



Appendix E: Preliminary Embedded Pile Wall Assessment



Project Saville Theatre
Project No. 3722
Subject Preliminary Embedded Pile Wall Assessment
Client Yoo Capital Ltd

Document Reference	Status	Revision	Issued	Checked	Approved	Date
3722-A2S-XX-XX-TN-Y-0001-00	First Issue	00	Seth Furney	Jessica Taylor	Andrew Brindle	24.01.2025
3722-A2S-XX-XX-TN-Y-0001-01	Minor revision to proposed development detail	01	Seth Furney	Jessica Taylor	Andrew Brindle	30.01.2025
3722-A2S-XX-XX-TN-Y-0001-02	Embedded wall revised to a secant pile wall	02	Seth Furney	Jessica Taylor	Andrew Brindle	04.04.2025

1. Introduction

A-squared Studio Engineers Ltd (A-squared) has been appointed by Yoo Capital Ltd (Yoo Capital) to undertake a preliminary feasibility assessment for the proposed embedded retaining wall at Saville Theatre, 135 Shaftsbury Avenue, London, WC2H 8AH. The development falls within the administrative boundaries of the London Borough of Camden and is currently occupied by a Grade II listed six- and seven-storey commercial building with a double-storey basement.

The island site is bound by Shaftesbury Avenue to the southeast, Stacey Street to the southwest, New Compton Street to the northwest and St Giles Passage to the northeast. The site and neighbouring infrastructure are presented in Figure 1.1 below.

The proposed commercial redevelopment comprises the extension of the existing two-storey basement to a five-storey basement while maintaining the existing basement footprint. The works will involve the partial demolition of the existing structure with partial retention of the building facades, followed by the construction of a five-storey vertical extension plus plant level on top of the existing building. The basement will extend to a depth of approximately 22.21m bgl. The facades on the southeast, southwest and northeast elevations will be fully retained, while the northwest elevation will be partially preserved.

The proposed pile wall is approximately 120 linear meters and encompasses the perimeter of the basement development. A-squared will review the feasibility of adopting a secant pile wall with a top-down construction sequence.

Axial line loads are noted on the Pile Loads Mark-Up prepared by Elliott Wood Ltd (Elliott Wood). Horizontal loads are not scheduled and therefore not included within this assessment.

According to the section drawings of the neighbouring buildings provided by Elliott Wood, there is an existing eleven-storey building, 125 Shaftesbury Avenue, to the southwest of the site, which is shown to be founded on underreamed pile foundations to an unconfirmed depth. To the northeast of the site is an eight-storey building with a double-storey basement, 151 Shaftesbury Avenue, which is shown to be supported on a raft foundation.

This document comprises an initial feasibility assessment for the proposed secant piled wall solution only and does not represent a detailed design document or basement impact assessment.

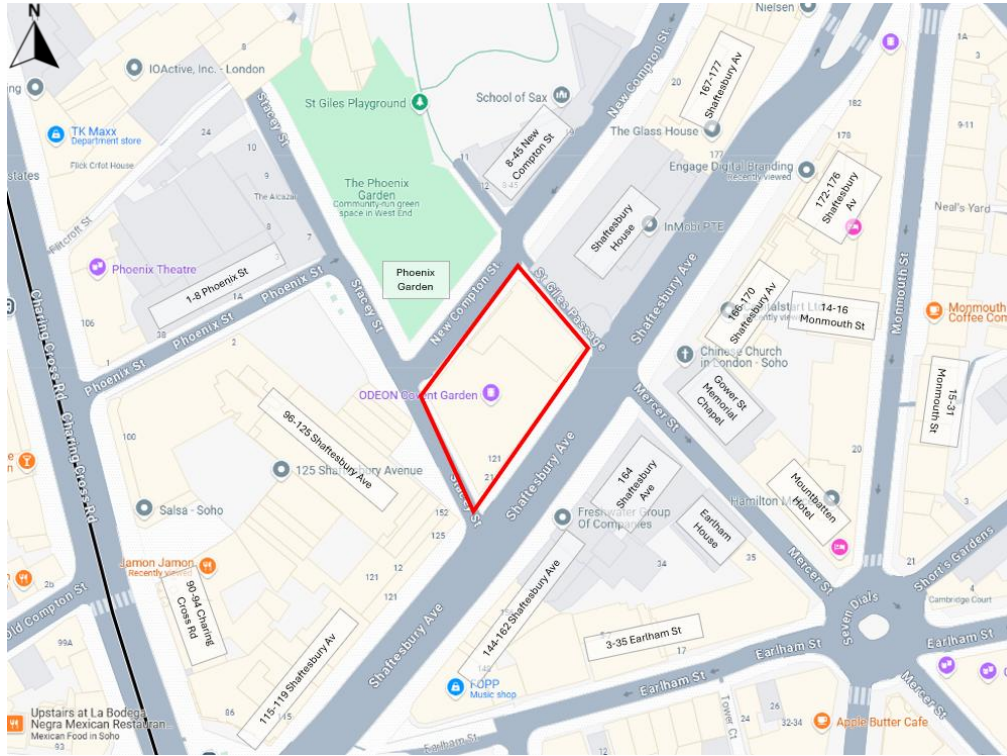


Figure 1.1 Site location and neighbouring roads

1.1. Information Sources

The principal sources of information which have informed the assessment include the following:

- *Desk Study & Ground Investigation Report* prepared by Geotechnical & Environmental Associated Limited, dated 15 December 2017 (doc. ref. J17183 Issue 1).
- *Land Contamination Risk Management Preliminary Risk Assessment* prepared by Pell Frischmann Consultants Limited, dated 24 January 2024 (doc. ref. 105465-PEF-ZZ-XX-RP-GG-600001 rev P02).
- *Pile Loads Mark-Up* prepared by Elliott Wood Partnership Limited, dated 8 January 2025.
- Proposed scheme drawings prepared by Elliott Wood Partnership Limited, dated January 2025 (doc. refs. 2111-EWP-ST-B4-DR-S-060000 WIP, B3-DR-S-070000 WIP, B2-DR-S-080000 WIP, B1-DR-S-090000 WIP, B1-DR-S-095000 WIP, B1-DR-S-097000 P01, 00-DR-S-100000 WIP, XX-DR-S-200000 P01, XX-DR-S-200001 P01).
- Proposed scheme drawings prepared by Elliott Wood Partnership Limited, dated June 2024 (doc. refs. 2240073-EWP-ZZ-B4-SK-S-0030 P2, B3-SK-S-0031 P1, B2-SK-S-0032 P1, B1-SK-S-0033 P1, 0G-SK-S-0034 to 0035 P1, 01-SK-S-0036 P1, 02-SK-S-0037 P1, 03-SK-S-0038 P1, 04-SK-S-0039 P1, 05-SK-S-0040 P1, 06-SK-S-0041 P1, 07-SK-S-0042 P1, 08-SK-S-0043 P1, 09-SK-S-0044 P1, 10-SK-S-0045 P1, 11-SK-S-0046 P1, ZZ-SK-S-0047 P1, XX-SK-S-0048 P1, XX-SK-S-0049 P1).
- *Proposed Sequence Sketches* prepared by Elliott Wood Partnership Limited, dated January 2025 (doc. ref. 2240073-EWP-ZZ-XX-S2-S-XXX P1).
- *Site Section – Existing Building* prepared by Elliott Wood Partnership Limited, dated January 2025 (doc. refs. 2240073-EWP-ZZ-XX-SK-S-0077 to 0078 P1).
- *Buildings Damage Ground Movement Assessment* prepared by A-squared Studio Engineers Limited, dated January 2025 (doc. ref. 3722-A2S-XX-XX-RP-Y-0002-00).

2. Ground Conditions

The ground conditions at the site comprise of Made Ground over medium dense SAND and GRAVEL (Lynch Hill Gravel Member), followed by firm to very stiff CLAY (London Clay Formation and Lambeth Group), very dense SAND (Thanet Formation) and extremely weak to weak CHALK (Chalk Group).

Long-term groundwater monitoring was undertaken at the site, with recorded groundwater depth between 4.39m and 5.28m below ground level (bgl).

The design groundwater level is taken at the highest recorded level detailed above, +18.34mOD.

2.1. Ground Model

The ground model and geotechnical parameters adopted for the preliminary wall assessment have been determined based on a review of the site-specific ground investigation. The ground model adopted for this assessment is presented Table 2.1.

Table 2.1 Ground model and geotechnical parameters adopted for the assessment

Stratum	Top of Stratum (mOD)	Thickness (m)	Bulk Unit Weight, γ (kN/m ³)	Angle of Shear Resistance, ϕ' (degrees)	Undrained Shear Strength, c_u (kPa)	Drained Cohesion, c' (kPa)	Undrained Young's Modulus, $E_{u,h}$ (MPa)	Drained Young's Modulus, E'_h (MPa)
Made Ground	+22.73	3.50	18	28	-	-	-	10
Lynch Hill Gravel Member	+19.23	1.23	19	34	-	-	-	34
London Clay Formation	+18.00	30.00	20	24	50 + 5.6z	5	1000 c_u	800 c_u
Lambeth Group	-12.00	15.50	20	24	250	5	1000 c_u	800 c_u

The design groundwater level is taken as the highest recorded level from the monitoring results, +18.34mOD.

3. Pile Wall Design Commentary

3.1. Installation

The retained height of the proposed basement is approximately 22.11m, therefore the required reinforcement cage length within the secant piles must be greater than this length. This length likely exceeds the maximum length that a cage can be plunged if adopting the Continuous Flight Auger (CFA) piling methodology. Therefore, the piles are likely to be installed using rotary bored techniques to allow for the placement of the reinforcement cage prior to concreting.

The wall piles are expected to toe within the base of the London Clay / the top of the Lambeth Group for axial stability. Due to the variable nature of the Lambeth Group, bands of granular soil may be encountered during installation. Therefore, support fluid may be required for the highest loaded piles to ensure the stability of the bore. The base of the London Clay should be verified with additional deep ground investigation to determine whether a dry bore may be possible using temporary casing alone.

3.2. Proposed Geometry

Back of wall surcharges are taken as the worst-case scenario from the section drawings provided. The existing eleven-storey building, 125 Shaftesbury Avenue, to the southwest of the site is selected as the worst-case surcharge, as this building does not have a

basement (which would reduce the active earth pressure acting on the wall) and is founded on underreamed pile foundations to depths shown to be at the new B1 level of the proposed basement. Underream pile foundations have an increased base diameter compared to the shaft, which will predominantly distribute the load via end-bearing. It is noted that the neighbouring pile depths are assumed. Building surcharges are assumed as 10kPa per storey, therefore this method is adopted and a surcharge applied at the assumed shallowest toe level of the underreams.

Directly adjacent to the proposed pile wall is the previous reinforced concrete retaining wall. This is applied as a surcharge representing the self-weight of the structure, acting between the new B1 and B1 Mezzanine levels.

The island site is bound by roads, therefore to account for traffic, a variable surcharge of 20kPa is applied behind the wall of the wall, extending over the road width.

Table 3.1 provides the breakdown of the applied back of wall surcharges used for the preliminary wall assessment.

Table 3.1 Back of wall surcharges adopted for the preliminary wall assessment

Surcharge Reference	Surcharge (kPa)	Application Level (mOD)	Distance from Wall (m)	Distance Perpendicular to wall (m)
125 Shaftesbury Av underream piles	110	+14.73	9.0	50.0
125 Shaftesbury Avenue ground floor slab	15	+22.73	9.0	50.0
Existing retaining wall structure	31.5	+13.50	0.1	1.5
Highway	20	+22.73	0.5	8.5

3.3. Preliminary Design

The formation level of the existing double-storey basement is situated within the impermeable London Clay, therefore a groundwater cut off through the gravels is already in place. The new B4 formation level of the proposed basement is also within the London Clay; therefore, very limited water ingress is expected through the clay layer during the basement excavation. The ground investigation reports pockets and partings of silt and sand within the London Clay which may be water bearing. The embedded wall is to be constructed as a secant pile wall which shall provide a temporary water cut off during the basement excavation.

The wall shall be formed of 900mm diameter primary (firm) and secondary (hard) piles.

The recommended centre-to-centre spacing between the secondary (hard) piles is 1500mm.

The basement shall be constructed using a top-down construction sequence.

3.3.1. Horizontal Slab Stiffness

As the basement will be constructed using a top-down construction method, each slab is modelled as a horizontal strut with a horizontal stiffness. A full slab stiffness is not applicable for the perimeter slabs as there will be significant voids within the layout, therefore a reduced horizontal stiffness is modelled, as agreed with Elliott Wood. A summary of the proposed slabs and associated horizontal stiffnesses is provided in Table 3.2.

Table 3.2 Summary of assumed horizontal slab stiffnesses

Slab Reference	Case	Minimum Horizontal Stiffness (kN/m/m)
GF steel frame	Permanent	50,000
B1 Mezzanine perimeter slab	Permanent	50,000
B1 perimeter slab	Temporary (with addition of prop)	100,000
B1 perimeter slab	Permanent	50,000
B2 perimeter slab	Permanent	50,000
B3 perimeter slab	Permanent	50,000
B4 slab (700mm thick)	Permanent	735,000

3.3.2. Construction Sequence

The following construction sequence is assumed:

1. Install pile wall from PPL (assumed to be +22.73mOD, top of wall) to the design toe level (-12.00mOD for axial stability).
2. Construct the capping beam.
3. Dewater soil to basement formation level +0.62mOD.
4. Excavate piling platform material to a depth of +18.01mOD.
5. Install steel transfer arches at capping beam level +22.73mOD.
6. Excavate to a depth of +17.50mOD.
7. Install B1 mezzanine floor at +18.10mOD.
8. Excavate to a depth of +11.64mOD.
9. Construct B1 perimeter slab with additional temporary prop at +12.14mOD.
10. Excavate to a depth of +8.32mOD.
11. Construct B2 perimeter slab at +8.82mOD.
12. Excavate to a depth of +0.62mOD.
13. Construct B4 slab at +1.52mOD.
14. Construct B3 perimeter slab at +5.50mOD.
15. Removal of temporary prop at B1 slab level +12.14mOD.
16. Switch to long term wall stiffness, draining of cohesive soils and long-term groundwater conditions.

3.3.3. Lateral Design

The Geosolve programme, WALLAP, has been used to assess the chosen construction sequence and pile diameter. The maximum horizontal wall deflection is 33mm. This is the limit outlined in the Buildings Damage Ground Movement Assessment (doc. ref. 3722-A2S-XX-XX-RP-Y-0002).

The calculated bending moments and shear forces are deemed reinforceable within a 900mm diameter bored pile.

3.3.4. Axial Design

The Oasys programme, Pile 20.0, has been used to assess the preliminary axial design of the secant pile wall. The assessment is based on the Design Actions outlined in BS EN 1997-1.

Table 3.3 summarises the preliminary axial design of the wall. The lateral toe level of the wall, -9.00mOD, satisfies the toe level required for axial stability.

Table 3.3 Summary of preliminary axial design

Tool diameter (mm)	Pile spacing c/c (mm)	Axial load (kN/5m)	Pile toe level for axial stability (mOD)
900	1500	5500	-12.00

4. Summary

A-squared Studio Engineers has been appointed by Yoo Capital to undertake a preliminary feasibility assessment for the proposed embedded retaining wall at Saville Theatre, 135 Shaftsbury Avenue, London, WC2H 8AH. The development falls within the administrative boundaries of the London Borough of Camden and is currently occupied by a Grade II listed six- and seven-storey commercial building with a double-storey basement.

The ground conditions at the site comprise of Made Ground over medium dense SAND and GRAVEL (Lynch Hill Gravel Member), followed by firm to very stiff CLAY (London Clay Formation and Lambeth Group), very dense SAND (Thanet Formation) and extremely weak to weak CHALK (Chalk Group).

The formation level of the existing double-storey basement is situated within the impermeable London Clay, therefore a groundwater cut off through the gravels is already in place. The new B4 formation level of the proposed basement is also within the London Clay; therefore, very limited water ingress is expected through the clay layer during the basement excavation. The ground investigation reports pockets and partings of silt and sand within the London Clay which may be water bearing. The embedded wall is to be constructed as a secant pile wall which shall provide a temporary water cut off during the basement excavation.

The wall can be formed of 900mm diameter primary (firm) and secondary (hard) piles at centre-to-centre spacing of 1500mm between the secondary (hard) piles. With this arrangement, the wall deflections will be at the limit set out in the Buildings GMA.

Pile shall be constructed using rotary bored techniques. The proposed construction sequence outlined in section 3.3.2 has been evaluated and the maximum horizontal displacement is found to be 33mm, this is in line with the horizontal wall deflection limit outlined in the Buildings Damage Ground Movement Assessment (doc. ref. 3722-A2S-XX-XX-RP-Y-0002).

It is to note that the preliminary wall analysis does not consider any applied horizontal loads from the superstructure. Additional surcharges are applied to the back of the wall to account for the adjacent roads and the eleven-storey building to the south-west of the site, 125 Shaftesbury Avenue.

Axial loads are scheduled for the pile wall. A preliminary axial capacity analysis has been undertaken for the pile wall. The pile toe level required for lateral stability satisfies the required pile toe level for axial stability.

It should be noted that all analyses undertaken as part of this assessment are considered preliminary and are subject to change following confirmation of the final basement scheme.

Appendix A: WALLAP Analysis

A-SQUARED STUDIO ENGINEERS LTD | Sheet No.
 Program: WALLAP Version 6.06 Revision A51.B69.R55 | Job No. 3722
 Licensed from GEOSOLVE | Made by : SF
 Data filename/Run ID: 3722Saville_Theatre__B2_top_down_secant
 135 Shaftsbury Avenue - Saville Theatre | Date: 4-04-2025
 Secant 900mm @ 1500mm cc B2 topdown | Checked :

Units: kN,m

INPUT DATA

SOIL PROFILE

Stratum no.	Elevation of top of stratum	Soil types -----	
		Left side	Right side
1	22.73	1 MG	5 Fill
2	19.23	2 Lynch Hill	5 Fill
3	18.00	3 LC1 UnDr	5 Fill
4	14.85	3 LC1 UnDr	3 LC1 UnDr

SOIL PROPERTIES

-- Soil type --	Bulk density	Young's Modulus	At rest coeff.	Consol state.	Active limit	Passive limit	Cohesion
No. Description (Datum elev.)	kN/m3	Eh,kN/m2 (dEh/dy)	Ko (dKo/dy)	NC/OC (Nu)	Ka (Kac)	Kp (Kpc)	kN/m2 (dc/dy)
1 MG	18.00	10000	0.530	OC (0.200)	0.309 (1.300)	4.132 (5.891)	0.0d
2 Lynch Hill	19.00	34000	0.440	OC (0.200)	0.237 (0.000)	6.204 (0.000)	
3 LC1 UnDr (18.00)	20.00	50000 (5666)	1.000	OC (0.490)	1.000 (2.389)	1.000 (2.390)	50.00u (5.600)
4 LC1 Drain (18.00)	20.00	40000 (4533)	1.000	OC (0.200)	0.366 (1.423)	3.244 (5.040)	5.000d
5 Fill	19.00	25000	0.455	OC (0.200)	0.248 (0.000)	5.773 (0.000)	

Additional soil parameters associated with Ka and Kp

--- parameters for Ka ---				--- parameters for Kp ---			
Soil		Wall	Back-	Soil		Wall	Back-
friction		adhesion	fill	friction		adhesion	fill
angle		coeff.	angle	angle		coeff.	angle
1 MG	28.00	0.670	0.00	28.00	0.670	0.00	
2 Lynch Hill	34.00	0.670	0.00	34.00	0.670	0.00	
3 LC1 UnDr	0.00	0.500	0.00	0.00	0.500	0.00	
4 LC1 Drain	24.00	0.670	0.00	24.00	0.670	0.00	
5 Fill	33.00	0.670	0.00	33.00	0.670	0.00	

GROUND WATER CONDITIONS

Density of water = 10.00 kN/m3

Initial water table elevation Left side Right side
 18.34 18.34

Automatic water pressure balancing at toe of wall : No

Left side					Right side			
Water press.	Point no.	Elev. m	Piezo elev. m	Water press. kN/m2	Point no.	Elev. m	Piezo elev. m	Water press. kN/m2
1	1	18.35	18.35	0.0	1	0.62	0.62	0.0 MC+WC
2	1	21.73	21.73	0.0	1	0.62	0.62	0.0 MC+WC
					2	0.62	21.73	211.1

WALL PROPERTIES

Type of structure = Fully Embedded Wall
 Elevation of toe of wall = -9.00
 Maximum finite element length = 1.00 m
 Youngs modulus of wall E = 2.1000E+07 kN/m2
 Moment of inertia of wall I = 0.021470 m4/m run
 E.I = 450870 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	Not defined							
3	22.73	1.00	1.000000	50000	1.00	0.00	0	No
4	18.10	1.00	1.000000	50000	1.00	0.00	0	No
5	12.14	1.00	1.000000	100000	1.00	0.00	0	No
6	1.52	1.00	0.700000	2.100E+07	20.00	0.00	0	No
7	5.50	1.00	1.000000	50000	1.00	0.00	0	No
8	8.82	1.00	1.000000	50000	1.00	0.00	0	No
9	12.04	1.00	1.000000	50000	1.00	0.00	0	No

SURCHARGE LOADS

Surch -arge no.	Elev.	Distance from wall	Length parallel to wall	Width perpend. to wall	Surcharge ----- Near edge	Surcharge ----- Far edge	Equiv. soil type	Partial factor/ Category
1	22.73	0.50 (L)	20.00	8.50	20.00	=	N/A	1.00 Var
2	0.62	-0.00 (R)	20.00	50.00	211.10	=	N/A	1.00 -
3	22.73	9.00 (L)	20.00	50.00	15.00	=	N/A	1.00 P/U
4	14.73	9.00 (L)	20.00	50.00	110.00	=	N/A	1.00 P/U
5	13.50	0.10 (L)	20.00	1.50	31.50	=	N/A	1.00 P/U

Note: L = Left side, R = Right 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 22.73
2	Apply surcharge no.4 at elevation 14.73
3	Apply surcharge no.5 at elevation 13.50
4	Change EI of wall to 450870 kN.m2/m run Yield moment not defined Reset wall displacements to zero at this stage
5	Apply surcharge no.1 at elevation 22.73
6	Apply water pressure profile no.1 (Mod. Conserv.)
7	Excavate to elevation 17.51 on RIGHT side
8	Install strut or anchor no.3 at elevation 22.73
9	Install strut or anchor no.4 at elevation 18.10
10	Excavate to elevation 11.64 on RIGHT side
11	Install strut or anchor no.5 at elevation 12.14
12	Excavate to elevation 8.32 on RIGHT side
13	Install strut or anchor no.8 at elevation 8.82
14	Excavate to elevation 0.62 on RIGHT side
15	Install strut or anchor no.6 at elevation 1.52
16	Install strut or anchor no.7 at elevation 5.50
17	Install strut or anchor no.9 at elevation 12.04
18	Remove strut or anchor no.5 at elevation 12.14
19	Apply surcharge no.2 at elevation 0.62
20	Apply water pressure profile no.2 (Mod. Conserv.)

- 21 Change properties of soil type 3 to soil type 4
Ko pressures will not be reset
- 22 Change EI of wall to 322050 kN.m2/m run
Yield moment not defined
Allow wall to relax with new modulus value

=====

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) = 31.73 m

Boundary conditions:

Length of wall (normal to plane of analysis) = 50.00 m

Width of excavation on Left side of wall = 50.00 m

Width of excavation on Right side of wall = 50.00 m

Distance to rigid boundary on Left side = 25.00 m

Distance to rigid boundary on Right side = 25.00 m

OUTPUT OPTIONS

Stage no.	Stage description	Displacement Bending mom. Shear force	Active, Passive pressures	Graph. output
1	Apply surcharge no.3 at elev. 22.73	Yes	Yes	Yes
2	Apply surcharge no.4 at elev. 14.73	Yes	Yes	Yes
3	Apply surcharge no.5 at elev. 13.50	Yes	Yes	Yes
4	Change EI of wall to 450870kN.m2/m run	Yes	Yes	Yes
5	Apply surcharge no.1 at elev. 22.73	Yes	Yes	Yes
6	Apply water pressure profile no.1	Yes	Yes	Yes
7	Excav. to elev. 17.51 on RIGHT side	Yes	Yes	Yes
8	Install strut no.3 at elev. 22.73	Yes	Yes	Yes
9	Install strut no.4 at elev. 18.10	Yes	Yes	Yes
10	Excav. to elev. 11.64 on RIGHT side	Yes	Yes	Yes
11	Install strut no.5 at elev. 12.14	Yes	Yes	Yes
12	Excav. to elev. 8.32 on RIGHT side	Yes	Yes	Yes
13	Install strut no.8 at elev. 8.82	Yes	Yes	Yes
14	Excav. to elev. 0.62 on RIGHT side	Yes	Yes	Yes
15	Install strut no.6 at elev. 1.52	Yes	Yes	Yes
16	Install strut no.7 at elev. 5.50	Yes	Yes	Yes
17	Install strut no.9 at elev. 12.04	Yes	Yes	Yes
18	Remove strut no.5 at elev. 12.14	Yes	Yes	Yes
19	Apply surcharge no.2 at elev. 0.62	Yes	Yes	Yes
20	Apply water pressure profile no.2	Yes	Yes	Yes
21	Change soil type 3 to soil type 4	Yes	Yes	Yes
22	Change EI of wall to 322050kN.m2/m run	Yes	Yes	Yes
*	Summary output	Yes	-	Yes

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QUARED STUDIO ENGINEERS LTD

| Sheet No.

Program: WALLAP Version 6.06 Revision A51.B69.R55

| Job No. 3722

Licensed from GEOSOLVE

| Made by : SF

Data filename/Run ID: 3722Saville_Theatre__B2_top_down_secant

135 Shaftsbury Avenue - Saville Theatre

| Date: 4-04-2025

Secant 900mm @ 1500mm cc B2 topdown

| Checked :

Units: kN,m

Stage No. 1 Apply surcharge no.3 at elevation 22.73

STABILITY ANALYSIS of Fully Embedded Wall according to Strength Factor method

Factor of safety on soil strength

			FoS for toe elev. = -9.00		Toe elev. for FoS = 1.000			
			-----		-----			
Stage No.	--- G.L. --- Act. Pass.	Strut Elev.	Factor of Safety	Moment equilib. at elev.	Toe elev.	Wall Penetr -ation	Direction of failure	
1	22.73	22.73	Cant.	Conditions not suitable for FoS calc.				

