# Middlesex Hospital Annex

## Historic Building Structural Engineering Report

September 2016

60516144
MHA-ACM-00-REP-S-0001

## Quality information

| Document name | Ref | Prepared for | Prepared by | Date | Reviewed by |
|---|---|---|---|---|---|
| Historic Building Structural Engineering Report | MHA-ACM-00-REP-S-0001 | UCLH Charity | Daniel Wallington | 13/09/16 | Jack Brunton |

## Revision history

| Revision | Revision date | Details | Name | Position |
|---|---|---|---|---|
| - | 13/09/16 | DRAFT | Daniel Wallington | Associate Director |
| A | 16/12/16 | Planning | Daniel Wallington | Associate Director |
| B | 20/01/17 | Planning (comments prefixed with * symbol) | Daniel Wallington | Associate Director |

# Contents

# 1. INTRODUCTION

This structural engineering report is written in support of University College London Hospitals Charity's planning application for the site.

The site is situated in a Conservation Area on level ground in a mature fully developed part of Central London.

The buildings on the site are redundant for their previous use as hospital facilities, and are now variously vacant or in short-term business and residential occupancy pending adaptive re-use or redevelopment.

The existing buildings consist of a Grade 2 listed Georgian Workhouse fronting onto Cleveland Street, with two later unlisted rear wings (rear north and rear south), plus two separate unlisted buildings on either side (front north and front south) of the Workhouse.

The client, University College London Hospitals Charity (UCLHC) wishes to obtain Planning Permission and Listed Building Consent to repair and convert the Workhouse and the front north and front south buildings into housing, with the demolition and re-development of the two rear wings for mixed commercial and residential use.

UCLHC has requested AECOM to advise upon the structural engineering aspects of the scheme in conjunction with architects Llewelyn Davies. (AECOM's letter of appointment dated 26 July 2016). The report is to be read in conjunction with the AECOM Conditions of Engagement for Structural Engineer's Reports (listed in the Appendix 1). AECOM have received and studied relevant drawings and reports about the site. These documents are listed in Appendix 2.

AECOM visited the site on the 4th and 5th August 2016, and made purely visual inspections (i.e. no moving of furniture, lifting carpets, or opening finishes of the buildings) internally and externally from readily available safe vantage points with the aid of binoculars. At the time of the survey, access to the upper roof surfaces and the majority of roof voids was not possible, and certain floors and rooms were inaccessible or obstructed from view by stored goods or debris.

In due course the findings of this report must be confirmed by gaining access to all areas, possibly in conjunction with an enabling contract to soft strip, and make holding repairs of building fabric to be retained.

The following report is based upon the foregoing activities, AECOM's experience of similar structures, and expertise in building conservation. See AECOM's credentials in Appendix 3.

**Historic Photograph**
Front Elevation facing Cleveland Street

## 2. SITE HISTORY

According to the report by Curtin Consulting Limited, ref: LO1161 dated 16.9.13, the Workhouse was built c.1778. It became an infirmary between 1868 and 1870. The site was rebuilt in the 1880's retaining the 18th century central front block (the original Workhouse). In the early 1920's the building was altered again

The Workhouse building became listed Grade II in March 2011.

The LCC Bomb Damage Map 61 in publication no.164 by the London Topographical Society, shows that during WW2 the Workhouse and its south wing suffered "general blast damage-not structural". The rear north wing and front north building were "seriously damaged doubtful if repairable", and the south building was undamaged.

*In 2013 Curtins Consulting Engineers carried out a suite of exploratory works within the Workhouse. Records of the opening-up works are unavailable; however it is understood that they were based on a larger planned structural scheme involving the wholesale removal of floors and walls.

