STOCKLEY

AMENDED
REPORT

Exeter College, Oxford, Walton Street Quadrangle
Flood Risk Assessment and Drainage Strategy
March 2013

Exeter College, Oxford, Walton Street Quadrangle

Flood Risk Assessment and Drainage Strategy

Prepared by	NC	NC	NC	
Checked by	JB	JB	JB	
Date:	18/3/13	25/03/13	23/04/13	
Revision:	P01	P02	P03	
Reason for issue:	Preliminary	Planning	Planning (Inclusion of EA information)	

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1 Introduction

Exeter College Oxford is developing a new college campus as an addition to the existing Turl Street site. The site is that of Ruskin College, who vacated the site in October 2012. The site is located on the junction of Worcester Place and Walton Street in Oxford City Centre, and is referred to in this report as the Walton Street Quadrangle site.

Stockley were appointed in January 2012 by Exeter College Oxford to provide structural and civil engineering services for the redevelopment of the Walton Street Quadrangle site. Alison Brooks Architects are the Lead Consultant appointed by the College, with Northcroft acting as the Project Manager.

The proposals are to transform the site into a new college facility for Exeter College including residential, teaching, cultural and social accommodation for students and faculty staff. Existing structures will be carefully demolished, with the exception of the existing façade to the original Ruskin building facing Walton Street and Worcester Place which will be retained.

This Flood Risk Assessment (FRA) has been prepared in line with PPS25 to support the planning application for the redevelopment of the Walton Street Quadrangle site. According to the online EA flood maps for the area, approximately half of the proposed site sits within flood zone 1 and the remaining area sits within flood zone 2.

2 Proposed Development

2.1 The Existing site

The site is located at the junction of Walton Street and Worcester Place in Oxford. The site sits on the northern edge of the city centre and is approximately 10 minutes' walk from Oxford Train Station.

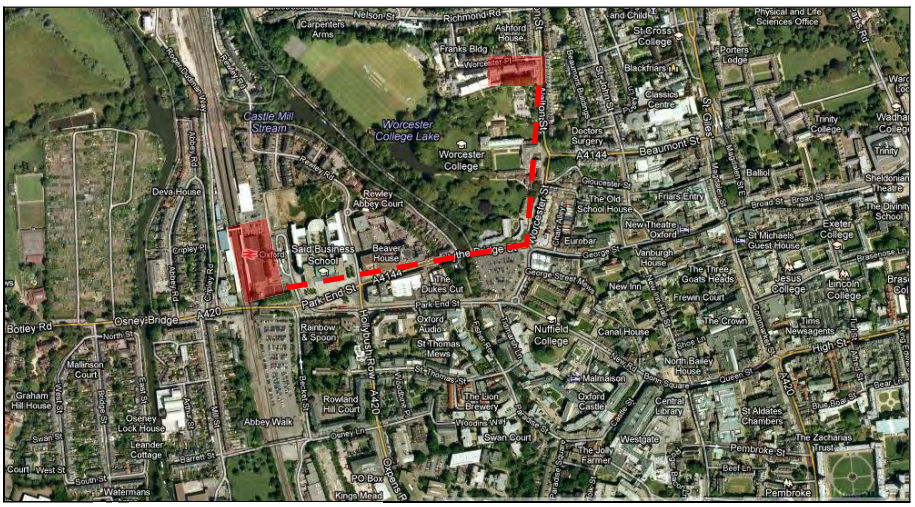


Figure 1 - Site Location Plan

The site is bounded on its northern edge by Worcester place which is a residential scale road and is home to residential properties along its entire length. To the east the site is bounded by Walton Street which is a distributor road and is also lined with residential properties in the vicinity of the site. To the south the site is bounded by Worcester Lane which is a private lane within the grounds of Worcester College. To the west the site is bounded by Worcester College properties providing residential accommodation for Worcester College.

Figure 2 - Existing Site Aerial View

2.2 Development

The development proposals are to create a structure which varies from three to five storeys in height and includes rebuilding the existing basement which covers approximately 70% of the site area. The new building will house student and Fellows accommodation on the upper levels whilst the ground floor and basement areas will house teaching, dining and communal areas along with archive storage, plant space, cycle parking and back of house areas.

2.3 Classification

The new building will house student and Fellows accommodation on the upper levels whilst the ground floor and basement areas will house teaching, dining and communal areas along with archive storage, plant space, cycle parking and back of house areas. The upper floors would be classified in accordance with PPS25, annex D, table D.2 as more vulnerable uses and the ground floor and basement areas are classified as less vulnerable uses.

2.4 Planning Background

In principle, planning policy at the local level is supportive of the redevelopment of sites already in use for higher education, increasing density whilst being respectful to the character and setting of Oxford's historic core (Policy CS29 : The Universities). Redevelopment of the former Ruskin College site, for use by Exeter College, is considered wholly consistent with this policy and with the wider policies of the Core Strategy. The proposals are also in accordance with the aims of the National Planning Policy Framework (NPPF). In particular, the scheme will adhere to the principles of sustainable development, seeking to deliver good quality design which makes a positive contribution to the surrounding area whilst conserving significant aspects of the buildings' heritage in an appropriate manner.

3 Potential Sources of Flooding

3.1 Historical Flooding Information

Oxford is located at the confluence of the Rivers Thames and Cherwell and as such is at risk of flooding by both watercourses. The Oxford SFRA1 report details dates of the historical flood events back to 1947 as follows;

Spring 1947
Summer 1977
Winter 1979
Autumn 1992
Autumn 1993
Easter 1998
Winter 2000
New Year 2003
Summer 2007

The mapping for these events taken from the SFRA appendix C is attached as Appendix A of this document.

None of these historical flood events resulted in flooding of the proposed development site on Walton Street.

3.2 Tidal / Coastal Flooding

Tidal or Coastal flooding is not applicable to this site in Oxford.

3.3 Flooding from Sewers

The Oxford City SFRA Level 2 (February 2012) contains data on historic incidences of flooding from sewers in the last 10 years. This data, which was gathered from Thames Water, shows that there were 16 flood incidents recorded in the last ten years. 13 of these incidents were attributed to flooding from foul water sewers and it is therefore assumed that the surface water flood risk from the surface water sewer network within the city is low;

Table 4-1: Thames Water Sewer Flooding Incidents

Postcode	Properties flooded by surface water sewers in last ten years	Properties flooded by foul water sewers in the last ten years	Properties flooded by combined sewers in the last ten years	Total
OX1 2	1	0	0	1
OX2 0	1	6	0	7
OX2 6	0	2	1	3
OX2 8	0	1	0	1
OX4 3	0	1	0	1
OX4 4	0	1	0	1
OX4 6	0	1	0	1
OX4 7	0	1	0	1
Total	2	13	1	16

Figure 3 - Incidents of Flooding from SFRA2

Further to that the incidents of flooding within the same postcode area as the proposed development site (OX1 2) was limited to only one incident, which occurred from a surface water sewer. This shows that the foul water flood risk in the vicinity of the site is also low. The mapping of the flooding events from sewers is contained within appendix A of this report.