BENDING MOMENT and DISPLACEMENT ANALYSIS of Fully Embedded Wall

Analysis options

Length of wall perpendicular to section = 50.00m

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: Left side 25.00 from wall

Right side 25.00 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	EI of wall kN.m2/m
1	22.73	0.00	0.001	-1.80E-04	0.0	0.0		450870
2	21.73	-5.22	0.002	-1.80E-04	-2.6	0.1		450870
3	21.11	-5.08	0.002	-1.78E-04	-5.8	-2.5		450870
4	20.48	-4.92	0.002	-1.72E-04	-9.0	-7.1		450870
5	19.86	-4.73	0.002	-1.57E-04	-12.0	-13.6		450870
6	19.23	-4.48	0.002	-1.33E-04	-14.8	-22.0		450870
		-15.42	0.002	-1.33E-04	-14.8	-22.0		
7	18.34	-16.21	0.002	-7.08E-05	-28.9	-41.3		450870
8	18.10	-16.32	0.002	-4.68E-05	-32.8	-48.7		450870
9	18.00	-16.35	0.002	-3.57E-05	-34.5	-52.1		450870
		21.20	0.002	-3.57E-05	-34.5	-52.1		
10	17.51	23.25	0.002	2.86E-05	-23.6	-66.3		450870
11	16.76	27.23	0.002	1.48E-04	-4.5	-77.0		450870
12	16.00	32.47	0.002	2.73E-04	18.0	-72.2		450870
13	15.43	37.38	0.002	3.55E-04	38.1	-56.3		450870
14	14.85	43.01	0.002	4.09E-04	61.2	-28.0		450870
		-32.00	0.002	4.09E-04	61.2	-28.0		
15	14.73	-31.23	0.001	4.15E-04	57.4	-20.9		450870
16	14.12	-26.76	0.001	4.24E-04	39.6	8.5		450870
17	13.50	-21.87	0.001	3.99E-04	24.6	27.8		450870
18	12.82	-16.48	0.001	3.48E-04	11.6	39.5		450870

19	12.14	-11.51	0.001	2.85E-04	2.1	43.6	450870
20	12.04	-10.83	0.000	2.76E-04	1.0	43.8	450870
21	11.64	-8.29	0.000	2.37E-04	-2.9	43.3	450870
22	10.82	-3.97	0.000	1.63E-04	-7.9	38.2	450870
23	10.00	-0.89	0.000	1.01E-04	-9.9	30.4	450870
24	9.41	0.62	0.000	6.51E-05	-10.0	24.4	450870
25	8.82	1.61	0.000	3.69E-05	-9.3	18.6	450870
26	8.32	2.11	0.000	1.87E-05	-8.4	14.2	450870
27	7.66	2.40	0.000	1.72E-06	-6.9	9.1	450870

Run ID. 3722Saville_Theatre_B2_top_down_secant | Sheet No.
135 Shaftsbury Avenue - Saville Theatre | Date: 4-04-2025
Secant 900mm @ 1500mm cc B2 topdown | Checked :

(continued)

Stage No.1 Apply surcharge no.3 at elevation 22.73

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	EI of wall kN.m2/m
28	7.00	2.37	0.000	-8.68E-06	-5.3	5.1		450870
29	6.25	2.09	0.000	-1.44E-05	-3.6	1.8		450870
30	5.50	1.68	0.000	-1.56E-05	-2.2	-0.3		450870
31	4.75	1.24	0.000	-1.40E-05	-1.1	-1.5		450870
32	4.00	0.83	0.000	-1.11E-05	-0.4	-2.0		450870
33	3.00	0.39	0.000	-6.65E-06	0.2	-2.0		450870
34	2.26	0.16	0.000	-3.63E-06	0.5	-1.7		450870
35	1.52	0.01	0.000	-1.15E-06	0.5	-1.3		450870
36	0.62	-0.10	0.000	9.88E-07	0.5	-0.8		450870
37	-0.19	-0.13	0.000	2.19E-06	0.4	-0.5		450870
38	-1.00	-0.13	0.000	2.83E-06	0.3	-0.2		450870
39	-2.00	-0.11	0.000	3.10E-06	0.2	-0.0		450870
40	-3.00	-0.07	0.000	3.02E-06	0.1	0.1		450870
41	-4.00	-0.04	0.000	2.78E-06	0.0	0.1		450870
42	-5.00	-0.02	0.000	2.53E-06	-0.0	0.1		450870
43	-6.00	-0.00	0.000	2.31E-06	-0.0	0.1		450870
44	-7.00	0.00	0.000	2.17E-06	-0.0	0.0		450870
45	-8.00	0.01	0.000	2.09E-06	-0.0	0.0		450870
46	-9.00	0.02	0.000	2.07E-06	0.0	-0.0		---

Node no.	Y coord	LEFT side					Total earth pressure	Coeff. of subgrade reaction
		Water press. kN/m2	Vertic -al kN/m2	Effective Active limit kN/m2	Effective Passive limit kN/m2	Earth pressure kN/m2		
1	22.73	0.00	0.00	0.00	0.00	0.00	0.00	1064
2	21.73	0.00	18.01	5.56	74.41	7.79	7.79	1064
3	21.11	0.00	29.28	9.05	120.99	13.64	13.64	1064
4	20.48	0.00	40.57	12.54	167.66	19.50	19.50	1064
5	19.86	0.00	51.90	16.04	214.44	25.37	25.37	1064
6	19.23	0.00	63.25	19.54	261.35	31.26	31.26	1064
		0.00	63.25	15.01	392.38	20.32	20.32	3619
7	18.34	0.00	80.35	19.07	498.48	27.47	27.47	3619
8	18.10	2.40	82.57	19.59	512.26	28.39	30.79	3619
9	18.00	3.40	83.50	19.81	518.01	28.77	32.17	3619
		Total>	86.90	23.65m	206.39	69.73	69.73	7891
10	17.51	Total>	96.83	26.10m	222.89	78.69	78.69	8329
11	16.76	Total>	112.16	29.88m	248.32	93.13	93.13	9005
12	16.00	Total>	127.50	33.65m	273.77	108.59	108.59	9680
13	15.43	Total>	139.19	36.53m	293.15	121.12	121.12	10194
14	14.85	Total>	150.88	39.40m	312.54	134.27	134.27	10708
15	14.73	Total>	153.32	40.00m	316.59	137.08	137.08	10815
16	14.12	Total>	165.82	43.08m	337.31	151.70	151.70	11365

17	13.50	Total>	178.31	46.15m	358.04	166.54	166.54	11915
18	12.82	Total>	192.11	49.55m	380.94	182.93	182.93	12523
19	12.14	Total>	205.90	52.95m	403.82	199.11	199.11	13131
20	12.04	Total>	207.93	53.45m	407.19	201.46	201.46	13221
21	11.64	Total>	216.03	55.45m	420.64	210.78	210.78	13578
22	10.82	Total>	232.62	59.55m	448.21	229.43	229.43	14312
23	10.00	Total>	249.19	63.65m	475.76	247.45	247.45	15045
24	9.41	Total>	261.13	66.61m	495.61	260.09	260.09	15574
25	8.82	Total>	273.06	69.57m	515.46	272.47	272.47	16103
26	8.32	Total>	283.13	72.07m	532.22	282.75	282.75	16550
27	7.66	Total>	296.39	75.36m	554.30	296.11	296.11	17139
28	7.00	Total>	309.64	78.65m	576.36	309.30	309.30	17728
29	6.25	Total>	324.74	82.41m	601.52	324.22	324.22	18400
30	5.50	Total>	339.83	86.17m	626.67	339.08	339.08	19072

Run ID. 3722Saville_Theatre_B2_top_down_secant | Sheet No.
135 Shaftsbury Avenue - Saville Theatre | Date: 4-04-2025
Secant 900mm @ 1500mm cc B2 topdown | Checked :

(continued)

Stage No.1 Apply surcharge no.3 at elevation 22.73

Node no.	Y coord	LEFT side						
		Water press.	Vertic -al	Effective Active limit	stresses Passive limit	Earth pressure	Total earth pressure	Coeff. of subgrade reaction
		kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m3
31	4.75	Total>	354.85	89.91m	651.70	353.85	353.85	19741
32	4.00	Total>	369.86	93.65m	676.73	368.64	368.64	20410
33	3.00	Total>	389.90	98.65m	710.15	388.44	388.44	21305
34	2.26	Total>	404.75	102.36m	734.93	403.16	403.16	21968
35	1.52	Total>	419.59	106.07m	759.69	417.92	417.92	22631
36	0.62	Total>	437.54	110.55m	789.64	435.81	435.81	23433
37	-0.19	Total>	453.73	114.60m	816.68	451.99	451.99	24157
38	-1.00	Total>	469.93	118.65m	843.72	468.19	468.19	24882
39	-2.00	Total>	489.91	123.65m	877.08	488.19	488.19	25776
40	-3.00	Total>	509.89	128.65m	910.45	508.20	508.20	26670
41	-4.00	Total>	529.86	133.65m	943.80	528.20	528.20	27564
42	-5.00	Total>	549.83	138.65m	977.15	548.20	548.20	28458
43	-6.00	Total>	569.80	143.65m	1010.50	568.19	568.19	29353
44	-7.00	Total>	589.76	148.65m	1043.85	588.17	588.17	30247
45	-8.00	Total>	609.72	153.65m	1077.19	608.16	608.16	31141
46	-9.00	Total>	629.67	158.65m	1110.53	628.14	628.14	32035

Node no.	Y coord	RIGHT side						
		Water press.	Vertic -al	Effective Active limit	stresses Passive limit	Earth pressure	Total earth pressure	Coeff. of subgrade reaction
		kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m3
1	22.73	0.00	0.00	0.00	0.00	0.00	0.00	2661
2	21.73	0.00	19.00	4.71	109.69	13.02	13.02	2661
3	21.11	0.00	30.88	7.66	178.24	18.72	18.72	2661
4	20.48	0.00	42.75	10.60	246.80	24.42	24.42	2661
5	19.86	0.00	54.63	13.55	315.35	30.09	30.09	2661
6	19.23	0.00	66.50	16.49	383.90	35.74	35.74	2661
7	18.34	0.00	83.41	20.69	481.53	43.68	43.68	2661
8	18.10	2.40	85.57	21.22	494.00	44.71	47.11	2661
9	18.00	3.40	86.47	21.44	499.19	45.13	48.53	2661
10	17.51	8.30	90.88	22.54	524.65	47.14	55.44	2661
11	16.76	15.85	97.68	24.22	563.88	50.06	65.91	2661
12	16.00	23.40	104.47	25.91	603.11	52.72	76.12	2661

13	15.43	29.15	109.65	27.19	632.98	54.59	83.74	2661
14	14.85	34.90	114.82	28.48	662.86	56.36	91.26	2661
		Total>	149.72	39.40m	311.38	166.27	166.27	10708
15	14.73	Total>	152.12	40.00m	315.38	168.30	168.30	10815
16	14.12	Total>	164.42	43.08m	335.91	178.47	178.47	11365
17	13.50	Total>	176.72	46.15m	356.44	188.41	188.41	11915
18	12.82	Total>	190.32	49.55m	379.14	199.41	199.41	12523
19	12.14	Total>	203.92	52.95m	401.85	210.62	210.62	13131
20	12.04	Total>	205.92	53.45m	405.18	212.29	212.29	13221
21	11.64	Total>	213.92	55.45m	418.54	219.07	219.07	13578
22	10.82	Total>	230.32	59.55m	445.91	233.40	233.40	14312
23	10.00	Total>	246.72	63.65m	473.29	248.34	248.34	15045
24	9.41	Total>	258.55	66.61m	493.03	259.47	259.47	15574
25	8.82	Total>	270.38	69.57m	512.78	270.85	270.85	16103
26	8.32	Total>	280.38	72.07m	529.47	280.64	280.64	16550
27	7.66	Total>	293.55	75.36m	551.45	293.71	293.71	17139
28	7.00	Total>	306.72	78.65m	573.44	306.93	306.93	17728
29	6.25	Total>	321.75	82.41m	598.53	322.14	322.14	18400
30	5.50	Total>	336.78	86.17m	623.61	337.40	337.40	19072
31	4.75	Total>	351.75	89.91m	648.60	352.61	352.61	19741

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Run ID. 3722Saville_Theatre__B2_top_down_secant | Sheet No.
135 Shaftsbury Avenue - Saville Theatre | Date: 4-04-2025
Secant 900mm @ 1500mm cc B2 topdown | Checked :
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(continued)

Stage No.1 Apply surcharge no.3 at elevation 22.73

Node no.	Y coord	----- RIGHT side -----						
		Water press.	Vertic -al	Effective Active limit	Passive limit	Earth pressure	Total earth pressure	Coeff. of subgrade reaction
		kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m3
32	4.00	Total>	366.72	93.65m	673.59	367.81	367.81	20410
33	3.00	Total>	386.72	98.65m	706.97	388.04	388.04	21305
34	2.26	Total>	401.55	102.36m	731.73	403.00	403.00	21968
35	1.52	Total>	416.38	106.07m	756.48	417.91	417.91	22631
36	0.62	Total>	434.32	110.55m	786.43	435.91	435.91	23433
37	-0.19	Total>	450.52	114.60m	813.47	452.12	452.12	24157
38	-1.00	Total>	466.72	118.65m	840.51	468.32	468.32	24882
39	-2.00	Total>	486.72	123.65m	873.89	488.30	488.30	25776
40	-3.00	Total>	506.72	128.65m	907.28	508.27	508.27	26670
41	-4.00	Total>	526.72	133.65m	940.66	528.24	528.24	27564
42	-5.00	Total>	546.72	138.65m	974.04	548.22	548.22	28458
43	-6.00	Total>	566.72	143.65m	1007.43	568.19	568.19	29353
44	-7.00	Total>	586.72	148.65m	1040.81	588.17	588.17	30247
45	-8.00	Total>	606.72	153.65m	1074.19	608.15	608.15	31141
46	-9.00	Total>	626.72	158.65m	1107.58	628.12	628.12	32035

=====A-SQUARED STUDIO

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ENGINEERS LTD | Sheet No.
Program: WALLAP Version 6.06 Revision A51.B69.R55 | Job No. 3722
Licensed from GEOSOLVE | Made by : SF
Data filename/Run ID: 3722Saville_Theatre__B2_top_down_secant
135 Shaftsbury Avenue - Saville Theatre | Date: 4-04-2025
Secant 900mm @ 1500mm cc B2 topdown | Checked :
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Units: kN,m

Stage No. 2 Apply surcharge no.4 at elevation 14.73

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

				FoS for toe elev. = -9.00		Toe elev. for FoS = 1.000			
				-----		-----			
Stage	---	G.L.	---	Strut	Factor	Moment	Toe	Wall	Direction
No.	Act.	Pass.	Elev.		of	equilib.	elev.	Penetr	of
					Safety	at elev.		-ation	failure
2	22.73	22.73	Cant.	<u>Conditions not suitable for FoS calc.</u>					

BENDING MOMENT and DISPLACEMENT ANALYSIS of Fully Embedded Wall

Analysis options

Length of wall perpendicular to section = 50.00m

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: Left side 25.00 from wall

Right side 25.00 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	EI of wall kN.m2/m
1	22.73	0.00	0.001	-1.79E-04	0.0	0.0		450870
2	21.73	-5.15	0.002	-1.79E-04	-2.6	0.1		450870
3	21.11	-5.00	0.002	-1.78E-04	-5.7	-2.4		450870
4	20.48	-4.84	0.002	-1.71E-04	-8.8	-7.0		450870
5	19.86	-4.64	0.002	-1.57E-04	-11.8	-13.4		450870
6	19.23	-4.40	0.002	-1.33E-04	-14.6	-21.6		450870
		-15.28	0.002	-1.33E-04	-14.6	-21.6		
7	18.34	-16.08	0.002	-7.18E-05	-28.6	-40.7		450870
8	18.10	-16.18	0.002	-4.82E-05	-32.4	-48.0		450870
9	18.00	-16.22	0.002	-3.72E-05	-34.1	-51.3		450870
		21.42	0.002	-3.72E-05	-34.1	-51.3		
10	17.51	23.47	0.002	2.61E-05	-23.1	-65.3		450870
11	16.76	27.42	0.002	1.44E-04	-3.8	-75.6		450870
12	16.00	32.62	0.002	2.66E-04	18.8	-70.2		450870
13	15.43	37.46	0.002	3.45E-04	39.0	-53.8		450870
14	14.85	43.00	0.002	3.95E-04	62.1	-25.0		450870
		-32.03	0.002	3.95E-04	62.1	-25.0		
15	14.73	-31.28	0.001	4.01E-04	58.3	-17.8		450870
16	14.12	-27.00	0.001	4.05E-04	40.4	12.1		450870
17	13.50	-22.30	0.001	3.75E-04	25.2	31.9		450870
18	12.82	-17.07	0.001	3.17E-04	11.8	43.9		450870
19	12.14	-12.20	0.001	2.48E-04	1.9	48.1		450870
20	12.04	-11.53	0.001	2.37E-04	0.7	48.2		450870
21	11.64	-8.98	0.000	1.95E-04	-3.4	47.6		450870
22	10.82	-4.58	0.000	1.14E-04	-9.0	41.9		450870
23	10.00	-1.31	0.000	4.57E-05	-11.4	33.2		450870
24	9.41	0.37	0.000	6.76E-06	-11.7	26.3		450870
25	8.82	1.54	0.000	-2.33E-05	-11.1	19.6		450870
26	8.32	2.17	0.000	-4.20E-05	-10.2	14.3		450870
27	7.66	2.61	0.000	-5.84E-05	-8.6	8.2		450870

Run ID. 3722Saville_Theatre_B2_top_down_secant

135 Shaftsbury Avenue - Saville Theatre

Secant 900mm @ 1500mm cc B2 topdown

| Sheet No.

| Date: 4-04-2025

| Checked :

(continued)

Stage No.2 Apply surcharge no.4 at elevation 14.73

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	EI of wall kN.m2/m
28	7.00	2.70	0.000	-6.67E-05	-6.8	3.2		450870
29	6.25	2.50	0.000	-6.85E-05	-4.9	-1.0		450870
30	5.50	2.11	0.000	-6.44E-05	-3.2	-3.8		450870
31	4.75	1.65	0.001	-5.68E-05	-1.7	-5.4		450870
32	4.00	1.20	0.001	-4.71E-05	-0.7	-6.1		450870
33	3.00	0.67	0.001	-3.37E-05	0.3	-5.9		450870
34	2.26	0.36	0.001	-2.44E-05	0.6	-5.5		450870
35	1.52	0.14	0.001	-1.59E-05	0.8	-4.8		450870
36	0.62	-0.04	0.001	-7.38E-06	0.9	-3.9		450870
37	-0.19	-0.12	0.001	-1.14E-06	0.8	-3.1		450870
38	-1.00	-0.16	0.001	3.77E-06	0.7	-2.4		450870
39	-2.00	-0.15	0.001	8.30E-06	0.5	-1.7		450870
40	-3.00	-0.12	0.001	1.14E-05	0.4	-1.1		450870
41	-4.00	-0.09	0.001	1.35E-05	0.3	-0.8		450870
42	-5.00	-0.06	0.001	1.49E-05	0.2	-0.5		450870
43	-6.00	-0.04	0.001	1.57E-05	0.2	-0.3		450870
44	-7.00	-0.04	0.001	1.61E-05	0.1	-0.1		450870
45	-8.00	-0.06	0.001	1.63E-05	0.1	-0.0		450870
46	-9.00	-0.08	0.001	1.63E-05	0.0	0.0		---

Node no.	Y coord	----- LEFT side -----						
		Water press. kN/m2	Vertic -al kN/m2	Effective Active limit kN/m2	Effective Passive limit kN/m2	Earth pressure kN/m2	Total earth pressure kN/m2	Coeff. of subgrade reaction kN/m3
1	22.73	0.00	0.00	0.00	0.00	0.00	0.00	1225
2	21.73	0.00	18.01	5.56	74.41	7.81	7.81	1225
3	21.11	0.00	29.28	9.05	120.99	13.66	13.66	1225
4	20.48	0.00	40.57	12.54	167.66	19.52	19.52	1225
5	19.86	0.00	51.90	16.04	214.44	25.39	25.39	1225
6	19.23	0.00	63.25	19.54	261.35	31.28	31.28	1225
		0.00	63.25	15.01	392.38	20.40	20.40	4164
7	18.34	0.00	80.35	19.07	498.48	27.55	27.55	4164
8	18.10	2.40	82.57	19.59	512.26	28.46	30.86	4164
9	18.00	3.40	83.50	19.81	518.01	28.85	32.25	4164
		Total>	86.90	23.65m	206.39	69.89	69.89	8917
10	17.51	Total>	96.83	26.10m	222.89	78.85	78.85	9412
11	16.76	Total>	112.16	29.88m	248.32	93.28	93.28	10175
12	16.00	Total>	127.50	33.65m	273.77	108.70	108.70	10938
13	15.43	Total>	139.19	36.53m	293.15	121.19	121.19	11519
14	14.85	Total>	150.88	39.40m	312.54	134.26	134.26	8700
15	14.73	Total>	153.32	40.00m	316.59	137.05	137.05	8787
16	14.12	Total>	165.83	43.08m	337.33	151.59	151.59	9234
17	13.50	Total>	178.41	46.15m	358.13	166.37	166.37	9681
18	12.82	Total>	192.45	49.55m	381.27	182.80	182.80	10175
19	12.14	Total>	206.70	52.95m	404.62	199.15	199.15	10669
20	12.04	Total>	208.81	53.45m	408.08	201.54	201.54	10742
21	11.64	Total>	217.33	55.45m	421.94	211.06	211.06	11033
22	10.82	Total>	235.03	59.55m	450.62	230.29	230.29	11628
23	10.00	Total>	253.05	63.65m	479.62	249.10	249.10	12224
24	9.41	Total>	266.20	66.61m	500.69	262.41	262.41	12654
25	8.82	Total>	279.45	69.57m	521.85	275.50	275.50	13084
26	8.32	Total>	290.69	72.07m	539.79	286.41	286.41	13447
27	7.66	Total>	305.54	75.36m	563.44	300.61	300.61	13925
28	7.00	Total>	320.38	78.65m	587.10	314.62	314.62	14404
29	6.25	Total>	337.27	82.41m	614.05	330.45	330.45	14950
30	5.50	Total>	354.08	86.17m	640.92	346.14	346.14	15496

135 Shaftsbury Avenue - Saville Theatre
Secant 900mm @ 1500mm cc B2 topdown

| Date: 4-04-2025
| Checked :

(continued)

Stage No.2 Apply surcharge no.4 at elevation 14.73

Node no.	Y coord	LEFT side					Total earth pressure	Coeff. of subgrade reaction
		Water press. kN/m2	Vertic -al kN/m2	Effective Active limit kN/m2	Effective Passive limit kN/m2	Earth pressure kN/m2		
31	4.75	Total>	370.71	89.91m	667.56	361.68	361.68	16040
32	4.00	Total>	387.21	93.65m	694.08	377.15	377.15	16584
33	3.00	Total>	409.03	98.65m	729.29	397.77	397.77	17310
34	2.26	Total>	425.05	102.36m	755.23	413.01	413.01	17849
35	1.52	Total>	440.93	106.07m	781.03	428.23	428.23	18388
36	0.62	Total>	459.96	110.55m	812.07	446.61	446.61	19039
37	-0.19	Total>	476.99	114.60m	839.94	463.17	463.17	19628
38	-1.00	Total>	493.89	120.20	867.67	479.68	479.68	20216
39	-2.00	Total>	514.57	127.51	901.74	500.02	500.02	20943
40	-3.00	Total>	535.09	134.65	935.65	520.28	520.28	21669
41	-4.00	Total>	555.47	141.64	969.40	540.48	540.48	22396
42	-5.00	Total>	575.71	148.51	1003.04	560.61	560.61	23123
43	-6.00	Total>	595.85	155.27	1036.56	580.69	580.69	23849
44	-7.00	Total>	615.90	161.93	1069.99	600.71	600.71	24576
45	-8.00	Total>	635.87	168.52	1103.34	620.69	620.69	25302
46	-9.00	Total>	655.76	175.04	1136.62	640.62	640.62	26029

Node no.	Y coord	RIGHT side					Total earth pressure	Coeff. of subgrade reaction
		Water press. kN/m2	Vertic -al kN/m2	Effective Active limit kN/m2	Effective Passive limit kN/m2	Earth pressure kN/m2		
1	22.73	0.00	0.00	0.00	0.00	0.00	0.00	3061
2	21.73	0.00	19.00	4.71	109.69	12.96	12.96	3061
3	21.11	0.00	30.88	7.66	178.24	18.66	18.66	3061
4	20.48	0.00	42.75	10.60	246.80	24.36	24.36	3061
5	19.86	0.00	54.63	13.55	315.35	30.04	30.04	3061
6	19.23	0.00	66.50	16.49	383.90	35.68	35.68	3061
7	18.34	0.00	83.41	20.69	481.53	43.63	43.63	3061
8	18.10	2.40	85.57	21.22	494.00	44.65	47.05	3061
9	18.00	3.40	86.47	21.44	499.19	45.07	48.47	3061
10	17.51	8.30	90.88	22.54	524.65	47.09	55.39	3061
11	16.76	15.85	97.68	24.22	563.88	50.01	65.86	3061
12	16.00	23.40	104.47	25.91	603.11	52.69	76.09	3061
13	15.43	29.15	109.65	27.19	632.98	54.58	83.73	3061
14	14.85	34.90	114.82	28.48	662.86	56.36	91.26	2038
		Total>	149.72	39.40m	311.38	166.29	166.29	8700
15	14.73	Total>	152.12	40.00m	315.38	168.33	168.33	8787
16	14.12	Total>	164.42	43.08m	335.91	178.59	178.59	9234
17	13.50	Total>	176.72	46.15m	356.44	188.67	188.67	9681
18	12.82	Total>	190.32	49.55m	379.14	199.87	199.87	10175
19	12.14	Total>	203.92	52.95m	401.85	211.35	211.35	10669
20	12.04	Total>	205.92	53.45m	405.18	213.07	213.07	10742
21	11.64	Total>	213.92	55.45m	418.54	220.04	220.04	11033
22	10.82	Total>	230.32	59.55m	445.91	234.87	234.87	11628
23	10.00	Total>	246.72	63.65m	473.29	250.41	250.41	12224
24	9.41	Total>	258.55	66.61m	493.03	262.03	262.03	12654
25	8.82	Total>	270.38	69.57m	512.78	273.96	273.96	13084
26	8.32	Total>	280.38	72.07m	529.47	284.24	284.24	13447
27	7.66	Total>	293.55	75.36m	551.45	298.00	298.00	13925
28	7.00	Total>	306.72	78.65m	573.44	311.93	311.93	14404

29	6.25	Total>	321.75	82.41m	598.53	327.95	327.95	14950
30	5.50	Total>	336.78	86.17m	623.61	344.03	344.03	15496
31	4.75	Total>	351.75	89.91m	648.60	360.02	360.02	16040

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Run ID. 3722Saville_Theatre__B2_top_down_secant          | Sheet No.
135 Shaftsbury Avenue - Saville Theatre                  | Date: 4-04-2025
Secant 900mm @ 1500mm cc B2 topdown                     | Checked :
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(continued)

Stage No.2 Apply surcharge no.4 at elevation 14.73

Node no.	Y coord	----- RIGHT side -----					Total earth pressure kN/m2	Coeff. of subgrade reaction kN/m3
		Water press. kN/m2	Vertic -al kN/m2	Active limit kN/m2	Passive limit kN/m2	Earth pressure kN/m2		
32	4.00	Total>	366.72	93.65m	673.59	375.96	375.96	16584
33	3.00	Total>	386.72	98.65m	706.97	397.10	397.10	17310
34	2.26	Total>	401.55	102.36m	731.73	412.65	412.65	17849
35	1.52	Total>	416.38	106.07m	756.48	428.10	428.10	18388
36	0.62	Total>	434.32	110.55m	786.43	446.65	446.65	19039
37	-0.19	Total>	450.52	114.60m	813.47	463.29	463.29	19628
38	-1.00	Total>	466.72	118.65m	840.51	479.84	479.84	20216
39	-2.00	Total>	486.72	123.65m	873.89	500.17	500.17	20943
40	-3.00	Total>	506.72	128.65m	907.28	520.40	520.40	21669
41	-4.00	Total>	526.72	133.65m	940.66	540.57	540.57	22396
42	-5.00	Total>	546.72	138.65m	974.04	560.67	560.67	23123
43	-6.00	Total>	566.72	143.65m	1007.43	580.73	580.73	23849
44	-7.00	Total>	586.72	148.65m	1040.81	600.75	600.75	24576
45	-8.00	Total>	606.72	153.65m	1074.19	620.74	620.74	25302
46	-9.00	Total>	626.72	158.65m	1107.58	640.71	640.71	26029

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=====A-SQUARED STUDIO
ENGINEERS LTD          | Sheet No.
Program: WALLAP  Version 6.06  Revision A51.B69.R55      | Job No.    3722
                  Licensed from GEOSOLVE                  | Made by :   SF
Data filename/Run ID: 3722Saville_Theatre__B2_top_down_secant
135 Shaftsbury Avenue - Saville Theatre                  | Date: 4-04-2025
Secant 900mm @ 1500mm cc B2 topdown                     | Checked :
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Units: kN,m

Stage No. 3 Apply surcharge no.5 at elevation 13.50

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. = -9.00		Toe elev. for FoS = 1.000		Direction of failure
			Factor of Safety	Moment at elev.	Toe elev.	Wall Penetr -ation	
3	22.73 22.73	Cant.	<u>Conditions not suitable for FoS calc.</u>				

BENDING MOMENT and DISPLACEMENT ANALYSIS of Fully Embedded Wall
Analysis options

Length of wall perpendicular to section = 50.00m
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: Left side 25.00 from wall

Right side 25.00 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	EI of wall kN.m2/m
1	22.73	0.00	0.001	-2.08E-04	0.0	0.0		450870
2	21.73	-4.34	0.002	-2.08E-04	-2.2	0.1		450870
3	21.11	-4.35	0.002	-2.06E-04	-4.9	-2.0		450870
4	20.48	-4.35	0.002	-2.01E-04	-7.6	-5.9		450870
5	19.86	-4.33	0.002	-1.89E-04	-10.3	-11.4		450870
6	19.23	-4.28	0.002	-1.68E-04	-13.0	-18.7		450870
		-15.07	0.002	-1.68E-04	-13.0	-18.7		
7	18.34	-16.21	0.002	-1.14E-04	-26.9	-36.3		450870
8	18.10	-16.38	0.002	-9.30E-05	-30.8	-43.2		450870
9	18.00	-16.45	0.002	-8.31E-05	-32.5	-46.4		450870
		21.04	0.002	-8.31E-05	-32.5	-46.4		
10	17.51	22.80	0.002	-2.55E-05	-21.7	-59.6		450870
11	16.76	26.21	0.002	8.22E-05	-3.2	-69.1		450870
12	16.00	30.69	0.002	1.93E-04	18.2	-63.6		450870
13	15.43	34.87	0.002	2.64E-04	37.1	-47.9		450870
14	14.85	39.64	0.002	3.08E-04	58.5	-20.6		450870
		-37.40	0.002	3.08E-04	58.5	-20.6		
15	14.73	-36.94	0.002	3.12E-04	54.1	-13.8		450870
16	14.12	-34.24	0.002	3.13E-04	32.2	12.5		450870
17	13.50	-31.24	0.001	2.87E-04	12.0	25.8		450870
18	12.82	-4.00	0.001	2.46E-04	0.1	28.6		450870
19	12.14	-1.22	0.001	2.03E-04	-1.7	27.8		450870
20	12.04	-1.15	0.001	1.97E-04	-1.8	27.6		450870
21	11.64	-1.13	0.001	1.73E-04	-2.3	26.7		450870
22	10.82	-1.28	0.001	1.27E-04	-3.3	24.2		450870
23	10.00	-1.04	0.001	8.65E-05	-4.2	20.9		450870
24	9.41	-0.66	0.001	6.08E-05	-4.7	18.2		450870
25	8.82	-0.23	0.001	3.89E-05	-5.0	15.3		450870
26	8.32	0.13	0.001	2.34E-05	-5.0	12.7		450870
27	7.66	0.53	0.001	7.17E-06	-4.8	9.5		450870

Run ID. 3722Saville_Theatre_B2_top_down_secant
135 Shaftsbury Avenue - Saville Theatre
Secant 900mm @ 1500mm cc B2 topdown

| Sheet No.
| Date: 4-04-2025
| Checked :

(continued)

Stage No.3 Apply surcharge no.5 at elevation 13.50

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	EI of wall kN.m2/m
28	7.00	0.83	0.001	-4.52E-06	-4.3	6.5		450870
29	6.25	1.02	0.001	-1.29E-05	-3.7	3.6		450870
30	5.50	1.06	0.001	-1.68E-05	-2.9	1.2		450870
31	4.75	1.01	0.001	-1.73E-05	-2.1	-0.6		450870
32	4.00	0.88	0.001	-1.54E-05	-1.4	-1.8		450870
33	3.00	0.65	0.001	-1.06E-05	-0.6	-2.6		450870
34	2.26	0.48	0.001	-6.26E-06	-0.2	-2.8		450870
35	1.52	0.32	0.001	-1.73E-06	0.1	-2.7		450870
36	0.62	0.17	0.001	3.42E-06	0.3	-2.4		450870
37	-0.19	0.06	0.001	7.50E-06	0.4	-2.1		450870
38	-1.00	-0.01	0.001	1.09E-05	0.4	-1.7		450870
39	-2.00	-0.05	0.001	1.41E-05	0.4	-1.2		450870
40	-3.00	-0.07	0.001	1.64E-05	0.3	-0.8		450870
41	-4.00	-0.07	0.001	1.79E-05	0.3	-0.5		450870

