

**STRUCTURAL ENGINEERS REPORT IN SUPPORT OF A PLANNING  
APPLICATION FOR THE EXTENSION AND REFURBISHMENT**

**OF:**

**FOX COURT  
14 GRAY'S INN ROAD  
LONDON  
WC1X**

**ON BEHALF OF:**

**THE TRUSTEES OF ROCKSPRING HANOVER PROPERTY UNIT TRUST**



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**7405/01/DG**

**JANUARY 2013**

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### **A. STRUCTURAL ENGINEERING DRAWINGS**

**FOX COURT, GRAYS INN ROAD, LONDON WC1X****1.0 INTRODUCTION**

- 1.1 This report has been prepared to support the planning application being submitted for the proposed commercial development at Fox Court, 14 Gray's Inn Road, London, WC1X by the Trustees of Rockspring Hanover Property Unit Trust.
- 1.2 The project comprises the extension and refurbishment of the existing office building at 14 Gray's Inn Road to provide additional commercial floor space. The infill development will occupy the existing courtyard to the rear of the building and will extend over ground to third floors. A convenience store and new office reception is proposed at ground floor with offices over.
- 1.3 The structural proposals presented are based on GMA Architecture drawings of the proposed development.
- 1.4 The report describes the structural design and construction methodology proposed for the development. It presents information relating to the existing site and surrounding area, the local geology and the envisaged construction techniques required to execute the proposals.
- 1.5 This report is to be read in conjunction with the architect's Design and Access Statement and other drawings and reports prepared by other consultants submitted with the application.

## **2.0 THE EXISTING BUILDING**

- 2.1 The existing building is considered to have been constructed in the 1960's with a concrete frame and predominantly brick elevations.
- 2.2 The building underwent a major refurbishment and alteration works in circa 1996 at which time a large computer building, which is believed to have been an earlier addition, (probably constructed in the mid 1970's) was demolished within the existing courtyard and the façade to Gray's Inn Road was re-worked with a new curtain wall glazing system. A number of structural modifications and extensions to the building were also undertaken at this time.
- 2.3 The building stretches between Gray's Inn Road at the front and Brooke Street to the rear in a 'U- shape' around an open courtyard at ground floor level.
- 2.4 There are two existing basement levels generally used for car parking, plant rooms and ancillary accommodation. Beneath the courtyard the basement is double-height and extends out under the rear wing (the Annex) to the Brooke Street elevation. The main building is seven storeys above ground floor level reducing to four or five storeys on the two legs of the 'U-shaped' building, with additional plant space at roof level.
- 2.5 The existing building is generally of in-situ reinforced concrete flat slab construction.
- 2.6 The existing main grid is generally 6 metres by 6/7.2 metres.
- 2.7 The flat slabs are generally 300 millimetres deep.
- 2.8 Other than to the Gray's Inn Road elevation, which is predominantly finished in stone cladding and glass curtain walling, the other elevations are generally of masonry brick and block cavity wall construction.
- 2.9 The main retaining walls within the basement are generally considered to be of reinforced concrete construction.
- 2.10 The foundations to the building are considered to be piled with localised pile caps to individual vertical elements of structure.

### **3.0 THE SITE**

- 3.1 The site is bounded to the west by Gray's Inn Road, to the north by Brookes Court, to the east by Brooke Street and the south by 150 High Holborn.
- 3.2 The general ground level is relatively flat but the existing ground floor slab level is raised above existing road levels to both Gray's Inn Road and Brooke Street.
- 3.3 There is vehicular access to the rear with an access ramp down into the basement car park.
- 3.4 The local geological map indicates the subsoil to be river terrace deposits comprising gravels and sands overlying the London clay formation.
- 3.5 Preliminary site investigations indicate that the existing basement and sub-basement slab were cast directly onto un-disturbed sand/gravel. There appears to be no made ground beneath the existing construction.

#### **4.0 PROPOSED STRUCTURE**

- 4.1 The new structure, as shown on the drawings included in Appendix A, would comprise a steel-frame with composite metal deck and lightweight concrete floors.
- 4.2 The proposal is to form a convenience store, extending into much of the existing ground floor, with its own separate entrance off Gray's Inn Road. Above the ground floor new infill office space will be introduced at first, second and third floors around a central atrium with a glass roof. All as shown on GMA's drawings.
- 4.3 In order to provide a level entrance into the retail unit and the main offices off Gray's Inn Road a section of the existing reinforced concrete floor slab over the basement would be broken out and re-cast at a lower level to provide the requisite level entrance.
- 4.4 Planning consent has already been granted for an additional level entrance to the rear off Brooke Street. This permission has been incorporated into the current proposal. The existing office entrance on Brooke Street is to be retained.
- 4.5 With reference to the new courtyard infill, the column grid will generally be a 6 metre by 12 metre grid at ground floor and above, whilst retaining the existing 6 metre by 6 metre column grid within the basement and sub-basement below.
- 4.6 The primary steel beams spanning 12 metres will be 625-millimetre deep cell form beams, with circular voids in the web through which services would be distributed. The new beams would be supported by new steel columns.

- 4.7 Due to the increase in vertical load from the new steel frame, new piled foundations will be constructed in the basement and sub-basement. These piled foundations will be located between existing pile caps. In order to increase the capacity of existing columns in the basement and transfer load to the new piled foundations new reinforced concrete walls are to be constructed between columns as shown on the basement and sub-basement plans.

## **5.0 CONSTRUCTION METHODOLOGY**

- 5.1 It is expected that a tower crane will be erected on site within the existing courtyard area for servicing of the site and lifting of materials. It is anticipated that the tower crane will include a luffing jib so that there is no oversailing of any adjoining property.
- 5.2 There is ample room for storage of materials on site, particularly within the existing basement and car park. Deliveries will be via the existing service ramp to the rear.
- 5.3 Site accommodation would be located within the basement car park area.



