PAC SIMS

Cardington Large Building Test Facility

Construction details for the first building

by P N R Bravery

Summary

This report details all structural information concerning the steelwork framed building erected on the Cardington strong floor during 1993. It includes, where available, test results for elements and materials used in the building and describes construction methods, specifications and standards adhered to. Extensive reference is made to construction drawings, all of which are reproduced at A3 scale within the report but the originals can be accessed via consultation with the LBTF Steering Group.

Contents:

Drawings:

A3 copies of construction drawings for the first building

Tables:

1:	Lackenby steelwork testing results
2:	Shelton steelwork testing results (356*171*51UB)
3:	Shelton steelwork testing results (254*254*89UC)
4:	Scunthorpe steelwork testing average results
5:	Mill releases results for members marked with cast numbers only
6:	Average results of Nut and Bolt testing
7:	Column base plate details
8:	Specification of column splices
9:	Location and type of splice per column
10:	Standard column to beam connection details
11:	Standard beam to beam connection details
12:	Second floor transfer structure beam to beam connection details
13:	Primary beam connections at roof level
14:	Average results of reinforcement mesh testing
15:	Average 7 & 28 day cube crushing strength of concrete from the floors

Figures:

1 - 8	Steelwork testing member identification floor plans
9 - 17	Steelwork testing member identification elevations

Sketches:

SK1 BRE	Windpost fixing details gridlines A and F
SK2 BRE	Windpost fixing details gridlines 1 and 4

Appendices:

A	Complete list of LBTF drawings held by the Steering Group
B	Details of rolling mill test procedure

1. Introduction

The steelwork structure, the first to stand on the strong floor, is designed to be typical of modern multi-storey office blocks.

1.1 Hypothetical Location and Occupancy

The building is hypothetically located in Croydon and inhabited by a high-profile firm of lawyers employing 318 people. The usage per floor would be as follows:

Ground Floor	Reception, Personnel, Accounts, Delivery and Security
1st Floor	Library, Archives and Meeting rooms
2nd - 6th Floors	Fee-earning Offices
7th Floor	Restaurant, including kitchen
Roof	Plant and Lift gear

Each fee-earning floor would include both open plan and enclosed office space, filing and storage areas, coffee making facilities and of course toilets.

1.2 Outline Geometry

The building has a foot print area 21m by 45m and stands to a height of 33m. Along the length, there are 5 bays each of 9m width. The ends comprise of 3 bays, of 6m, 9m and 6m respectively. There are 8 storeys, from the first floor to the roof the top-of-steel (t.o.s.) to top-of-steel height is 4.135m, the ground floor to first floor t.o.s. distance is 4.335m.

There is a two storey 9m by 8m ground floor atrium in the central bay of the South elevation. At the West end of the building there are two voids, one 2m by 4.5m being a goods lift for the 'restaurant', and the other 4m by 4.5m, a fireman's access and escape stairwell. There is only one void at the East end of the building, the 4m by 4.5m escape stairwell. In addition to these, there is a 9m by 2.5m central lift core.

2. Phase 1: Frame

2.1 Structural Steelwork

Design of the structure was carried out by Peter Brett Associates (PBA) to BS 5950. All steel members in the structure were tested and graded to BS 4360 and were blast cleaned but not painted. For steel section sizes and arrangement see Steel Layout Drawings numbers 5992/01, 02, 03, 04 & 07 issued by PBA.

It was intended that all of the members would be rolled at British Steels' Scunthorpe mill and that each bar rolled would be tested three times. Unfortunately due to a misunderstanding within British Steel this was not the case and the work was split between three mills, Lackenby, Shelton and Scunthorpe. Each mill devised its own testing procedure and member identification scheme. Details of these arrangements have been supplied by John Dowling of British Steel and are reproduced in Appendix B, a summary of which follows:

Lackenby

Each batch of the same section size from the same cast were tested just once and hence the results from this mill are no more accurate than the release certificates. The members are identified by a six digit number occasionally accompanied by a single letter suffix denoting multiple members from the same bar. The test results are displayed in Table 1.

Example member identification number 737723A

Shelton

The columns and beams rolled at this mill were treated separately but follow the same pattern. A sample was taken from the back of the first bar and the front of the last bar rolled from each bloom. Each bar within each bloom has been identified with a letter after the bloom number, where a bar has been split into multiple members a suffix number distinguishes them. The results for the bars tested are displayed in Tables 2 and 3, best estimates of intermediary bar strengths can be interpolated from these results.

Example member identification number 11D

Scunthorpe

This mill carried out the most comprehensive testing, each bar from each bloom being tested three times. A three digit identifier was used and pointed on each member, the vast majority of which were identifiable on site. The results are displayed in Table 4.

Example member identification number 525

The splitting of the order added further complications in tracing the members through the mill, the testing and into the structure. Many of the identifying markings were neglected, not recorded or obscured during erection and hence coverage is patchy. Members which have been traced from the mills into the structure are marked with their identifying number on figures 1 to 17 and a question mark is used to denote absent or unclear markings.

On these figures, those numbers for which a test result is available are highlighted in red. Where an estimate of the strength can be made from an interpolation of other results for the same bar the number is highlighted in green. For a small number of beams, where the cast number is marked on the member, the mill release certificate gives the best estimate of the strength and these are marked in yellow. The results for such members are summarised in Table 5. Where no test results can be found nor valid estimates made, no highlighting has been used.

In all cases, samples were taken from the flange either side of the web/flange interface.

2. Phase 1: Frame

2.1 Structural Steelwork

Design of the structure was carried out by Peter Brett Associates (PBA) to BS 5950. All steel members in the structure were tested and graded to BS 4360 and were blast cleaned but not painted. For steel section sizes and arrangement see Steel Layout Drawings numbers 5992/01, 02, 03, 04 & 07 issued by PBA.

It was intended that all of the members would be rolled at British Steels' Scunthorpe mill and that each bar rolled would be tested three times. Unfortunately due to a misunderstanding within British Steel this was not the case and the work was split between three mills, Lackenby, Shelton and Scunthorpe. Each mill devised its own testing procedure and member identification scheme. Details of these arrangements have been supplied by John Dowling of British Steel and are reproduced in Appendix B, a summary of which follows:

Lackenby

Each batch of the same section size from the same cast were tested just once and hence the results from this mill are no more accurate than the release certificates. The members are identified by a six digit number occasionally accompanied by a single letter suffix denoting multiple members from the same bar. The test results are displayed in Table 1.

Example member identification number 737723A

Shelton

The columns and beams rolled at this mill were treated separately but follow the same pattern. A sample was taken from the back of the first bar and the front of the last bar rolled from each bloom. Each bar within each bloom has been identified with a letter after the bloom number, where a bar has been split into multiple members a suffix number distinguishes them. The results for the bars tested are displayed in Tables 2 and 3, best estimates of intermediary bar strengths can be interpolated from these results.

Example member identification number 11D

Scunthorpe

This mill carried out the most comprehensive testing, each bar from each bloom being tested three times. A three digit identifier was used and pointed on each member, the vast majority of which were identifiable on site. The results are displayed in Table 4.

Example member identification number 525

The splitting of the order added further complications in tracing the members through the mill, the testing and into the structure. Many of the identifying markings were neglected, not recorded or obscured during erection and hence coverage is patchy. Members which have been traced from the mills into the structure are marked with their identifying number on figures 1 to 17 and a question mark is used to denote absent or unclear markings.

On these figures, those numbers for which a test result is available are highlighted in red. Where an estimate of the strength can be made from an interpolation of other results for the same bar the number is highlighted in green. For a small number of beams, where the cast number is marked on the member, the mill release certificate gives the best estimate of the strength and these are marked in yellow. The results for such members are summarised in Table 5. Where no test results can be found nor valid estimates made, no highlighting has been used.

In all cases, samples were taken from the flange either side of the web/flange interface.

2.2 Bracing

2.2.1 Vertical Bracing

Simple vertical bracing is provided around the central lift core and the escape stairwells, see Steel Layout Drawings numbers 5992/01, 02, 03, 04 & 07 issued by PBA. Flat, grade 50 steel is used throughout and is fixed coincident with the column centre line. From the ground to 4th floor the plates are 250mm wide by 15mm thick and from the 4th floor to the roof, 200mm by 10mm.

2.2.2 Horizontal Bracing

Horizontal bracing is provided in the bays adjacent to the atrium at first and second floor levels. Grade 50 steel, 168.3mm diameter, 10mm thick CHS's are used and their locations can be found on drawings 5992/02 & 03 issued by PBA.

2.3 Windposts

Windposts are RSA's of 43B steel at 3m centres ground to 4th floor and 2.25m centres to roof. See Elevation on gridline A drawing number 5992/06 issued by PBA. The mill release certificates for these elements indicate that they have a yield stress of 280 N/mm^2 and a tensile strength of 459 N/mm^2. A test on a specimen of length $L_0=5.65\sqrt{S_0}$ produced a 39% elongation.

2.4 Decking

The decking was designed to BS 5950 part 4 using PMF CF70 sheets of 0.9mm thickness which are notched around columns as necessary. See Decking layout drawings R1112/01, 02, 03 & 04 issued by Composite Profiles. The decking is continuous over a minimum of two spans and arranged such that troughs rest along the length of beams wherever present. The sheets are shot fired to the supporting steel.

3 Joints and Connections

All connections were designed using the SCI/BCSA method "Joints in Simple Construction" by Caunton Engineering Ltd (CEL). A copy of the connection design calculations can be found in the 'LBTF Data 2 File'.

3.1 Nuts, Bolts and Washers

A sample of the nuts, bolts and washers used were tested to BS 4395 or BS 3692 by Cooper & Turner, a summary of the results is shown in Table 6.

3.2 Column Bases

Column to baseplate connections are full profile continuous fillet welds and all baseplates are of grade 43 steel. The dimensions of the baseplates vary according to column size and location, see drawings 5992/01, 03 and 05 issued by PBA. Table 7 is a schedule of all baseplate details.

