor method

Factor of safety on soil strength

Stage No.	--- G.L. --- Act.	Pass.	Strut Elev.	FoS for toe elev. = 70.00 Factor of Safety	Moment equilib. at elev.	Toe elev. for FoS = 1.000 Toe elev.	Wall Penetr -ation
1	84.00	84.00	Cant.	Conditions not suitable for FoS calc.			
2	84.00	84.00		No analysis at this stage			
3	84.00	84.00		No analysis at this stage			
4	84.00	84.00		No analysis at this stage			
5	84.00	84.00	Cant.	Conditions not suitable for FoS calc.			
6	84.00	84.00		No analysis at this stage			
7	84.00	81.50	84.40	7.328	n/a	81.31	0.19
8	84.00	81.50		No analysis at this stage			

All remaining stages have more than one strut - FoS calculation n/a

Units: kN,m

Summary of results

BENDING MOMENT and DISPLACEMENT ANALYSIS of Fully Embedded Wall

Analysis options

Length of wall perpendicular to section = 6.00m
Subgrade reaction model - Boussinesq Influence coefficients
Soil deformations are elastic until the active or passive limit is reached
Open Tension Crack analysis - No

Rigid boundaries: Active side 20.00 from wall
Passive side 20.00 from wall

Limit State: Serviceability Limit State

Calculated Bending Moments and Strut Forces have been multiplied by a factor of 1.35 to obtain values for structural design.

Bending moment, shear force and displacement envelopes

Node no.	Y coord	Displacement		Bending moment Calculated		Bending moment Factored		Shear force Calculated		Shear force Factored	
		max.	min.	max.	min.	max.	min.	max.	min.	max.	min.
		m	m	kN.m/m		kN.m/m		kN/m	kN/m	kN/m	kN/m
1	84.40	0.001	0.000	0	-0	0	-0	0	-26	0	-36
2	84.00	0.002	0.000	0	-11	0	-14	0	-26	0	-36
3	83.50	0.003	0.000	1	-24	2	-32	4	-26	5	-35
4	83.00	0.004	0.000	4	-36	6	-49	9	-24	12	-32
5	82.50	0.005	0.000	10	-47	14	-64	16	-21	21	-28
6	82.00	0.006	0.000	20	-56	27	-76	25	-81	34	-109
7	81.65	0.006	0.000	31	-61	41	-83	33	-78	45	-105
8	81.50	0.007	0.000	20	-63	27	-85	0	-75	0	-102
9	81.00	0.008	0.000	0	-68	0	-92	0	-69	0	-92
10	80.25	0.009	0.000	0	-111	0	-149	1	-56	2	-75
11	79.50	0.010	0.000	0	-147	0	-198	18	-131	25	-177
12	78.90	0.011	0.000	0	-166	0	-225	49	-179	67	-242
13	78.45	0.012	0.000	0	-174	0	-235	27	-150	36	-203
14	78.00	0.013	0.000	0	-173	0	-234	46	-123	62	-166
15	77.50	0.013	0.000	0	-200	0	-271	37	-97	50	-131
16	76.75	0.013	0.000	1	-237	1	-320	66	-51	90	-68
17	76.00	0.013	0.000	2	-223	3	-301	103	0	139	0
18	75.38	0.012	0.000	18	-171	24	-231	194	0	262	0
19	74.75	0.011	0.000	89	-139	120	-188	301	-217	406	-292
20	74.00	0.011	0.000	55	-72	74	-97	111	-83	149	-112
21	73.50	0.010	0.000	57	-41	77	-56	109	-6	147	-8
22	73.20	0.010	0.000	55	-34	75	-46	94	-9	126	-12
23	73.00	0.010	0.000	53	-25	72	-34	73	-13	98	-17
24	72.50	0.009	0.000	57	-9	76	-13	29	-20	39	-26
25	72.00	0.009	0.000	55	0	75	0	15	-22	20	-30
26	71.20	0.008	0.000	31	0	41	0	2	-33	3	-44
27	70.60	0.007	0.000	11	0	14	0	0	-26	0	-35
28	70.00	0.006	0.000	0	0	0	0	0	-0	0	-0

Summary of results (continued)

Calculated Bending Moments and Strut Forces have been multiplied by a factor of 1.35 to obtain values for structural design.

Maximum and minimum bending moment and shear force at each stage

Stage no.	Bending moment						Shear force					
	Calculated				Factored		Calculated				Factored	
	max. kN.m/m	elev.	min. kN.m/m	elev.	max. kN.m/m	min.	max. kN/m	elev.	min. kN/m	elev.	max. kN/m	min. kN/m
1	3	74.75	-1	79.50	5	-2	2	76.00	-1	72.50	3	-1
2	No calculation at this stage											
3	No calculation at this stage											
4	No calculation at this stage											
5	6	74.00	-10	78.45	8	-13	8	76.00	-3	81.50	11	-4
6	No calculation at this stage											
7	35	74.00	-79	79.50	47	-106	51	76.00	-26	84.40	68	-36
8	No calculation at this stage											
9	35	74.00	-78	79.50	47	-106	50	76.00	-26	84.40	68	-35
10	57	73.50	-174	78.45	77	-235	103	76.00	-81	82.00	139	-109
11	No calculation at this stage											
12	56	73.50	-173	78.45	76	-233	102	76.00	-81	82.00	138	-109
13	31	72.00	-165	76.00	42	-222	100	74.00	-118	78.00	135	-160
14	No calculation at this stage											
15	45	72.00	-180	76.00	61	-244	108	74.00	-123	78.00	146	-166
16	No calculation at this stage											
17	57	72.50	-221	76.75	76	-299	107	74.00	-131	79.50	145	-177
18	No calculation at this stage											
19	55	72.50	-210	76.75	74	-283	111	74.00	-126	78.90	149	-170
20	No calculation at this stage											
21	55	72.50	-211	76.75	74	-285	110	74.00	-125	78.90	149	-169
22	55	72.50	-211	76.75	74	-285	110	74.00	-125	78.90	149	-169
23	55	72.50	-231	76.75	74	-311	125	74.75	-174	78.90	169	-235
24	44	72.00	-237	76.75	60	-320	261	74.75	-179	78.90	353	-242
25	89	74.75	-195	76.75	120	-263	301	74.75	-217	74.75	406	-292

Summary of results (continued)

Maximum and minimum displacement at each stage

Stage no.	Displacement maximum	elev.	minimum	elev.	Stage description
	m		m		
1	0.001	84.40	0.000	84.40	Apply surcharge no.1 at elev. 84.00
2	No calculation at this stage				Apply surcharge no.2 at elev. 84.00
3	No calculation at this stage				Apply surcharge no.3 at elev. 84.00
4	No calculation at this stage				Apply surcharge no.6 at elev. 84.00
5	0.001	80.25	0.000	84.40	Apply surcharge no.7 at elev. 83.00
6	No calculation at this stage				Install strut no.1 at elev. 84.40
7	0.006	78.90	0.000	84.40	Excav. to elev. 81.50 on PASSIVE side
8	No calculation at this stage				Install strut no.2 at elev. 82.00
9	0.006	78.90	0.000	84.40	Apply water pressure profile no.1
10	0.011	78.00	0.000	84.40	Excav. to elev. 77.50 on PASSIVE side
11	No calculation at this stage				Install strut no.3 at elev. 78.00
12	0.011	78.00	0.000	84.40	Apply water pressure profile no.3
13	0.012	76.00	0.000	84.40	Excav. to elev. 74.00 on PASSIVE side
14	No calculation at this stage				Install strut no.4 at elev. 74.75
15	0.012	76.75	0.000	84.40	Apply surcharge no.4 at elev. 73.20
16	No calculation at this stage				Install strut no.5 at elev. 79.50
17	0.013	76.75	0.000	84.40	Remove strut no.3 at elev. 78.00
18	No calculation at this stage				Install strut no.6 at elev. 78.90
19	0.013	76.75	0.000	84.40	Remove strut no.5 at elev. 79.50
20	No calculation at this stage				Install strut no.7 at elev. 81.65
21	0.013	76.75	0.000	84.40	Remove strut no.2 at elev. 82.00
22	0.013	76.75	0.000	84.40	Remove strut no.1 at elev. 84.40
23	0.013	76.75	0.000	84.40	Change soil type 1 to soil type 4
24	0.013	76.75	0.000	84.40	Change soil type 2 to soil type 5
25	0.013	76.75	0.000	84.40	Change soil type 3 to soil type 6

Summary of results (continued)

Calculated Bending Moments and Strut Forces have been multiplied by a factor of 1.35 to obtain values for structural design.

Strut forces at each stage (horizontal components)

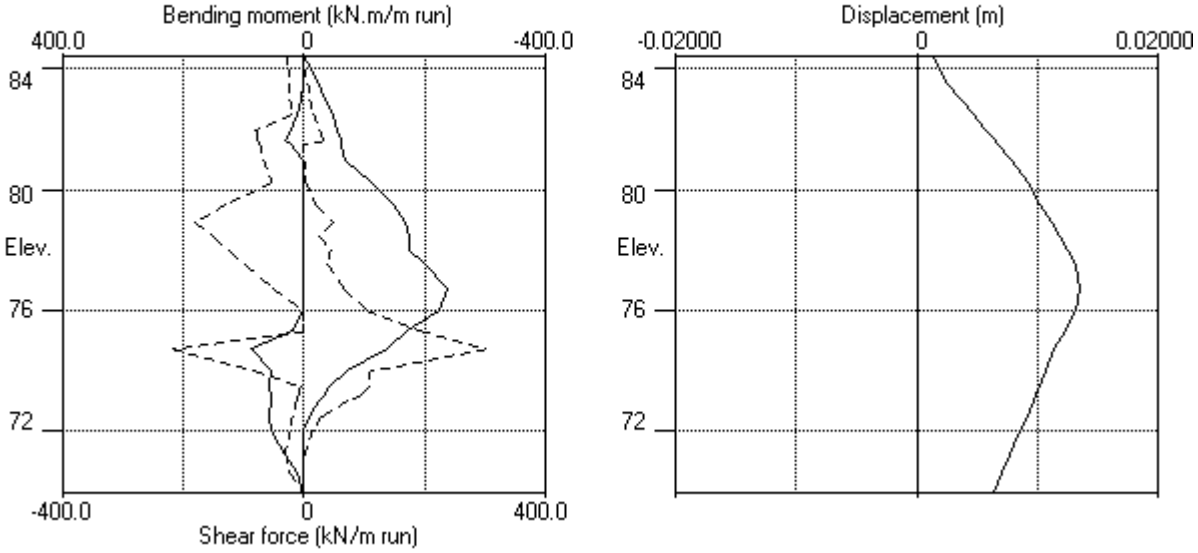
Stage no.	Strut no. 1 at elev. 84.40			Strut no. 2 at elev. 82.00			Strut no. 3 at elev. 78.00		
	--Calculated-- kN per m run	kN per strut	Factored kN per strut	--Calculated-- kN per m run	kN per strut	Factored kN per strut	--Calculated-- kN per m run	kN per strut	Factored kN per strut
7	26	158	213	---	---	---	---	---	---
9	26	157	212	0	0	0	---	---	---
10	slack	slack	slack	93	558	754	---	---	---
12	slack	slack	slack	93	557	752	1	6	8
13	slack	slack	slack	67	403	544	164	986	1332
15	slack	slack	slack	69	411	555	167	1003	1354
17	slack	slack	slack	47	281	379	---	---	---
19	slack	slack	slack	61	366	495	---	---	---
21	slack	slack	slack	---	---	---	---	---	---

Stage no.	Strut no. 4 at elev. 74.75			Strut no. 5 at elev. 79.50			Strut no. 6 at elev. 78.90		
	--Calculated-- kN per m run	kN per strut	Factored kN per strut	--Calculated-- kN per m run	kN per strut	Factored kN per strut	--Calculated-- kN per m run	kN per strut	Factored kN per strut
15	slack	slack	slack	---	---	---	---	---	---
17	35	35	48	149	895	1209	---	---	---
19	22	22	30	---	---	---	143	143	193
21	23	23	32	---	---	---	134	134	181
22	23	23	32	---	---	---	134	134	181
23	72	72	98	---	---	---	222	222	299
24	377	377	509	---	---	---	228	228	308
25	517	517	698	---	---	---	181	181	244

Stage no.	Strut no. 7 at elev. 81.65		
	--Calculated-- kN per m run	kN per strut	Factored kN per strut
21	67	67	90
22	67	67	90
23	100	100	134
24	98	98	132
25	111	111	150

Units: kN,m

Bending moment, shear force, displacement envelopes



Units: kN,m

INPUT DATA

SOIL PROFILE

Stratum no.	Elevation of top of stratum	Soil types Active side	Passive side
1	84.00	1 Made Ground / Alluv	1 Made Ground / Alluv
2	76.00	2 Claygate Beds	2 Claygate Beds
3	73.50	3 London Clay	3 London Clay

SOIL PROPERTIES (Unfactored SLS soil strengths)

-- Soil type -- No.	Description (Datum elev.)	Bulk density kN/m3	Young's Modulus Eh,kN/m2 (dEh/dy)	At rest coeff. Ko (dKo/dy)	Consol state. NC/OC (Nu)	Active limit Ka (Kac)	Passive limit Kp (Kpc)	Cohesion kN/m2 (dc/dy)
1	Made Ground / Alluv	17.00	12500	0.500	NC (0.490)	1.000 (2.570)	1.000 (2.571)	25.00u
2	Claygate .. (76.00)	18.00	37500 (3000)	0.500	OC (0.490)	1.000 (2.000)	1.000 (2.390)	75.00u (6.000)
3	London Clay (73.50)	19.00	45000 (2608)	1.000	OC (0.490)	1.000 (2.476)	1.000 (2.477)	90.00u (5.200)
4	MG /Alluv Drained	18.00	7500	0.500	NC (0.250)	0.324 (1.327)	3.601 (5.104)	0.0d
5	Claygate .. (76.00)	18.00	22500 (1800)	1.000	OC (0.200)	0.351 (1.391)	3.253 (4.831)	0.0d
6	London Cl.. (73.50)	19.00	27000 (1565)	1.000	OC (0.200)	0.351 (1.391)	3.440 (5.233)	0.0d

Additional soil parameters associated with Ka and Kp

------- Soil type ------- No.	Description	--- parameters for Ka --- Soil friction angle	Wall adhesion coeff.	Back-fill angle	--- parameters for Kp --- Soil friction angle	Wall adhesion coeff.	Back-fill angle
1	Made Ground / Alluv	0.00	1.000	0.00	0.00	1.000	0.00
2	Claygate Beds	0.00	0.000	0.00	0.00	0.500	0.00
3	London Clay	0.00	0.670	0.00	0.00	0.670	0.00
4	MG /Alluv Drained	27.00	0.641	0.00	27.00	0.471	0.00
5	Claygate Drained	25.00	0.670	0.00	25.00	0.500	0.00
6	London Clay Drained	25.00	0.670	0.00	25.00	0.670	0.00

GROUND WATER CONDITIONS

Density of water = 10.00 kN/m3

	Active side	Passive side
Initial water table elevation	81.00	81.00

Automatic water pressure balancing at toe of wall : No

Water press. profile no.	Active side Point no.	Elev. m	Piezo elev. m	Water press. kN/m2	Passive side Point no.	Elev. m	Piezo elev. m	Water press. kN/m2	
1	1	81.00	81.00	0.0	1	77.50	77.50	0.0	MC
2	1	82.00	82.00	0.0	1	77.00	77.00	0.0	WC
3	1	81.00	81.00	0.0	1	73.00	73.00	0.0	MC
4	1	82.00	82.00	0.0	1	73.20	73.20	0.0	WC

WALL PROPERTIES

Type of structure = Fully Embedded Wall
Elevation of toe of wall = 70.00
Maximum finite element length = 0.80 m
Youngs modulus of wall E = 2.8000E+07 kN/m2
Moment of inertia of wall I = 7.0700E-03 m4/m run
E.I = 197960 kN.m2/m run
Yield Moment of wall = Not defined

STRUTS and ANCHORS

Strut/ anchor no.	Elev.	Strut spacing m	X-section area of strut sq.m	Youngs modulus kN/m2	Free length m	Inclin -ation (degs)	Pre- stress /strut kN	Tension allowed
1	84.40	6.00	0.010000	2.000E+08	5.00	0.00	0	No
2	82.00	6.00	0.010000	2.000E+08	5.00	0.00	0	No
3	78.00	6.00	0.010000	2.000E+08	1.00	0.00	0	No
4	74.75	1.00	0.350000	3.000E+07	1.00	0.00	0	No
5	79.50	6.00	0.100000	2.000E+08	5.00	0.00	0	No
6	78.90	1.00	0.250000	3.000E+07	1.00	0.00	0	No
7	81.65	1.00	0.250000	3.000E+07	1.00	0.00	0	No
8	76.30	6.00	0.010000	2.000E+08	5.00	0.00	0	No

SURCHARGE LOADS

Surch -arge no.	Elev.	Distance from wall	Length parallel to wall	Width perpend. to wall	Surcharge ----- kN/m2 ----- Near edge	Far edge	Equiv. soil type	Partial factor/ Category
1	84.00	0.00(A)	8.00	20.00	5.00	=	N/A	1.10 Var
2	84.00	5.00(A)	8.00	15.00	5.00	=	N/A	1.10 Var
3	84.00	1.00(A)	8.00	4.00	0.00	17.00	N/A	1.00 P/U
4	73.20	-0.00(P)	8.00	10.00	70.00	=	N/A	1.00 -
5	74.00	-0.00(P)	10.00	10.00	70.00	=	N/A	1.00 -
6	84.00	5.00(A)	10.00	15.00	17.00	=	N/A	1.00 P/U
7	83.00	5.00(A)	2.00	2.00	25.00	=	N/A	1.00 P/U

Note: A = Active side, P = Passive side
A trapezoidal surcharge is defined by two values:
N = at edge near to wall, F = at edge far from wall
Limit State Categories P/U = Permanent Unfavourable
P/F = Permanent Favourable
Var = Variable (unfavourable)

CONSTRUCTION STAGES

Construction stage no.	Stage description
1	Apply surcharge no.1 at elevation 84.00 No analysis at this stage
2	Apply surcharge no.2 at elevation 84.00 No analysis at this stage
3	Apply surcharge no.3 at elevation 84.00 No analysis at this stage
4	Apply surcharge no.6 at elevation 84.00 No analysis at this stage
5	Apply surcharge no.7 at elevation 83.00 No analysis at this stage
6	Install strut or anchor no.1 at elevation 84.40
7	Excavate to elevation 81.50 on PASSIVE side
8	Install strut or anchor no.2 at elevation 82.00
9	Apply water pressure profile no.1 (Mod. Conserv.)
10	Excavate to elevation 77.50 on PASSIVE side
11	Install strut or anchor no.3 at elevation 78.00
12	Apply water pressure profile no.3 (Mod. Conserv.)
13	Excavate to elevation 74.00 on PASSIVE side
14	Install strut or anchor no.4 at elevation 74.75
15	Apply surcharge no.4 at elevation 73.20
16	Install strut or anchor no.5 at elevation 79.50
17	Remove strut or anchor no.3 at elevation 78.00
18	Install strut or anchor no.6 at elevation 78.90
19	Remove strut or anchor no.5 at elevation 79.50
20	Install strut or anchor no.7 at elevation 81.65
21	Remove strut or anchor no.2 at elevation 82.00
22	Remove strut or anchor no.1 at elevation 84.40
23	Change properties of soil type 1 to soil type 4 Ko pressures will be reset
24	Change properties of soil type 2 to soil type 5 Ko pressures will be reset
25	Change properties of soil type 3 to soil type 6 Ko pressures will be reset

FACTORS OF SAFETY and ANALYSIS OPTIONS

Limit State options: ULS DA1 Combination 1
Water pressures : Moderately Conservative
Partial factor on C' = 1.000
Partial factor on Phi' = 1.000
Partial factor on Cu = 1.000
Partial factor on Soil Modulus = 1.000
Partial factor on Permanent Unfavourable loads = 1.000
Partial factor on Permanent Favourable loads = 1.000
Partial factor on Permanent Variable loads = 1.100
Design factor on calculated Bending Moments = 1.350

Parameters for undrained strata:
Minimum equivalent fluid density = 5.00 kN/m3
Maximum depth of water filled tension crack = 0.00 m

Bending moment and displacement calculation:
Method - Subgrade reaction model using Influence Coefficients
Open Tension Crack analysis? - No
Non-linear Modulus Parameter (L) = 20.00 m

Boundary conditions:
Length of wall (normal to plane of analysis) = 6.00 m

Width of excavation on active side of wall = 20.00 m
Width of excavation on passive side of wall = 10.00 m

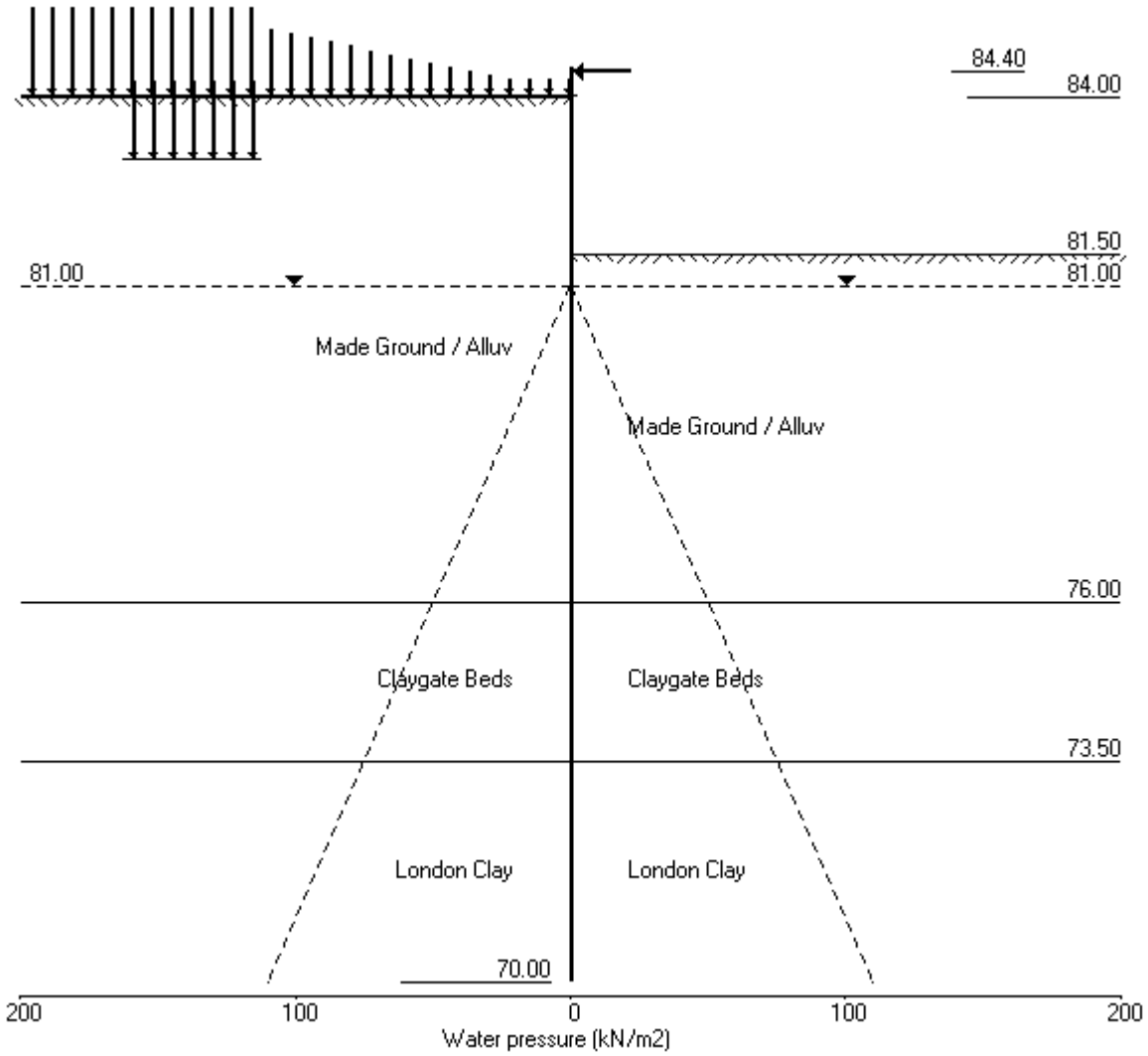
Distance to rigid boundary on active side = 20.00 m
Distance to rigid boundary on passive side = 20.00 m

OUTPUT OPTIONS

Stage no.	Stage description	Output options: Displacement Bending mom. Shear force	Active, Passive pressures	Graph. output
1	Apply surcharge no.1 at elev. 84.00	No	No	No
2	Apply surcharge no.2 at elev. 84.00	No	No	No
3	Apply surcharge no.3 at elev. 84.00	No	No	No
4	Apply surcharge no.6 at elev. 84.00	No	No	No
5	Apply surcharge no.7 at elev. 83.00	No	No	No
6	Install strut no.1 at elev. 84.40	No	No	No
7	Excav. to elev. 81.50 on PASSIVE side	Yes	No	Yes
8	Install strut no.2 at elev. 82.00	No	No	No
9	Apply water pressure profile no.1	No	No	No
10	Excav. to elev. 77.50 on PASSIVE side	Yes	No	Yes
11	Install strut no.3 at elev. 78.00	No	No	No
12	Apply water pressure profile no.3	No	No	No
13	Excav. to elev. 74.00 on PASSIVE side	Yes	No	Yes
14	Install strut no.4 at elev. 74.75	No	No	No
15	Apply surcharge no.4 at elev. 73.20	No	No	No
16	Install strut no.5 at elev. 79.50	No	No	No
17	Remove strut no.3 at elev. 78.00	No	No	No
18	Install strut no.6 at elev. 78.90	No	No	No
19	Remove strut no.5 at elev. 79.50	No	No	No
20	Install strut no.7 at elev. 81.65	No	No	No
21	Remove strut no.2 at elev. 82.00	No	No	No
22	Remove strut no.1 at elev. 84.40	No	No	No
23	Change soil type 1 to soil type 4	No	No	No
24	Change soil type 2 to soil type 5	No	No	No
25	Change soil type 3 to soil type 6	No	No	No
*	Summary output	Yes	-	Yes

Units: kN,m

Stage No.7 Excav. to elev. 81.50 on PASSIVE side



Units: kN,m

Stage No. 7 Excavate to elevation 81.50 on PASSIVE side

BENDING MOMENT and DISPLACEMENT ANALYSIS of Fully Embedded Wall

Analysis options

Length of wall perpendicular to section = 6.00m
Subgrade reaction model - Boussinesq Influence coefficients
Soil deformations are elastic until the active or passive limit is reached
Open Tension Crack analysis - No

Rigid boundaries: Active side 20.00 from wall
Passive side 20.00 from wall

Limit State: ULS DA1 Combination 1

Calculated Bending Moments and Strut Forces are to be multiplied by a factor of 1.35 to obtain values for structural design. See summary for factored values.

Node no.	Y coord	Nett pressure kN/m2	Wall disp. m	Wall rotation rad.	Shear force kN/m	Bending moment kN.m/m	Strut forces kN/m
1	84.40	0.00	0.001	-1.37E-03	-26.5	-0.0	26.5
2	84.00	0.00	0.002	-1.36E-03	-26.5	-10.6	
3	83.50	2.50	0.003	-1.32E-03	-25.9	-23.7	
4	83.00	5.00	0.003	-1.25E-03	-24.0	-36.2	
5	82.50	7.50	0.004	-1.14E-03	-20.9	-47.5	
6	82.00	10.00	0.004	-1.01E-03	-16.5	-56.9	
7	81.65	11.97	0.005	-9.07E-04	-12.6	-61.8	
8	81.50	12.99	0.005	-8.60E-04	-10.8	-63.5	
		0.24	0.005	-8.60E-04	-10.8	-63.5	
9	81.00	2.48	0.005	-6.93E-04	-10.1	-68.7	
10	80.25	4.22	0.006	-4.20E-04	-7.6	-75.1	
11	79.50	9.62	0.006	-1.28E-04	-2.4	-79.0	
12	78.90	12.33	0.006	1.09E-04	4.2	-78.5	
13	78.45	12.88	0.006	2.84E-04	9.9	-75.4	
14	78.00	13.84	0.006	4.49E-04	15.9	-69.7	
15	77.50	15.36	0.005	6.13E-04	23.2	-60.0	
16	76.75	18.35	0.005	7.99E-04	35.8	-38.3	
17	76.00	21.83	0.004	8.84E-04	50.9	-6.4	
		-36.18	0.004	8.84E-04	50.9	-6.4	
18	75.38	-29.51	0.004	8.65E-04	30.4	18.3	
19	74.75	-22.54	0.003	7.87E-04	14.1	31.5	
20	74.00	-14.73	0.003	6.59E-04	0.1	35.6	
21	73.50	-10.15	0.002	5.72E-04	-6.1	33.8	
22	73.20	-7.56	0.002	5.22E-04	-8.7	31.5	
23	73.00	-5.95	0.002	4.92E-04	-10.1	29.6	
24	72.50	-2.34	0.002	4.24E-04	-12.2	23.8	
25	72.00	0.79	0.002	3.72E-04	-12.6	17.3	
26	71.20	5.21	0.001	3.22E-04	-10.2	7.4	
27	70.60	8.42	0.001	3.08E-04	-6.1	2.2	
28	70.00	11.82	0.001	3.04E-04	0.0	-0.0	

Strut force at elev. 84.40 = 26.49 kN/m run = 158.95 kN/strut

Node no.	Y coord	ACTIVE side: Water press. kN/m2	Effective stresses: Vertic -al kN/m2	Active limit kN/m2	Passive limit kN/m2	Earth pressure kN/m2	Total earth pressure kN/m2	Soil stiffness coeff. kN/m3
1	84.40	0.00	0.00	0.00	0.00	0.00	0.00	0.0
2	84.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
		Total> 5.50	0.00	69.78	0.00	0.00a	3266	
3	83.50	Total> 14.09	2.50m	78.37	2.50	2.50a	3266	

(continued)

Stage No.7 Excavate to elevation 81.50 on PASSIVE side

Node no.	Y coord	ACTIVE side						
		Water press. kN/m2	Effective stresses Vertic -al kN/m2	Active limit kN/m2	Passive limit kN/m2	Earth pressure kN/m2	Total earth pressure kN/m2	Soil stiffness coeff. kN/m3
4	83.00	Total>	22.99	5.00m	87.27	5.00	5.00a	3266
5	82.50	Total>	32.09	7.50m	96.38	7.50	7.50a	3266
6	82.00	Total>	41.23	10.00m	105.52	10.00	10.00a	3266
7	81.65	Total>	47.61	11.75m	111.90	11.97	11.97	3266
8	81.50	Total>	50.33	12.50m	114.62	12.99	12.99	3266
9	81.00	Total>	59.35	15.00m	123.64	16.50	16.50	3266
10	80.25	Total>	72.71	18.75m	137.01	25.90	25.90	3266
11	79.50	Total>	85.89	22.50m	150.18	35.79	35.79	3266
12	78.90	Total>	96.30	32.02	160.60	44.11	44.11	3266
13	78.45	Total>	104.05	39.77	168.35	50.58	50.58	3266
14	78.00	Total>	111.75	47.47	176.05	57.26	57.26	3266
15	77.50	Total>	120.25	55.97	184.56	64.90	64.90	3266
16	76.75	Total>	132.93	68.65	197.24	76.72	76.72	3266
17	76.00	Total>	145.54	81.25	209.84	88.81	88.81	3266
		Total>	145.54	40.00m	324.81	60.97	60.97	9798
18	75.38	Total>	156.63	43.13m	344.86	73.21	73.21	10288
19	74.75	Total>	167.69	46.25m	364.88	85.61	85.61	10778
20	74.00	Total>	180.93	50.00m	388.88	100.24	100.24	11366
21	73.50	Total>	189.75	52.50m	404.87	109.69	109.69	11758
		Total>	189.75	52.50m	412.70	162.69	162.69	11758
22	73.20	Total>	195.34	54.00m	422.15	169.79	169.79	11962
23	73.00	Total>	199.06	55.00m	428.45	174.46	174.46	12098
24	72.50	Total>	208.37	57.50m	444.20	185.95	185.95	12439
25	72.00	Total>	217.68	60.00m	459.95	197.21	197.21	12780
26	71.20	Total>	232.57	64.00m	485.15	214.93	214.93	13325
27	70.60	Total>	243.74	67.00m	504.05	228.17	228.17	13734
28	70.00	Total>	254.91	70.00m	522.95	241.50	241.50	14143

Node no.	Y coord	PASSIVE side						
		Water press. kN/m2	Effective stresses Vertic -al kN/m2	Active limit kN/m2	Passive limit kN/m2	Earth pressure kN/m2	Total earth pressure kN/m2	Soil stiffness coeff. kN/m3
1	84.40	0.00	0.00	0.00	0.00	0.00	0.00	0.0
2	84.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
3	83.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
4	83.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
5	82.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
6	82.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
7	81.65	0.00	0.00	0.00	0.00	0.00	0.00	0.0
8	81.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
		Total>	0.00	0.00	64.28	12.75	12.75	3432
9	81.00	Total>	8.50	2.50m	72.78	14.02	14.02	3432
10	80.25	Total>	21.28	6.25m	85.57	21.67	21.67	3432
11	79.50	Total>	34.14	10.00m	98.42	26.17	26.17	3432
12	78.90	Total>	44.49	13.00m	108.78	31.78	31.78	3432
13	78.45	Total>	52.31	15.25m	116.60	37.70	37.70	3432
14	78.00	Total>	60.17	17.50m	124.46	43.42	43.42	3432
15	77.50	Total>	68.97	20.00m	133.25	49.54	49.54	3432
16	76.75	Total>	82.26	23.75m	146.55	58.38	58.38	3432
17	76.00	Total>	95.68	31.41	159.97	66.98	66.98	3432
		Total>	95.68	27.50m	274.94	97.15	97.15	10297
18	75.38	Total>	107.57	30.63m	295.79	102.72	102.72	10812
19	74.75	Total>	119.52	33.75m	316.70	108.15	108.15	11326

(continued)

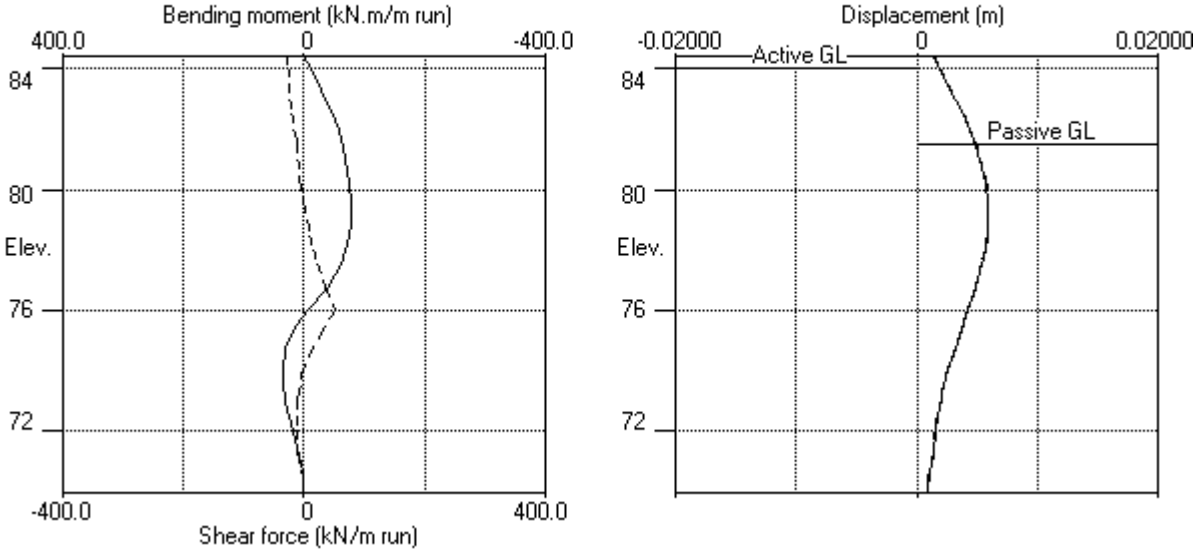
Stage No.7 Excavate to elevation 81.50 on PASSIVE side

Node no.	Y coord	PASSIVE side						
		Water press.	Effective stresses Vertic -al	Active limit	Passive limit	Earth pressure	Total earth pressure	Soil stiffness coeff.
		kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m3
20	74.00	Total>	133.92	37.50m	341.86	114.97	114.97	11944
21	73.50	Total>	143.56	40.00m	358.67	119.84	119.84	12356
		Total>	143.56	40.00m	366.50	172.84	172.84	12356
22	73.20	Total>	149.65	41.50m	376.45	177.35	177.35	12571
23	73.00	Total>	153.71	42.50m	383.09	180.42	180.42	12714
24	72.50	Total>	163.87	45.00m	399.70	188.29	188.29	13072
25	72.00	Total>	174.05	47.50m	416.31	196.42	196.42	13430
26	71.20	Total>	190.33	51.50m	442.90	209.72	209.72	14003
27	70.60	Total>	202.54	54.50m	462.84	219.75	219.75	14433
28	70.00	Total>	214.74	57.50m	482.77	229.68	229.68	14863

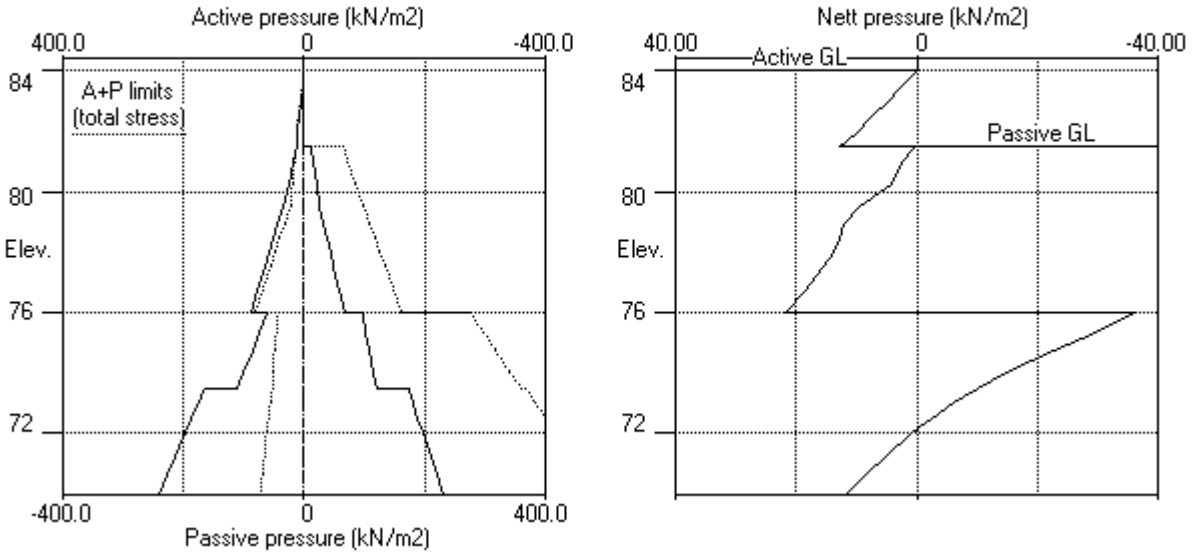
Note: 10.00a Soil pressure at active limit
123.45p Soil pressure at passive limit

Units: kN,m

Stage No.7 Excav. to elev. 81.50 on PASSIVE side

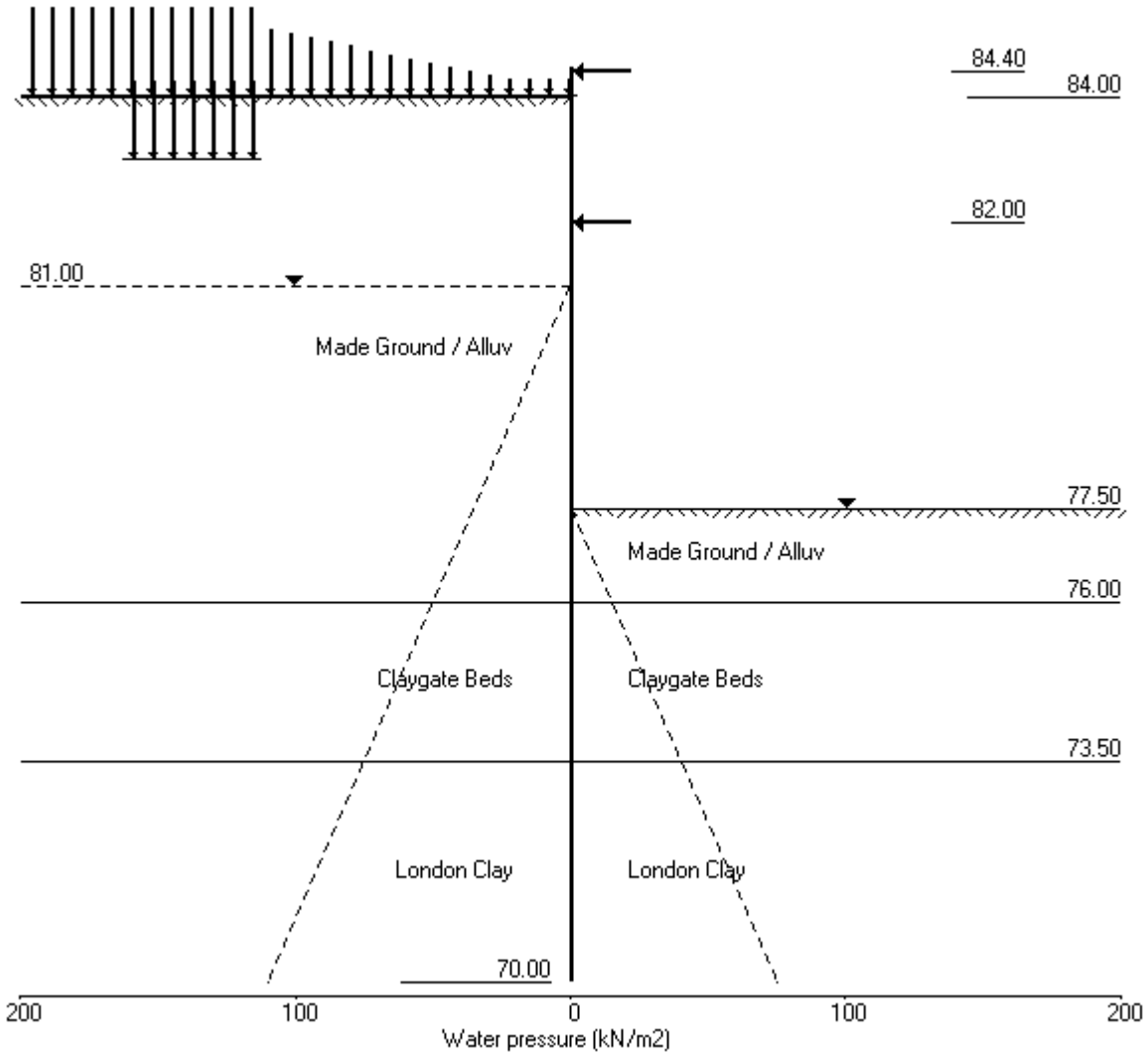


Stage No.7 Excav. to elev. 81.50 on PASSIVE side



Units: kN,m

Stage No.10 Excav. to elev. 77.50 on PASSIVE side



Units: kN,m

Stage No. 10 Excavate to elevation 77.50 on PASSIVE side

BENDING MOMENT and DISPLACEMENT ANALYSIS of Fully Embedded Wall

Analysis options

Length of wall perpendicular to section = 6.00m
Subgrade reaction model - Boussinesq Influence coefficients
Soil deformations are elastic until the active or passive limit is reached
Open Tension Crack analysis - No

Rigid boundaries: Active side 20.00 from wall
Passive side 20.00 from wall

Limit State: ULS DA1 Combination 1

Calculated Bending Moments and Strut Forces are to be multiplied by a factor of 1.35 to obtain values for structural design. See summary for factored values.

Node no.	Y coord	Nett pressure kN/m2	Wall disp. m	Wall rotation rad.	Shear force kN/m	Bending moment kN.m/m	Strut forces kN/m
1	84.40	0.00	0.001	-2.05E-03	0.0	-0.0	-0.0
2	84.00	0.00	0.002	-2.05E-03	0.0	-0.0	
		8.11	0.002	-2.05E-03	0.0	-0.0	
3	83.50	2.50	0.003	-2.05E-03	2.7	1.1	
4	83.00	5.00	0.004	-2.06E-03	4.5	2.9	
5	82.50	7.50	0.005	-2.07E-03	7.7	5.9	
6	82.00	10.00	0.006	-2.09E-03	12.0	10.7	93.3
		10.00	0.006	-2.09E-03	-81.3	10.7	
7	81.65	11.75	0.007	-2.08E-03	-77.5	-16.8	
8	81.50	12.50	0.007	-2.07E-03	-75.7	-28.3	
9	81.00	15.00	0.008	-1.95E-03	-68.8	-64.4	
10	80.25	18.75	0.009	-1.62E-03	-56.1	-111.1	
11	79.50	22.50	0.010	-1.13E-03	-40.7	-147.5	
12	78.90	32.02	0.011	-6.54E-04	-24.3	-167.2	
13	78.45	39.77	0.011	-2.65E-04	-8.2	-174.7	
14	78.00	47.47	0.011	1.30E-04	11.5	-174.1	
15	77.50	55.97	0.011	5.55E-04	37.3	-162.2	
		34.88	0.011	5.55E-04	37.3	-162.2	
16	76.75	44.20	0.010	1.09E-03	67.0	-123.8	
17	76.00	54.36	0.009	1.44E-03	103.9	-60.7	
		-47.10	0.009	1.44E-03	103.9	-60.7	
18	75.38	-47.30	0.008	1.55E-03	74.4	-5.6	
19	74.75	-46.40	0.007	1.51E-03	45.2	31.1	
20	74.00	-36.77	0.006	1.34E-03	14.0	55.4	
21	73.50	-26.98	0.006	1.20E-03	-2.0	57.8	
22	73.20	-21.20	0.005	1.11E-03	-9.2	56.0	
23	73.00	-17.58	0.005	1.06E-03	-13.1	53.7	
24	72.50	-9.25	0.005	9.38E-04	-19.8	44.9	
25	72.00	-1.86	0.004	8.39E-04	-22.5	33.8	
26	71.20	8.73	0.003	7.40E-04	-19.8	14.9	
27	70.60	16.42	0.003	7.11E-04	-12.3	4.5	
28	70.00	24.45	0.003	7.04E-04	0.0	0.0	

The strut at elev. 84.40 is slack
Strut force at elev. 82.00 = 93.32 kN/m run = 559.90 kN/strut

(continued)

Stage No.10 Excavate to elevation 77.50 on PASSIVE side

Node no.	Y coord	ACTIVE side						
		Effective stresses					Total earth pressure	Soil stiffness coeff.
		Water press. kN/m2	Vertic -al kN/m2	Active limit kN/m2	Passive limit kN/m2	Earth pressure kN/m2		
1	84.40	0.00	0.00	0.00	0.00	0.00	0.00	0.0
2	84.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
		Total> 5.50	0.00	69.78	8.11	8.11		30201
3	83.50	Total> 14.09	2.50m	78.37	2.50	2.50a		3264
4	83.00	Total> 22.99	5.00m	87.27	5.00	5.00a		3264
5	82.50	Total> 32.09	7.50m	96.38	7.50	7.50a		3264
6	82.00	Total> 41.23	10.00m	105.52	10.00	10.00a		3264
7	81.65	Total> 47.61	11.75m	111.90	11.75	11.75a		3264
8	81.50	Total> 50.33	12.50m	114.62	12.50	12.50a		3264
9	81.00	Total> 59.35	15.00m	123.64	15.00	15.00a		3264
10	80.25	Total> 72.71	18.75m	137.01	18.75	18.75a		3264
11	79.50	Total> 85.89	22.50m	150.18	22.50	22.50a		3264
12	78.90	Total> 96.30	32.02	160.60	32.02	32.02a		3264
13	78.45	Total> 104.05	39.77	168.35	39.77	39.77a		3264
14	78.00	Total> 111.75	47.47	176.05	47.47	47.47a		3264
15	77.50	Total> 120.25	55.97	184.56	55.97	55.97a		3264
16	76.75	Total> 132.93	68.65	197.24	68.65	68.65a		3264
17	76.00	Total> 145.54	81.25	209.84	81.25	81.25a		3264
		Total> 145.54	40.00m	324.81	40.00	40.00a		9791
18	75.38	Total> 156.63	43.13m	344.86	43.13	43.13a		10281
19	74.75	Total> 167.69	46.25m	364.88	46.25	46.25a		10770
20	74.00	Total> 180.93	50.00m	388.88	58.38	58.38		11358
21	73.50	Total> 189.75	52.50m	404.87	70.27	70.27		11749
		Total> 189.75	52.50m	412.70	123.27	123.27		11749
22	73.20	Total> 195.34	54.00m	422.15	131.89	131.89		11954
23	73.00	Total> 199.06	55.00m	428.45	137.54	137.54		12090
24	72.50	Total> 208.37	57.50m	444.20	151.36	151.36		12430
25	72.00	Total> 217.68	60.00m	459.95	164.79	164.79		12771
26	71.20	Total> 232.57	64.00m	485.15	185.81	185.81		13316
27	70.60	Total> 243.74	67.00m	504.05	201.53	201.53		13724
28	70.00	Total> 254.91	70.00m	522.95	217.46	217.46		14133

Node no.	Y coord	PASSIVE side						
		Effective stresses					Total earth pressure	Soil stiffness coeff.
		Water press. kN/m2	Vertic -al kN/m2	Active limit kN/m2	Passive limit kN/m2	Earth pressure kN/m2		
1	84.40	0.00	0.00	0.00	0.00	0.00	0.00	0.0
2	84.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
3	83.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
4	83.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
5	82.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
6	82.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
7	81.65	0.00	0.00	0.00	0.00	0.00	0.00	0.0
8	81.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
9	81.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
10	80.25	0.00	0.00	0.00	0.00	0.00	0.00	0.0
11	79.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
12	78.90	0.00	0.00	0.00	0.00	0.00	0.00	0.0
13	78.45	0.00	0.00	0.00	0.00	0.00	0.00	0.0
14	78.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
15	77.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
		Total> 0.00	0.00	64.28	21.09	21.09		3866
16	76.75	Total> 12.77	3.75m	77.05	24.45	24.45		3866

(continued)

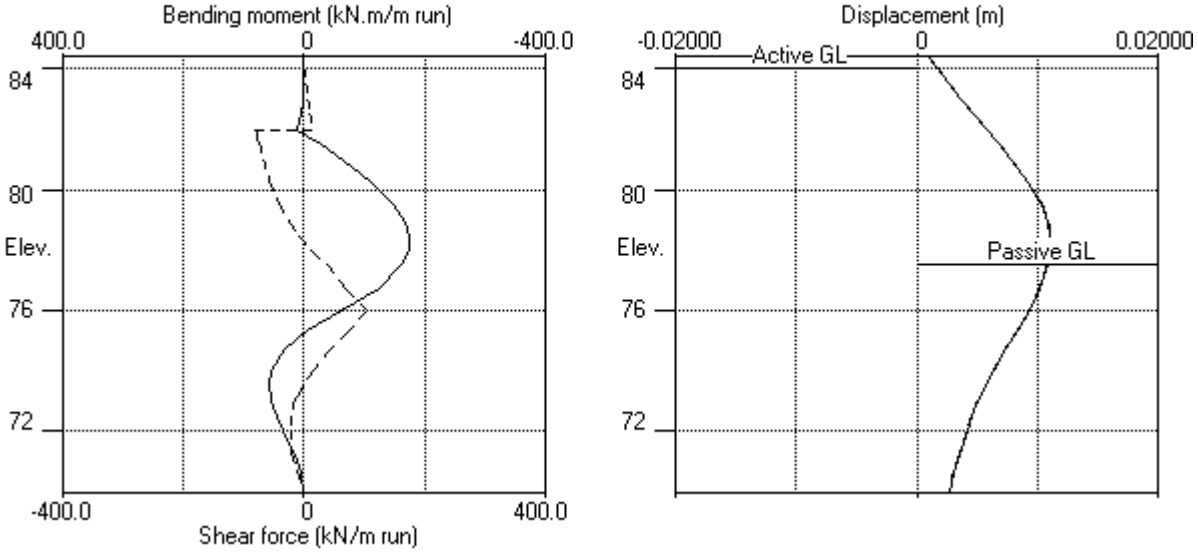
Stage No.10 Excavate to elevation 77.50 on PASSIVE side

Node no.	Y coord	PASSIVE side						
			Effective stresses				Total earth	Soil stiffness
		Water press.	Vertic -al	Active limit	Passive limit	Earth pressure	pressure	coeff.
		kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m3
17	76.00	Total>	25.65	7.50m	89.94	26.90	26.90	3866
		Total>	25.65	7.50m	204.90	87.10	87.10	11597
18	75.38	Total>	37.18	10.63m	225.39	90.42	90.42	12176
19	74.75	Total>	48.89	13.75m	246.07	92.65	92.65	12756
20	74.00	Total>	63.25	17.50m	271.18	95.15	95.15	13452
21	73.50	Total>	73.01	20.00m	288.11	97.26	97.26	13916
		Total>	73.01	20.00m	295.94	150.26	150.26	13916
22	73.20	Total>	79.24	21.50m	306.03	153.09	153.09	14158
23	73.00	Total>	83.42	22.50m	312.79	155.12	155.12	14319
24	72.50	Total>	93.98	25.00m	329.79	160.61	160.61	14722
25	72.00	Total>	104.67	27.50m	346.92	166.65	166.65	15126
26	71.20	Total>	122.02	31.50m	374.58	177.08	177.08	15771
27	70.60	Total>	135.20	34.50m	395.50	185.11	185.11	16255
28	70.00	Total>	148.50	37.50m	416.52	193.01	193.01	16739

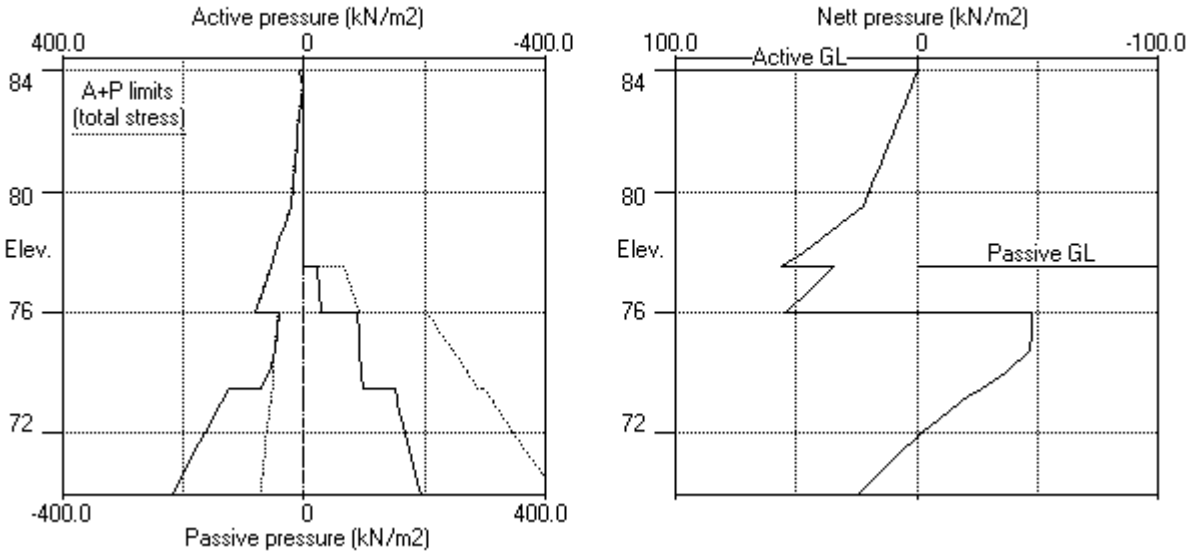
Note: 46.25a Soil pressure at active limit
123.45p Soil pressure at passive limit

Units: kN,m

Stage No.10 Excav. to elev. 77.50 on PASSIVE side

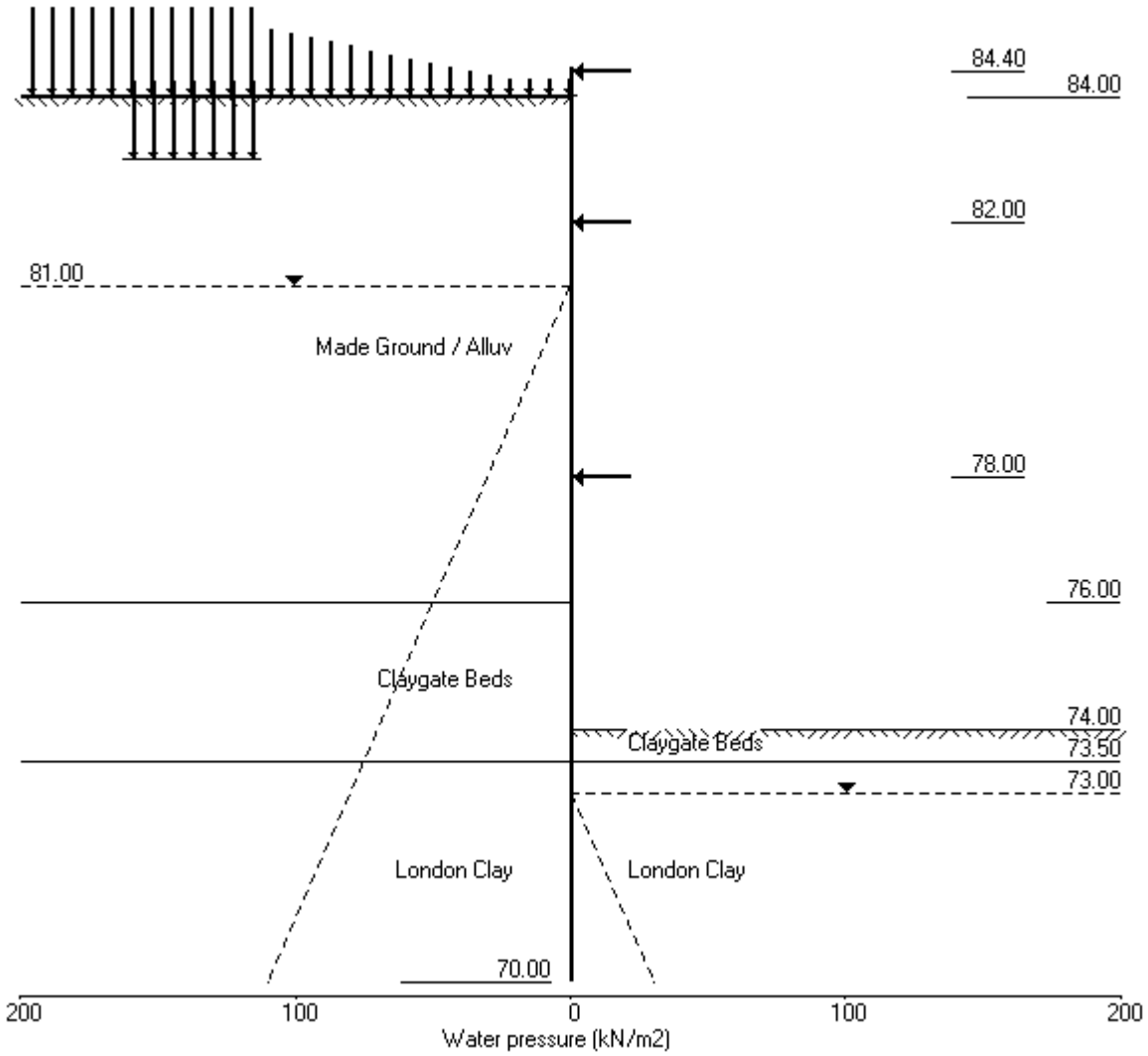


Stage No.10 Excav. to elev. 77.50 on PASSIVE side



Units: kN,m

Stage No.13 Excav. to elev. 74.00 on PASSIVE side



Units: kN,m

Stage No. 13 Excavate to elevation 74.00 on PASSIVE side

BENDING MOMENT and DISPLACEMENT ANALYSIS of Fully Embedded Wall

Analysis options

Length of wall perpendicular to section = 6.00m
Subgrade reaction model - Boussinesq Influence coefficients
Soil deformations are elastic until the active or passive limit is reached
Open Tension Crack analysis - No

Rigid boundaries: Active side 20.00 from wall
Passive side 20.00 from wall

Limit State: ULS DA1 Combination 1

Calculated Bending Moments and Strut Forces are to be multiplied by a factor of 1.35 to obtain values for structural design. See summary for factored values.

Node no.	Y coord	Nett pressure kN/m2	Wall disp. m	Wall rotation rad.	Shear force kN/m	Bending moment kN.m/m	Strut forces kN/m
1	84.40	0.00	0.001	-1.85E-03	0.0	-0.0	-0.0
2	84.00	0.00	0.002	-1.85E-03	0.0	-0.0	
		8.05	0.002	-1.85E-03	0.0	-0.0	
3	83.50	2.94	0.003	-1.85E-03	2.7	1.1	
4	83.00	5.88	0.004	-1.86E-03	5.0	3.0	
5	82.50	8.83	0.004	-1.87E-03	8.6	6.3	
6	82.00	11.78	0.005	-1.89E-03	13.8	11.8	67.3
		11.78	0.005	-1.89E-03	-53.5	11.8	
7	81.65	13.83	0.006	-1.90E-03	-49.0	-5.9	
8	81.50	14.70	0.006	-1.89E-03	-46.9	-13.1	
9	81.00	17.54	0.007	-1.83E-03	-38.8	-34.5	
10	80.25	21.45	0.009	-1.66E-03	-24.2	-58.1	
11	79.50	24.67	0.010	-1.41E-03	-6.9	-69.8	
12	78.90	33.05	0.011	-1.20E-03	10.4	-68.9	
13	78.45	39.77	0.011	-1.06E-03	26.8	-60.7	
14	78.00	47.47	0.012	-9.41E-04	46.4	-44.4	165.0
		47.47	0.012	-9.41E-04	-118.6	-44.4	
15	77.50	55.97	0.012	-7.62E-04	-92.7	-97.5	
16	76.75	68.65	0.012	-2.92E-04	-46.0	-150.4	
17	76.00	81.25	0.012	3.04E-04	10.2	-165.0	
		40.00	0.012	3.04E-04	10.2	-165.0	
18	75.38	43.13	0.012	8.03E-04	36.2	-151.2	
19	74.75	46.25	0.011	1.23E-03	64.1	-120.6	
20	74.00	50.00	0.010	1.56E-03	100.2	-56.5	
		-47.28	0.010	1.56E-03	100.2	-56.5	
21	73.50	-45.33	0.009	1.65E-03	77.1	-12.7	
		-77.30	0.009	1.65E-03	77.1	-12.7	
22	73.20	-68.41	0.009	1.66E-03	55.2	6.9	
23	73.00	-62.22	0.009	1.64E-03	42.1	16.6	
24	72.50	-46.42	0.008	1.58E-03	15.0	29.9	
25	72.00	-30.37	0.007	1.51E-03	-4.2	31.6	
26	71.20	-4.65	0.006	1.41E-03	-18.2	18.3	
27	70.60	14.99	0.005	1.37E-03	-15.1	6.5	
28	70.00	35.46	0.004	1.36E-03	0.0	0.0	

The strut at elev. 84.40 is slack
Strut force at elev. 82.00 = 67.31 kN/m run = 403.86 kN/strut
Strut force at elev. 78.00 = 165.00 kN/m run = 990.00 kN/strut

(continued)

Stage No.13 Excavate to elevation 74.00 on PASSIVE side

Node no.	Y coord	ACTIVE side						
		Effective stresses				Total earth pressure	Soil stiffness coeff.
		Water press. kN/m2	Vertic -al kN/m2	Active limit kN/m2	Passive limit kN/m2	Earth pressure kN/m2	kN/m2	kN/m3
1	84.40	0.00	0.00	0.00	0.00	0.00	0.00	0.0
2	84.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
		Total>	5.50	0.00	69.78	8.05	8.05	18040
3	83.50	Total>	14.09	2.50m	78.37	2.94	2.94	4556
4	83.00	Total>	22.99	5.00m	87.27	5.88	5.88	4556
5	82.50	Total>	32.09	7.50m	96.38	8.83	8.83	4556
6	82.00	Total>	41.23	10.00m	105.52	11.78	11.78	4556
7	81.65	Total>	47.61	11.75m	111.90	13.83	13.83	4556
8	81.50	Total>	50.33	12.50m	114.62	14.70	14.70	4556
9	81.00	Total>	59.35	15.00m	123.64	17.54	17.54	4556
10	80.25	Total>	72.71	18.75m	137.01	21.45	21.45	4556
11	79.50	Total>	85.89	22.50m	150.18	24.67	24.67	4556
12	78.90	Total>	96.30	32.02	160.60	33.05	33.05	4556
13	78.45	Total>	104.05	39.77	168.35	39.77	39.77a	3574
14	78.00	Total>	111.75	47.47	176.05	47.47	47.47a	3574
15	77.50	Total>	120.25	55.97	184.56	55.97	55.97a	3574
16	76.75	Total>	132.93	68.65	197.24	68.65	68.65a	3574
17	76.00	Total>	145.54	81.25	209.84	81.25	81.25a	3574
		Total>	145.54	40.00m	324.81	40.00	40.00a	10723
18	75.38	Total>	156.63	43.13m	344.86	43.13	43.13a	11259
19	74.75	Total>	167.69	46.25m	364.88	46.25	46.25a	11795
20	74.00	Total>	180.93	50.00m	388.88	50.00	50.00a	12439
21	73.50	Total>	189.75	52.50m	404.87	52.50	52.50a	12867
		Total>	189.75	52.50m	412.70	73.53	73.53	12867
22	73.20	Total>	195.34	54.00m	422.15	83.24	83.24	13091
23	73.00	Total>	199.06	55.00m	428.45	89.83	89.83	13240
24	72.50	Total>	208.37	57.50m	444.20	106.54	106.54	13613
25	72.00	Total>	217.68	60.00m	459.95	123.39	123.39	13986
26	71.20	Total>	232.57	64.00m	485.15	150.50	150.50	14583
27	70.60	Total>	243.74	67.00m	504.05	171.15	171.15	15030
28	70.00	Total>	254.91	70.00m	522.95	192.31	192.31	15478

Node no.	Y coord	PASSIVE side						
		Effective stresses				Total earth pressure	Soil stiffness coeff.
		Water press. kN/m2	Vertic -al kN/m2	Active limit kN/m2	Passive limit kN/m2	Earth pressure kN/m2	kN/m2	kN/m3
1	84.40	0.00	0.00	0.00	0.00	0.00	0.00	0.0
2	84.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
3	83.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
4	83.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
5	82.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
6	82.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
7	81.65	0.00	0.00	0.00	0.00	0.00	0.00	0.0
8	81.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
9	81.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
10	80.25	0.00	0.00	0.00	0.00	0.00	0.00	0.0
11	79.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
12	78.90	0.00	0.00	0.00	0.00	0.00	0.00	0.0
13	78.45	0.00	0.00	0.00	0.00	0.00	0.00	0.0
14	78.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
15	77.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
16	76.75	0.00	0.00	0.00	0.00	0.00	0.00	0.0
17	76.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0

(continued)

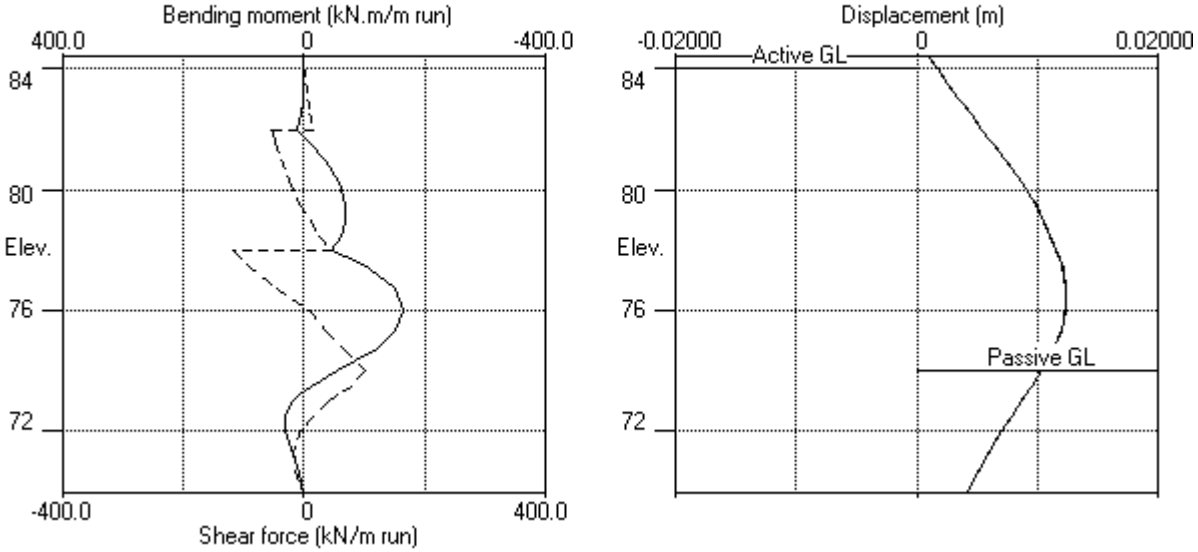
Stage No.13 Excavate to elevation 74.00 on PASSIVE side

Node no.	Y coord	PASSIVE side						
			Effective stresses				Total earth pressure	Soil stiffness coeff.
		Water press. kN/m2	Vertic -al kN/m2	Active limit kN/m2	Passive limit kN/m2	Earth pressure kN/m2	kN/m2	kN/m3
18	75.38	0.00	0.00	0.00	0.00	0.00	0.00	0.0
19	74.75	0.00	0.00	0.00	0.00	0.00	0.00	0.0
20	74.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
		Total>	0.00	0.00	207.93	97.28	97.28	15962
21	73.50	Total>	9.01	2.50m	224.11	97.83	97.83	16513
		Total>	9.01	2.50m	231.93	150.83	150.83	16513
22	73.20	Total>	14.74	4.00m	241.53	151.65	151.65	16800
23	73.00	Total>	18.57	5.00m	247.94	152.05	152.05	16991
24	72.50	Total>	28.24	7.50m	264.05	152.96	152.96	17470
25	72.00	Total>	38.06	10.00m	280.31	153.76	153.76	17948
26	71.20	Total>	54.16	14.00m	306.72	155.16	155.16	18714
27	70.60	Total>	66.62	17.00m	326.90	156.15	156.15	19288
28	70.00	Total>	79.41	20.00m	347.42	156.85	156.85	19862

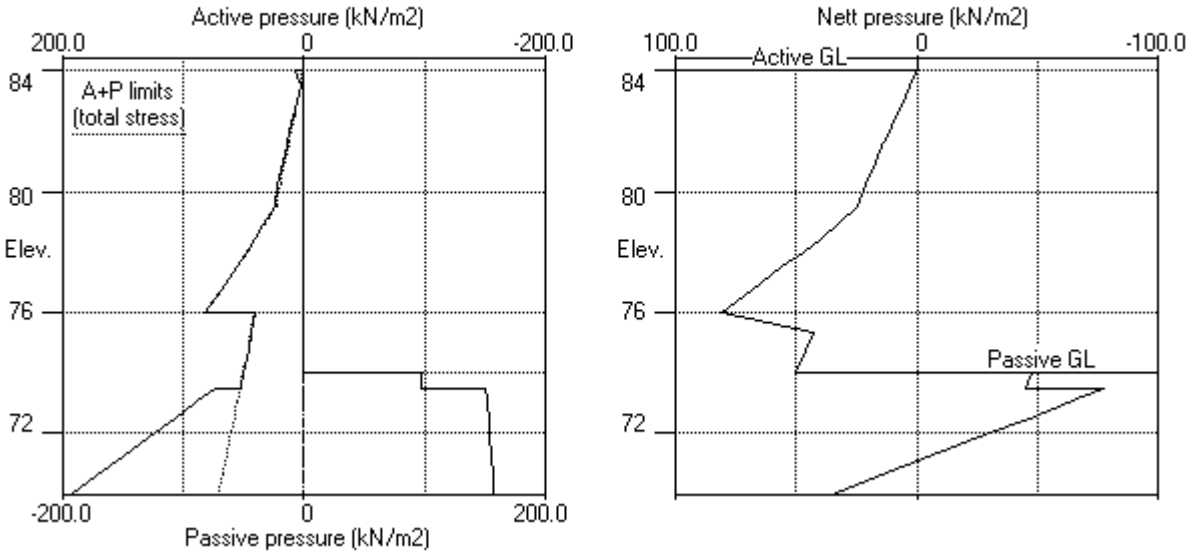
Note: 52.50a Soil pressure at active limit
123.45p Soil pressure at passive limit

Units: kN,m

Stage No.13 Excav. to elev. 74.00 on PASSIVE side

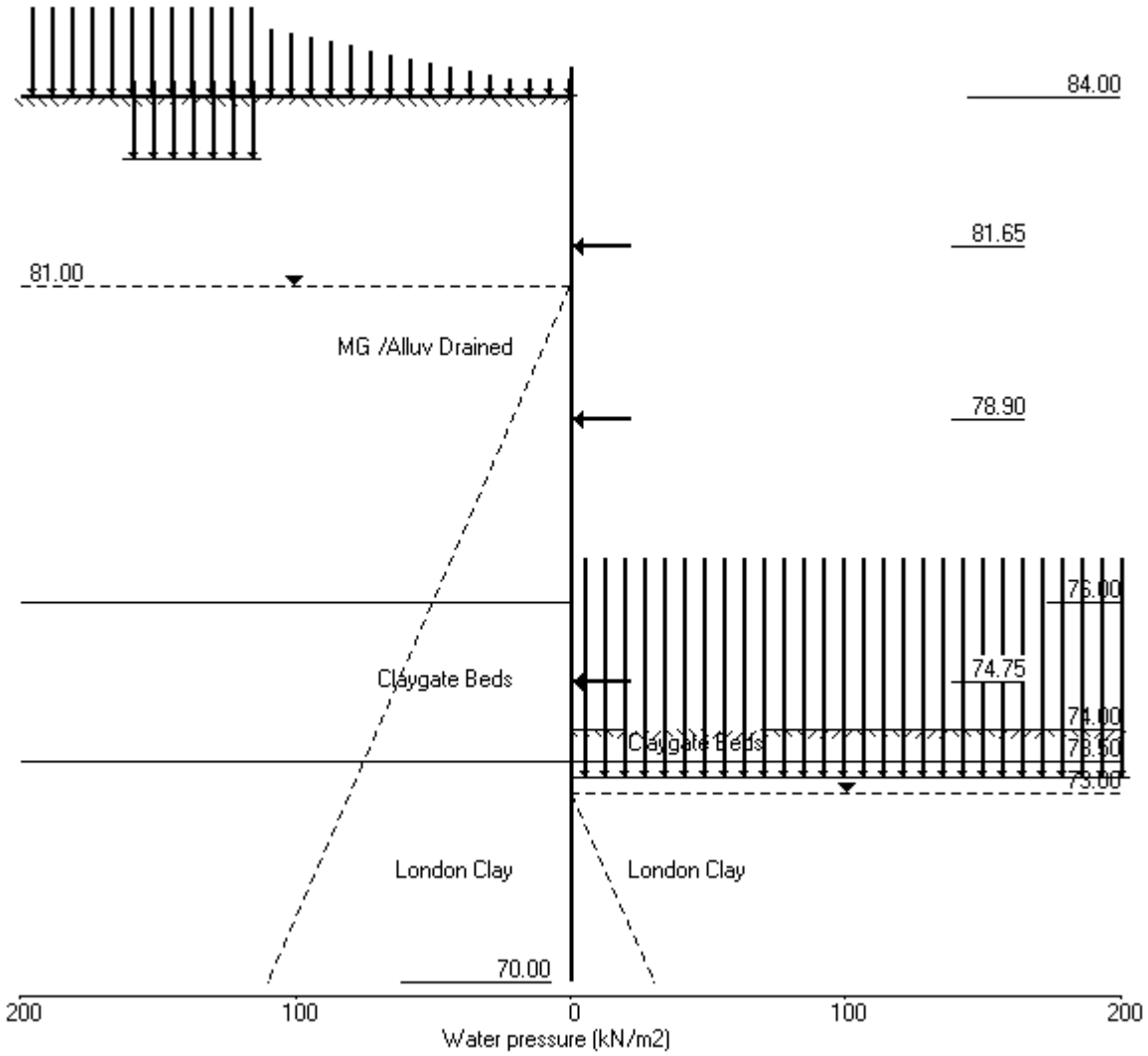


Stage No.13 Excav. to elev. 74.00 on PASSIVE side



Units: kN,m

Stage No.23 Change soil type 1 to soil type 4



Units: kN,m

Stage No. 23 Change properties of soil type 1 to soil type 4
Ko pressures will be reset

BENDING MOMENT and DISPLACEMENT ANALYSIS of Fully Embedded Wall

Analysis options

Length of wall perpendicular to section = 6.00m
Subgrade reaction model - Boussinesq Influence coefficients
Soil deformations are elastic until the active or passive limit is reached
Open Tension Crack analysis - No

Rigid boundaries: Active side 20.00 from wall
Passive side 20.00 from wall

Limit State: ULS DA1 Combination 1

Calculated Bending Moments and Strut Forces are to be multiplied by a factor of 1.35 to obtain values for structural design. See summary for factored values.

