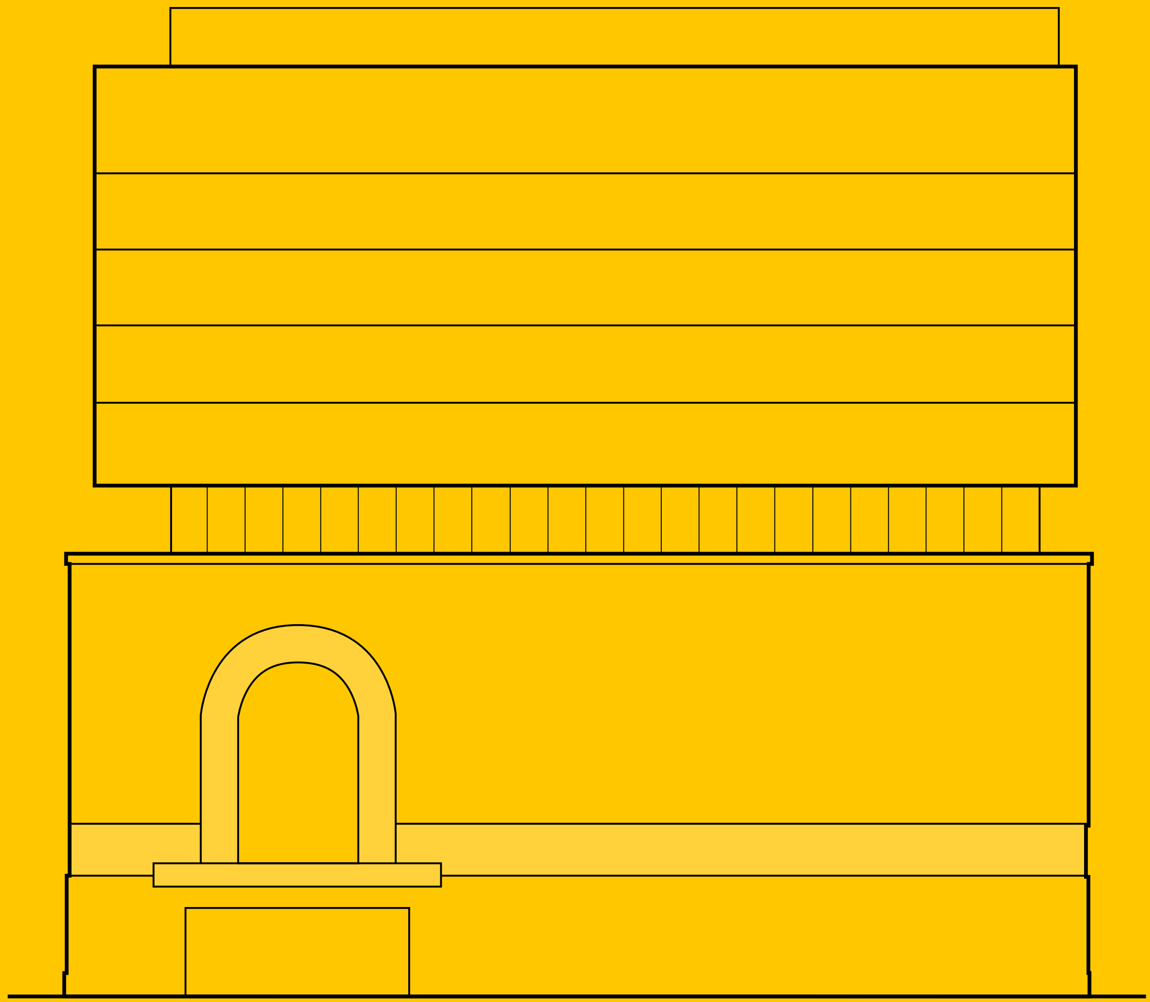

SAVILLE THEATRE

135 SHAFTESBURY AVENUE

ENGINEER'S REPORT - STRUCTURAL METHODOLOGY STATEMENT

2240073-EWP0ZZ-XX-RP-S-0001

ELLIOTT WOOD

ElliottWood

Saville Theatre, 135-149 Shaftesbury Avenue, London, WC2H 8AH

Engineer's Report – Structural Methodology Statement

● 2240073-EWP-ZZ-XX-RP-S-0001

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Client	YC Saville Theatre Limited
Status	Preliminary
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Contents

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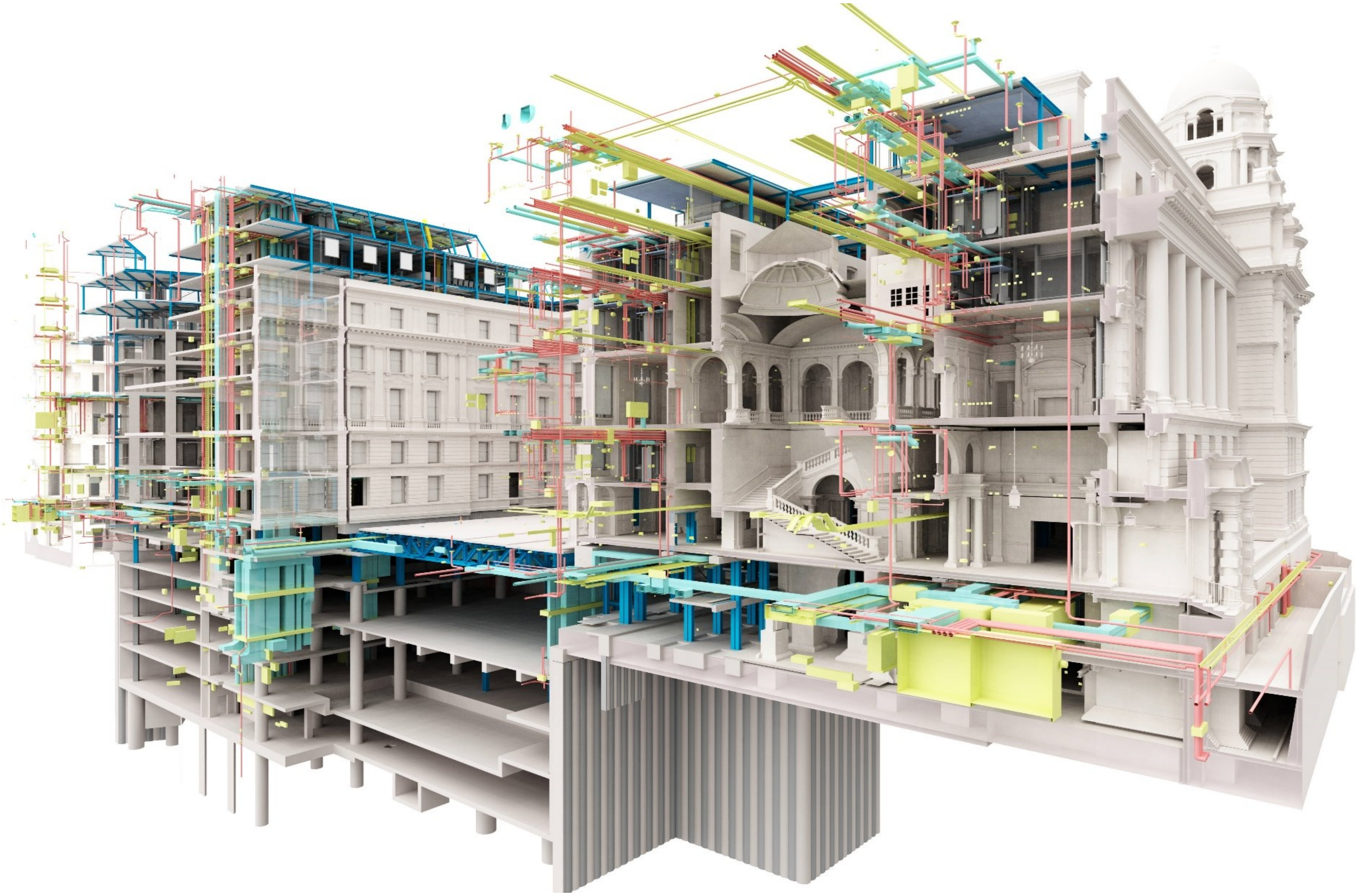
Engineering a better society.

Our portfolio is extraordinarily diverse, and we particularly enjoy those projects which provide the opportunity to engineer for the common good – from making dramatic improvements to the life of a town or city, through to nurturing a new generation of exceptional engineers in our own in-house academy.

Despite more than twenty years in practice, we continue to be curious and find ways to pass on the benefit of our collective experience. We foster enquiring minds and share ideas because we know that this knowledge can make a real difference to our clients.

Engineering is often about the unseen: much of what we do is hidden when a building is complete. But engineering is not a necessary evil – it's much cleverer than that. Our role is to demystify the invisible workings of a structure, to reveal unexpected opportunities and to make the existing engineering work harder.

We value both technical and creative thinking and are activists for a new kind of engineering profession in which our craft is pivotal to the design process. We are no ordinary engineers.



Reveal | Materialise | Impact

Engineers make a difference

We like to be involved at the start of our clients' creative and commissioning journey, because we are concerned that not enough people are realising the full potential of their buildings. They are only working with what they can see.

Our process challenges usual perceptions of the engineer's role because we help clients to see the unseen and achieve results beyond the aspirations of the brief – and which have a positive legacy for their wider communities.

Reveal

We ask questions. With innovative thinking, we reveal the unexpected opportunities in an already ambitious brief.

Materialise

We give ideas life. Using expertise and imagination, we materialise new assets for our clients

Impact

We make a difference. Our work not only benefits our clients, it has a positive impact on society as a whole.

1. Non-technical Summary

Elliott Wood is appointed by YC Saville Theatre Limited to provide structural & civil engineering services in relation to a project at a site at 135-149 Shaftesbury Avenue, London WC2H 8AH.

This report describes the site constraints, existing structure and the proposed civil and structural works that form part of the Application for planning consent. The report is to be read in conjunction with the relevant structural drawings and the design information produced by the Architect and other consultants within the design team.

The Design team for the project including the following consultants/ professionals;

- Architect: SPPARC
- M&E: Hoare Lea
- Cost consultant: Gardiner & Theobald
- Project manager: Yoo Capital

1.1 Site location and description

The site is located on 135-149 Shaftesbury Avenue between Cambridge Circus and St. Giles in the London Borough of Camden. The site is flat and roughly rectangular and approximately 1200m2 in area. The area can be accessed with public transport link with Leicester square and Tottenham Court underground station being 0.2miles away.

The site is occupied by a Grade II listed six-seven storey steel framed masonry building with two levels of basement supported by reinforced concrete basement retaining walls. The ground and basement levels are used as a cinema and upper floors used as office space and storage. Historic vaults are present below the pavements.

1.2 Proposed development

The Proposed Development comprises part demolition, restoration and refurbishment of the existing Grade II listed building, roof extension, and excavation of basement space, to provide a theatre (Sui Generis) at lower levels; restaurant / bar and office space (Class E(b) / Class E(g) / Sui Generis) at ground floor level; and hotel (Class C1) at upper levels; provision of ancillary cycle parking, servicing and rooftop plant, and other associated works

1.3 Construction method

It is proposed to construct the new basement using a top-down construction method. This has the advantage of the sequential installation of the floor slabs as the excavation progresses thus helping to minimise movement of the ground around the excavation and subsequently minimising damage to neighbouring assets.

The walls of the basement will be constructed using a secant piled wall to seal the site against water ingress from perched water. The piles will be designed to resist lateral earth and water pressures, as well as surcharge loadings from the neighbouring buildings. The piles are proposed to go through the existing vaults present below the pavements around the site and will be cased through these to maintain the stability of the pile and minimise the impact on adjacent building foundations.

1.4 Structural monitoring strategy

As recommended by A-Squared in the Basement Impact Assessment (BIA), all of the sensitive surrounding structures should be monitored during construction. A full monitoring strategy will be developed at a later stage and contingency measures will be implemented if the defined movement limits are exceeded.

1.5 BIA summary

The Basement Impact Assessment has been carried out by A-Squared and has been appended here. The BIA has evaluated land stability and the potential effects of the proposed development on the neighbouring structures and the listed façade. Damage categories are expected to remain within Category 1 – Very Slight. This is within the permitted value of Camden's Policy A5 for Basements.

A preliminary ground movement assessment of the critical Thames Water assets has been conducted using traditional methods, and the results indicate that the assets exceed the limiting strain criteria set by Thames Water. A qualitative review of the results by A-Squared highlights that this approach is inherently conservative. To address this, it is proposed that a more detailed and representative ground movement and impact assessment for Thames Water assets is required before the detailed design stage. This analysis is to consider the favourable basement geometry and construction sequence, which is not captured in the traditional assessment method.

2. Existing Building and Site Conditions

2.1 Site location

The Site is bound by Shaftesbury Avenue to the South-East, Stacey Street to South-West, New Compton Street and Phoenix Gardens to the North-west and St. Giles Passage to the North-East.

The primary entrance for visitors is accessed from Shaftesbury Avenue, the secondary entrance mainly used for escape and staff is accessed from Stacey Street while New Compton Street is used as a servicing access to the building.

The local vicinity of the site consists of a mix of commercial, retail and residential properties.

Figure 1: *Site Location*

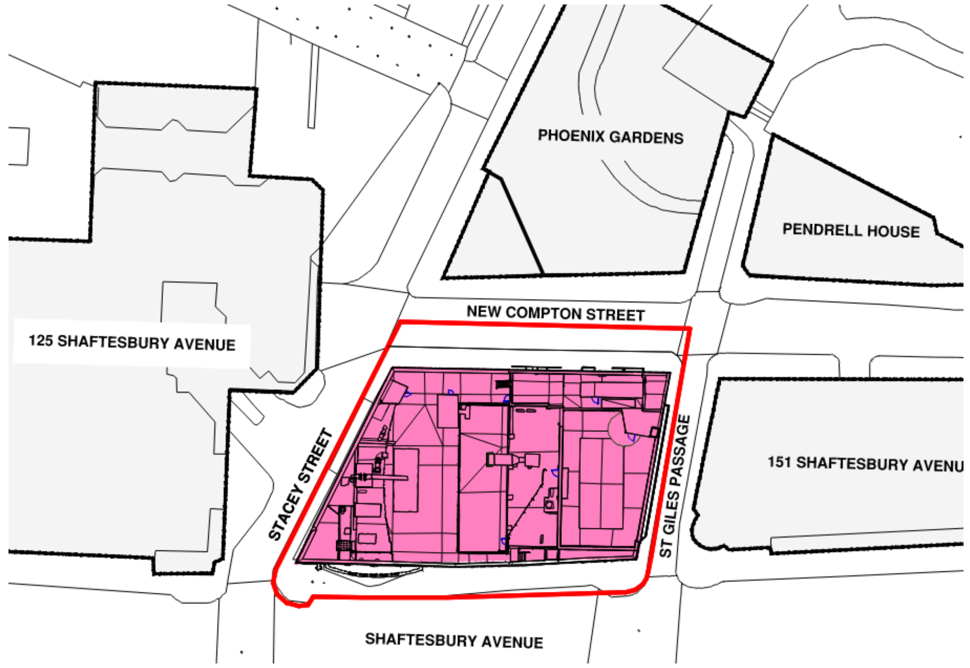


Figure 1: *Surrounding buildings*

2.2 Site history

From the OS mapping and archive information obtained, the site has been occupied by domestic dwellings and cinemas. Similarly, the areas surrounding the site has been exclusively residential with no industrial activity from historical mapping.

1874 mapping shows that the site to have been developed with terraced houses and private courtyards; six of the houses fronted onto New Compton Street and eight fronted onto Shaftesbury Avenue. This is also confirmed by archive information found. Vaults appear to be present under the pavements along Shaftesbury Avenue, St. Giles Passage and New Compton Street.

