

CIS Tower, Miller Street

Listed Building Consent Structural Report

Curtins Ref: 085832-CUR-00-XX-T-S-00001
Revision: P04
Issue Date: 07 April 2025

Client Name: Devonshire (CIS Tower) Ltd
Site Address: CIS Tower, Miller Street,
Manchester,
M60 0AL

Rev	Description	Issued by	Checked	Date
P01	Issued for comment	TJM	DS	20/12/2019
P02	Updated following comments and revised proposals	MA	DS	29/01/2020
P03	Updated to 2025 Proposals	KG	DS	20/03/2025
P04	Updated to Architect comments	KG	DS	07/04/2025

This report has been prepared for the sole benefit, use, and information of the Client. The liability of Curtins Consulting Limited with respect to the information contained in the report will not extend to any third party.

The description of development as stated on the application form for Listed Building Consent is as follows:

Listed Building Consent for the wholesale internal and external refurbishment, refurbishment of the external facade including replacement of the existing single glazed façade system and replacement of strip of solar panels on the service tower; removal of existing recreational space on the fifth floor and plant to facilitate the construction of a 3-storey extension to the Podium; external alterations to ground floor façade including an alteration to the ground floor entrance lobby; creation of new entrances on Dantzig Street and eastern elevation; alternations to the existing public realm; new rooftop plant and screening at level 8; hard landscaping and planting; removal of external signage; and associated works.

Author	Signature	Date
Terry Moran MEng (Hons.) MA CEng MIStructE Senior Engineer		20/12/2019

Reviewed	Signature	Date
David Sandbrook MEng (Hons.) CEng MICE MIStructE Technical Director		20/12/2019

Project Description

Planning permission for internal and external refurbishment of the CIS Tower for office accommodation on floors 1-23 (Use Class E c)); change of use to floor 24 and 25 from Use Class E c) (office) to Use Class E b) (F&B); change of use to basement and ground floor from Class E c) (office) to mixed uses (Use Class E a) (retail)/ Use Class E d) (gym) / Use Class E b) (F&B) / Sui generis (leisure); refurbishment of the external facade including replacement of the existing single glazed façade system and replacement of strip of solar panels on the service tower; removal of existing recreational space on the fifth floor and plant to facilitate the construction of a 3-storey extension to the Podium (Use Class Ec)) external alterations to ground floor façade including an alteration to the ground floor entrance lobby; creation of new entrances on Dantzig Street and on eastern elevation; hard landscaping and planting; removal of external signage; creation of 2x DDA parking spaces; new rooftop plant and screening at level 8; and other associated works.

Table of contents

1.0	Introduction.....	1
2.0	Background	3
3.0	Existing structural arrangement	5
4.0	Architectural Proposals	8
5.0	Structural Alterations	13
6.0	Appendices.....	20

Figures

Figure 1 : Site location.....	1
Figure 2 : General form of the building (viewed from the north-west).....	1
Figure 3 : 1891 O.S. map indicating future site of the CIS Building	3
Figure 4 : Destroyed buildings on Miller Street following bombing raids in December 1940.	3
Figure 5 : Plan of ARP shelter (the Bunker)	4
Figure 6 : The Bunker under construction, 1940 (looking towards Dantzic Street).	4
Figure 7 : The Bunker under construction, 1940.	4
Figure 8 : Cross-section showing basement levels.	5
Figure 9 : Podium column founded on the bunker roof	5
Figure 10 : Basement under the Tower showing RC columns and also ‘temporary’ steel structure	5
Figure 11 : Typical Tower floorplate	6
Figure 12 : Typical office floorplate within the Podium	6
Figure 13 : Existing form of main entrance.....	13
Figure 14 : Existing arrangement at Dantzic St / Hanover St corner.	13
Figure 15 : View of West lightwell and associated landscaping	14
Figure 16 : Level 01M Mezzanine	15
Figure 17 : Steel structure forming Level B01 (Upper).....	15
Figure 18 : Stairs at Dantzic St / Hanover St corner.	17

1.0 Introduction

Following a feasibility study which has been undertaken in order to assess the viability of various development proposals, an architectural scheme has been developed for the refurbishment and extension of the Co-Operative Insurance Society (CIS) Building. This report sets out the various modifications to the existing structure which are required in order to facilitate the proposed scheme.

1.1 Site Location

The CIS Building is located on the north side of Manchester city centre on a site bounded by Miller Street to the north, Hanover Street to the South, Dantzic Street to the west and Riga Street to the east. The eastern portion of the site (adjacent to Riga Street) is a surface-level carpark in private ownership and not part of this scheme. The site location is shown below.

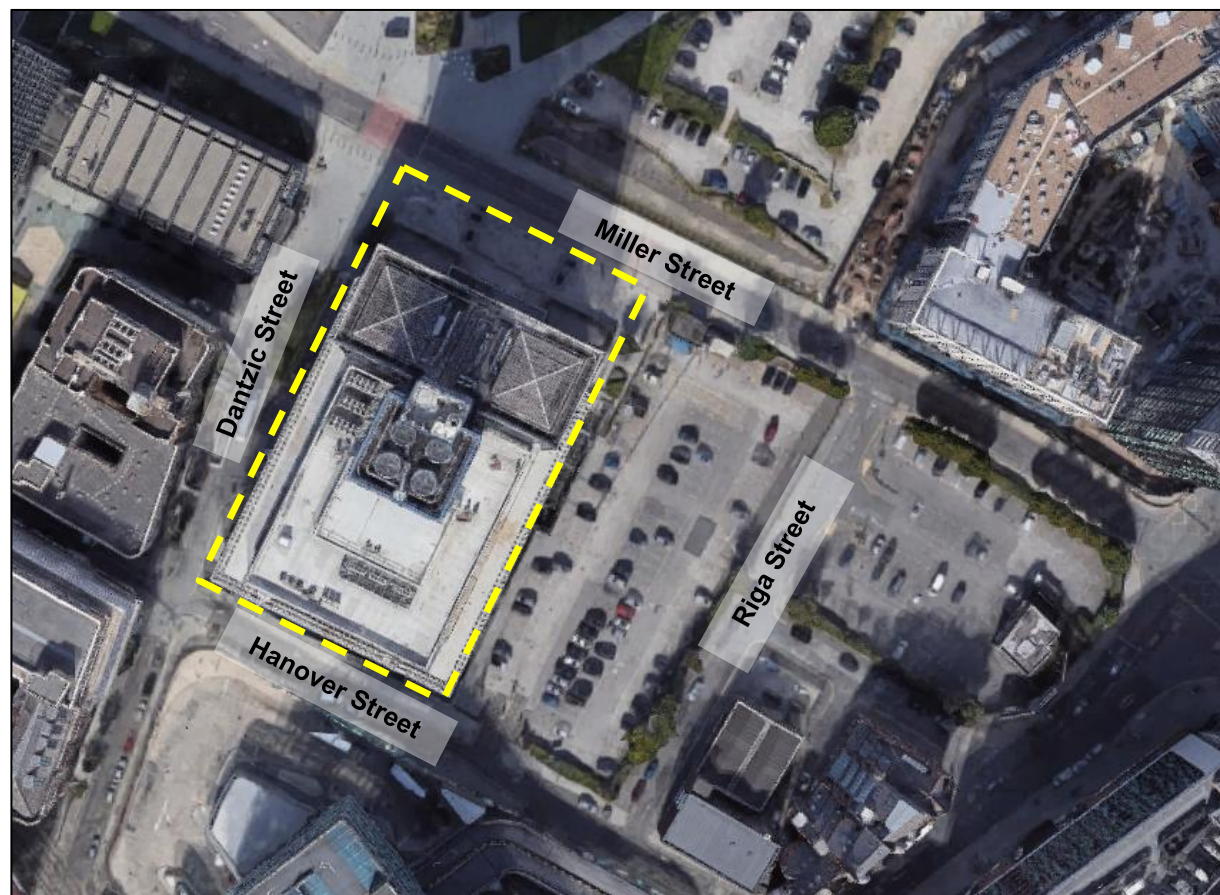


Figure 1 : Site location. Background image ©Google

1.2 Existing Building

The CIS Building was constructed between 1959 and 1962, being formally opened in October 1962. It was designed by Gordon Thomas Tait of Sir John Burnet, Tait and Partners in conjunction with George S. Hay, Chief Architect of the Co-Operative Wholesale Society (CWS). It was added to the National Heritage List for England (NHLE) in 1995 at Grade 2 (List entry number 1270494).