Node no.	Y coord	Nett pressure kN/m2	Wall disp. m	Wall rotation rad.	Shear force kN/m	Bending moment kN.m/m	Strut forces kN/m
1	84.40	0.00	0.001	-1.84E-03	0.0	-0.0	
2	84.00	0.00	0.002	-1.84E-03	0.0	-0.0	
		7.72	0.002	-1.84E-03	0.0	-0.0	
3	83.50	6.87	0.003	-1.84E-03	3.6	1.2	
4	83.00	11.70	0.003	-1.85E-03	8.3	4.1	
5	82.50	16.62	0.004	-1.86E-03	15.4	9.9	
6	82.00	21.55	0.005	-1.90E-03	24.9	19.8	
7	81.65	24.96	0.006	-1.95E-03	33.0	30.2	100.8
		24.96	0.006	-1.95E-03	-67.8	30.2	
8	81.50	26.41	0.006	-1.96E-03	-63.9	20.3	
9	81.00	31.18	0.007	-1.98E-03	-49.5	-8.1	
10	80.25	41.99	0.009	-1.90E-03	-22.1	-35.1	
11	79.50	52.70	0.010	-1.76E-03	13.4	-38.6	
12	78.90	61.18	0.011	-1.67E-03	47.6	-20.6	221.8
		61.18	0.011	-1.67E-03	-174.2	-20.6	
13	78.45	67.48	0.012	-1.54E-03	-145.3	-92.6	
14	78.00	73.75	0.013	-1.26E-03	-113.5	-151.0	
15	77.50	80.70	0.013	-8.27E-04	-74.9	-198.3	
16	76.75	91.15	0.013	-1.37E-05	-10.4	-231.2	
17	76.00	101.63	0.013	8.27E-04	61.9	-212.9	
		47.90	0.013	8.27E-04	61.9	-212.9	
18	75.38	50.93	0.012	1.42E-03	92.8	-165.4	
19	74.75	54.35	0.011	1.83E-03	125.7	-97.7	72.3
		54.35	0.011	1.83E-03	53.4	-97.7	
20	74.00	64.80	0.010	2.09E-03	98.1	-39.3	
		-33.26	0.010	2.09E-03	98.1	-39.3	
21	73.50	-18.83	0.009	2.14E-03	85.0	5.2	
		-50.81	0.009	2.14E-03	85.0	5.2	
22	73.20	-34.99	0.008	2.11E-03	72.2	28.4	
		-102.24	0.008	2.11E-03	72.2	28.4	
23	73.00	-91.67	0.008	2.08E-03	52.8	40.8	
24	72.50	-66.19	0.007	1.96E-03	13.3	55.7	
25	72.00	-41.86	0.006	1.82E-03	-13.7	54.0	
26	71.20	-3.32	0.004	1.65E-03	-31.8	29.8	
27	70.60	26.16	0.003	1.59E-03	-24.9	10.2	
28	70.00	56.99	0.002	1.57E-03	0.0	0.0	

Strut force at elev. 81.65 = 100.84 kN/m run = 100.84 kN/strut
Strut force at elev. 78.90 = 221.78 kN/m run = 221.78 kN/strut
Strut force at elev. 74.75 = 72.28 kN/m run = 72.28 kN/strut

(continued)

Stage No.23 Change properties of soil type 1 to soil type 4
Ko pressures will be reset

Node no.	Y coord	ACTIVE side: Water press. kN/m2	Effective stresses: Vertic-al kN/m2	Active limit kN/m2	Passive limit kN/m2	Earth pressure kN/m2	Total earth pressure kN/m2	Soil stiffness coeff. kN/m3
1	84.40	0.00	0.00	0.00	0.00	0.00	0.00	0.0
2	84.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
		0.00	5.50	1.78	19.80	7.72	7.72	4147
3	83.50	0.00	14.59	4.73	52.52	6.87	6.87	4147
4	83.00	0.00	23.99	7.77	86.37	11.70	11.70	4147
5	82.50	0.00	33.59	10.88	120.94	16.62	16.62	4147
6	82.00	0.00	43.23	14.01	155.66	21.55	21.55	4147
7	81.65	0.00	49.96	16.19	179.88	24.96	24.96	4147
8	81.50	0.00	52.83	17.12	190.22	26.41	26.41	4147
9	81.00	0.00	62.35	20.20	224.50	31.18	31.18	3114
10	80.25	7.50	68.96	22.35	248.31	34.49	41.99	3114
11	79.50	15.00	75.39	24.43	271.44	37.70	52.70	3114
12	78.90	21.00	80.40	26.05	289.50	40.18	61.18	1511
13	78.45	25.50	84.10	27.25	302.81	41.98	67.48	1511
14	78.00	30.00	87.75	28.43	315.95	43.75	73.75	1511
15	77.50	35.00	91.75	29.73	330.38	45.70	80.70	1511
16	76.75	42.50	97.68	31.65	351.73	48.65	91.15	1511
17	76.00	50.00	103.54	33.55	372.81	51.63	101.63	1511
		Total> 153.54	40.00m	332.81	47.90	47.90		9970
18	75.38	Total> 164.63	43.13m	352.86	50.93	50.93		10469
19	74.75	Total> 175.69	46.25m	372.88	54.35	54.35		10967
20	74.00	Total> 188.93	50.00m	396.88	64.80	64.80		11566
21	73.50	Total> 197.75	52.50m	412.87	71.81	71.81		11964
		Total> 197.75	52.50m	420.70	92.84	92.84		11964
22	73.20	Total> 203.34	54.00m	430.16	105.21	105.21		12172
23	73.00	Total> 207.06	55.00m	436.46	113.53	113.53		12311
24	72.50	Total> 216.37	57.50m	452.21	134.50	134.50		12658
25	72.00	Total> 225.68	60.00m	467.96	155.40	155.40		13004
26	71.20	Total> 240.57	64.00m	493.15	188.17	188.17		13559
27	70.60	Total> 251.74	67.00m	512.05	212.71	212.71		13975
28	70.00	Total> 262.91	70.00m	530.95	237.77	237.77		14391

Node no.	Y coord	PASSIVE side: Water press. kN/m2	Effective stresses: Vertic-al kN/m2	Active limit kN/m2	Passive limit kN/m2	Earth pressure kN/m2	Total earth pressure kN/m2	Soil stiffness coeff. kN/m3
1	84.40	0.00	0.00	0.00	0.00	0.00	0.00	0.0
2	84.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
3	83.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
4	83.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
5	82.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
6	82.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
7	81.65	0.00	0.00	0.00	0.00	0.00	0.00	0.0
8	81.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
9	81.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
10	80.25	0.00	0.00	0.00	0.00	0.00	0.00	0.0
11	79.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
12	78.90	0.00	0.00	0.00	0.00	0.00	0.00	0.0
13	78.45	0.00	0.00	0.00	0.00	0.00	0.00	0.0
14	78.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
15	77.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
16	76.75	0.00	0.00	0.00	0.00	0.00	0.00	0.0

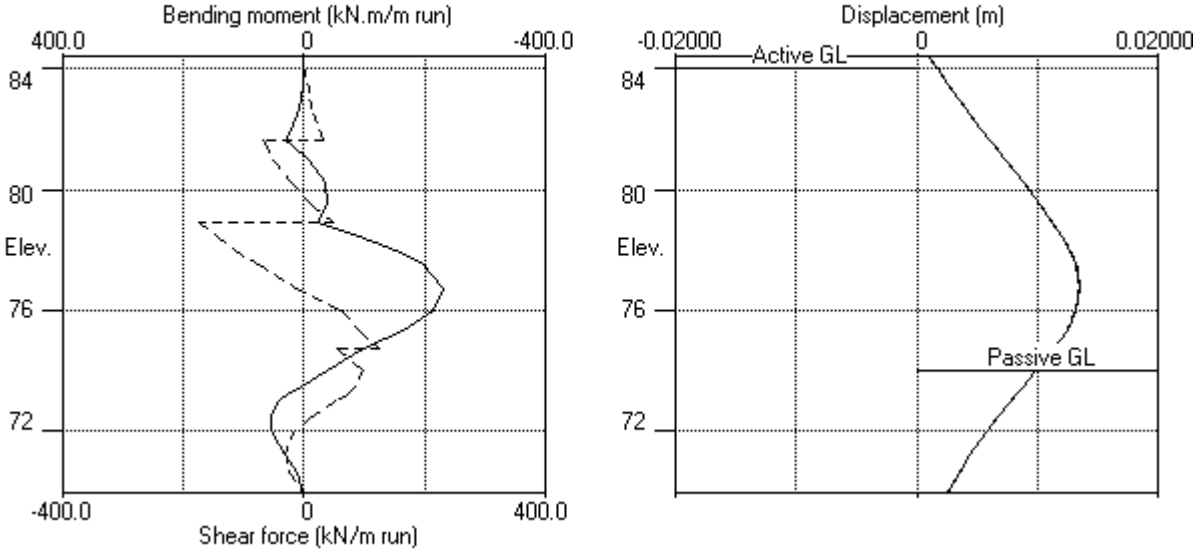
(continued)

Stage No.23 Change properties of soil type 1 to soil type 4
Ko pressures will be reset

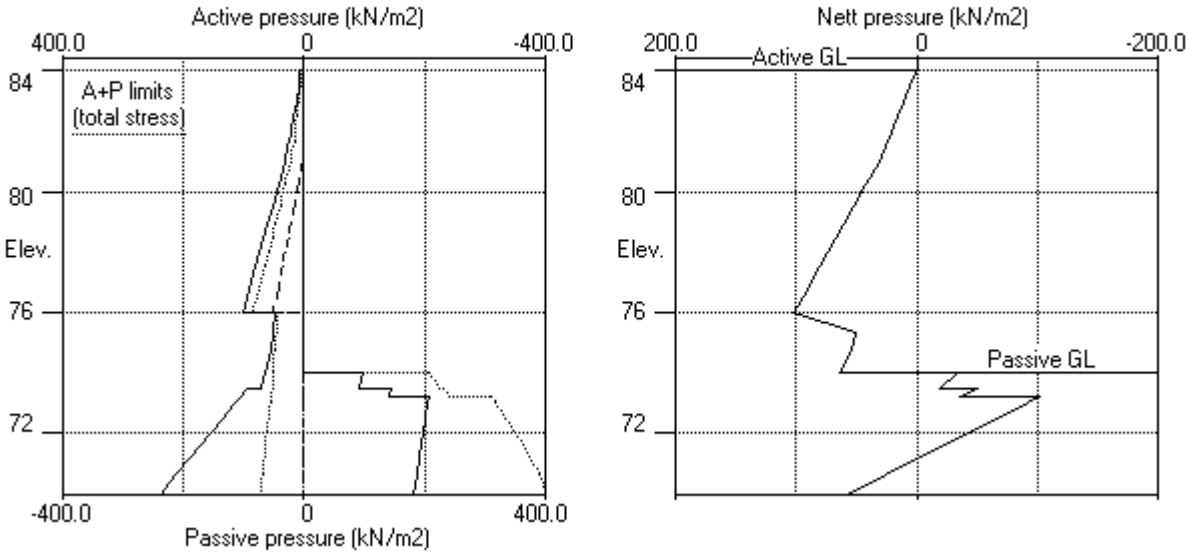
Node no.	Y coord	PASSIVE side						
		Water press.	Effective stresses: Vertic-al	Active limit	Passive limit	Earth pressure	Total earth pressure	Soil stiffness coeff.
		kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m3
17	76.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
18	75.38	0.00	0.00	0.00	0.00	0.00	0.00	0.0
19	74.75	0.00	0.00	0.00	0.00	0.00	0.00	0.0
20	74.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
		Total> 0.00	0.00	207.93	98.06	98.06		20831
21	73.50	Total> 9.01	2.50m	224.11	90.64	90.64		21549
		Total> 9.01	2.50m	231.93	143.64	143.64		21549
22	73.20	Total> 14.74	4.00m	241.53	140.19	140.19		21924
		Total> 84.74	4.00m	311.54	207.45	207.45		21924
23	73.00	Total> 88.56	5.00m	317.95	205.20	205.20		22174
24	72.50	Total> 98.08	7.50m	333.91	200.70	200.70		22798
25	72.00	Total> 107.31	10.00m	349.58	197.26	197.26		23423
26	71.20	Total> 121.23	14.00m	373.81	191.49	191.49		24422
27	70.60	Total> 131.10	17.00m	391.40	186.55	186.55		25171
28	70.00	Total> 140.73	20.00m	408.76	180.78	180.78		25921

Units: kN,m

Stage No.23 Change soil type 1 to soil type 4

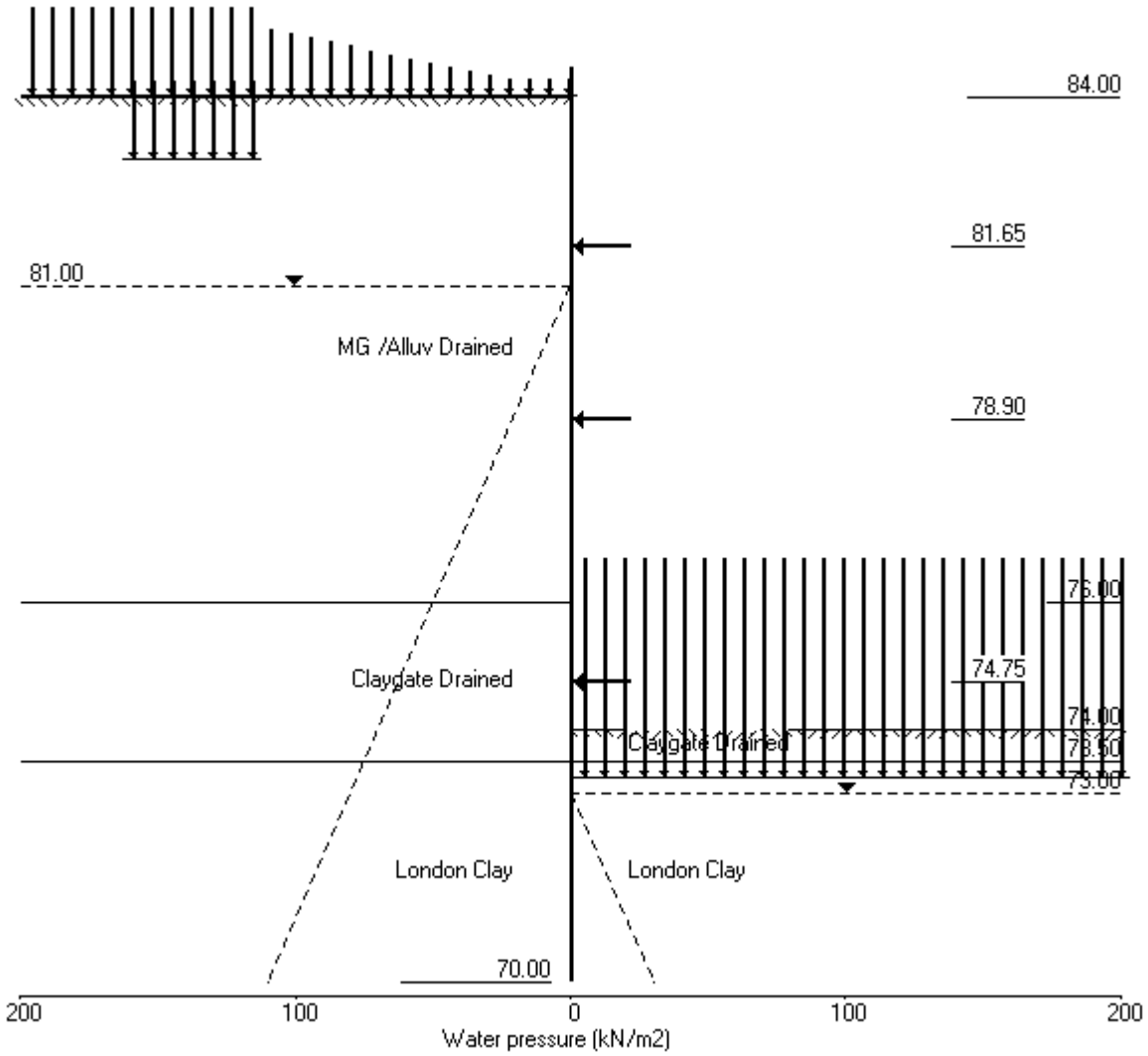


Stage No.23 Change soil type 1 to soil type 4



Units: kN,m

Stage No.24 Change soil type 2 to soil type 5



Units: kN,m

Stage No. 24 Change properties of soil type 2 to soil type 5
Ko pressures will be reset

BENDING MOMENT and DISPLACEMENT ANALYSIS of Fully Embedded Wall

Analysis options

Length of wall perpendicular to section = 6.00m
Subgrade reaction model - Boussinesq Influence coefficients
Soil deformations are elastic until the active or passive limit is reached
Open Tension Crack analysis - No

Rigid boundaries: Active side 20.00 from wall
Passive side 20.00 from wall

Limit State: ULS DA1 Combination 1

Calculated Bending Moments and Strut Forces are to be multiplied by a factor of 1.35 to obtain values for structural design. See summary for factored values.

Node no.	Y coord	Nett pressure kN/m2	Wall disp. m	Wall rotation rad.	Shear force kN/m	Bending moment kN.m/m	Strut forces kN/m
1	84.40	0.00	0.001	-1.83E-03	0.0	-0.0	
2	84.00	0.00	0.002	-1.83E-03	0.0	-0.0	
		7.64	0.002	-1.83E-03	0.0	-0.0	
3	83.50	6.81	0.003	-1.83E-03	3.6	1.2	
4	83.00	11.65	0.004	-1.84E-03	8.2	4.1	
5	82.50	16.59	0.004	-1.86E-03	15.3	9.8	
6	82.00	21.54	0.005	-1.89E-03	24.8	19.7	
7	81.65	24.96	0.006	-1.94E-03	33.0	30.0	99.2
		24.96	0.006	-1.94E-03	-66.2	30.0	
8	81.50	26.41	0.006	-1.96E-03	-62.4	20.4	
9	81.00	31.20	0.007	-1.97E-03	-48.0	-7.2	
10	80.25	42.02	0.009	-1.90E-03	-20.5	-33.1	
11	79.50	52.73	0.010	-1.77E-03	15.0	-35.4	
12	78.90	61.18	0.011	-1.69E-03	49.2	-16.4	228.4
		61.18	0.011	-1.69E-03	-179.2	-16.4	
13	78.45	67.46	0.012	-1.57E-03	-150.3	-90.7	
14	78.00	73.70	0.013	-1.29E-03	-118.5	-151.3	
15	77.50	80.62	0.013	-8.51E-04	-79.9	-201.1	
16	76.75	91.04	0.013	-1.98E-05	-15.6	-237.8	
17	76.00	101.54	0.013	8.54E-04	56.7	-223.5	
		153.28	0.013	8.54E-04	56.7	-223.5	
18	75.38	164.49	0.012	1.45E-03	156.0	-158.1	
19	74.75	175.49	0.011	1.75E-03	262.2	-28.2	378.2
		175.49	0.011	1.75E-03	-116.0	-28.2	
20	74.00	187.87	0.010	1.92E-03	20.3	-62.5	
21	73.50	166.83	0.009	2.04E-03	109.0	-30.7	
		-58.06	0.009	2.04E-03	109.0	-30.7	
22	73.20	-43.14	0.008	2.06E-03	93.8	-0.7	
		-110.39	0.008	2.06E-03	93.8	-0.7	
23	73.00	-100.18	0.008	2.05E-03	72.7	15.9	
24	72.50	-74.91	0.007	1.98E-03	29.0	39.7	
25	72.00	-50.06	0.006	1.87E-03	-2.3	44.8	
26	71.20	-9.75	0.005	1.73E-03	-26.2	27.1	
27	70.60	21.47	0.004	1.67E-03	-22.7	9.7	
28	70.00	54.20	0.003	1.66E-03	0.0	0.0	

Strut force at elev. 81.65 = 99.20 kN/m run = 99.20 kN/strut
Strut force at elev. 78.90 = 228.39 kN/m run = 228.39 kN/strut
Strut force at elev. 74.75 = 378.17 kN/m run = 378.17 kN/strut

(continued)

Stage No.24 Change properties of soil type 2 to soil type 5
Ko pressures will be reset

Node no.	Y coord	ACTIVE side: Water press. kN/m2	Effective stresses: Vertic-al kN/m2	Active limit kN/m2	Passive limit kN/m2	Earth pressure kN/m2	Total earth pressure kN/m2	Soil stiffness coeff. kN/m3
1	84.40	0.00	0.00	0.00	0.00	0.00	0.00	0.0
2	84.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
		0.00	5.50	1.78	19.80	7.64	7.64	3884
3	83.50	0.00	14.59	4.73	52.52	6.81	6.81	3884
4	83.00	0.00	23.99	7.77	86.37	11.65	11.65	3884
5	82.50	0.00	33.59	10.88	120.94	16.59	16.59	3884
6	82.00	0.00	43.23	14.01	155.66	21.54	21.54	3884
7	81.65	0.00	49.96	16.19	179.88	24.96	24.96	2987
8	81.50	0.00	52.83	17.12	190.22	26.41	26.41	2987
9	81.00	0.00	62.35	20.20	224.50	31.20	31.20	2987
10	80.25	7.50	68.96	22.35	248.31	34.52	42.02	2987
11	79.50	15.00	75.39	24.43	271.44	37.73	52.73	2987
12	78.90	21.00	80.40	26.05	289.50	40.18	61.18	2081
13	78.45	25.50	84.10	27.25	302.81	41.96	67.46	2081
14	78.00	30.00	87.75	28.43	315.95	43.70	73.70	2081
15	77.50	35.00	91.75	29.73	330.38	45.62	80.62	2081
16	76.75	42.50	97.68	31.65	351.73	48.54	91.04	2081
17	76.00	50.00	103.54	33.55	372.81	51.54	101.54	2081
		50.00	103.54	36.37	336.79	103.28	153.28	6058
18	75.38	56.25	108.38	38.07	352.52	108.24	164.49	6361
19	74.75	62.50	113.19	39.76	368.16	112.99	175.49	6664
20	74.00	70.00	118.93	41.78	386.85	117.87	187.87	7027
21	73.50	75.00	122.75	43.12	399.27	121.13	196.13	7270
		Total> 197.75	52.50m	420.70	89.25	89.25	16165	
22	73.20	Total> 203.34	54.00m	430.16	101.17	101.17	16447	
23	73.00	Total> 207.06	55.00m	436.46	109.32	109.32	16634	
24	72.50	Total> 216.37	57.50m	452.21	130.19	130.19	17102	
25	72.00	Total> 225.68	60.00m	467.96	151.34	151.34	17571	
26	71.20	Total> 240.57	64.00m	493.15	184.99	184.99	18320	
27	70.60	Total> 251.74	67.00m	512.05	210.39	210.39	18882	
28	70.00	Total> 262.91	70.00m	530.95	236.39	236.39	19445	

Node no.	Y coord	PASSIVE side: Water press. kN/m2	Effective stresses: Vertic-al kN/m2	Active limit kN/m2	Passive limit kN/m2	Earth pressure kN/m2	Total earth pressure kN/m2	Soil stiffness coeff. kN/m3
1	84.40	0.00	0.00	0.00	0.00	0.00	0.00	0.0
2	84.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
3	83.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
4	83.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
5	82.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
6	82.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
7	81.65	0.00	0.00	0.00	0.00	0.00	0.00	0.0
8	81.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
9	81.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
10	80.25	0.00	0.00	0.00	0.00	0.00	0.00	0.0
11	79.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
12	78.90	0.00	0.00	0.00	0.00	0.00	0.00	0.0
13	78.45	0.00	0.00	0.00	0.00	0.00	0.00	0.0
14	78.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
15	77.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
16	76.75	0.00	0.00	0.00	0.00	0.00	0.00	0.0

(continued)

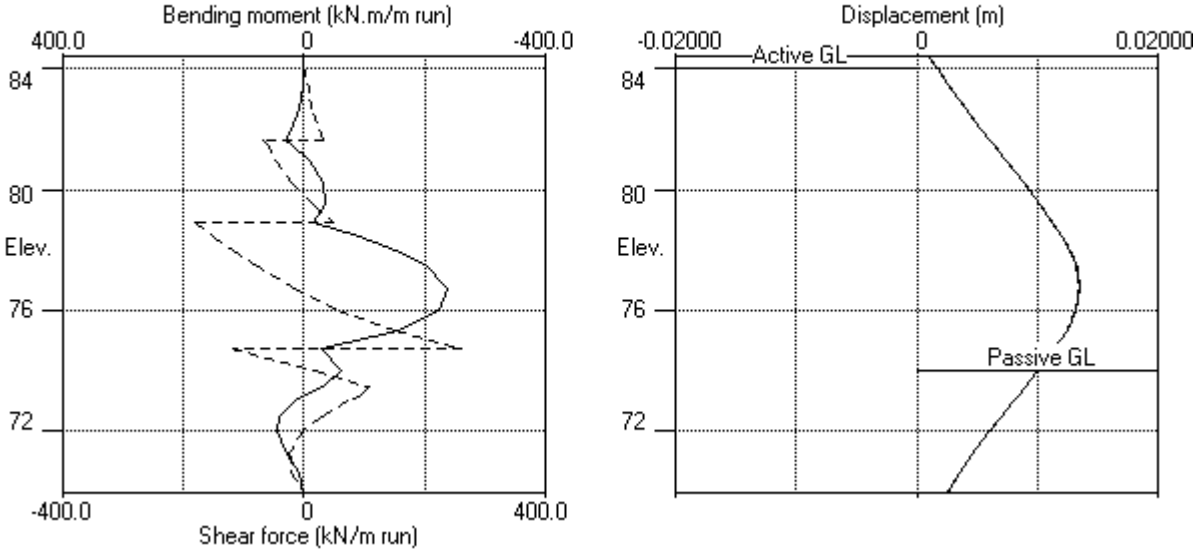
Stage No.24 Change properties of soil type 2 to soil type 5
Ko pressures will be reset

Node no.	Y coord	PASSIVE side						
		Effective stresses				Total earth pressure	Soil stiffness coeff.
		Water press. kN/m2	Vertic -al kN/m2	Active limit kN/m2	Passive limit kN/m2	Earth pressure kN/m2	kN/m2	kN/m3
17	76.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
18	75.38	0.00	0.00	0.00	0.00	0.00	0.00	0.0
19	74.75	0.00	0.00	0.00	0.00	0.00	0.00	0.0
20	74.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
		0.00	0.00	0.00	0.00	0.00	0.00	7178
21	73.50	0.00	9.01	3.16	29.30	29.30	29.30p	7426
		Total>	9.01	2.50m	231.93	147.31	147.31	16498
22	73.20	Total>	14.74	4.00m	241.53	144.31	144.31	16785
		Total>	84.74	4.00m	311.54	211.57	211.57	16785
23	73.00	Total>	88.56	5.00m	317.95	209.50	209.50	16976
24	72.50	Total>	98.08	7.50m	333.91	205.10	205.10	17454
25	72.00	Total>	107.31	10.00m	349.58	201.40	201.40	17932
26	71.20	Total>	121.23	14.00m	373.81	194.73	194.73	18697
27	70.60	Total>	131.10	17.00m	391.40	188.92	188.92	19271
28	70.00	Total>	140.73	20.00m	408.76	182.19	182.19	19844

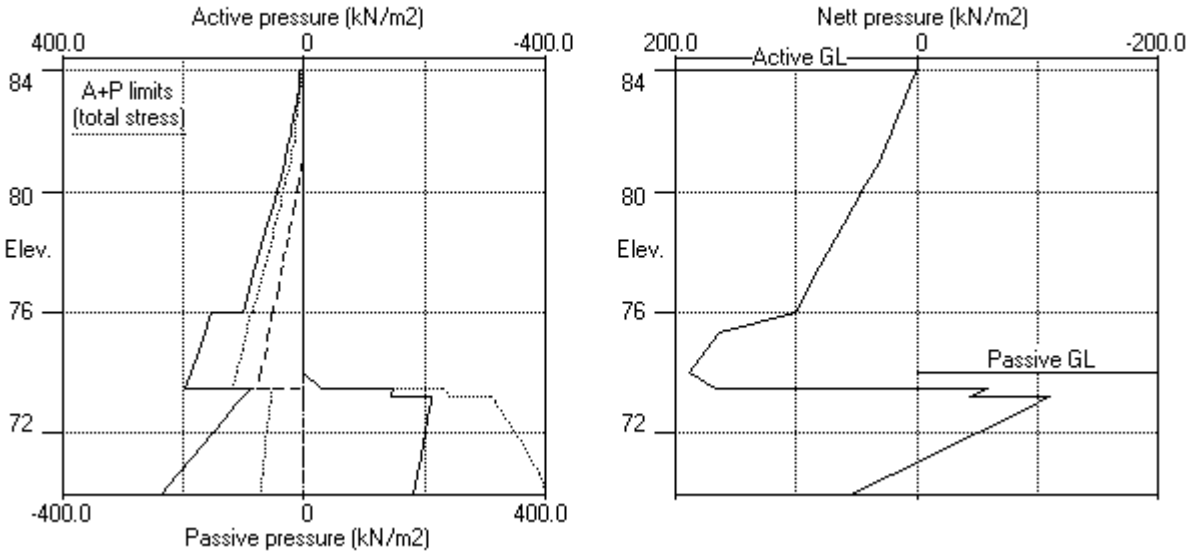
Note: 12.34a Soil pressure at active limit
29.30p Soil pressure at passive limit

Units: kN,m

Stage No.24 Change soil type 2 to soil type 5

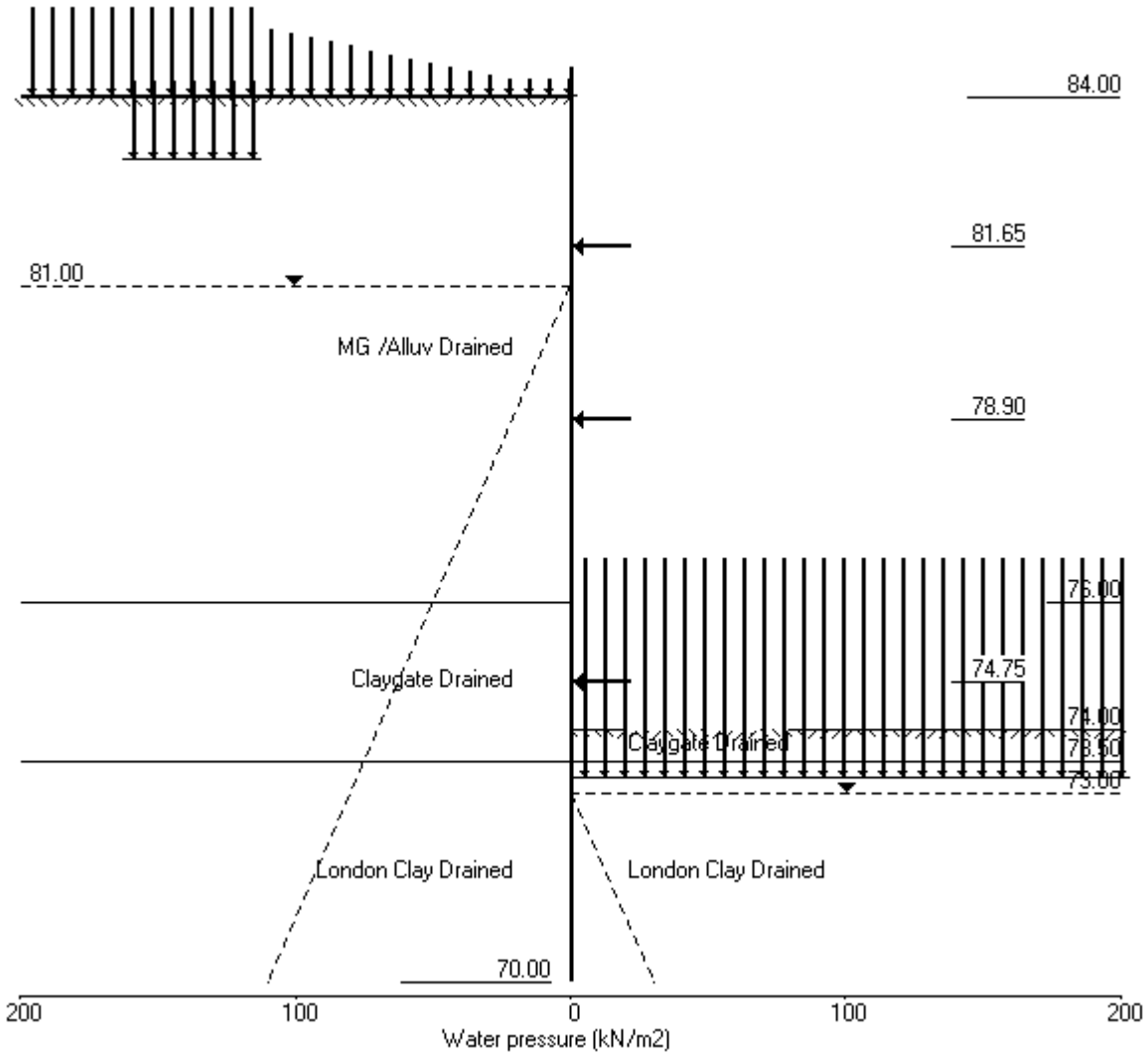


Stage No.24 Change soil type 2 to soil type 5



Units: kN,m

Stage No.25 Change soil type 3 to soil type 6



Units: kN,m

Stage No. 25 Change properties of soil type 3 to soil type 6
Ko pressures will be reset

BENDING MOMENT and DISPLACEMENT ANALYSIS of Fully Embedded Wall

Analysis options

Length of wall perpendicular to section = 6.00m
Subgrade reaction model - Boussinesq Influence coefficients
Soil deformations are elastic until the active or passive limit is reached
Open Tension Crack analysis - No

Rigid boundaries: Active side 20.00 from wall
Passive side 20.00 from wall

Limit State: ULS DA1 Combination 1

Calculated Bending Moments and Strut Forces are to be multiplied by a factor of 1.35 to obtain values for structural design. See summary for factored values.

Node no.	Y coord	Nett pressure kN/m2	Wall disp. m	Wall rotation rad.	Shear force kN/m	Bending moment kN.m/m	Strut forces kN/m
1	84.40	0.00	0.001	-1.89E-03	0.0	-0.0	
2	84.00	0.00	0.002	-1.89E-03	0.0	-0.0	
		8.23	0.002	-1.89E-03	0.0	-0.0	
3	83.50	7.27	0.002	-1.90E-03	3.9	1.3	
4	83.00	12.00	0.003	-1.90E-03	8.7	4.3	
5	82.50	16.81	0.004	-1.92E-03	15.9	10.4	
6	82.00	21.62	0.005	-1.96E-03	25.5	20.6	
7	81.65	24.96	0.006	-2.01E-03	33.7	31.2	112.4
		24.96	0.006	-2.01E-03	-78.7	31.2	
8	81.50	26.38	0.006	-2.03E-03	-74.9	19.6	
9	81.00	31.07	0.007	-2.03E-03	-60.5	-14.2	
10	80.25	41.80	0.009	-1.91E-03	-33.2	-49.5	
11	79.50	52.55	0.010	-1.70E-03	2.2	-61.4	
12	78.90	61.20	0.011	-1.53E-03	36.3	-50.1	180.6
		61.20	0.011	-1.53E-03	-144.3	-50.1	
13	78.45	67.68	0.012	-1.35E-03	-115.3	-108.6	
14	78.00	74.16	0.012	-1.05E-03	-83.4	-153.5	
15	77.50	81.37	0.013	-6.31E-04	-44.5	-185.7	
16	76.75	92.10	0.013	9.10E-05	20.6	-195.6	
17	76.00	102.62	0.013	7.52E-04	93.6	-153.8	
		156.43	0.013	7.52E-04	93.6	-153.8	
18	75.38	166.77	0.012	1.09E-03	194.6	-64.8	
19	74.75	175.39	0.011	1.05E-03	301.5	89.7	518.6
		175.39	0.011	1.05E-03	-217.1	89.7	
20	74.00	182.63	0.011	9.27E-04	-82.9	-20.5	
21	73.50	157.22	0.010	1.00E-03	2.1	-40.9	
22	73.20	140.32	0.010	1.06E-03	46.7	-33.7	
		-32.87	0.010	1.06E-03	46.7	-33.7	
23	73.00	-30.67	0.010	1.09E-03	40.4	-25.0	
24	72.50	-25.62	0.009	1.13E-03	26.3	-9.1	
25	72.00	-20.65	0.009	1.14E-03	14.7	0.3	
26	71.20	-10.75	0.008	1.13E-03	2.2	3.6	
27	70.60	-2.02	0.007	1.12E-03	-1.7	2.2	
28	70.00	7.57	0.006	1.12E-03	0.0	0.0	

Strut force at elev. 81.65 = 112.36 kN/m run = 112.36 kN/strut
Strut force at elev. 78.90 = 180.61 kN/m run = 180.61 kN/strut
Strut force at elev. 74.75 = 518.62 kN/m run = 518.62 kN/strut

(continued)

Stage No.25 Change properties of soil type 3 to soil type 6
Ko pressures will be reset

Node no.	Y coord	ACTIVE side: Water press. kN/m2	Effective stresses: Vertic-al kN/m2	Active limit kN/m2	Passive limit kN/m2	Earth pressure kN/m2	Total earth pressure kN/m2	Soil stiffness coeff. kN/m3
1	84.40	0.00	0.00	0.00	0.00	0.00	0.00	0.0
2	84.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
		0.00	5.50	1.78	19.80	8.23	8.23	3883
3	83.50	0.00	14.59	4.73	52.52	7.27	7.27	3883
4	83.00	0.00	23.99	7.77	86.37	12.00	12.00	3883
5	82.50	0.00	33.59	10.88	120.94	16.81	16.81	3883
6	82.00	0.00	43.23	14.01	155.66	21.62	21.62	3883
7	81.65	0.00	49.96	16.19	179.88	24.96	24.96	2983
8	81.50	0.00	52.83	17.12	190.22	26.38	26.38	2983
9	81.00	0.00	62.35	20.20	224.50	31.07	31.07	2983
10	80.25	7.50	68.96	22.35	248.31	34.30	41.80	2983
11	79.50	15.00	75.39	24.43	271.44	37.55	52.55	2983
12	78.90	21.00	80.40	26.05	289.50	40.20	61.20	2401
13	78.45	25.50	84.10	27.25	302.81	42.18	67.68	2401
14	78.00	30.00	87.75	28.43	315.95	44.16	74.16	2401
15	77.50	35.00	91.75	29.73	330.38	46.37	81.37	2401
16	76.75	42.50	97.68	31.65	351.73	49.60	92.10	2401
17	76.00	50.00	103.54	33.55	372.81	52.62	102.62	2401
		50.00	103.54	36.37	336.79	106.43	156.43	6996
18	75.38	56.25	108.38	38.07	352.52	110.52	166.77	7346
19	74.75	62.50	113.19	39.76	368.16	112.89	175.39	7485
20	74.00	70.00	118.93	41.78	386.85	112.63	182.63	7893
21	73.50	75.00	122.75	43.12	399.27	111.52	186.52	8165
		75.00	122.75	43.12	422.25	113.14	188.14	8165
22	73.20	78.00	125.34	44.03	431.16	113.01	191.01	8307
23	73.00	80.00	127.06	44.63	437.09	112.94	192.94	8402
24	72.50	85.00	131.37	46.15	451.92	112.93	197.93	8639
25	72.00	90.00	135.68	47.66	466.73	113.21	203.21	8875
26	71.20	98.00	142.57	50.08	490.44	114.28	212.28	9254
27	70.60	104.00	147.74	51.90	508.22	115.32	219.32	9538
28	70.00	110.00	152.91	53.71	526.02	116.34	226.34	9822

Node no.	Y coord	PASSIVE side: Water press. kN/m2	Effective stresses: Vertic-al kN/m2	Active limit kN/m2	Passive limit kN/m2	Earth pressure kN/m2	Total earth pressure kN/m2	Soil stiffness coeff. kN/m3
1	84.40	0.00	0.00	0.00	0.00	0.00	0.00	0.0
2	84.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
3	83.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
4	83.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
5	82.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
6	82.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
7	81.65	0.00	0.00	0.00	0.00	0.00	0.00	0.0
8	81.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
9	81.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
10	80.25	0.00	0.00	0.00	0.00	0.00	0.00	0.0
11	79.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
12	78.90	0.00	0.00	0.00	0.00	0.00	0.00	0.0
13	78.45	0.00	0.00	0.00	0.00	0.00	0.00	0.0
14	78.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
15	77.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
16	76.75	0.00	0.00	0.00	0.00	0.00	0.00	0.0

(continued)

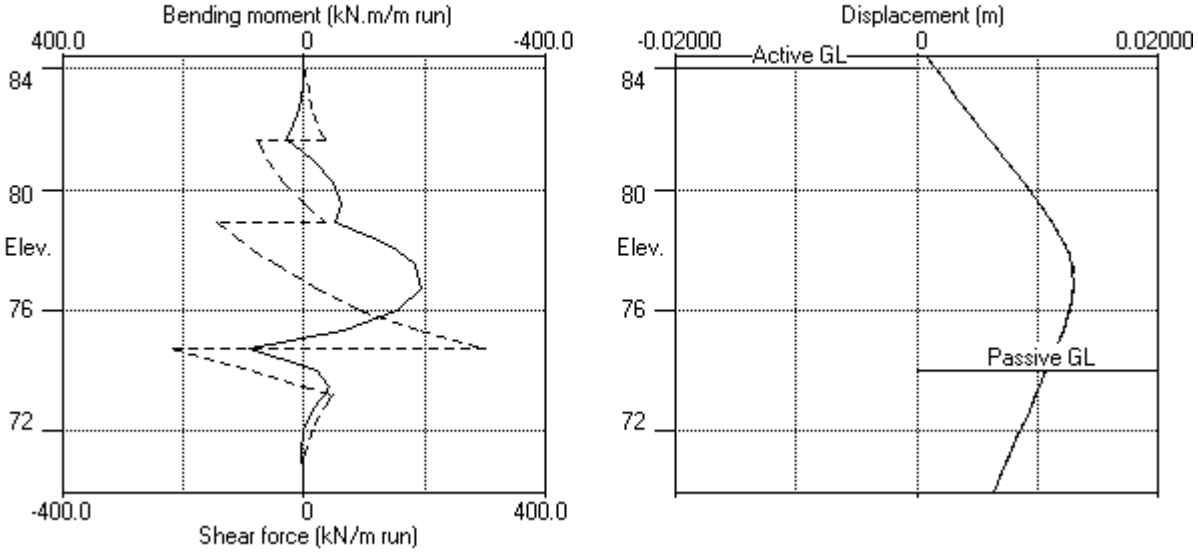
Stage No.25 Change properties of soil type 3 to soil type 6
Ko pressures will be reset

Node no.	Y coord	PASSIVE side						
		Effective stresses					Total earth pressure	Soil stiffness coeff.
		Water press. kN/m2	Vertic -al kN/m2	Active limit kN/m2	Passive limit kN/m2	Earth pressure kN/m2		
17	76.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
18	75.38	0.00	0.00	0.00	0.00	0.00	0.00	0.0
19	74.75	0.00	0.00	0.00	0.00	0.00	0.00	0.0
20	74.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
		0.00	0.00	0.00	0.00	0.00	0.00	7893
21	73.50	0.00	9.01	3.16	29.30	29.30	29.30p	8165
		0.00	9.01	3.16	30.99	30.99	30.99p	8165
22	73.20	0.00	14.74	5.18	50.70	50.70	50.70p	8307
		0.00	84.74	29.77	291.49	223.89	223.89	8307
23	73.00	0.00	88.56	31.11	304.66	223.62	223.62	8402
24	72.50	5.00	93.08	32.70	320.20	218.55	223.55	8639
25	72.00	10.00	97.31	34.18	334.75	213.86	223.86	8875
26	71.20	18.00	103.23	36.26	355.12	205.03	223.03	9254
27	70.60	24.00	107.10	37.62	368.41	197.34	221.34	9538
28	70.00	30.00	110.73	38.90	380.91	188.77	218.77	9822

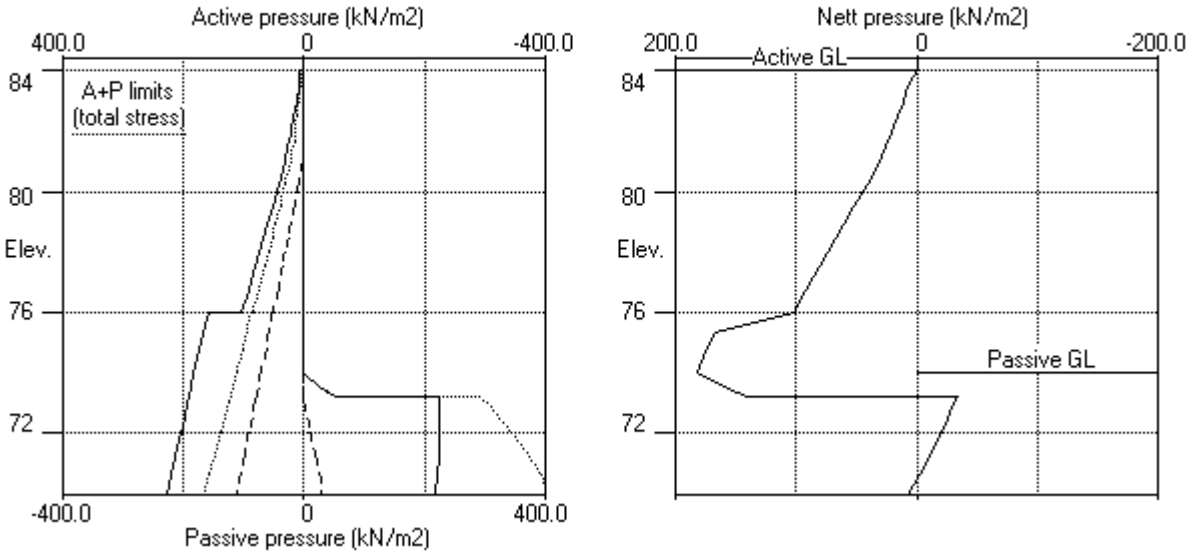
Note: 12.34a Soil pressure at active limit
50.70p Soil pressure at passive limit

Units: kN,m

Stage No.25 Change soil type 3 to soil type 6



Stage No.25 Change soil type 3 to soil type 6



Units: kN,m

Summary of results

BENDING MOMENT and DISPLACEMENT ANALYSIS of Fully Embedded Wall

Analysis options

Length of wall perpendicular to section = 6.00m
Subgrade reaction model - Boussinesq Influence coefficients
Soil deformations are elastic until the active or passive limit is reached
Open Tension Crack analysis - No

Rigid boundaries: Active side 20.00 from wall
Passive side 20.00 from wall

Limit State: ULS DA1 Combination 1

Calculated Bending Moments and Strut Forces have been multiplied by a factor of 1.35 to obtain values for structural design.

Bending moment, shear force and displacement envelopes

Node no.	Y coord	Displacement		Bending moment Calculated		Bending moment Factored		Shear force Calculated		Shear force Factored	
		max.	min.	max.	min.	max.	min.	max.	min.	max.	min.
		m	m	kN.m/m		kN.m/m		kN/m	kN/m	kN/m	kN/m
1	84.40	0.001	0.000	0	-0	0	-0	0	-26	0	-36
2	84.00	0.002	0.000	0	-11	0	-14	0	-26	0	-36
3	83.50	0.003	0.000	1	-24	2	-32	4	-26	5	-35
4	83.00	0.004	0.000	4	-36	6	-49	9	-24	12	-32
5	82.50	0.005	0.000	10	-48	14	-64	16	-21	21	-28
6	82.00	0.006	0.000	21	-57	28	-77	26	-81	34	-110
7	81.65	0.007	0.000	31	-62	42	-83	34	-79	45	-106
8	81.50	0.007	0.000	20	-64	28	-86	0	-76	0	-102
9	81.00	0.008	0.000	0	-69	0	-93	0	-69	0	-93
10	80.25	0.009	0.000	0	-111	0	-150	1	-56	2	-76
11	79.50	0.010	0.000	0	-147	0	-199	18	-131	25	-177
12	78.90	0.011	0.000	0	-167	0	-226	49	-179	66	-242
13	78.45	0.012	0.000	0	-175	0	-236	27	-150	36	-203
14	78.00	0.013	0.000	0	-174	0	-235	46	-123	63	-167
15	77.50	0.013	0.000	0	-201	0	-272	37	-97	50	-132
16	76.75	0.013	0.000	1	-238	1	-321	67	-51	90	-68
17	76.00	0.013	0.000	2	-223	3	-302	104	0	140	0
18	75.38	0.012	0.000	18	-171	25	-231	195	0	263	0
19	74.75	0.011	0.000	90	-139	121	-187	302	-217	407	-293
20	74.00	0.011	0.000	55	-72	75	-97	111	-83	150	-112
21	73.50	0.010	0.000	58	-41	78	-55	109	-6	147	-8
22	73.20	0.010	0.000	56	-34	76	-45	94	-9	127	-12
23	73.00	0.010	0.000	54	-25	73	-34	73	-13	98	-18
24	72.50	0.009	0.000	57	-9	77	-12	29	-20	39	-27
25	72.00	0.009	0.000	56	0	75	0	15	-23	20	-30
26	71.20	0.008	0.000	31	0	42	0	2	-33	3	-44
27	70.60	0.007	0.000	11	0	14	0	0	-26	0	-35
28	70.00	0.006	0.000	0	-0	0	-0	0	-0	0	-0

Summary of results (continued)

Calculated Bending Moments and Strut Forces have been multiplied by a factor of 1.35 to obtain values for structural design.

Maximum and minimum bending moment and shear force at each stage

Stage	Bending moment						Shear force					
	Calculated				Factored		Calculated				Factored	
no.	max.	elev.	min.	elev.	max.	min.	max.	elev.	min.	elev.	max.	min.
	kN.m/m		kN.m/m		kN.m/m		kN/m		kN/m		kN/m	kN/m
1	4	74.75	-1	79.50	5	-2	3	76.00	-1	72.50	3	-2
2	No calculation at this stage											
3	No calculation at this stage											
4	No calculation at this stage											
5	7	74.00	-10	78.90	9	-13	9	76.00	-3	81.50	12	-4
6	No calculation at this stage											
7	36	74.00	-79	79.50	48	-107	51	76.00	-26	84.40	69	-36
8	No calculation at this stage											
9	35	74.00	-79	79.50	47	-106	50	76.00	-26	84.40	68	-36
10	58	73.50	-175	78.45	78	-236	104	76.00	-81	82.00	140	-110
11	No calculation at this stage											
12	57	73.50	-174	78.45	77	-234	103	76.00	-81	82.00	139	-109
13	32	72.00	-165	76.00	43	-223	100	74.00	-119	78.00	135	-160
14	No calculation at this stage											
15	46	72.00	-181	76.00	62	-244	108	74.00	-123	78.00	146	-167
16	No calculation at this stage											
17	57	72.50	-222	76.75	77	-300	107	74.00	-131	79.50	145	-177
18	No calculation at this stage											
19	55	72.50	-211	76.75	75	-284	111	74.00	-127	78.90	150	-171
20	No calculation at this stage											
21	56	72.50	-212	76.75	75	-286	111	74.00	-125	78.90	149	-169
22	56	72.50	-212	76.75	75	-286	111	74.00	-125	78.90	149	-169
23	56	72.50	-231	76.75	75	-312	126	74.75	-174	78.90	170	-235
24	45	72.00	-238	76.75	61	-321	262	74.75	-179	78.90	354	-242
25	90	74.75	-196	76.75	121	-264	302	74.75	-217	74.75	407	-293

Summary of results (continued)

Maximum and minimum displacement at each stage

Stage no.	Displacement maximum m	elev.	minimum m	elev.	Stage description
1	0.001	84.40	0.000	84.40	Apply surcharge no.1 at elev. 84.00
2	No calculation at this stage				Apply surcharge no.2 at elev. 84.00
3	No calculation at this stage				Apply surcharge no.3 at elev. 84.00
4	No calculation at this stage				Apply surcharge no.6 at elev. 84.00
5	0.001	80.25	0.000	84.40	Apply surcharge no.7 at elev. 83.00
6	No calculation at this stage				Install strut no.1 at elev. 84.40
7	0.006	78.90	0.000	84.40	Excav. to elev. 81.50 on PASSIVE side
8	No calculation at this stage				Install strut no.2 at elev. 82.00
9	0.006	78.90	0.000	84.40	Apply water pressure profile no.1
10	0.011	78.00	0.000	84.40	Excav. to elev. 77.50 on PASSIVE side
11	No calculation at this stage				Install strut no.3 at elev. 78.00
12	0.011	78.00	0.000	84.40	Apply water pressure profile no.3
13	0.012	76.75	0.000	84.40	Excav. to elev. 74.00 on PASSIVE side
14	No calculation at this stage				Install strut no.4 at elev. 74.75
15	0.012	76.75	0.000	84.40	Apply surcharge no.4 at elev. 73.20
16	No calculation at this stage				Install strut no.5 at elev. 79.50
17	0.013	76.75	0.000	84.40	Remove strut no.3 at elev. 78.00
18	No calculation at this stage				Install strut no.6 at elev. 78.90
19	0.013	76.75	0.000	84.40	Remove strut no.5 at elev. 79.50
20	No calculation at this stage				Install strut no.7 at elev. 81.65
21	0.013	76.75	0.000	84.40	Remove strut no.2 at elev. 82.00
22	0.013	76.75	0.000	84.40	Remove strut no.1 at elev. 84.40
23	0.013	76.75	0.000	84.40	Change soil type 1 to soil type 4
24	0.013	76.75	0.000	84.40	Change soil type 2 to soil type 5
25	0.013	76.75	0.000	84.40	Change soil type 3 to soil type 6

Summary of results (continued)

Calculated Bending Moments and Strut Forces have been multiplied by a factor of 1.35 to obtain values for structural design.

Strut forces at each stage (horizontal components)

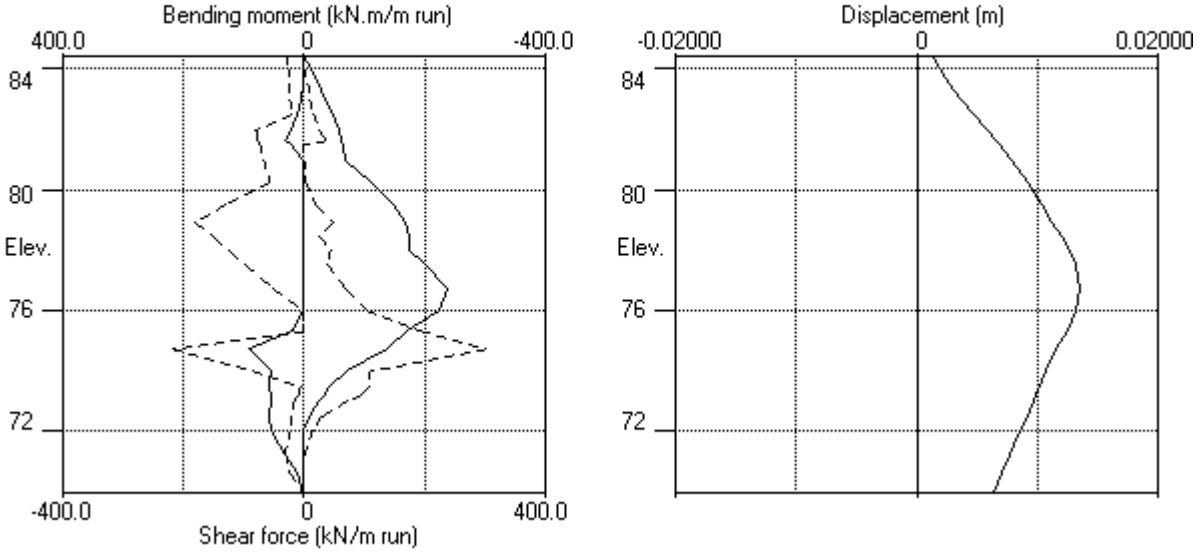
Stage no.	Strut no. 1 at elev. 84.40			Strut no. 2 at elev. 82.00			Strut no. 3 at elev. 78.00		
	--Calculated-- kN per m run	kN per strut	Factored kN per strut	--Calculated-- kN per m run	kN per strut	Factored kN per strut	--Calculated-- kN per m run	kN per strut	Factored kN per strut
7	26	159	215	---	---	---	---	---	---
9	26	158	214	0	0	0	---	---	---
10	slack	slack	slack	93	560	756	---	---	---
12	slack	slack	slack	93	559	754	1	6	8
13	slack	slack	slack	67	404	545	165	990	1337
15	slack	slack	slack	69	412	556	168	1007	1359
17	slack	slack	slack	47	282	380	---	---	---
19	slack	slack	slack	61	367	496	---	---	---
21	slack	slack	slack	---	---	---	---	---	---

Stage no.	Strut no. 4 at elev. 74.75			Strut no. 5 at elev. 79.50			Strut no. 6 at elev. 78.90		
	--Calculated-- kN per m run	kN per strut	Factored kN per strut	--Calculated-- kN per m run	kN per strut	Factored kN per strut	--Calculated-- kN per m run	kN per strut	Factored kN per strut
15	slack	slack	slack	---	---	---	---	---	---
17	36	36	48	150	898	1213	---	---	---
19	22	22	30	---	---	---	143	143	193
21	24	24	32	---	---	---	134	134	181
22	24	24	32	---	---	---	134	134	181
23	72	72	98	---	---	---	222	222	299
24	378	378	511	---	---	---	228	228	308
25	519	519	700	---	---	---	181	181	244

Stage no.	Strut no. 7 at elev. 81.65 --Calculated-- kN per m run	kN per strut	Factored kN per strut
21	67	67	91
22	67	67	91
23	101	101	136
24	99	99	134
25	112	112	152

Units: kN,m

Bending moment, shear force, displacement envelopes



Units: kN,m

INPUT DATA

SOIL PROFILE

Stratum no.	Elevation of top of stratum	Soil types Active side	Passive side
1	84.00	1 Made Ground / Alluv	1 Made Ground / Alluv
2	76.00	2 Claygate Beds	2 Claygate Beds
3	73.50	3 London Clay	3 London Clay

SOIL PROPERTIES (Unfactored SLS soil strengths)

-- Soil type -- No.	Description (Datum elev.)	Bulk density kN/m3	Young's Modulus Eh,kN/m2 (dEh/dy)	At rest coeff. Ko (dKo/dy)	Consol state. NC/OC (Nu)	Active limit Ka (Kac)	Passive limit Kp (Kpc)	Cohesion kN/m2 (dc/dy)
1	Made Ground / Alluv	17.00	12500	0.500	NC (0.490)	1.000 (2.570)	1.000 (2.571)	25.00u
2	Claygate .. (76.00)	18.00	37500 (3000)	0.500	OC (0.490)	1.000 (2.000)	1.000 (2.390)	75.00u (6.000)
3	London Clay (73.50)	19.00	45000 (2608)	1.000	OC (0.490)	1.000 (2.476)	1.000 (2.477)	90.00u (5.200)
4	MG /Alluv Drained	18.00	7500	0.500	NC (0.250)	0.324 (1.327)	3.601 (5.104)	0.0d
5	Claygate .. (76.00)	18.00	22500 (1800)	1.000	OC (0.200)	0.351 (1.391)	3.253 (4.831)	0.0d
6	London Cl.. (73.50)	19.00	27000 (1565)	1.000	OC (0.200)	0.351 (1.391)	3.440 (5.233)	0.0d

Additional soil parameters associated with Ka and Kp

------- Soil type ------- No.	Description	--- parameters for Ka --- Soil friction angle	Wall adhesion coeff.	Back-fill angle	--- parameters for Kp --- Soil friction angle	Wall adhesion coeff.	Back-fill angle
1	Made Ground / Alluv	0.00	1.000	0.00	0.00	1.000	0.00
2	Claygate Beds	0.00	0.000	0.00	0.00	0.500	0.00
3	London Clay	0.00	0.670	0.00	0.00	0.670	0.00
4	MG /Alluv Drained	27.00	0.641	0.00	27.00	0.471	0.00
5	Claygate Drained	25.00	0.670	0.00	25.00	0.500	0.00
6	London Clay Drained	25.00	0.670	0.00	25.00	0.670	0.00

GROUND WATER CONDITIONS

Density of water = 10.00 kN/m3

	Active side	Passive side
Initial water table elevation	81.00	81.00

Automatic water pressure balancing at toe of wall : No

Water press. profile no.	Active side Point no.	Elev. m	Piezo elev. m	Water press. kN/m2	Passive side Point no.	Elev. m	Piezo elev. m	Water press. kN/m2	
1	1	81.00	81.00	0.0	1	77.50	77.50	0.0	MC
2	1	82.00	82.00	0.0	1	77.00	77.00	0.0	WC
3	1	81.00	81.00	0.0	1	73.00	73.00	0.0	MC
4	1	82.00	82.00	0.0	1	73.20	73.20	0.0	WC

WALL PROPERTIES

Type of structure = Fully Embedded Wall
Elevation of toe of wall = 70.00
Maximum finite element length = 0.80 m
Youngs modulus of wall E = 2.8000E+07 kN/m2
Moment of inertia of wall I = 7.0700E-03 m4/m run
E.I = 197960 kN.m2/m run
Yield Moment of wall = Not defined

STRUTS and ANCHORS

Strut/ anchor no.	Elev.	Strut spacing m	X-section area of strut sq.m	Youngs modulus kN/m2	Free length m	Inclin -ation (degs)	Pre- stress /strut kN	Tension allowed
1	84.40	6.00	0.010000	2.000E+08	5.00	0.00	0	No
2	82.00	6.00	0.010000	2.000E+08	5.00	0.00	0	No
3	78.00	6.00	0.010000	2.000E+08	1.00	0.00	0	No
4	74.75	1.00	0.350000	3.000E+07	1.00	0.00	0	No
5	79.50	6.00	0.100000	2.000E+08	5.00	0.00	0	No
6	78.90	1.00	0.250000	3.000E+07	1.00	0.00	0	No
7	81.65	1.00	0.250000	3.000E+07	1.00	0.00	0	No
8	76.30	6.00	0.010000	2.000E+08	5.00	0.00	0	No

SURCHARGE LOADS

Surch -arge no.	Elev.	Distance from wall	Length parallel to wall	Width perpend. to wall	Surcharge ----- kN/m2 ----- Near edge	Far edge	Equiv. soil type	Partial factor/ Category
1	84.00	0.00(A)	8.00	20.00	5.00	=	N/A	1.30 Var
2	84.00	5.00(A)	8.00	15.00	5.00	=	N/A	1.30 Var
3	84.00	1.00(A)	8.00	4.00	0.00	17.00	N/A	1.00 P/U
4	73.20	-0.00(P)	8.00	10.00	70.00	=	N/A	1.00 -
5	74.00	-0.00(P)	10.00	10.00	70.00	=	N/A	1.00 -
6	84.00	5.00(A)	10.00	15.00	17.00	=	N/A	1.00 P/U
7	83.00	5.00(A)	2.00	2.00	25.00	=	N/A	1.00 P/U

Note: A = Active side, P = Passive side
A trapezoidal surcharge is defined by two values:
N = at edge near to wall, F = at edge far from wall
Limit State Categories P/U = Permanent Unfavourable
P/F = Permanent Favourable
Var = Variable (unfavourable)

CONSTRUCTION STAGES

Construction stage no.	Stage description
1	Apply surcharge no.1 at elevation 84.00 No analysis at this stage
2	Apply surcharge no.2 at elevation 84.00 No analysis at this stage
3	Apply surcharge no.3 at elevation 84.00 No analysis at this stage
4	Apply surcharge no.6 at elevation 84.00 No analysis at this stage
5	Apply surcharge no.7 at elevation 83.00 No analysis at this stage
6	Install strut or anchor no.1 at elevation 84.40
7	Excavate to elevation 81.50 on PASSIVE side
8	Install strut or anchor no.2 at elevation 82.00
9	Apply water pressure profile no.2 (Worst Cred.)
10	Excavate to elevation 77.50 on PASSIVE side
11	Install strut or anchor no.3 at elevation 78.00
12	Apply water pressure profile no.4 (Worst Cred.)
13	Excavate to elevation 74.00 on PASSIVE side
14	Install strut or anchor no.4 at elevation 74.75
15	Apply surcharge no.4 at elevation 73.20
16	Install strut or anchor no.5 at elevation 79.50
17	Remove strut or anchor no.3 at elevation 78.00
18	Install strut or anchor no.6 at elevation 78.90
19	Remove strut or anchor no.5 at elevation 79.50
20	Install strut or anchor no.7 at elevation 81.65
21	Remove strut or anchor no.2 at elevation 82.00
22	Remove strut or anchor no.1 at elevation 84.40
23	Change properties of soil type 1 to soil type 4 Ko pressures will be reset
24	Change properties of soil type 2 to soil type 5 Ko pressures will be reset
25	Change properties of soil type 3 to soil type 6 Ko pressures will be reset

FACTORS OF SAFETY and ANALYSIS OPTIONS

Limit State options: ULS DA1 Combination 2
- Water pressures : Worst Credible
- Partial factor on C' = 1.250
- Partial factor on Phi' = 1.250
- Partial factor on Cu = 1.400
- Partial factor on Soil Modulus = 1.000
- Partial factor on Permanent Unfavourable loads = 1.000
- Partial factor on Permanent Favourable loads = 1.000
- Partial factor on Permanent Variable loads = 1.300

Stability analysis:
- Method of analysis - Strength Factor method
- Overall factor on soil strength for calculating wall depth = 1.00

Parameters for undrained strata:
- Minimum equivalent fluid density = 5.00 kN/m3
- Maximum depth of water filled tension crack = 0.00 m

Bending moment and displacement calculation:
- Method - Subgrade reaction model using Influence Coefficients
- Open Tension Crack analysis? - No
- Non-linear Modulus Parameter (L) = 20.00 m

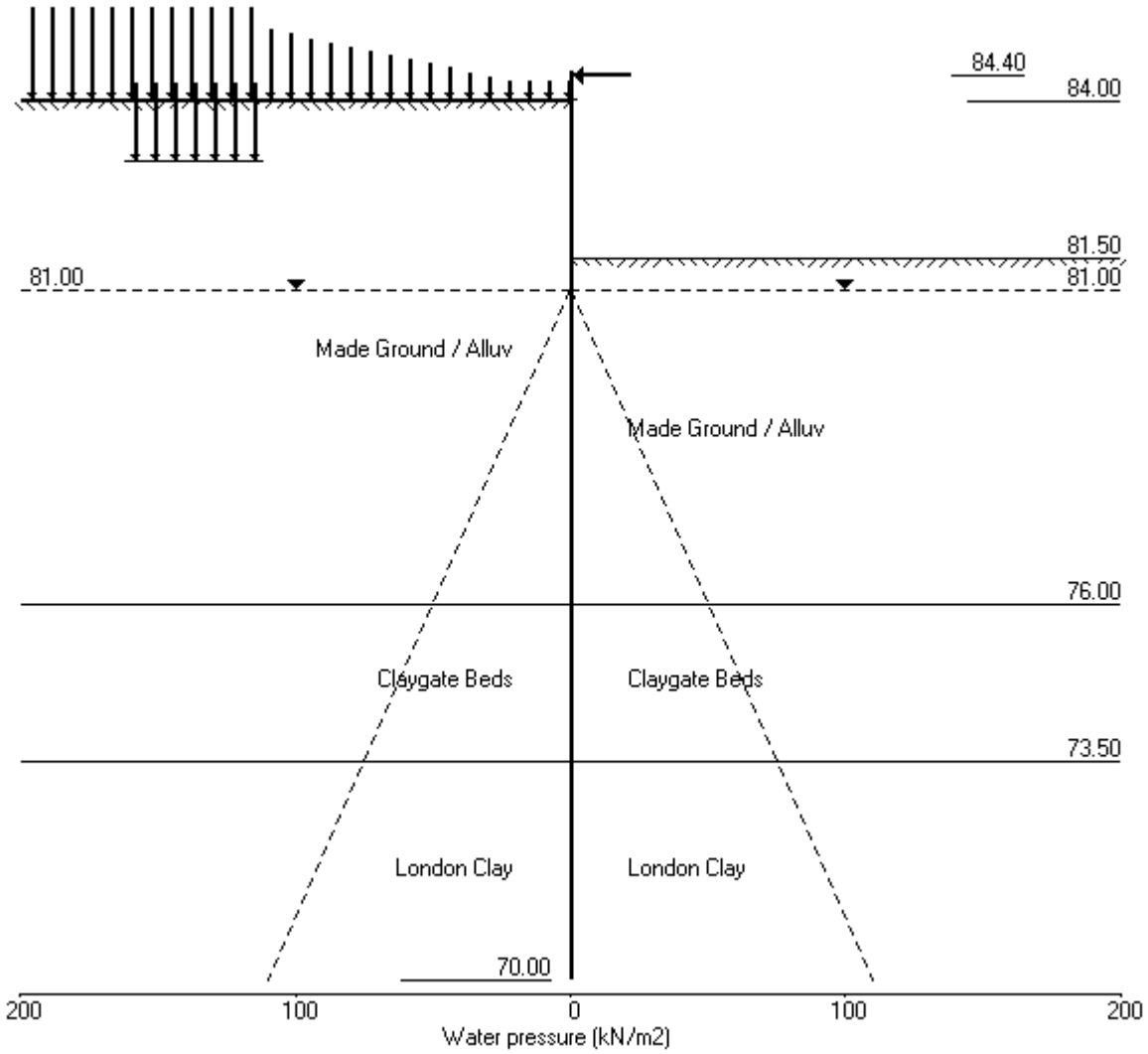
Boundary conditions:
- Length of wall (normal to plane of analysis) = 6.00 m
- Width of excavation on active side of wall = 20.00 m
- Width of excavation on passive side of wall = 10.00 m
- Distance to rigid boundary on active side = 20.00 m
- Distance to rigid boundary on passive side = 20.00 m

OUTPUT OPTIONS

Stage no.	Stage description	Output options: Displacement, Bending mom., Shear force	Active, Passive pressures	Graph. output
1	Apply surcharge no.1 at elev. 84.00	No	No	No
2	Apply surcharge no.2 at elev. 84.00	No	No	No
3	Apply surcharge no.3 at elev. 84.00	No	No	No
4	Apply surcharge no.6 at elev. 84.00	No	No	No
5	Apply surcharge no.7 at elev. 83.00	No	No	No
6	Install strut no.1 at elev. 84.40	No	No	No
7	Excav. to elev. 81.50 on PASSIVE side	Yes	No	Yes
8	Install strut no.2 at elev. 82.00	No	No	No
9	Apply water pressure profile no.2	No	No	No
10	Excav. to elev. 77.50 on PASSIVE side	Yes	No	Yes
11	Install strut no.3 at elev. 78.00	No	No	No
12	Apply water pressure profile no.4	No	No	No
13	Excav. to elev. 74.00 on PASSIVE side	Yes	No	Yes
14	Install strut no.4 at elev. 74.75	No	No	No
15	Apply surcharge no.4 at elev. 73.20	No	No	No
16	Install strut no.5 at elev. 79.50	No	No	No
17	Remove strut no.3 at elev. 78.00	No	No	No
18	Install strut no.6 at elev. 78.90	No	No	No
19	Remove strut no.5 at elev. 79.50	No	No	No
20	Install strut no.7 at elev. 81.65	No	No	No
21	Remove strut no.2 at elev. 82.00	No	No	No
22	Remove strut no.1 at elev. 84.40	No	No	No
23	Change soil type 1 to soil type 4	No	No	No
24	Change soil type 2 to soil type 5	No	No	No
25	Change soil type 3 to soil type 6	No	No	No
*	Summary output	Yes	-	Yes

Units: kN,m

Stage No.7 Excav. to elev. 81.50 on PASSIVE side



Units: kN,m

Stage No. 7 Excavate to elevation 81.50 on PASSIVE side

STABILITY ANALYSIS of Fully Embedded Wall according to Strength Factor method

Factor of safety on soil strength

Stage No.	--- G.L. --- Act.	Pass.	Strut Elev.	Overall FoS for toe elev. = 70.00 Factor of Safety	Moment equilib. at elev.	Toe elev. for FoS = 1.000 Toe elev.	Wall Penetr -ation
7	84.00	81.50	84.40	5.125	n/a	81.22	0.28

BENDING MOMENT and DISPLACEMENT ANALYSIS of Fully Embedded Wall

Analysis options

Length of wall perpendicular to section = 6.00m
Subgrade reaction model - Boussinesq Influence coefficients
Soil deformations are elastic until the active or passive limit is reached
Open Tension Crack analysis - No

Rigid boundaries: Active side 20.00 from wall
Passive side 20.00 from wall

Limit State: ULS DA1 Combination 2

Node no.	Y coord	Nett pressure kN/m2	Wall disp. m	Wall rotation rad.	Shear force kN/m	Bending moment kN.m/m	Strut forces kN/m
1	84.40	0.00	0.002	-1.57E-03	-28.4	-0.0	28.4
2	84.00	0.00	0.002	-1.56E-03	-28.4	-11.4	
3	83.50	2.50	0.003	-1.51E-03	-27.8	-25.5	
4	83.00	5.00	0.004	-1.43E-03	-25.9	-38.9	
5	82.50	7.50	0.004	-1.32E-03	-22.8	-51.2	
6	82.00	10.00	0.005	-1.17E-03	-18.4	-61.5	
7	81.65	11.75	0.005	-1.06E-03	-14.6	-67.3	
8	81.50	12.50	0.006	-1.01E-03	-12.8	-69.4	
		-2.40	0.006	-1.01E-03	-12.8	-69.4	
9	81.00	-1.46	0.006	-8.30E-04	-13.8	-76.0	
10	80.25	3.23	0.007	-5.23E-04	-13.1	-86.1	
11	79.50	11.62	0.007	-1.81E-04	-7.5	-94.2	
12	78.90	15.94	0.007	1.06E-04	0.7	-96.3	
13	78.45	17.77	0.007	3.23E-04	8.3	-94.4	
14	78.00	19.83	0.007	5.31E-04	16.8	-88.8	
15	77.50	22.39	0.006	7.42E-04	27.3	-77.9	
16	77.00	25.17	0.006	9.18E-04	39.2	-61.3	
17	76.50	28.13	0.005	1.04E-03	52.5	-38.5	
18	76.00	31.16	0.005	1.10E-03	67.4	-8.7	
		-48.24	0.005	1.10E-03	67.4	-8.7	
19	75.38	-39.20	0.004	1.07E-03	40.0	23.9	
20	74.75	-29.79	0.003	9.77E-04	18.5	41.2	
21	74.00	-19.30	0.003	8.10E-04	0.1	46.6	
22	73.50	-13.19	0.002	6.96E-04	-8.0	44.2	
23	73.20	-9.76	0.002	6.31E-04	-11.5	41.2	
24	72.60	-3.81	0.002	5.19E-04	-15.6	32.5	
25	72.00	1.15	0.002	4.36E-04	-16.4	22.4	
26	71.20	6.84	0.001	3.72E-04	-13.2	9.5	
27	70.60	10.92	0.001	3.53E-04	-7.8	2.8	
28	70.00	15.19	0.001	3.49E-04	0.0	0.0	

Strut force at elev. 84.40 = 28.42 kN/m run = 170.54 kN/strut

(continued)

Stage No.7 Excavate to elevation 81.50 on PASSIVE side

Node no.	Y coord	ACTIVE side						
		Effective stresses				Total earth pressure	Soil stiffness coeff.
		Water press. kN/m2	Vertic -al kN/m2	Active limit kN/m2	Passive limit kN/m2	Earth pressure kN/m2	kN/m2	kN/m3
1	84.40	0.00	0.00	0.00	0.00	0.00	0.00	0.0
2	84.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
		Total>	6.50	0.00	52.42	0.00	0.00a	3299
3	83.50	Total>	15.09	2.50m	61.00	2.50	2.50a	3299
4	83.00	Total>	23.98	5.00m	69.90	5.00	5.00a	3299
5	82.50	Total>	33.08	7.50m	79.00	7.50	7.50a	3299
6	82.00	Total>	42.21	10.00m	88.13	10.00	10.00a	3299
7	81.65	Total>	48.57	11.75m	94.50	11.75	11.75a	3299
8	81.50	Total>	51.29	12.50m	97.21	12.50	12.50a	3299
9	81.00	Total>	60.28	15.00m	106.21	15.00	15.00a	3299
10	80.25	Total>	73.61	27.70	119.54	27.70	27.70a	3299
11	79.50	Total>	86.75	40.83	132.68	40.83	40.83a	3299
12	78.90	Total>	97.14	51.22	143.07	51.22	51.22a	3299
13	78.45	Total>	104.86	58.94	150.80	58.94	58.94a	3299
14	78.00	Total>	112.54	66.62	158.47	66.62	66.62a	3299
15	77.50	Total>	121.02	75.10	166.96	75.10	75.10a	3299
16	77.00	Total>	129.46	83.54	175.40	83.54	83.54a	3299
17	76.50	Total>	137.87	91.94	183.80	91.94	91.94a	3299
18	76.00	Total>	146.24	100.32	192.18	100.32	100.32a	3299
		Total>	146.24	40.00m	274.30	55.44	55.44	9898
19	75.38	Total>	157.30	44.79	291.76	68.83	68.83	10392
20	74.75	Total>	168.34	50.47	309.20	82.40	82.40	10887
21	74.00	Total>	181.55	57.26	330.10	98.32	98.32	11481
22	73.50	Total>	190.35	61.77	344.02	108.51	108.51	11877
		Total>	190.35	52.50m	349.61	161.51	161.51	11877
23	73.20	Total>	195.93	54.00m	357.95	169.01	169.01	12084
24	72.60	Total>	207.08	57.00m	374.62	183.57	183.57	12497
25	72.00	Total>	218.23	60.00m	391.29	197.66	197.66	12910
26	71.20	Total>	233.10	64.00m	413.52	215.99	215.99	13460
27	70.60	Total>	244.25	67.00m	430.19	229.64	229.64	13873
28	70.00	Total>	255.40	70.00m	446.87	243.39	243.39	14286

Node no.	Y coord	PASSIVE side						
		Effective stresses				Total earth pressure	Soil stiffness coeff.
		Water press. kN/m2	Vertic -al kN/m2	Active limit kN/m2	Passive limit kN/m2	Earth pressure kN/m2	kN/m2	kN/m3
1	84.40	0.00	0.00	0.00	0.00	0.00	0.00	0.0
2	84.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
3	83.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
4	83.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
5	82.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
6	82.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
7	81.65	0.00	0.00	0.00	0.00	0.00	0.00	0.0
8	81.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
		Total>	0.00	0.00	45.91	14.90	14.90	3470
9	81.00	Total>	8.50	2.50m	54.42	16.46	16.46	3470
10	80.25	Total>	21.28	6.25m	67.20	24.47	24.47	3470
11	79.50	Total>	34.14	10.00m	80.06	29.21	29.21	3470
12	78.90	Total>	44.49	13.00m	90.41	35.27	35.27	3470
13	78.45	Total>	52.31	15.25m	98.23	41.17	41.17	3470
14	78.00	Total>	60.17	17.50m	106.09	46.78	46.78	3470
15	77.50	Total>	68.97	23.06	114.89	52.71	52.71	3470
16	77.00	Total>	77.82	31.91	123.74	58.37	58.37	3470

(continued)

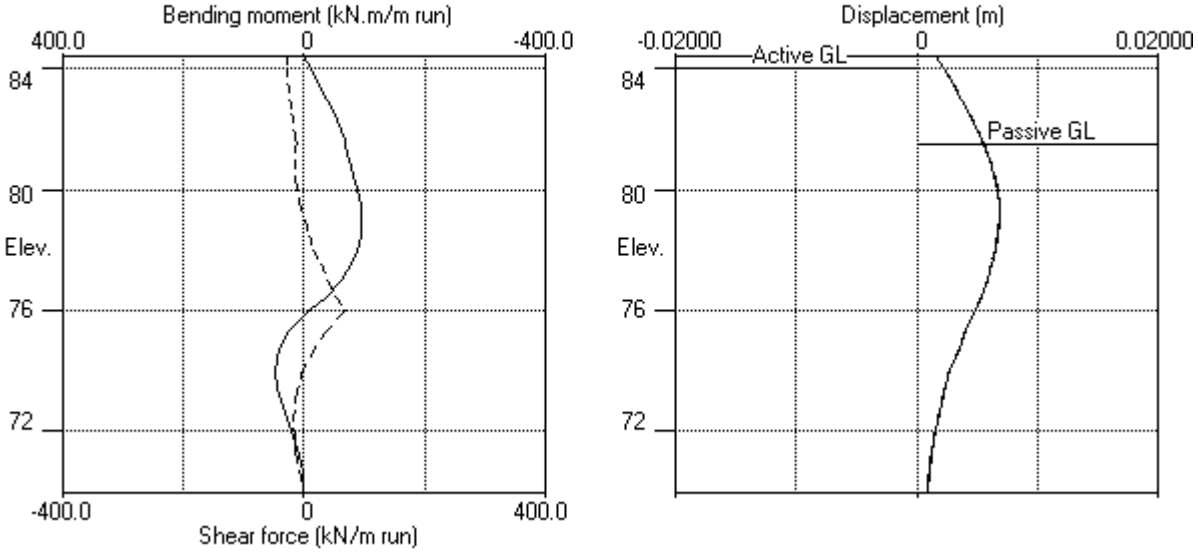
Stage No.7 Excavate to elevation 81.50 on PASSIVE side

Node no.	Y coord	PASSIVE side						
			Effective stresses				Total earth pressure	Soil stiffness coeff.
		Water press. kN/m2	Vertic -al kN/m2	Active limit kN/m2	Passive limit kN/m2	Earth pressure kN/m2	kN/m2	kN/m3
17	76.50	Total>	86.72	40.81	132.65	63.82	63.82	3470
18	76.00	Total>	95.68	49.77	141.61	69.15	69.15	3470
		Total>	95.68	27.50m	223.72	103.68	103.68	10411
19	75.38	Total>	107.57	30.63m	242.01	108.02	108.02	10932
20	74.75	Total>	119.52	33.75m	260.37	112.19	112.19	11452
21	74.00	Total>	133.92	37.50m	282.46	117.62	117.62	12077
22	73.50	Total>	143.56	40.00m	297.21	121.70	121.70	12494
		Total>	143.56	40.00m	302.81	174.70	174.70	12494
23	73.20	Total>	149.65	41.50m	311.66	178.77	178.77	12711
24	72.60	Total>	161.84	44.50m	329.37	187.39	187.39	13145
25	72.00	Total>	174.05	47.50m	347.10	196.51	196.51	13580
26	71.20	Total>	190.33	51.50m	370.74	209.15	209.15	14159
27	70.60	Total>	202.54	54.50m	388.47	218.72	218.72	14593
28	70.00	Total>	214.74	57.50m	406.19	228.20	228.20	15028

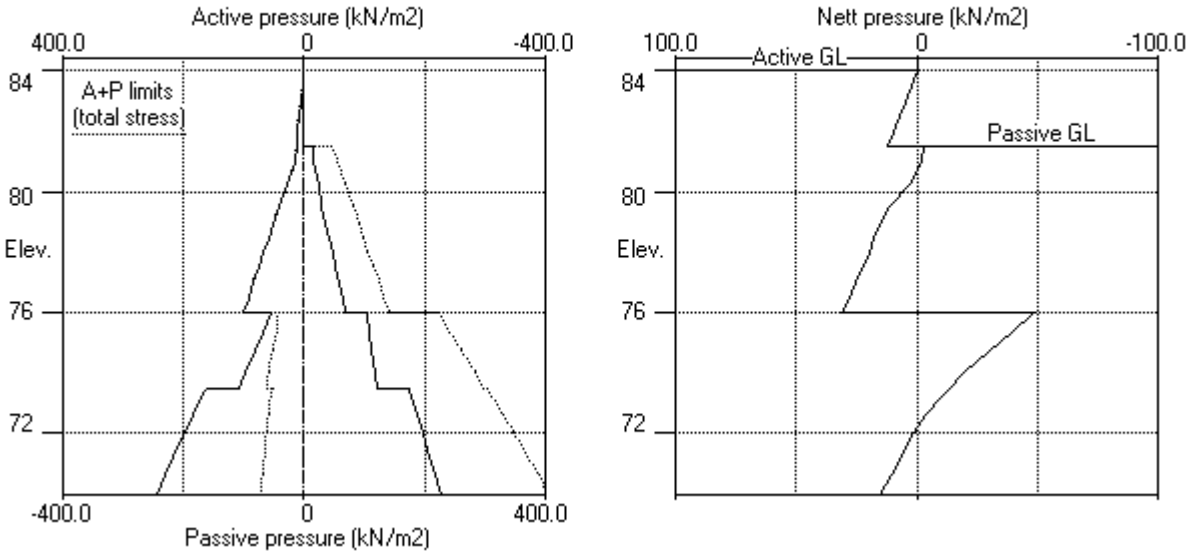
Note: 100.32a Soil pressure at active limit
123.45p Soil pressure at passive limit

