
Job Title

Hotspur Press, Cambridge Street,
Manchester

Prepared for

Manner

Report Type

Construction Methodology and
Façade Retention

Date

Sept 2023



Contents

1. Introduction	1
2. Site Context and Background Reports	1
3. Development Proposals	2
4. Façade Retention	3
4.1 Introduction.....	3
4.2 Appraisal of Existing Façade for Retention	3
4.3 Design Criteria and Loads on Retention System	9
4.4 Temporary Façade Retention Methodologies	10
5. Construction Methodology	15
5.1 Sequence of Demolition	15
5.2 Proposed construction Methodology	20
5.3 Access Requirements	22

Construction Methodology and Façade Retention

Prepared by JBr

Reviewed by DP

Civic Job No. 1006-03

Issued 14.11.23

Revised P03 - 05.04.2023

This report is the copyright of Civic Engineers and is for the sole use of the person/organisation to whom it is addressed. It may not be used or referred to in whole or in part by anyone else without the express agreement of Civic Engineers. Civic Engineers do not accept liability for any loss or damage arising from any unauthorised use of this report. Civic Engineers is a trading name of Civic Engineers Ltd (registered number 06824088), which is a limited company registered in England, registered address Carver's Warehouse, 77 Dale Street, Manchester M1 2HG

1. Introduction

Civic Engineers Ltd have been appointed by Manner to appraise the technical feasibility of the anticipated construction methodology and façade retention at the proposed development at Hotspur Press, Cambridge Street, Manchester.

The development includes the partial demolition of the former Hotspur Press Complex (Medlock Mill) and redevelopment of the site to provide Purpose Built Student Accommodation (Sui Generis Use Class) above ground floor commercial or community uses (Use Classes F(e), F2(a)(b) and E(b)), within a part 4/5-storey and part 37-storey building plus roof parapet level above basement level, associated ancillary internal and external amenity space, public realm (including a new public square), hard and soft landscaping and associated highway works.

The proposed development would involve the demolition of existing structures within the site, followed by the construction of a new 37 storey building (plus ground and rooftop amenity space).

This report should be read in conjunction with other consultants' work, including Architect, Mechanical and Electrical Engineer, Fire Engineer and Historic Building Consultant.

This report does not alleviate the Contractor in any way of their obligations under CDM 2015 in their role as Principal Contractor to develop a Construction Phase Plan in conjunction with the Principal Designer, Contractors and other Duty Holders.

2. Site Context and Background Reports

The site contains four buildings which were constructed at different times during the 19th Century. The buildings collectively form Hotspur Press, formerly known as Medlock Mill. The 1801 mill and 1882 warehouse are 5 storey buildings, constructed from loadbearing masonry walls to the perimeter, with internal cast iron columns supporting timber beams and timber joisted floors. Roofs are pitched timber in arrangements of Queen-post truss or pitched timber roof supported on timber beams.

A more detailed description of the structures can be found in Civic Engineers' report, '*Structural Appraisal, Condition and Proposals Report*', which details in full the structural form and condition of the buildings present on site. The condition report was based on a visual inspection carried out by Civic Engineers. High level access into the roof structures was not possible. There were also some areas of concealed ceiling which did not allow local inspection of the structure.

In addition to the visual inspections carried out by Civic Engineers, several specialist surveys were undertaken in 2018 to provide further information on the condition of key structural elements in each of the buildings investigated. These specialist surveys/reports are listed below.

- *Conservation Implementation Strategy* – Stephen Levrant Heritage Architecture
- *Asbestos Survey Report* – John Sherratt & Co Ltd
- *Measured Survey* – Chris Partington Land Suveyors
- *Timber Survey* – Timberwise
- *Structural report* – Thomasons

- *Phase 1 Desktop Study* – LK Consult

This report will concentrate on the construction methodology, with specific reference to façade retention of the 1801 mill in line with the development proposals.

3. Development Proposals

The proposed development can be summarised as follows:

- Partial demolition of the significantly altered 1801 warehouse (Building A) and the single storey 1882 sheds (Buildings C and D), with the retention of external facades. The curved 1882 warehouse (Building B) is also demolished and the curved façade to the river frontage is to be retained;
- A new 37 storey building (plus ground) will be delivered behind the retained 1801 warehouse facades and adjacent to the River Medlock. This building will comprise purpose built student accommodation and ground floor/basement amenity space;
- Ancillary facilities, such as a concierge and waste storage, in addition to ground floor and roof level amenity spaces;
- Significant new public realm and a high quality connection between First Street and Cambridge Street (Gloucester Street);
- Environmental improvements to River Medlock.

4. Façade Retention

4.1 Introduction

The development proposals are such that upon demolition of the 1801 mill it is the intention to retain and/or rebuild the east and north façade up to roof parapet level and upon demolition of the 1882 warehouse it is the intention to retain the southern river-side curved façade up to roof level. The overall façade retention strategy is shown in Figure 1 – Façade Retention Strategy Key Plan. The purpose of the façade retention is to create a plinth for the 37 storey tower that is to rise from the centre of the original structure that is to be demolished. The façade will provide an internal wall to a number of apartments along the elevations.

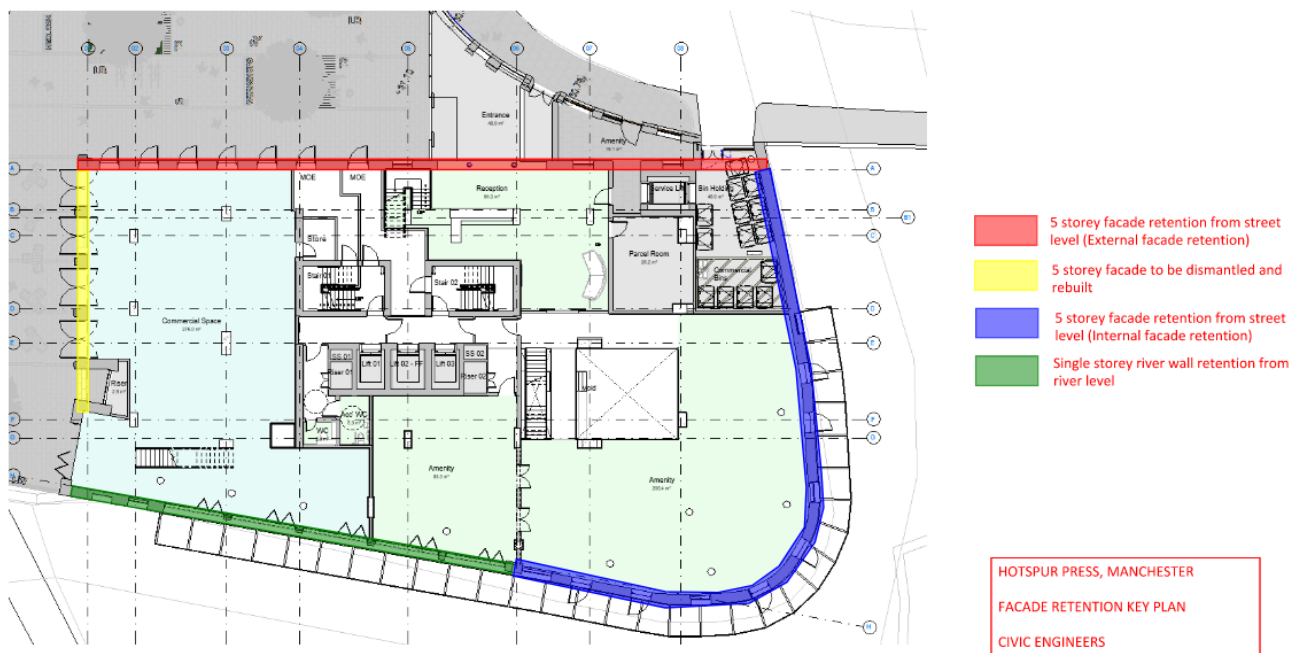


Figure 1 – Façade Retention Strategy Key Plan

This section will discuss the assessment of the existing façade in its retention, the design loads to which the façade and retention system are to be designed and the methods and options for façade retention.