## **6.0 PROPOSAL FOR RESIDENTIAL EXTENSION**

- 6.1 We have been asked to comment on the potential of providing on site residential accommodation (including affordable housing) as required by Camden's mixed use policy. We have assessed the implications of providing such accommodation over the existing roof top plant.
- 6.2 To accommodate the additional residential floor space a minimum of three extra storeys would be required. This extra floor space would have quite major structural implications.
- (i) This would result in a major increase in vertical load, requiring additional vertical structure and/or strengthening of existing columns. This would result in a significant increase in the size of existing columns with a corresponding loss of net lettable floor area, throughout the building.
  - (ii) Existing foundations would need to be strengthened. This would not be straightforward as there is no simple way of increasing the capacity of an existing piled foundation.
  - (iii) The increase in height would have a major impact on the lateral stability of the building which could not be provided for by the existing reinforced concrete cores. It would be necessary to introduced new braced vertical walls on new foundations to provide stability.
  - (iv) New service cores for access and means of escape would need to be provided (possibly four in total). This would result in cutting out of internal floor slabs and formation of new cores with consequential loss of lettable area. A separate main core and escape core would be required for the private and affordable elements.

- (v) The increased height of the building would require an upgrade in the level of structural fire protection. To achieve this would require the building to be fully stripped out, *i.e.* removal of all finishes, services etc., in order to be able to go back to the structure to retro-fit a new fire protective system.
- 6.3 In overall terms, the above works could not be undertaken in a part-occupied building due to the impact on the existing tenants. To undertake such extensive works the building would need to be fully vacated. Also the cost of the works alone would be far in excess of the cost of a complete new build.
- 6.4 In summary, in order to build three additional storeys above the current height of the building it would be necessary to demolish the existing building and construct a new building on new foundations.

## **7.0 EXECUTIVE SUMMARY**

- 7.1 The proposed infill of the courtyard area with a new retail unit on the ground floor with offices above is practicable and would not involve unusual construction. The proposed form of construction would comprise a steel frame with composite metal deck and lightweight concrete floors, as is used in many city centre office developments. This form of construction is adopted for ease and speed of erection. It also avoids the need for the extensive falsework and shuttering associated with reinforced concrete buildings, which would be difficult to handle and store on site.
- 7.2 Where existing localised columns to upper floor levels need to be strengthened, due to the additional load that would be applied, this would be done by the addition of a steel column adjacent to the existing column to support the increase in load.
- 7.3 Due to the increase in vertical load from the new steel frame, new piled foundations are to be constructed in the basement and sub-basement. These piled foundations will be located between existing pile caps. In order to increase the capacity of existing columns in the basement and transfer load to the new piled foundations, new reinforced concrete walls are to be constructed between columns as shown on the basement and sub-basement plans.
- 7.4 In order to provide three additional floors over and above the existing accommodation, to provide on-site residential accommodation, the existing building would need to be demolished and a new building constructed on new piled foundations. This is not feasible given the building is tenanted.

**DEREK GLENISTER BSc CEng MICE MIMStructE MConsE**

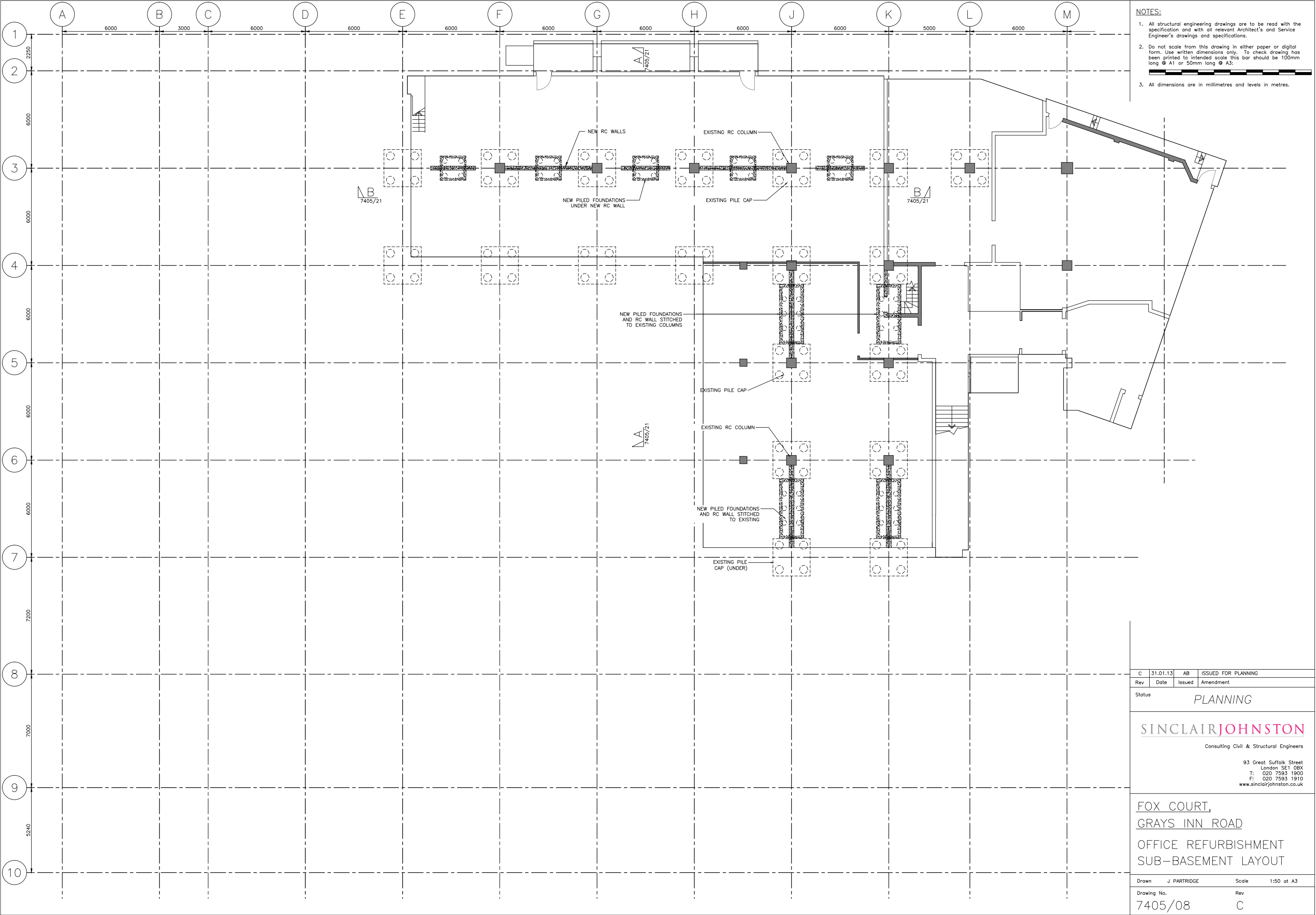
**FOX COURT, 14 GRAY'S INN ROAD  
LONDON WC1X**