42	-5.00	-0.06	0.001	1.88E-05	0.2	-0.3	450870
43	-6.00	-0.05	0.001	1.92E-05	0.1	-0.1	450870
44	-7.00	-0.05	0.001	1.94E-05	0.1	-0.0	450870
45	-8.00	-0.05	0.001	1.94E-05	0.0	0.0	450870
46	-9.00	-0.04	0.001	1.94E-05	-0.0	0.0	---

Node no.	Y coord	----- LEFT side -----						Total earth pressure	Coeff. of subgrade reaction
		Water	Vertic	Active	Passive	Earth			
		press. kN/m2	-al kN/m2	limit kN/m2	limit kN/m2	pressure kN/m2			
1	22.73	0.00	0.00	0.00	0.00	0.00	0.00	2565	
2	21.73	0.00	18.01	5.56	74.41	8.05	8.05	2565	
3	21.11	0.00	29.28	9.05	120.99	13.85	13.85	2565	
4	20.48	0.00	40.57	12.54	167.66	19.66	19.66	2565	
5	19.86	0.00	51.90	16.04	214.44	25.48	25.48	2565	
6	19.23	0.00	63.25	19.54	261.35	31.32	31.32	2565	
		0.00	63.25	15.01	392.38	20.53	20.53	8720	
7	18.34	0.00	80.35	19.07	498.48	27.48	27.48	3709	
8	18.10	2.40	82.57	19.59	512.26	28.35	30.75	3709	
9	18.00	3.40	83.50	19.81	518.01	28.72	32.12	3709	
		Total>	86.90	23.65m	206.39	69.61	69.61	8058	
10	17.51	Total>	96.83	26.10m	222.89	78.35	78.35	8505	
11	16.76	Total>	112.16	29.88m	248.32	92.35	92.35	9194	
12	16.00	Total>	127.50	33.65m	273.77	107.19	107.19	9884	
13	15.43	Total>	139.19	36.53m	293.15	119.14	119.14	10409	
14	14.85	Total>	150.88	39.40m	312.54	131.57	131.57	10934	
15	14.73	Total>	153.32	40.00m	316.59	134.22	134.22	11043	
16	14.12	Total>	165.83	43.08m	337.33	147.97	147.97	11605	
17	13.50	Total>	178.41	46.15m	358.13	161.90	161.90	12167	
18	12.82	Total>	217.29	49.55m	406.12	201.27	201.27	12787	
19	12.14	Total>	231.02	52.95m	428.95	216.32	216.32	13408	
20	12.04	Total>	232.72	53.45m	431.98	218.21	218.21	13500	
21	11.64	Total>	239.32	55.45m	443.94	225.55	225.55	13865	
22	10.82	Total>	253.12	59.55m	468.71	240.62	240.62	14614	
23	10.00	Total>	268.01	63.65m	494.57	256.42	256.42	15362	
24	9.41	Total>	279.38	66.61m	513.86	268.22	268.22	15902	
25	8.82	Total>	291.17	69.57m	533.56	280.25	280.25	16443	
26	8.32	Total>	301.37	72.07m	550.46	290.52	290.52	16899	
27	7.66	Total>	315.05	75.36m	572.95	304.14	304.14	17500	
28	7.00	Total>	328.92	78.65m	595.63	317.79	317.79	18102	
29	6.25	Total>	344.87	82.41m	621.65	333.36	333.36	18788	
30	5.50	Total>	360.89	86.17m	647.73	348.89	348.89	19474	

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Run ID. 3722Saville_Theatre_B2_top_down_secant | Sheet No.
135 Shaftsbury Avenue - Saville Theatre | Date: 4-04-2025
Secant 900mm @ 1500mm cc B2 topdown | Checked :
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(continued)

Stage No.3 Apply surcharge no.5 at elevation 13.50

Node no.	Y coord	----- LEFT side -----						
		----- Effective stresses -----					Total earth pressure	Coeff. of subgrade reaction
		Water	Vertic	Active	Passive	Earth		
		press.	-al	limit	limit	pressure		
		kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m3
31	4.75	Total>	376.85	89.91m	673.70	364.31	364.31	20157
32	4.00	Total>	392.77	93.65m	699.64	379.67	379.67	20841
33	3.00	Total>	413.93	98.65m	734.19	400.11	400.11	21754
34	2.26	Total>	429.53	102.36m	759.71	415.22	415.22	22431
35	1.52	Total>	445.04	106.07m	785.14	430.30	430.30	23108
36	0.62	Total>	463.67	111.66	815.78	448.50	448.50	23927

37	-0.19	Total>	480.39	117.54	843.34	464.89	464.89	24667
38	-1.00	Total>	497.01	123.32	870.80	481.26	481.26	25406
39	-2.00	Total>	517.39	130.33	904.57	501.42	501.42	26319
40	-3.00	Total>	537.65	137.21	938.21	521.54	521.54	27233
41	-4.00	Total>	557.80	143.97	971.74	541.61	541.61	28146
42	-5.00	Total>	577.85	150.64	1005.17	561.64	561.64	29059
43	-6.00	Total>	597.81	157.22	1038.51	581.62	581.62	29972
44	-7.00	Total>	617.70	163.73	1071.79	601.57	601.57	30885
45	-8.00	Total>	637.52	170.18	1105.00	621.49	621.49	31798
46	-9.00	Total>	657.30	176.57	1138.15	641.38	641.38	32711

Node no.	Y coord	----- RIGHT side -----						
		Water	Vertic	Active	Passive	Earth	Total	Coeff. of
		press.	-al	limit	limit	pressure	earth	subgrade
		kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	pressure	reaction
1	22.73	0.00	0.00	0.00	0.00	0.00	0.00	6412
2	21.73	0.00	19.00	4.71	109.69	12.38	12.38	6412
3	21.11	0.00	30.88	7.66	178.24	18.20	18.20	6412
4	20.48	0.00	42.75	10.60	246.80	24.01	24.01	6412
5	19.86	0.00	54.63	13.55	315.35	29.81	29.81	6412
6	19.23	0.00	66.50	16.49	383.90	35.59	35.59	6412
7	18.34	0.00	83.41	20.69	481.53	43.68	43.68	2727
8	18.10	2.40	85.57	21.22	494.00	44.73	47.13	2727
9	18.00	3.40	86.47	21.44	499.19	45.17	48.57	2727
10	17.51	8.30	90.88	22.54	524.65	47.25	55.55	2727
11	16.76	15.85	97.68	24.22	563.88	50.29	66.14	2727
12	16.00	23.40	104.47	25.91	603.11	53.11	76.51	2727
13	15.43	29.15	109.65	27.19	632.98	55.11	84.26	2727
14	14.85	34.90	114.82	28.48	662.86	57.03	91.93	2727
		Total>	149.72	39.40m	311.38	168.97	168.97	10934
15	14.73	Total>	152.12	40.00m	315.38	171.16	171.16	11043
16	14.12	Total>	164.42	43.08m	335.91	182.21	182.21	11605
17	13.50	Total>	176.72	46.15m	356.44	193.14	193.14	12167
18	12.82	Total>	190.32	49.55m	379.14	205.27	205.27	12787
19	12.14	Total>	203.92	52.95m	401.85	217.54	217.54	13408
20	12.04	Total>	205.92	53.45m	405.18	219.36	219.36	13500
21	11.64	Total>	213.92	55.45m	418.54	226.68	226.68	13865
22	10.82	Total>	230.32	59.55m	445.91	241.91	241.91	14614
23	10.00	Total>	246.72	63.65m	473.29	257.46	257.46	15362
24	9.41	Total>	258.55	66.61m	493.03	268.88	268.88	15902
25	8.82	Total>	270.38	69.57m	512.78	280.47	280.47	16443
26	8.32	Total>	280.38	72.07m	529.47	290.39	290.39	16899
27	7.66	Total>	293.55	75.36m	551.45	303.60	303.60	17500
28	7.00	Total>	306.72	78.65m	573.44	316.96	316.96	18102
29	6.25	Total>	321.75	82.41m	598.53	332.34	332.34	18788
30	5.50	Total>	336.78	86.17m	623.61	347.83	347.83	19474
31	4.75	Total>	351.75	89.91m	648.60	363.30	363.30	20157

Run ID. 3722Saville_Theatre__B2_top_down_secant | Sheet No.
135 Shaftsbury Avenue - Saville Theatre | Date: 4-04-2025
Secant 900mm @ 1500mm cc B2 topdown | Checked :

(continued)

Stage No.3 Apply surcharge no.5 at elevation 13.50

Node no.	Y coord	----- RIGHT side -----						
		Water	Vertic	Active	Passive	Earth	Total	Coeff. of
		press.	-al	limit	limit	pressure	earth	subgrade
		kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	pressure	reaction

32	4.00	Total>	366.72	93.65m	673.59	378.79	378.79	20841
33	3.00	Total>	386.72	98.65m	706.97	399.46	399.46	21754
34	2.26	Total>	401.55	102.36m	731.73	414.75	414.75	22431
35	1.52	Total>	416.38	106.07m	756.48	429.98	429.98	23108
36	0.62	Total>	434.32	110.55m	786.43	448.33	448.33	23927
37	-0.19	Total>	450.52	114.60m	813.47	464.83	464.83	24667
38	-1.00	Total>	466.72	118.65m	840.51	481.27	481.27	25406
39	-2.00	Total>	486.72	123.65m	873.89	501.47	501.47	26319
40	-3.00	Total>	506.72	128.65m	907.28	521.61	521.61	27233
41	-4.00	Total>	526.72	133.65m	940.66	541.68	541.68	28146
42	-5.00	Total>	546.72	138.65m	974.04	561.70	561.70	29059
43	-6.00	Total>	566.72	143.65m	1007.43	581.67	581.67	29972
44	-7.00	Total>	586.72	148.65m	1040.81	601.62	601.62	30885
45	-8.00	Total>	606.72	153.65m	1074.19	621.53	621.53	31798
46	-9.00	Total>	626.72	158.65m	1107.58	641.42	641.42	32711

=====A-SQUARED STUDIO
ENGINEERS LTD | Sheet No.
Program: WALLAP Version 6.06 Revision A51.B69.R55 | Job No. 3722
Licensed from GEOSOLVE | Made by : SF
Data filename/Run ID: 3722Saville_Theatre__B2_top_down_secant
135 Shaftsbury Avenue - Saville Theatre | Date: 4-04-2025
Secant 900mm @ 1500mm cc B2 topdown | Checked :

Units: kN,m

Stage No. 5 Apply surcharge no.1 at elevation 22.73

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

			FoS for toe		Toe elev. for			
			elev. = -9.00		FoS = 1.000			
			-----		-----			
Stage	--- G.L. ---	Strut	Factor	Moment	Toe	Wall	Direction	
No.	Act.	Pass.	of	equilib.	elev.	Penetr	of	
			Safety	at elev.		-ation	failure	
5	22.73	22.73	Cant.	<u>Conditions not suitable for FoS calc.</u>				

BENDING MOMENT and DISPLACEMENT ANALYSIS of Fully Embedded Wall

Analysis options

Length of wall perpendicular to section = 50.00m
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: Left side 25.00 from wall
Right side 25.00 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.

*** Wall displacements reset to zero at stage 4

Node	Y	Nett	Wall	Wall	Shear	Bending	Strut	EI of
no.	coord	pressure	disp.	rotation	force	moment	forces	wall
		kN/m2	m	rad.	kN/m	kN.m/m	kN/m	kN.m2/m
1	22.73	0.00	0.001	1.51E-05	0.0	0.0		450870
2	21.73	-6.08	0.001	1.47E-05	-3.0	0.5		450870
3	21.11	-5.17	0.001	1.48E-05	-6.6	-2.5		450870
4	20.48	-4.69	0.001	1.62E-05	-9.6	-7.5		450870
5	19.86	-4.39	0.001	1.94E-05	-12.5	-14.4		450870
6	19.23	-4.17	0.001	2.44E-05	-15.2	-23.0		450870
		-17.59	0.001	2.44E-05	-15.2	-23.0		

7	18.34	-18.52	0.001	3.58E-05	-31.2	-43.5	450870
8	18.10	-18.64	0.001	3.99E-05	-35.7	-51.5	450870
9	18.00	-18.69	0.001	4.18E-05	-37.5	-55.2	450870
		25.85	0.001	4.18E-05	-37.5	-55.2	
10	17.51	27.29	0.001	5.24E-05	-24.5	-70.3	450870
11	16.76	30.23	0.001	7.10E-05	-2.8	-80.7	450870
12	16.00	34.35	0.001	8.92E-05	21.6	-73.8	450870
13	15.43	38.36	0.001	1.00E-04	42.5	-55.5	450870
14	14.85	43.04	0.001	1.08E-04	65.9	-24.6	450870
		-40.18	0.001	1.08E-04	65.9	-24.6	
15	14.73	-39.71	0.001	1.08E-04	61.1	-17.0	450870
16	14.12	-36.85	0.001	1.10E-04	37.5	13.1	450870
17	13.50	-33.58	0.001	1.07E-04	15.9	29.2	450870
18	12.82	-5.97	0.001	1.01E-04	2.4	34.0	450870
19	12.14	-2.76	0.001	9.23E-05	-0.5	34.3	450870
20	12.04	-2.63	0.001	9.08E-05	-0.8	34.2	450870
21	11.64	-2.37	0.000	8.48E-05	-1.8	33.6	450870
22	10.82	-2.07	0.000	7.23E-05	-3.6	31.0	450870
23	10.00	-1.45	0.000	6.04E-05	-5.1	27.1	450870
24	9.41	-0.86	0.000	5.27E-05	-5.7	23.8	450870
25	8.82	-0.26	0.000	4.57E-05	-6.1	20.2	450870

Run ID. 3722Saville Theatre_B2_top_down_secant | Sheet No.
135 Shaftsbury Avenue - Saville Theatre | Date: 4-04-2025
Secant 900mm @ 1500mm cc B2 topdown | Checked :

(continued)

Stage No.5 Apply surcharge no.1 at elevation 22.73

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	EI of wall kN.m2/m
26	8.32	0.20	0.000	4.05E-05	-6.1	17.1		450870
27	7.66	0.69	0.000	3.47E-05	-5.8	13.2		450870
28	7.00	1.03	0.000	2.98E-05	-5.2	9.5		450870
29	6.25	1.24	0.000	2.53E-05	-4.4	5.9		450870
30	5.50	1.28	0.000	2.18E-05	-3.4	3.0		450870
31	4.75	1.19	0.000	1.91E-05	-2.5	0.9		450870
32	4.00	1.02	0.000	1.69E-05	-1.7	-0.6		450870
33	3.00	0.75	0.000	1.47E-05	-0.8	-1.7		450870
34	2.26	0.55	0.000	1.34E-05	-0.3	-2.0		450870
35	1.52	0.37	0.000	1.22E-05	0.0	-2.1		450870
36	0.62	0.19	0.000	1.10E-05	0.3	-1.9		450870
37	-0.19	0.07	0.000	1.00E-05	0.4	-1.6		450870
38	-1.00	-0.00	0.000	9.09E-06	0.4	-1.2		450870
39	-2.00	-0.05	0.000	8.05E-06	0.4	-0.8		450870
40	-3.00	-0.07	0.000	7.12E-06	0.3	-0.4		450870
41	-4.00	-0.08	0.000	6.31E-06	0.2	-0.2		450870
42	-5.00	-0.07	0.000	5.63E-06	0.2	-0.0		450870
43	-6.00	-0.06	0.000	5.09E-06	0.1	0.1		450870
44	-7.00	-0.05	0.000	4.72E-06	0.0	0.1		450870
45	-8.00	-0.03	0.000	4.51E-06	0.0	0.1		450870
46	-9.00	0.02	0.000	4.45E-06	0.0	0.0		---

Node no.	Y coord	LEFT side					Total earth pressure	Coeff. of subgrade reaction
		Water press. kN/m2	Vertical limit kN/m2	Effective Active limit kN/m2	Effective Passive limit kN/m2	Earth pressure kN/m2		
1	22.73	0.00	0.00	0.00	0.00	0.00	0.00	1011
2	21.73	0.00	26.99	8.34	111.54	9.15	9.15	1011
3	21.11	0.00	41.83	12.93	172.84	15.86	15.86	1011
4	20.48	0.00	54.91	16.97	226.89	22.12	22.12	1011

5	19.86	0.00	67.19	20.76	277.63	28.19	28.19	1011
6	19.23	0.00	79.03	24.42	326.56	34.17	34.17	1011
		0.00	79.03	18.75	490.29	20.75	20.75	3438
7	18.34	0.00	96.34	22.86	597.67	27.84	27.84	3438
8	18.10	2.40	98.54	23.38	611.34	28.74	31.14	3438
9	18.00	3.40	99.45	23.60	617.00	29.12	32.52	3438
		Total>	102.85	23.65m	222.35	77.05	77.05	7557
10	17.51	Total>	112.67	26.10m	238.72	85.42	85.42	7976
11	16.76	Total>	127.66	29.88m	263.82	98.83	98.83	8623
12	16.00	Total>	142.54	33.65m	288.80	113.17	113.17	9269
13	15.43	Total>	153.81	36.53m	307.77	124.79	124.79	9762
14	14.85	Total>	165.05	39.40m	326.70	136.99	136.99	10254
15	14.73	Total>	167.39	40.00m	330.65	139.59	139.59	10357
16	14.12	Total>	179.38	43.08m	350.87	153.17	153.17	10883
17	13.50	Total>	191.42	46.15m	371.15	166.98	166.98	11410
18	12.82	Total>	229.72	49.55m	418.54	206.26	206.26	11992
19	12.14	Total>	242.86	52.95m	440.78	221.24	221.24	12575
20	12.04	Total>	244.47	53.45m	443.73	223.12	223.12	12660
21	11.64	Total>	250.73	55.45m	455.35	230.41	230.41	13003
22	10.82	Total>	263.85	59.55m	479.44	245.39	245.39	13705
23	10.00	Total>	278.09	63.65m	504.65	261.06	261.06	14407
24	9.41	Total>	289.01	66.61m	523.50	272.75	272.75	14914
25	8.82	Total>	300.37	69.57m	542.77	284.65	284.65	15420
26	8.32	Total>	310.22	72.07m	559.31	294.81	294.81	15848
27	7.66	Total>	323.47	75.36m	581.37	308.26	308.26	16412
28	7.00	Total>	336.92	78.65m	603.64	321.74	321.74	16976

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Run ID. 3722Saville_Theatre_B2_top_down_secant | Sheet No.
135 Shaftsbury Avenue - Saville Theatre | Date: 4-04-2025
Secant 900mm @ 1500mm cc B2 topdown | Checked :
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(continued)

Stage No.5 Apply surcharge no.1 at elevation 22.73

Node no.	Y coord	LEFT side					Total earth pressure	Coeff. of subgrade reaction
		Water press.	Vertic -al	Effective Active limit	Passive limit	Earth pressure		
		kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m3
29	6.25	Total>	352.43	82.41m	629.21	337.10	337.10	17620
30	5.50	Total>	368.04	86.17m	654.87	352.43	352.43	18263
31	4.75	Total>	383.61	89.91m	680.46	367.64	367.64	18904
32	4.00	Total>	399.16	93.65m	706.03	382.81	382.81	19545
33	3.00	Total>	419.88	99.71	740.13	403.02	403.02	20401
34	2.26	Total>	435.17	105.08	765.34	417.97	417.97	21036
35	1.52	Total>	450.39	110.38	790.49	432.89	432.89	21671
36	0.62	Total>	468.70	116.69	820.81	450.93	450.93	22439
37	-0.19	Total>	485.15	122.30	848.10	467.19	467.19	23133
38	-1.00	Total>	501.52	127.83	875.31	483.43	483.43	23827
39	-2.00	Total>	521.62	134.56	908.80	503.45	503.45	24683
40	-3.00	Total>	541.62	141.17	942.18	523.44	523.44	25539
41	-4.00	Total>	561.53	147.70	975.47	543.40	543.40	26395
42	-5.00	Total>	581.36	154.15	1008.68	563.32	563.32	27252
43	-6.00	Total>	601.12	160.53	1041.82	583.20	583.20	28108
44	-7.00	Total>	620.82	166.85	1074.91	603.07	603.07	28964
45	-8.00	Total>	640.47	173.13	1107.95	622.91	622.91	29821
46	-9.00	Total>	660.09	179.36	1140.95	642.76	642.76	30677

Node no.	Y coord	RIGHT side					Total earth	Coeff. of subgrade
		Water	Vertic	Effective Active	Passive	Earth		

		press.	-al	limit	limit	pressure	pressure	reaction
		kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m3
1	22.73	0.00	0.00	0.00	0.00	0.00	0.00	2528
2	21.73	0.00	19.00	4.71	109.69	15.23	15.23	2528
3	21.11	0.00	30.88	7.66	178.24	21.03	21.03	2528
4	20.48	0.00	42.75	10.60	246.80	26.81	26.81	2528
5	19.86	0.00	54.63	13.55	315.35	32.59	32.59	2528
6	19.23	0.00	66.50	16.49	383.90	38.33	38.33	2528
7	18.34	0.00	83.41	20.69	481.53	46.36	46.36	2528
8	18.10	2.40	85.57	21.22	494.00	47.38	49.78	2528
9	18.00	3.40	86.47	21.44	499.19	47.81	51.21	2528
10	17.51	8.30	90.88	22.54	524.65	49.83	58.13	2528
11	16.76	15.85	97.68	24.22	563.88	52.75	68.60	2528
12	16.00	23.40	104.47	25.91	603.11	55.42	78.82	2528
13	15.43	29.15	109.65	27.19	632.98	57.29	86.44	2528
14	14.85	34.90	114.82	28.48	662.86	59.05	93.95	2528
		Total>	149.72	39.40m	311.38	177.16	177.16	10254
15	14.73	Total>	152.12	40.00m	315.38	179.30	179.30	10357
16	14.12	Total>	164.42	43.08m	335.91	190.03	190.03	10883
17	13.50	Total>	176.72	46.15m	356.44	200.57	200.57	11410
18	12.82	Total>	190.32	49.55m	379.14	212.22	212.22	11992
19	12.14	Total>	203.92	52.95m	401.85	224.00	224.00	12575
20	12.04	Total>	205.92	53.45m	405.18	225.75	225.75	12660
21	11.64	Total>	213.92	55.45m	418.54	232.78	232.78	13003
22	10.82	Total>	230.32	59.55m	445.91	247.45	247.45	13705
23	10.00	Total>	246.72	63.65m	473.29	262.51	262.51	14407
24	9.41	Total>	258.55	66.61m	493.03	273.61	273.61	14914
25	8.82	Total>	270.38	69.57m	512.78	284.91	284.91	15420
26	8.32	Total>	280.38	72.07m	529.47	294.61	294.61	15848
27	7.66	Total>	293.55	75.36m	551.45	307.57	307.57	16412
28	7.00	Total>	306.72	78.65m	573.44	320.70	320.70	16976
29	6.25	Total>	321.75	82.41m	598.53	335.86	335.86	17620

Run ID. 3722Saville_Theatre_B2_top_down_secant | Sheet No.
135 Shaftsbury Avenue - Saville Theatre | Date: 4-04-2025
Secant 900mm @ 1500mm cc B2 topdown | Checked :

(continued)

Stage No.5 Apply surcharge no.1 at elevation 22.73

Node	Y		RIGHT side					
no.	coord		Effective	stresses		Total	Coeff. of	
		Water	Vertic	Active	Passive	earth	subgrade	
		press.	-al	limit	limit	pressure	reaction	
		kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m3	
30	5.50	Total>	336.78	86.17m	623.61	351.15	18263	
31	4.75	Total>	351.75	89.91m	648.60	366.45	18904	
32	4.00	Total>	366.72	93.65m	673.59	381.79	19545	
33	3.00	Total>	386.72	98.65m	706.97	402.27	20401	
34	2.26	Total>	401.55	102.36m	731.73	417.42	21036	
35	1.52	Total>	416.38	106.07m	756.48	432.53	21671	
36	0.62	Total>	434.32	110.55m	786.43	450.74	22439	
37	-0.19	Total>	450.52	114.60m	813.47	467.11	23133	
38	-1.00	Total>	466.72	118.65m	840.51	483.43	23827	
39	-2.00	Total>	486.72	123.65m	873.89	503.51	24683	
40	-3.00	Total>	506.72	128.65m	907.28	523.52	25539	
41	-4.00	Total>	526.72	133.65m	940.66	543.47	26395	
42	-5.00	Total>	546.72	138.65m	974.04	563.39	27252	
43	-6.00	Total>	566.72	143.65m	1007.43	583.27	28108	
44	-7.00	Total>	586.72	148.65m	1040.81	603.12	28964	
45	-8.00	Total>	606.72	153.65m	1074.19	622.94	29821	
46	-9.00	Total>	626.72	158.65m	1107.58	642.73	30677	

=====A-SQUARED STUDIO
ENGINEERS LTD | Sheet No.
Program: WALLAP Version 6.06 Revision A51.B69.R55 | Job No. 3722
Licensed from GEOSOLVE | Made by : SF
Data filename/Run ID: 3722Saville_Theatre__B2_top_down_secant
135 Shaftsbury Avenue - Saville Theatre | Date: 4-04-2025
Secant 900mm @ 1500mm cc B2 topdown | Checked :

Units: kN,m
Stage No. 6 Apply water pressure profile no.1 (Mod. Conserv.)

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

				FoS for toe elev. = -9.00	Toe elev. for FoS = 1.000		
Stage	--- G.L. ---	Strut	Factor	Moment	Toe	Wall	Direction
No.	Act. Pass.	Elev.	of	equilib.	elev.	Penetr	of
			Safety	at elev.		-ation	failure
6	22.73	22.73	Cant.	<u>Conditions not suitable for FoS calc.</u>			

BENDING MOMENT and DISPLACEMENT ANALYSIS of Fully Embedded Wall
Analysis options

Length of wall perpendicular to section = 50.00m
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: Left side 25.00 from wall
Right side 25.00 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.

*** Wall displacements reset to zero at stage 4

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	EI of wall kN.m2/m
1	22.73	0.00	0.001	-6.29E-05	0.0	0.0		450870
2	21.73	-7.04	0.001	-6.33E-05	-3.5	0.5		450870
3	21.11	-6.32	0.001	-6.29E-05	-7.7	-3.0		450870
4	20.48	-6.02	0.001	-6.01E-05	-11.5	-8.9		450870
5	19.86	-5.90	0.001	-5.40E-05	-15.3	-17.3		450870
6	19.23	-5.84	0.002	-4.35E-05	-18.9	-27.9		450870
		-20.41	0.002	-4.35E-05	-18.9	-27.9		
7	18.34	-21.65	0.002	-1.80E-05	-37.7	-52.9		450870
8	18.10	-20.05	0.002	-8.52E-06	-42.7	-62.5		450870
9	18.00	-19.38	0.002	-4.10E-06	-44.6	-66.9		450870
		22.90	0.002	-4.10E-06	-44.6	-66.9		
10	17.51	27.58	0.002	2.12E-05	-32.3	-85.7		450870
11	16.76	35.67	0.002	7.00E-05	-8.4	-101.3		450870
12	16.00	45.23	0.001	1.24E-04	22.1	-96.5		450870
13	15.43	53.64	0.001	1.63E-04	50.6	-75.9		450870
14	14.85	62.95	0.001	1.92E-04	84.1	-37.5		450870
		-48.83	0.001	1.92E-04	84.1	-37.5		
15	14.73	-48.19	0.001	1.96E-04	78.3	-27.8		450870
16	14.12	-44.29	0.001	2.06E-04	49.8	11.2		450870
17	13.50	-39.80	0.001	2.02E-04	24.0	33.5		450870
18	12.82	-10.78	0.001	1.85E-04	6.8	42.5		450870
19	12.14	-6.24	0.001	1.62E-04	1.0	44.6		450870

20	12.04	-5.92	0.001	1.59E-04	0.4	44.6	450870
21	11.64	-4.96	0.001	1.43E-04	-1.8	44.3	450870
22	10.82	-3.44	0.001	1.12E-04	-5.2	40.8	450870
23	10.00	-1.92	0.000	8.44E-05	-7.4	35.2	450870
24	9.41	-0.88	0.000	6.69E-05	-8.3	30.4	450870
25	8.82	0.02	0.000	5.23E-05	-8.5	25.4	450870

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Run ID. 3722Saville_Theatre__B2_top_down_secant          | Sheet No.
135 Shaftsbury Avenue - Saville Theatre                  | Date: 4-04-2025
Secant 900mm @ 1500mm cc B2 topdown                     | Checked :
=====

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(continued)

Stage No.6 Apply water pressure profile no.1 (Mod. Conserv.)

