STRUCTURAL ENGINEERING STATEMENT

on

UCL INSTITUTE OF EDUCATION

PHASE 2

(PLANNING APPLICATIONS 2a -2d)

TAK STRUCTURES

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CONTENTS

Job Title: UCL IoE		Job No. 20094
	Name	Signature
Author	Greg Tyldesley	GT

Document Control

Revision	Detail	Date
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This report has been prepared by TAK Structures Ltd with all reasonable skill and care in accordance with the appointment of the clients.

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1.0 INTRODUCTION

1.1 Parts of the UCL IOE Faculty of Education and Society building are being refurbished and this includes extensive rationalisation and upgrading of the mechanical and electrical services.

1.2 The Institute of Education is a Lasdun 1970's concrete building along Bedford Way which is Grade II* listed. The proposals required listed building consent for internal alterations.

1.3 The redevelopment required some structural interventions and adaptions as summarised in the Structural Heritage Assessment documents (2a – 2d).

2.0 BRIEF DESCRIPTON OF INSTITUTE OF EDUCATION BLOCK

2.1 The block was built in the 1970's to a design by Denys Lasdun with Arup as the structural engineer. It is a massive block over 200m long with 3 basement and 6 upper storeys and 3 storey overruns to the 3 cores. Internally there are high quality exposed concrete finishes.

2.2 The building is piled and there are no signs of significant movement. The structural arrangement is sensible, and the detailing is of a high standard. Structurally it is a robust building with substantial concrete cores. In the teaching areas remote from the cores, the ribbed floors span east west across the width of the building.

3.0 STRUCTURAL WORKS SCHEME

3.1 The alterations assessed and summarised in this report are outlined in the information contained within the appendix of this report.

4.0 STRUCTURAL INTERVENTIONS

4.1 The structural interventions in the application relate to the accommodation of new services routes. They are generally small-scale penetrations through floors and at high level through the reinforced concrete walls. Where possible the number of new penetrations was limited by re-using existing openings.

4.2 As a general rule the smaller penetrations through floor slabs have been located to avoid existing reinforcement bars which were identified via ferro-scanning. Where beam & pot floors are present the penetrations were located through pots to avoid the structural ribs.

4.3 Where floor penetrations were greater than the width of the pots, a single rib was cut and re-supported with a steelwork beam. Where critical reinforcement bars were found or for larger holes, floor penetrations were supported by steelwork trimmer beams.

4.4 The large scale opening at roof was trimmed with new steelwork beams to re-support roof slab edges and restraint to the head of existing walls reinstated via flying steel props.

4.5 Where existing floor openings remained unused they were infilled with concrete.

4.6 Holes through (non-riser walls) were again located to suit existing reinforcement bars. Thorough assessments were made on the removal of sections of concrete and the adequacy of the remaining concrete sections checked.

4.7 Riser core walls to both cores A & B were modelled full-height via Finite Element analysis to provide an in-depth assessment on the proposed openings in the concrete. Key structural locations within the walls were design checked for adequacy due to the alterations. A summary of the extent of the new openings is included in the appendix to this report where red openings are existing original and blue are new.

5.0 DISCUSSION

5.1 The Institute of Education was well built and has been adequately maintained. The structure was found to have the necessary robustness to accommodate the limited alterations and do not compromise the integrity of the building.

5.2 The existing walls provided both an element of stability to the building and support adjacent floor slabs and both purposes will be maintained. There are many walls within the core areas and the walls to the lift shafts and stairs remain unaltered. Larger penetrations are solely located in the core riser walls which feature numerous existing openings (reused where possible) and as such there is negligible impact on the overall stability and floor slabs are still adequately supported.

5.3 In all cases the start point was to reuse existing openings and this minimised demolition works and minimised impact on the existing walls. The smaller penetrations will be clustered and located to avoid reinforcement bars.

6.0 CONCLUSIONS

6.1 The building was found to have sufficient capacity to accommodate the limited number of additional new openings within the core walls

6.2 Simple steelwork trimmer beams are provided to support floor openings whose size or location meant additional support was required.

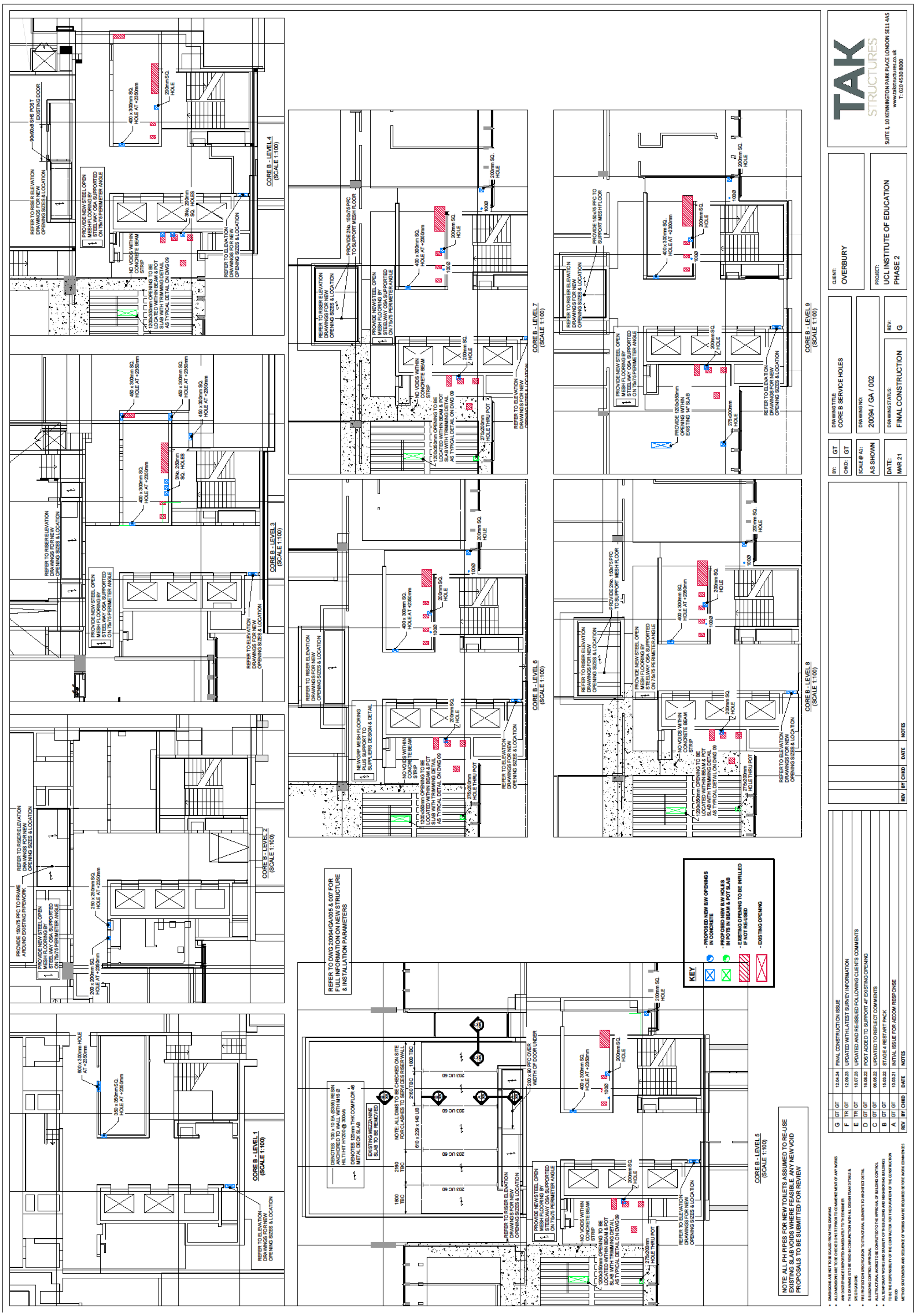
6.3 The alterations do not compromise the integrity of the structure.

APPENDIX 1

SUMMARY OF CORE ALTERATION WORKS

Note:

- Blue indicates new openings in concrete.
- Green indicates new openings in beam & pot floors.
- Red indicates existing original openings (hatched indicates infill).