3.4 Flooding from Surface Water

The Area Susceptible to Surface Water Flooding (AStSWF) maps taken from the Oxford SFRA2 show that the site is unlikely to susceptible tc surface water flow or ponding, below is an abstract from the mapping which is also contained within appendix A of this report.

Figure 4 - Area at Risk of Flooding Map

3.5 Flooding from Groundwater

The Oxford SFRA shows that there have been no historical events of groundwater flooding in proximity of the site, refer to Appendix A for the mapping of historical groundwater flooding events. The closest groundwater flooding event occurred in New Botley over 1Km to the west-southwest of the site.

A Hydrogeology assessment has been prepared by Card Geotechnics for the proposed development. This report was commissioned in order to assess the impact on groundwater of reconstructing the new basement on the site. The report is included in Appendix B of this report.

A maximum increase in groundwater level of 5.5cm is predicted at the up-gradient (north east) site boundary, reducing to 3.8cm at 20m distance. The impact of such a rise is considered to be negligible, given that the nearest upstream structures are some 10m to 15m away, and given that conservative assumptions were made in the modelling.

3.6 Fluvial Flooding

The site sits to the north east of the River Thames and Castle Mill Stream. The eastern half of the site sits in Flood zone 1 which gives a less than 0.1% annual probability (1 in 1000 year) of flooding occurring. The western half of the site sits within flood zone 2 which gives a 0.1% annual probability (1 in 1000 year) of flooding occurring. The Oxford SFRA flood zone map is contained within Appendix C of this report

As detailed in the Oxford SFRA1 the historical flooding events have been mapped, refer to appendix A of this report for the mapping of these flood events. None of these events resulted in fluvial flooding of the proposed site.

The information from the Oxford SFRA is substantiated by the data received from the environment agency which is contained in appendix D of this report which gives a 1% annual probability plus climate change flood water level of the nearest watercourses of +57.84 (mAOD).

3.7 Climate Change

PPS25 gives anticipated increases in rainfall intensities to account for climate change. The design of the new drainage system at the Walton Street development site will account for climate change and although there is little space available on the site due to the constrained nature of the site SUDS in the form of attenuation tanks will be provided to attenuate against climate change increases in rainfall and also to reduce the peak flow rates compared to the existing peak flow rates from the existing site.

4 Design Response

The new building will house student and Fellows accommodation on the upper levels whilst the ground floor and basement areas will house teaching, dining and communal areas along with archive storage, plant space, cycle parking and back of house areas. The upper floors would be classified in accordance with PPS25, annex D, table D.2 as more vulnerable uses and the ground floor and basement areas are classified as less vulnerable uses. The basement is to be constructed using a secant piled wall to create a complete box around the basement in conjunction with a watertight concrete method which together will ensure that the basement cannot be inundated by any way other than water overtopping the capping beam which is generally set at ground floor level (approximately +60.485m AOD) although this does did down to +58.50 (mAOD) in locations. The surface water drainage system within the basement is a pumped system which ensures that water cannot re-enter the basement from the sewer network due to the presence of non-return valves.

The ground floor level will be set at the threshold level at Walton Street (+60.485m AOD) which relates to a level above the 0.1% annual probability (1 in 1000 year) of flooding occurring this is generally raised from the existing ground floor level in the existing situation which currently follows ground level, this raised ground floor will ensure safe access from the residential parts of the development in the upper floors if required.

The 1% plus climate change flood water level of +57.84 (mAOD) is over 3.5m below the capping beam level generally and 660mm above the lowest capping beam level of +58.50 (mAOD) the capping beam level is the level that the water would need to reach to overtop the basement causing inundation.

5 Flood Risk Management Measures

Exeter College will sign up to the Environment Agency's flood warning system, Floodline Warnings Direct (FWD). FWD is a multimedia flood warning system that is used to issue flood warnings to specific areas by telephone, mobile, fax or pager. The aim of this service is to provide flood warnings at least two hours in advance of a flood event to properties that lie within flood zone 2 or flood zone 3.

6 Off-site Impacts

The redevelopment of the Walton Street site is not anticipated to cause any adverse effects to surrounding or downstream sites. The design of a new SUDS drainage system will reduce peak water flows from the sites which will help to reduce the risk of flooding from sewers and flash flooding in the locality of the site. A detailed hydrology report has been produced to test the impacts of the reconstructed basement on groundwater in the area and this has shown that the effects on groundwater are not considered to be significant.

7 Residual Risks

The new ground floor of the redeveloped Walton Street site will be set at threshold level and will be level throughout the site this has the effect of raising ground floor levels generally to those as

existing, this increase in ground floor levels will ensure safe access from the site in the event of a flood event.

8 Drainage Strategy

8.1 Existing Condition

The Site

The existing site is mainly covered with existing structures and hard standing although there is a small grassed quadrangle within the site which is presently not formally drained. The existing hard standing area is 1600m2 and the existing soft landscaping area is 100m2.

The drainage System

The existing complex of buildings on the site were home to Ruskin College, the existing drainage network carries the surface water from all hard standing and roofs to the surface water sewer within Worcester Place under gravity, there is currently no provision for attenuation or any form of SUDS system.

The existing foul water also drains under gravity to the foul water sewer within Worcester Place.

The as surveyed existing drainage layout is appended to this report.

8.2 Proposed Condition

The below ground drainage layout is shown indicatively on (DR) 001. The proposed hard standing area is 1700m2 although planting areas are to be provided these will generally be on top of structure and will require positive drainage.

Surface Water

The surface water from the majority of the 1150m2 roof areas will be drained into water harvesting tanks for re-use within the building as a grey water supply. Where collection is unfeasible from the roof due to the proximity of the boundary and the space restrictions the surface water from the roofs and hard standing will be drained under gravity to the existing sewer within Worcester Place.

The external hardstanding areas will drain to basement level and will need to be pumped to the surface water sewer in Worcester Place due to the reduced level of the existing basement. The pump chambers will conform to building regulations and provide 24 hour storage in case of malfunction.

The proposed development should be designed so that there is no flooding to the development in a 1 in 30 year (3.33% AEP) event and so that there is no property flooding in a 1 in 100 year (1% AEP) plus climate change event.

The increase in hard standing area of 100m2 will be attenuated for along with a target reduction of 30% of existing peak flows up to a 1 in 100 year plus climate change event as outlined in

Oxford City Councils SFRA2. The rainwater harvesting tanks will double up as attenuation tanks which will be further supplemented by the storage capacity within the Hydrobrake manhole by providing a free board within the tanks itself with flow being regulated by a Hydrobrake or similar flow control.

Foul Water

Foul water will generally be collected below the basement of the new building and will be pumped to the foul sewer on Worcester Place. The pump chambers will conform to building regulations and provide 24 hour storage in case of malfunction.

DRAWINGS

N

Boiler Room Part Plan

A-A EX010

B-B EX010

D-D EX011

C-C EX011

E-E EX012

Cavity wall with masonry external skin and loadbearing blockwork internal skin.

Structure of staircase to be confirmed (assumed RC).

RC blade columns.

Masonry infill wall with RC retaining wall under.