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	EI of wall kN.m2/m
26	8.32	0.65	0.000	4.20E-05	-8.3	21.1		450870
27	7.66	1.25	0.000	3.13E-05	-7.7	15.8		450870
28	7.00	1.61	0.000	2.34E-05	-6.8	11.0		450870
29	6.25	1.76	0.000	1.72E-05	-5.5	6.5		450870
30	5.50	1.69	0.000	1.34E-05	-4.2	2.9		450870
31	4.75	1.49	0.000	1.12E-05	-3.0	0.3		450870
32	4.00	1.23	0.000	1.02E-05	-2.0	-1.4		450870
33	3.00	0.86	0.000	1.00E-05	-1.0	-2.7		450870
34	2.26	0.64	0.000	1.03E-05	-0.4	-3.1		450870
35	1.52	0.48	0.000	1.08E-05	0.0	-3.1		450870
36	0.62	0.41	0.000	1.16E-05	0.4	-2.8		450870
37	-0.19	0.15	0.000	1.21E-05	0.6	-2.3		450870
38	-1.00	-0.02	0.000	1.23E-05	0.7	-1.7		450870
39	-2.00	-0.13	0.000	1.21E-05	0.6	-1.0		450870
40	-3.00	-0.16	0.000	1.15E-05	0.5	-0.5		450870
41	-4.00	-0.15	0.000	1.07E-05	0.3	-0.1		450870
42	-5.00	-0.12	0.000	9.83E-06	0.2	0.1		450870
43	-6.00	-0.09	0.000	9.04E-06	0.1	0.2		450870
44	-7.00	-0.06	0.000	8.46E-06	0.0	0.2		450870
45	-8.00	-0.01	0.000	8.14E-06	-0.0	0.1		450870
46	-9.00	0.08	0.000	8.05E-06	-0.0	0.0		---

Node no.	Y coord	----- LEFT side -----						
		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	Coeff. of subgrade reaction kN/m3
1	22.73	0.00	0.00	0.00	0.00	0.00	0.00	1081
2	21.73	0.00	26.99	8.34	111.54	8.88	8.88	1081
3	21.11	0.00	41.83	12.93	172.84	15.53	15.53	1081
4	20.48	0.00	54.91	16.97	226.89	21.74	21.74	1081
5	19.86	0.00	67.19	20.76	277.63	27.76	27.76	1081
6	19.23	0.00	79.03	24.42	326.56	33.69	33.69	1081
		0.00	79.03	18.75	490.29	19.12	19.12	3675
7	18.34	0.05	96.29	22.85	597.36	26.00	26.05	3675
8	18.10	2.45	98.49	23.37	611.03	26.85	29.30	3675
9	18.00	3.45	99.40	23.59	616.69	27.22	30.67	3675
		Total>	102.85	23.65m	222.35	72.94	72.94	7995
10	17.51	Total>	112.67	26.10m	238.72	80.92	80.92	8439
11	16.76	Total>	127.66	29.88m	263.82	93.86	93.86	9123
12	16.00	Total>	142.54	33.65m	288.80	107.94	107.94	9807
13	15.43	Total>	153.81	36.53m	307.77	119.58	119.58	10327
14	14.85	Total>	165.05	39.40m	326.70	131.98	131.98	10848
15	14.73	Total>	167.39	40.00m	330.65	134.64	134.64	10957
16	14.12	Total>	179.38	43.08m	350.87	148.63	148.63	11514
17	13.50	Total>	191.42	46.15m	371.15	162.93	162.93	12071

18	12.82	Total>	229.72	49.55m	418.54	202.77	202.77	12687
19	12.14	Total>	242.86	52.95m	440.78	218.28	218.28	13304
20	12.04	Total>	244.47	53.45m	443.73	220.24	220.24	13394
21	11.64	Total>	250.73	55.45m	455.35	227.80	227.80	13756
22	10.82	Total>	263.85	59.55m	479.44	243.23	243.23	14499
23	10.00	Total>	278.09	63.65m	504.65	259.18	259.18	15242
24	9.41	Total>	289.01	66.61m	523.50	270.99	270.99	15778
25	8.82	Total>	300.37	69.57m	542.77	282.93	282.93	16314
26	8.32	Total>	310.22	72.07m	559.31	293.07	293.07	16767
27	7.66	Total>	323.47	75.36m	581.37	306.45	306.45	17364
28	7.00	Total>	336.92	78.65m	603.64	319.80	319.80	17960

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Run ID. 3722Saville_Theatre_B2_top_down_secant	Sheet No.
135 Shaftsbury Avenue - Saville Theatre	Date: 4-04-2025
Secant 900mm @ 1500mm cc B2 topdown	Checked :

(continued)

Stage No.6 Apply water pressure profile no.1 (Mod. Conserv.)

Node no.	Y coord	LEFT side					Total earth pressure kN/m2	Coeff. of subgrade reaction kN/m3
		Water press. kN/m2	Vertic -al kN/m2	Effective Active limit kN/m2	Effective Passive limit kN/m2	Earth pressure kN/m2		
29	6.25	Total>	352.43	82.41m	629.21	334.99	334.99	18641
30	5.50	Total>	368.04	86.17m	654.87	350.12	350.12	19322
31	4.75	Total>	383.61	89.91m	680.46	365.13	365.13	20000
32	4.00	Total>	399.16	93.65m	706.03	380.10	380.10	20678
33	3.00	Total>	419.88	99.71	740.13	400.07	400.07	21584
34	2.26	Total>	435.17	105.08	765.34	414.86	414.86	22256
35	1.52	Total>	450.39	110.38	790.49	429.65	429.65	22927
36	0.62	Total>	468.70	116.69	820.81	447.56	447.56	23740
37	-0.19	Total>	485.15	122.30	848.10	463.75	463.75	24474
38	-1.00	Total>	501.52	127.83	875.31	479.95	479.95	25208
39	-2.00	Total>	521.62	134.56	908.80	499.94	499.94	26114
40	-3.00	Total>	541.62	141.17	942.18	519.93	519.93	27020
41	-4.00	Total>	561.53	147.70	975.47	539.89	539.89	27926
42	-5.00	Total>	581.36	154.15	1008.68	559.82	559.82	28832
43	-6.00	Total>	601.12	160.53	1041.82	579.72	579.72	29737
44	-7.00	Total>	620.82	166.85	1074.91	599.59	599.59	30643
45	-8.00	Total>	640.47	173.13	1107.95	619.45	619.45	31549
46	-9.00	Total>	660.09	179.36	1140.95	639.31	639.31	32455

Node no.	Y coord	RIGHT side					Total earth pressure kN/m2	Coeff. of subgrade reaction kN/m3
		Water press. kN/m2	Vertic -al kN/m2	Effective Active limit kN/m2	Effective Passive limit kN/m2	Earth pressure kN/m2		
1	22.73	0.00	0.00	0.00	0.00	0.00	0.00	2702
2	21.73	0.00	19.00	4.71	109.69	15.92	15.92	2702
3	21.11	0.00	30.88	7.66	178.24	21.84	21.84	2702
4	20.48	0.00	42.75	10.60	246.80	27.76	27.76	2702
5	19.86	0.00	54.63	13.55	315.35	33.66	33.66	2702
6	19.23	0.00	66.50	16.49	383.90	39.53	39.53	2702
7	18.34	0.00	83.41	20.69	481.53	47.70	47.70	2702
8	18.10	0.00	87.97	21.82	507.85	49.36	49.36	2702
9	18.00	0.00	89.87	22.29	518.82	50.04	50.04	2702
10	17.51	0.00	99.18	24.60	572.57	53.34	53.34	2702
11	16.76	0.00	113.53	28.15	655.38	58.19	58.19	2702
12	16.00	0.00	127.87	31.71	738.19	62.71	62.71	2702
13	15.43	0.00	138.80	34.42	801.26	65.94	65.94	2702

14	14.85	0.00	149.72	37.13	864.33	69.02	69.02	2702
		Total>	149.72	39.40m	311.38	180.81	180.81	10848
15	14.73	Total>	152.12	40.00m	315.38	182.84	182.84	10957
16	14.12	Total>	164.42	43.08m	335.91	192.92	192.92	11514
17	13.50	Total>	176.72	46.15m	356.44	202.73	202.73	12071
18	12.82	Total>	190.32	49.55m	379.14	213.55	213.55	12687
19	12.14	Total>	203.92	52.95m	401.85	224.52	224.52	13304
20	12.04	Total>	205.92	53.45m	405.18	226.16	226.16	13394
21	11.64	Total>	213.92	55.45m	418.54	232.76	232.76	13756
22	10.82	Total>	230.32	59.55m	445.91	246.67	246.67	14499
23	10.00	Total>	246.72	63.65m	473.29	261.11	261.11	15242
24	9.41	Total>	258.55	66.61m	493.03	271.87	271.87	15778
25	8.82	Total>	270.38	69.57m	512.78	282.90	282.90	16314
26	8.32	Total>	280.38	72.07m	529.47	292.42	292.42	16767
27	7.66	Total>	293.55	75.36m	551.45	305.19	305.19	17364
28	7.00	Total>	306.72	78.65m	573.44	318.19	318.19	17960
29	6.25	Total>	321.75	82.41m	598.53	333.23	333.23	18641

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Run ID. 3722Saville_Theatre__B2_top_down_secant | Sheet No.
135 Shaftsbury Avenue - Saville Theatre | Date: 4-04-2025
Secant 900mm @ 1500mm cc B2 topdown | Checked :
=====

(continued)

Stage No.6 Apply water pressure profile no.1 (Mod. Conserv.)

Node no.	Y coord	----- RIGHT side -----						Total earth pressure	Coeff. of subgrade reaction
		Water press.	Vertic -al	Effective Active limit	Effective Passive limit	Earth pressure			
		kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m3
30	5.50	Total>	336.78	86.17m	623.61	348.42	348.42	19322	
31	4.75	Total>	351.75	89.91m	648.60	363.64	363.64	20000	
32	4.00	Total>	366.72	93.65m	673.59	378.87	378.87	20678	
33	3.00	Total>	386.72	98.65m	706.97	399.20	399.20	21584	
34	2.26	Total>	401.55	102.36m	731.73	414.22	414.22	22256	
35	1.52	Total>	416.38	106.07m	756.48	429.17	429.17	22927	
36	0.62	Total>	434.32	110.55m	786.43	447.15	447.15	23740	
37	-0.19	Total>	450.52	114.60m	813.47	463.60	463.60	24474	
38	-1.00	Total>	466.72	118.65m	840.51	479.97	479.97	25208	
39	-2.00	Total>	486.72	123.65m	873.89	500.07	500.07	26114	
40	-3.00	Total>	506.72	128.65m	907.28	520.09	520.09	27020	
41	-4.00	Total>	526.72	133.65m	940.66	540.04	540.04	27926	
42	-5.00	Total>	546.72	138.65m	974.04	559.94	559.94	28832	
43	-6.00	Total>	566.72	143.65m	1007.43	579.81	579.81	29737	
44	-7.00	Total>	586.72	148.65m	1040.81	599.65	599.65	30643	
45	-8.00	Total>	606.72	153.65m	1074.19	619.46	619.46	31549	
46	-9.00	Total>	626.72	158.65m	1107.58	639.23	639.23	32455	

=====A-SQUARED STUDIO
ENGINEERS LTD | Sheet No.
Program: WALLAP Version 6.06 Revision A51.B69.R55 | Job No. 3722
Licensed from GEOSOLVE | Made by : SF
Data filename/Run ID: 3722Saville_Theatre__B2_top_down_secant
135 Shaftsbury Avenue - Saville Theatre | Date: 4-04-2025
Secant 900mm @ 1500mm cc B2 topdown | Checked :
=====

Units: kN,m

Stage No. 7 Excavate to elevation 17.51 on RIGHT side

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

FoS for toe Toe elev. for

				elev. = -9.00		FoS = 1.000			
				-----		-----			
Stage	---	G.L.	---	Strut	Factor	Moment	Toe	Wall	Direction
No.	Act.	Pass.	Elev.		of	equilib.	elev.	Penetr	of
					Safety	at elev.		-ation	failure
7	22.73	17.51	Cant.	3.115	-6.50	13.36	4.15		L to R

BENDING MOMENT and DISPLACEMENT ANALYSIS of Fully Embedded Wall

Analysis options

Length of wall perpendicular to section = 50.00m

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: Left side 25.00 from wall

Right side 25.00 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.

*** Wall displacements reset to zero at stage 4

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	EI of wall kN.m2/m
1	22.73	0.00	0.033	4.29E-03	0.0	0.0		450870
2	21.73	8.34	0.029	4.29E-03	4.2	3.1		450870
3	21.11	12.93	0.026	4.28E-03	10.8	7.7		450870
4	20.48	16.97	0.024	4.26E-03	20.2	17.3		450870
5	19.86	20.76	0.021	4.21E-03	31.9	33.5		450870
6	19.23	24.42	0.018	4.13E-03	46.1	57.8		450870
		18.75	0.018	4.13E-03	46.1	57.8		
7	18.34	22.90	0.015	3.91E-03	64.6	106.9		450870
8	18.10	25.82	0.014	3.83E-03	70.5	123.1		450870
9	18.00	27.04	0.014	3.79E-03	73.1	130.3		450870
		23.65	0.014	3.79E-03	73.1	130.3		
10	17.51	26.10	0.012	3.57E-03	85.3	169.1		450870
11	16.76	-52.94	0.009	3.12E-03	75.1	233.6		450870
12	16.00	-44.74	0.007	2.58E-03	38.3	279.9		450870
13	15.43	-21.35	0.006	2.14E-03	19.3	299.0		450870
14	14.85	8.66	0.005	1.71E-03	15.6	307.0		450870
		-98.22	0.005	1.71E-03	15.6	307.0		
15	14.73	-91.16	0.004	1.63E-03	4.3	308.2		450870
16	14.12	-59.38	0.003	1.22E-03	-42.0	293.5		450870
17	13.50	-35.16	0.003	8.71E-04	-71.1	256.5		450870
18	12.82	7.28	0.002	5.67E-04	-80.6	201.8		450870
19	12.14	18.12	0.002	3.45E-04	-71.9	148.7		450870
20	12.04	18.88	0.002	3.19E-04	-70.1	141.6		450870
21	11.64	20.62	0.002	2.29E-04	-62.2	115.0		450870
22	10.82	19.98	0.002	1.07E-04	-45.5	70.6		450870
23	10.00	16.51	0.002	4.75E-05	-30.6	39.8		450870
24	9.41	13.41	0.002	3.09E-05	-21.7	24.6		450870
25	8.82	10.32	0.002	2.75E-05	-14.7	14.0		450870

Run ID. 3722Saville Theatre_B2_top_down_secant

| Sheet No.

135 Shaftsbury Avenue - Saville Theatre

| Date: 4-04-2025

Secant 900mm @ 1500mm cc B2 topdown

| Checked :

(continued)

Stage No.7 Excavate to elevation 17.51 on RIGHT side

Node	Y	Nett	Wall	Wall	Shear	Bending	Strut	EI of
------	---	------	------	------	-------	---------	-------	-------

no.	coord	pressure kN/m2	disp. m	rotation rad.	force kN/m	moment kN.m/m	forces kN/m	wall kN.m2/m
26	8.32	7.94	0.002	3.08E-05	-10.2	8.0		450870
27	7.66	5.28	0.002	3.90E-05	-5.8	3.0		450870
28	7.00	3.24	0.002	4.82E-05	-3.0	0.4		450870
29	6.25	1.63	0.002	5.70E-05	-1.2	-0.9		450870
30	5.50	0.65	0.002	6.27E-05	-0.3	-1.2		450870
31	4.75	0.14	0.001	6.52E-05	-0.0	-1.2		450870
32	4.00	-0.07	0.001	6.51E-05	0.0	-1.1		450870
33	3.00	-0.08	0.001	6.26E-05	-0.1	-0.9		450870
34	2.26	0.00	0.001	5.98E-05	-0.1	-0.9		450870
35	1.52	0.12	0.001	5.68E-05	-0.0	-1.0		450870
36	0.62	0.29	0.001	5.35E-05	0.1	-0.9		450870
37	-0.19	0.16	0.001	5.08E-05	0.3	-0.7		450870
38	-1.00	0.05	0.001	4.83E-05	0.4	-0.3		450870
39	-2.00	-0.04	0.001	4.53E-05	0.4	0.1		450870
40	-3.00	-0.09	0.001	4.25E-05	0.4	0.4		450870
41	-4.00	-0.12	0.001	3.98E-05	0.3	0.7		450870
42	-5.00	-0.13	0.001	3.73E-05	0.1	0.8		450870
43	-6.00	-0.13	0.001	3.52E-05	-0.0	0.7		450870
44	-7.00	-0.10	0.001	3.36E-05	-0.1	0.6		450870
45	-8.00	0.02	0.001	3.26E-05	-0.2	0.3		450870
46	-9.00	0.29	0.001	3.23E-05	0.0	0.0		---

Node no.	Y coord	----- LEFT side -----						
		Water press. kN/m2	Vertic -al kN/m2	Effective Active limit kN/m2	Effective Passive limit kN/m2	Earth pressure kN/m2	Total earth pressure kN/m2	Coeff. of subgrade reaction kN/m3
1	22.73	0.00	0.00	0.00	0.00	0.00	0.00	1744
2	21.73	0.00	26.99	8.34	111.54	8.34	8.34a	1744
3	21.11	0.00	41.83	12.93	172.84	12.93	12.93a	1744
4	20.48	0.00	54.91	16.97	226.89	16.97	16.97a	1744
5	19.86	0.00	67.19	20.76	277.63	20.76	20.76a	1744
6	19.23	0.00	79.03	24.42	326.56	24.42	24.42a	1744
		0.00	79.03	18.75	490.29	18.75	18.75a	5931
7	18.34	0.05	96.29	22.85	597.36	22.85	22.90a	5931
8	18.10	2.45	98.49	23.37	611.03	23.37	25.82a	5931
9	18.00	3.45	99.40	23.59	616.69	23.59	27.04a	5931
		Total>	102.85	23.65m	222.35	23.65	23.65a	12332
10	17.51	Total>	112.67	26.10m	238.72	26.10	26.10a	13017
11	16.76	Total>	127.66	29.88m	263.82	29.88	29.88a	14072
12	16.00	Total>	142.54	33.65m	288.80	33.65	33.65a	15127
13	15.43	Total>	153.81	36.53m	307.77	51.00	51.00	15931
14	14.85	Total>	165.05	39.40m	326.70	76.80	76.80	16735
15	14.73	Total>	167.39	40.00m	330.65	81.92	81.92	16902
16	14.12	Total>	179.38	43.08m	350.87	106.53	106.53	17762
17	13.50	Total>	191.42	46.15m	371.15	128.36	128.36	18621
18	12.82	Total>	229.72	49.55m	418.54	173.33	173.33	19571
19	12.14	Total>	242.86	52.95m	440.78	191.25	191.25	20522
20	12.04	Total>	244.47	53.45m	443.73	193.37	193.37	20662
21	11.64	Total>	250.73	55.45m	455.35	201.24	201.24	21221
22	10.82	Total>	263.85	59.55m	479.44	215.85	215.85	22366
23	10.00	Total>	278.09	63.65m	504.65	229.92	229.92	23512
24	9.41	Total>	289.01	66.61m	523.50	240.16	240.16	24339
25	8.82	Total>	300.37	69.57m	542.77	250.59	250.59	25166
26	8.32	Total>	310.22	72.07m	559.31	259.60	259.60	25864
27	7.66	Total>	323.47	75.36m	581.37	271.75	271.75	26785
28	7.00	Total>	336.92	78.65m	603.64	284.22	284.22	27705

Secant 900mm @ 1500mm cc B2 toptdown

| Checked :

(continued)

Stage No.7 Excavate to elevation 17.51 on RIGHT side

Node no.	Y coord	LEFT side					Total earth pressure	Coeff. of subgrade reaction
		Water press. kN/m2	Vertic -al kN/m2	Effective Active limit kN/m2	Effective Passive limit kN/m2	Earth pressure kN/m2		
29	6.25	Total>	352.43	82.41m	629.21	298.77	298.77	28755
30	5.50	Total>	368.04	86.17m	654.87	313.58	313.58	29805
31	4.75	Total>	383.61	89.91m	680.46	328.51	328.51	30851
32	4.00	Total>	399.16	93.65m	706.03	343.54	343.54	31897
33	3.00	Total>	419.88	99.71	740.13	363.70	363.70	33295
34	2.26	Total>	435.17	105.08	765.34	378.67	378.67	34331
35	1.52	Total>	450.39	110.38	790.49	393.62	393.62	35367
36	0.62	Total>	468.70	116.69	820.81	411.70	411.70	36621
37	-0.19	Total>	485.15	122.30	848.10	428.00	428.00	37753
38	-1.00	Total>	501.52	127.83	875.31	444.30	444.30	38885
39	-2.00	Total>	521.62	134.56	908.80	464.41	464.41	40282
40	-3.00	Total>	541.62	141.17	942.18	484.49	484.49	41680
41	-4.00	Total>	561.53	147.70	975.47	504.56	504.56	43078
42	-5.00	Total>	581.36	154.15	1008.68	524.60	524.60	44475
43	-6.00	Total>	601.12	160.53	1041.82	544.62	544.62	45873
44	-7.00	Total>	620.82	166.85	1074.91	564.63	564.63	47270
45	-8.00	Total>	640.47	173.13	1107.95	584.67	584.67	48668
46	-9.00	Total>	660.09	179.36	1140.95	604.75	604.75	50065

Node no.	Y coord	RIGHT side					Total earth pressure	Coeff. of subgrade reaction
		Water press. kN/m2	Vertic -al kN/m2	Effective Active limit kN/m2	Effective Passive limit kN/m2	Earth pressure kN/m2		
1	22.73	0.00	0.00	0.00	0.00	0.00	0.00	0.0
2	21.73	0.00	0.00	0.00	0.00	0.00	0.00	0.0
3	21.11	0.00	0.00	0.00	0.00	0.00	0.00	0.0
4	20.48	0.00	0.00	0.00	0.00	0.00	0.00	0.0
5	19.86	0.00	0.00	0.00	0.00	0.00	0.00	0.0
6	19.23	0.00	0.00	0.00	0.00	0.00	0.00	0.0
7	18.34	0.00	0.00	0.00	0.00	0.00	0.00	0.0
8	18.10	0.00	0.00	0.00	0.00	0.00	0.00	0.0
9	18.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
10	17.51	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	7249
11	16.76	0.00	14.35	3.56	82.81	82.81	82.81p	7249
12	16.00	0.00	28.69	7.12	165.63	78.39	78.39	7249
13	15.43	0.00	39.62	9.83	228.71	72.35	72.35	7249
14	14.85	0.00	50.55	12.54	291.80	68.13	68.13	7249
		Total>	50.55	13.30m	212.20	175.02	175.02	27142
15	14.73	Total>	52.95	13.90m	216.21	173.07	173.07	27414
16	14.12	Total>	65.25	16.98m	236.75	165.91	165.91	28808
17	13.50	Total>	77.56	20.05m	257.29	163.52	163.52	30202
18	12.82	Total>	91.17	23.45m	280.00	166.04	166.04	31743
19	12.14	Total>	104.79	26.85m	302.72	173.13	173.13	33285
20	12.04	Total>	106.79	27.35m	306.06	174.49	174.49	33511
21	11.64	Total>	114.81	29.35m	319.42	180.62	180.62	34418
22	10.82	Total>	131.24	33.45m	346.83	195.87	195.87	36276
23	10.00	Total>	147.68	37.55m	374.25	213.41	213.41	38135
24	9.41	Total>	159.54	40.51m	394.03	226.75	226.75	39476
25	8.82	Total>	171.41	43.47m	413.81	240.27	240.27	40817
26	8.32	Total>	181.45	45.97m	430.54	251.66	251.66	41950

27	7.66	Total>	194.68	49.26m	452.58	266.47	266.47	43442
28	7.00	Total>	207.91	52.55m	474.63	280.97	280.97	44935

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Run ID. 3722Saville_Theatre__B2_top_down_secant          | Sheet No.
135 Shaftsbury Avenue - Saville Theatre                  | Date: 4-04-2025
Secant 900mm @ 1500mm cc B2 topdown                     | Checked :
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(continued)

Stage No.7 Excavate to elevation 17.51 on RIGHT side

Node no.	Y coord	----- RIGHT side -----						
		----- Effective stresses -----					Total earth pressure	Coeff. of subgrade reaction
		Water press. kN/m2	Vertic -al kN/m2	Active limit kN/m2	Passive limit kN/m2	Earth pressure kN/m2		
29	6.25	Total>	223.02	56.31m	499.80	297.13	297.13	46638
30	5.50	Total>	238.15	60.07m	524.98	312.92	312.92	48342
31	4.75	Total>	253.22	63.81m	550.07	328.37	328.37	50038
32	4.00	Total>	268.30	67.55m	575.17	343.61	343.61	51735
33	3.00	Total>	288.47	72.55m	608.73	363.79	363.79	54002
34	2.26	Total>	303.44	76.26m	633.62	378.66	378.66	55682
35	1.52	Total>	318.43	79.97m	658.53	393.50	393.50	57363
36	0.62	Total>	336.56	84.45m	688.67	411.40	411.40	59396
37	-0.19	Total>	352.96	88.50m	715.91	427.85	427.85	61232
38	-1.00	Total>	369.37	92.55m	743.16	444.25	444.25	63068
39	-2.00	Total>	389.65	97.55m	776.82	464.44	464.44	65335
40	-3.00	Total>	409.95	102.55m	810.50	484.58	484.58	67601
41	-4.00	Total>	430.27	107.55m	844.21	504.67	504.67	69868
42	-5.00	Total>	450.61	112.55m	877.94	524.73	524.73	72135
43	-6.00	Total>	470.98	117.55m	911.68	544.75	544.75	74401
44	-7.00	Total>	491.36	122.55m	945.45	564.73	564.73	76668
45	-8.00	Total>	511.77	127.55m	979.24	584.64	584.64	78935
46	-9.00	Total>	532.19	132.55m	1013.05	604.46	604.46	81201

Note: 33.65a Soil pressure at active limit
 82.81p Soil pressure at passive limit

=====A-SQUARED STUDIO

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ENGINEERS LTD                      | Sheet No.
Program: WALLAP  Version 6.06  Revision A51.B69.R55      | Job No.   3722
                        Licensed from GEOSOLVE             | Made by :   SF
Data filename/Run ID: 3722Saville_Theatre__B2_top_down_secant
135 Shaftsbury Avenue - Saville Theatre                  | Date: 4-04-2025
Secant 900mm @ 1500mm cc B2 topdown                     | Checked :
=====

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Units: kN,m

Stage No. 10 Excavate to elevation 11.64 on RIGHT 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. = -9.00		Toe elev. for FoS = 1.000		Direction of failure
			Factor of Safety	Moment equilib. at elev.	Toe elev.	Wall Penetr -ation	
10	22.73 11.64		More than one strut. No FoS calc.				

BENDING MOMENT and DISPLACEMENT ANALYSIS of Fully Embedded Wall

Analysis options

Length of wall perpendicular to section = 50.00m

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: Left side 25.00 from wall
 Right side 25.00 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.

