8-16 Newton Street
Structural condition Summary and Repair Strategy Report

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Revision A

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8-16 NEWTON STREET

STRUCTURAL CONDITION SUMMARY AND

REPAIR STRATEGY REPORT

PREPARED FOR

EASTERN GREEN LIMITED

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1.0 INTRODUCTION AND BRIEF

Eastern Green limited have commissioned Clancy Consulting Ltd to prepare a report to provide guidance on restoring the No.8, No.10, No,12, No.14 and No.16 Newton Street, Manchester and provide recommendations on alterations required to convert the upper floors of the offices for use as commercial offices. This report should be read in conjunction with: *1-20289-Rep-001-A Structural Condition report*.

2.0 DESCRIPTION OF PROPERTIES

The properties are five adjacent four/three storey buildings located on Newton Street, Manchester. The five properties are made up of a block of two (14-16), four story buildings and a block of three (8-12), three story buildings believed to be constructed around the same time. To the right-hand side is Dale Street and to the rear, Mangle Street

The buildings were former cotton workshops, constructed between 1860-1870. The buildings are Grade II listed.

The general arrangement as a cotton workshop included for offices and show rooms to the front of the building and storage facilities at the rear with all floors served by an internal hoist located to the rear of each building. The use of these buildings has changed over the years with internal alterations such as the addition of non-loadbearing internal blockwork walls and removal of loadbearing masonry walls between buildings. The ground floors have been refurbished previously and are currently bars/restaurants and mixed used retail.

The buildings are part load bearing brickwork construction and part framed. The first to fourth floors of the No.16 building is of suspended timber construction. Principal timber beams gain support from internal circular cast iron columns. For the No.14 building the first to fourth floors are suspended timber construction supported by a mixture of steel/ wrought iron beams, channel TFC and timber beams which gain support from internal steel/wrought iron columns. The timber beams are supported at midpoint by a bespoke bow string arrangement carrying the load back to the adjacent columns.

First to third floors of the No.12 and 10 buildings are of suspended timber construction. Principal timber beams gain support from internal circular cast iron columns and load bearing masonry walls.

For the building No.8 second to third floors are supported by timber beams that span between internal load bearing masonry wall and rafters which forms the roof/outer wall. Steel/wrought iron columns are provided to support the floor beams for the first/second floor as the width of the building increases on the lower floors.

The roof of No.14 is a traditional timber construction with king post trusses supporting purlins and common rafters. The roof of No.16 is a queen post (attic) truss with a unique bearing arrangement which also supports purlins and common rafters. The roof structures of building No.12 and 10 are also timber trusses however the exact type and build up is unknown due to being hidden by low ceiling. Building No.8 has a sloping monopitch roof which forms the outer walls for the different levels. All roofs are covered in Welsh slate.

A detailed breakdown of the individual members undertaken in *1-20289-Rep-001* highlights most of the issues that were encountered. It does not purport to identify every defect as this would require additional soft strip out.

This report provides an assessment of the structural condition of the roof, internal walls, suspended and ground floors except those areas which were occupied/inaccessible. Assessment was undertaken from inside the property only and no external assessment to the roof/walls were undertaken.

This report summarises the issues highlighted in the detailed report and identifies areas which will require further investigation.

3.0 GENERAL OBSERVATIONS AND REMARKS

Roof Structure

- No external survey was undertaken, and it will be required to inspect the external roof. Damaged/slipped roof tiles should be repaired and replaced as required.

- All timber trusses will require a closer visual inspection and damp and fungal investigation as some trusses show signs of water damage at the support positions will be required to all the timber elements to determine any areas or water damage or decay.

- Roof lights will also need to be inspected to ensure they are watertight. Where rooflights are formed using timber frames these should be investigated to ensure that there is no water damage or fungal decay and repaired as appropriate in accordance with conservation guidelines. Typical details are provided on drawing CCL-1-20289-110.

- Minor cracks/defects should be repaired using a resin product.

Masonry Walls

- The walls are painted throughout and generally show no evidence of distress.

- Timber lintels should be checked for rot/fungal decay. Several are known to be defective and needing repair.

- External walls/ walls with RWP should be checked for water ingress. These should be sealed if found.

- Timber window frames are to be checked for water damage and rot/fungal decay. These should be repaired in accordance with the conservation guidelines.