Column (construction T.B.C.) picking up steel section above.

Concrete stair access to basement.

Perimeter loadbearing masonry walls.

Ground bearing concrete floor slab throughout basement areas.

Internal loadbearing masonry piers picking up steel beams.

Masonry infill walls.

Low level masonry retaining wall.

Masonry retaining wall.

Garden area.

Banked landscaping down to library floor level.

Masonry external skin to library wall.

RC columns.

Assumed RC retaining wall

Worcester College stone wall.

Masonry boundary wall.

Lane separating Worcester College site from existing Ruskin College site.

Internal loadbearing masonry walls pick up filler joist ground floor above.

Internal loadbearing masonry pier picking up steel column section above.

Masonry piers within boundary wall.

Perimeter loadbearing masonry walls act as retaining structure below adjacent ground level.

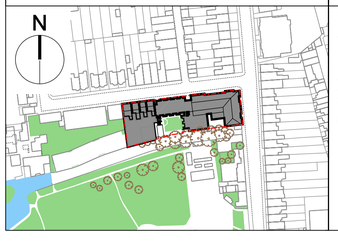
Concrete stair structure.

Electricity substation.

TP1 TP2 TP3 TP5 TP6 TP7 TP8 Abandoned TP9 TP10 Abandoned TP11 TP14 TP15 TP16 TP19 TP21 TP23 TP24 TP25

58.664 59.006 57.619 59.001 58.905 59.346 57.793 58.206 57.462 59.030 57.615 59.039 58.559 57.925 59.002 59.809

Key Plan:



Notes:

This drawing is to be read in conjunction with all relevant Architect's and Engineer's drawings and the specification.

This drawing should not be scaled.

All dimensions are to be verified by the contractor on site. All discrepancies should be reported to the C.A. prior to the commencement of the works.

Notes Continued:

This drawing has been produced using a combination of survey information supplied at competition stage and on site visual inspections.

All information shown on these drawings is to be checked on site for verification.

The accuracy of the information contained on these drawings can not be guaranteed.

Notes Continued:

Key

Existing RC element

Existing brickwork

Existing blockwork

Existing stonework

Existing structure under

59.039 Existing levels

Notes Continued:

Key

Trial pit location

Date:	Rev:	Description:	Drawn:	Chkd:
07.12.12	P03	Issued for Information	IS	NC
07.06.12	P03	Trial pit locations added	IS	NC
30.03.12	P02	Issued for Information	IS	NC
02.03.12	P01	Issued for Information	IS	NC

Project:

Exeter College
Oxford

Title:

Existing Plan at 59.5m
Basement Level

STOCKLEY

MANCHESTER
Carver's Warehouse, 77 Dale Street, Manchester, M1 2HG.
T: 0161 228 6707

LONDON
18 Bowling Green Lane, London, EC1R 0BW
T: 020 7253 2977

ONLINE
www.stockley.co.uk

Status: INFORMATION

Scale:	Date:	Drawn:	Checked:	Job Number:	Drawing Number:	Revision:
1:100@A1 1:200@A3	Mar 2012	IS	NC	521/01	(EX) 001	P03

Notes:

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Notes Continued:

This drawing was produced using survey information from The Downland Partnership Ltd - April 2011 and relevant Ordnance Survey information.

Notes Continued:

Key:

- Site boundary
- Existing pavement line
- Existing pavement line
- Existing grassed area

Notes Continued:

Notes Continued:

Date:	Rev:	Description:	Drawn:	Chkd:
30.03.12	P01	Issued for Information	IS	NC

Project:
Exeter College
Oxford

Title:
Site Plan

STOCKLEY

MANCHESTER
Carver's Warehouse, 77 Dale Street,
Manchester, M1 2HG
T: 0161 228 6757

LONDON
28-30 Worship Street,
London, EC2A 2AH
T: 020 7374 8380

ONLINE
www.stockley.co.uk

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Scale:	Date:	Drawn:	Checked:	Job Number:	Drawing Number:	Revision:
1:200@A1 1:400@A3	Jan 12	IS	NC	521/01	(GA) 001	P01

D-D GA021

C-C GA021

B-B GA020

A-A GA020

N

Basement slab tied into perimeter piled wall with shear dowels. Waterbars provided at interface.

450Ø secant piled wall with 200mm Caltite liner wall, 50mm waterproofing layer and 100mm facing wall around perimeter of basement.

Piled wall 1000mm off existing masonry wall line to provide adequate clearance for piling rig.

250mm thick RC stair waist.

350mm thick RC Caltite suspended basement slab spanning between pile caps and perimeter piled walls.

S.S.L. 56.425m

RC stair with 250mm thick waist.

200mm thick RC walls to pick up stairs leading down to learning commons.

200mm thick RC stairs spanning between walls below.

Ground beam spanning between pile caps to pick up RC wall.

Area to be infilled.

Existing substation to be retained.

E-E GA022

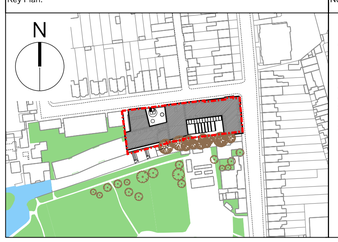
RC Column Schedule

Reference	Size
c1	250 x 1000
c2	500Ø
c3	225 x 500
c4	250 x 1000
c5	250 x 250

Wall Schedule

All walls 250mm thick - length as shown.

Key Plan:



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Notes Continued:

1. Concrete special finish to be achieved through the use of limiting percentage of coarse aggregate and a controlled permeability formwork.

Notes Continued:

Key

- RC element in section
- RC element below
- RC element under
- Span of slab

Notes Continued:

Date:	Rev:	Description:	Drawn:	Chkd:
07.12.12	P03	Issued for Stage D	IS	NC
07.06.12	P02	Issued for Stage C	IS	NC
04.05.12	P01	Issued for Stage C	IS	NC

Project:
Exeter College
Oxford

Title:
Proposed
Basement Plan

STOCKLEY

MANCHESTER
Carver's Warehouse, 77 Dale Street,
Manchester, M1 2HG.
T: 0161 228 6757