4.2 Appraisal of Existing Façade for Retention

4.2.1 East Elevation Façade

The east elevation façade is made up of loadbearing masonry with timber joists and beams that bear into the wall. The east elevation façade is typically in poor condition. There are signs of prolonged water ingress from poor weatherproofing at parapet level.

Lintels along the east elevation to the internal face are typically historic cast iron lintels. These lintels have exhibited signs of corrosion due to water ingress, and in a number of locations across the east façade these have perished. Some cills internally have dropped, but this is not evident externally since the external lintels are arched brickwork.

As viewed from Cambridge Street level it appears that there are several pattress plates visible along the eastern elevation, as illustrated in Figure 2. The pattress plates in Figure 2 (A) might be connected through steel tie rods to the pattress plates in the lift shaft connecting the Warehouse building to the Mill structure- this is noted in the Structural Appraisal Report.

Traditionally, pattress plates are added as a remediation measure to restrain lateral movement of the facades that may have occurred during the life of the structure. Pattress plates have been installed to the head of the first-floor and second-floor windows, as is shown in Figure 2 (B). The plates in Figure 2 (B) are not visible on the opposite elevation, thus indicating that they do not pass through the entire structure, although ties could be hidden from view within the floor build up. Since there are no visible corresponding pattress plates on the western elevation, the pattress plates indicated in Figure 2 are likely to be restraining only the eastern elevation from bowing laterally.



(A)



(B)

Figure 2 - Pattress plates on eastern elevation (taken 2018)

In some instances, at the head of the second-floor windows, as per Figure 3 (A), the surrounding brickwork has become dislodged as the vegetation root system expands and forces the brickwork out of alignment. Cracking has also been induced due to the expansion of the root system. Internally, severe water penetration has led to the crumbling and spalling of the masonry, as illustrated in Figure 3 (B).

The cause of this growth is most likely due to open mortar joints in the stonework, allowing spores within the air to take root.



Figure 3 - Severe vegetation growth on eastern elevation (taken 2018)

The window openings on the eastern elevation have typically brickwork lintels, while the window openings of the staircase (which was a later addition) have stone lintels. There was no access possible near the staircase to establish whether the staircase has been effectively tied into the external walls of the Mill.

There are signs of vegetation growth at the top of the third-floor window located at the corner with the staircase structure, as per Figure 3 (A)

Part of the eastern elevation wall (at the corner of the building on Gloucester Street) appears to be stonework instead of masonry. It is possible this corner was rebuilt with stonework during works when the steel shutter was installed,

Lateral stability to the east elevation is provided by the perpendicular adjoining walls to the north and south elevation. Lateral forces in the north-south direction are transferred via the floor and roof into the elevation walls, which transfers these forces vertically into the foundation.

The trusses at roof level restrain the top of the walls laterally between adjacent piers. At floor level the joist ends provide lateral restraint to the floor diaphragm.

4.2.2 North Elevation Façade

The north elevation is not readily accessible to view from foot and is only visible from the First Street side of the River Medlock. As with the eastern elevation as noted above, there are areas of loose brickwork and poor mortar joints. The poor condition of the building fabric has allowed water to enter the building which has resulted in vegetation growth, which is evident in some of the mortar joints that have been opened due to weathering.

Internally there are visible signs of dropped window cills, which is a result of perished lintels at the floor level below that have allowed the brickwork to deflect downwards. This is evidence that this is due to water ingress that has penetrated the timber lintels.

Water staining is evident down the external face of the north elevation. This would appear to be due to perished rainwater goods that have allowed water to flow down the face of the brickwork.

The existing shed roof abuts up against the north elevation. The condition of the roof coverings at the interface is poor, which is also evident with water flow down the internal face of the north elevation within the shed section of the building. Brickwork and mortar condition below the roof level is poor.

There are areas of new brickwork infill along the north elevation. This is evident over the window at first floor. The lintel in this area is likely to have been previously replaced.

Lateral stability to the north elevation is provided by the perpendicular adjoining walls to the east and west elevation. Lateral forces in the east-west direction are transferred via the floor and roof into the elevation wall, which transfers these forces vertically into the foundation.

The floor plate restrains the walls at each floor level, and at roof level the return walls, purlins and ridge member restrains the gable.

4.2.3 South Elevation (adjacent to River Medlock)

The southern elevation is visible from the adjacent bank of the River Medlock, or the road bridge over the river along Cambridge Street.

The façade is made up of loadbearing masonry with timber joists and beams that bear into the wall. The southern elevation façade is typically in poor condition. There are signs of prolonged water ingress from poor weatherproofing at parapet level and well established vegetation growth, and the build-up of mosses and lichens is evident, particularly in the areas surrounding rainwater goods and the areas adjacent the River Medlock, as illustrated in Figure 4.



Figure 4 - Heavy vegetation growth on south elevation (taken 2018)

There appears to be a significant change in the visual appearance to the brickwork at the head of the third-floor windows. The band of brickwork from the window head of the third-floor appears to be consistent up to the top of the parapet, as illustrated in Figure 5, (A). It appears the original brickwork arch lintels above third-floor windows had been previously replaced with steel lintels, most probably during works of the parapet



Figure 5 - Significant cracking on southern elevation (taken 2018)

Cracking is evident to the head of the ground-floor window, with a vertical stepped crack leading up to the window sill at the first-floor level, continuing through the lintel at first-floor window up until the sill at third-floor level, as illustrated in Figure 5. Several of the brickwork units to the window opening appear to be loose, due to the cracking in the elevation wall. The cracks in the elevation may be due to movement of the building, which would indicate settlement of the river wall and foundations. Cracking in the brickwork walls could be due also to thermal expansion, although further investigations into the brickwork is required to determine the cause of this cracking.

At second floor level it appears a former window opening was previously infilled with modern brickwork. The adjacent window openings have been reduced and the space between the previous sill and the new window sills has been previously infilled with modern brickwork as depicted in

Figure 6. A protruding hoist structure is protruding over River Medlock between ground and first floor level, refer also to Figure 6.



Figure 6 - Modern brickwork infill at second floor (taken 2018)

4.3 Design Criteria and Loads on Retention System

The external loadbearing walls resist vertical loads from the floors, and lateral loads from wind. These walls also stabilise the internal frame. As noted in the façade appraisal above, lateral loads are transferred via the floor diaphragm into the perpendicular external walls that act as stability walls. When the existing structure is partially or totally removed, the façade will need to be supported in the temporary condition until it is tied permanently to the proposed structure.

Typical problems associated with façade retention are:

- Designing the temporary support to the façade during demolition and reconstruction of the interior of the building;
- Allowing for access of plant and materials, and vehicular or pedestrian movement outside;
- Connecting the new structure to the façade, and allowing for subsequent differential movement; and
- Designing the new foundation system which does not impair the stability of the façade.