TAK STRUCTURES
OVERBURY
UCL INSTITUTE OF EDUCATION PHASE 2
CORE B SERVICE HOLES
20094 / GA / 002
AS SHOWN
MAR 21
FINAL CONSTRUCTION
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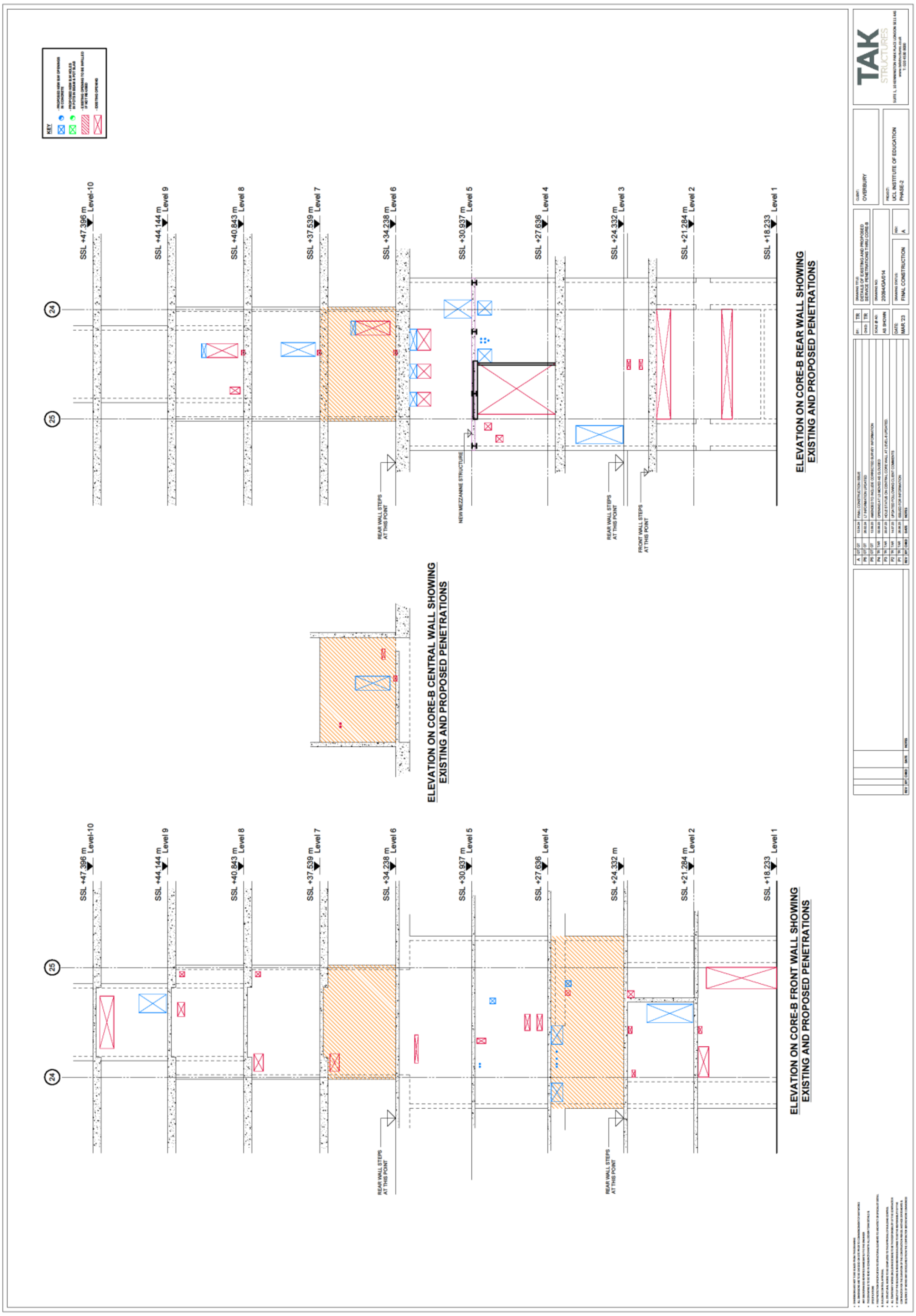
ELEVATION ON CORE-B REAR WALL SHOWING EXISTING AND PROPOSED PENETRATIONS
ELEVATION ON CORE-B CENTRAL WALL SHOWING EXISTING AND PROPOSED PENETRATIONS
ELEVATION ON CORE-B FRONT WALL SHOWING EXISTING AND PROPOSED PENETRATIONS
SSL +47.396 m Level-10
SSL +44.144 m Level 9
SSL +40.843 m Level 8
SSL +37.539 m Level 7
SSL +34.238 m Level 6
SSL +30.937 m Level 5
SSL +27.636 m Level 4
SSL +24.332 m Level 3
SSL +21.284 m Level 2
SSL +18.233 Level 1
REAR WALL STEPS AT THIS POINT
FRONT WALL STEPS AT THIS POINT
NEW MEZZANINE STRUCTURE
KEY
TAK STRUCTURES
OVERBURY
UCL INSTITUTE OF EDUCATION PHASE-2
FINAL CONSTRUCTION

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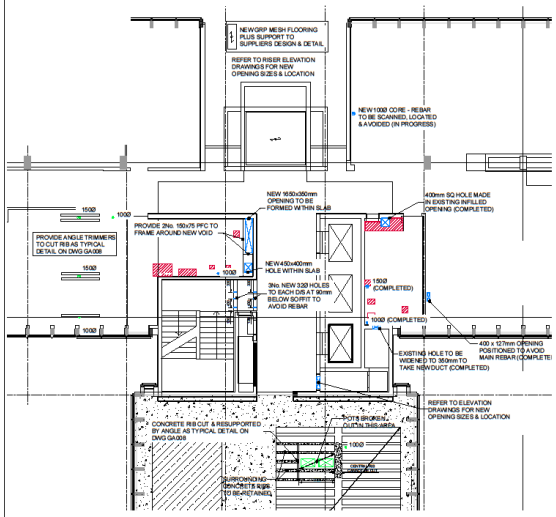
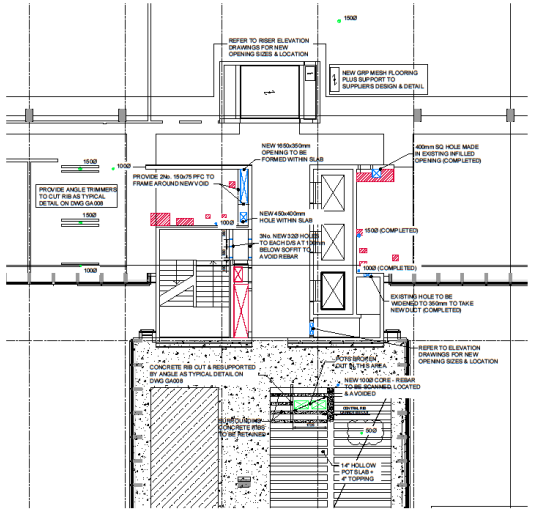


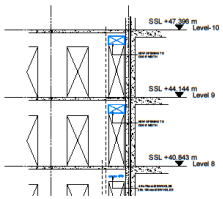
CORE A - LEVEL 9
(SCALE 1:100)



CORE A - LEVEL 8
(SCALE 1:100)

KEY

- PROPOSED NEW S.W OPENINGS IN CONCRETE
- PROPOSED NEW S.W HOLES IN POTS IN BEAM & POT SLAB
- EXISTING OPENING TO BE INFILLED IF NOT RE-USED
- EXISTING OPENING



ELEVATION ON CORE A LIFT ENTRANCE WALL
EXISTING AND PROPOSED PENETRATIONS
(REF: D15)

NOTE: ALL SUPPORT TO MESH FLOORING SUBJECT TO COORDINATION WITH EXISTING RISER SERVICES ONCE ESTABLISHED BY M&E CONTRACTOR

NOTE: ALL PH PIPES FOR NEW TOILETS ASSUMED TO RE-USE EXISTING SLAB VOIDS WHERE FEASIBLE. ANY NEW VOID PROPOSALS TO BE SUBMITTED FOR REVIEW

- DIMENSIONS ARE NOT TO BE SCALED FROM THIS DRAWING
- ALL DIMENSIONS ARE TO BE CHECKED ON SITE PRIOR TO COMMENCEMENT OF ANY WORKS ANY DISCREPANCIES REPORTED IMMEDIATELY TO THE ENGINEER
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METHOD STATEMENTS AND SEQUENCE OF WORKS MAYBE REQUIRED BEFORE WORK COMMENCES

REV	BY	CHKD	DATE	NOTES
D	GT	GT	12.04.24	FINAL CONSTRUCTION ISSUE
C	GT	GT	07.11.23	50 DIAMETER HOLE ADDED THRU POT LEVEL 8 (AS CLOUDED)
B	GT	GT	12.10.23	RISER CORE WALL INFORMATION REMOVED
A	TR	GT	09.08.23	SUMMARY OF BW HOLES TO LEVELS 8 & 9

REV	BY	CHKD	DATE	NOTES

BY: GT
CHKD: GT

DRAWING TITLE: CORE A SERVICE HOLES LEVELS 8 & 9 (EARLY HANDOVER)