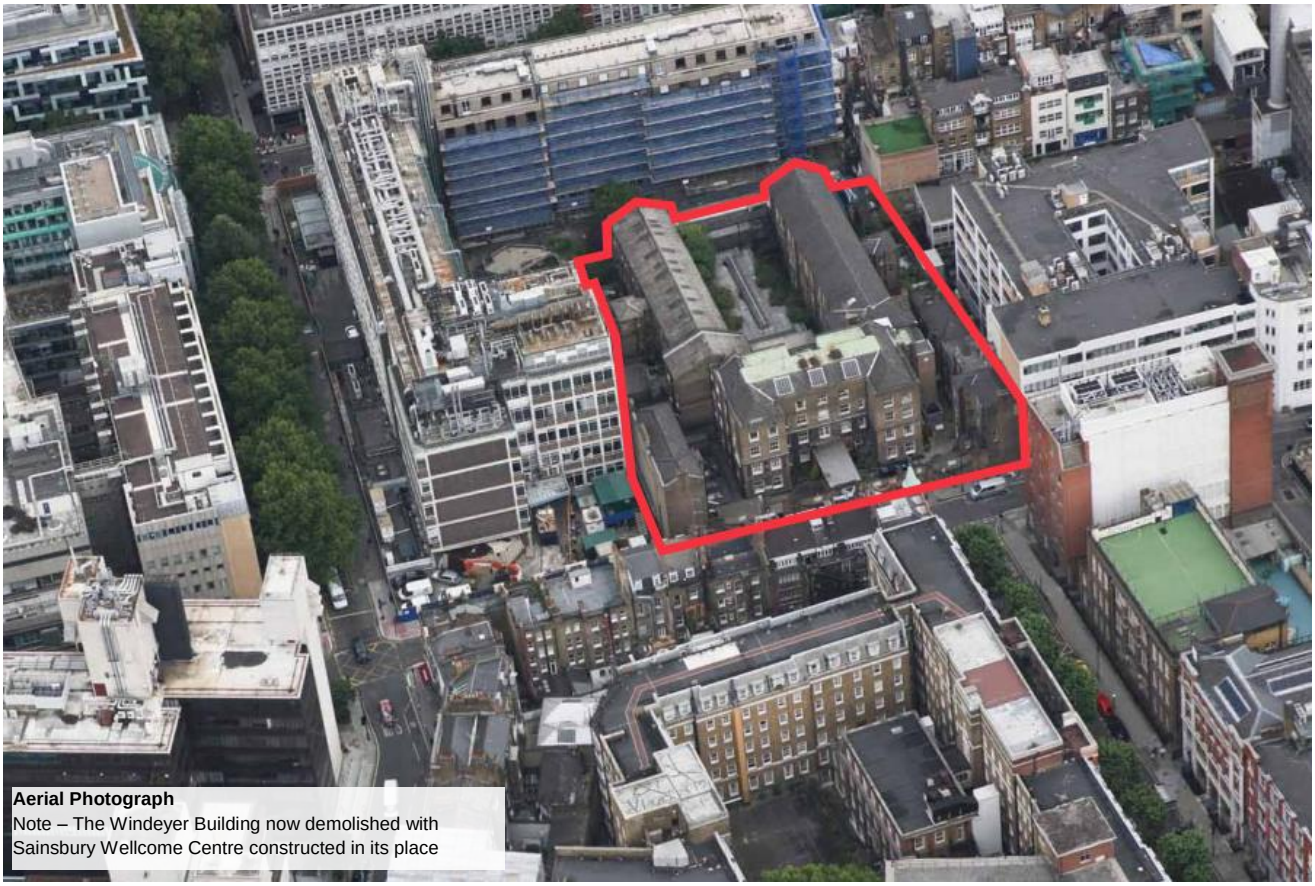
## 3. GROUND CONDITIONS AND EXISTING FOUNDATIONS

British Geological Survey sheet 256, Drift edition 1" to 1 mile, shows Taplow Gravels overlying London Clay to considerable depth. Actual soil conditions can vary so trial pits are always necessary to confirm the strata.
In our experience, the water table is perched on top of the impervious clay, running in the gravel towards the River Tyburn to the west and/or the Thames to the south.

Taplow Gravel is a firm mixture of sand and gravel which is a strong bearing stratum for foundations. In this area of London the gravel stratum is usually 4-6m deep; however its qualities made it very attractive as a building material, and so it is understood that the Gravels were randomly excavated, and the resultant borrow pits backfilled with unpredictable organic Made Ground /random Fill.

As the existing buildings have basements, any borrow pits may have been eliminated. There is unlikely to be much, if any, Gravel remaining above the top of the London Clay to provide a suitable base to spread foundation loads.

The external brick walls to the buildings are generally plumb and true, which suggests that they are adequately founded, with the exception of a few localised areas where differential settlement has lozenged window openings and cracked window sills. This may be attributable to thin spots in the gravel and/or drain problems. The settlement appears old and not progressive, subject to monitoring wall cracks and checking the drains.



**Aerial Photograph**
Note – The Windeyer Building now demolished with Sainsbury Wellcome Centre constructed in its place

# 4. EXISTING STRUCTURES

## 4.1 THE WORKHOUSE

### 4.1.1 Structural Format

The Workhouse building has four storeys plus a basement.

It has a solid brick shell with timber suspended floors mostly with narrow tongue and grooved floor boards; although some wider plain edge boards and some large sheets of ply are visible. Many floor surfaces were hidden by carpet or vinyl. Ceilings are a mixture of plasterboard, lath and plaster, and lay-in tray suspended ceilings.

The floors are supported by steel beams and posts. The cleated connections have bolts and rivets. The structural layouts need to be confirmed once they become fully visible after the ceilings have been stripped out.

Sway stability is not provided by the steelwork. The building relies upon the cellular behaviour of its masonry walls and plate action of the floors for lateral stability.

The roof structure comprises timber rafters and purlins supported on modern steel trusses that clear span between the main elevation walls. Roof access was made available in August 2016, and a measured survey was undertaken.

Partitions are a mixture of timber studwork clad with plasterboard, and thin clinker concrete blocks plastered on both faces.

The staircase is stone of the “cantilever” type, with iron balustrades. The stone landings have metal beams, probably wrought iron carrying their leading edges.