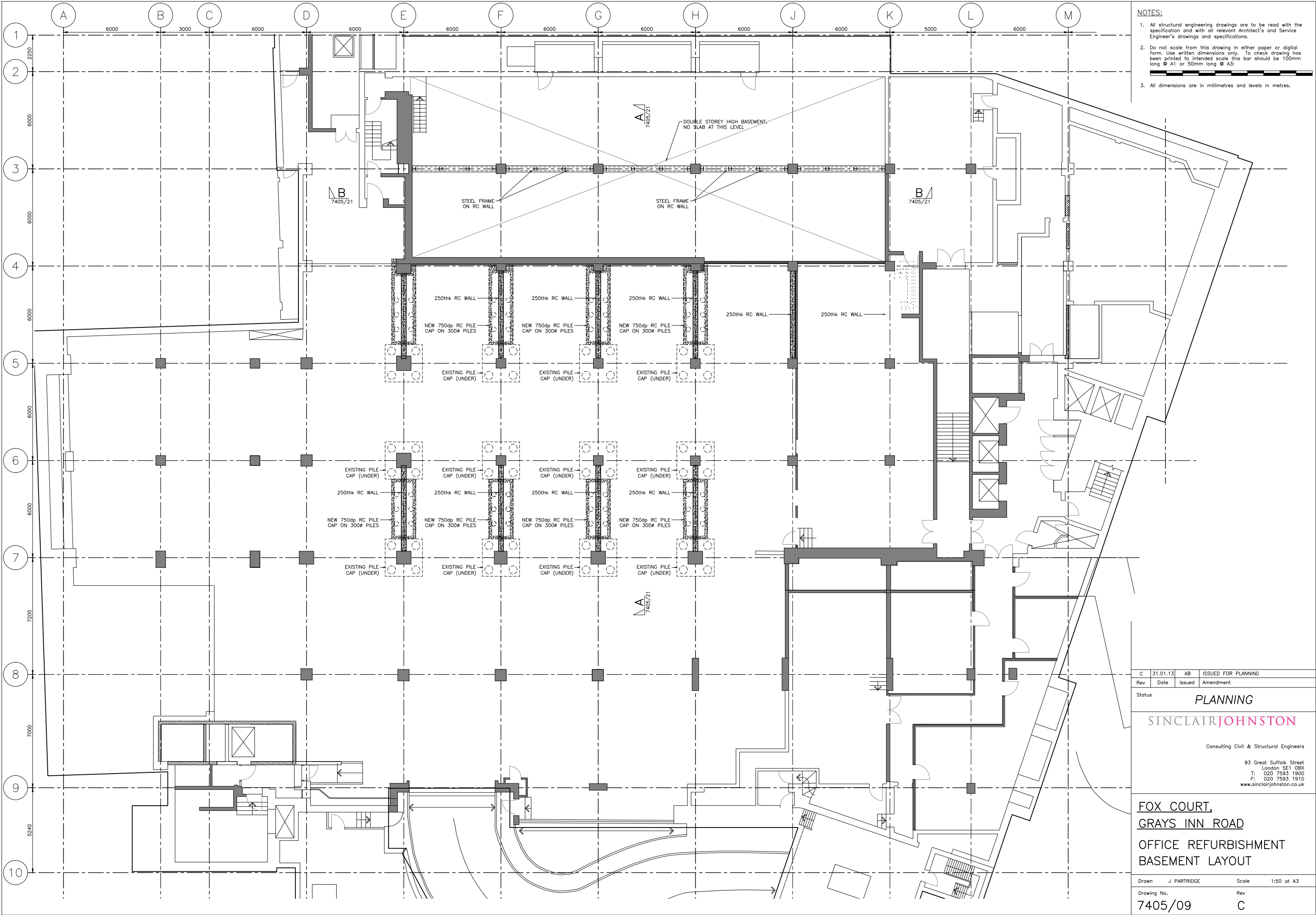
**APPENDIX A**

**STRUCTURAL ENGINEERING DRAWINGS**

**SCHEDULE OF DRAWINGS****FOX COURT, 14 GRAY'S INN ROAD**

7405/08 Rev. C	Office Refurbishment - Sub-Basement Layout
7405/09 Rev. C	Office Refurbishment - Basement Layout
7405/10 Rev. C	Office Refurbishment – Ground Floor Layout
7405/11 Rev. C	Office Refurbishment – First Floor Layout
7405/12 Rev. C	Office Refurbishment – Second Floor Layout
7405/13 Rev. C	Office Refurbishment – Third Floor Layout
7405/14 Rev. C	Office Refurbishment – Fourth Floor Layout
7405/21 Rev. C	Office Refurbishment – Section A-A & B-B





- NOTES:
1. All structural engineering drawings are to be read with the specification and with all relevant Architect's and Service Engineer's drawings and specifications.
  2. Do not scale from this drawing in either paper or digital form. Use written dimensions only. To check drawing has been printed to intended scale this bar should be 100mm long @ A1 or 50mm long @ A3:
  3. All dimensions are in millimetres and levels in metres.