Internal Columns

- The columns supporting the roof show no sign or distress or distortion based on the visual assessment.

- Some of the columns are boxed in and cannot be visually assessed. These will need to be exposed and inspected.

Floor Construction

- Floor is constructed from timber boards supported by timber floor joists which span between the primary floor beams. Typical Joists are measured to be approximately 80mm wide by 160mm deep and are spaced at 400mm centres. Full inspection of the floor joists cannot be undertaken as they are hidden by the floorboards and their condition is therefore unknown.

- Floor boards are generally firm underfoot in most areas. Some areas are covered over with tarpaulin with buckets collecting water. Further investigation to expose the full extent of water damage will be required.

- Some areas of timber boards have additional boards placed over top. These should be removed to expose the original timber boards which will be repaired where required in accordance with the conservation guidelines. Boards cannot be overlaid as structure load will not permit.

- Water damage is visible on the surface of the floorboards. It is likely that some joists not visible will be water damaged.

- Where there is evidence of water damage the timber joists should be checked for rot/fungal decay and replaced where required. Significant areas where this have been noted are highlighted on the floor plans in appendix A.

- Joists that are observed to be damaged should be replaced

- Existing floorboards should be reused where possible in line with the conservation guidelines.

- Some timber boards have been replaced previously but have not been cut at a joist position and the boards are not adequately supported. These should be repaired to ensure all boards end at a joist position. Typical details are provided on drawing CCL-1-20289-110.

- Protruding nails observed should be nailed in fully.

- Most beams do not show any signs of distress or distortion with the exception of those shown in the following sections.

- Water damage is observed at the support of many of the timber beams embedded in walls.

- All the timber beams will need to be checked for rot/fungal decay paying close attention to the areas where water damage is observed.

- Minor cracks/defects should be repaired using a resin product.

- The soffit boards on the underside of the floor joists are in disrepair is some locations and will need to be replaced in accordance with the conservation guidelines. This appears to be caused from historical water ingress. Significant areas where this has been noted are highlighted on the floor plans in appendix A.

4.0 BUILDING NO.8



As discussed in *1-20289-Rep-001* this building is in considerable disrepair and will require significant remediation to restore it. Temporary propping has historically been installed to support the roof structure however the building has deteriorated requiring further remediation works.

The remediation drawings for this building can be seen on the following drawings:

- 1-20289-111- REMEDIATION WORKS 1st, 2nd, 3rd FLOORS GENERAL ARRANGMENT
- 1-20289-112- REMEDIATION WORKS 1st, 2nd, 3rd FLOORS SECTION DETAILS
- 1-20289-113- TEMPORARY PROPPING SECTION DETAILS

In the course of developing this solution, consideration was given to various solutions to remediating the floor however the options were limited due to the severity of the deterioration. Resin fixing of the timber floor beams and rafters would not possible as the timber beams had split and dropped causing the sloping roof to move outwards. To restore the timber floor joists, steel plates will be required to strengthen the existing timber elements once propped back into the original position.

An additional row of columns will also be required on the 2nd floor to support the 3rd floor. Due to the deterioration of the beams and movement of the roof the existing load paths can not be maintained as they are no longer viable meaning additional vertical support is required at this position.

5.0 BUILDING NO.10



Roof Structure

- The roof structure in building 10 is formed using timber trusses which are supported on load bearing masonry walls and steel columns at intermediate positions.

- A limited inspection could only be undertaken as most of the trusses were hidden by the presence of a suspended ceilings which covered the roof trusses. These will require further investigation.

- Where inspection of the trusses was undertaken, this was due to the partial collapse of the suspended roof due to water ingress. The suspended ceiling should be thoroughly investigated and replaced/repaired where water damage has occurred in accordance with the conservation guidelines.

- The truss at the end of the building (10-T-3D) perpendicular to Newton Street has dropped significantly and is currently being propped. This will need to be repaired to restore it back to its original capacity. Details of the required repair are shown on drawing CCL-1-20289-110.

Masonry Walls

- On the second floor there is a large diagonal crack in the masonry originating from a beam position down towards the door. This is caused from deterioration of a timber padstone for a steel beam supporting the wall below. This has been repaired previously and the masonry wall will require repointing and making good.