*** Wall displacements reset to zero at stage 4

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	EI of wall kN.m2/m
1	22.73	0.00	0.029	2.38E-03	0.0	0.0	-0.0	450870
2	21.73	18.83	0.026	2.37E-03	9.4	3.1		450870
3	21.11	19.04	0.025	2.36E-03	21.3	13.0		450870
4	20.48	18.70	0.023	2.33E-03	33.0	30.3		450870
5	19.86	20.76	0.022	2.26E-03	45.4	54.9		450870
6	19.23	24.42	0.020	2.14E-03	59.5	87.6		450870
		18.75	0.020	2.14E-03	59.5	87.6		
7	18.34	22.90	0.019	1.85E-03	78.0	148.7		450870
8	18.10	25.82	0.018	1.74E-03	83.9	168.1	213.7	450870
		25.82	0.018	1.74E-03	-129.8	168.1		
9	18.00	27.04	0.018	1.70E-03	-127.2	155.2		450870
		23.65	0.018	1.70E-03	-127.2	155.2		
10	17.51	26.10	0.017	1.50E-03	-115.0	95.9		450870
11	16.76	29.88	0.016	1.30E-03	-93.8	17.1		450870
12	16.00	33.65	0.015	1.21E-03	-69.9	-41.0		450870
13	15.43	36.53	0.015	1.21E-03	-49.7	-72.2		450870
14	14.85	39.40	0.014	1.27E-03	-27.9	-95.8		450870
15	14.73	40.00	0.014	1.30E-03	-23.1	-98.9		450870
16	14.12	43.08	0.013	1.44E-03	2.4	-107.4		450870
17	13.50	46.15	0.012	1.60E-03	29.9	-99.1		450870
18	12.82	60.11	0.011	1.76E-03	66.0	-59.7		450870
19	12.14	85.71	0.010	1.85E-03	115.6	-0.4		450870
20	12.04	89.29	0.009	1.86E-03	124.3	11.6		450870
21	11.64	103.62	0.009	1.84E-03	162.9	68.6		450870
		-100.99	0.009	1.84E-03	162.9	68.6		
22	10.82	-98.56	0.007	1.68E-03	81.1	166.6		450870
23	10.00	-69.42	0.006	1.37E-03	12.2	216.2		450870
24	9.41	-44.36	0.005	1.11E-03	-21.4	211.2		450870

Run ID. 3722Saville_Theatre_B2_top_down_secant
 135 Shaftsbury Avenue - Saville Theatre
 Secant 900mm @ 1500mm cc B2 topdown

| Sheet No.
 | Date: 4-04-2025
 | Checked :

(continued)

Stage No.10 Excavate to elevation 11.64 on RIGHT 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	EI of wall kN.m2/m
25	8.82	-24.10	0.005	8.77E-04	-41.7	190.8		450870
26	8.32	-10.80	0.004	6.94E-04	-50.4	166.9		450870
27	7.66	1.72	0.004	4.93E-04	-53.4	131.4		450870
28	7.00	9.32	0.003	3.38E-04	-49.7	96.7		450870
29	6.25	13.32	0.003	2.14E-04	-41.2	62.0		450870
30	5.50	13.84	0.003	1.37E-04	-31.0	34.9		450870
31	4.75	12.28	0.003	9.62E-05	-21.2	15.6		450870
32	4.00	9.75	0.003	7.86E-05	-13.0	3.2		450870
33	3.00	6.13	0.003	7.55E-05	-5.1	-4.8		450870

34	2.26	3.84	0.003	8.06E-05	-1.4	-6.8	450870
35	1.52	2.09	0.003	8.72E-05	0.8	-6.7	450870
36	0.62	0.76	0.003	9.37E-05	2.1	-5.0	450870
37	-0.19	-0.13	0.003	9.68E-05	2.4	-3.1	450870
38	-1.00	-0.56	0.003	9.73E-05	2.1	-1.2	450870
39	-2.00	-0.68	0.002	9.47E-05	1.5	0.6	450870
40	-3.00	-0.59	0.002	8.99E-05	0.8	1.6	450870
41	-4.00	-0.44	0.002	8.43E-05	0.3	2.1	450870
42	-5.00	-0.31	0.002	7.88E-05	-0.1	2.1	450870
43	-6.00	-0.21	0.002	7.41E-05	-0.3	1.7	450870
44	-7.00	-0.09	0.002	7.07E-05	-0.5	1.2	450870
45	-8.00	0.17	0.002	6.88E-05	-0.4	0.5	450870
46	-9.00	0.70	0.002	6.83E-05	0.0	0.0	---

At elev. 22.73 The strut is slack

At elev. 18.10 Strut force = 213.7 kN/strut = 213.7 kN/m run

Node no.	Y coord	LEFT side						
		Water press.	Vertic -al	Effective Active limit	Effective Passive limit	Earth pressure	Total earth pressure	Coeff. of subgrade reaction
		kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m3
1	22.73	0.00	0.00	0.00	0.00	0.00	0.00	3650
2	21.73	0.00	26.99	8.34	111.54	18.83	18.83	3650
3	21.11	0.00	41.83	12.93	172.84	19.04	19.04	3650
4	20.48	0.00	54.91	16.97	226.89	18.70	18.70	3650
5	19.86	0.00	67.19	20.76	277.63	20.76	20.76a	1160
6	19.23	0.00	79.03	24.42	326.56	24.42	24.42a	1160
		0.00	79.03	18.75	490.29	18.75	18.75a	3946
7	18.34	0.05	96.29	22.85	597.36	22.85	22.90a	3946
8	18.10	2.45	98.49	23.37	611.03	23.37	25.82a	3946
9	18.00	3.45	99.40	23.59	616.69	23.59	27.04a	3946
		Total>	102.85	23.65m	222.35	23.65	23.65a	8503
10	17.51	Total>	112.67	26.10m	238.72	26.10	26.10a	8975
11	16.76	Total>	127.66	29.88m	263.82	29.88	29.88a	9703
12	16.00	Total>	142.54	33.65m	288.80	33.65	33.65a	10430
13	15.43	Total>	153.81	36.53m	307.77	36.53	36.53a	10984
14	14.85	Total>	165.05	39.40m	326.70	39.40	39.40a	11539
15	14.73	Total>	167.39	40.00m	330.65	40.00	40.00a	11654
16	14.12	Total>	179.38	43.08m	350.87	43.08	43.08a	12247
17	13.50	Total>	191.42	46.15m	371.15	46.15	46.15a	12839
18	12.82	Total>	229.72	49.55m	418.54	60.11	60.11	13495
19	12.14	Total>	242.86	52.95m	440.78	85.71	85.71	14150
20	12.04	Total>	244.47	53.45m	443.73	89.29	89.29	14246
21	11.64	Total>	250.73	55.45m	455.35	103.62	103.62	14632
22	10.82	Total>	263.85	59.55m	479.44	133.43	133.43	15422
23	10.00	Total>	278.09	63.65m	504.65	162.72	162.72	16212
24	9.41	Total>	289.01	66.61m	523.50	182.59	182.59	16782
25	8.82	Total>	300.37	69.57m	542.77	201.00	201.00	17352

Run ID. 3722Saville_Theatre_B2_top_down_secant	Sheet No.
135 Shaftsbury Avenue - Saville Theatre	Date: 4-04-2025
Secant 900mm @ 1500mm cc B2 topdown	Checked :

(continued)

Stage No.10 Excavate to elevation 11.64 on RIGHT side

Node no.	Y coord	LEFT side						
		Water press.	Vertic -al	Effective Active limit	Effective Passive limit	Earth pressure	Total earth pressure	Coeff. of subgrade reaction
		kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m3
26	8.32	Total>	310.22	72.07m	559.31	215.37	215.37	17834

27	7.66	Total>	323.47	75.36m	581.37	232.71	232.71	18468
28	7.00	Total>	336.92	78.65m	603.64	248.46	248.46	19103
29	6.25	Total>	352.43	82.41m	629.21	264.92	264.92	19827
30	5.50	Total>	368.04	86.17m	654.87	280.23	280.23	20551
31	4.75	Total>	383.61	89.91m	680.46	294.79	294.79	21272
32	4.00	Total>	399.16	93.65m	706.03	309.02	309.02	21993
33	3.00	Total>	419.88	99.71	740.13	327.93	327.93	22957
34	2.26	Total>	435.17	105.08	765.34	342.08	342.08	23672
35	1.52	Total>	450.39	110.38	790.49	356.39	356.39	24386
36	0.62	Total>	468.70	116.69	820.81	373.95	373.95	25250
37	-0.19	Total>	485.15	122.30	848.10	390.01	390.01	26031
38	-1.00	Total>	501.52	127.83	875.31	406.20	406.20	26811
39	-2.00	Total>	521.62	134.56	908.80	426.31	426.31	27775
40	-3.00	Total>	541.62	141.17	942.18	446.47	446.47	28739
41	-4.00	Total>	561.53	147.70	975.47	466.62	466.62	29702
42	-5.00	Total>	581.36	154.15	1008.68	486.75	486.75	30666
43	-6.00	Total>	601.12	160.53	1041.82	506.86	506.86	31629
44	-7.00	Total>	620.82	166.85	1074.91	526.96	526.96	32593
45	-8.00	Total>	640.47	173.13	1107.95	547.11	547.11	33556
46	-9.00	Total>	660.09	179.36	1140.95	567.36	567.36	34520

Node no.	Y coord	----- RIGHT side -----						
		Water press. kN/m2	Vertic -al kN/m2	Effective Active limit kN/m2	Passive limit kN/m2	Earth pressure kN/m2	Total earth pressure kN/m2	Coeff. of subgrade reaction kN/m3
1	22.73	0.00	0.00	0.00	0.00	0.00	0.00	0.0
2	21.73	0.00	0.00	0.00	0.00	0.00	0.00	0.0
3	21.11	0.00	0.00	0.00	0.00	0.00	0.00	0.0
4	20.48	0.00	0.00	0.00	0.00	0.00	0.00	0.0
5	19.86	0.00	0.00	0.00	0.00	0.00	0.00	0.0
6	19.23	0.00	0.00	0.00	0.00	0.00	0.00	0.0
7	18.34	0.00	0.00	0.00	0.00	0.00	0.00	0.0
8	18.10	0.00	0.00	0.00	0.00	0.00	0.00	0.0
9	18.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
10	17.51	0.00	0.00	0.00	0.00	0.00	0.00	0.0
11	16.76	0.00	0.00	0.00	0.00	0.00	0.00	0.0
12	16.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
13	15.43	0.00	0.00	0.00	0.00	0.00	0.00	0.0
14	14.85	0.00	0.00	0.00	0.00	0.00	0.00	0.0
15	14.73	0.00	0.00	0.00	0.00	0.00	0.00	0.0
16	14.12	0.00	0.00	0.00	0.00	0.00	0.00	0.0
17	13.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
18	12.82	0.00	0.00	0.00	0.00	0.00	0.00	0.0
19	12.14	0.00	0.00	0.00	0.00	0.00	0.00	0.0
20	12.04	0.00	0.00	0.00	0.00	0.00	0.00	0.0
21	11.64	0.00	0.00	0.00	0.00	0.00	0.00	0.0
		Total>	0.00	0.00	204.62	204.62	204.62p	28109
22	10.82	Total>	16.40	4.10m	231.99	231.99	231.99p	29627
23	10.00	Total>	32.80	8.20m	259.37	232.14	232.14	31145
24	9.41	Total>	44.64	11.16m	279.12	226.94	226.94	32240
25	8.82	Total>	56.48	14.12m	298.88	225.10	225.10	33335
26	8.32	Total>	66.49	16.62m	315.58	226.17	226.17	34260

Run ID. 3722Saville_Theatre_B2_top_down_secant
135 Shaftsbury Avenue - Saville Theatre
Secant 900mm @ 1500mm cc B2 topdown

| Sheet No.
| Date: 4-04-2025
| Checked :

(continued)

Stage No.10 Excavate to elevation 11.64 on RIGHT side

Node no.	Y coord	----- RIGHT side -----						
		Water	Vertic	Effective	Passive	Earth	Total	Coeff. of
		press.	-al	Active	limit	pressure	earth	subgrade
		kN/m2	kN/m2	limit	limit	kN/m2	kN/m2	reaction
27	7.66	Total>	79.68	19.91m	337.58	230.99	230.99	35479
28	7.00	Total>	92.87	23.20m	359.59	239.14	239.14	36698
29	6.25	Total>	107.94	26.96m	384.72	251.59	251.59	38089
30	5.50	Total>	123.03	30.71m	409.86	266.39	266.39	39481
31	4.75	Total>	138.06	34.46m	434.91	282.51	282.51	40866
32	4.00	Total>	153.12	38.20m	459.98	299.27	299.27	42252
33	3.00	Total>	173.25	43.20m	493.51	321.80	321.80	44103
34	2.26	Total>	188.21	46.91m	518.38	338.24	338.24	45475
35	1.52	Total>	203.18	50.62m	543.28	354.30	354.30	46848
36	0.62	Total>	221.32	55.10m	573.42	373.19	373.19	48509
37	-0.19	Total>	237.73	59.15m	600.67	390.13	390.13	50008
38	-1.00	Total>	254.16	63.20m	627.95	406.76	406.76	51507
39	-2.00	Total>	274.49	68.20m	661.66	426.99	426.99	53359
40	-3.00	Total>	294.86	73.20m	695.42	447.06	447.06	55210
41	-4.00	Total>	315.28	78.20m	729.22	467.06	467.06	57061
42	-5.00	Total>	335.75	83.20m	763.07	487.07	487.07	58912
43	-6.00	Total>	356.26	88.20m	796.97	507.07	507.07	60763
44	-7.00	Total>	376.82	93.20m	830.91	527.05	527.05	62614
45	-8.00	Total>	397.43	98.20m	864.90	546.94	546.94	64465
46	-9.00	Total>	418.08	103.20m	898.94	566.66	566.66	66317

Note: 46.15a Soil pressure at active limit
231.99p Soil pressure at passive limit

=====A-SQUARED STUDIO
ENGINEERS LTD | Sheet No.
Program: WALLAP Version 6.06 Revision A51.B69.R55 | Job No. 3722
Licensed from GEOSOLVE | Made by : SF
Data filename/Run ID: 3722Saville_Theatre__B2_top_down_secant
135 Shaftsbury Avenue - Saville Theatre | Date: 4-04-2025
Secant 900mm @ 1500mm cc B2 topdown | Checked :

Units: kN,m

Stage No. 12 Excavate to elevation 8.32 on RIGHT side

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

			FoS for toe		Toe elev. for		
			elev. = -9.00		FoS = 1.000		
			-----		-----		
Stage	--- G.L. ---	Strut	Factor	Moment	Toe	Wall	Direction of failure
No.	Act. Pass.	Elev.	of	equilib.	elev.	Penetr	
			Safety	at elev.		-ation	
12	22.73	8.32	More than one strut. No FoS calc.				

BENDING MOMENT and DISPLACEMENT ANALYSIS of Fully Embedded Wall **Analysis options**

Length of wall perpendicular to section = 50.00m
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: Left side 25.00 from wall
Right side 25.00 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.

*** Wall displacements reset to zero at stage 4

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	EI of wall kN.m2/m
1	22.73	0.00	0.028	2.21E-03	0.0	0.0	-0.0	450870
2	21.73	20.51	0.025	2.20E-03	10.3	3.1		450870
3	21.11	20.50	0.024	2.19E-03	23.1	13.8		450870
4	20.48	19.94	0.023	2.15E-03	35.7	32.6		450870
5	19.86	21.78	0.021	2.08E-03	48.7	59.1		450870
6	19.23	25.20	0.020	1.95E-03	63.4	94.1		450870
		21.41	0.020	1.95E-03	63.4	94.1		
7	18.34	24.36	0.018	1.65E-03	83.8	159.7		450870
8	18.10	26.93	0.018	1.53E-03	89.9	180.6	205.7	450870
		26.93	0.018	1.53E-03	-115.8	180.6		
9	18.00	28.00	0.018	1.49E-03	-113.0	169.1		450870
		25.64	0.018	1.49E-03	-113.0	169.1		
10	17.51	26.56	0.017	1.27E-03	-100.2	117.0		450870
11	16.76	29.88	0.016	1.03E-03	-78.9	49.4		450870
12	16.00	33.65	0.016	8.75E-04	-55.0	2.5		450870
13	15.43	36.53	0.015	8.15E-04	-34.8	-20.1		450870
14	14.85	39.40	0.015	8.07E-04	-13.0	-35.2		450870
15	14.73	40.00	0.015	8.12E-04	-8.2	-36.5		450870
16	14.12	43.08	0.014	8.60E-04	17.3	-35.7		450870
17	13.50	46.15	0.014	9.23E-04	44.8	-18.3		450870
18	12.82	49.55	0.013	9.55E-04	77.3	30.4		450870
19	12.14	52.95	0.012	9.04E-04	112.2	93.3	273.1	450870
		52.95	0.012	9.04E-04	-160.9	93.3		
20	12.04	53.45	0.012	8.92E-04	-155.6	77.5		450870
21	11.64	55.45	0.012	8.73E-04	-133.8	19.3		450870
22	10.82	67.81	0.011	9.61E-04	-83.3	-65.0		450870
23	10.00	86.77	0.010	1.14E-03	-19.9	-94.2		450870
24	9.41	103.69	0.009	1.29E-03	36.4	-91.2		450870

Run ID. 3722Saville Theatre_B2_top_down_secant

135 Shaftsbury Avenue - Saville Theatre

Secant 900mm @ 1500mm cc B2 topdown

| Sheet No.

| Date: 4-04-2025

| Checked :

(continued)

Stage No.12 Excavate to elevation 8.32 on RIGHT 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	EI of wall kN.m2/m
25	8.82	123.41	0.009	1.40E-03	103.6	-51.6		450870
26	8.32	141.89	0.008	1.44E-03	169.9	15.7		450870
		-107.20	0.008	1.44E-03	169.9	15.7		
27	7.66	-103.55	0.007	1.37E-03	100.6	103.1		450870
28	7.00	-80.74	0.006	1.19E-03	39.9	154.5		450870
29	6.25	-46.77	0.005	9.42E-04	-8.0	161.7		450870
30	5.50	-20.92	0.005	6.93E-04	-33.5	142.5		450870
31	4.75	-3.47	0.004	4.82E-04	-42.6	111.7		450870
32	4.00	6.79	0.004	3.22E-04	-41.4	78.9		450870
33	3.00	12.09	0.004	1.84E-04	-31.9	41.1		450870
34	2.26	12.06	0.004	1.29E-04	-23.0	20.8		450870
35	1.52	10.30	0.004	1.01E-04	-14.7	7.2		450870
36	0.62	7.35	0.003	9.13E-05	-6.8	-1.8		450870
37	-0.19	4.50	0.003	9.32E-05	-2.0	-4.8		450870
38	-1.00	2.24	0.003	9.85E-05	0.8	-4.9		450870
39	-2.00	0.42	0.003	1.04E-04	2.1	-3.1		450870
40	-3.00	-0.49	0.003	1.06E-04	2.1	-0.8		450870
41	-4.00	-0.80	0.003	1.04E-04	1.4	0.9		450870

42	-5.00	-0.77	0.003	1.00E-04	0.6	1.8	450870
43	-6.00	-0.60	0.003	9.60E-05	-0.1	2.0	450870
44	-7.00	-0.31	0.003	9.21E-05	-0.5	1.5	450870
45	-8.00	0.17	0.003	8.97E-05	-0.6	0.7	450870
46	-9.00	0.99	0.003	8.90E-05	0.0	0.0	---

At elev. 22.73 The strut is slack

At elev. 18.10 Strut force = 205.7 kN/strut = 205.7 kN/m run

At elev. 12.14 Strut force = 273.1 kN/strut = 273.1 kN/m run

Node no.	Y coord	LEFT side						Total earth pressure kN/m2	Coeff. of subgrade reaction kN/m3
		Effective stresses							
		Water press. kN/m2	Vertic -al kN/m2	Active limit kN/m2	Passive limit kN/m2	Earth pressure kN/m2			
1	22.73	0.00	0.00	0.00	0.00	0.00	0.00	2057	
2	21.73	0.00	26.99	8.34	111.54	20.51	20.51	2057	
3	21.11	0.00	41.83	12.93	172.84	20.50	20.50	2057	
4	20.48	0.00	54.91	16.97	226.89	19.94	19.94	2057	
5	19.86	0.00	67.19	20.76	277.63	21.78	21.78	2057	
6	19.23	0.00	79.03	24.42	326.56	25.20	25.20	2057	
7	18.34	0.00	79.03	18.75	490.29	21.41	21.41	6993	
		0.05	96.29	22.85	597.36	24.31	24.36	6993	
		2.45	98.49	23.37	611.03	24.48	26.93	6993	
9	18.00	3.45	99.40	23.59	616.69	24.55	28.00	6993	
10	17.51	Total>	102.85	23.65m	222.35	25.64	25.64	14403	
		Total>	112.67	26.10m	238.72	26.56	26.56	15202	
		Total>	127.66	29.88m	263.82	29.88	29.88a	10486	
12	16.00	Total>	142.54	33.65m	288.80	33.65	33.65a	11273	
13	15.43	Total>	153.81	36.53m	307.77	36.53	36.53a	11871	
14	14.85	Total>	165.05	39.40m	326.70	39.40	39.40a	12470	
15	14.73	Total>	167.39	40.00m	330.65	40.00	40.00a	12595	
16	14.12	Total>	179.38	43.08m	350.87	43.08	43.08a	13236	
17	13.50	Total>	191.42	46.15m	371.15	46.15	46.15a	13876	
18	12.82	Total>	229.72	49.55m	418.54	49.55	49.55a	14584	
19	12.14	Total>	242.86	52.95m	440.78	52.95	52.95a	15292	
20	12.04	Total>	244.47	53.45m	443.73	53.45	53.45a	15396	
21	11.64	Total>	250.73	55.45m	455.35	55.45	55.45a	15813	
22	10.82	Total>	263.85	59.55m	479.44	67.81	67.81	16667	
23	10.00	Total>	278.09	63.65m	504.65	86.77	86.77	17521	

Run ID. 3722Saville_Theatre_B2_top_down_secant	Sheet No.
135 Shaftsbury Avenue - Saville Theatre	Date: 4-04-2025
Secant 900mm @ 1500mm cc B2 topdown	Checked :

(continued)

Stage No.12 Excavate to elevation 8.32 on RIGHT side

Node no.	Y coord	LEFT side						
		Effective stresses					Total earth pressure	Coeff. of subgrade reaction
		Water press.	Vertic -al	Active limit	Passive limit	Earth pressure		
		kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m3
24	9.41	Total>	289.01	66.61m	523.50	103.69	103.69	18137
25	8.82	Total>	300.37	69.57m	542.77	123.41	123.41	18753
26	8.32	Total>	310.22	72.07m	559.31	141.89	141.89	19274
27	7.66	Total>	323.47	75.36m	581.37	167.53	167.53	19959
28	7.00	Total>	336.92	78.65m	603.64	193.02	193.02	20645
29	6.25	Total>	352.43	82.41m	629.21	220.25	220.25	21428
30	5.50	Total>	368.04	86.17m	654.87	244.67	244.67	22210
31	4.75	Total>	383.61	89.91m	680.46	266.06	266.06	22990
32	4.00	Total>	399.16	93.65m	706.03	284.88	284.88	23769
33	3.00	Total>	419.88	99.71	740.13	306.98	306.98	24811

34	2.26	Total>	435.17	105.08	765.34	321.92	321.92	25583
35	1.52	Total>	450.39	110.38	790.49	336.21	336.21	26355
36	0.62	Total>	468.70	116.69	820.81	353.16	353.16	27289
37	-0.19	Total>	485.15	122.30	848.10	368.49	368.49	28133
38	-1.00	Total>	501.52	127.83	875.31	384.00	384.00	28976
39	-2.00	Total>	521.62	134.56	908.80	403.47	403.47	30017
40	-3.00	Total>	541.62	141.17	942.18	423.25	423.25	31059
41	-4.00	Total>	561.53	147.70	975.47	443.22	443.22	32100
42	-5.00	Total>	581.36	154.15	1008.68	463.29	463.29	33142
43	-6.00	Total>	601.12	160.53	1041.82	483.41	483.41	34183
44	-7.00	Total>	620.82	166.85	1074.91	503.56	503.56	35224
45	-8.00	Total>	640.47	173.13	1107.95	523.79	523.79	36266
46	-9.00	Total>	660.09	179.36	1140.95	544.14	544.14	37307

Node no.	Y coord	----- RIGHT side -----						
		Water press. kN/m2	Vertic -al kN/m2	Effective Active limit kN/m2	Effective Passive limit kN/m2	Earth pressure kN/m2	Total earth pressure kN/m2	Coeff. of subgrade reaction kN/m3
1	22.73	0.00	0.00	0.00	0.00	0.00	0.00	0.0
2	21.73	0.00	0.00	0.00	0.00	0.00	0.00	0.0
3	21.11	0.00	0.00	0.00	0.00	0.00	0.00	0.0
4	20.48	0.00	0.00	0.00	0.00	0.00	0.00	0.0
5	19.86	0.00	0.00	0.00	0.00	0.00	0.00	0.0
6	19.23	0.00	0.00	0.00	0.00	0.00	0.00	0.0
7	18.34	0.00	0.00	0.00	0.00	0.00	0.00	0.0
8	18.10	0.00	0.00	0.00	0.00	0.00	0.00	0.0
9	18.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
10	17.51	0.00	0.00	0.00	0.00	0.00	0.00	0.0
11	16.76	0.00	0.00	0.00	0.00	0.00	0.00	0.0
12	16.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
13	15.43	0.00	0.00	0.00	0.00	0.00	0.00	0.0
14	14.85	0.00	0.00	0.00	0.00	0.00	0.00	0.0
15	14.73	0.00	0.00	0.00	0.00	0.00	0.00	0.0
16	14.12	0.00	0.00	0.00	0.00	0.00	0.00	0.0
17	13.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
18	12.82	0.00	0.00	0.00	0.00	0.00	0.00	0.0
19	12.14	0.00	0.00	0.00	0.00	0.00	0.00	0.0
20	12.04	0.00	0.00	0.00	0.00	0.00	0.00	0.0
21	11.64	0.00	0.00	0.00	0.00	0.00	0.00	0.0
22	10.82	0.00	0.00	0.00	0.00	0.00	0.00	0.0
23	10.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
24	9.41	0.00	0.00	0.00	0.00	0.00	0.00	0.0
25	8.82	0.00	0.00	0.00	0.00	0.00	0.00	0.0

Run ID. 3722Saville_Theatre__B2_top_down_secant | Sheet No.
 135 Shaftsbury Avenue - Saville Theatre | Date: 4-04-2025
 Secant 900mm @ 1500mm cc B2 topdown | Checked :

(continued)

Stage No.12 Excavate to elevation 8.32 on RIGHT side

Node no.	Y coord	----- RIGHT side -----						
		Water press. kN/m2	Vertic -al kN/m2	Effective Active limit kN/m2	Effective Passive limit kN/m2	Earth pressure kN/m2	Total earth pressure kN/m2	Coeff. of subgrade reaction kN/m3
26	8.32	0.00	0.00	0.00	0.00	0.00	0.00	0.0
		Total>	0.00	0.00	249.09	249.09	249.09p	34257
27	7.66	Total>	13.17	3.29m	271.08	271.08	271.08p	35475
28	7.00	Total>	26.34	6.58m	293.06	273.76	273.76	36694

29	6.25	Total>	41.38	10.34m	318.15	267.02	267.02	38085
30	5.50	Total>	56.42	14.10m	343.26	265.59	265.59	39476
31	4.75	Total>	71.41	17.84m	368.26	269.53	269.53	40862
32	4.00	Total>	86.42	21.58m	393.29	278.09	278.09	42247
33	3.00	Total>	106.48	26.58m	426.73	294.89	294.89	44098
34	2.26	Total>	121.38	30.29m	451.55	309.86	309.86	45471
35	1.52	Total>	136.29	34.00m	476.39	325.91	325.91	46843
36	0.62	Total>	154.36	38.48m	506.47	345.81	345.81	48503
37	-0.19	Total>	170.71	42.54m	533.65	363.99	363.99	50003
38	-1.00	Total>	187.08	46.59m	560.87	381.76	381.76	51502
39	-2.00	Total>	207.33	51.59m	594.51	403.06	403.06	53353
40	-3.00	Total>	227.64	56.59m	628.19	423.74	423.74	55204
41	-4.00	Total>	248.00	61.58m	661.94	444.02	444.02	57055
42	-5.00	Total>	268.41	66.58m	695.73	464.07	464.07	58906
43	-6.00	Total>	288.88	71.58m	729.59	484.01	484.01	60757
44	-7.00	Total>	309.41	76.58m	763.50	503.87	503.87	62608
45	-8.00	Total>	330.00	81.59m	797.48	523.62	523.62	64459
46	-9.00	Total>	350.65	86.59m	831.51	543.15	543.15	66310

Note: 55.45a Soil pressure at active limit
271.08p Soil pressure at passive limit

=====A-SQUARED STUDIO
ENGINEERS LTD | Sheet No.
Program: WALLAP Version 6.06 Revision A51.B69.R55 | Job No. 3722
Licensed from GEOSOLVE | Made by : SF
Data filename/Run ID: 3722Saville Theatre__B2_top_down_secant
135 Shaftsbury Avenue - Saville Theatre | Date: 4-04-2025
Secant 900mm @ 1500mm cc B2 topdown | Checked :

Units: kN,m

Stage No. 14 Excavate to elevation 0.62 on RIGHT side

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

			FoS for toe		Toe elev. for			
			elev. = -9.00		FoS = 1.000			
			-----		-----			
Stage	--- G.L. ---	Strut	Factor	Moment	Toe	Wall	Direction	
No.	Act. Pass.	Elev.	of	equilib.	elev.	Penetr	of	
			Safety	at elev.		-ation	failure	
14	22.73	0.62	More than one strut. No FoS calc.					

BENDING MOMENT and DISPLACEMENT ANALYSIS of Fully Embedded Wall
Analysis options

Length of wall perpendicular to section = 50.00m
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: Left side 25.00 from wall
Right side 25.00 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.