Rev	Date	Issued	Amendment
C	31.01.13	AB	ISSUED FOR PLANNING

Status **PLANNING**

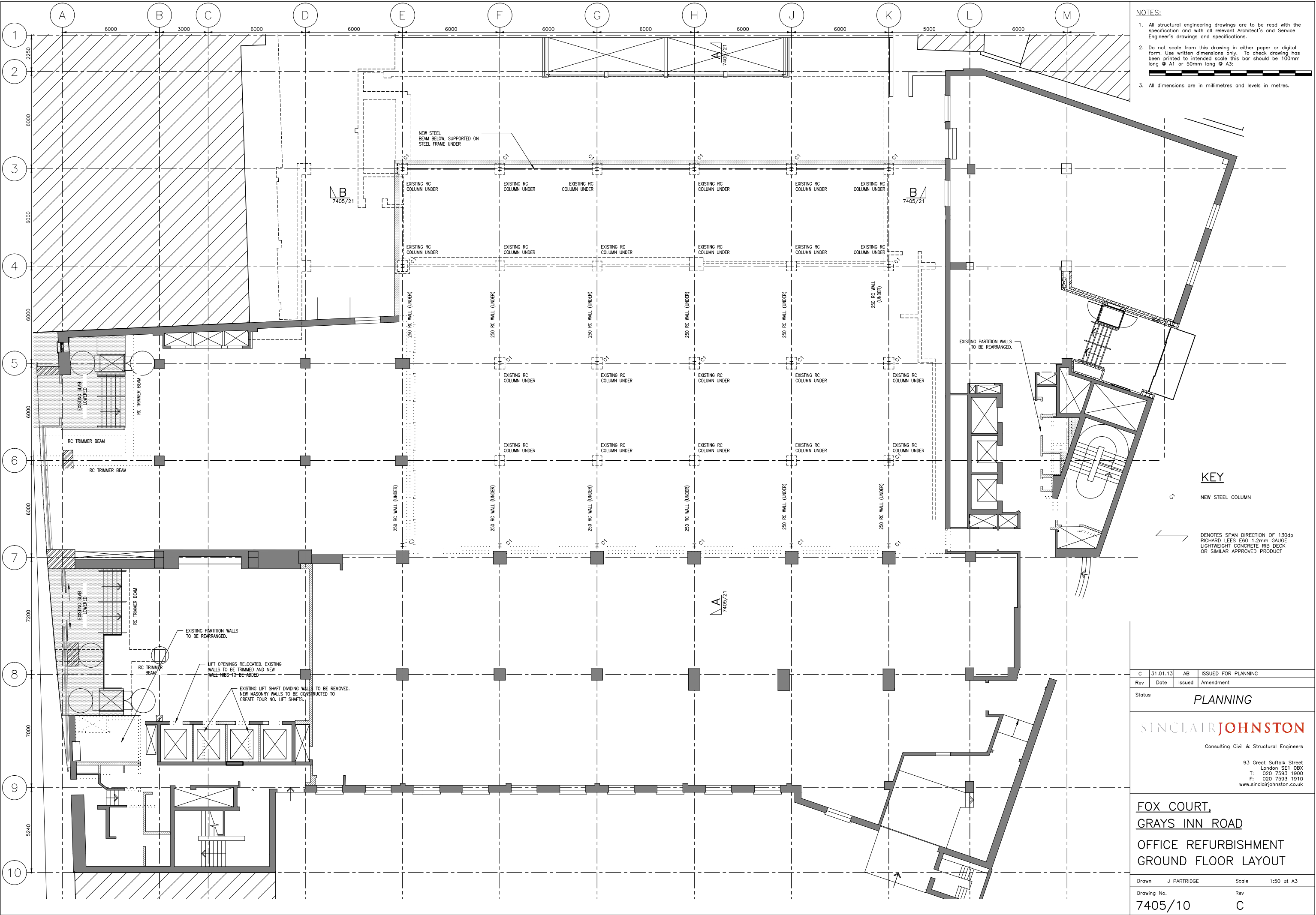
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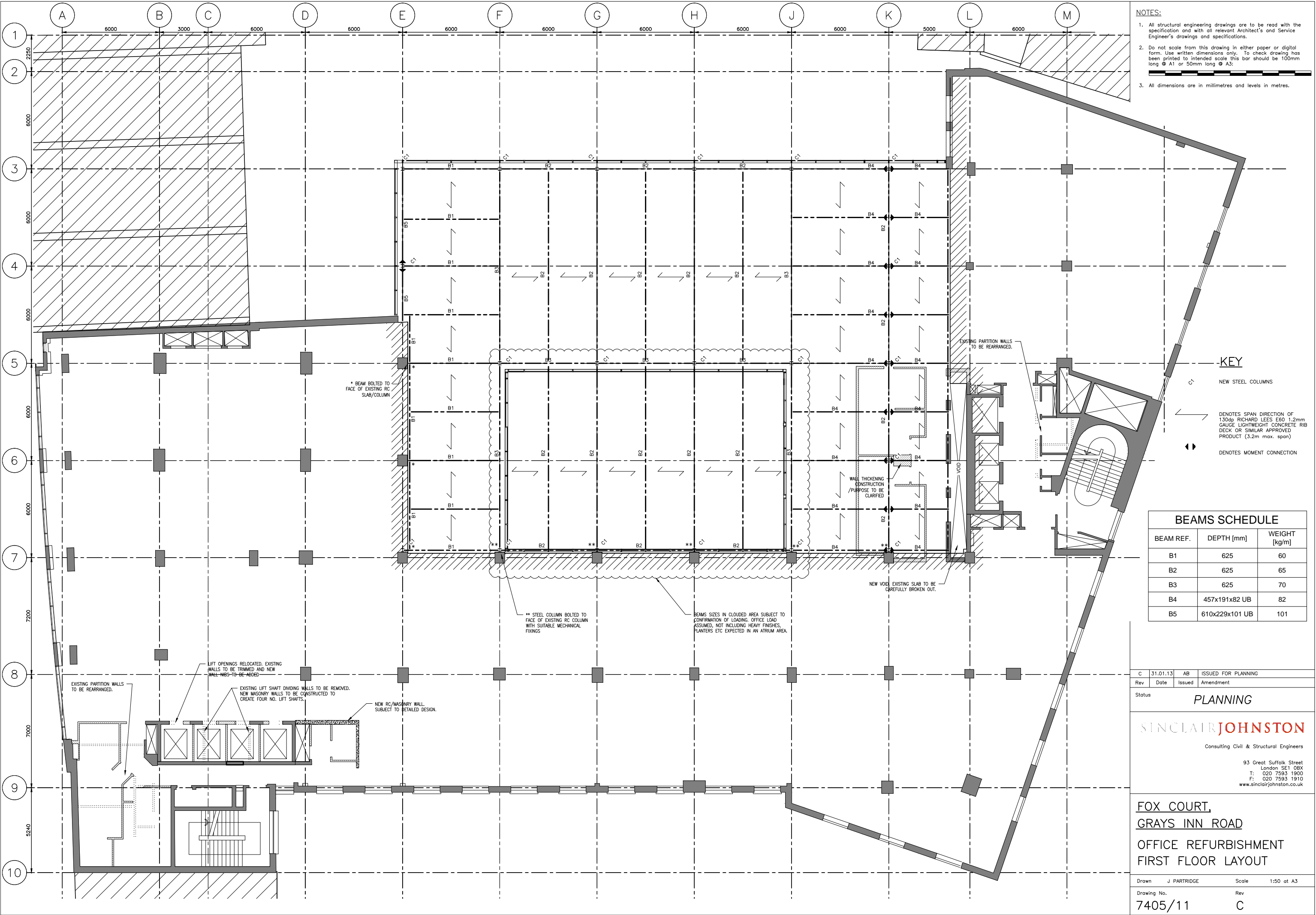
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**FOX COURT,  
GRAYS INN ROAD  
OFFICE REFURBISHMENT  
BASEMENT LAYOUT**

