18 Frogmore Road
Hemel Hempstead
Hertfordshire
HP3 9RT
UK

Telephone: +44 (0)1442 437500
Fax: +44 (0)1442 437550
www.rsk.co.uk

Our Ref: 371647-L04 (00)

14th February 2020

The Theatre of Comedy Company
Shaftesbury Theatre
210 Shaftesbury Avenue
London
WC2H 8DP

For the attention of Richard Anelay

Dear Richard,

SHAFTESBURY THEATRE, LONDON
GROUND MOVEMENT ASSESSMENT, CROSSRAIL TUNNEL - CATEGORY II CHECK

1. INTRODUCTION

On the instructions of The Theatre of Comedy Company (the Client), RSK Environment Limited – Geosciences (RSK) have undertaken a Category II check of the work presented in report ref. 52167-01 (01), dated February 2020. This work comprised a numerical ground movement assessment to determine what influence the proposed development at the Shaftesbury Theatre, London, would have on the adjacent Crossrail Tunnel.

This letter report is not intended to address the likely impact the proposed development would have on any adjacent properties and other infrastructure in the vicinity of the site.

The site investigation and development proposals contained within the Basement Impact Assessment Report for Shaftesbury Theatre, (ref. 52167-01 (01)) were adopted for the purpose of this assessment.

This Category II check has been carried out independently by Geotechnical Engineers that were not involved in the original assessment.

2. DEVELOPMENT

The proposed development comprises the extension of the existing basement both westward and southward beneath Bloomsbury Street and High Holborn, respectively (see **Appendix A**). In order to facilitate the construction of the proposed basement a sheet piled wall be installed around the perimeter prior to bulk excavation and construction of the proposed raft at a finished formation level of 19.60 mAOD.

3. GROUND CONDITIONS

The intrusive site investigation works undertaken in January 2013 beneath the eastern end of the site indicated the ground conditions to comprise a limited thickness of made ground (crushed fragments of brick and concrete in a clay matrix) to a depth of 0.40m below existing basement floor level. Beneath this

stiff to very stiff fissured London Clay was encountered. Very stiff Lambeth Group clays were encountered at 21.70 m below the basement floor level, and proven to the final depth of 25.20 mbbl.

From available BGS data it is anticipated the above strata are overlain by superficial deposits of the Lynch Hill Gravel Member outside the basement, this layer possibly being removed during the original basement excavation. No recorded groundwater strikes or monitoring results were presented within any of the available reports.

4. GROUND MOVEMENTS ASSESSMENT

The Category II check calculations presented in this report adopted the Oasys PDISP Version PDISP 20.0.0.2 computer package developed by ARUP and used the Boussinesq method of elastic analysis to estimate the vertical displacements likely to influence the Crossrail Tunnel.

4.1 Ground model

The Young's modulus for the cohesive deposits of the London Clay Formation and the Lambeth Group have been estimated from the undrained shear strength (c_u) profile obtained from SPT 'N' values and laboratory triaxial testing, using the correlations proposed by Jamiolkowski, et al.

Based on this the undrained Young's Modulus (E_u) has been estimated using the correlation $E_u=400c_u$, while for the drained Young's modulus (E') has been determined from the relationship $E' = 0.8E_u$.

For the Lynch Hill Gravel the drained Young's modulus has been assumed to be approximately 15 MN/m^2 based on experience although it should be stressed that this will have no influence on the calculations as it is present above the level where there is any change of loading.

The ground profile and associated parameters adopted for the analyses are presented in **Table 1**.

Table 1: Summary of ground profile and associated Young's Modulus Values Used

Strata	Level of top of stratum mAOD	Level of base of stratum mAOD	Undrained Conditions		Drained Conditions	
			E_u MN/m^2	ν	E' MN/m^2	ν'
Lynch Hill Gravel	24.15	20.15	-	-	15	0.2
London Clay Formation	20.15	-6.50	20 – at surface 110 – at base	0.5	16 – at surface 90 – at base	0.2
Lambeth Group	-6.50	-10.50	125.00	0.5	100.00	0.2

A rigid boundary layer was assumed at -20 mAOD, below which no movement is considered to occur.

4.2 Loading

The excavation associated with the basement excavation has been represented by applying a negative uniformly distributed load at the base of the excavation. The loads associated with the proposed development construction have been applied as positive loads at the base of the raft.

For the proposed work, it is estimated that between 3.90 m and 4.40 m of soil will be removed from the southern and western extensions, respectively. This equates to an unloading equal to 78 kN/m^2 and

88 kN/m^2, based on a unit weight of soil of 20 kN/m^3. These pressures have then been applied at the proposed slab formation level of 19.60 mAOD.

In order to model the proposed development a conservative average load of 100 kN/m^2 has been applied across the full area of the raft based on the analysis undertaken by the JMS Group and included within **Appendix A**.

4.3 Analyses and Results

The vertical movements at the line and level of the Crossrail Tunnel (approx. 10.00 mAOD) have been calculated to assess what effect the construction works will have.

The analyses have considered both undrained and drained soil conditions to investigate both the expected short and long term ground/tunnel movements resulting from the proposed development.

The short term analyses have adopted undrained Young's modulus values for the soil and a Poisson's ratio of 0.50, allowing immediate elastic heave and settlement movements to be estimated. The long term analyses have adopted the drained Young's modulus values for the soils and a Poisson's ratio of 0.20 which allows for long term net tunnel movements resulting from construction of the new development to be determined. Typically, the fully drained conditions would take many years to develop.

The analyses have been carried out to determine the conditions at the following stages in the construction process, namely:

- unloading due to excavation for the new basement; and
- full loading following construction of the new basement.

The results from the analyses at various stages of the construction are included at the end of this letter report, while a summary of the maximum and minimum displacements is presented in **Table 2**.

Table 2: Estimated displacements at Crossrail Tunnel level at various construction stages

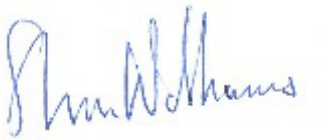
Loading Stage	Displacements (mm)[1)]	
	Max	Min
Unloading – undrained conditions (stage only)	-1.00	0.00
Unloading – drained conditions (stage only)	-2.00	0.00
Full Loading – drained conditions (stage only)	2.00	0.00
Full Loading – drained conditions (net)	0.50	0.00

[1)] negative displacements represent heave; positive displacements represent settlement

The results presented in **Table 2** indicate that based on the available information, the maximum and differential net displacements at the relevant construction stages are not anticipated to exceed 0.5 mm along the length of the tunnel. Therefore, the proposed development is unlikely to have a significant impact on the Crossrail tunnel.

It is hoped that the information provided within this Category II check is sufficient for your current requirements. If you have any questions then please contact the undersigned.

Yours sincerely
For RSK Environment Ltd

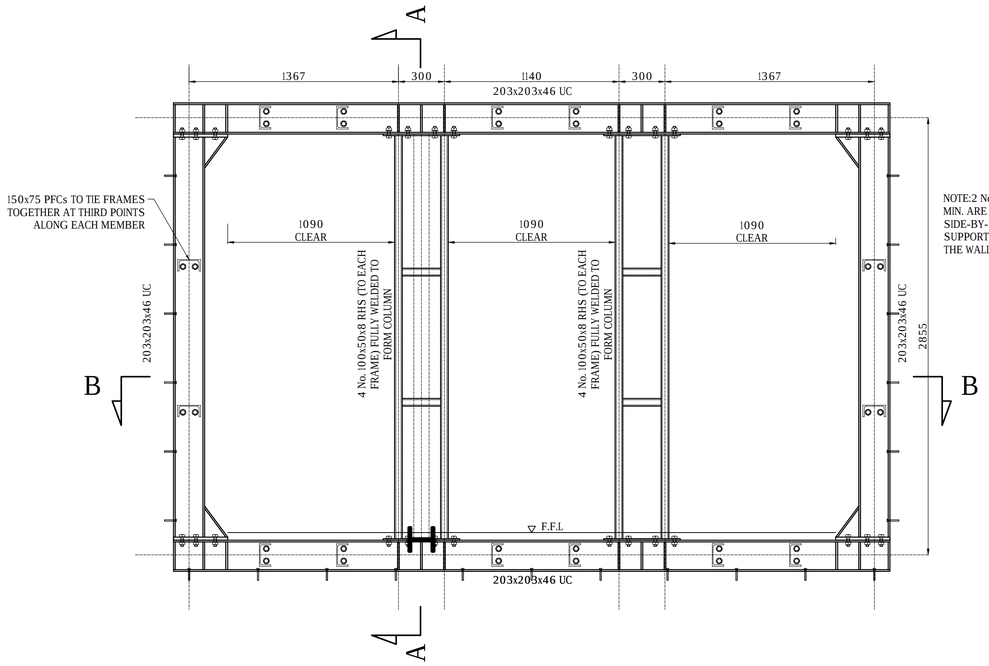


Dr Shon Williams
Geotechnical Engineer Technical Director

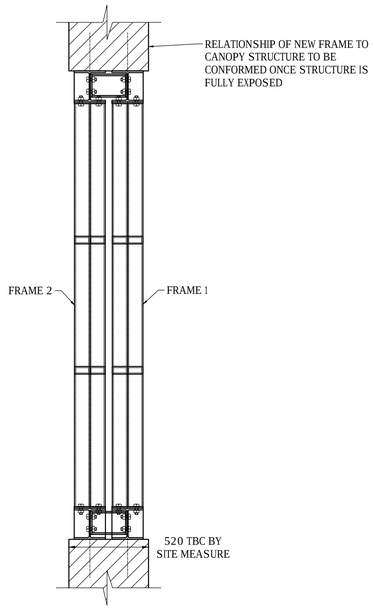
Enclosed:

Appendix A Proposed Development Plans and Loading Information
Appendix B Results of Ground Movement Assessment

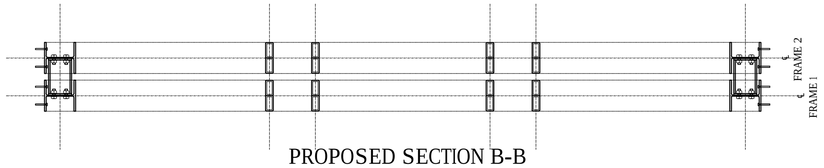
APPENDIX A
PROPOSED DEVELOPMENT PLANS AND LOADING INFORMATION



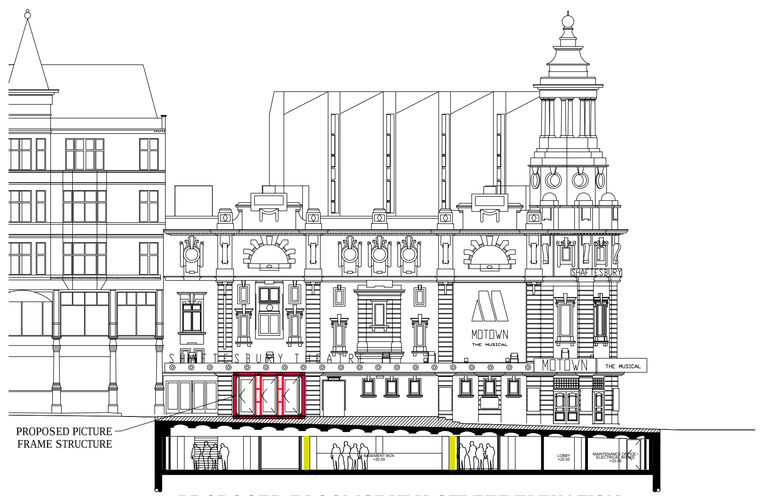
ELEVATION OF PROPOSED PICTURE FRAME TO NEW BLOOMSBURY STREET ENTRANCE
SCALE 1:20 AT A1



PROPOSED SECTION A-A
SCALE 1:20 AT A1



PROPOSED SECTION B-B
SCALE 1:20 AT A1



PROPOSED BLOOMSBURY STREET ELEVATION
SCALE 1:200 AT A1

STEELWORK

S1. ALL STEELWORK TO BE GRADE S275 UNLESS NOTED OTHERWISE.

S2. ALL HOLLOW SECTIONS TO BE GRADE S355 UNLESS NOTED OTHERWISE.

S3. ALL STEEL WORK CONNECTIONS TO HAVE A MINIMUM OF 2 No. M16 BOLTS GRADE 8.8

S4. ALL NUTS TO BE NYLOCK TYPE GRADE 8.8

S5. ALL STEEL IS TO MEET THE REQUIREMENTS OF EN1090. THE EXECUTION CLASS IS TO BE OBTAINED BY THE CONTRACTOR FROM THE CODE.

S6. NEW STEELWORK TO BE TREATED AS FOLLOWS:

SHOT BLAST CLEAN TO SA 2 1/2, SHOP APPLY ZINC RICH EPOXY PRIMER TO 40 MICRONS, THEN SHOP APPLY HIGH BUILD EPOXY MIO TO 100 MICRONS. THEN SITE APPLY HIGH BUILD EPOXY MIO TO 100 MICRONS.

S7. ANY DAMAGED AREA OF PAINT FINISH TO BE TOUCHED UP LOCALLY ON SITE.

S8. THE STEELWORK CONTRACTOR IS TO PROVIDE THE ENGINEER WITH 2 SETS OF FABRICATION DRAWINGS A MINIMUM OF 21 WORKING DAYS IN ADVANCE OF THE COMMENCEMENT OF FABRICATION.

S9. A MINIMUM OF 1 HOUR FIRE PROTECTION IS TO BE PROVIDED TO ALL EXPOSED STEEL WORK TO THE ARCHITECT'S SPECIFICATION.

S10. ALL STEELWORK TO BE INTUMESCENTLY COATED TO ACHIEVE REQUIRED FIRE RATING

DO NOT SCALE THIS DRAWING.

ORIGINAL DRAWING SIZE A1

Notes

GENERAL

G1. ALL DIMENSIONS SHOWN ARE IN mm UNLESS NOTED OTHERWISE.

G2. ALL DIMENSIONS SHOWN ARE APPROXIMATELY ONLY AND MUST BE CHECKED AND CONFIRMED BY THE CONTRACTOR VIA A FULL DIMENSIONAL SURVEY OF THE AREA OF THE WORKS PRIOR TO UNDERTAKING OF THE WORKS. THE ENGINEER MUST BE NOTIFIED IMMEDIATELY SHOULD ANY DISCREPANCIES BECOME APPARENT.

G3. ALL DETAILS AND DIMENSIONS SHOWN RELATING TO THE EXISTING STRUCTURE ARE SCHEMATIC AND APPROXIMATE ONLY, BASED UPON NO EXPOSURE PRIOR TO COMMENCEMENT OF THE PREPARATION OF THESE DETAILS.

G4. THE DEPTH AND LOCATION OF ANY SERVICES HAS NOT BEEN ESTABLISHED. THE CONTRACTOR IS RESPONSIBLE FOR LOCATING AND PROTECTING THEM.

G5. ALL WORKMANSHIP AND MATERIALS TO COMPLY WITH THE CURRENT BUILDING REGULATIONS AND RELEVANT CURRENT BRITISH STANDARDS.

G6. THE CONTRACTOR SHALL ALLOW FOR ALL WORK NECESSARY TO OBTAIN FULL APPROVAL AND SATISFACTION OF THE BUILDING INSPECTOR.

G7. THE CONTRACTOR SHALL COMPLY WITH ALL REQUIREMENTS OF THE CURRENT HEALTH & SAFETY AT WORK ACT AND CONSTRUCTION REGULATIONS.

G8. THE CONTRACTOR IS RESPONSIBLE FOR ENSURING THAT HIS OPERATIONS DO NOT IN ANY WAY IMPAIR THE SAFETY OR CONDITION OF THE EXISTING STRUCTURE OR ADJACENT STRUCTURES. HE IS TO PROVIDE ANY TEMPORARY SUPPORTS, SHORING, ETC REQUIRED FOR THIS PURPOSE AND HE IS TO CAREFULLY INSPECT THE CONDITION OF THE STRUCTURES BOTH BEFORE AND DURING THE EXECUTION OF THE WORK. THE ENGINEER IS TO BE NOTIFIED IMMEDIATELY SHOULD ANY DAMAGE OCCUR.

G9. ALL PROPRIETARY PRODUCTS TO BE USED IN STRICT ACCORDANCE WITH MANUFACTURERS INSTRUCTIONS AND RECOMMENDATIONS

THESE DRAWINGS HAVE BEEN PREPARED SOLELY AS A DRAFT SCHEME TO ASSIST THE QS IN COSTING THE RC AND STEELWORK ONLY.

THE SCHEME IS BASED ON A SECTION THROUGH PROVIDED BY BENNETTS ASSOCIATES. THE HEIGHTS AND LEVELS OF THE FOUNDATIONS ARE INDICATIVE ONLY BASED ON NO EXPOSURE WORK.

THE FOUNDATIONS SHOULD BE EXPOSED TO ALLOW THE SCHEME TO BE VALIDATED OR REVISED ACCORDINGLY.

IT IS ANTICIPATED THE STALLS FLOOR WILL NEED TO BE LOWERED TO PROVIDE THE ADDITIONAL HEADROOM REQUIRED TO ACCESS BENEATH THE BEAMS.

TENDER ISSUE

Rev	Date	Description	By
T	08/01/20	TENDER ISSUE	DC

Revisions

Michael Jackson Consulting
Chartered Structural Engineers
204 BOLTON ROAD
WALKDEN, WORSLEY
MANCHESTER, M28 3BN
Tel: 0161 790 4404
Fax: 0161 790 4405

Client
The Theatre of Comedy Company
Shaftesbury Theatre

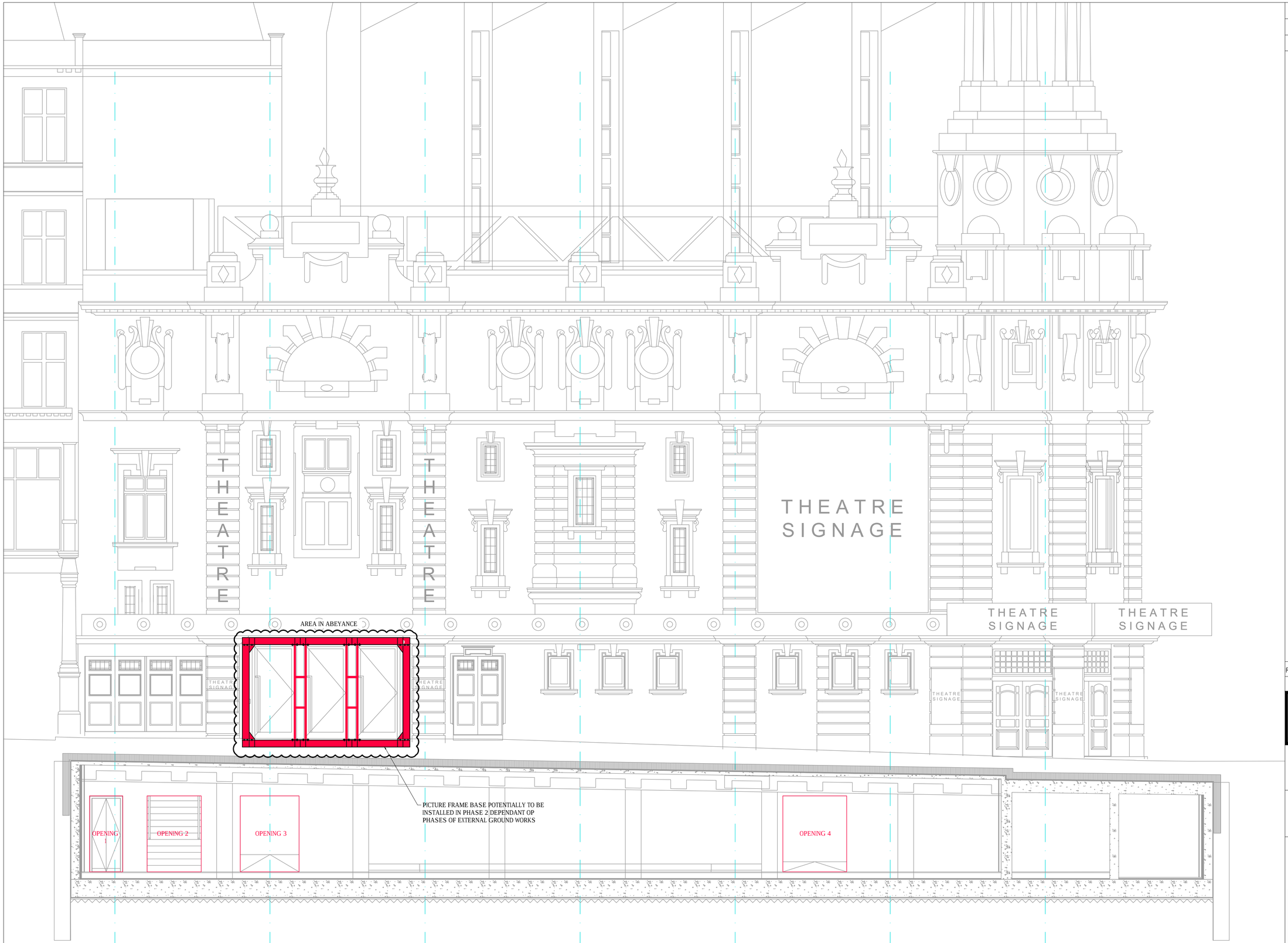
Site
SHAFTESBURY THEATRE

Project
PROPOSED FOH UPGRADE AND BASEMENT EXTENSION

Drawing Title
PROPOSED NEW BLOOMSBURY STREET ENTRANCE

Scale	Date	Drawn	Checked	Passed
AS SHOWN	JAN 2018	GAD		

DRG. No.
2714 - 400-T



PROPOSED ELEVATION ON BASEMENT BOX BLOOMSBURY OPENINGS
SCALE 1:50 AT A1

DO NOT SCALE THIS DRAWING.

Original Drawing Size A1

Notes

TENDER ISSUE

Rev.	Date	Description	By
T1	24/01/20	REVISED TO SUIT MEETING COMMENTS	DC
T	08/01/20	TENDER ISSUE	DC

Revisions

Michael Jackson Consulting
Chartered Structural Engineers
204 BOLTON ROAD
WALKDEN, WORSLEY
MANCHESTER, M28 3BN
Tel: 0161 790 4404
Fax: 0161 790 4405

Client

The Theatre of Comedy Company
Shaftesbury Theatre

Site

SHAFTESBURY THEATRE

Project

PROPOSED BASEMENT

Drawing Title

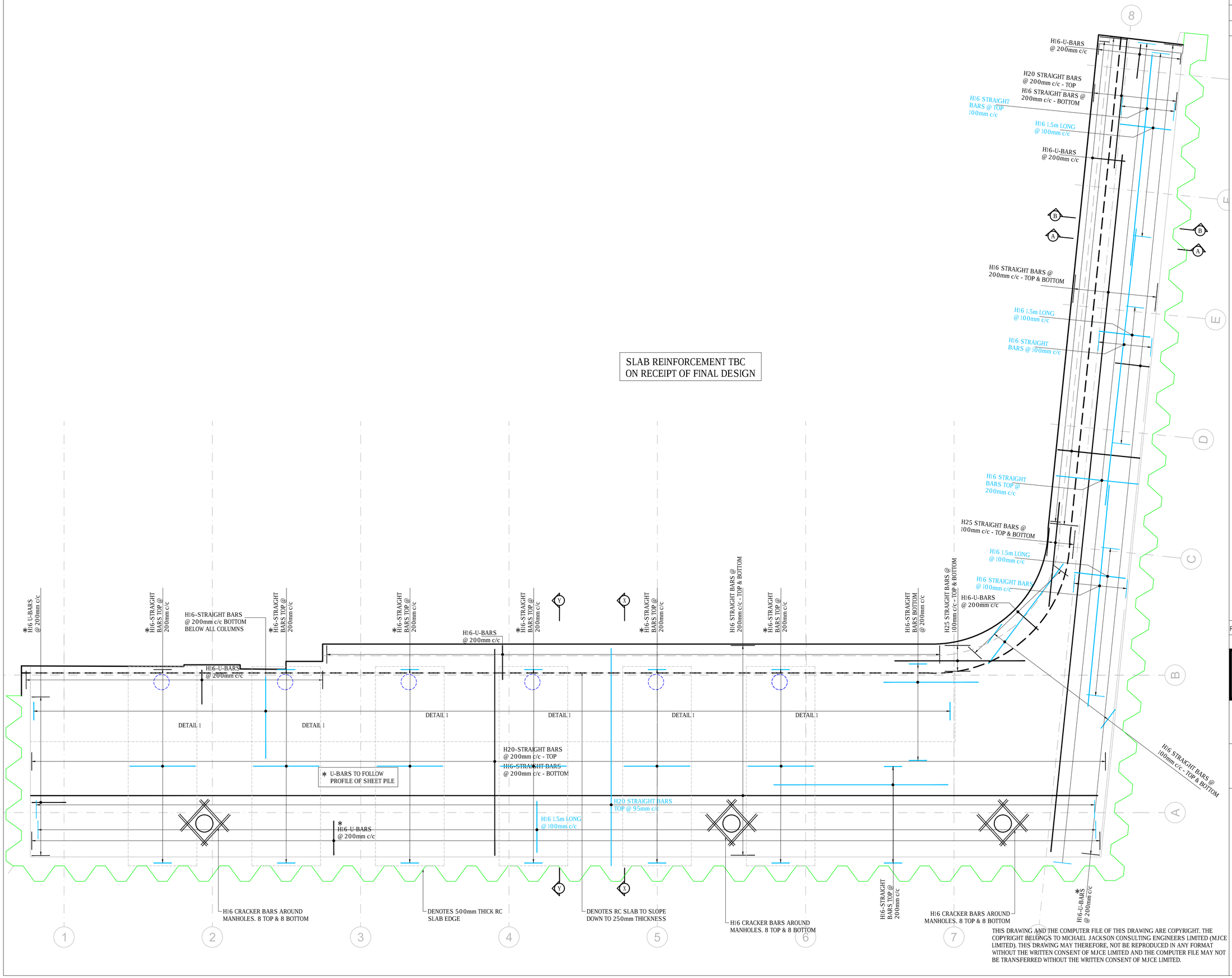
PROPOSED BASEMENT BOX ELEVATIONS ON BLOOMSBURY OPENINGS

Scale	Date	Drawn	Checked	Passed
AS SHOWN	---/--	--		

DRG. No.

2714-401-T1

SLAB REINFORCEMENT TBC
ON RECEIPT OF FINAL DESIGN



DO NOT SCALE THIS DRAWING.

Original Drawing Size A1

Notes

TENDER ISSUE

Rev.	Date	Description	By
T1	24/01/20	REVISED TO SUIT MEETING COMMENTS	DC
T	08/01/20	TENDER ISSUE	DC
P	26/11/19	PRELIMINARY ISSUE FOR COMMENTS	DC

Revisions

Michael Jackson Consulting
Chartered Structural Engineers
204 BOLTON ROAD
WALKDEN, WORSLEY
MANCHESTER, M28 3BN
Tel: 0161 790 4404
Fax: 0161 790 4405

Client

The Theatre of Comedy Company
Shaftesbury Theatre

Site

SHAFTESBURY THEATRE

Project

PROPOSED BASEMENT

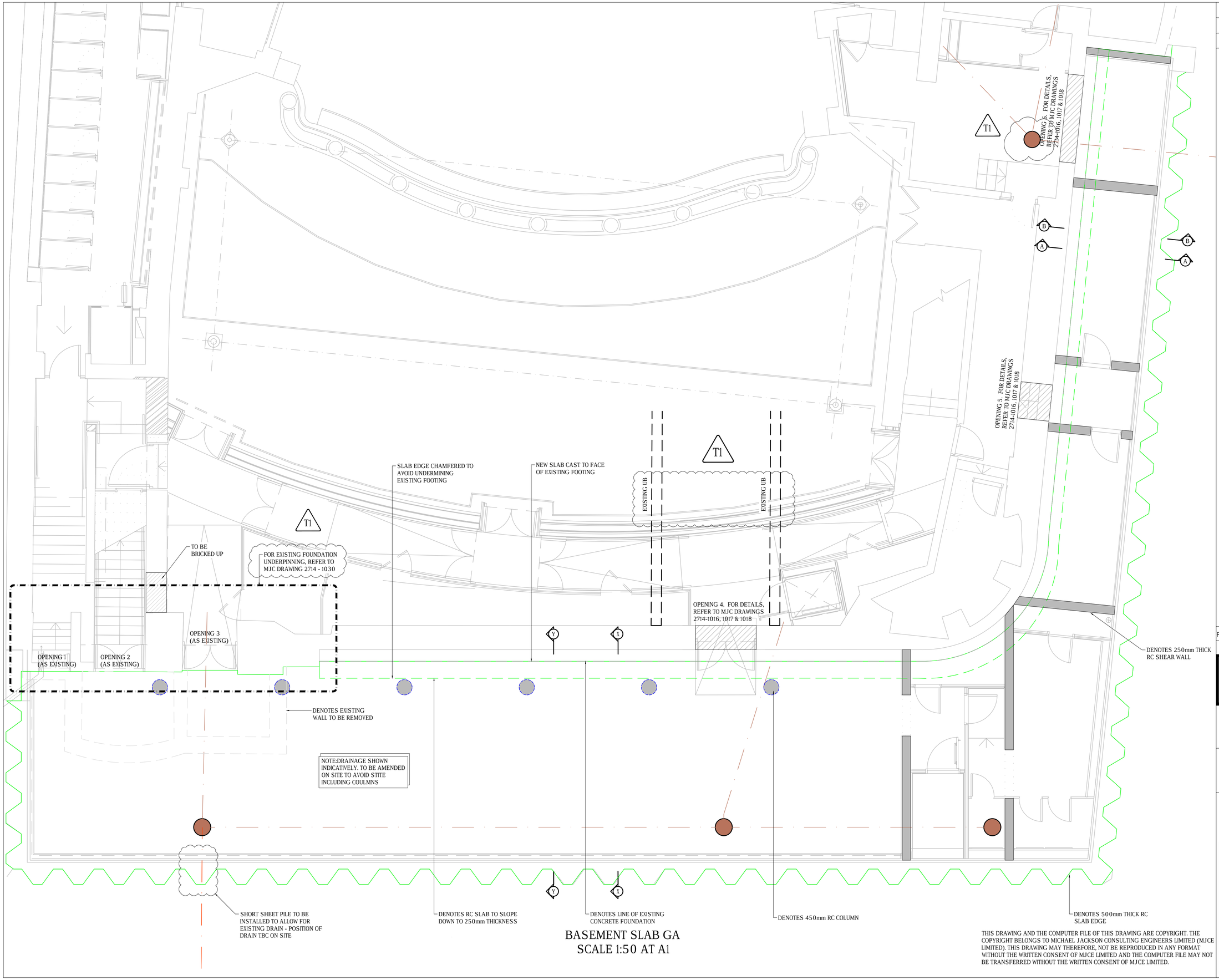
Drawing Title

BASEMENT BOX RC SLAB GA

Scale	Date	Drawn	Checked	Passed
AS SHOWN	OCT 2019	DC		

DRG. No.

2714-1004-T1



BASEMENT SLAB GA
SCALE 1:50 AT A1

DO NOT SCALE THIS DRAWING.

Original Drawing Size A1

Notes

TENDER ISSUE

Rev.	Date	Description	By
T1	24/01/20	REVISED TO SUIT MEETING COMMENTS	DC
T	08/01/20	TENDER ISSUE	DC
P	26/11/19	PRELIMINARY ISSUE FOR COMMENTS	DC

Revisions

Michael Jackson Consulting
Chartered Structural Engineers
204 BOLTON ROAD
WALKDEN, WORSLEY
MANCHESTER, M28 3BN
Tel: 0161 790 4404
Fax: 0161 790 4405

Client

The Theatre of Comedy Company
Shaftesbury Theatre

Site

SHAFTESBURY THEATRE

Project

PROPOSED BASEMENT

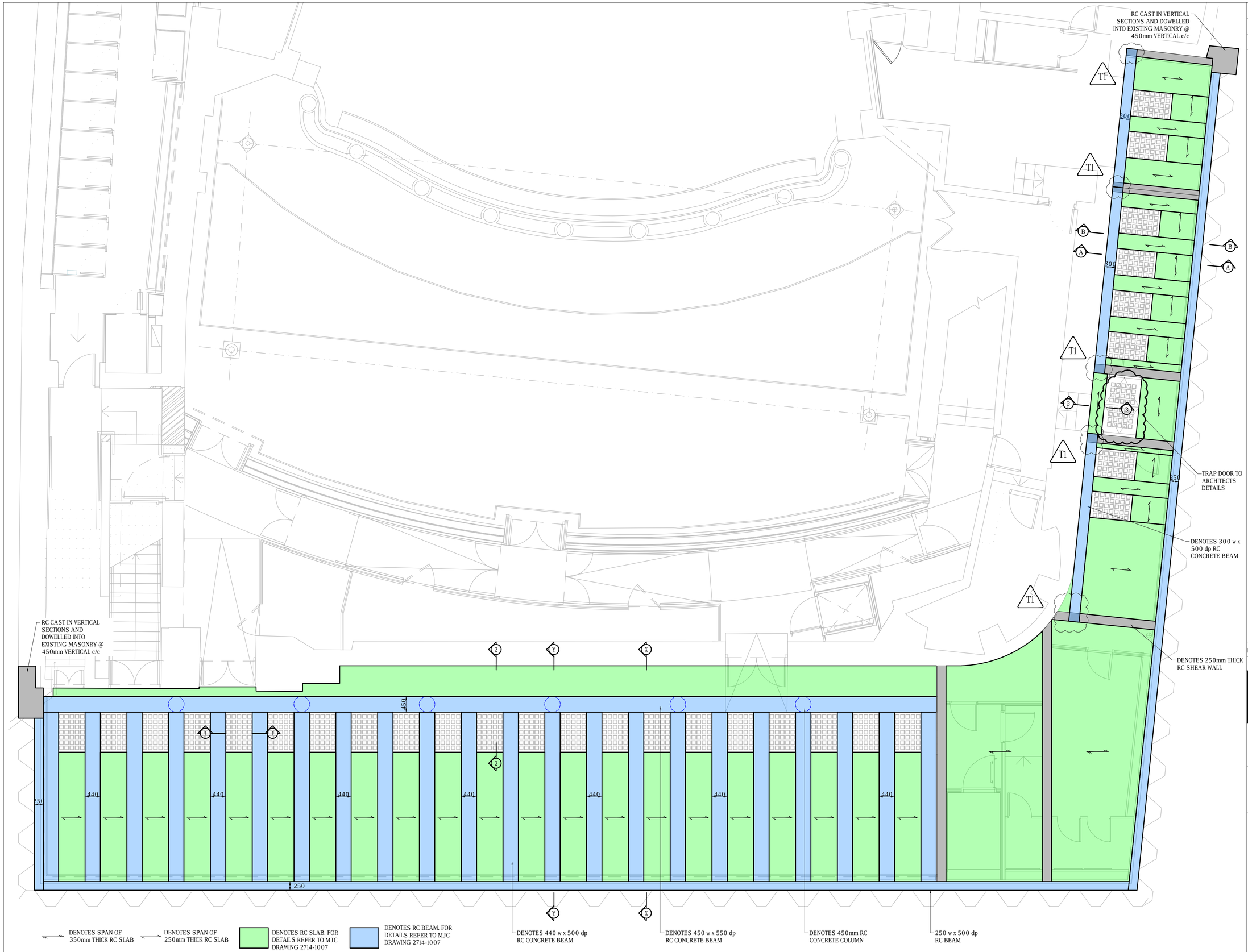
Drawing Title

BASEMENT BOX SLAB GA

Scale	Date	Drawn	Checked	Passed
AS SHOWN	OCT 2019	DC		

DRG. No.

2714-1005-T1



DO NOT SCALE THIS DRAWING.

Original Drawing Size A1

Notes

PLEASE REFER TO MJC DRAWING 2714-1020 FOR NOTES

TENDER ISSUE

Rev.	Date	Description	By
T1	24/01/20	REVISED TO SUIT MEETING COMMENTS	DC
T	08/01/20	TENDER ISSUE	DC
P	~~15/11/19~~	PRELIMINARY ISSUE FOR COMMENTS	DC

Revisions

Michael Jackson Consulting
Chartered Structural Engineers
204 BOLTON ROAD
WALKDEN, WORSLEY
MANCHESTER, M28 3BN
Tel: 0161 790 4404
Fax: 0161 790 4405

Client

The Theatre of Comedy Company
Shaftesbury Theatre

Site

SHAFTESBURY THEATRE

Project

PROPOSED BASEMENT

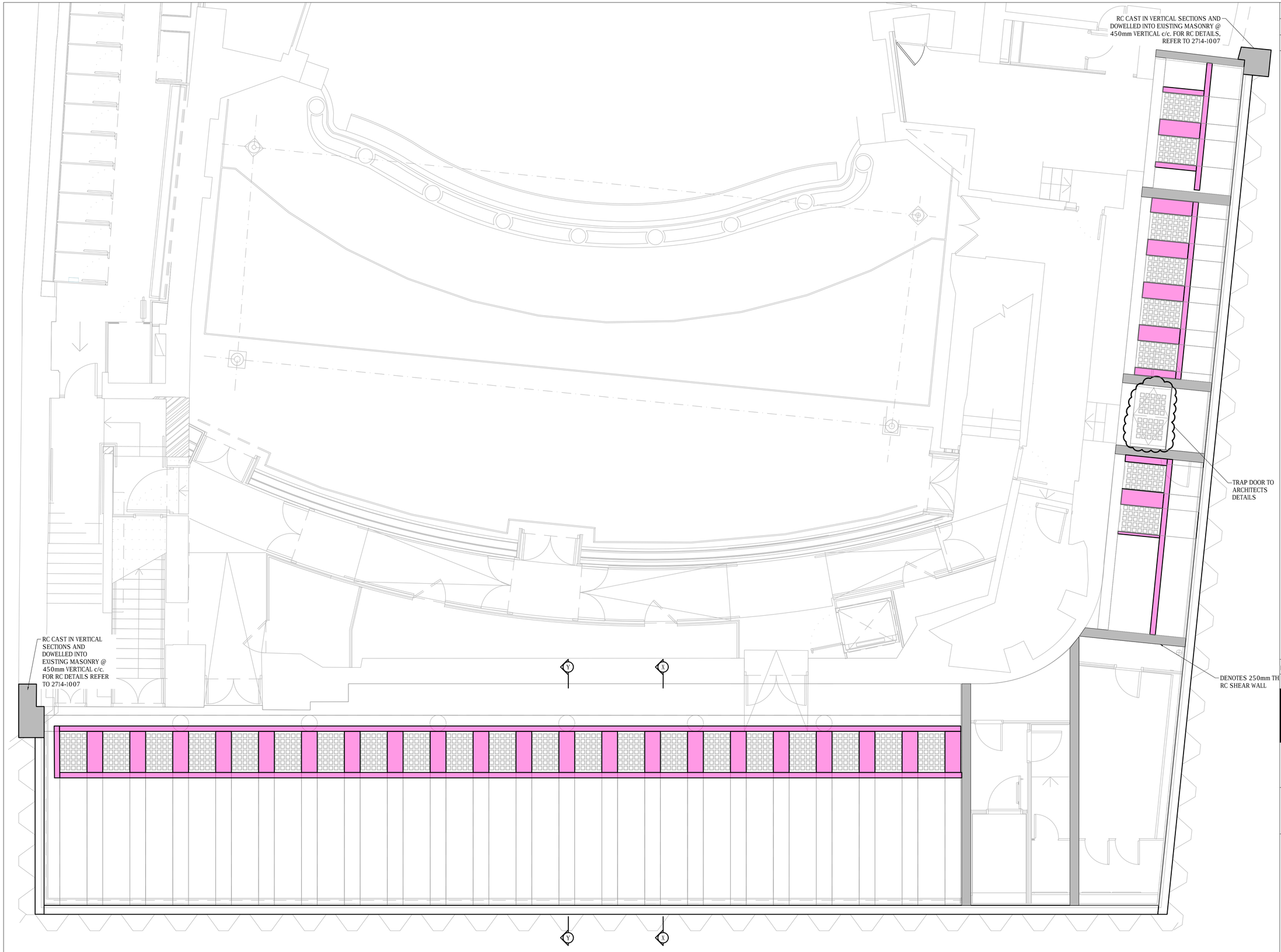
Drawing Title

BASEMENT BOX ROOF SLAB GA

Scale	Date	Drawn	Checked	Passed
AS SHOWN	OCT 2019	DC		

DRG. No.

2714-1006-T1



DO NOT SCALE THIS DRAWING.

Original Drawing Size A1

Notes

PLEASE REFER TO MJC DRAWING 2714-1020 FOR NOTES

TENDER ISSUE

Rev.	Date	Description	By
T	08/01/20	TENDER ISSUE	DC
P	15/11/19	PRELIMINARY ISSUE FOR COMMENTS	DC

Revisions

Michael Jackson Consulting
Chartered Structural Engineers
204 BOLTON ROAD
WALKDEN, WORSLEY
MANCHESTER, M28 3BN
Tel: 0161 790 4404
Fax: 0161 790 4405

Client

The Theatre of Comedy Company
Shaftesbury Theatre

Site

SHAFTESBURY THEATRE

Project

PROPOSED BASEMENT

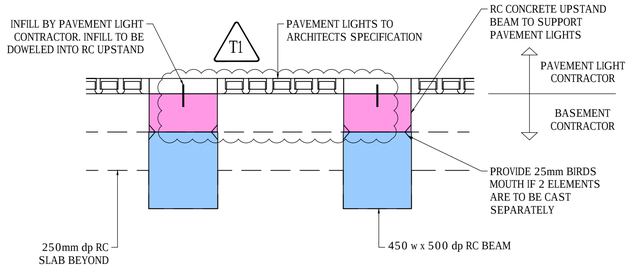
Drawing Title

BASEMENT BOX PAVEMENT LIGHT SUPPORTS GA

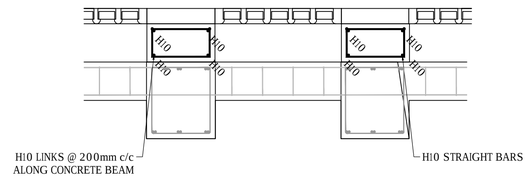
Scale	Date	Drawn	Checked	Passed
AS SHOWN	OCT 2019	DC		

DRG. No.