A passenger lift exists in the core of the building. The lift shaft and the lift motor room were inaccessible. Access will need to be provided for a full survey in due course.

Many of the above elements are patently 20th century, so the Georgian building appears to have undergone one or more rounds of internal alterations during its life.
In AECOM’s experience, buildings that have been altered several times often have inadequate work hidden within them, which needs to be remedied during planned works. A cost allowance needs to be made for this contingency.

Extract from record Ground Floor drawing dated May 1924 is included below right.

### 4.1.2. Structural Condition

The external walls are generally square, plumb, true and uncracked and the floors are level, indicating that the building is generally stable and robust.

There is localised differential settlement distortion of the brickwork coursing in the front elevation either side of the entrance lobby. The movement appears historic and not progressive, subject to monitoring the movement and checking the drains in the vicinity.

The south flank wall has chronic water saturation due to a missing rainwater hopper at parapet level. It has caused Buddleia (or the butterfly bush) to grow, and extensive damaged to wall plasterwork internally. It is very likely that the water ingress has also rotted any timbers bearing into the wall. The floors need to be opened-up to check the extent of decay.

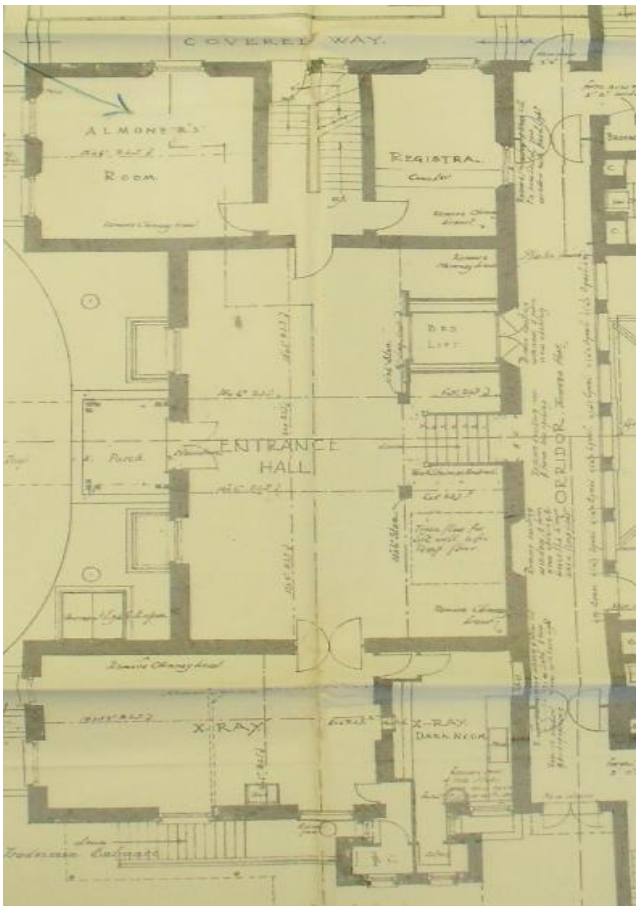
The roof trusses and timbers appeared dry and in sound condition.

Access to the locked rooms may identify further defects.

### 4.1.3 Conservation-based repairs.

The Workhouse is listed Grade 2, principally for its group value and context. Since the building has been severely altered, there is little of merit left internally. It is important that any necessary repairs and alterations, particularly to the external envelope, respect the accepted conservation principles of minimum intervention, like for like materials, honest repairs, and sympathetic alterations.

AECOM’s CARE accredited conservation engineers would ensure appropriate materials and workmanship specifications are used.




**Historic Record Drawing**
Extract from record ground floor drawing, dated May 1924

#### 4.1.4. Structural Alterations

The proposed alterations are provided on Llewelyn Davies' drawings. There will be a change of use to residential, which has lighter floor loading than the building's previous use as a workhouse and hospital. The imposed load for housing (self-contained residential loading) is 1.5kN/$m^2$ plus 1.0kN/$m^2$ for new demountable partitions. Floor strengthening is not anticipated to be generally necessary; however where new floors are infilled or heavy walls are introduced, it may become necessary to reinforce or supplement existing steel floor beams and floor joists.

The existing stone staircase on the north side of the building is being retained. Two new staircases are proposed at 3rd floor to provide access to the new accommodation at 4th floor within a new roof structure.

There will be new partitions built onto the timber floors. Partitions running parallel to floor joists may require doubling or tripling of joists. New or heavy baths may require floor joists to be reinforced by doubling-up.

To maintain plate-action of the timber floors it may be necessary to tie joists together across supporting beams. This will depend upon what existing tying is found following the strip-out stage.

It is envisaged that the separating floors will require enhancing to reduce the transfer of impact and airborne sound to meet Building Regulations requirements. The additional weight of acoustically enhanced floors needs to be considered in the overall structural assessment.

#### 4.1.5. Summary of the Workhouse Building

Subject to stripping-out finishes and completing the survey of areas inaccessible so far, it would appear that the Workhouse is a robust and stable structure, with few defects. The building will readily lend itself to its adaptive re-use for housing through conservation-based repairs and alterations.