Drawn	J PARTRIDGE	Scale	1:50 at A3
Drawing No.	7405/09	Rev	C







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KEY

NEW STEEL COLUMNS

DENOTES SPAN DIRECTION OF 130dp RICHARD LEES E60 1.2mm GAUGE LIGHTWEIGHT CONCRETE RIB DECK OR SIMILAR APPROVED PRODUCT (3.2m max. span)

DENOTES MOMENT CONNECTION

BEAMS SCHEDULE

BEAM REF.	DEPTH [mm]	WEIGHT [kg/m]
B1	625	60
B2	625	65
B3	625	70
B4	457x191x82 UB	82
B5	610x229x101 UB	101

C	31.01.13	AB	ISSUED FOR PLANNING
Rev	Date	Issued	Amendment

Status

PLANNING

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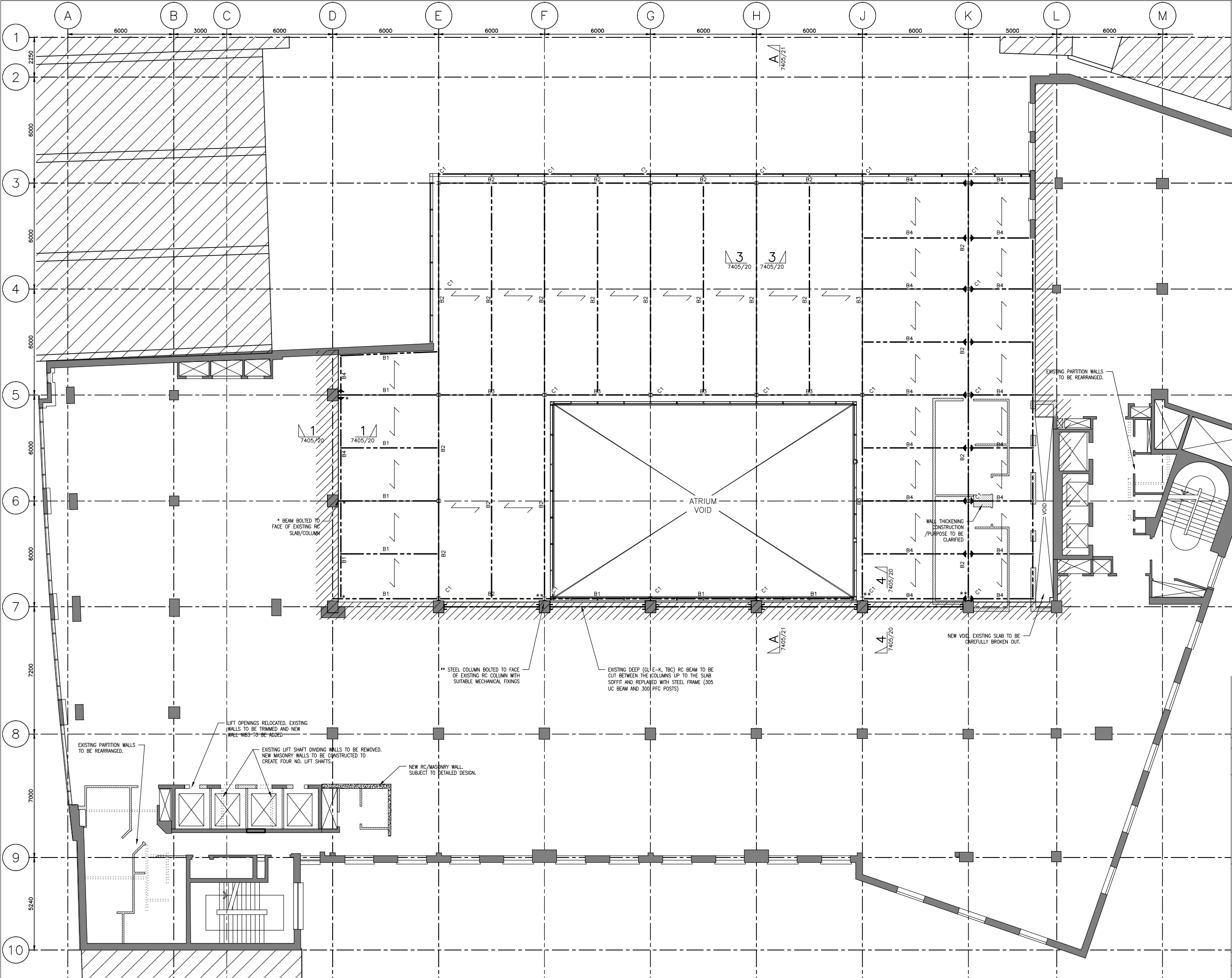
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FOX COURT,  
GRAYS INN ROAD