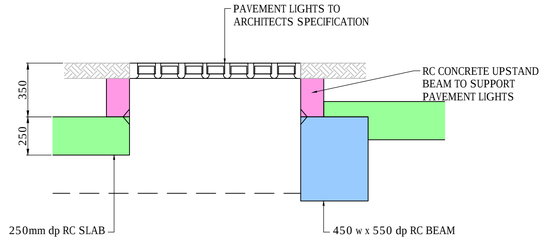
2714-1007-T



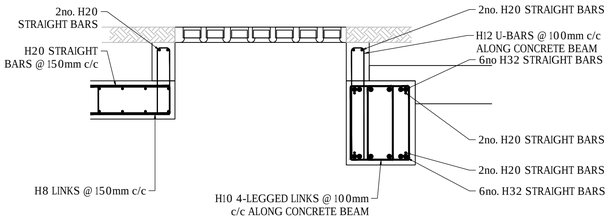
SECTION 1-1
(SCALE 1:20 AT A1)



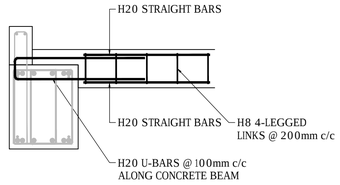
SECTION 1-1 - REINFORCEMENT
(SCALE 1:20 AT A1)



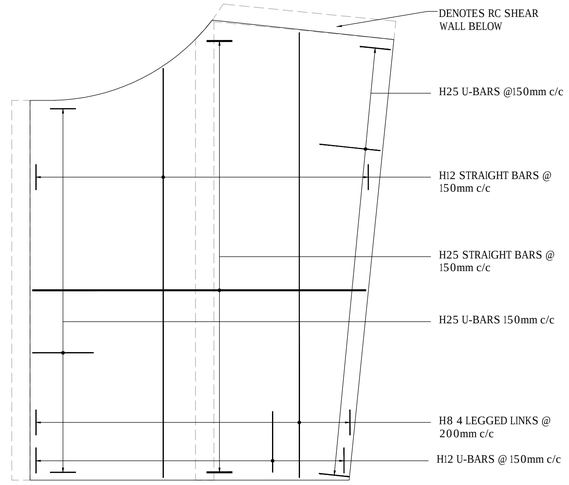
SECTION 2-2
(SCALE 1:20 AT A1)



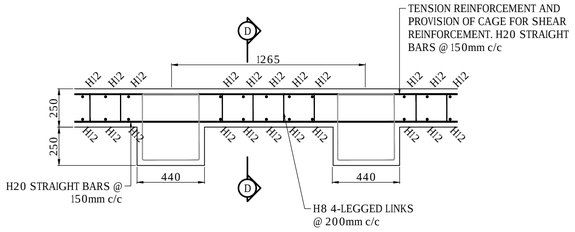
SECTION 2-2 - REINFORCEMENT
(SCALE 1:20 AT A1)



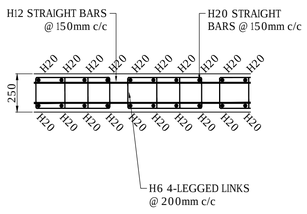
SECTION 2-2 - RC BEAM TO SLAB REBAR
(SCALE 1:20 AT A1)



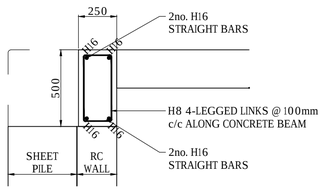
TYPICAL RC PLAN ON 350mm THICK SLAB
(SCALE 1:50 AT A1)



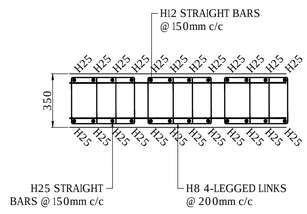
TYPICAL SECTION THROUGH BASEMENT BOX RC SLAB AND CONCRETE BEAMS
(SCALE 1:20 AT A1)



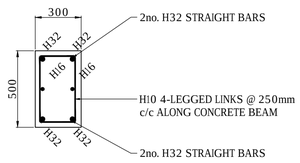
SECTION D-D - TYPICAL SECTION THROUGH 250mm THICK RC SLAB
(SCALE 1:20 AT A1)



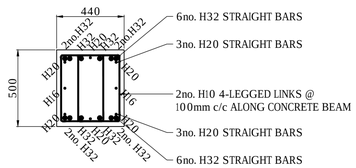
TYPICAL SECTION THROUGH RC CAPPING BEAM
(SCALE 1:20 AT A1)



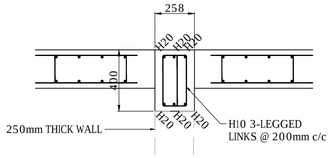
TYPICAL SECTION THROUGH 350mm THICK RC SLAB
(SCALE 1:20 AT A1)



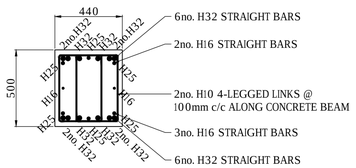
TYPICAL SECTION THROUGH 300mm WIDE RC BEAM
(SCALE 1:20 AT A1)



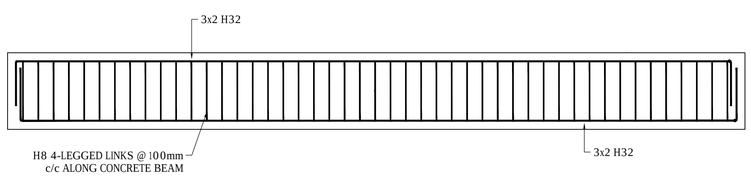
SECTION E-E - TYPICAL SECTION THROUGH 440mm WIDE RC BEAM
(SCALE 1:20 AT A1)



TYPICAL LINTEL DETAIL THROUGH OPENINGS
(SCALE 1:20 AT A1)



TYPICAL SECTION THROUGH 450mm WIDE RC BEAM
(SCALE 1:20 AT A1)



TYPICAL ELEVATION ON 440mm WIDE RC BEAM
(SCALE 1:20 AT A1)

NOTE:
CONTRACTOR IS RESPONSIBLE FOR THE PRODUCTION OF REINFORCEMENT SCHEDULES AND ANY FURTHER REINFORCEMENT DRAWINGS

DO NOT SCALE THIS DRAWING.

Original Drawing Size A1

Notes

PLEASE REFER TO MJC DRAWING 2714-1020 FOR NOTES

TENDER ISSUE

Rev.	Date	Description	By
T1	24/01/20	REVISED TO SUIT MEETING COMMENTS	DC
T	08/01/20	TENDER ISSUE	DC
P	15/11/19	PRELIMINARY ISSUE FOR COMMENTS	DC

Revisions

Michael Jackson Consulting
Chartered Structural Engineers
204 BOLTON ROAD
WALKDEN, WORSLEY
MANCHESTER, M28 3BN
Tel: 0161 790 4404
Fax: 0161 790 4405

Client

The Theatre of Comedy Company
Shaftesbury Theatre

Site

SHAFTESBURY THEATRE

Project

PROPOSED BASEMENT

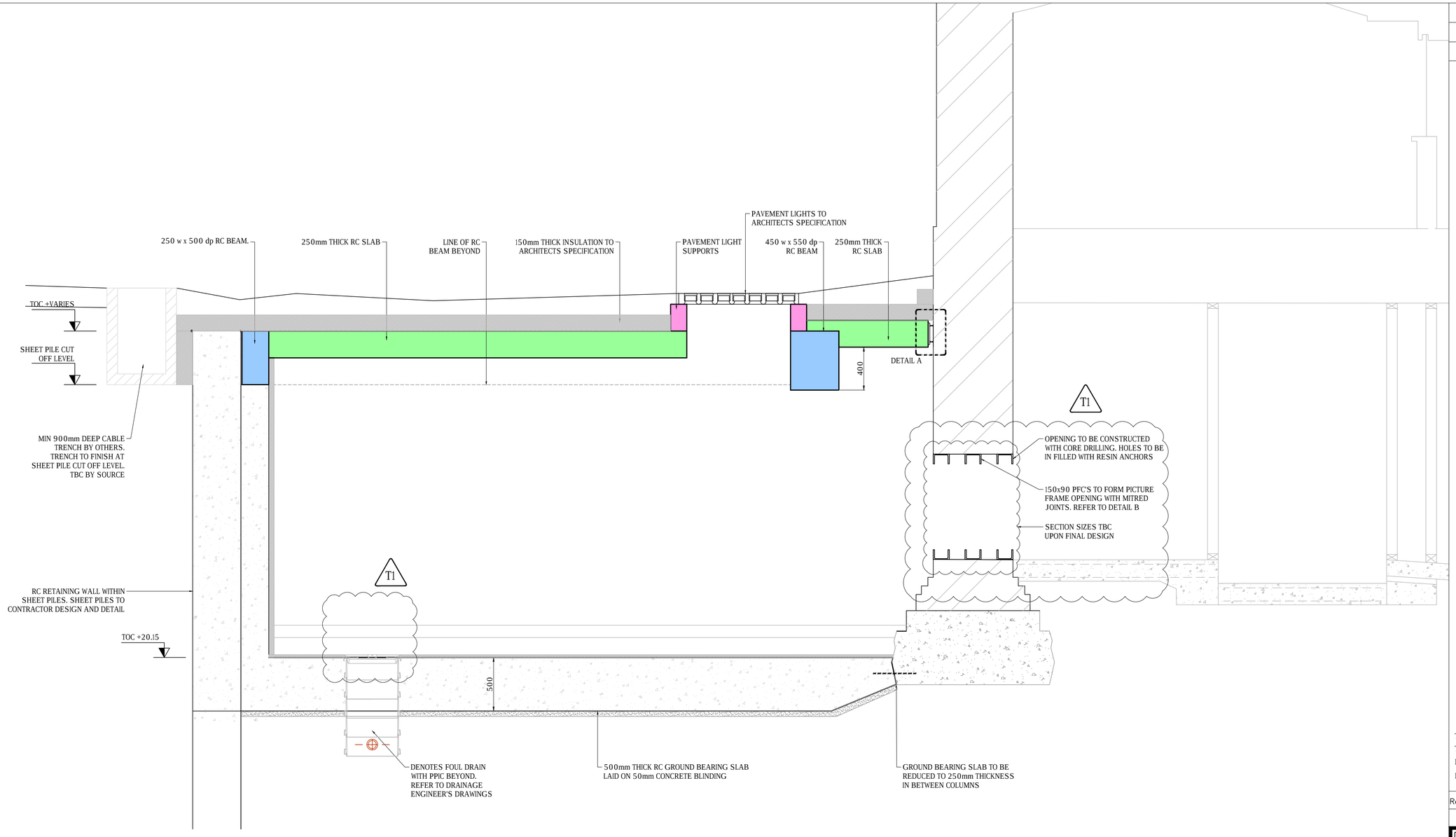
Drawing Title

BASEMENT BOX SLAB AND REINFORCEMENT DETAILS

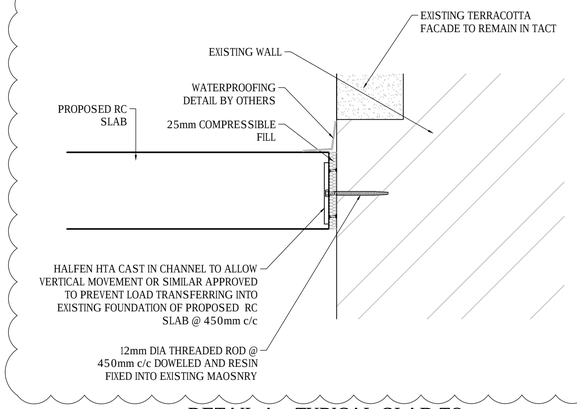
Scale	Date	Drawn	Checked	Passed
AS SHOWN	OCT 2019	DC		

DRG. No.

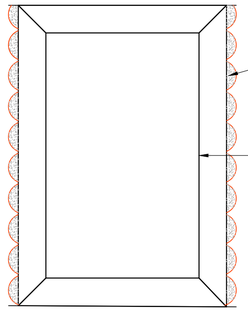
2714-1008-T1



SECTION X-X
(SCALE 1:20 AT A1)



DETAIL A - TYPICAL SLAB TO WALL CONNECTION DETAIL
(SCALE 1:10 AT A1)



DETAIL B - TYPICAL ELEVATION ON NEW OPENING IN EXISTING WALL
(SCALE 1:10 AT A1)

DO NOT SCALE THIS DRAWING.

Original Drawing Size A1

Notes

PLEASE REFER TO MJC DRAWING 2714-1020 FOR NOTES

TENDER ISSUE

Rev.	Date	Description	By
T1	24/01/20	REVISED TO SUIT MEETING COMMENTS	DC
T	08/01/20	TENDER ISSUE	DC
P1	26/11/19	BASE SLAB DESIGN ADDED	DC
P	15/11/19	PRELIMINARY ISSUE FOR COMMENTS	DC

Revisions

Michael Jackson Consulting
Chartered Structural Engineers
204 BOLTON ROAD
WALKDEN, WORSLEY
MANCHESTER, M28 3BN
Tel: 0161 790 4404
Fax: 0161 790 4405

Client

The Theatre of Comedy Company
Shaftesbury Theatre

Site

SHAFTESBURY THEATRE

Project

PROPOSED BASEMENT

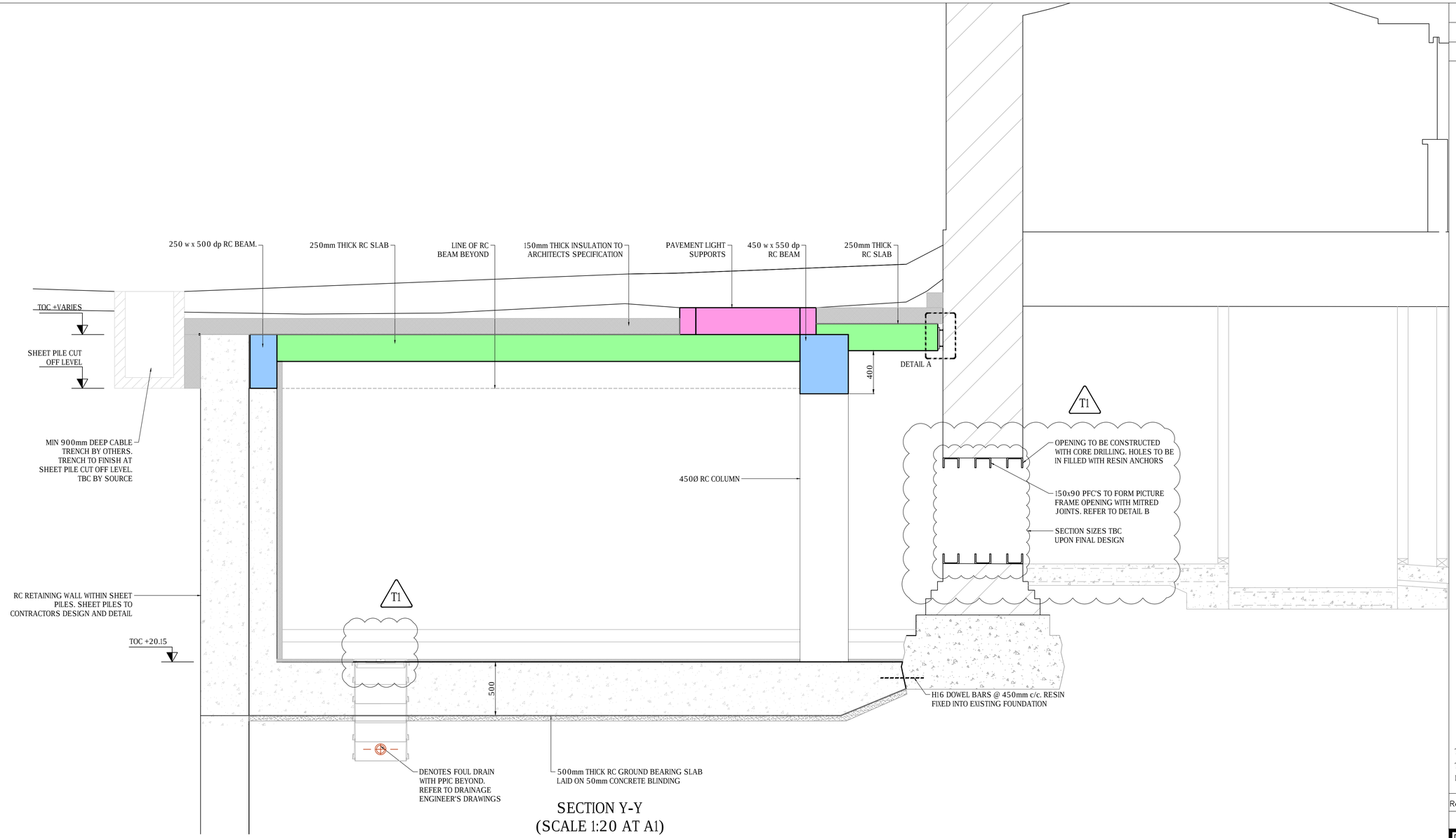
Drawing Title

SECTION X-X

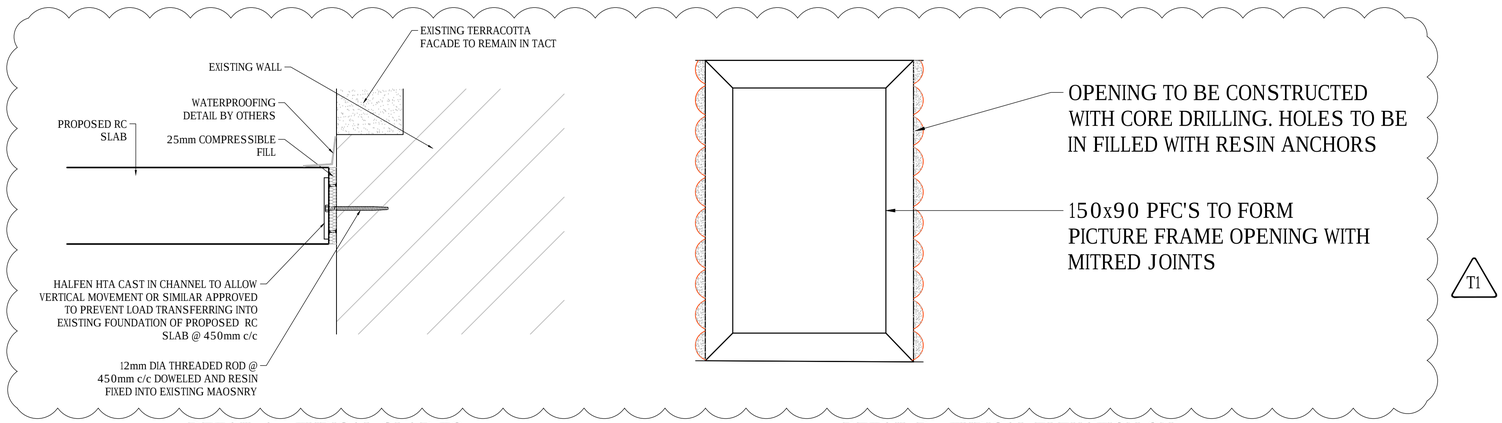
Scale	Date	Drawn	Checked	Passed
AS SHOWN	OCT 2019	DC		

DRG. No.

2714-1009-T1



SECTION Y-Y
(SCALE 1:20 AT A1)



DETAIL A - TYPICAL SLAB TO WALL CONNECTION DETAIL
(SCALE 1:10 AT A1)

DETAIL B - TYPICAL ELEVATION ON NEW OPENING IN EXISTING WALL
(SCALE 1:10 AT A1)

DO NOT SCALE THIS DRAWING.

Original Drawing Size A1

Notes

PLEASE REFER TO MJC DRAWING 2714-1020 FOR NOTES

TENDER ISSUE

Rev.	Date	Description	By
T1	24/01/20	REVISED TO SUIT MEETING COMMENTS	DC
T	08/01/20	TENDER ISSUE	DC
P	15/11/19	PRELIMINARY ISSUE FOR COMMENTS	DC

Revisions

Michael Jackson Consulting
Chartered Structural Engineers
204 BOLTON ROAD
WALKDEN, WORSLEY
MANCHESTER, M28 3BN
Tel: 0161 790 4404
Fax: 0161 790 4405

Client

The Theatre of Comedy Company
Shaftesbury Theatre

Site

SHAFTESBURY THEATRE

Project

PROPOSED BASEMENT

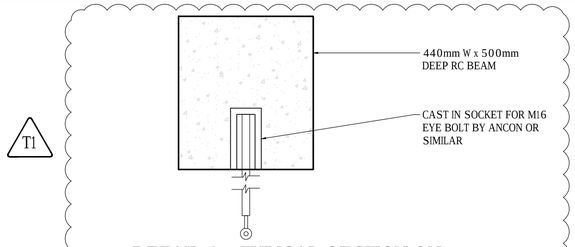
Drawing Title

SECTION Y-Y

Scale	Date	Drawn	Checked	Passed
AS SHOWN	OCT 2019	DC		

DRG. No.

2714-1010-T1



DETAIL A - TYPICAL SECTION ON BUILT IN SOCKET IN RC BEAM (SCALE 1:10 AT A1)

RC CAST IN VERTICAL SECTIONS AND DOWELLED INTO EXISTING MASONRY @ 450mm VERTICAL c/c. FOR RC DETAILS, REFER TO 2714-1007

H12 U-BARS @ 150 c/c FROM 250 dp RC SLAB TO SHEET PILE CAPPING BEAM

H12 U-BARS @ 150 c/c FROM 250 dp RC SLAB TO SHEET PILE CAPPING BEAM

RC CAST IN VERTICAL SECTIONS AND DOWELLED INTO EXISTING MASONRY @ 450mm VERTICAL c/c. FOR RC DETAILS REFER TO 2714-1007

H20 U-BARS @ 150 c/c FROM 350 dp RC SLAB TO SHEET PILE CAPPING BEAM

H20 U-BARS @ 150 c/c FROM 350 dp RC SLAB TO SHEET PILE CAPPING BEAM

H12 U-BARS @ 150 c/c FROM 250 dp RC SLAB TO SHEET PILE CAPPING BEAM

DENOTES SPAN OF 350mm THICK RC SLAB

DENOTES SPAN OF 250mm THICK RC SLAB

* DENOTES CAST IN SOCKET FOR M16 EYE BOLT BY ANCON OR SIMILAR. REFER TO DETAIL A

H32 BENT STRAIGHT BARS FROM 500mm dp RC BEAM TO SHEET PILE CAPPING BEAM

H12 U-BARS @ 150 c/c FROM 250 dp RC SLAB TO SHEET PILE CAPPING BEAM

H10 4-LEGGED LINKS @ 100mm VERTICAL c/c DOWN THROUGH SHEET PILES

DO NOT SCALE THIS DRAWING.

Original Drawing Size A1

Notes

PLEASE REFER TO MJC DRAWING 2714-1020 FOR NOTES

TENDER ISSUE

Rev.	Date	Description	By
T1	24/01/20	REVISED TO SUIT MEETING COMMENTS	DC
T	08/01/20	TENDER ISSUE	DC
P	15/11/19	PRELIMINARY ISSUE FOR COMMENTS	DC

Revisions

Michael Jackson Consulting
Chartered Structural Engineers
204 BOLTON ROAD
WALKDEN, WORSLEY
MANCHESTER, M28 3BN
Tel: 0161 790 4404
Fax: 0161 790 4405

Client

The Theatre of Comedy Company
Shaftesbury Theatre

Site

SHAFTESBURY THEATRE

Project

PROPOSED BASEMENT

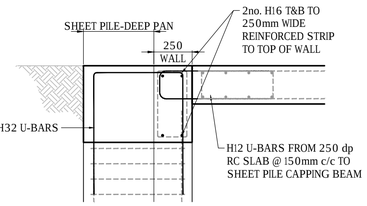
Drawing Title

SHEET PILE CAPPING BEAM RC GA

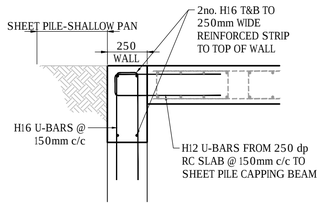
Scale	Date	Drawn	Checked	Passed
AS SHOWN	OCT 2019	DC		

DRG. No.

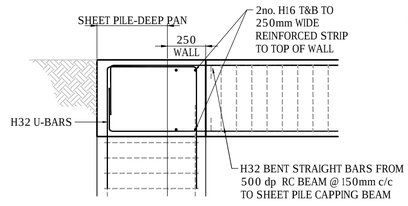
2714-1011-T1



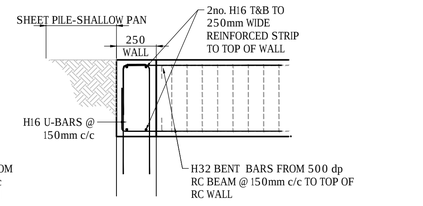
TYPICAL SECTION THROUGH 710mm WIDE RC WALL 250mm DEEP RC SLAB
(SCALE 1:20 AT A1)



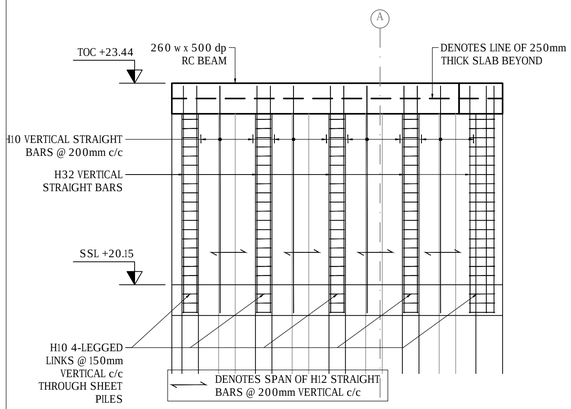
TYPICAL SECTION THROUGH 250mm WIDE RC WALL 250mm DEEP RC SLAB
(SCALE 1:20 AT A1)



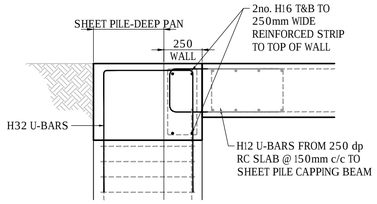
TYPICAL SECTION THROUGH 710mm WIDE RC WALL & 500mm DEEP RC BEAM
(SCALE 1:20 AT A1)



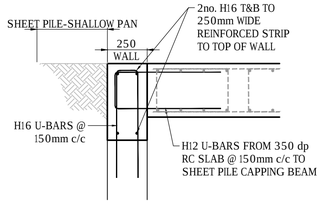
TYPICAL SECTION THROUGH 250mm WIDE RC WALL AND 500mm DEEP RC BEAM
(SCALE 1:20 AT A1)



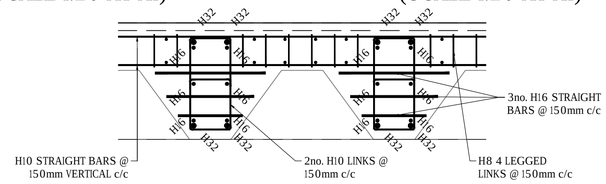
RC ON ELEVATION A-A
(SCALE 1:50 AT A1)



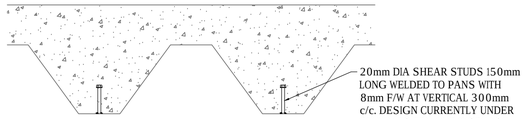
TYPICAL SECTION THROUGH
710mm WIDE RC WALL
250mm DEEP RC SLAB
(SCALE 1:20 AT A1)



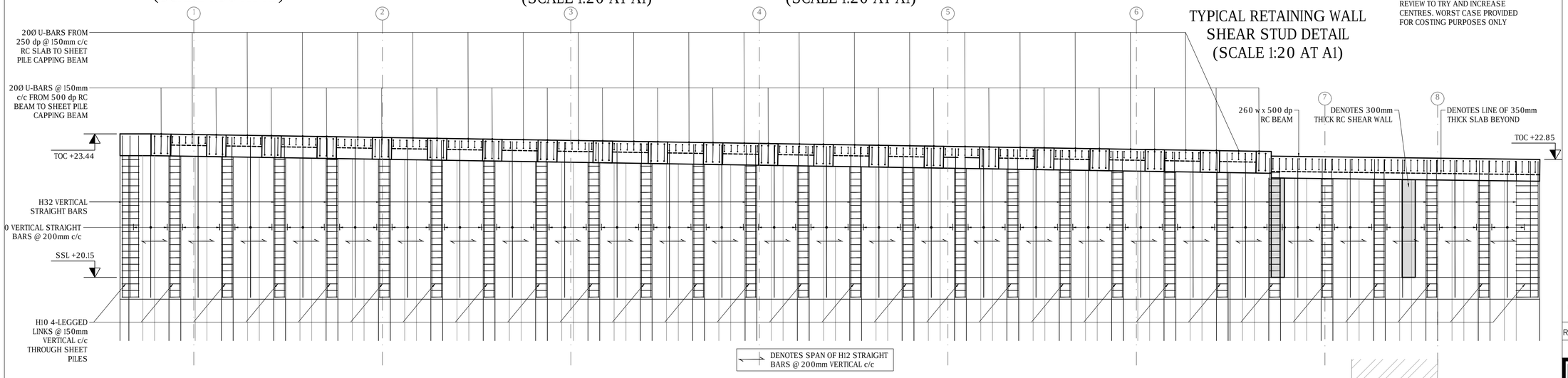
TYPICAL SECTION THROUGH
250mm WIDE RC WALL 250mm
DEEP RC SLAB
(SCALE 1:20 AT A1)



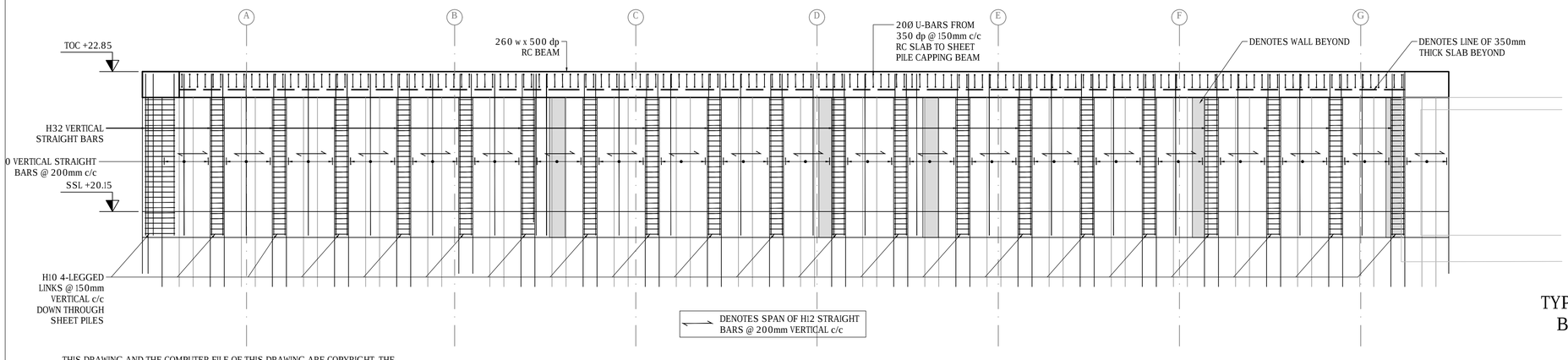
TYPICAL PLAN ON RETAINING WALL REINFORCEMENT
(SCALE 1:20 AT A1)



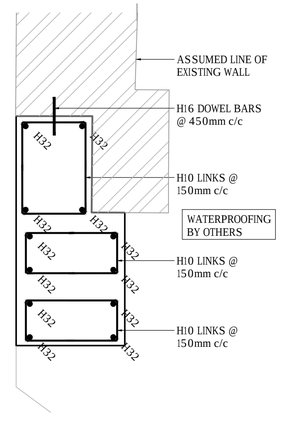
TYPICAL RETAINING WALL
SHEAR STUD DETAIL
(SCALE 1:20 AT A1)



RC ON ELEVATION B-B
(SCALE 1:50 AT A1)



RC ON ELEVATION C-C
(SCALE 1:50 AT A1)



TYPICAL PLAN ON JUNCTION
BETWEEN SHEET PILE &
EXISTING BUILDING
(SCALE 1:20 AT A1)

DO NOT SCALE THIS DRAWING.

Original Drawing Size A1

Notes

PLEASE REFER TO MJC DRAWING 2714-1020 FOR NOTES

TENDER ISSUE

Rev.	Date	Description	By
T	08/01/20	TENDER ISSUE	DC
P	15/11/19	PRELIMINARY ISSUE FOR COMMENTS	DC

Revisions

Michael Jackson Consulting
Chartered Structural Engineers
204 BOLTON ROAD
WALKDEN, WORSLEY
MANCHESTER, M28 3BN
Tel: 0161 790 4404
Fax: 0161 790 4405

Client

The Theatre of Comedy Company
Shaftesbury Theatre

Site

SHAFTESBURY THEATRE

Project

PROPOSED BASEMENT

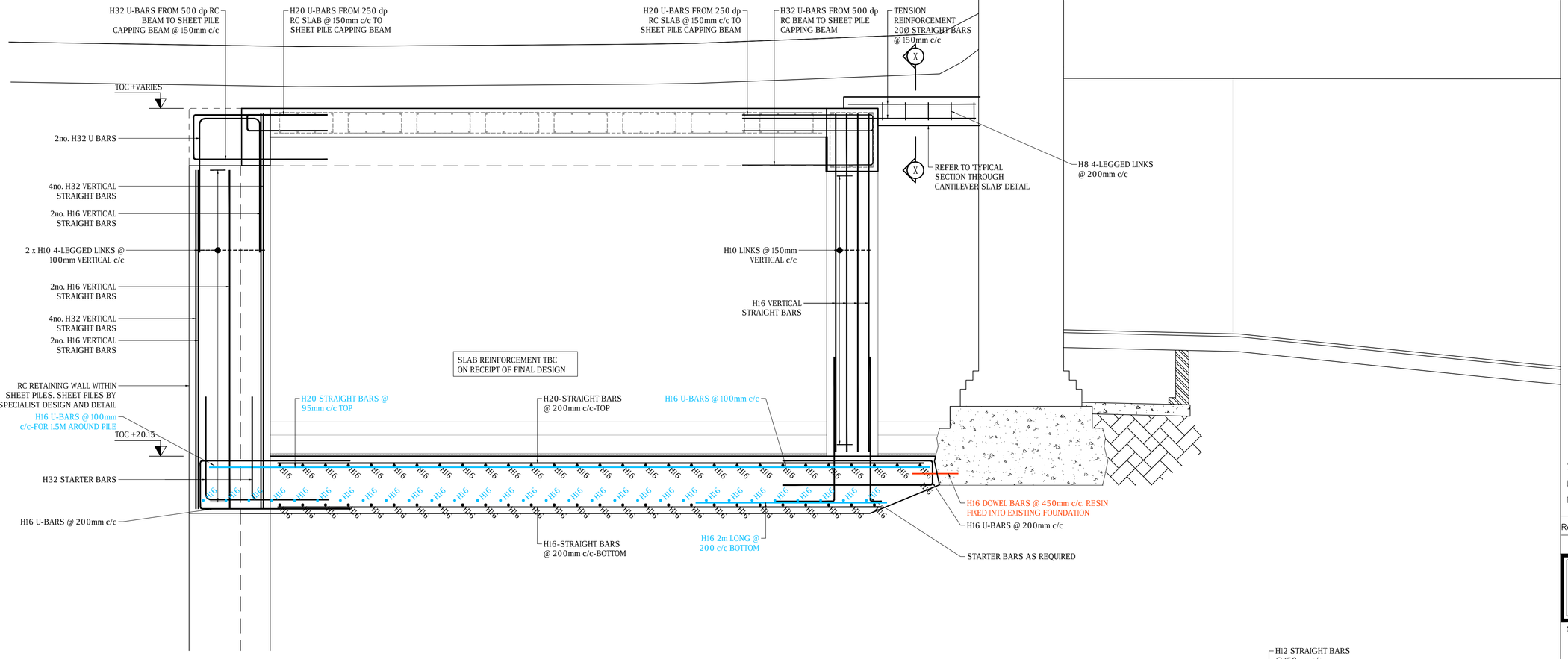
Drawing Title

RETAINING WALL ELEVATIONS & DETAILS

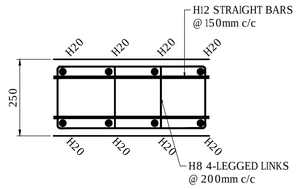
Scale	Date	Drawn	Checked	Passed
AS SHOWN	OCT 2019	DC		

DRG. No.

2714-1012-T



TYPICAL RC SECTION THROUGH BASEMENT BOX
(SCALE 1:20 AT A1)



SECTION X-X
(SCALE 1:10 AT A1)

DO NOT SCALE THIS DRAWING.

Original Drawing Size A1

Notes

PLEASE REFER TO MJC DRAWING 2714-1020 FOR NOTES

TENDER ISSUE

Rev.	Date	Description	By
T	08/01/20	TENDER ISSUE	DC
P1	26/11/19	BASE SLAB DESIGN ADDED	DC
P	15/11/19	PRELIMINARY ISSUE FOR COMMENTS	DC

Revisions

Michael Jackson Consulting
Chartered Structural Engineers
204 BOLTON ROAD
WALKDEN, WORSLEY
MANCHESTER, M28 3BN
Tel: 0161 790 4404
Fax: 0161 790 4405

Client

Shaftesbury Theatre

Site

SHAFTESBURY THEATRE

Project

PROPOSED BASEMENT

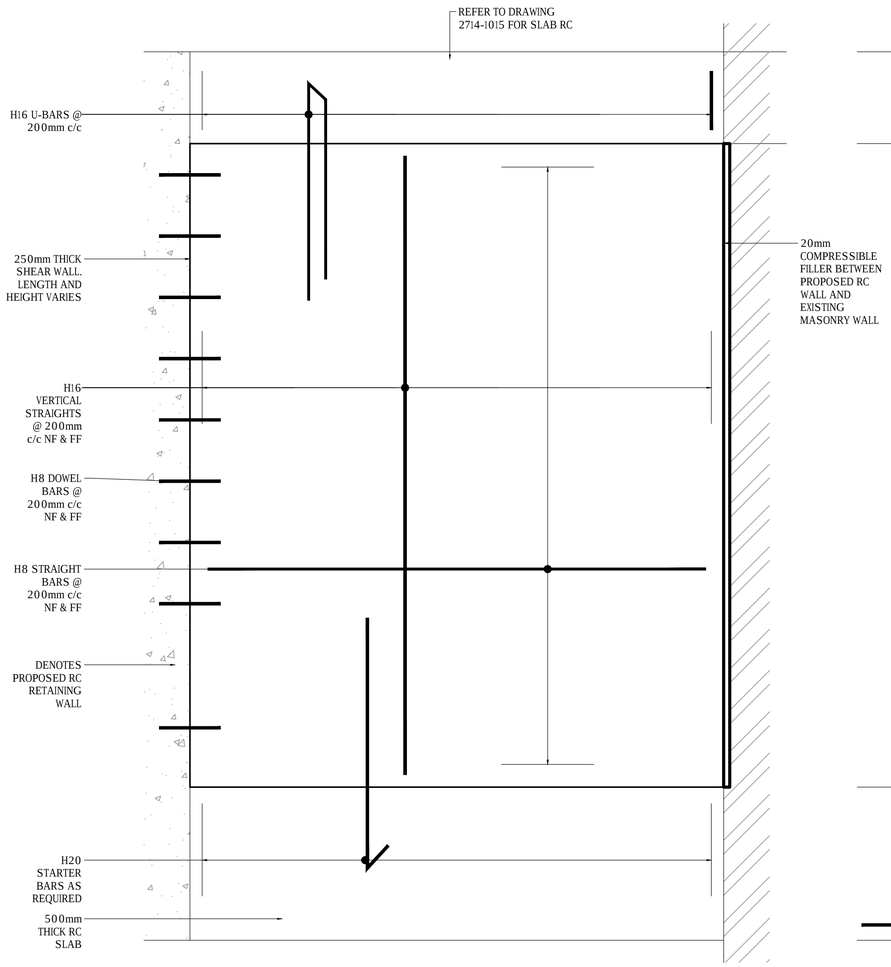
Drawing Title

TYPICAL RC SECTION THROUGH BASEMENT BOX

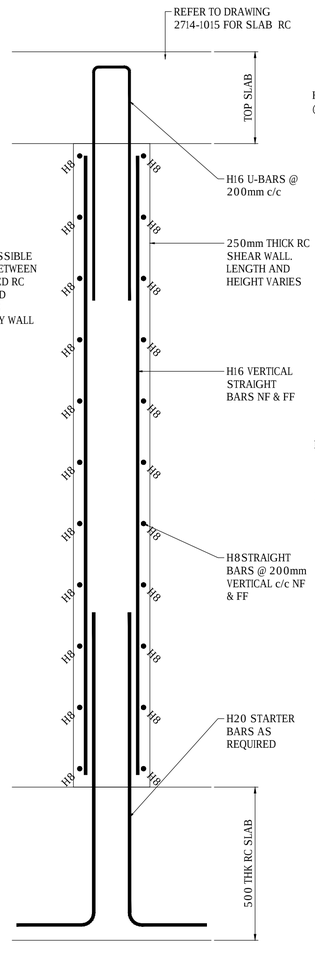
Scale	Date	Drawn	Checked	Passed
AS SHOWN	OCT 2019	DC		

DRG. No.

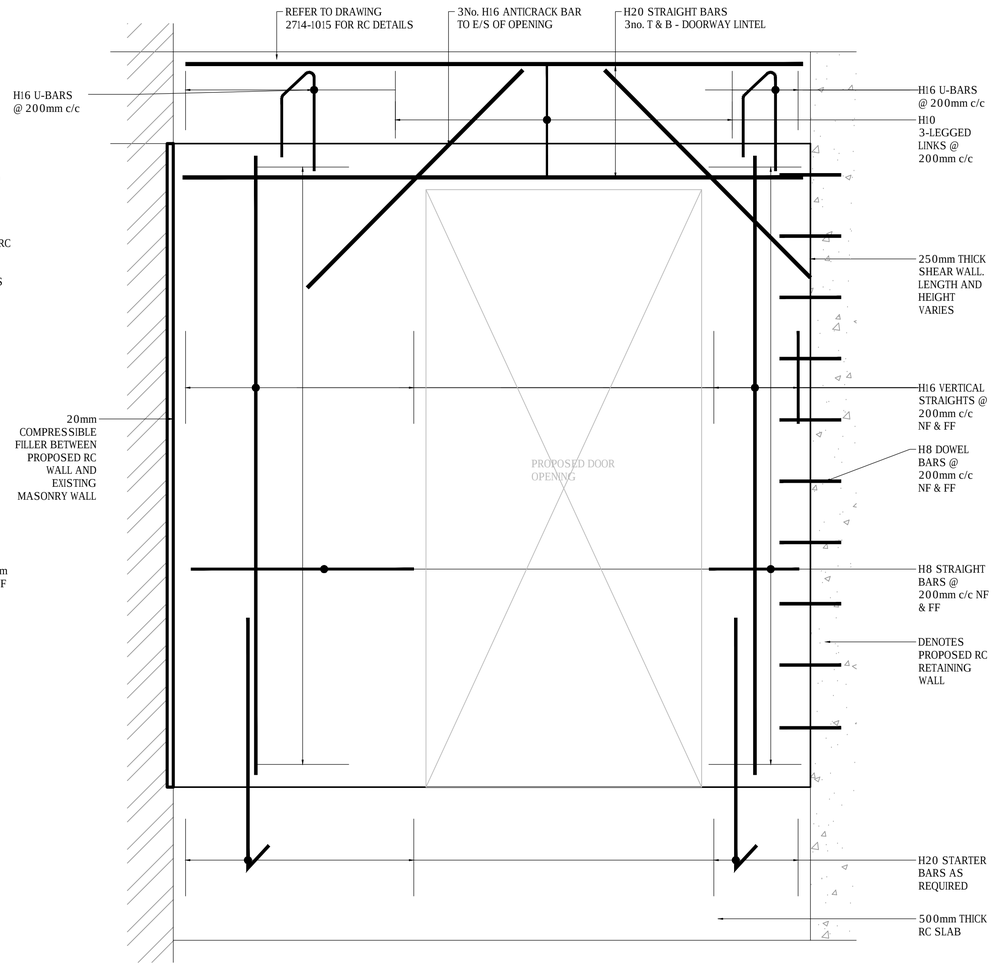
2714-1013-T



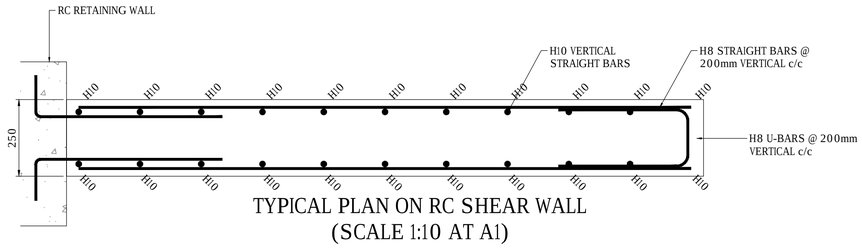
TYPICAL ELEVATION ON
RC SHEAR WALL
(SCALE 1:10 AT A1)



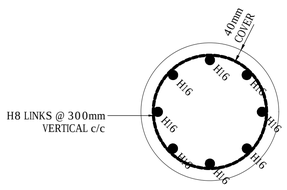
TYPICAL SECTION THROUGH
RC SHEAR WALL
(SCALE 1:10 AT A1)



TYPICAL ELEVATION ON RC
SHEAR WALL OPENING
(SCALE 1:10 AT A1)



TYPICAL PLAN ON RC SHEAR WALL
(SCALE 1:10 AT A1)



TYPICAL PLAN ON 450
RC COLUMN
(SCALE 1:10 AT A1)

DO NOT SCALE THIS DRAWING.