*During the useful meeting on site with Camden and Historic England on 16/12/16, AECOM advised that the existing exposures made by Curtins Consulting in 2011 are not applicable to the proposed structural proposals. The proposed alterations in the current planning application are less extensive; however a new schedule of exposures is proposed in the next stage (RIBA Stage 3); which will be discussed with Camden and HE.

### 4.2 FRONT NORTH BUILDING

#### 4.2.1 Structural Format

This unlisted c.19thC building terrace has three storeys plus a basement and attic roof space, under a pitched roof. The building is constructed in loadbearing external masonry, incorporating internal load-bearing masonry and timber partitions. The external façade is comprised of brickwork. The date of construction of the front north building (and the front south building) is not known; however they are likely to have been built in the late Victorian era.

Access into the roof spaces was not available at the time of the inspection. The roof appears to be a traditional pitched timber roof with slate tiles.

At the front elevation facing south the upper ground floor can be accessed from the main yard to the Middlesex Hospital Annexe site via an external concrete staircase. Directly below the front entrance are the basement rooms, accessed from the lower ground floor lightwell to the north.

The floor construction to ground floor and above comprises timber suspended floor joists supporting traditional timber floor boards. The floors are supported by the loadbearing walls. Most of the floors are currently occupied, and many floor surfaces are hidden by vinyl.

Ceilings are generally plasterboard or lath and plaster construction. It is believed that the original cellular construction provided separate accommodation between the party walls. The floor arrangement today allows occupants to access rooms along the terrace through various openings in the party walls. At the upper floors as you travel east along the building, the floors change in level forming timber steps at the party walls junctions (circa 150mm step at first floor and 830mm step at second floor). To the east entrance the upper floors were inaccessible due to boarding sealing-off the access staircase.

The façades to the building facing the hospital courtyard are comprised of London stock brickwork. Above the windows are semi-circular soldier course brick arches.

The gable wall to the front north house comprises two vertical columns of iron wall bosses at each building corner. Bosses were used to tie walls to the internal floors or walls to provide lateral restraint, or to arrest building movement such as brickwork deformation. Historic photographs of the Middlesex Hospital Annexe buildings c.1920's show the metal bosses as they exist today. Some of the corresponding ends of the ties can be seen internally, protruding through the west staircase wall.

#### 4.2.2. Structural Condition

Access into the roof spaces was not available at the time of the inspection. Therefore the structural condition of the roof is not currently known.

Some upper timber floors are bouncy under footfall, which rattle the window frames. Bouncy floors can be partly due to an historic defect in their construction, which can be exacerbated by latent (hidden) defects in the floor, such as notching or cutting joists. It is recommended that certain floors are examined following lifting of the floorboards.

According to the LCC Bomb Damage Maps, the front north building was "seriously damaged, doubtful if repairable", and the south building was undamaged. There are no obvious signs to suggest that the front north building has been damaged appreciably, or repaired extensively since

the Second World War. Full and further access to the structure will allow the condition to be investigated which may identify further defects.

At the gable end wall facing Cleveland Street the chimney stack above the line of the parapet is badly distorted and it is leaning into the building. The extent of the distortion at high level is severe. It is believed that the withes (the walls that separate the flues) have perished. The consequent deformation in the chimney stack produces outward thrusting in the gable wall over the pavement. Given that the brickwork in the region of the distortion has lost its togetherness with missing mortar in the bed joints and perpends, it is recommended that the gable wall is inspected internally and externally.

The locations of the iron wall bosses on the Cleveland Street elevation, situated close to the corner junctions of the building are confusing; since the building corners are inherently stiff. The bosses and ties are to be inspected further following full access to the building. In August 2016 Curtins Consulting Engineers issued a report to UCLH, advising on the structural condition and safety of the leaning gable wall facing Cleveland Street. Curtins conclude that the masonry has suffered gradual deterioration, and it is long overdue for repair. Curtins suggestion to the landlord is for the defects to be remedied forthwith.

There is localised differential settlement distortion of the brickwork coursing in the front elevation to the left hand side of the south main entrance staircase. The movement appears historic and not progressive, subject to monitoring the movement and checking the drains in the vicinity.

With the exception of the external gable wall facing Cleveland Street, the external walls are generally square, plumb, true and uncracked and the floors are level, indicating that the building is generally stable and robust. The south gable wall is badly distorted due to the defective chimney structure, and it will need investigating further.

Access to the locked rooms, roof and roof voids may identify further defects.

#### 4.2.3. Structural Alterations

According to the latest architect's proposals the front north building is proposed to be detached from the two-storey end-of-terrace building to the east. The proposed cut line occurs at the outside face of the dividing party wall. Prior to removal of the eastern end, the retained parts of the building would be checked for overall robustness. Remedial tying can be adopted using recognised structural techniques, such as steel floor strapping and the use of remedial wall ties.