SCALE @ A1: AS SHOWN

DRAWING NO: 20094 / GA / 018

DATE: JUL '23

DRAWING STATUS: FINAL CONSTRUCTION

REV: D

CLIENT: OVERBURY

PROJECT: UCL INSTITUTE OF EDUCATION PHASE 2

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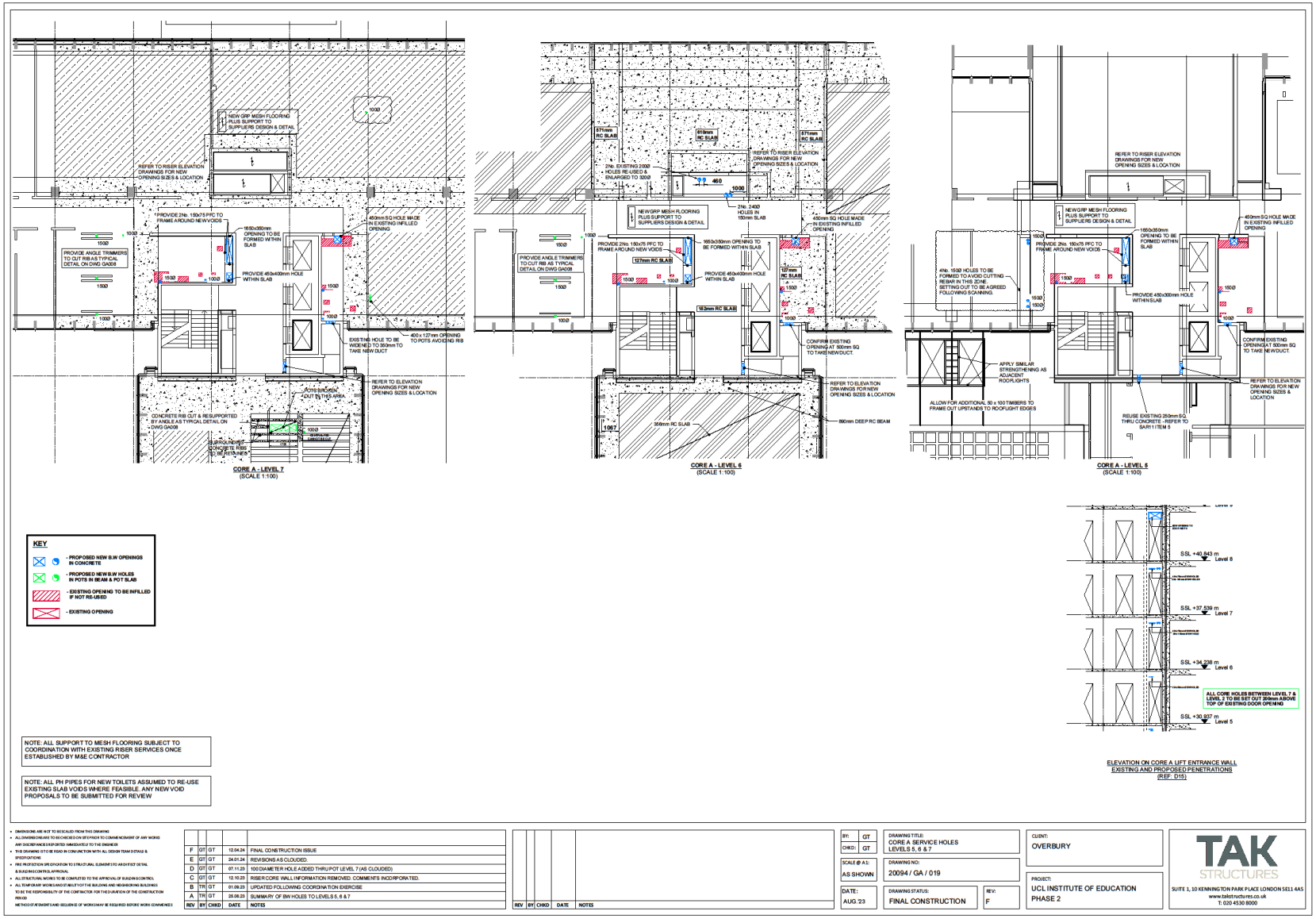

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REV	BY	CHKD	DATE	NOTES
F	GT	GT	12.04.24	FINAL CONSTRUCTION ISSUE
E	GT	GT	24.01.24	REVISIONS AS CLOUDED.
D	GT	GT	07.11.23	100 DIAMETER HOLE ADDED THRU POT LEVEL 7 (AS CLOUDED)
C	GT	GT	12.10.23	RISER CORE WALL INFORMATION REMOVED. COMMENTS INCORPORATED.
B	TR	GT	01.09.23	UPDATED FOLLOWING COORDINATION EXERCISE
A	TR	GT	28.08.23	SUMMARY OF BW HOLES TO LEVELS 5, 6 & 7

REV	BY	CHKD	DATE	NOTES

BY: GT
CHKD: GT
SCALE @ A1: AS SHOWN
DATE: AUG.'23

DRAWING TITLE: CORE A SERVICE HOLES LEVELS 5, 6 & 7
DRAWING NO: 20094 / GA / 019
DRAWING STATUS: FINAL CONSTRUCTION
REV: F

CLIENT: OVERBURY
PROJECT: UCL INSTITUTE OF EDUCATION PHASE 2

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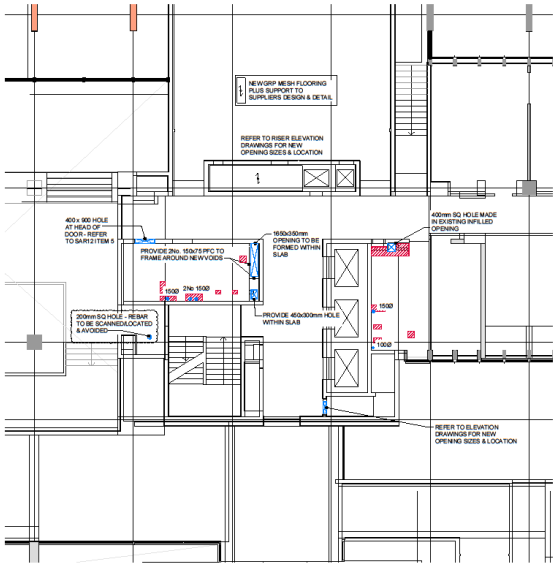

CORE A - LEVEL 4
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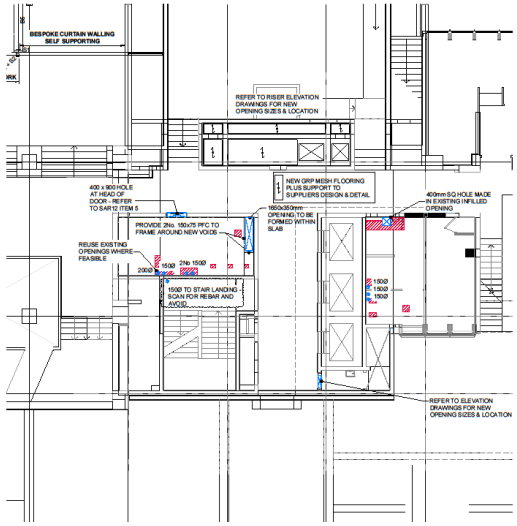

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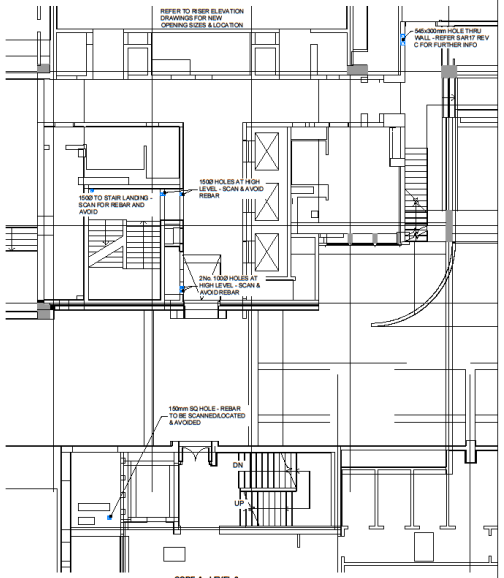

CORE A - LEVEL 2
(SCALE 1:100)

KEY

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- PROPOSED NEW B.W HOLES IN POTS IN BEAM & POT SLAB
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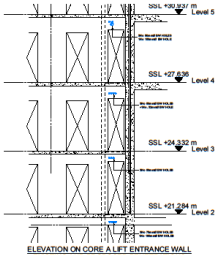
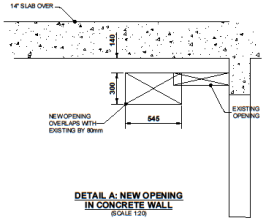


ELEVATION ON CORE A LIFT ENTRANCE WALL EXISTING AND PROPOSED PENETRATIONS (REF: D15)



DETAIL A: NEW OPENING IN CONCRETE WALL
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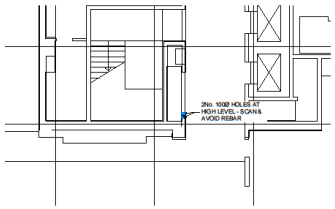

CORE A - LEVEL 1 (PART)
(SCALE 1:100)

NOTE: ALL SUPPORT TO MESH FLOORING SUBJECT TO COORDINATION WITH EXISTING RISER SERVICES ONCE ESTABLISHED BY M&E CONTRACTOR

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REV	BY	CHKD	DATE	NOTES
G	GT	GT	24.01.24	REVISIONS AS CLOUDED.
F	GT	GT	09.11.23	REVISIONS AS CLOUDED. DSS1 OPENINGS REMOVED.
E	GT	GT	01.11.23	REVISIONS AS CLOUDED. DSS1 OPENINGS REMOVED.
D	GT	GT	25.10.23	REVISIONS AS CLOUDED. LEVEL 1 EXTRACT ADDED.
C	GT	GT	12.10.23	RISER CORE WALL INFORMATION REMOVED. COMMENTS INCORPORATED.
B	TR	GT	05.09.23	UPDATED FOLLOWING COORDINATION
A	TR	GT	25.08.23	SUMMARY OF BW HOLES TO LEVELS 2, 3 & 4

REV	BY	CHKD	DATE	NOTES
H	GT	GT	12.04.24	FINAL CONSTRUCTION ISSUE

BY: GT
CHKD: GT
SCALE @ A1: AS SHOWN
DATE: AUG.'23

DRAWING TITLE: CORE A SERVICE HOLES LEVELS 2, 3 & 4
DRAWING NO.: 20094 / GA / 020
DRAWING STATUS: FINAL CONSTRUCTION
REV: H