For columns bearing onto the strong floor, all hold-down bolts and sockets are fixed into the reinforced concrete slab by anchor grout and the underside of the baseplate grouted up to a maximum depth of 50mm. The completed baseplate connections are cased in concrete with 75mm cover.

Columns C2 and D2 bear onto the second floor transfer structure. The hold down bolts are connected through the base plate, the 15mm thick stiffening plate and the flange of the supporting member.

3.3 Column to Column splices

Internal column splices are located with the column neutral axis coincident and co-linear. External column splices are orientated such that external faces are flush. The columns around the central lift core are spliced with web and flange plates, all others use a cap and base plate splice. Table 8 details the different types of splice used and Table 9 gives a schedule of their location.

3.3.1 Cap and base plate splices

Full profile, 6mm fillet welds are used to attach cap and base plates to column ends. All such end plates are of grade 43 steel and all bolts are M20 grade 8.8.

3.3.2 Web and flange plate splices

Bolts through the web plate are M20 grade 8.8 and those through the flange plate are M20 general grade HSFG bolts.

3.4 Column to Beam Connections

Column to beam connections are standard on all floors except the second floor transfer structure and roof connections where a beam is continuous over a column top. See drawing numbers 5992/03 and 07 issued by PBA for the location of these exceptions.

3.4.1 Standard column to beam connections

A standard connection uses flexible end plates of grade 43 steel and grade 8.8 bolts, the thickness of plate, size of fillet weld and number of bolts used in each connection is listed in Table 10.

Although listed separately, it is of note that the column size is not important when determining the type of connection used, for example, a 610*229*101UB has the same

connection to a 254*254*89UC as it does to a 305*305*198UC. Each column type is listed separately for clarity.

3.4.2 Second floor transfer structure beam to column connections

Details of the structure necessary to transfer the loads over the two storey Atrium can be found in drawing number 5992/05 issued by PBA.

The 686*254*170UBs are fixed to the 305*305*198UCs in the following way. A 20mm thick grade 50 steel plate is welded across the toes of the column using a 8mm fillet weld to the rear of the plate and an 12mm weld to the front. The beam flanges are removed as necessary and the web bolted to the toe plate with 20 M24 grade 12.9 bolts.

At these column locations, longitudinal beams are fixed to the web of the 686*254*170UB, hence these east-west connections are described in the Beam to Beam connection section.

3.4.3 Continuous beam to column connections at roof level

Where a beam is continuous over a column top, 15mm thick, full depth stiffeners are attached to both sides of the beam in such a way as to continue the line of the column flanges. The plates are fixed to the web and flange with 6mm fillet welds. The column is fitted with a 20mm thick cap plate also attached with a fillet weld and the beam flange is bolted to the cap plate with four M20 grade 8.8 bolts.

In these cases, longitudinal primary beams are fixed to the continuous roof beam and not the column, hence these east-west connections are detailed in the Beam to Beam connection section.

3.5 Beam to Beam Connections

Beam to beam connections are standard on all floors except the second floor transfer structure and roof connections where a beam is continuous over a column top. See drawing numbers 5992/03 and 07 issued by PBA for the location of these exceptions.

3.5.1 Standard beam to beam connections

A standard beam to beam connection incorporates fin plates of grade 43 steel welded to the beam web only and M20 grade 8.8 bolts. The thickness of plate, size of fillet weld and number of bolts used in each connection is listed in Table 11.

3.5.2 Second floor transfer structure beam to beam connections

There are three different connection types to the 686*254*170UB transfer beam and the details are listed in table 12. A diaphragm comprising of a short length of 356*171*45UB is provided at the intersection of the twin transfer beams and the two 305*165*40UBs (grid ref. C1/2 and D1/2).

3.5.3 Continuous beam to beam connections at roof level

The connection of the longitudinal primary beams to the continuous roof beams is made in one of two ways. Firstly a toe plate is welded between the web stiffeners of the continuous member and then, either a fin plate is welded to this toe and the beam is attached to the fin plate in the standard way, or an end plate is fitted to the supported beam which is then bolted direct to the toe plate. The style of connection, the thickness of toe, fin and end plates, the size of fillet welds and the number of bolts used is detailed in Table 13.

3.6 Bracing Connections

3.6.1 Horizontal Bracing

Each end of the CHS bracing member is fixed with 10mm thick end and gusset plates. The gusset plate is set 150mm into the end of the tube and fixed with a 6mm fillet weld. A similar gusset plate is fixed to the column with a 8mm fillet weld. The two plates are bolted together with six M20 grade 8.8 bolts.

3.6.2 Vertical Bracing

From the ground to fourth floor, 15mm thick gusset plates are attached at the intersection of beam and column. A 6mm fillet weld fixes the gusset plate to both the beam flange and the oversized end plate used in the beam-column connection. The flat bracing member and gusset plate are bolted together with nine M20 grade 8.8 bolts.

From the fourth floor to the roof, 10mm thick gusset plates are used and six M20 grade 8.8 bolts are sufficient to make the connection between the flat bracing member and gusset plate.

3.7 Windpost Fixings

A rigid connection is made between the windpost and beam at floor level. At ceiling level, slotted holes in the windpost allow unhindered displacement of the ceiling beam, see sketches SK1 BRE and SK2 BRE originally produced by PBA.

3.8 Statement on Robustness/Accidental Damage

The structure as a whole will be designed in accordance with cl. 2.4.5.3 of BS 5950 Part 1 to cater for robustness and accidental damage. This approach is normally deemed to satisfy the requirements of clause A3/4 of the building regulations.

The twin transfer beams at second floor level have been classified as key elements, since their removal cannot be catered for by alternative load paths.

The transfer beams together with the supporting columns will be designed to withstand a blast loading of 34 kN/m^2.

Members required as restraints to the transfer beams and columns have also been designed as key elements (34 kN/m^2) to satisfy cl. 2.4.5.5. Elements supporting these restraint members in turn, have **NOT** been designed as key elements - compliance with cl. 2.4.5.3 is considered sufficient in these cases.

For reference purposes all key elements have been identified by the symbol '+' on structural drawings (5992/01 - 03 inclusive).

4. Phase 2 - Floors

A Composite Floor solution was adopted including shear studs, reinforcing mesh and Lytag concrete. The completed system gives an overall floor depth of 130mm with a fire rating of 1½ hours. For composite floor details see Drawing no. 5992/05 issued by PBA.

4.1 Shear Studs

The 95mm long 19mm diameter shear studs have a minimum yield stress of 350 N/mm^2. They are welded through to the support beams in accordance with SCI booklet "Good practice in composite floor construction". The arrangement of shear studs is shown on drawing numbers 5992/01, 02, 03, 04 & 07 issued by PBA.

4.2 Reinforcement Mesh

All floors are reinforced with one layer of A142 mesh laid with lower bars bearing on the ribs of the steel decking. The mesh was tested to BS 4483 by Allied Reinforcements, the average results of these tests are displayed in Table 14.

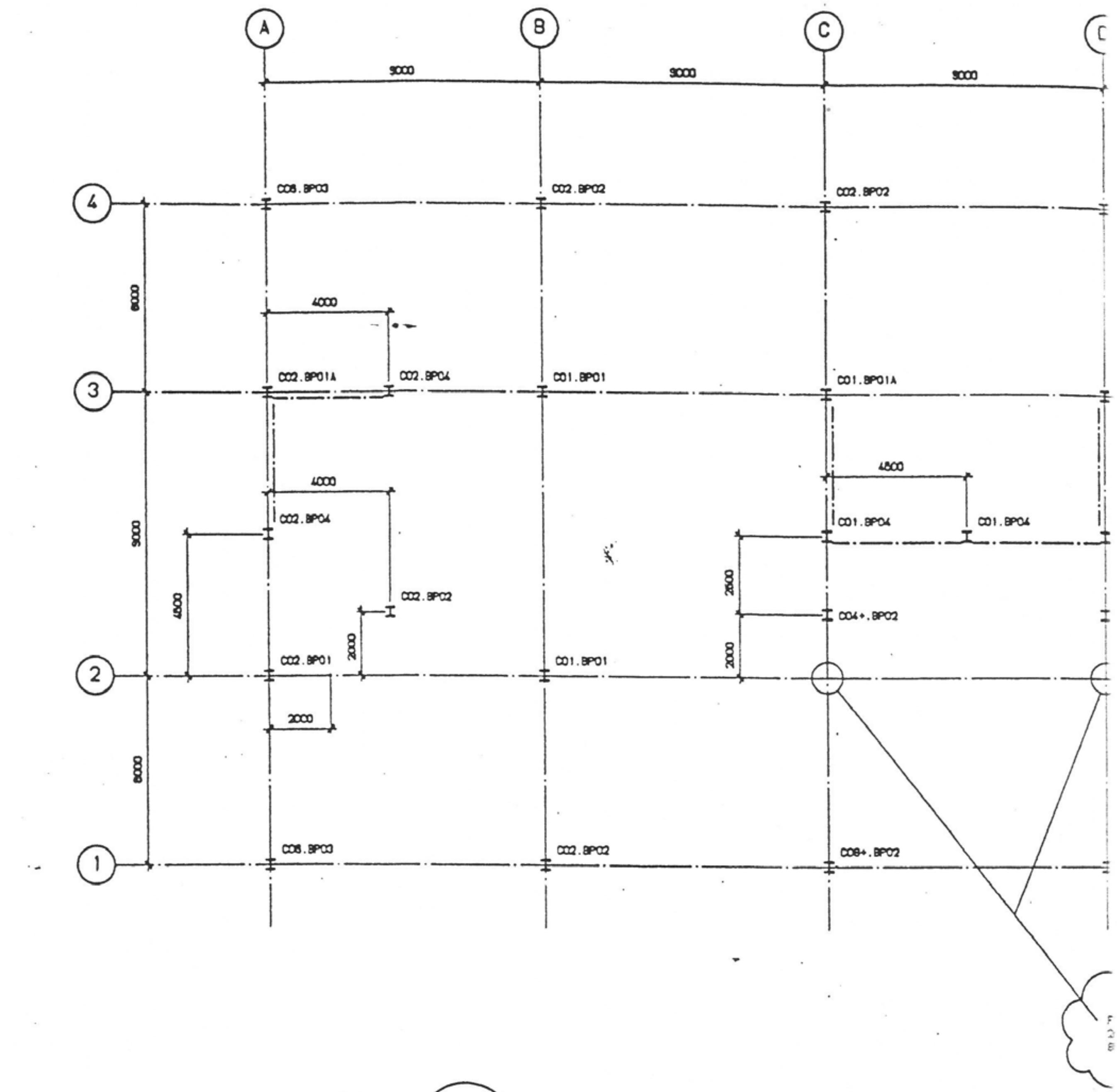
4.3 Concrete

The concrete is a grade 35 light-weight mix tested to BS 1881 by Contest Melbourne Weeks Limited. The average 7 day and 28 day crushing strength per floor is as shown in Table 15. The 7 day results for floor 1 are considerably higher than the other floors and should be treated with a degree of scepticism.