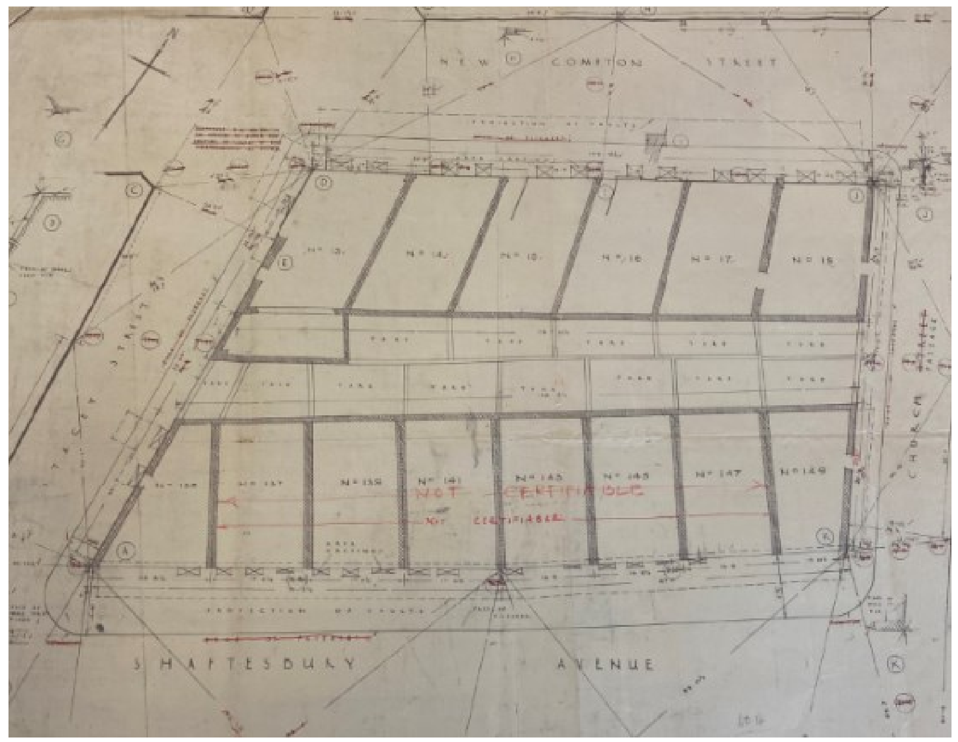


Figure 2: *Archive drawing showing terraced houses on the site before 1930*

In 1930-1931, the Saville Theatre building, comprising a theatre over three levels, was built and opened in 1931. The building was damaged during World War II, but later restored.

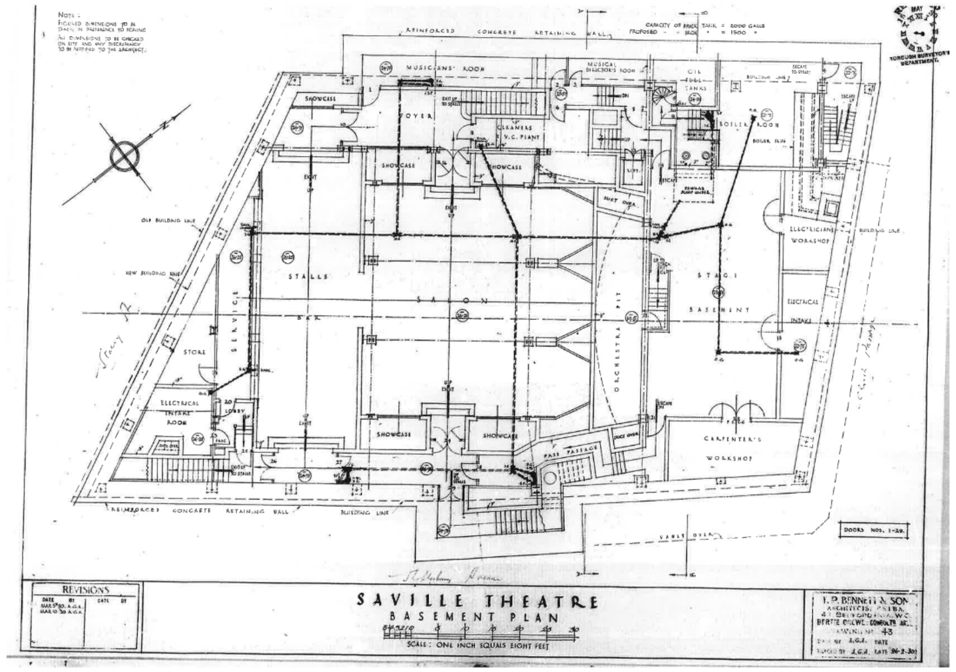


Figure 3: *Archive drawing showing the foundations of the Saville Theatre building*

The original building comprises a steel frame superstructure with an external load-bearing solid masonry façade, encasing the outer perimeter steel columns and beams. The substructure consists of a two-storey basement with large reinforced concrete retaining walls, up to approximately 1m thick, to the perimeter of the basement footprint. The retaining walls are assumed to be propped at Basement 1 and Basement 2 levels.

Information of the original building has been obtained from archive drawings.

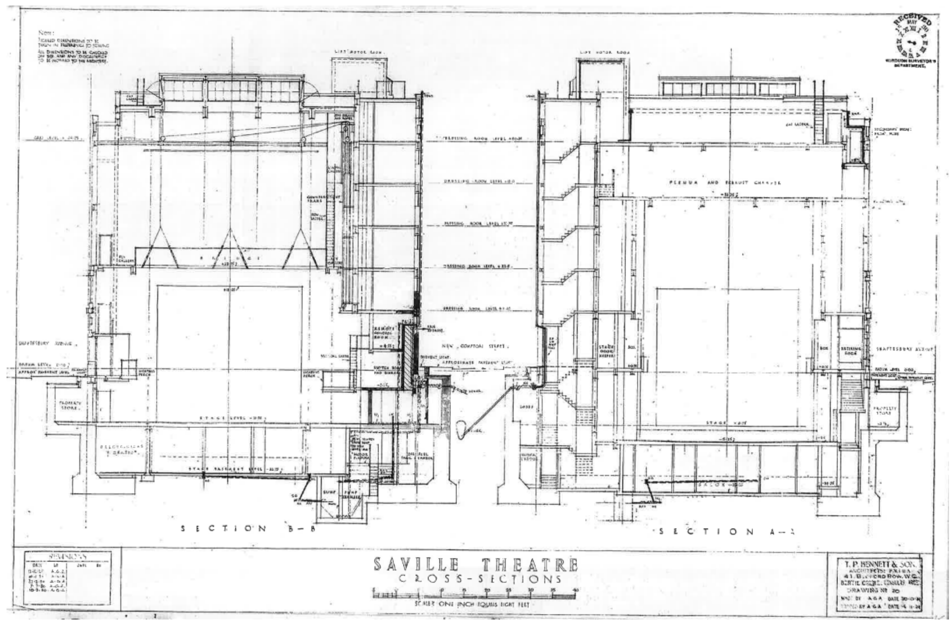


Figure 4: *Archive sectional drawings showing the Saville Theatre building arrangement*

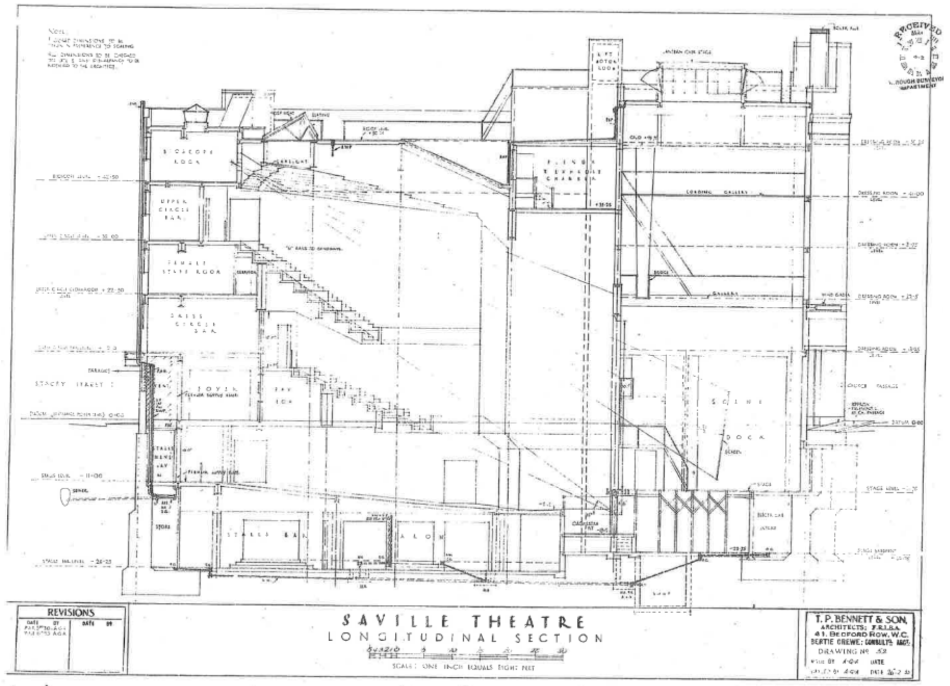


Figure 5: *Archive sectional drawing showing the Saville Theatre building arrangement*

In the 1970s structural alterations were carried out to remodel the interior of the building for a cinema. In the early 2000s a subsequent reconfiguration of the building was carried out to form the four-screen Odeon cinema currently on site today.

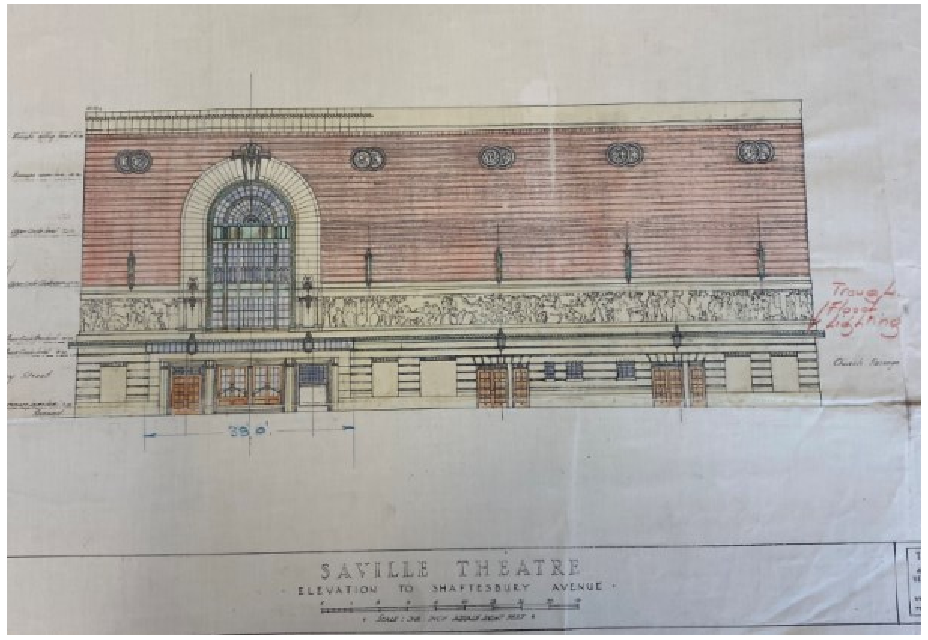


Figure 6*: Archive drawing of the original Shaftesbury Avenue façade*

Limited archive information is available for these works, and this is in the form of architectural drawings. It is thus not possible to state with certainty what parts of the original building are still present. It is expected that some parts of the original steel frame are still present, such as within the perimeter façade, with newer steel elements constructed to support the new cinema. It is likely that some new foundations were also installed during these works.

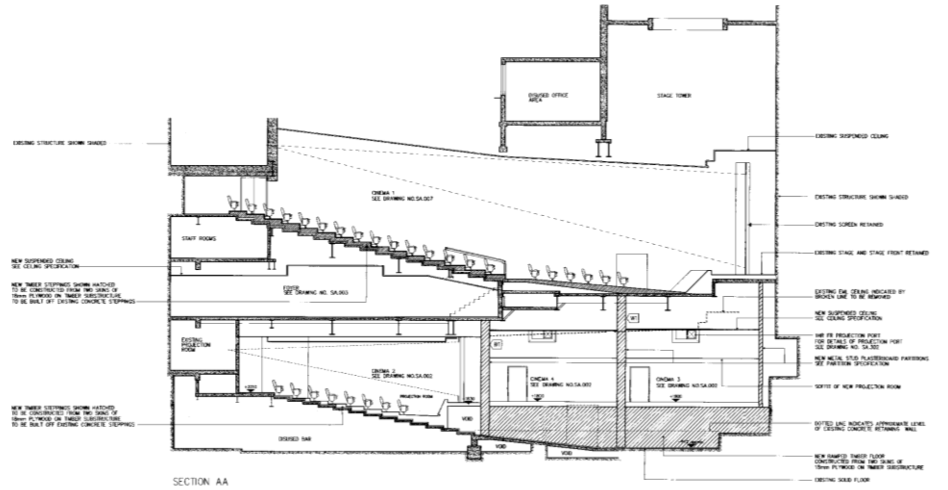


Figure 7: *Archive drawing showing the 2000's alterations*

2.3 Condition of existing building

A façade condition report that was carried out shows that the masonry and cladding show some deterioration, which will be addressed by local repairs and restoration work as part of the proposed works.

A building condition survey carried out in 2021 discovered that the building is in need of some repairs, as it has suffered some corrosion-related damage (Regent's Street Disease).

2.4 Historic site investigations

A single cable percussion borehole was completed in 2017 by GEA Limited. The borehole was located on New Compton Street, adjacent to the site and extended to 35m below ground level. Based on the historic investigation and available data, the following idealised stratigraphy has been assumed for the site:

- Made ground to 3.5m bgl
- Lynch Hill Gravel 1.2m thickness
- London Clay, from 4.7m bgl to 34.4m bgl
- Lambeth Group from 34.4m to 35m bgl (base of borehole)

2.5 Summary of site constraints

As with any London city centre site, the site is heavily constrained on all boundaries. In addition to the typical constraints, the following site-specific constraints have been identified, also shown in the below figure.

Site Constraints

1. Existing Grade II listed building seven storeys high with a two storey deep basement. Retained listed facade on Shaftesbury Avenue, Stacey Street, St Giles Passage and partially on New Compton Street
2. Historic Vaults under pavements
3. Shaftesbury avenue - high traffic dual carriageway
4. Stacey Street - two way road leading to Shaftesbury avenue
5. New Compton street two way road with bayed parking on one side
6. St Giles Passage - Narrow passage that leads to new Compton street
7. The Pheonix Garden community garden
8. Thames Water sewer lines
9. Crossrail 1 line - depth approximately 17m bgl
10. Zone of influence of Crossrail line 1

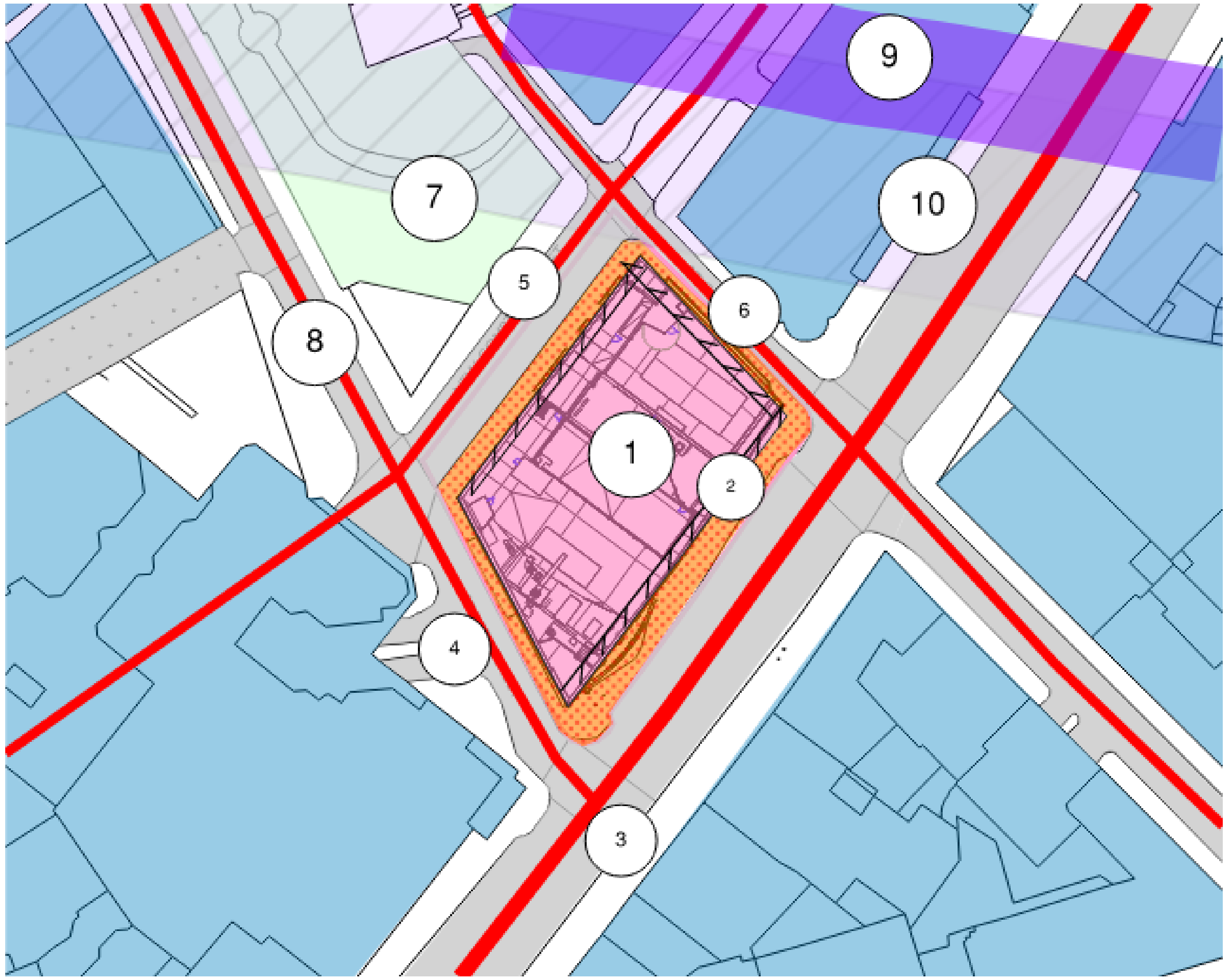


Figure 8: *Site constraints*

3. Proposed works

The Proposed Development seeks to re-introduce a live performance venue to this Site and introduce a new hotel use on upper floors. The Proposed Development includes a five-storey extension, plus plant, on top of the existing Building.