Units: kN,m

Stage No.7 Excav. to elev. 81.50 on PASSIVE side

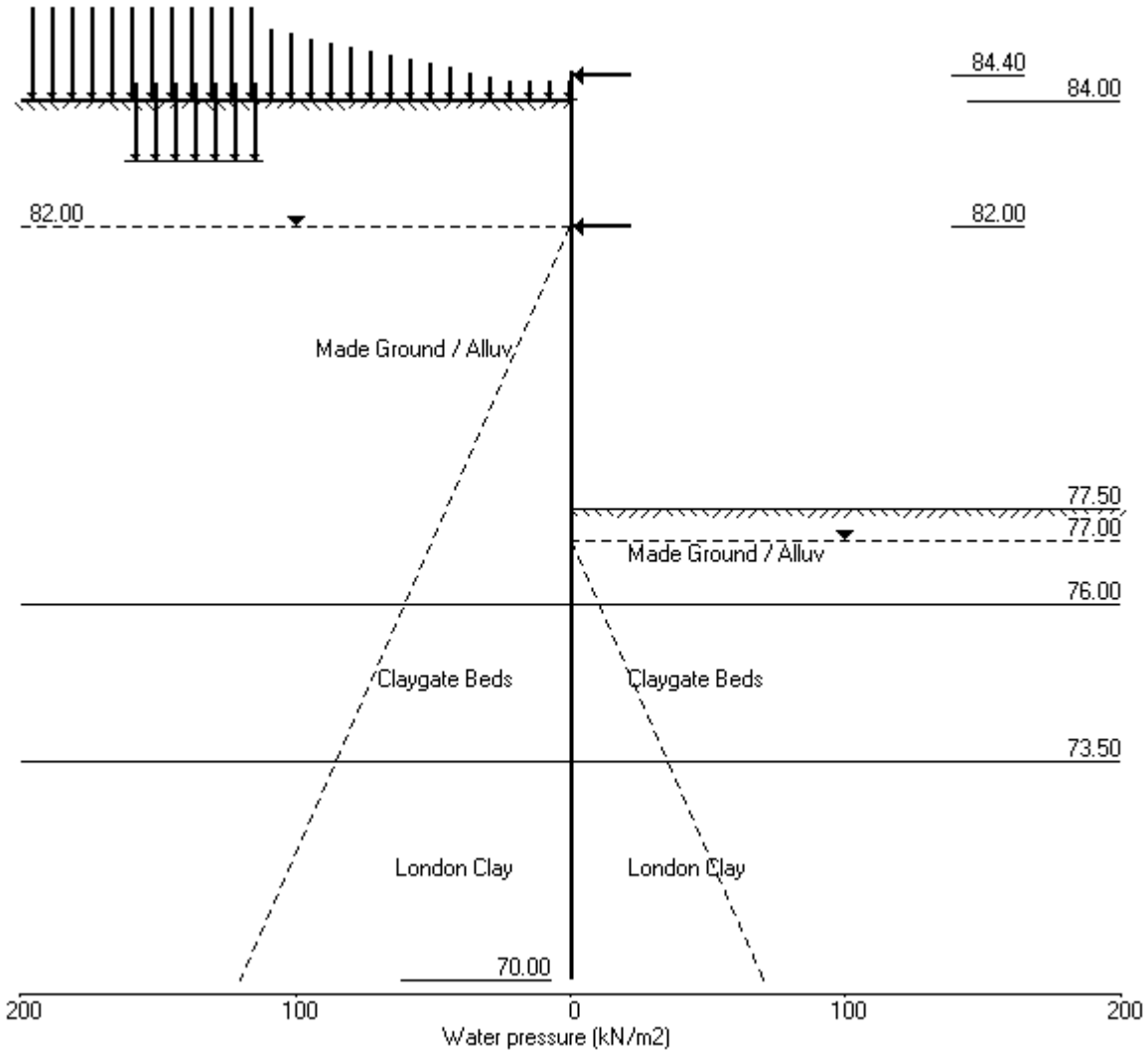


Stage No.7 Excav. to elev. 81.50 on PASSIVE side



Units: kN,m

Stage No.10 Excav. to elev. 77.50 on PASSIVE side



Units: kN,m

Stage No. 10 Excavate to elevation 77.50 on PASSIVE side

STABILITY ANALYSIS of Fully Embedded Wall according to Strength Factor method

Factor of safety on soil strength

Stage No.	--- G.L. --- Act.	Pass.	Strut Elev.	Overall FoS for toe elev. = 70.00 Factor of Safety	Moment equilib. at elev.	Toe elev. for FoS = 1.000 Toe elev.	Wall Penetr -ation
10	84.00	77.50		More than one strut			

BENDING MOMENT and DISPLACEMENT ANALYSIS of Fully Embedded Wall

Analysis options

Length of wall perpendicular to section = 6.00m
Subgrade reaction model - Boussinesq Influence coefficients
Soil deformations are elastic until the active or passive limit is reached
Open Tension Crack analysis - No

Rigid boundaries: Active side 20.00 from wall
Passive side 20.00 from wall

Limit State: ULS DA1 Combination 2

Node no.	Y coord	Nett pressure kN/m2	Wall disp. m	Wall rotation rad.	Shear force kN/m	Bending moment kN.m/m	Strut forces kN/m
1	84.40	0.00	0.000	-2.70E-03	0.0	-0.0	-0.0
2	84.00	0.00	0.001	-2.70E-03	0.0	-0.0	
		15.16	0.001	-2.70E-03	0.0	-0.0	
3	83.50	5.54	0.003	-2.70E-03	5.2	2.0	
4	83.00	5.00	0.004	-2.71E-03	7.8	5.4	
5	82.50	7.50	0.006	-2.73E-03	10.9	10.0	
6	82.00	10.00	0.007	-2.77E-03	15.3	16.5	126.1
		10.00	0.007	-2.77E-03	-110.8	16.5	
7	81.65	11.75	0.008	-2.76E-03	-107.0	-21.6	
8	81.50	12.50	0.008	-2.74E-03	-105.2	-37.5	
9	81.00	15.00	0.010	-2.58E-03	-98.3	-88.3	
10	80.25	27.70	0.011	-2.12E-03	-82.3	-156.5	
11	79.50	40.83	0.013	-1.42E-03	-56.6	-209.1	
12	78.90	51.22	0.013	-7.54E-04	-29.0	-235.1	
13	78.45	58.94	0.014	-2.11E-04	-4.2	-242.7	
14	78.00	66.62	0.014	3.34E-04	24.1	-238.4	
15	77.50	75.10	0.013	9.11E-04	59.5	-217.7	
		45.15	0.013	9.11E-04	59.5	-217.7	
16	77.00	54.34	0.013	1.41E-03	84.4	-182.1	
17	76.50	59.13	0.012	1.81E-03	112.7	-133.0	
18	76.00	66.89	0.011	2.06E-03	144.2	-69.1	
		-73.25	0.011	2.06E-03	144.2	-69.1	
19	75.38	-67.63	0.010	2.16E-03	100.2	6.2	
20	74.75	-59.72	0.008	2.07E-03	60.4	55.0	
21	74.00	-50.25	0.007	1.81E-03	19.2	82.6	
22	73.50	-40.48	0.006	1.59E-03	-3.5	87.6	
23	73.20	-31.60	0.005	1.46E-03	-14.3	84.7	
24	72.60	-15.81	0.005	1.23E-03	-28.5	70.3	
25	72.00	-2.31	0.004	1.04E-03	-34.0	50.2	
26	71.20	13.35	0.003	9.02E-04	-29.6	22.1	
27	70.60	24.54	0.003	8.58E-04	-18.2	6.6	

(continued)

Stage No.10 Excavate to elevation 77.50 on PASSIVE side

Node no.	Y coord	Nett pressure kN/m2	Wall disp. m	Wall rotation rad.	Shear force kN/m	Bending moment kN.m/m	Strut forces kN/m
28	70.00	36.11	0.002	8.48E-04	0.0	0.0	

The strut at elev. 84.40 is slack
Strut force at elev. 82.00 = 126.11 kN/m run = 756.67 kN/strut

Node no.	Y coord	ACTIVE side: Water press. kN/m2	Effective stresses: Vertic -al kN/m2	Active limit kN/m2	Passive limit kN/m2	Earth pressure kN/m2	Total earth pressure kN/m2	Soil stiffness coeff. kN/m3
1	84.40	0.00	0.00	0.00	0.00	0.00	0.00	0.0
2	84.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
		Total> 6.50	0.00	52.42	15.16	15.16		20844
3	83.50	Total> 15.09	2.50m	61.00	5.54	5.54		20844
4	83.00	Total> 23.98	5.00m	69.90	5.00	5.00a		3368
5	82.50	Total> 33.08	7.50m	79.00	7.50	7.50a		3368
6	82.00	Total> 42.21	10.00m	88.13	10.00	10.00a		3368
7	81.65	Total> 48.57	11.75m	94.49	11.75	11.75a		3368
8	81.50	Total> 51.29	12.50m	97.21	12.50	12.50a		3368
9	81.00	Total> 60.28	15.00m	106.21	15.00	15.00a		3368
10	80.25	Total> 73.61	27.70	119.54	27.70	27.70a		3368
11	79.50	Total> 86.75	40.83	132.68	40.83	40.83a		3368
12	78.90	Total> 97.14	51.22	143.07	51.22	51.22a		3368
13	78.45	Total> 104.86	58.94	150.79	58.94	58.94a		3368
14	78.00	Total> 112.54	66.62	158.47	66.62	66.62a		3368
15	77.50	Total> 121.02	75.10	166.96	75.10	75.10a		3368
16	77.00	Total> 129.46	83.54	175.40	83.54	83.54a		3368
17	76.50	Total> 137.87	91.94	183.80	91.94	91.94a		3368
18	76.00	Total> 146.24	100.32	192.18	100.32	100.32a		3368
		Total> 146.24	40.00m	274.29	40.00	40.00a		10103
19	75.38	Total> 157.30	44.80	291.76	44.80	44.80a		10608
20	74.75	Total> 168.34	50.47	309.20	50.47	50.47a		11113
21	74.00	Total> 181.55	57.26	330.10	57.26	57.26a		11720
22	73.50	Total> 190.35	61.77	344.02	65.97	65.97		12124
		Total> 190.35	52.50m	349.61	118.97	118.97		12124
23	73.20	Total> 195.93	54.00m	357.95	128.93	128.93		12335
24	72.60	Total> 207.08	57.00m	374.62	148.01	148.01		12756
25	72.00	Total> 218.23	60.00m	391.29	166.12	166.12		13178
26	71.20	Total> 233.10	64.00m	413.52	189.30	189.30		13740
27	70.60	Total> 244.25	67.00m	430.19	206.50	206.50		14161
28	70.00	Total> 255.40	70.00m	446.87	223.94	223.94		14583

Node no.	Y coord	PASSIVE side: Water press. kN/m2	Effective stresses: Vertic -al kN/m2	Active limit kN/m2	Passive limit kN/m2	Earth pressure kN/m2	Total earth pressure kN/m2	Soil stiffness coeff. kN/m3
1	84.40	0.00	0.00	0.00	0.00	0.00	0.00	0.0
2	84.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
3	83.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
4	83.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
5	82.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
6	82.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
7	81.65	0.00	0.00	0.00	0.00	0.00	0.00	0.0
8	81.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
9	81.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
10	80.25	0.00	0.00	0.00	0.00	0.00	0.00	0.0

(continued)

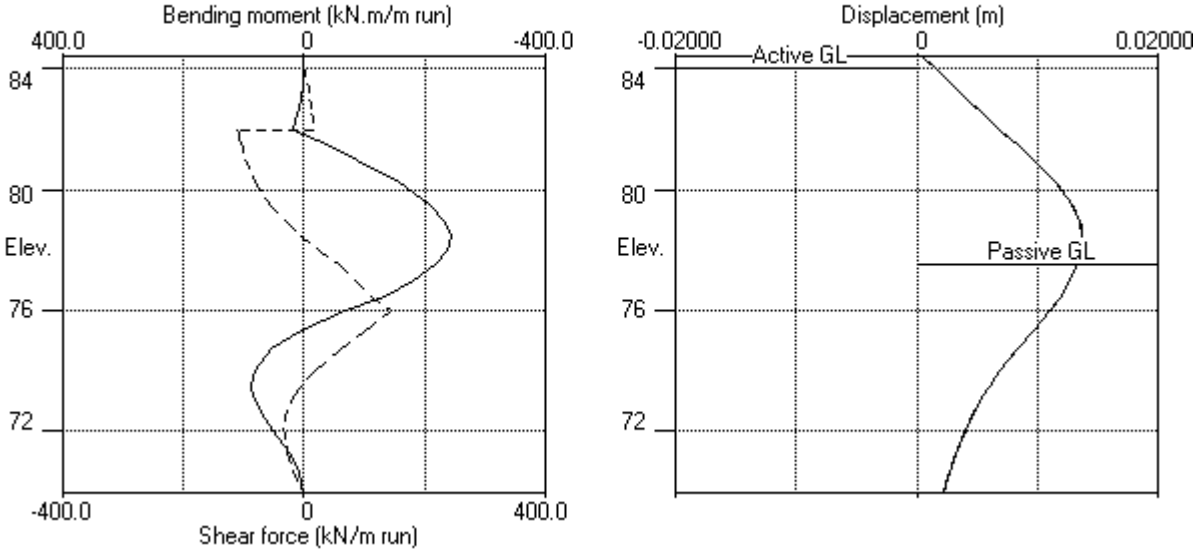
Stage No.10 Excavate to elevation 77.50 on PASSIVE side

Node no.	Y coord	PASSIVE side						
		Effective stresses					Total earth pressure	Soil stiffness coeff.
		Water press.	Vertic -al	Active limit	Passive limit	Earth pressure		
		kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m3
11	79.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
12	78.90	0.00	0.00	0.00	0.00	0.00	0.00	0.0
13	78.45	0.00	0.00	0.00	0.00	0.00	0.00	0.0
14	78.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
15	77.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
		Total>	0.00	0.00	45.91	29.95	29.95	4263
16	77.00	Total>	8.51	2.50m	54.42	29.20	29.20	4263
17	76.50	Total>	17.05	5.00m	62.96	32.81	32.81	4263
18	76.00	Total>	25.65	7.50m	71.57	33.42	33.42	4263
		Total>	25.65	7.50m	153.69	113.25	113.25	12788
19	75.38	Total>	37.18	10.63m	171.62	112.43	112.43	13427
20	74.75	Total>	48.89	13.75m	189.74	110.19	110.19	14066
21	74.00	Total>	63.25	17.50m	211.78	107.51	107.51	14834
22	73.50	Total>	73.01	20.00m	226.66	106.44	106.44	15345
		Total>	73.01	20.00m	232.25	159.44	159.44	15345
23	73.20	Total>	79.24	21.50m	241.24	160.53	160.53	15612
24	72.60	Total>	91.85	24.50m	259.38	163.82	163.82	16145
25	72.00	Total>	104.67	27.50m	277.71	168.43	168.43	16679
26	71.20	Total>	122.02	31.50m	302.43	175.95	175.95	17390
27	70.60	Total>	135.20	34.50m	321.13	181.97	181.97	17924
28	70.00	Total>	148.50	37.50m	339.95	187.83	187.83	18458

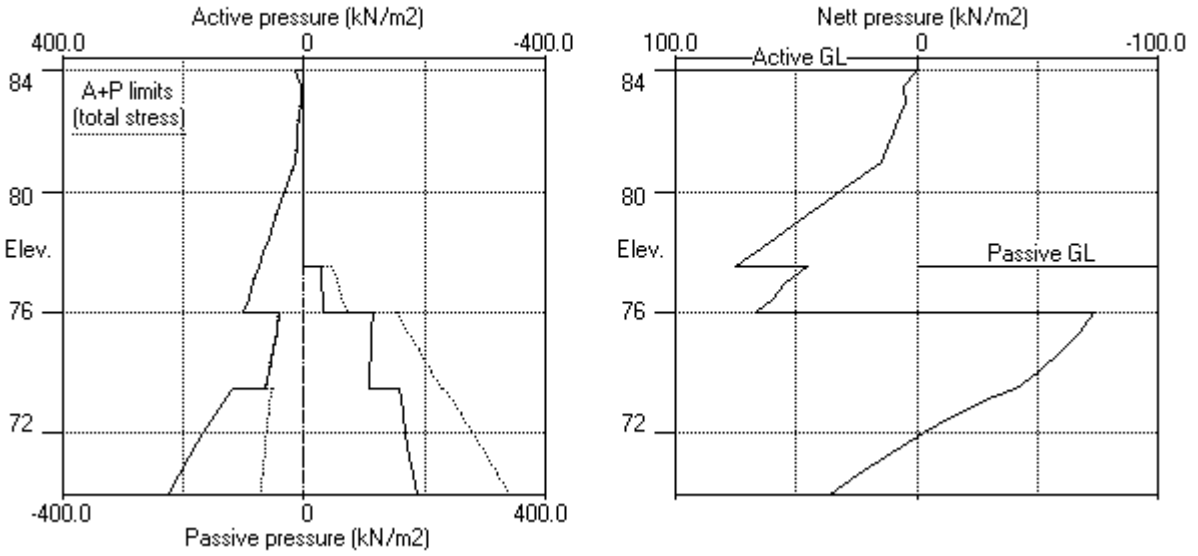
Note: 57.26a Soil pressure at active limit
123.45p Soil pressure at passive limit

Units: kN,m

Stage No.10 Excav. to elev. 77.50 on PASSIVE side

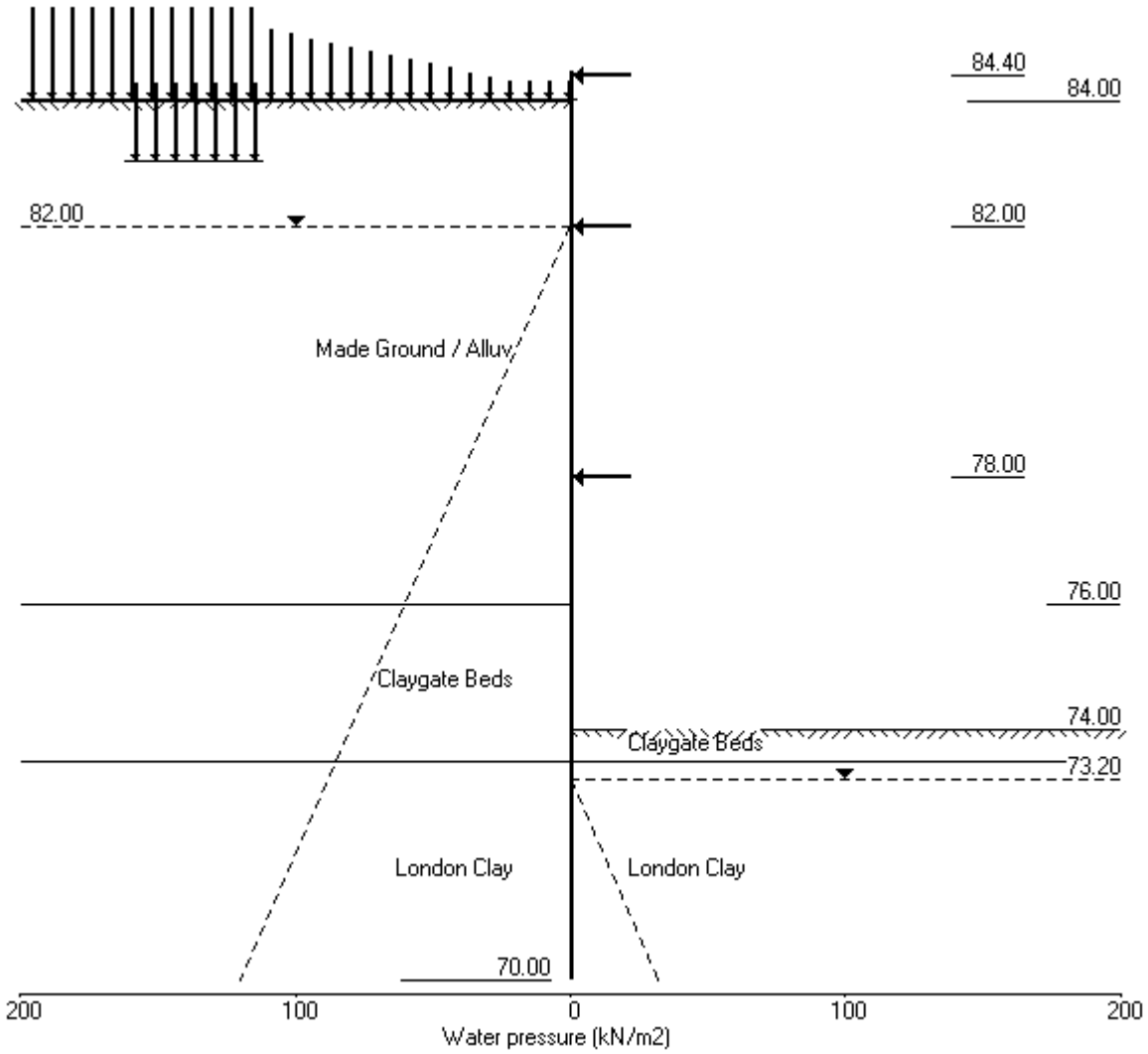


Stage No.10 Excav. to elev. 77.50 on PASSIVE side



Units: kN,m

Stage No.13 Excav. to elev. 74.00 on PASSIVE side



Units: kN,m

Stage No. 13 Excavate to elevation 74.00 on PASSIVE side

STABILITY ANALYSIS of Fully Embedded Wall according to Strength Factor method

Factor of safety on soil strength

Stage No.	--- G.L. --- Act.	Pass.	Strut Elev.	Overall FoS for toe elev. = 70.00 Factor of Safety	Moment equilib. at elev.	Toe elev. for FoS = 1.000 Toe elev.	Wall Penetr -ation
13	84.00	74.00		More than one strut			

BENDING MOMENT and DISPLACEMENT ANALYSIS of Fully Embedded Wall

Analysis options

Length of wall perpendicular to section = 6.00m
Subgrade reaction model - Boussinesq Influence coefficients
Soil deformations are elastic until the active or passive limit is reached
Open Tension Crack analysis - No

Rigid boundaries: Active side 20.00 from wall
Passive side 20.00 from wall

Limit State: ULS DA1 Combination 2

Node no.	Y coord	Nett pressure kN/m2	Wall disp. m	Wall rotation rad.	Shear force kN/m	Bending moment kN.m/m	Strut forces kN/m
1	84.40	0.00	0.000	-2.47E-03	0.0	-0.0	-0.0
2	84.00	0.00	0.001	-2.47E-03	0.0	-0.0	
		15.16	0.001	-2.47E-03	0.0	-0.0	
3	83.50	6.08	0.003	-2.47E-03	5.3	2.0	
4	83.00	6.05	0.004	-2.48E-03	8.3	5.5	
5	82.50	9.07	0.005	-2.50E-03	12.1	10.6	
6	82.00	12.09	0.006	-2.54E-03	17.4	17.9	95.6
		12.09	0.006	-2.54E-03	-78.1	17.9	
7	81.65	14.19	0.007	-2.55E-03	-73.5	-8.7	
8	81.50	15.08	0.008	-2.54E-03	-71.3	-19.6	
9	81.00	17.97	0.009	-2.45E-03	-63.1	-53.2	
10	80.25	30.83	0.011	-2.17E-03	-44.8	-94.1	
11	79.50	43.33	0.012	-1.77E-03	-17.0	-117.7	
12	78.90	52.36	0.013	-1.41E-03	11.7	-119.5	
13	78.45	58.94	0.014	-1.15E-03	36.8	-108.7	
14	78.00	66.62	0.014	-9.31E-04	65.0	-85.9	200.4
		66.62	0.014	-9.31E-04	-135.3	-85.9	
15	77.50	75.10	0.015	-6.39E-04	-99.9	-144.9	
16	77.00	83.54	0.015	-2.22E-04	-60.2	-185.3	
17	76.50	91.94	0.015	2.69E-04	-16.4	-204.7	
18	76.00	100.32	0.015	7.82E-04	31.7	-201.2	
		40.00	0.015	7.82E-04	31.7	-201.2	
19	75.38	44.80	0.014	1.37E-03	58.2	-174.2	
20	74.75	50.47	0.013	1.85E-03	88.0	-129.8	
21	74.00	57.26	0.011	2.19E-03	128.4	-50.8	
		-66.46	0.011	2.19E-03	128.4	-50.8	
22	73.50	-57.89	0.010	2.25E-03	97.3	6.6	
		-105.83	0.010	2.25E-03	97.3	6.6	
23	73.20	-96.32	0.010	2.22E-03	67.0	32.1	
24	72.60	-67.79	0.008	2.09E-03	17.7	54.9	
25	72.00	-39.36	0.007	1.92E-03	-14.4	53.3	

(continued)

Stage No.13 Excavate to elevation 74.00 on PASSIVE side

Node no.	Y coord	Nett pressure kN/m2	Wall disp. m	Wall rotation rad.	Shear force kN/m	Bending moment kN.m/m	Strut forces kN/m
26	71.20	-2.29	0.006	1.76E-03	-31.1	29.1	
27	70.60	25.64	0.005	1.70E-03	-24.1	9.9	
28	70.00	54.60	0.004	1.68E-03	0.0	0.0	

The strut at elev. 84.40 is slack
Strut force at elev. 82.00 = 95.55 kN/m run = 573.32 kN/strut
Strut force at elev. 78.00 = 200.35 kN/m run = 1202.11 kN/strut

ACTIVE side

Node no.	Y coord	Effective stresses: Water press. kN/m2	Vertic -al kN/m2	Active limit kN/m2	Passive limit kN/m2	Earth pressure kN/m2	Total earth pressure kN/m2	Soil stiffness coeff. kN/m3
1	84.40	0.00	0.00	0.00	0.00	0.00	0.00	0.0
2	84.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
		Total> 6.50	0.00	52.42	15.16	15.16		4552
3	83.50	Total> 15.09	2.50m	61.00	6.08	6.08		4552
4	83.00	Total> 23.98	5.00m	69.90	6.05	6.05		4552
5	82.50	Total> 33.08	7.50m	79.00	9.07	9.07		4552
6	82.00	Total> 42.21	10.00m	88.13	12.09	12.09		4552
7	81.65	Total> 48.57	11.75m	94.49	14.19	14.19		4552
8	81.50	Total> 51.29	12.50m	97.21	15.08	15.08		4552
9	81.00	Total> 60.28	15.00m	106.21	17.97	17.97		4552
10	80.25	Total> 73.61	27.70	119.54	30.83	30.83		4552
11	79.50	Total> 86.75	40.83	132.68	43.33	43.33		4552
12	78.90	Total> 97.14	51.22	143.07	52.36	52.36		4552
13	78.45	Total> 104.86	58.94	150.79	58.94	58.94a		3681
14	78.00	Total> 112.54	66.62	158.47	66.62	66.62a		3681
15	77.50	Total> 121.02	75.10	166.96	75.10	75.10a		3681
16	77.00	Total> 129.46	83.54	175.40	83.54	83.54a		3681
17	76.50	Total> 137.87	91.94	183.80	91.94	91.94a		3681
18	76.00	Total> 146.24	100.32	192.18	100.32	100.32a		3681
		Total> 146.24	40.00m	274.29	40.00	40.00a		11044
19	75.38	Total> 157.30	44.80	291.76	44.80	44.80a		11596
20	74.75	Total> 168.34	50.47	309.20	50.47	50.47a		12149
21	74.00	Total> 181.55	57.26	330.10	57.26	57.26a		12811
22	73.50	Total> 190.35	61.77	344.02	61.77	61.77a		13253
		Total> 190.35	52.50m	349.61	62.41	62.41		13253
23	73.20	Total> 195.93	54.00m	357.95	74.26	74.26		13484
24	72.60	Total> 207.08	57.00m	374.62	98.33	98.33		13944
25	72.00	Total> 218.23	60.00m	391.29	122.36	122.36		14405
26	71.20	Total> 233.10	64.00m	413.52	154.14	154.14		15020
27	70.60	Total> 244.25	67.00m	430.19	178.16	178.16		15481
28	70.00	Total> 255.40	70.00m	446.87	202.79	202.79		15941

PASSIVE side

Node no.	Y coord	Effective stresses: Water press. kN/m2	Vertic -al kN/m2	Active limit kN/m2	Passive limit kN/m2	Earth pressure kN/m2	Total earth pressure kN/m2	Soil stiffness coeff. kN/m3
1	84.40	0.00	0.00	0.00	0.00	0.00	0.00	0.0
2	84.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
3	83.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
4	83.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
5	82.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
6	82.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
7	81.65	0.00	0.00	0.00	0.00	0.00	0.00	0.0

(continued)

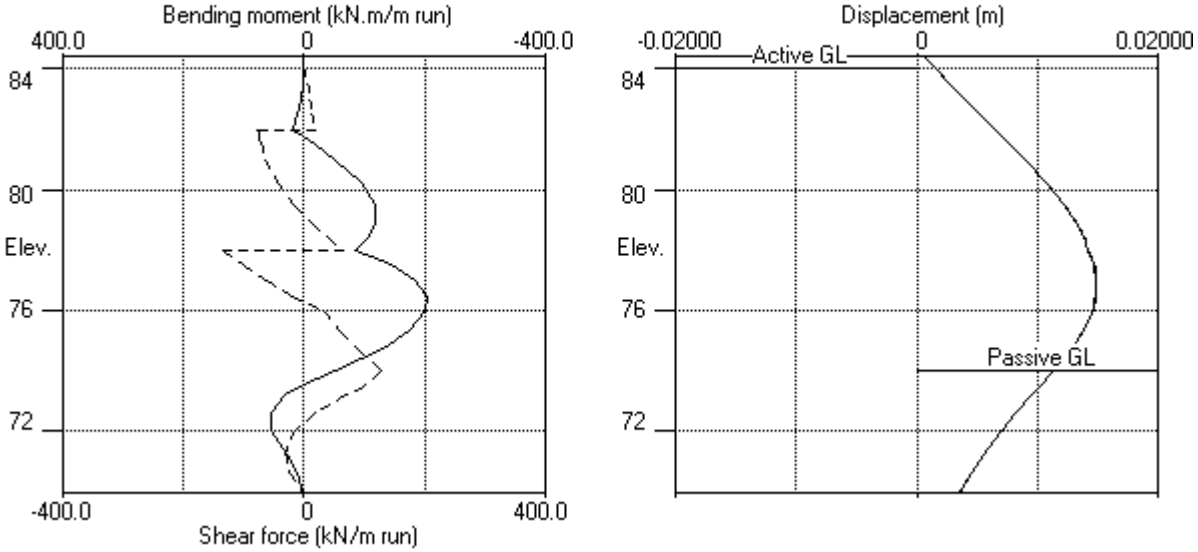
Stage No.13 Excavate to elevation 74.00 on PASSIVE side

Node no.	Y coord	PASSIVE side						
			Effective stresses				Total earth	Soil stiffness
		Water press.	Vertic -al	Active limit	Passive limit	Earth pressure	pressure	coeff.
		kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m3
8	81.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
9	81.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
10	80.25	0.00	0.00	0.00	0.00	0.00	0.00	0.0
11	79.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
12	78.90	0.00	0.00	0.00	0.00	0.00	0.00	0.0
13	78.45	0.00	0.00	0.00	0.00	0.00	0.00	0.0
14	78.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
15	77.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
16	77.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
17	76.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
18	76.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
19	75.38	0.00	0.00	0.00	0.00	0.00	0.00	0.0
20	74.75	0.00	0.00	0.00	0.00	0.00	0.00	0.0
21	74.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
		Total>	0.00	0.00	148.52	123.72	123.72	17286
22	73.50	Total>	9.01	2.50m	162.65	119.66	119.66	17882
		Total>	9.01	2.50m	168.24	168.24	168.24p	17882
23	73.20	Total>	14.74	4.00m	176.73	170.58	170.58	18193
24	72.60	Total>	26.30	7.00m	193.81	166.12	166.12	18815
25	72.00	Total>	38.06	10.00m	211.09	161.72	161.72	19436
26	71.20	Total>	54.16	14.00m	234.56	156.42	156.42	20266
27	70.60	Total>	66.62	17.00m	252.54	152.53	152.53	20887
28	70.00	Total>	79.41	20.00m	270.85	148.19	148.19	21509

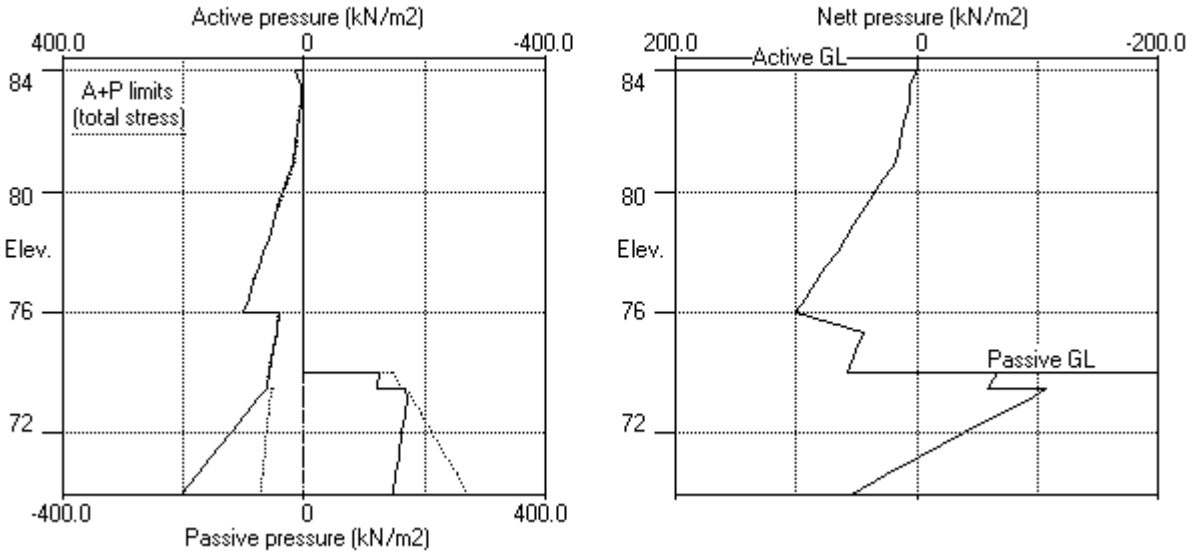
Note: 61.77a Soil pressure at active limit
168.24p Soil pressure at passive limit

Units: kN,m

Stage No.13 Excav. to elev. 74.00 on PASSIVE side

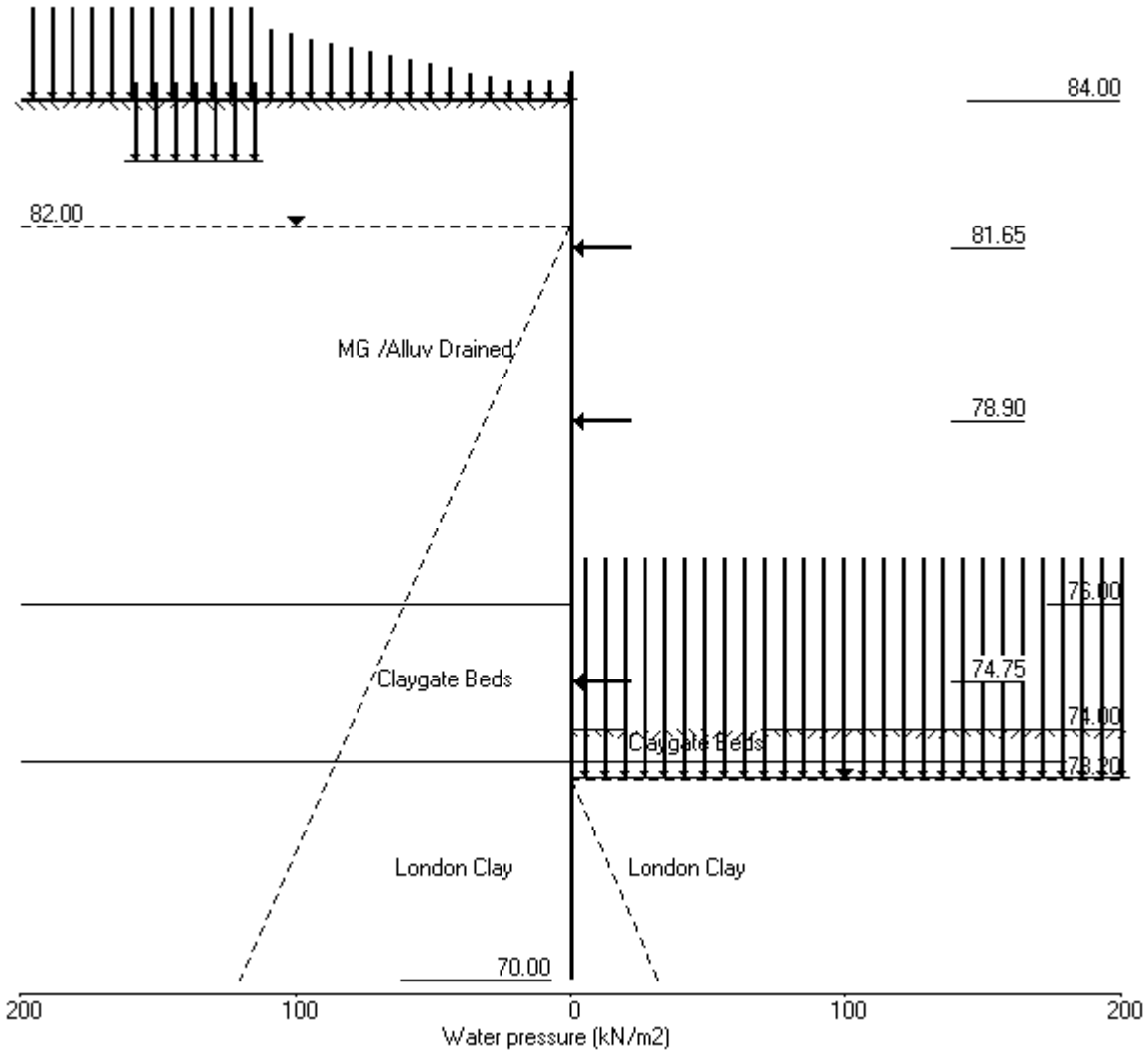


Stage No.13 Excav. to elev. 74.00 on PASSIVE side



Units: kN,m

Stage No.23 Change soil type 1 to soil type 4



Units: kN,m

Stage No. 23 Change properties of soil type 1 to soil type 4
Ko pressures will be reset

STABILITY ANALYSIS of Fully Embedded Wall according to Strength Factor method
Factor of safety on soil strength

Stage No.	--- G.L. --- Act.	Pass.	Strut Elev.	Overall FoS for toe elev. = 70.00 Factor of Safety	Moment equilib. at elev.	Toe elev. for FoS = 1.000 Toe elev.	Wall Penetr -ation
23	84.00	74.00		More than one strut			

BENDING MOMENT and DISPLACEMENT ANALYSIS of Fully Embedded Wall
Analysis options
Length of wall perpendicular to section = 6.00m
Subgrade reaction model - Boussinesq Influence coefficients
Soil deformations are elastic until the active or passive limit is reached
Open Tension Crack analysis - No

Rigid boundaries: Active side 20.00 from wall
Passive side 20.00 from wall
Limit State: ULS DA1 Combination 2

Node no.	Y coord	Nett pressure kN/m2	Wall disp. m	Wall rotation rad.	Shear force kN/m	Bending moment kN.m/m	Strut forces kN/m
1	84.40	0.00	0.000	-2.47E-03	0.0	-0.0	
2	84.00	0.00	0.001	-2.47E-03	0.0	-0.0	
		14.74	0.001	-2.47E-03	0.0	-0.0	
3	83.50	7.63	0.003	-2.47E-03	5.6	2.0	
4	83.00	12.38	0.004	-2.48E-03	10.6	6.1	
5	82.50	17.23	0.005	-2.51E-03	18.0	13.1	
6	82.00	22.08	0.006	-2.55E-03	27.8	24.4	
7	81.65	27.20	0.007	-2.61E-03	36.4	35.6	134.6
		27.20	0.007	-2.61E-03	-98.2	35.6	
8	81.50	29.38	0.008	-2.63E-03	-93.9	21.2	
9	81.00	36.62	0.009	-2.63E-03	-77.4	-21.7	
10	80.25	47.40	0.011	-2.46E-03	-45.9	-68.3	
11	79.50	58.10	0.013	-2.16E-03	-6.4	-88.1	
12	78.90	66.60	0.014	-1.90E-03	31.1	-81.0	203.2
		66.60	0.014	-1.90E-03	-172.2	-81.0	
13	78.45	72.92	0.015	-1.64E-03	-140.8	-151.5	
14	78.00	79.20	0.015	-1.23E-03	-106.5	-207.3	
15	77.50	86.17	0.016	-6.58E-04	-65.2	-250.5	
16	77.00	93.13	0.016	1.78E-06	-20.4	-272.1	
17	76.50	100.09	0.016	6.87E-04	27.9	-270.5	
18	76.00	107.06	0.015	1.33E-03	79.7	-243.9	
		48.62	0.015	1.33E-03	79.7	-243.9	
19	75.38	52.99	0.014	2.01E-03	111.5	-185.3	
20	74.75	58.47	0.013	2.47E-03	146.3	-105.7	69.6
		58.47	0.013	2.47E-03	76.7	-105.7	
21	74.00	72.01	0.011	2.73E-03	125.6	-32.9	
		-53.21	0.011	2.73E-03	125.6	-32.9	
22	73.50	-30.71	0.010	2.74E-03	104.6	24.8	
		-78.66	0.010	2.74E-03	104.6	24.8	
23	73.20	-61.61	0.009	2.68E-03	83.6	53.7	
		-128.87	0.009	2.68E-03	83.6	53.7	

(continued)

Stage No.23 Change properties of soil type 1 to soil type 4
Ko pressures will be reset

Node no.	Y coord	Nett pressure kN/m2	Wall disp. m	Wall rotation rad.	Shear force kN/m	Bending moment kN.m/m	Strut forces kN/m
24	72.60	-89.00	0.007	2.48E-03	18.2	80.6	
25	72.00	-50.82	0.006	2.24E-03	-23.7	75.5	
26	71.20	-1.06	0.004	2.01E-03	-44.5	40.4	
27	70.60	36.66	0.003	1.93E-03	-33.8	13.6	
28	70.00	75.98	0.002	1.91E-03	0.0	-0.0	

Strut force at elev. 81.65 = 134.62 kN/m run = 134.62 kN/strut
Strut force at elev. 78.90 = 203.21 kN/m run = 203.21 kN/strut
Strut force at elev. 74.75 = 69.63 kN/m run = 69.63 kN/strut

Node no.	Y coord	ACTIVE side: Effective stresses: Water press. kN/m2	Vertic -al kN/m2	Active limit kN/m2	Passive limit kN/m2	Earth pressure kN/m2	Total earth pressure kN/m2	Soil stiffness coeff. kN/m3
1	84.40	0.00	0.00	0.00	0.00	0.00	0.00	0.0
2	84.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
		0.00	6.50	2.58	17.95	14.74	14.74	2505
3	83.50	0.00	15.59	6.19	43.04	7.63	7.63	2505
4	83.00	0.00	24.98	9.92	68.99	12.38	12.38	2505
5	82.50	0.00	34.58	13.73	95.48	17.23	17.23	2505
6	82.00	0.00	44.21	17.56	122.07	22.08	22.08	2505
7	81.65	3.50	47.42	18.83	130.95	23.70	27.20	2505
8	81.50	5.00	48.79	19.38	134.72	24.38	29.38	2505
9	81.00	10.00	53.28	21.16	147.14	26.62	36.62	2505
10	80.25	17.50	59.86	23.78	165.31	29.90	47.40	2505
11	79.50	25.00	66.25	26.31	182.95	33.10	58.10	2505
12	78.90	31.00	71.24	28.29	196.71	35.60	66.60	2505
13	78.45	35.50	74.91	29.75	206.86	37.42	72.92	2505
14	78.00	40.00	78.54	31.19	216.88	39.20	79.20	2505
15	77.50	45.00	82.52	32.78	227.88	41.17	86.17	2505
16	77.00	50.00	86.46	34.34	238.76	43.13	93.13	2505
17	76.50	55.00	90.37	35.89	249.54	45.09	100.09	2505
18	76.00	60.00	94.24	37.43	260.24	47.06	107.06	2505
		Total> 154.24	47.09	282.30	48.62	48.62	16118	
19	75.38	Total> 165.30	52.79	299.76	52.99	52.99	16923	
20	74.75	Total> 176.34	58.47	317.20	58.47	58.47a	17729	
21	74.00	Total> 189.55	65.26	338.10	72.01	72.01	18696	
22	73.50	Total> 198.35	69.77	352.02	80.95	80.95	19341	
		Total> 198.35	52.50m	357.61	81.58	81.58	19341	
23	73.20	Total> 203.93	54.00m	365.95	96.01	96.01	19677	
24	72.60	Total> 215.08	57.00m	382.62	125.15	125.15	20350	
25	72.00	Total> 226.23	60.00m	399.29	153.75	153.75	21022	
26	71.20	Total> 241.10	64.00m	421.52	190.82	190.82	21919	
27	70.60	Total> 252.25	67.00m	438.19	218.50	218.50	22592	
28	70.00	Total> 263.40	71.99	454.87	246.78	246.78	23264	

Node no.	Y coord	PASSIVE side: Effective stresses: Water press. kN/m2	Vertic -al kN/m2	Active limit kN/m2	Passive limit kN/m2	Earth pressure kN/m2	Total earth pressure kN/m2	Soil stiffness coeff. kN/m3
1	84.40	0.00	0.00	0.00	0.00	0.00	0.00	0.0
2	84.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
3	83.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
4	83.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0

(continued)

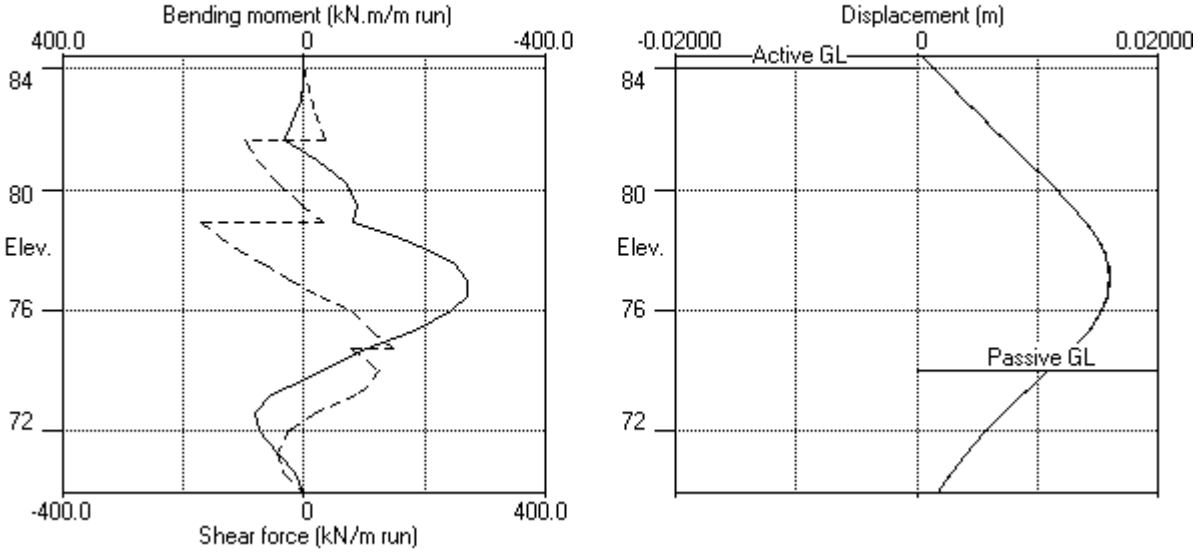
Stage No.23 Change properties of soil type 1 to soil type 4
Ko pressures will be reset

Node no.	Y coord	PASSIVE side						
		Effective stresses				Total earth pressure	Soil stiffness coeff.
		Water press. kN/m2	Vertic -al kN/m2	Active limit kN/m2	Passive limit kN/m2	Earth pressure kN/m2	kN/m2	kN/m3
5	82.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
6	82.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
7	81.65	0.00	0.00	0.00	0.00	0.00	0.00	0.0
8	81.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
9	81.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
10	80.25	0.00	0.00	0.00	0.00	0.00	0.00	0.0
11	79.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
12	78.90	0.00	0.00	0.00	0.00	0.00	0.00	0.0
13	78.45	0.00	0.00	0.00	0.00	0.00	0.00	0.0
14	78.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
15	77.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
16	77.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
17	76.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
18	76.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
19	75.38	0.00	0.00	0.00	0.00	0.00	0.00	0.0
20	74.75	0.00	0.00	0.00	0.00	0.00	0.00	0.0
21	74.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
		Total> 0.00	0.00	148.52	125.22	125.22		18696
22	73.50	Total> 9.01	2.50m	162.65	111.66	111.66		19341
		Total> 9.01	2.50m	168.24	160.24	160.24		19341
23	73.20	Total> 14.74	4.00m	176.73	157.62	157.62		19677
		Total> 84.74	4.00m	246.75	224.88	224.88		19677
24	72.60	Total> 96.19	7.00m	263.73	214.16	214.16		20350
25	72.00	Total> 107.31	10.00m	280.37	204.57	204.57		21022
26	71.20	Total> 121.23	14.00m	301.65	191.88	191.88		21919
27	70.60	Total> 131.10	17.00m	317.03	181.84	181.84		22592
28	70.00	Total> 140.73	20.00m	332.19	170.80	170.80		23264

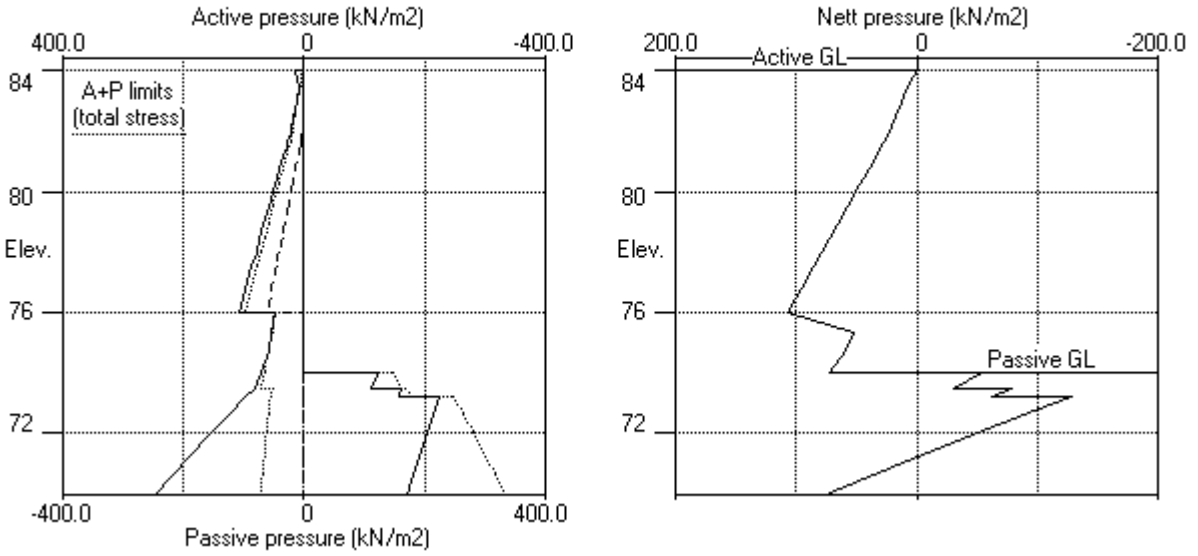
Note: 58.47a Soil pressure at active limit
123.45p Soil pressure at passive limit

Units: kN,m

Stage No.23 Change soil type 1 to soil type 4

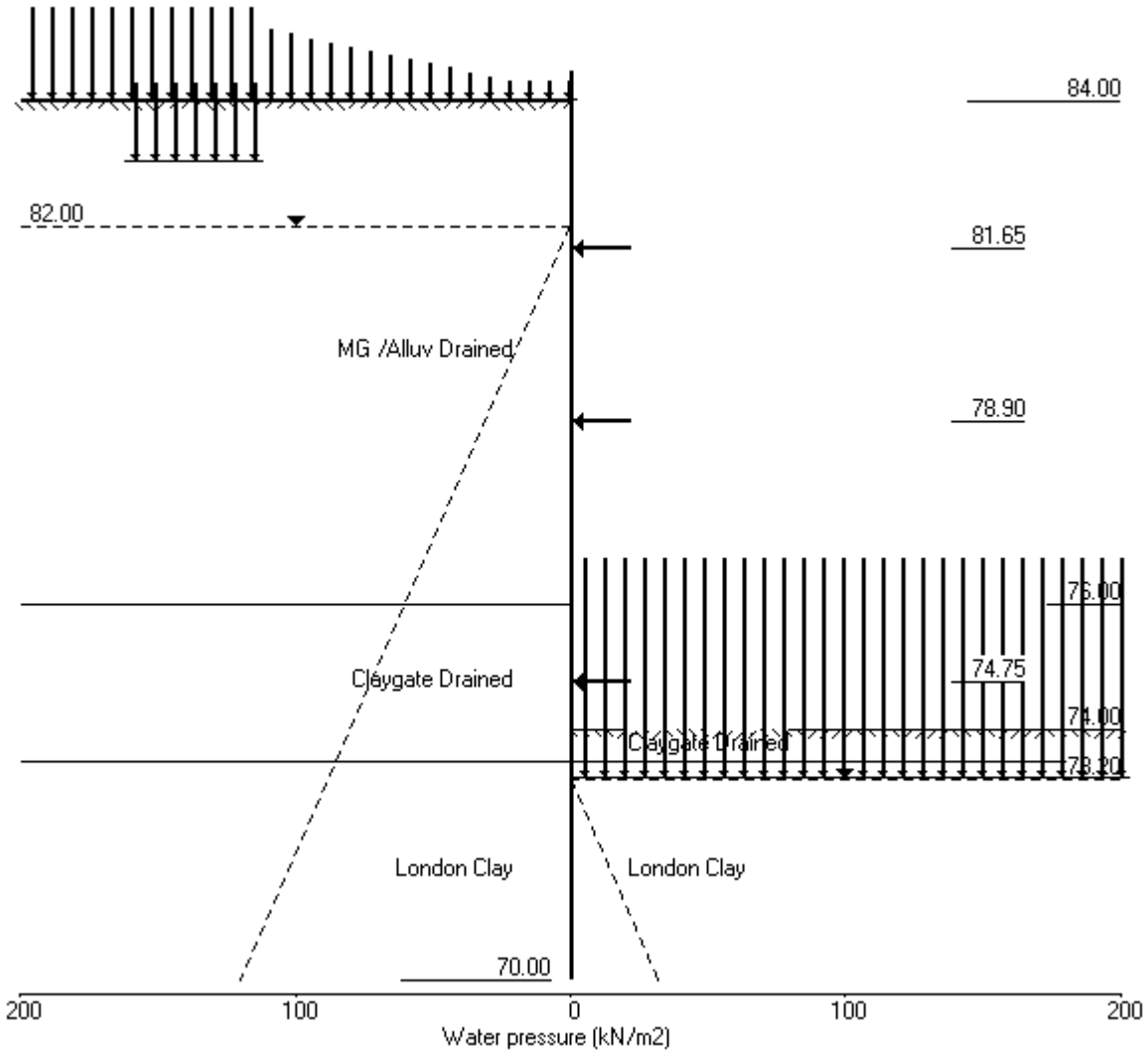


Stage No.23 Change soil type 1 to soil type 4



Units: kN,m

Stage No.24 Change soil type 2 to soil type 5



Units: kN,m

Stage No. 24 Change properties of soil type 2 to soil type 5
Ko pressures will be reset

STABILITY ANALYSIS of Fully Embedded Wall according to Strength Factor method
Factor of safety on soil strength

Stage No.	--- G.L. --- Act.	Pass.	Strut Elev.	Overall FoS for toe elev. = 70.00 Factor of Safety	Moment equilib. at elev.	Toe elev. for FoS = 1.000 Toe elev.	Wall Penetr -ation
24	84.00	74.00		More than one strut			

BENDING MOMENT and DISPLACEMENT ANALYSIS of Fully Embedded Wall
Analysis options
Length of wall perpendicular to section = 6.00m
Subgrade reaction model - Boussinesq Influence coefficients
Soil deformations are elastic until the active or passive limit is reached
Open Tension Crack analysis - No

Rigid boundaries: Active side 20.00 from wall
Passive side 20.00 from wall
Limit State: ULS DA1 Combination 2

Node no.	Y coord	Nett pressure kN/m2	Wall disp. m	Wall rotation rad.	Shear force kN/m	Bending moment kN.m/m	Strut forces kN/m
1	84.40	0.00	0.000	-2.46E-03	0.0	-0.0	
2	84.00	0.00	0.001	-2.46E-03	0.0	-0.0	
		14.68	0.001	-2.46E-03	0.0	-0.0	
3	83.50	7.59	0.003	-2.46E-03	5.6	2.0	
4	83.00	12.35	0.004	-2.47E-03	10.6	6.0	
5	82.50	17.20	0.005	-2.50E-03	17.9	13.0	
6	82.00	22.07	0.006	-2.55E-03	27.8	24.3	
7	81.65	27.20	0.007	-2.60E-03	36.4	35.5	133.3
		27.20	0.007	-2.60E-03	-96.9	35.5	
8	81.50	29.38	0.008	-2.62E-03	-92.7	21.3	
9	81.00	36.63	0.009	-2.62E-03	-76.2	-21.0	
10	80.25	47.42	0.011	-2.45E-03	-44.7	-66.6	
11	79.50	58.12	0.013	-2.17E-03	-5.1	-85.6	
12	78.90	66.60	0.014	-1.92E-03	32.3	-77.7	208.6
		66.60	0.014	-1.92E-03	-176.3	-77.7	
13	78.45	72.90	0.015	-1.66E-03	-144.9	-150.0	
14	78.00	79.16	0.015	-1.25E-03	-110.7	-207.7	
15	77.50	86.11	0.016	-6.76E-04	-69.4	-252.9	
16	77.00	93.05	0.016	-8.00E-06	-24.6	-276.7	
17	76.50	100.01	0.016	6.91E-04	23.7	-277.2	
18	76.00	106.99	0.015	1.36E-03	75.4	-252.7	
		154.05	0.015	1.36E-03	75.4	-252.7	
19	75.38	165.21	0.014	2.03E-03	175.2	-175.8	
20	74.75	176.14	0.013	2.36E-03	281.9	-34.1	378.3
		176.14	0.013	2.36E-03	-96.5	-34.1	
21	74.00	188.39	0.011	2.54E-03	40.2	-58.1	
22	73.50	173.64	0.010	2.63E-03	130.7	-14.4	
		-86.59	0.010	2.63E-03	130.7	-14.4	
23	73.20	-70.52	0.009	2.62E-03	107.2	22.0	
		-137.78	0.009	2.62E-03	107.2	22.0	

(continued)

Stage No.24 Change properties of soil type 2 to soil type 5
Ko pressures will be reset

Node no.	Y coord	Nett pressure kN/m2	Wall disp. m	Wall rotation rad.	Shear force kN/m	Bending moment kN.m/m	Strut forces kN/m
24	72.60	-98.57	0.007	2.50E-03	36.3	61.5	
25	72.00	-59.78	0.006	2.30E-03	-11.2	65.5	
26	71.20	-8.08	0.004	2.10E-03	-38.4	37.5	
27	70.60	31.54	0.003	2.02E-03	-31.3	13.0	
28	70.00	72.95	0.002	2.00E-03	0.0	-0.0	

Strut force at elev. 81.65 = 133.31 kN/m run = 133.31 kN/strut
Strut force at elev. 78.90 = 208.62 kN/m run = 208.62 kN/strut
Strut force at elev. 74.75 = 378.35 kN/m run = 378.35 kN/strut

ACTIVE side

Node no.	Y coord	Effective stresses: Water press. kN/m2	Vertic -al kN/m2	Active limit kN/m2	Passive limit kN/m2	Earth pressure kN/m2	Total earth pressure kN/m2	Soil stiffness coeff. kN/m3
1	84.40	0.00	0.00	0.00	0.00	0.00	0.00	0.0
2	84.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
		0.00	6.50	2.58	17.95	14.68	14.68	3884
3	83.50	0.00	15.59	6.19	43.04	7.59	7.59	3884
4	83.00	0.00	24.98	9.92	68.99	12.35	12.35	3884
5	82.50	0.00	34.58	13.73	95.48	17.20	17.20	3884
6	82.00	0.00	44.21	17.56	122.07	22.07	22.07	3884
7	81.65	3.50	47.42	18.83	130.95	23.70	27.20	2987
8	81.50	5.00	48.79	19.38	134.72	24.38	29.38	2987
9	81.00	10.00	53.28	21.16	147.14	26.63	36.63	2987
10	80.25	17.50	59.86	23.78	165.31	29.92	47.42	2987
11	79.50	25.00	66.25	26.31	182.95	33.12	58.12	2987
12	78.90	31.00	71.24	28.29	196.71	35.60	66.60	2087
13	78.45	35.50	74.91	29.75	206.86	37.40	72.90	2087
14	78.00	40.00	78.54	31.19	216.88	39.16	79.16	2087
15	77.50	45.00	82.52	32.78	227.88	41.11	86.11	2087
16	77.00	50.00	86.46	34.34	238.76	43.05	93.05	2087
17	76.50	55.00	90.37	35.89	249.54	45.01	100.01	2087
18	76.00	60.00	94.24	37.43	260.24	46.99	106.99	2087
		60.00	94.24	40.06	240.07	94.05	154.05	6076
19	75.38	66.25	99.05	42.11	252.33	98.96	165.21	6380
20	74.75	72.50	103.84	44.14	264.51	103.64	176.14	6684
21	74.00	80.00	109.55	46.57	279.08	108.39	188.39	7048
22	73.50	85.00	113.35	48.19	288.76	111.59	196.59	7291
		Total> 198.35	52.50m	357.61	77.66	77.66	16212	
23	73.20	Total> 203.93	54.00m	365.95	91.60	91.60	16493	
24	72.60	Total> 215.08	57.00m	382.62	120.42	120.42	17057	
25	72.00	Total> 226.23	60.00m	399.29	149.31	149.31	17621	
26	71.20	Total> 241.10	64.00m	421.52	187.34	187.34	18373	
27	70.60	Total> 252.25	67.00m	438.19	215.96	215.96	18936	
28	70.00	Total> 263.40	71.99	454.87	245.28	245.28	19500	

PASSIVE side

Node no.	Y coord	Effective stresses: Water press. kN/m2	Vertic -al kN/m2	Active limit kN/m2	Passive limit kN/m2	Earth pressure kN/m2	Total earth pressure kN/m2	Soil stiffness coeff. kN/m3
1	84.40	0.00	0.00	0.00	0.00	0.00	0.00	0.0
2	84.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
3	83.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
4	83.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0

(continued)

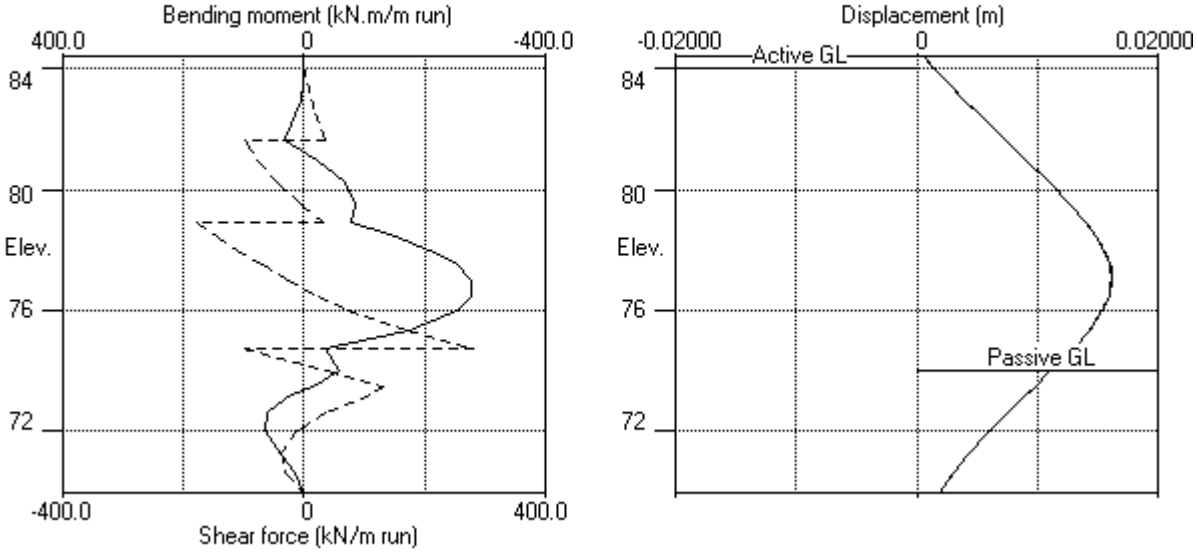
Stage No.24 Change properties of soil type 2 to soil type 5
Ko pressures will be reset

Node no.	Y coord	PASSIVE side						
		Effective stresses				Total earth pressure	Soil stiffness coeff.
		Water press. kN/m2	Vertic -al kN/m2	Active limit kN/m2	Passive limit kN/m2	Earth pressure kN/m2	kN/m2	kN/m3
5	82.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
6	82.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
7	81.65	0.00	0.00	0.00	0.00	0.00	0.00	0.0
8	81.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
9	81.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
10	80.25	0.00	0.00	0.00	0.00	0.00	0.00	0.0
11	79.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
12	78.90	0.00	0.00	0.00	0.00	0.00	0.00	0.0
13	78.45	0.00	0.00	0.00	0.00	0.00	0.00	0.0
14	78.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
15	77.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
16	77.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
17	76.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
18	76.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
19	75.38	0.00	0.00	0.00	0.00	0.00	0.00	0.0
20	74.75	0.00	0.00	0.00	0.00	0.00	0.00	0.0
21	74.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
		0.00	0.00	0.00	0.00	0.00	0.00	7192
22	73.50	0.00	9.01	3.83	22.95	22.95	22.95p	7440
		Total>	9.01	2.50m	168.24	164.25	164.25	16527
23	73.20	Total>	14.74	4.00m	176.73	162.12	162.12	16815
		Total>	84.74	4.00m	246.75	229.38	229.38	16815
24	72.60	Total>	96.19	7.00m	263.73	218.99	218.99	17389
25	72.00	Total>	107.31	10.00m	280.37	209.09	209.09	17964
26	71.20	Total>	121.23	14.00m	301.65	195.43	195.43	18730
27	70.60	Total>	131.10	17.00m	317.03	184.42	184.42	19305
28	70.00	Total>	140.73	20.00m	332.19	172.33	172.33	19880

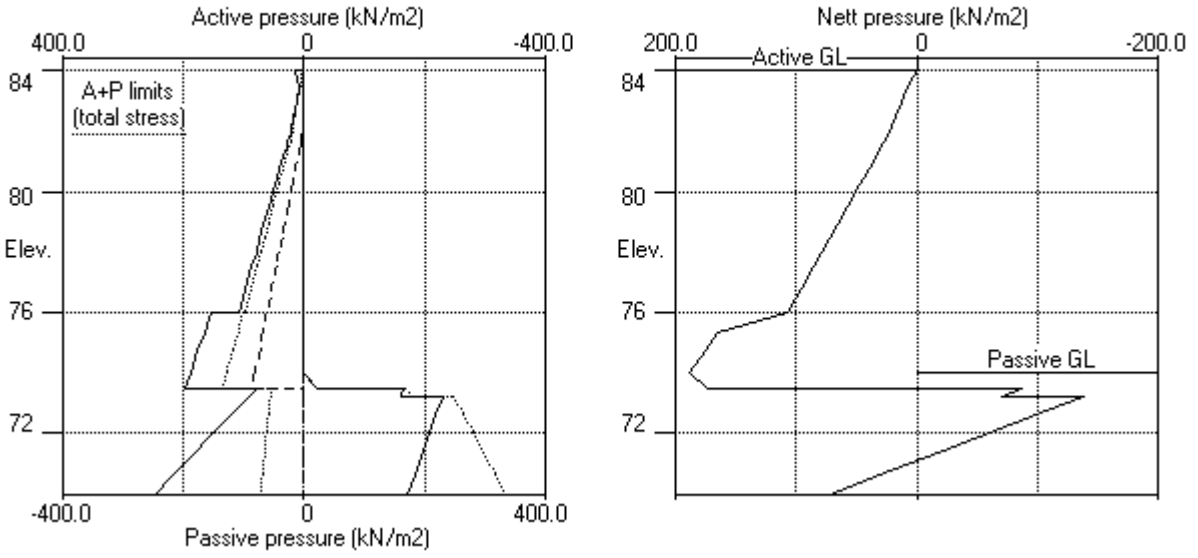
Note: 12.34a Soil pressure at active limit
22.95p Soil pressure at passive limit

Units: kN,m

Stage No.24 Change soil type 2 to soil type 5

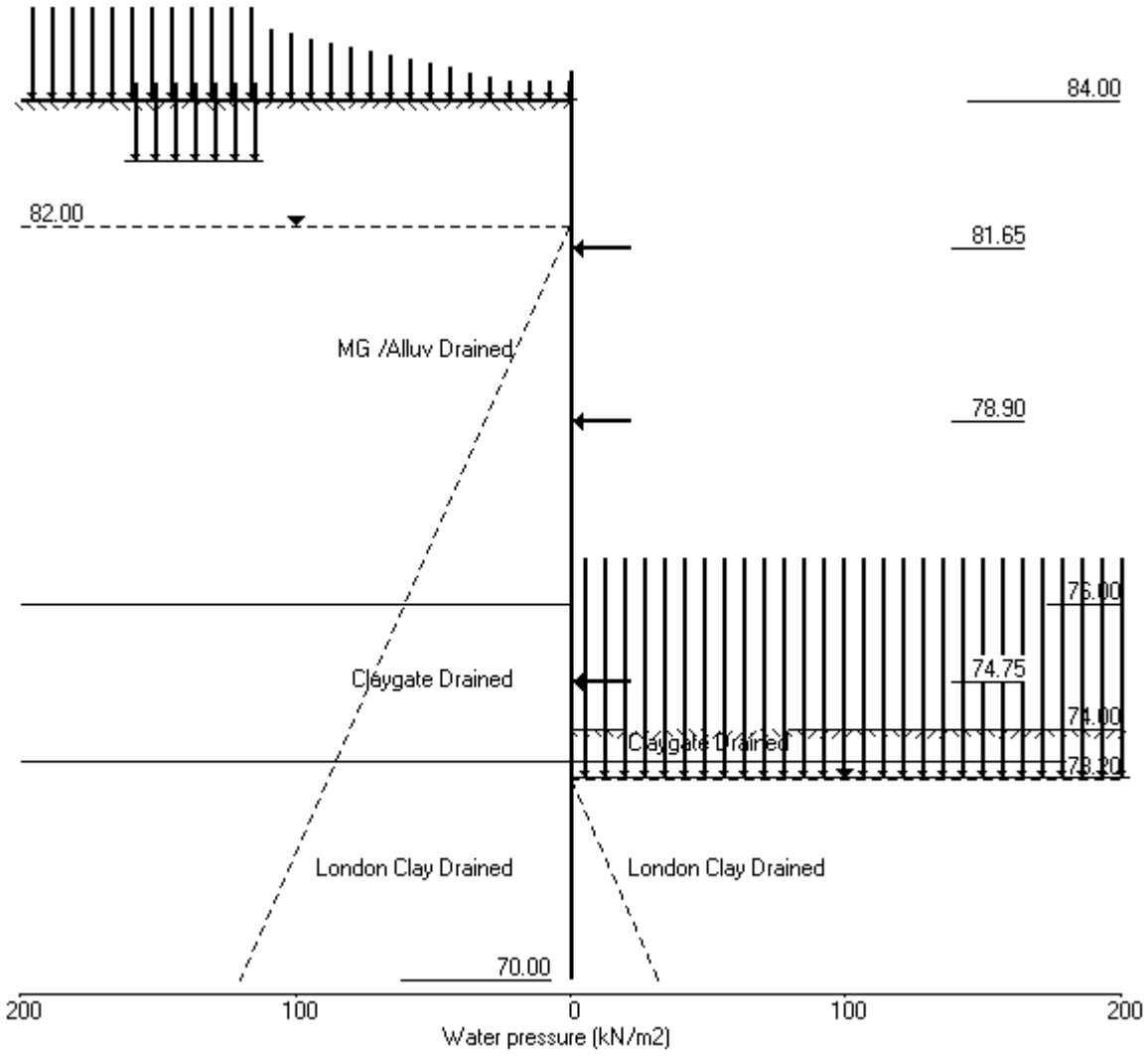


Stage No.24 Change soil type 2 to soil type 5



Units: kN,m

Stage No.25 Change soil type 3 to soil type 6



Units: kN,m

Stage No. 25 Change properties of soil type 3 to soil type 6
Ko pressures will be reset

STABILITY ANALYSIS of Fully Embedded Wall according to Strength Factor method
Factor of safety on soil strength

Stage No.	--- G.L. --- Act.	Pass.	Strut Elev.	Overall FoS for toe elev. = 70.00 Factor of Safety	Moment equilib. at elev.	Toe elev. for FoS = 1.000 Toe elev.	Wall Penetr -ation
25	84.00	74.00		More than one strut			

BENDING MOMENT and DISPLACEMENT ANALYSIS of Fully Embedded Wall
Analysis options
Length of wall perpendicular to section = 6.00m
Subgrade reaction model - Boussinesq Influence coefficients
Soil deformations are elastic until the active or passive limit is reached
Open Tension Crack analysis - No

Rigid boundaries: Active side 20.00 from wall
Passive side 20.00 from wall
Limit State: ULS DA1 Combination 2

Node no.	Y coord	Nett pressure kN/m2	Wall disp. m	Wall rotation rad.	Shear force kN/m	Bending moment kN.m/m	Strut forces kN/m
1	84.40	0.00	0.000	-2.53E-03	0.0	-0.0	
2	84.00	0.00	0.001	-2.53E-03	0.0	-0.0	
		15.32	0.001	-2.53E-03	0.0	-0.0	
3	83.50	8.09	0.003	-2.53E-03	5.9	2.1	
4	83.00	12.72	0.004	-2.54E-03	11.1	6.3	
5	82.50	17.44	0.005	-2.57E-03	18.6	13.6	
6	82.00	22.16	0.006	-2.62E-03	28.5	25.3	
7	81.65	27.19	0.007	-2.67E-03	37.1	36.7	147.6
		27.19	0.007	-2.67E-03	-110.4	36.7	
8	81.50	29.35	0.008	-2.70E-03	-106.2	20.5	
9	81.00	36.49	0.009	-2.69E-03	-89.7	-28.6	
10	80.25	47.18	0.011	-2.47E-03	-58.4	-84.4	
11	79.50	57.93	0.013	-2.10E-03	-19.0	-113.7	
12	78.90	66.62	0.014	-1.75E-03	18.4	-114.2	156.8
		66.62	0.014	-1.75E-03	-138.4	-114.2	
13	78.45	73.14	0.015	-1.43E-03	-107.0	-169.5	
14	78.00	79.67	0.015	-1.00E-03	-72.6	-210.0	
15	77.50	86.92	0.016	-4.38E-04	-30.9	-236.1	
16	77.00	94.12	0.016	1.63E-04	14.3	-240.6	
17	76.50	101.22	0.015	7.47E-04	63.2	-221.5	
18	76.00	108.17	0.015	1.25E-03	115.5	-177.1	
		157.49	0.015	1.25E-03	115.5	-177.1	
19	75.38	167.70	0.014	1.64E-03	217.1	-74.5	
20	74.75	176.03	0.013	1.61E-03	324.6	93.9	538.2
		176.03	0.013	1.61E-03	-213.6	93.9	
21	74.00	182.83	0.012	1.47E-03	-79.1	-18.0	
22	73.50	163.50	0.011	1.54E-03	7.5	-34.7	
		164.27	0.011	1.54E-03	7.5	-34.7	
23	73.20	151.83	0.011	1.58E-03	54.9	-24.4	
		-34.22	0.011	1.58E-03	54.9	-24.4	

(continued)

Stage No.25 Change properties of soil type 3 to soil type 6
Ko pressures will be reset

Node no.	Y coord	Nett pressure kN/m2	Wall disp. m	Wall rotation rad.	Shear force kN/m	Bending moment kN.m/m	Strut forces kN/m
24	72.60	-40.42	0.010	1.62E-03	32.5	1.1	
25	72.00	-28.87	0.009	1.60E-03	11.7	12.3	
26	71.20	-11.30	0.007	1.55E-03	-4.3	10.0	
27	70.60	3.33	0.006	1.53E-03	-6.7	4.4	
28	70.00	19.06	0.006	1.52E-03	0.0	-0.0	

Strut force at elev. 81.65 = 147.57 kN/m run = 147.57 kN/strut
Strut force at elev. 78.90 = 156.81 kN/m run = 156.81 kN/strut
Strut force at elev. 74.75 = 538.20 kN/m run = 538.20 kN/strut

Node no.	Y coord	ACTIVE side: Effective stresses: Water press. kN/m2	Vertic -al kN/m2	Active limit kN/m2	Passive limit kN/m2	Earth pressure kN/m2	Total earth pressure kN/m2	Soil stiffness coeff. kN/m3
1	84.40	0.00	0.00	0.00	0.00	0.00	0.00	0.0
2	84.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
		0.00	6.50	2.58	17.95	15.32	15.32	3883
3	83.50	0.00	15.59	6.19	43.04	8.09	8.09	3883
4	83.00	0.00	24.98	9.92	68.99	12.72	12.72	3883
5	82.50	0.00	34.58	13.73	95.48	17.44	17.44	3883
6	82.00	0.00	44.21	17.56	122.07	22.16	22.16	3883
7	81.65	3.50	47.42	18.83	130.95	23.69	27.19	2983
8	81.50	5.00	48.79	19.38	134.72	24.35	29.35	2983
9	81.00	10.00	53.28	21.16	147.14	26.49	36.49	2983
10	80.25	17.50	59.86	23.78	165.31	29.68	47.18	2983
11	79.50	25.00	66.25	26.31	182.95	32.93	57.93	2983
12	78.90	31.00	71.24	28.29	196.71	35.62	66.62	2418
13	78.45	35.50	74.91	29.75	206.86	37.64	73.14	2418
14	78.00	40.00	78.54	31.19	216.88	39.67	79.67	2418
15	77.50	45.00	82.52	32.78	227.88	41.92	86.92	2418
16	77.00	50.00	86.46	34.34	238.76	44.12	94.12	2418
17	76.50	55.00	90.37	35.89	249.54	46.22	101.22	2418
18	76.00	60.00	94.24	37.43	260.24	48.17	108.17	2418
		60.00	94.24	40.06	240.07	97.49	157.49	7043
19	75.38	66.25	99.05	42.11	252.33	101.45	167.70	7395
20	74.75	72.50	103.84	44.14	264.51	103.53	176.03	7339
21	74.00	80.00	109.55	46.57	279.08	102.83	182.83	7739
22	73.50	85.00	113.35	48.19	288.76	101.45	186.45	8006
		85.00	113.35	48.19	301.28	103.22	188.22	8006
23	73.20	88.00	115.93	49.28	308.13	103.00	191.00	8145
24	72.60	94.00	121.08	51.47	321.82	102.83	196.83	8423
25	72.00	100.00	126.23	53.66	335.51	103.23	203.23	8702
26	71.20	108.00	133.10	56.58	353.76	104.61	212.61	9073
27	70.60	114.00	138.25	58.77	367.45	106.00	220.00	9351
28	70.00	120.00	143.40	60.96	381.15	107.40	227.40	9630

Node no.	Y coord	PASSIVE side: Effective stresses: Water press. kN/m2	Vertic -al kN/m2	Active limit kN/m2	Passive limit kN/m2	Earth pressure kN/m2	Total earth pressure kN/m2	Soil stiffness coeff. kN/m3
1	84.40	0.00	0.00	0.00	0.00	0.00	0.00	0.0
2	84.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
3	83.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
4	83.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0

(continued)