Drawings

The following drawings have been reproduced at A3 scale and included in this report:

Drawing No.	Drawing Title	Issued by
5992/01	Ground floor steel layout	Peter Brett Associates
5992/02	First floor steel layout	Peter Brett Associates
5992/03	Second floor steel layout	Peter Brett Associates
5992/04	Third to Seventh floor steel layout	Peter Brett Associates
5992/05	Typical Steel Details	Peter Brett Associates
5992/06	Elevation on Gridline A	Peter Brett Associates
5992/07	Roof Steel Layout	Peter Brett Associates
5992/08	First floor steel layout Connection Forces	Peter Brett Associates
5992/09	Second floor steel layout Connection Forces	Peter Brett Associates
5992/10	Third to Seventh floor steel layout Connection Forces	Peter Brett Associates
5992/11	Roof Steel Layout Connection Details	Peter Brett Associates
92066/1	Foundation Plan	Caunton Engineering Ltd
92066/3	Plan on 1st floor steel	Caunton Engineering Ltd
92066/4	Plan on 2nd floor steel	Caunton Engineering Ltd
92066/5	Plan on 3rd floor steel	Caunton Engineering Ltd
92066/6	Plan on 4th floor steel	Caunton Engineering Ltd
92066/7	Elevation on grid lines A & F and sections thru' grid lines C & D ground to 4th floor	Caunton Engineering Ltd
92066/8	Section thru' grid line 2/3 ground to 4th floor	Caunton Engineering Ltd
92066/10	Plan on 5th floor steel	Caunton Engineering Ltd
92066/11	Plan on 6th floor steel	Caunton Engineering Ltd
92066/12	Plan on 7th floor steel	Caunton Engineering Ltd
92066/13	Plan on 8th floor steel	Caunton Engineering Ltd
92066/14	Elevation on grid lines A & F and sections thru' grid lines C & D 5th-8th floor	Caunton Engineering Ltd
92066/15	Section thru' grid line 2/3 5th-8th floor	Caunton Engineering Ltd
Q/6710/01	Typical sections showing Dado wall head restraint details	Convoy Installations Ltd.
Q/6710/02	Typical section showing Dado wall head restraint details	Convoy Installations Ltd.
R1112/01	First floor level Decking Layout	Composite Profiles
R1112/02	Second floor level Decking Layout	Composite Profiles
R1112/03	Third to Seventh floor levels Decking Layout	Composite Profiles
R1112/04	Roof level Decking Layout	Composite Profiles
TE/9202/001	End Elevations & Blockwork Restraint Details	Taywood Engineering Ltd.
TE/9202/002	Front Elevation	Taywood Engineering Ltd.
TE/9202/003	Rear Elevation	Taywood Engineering Ltd.

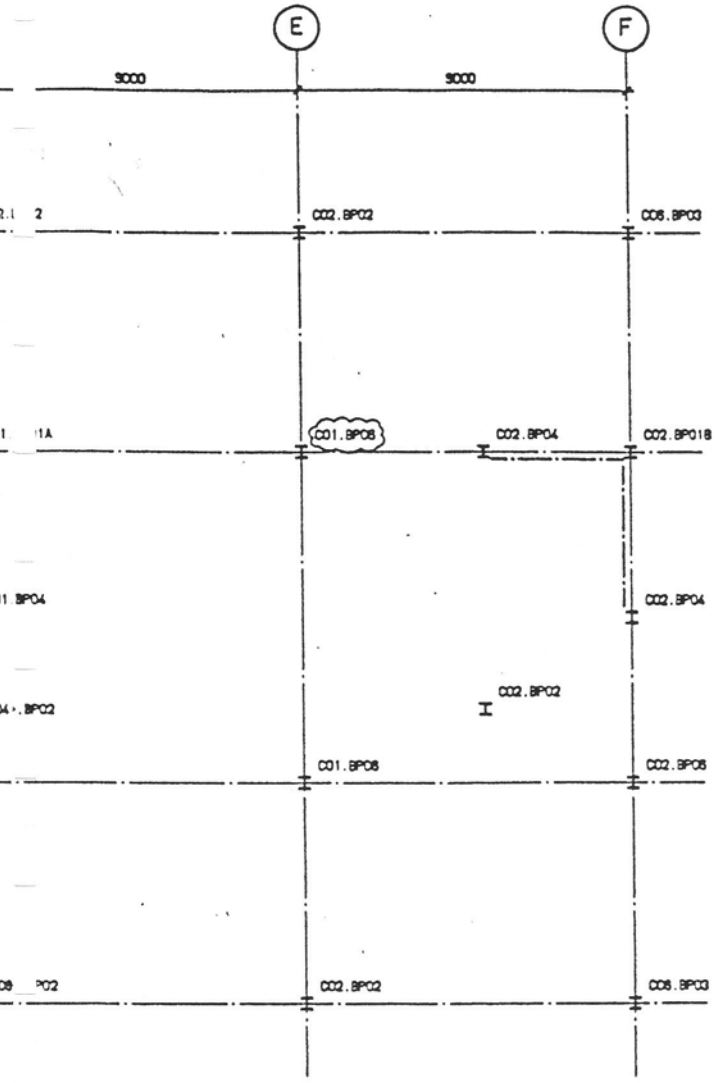


REFERENCE	DESIGNATION	REMARKS
C01.BPO1 & C01.BPO1A C01.BPO4 C01.BPO6	305x305x198UC 305x305x137UC 254x254x89UC	FOUND. - 2nd 2nd - 5th 5th - ROOF ('A' DENOTES 8 BOLT HD DETAIL)
C02.BPO1 C02.BPO1A C02.BPO1B	305x305x137UC 254x254x89UC	FOUND. - 4th 4th - ROOF
C02.BPO2 C02.BPO6	305x305x137UC 254x254x89UC	FOUND. - 4th 4th - ROOF
C02.BPO4	305x305x137UC 254x254x89UC	FOUND. - 4th 4th - ROOF
C04.BPO2	305x305x198UC	FOUND. - 2nd
C06.BPO3	254x254x89UC	FOUND - ROOF (SPLICED AT FOURTH FLOOR)
C07.BPO5	305x305x137UC 254x254x89UC	2nd - 4th 4th - ROOF (FOR LOCATION SEE DRG No 5892/03)
C08.BPO2	305x305x198UC 254x254x89UC	FOUND - 4th 4th - ROOF

ALL COLUMNS TO BE GRADE 50

ALL PERIMETER COLUMNS WHEN SPLICED TO BE FLUSH EXTERNALLY

Project Name = [illegible] Drawing name = first Drg Database = [illegible] Time = 08:38:00 Date = 10/12/93



C COLUMNS ABOVE
F R LEVEL
DRG. 03.

REFERENCE DRAWINGS:-

5.1

DRAWING No	TITLE/CONTENT
5992/08	FIRST FLOOR STEEL LAYOUT CONNECTION FORCES
09	SECOND FLOOR STEEL LAYOUT CONNECTION FORCES
10	THIRD - SEVENTH FLOOR STEEL LAYOUT CONNECTION FORCES
11	ROOF STEEL LAYOUT CONNECTION DETAILS

KEY

1. ALL BEAMS NOT NOTED ARE 254x146x31UB.
2. 'a' APPLIES TO 305x165x40UB RIBS 300mm LONG WHICH REQUIRE 35mm PRECAMBER.
3. = VOID.
4. = ATRIUM WALKWAY BY OTHERS.
5. = VERTICAL CROSS BRACED BAYS FOUNDATION TO FOURTH FLOOR = 250x16 FLATS (50) FOURTH TO ROOF = 200x10 FLATS (50). BRACING TO BE COINCIDENT WITH AXES OF COLUMN.

GENERAL NOTES CONT

6.1 PERIMETER BEAMS ON GRIDS 1 & 4 TO HAVE 4 No HOLES M12 BOLTS FOR ANCON PARAPET POSTS AT 2.25m C/C OR SIMILAR APPROVED (150x70x300 HIGH).

6.2 '*' DENOTES MEMBER DESIGNED AS KEY ELEMENT TO BS 5950 PART1. (GROUND TO SECOND FLOOR).

REVISIONS. (CONT'D)

F C04 ORIENTATION AMENDED. 14/12/92 JLC

NOTES REVISED.

FOR CONSTRUCTION

GENERAL NOTES.

1.1 THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS, SERVICE ENGINEERS AND STRUCTURAL ENGINEERS DRAWINGS AND SPECIFICATIONS.