It is envisaged that the separating floors will require enhancing to reduce the transfer of impact and airborne sound to meet Building Regulations requirements. The additional weight of acoustically enhanced floors needs to be considered in the overall structural assessment.

#### 4.2.4. Summary of the Front North Building

Subject to lifting floors, stripping-out finishes and completing the survey of areas inaccessible so far, it would appear that the front north building is a robust and stable structure, with few defects. The chimney breast / stack within the gable wall facing Cleveland Street needs to be investigated using access scaffolding, and re-stabilised.

As part of the proposed alterations by the project architect, it will be necessary to detach the north building from its eastern end.

The building will readily lend itself to its adaptive re-use for housing through conservation-based repairs and alterations.
In AECOM's experience, buildings that have been altered several times often have inadequate work hidden within them, which needs to be remedied during planned works. A cost allowance needs to be made for this contingency.

### 4.3 FRONT SOUTH BUILDING

#### 4.3.1 Structural Format

The age, nature and structural format of the Front South Building is very similar to the Front North Building, described the foregoing sections. At the time of the inspections the building was partially occupied by guardians.

This Victorian building constructed in the late 19th century appears to have undergone one or more rounds of internal alterations during its life. Similarly with the north building, the floor levels appear to follow with the lie of the land; producing steps in the floors between party walls. Communal corridors have been built; presumably to meet today's fire regulations.

Below the ground floor to the South Building is the main basement access corridor that serves the Workhouse and the Front North Building. The basement corridor continues west under Cleveland Street. At the time of the inspection, the corridor under the road was inaccessible due to the adjoining building site. Directly below the front entrance to the South House is a part cellar and lightwell, accessed only via an external cat ladder. Limited access was available in the cellar due to pigeon infestation and stockpiled debris.

#### 4.3.2. Structural Condition

Access into the roof spaces was not available at the time of the inspection. Therefore the structural condition of the roof is not currently known. Access was restricted to the west face of the building (Derwent property) including the wall/roof interface.

Some upper timber floors are bouncy under footfall, which rattle the window frames. Bouncy floors can be partly due to an historic defect in their construction, which can be exacerbated by latent (hidden) defects in the floor, such as

notching or cutting joists. It is recommended that certain floors are examined following lifting of the floorboards

The external walls are generally square, plumb, true and uncracked and the floors are level, indicating that the building is generally stable and robust. The south gable chimney wall is locally distorted due to the defective chimney structure, and it will need investigating further.

### 4.3.3. Structural Alterations

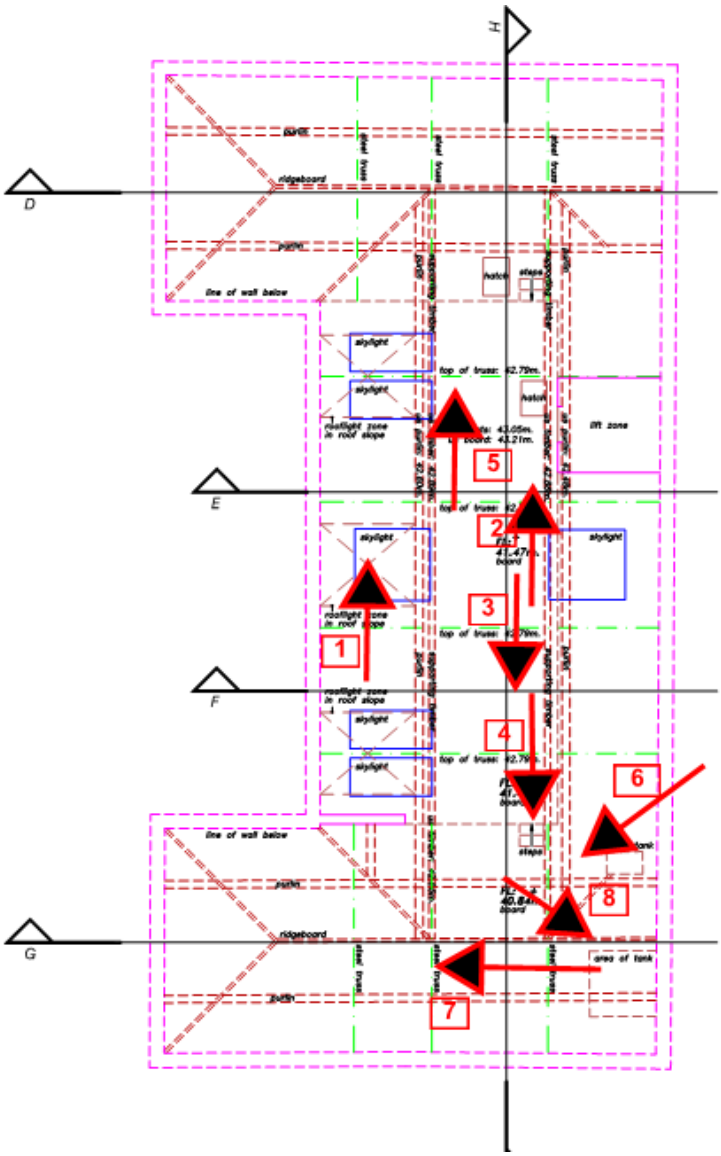
According to the latest architect's proposals, the front south building is proposed to be detached from the terrace continuing east. Approximately two-thirds of the south building are planned to be removed. The proposed cut line occurs at the outside face of the dividing party wall. Prior to removal of the eastern end, the retained parts of the building would be checked for overall robustness. Remedial tying can be adopted using recognised structural techniques, such as steel floor strapping and the use of remedial wall ties.