As indicated by the figure below, the building consists of three distinct parts: the tower (shaded blue), the service core (shaded green) and the podium (shaded orange) of twenty-six, twenty-eight and six storeys respectively. References to these areas are used throughout this document.



Figure 2 : General form of the building (viewed from the north-west). Background image © Google

1.3 Proposals

The proposals allow for the wholesale internal and external refurbishment of the building for office accommodation on level 1-25 (Use Class B1), including refurbishment of single glazed façade and replacement of solar panels on the service tower; demolition of existing recreational space on the fifth floor and plant to facilitate the construction of a 3-storey extension to the Podium; external alterations to ground floor façade including an extension to the ground floor entrance lobby; creation of new entrances on Danztic Street and the eastern elevation of the building; alternations to the existing public realm alongside the creation of a new rooftop plant and screen at level 8; removal of external signage and associated works.

The architectural proposals are outlined in Section 4.0 below; the required structural modifications are covered in Section 5.0.

The scope of this report has been informed by the information obtained to date- historical research, archival information, measured survey and intrusive surveys. Further survey will be undertaken as the project progresses, however the proposals presented in this report are presently thought to minimise the impact on existing structure and historical significance wherever possible.

2.0 Background

The CIS and CWS have had a significant presence in Manchester since their formation in the nineteenth century. In the late 1950s the CIS decided to consolidate their many separate premises in Manchester to one location and to do this they chose a site adjacent to many existing CWS buildings which had been bombed during World War 2 and subsequently cleared.

Following relocation of the Co-op group of companies to new premises on the other side of Miller Street in 2013, the surrounding buildings belonging to the group were sold off and most have since been redeveloped. This part of the city is now commonly referred to as 'NOMA'.

Curtins were engaged to provide structural engineering consultancy services for proposed refurbishment and development of the building.

2.1 The Site

Until the destruction caused by bombing during the Second World War, the site of the CIS Building was occupied by small, low-rise buildings as shown on the extract from the 1891 O.S. map shown below (the approximate position of the CIS Building is shown by a dashed line).



Figure 3 : 1891 O.S. map indicating future site of the CIS Building

This area of the city centre was heavily damaged during bombing raids in December 1940 and the buildings occupying the site were almost totally destroyed. The photograph below, taken from Miller street and looking west, shows the extent of the damage. The site of the CIS Building is on the left-hand side of the photograph.



Figure 4 : Destroyed buildings on Miller Street following bombing raids in December 1940. Image © Manchester Libraries

2.2 ARP Shelter ('the Bunker')

Although no documentary evidence can be found, it appears that the authorities took the opportunity to build a large ARP bomb shelter on the site of some of the destroyed buildings. This shelter (referred to hereafter as the 'Bunker') was retained when the CIS Building was constructed, and now forms the lowest basement level under the Podium part of the building. A plan of the bunker, which forms part of a set of archive drawings for the CIS Building, is shown below with the outline of the building above superimposed.



Figure 5 : Plan of ARP shelter (the Bunker), approximate line of CIS Building (Podium) shown dashed

The bunker is of reinforced concrete construction and the roof (apparently over two metres thick) was used as the foundation for most of the columns of the podium part of the new building above. A small number of photographs of the bunker under construction have been located, two of which are shown below.



Figure 6 : The Bunker under construction, 1940 (looking towards Dantzic Street). Image © Manchester Libraries



Figure 7 : The Bunker under construction, 1940. Image © Manchester Libraries

3.0 Existing structural arrangement

As outlined in Section 1.2 above, the building has three distinct parts. Although these parts are somewhat different structurally, they act as one building with respect to lateral stability, with this function being performed by the service core. The structural arrangement of each part of the building, along with the basement areas, will be briefly described below.

3.1 Basements

As outlined in Section 2.2 above, the Bunker constructed circa 1940 was largely retained and now forms the lowest basement level below the Podium. The Bunker is indicated on the diagram below (the small space above is a crawl space / service zone). Columns supporting the podium above are founded at this level.

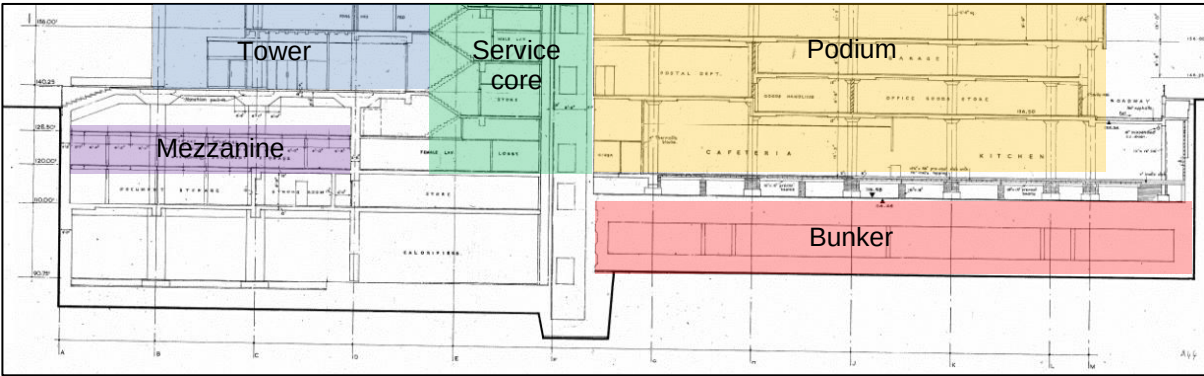


Figure 8 : Cross-section showing basement levels.

The basement beneath the service core and tower consists of a reinforced concrete (RC) raft foundation with RC retaining walls to the perimeter and RC columns and slabs up to ground level. Beneath the tower, part of the basement was seemingly intended as a double-height space, however two mezzanine levels are present (labelled 'temporary' on the archive drawings) consisting of steel columns and beams connected into the adjacent RC frame with heavy metal grating forming the floors. In the area of the tower, the roof of the basement projects above ground level to form the main entrance to the building, somewhat above the adjacent external levels. Where external staircases are present, the roof of the basement is sloped to accommodate them (as shown in Figure 8 above).



Figure 9 : Podium column founded on the bunker roof



Figure 10 : Basement under the Tower showing RC columns and also 'temporary' steel structure

3.2 The Tower

The tower portion of the building is twenty-six storeys high and consists of a steel frame (formed from I – sections) encased by concrete. The concrete encasement is not thought to be structural, rather it is thought to provide fire protection and durability.

Floors within the tower consist of steel secondary beams (spanning between primary beams) which are not encased in concrete but are instead boxed out. Spanning onto these secondary beams are precast concrete beams with insitu concrete above forming the floor surface.

Curtain-wall glazing to the tower is supported on steel beams which go around the perimeter of the floors, supported by stub beams cantilevering from the primary and secondary members behind.

The uppermost level of the tower (Level 25) is open-plan, originally used as a viewing gallery. The roof above contains two large openings which have pyramid-shaped rooflights over.



Figure 11 : Typical Tower floorplate

3.3 The Service Core

The service core consists of RC walls forming the vertical elements, with insitu RC floors. The service core contains two banks of four lift shafts, two staircases and various service risers. As mentioned above, the service core forms the primary stability element for the building as a whole.

The external walls of the service core were originally clad with small mosaic tiles but these have since been overclad with photovoltaic panels.