1.2 ALL DIMENSIONS ARE IN MILLIMETRES.

1.3 DIMENSIONS SHOULD NOT BE SCALED FROM THIS DRAWING.

1.4 ALL LEVELS ARE IN METRES AND UNLESS OTHERWISE NOTED ARE STRUCTURAL LEVELS.

STEELWORK:-

2.1 ALL STEEL TO BE BLAST CLEANED. NO PAINTING REQUIRED.

2.2 ALL STEELWORK TO BE GRADE 43B TO BS4360. TUBES 50C, UNLESS NOTED OTHERWISE.

2.3 THE STEELWORK CONTRACTOR SHALL BE RESPONSIBLE FOR STABILITY OF THE STRUCTURE DURING ALL STAGES OF ERECTION.

2.4 ALL BOLTS TO BE M20 (GRADE 8.8) UNLESS NOTED OTHERWISE

2.5 FRAME TO BE BRACED SIMPLE DESIGN. (BRACING AROUND CENTRAL CORE AND ESCAPE STAIRS)

2.6 P.B.A. TO COMPLETE OVERALL FRAMING PLAN, REACTIONS ETC. FABRICATOR TO PROVIDE THE CONNECTION CALCULATIONS TO PBA ACCEPTANCE USING ONE OF THE 3 "INDUSTRY" STANDARDS PROMOTED BY SCI/BCSA EXCEPT THE SECOND FLOOR TRANSFER STRUCTURE WHICH WILL BE DESIGNED AND DETAILED JOINTLY BY PBA AND THE FABRICATOR.

2.7 ALL PERIMETER BEAMS HAVE BEEN DESIGNED TO ALLOW FOR UP TO 200 THK SINGLE SKIN BLOCKWORK (DENSITY < 1400KG/m3) ANY ADDITIONAL CLADDING SHOULD NOT EXCEED AN UNFACTURED LOAD OF 1KN/m2 ON ELEVATION. FINAL SOLUTION TO BE CONFIRMED WITH PBA.

2.8 STEEL DESIGN STANDARD IS BS.5950.

2.9 FOR BID PURPOSES ADD 7.5% TO ALL COLUMN AND BEAM WEIGHTS TO ALLOW FOR CONNECTIONS, BASEPLATES & HD BOLTS.

DECKING:-

3.1 PMF DECKING TO BE CONTINUOUS OVER A MINIMUM OF 2 SPANS. SHEETS TO BE FIXED TO SUPPORTING STEEL WITH SHOT FIRED FIXINGS. A MINIMUM OF 2 No FIXINGS AT EACH END OF SHEET AT 500 CENTRES AND 1 No FIXING INTERMEDIATE SUPPORTS.

3.2 SEAMS BETWEEN PMF SHEETS TO BE EITHER RIVETED OR SPOT WELDED AT 1/4 SPAN POINTS.

3.3 JOINTS IN DECKING TO BE TAPED TO PREVENT GROUT LOSS.

3.4 PMF CF70 DECK (0.9mm) TO BE USED WITH 1 LAYER A142 MESH IN TOP. SEPERATE R.C. FLOOR PLAN TO BE USED FOR CONSTRUCTION.

3.5 95mm x 19 DIAMETER SHEAR STUDS OF 350N/mm2 MINIMUM YIELD STRESS ARE TO BE WELDED THROUGH THE DECKING TO ALL SUPPORT BEAMS AT 300 c/c U.N.O. WITH THE 'NELSON' WELD THROUGH TECHNIQUE OR SIMILAR APPROVED. STUD WELDS TO BE CARRIED OUT BY APPROVED OPERATOR.

3.6 CONCRETE TO BE GRADE 35 LIGHT WEIGHT AGGREGATE.

4.1

FLOOR LOADINGS:-	ROOF LOADINGS:-
DEAD:- SLAB 2.8 KN/m2	DEAD:- SLAB 2.8 KN/m2
RAISED FLOOR 0.4 KN/m	50 SCREED 1.2 KN/m2
SERVICES 0.25 KN/m2	SERVICES 0.25 KN/m2
CEILING 0.15 KN/m2	CEILING 0.15 KN/m2
STEEL SELF WEIGHT 0.25 KN/m2	STEEL SELF WEIGHT 0.25 KN/m2
LIVE:- IMPOSED 2.5 KN/m2	LIVE:- PLANT 7.5 KN/m2
PARTITIONS 1.0 KN/m2	SUPER 0.5KN/m2

REFERENCE DRAWINGS:-

5.1

DRAWING No	TITLE/CONTENT
5992/01	GROUND FLOOR LAYOUT
02	FIRST FLOOR STEEL LAYOUT
03	SECOND FLOOR STEEL LAYOUT
04	THIRD - SEVENTH FLOOR STEEL LAYOUT
05	TYPICAL STEEL DETAILS
06	ELEVATION ON GRIDLINE A
07	ROOF STEEL LAYOUT.

ARCHITECT - PENTAR ARCHITECTS.

Mark	Revision	Date	Drawn
E	BASEPLATE REFERENCES AMENDED TO SUIT	16/11/92	JLC
	RELOCATION OF BUILDING. BRACING SIZES REDUCED		
	C04 ORIENTATION AMENDED.		
D	COLUMN SIZES AMENDED TO SUIT		
	NEW ROOF LOADS. ANCON POST SPACING ADDED.	30/10/92	JLC
C	ISSUED FOR BID.		
	BASEPLATE TYPE BP01A INDICATED/NOTES REV	20/08/92	MB
B	REFERENCE C08 ADDED ON GRIDS C1 & D1	07/08/92	MB
A	ISSUED FOR INFORMATION	13/08/92	MB

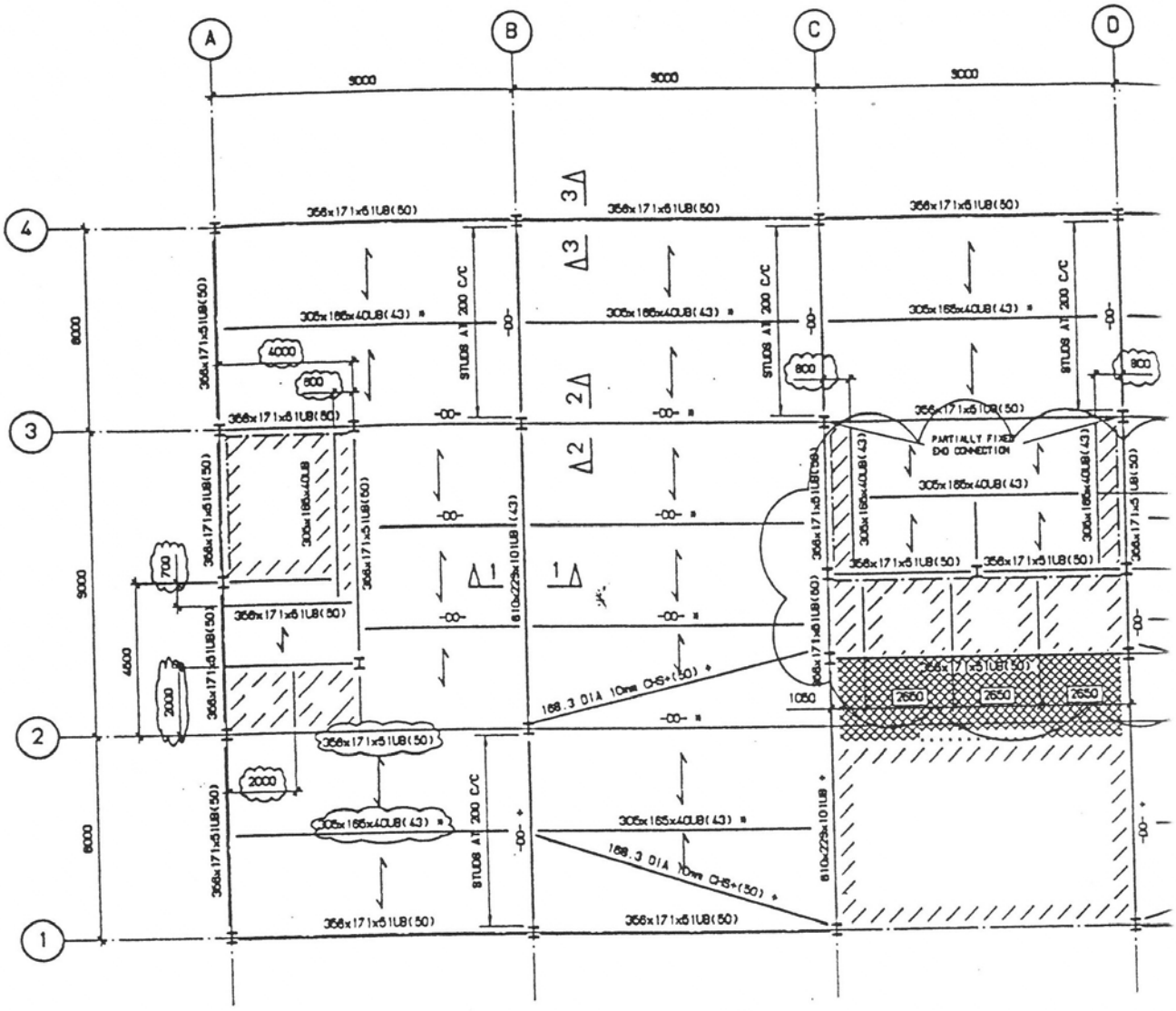
MULTI - STOREY STRUCTURAL AND FIRE TEST FACILITY