In the case of Hotspur Press, the new building will provide its own stability and vertical load carrying function. The existing masonry walls to the retained facades will provide their own vertical load carrying function but will be laterally tied to the new building to rely on its stability, which will be lost due to the proposed demolition of the internal floor plates. Given that the existing wall and new building will be on different foundations there may be differential movement between the two. Vertical moving connections will be provided to account for any anticipated differential movement,

There are three temporary façade retention options, and these are discussed in section 4.4 below. The advantages and disadvantages of each system is discussed and a recommendation for Hotspur Press is made.

The façade support system has to provide both structural capacity to resist lateral forces on the wall and sufficient stiffness so that eccentricities are not created due to excessive movement or deflection. The Contractor shall follow the relevant Code of Practice for falsework to design the temporary system.

The Contractor will need to design the retention system to current wind loading Code of Practice. Additional horizontal load may be applied to the system in the form of equivalent horizontal forces applied as a percentage of the overall vertical forces in the structure.

The foundation of the retention system should adopt a suitable factor of safety for overturning and sliding.

The retention system should be designed using current load factors and permissible stress in permanent works. Bracing should be considered over moment frames and fixed connections. Slotted connections in the temporary support that may allow the façade to deflect excessively and cause cracking in the façade should be avoided.

4.4 Temporary Façade Retention Methodologies

There are various options available for façade retention which are principally described by two main categories; external and internal façade retention. Both systems have their advantages and disadvantages for application in this instance.

The external system is built around the perimeter of the building that then allows the internal structure to be demolished. The internal system is built within the existing internal structure, and then the structure demolished around it.

4.4.4 Temporary External Façade Retention

An external system offers a clear working space inside the façade to allow demolition and construction site activities to take place without hindrance from the façade retention works but has the disadvantage of requiring space outside of the building, which could have an impact on access adjacent to the Network Rail owned viaduct to the north. This can be seen in the indicative access and delivery sketch at the back of this report.

The external framing option for the north façade of the Hotspur Press building cannot utilise mutual support from return walls due to the proposed demolition of the west facade of the building. This method should therefore utilise a braced steelwork frame on piled footings at base level.

Wailing beams or horizontal trusses would be placed at each of the existing floor levels, roof and parapet level, which mimics the existing restraint provided by the existing floor structure, tied between internal and external face of the wall. The wailing beams/trusses are then braced by a steel frame. Lateral loads from wind are then transferred via the braced frame into vertical loads into the footings.

The design of the piled foundations that the Contractor proposes will need to be based on ground conditions exposed during Phase II and III intrusive site investigation work. Kentledge would need sufficient weight to withstand horizontal shear/sliding and overturning as noted in Section 4.3 above. This will not be appropriate due to the depth of the existing footings below the existing ground levels around the east and north elevation. A further propping arrangement to the basement wall would need to be developed if kentledge adopted.

Temporary fixings must be resin, mechanical or through fixings (preferred), avoiding prominent features on the façade in accordance with the Conservation Implementation Strategy as written by Stephen Levrant Heritage Architecture.

Given the proximity of the River Medlock to the southern curved façade, it is not anticipated this method of façade restraint would be viable in this situation without substantial temporary works and crash deck construction across the river channel.



Figure 7 - Example of External Façade Retention - Image Courtesy of Pinterest

4.4.5 Temporary Internal Façade Retention

An internal framing option for the north and east façades of the Hotspur Press building would seek to minimise horizontal distance from the existing façade to ensure minimal disruption to the on site activities. This would be achieved by providing a regularly spaced braced steelwork frame so that lateral forces can be transferred into pad footings or kentledge at base level.

This is similar to the proposed external façade retention method, but this would allow additional working and access space around the north elevation of the façade. This option would have the vertical elements spaced more regularly due to the working distance between the proposed slab edge and the existing façade of circa 1500mm.

The temporary façade retention structure would need to be designed with due consideration of the permanent façade retention, which is currently proposed to take lateral restraint from the new structural frame. The internal system would need to be installed during a controlled sequence of demolition due to the floor plates providing lateral restraint to the external walls. This system can often be slower to erect due to the careful planning that is required to the sequencing of demolition and installation of retention system, however this system is wholly contained within the existing building footprint so there will not be any issues with access provision to the north elevation of the mill.

There is limited room proposed between the proposed slab edge and the external façade, therefore the internal façade retention system would need to work significantly harder to resist the lateral forces

Temporary fixings must be resin, mechanical or through fixings (preferred), avoiding prominent features on the façade in accordance with the Conservation Implementation Strategy as written by Stephen Levrant Heritage Architecture.

An example of internal façade retention, designed by Civic Engineers, is shown in Figure 8 below. This indicates the complexities of installing the façade retention with tower crane and internal site activities.



Figure 8- Example Internal Façade Retention - Civic Engineers

In the instance of the south elevation, this methodology is considered the most viable solution given the proximity of the adjacent River Medlock.

4.4.6 Deconstruct and Rebuild

An option that the appointed contractor may wish to consider is to completely deconstruct the external facades to be retained in a controlled manner, agreed with statutory bodies. The facades would need to be rebuilt upon completion. New footings supported in the same manner as the new build structure can be incorporated into the substructure to minimise differential movement between the new building and existing façade.

This option is likely to be labour intensive and may incur programme implications.

4.4.7 Recommendations for Façade Retention

The following recommendations for façade retention take into consideration the discussions in previous sections of this report as well as initial engagement with contractors and temporary works engineers.

East Façade

Based on initial discussions with contractors and temporary works engineers it is proposed that an external temporary façade retention option for this façade will be suitable. Limited working space is available between the proposed slab edge of the new building and the existing façade resulting in greater challenges to adopt an internal retention solution.

This elevation generally has sufficient working space and access should not pose an issue. A braced bay with horizontal spanning truss would be required at the end abutting the proposed retained 1882 warehouse.

Northern Façade

Based on initial discussions with contractors and temporary works engineers it is proposed that a dismantling and rebuild option for this façade will be suitable. Although there are no immediate signs of significant structural distress to this façade, which may result in retention being unviable, other factors and considerations have been advised as follows.

- Existing geometry of the façade. The current façade geometry comprising of double height windows, narrow piers and a triangular gable wall at the head will be unstable in temporary condition requiring strengthening works (above and beyond temporary restraint) in the temporary case to facilitate a temporary works strategy. This includes

Widespread vegetation growth which has been identified. This growth would need to be removed, treated and then local masonry repairs and repointing carried out prior to implementation of a façade retention strategy and removal of internal floors.

Strengthening of the triangular wall gable head. With the removal of the existing roof in the temporary case permanent intervention will be required to achieve the free standing aspiration of this wall within the terrace zones. This permanent intervention will need to be implemented prior to the implementation of a façade retention strategy and removal of internal floors.

Modified windows. As per Civic Engineers Structural Appraisal Report it has been observed that 1No of the original windows has been modified using a different type of brickwork (visually, unknown from a structural perspective) We understand the architectural intent is to return to the original window position.

- Proximity to Network Rail Viaduct. An external façade retention strategy in the area of external steel sheds is likely to sterilise this area limiting construction activity. This zone is likely to become a primary means of access to the existing basement space.
- An internal façade retention would not alleviate this issue and cause challenges with construction as discussed in previous sections of this report.

Southern Elevation

Based on initial discussions with contractors and temporary works engineers it is proposed that an internal temporary façade retention option for this façade will be suitable given the proximity of the adjacent River Medlock. To adopt an external façade retention will require either temporary works within the River or over the River to adjacent land which will not be possible due to ownership.

Permanent façade retention will be further developed in the next stage of design, which will need to allow for vertical differential movement, and resist lateral loads from the existing façade into the new building stability model.