3.4 The Podium

The podium consists of a reinforced concrete frame of six storeys; the ground floor housing the loading dock accessed from Dantzic Street and various storage areas, one partial floor used for car parking accessible from Hanover Street with office floors above. Some office floors contain various partitions,

thought to be much later introductions. At fifth floor level the building steps back forming an external area on the three sides of the podium (the Tower is located on the fourth side). Above fifth floor there is a large plant room and an adjoining recreation space formed by long-span beams giving a column-free area approximately 23m x 15m with adjacent back-of house areas. The recreation space, plant room and adjoining areas all have flat roofs.



Figure 12 : Typical office floorplate within the Podium

3.5 Condition of Existing Structure

Although a formal condition survey has not been fully undertaken due to existing architectural coverings present throughout, various site visits combined with the findings of intrusive surveys can be used to give an indication of the condition of the existing structure.

In those areas where primary structure is visible, it appears to be in good condition. No significant signs of distress are visible however minor areas of damage are present along with some areas where prior modification of the structure is apparent.

Where intrusive investigations have been carried out, a number of material tests have been undertaken which can, to some extent, also inform with regard to the condition of the structure. These investigations are summarised below; refer to the intrusive survey report presented in Appendix D for further information.

3.5.1 Concrete cover to reinforcement

Although generally somewhat less than required by modern design codes, the concrete cover to reinforcement has generally been found to be typical for a building of this age. While concrete cover is not strictly a structural consideration, it is particularly important with regard to durability and fire resistance. Additional passive fire protection has been proposed in areas where cover is less than required for the 2025 fire performance (fire ratings).

3.5.2 Concrete testing

A number of different tests have been performed on concrete samples obtained from the building: carbonation, compressive strength, alkali-silica reaction, chlorides, cement content and checking for the presence of high-alumina cement.

The testing of compressive strength and cement content are used to inform the actual and intended design strength of the concrete, respectively. The remaining tests are used to verify particular chemical properties which affect durability. The testing undertaken so far shows that the mechanical properties of the concrete are largely as expected, carbonation has occurred in some locations (though no more severe than would be anticipated for a building of this age) and no high-alumina cement is present.

3.5.3 Steel testing

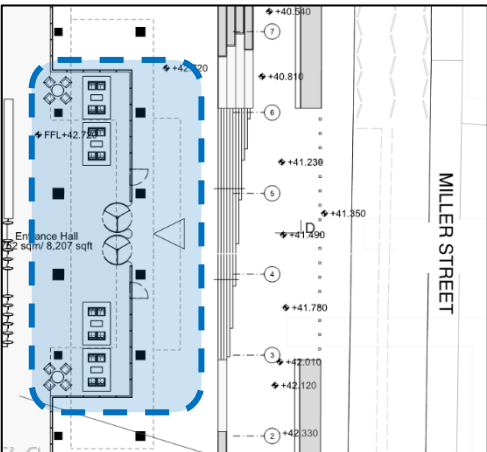
In various locations, samples of steel have been obtained from rolled structural sections or from reinforcement and these have been tested to determine their tensile strength. The samples tested so far have shown results in line with those anticipated.

4.0 Architectural Proposals

The main aspects of the architectural proposals which have impacts on the structure are outlined in this section; the resulting structural alterations are covered in Section 5.0 below and reflected in the structural General Arrangement drawings presented in Appendix B. A set of architectural drawings showing the proposed scheme are presented in Appendix A.

Note that all items covered in this section may be subject to design development, however the principles for achieving them (covered in Section 5.0) are based on the various surveys and investigations already carried out.

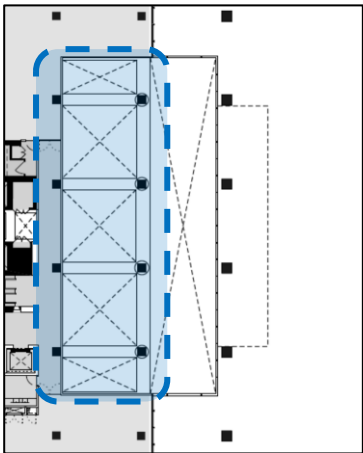
4.1 Reconfiguration of main entrance floor area



It is proposed to modify the existing reception area (accessed from Miller Street) in order to increase its area and clear height, by removing a portion of the existing curtain walling and installing new curtain walling to enclose a larger area. The effects on the existing structure are minimal.

Refer to SH drg. 10518-SHA-Z1-A-G200-PL-00-001 presented in Appendix A.

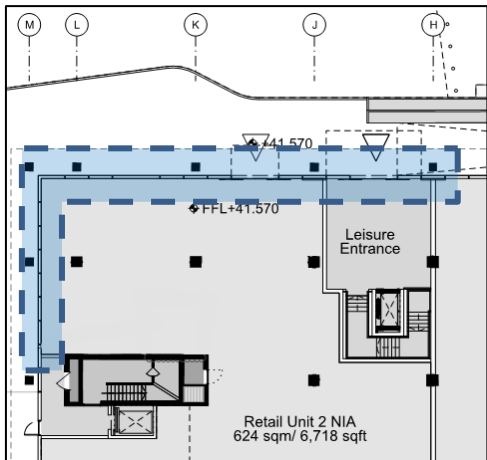
4.2 Removal of floor panels at Level 01



As part of the reconfiguration of the main entrance, it is proposed to remove sections of floor slab at Level 01 in order to create a double-height space in the reception area. The effects on the existing structure are minimised by only removing slab panels which could be reinstated at a later date if required; the primary frame is not affected.

Refer to SH drg. 10518-SHA-Z1-A-G200-PL-01-001 presented in Appendix A.

4.3 Removal of wall panels on Dantzig Street / Hanover Street

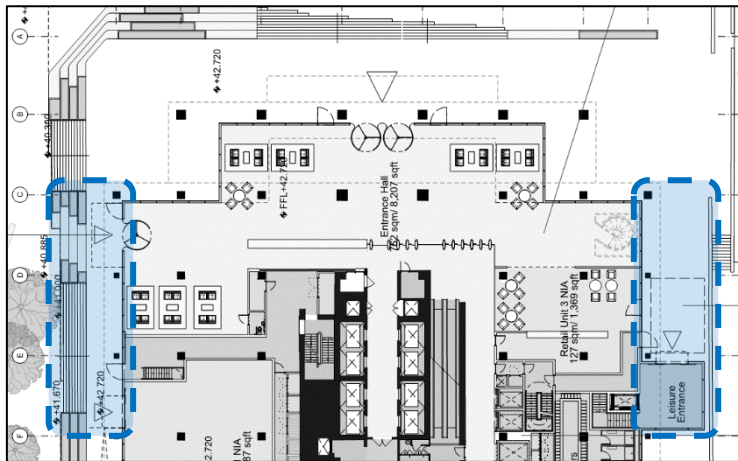


In order to 'open up' the building and the streetscape around the Dantzig Street / Hanover Street corner, it is proposed to remove some existing wall panels at ground level, to be replaced by a glazed façade incorporating new pedestrian entrances. These wall panels are not part of the primary structure and could be reinstated if required.

Refer to SH drg. 10518-SHA-Z1-A-G200-PL-00-001 presented in appendix A.

4.4 Item Withdrawn

4.5 Modification of lightwells to the exterior of the building

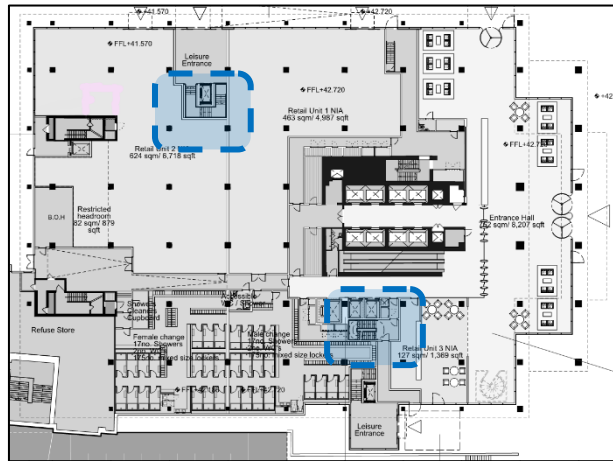


At ground level, on the west and eastern sides of the building (adjacent to Dantzig Street and the carpark) are voids down to B03 level which function as lightwells while also containing emergency escape staircases from the basement levels and allowing removal and installation of large pieces of equipment. On both sides of the building it is proposed to cover these

voids in order to provide pedestrian access to the building through newly-formed entries. Where the retaining walls (forming the outer edge of the lightwell) project above ground level, they may be reduced in height locally but the effect on the structure of the building is minimal.