Original Drawing Size A1

Notes

TENDER ISSUE

Rev.	Date	Description	By
T	08/01/20	TENDER ISSUE	DC
P	15/11/19	PRELIMINARY ISSUE FOR COMMENTS	DC

Revisions

Michael Jackson Consulting
Chartered Structural Engineers
204 BOLTON ROAD
WALKDEN, WORSLEY
MANCHESTER, M28 3BN
Tel: 0161 790 4404
Fax: 0161 790 4405

Client

Shaftesbury Theatre

Site

SHAFTESBURY THEATRE

Project

PROPOSED BASEMENT

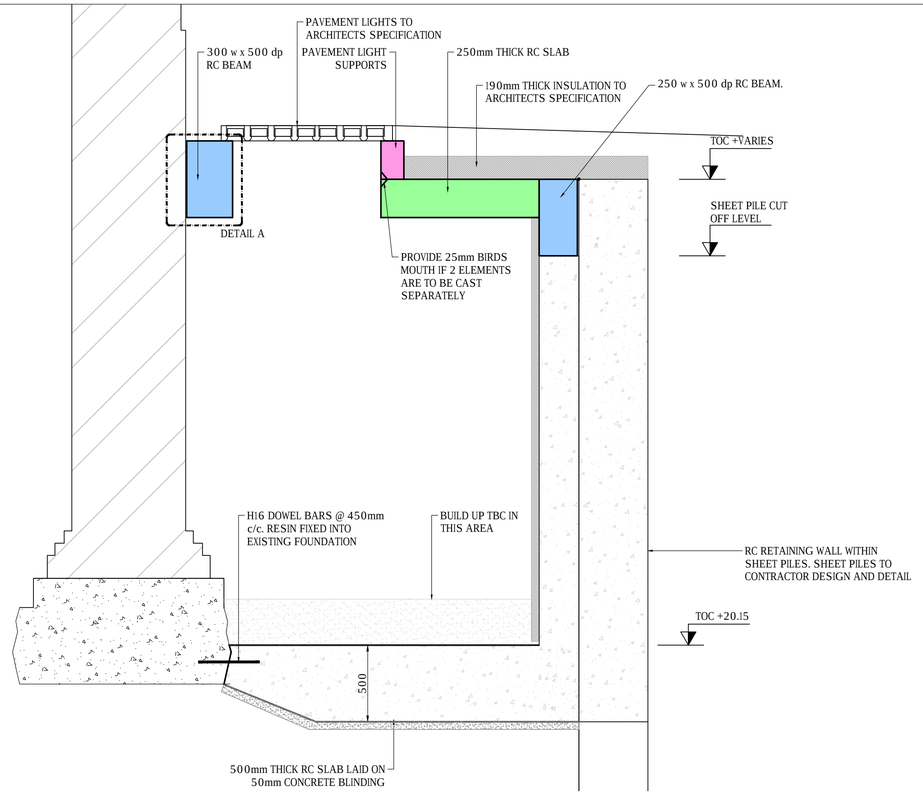
Drawing Title

BASEMENT BOX RC SHEAR WALL AND COLUMN GA

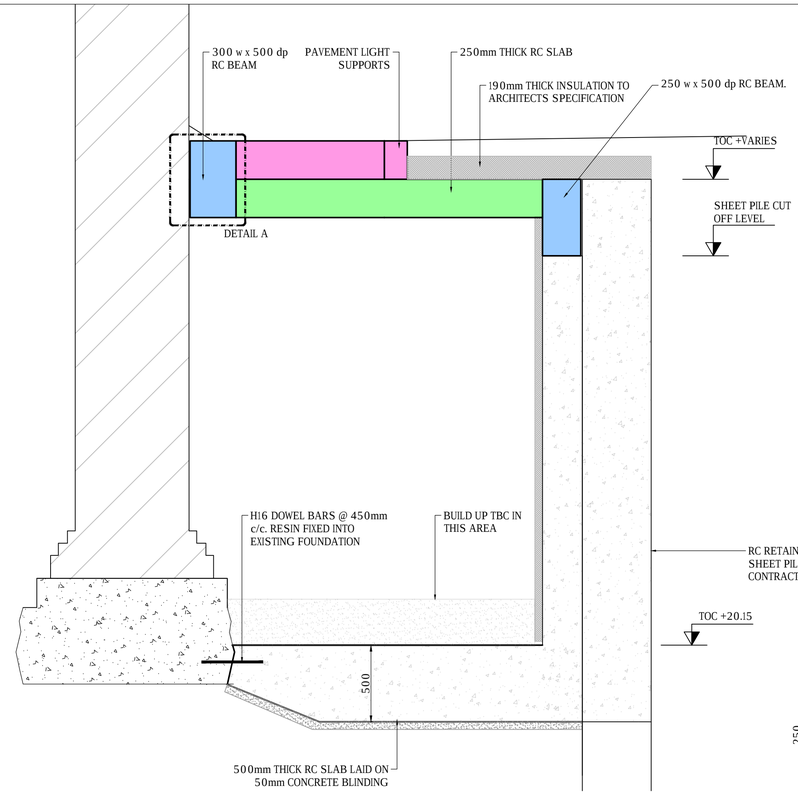
Scale	Date	Drawn	Checked	Passed
AS SHOWN	OCT 2019	DC		

DRG. No.

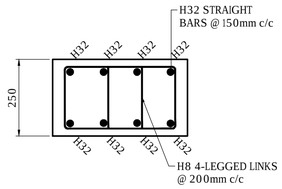
2714-1014-T



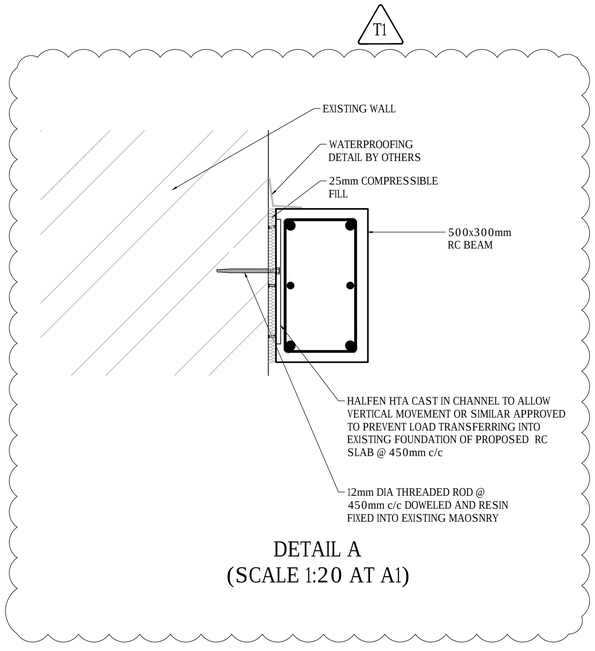
SECTION A-A
(SCALE 1:20 AT A1)



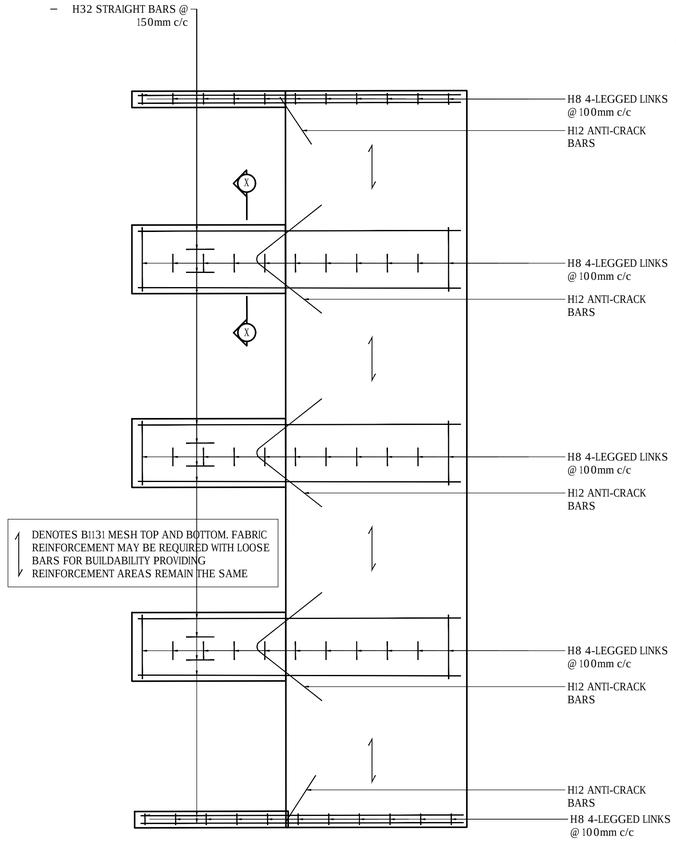
SECTION B-B
(SCALE 1:20 AT A1)



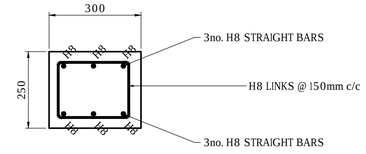
SECTION X-X
(SCALE 1:10 AT A1)



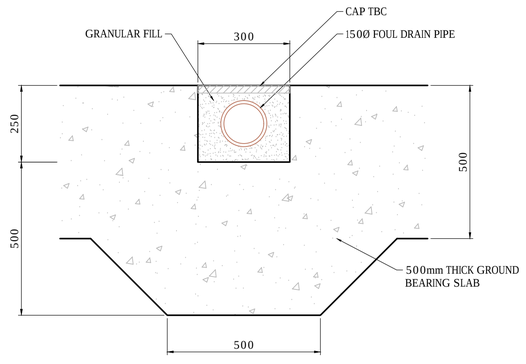
DETAIL A
(SCALE 1:20 AT A1)



TYPICAL RC PLAN ON HIGH HOLBURN PAVEMENT LIGHTS
(SCALE 1:20 AT A1)



SECTION 3-3
(SCALE 1:10 AT A1)



TYPICAL SECTION ON FOUL DRAIN THROUGH GROUND BEARING SLAB
(SCALE 1:10 AT A1)

DO NOT SCALE THIS DRAWING.

Original Drawing Size A1

Notes

PLEASE REFER TO MJC DRAWING 2714-1020 FOR NOTES

TENDER ISSUE

Rev.	Date	Description	By
T1	24/01/20	REVISED TO SUIT MEETING COMMENTS	DC
T	08/01/20	TENDER ISSUE	DC
P1	26/11/19	GROUND BEARING SLAB DESIGN ADDED	DC
P	15/11/19	PRELIMINARY ISSUE FOR COMMENTS	DC

Revisions

Michael Jackson Consulting
Chartered Structural Engineers
204 BOLTON ROAD
WALKDEN, WORSLEY
MANCHESTER, M28 3BN
Tel: 0161 790 4404
Fax: 0161 790 4405

Client

The Theatre of Comedy Company
Shaftesbury Theatre

Site

SHAFTESBURY THEATRE

Project

PROPOSED BASEMENT

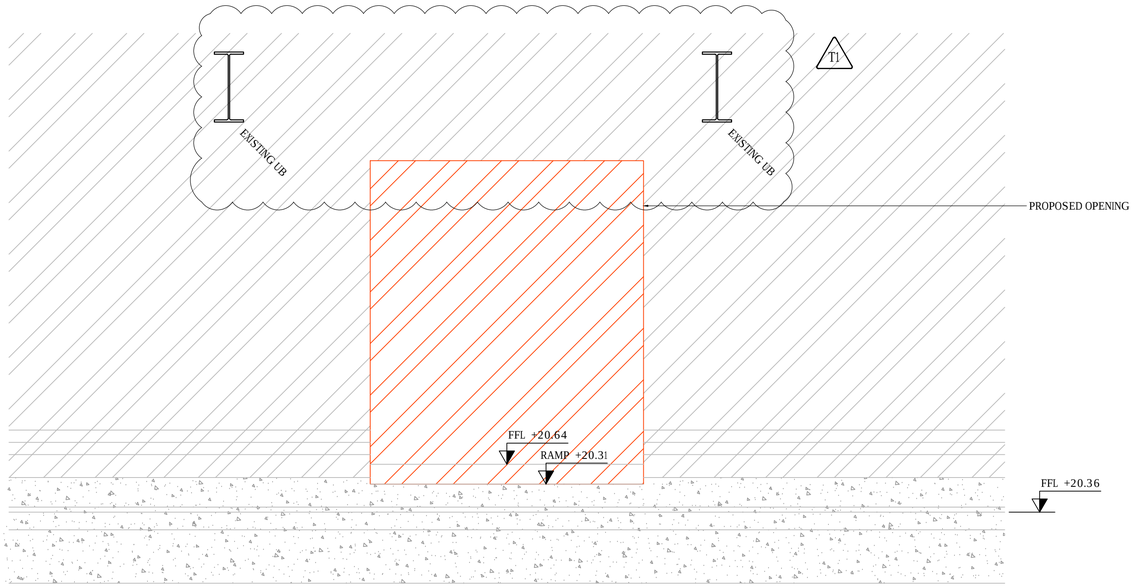
Drawing Title

HIGH HOLBURN RC GA AND SECTIONS

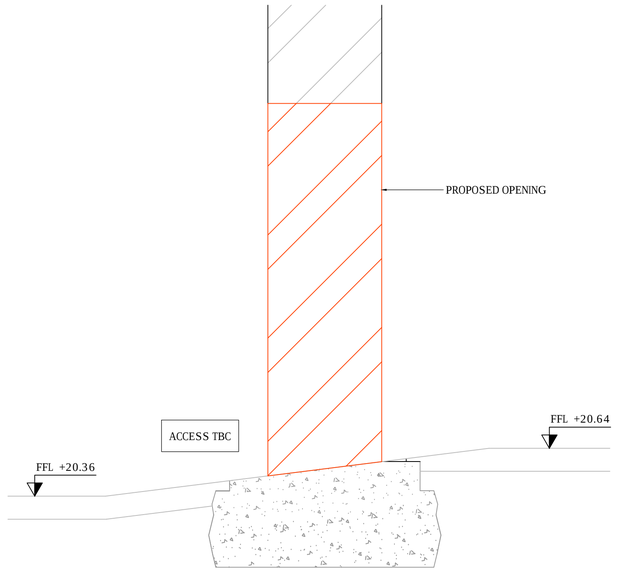
Scale	Date	Drawn	Checked	Passed
AS SHOWN	OCT 2019	DC		

DRG. No.

2714-1015-T1

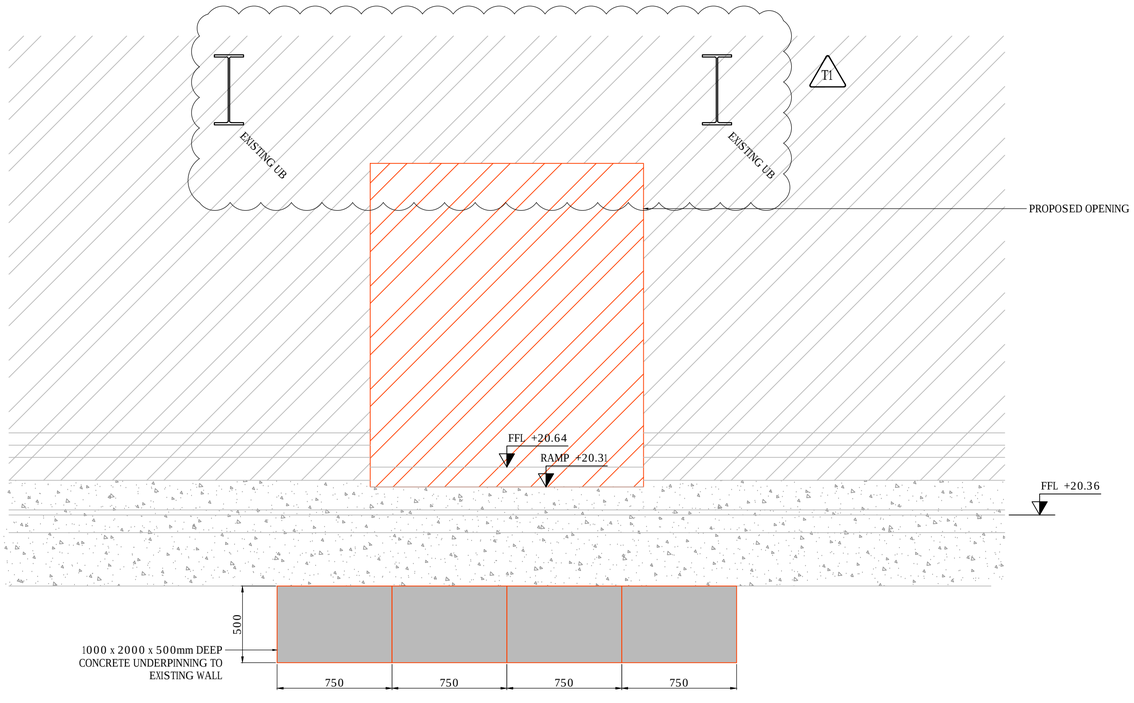


STEP 1 - TYPICAL ELEVATION ON PROPOSED OPENING
(SCALE 1:20 AT A1)

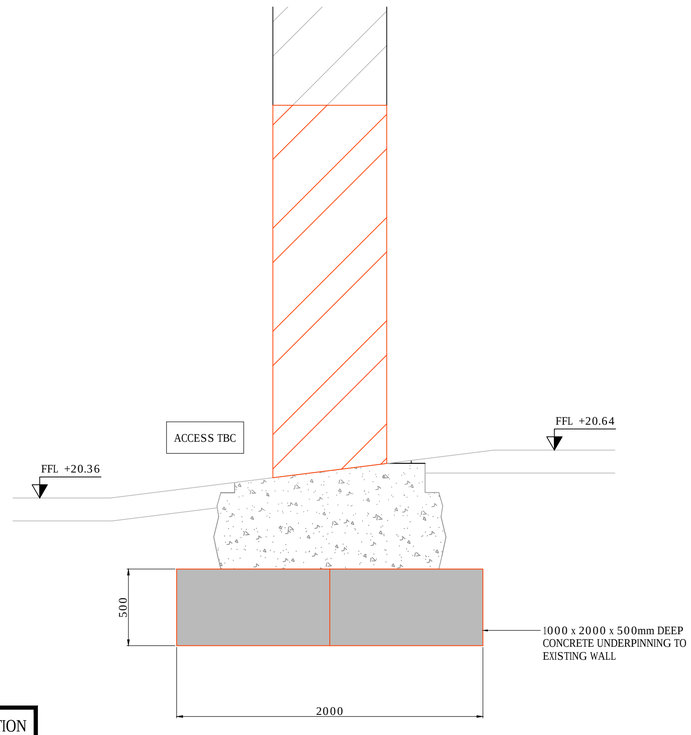


STEP 1 - TYPICAL SECTION
THROUGH OPENING
(SCALE 1:20 AT A1)

DESIGN TBC FOLLOWING CONFIRMATION OF WALL SIZE AND THICKNESSES



STEP 2 - TYPICAL ELEVATION ON OPENING
UNDERPINNING
(SCALE 1:20 AT A1)



DESIGN TBC FOLLOWING CONFIRMATION OF WALL SIZE AND THICKNESSES

STEP 2 - TYPICAL SECTION THROUGH
OPENING UNDERPINNING
(SCALE 1:20 AT A1)

DO NOT SCALE THIS DRAWING.

Original Drawing Size A1

Notes

PLEASE REFER TO MJC DRAWING 2714-1020 FOR NOTES

TENDER ISSUE

Rev.	Date	Description	By
T1	24/01/20	REVISED TO SUIT MEETING COMMENTS	DC
T	08/01/20	TENDER ISSUE	DC
P	15/11/19	PRELIMINARY ISSUE FOR COMMENTS	DC

Revisions

Michael Jackson Consulting
Chartered Structural Engineers
204 BOLTON ROAD
WALKDEN, WORSLEY
MANCHESTER, M28 3BN
Tel: 0161 790 4404
Fax: 0161 790 4405

Client

Shaftesbury Theatre

Site

SHAFTESBURY THEATRE

Project

PROPOSED BASEMENT

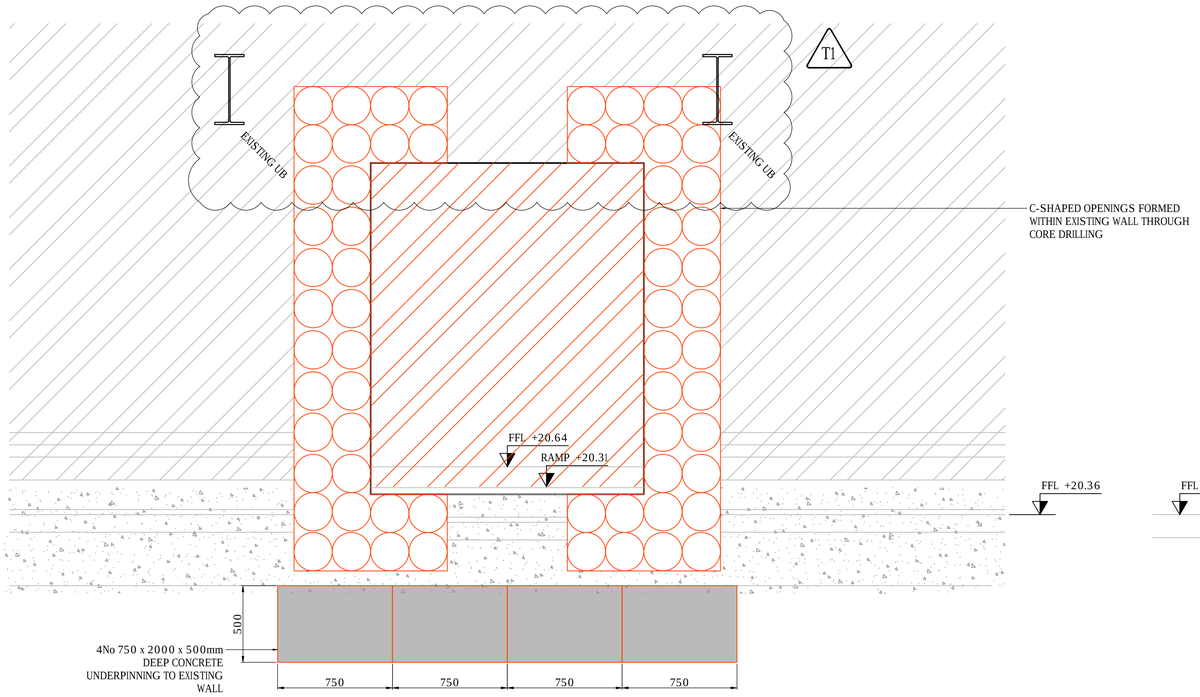
Drawing Title

STEPS 1 & 2 TO FORM NEW OPENING IN EXISTING WALL

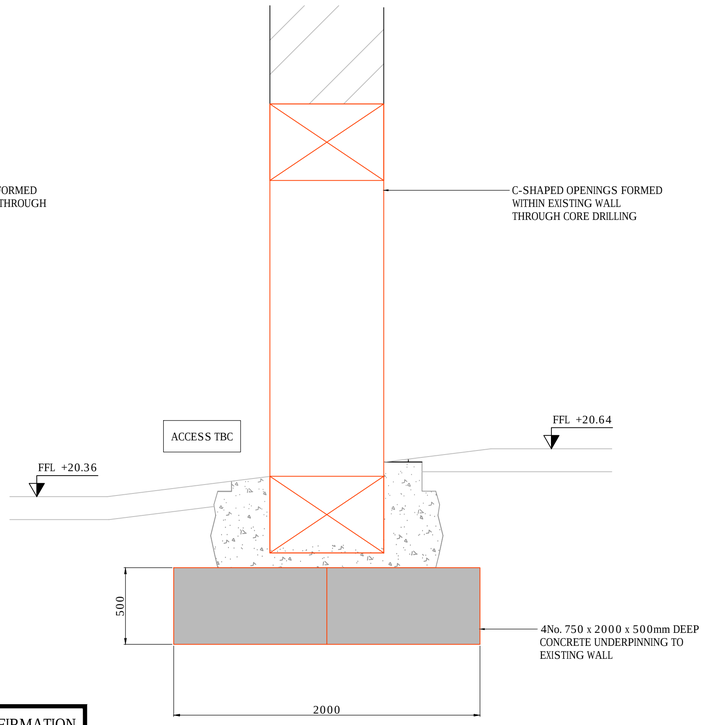
Scale	Date	Drawn	Checked	Passed
AS SHOWN	OCT 2019	DC		

DRG. No.

2714-1016-T1

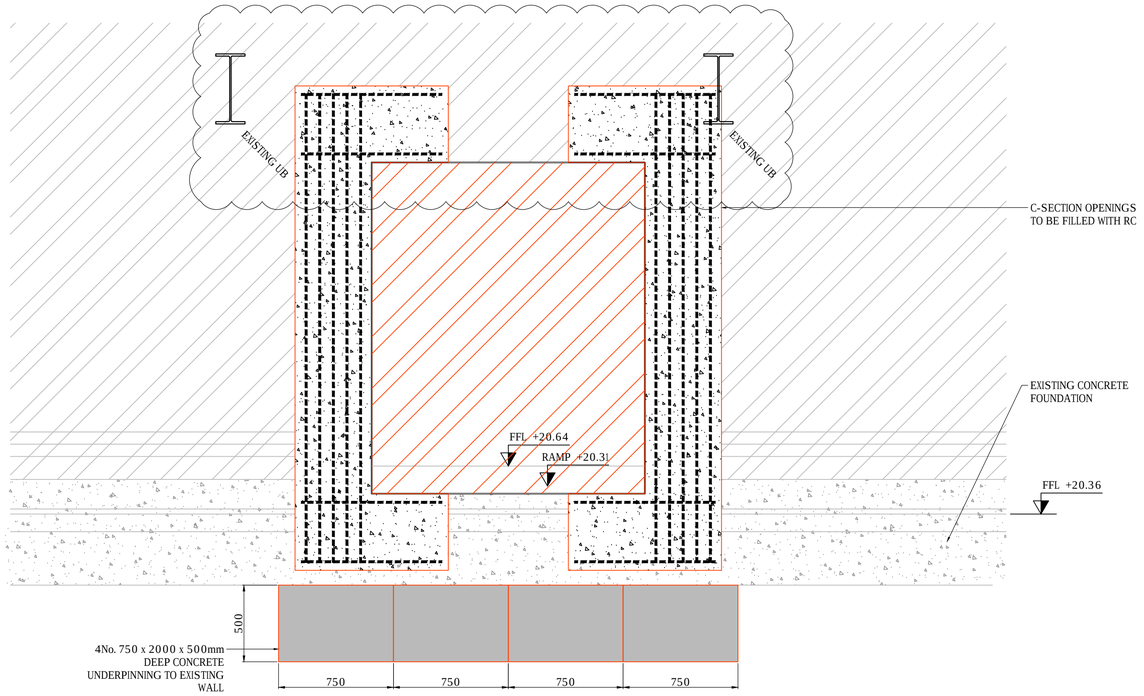


STEP 3 - TYPICAL ELEVATION ON CORE DRILLING FOR OPENING
(SCALE 1:20 AT A1)

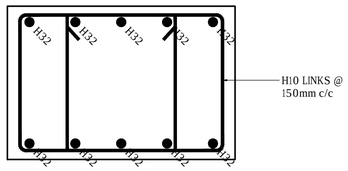


DESIGN TBC FOLLOWING CONFIRMATION OF WALL SIZE AND THICKNESSES

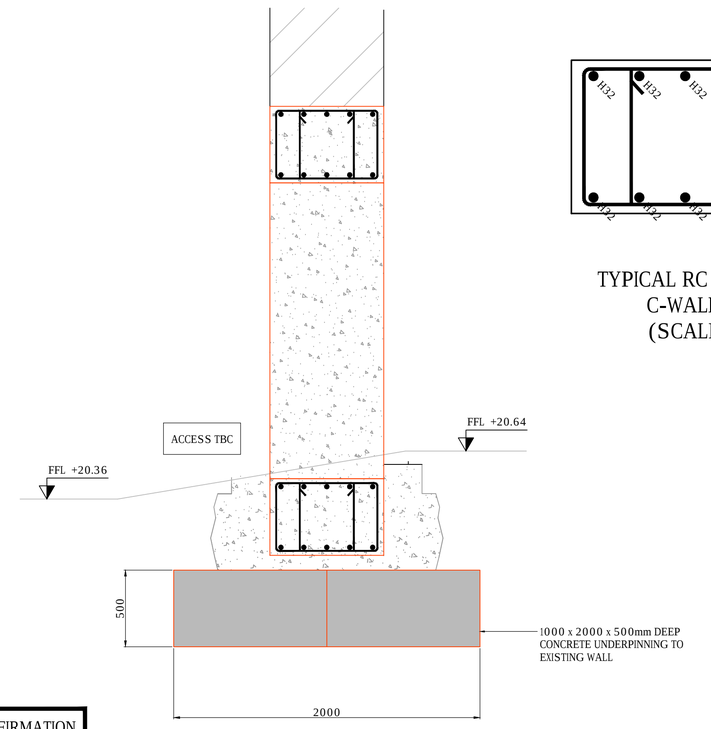
STEP 3 - TYPICAL SECTION THROUGH CORE DRILLING FOR OPENING
(SCALE 1:20 AT A1)



STEP 4 - TYPICAL ELEVATION ON RC C-SHAPED WALLS
(SCALE 1:20 AT A1)



TYPICAL RC SECTION TROUGH C-WALL OPENINGS
(SCALE 1:10 AT A1)



DESIGN TBC FOLLOWING CONFIRMATION OF WALL SIZE AND THICKNESSES

STEP 4 - TYPICAL SECTION THROUGH RC C-SHAPED WALLS
(SCALE 1:20 AT A1)

DO NOT SCALE THIS DRAWING.

Original Drawing Size A1

Notes

PLEASE REFER TO MJC DRAWING 2714-1020 FOR NOTES

TENDER ISSUE

Rev.	Date	Description	By
T1	24/01/20	REVISED TO SUIT MEETING COMMENTS	DC
T	08/01/20	TENDER ISSUE	DC
P	15/11/19	PRELIMINARY ISSUE FOR COMMENTS	DC

Revisions

Michael Jackson Consulting
Chartered Structural Engineers
204 BOLTON ROAD
WALKDEN, WORSLEY
MANCHESTER, M28 3BN
Tel: 0161 790 4404
Fax: 0161 790 4405

Client

The Theatre of Comedy Company
Shaftesbury Theatre

Site

SHAFTESBURY THEATRE

Project

PROPOSED BASEMENT

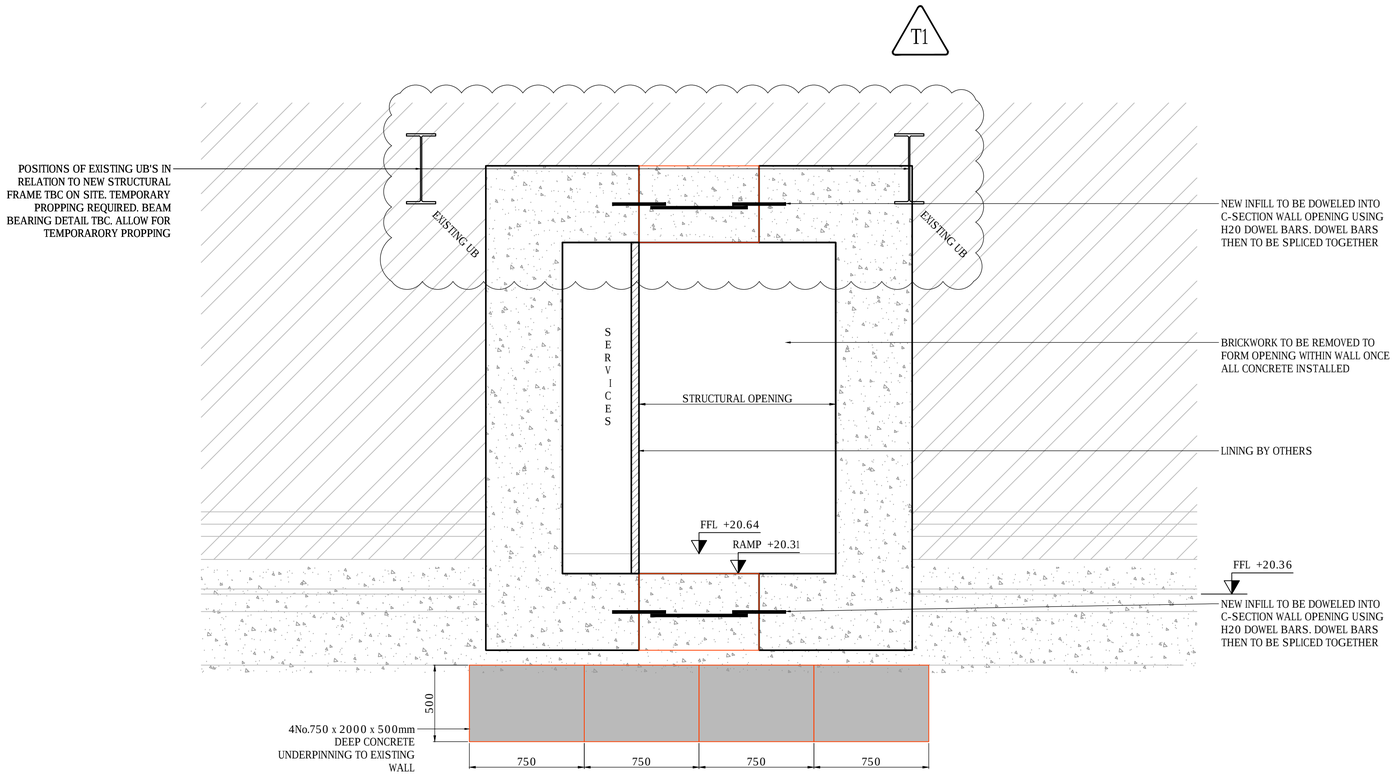
Drawing Title

STEPS 3 & 4 TO FORM NEW OPENING IN EXISTING WALL

Scale	Date	Drawn	Checked	Passed
AS SHOWN	OCT 2019	DC		

DRG. No.

2714-1017-T1



STEP 5 - TYPICAL ELEVATION ON OPENING
(SCALE 1:20 AT A1)

DESIGN TBC FOLLOWING CONFIRMATION OF WALL SIZE AND THICKNESSES

DO NOT SCALE THIS DRAWING.

Original Drawing Size A1

Notes

PLEASE REFER TO MJC DRAWING 2714-1020 FOR NOTES

TENDER ISSUE

Rev.	Date	Description	By
T1	24/01/20	REVISED TO SUIT MEETING COMMENTS	DC
T	08/01/20	TENDER ISSUE	DC
P	15/11/19	PRELIMINARY ISSUE FOR COMMENTS	DC

Revisions

Michael Jackson Consulting
Chartered Structural Engineers
204 BOLTON ROAD
WALKDEN, WORSLEY
MANCHESTER, M28 3BN
Tel: 0161 790 4404
Fax: 0161 790 4405

Client

The Theatre of Comedy Company
Shaftesbury Theatre

Site

SHAFTESBURY THEATRE

Project

PROPOSED BASEMENT

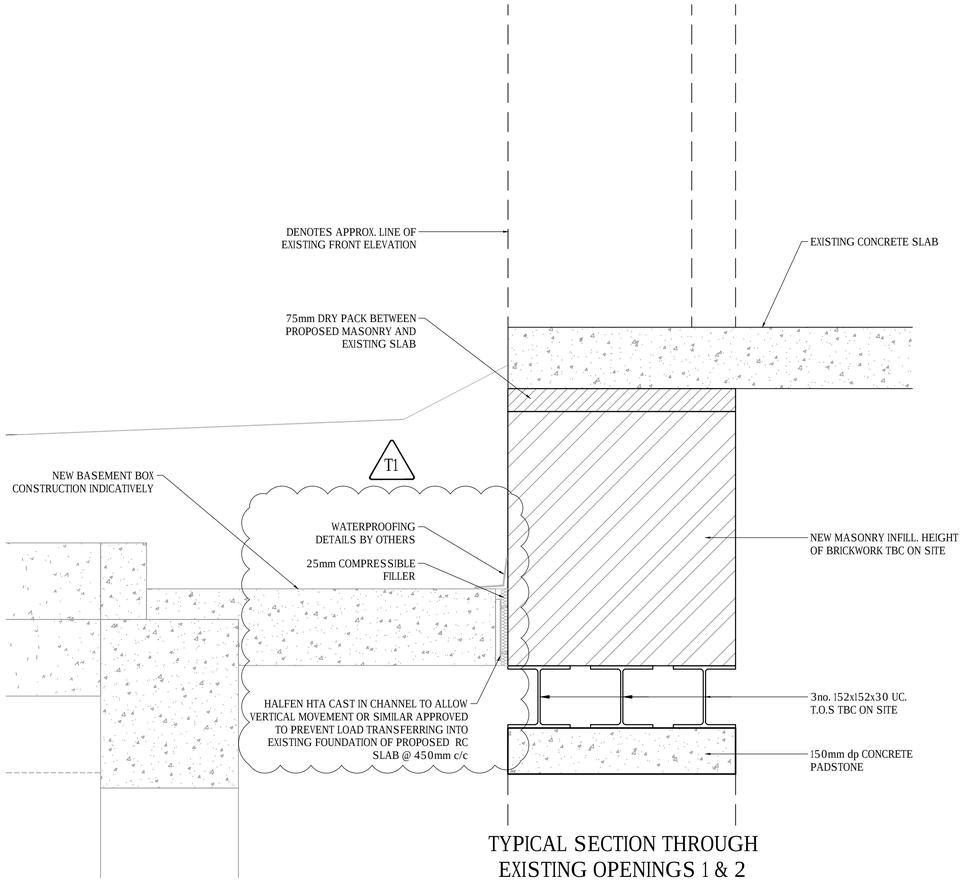
Drawing Title

STEP 5 FOR NEW OPENING IN EXISTING WALL

Scale	Date	Drawn	Checked	Passed
AS SHOWN	OCT 2019	DC		

DRG. No.

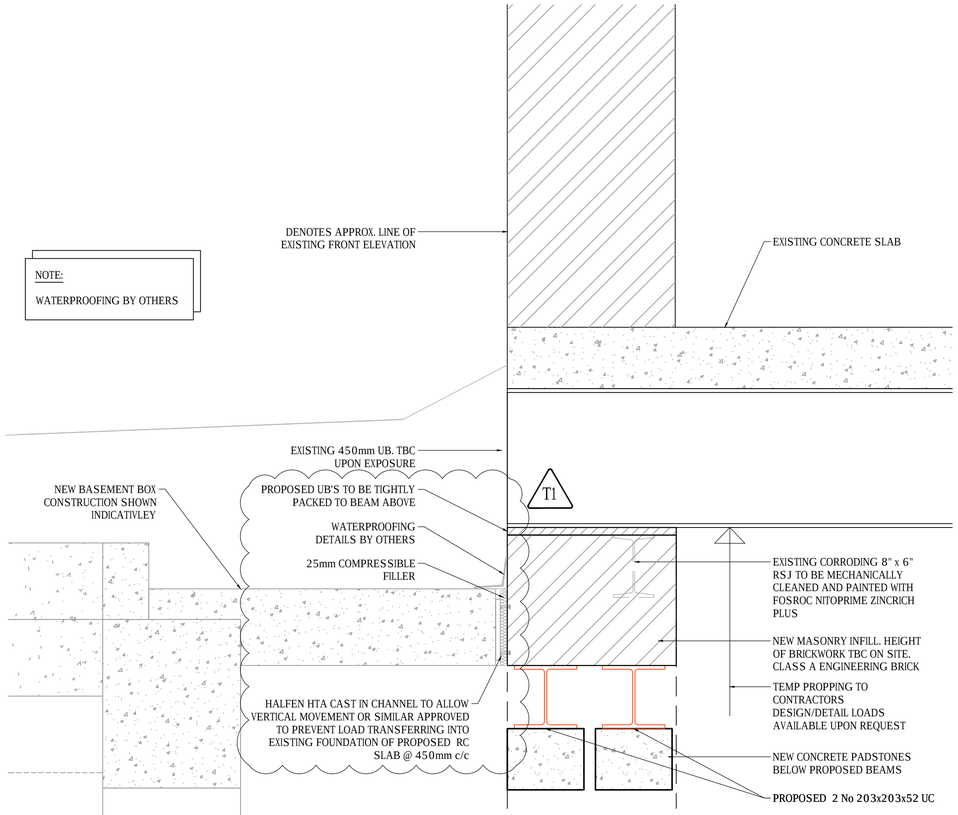
2714-1018-T1



TYPICAL SECTION THROUGH EXISTING OPENINGS 1 & 2
(SCALE 1:20 AT A1)

NOTE:

WATERPROOFING BY OTHERS



TYPICAL SECTION THROUGH OPENING 3
(SCALE 1:20 AT A1)

SEQUENCE OF WORKS

1) PROP EXISTING BEAM
2) NEW BEAM AND PADSTONES TO BE INSTALLED
3) EXISTING 8" x 6" RSJ TO BE ENCASED IN ENGINEEERING BRICK BUILT FROM NEW BEAMS

NOTE:

THE DETAILS ON THIS DRAWING ARE INDICATIVE AND ARE FOR PRICING PURPOSES ONLY. DETAIL ARE TO BE CONFIRMED UPON EXPOSURE AND CONFIRMATION OF NEW AND EXISTING LEVELS

DO NOT SCALE THIS DRAWING.

Original Drawing Size A1

Notes

PLEASE REFER TO MJC DRAWING 2714-1020 FOR NOTES

TENDER ISSUE

Rev.	Date	Description	By
T1	24/01/20	REVISED TO SUIT MEETING COMMENTS	DC
T	08/01/20	TENDER ISSUE	DC

Revisions

Michael Jackson Consulting
Chartered Structural Engineers
204 BOLTON ROAD
WALKDEN, WORSLEY
MANCHESTER, M28 3BN
Tel: 0161 790 4404
Fax: 0161 790 4405

Client

The Theatre of Comedy Company
Shaftesbury Theatre

Site

SHAFTESBURY THEATRE

Project

PROPOSED BASEMENT

Drawing Title

SECTIONS THROUGH EXISTING OPENINGS

Scale	Date	Drawn	Checked	Passed
AS SHOWN	OCT 2019	DC		

DRG. No.

2714-1019-T1

GENERAL

G1. ALL DIMENSIONS SHOWN ARE IN mm UNLESS NOTED OTHERWISE.

G2. ALL DIMENSIONS SHOWN ARE APPROXIMATELY ONLY AND MUST BE CHECKED AND CONFIRMED BY THE CONTRACTOR VIA A FULL DIMENSIONAL SURVEY OF THE AREA OF THE WORKS PRIOR TO UNDERTAKING OF THE WORKS. THE ENGINEER MUST BE NOTIFIED IMMEDIATELY SHOULD ANY DISCREPANCIES BECOME APPARENT.

G3. ALL DETAILS AND DIMENSIONS SHOWN RELATING TO THE EXISTING STRUCTURE ARE SCHEMATIC AND APPROXIMATE ONLY, BASED UPON NO EXPOSURE PRIOR TO COMMENCEMENT OF THE PREPARATION OF THESE DETAILS.

G4. THE DEPTH AND LOCATION OF ANY SERVICES HAS NOT BEEN ESTABLISHED. THE CONTRACTOR IS RESPONSIBLE FOR LOCATING AND PROTECTING THEM.

G5. ALL WORKMANSHIP AND MATERIALS TO COMPLY WITH THE CURRENT BUILDING REGULATIONS AND RELEVANT CURRENT BRITISH STANDARDS.

G6. THE CONTRACTOR SHALL ALLOW FOR ALL WORK NECESSARY TO OBTAIN FULL APPROVAL AND SATISFACTION OF THE BUILDING INSPECTOR.

G7. THE CONTRACTOR SHALL COMPLY WITH ALL REQUIREMENTS OF THE CURRENT HEALTH & SAFETY AT WORK ACT AND CONSTRUCTION REGULATIONS.