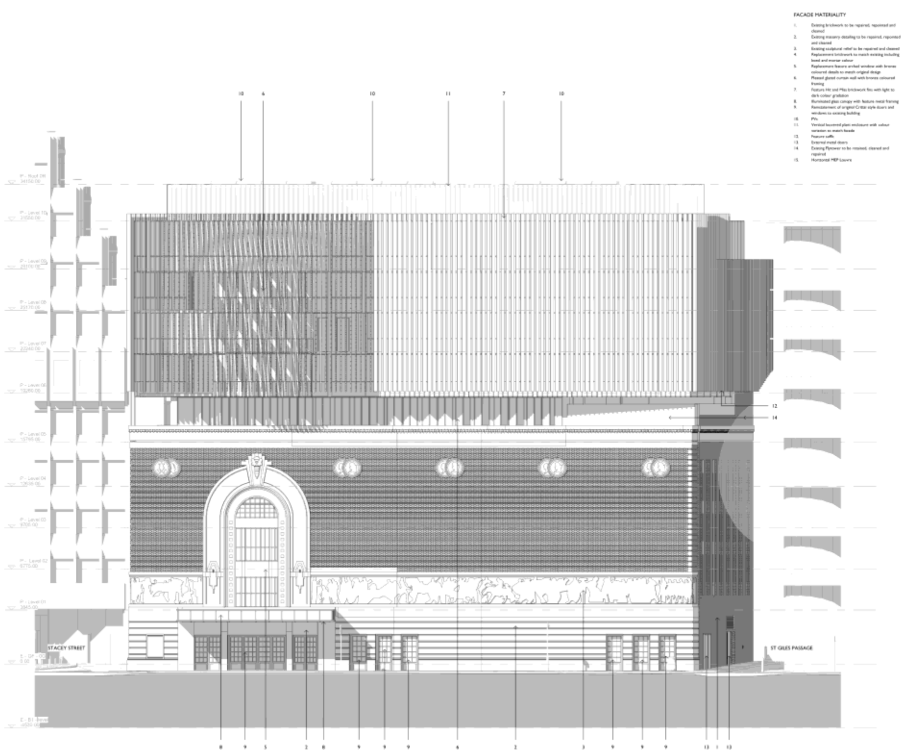


Figure 9: *Proposed Shaftesbury Avenue Elevation - Extracted from SPPARC drawing*

The proposed works involve the demolition of all of the internal structure of the existing building, including the basement slabs and walls, with the exception of the masonry façades along Shaftesbury Avenue, St. Giles Passage, Stacey Street and partially along New Compton Street to facilitate the construction of a new eleven-storey hotel with a five-storey basement housing a theatre space.

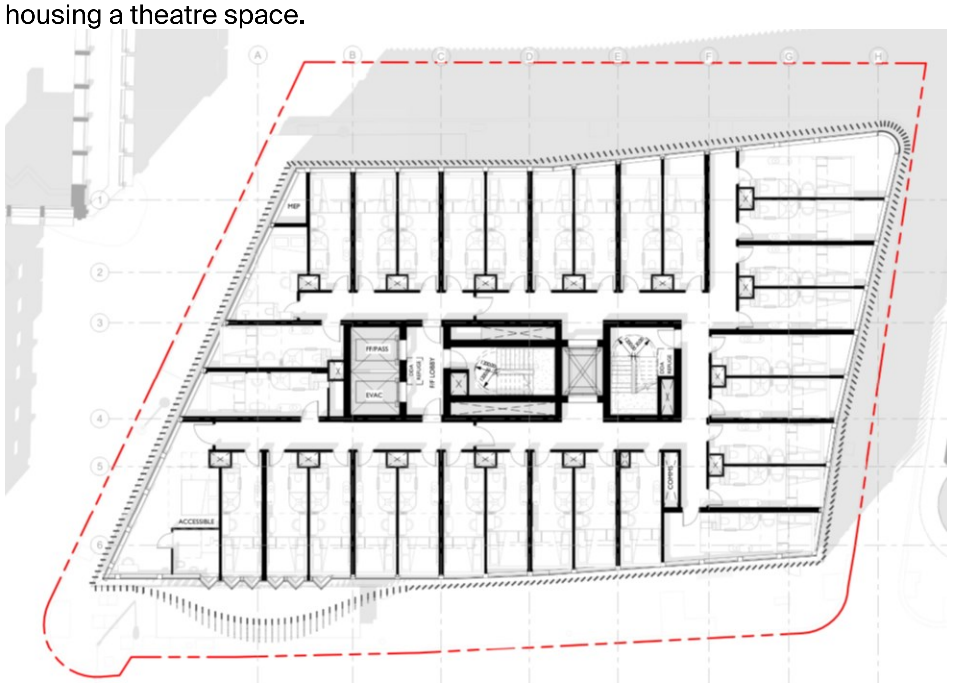


Figure 10*: Proposed level 07 plan - Extracted from SPPARC drawing*

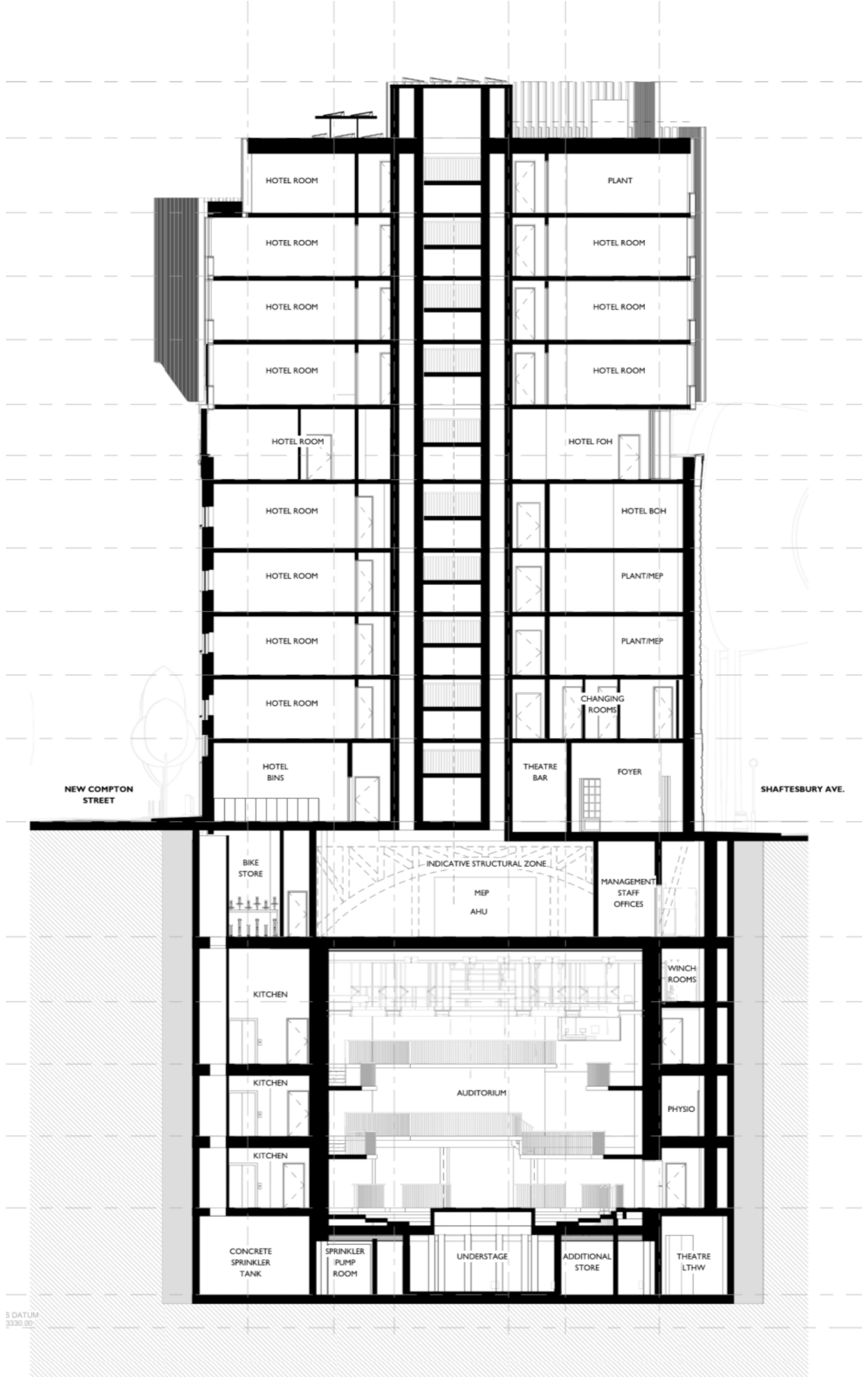


Figure 11*: Proposed east facing Section - Extracted from SPPARC drawing*

3.1 Demolition

It is proposed to remove the existing internal structure, including roof, internal floors and retaining walls. The existing masonry façade will be retained in place along Shaftesbury Avenue, St. Giles Passage, Stacey Street and partially along New Compton Street during the proposed works using temporary restraint systems.

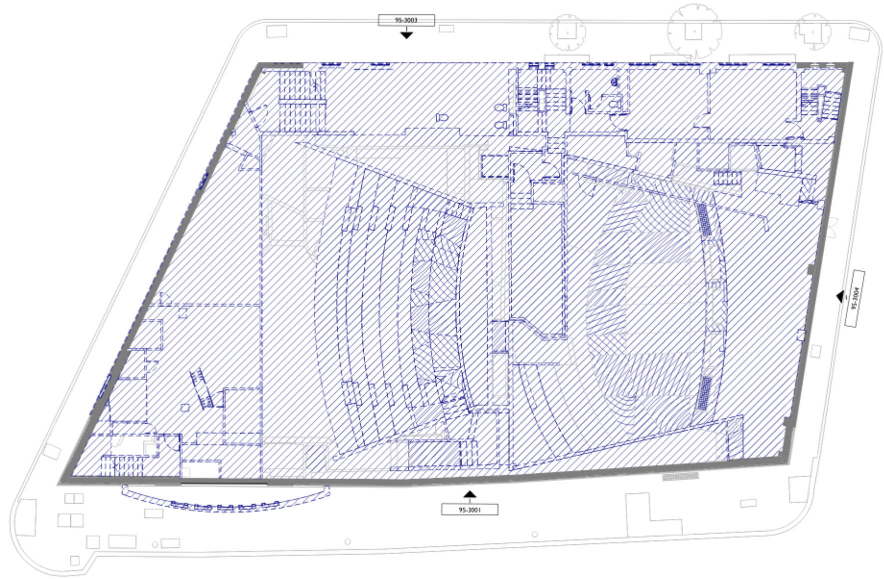


Figure 12: *Demolition plan prepared by SPPARC showing the extent of the retained façade*

3.2 Substructure

The proposed basement covers the full plan area of the site, with the objective to maximise the internal usable space. It has five storeys below Ground Floor, with an additional part floor above the B1 level. The basement uses include:

- Theatre auditorium
- Theatre offices
- Back of house areas
- Kitchen
- Plant space

The basement box will be formed using piled retaining walls which are propped at each floor level by reinforced concrete floor slabs. At the perimeter, the floors are supported by the piled wall, and internally by reinforced concrete walls and columns.

It is envisaged that a top-down construction method will be utilised for the formation of the basement storeys. This has the advantage of the sequential installation of the floor slabs as the excavation progresses thus helping to minimise movement of the ground around the excavation and subsequently minimising damage to neighbouring assets. The floor slabs have therefore been designed to provide both the temporary and permanent prop to the retaining walls, reducing movement by limiting the height of the walls between props, and preventing lateral deflections being "locked in" when restraint switches from the temporary to the permanent solutions.

The walls of the basement will be constructed using a secant pile wall to seal the site against water ingress. To maximise the basement footprint, it is proposed to pile through the existing pavement vaults along Shaftesbury Avenue and New Compton Street. It is likely that the historic vaults have been backfilled with demolition materials from previous developments. It is proposed that the piles will cut through the reinforced concrete retaining walls bases, which will then be fully removed as part of the basement dig. Piles will be cased through the fill material to maintain the stability of the pile borehole and to minimise impact on the adjacent structures.

At ground floor level, a capping beam will top off the piles The capping beam will be stepped to match the proposed site levels.

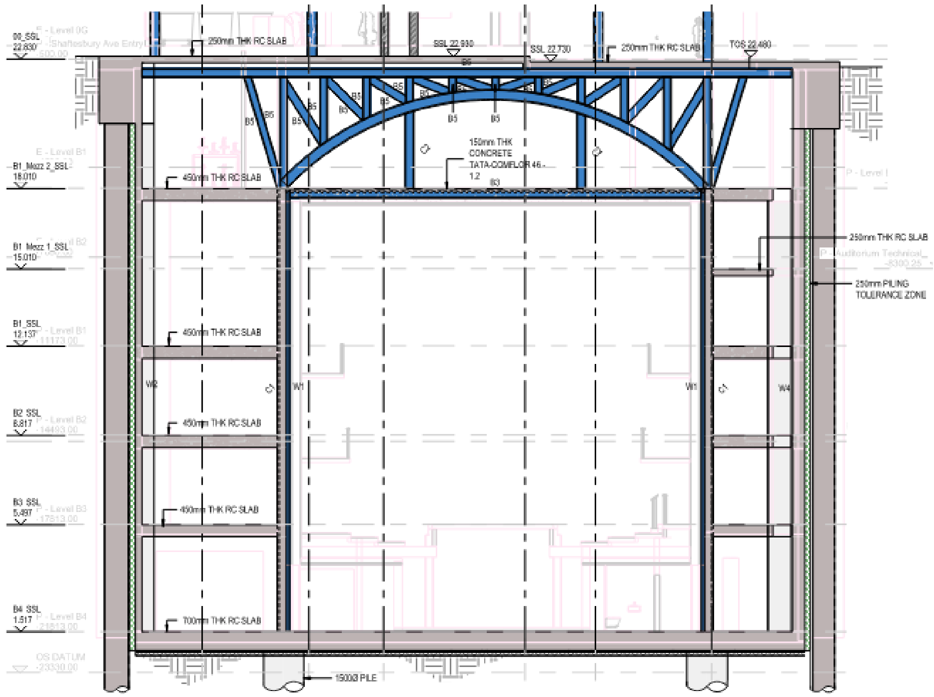


Figure 13: *Proposed east facing basement section*

3.3 Basement transfers

To achieve the large structure-free theatre within the basement, it is necessary to transfer the superstructure structural grid to a different arrangement within the basement.

It is proposed that the transfer structures are steel trussed arches, approximately 4m deep, located above B1 level. At the base of the arch, a steel tie is present to resist the horizontal thrust. This will also be utilised as a frame for a plant room space.