### 4.3.4. Summary of the Front South Building

Subject to lifting floors, stripping-out finishes and completing the survey of areas inaccessible so far, it would appear that the front south building is a robust and stable structure, with few defects. The chimney breast/stack within the gable wall facing Cleveland Street is leaning similarly to the chimney to the north building; however the severity of the movement is much less.

The building will readily lend itself to its adaptive re-use for housing through conservation-based repairs and alterations.

# APP. 1 THE WORKHOUSE ROOF – PHOTOGRAPHS




Roof Void Plan.

**Extract from Greenhatch Group Survey drawing**
**13514b_06_P dated 23.9.16 showing the key to photographs**

**Photo 1**

**Photo 2**

**Photo 3**

**Photo 4**

**Photo 5**

**Photo 6**

**Photo 7**

**Photo 8**

# APP. 2 AECOM's CONDITIONS OF ENGAGENMENT FOR STRUCTURAL ENGINEERING REPORTS

## Conditions of Engagement for Structural Engineers Reports

Project No: 60516144
Project Title: Middlesex Hospital Annexe. London
Date: 30.08.16

**1.0 *Definitions***

1.1 A Structural Engineers Report will comprise a visual inspection, with the naked eye, of those parts of the visible structure that can be seen from safe, readily accessible vantage points. External roof surfaces, chimneys, eaves and other features at high level will be viewed from the ground or from the upper storey windows unless access to the roof is readily and safely obtainable during our inspection. This means that parts of the building may be incapable of inspection and we cannot confirm that these parts are free from defects. We will not carry out any tests or make any enquiries concerning particular materials or re-appraise original design criteria unless specifically forming part of our brief.

1.2 A Specific Structural Defects Report will be carried out where concern exists regarding specific parts of, or defects in, a property. Examples of this specialist work are the detailed study of concrete degradation, cracking, bulging, timber defects, etc and will be specifically referred to in the brief.

1.3 The report will be confined to an inspection of the visible load-bearing structural elements of the building only. The "Structure" of a building is defined as those parts of the fabric of the building which significantly contribute to its strength, stability and integrity such as roof carcassing, floors, walls, frameworks and foundations. The report will not address such items as finishes, coverings, fixtures and fittings, fenestration, doors and windows, water pipes / plumbing, gas pipes, electrical services, mechanical installations, decorations, plasterwork, non-structural timber, claddings, woodwork or any form of infestation, moisture penetration, damp, waterproofing, etc. or external works, boundary fences or compliance with local/national legislation.

**2.0 *Limitations***

2.1 **AECOM Day One Terms**: These Conditions of Engagement for Structural Engineers Reports should be read with AECOM's Terms and Conditions of Appointment.

2.2 **General**: Unless the scope of our brief specifically allows for the opening up of an area, we will not inspect woodwork or any inaccessible, covered or unexposed part of the building. We will therefore not be able to report on the structural condition of such areas or that such areas are free of rot, insect infestation or other defects.

Our report will be based on the available visual evidence together with our previous experience of similar buildings and their problems. We shall only report upon those structural defects that may materially affect the stability of the building and are reasonably detectable and visible at the time of our inspection.

It must be appreciated that deterioration may occur to some areas in the future due to the potentially detrimental effects arising from the existence of Asbestos, High Alumina Cement, concrete carbonation, corrosion of reinforcement or other items of covered steel, etc, even where no obvious evidence of distress is visible at the time of our inspection, particularly where circumstances change subsequent to our inspection.

The scope of this report will be specific to each project and, if necessary, the brief may be altered as findings on site dictate. Where appropriate, the revised scope will be discussed and agreed with you prior to embarking on the expenditure of increased fees or third party costs, where these are significant.

AECOM cannot offer any guarantees that the building will be free from future defects or that existing ones, which are non-structural and hence outside the scope of the report and/or beyond the limitations and exclusions of this report, will not deteriorate in the future, and hence lead to problems with the structure.

The report is confidential and non-assignable and is intended for the sole use of the client. Unless specifically stated, it will not constitute a statement of fact, which might be used in resolution of disputes or litigation. AECOM takes no responsibility for any action by third parties, resulting from the contents of their report. Copyright is held by AECOM hence reproduction of additional copies of the report is prohibited without prior agreement.

2.3 **Roof Void(s):** Unless the scope of our inspection specifically allows for access to the roof void and there is reasonable means of safe access available, the report will not comment on this part of the building. We will therefore be unable to report that any element within the roof void is free of a defect.