G8. THE CONTRACTOR IS RESPONSIBLE FOR ENSURING THAT HIS OPERATIONS DO NOT IN ANY WAY IMPAIR THE SAFETY OR CONDITION OF THE EXISTING STRUCTURE OR ADJACENT STRUCTURES. HE IS TO PROVIDE ANY TEMPORARY SUPPORTS, SHORING, ETC REQUIRED FOR THIS PURPOSE AND HE IS TO CAREFULLY INSPECT THE CONDITION OF THE STRUCTURES BOTH BEFORE AND DURING THE EXECUTION OF THE WORK. THE ENGINEER IS TO BE NOTIFIED IMMEDIATELY SHOULD ANY DAMAGE OCCUR.

G9. ALL PROPRIETARY PRODUCTS TO BE USED IN STRICT ACCORDANCE WITH MANUFACTURERS INSTRUCTIONS AND RECOMMENDATIONS.

G10. THIS DRAWING TO BE READ IN CONJUNCTION WITH THE FOLLOWING:
a) STRUCTURAL SPECIFICATION
b) ARCHITECTS DRAWINGS
c) ARCHITECT'S SPECIFICATION

G11. THE BUILDING SET-OUT, INCLUDING FLOORS AND GROUND LEVELS, IS TO BE OBTAINED FROM THE ARCHITECTS DRAWINGS.

CONCRETE

C1. ALL CONCRETE, UNLESS NOTED OTHERWISE, TO BE GRADE RC32/40 WITH A MAXIMUM AGGREGATE SIZE OF 20mm, A MINIMUM CEMENT CONTENT OF 300kg/m3 AND A MAXIMUM FREE WATER/CEMENT RATIO OF 0.6. ONLY READY MIXED CONCRETE IS TO BE USED.'BARROW MIX' CONCRETE OR SITE MIXED CONCRETE ARE STRICTLY PROHIBITED.

C2. ALL CONCRETE TO BE PROPERLY POKER VIBRATED.

C3. THE CONCRETE SPECIFICATION PRESUMES NO SULPHATES OR AGGRESSIVE MATERIALS ARE PRESENT WITHIN THE GROUND. THE ENGINEER IS TO BE NOTIFIED IMMEDIATELY IF ANY ARE DISCOVERED OR SUSPECTED.

C4. BACKFILLING OF EXCAVATIONS IS TO BE CARRIED OUT USING SELECTED EXCAVATED MATERIAL IN LAYERS NOT EXCEEDING 150mm THICKNESS AND WELL COMPACTED.

REINFORCEMENTS

R1. ALL FABRIC REINFORCEMENT TO COMPLY WITH BS4483.

R2. ALL REINFORCEMENT, UNLESS NOTED OTHERWISE, IS TO BE HIGH TENSILE TYPE 2 DEFORMED.

R3. LAP TO FABRIC TO BE 300mm MINIMUM (UP TO B785)
LAP TO H12 BARS TO BE 450mm MINIMUM
LAP TO H16 BARS TO BE 600mm MINIMUM
LAP TO H20 BARS TO BE 750mm MINIMUM
LAP TO H25 BARS TO BE 950mm MINIMUM

R4. CONCRETE COVER TO REINFORCEMENT TO BE AS DETAILED BELOW, UNLESS NOTED OTHERWISE.
75mm ON TOP OF CLEAN GROUND
50mm ON TOP OF BLINDED GROUND
50mm TO SIDES OF GROUND BEAMS
35mm TO ALL SIDES OF ALL OTHER BEAMS
35mm TO TOP OF FLOOR SLABS

R5. THE ENGINEERS CONSENT MUST BE REQUESTED REGARDING THE FIXING OF REINFORCEMENT AND FORMWORK, ETC. PRIOR TO PLACING OF CONCRETE.

R6. ALL REINFORCEMENT TO BE SECURELY SUPPORTED IN THE SPECIFIED POSITION BY PROPRIETARY PRODUCTS TO PREVENT MOVEMENT OF THE REINFORCEMENT AS CONCRETE IS BEING POURED.

CONCRETE SLAB

CS1. THE SLAB IS TO BE FOUNDED ON A BEARING STRATA WITH A MINIMUM GROUND BEARING CAPACITY OF 150 kN/m2. PRIOR TO CASTING CONCRETE TO FOUNDATIONS, THE CONTRACTOR MUST OBTAIN APPROVAL FROM THE LOCAL AUTHORITY BUILDING CONTROL OFFICER ON THE GROUND BEARING CAPACITY. IN ADDITION, THE ENGINEER MUST BE PROVIDED WITH A MINIMUM 3 DAYS NOTICE TO ALLOW AN INSPECTION TO BE CARRIED OUT IF REQUIRED BY THE CLIENT.

CS2. THE CONTRACTOR IS RESPONSIBLE FOR ENSURING THAT HIS OPERATIONS DO NOT IN ANY WAY IMPAIR THE SAFETY OR CONDITION OF THE EXISTING STRUCTURE OR ADJACENT STRUCTURES. HE IS TO PROVIDE ANY TEMPORARY SUPPORTS, SHORING, ETC REQUIRED FOR THIS PURPOSE AND HE IS TO CAREFULLY INSPECT THE CONDITION OF THE STRUCTURES BOTH BEFORE AND DURING THE EXECUTION OF THE WORK. THE ENGINEER IS TO BE NOTIFIED IMMEDIATELY SHOULD ANY DAMAGE OCCUR.

CS3. ALL CONCRETE FOR SLAB, UNLESS NOTED OTHERWISE, TO BE GRADE C32/40 READY MIXED CONCRETE BATCHED IN A PLANT UNDER CONTROLLED CONDITIONS WITH A MAXIMUM AGGREGATE SIZE OF 20mm, A MINIMUM CEMENT CONTENT OF 300kg/m AND A MAXIMUM FREE WATER/CEMENT RATIO OF 0.6

CS5. ALL CONCRETE TO BE PROPERLY POKER VIBRATED USING A POKER CAPABLE OF A MINIMUM OF 10,000 CYCLES PER MINUTE AND THE CONCRETE IS TO BE VIBRATED UNTIL AIR VOIDS HAVE BEEN REMOVED BUT THE CONCRETE MUST NOT BE OVER-VIBRATED TO CAUSE THE AGGREGATE TO SINK AND BECOME UNEVENLY DISTRIBUTED THROUGHOUT THE SLAB.

UNDERPINNING

U1. UNDERPINNING IS TO BE CARRIED OUT TO THE SATISFACTION OF THE ENGINEER AND LOCAL AUTHORITY IN SHORT SECTIONS AS SHOWN IN SUCH A MANNER THAT ADEQUATE SUPPORT IS AT ALL TIMES MAINTAINED TO THE UNDERSIDE OF THE WALL FOR AT LEAST THREE-QUARTERS OF ITS LENGTH AND THAT SECTIONS OF WORK IN PROGRESS AT ANY ONE TIME ARE SEPARATED BY A DISTANCE OF AT LEAST 2m. AS FAR AS PRACTICABLE EXCAVATION AND CONCRETING OF ANY SECTION OF UNDERPINNING SHALL BE CARRIED OUT ON THE SAME DAY.

U2. THE CONCRETE IS TO BE CAST ABOVE THE UNDERSIDE OF THE EXISTING FOOTING. THE PINNING IS TO BE IN ACCORDANCE WITH THE SPECIFICATION.

U3. UNDERPINNING TO BE CARRIED OUT IN SEQUENCE SHOWN OR THE CONTRACTORS OWN SUBMITTED AND APPROVED SEQUENCE, ALLOWING TWO DAYS MINIMUM TO BE LEFT BETWEEN PINNING UP AND EXCAVATING ADJACENT PINS.

U4. SUITABLE BEARING STRATA TO BE APPROVED BY BUILDING CONTROL OFFICER PRIOR TO CASTING OF NEW PINS.

U5. CONCRETE UNDERPINNING TO BE POURED IN LAYERS AND WELL VIBRATED USING VIBRATING POKER TO ENSURE NO VOIDING.

U6. ALL WORK TO COMPLY WITH BUILDING REGULATIONS.

U7. ALL UNDERPINS TO BE LOCATED CENTRALLY UNDER WALLS.

U8. BACKFILLING OF EXCAVATIONS SHALL BE CARRIED OUT USING SELECTED EXCAVATED MATERIAL IN LAYERS NOT EXCEEDING 150mm THICKNESS AND WELL COMPACTED.

PILING

P1. PILES TO BE DESIGNED BY CONTRACTOR TO S.W.L SUPPLIED BY STRUCTURAL ENGINEER

P2. THE USE OF DRIVEN PILES IS NOT PERMITTED

P3. PILES ARE TO BE SET OUT TO ARCHITECTS DIMENSIONS WITH SUPPLEMENTARY INFORMATION FOR STRUCTURAL ENGINEER WHERE REQUIRED

P4. TOLERANCE ON PLAN POSITIONING OF PILE IS +/- 50mm

P5. TESTING OF PILES IS TO BE IN ACCORDANCE WITH THE SPECIFICATION

P6. PILES ARE TO BE DESIGNED TO ACCOMMODATE 10% OF S.W.L APPLIED LATERALLY AT THE HEAD OF THE PILE

NOTE:
DRAWING TO BE READ IN CONJUNCTION WITH STRUCTURAL ENGINEER AND ARCHITECTS SPECIFICATION

DO NOT SCALE THIS DRAWING.

Original Drawing Size A1

Notes

TENDER ISSUE

Rev.	Date	Description	By
T	08/01/20	TENDER ISSUE	DC
P	15/11/19	PRELIMINARY ISSUE FOR COMMENTS	DC

Revisions

Michael Jackson Consulting
Chartered Structural Engineers
204 BOLTON ROAD
WALKDEN, WORSLEY
MANCHESTER, M28 3BN
Tel: 0161 790 4404
Fax: 0161 790 4405

Client

The Theatre of Comedy Company
Shaftesbury Theatre

Site

SHAFTESBURY THEATRE

Project

PROPOSED BASEMENT

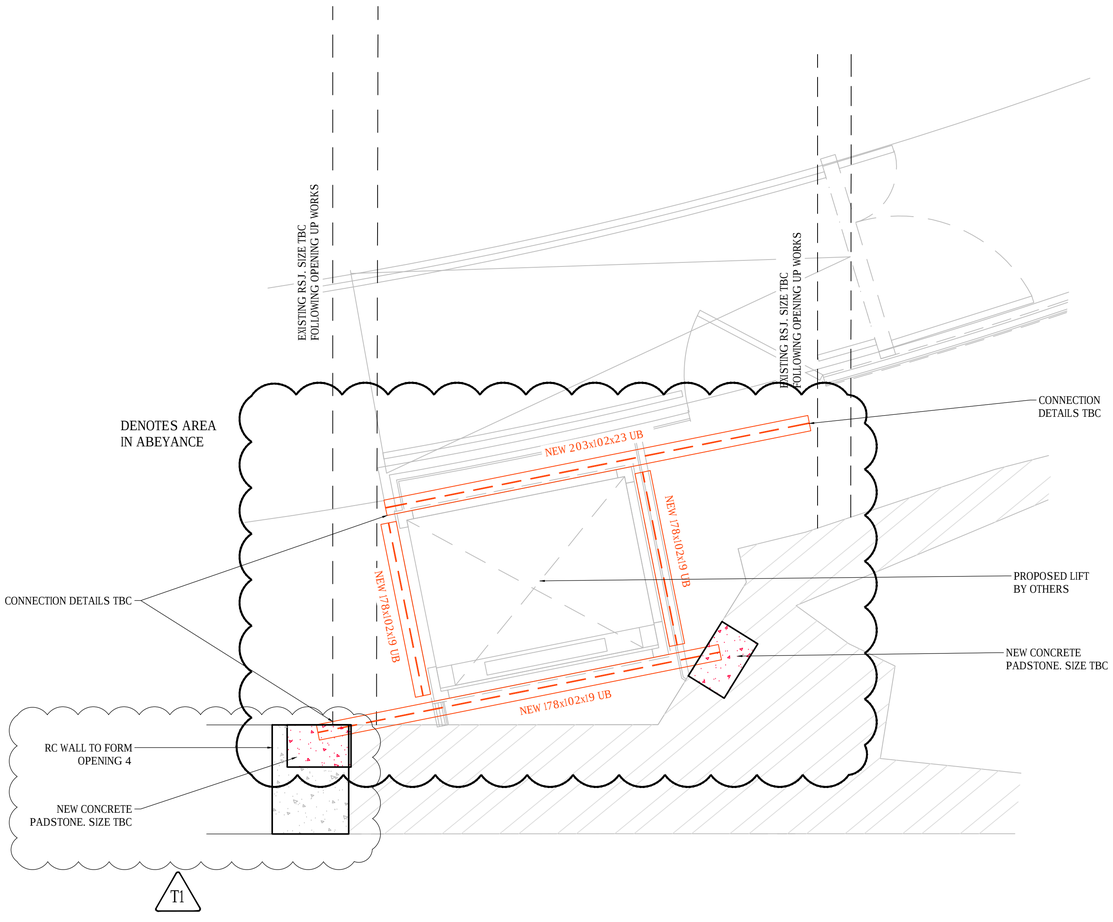
Drawing Title

NOTES

Scale	Date	Drawn	Checked	Passed
AS SHOWN	OCT 2019	DC		

DRG. No.

2714-1020-T



PROPOSED LIFT TRIMMING STEELWORK GA
(SCALE 1:20 AT A1)

DO NOT SCALE THIS DRAWING.

Original Drawing Size A1

Notes

PLEASE REFER TO MJC DRAWING 2714-1020 FOR NOTES

TENDER ISSUE

Rev.	Date	Description	By
T1	24/01/20	REVISED TO SUIT MEETING COMMENTS	DC
T	08/01/20	TENDER ISSUE	DC

Revisions

Michael Jackson Consulting
Chartered Structural Engineers
204 BOLTON ROAD
WALKDEN, WORSLEY
MANCHESTER, M28 3BN
Tel: 0161 790 4404
Fax: 0161 790 4405

Client

The Theatre of Comedy Company
Shaftesbury Theatre

Site

SHAFTESBURY THEATRE

Project

PROPOSED BASEMENT

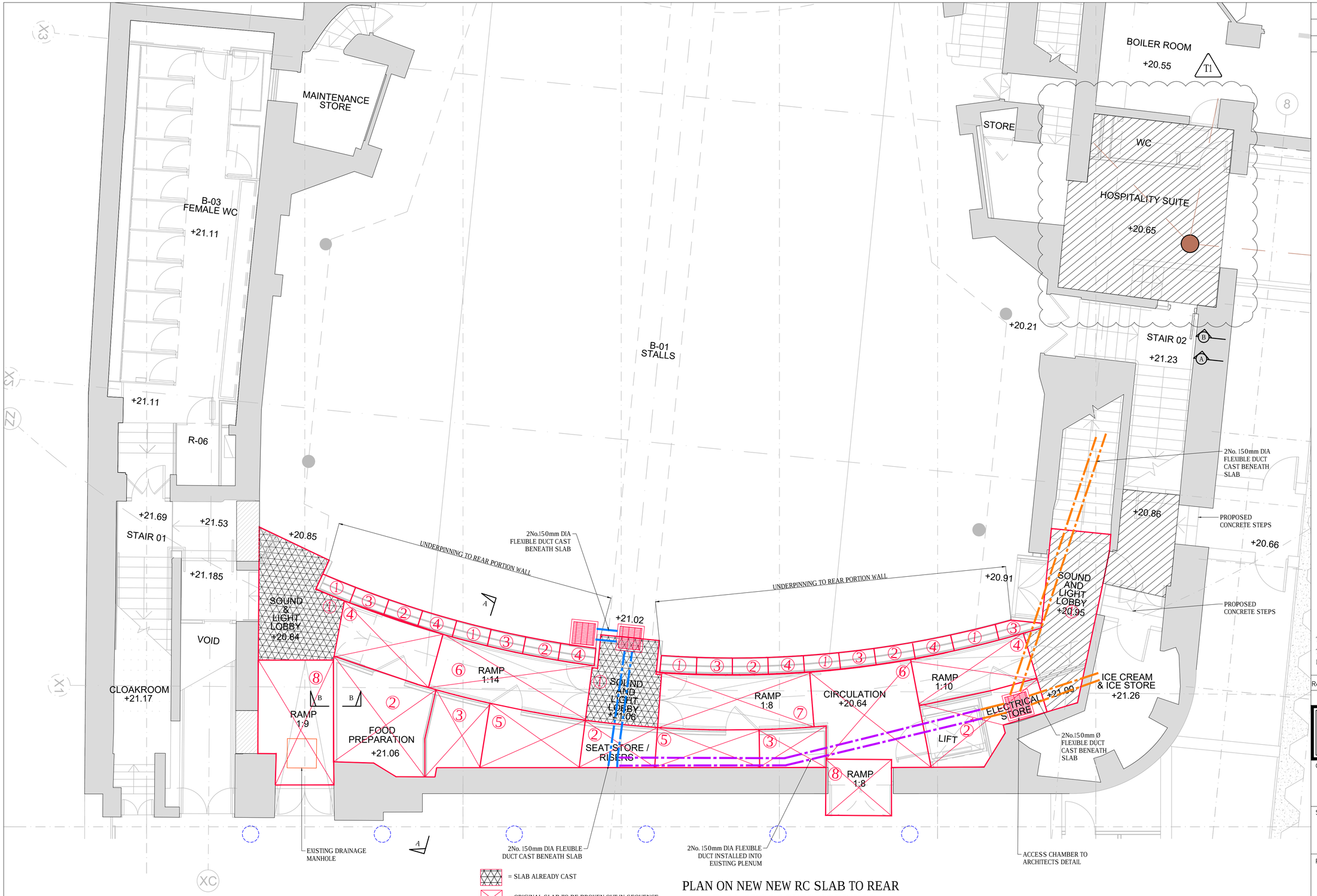
Drawing Title

PROPOSED LIFT TRIMMING STEELWORK GA

Scale	Date	Drawn	Checked	Passed
AS SHOWN	OCT 2019	DC		

DRG. No.

2714-1021-T1



SEQUENCE OF WORKS TO BE PROPOSED BY CONTRACTOR

= SLAB ALREADY CAST

= ORIGINAL SLAB TO BE BROKEN OUT IN SEQUENCE AND NEW SLAB CAST AT REVISED LEVELS TO SUIT ARCHITECTS LAYOUT

= EXISTING SLAB TO BE BROKEN OUT AND RE-CAST AT REVISED LEVEL.

NOTE: DUCTS FOR PRODUCTION LX T.B.C BY ELECTRICAL ENGINEER

PLAN ON NEW NEW RC SLAB TO REAR STALL CROSSOVER CORRIDOR (SCALE 1:50 @ A1)

NOTE:
PROPOSED SLAB HAS NOT BEEN DESIGNED TO RESIST UPLIFT FOR FUTURE GROUND WATER PRESSURE. AS THE EXISTING SLAB ADJACENT TO THIS IS ORIGINAL CONSTRUCTION. BUILDING CONTROL TO CONFIRM IF THIS IS ACCEPTABLE

DO NOT SCALE THIS DRAWING.

Original Drawing Size A1

Notes

GENERAL

G1. ALL DIMENSIONS SHOWN ARE IN mm UNLESS NOTED OTHERWISE.

G2. ALL DIMENSIONS SHOWN ARE APPROXIMATELY ONLY AND MUST BE CHECKED AND CONFIRMED BY THE CONTRACTOR VIA A FULL DIMENSIONAL SURVEY OF THE AREA OF THE WORKS PRIOR TO UNDERTAKING OF THE WORKS. THE ENGINEER MUST BE NOTIFIED IMMEDIATELY SHOULD ANY DISCREPANCIES BECOME APPARENT.

G3. ALL DETAILS AND DIMENSIONS SHOWN RELATING TO THE EXISTING STRUCTURE ARE SCHEMATIC AND APPROXIMATE ONLY, BASED UPON NO EXPOSURE PRIOR TO COMMENCEMENT OF THE PREPARATION OF THESE DETAILS.

G4. THE DEPTH AND LOCATION OF ANY SERVICES HAS NOT BEEN ESTABLISHED. THE CONTRACTOR IS RESPONSIBLE FOR LOCATING AND PROTECTING THEM.

G5. ALL WORKMANSHIP AND MATERIALS TO COMPLY WITH THE CURRENT BUILDING REGULATIONS AND RELEVANT CURRENT BRITISH STANDARDS.

G6. THE CONTRACTOR SHALL ALLOW FOR ALL WORK NECESSARY TO OBTAIN FULL APPROVAL AND SATISFACTION OF THE BUILDING INSPECTOR.

G7. THE CONTRACTOR SHALL COMPLY WITH ALL REQUIREMENTS OF THE CURRENT HEALTH & SAFETY AT WORK ACT AND CONSTRUCTION REGULATIONS.

G8. THE CONTRACTOR IS RESPONSIBLE FOR ENSURING THAT HIS OPERATIONS DO NOT IN ANY WAY IMPAIR THE SAFETY OR CONDITION OF THE EXISTING STRUCTURE OR ADJACENT STRUCTURES. HE IS TO PROVIDE ANY TEMPORARY SUPPORTS, SHORING, ETC REQUIRED FOR THIS PURPOSE AND HE IS TO CAREFULLY INSPECT THE CONDITION OF THE STRUCTURES BOTH BEFORE AND DURING THE EXECUTION OF THE WORK. THE ENGINEER IS TO BE NOTIFIED IMMEDIATELY SHOULD ANY DAMAGE OCCUR.

G9. ALL PROPRIETARY PRODUCTS TO BE USED IN STRICT ACCORDANCE WITH MANUFACTURERS INSTRUCTIONS AND RECOMMENDATIONS

TENDER ISSUE

Rev.	Date	Description	By
T1	24/01/20	REVISED TO SUIT MEETING COMMENTS	DC
T	08/01/20	TENDER ISSUE	DC
P	15/11/19	PRELIMINARY ISSUE FOR COMMENTS	DC

Revisions

Michael Jackson Consulting
Chartered Structural Engineers
204 BOLTON ROAD
WALKDEN, WORSLEY
MANCHESTER, M28 3BN
Tel: 0161 790 4404
Fax: 0161 790 4405

Client

The Theatre of Comedy Company
Shaftesbury Theatre

Site

SHAFTESBURY THEATRE

Project

PROPOSED BASEMENT

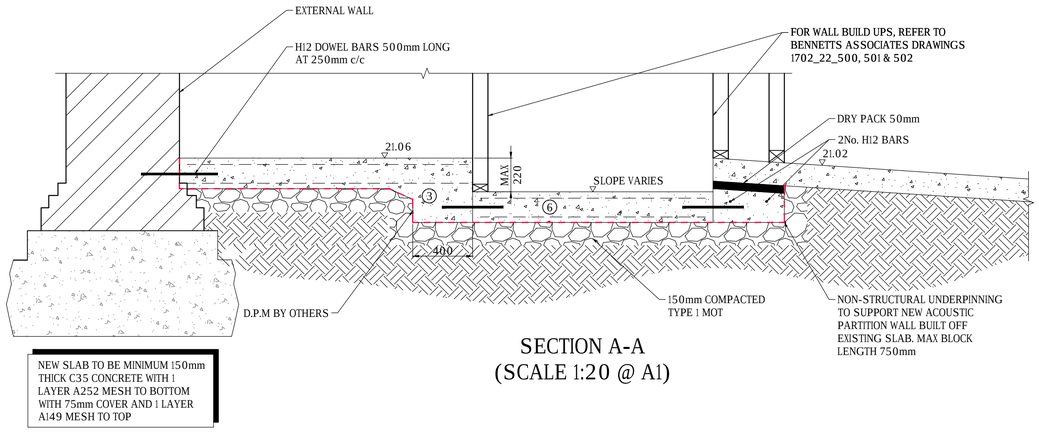
Drawing Title

REAR AUDITORIUM SLAB ALTERATIONS

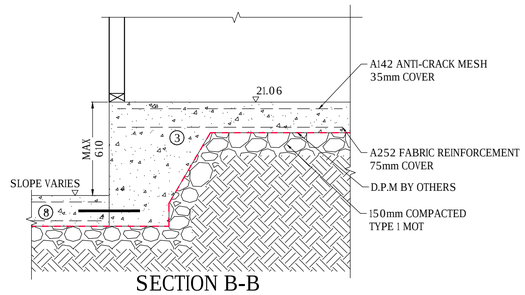
Scale	Date	Drawn	Checked	Passed
AS SHOWN	OCT 2019	DC		

DRG. No.

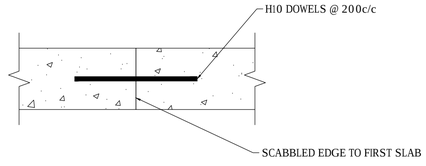
2714-1025-T1



SECTION A-A
(SCALE 1:20 @ A1)



SECTION B-B
(SCALE 1:20 @ A1)



TYPICAL SLAB ABUTMENT DETAIL
(SCALE 1:10 @ A1)

DO NOT SCALE THIS DRAWING.

Original Drawing Size A1

Notes

GENERAL

G1. ALL DIMENSIONS SHOWN ARE IN mm UNLESS NOTED OTHERWISE.

G2. ALL DIMENSIONS SHOWN ARE APPROXIMATELY ONLY AND MUST BE CHECKED AND CONFIRMED BY THE CONTRACTOR VIA A FULL DIMENSIONAL SURVEY OF THE AREA OF THE WORKS PRIOR TO UNDERTAKING OF THE WORKS. THE ENGINEER MUST BE NOTIFIED IMMEDIATELY SHOULD ANY DISCREPANCIES BECOME APPARENT.

G3. ALL DETAILS AND DIMENSIONS SHOWN RELATING TO THE EXISTING STRUCTURE ARE SCHEMATIC AND APPROXIMATE ONLY, BASED UPON NO EXPOSURE PRIOR TO COMMENCEMENT OF THE PREPARATION OF THESE DETAILS.

G4. THE DEPTH AND LOCATION OF ANY SERVICES HAS NOT BEEN ESTABLISHED. THE CONTRACTOR IS RESPONSIBLE FOR LOCATING AND PROTECTING THEM.

G5. ALL WORKMANSHIP AND MATERIALS TO COMPLY WITH THE CURRENT BUILDING REGULATIONS AND RELEVANT CURRENT BRITISH STANDARDS.

G6. THE CONTRACTOR SHALL ALLOW FOR ALL WORK NECESSARY TO OBTAIN FULL APPROVAL AND SATISFACTION OF THE BUILDING INSPECTOR.

G7. THE CONTRACTOR SHALL COMPLY WITH ALL REQUIREMENTS OF THE CURRENT HEALTH & SAFETY AT WORK ACT AND CONSTRUCTION REGULATIONS.

G8. THE CONTRACTOR IS RESPONSIBLE FOR ENSURING THAT HIS OPERATIONS DO NOT IN ANY WAY IMPAIR THE SAFETY OR CONDITION OF THE EXISTING STRUCTURE OR ADJACENT STRUCTURES. HE IS TO PROVIDE ANY TEMPORARY SUPPORTS, SHORING, ETC REQUIRED FOR THIS PURPOSE AND HE IS TO CAREFULLY INSPECT THE CONDITION OF THE STRUCTURES BOTH BEFORE AND DURING THE EXECUTION OF THE WORK. THE ENGINEER IS TO BE NOTIFIED IMMEDIATELY SHOULD ANY DAMAGE OCCUR.

G9. ALL PROPRIETARY PRODUCTS TO BE USED IN STRICT ACCORDANCE WITH MANUFACTURERS INSTRUCTIONS AND RECOMMENDATIONS

TENDER ISSUE

Rev.	Date	Description	By
T	24/01/20	TENDER ISSUE	DC

Revisions

Michael Jackson Consulting
Chartered Structural Engineers
204 BOLTON ROAD
WALKDEN, WORSLEY
MANCHESTER, M28 3BN
Tel: 0161 790 4404
Fax: 0161 790 4405

Client

Shaftesbury Theatre

Site

SHAFTESBURY THEATRE

Project

PROPOSED BASEMENT

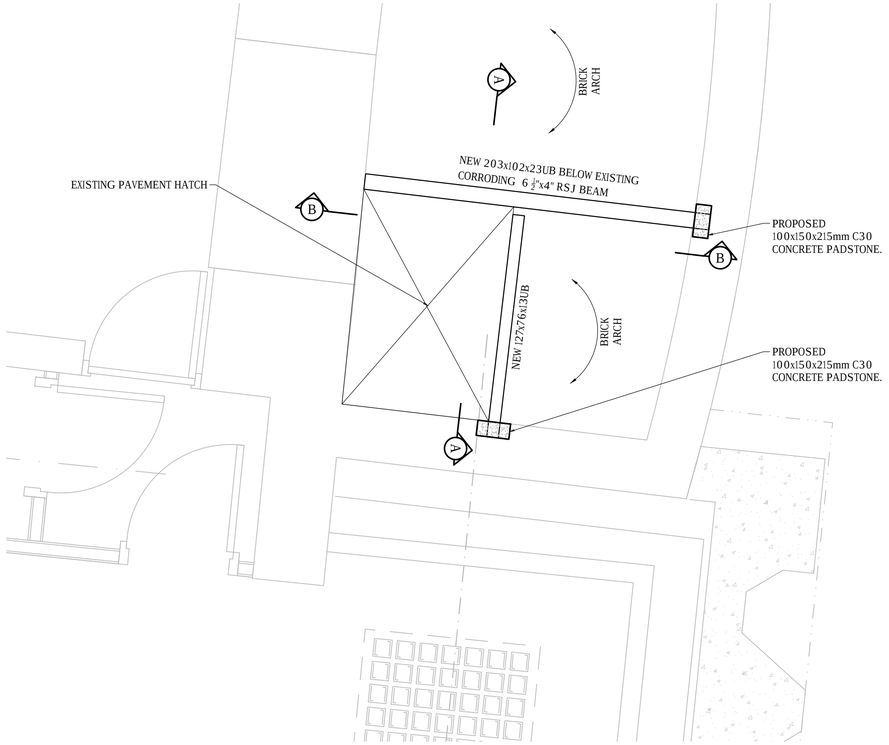
Drawing Title

REAR AUDITORIUM SLAB ALTERATIONS DETAILS

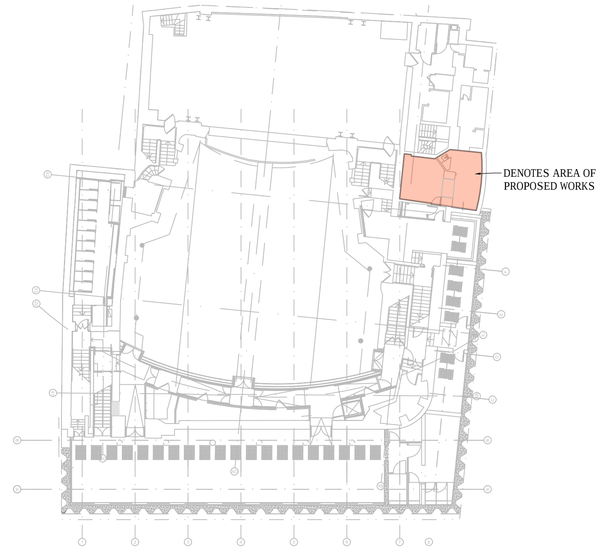
Scale	Date	Drawn	Checked	Passed
AS SHOWN	OCT 2019	DC		

DRG. No.

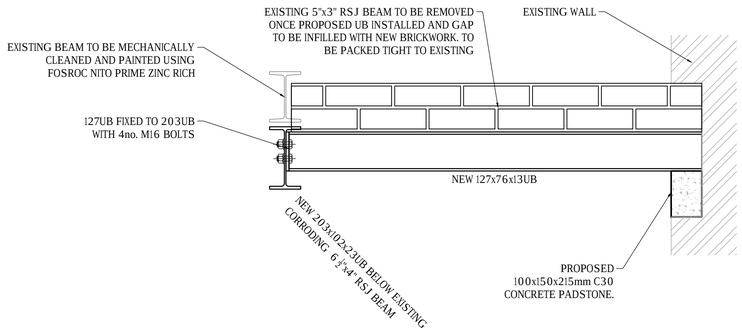
2714-1026-T



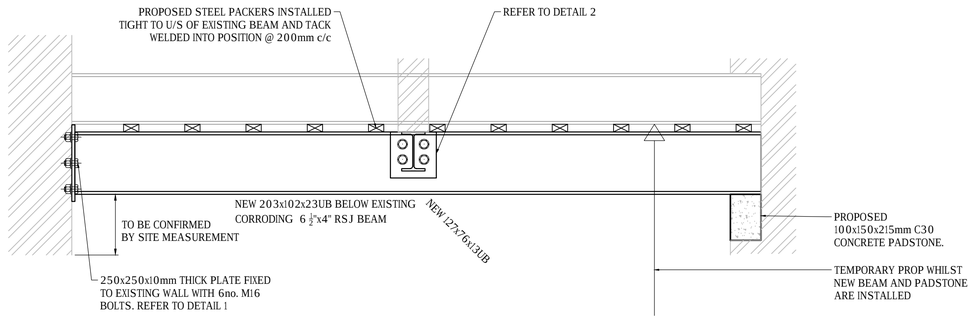
PLAN ON EXISTING BEAMS TO BE REPAIRED
(SCALE 1:20 @ A1)



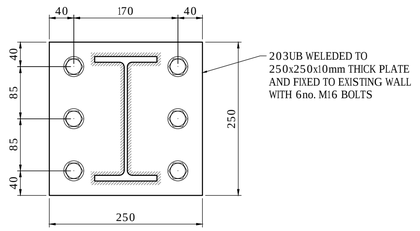
LOCATION GA
(SCALE 1:250 @ A1)



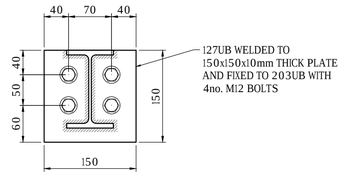
SECTION A-A
(SCALE 1:10 @ A1)



SECTION B-B
(SCALE 1:10 @ A1)



DETAIL 1
(SCALE 1:5 @ A1)



DETAIL 2
(SCALE 1:5 @ A1)

DO NOT SCALE THIS DRAWING.

Original Drawing Size A1

Notes

STEELWORK

S1. ALL STEELWORK TO BE GRADE S275 UNLESS NOTED OTHERWISE.

S2. ALL HOLLOW SECTIONS TO BE GRADE S355 UNLESS NOTED OTHERWISE

S3. ALL STEEL WORK CONNECTIONS TO HAVE A MINIMUM OF 2 No. M16 BOLTS GRADE 8.8

S4. ALL NUTS TO BE NYLOCK TYPE GRADE 8.8

S5. ALL STEEL IS TO MEET THE REQUIREMENTS OF EN1090. THE EXECUTION CLASS IS TO BE OBTAINED BY THE CONTRACTOR FROM THE CODE.

S6. NEW STEELWORK TO BE TREATED AS FOLLOWS:

SHOT BLAST CLEAN TO SA 2 1/2, SHOP APPLY ZINC RICH EPOXY PRIMER TO 40 MICRONS, THEN SHOP APPLY HIGH BUILD EPOXY MIO TO 100 MICRONS. THEN SITE APPLY HIGH BUILD EPOXY MIO TO 100 MICRONS.

S7. ANY DAMAGED AREA OF PAINT FINISH TO BE TOUCHED UP LOCALLY ON SITE.

S8. THE STEELWORK CONTRACTOR IS TO PROVIDE THE ENGINEER WITH 2 SETS OF FABRICATION DRAWINGS A MINIMUM OF 21 WORKING DAYS IN ADVANCE OF THE COMMENCEMENT OF FABRICATION.

TENDER ISSUE

Rev.	Date	Description	By
T	08/01/20	TENDER ISSUE	DC
P	27/11/19	PRELIMINARY ISSUE FOR COMMENTS	DC

Revisions

Michael Jackson Consulting
Chartered Structural Engineers
204 BOLTON ROAD
WALKDEN, WORSLEY
MANCHESTER, M28 3BN
Tel: 0161 790 4404
Fax: 0161 790 4405

Client

Shaftesbury Theatre

Site

SHAFTESBURY THEATRE

Project

PROPOSED BASEMENT

Drawing Title

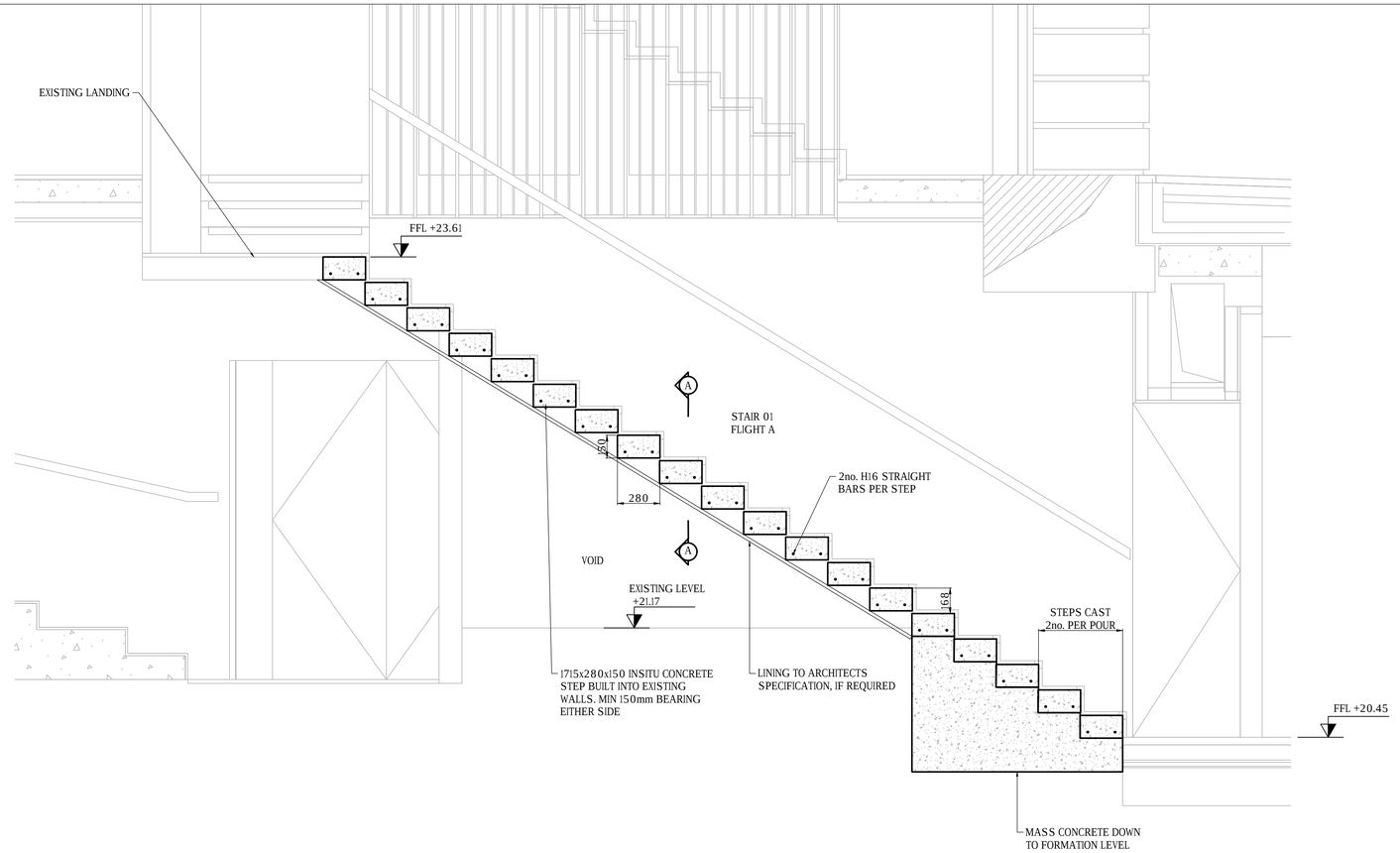
REPAIRS TO EXISTING BOILER ROOM STEELWORK

Scale	Date	Drawn	Checked	Passed
AS SHOWN	OCT 2019	DC		

DRG. No.

2714-1030-T

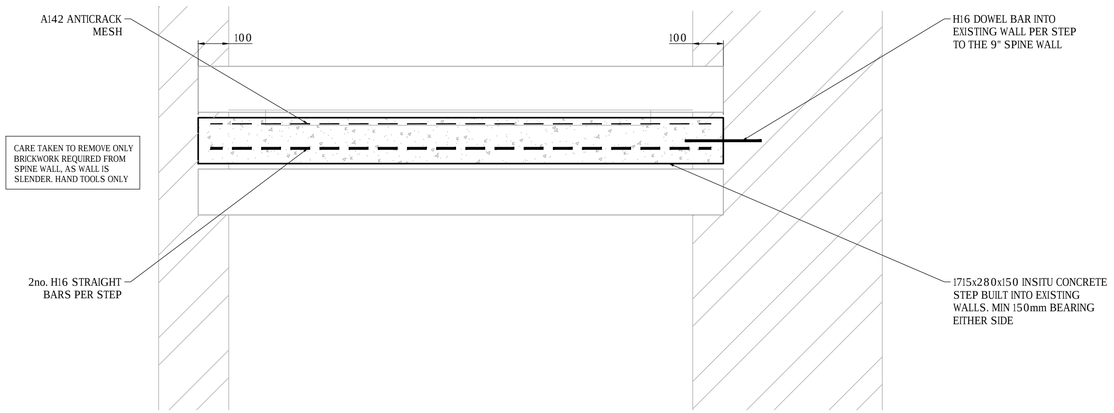
PLAN ON STAIRCASE 1 FLIGHT A
SCALE 1:20 AT A1



TYPICAL SECTION THROUGH
STAIRCASE 1 FLIGHT A
SCALE 1:20 AT A1

NOTE: MAXIMUM OF 2 STEPS TO BE CAST AT ONE TIME TO AVOID DAMAGE

DESIGN INTENT ONLY. CALCULATIONS TO BE PROVIDED BY CONTRACTOR



SECTION A-A
SCALE 1:10 AT A1

DO NOT SCALE THIS DRAWING.