5. Construction Methodology

5.1 Sequence of Demolition

The sequence outlined below is the anticipated sequence of demolition, including preceding works to make the retained elevations stable upon its demolition. For any required structural works to the buildings prior to the demolition refer to the Structural Appraisal Report.

- Remove the roof structure to the 1880 shed buildings;
- Phase 1 demolition 1880s shed- install temporary or permanent propping to the wall along Gloucester Street. Remove steelwork and make good masonry in areas of steelwork embedded into north and east façade of 1801 mill. It is anticipated that some of the steelwork elements of the roof will be kept. This could be stored on site for later reuse subject to load balancing between the existing and proposed use.
- For the demolition of 1882 shed and installation of the brickwork wall along the west elevation adjacent to River Medlock, there are a number of options for restraining the head of the existing wall and allow access on the river side of the site elevation of the new build structure. The preferred option would need to be discussed and agreed with Environment Agency:

Option 1 – Provide temporary propping to the head of the existing wall across the river to the adjoining river bank with wailing beam that restrains the head of the existing wall. This is to provide lateral stability to the wall during the high level piling operation and would also provide enhanced heritage aspect in retaining more of the existing building. Provide working platform across the river. The piling operation at higher level can then be carried out. The new brickwork wall would be built off a cantilever ground beam off the new pile caps, with head of the existing wall at low level tied to the new slab- refer to figure 9; .

Option 2 - Reduced level dig behind the back of the existing river wall. Install new reinforced concrete retaining wall to the back of the existing river wall. Pile from low level. New RC column built off pile cap at low level, which is to be backfilled around and basement slab cast at high level. The new brickwork wall built from the top of the new reinforced concrete retaining wall

Option 3 - Provide sheet piled earth retaining wall to the back of the existing river wall. This can be provided either temporarily or permanent. In the temporary case the sheet piled earth retaining wall would need to be designed to resist lateral forces from the piling rig at high level over the river bank. In the permanent condition the wall would need to be designed to resist vertical forces from the newly built wall.

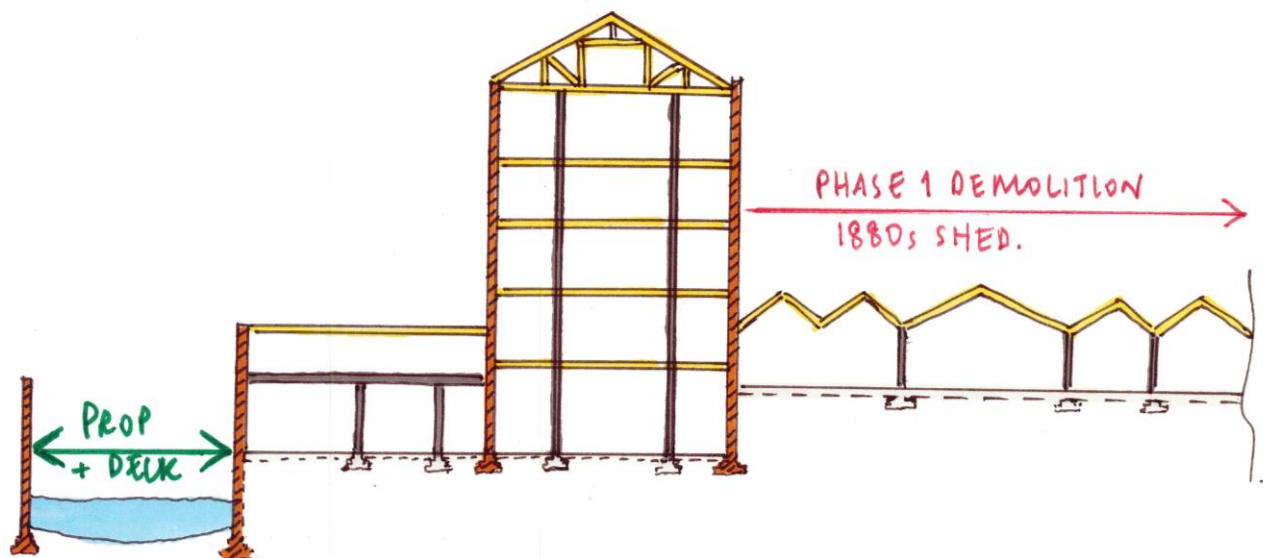


Figure 9 – Installation of prop & deck + phase 1 demolition of 1880s shed. Prop to wall on Gloucester Street

- Install piles to the façade retention system and tower crane. Install external façade retention system with access scaffold for future façade masonry repairs or replacement works. Install tower crane, expected to remain for the duration of the superstructure works – refer to figure 10;

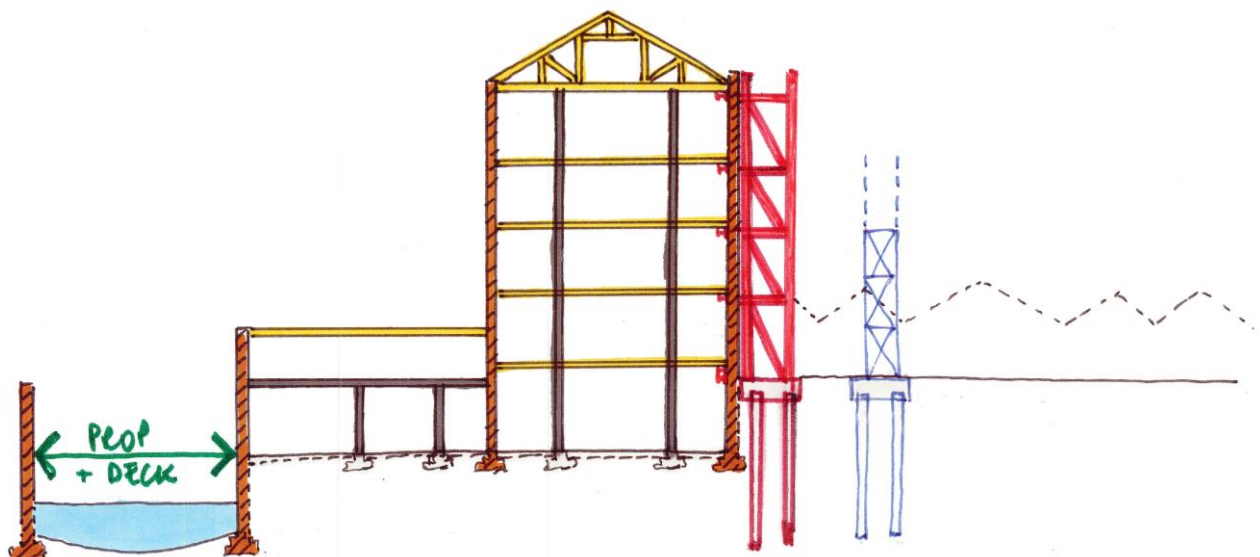


Figure 10 - Erection of temporary facade retention following installation of piled footings. Installation of tower crane and base

- Phase 2 demolition 1882 shed (refer to figure 11)- create access ramp into basement of 1882 shed. Ensure the wall adjoining River Medlock to the 1882 shed remains stable during removal of steelwork from the roof structure and avoid debris from falling into the river