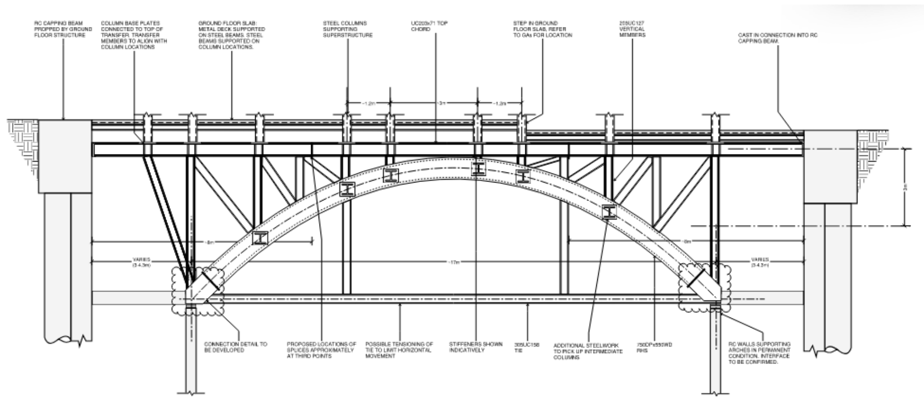


Figure 14: *Proposed trussed arch detail*

3.4 Plunge columns and temporary piles

In order to accommodate the top-down construction methodology required for the basement, the internal basement columns between Ground Floor and B4 level will need to be constructed as steel plunge columns.

Plunge columns are constructed by first boring a hole from the piling platform level down through to B4 and continuing below. A concrete pile is cast up to the underside of the underside of the B4 slab and a steel column dropped into the hole and cast into the pile. The hole around the column is then backfilled up to piling platform level with gravels which can be easily excavated as the excavation of the basement is carried out.

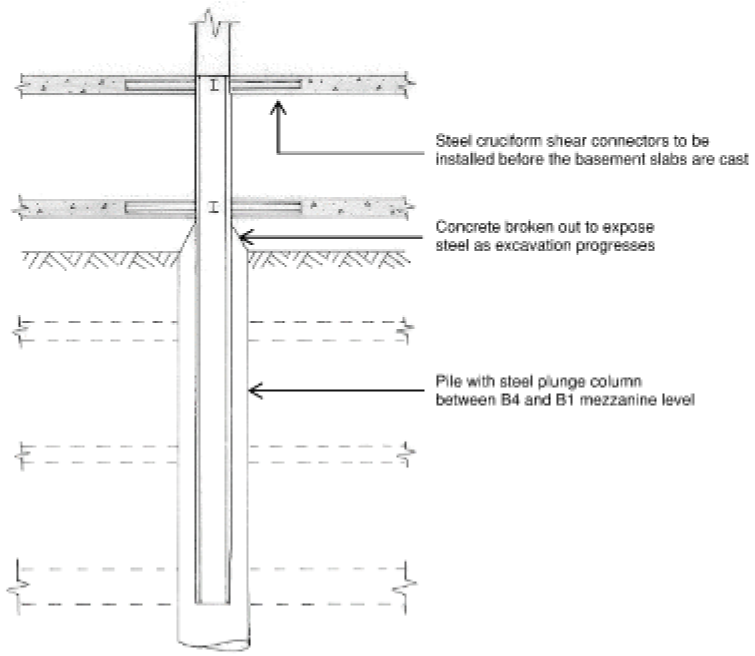


Figure 15: *Typical plunge column detail*

Internal reinforced concrete walls around lift, stair cores and the auditorium will be cast after the basement has been excavated. Temporary plunge columns or piles will be used to support the floor slabs during the construction phase. Voids will be let in the slab and the reinforced concrete lift and stair walls constructed around the voids follow completion of the basement excavation and construction of the B4 slab.

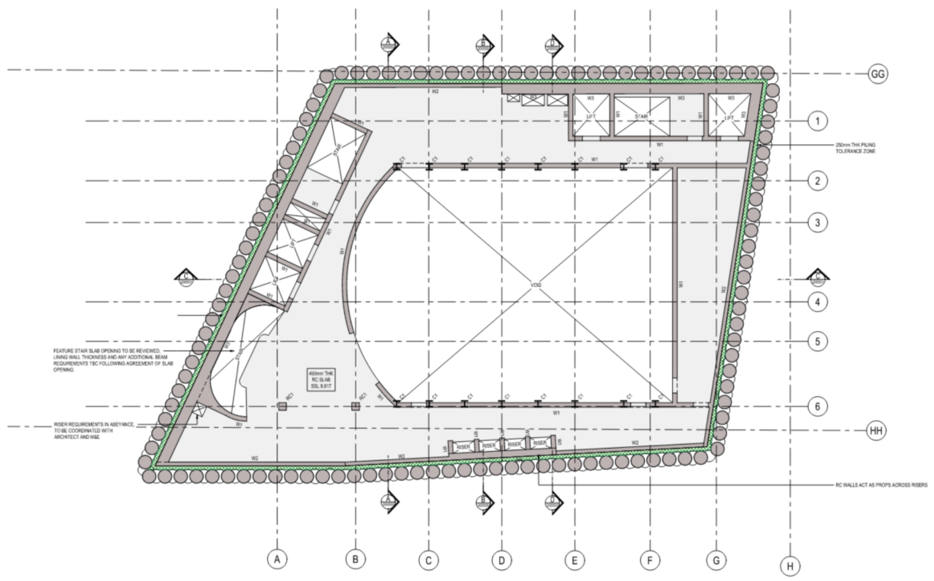


Figure 16: *Proposed B2 level plan*

This method allows for the construction of the superstructure to be progressed at the same time as the basement is being excavated and constructed, where-by superstructure columns are core walls can be supported on the plunge columns and temporary piles.

3.4.1 Raft foundation

Based on geotechnical information and advice, a piled raft foundation solution is proposed. The raft will therefore be subject to uplift forces as the London Clay heaves. Piles below the raft will act as tension piles to resist any uplift forces from heave. Further to this, below ground drainage will also be installed below the raft to remove the build-up of water prssure.

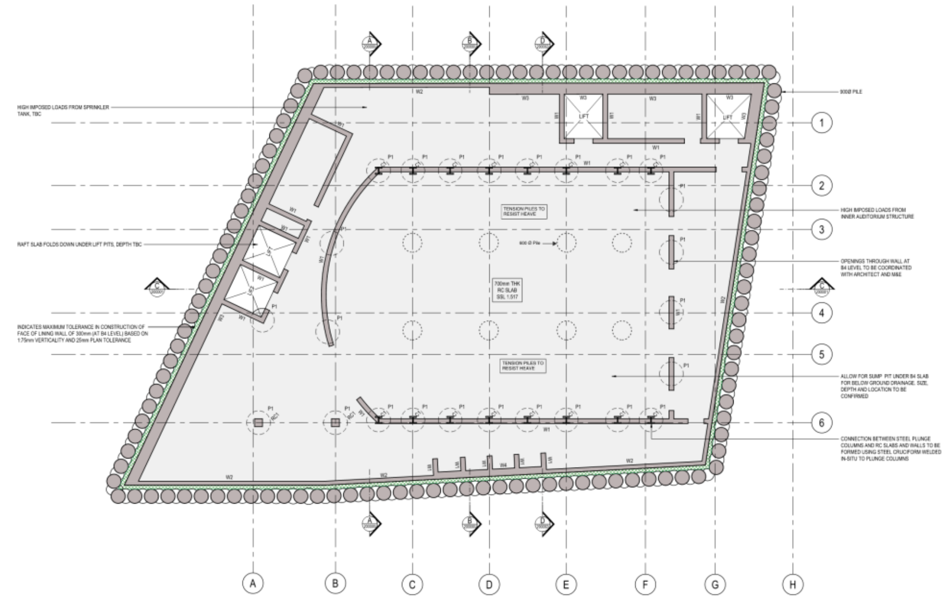


Figure 17: *Proposed B4 level plan*

3.4.2 Basement stability

In the temporary condition, the lateral soil loads will pass into the reinforced concrete floor diaphragms, which will act as deep beams spanning between pile retaining walls to prop the piled wall.

In the permanent case, these deep beams will be augmented by the reinforced concrete lining walls to the pile retaining walls and auditorium walls, which will act as vertical shear walls.

The location of the temporary and permanent voids in the floor plates will be a consideration in the scheme design so as to maintain this propping action and temporary props across voids may be necessary. Additional lateral stiffness will be achieved through the provision of reinforced concrete walls around points lift and stair cores.

3.4.3 Theatre structure

The theatre structure is proposed to be in lightweight steel construction, supported off the B4 slab. To control vibration and noise transmission out of the theatre box into the other parts of the building, it is proposed that the auditorium is acoustically isolated, using appropriate detailing and connections.

3.5 Superstructure

The proposed superstructure is to host the following uses:

- Hotel accommodation
- Hotel front of house areas
- Back of house areas
- Plant areas

The superstructure has been designed as a steel frame supporting metal deck reinforced concrete slabs, to minimise the weight of the superstructure on the basement transfer arches. The ground floor slab will be a reinforced concrete slab supported on the top chord of trussed arches.

The superstructure gird prioritises an efficient hotel room layout. Columns within the hotel portion of the building are position within room partitions, typically at 4.9m centres. The structural grid has been coordinated to maintain vertical column alignment across most of the building's footprint, minimising the need for transfer structures at lower levels.

Between levels 07 and 09, the northeast corner of the floorplate is locally extended. In this location the structural frame will extend to support the floorplate. The superstructure sets back to the north at levels 09 and 10. The step backs are aligned with the structural grid, where possible, to minimise transfer requirements. Localised transfers will be required in some areas to achieve the floorplate extension and setbacks, and these are to be coordinated with the design team.

3.6 Superstructure stability

Stability to the superstructure will be provided by bracing within the vertical circulation core, located centrally to the building. At each level the floor slabs will act as horizontal diaphragms transmitting the horizontal wind forces into the bracing.

3.7 Basement waterproofing

With reference to BS8102:2009, the basement will be a Grade 3 habitable space, which means: a dry environment with no water penetration and additional ventilation, dehumidification, or air condition appropriate to the intended use. Two methods of protection against water ingress are required.

To achieve this, the basement will have Type B and C water-resisting construction, combining a piled wall faced with a reinforced concrete lining wall designed to BS EN 1992 and a drained cavity to give the highest degree of protection.

The piles will be lined with a sprayed reinforced concrete wall which retains water and stops it entering the basement. The concrete will be designed for hydrostatic pressure and with 0.2mm crack widths with crack inducers and water bars in accordance with BS 8102:2009.

As part of the system, any water that seeps through will be collected in the drained cavity, directed to a sump and be pumped up to high level where it will drain under gravity into the main drainage system.

3.8 Retained façade

The existing masonry façades on Shaftesbury Avenue, Stacey Street, New Compton Street and St Giles Passage will be retained as far as feasibly possible, with local repairs required where historic cracking and movement has occurred.

Figure 18: *Visual of proposed façade retention works viewed from the corner of New Compton Street and St. Giles Passage – "Construction Management Plan – Saville Theatre Rev 03"*

The original frame built in the late 20's consisted of a steel frame supporting the façade. The building has gone through a refurbished works since which have likely altered the support condition of the façade.

In absence of information from the 1970s and 2000s structural alterations, it is assumed that the masonry façade is self-supporting and supported at ground level, with localised piers transferring the loads onto the basement foundations, where vaults are present. Detailed intrusive investigations are scheduled at the following stages of the project which will address any unknowns and support the detail design development of the façade.

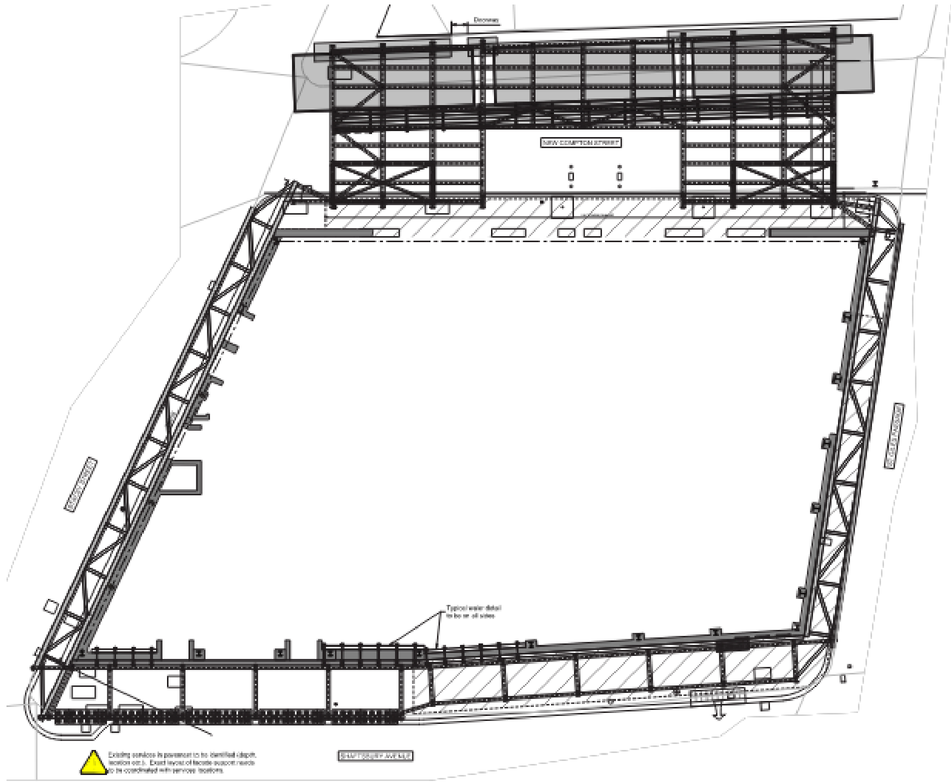


Figure 19: *Plan schematic of the façade retention proposals – "Construction Management Plan – Saville Theatre Rev 03"*

Along Shaftesbury Avenue, and New Compton Street the façade retention temporary works will likely consist of a traditional façade retention frame with a series of columns and beams providing lateral stability to the façade. Vertically, the façade is to be supported on a reinforced concrete pynford beam, spanning between the steel transfer trusses. The pynford beam is to be constructed in a hit-and-miss sequence to ensure the façade stability.

Along Stacey Street and St. Giles Passage, due to the narrow width of the roads, it is proposed that temporary steel trusses spanning horizontally onto the Shaftesbury Avenue and New Compton Street façade retention gantries provide the lateral support to these façades during construction. The trusses will be propped on temporary columns supported on shallow footings.

Along New Compton Street, the existing façade will be partially removed. Along this elevation, it is proposed that the retained parts of the façade are laterally restrained by steel frame gantries that will also be used for site welfare facilities.

The proposed internal steel structure will stabilise the retained masonry façade in the permanent case. The connections will allow vertical movement, to avoid new floor loads being transferred into the masonry wall.

4. General Design Criteria

4.1 Design life

The structural frame will be designed in accordance with the relevant Eurocodes which are intended to provide for a design life of 50 years. Appropriate concrete cover for concrete elements (taking into consideration sulphates, fire, carbonation, chlorides, and freeze/thaw attack) and paint/galvanising systems for steel elements will be specified as required to provide adequate protection. Periodic inspection and maintenance will be required throughout the life of the building to ensure protection measures are performing adequately. External structures will require more frequent inspection and maintenance than internal structures due to more severe exposure conditions.

4.2 Codes and standards

Eurocodes will be typically adopted for the design of the structure, including the following:

Loading:	BS EN 1991-1(2002) Dead & Imposed BS EN 1991-3(2003) Snow BS EN 1991-4(2005) Wind
Concrete:	BS EN 1992
Steel:	BS EN 1993
Masonry:	BS EN 1996
Timber:	BS EN 1995

4.3 Fire rating

Fire ratings are based upon the requirements of Approved Document B – Fire Safety. Refer to Architect's / Fire Consultant's information for fire ratings. Concrete elements will be specified with the appropriate cover to suit fire ratings in specific areas. Adequate protection in the form of intumescent paint or other manes of fire protection will be required for structural steel elements as specified by the Architect.

4.4 Disproportionate collapse

As the building is to function as a hotel that does not exceed fifteen storeys and a building to which members of the public are admitted and where the floor area of each storey does not exceed 2000m^2 it would be classed as 2B in accordance with Approved Document A – Structure. The structure shall be designed to meet the criteria of this classification with the required effective horizontal and vertical ties provided throughout. Checks for the effect of notional removal and the design of supporting elements as key elements will be required where effective vertical tying is not possible.

4.5 Loadings

The below loadings have been assumed at this stage of the design, and are to be confirmed in the next stages, with the design team and client.

- Hotel: Live load = 2.5kN/m^2 Superimposed dead load = 1kN/m^2
- Circulation: Live load = 4.0kN/m^2 Superimposed dead load = 1kN/m^2 + 140mm medium dense blockwork along core wall lines
- Plant: Live load = 5.0kN/m^2 Superimposed dead load = 1kN/m^2
- Terraces: Live load = 5.0kN/m^2 Superimposed dead load = 1kN/m^2
- Roof: Live load = 1.5kN/m^2 Superimposed dead load = 1kN/m^2
- Cladding: 5kN/m at each floor, L5 and above
- Theatre: Live load = 5.0kN/m^2 Superimposed dead load = 1kN/m^2

5. Construction Method Statement

Construction Generally

It is assumed that these measures and assumed sequence of works are considered in the eventual detailed design and construction of the proposed works.