LONDON
18 Bowling Green Lane,
London, EC1R 0BW
T: 020 7253 2977

ONLINE
www.stockley.co.uk

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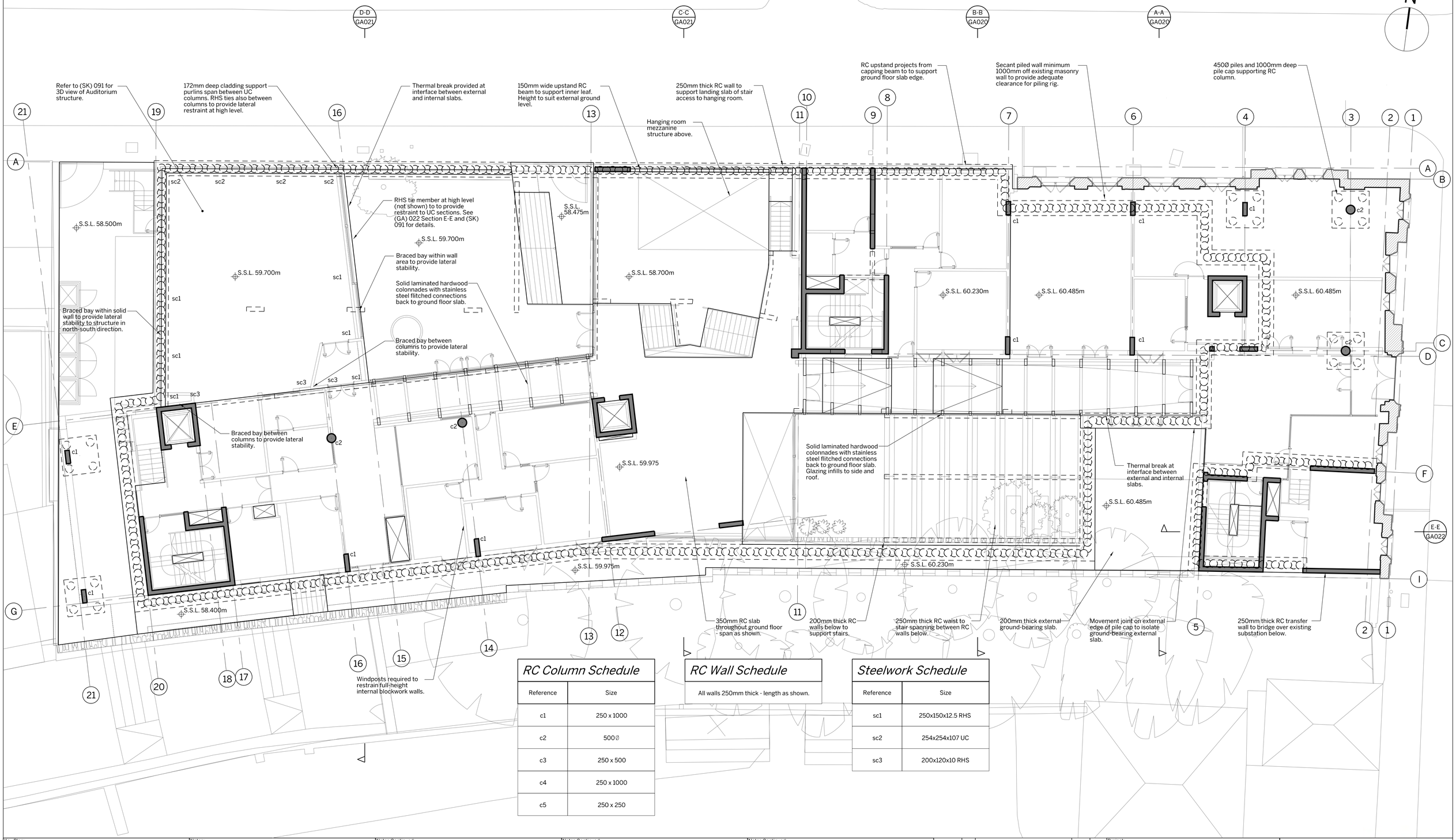

RC Column Schedule

Reference	Size
c1	250 x 1000
c2	500Ø
c3	250 x 500
c4	250 x 1000
c5	250 x 250

RC Wall Schedule

All walls 250mm thick - length as shown.

Steelwork Schedule

Reference	Size
sc1	250x150x12.5 RHS
sc2	254x254x107 UC
sc3	200x120x10 RHS

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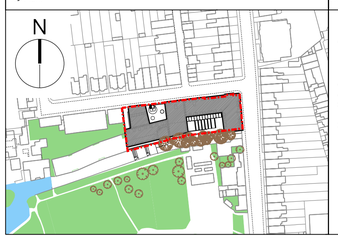

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Notes Continued:

1. Concrete special finish to be achieved through the use of limiting percentage of coarse aggregate and a controlled permeability formwork.

Notes Continued:

Key

- RC element in section
- RC element below
- RC element under
- Span of slab

Notes Continued:

Date:	Rev:	Description:	Drawn:	Chkd:
07.12.12	P02	Issued for Stage D	IS	NC
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Project:
Exeter College
Oxford

Title:
Proposed
Ground Floor Plan

STOCKLEY
MANCHESTER
Carver's Warehouse, 77 Dale Street,
Manchester, M1 2HG.
T: 0161 228 6757
LONDON
18 Bowling Green Lane,
London, EC1R 0BW.
T: 020 7253 2977
ONLINE
www.stockley.co.uk