Original Drawing Size A1

Notes

TENDER ISSUE

Rev.	Date	Description	By
T	08/01/20	TENDER ISSUE	DC
P	20/12/19	DESIGN INTENT	DC

Revisions

Michael Jackson Consulting
Chartered Structural Engineers
204 BOLTON ROAD
WALKDEN, WORSLEY
MANCHESTER, M28 3BN
Tel: 0161 790 4404
Fax: 0161 790 4405

Client

The Theatre of Comedy Company
Shaftesbury Theatre

Site

SHAFTESBURY THEATRE

Project

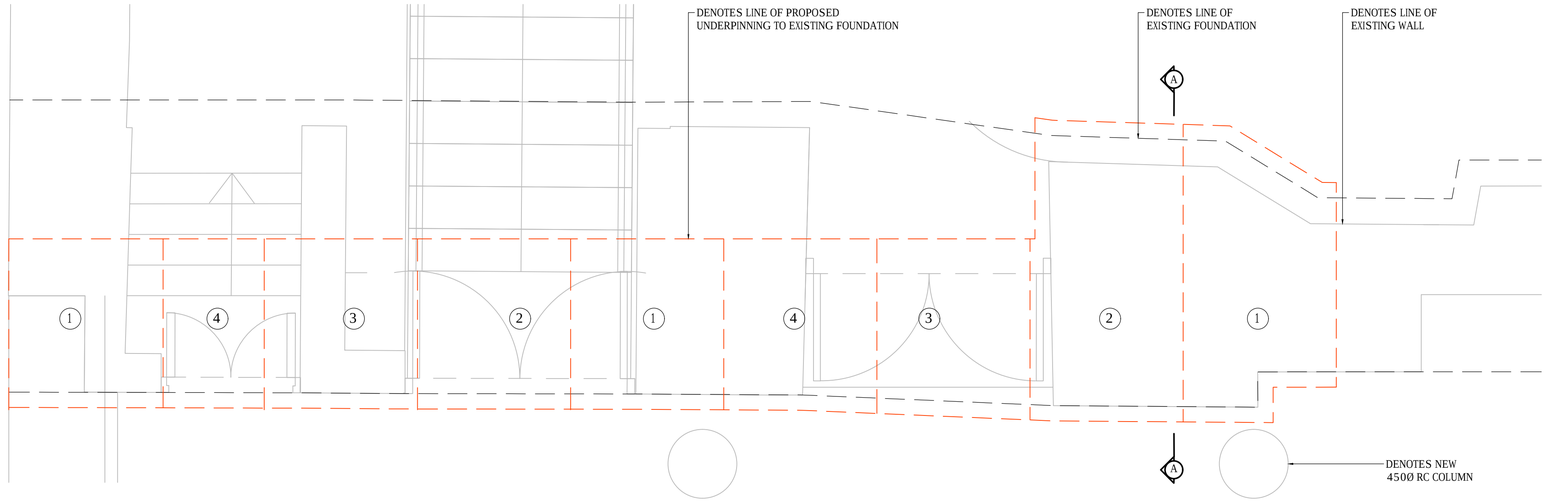
PROPOSED BASEMENT

Drawing Title

STAIR 1 FLIGHT A
SECTIONS AND DETAILS

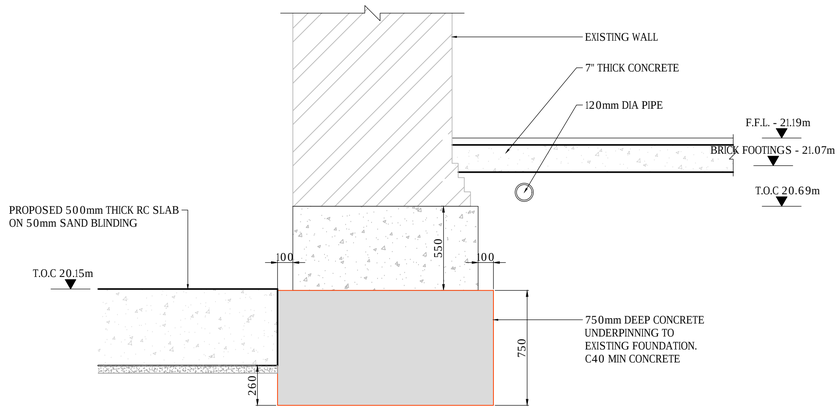
Scale	Date	Drawn	Checked	Passed
AS SHOWN	---/--	--		

DRG. No.
2714-1035-T



EXISTING FOUNDATION UNDERPINNING GA
SCALE 1:20 AT A1

NOTE:
- INDICATIVE UNDERPINNING SCHEME TO NORTHERN END OF BLOOMSBURY STREET
- TO BE CONFIRMED UPOON EXPOSURE OF EXISTING FOUNDATIONS
- SEQUENCE TO BE AGREED WITH CONTRACTOR



SECTION A-A
(SCALE 1:20 AT A1)

DO NOT SCALE THIS DRAWING.

Original Drawing Size A1

Notes

TENDER ISSUE

Rev.	Date	Description	By
T	24/01/20	TENDER ISSUE	DC

Revisions

Michael Jackson Consulting
Chartered Structural Engineers
204 BOLTON ROAD
WALKDEN, WORSLEY
MANCHESTER, M28 3BN
Tel: 0161 790 4404
Fax: 0161 790 4405

Client

The Theatre of Comedy Company
Shaftesbury Theatre

Site

SHAFTESBURY THEATRE

Project

PROPOSED BASEMENT

Drawing Title

EXISTING FOUNDATION UNDERPINNING GA AND DETAILS

Scale	Date	Drawn	Checked	Passed
AS SHOWN	OCT 2019	DC		

DRG. No.

2714-1040-T

Engineering That Brings Design To Life.

Structural Calculations

EX19/181/10

Shaftesbury Theatre

Basement Slab

Revision	Date	Changes
-	19.12.2019	Initial Issue for Discussion Only
A	07.01.2020	Issue to Client

General Construction Notes and Guidance on using these Calculations

1. Calculations are not to be used for the purpose of ordering materials and should only be used for Building Regulations submissions. All dimensions should be checked by the contractor on site.

2. All steelwork to be mechanically wire brushed and painted two coats of red oxide. Steelwork located in the cavity or below DPC to be suitably protected with 2 coats of bituminous paint.

3. All steelwork connections to use grade 8.8 bolts unless stated otherwise. These are to be spanner tightened using the appropriate podger spanner (min length 460mm) or suitable power tools in accordance with BS2583. If a torque wrench is used the torque applied should be around 90Nm for M16 bolts, 110Nm for M20 & 130Nm for M24.

4. All timber to be grade C24 (SC4), unless stated otherwise. Preservative treated to Architects details.

5. To be read in conjunction with Architects drawings, any inconsistencies between the drawings should be reported. If any site conditions or existing details are found that may affect the structural design, JMS Consulting Engineers are to be notified immediately.

6. For details of fire protection to steelwork, see Architects drawings.

7. The Contractor is to ensure that all existing construction is adequately supported, using needles and props as required. Where a new beam supports the existing construction, adequate pre-load is to be applied and suitable packs such as driven dry-slate introduced, then pointed up with mortar.

8. All blockwork to be 7.3 N/mm^2 in class III mortar below DPC in accordance with BS 5628 : Part 3 : 2005 or suitable 7.0 N/mm^2 foundation quality blocks in class II mortar in accordance with the manufacturer's instructions. All brickwork below DPC to be Engineering Bricks DPC in accordance with BS 5628 : Part 3 : 2005.

9. The project requires the introduction of heavy structural elements such as steel beams or concrete lintels. Although the Construction (Design and Management) Regulation 2015 would not normally apply to this type of construction, the designer still has an obligation to foresee risks and bring to the attention of the builder such risks. In consequence, the builder is to take into consideration the placement of all structural elements, ensuring that the method of lifting and placement is safely carried out. Responsibility for this element lies with the Contractor. As the existing walls need to be propped in order to introduce some of the lintels, this should also be considered in relationship to the risk assessment of the Contractor. Safe working procedures must be adopted. Responsibility for this element lies with the Contractor. Splice details for long-span beams can often be accommodated if required.

10. All construction products should be CE marked in accordance current legislation. This includes all fabricated structural steelwork in accordance with BS EN 1090-1 and BS EN 1090-2. The consequence class is CC2 unless noted otherwise. The service class is SC1 for all buildings, SC2 for all lifting beams, sculptures & fall arrest systems. Production category will be PC1 unless noted otherwise. All site welded items, S355 steelwork & CHS lattice girders will be PC2. As such the execution class for buildings will be EXC2.

11. CLIMATE CHANGE: The Building Research establishment have produced a document CBG 63 "Climate Change: impact on building design and construction". Part of their recommendations are that designers and builders should give consideration to:
    a. Increased wind loading by providing additional laps and fixings to roof coverings

    b. Consider foundation depth on shrinkable clays and to avoid future problems, increase the depth above standard requirements if there is a risk. This should be in accordance with the NHBC Standards, Chapter 4.2 Guidance on Building near Trees. If the calculations do not specifically design the depths of the foundations to take into account any local trees, then this should be checked and agreed with the Building Inspector on site.

Party Wall etc. Act 1996

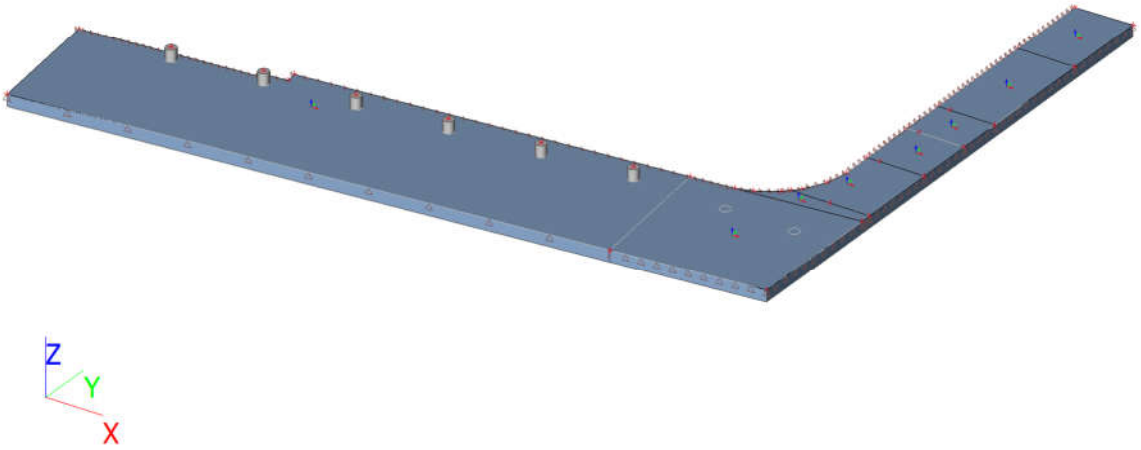
If part of the work is adjacent to the boundary, the adjacent neighbours right to support could be affected; the issues associated with Party Wall Act may need to be considered. This may include providing information to the adjoining owner, giving sufficient notice of works in compliance with the Act. If the following list applies to this project then the Party Wall Act will apply.

- Installing a new beam into the shared wall between properties
- Demolishing, building or under-pinning an existing shared wall
- Building a new wall at or on the boundary or junction of two properties
- Damp-proofing all the way through a party wall
- Digging foundations that are within 3m of a Party Wall, where the new foundations are deeper than the existing ones
- Where the new foundations are within 6m and lower than a 45° line from the bottom of the existing foundations

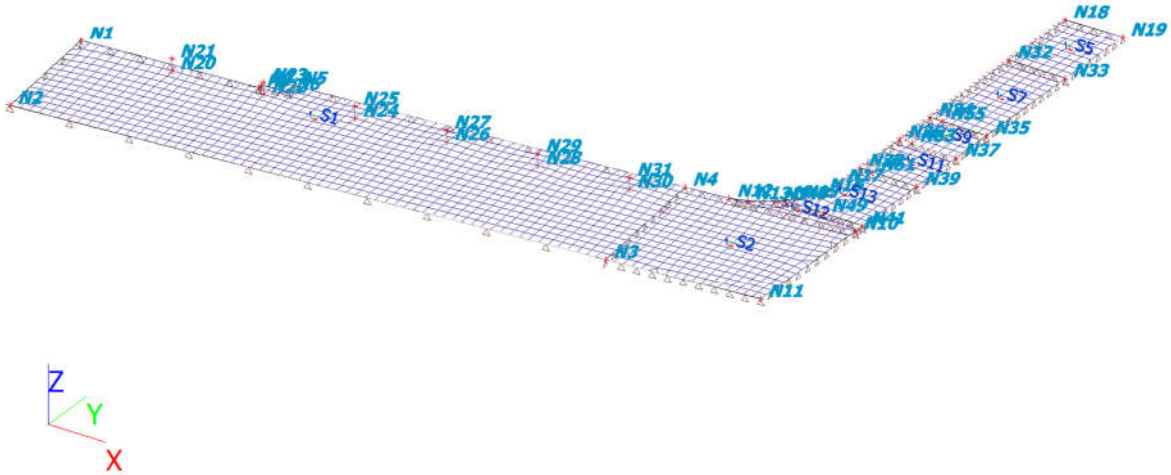
1. Table of contents

2. Model

2.1. 3D model



2.2. Analysis model



3. Libraries

3.1. Setup manager

(STR/GEO) alternative

Combination	Eq.6.10

Psi factors

Load	Psi0	Psi1	Psi2
CategoryA	0.7	0.5	0.3
CategoryB	0.7	0.5	0.3
CategoryC	0.7	0.7	0.6
CategoryD	0.7	0.7	0.6
CategoryE	1	0.9	0.8
CategoryF	0.7	0.7	0.6
CategoryG	0.7	0.5	0.3
CategoryH	0	0	0
Snow	0.5	0.2	0
Wind	0.6	0.2	0
Temperature	0.6	0.5	0

Load combination factors

Permanent action - unfavorable	1.35
Permanent action - favorable	1.00
Leading variable action	1.50
Accompanying variable action	1.50
Reduction factor ksi	0.85
Permanent action - unfavorable	1.00
Permanent action - favorable	1.00
Leading variable action	1.30
Accompanying variable action	1.30

3.2. Cross-sections

Name	Type	Item material	Fabrication	A [m^2]	A_y [m^2]	I_y [m^4]	$W_{el.y}$ [m^3]	$W_{pl.y}$ [m^3]	Colour
	Detailed				A_z [m^2]	I_z [m^4]	$W_{el.z}$ [m^3]	$W_{pl.z}$ [m^3]	
CS1	Circle	C30/37	concrete	1.5904e-01	1.4319e-01	2.0129e-03	8.9462e-03	1.5188e-02	
	450				1.4319e-01	2.0129e-03	8.9462e-03	1.5188e-02	

3.3. Materials

Name	Type	ρ [kg/m^3]	Density in fresh state [kg/m^3]	E_{mod} [kN/m^2]	μ	α [m/mK]	$f_{c.k.28}$ [MPa]	Colour
C30/37	Concrete	2500.0	2600.0	32800000.0	0.2	0.00	30.00	

Explanations of symbols	
Density in fresh state	The value in the density in fresh state property is used only in case a composite deck is input and its self-weight load is taken into account.

Reinforcement EC2

Name	Type	ρ [kg/m^3]	E_{mod} [kN/m^2]	G_{mod} [kN/m^2]	α [m/mK]	$f_{y.k}$ [MPa]
B 500B	Reinforcement steel	7850.0	200000000.0	83333333.3	0.00	500.0

3.4. Subsoils

Name	C1x [kN/m^3]	C1z	C1y [kN/m^3]	Stiffness [kN/m^3]	C2x [kN/m]	C2y [kN/m]
225 KN/m2	2250.0	Flexible	2250.0	22500.0	2250.0	2250.0

4. Structure

4.1. Nodes

Name	Coord X [m]	Coord Y [m]	Coord Z [m]
N1	-0.551	5.530	0.000
N2	0.000	0.000	0.000
N3	24.618	2.452	0.000
N4	24.006	8.618	0.000
N5	7.857	7.008	0.000
N6	7.907	6.507	0.000
N7	6.845	6.400	0.000
N8	6.868	6.171	0.000
N10	31.037	9.320	0.000
N11	31.025	3.090	0.000
N12	25.831	8.800	0.000
N13	26.504	9.015	0.000
N14	27.358	9.536	0.000
N15	27.882	10.085	0.000
N16	28.383	11.025	0.000
N17	28.563	11.983	0.000
N18	28.583	26.892	0.000
N19	31.074	26.968	0.000
N20	3.511	5.465	0.000
N21	3.511	5.465	0.500
N22	7.287	5.841	0.000
N23	7.287	5.841	0.500
N24	11.063	6.217	0.000
N25	11.063	6.217	0.500
N26	14.842	6.594	0.000
N27	14.842	6.594	0.500
N28	18.618	6.970	0.000
N29	18.618	6.970	0.500
N30	22.392	7.346	0.000
N31	22.392	7.346	0.500
N32	28.578	23.173	0.000
N33	31.066	23.168	0.000
N34	28.571	17.973	0.000
N35	31.055	17.968	0.000
N36	28.569	15.973	0.000
N37	31.051	15.968	0.000
N38	28.565	13.373	0.000
N39	31.046	13.368	0.000
N40	27.620	9.810	0.000
N41	31.038	9.803	0.000
N49	29.329	9.807	0.000
N51	29.105	13.372	0.000
N53	29.110	15.972	0.000
N55	29.113	17.972	0.000

4.2. Members

Name	CrossSection	Material	Length [m]	Beg. node	End node	Type
B1	CS1 - Circle (450)	C30/37	0.500	N20	N21	column (100)
B2	CS1 - Circle (450)	C30/37	0.500	N22	N23	column (100)
B3	CS1 - Circle (450)	C30/37	0.500	N24	N25	column (100)
B4	CS1 - Circle (450)	C30/37	0.500	N26	N27	column (100)
B5	CS1 - Circle (450)	C30/37	0.500	N28	N29	column (100)
B6	CS1 - Circle (450)	C30/37	0.500	N30	N31	column (100)

4.3. 2D members

Name	Layer	Type	Analysis model	Material	Thickness type	Th. [mm]
S1	Layer2-Slab	plate (90)	Standard	C30/37	constant	500
S2	Layer2-Slab	plate (90)	Standard	C30/37	constant	500
S5	Layer2-Slab	plate (90)	Standard	C30/37	constant	500
S7	Layer2-Slab	plate (90)	Standard	C30/37	constant	500
S9	Layer2-Slab	plate (90)	Standard	C30/37	constant	500

Name	Layer	Type	Analysis model	Material	Thickness type	Th. [mm]
S11	Layer2-Slab	plate (90)	Standard	C30/37	constant	500
S12	Layer2-Slab	plate (90)	Standard	C30/37	constant	500
S13	Layer2-Slab	plate (90)	Standard	C30/37	constant	500

4.4. Supports on 2D member edge

Name	2D member	Orig	Pos x_1	X	Y	Z	Rx	Ry	Rz
	Edge	Coor	Pos x_2						
Sle1	S5	From start	0.000	Rigid	Rigid	Free	Free	Free	Free
	1	Rela	1.000						
Sle2	S7	From start	0.000	Rigid	Rigid	Free	Free	Free	Free
	1	Rela	1.000						
Sle3	S9	From start	0.000	Rigid	Rigid	Free	Free	Free	Free
	1	Rela	1.000						
Sle4	S11	From start	0.000	Rigid	Rigid	Free	Free	Free	Free
	1	Rela	1.000						
Sle5	S13	From start	0.000	Rigid	Rigid	Free	Free	Free	Free
	4	Rela	1.000						
Sle6	S13	From start	0.000	Rigid	Rigid	Free	Free	Free	Free
	3	Rela	1.000						
Sle7	S13	From start	0.000	Rigid	Rigid	Free	Free	Free	Free
	2	Rela	1.000						
Sle8	S12	From start	0.000	Rigid	Rigid	Free	Free	Free	Free
	6	Rela	1.000						
Sle9	S12	From start	0.000	Rigid	Rigid	Free	Free	Free	Free
	5	Rela	1.000						
Sle10	S12	From start	0.000	Rigid	Rigid	Free	Free	Free	Free
	4	Rela	1.000						
Sle11	S1	From start	0.000	Rigid	Rigid	Free	Free	Free	Free
	4	Rela	1.000						
Sle12	S1	From start	0.000	Rigid	Rigid	Free	Free	Free	Free
	8	Rela	1.000						
Sle13	S1	From start	0.000	Rigid	Rigid	Free	Free	Free	Free
	7	Rela	1.000						
Sle14	S1	From start	0.000	Rigid	Rigid	Free	Free	Free	Free
	6	Rela	1.000						
Sle15	S2	From start	0.000	Rigid	Rigid	Free	Free	Free	Free
	1	Rela	0.230						

4.5. 2D member supports

Name	Type	Subsoil	2D member
SS1	Individual	225 KN/m2	S1
SS2	Individual	225 KN/m2	S2
SS3	Individual	225 KN/m2	S5
SS4	Individual	225 KN/m2	S7
SS5	Individual	225 KN/m2	S9
SS6	Individual	225 KN/m2	S11
SS7	Individual	225 KN/m2	S12
SS8	Individual	225 KN/m2	S13

5. Sets

5.1. Load cases

Name	Description	Action type	LoadGroup	Direction	Duration	Master load case
	Spec	Load type				
LC1	Self-Weight	Permanent	LG1-D	-Z		
		Self weight				
LC2	Dead	Permanent	LG1-D			
		Standard				
LC3	Live	Variable	LG2-L		Short	None
	Standard	Static				
LC4	Water Pressure	Variable	LG2-L		Short	None
	Standard	Static				
LC5	SLS from superstructure (unfactored)	Permanent	LG1-D			
		Standard				

Name	Description	Action type	LoadGroup	Direction	Duration	Master load case
	Spec	Load type				
LC6	ULS from superstructure (factored)	Permanent	LG1-D			
		Standard				

5.2. Load groups

Name	Load	Relation	Type
LG1-D	Permanent		
LG2-L	Variable	Standard	Cat C : Congregation

5.3. Combinations

Name	Description	Type	Load cases	Coeff. [-]
ULS-for foundation.1		Envelope - ultimate	LC1 - Self-Weight	1.35
			LC2 - Dead	1.35
			LC5 - SLS from superstructure (unfactored)	1.00
ULS-for foundation.2		Envelope - ultimate	LC1 - Self-Weight	1.00
			LC2 - Dead	1.00
			LC5 - SLS from superstructure (unfactored)	0.74
ULS-for foundation.3		Envelope - ultimate	LC1 - Self-Weight	1.35
			LC3 - Live	1.50
			LC4 - Water Pressure	1.50
			LC2 - Dead	1.35
			LC5 - SLS from superstructure (unfactored)	1.00
ULS-for foundation.4		Envelope - ultimate	LC1 - Self-Weight	1.00
			LC3 - Live	1.50
			LC4 - Water Pressure	1.50
			LC2 - Dead	1.00
			LC5 - SLS from superstructure (unfactored)	0.74
SLS-Ch.1		Envelope - serviceability	LC1 - Self-Weight	1.00
			LC2 - Dead	1.00
			LC5 - SLS from superstructure (unfactored)	1.00
SLS-Ch.2		Envelope - serviceability	LC1 - Self-Weight	1.00
			LC3 - Live	1.00
			LC4 - Water Pressure	1.00
			LC2 - Dead	1.00
			LC5 - SLS from superstructure (unfactored)	1.00
SLS-Fr.1		Envelope - serviceability	LC1 - Self-Weight	1.00
			LC2 - Dead	1.00
			LC5 - SLS from superstructure (unfactored)	1.00
SLS-Fr.2		Envelope - serviceability	LC1 - Self-Weight	1.00
			LC3 - Live	0.70
			LC4 - Water Pressure	0.70
			LC2 - Dead	1.00
			LC5 - SLS from superstructure (unfactored)	1.00
SLS-Qp.1		Envelope - serviceability	LC1 - Self-Weight	1.00
			LC2 - Dead	1.00
			LC5 - SLS from superstructure (unfactored)	1.00
SLS-Qp.2		Envelope - serviceability	LC1 - Self-Weight	1.00
			LC3 - Live	0.60
			LC4 - Water Pressure	0.60
			LC2 - Dead	1.00
			LC5 - SLS from superstructure (unfactored)	1.00
ULS-for slab design.1		Envelope - ultimate	LC1 - Self-Weight	1.35
			LC2 - Dead	1.35
			LC6 - ULS from superstructure (factored)	1.10

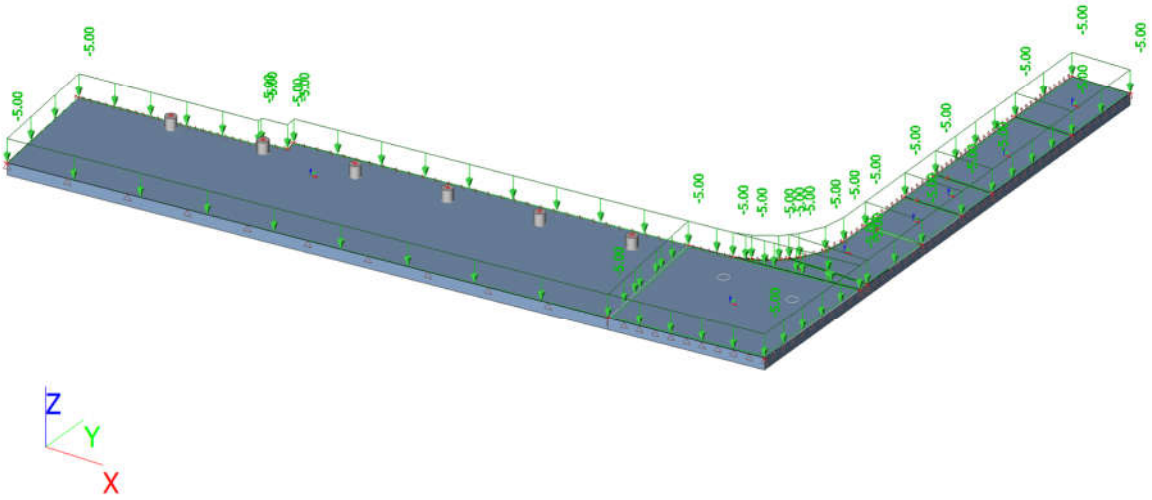
Name	Description	Type	Load cases	Coeff. [-]
ULS-for slab design.2		Envelope - ultimate	LC1 - Self-Weight	1.00
			LC2 - Dead	1.00
			LC6 - ULS from superstructure (factored)	0.81
ULS-for slab design.3		Envelope - ultimate	LC1 - Self-Weight	1.35
			LC3 - Live	1.50
			LC4 - Water Pressure	1.50
			LC2 - Dead	1.35
			LC6 - ULS from superstructure (factored)	1.10
ULS-for slab design.4		Envelope - ultimate	LC1 - Self-Weight	1.00
			LC3 - Live	1.50
			LC4 - Water Pressure	1.50
			LC2 - Dead	1.00
			LC6 - ULS from superstructure (factored)	0.81

5.4. Result classes

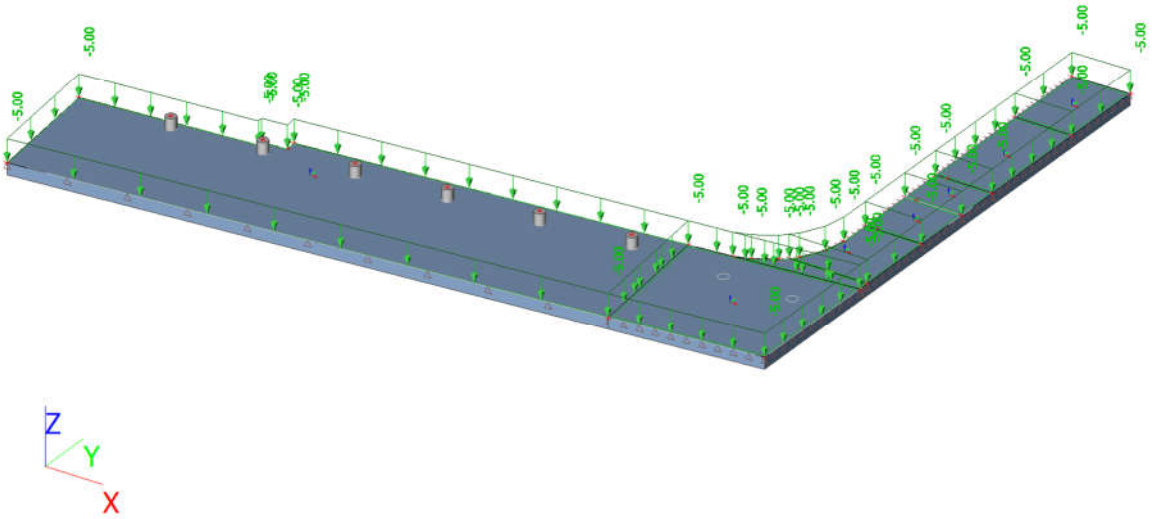
Name	List
GEO	ULS-for foundation - EN-ULS (STR/GEO) Set B
	ULS-for slab design - EN-ULS (STR/GEO) Set B
SLS	SLS-Ch - EN-SLS Characteristic
	SLS-Fr - EN-SLS Frequent
	SLS-Qp - EN-SLS Quasi-permanent

6. Loads

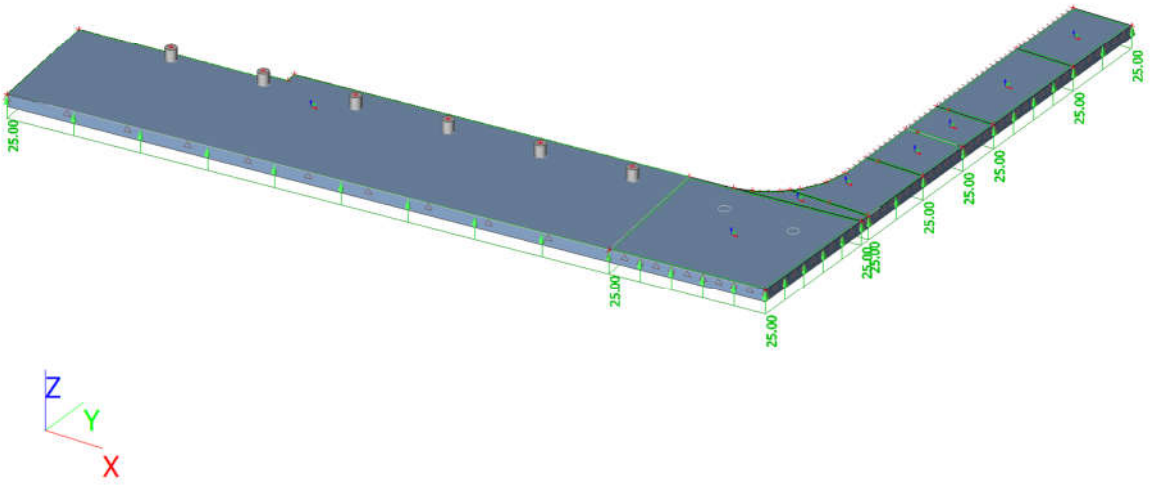
6.1. LC2 - Dead loads



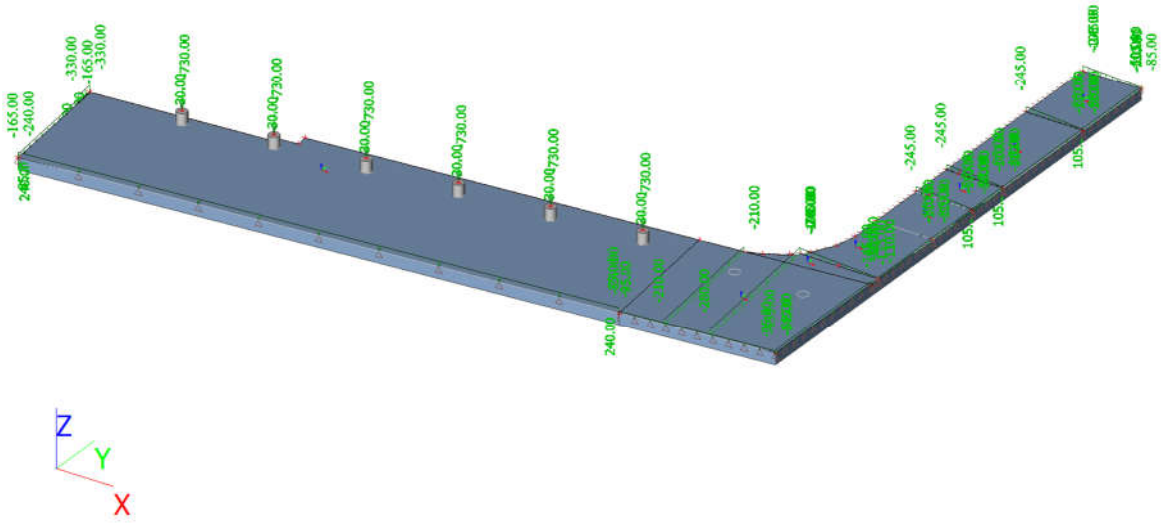
6.2. LC3 - Live Loads



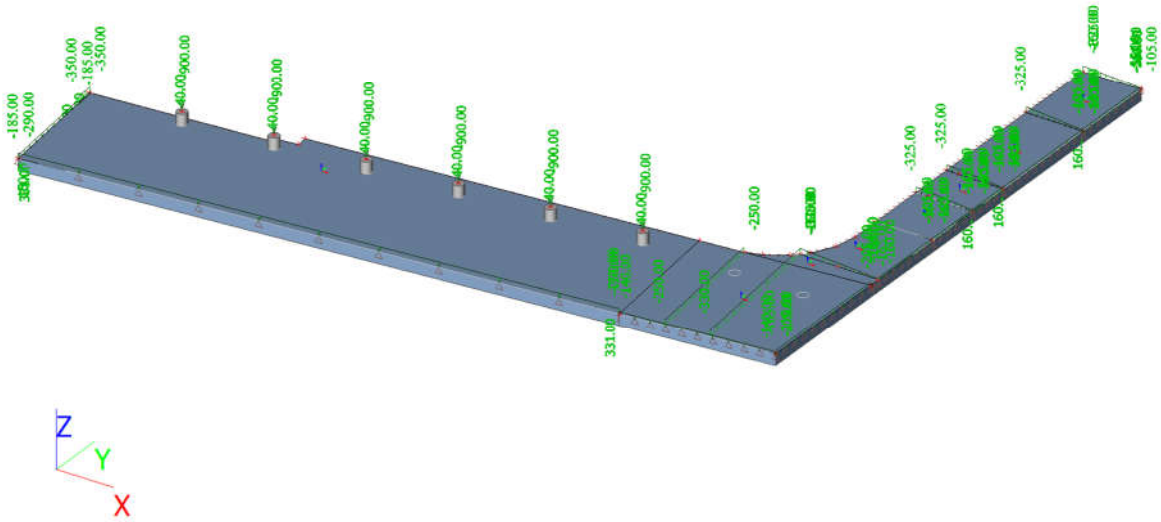
6.3. LC4 - Water Pressure



6.4. LC5 - SLS from superstructure (unfactored)



6.5. LC6 - ULS from superstructure (factored)



6.6. Point force in node

Name	Node	Load case	System	Dir	Type	Value - F [kN]
F1	N21	LC5 - SLS from superstructure (unfactored)	GCS	Z	Force	-730.00
F2	N23	LC5 - SLS from superstructure (unfactored)	GCS	Z	Force	-730.00
F3	N25	LC5 - SLS from superstructure (unfactored)	GCS	Z	Force	-730.00
F4	N27	LC5 - SLS from superstructure (unfactored)	GCS	Z	Force	-730.00
F5	N29	LC5 - SLS from superstructure (unfactored)	GCS	Z	Force	-730.00
F6	N31	LC5 - SLS from superstructure (unfactored)	GCS	Z	Force	-730.00
F7	N21	LC6 - ULS from superstructure (factored)	GCS	Z	Force	-900.00
F8	N23	LC6 - ULS from superstructure (factored)	GCS	Z	Force	-900.00
F9	N25	LC6 - ULS from superstructure (factored)	GCS	Z	Force	-900.00
F10	N27	LC6 - ULS from superstructure (factored)	GCS	Z	Force	-900.00
F11	N29	LC6 - ULS from superstructure (factored)	GCS	Z	Force	-900.00
F12	N31	LC6 - ULS from superstructure (factored)	GCS	Z	Force	-900.00

6.7. Moment in node

Name	Node	Load case	System	Dir	Type	Value - M [kNm]
M1	N21	LC5 - SLS from superstructure (unfactored)	GCS	Mx	Moment	30.00
M2	N23	LC5 - SLS from superstructure (unfactored)	GCS	Mx	Moment	30.00
M3	N25	LC5 - SLS from superstructure (unfactored)	GCS	Mx	Moment	30.00
M4	N27	LC5 - SLS from superstructure (unfactored)	GCS	Mx	Moment	30.00
M5	N29	LC5 - SLS from superstructure (unfactored)	GCS	Mx	Moment	30.00
M6	N31	LC5 - SLS from superstructure (unfactored)	GCS	Mx	Moment	30.00
M7	N21	LC6 - ULS from superstructure (factored)	GCS	Mx	Moment	40.00
M8	N23	LC6 - ULS from superstructure (factored)	GCS	Mx	Moment	40.00
M9	N25	LC6 - ULS from superstructure (factored)	GCS	Mx	Moment	40.00
M10	N27	LC6 - ULS from superstructure (factored)	GCS	Mx	Moment	40.00
M11	N29	LC6 - ULS from superstructure (factored)	GCS	Mx	Moment	40.00
M12	N31	LC6 - ULS from superstructure (factored)	GCS	Mx	Moment	40.00

6.8. Line force on 2D member edge

Name	2D member	Type	Dir	Value - P_1 [kN/m]	Pos x_1	Loc	Edge
	Load case	System	Distribution	Value - P_2 [kN/m]	Pos x_2	Coor	Orig
LFS3	S2	Force	Z	-135.00	0.000	Length	2
	LC5 - SLS from superstructure (unfactored)	GCS	Uniform		1.000	Rela	From start

Name	2D member	Type	Dir	Value - P_1 [kN/m]	Pos x_1	Loc	Edge
	Load case	System	Distribution	Value - P_2 [kN/m]	Pos x_2	Coor	Orig
LFS4	S2	Force	Z	-85.00	0.000	Length	3
	LC5 - SLS from superstructure (unfactored)	GCS	Uniform		1.000	Rela	From start
LFS5	S1	Force	Z	-240.00	0.000	Length	2
	LC5 - SLS from superstructure (unfactored)	GCS	Uniform		1.000	Rela	From start
LFS6	S1	Force	Z	-330.00	0.000	Length	1
	LC5 - SLS from superstructure (unfactored)	GCS	Uniform		1.000	Abso	From start
LFS8	S1	Force	Z	-165.00	1.000	Length	1
	LC5 - SLS from superstructure (unfactored)	GCS	Uniform		5.558	Abso	From start
LFS10	S9	Force	Z	-50.00	0.000	Length	4
	LC5 - SLS from superstructure (unfactored)	GCS	Trapez	-245.00	1.000	Rela	From start
LFS11	S7	Force	Z	-50.00	0.000	Length	4
	LC5 - SLS from superstructure (unfactored)	GCS	Trapez	-245.00	1.000	Rela	From start
LFS12	S5	Force	Z	-50.00	0.000	Length	4
	LC5 - SLS from superstructure (unfactored)	GCS	Trapez	-245.00	1.000	Rela	From start
LFS13	S5	Force	Z	-245.00	0.000	Length	2
	LC5 - SLS from superstructure (unfactored)	GCS	Trapez	-50.00	1.000	Rela	From start
LFS10	S12	Force	Z	-245.00	0.000	Length	1
	LC5 - SLS from superstructure (unfactored)	GCS	Trapez	-50.00	1.000	Rela	From start
LFS14	S2	Force	Z	-165.00	0.000	Length	2
	LC6 - ULS from superstructure (factored)	GCS	Uniform		1.000	Rela	From start
LFS15	S2	Force	Z	-110.00	0.000	Length	3
	LC6 - ULS from superstructure (factored)	GCS	Uniform		1.000	Rela	From start
LFS16	S1	Force	Z	-290.00	0.000	Length	2
	LC6 - ULS from superstructure (factored)	GCS	Uniform		1.000	Rela	From start
LFS17	S1	Force	Z	-350.00	0.000	Length	1
	LC6 - ULS from superstructure (factored)	GCS	Uniform		1.000	Abso	From start
LFS19	S1	Force	Z	-185.00	1.000	Length	1
	LC6 - ULS from superstructure (factored)	GCS	Uniform		5.558	Abso	From start
LFS20	S9	Force	Z	-55.00	0.000	Length	4
	LC6 - ULS from superstructure (factored)	GCS	Trapez	-325.00	1.000	Rela	From start
LFS21	S7	Force	Z	-55.00	0.000	Length	4
	LC6 - ULS from superstructure (factored)	GCS	Trapez	-325.00	1.000	Rela	From start
LFS22	S5	Force	Z	-55.00	0.000	Length	4
	LC6 - ULS from superstructure (factored)	GCS	Trapez	-325.00	1.000	Rela	From start
LFS23	S5	Force	Z	-325.00	0.000	Length	2
	LC6 - ULS from superstructure (factored)	GCS	Trapez	-55.00	1.000	Rela	From start
LFS25	S12	Force	Z	-325.00	0.000	Length	1
	LC6 - ULS from superstructure (factored)	GCS	Trapez	-55.00	1.000	Rela	From start
LFS26	S13	Force	Z	-105.00	0.000	Length	6
	LC6 - ULS from superstructure (factored)	GCS	Uniform		1.000	Rela	From start
LFS27	S11	Force	Z	-105.00	0.000	Length	3
	LC6 - ULS from superstructure (factored)	GCS	Uniform		1.000	Rela	From start
LFS28	S9	Force	Z	-105.00	0.000	Length	3
	LC6 - ULS from superstructure (factored)	GCS	Uniform		1.000	Rela	From start
LFS29	S7	Force	Z	-105.00	0.000	Length	3
	LC6 - ULS from superstructure (factored)	GCS	Uniform		1.000	Rela	From start
LFS30	S5	Force	Z	-105.00	0.000	Length	3
	LC6 - ULS from superstructure (factored)	GCS	Uniform		1.000	Rela	From start
LFS31	S13	Force	Z	-85.00	0.000	Length	6
	LC5 - SLS from superstructure (unfactored)	GCS	Uniform		1.000	Rela	From start
LFS32	S11	Force	Z	-85.00	0.000	Length	3
	LC5 - SLS from superstructure (unfactored)	GCS	Uniform		1.000	Rela	From start
LFS33	S9	Force	Z	-85.00	0.000	Length	3
	LC5 - SLS from superstructure (unfactored)	GCS	Uniform		1.000	Rela	From start
LFS34	S7	Force	Z	-85.00	0.000	Length	3
	LC5 - SLS from superstructure (unfactored)	GCS	Uniform		1.000	Rela	From start
LFS35	S5	Force	Z	-85.00	0.000	Length	3
	LC5 - SLS from superstructure (unfactored)	GCS	Uniform		1.000	Rela	From start

6.9. Line moment on 2D member edge

Name	2D member	Type	Dir	Value - M_1 [kNm/m]	Pos x_1	Loc	Edge
	Load case	System	Distribution	Value - M_2 [kNm/m]	Pos x_2	Coor	Orig
LMS1	S1	Moment	Mx	85.00	0.170	Length	1
	LC5 - SLS from superstructure (unfactored)	LCS	Uniform		1.000	Rela	From start

Name	2D member	Type	Dir	Value - M_1 [kNm/m]	Pos x_1	Loc	Edge
	Load case	System	Distribution	Value - M_2 [kNm/m]	Pos x_2	Coor	Orig
LMS2	S1	Moment	Mx	240.00	0.000	Length	2
	LC5 - SLS from superstructure (unfactored)	LCS	Uniform		1.000	Rela	From start
LMS3	S2	Moment	Mx	-95.00	0.000	Length	3
	LC5 - SLS from superstructure (unfactored)	LCS	Uniform		1.000	Rela	From start
LMS4	S2	Moment	Mx	-145.00	0.000	Length	2
	LC5 - SLS from superstructure (unfactored)	LCS	Uniform		1.000	Rela	From start
LMS6	S9	Moment	Mx	105.00	0.000	Length	4
	LC5 - SLS from superstructure (unfactored)	LCS	Uniform		1.000	Rela	From start
LMS7	S7	Moment	Mx	105.00	0.000	Length	4
	LC5 - SLS from superstructure (unfactored)	LCS	Uniform		1.000	Rela	From start
LMS8	S5	Moment	Mx	105.00	0.000	Length	4
	LC5 - SLS from superstructure (unfactored)	LCS	Uniform		1.000	Rela	From start
LMS9	S5	Moment	Mx	-105.00	0.000	Length	2
	LC5 - SLS from superstructure (unfactored)	LCS	Uniform		1.000	Rela	From start
LMS6	S12	Moment	Mx	-105.00	0.000	Length	1
	LC5 - SLS from superstructure (unfactored)	LCS	Uniform		1.000	Rela	From start
LMS10	S1	Moment	Mx	125.00	0.000	Length	1
	LC6 - ULS from superstructure (factored)	LCS	Uniform		0.170	Rela	From start
LMS11	S1	Moment	Mx	331.00	0.000	Length	2
	LC6 - ULS from superstructure (factored)	LCS	Uniform		1.000	Rela	From start
LMS12	S2	Moment	Mx	-140.00	0.000	Length	3
	LC6 - ULS from superstructure (factored)	LCS	Uniform		1.000	Rela	From start
LMS13	S2	Moment	Mx	-205.00	0.000	Length	2
	LC6 - ULS from superstructure (factored)	LCS	Uniform		1.000	Rela	From start
LMS14	S9	Moment	Mx	160.00	0.000	Length	4
	LC6 - ULS from superstructure (factored)	LCS	Uniform		1.000	Rela	From start
LMS15	S7	Moment	Mx	160.00	0.000	Length	4
	LC6 - ULS from superstructure (factored)	LCS	Uniform		1.000	Rela	From start
LMS16	S5	Moment	Mx	160.00	0.000	Length	4
	LC6 - ULS from superstructure (factored)	LCS	Uniform		1.000	Rela	From start
LMS17	S5	Moment	Mx	-160.00	0.000	Length	2
	LC6 - ULS from superstructure (factored)	LCS	Uniform		1.000	Rela	From start
LMS19	S12	Moment	Mx	-160.00	0.000	Length	1
	LC6 - ULS from superstructure (factored)	LCS	Uniform		1.000	Rela	From start
LMS20	S13	Moment	Mx	-160.00	0.000	Length	6
	LC6 - ULS from superstructure (factored)	LCS	Uniform		1.000	Rela	From start
LMS21	S11	Moment	Mx	-160.00	0.000	Length	3
	LC6 - ULS from superstructure (factored)	LCS	Uniform		1.000	Rela	From start
LMS22	S9	Moment	Mx	-160.00	0.000	Length	3
	LC6 - ULS from superstructure (factored)	LCS	Uniform		1.000	Rela	From start
LMS23	S7	Moment	Mx	-160.00	0.000	Length	3
	LC6 - ULS from superstructure (factored)	LCS	Uniform		1.000	Rela	From start
LMS24	S5	Moment	Mx	-160.00	0.000	Length	3
	LC6 - ULS from superstructure (factored)	LCS	Uniform		1.000	Rela	From start
LMS25	S13	Moment	Mx	-110.00	0.000	Length	6
	LC5 - SLS from superstructure (unfactored)	LCS	Uniform		1.000	Rela	From start
LMS26	S11	Moment	Mx	-110.00	0.000	Length	3
	LC5 - SLS from superstructure (unfactored)	LCS	Uniform		1.000	Rela	From start
LMS27	S9	Moment	Mx	-110.00	0.000	Length	3
	LC5 - SLS from superstructure (unfactored)	LCS	Uniform		1.000	Rela	From start
LMS28	S7	Moment	Mx	-110.00	0.000	Length	3
	LC5 - SLS from superstructure (unfactored)	LCS	Uniform		1.000	Rela	From start
LMS29	S5	Moment	Mx	-110.00	0.000	Length	3
	LC5 - SLS from superstructure (unfactored)	LCS	Uniform		1.000	Rela	From start
LMS30	S1	Moment	Mx	85.00	0.000	Length	1
	LC5 - SLS from superstructure (unfactored)	LCS	Uniform		0.170	Rela	From start
LMS31	S1	Moment	Mx	150.00	0.170	Length	1
	LC6 - ULS from superstructure (factored)	LCS	Uniform		1.000	Rela	From start