Detailed method statements and calculations for the enabling and temporary works will need to be prepared by the Contractor for comment by all relevant parties including Party Wall Surveyors and their Engineers. Elliott Wood will need to ensure that adequate supervision and monitoring is provided throughout the works particularly during the excavation and demolition stages.

To this end, Elliott Wood will have an on-going role during the works on site to monitor that the works are being carried out generally in accordance with Elliott Wood's design and specification. This role will typically involve weekly site visits at the beginning of the project and fortnightly thereafter. A written site report is to be provided to the design team, Contractor and Party Wall Surveyor.

Access for construction traffic and site workers onto the site will be from Arlington Street and must be coordinated in a sensible manner to minimise disruption to the adjoining residents and provide a safe working environment.

Stage 1 – Site set up

- Set up site hoarding along the site boundary
- Before starting works, the contractor is to ensure that all services have been located/switched off/made safe for the duration of the construction works
- The site is to be set up for vehicle access necessary to enable the demolition and construction works to commence
- Prior to demolition and construction, monitoring points should be installed to façades that will be impacted by the proposed demolition and construction works, as outlined in the Ground Movement Assessment Report, and a baseline reading taken prior to works starting

Stage 2 – Enabling works

- Infill existing vaults along Shaftesbury Avenue (if required, to be confirmed by site investigations)
- Carry out soft strip and localised demolition to allow mini rig access into the existing ground floor and B1 levels
- Install back-propping between B2 and B1 level slabs
- Install ramp to B1 level for piling rig access

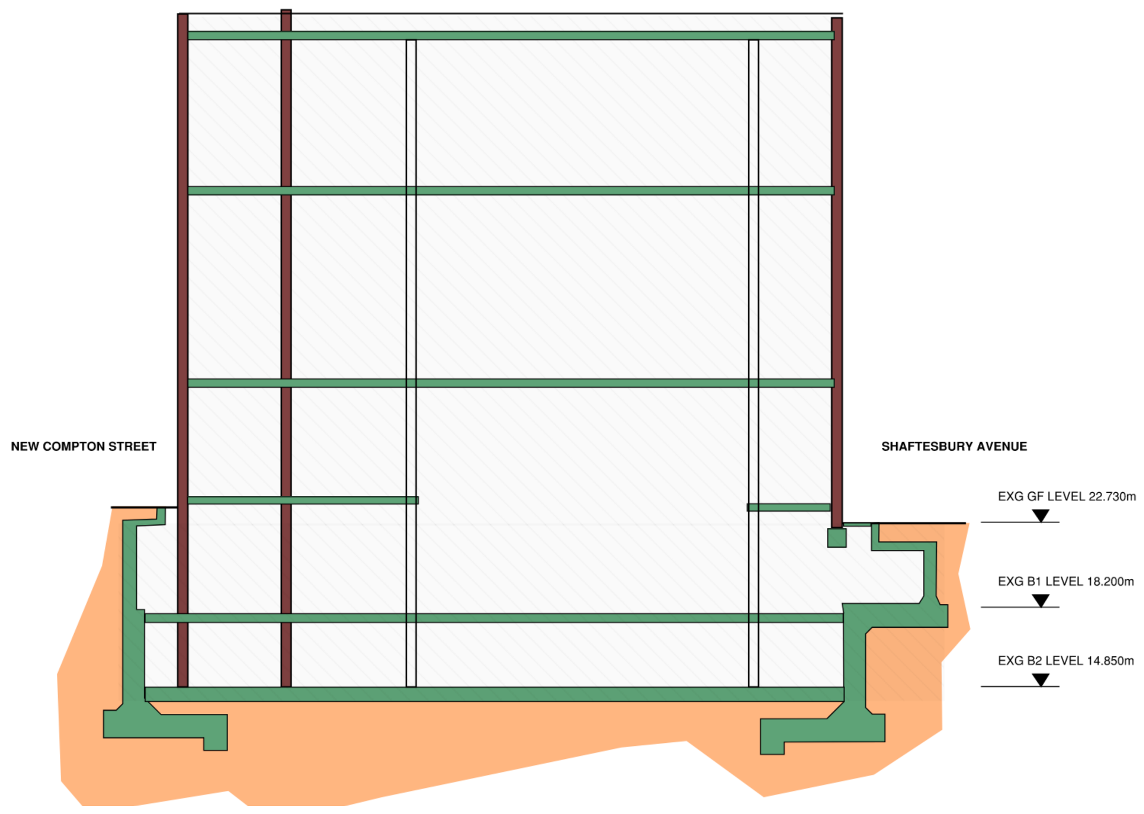


Figure 20: *Stage 1 - Site set up*

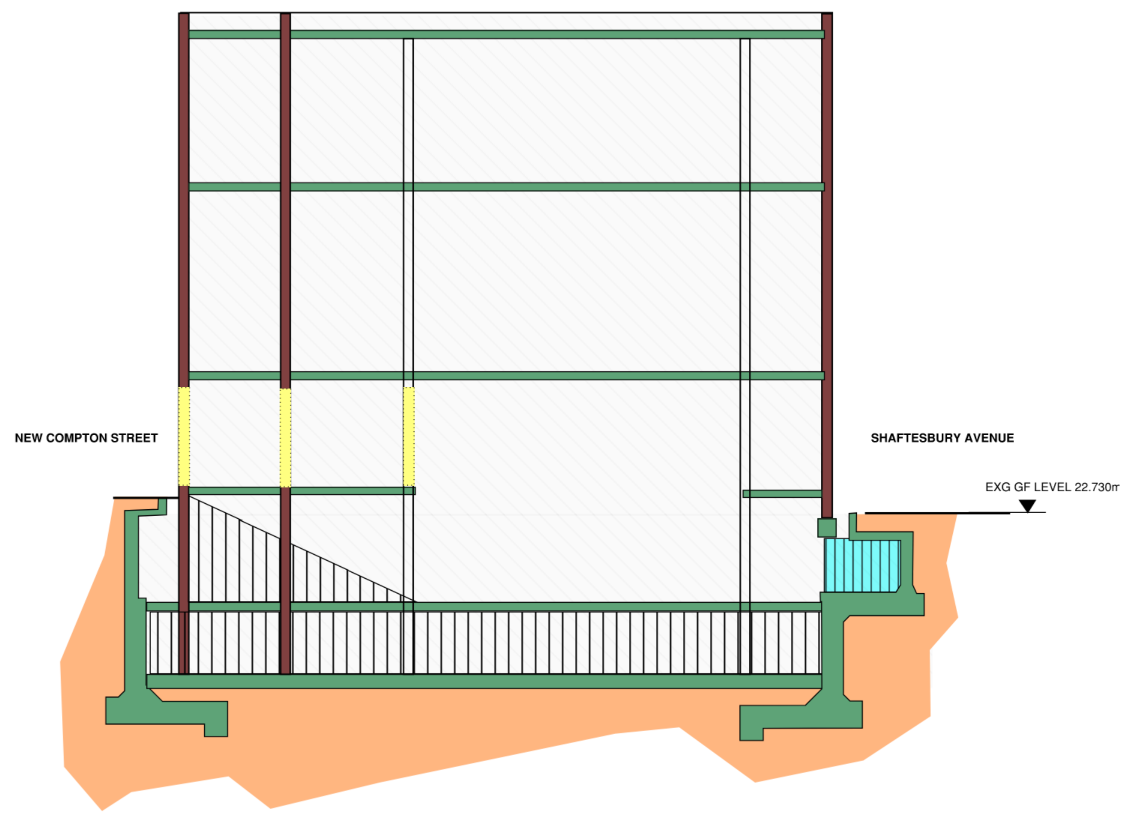


Figure 21: *Stage 2 - Enabling works*

Stage 3 – Piling and façade retention

- Install piled wall through Shaftesbury Avenue vaults
- Install temporary piles with plunge columns internally for Shaftesbury Avenue façade retention frames. Temporary piles located to avoid locations of permanent piles
- Install needles between temporary plunge columns and perimeter piled wall to support Shaftesbury Avenue façade, and construct pynford beam
- Shaftesbury Avenue: construct façade retention frames
- Stacey Street and St Giles Passage: erect horizontal trusses to provide lateral support to facades
- New Compton Street: Erect gantry and façade retention frames suitable to create a temporary opening for site access through north elevation

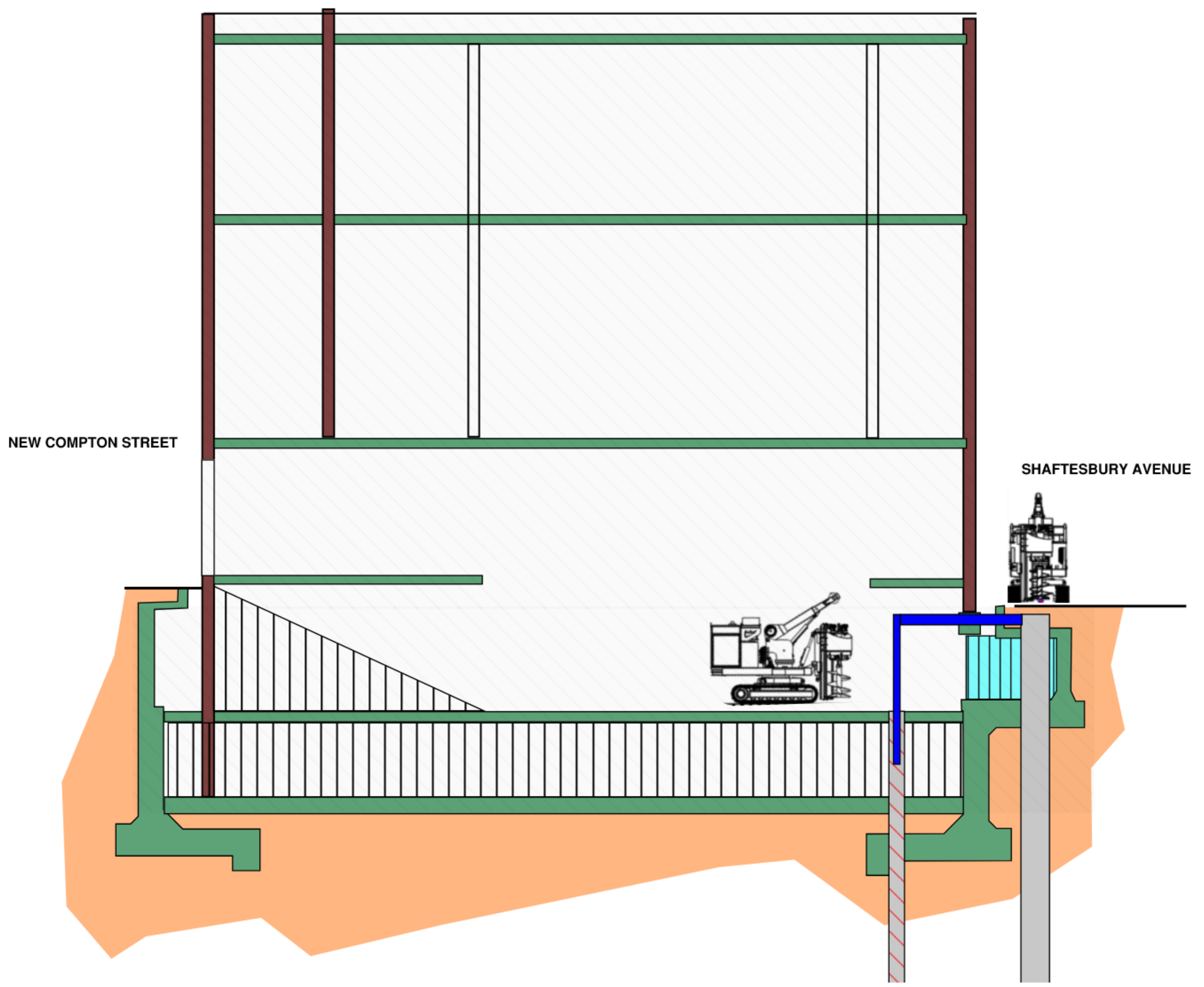


***Figure 22**: Stage 3 – Piling works*

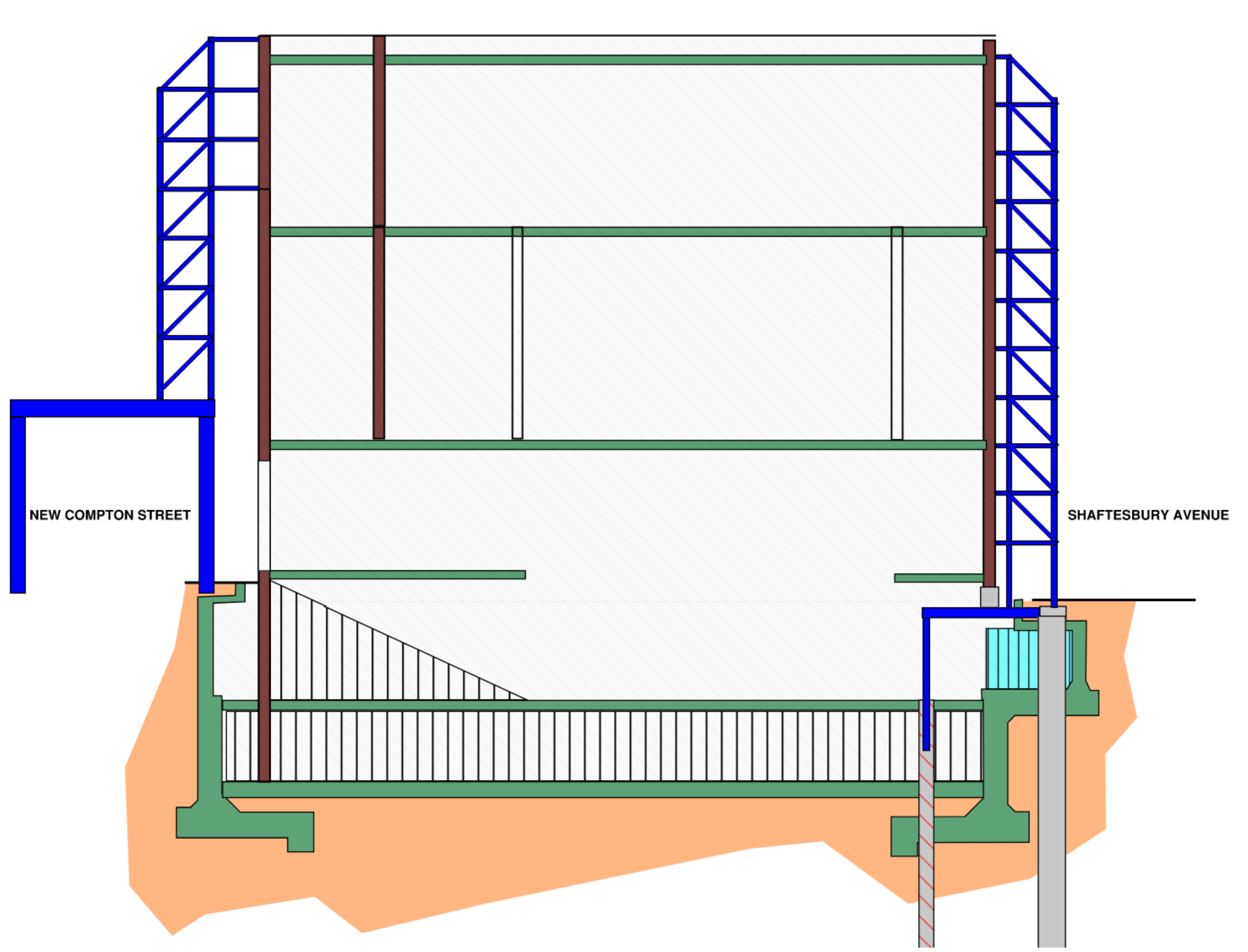


***Figure 23**: Stage 3 - Façade retention works*

Stage 4 – Demolition

- Commence demolition, starting from the top floors
- Install propping frame below ground floor and at B1 level to enable demolition of existing basement slabs
- Cut through existing retaining wall foundations and backfill with loose fill, for permanent piling works
- Demolish Ground floor and B1 slabs