2.4 **Foundations:** Unless the scope of our inspection specifically allows for the exposure of the foundations, the foundations must be deemed an unexposed part.

Where trial pits are to be excavated as part of the investigations and inspection and described in the report, it must be understood that any comment on the ground conditions beneath the foundations can only relate to the exposed soil at the place of the excavation and does not necessarily mean that those conditions are consistent across the whole of the site.

Whilst local trial pits usually provide a reasonable representation of the foundations and ground conditions, these cannot be determined with complete certainty.

2.5 **Drainage:** Unless the scope of our inspection specifically allows for a CCTV survey and/or testing of the drainage system, the report will not usually cover the condition of any part of the system.

2.6 **Statutory Requirements:** Unless the scope of our inspection specifically requires us to, we will not approach the Local or Statutory Authorities. We may draw attention to any apparent breaches of the Statutory Requirements relative to the building or the site, however the absence of any such comment must not be construed that total compliance with the Statutory Requirements is in place.

2.7 **Cost Information:** Whilst we may give some guidance on the cost of works this is conditional that such information is not relied upon or to form any part of a strategy to purchase or any other action which may be deemed to be dependant on the costs mentioned in the report. We strongly recommend that you either obtain competitive tenders or seek the assistance of a Quantity Surveyor in this event.

2.8 **Environmental Issues:** In making our inspection we will specifically not concern ourselves with the way in which the property or its use may impact upon the environment. We will not therefore consider or investigate the nature and use of potentially environmentally damaging materials that may be found in the building, any contamination or the energy efficiency of the building. We are able to make such further enquiries as may be necessary to enable us to report on these matters subject to specific instruction to do so.

We shall not be liable for any losses incurred by the Client in respect of pollution or contamination.

Our report will not consider, deal or comment on the testing for or enquiry about the possible presence of Methane from organic or geological sources, or the presence or susceptibility to Radon Gas.

The report will not consider any issues regarding the risk of flooding to the property arising from any source what so ever.

# APP. 3 SOURCES OF RESEARCH

## SOURCES OF RESEARCH

- Listed Building Report for Planning. Curtin Consulting Limited, ref: LO1161 dated 16.9.13
- Building Impact Assessment. Curtin Consulting Limited, ref: LO1161 dated 16.9.13
- British Geological Survey sheet 256, Drift edition
- The LCC Bomb Damage Map 61 in publication no.164 by the London Topographical Society
- Various record architects drawings, by Almer W Hall Architects (Young & Hall), dated May 1924
- Various historic photographs
- Written Scheme of Investigation for Archaeological Monitoring; dated 27.3.14, by Pre Construct Archaeology Limited
- Measured, topographical and elevations surveys by Greenhatch Group, dated July/August 2009
- Asbestos Register, Copy 1. Redhill Consultants, dated July 2005 (Type II, non-destructive survey)
- Asbestos Register, Copy 1 (Tunnels) Redhill Consultants, dated July 2006. (Type II, non-destructive survey)
- Phase 1 Ground Condition Report. Peter Brett Associates LLP, ref: 22780/011 dated August 2009
- Historic England letter to UCLHC, dated 10.6.16, ref: 1434178 re: Former Middlesex Hospital Annexe (buildings to north, south and rear of the former Strand Union Workhouse)
- Historic England, Advice Report dated 4 May 2016
- URS Ground Condition Report for Arthur Stanley House (Tottenham Street), ref: ASH-URS-00-XX-RPT-CE-0001 dated January 2015, incorporating the factual report by Concept Site Investigations, ref: 14/2665 dated January 2015.
- Reports on the Tottenham Mews Resource Centre, by Penson Structures, ref 1211 dated December 2011
- The Re-Provision of Tottenham Mews Mental Health Resource Centre. Drawings by Studio Downie Architects LLP, dated February 2012.
- Ground Investigation Report for 73 Charlotte Street. Elliott Wood Partnership, ref: J12030A dated May 2013
- Ground Investigation Report for Astor College on Charlotte Street. Albury S.I Limited, ref: 14/10260 dated September 2014.
- Astor College Refurbishment drawings. Wilde Carter Clack Consulting Engineers. Ref: 4370 dated 2016
- Astor College drawings. Levitt Bernstein Architects. Ref: 2869 dated 2015/16
- Report by Curtins Consulting Structural Engineers, ref: 62255.002/E/PW dated 25/8/16; regarding the defective masonry gable wall to the North House, facing west over Cleveland Street.
- Greenhatch Group Measured Survey dated 23.9.16
- Basement Impact Assessment and Ground Condition Statement for the Howland Street Site. Arup dated March 2011

# APP. 4 AECOM CONSERVATION STRUCTURAL ENGINEERING CREDENTIALS

**Clive Richardson** BSc (Hons), CEng, FICE, FIStructE, IHBC
Technical Director

Structural Engineer specialising in conservation regeneration and new buildings in historic environments. Technical Secretary of the ICE/IStructE CARE Panel.