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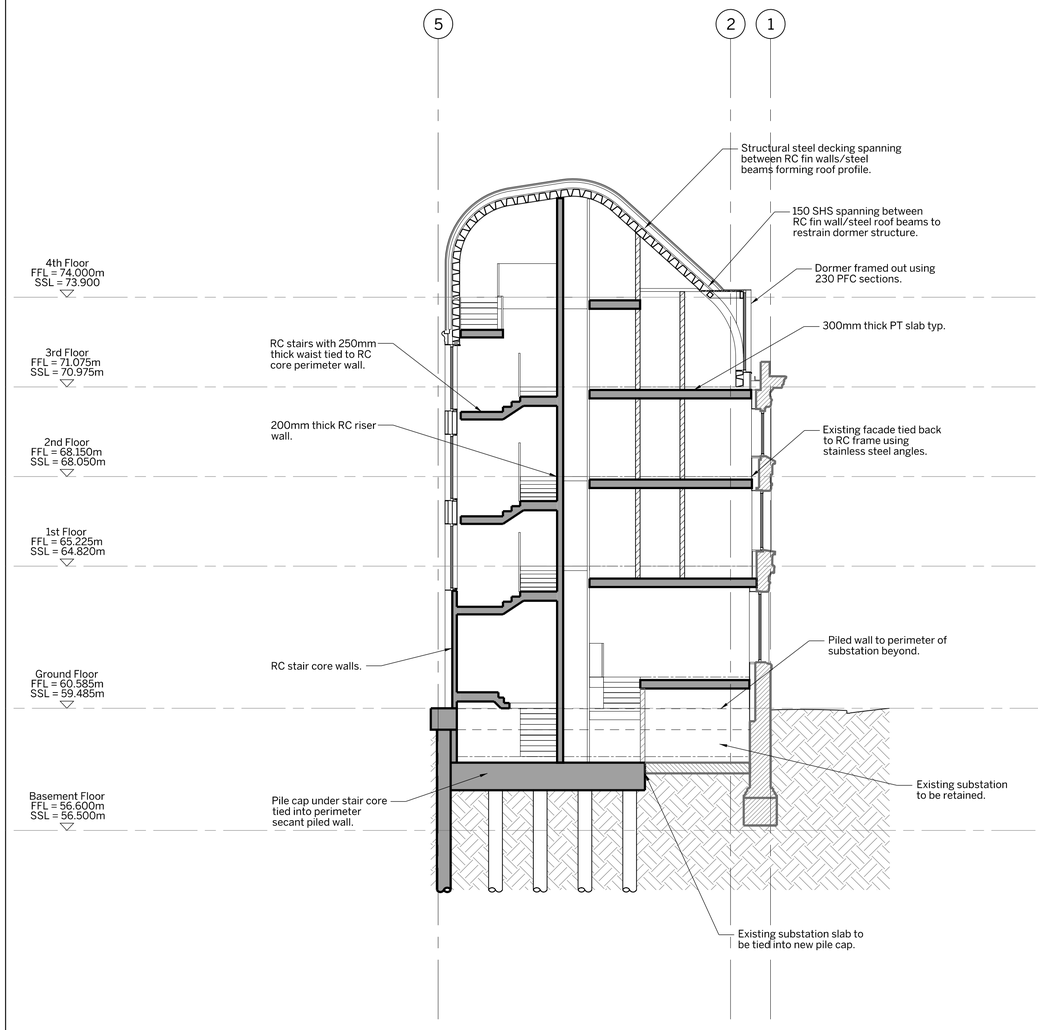
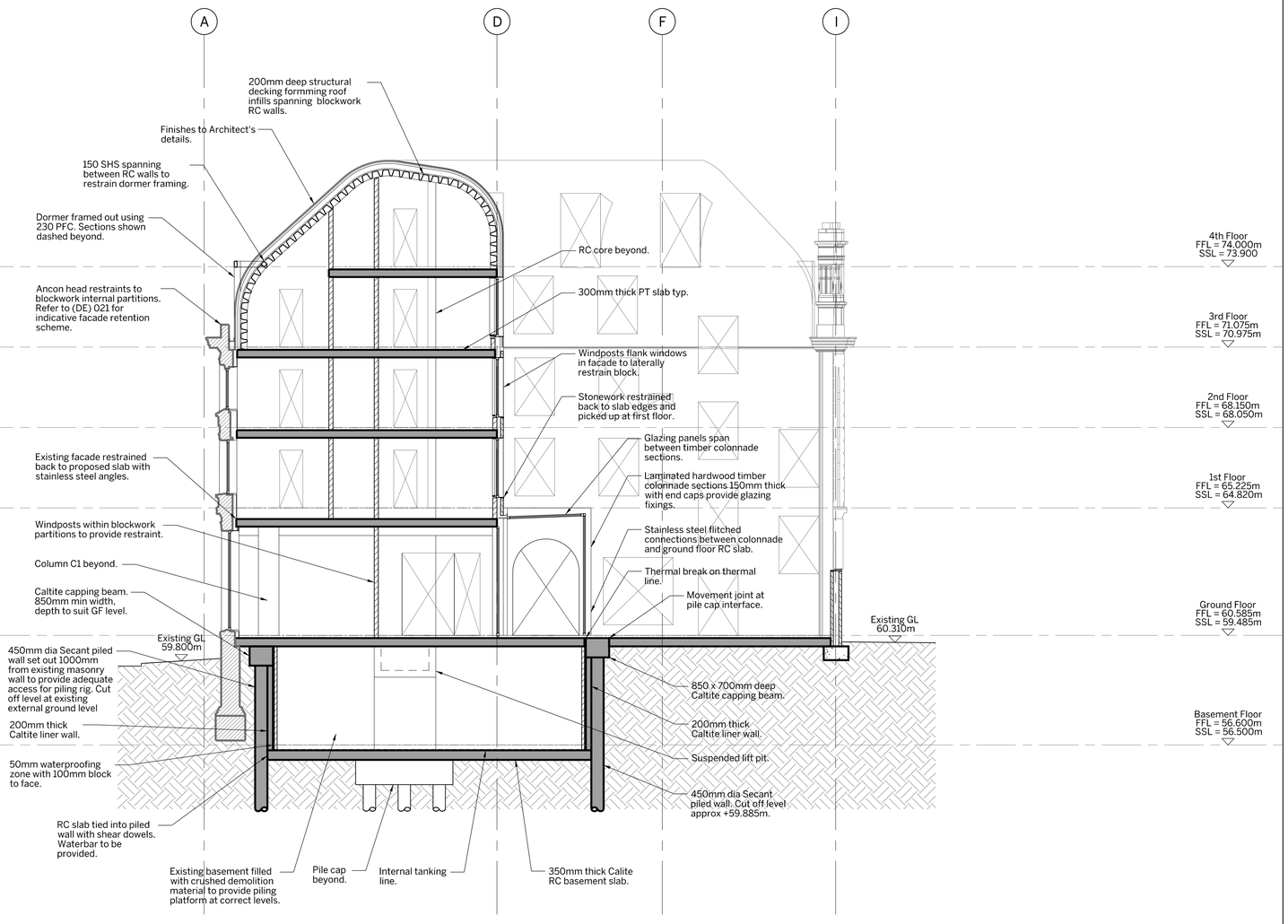


Section A-A



Section B-B

Key Plan:

Notes:

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Notes Continued:

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Date:	Rev:	Description:	Drawn:	Chkd:
07.12.12	P01	Issued for Stage D	IS	NC

Project:
Exeter College
Oxford

Title:
Proposed
Sections A-A and B-B

STOCKLEY
MANCHESTER
Carver's Warehouse, 77 Dale Street,
Manchester, M1 2HG.
T: 0161 228 6757
LONDON
18 Bowling Green Lane,
London, EC1R 0BW.
T: 020 7253 2977
ONLINE
www.stockley.co.uk