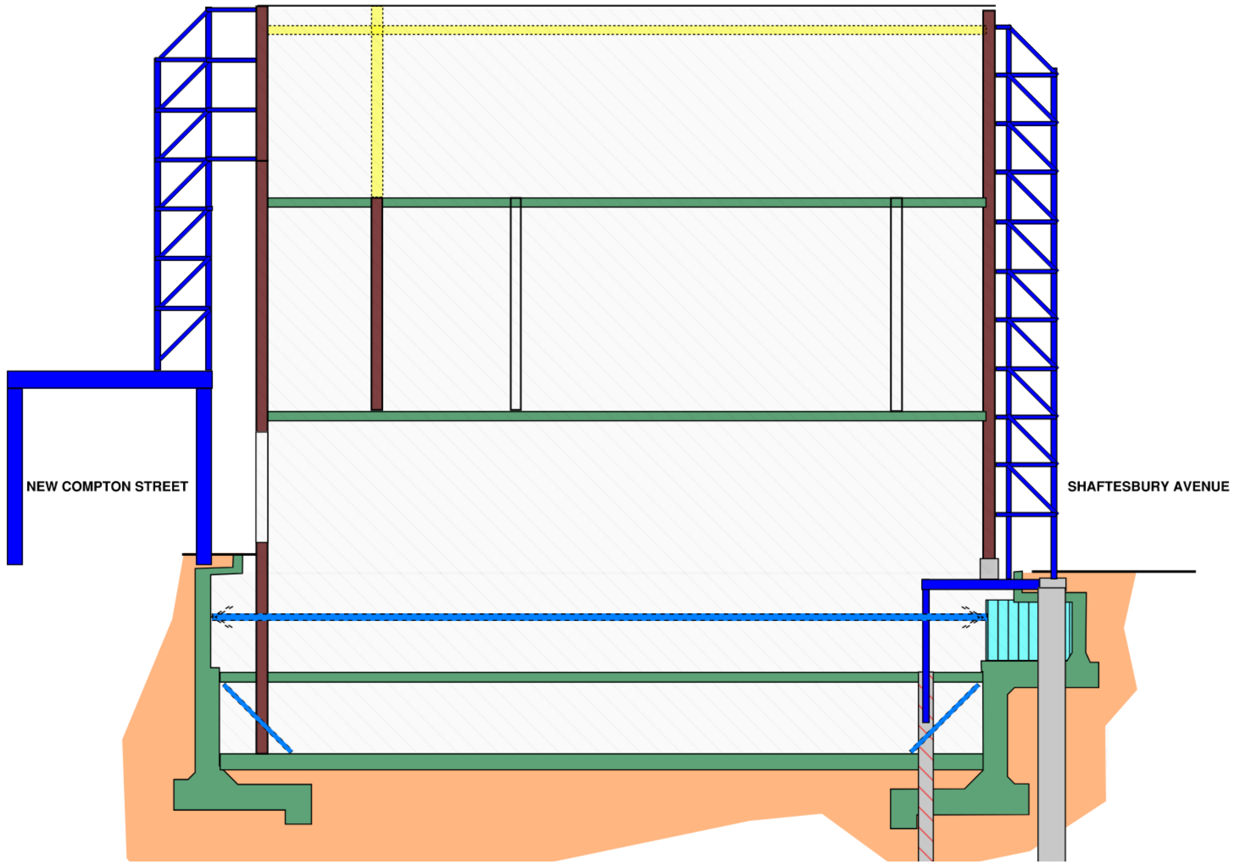


Figure 24: *Stage 4 - Commence demolition and install façade retention propping frame*

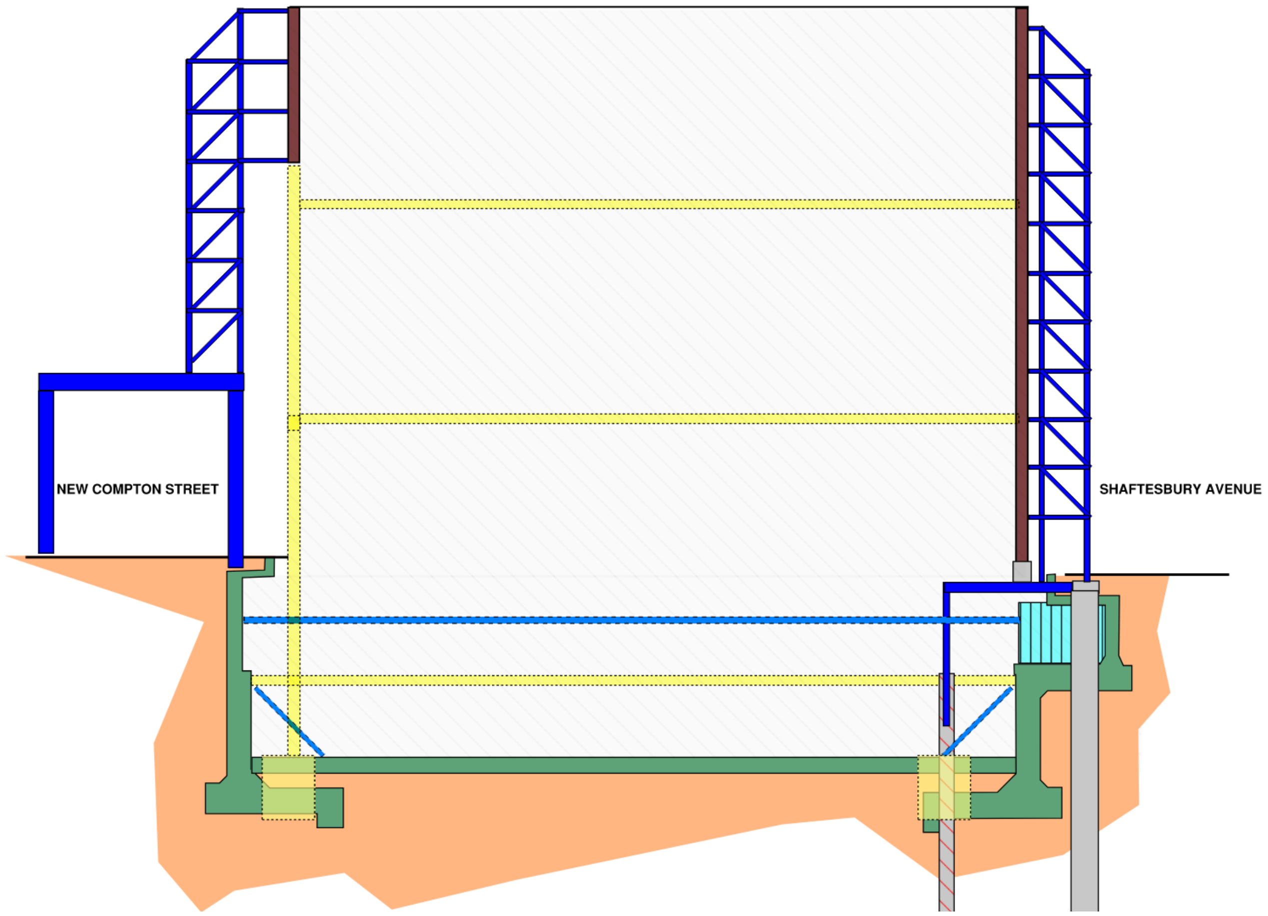


Figure 25: *Stage 4 - Demolish ground and B1 slabs*

Stage 5 – Piling

- Install piling platform and remove temporary props while backfilling in appropriate sequence
- Install perimeter secant pile wall to New Compton Street, Stacey Street and St. Giles Passage
- Install plunge columns for top-down construction and other internal piles required

Stage 6 – Cast capping beam

- Following completion of the piling works capping beam casting works can commence

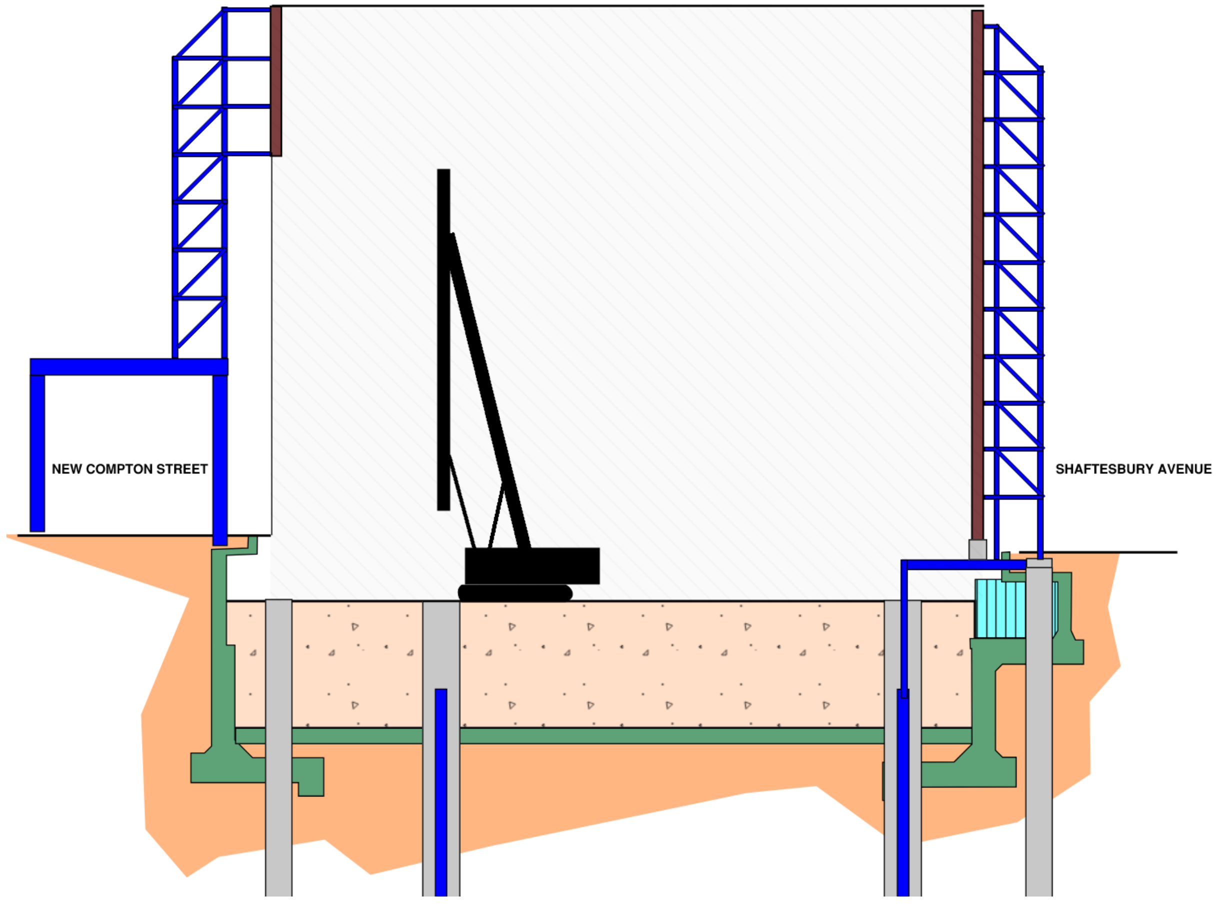


Figure 26: *Stage 5 - Piling*

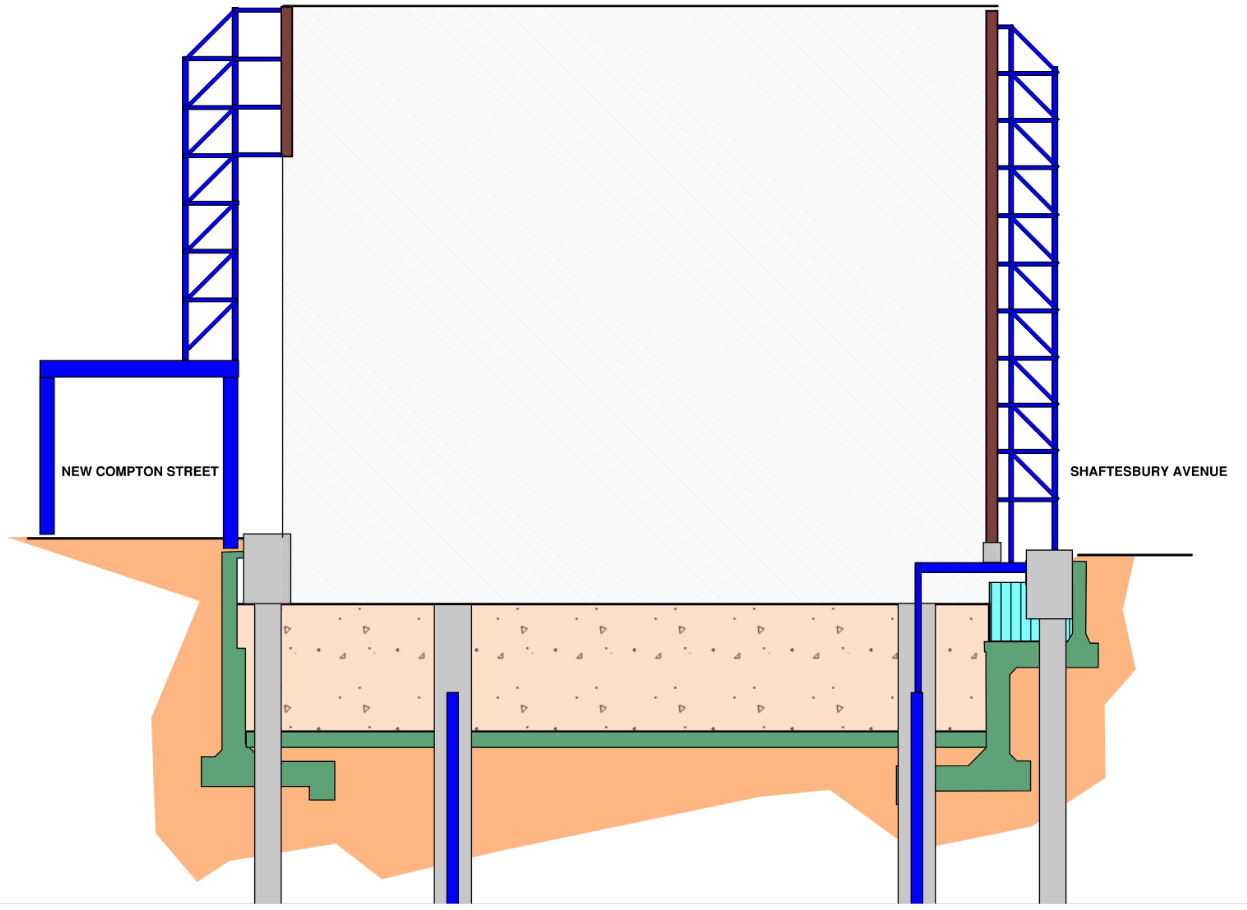


Figure 27: *Stage 6 - Cast capping beam*

Stage 7 – Install transfer arches

- Remove the piling mat down to new B1 mezzanine formation level
- Install trussed arches; arches are supported on the plunge columns with top chord at the perimeter connected to the capping beam
- Re-support the pynford beam supporting the retained façade on the permanent steel trusses, works to be carried out in controlled sequence