Refer to SH drg. 10518-SHA-Z1-A-G200-PL-00-001 presented in appendix A.

4.6 Introduction of new lift / stair cores



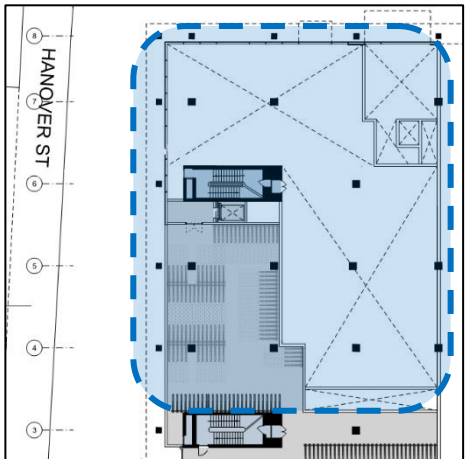
To allow more rapid movement around the building and to accommodate the increase in occupancy resulting from the proposed podium extension (see Section 4.24), new lift and stair cores are proposed: one adjacent to the Service Tower and one in the Podium. To achieve this, openings must be formed through the existing floors, coordinated to minimise the impact on the existing structure.

Refer to SH drgs. 10518-SHP-Z1-BB-SE-A-B5D3-G200-001 and 10518-SHP-Z1-CC-SE-A-B5D3-G200-001 presented in Appendix A.

4.7 Tower Rooflight over-roofing

It is proposed that the existing rooflights above Level 25 which are composed of lightweight steel trusses are to be retained but with the glazing removed due to poor thermal performance. The skylight is proposed to be bridged-over with a structure mirroring the original to enable the installation of contemporary glazing. This is considered a sensitive approach to restoration as this leaves the original in place for potential re-use in the future and tells the story of the building honestly. Please refer to Ramboll's façade report for further details.

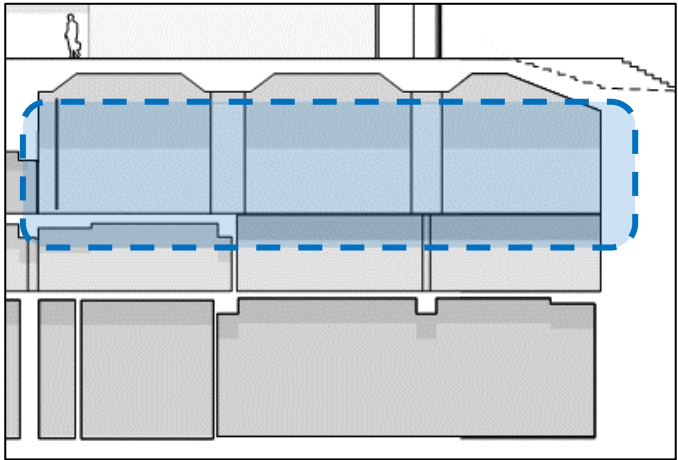
4.8 Partial removal of Level 01M Mezzanine



In order to increase the clear height of the proposed retail units at Ground floor on the Dantzig Street / Hanover Street areas of the building, it is proposed to remove parts of the Level 01M floor structure which do not contribute significantly to the primary structure.

Refer to SH drg. 10518-SHA-Z1-A-G200-PL-M0-001 presented in Appendix A.

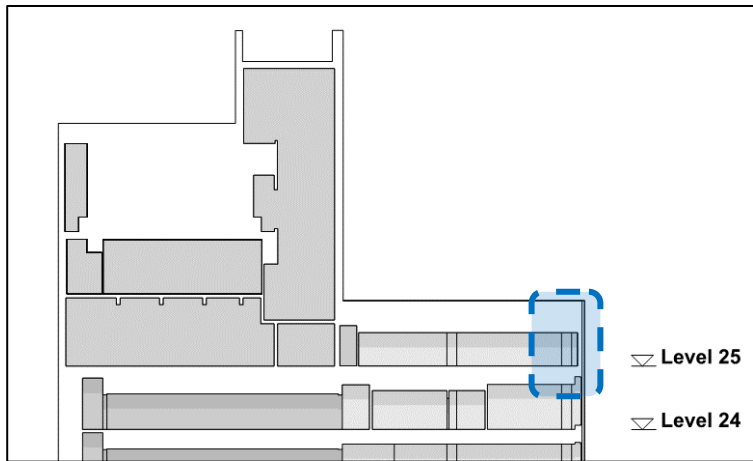
4.9 Removal of Level B01 (Upper) & Level B01, reinstatement of Level B01



To provide an area with increased clear height towards the front of the building it is proposed to remove the existing steel floor structures forming Level B01 (Upper) and Level B01. It is proposed to reinstate Level B01 with a steel & concrete floor structure.

Refer to SH drgs. 10518-SHA-Z1-A-G200-PL-B1U-001 and 10518-SHA-Z1-A-G200-PL-B1-001 presented in Appendix A.

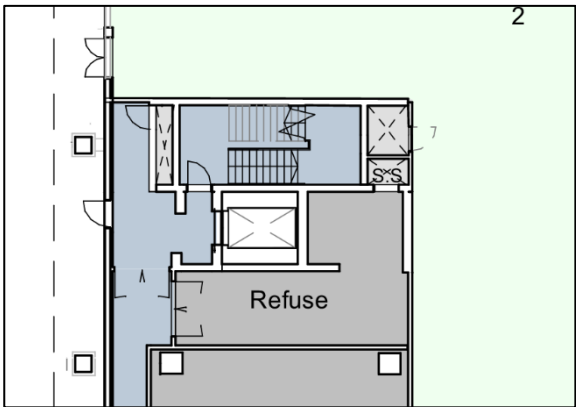
4.10 Removal of perimeter walls at Level 25



The perimeter of Level 25 currently has a concrete upstand wall; it is proposed to remove this wall and provide a glazing system in its place.

Refer to SH drg. 10518-SHP-Z1-AA-SE-A-B5D3-G200-001 presented in Appendix A.

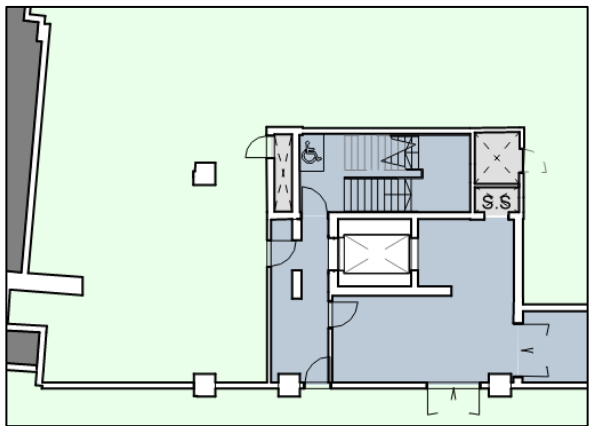
4.11 New lifts to the podium cores



It is proposed to introduce a passenger lift immediately adjacent to one of the existing staircases at the Hanover Street end of the Podium, serving Level B01 and all levels above. This requires the formation of a void through the existing floors including B1 to B1U (crawl space above shelter).

Refer to SH drg. 10518-SHP-Z1-A-G200-PL-00-001 presented in Appendix A.