- This crack is visible on the first floor. This has also been rectified as part of the previous repair and will also require repointing and making good.

- On the second floor It was observed that above the door A (as marked on the plan) the timber lintel has been removed. This has caused some of the blocks to drop into the door space. This will need to be urgently reinstated.

Floor Construction

- All floor beams are timber and observed to be approximately 200mm wide by 250mm deep and were all painted. In some areas the paint was flaking off making it difficult to assess the beam. All the paint will need to be stripped of to allow for a closer investigation and ensure there are no underlying issues.

- Calculations undertaken show that the floor beams are suitable for conversion to office carrying loads off
    - Imposed UDL load of 2.50 kN/m^2
    - Partition load of 1.00 kN/m^2
    - Ceiling and services 0.15 kN/m^2
    - Floorboards/beams/Joists 0.90 kN/m^2

- Beams 10-B-1D, 10-B-1K which form part of the second-floor construction show signs of damage. There are splits in the beam however not full depth. This will require strengthening. Typical details of strengthening are shown on drawing CCL-1-20289-110.

6.0 BUILDING NO.12



Roof Structure

- The roof structure in building 12 is formed using timber trusses which are supported on load bearing masonry walls and steel columns at intermediate positions.

- A limited inspection could only be undertaken as most of the trusses were hidden by the presence of a suspended ceilings which covered the roof trusses. Paint should be stripped off and access provided to carry out a closer inspection to determine their condition.

- Where inspection of the trusses was undertaken, this was due to the partial collapse of the suspended roof due to water ingress. The suspended ceiling should be thoroughly investigated and replaced/repaired where water damage has occurred in accordance with the conservation guidelines.

- Additional load on the roof cannot be introduced without further strengthening.

Masonry Walls

- No additional remarks/observations to those specified in section 3.

Internal Columns

- No additional remarks/observations to those specified in section 3.

Floor Construction

- All floor beams are timber and observed to be approximately 200mm wide by 250mm deep and are all painted. In some areas the paint was flaking off making it difficult to assess the

beam. All the paint will need to be stripped of to allow for a closer investigation and ensure there are no underlying issues.

- Calculations undertaken show that the floor beams are suitable for conversion to office carrying loads off
    - Imposed UDL load of 2.50 kN/m^2
    - Partition load of 1.00 kN/m^2
    - Ceiling and services 0.15 kN/m^2
    - Floorboards/beams/Joists 0.90 kN/m^2

- On the second floor It was observed that above the door A (as marked on the plan) the timber joist has been removed. This has caused some of the blocks to drop into the door space. This will need to be urgently reinstated.

- Beams 12-B-1G, 12-B-1J, 12-B-1K show signs of damage. There are splits in the beam however not full depth. These will need to be repaired to restore them back to their original capacity. Details of the required repairs are shown on drawing CCL-1-20289-110.

Masonry Walls

- No additional remarks/observations to those specified in section 3.

Internal Columns

- No additional remarks/observations to those specified in section 3.

Columns/beams between building No. 12 and 10

- The columns/beams that are between building 12/10 at the end adjacent to Newton street replace an existing load bearing masonry wall show no sign or distress or distortion based on the visual assessment.

7.0 BUILDING NO.14



Roof construction

- The roof and purlins in this building was painted black making it difficult to observe the condition of the roof purlins which were supported by the timber truss. The roof is of traditional construction with purlins spanning between loadbearing walls and gaining intermediate support from timber trusses. Paint should be stripped off and access provided to carry out a closer inspection to determine their condition.

- There is a significant longitudinal split in the perimeter beam at the front of the building adjacent with Newton street. This will require further investigation and repaired if required.

- Truss 14-T-4I was observed to have a split in the bottom chord. Details of the required repairs are shown on drawing CCL-1-20289-110.

Floor Construction

- Floor beams are a mixture of steel/wrought iron and timber beams.

- The wrought iron/steel beams show no signs of distress or distortion.

- Beam 14-B-3K has a large longitudinal crack. This will be repaired. Details of the required repairs are shown on drawing CCL-1-20289-110.

- Some timber beams are supported at midpoint by a bow string support. Steel rods in in tension support the beam. back to the adjacent columns. A steel timber beam runs above

acting as a strut to resolve the horizontal forces applied to the column. The steel rods and support bracket show no sign of distress or distortion. This strut beams are hidden by the soffit boards and will need to be exposed and checked for damage or distress.