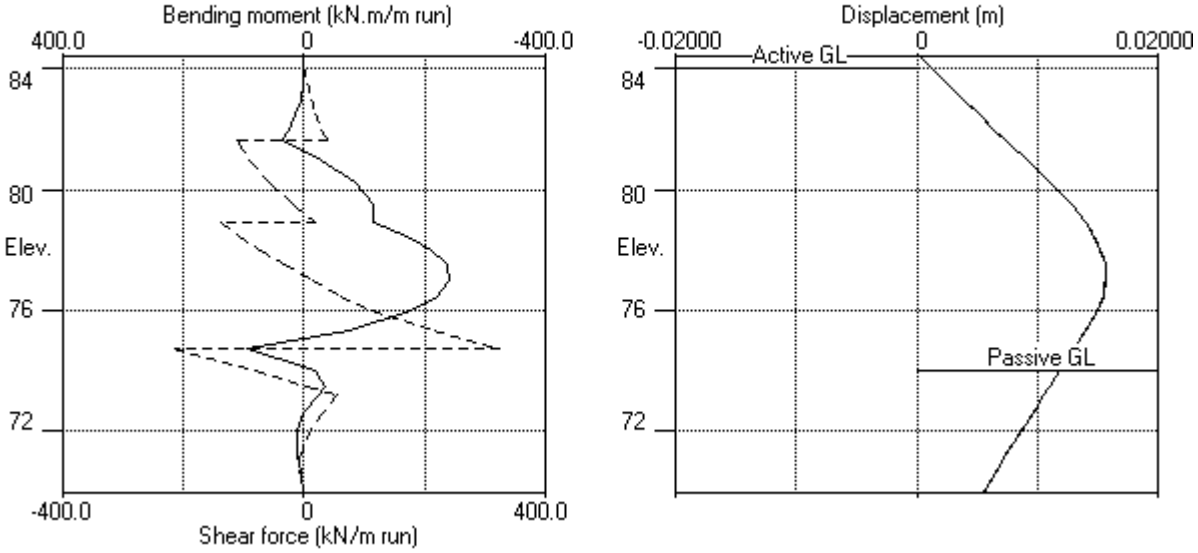
Stage No.25 Change properties of soil type 3 to soil type 6
Ko pressures will be reset

Node no.	Y coord	PASSIVE side						
		Effective stresses					Total earth pressure	Soil stiffness coeff.
		Water press.	Vertic -al	Active limit	Passive limit	Earth pressure		
		kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m3
5	82.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
6	82.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
7	81.65	0.00	0.00	0.00	0.00	0.00	0.00	0.0
8	81.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
9	81.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
10	80.25	0.00	0.00	0.00	0.00	0.00	0.00	0.0
11	79.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
12	78.90	0.00	0.00	0.00	0.00	0.00	0.00	0.0
13	78.45	0.00	0.00	0.00	0.00	0.00	0.00	0.0
14	78.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
15	77.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
16	77.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
17	76.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
18	76.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
19	75.38	0.00	0.00	0.00	0.00	0.00	0.00	0.0
20	74.75	0.00	0.00	0.00	0.00	0.00	0.00	0.0
21	74.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
		0.00	0.00	0.00	0.00	0.00	0.00	7739
22	73.50	0.00	9.01	3.83	22.95	22.95	22.95p	8006
		0.00	9.01	3.83	23.94	23.94	23.94p	8006
23	73.20	0.00	14.74	6.26	39.17	39.17	39.17p	8145
		0.00	84.74	36.02	225.22	225.22	225.22p	8145
24	72.60	6.00	90.19	38.34	239.72	231.24	237.24	8423
25	72.00	12.00	95.31	40.52	253.33	220.10	232.10	8702
26	71.20	20.00	101.23	43.04	269.07	203.91	223.91	9073
27	70.60	26.00	105.10	44.68	279.33	190.67	216.67	9351
28	70.00	32.00	108.73	46.22	288.99	176.34	208.34	9630

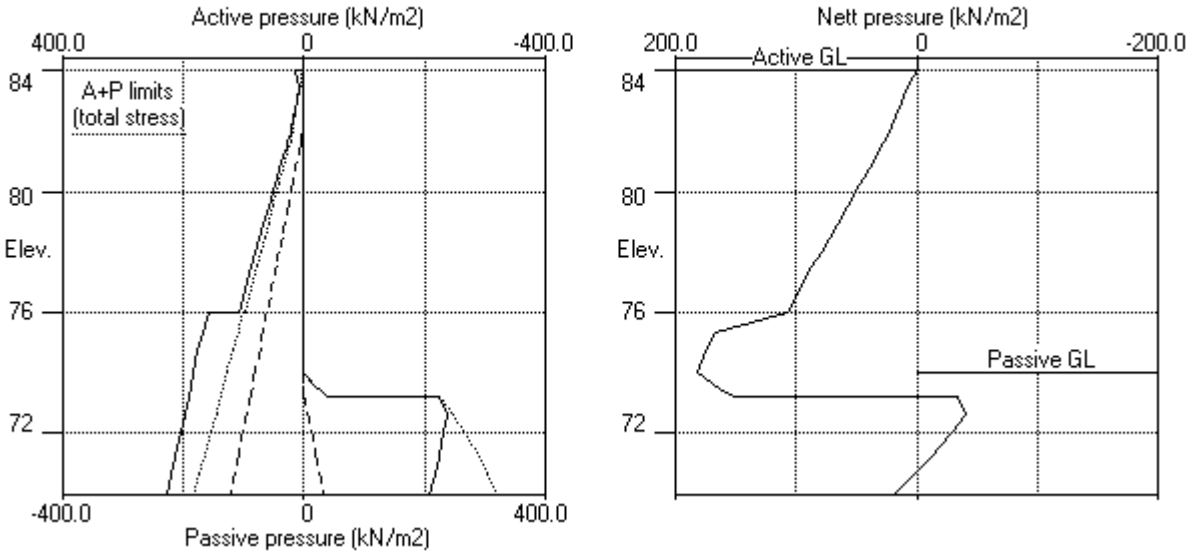
Note: 12.34a Soil pressure at active limit
225.22p Soil pressure at passive limit

Units: kN,m

Stage No.25 Change soil type 3 to soil type 6



Stage No.25 Change soil type 3 to soil type 6



Units: kN,m

Summary of results

LIMIT STATE PARAMETERS

Limit State: ULS DA1 Combination 2
Water pressures : Worst Credible
Partial factor on C' = 1.250
Partial factor on Phi' = 1.250
Partial factor on Cu = 1.400
Partial factor on Soil Modulus = 1.000
Partial factor on Permanent Unfavourable loads = 1.000
Partial factor on Permanent Favourable loads = 1.000
Partial factor on Permanent Variable loads = 1.300

STABILITY ANALYSIS of Fully Embedded Wall according to Strength Factor method

Factor of safety on soil strength

Stage No.	--- G.L. --- Act.	Pass.	Strut Elev.	Overall FoS for toe elev. = 70.00 Factor of Safety	Moment equilib. at elev.	Toe elev. for FoS = 1.000 Toe elev.	Wall Penetr -ation
1	84.00	84.00	Cant.	Conditions not suitable for FoS calc.			
2	84.00	84.00		No analysis at this stage			
3	84.00	84.00		No analysis at this stage			
4	84.00	84.00		No analysis at this stage			
5	84.00	84.00	Cant.	Conditions not suitable for FoS calc.			
6	84.00	84.00		No analysis at this stage			
7	84.00	81.50	84.40	5.125	n/a	81.22	0.28
8	84.00	81.50		No analysis at this stage			

All remaining stages have more than one strut - FoS calculation n/a

Units: kN,m

Summary of results

BENDING MOMENT and DISPLACEMENT ANALYSIS of Fully Embedded Wall

Analysis options

Length of wall perpendicular to section = 6.00m
Subgrade reaction model - Boussinesq Influence coefficients
Soil deformations are elastic until the active or passive limit is reached
Open Tension Crack analysis - No

Rigid boundaries: Active side 20.00 from wall
Passive side 20.00 from wall

Limit State: ULS DA1 Combination 2

Bending moment, shear force and displacement envelopes

Node no.	Y coord	Displacement maximum m	Displacement minimum m	Bending moment maximum kN.m/m	Bending moment minimum kN.m/m	Shear force maximum kN/m	Shear force minimum kN/m
1	84.40	0.002	-0.000	0.0	-0.0	0.0	-28.4
2	84.00	0.002	0.000	0.0	-11.4	0.0	-28.4
3	83.50	0.003	0.000	2.3	-25.5	6.5	-27.8
4	83.00	0.004	0.000	6.7	-38.9	11.1	-25.9
5	82.50	0.006	0.000	13.6	-51.2	18.6	-22.8
6	82.00	0.007	0.000	25.3	-61.5	28.5	-110.8
7	81.65	0.008	0.000	36.7	-67.3	37.1	-110.4
8	81.50	0.008	0.000	21.3	-69.4	0.0	-106.2
9	81.00	0.010	0.000	0.0	-88.3	0.0	-98.3
10	80.25	0.011	0.000	0.0	-156.5	0.0	-82.3
11	79.50	0.013	0.000	0.0	-209.1	12.9	-165.8
12	78.90	0.014	0.000	0.0	-235.1	32.3	-176.3
13	78.45	0.015	0.000	0.0	-242.7	36.8	-144.9
14	78.00	0.015	0.000	0.0	-238.4	65.0	-140.0
15	77.50	0.016	0.000	0.0	-265.0	59.5	-104.6
16	77.00	0.016	0.000	0.5	-280.0	84.4	-64.8
17	76.50	0.016	0.000	1.5	-277.2	112.7	-20.7
18	76.00	0.015	0.000	2.8	-252.7	144.2	0.0
19	75.38	0.014	0.000	23.9	-191.9	217.1	0.0
20	74.75	0.013	0.000	93.9	-147.8	324.6	-213.6
21	74.00	0.012	0.000	82.6	-65.7	136.7	-79.1
22	73.50	0.011	0.000	87.6	-34.7	130.7	-8.0
23	73.20	0.011	0.000	84.7	-24.4	107.2	-14.3
24	72.60	0.010	0.000	84.2	0.0	36.3	-28.5
25	72.00	0.009	0.000	78.4	0.0	11.7	-34.0
26	71.20	0.007	0.000	41.8	0.0	0.0	-46.2
27	70.60	0.006	0.000	14.0	0.0	0.0	-35.0
28	70.00	0.006	0.000	0.0	-0.0	0.0	-0.0

Summary of results (continued)

Maximum and minimum bending moment and shear force at each stage

Stage	Bending moment				Shear force			
no.	maximum	elev.	minimum	elev.	maximum	elev.	minimum	elev.
	kN.m/m		kN.m/m		kN/m		kN/m	
1	4.5	74.75	-1.5	79.50	3.0	76.00	-1.4	72.60
2	No calculation at this stage							
3	No calculation at this stage							
4	No calculation at this stage							
5	7.2	74.00	-10.4	78.90	9.1	76.00	-3.0	81.50
6	No calculation at this stage							
7	46.6	74.00	-96.3	78.90	67.4	76.00	-28.4	84.40
8	No calculation at this stage							
9	45.8	74.00	-96.0	78.90	66.8	76.00	-28.2	84.40
10	87.6	73.50	-242.7	78.45	144.2	76.00	-110.8	82.00
11	No calculation at this stage							
12	86.8	73.50	-241.8	78.45	143.6	76.00	-110.6	82.00
13	54.9	72.60	-204.7	76.50	128.4	74.00	-135.3	78.00
14	No calculation at this stage							
15	67.4	72.00	-218.3	76.50	136.7	74.00	-140.0	78.00
16	No calculation at this stage							
17	84.2	72.60	-280.0	77.00	138.6	74.75	-165.8	79.50
18	No calculation at this stage							
19	81.8	72.60	-263.9	76.50	135.2	74.00	-151.9	78.90
20	No calculation at this stage							
21	82.1	72.60	-265.4	77.00	134.7	74.00	-150.2	78.90
22	82.1	72.60	-265.4	77.00	134.7	74.00	-150.2	78.90
23	80.6	72.60	-272.1	77.00	146.3	74.75	-172.2	78.90
24	65.5	72.00	-277.2	76.50	281.9	74.75	-176.3	78.90
25	93.9	74.75	-240.6	77.00	324.6	74.75	-213.6	74.75

Maximum and minimum displacement at each stage

Stage	Displacement				Stage description
no.	maximum	elev.	minimum	elev.	
	m		m		
1	0.001	84.40	0.000	84.40	Apply surcharge no.1 at elev. 84.00
2	No calculation at this stage				Apply surcharge no.2 at elev. 84.00
3	No calculation at this stage				Apply surcharge no.3 at elev. 84.00
4	No calculation at this stage				Apply surcharge no.6 at elev. 84.00
5	0.001	80.25	0.000	84.40	Apply surcharge no.7 at elev. 83.00
6	No calculation at this stage				Install strut no.1 at elev. 84.40
7	0.007	78.90	0.000	84.40	Excav. to elev. 81.50 on PASSIVE side
8	No calculation at this stage				Install strut no.2 at elev. 82.00
9	0.007	78.90	0.000	84.40	Apply water pressure profile no.2
10	0.014	78.45	0.000	84.40	Excav. to elev. 77.50 on PASSIVE side
11	No calculation at this stage				Install strut no.3 at elev. 78.00
12	0.014	78.45	0.000	84.40	Apply water pressure profile no.4
13	0.015	77.00	0.000	84.40	Excav. to elev. 74.00 on PASSIVE side
14	No calculation at this stage				Install strut no.4 at elev. 74.75
15	0.015	77.00	0.000	84.40	Apply surcharge no.4 at elev. 73.20
16	No calculation at this stage				Install strut no.5 at elev. 79.50
17	0.016	77.00	-0.000	84.40	Remove strut no.3 at elev. 78.00
18	No calculation at this stage				Install strut no.6 at elev. 78.90
19	0.016	77.00	-0.000	84.40	Remove strut no.5 at elev. 79.50
20	No calculation at this stage				Install strut no.7 at elev. 81.65
21	0.016	77.00	0.000	84.40	Remove strut no.2 at elev. 82.00
22	0.016	77.00	0.000	84.40	Remove strut no.1 at elev. 84.40
23	0.016	77.00	0.000	84.40	Change soil type 1 to soil type 4
24	0.016	77.00	0.000	84.40	Change soil type 2 to soil type 5
25	0.016	77.00	0.000	84.40	Change soil type 3 to soil type 6

Summary of results (continued)

Strut forces at each stage (horizontal components)

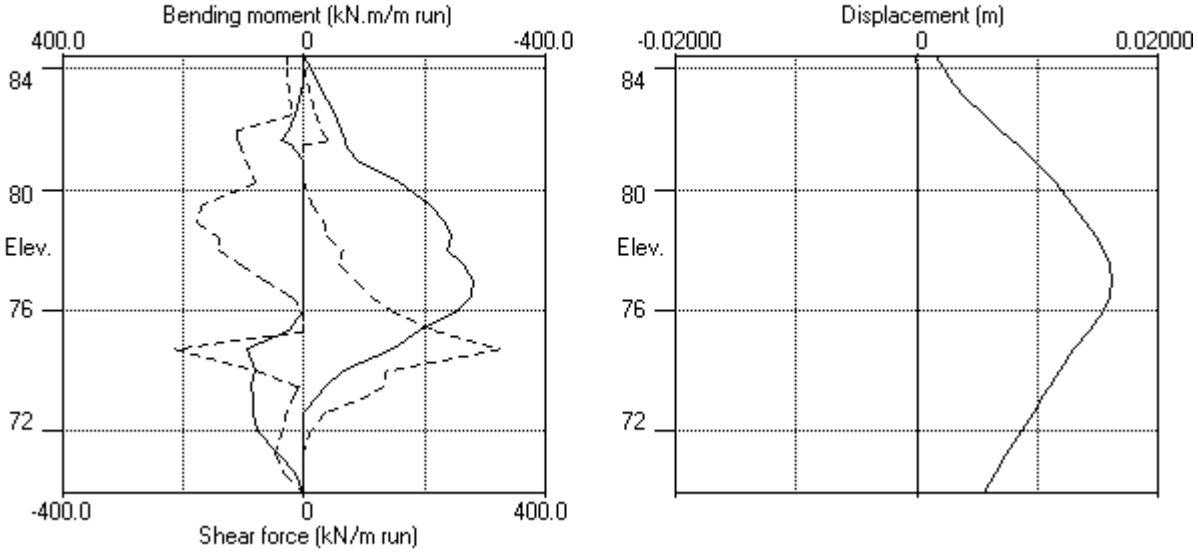
Stage no.	Strut no. 1 at elev. 84.40		Strut no. 2 at elev. 82.00		Strut no. 3 at elev. 78.00	
	kN/m run	kN/strut	kN/m run	kN/strut	kN/m run	kN/strut
7	28.42	170.54	---	---	---	---
9	28.23	169.39	0.21	1.29	---	---
10	slack	slack	126.11	756.67	---	---
12	slack	slack	125.90	755.39	0.84	5.04
13	slack	slack	95.55	573.32	200.35	1202.11
15	slack	slack	96.95	581.69	203.11	1218.64
17	slack	slack	71.46	428.79	---	---
19	slack	slack	88.47	530.84	---	---
21	slack	slack	---	---	---	---

Stage no.	Strut no. 4 at elev. 74.75		Strut no. 5 at elev. 79.50		Strut no. 6 at elev. 78.90	
	kN/m run	kN/strut	kN/m run	kN/strut	kN/m run	kN/strut
15	slack	slack	---	---	---	---
17	51.11	51.11	178.71	1072.26	---	---
19	35.40	35.40	---	---	170.93	170.93
21	37.31	37.31	---	---	158.02	158.02
22	37.31	37.31	---	---	158.02	158.02
23	69.63	69.63	---	---	203.21	203.21
24	378.35	378.35	---	---	208.62	208.62
25	538.20	538.20	---	---	156.81	156.81

Stage no.	--- Strut no. 7 --- at elev. 81.65 kN/m run	kN/strut
21	97.12	97.12
22	97.12	97.12
23	134.62	134.62
24	133.31	133.31
25	147.57	147.57

Units: kN,m

Bending moment, shear force, displacement envelopes



Units: kN,m

INPUT DATA

SOIL PROFILE

Stratum no.	Elevation of top of stratum	Soil types Active side	Passive side
1	82.00	1 Made Ground / Alluv	1 Made Ground / Alluv
2	76.00	2 Claygate Beds	2 Claygate Beds
3	73.50	3 London Clay	3 London Clay

SOIL PROPERTIES

-- Soil type -- No.	Description (Datum elev.)	Bulk density kN/m3	Young's Modulus Eh,kN/m2 (dEh/dy)	At rest coeff. Ko (dKo/dy)	Consol state. NC/OC (Nu)	Active limit Ka (Kac)	Passive limit Kp (Kpc)	Cohesion kN/m2 (dc/dy)
1	Made Ground / Alluv	17.00	12500	0.500	NC (0.490)	1.000 (2.570)	1.000 (2.571)	25.00u
2	Claygate .. (76.00)	18.00	37500 (3000)	0.500	OC (0.490)	1.000 (2.000)	1.000 (2.000)	75.00u (6.000)
3	London Clay (73.50)	19.00	45000 (2608)	1.000	OC (0.490)	1.000 (1.000)	1.000 (1.000)	90.00u (5.200)
4	MG /Alluv Drained	18.00	7500	0.500	NC (0.250)	0.324 (1.327)	3.601 (5.104)	0.0d
5	Claygate .. (76.00)	18.00	22500 (1800)	1.000	OC (0.200)	0.351 (1.391)	3.440 (5.233)	0.0d
6	London Cl.. (73.50)	19.00	27000 (1565)	1.000	OC (0.200)	0.337 (1.360)	3.440 (5.233)	0.0d

Additional soil parameters associated with Ka and Kp

------- Soil type ------- No.	Description	--- parameters for Ka --- Soil friction angle	Wall adhesion coeff.	Back-fill angle	--- parameters for Kp --- Soil friction angle	Wall adhesion coeff.	Back-fill angle
1	Made Ground / Alluv	0.00	1.000	0.00	0.00	1.000	0.00
2	Claygate Beds	0.00	0.000	0.00	0.00	0.000	0.00
3	London Clay	0.00	-0.674	0.00	0.00	-0.674	0.00
4	MG /Alluv Drained	27.00	0.641	0.00	27.00	0.471	0.00
5	Claygate Drained	25.00	0.670	0.00	25.00	0.670	0.00
6	London Clay Drained	26.00	0.670	0.00	25.00	0.670	0.00

GROUND WATER CONDITIONS

Density of water = 10.00 kN/m3

	Active side	Passive side
Initial water table elevation	81.00	81.00

Automatic water pressure balancing at toe of wall : No

Water press. profile no.	Active side Point no.	Elev. m	Piezo elev. m	Water press. kN/m2	Passive side Point no.	Elev. m	Piezo elev. m	Water press. kN/m2	
1	1	81.00	81.00	0.0	1	77.50	77.50	0.0	MC
2	1	82.00	82.00	0.0	1	77.00	77.00	0.0	WC
3	1	81.00	81.00	0.0	1	76.00	76.00	0.0	MC
4	1	82.00	82.00	0.0	1	75.00	75.00	0.0	WC

WALL PROPERTIES

Type of structure = Fully Embedded Wall
Elevation of toe of wall = 70.00
Maximum finite element length = 0.60 m
Youngs modulus of wall E = 2.8000E+07 kN/m2
Moment of inertia of wall I = 7.0700E-03 m4/m run
E.I = 197960 kN.m2/m run
Yield Moment of wall = Not defined

STRUTS and ANCHORS

Strut/ anchor no.	Elev.	Strut spacing m	X-section area of strut sq.m	Youngs modulus kN/m2	Free length m	Inclin -ation (degs)	Pre- stress /strut kN	Tension allowed
1	Not defined							
2	82.00	6.00	0.010000	2.000E+08	4.00	0.00	0	No
3	78.00	6.00	0.010000	2.000E+08	4.00	0.00	0	No
4	76.25	1.00	0.350000	3.000E+07	1.00	0.00	0	No
5	Not defined							
6	78.90	1.00	0.250000	3.000E+07	1.00	0.00	0	No
7	81.65	1.00	0.250000	2.000E+08	1.00	0.00	0	No

SURCHARGE LOADS

Surch -arge no.	Elev.	Distance from wall	Length parallel to wall	Width perpend. to wall	Surcharge ----- kN/m2 ----- Near edge	Far edge	Equiv. soil type	Partial factor/ Category
1	81.50	1.30(A)	0.50	20.00	100.00	=	N/A	1.00 P/U
2	81.50	0.80(A)	20.00	0.50	80.00	=	N/A	1.00 P/U
3	82.00	0.00(A)	20.00	20.00	5.00	=	N/A	1.00 P/U
4	76.00	-0.00(P)	8.00	10.00	50.00	=	N/A	1.00 -

Note: A = Active side, P = Passive side
Limit State Categories P/U = Permanent Unfavourable
P/F = Permanent Favourable
Var = Variable (unfavourable)

CONSTRUCTION STAGES

Construction stage no.	Stage description
1	Apply surcharge no.1 at elevation 81.50
	No analysis at this stage
2	Apply surcharge no.2 at elevation 81.50
	No analysis at this stage
3	Apply surcharge no.3 at elevation 82.00
	No analysis at this stage
4	Excavate to elevation 81.50 on PASSIVE side
5	Install strut or anchor no.2 at elevation 82.00
6	Apply water pressure profile no.1 (Mod. Conserv.)
7	Excavate to elevation 77.50 on PASSIVE side
8	Install strut or anchor no.3 at elevation 78.00
9	Apply water pressure profile no.3 (Mod. Conserv.)
10	Excavate to elevation 76.00 on PASSIVE side
11	Apply surcharge no.4 at elevation 76.00
12	Install strut or anchor no.4 at elevation 76.25
13	Install strut or anchor no.6 at elevation 78.90
14	Remove strut or anchor no.3 at elevation 78.00
15	Install strut or anchor no.7 at elevation 81.65
16	Remove strut or anchor no.2 at elevation 82.00
17	Change properties of soil type 1 to soil type 4
	Ko pressures will be reset
18	Change properties of soil type 2 to soil type 5
	Ko pressures will be reset
19	Change properties of soil type 3 to soil type 6
	Ko pressures will be reset

FACTORS OF SAFETY and ANALYSIS OPTIONS

Limit State options: Serviceability Limit State
All loads and soil strengths are unfactored

Stability analysis:
Method of analysis - Strength Factor method
Factor on soil strength for calculating wall depth = 1.00

Parameters for undrained strata:
Minimum equivalent fluid density = 5.00 kN/m3
Maximum depth of water filled tension crack = 0.00 m

Bending moment and displacement calculation:
Method - Subgrade reaction model using Influence Coefficients
Open Tension Crack analysis? - No
Non-linear Modulus Parameter (L) = 20.00 m

Boundary conditions:
Length of wall (normal to plane of analysis) = 6.00 m

Width of excavation on active side of wall = 20.00 m
Width of excavation on passive side of wall = 10.00 m

Distance to rigid boundary on active side = 20.00 m
Distance to rigid boundary on passive side = 20.00 m

OUTPUT OPTIONS

Stage no.	Stage description	Output options: Displacement, Bending mom., Shear force	Active, Passive pressures	Graph. output
1	Apply surcharge no.1 at elev. 81.50	No	No	No
2	Apply surcharge no.2 at elev. 81.50	No	No	No
3	Apply surcharge no.3 at elev. 82.00	No	No	No
4	Excav. to elev. 81.50 on PASSIVE side	Yes	No	Yes
5	Install strut no.2 at elev. 82.00	No	No	No
6	Apply water pressure profile no.1	No	No	No
7	Excav. to elev. 77.50 on PASSIVE side	Yes	No	Yes
8	Install strut no.3 at elev. 78.00	No	No	No
9	Apply water pressure profile no.3	No	No	No
10	Excav. to elev. 76.00 on PASSIVE side	No	No	No
11	Apply surcharge no.4 at elev. 76.00	No	No	No
12	Install strut no.4 at elev. 76.25	No	No	No
13	Install strut no.6 at elev. 78.90	No	No	No
14	Remove strut no.3 at elev. 78.00	No	No	No
15	Install strut no.7 at elev. 81.65	No	No	No
16	Remove strut no.2 at elev. 82.00	No	No	No
17	Change soil type 1 to soil type 4	No	No	No
18	Change soil type 2 to soil type 5	No	No	No
19	Change soil type 3 to soil type 6	No	No	No
*	Summary output	Yes	-	Yes

Units: kN,m

Summary of results

BENDING MOMENT and DISPLACEMENT ANALYSIS of Fully Embedded Wall

Analysis options

Length of wall perpendicular to section = 6.00m
Subgrade reaction model - Boussinesq Influence coefficients
Soil deformations are elastic until the active or passive limit is reached
Open Tension Crack analysis - No

Rigid boundaries: Active side 20.00 from wall
Passive side 20.00 from wall

Limit State: Serviceability Limit State

Calculated Bending Moments and Strut Forces have been multiplied by a factor of 1.35 to obtain values for structural design.

Bending moment, shear force and displacement envelopes

Node no.	Y coord	Displacement		Bending moment Calculated		Bending moment Factored		Shear force Calculated		Shear force Factored	
		max.	min.	max.	min.	max.	min.	max.	min.	max.	min.
		m	m	kN.m/m		kN.m/m		kN/m	kN/m	kN/m	kN/m
1	82.00	0.005	0.000	0	0	0	0	0	-57	0	-77
2	81.65	0.006	0.000	0	-20	0	-27	2	-84	2	-113
3	81.50	0.006	0.000	0	-29	0	-38	1	-83	1	-112
4	81.00	0.007	0.000	0	-56	0	-76	0	-78	0	-105
5	80.40	0.007	0.000	0	-94	0	-127	0	-65	0	-88
6	79.80	0.008	0.000	0	-128	0	-172	0	-48	0	-65
7	79.35	0.008	0.000	0	-144	0	-195	0	-38	0	-51
8	78.90	0.009	0.000	0	-152	0	-205	1	-50	2	-68
9	78.45	0.009	0.000	0	-152	0	-205	22	-26	30	-35
10	78.00	0.009	0.000	0	-156	0	-210	49	-18	66	-25
11	77.50	0.009	0.000	0	-148	0	-199	82	0	111	0
12	77.19	0.009	0.000	0	-134	0	-181	104	0	140	0
13	76.88	0.009	0.000	0	-114	0	-154	127	0	172	0
14	76.56	0.008	0.000	19	-94	26	-127	152	0	205	0
15	76.25	0.008	0.000	71	-76	96	-102	178	-69	240	-94
16	76.00	0.008	0.000	56	-56	76	-76	112	-48	151	-65
17	75.50	0.007	0.000	36	-16	49	-22	81	-39	109	-52
18	75.00	0.007	0.000	45	-3	61	-4	52	-28	70	-38
19	74.40	0.006	0.000	65	-7	87	-9	24	-15	33	-20
20	73.95	0.006	0.000	70	-2	94	-3	20	-4	27	-5
21	73.50	0.006	0.000	68	0	91	0	39	-11	53	-14
22	73.05	0.005	0.000	61	0	82	0	19	-19	26	-25
23	72.60	0.005	0.000	51	0	69	0	4	-24	5	-33
24	72.00	0.005	0.000	35	0	47	0	0	-26	0	-35
25	71.40	0.005	0.000	19	0	26	0	0	-23	0	-31
26	70.80	0.004	0.000	7	0	10	0	0	-16	0	-22
27	70.40	0.004	0.000	2	0	3	0	0	-9	0	-12
28	70.00	0.004	0.000	0	-0	0	-0	0	-0	0	-0

Summary of results (continued)

Calculated Bending Moments and Strut Forces have been multiplied by a factor of 1.35 to obtain values for structural design.

Maximum and minimum bending moment and shear force at each stage

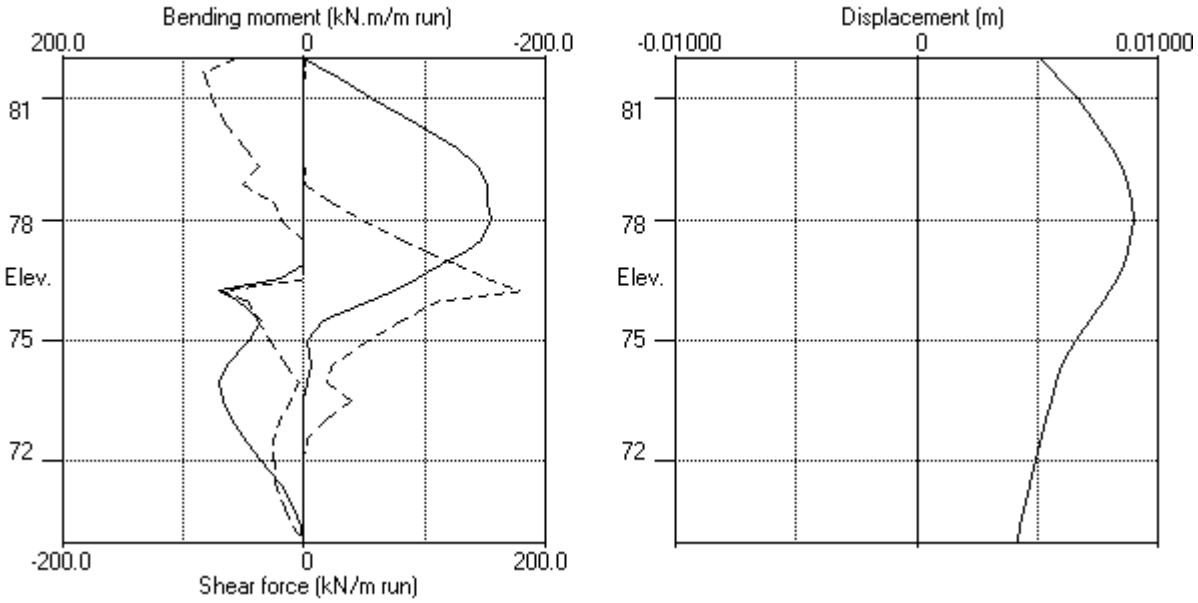
Stage	Bending moment						Shear force					
	Calculated				Factored		Calculated				Factored	
no.	max.	elev.	min.	elev.	max.	min.	max.	elev.	min.	elev.	max.	min.
	kN.m/m		kN.m/m		kN.m/m		kN/m		kN/m		kN/m	kN/m
1	2	73.95	-6	78.45	3	-8	4	76.00	-3	80.40	5	-4
2	No calculation at this stage											
3	No calculation at this stage											
4	24	74.40	-15	78.45	32	-21	22	76.00	-9	80.40	29	-12
5	No calculation at this stage											
6	23	74.40	-15	78.45	31	-21	21	76.00	-9	80.40	28	-12
7	52	73.95	-139	78.45	70	-188	88	76.00	-56	82.00	119	-75
8	No calculation at this stage											
9	52	73.95	-139	78.45	70	-187	88	76.00	-56	82.00	119	-75
10	42	73.50	-120	78.45	57	-162	86	76.00	-50	82.00	116	-68
11	69	73.95	-146	78.45	94	-197	112	76.00	-57	82.00	151	-77
12	No calculation at this stage											
13	No calculation at this stage											
14	70	73.95	-149	78.00	94	-201	111	76.00	-57	82.00	150	-77
15	No calculation at this stage											
16	70	73.95	-150	78.00	94	-203	111	76.00	-65	81.65	150	-87
17	68	73.95	-156	78.00	92	-210	128	76.25	-77	81.65	173	-103
18	35	76.25	-152	78.90	47	-205	167	76.25	-84	81.65	226	-113
19	71	76.25	-142	78.90	96	-192	178	76.25	-80	81.65	240	-108

Maximum and minimum displacement at each stage

Stage	Displacement				Stage description
no.	maximum	elev.	minimum	elev.	
	m		m		
1	0.000	78.90	0.000	82.00	Apply surcharge no.1 at elev. 81.50
2	No calculation at this stage				Apply surcharge no.2 at elev. 81.50
3	No calculation at this stage				Apply surcharge no.3 at elev. 82.00
4	0.004	82.00	0.000	82.00	Excav. to elev. 81.50 on PASSIVE side
5	No calculation at this stage				Install strut no.2 at elev. 82.00
6	0.004	82.00	0.000	82.00	Apply water pressure profile no.1
7	0.009	78.45	0.000	82.00	Excav. to elev. 77.50 on PASSIVE side
8	No calculation at this stage				Install strut no.3 at elev. 78.00
9	0.009	78.45	0.000	82.00	Apply water pressure profile no.3
10	0.009	78.00	0.000	82.00	Excav. to elev. 76.00 on PASSIVE side
11	0.009	78.45	0.000	82.00	Apply surcharge no.4 at elev. 76.00
12	No calculation at this stage				Install strut no.4 at elev. 76.25
13	No calculation at this stage				Install strut no.6 at elev. 78.90
14	0.009	78.45	0.000	82.00	Remove strut no.3 at elev. 78.00
15	No calculation at this stage				Install strut no.7 at elev. 81.65
16	0.009	78.45	0.000	82.00	Remove strut no.2 at elev. 82.00
17	0.009	78.45	0.000	82.00	Change soil type 1 to soil type 4
18	0.009	78.45	0.000	82.00	Change soil type 2 to soil type 5
19	0.008	78.45	0.000	82.00	Change soil type 3 to soil type 6

Units: kN,m

Bending moment, shear force, displacement envelopes



Units: kN,m

INPUT DATA

SOIL PROFILE

Stratum no.	Elevation of top of stratum	Soil types Active side	Passive side
1	82.00	1 Made Ground / Alluv	1 Made Ground / Alluv
2	76.00	2 Claygate Beds	2 Claygate Beds
3	73.50	3 London Clay	3 London Clay

SOIL PROPERTIES (Unfactored SLS soil strengths)

No.	Soil type Description (Datum elev.)	Bulk density kN/m3	Young's Modulus Eh,kN/m2 (dEh/dy)	At rest coeff. Ko (dKo/dy)	Consol state. NC/OC (Nu)	Active limit Ka (Kac)	Passive limit Kp (Kpc)	Cohesion kN/m2 (dc/dy)
1	Made Ground / Alluv	17.00	12500	0.500	NC (0.490)	1.000 (2.570)	1.000 (2.571)	25.00u
2	Claygate .. (76.00)	18.00	37500 (3000)	0.500	OC (0.490)	1.000 (2.000)	1.000 (2.000)	75.00u (6.000)
3	London Clay (73.50)	19.00	45000 (2608)	1.000	OC (0.490)	1.000 (1.000)	1.000 (1.000)	90.00u (5.200)
4	MG /Alluv Drained	18.00	7500	0.500	NC (0.250)	0.324 (1.327)	3.601 (5.104)	0.0d
5	Claygate .. (76.00)	18.00	22500 (1800)	1.000	OC (0.200)	0.351 (1.391)	3.440 (5.233)	0.0d
6	London Cl.. (73.50)	19.00	27000 (1565)	1.000	OC (0.200)	0.337 (1.360)	3.440 (5.233)	0.0d

Additional soil parameters associated with Ka and Kp

No.	Soil type Description	--- parameters for Ka --- Soil friction angle	Wall adhesion coeff.	Back-fill angle	--- parameters for Kp --- Soil friction angle	Wall adhesion coeff.	Back-fill angle
1	Made Ground / Alluv	0.00	1.000	0.00	0.00	1.000	0.00
2	Claygate Beds	0.00	0.000	0.00	0.00	0.000	0.00
3	London Clay	0.00	-0.674	0.00	0.00	-0.674	0.00
4	MG /Alluv Drained	27.00	0.641	0.00	27.00	0.471	0.00
5	Claygate Drained	25.00	0.670	0.00	25.00	0.670	0.00
6	London Clay Drained	26.00	0.670	0.00	25.00	0.670	0.00

GROUND WATER CONDITIONS

Density of water = 10.00 kN/m3

	Active side	Passive side
Initial water table elevation	81.00	81.00

Automatic water pressure balancing at toe of wall : No

Water press. profile no.	Active side Point no.	Elev. m	Piezo elev. m	Water press. kN/m2	Passive side Point no.	Elev. m	Piezo elev. m	Water press. kN/m2	
1	1	81.00	81.00	0.0	1	77.50	77.50	0.0	MC
2	1	82.00	82.00	0.0	1	77.00	77.00	0.0	WC
3	1	81.00	81.00	0.0	1	76.00	76.00	0.0	MC
4	1	82.00	82.00	0.0	1	75.00	75.00	0.0	WC

WALL PROPERTIES

Type of structure = Fully Embedded Wall
Elevation of toe of wall = 70.00
Maximum finite element length = 0.60 m
Youngs modulus of wall E = 2.8000E+07 kN/m2
Moment of inertia of wall I = 7.0700E-03 m4/m run
E.I = 197960 kN.m2/m run
Yield Moment of wall = Not defined

STRUTS and ANCHORS

Strut/ anchor no.	Elev.	Strut spacing m	X-section area of strut sq.m	Youngs modulus kN/m2	Free length m	Inclin -ation (degs)	Pre- stress /strut kN	Tension allowed
1	Not defined							
2	82.00	6.00	0.010000	2.000E+08	4.00	0.00	0	No
3	78.00	6.00	0.010000	2.000E+08	4.00	0.00	0	No
4	76.25	1.00	0.350000	3.000E+07	1.00	0.00	0	No
5	Not defined							
6	78.90	1.00	0.250000	3.000E+07	1.00	0.00	0	No
7	81.65	1.00	0.250000	2.000E+08	1.00	0.00	0	No

SURCHARGE LOADS

Surch -arge no.	Elev.	Distance from wall	Length parallel to wall	Width perpend. to wall	Surcharge ----- kN/m2 ----- Near edge	Far edge	Equiv. soil type	Partial factor/ Category
1	81.50	1.30(A)	0.50	20.00	100.00	=	N/A	1.00 P/U
2	81.50	0.80(A)	20.00	0.50	80.00	=	N/A	1.00 P/U
3	82.00	0.00(A)	20.00	20.00	5.00	=	N/A	1.00 P/U
4	75.44	-0.00(P)	8.00	10.00	50.00	=	N/A	1.00 -

Note: A = Active side, P = Passive side
Limit State Categories P/U = Permanent Unfavourable
P/F = Permanent Favourable
Var = Variable (unfavourable)

CONSTRUCTION STAGES

Construction stage no.	Stage description
1	Apply surcharge no.1 at elevation 81.50
	No analysis at this stage
2	Apply surcharge no.2 at elevation 81.50
	No analysis at this stage
3	Apply surcharge no.3 at elevation 82.00
	No analysis at this stage
4	Excavate to elevation 81.50 on PASSIVE side
5	Install strut or anchor no.2 at elevation 82.00
6	Apply water pressure profile no.1 (Mod. Conserv.)
7	Excavate to elevation 77.50 on PASSIVE side
8	Install strut or anchor no.3 at elevation 78.00
9	Apply water pressure profile no.3 (Mod. Conserv.)
10	Excavate to elevation 75.44 on PASSIVE side
11	Apply surcharge no.4 at elevation 75.44
12	Install strut or anchor no.4 at elevation 76.25
13	Install strut or anchor no.6 at elevation 78.90
14	Remove strut or anchor no.3 at elevation 78.00
15	Install strut or anchor no.7 at elevation 81.65
16	Remove strut or anchor no.2 at elevation 82.00
17	Change properties of soil type 1 to soil type 4
	Ko pressures will be reset
18	Change properties of soil type 2 to soil type 5
	Ko pressures will be reset
19	Change properties of soil type 3 to soil type 6
	Ko pressures will be reset

FACTORS OF SAFETY and ANALYSIS OPTIONS

Limit State options: ULS DA1 Combination 1
Water pressures : Moderately Conservative
Partial factor on C' = 1.000
Partial factor on Phi' = 1.000
Partial factor on Cu = 1.000
Partial factor on Soil Modulus = 1.000
Partial factor on Permanent Unfavourable loads = 1.000
Partial factor on Permanent Favourable loads = 1.000
Partial factor on Permanent Variable loads = 1.100
Design factor on calculated Bending Moments = 1.350

Parameters for undrained strata:
Minimum equivalent fluid density = 5.00 kN/m3
Maximum depth of water filled tension crack = 0.00 m

Bending moment and displacement calculation:
Method - Subgrade reaction model using Influence Coefficients
Open Tension Crack analysis? - No
Non-linear Modulus Parameter (L) = 20.00 m

Boundary conditions:
Length of wall (normal to plane of analysis) = 6.00 m

Width of excavation on active side of wall = 20.00 m
Width of excavation on passive side of wall = 10.00 m

Distance to rigid boundary on active side = 20.00 m
Distance to rigid boundary on passive side = 20.00 m

OUTPUT OPTIONS

Stage no.	Stage description	Output options: Displacement, Bending mom., Shear force	Active, Passive pressures	Graph. output
1	Apply surcharge no.1 at elev. 81.50	No	No	No
2	Apply surcharge no.2 at elev. 81.50	No	No	No
3	Apply surcharge no.3 at elev. 82.00	No	No	No
4	Excav. to elev. 81.50 on PASSIVE side	Yes	No	Yes
5	Install strut no.2 at elev. 82.00	No	No	No
6	Apply water pressure profile no.1	No	No	No
7	Excav. to elev. 77.50 on PASSIVE side	Yes	No	Yes
8	Install strut no.3 at elev. 78.00	No	No	No
9	Apply water pressure profile no.3	No	No	No
10	Excav. to elev. 75.44 on PASSIVE side	No	No	No
11	Apply surcharge no.4 at elev. 75.44	No	No	No
12	Install strut no.4 at elev. 76.25	No	No	No
13	Install strut no.6 at elev. 78.90	No	No	No
14	Remove strut no.3 at elev. 78.00	No	No	No
15	Install strut no.7 at elev. 81.65	No	No	No
16	Remove strut no.2 at elev. 82.00	No	No	No
17	Change soil type 1 to soil type 4	No	No	No
18	Change soil type 2 to soil type 5	No	No	No
19	Change soil type 3 to soil type 6	No	No	No
*	Summary output	Yes	-	Yes

Units: kN,m

Summary of results

BENDING MOMENT and DISPLACEMENT ANALYSIS of Fully Embedded Wall

Analysis options

Length of wall perpendicular to section = 6.00m
Subgrade reaction model - Boussinesq Influence coefficients
Soil deformations are elastic until the active or passive limit is reached
Open Tension Crack analysis - No

Rigid boundaries: Active side 20.00 from wall
Passive side 20.00 from wall

Limit State: ULS DA1 Combination 1

Calculated Bending Moments and Strut Forces have been multiplied by a factor of 1.35 to obtain values for structural design.

Bending moment, shear force and displacement envelopes

Node no.	Y coord	Displacement		Bending moment Calculated		Bending moment Factored		Shear force Calculated		Shear force Factored	
		max.	min.	max.	min.	max.	min.	max.	min.	max.	min.
		m	m	kN.m/m		kN.m/m		kN/m	kN/m	kN/m	kN/m
1	82.00	0.005	0.000	0	0	0	0	0	-56	0	-75
2	81.65	0.006	0.000	0	-19	0	-26	2	-81	2	-110
3	81.50	0.006	0.000	0	-28	0	-37	1	-80	1	-108
4	81.00	0.007	0.000	0	-55	0	-74	0	-75	0	-101
5	80.40	0.007	0.000	0	-91	0	-123	0	-63	0	-85
6	79.80	0.008	0.000	0	-123	0	-166	0	-43	0	-59
7	79.35	0.009	0.000	0	-139	0	-187	0	-32	0	-44
8	78.90	0.009	0.000	0	-145	0	-196	8	-67	11	-91
9	78.45	0.009	0.000	0	-141	0	-191	21	-43	28	-59
10	78.00	0.009	0.000	0	-153	0	-206	47	-36	64	-48
11	77.50	0.009	0.000	0	-153	0	-207	80	-15	108	-21
12	77.19	0.009	0.000	0	-145	0	-196	102	-1	138	-1
13	76.88	0.009	0.000	0	-130	0	-175	125	0	169	0
14	76.56	0.009	0.000	12	-114	16	-154	150	0	203	0
15	76.25	0.009	0.000	63	-97	85	-130	176	-112	237	-152
16	76.00	0.008	0.000	37	-82	51	-111	88	-91	119	-123
17	75.44	0.008	0.000	19	-39	25	-53	105	-21	141	-29
18	74.92	0.007	0.000	36	-30	49	-40	71	-13	97	-18
19	74.40	0.007	0.000	52	-24	70	-32	41	-4	55	-5
20	73.95	0.006	0.000	64	-12	87	-16	34	-4	45	-5
21	73.50	0.006	0.000	67	-1	91	-2	51	-7	69	-10
22	73.05	0.006	0.000	63	0	85	0	27	-14	36	-19
23	72.60	0.006	0.000	55	0	74	0	8	-22	10	-30
24	72.00	0.005	0.000	39	0	53	0	0	-27	0	-37
25	71.40	0.005	0.000	22	0	30	0	0	-26	0	-35
26	70.80	0.005	0.000	8	0	11	0	0	-18	0	-25
27	70.40	0.004	0.000	3	0	3	0	0	-10	0	-14
28	70.00	0.004	0.000	0	-0	0	-0	0	0	0	0

Summary of results (continued)

Calculated Bending Moments and Strut Forces have been multiplied by a factor of 1.35 to obtain values for structural design.

Maximum and minimum bending moment and shear force at each stage

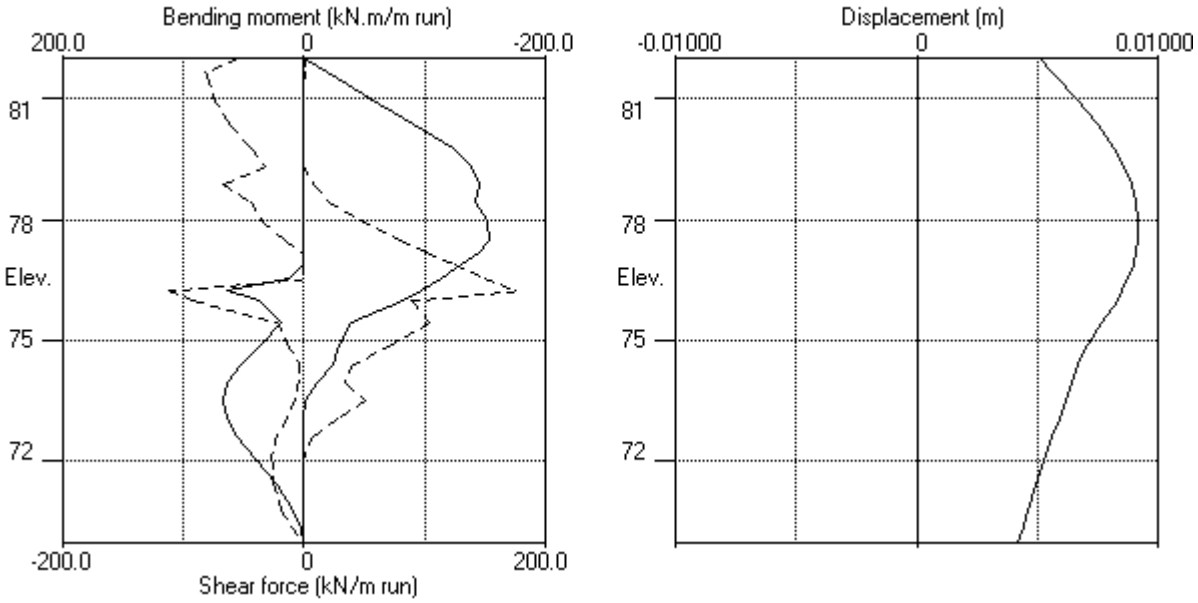
Stage	Bending moment						Shear force					
no.	Calculated				Factored		Calculated				Factored	
	max.	elev.	min.	elev.	max.	min.	max.	elev.	min.	elev.	max.	min.
	kN.m/m		kN.m/m		kN.m/m		kN/m		kN/m		kN/m	kN/m
1	2	73.95	-6	78.45	3	-8	4	76.00	-3	80.40	5	-4
2	No calculation at this stage											
3	No calculation at this stage											
4	24	74.40	-15	78.45	32	-21	22	76.00	-9	80.40	29	-12
5	No calculation at this stage											
6	23	74.40	-15	78.45	31	-21	21	76.00	-9	80.40	28	-12
7	52	73.95	-139	78.45	70	-188	88	76.00	-56	82.00	119	-75
8	No calculation at this stage											
9	52	73.95	-139	78.45	70	-188	88	76.00	-56	82.00	118	-75
10	41	73.50	-119	77.19	55	-160	82	75.44	-48	82.00	110	-64
11	67	73.50	-134	77.50	90	-182	105	75.44	-53	82.00	141	-72
12	No calculation at this stage											
13	No calculation at this stage											
14	67	73.50	-145	78.00	91	-196	102	75.44	-51	82.00	138	-69
15	No calculation at this stage											
16	67	73.50	-148	78.00	91	-200	102	75.44	-59	81.65	138	-80
17	65	73.50	-153	77.50	87	-207	111	76.25	-70	81.65	149	-94
18	31	72.60	-141	78.45	42	-190	152	76.25	-96	76.25	206	-130
19	63	76.25	-145	78.90	85	-196	176	76.25	-112	76.25	237	-152

Maximum and minimum displacement at each stage

Stage	Displacement				Stage description
no.	maximum	elev.	minimum	elev.	
	m		m		
1	0.000	78.90	0.000	82.00	Apply surcharge no.1 at elev. 81.50
2	No calculation at this stage				Apply surcharge no.2 at elev. 81.50
3	No calculation at this stage				Apply surcharge no.3 at elev. 82.00
4	0.004	82.00	0.000	82.00	Excav. to elev. 81.50 on PASSIVE side
5	No calculation at this stage				Install strut no.2 at elev. 82.00
6	0.004	82.00	0.000	82.00	Apply water pressure profile no.1
7	0.009	78.45	0.000	82.00	Excav. to elev. 77.50 on PASSIVE side
8	No calculation at this stage				Install strut no.3 at elev. 78.00
9	0.009	78.45	0.000	82.00	Apply water pressure profile no.3
10	0.009	78.00	0.000	82.00	Excav. to elev. 75.44 on PASSIVE side
11	0.009	78.00	0.000	82.00	Apply surcharge no.4 at elev. 75.44
12	No calculation at this stage				Install strut no.4 at elev. 76.25
13	No calculation at this stage				Install strut no.6 at elev. 78.90
14	0.009	78.00	0.000	82.00	Remove strut no.3 at elev. 78.00
15	No calculation at this stage				Install strut no.7 at elev. 81.65
16	0.009	78.00	0.000	82.00	Remove strut no.2 at elev. 82.00
17	0.009	78.00	0.000	82.00	Change soil type 1 to soil type 4
18	0.009	78.45	0.000	82.00	Change soil type 2 to soil type 5
19	0.009	78.45	0.000	82.00	Change soil type 3 to soil type 6

Units: kN,m

Bending moment, shear force, displacement envelopes



Units: kN,m

INPUT DATA

SOIL PROFILE

Stratum no.	Elevation of top of stratum	Soil types Active side	Passive side
1	82.00	1 Made Ground / Alluv	1 Made Ground / Alluv
2	76.00	2 Claygate Beds	2 Claygate Beds
3	73.50	3 London Clay	3 London Clay

SOIL PROPERTIES (Unfactored SLS soil strengths)

-- Soil type -- No.	Description (Datum elev.)	Bulk density kN/m3	Young's Modulus Eh,kN/m2 (dEh/dy)	At rest coeff. Ko (dKo/dy)	Consol state. NC/OC (Nu)	Active limit Ka (Kac)	Passive limit Kp (Kpc)	Cohesion kN/m2 (dc/dy)
1	Made Ground / Alluv	17.00	12500	0.500	NC (0.490)	1.000 (2.570)	1.000 (2.571)	25.00u
2	Claygate .. (76.00)	18.00	37500 (3000)	0.500	OC (0.490)	1.000 (2.000)	1.000 (2.000)	75.00u (6.000)
3	London Clay (73.50)	19.00	45000 (2608)	1.000	OC (0.490)	1.000 (1.000)	1.000 (1.000)	90.00u (5.200)
4	MG /Alluv Drained	18.00	7500	0.500	NC (0.250)	0.324 (1.327)	3.601 (5.104)	0.0d
5	Claygate .. (76.00)	18.00	22500 (1800)	1.000	OC (0.200)	0.351 (1.391)	3.440 (5.233)	0.0d
6	London Cl.. (73.50)	19.00	27000 (1565)	1.000	OC (0.200)	0.337 (1.360)	3.440 (5.233)	0.0d

Additional soil parameters associated with Ka and Kp

------- Soil type ------- No.	Description	--- parameters for Ka --- Soil friction angle	Wall adhesion coeff.	Back-fill angle	--- parameters for Kp --- Soil friction angle	Wall adhesion coeff.	Back-fill angle
1	Made Ground / Alluv	0.00	1.000	0.00	0.00	1.000	0.00
2	Claygate Beds	0.00	0.000	0.00	0.00	0.000	0.00
3	London Clay	0.00	-0.674	0.00	0.00	-0.674	0.00
4	MG /Alluv Drained	27.00	0.641	0.00	27.00	0.471	0.00
5	Claygate Drained	25.00	0.670	0.00	25.00	0.670	0.00
6	London Clay Drained	26.00	0.670	0.00	25.00	0.670	0.00

GROUND WATER CONDITIONS

Density of water = 10.00 kN/m3

	Active side	Passive side
Initial water table elevation	81.00	81.00

Automatic water pressure balancing at toe of wall : No

Water press. profile no.	Active side Point no.	Elev. m	Piezo elev. m	Water press. kN/m2	Passive side Point no.	Elev. m	Piezo elev. m	Water press. kN/m2	
1	1	81.00	81.00	0.0	1	77.50	77.50	0.0	MC
2	1	82.00	82.00	0.0	1	77.00	77.00	0.0	WC
3	1	81.00	81.00	0.0	1	76.00	76.00	0.0	MC
4	1	82.00	82.00	0.0	1	75.00	75.00	0.0	WC

WALL PROPERTIES

Type of structure = Fully Embedded Wall
Elevation of toe of wall = 70.00
Maximum finite element length = 0.60 m
Youngs modulus of wall E = 2.8000E+07 kN/m2
Moment of inertia of wall I = 7.0700E-03 m4/m run
E.I = 197960 kN.m2/m run
Yield Moment of wall = Not defined

STRUTS and ANCHORS

Strut/ anchor no.	Elev.	Strut spacing m	X-section area of strut sq.m	Youngs modulus kN/m2	Free length m	Inclin -ation (degs)	Pre- stress /strut kN	Tension allowed
1	Not defined							
2	82.00	6.00	0.010000	2.000E+08	4.00	0.00	0	No
3	78.00	6.00	0.010000	2.000E+08	4.00	0.00	0	No
4	76.25	1.00	0.350000	3.000E+07	1.00	0.00	0	No
5	Not defined							
6	78.90	1.00	0.250000	3.000E+07	1.00	0.00	0	No
7	81.65	1.00	0.250000	2.000E+08	1.00	0.00	0	No

SURCHARGE LOADS

Surch -arge no.	Elev.	Distance from wall	Length parallel to wall	Width perpend. to wall	Surcharge ----- kN/m2 ----- Near edge	Far edge	Equiv. soil type	Partial factor/ Category
1	81.50	1.30(A)	0.50	20.00	100.00	=	N/A	1.00 P/U
2	81.50	0.80(A)	20.00	0.50	80.00	=	N/A	1.00 P/U
3	82.00	0.00(A)	20.00	20.00	5.00	=	N/A	1.00 P/U
4	75.44	-0.00(P)	8.00	10.00	50.00	=	N/A	1.00 -

Note: A = Active side, P = Passive side
Limit State Categories P/U = Permanent Unfavourable
P/F = Permanent Favourable
Var = Variable (unfavourable)

CONSTRUCTION STAGES

Construction stage no.	Stage description
1	Apply surcharge no.1 at elevation 81.50
	No analysis at this stage
2	Apply surcharge no.2 at elevation 81.50
	No analysis at this stage
3	Apply surcharge no.3 at elevation 82.00
	No analysis at this stage
4	Excavate to elevation 81.50 on PASSIVE side
5	Install strut or anchor no.2 at elevation 82.00
6	Apply water pressure profile no.2 (Worst Cred.)
7	Excavate to elevation 77.50 on PASSIVE side
8	Install strut or anchor no.3 at elevation 78.00
9	Apply water pressure profile no.4 (Worst Cred.)
10	Excavate to elevation 75.44 on PASSIVE side
11	Apply surcharge no.4 at elevation 75.44
12	Install strut or anchor no.4 at elevation 76.25
13	Install strut or anchor no.6 at elevation 78.90
14	Remove strut or anchor no.3 at elevation 78.00
15	Install strut or anchor no.7 at elevation 81.65
16	Remove strut or anchor no.2 at elevation 82.00
17	Change properties of soil type 1 to soil type 4
	Ko pressures will be reset
18	Change properties of soil type 2 to soil type 5
	Ko pressures will be reset
19	Change properties of soil type 3 to soil type 6
	Ko pressures will be reset

FACTORS OF SAFETY and ANALYSIS OPTIONS

Limit State options: ULS DA1 Combination 2
Water pressures : Worst Credible
Partial factor on C' = 1.250
Partial factor on Phi' = 1.250
Partial factor on Cu = 1.400
Partial factor on Soil Modulus = 1.000
Partial factor on Permanent Unfavourable loads = 1.000
Partial factor on Permanent Favourable loads = 1.000
Partial factor on Permanent Variable loads = 1.300

Stability analysis:
Method of analysis - Strength Factor method
Overall factor on soil strength for calculating wall depth = 1.00

Parameters for undrained strata:
Minimum equivalent fluid density = 5.00 kN/m3
Maximum depth of water filled tension crack = 0.00 m

Bending moment and displacement calculation:
Method - Subgrade reaction model using Influence Coefficients
Open Tension Crack analysis? - No
Non-linear Modulus Parameter (L) = 20.00 m

Boundary conditions:
Length of wall (normal to plane of analysis) = 6.00 m

Width of excavation on active side of wall = 20.00 m
Width of excavation on passive side of wall = 10.00 m

Distance to rigid boundary on active side = 20.00 m
Distance to rigid boundary on passive side = 20.00 m

OUTPUT OPTIONS

Stage no.	Stage description	Output options: Displacement Bending mom. Shear force	Active, Passive pressures	Graph. output
1	Apply surcharge no.1 at elev. 81.50	No	No	No
2	Apply surcharge no.2 at elev. 81.50	No	No	No
3	Apply surcharge no.3 at elev. 82.00	No	No	No
4	Excav. to elev. 81.50 on PASSIVE side	Yes	No	Yes
5	Install strut no.2 at elev. 82.00	No	No	No
6	Apply water pressure profile no.2	No	No	No
7	Excav. to elev. 77.50 on PASSIVE side	Yes	No	Yes
8	Install strut no.3 at elev. 78.00	No	No	No
9	Apply water pressure profile no.4	No	No	No
10	Excav. to elev. 75.44 on PASSIVE side	No	No	No
11	Apply surcharge no.4 at elev. 75.44	No	No	No
12	Install strut no.4 at elev. 76.25	No	No	No
13	Install strut no.6 at elev. 78.90	No	No	No
14	Remove strut no.3 at elev. 78.00	No	No	No
15	Install strut no.7 at elev. 81.65	No	No	No
16	Remove strut no.2 at elev. 82.00	No	No	No
17	Change soil type 1 to soil type 4	No	No	No
18	Change soil type 2 to soil type 5	No	No	No
19	Change soil type 3 to soil type 6	No	No	No
*	Summary output	Yes	-	Yes

Units: kN,m

Summary of results

LIMIT STATE PARAMETERS

Limit State: ULS DA1 Combination 2
Water pressures : Worst Credible
Partial factor on C' = 1.250
Partial factor on Phi' = 1.250
Partial factor on Cu = 1.400
Partial factor on Soil Modulus = 1.000
Partial factor on Permanent Unfavourable loads = 1.000
Partial factor on Permanent Favourable loads = 1.000
Partial factor on Permanent Variable loads = 1.300

STABILITY ANALYSIS of Fully Embedded Wall according to Strength Factor method

Factor of safety on soil strength

Stage No.	--- G.L. --- Act.	Pass.	Strut Elev.	Overall FoS for toe elev. = 70.00 Factor of Safety	Moment equilib. at elev.	Toe elev. for FoS = 1.000 Toe elev.	Wall Penetr -ation
1	82.00	82.00	Cant.	Conditions not suitable for FoS calc.			
2	82.00	82.00		No analysis at this stage			
3	82.00	82.00		No analysis at this stage			
4	82.00	81.50	Cant.	Conditions not suitable for FoS calc.			
5	82.00	81.50		No analysis at this stage			
6	82.00	81.50	82.00	7.066	n/a	81.49	0.01
7	82.00	77.50	82.00	1.737	n/a	75.53	1.97
8	82.00	77.50		No analysis at this stage			

All remaining stages have more than one strut - FoS calculation n/a

Units: kN,m

Summary of results

BENDING MOMENT and DISPLACEMENT ANALYSIS of Fully Embedded Wall

Analysis options

Length of wall perpendicular to section = 6.00m
Subgrade reaction model - Boussinesq Influence coefficients
Soil deformations are elastic until the active or passive limit is reached
Open Tension Crack analysis - No

Rigid boundaries: Active side 20.00 from wall
Passive side 20.00 from wall

Limit State: ULS DA1 Combination 2

Bending moment, shear force and displacement envelopes

Node no.	Y coord	Displacement maximum m	Displacement minimum m	Bending moment maximum kN.m/m	Bending moment minimum kN.m/m	Shear force maximum kN/m	Shear force minimum kN/m
1	82.00	0.005	0.000	0.0	0.0	0.0	-56.9
2	81.65	0.006	0.000	0.3	-19.9	1.8	-85.6
3	81.50	0.006	0.000	0.1	-28.3	0.7	-84.3
4	81.00	0.007	0.000	0.0	-56.1	0.0	-77.4
5	80.40	0.008	0.000	0.0	-93.8	0.0	-62.1
6	79.80	0.008	0.000	0.0	-124.5	0.0	-41.3
7	79.35	0.009	0.000	0.0	-137.8	0.0	-31.4
8	78.90	0.009	0.000	0.0	-141.7	17.1	-79.7
9	78.45	0.009	0.000	0.0	-145.7	13.7	-53.5
10	78.00	0.010	0.000	0.0	-155.8	42.7	-48.8
11	77.50	0.010	0.000	0.0	-159.7	78.0	-25.2
12	77.00	0.010	0.000	0.0	-145.3	116.5	0.0
13	76.63	0.009	0.000	0.0	-126.9	147.4	0.0
14	76.25	0.009	0.000	59.8	-107.2	180.0	-114.9
15	76.00	0.009	0.000	33.9	-92.6	94.0	-92.2
16	75.44	0.008	0.000	18.9	-50.3	108.1	-21.2
17	75.00	0.008	0.000	35.1	-38.2	78.9	-15.6
18	74.40	0.007	0.000	51.3	-32.7	41.7	-7.1
19	73.95	0.007	0.000	57.2	-21.4	30.6	-3.7
20	73.50	0.007	0.000	58.2	-11.9	46.6	-8.1
21	73.05	0.007	0.000	53.5	-8.1	30.1	-14.6
22	72.60	0.006	0.000	47.4	-3.4	14.0	-18.8
23	72.00	0.006	0.000	34.9	0.0	4.9	-22.4
24	71.40	0.005	0.000	21.8	0.0	0.6	-23.3
25	70.80	0.005	0.000	8.4	0.0	0.0	-17.9
26	70.40	0.005	0.000	2.6	0.0	0.0	-10.5
27	70.00	0.005	0.000	0.0	-0.0	0.0	0.0

Summary of results (continued)

Maximum and minimum bending moment and shear force at each stage

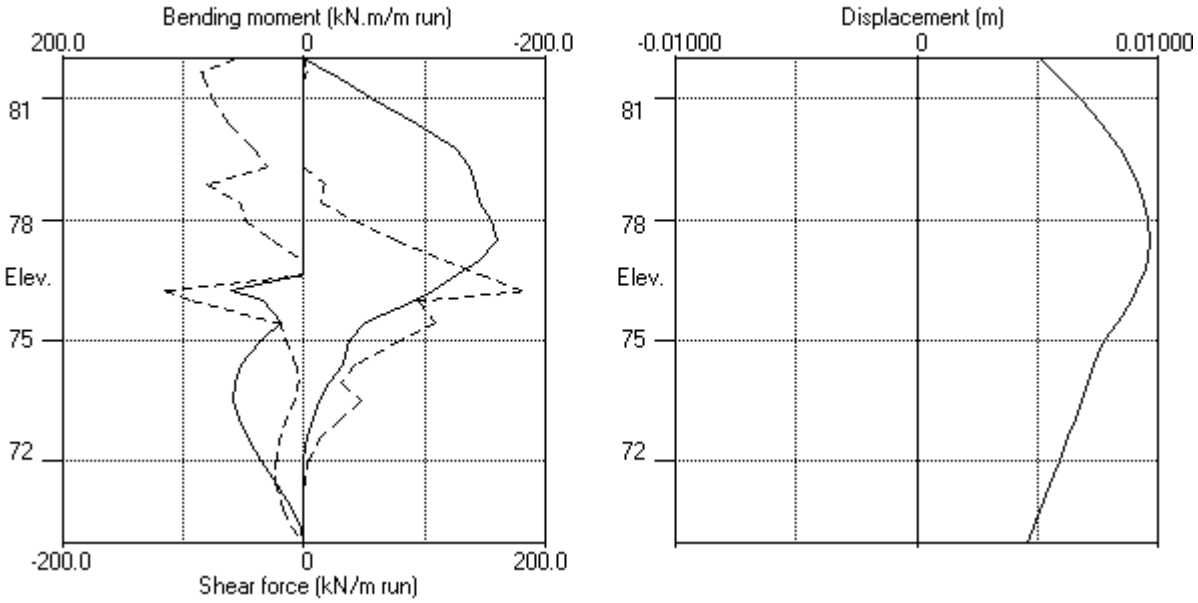
Stage	Bending moment				Shear force			
no.	maximum kN.m/m	elev.	minimum kN.m/m	elev.	maximum kN/m	elev.	minimum kN/m	elev.
1	2.5	73.95	-5.9	78.45	4.0	76.00	-2.7	80.40
2	No calculation at this stage							
3	No calculation at this stage							
4	23.8	74.40	-15.5	78.45	21.6	76.00	-8.9	80.40
5	No calculation at this stage							
6	22.9	74.40	-15.2	78.45	20.9	76.00	-8.8	80.40
7	55.2	73.95	-145.7	78.45	94.0	76.00	-56.9	82.00
8	No calculation at this stage							
9	54.8	73.95	-145.2	78.45	93.6	76.00	-56.8	82.00
10	31.4	73.50	-126.0	77.00	85.1	75.44	-48.8	78.00
11	57.3	73.50	-138.4	77.50	108.1	75.44	-52.8	82.00
12	No calculation at this stage							
13	No calculation at this stage							
14	58.1	73.50	-153.2	77.50	105.2	75.44	-51.2	78.90
15	No calculation at this stage							
16	58.2	73.50	-154.8	77.50	104.8	75.44	-57.4	81.65
17	55.5	73.50	-159.7	77.50	111.6	76.25	-79.7	78.90
18	24.5	72.00	-140.1	78.45	154.3	76.25	-98.1	76.25
19	59.8	76.25	-141.7	78.90	180.0	76.25	-114.9	76.25

Maximum and minimum displacement at each stage

Stage	Displacement				Stage description
no.	maximum m	elev.	minimum m	elev.	
1	0.000	78.90	0.000	82.00	Apply surcharge no.1 at elev. 81.50
2	No calculation at this stage				Apply surcharge no.2 at elev. 81.50
3	No calculation at this stage				Apply surcharge no.3 at elev. 82.00
4	0.004	82.00	0.000	82.00	Excav. to elev. 81.50 on PASSIVE side
5	No calculation at this stage				Install strut no.2 at elev. 82.00
6	0.004	82.00	0.000	82.00	Apply water pressure profile no.2
7	0.009	78.45	0.000	82.00	Excav. to elev. 77.50 on PASSIVE side
8	No calculation at this stage				Install strut no.3 at elev. 78.00
9	0.009	78.45	0.000	82.00	Apply water pressure profile no.4
10	0.010	77.50	0.000	82.00	Excav. to elev. 75.44 on PASSIVE side
11	0.009	78.00	0.000	82.00	Apply surcharge no.4 at elev. 75.44
12	No calculation at this stage				Install strut no.4 at elev. 76.25
13	No calculation at this stage				Install strut no.6 at elev. 78.90
14	0.009	78.00	0.000	82.00	Remove strut no.3 at elev. 78.00
15	No calculation at this stage				Install strut no.7 at elev. 81.65
16	0.009	78.00	0.000	82.00	Remove strut no.2 at elev. 82.00
17	0.009	78.00	0.000	82.00	Change soil type 1 to soil type 4
18	0.009	78.00	0.000	82.00	Change soil type 2 to soil type 5
19	0.009	78.00	0.000	82.00	Change soil type 3 to soil type 6

Units: kN,m

Bending moment, shear force, displacement envelopes



Units: kN,m

INPUT DATA

SOIL PROFILE

Stratum no.	Elevation of top of stratum	Soil types Active side	Passive side
1	82.00	1 Made Ground / Alluv	1 Made Ground / Alluv
2	76.00	2 Claygate Beds	2 Claygate Beds
3	73.50	3 London Clay	3 London Clay

SOIL PROPERTIES

-- Soil type -- No.	Description (Datum elev.)	Bulk density kN/m3	Young's Modulus Eh,kN/m2 (dEh/dy)	At rest coeff. Ko (dKo/dy)	Consol state. NC/OC (Nu)	Active limit Ka (Kac)	Passive limit Kp (Kpc)	Cohesion kN/m2 (dc/dy)
1	Made Ground / Alluv	17.00	12500	0.500	NC (0.490)	1.000 (2.570)	1.000 (2.571)	25.00u
2	Claygate .. (76.00)	18.00	37500 (3000)	0.500	OC (0.490)	1.000 (2.000)	1.000 (2.000)	75.00u (6.000)
3	London Clay (73.50)	19.00	45000 (2608)	1.000	OC (0.490)	1.000 (1.000)	1.000 (1.000)	90.00u (5.200)
4	MG /Alluv Drained	18.00	7500	0.500	NC (0.250)	0.324 (1.327)	3.601 (5.104)	0.0d
5	Claygate .. (76.00)	18.00	22500 (1800)	1.000	OC (0.200)	0.351 (1.391)	3.440 (5.233)	0.0d
6	London Cl.. (73.50)	19.00	27000 (1565)	1.000	OC (0.200)	0.337 (1.360)	3.440 (5.233)	0.0d

Additional soil parameters associated with Ka and Kp

------- Soil type ------- No.	Description	--- parameters for Ka --- Soil friction angle	Wall adhesion coeff.	Back-fill angle	--- parameters for Kp --- Soil friction angle	Wall adhesion coeff.	Back-fill angle
1	Made Ground / Alluv	0.00	1.000	0.00	0.00	1.000	0.00
2	Claygate Beds	0.00	0.000	0.00	0.00	0.000	0.00
3	London Clay	0.00	-0.674	0.00	0.00	-0.674	0.00
4	MG /Alluv Drained	27.00	0.641	0.00	27.00	0.471	0.00
5	Claygate Drained	25.00	0.670	0.00	25.00	0.670	0.00
6	London Clay Drained	26.00	0.670	0.00	25.00	0.670	0.00

GROUND WATER CONDITIONS

Density of water = 10.00 kN/m3

	Active side	Passive side
Initial water table elevation	81.00	81.00

Automatic water pressure balancing at toe of wall : No

Water press. profile no.	Active side Point no.	Elev. m	Piezo elev. m	Water press. kN/m2	Passive side Point no.	Elev. m	Piezo elev. m	Water press. kN/m2	
1	1	81.00	81.00	0.0	1	77.50	77.50	0.0	MC
2	1	82.00	82.00	0.0	1	77.00	77.00	0.0	WC
3	1	81.00	81.00	0.0	1	76.00	76.00	0.0	MC
4	1	82.00	82.00	0.0	1	75.00	75.00	0.0	WC

WALL PROPERTIES

Type of structure = Fully Embedded Wall
Elevation of toe of wall = 70.00
Maximum finite element length = 0.60 m
Youngs modulus of wall E = 2.8000E+07 kN/m2
Moment of inertia of wall I = 7.0700E-03 m4/m run
E.I = 197960 kN.m2/m run
Yield Moment of wall = Not defined

STRUTS and ANCHORS

Strut/ anchor no.	Elev.	Strut spacing m	X-section area of strut sq.m	Youngs modulus kN/m2	Free length m	Inclin -ation (degs)	Pre- stress /strut kN	Tension allowed
1	Not defined							
2	82.00	6.00	0.010000	2.000E+08	4.00	0.00	0	No
3	78.00	6.00	0.010000	2.000E+08	4.00	0.00	0	No
4	76.25	1.00	0.350000	3.000E+07	1.00	0.00	0	No
5	Not defined							
6	78.90	1.00	0.250000	3.000E+07	1.00	0.00	0	No
7	81.65	1.00	0.250000	2.000E+08	1.00	0.00	0	No

SURCHARGE LOADS

Surch -arge no.	Elev.	Distance from wall	Length parallel to wall	Width perpend. to wall	Surcharge ----- kN/m2 ----- Near edge	Far edge	Equiv. soil type	Partial factor/ Category
1	81.50	1.30(A)	0.50	20.00	100.00	=	N/A	1.00 P/U
2	81.50	0.80(A)	20.00	0.50	80.00	=	N/A	1.00 P/U
3	82.00	0.00(A)	20.00	20.00	5.00	=	N/A	1.00 P/U
4	75.44	-0.00(P)	8.00	10.00	50.00	=	N/A	1.00 -

Note: A = Active side, P = Passive side
Limit State Categories P/U = Permanent Unfavourable
P/F = Permanent Favourable
Var = Variable (unfavourable)

CONSTRUCTION STAGES

Construction stage no.	Stage description
1	Apply surcharge no.3 at elevation 82.00
	No analysis at this stage
2	Excavate to elevation 81.50 on PASSIVE side
3	Install strut or anchor no.2 at elevation 82.00
4	Apply water pressure profile no.1 (Mod. Conserv.)
5	Excavate to elevation 77.50 on PASSIVE side
6	Install strut or anchor no.3 at elevation 78.00
7	Apply water pressure profile no.3 (Mod. Conserv.)
8	Excavate to elevation 75.44 on PASSIVE side
9	Apply surcharge no.4 at elevation 75.44
10	Install strut or anchor no.4 at elevation 76.25
11	Install strut or anchor no.6 at elevation 78.90
12	Remove strut or anchor no.3 at elevation 78.00
13	Install strut or anchor no.7 at elevation 81.65
14	Remove strut or anchor no.2 at elevation 82.00
15	Change properties of soil type 1 to soil type 4
	Ko pressures will be reset
16	Change properties of soil type 2 to soil type 5
	Ko pressures will be reset
17	Change properties of soil type 3 to soil type 6
	Ko pressures will be reset

FACTORS OF SAFETY and ANALYSIS OPTIONS

Limit State options: Serviceability Limit State
All loads and soil strengths are unfactored

Stability analysis:
Method of analysis - Strength Factor method
Factor on soil strength for calculating wall depth = 1.00

Parameters for undrained strata:
Minimum equivalent fluid density = 5.00 kN/m3
Maximum depth of water filled tension crack = 0.00 m

Bending moment and displacement calculation:
Method - Subgrade reaction model using Influence Coefficients
Open Tension Crack analysis? - No
Non-linear Modulus Parameter (L) = 20.00 m

Boundary conditions:
Length of wall (normal to plane of analysis) = 6.00 m

Width of excavation on active side of wall = 20.00 m
Width of excavation on passive side of wall = 10.00 m

Distance to rigid boundary on active side = 20.00 m
Distance to rigid boundary on passive side = 20.00 m

OUTPUT OPTIONS

Stage no.	Stage description	Output options: Displacement Bending mom. Shear force	Active, Passive pressures	Graph. output
1	Apply surcharge no.3 at elev. 82.00	No	No	No
2	Excav. to elev. 81.50 on PASSIVE side	Yes	No	Yes
3	Install strut no.2 at elev. 82.00	No	No	No
4	Apply water pressure profile no.1	No	No	No
5	Excav. to elev. 77.50 on PASSIVE side	Yes	No	Yes
6	Install strut no.3 at elev. 78.00	No	No	No
7	Apply water pressure profile no.3	No	No	No
8	Excav. to elev. 75.44 on PASSIVE side	No	No	No
9	Apply surcharge no.4 at elev. 75.44	No	No	No
10	Install strut no.4 at elev. 76.25	No	No	No
11	Install strut no.6 at elev. 78.90	No	No	No
12	Remove strut no.3 at elev. 78.00	No	No	No
13	Install strut no.7 at elev. 81.65	No	No	No
14	Remove strut no.2 at elev. 82.00	No	No	No
15	Change soil type 1 to soil type 4	No	No	No
16	Change soil type 2 to soil type 5	No	No	No
17	Change soil type 3 to soil type 6	No	No	No
*	Summary output	Yes	-	Yes

Units: kN,m

Summary of results

LIMIT STATE PARAMETERS

Limit State: Serviceability Limit State

All loads and soil strengths are unfactored

STABILITY ANALYSIS of Fully Embedded Wall according to Strength Factor method

Factor of safety on soil strength

Stage No.	--- G.L. --- Act.	Pass.	Strut Elev.	FoS for toe elev. = 70.00 Factor of Safety	Moment equilib. at elev.	Toe elev. for FoS = 1.000 Toe elev.	Wall Penetr -ation
1	82.00	82.00	Cant.	Conditions not suitable for FoS calc.			
2	82.00	81.50	Cant.	Conditions not suitable for FoS calc.			
3	82.00	81.50		No analysis at this stage			
4	82.00	81.50	82.00	18.221	n/a	81.50	0.00
5	82.00	77.50	82.00	2.754	n/a	76.81	0.69
6	82.00	77.50		No analysis at this stage			

All remaining stages have more than one strut - FoS calculation n/a

Units: kN,m

Summary of results

BENDING MOMENT and DISPLACEMENT ANALYSIS of Fully Embedded Wall

Analysis options

Length of wall perpendicular to section = 6.00m
Subgrade reaction model - Boussinesq Influence coefficients
Soil deformations are elastic until the active or passive limit is reached
Open Tension Crack analysis - No

Rigid boundaries: Active side 20.00 from wall
Passive side 20.00 from wall

Limit State: Serviceability Limit State

Calculated Bending Moments and Strut Forces have been multiplied by a factor of 1.35 to obtain values for structural design.