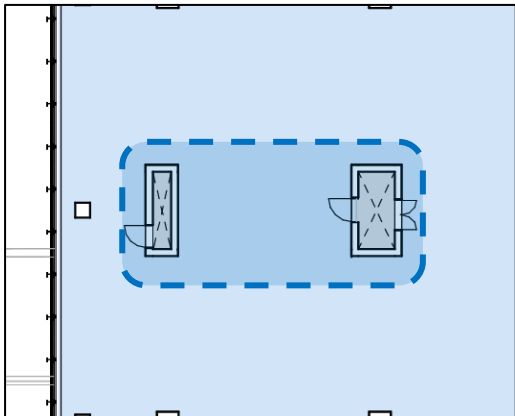
4.12 Extension of stairs to basement level



There are currently two staircases located at the Hanover Street end of the Podium however these do not serve Level B01 (or below). It is proposed to extend one of these staircases downwards to serve Level B01, by forming an opening in the ground floor slab.

Refer to SH drg. 10518-SHA-Z1-A-G200-PL-B1-001 presented in appendix A.

4.13 Removal of staircase in the Podium



While one of the existing staircases it to be extended (as per section 4.12 above), the other is to be removed and the resulting voids infilled.

Refer to SH drg. 10518-SHA-Z1-A-G200-PL-01-001 presented in appendix A.

4.14 Forming new service routes

As part of the modernisation and enlargement of the building, various new building service routes are required. Wherever possible, existing service voids will be reused. However in many instances new openings will be required through existing floors and walls. Such penetrations will be positioned wherever possible in areas of low heritage significance, with minimal impact on the existing structure.

4.15 Forming voids in floors (Podium / Service tower)

The provision of various openings through the floors of the Podium is proposed, (in addition to those for lifts, stair etc. mentioned above) to allow for services. For larger openings, limited supporting structure (steel beams) need to be introduced.

4.16 Forming voids in floors (Tower)

Though less numerous, it is also proposed to form some new openings in the floors of the Tower to allow for additional services. For larger openings limited supporting structure (trimming steels) may need to be introduced.

4.17 Forming openings in walls

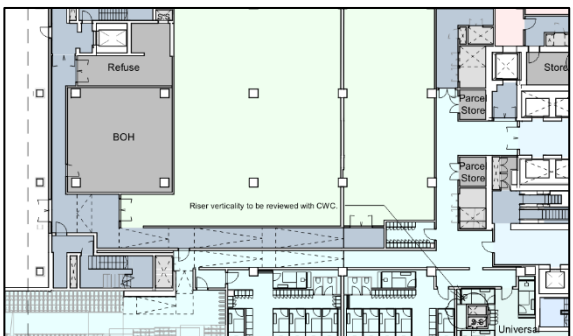
In some places it may be necessary to form openings through existing walls to accommodate services. Existing walls are generally continuous reinforced concrete so do not require lintels and insignificant to

stability unless oversized or through critical zones. Each will be subject to structural coordination to validate locations.

4.18 Forming new trunking routes in floors

In order to provide the floors of the Tower with the required data and power cables, it is generally proposed to provide additional raised access floors to run cables freely. Where this is not possible, it may become necessary to form chases into the top surface of the existing floor slabs. The top surface is an architectural screed and not structural but structural consideration is required to ensure this work does not exceed the allowable depth.

4.19 Infill of existing ramp at Level 00



As part of the general reconfiguration of internal areas, it is proposed to infill an existing ramp at Level 00 to provide a level surface.

Refer to SH drg. 10518-SHA-Z1-A-G200-PL-00-001 presented in appendix A.

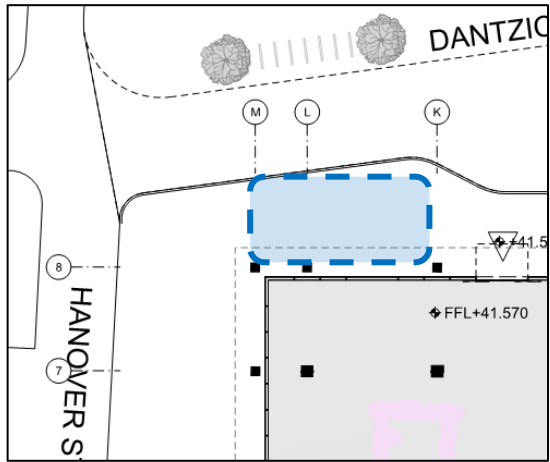
4.20 Infilling of openings

In both the Podium and the Tower, some existing wall openings will no longer be needed and in such cases they will be infilled. This will typically be to the same material as the adjacent wall to reinstate structural strength.

4.21 Typical patch repairs

As required, patch repairs to the concrete structure will be carried out to reinstate an spalled concrete or cover rebar exposed by demolition.

4.22 Removal of stairs near Dantzic Street / Hanover Street corner



To facilitate the 'opening up' of Dantzic Street (see also Sections 4.3 and 4.4 above) the existing emergency staircase which extends from the bunker (Level B02) to ground level, in the footpath near the corner of Dantzic Street and Hanover Street, is to be closed off and the walls which currently project above street level will be removed.

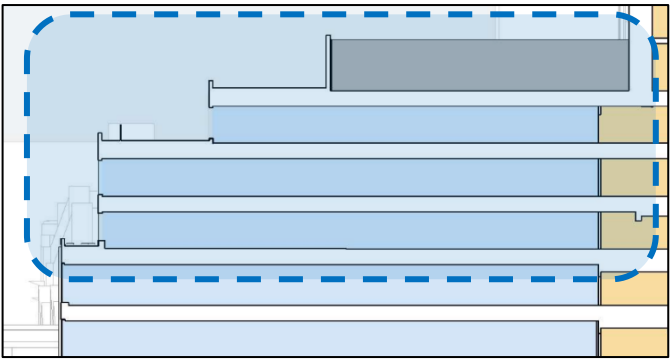
Refer to SH drg. 10518-SHA-Z1-A-G200-PL-00-001 presented in Appendix A.

4.23 Addition of strengthening structure

As part of the podium extension works (see Section 4.24 below) and also elsewhere within the building, it will be necessary to introduce new structure below existing floor structures in order to provide required strengthening in order to accommodate increased loading and/or changed loading conditions. This includes:

- Strengthening to concrete Columns using carbon fibre wrapping, and where this is insufficient concrete encasement ('concrete jacketing') or steel jacketing.
- Steel trimming beams where slab demolition leaves existing slabs compromised.
- Extending walls to B2 / B3 level to carry lift shaft / stairwells overhead.

4.24 Podium Extension



It is proposed to extend the Podium upwards by the provision of two additional office floors (and one replacing a demolished roof level). The roof over is to carry extensive plant equipment to serve the Podium. To achieve this, it is necessary to remove the structures which currently project above Level 05. A new steel structure will then be constructed

on the existing Level 05.

Refer to SH drg. 10518-SHA-Z1-A-G200-SE-AA-201 presented in Appendix A.

5.0 Structural Alterations

The structural alterations necessary to achieve the architectural proposals covered in Section 4.0 are outlined below. For each item, a typical detail is shown on the drawings presented in Appendix C along with an indicative method statement showing how the detail may be achieved. In response to the Listed status of the building, the details and method statements have been developed so as to minimise any adverse impacts on the existing structure. Reference should also be made to the structural drawings presented in Appendix B which identify the location(s) where each detail occurs.

Non-structural repairs are not covered, however it is anticipated that a number of locations will require patch repairs to the concrete as covered in Section 5.21 below in order to ensure the durability of the structure.

5.1 Reconfiguration of main entrance

The existing reception area and lobby is entirely within the footprint of the tower above however it is partly external, formed by a ‘box’ which projects forward of the main building line where it steps back at first floor level. This box is formed by curtain wall glazing which is independent of the primary structure. It is proposed that the enlarged reception / lobby area is again formed from curtain wall glazing which, if required, will be provided with steel mullions and transoms to restrain the glazing units. If required, the mullions would be connected into the ground floor slab and the underside of the Level 02 slab by way of resin anchors, having very limited impact on the building fabric.

Refer to detail(s) 18 on drawing 085832-CUR-00-XX-DR-S-28102 presented in Appendix C.