*** Wall displacements reset to zero at stage 4

Node	Y	Nett	Wall	Wall	Shear	Bending	Strut	EI of
no.	coord	pressure	disp.	rotation	force	moment	forces	wall
		kN/m2	m	rad.	kN/m	kN.m/m	kN/m	kN.m2/m
1	22.73	0.00	0.028	2.43E-03	0.0	0.0	-0.0	450870

2	21.73	19.14	0.026	2.43E-03	9.6	3.1		450870
3	21.11	19.60	0.024	2.42E-03	21.7	13.1		450870
4	20.48	19.51	0.023	2.38E-03	33.9	30.8		450870
5	19.86	21.80	0.021	2.31E-03	46.8	56.1		450870
6	19.23	25.45	0.020	2.19E-03	61.6	89.9		450870
		22.26	0.020	2.19E-03	61.6	89.9		
7	18.34	26.32	0.018	1.89E-03	83.2	154.2		450870
8	18.10	29.21	0.018	1.78E-03	89.9	175.0	183.9	450870
		29.21	0.018	1.78E-03	-94.0	175.0		
9	18.00	30.41	0.017	1.74E-03	-91.0	165.7		450870
		30.68	0.017	1.74E-03	-91.0	165.7		
10	17.51	33.29	0.017	1.52E-03	-75.4	125.0		450870
11	16.76	39.37	0.016	1.24E-03	-47.9	78.1		450870
12	16.00	45.73	0.015	1.02E-03	-15.8	57.4		450870
13	15.43	50.11	0.014	8.77E-04	11.7	59.2		450870
14	14.85	53.70	0.014	7.49E-04	41.6	73.2		450870
15	14.73	54.32	0.014	7.24E-04	48.1	78.5		450870
16	14.12	56.43	0.013	5.90E-04	82.1	116.5		450870
17	13.50	56.25	0.013	4.16E-04	116.8	176.4		450870
18	12.82	52.32	0.013	1.16E-04	153.7	276.4		450870
19	12.14	52.95	0.013	-3.45E-04	189.5	391.8	327.7	450870
		52.95	0.013	-3.45E-04	-138.2	391.8		
20	12.04	53.45	0.013	-4.24E-04	-132.9	378.2		450870
21	11.64	55.45	0.013	-7.14E-04	-111.1	329.1		450870
22	10.82	59.55	0.014	-1.20E-03	-64.0	262.5		450870
23	10.00	63.65	0.015	-1.62E-03	-13.5	244.7		450870
24	9.41	66.61	0.016	-1.92E-03	25.1	246.7		450870

Run ID. 3722Saville_Theatre_B2_top_down_secant | Sheet No.
135 Shaftsbury Avenue - Saville Theatre | Date: 4-04-2025
Secant 900mm @ 1500mm cc B2 topdown | Checked :

(continued)

Stage No.14 Excavate to elevation 0.62 on RIGHT 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	EI of wall kN.m2/m
25	8.82	69.57	0.017	-2.24E-03	65.3	272.1	431.0	450870
		69.57	0.017	-2.24E-03	-365.6	272.1		
26	8.32	72.07	0.018	-2.43E-03	-330.2	97.3		450870
27	7.66	75.36	0.020	-2.40E-03	-281.7	-105.7		450870
28	7.00	78.65	0.022	-2.12E-03	-231.0	-268.7		450870
29	6.25	82.41	0.023	-1.53E-03	-170.4	-422.9		450870
30	5.50	86.17	0.024	-7.40E-04	-107.1	-529.7		450870
31	4.75	89.91	0.024	1.87E-04	-41.2	-586.9		450870
32	4.00	93.65	0.024	1.16E-03	27.5	-593.1		450870
33	3.00	99.71	0.022	2.39E-03	124.2	-518.5		450870
34	2.26	105.08	0.020	3.14E-03	200.1	-398.5		450870
35	1.52	110.38	0.017	3.64E-03	280.0	-220.5		450870
36	0.62	116.69	0.014	3.78E-03	381.8	76.3		450870
		-235.41	0.014	3.78E-03	381.8	76.3		
37	-0.19	-199.10	0.011	3.41E-03	205.8	333.3		450870
38	-1.00	-153.01	0.008	2.72E-03	63.2	433.7		450870
39	-2.00	-113.59	0.006	1.77E-03	-70.1	418.3		450870
40	-3.00	-13.95	0.005	9.49E-04	-133.8	322.4		450870
41	-4.00	36.24	0.004	3.88E-04	-122.7	181.5		450870
42	-5.00	46.06	0.004	1.01E-04	-81.5	76.9		450870
43	-6.00	36.58	0.004	-4.72E-06	-40.2	18.3		450870
44	-7.00	21.11	0.004	-2.11E-05	-11.4	-3.7		450870
45	-8.00	5.49	0.004	-1.20E-05	1.9	-4.6		450870
46	-9.00	-9.36	0.004	-6.95E-06	0.0	0.0		---

At elev. 22.73 The strut is slack

At elev. 18.10 Strut force = 183.9 kN/strut = 183.9 kN/m run
 At elev. 12.14 Strut force = 327.7 kN/strut = 327.7 kN/m run
 At elev. 8.82 Strut force = 431.0 kN/strut = 431.0 kN/m run

Node no.	Y coord	LEFT side						
		Water press. kN/m2	Vertic -al kN/m2	Effective Active limit kN/m2	Effective Passive limit kN/m2	Earth pressure kN/m2	Total earth pressure kN/m2	Coeff. of subgrade reaction kN/m3
1	22.73	0.00	0.00	0.00	0.00	0.00	0.00	3363
2	21.73	0.00	26.99	8.34	111.54	19.14	19.14	3363
3	21.11	0.00	41.83	12.93	172.84	19.60	19.60	3363
4	20.48	0.00	54.91	16.97	226.89	19.51	19.51	3363
5	19.86	0.00	67.19	20.76	277.63	21.80	21.80	1530
6	19.23	0.00	79.03	24.42	326.56	25.45	25.45	1530
		0.00	79.03	18.75	490.29	22.26	22.26	5202
7	18.34	0.05	96.29	22.85	597.36	26.27	26.32	5202
8	18.10	2.45	98.49	23.37	611.03	26.76	29.21	5202
9	18.00	3.45	99.40	23.59	616.69	26.96	30.41	5202
		Total>	102.85	23.65m	222.35	30.68	30.68	10916
10	17.51	Total>	112.67	26.10m	238.72	33.29	33.29	11522
11	16.76	Total>	127.66	29.88m	263.82	39.37	39.37	12456
12	16.00	Total>	142.54	33.65m	288.80	45.73	45.73	13390
13	15.43	Total>	153.81	36.53m	307.77	50.11	50.11	14101
14	14.85	Total>	165.05	39.40m	326.70	53.70	53.70	14812
15	14.73	Total>	167.39	40.00m	330.65	54.32	54.32	14961
16	14.12	Total>	179.38	43.08m	350.87	56.43	56.43	15722
17	13.50	Total>	191.42	46.15m	371.15	56.25	56.25	16482
18	12.82	Total>	229.72	49.55m	418.54	52.32	52.32	17324
19	12.14	Total>	242.86	52.95m	440.78	52.95	52.95a	13805
20	12.04	Total>	244.47	53.45m	443.73	53.45	53.45a	13899
21	11.64	Total>	250.73	55.45m	455.35	55.45	55.45a	14275

Run ID. 3722Saville_Theatre_B2_top_down_secant | Sheet No.
 135 Shaftsbury Avenue - Saville Theatre | Date: 4-04-2025
 Secant 900mm @ 1500mm cc B2 topdown | Checked :

(continued)

Stage No.14 Excavate to elevation 0.62 on RIGHT side

Node no.	Y coord	LEFT side						
		Water press. kN/m2	Vertic -al kN/m2	Effective Active limit kN/m2	Effective Passive limit kN/m2	Earth pressure kN/m2	Total earth pressure kN/m2	Coeff. of subgrade reaction kN/m3
22	10.82	Total>	263.85	59.55m	479.44	59.55	59.55a	15046
23	10.00	Total>	278.09	63.65m	504.65	63.65	63.65a	15817
24	9.41	Total>	289.01	66.61m	523.50	66.61	66.61a	16373
25	8.82	Total>	300.37	69.57m	542.77	69.57	69.57a	16929
26	8.32	Total>	310.22	72.07m	559.31	72.07	72.07a	17399
27	7.66	Total>	323.47	75.36m	581.37	75.36	75.36a	18018
28	7.00	Total>	336.92	78.65m	603.64	78.65	78.65a	18637
29	6.25	Total>	352.43	82.41m	629.21	82.41	82.41a	19344
30	5.50	Total>	368.04	86.17m	654.87	86.17	86.17a	20050
31	4.75	Total>	383.61	89.91m	680.46	89.91	89.91a	20754
32	4.00	Total>	399.16	93.65m	706.03	93.65	93.65a	21458
33	3.00	Total>	419.88	99.71	740.13	99.71	99.71a	22398
34	2.26	Total>	435.17	105.08	765.34	105.08	105.08a	23095
35	1.52	Total>	450.39	110.38	790.49	110.38	110.38a	23792
36	0.62	Total>	468.70	116.69	820.81	116.69	116.69a	24635
37	-0.19	Total>	485.15	122.30	848.10	180.04	180.04	25397
38	-1.00	Total>	501.52	127.83	875.31	253.18	253.18	26158

[illegible]

35	1.52	0.00	0.00	0.00	0.00	0.00	0.00	0.0
36	0.62	0.00	0.00	0.00	0.00	0.00	0.00	0.0
		Total>	0.00	0.00	352.11	352.11	352.11p	63473
37	-0.19	Total>	16.20	4.05m	379.15	379.15	379.15p	65434
38	-1.00	Total>	32.41	8.10m	406.19	406.19	406.19p	67396
39	-2.00	Total>	52.43	13.10m	439.60	439.60	439.60p	69819
40	-3.00	Total>	72.47	18.10m	473.02	391.75	391.75	72241
41	-4.00	Total>	92.54	23.10m	506.48	375.57	375.57	74663
42	-5.00	Total>	112.66	28.10m	539.98	388.48	388.48	77085
43	-6.00	Total>	132.82	33.10m	573.53	415.30	415.30	79507
44	-7.00	Total>	153.03	38.10m	607.12	446.43	446.43	81930
45	-8.00	Total>	173.31	43.10m	640.79	477.69	477.69	84352
46	-9.00	Total>	193.66	48.10m	674.51	508.43	508.43	86774

Note: 116.69a Soil pressure at active limit
439.60p Soil pressure at passive limit

=====A-SQUARED STUDIO

ENGINEERS LTD | Sheet No.
Program: WALLAP Version 6.06 Revision A51.B69.R55 | Job No. 3722
Licensed from GEOSOLVE | Made by : SF
Data filename/Run ID: 3722Saville_Theatre__B2_top_down_secant
135 Shaftsbury Avenue - Saville Theatre | Date: 4-04-2025
Secant 900mm @ 1500mm cc B2 topdown | Checked :

Units: kN,m

Stage No. 18 Remove strut or anchor no.5 at elevation 12.14

STABILITY ANALYSIS of Fully Embedded Wall according to Strength Factor method

Factor of safety on soil strength

			FoS for toe		Toe elev. for			
			elev. = -9.00		FoS = 1.000			
			-----		-----			
Stage	--- G.L. ---	Strut	Factor	Moment	Toe	Wall	Direction	
No.	Act.	Pass.	of	equilib.	elev.	Penetr	of	
			Safety	at elev.		-ation	failure	
18	22.73	0.62	More than one strut. No FoS calc.					

BENDING MOMENT and DISPLACEMENT ANALYSIS of Fully Embedded Wall

Analysis options

Length of wall perpendicular to section = 50.00m
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: Left side 25.00 from wall
Right side 25.00 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.

*** Wall displacements reset to zero at stage 4

Node	Y	Nett	Wall	Wall	Shear	Bending	Strut	EI of
no.	coord	pressure	disp.	rotation	force	moment	forces	wall
		kN/m2	m	rad.	kN/m	kN.m/m	kN/m	kN.m2/m
1	22.73	0.00	0.026	1.85E-03	0.0	0.0	-0.0	450870
2	21.73	23.77	0.024	1.85E-03	11.9	3.1		450870
3	21.11	23.29	0.023	1.83E-03	26.6	15.5		450870
4	20.48	22.24	0.022	1.79E-03	40.8	37.0		450870
5	19.86	23.56	0.021	1.71E-03	55.1	67.1		450870
6	19.23	26.22	0.020	1.57E-03	70.7	106.5		450870

		24.87	0.020	1.57E-03	70.7	106.5		
7	18.34	25.21	0.018	1.23E-03	93.0	179.9		450870
8	18.10	27.44	0.018	1.11E-03	99.3	203.0	205.7	450870
		27.44	0.018	1.11E-03	-106.4	203.0		
9	18.00	28.37	0.018	1.05E-03	-103.6	192.5		450870
		26.30	0.018	1.05E-03	-103.6	192.5		
10	17.51	26.10	0.017	8.16E-04	-90.7	144.8		450870
11	16.76	29.88	0.017	5.16E-04	-69.6	84.0		450870
12	16.00	33.65	0.017	2.98E-04	-45.6	44.0		450870
13	15.43	36.53	0.017	1.82E-04	-25.4	26.6		450870
14	14.85	39.40	0.016	1.11E-04	-3.6	16.9		450870
15	14.73	40.00	0.016	1.01E-04	1.1	16.7		450870
16	14.12	43.08	0.016	7.38E-05	26.7	23.2		450870
17	13.50	46.15	0.016	5.22E-05	54.1	46.7		450870
18	12.82	49.55	0.016	-1.90E-05	86.7	102.3		450870
19	12.14	52.95	0.016	-1.83E-04	121.5	171.7		450870
20	12.04	53.45	0.016	-2.16E-04	126.8	184.1	179.3	450870
		53.45	0.016	-2.16E-04	-52.5	184.1		
21	11.64	55.45	0.017	-3.48E-04	-30.7	167.2		450870
22	10.82	59.55	0.017	-6.05E-04	16.5	166.5		450870
23	10.00	63.65	0.018	-9.11E-04	67.0	214.6		450870
24	9.41	66.61	0.018	-1.19E-03	105.5	264.2		450870

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Run ID. 3722Saville_Theatre_B2_top_down_secant      | Sheet No.
135 Shaftsbury Avenue - Saville Theatre             | Date: 4-04-2025
Secant 900mm @ 1500mm cc B2 topdown                 | Checked :
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(continued)

Stage No.18 Remove strut or anchor no.5 at elevation 12.14

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	EI of wall kN.m2/m
25	8.82	69.57	0.019	-1.57E-03	145.8	337.2	514.7	450870
		69.57	0.019	-1.57E-03	-368.9	337.2		
26	8.32	72.07	0.020	-1.83E-03	-333.5	160.8		450870
27	7.66	75.36	0.021	-1.90E-03	-285.0	-44.4		450870
28	7.00	78.65	0.022	-1.70E-03	-234.3	-209.6		450870
29	6.25	82.41	0.023	-1.21E-03	-173.8	-366.3		450870
30	5.50	86.17	0.024	-5.10E-04	-110.4	-475.6	10.3	450870
		86.17	0.024	-5.10E-04	-120.8	-475.6		
31	4.75	89.91	0.024	3.35E-04	-54.9	-543.0		450870
32	4.00	94.30	0.024	1.24E-03	14.1	-559.4		450870
33	3.00	102.18	0.022	2.41E-03	112.3	-497.9		450870
34	2.26	107.86	0.020	3.13E-03	190.2	-386.0		450870
35	1.52	112.91	0.017	3.62E-03	272.0	-214.6	-0.0	450870
36	0.62	118.53	0.014	3.76E-03	375.8	76.1		450870
		-229.67	0.014	3.76E-03	375.8	76.1		
37	-0.19	-195.53	0.011	3.39E-03	203.6	330.1		450870
38	-1.00	-151.23	0.008	2.70E-03	63.2	429.9		450870
39	-2.00	-113.26	0.006	1.76E-03	-69.0	415.4		450870
40	-3.00	-14.19	0.005	9.46E-04	-132.8	320.7		450870
41	-4.00	35.88	0.004	3.88E-04	-121.9	180.8		450870
42	-5.00	45.75	0.004	1.02E-04	-81.1	76.7		450870
43	-6.00	36.37	0.004	-3.56E-06	-40.0	18.4		450870
44	-7.00	21.00	0.004	-2.02E-05	-11.4	-3.5		450870
45	-8.00	5.45	0.004	-1.13E-05	1.9	-4.5		450870
46	-9.00	-9.18	0.004	-6.40E-06	0.0	0.0		---

At elev. 22.73 The strut is slack

At elev. 18.10 Strut force = 205.7 kN/strut = 205.7 kN/m run

At elev. 12.04 Strut force = 179.3 kN/strut = 179.3 kN/m run

At elev. 8.82 Strut force = 514.7 kN/strut = 514.7 kN/m run

At elev. 5.50 Strut force = 10.3 kN/strut = 10.3 kN/m run

At elev. 1.52 The strut is slack

Node no.	Y coord	LEFT side						
		Effective stresses					Total earth pressure	Coeff. of subgrade reaction
		Water press. kN/m2	Vertic -al kN/m2	Active limit kN/m2	Passive limit kN/m2	Earth pressure kN/m2		
1	22.73	0.00	0.00	0.00	0.00	0.00	0.00	2603
2	21.73	0.00	26.99	8.34	111.54	23.77	23.77	2603
3	21.11	0.00	41.83	12.93	172.84	23.29	23.29	2603
4	20.48	0.00	54.91	16.97	226.89	22.24	22.24	2603
5	19.86	0.00	67.19	20.76	277.63	23.56	23.56	2603
6	19.23	0.00	79.03	24.42	326.56	26.22	26.22	2603
		0.00	79.03	18.75	490.29	24.87	24.87	8850
7	18.34	0.05	96.29	22.85	597.36	25.16	25.21	4052
8	18.10	2.45	98.49	23.37	611.03	24.99	27.44	4052
9	18.00	3.45	99.40	23.59	616.69	24.92	28.37	4052
		Total>	102.85	23.65m	222.35	26.30	26.30	8705
10	17.51	Total>	112.67	26.10m	238.72	26.10	26.10a	9188
11	16.76	Total>	127.66	29.88m	263.82	29.88	29.88a	9933
12	16.00	Total>	142.54	33.65m	288.80	33.65	33.65a	10678
13	15.43	Total>	153.81	36.53m	307.77	36.53	36.53a	11245
14	14.85	Total>	165.05	39.40m	326.70	39.40	39.40a	11812
15	14.73	Total>	167.39	40.00m	330.65	40.00	40.00a	11931
16	14.12	Total>	179.38	43.08m	350.87	43.08	43.08a	12537
17	13.50	Total>	191.42	46.15m	371.15	46.15	46.15a	13144
18	12.82	Total>	229.72	49.55m	418.54	49.55	49.55a	13815

Run ID. 3722Saville_Theatre_B2_top_down_secant | Sheet No.
 135 Shaftsbury Avenue - Saville Theatre | Date: 4-04-2025
 Secant 900mm @ 1500mm cc B2 topdown | Checked :

(continued)

Stage No.18 Remove strut or anchor no.5 at elevation 12.14

Node no.	Y coord	LEFT side						Total earth pressure	Coeff. of subgrade reaction
		Effective stresses							
		Water press. kN/m2	Vertic -al kN/m2	Active limit kN/m2	Passive limit kN/m2	Earth pressure kN/m2			
19	12.14	Total>	242.86	52.95m	440.78	52.95	52.95a	14486	
20	12.04	Total>	244.47	53.45m	443.73	53.45	53.45a	14584	
21	11.64	Total>	250.73	55.45m	455.35	55.45	55.45a	14979	
22	10.82	Total>	263.85	59.55m	479.44	59.55	59.55a	15788	
23	10.00	Total>	278.09	63.65m	504.65	63.65	63.65a	16597	
24	9.41	Total>	289.01	66.61m	523.50	66.61	66.61a	17180	
25	8.82	Total>	300.37	69.57m	542.77	69.57	69.57a	17764	
26	8.32	Total>	310.22	72.07m	559.31	72.07	72.07a	18257	
27	7.66	Total>	323.47	75.36m	581.37	75.36	75.36a	18906	
28	7.00	Total>	336.92	78.65m	603.64	78.65	78.65a	19556	
29	6.25	Total>	352.43	82.41m	629.21	82.41	82.41a	20297	
30	5.50	Total>	368.04	86.17m	654.87	86.17	86.17a	21039	
31	4.75	Total>	383.61	89.91m	680.46	89.91	89.91a	21777	
32	4.00	Total>	399.16	93.65m	706.03	94.30	94.30	33450	
33	3.00	Total>	419.88	99.71	740.13	102.18	102.18	34915	
34	2.26	Total>	435.17	105.08	765.34	107.86	107.86	36002	
35	1.52	Total>	450.39	110.38	790.49	112.91	112.91	37089	
36	0.62	Total>	468.70	116.69	820.81	118.53	118.53	38403	
37	-0.19	Total>	485.15	122.30	848.10	181.19	181.19	39590	
38	-1.00	Total>	501.52	127.83	875.31	253.75	253.75	40777	
39	-2.00	Total>	521.62	134.56	908.80	326.12	326.12	42243	
40	-3.00	Total>	541.62	141.17	942.18	377.68	377.68	44381	

[illegible]

(continued)

[illegible]

		Total>	0.00	0.00	352.11	348.20	348.20	81567
37	-0.19	Total>	16.20	4.05m	379.15	376.72	376.72	84088
38	-1.00	Total>	32.41	8.10m	406.19	404.99	404.99	86609
39	-2.00	Total>	52.43	13.10m	439.60	439.38	439.38	89722
40	-3.00	Total>	72.47	18.10m	473.02	391.87	391.87	44381
41	-4.00	Total>	92.54	23.10m	506.48	375.75	375.75	45869
42	-5.00	Total>	112.66	28.10m	539.98	388.64	388.64	47357
43	-6.00	Total>	132.82	33.10m	573.53	415.40	415.40	48845
44	-7.00	Total>	153.03	38.10m	607.12	446.49	446.49	50333
45	-8.00	Total>	173.31	43.10m	640.79	477.71	477.71	51821
46	-9.00	Total>	193.66	48.10m	674.51	508.34	508.34	387716

Note: 89.91a Soil pressure at active limit
123.45p Soil pressure at passive limit

=====A-SQUARED STUDIO
ENGINEERS LTD | Sheet No.
Program: WALLAP Version 6.06 Revision A51.B69.R55 | Job No. 3722
Licensed from GEOSOLVE | Made by : SF
Data filename/Run ID: 3722Saville Theatre__B2_top_down_secant
135 Shaftsbury Avenue - Saville Theatre | Date: 4-04-2025
Secant 900mm @ 1500mm cc B2 topdown | Checked :

Units: kN,m

Stage No. 19 Apply surcharge no.2 at elevation 0.62

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

				FoS for toe elev. = -9.00	Toe elev. for FoS = 1.000		
				-----	-----		
Stage	--- G.L. ---	Strut	Factor	Moment	Toe	Wall	Direction
No.	Act. Pass.	Elev.	of	equilib.	elev.	Penetr	of
			Safety	at elev.		-ation	failure
19	22.73 0.62		More than one	strut.	No	FoS calc.	

BENDING MOMENT and DISPLACEMENT ANALYSIS of Fully Embedded Wall

Analysis options

Length of wall perpendicular to section = 50.00m
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: Left side 25.00 from wall
Right side 25.00 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.

*** Wall displacements reset to zero at stage 4

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	EI of wall kN.m2/m
1	22.73	0.00	0.026	1.85E-03	0.0	0.0	-0.0	450870
2	21.73	23.82	0.024	1.84E-03	11.9	3.1		450870
3	21.11	23.33	0.023	1.83E-03	26.6	15.5		450870
4	20.48	22.28	0.022	1.79E-03	40.9	37.0		450870
5	19.86	23.60	0.021	1.70E-03	55.2	67.2		450870
6	19.23	26.25	0.020	1.56E-03	70.8	106.6		450870
		24.96	0.020	1.56E-03	70.8	106.6		
7	18.34	25.26	0.018	1.22E-03	93.2	180.2		450870

8	18.10	27.49	0.018	1.10E-03	99.5	203.3	205.3	450870
		27.49	0.018	1.10E-03	-105.8	203.3		
9	18.00	28.41	0.018	1.05E-03	-103.0	192.9		450870
		26.38	0.018	1.05E-03	-103.0	192.9		
10	17.51	26.15	0.017	8.10E-04	-90.2	145.5		450870
11	16.76	29.88	0.017	5.09E-04	-69.0	85.2		450870
12	16.00	33.65	0.017	2.88E-04	-45.0	45.5		450870
13	15.43	36.53	0.017	1.70E-04	-24.9	28.5		450870
14	14.85	39.40	0.016	9.63E-05	-3.0	19.1		450870
15	14.73	40.00	0.016	8.66E-05	1.7	19.0		450870
16	14.12	43.08	0.016	5.51E-05	27.3	25.9		450870
17	13.50	46.15	0.016	2.97E-05	54.7	49.7		450870
18	12.82	49.55	0.016	-4.63E-05	87.2	105.6		450870
19	12.14	52.95	0.016	-2.15E-04	122.1	175.5		450870
20	12.04	53.45	0.017	-2.49E-04	127.4	187.9	183.7	450870
		53.45	0.017	-2.49E-04	-56.3	187.9		
21	11.64	55.45	0.017	-3.84E-04	-34.5	169.5		450870
22	10.82	59.55	0.017	-6.42E-04	12.7	165.7		450870
23	10.00	63.65	0.018	-9.44E-04	63.2	210.7		450870
24	9.41	66.61	0.018	-1.22E-03	101.7	258.0		450870

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Run ID. 3722Saville_Theatre_B2_top_down_secant | Sheet No.
135 Shaftsbury Avenue - Saville Theatre | Date: 4-04-2025
Secant 900mm @ 1500mm cc B2 topdown | Checked :
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(continued)

Stage No.19 Apply surcharge no.2 at elevation 0.62

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	EI of wall kN.m2/m
25	8.82	69.57	0.019	-1.58E-03	142.0	328.7	524.3	450870
		69.57	0.019	-1.58E-03	-382.4	328.7		
26	8.32	72.07	0.020	-1.83E-03	-347.0	145.6		450870
27	7.66	75.36	0.021	-1.87E-03	-298.4	-68.5		450870
28	7.00	78.65	0.022	-1.63E-03	-247.7	-242.6		450870
29	6.25	82.41	0.023	-1.08E-03	-187.2	-409.3		450870
30	5.50	86.85	0.024	-3.00E-04	-123.6	-528.7	8.4	450870
		86.85	0.024	-3.00E-04	-132.0	-528.7		
31	4.75	94.18	0.024	6.40E-04	-64.3	-604.4		450870
32	4.00	103.85	0.023	1.66E-03	9.8	-626.7		450870
33	3.00	121.88	0.021	2.97E-03	122.7	-564.6		450870
34	2.26	137.54	0.018	3.79E-03	218.9	-439.6		450870
35	1.52	154.44	0.015	4.35E-03	327.1	-238.8	-0.0	450870
36	0.62	175.86	0.011	4.46E-03	475.3	118.1		450870
		-315.82	0.011	4.46E-03	475.3	118.1		
37	-0.19	-253.63	0.008	3.97E-03	244.6	424.4		450870
38	-1.00	-185.64	0.005	3.10E-03	66.7	538.4		450870
39	-2.00	-126.46	0.002	1.94E-03	-89.3	510.4		450870
40	-3.00	-14.68	0.001	9.40E-04	-159.9	389.1		450870
41	-4.00	41.50	0.000	2.61E-04	-146.5	222.4		450870
42	-5.00	53.14	0.000	-9.40E-05	-99.2	97.3		450870
43	-6.00	43.13	0.000	-2.30E-04	-51.0	25.5		450870
44	-7.00	25.98	0.001	-2.55E-04	-16.5	-3.1		450870
45	-8.00	8.13	0.001	-2.46E-04	0.6	-5.6		450870
46	-9.00	-9.31	0.001	-2.39E-04	0.0	0.0		---

At elev. 22.73 The strut is slack

At elev. 18.10 Strut force = 205.3 kN/strut = 205.3 kN/m run

At elev. 12.04 Strut force = 183.7 kN/strut = 183.7 kN/m run

At elev. 8.82 Strut force = 524.3 kN/strut = 524.3 kN/m run

At elev. 5.50 Strut force = 8.4 kN/strut = 8.4 kN/m run

At elev. 1.52 The strut is slack

Node no.	Y coord	LEFT side						Total earth pressure	Coeff. of subgrade reaction
		Effective stresses				Earth pressure			
		Water press. kN/m2	Vertic -al kN/m2	Active limit kN/m2	Passive limit kN/m2				
1	22.73	0.00	0.00	0.00	0.00	0.00	0.00	1943	
2	21.73	0.00	26.99	8.34	111.54	23.82	23.82	1943	
3	21.11	0.00	41.83	12.93	172.84	23.33	23.33	1943	
4	20.48	0.00	54.91	16.97	226.89	22.28	22.28	1943	
5	19.86	0.00	67.19	20.76	277.63	23.60	23.60	1943	
6	19.23	0.00	79.03	24.42	326.56	26.25	26.25	1943	
7	18.34	0.00	79.03	18.75	490.29	24.96	24.96	6607	
		0.05	96.29	22.85	597.36	25.21	25.26	6607	
		2.45	98.49	23.37	611.03	25.04	27.49	6607	
9	18.00	3.45	99.40	23.59	616.69	24.96	28.41	6607	
10	17.51	Total>	102.85	23.65m	222.35	26.38	26.38	13649	
		Total>	112.67	26.10m	238.72	26.15	26.15	14407	
		Total>	127.66	29.88m	263.82	29.88	29.88a	11473	
12	16.00	Total>	142.54	33.65m	288.80	33.65	33.65a	12333	
13	15.43	Total>	153.81	36.53m	307.77	36.53	36.53a	12988	
14	14.85	Total>	165.05	39.40m	326.70	39.40	39.40a	13643	
15	14.73	Total>	167.39	40.00m	330.65	40.00	40.00a	13780	
16	14.12	Total>	179.38	43.08m	350.87	43.08	43.08a	14481	
17	13.50	Total>	191.42	46.15m	371.15	46.15	46.15a	15182	
18	12.82	Total>	229.72	49.55m	418.54	49.55	49.55a	15956	

Run ID. 3722Saville_Theatre_B2_top_down_secant | Sheet No.
135 Shaftsbury Avenue - Saville Theatre | Date: 4-04-2025
Secant 900mm @ 1500mm cc B2 topdown | Checked :

(continued)

Stage No.19 Apply surcharge no.2 at elevation 0.62

Node no.	Y coord	LEFT side						
		Effective stresses				Total earth pressure	Coeff. of subgrade reaction	
		Water press. kN/m2	Vertic -al kN/m2	Active limit kN/m2	Passive limit kN/m2			Earth pressure kN/m2
19	12.14	Total>	242.86	52.95m	440.78	52.95	52.95a	16731
20	12.04	Total>	244.47	53.45m	443.73	53.45	53.45a	16845
21	11.64	Total>	250.73	55.45m	455.35	55.45	55.45a	17301
22	10.82	Total>	263.85	59.55m	479.44	59.55	59.55a	18235
23	10.00	Total>	278.09	63.65m	504.65	63.65	63.65a	19169
24	9.41	Total>	289.01	66.61m	523.50	66.61	66.61a	19843
25	8.82	Total>	300.37	69.57m	542.77	69.57	69.57a	20517
26	8.32	Total>	310.22	72.07m	559.31	72.07	72.07a	21087
27	7.66	Total>	323.47	75.36m	581.37	75.36	75.36a	21837
28	7.00	Total>	336.92	78.65m	603.64	78.65	78.65a	22587
29	6.25	Total>	352.43	82.41m	629.21	82.41	82.41a	23444
30	5.50	Total>	368.04	86.17m	654.87	86.85	86.85	17911
31	4.75	Total>	383.61	89.91m	680.46	94.18	94.18	18539
32	4.00	Total>	399.16	93.65m	706.03	103.85	103.85	19168
33	3.00	Total>	419.88	99.71	740.13	121.88	121.88	20008
34	2.26	Total>	435.17	105.08	765.34	137.54	137.54	20630
35	1.52	Total>	450.39	110.38	790.49	154.44	154.44	21253
36	0.62	Total>	468.70	116.69	820.81	175.86	175.86	22006
37	-0.19	Total>	485.15	122.30	848.10	252.27	252.27	22687
38	-1.00	Total>	501.52	127.83	875.31	336.33	336.33	23367
39	-2.00	Total>	521.62	134.56	908.80	418.58	418.58	24207
40	-3.00	Total>	541.62	141.17	942.18	475.36	475.36	25046
41	-4.00	Total>	561.53	147.70	975.47	510.74	510.74	25886
42	-5.00	Total>	581.36	154.15	1008.68	532.28	532.28	26726

43	-6.00	Total>	601.12	160.53	1041.82	546.84	546.84	27566
44	-7.00	Total>	620.82	166.85	1074.91	558.84	558.84	28406
45	-8.00	Total>	640.47	173.13	1107.95	570.33	570.33	29245
46	-9.00	Total>	660.09	179.36	1140.95	581.79	581.79	30085

Node no.	Y coord	RIGHT side						
		Water press.	Vertic -al	Effective Active limit	Effective Passive limit	Earth pressure	Total earth pressure	Coeff. of subgrade reaction
		kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m3
1	22.73	0.00	0.00	0.00	0.00	0.00	0.00	0.0
2	21.73	0.00	0.00	0.00	0.00	0.00	0.00	0.0
3	21.11	0.00	0.00	0.00	0.00	0.00	0.00	0.0
4	20.48	0.00	0.00	0.00	0.00	0.00	0.00	0.0
5	19.86	0.00	0.00	0.00	0.00	0.00	0.00	0.0
6	19.23	0.00	0.00	0.00	0.00	0.00	0.00	0.0
7	18.34	0.00	0.00	0.00	0.00	0.00	0.00	0.0
8	18.10	0.00	0.00	0.00	0.00	0.00	0.00	0.0
9	18.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
10	17.51	0.00	0.00	0.00	0.00	0.00	0.00	0.0
11	16.76	0.00	0.00	0.00	0.00	0.00	0.00	0.0
12	16.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
13	15.43	0.00	0.00	0.00	0.00	0.00	0.00	0.0
14	14.85	0.00	0.00	0.00	0.00	0.00	0.00	0.0
15	14.73	0.00	0.00	0.00	0.00	0.00	0.00	0.0
16	14.12	0.00	0.00	0.00	0.00	0.00	0.00	0.0
17	13.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
18	12.82	0.00	0.00	0.00	0.00	0.00	0.00	0.0
19	12.14	0.00	0.00	0.00	0.00	0.00	0.00	0.0
20	12.04	0.00	0.00	0.00	0.00	0.00	0.00	0.0

Run ID. 3722Saville_Theatre_B2_top_down_secant	Sheet No.
135 Shaftsbury Avenue - Saville Theatre	Date: 4-04-2025
Secant 900mm @ 1500mm cc B2 topdown	Checked :

(continued)

Stage No.19 Apply surcharge no.2 at elevation 0.62

Node no.	Y coord	RIGHT side						
		Water press.	Vertic -al	Effective Active limit	Effective Passive limit	Earth pressure	Total earth pressure	Coeff. of subgrade reaction
		kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m3
21	11.64	0.00	0.00	0.00	0.00	0.00	0.00	0.0
22	10.82	0.00	0.00	0.00	0.00	0.00	0.00	0.0
23	10.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
24	9.41	0.00	0.00	0.00	0.00	0.00	0.00	0.0
25	8.82	0.00	0.00	0.00	0.00	0.00	0.00	0.0
26	8.32	0.00	0.00	0.00	0.00	0.00	0.00	0.0
27	7.66	0.00	0.00	0.00	0.00	0.00	0.00	0.0
28	7.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
29	6.25	0.00	0.00	0.00	0.00	0.00	0.00	0.0
30	5.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
31	4.75	0.00	0.00	0.00	0.00	0.00	0.00	0.0
32	4.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
33	3.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
34	2.26	0.00	0.00	0.00	0.00	0.00	0.00	0.0
35	1.52	0.00	0.00	0.00	0.00	0.00	0.00	0.0
36	0.62	0.00	0.00	0.00	0.00	0.00	0.00	0.0
		Total>	211.10	0.00	563.21	491.68	491.68	22780
37	-0.19	Total>	227.25	4.05m	590.20	505.90	505.90	23485

38	-1.00	Total>	243.13	8.10m	616.92	521.97	521.97	24189
39	-2.00	Total>	262.03	13.10m	649.21	545.04	545.04	25058
40	-3.00	Total>	279.90	18.10m	680.45	490.04	490.04	25927
41	-4.00	Total>	296.63	23.10m	710.57	469.24	469.24	26797
42	-5.00	Total>	312.32	28.10m	739.64	479.14	479.14	27666
43	-6.00	Total>	327.14	33.10m	767.85	503.71	503.71	28535
44	-7.00	Total>	341.35	38.10m	795.44	532.85	532.85	29405
45	-8.00	Total>	355.17	43.10m	822.64	562.20	562.20	30274
46	-9.00	Total>	368.82	48.10m	849.68	591.10	591.10	31143

Note: 82.41a Soil pressure at active limit
123.45p Soil pressure at passive limit

=====A-SQUARED STUDIO

ENGINEERS LTD | Sheet No.
Program: WALLAP Version 6.06 Revision A51.B69.R55 | Job No. 3722
Licensed from GEOSOLVE | Made by : SF
Data filename/Run ID: 3722Saville_Theatre__B2_top_down_secant
135 Shaftsbury Avenue - Saville Theatre | Date: 4-04-2025
Secant 900mm @ 1500mm cc B2 topdown | Checked :

Units: kN,m

Stage No. 20 Apply water pressure profile no.2 (Mod. Conserv.)