Bending moment, shear force and displacement envelopes

Node no.	Y coord	Displacement		Bending moment Calculated		Bending moment Factored		Shear force Calculated		Shear force Factored	
		max.	min.	max.	min.	max.	min.	max.	min.	max.	min.
		m	m	kN.m/m		kN.m/m		kN/m	kN/m	kN/m	kN/m
1	82.00	0.003	0.000	0	0	0	0	0	-42	0	-57
2	81.65	0.003	0.000	0	-15	0	-20	2	-64	2	-87
3	81.50	0.003	0.000	0	-21	0	-28	1	-63	1	-85
4	81.00	0.004	0.000	0	-41	0	-56	0	-59	0	-79
5	80.40	0.005	0.000	0	-72	0	-98	0	-49	0	-67
6	79.80	0.006	0.000	0	-98	0	-132	0	-35	0	-47
7	79.35	0.006	0.000	0	-110	0	-149	0	-27	0	-37
8	78.90	0.007	0.000	0	-116	0	-156	7	-65	9	-87
9	78.45	0.007	0.000	0	-115	0	-155	13	-45	17	-61
10	78.00	0.007	0.000	0	-127	0	-171	35	-39	48	-53
11	77.50	0.007	0.000	0	-131	0	-177	64	-23	87	-30
12	77.19	0.007	0.000	0	-126	0	-170	84	-11	113	-14
13	76.88	0.007	0.000	0	-115	0	-155	105	0	142	0
14	76.56	0.007	0.000	10	-104	13	-140	128	0	172	0
15	76.25	0.007	0.000	53	-91	72	-123	151	-109	204	-148
16	76.00	0.007	0.000	28	-81	38	-109	66	-90	89	-121
17	75.44	0.007	0.000	9	-48	12	-65	86	-27	116	-36
18	74.92	0.006	0.000	16	-40	21	-54	61	-16	82	-21
19	74.40	0.006	0.000	32	-36	43	-48	37	-4	50	-6
20	73.95	0.006	0.000	44	-25	59	-33	32	-2	43	-3
21	73.50	0.005	0.000	48	-13	64	-17	49	-3	67	-4
22	73.05	0.005	0.000	46	-6	62	-8	29	-8	39	-11
23	72.60	0.005	0.000	40	-2	55	-2	12	-15	16	-21
24	72.00	0.005	0.000	29	0	40	0	3	-20	4	-27
25	71.40	0.005	0.000	17	0	23	0	0	-19	0	-26
26	70.80	0.004	0.000	6	0	9	0	0	-14	0	-19
27	70.40	0.004	0.000	2	0	3	0	0	-8	0	-11
28	70.00	0.004	0.000	0	-0	0	-0	0	0	0	0

Summary of results (continued)

Calculated Bending Moments and Strut Forces have been multiplied by a factor of 1.35 to obtain values for structural design.

Maximum and minimum bending moment and shear force at each stage

Stage	Bending moment						Shear force					
	Calculated				Factored		Calculated				Factored	
no.	max.	elev.	min.	elev.	max.	min.	max.	elev.	min.	elev.	max.	min.
	kN.m/m		kN.m/m		kN.m/m		kN/m		kN/m		kN/m	kN/m
1	4	74.40	-2	78.45	5	-3	3	76.00	-1	72.60	5	-2
2	11	74.40	-3	78.00	14	-4	9	76.00	-3	72.60	12	-5
3	No calculation at this stage											
4	10	74.40	-3	78.00	13	-4	9	76.00	-3	72.60	12	-4
5	32	73.50	-110	78.45	43	-149	66	76.00	-42	82.00	89	-57
6	No calculation at this stage											
7	31	73.50	-110	78.45	42	-149	66	76.00	-42	82.00	89	-57
8	23	73.05	-102	76.88	31	-138	63	75.44	-39	78.00	85	-53
9	47	73.50	-115	77.19	63	-155	86	75.44	-41	82.00	116	-56
10	No calculation at this stage											
11	No calculation at this stage											
12	48	73.50	-123	77.50	64	-166	84	75.44	-39	82.00	114	-53
13	No calculation at this stage											
14	48	73.50	-124	77.50	64	-167	84	75.44	-45	81.65	113	-61
15	45	73.50	-131	77.50	61	-177	93	76.25	-65	78.90	125	-87
16	20	72.00	-113	78.45	27	-153	130	76.25	-96	76.25	175	-129
17	53	76.25	-116	78.90	72	-156	151	76.25	-109	76.25	204	-148

Maximum and minimum displacement at each stage

Stage	Displacement				Stage description
no.	maximum	elev.	minimum	elev.	
	m		m		
1	0.001	82.00	0.000	82.00	Apply surcharge no.3 at elev. 82.00
2	0.002	82.00	0.000	82.00	Excav. to elev. 81.50 on PASSIVE side
3	No calculation at this stage				Install strut no.2 at elev. 82.00
4	0.002	82.00	0.000	82.00	Apply water pressure profile no.1
5	0.006	78.00	0.000	82.00	Excav. to elev. 77.50 on PASSIVE side
6	No calculation at this stage				Install strut no.3 at elev. 78.00
7	0.006	78.00	0.000	82.00	Apply water pressure profile no.3
8	0.007	77.19	0.000	82.00	Excav. to elev. 75.44 on PASSIVE side
9	0.007	77.50	0.000	82.00	Apply surcharge no.4 at elev. 75.44
10	No calculation at this stage				Install strut no.4 at elev. 76.25
11	No calculation at this stage				Install strut no.6 at elev. 78.90
12	0.007	77.50	0.000	82.00	Remove strut no.3 at elev. 78.00
13	No calculation at this stage				Install strut no.7 at elev. 81.65
14	0.007	77.50	0.000	82.00	Remove strut no.2 at elev. 82.00
15	0.007	77.50	0.000	82.00	Change soil type 1 to soil type 4
16	0.007	78.00	0.000	82.00	Change soil type 2 to soil type 5
17	0.007	78.00	0.000	82.00	Change soil type 3 to soil type 6

Summary of results (continued)

Calculated Bending Moments and Strut Forces have been multiplied by a factor of 1.35 to obtain values for structural design.

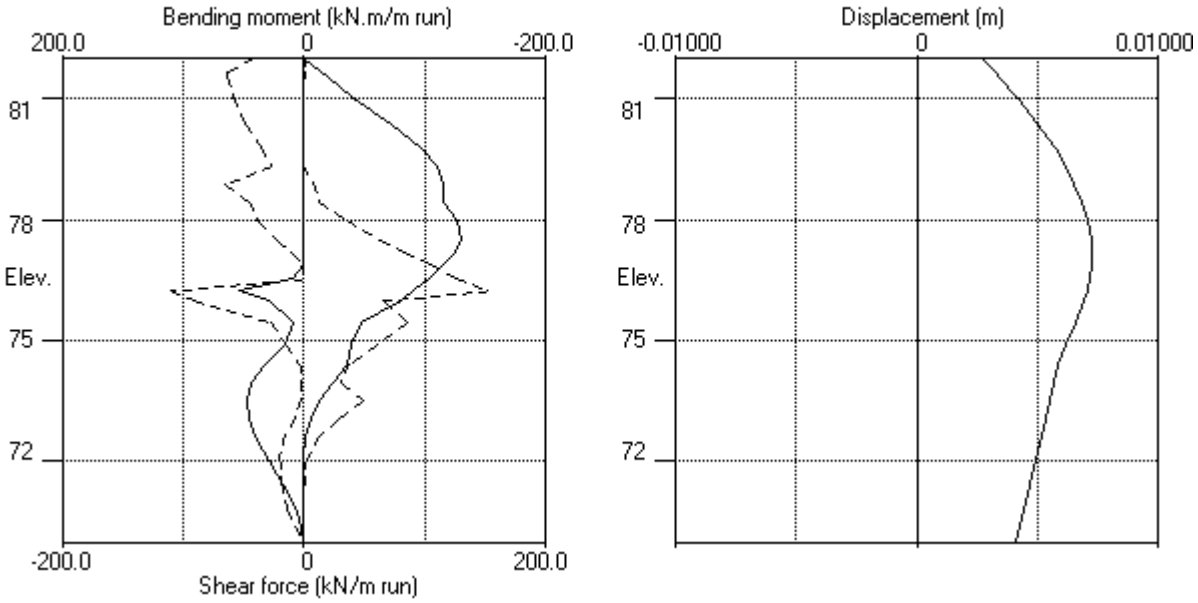
Strut forces at each stage (horizontal components)

Stage no.	Strut no. 2 at elev. 82.00			Strut no. 3 at elev. 78.00			Strut no. 4 at elev. 76.25		
	--Calculated-- kN per m run	kN per strut	Factored kN per strut	--Calculated-- kN per m run	kN per strut	Factored kN per strut	--Calculated-- kN per m run	kN per strut	Factored kN per strut
4	slack	slack	slack	---	---	---	---	---	---
5	42	254	343	---	---	---	---	---	---
7	42	254	343	0	2	3	---	---	---
8	35	211	284	52	314	423	---	---	---
9	41	247	333	33	199	269	---	---	---
12	39	237	320	---	---	---	12	12	17
14	---	---	---	---	---	---	14	14	19
15	---	---	---	---	---	---	62	62	83
16	---	---	---	---	---	---	225	225	304
17	---	---	---	---	---	---	261	261	352

Stage no.	Strut no. 6 at elev. 78.90			Strut no. 7 at elev. 81.65		
	--Calculated-- kN per m run	kN per strut	Factored kN per strut	--Calculated-- kN per m run	kN per strut	Factored kN per strut
12	24	24	33	---	---	---
14	16	16	22	46	46	62
15	71	71	96	55	55	74
16	28	28	38	62	62	83
17	3	3	4	66	66	89

Units: kN,m

Bending moment, shear force, displacement envelopes



Units: kN,m

INPUT DATA

SOIL PROFILE

Stratum no.	Elevation of top of stratum	Soil types Active side	Passive side
1	82.00	1 Made Ground / Alluv	1 Made Ground / Alluv
2	76.00	2 Claygate Beds	2 Claygate Beds
3	73.50	3 London Clay	3 London Clay

SOIL PROPERTIES (Unfactored SLS soil strengths)

-- Soil type -- No.	Description (Datum elev.)	Bulk density kN/m3	Young's Modulus Eh,kN/m2 (dEh/dy)	At rest coeff. Ko (dKo/dy)	Consol state. NC/OC (Nu)	Active limit Ka (Kac)	Passive limit Kp (Kpc)	Cohesion kN/m2 (dc/dy)
1	Made Ground / Alluv	17.00	12500	0.500	NC (0.490)	1.000 (2.570)	1.000 (2.571)	25.00u
2	Claygate .. (76.00)	18.00	37500 (3000)	0.500	OC (0.490)	1.000 (2.000)	1.000 (2.000)	75.00u (6.000)
3	London Clay (73.50)	19.00	45000 (2608)	1.000	OC (0.490)	1.000 (1.000)	1.000 (1.000)	90.00u (5.200)
4	MG /Alluv Drained	18.00	7500	0.500	NC (0.250)	0.324 (1.327)	3.601 (5.104)	0.0d
5	Claygate .. (76.00)	18.00	22500 (1800)	1.000	OC (0.200)	0.351 (1.391)	3.440 (5.233)	0.0d
6	London Cl.. (73.50)	19.00	27000 (1565)	1.000	OC (0.200)	0.337 (1.360)	3.440 (5.233)	0.0d

Additional soil parameters associated with Ka and Kp

------- Soil type ------- No.	Description	--- parameters for Ka --- Soil friction angle	Wall adhesion coeff.	Back-fill angle	--- parameters for Kp --- Soil friction angle	Wall adhesion coeff.	Back-fill angle
1	Made Ground / Alluv	0.00	1.000	0.00	0.00	1.000	0.00
2	Claygate Beds	0.00	0.000	0.00	0.00	0.000	0.00
3	London Clay	0.00	-0.674	0.00	0.00	-0.674	0.00
4	MG /Alluv Drained	27.00	0.641	0.00	27.00	0.471	0.00
5	Claygate Drained	25.00	0.670	0.00	25.00	0.670	0.00
6	London Clay Drained	26.00	0.670	0.00	25.00	0.670	0.00

GROUND WATER CONDITIONS

Density of water = 10.00 kN/m3

	Active side	Passive side
Initial water table elevation	81.00	81.00

Automatic water pressure balancing at toe of wall : No

Water press. profile no.	Active side Point no.	Elev. m	Piezo elev. m	Water press. kN/m2	Passive side Point no.	Elev. m	Piezo elev. m	Water press. kN/m2	
1	1	81.00	81.00	0.0	1	77.50	77.50	0.0	MC
2	1	82.00	82.00	0.0	1	77.00	77.00	0.0	WC
3	1	81.00	81.00	0.0	1	76.00	76.00	0.0	MC
4	1	82.00	82.00	0.0	1	75.00	75.00	0.0	WC

WALL PROPERTIES

Type of structure = Fully Embedded Wall
Elevation of toe of wall = 70.00
Maximum finite element length = 0.60 m
Youngs modulus of wall E = 2.8000E+07 kN/m2
Moment of inertia of wall I = 7.0700E-03 m4/m run
E.I = 197960 kN.m2/m run
Yield Moment of wall = Not defined

STRUTS and ANCHORS

Strut/ anchor no.	Elev.	Strut spacing m	X-section area of strut sq.m	Youngs modulus kN/m2	Free length m	Inclin -ation (degs)	Pre- stress /strut kN	Tension allowed
1	Not defined							
2	82.00	6.00	0.010000	2.000E+08	4.00	0.00	0	No
3	78.00	6.00	0.010000	2.000E+08	4.00	0.00	0	No
4	76.25	1.00	0.350000	3.000E+07	1.00	0.00	0	No
5	Not defined							
6	78.90	1.00	0.250000	3.000E+07	1.00	0.00	0	No
7	81.65	1.00	0.250000	2.000E+08	1.00	0.00	0	No

SURCHARGE LOADS

Surch -arge no.	Elev.	Distance from wall	Length parallel to wall	Width perpend. to wall	Surcharge ----- kN/m2 ----- Near edge	Far edge	Equiv. soil type	Partial factor/ Category
1	81.50	1.30(A)	0.50	20.00	100.00	=	N/A	1.00 P/U
2	81.50	0.80(A)	20.00	0.50	80.00	=	N/A	1.00 P/U
3	82.00	0.00(A)	20.00	20.00	5.00	=	N/A	1.00 P/U
4	75.44	-0.00(P)	8.00	10.00	50.00	=	N/A	1.00 -

Note: A = Active side, P = Passive side
Limit State Categories P/U = Permanent Unfavourable
P/F = Permanent Favourable
Var = Variable (unfavourable)

CONSTRUCTION STAGES

Construction stage no.	Stage description
1	Apply surcharge no.3 at elevation 82.00
	No analysis at this stage
2	Excavate to elevation 81.50 on PASSIVE side
3	Install strut or anchor no.2 at elevation 82.00
4	Apply water pressure profile no.1 (Mod. Conserv.)
5	Excavate to elevation 77.50 on PASSIVE side
6	Install strut or anchor no.3 at elevation 78.00
7	Apply water pressure profile no.3 (Mod. Conserv.)
8	Excavate to elevation 75.44 on PASSIVE side
9	Apply surcharge no.4 at elevation 75.44
10	Install strut or anchor no.4 at elevation 76.25
11	Install strut or anchor no.6 at elevation 78.90
12	Remove strut or anchor no.3 at elevation 78.00
13	Install strut or anchor no.7 at elevation 81.65
14	Remove strut or anchor no.2 at elevation 82.00
15	Change properties of soil type 1 to soil type 4
	Ko pressures will be reset
16	Change properties of soil type 2 to soil type 5
	Ko pressures will be reset
17	Change properties of soil type 3 to soil type 6
	Ko pressures will be reset

FACTORS OF SAFETY and ANALYSIS OPTIONS

Limit State options: ULS DA1 Combination 1
Water pressures : Moderately Conservative
Partial factor on C' = 1.000
Partial factor on Phi' = 1.000
Partial factor on Cu = 1.000
Partial factor on Soil Modulus = 1.000
Partial factor on Permanent Unfavourable loads = 1.000
Partial factor on Permanent Favourable loads = 1.000
Partial factor on Permanent Variable loads = 1.100
Design factor on calculated Bending Moments = 1.350

Parameters for undrained strata:
Minimum equivalent fluid density = 5.00 kN/m3
Maximum depth of water filled tension crack = 0.00 m

Bending moment and displacement calculation:
Method - Subgrade reaction model using Influence Coefficients
Open Tension Crack analysis? - No
Non-linear Modulus Parameter (L) = 20.00 m

Boundary conditions:
Length of wall (normal to plane of analysis) = 6.00 m

Width of excavation on active side of wall = 20.00 m
Width of excavation on passive side of wall = 10.00 m

Distance to rigid boundary on active side = 20.00 m
Distance to rigid boundary on passive side = 20.00 m

OUTPUT OPTIONS

Stage no.	Stage description	Output options: Displacement Bending mom. Shear force	Active, Passive pressures	Graph. output
1	Apply surcharge no.3 at elev. 82.00	No	No	No
2	Excav. to elev. 81.50 on PASSIVE side	Yes	No	Yes
3	Install strut no.2 at elev. 82.00	No	No	No
4	Apply water pressure profile no.1	No	No	No
5	Excav. to elev. 77.50 on PASSIVE side	Yes	No	Yes
6	Install strut no.3 at elev. 78.00	No	No	No
7	Apply water pressure profile no.3	No	No	No
8	Excav. to elev. 75.44 on PASSIVE side	No	No	No
9	Apply surcharge no.4 at elev. 75.44	No	No	No
10	Install strut no.4 at elev. 76.25	No	No	No
11	Install strut no.6 at elev. 78.90	No	No	No
12	Remove strut no.3 at elev. 78.00	No	No	No
13	Install strut no.7 at elev. 81.65	No	No	No
14	Remove strut no.2 at elev. 82.00	No	No	No
15	Change soil type 1 to soil type 4	No	No	No
16	Change soil type 2 to soil type 5	No	No	No
17	Change soil type 3 to soil type 6	No	No	No
*	Summary output	Yes	-	Yes

Units: kN,m

Summary of results

BENDING MOMENT and DISPLACEMENT ANALYSIS of Fully Embedded Wall

Analysis options

Length of wall perpendicular to section = 6.00m
Subgrade reaction model - Boussinesq Influence coefficients
Soil deformations are elastic until the active or passive limit is reached
Open Tension Crack analysis - No

Rigid boundaries: Active side 20.00 from wall
Passive side 20.00 from wall

Limit State: ULS DA1 Combination 1

Calculated Bending Moments and Strut Forces have been multiplied by a factor of 1.35 to obtain values for structural design.

Bending moment, shear force and displacement envelopes

Node no.	Y coord	Displacement		Bending moment Calculated		Bending moment Factored		Shear force Calculated		Shear force Factored	
		max.	min.	max.	min.	max.	min.	max.	min.	max.	min.
		m	m	kN.m/m		kN.m/m		kN/m	kN/m	kN/m	kN/m
1	82.00	0.003	0.000	0	0	0	0	0	-42	0	-57
2	81.65	0.003	0.000	0	-15	0	-20	2	-64	2	-87
3	81.50	0.003	0.000	0	-21	0	-28	1	-63	1	-85
4	81.00	0.004	0.000	0	-41	0	-56	0	-59	0	-79
5	80.40	0.005	0.000	0	-72	0	-98	0	-49	0	-67
6	79.80	0.006	0.000	0	-98	0	-132	0	-35	0	-47
7	79.35	0.006	0.000	0	-110	0	-149	0	-27	0	-37
8	78.90	0.007	0.000	0	-116	0	-156	7	-65	9	-87
9	78.45	0.007	0.000	0	-115	0	-155	13	-45	17	-61
10	78.00	0.007	0.000	0	-127	0	-171	35	-39	48	-53
11	77.50	0.007	0.000	0	-131	0	-177	64	-23	87	-30
12	77.19	0.007	0.000	0	-126	0	-170	84	-11	113	-14
13	76.88	0.007	0.000	0	-115	0	-155	105	0	142	0
14	76.56	0.007	0.000	10	-104	13	-140	128	0	172	0
15	76.25	0.007	0.000	53	-91	72	-123	151	-109	204	-148
16	76.00	0.007	0.000	28	-81	38	-109	66	-90	89	-121
17	75.44	0.007	0.000	9	-48	12	-65	86	-27	116	-36
18	74.92	0.006	0.000	16	-40	21	-54	61	-16	82	-21
19	74.40	0.006	0.000	32	-36	43	-48	37	-4	50	-6
20	73.95	0.006	0.000	44	-25	59	-33	32	-2	43	-3
21	73.50	0.005	0.000	48	-13	64	-17	49	-3	67	-4
22	73.05	0.005	0.000	46	-6	62	-8	29	-8	39	-11
23	72.60	0.005	0.000	40	-2	55	-2	12	-15	16	-21
24	72.00	0.005	0.000	29	0	40	0	3	-20	4	-27
25	71.40	0.005	0.000	17	0	23	0	0	-19	0	-26
26	70.80	0.004	0.000	6	0	9	0	0	-14	0	-19
27	70.40	0.004	0.000	2	0	3	0	0	-8	0	-11
28	70.00	0.004	0.000	0	-0	0	-0	0	0	0	0

Summary of results (continued)

Calculated Bending Moments and Strut Forces have been multiplied by a factor of 1.35 to obtain values for structural design.

Maximum and minimum bending moment and shear force at each stage

Stage	Bending moment						Shear force					
	Calculated				Factored		Calculated				Factored	
no.	max.	elev.	min.	elev.	max.	min.	max.	elev.	min.	elev.	max.	min.
	kN.m/m		kN.m/m		kN.m/m		kN/m		kN/m		kN/m	kN/m
1	4	74.40	-2	78.45	5	-3	3	76.00	-1	72.60	5	-2
2	11	74.40	-3	78.00	14	-4	9	76.00	-3	72.60	12	-5
3	No calculation at this stage											
4	10	74.40	-3	78.00	13	-4	9	76.00	-3	72.60	12	-4
5	32	73.50	-110	78.45	43	-149	66	76.00	-42	82.00	89	-57
6	No calculation at this stage											
7	31	73.50	-110	78.45	42	-149	66	76.00	-42	82.00	89	-57
8	23	73.05	-102	76.88	31	-138	63	75.44	-39	78.00	85	-53
9	47	73.50	-115	77.19	63	-155	86	75.44	-41	82.00	116	-56
10	No calculation at this stage											
11	No calculation at this stage											
12	48	73.50	-123	77.50	64	-166	84	75.44	-39	82.00	114	-53
13	No calculation at this stage											
14	48	73.50	-124	77.50	64	-167	84	75.44	-45	81.65	113	-61
15	45	73.50	-131	77.50	61	-177	93	76.25	-65	78.90	125	-87
16	20	72.00	-113	78.45	27	-153	130	76.25	-96	76.25	175	-129
17	53	76.25	-116	78.90	72	-156	151	76.25	-109	76.25	204	-148

Maximum and minimum displacement at each stage

Stage	Displacement				Stage description
no.	maximum	elev.	minimum	elev.	
	m		m		
1	0.001	82.00	0.000	82.00	Apply surcharge no.3 at elev. 82.00
2	0.002	82.00	0.000	82.00	Excav. to elev. 81.50 on PASSIVE side
3	No calculation at this stage				Install strut no.2 at elev. 82.00
4	0.002	82.00	0.000	82.00	Apply water pressure profile no.1
5	0.006	78.00	0.000	82.00	Excav. to elev. 77.50 on PASSIVE side
6	No calculation at this stage				Install strut no.3 at elev. 78.00
7	0.006	78.00	0.000	82.00	Apply water pressure profile no.3
8	0.007	77.19	0.000	82.00	Excav. to elev. 75.44 on PASSIVE side
9	0.007	77.50	0.000	82.00	Apply surcharge no.4 at elev. 75.44
10	No calculation at this stage				Install strut no.4 at elev. 76.25
11	No calculation at this stage				Install strut no.6 at elev. 78.90
12	0.007	77.50	0.000	82.00	Remove strut no.3 at elev. 78.00
13	No calculation at this stage				Install strut no.7 at elev. 81.65
14	0.007	77.50	0.000	82.00	Remove strut no.2 at elev. 82.00
15	0.007	77.50	0.000	82.00	Change soil type 1 to soil type 4
16	0.007	78.00	0.000	82.00	Change soil type 2 to soil type 5
17	0.007	78.00	0.000	82.00	Change soil type 3 to soil type 6

Summary of results (continued)

Calculated Bending Moments and Strut Forces have been multiplied by a factor of 1.35 to obtain values for structural design.

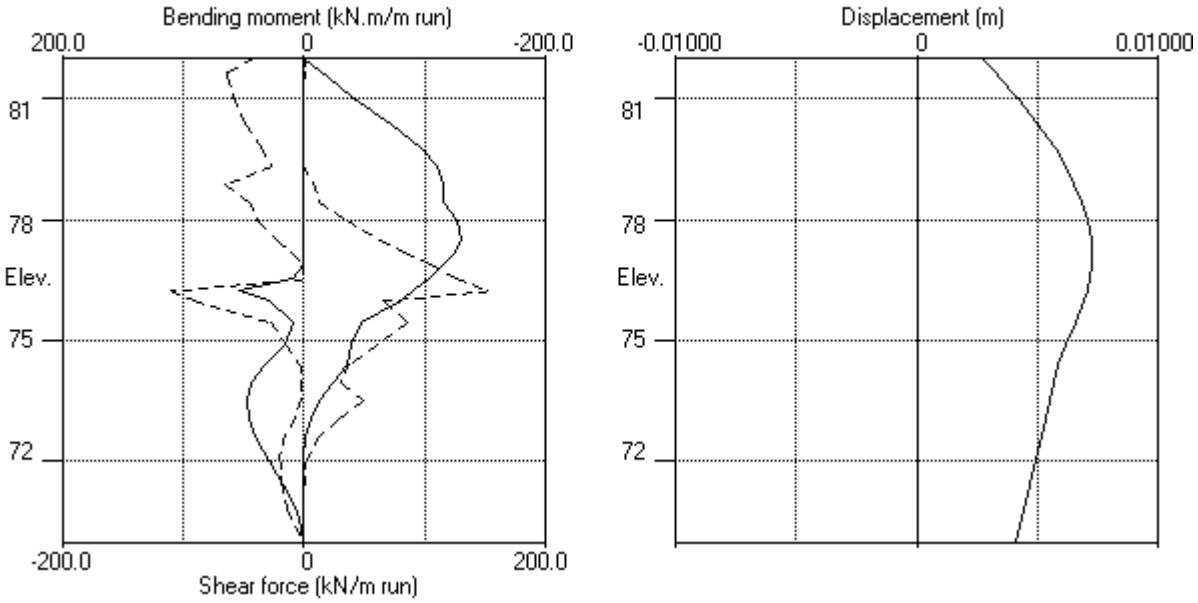
Strut forces at each stage (horizontal components)

Stage no.	Strut no. 2 at elev. 82.00			Strut no. 3 at elev. 78.00			Strut no. 4 at elev. 76.25		
	--Calculated-- kN per m run	kN per strut	Factored kN per strut	--Calculated-- kN per m run	kN per strut	Factored kN per strut	--Calculated-- kN per m run	kN per strut	Factored kN per strut
4	slack	slack	slack	---	---	---	---	---	---
5	42	254	343	---	---	---	---	---	---
7	42	254	343	0	2	3	---	---	---
8	35	211	284	52	314	423	---	---	---
9	41	247	333	33	199	269	---	---	---
12	39	237	320	---	---	---	12	12	17
14	---	---	---	---	---	---	14	14	19
15	---	---	---	---	---	---	62	62	83
16	---	---	---	---	---	---	225	225	304
17	---	---	---	---	---	---	261	261	352

Stage no.	Strut no. 6 at elev. 78.90			Strut no. 7 at elev. 81.65		
	--Calculated-- kN per m run	kN per strut	Factored kN per strut	--Calculated-- kN per m run	kN per strut	Factored kN per strut
12	24	24	33	---	---	---
14	16	16	22	46	46	62
15	71	71	96	55	55	74
16	28	28	38	62	62	83
17	3	3	4	66	66	89

Units: kN,m

Bending moment, shear force, displacement envelopes



Units: kN,m

INPUT DATA

SOIL PROFILE

Stratum no.	Elevation of top of stratum	Soil types Active side	Passive side
1	82.00	1 Made Ground / Alluv	1 Made Ground / Alluv
2	76.00	2 Claygate Beds	2 Claygate Beds
3	73.50	3 London Clay	3 London Clay

SOIL PROPERTIES (Unfactored SLS soil strengths)

-- Soil type -- No.	Description (Datum elev.)	Bulk density kN/m3	Young's Modulus Eh,kN/m2 (dEh/dy)	At rest coeff. Ko (dKo/dy)	Consol state. NC/OC (Nu)	Active limit Ka (Kac)	Passive limit Kp (Kpc)	Cohesion kN/m2 (dc/dy)
1	Made Ground / Alluv	17.00	12500	0.500	NC (0.490)	1.000 (2.570)	1.000 (2.571)	25.00u
2	Claygate .. (76.00)	18.00	37500 (3000)	0.500	OC (0.490)	1.000 (2.000)	1.000 (2.000)	75.00u (6.000)
3	London Clay (73.50)	19.00	45000 (2608)	1.000	OC (0.490)	1.000 (1.000)	1.000 (1.000)	90.00u (5.200)
4	MG /Alluv Drained	18.00	7500	0.500	NC (0.250)	0.324 (1.327)	3.601 (5.104)	0.0d
5	Claygate .. (76.00)	18.00	22500 (1800)	1.000	OC (0.200)	0.351 (1.391)	3.440 (5.233)	0.0d
6	London Cl.. (73.50)	19.00	27000 (1565)	1.000	OC (0.200)	0.337 (1.360)	3.440 (5.233)	0.0d

Additional soil parameters associated with Ka and Kp

------- Soil type ------- No.	Description	--- parameters for Ka --- Soil friction angle	Wall adhesion coeff.	Back-fill angle	--- parameters for Kp --- Soil friction angle	Wall adhesion coeff.	Back-fill angle
1	Made Ground / Alluv	0.00	1.000	0.00	0.00	1.000	0.00
2	Claygate Beds	0.00	0.000	0.00	0.00	0.000	0.00
3	London Clay	0.00	-0.674	0.00	0.00	-0.674	0.00
4	MG /Alluv Drained	27.00	0.641	0.00	27.00	0.471	0.00
5	Claygate Drained	25.00	0.670	0.00	25.00	0.670	0.00
6	London Clay Drained	26.00	0.670	0.00	25.00	0.670	0.00

GROUND WATER CONDITIONS

Density of water = 10.00 kN/m3

	Active side	Passive side
Initial water table elevation	81.00	81.00

Automatic water pressure balancing at toe of wall : No

Water press. profile no.	Active side Point no.	Elev. m	Piezo elev. m	Water press. kN/m2	Passive side Point no.	Elev. m	Piezo elev. m	Water press. kN/m2	
1	1	81.00	81.00	0.0	1	77.50	77.50	0.0	MC
2	1	82.00	82.00	0.0	1	77.00	77.00	0.0	WC
3	1	81.00	81.00	0.0	1	76.00	76.00	0.0	MC
4	1	82.00	82.00	0.0	1	75.00	75.00	0.0	WC

WALL PROPERTIES

Type of structure = Fully Embedded Wall
Elevation of toe of wall = 70.00
Maximum finite element length = 0.60 m
Youngs modulus of wall E = 2.8000E+07 kN/m2
Moment of inertia of wall I = 7.0700E-03 m4/m run
E.I = 197960 kN.m2/m run
Yield Moment of wall = Not defined

STRUTS and ANCHORS

Strut/ anchor no.	Elev.	Strut spacing m	X-section area of strut sq.m	Youngs modulus kN/m2	Free length m	Inclin -ation (degs)	Pre- stress /strut kN	Tension allowed
1	Not defined							
2	82.00	6.00	0.010000	2.000E+08	4.00	0.00	0	No
3	78.00	6.00	0.010000	2.000E+08	4.00	0.00	0	No
4	76.25	1.00	0.350000	3.000E+07	1.00	0.00	0	No
5	Not defined							
6	78.90	1.00	0.250000	3.000E+07	1.00	0.00	0	No
7	81.65	1.00	0.250000	2.000E+08	1.00	0.00	0	No

SURCHARGE LOADS

Surch -arge no.	Elev.	Distance from wall	Length parallel to wall	Width perpend. to wall	Surcharge ----- kN/m2 ----- Near edge	Far edge	Equiv. soil type	Partial factor/ Category
1	81.50	1.30(A)	0.50	20.00	100.00	=	N/A	1.00 P/U
2	81.50	0.80(A)	20.00	0.50	80.00	=	N/A	1.00 P/U
3	82.00	0.00(A)	20.00	20.00	5.00	=	N/A	1.00 P/U
4	75.44	-0.00(P)	8.00	10.00	50.00	=	N/A	1.00 -

Note: A = Active side, P = Passive side
Limit State Categories P/U = Permanent Unfavourable
P/F = Permanent Favourable
Var = Variable (unfavourable)

CONSTRUCTION STAGES

Construction stage no.	Stage description
1	Apply surcharge no.3 at elevation 82.00
	No analysis at this stage
2	Excavate to elevation 81.50 on PASSIVE side
3	Install strut or anchor no.2 at elevation 82.00
4	Apply water pressure profile no.2 (Worst Cred.)
5	Excavate to elevation 77.50 on PASSIVE side
6	Install strut or anchor no.3 at elevation 78.00
7	Apply water pressure profile no.4 (Worst Cred.)
8	Excavate to elevation 75.44 on PASSIVE side
9	Apply surcharge no.4 at elevation 75.44
10	Install strut or anchor no.4 at elevation 76.25
11	Install strut or anchor no.6 at elevation 78.90
12	Remove strut or anchor no.3 at elevation 78.00
13	Install strut or anchor no.7 at elevation 81.65
14	Remove strut or anchor no.2 at elevation 82.00
15	Change properties of soil type 1 to soil type 4
	Ko pressures will be reset
16	Change properties of soil type 2 to soil type 5
	Ko pressures will be reset
17	Change properties of soil type 3 to soil type 6
	Ko pressures will be reset

FACTORS OF SAFETY and ANALYSIS OPTIONS

Limit State options: ULS DA1 Combination 2
Water pressures : Worst Credible
Partial factor on C' = 1.250
Partial factor on Phi' = 1.250
Partial factor on Cu = 1.400
Partial factor on Soil Modulus = 1.000
Partial factor on Permanent Unfavourable loads = 1.000
Partial factor on Permanent Favourable loads = 1.000
Partial factor on Permanent Variable loads = 1.300

Stability analysis:
Method of analysis - Strength Factor method
Overall factor on soil strength for calculating wall depth = 1.00

Parameters for undrained strata:
Minimum equivalent fluid density = 5.00 kN/m3
Maximum depth of water filled tension crack = 0.00 m

Bending moment and displacement calculation:
Method - Subgrade reaction model using Influence Coefficients
Open Tension Crack analysis? - No
Non-linear Modulus Parameter (L) = 20.00 m

Boundary conditions:
Length of wall (normal to plane of analysis) = 6.00 m

Width of excavation on active side of wall = 20.00 m
Width of excavation on passive side of wall = 10.00 m

Distance to rigid boundary on active side = 20.00 m
Distance to rigid boundary on passive side = 20.00 m

OUTPUT OPTIONS

Stage no.	Stage description	Output options: Displacement Bending mom. Shear force	Active, Passive pressures	Graph. output
1	Apply surcharge no.3 at elev. 82.00	No	No	No
2	Excav. to elev. 81.50 on PASSIVE side	Yes	No	Yes
3	Install strut no.2 at elev. 82.00	No	No	No
4	Apply water pressure profile no.2	No	No	No
5	Excav. to elev. 77.50 on PASSIVE side	Yes	No	Yes
6	Install strut no.3 at elev. 78.00	No	No	No
7	Apply water pressure profile no.4	No	No	No
8	Excav. to elev. 75.44 on PASSIVE side	No	No	No
9	Apply surcharge no.4 at elev. 75.44	No	No	No
10	Install strut no.4 at elev. 76.25	No	No	No
11	Install strut no.6 at elev. 78.90	No	No	No
12	Remove strut no.3 at elev. 78.00	No	No	No
13	Install strut no.7 at elev. 81.65	No	No	No
14	Remove strut no.2 at elev. 82.00	No	No	No
15	Change soil type 1 to soil type 4	No	No	No
16	Change soil type 2 to soil type 5	No	No	No
17	Change soil type 3 to soil type 6	No	No	No
*	Summary output	Yes	-	Yes

Units: kN,m

Summary of results

LIMIT STATE PARAMETERS

Limit State: ULS DA1 Combination 2
Water pressures : Worst Credible
Partial factor on C' = 1.250
Partial factor on Phi' = 1.250
Partial factor on Cu = 1.400
Partial factor on Soil Modulus = 1.000
Partial factor on Permanent Unfavourable loads = 1.000
Partial factor on Permanent Favourable loads = 1.000
Partial factor on Permanent Variable loads = 1.300

STABILITY ANALYSIS of Fully Embedded Wall according to Strength Factor method

Factor of safety on soil strength

Stage No.	--- G.L. --- Act.	Pass.	Strut Elev.	Overall FoS for toe elev. = 70.00 Factor of Safety	Moment equilib. at elev.	Toe elev. for FoS = 1.000 Toe elev.	Wall Penetr -ation
1	82.00	82.00	Cant.	Conditions not suitable for FoS calc.			
2	82.00	81.50	Cant.	Conditions not suitable for FoS calc.			
3	82.00	81.50		No analysis at this stage			
4	82.00	81.50	82.00	13.014	n/a	81.49	0.01
5	82.00	77.50	82.00	1.967	n/a	75.86	1.64
6	82.00	77.50		No analysis at this stage			

All remaining stages have more than one strut - FoS calculation n/a

Units: kN,m

Summary of results

BENDING MOMENT and DISPLACEMENT ANALYSIS of Fully Embedded Wall

Analysis options

Length of wall perpendicular to section = 6.00m
Subgrade reaction model - Boussinesq Influence coefficients
Soil deformations are elastic until the active or passive limit is reached
Open Tension Crack analysis - No

Rigid boundaries: Active side 20.00 from wall
Passive side 20.00 from wall

Limit State: ULS DA1 Combination 2

Bending moment, shear force and displacement envelopes

Node no.	Y coord	Displacement maximum m	Displacement minimum m	Bending moment maximum kN.m/m	Bending moment minimum kN.m/m	Shear force maximum kN/m	Shear force minimum kN/m
1	82.00	0.003	0.000	0.0	-0.0	0.0	-42.5
2	81.65	0.003	0.000	0.3	-14.8	1.8	-67.0
3	81.50	0.003	0.000	0.1	-21.2	0.7	-65.8
4	81.00	0.004	0.000	0.4	-41.5	0.0	-59.3
5	80.40	0.005	0.000	0.0	-73.1	0.0	-47.0
6	79.80	0.006	0.000	0.0	-96.4	0.0	-31.0
7	79.35	0.006	0.000	0.0	-105.7	0.0	-25.2
8	78.90	0.007	0.000	0.0	-107.5	16.9	-75.6
9	78.45	0.007	0.000	0.0	-111.0	6.2	-53.6
10	78.00	0.007	0.000	0.0	-125.2	31.3	-44.3
11	77.50	0.007	0.000	0.0	-132.0	62.5	-28.1
12	77.00	0.007	0.000	0.0	-122.6	97.3	-8.2
13	76.63	0.007	0.000	3.1	-108.0	125.6	0.0
14	76.25	0.007	0.000	55.7	-95.0	155.7	-116.3
15	76.00	0.007	0.000	29.2	-85.8	66.8	-95.3
16	75.44	0.007	0.000	8.8	-54.2	84.7	-30.7
17	75.00	0.007	0.000	13.2	-45.8	64.1	-20.7
18	74.40	0.006	0.000	26.7	-42.9	37.2	-7.0
19	73.95	0.006	0.000	37.3	-32.2	30.9	-1.9
20	73.50	0.006	0.000	41.2	-20.1	49.1	-2.8
21	73.05	0.006	0.000	40.6	-13.1	31.2	-7.2
22	72.60	0.006	0.000	36.2	-7.8	15.2	-12.4
23	72.00	0.005	0.000	27.9	-1.7	6.1	-17.7
24	71.40	0.005	0.000	16.5	0.0	2.3	-18.2
25	70.80	0.005	0.000	6.3	0.0	0.2	-13.7
26	70.40	0.005	0.000	2.0	0.0	0.0	-7.9
27	70.00	0.005	0.000	0.0	-0.0	0.0	-0.0

Summary of results (continued)

Maximum and minimum bending moment and shear force at each stage

Stage	Bending moment				Shear force			
no.	maximum kN.m/m	elev.	minimum kN.m/m	elev.	maximum kN/m	elev.	minimum kN/m	elev.
1	3.8	74.40	-1.9	78.45	3.5	76.00	-1.2	72.60
2	10.6	74.40	-3.3	78.00	9.0	76.00	-3.4	72.60
3	No calculation at this stage							
4	9.7	74.40	-3.1	78.00	8.3	76.00	-3.1	72.60
5	31.8	73.50	-111.0	78.45	66.8	76.00	-42.5	82.00
6	No calculation at this stage							
7	31.4	73.50	-110.6	78.45	66.4	76.00	-42.4	82.00
8	17.9	72.60	-102.3	77.00	61.7	75.44	-44.3	78.00
9	40.5	73.50	-113.7	77.00	84.7	75.44	-39.8	82.00
10	No calculation at this stage							
11	No calculation at this stage							
12	41.1	73.50	-121.9	77.50	82.6	75.44	-40.3	78.90
13	No calculation at this stage							
14	41.2	73.50	-123.1	77.50	82.3	75.44	-43.4	81.65
15	38.8	73.50	-132.0	77.50	94.9	76.25	-75.6	78.90
16	18.6	72.00	-110.4	78.00	132.5	76.25	-101.6	76.25
17	55.7	76.25	-109.8	78.45	155.7	76.25	-116.3	76.25

Maximum and minimum displacement at each stage

Stage	Displacement				Stage description
no.	maximum m	elev.	minimum m	elev.	
1	0.001	82.00	0.000	82.00	Apply surcharge no.3 at elev. 82.00
2	0.002	82.00	0.000	82.00	Excav. to elev. 81.50 on PASSIVE side
3	No calculation at this stage				Install strut no.2 at elev. 82.00
4	0.002	82.00	0.000	82.00	Apply water pressure profile no.2
5	0.006	78.00	0.000	82.00	Excav. to elev. 77.50 on PASSIVE side
6	No calculation at this stage				Install strut no.3 at elev. 78.00
7	0.006	78.00	0.000	82.00	Apply water pressure profile no.4
8	0.007	77.00	0.000	82.00	Excav. to elev. 75.44 on PASSIVE side
9	0.007	77.50	0.000	82.00	Apply surcharge no.4 at elev. 75.44
10	No calculation at this stage				Install strut no.4 at elev. 76.25
11	No calculation at this stage				Install strut no.6 at elev. 78.90
12	0.007	77.50	0.000	82.00	Remove strut no.3 at elev. 78.00
13	No calculation at this stage				Install strut no.7 at elev. 81.65
14	0.007	77.50	0.000	82.00	Remove strut no.2 at elev. 82.00
15	0.007	77.50	0.000	82.00	Change soil type 1 to soil type 4
16	0.007	77.50	0.000	82.00	Change soil type 2 to soil type 5
17	0.007	78.00	0.000	82.00	Change soil type 3 to soil type 6

Summary of results (continued)

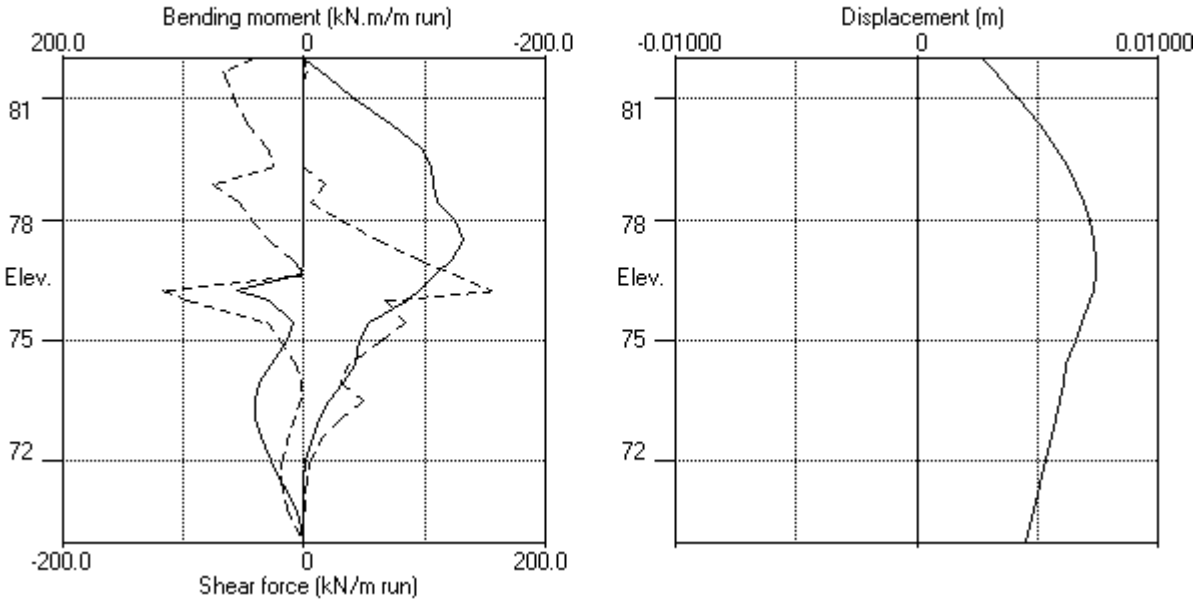
Strut forces at each stage (horizontal components)

Stage no.	Strut no. 2 at elev. 82.00		Strut no. 3 at elev. 78.00		Strut no. 4 at elev. 76.25	
	kN/m run	kN/strut	kN/m run	kN/strut	kN/m run	kN/strut
4	slack	slack	---	---	---	---
5	42.52	255.10	---	---	---	---
7	42.41	254.47	0.35	2.10	---	---
8	33.89	203.36	58.61	351.64	---	---
9	39.84	239.02	39.49	236.93	---	---
12	37.88	227.27	---	---	14.87	14.87
14	---	---	---	---	16.64	16.64
15	---	---	---	---	68.92	68.92
16	---	---	---	---	234.18	234.18
17	---	---	---	---	272.08	272.08

Stage no.	Strut no. 6 at elev. 78.90		Strut no. 7 at elev. 81.65	
	kN/m run	kN/strut	kN/m run	kN/strut
12	28.70	28.70	---	---
14	21.24	21.24	43.92	43.92
15	92.54	92.54	58.01	58.01
16	48.70	48.70	64.68	64.68
17	21.65	21.65	68.86	68.86

Units: kN,m

Bending moment, shear force, displacement envelopes



APPENDIX 5

Soil Displacement Model Results

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	Line 1	-	20.50000	20.00000	82.00000	37.00000	20.00000	82.00000	50	-	-	Yes	Sub-surface
Grid	Grid 1	Global X	0.00000	0.00000	82.00000	-	40.00000	82.00000	50	60.00000	50	Yes	Sub-surface
Grid	Grid 2	Global Y	20.00000	20.00000	82.00000	37.00000	-	82.00000	10	3.00000	10	Yes	Sub-surface
Line	Line 2	-	25.00000	20.00000	82.00000	25.00000	10.00000	82.00000	10	-	-	Yes	Sub-surface
Line	Line 3	-	33.00000	20.00000	82.00000	33.00000	10.00000	82.00000	10	-	-	Yes	Sub-surface

Vertical Ground Movement Curves

Curve Name: **Excavation in front of high stiffness wall in stiff clay (CIRIA 580 Fig. 2.11(b)**

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)(%)]
[0.000,0.000,0.039][0.100,0.000,0.049][0.200,0.000,0.056][0.300,0.000,0.062]
[0.400,0.000,0.067][0.500,0.000,0.070][0.600,0.000,0.072][0.700,0.000,0.073]
[0.800,0.000,0.073][0.900,0.000,0.072][1.000,0.000,0.070][1.100,0.000,0.068]
[1.200,0.000,0.065][1.300,0.000,0.061][1.400,0.000,0.058][1.500,0.000,0.054]
[1.600,0.000,0.050][1.700,0.000,0.046][1.800,0.000,0.042][1.900,0.000,0.038]
[2.000,0.000,0.034][2.100,0.000,0.030][2.200,0.000,0.027][2.300,0.000,0.023]
[2.400,0.000,0.020][2.500,0.000,0.017][2.600,0.000,0.014][2.700,0.000,0.012]
[2.800,0.000,0.010][2.900,0.000,0.008][3.000,0.000,0.007][3.100,0.000,0.005]
[3.200,0.000,0.004][3.300,0.000,0.004][3.400,0.000,0.003][3.500,0.000,0.002]
[3.600,0.000,0.002][3.700,0.000,0.002][3.800,0.000,0.001][3.900,0.000,0.001]
[4.000,0.000,0.000]

Curve Fitting Method: Polynomial
x Order: 4
y Order: 0
Polynomial: $z = -2.6455E\text{-}3x^4 + 2.8495E\text{-}2x^3 - 1.0051E\text{-}1x^2 + 1.0569E\text{-}1x + 3.8990E\text{-}2$
Coeff. of Determination: 9.9991E-1

Horizontal Ground Movement Curves

Curve Name: **Excavation in front of high stiffness wall in stiff clay (CIRIA 580 Fig. 2.11(a))**

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)(%)]
[0.000,0.000,0.150][4.000,0.000,0.000]

Curve Fitting Method: Polynomial
x Order: 1
y Order: 0
Polynomial: $z = -3.75E\text{-}2x + 1.50E\text{-}1$
Coeff. of Determination: 1.00

Polygonal Excavations

Excavation Name: **General Excavation**

Surface level [m]: 82.000
Contribution: Positive

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	20.500	20.500	76.000	No	-	-	-	-	-	-
2	20.500	27.500	76.000	No	-	-	-	-	-	-
3	37.000	27.500	76.000	No	-	-	-	-	-	-
4	37.000	20.500	76.000	No	-	-	-	-	-	-

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	20.500	20.500	20.500	27.500	Excavation in front of high stiffness wall in stiff clay (CIRIA 580 Fig. 2.11(b)	Excavation in front of high stiffness wall in stiff clay (CIRIA 580 Fig. 2.11(a))
2	20.500	27.500	37.000	27.500	Excavation in front of high stiffness wall in stiff clay (CIRIA 580 Fig. 2.11(b)	Excavation in front of high stiffness wall in stiff clay (CIRIA 580 Fig. 2.11(a))
3	37.000	27.500	37.000	20.500	Excavation in front of high stiffness wall in stiff clay (CIRIA 580 Fig. 2.11(b)	Excavation in front of high stiffness wall in stiff clay (CIRIA 580 Fig. 2.11(a))
4	37.000	20.500	20.500	20.500	Excavation in front of high stiffness wall in stiff clay (CIRIA 580 Fig. 2.11(b)	Excavation in front of high stiffness wall in stiff clay (CIRIA 580 Fig. 2.11(a))

Excavation Name: **Pool Excavation**

Surface level [m]: 84.000
Contribution: Positive

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	31.500	20.500	74.000	No	-	-	-	-	-	-
2	31.500	27.500	74.000	No	-	-	-	-	-	-
3	37.000	27.500	74.000	No	-	-	-	-	-	-
4	37.000	20.500	74.000	No	-	-	-	-	-	-

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	31.500	20.500	31.500	27.500	Excavation in front of high stiffness wall in stiff clay (CIRIA 580 Fig. 2.11(b)	Excavation in front of high stiffness wall in stiff clay (CIRIA 580 Fig. 2.11(a))
2	31.500	27.500	37.000	27.500	Excavation in front of high stiffness wall in stiff clay (CIRIA 580 Fig. 2.11(b)	Excavation in front of high stiffness wall in stiff clay (CIRIA 580 Fig. 2.11(a))
3	37.000	27.500	37.000	20.500	Excavation in front of high stiffness wall in stiff clay (CIRIA 580 Fig. 2.11(b)	Excavation in front of high stiffness wall in stiff clay (CIRIA 580 Fig. 2.11(a))
4	37.000	20.500	31.500	20.500	Excavation in front of high stiffness wall in stiff clay (CIRIA 580 Fig. 2.11(b)	Excavation in front of high stiffness wall in stiff clay (CIRIA 580 Fig. 2.11(a))

Excavation Name: **Upper Pool Excavation**

Surface level [m]: 84.000
Contribution: Negative

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	31.500	20.500	76.000	No	-	-	-	-	-	-
2	31.500	27.500	76.000	No	-	-	-	-	-	-

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* [%]
3	37.000	27.500	76.000	No	-	-	-	-	-	-
4	37.000	20.500	76.000	No	-	-	-	-	-	-

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	31.500	20.500	31.500	27.500	Excavation in front of high stiffness wall in stiff clay (CIRIA 580 Fig. 2.11(b)	Excavation in front of high stiffness wall in stiff clay (CIRIA 580 Fig. 2.11(a))
2	31.500	27.500	37.000	27.500	Excavation in front of high stiffness wall in stiff clay (CIRIA 580 Fig. 2.11(b)	Excavation in front of high stiffness wall in stiff clay (CIRIA 580 Fig. 2.11(a))
3	37.000	27.500	37.000	20.500	Excavation in front of high stiffness wall in stiff clay (CIRIA 580 Fig. 2.11(b)	Excavation in front of high stiffness wall in stiff clay (CIRIA 580 Fig. 2.11(a))
4	37.000	20.500	31.500	20.500	Excavation in front of high stiffness wall in stiff clay (CIRIA 580 Fig. 2.11(b)	Excavation in front of high stiffness wall in stiff clay (CIRIA 580 Fig. 2.11(a))

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
57 Maresfield	North Elevation	Line 1	4.50000	13.00000	0	0.10000	Burland Strain Limits	0.20000	2.6000
57 Maresfield	West Wall	Line 2	0.10000	9.00000	0	0.10000	Burland Strain Limits	0.20000	2.6000
57 Maresfield	East Wall	Line 3	0.10000	9.00000	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]
57 Maresfield	North Elevation	10.000	Yes	333.33	10.000	10.000	83.333	5.0000	5.0000
57 Maresfield	West Wall	10.000	Yes	333.33	10.000	10.000	83.333	5.0000	5.0000
57 Maresfield	East Wall	10.000	Yes	333.33	10.000	10.000	83.333	5.0000	5.0000

Building Segment Combinations

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

No structures have segments combined.

Warnings

1 Multiple excavations have been specified. The displacements resulting from these excavations are calculated by summing the displacements resulting from each individual excavation. No account has been taken of the interactions between excavations (e.g. overlapping zones of influence or 'shielding' of one excavation by another).

2 Embedded Wall Excavation PE1 : General Excavation intersects PE2 : Pool Excavation, and PE3 : Upper Pool Excavation.

3 Embedded Wall Excavation PE2 : Pool Excavation intersects PE1 : General Excavation.

4 Embedded Wall Excavation PE3 : Upper Pool Excavation intersects PE1 : General Excavation.

Displacement and Strain Results

Type/No. Name	Dist. [m]	Coordinates x [m]	y [m]	z [m]	Displacements x [mm]	y [mm]	z [mm]	Along the Line [mm]	Perpendicular to Line [mm]	Angle of Line to x Axis [°]
Line 1	Line 1	20.50000	20.00000	82.00000	2.9969	8.9487	4.8841	2.9969	8.9487	0.0
	0.33000	20.83000	20.00000	82.00000	2.9967	8.9529	4.8485	2.9967	8.9529	0.0
	0.66000	21.16000	20.00000	82.00000	2.9965	8.9574	4.8109	2.9965	8.9574	0.0
	0.99000	21.49000	20.00000	82.00000	2.9963	8.9622	4.7715	2.9963	8.9622	0.0
	1.3200	21.82000	20.00000	82.00000	2.9960	8.9673	4.7304	2.9960	8.9673	0.0
	1.6500	22.15000	20.00000	82.00000	2.9957	8.9727	4.6877	2.9957	8.9727	0.0
	1.9800	22.48000	20.00000	82.00000	2.9954	8.9785	4.6436	2.9954	8.9785	0.0
	2.3100	22.81000	20.00000	82.00000	2.9950	8.9848	4.5982	2.9950	8.9848	0.0
	2.6400	23.14000	20.00000	82.00000	2.9946	8.9916	4.5517	2.9946	8.9916	0.0
	2.9700	23.47000	20.00000	82.00000	2.9942	8.9989	4.5041	2.9942	8.9989	0.0
	3.3000	23.80000	20.00000	82.00000	2.9937	9.0069	4.4558	2.9937	9.0069	0.0
	3.6300	24.13000	20.00000	82.00000	2.9931	9.0156	4.4069	2.9931	9.0156	0.0
	3.9600	24.46000	20.00000	82.00000	2.9925	9.0250	4.3574	2.9925	9.0250	0.0
	4.2900	24.79000	20.00000	82.00000	2.9917	9.0354	4.3078	2.9917	9.0354	0.0
	4.6200	25.12000	20.00000	82.00000	2.9908	9.0469	4.2580	2.9908	9.0469	0.0
	4.9500	25.45000	20.00000	82.00000	2.9898	9.0596	4.2084	2.9898	9.0596	0.0
	5.2800	25.78000	20.00000	82.00000	2.9886	9.0737	4.1592	2.9886	9.0737	0.0
	5.6100	26.11000	20.00000	82.00000	2.9872	9.0896	4.1105	2.9872	9.0896	0.0
	5.9400	26.44000	20.00000	82.00000	2.9855	9.1075	4.0625	2.9855	9.1075	0.0
	6.2700	26.77000	20.00000	82.00000	2.9834	9.1279	4.0156	2.9834	9.1279	0.0
	6.6000	27.10000	20.00000	82.00000	2.9808	9.1512	3.9700	2.9808	9.1512	0.0
	6.9300	27.43000	20.00000	82.00000	2.9776	9.1783	3.9259	2.9776	9.1783	0.0
	7.2600	27.76000	20.00000	82.00000	2.9735	9.2100	3.8835	2.9735	9.2100	0.0
	7.5900	28.09000	20.00000	82.00000	2.9683	9.2477	3.8432	2.9683	9.2477	0.0
	7.9200	28.42000	20.00000	82.00000	2.9612	9.2932	3.8051	2.9612	9.2932	0.0
	8.2500	28.75000	20.00000	82.00000	2.9516	9.3492	3.7696	2.9516	9.3492	0.0
	8.5800	29.08000	20.00000	82.00000	2.9379	9.4195	3.7370	2.9379	9.4195	0.0
	8.9100	29.41000	20.00000	82.00000	2.9177	9.5105	3.7074	2.9177	9.5105	0.0
	9.2400	29.74000	20.00000	82.00000	2.8858	9.6323	3.6814	2.8858	9.6323	0.0
	9.5700	30.07000	20.00000	82.00000	2.8319	9.8027	3.6590	2.8319	9.8027	0.0
	9.9000	30.40000	20.00000	82.00000	2.7311	10.054	3.6407	2.7311	10.054	0.0
	10.230	30.73000	20.00000	82.00000	2.5161	10.446	3.6267	2.5161	10.446	0.0
	10.560	31.06000	20.00000	82.00000	1.9819	11.065	3.6175	1.9819	11.065	0.0
	10.890	31.39000	20.00000	82.00000	0.64459	11.742	3.6132	0.64459	11.742	0.0
	11.220	31.72000	20.00000	82.00000	0.0	11.813	3.6129	0.0	11.812	0.0
	11.550	32.05000	20.00000	82.00000	0.0	11.813	3.6129	0.0	11.812	0.0
	11.880	32.38000	20.00000	82.00000	0.0	11.813	3.6129	0.0	11.812	0.0
	12.210	32.71000	20.00000	82.00000	0.0	11.813	3.6129	0.0	11.812	0.0
	12.540	33.04000	20.00000	82.00000	0.0	11.813	3.6129	0.0	11.812	0.0
	12.870	33.37000	20.00000	82.00000	0.0	11.813	3.6129	0.0	11.812	0.0
	13.200	33.70000	20.00000	82.00000	0.0	11.813	3.6129	0.0	11.812	0.0
	13.530	34.03000	20.00000	82.00000	0.0	11.813	3.6129	0.0	11.812	0.0
	13.860	34.36000	20.00000	82.00000	0.0	11.813	3.6129	0.0	11.812	0.0
	14.190	34.69000	20.00000	82.00000	0.0	11.813	3.6129	0.0	11.812	0.0
	14.520	35.02000	20.00000	82.00000	0.0	11.813	3.6129	0.0	11.812	0.0
	14.850	35.35000	20.00000	82.00000	0.0	11.813	3.6129	0.0	11.812	0.0
	15.180	35.68000	20.00000	82.00000	0.0	11.813	3.6129	0.0	11.812	0.0

Type/No.		Coordinates			Displacements			Angle of Line		
Name	Dist.	x	y	z	x	y	z	Along the Line	Perpendicular to Line	x Axis
	15.510	36.01000	20.00000	82.00000	0.0	11.813	3.6129	0.0	11.812	0.0
	15.840	36.34000	20.00000	82.00000	0.0	11.813	3.6129	0.0	11.812	0.0
	16.170	36.67000	20.00000	82.00000	0.0	11.813	3.6129	0.0	11.812	0.0
	16.500	37.00000	20.00000	82.00000	0.0	11.813	3.6129	0.0	11.812	0.0
Grid 1	Grid 1	0.00000	0.00000	82.00000	0.75959	0.49434	0.14368	-	-	-
		1.20000	0.00000	82.00000	1.0612	0.71797	0.18199	-	-	-
		2.40000	0.00000	82.00000	1.3502	0.95116	0.21934	-	-	-
		3.60000	0.00000	82.00000	1.6253	1.1942	0.26120	-	-	-
		4.80000	0.00000	82.00000	1.8851	1.4474	0.31201	-	-	-
		6.00000	0.00000	82.00000	2.1281	1.7109	0.37518	-	-	-
		7.20000	0.00000	82.00000	2.2930	1.9344	0.43066	-	-	-
		8.40000	0.00000	82.00000	2.2811	2.0544	0.48947	-	-	-
		9.60000	0.00000	82.00000	2.3279	2.3092	0.59690	-	-	-
		10.80000	0.00000	82.00000	2.3435	2.5588	0.71783	-	-	-
		12.00000	0.00000	82.00000	2.3273	2.7999	0.84937	-	-	-
		13.20000	0.00000	82.00000	2.2795	3.0290	0.98786	-	-	-
		14.40000	0.00000	82.00000	2.2010	3.2424	1.1292	-	-	-
		15.60000	0.00000	82.00000	2.0934	3.4365	1.2693	-	-	-
		16.80000	0.00000	82.00000	1.9593	3.6074	1.4040	-	-	-
		18.00000	0.00000	82.00000	1.8020	3.7518	1.5301	-	-	-
		19.20000	0.00000	82.00000	1.6256	3.8669	1.6447	-	-	-
		20.40000	0.00000	82.00000	1.4348	3.9505	1.7458	-	-	-
		21.60000	0.00000	82.00000	1.3046	4.0140	1.8339	-	-	-
		22.80000	0.00000	82.00000	1.1720	4.0741	1.9107	-	-	-
		24.00000	0.00000	82.00000	1.0307	4.1299	1.9762	-	-	-
		25.20000	0.00000	82.00000	0.88127	4.1801	2.0306	-	-	-
		26.40000	0.00000	82.00000	0.72426	4.2238	2.0743	-	-	-
		27.60000	0.00000	82.00000	0.56068	4.2596	2.1081	-	-	-
		28.80000	0.00000	82.00000	0.39174	4.2868	2.1323	-	-	-
		30.00000	0.00000	82.00000	0.21893	4.3045	2.1474	-	-	-
		31.20000	0.00000	82.00000	0.043898	4.3122	2.1538	-	-	-
		32.40000	0.00000	82.00000	0.0	4.3125	2.1541	-	-	-
		33.60000	0.00000	82.00000	0.0	4.3125	2.1541	-	-	-
		34.80000	0.00000	82.00000	0.0	4.3125	2.1541	-	-	-
		36.00000	0.00000	82.00000	0.0	4.3125	2.1541	-	-	-
		37.20000	0.00000	82.00000	-0.042068	4.3119	2.1539	-	-	-
		38.40000	0.00000	82.00000	-0.29261	4.2846	2.1458	-	-	-
		39.60000	0.00000	82.00000	-0.53486	4.2171	2.1255	-	-	-
		40.80000	0.00000	82.00000	-0.76213	4.1115	2.0933	-	-	-
		42.00000	0.00000	82.00000	-0.96847	3.9707	2.0493	-	-	-
		43.20000	0.00000	82.00000	-1.1489	3.7987	1.9936	-	-	-
		44.40000	0.00000	82.00000	-1.2994	3.5996	1.9258	-	-	-
		45.60000	0.00000	82.00000	-1.4172	3.3782	1.8450	-	-	-
		46.80000	0.00000	82.00000	-1.5006	3.1390	1.7495	-	-	-
		48.00000	0.00000	82.00000	-1.5488	2.8864	1.6363	-	-	-
		49.20000	0.00000	82.00000	-1.5619	2.6245	1.5012	-	-	-
		50.40000	0.00000	82.00000	-1.6414	2.5111	1.3770	-	-	-
		51.60000	0.00000	82.00000	-1.7403	2.4436	1.2601	-	-	-
		52.80000	0.00000	82.00000	-1.8314	2.3761	1.1367	-	-	-
		54.00000	0.00000	82.00000	-1.9150	2.3093	1.0095	-	-	-
		55.20000	0.00000	82.00000	-1.9917	2.2434	0.88214	-	-	-
		56.40000	0.00000	82.00000	-2.0621	2.1790	0.75911	-	-	-
		57.60000	0.00000	82.00000	-2.1265	2.1162	0.64579	-	-	-
		58.80000	0.00000	82.00000	-2.1855	2.0552	0.54850	-	-	-
		60.00000	0.00000	82.00000	-2.2395	1.9961	0.47460	-	-	-
		0.00000	0.80000	82.00000	0.90521	0.56611	0.16062	-	-	-
		1.20000	0.80000	82.00000	1.2132	0.78878	0.19842	-	-	-
		2.40000	0.80000	82.00000	1.5088	1.0214	0.23795	-	-	-
		3.60000	0.80000	82.00000	1.7908	1.2645	0.28451	-	-	-
		4.80000	0.80000	82.00000	2.0577	1.5182	0.34235	-	-	-
		6.00000	0.80000	82.00000	2.3078	1.7829	0.41472	-	-	-
		7.20000	0.80000	82.00000	2.3788	1.9609	0.47017	-	-	-
		8.40000	0.80000	82.00000	2.4555	2.2281	0.56918	-	-	-
		9.60000	0.80000	82.00000	2.5001	2.4938	0.68618	-	-	-
		10.80000	0.80000	82.00000	2.5113	2.7550	0.81848	-	-	-
		12.00000	0.80000	82.00000	2.4885	3.0082	0.96226	-	-	-
		13.20000	0.80000	82.00000	2.4315	3.2497	1.1130	-	-	-
		14.40000	0.80000	82.00000	2.3411	3.4753	1.2657	-	-	-
		15.60000	0.80000	82.00000	2.2191	3.6809	1.4156	-	-	-
		16.80000	0.80000	82.00000	2.0679	3.8622	1.5582	-	-	-
		18.00000	0.80000	82.00000	1.8914	4.0156	1.6896	-	-	-
		19.20000	0.80000	82.00000	1.6940	4.1377	1.8067	-	-	-
		20.40000	0.80000	82.00000	1.4809	4.2260	1.9077	-	-	-
		21.60000	0.80000	82.00000	1.3471	4.2931	1.9937	-	-	-
		22.80000	0.80000	82.00000	1.2119	4.3568	2.0678	-	-	-
		24.00000	0.80000	82.00000	1.0674	4.4162	2.1301	-	-	-
		25.20000	0.80000	82.00000	0.91380	4.4699	2.1812	-	-	-
		26.40000	0.80000	82.00000	0.75186	4.5168	2.2219	-	-	-
		27.60000	0.80000	82.00000	0.58260	4.5554	2.2529	-	-	-
		28.80000	0.80000	82.00000	0.40736	4.5847	2.2749	-	-	-
		30.00000	0.80000	82.00000	0.22777	4.6038	2.2886	-	-	-
		31.20000	0.80000	82.00000	0.045680	4.6122	2.2944	-	-	-
		32.40000	0.80000	82.00000	0.0	4.6125	2.2946	-	-	-
		33.60000	0.80000	82.00000	0.0	4.6125	2.2946	-	-	-
		34.80000	0.80000	82.00000	0.0	4.6125	2.2946	-	-	-
		36.00000	0.80000	82.00000	0.0	4.6125	2.2946	-	-	-
		37.20000	0.80000	82.00000	-0.046821	4.6119	2.2944	-	-	-
		38.40000	0.80000	82.00000	-0.32565	4.5823	2.2858	-	-	-
		39.60000	0.80000	82.00000	-0.59514	4.5093	2.2643	-	-	-
		40.80000	0.80000	82.00000	-0.84782	4.3953	2.2304	-	-	-
		42.00000	0.80000	82.00000	-1.0771	4.2437	2.1847	-	-	-
		43.20000	0.80000	82.00000	-1.2775	4.0590	2.1275	-	-	-
		44.40000	0.80000	82.00000	-1.4447	3.8461	2.0593	-	-	-
		45.60000	0.80000	82.00000	-1.5760	3.6102	1.9796	-	-	-
		46.80000	0.80000	82.00000	-1.6697	3.3565	1.8876	-	-	-
		48.00000	0.80000	82.00000	-1.7253	3.0898	1.7810	-	-	-
		49.20000	0.80000	82.00000	-1.7430	2.8146	1.6564	-	-	-
		50.40000	0.80000	82.00000	-1.7241	2.5347	1.5085	-	-	-
		51.60000	0.80000	82.00000	-1.7863	2.4102	1.3719	-	-	-
		52.80000	0.80000	82.00000	-1.8770	2.3403	1.2453	-	-	-
		54.00000	0.80000	82.00000	-1.9600	2.2712	1.1129	-	-	-
		55.20000	0.80000	82.00000	-2.0358	2.2036	0.97815	-	-	-
		56.40000	0.80000	82.00000	-2.1050	2.1375	0.84532	-	-	-
		57.60000	0.80000	82.00000	-2.1682	2.0734	0.71958	-	-	-
		58.80000	0.80000	82.00000	-2.2258	2.0114	0.60710	-	-	-
		60.00000	0.80000	82.00000	-2.2785	1.9516	0.51506	-	-	-
		0.00000	1.60000	82.00000	1.0499	0.62994	0.17636	-	-	-
		1.20000	1.60000	82.00000	1.3645	0.85115	0.21481	-	-	-
		2.40000	1.60000	82.00000	1.6671	1.0828	0.25758	-	-	-
		3.60000	1.60000	82.00000	1.9563	1.3252	0.30983	-	-	-
		4.80000	1.60000	82.00000	2.2306	1.5789	0.37564	-	-	-
		6.00000	1.60000	82.00000	2.4509	1.8395	0.45036	-	-	-
		7.20000	1.60000	82.00000	2.5600	2.1146	0.53734	-	-	-
		8.40000	1.60000	82.00000	2.6370	2.3919	0.64692	-	-	-
		9.60000	1.60000	82.00000	2.6800	2.6689	0.77692	-	-	-
		10.80000	1.60000	82.00000	2.6874	2.9423	0.92365	-	-	-
		12.00000	1.60000	82.00000	2.6582	3.2085	1.0823	-	-	-
		13.20000	1.60000	82.00000	2.5920	3.4633	1.2475	-	-	-
		14.40000	1.60000	82.00000	2.4896	3.7021	1.4134	-	-	-
		15.60000	1.60000	82.00000	2.3524	3.9202	1.5745	-	-	-
		16.80000	1.60000	82.00000	2.1834	4.1129	1.7256	-	-	-
		18.00000	1.60000	82.00000	1.9864	4.2760	1.8625	-	-	-
		19.20000	1.60000	82.00000	1.7665	4.4057	1.9818	-	-	-
		20.40000	1.60000	82.00000	1.5294	4.4992	2.0817	-	-	-
		21.60000	1.60000	82.00000	1.3920	4.5700	2.1644	-	-	-
		22.80000	1.60000	82.00000	1.2544	4.6376	2.2345	-	-	-
		24.00000	1.60000	82.00000	1.1065	4.7010	2.2927	-	-	-
		25.20000	1.60000	82.00000	0.94868	4.7585	2.3396	-	-	-
		26.40000	1.60000	82.00000	0.78157	4.8089	2.3764	-	-	-
		27.60000	1.60000	82.00000	0.60627	4.8506	2.4039	-	-	-
		28.80000	1.60000	82.00000	0.42426	4.8823	2.4233	-	-	-
		30.00000	1.60000	82.00000	0.23735	4.9031	2.4352	-	-	-
		31.20000	1.60000	82.00000	0.047613	4.9121	2.4402	-	-	-
		32.40000	1.60000	82.00000	0.0	4.9125	2.4404	-	-	-
		33.60000	1.60000	82.00000	0.0	4.9125	2.4404	-	-	-
		34.80000	1.60000	82.00000	0.0	4.9125	2.4404	-	-	-
		36.00000	1.60000	82.00000	0.0	4.9125	2.4404	-	-	-
		37.20000	1.60000	82.00000	-0.051977	4.9118	2.4402	-	-	-
		38.40000	1.60000	82.00000	-0.36146	4.8797	2.4307	-	-	-
		39.60000	1.60000	82.00000	-0.66039	4.8005	2.4073	-	-	-
		40.80000	1.60000	82.00000	-0.94036	4.6771	2.3705	-	-	-

Type/No.		Coordinates			Displacements			Angle of Line
Name	Dist.	x	y	z	x	y	z	Along the Line	Perpendicular to Line	x Axis
		42.00000	1.60000	82.00000	-1.1940	4.5134	2.3214	-	-	-
		43.20000	1.60000	82.00000	-1.4154	4.3147	2.2607	-	-	-
		44.40000	1.60000	82.00000	-1.6000	4.0865	2.1895	-	-	-
		45.60000	1.60000	82.00000	-1.7450	3.8349	2.1080	-	-	-
		46.80000	1.60000	82.00000	-1.8488	3.5656	2.0161	-	-	-
		48.00000	1.60000	82.00000	-1.9112	3.2838	1.9124	-	-	-
		49.20000	1.60000	82.00000	-1.9330	2.9945	1.7942	-	-	-
		50.40000	1.60000	82.00000	-1.9155	2.7017	1.6571	-	-	-
		51.60000	1.60000	82.00000	-1.8609	2.4090	1.4947	-	-	-
		52.80000	1.60000	82.00000	-1.9241	2.3017	1.3523	-	-	-
		54.00000	1.60000	82.00000	-2.0062	2.2305	1.2163	-	-	-
		55.20000	1.60000	82.00000	-2.0809	2.1610	1.0758	-	-	-
		56.40000	1.60000	82.00000	-2.1488	2.0934	0.93486	-	-	-
		57.60000	1.60000	82.00000	-2.2106	2.0281	0.79847	-	-	-
		58.80000	1.60000	82.00000	-2.2667	1.9652	0.67263	-	-	-
		60.00000	1.60000	82.00000	-2.3178	1.9046	0.56435	-	-	-
		0.00000	2.40000	82.00000	1.1933	0.68569	0.19138	-	-	-
		1.20000	2.40000	82.00000	1.5149	0.90492	0.23152	-	-	-
		2.40000	2.40000	82.00000	1.8247	1.1349	0.27850	-	-	-
		3.60000	2.40000	82.00000	2.1214	1.3762	0.33732	-	-	-
		4.80000	2.40000	82.00000	2.4132	1.6406	0.42013	-	-	-
		6.00000	2.40000	82.00000	2.6359	1.9730	0.50542	-	-	-
		7.20000	2.40000	82.00000	2.7476	2.2571	0.60339	-	-	-
		8.40000	2.40000	82.00000	2.8258	2.5449	0.72709	-	-	-
		9.60000	2.40000	82.00000	2.8679	2.8336	0.87332	-	-	-
		10.80000	2.40000	82.00000	2.8721	3.1199	1.0374	-	-	-
		12.00000	2.40000	82.00000	2.8370	3.3998	1.2135	-	-	-
		13.20000	2.40000	82.00000	2.7618	3.6688	1.3952	-	-	-
		14.40000	2.40000	82.00000	2.6470	3.9219	1.5760	-	-	-
		15.60000	2.40000	82.00000	2.4942	4.1537	1.7494	-	-	-
		16.80000	2.40000	82.00000	2.3063	4.3589	1.9097	-	-	-
		18.00000	2.40000	82.00000	2.0875	4.5326	2.0523	-	-	-
		19.20000	2.40000	82.00000	1.8434	4.6707	2.1735	-	-	-
		20.40000	2.40000	82.00000	1.5806	4.7698	2.2713	-	-	-
		21.60000	2.40000	82.00000	1.4396	4.8445	2.3495	-	-	-
		22.80000	2.40000	82.00000	1.2996	4.9164	2.4146	-	-	-
		24.00000	2.40000	82.00000	1.1484	4.9840	2.4675	-	-	-
		25.20000	2.40000	82.00000	0.98617	5.0458	2.5094	-	-	-
		26.40000	2.40000	82.00000	0.81362	5.1001	2.5414	-	-	-
		27.60000	2.40000	82.00000	0.63191	5.1452	2.5649	-	-	-
		28.80000	2.40000	82.00000	0.44262	5.1797	2.5811	-	-	-
		30.00000	2.40000	82.00000	0.24777	5.2023	2.5909	-	-	-
		31.20000	2.40000	82.00000	0.049717	5.2121	2.5950	-	-	-
		32.40000	2.40000	82.00000	0.0	5.2125	2.5951	-	-	-
		33.60000	2.40000	82.00000	0.0	5.2125	2.5951	-	-	-
		34.80000	2.40000	82.00000	0.0	5.2125	2.5951	-	-	-
		36.00000	2.40000	82.00000	0.0	5.2125	2.5951	-	-	-
		37.20000	2.40000	82.00000	-0.057589	5.2118	2.5949	-	-	-
		38.40000	2.40000	82.00000	-0.40041	5.1768	2.5843	-	-	-
		39.60000	2.40000	82.00000	-0.73124	5.0906	2.5582	-	-	-
		40.80000	2.40000	82.00000	-1.0406	4.9565	2.5175	-	-	-
		42.00000	2.40000	82.00000	-1.3202	4.7793	2.4633	-	-	-
		43.20000	2.40000	82.00000	-1.5637	4.5650	2.3972	-	-	-
		44.40000	2.40000	82.00000	-1.7662	4.3200	2.3206	-	-	-
		45.60000	2.40000	82.00000	-1.9249	4.0512	2.2346	-	-	-
		46.80000	2.40000	82.00000	-2.0385	3.7650	2.1397	-	-	-
		48.00000	2.40000	82.00000	-2.1072	3.4673	2.0354	-	-	-
		49.20000	2.40000	82.00000	-2.1321	3.1631	1.9197	-	-	-
		50.40000	2.40000	82.00000	-2.1152	2.8571	1.7893	-	-	-
		51.60000	2.40000	82.00000	-2.0590	2.5526	1.6386	-	-	-
		52.80000	2.40000	82.00000	-1.9729	2.2600	1.4564	-	-	-
		54.00000	2.40000	82.00000	-2.0538	2.1867	1.3182	-	-	-
		55.20000	2.40000	82.00000	-2.1272	2.1155	1.1735	-	-	-
		56.40000	2.40000	82.00000	-2.1935	2.0466	1.0261	-	-	-
		57.60000	2.40000	82.00000	-2.2537	1.9802	0.88076	-	-	-
		58.80000	2.40000	82.00000	-2.3081	1.9164	0.74330	-	-	-
		60.00000	2.40000	82.00000	-2.3575	1.8553	0.62061	-	-	-
		0.00000	3.20000	82.00000	1.3351	0.73327	0.20609	-	-	-
		1.20000	3.20000	82.00000	1.6638	0.94995	0.24884	-	-	-
		2.40000	3.20000	82.00000	1.9811	1.1777	0.30088	-	-	-
		3.60000	3.20000	82.00000	2.2856	1.4173	0.36704	-	-	-
		4.80000	3.20000	82.00000	2.5785	1.8085	0.47789	-	-	-
		6.00000	3.20000	82.00000	2.8263	2.0944	0.55955	-	-	-
		7.20000	3.20000	82.00000	2.9418	2.3876	0.67211	-	-	-
		8.40000	3.20000	82.00000	3.0220	2.6859	0.81324	-	-	-
		9.60000	3.20000	82.00000	3.0643	2.9868	0.97873	-	-	-
		10.80000	3.20000	82.00000	3.0660	3.2866	1.1628	-	-	-
		12.00000	3.20000	82.00000	3.0254	3.5811	1.3587	-	-	-
		13.20000	3.20000	82.00000	2.9415	3.8654	1.5590	-	-	-
		14.40000	3.20000	82.00000	2.8143	4.1339	1.7561	-	-	-
		15.60000	3.20000	82.00000	2.6452	4.3807	1.9430	-	-	-
		16.80000	3.20000	82.00000	2.4373	4.5996	2.1132	-	-	-
		18.00000	3.20000	82.00000	2.1953	4.7851	2.2616	-	-	-
		19.20000	3.20000	82.00000	1.9253	4.9322	2.3843	-	-	-
		20.40000	3.20000	82.00000	1.6346	5.0373	2.4791	-	-	-
		21.60000	3.20000	82.00000	1.4900	5.1163	2.5517	-	-	-
		22.80000	3.20000	82.00000	1.3478	5.1927	2.6107	-	-	-
		24.00000	3.20000	82.00000	1.1933	5.2650	2.6574	-	-	-
		25.20000	3.20000	82.00000	1.0265	5.3314	2.6932	-	-	-
		26.40000	3.20000	82.00000	0.84830	5.3901	2.7197	-	-	-
		27.60000	3.20000	82.00000	0.65974	5.4391	2.7386	-	-	-
		28.80000	3.20000	82.00000	0.46261	5.4766	2.7511	-	-	-
		30.00000	3.20000	82.00000	0.25914	5.5013	2.7585	-	-	-
		31.20000	3.20000	82.00000	0.052015	5.5120	2.7615	-	-	-
		32.40000	3.20000	82.00000	0.0	5.5125	2.7616	-	-	-
		33.60000	3.20000	82.00000	0.0	5.5125	2.7616	-	-	-
		34.80000	3.20000	82.00000	0.0	5.5125	2.7616	-	-	-
		36.00000	3.20000	82.00000	0.0	5.5125	2.7616	-	-	-
		37.20000	3.20000	82.00000	-0.063719	5.5117	2.7614	-	-	-
		38.40000	3.20000	82.00000	-0.44293	5.4734	2.7494	-	-	-
		39.60000	3.20000	82.00000	-0.80844	5.3792	2.7200	-	-	-
		40.80000	3.20000	82.00000	-1.1495	5.2331	2.6742	-	-	-
		42.00000	3.20000	82.00000	-1.4568	5.0407	2.6136	-	-	-
		43.20000	3.20000	82.00000	-1.7234	4.8090	2.5403	-	-	-
		44.40000	3.20000	82.00000	-1.9443	4.5455	2.4561	-	-	-
		45.60000	3.20000	82.00000	-2.1167	4.2580	2.3630	-	-	-
		46.80000	3.20000	82.00000	-2.2396	3.9536	2.2622	-	-	-
		48.00000	3.20000	82.00000	-2.3137	3.6388	2.1539	-	-	-
		49.20000	3.20000	82.00000	-2.3407	3.3193	2.0373	-	-	-
		50.40000	3.20000	82.00000	-2.3233	2.9995	1.9097	-	-	-
		51.60000	3.20000	82.00000	-2.2644	2.6832	1.7663	-	-	-
		52.80000	3.20000	82.00000	-2.1674	2.3732	1.6001	-	-	-
		54.00000	3.20000	82.00000	-2.1027	2.1398	1.4174	-	-	-
		55.20000	3.20000	82.00000	-2.1744	2.0669	1.2700	-	-	-
		56.40000	3.20000	82.00000	-2.2390	1.9967	1.1176	-	-	-
		57.60000	3.20000	82.00000	-2.2973	1.9293	0.96489	-	-	-
		58.80000	3.20000	82.00000	-2.3500	1.8649	0.81748	-	-	-
		60.00000	3.20000	82.00000	-2.3975	1.8033	0.68211	-	-	-
		0.00000	4.00000	82.00000	1.4750	0.77260	0.22077	-	-	-
		1.20000	4.00000	82.00000	1.8109	0.98614	0.26696	-	-	-
		2.40000	4.00000	82.00000	2.1359	1.2111	0.32479	-	-	-
		3.60000	4.00000	82.00000	2.5508	1.5479	0.43117	-	-	-
		4.80000	4.00000	82.00000	2.8685	1.9096	0.52011	-	-	-
		6.00000	4.00000	82.00000	3.0222	2.2027	0.61606	-	-	-
		7.20000	4.00000	82.00000	3.1425	2.5048	0.74651	-	-	-
		8.40000	4.00000	82.00000	3.2260	2.8139	0.90814	-	-	-
		9.60000	4.00000	82.00000	3.2693	3.1271	1.0957	-	-	-
		10.80000	4.00000	82.00000	3.2695	3.4411	1.3023	-	-	-
		12.00000	4.00000	82.00000	3.2243	3.7511	1.5201	-	-	-
		13.20000	4.00000	82.00000	3.1319	4.0519	1.7407	-	-	-
		14.40000	4.00000	82.00000	2.9922	4.3372	1.9557	-	-	-
		15.60000	4.00000	82.00000	2.8063	4.6003	2.1570	-	-	-
		16.80000	4.00000	82.00000	2.5774	4.8344	2.3377	-	-	-
		18.00000	4.00000	82.00000	2.3105	5.0328	2.4919	-	-	-
		19.20000	4.00000	82.00000	2.0124	5.1899	2.6157	-	-	-
		20.40000	4.00000	82.00000	1.6916	5.3015	2.7068	-	-	-
		21.60000	4.00000	82.00000	1.5435	5.3850	2.7726	-	-	-
		22.80000	4.00000	82.00000	1.3992	5.4662	2.8244	-	-	-
		24.00000	4.00000	82.00000	1.2414	5.5436	2.8639	-	-	-
		25.20000	4.00000	82.00000	1.0701	5.6152	2.8929	-	-	-
		26.40000	4.00000	82.00000	0.88592	5.6787	2.9131	-	-	-