6.10. Free line force

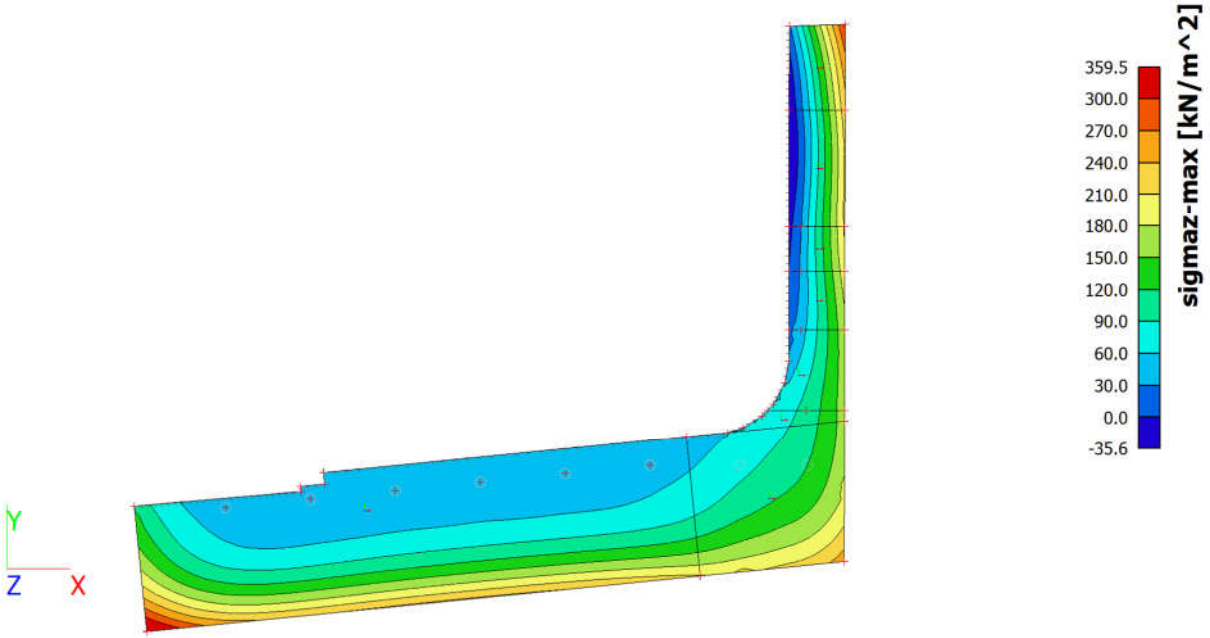
Name	Load case	Dir	Type	Distribution	Value - P_1 [kN/m]	Validity	Select	System	Location
FL1	LC5 - SLS from superstructure (unfactored)	Z	Force	Uniform	-280.00	Z=0	Auto	GCS	Length
FL2	LC6 - ULS from superstructure (factored)	Z	Force	Uniform	-330.00	Z=0	Auto	GCS	Length
FL5	LC5 - SLS from superstructure (unfactored)	Z	Force	Uniform	-210.00	Z=0	Auto	GCS	Length
FL6	LC6 - ULS from superstructure (factored)	Z	Force	Uniform	-250.00	Z=0	Auto	GCS	Length

6.11. Surface load

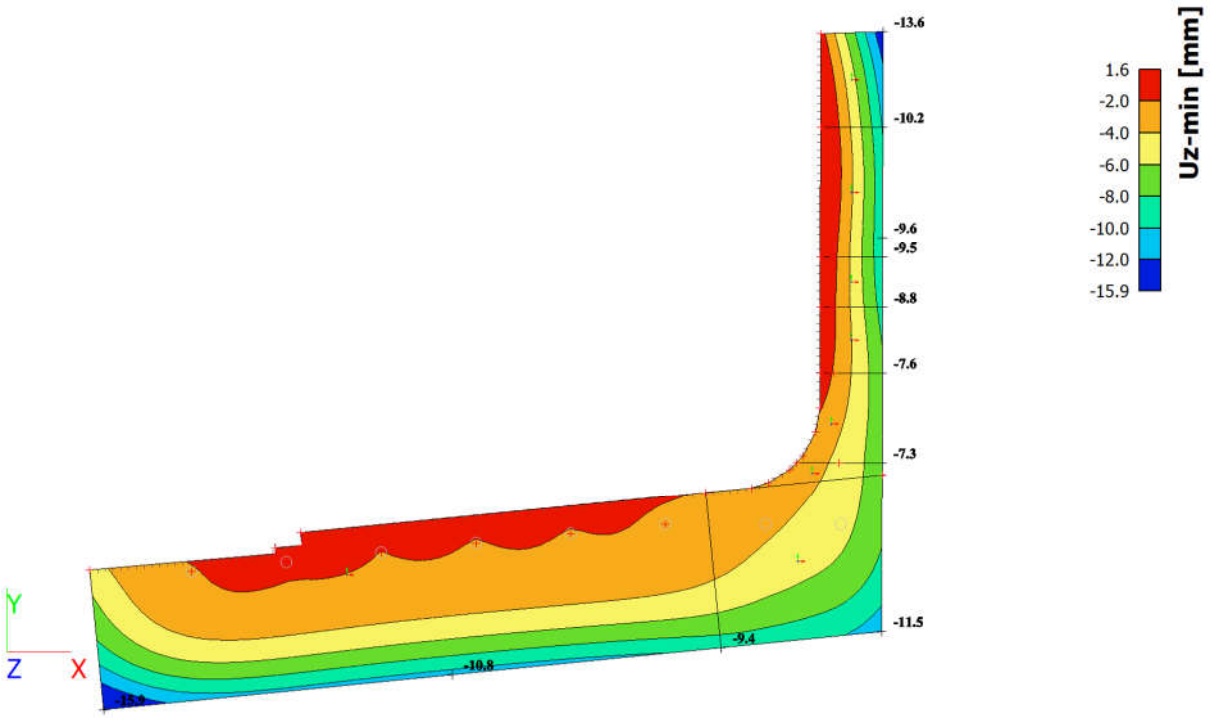
Name	Dir	Type	Value [kN/m²]	2D member	Load case	System	Loc
SF1	Z	Force	-5.00	S1	LC3 - Live	GCS	Length
SF2	Z	Force	-5.00	S2	LC3 - Live	GCS	Length
SF3	Z	Force	-5.00	S12	LC3 - Live	GCS	Length
SF4	Z	Force	-5.00	S1	LC2 - Dead	GCS	Length
SF5	Z	Force	-5.00	S2	LC2 - Dead	GCS	Length
SF6	Z	Force	-5.00	S12	LC2 - Dead	GCS	Length
SF7	Z	Force	25.00	S1	LC4 - Water Pressure	GCS	Length
SF8	Z	Force	25.00	S2	LC4 - Water Pressure	GCS	Length
SF9	Z	Force	25.00	S12	LC4 - Water Pressure	GCS	Length
SF10	Z	Force	-5.00	S13	LC2 - Dead	GCS	Length
SF11	Z	Force	-5.00	S11	LC2 - Dead	GCS	Length
SF12	Z	Force	-5.00	S9	LC2 - Dead	GCS	Length
SF13	Z	Force	-5.00	S7	LC2 - Dead	GCS	Length
SF14	Z	Force	-5.00	S5	LC2 - Dead	GCS	Length
SF15	Z	Force	-5.00	S13	LC3 - Live	GCS	Length
SF16	Z	Force	-5.00	S11	LC3 - Live	GCS	Length
SF17	Z	Force	-5.00	S9	LC3 - Live	GCS	Length
SF18	Z	Force	-5.00	S7	LC3 - Live	GCS	Length
SF19	Z	Force	-5.00	S5	LC3 - Live	GCS	Length
SF20	Z	Force	25.00	S13	LC4 - Water Pressure	GCS	Length
SF21	Z	Force	25.00	S11	LC4 - Water Pressure	GCS	Length
SF22	Z	Force	25.00	S9	LC4 - Water Pressure	GCS	Length
SF23	Z	Force	25.00	S7	LC4 - Water Pressure	GCS	Length
SF24	Z	Force	25.00	S5	LC4 - Water Pressure	GCS	Length

7. Results

7.1. Contact stresses; sigmaz

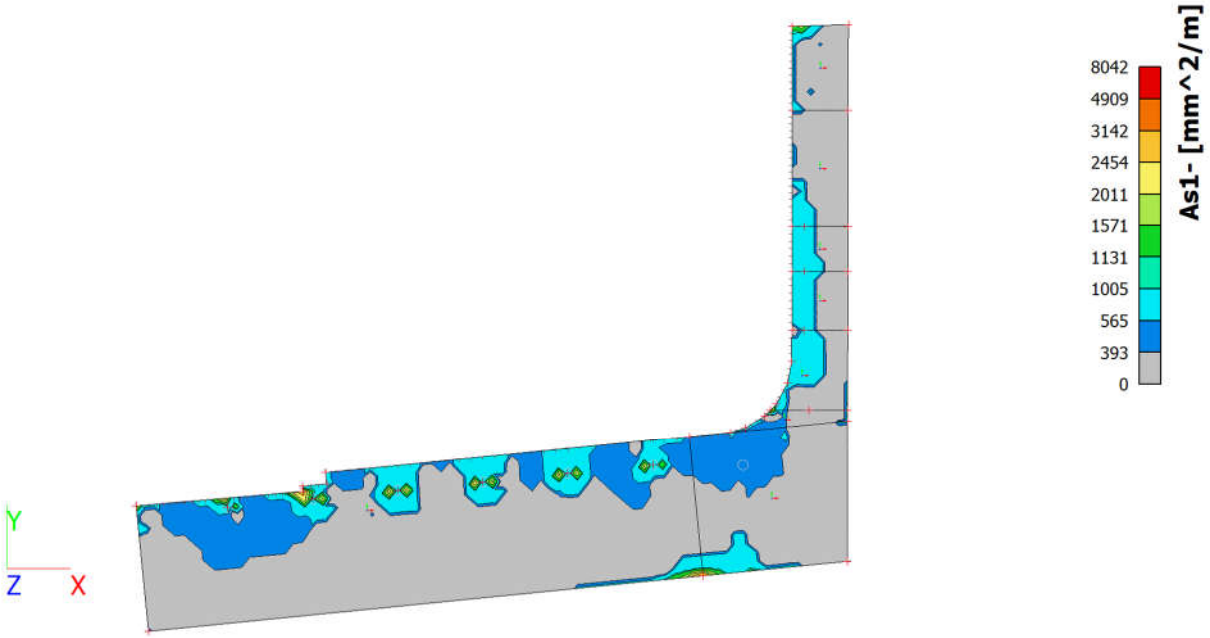


7.2. Displacement of nodes; Uz (SLS)

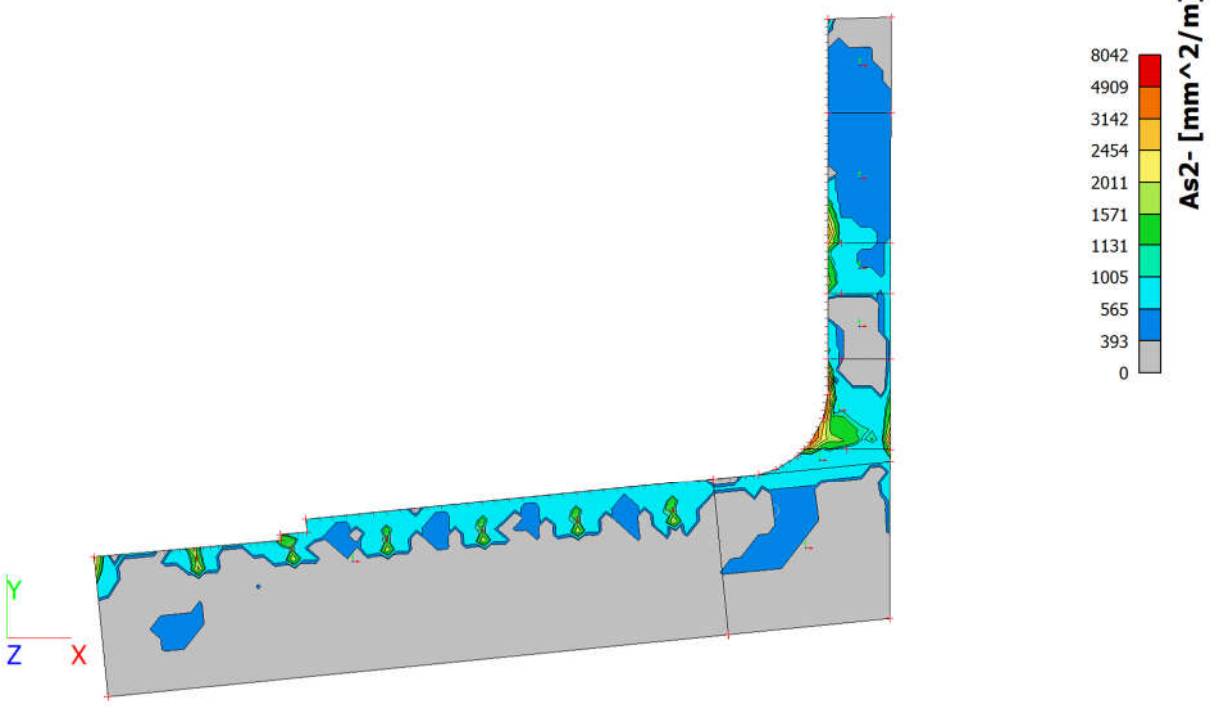


8. Design

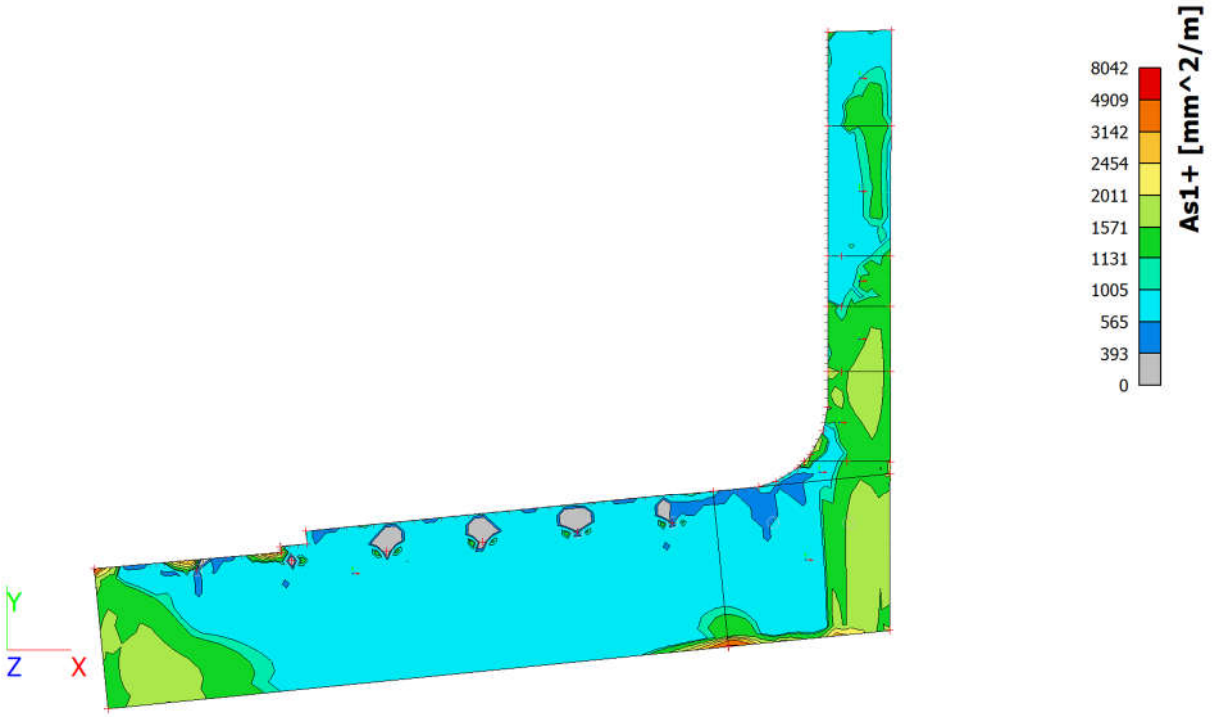
8.1. Member 2D - design - required areas; As1- (bottom x-x)



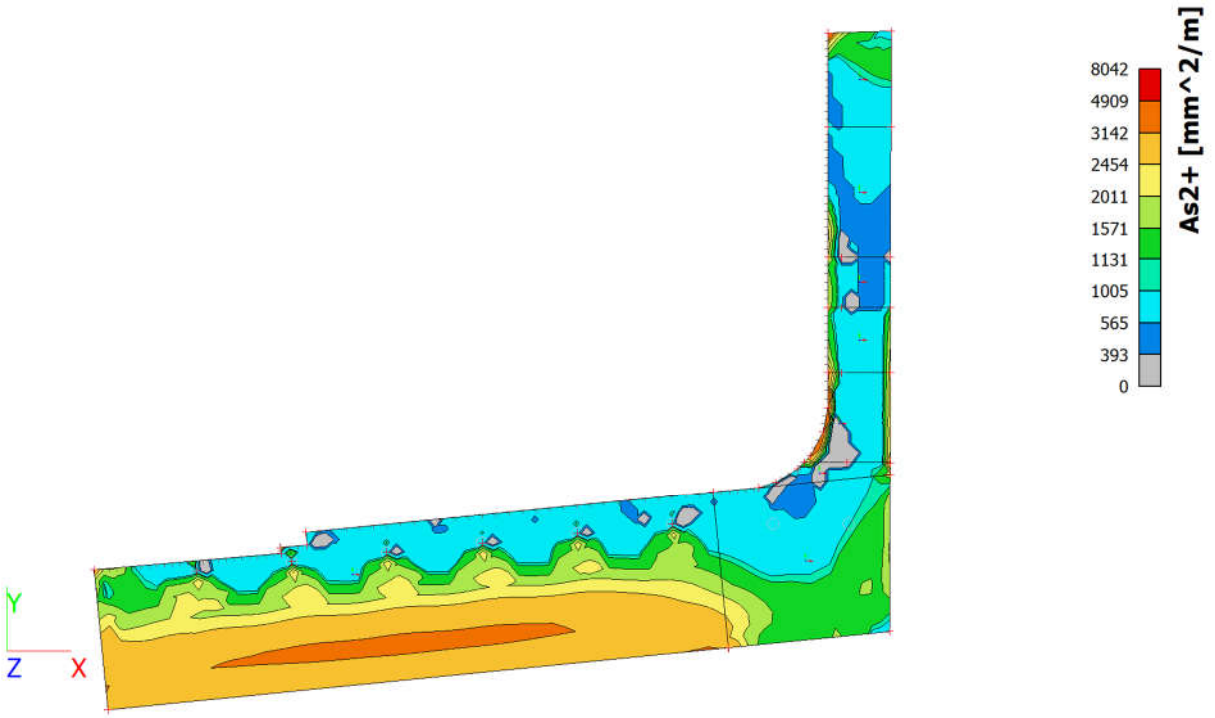
8.2. Member 2D - design - required areas; As2- (bottom y-y)



8.3. Member 2D - design - required areas; As1+ (top x-x)



8.4. Member 2D - design - required areas; As2+ (top y-y)



APPENDIX B
RESULTS OF GROUND MOVEMENT ASSESSMENT

Oasys Ltd.

Shaftesbury Theatre
New Ex _ Undrained

File 01 Ex - Undrained.pdd
Exported 02/12/20 09:42:47

Titles

START_TABLE
Job No.: 371647
Job Title: Shaftesbury Theatre
Sub-title: New Ex _ Undrained
Calculation Heading:
Initials: SW
Checker:
Date Saved:
Date Checked:
Notes:
File Name: 01 Ex - Undrained.pdd
File Path: \\to-dc0\Geo\52100 onwards\52167 Shaftesbury Theatre Updated BIA\9. GMA\03 analyses\pdisp\CAT II
END_TABLE

Analysis Options

General
Global Poisson's ratio: 0.50
Maximum allowable ratio between values of E: 1.5
Horizontal rigid boundary level: -10.10 [m OD]
Displacements at load centroids: Yes
GSA piled raft data : No

Elastic
Elastic : Yes
Analysis: Boussinesq
Stiffness for horizontal displacement calculations: Weighted average
Using legacy heave correction factor: No

Consolidation
Consolidation : No

Soil ProfilesSoil Profile 1
START_TABLE

Layer ref.	Name	Level at top [mOD]	Number of	Youngs Mo [kN/m²]	Youngs Mo [kN/m²]	Poissons ra	Non-linear curve
1	1	24.15	5	20000	20000	0.2	None
2	2	20.15	5	20000	110000	0.5	None
3	3	-6.5	5	125000	125000	0.5	None

END_TABLE

Soil Zones
START_TABLE

Zone	Name	X min [m]	X max [m]	Y min [m]	Y max [m]	Profile
1	SZ1	-20	100	-20	60	Soil Profile 1

END_TABLE

Polygonal Load Data
START_TABLE

Load ref.	Name	Position : L [m]	Position : P [m]	Position : P [%]	No. of Rect	Value : Normal (local z) [kN/m²]
1	Western E	19.6	(6.5,-1.8) (3	10	7	-88
2	Southern E	19.6	(35.9,5.3) (	10	9	-78

END_TABLE

Polygonal Loads' Rectangles
START_TABLE

No.	Centre : x [m]	Centre : y [m]	Angle of lo [Degrees]	Width x [m]	Depth y [m]
Load 1 : Western Excavation					
(Edge 1 optimal)					
1	21.22018	1.57035	0.35258	29.405	6.5594
2	37.45029	1.80282	0.35258	3.0575	6.8246
3	39.04936	2.09754	0.35258	0.14423	6.0572
4	39.1895	2.76253	0.35258	0.14423	4.7111
5	39.32965	3.42752	0.35258	0.14423	3.3651
6	39.46979	4.09251	0.35258	0.14423	2.0191
7	39.60993	4.7575	0.35258	0.14423	0.67302
Load 2 : Southern Excavation					
(Edge 4 optimal)					
1	38.95313	27.64382	-95.034	0.085059	0.31495
2	39.2594	27.53145	-95.034	0.085059	0.94484
3	39.56567	27.41909	-95.034	0.085059	1.5747
4	39.87194	27.30672	-95.034	0.085059	2.2046
5	40.17821	27.19435	-95.034	0.085059	2.8345
6	39.43807	17.70546	-95.034	18.949	3.0251
7	38.1789	6.76359	-95.034	3.0709	3.3246
8	37.33476	5.26584	-95.034	0.06124	2.8113
9	36.37825	5.28861	-95.034	0.06124	0.93711

END_TABLE

Displacement Points

START_TABLE

Name	X [m]	Y [m]	Z(level) [m]	Calculate	Detailed Results
GrapeNear	38	39	24	No	Yes
GrapeFar	38	44.5	24	No	Yes
HighNear	41	10	24	No	Yes
HighFar	61	10	24	No	Yes

ShaftsNear	20	-2.5	24	No	Yes
ShaftsFar	20	-8	24	No	Yes

END_TABLE

Displacement Lines

START_TABLE

Name	X1 [m]	Y1 [m]	Z1 [m]	X2 [m]	Y2 [m]	Z2 [m]	Intervals [No.]	Calculate	Detailed Results
Berkshire H	63	-10	22.5	62	31	22.5	41	Yes	Yes
Berkshire H	62	31	22.5	90	32	22.5	28	Yes	Yes
Berkshire H	90	32	22.5	90	-5	22.5	37	Yes	Yes
Berkshire H	90	-5	22.5	63	-10	22.5	27	Yes	Yes
Archway - S	6.5	5	20.5	6.5	15.5	20.5	11	Yes	Yes
Archway - (	6.5	15.5	20.5	4	15.5	20.5	3	Yes	Yes
Archway - \	4	5	20.5	6.5	5	20.5	3	Yes	Yes
167High H	27	45	20.5	40	45	20.5	13	Yes	Yes
167High H	40	45	20.5	40	52	20.5	7	Yes	Yes
167High H	40	52	20.5	27	52	20.5	13	Yes	Yes
167High H	27	52	20.5	27	45	20.5	7	Yes	Yes
Sovereign I	4	5	20.5	-1	5	20.5	5	Yes	Yes
Sovereign I	-1	5	20.5	-4.5	8	20.5	5	Yes	Yes
Sovereign I	-4.5	8	20.5	4	15.5	20.5	11	Yes	Yes
Sovereign I	4	15.5	20.5	4	5	20.5	11	Yes	Yes
Crossrail Tu	52	50	10	47	-10	10	60	Yes	Yes

END_TABLE

Displacement Grids

START_TABLE

Name	Extrusion: I	X1 [m]	Y1 [m]	Z1 [m]	X2 [m]	Y2 [m]	Z2 [m]	Intervals A [No.]	Extrusion: [m]	Extrusion: I [No.]	Calculate	Detailed Results
Grid 1	Global X	-10	-20	24	-	60	24	100	80	100	No	No
Basement	Global X	-20	-20	19.6	-	60	19.6	50	120	50	No	Yes

END_TABLE

Warnings

(1)One or more displacement grids have numbers of intervals of at least 100. Large numbers of intervals will slow the analysis.

(2)The load at (23.219, 1.611, 19.600)m lies wide of all soil zones. Displacements at its centre have been requested. The first soil profile will be used.

Oasys Ltd.

Shaftesbury Theatre
New Ex - Drained

File 02 Ex - Drained.pdd
Exported 02/12/20 09:43:51

Titles

START_TABLE
Job No.: 371647
Job Title: Shaftesbury Theatre
Sub-title: New Ex - Drained
Calculation Heading:
Initials: SW
Checker:
Date Saved:
Date Checked:
Notes:
File Name: 02 Ex - Drained.pdd
File Path: \\to-dc0\Geo\52100 onwards\52167 Shaftesbury Theatre Updated BIA\9. GMA\03 analyses\pdisp\CAT II
END_TABLE

Analysis Options

General
Global Poisson's ratio: 0.20
Maximum allowable ratio between values of E: 1.5
Horizontal rigid boundary level: -10.10 [m OD]
Displacements at load centroids: Yes
GSA piled raft data : No

Elastic
Elastic : Yes
Analysis: Boussinesq
Stiffness for horizontal displacement calculations: Weighted average
Using legacy heave correction factor: No

Consolidation
Consolidation : No

Soil ProfilesSoil Profile 1
START_TABLE

Layer ref.	Name	Level at to	Number of	Youngs Mc	Youngs Mc	Poissons ra	Non-linear curve
		[mOD]		[kN/m²]	[kN/m²]		
1	1	24.15	5	20000	20000	0.2	None
2	2	20.15	5	16000	88000	0.2	None
3	3	-6.5	5	100000	100000	0.2	None

END_TABLE

Soil Zones
START_TABLE

Zone	Name	X min	X max	Y min	Y max	Profile
		[m]	[m]	[m]	[m]	
1	SZ1	-20	100	-20	60	Soil Profile 1

END_TABLE

Polygonal Load Data
START_TABLE

Load ref.	Name	Position : L	Position : P	Position : F	No. of Rect	Value : Normal (local z)
		[m]	[m]	[%]		[kN/m²]
1	Western E	19.6	(6.5,-1.8) (3	10	7	-88
2	Southern E	19.6	(35.9,5.3) (	10	9	-78

END_TABLE

Polygonal Loads' Rectangles
START_TABLE

No.	Centre : x	Centre : y	Angle of lo	Width x	Depth y
	[m]	[m]	[Degrees]	[m]	[m]
Load 1 : Western Excavation					
(Edge 1 optimal)					
1	21.22018	1.57035	0.35258	29.405	6.5594
2	37.45029	1.80282	0.35258	3.0575	6.8246
3	39.04936	2.09754	0.35258	0.14423	6.0572
4	39.1895	2.76253	0.35258	0.14423	4.7111
5	39.32965	3.42752	0.35258	0.14423	3.3651
6	39.46979	4.09251	0.35258	0.14423	2.0191
7	39.60993	4.7575	0.35258	0.14423	0.67302
Load 2 : Southern Excavation					
(Edge 4 optimal)					
1	38.95313	27.64382	-95.034	0.085059	0.31495
2	39.2594	27.53145	-95.034	0.085059	0.94484
3	39.56567	27.41909	-95.034	0.085059	1.5747
4	39.87194	27.30672	-95.034	0.085059	2.2046
5	40.17821	27.19435	-95.034	0.085059	2.8345
6	39.43807	17.70546	-95.034	18.949	3.0251
7	38.1789	6.76359	-95.034	3.0709	3.3246
8	37.33476	5.26584	-95.034	0.06124	2.8113
9	36.37825	5.28861	-95.034	0.06124	0.93711

END_TABLE

Displacement Points

START_TABLE

Name	X	Y	Z(level)	Calculate	Detailed
	[m]	[m]	[m]		Results
GrapeNear	38	39	24	Yes	Yes
GrapeFar	38	44.5	24	Yes	Yes
HighNear	41	10	24	Yes	Yes
HighFar	61	10	24	Yes	Yes
ShaftsNear	20	-2.5	24	Yes	Yes
ShaftsFar	20	-8	24	Yes	Yes

END_TABLE

Displacement Lines

START_TABLE

Name	X1	Y1	Z1	X2	Y2	Z2	Intervals	Calculate	Detailed Results
	[m]	[m]	[m]	[m]	[m]	[m]	[No.]		
Berkshire H	63	-10	22.5	62	31	22.5	41	Yes	Yes
Berkshire H	62	31	22.5	90	32	22.5	28	Yes	Yes
Berkshire H	90	32	22.5	90	-5	22.5	37	Yes	Yes
Berkshire H	90	-5	22.5	63	-10	22.5	27	Yes	Yes
Archway - S	6.5	5	20.5	6.5	15.5	20.5	11	Yes	Yes
Archway -	6.5	15.5	20.5	4	15.5	20.5	3	Yes	Yes
Archway -	4	5	20.5	6.5	5	20.5	3	Yes	Yes
167High H	27	45	20.5	40	45	20.5	13	Yes	Yes
167High H	40	45	20.5	40	52	20.5	7	Yes	Yes
167High H	40	52	20.5	27	52	20.5	13	Yes	Yes
167High H	27	52	20.5	27	45	20.5	7	Yes	Yes
Sovereign I	4	5	20.5	-1	5	20.5	5	Yes	Yes
Sovereign I	-1	5	20.5	-4.5	8	20.5	5	Yes	Yes
Sovereign I	-4.5	8	20.5	4	15.5	20.5	11	Yes	Yes
Sovereign I	4	15.5	20.5	4	5	20.5	11	Yes	Yes
Crossrail Tu	52	50	10	47	-10	10	60	Yes	Yes

END_TABLE

Displacement Grids

START_TABLE

Name	Extrusion:	X1	Y1	Z1	X2	Y2	Z2	Intervals A	Extrusion:	Extrusion:	Calculate	Detailed Results
		[m]	[m]	[m]	[m]	[m]	[m]	[No.]	[m]	[No.]		
Grid 1	Global X	-10	-20	24	-	60	24	100	80	100	No	No
Basement	Global X	-20	-20	19.6	-	60	19.6	50	120	50	No	No

END_TABLE

Warnings

(1)One or more displacement grids have numbers of intervals of at least 100. Large numbers of intervals will slow the analysis.

(2)The load at (23.219, 1.611, 19.600)m lies wide of all soil zones. Displacements at its centre have been requested. The first soil profile will be used.

Results : Immediate : Load Centres : Polygonal

START_TABLE

Ref.	Name	x	y	z	dz	Stress: Cal	Stress: Ver	Stress: Sun	Vert. Strain
		[m]	[m]	[mOD]	[mm]	[mOD]	[kN/m²]	[kN/m²]	[
1	Western E	23.21861	1.61111	19.6	-25.8254	17.028	-77.933	-120.38	-0.00292
2	Southern E	39.25431	16.22418	19.6	-14.8912	17.028	-48.112	-64.202	-0.00189

END_TABLE

Results : Consolidation : Load Centres : Polygonal

None

Results : Total : Load Centres : Polygonal

None

Results : Immediate : Displacement Data : Points

START_TABLE

Ref.	Name	x	y	z	dz	Stress: Cal	Stress: Ver	Stress: Sun	Vert. Strain
		[m]	[m]	[mOD]	[mm]	[mOD]	[kN/m²]	[kN/m²]	[
1	GrapeNear	38	39	24	-0.23311	23.615	0	0	0
2	GrapeFar	38	44.5	24	-0.07775	23.615	0	0	0
3	HighNear	41	10	24	-8.1551	23.615	0	0	0
4	HighFar	61	10	24	-0.19129	23.615	0	0	0
5	ShaftsNear	20	-2.5	24	-11.1809	23.615	0	0	0
6	ShaftsFar	20	-8	24	-3.19939	23.615	0	0	0

END_TABLE

Results : Consolidation : Displacement Data : Points

None

Results : Total : Displacement Data : Points

None

Results : Immediate : Displacement Data : Lines

START_TABLE

Ref.	Name	x	y	z	dz	Stress: Cal	Stress: Ver	Stress: Sun	Vert. Strain
		[m]	[m]	[mOD]	[mm]	[mOD]	[kN/m²]	[kN/m²]	[
1	Berkshire H	63	-10	22.5	-0.05284	22.108	0	0	0
1	Berkshire H	62.97561	-9	22.5	-0.05876	22.108	0	0	0
1	Berkshire H	62.95122	-8	22.5	-0.06483	22.108	0	0	0
1	Berkshire H	62.92683	-7	22.5	-0.07101	22.108	0	0	0
1	Berkshire H	62.90244	-6	22.5	-0.07727	22.108	0	0	0
1	Berkshire H	62.87805	-5	22.5	-0.08355	22.108	0	0	0
1	Berkshire H	62.85366	-4	22.5	-0.0898	22.108	0	0	0
1	Berkshire H	62.82927	-3	22.5	-0.09597	22.108	0	0	0
1	Berkshire H	62.80488	-2	22.5	-0.10201	22.108	0	0	0
1	Berkshire H	62.78049	-1	22.5	-0.10786	22.108	0	0	0
1	Berkshire H	62.7561	0	22.5	-0.11346	22.108	0	0	0
1	Berkshire H	62.73171	1	22.5	-0.11877	22.108	0	0	0
1	Berkshire H	62.70732	2	22.5	-0.12374	22.108	0	0	0
1	Berkshire H	62.68293	3	22.5	-0.12831	22.108	0	0	0
1	Berkshire H	62.65854	4	22.5	-0.13246	22.108	0	0	0
1	Berkshire H	62.63415	5	22.5	-0.13614	22.108	0	0	0
1	Berkshire H	62.60976	6	22.5	-0.13934	22.108	0	0	0
1	Berkshire H	62.58537	7	22.5	-0.14202	22.108	0	0	0
1	Berkshire H	62.56098	8	22.5	-0.14416	22.108	0	0	0
1	Berkshire H	62.53659	9	22.5	-0.14577	22.108	0	0	0
1	Berkshire H	62.5122	10	22.5	-0.14682	22.108	0	0	0
1	Berkshire H	62.4878	11	22.5	-0.14732	22.108	0	0	0
1	Berkshire H	62.46341	12	22.5	-0.14727	22.108	0	0	0
1	Berkshire H	62.43902	13	22.5	-0.14667	22.108	0	0	0
1	Berkshire H	62.41463	14	22.5	-0.14552	22.108	0	0	0
1	Berkshire H	62.39024	15	22.5	-0.14385	22.108	0	0	0
1	Berkshire H	62.36585	16	22.5	-0.14165	22.108	0	0	0
1	Berkshire H	62.34146	17	22.5	-0.13894	22.108	0	0	0
1	Berkshire H	62.31707	18	22.5	-0.13575	22.108	0	0	0
1	Berkshire H	62.29268	19	22.5	-0.13208	22.108	0	0	0
1	Berkshire H	62.26829	20	22.5	-0.12796	22.108	0	0	0
1	Berkshire H	62.2439	21	22.5	-0.12342	22.108	0	0	0
1	Berkshire H	62.21951	22	22.5	-0.11849	22.108	0	0	0
1	Berkshire H	62.19512	23	22.5	-0.11321	22.108	0	0	0
1	Berkshire H	62.17073	24	22.5	-0.10762	22.108	0	0	0
1	Berkshire H	62.14634	25	22.5	-0.10176	22.108	0	0	0
1	Berkshire H	62.12195	26	22.5	-0.09568	22.108	0	0	0
1	Berkshire H	62.09756	27	22.5	-0.08944	22.108	0	0	0
1	Berkshire H	62.07317	28	22.5	-0.0831	22.108	0	0	0
1	Berkshire H	62.04878	29	22.5	-0.0767	22.108	0	0	0
1	Berkshire H	62.02439	30	22.5	-0.0703	22.108	0	0	0
1	Berkshire H	62	31	22.5	-0.06397	22.108	0	0	0
2	Berkshire H	62	31	22.5	-0.06397	22.108	0	0	0
2	Berkshire H	63	31.03571	22.5	-0.05242	22.108	0	0	0
2	Berkshire H	64	31.07143	22.5	-0.04239	22.108	0	0	0
2	Berkshire H	65	31.10714	22.5	-0.03367	22.108	0	0	0
2	Berkshire H	66	31.14286	22.5	-0.02609	22.108	0	0	0
2	Berkshire H	67	31.17857	22.5	-0.01952	22.108	0	0	0
2	Berkshire H	68	31.21429	22.5	-0.01383	22.108	0	0	0
2	Berkshire H	69	31.25	22.5	-0.0089	22.108	0	0	0
2	Berkshire H	70	31.28571	22.5	-0.00464	22.108	0	0	0
2	Berkshire H	71	31.32143	22.5	-0.00096	22.108	0	0	0
2	Berkshire H	72	31.35714	22.5	0.0022	22.108	0	0	0
2	Berkshire H	73	31.39286	22.5	0.00491	22.108	0	0	0
2	Berkshire H	74	31.42857	22.5	0.00724	22.108	0	0	0
2	Berkshire H	75	31.46429	22.5	0.00921	22.108	0	0	0
2	Berkshire H	76	31.5	22.5	0.01089	22.108	0	0	0
2	Berkshire H	77	31.53571	22.5	0.0123	22.108	0	0	0
2	Berkshire H	78	31.57143	22.5	0.01348	22.108	0	0	0
2	Berkshire H	79	31.60714	22.5	0.01447	22.108	0	0	0
2	Berkshire H	80	31.64286	22.5	0.01527	22.108	0	0	0
2	Berkshire H	81	31.67857	22.5	0.01592	22.108	0	0	0
2	Berkshire H	82	31.71429	22.5	0.01644	22.108	0	0	0
2	Berkshire H	83	31.75	22.5	0.01684	22.108	0	0	0
2	Berkshire H	84	31.78571	22.5	0.01714	22.108	0	0	0
2	Berkshire H	85	31.82143	22.5	0.01735	22.108	0	0	0
2	Berkshire H	86	31.85714	22.5	0.01748	22.108	0	0	0
2	Berkshire H	87	31.89286	22.5	0.01755	22.108	0	0	0
2	Berkshire H	88	31.92857	22.5	0.01755	22.108	0	0	0
2	Berkshire H	89	31.96429	22.5	0.01751	22.108	0	0	0
2	Berkshire H	90	32	22.5	0.01743	22.108	0	0	0
3	Berkshire H	90	32	22.5	0.01743	22.108	0	0	0
3	Berkshire H	90	31	22.5	0.0175	22.108	0	0	0
3	Berkshire H	90	30	22.5	0.01756	22.108	0	0	0
3	Berkshire H	90	29	22.5	0.01762	22.108	0	0	0
3	Berkshire H	90	28	22.5	0.01768	22.108	0	0	0
3	Berkshire H	90	27	22.5	0.01773	22.108	0	0	0
3	Berkshire H	90	26	22.5	0.01778	22.108	0	0	0
3	Berkshire H	90	25	22.5	0.01783	22.108	0	0	0
3	Berkshire H	90	24	22.5	0.01787	22.108	0	0	0
3	Berkshire H	90	23	22.5	0.01791	22.108	0	0	0
3	Berkshire H	90	22	22.5	0.01795	22.108	0	0	0
3	Berkshire H	90	21	22.5	0.01799	22.108	0	0	0
3	Berkshire H	90	20	22.5	0.01803	22.108	0	0	0
3	Berkshire H	90	19	22.5	0.01807	22.108	0	0	0
3	Berkshire H	90	18	22.5	0.0181	22.108	0	0	0
3	Berkshire H	90	17	22.5	0.01813	22.108	0	0	0
3	Berkshire H	90	16	22.5	0.01817	22.108	0	0	0
3	Berkshire H	90	15	22.5	0.0182	22.108	0	0	0
3	Berkshire H	90	14	22.5	0.01823	22.108	0	0	0
3	Berkshire H	90	13	22.5	0.01827	22.108	0	0	0
3	Berkshire H	90	12	22.5	0.0183	22.108	0	0	0