CLIENT: OVERBURY
PROJECT: UCL INSTITUTE OF EDUCATION PHASE 2

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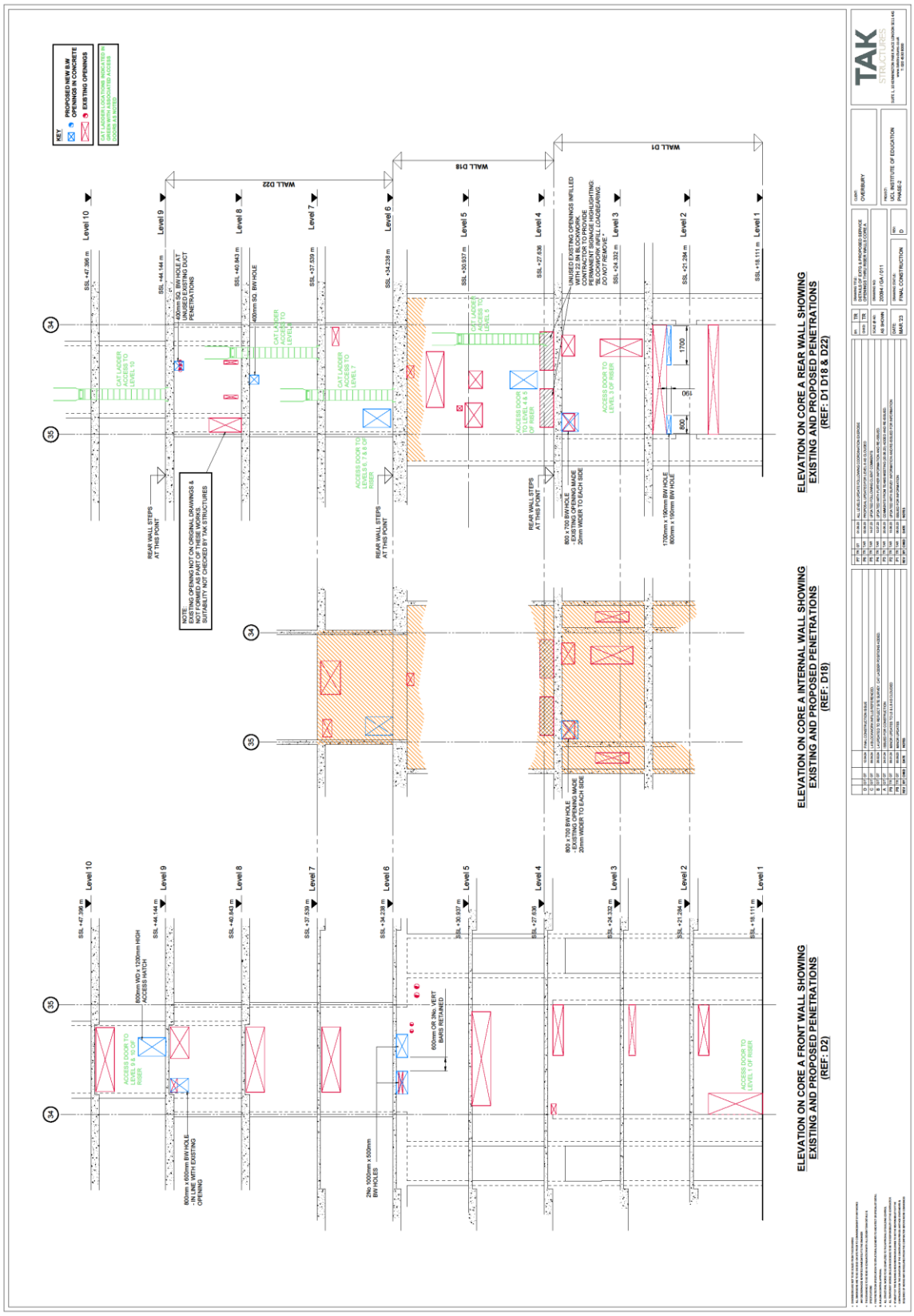

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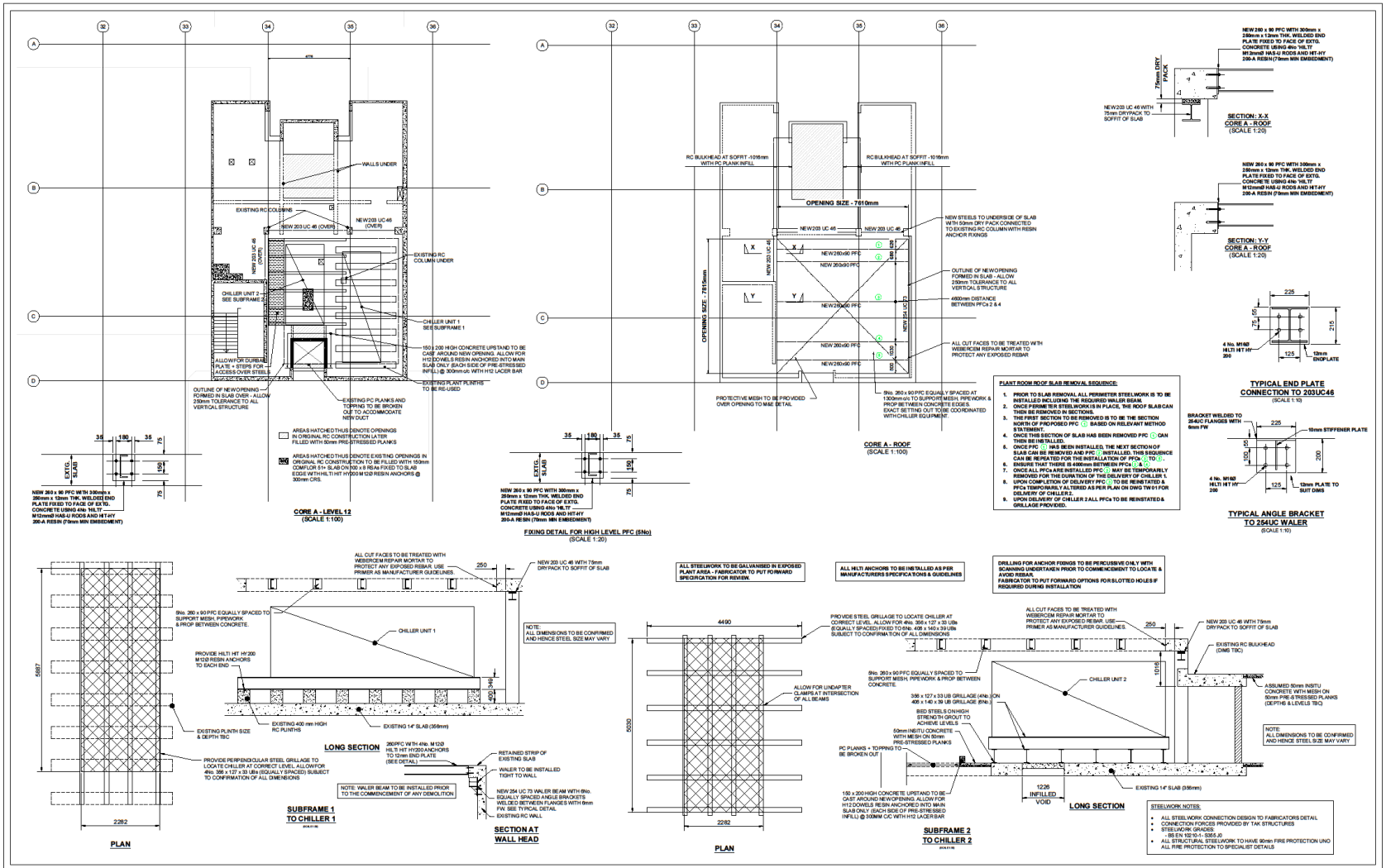

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METHOD STATEMENT AND SEQUENCE OF WORKS MAY BE REQUIRED BEFORE WORK COMMENCES

REV	BY	CHKD	DATE	NOTES
G	GT	GT	15.08.23	UPDATED TO SUIT LATEST INSTALLATION SEQUENCE
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E	GT	GT	18.04.23	UPDATED TO SUIT LATEST AECOM COMMENTS AND CHILLER INFORMATION
D	GT	GT	13.04.23	WALER SUPPORT UPDATED TO SUIT INSTALLATION METHOD. MESH SUPPORT STEELS ADDED.
C	GT	GT	06.03.22	UPDATED TO REFLECT COMMENTS
B	GT	GT	15.03.22	STAGE 4 RESTART PACK
A	GT	GT	10.03.21	INITIAL ISSUE FOR AECOM RESPONSE

REV	BY	CHKD	DATE	NOTES
K	GT	GT	12.04.24	FINAL CONSTRUCTION ISSUE
J	GT	GT	13.09.23	SETTING OUT TO PFCs 2 & 4 UPDATED
I	GT	GT	07.09.23	UPDATED TO SUIT AGREED SEQUENCE
H	GT	GT	04.09.23	UPDATED TO SUIT LATEST DIMENSIONS

BY:	GT
CHKD:	GT
SCALE @ A1:	AS SHOWN
DATE:	MAR 21
DRAWING TITLE:	CORE A LEVEL 12 + ROOF PLANT INSTALLATION
DRAWING NO:	20094 / GA / 006
DRAWING STATUS:	FINAL CONSTRUCTION
REV:	K
CLIENT:	OVERBURY
PROJECT:	UCL INSTITUTE OF EDUCATION PHASE 2

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HERITAGE STRUCTURAL ASSESSMENT

on

UCL INSTITUTE OF EDUCATION

PHASE 2

(PLANNING APPLICATION 2a)

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i. INTRODUCTION

The purpose of this document is to provide an addendum to the original Heritage Structural Assessment for planning application 2a of the phase 2 project at the UCL Institute of Education. It will summarise the works that were undertaken and highlight those not carried out. It will also comment on whether the original conclusions remain valid.

The original report produced by Train & Kemp LLP follows this portion and includes the items referenced below.

ii. STRUCTURAL ALTERATIONS

The following structural alterations were listed in the original document:

1. Existing Service Riser Modifications
   Works completed although opening sizes referenced were significantly smaller. Conclusions remain valid.

2. Existing Standalone Riser Enlargement
   Works completed. Conclusions remain valid.

3. New Penetrations
   Works only completed for core B. Existing openings utilised. Conclusions remain valid.

4. Existing Level 5 Mezzanine removed in Cores B & C
   Works only completed for core B. Replacement structure provided. Conclusions remain valid.