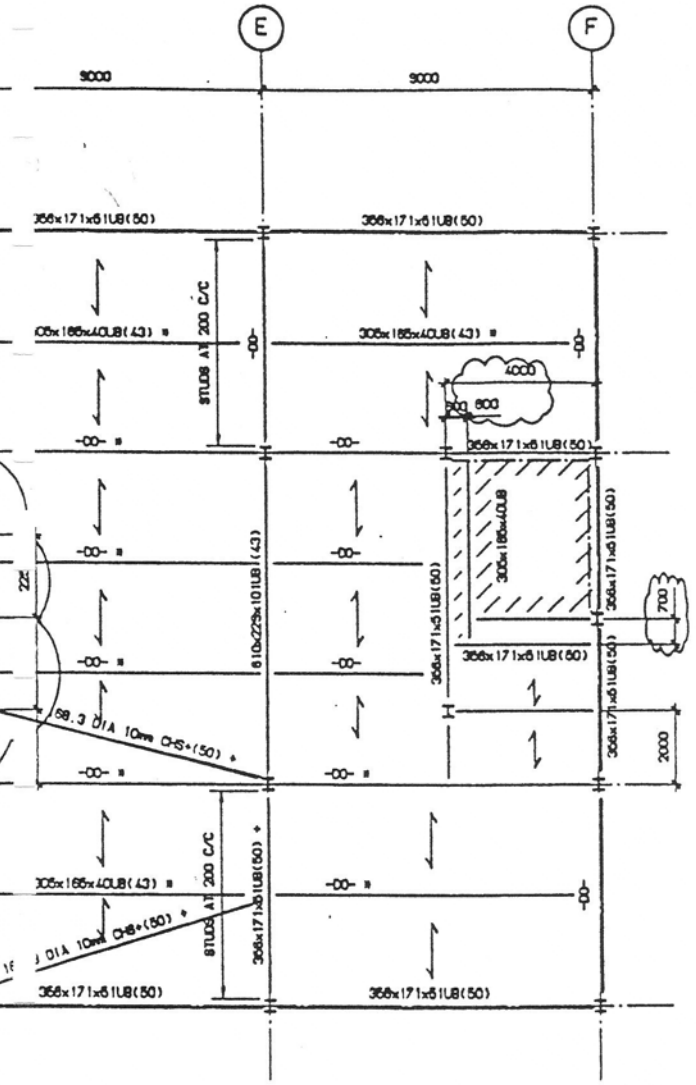
GROUND FLOOR STEEL LAYOUT

CARDINGTON BRE

PETER BRETT ASSOCIATES
CONSULTING ENGINEERS
pba
16 WESTCOTE ROAD READING BERKSHIRE RG3 2DE TEL 0734 [illegible] FAX 0734 [illegible]

Scales	1:100	Drawing No	5992/01 F
Date	11/08/92	Drawn	MJW
Checked		Passed	


A
B
C
D
9000
9000
9000
4
3
2
1
8000
9000
8000
356x171x61UB(50)
305x165x40UB(43)
STUDS AT 200 C/C
4000
800
700
2000
4500
610x229x101UB(43)
610x229x101UB(60)
168.3 DIA 10mm CHS*(50)
PARTIALLY FIXED END CONNECTION
2650
1050



REFERENCE DRAWINGS:-

5.1	DRAWING No	TITLE/CONTENT
	5992/08	FIRST FLOOR STEEL LAYOUT CONNECTION FORCES
	09	SECOND FLOOR STEEL LAYOUT CONNECTION FORCES
	10	THIRD - SEVENTH FLOOR STEEL LAYOUT CONNECTION FORCES
	11	ROOF STEEL LAYOUT CONNECTION DETAILS

KEY

1. ALL BEAMS NOT NOTED ARE 254x146x31UB.
2. 'a' APPLIES TO 305x165x40UB R1BS 9000mm LONG WHICH REQUIRE 35mm PRECAMBER.
3. = VOID.
4. = ATRIUM WALKWAY BY OTHERS.
5. = VERTICAL CROSS BRACED BAYS FOUNDATION TO FOURTH FLOOR = 250x15 FLATS (50) FOURTH TO ROOF = 200x10 FLATS (50) BRACING TO BE COINCIDENT WITH AXES OF COLUMNS

GENERAL NOTES CONT

8.1 PERIMETER BEAMS ON GRIDS 1 & 4 TO HAVE 4 No HOLES M12 BOLTS FOR ANCON PARAPET POSTS AT 2.25m C/C OR SIMILAR APPROVED (150x70x300 HIGH).

8.2 '+' DENOTES MEMBER DESIGNED AS KEY ELEMENT TO BS 5950 PART1.

REVISIONS. (CONT'D)

F	STUD SPACING REDUCED FOR BEAMS AS SHOWN	14/12/92	jlc
	COL ORIENTATION GRID C & D / 2.0m OFFSET		
	GRID 2 AMENDED. NOTES REVISED.		

FOR CONSTRUCTION

GENERAL NOTES.

1.1 THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS, SERVICE ENGINEERS AND STRUCTURAL ENGINEERS DRAWINGS AND SPECIFICATIONS.

1.2 ALL DIMENSIONS ARE IN MILLIMETRES.

1.3 DIMENSIONS SHOULD NOT BE SCALED FROM THIS DRAWING.

1.4 ALL LEVELS ARE IN METRES AND UNLESS OTHERWISE NOTED ARE STRUCTURAL LEVELS.

STEELWORK:-

2.1 ALL STEEL TO BE BLAST CLEANED. NO PAINTING REQUIRED.

2.2 ALL STEELWORK TO BE GRADE 43B TO BS4360. TUBES 50C. UNLESS NOTED OTHERWISE.

2.3 THE STEELWORK CONTRACTOR SHALL BE RESPONSIBLE FOR STABILITY OF THE STRUCTURE DURING ALL STAGES OF ERECTION.

2.4 ALL BOLTS TO BE M20 (GRADE 8.8) UNLESS NOTED OTHERWISE

2.5 FRAME TO BE BRACED SIMPLE DESIGN. (BRACING AROUND CENTRAL CORE AND ESCAPE STAIRS)

2.6 P.B.A. TO COMPLETE OVERALL FRAMING PLAN, REACTIONS ETC. FABRICATOR TO PROVIDE THE CONNECTION CALCULATIONS TO PBA ACCEPTANCE USING ONE OF THE 3 "INDUSTRY" STANDARDS PROMOTED BY SCI/BCSA EXCEPT THE SECOND FLOOR TRANSFER STRUCTURE WHICH WILL BE DESIGNED AND DETAILED JOINTLY BY PBA AND THE FABRICATOR.

2.7 ALL PERIMETER BEAMS HAVE BEEN DESIGNED TO ALLOW FOR UP TO 200 THK SINGLE SKIN BLOCKWORK (DENSITY < 1400KG/m3) ANY ADDITIONAL CLADDING SHOULD NOT EXCEED AN UNFACTURED LOAD OF 1KN/m2 ON ELEVATION. FINAL SOLUTION TO BE CONFIRMED WITH PBA.

2.8 STEEL DESIGN STANDARD IS BS.5950.

2.9 FOR BID PURPOSES ADD 7.5% TO ALL COLUMN AND BEAM WEIGHTS TO ALLOW FOR CONNECTIONS, BASEPLATES & HD BOLTS.

DECKING:-

3.1 PMF DECKING TO BE CONTINUOUS OVER A MINIMUM OF 2 SPANS. SHEETS TO BE FIXED TO SUPPORTING STEEL WITH SHOT FIRED FIXINGS. A MINIMUM OF 2 No FIXINGS AT EACH END OF SHEET AT 500 CENTRES AND 1 No FIXING INTERMEDIATE SUPPORTS.

3.2 SEAMS BETWEEN PMF SHEETS TO BE EITHER RIVETED OR SPOT WELDED AT 1/4 SPAN POINTS.

3.3 JOINTS IN DECKING TO BE TAPED TO PREVENT GROUT LOSS.

3.4 PMF CF70 DECK (0.9mm) TO BE USED WITH 1 LAYER A142 MESH IN TOP. SEPERATE R.C. FLOOR PLAN TO BE USED FOR CONSTRUCTION.

3.5 95mm x 19 DIAMETER SHEAR STUDS OF 350N/mm2 MINIMUM YIELD STRESS ARE TO BE WELDED THROUGH THE DECKING TO ALL SUPPORT BEAMS AT 300 c/c U.N.O. WITH THE 'NELSON' WELD THROUGH TECHNIQUE OR SIMILAR APPROVED. STUD WELDS TO BE CARRIED OUT BY APPROVED OPERATOR.

3.6 CONCRETE TO BE GRADE 35 LIGHT WEIGHT AGGREGATE.

4.1 FLOOR LOADINGS:-

DEAD:- SLAB 2.6 KN/m2
RAISED FLOOR 0.4 KN/m
SERVICES 0.25 KN/m2
CEILING 0.15 KN/m2
STEEL SELF WEIGHT 0.25 KN/m2
LIVE:- IMPOSED 2.5 KN/m2
PARTITIONS 1.0 KN/m2

ROOF LOADINGS:-

DEAD:- SLAB 2.6 KN/m2
50 SCREED 1.2 KN/m2
SERVICES 0.25 KN/m2
CEILING 0.15 KN/m2
STEEL SELF WEIGHT 0.25 KN/m2
LIVE:- PLANT 7.5 KN/m2
SUPER 0.6KN/m2

REFERENCE DRAWINGS:-

5.1	DRAWING No	TITLE/CONTENT
	5992/01	GROUND FLOOR LAYOUT
	02	FIRST FLOOR STEEL LAYOUT
	03	SECOND FLOOR STEEL LAYOUT
	04	THIRD - SEVENTH FLOOR STEEL LAYOUT
	05	TYPICAL STEEL DETAILS
	06	ELEVATION ON GRIDLINE A
	07	ROOF STEEL LAYOUT.