3	Berkshire H	90	11	22.5	0.01833	22.108	0	0	0
3	Berkshire H	90	10	22.5	0.01837	22.108	0	0	0
3	Berkshire H	90	9	22.5	0.0184	22.108	0	0	0
3	Berkshire H	90	8	22.5	0.01843	22.108	0	0	0
3	Berkshire H	90	7	22.5	0.01847	22.108	0	0	0
3	Berkshire H	90	6	22.5	0.0185	22.108	0	0	0
3	Berkshire H	90	5	22.5	0.01853	22.108	0	0	0
3	Berkshire H	90	4	22.5	0.01856	22.108	0	0	0
3	Berkshire H	90	3	22.5	0.01859	22.108	0	0	0
3	Berkshire H	90	2	22.5	0.01862	22.108	0	0	0
3	Berkshire H	90	1	22.5	0.01865	22.108	0	0	0
3	Berkshire H	90	0	22.5	0.01868	22.108	0	0	0
3	Berkshire H	90	-1	22.5	0.0187	22.108	0	0	0
3	Berkshire H	90	-2	22.5	0.01872	22.108	0	0	0
3	Berkshire H	90	-3	22.5	0.01874	22.108	0	0	0
3	Berkshire H	90	-4	22.5	0.01875	22.108	0	0	0
3	Berkshire H	90	-5	22.5	0.01877	22.108	0	0	0
4	Berkshire H	90	-5	22.5	0.01877	22.108	0	0	0
4	Berkshire H	89	-5.18519	22.5	0.01881	22.108	0	0	0
4	Berkshire H	88	-5.37037	22.5	0.0188	22.108	0	0	0
4	Berkshire H	87	-5.55556	22.5	0.01873	22.108	0	0	0
4	Berkshire H	86	-5.74074	22.5	0.01859	22.108	0	0	0
4	Berkshire H	85	-5.92593	22.5	0.01837	22.108	0	0	0
4	Berkshire H	84	-6.11111	22.5	0.01806	22.108	0	0	0
4	Berkshire H	83	-6.2963	22.5	0.01765	22.108	0	0	0
4	Berkshire H	82	-6.48148	22.5	0.01712	22.108	0	0	0
4	Berkshire H	81	-6.66667	22.5	0.01645	22.108	0	0	0
4	Berkshire H	80	-6.85185	22.5	0.01564	22.108	0	0	0
4	Berkshire H	79	-7.03704	22.5	0.01466	22.108	0	0	0
4	Berkshire H	78	-7.22222	22.5	0.01348	22.108	0	0	0
4	Berkshire H	77	-7.40741	22.5	0.01209	22.108	0	0	0
4	Berkshire H	76	-7.59259	22.5	0.01045	22.108	0	0	0
4	Berkshire H	75	-7.77778	22.5	0.00854	22.108	0	0	0
4	Berkshire H	74	-7.96296	22.5	0.00632	22.108	0	0	0
4	Berkshire H	73	-8.14815	22.5	0.00375	22.108	0	0	0
4	Berkshire H	72	-8.33333	22.5	0.00079	22.108	0	0	0
4	Berkshire H	71	-8.51852	22.5	-0.00261	22.108	0	0	0
4	Berkshire H	70	-8.7037	22.5	-0.00649	22.108	0	0	0
4	Berkshire H	69	-8.88889	22.5	-0.01092	22.108	0	0	0
4	Berkshire H	68	-9.07407	22.5	-0.01595	22.108	0	0	0
4	Berkshire H	67	-9.25926	22.5	-0.02166	22.108	0	0	0
4	Berkshire H	66	-9.44444	22.5	-0.02812	22.108	0	0	0
4	Berkshire H	65	-9.62963	22.5	-0.03541	22.108	0	0	0
4	Berkshire H	64	-9.81481	22.5	-0.04362	22.108	0	0	0
4	Berkshire H	63	-10	22.5	-0.05284	22.108	0	0	0
5	Archway - S	6.5	5	20.5	-7.78794	20.325	0	0	0
5	Archway - S	6.5	5.95455	20.5	-4.99435	20.325	0	0	0
5	Archway - S	6.5	6.90909	20.5	-3.91565	20.325	0	0	0
5	Archway - S	6.5	7.86364	20.5	-3.20061	20.325	0	0	0
5	Archway - S	6.5	8.81818	20.5	-2.65372	20.325	0	0	0
5	Archway - S	6.5	9.77273	20.5	-2.22382	20.325	0	0	0
5	Archway - S	6.5	10.72727	20.5	-1.8799	20.325	0	0	0
5	Archway - S	6.5	11.68182	20.5	-1.60024	20.325	0	0	0
5	Archway - S	6.5	12.63636	20.5	-1.36961	20.325	0	0	0
5	Archway - S	6.5	13.59091	20.5	-1.17723	20.325	0	0	0
5	Archway - S	6.5	14.54545	20.5	-1.01526	20.325	0	0	0
5	Archway - S	6.5	15.5	20.5	-0.87788	20.325	0	0	0
6	Archway - C	6.5	15.5	20.5	-0.87788	20.325	0	0	0
6	Archway - C	5.66667	15.5	20.5	-0.8168	20.325	0	0	0
6	Archway - C	4.83333	15.5	20.5	-0.75657	20.325	0	0	0
6	Archway - C	4	15.5	20.5	-0.69776	20.325	0	0	0
7	Archway - T	4	5	20.5	-3.22946	20.325	0	0	0
7	Archway - T	4.83333	5	20.5	-3.99319	20.325	0	0	0
7	Archway - T	5.66667	5	20.5	-5.21062	20.325	0	0	0
7	Archway - T	6.5	5	20.5	-7.78794	20.325	0	0	0
8	167High He	27	45	20.5	-0.03925	20.325	0	0	0
8	167High He	28	45	20.5	-0.04288	20.325	0	0	0
8	167High He	29	45	20.5	-0.04651	20.325	0	0	0
8	167High He	30	45	20.5	-0.0501	20.325	0	0	0
8	167High He	31	45	20.5	-0.05359	20.325	0	0	0
8	167High He	32	45	20.5	-0.05692	20.325	0	0	0
8	167High He	33	45	20.5	-0.06002	20.325	0	0	0
8	167High He	34	45	20.5	-0.06283	20.325	0	0	0
8	167High He	35	45	20.5	-0.06527	20.325	0	0	0
8	167High He	36	45	20.5	-0.06728	20.325	0	0	0
8	167High He	37	45	20.5	-0.06878	20.325	0	0	0
8	167High He	38	45	20.5	-0.06974	20.325	0	0	0
8	167High He	39	45	20.5	-0.07012	20.325	0	0	0
8	167High He	40	45	20.5	-0.06988	20.325	0	0	0
9	167High He	40	45	20.5	-0.06988	20.325	0	0	0
9	167High He	40	46	20.5	-0.05572	20.325	0	0	0
9	167High He	40	47	20.5	-0.04377	20.325	0	0	0
9	167High He	40	48	20.5	-0.03367	20.325	0	0	0
9	167High He	40	49	20.5	-0.02512	20.325	0	0	0
9	167High He	40	50	20.5	-0.01789	20.325	0	0	0
9	167High He	40	51	20.5	-0.01177	20.325	0	0	0
9	167High He	40	52	20.5	-0.0066	20.325	0	0	0
10	167High He	40	52	20.5	-0.0066	20.325	0	0	0
10	167High He	39	52	20.5	-0.00663	20.325	0	0	0
10	167High He	38	52	20.5	-0.00652	20.325	0	0	0
10	167High He	37	52	20.5	-0.00627	20.325	0	0	0
10	167High He	36	52	20.5	-0.00588	20.325	0	0	0
10	167High He	35	52	20.5	-0.00537	20.325	0	0	0
10	167High He	34	52	20.5	-0.00474	20.325	0	0	0
10	167High He	33	52	20.5	-0.004	20.325	0	0	0
10	167High He	32	52	20.5	-0.00318	20.325	0	0	0
10	167High He	31	52	20.5	-0.00227	20.325	0	0	0
10	167High He	30	52	20.5	-0.0013	20.325	0	0	0
10	167High He	29	52	20.5	-0.00028	20.325	0	0	0
10	167High He	28	52	20.5	0.00078	20.325	0	0	0
10	167High He	27	52	20.5	0.00186	20.325	0	0	0
11	167High He	27	52	20.5	0.00186	20.325	0	0	0
11	167High He	27	51	20.5	-0.00173	20.325	0	0	0
11	167High He	27	50	20.5	-0.00592	20.325	0	0	0
11	167High He	27	49	20.5	-0.01079	20.325	0	0	0
11	167High He	27	48	20.5	-0.01644	20.325	0	0	0
11	167High He	27	47	20.5	-0.02299	20.325	0	0	0
11	167High He	27	46	20.5	-0.03054	20.325	0	0	0
11	167High He	27	45	20.5	-0.03925	20.325	0	0	0
12	Sovereign I	4	5	20.5	-3.22946	20.325	0	0	0
12	Sovereign I	3	5	20.5	-2.5501	20.325	0	0	0
12	Sovereign I	2	5	20.5	-2.03846	20.325	0	0	0
12	Sovereign I	1	5	20.5	-1.64677	20.325	0	0	0
12	Sovereign I	0	5	20.5	-1.34225	20.325	0	0	0
12	Sovereign I	-1	5	20.5	-1.10197	20.325	0	0	0
13	Sovereign I	-1	5	20.5	-1.10197	20.325	0	0	0
13	Sovereign I	-1.7	5.6	20.5	-0.93287	20.325	0	0	0
13	Sovereign I	-2.4	6.2	20.5	-0.79187	20.325	0	0	0
13	Sovereign I	-3.1	6.8	20.5	-0.67365	20.325	0	0	0
13	Sovereign I	-3.8	7.4	20.5	-0.57404	20.325	0	0	0
13	Sovereign I	-4.5	8	20.5	-0.48973	20.325	0	0	0
14	Sovereign I	-4.5	8	20.5	-0.48973	20.325	0	0	0
14	Sovereign I	-3.72727	8.68182	20.5	-0.53157	20.325	0	0	0
14	Sovereign I	-2.95455	9.36364	20.5	-0.57182	20.325	0	0	0
14	Sovereign I	-2.18182	10.04545	20.5	-0.60921	20.325	0	0	0
14	Sovereign I	-1.40909	10.72727	20.5	-0.64247	20.325	0	0	0
14	Sovereign I	-0.63636	11.40909	20.5	-0.67041	20.325	0	0	0
14	Sovereign I	0.13636	12.09091	20.5	-0.69208	20.325	0	0	0
14	Sovereign I	0.90909	12.77273	20.5	-0.70685	20.325	0	0	0
14	Sovereign I	1.68182	13.45455	20.5	-0.71449	20.325	0	0	0
14	Sovereign I	2.45455	14.13636	20.5	-0.71515	20.325	0	0	0
14	Sovereign I	3.22727	14.81818	20.5	-0.70933	20.325	0	0	0
14	Sovereign I	4	15.5	20.5	-0.69776	20.325	0	0	0
15	Sovereign I	4	15.5	20.5	-0.69776	20.325	0	0	0
15	Sovereign I	4	14.54545	20.5	-0.79983	20.325	0	0	0
15	Sovereign I	4	13.59091	20.5	-0.91757	20.325	0	0	0
15	Sovereign I	4	12.63636	20.5	-1.05375	20.325	0	0	0
15	Sovereign I	4	11.68182	20.5	-1.21176	20.325	0	0	0
15	Sovereign I	4	10.72727	20.5	-1.39564	20.325	0	0	0
15	Sovereign I	4	9.77273	20.5	-1.61013	20.325	0	0	0
15	Sovereign I	4	8.81818	20.5	-1.86041	20.325	0	0	0
15	Sovereign I	4	7.86364	20.5	-2.15107	20.325	0	0	0
15	Sovereign I	4	6.90909	20.5	-2.48342	20.325	0	0	0
15	Sovereign I	4	5.95455	20.5	-2.85047	20.325	0	0	0
15	Sovereign I	4	5	20.5	-3.22946	20.325	0	0	0
16	Crossrail Tu	52	50	10	-0.02438	8.4091	-0.08723	-0.91866	1.66E-06
16	Crossrail Tu	51.91667	49	10	-0.02981	8.4091	-0.09866	-0.97989	1.63E-06
16	Crossrail Tu	51.83333	48	10	-0.03604	8.4091	-0.11193	-1.0467	1.58E-06
16	Crossrail Tu	51.75	47	10	-0.04316	8.4091	-0.12737	-1.1197	1.49E-06
16	Crossrail Tu	51.66667	46	10	-0.05131	8.4091	-0.14539	-1.1995	1.38E-06

16	Crossrail Tu	51.58333	45	10	-0.06062	8.4091	-0.16648	-1.2871	1.21E-06
16	Crossrail Tu	51.5	44	10	-0.07125	8.4091	-0.19121	-1.3831	9.91E-07
16	Crossrail Tu	51.41667	43	10	-0.08338	8.4091	-0.22028	-1.4886	7.02E-07
16	Crossrail Tu	51.33333	42	10	-0.0972	8.4091	-0.25449	-1.6046	3.26E-07
16	Crossrail Tu	51.25	41	10	-0.11292	8.4091	-0.29482	-1.7321	-1.54E-07
16	Crossrail Tu	51.16667	40	10	-0.13078	8.4091	-0.34236	-1.8725	-7.63E-07
16	Crossrail Tu	51.08333	39	10	-0.15102	8.4091	-0.39841	-2.027	-1.53E-06
16	Crossrail Tu	51	38	10	-0.1739	8.4091	-0.46438	-2.1969	-2.48E-06
16	Crossrail Tu	50.91667	37	10	-0.19968	8.4091	-0.54186	-2.3835	-3.65E-06
16	Crossrail Tu	50.83333	36	10	-0.22861	8.4091	-0.6325	-2.5879	-5.07E-06
16	Crossrail Tu	50.75	35	10	-0.26093	8.4091	-0.73797	-2.8113	-6.79E-06
16	Crossrail Tu	50.66667	34	10	-0.29681	8.4091	-0.85982	-3.0545	-8.84E-06
16	Crossrail Tu	50.58333	33	10	-0.33637	8.4091	-0.99931	-3.3178	-1.13E-05
16	Crossrail Tu	50.5	32	10	-0.37964	8.4091	-1.1572	-3.6013	-1.40E-05
16	Crossrail Tu	50.41667	31	10	-0.42653	8.4091	-1.3336	-3.9041	-1.72E-05
16	Crossrail Tu	50.33333	30	10	-0.4768	8.4091	-1.5275	-4.225	-2.08E-05
16	Crossrail Tu	50.25	29	10	-0.53005	8.4091	-1.737	-4.5616	-2.46E-05
16	Crossrail Tu	50.16667	28	10	-0.58577	8.4091	-1.959	-4.9112	-2.88E-05
16	Crossrail Tu	50.08333	27	10	-0.64327	8.4091	-2.1895	-5.2701	-3.31E-05
16	Crossrail Tu	50	26	10	-0.70182	8.4091	-2.424	-5.6345	-3.74E-05
16	Crossrail Tu	49.91667	25	10	-0.76064	8.4091	-2.6574	-6.0004	-4.18E-05
16	Crossrail Tu	49.83333	24	10	-0.81898	8.4091	-2.8853	-6.3637	-4.60E-05
16	Crossrail Tu	49.75	23	10	-0.8762	8.4091	-3.1037	-6.721	-5.00E-05
16	Crossrail Tu	49.66667	22	10	-0.93174	8.4091	-3.3098	-7.0693	-5.37E-05
16	Crossrail Tu	49.58333	21	10	-0.98523	8.4091	-3.5017	-7.4063	-5.72E-05
16	Crossrail Tu	49.5	20	10	-1.0364	8.4091	-3.6789	-7.7303	-6.03E-05
16	Crossrail Tu	49.41667	19	10	-1.08513	8.4091	-3.8417	-8.0404	-6.31E-05
16	Crossrail Tu	49.33333	18	10	-1.13139	8.4091	-3.9909	-8.336	-6.56E-05
16	Crossrail Tu	49.25	17	10	-1.17519	8.4091	-4.128	-8.6168	-6.79E-05
16	Crossrail Tu	49.16667	16	10	-1.21659	8.4091	-4.2544	-8.8828	-6.99E-05
16	Crossrail Tu	49.08333	15	10	-1.25561	8.4091	-4.3717	-9.1337	-7.18E-05
16	Crossrail Tu	49	14	10	-1.29226	8.4091	-4.4811	-9.3691	-7.36E-05
16	Crossrail Tu	48.91667	13	10	-1.32643	8.4091	-4.5833	-9.5882	-7.53E-05
16	Crossrail Tu	48.83333	12	10	-1.35795	8.4091	-4.6785	-9.7899	-7.68E-05
16	Crossrail Tu	48.75	11	10	-1.38651	8.4091	-4.7662	-9.9721	-7.83E-05
16	Crossrail Tu	48.66667	10	10	-1.41169	8.4091	-4.8452	-10.132	-7.96E-05
16	Crossrail Tu	48.58333	9	10	-1.43294	8.4091	-4.9133	-10.268	-8.07E-05
16	Crossrail Tu	48.5	8	10	-1.44958	8.4091	-4.9674	-10.374	-8.17E-05
16	Crossrail Tu	48.41667	7	10	-1.46086	8.4091	-5.0039	-10.448	-8.23E-05
16	Crossrail Tu	48.33333	6	10	-1.46595	8.4091	-5.0183	-10.484	-8.25E-05
16	Crossrail Tu	48.25	5	10	-1.46403	8.4091	-5.0059	-10.479	-8.22E-05
16	Crossrail Tu	48.16667	4	10	-1.45437	8.4091	-4.9624	-10.428	-8.13E-05
16	Crossrail Tu	48.08333	3	10	-1.43636	8.4091	-4.8837	-10.329	-7.97E-05
16	Crossrail Tu	48	2	10	-1.40965	8.4091	-4.7673	-10.18	-7.74E-05
16	Crossrail Tu	47.91667	1	10	-1.37419	8.4091	-4.6124	-9.9804	-7.44E-05
16	Crossrail Tu	47.83333	0	10	-1.33025	8.4091	-4.4201	-9.7322	-7.06E-05
16	Crossrail Tu	47.75	-1	10	-1.27849	8.4091	-4.1941	-9.4387	-6.61E-05
16	Crossrail Tu	47.66667	-2	10	-1.21988	8.4091	-3.9397	-9.1051	-6.11E-05
16	Crossrail Tu	47.58333	-3	10	-1.15569	8.4091	-3.6642	-8.7379	-5.57E-05
16	Crossrail Tu	47.5	-4	10	-1.08734	8.4091	-3.3756	-8.3447	-5.00E-05
16	Crossrail Tu	47.41667	-5	10	-1.01634	8.4091	-3.0821	-7.9333	-4.44E-05
16	Crossrail Tu	47.33333	-6	10	-0.94415	8.4091	-2.7914	-7.5116	-3.88E-05
16	Crossrail Tu	47.25	-7	10	-0.87213	8.4091	-2.51	-7.0869	-3.35E-05
16	Crossrail Tu	47.16667	-8	10	-0.80146	8.4091	-2.2433	-6.6659	-2.86E-05
16	Crossrail Tu	47.08333	-9	10	-0.73309	8.4091	-1.9948	-6.2537	-2.40E-05
16	Crossrail Tu	47	-10	10	-0.66775	8.4091	-1.7666	-5.8549	-1.99E-05

END_TABLE

Results : Consolidation : Displacement Data : Lines

None

Results : Total : Displacement Data : Lines

None

Oasys Ltd.

Shaftesbury Theatre
Prop Dev - Undrained

File 03 Prop Dev - Undrained.pdd
Exported 02/12/20 09:43:39

Titles

START_TABLE
Job No.: 371647
Job Title: Shaftesbury Theatre
Sub-title: Prop Dev - Undrained
Calculation Heading:
Initials: SW
Checker:
Date Saved:
Date Checked:
Notes:
File Name: 03 Prop Dev - Undrained.pdd
File Path: \\to-dc0\Geo\52100 onwards\52167 Shaftesbury Theatre Updated BIA\9. GMA\03 analyses\pdisp\CAT II
END_TABLE

Analysis Options

General
Global Poisson's ratio: 0.50
Maximum allowable ratio between values of E: 1.5
Horizontal rigid boundary level: -10.10 [m OD]
Displacements at load centroids: Yes
GSA piled raft data : No

Elastic
Elastic : Yes
Analysis: Boussinesq
Stiffness for horizontal displacement calculations: Weighted average
Using legacy heave correction factor: No

Consolidation
Consolidation : No

Soil ProfilesSoil Profile 1
START_TABLE

Layer ref.	Name	Level at top [mOD]	Number of	Youngs Mo [kN/m²]	Youngs Mo [kN/m²]	Poissons ra	Non-linear curve
1	1	24.15	5	20000	20000	0.2	None
2	2	20.15	5	20000	110000	0.5	None
3	3	-6.5	5	125000	125000	0.5	None

END_TABLE

Soil Zones
START_TABLE

Zone	Name	X min [m]	X max [m]	Y min [m]	Y max [m]	Profile
1	SZ1	-20	100	-20	60	Soil Profile 1

END_TABLE

Polygonal Load Data
START_TABLE

Load ref.	Name	Position : L [m]	Position : P [m]	Position : P [%]	No. of Rect	Value : Normal (local z) [kN/m²]
1	Western E	19.6	(6.5,-1.8) (3	10	7	100
2	Southern E	19.6	(35.9,5.3) (	10	9	100

END_TABLE

Polygonal Loads' Rectangles
START_TABLE

No.	Centre : x [m]	Centre : y [m]	Angle of lo [Degrees]	Width x [m]	Depth y [m]
Load 1 : Western Excavation					
(Edge 1 optimal)					
1	21.22018	1.57035	0.35258	29.405	6.5594
2	37.45029	1.80282	0.35258	3.0575	6.8246
3	39.04936	2.09754	0.35258	0.14423	6.0572
4	39.1895	2.76253	0.35258	0.14423	4.7111
5	39.32965	3.42752	0.35258	0.14423	3.3651
6	39.46979	4.09251	0.35258	0.14423	2.0191
7	39.60993	4.7575	0.35258	0.14423	0.67302
Load 2 : Southern Excavation					
(Edge 4 optimal)					
1	38.95313	27.64382	-95.034	0.085059	0.31495
2	39.2594	27.53145	-95.034	0.085059	0.94484
3	39.56567	27.41909	-95.034	0.085059	1.5747
4	39.87194	27.30672	-95.034	0.085059	2.2046
5	40.17821	27.19435	-95.034	0.085059	2.8345
6	39.43807	17.70546	-95.034	18.949	3.0251
7	38.1789	6.76359	-95.034	3.0709	3.3246
8	37.33476	5.26584	-95.034	0.06124	2.8113
9	36.37825	5.28861	-95.034	0.06124	0.93711

END_TABLE

Displacement Points

START_TABLE

Name	X [m]	Y [m]	Z(level) [m]	Calculate	Detailed Results
GrapeNear	38	39	24	Yes	Yes
GrapeFar	38	44.5	24	Yes	Yes
HighNear	41	10	24	Yes	Yes
HighFar	61	10	24	Yes	Yes
ShaftsNear	20	-2.5	24	Yes	Yes
ShaftsFar	20	-8	24	Yes	Yes

END_TABLE

Displacement Lines

START_TABLE

Name	X1 [m]	Y1 [m]	Z1 [m]	X2 [m]	Y2 [m]	Z2 [m]	Intervals [No.]	Calculate	Detailed Results
Berkshire H	63	-10	22.5	62	31	22.5	41	Yes	Yes
Berkshire H	62	31	22.5	90	32	22.5	28	Yes	Yes
Berkshire H	90	32	22.5	90	-5	22.5	37	Yes	Yes
Berkshire H	90	-5	22.5	63	-10	22.5	27	Yes	Yes
Archway - s	6.5	5	20.5	6.5	15.5	20.5	11	Yes	Yes
Archway - e	6.5	15.5	20.5	4	15.5	20.5	3	Yes	Yes
Archway - v	4	5	20.5	6.5	5	20.5	3	Yes	Yes
167High Hc	27	45	20.5	40	45	20.5	13	Yes	Yes
167High Hc	40	45	20.5	40	52	20.5	7	Yes	Yes
167High Hc	40	52	20.5	27	52	20.5	13	Yes	Yes
167High Hc	27	52	20.5	27	45	20.5	7	Yes	Yes
Sovereign H	4	5	20.5	-1	5	20.5	5	Yes	Yes
Sovereign H	-1	5	20.5	-4.5	8	20.5	5	Yes	Yes
Sovereign H	-4.5	8	20.5	4	15.5	20.5	11	Yes	Yes
Sovereign H	4	15.5	20.5	4	5	20.5	11	Yes	Yes
Crossrail Tu	52	50	10	47	-10	10	60	Yes	Yes

END_TABLE

Displacement Grids

START_TABLE

Name	Extrusion: I	X1 [m]	Y1 [m]	Z1 [m]	X2 [m]	Y2 [m]	Z2 [m]	Intervals Al [No.]	Extrusion: I [m]	Extrusion: I [No.]	Calculate	Detailed Results
Grid 1	Global X	-10	-20	24	-	60	24	100	80	100	No	No
Basement I	Global X	-20	-20	19.6	-	60	19.6	50	120	50	No	No

END_TABLE

Warnings

(1)One or more displacement grids have numbers of intervals of at least 100. Large numbers of intervals will slow the analysis.

(2)The load at (23.219, 1.611, 19.600)m lies wide of all soil zones. Displacements at its centre have been requested. The first soil profile will be used.

Results : Immediate : Load Centres : Polygonal

START_TABLE

Ref.	Name	x	y	z	dz	Stress: Calc	Stress: Vert	Stress: Sum	Vert. Strain
		[m]	[m]	[mOD]	[mm]	[mOD]	[kN/m²]	[kN/m²]	[
1	Western E>	23.21861	1.61111	19.6	16.30277	17.028	88.563	171.11	0.001592
2	Southern E	39.25431	16.22418	19.6	11.18748	17.028	61.671	102.42	0.00139

END_TABLE

Results : Consolidation : Load Centres : Polygonal

None

Results : Total : Load Centres : Polygonal

None

Results : Immediate : Displacement Data : Points

START_TABLE

Ref.	Name	x	y	z	dz	Stress: Calc	Stress: Vert	Stress: Sum	Vert. Strain
		[m]	[m]	[mOD]	[mm]	[mOD]	[kN/m²]	[kN/m²]	[
1	GrapeNear	38	39	24	-0.21435	23.615	0	0	0
2	GrapeFar	38	44.5	24	-0.22213	23.615	0	0	0
3	HighNear	41	10	24	3.6115	23.615	0	0	0
4	HighFar	61	10	24	-0.27656	23.615	0	0	0
5	ShaftsNear	20	-2.5	24	4.63056	23.615	0	0	0
6	ShaftsFar	20	-8	24	0.78425	23.615	0	0	0

END_TABLE

Results : Consolidation : Displacement Data : Points

None

Results : Total : Displacement Data : Points

None

Results : Immediate : Displacement Data : Lines

START_TABLE

Ref.	Name	x	y	z	dz	Stress: Calc	Stress: Vert	Stress: Sum	Vert. Strain
		[m]	[m]	[mOD]	[mm]	[mOD]	[kN/m²]	[kN/m²]	[
1	Berkshire H	63	-10	22.5	-0.25312	22.108	0	0	0
1	Berkshire H	62.97561	-9	22.5	-0.25638	22.108	0	0	0
1	Berkshire H	62.95122	-8	22.5	-0.25942	22.108	0	0	0
1	Berkshire H	62.92683	-7	22.5	-0.26223	22.108	0	0	0
1	Berkshire H	62.90244	-6	22.5	-0.26479	22.108	0	0	0
1	Berkshire H	62.87805	-5	22.5	-0.26711	22.108	0	0	0
1	Berkshire H	62.85366	-4	22.5	-0.26918	22.108	0	0	0
1	Berkshire H	62.82927	-3	22.5	-0.271	22.108	0	0	0
1	Berkshire H	62.80488	-2	22.5	-0.27257	22.108	0	0	0
1	Berkshire H	62.78049	-1	22.5	-0.2739	22.108	0	0	0
1	Berkshire H	62.7561	0	22.5	-0.27498	22.108	0	0	0
1	Berkshire H	62.73171	1	22.5	-0.27582	22.108	0	0	0
1	Berkshire H	62.70732	2	22.5	-0.27642	22.108	0	0	0
1	Berkshire H	62.68293	3	22.5	-0.27679	22.108	0	0	0

1	Berkshire H	62.65854	4	22.5	-0.27693	22.108	0	0	0
1	Berkshire H	62.63415	5	22.5	-0.27686	22.108	0	0	0
1	Berkshire H	62.60976	6	22.5	-0.27656	22.108	0	0	0
1	Berkshire H	62.58537	7	22.5	-0.27606	22.108	0	0	0
1	Berkshire H	62.56098	8	22.5	-0.27534	22.108	0	0	0
1	Berkshire H	62.53659	9	22.5	-0.27443	22.108	0	0	0
1	Berkshire H	62.5122	10	22.5	-0.27332	22.108	0	0	0
1	Berkshire H	62.4878	11	22.5	-0.27202	22.108	0	0	0
1	Berkshire H	62.46341	12	22.5	-0.27054	22.108	0	0	0
1	Berkshire H	62.43902	13	22.5	-0.26888	22.108	0	0	0
1	Berkshire H	62.41463	14	22.5	-0.26706	22.108	0	0	0
1	Berkshire H	62.39024	15	22.5	-0.26509	22.108	0	0	0
1	Berkshire H	62.36585	16	22.5	-0.26297	22.108	0	0	0
1	Berkshire H	62.34146	17	22.5	-0.26072	22.108	0	0	0
1	Berkshire H	62.31707	18	22.5	-0.25835	22.108	0	0	0
1	Berkshire H	62.29268	19	22.5	-0.25587	22.108	0	0	0
1	Berkshire H	62.26829	20	22.5	-0.25329	22.108	0	0	0
1	Berkshire H	62.2439	21	22.5	-0.25062	22.108	0	0	0
1	Berkshire H	62.21951	22	22.5	-0.24787	22.108	0	0	0
1	Berkshire H	62.19512	23	22.5	-0.24505	22.108	0	0	0
1	Berkshire H	62.17073	24	22.5	-0.24215	22.108	0	0	0
1	Berkshire H	62.14634	25	22.5	-0.23919	22.108	0	0	0
1	Berkshire H	62.12195	26	22.5	-0.23616	22.108	0	0	0
1	Berkshire H	62.09756	27	22.5	-0.23305	22.108	0	0	0
1	Berkshire H	62.07317	28	22.5	-0.22987	22.108	0	0	0
1	Berkshire H	62.04878	29	22.5	-0.22661	22.108	0	0	0
1	Berkshire H	62.02439	30	22.5	-0.22327	22.108	0	0	0
1	Berkshire H	62	31	22.5	-0.21984	22.108	0	0	0
2	Berkshire H	62	31	22.5	-0.21984	22.108	0	0	0
2	Berkshire H	63	31.03571	22.5	-0.21599	22.108	0	0	0
2	Berkshire H	64	31.07143	22.5	-0.21165	22.108	0	0	0
2	Berkshire H	65	31.10714	22.5	-0.20694	22.108	0	0	0
2	Berkshire H	66	31.14286	22.5	-0.20194	22.108	0	0	0
2	Berkshire H	67	31.17857	22.5	-0.19674	22.108	0	0	0
2	Berkshire H	68	31.21429	22.5	-0.19141	22.108	0	0	0
2	Berkshire H	69	31.25	22.5	-0.186	22.108	0	0	0
2	Berkshire H	70	31.28571	22.5	-0.18055	22.108	0	0	0
2	Berkshire H	71	31.32143	22.5	-0.17511	22.108	0	0	0
2	Berkshire H	72	31.35714	22.5	-0.16971	22.108	0	0	0
2	Berkshire H	73	31.39286	22.5	-0.16437	22.108	0	0	0
2	Berkshire H	74	31.42857	22.5	-0.15911	22.108	0	0	0
2	Berkshire H	75	31.46429	22.5	-0.15395	22.108	0	0	0
2	Berkshire H	76	31.5	22.5	-0.1489	22.108	0	0	0
2	Berkshire H	77	31.53571	22.5	-0.14398	22.108	0	0	0
2	Berkshire H	78	31.57143	22.5	-0.13918	22.108	0	0	0
2	Berkshire H	79	31.60714	22.5	-0.13452	22.108	0	0	0
2	Berkshire H	80	31.64286	22.5	-0.13	22.108	0	0	0
2	Berkshire H	81	31.67857	22.5	-0.12562	22.108	0	0	0
2	Berkshire H	82	31.71429	22.5	-0.12137	22.108	0	0	0
2	Berkshire H	83	31.75	22.5	-0.11727	22.108	0	0	0
2	Berkshire H	84	31.78571	22.5	-0.11331	22.108	0	0	0
2	Berkshire H	85	31.82143	22.5	-0.10949	22.108	0	0	0
2	Berkshire H	86	31.85714	22.5	-0.1058	22.108	0	0	0
2	Berkshire H	87	31.89286	22.5	-0.10224	22.108	0	0	0
2	Berkshire H	88	31.92857	22.5	-0.09881	22.108	0	0	0
2	Berkshire H	89	31.96429	22.5	-0.09551	22.108	0	0	0
2	Berkshire H	90	32	22.5	-0.09233	22.108	0	0	0
3	Berkshire H	90	32	22.5	-0.09233	22.108	0	0	0
3	Berkshire H	90	31	22.5	-0.09355	22.108	0	0	0
3	Berkshire H	90	30	22.5	-0.09475	22.108	0	0	0
3	Berkshire H	90	29	22.5	-0.09591	22.108	0	0	0
3	Berkshire H	90	28	22.5	-0.09705	22.108	0	0	0
3	Berkshire H	90	27	22.5	-0.09815	22.108	0	0	0
3	Berkshire H	90	26	22.5	-0.09921	22.108	0	0	0
3	Berkshire H	90	25	22.5	-0.10023	22.108	0	0	0
3	Berkshire H	90	24	22.5	-0.10121	22.108	0	0	0
3	Berkshire H	90	23	22.5	-0.10214	22.108	0	0	0
3	Berkshire H	90	22	22.5	-0.10303	22.108	0	0	0
3	Berkshire H	90	21	22.5	-0.10387	22.108	0	0	0
3	Berkshire H	90	20	22.5	-0.10466	22.108	0	0	0
3	Berkshire H	90	19	22.5	-0.1054	22.108	0	0	0
3	Berkshire H	90	18	22.5	-0.10608	22.108	0	0	0
3	Berkshire H	90	17	22.5	-0.10671	22.108	0	0	0
3	Berkshire H	90	16	22.5	-0.10727	22.108	0	0	0

3	Berkshire H	90	15	22.5	-0.10778	22.108	0	0	0
3	Berkshire H	90	14	22.5	-0.10823	22.108	0	0	0
3	Berkshire H	90	13	22.5	-0.10862	22.108	0	0	0
3	Berkshire H	90	12	22.5	-0.10894	22.108	0	0	0
3	Berkshire H	90	11	22.5	-0.1092	22.108	0	0	0
3	Berkshire H	90	10	22.5	-0.10939	22.108	0	0	0
3	Berkshire H	90	9	22.5	-0.10952	22.108	0	0	0
3	Berkshire H	90	8	22.5	-0.10959	22.108	0	0	0
3	Berkshire H	90	7	22.5	-0.10959	22.108	0	0	0
3	Berkshire H	90	6	22.5	-0.10952	22.108	0	0	0
3	Berkshire H	90	5	22.5	-0.1094	22.108	0	0	0
3	Berkshire H	90	4	22.5	-0.1092	22.108	0	0	0
3	Berkshire H	90	3	22.5	-0.10895	22.108	0	0	0
3	Berkshire H	90	2	22.5	-0.10863	22.108	0	0	0
3	Berkshire H	90	1	22.5	-0.10824	22.108	0	0	0
3	Berkshire H	90	0	22.5	-0.1078	22.108	0	0	0
3	Berkshire H	90	-1	22.5	-0.1073	22.108	0	0	0
3	Berkshire H	90	-2	22.5	-0.10674	22.108	0	0	0
3	Berkshire H	90	-3	22.5	-0.10612	22.108	0	0	0
3	Berkshire H	90	-4	22.5	-0.10545	22.108	0	0	0
3	Berkshire H	90	-5	22.5	-0.10473	22.108	0	0	0
4	Berkshire H	90	-5	22.5	-0.10473	22.108	0	0	0
4	Berkshire H	89	-5.18519	22.5	-0.10841	22.108	0	0	0
4	Berkshire H	88	-5.37037	22.5	-0.11224	22.108	0	0	0
4	Berkshire H	87	-5.55556	22.5	-0.11621	22.108	0	0	0
4	Berkshire H	86	-5.74074	22.5	-0.12034	22.108	0	0	0
4	Berkshire H	85	-5.92593	22.5	-0.12461	22.108	0	0	0
4	Berkshire H	84	-6.11111	22.5	-0.12904	22.108	0	0	0
4	Berkshire H	83	-6.2963	22.5	-0.13363	22.108	0	0	0
4	Berkshire H	82	-6.48148	22.5	-0.13838	22.108	0	0	0
4	Berkshire H	81	-6.66667	22.5	-0.14329	22.108	0	0	0
4	Berkshire H	80	-6.85185	22.5	-0.14837	22.108	0	0	0
4	Berkshire H	79	-7.03704	22.5	-0.15361	22.108	0	0	0
4	Berkshire H	78	-7.22222	22.5	-0.15901	22.108	0	0	0
4	Berkshire H	77	-7.40741	22.5	-0.16457	22.108	0	0	0
4	Berkshire H	76	-7.59259	22.5	-0.17029	22.108	0	0	0
4	Berkshire H	75	-7.77778	22.5	-0.17617	22.108	0	0	0
4	Berkshire H	74	-7.96296	22.5	-0.18218	22.108	0	0	0
4	Berkshire H	73	-8.14815	22.5	-0.18834	22.108	0	0	0
4	Berkshire H	72	-8.33333	22.5	-0.19461	22.108	0	0	0
4	Berkshire H	71	-8.51852	22.5	-0.201	22.108	0	0	0
4	Berkshire H	70	-8.7037	22.5	-0.20748	22.108	0	0	0
4	Berkshire H	69	-8.88889	22.5	-0.21403	22.108	0	0	0
4	Berkshire H	68	-9.07407	22.5	-0.22063	22.108	0	0	0
4	Berkshire H	67	-9.25926	22.5	-0.22724	22.108	0	0	0
4	Berkshire H	66	-9.44444	22.5	-0.23384	22.108	0	0	0
4	Berkshire H	65	-9.62963	22.5	-0.24038	22.108	0	0	0
4	Berkshire H	64	-9.81481	22.5	-0.24682	22.108	0	0	0
4	Berkshire H	63	-10	22.5	-0.25312	22.108	0	0	0
5	Archway - S	6.5	5	20.5	3.51701	20.325	0	0	0
5	Archway - S	6.5	5.95455	20.5	1.75051	20.325	0	0	0
5	Archway - S	6.5	6.90909	20.5	1.27685	20.325	0	0	0
5	Archway - S	6.5	7.86364	20.5	0.9432	20.325	0	0	0
5	Archway - S	6.5	8.81818	20.5	0.67186	20.325	0	0	0
5	Archway - S	6.5	9.77273	20.5	0.45734	20.325	0	0	0
5	Archway - S	6.5	10.72727	20.5	0.28913	20.325	0	0	0
5	Archway - S	6.5	11.68182	20.5	0.15664	20.325	0	0	0
5	Archway - S	6.5	12.63636	20.5	0.05157	20.325	0	0	0
5	Archway - S	6.5	13.59091	20.5	-0.03222	20.325	0	0	0
5	Archway - S	6.5	14.54545	20.5	-0.09922	20.325	0	0	0
5	Archway - S	6.5	15.5	20.5	-0.15279	20.325	0	0	0
6	Archway - E	6.5	15.5	20.5	-0.15279	20.325	0	0	0
6	Archway - E	5.66667	15.5	20.5	-0.16757	20.325	0	0	0
6	Archway - E	4.83333	15.5	20.5	-0.18185	20.325	0	0	0
6	Archway - E	4	15.5	20.5	-0.19541	20.325	0	0	0
7	Archway - W	4	5	20.5	0.99123	20.325	0	0	0
7	Archway - W	4.83333	5	20.5	1.32133	20.325	0	0	0
7	Archway - W	5.66667	5	20.5	1.88192	20.325	0	0	0
7	Archway - W	6.5	5	20.5	3.51701	20.325	0	0	0
8	167High Ho	27	45	20.5	-0.23587	20.325	0	0	0
8	167High Ho	28	45	20.5	-0.23539	20.325	0	0	0
8	167High Ho	29	45	20.5	-0.23466	20.325	0	0	0
8	167High Ho	30	45	20.5	-0.2337	20.325	0	0	0
8	167High Ho	31	45	20.5	-0.23251	20.325	0	0	0

8	167High Hc	32	45	20.5	-0.23112	20.325	0	0	0
8	167High Hc	33	45	20.5	-0.22957	20.325	0	0	0
8	167High Hc	34	45	20.5	-0.22787	20.325	0	0	0
8	167High Hc	35	45	20.5	-0.22607	20.325	0	0	0
8	167High Hc	36	45	20.5	-0.22419	20.325	0	0	0
8	167High Hc	37	45	20.5	-0.22227	20.325	0	0	0
8	167High Hc	38	45	20.5	-0.22033	20.325	0	0	0
8	167High Hc	39	45	20.5	-0.21841	20.325	0	0	0
8	167High Hc	40	45	20.5	-0.21651	20.325	0	0	0
9	167High Hc	40	45	20.5	-0.21651	20.325	0	0	0
9	167High Hc	40	46	20.5	-0.21259	20.325	0	0	0
9	167High Hc	40	47	20.5	-0.20801	20.325	0	0	0
9	167High Hc	40	48	20.5	-0.20295	20.325	0	0	0
9	167High Hc	40	49	20.5	-0.19756	20.325	0	0	0
9	167High Hc	40	50	20.5	-0.19194	20.325	0	0	0
9	167High Hc	40	51	20.5	-0.18619	20.325	0	0	0
9	167High Hc	40	52	20.5	-0.18038	20.325	0	0	0
10	167High Hc	40	52	20.5	-0.18038	20.325	0	0	0
10	167High Hc	39	52	20.5	-0.18162	20.325	0	0	0
10	167High Hc	38	52	20.5	-0.18275	20.325	0	0	0
10	167High Hc	37	52	20.5	-0.18377	20.325	0	0	0
10	167High Hc	36	52	20.5	-0.18469	20.325	0	0	0
10	167High Hc	35	52	20.5	-0.18549	20.325	0	0	0
10	167High Hc	34	52	20.5	-0.18617	20.325	0	0	0
10	167High Hc	33	52	20.5	-0.18672	20.325	0	0	0
10	167High Hc	32	52	20.5	-0.18714	20.325	0	0	0
10	167High Hc	31	52	20.5	-0.18743	20.325	0	0	0
10	167High Hc	30	52	20.5	-0.18759	20.325	0	0	0
10	167High Hc	29	52	20.5	-0.1876	20.325	0	0	0
10	167High Hc	28	52	20.5	-0.18747	20.325	0	0	0
10	167High Hc	27	52	20.5	-0.1872	20.325	0	0	0
11	167High Hc	27	52	20.5	-0.1872	20.325	0	0	0
11	167High Hc	27	51	20.5	-0.19391	20.325	0	0	0
11	167High Hc	27	50	20.5	-0.20075	20.325	0	0	0
11	167High Hc	27	49	20.5	-0.2077	20.325	0	0	0
11	167High Hc	27	48	20.5	-0.21473	20.325	0	0	0
11	167High Hc	27	47	20.5	-0.2218	20.325	0	0	0
11	167High Hc	27	46	20.5	-0.22886	20.325	0	0	0
11	167High Hc	27	45	20.5	-0.23587	20.325	0	0	0
12	Sovereign H	4	5	20.5	0.99123	20.325	0	0	0
12	Sovereign H	3	5	20.5	0.67708	20.325	0	0	0
12	Sovereign H	2	5	20.5	0.43594	20.325	0	0	0
12	Sovereign H	1	5	20.5	0.2554	20.325	0	0	0
12	Sovereign H	0	5	20.5	0.12084	20.325	0	0	0
12	Sovereign H	-1	5	20.5	0.02027	20.325	0	0	0
13	Sovereign H	-1	5	20.5	0.02027	20.325	0	0	0
13	Sovereign H	-1.7	5.6	20.5	-0.04819	20.325	0	0	0
13	Sovereign H	-2.4	6.2	20.5	-0.10184	20.325	0	0	0
13	Sovereign H	-3.1	6.8	20.5	-0.14369	20.325	0	0	0
13	Sovereign H	-3.8	7.4	20.5	-0.17608	20.325	0	0	0
13	Sovereign H	-4.5	8	20.5	-0.20087	20.325	0	0	0
14	Sovereign H	-4.5	8	20.5	-0.20087	20.325	0	0	0
14	Sovereign H	-3.72727	8.68182	20.5	-0.19201	20.325	0	0	0
14	Sovereign H	-2.95455	9.36364	20.5	-0.1835	20.325	0	0	0
14	Sovereign H	-2.18182	10.04545	20.5	-0.17589	20.325	0	0	0
14	Sovereign H	-1.40909	10.72727	20.5	-0.16977	20.325	0	0	0
14	Sovereign H	-0.63636	11.40909	20.5	-0.16569	20.325	0	0	0
14	Sovereign H	0.13636	12.09091	20.5	-0.16407	20.325	0	0	0
14	Sovereign H	0.90909	12.77273	20.5	-0.16518	20.325	0	0	0
14	Sovereign H	1.68182	13.45455	20.5	-0.16907	20.325	0	0	0
14	Sovereign H	2.45455	14.13636	20.5	-0.17562	20.325	0	0	0
14	Sovereign H	3.22727	14.81818	20.5	-0.18454	20.325	0	0	0
14	Sovereign H	4	15.5	20.5	-0.19541	20.325	0	0	0
15	Sovereign H	4	15.5	20.5	-0.19541	20.325	0	0	0
15	Sovereign H	4	14.54545	20.5	-0.15815	20.325	0	0	0
15	Sovereign H	4	13.59091	20.5	-0.11225	20.325	0	0	0
15	Sovereign H	4	12.63636	20.5	-0.05605	20.325	0	0	0
15	Sovereign H	4	11.68182	20.5	0.01248	20.325	0	0	0
15	Sovereign H	4	10.72727	20.5	0.09574	20.325	0	0	0
15	Sovereign H	4	9.77273	20.5	0.19652	20.325	0	0	0
15	Sovereign H	4	8.81818	20.5	0.31773	20.325	0	0	0
15	Sovereign H	4	7.86364	20.5	0.46142	20.325	0	0	0
15	Sovereign H	4	6.90909	20.5	0.62688	20.325	0	0	0
15	Sovereign H	4	5.95455	20.5	0.80783	20.325	0	0	0