5. Lowering of Archive Store at Level 3 in Core C
   Works not carried out.

6. Core C smoke vents at Level 3
   Works completed. Conclusions remain valid.

7. Core A Roof Chiller Ventilation
   Works completed. Conclusions remain valid.

iii. ADDENDUM SUMMARY

The design and works were carried out with attention to the challenges noted in the original assessment and the conclusions from the original assessment remain valid.

TRAIN & KEMP
CONSULTING ENGINEERS

HERITAGE STRUCTURAL ASSESSMENT

on

UCL INSTITUTE OF EDUCATION

PHASE 2

Train & Kemp (Consulting Engineers) LLP | 10 Kennington Park Place London SE11 4AS | Limited Liability Partnership No. OC305768

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CONTENTS

Job Title: UCL IoE		Job No. **14392**
	Name	Signature
Author	Norman Train	
Report Status		

Document Control

Revision	Detail	Date
01	Initial issue	20.11.19
02	Revised following comments from Overbury.	21.11.19
03	Updated to suit M&E rev + Deloitte comments	04.12.19

This report has been prepared by Train & Kemp (Consulting Engineers) LLP with all reasonable skill and care in accordance with the appointment of the clients

INTRODUCTION

1.1 UCL intend to refurbish and upgrade the Institute of Education facilities. This will include rationalisation and upgrading of the services, and replacement of mezzanine floors.

1.2 The Institute of Education is a Lasdun 1970's concrete building along Bedford Way which is Grade II* listed. The proposals require planning and listed building consent for internal alterations. The application is supported by a heritage assessment which has been prepared by Alan Baxter Associates.

1.3 The redevelopment will require some structural interventions and adaptions, and these are presented in Appendix 1

1.4 For the purposes of this report the orientation is taken with Bedford Way to the east and Tavistock and Russell Squares to the north and south respectively.

2.0 BRIEF DESCRIPTON OF INSTITUTE OF EDUCATION BLOCK

2.1 The block was built in the 1970's to a design by Denys Lasdun with Arup as the structural engineer. It is a massive block over 200m long with 3 basement and 6 upper storeys and 3 storey overruns to the 3 cores. Internally there are high quality exposed concrete finishes.

2.2 The building is piled and there are no signs of significant movement. The structural arrangement is sensible, and the detailing is of a high standard. Structurally it is a robust building with substantial concrete cores. In the teaching areas remote from the cores, the ribbed floors span east west across the width of the building.

2.3 Inevitably in the intervening 40 years there have been some structural alterations and adaptions; again, these are sensible. Infills and alterations in an occupied building have inevitably been framed in steel with appropriate fire protection. The maintenance has also been of a high standard.

3.0 PROPOSED SCHEME

3.1 The Phase 2 proposed alterations relate only to work to Cores A, B and C and are outlined in information from Architon LLP.

3.2 The proposals are to improve the quality of the services within the building and to rationalise some of the infill spaces to give a better use of the building. There are no proposed extensions.

3.3 The principles for forming builders works holes for new service penetrations through floor slabs and core walls which were established in Phase 1 will also be used for Phase 2.

4.0 STRUCTURAL INTERVENTIONS

4.1 The majority of the alterations relate to service penetrations in the cores. These are through slabs and walls and generally are localised in scale. The challenge is assessing how these aggregate with the current penetrations, particularly on the lower floors where the loads are the greatest. As set out in Appendix 1, there are three classes of penetrations that are considered.

4.2 The required structural interventions are at specific locations and the structural works have been developed to ensure that the stability and well-being of the structure is maintained.

4.3 The infills and alterations in an occupied building have inevitably been framed in steel with appropriate fire protection.

4.4 Seven key interventions are given in Appendix 1. These use established engineering and building techniques.

5.0 DISCUSSIONS

5.1 The Institute of Education was well built and has been adequately maintained. The structure has the necessary robustness to accommodate the proposed alterations which are both sensible and achievable and will not compromise the integrity of the building.

5.2 There is asbestos within what is an occupied building and its removal is being completed in a safe and methodical manner. Once this has been undertaken, the details of the steel framed infills and their connections to the concrete core walls can be established and the possibility of salvaging and reusing the steels will be explored. It is not envisaged that these subsequent additions impact on the integrity of the original structure.

6.0 CONCLUSIONS

6.1 The proposed alterations do not comprise the integrity of the structure.

6.2 The alterations are not extensive in magnitude or density. Where framing is required, established engineering techniques are adopted and this will ensure that the integrity of the structure is maintained.

Institute of Education

Appendix 1

List of Structural Alterations

Revision 01 21 November 2019

1. Existing Service Riser Modifications
2. Existing Standalone Riser Enlargement
3. New penetrations
4. Existing Level 5 mezzanine removed in Cores B & C and reformed
5. Lowering of Archive Store at Level 3 in Core C
6. Core C smoke vents at Level 3
7. Core A roof chiller ventilation

Institute of Education

Structural Alteration 01

Existing Service Riser Modification

Revision 03 04 December 2019

1. Current Arrangement
   - 1.1 The existing risers are located in the three cores. The primary riser is to the east side of the corridor on Grid B as a series of shafts and a large central riser surrounded by concrete walls.

2. Alterations and Challenges
   - 2.1 It is proposed to cut further holes in the central riser slab with slots in the corridor wall on Grid B to allow ventilation of the corridors.
   - 2.2 Where there are teaching spaces at the lower levels to the east side of the riser there will be further slots to provide air handling to these areas. There will also need to be access provision with existing doors re-used where feasible.
   - 2.3 The largest slab holes are Core B at Level 1 with 2/1750m x 1250mm to the back eastern wall of the riser.
   - 2.4 The largest wall slots are 2/1750mm wide to the Grid B corridor wall.
   - 2.5 The challenge will be in ensuring that these new holes and slots do not combine with the existing ones to generate significant weaknesses.

3. Solution
   - 3.1 The new holes and slots are being mapped on the existing holes as a drawing exercise in the first instance and will be marked out on site when the areas are declared free of asbestos.
   - 3.2 The riser slab is framed on all sides and is inherently strong; it is only any free edges that will need local support. This will be with steels spanning the width of the riser
   - 3.3 The corridor wall on Grid B, only has to support the 2m corridor and is hence a strong point in the structure. Where the slots are for pipework distribution, discrete holes will be spaced for individual larger diameter pipes as far as possible.
   - 3.4 Floor structure to teaching spaces on the east side of the riser will span north/south and therefore limit the vertical load transferred to the riser wall. Slots will be installed vertically where feasible to limit the width dimension and doors re-used.
   - 3.5 As a rule of thumb, the wall sections remaining between the slots should be longer than the slot opening. Where the piers between the slots are less a full analysis of the load paths will be completed.

Institute of Education

Structural Alteration 02

Existing Standalone Riser Enlargement

Revision 0 20 November 2019

1. Current Arrangement
   - 1.1 Inevitably over the last 40 years it has been found that service distribution has also had to be positioned remote from the core risers.
   - 1.2 These standalone risers are mostly orientated to be parallel with the ribs in the floors.

2. Alterations and Challenges
   - 2.1 Any increase in the holes will be parallel to the ribs to minimise their impact on the ribs.
   - 2.2 It is the risers that are located in the beam strips that have had the greatest impact on the structure. Again, the same principle applies with any opening being extended across the width of the building, so the beam strip is not weakened further.

3. Solution
   - 3.1 Openings in slab to be in the direction of the ribs, i.e. across the width of the building.
   - 3.2 Enlarging any openings in the beam strips will be resisted as far as possible with duct routes altered to suit.
   - 3.3 If necessary, trimming can be introduced to any ribs that need to be cut as SK01 Appendix 02.

Institute of Education

Structural Alteration 03

New Penetrations

Revision 03 04 December 2019

1. Current Arrangement
   1.1 Existing slabs

2. Alterations and Challenges
   2.1 New 350mm wide slots are required in Cores A and B on Grids 33 and 26 respectively; these are alongside concrete walls as strong points in the structure. At the upper levels (4+) the location of these slots will shift to avoid concrete beam strips and run through the beam and pot floors with trimming as 02.

3. Solution
   3.1 Such openings will be resisted as far as possible, with enlarging of existing holes being the preferred solution.
   3.2 Any openings in slab to be at strong points in the structure and avoid solid concrete beam strips.

Institute of Education

Structural Alteration 04

Existing Level 5 mezzanines removed in Cores B & C and reformed

Revision 0 20 November 2019

1. Current Arrangement
   - 1.1 There are mezzanine infills that are at approximately Level 5 in both Cores B and C; these only have staircase access from Level 4. In order to maximise the teaching space at Level 4, the staircases are to be removed. Unfortunately, the mezzanines are not exactly at Level 5 and need to be removed and reformed.

2. Alterations and Challenges
   - 2.1 With the asbestos, the current construction of the mezzanines has not been established.
   - 2.2 Consequently, the assumption is that the existing mezzanine will need to be demolished and cannot be salvaged. A new mezzanine will be constructed with access from Level 5 using steel beams and composite concrete floors. The steels will be supported on the existing concrete walls.

3. Solution
   - 3.1 The current installation will be investigated to see if it is possible to salvage and reuse any of the elements. The existing fixing assemblies will also be investigated so the principles can be readopted with the revised floor.
   - 3.2 Depending on the ability to salvage any items, a dismantling plan will be developed.
   - 3.3 The loadings will be similar to previous and the structure can support the new mezzanines

Institute of Education

Structural Alteration 05

Lowering of Archive Store at Level 3 in Core C

Revision 0 20 November 2019

1. Current Arrangement
   - 1.1 The existing archive store in Core C is to become teaching space at Level 3 and consequently needs to be lowered by 0.4m.