- Timber beams at the lift shaft location are supported by a steel corbel. This column and corbel bracket is boxed in and could not be seen. This will need to be investigated to ensure there is no damage or distress.

- Beam 14-B-1N shows a vertical crack near the support position. This will need to be repaired. Details of the required repairs are shown on drawing CCL-1-20289-110.

- Calculations undertaken show that the floor beams are suitable for conversion to office carrying loads off
    - Imposed UDL load of 2.50 kN/m^2
    - Partition load of 1.00 kN/m^2
    - Ceiling and services 0.15 kN/m^2
    - Floorboards/beams/Joists 0.90 kN/m^2

Columns Supporting Fourth Floor

- No additional remarks/observations to those specified in section 3.

Masonry Walls

- No additional remarks/observations to those specified in section 3.

Ground Floor

- Ground floor is currently occupied, and no further investigation is required on this level.

8.0 BUILDING NO.16

Roof Structure



- The roof is of traditional construction with purlins spanning between loadbearing walls and gaining intermediate support from timber trusses. Any paint should be stripped off and access provided to carry out a closer inspection to determine their condition.

- The trusses have a unique triangular bearing at the external support condition. This transfers the roof load down to the floor beams which span onto the external masonry wall.

- Truss 16-T-4B to the rear of the building is currently being propped. The truss is being supported because the timber beam below that it is supported off is damaged and has a longitudinal split in the bottom chord. Details of the required repairs are shown on drawing CCL-1-20289-110.

- There is a significant longitudinal split in the perimeter beam at the front of the building adjacent with Newton street. This will require further investigation and repaired. These will be repaired using resin product.

Walls to Roof

- The walls to this floor are formed by the sloping roof which consists of purlins and rafters spanning from the floor to a perimeter beam which is supported by the truss.

- Lath and plaster has been stripped from the walls to reveal the roof construction. A damp and fungal investigation will be required to all the timber elements to determine any areas or water damage or decay.

- The perimeter beams are painted yellow and it is flaking off in places making them difficult to inspect. It is noted that some of the beams have longitudinal cracks which and will require repairing. Details of the required repairs are shown on drawing CCL-1-20289-110.

Floor Construction

- Most beams are timber and observed to be approximately 350mm wide by 300mm deep. The longer span beam at the end of the building adjacent to Mangle Street is 350mm wide by 350mm deep.

- Visual inspection of Beam 16-B-3A from floor level identifies a vertical split is noted in the beam but this is not through the full height. There is also evidence of water damage at this support position. It is noted that there is a vertical crack along the underside of the beam around the middle of the beam. These will be repaired using resin product.

- The timber 16-B-3B supporting the truss that is currently being propped is significantly damaged at the support position adjacent to Dale Street. Significant remedial works will be required to rectify this member to restore the floor level. Details of the required repairs are shown on drawing CCL-1-20289-110.

- The timber beam 16-B-3H at the front of the building adjacent to Newton street is split and has dropped. It looks as though a repair has been previously been carried out on this beam but will require further attention during these works. Details of the required repairs are shown on drawing CCL-1-20289-110.

- Calculations based on the following loads below show that the beams may be overstressed in this area.
    - Imposed UDL load of 2.50 kN/m2
    - Partition load of 1.00 kN/m2
    - Ceiling and services 0.15 kN/m2
    - Floorboards/beams/Joists 0.90 kN/m^2

  This however is based on a conservative estimation of the timber grade which may be more than what was assumed. The beams will require grading to determine the correct grade and ensure that they are suitable otherwise they will require as shown on drawing CCL-1-20289-110.

Internal Columns

- No additional remarks/observations to those specified in section 3.

Masonry Walls

- No additional remarks/observations to those specified in section 3.

Ground Floor

- Ground floor is currently occupied, and no further investigation is required on this level.

Columns Supporting First Floor

- The columns supporting the first floor were not investigated as they were located on in an area previously refurbished and currently occupied. No further investigation is required for these columns.

Hoist Shaft

- At the rear of the building there is a hoist shaft. This was inaccessible at the time of the survey and its structural condition is unknown. Further investigation will be required.