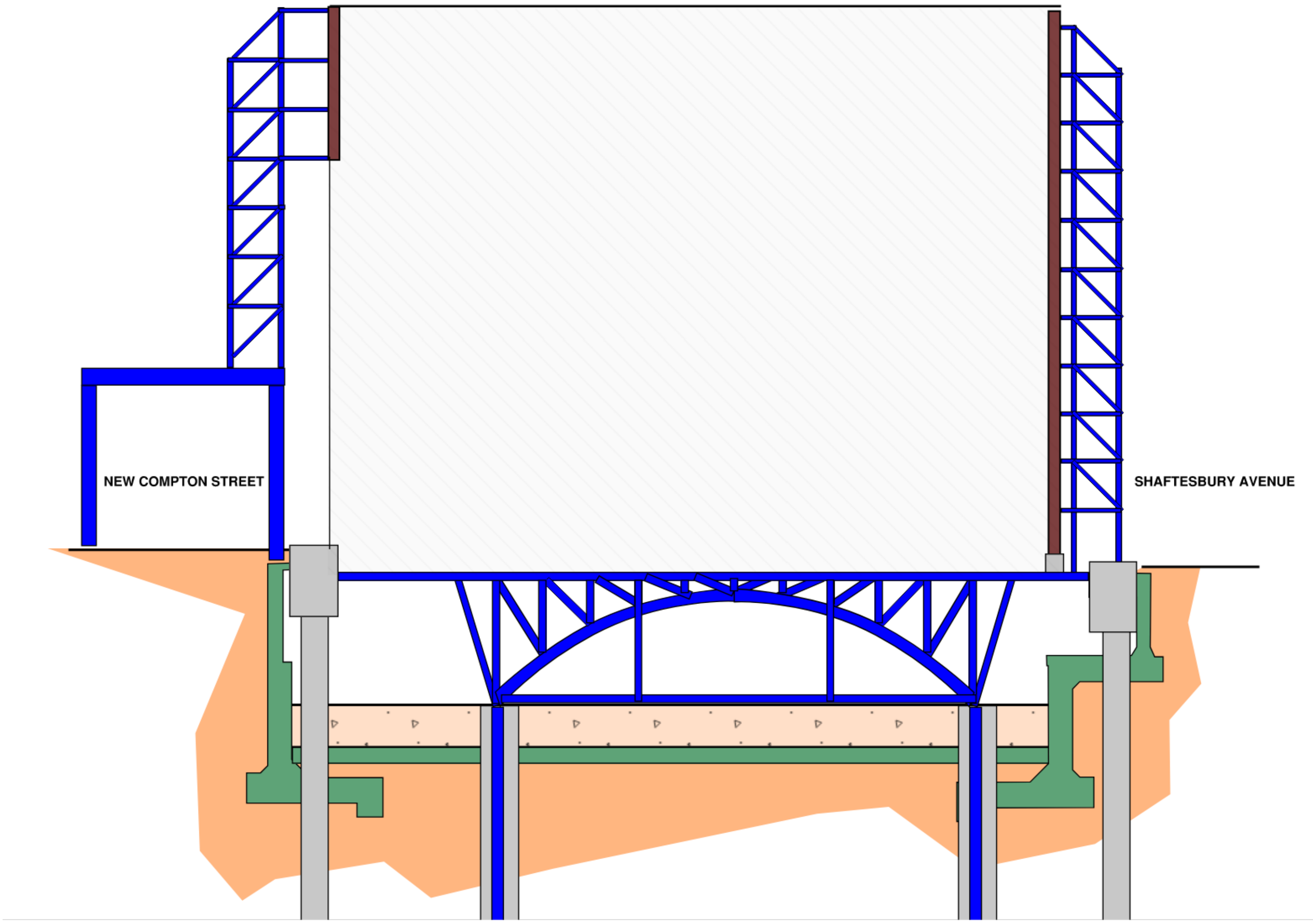


Figure 28: *Stage 7 - Install transfer arches*

Stage 8 – Construct ground and B1 mezzanine slabs

- Fix reinforcement, install shuttering and cast ground floor slab supported on the top chord of the trussed arches
- A mole hole will be left in the slab, confirmed by the contractor to allow for the excavation of the ground below
- Cast B1 mezzanine slab, supported on the plunge columns and dowelled into the perimeter piled wall leaving starter bars for the lining wall and the auditorium wall

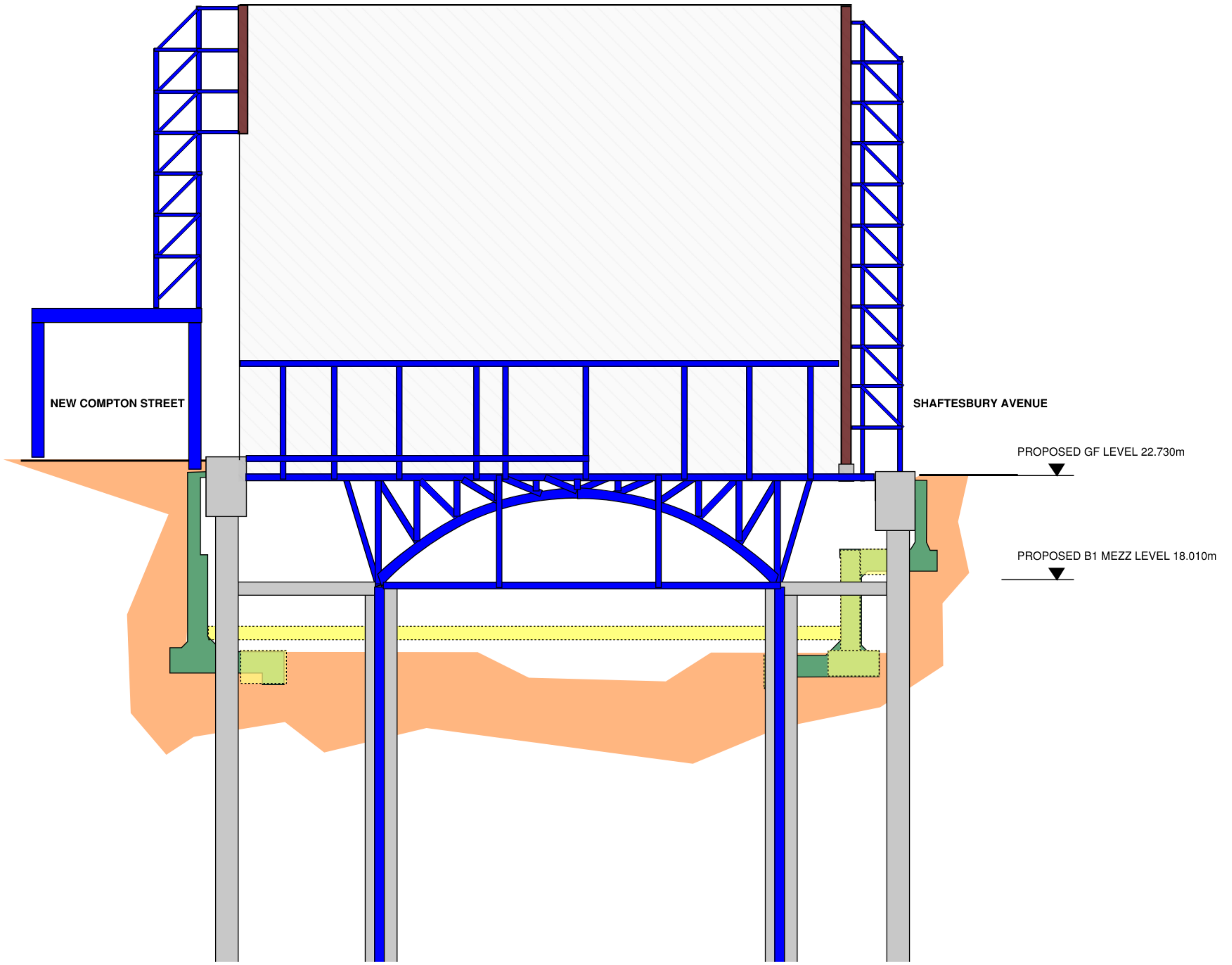


***Figure 29**: Stage 8 - Construct ground floor slab and commence superstructure construction. Cast B1 mezzanine slab.*

Stage 9 – Excavation and construction of B1 slab

- Excavate beneath B1 mezzanine level to B1 formation level
- Break out the concrete encasement to the steel plunge columns and install steel cruciforms required to support the B1 slab
- Fix rebar and cast B1 slab, dowelled into the perimeter piled wall, leaving starter bars for the lining wall and the auditorium wall
- Install temporary steel props across auditorium void; once concrete has gained sufficient strength, excavation below B1 slab can commence

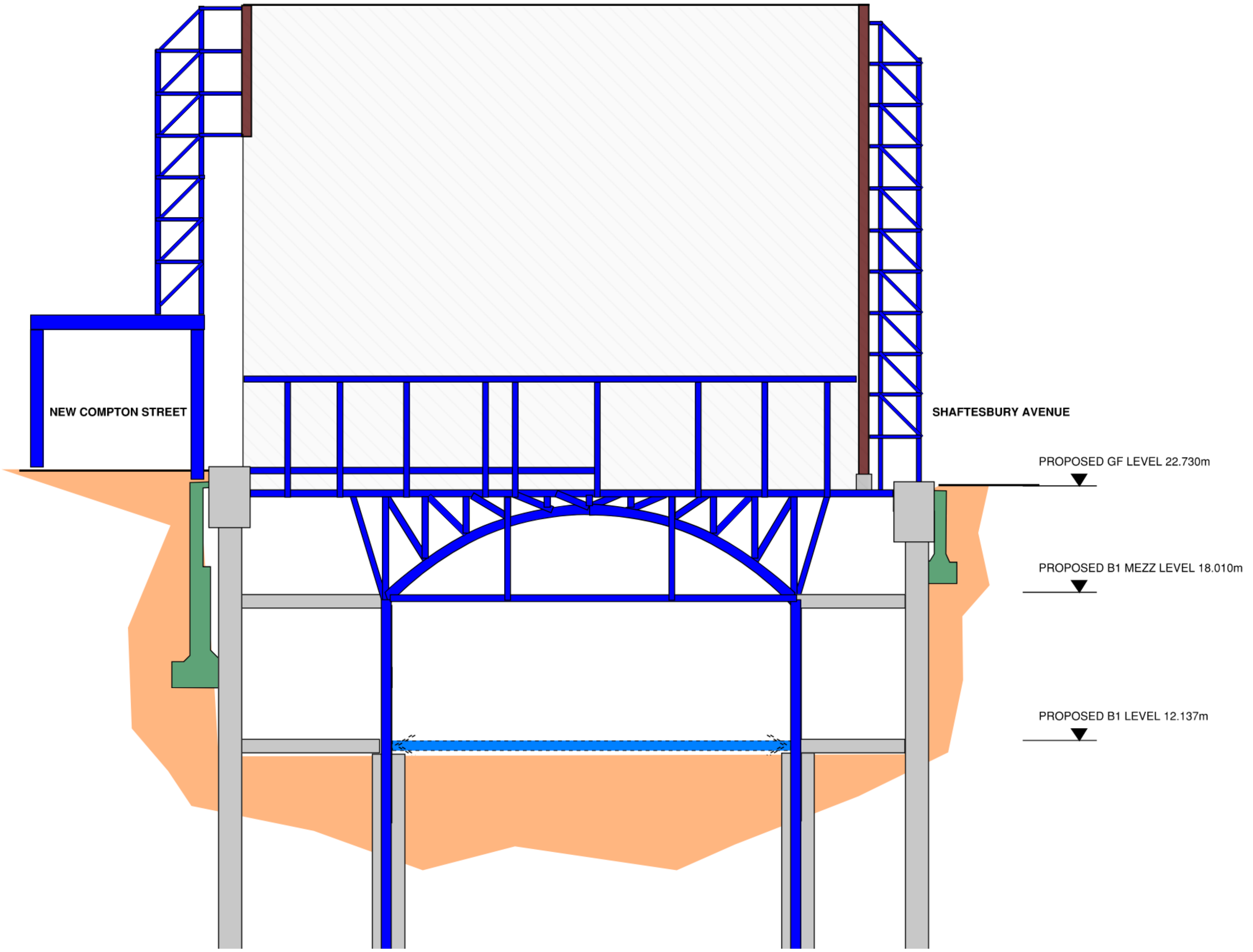


Figure 30: *Stage 9 - Excavate and construct B1 slab, continue superstructure*

Stage 10 – Excavation and construction of B2 slab

- Excavate beneath B1 level slab to B2 formation level
- Break out the concrete encasement to the steel plunge columns and install steel cruciforms required to support the B1 slab
- Fix rebar and cast B2 slab, dowelled into the perimeter piled wall, leaving starter bars for the lining wall and the auditorium wall
- Once concrete has gained sufficient strength, excavation below B2 slab can commence

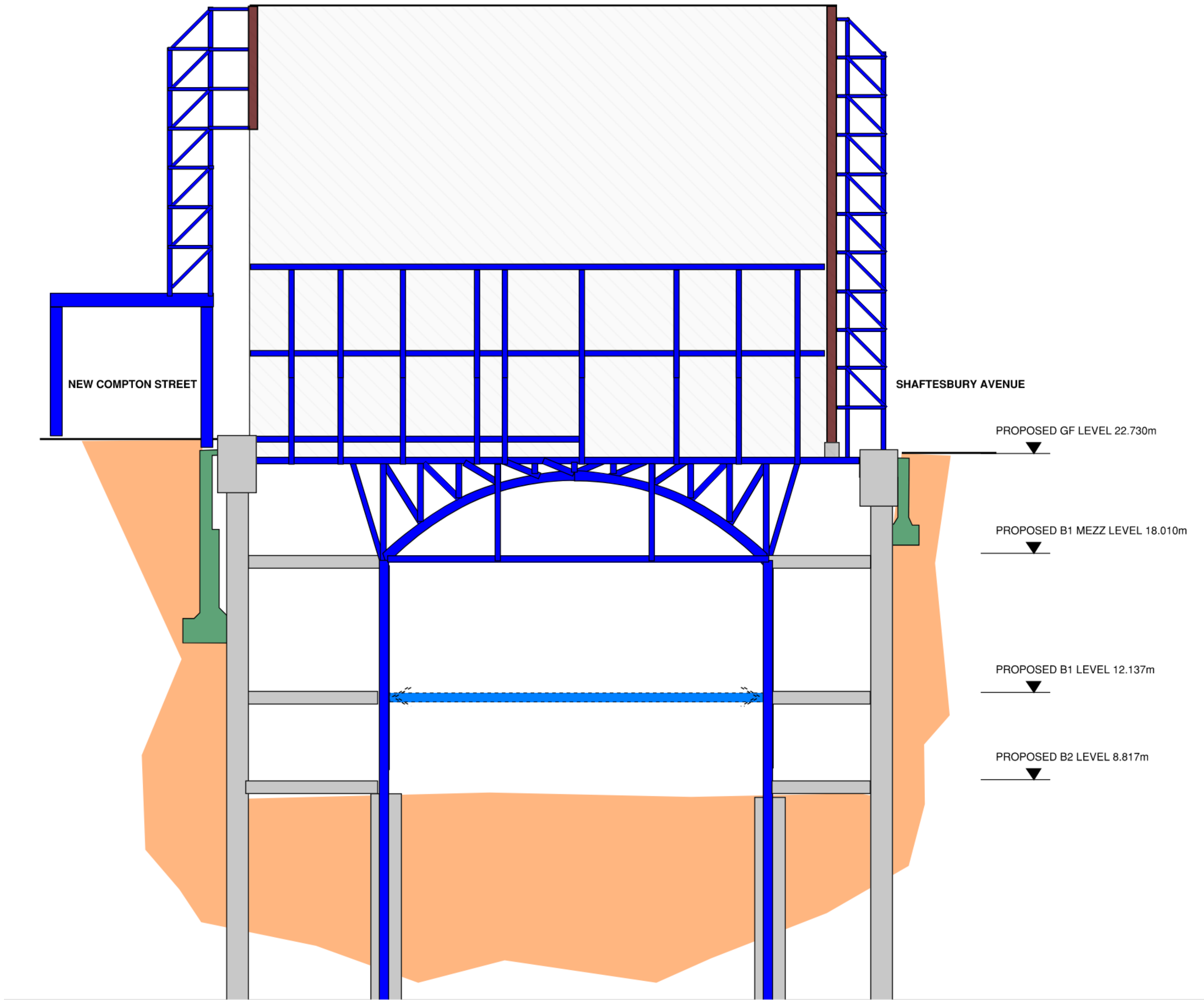


***Figure 31**: Stage 10 - Construct B2 slab*

Stage 11 – Excavation and construction of B4 slab

- Excavate beneath B2 level, to B4 formation level
- Install drainage
- Break out concrete encasement to plunge columns
- Fix rebar, shutter and cast raft slab
- Cast lining walls