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

			FoS for toe		Toe elev. for			
			elev. = -9.00		FoS = 1.000			
			-----		-----			
Stage	--- G.L. ---	Strut	Factor	Moment	Toe	Wall	Direction	
No.	Act.	Pass.	Elev.	of	elev.	Penetr	of	
				Safety	at elev.	-ation	failure	
20	22.73	0.62		More than one strut.	No FoS calc.			

BENDING MOMENT and DISPLACEMENT ANALYSIS of Fully Embedded Wall

Analysis options

Length of wall perpendicular to section = 50.00m

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: Left side 25.00 from wall

Right side 25.00 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.

*** Wall displacements reset to zero at stage 4

Node	Y	Nett	Wall	Wall	Shear	Bending	Strut	EI of
no.	coord	pressure	disp.	rotation	force	moment	forces	wall
		kN/m2	m	rad.	kN/m	kN.m/m	kN/m	kN.m2/m
1	22.73	0.00	0.028	2.18E-03	0.0	0.0	-0.0	450870
2	21.73	20.11	0.026	2.18E-03	10.1	3.1		450870
3	21.11	24.70	0.025	2.17E-03	24.1	13.9		450870
4	20.48	28.71	0.023	2.13E-03	40.8	34.4		450870
5	19.86	35.10	0.022	2.05E-03	60.7	66.1		450870
6	19.23	42.83	0.021	1.90E-03	85.0	111.5		450870
		37.82	0.021	1.90E-03	85.0	111.5		
7	18.34	48.72	0.019	1.54E-03	123.6	204.2		450870
8	18.10	51.64	0.019	1.40E-03	135.6	235.3	247.0	450870
		51.64	0.019	1.40E-03	-111.4	235.3		

9	18.00	52.86	0.019	1.34E-03	-106.2	224.4		450870
		23.65	0.019	1.34E-03	-106.2	224.4		
10	17.51	26.10	0.018	1.06E-03	-94.0	175.2		450870
11	16.76	29.88	0.017	7.18E-04	-72.8	112.1		450870
12	16.00	33.65	0.017	4.55E-04	-48.9	69.6		450870
13	15.43	36.53	0.017	3.07E-04	-28.7	50.3		450870
14	14.85	39.40	0.017	2.07E-04	-6.9	38.7		450870
15	14.73	40.00	0.017	1.92E-04	-2.1	38.2		450870
16	14.12	43.08	0.017	1.36E-04	23.5	42.7		450870
17	13.50	46.15	0.016	8.96E-05	50.9	64.1		450870
18	12.82	49.93	0.016	-6.42E-06	83.6	117.6		450870
19	12.14	53.74	0.017	-1.92E-04	118.8	185.0		450870
20	12.04	54.28	0.017	-2.28E-04	124.2	197.2	184.8	450870
		54.28	0.017	-2.28E-04	-60.6	197.2		
21	11.64	56.43	0.017	-3.70E-04	-38.5	177.1		450870
22	10.82	60.66	0.017	-6.39E-04	9.5	170.3		450870
23	10.00	64.74	0.018	-9.47E-04	60.9	213.1		450870
24	9.41	67.61	0.018	-1.23E-03	100.1	259.3		450870

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Run ID. 3722Saville_Theatre_B2_top_down_secant | Sheet No.
135 Shaftsbury Avenue - Saville Theatre | Date: 4-04-2025
Secant 900mm @ 1500mm cc B2 topdown | Checked :
=====

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(continued)

Stage No.20 Apply water pressure profile no.2 (Mod. Conserv.)

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	EI of wall kN.m2/m
25	8.82	70.46	0.019	-1.59E-03	140.9	329.2	525.2	450870
		70.46	0.019	-1.59E-03	-384.3	329.2		
26	8.32	72.85	0.020	-1.84E-03	-348.4	145.3		450870
27	7.66	76.00	0.021	-1.88E-03	-299.4	-69.6		450870
28	7.00	79.17	0.022	-1.64E-03	-248.3	-244.2		450870
29	6.25	82.84	0.024	-1.08E-03	-187.5	-411.2		450870
30	5.50	87.26	0.024	-2.98E-04	-123.6	-530.7	9.9	450870
		87.26	0.024	-2.98E-04	-133.5	-530.7		
31	4.75	94.65	0.024	6.47E-04	-65.4	-607.4		450870
32	4.00	104.51	0.023	1.67E-03	9.1	-630.4		450870
33	3.00	123.07	0.021	2.99E-03	122.9	-568.7		450870
34	2.26	139.15	0.018	3.82E-03	220.2	-443.1		450870
35	1.52	156.55	0.015	4.38E-03	329.8	-240.9	-0.0	450870
36	0.62	178.66	0.011	4.49E-03	480.1	119.2		450870
		-319.83	0.011	4.49E-03	480.1	119.2		
37	-0.19	-256.37	0.008	4.00E-03	246.8	428.0		450870
38	-1.00	-187.29	0.005	3.12E-03	67.1	542.8		450870
39	-2.00	-127.11	0.002	1.95E-03	-90.1	514.4		450870
40	-3.00	-14.71	0.001	9.44E-04	-161.0	392.0		450870
41	-4.00	41.76	0.000	2.60E-04	-147.5	224.1		450870
42	-5.00	53.49	0.000	-9.80E-05	-99.9	98.1		450870
43	-6.00	43.43	0.000	-2.35E-04	-51.4	25.8		450870
44	-7.00	26.19	0.001	-2.61E-04	-16.6	-3.1		450870
45	-8.00	8.20	0.001	-2.51E-04	0.6	-5.6		450870
46	-9.00	-9.37	0.001	-2.45E-04	0.0	0.0		---

At elev. 22.73 The strut is slack

At elev. 18.10 Strut force = 247.0 kN/strut = 247.0 kN/m run

At elev. 12.04 Strut force = 184.8 kN/strut = 184.8 kN/m run

At elev. 8.82 Strut force = 525.2 kN/strut = 525.2 kN/m run

At elev. 5.50 Strut force = 9.9 kN/strut = 9.9 kN/m run

At elev. 1.52 The strut is slack

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Node   Y   ----- LEFT side -----
no.   coord   ----- Effective stresses -----   Total   Coeff. of

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		Water press. kN/m2	Vertic -al kN/m2	Active limit kN/m2	Passive limit kN/m2	Earth pressure kN/m2	earth pressure kN/m2	subgrade reaction kN/m3
1	22.73	0.00	0.00	0.00	0.00	0.00	0.00	1807
2	21.73	0.00	26.99	8.34	111.54	20.11	20.11	1807
3	21.11	6.25	35.58	10.99	147.01	18.45	24.70	1807
4	20.48	12.50	42.41	13.11	175.24	16.21	28.71	1807
5	19.86	18.75	48.44	14.97	200.15	16.35	35.10	1807
6	19.23	25.00	54.03	16.70	223.25	17.83	42.83	1807
		25.00	54.03	12.82	335.19	12.82	37.82a	6142
7	18.34	33.90	62.44	14.82	387.35	14.82	48.72a	6142
8	18.10	36.30	64.64	15.34	401.03	15.34	51.64a	6142
9	18.00	37.30	65.55	15.56	406.69	15.56	52.86a	6142
		Total>	102.85	23.65m	222.35	23.65	23.65a	12743
10	17.51	Total>	112.67	26.10m	238.72	26.10	26.10a	13451
11	16.76	Total>	127.66	29.88m	263.82	29.88	29.88a	14541
12	16.00	Total>	142.54	33.65m	288.80	33.65	33.65a	15631
13	15.43	Total>	153.81	36.53m	307.77	36.53	36.53a	16462
14	14.85	Total>	165.05	39.40m	326.70	39.40	39.40a	17292
15	14.73	Total>	167.39	40.00m	330.65	40.00	40.00a	17465
16	14.12	Total>	179.38	43.08m	350.87	43.08	43.08a	18353
17	13.50	Total>	191.42	46.15m	371.15	46.15	46.15a	19242
18	12.82	Total>	229.72	49.55m	418.54	49.93	49.93	20224

Run ID. 3722Saville_Theatre_B2_top_down_secant | Sheet No.
135 Shaftsbury Avenue - Saville Theatre | Date: 4-04-2025
Secant 900mm @ 1500mm cc B2 topdown | Checked :

(continued)

Stage No.20 Apply water pressure profile no.2 (Mod. Conserv.)

Node no.	Y coord	LEFT side						
		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	Coeff. of subgrade reaction kN/m3
19	12.14	Total>	242.86	52.95m	440.78	53.74	53.74	21205
20	12.04	Total>	244.47	53.45m	443.73	54.28	54.28	21350
21	11.64	Total>	250.73	55.45m	455.35	56.43	56.43	21928
22	10.82	Total>	263.85	59.55m	479.44	60.66	60.66	23112
23	10.00	Total>	278.09	63.65m	504.65	64.74	64.74	24296
24	9.41	Total>	289.01	66.61m	523.50	67.61	67.61	25150
25	8.82	Total>	300.37	69.57m	542.77	70.46	70.46	26004
26	8.32	Total>	310.22	72.07m	559.31	72.85	72.85	26726
27	7.66	Total>	323.47	75.36m	581.37	76.00	76.00	27677
28	7.00	Total>	336.92	78.65m	603.64	79.17	79.17	28628
29	6.25	Total>	352.43	82.41m	629.21	82.84	82.84	29713
30	5.50	Total>	368.04	86.17m	654.87	87.26	87.26	30798
31	4.75	Total>	383.61	89.91m	680.46	94.65	94.65	31879
32	4.00	Total>	399.16	93.65m	706.03	104.51	104.51	32960
33	3.00	Total>	419.88	99.71	740.13	123.07	123.07	34404
34	2.26	Total>	435.17	105.08	765.34	139.15	139.15	21435
35	1.52	Total>	450.39	110.38	790.49	156.55	156.55	22082
36	0.62	Total>	468.70	116.69	820.81	178.66	178.66	22865
37	-0.19	Total>	485.15	122.30	848.10	255.71	255.71	23572
38	-1.00	Total>	501.52	127.83	875.31	340.31	340.31	24278
39	-2.00	Total>	521.62	134.56	908.80	423.06	423.06	25151
40	-3.00	Total>	541.62	141.17	942.18	480.15	480.15	26023
41	-4.00	Total>	561.53	147.70	975.47	515.68	515.68	26896
42	-5.00	Total>	581.36	154.15	1008.68	537.26	537.26	27769
43	-6.00	Total>	601.12	160.53	1041.82	551.79	551.79	28641
44	-7.00	Total>	620.82	166.85	1074.91	563.74	563.74	29514

45	-8.00	Total>	640.47	173.13	1107.95	575.17	575.17	30386
46	-9.00	Total>	660.09	179.36	1140.95	586.56	586.56	31259

Node no.	Y coord	----- RIGHT side -----						
		Water press. kN/m2	Vertic -al kN/m2	Effective Active limit kN/m2	Effective Passive limit kN/m2	Earth pressure kN/m2	Total earth pressure kN/m2	Coeff. of subgrade reaction kN/m3
1	22.73	0.00	0.00	0.00	0.00	0.00	0.00	0.0
2	21.73	0.00	0.00	0.00	0.00	0.00	0.00	0.0
3	21.11	0.00	0.00	0.00	0.00	0.00	0.00	0.0
4	20.48	0.00	0.00	0.00	0.00	0.00	0.00	0.0
5	19.86	0.00	0.00	0.00	0.00	0.00	0.00	0.0
6	19.23	0.00	0.00	0.00	0.00	0.00	0.00	0.0
7	18.34	0.00	0.00	0.00	0.00	0.00	0.00	0.0
8	18.10	0.00	0.00	0.00	0.00	0.00	0.00	0.0
9	18.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
10	17.51	0.00	0.00	0.00	0.00	0.00	0.00	0.0
11	16.76	0.00	0.00	0.00	0.00	0.00	0.00	0.0
12	16.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
13	15.43	0.00	0.00	0.00	0.00	0.00	0.00	0.0
14	14.85	0.00	0.00	0.00	0.00	0.00	0.00	0.0
15	14.73	0.00	0.00	0.00	0.00	0.00	0.00	0.0
16	14.12	0.00	0.00	0.00	0.00	0.00	0.00	0.0
17	13.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
18	12.82	0.00	0.00	0.00	0.00	0.00	0.00	0.0
19	12.14	0.00	0.00	0.00	0.00	0.00	0.00	0.0
20	12.04	0.00	0.00	0.00	0.00	0.00	0.00	0.0

Run ID. 3722Saville_Theatre_B2_top_down_secant	Sheet No.
135 Shaftsbury Avenue - Saville Theatre	Date: 4-04-2025
Secant 900mm @ 1500mm cc B2 topdown	Checked :

(continued)

Stage No.20 Apply water pressure profile no.2 (Mod. Conserv.)

Node no.	Y coord	----- RIGHT side -----						
		Water press. kN/m2	Vertic -al kN/m2	Effective Active limit kN/m2	Effective Passive limit kN/m2	Earth pressure kN/m2	Total earth pressure kN/m2	Coeff. of subgrade reaction kN/m3
21	11.64	0.00	0.00	0.00	0.00	0.00	0.00	0.0
22	10.82	0.00	0.00	0.00	0.00	0.00	0.00	0.0
23	10.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
24	9.41	0.00	0.00	0.00	0.00	0.00	0.00	0.0
25	8.82	0.00	0.00	0.00	0.00	0.00	0.00	0.0
26	8.32	0.00	0.00	0.00	0.00	0.00	0.00	0.0
27	7.66	0.00	0.00	0.00	0.00	0.00	0.00	0.0
28	7.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
29	6.25	0.00	0.00	0.00	0.00	0.00	0.00	0.0
30	5.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
31	4.75	0.00	0.00	0.00	0.00	0.00	0.00	0.0
32	4.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
33	3.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
34	2.26	0.00	0.00	0.00	0.00	0.00	0.00	0.0
35	1.52	0.00	0.00	0.00	0.00	0.00	0.00	0.0
36	0.62	0.00	0.00	0.00	0.00	0.00	0.00	0.0
		Total>	211.10	0.00	563.21	498.49	498.49	22865
37	-0.19	Total>	227.25	4.05m	590.20	512.08	512.08	23572
38	-1.00	Total>	243.13	8.10m	616.92	527.60	527.60	24278
39	-2.00	Total>	262.03	13.10m	649.21	550.17	550.17	25151

40	-3.00	Total>	279.90	18.10m	680.45	494.86	494.86	26023
41	-4.00	Total>	296.63	23.10m	710.57	473.91	473.91	26896
42	-5.00	Total>	312.32	28.10m	739.64	483.77	483.77	27769
43	-6.00	Total>	327.14	33.10m	767.85	508.36	508.36	28641
44	-7.00	Total>	341.35	38.10m	795.44	537.55	537.55	29514
45	-8.00	Total>	355.17	43.10m	822.64	566.96	566.96	30386
46	-9.00	Total>	368.82	48.10m	849.68	595.93	595.93	31259

Note: 46.15a Soil pressure at active limit
123.45p Soil pressure at passive limit

=====A-SQUARED STUDIO
ENGINEERS LTD | Sheet No.
Program: WALLAP Version 6.06 Revision A51.B69.R55 | Job No. 3722
Licensed from GEOSOLVE | Made by : SF
Data filename/Run ID: 3722Saville_Theatre__B2_top_down_secant
135 Shaftsbury Avenue - Saville Theatre | Date: 4-04-2025
Secant 900mm @ 1500mm cc B2 topdown | Checked :

Units: kN,m

Stage No. 21 Change properties of soil type 3 to soil type 4
Ko pressures will not be reset

STABILITY ANALYSIS of Fully Embedded Wall according to Strength Factor method

Factor of safety on soil strength

			FoS for toe		Toe elev. for			
			elev. = -9.00		FoS = 1.000			
			-----		-----			
Stage	--- G.L. ---	Strut	Factor	Moment	Toe	Wall	Direction	
No.	Act. Pass.	Elev.	of	equilib.	elev.	Penetr	of	
			Safety	at elev.		-ation	failure	
21	22.73	0.62	More than one strut. No FoS calc.					

BENDING MOMENT and DISPLACEMENT ANALYSIS of Fully Embedded Wall

Analysis options

Length of wall perpendicular to section = 50.00m

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: Left side 25.00 from wall

Right side 25.00 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.

*** Wall displacements reset to zero at stage 4

Node	Y	Nett	Wall	Wall	Shear	Bending	Strut	EI of
no.	coord	pressure	disp.	rotation	force	moment	forces	wall
		kN/m2	m	rad.	kN/m	kN.m/m	kN/m	kN.m2/m
1	22.73	0.00	0.024	7.79E-04	0.0	0.0	-0.0	450870
2	21.73	28.38	0.024	7.76E-04	14.2	3.1		450870
3	21.11	29.91	0.023	7.60E-04	32.4	18.1		450870
4	20.48	30.86	0.023	7.11E-04	51.4	44.8		450870
5	19.86	34.90	0.022	6.10E-04	71.9	83.6		450870
6	19.23	41.97	0.022	4.37E-04	96.0	136.0		450870
		37.82	0.022	4.37E-04	96.0	136.0		
7	18.34	48.72	0.022	1.32E-05	134.5	238.4		450870
8	18.10	51.64	0.022	-1.43E-04	146.5	272.2	391.2	450870
		51.64	0.022	-1.43E-04	-244.7	272.2		
9	18.00	52.86	0.022	-2.11E-04	-239.5	247.9		450870

		54.21	0.022	-2.11E-04	-239.5	247.9		
10	17.51	60.91	0.022	-4.78E-04	-211.3	137.3		450870
11	16.76	71.19	0.022	-6.97E-04	-161.4	-4.0		450870
12	16.00	81.42	0.023	-7.20E-04	-103.8	-101.0		450870
13	15.43	89.19	0.023	-6.36E-04	-54.8	-143.6		450870
14	14.85	96.95	0.024	-4.85E-04	-1.2	-161.2		450870
15	14.73	98.57	0.024	-4.47E-04	10.5	-160.7		450870
16	14.12	106.86	0.024	-2.44E-04	73.7	-137.0		450870
17	13.50	115.17	0.024	-7.60E-05	141.9	-72.3		450870
18	12.82	133.51	0.024	-2.58E-05	226.5	60.2		450870
19	12.14	142.64	0.024	-2.13E-04	320.4	244.5		450870
20	12.04	143.86	0.024	-2.64E-04	334.7	277.2	565.6	450870
		143.86	0.024	-2.64E-04	-230.9	277.2		
21	11.64	148.69	0.024	-4.50E-04	-172.4	196.3		450870
22	10.82	158.69	0.025	-6.84E-04	-46.3	111.4		450870
23	10.00	169.11	0.025	-8.73E-04	88.1	142.1		450870

Run ID. 3722Saville_Theatre_B2_top_down_secant
135 Shaftsbury Avenue - Saville Theatre
Secant 900mm @ 1500mm cc B2 topdown

| Sheet No.
| Date: 4-04-2025
| Checked :

(continued)

Stage No.21 Change properties of soil type 3 to soil type 4
Ko pressures will not 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	EI of wall kN.m2/m
24	9.41	176.86	0.026	-1.08E-03	190.4	222.9		450870
25	8.82	184.77	0.027	-1.45E-03	297.3	365.6	901.8	450870
		184.77	0.027	-1.45E-03	-604.5	365.6		
26	8.32	191.55	0.028	-1.68E-03	-510.4	86.0		450870
27	7.66	200.57	0.029	-1.58E-03	-381.3	-209.4		450870
28	7.00	209.67	0.030	-1.11E-03	-246.2	-410.4		450870
29	6.25	220.12	0.030	-3.16E-04	-84.7	-538.4		450870
30	5.50	230.60	0.030	5.86E-04	84.6	-541.3	306.0	450870
		230.60	0.030	5.86E-04	-221.4	-541.3		
31	4.75	241.04	0.029	1.57E-03	-44.9	-643.3		450870
32	4.00	251.49	0.028	2.60E-03	139.5	-609.9		450870
33	3.00	265.41	0.024	3.66E-03	397.9	-345.1		450870
34	2.26	275.71	0.022	3.92E-03	598.6	22.9		450870
35	1.52	285.99	0.019	3.45E-03	806.8	542.6	1188.5	450870
		285.99	0.019	3.45E-03	-381.7	542.6		
36	0.62	298.39	0.016	2.59E-03	-119.6	315.3		450870
		62.09	0.016	2.59E-03	-119.6	315.3		
37	-0.19	39.04	0.014	2.07E-03	-78.6	254.3		450870
38	-1.00	16.81	0.013	1.67E-03	-56.0	192.4		450870
39	-2.00	-5.76	0.011	1.29E-03	-50.5	143.5		450870
40	-3.00	10.16	0.010	1.02E-03	-48.3	106.3		450870
41	-4.00	14.30	0.009	8.39E-04	-36.0	54.8		450870
42	-5.00	12.14	0.008	7.52E-04	-22.8	23.4		450870
43	-6.00	8.16	0.008	7.17E-04	-12.7	7.3		450870
44	-7.00	4.82	0.007	7.09E-04	-6.2	0.5		450870
45	-8.00	2.83	0.006	7.10E-04	-2.4	-1.2		450870
46	-9.00	1.89	0.005	7.11E-04	0.0	0.0		---

At elev. 22.73 The strut is slack

At elev. 18.10 Strut force = 391.2 kN/strut = 391.2 kN/m run
At elev. 12.04 Strut force = 565.6 kN/strut = 565.6 kN/m run
At elev. 8.82 Strut force = 901.8 kN/strut = 901.8 kN/m run
At elev. 5.50 Strut force = 306.0 kN/strut = 306.0 kN/m run
At elev. 1.52 Strut force = 1188.5 kN/strut = 1188.5 kN/m run

Node Y ----- LEFT side -----

no.	coord	----- Effective stresses -----					Total earth pressure kN/m2	Coeff. of subgrade reaction kN/m3
		Water press. kN/m2	Vertic -al kN/m2	Active limit kN/m2	Passive limit kN/m2	Earth pressure kN/m2		
1	22.73	0.00	0.00	0.00	0.00	0.00	0.00	3469
2	21.73	0.00	26.99	8.34	111.54	28.38	28.38	3469
3	21.11	6.25	35.58	10.99	147.01	23.66	29.91	3469
4	20.48	12.50	42.41	13.11	175.24	18.36	30.86	3469
5	19.86	18.75	48.44	14.97	200.15	16.15	34.90	726
6	19.23	25.00	54.03	16.70	223.25	16.97	41.97	726
		25.00	54.03	12.82	335.19	12.82	37.82a	2469
7	18.34	33.90	62.44	14.82	387.35	14.82	48.72a	2469
8	18.10	36.30	64.64	15.34	401.03	15.34	51.64a	2469
9	18.00	37.30	65.55	15.56	406.69	15.56	52.86a	2469
		37.30	65.55	16.91	237.85	16.91	54.21a	2905
10	17.51	42.20	70.47	18.71	253.79	18.71	60.91a	3066
11	16.76	49.75	77.91	21.44	277.93	21.44	71.19a	3315
12	16.00	57.30	85.24	24.12	301.70	24.12	81.42a	3563
13	15.43	63.05	90.76	26.14	319.62	26.14	89.19a	3753
14	14.85	68.80	96.25	28.15	337.41	28.15	96.95a	3942
15	14.73	70.00	97.39	28.57	341.12	28.57	98.57a	3981

Run ID. 3722Saville_Theatre_B2_top_down_secant | Sheet No.
 135 Shaftsbury Avenue - Saville Theatre | Date: 4-04-2025
 Secant 900mm @ 1500mm cc B2 topdown | Checked :

(continued)

Stage No.21 Change properties of soil type 3 to soil type 4
 Ko pressures will not be reset

Node no.	Y coord	----- LEFT side -----					Total earth pressure kN/m2	Coeff. of subgrade reaction kN/m3
		Water press. kN/m2	Vertic -al kN/m2	Active limit kN/m2	Passive limit kN/m2	Earth pressure kN/m2		
16	14.12	76.15	103.23	30.71	360.07	30.71	106.86a	4184
17	13.50	82.30	109.12	32.87	379.18	32.87	115.17a	4386
18	12.82	89.10	140.62	44.41	481.35	44.41	133.51a	4610
19	12.14	95.90	146.96	46.74	501.92	46.74	142.64a	4834
20	12.04	96.90	147.57	46.96	503.90	46.96	143.86a	4867
21	11.64	100.90	149.83	47.79	511.23	47.79	148.69a	4999
22	10.82	109.10	154.75	49.59	527.19	49.59	158.69a	5268
23	10.00	117.30	160.79	51.81	546.78	51.81	169.11a	5538
24	9.41	123.22	165.80	53.64	563.04	53.64	176.86a	5733
25	8.82	129.13	171.24	55.64	580.68	55.64	184.77a	5928
26	8.32	134.13	176.09	57.42	596.43	57.42	191.55a	6092
27	7.66	140.72	182.75	59.85	618.03	59.85	200.57a	6309
28	7.00	147.30	189.62	62.37	640.31	62.37	209.67a	6526
29	6.25	154.82	197.62	65.30	666.26	65.30	220.12a	6773
30	5.50	162.33	205.71	68.27	692.49	68.27	230.60a	7021
31	4.75	169.82	213.79	71.23	718.72	71.23	241.04a	7267
32	4.00	177.30	221.86	74.19	744.90	74.19	251.49a	7514
33	3.00	187.30	232.58	78.11	779.66	78.11	265.41a	7843
34	2.26	194.72	240.45	81.00	805.21	81.00	275.71a	8087
35	1.52	202.13	248.26	83.86	830.53	83.86	285.99a	8331
36	0.62	211.10	257.60	87.29	860.85	87.29	298.39a	8626
37	-0.19	219.20	265.95	90.34	887.93	90.34	309.54a	8893
38	-1.00	227.30	274.22	93.37	914.75	93.37	320.67a	9160
39	-2.00	237.30	284.32	97.08	947.52	99.68	336.98	9489
40	-3.00	247.30	294.32	100.74	979.96	141.09	388.39	9818
41	-4.00	257.30	304.23	104.37	1012.09	167.09	424.39	10147
42	-5.00	267.30	314.06	107.97	1043.97	183.38	450.68	10476