Staircase 16-B

- This is located middle of the building. This consists of a timber fame stair case with timber balustrade. The staircase creeks underfoot and the balustrade does not feel stable. This will require significant refurbishment.

9.0 ADDITIONAL WORKS

As part of the remediation various structural alterations are proposed which include;

- Removal of internal walls and chimney breasts (various locations).
- New rooftop plant area above building 14/16.
- New plant room in building No.8 on the 2nd floor.
- New lift in building No.10.
- New lift and stair core in building 16.
- 2 new platform lifts for disabled access (building no. 14 and 10).
- New doorways between buildings.
- Service ducts alterations.

Where internal load bearing walls are removed new structural steel will be provided to carry the wall/roof structure above. Masonry piers or columns have been provided to give intermediate support limiting the size of openings. New pad stones will be installed where new beams and columns bear onto masonry. Where chimney breasts are removed 2 new steel beams will be installed perpendicular to the wall being removed spanning from the new beams supporting the wall above to the adjacent load bearing wall. An intermediate beam spanning between the 2 beams will support the outer breast of the chimney. Details are shown on drawings CCL-1-20289-100 to CCL-1-20289-113

The existing stair and lift core will be removed and replaced with a steel frame glass lift shaft. PFC stringers will span between exiting floor edge supports and will support the new stairs which will be constructed using steel plate around the new lift. A pad foundation will be built on top of the existing basement slab to support the new two new columns. Details are shown on drawing CCL-1-20289-109.

The lift in building 10 will be formed through the timber floors adjacent to the existing staircases. Existing timber beam and joists will be trimmed back and supported by a new steel/masonry frame which will support the lift. The masonry that is supporting part of the steel frame will be rebuilt. A pad foundation will be built on the top of the existing basement slab to support the new two new columns. Details are shown on drawing CCL-1-20289-108.

Two new platform lifts will be constructed in buildings 10 and 14 to allow for disabled access to the buildings. To support the platform lifts a blockwork substructure will be constructed in the basement which will provide support to the first floor its perimeter. Timber trimmers will span between the blockwork and support the platform.

Roof plant area will be constructed in the valley between roof of buildings 14 and 16. Existing masonry wall between buildings will be deconstructed down to underside of the new floor. The plant area will be formed using new timber beams which are supported by steel beams which span across building 14 at the same level as the bottom chord of the truss and cantilever part way into building 16. Access will be by ladder, and access point will be trimmed out by timber beams. Existing timber batons will be cut back to form the opening for the plant room and ladder access. Details are shown on drawing CCL-1-20289-107

The plant room in building 8 will be located on the 2nd floor. The floor beams will be strengthening as part of the remediation to allow for plant loading in this area. Steel runner beams supported by the floor beams on steel stubs will support the plant equipment. Details are shown on drawing CCL-1-20289-111

Where new doorways are formed (less than 1.4m) proprietary precast concrete lintels will be installed above opening.

The existing hoist shafts will be reused for services. A new open mesh flooring will be constructed at each level, which will be supported by three beams built into the existing masonry wall.

10.0 SUMMARY AND CONCLUSION

- Should the building be refurbished, and the further investigations undertaken as outlined in this report the buildings would be suitable for use as a commercial office

- There is evidence throughout the buildings of water ingress and damage and it is important to fully determine the extent of the damage.

- Further specialist investigation is required to determine whether the timber elements are subject to rot or fungal decay as a result.

- The steel/wrought iron columns throughout do not show any signs of distress and are suitable for the proposed used as a commercial office.

- The columns not inspected as they were boxed in or hidden in masonry wall will need to be exposed to allow them to be inspected.

- The steel beams observed show no sign of distortion or distress and are suitable for use as a commercial office.

- The steel/wrought iron beams that were not observed in building 14 as they were boxed in/ hidden above soffit boards will need to be exposed to be inspected.