ARCHITECT - PENTAR ARCHITESIS

Mark	Revision	Date	Drawn
E	VERTICAL BRACING SIZE AMENDED	17/11/92	jlc
	COL ORIENTATION GRID C & D REVISED.		
	P.M.F. / STUD SPACING AMENDED.		
D	SHEAR STUD SPACING AMENDED. BM GRID 2/A-B	30/10/92	jlc
C	ISSUED FOR BID		
	BRACING SECTION/NOTES REVISED	23/09/92	MS
B	356 UB SECTION AND NOTE 2.7 REVISED	07/09/92	MS
A	ISSUED FOR INFORMATION	13/08/92	MS

MULTI - STOREY STRUCTURAL AND FIRE TEST FACILITY

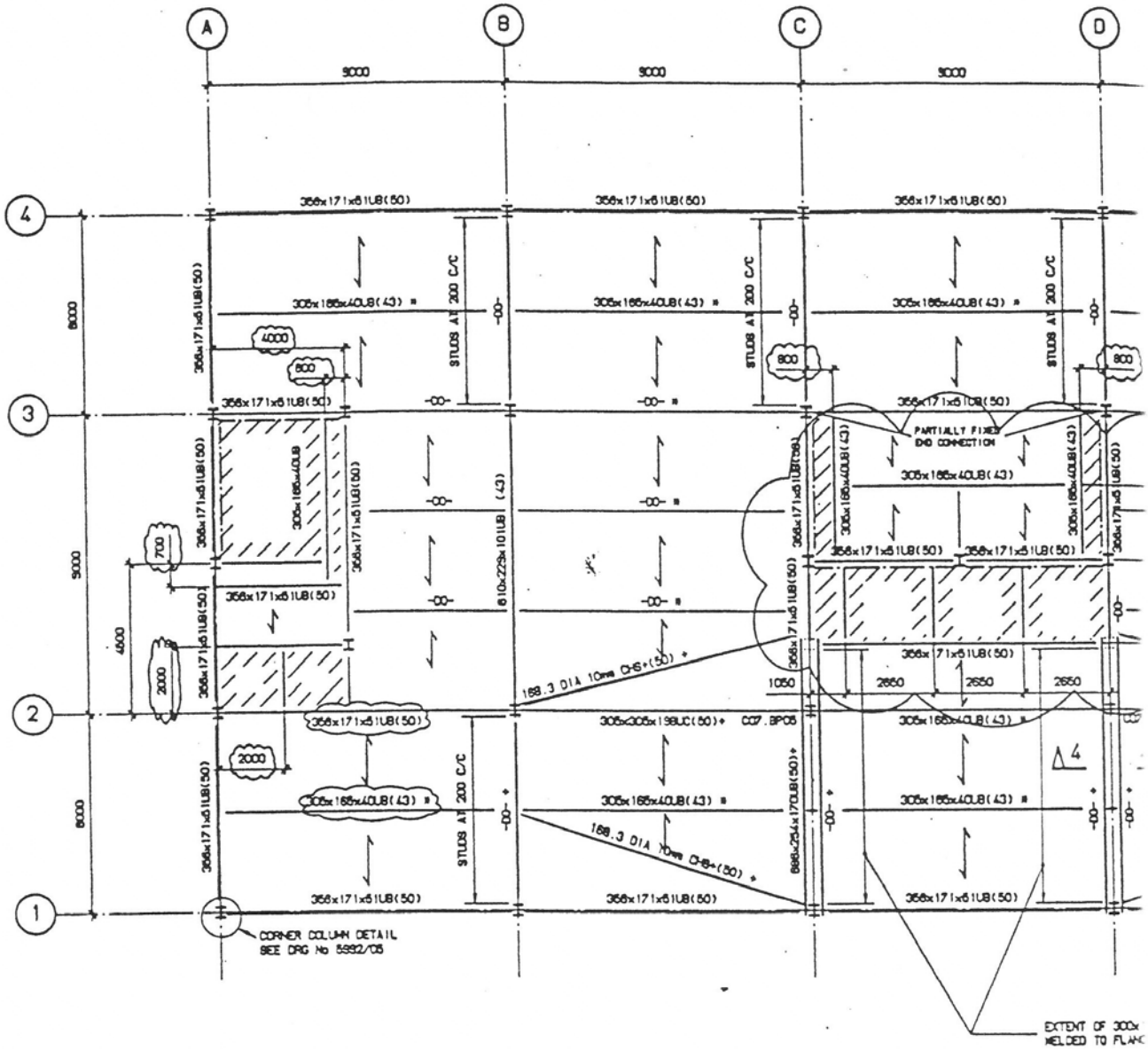
FIRST FLOOR STEEL LAYOUT

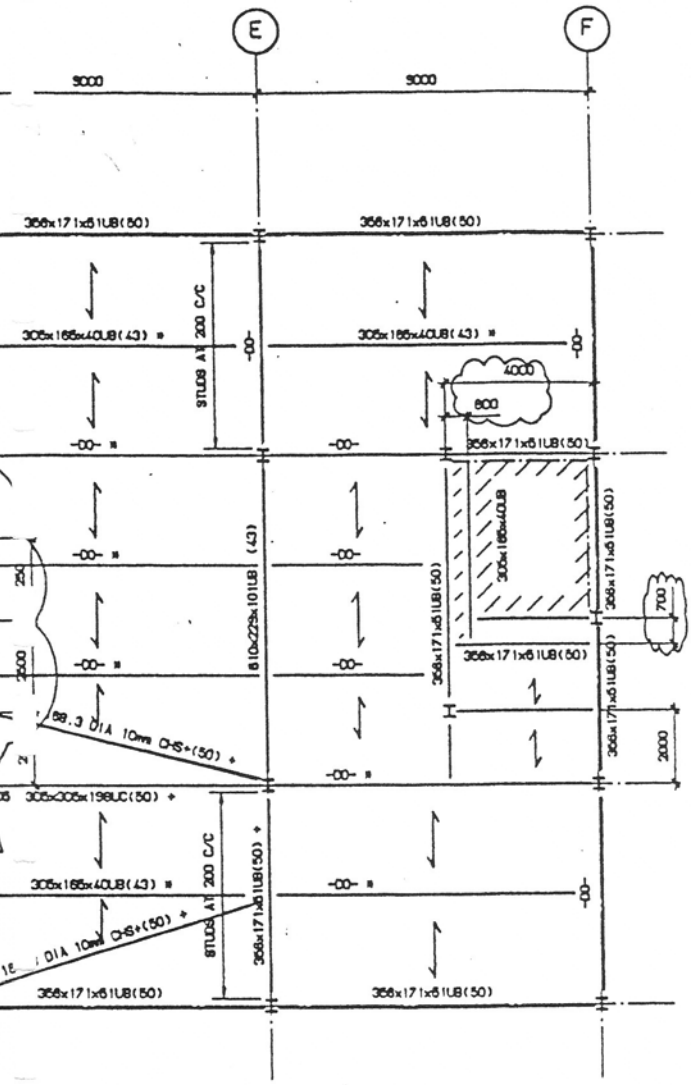
CARDINGTON bre

PETER BRETT ASSOCIATES
CONSULTING ENGINEERS

pba
16 WESTCOTE ROAD READING BERKSHIRE RG3 2DE TEL 0734 500761 FAX 0734 597499

Scales	1:100	Drawing No	5992/02 F
Date 11/08/92	Drawn MJW		
Checked	Passed		


A
B
C
D
9000
9000
9000
4
3
2
1
8000
9000
4500
8000
356x171x61UB(50)
305x165x40UB(43)
STUDS AT 200 C/C
4000
800
700
2000
610x229x101UB (43)
168.3 DIA 10mm CHS+(50)
305x305x198UC(50)+ CG7. BP08
868x254x170UB(50)+
1050
2650
PARTIALLY FIXED END CONNECTION
CORNER COLUMN DETAIL
SEE DRG No 5992/05
EXTENT OF 300x
WELDED TO FLANG



GENERAL NOTES.

1.1 THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS, SERVICE ENGINEERS AND STRUCTURAL ENGINEERS DRAWINGS AND SPECIFICATIONS.

1.2 ALL DIMENSIONS ARE IN MILLIMETRES.

1.3 DIMENSIONS SHOULD NOT BE SCALED FROM THIS DRAWING.

1.4 ALL LEVELS ARE IN METRES AND UNLESS OTHERWISE NOTED ARE STRUCTURAL LEVELS.

STEELWORK:-

2.1 ALL STEEL TO BE BLAST CLEANED. NO PAINTING REQUIRED.

2.2 ALL STEELWORK TO BE GRADE 43B TO BS4360, TUBES 50C, UNLESS NOTED OTHERWISE.

2.3 THE STEELWORK CONTRACTOR SHALL BE RESPONSIBLE FOR STABILITY OF THE STRUCTURE DURING ALL STAGES OF ERECTION.

2.4 ALL BOLTS TO BE M20 (GRADE 8.8) UNLESS NOTED OTHERWISE

2.5 FRAME TO BE BRACED SIMPLE DESIGN. (BRACING AROUND CENTRAL CORE AND ESCAPE STAIRS)

2.6 P.B.A. TO COMPLETE OVERALL FRAMING PLAN, REACTIONS ETC. FABRICATOR TO PROVIDE THE CONNECTION CALCULATIONS TO PBA ACCEPTANCE USING ONE OF THE 3 "INDUSTRY" STANDARDS PROMOTED BY SCI/BCSA EXCEPT THE SECOND FLOOR TRANSFER STRUCTURE WHICH WILL BE DESIGNED AND DETAILED JOINTLY BY PBA AND THE FABRICATOR.

2.7 ALL PERIMETER BEAMS HAVE BEEN DESIGNED TO ALLOW FOR UP TO 200 THK SINGLE SKIN BLOCKWORK (DENSITY < 1400KG/m3) ANY ADDITIONAL CLADDING SHOULD NOT EXCEED AN UNFACTURED LOAD OF 1KN/m2 ON ELEVATION. FINAL SOLUTION TO BE CONFIRMED WITH PBA.

2.8 STEEL DESIGN STANDARD IS BS.5950.

2.9 FOR BID PURPOSES ADD 7.5% TO ALL COLUMN AND BEAM WEIGHTS TO ALLOW FOR CONNECTIONS, BASEPLATES & HD BOLTS.

DECKING:-

3.1 PMF DECKING TO BE CONTINUOUS OVER A MINIMUM OF 2 SPANS. SHEETS TO BE FIXED TO SUPPORTING STEEL WITH SHOT FIRED FIXINGS. A MINIMUM OF 2 No FIXINGS AT EACH END OF SHEET AT 500 CENTRES AND 1 No FIXING INTERMEDIATE SUPPORTS.