OFFICE REFURBISHMENT  
FIRST FLOOR LAYOUT

Drawn J. PARTRIDGE Scale 1:50 at A3

Drawing No. 7405/11 Rev C



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**KEY**

$C_1$  NEW STEEL COLUMN

DENOTES SPAN DIRECTION OF 130dp RICHARD LEES E60 1.2mm GAUGE LIGHTWEIGHT CONCRETE RIB DECK OR SIMILAR APPROVED PRODUCT (3.2m max. span)

DENOTES MOMENT CONNECTION

BEAMS SCHEDULE		
BEAM REF.	DEPTH [mm]	WEIGHT [kg/m]
B1	625	60
B2	625	65
B3	625	70
B4	457x191x82 UB	82

C	31.01.13	AB	ISSUED FOR PLANNING
Rev	Date	Issued	Amendment
Status			

**PLANNING**

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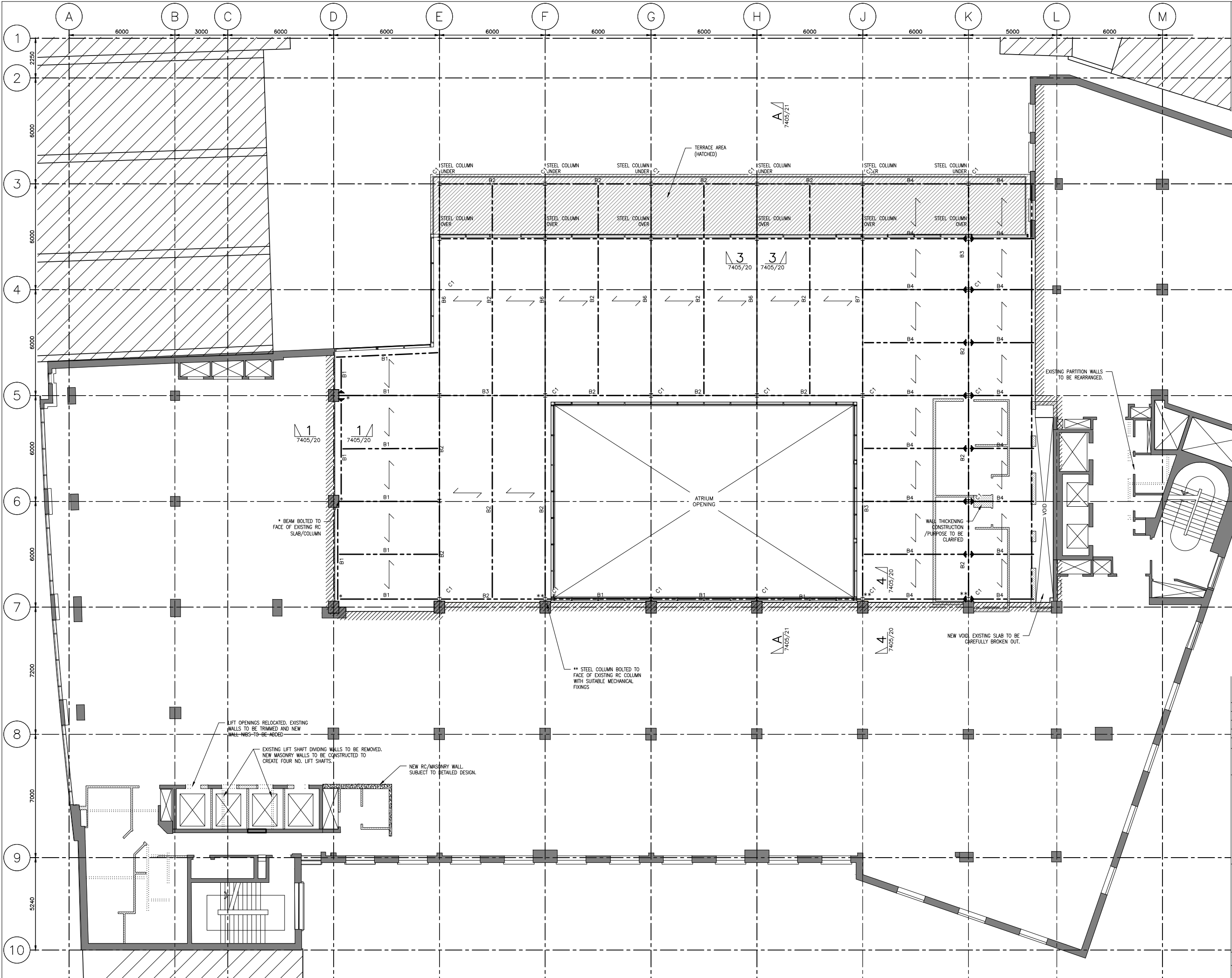
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**FOX COURT,  
GRAYS INN ROAD**

**OFFICE REFURBISHMENT  
SECOND FLOOR LAYOUT**

Drawn	J. PARTRIDGE	Scale	1:50 at A3
Drawing No.	7405/12	Rev	C



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KEY

- NEW STEEL COLUMN
- DENOTES SPAN DIRECTION OF 130dp RICHARD LEES E60 1.2mm GAUGE LIGHTWEIGHT CONCRETE RIB DECK OR SIMILAR APPROVED PRODUCT (3.2m max. span)
- DENOTES MOMENT CONNECTION

BEAMS SCHEDULE		
BEAM REF.	DEPTH [mm]	WEIGHT [kg/m]
B1	625	60
B2	625	65
B3	625	70
B4	457x191x82 UB	82
B5	610x229x101 UB	101
B6	625	80
B7	625	115

C	23.01.13	AB	ISSUED FOR PLANNING
B	13.09.	PK	UPDATED
A	06.07.12	PK	FINAL REPORT
-	28.06.12	JP	ISSUED FOR COMMENTS
Rev	Date	Issued	Amendment