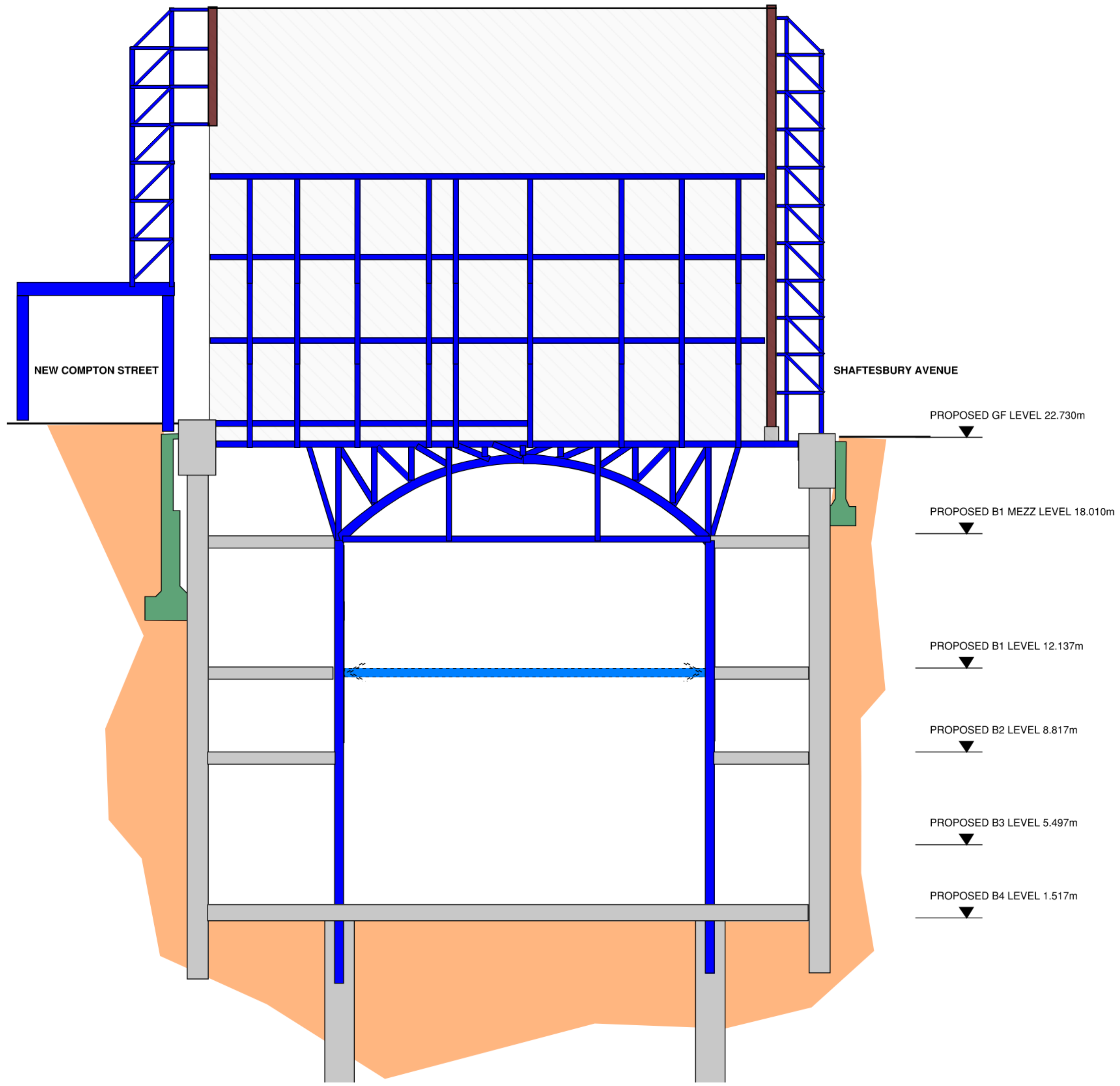


Figure 32: *Stage 11 - Construct B4 slab*

Stage 12 – Construction of permanent walls and columns and B3 slab

- Once excavation is complete, construction of core walls, auditorium perimeter wall and columns can commence
- Fix rebar, install shuttering and cast walls/columns
- Once walls and columns have gained sufficient strength, sacrificial temporary columns can be removed
- Remove temporary prop at B1 level
- Infill the temporary opening through New Compton Street Façade and remove all façade retention frames

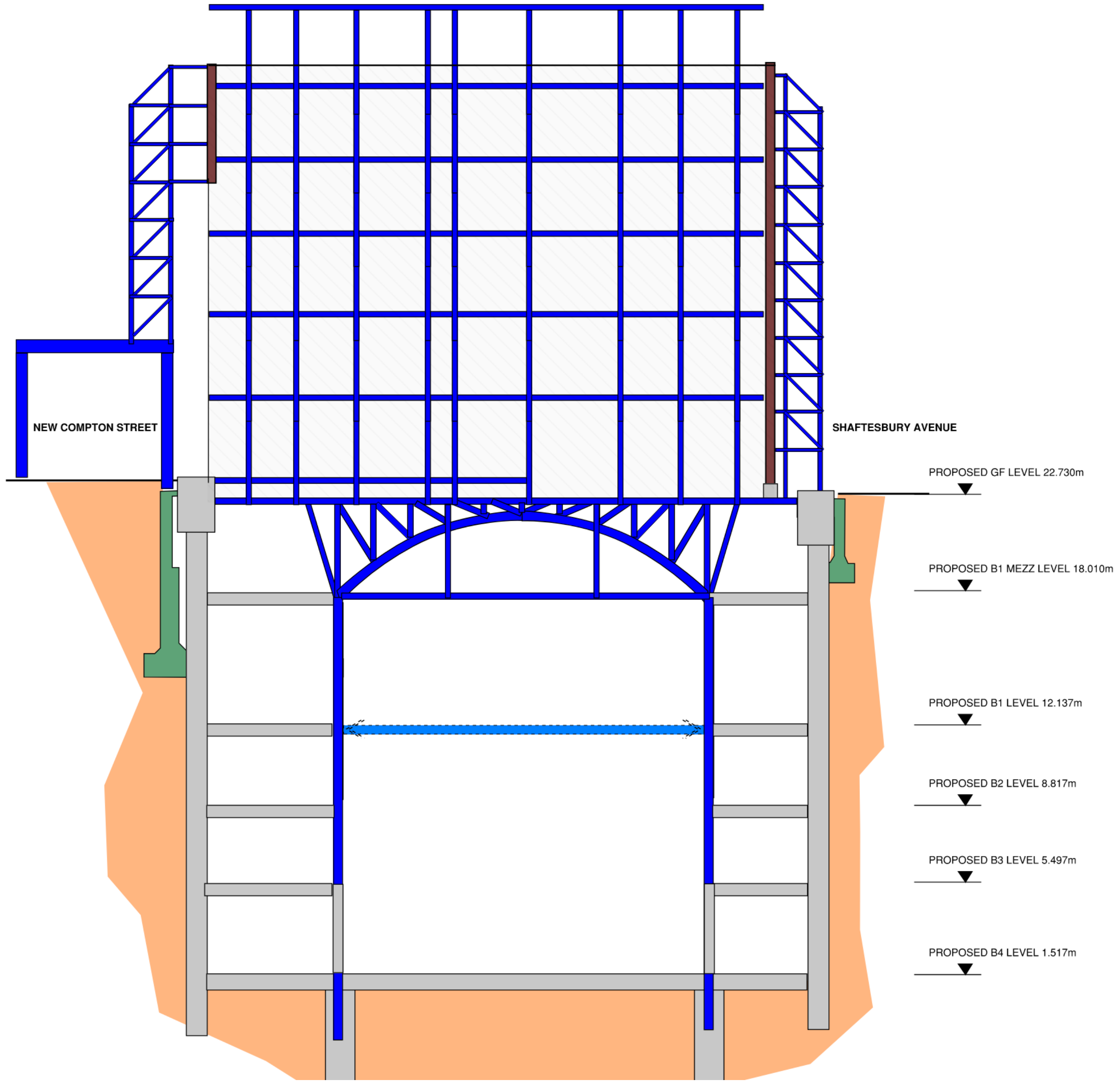


Figure 33: *Stage 12 - Construct B3 level*

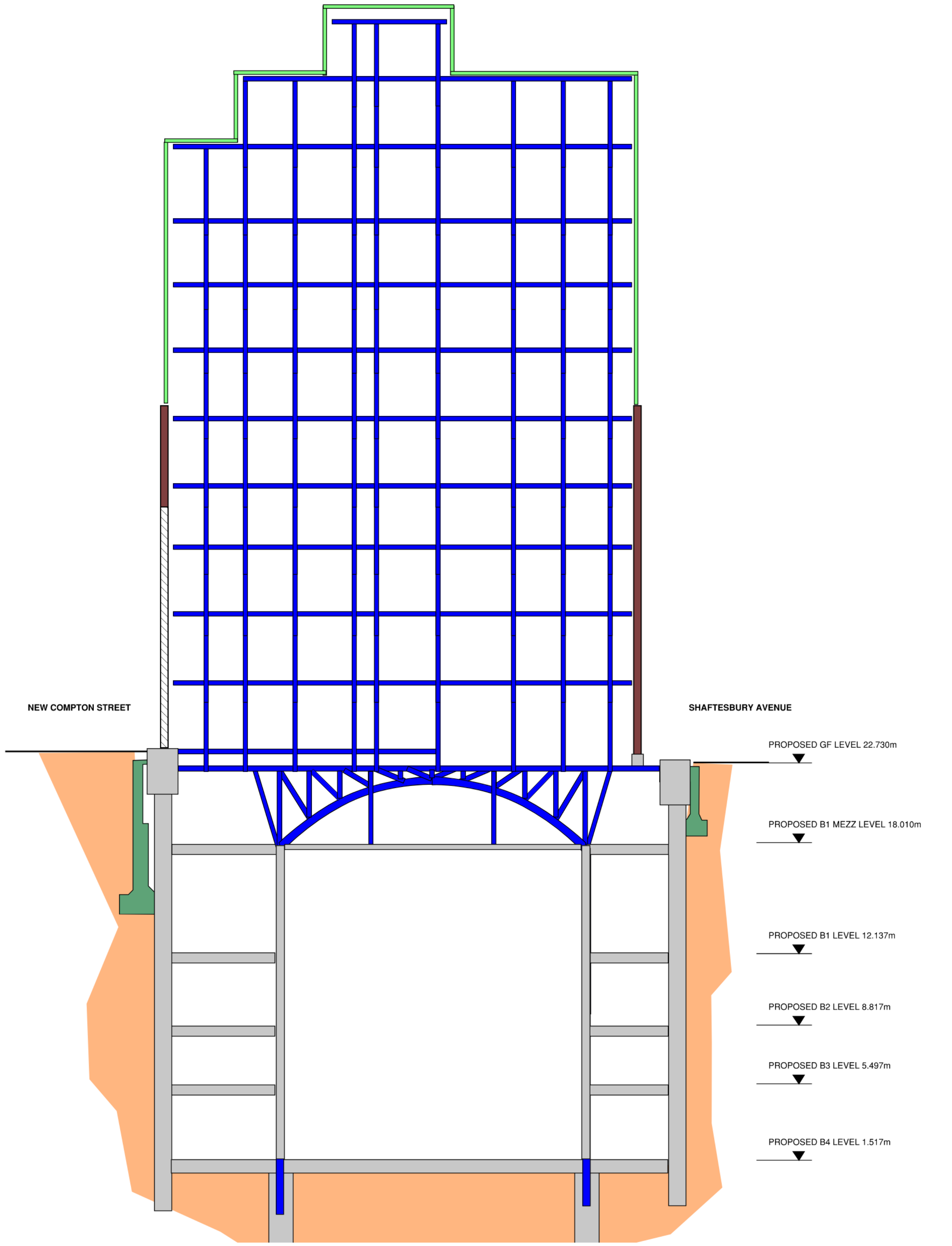


Figure 34: *Building complete*

6. Dust, Noise and Vibration

The Camden Planning Guidance states that "construction management plans should include management of noise, vibration, dust and waste".

The construction works will involve top-down construction of the basement, meaning that superstructure works are likely to happen simultaneously with substructure works. A more detailed sequence of works has been given in the previous section. Those most likely to be affected by noise, dust and vibration will be the immediate neighbours at 125 Shaftesbury Avenue, 151 Shaftesbury Avenue and Pendrell House. There may be some impact on other residents along Shaftesbury Avenue due to the related construction traffic, but this should be minimal.

Below, the mitigation measures that are proposed to keep noise, dust and vibration to acceptable levels are described.

6.1 Mitigation measures for demolition of existing building

The breaking out of the existing Saville Theatre structure shall be carried out by percussive breakers, diamond saw cutting and hydraulic bursting where possible, to minimise noise and vibration to the adjacent properties. All demolition and excavation work will be undertaken in a carefully controlled sequence, taking into account the requirement to minimise vibration and noise. The contractor will need to utilise non-percussive breaking techniques where practicable.

Dust suppression equipment should be used during the demolition process to ensure that any airborne dust is kept to a minimum. Where practical, concrete should also be wetted down prior to and during breakout to further inhibit airborne dust.

6.2 Mitigation measures for bulk excavation

Due to the size of the basement, it is likely that some mechanical plant will be required to complete the bulk excavation. The contractor should ensure that any mechanical plant is switched off when not in use and is subject to regular maintenance checks and servicing. An electrically powered conveyor will likely be used.

6.3 Mitigation measures for the construction of the concrete basement shell

The contractor should ensure that any concrete pours are completed within the permitted hours for noise generating works. The contractor should allow for a contingency period to endure that concrete pours can be completed within these hours regardless of unforeseen circumstances such as batching plant delays and traffic congestion.

6.4 Mitigation measures for piling

The secant piled wall will likely be formed using rotary piling rig, this is a non-percussive technique and therefore produces significantly less noise and vibration than the alternative driven piles. Some temporary piles will be required to be broken down to slab level once the basement works are complete. The contractor should ensure that they use non-percussive pile reduction techniques which are much quieter than traditional breakers.

6.5 Dust control

In order to reduce the amount of dust generated from the site, the contractor should ensure that any cutting, grinding and sawing should be completed off site where practicable. If cutting, grinding and sawing is being carried out on site, surfaces are to be wetted down prior to and during these types of work whenever possible. Any equipment used on site should be fitted with dust suppression or a dust collection facility.
The contractor will be responsible for ensuring good practice with regards to dust and should adopt regular sweeping, cleaning and washing down of the hoardings and scaffolding to ensure that the site is kept within good order. The Contractor selected will be a member of the Considerate Contractors Scheme. Contact details of the contractor who will be responsible for containing dust and emissions within the site will be displayed on the site boundary so that the local residents can contact the contractor to raise any concerns regarding noise and dust.

The building will be enclosed within suitable scaffold sheeting and any stockpiles of sand or dust-generating materials will be covered. Cement, fine aggregates, sand, and other fine powders should be sealed after use.

7. Monitoring during excavation and Construction

The Contractor shall provide monitoring to all structures and infrastructure adjacent to the basement excavation at the time of demolition, excavation and construction.

The full extent of the proposed monitoring and expected movements are shown in the BIA report by A-Squared, appended in this report.

Monitoring shall be completed as follows:

1. One month prior to any works being started to provide a base reading.
2. On a weekly basis during the excavation and until the basement slab and lining wall has been cast.
3. On a monthly basis thereafter for a 6-month period following completion of the notifiable works.

Horizontal and vertical movement trigger levels will vary according to distance from the site and with height. Green, Amber and Red trigger levels will be agreed as part of the Party Wall process to ensure movement remains within the limits proposed by A-Squared and used in their assessment of Building Damage Category.

Movement Approaching Critical Values

Should the trigger values be reached, the following procedures should be followed:

Code Amber Trigger Value:

All interested parties, including the Adjoining Owner's Surveyor and their Engineer, should be informed and further actions immediately agreed between two of the three Surveyors and implemented by the Building Owner. Notwithstanding the Party Wall requirements, the Contractor is to appoint a suitably qualified Structural Engineer who will be responsible for the reviewing of the movement monitoring results at the start and end of each day and provide immediate advice, remedial works and design as necessary in the event of movement being noted.

The Contractor is to ensure that they have 24 hour / 7 days a week access to emergency support provision including but not limited to additional temporary props, needles, waling beams and concrete supply at the start of the excavation and prior to any likelihood of this trigger value being reached. If this value is reached the Contractor, and their Engineer, provide all interested parties with their plan to implement any emergency remedial and supporting works deemed necessary. The Contractor must be ready to carry out these works without delay if the movement continues and approaches the trigger value below.

Code Red Trigger Value:

All interested parties including Adjoining Owner's Surveyor and Engineer will be informed immediately. Works will stop and be made safe using methods and equipment agreed at the above stage. The Contractor is to ensure that the movement has stopped as a result of the implemented remedial works designed and installed at this stage. The requirements of the Party Wall Act will also ensure that two of the three Surveyors and their advising Engineers shall then enter into an addendum Award, setting out whether or not the Building Owner's works can re-commence and when, and if so, agree on additional precautions or modifications to the proposals prior to recommencement.

8. Conclusions

It is intended that the above measures and sequence of works are adopted for the eventual design and construction of the proposed works. If the works noted above are properly undertaken by suitably qualified contractors, these works should pose no significant threat to the structural stability of the building or the adjoining properties.

Detailed method statements and calculations for the enabling works, piling, and any temporary works will need to be prepared by the Contractor for comment by all relevant parties including party wall surveyors and their engineers. Elliott Wood will need to ensure that adequate supervision and monitoring are provided throughout the works particularly during the excavation and demolition stages.

A Burland Category report and Damage Risk Assessment has been prepared by A-Squared which is included in the appendix. The report concludes that, given good workmanship, the basement to Saville Theatre constructed without imposing more than Category 1 damage on the adjoining properties.

To this end, Elliott Wood will have an on-going role during the works on site to monitor that the works are being carried out generally in accordance with Elliott Wood's design and specification. This role will typically involve weekly site visits at the beginning of the project and fortnightly thereafter. A written site report will be provided to the design team, Contractor and Party Wall Surveyor.

Appendices

Appendix A – Historic Site Investigations

Appendix B – Basement Impact Assessment

Appendix C – Proposed Basement Drawings

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