3.2 SEAMS BETWEEN PMF SHEETS TO BE EITHER RIVETED OR SPOT WELDED AT 1/4 SPAN POINTS.

3.3 JOINTS IN DECKING TO BE TAPED TO PREVENT GROUT LOSS.

3.4 PMF CF70 DECK (0.9mm) TO BE USED WITH 1 LAYER A142 MESH IN TOP. SEPERATE R.C. FLOOR PLAN TO BE USED FOR CONSTRUCTION.

3.5 95mm x 19 DIAMETER SHEAR STUDS OF 350N/mm2 MINIMUM YIELD STRESS ARE TO BE WELDED THROUGH THE DECKING TO ALL SUPPORT BEAMS AT 300 c/c U.N.O. WITH THE 'NELSON' WELD THROUGH TECHNIQUE OR SIMILAR APPROVED. STUD WELDS TO BE CARRIED OUT BY APPROVED OPERATOR.

3.6 CONCRETE TO BE GRADE 35 LIGHT WEIGHT AGGREGATE.

4.1 FLOOR LOADINGS:-

DEAD:- SLAB 2.6 KN/m2
RAISED FLOOR 0.4 KN/m
SERVICES 0.25 KN/m2
CEILING 0.15 KN/m2
STEEL SELF WEIGHT 0.26 KN/m2

LIVE:- IMPOSED 2.5 KN/m2
PARTITIONS 1.0 KN/m2

ROOF LOADINGS:-

DEAD:- SLAB 2.6 KN/m2
50 SCREED 1.2 KN/m2
SERVICES 0.25 KN/m2
CEILING 0.15 KN/m2
STEEL SELF WEIGHT 0.25 KN/m2

LIVE:- PLANT 7.5 KN/m2
SUPER 0.90N/m2

REFERENCE DRAWINGS:-

5.1

DRAWING No	TITLE/CONTENT
5992/01	GROUND FLOOR LAYOUT
02	FIRST FLOOR STEEL LAYOUT
03	SECOND FLOOR STEEL LAYOUT
04	THIRD - SEVENTH FLOOR STEEL LAYOUT
05	TYPICAL STEEL DETAILS
06	ELEVATION ON GRIDLINE A
07	ROOF STEEL LAYOUT.

ARCHITECT - PENTAR ARCHITECTS

REFERENCE DRAWINGS:-

5.1

DRAWING No	TITLE/CONTENT
5992/08	FIRST FLOOR STEEL LAYOUT CONNECTION FORCES
09	SECOND FLOOR STEEL LAYOUT CONNECTION FORCES
10	THIRD - SEVENTH FLOOR STEEL LAYOUT CONNECTION FORCES
11	ROOF STEEL LAYOUT CONNECTION DETAILS

KEY

1. ALL BEAMS NOT NOTED ARE 254x146x31UB.
2. '*' APPLIES TO 305x165x40UB RIBS 3000mm LONG WHICH REQUIRE 35mm PRECAMBER.
3. = VOID.
4. = ATRIUM WALKWAY BY OTHERS.
5. = VERTICAL CROSS BRACED BAYS. FOUNDATION TO FOURTH FLOOR = 250x16 FLATS (50) FOURTH TO ROOF = 200x10 FLATS (50) BRACING TO BE COINCIDENT WITH AXES OF COLUMNS.

GENERAL NOTES CONT

6.1 PERIMETER BEAMS ON GRIDS 1 & 4 TO HAVE 4 No HOLES M12 BOLTS @ 225 c/c FOR ANCON PARAPET POSTS AT 2.25m C/C SIMILAR APPROVED (160x70x900 HIGH).

6.2 '+' DENOTES MEMBER DESIGNED AS KEY ELEMENT TO BS 5950 PART1.

REVISIONS. (CONT-D)

F	STUD SPACING REDUCED FOR BEAMS AS SHOWN	14/12/92	JIC
	COL ORIENTATION GRID C & D / 2.0m OFFSET		
	GRID 2 AMENDED. NOTES REVISED.		

FOR CONSTRUCTION

E	VERTICAL BRACING SIZE AMENDED	17/11/92	JIC
	COL ORIENTATION GRID C & D REVISED.		
	P.M.F. / STUD SPACING AMENDED.		
D	SHEAR STUD SPACING AMENDED. BM.GRID 2/A-B.	30/10/92	JIC
C	ISSUED FOR BID		
	BRACING SECTION-NOTES REVISED	23/09/92	MB
B	356 UB SECTION AND NOTE 2.7 REVISED	07/09/92	MB
A	ISSUED FOR INFORMATION	13/08/92	MB
Mark	Revision	Date	Drawn

MULTI - STOREY STRUCTURAL AND FIRE TEST FACILITY

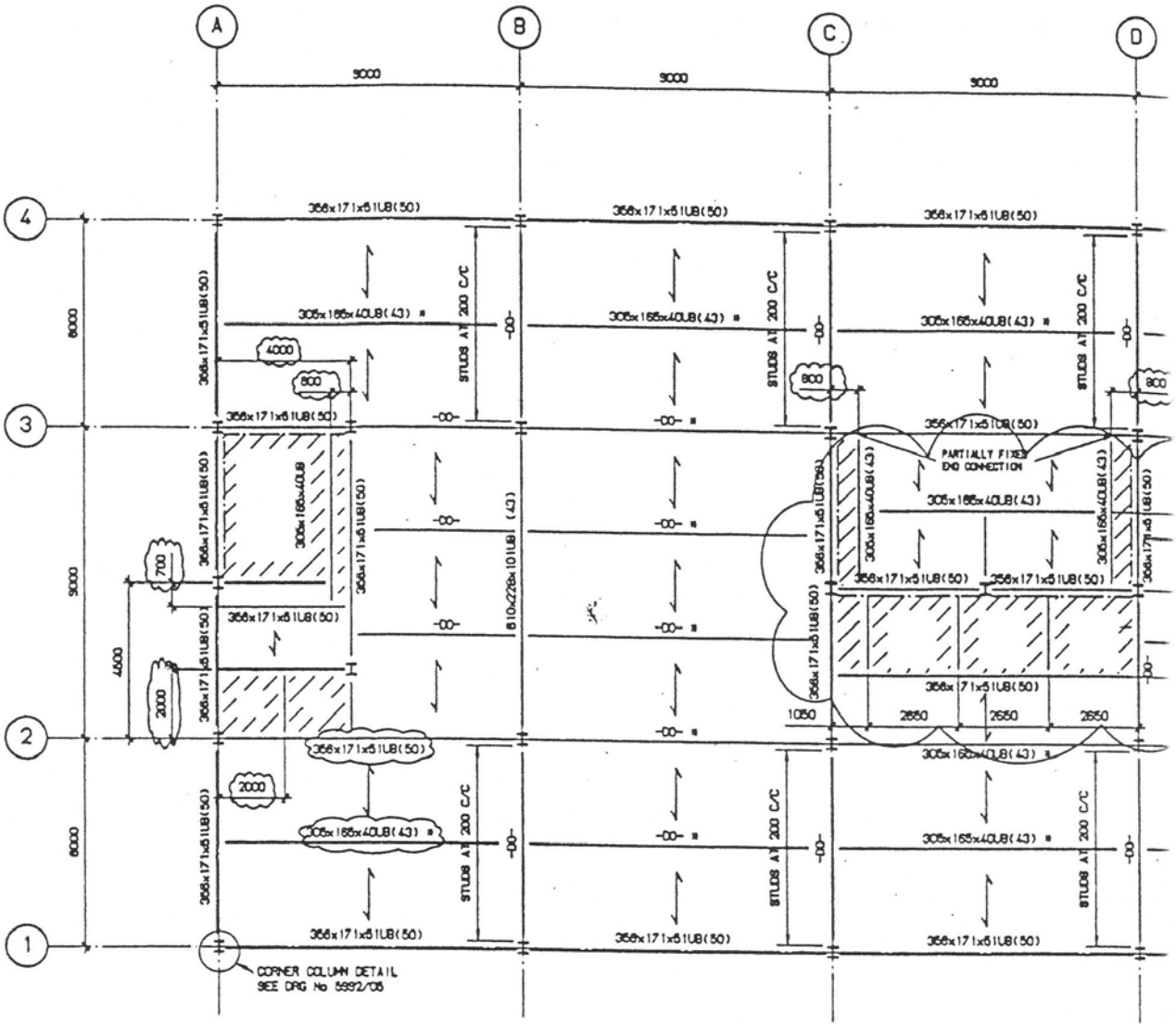
SECOND FLOOR STEEL LAYOUT

CARDINGTON bre

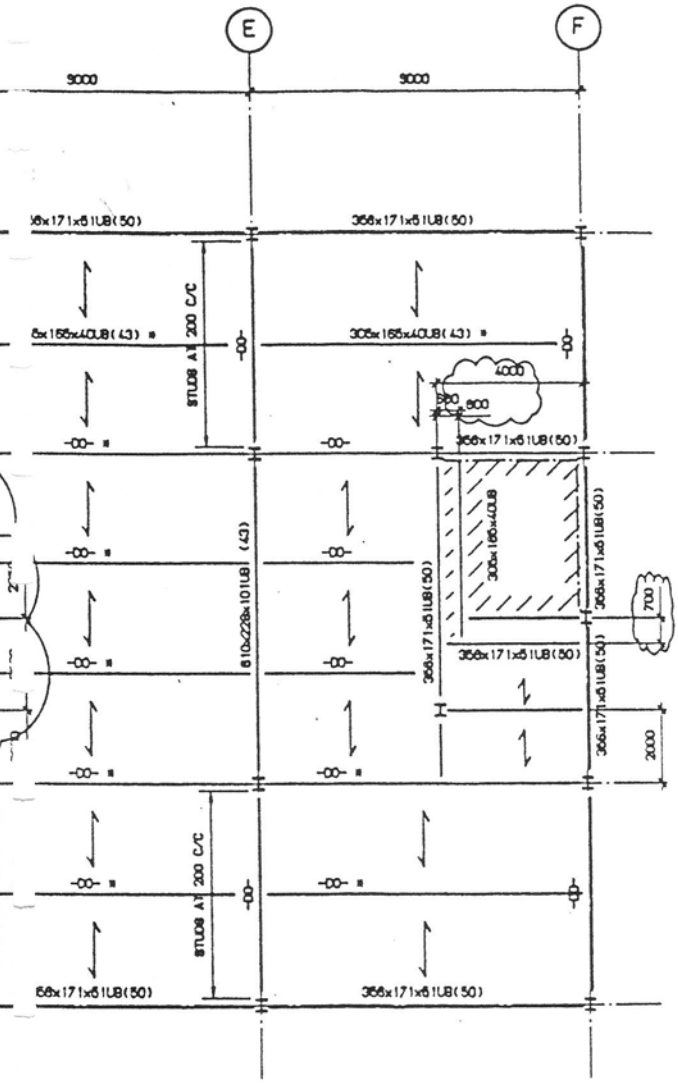
PETER BRETT ASSOCIATES
CONSULTING ENGINEERS