Status

PLANNING

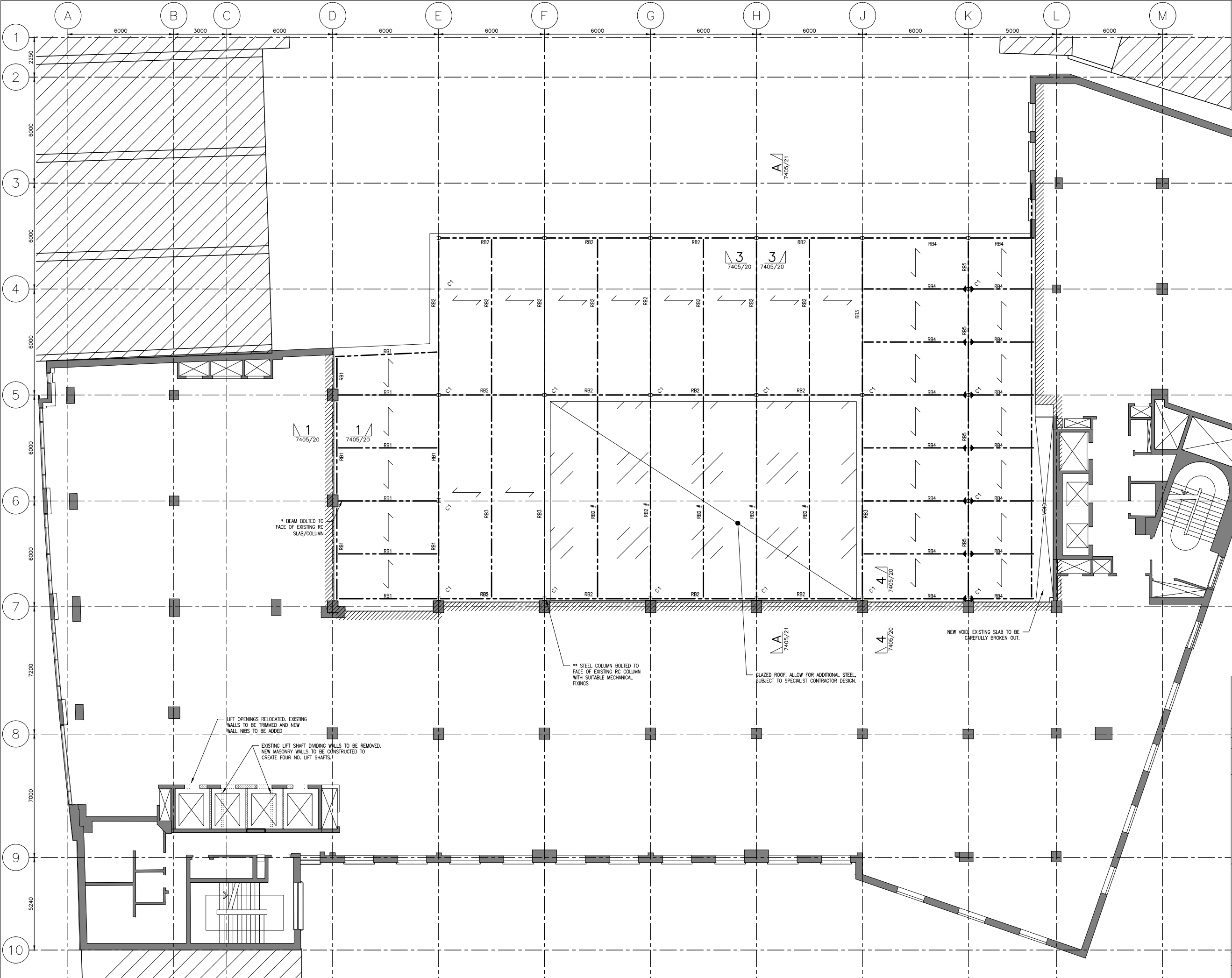
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FOX COURT,  
GRAYS INN ROAD  
OFFICE REFURBISHMENT  
THIRD FLOOR LAYOUT

Drawn	J PARTRIDGE	Scale	1:50 at A3
Drawing No.	7405/13	Rev	C



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  - All dimensions are in millimetres and levels in metres.

KEY

C<sub>1</sub>

NEW STEEL COLUMN

DENOTES SPAN DIRECTION OF  
130dp RICHARD LEES E60 1.2mm  
GAUGE LIGHTWEIGHT CONCRETE RIB  
DECK OR SIMILAR APPROVED  
PRODUCT (3.2m max. span)

DENOTES MOMENT CONNECTION

ROOF BEAMS SCHEDULE

BEAM REF.	DEPTH [mm]	WEIGHT [kg/m]
RB1	300	35
RB2	400	45
RB3	625	70
RB4	457x191x82 UB	82
RB5	625	85

C	31.01.13	AMB	ISSUED FOR PLANNING
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Status