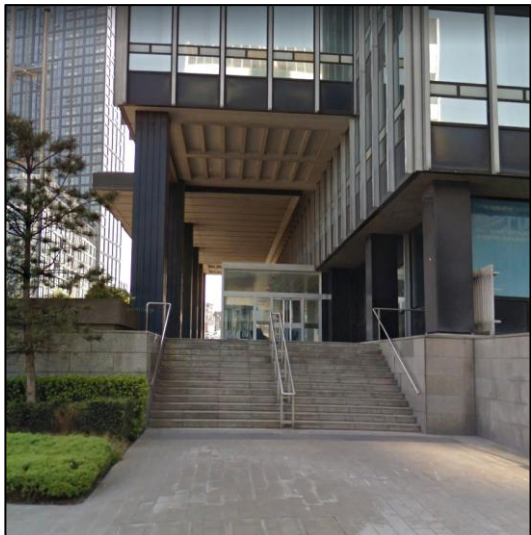


Figure 13 : Existing form of main entrance. Image © Google.

5.2 Removal of floor panels at Level 01

Removal of floor panels at Level 01 (above the reception area) will be achieved by carefully trimming the floor slabs up to the edges of the primary beams, which will remain. In this way, the amount of existing structure to be removed is minimised. In order to maintain the robustness of the structure, feature bracing members will be introduced into the resulting voids. It is envisaged that these bracing members will in the form of tension rods. The bracing members will need to be connected directly into the primary steelwork, requiring the concrete encasement to the columns to be broken out locally to allow steel cleats to be welded to the steel section. Following the welding process, the concrete encasement will be reinstated.

Refer to detail(s) 24 on drawing 085832-CUR-00-XX-DR-S-28103 presented in Appendix C.

5.3 Removal of wall panels on Dantzic Street / Hanover Street

The material and construction of the existing walls is unknown however it is thought likely that they are formed either of insitu reinforced concrete or masonry. Analysis of the structure shows that these walls are unlikely to be structural and therefore can be removed without the need for further structural modification. However, further structural investigations are required in order to confirm this. The replacement façade system would be restrained at the base and the head, fixed to the structure by mechanical or resin fixings.

Refer to detail(s) 12 on drawing 085832-CUR-00-XX-DR-S-28101 presented in Appendix C.



Figure 14 : Existing arrangement at Dantzic St / Hanover St corner. Image © Google.

5.4 Introduction of louvers above masonry panels

Where a medium sized opening in a masonry wall panel is to be created for mechanical louvres etc, a head restraint will need to be introduced. This will consist of a steel beam positioned directly above the remaining brickwork and fixed to the RC structure on either side.

5.5 Modification of lightwells to the exterior of the building

The structure of the lightwells consists of three-storey high retaining walls that are propped at regular intervals back to the main structure. To provide the proposed means of access to the building, concrete slabs on steel beams would be formed above the lightwells, spanning between the existing retaining wall and the ground floor slab. The precise detail of the connection between new and existing structure will depend on the required slab level, however it is likely that in both cases the connection will consist of a steel shelf angle fixed to the face of the existing structure with some dowel bars being provided (fixed into the existing structure by way of resin anchors) in order to tie the new and existing elements together and provide some robustness. Where necessary, the existing portion of the existing retaining walls which project above ground level may need to be reduced in height. A portion of the new slab will be removeable in order to facilitate the removal or introduction of M&E plant items to the basement plant room.

Refer to detail(s) 14 and 15 on drawing 085832-CUR-00-XX-DR-S-28101 presented in Appendix C.



Figure 15 : View of West lightwell and associated landscaping Image © Google

5.6 Introduction of new lift / stair cores

Introduction of new cores first involves forming voids through the floor slabs, following the careful removal of any ceilings or floor finishes for reinstatement where required and the provision of temporary propping as necessary. The cores have been positioned to minimise, as far as possible, effects on the existing structure. Removal of the floor slabs is achieved by carefully marking out the areas to be removed and drilling small cores to allow a concrete saw to be introduced. Care should be taken during the cutting operation to only remove the agreed portions of slab. Any reinforcement left exposed once the openings have been formed should be provided with a zinc-rich primer or patching mortar in order to prevent corrosion. New RC walls can then be formed, tied to the adjacent existing RC elements by dowel bars which are drilled and fixed by means of resin anchors. Following construction of the new walls and removal of the temporary propping, previously removed ceilings and floor finishes can be reinstated where required and interfaces between new and existing fabric made good.

Refer to detail(s) 6 on drawing 085832-CUR-00-XX-DR-S-28100 presented in Appendix C.

5.7 Item Omitted from scheme

5.8 Partial removal of Level 01M Mezzanine

Level 01M consists of RC band beams and slab panels similar to the other levels of the Podium. Removal of portions of this level (coordinated with the Architect to minimise effects on the existing structure wherever possible) is achieved in a similar fashion to providing penetrations such as covered in Section 5.6 above, however in this area the intention is also to remove some of the beams which tie the columns together. Following the provision of temporary propping to the columns which are to remain, demolition should proceed carefully to limit the removal of original building fabric. Following removal of the floor panels and band beams, the remaining columns will require strengthening by means of carbon fibre wrapping or alternatives (see Section 5.24.2 below).



Figure 16 : Level 01M Mezzanine

5.9 Removal of Level B01 (Upper) & Level B01, reinstatement of Level B01

At the front of the building (i.e. the area adjacent to Miller Street) Level B01 consists of a steel structure, as does Level B01 (Upper) above. Steel beams are connected into and supported by the primary columns and also numerous steel columns which are in turn supported by the RC structure of Level B01 (Lower). A review of available historic structural drawings shows this steel structure indicated as 'temporary'. Removal of these levels would entail the steel beams having their connection fixings (bolts and/or rivets) removed to allow their removal. Steel columns can be removed in a similar fashion by removing their fixings to the concrete structure below and adjacent. Removal of the steel structure may cause the RC columns to require strengthening to accommodate the loss of restraint (to be confirmed), in this case the strengthening would be carried out by means of carbon fibre wrapping in the same fashion as outlined in Section 5.24.2 below. This method of strengthening is preferred (whenever possible) to alternate methods which would have greater impact on the existing structure and form.

Level B01 will be reinstated in the form of a concrete slab on metal decking, supported by new steel beams connected into the existing RC structure (columns and perimeter walls). These new steel beams will be fixed by means of resin anchors.

Refer to detail(s) 10 on drawing 085832-CUR-00-XX-DR-S-28100 presented in Appendix C.



Figure 17 : Steel structure forming Level B01 (Upper)

5.10 Removal of perimeter walls at Level 25

Removal of the half-height walls to the perimeter of Level 25 is proposed to provide a glazed elevation like storeys below. Their removal will be achieved by first removing any finishes which may be present then using a concrete saw to carefully cut through the walls, flush with the face of the columns. The walls can then be carefully broken down to prevent the damage of any adjacent areas. At the base of the wall, any damage to the slab should be made good by application of a suitable patching mortar / a zinc-rich primer to rebar.

Refer to detail(s) 33 on drawing 085832-CUR-00-XX-DR-S-28103 presented in Appendix C.

5.11 New lifts to the podium cores

New lifts and / or stairs will be introduced to the Podium, adjacent to the existing staircases. This will require voids to be created in the slab and the construction of new walls in the same fashion as covered in Section 5.6 above. Strengthening of the adjacent slabs may be required (though this is to be confirmed); in such cases the strengthening will be in the form of steel trimming beams to support the slabs at each level with the steel beams being connected into the existing primary columns. Additional structure within the bunker may also be required in the bunker space, if this is the case it will be achieved as outlined in Section 5.24.3 below.

Refer to detail(s) 5 on drawing 085832-CUR-00-XX-DR-S-28100 presented in Appendix C.