Type/No.		Coordinates			Displacements			Angle of Line		
Name	Dist.	x	y	z	x	y	z	Along the Line	Perpendicular to Line	x Axis
		27.60000	4.00000	82.00000	0.69008	5.7321	2.9266	-	-	-
		28.80000	4.00000	82.00000	0.48447	5.7731	2.9350	-	-	-
		30.00000	4.00000	82.00000	0.27161	5.8002	2.9396	-	-	-
		31.20000	4.00000	82.00000	0.054536	5.8120	2.9414	-	-	-
		32.40000	4.00000	82.00000	0.0	5.8125	2.9415	-	-	-
		33.60000	4.00000	82.00000	0.0	5.8125	2.9415	-	-	-
		34.80000	4.00000	82.00000	0.0	5.8125	2.9415	-	-	-
		36.00000	4.00000	82.00000	0.0	5.8125	2.9415	-	-	-
		37.20000	4.00000	82.00000	-0.070444	5.8116	2.9412	-	-	-
		38.40000	4.00000	82.00000	-0.48954	5.7695	2.9277	-	-	-
		39.60000	4.00000	82.00000	-0.89286	5.6662	2.8944	-	-	-
		40.80000	4.00000	82.00000	-1.2681	5.5064	2.8426	-	-	-
		42.00000	4.00000	82.00000	-1.6051	5.2968	2.7744	-	-	-
		43.20000	4.00000	82.00000	-1.8959	5.0456	2.6921	-	-	-
		44.40000	4.00000	82.00000	-2.1356	4.7618	2.5985	-	-	-
		45.60000	4.00000	82.00000	-2.3214	4.4538	2.4959	-	-	-
		46.80000	4.00000	82.00000	-2.4529	4.1299	2.3865	-	-	-
		48.00000	4.00000	82.00000	-2.5314	3.7971	2.2714	-	-	-
		49.20000	4.00000	82.00000	-2.5593	3.4614	2.1505	-	-	-
		50.40000	4.00000	82.00000	-2.5400	3.1276	2.0221	-	-	-
		51.60000	4.00000	82.00000	-2.4771	2.7994	1.8822	-	-	-
		52.80000	4.00000	82.00000	-2.3744	2.4796	1.7246	-	-	-
		54.00000	4.00000	82.00000	-2.2360	2.1702	1.5404	-	-	-
		55.20000	4.00000	82.00000	-2.2226	2.0150	1.3641	-	-	-
		56.40000	4.00000	82.00000	-2.2852	1.9436	1.2081	-	-	-
		57.60000	4.00000	82.00000	-2.3415	1.8755	1.0495	-	-	-
		58.80000	4.00000	82.00000	-2.3921	1.8105	0.89373	-	-	-
		60.00000	4.00000	82.00000	-2.4376	1.7487	0.74732	-	-	-
		0.00000	4.80000	82.00000	1.6124	0.80365	0.23564	-	-	-
		1.20000	4.80000	82.00000	1.9558	1.0134	0.28599	-	-	-
		2.40000	4.80000	82.00000	2.3000	1.2446	0.35846	-	-	-
		3.60000	4.80000	82.00000	2.8661	1.7067	0.49611	-	-	-
		4.80000	4.80000	82.00000	3.0625	1.9971	0.56401	-	-	-
		6.00000	4.80000	82.00000	3.2234	2.2970	0.67749	-	-	-
		7.20000	4.80000	82.00000	3.3497	2.6077	0.82885	-	-	-
		8.40000	4.80000	82.00000	3.4377	2.9274	1.0137	-	-	-
		9.60000	4.80000	82.00000	3.4834	3.2534	1.2258	-	-	-
		10.80000	4.80000	82.00000	3.4832	3.5819	1.4572	-	-	-
		12.00000	4.80000	82.00000	3.4342	3.9084	1.6989	-	-	-
		13.20000	4.80000	82.00000	3.3340	4.2269	1.9415	-	-	-
		14.40000	4.80000	82.00000	3.1818	4.5305	2.1755	-	-	-
		15.60000	4.80000	82.00000	2.9786	4.8116	2.3922	-	-	-
		16.80000	4.80000	82.00000	2.7274	5.0624	2.5837	-	-	-
		18.00000	4.80000	82.00000	2.4337	5.2752	2.7439	-	-	-
		19.20000	4.80000	82.00000	2.1053	5.4434	2.8684	-	-	-
		20.40000	4.80000	82.00000	1.7517	5.5619	2.9549	-	-	-
		21.60000	4.80000	82.00000	1.6002	5.6501	3.0129	-	-	-
		22.80000	4.80000	82.00000	1.4541	5.7365	3.0565	-	-	-
		24.00000	4.80000	82.00000	1.2931	5.8195	3.0879	-	-	-
		25.20000	4.80000	82.00000	1.1172	5.8967	3.1091	-	-	-
		26.40000	4.80000	82.00000	0.92685	5.9657	3.1223	-	-	-
		27.60000	4.80000	82.00000	0.72324	6.0240	3.1299	-	-	-
		28.80000	4.80000	82.00000	0.50846	6.0691	3.1336	-	-	-
		30.00000	4.80000	82.00000	0.28532	6.0989	3.1352	-	-	-
		31.20000	4.80000	82.00000	0.057314	6.1120	3.1357	-	-	-
		32.40000	4.80000	82.00000	0.0	6.1125	3.1357	-	-	-
		33.60000	4.80000	82.00000	0.0	6.1125	3.1357	-	-	-
		34.80000	4.80000	82.00000	0.0	6.1125	3.1357	-	-	-
		36.00000	4.80000	82.00000	0.0	6.1125	3.1357	-	-	-
		37.20000	4.80000	82.00000	-0.077854	6.1115	3.1354	-	-	-
		38.40000	4.80000	82.00000	-0.54084	6.0651	3.1200	-	-	-
		39.60000	4.80000	82.00000	-0.98556	5.9513	3.0824	-	-	-
		40.80000	4.80000	82.00000	-1.3979	5.7757	3.0239	-	-	-
		42.00000	4.80000	82.00000	-1.7664	5.5467	2.9469	-	-	-
		43.20000	4.80000	82.00000	-2.0826	5.2737	2.8543	-	-	-
		44.40000	4.80000	82.00000	-2.3412	4.9672	2.7494	-	-	-
		45.60000	4.80000	82.00000	-2.5400	4.6370	2.6354	-	-	-
		46.80000	4.80000	82.00000	-2.6792	4.2921	2.5150	-	-	-
		48.00000	4.80000	82.00000	-2.7607	3.9403	2.3903	-	-	-
		49.20000	4.80000	82.00000	-2.7881	3.5880	2.2622	-	-	-
		50.40000	4.80000	82.00000	-2.7653	3.2400	2.1296	-	-	-
		51.60000	4.80000	82.00000	-2.6969	2.9000	1.9896	-	-	-
		52.80000	4.80000	82.00000	-2.5872	2.5708	1.8368	-	-	-
		54.00000	4.80000	82.00000	-2.4407	2.2540	1.6630	-	-	-
		55.20000	4.80000	82.00000	-2.2716	1.9596	1.4547	-	-	-
		56.40000	4.80000	82.00000	-2.3320	1.8872	1.2966	-	-	-
		57.60000	4.80000	82.00000	-2.3860	1.8185	1.1335	-	-	-
		58.80000	4.80000	82.00000	-2.4344	1.7532	0.97077	-	-	-
		60.00000	4.80000	82.00000	-2.4778	1.6913	0.81487	-	-	-
		0.00000	5.60000	82.00000	1.7471	0.82639	0.25085	-	-	-
		1.20000	5.60000	82.00000	2.0980	1.0317	0.30596	-	-	-
		2.40000	5.60000	82.00000	2.6000	1.3814	0.42009	-	-	-
		3.60000	5.60000	82.00000	3.0596	1.7777	0.52182	-	-	-
		4.80000	5.60000	82.00000	3.2603	2.0699	0.61178	-	-	-
		6.00000	5.60000	82.00000	3.4295	2.3760	0.74569	-	-	-
		7.20000	5.60000	82.00000	3.5632	2.6949	0.92065	-	-	-
		8.40000	5.60000	82.00000	3.6571	3.0251	1.1313	-	-	-
		9.60000	5.60000	82.00000	3.7067	3.3639	1.3702	-	-	-
		10.80000	5.60000	82.00000	3.7076	3.7076	1.6283	-	-	-
		12.00000	5.60000	82.00000	3.6559	4.0514	1.8956	-	-	-
		13.20000	5.60000	82.00000	3.5486	4.3888	2.1615	-	-	-
		14.40000	5.60000	82.00000	3.3842	4.7124	2.4157	-	-	-
		15.60000	5.60000	82.00000	3.1631	5.0134	2.6484	-	-	-
		16.80000	5.60000	82.00000	2.8885	5.2828	2.8511	-	-	-
		18.00000	5.60000	82.00000	2.5661	5.5116	3.0172	-	-	-
		19.20000	5.60000	82.00000	2.2046	5.6920	3.1420	-	-	-
		20.40000	5.60000	82.00000	1.8151	5.8181	3.2231	-	-	-
		21.60000	5.60000	82.00000	1.6602	5.9112	3.2722	-	-	-
		22.80000	5.60000	82.00000	1.5127	6.0032	3.3068	-	-	-
		24.00000	5.60000	82.00000	1.3488	6.0922	3.3291	-	-	-
		25.20000	5.60000	82.00000	1.1683	6.1757	3.3417	-	-	-
		26.40000	5.60000	82.00000	0.97151	6.2508	3.3472	-	-	-
		27.60000	5.60000	82.00000	0.75964	6.3147	3.3482	-	-	-
		28.80000	5.60000	82.00000	0.53491	6.3644	3.3468	-	-	-
		30.00000	5.60000	82.00000	0.30049	6.3974	3.3450	-	-	-
		31.20000	5.60000	82.00000	0.060390	6.4119	3.3440	-	-	-
		32.40000	5.60000	82.00000	0.0	6.4125	3.3440	-	-	-
		33.60000	5.60000	82.00000	0.0	6.4125	3.3440	-	-	-
		34.80000	5.60000	82.00000	0.0	6.4125	3.3440	-	-	-
		36.00000	5.60000	82.00000	0.0	6.4125	3.3440	-	-	-
		37.20000	5.60000	82.00000	-0.086060	6.4114	3.3436	-	-	-
		38.40000	5.60000	82.00000	-0.59757	6.3599	3.3264	-	-	-
		39.60000	5.60000	82.00000	-1.0878	6.2339	3.2840	-	-	-
		40.80000	5.60000	82.00000	-1.5405	6.0403	3.2181	-	-	-
		42.00000	5.60000	82.00000	-1.9426	5.7890	3.1315	-	-	-
		43.20000	5.60000	82.00000	-2.2851	5.4916	3.0275	-	-	-
		44.40000	5.60000	82.00000	-2.5627	5.1600	2.9098	-	-	-
		45.60000	5.60000	82.00000	-2.7737	4.8056	2.7825	-	-	-
		46.80000	5.60000	82.00000	-2.9192	4.4383	2.6491	-	-	-
		48.00000	5.60000	82.00000	-3.0022	4.0667	2.5125	-	-	-
		49.20000	5.60000	82.00000	-3.0272	3.6972	2.3743	-	-	-
		50.40000	5.60000	82.00000	-2.9993	3.3350	2.2346	-	-	-
		51.60000	5.60000	82.00000	-2.9236	2.9836	2.0913	-	-	-
		52.80000	5.60000	82.00000	-2.8053	2.6455	1.9398	-	-	-
		54.00000	5.60000	82.00000	-2.6493	2.3221	1.7726	-	-	-
		55.20000	5.60000	82.00000	-2.4602	2.0141	1.5794	-	-	-
		56.40000	5.60000	82.00000	-2.3792	1.8274	1.3820	-	-	-
		57.60000	5.60000	82.00000	-2.4308	1.7582	1.2158	-	-	-
		58.80000	5.60000	82.00000	-2.4768	1.6928	1.0475	-	-	-
		60.00000	5.60000	82.00000	-2.5178	1.6311	0.88352	-	-	-
		0.00000	6.40000	82.00000	1.8785	0.84085	0.26646	-	-	-
		1.20000	6.40000	82.00000	2.2668	1.0627	0.33947	-	-	-
		2.40000	6.40000	82.00000	2.8988	1.4966	0.47441	-	-	-
		3.60000	6.40000	82.00000	3.2506	1.8313	0.55597	-	-	-
		4.80000	6.40000	82.00000	3.4613	2.1270	0.66497	-	-	-
		6.00000	6.40000	82.00000	3.6402	2.4385	0.82185	-	-	-
		7.20000	6.40000	82.00000	3.7828	2.7651	1.0227	-	-	-
		8.40000	6.40000	82.00000	3.8843	3.1054	1.2613	-	-	-
		9.60000	6.40000	82.00000	3.9394	3.4570	1.5289	-	-	-
		10.80000	6.40000	82.00000	3.9429	3.8162	1.8154	-	-	-
		12.00000	6.40000	82.00000	3.8901	4.1781	2.1097	-	-	-

Type/No.		Coordinates			Displacements			Angle of Line
Name	Dist.	x	y	z	x	y	z	Along the Line	Perpendicular to Line	x Axis
		13.20000	6.40000	82.00000	3.7768	4.5359	2.4001	-	-	-
		14.40000	6.40000	82.00000	3.6007	4.8812	2.6752	-	-	-
		15.60000	6.40000	82.00000	3.3614	5.2042	2.9244	-	-	-
		16.80000	6.40000	82.00000	3.0619	5.4944	3.1386	-	-	-
		18.00000	6.40000	82.00000	2.7085	5.7412	3.3104	-	-	-
		19.20000	6.40000	82.00000	2.3109	5.9352	3.4350	-	-	-
		20.40000	6.40000	82.00000	1.8820	6.0695	3.5100	-	-	-
		21.60000	6.40000	82.00000	1.7239	6.1677	3.5494	-	-	-
		22.80000	6.40000	82.00000	1.5753	6.2656	3.5739	-	-	-
		24.00000	6.40000	82.00000	1.4088	6.3611	3.5864	-	-	-
		25.20000	6.40000	82.00000	1.2238	6.4515	3.5896	-	-	-
		26.40000	6.40000	82.00000	1.0204	6.5336	3.5866	-	-	-
		27.60000	6.40000	82.00000	0.79976	6.6039	3.5804	-	-	-
		28.80000	6.40000	82.00000	0.56422	6.6590	3.5735	-	-	-
		30.00000	6.40000	82.00000	0.31736	6.6957	3.5680	-	-	-
		31.20000	6.40000	82.00000	0.063815	6.7118	3.5654	-	-	-
		32.40000	6.40000	82.00000	0.0	6.7125	3.5652	-	-	-
		33.60000	6.40000	82.00000	0.0	6.7125	3.5652	-	-	-
		34.80000	6.40000	82.00000	0.0	6.7125	3.5652	-	-	-
		36.00000	6.40000	82.00000	0.0	6.7125	3.5652	-	-	-
		37.20000	6.40000	82.00000	-0.095196	6.7113	3.5648	-	-	-
		38.40000	6.40000	82.00000	-0.66066	6.6538	3.5456	-	-	-
		39.60000	6.40000	82.00000	-1.2011	6.5135	3.4982	-	-	-
		40.80000	6.40000	82.00000	-1.6976	6.2991	3.4247	-	-	-
		42.00000	6.40000	82.00000	-2.1356	6.0224	3.3278	-	-	-
		43.20000	6.40000	82.00000	-2.5053	5.6974	3.2114	-	-	-
		44.40000	6.40000	82.00000	-2.8015	5.3380	3.0799	-	-	-
		45.60000	6.40000	82.00000	-3.0236	4.9573	2.9378	-	-	-
		46.80000	6.40000	82.00000	-3.1737	4.5662	2.7896	-	-	-
		48.00000	6.40000	82.00000	-3.2562	4.1739	2.6390	-	-	-
		49.20000	6.40000	82.00000	-3.2768	3.7871	2.4885	-	-	-
		50.40000	6.40000	82.00000	-3.2416	3.4110	2.3391	-	-	-
		51.60000	6.40000	82.00000	-3.1568	3.0487	2.1895	-	-	-
		52.80000	6.40000	82.00000	-3.0283	2.7024	2.0360	-	-	-
		54.00000	6.40000	82.00000	-2.8614	2.3733	1.8721	-	-	-
		55.20000	6.40000	82.00000	-2.6612	2.0617	1.6879	-	-	-
		56.40000	6.40000	82.00000	-2.4320	1.7676	1.4702	-	-	-
		57.60000	6.40000	82.00000	-2.4756	1.6945	1.2955	-	-	-
		58.80000	6.40000	82.00000	-2.5190	1.6293	1.1229	-	-	-
		60.00000	6.40000	82.00000	-2.5576	1.5679	0.95223	-	-	-
		0.00000	7.20000	82.00000	2.0062	0.84708	0.28248	-	-	-
		1.20000	7.20000	82.00000	2.5458	1.1608	0.39177	-	-	-
		2.40000	7.20000	82.00000	3.1936	1.5888	0.51711	-	-	-
		3.60000	7.20000	82.00000	3.4430	1.8694	0.59412	-	-	-
		4.80000	7.20000	82.00000	3.6649	2.1675	0.72452	-	-	-
		6.00000	7.20000	82.00000	3.8549	2.4834	0.90653	-	-	-
		7.20000	7.20000	82.00000	4.0081	2.8168	1.1353	-	-	-
		8.40000	7.20000	82.00000	4.1189	3.1666	1.4035	-	-	-
		9.60000	7.20000	82.00000	4.1815	3.5307	1.7014	-	-	-
		10.80000	7.20000	82.00000	4.1897	3.9057	2.0177	-	-	-
		12.00000	7.20000	82.00000	4.1375	4.2865	2.3401	-	-	-
		13.20000	7.20000	82.00000	4.0197	4.6659	2.6558	-	-	-
		14.40000	7.20000	82.00000	3.8326	5.0349	2.9524	-	-	-
		15.60000	7.20000	82.00000	3.5749	5.3824	3.2184	-	-	-
		16.80000	7.20000	82.00000	3.2493	5.6960	3.4439	-	-	-
		18.00000	7.20000	82.00000	2.8622	5.9630	3.6212	-	-	-
		19.20000	7.20000	82.00000	2.4249	6.1723	3.7451	-	-	-
		20.40000	7.20000	82.00000	1.9524	6.3155	3.8132	-	-	-
		21.60000	7.20000	82.00000	1.7913	6.4190	3.8420	-	-	-
		22.80000	7.20000	82.00000	1.6423	6.5231	3.8558	-	-	-
		24.00000	7.20000	82.00000	1.4736	6.6257	3.8575	-	-	-
		25.20000	7.20000	82.00000	1.2843	6.7237	3.8506	-	-	-
		26.40000	7.20000	82.00000	1.0741	6.8136	3.8385	-	-	-
		27.60000	7.20000	82.00000	0.84415	6.8913	3.8245	-	-	-
		28.80000	7.20000	82.00000	0.59685	6.9525	3.8115	-	-	-
		30.00000	7.20000	82.00000	0.33621	6.9936	3.8020	-	-	-
		31.20000	7.20000	82.00000	0.067652	7.0117	3.7977	-	-	-
		32.40000	7.20000	82.00000	0.0	7.0125	3.7975	-	-	-
		33.60000	7.20000	82.00000	0.0	7.0125	3.7975	-	-	-
		34.80000	7.20000	82.00000	0.0	7.0125	3.7975	-	-	-
		36.00000	7.20000	82.00000	0.0	7.0125	3.7975	-	-	-
		37.20000	7.20000	82.00000	-0.10543	7.0111	3.7970	-	-	-
		38.40000	7.20000	82.00000	-0.73122	6.9466	3.7758	-	-	-
		39.60000	7.20000	82.00000	-1.3273	6.7896	3.7234	-	-	-
		40.80000	7.20000	82.00000	-1.8717	6.5508	3.6419	-	-	-
		42.00000	7.20000	82.00000	-2.3477	6.2450	3.5345	-	-	-
		43.20000	7.20000	82.00000	-2.7451	5.8888	3.4052	-	-	-
		44.40000	7.20000	82.00000	-3.0594	5.4987	3.2590	-	-	-
		45.60000	7.20000	82.00000	-3.2909	5.0894	3.1011	-	-	-
		46.80000	7.20000	82.00000	-3.4434	4.6732	2.9367	-	-	-
		48.00000	7.20000	82.00000	-3.5230	4.2596	2.7704	-	-	-
		49.20000	7.20000	82.00000	-3.5367	3.8556	2.6056	-	-	-
		50.40000	7.20000	82.00000	-3.4920	3.4659	2.4442	-	-	-
		51.60000	7.20000	82.00000	-3.3960	3.0936	2.2858	-	-	-
		52.80000	7.20000	82.00000	-3.2554	2.7403	2.1275	-	-	-
		54.00000	7.20000	82.00000	-3.0762	2.4067	1.9637	-	-	-
		55.20000	7.20000	82.00000	-2.8637	2.0927	1.7852	-	-	-
		56.40000	7.20000	82.00000	-2.6224	1.7978	1.5794	-	-	-
		57.60000	7.20000	82.00000	-2.5204	1.6272	1.3719	-	-	-
		58.80000	7.20000	82.00000	-2.5610	1.5624	1.1962	-	-	-
		60.00000	7.20000	82.00000	-2.5971	1.5018	1.0200	-	-	-
		0.00000	8.00000	82.00000	2.1299	0.84518	0.29888	-	-	-
		1.20000	8.00000	82.00000	2.8204	1.2380	0.43754	-	-	-
		2.40000	8.00000	82.00000	3.3746	1.6109	0.54109	-	-	-
		3.60000	8.00000	82.00000	3.6361	1.8910	0.63706	-	-	-
		4.80000	8.00000	82.00000	3.8704	2.1903	0.79082	-	-	-
		6.00000	8.00000	82.00000	4.0730	2.5094	0.99973	-	-	-
		7.20000	8.00000	82.00000	4.2384	2.8485	1.2580	-	-	-
		8.40000	8.00000	82.00000	4.3606	3.2068	1.5572	-	-	-
		9.60000	8.00000	82.00000	4.4330	3.5829	1.8865	-	-	-
		10.80000	8.00000	82.00000	4.4482	3.9736	2.2336	-	-	-
		12.00000	8.00000	82.00000	4.3989	4.3738	2.5848	-	-	-
		13.20000	8.00000	82.00000	4.2785	4.7764	2.9264	-	-	-
		14.40000	8.00000	82.00000	4.0815	5.1712	3.2447	-	-	-
		15.60000	8.00000	82.00000	3.8056	5.5458	3.5275	-	-	-
		16.80000	8.00000	82.00000	3.4524	5.8858	3.7641	-	-	-
		18.00000	8.00000	82.00000	3.0288	6.1760	3.9463	-	-	-
		19.20000	8.00000	82.00000	2.5476	6.4026	4.0689	-	-	-
		20.40000	8.00000	82.00000	2.0265	6.5554	4.1294	-	-	-
		21.60000	8.00000	82.00000	1.8626	6.6643	4.1469	-	-	-
		22.80000	8.00000	82.00000	1.7138	6.7748	4.1491	-	-	-
		24.00000	8.00000	82.00000	1.5435	6.8850	4.1395	-	-	-
		25.20000	8.00000	82.00000	1.3502	6.9915	4.1217	-	-	-
		26.40000	8.00000	82.00000	1.1333	7.0902	4.0998	-	-	-
		27.60000	8.00000	82.00000	0.89352	7.1763	4.0774	-	-	-
		28.80000	8.00000	82.00000	0.63339	7.2449	4.0580	-	-	-
		30.00000	8.00000	82.00000	0.35744	7.2911	4.0442	-	-	-
		31.20000	8.00000	82.00000	0.071979	7.3116	4.0379	-	-	-
		32.40000	8.00000	82.00000	0.0	7.3125	4.0376	-	-	-
		33.60000	8.00000	82.00000	0.0	7.3125	4.0376	-	-	-
		34.80000	8.00000	82.00000	0.0	7.3125	4.0376	-	-	-
		36.00000	8.00000	82.00000	0.0	7.3125	4.0376	-	-	-
		37.20000	8.00000	82.00000	-0.11698	7.3110	4.0371	-	-	-
		38.40000	8.00000	82.00000	-0.81065	7.2379	4.0139	-	-	-
		39.60000	8.00000	82.00000	-1.4687	7.0610	3.9567	-	-	-
		40.80000	8.00000	82.00000	-2.0653	6.7937	3.8674	-	-	-
		42.00000	8.00000	82.00000	-2.5817	6.4542	3.7494	-	-	-
		43.20000	8.00000	82.00000	-3.0071	6.0628	3.6071	-	-	-
		44.40000	8.00000	82.00000	-3.3381	5.6387	3.4458	-	-	-
		45.60000	8.00000	82.00000	-3.5767	5.1987	3.2714	-	-	-
		46.80000	8.00000	82.00000	-3.7288	4.7562	3.0898	-	-	-
		48.00000	8.00000	82.00000	-3.8025	4.3211	2.9065	-	-	-
		49.20000	8.00000	82.00000	-3.8066	3.9002	2.7258	-	-	-
		50.40000	8.00000	82.00000	-3.7498	3.4980	2.5505	-	-	-
		51.60000	8.00000	82.00000	-3.6405	3.1169	2.3812	-	-	-
		52.80000	8.00000	82.00000	-3.4860	2.7579	2.2158	-	-	-
		54.00000	8.00000	82.00000	-3.2928	2.4212	2.0493	-	-	-
		55.20000	8.00000	82.00000	-3.0667	2.1062	1.8734	-	-	-
		56.40000	8.00000	82.00000	-2.8124	1.8121	1.6762	-	-	-
		57.60000	8.00000	82.00000	-2.5648	1.5563	1.4445	-	-	-
		58.80000	8.00000	82.00000	-2.6025	1.4923	1.2667	-	-	-

Type/No.		Coordinates			Displacements			Angle of Line	
Name	Dist.	x	y	z	x	y	z	Along the Line	Perpendicular to Line
		60.00000	8.00000	82.00000	-2.6359	1.4325	1.0862	-	-
		0.00000	8.80000	82.00000	2.3779	0.90894	0.34876	-	-
		1.20000	8.80000	82.00000	3.0893	1.2938	0.47901	-	-
		2.40000	8.80000	82.00000	3.5543	1.6174	0.56842	-	-
		3.60000	8.80000	82.00000	3.8288	1.8956	0.68510	-	-
		4.80000	8.80000	82.00000	4.0768	2.1945	0.86376	-	-
		6.00000	8.80000	82.00000	4.2934	2.5152	1.1009	-	-
		7.20000	8.80000	82.00000	4.4729	2.8585	1.3898	-	-
		8.40000	8.80000	82.00000	4.6088	3.2241	1.7209	-	-
		9.60000	8.80000	82.00000	4.6934	3.6113	2.0825	-	-
		10.80000	8.80000	82.00000	4.7184	4.0172	2.4609	-	-
		12.00000	8.80000	82.00000	4.6748	4.4373	2.8413	-	-
		13.20000	8.80000	82.00000	4.5542	4.8641	3.2088	-	-
		14.40000	8.80000	82.00000	4.3492	5.2870	3.5487	-	-
		15.60000	8.80000	82.00000	4.0555	5.6919	3.8479	-	-
		16.80000	8.80000	82.00000	3.6735	6.0619	4.0950	-	-
		18.00000	8.80000	82.00000	3.2102	6.3786	4.2815	-	-
		19.20000	8.80000	82.00000	2.6801	6.6251	4.4020	-	-
		20.40000	8.80000	82.00000	2.1042	6.7886	4.4543	-	-
		21.60000	8.80000	82.00000	1.9378	6.9027	4.4598	-	-
		22.80000	8.80000	82.00000	1.7901	7.0199	4.4498	-	-
		24.00000	8.80000	82.00000	1.6190	7.1381	4.4281	-	-
		25.20000	8.80000	82.00000	1.4223	7.2539	4.3989	-	-
		26.40000	8.80000	82.00000	1.1988	7.3626	4.3665	-	-
		27.60000	8.80000	82.00000	0.94868	7.4586	4.3352	-	-
		28.80000	8.80000	82.00000	0.67458	7.5357	4.3088	-	-
		30.00000	8.80000	82.00000	0.38149	7.5881	4.2904	-	-
		31.20000	8.80000	82.00000	0.076898	7.6115	4.2821	-	-
		32.40000	8.80000	82.00000	0.0	7.6125	4.2817	-	-
		33.60000	8.80000	82.00000	0.0	7.6125	4.2817	-	-
		34.80000	8.80000	82.00000	0.0	7.6125	4.2817	-	-
		36.00000	8.80000	82.00000	0.0	7.6125	4.2817	-	-
		37.20000	8.80000	82.00000	-0.13010	7.6107	4.2812	-	-
		38.40000	8.80000	82.00000	-0.90073	7.5275	4.2562	-	-
		39.60000	8.80000	82.00000	-1.6282	7.3267	4.1945	-	-
		40.80000	8.80000	82.00000	-2.2818	7.0256	4.0980	-	-
		42.00000	8.80000	82.00000	-2.8406	6.6471	3.9699	-	-
		43.20000	8.80000	82.00000	-3.2938	6.2157	3.8149	-	-
		44.40000	8.80000	82.00000	-3.6394	5.7542	3.6386	-	-
		45.60000	8.80000	82.00000	-3.8821	5.2815	3.4474	-	-
		46.80000	8.80000	82.00000	-4.0304	4.8118	3.2480	-	-
		48.00000	8.80000	82.00000	-4.0947	4.3553	3.0468	-	-
		49.20000	8.80000	82.00000	-4.0859	3.9184	2.8490	-	-
		50.40000	8.80000	82.00000	-4.0143	3.5050	2.6583	-	-
		51.60000	8.80000	82.00000	-3.8892	3.1167	2.4763	-	-
		52.80000	8.80000	82.00000	-3.7188	2.7538	2.3017	-	-
		54.00000	8.80000	82.00000	-3.5101	2.4158	2.1302	-	-
		55.20000	8.80000	82.00000	-3.2691	2.1016	1.9544	-	-
		56.40000	8.80000	82.00000	-3.0009	1.8098	1.7628	-	-
		57.60000	8.80000	82.00000	-2.7095	1.5389	1.5404	-	-
		58.80000	8.80000	82.00000	-2.6434	1.4187	1.3339	-	-
		60.00000	8.80000	82.00000	-2.6739	1.3602	1.1500	-	-
		0.00000	9.60000	82.00000	2.6219	0.95534	0.38796	-	-
		1.20000	9.60000	82.00000	3.3511	1.3283	0.51779	-	-
		2.40000	9.60000	82.00000	3.7318	1.6078	0.59941	-	-
		3.60000	9.60000	82.00000	4.0201	1.8823	0.73811	-	-
		4.80000	9.60000	82.00000	4.2829	2.1791	0.94275	-	-
		6.00000	9.60000	82.00000	4.5151	2.4996	1.2090	-	-
		7.20000	9.60000	82.00000	4.7107	2.8452	1.5292	-	-
		8.40000	9.60000	82.00000	4.8625	3.2165	1.8929	-	-
		9.60000	9.60000	82.00000	4.9622	3.6122	2.2871	-	-
		10.80000	9.60000	82.00000	5.0001	4.0335	2.6969	-	-
		12.00000	9.60000	82.00000	4.9656	4.4734	3.1065	-	-
		13.20000	9.60000	82.00000	4.8481	4.9256	3.4996	-	-
		14.40000	9.60000	82.00000	4.6375	5.3788	3.8605	-	-
		15.60000	9.60000	82.00000	4.3270	5.8175	4.1751	-	-
		16.80000	9.60000	82.00000	3.9152	6.2217	4.4317	-	-
		18.00000	9.60000	82.00000	3.4086	6.5693	4.6215	-	-
		19.20000	9.60000	82.00000	2.8236	6.8389	4.7391	-	-
		20.40000	9.60000	82.00000	2.1856	7.0141	4.7824	-	-
		21.60000	9.60000	82.00000	2.0170	7.1332	4.7754	-	-
		22.80000	9.60000	82.00000	1.8715	7.2572	4.7526	-	-
		24.00000	9.60000	82.00000	1.7005	7.3840	4.7182	-	-
		25.20000	9.60000	82.00000	1.5012	7.5099	4.6770	-	-
		26.40000	9.60000	82.00000	1.2714	7.6298	4.6336	-	-
		27.60000	9.60000	82.00000	1.0107	7.7371	4.5929	-	-
		28.80000	9.60000	82.00000	0.72132	7.8245	4.5591	-	-
		30.00000	9.60000	82.00000	0.40899	7.8845	4.5358	-	-
		31.20000	9.60000	82.00000	0.082537	7.9114	4.5253	-	-
		32.40000	9.60000	82.00000	0.0	7.9125	4.5249	-	-
		33.60000	9.60000	82.00000	0.0	7.9125	4.5249	-	-
		34.80000	9.60000	82.00000	0.0	7.9125	4.5249	-	-
		36.00000	9.60000	82.00000	0.0	7.9125	4.5249	-	-
		37.20000	9.60000	82.00000	-0.14515	7.9105	4.5243	-	-
		38.40000	9.60000	82.00000	-1.0037	7.8147	4.4979	-	-
		39.60000	9.60000	82.00000	-1.8093	7.5850	4.4324	-	-
		40.80000	9.60000	82.00000	-2.5253	7.2437	4.3296	-	-
		42.00000	9.60000	82.00000	-3.1283	6.8197	4.1924	-	-
		43.20000	9.60000	82.00000	-3.6080	6.3432	4.0255	-	-
		44.40000	9.60000	82.00000	-3.9652	5.8407	3.8347	-	-
		45.60000	9.60000	82.00000	-4.2079	5.3333	3.6269	-	-
		46.80000	9.60000	82.00000	-4.3481	4.8361	3.4097	-	-
		48.00000	9.60000	82.00000	-4.3989	4.3589	3.1901	-	-
		49.20000	9.60000	82.00000	-4.3736	3.9076	2.9744	-	-
		50.40000	9.60000	82.00000	-4.2841	3.4848	2.7674	-	-
		51.60000	9.60000	82.00000	-4.1408	3.0914	2.5712	-	-
		52.80000	9.60000	82.00000	-3.9525	2.7268	2.3857	-	-
		54.00000	9.60000	82.00000	-3.7269	2.3896	2.2074	-	-
		55.20000	9.60000	82.00000	-3.4699	2.0781	2.0294	-	-
		56.40000	9.60000	82.00000	-3.1868	1.7905	1.8409	-	-
		57.60000	9.60000	82.00000	-2.8817	1.5248	1.6273	-	-
		58.80000	9.60000	82.00000	-2.6833	1.3416	1.3972	-	-
		60.00000	9.60000	82.00000	-2.7110	1.2848	1.2109	-	-
		0.00000	10.40000	82.00000	2.8571	0.98246	0.42251	-	-
		1.20000	10.40000	82.00000	3.5827	1.3342	0.54343	-	-
		2.40000	10.40000	82.00000	3.9059	1.5817	0.63396	-	-
		3.60000	10.40000	82.00000	4.2088	1.8507	0.79556	-	-
		4.80000	10.40000	82.00000	4.4875	2.1432	1.0268	-	-
		6.00000	10.40000	82.00000	4.7367	2.4613	1.3226	-	-
		7.20000	10.40000	82.00000	4.9503	2.8069	1.6745	-	-
		8.40000	10.40000	82.00000	5.1206	3.1816	2.0708	-	-
		9.60000	10.40000	82.00000	5.2384	3.5860	2.4974	-	-
		10.80000	10.40000	82.00000	5.2928	4.0192	2.9384	-	-
		12.00000	10.40000	82.00000	5.2715	4.4782	3.3766	-	-
		13.20000	10.40000	82.00000	5.1611	4.9563	3.7944	-	-
		14.40000	10.40000	82.00000	4.9485	5.4421	4.1752	-	-
		15.60000	10.40000	82.00000	4.6232	5.9184	4.5041	-	-
		16.80000	10.40000	82.00000	4.1809	6.3622	4.7687	-	-
		18.00000	10.40000	82.00000	3.6271	6.7460	4.9602	-	-
		19.20000	10.40000	82.00000	2.9799	7.0427	5.0736	-	-
		20.40000	10.40000	82.00000	2.2705	7.2311	5.1073	-	-
		21.60000	10.40000	82.00000	2.1000	7.3549	5.0874	-	-
		22.80000	10.40000	82.00000	1.9579	7.4855	5.0514	-	-
		24.00000	10.40000	82.00000	1.7885	7.6211	5.0039	-	-
		25.20000	10.40000	82.00000	1.5877	7.7579	4.9501	-	-
		26.40000	10.40000	82.00000	1.3522	7.8905	4.8952	-	-
		27.60000	10.40000	82.00000	1.0806	8.0111	4.8446	-	-
		28.80000	10.40000	82.00000	0.77477	8.1107	4.8030	-	-
		30.00000	10.40000	82.00000	0.44071	8.1800	4.7744	-	-
		31.20000	10.40000	82.00000	0.089069	8.2112	4.7617	-	-
		32.40000	10.40000	82.00000	0.0	8.2125	4.7611	-	-
		33.60000	10.40000	82.00000	0.0	8.2125	4.7611	-	-
		34.80000	10.40000	82.00000	0.0	8.2125	4.7611	-	-
		36.00000	10.40000	82.00000	0.0	8.2125	4.7611	-	-
		37.20000	10.40000	82.00000	-0.16258	8.2101	4.7606	-	-
		38.40000	10.40000	82.00000	-1.1226	8.0989	4.7332	-	-
		39.60000	10.40000	82.00000	-2.0166	7.8336	4.6651	-	-
		40.80000	10.40000	82.00000	-2.8007	7.4439	4.5575	-	-
		42.00000	10.40000	82.00000	-3.4489	6.9668	4.4129	-	-
		43.20000	10.40000	82.00000	-3.9529	6.4393	4.2355	-	-
		44.40000	10.40000	82.00000	-4.3172	5.8924	4.0313	-	-

Type/No.		Coordinates			Displacements			Angle of Line	
Name	Dist.	x	y	z	x	y	z	Along the Line	Perpendicular to Line
		45.60000	10.40000	82.00000	-4.5547	5.3491	3.8077	-	-
		46.80000	10.40000	82.00000	-4.6814	4.8247	3.5729	-	-
		48.00000	10.40000	82.00000	-4.7142	4.3285	3.3350	-	-
		49.20000	10.40000	82.00000	-4.6684	3.8649	3.1011	-	-
		50.40000	10.40000	82.00000	-4.5578	3.4354	2.8769	-	-
		51.60000	10.40000	82.00000	-4.3937	3.0395	2.6658	-	-
		52.80000	10.40000	82.00000	-4.1857	2.6757	2.4682	-	-
		54.00000	10.40000	82.00000	-3.9416	2.3418	2.2814	-	-
		55.20000	10.40000	82.00000	-3.6676	2.0353	2.0993	-	-
		56.40000	10.40000	82.00000	-3.3689	1.7539	1.9117	-	-
		57.60000	10.40000	82.00000	-3.0496	1.4952	1.7045	-	-
		58.80000	10.40000	82.00000	-2.7220	1.2611	1.4564	-	-
		60.00000	10.40000	82.00000	-2.7468	1.2062	1.2684	-	-
		0.00000	11.20000	82.00000	3.0821	0.99053	0.45367	-	-
		1.20000	11.20000	82.00000	3.7382	1.2996	0.56199	-	-
		2.40000	11.20000	82.00000	4.0752	1.5389	0.67168	-	-
		3.60000	11.20000	82.00000	4.3935	1.8002	0.85660	-	-
		4.80000	11.20000	82.00000	4.6890	2.0862	1.1147	-	-
		6.00000	11.20000	82.00000	4.9566	2.3993	1.4401	-	-
		7.20000	11.20000	82.00000	5.1900	2.7422	1.8233	-	-
		8.40000	11.20000	82.00000	5.3812	3.1174	2.2518	-	-
		9.60000	11.20000	82.00000	5.5204	3.5267	2.7104	-	-
		10.80000	11.20000	82.00000	5.5955	3.9705	3.1818	-	-
		12.00000	11.20000	82.00000	5.5921	4.4472	3.6475	-	-
		13.20000	11.20000	82.00000	5.4940	4.9512	4.0888	-	-
		14.40000	11.20000	82.00000	5.2841	5.4714	4.4878	-	-
		15.60000	11.20000	82.00000	4.9473	5.9896	4.8288	-	-
		16.80000	11.20000	82.00000	4.4747	6.4789	5.0993	-	-
		18.00000	11.20000	82.00000	3.8694	6.9059	5.2906	-	-
		19.20000	11.20000	82.00000	3.1514	7.2352	5.3982	-	-
		20.40000	11.20000	82.00000	2.3588	7.4386	5.4214	-	-
		21.60000	11.20000	82.00000	2.1865	7.5665	5.3884	-	-
		22.80000	11.20000	82.00000	2.0495	7.7033	5.3389	-	-
		24.00000	11.20000	82.00000	1.8833	7.8477	5.2780	-	-
		25.20000	11.20000	82.00000	1.6825	7.9963	5.2112	-	-
		26.40000	11.20000	82.00000	1.4425	8.1429	5.1444	-	-
		27.60000	11.20000	82.00000	1.1602	8.2791	5.0834	-	-
		28.80000	11.20000	82.00000	0.83643	8.3935	5.0336	-	-
		30.00000	11.20000	82.00000	0.47770	8.4742	4.9995	-	-
		31.20000	11.20000	82.00000	0.096724	8.5109	4.9843	-	-
		32.40000	11.20000	82.00000	0.0	8.5125	4.9837	-	-
		33.60000	11.20000	82.00000	0.0	8.5125	4.9837	-	-
		34.80000	11.20000	82.00000	0.0	8.5125	4.9837	-	-
		36.00000	11.20000	82.00000	0.0	8.5125	4.9837	-	-
		37.20000	11.20000	82.00000	-0.18301	8.5097	4.9831	-	-
		38.40000	11.20000	82.00000	-1.2613	8.3788	4.9556	-	-
		39.60000	11.20000	82.00000	-2.2559	8.0694	4.8866	-	-
		40.80000	11.20000	82.00000	-3.1139	7.6210	4.7765	-	-
		42.00000	11.20000	82.00000	-3.8074	7.0818	4.6268	-	-
		43.20000	11.20000	82.00000	-4.3314	6.4971	4.4411	-	-
		44.40000	11.20000	82.00000	-4.6967	5.9026	4.2252	-	-
		45.60000	11.20000	82.00000	-4.9222	5.3229	3.9871	-	-
		46.80000	11.20000	82.00000	-5.0294	4.7728	3.7355	-	-
		48.00000	11.20000	82.00000	-5.0388	4.2601	3.4796	-	-
		49.20000	11.20000	82.00000	-4.9684	3.7874	3.2276	-	-
		50.40000	11.20000	82.00000	-4.8334	3.3545	2.9861	-	-
		51.60000	11.20000	82.00000	-4.6461	2.9595	2.7594	-	-
		52.80000	11.20000	82.00000	-4.4165	2.5996	2.5488	-	-
		54.00000	11.20000	82.00000	-4.1526	2.2717	2.3525	-	-
		55.20000	11.20000	82.00000	-3.8607	1.9728	2.1648	-	-
		56.40000	11.20000	82.00000	-3.5459	1.6998	1.9763	-	-
		57.60000	11.20000	82.00000	-3.2121	1.4501	1.7733	-	-
		58.80000	11.20000	82.00000	-2.8626	1.2212	1.5380	-	-
		60.00000	11.20000	82.00000	-2.7812	1.1246	1.3221	-	-
		0.00000	12.00000	82.00000	3.2957	0.97998	0.48231	-	-
		1.20000	12.00000	82.00000	3.8876	1.2503	0.58276	-	-
		2.40000	12.00000	82.00000	4.2386	1.4793	0.71188	-	-
		3.60000	12.00000	82.00000	4.5726	1.7307	0.92012	-	-
		4.80000	12.00000	82.00000	4.8856	2.0075	1.2048	-	-
		6.00000	12.00000	82.00000	5.1728	2.3127	1.5593	-	-
		7.20000	12.00000	82.00000	5.4278	2.6497	1.9732	-	-
		8.40000	12.00000	82.00000	5.6424	3.0219	2.4332	-	-
		9.60000	12.00000	82.00000	5.8064	3.4325	2.9227	-	-
		10.80000	12.00000	82.00000	5.9065	3.8835	3.4232	-	-
		12.00000	12.00000	82.00000	5.9265	4.3752	3.9149	-	-
		13.20000	12.00000	82.00000	5.8471	4.9039	4.3778	-	-
		14.40000	12.00000	82.00000	5.6463	5.4598	4.7927	-	-
		15.60000	12.00000	82.00000	5.3030	6.0241	5.1432	-	-
		16.80000	12.00000	82.00000	4.8017	6.5663	5.4165	-	-
		18.00000	12.00000	82.00000	4.1407	7.0452	5.6047	-	-
		19.20000	12.00000	82.00000	3.3412	7.4146	5.7045	-	-
		20.40000	12.00000	82.00000	2.4502	7.6358	5.7164	-	-
		21.60000	12.00000	82.00000	2.2761	7.7668	5.6701	-	-
		22.80000	12.00000	82.00000	2.1458	7.9090	5.6070	-	-
		24.00000	12.00000	82.00000	1.9849	8.0620	5.5324	-	-
		25.20000	12.00000	82.00000	1.7864	8.2227	5.4524	-	-
		26.40000	12.00000	82.00000	1.5435	8.3850	5.3732	-	-
		27.60000	12.00000	82.00000	1.2511	8.5392	5.3015	-	-
		28.80000	12.00000	82.00000	0.90822	8.6717	5.2431	-	-
		30.00000	12.00000	82.00000	0.52136	8.7669	5.2032	-	-
		31.20000	12.00000	82.00000	0.10582	8.8106	5.1855	-	-
		32.40000	12.00000	82.00000	0.0	8.8125	5.1847	-	-
		33.60000	12.00000	82.00000	0.0	8.8125	5.1847	-	-
		34.80000	12.00000	82.00000	0.0	8.8125	5.1847	-	-
		36.00000	12.00000	82.00000	0.0	8.8125	5.1847	-	-
		37.20000	12.00000	82.00000	-0.20728	8.8092	5.1842	-	-
		38.40000	12.00000	82.00000	-1.4252	8.6530	5.1576	-	-
		39.60000	12.00000	82.00000	-2.5351	8.2877	5.0902	-	-
		40.80000	12.00000	82.00000	-3.4726	7.7676	4.9808	-	-
		42.00000	12.00000	82.00000	-4.2092	7.1557	4.8292	-	-
		43.20000	12.00000	82.00000	-4.7466	6.5075	4.6381	-	-
		44.40000	12.00000	82.00000	-5.1044	5.8632	4.4129	-	-
		45.60000	12.00000	82.00000	-5.3098	5.2480	4.1620	-	-
		46.80000	12.00000	82.00000	-5.3902	4.6752	3.8950	-	-
		48.00000	12.00000	82.00000	-5.3704	4.1499	3.6220	-	-
		49.20000	12.00000	82.00000	-5.2709	3.6724	3.3523	-	-
		50.40000	12.00000	82.00000	-5.1083	3.2403	3.0936	-	-
		51.60000	12.00000	82.00000	-4.8955	2.8501	2.8511	-	-
		52.80000	12.00000	82.00000	-4.6428	2.4977	2.6272	-	-
		54.00000	12.00000	82.00000	-4.3581	2.1791	2.4205	-	-
		55.20000	12.00000	82.00000	-4.0477	1.8904	2.2262	-	-
		56.40000	12.00000	82.00000	-3.7163	1.6283	2.0354	-	-
		57.60000	12.00000	82.00000	-3.3678	1.3896	1.8348	-	-
		58.80000	12.00000	82.00000	-3.0052	1.1718	1.6069	-	-
		60.00000	12.00000	82.00000	-2.8140	1.0400	1.3719	-	-
		0.00000	12.80000	82.00000	3.4963	0.95141	0.50895	-	-
		1.20000	12.80000	82.00000	4.0294	1.1864	0.60529	-	-
		2.40000	12.80000	82.00000	4.3944	1.4031	0.75368	-	-
		3.60000	12.80000	82.00000	4.7444	1.6421	0.98480	-	-
		4.80000	12.80000	82.00000	5.0755	1.9068	1.2953	-	-
		6.00000	12.80000	82.00000	5.3832	2.2008	1.6780	-	-
		7.20000	12.80000	82.00000	5.6612	2.5280	2.1216	-	-
		8.40000	12.80000	82.00000	5.9015	2.8931	2.6116	-	-
		9.60000	12.80000	82.00000	6.0935	3.3004	3.1306	-	-
		10.80000	12.80000	82.00000	6.2233	3.7541	3.6585	-	-
		12.00000	12.80000	82.00000	6.2729	4.2567	4.1742	-	-
		13.20000	12.80000	82.00000	6.2197	4.8073	4.6562	-	-
		14.40000	12.80000	82.00000	6.0366	5.3988	5.0840	-	-
		15.60000	12.80000	82.00000	5.6944	6.0130	5.4404	-	-
		16.80000	12.80000	82.00000	5.1680	6.6166	5.7127	-	-
		18.00000	12.80000	82.00000	4.4477	7.1590	5.8940	-	-
		19.20000	12.80000	82.00000	3.5536	7.5788	5.9830	-	-
		20.40000	12.80000	82.00000	2.5443	7.8217	5.9823	-	-
		21.60000	12.80000	82.00000	2.3681	7.9543	5.9230	-	-
		22.80000	12.80000	82.00000	2.2465	8.1008	5.8463	-	-
		24.00000	12.80000	82.00000	2.0932	8.2615	5.7580	-	-
		25.20000	12.80000	82.00000	1.8997	8.4344	5.6645	-	-
		26.40000	12.80000	82.00000	1.6566	8.6136	5.5729	-	-
		27.60000	12.80000	82.00000	1.3555	8.7888	5.4900	-	-
		28.80000	12.80000	82.00000	0.99269	8.9435	5.4228	-	-
		30.00000	12.80000	82.00000	0.57363	9.0571	5.3768	-	-

Type/No.		Coordinates			Displacements			Angle of Line		
Name	Dist.	x	y	z	x	y	z	Along the Line	Perpendicular to Line	x Axis
		31.20000	12.80000	82.00000	0.11679	9.1102	5.3564	-	-	-
		32.40000	12.80000	82.00000	0.0	9.1125	5.3555	-	-	-
		33.60000	12.80000	82.00000	0.0	9.1125	5.3555	-	-	-
		34.80000	12.80000	82.00000	0.0	9.1125	5.3555	-	-	-
		36.00000	12.80000	82.00000	0.0	9.1125	5.3555	-	-	-
		37.20000	12.80000	82.00000	-0.23658	9.1085	5.3550	-	-	-
		38.40000	12.80000	82.00000	-1.6216	8.9189	5.3309	-	-	-
		39.60000	12.80000	82.00000	-2.8640	8.4818	5.2686	-	-	-
		40.80000	12.80000	82.00000	-3.8856	7.8734	5.1642	-	-	-
		42.00000	12.80000	82.00000	-4.6603	7.1768	5.0152	-	-	-
		43.20000	12.80000	82.00000	-5.2009	6.4592	4.8223	-	-	-
		44.40000	12.80000	82.00000	-5.5401	5.7647	4.5910	-	-	-
		45.60000	12.80000	82.00000	-5.7152	5.1171	4.3296	-	-	-
		46.80000	12.80000	82.00000	-5.7608	4.5264	4.0488	-	-	-
		48.00000	12.80000	82.00000	-5.7058	3.9940	3.7599	-	-	-
		49.20000	12.80000	82.00000	-5.5728	3.5173	3.4734	-	-	-
		50.40000	12.80000	82.00000	-5.3796	3.0912	3.1981	-	-	-
		51.60000	12.80000	82.00000	-5.1393	2.7104	2.9401	-	-	-
		52.80000	12.80000	82.00000	-4.8622	2.3695	2.7026	-	-	-
		54.00000	12.80000	82.00000	-4.5560	2.0636	2.4852	-	-	-
		55.20000	12.80000	82.00000	-4.2266	1.7882	2.2836	-	-	-
		56.40000	12.80000	82.00000	-3.8786	1.5394	2.0893	-	-	-
		57.60000	12.80000	82.00000	-3.5154	1.3140	1.8896	-	-	-
		58.80000	12.80000	82.00000	-3.1399	1.1091	1.6674	-	-	-
		60.00000	12.80000	82.00000	-2.8448	0.95239	1.4174	-	-	-
		0.00000	13.60000	82.00000	3.6824	0.90562	0.53384	-	-	-
		1.20000	13.60000	82.00000	4.1623	1.1084	0.62892	-	-	-
		2.40000	13.60000	82.00000	4.5412	1.3105	0.79604	-	-	-
		3.60000	13.60000	82.00000	4.9070	1.5347	1.0492	-	-	-
		4.80000	13.60000	82.00000	5.2565	1.7843	1.3845	-	-	-
		6.00000	13.60000	82.00000	5.5851	2.0633	1.7939	-	-	-
		7.20000	13.60000	82.00000	5.8873	2.3766	2.2656	-	-	-
		8.40000	13.60000	82.00000	6.1552	2.7294	2.7840	-	-	-
		9.60000	13.60000	82.00000	6.3783	3.1278	3.3305	-	-	-
		10.80000	13.60000	82.00000	6.5424	3.5780	3.8837	-	-	-
		12.00000	13.60000	82.00000	6.6282	4.0855	4.4210	-	-	-
		13.20000	13.60000	82.00000	6.6102	4.6532	4.9190	-	-	-
		14.40000	13.60000	82.00000	6.4556	5.2779	5.3562	-	-	-
		15.60000	13.60000	82.00000	6.1255	5.9447	5.7141	-	-	-
		16.80000	13.60000	82.00000	5.5814	6.6188	5.9802	-	-	-
		18.00000	13.60000	82.00000	4.7996	7.2395	6.1492	-	-	-
		19.20000	13.60000	82.00000	3.7953	7.7246	6.2233	-	-	-
		20.40000	13.60000	82.00000	2.6408	7.9954	6.2086	-	-	-
		21.60000	13.60000	82.00000	2.4612	8.1279	6.1365	-	-	-
		22.80000	13.60000	82.00000	2.3505	8.2767	6.0464	-	-	-
		24.00000	13.60000	82.00000	2.2078	8.4437	5.9445	-	-	-
		25.20000	13.60000	82.00000	2.0228	8.6280	5.8377	-	-	-
		26.40000	13.60000	82.00000	1.7832	8.8250	5.7334	-	-	-
		27.60000	13.60000	82.00000	1.4762	9.0242	5.6393	-	-	-
		28.80000	13.60000	82.00000	1.0932	9.2062	5.5629	-	-	-
		30.00000	13.60000	82.00000	0.63729	9.3440	5.5106	-	-	-
		31.20000	13.60000	82.00000	0.13031	9.4097	5.4873	-	-	-
		32.40000	13.60000	82.00000	0.0	9.4125	5.4863	-	-	-
		33.60000	13.60000	82.00000	0.0	9.4125	5.4863	-	-	-
		34.80000	13.60000	82.00000	0.0	9.4125	5.4863	-	-	-
		36.00000	13.60000	82.00000	0.0	9.4125	5.4863	-	-	-
		37.20000	13.60000	82.00000	-0.27268	9.4075	5.4859	-	-	-
		38.40000	13.60000	82.00000	-1.8612	9.1729	5.4667	-	-	-
		39.60000	13.60000	82.00000	-3.2563	8.6417	5.4143	-	-	-
		40.80000	13.60000	82.00000	-4.3639	7.9239	5.3208	-	-	-
		42.00000	13.60000	82.00000	-5.1663	7.1295	5.1797	-	-	-
		43.20000	13.60000	82.00000	-5.6954	6.3385	4.9900	-	-	-
		44.40000	13.60000	82.00000	-6.0016	5.5961	4.7560	-	-	-
		45.60000	13.60000	82.00000	-6.1348	4.9221	4.4869	-	-	-
		46.80000	13.60000	82.00000	-6.1369	4.3209	4.1945	-	-	-
		48.00000	13.60000	82.00000	-6.0406	3.7891	3.8913	-	-	-
		49.20000	13.60000	82.00000	-5.8702	3.3200	3.5891	-	-	-
		50.40000	13.60000	82.00000	-5.6437	2.9061	3.2980	-	-	-
		51.60000	13.60000	82.00000	-5.3744	2.5400	3.0251	-	-	-
		52.80000	13.60000	82.00000	-5.0721	2.2150	2.7744	-	-	-
		54.00000	13.60000	82.00000	-4.7440	1.9255	2.5462	-	-	-
		55.20000	13.60000	82.00000	-4.3957	1.6665	2.3369	-	-	-
		56.40000	13.60000	82.00000	-4.0312	1.4338	2.1383	-	-	-
		57.60000	13.60000	82.00000	-3.6537	1.2238	1.9384	-	-	-
		58.80000	13.60000	82.00000	-3.2656	1.0336	1.7203	-	-	-
		60.00000	13.60000	82.00000	-2.8735	0.86204	1.4586	-	-	-
		0.00000	14.40000	82.00000	3.8526	0.84360	0.55701	-	-	-
		1.20000	14.40000	82.00000	4.2851	1.0169	0.65292	-	-	-
		2.40000	14.40000	82.00000	4.6774	1.2023	0.83780	-	-	-
		3.60000	14.40000	82.00000	5.0587	1.4088	1.1117	-	-	-
		4.80000	14.40000	82.00000	5.4262	1.6401	1.4702	-	-	-
		6.00000	14.40000	82.00000	5.7760	1.9004	1.9047	-	-	-
		7.20000	14.40000	82.00000	6.1028	2.1949	2.4025	-	-	-
		8.40000	14.40000	82.00000	6.3996	2.5299	2.9472	-	-	-
		9.60000	14.40000	82.00000	6.6563	2.9127	3.5188	-	-	-
		10.80000	14.40000	82.00000	6.8589	3.3517	4.0948	-	-	-
		12.00000	14.40000	82.00000	6.9876	3.8556	4.6507	-	-	-
		13.20000	14.40000	82.00000	7.0148	4.4321	5.1616	-	-	-
		14.40000	14.40000	82.00000	6.9021	5.0844	5.6039	-	-	-
		15.60000	14.40000	82.00000	6.5997	5.8037	5.9579	-	-	-
		16.80000	14.40000	82.00000	6.0509	6.5574	6.2112	-	-	-
		18.00000	14.40000	82.00000	5.2094	7.2755	6.3610	-	-	-
		19.20000	14.40000	82.00000	4.0760	7.8477	6.4142	-	-	-
		20.40000	14.40000	82.00000	2.7392	8.1561	6.3832	-	-	-
		21.60000	14.40000	82.00000	2.5541	8.2862	6.2988	-	-	-
		22.80000	14.40000	82.00000	2.4564	8.4348	6.1958	-	-	-
		24.00000	14.40000	82.00000	2.3274	8.6054	6.0808	-	-	-
		25.20000	14.40000	82.00000	2.1553	8.7993	5.9609	-	-	-
		26.40000	14.40000	82.00000	1.9243	9.0141	5.8440	-	-	-
		27.60000	14.40000	82.00000	1.6160	9.2401	5.7385	-	-	-
		28.80000	14.40000	82.00000	1.2142	9.4558	5.6527	-	-	-
		30.00000	14.40000	82.00000	0.71636	9.6257	5.5939	-	-	-
		31.20000	14.40000	82.00000	0.14736	9.7089	5.5676	-	-	-
		32.40000	14.40000	82.00000	0.0	9.7125	5.5665	-	-	-
		33.60000	14.40000	82.00000	0.0	9.7125	5.5665	-	-	-
		34.80000	14.40000	82.00000	0.0	9.7125	5.5665	-	-	-
		36.00000	14.40000	82.00000	0.0	9.7125	5.5665	-	-	-
		37.20000	14.40000	82.00000	-0.31823	9.7061	5.5663	-	-	-
		38.40000	14.40000	82.00000	-2.1593	9.4084	5.5551	-	-	-
		39.60000	14.40000	82.00000	-3.7302	8.7516	5.5195	-	-	-
		40.80000	14.40000	82.00000	-4.9200	7.8979	5.4447	-	-	-
		42.00000	14.40000	82.00000	-5.7321	6.9932	5.3187	-	-	-
		43.20000	14.40000	82.00000	-6.2290	6.1285	5.1375	-	-	-
		44.40000	14.40000	82.00000	-6.4845	5.3454	4.9050	-	-	-
		45.60000	14.40000	82.00000	-6.5628	4.6550	4.6313	-	-	-
		46.80000	14.40000	82.00000	-6.5126	4.0538	4.3296	-	-	-
		48.00000	14.40000	82.00000	-6.3694	3.5321	4.0139	-	-	-
		49.20000	14.40000	82.00000	-6.1581	3.0791	3.6976	-	-	-
		50.40000	14.40000	82.00000	-5.8966	2.6843	3.3918	-	-	-
		51.60000	14.40000	82.00000	-5.5974	2.3387	3.1049	-	-	-
		52.80000	14.40000	82.00000	-5.2697	2.0345	2.8416	-	-	-
		54.00000	14.40000	82.00000	-4.9199	1.7654	2.6029	-	-	-
		55.20000	14.40000	82.00000	-4.5529	1.5260	2.3857	-	-	-
		56.40000	14.40000	82.00000	-4.1724	1.3120	2.1826	-	-	-
		57.60000	14.40000	82.00000	-3.7811	1.1197	1.9816	-	-	-
		58.80000	14.40000	82.00000	-3.3811	0.94609	1.7663	-	-	-
		60.00000	14.40000	82.00000	-2.9740	0.78875	1.5157	-	-	-
		0.00000	15.20000	82.00000	3.9844	0.76302	0.56702	-	-	-
		1.20000	15.20000	82.00000	4.3963	0.91268	0.67644	-	-	-
		2.40000	15.20000	82.00000	4.8013	1.0792	0.87780	-	-	-
		3.60000	15.20000	82.00000	5.1974	1.2655	1.1708	-	-	-
		4.80000	15.20000	82.00000	5.5823	1.4752	1.5506	-	-	-
		6.00000	15.20000	82.00000	5.9528	1.7127	2.0080	-	-	-
		7.20000	15.20000	82.00000	6.3042	1.9835	2.5296	-	-	-
		8.40000	15.20000	82.00000	6.6304	2.2943	3.0980	-	-	-
		9.60000	15.20000	82.00000	6.9222	2.6537	3.6922	-	-	-
		10.80000	15.20000	82.00000	7.1667	3.0720	4.2881	-	-	-
		12.00000	15.20000	82.00000	7.3445	3.5613	4.8597	-	-	-
		13.20000	15.20000	82.00000	7.4270	4.1347	5.3797	-	-	-
		14.40000	15.20000	82.00000	7.3719	4.8035	5.8225	-	-	-
		15.60000	15.20000	82.00000	7.1182	5.5696	6.1666	-	-	-

Type/No.		Coordinates			Displacements			Angle of Line		
Name	Dist.	x	y	z	x	y	z	Along the Line	Perpendicular to Line	x Axis
		16.80000	15.20000	82.00000	6.5865	6.4096	6.3991	-	-	-
		18.00000	15.20000	82.00000	5.6946	7.2487	6.5200	-	-	-
		19.20000	15.20000	82.00000	4.4116	7.9406	6.5439	-	-	-
		20.40000	15.20000	82.00000	2.8395	8.3035	6.4931	-	-	-
		21.60000	15.20000	82.00000	2.6448	8.4284	6.3970	-	-	-
		22.80000	15.20000	82.00000	2.5620	8.5733	6.2819	-	-	-
		24.00000	15.20000	82.00000	2.4500	8.7438	6.1543	-	-	-
		25.20000	15.20000	82.00000	2.2957	8.9438	6.0218	-	-	-
		26.40000	15.20000	82.00000	2.0801	9.1742	5.8926	-	-	-
		27.60000	15.20000	82.00000	1.7780	9.4288	5.7759	-	-	-
		28.80000	15.20000	82.00000	1.3618	9.6856	5.6805	-	-	-
		30.00000	15.20000	82.00000	0.81697	9.8991	5.6150	-	-	-
		31.20000	15.20000	82.00000	0.16954	10.008	5.5856	-	-	-
		32.40000	15.20000	82.00000	0.0	10.012	5.5844	-	-	-
		33.60000	15.20000	82.00000	0.0	10.012	5.5844	-	-	-
		34.80000	15.20000	82.00000	0.0	10.012	5.5844	-	-	-
		36.00000	15.20000	82.00000	0.0	10.012	5.5844	-	-	-
		37.20000	15.20000	82.00000	-0.37751	10.004	5.5844	-	-	-
		38.40000	15.20000	82.00000	-2.5397	9.6146	5.5864	-	-	-
		39.60000	15.20000	82.00000	-4.3101	8.7860	5.5771	-	-	-
		40.80000	15.20000	82.00000	-5.5673	7.7649	5.5312	-	-	-
		42.00000	15.20000	82.00000	-6.3596	6.7412	5.4288	-	-	-
		43.20000	15.20000	82.00000	-6.7965	5.8099	5.2623	-	-	-
		44.40000	15.20000	82.00000	-6.9809	4.9998	5.0357	-	-	-
		45.60000	15.20000	82.00000	-6.9908	4.3083	4.7606	-	-	-
		46.80000	15.20000	82.00000	-6.8803	3.7210	4.4519	-	-	-
		48.00000	15.20000	82.00000	-6.6856	3.2212	4.1258	-	-	-
		49.20000	15.20000	82.00000	-6.4313	2.7939	3.7970	-	-	-
		50.40000	15.20000	82.00000	-6.1339	2.4261	3.4780	-	-	-
		51.60000	15.20000	82.00000	-5.8048	2.1072	3.1782	-	-	-
		52.80000	15.20000	82.00000	-5.4520	1.8288	2.9032	-	-	-
		54.00000	15.20000	82.00000	-5.0812	1.5841	2.6546	-	-	-
		55.20000	15.20000	82.00000	-4.6964	1.3676	2.4299	-	-	-
		56.40000	15.20000	82.00000	-4.3008	1.1750	2.2220	-	-	-
		57.60000	15.20000	82.00000	-3.8965	1.0025	2.0194	-	-	-
		58.80000	15.20000	82.00000	-3.4853	0.84735	1.8059	-	-	-
		60.00000	15.20000	82.00000	-3.0686	0.70710	1.5608	-	-	-
		0.00000	16.00000	82.00000	4.0730	0.66643	0.57702	-	-	-
		1.20000	16.00000	82.00000	4.4949	0.79684	0.69865	-	-	-
		2.40000	16.00000	82.00000	4.9114	0.94243	0.91484	-	-	-
		3.60000	16.00000	82.00000	5.3212	1.1060	1.2250	-	-	-
		4.80000	16.00000	82.00000	5.7224	1.2909	1.6238	-	-	-
		6.00000	16.00000	82.00000	6.1124	1.5014	2.1016	-	-	-
		7.20000	16.00000	82.00000	6.4876	1.7432	2.6442	-	-	-
		8.40000	16.00000	82.00000	6.8427	2.0233	3.2336	-	-	-
		9.60000	16.00000	82.00000	7.1700	2.3507	3.8474	-	-	-
		10.80000	16.00000	82.00000	7.4583	2.7373	4.4604	-	-	-
		12.00000	16.00000	82.00000	7.6898	3.1981	5.0443	-	-	-
		13.20000	16.00000	82.00000	7.8370	3.7516	5.5699	-	-	-
		14.40000	16.00000	82.00000	7.8562	4.4188	6.0087	-	-	-
		15.60000	16.00000	82.00000	7.6779	5.2171	6.3363	-	-	-
		16.80000	16.00000	82.00000	7.1970	6.1425	6.5385	-	-	-
		18.00000	16.00000	82.00000	6.2793	7.1286	6.6181	-	-	-
		19.20000	16.00000	82.00000	4.8277	7.9897	6.6002	-	-	-
		20.40000	16.00000	82.00000	2.9427	8.4374	6.5238	-	-	-
		21.60000	16.00000	82.00000	2.7311	8.5539	6.4171	-	-	-
		22.80000	16.00000	82.00000	2.6647	8.6908	6.2908	-	-	-
		24.00000	16.00000	82.00000	2.5725	8.8560	6.1516	-	-	-
		25.20000	16.00000	82.00000	2.4412	9.0562	6.0072	-	-	-
		26.40000	16.00000	82.00000	2.2495	9.2974	5.8663	-	-	-
		27.60000	16.00000	82.00000	1.9648	9.5796	5.7386	-	-	-
		28.80000	16.00000	82.00000	1.5435	9.8850	5.6338	-	-	-
		30.00000	16.00000	82.00000	0.94868	10.159	5.5614	-	-	-
		31.20000	16.00000	82.00000	0.19956	10.306	5.5288	-	-	-
		32.40000	16.00000	82.00000	0.0	10.313	5.5274	-	-	-
		33.60000	16.00000	82.00000	0.0	10.313	5.5274	-	-	-
		34.80000	16.00000	82.00000	0.0	10.313	5.5274	-	-	-
		36.00000	16.00000	82.00000	0.0	10.313	5.5274	-	-	-
		37.20000	16.00000	82.00000	-0.45781	10.301	5.5280	-	-	-
		38.40000	16.00000	82.00000	-3.0398	9.7708	5.5506	-	-	-
		39.60000	16.00000	82.00000	-5.0283	8.7029	5.5815	-	-	-
		40.80000	16.00000	82.00000	-6.3172	7.4809	5.5777	-	-	-
		42.00000	16.00000	82.00000	-7.0445	6.3401	5.5083	-	-	-
		43.20000	16.00000	82.00000	-7.3866	5.3612	5.3629	-	-	-
		44.40000	16.00000	82.00000	-7.4781	4.5475	5.1464	-	-	-
		45.60000	16.00000	82.00000	-7.4074	3.8760	4.8729	-	-	-
		46.80000	16.00000	82.00000	-7.2303	3.3200	4.5598	-	-	-
		48.00000	16.00000	82.00000	-6.9816	2.8561	4.2252	-	-	-
		49.20000	16.00000	82.00000	-6.6835	2.4652	3.8858	-	-	-
		50.40000	16.00000	82.00000	-6.3507	2.1327	3.5552	-	-	-
		51.60000	16.00000	82.00000	-5.9926	1.8470	3.2439	-	-	-
		52.80000	16.00000	82.00000	-5.6160	1.5995	2.9583	-	-	-
		54.00000	16.00000	82.00000	-5.2255	1.3832	2.7007	-	-	-
		55.20000	16.00000	82.00000	-4.8242	1.1928	2.4690	-	-	-
		56.40000	16.00000	82.00000	-4.4146	1.0240	2.2565	-	-	-
		57.60000	16.00000	82.00000	-3.9985	0.87347	2.0520	-	-	-
		58.80000	16.00000	82.00000	-3.5772	0.73842	1.8395	-	-	-
		60.00000	16.00000	82.00000	-3.1517	0.61664	1.5986	-	-	-
		0.00000	16.80000	82.00000	4.1489	0.56104	0.58643	-	-	-
		1.20000	16.80000	82.00000	4.5794	0.67067	0.71874	-	-	-
		2.40000	16.80000	82.00000	5.0062	0.79340	0.94783	-	-	-
		3.60000	16.80000	82.00000	5.4282	0.93172	1.2728	-	-	-
		4.80000	16.80000	82.00000	5.8441	1.0888	1.6880	-	-	-
		6.00000	16.80000	82.00000	6.2520	1.2685	2.1834	-	-	-
		7.20000	16.80000	82.00000	6.6490	1.4762	2.7441	-	-	-
		8.40000	16.80000	82.00000	7.0314	1.7187	3.3513	-	-	-
		9.60000	16.80000	82.00000	7.3930	2.0052	3.9818	-	-	-
		10.80000	16.80000	82.00000	7.7247	2.3479	4.6086	-	-	-
		12.00000	16.80000	82.00000	8.0120	2.7638	5.2019	-	-	-
		13.20000	16.80000	82.00000	8.2307	3.2759	5.7298	-	-	-
		14.40000	16.80000	82.00000	8.3397	3.9145	6.1604	-	-	-
		15.60000	16.80000	82.00000	8.2668	4.7159	6.4655	-	-	-
		16.80000	16.80000	82.00000	7.8857	5.7087	6.6274	-	-	-
		18.00000	16.80000	82.00000	6.9945	6.8628	6.6499	-	-	-
		19.20000	16.80000	82.00000	5.3687	7.9678	6.5715	-	-	-
		20.40000	16.80000	82.00000	3.0517	8.5579	6.4597	-	-	-
		21.60000	16.80000	82.00000	2.8102	8.6628	6.3436	-	-	-
		22.80000	16.80000	82.00000	2.7607	8.7866	6.2074	-	-	-
		24.00000	16.80000	82.00000	2.6904	8.9398	6.0578	-	-	-
		25.20000	16.80000	82.00000	2.5869	9.1318	5.9026	-	-	-
		26.40000	16.80000	82.00000	2.4283	9.3742	5.7509	-	-	-
		27.60000	16.80000	82.00000	2.1764	9.6773	5.6128	-	-	-
		28.80000	16.80000	82.00000	1.7684	10.036	5.4988	-	-	-
		30.00000	16.80000	82.00000	1.1271	10.393	5.4195	-	-	-
		31.20000	16.80000	82.00000	0.24245	10.603	5.3836	-	-	-
		32.40000	16.80000	82.00000	0.0	10.612	5.3821	-	-	-
		33.60000	16.80000	82.00000	0.0	10.612	5.3821	-	-	-
		34.80000	16.80000	82.00000	0.0	10.612	5.3821	-	-	-
		36.00000	16.80000	82.00000	0.0	10.612	5.3821	-	-	-
		37.20000	16.80000	82.00000	-0.57271	10.595	5.3834	-	-	-
		38.40000	16.80000	82.00000	-3.7217	9.8359	5.4391	-	-	-
		39.60000	16.80000	82.00000	-5.9243	8.4308	5.5301	-	-	-
		40.80000	16.80000	82.00000	-7.1727	6.9839	5.5844	-	-	-
		42.00000	16.80000	82.00000	-7.7711	5.7506	5.5581	-	-	-
		43.20000	16.80000	82.00000	-7.9796	4.7620	5.4394	-	-	-
		44.40000	16.80000	82.00000	-7.9581	3.9791	5.2366	-	-	-
		45.60000	16.80000	82.00000	-7.7981	3.3550	4.9670	-	-	-
		46.80000	16.80000	82.00000	-7.5515	2.8511	4.6516	-	-	-
		48.00000	16.80000	82.00000	-7.2488	2.4382	4.3106	-	-	-
		49.20000	16.80000	82.00000	-6.9085	2.0952	3.9623	-	-	-
		50.40000	16.80000	82.00000	-6.5421	1.8064	3.6220	-	-	-
		51.60000	16.80000	82.00000	-6.1573	1.5604	3.3008	-	-	-
		52.80000	16.80000	82.00000	-5.7589	1.3486	3.0060	-	-	-
		54.00000	16.80000	82.00000	-5.3505	1.1645	2.7405	-	-	-
		55.20000	16.80000	82.00000	-4.9345	1.0032	2.5025	-	-	-
		56.40000	16.80000	82.00000	-4.5125	0.86064	2.2858	-	-	-
		57.60000	16.80000	82.00000	-4.0860	0.73389	2.0793	-	-	-
		58.80000	16.80000	82.00000	-3.6558	0.62048	1.8674	-	-	-
		60.00000	16.80000	82.00000	-3.2227	0.51843	1.6296	-	-	-
		0.00000	17.60000	82.00000	4.2111	0.44815	0.59473	-	-	-
		1.20000	17.60000	82.00000	4.6489	0.53564	0.73595	-	-	-