## Relevant experience

Clive is a Structural Engineer specialising in conservation, regeneration, and new buildings in historic environments. He is an acknowledged expert in the survey, repair, and alteration of buildings. Clive is the author of many technical works relating to the appraisal of structures, and he lectures widely on the subject. His experience spans residential, commercial, and institutional buildings.

He is a visiting lecturer at the Architectural Association and Technical Secretary of the ICE/IStructE CARE Panel. In addition, he invented the 'GIRAFFE' surveying instrument, discovered the 'Bookend Effect' of old terraces and is author of the'AJ Guide to Structural Surveys'. He is the Engineer Emeritus to the Dean and Chapter of Westminster Abbey, arguably the greatest church in England.

## Selected experience

**Westminster Abbey, London:** Engineer Emeritus to the Dean and Chapter of Westminster Abbey since 1991. The Abbey is a World Heritage Site, Scheduled Monument and Grade I listed complex of buildings with fabric dating back to William the Conqueror, in constant need of attention.

**Roedean School, Brighton:** Grade II listed estate of over twenty buildings, 1897 onwards. (Sir John Simpson – architect). Survey, design and inspection of prioritised repairs. Current work includes the £15m refurbishment of the boarding houses.

**Temple Mill, Leeds:** Grade I listed, unique top-lit single-storey flax mill, c1838 (Joseph Bonomi Jnr) modelled on the Temple of Edfu. We appraised the structure and supported the planning process for its repair and adaption as part of the Holbeck Inner City regeneration.

**Dan Wallington** BEng (Hons), CEng, MIStructE
Associate Director

Structural Engineer with considerable experience in most aspects of structural engineering and design, including conservation engineering.

## Relevant experience

Daniel joined the Company in 2004 following seven years working with two other consultancy engineering practices. He has considerable experience in most aspects of structural engineering and design, including conservation engineering.

## Selected experience

**Roedean School, Brighton:** Grade II listed estate of over twenty buildings, 1897 onwards. (Sir John Simpson – architect). Survey, design and inspection of prioritised repairs. Current work includes the £15m refurbishment of the boarding houses.

**The Embassy of Japan, London:** Project engineer for various structural repairs at the Grade II Embassy building; including assessing the 19th century ballroom floor.

**4 Fitzroy Square, London:** Refurbishment of 5-storey, Grade I listed building, including structural strengthening of floors and repairs, and the design of a new rooflight over a cantilevered staircase (Robert Adam 1728-92).

**Russell House, 43 King Street, Covent Garden, London:** 1716 (Thomas Archer) Refurbishment project of a Grade II* listed 18th century townhouse into retail and luxury residential flats. Project engineer for the structural alterations and repair works.

**Arthur Stanley House, London:** Providing structural engineering services for the enabling works stage of the project on an existing eight-storey 1960's RC framed building situated within the Fitzrovia Conservation Area. . Key project features include staged demolition works to suit sensate planning conditions and comprehensive party wall negotiations.

## Roedean School Refurbishment
Brighton

**Roedean School is a Grade II listed estate consisting of over twenty school buildings built between 1897 and 1980, standing on the cliffs overlooking Brighton Marina.**

AECOM provided the survey and appraisal of the whole estate for planned maintenance and long-term development. Subsequent to this, we provided the structural engineering design and inspection of prioritised repairs and alterations, including the refurbishment of boarding houses one to four

## The Embassy of Japan
London

**The Embassy of Japan is located at 101-104 Piccadilly.**
**The origins of the Grade II Listed building are as the Junior Constitutional Club, built in 1883-87, and designed by architect Sir Robert William Edis.**

AECOM were appointed as Structural Engineering Consultants to undertake a thorough assessment of the undesirable bounce and spring of the grand function room at first floor level. Key project features include strength testing of the historic structure, specialist vibration field testing and analysis and design of remedial works sensitive to the listed status of the building.

## Arthur Stanley House
London

**Arthur Stanley House is an eight storey 1960's RC framed building within London's Fitzrovia Conservation Area in the Borough of Camden.**

The proposed scheme comprises the alteration and extension of the existing building to create a mixed use development for residential and commerical use.

The new development at the rear of the ASH bulding is comprised of a steel frame to the offices and RC frame with flat slab floor plates, terracing back from the adjoining Mews on Tottenham Street. Key project features include staged demolition works to suit sensate planning conditions and comprehensive party wall negotiations.

**About AECOM**

AECOM (NYSE: ACM) is built to deliver a better world. We design, build, finance and operate infrastructure assets for governments, businesses and organizations in more than 150 countries.

As a fully integrated firm, we connect knowledge and experience across our global network of experts to help clients solve their most complex challenges.

From high-performance buildings and infrastructure, to resilient communities and environments, to stable and secure nations, our work is transformative, differentiated and vital. A Fortune 500 firm, AECOM companies had revenue of approximately US$19 billion during the 12 months ended June 30, 2015.

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