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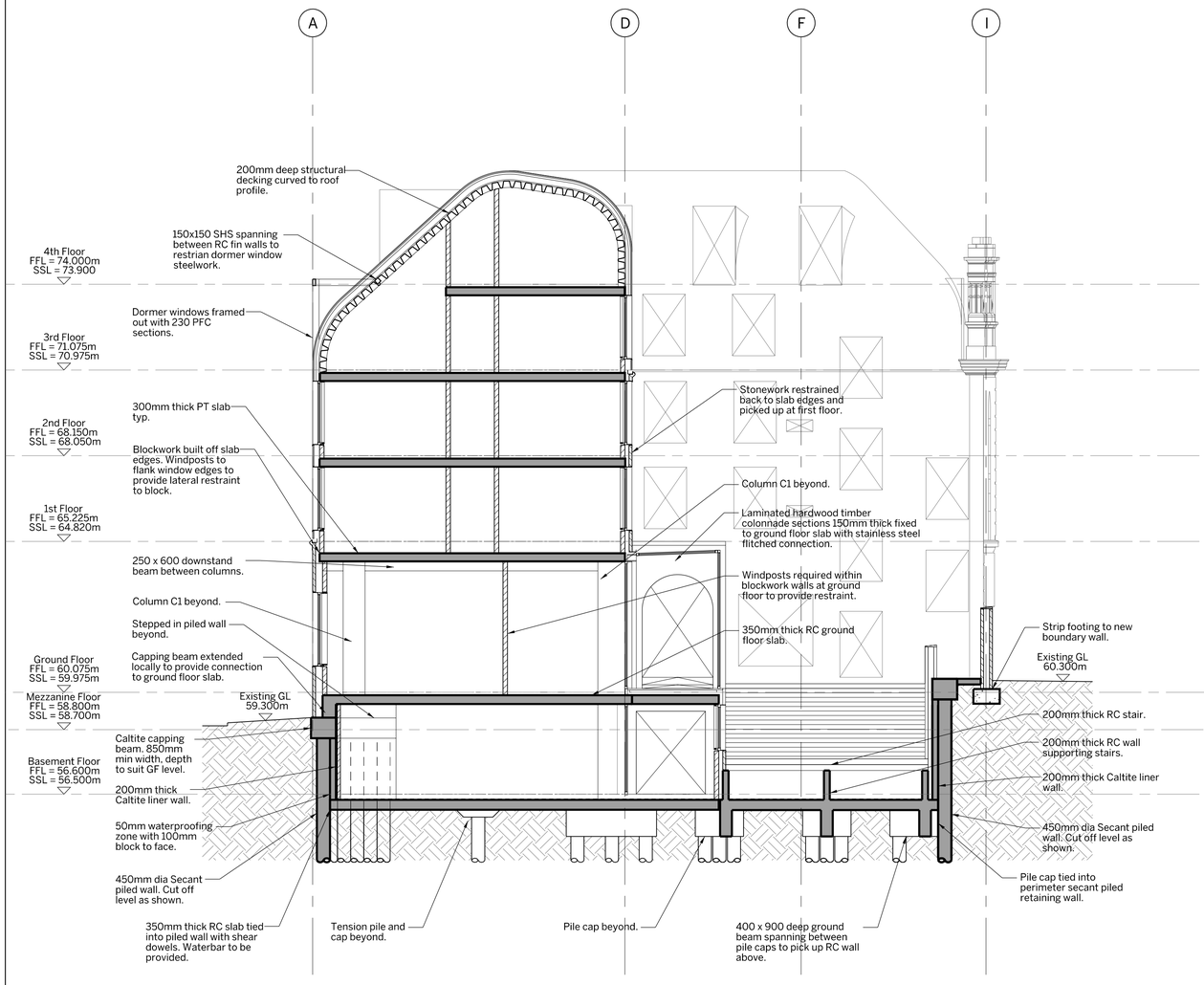

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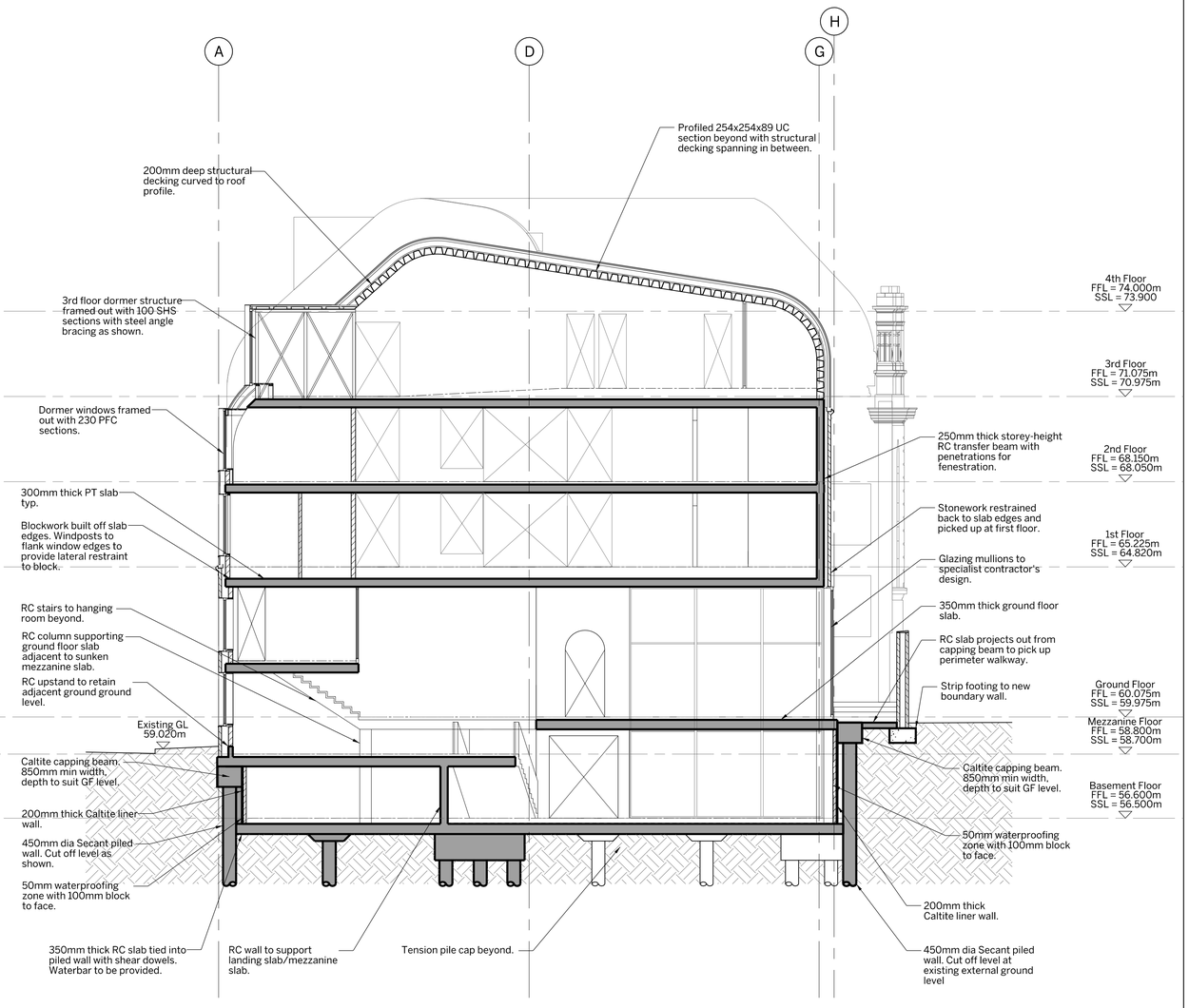

Section D-D

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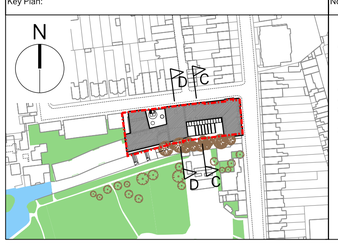

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Date:	Rev:	Description:	Drawn:	Chkd:
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Project:
Exeter College
Oxford

Title:
Proposed
Sections C-C and D-D

STOCKLEY
MANCHESTER
Carver's Warehouse, 77 Dale Street,
Manchester, M1 2HG.
T: 0161 228 6757
LONDON
18 Bowling Green Lane,
London, EC1R 0BW.
T: 020 7253 2977
ONLINE
www.stockley.co.uk