15	Sovereign H	4	5	20.5	0.99123	20.325	0	0	0
16	Crossrail Tu	52	50	10	-0.09796	8.4091	0.1087	1.3932	-8.97E-06
16	Crossrail Tu	51.91667	49	10	-0.09846	8.4091	0.12309	1.4875	-9.40E-06
16	Crossrail Tu	51.83333	48	10	-0.0985	8.4091	0.13981	1.5904	-9.84E-06
16	Crossrail Tu	51.75	47	10	-0.09799	8.4091	0.15928	1.703	-1.03E-05
16	Crossrail Tu	51.66667	46	10	-0.09681	8.4091	0.18202	1.8263	-1.08E-05
16	Crossrail Tu	51.58333	45	10	-0.09483	8.4091	0.20866	1.9616	-1.12E-05
16	Crossrail Tu	51.5	44	10	-0.09192	8.4091	0.23993	2.1101	-1.17E-05
16	Crossrail Tu	51.41667	43	10	-0.08791	8.4091	0.27671	2.2735	-1.21E-05
16	Crossrail Tu	51.33333	42	10	-0.0826	8.4091	0.32003	2.4533	-1.26E-05
16	Crossrail Tu	51.25	41	10	-0.0758	8.4091	0.37113	2.6513	-1.29E-05
16	Crossrail Tu	51.16667	40	10	-0.06726	8.4091	0.43141	2.8693	-1.32E-05
16	Crossrail Tu	51.08333	39	10	-0.05674	8.4091	0.50251	3.1094	-1.35E-05
16	Crossrail Tu	51	38	10	-0.04397	8.4091	0.58625	3.3737	-1.36E-05
16	Crossrail Tu	50.91667	37	10	-0.02868	8.4091	0.68464	3.6641	-1.35E-05
16	Crossrail Tu	50.83333	36	10	-0.01059	8.4091	0.79979	3.9825	-1.33E-05
16	Crossrail Tu	50.75	35	10	0.01056	8.4091	0.93382	4.3306	-1.29E-05
16	Crossrail Tu	50.66667	34	10	0.03497	8.4091	1.0887	4.7096	-1.21E-05
16	Crossrail Tu	50.58333	33	10	0.0628	8.4091	1.266	5.1202	-1.11E-05
16	Crossrail Tu	50.5	32	10	0.09412	8.4091	1.4667	5.5621	-9.77E-06
16	Crossrail Tu	50.41667	31	10	0.12884	8.4091	1.6909	6.0341	-8.08E-06
16	Crossrail Tu	50.33333	30	10	0.16676	8.4091	1.9372	6.5339	-6.07E-06
16	Crossrail Tu	50.25	29	10	0.20751	8.4091	2.2033	7.0579	-3.76E-06
16	Crossrail Tu	50.16667	28	10	0.25054	8.4091	2.4851	7.6012	-1.23E-06
16	Crossrail Tu	50.08333	27	10	0.29519	8.4091	2.7774	8.1583	1.46E-06
16	Crossrail Tu	50	26	10	0.3407	8.4091	3.0742	8.7227	4.20E-06
16	Crossrail Tu	49.91667	25	10	0.38627	8.4091	3.3692	9.2877	6.89E-06
16	Crossrail Tu	49.83333	24	10	0.43114	8.4091	3.6565	9.8469	9.43E-06
16	Crossrail Tu	49.75	23	10	0.47467	8.4091	3.9308	10.395	1.17E-05
16	Crossrail Tu	49.66667	22	10	0.51633	8.4091	4.1885	10.926	1.38E-05
16	Crossrail Tu	49.58333	21	10	0.55575	8.4091	4.4272	11.437	1.55E-05
16	Crossrail Tu	49.5	20	10	0.59271	8.4091	4.6458	11.924	1.69E-05
16	Crossrail Tu	49.41667	19	10	0.62715	8.4091	4.8445	12.387	1.80E-05
16	Crossrail Tu	49.33333	18	10	0.6591	8.4091	5.0245	12.824	1.89E-05
16	Crossrail Tu	49.25	17	10	0.68864	8.4091	5.1872	13.235	1.96E-05
16	Crossrail Tu	49.16667	16	10	0.71591	8.4091	5.3344	13.619	2.00E-05
16	Crossrail Tu	49.08333	15	10	0.74102	8.4091	5.4678	13.976	2.04E-05
16	Crossrail Tu	49	14	10	0.76404	8.4091	5.5889	14.305	2.07E-05
16	Crossrail Tu	48.91667	13	10	0.78499	8.4091	5.6983	14.606	2.09E-05
16	Crossrail Tu	48.83333	12	10	0.80378	8.4091	5.7965	14.876	2.11E-05
16	Crossrail Tu	48.75	11	10	0.82023	8.4091	5.8827	15.114	2.13E-05
16	Crossrail Tu	48.66667	10	10	0.83405	8.4091	5.9557	15.315	2.15E-05
16	Crossrail Tu	48.58333	9	10	0.84482	8.4091	6.0129	15.476	2.15E-05
16	Crossrail Tu	48.5	8	10	0.85203	8.4091	6.0514	15.592	2.15E-05
16	Crossrail Tu	48.41667	7	10	0.85509	8.4091	6.0671	15.657	2.14E-05
16	Crossrail Tu	48.33333	6	10	0.85335	8.4091	6.0556	15.666	2.10E-05
16	Crossrail Tu	48.25	5	10	0.84618	8.4091	6.0122	15.614	2.04E-05
16	Crossrail Tu	48.16667	4	10	0.833	8.4091	5.9326	15.495	1.94E-05
16	Crossrail Tu	48.08333	3	10	0.81337	8.4091	5.813	15.308	1.79E-05
16	Crossrail Tu	48	2	10	0.78703	8.4091	5.6514	15.049	1.60E-05
16	Crossrail Tu	47.91667	1	10	0.754	8.4091	5.4473	14.72	1.36E-05
16	Crossrail Tu	47.83333	0	10	0.71459	8.4091	5.2027	14.323	1.08E-05
16	Crossrail Tu	47.75	-1	10	0.66941	8.4091	4.9219	13.864	7.58E-06
16	Crossrail Tu	47.66667	-2	10	0.61939	8.4091	4.6113	13.351	4.06E-06
16	Crossrail Tu	47.58333	-3	10	0.56563	8.4091	4.2791	12.792	3.80E-07
16	Crossrail Tu	47.5	-4	10	0.50941	8.4091	3.9343	12.199	-3.33E-06
16	Crossrail Tu	47.41667	-5	10	0.45203	8.4091	3.5863	11.583	-6.93E-06
16	Crossrail Tu	47.33333	-6	10	0.39477	8.4091	3.2434	10.956	-1.03E-05
16	Crossrail Tu	47.25	-7	10	0.33874	8.4091	2.9131	10.327	-1.33E-05
16	Crossrail Tu	47.16667	-8	10	0.2849	8.4091	2.601	9.7051	-1.60E-05
16	Crossrail Tu	47.08333	-9	10	0.23398	8.4091	2.3108	9.0985	-1.82E-05
16	Crossrail Tu	47	-10	10	0.18652	8.4091	2.0451	8.5128	-2.00E-05

END_TABLE

Results : Consolidation : Displacement Data : Lines

None

Results : Total : Displacement Data : Lines

None

Oasys Ltd.

Shaftesbury Theatre
Prop Dev - Drained

File 04 Prop Dev - Drained.pdd
Exported 02/12/20 09:43:20

Titles

START_TABLE
Job No.: 371647
Job Title: Shaftesbury Theatre
Sub-title: Prop Dev - Drained
Calculation Heading:
Initials: SW
Checker:
Date Saved:
Date Checked:
Notes:
File Name: 04 Prop Dev - Drained.pdd
File Path: \\to-dc0\Geo\52100 onwards\52167 Shaftesbury Theatre Updated BIA\9. GMA\03 analyses\pdisp\CAT II
END_TABLE

History

START_TABLE

Date	Time	By	Notes
18-Oct-17	16:20	TYLER_A	
23-Oct-17	12:00	tyler_a	
26-Oct-17	13:41	TYLER_A	
26-Oct-17	13:46	TYLER_A	
26-Oct-17	14:24	TYLER_A	
26-Oct-17	14:26	TYLER_A	
26-Oct-17	14:52	TYLER_A	
29-Jan-20	10:55	TRAJKOVSKI_S	
30-Jan-20	16:19	TRAJKOVSKI_S	
30-Jan-20	16:20	TRAJKOVSKI_S	
30-Jan-20	17:26	TRAJKOVSKI_S	
31-Jan-20	12:30	TRAJKOVSKI_S	
05-Feb-20	17:08	TRAJKOVSKI_S	
10-Feb-20	17:21	TYLER_A	
12-Feb-20	09:42	TYLER_A	Open

END_TABLE

Analysis Options

General
Global Poisson's ratio: 0.20
Maximum allowable ratio between values of E: 1.5
Horizontal rigid boundary level: -10.10 [m OD]
Displacements at load centroids: Yes
GSA piled raft data : No

Elastic
Elastic : Yes
Analysis: Boussinesq
Stiffness for horizontal displacement calculations: Weighted average
Using legacy heave correction factor: No

Consolidation
Consolidation : No

Soil ProfilesSoil Profile 1
START_TABLE

Layer ref.	Name	Level at top [mOD]	Number of	Youngs Mo [kN/m²]	Youngs Mo [kN/m²]	Poissons ra	Non-linear curve
1	1	24.15	5	20000	20000	0.2	None
2	2	20.15	5	16000	88000	0.2	None
3	3	-6.5	5	100000	100000	0.2	None

END_TABLE

Soil Zones
START_TABLE

Zone	Name	X min [m]	X max [m]	Y min [m]	Y max [m]	Profile
1	SZ1	-20	100	-20	60	Soil Profile 1

END_TABLE

Polygonal Load Data
START_TABLE

Load ref.	Name	Position : L [m]	Position : P [m]	Position : P [%]	No. of Rect	Value : Normal (local z) [kN/m²]
1	Western Ex	19.6	(6.5,-1.8) (3	10	7	100
2	Southern E	19.6	(35.9,5.3) (	10	9	100

END_TABLE

Polygonal Loads' Rectangles
START_TABLE

No.	Centre : x [m]	Centre : y [m]	Angle of lo [Degrees]	Width x [m]	Depth y [m]
Load 1 : Western Excavation					
(Edge 1 optimal)					
1	21.22018	1.57035	0.35258	29.405	6.5594
2	37.45029	1.80282	0.35258	3.0575	6.8246
3	39.04936	2.09754	0.35258	0.14423	6.0572
4	39.1895	2.76253	0.35258	0.14423	4.7111
5	39.32965	3.42752	0.35258	0.14423	3.3651
6	39.46979	4.09251	0.35258	0.14423	2.0191

7	39.60993	4.7575	0.35258	0.14423	0.67302

Load 2 : Southern Excavation
(Edge 4 optimal)

1	38.95313	27.64382	-95.034	0.085059	0.31495
2	39.2594	27.53145	-95.034	0.085059	0.94484
3	39.56567	27.41909	-95.034	0.085059	1.5747
4	39.87194	27.30672	-95.034	0.085059	2.2046
5	40.17821	27.19435	-95.034	0.085059	2.8345
6	39.43807	17.70546	-95.034	18.949	3.0251
7	38.1789	6.76359	-95.034	3.0709	3.3246
8	37.33476	5.26584	-95.034	0.06124	2.8113
9	36.37825	5.28861	-95.034	0.06124	0.93711

END_TABLE

Displacement Points

START_TABLE

Name	X [m]	Y [m]	Z(level) [m]	Calculate	Detailed Results
GrapeNear	38	39	24	Yes	Yes
GrapeFar	38	44.5	24	Yes	Yes
HighNear	41	10	24	Yes	Yes
HighFar	61	10	24	Yes	Yes
ShaftsNear	20	-2.5	24	Yes	Yes
ShaftsFar	20	-8	24	Yes	Yes

END_TABLE

Displacement Lines

START_TABLE

Name	X1 [m]	Y1 [m]	Z1 [m]	X2 [m]	Y2 [m]	Z2 [m]	Intervals [No.]	Calculate	Detailed Results
Berkshire H	63	-10	22.5	62	31	22.5	41	Yes	Yes
Berkshire H	62	31	22.5	90	32	22.5	28	Yes	Yes
Berkshire H	90	32	22.5	90	-5	22.5	37	Yes	Yes
Berkshire H	90	-5	22.5	63	-10	22.5	27	Yes	Yes
Archway - S	6.5	5	20.5	6.5	15.5	20.5	11	Yes	Yes
Archway - (	6.5	15.5	20.5	4	15.5	20.5	3	Yes	Yes
Archway - '	4	5	20.5	6.5	5	20.5	3	Yes	Yes
167High Ho	27	45	20.5	40	45	20.5	13	Yes	Yes
167High Ho	40	45	20.5	40	52	20.5	7	Yes	Yes
167High Ho	40	52	20.5	27	52	20.5	13	Yes	Yes
167High Ho	27	52	20.5	27	45	20.5	7	Yes	Yes
Sovereign I	4	5	20.5	-1	5	20.5	5	Yes	Yes
Sovereign I	-1	5	20.5	-4.5	8	20.5	5	Yes	Yes
Sovereign I	-4.5	8	20.5	4	15.5	20.5	11	Yes	Yes
Sovereign I	4	15.5	20.5	4	5	20.5	11	Yes	Yes
Crossrail Tu	52	50	10	47	-10	10	60	Yes	Yes

END_TABLE

Displacement Grids

START_TABLE

Name	Extrusion: I	X1 [m]	Y1 [m]	Z1 [m]	X2 [m]	Y2 [m]	Z2 [m]	Intervals A [No.]	Extrusion: [m]	Extrusion: I [No.]	Calculate	Detailed Results
Grid 1	Global X	-20	-20	24	-	60	24	100	120	100	No	No
Basement	Global X	-20	-20	19.6	-	60	19.6	50	120	50	No	No

END_TABLE

Warnings

(1)One or more displacement grids have numbers of intervals of at least 100. Large numbers of intervals will slow the analysis.

(2)The load at (23.219, 1.611, 19.600)m lies wide of all soil zones. Displacements at its centre have been requested. The first soil profile will be used.

Results : Immediate : Load Centres : Polygonal

START_TABLE

Ref.	Name	x [m]	y [m]	z [mOD]	dz [mm]	Stress: Calc [mOD]	Stress: Ver [kN/m²]	Stress: Sun [kN/m²]	Vert. Strain [
1	Western E	23.21861	1.61111	19.6	29.37524	17.028	88.563	136.89	0.003321
2	Southern E	39.25431	16.22418	19.6	18.97582	17.028	61.671	81.937	0.002425

END_TABLE

Results : Consolidation : Load Centres : Polygonal

None

Results : Total : Load Centres : Polygonal

None

Results : Immediate : Displacement Data : Points

START_TABLE

Ref.	Name	x [m]	y [m]	z [mOD]	dz [mm]	Stress: Calc [mOD]	Stress: Ver [kN/m²]	Stress: Sun [kN/m²]	Vert. Strain [
1	GrapeNear	38	39	24	0.29729	23.615	0	0	0
2	GrapeFar	38	44.5	24	0.10067	23.615	0	0	0
3	HighNear	41	10	24	10.18566	23.615	0	0	0
4	HighFar	61	10	24	0.23484	23.615	0	0	0
5	ShaftsNear	20	-2.5	24	12.71792	23.615	0	0	0
6	ShaftsFar	20	-8	24	3.64228	23.615	0	0	0

END_TABLE

Results : Consolidation : Displacement Data : Points

None

Results : Total : Displacement Data : Points

None

Results : Immediate : Displacement Data : Lines

START_TABLE

Ref.	Name	x [m]	y [m]	z [mOD]	dz [mm]	Stress: Calc [mOD]	Stress: Ver [kN/m²]	Stress: Sun [kN/m²]	Vert. Strain [
1	Berkshire H	63	-10	22.5	0.06243	22.108	0	0	0
1	Berkshire H	62.97561	-9	22.5	0.06951	22.108	0	0	0
1	Berkshire H	62.95122	-8	22.5	0.0768	22.108	0	0	0
1	Berkshire H	62.92683	-7	22.5	0.08425	22.108	0	0	0
1	Berkshire H	62.90244	-6	22.5	0.09182	22.108	0	0	0
1	Berkshire H	62.87805	-5	22.5	0.09944	22.108	0	0	0
1	Berkshire H	62.85366	-4	22.5	0.10706	22.108	0	0	0
1	Berkshire H	62.82927	-3	22.5	0.11462	22.108	0	0	0
1	Berkshire H	62.80488	-2	22.5	0.12206	22.108	0	0	0
1	Berkshire H	62.78049	-1	22.5	0.1293	22.108	0	0	0
1	Berkshire H	62.7561	0	22.5	0.13629	22.108	0	0	0
1	Berkshire H	62.73171	1	22.5	0.14297	22.108	0	0	0
1	Berkshire H	62.70732	2	22.5	0.14927	22.108	0	0	0
1	Berkshire H	62.68293	3	22.5	0.15513	22.108	0	0	0
1	Berkshire H	62.65854	4	22.5	0.16052	22.108	0	0	0
1	Berkshire H	62.63415	5	22.5	0.16537	22.108	0	0	0
1	Berkshire H	62.60976	6	22.5	0.16966	22.108	0	0	0
1	Berkshire H	62.58537	7	22.5	0.17334	22.108	0	0	0
1	Berkshire H	62.56098	8	22.5	0.1764	22.108	0	0	0
1	Berkshire H	62.53659	9	22.5	0.17881	22.108	0	0	0
1	Berkshire H	62.5122	10	22.5	0.18056	22.108	0	0	0
1	Berkshire H	62.4878	11	22.5	0.18163	22.108	0	0	0
1	Berkshire H	62.46341	12	22.5	0.18202	22.108	0	0	0
1	Berkshire H	62.43902	13	22.5	0.18173	22.108	0	0	0
1	Berkshire H	62.41463	14	22.5	0.18076	22.108	0	0	0
1	Berkshire H	62.39024	15	22.5	0.17911	22.108	0	0	0
1	Berkshire H	62.36585	16	22.5	0.17679	22.108	0	0	0
1	Berkshire H	62.34146	17	22.5	0.17382	22.108	0	0	0
1	Berkshire H	62.31707	18	22.5	0.17022	22.108	0	0	0
1	Berkshire H	62.29268	19	22.5	0.166	22.108	0	0	0
1	Berkshire H	62.26829	20	22.5	0.16118	22.108	0	0	0
1	Berkshire H	62.2439	21	22.5	0.15581	22.108	0	0	0
1	Berkshire H	62.21951	22	22.5	0.14992	22.108	0	0	0
1	Berkshire H	62.19512	23	22.5	0.14356	22.108	0	0	0
1	Berkshire H	62.17073	24	22.5	0.13677	22.108	0	0	0
1	Berkshire H	62.14634	25	22.5	0.12962	22.108	0	0	0
1	Berkshire H	62.12195	26	22.5	0.12217	22.108	0	0	0
1	Berkshire H	62.09756	27	22.5	0.11448	22.108	0	0	0
1	Berkshire H	62.07317	28	22.5	0.10663	22.108	0	0	0
1	Berkshire H	62.04878	29	22.5	0.09869	22.108	0	0	0
1	Berkshire H	62.02439	30	22.5	0.09074	22.108	0	0	0
1	Berkshire H	62	31	22.5	0.08283	22.108	0	0	0
2	Berkshire H	62	31	22.5	0.08283	22.108	0	0	0
2	Berkshire H	63	31.03571	22.5	0.06824	22.108	0	0	0
2	Berkshire H	64	31.07143	22.5	0.05556	22.108	0	0	0
2	Berkshire H	65	31.10714	22.5	0.04455	22.108	0	0	0
2	Berkshire H	66	31.14286	22.5	0.03498	22.108	0	0	0
2	Berkshire H	67	31.17857	22.5	0.02668	22.108	0	0	0
2	Berkshire H	68	31.21429	22.5	0.01948	22.108	0	0	0
2	Berkshire H	69	31.25	22.5	0.01325	22.108	0	0	0
2	Berkshire H	70	31.28571	22.5	0.00787	22.108	0	0	0
2	Berkshire H	71	31.32143	22.5	0.00322	22.108	0	0	0
2	Berkshire H	72	31.35714	22.5	-0.00078	22.108	0	0	0
2	Berkshire H	73	31.39286	22.5	-0.00422	22.108	0	0	0
2	Berkshire H	74	31.42857	22.5	-0.00717	22.108	0	0	0
2	Berkshire H	75	31.46429	22.5	-0.00968	22.108	0	0	0
2	Berkshire H	76	31.5	22.5	-0.01181	22.108	0	0	0
2	Berkshire H	77	31.53571	22.5	-0.01361	22.108	0	0	0
2	Berkshire H	78	31.57143	22.5	-0.01513	22.108	0	0	0
2	Berkshire H	79	31.60714	22.5	-0.01639	22.108	0	0	0
2	Berkshire H	80	31.64286	22.5	-0.01743	22.108	0	0	0
2	Berkshire H	81	31.67857	22.5	-0.01828	22.108	0	0	0
2	Berkshire H	82	31.71429	22.5	-0.01896	22.108	0	0	0
2	Berkshire H	83	31.75	22.5	-0.01949	22.108	0	0	0
2	Berkshire H	84	31.78571	22.5	-0.01989	22.108	0	0	0
2	Berkshire H	85	31.82143	22.5	-0.02018	22.108	0	0	0
2	Berkshire H	86	31.85714	22.5	-0.02038	22.108	0	0	0
2	Berkshire H	87	31.89286	22.5	-0.02049	22.108	0	0	0
2	Berkshire H	88	31.92857	22.5	-0.02053	22.108	0	0	0
2	Berkshire H	89	31.96429	22.5	-0.02051	22.108	0	0	0
2	Berkshire H	90	32	22.5	-0.02043	22.108	0	0	0
3	Berkshire H	90	32	22.5	-0.02043	22.108	0	0	0
3	Berkshire H	90	31	22.5	-0.02051	22.108	0	0	0
3	Berkshire H	90	30	22.5	-0.02058	22.108	0	0	0
3	Berkshire H	90	29	22.5	-0.02064	22.108	0	0	0
3	Berkshire H	90	28	22.5	-0.0207	22.108	0	0	0
3	Berkshire H	90	27	22.5	-0.02076	22.108	0	0	0
3	Berkshire H	90	26	22.5	-0.02081	22.108	0	0	0
3	Berkshire H	90	25	22.5	-0.02086	22.108	0	0	0
3	Berkshire H	90	24	22.5	-0.02091	22.108	0	0	0
3	Berkshire H	90	23	22.5	-0.02095	22.108	0	0	0
3	Berkshire H	90	22	22.5	-0.021	22.108	0	0	0
3	Berkshire H	90	21	22.5	-0.02104	22.108	0	0	0
3	Berkshire H	90	20	22.5	-0.02108	22.108	0	0	0
3	Berkshire H	90	19	22.5	-0.02112	22.108	0	0	0
3	Berkshire H	90	18	22.5	-0.02116	22.108	0	0	0
3	Berkshire H	90	17	22.5	-0.0212	22.108	0	0	0
3	Berkshire H	90	16	22.5	-0.02123	22.108	0	0	0
3	Berkshire H	90	15	22.5	-0.02127	22.108	0	0	0
3	Berkshire H	90	14	22.5	-0.02131	22.108	0	0	0
3	Berkshire H	90	13	22.5	-0.02135	22.108	0	0	0
3	Berkshire H	90	12	22.5	-0.02139	22.108	0	0	0

3	Berkshire H	90	11	22.5	-0.02143	22.108	0	0	0
3	Berkshire H	90	10	22.5	-0.02147	22.108	0	0	0
3	Berkshire H	90	9	22.5	-0.02151	22.108	0	0	0
3	Berkshire H	90	8	22.5	-0.02155	22.108	0	0	0
3	Berkshire H	90	7	22.5	-0.02159	22.108	0	0	0
3	Berkshire H	90	6	22.5	-0.02164	22.108	0	0	0
3	Berkshire H	90	5	22.5	-0.02168	22.108	0	0	0
3	Berkshire H	90	4	22.5	-0.02172	22.108	0	0	0
3	Berkshire H	90	3	22.5	-0.02175	22.108	0	0	0
3	Berkshire H	90	2	22.5	-0.02179	22.108	0	0	0
3	Berkshire H	90	1	22.5	-0.02183	22.108	0	0	0
3	Berkshire H	90	0	22.5	-0.02186	22.108	0	0	0
3	Berkshire H	90	-1	22.5	-0.02189	22.108	0	0	0
3	Berkshire H	90	-2	22.5	-0.02192	22.108	0	0	0
3	Berkshire H	90	-3	22.5	-0.02194	22.108	0	0	0
3	Berkshire H	90	-4	22.5	-0.02196	22.108	0	0	0
3	Berkshire H	90	-5	22.5	-0.02198	22.108	0	0	0
4	Berkshire H	90	-5	22.5	-0.02198	22.108	0	0	0
4	Berkshire H	89	-5.18519	22.5	-0.02202	22.108	0	0	0
4	Berkshire H	88	-5.37037	22.5	-0.02199	22.108	0	0	0
4	Berkshire H	87	-5.55556	22.5	-0.0219	22.108	0	0	0
4	Berkshire H	86	-5.74074	22.5	-0.02172	22.108	0	0	0
4	Berkshire H	85	-5.92593	22.5	-0.02145	22.108	0	0	0
4	Berkshire H	84	-6.11111	22.5	-0.02107	22.108	0	0	0
4	Berkshire H	83	-6.2963	22.5	-0.02057	22.108	0	0	0
4	Berkshire H	82	-6.48148	22.5	-0.01993	22.108	0	0	0
4	Berkshire H	81	-6.66667	22.5	-0.01913	22.108	0	0	0
4	Berkshire H	80	-6.85185	22.5	-0.01815	22.108	0	0	0
4	Berkshire H	79	-7.03704	22.5	-0.01698	22.108	0	0	0
4	Berkshire H	78	-7.22222	22.5	-0.01557	22.108	0	0	0
4	Berkshire H	77	-7.40741	22.5	-0.01391	22.108	0	0	0
4	Berkshire H	76	-7.59259	22.5	-0.01196	22.108	0	0	0
4	Berkshire H	75	-7.77778	22.5	-0.00969	22.108	0	0	0
4	Berkshire H	74	-7.96296	22.5	-0.00706	22.108	0	0	0
4	Berkshire H	73	-8.14815	22.5	-0.00401	22.108	0	0	0
4	Berkshire H	72	-8.33333	22.5	-0.00051	22.108	0	0	0
4	Berkshire H	71	-8.51852	22.5	0.0035	22.108	0	0	0
4	Berkshire H	70	-8.7037	22.5	0.00807	22.108	0	0	0
4	Berkshire H	69	-8.88889	22.5	0.01329	22.108	0	0	0
4	Berkshire H	68	-9.07407	22.5	0.01921	22.108	0	0	0
4	Berkshire H	67	-9.25926	22.5	0.02592	22.108	0	0	0
4	Berkshire H	66	-9.44444	22.5	0.0335	22.108	0	0	0
4	Berkshire H	65	-9.62963	22.5	0.04204	22.108	0	0	0
4	Berkshire H	64	-9.81481	22.5	0.05165	22.108	0	0	0
4	Berkshire H	63	-10	22.5	0.06243	22.108	0	0	0
5	Archway - S	6.5	5	20.5	8.85219	20.325	0	0	0
5	Archway - S	6.5	5.95455	20.5	5.67777	20.325	0	0	0
5	Archway - S	6.5	6.90909	20.5	4.45208	20.325	0	0	0
5	Archway - S	6.5	7.86364	20.5	3.63963	20.325	0	0	0
5	Archway - S	6.5	8.81818	20.5	3.01825	20.325	0	0	0
5	Archway - S	6.5	9.77273	20.5	2.52981	20.325	0	0	0
5	Archway - S	6.5	10.72727	20.5	2.13906	20.325	0	0	0
5	Archway - S	6.5	11.68182	20.5	1.82131	20.325	0	0	0
5	Archway - S	6.5	12.63636	20.5	1.55927	20.325	0	0	0
5	Archway - S	6.5	13.59091	20.5	1.34069	20.325	0	0	0
5	Archway - S	6.5	14.54545	20.5	1.15665	20.325	0	0	0
5	Archway - S	6.5	15.5	20.5	1.00054	20.325	0	0	0
6	Archway - C	6.5	15.5	20.5	1.00054	20.325	0	0	0
6	Archway - C	5.66667	15.5	20.5	0.93067	20.325	0	0	0
6	Archway - C	4.83333	15.5	20.5	0.86183	20.325	0	0	0
6	Archway - C	4	15.5	20.5	0.79464	20.325	0	0	0
7	Archway - V	4	5	20.5	3.67112	20.325	0	0	0
7	Archway - V	4.83333	5	20.5	4.53929	20.325	0	0	0
7	Archway - V	5.66667	5	20.5	5.92306	20.325	0	0	0
7	Archway - V	6.5	5	20.5	8.85219	20.325	0	0	0
8	167High H(	27	45	20.5	0.05095	20.325	0	0	0
8	167High H(	28	45	20.5	0.05562	20.325	0	0	0
8	167High H(	29	45	20.5	0.0603	20.325	0	0	0
8	167High H(	30	45	20.5	0.06494	20.325	0	0	0
8	167High H(	31	45	20.5	0.06945	20.325	0	0	0
8	167High H(	32	45	20.5	0.07377	20.325	0	0	0
8	167High H(	33	45	20.5	0.07779	20.325	0	0	0
8	167High H(	34	45	20.5	0.08144	20.325	0	0	0
8	167High H(	35	45	20.5	0.08463	20.325	0	0	0
8	167High H(	36	45	20.5	0.08726	20.325	0	0	0
8	167High H(	37	45	20.5	0.08925	20.325	0	0	0
8	167High H(	38	45	20.5	0.09054	20.325	0	0	0
8	167High H(	39	45	20.5	0.09108	20.325	0	0	0
8	167High H(	40	45	20.5	0.09084	20.325	0	0	0
9	167High H(	40	45	20.5	0.09084	20.325	0	0	0
9	167High H(	40	46	20.5	0.07292	20.325	0	0	0
9	167High H(	40	47	20.5	0.05778	20.325	0	0	0
9	167High H(	40	48	20.5	0.04499	20.325	0	0	0
9	167High H(	40	49	20.5	0.03417	20.325	0	0	0
9	167High H(	40	50	20.5	0.025	20.325	0	0	0
9	167High H(	40	51	20.5	0.01724	20.325	0	0	0
9	167High H(	40	52	20.5	0.01067	20.325	0	0	0
10	167High H(	40	52	20.5	0.01067	20.325	0	0	0
10	167High H(	39	52	20.5	0.0107	20.325	0	0	0
10	167High H(	38	52	20.5	0.01055	20.325	0	0	0
10	167High H(	37	52	20.5	0.01022	20.325	0	0	0
10	167High H(	36	52	20.5	0.00971	20.325	0	0	0
10	167High H(	35	52	20.5	0.00904	20.325	0	0	0
10	167High H(	34	52	20.5	0.00822	20.325	0	0	0
10	167High H(	33	52	20.5	0.00727	20.325	0	0	0
10	167High H(	32	52	20.5	0.0062	20.325	0	0	0
10	167High H(	31	52	20.5	0.00503	20.325	0	0	0
10	167High H(	30	52	20.5	0.00378	20.325	0	0	0
10	167High H(	29	52	20.5	0.00246	20.325	0	0	0
10	167High H(	28	52	20.5	0.0011	20.325	0	0	0
10	167High H(	27	52	20.5	-0.00029	20.325	0	0	0
11	167High H(	27	52	20.5	-0.00029	20.325	0	0	0
11	167High H(	27	51	20.5	0.0042	20.325	0	0	0
11	167High H(	27	50	20.5	0.00944	20.325	0	0	0
11	167High H(	27	49	20.5	0.01552	20.325	0	0	0
11	167High H(	27	48	20.5	0.02256	20.325	0	0	0
11	167High H(	27	47	20.5	0.03071	20.325	0	0	0
11	167High H(	27	46	20.5	0.04012	20.325	0	0	0

11	167High H	27	45	20.5	0.05095	20.325	0	0	0
12	Sovereign I	4	5	20.5	3.67112	20.325	0	0	0
12	Sovereign I	3	5	20.5	2.89882	20.325	0	0	0
12	Sovereign I	2	5	20.5	2.31715	20.325	0	0	0
12	Sovereign I	1	5	20.5	1.87183	20.325	0	0	0
12	Sovereign I	0	5	20.5	1.5256	20.325	0	0	0
12	Sovereign I	-1	5	20.5	1.25238	20.325	0	0	0
13	Sovereign I	-1	5	20.5	1.25238	20.325	0	0	0
13	Sovereign I	-1.7	5.6	20.5	1.06014	20.325	0	0	0
13	Sovereign I	-2.4	6.2	20.5	0.89984	20.325	0	0	0
13	Sovereign I	-3.1	6.8	20.5	0.76543	20.325	0	0	0
13	Sovereign I	-3.8	7.4	20.5	0.65216	20.325	0	0	0
13	Sovereign I	-4.5	8	20.5	0.5563	20.325	0	0	0
14	Sovereign I	-4.5	8	20.5	0.5563	20.325	0	0	0
14	Sovereign I	-3.72727	8.68182	20.5	0.60393	20.325	0	0	0
14	Sovereign I	-2.95455	9.36364	20.5	0.64977	20.325	0	0	0
14	Sovereign I	-2.18182	10.04545	20.5	0.69237	20.325	0	0	0
14	Sovereign I	-1.40909	10.72727	20.5	0.7303	20.325	0	0	0
14	Sovereign I	-0.63636	11.40909	20.5	0.7622	20.325	0	0	0
14	Sovereign I	0.13636	12.09091	20.5	0.78699	20.325	0	0	0
14	Sovereign I	0.90909	12.77273	20.5	0.80396	20.325	0	0	0
14	Sovereign I	1.68182	13.45455	20.5	0.81286	20.325	0	0	0
14	Sovereign I	2.45455	14.13636	20.5	0.81384	20.325	0	0	0
14	Sovereign I	3.22727	14.81818	20.5	0.80749	20.325	0	0	0
14	Sovereign I	4	15.5	20.5	0.79464	20.325	0	0	0
15	Sovereign I	4	15.5	20.5	0.79464	20.325	0	0	0
15	Sovereign I	4	14.54545	20.5	0.91063	20.325	0	0	0
15	Sovereign I	4	13.59091	20.5	1.04441	20.325	0	0	0
15	Sovereign I	4	12.63636	20.5	1.19915	20.325	0	0	0
15	Sovereign I	4	11.68182	20.5	1.37867	20.325	0	0	0
15	Sovereign I	4	10.72727	20.5	1.58759	20.325	0	0	0
15	Sovereign I	4	9.77273	20.5	1.83129	20.325	0	0	0
15	Sovereign I	4	8.81818	20.5	2.11565	20.325	0	0	0
15	Sovereign I	4	7.86364	20.5	2.44588	20.325	0	0	0
15	Sovereign I	4	6.90909	20.5	2.82349	20.325	0	0	0
15	Sovereign I	4	5.95455	20.5	3.24052	20.325	0	0	0
15	Sovereign I	4	5	20.5	3.67112	20.325	0	0	0
16	Crossrail Tu	52	50	10	0.032	8.4091	0.1087	1.1146	-1.94E-06
16	Crossrail Tu	51.91667	49	10	0.03887	8.4091	0.12309	1.19	-1.90E-06
16	Crossrail Tu	51.83333	48	10	0.04673	8.4091	0.13981	1.2723	-1.82E-06
16	Crossrail Tu	51.75	47	10	0.05572	8.4091	0.15928	1.3624	-1.71E-06
16	Crossrail Tu	51.66667	46	10	0.066	8.4091	0.18202	1.461	-1.55E-06
16	Crossrail Tu	51.58333	45	10	0.07775	8.4091	0.20866	1.5693	-1.33E-06
16	Crossrail Tu	51.5	44	10	0.09117	8.4091	0.23993	1.6881	-1.04E-06
16	Crossrail Tu	51.41667	43	10	0.10648	8.4091	0.27671	1.8188	-6.66E-07
16	Crossrail Tu	51.33333	42	10	0.12392	8.4091	0.32003	1.9626	-1.78E-07
16	Crossrail Tu	51.25	41	10	0.14377	8.4091	0.37113	2.121	4.44E-07
16	Crossrail Tu	51.16667	40	10	0.16632	8.4091	0.43141	2.2954	1.23E-06
16	Crossrail Tu	51.08333	39	10	0.19187	8.4091	0.50251	2.4876	2.22E-06
16	Crossrail Tu	51	38	10	0.22075	8.4091	0.58625	2.699	3.44E-06
16	Crossrail Tu	50.91667	37	10	0.25329	8.4091	0.68464	2.9313	4.94E-06
16	Crossrail Tu	50.83333	36	10	0.28981	8.4091	0.79979	3.186	6.78E-06
16	Crossrail Tu	50.75	35	10	0.33059	8.4091	0.93382	3.4645	8.99E-06
16	Crossrail Tu	50.66667	34	10	0.37586	8.4091	1.0887	3.7677	1.16E-05
16	Crossrail Tu	50.58333	33	10	0.42576	8.4091	1.266	4.0962	1.47E-05
16	Crossrail Tu	50.5	32	10	0.48031	8.4091	1.4667	4.4497	1.83E-05
16	Crossrail Tu	50.41667	31	10	0.53938	8.4091	1.6909	4.8273	2.23E-05
16	Crossrail Tu	50.33333	30	10	0.60266	8.4091	1.9372	5.2271	2.69E-05
16	Crossrail Tu	50.25	29	10	0.66963	8.4091	2.2033	5.6463	3.18E-05
16	Crossrail Tu	50.16667	28	10	0.73958	8.4091	2.4851	6.081	3.71E-05
16	Crossrail Tu	50.08333	27	10	0.81165	8.4091	2.7774	6.5266	4.26E-05
16	Crossrail Tu	50	26	10	0.88487	8.4091	3.0742	6.9781	4.82E-05
16	Crossrail Tu	49.91667	25	10	0.95821	8.4091	3.3692	7.4302	5.37E-05
16	Crossrail Tu	49.83333	24	10	1.03071	8.4091	3.6565	7.8775	5.91E-05
16	Crossrail Tu	49.75	23	10	1.10149	8.4091	3.9308	8.3157	6.42E-05
16	Crossrail Tu	49.66667	22	10	1.16984	8.4091	4.1885	8.7406	6.89E-05
16	Crossrail Tu	49.58333	21	10	1.23523	8.4091	4.4272	9.1492	7.32E-05
16	Crossrail Tu	49.5	20	10	1.2973	8.4091	4.6458	9.5394	7.71E-05
16	Crossrail Tu	49.41667	19	10	1.35587	8.4091	4.8445	9.9097	8.05E-05
16	Crossrail Tu	49.33333	18	10	1.41087	8.4091	5.0245	10.259	8.36E-05
16	Crossrail Tu	49.25	17	10	1.4623	8.4091	5.1872	10.588	8.63E-05
16	Crossrail Tu	49.16667	16	10	1.51021	8.4091	5.3344	10.895	8.87E-05
16	Crossrail Tu	49.08333	15	10	1.55464	8.4091	5.4678	11.18	9.09E-05
16	Crossrail Tu	49	14	10	1.59556	8.4091	5.5889	11.444	9.28E-05
16	Crossrail Tu	48.91667	13	10	1.63288	8.4091	5.6983	11.685	9.46E-05
16	Crossrail Tu	48.83333	12	10	1.6664	8.4091	5.7965	11.901	9.61E-05
16	Crossrail Tu	48.75	11	10	1.69581	8.4091	5.8827	12.091	9.75E-05
16	Crossrail Tu	48.66667	10	10	1.72064	8.4091	5.9557	12.252	9.87E-05
16	Crossrail Tu	48.58333	9	10	1.74031	8.4091	6.0129	12.381	9.96E-05
16	Crossrail Tu	48.5	8	10	1.75412	8.4091	6.0514	12.473	1.00E-04
16	Crossrail Tu	48.41667	7	10	1.76128	8.4091	6.0671	12.525	1.00E-04
16	Crossrail Tu	48.33333	6	10	1.76097	8.4091	6.0556	12.533	1.00E-04
16	Crossrail Tu	48.25	5	10	1.75237	8.4091	6.0122	12.491	9.91E-05
16	Crossrail Tu	48.16667	4	10	1.73475	8.4091	5.9326	12.396	9.75E-05
16	Crossrail Tu	48.08333	3	10	1.7076	8.4091	5.813	12.246	9.51E-05
16	Crossrail Tu	48	2	10	1.67061	8.4091	5.6514	12.039	9.19E-05
16	Crossrail Tu	47.91667	1	10	1.62384	8.4091	5.4473	11.776	8.79E-05
16	Crossrail Tu	47.83333	0	10	1.56772	8.4091	5.2027	11.459	8.30E-05
16	Crossrail Tu	47.75	-1	10	1.50305	8.4091	4.9219	11.091	7.75E-05
16	Crossrail Tu	47.66667	-2	10	1.43101	8.4091	4.6113	10.68	7.14E-05
16	Crossrail Tu	47.58333	-3	10	1.35305	8.4091	4.2791	10.234	6.49E-05
16	Crossrail Tu	47.5	-4	10	1.2708	8.4091	3.9343	9.7594	5.82E-05
16	Crossrail Tu	47.41667	-5	10	1.18596	8.4091	3.5863	9.2668	5.15E-05
16	Crossrail Tu	47.33333	-6	10	1.1002	8.4091	3.2434	8.7647	4.50E-05
16	Crossrail Tu	47.25	-7	10	1.01503	8.4091	2.9131	8.2614	3.87E-05
16	Crossrail Tu	47.16667	-8	10	0.93176	8.4091	2.601	7.7641	3.30E-05
16	Crossrail Tu	47.08333	-9	10	0.85143	8.4091	2.3108	7.2788	2.77E-05
16	Crossrail Tu	47	-10	10	0.77487	8.4091	2.0451	6.8103	2.29E-05

END_TABLE

Results : Consolidation : Displacement Data : Lines

None

Results : Total : Displacement Data : Lines

None

Crossrail Asset (10.00mAOD) - North to South