Type/No.		Coordinates			Displacements			Angle of Line		
Name	Dist.	x	y	z	x	y	z	Along the Line	Perpendicular to Line	x Axis
		2.40000	17.60000	82.00000	5.0844	0.63382	0.97575	-	-	-
		3.60000	17.60000	82.00000	5.5168	0.74479	1.3130	-	-	-
		4.80000	17.60000	82.00000	5.9452	0.87120	1.7418	-	-	-
		6.00000	17.60000	82.00000	6.3685	1.0165	2.2516	-	-	-
		7.20000	17.60000	82.00000	6.7848	1.1854	2.8272	-	-	-
		8.40000	17.60000	82.00000	7.1913	1.3838	3.4490	-	-	-
		9.60000	17.60000	82.00000	7.5840	1.6203	4.0928	-	-	-
		10.80000	17.60000	82.00000	7.9564	1.9067	4.7306	-	-	-
		12.00000	17.60000	82.00000	8.2978	2.2599	5.3305	-	-	-
		13.20000	17.60000	82.00000	8.5897	2.7048	5.8581	-	-	-
		14.40000	17.60000	82.00000	8.7985	3.2783	6.2777	-	-	-
		15.60000	17.60000	82.00000	8.8590	4.0347	6.5559	-	-	-
		16.80000	17.60000	82.00000	8.6393	5.0451	6.6686	-	-	-
		18.00000	17.60000	82.00000	7.8720	6.3593	6.6158	-	-	-
		19.20000	17.60000	82.00000	6.1139	7.8135	6.4489	-	-	-
		20.40000	17.60000	82.00000	3.1752	8.6655	6.2840	-	-	-
		21.60000	17.60000	82.00000	2.8790	8.7558	6.1598	-	-	-
		22.80000	17.60000	82.00000	2.8461	8.8612	6.0152	-	-	-
		24.00000	17.60000	82.00000	2.7981	8.9944	5.8566	-	-	-
		25.20000	17.60000	82.00000	2.7251	9.1669	5.6921	-	-	-
		26.40000	17.60000	82.00000	2.6079	9.3954	5.5310	-	-	-
		27.60000	17.60000	82.00000	2.4074	9.7026	5.3835	-	-	-
		28.80000	17.60000	82.00000	2.0443	10.108	5.2609	-	-	-
		30.00000	17.60000	82.00000	1.3783	10.577	5.1748	-	-	-
		31.20000	17.60000	82.00000	0.30870	10.897	5.1356	-	-	-
		32.40000	17.60000	82.00000	0.0	10.913	5.1339	-	-	-
		33.60000	17.60000	82.00000	0.0	10.913	5.1339	-	-	-
		34.80000	17.60000	82.00000	0.0	10.913	5.1339	-	-	-
		36.00000	17.60000	82.00000	0.0	10.913	5.1339	-	-	-
		37.20000	17.60000	82.00000	-0.75063	10.884	5.1365	-	-	-
		38.40000	17.60000	82.00000	-4.6920	9.7191	5.2466	-	-	-
		39.60000	17.60000	82.00000	-7.0355	7.8473	5.4264	-	-	-
		40.80000	17.60000	82.00000	-8.1144	6.1926	5.5567	-	-	-
		42.00000	17.60000	82.00000	-8.5054	4.9331	5.5818	-	-	-
		43.20000	17.60000	82.00000	-8.5447	3.9967	5.4936	-	-	-
		44.40000	17.60000	82.00000	-8.3977	3.2910	5.3064	-	-	-
		45.60000	17.60000	82.00000	-8.1459	2.7469	5.0425	-	-	-
		46.80000	17.60000	82.00000	-7.8318	2.3176	4.7264	-	-	-
		48.00000	17.60000	82.00000	-7.4785	1.9716	4.3807	-	-	-
		49.20000	17.60000	82.00000	-7.0997	1.6876	4.0255	-	-	-
		50.40000	17.60000	82.00000	-6.7035	1.4508	3.6772	-	-	-
		51.60000	17.60000	82.00000	-6.2951	1.2504	3.3479	-	-	-
		52.80000	17.60000	82.00000	-5.8778	1.0788	3.0456	-	-	-
		54.00000	17.60000	82.00000	-5.4541	0.93041	2.7734	-	-	-
		55.20000	17.60000	82.00000	-5.0255	0.80077	2.5301	-	-	-
		56.40000	17.60000	82.00000	-4.5931	0.68660	2.3097	-	-	-
		57.60000	17.60000	82.00000	-4.1578	0.58533	2.1013	-	-	-
		58.80000	17.60000	82.00000	-3.7202	0.49489	1.8896	-	-	-
		60.00000	17.60000	82.00000	-3.2807	0.41366	1.6542	-	-	-
		0.00000	18.40000	82.00000	4.2590	0.32921	0.60147	-	-	-
		1.20000	18.40000	82.00000	4.7025	0.39345	0.74962	-	-	-
		2.40000	18.40000	82.00000	5.1447	0.46567	0.99774	-	-	-
		3.60000	18.40000	82.00000	5.5853	0.54748	1.3445	-	-	-
		4.80000	18.40000	82.00000	6.0238	0.64092	1.7838	-	-	-
		6.00000	18.40000	82.00000	6.4595	0.74872	2.3048	-	-	-
		7.20000	18.40000	82.00000	6.8912	0.87446	2.8918	-	-	-
		8.40000	18.40000	82.00000	7.3176	1.0231	3.5247	-	-	-
		9.60000	18.40000	82.00000	7.7363	1.2015	4.1787	-	-	-
		10.80000	18.40000	82.00000	8.1434	1.4196	4.8244	-	-	-
		12.00000	18.40000	82.00000	8.5325	1.6923	5.4287	-	-	-
		13.20000	18.40000	82.00000	8.8922	2.0427	5.9544	-	-	-
		14.40000	18.40000	82.00000	9.2000	2.5078	6.3622	-	-	-
		15.60000	18.40000	82.00000	9.4090	3.1506	6.6125	-	-	-
		16.80000	18.40000	82.00000	9.4095	4.0792	6.6715	-	-	-
		18.00000	18.40000	82.00000	8.9182	5.4624	6.5270	-	-	-
		19.20000	18.40000	82.00000	7.2069	7.3698	6.2319	-	-	-
		20.40000	18.40000	82.00000	3.3383	8.7600	5.9785	-	-	-
		21.60000	18.40000	82.00000	2.9347	8.8350	5.8475	-	-	-
		22.80000	18.40000	82.00000	2.9162	8.9164	5.6963	-	-	-
		24.00000	18.40000	82.00000	2.8889	9.0214	5.5306	-	-	-
		25.20000	18.40000	82.00000	2.8460	9.1612	5.3587	-	-	-
		26.40000	18.40000	82.00000	2.7740	9.3547	5.1897	-	-	-
		27.60000	18.40000	82.00000	2.6414	9.6348	5.0343	-	-	-
		28.80000	18.40000	82.00000	2.3681	10.054	4.9042	-	-	-
		30.00000	18.40000	82.00000	1.7437	10.654	4.8119	-	-	-
		31.20000	18.40000	82.00000	0.42426	11.182	4.7692	-	-	-
		32.40000	18.40000	82.00000	0.0	11.212	4.7674	-	-	-
		33.60000	18.40000	82.00000	0.0	11.212	4.7674	-	-	-
		34.80000	18.40000	82.00000	0.0	11.212	4.7674	-	-	-
		36.00000	18.40000	82.00000	0.0	11.212	4.7674	-	-	-
		37.20000	18.40000	82.00000	-1.0627	11.158	4.7725	-	-	-
		38.40000	18.40000	82.00000	-6.1314	9.1971	4.9773	-	-	-
		39.60000	18.40000	82.00000	-8.3603	6.7525	5.2847	-	-	-
		40.80000	18.40000	82.00000	-9.0779	5.0167	5.5061	-	-	-
		42.00000	18.40000	82.00000	-9.1888	3.8593	5.5862	-	-	-
		43.20000	18.40000	82.00000	-9.0407	3.0622	5.5287	-	-	-
		44.40000	18.40000	82.00000	-8.7692	2.4885	5.3570	-	-	-
		45.60000	18.40000	82.00000	-8.4325	2.0591	5.0993	-	-	-
		46.80000	18.40000	82.00000	-8.0586	1.7268	4.7834	-	-	-
		48.00000	18.40000	82.00000	-7.6621	1.4628	4.4346	-	-	-
		49.20000	18.40000	82.00000	-7.2511	1.2481	4.0743	-	-	-
		50.40000	18.40000	82.00000	-6.8303	1.0704	3.7199	-	-	-
		51.60000	18.40000	82.00000	-6.4028	0.92095	3.3844	-	-	-
		52.80000	18.40000	82.00000	-5.9704	0.79353	3.0762	-	-	-
		54.00000	18.40000	82.00000	-5.5345	0.68367	2.7988	-	-	-
		55.20000	18.40000	82.00000	-5.0959	0.58799	2.5514	-	-	-
		56.40000	18.40000	82.00000	-4.6553	0.50392	2.3280	-	-	-
		57.60000	18.40000	82.00000	-4.2131	0.42949	2.1181	-	-	-
		58.80000	18.40000	82.00000	-3.7697	0.36314	1.9064	-	-	-
		60.00000	18.40000	82.00000	-3.3253	0.30361	1.6726	-	-	-
		0.00000	19.20000	82.00000	4.2919	0.20579	0.60628	-	-	-
		1.20000	19.20000	82.00000	4.7394	0.24594	0.75924	-	-	-
		2.40000	19.20000	82.00000	5.1864	0.29113	1.0131	-	-	-
		3.60000	19.20000	82.00000	5.6327	0.34240	1.3664	-	-	-
		4.80000	19.20000	82.00000	6.0783	0.40108	1.8130	-	-	-
		6.00000	19.20000	82.00000	6.5227	0.46892	2.3416	-	-	-
		7.20000	19.20000	82.00000	6.9655	0.54829	2.9365	-	-	-
		8.40000	19.20000	82.00000	7.4063	0.64247	3.5771	-	-	-
		9.60000	19.20000	82.00000	7.8439	0.75611	4.2379	-	-	-
		10.80000	19.20000	82.00000	8.2768	0.89603	4.8890	-	-	-
		12.00000	19.20000	82.00000	8.7024	1.0727	5.4957	-	-	-
		13.20000	19.20000	82.00000	9.1156	1.3030	6.0192	-	-	-
		14.40000	19.20000	82.00000	9.5062	1.6158	6.4167	-	-	-
		15.60000	19.20000	82.00000	9.8516	2.0649	6.6429	-	-	-
		16.80000	19.20000	82.00000	10.092	2.7601	6.6530	-	-	-
		18.00000	19.20000	82.00000	10.034	3.9522	6.4131	-	-	-
		19.20000	19.20000	82.00000	8.8598	6.1918	5.9451	-	-	-
		20.40000	19.20000	82.00000	3.6324	8.8350	5.5240	-	-	-
		21.60000	19.20000	82.00000	2.9745	8.9031	5.3873	-	-	-
		22.80000	19.20000	82.00000	2.9671	8.9559	5.2314	-	-	-
		24.00000	19.20000	82.00000	2.9559	9.0249	5.0607	-	-	-
		25.20000	19.20000	82.00000	2.9381	9.1188	4.8834	-	-	-
		26.40000	19.20000	82.00000	2.9070	9.2535	4.7088	-	-	-
		27.60000	19.20000	82.00000	2.8461	9.4612	4.5476	-	-	-
		28.80000	19.20000	82.00000	2.7030	9.8139	4.4117	-	-	-
		30.00000	19.20000	82.00000	2.2671	10.477	4.3140	-	-	-
		31.20000	19.20000	82.00000	0.67458	11.436	4.2682	-	-	-
		32.40000	19.20000	82.00000	0.0	11.513	4.2662	-	-	-
		33.60000	19.20000	82.00000	0.0	11.513	4.2662	-	-	-
		34.80000	19.20000	82.00000	0.0	11.513	4.2662	-	-	-
		36.00000	19.20000	82.00000	0.0	11.513	4.2662	-	-	-
		37.20000	19.20000	82.00000	-1.7497	11.373	4.2771	-	-	-
		38.40000	19.20000	82.00000	-8.2685	7.6779	4.6615	-	-	-
		39.60000	19.20000	82.00000	-9.7581	4.8791	5.1365	-	-	-
		40.80000	19.20000	82.00000	-9.9290	3.3968	5.4510	-	-	-
		42.00000	19.20000	82.00000	-9.7389	2.5321	5.5804	-	-	-
		43.20000	19.20000	82.00000	-9.4196	1.9751	5.5489	-	-	-
		44.40000	19.20000	82.00000	-9.0440	1.5888	5.3900	-	-	-
		45.60000	19.20000	82.00000	-8.6402	1.3061	5.1375	-	-	-
		46.80000	19.20000	82.00000	-8.2208	1.0905	4.8223	-	-	-
		48.00000	19.20000	82.00000	-7.7921	0.92088	4.4716	-	-	-

Type/No.		Coordinates			Displacements			Angle of Line
Name	Dist.	x	y	z	x	y	z	Along the Line / Perpendicular to Line / x Axis
		49.20000	19.20000	82.00000	-7.3574	0.78399	4.1079	- - -
		50.40000	19.20000	82.00000	-6.9189	0.67124	3.7494	- - -
		51.60000	19.20000	82.00000	-6.4777	0.57678	3.4097	- - -
		52.80000	19.20000	82.00000	-6.0346	0.49652	3.0973	- - -
		54.00000	19.20000	82.00000	-5.5901	0.42748	2.8164	- - -
		55.20000	19.20000	82.00000	-5.1445	0.36746	2.5660	- - -
		56.40000	19.20000	82.00000	-4.6981	0.31482	2.3406	- - -
		57.60000	19.20000	82.00000	-4.2512	0.26828	2.1296	- - -
		58.80000	19.20000	82.00000	-3.8037	0.22683	1.9177	- - -
		60.00000	19.20000	82.00000	-3.3559	0.18968	1.6850	- - -
		0.00000	20.00000	82.00000	4.3094	0.079560	0.60891	- - -
		1.20000	20.00000	82.00000	4.7591	0.095081	0.76445	- - -
		2.40000	20.00000	82.00000	5.2086	0.11256	1.0214	- - -
		3.60000	20.00000	82.00000	5.6581	0.13241	1.3782	- - -
		4.80000	20.00000	82.00000	6.1074	0.15515	1.8286	- - -
		6.00000	20.00000	82.00000	6.5566	0.18147	2.3614	- - -
		7.20000	20.00000	82.00000	7.0055	0.21232	2.9605	- - -
		8.40000	20.00000	82.00000	7.4541	0.24900	3.6051	- - -
		9.60000	20.00000	82.00000	7.9023	0.29339	4.2695	- - -
		10.80000	20.00000	82.00000	8.3497	0.34825	4.9233	- - -
		12.00000	20.00000	82.00000	8.7960	0.41790	5.5312	- - -
		13.20000	20.00000	82.00000	9.2403	0.50943	6.0531	- - -
		14.40000	20.00000	82.00000	9.6811	0.63542	6.4444	- - -
		15.60000	20.00000	82.00000	10.115	0.82042	6.6558	- - -
		16.80000	20.00000	82.00000	10.530	1.1197	6.6342	- - -
		18.00000	20.00000	82.00000	10.886	1.6886	6.3247	- - -
		19.20000	20.00000	82.00000	10.910	3.1652	5.6839	- - -
		20.40000	20.00000	82.00000	4.7245	8.7727	4.9033	- - -
		21.60000	20.00000	82.00000	2.9962	8.9638	4.7580	- - -
		22.80000	20.00000	82.00000	2.9951	8.9846	4.5996	- - -
		24.00000	20.00000	82.00000	2.9934	9.0121	4.4262	- - -
		25.20000	20.00000	82.00000	2.9906	9.0498	4.2460	- - -
		26.40000	20.00000	82.00000	2.9857	9.1052	4.0683	- - -
		27.60000	20.00000	82.00000	2.9756	9.1940	3.9038	- - -
		28.80000	20.00000	82.00000	2.9498	9.3588	3.7645	- - -
		30.00000	20.00000	82.00000	2.8460	9.7612	3.6634	- - -
		31.20000	20.00000	82.00000	1.5435	11.385	3.6150	- - -
		32.40000	20.00000	82.00000	0.0	11.813	3.6129	- - -
		33.60000	20.00000	82.00000	0.0	11.813	3.6129	- - -
		34.80000	20.00000	82.00000	0.0	11.813	3.6129	- - -
		36.00000	20.00000	82.00000	0.0	11.813	3.6129	- - -
		37.20000	20.00000	82.00000	-4.3817	10.954	3.6481	- - -
		38.40000	20.00000	82.00000	-10.776	3.8485	4.3960	- - -
		39.60000	20.00000	82.00000	-10.809	2.0787	5.0318	- - -
		40.80000	20.00000	82.00000	-10.472	1.3780	5.4129	- - -
		42.00000	20.00000	82.00000	-10.065	1.0065	5.5739	- - -
		43.20000	20.00000	82.00000	-9.6362	0.77711	5.5581	- - -
		44.40000	20.00000	82.00000	-9.1977	0.62147	5.4069	- - -
		45.60000	20.00000	82.00000	-8.7548	0.50900	5.1576	- - -
		46.80000	20.00000	82.00000	-8.3094	0.42395	4.8430	- - -
		48.00000	20.00000	82.00000	-7.8626	0.35739	4.4913	- - -
		49.20000	20.00000	82.00000	-7.4149	0.30389	4.1258	- - -
		50.40000	20.00000	82.00000	-6.9667	0.25995	3.7652	- - -
		51.60000	20.00000	82.00000	-6.5180	0.22322	3.4232	- - -
		52.80000	20.00000	82.00000	-6.0690	0.19206	3.1087	- - -
		54.00000	20.00000	82.00000	-5.6198	0.16529	2.8258	- - -
		55.20000	20.00000	82.00000	-5.1705	0.14205	2.5738	- - -
		56.40000	20.00000	82.00000	-4.7210	0.12168	2.3473	- - -
		57.60000	20.00000	82.00000	-4.2715	0.10368	2.1356	- - -
		58.80000	20.00000	82.00000	-3.8218	0.087657	1.9238	- - -
		60.00000	20.00000	82.00000	-3.3722	0.073308	1.6915	- - -
		0.00000	20.80000	82.00000	4.3125	0.0	0.60937	- - -
		1.20000	20.80000	82.00000	4.7625	0.0	0.76536	- - -
		2.40000	20.80000	82.00000	5.2125	0.0	1.0228	- - -
		3.60000	20.80000	82.00000	5.6625	0.0	1.3803	- - -
		4.80000	20.80000	82.00000	6.1125	0.0	1.8314	- - -
		6.00000	20.80000	82.00000	6.5625	0.0	2.3648	- - -
		7.20000	20.80000	82.00000	7.0125	0.0	2.9647	- - -
		8.40000	20.80000	82.00000	7.4625	0.0	3.6100	- - -
		9.60000	20.80000	82.00000	7.9125	0.0	4.2751	- - -
		10.80000	20.80000	82.00000	8.3625	0.0	4.9293	- - -
		12.00000	20.80000	82.00000	8.8125	0.0	5.5374	- - -
		13.20000	20.80000	82.00000	9.2625	0.0	6.0590	- - -
		14.40000	20.80000	82.00000	9.7125	0.0	6.4491	- - -
		15.60000	20.80000	82.00000	10.163	0.0	6.6577	- - -
		16.80000	20.80000	82.00000	10.612	0.0	6.6301	- - -
		18.00000	20.80000	82.00000	11.063	0.0	6.3067	- - -
		19.20000	20.80000	82.00000	11.512	0.0	5.6230	- - -
		20.40000	20.80000	82.00000	11.962	0.0	4.5098	- - -
		21.60000	20.80000	82.00000		Point lies within an excavation.		
		22.80000	20.80000	82.00000		Point lies within an excavation.		
		24.00000	20.80000	82.00000		Point lies within an excavation.		
		25.20000	20.80000	82.00000		Point lies within an excavation.		
		26.40000	20.80000	82.00000		Point lies within an excavation.		
		27.60000	20.80000	82.00000		Point lies within an excavation.		
		28.80000	20.80000	82.00000		Point lies within an excavation.		
		30.00000	20.80000	82.00000		Point lies within an excavation.		
		31.20000	20.80000	82.00000		Point lies within an excavation.		
		32.40000	20.80000	82.00000		Point lies within an excavation.		
		33.60000	20.80000	82.00000		Point lies within an excavation.		
		34.80000	20.80000	82.00000		Point lies within an excavation.		
		36.00000	20.80000	82.00000		Point lies within an excavation.		
		37.20000	20.80000	82.00000	-11.925	0.0	3.3250	- - -
		38.40000	20.80000	82.00000	-11.475	0.0	4.3368	- - -
		39.60000	20.80000	82.00000	-11.025	0.0	5.0112	- - -
		40.80000	20.80000	82.00000	-10.575	0.0	5.4056	- - -
		42.00000	20.80000	82.00000	-10.125	0.0	5.5725	- - -
		43.20000	20.80000	82.00000	-9.6750	0.0	5.5596	- - -
		44.40000	20.80000	82.00000	-9.2250	0.0	5.4098	- - -
		45.60000	20.80000	82.00000	-8.7750	0.0	5.1610	- - -
		46.80000	20.80000	82.00000	-8.3250	0.0	4.8466	- - -
		48.00000	20.80000	82.00000	-7.8750	0.0	4.4947	- - -
		49.20000	20.80000	82.00000	-7.4250	0.0	4.1290	- - -
		50.40000	20.80000	82.00000	-6.9750	0.0	3.7679	- - -
		51.60000	20.80000	82.00000	-6.5250	0.0	3.4255	- - -
		52.80000	20.80000	82.00000	-6.0750	0.0	3.1106	- - -
		54.00000	20.80000	82.00000	-5.6250	0.0	2.8274	- - -
		55.20000	20.80000	82.00000	-5.1750	0.0	2.5752	- - -
		56.40000	20.80000	82.00000	-4.7250	0.0	2.3484	- - -
		57.60000	20.80000	82.00000	-4.2750	0.0	2.1367	- - -
		58.80000	20.80000	82.00000	-3.8250	0.0	1.9248	- - -
		60.00000	20.80000	82.00000	-3.3750	0.0	1.6927	- - -
		0.00000	21.60000	82.00000	4.3125	0.0	0.60937	- - -
		1.20000	21.60000	82.00000	4.7625	0.0	0.76536	- - -
		2.40000	21.60000	82.00000	5.2125	0.0	1.0228	- - -
		3.60000	21.60000	82.00000	5.6625	0.0	1.3803	- - -
		4.80000	21.60000	82.00000	6.1125	0.0	1.8314	- - -
		6.00000	21.60000	82.00000	6.5625	0.0	2.3648	- - -
		7.20000	21.60000	82.00000	7.0125	0.0	2.9647	- - -
		8.40000	21.60000	82.00000	7.4625	0.0	3.6100	- - -
		9.60000	21.60000	82.00000	7.9125	0.0	4.2751	- - -
		10.80000	21.60000	82.00000	8.3625	0.0	4.9293	- - -
		12.00000	21.60000	82.00000	8.8125	0.0	5.5374	- - -
		13.20000	21.60000	82.00000	9.2625	0.0	6.0590	- - -
		14.40000	21.60000	82.00000	9.7125	0.0	6.4491	- - -
		15.60000	21.60000	82.00000	10.163	0.0	6.6577	- - -
		16.80000	21.60000	82.00000	10.612	0.0	6.6301	- - -
		18.00000	21.60000	82.00000	11.063	0.0	6.3067	- - -
		19.20000	21.60000	82.00000	11.512	0.0	5.6230	- - -
		20.40000	21.60000	82.00000	11.962	0.0	4.5098	- - -
		21.60000	21.60000	82.00000		Point lies within an excavation.		
		22.80000	21.60000	82.00000		Point lies within an excavation.		
		24.00000	21.60000	82.00000		Point lies within an excavation.		
		25.20000	21.60000	82.00000		Point lies within an excavation.		
		26.40000	21.60000	82.00000		Point lies within an excavation.		
		27.60000	21.60000	82.00000		Point lies within an excavation.		
		28.80000	21.60000	82.00000		Point lies within an excavation.		
		30.00000	21.60000	82.00000		Point lies within an excavation.		
		31.20000	21.60000	82.00000		Point lies within an excavation.		
		32.40000	21.60000	82.00000		Point lies within an excavation.		
		33.60000	21.60000	82.00000		Point lies within an excavation.		

Name	Type/No. Dist.	Coordinates x	y	z	Displacements x	y	z	Angle of Line Along the Line	Perpendicular to Line	x Axis
		34.80000	21.60000	82.00000		Point lies within an excavation.				
		36.00000	21.60000	82.00000		Point lies within an excavation.				
		37.20000	21.60000	82.00000	-11.925	0.0	3.3250	-	-	-
		38.40000	21.60000	82.00000	-11.475	0.0	4.3368	-	-	-
		39.60000	21.60000	82.00000	-11.025	0.0	5.0112	-	-	-
		40.80000	21.60000	82.00000	-10.575	0.0	5.4056	-	-	-
		42.00000	21.60000	82.00000	-10.125	0.0	5.5725	-	-	-
		43.20000	21.60000	82.00000	-9.6750	0.0	5.5596	-	-	-
		44.40000	21.60000	82.00000	-9.2250	0.0	5.4098	-	-	-
		45.60000	21.60000	82.00000	-8.7750	0.0	5.1610	-	-	-
		46.80000	21.60000	82.00000	-8.3250	0.0	4.8466	-	-	-
		48.00000	21.60000	82.00000	-7.8750	0.0	4.4947	-	-	-
		49.20000	21.60000	82.00000	-7.4250	0.0	4.1290	-	-	-
		50.40000	21.60000	82.00000	-6.9750	0.0	3.7679	-	-	-
		51.60000	21.60000	82.00000	-6.5250	0.0	3.4255	-	-	-
		52.80000	21.60000	82.00000	-6.0750	0.0	3.1106	-	-	-
		54.00000	21.60000	82.00000	-5.6250	0.0	2.8274	-	-	-
		55.20000	21.60000	82.00000	-5.1750	0.0	2.5752	-	-	-
		56.40000	21.60000	82.00000	-4.7250	0.0	2.3484	-	-	-
		57.60000	21.60000	82.00000	-4.2750	0.0	2.1367	-	-	-
		58.80000	21.60000	82.00000	-3.8250	0.0	1.9248	-	-	-
		60.00000	21.60000	82.00000	-3.3750	0.0	1.6927	-	-	-
		0.00000	22.40000	82.00000	4.3125	0.0	0.60937	-	-	-
		1.20000	22.40000	82.00000	4.7625	0.0	0.76536	-	-	-
		2.40000	22.40000	82.00000	5.2125	0.0	1.0228	-	-	-
		3.60000	22.40000	82.00000	5.6625	0.0	1.3803	-	-	-
		4.80000	22.40000	82.00000	6.1125	0.0	1.8314	-	-	-
		6.00000	22.40000	82.00000	6.5625	0.0	2.3648	-	-	-
		7.20000	22.40000	82.00000	7.0125	0.0	2.9647	-	-	-
		8.40000	22.40000	82.00000	7.4625	0.0	3.6100	-	-	-
		9.60000	22.40000	82.00000	7.9125	0.0	4.2751	-	-	-
		10.80000	22.40000	82.00000	8.3625	0.0	4.9293	-	-	-
		12.00000	22.40000	82.00000	8.8125	0.0	5.5374	-	-	-
		13.20000	22.40000	82.00000	9.2625	0.0	6.0590	-	-	-
		14.40000	22.40000	82.00000	9.7125	0.0	6.4491	-	-	-
		15.60000	22.40000	82.00000	10.163	0.0	6.6577	-	-	-
		16.80000	22.40000	82.00000	10.612	0.0	6.6301	-	-	-
		18.00000	22.40000	82.00000	11.063	0.0	6.3067	-	-	-
		19.20000	22.40000	82.00000	11.512	0.0	5.6230	-	-	-
		20.40000	22.40000	82.00000	11.962	0.0	4.5098	-	-	-
		21.60000	22.40000	82.00000		Point lies within an excavation.				
		22.80000	22.40000	82.00000		Point lies within an excavation.				
		24.00000	22.40000	82.00000		Point lies within an excavation.				
		25.20000	22.40000	82.00000		Point lies within an excavation.				
		26.40000	22.40000	82.00000		Point lies within an excavation.				
		27.60000	22.40000	82.00000		Point lies within an excavation.				
		28.80000	22.40000	82.00000		Point lies within an excavation.				
		30.00000	22.40000	82.00000		Point lies within an excavation.				
		31.20000	22.40000	82.00000		Point lies within an excavation.				
		32.40000	22.40000	82.00000		Point lies within an excavation.				
		33.60000	22.40000	82.00000		Point lies within an excavation.				
		34.80000	22.40000	82.00000		Point lies within an excavation.				
		36.00000	22.40000	82.00000		Point lies within an excavation.				
		37.20000	22.40000	82.00000	-11.925	0.0	3.3250	-	-	-
		38.40000	22.40000	82.00000	-11.475	0.0	4.3368	-	-	-
		39.60000	22.40000	82.00000	-11.025	0.0	5.0112	-	-	-
		40.80000	22.40000	82.00000	-10.575	0.0	5.4056	-	-	-
		42.00000	22.40000	82.00000	-10.125	0.0	5.5725	-	-	-
		43.20000	22.40000	82.00000	-9.6750	0.0	5.5596	-	-	-
		44.40000	22.40000	82.00000	-9.2250	0.0	5.4098	-	-	-
		45.60000	22.40000	82.00000	-8.7750	0.0	5.1610	-	-	-
		46.80000	22.40000	82.00000	-8.3250	0.0	4.8466	-	-	-
		48.00000	22.40000	82.00000	-7.8750	0.0	4.4947	-	-	-
		49.20000	22.40000	82.00000	-7.4250	0.0	4.1290	-	-	-
		50.40000	22.40000	82.00000	-6.9750	0.0	3.7679	-	-	-
		51.60000	22.40000	82.00000	-6.5250	0.0	3.4255	-	-	-
		52.80000	22.40000	82.00000	-6.0750	0.0	3.1106	-	-	-
		54.00000	22.40000	82.00000	-5.6250	0.0	2.8274	-	-	-
		55.20000	22.40000	82.00000	-5.1750	0.0	2.5752	-	-	-
		56.40000	22.40000	82.00000	-4.7250	0.0	2.3484	-	-	-
		57.60000	22.40000	82.00000	-4.2750	0.0	2.1367	-	-	-
		58.80000	22.40000	82.00000	-3.8250	0.0	1.9248	-	-	-
		60.00000	22.40000	82.00000	-3.3750	0.0	1.6927	-	-	-
		0.00000	23.20000	82.00000	4.3125	0.0	0.60937	-	-	-
		1.20000	23.20000	82.00000	4.7625	0.0	0.76536	-	-	-
		2.40000	23.20000	82.00000	5.2125	0.0	1.0228	-	-	-
		3.60000	23.20000	82.00000	5.6625	0.0	1.3803	-	-	-
		4.80000	23.20000	82.00000	6.1125	0.0	1.8314	-	-	-
		6.00000	23.20000	82.00000	6.5625	0.0	2.3648	-	-	-
		7.20000	23.20000	82.00000	7.0125	0.0	2.9647	-	-	-
		8.40000	23.20000	82.00000	7.4625	0.0	3.6100	-	-	-
		9.60000	23.20000	82.00000	7.9125	0.0	4.2751	-	-	-
		10.80000	23.20000	82.00000	8.3625	0.0	4.9293	-	-	-
		12.00000	23.20000	82.00000	8.8125	0.0	5.5374	-	-	-
		13.20000	23.20000	82.00000	9.2625	0.0	6.0590	-	-	-
		14.40000	23.20000	82.00000	9.7125	0.0	6.4491	-	-	-
		15.60000	23.20000	82.00000	10.163	0.0	6.6577	-	-	-
		16.80000	23.20000	82.00000	10.612	0.0	6.6301	-	-	-
		18.00000	23.20000	82.00000	11.063	0.0	6.3067	-	-	-
		19.20000	23.20000	82.00000	11.512	0.0	5.6230	-	-	-
		20.40000	23.20000	82.00000	11.962	0.0	4.5098	-	-	-
		21.60000	23.20000	82.00000		Point lies within an excavation.				
		22.80000	23.20000	82.00000		Point lies within an excavation.				
		24.00000	23.20000	82.00000		Point lies within an excavation.				
		25.20000	23.20000	82.00000		Point lies within an excavation.				
		26.40000	23.20000	82.00000		Point lies within an excavation.				
		27.60000	23.20000	82.00000		Point lies within an excavation.				
		28.80000	23.20000	82.00000		Point lies within an excavation.				
		30.00000	23.20000	82.00000		Point lies within an excavation.				
		31.20000	23.20000	82.00000		Point lies within an excavation.				
		32.40000	23.20000	82.00000		Point lies within an excavation.				
		33.60000	23.20000	82.00000		Point lies within an excavation.				
		34.80000	23.20000	82.00000		Point lies within an excavation.				
		36.00000	23.20000	82.00000		Point lies within an excavation.				
		37.20000	23.20000	82.00000	-11.925	0.0	3.3250	-	-	-
		38.40000	23.20000	82.00000	-11.475	0.0	4.3368	-	-	-
		39.60000	23.20000	82.00000	-11.025	0.0	5.0112	-	-	-
		40.80000	23.20000	82.00000	-10.575	0.0	5.4056	-	-	-
		42.00000	23.20000	82.00000	-10.125	0.0	5.5725	-	-	-
		43.20000	23.20000	82.00000	-9.6750	0.0	5.5596	-	-	-
		44.40000	23.20000	82.00000	-9.2250	0.0	5.4098	-	-	-
		45.60000	23.20000	82.00000	-8.7750	0.0	5.1610	-	-	-
		46.80000	23.20000	82.00000	-8.3250	0.0	4.8466	-	-	-
		48.00000	23.20000	82.00000	-7.8750	0.0	4.4947	-	-	-
		49.20000	23.20000	82.00000	-7.4250	0.0	4.1290	-	-	-
		50.40000	23.20000	82.00000	-6.9750	0.0	3.7679	-	-	-
		51.60000	23.20000	82.00000	-6.5250	0.0	3.4255	-	-	-
		52.80000	23.20000	82.00000	-6.0750	0.0	3.1106	-	-	-
		54.00000	23.20000	82.00000	-5.6250	0.0	2.8274	-	-	-
		55.20000	23.20000	82.00000	-5.1750	0.0	2.5752	-	-	-
		56.40000	23.20000	82.00000	-4.7250	0.0	2.3484	-	-	-
		57.60000	23.20000	82.00000	-4.2750	0.0	2.1367	-	-	-
		58.80000	23.20000	82.00000	-3.8250	0.0	1.9248	-	-	-
		60.00000	23.20000	82.00000	-3.3750	0.0	1.6927	-	-	-
		0.00000	24.00000	82.00000	4.3125	0.0	0.60937	-	-	-
		1.20000	24.00000	82.00000	4.7625	0.0	0.76536	-	-	-
		2.40000	24.00000	82.00000	5.2125	0.0	1.0228	-	-	-
		3.60000	24.00000	82.00000	5.6625	0.0	1.3803	-	-	-
		4.80000	24.00000	82.00000	6.1125	0.0	1.8314	-	-	-
		6.00000	24.00000	82.00000	6.5625	0.0	2.3648	-	-	-
		7.20000	24.00000	82.00000	7.0125	0.0	2.9647	-	-	-
		8.40000	24.00000	82.00000	7.4625	0.0	3.6100	-	-	-
		9.60000	24.00000	82.00000	7.9125	0.0	4.2751	-	-	-
		10.80000	24.00000	82.00000	8.3625	0.0	4.9293	-	-	-
		12.00000	24.00000	82.00000	8.8125	0.0	5.5374	-	-	-
		13.20000	24.00000	82.00000	9.2625	0.0	6.0590	-	-	-
		14.40000	24.00000	82.00000	9.7125	0.0	6.4491	-	-	-
		15.60000	24.00000	82.00000	10.163	0.0	6.6577	-	-	-
		16.80000	24.00000	82.00000	10.612	0.0	6.6301	-	-	-
		18.00000	24.00000	82.00000	11.063	0.0	6.3067	-	-	-
		19.20000	24.00000	82.00000	11.512	0.0	5.6230	-	-	-

Type/No.		Coordinates			Displacements			Angle of Line	
Name	Dist.	x	y	z	x	y	z	Along the Line	Perpendicular to Line
		20.40000	24.00000	82.00000	11.962	0.0	4.5098	-	-
		21.60000	24.00000	82.00000		Point lies within an excavation.			
		22.80000	24.00000	82.00000		Point lies within an excavation.			
		24.00000	24.00000	82.00000		Point lies within an excavation.			
		25.20000	24.00000	82.00000		Point lies within an excavation.			
		26.40000	24.00000	82.00000		Point lies within an excavation.			
		27.60000	24.00000	82.00000		Point lies within an excavation.			
		28.80000	24.00000	82.00000		Point lies within an excavation.			
		30.00000	24.00000	82.00000		Point lies within an excavation.			
		31.20000	24.00000	82.00000		Point lies within an excavation.			
		32.40000	24.00000	82.00000		Point lies within an excavation.			
		33.60000	24.00000	82.00000		Point lies within an excavation.			
		34.80000	24.00000	82.00000		Point lies within an excavation.			
		36.00000	24.00000	82.00000		Point lies within an excavation.			
		37.20000	24.00000	82.00000	-11.925	0.0	3.3250	-	-
		38.40000	24.00000	82.00000	-11.475	0.0	4.3368	-	-
		39.60000	24.00000	82.00000	-11.025	0.0	5.0112	-	-
		40.80000	24.00000	82.00000	-10.575	0.0	5.4056	-	-
		42.00000	24.00000	82.00000	-10.125	0.0	5.5725	-	-
		43.20000	24.00000	82.00000	-9.6750	0.0	5.5596	-	-
		44.40000	24.00000	82.00000	-9.2250	0.0	5.4098	-	-
		45.60000	24.00000	82.00000	-8.7750	0.0	5.1610	-	-
		46.80000	24.00000	82.00000	-8.3250	0.0	4.8466	-	-
		48.00000	24.00000	82.00000	-7.8750	0.0	4.4947	-	-
		49.20000	24.00000	82.00000	-7.4250	0.0	4.1290	-	-
		50.40000	24.00000	82.00000	-6.9750	0.0	3.7679	-	-
		51.60000	24.00000	82.00000	-6.5250	0.0	3.4255	-	-
		52.80000	24.00000	82.00000	-6.0750	0.0	3.1106	-	-
		54.00000	24.00000	82.00000	-5.6250	0.0	2.8274	-	-
		55.20000	24.00000	82.00000	-5.1750	0.0	2.5752	-	-
		56.40000	24.00000	82.00000	-4.7250	0.0	2.3484	-	-
		57.60000	24.00000	82.00000	-4.2750	0.0	2.1367	-	-
		58.80000	24.00000	82.00000	-3.8250	0.0	1.9248	-	-
		60.00000	24.00000	82.00000	-3.3750	0.0	1.6927	-	-
		0.00000	24.80000	82.00000	4.3125	0.0	0.60937	-	-
		1.20000	24.80000	82.00000	4.7625	0.0	0.76536	-	-
		2.40000	24.80000	82.00000	5.2125	0.0	1.0228	-	-
		3.60000	24.80000	82.00000	5.6625	0.0	1.3803	-	-
		4.80000	24.80000	82.00000	6.1125	0.0	1.8314	-	-
		6.00000	24.80000	82.00000	6.5625	0.0	2.3648	-	-
		7.20000	24.80000	82.00000	7.0125	0.0	2.9647	-	-
		8.40000	24.80000	82.00000	7.4625	0.0	3.6100	-	-
		9.60000	24.80000	82.00000	7.9125	0.0	4.2751	-	-
		10.80000	24.80000	82.00000	8.3625	0.0	4.9293	-	-
		12.00000	24.80000	82.00000	8.8125	0.0	5.5374	-	-
		13.20000	24.80000	82.00000	9.2625	0.0	6.0590	-	-
		14.40000	24.80000	82.00000	9.7125	0.0	6.4491	-	-
		15.60000	24.80000	82.00000	10.163	0.0	6.6577	-	-
		16.80000	24.80000	82.00000	10.612	0.0	6.6301	-	-
		18.00000	24.80000	82.00000	11.063	0.0	6.3067	-	-
		19.20000	24.80000	82.00000	11.512	0.0	5.6230	-	-
		20.40000	24.80000	82.00000	11.962	0.0	4.5098	-	-
		21.60000	24.80000	82.00000		Point lies within an excavation.			
		22.80000	24.80000	82.00000		Point lies within an excavation.			
		24.00000	24.80000	82.00000		Point lies within an excavation.			
		25.20000	24.80000	82.00000		Point lies within an excavation.			
		26.40000	24.80000	82.00000		Point lies within an excavation.			
		27.60000	24.80000	82.00000		Point lies within an excavation.			
		28.80000	24.80000	82.00000		Point lies within an excavation.			
		30.00000	24.80000	82.00000		Point lies within an excavation.			
		31.20000	24.80000	82.00000		Point lies within an excavation.			
		32.40000	24.80000	82.00000		Point lies within an excavation.			
		33.60000	24.80000	82.00000		Point lies within an excavation.			
		34.80000	24.80000	82.00000		Point lies within an excavation.			
		36.00000	24.80000	82.00000		Point lies within an excavation.			
		37.20000	24.80000	82.00000	-11.925	0.0	3.3250	-	-
		38.40000	24.80000	82.00000	-11.475	0.0	4.3368	-	-
		39.60000	24.80000	82.00000	-11.025	0.0	5.0112	-	-
		40.80000	24.80000	82.00000	-10.575	0.0	5.4056	-	-
		42.00000	24.80000	82.00000	-10.125	0.0	5.5725	-	-
		43.20000	24.80000	82.00000	-9.6750	0.0	5.5596	-	-
		44.40000	24.80000	82.00000	-9.2250	0.0	5.4098	-	-
		45.60000	24.80000	82.00000	-8.7750	0.0	5.1610	-	-
		46.80000	24.80000	82.00000	-8.3250	0.0	4.8466	-	-
		48.00000	24.80000	82.00000	-7.8750	0.0	4.4947	-	-
		49.20000	24.80000	82.00000	-7.4250	0.0	4.1290	-	-
		50.40000	24.80000	82.00000	-6.9750	0.0	3.7679	-	-
		51.60000	24.80000	82.00000	-6.5250	0.0	3.4255	-	-
		52.80000	24.80000	82.00000	-6.0750	0.0	3.1106	-	-
		54.00000	24.80000	82.00000	-5.6250	0.0	2.8274	-	-
		55.20000	24.80000	82.00000	-5.1750	0.0	2.5752	-	-
		56.40000	24.80000	82.00000	-4.7250	0.0	2.3484	-	-
		57.60000	24.80000	82.00000	-4.2750	0.0	2.1367	-	-
		58.80000	24.80000	82.00000	-3.8250	0.0	1.9248	-	-
		60.00000	24.80000	82.00000	-3.3750	0.0	1.6927	-	-
		0.00000	25.60000	82.00000	4.3125	0.0	0.60937	-	-
		1.20000	25.60000	82.00000	4.7625	0.0	0.76536	-	-
		2.40000	25.60000	82.00000	5.2125	0.0	1.0228	-	-
		3.60000	25.60000	82.00000	5.6625	0.0	1.3803	-	-
		4.80000	25.60000	82.00000	6.1125	0.0	1.8314	-	-
		6.00000	25.60000	82.00000	6.5625	0.0	2.3648	-	-
		7.20000	25.60000	82.00000	7.0125	0.0	2.9647	-	-
		8.40000	25.60000	82.00000	7.4625	0.0	3.6100	-	-
		9.60000	25.60000	82.00000	7.9125	0.0	4.2751	-	-
		10.80000	25.60000	82.00000	8.3625	0.0	4.9293	-	-
		12.00000	25.60000	82.00000	8.8125	0.0	5.5374	-	-
		13.20000	25.60000	82.00000	9.2625	0.0	6.0590	-	-
		14.40000	25.60000	82.00000	9.7125	0.0	6.4491	-	-
		15.60000	25.60000	82.00000	10.163	0.0	6.6577	-	-
		16.80000	25.60000	82.00000	10.612	0.0	6.6301	-	-
		18.00000	25.60000	82.00000	11.063	0.0	6.3067	-	-
		19.20000	25.60000	82.00000	11.512	0.0	5.6230	-	-
		20.40000	25.60000	82.00000	11.962	0.0	4.5098	-	-
		21.60000	25.60000	82.00000		Point lies within an excavation.			
		22.80000	25.60000	82.00000		Point lies within an excavation.			
		24.00000	25.60000	82.00000		Point lies within an excavation.			
		25.20000	25.60000	82.00000		Point lies within an excavation.			
		26.40000	25.60000	82.00000		Point lies within an excavation.			
		27.60000	25.60000	82.00000		Point lies within an excavation.			
		28.80000	25.60000	82.00000		Point lies within an excavation.			
		30.00000	25.60000	82.00000		Point lies within an excavation.			
		31.20000	25.60000	82.00000		Point lies within an excavation.			
		32.40000	25.60000	82.00000		Point lies within an excavation.			
		33.60000	25.60000	82.00000		Point lies within an excavation.			
		34.80000	25.60000	82.00000		Point lies within an excavation.			
		36.00000	25.60000	82.00000		Point lies within an excavation.			
		37.20000	25.60000	82.00000	-11.925	0.0	3.3250	-	-
		38.40000	25.60000	82.00000	-11.475	0.0	4.3368	-	-
		39.60000	25.60000	82.00000	-11.025	0.0	5.0112	-	-
		40.80000	25.60000	82.00000	-10.575	0.0	5.4056	-	-
		42.00000	25.60000	82.00000	-10.125	0.0	5.5725	-	-
		43.20000	25.60000	82.00000	-9.6750	0.0	5.5596	-	-
		44.40000	25.60000	82.00000	-9.2250	0.0	5.4098	-	-
		45.60000	25.60000	82.00000	-8.7750	0.0	5.1610	-	-
		46.80000	25.60000	82.00000	-8.3250	0.0	4.8466	-	-
		48.00000	25.60000	82.00000	-7.8750	0.0	4.4947	-	-
		49.20000	25.60000	82.00000	-7.4250	0.0	4.1290	-	-
		50.40000	25.60000	82.00000	-6.9750	0.0	3.7679	-	-
		51.60000	25.60000	82.00000	-6.5250	0.0	3.4255	-	-
		52.80000	25.60000	82.00000	-6.0750	0.0	3.1106	-	-
		54.00000	25.60000	82.00000	-5.6250	0.0	2.8274	-	-
		55.20000	25.60000	82.00000	-5.1750	0.0	2.5752	-	-
		56.40000	25.60000	82.00000	-4.7250	0.0	2.3484	-	-
		57.60000	25.60000	82.00000	-4.2750	0.0	2.1367	-	-
		58.80000	25.60000	82.00000	-3.8250	0.0	1.9248	-	-
		60.00000	25.60000	82.00000	-3.3750	0.0	1.6927	-	-
		0.00000	26.40000	82.00000	4.3125	0.0	0.60937	-	-
		1.20000	26.40000	82.00000	4.7625	0.0	0.76536	-	-
		2.40000	26.40000	82.00000	5.2125	0.0	1.0228	-	-
		3.60000	26.40000	82.00000	5.6625	0.0	1.3803	-	-
		4.80000	26.40000	82.00000	6.1125	0.0	1.8314	-	-

Type/No.		Coordinates			Displacements			Angle of Line	
Name	Dist.	x	y	z	x	y	z	Along the Line	Perpendicular to Line
		6.00000	26.40000	82.00000	6.5625	0.0	2.3648	-	-
		7.20000	26.40000	82.00000	7.0125	0.0	2.9647	-	-
		8.40000	26.40000	82.00000	7.4625	0.0	3.6100	-	-
		9.60000	26.40000	82.00000	7.9125	0.0	4.2751	-	-
		10.80000	26.40000	82.00000	8.3625	0.0	4.9293	-	-
		12.00000	26.40000	82.00000	8.8125	0.0	5.5374	-	-
		13.20000	26.40000	82.00000	9.2625	0.0	6.0590	-	-
		14.40000	26.40000	82.00000	9.7125	0.0	6.4491	-	-
		15.60000	26.40000	82.00000	10.163	0.0	6.6577	-	-
		16.80000	26.40000	82.00000	10.612	0.0	6.6301	-	-
		18.00000	26.40000	82.00000	11.063	0.0	6.3067	-	-
		19.20000	26.40000	82.00000	11.512	0.0	5.6230	-	-
		20.40000	26.40000	82.00000	11.962	0.0	4.5098	-	-
		21.60000	26.40000	82.00000		Point lies within an excavation.			
		22.80000	26.40000	82.00000		Point lies within an excavation.			
		24.00000	26.40000	82.00000		Point lies within an excavation.			
		25.20000	26.40000	82.00000		Point lies within an excavation.			
		26.40000	26.40000	82.00000		Point lies within an excavation.			
		27.60000	26.40000	82.00000		Point lies within an excavation.			
		28.80000	26.40000	82.00000		Point lies within an excavation.			
		30.00000	26.40000	82.00000		Point lies within an excavation.			
		31.20000	26.40000	82.00000		Point lies within an excavation.			
		32.40000	26.40000	82.00000		Point lies within an excavation.			
		33.60000	26.40000	82.00000		Point lies within an excavation.			
		34.80000	26.40000	82.00000		Point lies within an excavation.			
		36.00000	26.40000	82.00000		Point lies within an excavation.			
		37.20000	26.40000	82.00000	-11.925	0.0	3.3250	-	-
		38.40000	26.40000	82.00000	-11.475	0.0	4.3368	-	-
		39.60000	26.40000	82.00000	-11.025	0.0	5.0112	-	-
		40.80000	26.40000	82.00000	-10.575	0.0	5.4056	-	-
		42.00000	26.40000	82.00000	-10.125	0.0	5.5725	-	-
		43.20000	26.40000	82.00000	-9.6750	0.0	5.5596	-	-
		44.40000	26.40000	82.00000	-9.2250	0.0	5.4098	-	-
		45.60000	26.40000	82.00000	-8.7750	0.0	5.1610	-	-
		46.80000	26.40000	82.00000	-8.3250	0.0	4.8466	-	-
		48.00000	26.40000	82.00000	-7.8750	0.0	4.4947	-	-
		49.20000	26.40000	82.00000	-7.4250	0.0	4.1290	-	-
		50.40000	26.40000	82.00000	-6.9750	0.0	3.7679	-	-
		51.60000	26.40000	82.00000	-6.5250	0.0	3.4255	-	-
		52.80000	26.40000	82.00000	-6.0750	0.0	3.1106	-	-
		54.00000	26.40000	82.00000	-5.6250	0.0	2.8274	-	-
		55.20000	26.40000	82.00000	-5.1750	0.0	2.5752	-	-
		56.40000	26.40000	82.00000	-4.7250	0.0	2.3484	-	-
		57.60000	26.40000	82.00000	-4.2750	0.0	2.1367	-	-
		58.80000	26.40000	82.00000	-3.8250	0.0	1.9248	-	-
		60.00000	26.40000	82.00000	-3.3750	0.0	1.6927	-	-
		0.00000	27.20000	82.00000	4.3125	0.0	0.60937	-	-
		1.20000	27.20000	82.00000	4.7625	0.0	0.76536	-	-
		2.40000	27.20000	82.00000	5.2125	0.0	1.0228	-	-
		3.60000	27.20000	82.00000	5.6625	0.0	1.3803	-	-
		4.80000	27.20000	82.00000	6.1125	0.0	1.8314	-	-
		6.00000	27.20000	82.00000	6.5625	0.0	2.3648	-	-
		7.20000	27.20000	82.00000	7.0125	0.0	2.9647	-	-
		8.40000	27.20000	82.00000	7.4625	0.0	3.6100	-	-
		9.60000	27.20000	82.00000	7.9125	0.0	4.2751	-	-
		10.80000	27.20000	82.00000	8.3625	0.0	4.9293	-	-
		12.00000	27.20000	82.00000	8.8125	0.0	5.5374	-	-
		13.20000	27.20000	82.00000	9.2625	0.0	6.0590	-	-
		14.40000	27.20000	82.00000	9.7125	0.0	6.4491	-	-
		15.60000	27.20000	82.00000	10.163	0.0	6.6577	-	-
		16.80000	27.20000	82.00000	10.612	0.0	6.6301	-	-
		18.00000	27.20000	82.00000	11.063	0.0	6.3067	-	-
		19.20000	27.20000	82.00000	11.512	0.0	5.6230	-	-
		20.40000	27.20000	82.00000	11.962	0.0	4.5098	-	-
		21.60000	27.20000	82.00000		Point lies within an excavation.			
		22.80000	27.20000	82.00000		Point lies within an excavation.			
		24.00000	27.20000	82.00000		Point lies within an excavation.			
		25.20000	27.20000	82.00000		Point lies within an excavation.			
		26.40000	27.20000	82.00000		Point lies within an excavation.			
		27.60000	27.20000	82.00000		Point lies within an excavation.			
		28.80000	27.20000	82.00000		Point lies within an excavation.			
		30.00000	27.20000	82.00000		Point lies within an excavation.			
		31.20000	27.20000	82.00000		Point lies within an excavation.			
		32.40000	27.20000	82.00000		Point lies within an excavation.			
		33.60000	27.20000	82.00000		Point lies within an excavation.			
		34.80000	27.20000	82.00000		Point lies within an excavation.			
		36.00000	27.20000	82.00000		Point lies within an excavation.			
		37.20000	27.20000	82.00000	-11.925	0.0	3.3250	-	-
		38.40000	27.20000	82.00000	-11.475	0.0	4.3368	-	-
		39.60000	27.20000	82.00000	-11.025	0.0	5.0112	-	-
		40.80000	27.20000	82.00000	-10.575	0.0	5.4056	-	-
		42.00000	27.20000	82.00000	-10.125	0.0	5.5725	-	-
		43.20000	27.20000	82.00000	-9.6750	0.0	5.5596	-	-
		44.40000	27.20000	82.00000	-9.2250	0.0	5.4098	-	-
		45.60000	27.20000	82.00000	-8.7750	0.0	5.1610	-	-
		46.80000	27.20000	82.00000	-8.3250	0.0	4.8466	-	-
		48.00000	27.20000	82.00000	-7.8750	0.0	4.4947	-	-
		49.20000	27.20000	82.00000	-7.4250	0.0	4.1290	-	-
		50.40000	27.20000	82.00000	-6.9750	0.0	3.7679	-	-
		51.60000	27.20000	82.00000	-6.5250	0.0	3.4255	-	-
		52.80000	27.20000	82.00000	-6.0750	0.0	3.1106	-	-
		54.00000	27.20000	82.00000	-5.6250	0.0	2.8274	-	-
		55.20000	27.20000	82.00000	-5.1750	0.0	2.5752	-	-
		56.40000	27.20000	82.00000	-4.7250	0.0	2.3484	-	-
		57.60000	27.20000	82.00000	-4.2750	0.0	2.1367	-	-
		58.80000	27.20000	82.00000	-3.8250	0.0	1.9248	-	-
		60.00000	27.20000	82.00000	-3.3750	0.0	1.6927	-	-
		0.00000	28.00000	82.00000	4.3094	-0.079560	0.60891	-	-
		1.20000	28.00000	82.00000	4.7591	-0.095081	0.76445	-	-
		2.40000	28.00000	82.00000	5.2086	-0.11256	1.0214	-	-
		3.60000	28.00000	82.00000	5.6581	-0.13241	1.3782	-	-
		4.80000	28.00000	82.00000	6.1074	-0.15515	1.8286	-	-
		6.00000	28.00000	82.00000	6.5566	-0.18147	2.3614	-	-
		7.20000	28.00000	82.00000	7.0055	-0.21232	2.9605	-	-
		8.40000	28.00000	82.00000	7.4541	-0.24900	3.6051	-	-
		9.60000	28.00000	82.00000	7.9023	-0.29339	4.2695	-	-
		10.80000	28.00000	82.00000	8.3497	-0.34825	4.9233	-	-
		12.00000	28.00000	82.00000	8.7960	-0.41790	5.5312	-	-
		13.20000	28.00000	82.00000	9.2403	-0.50943	6.0531	-	-
		14.40000	28.00000	82.00000	9.6811	-0.63542	6.4444	-	-
		15.60000	28.00000	82.00000	10.115	-0.82042	6.6558	-	-
		16.80000	28.00000	82.00000	10.530	-1.1197	6.6342	-	-
		18.00000	28.00000	82.00000	10.886	-1.6886	6.3247	-	-
		19.20000	28.00000	82.00000	10.910	-3.1652	5.6839	-	-
		20.40000	28.00000	82.00000	4.7245	-8.7727	4.9033	-	-
		21.60000	28.00000	82.00000	2.9962	-8.9638	4.7580	-	-
		22.80000	28.00000	82.00000	2.9951	-8.9846	4.5996	-	-
		24.00000	28.00000	82.00000	2.9934	-9.0121	4.4262	-	-
		25.20000	28.00000	82.00000	2.9906	-9.0498	4.2460	-	-
		26.40000	28.00000	82.00000	2.9857	-9.1052	4.0683	-	-
		27.60000	28.00000	82.00000	2.9756	-9.1940	3.9038	-	-
		28.80000	28.00000	82.00000	2.9498	-9.3588	3.7645	-	-
		30.00000	28.00000	82.00000	2.8460	-9.7612	3.6634	-	-
		31.20000	28.00000	82.00000	1.5435	-11.385	3.6150	-	-
		32.40000	28.00000	82.00000	0.0	-11.813	3.6129	-	-
		33.60000	28.00000	82.00000	0.0	-11.813	3.6129	-	-
		34.80000	28.00000	82.00000	0.0	-11.813	3.6129	-	-
		36.00000	28.00000	82.00000	0.0	-11.813	3.6129	-	-
		37.20000	28.00000	82.00000	-4.3817	-10.954	3.6481	-	-
		38.40000	28.00000	82.00000	-10.776	-3.8485	4.3960	-	-
		39.60000	28.00000	82.00000	-10.809	-2.0787	5.0318	-	-
		40.80000	28.00000	82.00000	-10.472	-1.3780	5.4129	-	-
		42.00000	28.00000	82.00000	-10.065	-1.0065	5.5739	-	-
		43.20000	28.00000	82.00000	-9.6362	-0.77711	5.5581	-	-
		44.40000	28.00000	82.00000	-9.1977	-0.62147	5.4069	-	-
		45.60000	28.00000	82.00000	-8.7548	-0.50900	5.1576	-	-
		46.80000	28.00000	82.00000	-8.3094	-0.42395	4.8430	-	-
		48.00000	28.00000	82.00000	-7.8626	-0.35739	4.4913	-	-
		49.20000	28.00000	82.00000	-7.4149	-0.30389	4.1258	-	-
		50.40000	28.00000	82.00000	-6.9667	-0.25995	3.7652	-	-
		51.60000	28.00000	82.00000	-6.5180	-0.22322	3.4232	-	-

Type/No.		Coordinates			Displacements			Angle of Line		
Name	Dist.	x	y	z	x	y	z	Along the Line	Perpendicular to Line	x Axis
		52.80000	28.00000	82.00000	-6.0690	-0.19206	3.1087	-	-	-
		54.00000	28.00000	82.00000	-5.6198	-0.16529	2.8258	-	-	-
		55.20000	28.00000	82.00000	-5.1705	-0.14205	2.5738	-	-	-
		56.40000	28.00000	82.00000	-4.7210	-0.12168	2.3473	-	-	-
		57.60000	28.00000	82.00000	-4.2715	-0.10368	2.1356	-	-	-
		58.80000	28.00000	82.00000	-3.8218	-0.087657	1.9238	-	-	-
		60.00000	28.00000	82.00000	-3.3722	-0.073308	1.6915	-	-	-
		0.00000	28.80000	82.00000	4.2919	-0.20579	0.60628	-	-	-
		1.20000	28.80000	82.00000	4.7394	-0.24594	0.75924	-	-	-
		2.40000	28.80000	82.00000	5.1864	-0.29113	1.0131	-	-	-
		3.60000	28.80000	82.00000	5.6327	-0.34240	1.3664	-	-	-
		4.80000	28.80000	82.00000	6.0783	-0.40108	1.8130	-	-	-
		6.00000	28.80000	82.00000	6.5227	-0.46892	2.3416	-	-	-
		7.20000	28.80000	82.00000	6.9655	-0.54829	2.9365	-	-	-
		8.40000	28.80000	82.00000	7.4063	-0.64247	3.5771	-	-	-
		9.60000	28.80000	82.00000	7.8439	-0.75611	4.2379	-	-	-
		10.80000	28.80000	82.00000	8.2768	-0.89603	4.8890	-	-	-
		12.00000	28.80000	82.00000	8.7024	-1.0727	5.4957	-	-	-
		13.20000	28.80000	82.00000	9.1156	-1.3030	6.0192	-	-	-
		14.40000	28.80000	82.00000	9.5062	-1.6158	6.4167	-	-	-
		15.60000	28.80000	82.00000	9.8516	-2.0649	6.6429	-	-	-
		16.80000	28.80000	82.00000	10.092	-2.7601	6.6530	-	-	-
		18.00000	28.80000	82.00000	10.034	-3.9522	6.4131	-	-	-
		19.20000	28.80000	82.00000	8.8598	-6.1918	5.9451	-	-	-
		20.40000	28.80000	82.00000	3.6324	-8.8350	5.5240	-	-	-
		21.60000	28.80000	82.00000	2.9745	-8.9031	5.3873	-	-	-
		22.80000	28.80000	82.00000	2.9671	-8.9559	5.2314	-	-	-
		24.00000	28.80000	82.00000	2.9559	-9.0249	5.0607	-	-	-
		25.20000	28.80000	82.00000	2.9381	-9.1188	4.8834	-	-	-
		26.40000	28.80000	82.00000	2.9070	-9.2535	4.7088	-	-	-
		27.60000	28.80000	82.00000	2.8461	-9.4612	4.5476	-	-	-
		28.80000	28.80000	82.00000	2.7030	-9.8139	4.4117	-	-	-
		30.00000	28.80000	82.00000	2.2671	-10.477	4.3140	-	-	-
		31.20000	28.80000	82.00000	0.67458	-11.436	4.2682	-	-	-
		32.40000	28.80000	82.00000	0.0	-11.513	4.2662	-	-	-
		33.60000	28.80000	82.00000	0.0	-11.513	4.2662	-	-	-
		34.80000	28.80000	82.00000	0.0	-11.513	4.2662	-	-	-
		36.00000	28.80000	82.00000	0.0	-11.513	4.2662	-	-	-
		37.20000	28.80000	82.00000	-1.7497	-11.373	4.2771	-	-	-
		38.40000	28.80000	82.00000	-8.2685	-7.6779	4.6615	-	-	-
		39.60000	28.80000	82.00000	-9.7581	-4.8791	5.1365	-	-	-
		40.80000	28.80000	82.00000	-9.9290	-3.3968	5.4510	-	-	-
		42.00000	28.80000	82.00000	-9.7389	-2.5321	5.5804	-	-	-
		43.20000	28.80000	82.00000	-9.4196	-1.9751	5.5489	-	-	-
		44.40000	28.80000	82.00000	-9.0440	-1.5888	5.3900	-	-	-
		45.60000	28.80000	82.00000	-8.6402	-1.3061	5.1375	-	-	-
		46.80000	28.80000	82.00000	-8.2208	-1.0905	4.8223	-	-	-
		48.00000	28.80000	82.00000	-7.7921	-0.92088	4.4716	-	-	-
		49.20000	28.80000	82.00000	-7.3574	-0.78399	4.1079	-	-	-
		50.40000	28.80000	82.00000	-6.9189	-0.67124	3.7494	-	-	-
		51.60000	28.80000	82.00000	-6.4777	-0.57678	3.4097	-	-	-
		52.80000	28.80000	82.00000	-6.0346	-0.49652	3.0973	-	-	-
		54.00000	28.80000	82.00000	-5.5901	-0.42748	2.8164	-	-	-
		55.20000	28.80000	82.00000	-5.1445	-0.36746	2.5660	-	-	-
		56.40000	28.80000	82.00000	-4.6981	-0.31482	2.3406	-	-	-
		57.60000	28.80000	82.00000	-4.2512	-0.26828	2.1296	-	-	-
		58.80000	28.80000	82.00000	-3.8037	-0.22683	1.9177	-	-	-
		60.00000	28.80000	82.00000	-3.3559	-0.18968	1.6850	-	-	-
		0.00000	29.60000	82.00000	4.2590	-0.32921	0.60147	-	-	-
		1.20000	29.60000	82.00000	4.7025	-0.39345	0.74962	-	-	-
		2.40000	29.60000	82.00000	5.1447	-0.46567	0.99774	-	-	-
		3.60000	29.60000	82.00000	5.5853	-0.54748	1.3445	-	-	-
		4.80000	29.60000	82.00000	6.0238	-0.64092	1.7838	-	-	-
		6.00000	29.60000	82.00000	6.4595	-0.74872	2.3048	-	-	-
		7.20000	29.60000	82.00000	6.8912	-0.87446	2.8918	-	-	-
		8.40000	29.60000	82.00000	7.3176	-1.0231	3.5247	-	-	-
		9.60000	29.60000	82.00000	7.7363	-1.2015	4.1787	-	-	-
		10.80000	29.60000	82.00000	8.1434	-1.4196	4.8244	-	-	-
		12.00000	29.60000	82.00000	8.5325	-1.6923	5.4287	-	-	-
		13.20000	29.60000	82.00000	8.8922	-2.0427	5.9544	-	-	-
		14.40000	29.60000	82.00000	9.2000	-2.5078	6.3622	-	-	-
		15.60000	29.60000	82.00000	9.4090	-3.1506	6.6125	-	-	-
		16.80000	29.60000	82.00000	9.4095	-4.0792	6.6715	-	-	-
		18.00000	29.60000	82.00000	8.9182	-5.4624	6.5270	-	-	-
		19.20000	29.60000	82.00000	7.2069	-7.3698	6.2319	-	-	-
		20.40000	29.60000	82.00000	3.3383	-8.7600	5.9785	-	-	-
		21.60000	29.60000	82.00000	2.9347	-8.8350	5.8475	-	-	-
		22.80000	29.60000	82.00000	2.9162	-8.9164	5.6963	-	-	-
		24.00000	29.60000	82.00000	2.8889	-9.0214	5.5306	-	-	-
		25.20000	29.60000	82.00000	2.8460	-9.1612	5.3587	-	-	-
		26.40000	29.60000	82.00000	2.7740	-9.3547	5.1897	-	-	-
		27.60000	29.60000	82.00000	2.6414	-9.6348	5.0343	-	-	-
		28.80000	29.60000	82.00000	2.3681	-10.054	4.9042	-	-	-
		30.00000	29.60000	82.00000	1.7437	-10.654	4.8119	-	-	-
		31.20000	29.60000	82.00000	0.42426	-11.182	4.7692	-	-	-
		32.40000	29.60000	82.00000	0.0	-11.212	4.7674	-	-	-
		33.60000	29.60000	82.00000	0.0	-11.212	4.7674	-	-	-
		34.80000	29.60000	82.00000	0.0	-11.212	4.7674	-	-	-
		36.00000	29.60000	82.00000	0.0	-11.212	4.7674	-	-	-
		37.20000	29.60000	82.00000	-1.0627	-11.158	4.7725	-	-	-
		38.40000	29.60000	82.00000	-6.1314	-9.1971	4.9773	-	-	-
		39.60000	29.60000	82.00000	-8.3603	-6.7525	5.2847	-	-	-
		40.80000	29.60000	82.00000	-9.0779	-5.0167	5.5061	-	-	-
		42.00000	29.60000	82.00000	-9.1888	-3.8593	5.5862	-	-	-
		43.20000	29.60000	82.00000	-9.0407	-3.0623	5.5287	-	-	-
		44.40000	29.60000	82.00000	-8.7692	-2.4885	5.3570	-	-	-
		45.60000	29.60000	82.00000	-8.4325	-2.0591	5.0993	-	-	-
		46.80000	29.60000	82.00000	-8.0586	-1.7268	4.7834	-	-	-
		48.00000	29.60000	82.00000	-7.6621	-1.4628	4.4346	-	-	-
		49.20000	29.60000	82.00000	-7.2511	-1.2481	4.0743	-	-	-
		50.40000	29.60000	82.00000	-6.8303	-1.0704	3.7199	-	-	-
		51.60000	29.60000	82.00000	-6.4028	-0.92095	3.3844	-	-	-
		52.80000	29.60000	82.00000	-5.9704	-0.79353	3.0762	-	-	-
		54.00000	29.60000	82.00000	-5.5345	-0.68367	2.7988	-	-	-
		55.20000	29.60000	82.00000	-5.0959	-0.58799	2.5514	-	-	-
		56.40000	29.60000	82.00000	-4.6553	-0.50392	2.3280	-	-	-
		57.60000	29.60000	82.00000	-4.2131	-0.42949	2.1181	-	-	-
		58.80000	29.60000	82.00000	-3.7697	-0.36314	1.9064	-	-	-
		60.00000	29.60000	82.00000	-3.3253	-0.30361	1.6726	-	-	-
		0.00000	30.40000	82.00000	4.2111	-0.44815	0.59473	-	-	-
		1.20000	30.40000	82.00000	4.6489	-0.53564	0.73595	-	-	-
		2.40000	30.40000	82.00000	5.0844	-0.63382	0.97575	-	-	-
		3.60000	30.40000	82.00000	5.5168	-0.74479	1.3130	-	-	-
		4.80000	30.40000	82.00000	5.9452	-0.87120	1.7418	-	-	-
		6.00000	30.40000	82.00000	6.3685	-1.0165	2.2516	-	-	-
		7.20000	30.40000	82.00000	6.7848	-1.1854	2.8272	-	-	-
		8.40000	30.40000	82.00000	7.1913	-1.3838	3.4490	-	-	-
		9.60000	30.40000	82.00000	7.5840	-1.6203	4.0928	-	-	-
		10.80000	30.40000	82.00000	7.9564	-1.9067	4.7306	-	-	-
		12.00000	30.40000	82.00000	8.2978	-2.2599	5.3305	-	-	-
		13.20000	30.40000	82.00000	8.5897	-2.7048	5.8581	-	-	-
		14.40000	30.40000	82.00000	8.7985	-3.2783	6.2777	-	-	-
		15.60000	30.40000	82.00000	8.8590	-4.0347	6.5559	-	-	-
		16.80000	30.40000	82.00000	8.6393	-5.0451	6.6686	-	-	-
		18.00000	30.40000	82.00000	7.8720	-6.3593	6.6158	-	-	-
		19.20000	30.40000	82.00000	6.1139	-7.8135	6.4489	-	-	-
		20.40000	30.40000	82.00000	3.1752	-8.6655	6.2840	-	-	-
		21.60000	30.40000	82.00000	2.8790	-8.7558	6.1598	-	-	-
		22.80000	30.40000	82.00000	2.8461	-8.8612	6.0152	-	-	-
		24.00000	30.40000	82.00000	2.7981	-8.9944	5.8566	-	-	-
		25.20000	30.40000	82.00000	2.7251	-9.1669	5.6921	-	-	-
		26.40000	30.40000	82.00000	2.6079	-9.3954	5.5310	-	-	-
		27.60000	30.40000	82.00000	2.4074	-9.7026	5.3835	-	-	-
		28.80000	30.40000	82.00000	2.0443	-10.108	5.2609	-	-	-
		30.00000	30.40000	82.00000	1.3783	-10.577	5.1748	-	-	-
		31.20000	30.40000	82.00000	0.30870	-10.897	5.1356	-	-	-
		32.40000	30.40000	82.00000	0.0	-10.913	5.1339	-	-	-
		33.60000	30.40000	82.00000	0.0	-10.913	5.1339	-	-	-
		34.80000	30.40000	82.00000	0.0	-10.913	5.1339	-	-	-
		36.00000	30.40000	82.00000	0.0	-10.913	5.1339	-	-	-
		37.20000	30.40000	82.00000	-0.75063	-10.884	5.1365	-	-	-

Type/No.		Coordinates			Displacements			Angle of Line
Name	Dist.	x	y	z	x	y	z	Along the Line	Perpendicular to Line	x Axis
		38.40000	30.40000	82.00000	-4.6920	-9.7191	5.2466	-	-	-
		39.60000	30.40000	82.00000	-7.0355	-7.8473	5.4264	-	-	-
		40.80000	30.40000	82.00000	-8.1144	-6.1926	5.5567	-	-	-
		42.00000	30.40000	82.00000	-8.5054	-4.9331	5.5818	-	-	-
		43.20000	30.40000	82.00000	-8.5447	-3.9967	5.4936	-	-	-
		44.40000	30.40000	82.00000	-8.3977	-3.2910	5.3064	-	-	-
		45.60000	30.40000	82.00000	-8.1459	-2.7469	5.0425	-	-	-
		46.80000	30.40000	82.00000	-7.8318	-2.3176	4.7264	-	-	-
		48.00000	30.40000	82.00000	-7.4785	-1.9716	4.3807	-	-	-
		49.20000	30.40000	82.00000	-7.0997	-1.6876	4.0255	-	-	-
		50.40000	30.40000	82.00000	-6.7035	-1.4508	3.6772	-	-	-
		51.60000	30.40000	82.00000	-6.2951	-1.2504	3.3479	-	-	-
		52.80000	30.40000	82.00000	-5.8778	-1.0788	3.0456	-	-	-
		54.00000	30.40000	82.00000	-5.4541	-0.93041	2.7734	-	-	-
		55.20000	30.40000	82.00000	-5.0255	-0.80077	2.5301	-	-	-
		56.40000	30.40000	82.00000	-4.5931	-0.68660	2.3097	-	-	-
		57.60000	30.40000	82.00000	-4.1578	-0.58533	2.1013	-	-	-
		58.80000	30.40000	82.00000	-3.7202	-0.49489	1.8896	-	-	-
		60.00000	30.40000	82.00000	-3.2807	-0.41366	1.6542	-	-	-
		0.00000	31.20000	82.00000	4.1489	-0.56104	0.58643	-	-	-
		1.20000	31.20000	82.00000	4.5794	-0.67067	0.71874	-	-	-
		2.40000	31.20000	82.00000	5.0062	-0.79340	0.94783	-	-	-
		3.60000	31.20000	82.00000	5.4282	-0.93172	1.2728	-	-	-
		4.80000	31.20000	82.00000	5.8441	-1.0888	1.6880	-	-	-
		6.00000	31.20000	82.00000	6.2520	-1.2685	2.1834	-	-	-
		7.20000	31.20000	82.00000	6.6490	-1.4762	2.7441	-	-	-
		8.40000	31.20000	82.00000	7.0314	-1.7187	3.3513	-	-	-
		9.60000	31.20000	82.00000	7.3930	-2.0052	3.9818	-	-	-
		10.80000	31.20000	82.00000	7.7247	-2.3479	4.6086	-	-	-
		12.00000	31.20000	82.00000	8.0120	-2.7638	5.2019	-	-	-
		13.20000	31.20000	82.00000	8.2307	-3.2759	5.7298	-	-	-
		14.40000	31.20000	82.00000	8.3397	-3.9145	6.1604	-	-	-
		15.60000	31.20000	82.00000	8.2668	-4.7159	6.4655	-	-	-
		16.80000	31.20000	82.00000	7.8857	-5.7087	6.6274	-	-	-
		18.00000	31.20000	82.00000	6.9945	-6.8628	6.6499	-	-	-
		19.20000	31.20000	82.00000	5.3687	-7.9678	6.5715	-	-	-
		20.40000	31.20000	82.00000	3.0517	-8.8579	6.4597	-	-	-
		21.60000	31.20000	82.00000	2.8102	-8.6628	6.3436	-	-	-
		22.80000	31.20000	82.00000	2.7607	-8.7866	6.2074	-	-	-
		24.00000	31.20000	82.00000	2.6904	-8.9398	6.0578	-	-	-
		25.20000	31.20000	82.00000	2.5869	-9.1318	5.9026	-	-	-
		26.40000	31.20000	82.00000	2.4283	-9.3742	5.7509	-	-	-
		27.60000	31.20000	82.00000	2.1764	-9.6773	5.6128	-	-	-
		28.80000	31.20000	82.00000	1.7684	-10.036	5.4988	-	-	-
		30.00000	31.20000	82.00000	1.1271	-10.393	5.4195	-	-	-
		31.20000	31.20000	82.00000	0.24245	-10.603	5.3836	-	-	-
		32.40000	31.20000	82.00000	0.0	-10.612	5.3821	-	-	-
		33.60000	31.20000	82.00000	0.0	-10.612	5.3821	-	-	-
		34.80000	31.20000	82.00000	0.0	-10.612	5.3821	-	-	-
		36.00000	31.20000	82.00000	0.0	-10.612	5.3821	-	-	-
		37.20000	31.20000	82.00000	-0.57271	-10.595	5.3834	-	-	-
		38.40000	31.20000	82.00000	-3.7217	-9.8359	5.4391	-	-	-
		39.60000	31.20000	82.00000	-5.9243	-8.4308	5.5301	-	-	-
		40.80000	31.20000	82.00000	-7.1727	-6.9839	5.5844	-	-	-
		42.00000	31.20000	82.00000	-7.7711	-5.7506	5.5581	-	-	-
		43.20000	31.20000	82.00000	-7.9796	-4.7620	5.4394	-	-	-
		44.40000	31.20000	82.00000	-7.9581	-3.9791	5.2366	-	-	-
		45.60000	31.20000	82.00000	-7.7981	-3.3550	4.9670	-	-	-
		46.80000	31.20000	82.00000	-7.5515	-2.8511	4.6516	-	-	-
		48.00000	31.20000	82.00000	-7.2488	-2.4382	4.3106	-	-	-
		49.20000	31.20000	82.00000	-6.9085	-2.0952	3.9623	-	-	-
		50.40000	31.20000	82.00000	-6.5421	-1.8064	3.6220	-	-	-
		51.60000	31.20000	82.00000	-6.1573	-1.5604	3.3008	-	-	-
		52.80000	31.20000	82.00000	-5.7589	-1.3486	3.0060	-	-	-
		54.00000	31.20000	82.00000	-5.3505	-1.1645	2.7405	-	-	-
		55.20000	31.20000	82.00000	-4.9345	-1.0032	2.5025	-	-	-
		56.40000	31.20000	82.00000	-4.5125	-0.86064	2.2858	-	-	-
		57.60000	31.20000	82.00000	-4.0860	-0.73389	2.0793	-	-	-
		58.80000	31.20000	82.00000	-3.6558	-0.62048	1.8674	-	-	-
		60.00000	31.20000	82.00000	-3.2227	-0.51843	1.6296	-	-	-
		0.00000	32.00000	82.00000	4.0730	-0.66643	0.57702	-	-	-
		1.20000	32.00000	82.00000	4.4949	-0.79634	0.69865	-	-	-
		2.40000	32.00000	82.00000	4.9114	-0.94243	0.91484	-	-	-
		3.60000	32.00000	82.00000	5.3212	-1.1060	1.2250	-	-	-
		4.80000	32.00000	82.00000	5.7224	-1.2909	1.6238	-	-	-
		6.00000	32.00000	82.00000	6.1124	-1.5014	2.1016	-	-	-
		7.20000	32.00000	82.00000	6.4876	-1.7432	2.6442	-	-	-
		8.40000	32.00000	82.00000	6.8427	-2.0233	3.2336	-	-	-
		9.60000	32.00000	82.00000	7.1700	-2.3507	3.8474	-	-	-
		10.80000	32.00000	82.00000	7.4583	-2.7373	4.4604	-	-	-
		12.00000	32.00000	82.00000	7.6898	-3.1981	5.0443	-	-	-
		13.20000	32.00000	82.00000	7.8370	-3.7516	5.5699	-	-	-
		14.40000	32.00000	82.00000	7.8562	-4.4188	6.0087	-	-	-
		15.60000	32.00000	82.00000	7.6779	-5.2171	6.3363	-	-	-
		16.80000	32.00000	82.00000	7.1970	-6.1425	6.5385	-	-	-
		18.00000	32.00000	82.00000	6.2793	-7.1286	6.6181	-	-	-
		19.20000	32.00000	82.00000	4.8277	-7.9897	6.6002	-	-	-
		20.40000	32.00000	82.00000	2.9427	-8.4374	6.5238	-	-	-
		21.60000	32.00000	82.00000	2.7311	-8.5539	6.4171	-	-	-
		22.80000	32.00000	82.00000	2.6647	-8.6908	6.2908	-	-	-
		24.00000	32.00000	82.00000	2.5725	-8.8560	6.1516	-	-	-
		25.20000	32.00000	82.00000	2.4412	-9.0562	6.0072	-	-	-
		26.40000	32.00000	82.00000	2.2495	-9.2974	5.8663	-	-	-
		27.60000	32.00000	82.00000	1.9648	-9.5796	5.7386	-	-	-
		28.80000	32.00000	82.00000	1.5435	-9.8850	5.6338	-	-	-
		30.00000	32.00000	82.00000	0.94868	-10.159	5.5614	-	-	-
		31.20000	32.00000	82.00000	0.19956	-10.306	5.5288	-	-	-
		32.40000	32.00000	82.00000	0.0	-10.313	5.5274	-	-	-
		33.60000	32.00000	82.00000	0.0	-10.313	5.5274	-	-	-
		34.80000	32.00000	82.00000	0.0	-10.313	5.5274	-	-	-
		36.00000	32.00000	82.00000	0.0	-10.313	5.5274	-	-	-
		37.20000	32.00000	82.00000	-0.45781	-10.301	5.5280	-	-	-
		38.40000	32.00000	82.00000	-3.0398	-9.7708	5.5506	-	-	-
		39.60000	32.00000	82.00000	-5.0283	-8.7029	5.5815	-	-	-
		40.80000	32.00000	82.00000	-6.3172	-7.4809	5.5777	-	-	-
		42.00000	32.00000	82.00000	-7.0445	-6.3401	5.5083	-	-	-
		43.20000	32.00000	82.00000	-7.3866	-5.3612	5.3629	-	-	-
		44.40000	32.00000	82.00000	-7.4781	-4.5475	5.1464	-	-	-
		45.60000	32.00000	82.00000	-7.4074	-3.8760	4.8729	-	-	-
		46.80000	32.00000	82.00000	-7.2303	-3.3200	4.5598	-	-	-
		48.00000	32.00000	82.00000	-6.9816	-2.8561	4.2252	-	-	-
		49.20000	32.00000	82.00000	-6.6835	-2.4652	3.8858	-	-	-
		50.40000	32.00000	82.00000	-6.3507	-2.1327	3.5552	-	-	-
		51.60000	32.00000	82.00000	-5.9926	-1.8470	3.2439	-	-	-
		52.80000	32.00000	82.00000	-5.6160	-1.5995	2.9583	-	-	-
		54.00000	32.00000	82.00000	-5.2255	-1.3832	2.7007	-	-	-
		55.20000	32.00000	82.00000	-4.8242	-1.1928	2.4690	-	-	-
		56.40000	32.00000	82.00000	-4.4146	-1.0240	2.2565	-	-	-
		57.60000	32.00000	82.00000	-3.9985	-0.87347	2.0520	-	-	-
		58.80000	32.00000	82.00000	-3.5772	-0.73842	1.8395	-	-	-
		60.00000	32.00000	82.00000	-3.1517	-0.61664	1.5986	-	-	-
		0.00000	32.80000	82.00000	3.9844	-0.76302	0.56702	-	-	-
		1.20000	32.80000	82.00000	4.3963	-0.91268	0.67644	-	-	-
		2.40000	32.80000	82.00000	4.8013	-1.0792	0.87780	-	-	-
		3.60000	32.80000	82.00000	5.1974	-1.2655	1.1708	-	-	-
		4.80000	32.80000	82.00000	5.5823	-1.4752	1.5506	-	-	-
		6.00000	32.80000	82.00000	5.9528	-1.7127	2.0080	-	-	-
		7.20000	32.80000	82.00000	6.3042	-1.9835	2.5296	-	-	-
		8.40000	32.80000	82.00000	6.6304	-2.2943	3.0980	-	-	-
		9.60000	32.80000	82.00000	6.9222	-2.6537	3.6922	-	-	-
		10.80000	32.80000	82.00000	7.1667	-3.0720	4.2881	-	-	-
		12.00000	32.80000	82.00000	7.3445	-3.5613	4.8597	-	-	-
		13.20000	32.80000	82.00000	7.4270	-4.1347	5.3797	-	-	-
		14.40000	32.80000	82.00000	7.3719	-4.8035	5.8225	-	-	-
		15.60000	32.80000	82.00000	7.1182	-5.5696	6.1666	-	-	-
		16.80000	32.80000	82.00000	6.5865	-6.4096	6.3991	-	-	-
		18.00000	32.80000	82.00000	5.6946	-7.2487	6.5200	-	-	-
		19.20000	32.80000	82.00000	4.4116	-7.9406	6.5439	-	-	-
		20.40000	32.80000	82.00000	2.8395	-8.3035	6.4931	-	-	-
		21.60000	32.80000	82.00000	2.6448	-8.4284	6.3970	-	-	-
		22.80000	32.80000	82.00000	2.5620	-8.5733	6.2819	-	-	-