2. Alterations and Challenges
   - 2.1 The existing steel beams to the archive have deflected, although this is due to the high archive loads.
   - 2.2 It is hoped that the beams can be salvaged and reused in the formation of the teaching space, but with headroom constraints the deflection may be too great
   - 2.3 As previous, the walls on Grids 13 and 16 will be used for support.

3. Solution
   - 3.1 The deflected profile of the existing steels will be surveyed to see if the beams will fit. Consideration will also be given to turning the beams upside down and use the deflection as a precamber.
   - 3.2 The existing fixing assemblies will also be investigated so the principles can be readopted with the salvaged/new beams.
   - 3.3 Depending on the ability to salvage any items, the dismantling plan will be developed.

Institute of Education

Structural Alteration 06

Smoke Vents Core C Level 3

Revision 0 20 November 2019

1. Current Arrangement
   1.1 The new teaching space to Level 3 only has one means of escape and smoke ventilation will be required at Level 3 high level.

2. Alterations and Challenges
   2.1 The precise size of the smoke vent slots has still to be established but will be located in the core wall beside Grids 13 and 16.

3. Solution
   3.1 Currently the core walls are imperforate, so it will be possible to insert smoke vent slots without compromising the structure.

Institute of Education

Structural Alteration 07

Core A Roof Chiller Ventilation

Revision 0 20 November 2019

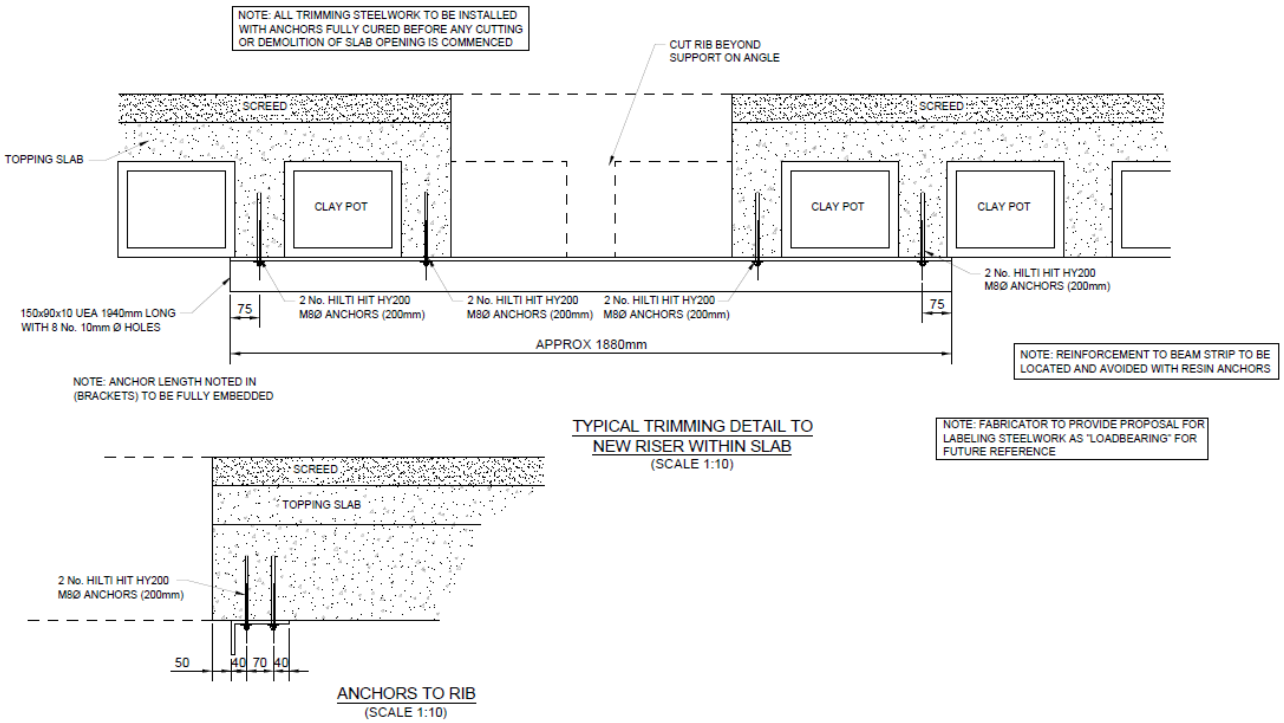
1. Current Arrangement
   1.1 The new chiller unit to Level 9 in Core A needs greater ventilation than previous and will require the roof slab to be removed.

2. Alterations and Challenges
   2.1 The stability of the current roof support walls will need to be checked since the restraint to their head will be removed. As concrete walls that buttress each other, their stability is not anticipated to be a problem.
   2.2 The main challenge is waterproofing and weather sealing rather than structure.

Institute of Education

Appendix 2

Rib trimming detail for Structural Alteration 02



HERITAGE STRUCTURAL ASSESSMENT

on

UCL INSTITUTE OF EDUCATION

PHASE 2

(PLANNING APPLICATION 2b)

TAK STRUCTURES

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i. INTRODUCTION

The purpose of this document is to provide an addendum to the original Heritage Structural Assessment for planning application 2b of the phase 2 project at the UCL Institute of Education. It will summarise the works that were undertaken and highlight those not carried out. It will also comment on whether the original conclusions remain valid.

The original report produced by Train & Kemp LLP follows this portion and includes the items referenced below.

ii. STRUCTURAL ALTERATIONS

The following structural alterations were listed in the original document:

1. New Riser Penetrations Core A Wing
   Works completed. Conclusions remain valid.

2. Level 1 Plantroom 3/12 – installation of new plant.
   Works completed. Conclusions remain valid.

iii. ADDENDUM SUMMARY

The design and works were carried out with attention to the challenges noted in the original assessment and the conclusions from the original assessment remain valid.

TRAIN & KEMP
CONSULTING ENGINEERS

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PHASE 2

(PLANNING APPLICATION 2)

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Job Title: UCL IoE		Job No. **14392**
	Name	Signature
Author	Greg Tyldesley	GT
Report Status		

Document Control

Revision	Detail	Date
0	Initial issue	24.03.20

This report has been prepared by Train & Kemp (Consulting Engineers) LLP with all reasonable skill and care in accordance with the appointment of the clients

INTRODUCTION

1.1 UCL intend to refurbish and upgrade the Institute of Education facilities. This will include rationalisation and upgrading of the services.

1.2 The Institute of Education is a Lasdun 1970's concrete building along Bedford Way which is Grade II* listed. The proposals require planning and listed building consent for internal alterations. The application is supported by a heritage assessment which has been prepared by Alan Baxter Associates.

1.3 The redevelopment will require some structural interventions and adaptions, and the second set of these are presented in Appendix 1

1.4 For the purposes of this report the orientation is taken with Bedford Way to the east and Tavistock and Russell Squares to the north and south respectively.

2.0 BRIEF DESCRIPTON OF INSTITUTE OF EDUCATION BLOCK

2.1 The block was built in the 1970's to a design by Denys Lasdun with Arup as the structural engineer. It is a massive block over 200m long with 3 basement and 6 upper storeys and 3 storey overruns to the 3 cores. Internally there are high quality exposed concrete finishes.

2.2 The building is piled and there are no signs of significant movement. The structural arrangement is sensible, and the detailing is of a high standard. Structurally it is a robust building with substantial concrete cores. In the teaching areas remote from the cores, the ribbed floors span east west across the width of the building.

2.3 Inevitably in the intervening 40 years there have been some structural alterations and adaptions; again, these are sensible. Infills and alterations in an occupied building have inevitably been framed in steel with appropriate fire protection. The maintenance has also been of a high standard.

3.0 PROPOSED SCHEME

3.1 The Phase 2 proposed alterations relate only to work to Cores A, B and C and are outlined in information from Architon LLP.

3.2 The proposals are to improve the quality of the services within the building and to rationalise some of the infill spaces to give a better use of the building. There are no proposed extensions.

3.3 The principles for forming builders works holes for new service penetrations through floor slabs and core walls which were established in Phase 1 will also be used for Phase 2.

4.0 STRUCTURAL INTERVENTIONS

4.1 The alterations in this application relate to service provision and penetrations. These are generally through slabs are localised in scale with the primary aim to re-use existing where feasible.

4.2 The required structural interventions are at specific locations and the structural works have been developed to ensure that the stability and well-being of the structure is maintained.

4.3 Two key structural interventions are given in Appendix 1. These use established engineering and building techniques.

5.0 DISCUSSIONS

5.1 The Institute of Education was well built and has been adequately maintained. The structure has the necessary robustness to accommodate the proposed alterations which are both sensible and achievable and will not compromise the integrity of the building.

5.2 There is asbestos within what is an occupied building and its removal is being completed in a safe and methodical manner. Once this has been undertaken, the details of the steel framing to openings can be fully established. It is not envisaged that these subsequent additions impact on the integrity of the original structure.

6.0 CONCLUSIONS

6.1 The proposed alterations do not comprise the integrity of the structure.

6.2 The alterations are not extensive in magnitude or density. Where framing is required, established engineering techniques are adopted and this will ensure that the integrity of the structure is maintained.

Institute of Education

Appendix 1

List of Structural Alterations

Revision 01 24 March 2020

1. New Riser Penetrations (Core A Wing)
2. Level 1 - Installation of new plant units.

Institute of Education

Structural Alteration 01

New Riser Penetrations

Revision 0 24 March 2020

1. Current Arrangement
   - 1.1 Offices are provided along the extent of both wings to Core A with services distributed from the core risers for levels 5, 6, 7 & 8. The floor structure is generally formed of RC beam strips supporting either beam and pot floors or solid RC slabs.