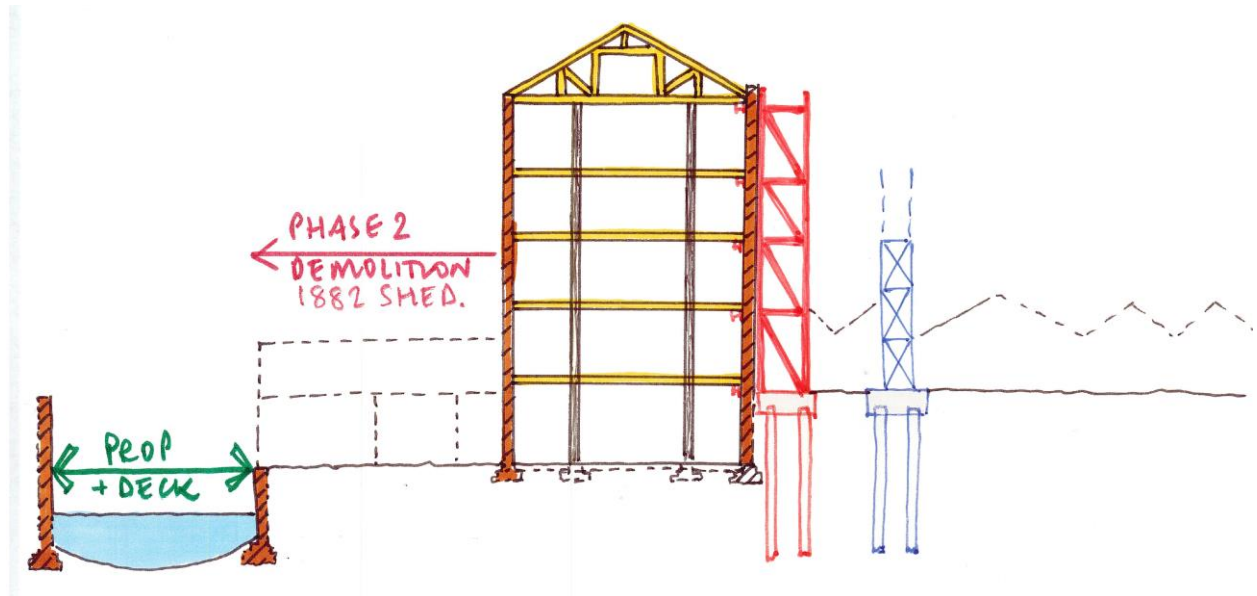


Figure 11 - Phase 2 demolition

- Install lateral restraint ties to the perimeter of the 1881 warehouse. Install reinforced concrete elbow ties to the walls that abut the façade interfaces of the 1801 mill that are showing signs of debonding; Repair external facades of the east elevation of the 1801 mill, including replacement lintels, brickwork repair and crack stitching;
- Install monitoring equipment to retained facades to determine whether any movement occurs during the next phase of demolition. Contractor should carry out a condition survey ahead of this;
- Phase 3 demolition 1801 mill - demolish from top down- refer to figure 8
 1. Remove roof coverings;
 2. Remove roof trusses
 3. Remove cast iron columns to third floor;
 4. Take down west elevation wall to third floor level;
 5. Remove third floor;
 6. Take down wall to second floor level and repeat steps 3 to 5 from second floor down to basement.
 7. Some temporary works on the west elevation may be required when lateral restraint is lost to the external wall when floor structure removed. Contractor to advise

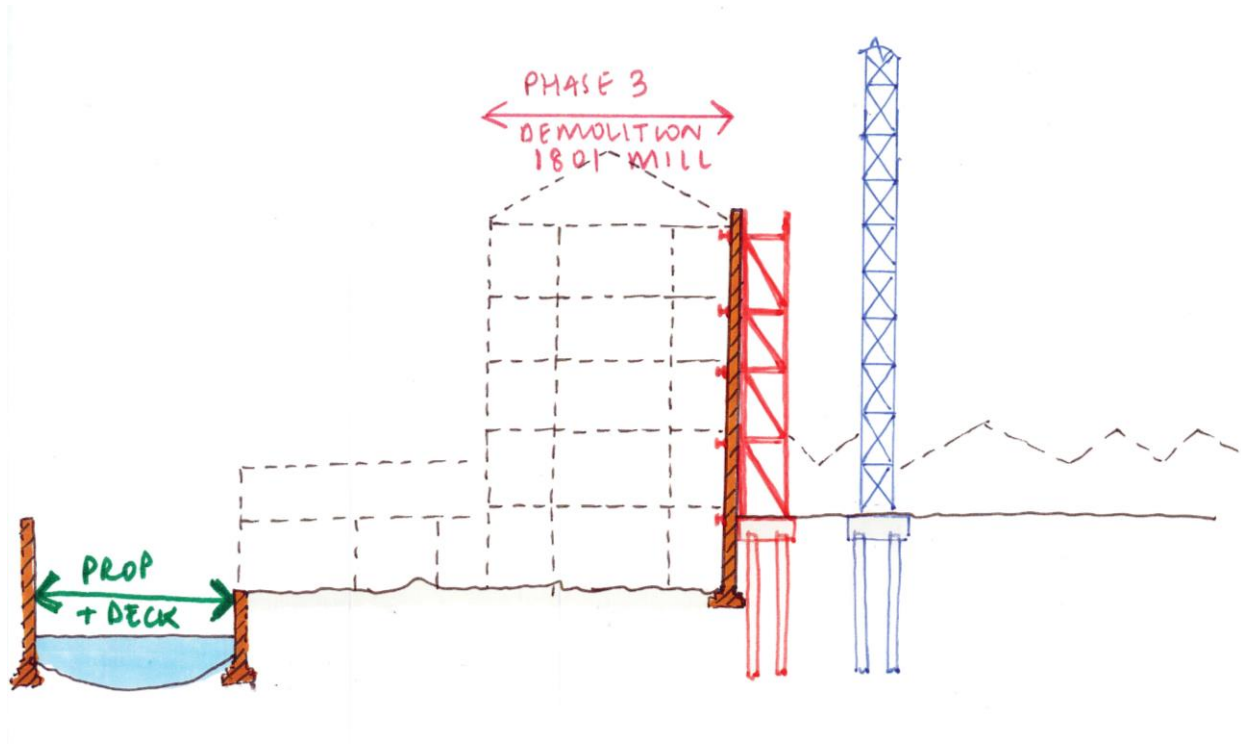


Figure 12 - Phase 3 demolition of 1881 mill

- For demolition of the 1882 warehouse building, an internal façade retention system is preferable due to the proximity of the adjacent River Medlock. Specific locations of the internal façade retention masts are to be developed further in the next design stage. Overall sequence of works to be as described below:
- Install piles to the internal façade retention system. Install internal façade retention system taking reference of existing and proposed permanent works locations and stability. Access scaffold for future façade masonry repairs or replacement works to be provided.
- Repair external facades of the southern curved elevation of the 1882 warehouse building, including replacement lintels, brickwork repair and crack stitching;
- Install monitoring equipment to retained facades to determine whether any movement occurs during the next phase of demolition. Contractor should carry out a condition survey ahead of this;
- Demolish from top down:
 1. Remove roof coverings;
 2. Remove roof structure;
 3. Remove cast iron columns to third floor;
 4. Take down north elevation wall to third floor level;
 5. Remove third floor;

6. Take down wall to second floor level and repeat steps 3 to 5 from second floor down to basement.
 7. Some temporary works on the north elevation may be required when lateral restraint is lost to the external wall when floor structure removed. Contractor to advise.
- Masonry removed during demolition can be reused in sections of the building requiring brickwork repair. Full bricks can be cleaned of mortar and debris and stored on site for later reuse. The contractor should make an allowance for brickwork storage in their Construction Phase Plan based on an estimate of number of bricks to be reused in the brickwork repair.
 - Grub up existing foundations to the demolished buildings, making good the surface suitable for a temporary working platform.
 - It would be prudent at this point to carry out any further repair on the retained facades where structure removed ahead of carrying out works to the proposed tower.