Type/No.		Coordinates			Displacements			Angle of Line		
Name	Dist.	x	y	z	x	y	z	Along the Line	Perpendicular to Line	x Axis
		24.00000	32.80000	82.00000	2.4500	-8.7438	6.1543	-	-	-
		25.20000	32.80000	82.00000	2.2957	-8.9438	6.0218	-	-	-
		26.40000	32.80000	82.00000	2.0801	-9.1742	5.8926	-	-	-
		27.60000	32.80000	82.00000	1.7780	-9.4288	5.7759	-	-	-
		28.80000	32.80000	82.00000	1.3618	-9.6856	5.6805	-	-	-
		30.00000	32.80000	82.00000	0.81697	-9.8991	5.6150	-	-	-
		31.20000	32.80000	82.00000	0.16954	-10.008	5.5856	-	-	-
		32.40000	32.80000	82.00000	0.0	-10.012	5.5844	-	-	-
		33.60000	32.80000	82.00000	0.0	-10.012	5.5844	-	-	-
		34.80000	32.80000	82.00000	0.0	-10.012	5.5844	-	-	-
		36.00000	32.80000	82.00000	0.0	-10.012	5.5844	-	-	-
		37.20000	32.80000	82.00000	-0.37751	-10.004	5.5844	-	-	-
		38.40000	32.80000	82.00000	-2.5397	-9.6146	5.5864	-	-	-
		39.60000	32.80000	82.00000	-4.3101	-8.7860	5.5771	-	-	-
		40.80000	32.80000	82.00000	-5.5673	-7.7649	5.5312	-	-	-
		42.00000	32.80000	82.00000	-6.3596	-6.7412	5.4288	-	-	-
		43.20000	32.80000	82.00000	-6.7965	-5.8099	5.2623	-	-	-
		44.40000	32.80000	82.00000	-6.9809	-4.9998	5.0357	-	-	-
		45.60000	32.80000	82.00000	-6.9908	-4.3083	4.7606	-	-	-
		46.80000	32.80000	82.00000	-6.8803	-3.7210	4.4519	-	-	-
		48.00000	32.80000	82.00000	-6.6856	-3.2212	4.1258	-	-	-
		49.20000	32.80000	82.00000	-6.4313	-2.7939	3.7970	-	-	-
		50.40000	32.80000	82.00000	-6.1339	-2.4261	3.4780	-	-	-
		51.60000	32.80000	82.00000	-5.8048	-2.1072	3.1782	-	-	-
		52.80000	32.80000	82.00000	-5.4520	-1.8288	2.9032	-	-	-
		54.00000	32.80000	82.00000	-5.0812	-1.5841	2.6546	-	-	-
		55.20000	32.80000	82.00000	-4.6964	-1.3676	2.4299	-	-	-
		56.40000	32.80000	82.00000	-4.3008	-1.1750	2.2220	-	-	-
		57.60000	32.80000	82.00000	-3.8965	-1.0025	2.0194	-	-	-
		58.80000	32.80000	82.00000	-3.4853	-0.84735	1.8059	-	-	-
		60.00000	32.80000	82.00000	-3.0686	-0.70710	1.5608	-	-	-
		0.00000	33.60000	82.00000	3.8526	-0.84360	0.55701	-	-	-
		1.20000	33.60000	82.00000	4.2851	-1.0169	0.65292	-	-	-
		2.40000	33.60000	82.00000	4.6774	-1.2023	0.83780	-	-	-
		3.60000	33.60000	82.00000	5.0587	-1.4088	1.1117	-	-	-
		4.80000	33.60000	82.00000	5.4262	-1.6401	1.4702	-	-	-
		6.00000	33.60000	82.00000	5.7760	-1.9041	1.9047	-	-	-
		7.20000	33.60000	82.00000	6.1028	-2.1949	2.4025	-	-	-
		8.40000	33.60000	82.00000	6.3996	-2.5299	2.9472	-	-	-
		9.60000	33.60000	82.00000	6.6563	-2.9127	3.5188	-	-	-
		10.80000	33.60000	82.00000	6.8589	-3.3517	4.0948	-	-	-
		12.00000	33.60000	82.00000	6.9876	-3.8556	4.6507	-	-	-
		13.20000	33.60000	82.00000	7.0148	-4.4321	5.1616	-	-	-
		14.40000	33.60000	82.00000	6.9021	-5.0844	5.6039	-	-	-
		15.60000	33.60000	82.00000	6.5997	-5.8037	5.9579	-	-	-
		16.80000	33.60000	82.00000	6.0509	-6.5574	6.2112	-	-	-
		18.00000	33.60000	82.00000	5.2094	-7.2755	6.3610	-	-	-
		19.20000	33.60000	82.00000	4.0760	-7.8477	6.4142	-	-	-
		20.40000	33.60000	82.00000	2.7392	-8.1561	6.3832	-	-	-
		21.60000	33.60000	82.00000	2.5541	-8.2862	6.2988	-	-	-
		22.80000	33.60000	82.00000	2.4564	-8.4348	6.1958	-	-	-
		24.00000	33.60000	82.00000	2.3274	-8.6054	6.0808	-	-	-
		25.20000	33.60000	82.00000	2.1553	-8.7993	5.9609	-	-	-
		26.40000	33.60000	82.00000	1.9243	-9.0141	5.8440	-	-	-
		27.60000	33.60000	82.00000	1.6160	-9.2401	5.7385	-	-	-
		28.80000	33.60000	82.00000	1.2142	-9.4558	5.6527	-	-	-
		30.00000	33.60000	82.00000	0.71636	-9.6257	5.5939	-	-	-
		31.20000	33.60000	82.00000	0.14736	-9.7089	5.5676	-	-	-
		32.40000	33.60000	82.00000	0.0	-9.7125	5.5665	-	-	-
		33.60000	33.60000	82.00000	0.0	-9.7125	5.5665	-	-	-
		34.80000	33.60000	82.00000	0.0	-9.7125	5.5665	-	-	-
		36.00000	33.60000	82.00000	0.0	-9.7125	5.5665	-	-	-
		37.20000	33.60000	82.00000	-0.31823	-9.7061	5.5663	-	-	-
		38.40000	33.60000	82.00000	-2.1593	-9.4084	5.5551	-	-	-
		39.60000	33.60000	82.00000	-3.7302	-8.7516	5.5195	-	-	-
		40.80000	33.60000	82.00000	-4.9200	-7.8978	5.4447	-	-	-
		42.00000	33.60000	82.00000	-5.7321	-6.9932	5.3187	-	-	-
		43.20000	33.60000	82.00000	-6.2290	-6.1285	5.1375	-	-	-
		44.40000	33.60000	82.00000	-6.4846	-5.3454	4.9050	-	-	-
		45.60000	33.60000	82.00000	-6.5628	-4.6550	4.6313	-	-	-
		46.80000	33.60000	82.00000	-6.5126	-4.0538	4.3296	-	-	-
		48.00000	33.60000	82.00000	-6.3694	-3.5321	4.0139	-	-	-
		49.20000	33.60000	82.00000	-6.1581	-3.0791	3.6976	-	-	-
		50.40000	33.60000	82.00000	-5.8966	-2.6843	3.3918	-	-	-
		51.60000	33.60000	82.00000	-5.5974	-2.3387	3.1049	-	-	-
		52.80000	33.60000	82.00000	-5.2697	-2.0345	2.8416	-	-	-
		54.00000	33.60000	82.00000	-4.9199	-1.7654	2.6029	-	-	-
		55.20000	33.60000	82.00000	-4.5529	-1.5260	2.3857	-	-	-
		56.40000	33.60000	82.00000	-4.1724	-1.3120	2.1826	-	-	-
		57.60000	33.60000	82.00000	-3.7811	-1.1197	1.9816	-	-	-
		58.80000	33.60000	82.00000	-3.3811	-0.94609	1.7663	-	-	-
		60.00000	33.60000	82.00000	-2.9740	-0.78875	1.5157	-	-	-
		0.00000	34.40000	82.00000	3.6824	-0.90562	0.53384	-	-	-
		1.20000	34.40000	82.00000	4.1623	-1.1084	0.62892	-	-	-
		2.40000	34.40000	82.00000	4.5412	-1.3105	0.79604	-	-	-
		3.60000	34.40000	82.00000	4.9070	-1.5347	1.0492	-	-	-
		4.80000	34.40000	82.00000	5.2565	-1.7843	1.3845	-	-	-
		6.00000	34.40000	82.00000	5.5851	-2.0633	1.7939	-	-	-
		7.20000	34.40000	82.00000	5.8873	-2.3766	2.2656	-	-	-
		8.40000	34.40000	82.00000	6.1552	-2.7294	2.7840	-	-	-
		9.60000	34.40000	82.00000	6.3783	-3.1278	3.3305	-	-	-
		10.80000	34.40000	82.00000	6.5424	-3.5780	3.8837	-	-	-
		12.00000	34.40000	82.00000	6.6282	-4.0855	4.4209	-	-	-
		13.20000	34.40000	82.00000	6.6102	-4.6532	4.9190	-	-	-
		14.40000	34.40000	82.00000	6.4556	-5.2779	5.3562	-	-	-
		15.60000	34.40000	82.00000	6.1255	-5.9447	5.7141	-	-	-
		16.80000	34.40000	82.00000	5.5814	-6.6188	5.9802	-	-	-
		18.00000	34.40000	82.00000	4.7996	-7.2395	6.1492	-	-	-
		19.20000	34.40000	82.00000	3.7953	-7.7246	6.2233	-	-	-
		20.40000	34.40000	82.00000	2.6408	-7.9954	6.2086	-	-	-
		21.60000	34.40000	82.00000	2.4612	-8.1279	6.1365	-	-	-
		22.80000	34.40000	82.00000	2.3505	-8.2767	6.0464	-	-	-
		24.00000	34.40000	82.00000	2.2078	-8.4437	5.9445	-	-	-
		25.20000	34.40000	82.00000	2.0228	-8.6280	5.8377	-	-	-
		26.40000	34.40000	82.00000	1.7832	-8.8250	5.7334	-	-	-
		27.60000	34.40000	82.00000	1.4762	-9.0242	5.6393	-	-	-
		28.80000	34.40000	82.00000	1.0932	-9.2062	5.5629	-	-	-
		30.00000	34.40000	82.00000	0.63729	-9.3440	5.5106	-	-	-
		31.20000	34.40000	82.00000	0.13031	-9.4097	5.4873	-	-	-
		32.40000	34.40000	82.00000	0.0	-9.4125	5.4863	-	-	-
		33.60000	34.40000	82.00000	0.0	-9.4125	5.4863	-	-	-
		34.80000	34.40000	82.00000	0.0	-9.4125	5.4863	-	-	-
		36.00000	34.40000	82.00000	0.0	-9.4125	5.4863	-	-	-
		37.20000	34.40000	82.00000	-0.27268	-9.4075	5.4859	-	-	-
		38.40000	34.40000	82.00000	-1.8612	-9.1729	5.4667	-	-	-
		39.60000	34.40000	82.00000	-3.2563	-8.6417	5.4143	-	-	-
		40.80000	34.40000	82.00000	-4.3639	-7.9239	5.3208	-	-	-
		42.00000	34.40000	82.00000	-5.1663	-7.1295	5.1797	-	-	-
		43.20000	34.40000	82.00000	-5.6954	-6.3385	4.9900	-	-	-
		44.40000	34.40000	82.00000	-6.0016	-5.5961	4.7560	-	-	-
		45.60000	34.40000	82.00000	-6.1348	-4.9221	4.4869	-	-	-
		46.80000	34.40000	82.00000	-6.1369	-4.3209	4.1945	-	-	-
		48.00000	34.40000	82.00000	-6.0406	-3.7891	3.8913	-	-	-
		49.20000	34.40000	82.00000	-5.8702	-3.3200	3.5891	-	-	-
		50.40000	34.40000	82.00000	-5.6437	-2.9061	3.2980	-	-	-
		51.60000	34.40000	82.00000	-5.3744	-2.5400	3.0251	-	-	-
		52.80000	34.40000	82.00000	-5.0721	-2.2150	2.7744	-	-	-
		54.00000	34.40000	82.00000	-4.7440	-1.9255	2.5462	-	-	-
		55.20000	34.40000	82.00000	-4.3957	-1.6665	2.3369	-	-	-
		56.40000	34.40000	82.00000	-4.0312	-1.4338	2.1383	-	-	-
		57.60000	34.40000	82.00000	-3.6537	-1.2238	1.9384	-	-	-
		58.80000	34.40000	82.00000	-3.2656	-1.0336	1.7203	-	-	-
		60.00000	34.40000	82.00000	-2.8735	-0.86204	1.4586	-	-	-
		0.00000	35.20000	82.00000	3.4963	-0.95141	0.50895	-	-	-
		1.20000	35.20000	82.00000	4.0294	-1.1864	0.60529	-	-	-
		2.40000	35.20000	82.00000	4.3944	-1.4031	0.75368	-	-	-
		3.60000	35.20000	82.00000	4.7444	-1.6421	0.98480	-	-	-
		4.80000	35.20000	82.00000	5.0755	-1.9068	1.2953	-	-	-
		6.00000	35.20000	82.00000	5.3832	-2.2008	1.6780	-	-	-
		7.20000	35.20000	82.00000	5.6612	-2.5280	2.1216	-	-	-
		8.40000	35.20000	82.00000	5.9015	-2.8931	2.6116	-	-	-

Type/No.		Coordinates			Displacements			Angle of Line		
Name	Dist.	x	y	z	x	y	z	Along the Line	Perpendicular to Line	x Axis
		9.60000	35.20000	82.00000	6.0935	-3.3004	3.1306	-	-	-
		10.80000	35.20000	82.00000	6.2233	-3.7541	3.6585	-	-	-
		12.00000	35.20000	82.00000	6.2729	-4.2567	4.1742	-	-	-
		13.20000	35.20000	82.00000	6.2197	-4.8073	4.6562	-	-	-
		14.40000	35.20000	82.00000	6.0366	-5.3988	5.0840	-	-	-
		15.60000	35.20000	82.00000	5.6944	-6.0130	5.4404	-	-	-
		16.80000	35.20000	82.00000	5.1680	-6.6166	5.7127	-	-	-
		18.00000	35.20000	82.00000	4.4477	-7.1590	5.8940	-	-	-
		19.20000	35.20000	82.00000	3.5536	-7.5788	5.9830	-	-	-
		20.40000	35.20000	82.00000	2.5443	-7.8217	5.9823	-	-	-
		21.60000	35.20000	82.00000	2.3681	-7.9543	5.9230	-	-	-
		22.80000	35.20000	82.00000	2.2465	-8.1008	5.8463	-	-	-
		24.00000	35.20000	82.00000	2.0932	-8.2615	5.7580	-	-	-
		25.20000	35.20000	82.00000	1.8997	-8.4344	5.6645	-	-	-
		26.40000	35.20000	82.00000	1.6566	-8.6136	5.5729	-	-	-
		27.60000	35.20000	82.00000	1.3555	-8.7888	5.4900	-	-	-
		28.80000	35.20000	82.00000	0.99269	-8.9435	5.4228	-	-	-
		30.00000	35.20000	82.00000	0.57363	-9.0571	5.3768	-	-	-
		31.20000	35.20000	82.00000	0.11679	-9.1102	5.3564	-	-	-
		32.40000	35.20000	82.00000	0.0	-9.1125	5.3555	-	-	-
		33.60000	35.20000	82.00000	0.0	-9.1125	5.3555	-	-	-
		34.80000	35.20000	82.00000	0.0	-9.1125	5.3555	-	-	-
		36.00000	35.20000	82.00000	0.0	-9.1125	5.3555	-	-	-
		37.20000	35.20000	82.00000	-0.23658	-9.1085	5.3550	-	-	-
		38.40000	35.20000	82.00000	-1.6216	-8.9189	5.3309	-	-	-
		39.60000	35.20000	82.00000	-2.8640	-8.4818	5.2686	-	-	-
		40.80000	35.20000	82.00000	-3.8856	-7.8734	5.1642	-	-	-
		42.00000	35.20000	82.00000	-4.6603	-7.1768	5.0152	-	-	-
		43.20000	35.20000	82.00000	-5.2009	-6.4592	4.8223	-	-	-
		44.40000	35.20000	82.00000	-5.5401	-5.7647	4.5910	-	-	-
		45.60000	35.20000	82.00000	-5.7152	-5.1171	4.3296	-	-	-
		46.80000	35.20000	82.00000	-5.7608	-4.5264	4.0488	-	-	-
		48.00000	35.20000	82.00000	-5.7058	-3.9940	3.7599	-	-	-
		49.20000	35.20000	82.00000	-5.5728	-3.5173	3.4734	-	-	-
		50.40000	35.20000	82.00000	-5.3796	-3.0912	3.1981	-	-	-
		51.60000	35.20000	82.00000	-5.1393	-2.7104	2.9401	-	-	-
		52.80000	35.20000	82.00000	-4.8622	-2.3695	2.7026	-	-	-
		54.00000	35.20000	82.00000	-4.5560	-2.0636	2.4852	-	-	-
		55.20000	35.20000	82.00000	-4.2266	-1.7882	2.2836	-	-	-
		56.40000	35.20000	82.00000	-3.8786	-1.5394	2.0893	-	-	-
		57.60000	35.20000	82.00000	-3.5154	-1.3140	1.8896	-	-	-
		58.80000	35.20000	82.00000	-3.1399	-1.1091	1.6674	-	-	-
		60.00000	35.20000	82.00000	-2.8448	-0.95239	1.4174	-	-	-
		0.00000	36.00000	82.00000	3.2957	-0.97998	0.48231	-	-	-
		1.20000	36.00000	82.00000	3.8876	-1.2503	0.58276	-	-	-
		2.40000	36.00000	82.00000	4.2386	-1.4793	0.71188	-	-	-
		3.60000	36.00000	82.00000	4.5726	-1.7307	0.92012	-	-	-
		4.80000	36.00000	82.00000	4.8856	-2.0075	1.2048	-	-	-
		6.00000	36.00000	82.00000	5.1728	-2.3127	1.5593	-	-	-
		7.20000	36.00000	82.00000	5.4278	-2.6497	1.9732	-	-	-
		8.40000	36.00000	82.00000	5.6424	-3.0219	2.4332	-	-	-
		9.60000	36.00000	82.00000	5.8064	-3.4325	2.9227	-	-	-
		10.80000	36.00000	82.00000	5.9065	-3.8835	3.4232	-	-	-
		12.00000	36.00000	82.00000	5.9265	-4.3752	3.9149	-	-	-
		13.20000	36.00000	82.00000	5.8471	-4.9039	4.3778	-	-	-
		14.40000	36.00000	82.00000	5.6463	-5.4598	4.7927	-	-	-
		15.60000	36.00000	82.00000	5.3030	-6.0241	5.1432	-	-	-
		16.80000	36.00000	82.00000	4.8017	-6.5663	5.4165	-	-	-
		18.00000	36.00000	82.00000	4.1407	-7.0452	5.6047	-	-	-
		19.20000	36.00000	82.00000	3.3412	-7.4146	5.7045	-	-	-
		20.40000	36.00000	82.00000	2.4502	-7.6358	5.7164	-	-	-
		21.60000	36.00000	82.00000	2.2761	-7.7668	5.6701	-	-	-
		22.80000	36.00000	82.00000	2.1458	-7.9090	5.6070	-	-	-
		24.00000	36.00000	82.00000	1.9849	-8.0620	5.5324	-	-	-
		25.20000	36.00000	82.00000	1.7864	-8.2227	5.4524	-	-	-
		26.40000	36.00000	82.00000	1.5435	-8.3850	5.3732	-	-	-
		27.60000	36.00000	82.00000	1.2511	-8.5392	5.3015	-	-	-
		28.80000	36.00000	82.00000	0.90822	-8.6717	5.2431	-	-	-
		30.00000	36.00000	82.00000	0.52136	-8.7669	5.2032	-	-	-
		31.20000	36.00000	82.00000	0.10582	-8.8106	5.1855	-	-	-
		32.40000	36.00000	82.00000	0.0	-8.8125	5.1847	-	-	-
		33.60000	36.00000	82.00000	0.0	-8.8125	5.1847	-	-	-
		34.80000	36.00000	82.00000	0.0	-8.8125	5.1847	-	-	-
		36.00000	36.00000	82.00000	0.0	-8.8125	5.1847	-	-	-
		37.20000	36.00000	82.00000	-0.20728	-8.8092	5.1842	-	-	-
		38.40000	36.00000	82.00000	-1.4252	-8.6530	5.1576	-	-	-
		39.60000	36.00000	82.00000	-2.5351	-8.2877	5.0902	-	-	-
		40.80000	36.00000	82.00000	-3.4726	-7.7676	4.9808	-	-	-
		42.00000	36.00000	82.00000	-4.2092	-7.1557	4.8292	-	-	-
		43.20000	36.00000	82.00000	-4.7466	-6.5075	4.6381	-	-	-
		44.40000	36.00000	82.00000	-5.1044	-5.8632	4.4129	-	-	-
		45.60000	36.00000	82.00000	-5.3098	-5.2480	4.1620	-	-	-
		46.80000	36.00000	82.00000	-5.3902	-4.6752	3.8950	-	-	-
		48.00000	36.00000	82.00000	-5.3704	-4.1499	3.6220	-	-	-
		49.20000	36.00000	82.00000	-5.2709	-3.6724	3.3523	-	-	-
		50.40000	36.00000	82.00000	-5.1083	-3.2403	3.0936	-	-	-
		51.60000	36.00000	82.00000	-4.8955	-2.8501	2.8511	-	-	-
		52.80000	36.00000	82.00000	-4.6428	-2.4977	2.6272	-	-	-
		54.00000	36.00000	82.00000	-4.3581	-2.1791	2.4205	-	-	-
		55.20000	36.00000	82.00000	-4.0477	-1.8904	2.2262	-	-	-
		56.40000	36.00000	82.00000	-3.7163	-1.6283	2.0354	-	-	-
		57.60000	36.00000	82.00000	-3.3678	-1.3896	1.8348	-	-	-
		58.80000	36.00000	82.00000	-3.0052	-1.1718	1.6069	-	-	-
		60.00000	36.00000	82.00000	-2.8140	-1.0400	1.3719	-	-	-
		0.00000	36.80000	82.00000	3.0821	-0.99053	0.45367	-	-	-
		1.20000	36.80000	82.00000	3.7382	-1.2996	0.56199	-	-	-
		2.40000	36.80000	82.00000	4.0752	-1.5389	0.67168	-	-	-
		3.60000	36.80000	82.00000	4.3935	-1.8002	0.85660	-	-	-
		4.80000	36.80000	82.00000	4.6890	-2.0862	1.1147	-	-	-
		6.00000	36.80000	82.00000	4.9566	-2.3993	1.4401	-	-	-
		7.20000	36.80000	82.00000	5.1900	-2.7422	1.8233	-	-	-
		8.40000	36.80000	82.00000	5.3812	-3.1174	2.2518	-	-	-
		9.60000	36.80000	82.00000	5.5204	-3.5267	2.7104	-	-	-
		10.80000	36.80000	82.00000	5.5955	-3.9705	3.1818	-	-	-
		12.00000	36.80000	82.00000	5.5921	-4.4472	3.6475	-	-	-
		13.20000	36.80000	82.00000	5.4940	-4.9512	4.0888	-	-	-
		14.40000	36.80000	82.00000	5.2841	-5.4714	4.4878	-	-	-
		15.60000	36.80000	82.00000	4.9473	-5.9896	4.8288	-	-	-
		16.80000	36.80000	82.00000	4.4747	-6.4789	5.0993	-	-	-
		18.00000	36.80000	82.00000	3.8694	-6.9059	5.2906	-	-	-
		19.20000	36.80000	82.00000	3.1514	-7.2352	5.3982	-	-	-
		20.40000	36.80000	82.00000	2.3588	-7.4386	5.4214	-	-	-
		21.60000	36.80000	82.00000	2.1865	-7.5665	5.3884	-	-	-
		22.80000	36.80000	82.00000	2.0495	-7.7033	5.3389	-	-	-
		24.00000	36.80000	82.00000	1.8833	-7.8477	5.2780	-	-	-
		25.20000	36.80000	82.00000	1.6825	-7.9963	5.2112	-	-	-
		26.40000	36.80000	82.00000	1.4425	-8.1429	5.1444	-	-	-
		27.60000	36.80000	82.00000	1.1602	-8.2791	5.0834	-	-	-
		28.80000	36.80000	82.00000	0.83643	-8.3935	5.0336	-	-	-
		30.00000	36.80000	82.00000	0.47770	-8.4742	4.9995	-	-	-
		31.20000	36.80000	82.00000	0.096724	-8.5109	4.9843	-	-	-
		32.40000	36.80000	82.00000	0.0	-8.5125	4.9837	-	-	-
		33.60000	36.80000	82.00000	0.0	-8.5125	4.9837	-	-	-
		34.80000	36.80000	82.00000	0.0	-8.5125	4.9837	-	-	-
		36.00000	36.80000	82.00000	0.0	-8.5125	4.9837	-	-	-
		37.20000	36.80000	82.00000	-0.18301	-8.5097	4.9831	-	-	-
		38.40000	36.80000	82.00000	-1.2613	-8.3788	4.9556	-	-	-
		39.60000	36.80000	82.00000	-2.2559	-8.0694	4.8866	-	-	-
		40.80000	36.80000	82.00000	-3.1139	-7.6210	4.7765	-	-	-
		42.00000	36.80000	82.00000	-3.8074	-7.0818	4.6268	-	-	-
		43.20000	36.80000	82.00000	-4.3314	-6.4971	4.4411	-	-	-
		44.40000	36.80000	82.00000	-4.6967	-5.9026	4.2252	-	-	-
		45.60000	36.80000	82.00000	-4.9222	-5.3229	3.9871	-	-	-
		46.80000	36.80000	82.00000	-5.0294	-4.7728	3.7355	-	-	-
		48.00000	36.80000	82.00000	-5.0388	-4.2601	3.4796	-	-	-
		49.20000	36.80000	82.00000	-4.9684	-3.7874	3.2276	-	-	-
		50.40000	36.80000	82.00000	-4.8334	-3.3545	2.9861	-	-	-
		51.60000	36.80000	82.00000	-4.6461	-2.9595	2.7594	-	-	-
		52.80000	36.80000	82.00000	-4.4165	-2.5996	2.5488	-	-	-
		54.00000	36.80000	82.00000	-4.1526	-2.2717	2.3525	-	-	-
		55.20000	36.80000	82.00000	-3.8607	-1.9728	2.1648	-	-	-

Type/No.		Coordinates			Displacements			Angle of Line
Name	Dist.	x	y	z	x	y	z	Along the Line	Perpendicular to Line	x Axis
		56.40000	36.80000	82.00000	-3.5459	-1.6998	1.9763	-	-	-
		57.60000	36.80000	82.00000	-3.2121	-1.4501	1.7733	-	-	-
		58.80000	36.80000	82.00000	-2.8626	-1.2212	1.5380	-	-	-
		60.00000	36.80000	82.00000	-2.7812	-1.1246	1.3221	-	-	-
		0.00000	37.60000	82.00000	2.8571	-0.98246	0.42251	-	-	-
		1.20000	37.60000	82.00000	3.5827	-1.3342	0.54343	-	-	-
		2.40000	37.60000	82.00000	3.9059	-1.5817	0.63396	-	-	-
		3.60000	37.60000	82.00000	4.2088	-1.8507	0.79556	-	-	-
		4.80000	37.60000	82.00000	4.4875	-2.1432	1.0268	-	-	-
		6.00000	37.60000	82.00000	4.7367	-2.4613	1.3226	-	-	-
		7.20000	37.60000	82.00000	4.9503	-2.8069	1.6745	-	-	-
		8.40000	37.60000	82.00000	5.1206	-3.1816	2.0708	-	-	-
		9.60000	37.60000	82.00000	5.2384	-3.5860	2.4974	-	-	-
		10.80000	37.60000	82.00000	5.2928	-4.0192	2.9384	-	-	-
		12.00000	37.60000	82.00000	5.2715	-4.4782	3.3766	-	-	-
		13.20000	37.60000	82.00000	5.1611	-4.9563	3.7944	-	-	-
		14.40000	37.60000	82.00000	4.9485	-5.4421	4.1752	-	-	-
		15.60000	37.60000	82.00000	4.6232	-5.9184	4.5041	-	-	-
		16.80000	37.60000	82.00000	4.1810	-6.3622	4.7687	-	-	-
		18.00000	37.60000	82.00000	3.6271	-6.7460	4.9602	-	-	-
		19.20000	37.60000	82.00000	2.9799	-7.0427	5.0736	-	-	-
		20.40000	37.60000	82.00000	2.2705	-7.2311	5.1073	-	-	-
		21.60000	37.60000	82.00000	2.1000	-7.3549	5.0874	-	-	-
		22.80000	37.60000	82.00000	1.9579	-7.4855	5.0514	-	-	-
		24.00000	37.60000	82.00000	1.7885	-7.6211	5.0039	-	-	-
		25.20000	37.60000	82.00000	1.5877	-7.7579	4.9501	-	-	-
		26.40000	37.60000	82.00000	1.3522	-7.8905	4.8952	-	-	-
		27.60000	37.60000	82.00000	1.0806	-8.0111	4.8446	-	-	-
		28.80000	37.60000	82.00000	0.77477	-8.1107	4.8030	-	-	-
		30.00000	37.60000	82.00000	0.44071	-8.1800	4.7744	-	-	-
		31.20000	37.60000	82.00000	0.089069	-8.2112	4.7617	-	-	-
		32.40000	37.60000	82.00000	0.0	-8.2125	4.7611	-	-	-
		33.60000	37.60000	82.00000	0.0	-8.2125	4.7611	-	-	-
		34.80000	37.60000	82.00000	0.0	-8.2125	4.7611	-	-	-
		36.00000	37.60000	82.00000	0.0	-8.2125	4.7611	-	-	-
		37.20000	37.60000	82.00000	-0.16258	-8.2101	4.7606	-	-	-
		38.40000	37.60000	82.00000	-1.1226	-8.0989	4.7332	-	-	-
		39.60000	37.60000	82.00000	-2.0166	-7.8336	4.6651	-	-	-
		40.80000	37.60000	82.00000	-2.8007	-7.4439	4.5575	-	-	-
		42.00000	37.60000	82.00000	-3.4489	-6.9668	4.4129	-	-	-
		43.20000	37.60000	82.00000	-3.9529	-6.4393	4.2355	-	-	-
		44.40000	37.60000	82.00000	-4.3172	-5.8924	4.0313	-	-	-
		45.60000	37.60000	82.00000	-4.5547	-5.3491	3.8077	-	-	-
		46.80000	37.60000	82.00000	-4.6814	-4.8247	3.5729	-	-	-
		48.00000	37.60000	82.00000	-4.7142	-4.3285	3.3350	-	-	-
		49.20000	37.60000	82.00000	-4.6684	-3.8649	3.1011	-	-	-
		50.40000	37.60000	82.00000	-4.5578	-3.4354	2.8769	-	-	-
		51.60000	37.60000	82.00000	-4.3937	-3.0395	2.6658	-	-	-
		52.80000	37.60000	82.00000	-4.1857	-2.6757	2.4682	-	-	-
		54.00000	37.60000	82.00000	-3.9416	-2.3418	2.2814	-	-	-
		55.20000	37.60000	82.00000	-3.6676	-2.0353	2.0993	-	-	-
		56.40000	37.60000	82.00000	-3.3689	-1.7539	1.9117	-	-	-
		57.60000	37.60000	82.00000	-3.0496	-1.4952	1.7045	-	-	-
		58.80000	37.60000	82.00000	-2.7220	-1.2611	1.4564	-	-	-
		60.00000	37.60000	82.00000	-2.7468	-1.2062	1.2684	-	-	-
		0.00000	38.40000	82.00000	2.6219	-0.95534	0.38796	-	-	-
		1.20000	38.40000	82.00000	3.3511	-1.3283	0.51779	-	-	-
		2.40000	38.40000	82.00000	3.7318	-1.6078	0.59941	-	-	-
		3.60000	38.40000	82.00000	4.0201	-1.8823	0.73811	-	-	-
		4.80000	38.40000	82.00000	4.2829	-2.1791	0.94275	-	-	-
		6.00000	38.40000	82.00000	4.5151	-2.4996	1.2090	-	-	-
		7.20000	38.40000	82.00000	4.7107	-2.8452	1.5292	-	-	-
		8.40000	38.40000	82.00000	4.8625	-3.2165	1.8929	-	-	-
		9.60000	38.40000	82.00000	4.9622	-3.6132	2.2871	-	-	-
		10.80000	38.40000	82.00000	5.0001	-4.0335	2.6969	-	-	-
		12.00000	38.40000	82.00000	4.9656	-4.4734	3.1065	-	-	-
		13.20000	38.40000	82.00000	4.8481	-4.9256	3.4996	-	-	-
		14.40000	38.40000	82.00000	4.6375	-5.3788	3.8605	-	-	-
		15.60000	38.40000	82.00000	4.3270	-5.8175	4.1751	-	-	-
		16.80000	38.40000	82.00000	3.9152	-6.2217	4.4317	-	-	-
		18.00000	38.40000	82.00000	3.4086	-6.5693	4.6215	-	-	-
		19.20000	38.40000	82.00000	2.8236	-6.8539	4.7391	-	-	-
		20.40000	38.40000	82.00000	2.1856	-7.0141	4.7824	-	-	-
		21.60000	38.40000	82.00000	2.0170	-7.1332	4.7754	-	-	-
		22.80000	38.40000	82.00000	1.8715	-7.2572	4.7526	-	-	-
		24.00000	38.40000	82.00000	1.7005	-7.3840	4.7182	-	-	-
		25.20000	38.40000	82.00000	1.5012	-7.5099	4.6770	-	-	-
		26.40000	38.40000	82.00000	1.2714	-7.6298	4.6336	-	-	-
		27.60000	38.40000	82.00000	1.0107	-7.7371	4.5929	-	-	-
		28.80000	38.40000	82.00000	0.72132	-7.8245	4.5591	-	-	-
		30.00000	38.40000	82.00000	0.40899	-7.8845	4.5358	-	-	-
		31.20000	38.40000	82.00000	0.082537	-7.9114	4.5253	-	-	-
		32.40000	38.40000	82.00000	0.0	-7.9125	4.5249	-	-	-
		33.60000	38.40000	82.00000	0.0	-7.9125	4.5249	-	-	-
		34.80000	38.40000	82.00000	0.0	-7.9125	4.5249	-	-	-
		36.00000	38.40000	82.00000	0.0	-7.9125	4.5249	-	-	-
		37.20000	38.40000	82.00000	-0.14515	-7.9105	4.5243	-	-	-
		38.40000	38.40000	82.00000	-1.0037	-7.8147	4.4979	-	-	-
		39.60000	38.40000	82.00000	-1.8093	-7.5850	4.4324	-	-	-
		40.80000	38.40000	82.00000	-2.5253	-7.2437	4.3296	-	-	-
		42.00000	38.40000	82.00000	-3.1283	-6.8197	4.1924	-	-	-
		43.20000	38.40000	82.00000	-3.6080	-6.3432	4.0255	-	-	-
		44.40000	38.40000	82.00000	-3.9652	-5.8407	3.8347	-	-	-
		45.60000	38.40000	82.00000	-4.2079	-5.3333	3.6269	-	-	-
		46.80000	38.40000	82.00000	-4.3481	-4.8361	3.4097	-	-	-
		48.00000	38.40000	82.00000	-4.3989	-4.3589	3.1901	-	-	-
		49.20000	38.40000	82.00000	-4.3736	-3.9076	2.9744	-	-	-
		50.40000	38.40000	82.00000	-4.2841	-3.4848	2.7674	-	-	-
		51.60000	38.40000	82.00000	-4.1408	-3.0914	2.5712	-	-	-
		52.80000	38.40000	82.00000	-3.9525	-2.7268	2.3857	-	-	-
		54.00000	38.40000	82.00000	-3.7269	-2.3896	2.2074	-	-	-
		55.20000	38.40000	82.00000	-3.4699	-2.0781	2.0294	-	-	-
		56.40000	38.40000	82.00000	-3.1868	-1.7905	1.8409	-	-	-
		57.60000	38.40000	82.00000	-2.8817	-1.5248	1.6273	-	-	-
		58.80000	38.40000	82.00000	-2.6833	-1.3416	1.3972	-	-	-
		60.00000	38.40000	82.00000	-2.7110	-1.2848	1.2109	-	-	-
		0.00000	39.20000	82.00000	2.3779	-0.90894	0.34876	-	-	-
		1.20000	39.20000	82.00000	3.0893	-1.2938	0.47901	-	-	-
		2.40000	39.20000	82.00000	3.5543	-1.6174	0.56842	-	-	-
		3.60000	39.20000	82.00000	3.8288	-1.8956	0.68510	-	-	-
		4.80000	39.20000	82.00000	4.0768	-2.1945	0.86376	-	-	-
		6.00000	39.20000	82.00000	4.2934	-2.5152	1.1009	-	-	-
		7.20000	39.20000	82.00000	4.4729	-2.8585	1.3898	-	-	-
		8.40000	39.20000	82.00000	4.6088	-3.2241	1.7209	-	-	-
		9.60000	39.20000	82.00000	4.6934	-3.6113	2.0825	-	-	-
		10.80000	39.20000	82.00000	4.7184	-4.0172	2.4609	-	-	-
		12.00000	39.20000	82.00000	4.6748	-4.4373	2.8413	-	-	-
		13.20000	39.20000	82.00000	4.5542	-4.8641	3.2088	-	-	-
		14.40000	39.20000	82.00000	4.3492	-5.2870	3.5487	-	-	-
		15.60000	39.20000	82.00000	4.0555	-5.6919	3.8479	-	-	-
		16.80000	39.20000	82.00000	3.6735	-6.0619	4.0950	-	-	-
		18.00000	39.20000	82.00000	3.2102	-6.3786	4.2815	-	-	-
		19.20000	39.20000	82.00000	2.6801	-6.6251	4.4020	-	-	-
		20.40000	39.20000	82.00000	2.1042	-6.7886	4.4543	-	-	-
		21.60000	39.20000	82.00000	1.9378	-6.9027	4.4598	-	-	-
		22.80000	39.20000	82.00000	1.7901	-7.0199	4.4498	-	-	-
		24.00000	39.20000	82.00000	1.6190	-7.1381	4.4281	-	-	-
		25.20000	39.20000	82.00000	1.4223	-7.2539	4.3989	-	-	-
		26.40000	39.20000	82.00000	1.1988	-7.3626	4.3665	-	-	-
		27.60000	39.20000	82.00000	0.94868	-7.4585	4.3352	-	-	-
		28.80000	39.20000	82.00000	0.67458	-7.5357	4.3088	-	-	-
		30.00000	39.20000	82.00000	0.38149	-7.5881	4.2904	-	-	-
		31.20000	39.20000	82.00000	0.076898	-7.6115	4.2821	-	-	-
		32.40000	39.20000	82.00000	0.0	-7.6125	4.2817	-	-	-
		33.60000	39.20000	82.00000	0.0	-7.6125	4.2817	-	-	-
		34.80000	39.20000	82.00000	0.0	-7.6125	4.2817	-	-	-
		36.00000	39.20000	82.00000	0.0	-7.6125	4.2817	-	-	-
		37.20000	39.20000	82.00000	-0.13010	-7.6107	4.2812	-	-	-
		38.40000	39.20000	82.00000	-0.90073	-7.5275	4.2562	-	-	-
		39.60000	39.20000	82.00000	-1.6282	-7.3267	4.1945	-	-	-
		40.80000	39.20000	82.00000	-2.2818	-7.0256	4.0980	-	-	-

Type/No.		Coordinates			Displacements			Angle of Line	
Name	Dist.	x	y	z	x	y	z	Along the Line	Perpendicular to Line
		42.00000	39.20000	82.00000	-2.8406	-6.6471	3.9699	-	-
		43.20000	39.20000	82.00000	-3.2938	-6.2157	3.8149	-	-
		44.40000	39.20000	82.00000	-3.6394	-5.7542	3.6386	-	-
		45.60000	39.20000	82.00000	-3.8821	-5.2815	3.4474	-	-
		46.80000	39.20000	82.00000	-4.0304	-4.8118	3.2480	-	-
		48.00000	39.20000	82.00000	-4.0947	-4.3553	3.0468	-	-
		49.20000	39.20000	82.00000	-4.0859	-3.9184	2.8490	-	-
		50.40000	39.20000	82.00000	-4.0143	-3.5050	2.6583	-	-
		51.60000	39.20000	82.00000	-3.8892	-3.1167	2.4763	-	-
		52.80000	39.20000	82.00000	-3.7188	-2.7538	2.3017	-	-
		54.00000	39.20000	82.00000	-3.5101	-2.4158	2.1302	-	-
		55.20000	39.20000	82.00000	-3.2691	-2.1016	1.9544	-	-
		56.40000	39.20000	82.00000	-3.0009	-1.8098	1.7628	-	-
		57.60000	39.20000	82.00000	-2.7095	-1.5389	1.5404	-	-
		58.80000	39.20000	82.00000	-2.6434	-1.4187	1.3339	-	-
		60.00000	39.20000	82.00000	-2.6739	-1.3602	1.1500	-	-
		0.00000	40.00000	82.00000	2.1299	-0.84518	0.29888	-	-
		1.20000	40.00000	82.00000	2.8204	-1.2380	0.43754	-	-
		2.40000	40.00000	82.00000	3.3746	-1.6109	0.54109	-	-
		3.60000	40.00000	82.00000	3.6361	-1.8910	0.63706	-	-
		4.80000	40.00000	82.00000	3.8704	-2.1903	0.79082	-	-
		6.00000	40.00000	82.00000	4.0730	-2.5094	0.99973	-	-
		7.20000	40.00000	82.00000	4.2384	-2.8485	1.2580	-	-
		8.40000	40.00000	82.00000	4.3606	-3.2068	1.5572	-	-
		9.60000	40.00000	82.00000	4.4330	-3.5829	1.8865	-	-
		10.80000	40.00000	82.00000	4.4482	-3.9736	2.2336	-	-
		12.00000	40.00000	82.00000	4.3989	-4.3738	2.5848	-	-
		13.20000	40.00000	82.00000	4.2785	-4.7764	2.9264	-	-
		14.40000	40.00000	82.00000	4.0815	-5.1712	3.2447	-	-
		15.60000	40.00000	82.00000	3.8056	-5.5458	3.5275	-	-
		16.80000	40.00000	82.00000	3.4524	-5.8858	3.7641	-	-
		18.00000	40.00000	82.00000	3.0288	-6.1760	3.9463	-	-
		19.20000	40.00000	82.00000	2.5476	-6.4026	4.0689	-	-
		20.40000	40.00000	82.00000	2.0265	-6.5554	4.1294	-	-
		21.60000	40.00000	82.00000	1.8626	-6.6643	4.1469	-	-
		22.80000	40.00000	82.00000	1.7138	-6.7748	4.1491	-	-
		24.00000	40.00000	82.00000	1.5435	-6.8850	4.1395	-	-
		25.20000	40.00000	82.00000	1.3502	-6.9915	4.1217	-	-
		26.40000	40.00000	82.00000	1.1333	-7.0902	4.0998	-	-
		27.60000	40.00000	82.00000	0.89352	-7.1763	4.0774	-	-
		28.80000	40.00000	82.00000	0.63339	-7.2449	4.0580	-	-
		30.00000	40.00000	82.00000	0.35744	-7.2911	4.0442	-	-
		31.20000	40.00000	82.00000	0.071979	-7.3116	4.0379	-	-
		32.40000	40.00000	82.00000	0.0	-7.3125	4.0376	-	-
		33.60000	40.00000	82.00000	0.0	-7.3125	4.0376	-	-
		34.80000	40.00000	82.00000	0.0	-7.3125	4.0376	-	-
		36.00000	40.00000	82.00000	0.0	-7.3125	4.0376	-	-
		37.20000	40.00000	82.00000	-0.11698	-7.3110	4.0371	-	-
		38.40000	40.00000	82.00000	-0.81065	-7.2379	4.0139	-	-
		39.60000	40.00000	82.00000	-1.4687	-7.0610	3.9567	-	-
		40.80000	40.00000	82.00000	-2.0653	-6.7937	3.8674	-	-
		42.00000	40.00000	82.00000	-2.5817	-6.4542	3.7494	-	-
		43.20000	40.00000	82.00000	-3.0071	-6.0628	3.6071	-	-
		44.40000	40.00000	82.00000	-3.3381	-5.6387	3.4458	-	-
		45.60000	40.00000	82.00000	-3.5767	-5.1987	3.2714	-	-
		46.80000	40.00000	82.00000	-3.7288	-4.7562	3.0898	-	-
		48.00000	40.00000	82.00000	-3.8025	-4.3211	2.9065	-	-
		49.20000	40.00000	82.00000	-3.8066	-3.9002	2.7258	-	-
		50.40000	40.00000	82.00000	-3.7498	-3.4980	2.5505	-	-
		51.60000	40.00000	82.00000	-3.6405	-3.1169	2.3812	-	-
		52.80000	40.00000	82.00000	-3.4860	-2.7579	2.2158	-	-
		54.00000	40.00000	82.00000	-3.2928	-2.4212	2.0493	-	-
		55.20000	40.00000	82.00000	-3.0667	-2.1062	1.8734	-	-
		56.40000	40.00000	82.00000	-2.8124	-1.8121	1.6762	-	-
		57.60000	40.00000	82.00000	-2.5648	-1.5563	1.4445	-	-
		58.80000	40.00000	82.00000	-2.6025	-1.4923	1.2667	-	-
		60.00000	40.00000	82.00000	-2.6359	-1.4325	1.0862	-	-
Grid 2	Grid 2	20.00000	20.00000	82.00000	9.1736	6.3068	5.1129	-	-
		20.00000	20.30000	82.00000	11.168	3.3197	4.9675	-	-
		20.00000	20.60000	82.00000	11.813	0.0	4.9331	-	-
		20.00000	20.90000	82.00000	11.813	0.0	4.9331	-	-
		20.00000	21.20000	82.00000	11.813	0.0	4.9331	-	-
		20.00000	21.50000	82.00000	11.813	0.0	4.9331	-	-
		20.00000	21.80000	82.00000	11.813	0.0	4.9331	-	-
		20.00000	22.10000	82.00000	11.813	0.0	4.9331	-	-
		20.00000	22.40000	82.00000	11.813	0.0	4.9331	-	-
		20.00000	22.70000	82.00000	11.813	0.0	4.9331	-	-
		20.00000	23.00000	82.00000	11.813	0.0	4.9331	-	-
		21.70000	20.00000	82.00000	2.9961	8.9654	4.7455	-	-
		21.70000	20.30000	82.00000	2.9994	8.9862	4.4614	-	-
		21.70000	20.60000	82.00000	Point lies within an excavation.				
		21.70000	20.90000	82.00000	Point lies within an excavation.				
		21.70000	21.20000	82.00000	Point lies within an excavation.				
		21.70000	21.50000	82.00000	Point lies within an excavation.				
		21.70000	21.80000	82.00000	Point lies within an excavation.				
		21.70000	22.10000	82.00000	Point lies within an excavation.				
		21.70000	22.40000	82.00000	Point lies within an excavation.				
		21.70000	22.70000	82.00000	Point lies within an excavation.				
		21.70000	23.00000	82.00000	Point lies within an excavation.				
		23.40000	20.00000	82.00000	2.9943	8.9973	4.5143	-	-
		23.40000	20.30000	82.00000	2.9991	8.9991	4.2296	-	-
		23.40000	20.60000	82.00000	Point lies within an excavation.				
		23.40000	20.90000	82.00000	Point lies within an excavation.				
		23.40000	21.20000	82.00000	Point lies within an excavation.				
		23.40000	21.50000	82.00000	Point lies within an excavation.				
		23.40000	21.80000	82.00000	Point lies within an excavation.				
		23.40000	22.10000	82.00000	Point lies within an excavation.				
		23.40000	22.40000	82.00000	Point lies within an excavation.				
		23.40000	22.70000	82.00000	Point lies within an excavation.				
		23.40000	23.00000	82.00000	Point lies within an excavation.				
		25.10000	20.00000	82.00000	2.9909	9.0462	4.2610	-	-
		25.10000	20.30000	82.00000	2.9985	9.0187	3.9757	-	-
		25.10000	20.60000	82.00000	Point lies within an excavation.				
		25.10000	20.90000	82.00000	Point lies within an excavation.				
		25.10000	21.20000	82.00000	Point lies within an excavation.				
		25.10000	21.50000	82.00000	Point lies within an excavation.				
		25.10000	21.80000	82.00000	Point lies within an excavation.				
		25.10000	22.10000	82.00000	Point lies within an excavation.				
		25.10000	22.40000	82.00000	Point lies within an excavation.				
		25.10000	22.70000	82.00000	Point lies within an excavation.				
		25.10000	23.00000	82.00000	Point lies within an excavation.				
		26.80000	20.00000	82.00000	2.9832	9.1299	4.0114	-	-
		26.80000	20.30000	82.00000	2.9973	9.0525	3.7255	-	-
		26.80000	20.60000	82.00000	Point lies within an excavation.				
		26.80000	20.90000	82.00000	Point lies within an excavation.				
		26.80000	21.20000	82.00000	Point lies within an excavation.				
		26.80000	21.50000	82.00000	Point lies within an excavation.				
		26.80000	21.80000	82.00000	Point lies within an excavation.				
		26.80000	22.10000	82.00000	Point lies within an excavation.				
		26.80000	22.40000	82.00000	Point lies within an excavation.				
		26.80000	22.70000	82.00000	Point lies within an excavation.				
		26.80000	23.00000	82.00000	Point lies within an excavation.				
		28.50000	20.00000	82.00000	2.9592	9.3057	3.7963	-	-
		28.50000	20.30000	82.00000	2.9934	9.1246	3.5096	-	-
		28.50000	20.60000	82.00000	Point lies within an excavation.				
		28.50000	20.90000	82.00000	Point lies within an excavation.				
		28.50000	21.20000	82.00000	Point lies within an excavation.				
		28.50000	21.50000	82.00000	Point lies within an excavation.				
		28.50000	21.80000	82.00000	Point lies within an excavation.				
		28.50000	22.10000	82.00000	Point lies within an excavation.				
		28.50000	22.40000	82.00000	Point lies within an excavation.				
		28.50000	22.70000	82.00000	Point lies within an excavation.				
		28.50000	23.00000	82.00000	Point lies within an excavation.				
		30.20000	20.00000	82.00000	2.8000	9.8894	3.6513	-	-
		30.20000	20.30000	82.00000	2.9651	9.3812	3.3639	-	-
		30.20000	20.60000	82.00000	Point lies within an excavation.				
		30.20000	20.90000	82.00000	Point lies within an excavation.				
		30.20000	21.20000	82.00000	Point lies within an excavation.				
		30.20000	21.50000	82.00000	Point lies within an excavation.				
		30.20000	21.80000	82.00000	Point lies within an excavation.				
		30.20000	22.10000	82.00000	Point lies within an excavation.				

Name	Type/No. Dist.	Coordinates x	y	z	Displacements x	y	z	Angle of Line Along the Line	Perpendicular to Line	to x Axis
		30.20000	22.40000	82.00000			Point lies within an excavation.			
		30.20000	22.70000	82.00000			Point lies within an excavation.			
		30.20000	23.00000	82.00000			Point lies within an excavation.			
		31.90000	20.00000	82.00000	0.0	11.813	3.6129	-	-	-
		31.90000	20.30000	82.00000	0.0	11.925	3.3250	-	-	-
		31.90000	20.60000	82.00000			Point lies within an excavation.			
		31.90000	20.90000	82.00000			Point lies within an excavation.			
		31.90000	21.20000	82.00000			Point lies within an excavation.			
		31.90000	21.50000	82.00000			Point lies within an excavation.			
		31.90000	21.80000	82.00000			Point lies within an excavation.			
		31.90000	22.10000	82.00000			Point lies within an excavation.			
		31.90000	22.40000	82.00000			Point lies within an excavation.			
		31.90000	22.70000	82.00000			Point lies within an excavation.			
		31.90000	23.00000	82.00000			Point lies within an excavation.			
		33.60000	20.00000	82.00000	0.0	11.813	3.6129	-	-	-
		33.60000	20.30000	82.00000	0.0	11.925	3.3250	-	-	-
		33.60000	20.60000	82.00000			Point lies within an excavation.			
		33.60000	20.90000	82.00000			Point lies within an excavation.			
		33.60000	21.20000	82.00000			Point lies within an excavation.			
		33.60000	21.50000	82.00000			Point lies within an excavation.			
		33.60000	21.80000	82.00000			Point lies within an excavation.			
		33.60000	22.10000	82.00000			Point lies within an excavation.			
		33.60000	22.40000	82.00000			Point lies within an excavation.			
		33.60000	22.70000	82.00000			Point lies within an excavation.			
		33.60000	23.00000	82.00000			Point lies within an excavation.			
		35.30000	20.00000	82.00000	0.0	11.813	3.6129	-	-	-
		35.30000	20.30000	82.00000	0.0	11.925	3.3250	-	-	-
		35.30000	20.60000	82.00000			Point lies within an excavation.			
		35.30000	20.90000	82.00000			Point lies within an excavation.			
		35.30000	21.20000	82.00000			Point lies within an excavation.			
		35.30000	21.50000	82.00000			Point lies within an excavation.			
		35.30000	21.80000	82.00000			Point lies within an excavation.			
		35.30000	22.10000	82.00000			Point lies within an excavation.			
		35.30000	22.40000	82.00000			Point lies within an excavation.			
		35.30000	22.70000	82.00000			Point lies within an excavation.			
		35.30000	23.00000	82.00000			Point lies within an excavation.			
		37.00000	20.00000	82.00000	0.0	11.813	3.6129	-	-	-
		37.00000	20.30000	82.00000	0.0	11.925	3.3250	-	-	-
		37.00000	20.60000	82.00000	-12.000	0.0	3.1192	-	-	-
		37.00000	20.90000	82.00000	-12.000	0.0	3.1192	-	-	-
		37.00000	21.20000	82.00000	-12.000	0.0	3.1192	-	-	-
		37.00000	21.50000	82.00000	-12.000	0.0	3.1192	-	-	-
		37.00000	21.80000	82.00000	-12.000	0.0	3.1192	-	-	-
		37.00000	22.10000	82.00000	-12.000	0.0	3.1192	-	-	-
		37.00000	22.40000	82.00000	-12.000	0.0	3.1192	-	-	-
		37.00000	22.70000	82.00000	-12.000	0.0	3.1192	-	-	-
		37.00000	23.00000	82.00000	-12.000	0.0	3.1192	-	-	-
Line 2	Line 2	25.00000	20.00000	82.00000	2.9912	9.0426	4.2761	-9.0426	2.9912	270.00
	1.0000	25.00000	19.00000	82.00000	2.9232	9.1121	5.0460	-9.1121	2.9232	270.00
	2.0000	25.00000	18.00000	82.00000	2.8000	9.1394	5.5700	-9.1394	2.8000	270.00
	3.0000	25.00000	17.00000	82.00000	2.6414	9.1098	5.8868	-9.1098	2.6414	270.00
	4.0000	25.00000	16.00000	82.00000	2.4666	9.0201	6.0313	-9.0201	2.4666	270.00
	5.0000	25.00000	15.00000	82.00000	2.2902	8.8753	6.0347	-8.8753	2.2902	270.00
	6.0000	25.00000	14.00000	82.00000	2.1213	8.6838	5.9252	-8.6838	2.1213	270.00
	7.0000	25.00000	13.00000	82.00000	1.9648	8.4546	5.7281	-8.4546	1.9648	270.00
	8.0000	25.00000	12.00000	82.00000	1.8224	8.1956	5.4658	-8.1956	1.8224	270.00
	9.0000	25.00000	11.00000	82.00000	1.6941	7.9134	5.1582	-7.9134	1.6941	270.00
	10.000	25.00000	10.00000	82.00000	1.5791	7.6133	4.8227	-7.6133	1.5791	270.00
Line 3	Line 3	33.00000	20.00000	82.00000	0.0	11.813	3.6129	-11.812	0.0	270.00
	1.0000	33.00000	19.00000	82.00000	0.0	11.438	4.4050	-11.437	0.0	270.00
	2.0000	33.00000	18.00000	82.00000	0.0	11.063	4.9664	-11.063	0.0	270.00
	3.0000	33.00000	17.00000	82.00000	0.0	10.688	5.3303	-10.688	0.0	270.00
	4.0000	33.00000	16.00000	82.00000	0.0	10.313	5.5274	-10.313	0.0	270.00
	5.0000	33.00000	15.00000	82.00000	0.0	9.9375	5.5864	-9.9375	0.0	270.00
	6.0000	33.00000	14.00000	82.00000	0.0	9.5625	5.5334	-9.5625	0.0	270.00
	7.0000	33.00000	13.00000	82.00000	0.0	9.1875	5.3923	-9.1875	0.0	270.00
	8.0000	33.00000	12.00000	82.00000	0.0	8.8125	5.1847	-8.8125	0.0	270.00
	9.0000	33.00000	11.00000	82.00000	0.0	8.4375	4.9297	-8.4375	0.0	270.00
	10.000	33.00000	10.00000	82.00000	0.0	8.0625	4.6443	-8.0625	0.0	270.00

Specific Building Damage Results - Horizontal Displacements

Dist.	Coordinates x	y	z	Displacements x	y	Along the Line	Perpendicular to Line
	[m]	[m]	[m]	[mm]	[mm]	[mm]	[mm]
Structure: 57 Maresfield Sub-structure: North Elevation							
0.0	20.50000	20.00000	82.00000	2.9969	8.9487	2.9969	8.9487
0.33000	20.83000	20.00000	82.00000	2.9967	8.9529	2.9967	8.9529
0.66000	21.16000	20.00000	82.00000	2.9965	8.9574	2.9965	8.9574
0.99000	21.49000	20.00000	82.00000	2.9963	8.9622	2.9963	8.9622
1.3200	21.82000	20.00000	82.00000	2.9960	8.9673	2.9960	8.9673
1.6500	22.15000	20.00000	82.00000	2.9957	8.9727	2.9957	8.9727
1.9800	22.48000	20.00000	82.00000	2.9954	8.9785	2.9954	8.9785
2.3100	22.81000	20.00000	82.00000	2.9950	8.9848	2.9950	8.9848
2.6400	23.14000	20.00000	82.00000	2.9946	8.9916	2.9946	8.9916
2.9700	23.47000	20.00000	82.00000	2.9942	8.9989	2.9942	8.9989
3.3000	23.80000	20.00000	82.00000	2.9937	9.0069	2.9937	9.0069
3.6300	24.13000	20.00000	82.00000	2.9931	9.0156	2.9931	9.0156
3.9600	24.46000	20.00000	82.00000	2.9925	9.0250	2.9925	9.0250
4.2900	24.79000	20.00000	82.00000	2.9917	9.0354	2.9917	9.0354
4.6200	25.12000	20.00000	82.00000	2.9908	9.0469	2.9908	9.0469
4.9500	25.45000	20.00000	82.00000	2.9898	9.0596	2.9898	9.0596
5.2800	25.78000	20.00000	82.00000	2.9886	9.0737	2.9886	9.0737
5.6100	26.11000	20.00000	82.00000	2.9872	9.0896	2.9872	9.0896
5.9400	26.44000	20.00000	82.00000	2.9855	9.1075	2.9855	9.1075
6.2700	26.77000	20.00000	82.00000	2.9834	9.1279	2.9834	9.1279
6.6000	27.10000	20.00000	82.00000	2.9808	9.1512	2.9808	9.1512
6.9300	27.43000	20.00000	82.00000	2.9776	9.1783	2.9776	9.1783
7.2600	27.76000	20.00000	82.00000	2.9735	9.2100	2.9735	9.2100
7.5900	28.09000	20.00000	82.00000	2.9683	9.2477	2.9683	9.2477
7.9200	28.42000	20.00000	82.00000	2.9612	9.2932	2.9612	9.2932
8.2500	28.75000	20.00000	82.00000	2.9516	9.3492	2.9516	9.3492
8.5800	29.08000	20.00000	82.00000	2.9379	9.4195	2.9379	9.4195
8.9100	29.41000	20.00000	82.00000	2.9177	9.5105	2.9177	9.5105
9.2400	29.74000	20.00000	82.00000	2.8858	9.6323	2.8858	9.6323
9.5700	30.07000	20.00000	82.00000	2.8319	9.8027	2.8319	9.8027
9.9000	30.40000	20.00000	82.00000	2.7311	10.054	2.7311	10.054
10.230	30.73000	20.00000	82.00000	2.5161	10.446	2.5161	10.446
10.560	31.06000	20.00000	82.00000	1.9819	11.065	1.9819	11.065
10.890	31.39000	20.00000	82.00000	0.64459	11.742	0.64459	11.742
11.220	31.72000	20.00000	82.00000	0.0	11.813	0.0	11.812
11.550	32.05000	20.00000	82.00000	0.0	11.813	0.0	11.812
11.880	32.38000	20.00000	82.00000	0.0	11.813	0.0	11.812
12.210	32.71000	20.00000	82.00000	0.0	11.813	0.0	11.812
12.540	33.04000	20.00000	82.00000	0.0	11.813	0.0	11.812
12.870	33.37000	20.00000	82.00000	0.0	11.813	0.0	11.812
13.200	33.70000	20.00000	82.00000	0.0	11.813	0.0	11.812
13.530	34.03000	20.00000	82.00000	0.0	11.813	0.0	11.812
13.860	34.36000	20.00000	82.00000	0.0	11.813	0.0	11.812
14.190	34.69000	20.00000	82.00000	0.0	11.813	0.0	11.812
14.520	35.02000	20.00000	82.00000	0.0	11.813	0.0	11.812
14.850	35.35000	20.00000	82.00000	0.0	11.813	0.0	11.812
15.180	35.68000	20.00000	82.00000	0.0	11.813	0.0	11.812
15.510	36.01000	20.00000	82.00000	0.0	11.813	0.0	11.812
15.840	36.34000	20.00000	82.00000	0.0	11.813	0.0	11.812
16.170	36.67000	20.00000	82.00000	0.0	11.813	0.0	11.812
16.500	37.00000	20.00000	82.00000	0.0	11.813	0.0	11.812
Structure: 57 Maresfield Sub-structure: West Wall							
0.0	25.00000	20.00000	82.00000	2.9912	9.0426	-9.0426	2.9912
1.0000	25.00000	19.00000	82.00000	2.9232	9.1121	-9.1121	2.9232
2.0000	25.00000	18.00000	82.00000	2.8000	9.1394	-9.1394	2.8000
3.0000	25.00000	17.00000	82.00000	2.6414	9.1098	-9.1098	2.6414
4.0000	25.00000	16.00000	82.00000	2.4666	9.0201	-9.0201	2.4666
5.0000	25.00000	15.00000	82.00000	2.2902	8.8753	-8.8753	2.2902

Dist.	Coordinates			Displacements			
	x	y	z	x	y	Along the Line	Perpendicular to Line
6.0000	25.00000	14.00000	82.00000	2.1213	8.6838	-8.6838	2.1213
7.0000	25.00000	13.00000	82.00000	1.9648	8.4546	-8.4546	1.9648
8.0000	25.00000	12.00000	82.00000	1.8224	8.1956	-8.1956	1.8224
9.0000	25.00000	11.00000	82.00000	1.6941	7.9134	-7.9134	1.6941
10.000	25.00000	10.00000	82.00000	1.5791	7.6133	-7.6133	1.5791

Structure: 57 Maresfield Sub-structure: East Wall

0.0	33.00000	20.00000	82.00000	0.0	11.813	-11.812	0.0
1.0000	33.00000	19.00000	82.00000	0.0	11.438	-11.437	0.0
2.0000	33.00000	18.00000	82.00000	0.0	11.063	-11.063	0.0
3.0000	33.00000	17.00000	82.00000	0.0	10.688	-10.688	0.0
4.0000	33.00000	16.00000	82.00000	0.0	10.313	-10.313	0.0
5.0000	33.00000	15.00000	82.00000	0.0	9.9375	-9.9375	0.0
6.0000	33.00000	14.00000	82.00000	0.0	9.5625	-9.5625	0.0
7.0000	33.00000	13.00000	82.00000	0.0	9.1875	-9.1875	0.0
8.0000	33.00000	12.00000	82.00000	0.0	8.8125	-8.8125	0.0
9.0000	33.00000	11.00000	82.00000	0.0	8.4375	-8.4375	0.0
10.000	33.00000	10.00000	82.00000	0.0	8.0625	-8.0625	0.0

Specific Building Damage Results - Vertical Displacements

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

Structure: 57 Maresfield Sub-structure: North Elevation
Vertical Offset 1

0.0	20.50000	20.00000	82.00000	4.8841
0.33000	20.83000	20.00000	82.00000	4.8485
0.66000	21.16000	20.00000	82.00000	4.8109
0.99000	21.49000	20.00000	82.00000	4.7715
1.3200	21.82000	20.00000	82.00000	4.7304
1.6500	22.15000	20.00000	82.00000	4.6877
1.9800	22.48000	20.00000	82.00000	4.6436
2.3100	22.81000	20.00000	82.00000	4.5982
2.6400	23.14000	20.00000	82.00000	4.5517
2.9700	23.47000	20.00000	82.00000	4.5041
3.3000	23.80000	20.00000	82.00000	4.4558
3.6300	24.13000	20.00000	82.00000	4.4069
3.9600	24.46000	20.00000	82.00000	4.3574
4.2900	24.79000	20.00000	82.00000	4.3078
4.6200	25.12000	20.00000	82.00000	4.2580
4.9500	25.45000	20.00000	82.00000	4.2084
5.2800	25.78000	20.00000	82.00000	4.1592
5.6100	26.11000	20.00000	82.00000	4.1105
5.9400	26.44000	20.00000	82.00000	4.0625
6.2700	26.77000	20.00000	82.00000	4.0156
6.6000	27.10000	20.00000	82.00000	3.9700
6.9300	27.43000	20.00000	82.00000	3.9259
7.2600	27.76000	20.00000	82.00000	3.8835
7.5900	28.09000	20.00000	82.00000	3.8432
7.9200	28.42000	20.00000	82.00000	3.8051
8.2500	28.75000	20.00000	82.00000	3.7696
8.5800	29.08000	20.00000	82.00000	3.7370
8.9100	29.41000	20.00000	82.00000	3.7074
9.2400	29.74000	20.00000	82.00000	3.6814
9.5700	30.07000	20.00000	82.00000	3.6590
9.9000	30.40000	20.00000	82.00000	3.6407
10.230	30.73000	20.00000	82.00000	3.6267
10.560	31.06000	20.00000	82.00000	3.6175
10.890	31.39000	20.00000	82.00000	3.6132
11.220	31.72000	20.00000	82.00000	3.6129
11.550	32.05000	20.00000	82.00000	3.6129
11.880	32.38000	20.00000	82.00000	3.6129
12.210	32.71000	20.00000	82.00000	3.6129
12.540	33.04000	20.00000	82.00000	3.6129
12.870	33.37000	20.00000	82.00000	3.6129
13.200	33.70000	20.00000	82.00000	3.6129
13.530	34.03000	20.00000	82.00000	3.6129
13.860	34.36000	20.00000	82.00000	3.6129
14.190	34.69000	20.00000	82.00000	3.6129
14.520	35.02000	20.00000	82.00000	3.6129
14.850	35.35000	20.00000	82.00000	3.6129
15.180	35.68000	20.00000	82.00000	3.6129
15.510	36.01000	20.00000	82.00000	3.6129
15.840	36.34000	20.00000	82.00000	3.6129
16.170	36.67000	20.00000	82.00000	3.6129
16.500	37.00000	20.00000	82.00000	3.6129

Structure: 57 Maresfield Sub-structure: West Wall
Vertical Offset 1

0.0	25.00000	20.00000	82.00000	4.2761
1.0000	25.00000	19.00000	82.00000	5.0460
2.0000	25.00000	18.00000	82.00000	5.5700
3.0000	25.00000	17.00000	82.00000	5.8868
4.0000	25.00000	16.00000	82.00000	6.0313
5.0000	25.00000	15.00000	82.00000	6.0347
6.0000	25.00000	14.00000	82.00000	5.9252
7.0000	25.00000	13.00000	82.00000	5.7281
8.0000	25.00000	12.00000	82.00000	5.4658
9.0000	25.00000	11.00000	82.00000	5.1582
10.000	25.00000	10.00000	82.00000	4.8227

Structure: 57 Maresfield Sub-structure: East Wall
Vertical Offset 1

0.0	33.00000	20.00000	82.00000	3.6129
1.0000	33.00000	19.00000	82.00000	4.4050
2.0000	33.00000	18.00000	82.00000	4.9664
3.0000	33.00000	17.00000	82.00000	5.3303
4.0000	33.00000	16.00000	82.00000	5.5274
5.0000	33.00000	15.00000	82.00000	5.5864
6.0000	33.00000	14.00000	82.00000	5.5334
7.0000	33.00000	13.00000	82.00000	5.3923
8.0000	33.00000	12.00000	82.00000	5.1847
9.0000	33.00000	11.00000	82.00000	4.9297
10.000	33.00000	10.00000	82.00000	4.6443

Specific Building Damage Results - All Segments

Structure Name	Sub-Structure Name	Vertical Offsets from Line for Vertical Movement Calculations	Segment	Start	Length	Curvature	Deflection Ratio	Average Horizontal Strain	Max. Tensile Strain	Maximum Gradient of Horizontal Displacement Curve	Maximum Gradient of Vertical Displacement Curve	Min. Radius of Curvature	Damage Category
		[m]		[m]	[m]		[%]	[%]	[%]			[m]	
57 Maresfield	North Elevation	0	1	0.0	7.3800	Hogging	0.0023359	-0.040530	0.0082106	0.0040689	150.74E-6	23304.	0 (Negligible)
			2	7.3800	1.1200	None	0.0	0.0	0.0	0.0	0.0	-	0 (Negligible)
57 Maresfield	West Wall	0	1	0.0	8.9000	Sagging	0.014870	0.012765	0.029688	-282.07E-6	-769.99E-6	3687.3	0 (Negligible)
57 Maresfield	East Wall	0	1	0.0	8.9000	Sagging	0.014500	0.037500	0.054002	-374.86E-6	-791.88E-6	3945.2	1 (Very Slight)

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

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

Structure Name	Sub-Structure Name	Vertical Offsets from Line for Vertical Movement Calculations	Deflection Ratio	Average Horizontal Strain	Maximum Slope	Maximum Settlement	Max. Tensile Strain	Maximum Gradient of Horizontal Displacement Curve	Maximum Gradient of Vertical Displacement Curve	Min. Radius of Curvature (Hogging)	Min. Radius of Curvature (Sagging)	Damage Category
		[m]	[%]	[%]		[mm]	[%]			[m]	[m]	
57 Maresfield	North Elevation	0	0.0023359	-0.040530	150.74E-6	4.2761	0.0082106	0.0040689	150.74E-6	23304.	-	0 (Negligible)
57 Maresfield	West Wall	0	0.014870	0.012765	-769.99E-6	6.0345	0.029688	-282.07E-6	-769.99E-6	-	3687.3	0 (Negligible)
57 Maresfield	East Wall	0	0.014500	0.037500	-791.88E-6	5.5840	0.054002	-374.86E-6	-791.88E-6	-	3945.2	1 (Very Slight)

Specific Building Damage Results - Critical Segments within Each Structure

Structure Name	Sub-Structure Name	Vertical Offsets from Line for Vertical	Deflection Ratio	Average Horizontal Strain	Maximum Slope	Maximum Settlement	Max. Tensile Strain	Maximum Gradient of Horizontal Displacement	Maximum Gradient of Vertical Displacement	Min. Radius of Curvature (Hogging)	Min. Radius of Curvature (Sagging)	Damage Category

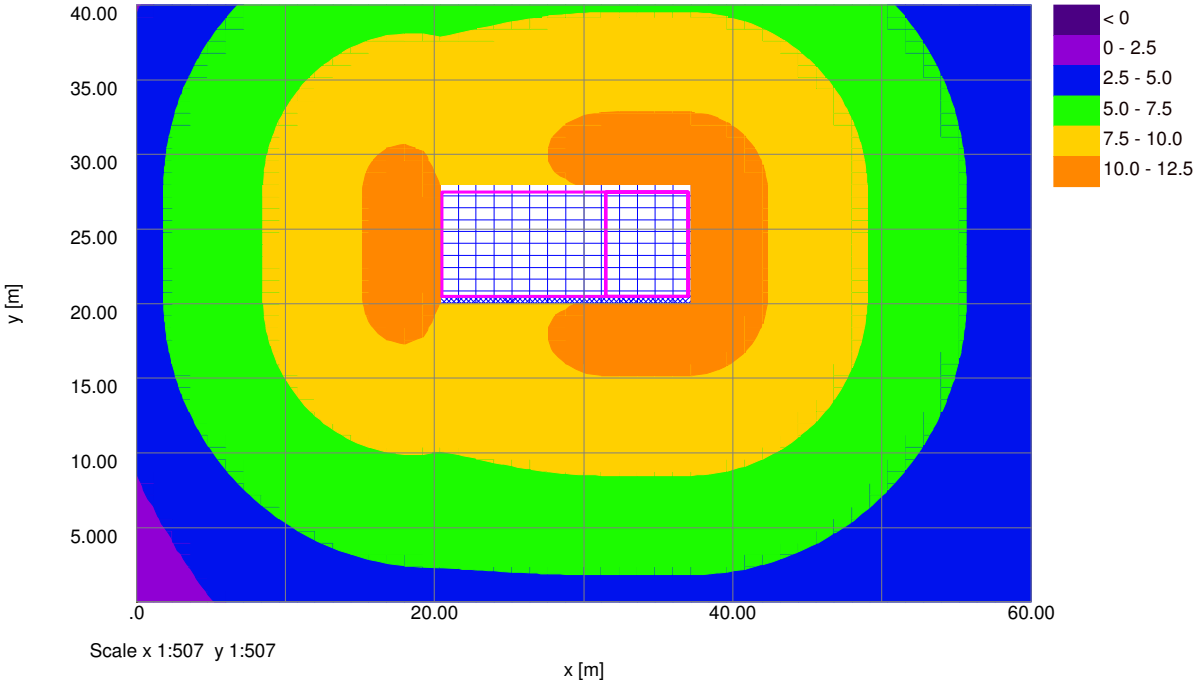
Structure Name	Parameter	Critical Sub-Structure	Critical Segment	Start	End	Curvature	Maximum Slope	Maximum Settlement	Max. Tensile Strain	Min. Radius of Curvature (Hogging)	Min. Radius of Curvature (Sagging)	Damage Category
				[m]	[m]			[mm]	[%]	[m]	[m]	
57 Maresfield	Maximum Slope	East Wall	1	0.0	8.9000	Sagging	**791.88E-6**	5.5840	0.054002	-	3945.2	1 (Very Slight)
	Maximum Settlement	West Wall	1	0.0	8.9000	Sagging	769.99E-6	**6.0345**	0.029688	-	3687.3	0 (Negligible)
	Max. Tensile Strain	East Wall	1	0.0	8.9000	Sagging	791.88E-6	5.5840	**0.054002**	-	3945.2	1 (Very Slight)
	Min. Radius of Curvature (Hogging)	North Elevation	1	0.0	7.3800	Hogging	150.74E-6	4.2761	0.0082106	**23304.**	-	0 (Negligible)
	Min. Radius of Curvature (Sagging)	West Wall	1	0.0	8.9000	Sagging	769.99E-6	6.0345	0.029688	-	**3687.3**	0 (Negligible)

Specific Building Damage Results - All Combined Segments

Structure Name	Sub-Structure Name	Vertical Offsets from Line for Vertical Movement Calculations	Combined Segment	Start	Length	Curvature	Deflection Ratio	Average Horizontal Strain	Max. Tensile Strain	Damage Category
		[m]		[m]	[m]		[%]	[%]	[%]	

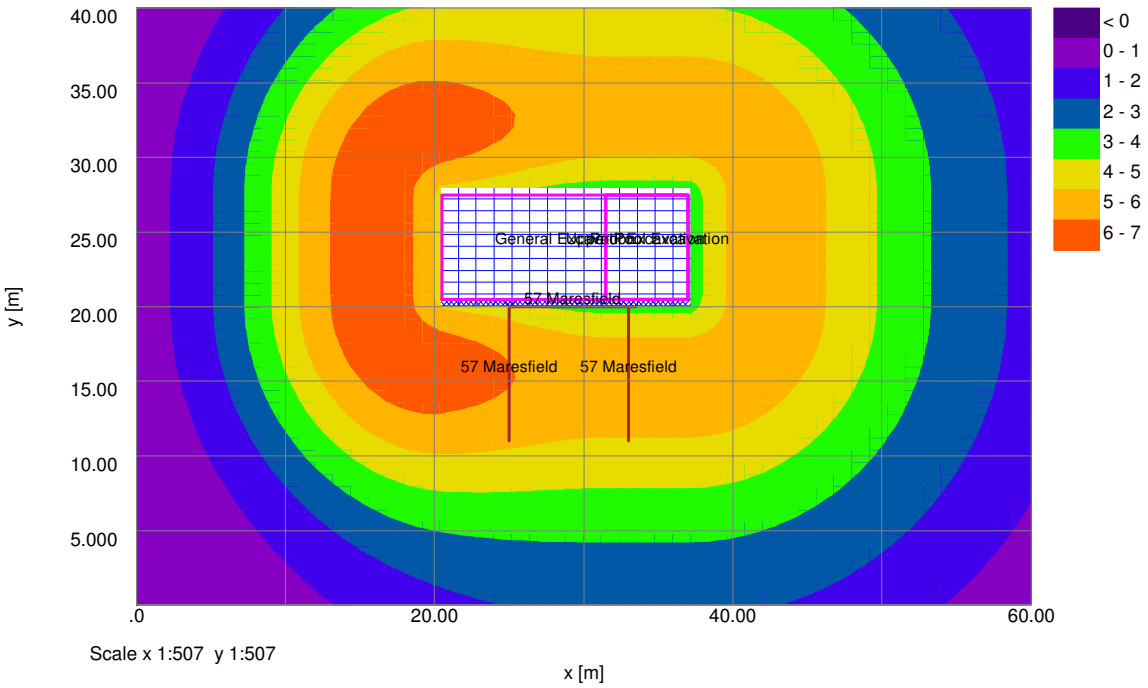
No structures have segments combined.

Horizontal Displacement Contours: Grid 1 (level 82.000m) Interval 2.5mm



Scale x 1:507 y 1:507

Vertical Settlement Contours: Grid 1 (level 82.000m) (Interval 1mm)



Scale x 1:507 y 1:507

Geotechnical & Environmental Associates (GEA) is an engineer-led and client-focused independent specialist providing a complete range of geotechnical and contaminated land investigation, analytical and consultancy services to the property and construction industries.

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