2. Alterations and Challenges
   - 2.1 The updates to the office provision to include shared hub spaces requires a new riser to distribute mechanical ductwork up from level 5 to level 8.
   - 2.2 The challenge is to avoid existing primary beam strips and coordinate the floor layouts to provide a riser location within slab areas such that they can be framed using established engineering techniques to ensure that the integrity of the structure is maintained.

3. Solution
   - 3.1 Riser penetration within beam strips to be avoided. Openings to be located in slab areas only and to be in the direction of the ribs, i.e. across the width of the building.
   - 3.2 Trimming can be introduced to any ribs that need to be cut as SK01 Appendix 02.

Institute of Education

Structural Alteration 02

Level 1 – New Plant Installation

Revision 0 24 March 2020

1. Current Arrangement
   - 1.1 Level 1 Plant Room 3/12 - A mid-storey level slab has been installed to support and frame ductwork. It is supported on blockwork masonry walls and not part of the original RC frame structure. It is not recorded on any of the original record drawings.
   - 1.2 Existing concrete plinths are provided as bases for plant units.

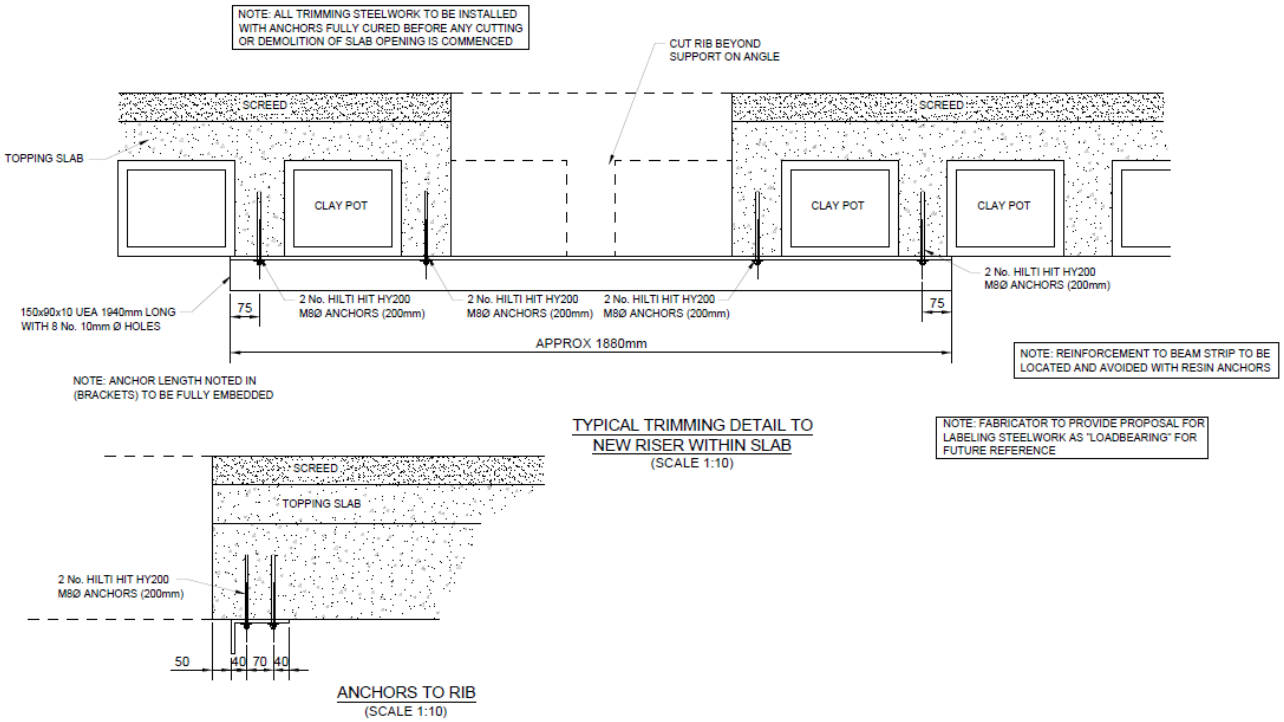
2. Alterations and Challenges
   - 2.1 New AHUs are required to be situated in the area currently taken up by the mid-storey level slab and associated ductwork. This necessitates the removal of the slab and supporting blockwork walls. Plinths may need to be reduced in height to accommodate.
   - 2.2 Demolition works to the slab are straightforward and sections of slab near existing RC columns will generally be retained. The removal will be controlled and limited to the open areas required to be clear for the new plant units.

3. Solution
   - 3.1 Saw cutting will provide accuracy in demolition of the mid-level slab and sections of concrete slab within retained block walls (currently supporting cabling) will be retained. Demolition cutting near existing RC frame columns will be limited where possible.
   - 3.2 Existing concrete plinths are not integral to the structure and can be safely reduced in height.

Institute of Education

Appendix 2

Rib trimming detail for Structural Alteration 01



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PHASE 2

(PLANNING APPLICATION 2c)

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i. INTRODUCTION

The purpose of this document is to provide an addendum to the original Heritage Structural Assessment for planning application 2c of the phase 2 project at the UCL Institute of Education. It will summarise the works that were undertaken and highlight those not carried out. It will also comment on whether the original conclusions remain valid.

The original report produced by TAK Structures Ltd follows this portion and includes the items referenced below.

ii. STRUCTURAL ALTERATIONS

The following structural alterations were listed in the original document:

1. New Entrance Pavilion
   Works completed. Conclusions remain valid.

2. New Platform Lift (Level 3)
   Works completed. Conclusions remain valid.

iii. ADDENDUM SUMMARY

The design and works were carried out with attention to the challenges noted in the original assessment and the conclusions from the original assessment remain valid.

HERITAGE STRUCTURAL ASSESSMENT

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PHASE 2

(PLANNING APPLICATION 2c)

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	Name	Signature
Author	Greg Tyldesley	GT

Document Control

Revision	Detail	Date
00	Initial issue	18.02.21
01	Updated issue	16.12.21

This report has been prepared by TAK Structures Ltd with all reasonable skill and care in accordance with the appointment of the clients.

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1.0 INTRODUCTION

1.1 UCL intend to refurbish and upgrade the Institute of Education facilities. This will include rationalisation and upgrading of the services.

1.2 The Institute of Education is a Lasdun 1970's concrete building along Bedford Way which is Grade II* listed. The proposals require planning and listed building consent for internal and external alterations. The application is supported by a heritage assessment which has been prepared by Alan Baxter Associates.

1.3 The redevelopment will require some structural interventions and adaptions, and those related to application 2C are presented in Appendix 1.

1.4 For the purposes of this report the orientation is taken with Bedford Way to the east and Tavistock and Russell Squares to the north and south respectively.

2.0 BRIEF DESCRIPTON OF INSTITUTE OF EDUCATION BLOCK

2.1 The block was built in the 1970's to a design by Denys Lasdun with Arup as the structural engineer. It is a massive block over 200m long with 3 basement and 6 upper storeys and 3 storey overruns to the 3 cores. Internally there are high quality exposed concrete finishes.

2.2 The building is piled and there are no signs of significant movement. The structural arrangement is sensible, and the detailing is of a high standard. Structurally it is a robust building with substantial concrete cores. In the teaching areas remote from the cores, the ribbed floors span east west across the width of the building.

2.3 Inevitably in the intervening 40 years there have been some structural alterations and adaptions; again, these are sensible. Infills and alterations in an occupied building have inevitably been framed in steel with appropriate fire protection. The maintenance has also been of a high standard.

3.0 PROPOSED SCHEME

3.1 The Phase 2C proposed structural alterations relate to the entrance areas at levels 3 and 4 - these are outlined in information from Architon LLP in the 3147-P3-2000 series of drawings. This includes a minor extension to the main entrance of the IoE on Bedford Way, the installation of security gates, a reconfigured entrance at Thornhaugh Mews, the insertion of a new platform lift at Level 3 and a platform lift serving Level 3 and 4, and refurbishment of the foyers at Levels 1, 3 and 4 including the installation of fixed furniture.

3.2 The proposals are to improve the quality of access into the building at both levels 3 and 4.

4.0 STRUCTURAL INTERVENTIONS

4.1 The structural interventions in this application relate to removal and replacement of older entranceways, glazing and the installation of a new entrance pavilion. There is also the provision of a new platform lift at level 3.

4.2 The required structural interventions are at specific locations indicated on the accompanying drawing 20094/GA/001 and the structural works have been developed to ensure that the stability and well-being of the structure is maintained.

4.3 The key structural interventions are expanded on in Appendix 1. The installation of a new entrance pavilion and the provision of a new platform lift at level 3 both use established engineering and building techniques which take account of the Grade II* listed nature of the structure and limit any impact.

5.0 DISCUSSION

5.1 The Institute of Education was well built and has been adequately maintained. The structure has the necessary robustness to accommodate the proposed alterations which are both sensible and achievable and will not compromise the integrity of the building.

5.2 The existing entrance bridge is understood to be independent of the primary structure of the building and its demolition and removal does not affect the adjacent structure being retained.

5.3 The curtain wall glazing to the level three is original and the doors and short sections being removed will be replaced by a glazing specialist. This replacement section will also consider the support requirements of those areas being retained to ensure their integrity is maintained both during the works and long term.

5.4 The platform lift requires the removal of a small section of reinforced concrete (RC) stair that forms part of the level 3 slab where it steps down a level. The location of this lift has been carefully reviewed and adjusted to ensure there is no negative impact on the surrounding existing reinforced concrete structure.