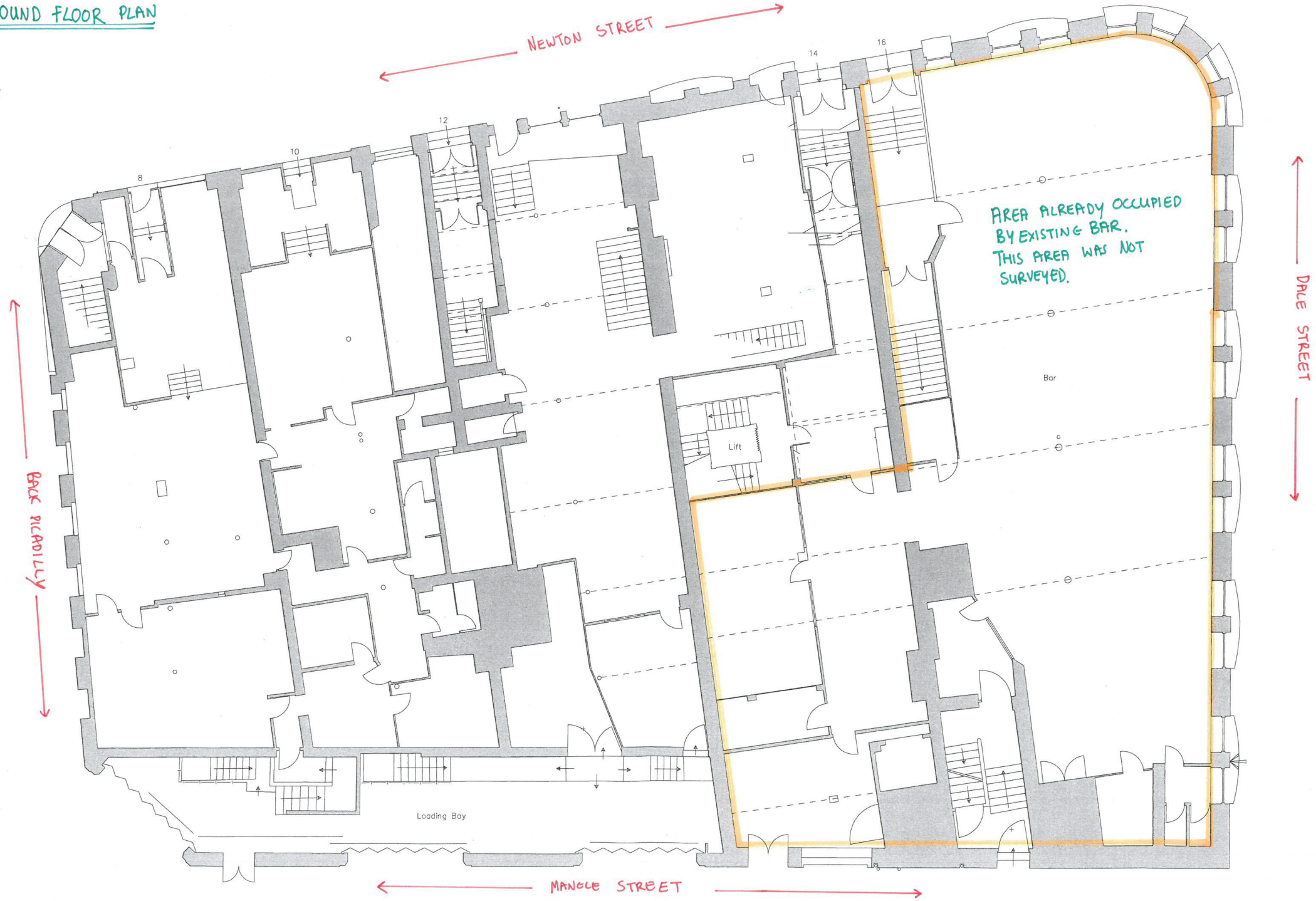
- All the beams both timber beams and wrought iron/steel have been checked and deemed suitable to withstand the loading from the proposed use of a commercial office with the exception of those in building number 16. They appear to be overstressed however this is based on a conservative timber grade as the exact grade of timber used is unknown. These beams will require stress grading to fully establish the suitability of the building to determine the whether strengthening of the beams are required.

- Should the building be restored/ refurbished in line with this report, the building would be suitable to be converted into commercial offices.

- The proposed structural alterations for the building are suitable for the refurbishment of the building.

APPENDIX A- SUPPORTING PLANS

GROUND FLOOR PLAN



FIRST FLOOR PLAN



SECOND FLOOR PLAN



THIRD FLOOR PLAN



FOURTH FLOOR PLAN