5.12 Extension of stairs to basement level

The extension of the existing staircases within the Podium to serve Level B01 is similar in principle to providing a penetration through the slab, however the wall surrounding the stairs are already in place so the only new construction required is the new stair flight(s). Formation of the new penetration is as per Section 5.6. The new stair flight(s) are likely to be of RC and will be connected into the existing structure (B01 slab and walls) by starter bars drilled and fixed with epoxy anchors. If the B01 slab is found to require strengthening to accommodate the loads imparted by the new stair flight(s) (TBC) then this will be achieved by the introduction of steelwork in a similar manner to that for trimming slab voids as outlined in Section 0 above.

5.13 Removal of staircase in the Podium

Removal of one staircase within the Podium will entail the careful demolition of the existing stair flights and the surrounding walls. The resulting void in each floor slab will need to be infilled (see Section 5.19) and it is likely that trimming steelwork will be required to the perimeter of the void, connected back to the existing RC columns.

Refer to detail(s) 28 on drawing 085832-CUR-00-XX-DR-S-28103 presented in Appendix C.

5.14 Forming new service routes

Where new openings are required in existing floors or walls, their method of formation will vary depending on the type of construction present. Small openings can generally be formed without any requirement for additional strengthening, provided they are located appropriately. Where larger openings are required, strengthening may be required. See Sections 5.15, 5.16 and 5.17 below.

5.15 Forming voids in floors (Podium / Service Tower)

In the podium structure any penetrations less than 300mm square that are not through the 'band beams' are thought to be achievable without the need for any strengthening. Penetrations above this size are feasible but may require structural strengthening in the form of steel trimming beams as outlined in Section 0.

Refer to detail(s) 7 on drawing 085832-CUR-00-XX-DR-S-28100 presented in Appendix C.

5.16 Forming voids in floors (Tower)

In the tower structure any penetrations must avoid the steel beams and pre-cast concrete beams and go through the in-situ slab structure. Holes bigger than 150mm square will need to be reviewed by the engineer on a case by case basis and may require structural strengthening in the form of steel trimming beams as outlined in Section 0.

Refer to detail(s) 32 on drawing 085832-CUR-00-XX-DR-S-28103 presented in Appendix C.

5.17 Forming openings in walls

Where openings are required through existing walls, it is proposed that this will be achieved by core drilling/breaking through of walls, as this allows for the holes to be as small as possible, minimising the impact on existing structure.

Refer to detail(s) 20 on drawing 085832-CUR-00-XX-DR-S-28102 and 34 on 085832-CUR-00-XX-DR-S-28104 presented in Appendix C.

5.18 Forming new trunking routes in floors

Where a Raised access floor is not proposed and new trunking routes are to be formed in the existing slabs, the intended routes will first be marked out and then the screed removed using hand tools, in order to minimise overbreak and any effect on the existing structure.

Refer to detail(s) 35 on drawing 085832-CUR-00-XX-DR-S-28104 presented in Appendix C.

5.19 Infill of existing ramp at Level 00

To infill the existing ramp, it is proposed to first form a new wall to 'close off' the opening in the vertical face at the base of the ramp with blockwork built off the existing slab before installing structural void former of varying thickness, with a thin concrete slab over to bring the ramp up to the required level.

Refer to detail(s) 17 on drawing 085832-CUR-00-XX-DR-S-28101 presented in Appendix C.

5.20 Infilling of openings

Where existing floor voids are to be infilled, two main solutions will be employed, depending on the size and location of the particular opening. For openings in the slabs of the tower, which are relatively thick, it is envisaged that the void will be infilled by the provision of a steel shelf angle fixed by resin anchors to the edges of the opening with a thin concrete slab, supported on steel decking, introduced subsequently. For openings in the slabs of the Podium, which are somewhat thinner, the same method may be employed for small openings. For larger openings, however, it may be necessary to introduce steelwork to 'trim' the edges of the void. In such cases, the steelwork would be positioned directly under the soffit of the slab and be connected back to the nearest primary columns by means of resin anchors, with minimal impact on the existing structure. This trimming steelwork would also provide the support for the infill slab, again formed of concrete supported on steel decking.

Refer to detail(s) 16 on drawing 085832-CUR-00-XX-DR-S-28101 presented in Appendix C.

5.21 Typical patch repair detail

Where concrete has been damaged, reducing cover to the embedded steel, it may need to be repaired. Such repairs will be undertaken by first removing any loose concrete and / or corrosion products using hand tools, then preparing the surfaces as necessary in order to receive a cementitious patching mortar, applied by hand. Finishes can then be applied or reinstated.

Refer to detail(s) 27 on drawing 085832-CUR-00-XX-DR-S-28103 presented in Appendix C.

5.22 Removal of stairs near Dantzic Street / Hanover Street corner

Removal of the above-ground portions of the stairwell at the Dantzic Street / Hanover Street corner requires the existing RC walls to be broken down to approximately 500mm below the proposed external level in this area, to allow for a new capping slab to be introduced. The new capping slab will consist of a concrete slab supported on steel decking, supported off the remaining (below-ground) portions of wall.

Refer to detail(s) 13 on drawing 085832-CUR-00-XX-DR-S-28101 presented in Appendix C.



Figure 18 : Stairs at Dantzic St / Hanover St corner. Image © google

5.23 Addition of strengthening steelwork

Where new loads are to be applied to existing floors, or loads are increasing, it may be necessary to introduce strengthening steelwork in order to adequately transfer these loads back to adjacent vertical elements. Where such strengthening steelwork is required, steel beams will be introduced to the underside of the existing floor, with each end connected into existing vertical structure (columns primarily). These connections will be formed by means of resin anchors in some cases; in other locations the connections will be formed from steel plates with bolts passing through the full thickness of the column.

Refer to detail(s) 26 on 085832-CUR-00-XX-DR-S-28103 presented in Appendix C.

5.24 Podium Extension

The architectural proposals envisage extending the podium vertically by providing two additional storeys with a roof over. The existing podium structure is supported by the roof of the bunker which effectively acts as a transfer structure, taking the load from the podium columns down through the walls below and into the slab at the base of the bunker. This slab forms a raft footing on which the bunker itself and, therefore, the overlying podium are founded.

This structural arrangement, combined with a resultant increase in the load carried by the existing columns, requires a number of structural modifications in addition to the addition of new structure as outlined below.

Refer to detail 29 on drawing 085832-CUR-00-XX-DR-S-28103, detail 8 and 4 on drawing 085832-CUR-00-XX-DR-S-28100, detail 22 on drawing 085832-CUR-00-XX-DR-S-28102 and detail 30 on drawing 085832-CUR-00-XX-DR-S-28103 presented in Appendix C.

5.24.1 Removal of existing level 06

In order to reduce the load increase on the existing columns it is necessary to remove the existing structure above Level 05. This should be performed carefully so as not to damage those elements (walls and columns) that are to remain.

5.24.2 Strengthening of existing columns

Where the increase in load on the existing columns is not excessive, it is usually possible to increase their capacity by wrapping them with carbon fibre which is bonded to the concrete (refer to Detail 8). For this to be done, any finished to the concrete must be removed carefully, the corners radiused so as not to damage the carbon wrapping, and a bonding agent applied to the surface of the concrete. Subsequent to application of the carbon fibre, it must be provided with fire protection in the form of boarding or alternately, a cementitious render. At this stage, it has been assumed that all RC columns subject to a net load increase will be strengthened in this manner.

An alternate strengthening method (Refer to detail 8b), is to provide additional reinforced concrete encasement to enhance the compressive strength. The disruption is greater that fibre wrapping due to wet trades and requirement to continue wrapping down to foundations; so this is only planned where load increases are beyond the capabilities of fibre wrapping. The advantage of this method is the new concrete can provide the fire protection inherently offering opportunity to expose the columns visually.

A third option (Detail 26) involves steel members (typically PFCs) on opposing faces of the column (two faces or all four, as necessary) and bolting these members together, through the RC column. This is likely to be only employed where other options are not viable.