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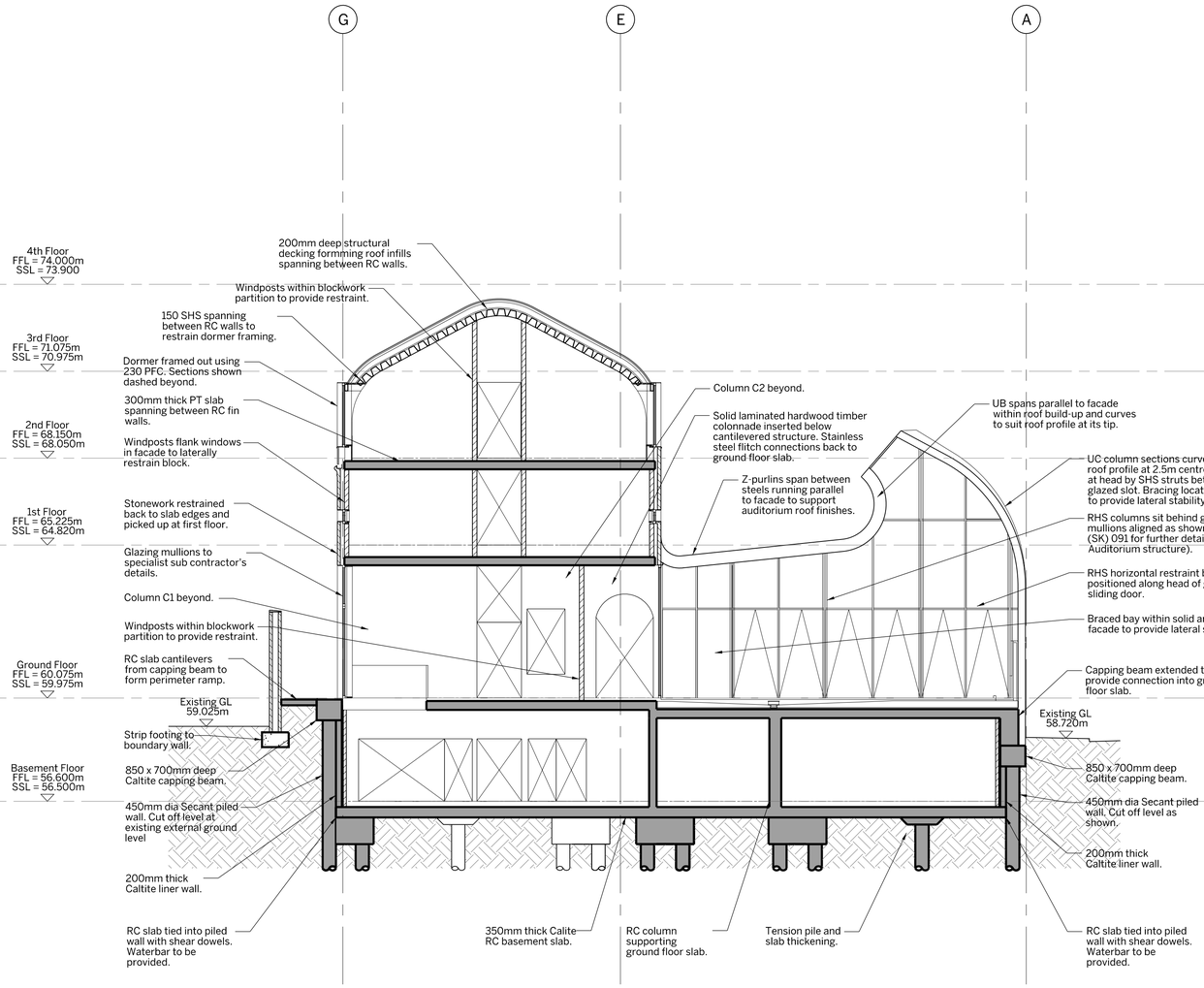

Section E-E

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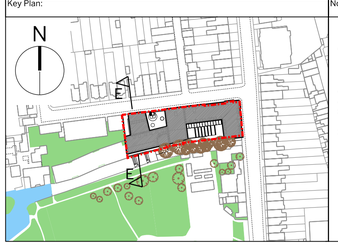

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Notes Continued:

Date:	Rev:	Description:	Drawn:	Chkd:
07.12.12	P01	Issued for Stage D	IS	NC

Project:
Exeter College
Oxford

Title:
Proposed
Sections E-E

STOCKLEY

MANCHESTER
Carver's Warehouse, 77 Dale Street,
Manchester, M1 2HG.
T: 0161 228 6757

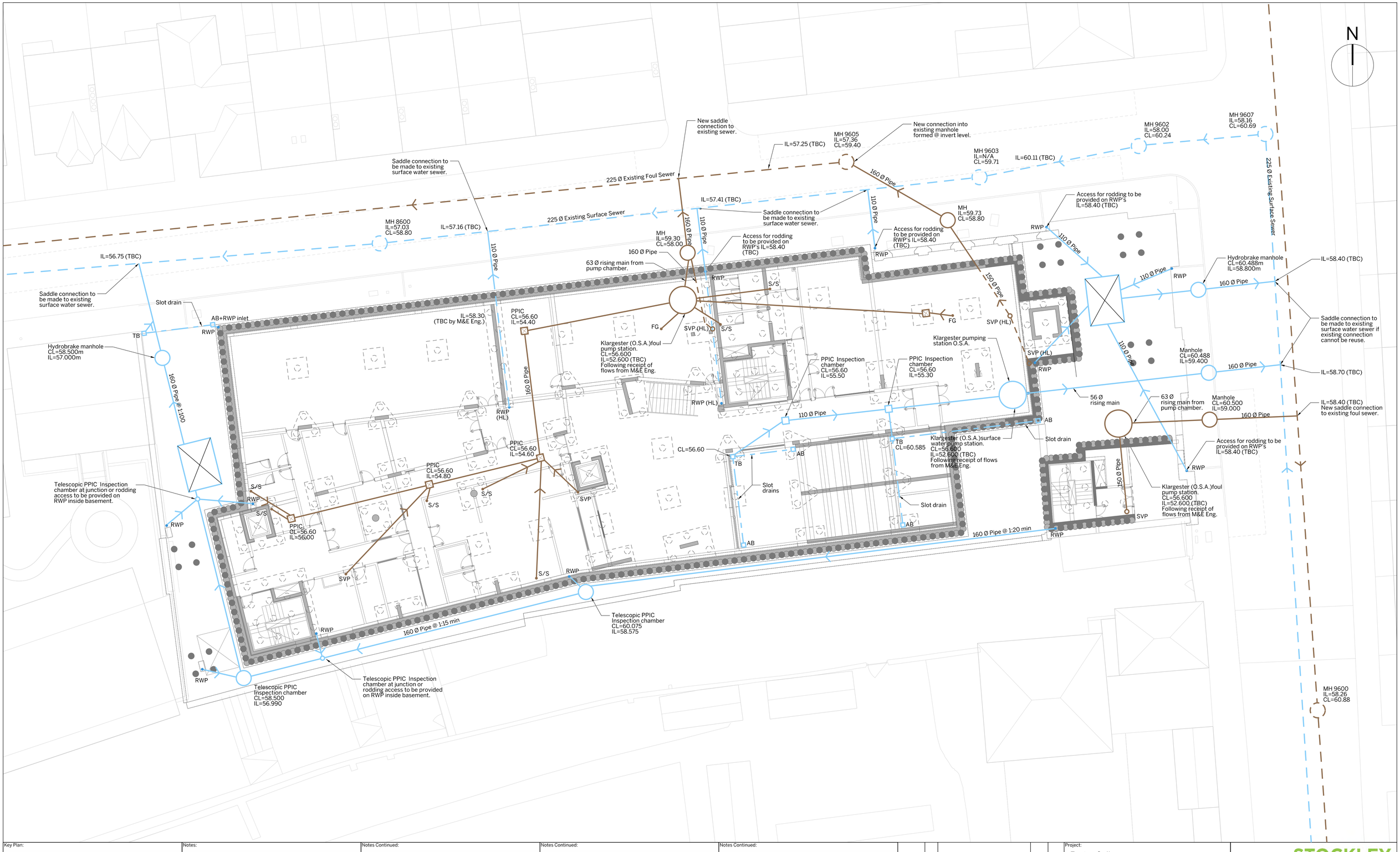
LONDON
18 Bowling Green Lane,
London, EC1R 0BW
T: 020 7253 2977