5.2 Proposed construction Methodology

The following construction methodology is an assumed sequence and is subject to detailed consideration by the appointed contractor. Detailed discussions will be required with statutory bodies such as Manchester City Council, Environment Agency, Building Control to discharge portions of the construction methodology.

- Works to the external retained façades can be run concurrently with the works below providing an access scaffold is provided integral with the façade retention system;
- Prepare the ground for piling rig, which will include reduced level dig and installation of a piling mat to the requisite depth. This will need to be designed by a specialist;
- Upon installation of one of the options above, the piling operation can commence. This is expected to be continuous flight auger piles installed to depth to resist the horizontal and vertical forces from the new tower- refer to figure 13

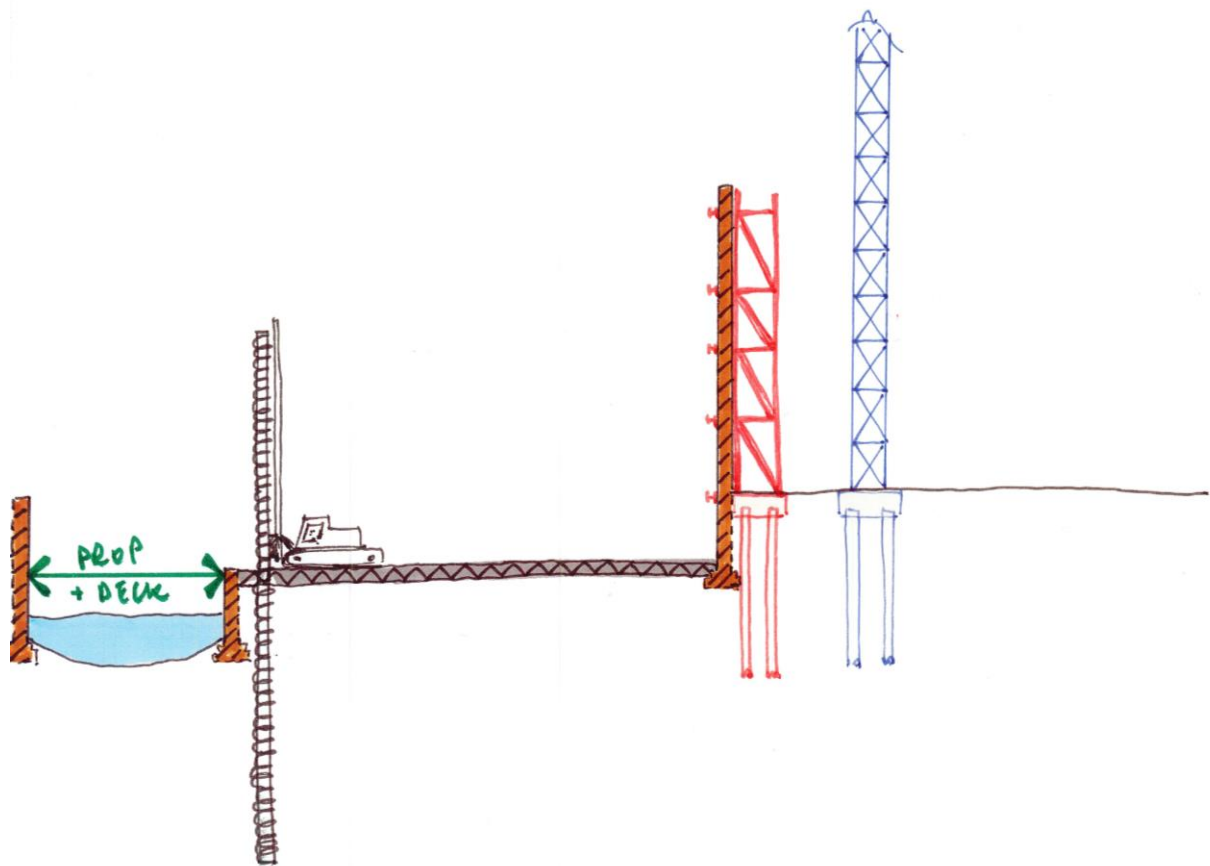


Figure 13 - Installation of substructure

- Upon completion of the piling operation, reduced level dig and pile cropping can commence to install new reinforced concrete pile caps at shear wall and column positions;
- Install gas membrane (if required) and waterproofing below slab level, lapping below pile caps and any ground beams in accordance with manufacturer's requirements;

- Install core, either by slip form or jump form, contractor's preference, along with rising elements and slabs- refer to figure 14;

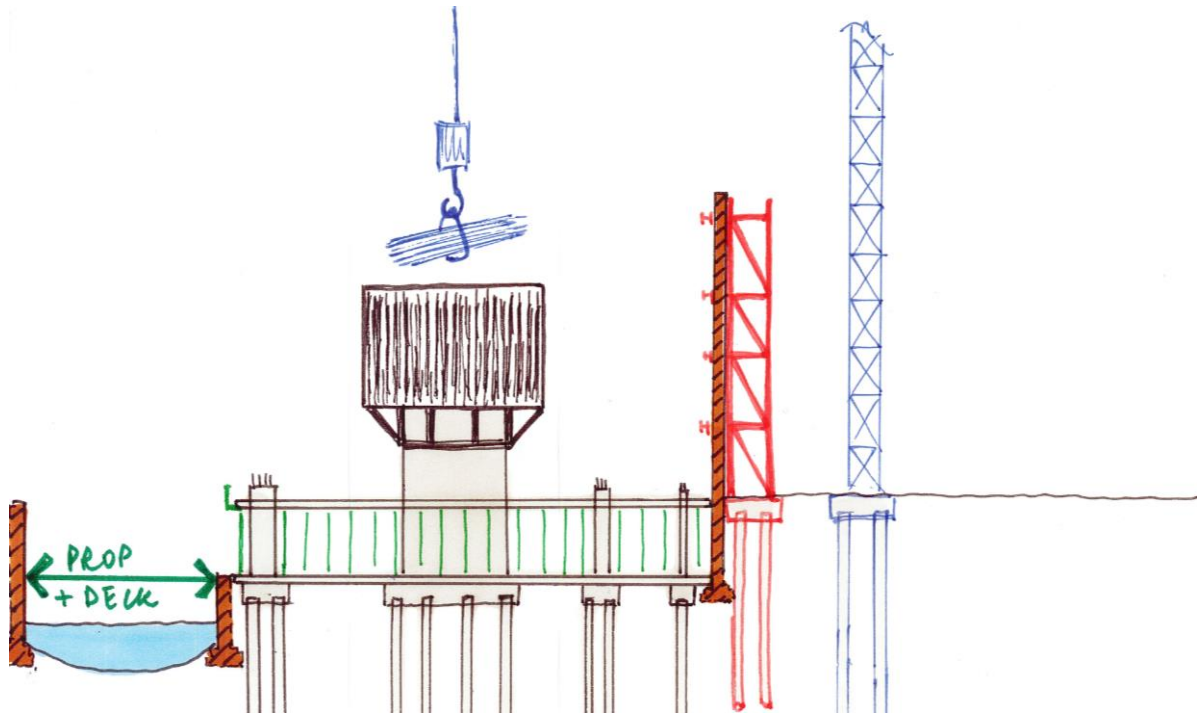


Figure 14- Erection of superstructure

- At ground, level 01, 02 + 03, tie the new slab edge to the retained façade to provide the final restraint. Upon completion of these levels the façade retention system can be removed. Make good the external façade during deconstruction of the temporary façade retention system. Existing façade to be restrained back to the slab edge of new tower construction.
- Where works are adjacent the retained south curved façade, permanent works construction is to be cognisant of the temporary façade retention system ensuring stability and work space for removal of the retention system can be maintained.
- Upon completion of the new construction within the retained southern façade and the façade is appropriately restrained back to the new concrete frame construction, the temporary can be deconstructed from within the building and subsequent voids within slabs can be filled where restrained system masts previously stood.