6.0 CONCLUSIONS

6.1 The proposed alterations do not compromise the integrity of the structure.

6.2 The alterations are not extensive in magnitude or density. Where framing is required, established engineering techniques are adopted and this will ensure that the integrity of the structure is maintained.

UCL INSTITUTE OF EDUCATION

Appendix 1: List of Structural Alterations

Revision 01 Dec 21

01. New Entrance Pavilion

02. New Platform Lift

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Structural Alteration 01

New Entrance Pavilion
Revision 01 Dec 21

1. Current Arrangement

1.1 The existing entrance consists of doors at level 3 that are part of the existing curtain wall glazing. There are also existing entrance steps that span up and over to level 4 from street level. This is all supported by the level 3 concrete slab which is supported by concrete columns and walls beneath.

2. Proposed Arrangement

2.1 The level 3 doors are to be removed and replaced with the new entrance pavilion featuring a new set of revolving doors set out towards the road, a new reception, and security gates housed within the pavilion. The existing entrance steps over to level 4 will be removed and replaced with full height curtain wall glazing from level 3 to soffit of level 5.

3. Alterations and Challenges

3.1 The glazing will only need to be replaced over limited areas and a junction detail developed between new and existing glazing. The new glazing will require support over the new security gates. The challenge will be to integrate this into the pavilion structure and to ensure the integrity of this façade is maintained.

3.2 The existing slab will be required to support the new entrance pavilion structure however there are no alterations planned to the existing concrete structure in this area.

4. Solution

4.1 The demolition of the existing steps will be carefully carried out with temporary support and saw cutting to isolate those areas being removed and avoid any damage to that being retained. A glazing specialist will provide the necessary mullions and glazing structure to the areas being replaced or infilled. This installation will be sequenced to avoid any negative impact on the retained glazed façade.

4.2 The use of established engineering solutions will establish safe re-use of the existing slab with the pavilion structure kept lightweight using a steel frame to support a timber roof. Spreader beams at the base of any pavilion posts will be used to reinforce the existing slab where this proves necessary. A goal-post type frame taking restraint from the surrounding structure will be used to support glazing over the reception and security gates. The installation of this pavilion will be justified using analysis of the available information on the existing structure and load comparisons to ensure the integrity of the existing concrete slab and support columns is maintained.

Structural Alteration 02

New Platform Lift
Revision 01 Dec 21

1. Current Arrangement

1.1 Access to the central staircase and core A is via steps down from the level 3 entrance. The steps form part of the concrete slab where it is continuous and cranks down to the lower level. This slab is supported by the primary reinforced concrete columns and a reinforced concrete wall beneath.

2. Proposed Arrangement

2.1 To make the whole entrance area fully accessible a new platform lift will be installed at the change in level. This platform lift will be located at the end of the steps opposite the new security gates.

3. Alterations and Challenges

3.1 An opening will need to be formed in the steps/slab to remove a portion of the concrete allowing direct access to the differing levels on each side of the platform lift. The challenge is to limit the impact on the surrounding existing concrete slab as well as supporting the lift structure itself.

3.2 Demolition works to the slab are straightforward with any existing concrete removal needing to be controlled and limited to just that area needed to accommodate the lift structure.

4. Solution

4.1 The location of the lift has been carefully selected with the limits of the existing slab dictating the most appropriate location. Saw cutting will provide accuracy in demolition of the slab steps with straightforward temporary works provided to support existing slab edges. This will maintain the integrity of the existing concrete structure.

4.2 For the new lift arrangement, support to the concrete slab edge will be provided from below via posts and steelwork framing with an infill floor extension providing a simple solution to support the lift itself.

HERITAGE STRUCTURAL ASSESSMENT

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UCL INSTITUTE OF EDUCATION

PHASE 2

(PLANNING APPLICATION 2d)

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i. INTRODUCTION

The purpose of this document is to provide an addendum to the original Heritage Structural Assessment for planning application 2d of the phase 2 project at the UCL Institute of Education. It will summarise the works that were undertaken and highlight those not carried out. It will also comment on whether the original conclusions remain valid.

The original report produced by TAK Structures Ltd used reference WS5 and follows this portion. It includes the items referenced below.

ii. STRUCTURAL ALTERATIONS

The following structural alterations were listed in the original document:

1. Level 5
   Works completed. Original openings reused. Conclusions remain valid.

iii. ADDENDUM SUMMARY

The design and works were carried out with attention to the challenges noted in the original assessment and the conclusions from the original assessment remain valid.

HERITAGE STRUCTURAL ASSESSMENT

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UCL INSTITUTE OF EDUCATION

PHASE 2

(PLANNING APPLICATION WS5)

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	Name	Signature
Author	Greg Tyldesley	GT

Document Control

Revision	Detail	Date
00	Initial issue	14.12.22

This report has been prepared by TAK Structures Ltd with all reasonable skill and care in accordance with the appointment of the clients.

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1.0 INTRODUCTION

1.1 UCL intend to refurbish and upgrade the Institute of Education facilities. This will include rationalisation and upgrading of the services.

1.2 The Institute of Education is a Lasdun 1970's concrete building along Bedford Way which is Grade II* listed. The proposals require listed building consent for internal alterations. The application is supported by a heritage assessment which has been prepared by Alan Baxter Associates.

1.3 The redevelopment will require some structural interventions and adaptions, and those related to application WS5 are presented in Appendix 1.

1.4 For the purposes of this report the orientation is taken with Bedford Way to the east and Tavistock and Russell Squares to the north and south respectively.

2.0 BRIEF DESCRIPTON OF INSTITUTE OF EDUCATION BLOCK

2.1 The block was built in the 1970's to a design by Denys Lasdun with Arup as the structural engineer. It is a massive block over 200m long with 3 basement and 6 upper storeys and 3 storey overruns to the 3 cores. Internally there are high quality exposed concrete finishes.

2.2 The building is piled and there are no signs of significant movement. The structural arrangement is sensible, and the detailing is of a high standard. Structurally it is a robust building with substantial concrete cores. In the teaching areas remote from the cores, the ribbed floors span east west across the width of the building.

2.3 Inevitably in the intervening 40 years there have been some structural alterations and adaptions; again, these are sensible. Infills and alterations in an occupied building have inevitably been framed in steel with appropriate fire protection. The maintenance has also been of a high standard.

3.0 PROPOSED SCHEME

3.1 The proposed alterations relate to Zone C at level 5. These are outlined in the information from Architon LLP in the 3147-WS5 series of drawings. The extent of the structural works is captured in demolition drawing 3147-WS5-0502.

4.0 STRUCTURAL INTERVENTIONS

4.1 The structural interventions in this application relate to the accommodation of new services routes along corridors and into existing risers. They are generally penetrations at high level through the reinforced concrete walls.

4.2 With reference to drawing 3147-WS5-0502:

- Small penetrations for containment will be 75mm diameter in size.
- An access door is required off the main corridor.
- Penetrations for ductwork are the largest interventions in the riser wall. These routes will use existing openings as far as possible to limit new openings in walls. Where not feasible, existing openings will be widened, or new openings set at sufficient distance away to maintain robust sections of wall.

4.3 The key structural interventions are expanded on in Appendix 1.

5.0 DISCUSSION

5.1 The Institute of Education was well built and has been adequately maintained. The structure has the necessary robustness to accommodate the proposed alterations which are both sensible and achievable and will not compromise the integrity of the building.

5.2 The existing walls provided both an element of stability to the building and support adjacent floor slabs and both purposes will be maintained. There are many walls within the core areas and the larger penetrations are in longer sections of wall. In comparison to this length, the opening size is such that there is little impact on the overall stability and the slabs will be able to arch over the width to retain support.

5.3 In all cases the start point will be to reuse existing openings as this will minimise demolition works and minimise any impact on the existing walls. The smaller penetrations will be clustered and located to avoid reinforcement bars which are generally at greater centres than the proposed diameters.

5.4 Should layouts in relation to existing openings not allow re-use then coordination of locations may result in the use of trimming steels to frame out – an established engineering technique used to maintain structural integrity.

6.0 CONCLUSIONS

6.1 The proposed alterations do not compromise the integrity of the structure.

6.2 The alterations are not extensive in magnitude or density. Where framing is required, established engineering techniques such as trimming steels will be adopted, and this will ensure that the integrity of the structure is maintained.

UCL INSTITUTE OF EDUCATION

Appendix 1: List of Structural Alterations

Revision 00 Dec 22

01. Level 5

TAK STRUCTURES

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Structural Alteration 01

Level 5
Revision 00 Dec 22

1. Current Arrangement

1.1 Riser R599E currently houses services that distribute to Level 5. The risers feature openings at various locations to allow ducts or pipe runs to enter the corridor.

2. Proposed Arrangement

2.1 The existing services runs will be validated and either removed or re-used. Where removed the redundant openings will be used to accommodate the new proposals. Smaller diameter pipework will be run through shared existing openings where possible. New openings will be created where required.

3. Alterations and Challenges

3.1 Any new openings will need to be coordinated with existing openings and maintain sufficient spacing such that the integrity of the wall is maintained in terms of overall stability.

3.2 Trimming steels will need to be installed for local slab support should dimensions dictate as a requirement. The challenge will be in spacial terms to fit everything within the ceiling/services zone.

4. Solution

4.1 The intended re-use of openings means demolition should be limited. A careful approach to the formation of any new holes will utilise diamond drilling and the necessary temporary works to support any slabs prior to installation of trimming steels.

4.2 The use of these established engineering solutions will maintain structural integrity.