PLANNING

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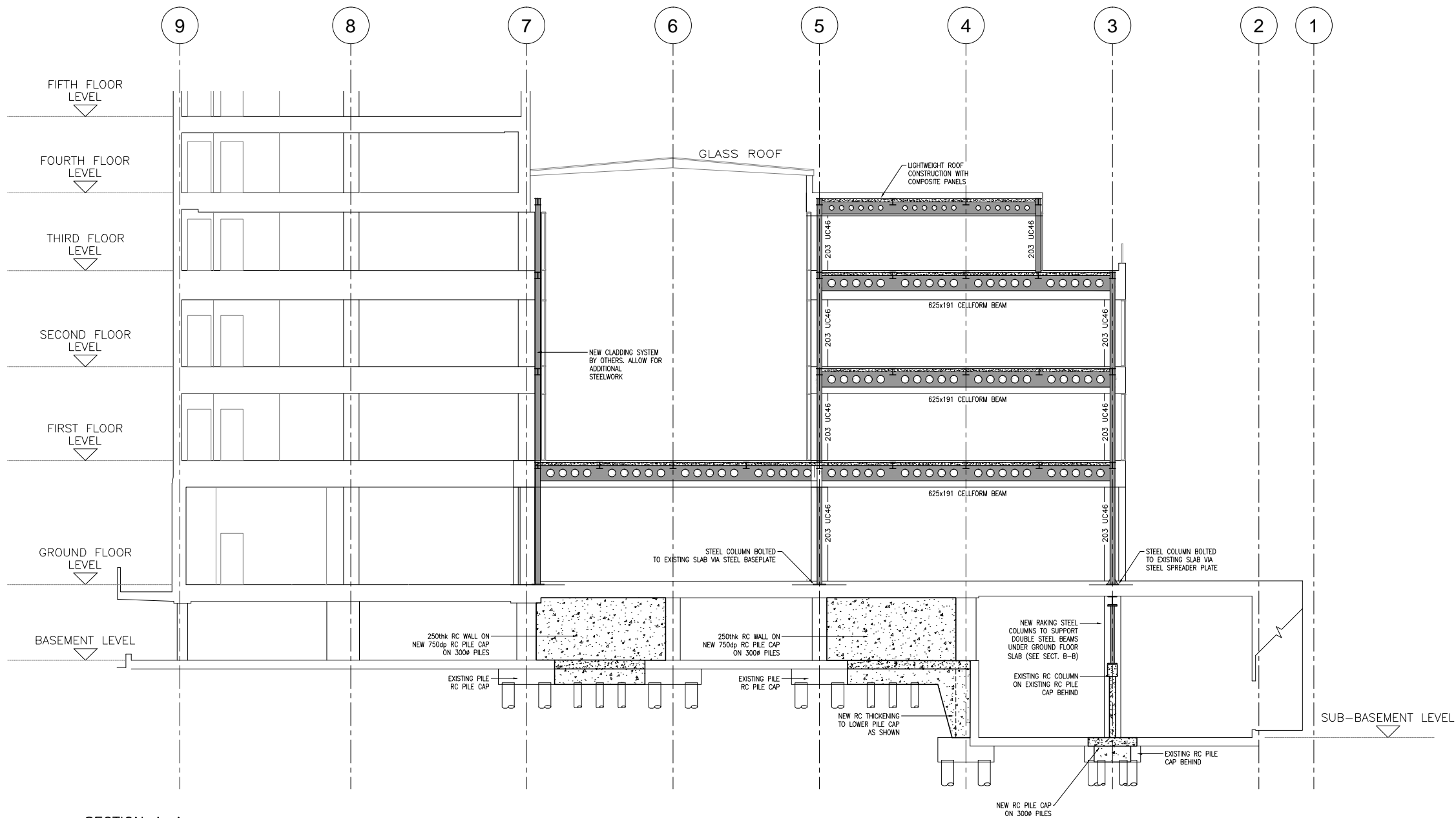
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FOX COURT,  
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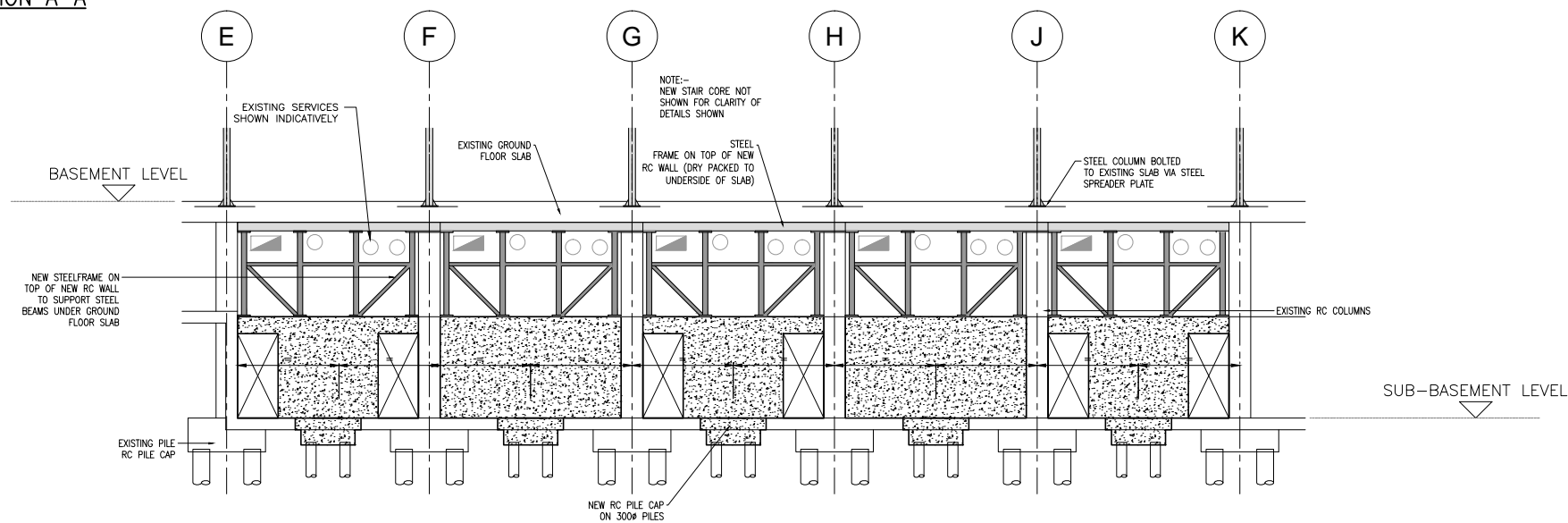
OFFICE REFURBISHMENT  
FOURTH FLOOR LAYOUT

Drawn A BLOCHER Scale 1:50 at A3

Drawing No. 7405/14 Rev C



SECTION A-A



SECTION B-B

NOTES:

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Rev	Date	Issued	Amendment
C	31.01.13	AB	ISSUED FOR PLANNING

Status  
PLANNING

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**FOX COURT**  
**GRAYS INN ROAD**  
**OFFICE REFURBISHMENT**  
**SECTION A-A & B-B**

Drawn	J. PARTRIDGE	Scale	50 at A1
Project No./Drawing No.	7405/21	Rev	C