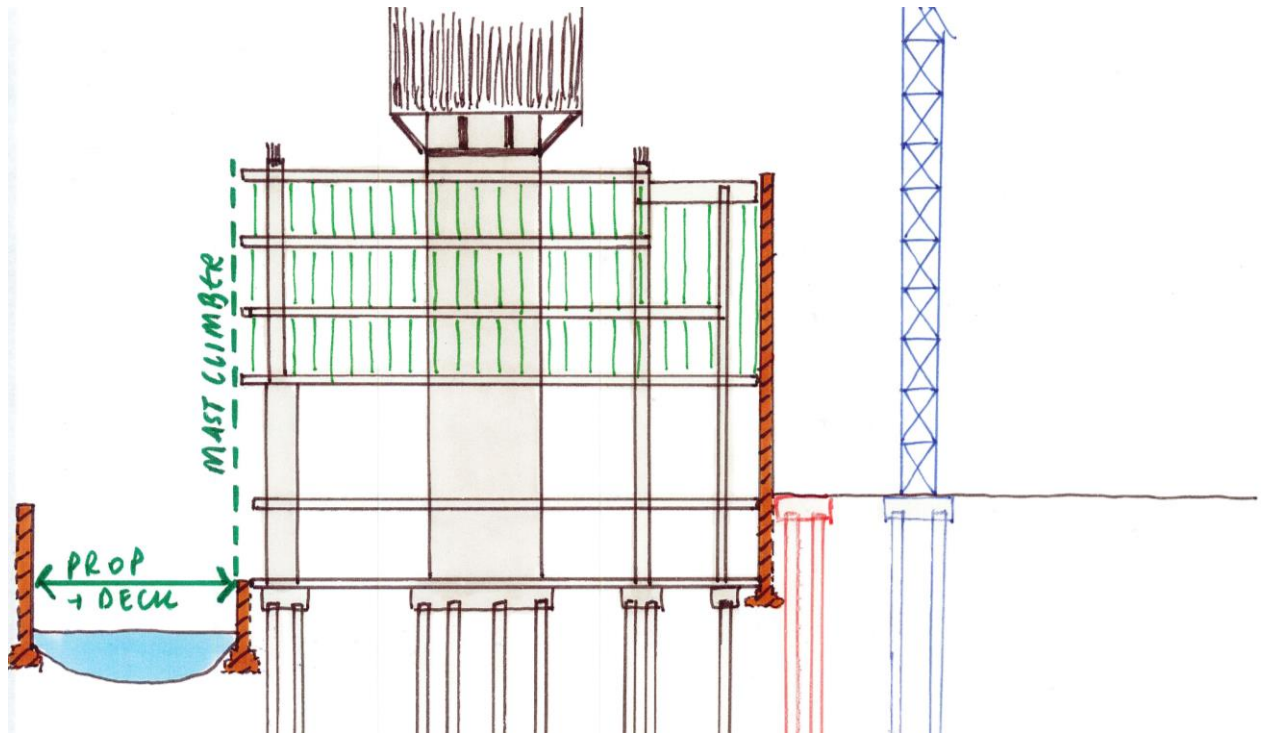


Figure 15 - Continuation of erection of superstructure. Façade retention removed once restrained to proposed slab edge

- Upon completion of the superstructure works mechanical and electrical installation can commence, along with internal fit out following thereafter. These works can be carried out as the superstructure rises at higher level.

5.3 Access Requirements

Initial discussions with Main Contractors suggest that access to the site for construction traffic is likely to require the careful dismantling of the existing wall that fronts onto Gloucester Street. The feature arch is to be retained.

It is the intention that the masonry units of this wall would be stored during construction works to allow rebuilding at a later date.

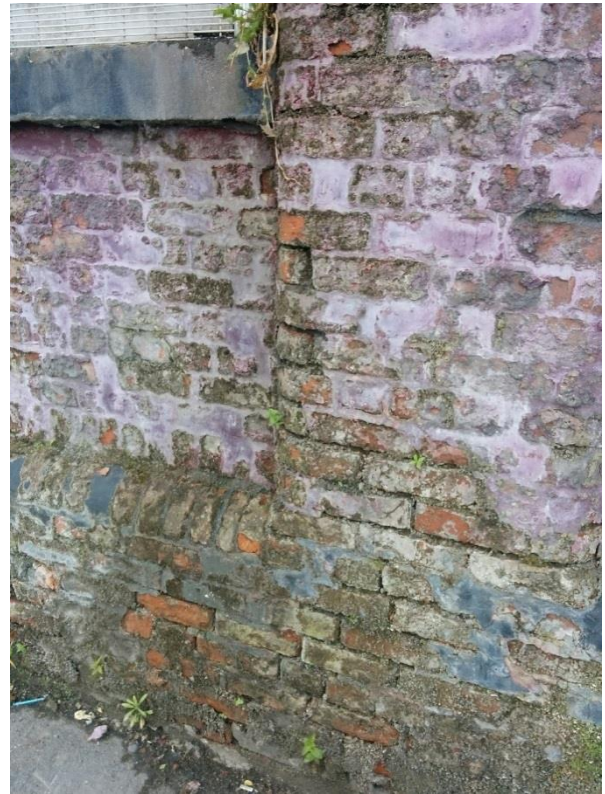
Generally the single storey building elevation along Gloucester Street is in poor condition with significant vegetation growth evident in several places along the wall, as shown in Figure 16 (A). There is a loss of mortar within the brickwork joints and some discoloration of the brickwork, as per Figure 16 (B). There are several brickwork units that appear to be crumbling, with significant build-up of moss and lichens on the brickwork wall. The wall has been previously painted, with paint chipping off due to weathering of brickwork.

Visual inspection suggests the wall appears to exhibit a lean towards Gloucester Street at the head.. The inclination was not measured but was visible to the eye.

The advantage of opting for a dismantle and rebuild approach with this wall is that the above structural concerns can be addressed as part of the rebuild process to restore plumbness and stability to the wall.



(A)



(B)