ONLINE
www.stockley.co.uk

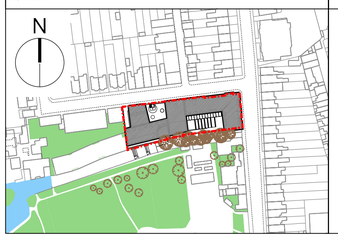
Status:
INFORMATION

Scale:	Date:	Drawn:	Checked:
1:100@A1 1:200@A3	Dec 2012	IS	NC

Job Number:	Drawing Number:	Revision:
521/01	(GA) 022	P01



Key Plan:



Notes:

This drawing is to be read in conjunction with all relevant Architect's and Engineer's drawings and the specification.

This drawing should not be scaled.

All dimensions are to be verified by the contractor on site. All discrepancies should be reported to the C.A. prior to the commencement of the works.

Notes Continued:

Notes Continued:

Key

- Slot drain
- AB — Access box
- TB — Trash box and outlet
- RE — Rodding eye
- FG — Floor gulley
- Pump and storage chamber

Notes Continued:

Key

- High level above slab drainage to M & E Engineers specifications.
- Existing foul
- Existing Surface

Date:	Rev:	Description:	Drawn:	Chkd:
15.02.13	P03	General Updates	GB	NC
07.12.12	P02	Issued for Stage D	GB	NC
04.05.12	P01	Issued for Stage C	IS	NC

Project:
Exeter College
Oxford

Title:
Proposed
Drainage Plan

STOCKLEY

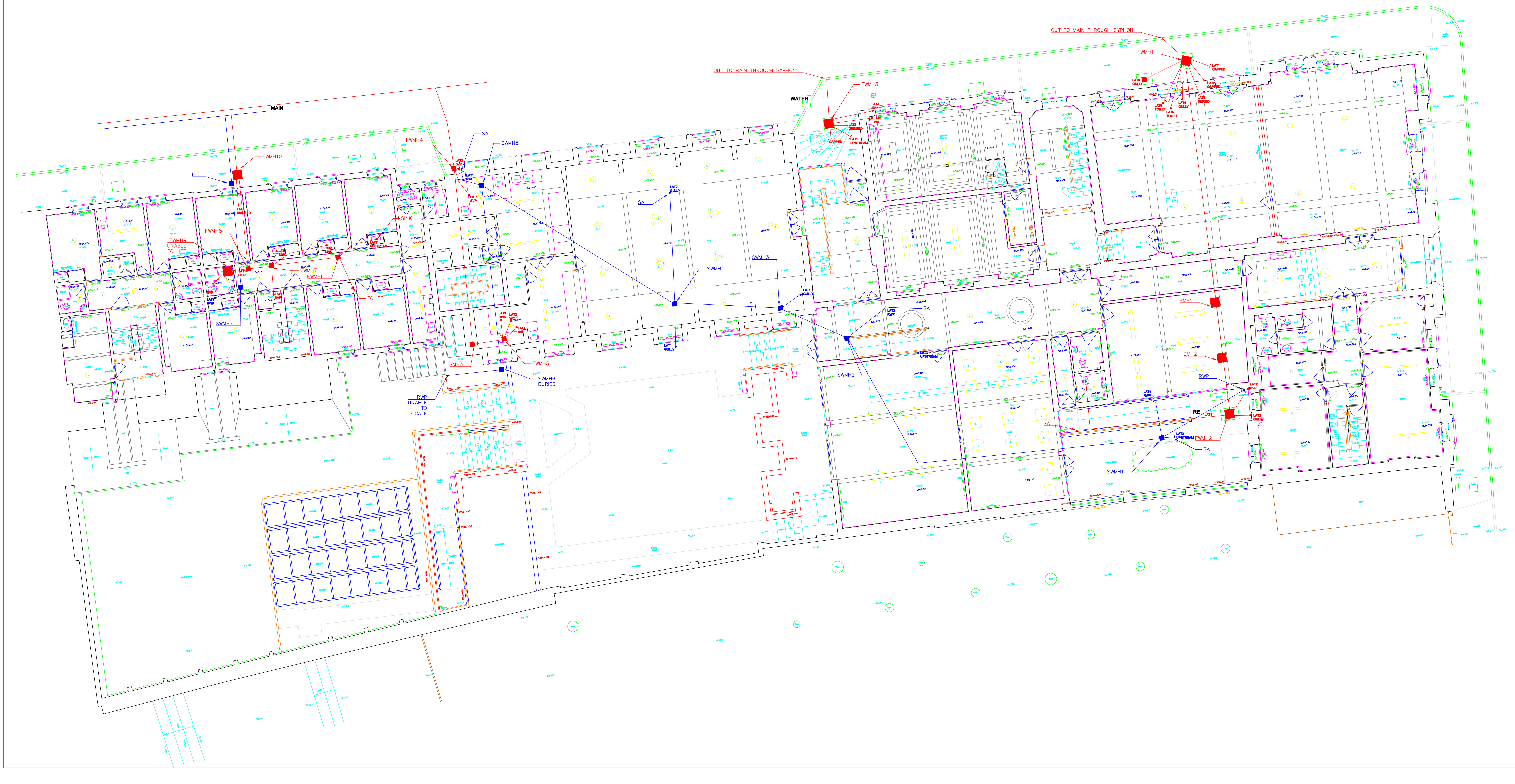
MANCHESTER
Carver's Warehouse, 77 Dale Street,
Manchester, M1 2HG
T: 0161 228 6757

LONDON
18 Bowling Green Lane
London, EC1R 0BW
T: 020 7253 2977

ONLINE
www.stockley.co.uk

Status:
INFORMATION

Scale:	Date:	Drawn:	Checked:	Job Number:	Drawing Number:	Revision:
1:125@A1 1:250@A3	Apr 2012	IS	NC	521/01	(DR) 001	P03



DRAINCAD
info@draincad.com
07817 411108

SURFACE WATER SURVEYED

FOUL WATER SURVEYED

Lanes Group Plc
West Midlands Division

Exeter College
Oxford

WG
28-04-12
NTS
DACD-00163A