43	-6.00	277.30	323.82	111.55	1075.63	195.05	472.35	10805
44	-7.00	287.30	333.52	115.10	1107.11	205.34	492.64	11135
45	-8.00	297.30	343.17	118.64	1138.43	215.75	513.05	11464
46	-9.00	307.30	352.79	122.17	1169.62	226.66	533.96	11793

Node no.	Y coord	----- RIGHT side -----						
		----- Effective stresses -----					Total earth pressure	Coeff. of subgrade reaction
		Water press. kN/m2	Vertic -al kN/m2	Active limit kN/m2	Passive limit kN/m2	Earth pressure kN/m2		
1	22.73	0.00	0.00	0.00	0.00	0.00	0.00	0.0
2	21.73	0.00	0.00	0.00	0.00	0.00	0.00	0.0
3	21.11	0.00	0.00	0.00	0.00	0.00	0.00	0.0
4	20.48	0.00	0.00	0.00	0.00	0.00	0.00	0.0
5	19.86	0.00	0.00	0.00	0.00	0.00	0.00	0.0
6	19.23	0.00	0.00	0.00	0.00	0.00	0.00	0.0
7	18.34	0.00	0.00	0.00	0.00	0.00	0.00	0.0
8	18.10	0.00	0.00	0.00	0.00	0.00	0.00	0.0
9	18.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
10	17.51	0.00	0.00	0.00	0.00	0.00	0.00	0.0
11	16.76	0.00	0.00	0.00	0.00	0.00	0.00	0.0
12	16.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
13	15.43	0.00	0.00	0.00	0.00	0.00	0.00	0.0
14	14.85	0.00	0.00	0.00	0.00	0.00	0.00	0.0
15	14.73	0.00	0.00	0.00	0.00	0.00	0.00	0.0
16	14.12	0.00	0.00	0.00	0.00	0.00	0.00	0.0

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Run ID. 3722Saville_Theatre_B2_top_down_secant          | Sheet No.
135 Shaftsbury Avenue - Saville Theatre                 | Date: 4-04-2025
Secant 900mm @ 1500mm cc B2 topdown                     | Checked :
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(continued)

Stage No.21 Change properties of soil type 3 to soil type 4
Ko pressures will not be reset

Node no.	Y coord	----- RIGHT side -----						
		----- Effective stresses -----					Total earth pressure	Coeff. of subgrade reaction
		Water press. kN/m2	Vertic -al kN/m2	Active limit kN/m2	Passive limit kN/m2	Earth pressure kN/m2		
17	13.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
18	12.82	0.00	0.00	0.00	0.00	0.00	0.00	0.0
19	12.14	0.00	0.00	0.00	0.00	0.00	0.00	0.0
20	12.04	0.00	0.00	0.00	0.00	0.00	0.00	0.0
21	11.64	0.00	0.00	0.00	0.00	0.00	0.00	0.0
22	10.82	0.00	0.00	0.00	0.00	0.00	0.00	0.0
23	10.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
24	9.41	0.00	0.00	0.00	0.00	0.00	0.00	0.0
25	8.82	0.00	0.00	0.00	0.00	0.00	0.00	0.0
26	8.32	0.00	0.00	0.00	0.00	0.00	0.00	0.0
27	7.66	0.00	0.00	0.00	0.00	0.00	0.00	0.0
28	7.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
29	6.25	0.00	0.00	0.00	0.00	0.00	0.00	0.0
30	5.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
31	4.75	0.00	0.00	0.00	0.00	0.00	0.00	0.0
32	4.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
33	3.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
34	2.26	0.00	0.00	0.00	0.00	0.00	0.00	0.0
35	1.52	0.00	0.00	0.00	0.00	0.00	0.00	0.0
36	0.62	0.00	0.00	0.00	0.00	0.00	0.00	0.0
		211.10	0.00	0.00	25.20	25.20	236.30p	12366

37	-0.19	219.20	8.05	0.00	51.31	51.31	270.51p	12748
38	-1.00	227.30	15.83	0.00	76.56	76.56	303.86p	13131
39	-2.00	237.30	24.73	1.95	105.43	105.43	342.73p	13602
40	-3.00	247.30	32.60	4.83	130.94	130.94	378.24p	14074
41	-4.00	257.30	39.33	7.30	152.79	152.79	410.09p	14546
42	-5.00	267.30	45.02	9.38	171.23	171.23	438.53p	15018
43	-6.00	277.30	49.84	11.15	186.89	186.89	464.19p	15490
44	-7.00	287.30	54.05	12.69	200.52	200.52	487.82p	15962
45	-8.00	297.30	57.87	14.09	212.92	212.92	510.22p	16434
46	-9.00	307.30	61.52	15.43	224.77	224.77	532.07p	16906

Note: 320.67a Soil pressure at active limit
532.07p Soil pressure at passive limit

=====A-SQUARED STUDIO

ENGINEERS LTD | Sheet No.

Program: WALLAP Version 6.06 Revision A51.B69.R55 | Job No. 3722

Licensed from GEOSOLVE | Made by : SF

Data filename/Run ID: 3722Saville_Theatre__B2_top_down_secant

135 Shaftsbury Avenue - Saville Theatre | Date: 4-04-2025

Secant 900mm @ 1500mm cc B2 topdown | Checked :

Units: kN,m

Stage No. 22 Change EI of wall to 322050 kN.m2/m run
Yield moment not defined
Allow wall to relax with new modulus value

STABILITY ANALYSIS of Fully Embedded Wall according to Strength Factor method

Factor of safety on soil strength

			FoS for toe		Toe elev. for			
			elev. = -9.00		FoS = 1.000			
			-----		-----			
Stage	--- G.L. ---	Strut	Factor	Moment	Toe	Wall	Direction	
No.	Act. Pass.	Elev.	of	equilib.	elev.	Penetr	of	
			Safety	at elev.		-ation	failure	
22	22.73	0.62	More than one strut. No FoS calc.					

BENDING MOMENT and DISPLACEMENT ANALYSIS of Fully Embedded Wall

Analysis options

Length of wall perpendicular to section = 50.00m

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: Left side 25.00 from wall
Right side 25.00 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.

*** Wall displacements reset to zero at stage 4

Node	Y	Nett	Wall	Wall	Shear	Bending	Strut	EI of
no.	coord	pressure	disp.	rotation	force	moment	forces	wall
		kN/m2	m	rad.	kN/m	kN.m/m	kN/m	kN.m2/m
1	22.73	0.00	0.025	1.08E-03	0.0	0.0	-0.0	322050
2	21.73	26.22	0.024	1.08E-03	13.1	3.0		322050
3	21.11	28.29	0.024	1.05E-03	30.1	17.7		322050
4	20.48	29.77	0.023	9.94E-04	48.3	44.0		322050
5	19.86	34.30	0.022	8.60E-04	68.3	82.2		322050
6	19.23	41.77	0.022	6.30E-04	92.1	134.4		322050
		37.82	0.022	6.30E-04	92.1	134.4		

7	18.34	49.49	0.022	6.20E-05	130.9	238.0		322050
8	18.10	52.50	0.022	-1.49E-04	143.2	272.7	388.8	322050
		52.50	0.022	-1.49E-04	-245.6	272.7		
9	18.00	53.69	0.022	-2.40E-04	-240.3	249.1		322050
		55.19	0.022	-2.40E-04	-240.3	249.1		
10	17.51	61.12	0.022	-5.96E-04	-211.8	141.1		322050
11	16.76	71.19	0.023	-8.74E-04	-161.9	1.7		322050
12	16.00	81.42	0.023	-8.77E-04	-104.3	-96.7		322050
13	15.43	89.19	0.024	-7.35E-04	-55.2	-143.1		322050
14	14.85	96.95	0.024	-5.01E-04	-1.7	-167.0		322050
15	14.73	98.57	0.024	-4.42E-04	10.0	-168.0		322050
16	14.12	106.86	0.024	-1.34E-04	73.2	-150.4		322050
17	13.50	115.17	0.024	1.28E-04	141.5	-88.8		322050
18	12.82	133.51	0.024	2.28E-04	226.0	42.8		322050
19	12.14	144.08	0.024	-3.57E-06	320.4	227.1		322050
20	12.04	145.58	0.024	-7.14E-05	334.9	259.9	559.0	322050
		145.58	0.024	-7.14E-05	-224.1	259.9		
21	11.64	151.34	0.024	-3.15E-04	-164.7	181.3		322050
22	10.82	162.59	0.024	-6.22E-04	-36.0	102.6		322050

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Run ID. 3722Saville_Theatre_B2_top_down_secant | Sheet No.
135 Shaftsbury Avenue - Saville Theatre | Date: 4-04-2025
Secant 900mm @ 1500mm cc B2 topdown | Checked :
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(continued)

Stage No.22 Change EI of wall to 322050 kN.m2/m run
Yield moment not defined
Allow wall to relax with new modulus value

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	EI of wall kN.m2/m
23	10.00	173.55	0.025	-8.88E-04	101.8	141.5		322050
24	9.41	180.89	0.026	-1.20E-03	206.6	229.8		322050
25	8.82	187.04	0.027	-1.75E-03	315.4	381.2	894.7	322050
		187.04	0.027	-1.75E-03	-579.3	381.2		
26	8.32	191.55	0.028	-2.12E-03	-484.7	112.2		322050
27	7.66	200.57	0.029	-2.07E-03	-355.6	-169.3		322050
28	7.00	209.67	0.030	-1.55E-03	-220.5	-356.5		322050
29	6.25	220.12	0.031	-6.20E-04	-59.0	-468.7		322050
30	5.50	230.60	0.031	4.10E-04	110.4	-456.1	362.5	322050
		230.60	0.031	4.10E-04	-252.1	-456.1		
31	4.75	241.04	0.030	1.55E-03	-75.6	-575.6		322050
32	4.00	251.49	0.029	2.83E-03	108.7	-559.8		322050
33	3.00	265.41	0.025	4.16E-03	367.2	-318.8		322050
34	2.26	275.71	0.022	4.47E-03	567.8	31.6		322050
35	1.52	286.30	0.019	3.82E-03	776.2	533.5	1179.0	322050
		286.30	0.019	3.82E-03	-402.8	533.5		
36	0.62	303.28	0.016	2.68E-03	-138.4	291.5		322050
		72.44	0.016	2.68E-03	-138.4	291.5		
37	-0.19	50.77	0.014	2.05E-03	-88.5	221.2		322050
38	-1.00	26.48	0.013	1.60E-03	-57.2	156.0		322050
39	-2.00	-0.35	0.011	1.21E-03	-44.1	109.9		322050
40	-3.00	11.12	0.010	9.46E-04	-38.7	79.6		322050
41	-4.00	13.30	0.009	7.86E-04	-26.5	35.8		322050
42	-5.00	10.26	0.008	7.25E-04	-14.7	11.4		322050
43	-6.00	5.91	0.008	7.14E-04	-6.6	0.8		322050
44	-7.00	2.61	0.007	7.20E-04	-2.4	-2.2		322050
45	-8.00	0.91	0.006	7.28E-04	-0.6	-1.8		322050
46	-9.00	0.37	0.006	7.31E-04	0.0	0.0		---

At elev. 22.73 The strut is slack

At elev. 18.10 Strut force = 388.8 kN/strut = 388.8 kN/m run

At elev. 12.04 Strut force = 559.0 kN/strut = 559.0 kN/m run

At elev. 8.82 Strut force = 894.7 kN/strut = 894.7 kN/m run
 At elev. 5.50 Strut force = 362.5 kN/strut = 362.5 kN/m run
 At elev. 1.52 Strut force = 1179.0 kN/strut = 1179.0 kN/m run

Node no.	Y coord	LEFT side						Total earth pressure kN/m2	Coeff. of subgrade reaction kN/m3
		Water press. kN/m2	Vertic -al kN/m2	Effective Active limit kN/m2	Effective Passive limit kN/m2	Earth pressure kN/m2			
1	22.73	0.00	0.00	0.00	0.00	0.00	0.00	2893	
2	21.73	0.00	26.99	8.34	111.54	26.22	26.22	2893	
3	21.11	6.25	35.58	10.99	147.01	22.04	28.29	2893	
4	20.48	12.50	42.41	13.11	175.24	17.27	29.77	2893	
5	19.86	18.75	48.44	14.97	200.15	15.55	34.30	2893	
6	19.23	25.00	54.03	16.70	223.25	16.77	41.77	2893	
		25.00	54.03	12.82	335.19	12.82	37.82a	9836	
7	18.34	33.90	62.44	14.82	387.35	15.59	49.49	17525	
8	18.10	36.30	64.64	15.34	401.03	16.20	52.50	17525	
9	18.00	37.30	65.55	15.56	406.69	16.39	53.69	17525	
		37.30	65.55	16.91	237.85	17.89	55.19	20617	
10	17.51	42.20	70.47	18.71	253.79	18.92	61.12	21762	
11	16.76	49.75	77.91	21.44	277.93	21.44	71.19a	9058	
12	16.00	57.30	85.24	24.12	301.70	24.12	81.42a	9737	
13	15.43	63.05	90.76	26.14	319.62	26.14	89.19a	10255	

Run ID. 3722Saville_Theatre_B2_top_down_secant | Sheet No.
 135 Shaftsbury Avenue - Saville Theatre | Date: 4-04-2025
 Secant 900mm @ 1500mm cc B2 topdown | Checked :

(continued)

Stage No.22 Change EI of wall to 322050 kN.m2/m run
 Yield moment not defined
 Allow wall to relax with new modulus value

Node no.	Y coord	LEFT side						
		Effective stresses					Total earth pressure	Coeff. of subgrade reaction
		Water press. kN/m2	Vertic -al kN/m2	Active limit kN/m2	Passive limit kN/m2	Earth pressure kN/m2		
14	14.85	68.80	96.25	28.15	337.41	28.15	96.95a	10772
15	14.73	70.00	97.39	28.57	341.12	28.57	98.57a	10880
16	14.12	76.15	103.23	30.71	360.07	30.71	106.86a	11433
17	13.50	82.30	109.12	32.87	379.18	32.87	115.17a	11986
18	12.82	89.10	140.62	44.41	481.35	44.41	133.51a	12598
19	12.14	95.90	146.96	46.74	501.92	48.18	144.08	13090
20	12.04	96.90	147.57	46.96	503.90	48.68	145.58	13179
21	11.64	100.90	149.83	47.79	511.23	50.44	151.34	13536
22	10.82	109.10	154.75	49.59	527.19	53.49	162.59	14267
23	10.00	117.30	160.79	51.81	546.78	56.25	173.55	14998
24	9.41	123.22	165.80	53.64	563.04	57.68	180.89	15525
25	8.82	129.13	171.24	55.64	580.68	57.91	187.04	16052
26	8.32	134.13	176.09	57.42	596.43	57.42	191.55a	13174
27	7.66	140.72	182.75	59.85	618.03	59.85	200.57a	13643
28	7.00	147.30	189.62	62.37	640.31	62.37	209.67a	14111
29	6.25	154.82	197.62	65.30	666.26	65.30	220.12a	14646
30	5.50	162.33	205.71	68.27	692.49	68.27	230.60a	15181
31	4.75	169.82	213.79	71.23	718.72	71.23	241.04a	15714
32	4.00	177.30	221.86	74.19	744.90	74.19	251.49a	16247
33	3.00	187.30	232.58	78.11	779.66	78.11	265.41a	16959
34	2.26	194.72	240.45	81.00	805.21	81.00	275.71a	17486
35	1.52	202.13	248.26	83.86	830.53	84.17	286.30	23637
36	0.62	211.10	257.60	87.29	860.85	92.18	303.28	24475

[illegible]

(continued)

[illegible]

31	4.75	0.00	0.00	0.00	0.00	0.00	0.00	0.0
32	4.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
33	3.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
34	2.26	0.00	0.00	0.00	0.00	0.00	0.00	0.0
35	1.52	0.00	0.00	0.00	0.00	0.00	0.00	0.0
36	0.62	0.00	0.00	0.00	0.00	0.00	0.00	0.0
		211.10	0.00	0.00	25.20	19.74	230.84	27267
37	-0.19	219.20	8.05	0.00	51.31	45.12	264.32	28110
38	-1.00	227.30	15.83	0.00	76.56	71.46	298.76	28953
39	-2.00	237.30	24.73	1.95	105.43	102.59	339.89	29993
40	-3.00	247.30	32.60	4.83	130.94	130.43	377.73	31034
41	-4.00	257.30	39.33	7.30	152.79	152.79	410.09p	20573
42	-5.00	267.30	45.02	9.38	171.23	171.23	438.53p	21240
43	-6.00	277.30	49.84	11.15	186.89	186.89	464.19p	21908
44	-7.00	287.30	54.05	12.69	200.52	200.52	487.82p	22575
45	-8.00	297.30	57.87	14.09	212.92	212.92	510.22p	23243
46	-9.00	307.30	61.52	15.43	224.77	224.77	532.07p	23910

Note: 275.71a Soil pressure at active limit
532.07p Soil pressure at passive limit

=====A-SQUARED STUDIO
ENGINEERS LTD | Sheet No.
Program: WALLAP Version 6.06 Revision A51.B69.R55 | Job No. 3722
Licensed from GEOSOLVE | Made by : SF
Data filename/Run ID: 3722Saville Theatre__B2_top_down_secant
135 Shaftsbury Avenue - Saville Theatre | Date: 4-04-2025
Secant 900mm @ 1500mm cc B2 topdown | Checked :

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

			FoS for toe elev. = -9.00		Toe elev. for FoS = 1.000			
			-----		-----			
Stage	--- G.L. ---		Strut	Factor	Moment	Toe	Wall	Direction
No.	Act.	Pass.	Elev.	of	equilib.	elev.	Penetr	of
				Safety	at elev.		-ation	failure
1	22.73	22.73	Cant.	Conditions not suitable for FoS calc.				
2	22.73	22.73	Cant.	Conditions not suitable for FoS calc.				
3	22.73	22.73	Cant.	Conditions not suitable for FoS calc.				
4	22.73	22.73		No analysis at this stage				
5	22.73	22.73	Cant.	Conditions not suitable for FoS calc.				
6	22.73	22.73	Cant.	Conditions not suitable for FoS calc.				
7	22.73	17.51	Cant.	3.115	-6.50	13.36	4.15	L to R
8	22.73	17.51		No analysis at this stage				
All remaining stages have more than one strut - FoS calculation n/a								

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

=====A-SQUARED STUDIO ENGINEERS LTD | Sheet No.
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135 Shaftsbury Avenue - Saville Theatre | Date: 4-04-2025
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Summary of results

BENDING MOMENT and DISPLACEMENT ANALYSIS of Fully Embedded Wall

Analysis options

Length of wall perpendicular to section = 50.00m

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: Left side 25.00 from wall

Right side 25.00 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				Shear force			
				Calculated		Factored		Calculated		Factored	
		max.	min.	max.	min.	max.	min.	max.	min.	max.	min.
		m	m	kN.m/m		kN.m/m		kN/m		kN/m	
1	22.73	0.033	0.000	0	0	0	0	0	0	0	0
2	21.73	0.029	0.000	3	0	4	0	14	-4	19	-5
3	21.11	0.026	0.000	18	-3	24	-4	32	-8	44	-10
4	20.48	0.024	0.000	45	-9	61	-12	51	-12	69	-16
5	19.86	0.022	0.000	84	-17	113	-23	72	-15	97	-21
6	19.23	0.022	0.000	136	-28	184	-38	96	-19	130	-26
7	18.34	0.022	0.000	238	-53	322	-71	134	-38	182	-51
8	18.10	0.022	0.000	273	-63	368	-84	147	-246	198	-332
9	18.00	0.022	0.000	249	-67	336	-90	73	-240	99	-324
10	17.51	0.022	0.000	175	-86	237	-116	85	-212	115	-286
11	16.76	0.023	0.000	234	-101	315	-137	75	-162	101	-219
12	16.00	0.023	0.000	280	-101	378	-136	38	-104	52	-141
13	15.43	0.024	0.000	299	-144	404	-194	51	-55	68	-75
14	14.85	0.024	0.000	307	-167	414	-225	84	-28	114	-38
15	14.73	0.024	0.000	308	-168	416	-227	78	-23	106	-31
16	14.12	0.024	0.000	294	-150	396	-203	82	-42	111	-57
17	13.50	0.024	0.000	256	-99	346	-134	142	-71	192	-96
18	12.82	0.024	0.000	276	-60	373	-81	226	-81	306	-109
19	12.14	0.024	0.000	392	-0	529	-0	320	-161	433	-217
20	12.04	0.024	0.000	378	0	511	0	335	-231	452	-312
21	11.64	0.024	0.000	329	0	444	0	163	-172	220	-233
22	10.82	0.025	0.000	263	-65	354	-88	81	-83	109	-112
23	10.00	0.025	0.000	245	-94	330	-127	102	-31	137	-41
24	9.41	0.026	0.000	264	-91	357	-123	207	-22	279	-29
25	8.82	0.027	0.000	381	-52	515	-70	315	-604	426	-816
26	8.32	0.028	0.000	167	0	225	0	170	-510	229	-689
27	7.66	0.029	0.000	131	-209	177	-283	101	-381	136	-515
28	7.00	0.030	0.000	154	-410	209	-554	40	-248	54	-335
29	6.25	0.031	0.000	162	-538	218	-727	0	-187	0	-253
30	5.50	0.031	0.000	143	-541	192	-731	110	-252	149	-340
31	4.75	0.030	0.000	112	-643	151	-868	0	-76	0	-102
32	4.00	0.029	0.000	79	-630	107	-851	139	-41	188	-56
33	3.00	0.025	0.000	41	-569	56	-768	398	-32	537	-43
34	2.26	0.022	0.000	32	-443	43	-598	599	-23	808	-31
35	1.52	0.019	0.000	543	-241	733	-325	807	-403	1089	-544
36	0.62	0.016	0.000	315	-5	426	-7	480	-138	648	-187
37	-0.19	0.014	0.000	428	-5	578	-7	247	-88	333	-119
38	-1.00	0.013	0.000	543	-5	733	-7	67	-57	91	-77
39	-2.00	0.011	0.000	514	-3	694	-4	2	-90	3	-122
40	-3.00	0.010	0.000	392	-1	529	-2	2	-161	3	-217

Secant 900mm @ 1500mm cc B2 topdown

| Checked :

Bending moment, shear force and displacement envelopes

Node no.	Y coord	Displacement		Bending moment				Shear force			
				Calculated		Factored		Calculated		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
41	-4.00	0.009	0.000	224	-1	303	-1	1	-148	2	-199
42	-5.00	0.008	0.000	98	-0	132	-1	1	-100	1	-135
43	-6.00	0.008	0.000	26	-0	35	-0	0	-51	0	-69
44	-7.00	0.007	0.000	1	-4	2	-5	0	-17	0	-22
45	-8.00	0.006	0.000	1	-6	1	-8	2	-2	3	-3
46	-9.00	0.006	0.000	0	-0	0	-0	0	-0	0	-0

Maximum and minimum bending moment and shear force at each stage

Stage no.	Bending moment				Shear force			
	Calculated		Factored		Calculated		Factored	
	max.	elev.	min.	elev.	max.	elev.	min.	elev.
min.	kN.m/m		kN.m/m		kN.m/m		kN/m	
kN/m								
1	44	12.04	-77	16.76	59	-104	61	14.85
-47								
2	48	12.04	-76	16.76	65	-102	62	14.85
-46								
3	29	12.82	-69	16.76	39	-93	59	14.85
-44								
4	No calculation at this stage							
5	34	12.14	-81	16.76	46	-109	66	14.85
-51								
6	45	12.04	-101	16.76	60	-137	84	14.85
-60								
7	308	14.73	-1	5.50	416	-2	85	17.51
-109								
8	No calculation at this stage							
9	No calculation at this stage							
10	216	10.00	-107	14.12	292	-145	163	11.64
-175								
11	No calculation at this stage							
12	181	18.10	-94	10.00	244	-127	170	8.32
-217								
13	No calculation at this stage							
14	434	-1.00	-593	4.00	585	-801	382	0.62
-494								
15	No calculation at this stage							
16	No calculation at this stage							
17	No calculation at this stage							
18	430	-1.00	-559	4.00	580	-755	376	0.62
-498								
19	538	-1.00	-627	4.00	727	-846	475	0.62
-516								
20	543	-1.00	-630	4.00	733	-851	480	0.62
-519								
21	543	1.52	-643	4.75	733	-868	807	1.52
-816								
22	533	1.52	-576	4.75	720	-777	776	1.52
-782								

Run ID. 3722Saville_Theatre_B2_top_down_secant

135 Shaftsbury Avenue - Saville Theatre

Secant 900mm @ 1500mm cc B2 topdown

| Sheet No.

| Date: 4-04-2025

| Checked :

Summary of results (continued)

Maximum and minimum displacement at each stage

Stage no.	Displacement maximum m	Displacement elev.	Displacement minimum m	Displacement elev.	Stage description
1	0.002	17.51	0.000	22.73	Apply surcharge no.3 at elev. 22.73
2	0.002	17.51	0.000	22.73	Apply surcharge no.4 at elev. 14.73
3	0.002	17.51	0.000	22.73	Apply surcharge no.5 at elev. 13.50
4	Wall displacements reset to zero				Change EI of wall to 450870kN.m2/m run
5	0.001	22.73	0.000	22.73	Apply surcharge no.1 at elev. 22.73
6	0.002	18.00	0.000	22.73	Apply water pressure profile no.1
7	0.033	22.73	0.000	22.73	Excav. to elev. 17.51 on RIGHT side
8	No calculation at this stage				Install strut no.3 at elev. 22.73
9	No calculation at this stage				Install strut no.4 at elev. 18.10
10	0.029	22.73	0.000	22.73	Excav. to elev. 11.64 on RIGHT side
11	No calculation at this stage				Install strut no.5 at elev. 12.14
12	0.028	22.73	0.000	22.73	Excav. to elev. 8.32 on RIGHT side
13	No calculation at this stage				Install strut no.8 at elev. 8.82
14	0.028	22.73	0.000	22.73	Excav. to elev. 0.62 on RIGHT side
15	No calculation at this stage				Install strut no.6 at elev. 1.52
16	No calculation at this stage				Install strut no.7 at elev. 5.50
17	No calculation at this stage				Install strut no.9 at elev. 12.04
18	0.026	22.73	0.000	22.73	Remove strut no.5 at elev. 12.14
19	0.026	22.73	0.000	22.73	Apply surcharge no.2 at elev. 0.62
20	0.028	22.73	0.000	22.73	Apply water pressure profile no.2
21	0.030	6.25	0.000	22.73	Change soil type 3 to soil type 4
22	0.031	5.50	0.000	22.73	Change EI of wall to 322050kN.m2/m run

Run ID. 3722Saville_Theatre_B2_top_down_secant | Sheet No.
135 Shaftsbury Avenue - Saville Theatre | Date: 4-04-2025
Secant 900mm @ 1500mm cc B2 topdown | Checked :

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. 3 at elev. 22.73			Strut no. 4 at elev. 18.10			Strut no. 5 at elev. 12.14		
	--Calculated--	Factored		--Calculated--	Factored		--Calculated--	Factored	
	kN per m run	kN per strut	kN per strut	kN per m run	kN per strut	kN per strut	kN per m run	kN per strut	kN per strut
10	slack	slack	slack	214	214	288	---	---	---
12	slack	slack	slack	206	206	278	273	273	369
14	slack	slack	slack	184	184	248	328	328	442
18	slack	slack	slack	206	206	278	---	---	---
19	slack	slack	slack	205	205	277	---	---	---
20	slack	slack	slack	247	247	333	---	---	---
21	slack	slack	slack	391	391	528	---	---	---
22	slack	slack	slack	389	389	525	---	---	---

Run ID. 3722Saville_Theatre_B2_top_down_secant | Sheet No.
135 Shaftsbury Avenue - Saville Theatre | Date: 4-04-2025
Secant 900mm @ 1500mm cc B2 topdown | Checked :

Stage no.	Strut no. 6 at elev. 1.52			Strut no. 7 at elev. 5.50			Strut no. 8 at elev. 8.82		
	--Calculated--	Factored		--Calculated--	Factored		--Calculated--	Factored	
	kN per m run	kN per strut	kN per strut	kN per m run	kN per strut	kN per strut	kN per m run	kN per strut	kN per strut

	m run	strut	strut	m run	strut	strut	m run	strut	strut
14	---	---	---	---	---	---	431	431	582
18	slack	slack	slack	10	10	14	515	515	695
19	slack	slack	slack	8	8	11	524	524	708
20	slack	slack	slack	10	10	13	525	525	709
21	1188	1188	1604	306	306	413	902	902	1217
22	1179	1179	1592	362	362	489	895	895	1208

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Run ID. 3722Saville_Theatre__B2_top_down_secant          | Sheet No.
135 Shaftsbury Avenue - Saville Theatre                 | Date: 4-04-2025
Secant 900mm @ 1500mm cc B2 topdown                    | Checked :
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Stage  ----- Strut no. 9 -----
no.          at elev. 12.04
            --Calculated-- Factored
            kN per kN per kN per
            m run  strut  strut
18          179    179    242
19          184    184    248
20          185    185    250
21          566    566    764
22          559    559    755

```

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=====A-SQUARED STUDIO
ENGINEERS LTD                               | Sheet No.
Program: WALLAP Version 6.06 Revision A51.B69.R55 | Job No. 3722
                                                | Made by : SF
Data filename/Run ID: 3722Saville_Theatre__B2_top_down_secant
135 Shaftsbury Avenue - Saville Theatre       | Date: 4-04-2025
Secant 900mm @ 1500mm cc B2 topdown          | Checked :
-----

```

Units: kN,m

Bending moment, shear force, displacement envelopes