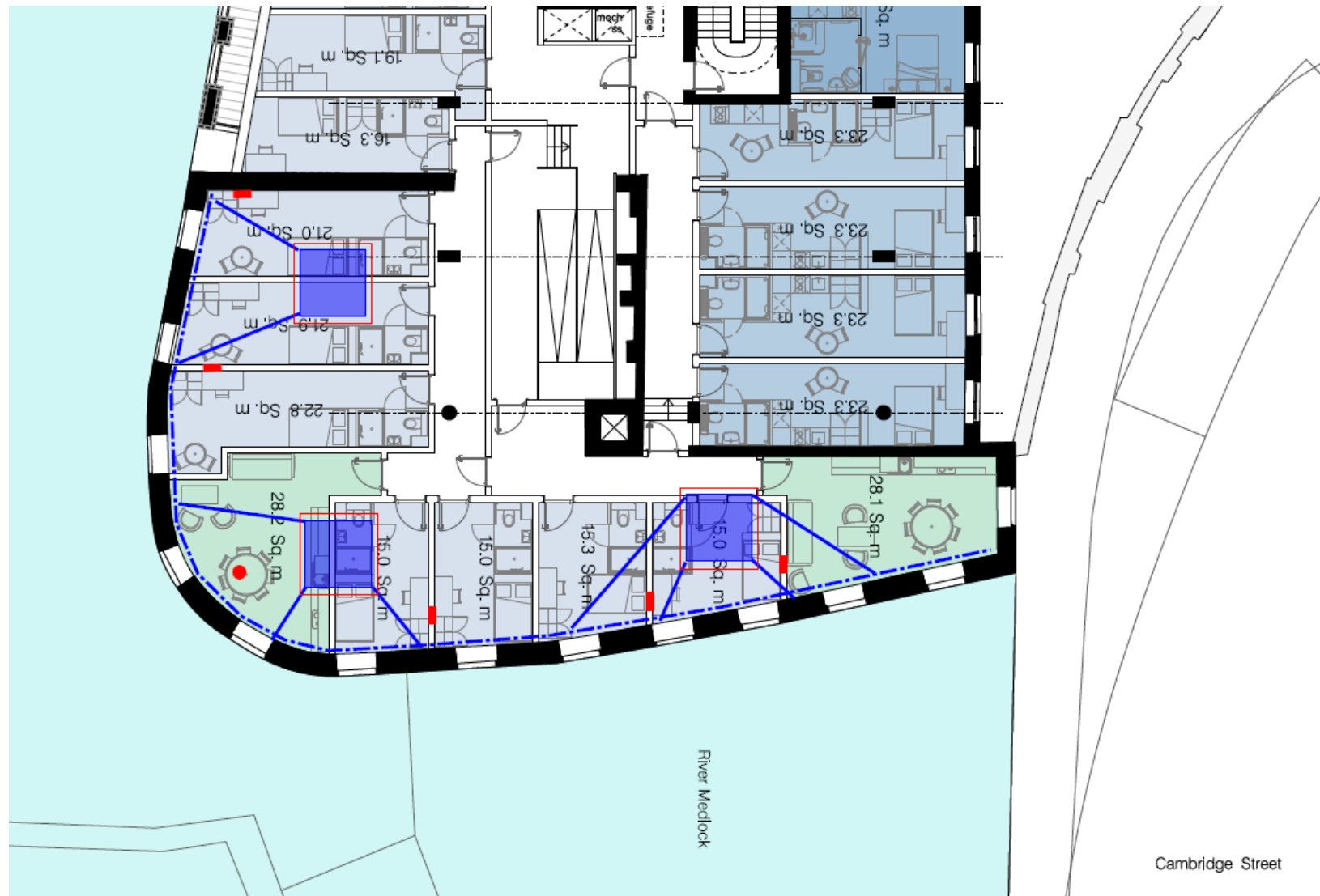
Figure 16 - Wall following the curve comprising both of Gloucester Street and Cambridge Street

Temporary road closures may be required for on street access. Road closures will need to be agreed with Manchester City Council's Highways Department. The section that would suit site access is shown in Figure 17 below, which corresponds to the leaning section of wall.

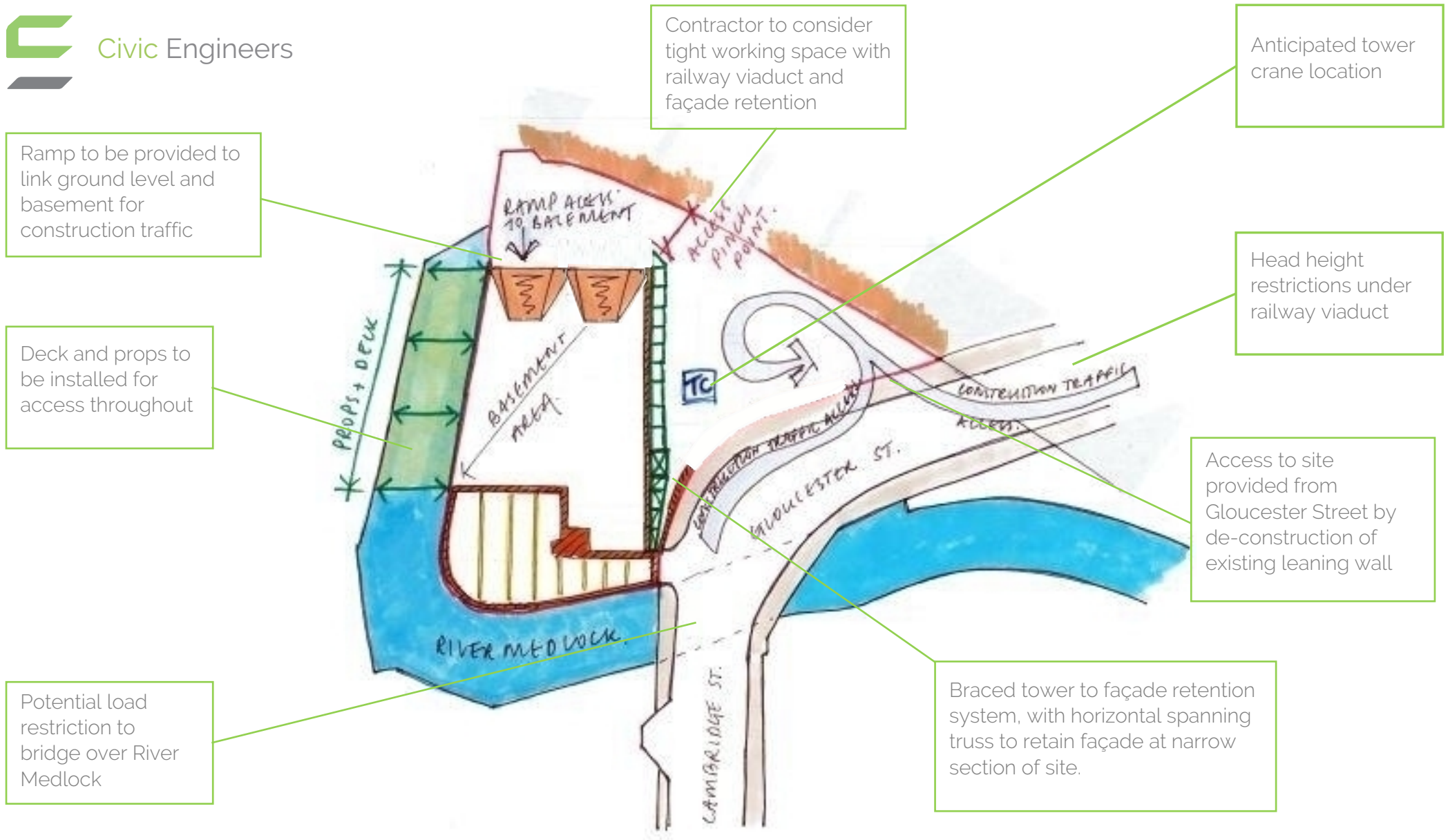


Figure 17 - Leaning wall + site access provision

The sketch on the next page shows an indicative access and delivery arrangement for the site, which highlights a number of constraints.



Indicative South Curved Façade Retention Strategy



Indicative Site Access and Delivery Sketch

Manchester

Carver's Warehouse
77 Dale Street
Manchester M1 2HG
+44 (0)161 228 6757

London

Reeds Wharf
33 Mill Street
London SE1 2AX
+44 (0)20 7253 2977

Leeds

Unit 02/01 Tower Works
Globe Road
Leeds LS11 5QG
+44 (0)113 2025 130

Glasgow

Gresham Chambers
45 West Nile Street
Glasgow G1 2PT
+44 (0)141 370 1829