5.24.3 Introduction of columns / walls within the bunker

In order to transfer the increased column loads effectively to the raft footing, it is proposed to introduce new RC columns and walls into the bunker space, directly below the existing columns (above) which are currently supported by the bunker roof. These new elements will be fixed at their top and bottom by means of dowel bars drilled and fixed into the existing structure with resin anchors, however the effect on the existing building fabric is minimal. At this stage, it has been assumed that a new column / wall will

be introduced into the Bunker to correspond with every column or new wall above, however this should be considered a worst-case scenario. Following further analysis, it may be possible to omit some of the proposed new columns and/or walls.

5.24.4 Addition of new steel frame

Following the above tasks, the new steel frame can be introduced onto the existing Level 05 slab. The new steel structure is of “moment-frame” construction. As such, the new steel structure does not contain vertical bracing and the effect on the existing structure due to increased lateral loading (from wind) is minimised.

Around the perimeter of the building, below the existing Level 05 slab, new steel transfer beams will be introduced to transfer loads from the new perimeter columns (above) to the existing RC columns below. This detail has been adopted as it is less intrusive than introducing new columns over the full height of the exiting building and is reversible, should this be required in the future.

5.24.5 Addition of strengthening steelwork

As per Section 5.23 above, strengthening steelwork will be introduced to the underside of Level 05 in order to accommodate the loads imposed by the columns of the new steel structure above. To accommodate the geometry of the slab / column interface above, these beams will be cranked at both ends.

5.24.6 Connection of new steelwork into tower structure

Where the new steelwork structure meets the existing tower, a connection will need to be formed. In order to achieve this, a small portion of curtain walling will first need to be carefully removed. Following this, the concrete encasement to the steel section will be carefully broken out to allow the welding of steel plates between the beam flanges. Following connection of the new steel member, the concrete encasement will be reinstated, followed by making good the curtain walling.

5.25 Roof-over to Tower Rooflight

As discussed above the architectural proposal is to install a roof over the original rooflight to enable new (heavier) glazing. The structural proposals are within the Ramboll façade report but a proposed connection interface is shown below based on supporting new steelwork on the same slab upstand. Further investigations are required to validate this approach as roof access is not currently possible.

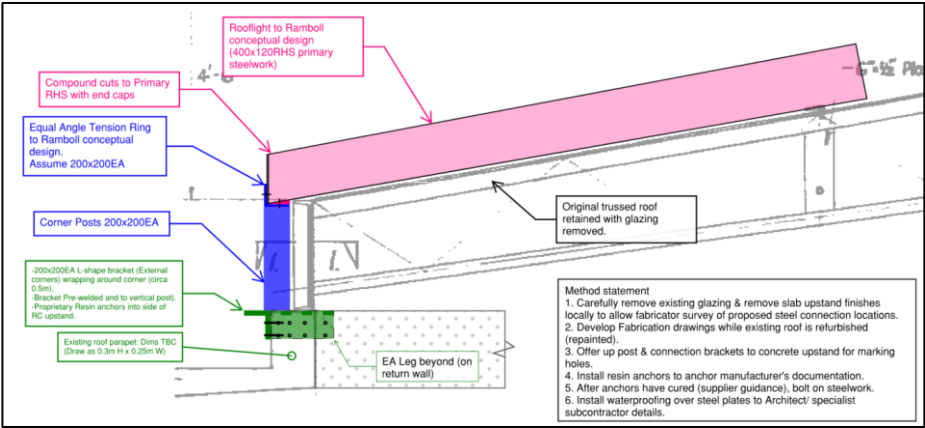


Figure 19 Interface proposal for over-roofing design to Level 26 rooflight

5.26 Temporary Crane

Temporary works to enable the refurbishment of the building are not yet developed and await a Principal Contractor. However preliminary discussions with a contractor have led to draft proposals that a tower crane may be required within the Podium to enable lifting of M&E building services Plant and construction materials onto the podium. In the absence of loading information, it has been assumed that will be located on the roof of Level 05 podium. To avoid overloading the level 05 structure such a placement would require temporary back-propping down to foundations. Or alternatively the crane could bear onto existing concrete columns to run to ground; however this would require appraisal of temporary column capacity and potential early installation of the column strengthening locally. This shall be progressed further with an appointed contractor to avoid works adverse to the heritage of the building.

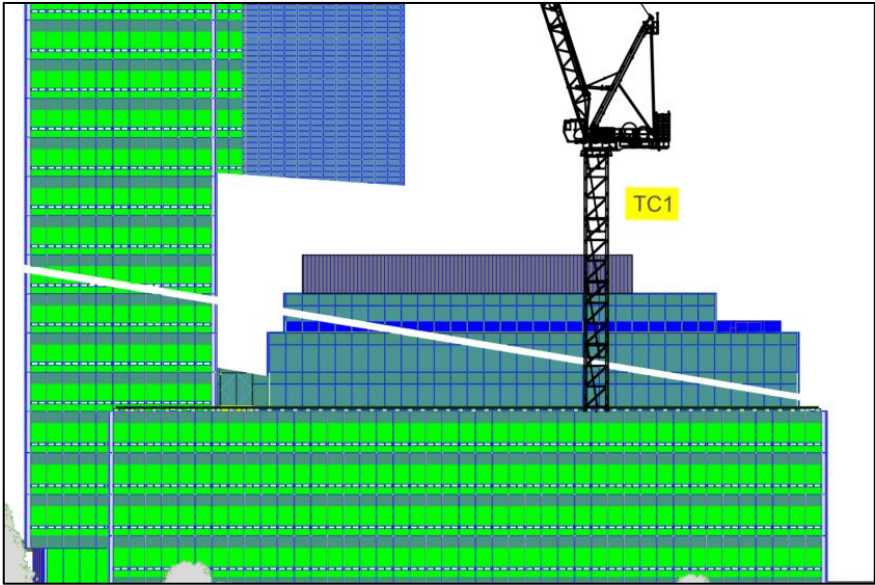


Figure 20 Draft proposal for tower crane bearing on podium.

6.0 Appendices

Appendix A Selected Architectural drawings

Appendix B Structural General Arrangement drawings

Appendix C Structural details drawings

Appendix D Intrusive Survey Reports

Our Locations

Birmingham
2 The Wharf
Bridge Street
Birmingham
B1 2JS
T. 0121 643 4694
birmingham@curtins.com

Bristol
Quayside
40-58 Hotwell Road
Bristol
BS8 4UQ
T. 0117 302 7560
bristol@curtins.com

Cambridge
50 Cambridge Place
Cambridge
CB2 1NS
T. 01223 631 799
cambridge@curtins.com

Cardiff
3 Cwrt-y-Parc
Earlswood Road
Cardiff
CF14 5GH
T. 029 2068 0900
cardiff@curtins.com

Douglas
Varley House
29-31 Duke Street
Douglas
Isle of Man
IM1 2AZ
T. 01624 624 585
douglas@curtins.com

Dublin
11 Pembroke Lane
Dublin 2
D02 CX82
Ireland
T. +353 1 507 9447
dublin@curtins.com

Edinburgh
1a Belford Road
Edinburgh
EH4 3BL
T. 0131 225 2175
edinburgh@curtins.com

Glasgow
Queens House
29 St Vincent Place
Glasgow
G1 2DT
T. 0141 319 8777
glasgow@curtins.com

Kendal
Units 24 & 25 Riverside Place
K Village
Lound Road
Kendal
LA9 7FH
T. 01539 724 823
kendal@curtins.com

Leeds
Ground Floor
Rose Wharf
78-80 East Street
Leeds
LS9 8EE
T. 0113 274 8509
leeds@curtins.com

Liverpool
51-55 Tithebarn Street
Liverpool
L2 2SB
T. 0151 726 2000
liverpool@curtins.com

London
40 Compton Street
London
EC1V 0BD
T. 020 7324 2240
london@curtins.com

Manchester
Merchant Exchange
17-19 Whitworth Street West
Manchester
M1 5WG
T. 0161 236 2394
manchester@curtins.com

Nottingham
56 The Ropewalk
Nottingham
NG1 5DW
T. 0115 941 5551
nottingham@curtins.com