pba
16 WESTCOTE ROAD READING BERKSHIRE RG3 2DE TEL 0734 500761 FAX 0734 597498

Scales	1:100	Drawing No	5992/03 F
Date 11/08/92	Drawn MJM		
Checked	Passed		


A
B
C
D
9000
9000
9000
4
3
2
1
8000
9000
8000
4600
356x171x51UB(50)
305x165x40UB(43)
610x229x101UB(43)
STUDS AT 200 C/C
4000
800
700
2000
1050
2650
2650
2650
PARTIALLY FIXED END CONNECTION
CORNER COLUMN DETAIL SEE DRG No 5992/06

5 No FLOORS



GENERAL NOTES.

1.1 THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS, SERVICE ENGINEERS AND STRUCTURAL ENGINEERS DRAWINGS AND SPECIFICATIONS.

1.2 ALL DIMENSIONS ARE IN MILLIMETRES.

1.3 DIMENSIONS SHOULD NOT BE SCALED FROM THIS DRAWING.

1.4 ALL LEVELS ARE IN METRES AND UNLESS OTHERWISE NOTED ARE STRUCTURAL LEVELS.

STEELWORK:-

2.1 ALL STEEL TO BE BLAST CLEANED. NO PAINTING REQUIRED.

2.2 ALL STEELWORK TO BE GRADE 43B TO BS4360, TUBES 50C, UNLESS NOTED OTHERWISE.

2.3 THE STEELWORK CONTRACTOR SHALL BE RESPONSIBLE FOR STABILITY OF THE STRUCTURE DURING ALL STAGES OF ERECTION.

2.4 ALL BOLTS TO BE M20 (GRADE 8.8) UNLESS NOTED OTHERWISE

2.5 FRAME TO BE BRACED SIMPLE DESIGN. (BRACING AROUND CENTRAL CORE AND ESCAPE STAIRS)

2.6 P.B.A. TO COMPLETE OVERALL FRAMING PLAN, REACTIONS ETC. FABRICATOR TO PROVIDE THE CONNECTION CALCULATIONS TO PBA ACCEPTANCE USING ONE OF THE 3 "INDUSTRY" STANDARDS PROMOTED BY SCI/BCSA EXCEPT THE SECOND FLOOR TRANSFER STRUCTURE WHICH WILL BE DESIGNED AND DETAILED JOINTLY BY PBA AND THE FABRICATOR.

2.7 ALL PERIMETER BEAMS HAVE BEEN DESIGNED TO ALLOW FOR UP TO 200 THK SINGLE SKIN BLOCKWORK (DENSITY < 1400KG/m3) ANY ADDITIONAL CLADDING SHOULD NOT EXCEED AN UNFACTURED LOAD OF 1KN/m2 ON ELEVATION. FINAL SOLUTION TO BE CONFIRMED WITH PBA.

2.8 STEEL DESIGN STANDARD IS BS.5950.

2.9 FOR BID PURPOSES ADD 7.5% TO ALL COLUMN AND BEAM WEIGHTS TO ALLOW FOR CONNECTIONS, BASEPLATES & HD BOLTS.

DECKING:-

3.1 PMF DECKING TO BE CONTINUOUS OVER A MINIMUM OF 2 SPANS. SHEETS TO BE FIXED TO SUPPORTING STEEL WITH SHOT FIRED FIXINGS. A MINIMUM OF 2 No FIXINGS AT EACH END OF SHEET AT 600 CENTRES AND 1 No FIXING INTERMEDIATE SUPPORTS.

3.2 SEAMS BETWEEN PMF SHEETS TO BE EITHER RIVETED OR SPOT WELDED AT 1/4 SPAN POINTS.

3.3 JOINTS IN DECKING TO BE TAPED TO PREVENT GROUT LOSS.

3.4 PMF CF70 DECK (0.9mm) TO BE USED WITH 1 LAYER A142 MESH IN TOP. SEPERATE R.C. FLOOR PLAN TO BE USED FOR CONSTRUCTION.

3.5 95mm x 19 DIAMETER SHEAR STUDS OF 350N/mm2 MINIMUM YIELD STRESS ARE TO BE WELDED THROUGH THE DECKING TO ALL SUPPORT BEAMS AT 300 c/c U.N.O. WITH THE 'NELSON' WELD THROUGH TECHNIQUE OR SIMILAR APPROVED. STUD WELDS TO BE CARRIED OUT BY APPROVED OPERATOR.

3.6 CONCRETE TO BE GRADE 35 LIGHT WEIGHT AGGREGATE.

4.1 FLOOR LOADINGS:-

DEAD:- SLAB 2.6 KN/m2
RAISED FLOOR 0.4 KN/m
SERVICES 0.25 KN/m2
CEILING 0.15 KN/m2
STEEL SELF WEIGHT 0.25 KN/m2
LIVE:- IMPOSED 2.5 KN/m2
PARTITIONS 1.0 KN/m2

ROOF LOADINGS:-

DEAD:- SLAB 2.6 KN/m2
50 SCREED 1.2 KN/m2
SERVICES 0.25 KN/m2
CEILING 0.15 KN/m2
STEEL SELF WEIGHT 0.25 KN/m2
LIVE:- PLANT 7.5 KN/m2
SUPER 0.6KN/m2

REFERENCE DRAWINGS:-

5.1

DRAWING No	TITLE/CONTENT
5992/01	GROUND FLOOR LAYOUT
02	FIRST FLOOR STEEL LAYOUT
03	SECOND FLOOR STEEL LAYOUT
04	THIRD - SEVENTH FLOOR STEEL LAYOUT
05	TYPICAL STEEL DETAILS
06	ELEVATION ON GRIDLINE A
07	ROOF STEEL LAYOUT.

ARCHITECT - PENTAR ARCHITECTS

REFERENCE DRAWINGS:-

5.1

DRAWING No	TITLE/CONTENT
5992/08	FIRST FLOOR STEEL LAYOUT CONNECTION FORCES
09	SECOND FLOOR STEEL LAYOUT CONNECTION FORCES
10	THIRD - SEVENTH FLOOR STEEL LAYOUT CONNECTION FORCES
11	ROOF STEEL LAYOUT CONNECTION DETAILS

KEY

1. ALL BEAMS NOT NOTED ARE 254x146x31UB.
2. '*' APPLIES TO 305x165x40UB RIBS 900mm LONG WHICH REQUIRE 35mm PRECAMBER.
3. = VOID.
4. = ATRIUM WALKWAY BY OTHERS.
5. = VERTICAL CROSS BRACED BAYS. FOUNDATION TO FOURTH FLOOR = 250x16 FLATS (50) FOURTH TO ROOF = 200x10 FLATS (50) BRACING TO BE COINCIDENT WITH AXES OF COLUMN.

GENERAL NOTES CONT

6.1 PERIMETER BEAMS ON GRIDS 1 & 4 TO HAVE 4 No HOLES M12 BOLTS FOR ANCON PARAPET POSTS AT 2.25m C/C SIMILAR APPROVED (150x70x300 HIGH).

REVISIONS. (CONT'D)

F	STUD SPACING REDUCED FOR BEAMS AS SHOWN NOTES REVISED.	11/12/92	JLC

FOR CONSTRUCTION

E	VERTICAL BRACING SIZE AMENDED.	17/11/92	JLC
	P.M.F. / STUD SPACING AMENDED.		
D	SHEAR STUD SPACING AMMENDED. BM GRID 2/A-B	30/10/92	JLC
C	ISSUED FOR BID		
	BRACING SECTION/NOTES REVISED	23/09/92	MS
B	356 UB SECTION AND NOTE 2.7 REVISED	07/09/92	MS
A	ISSUED FOR INFORMATION	13/08/92	MS
Mark	Revision	Date	Drawn

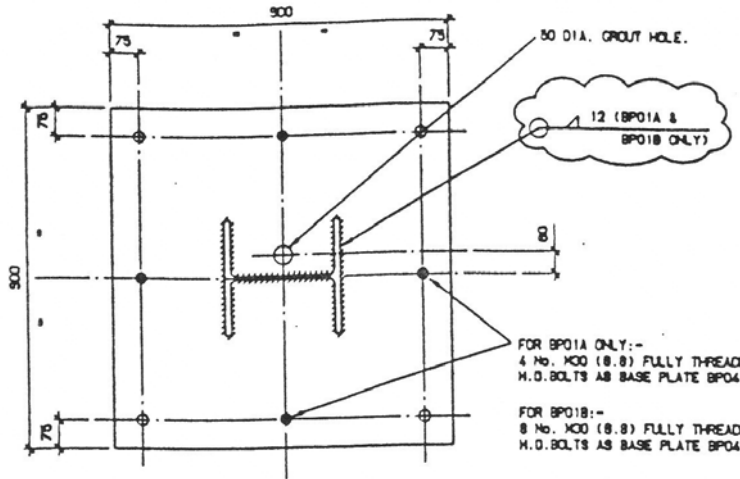
MULTI - STOREY STRUCTURAL AND FIRE TEST FACILITY

THIRD TO SEVENTH FLOOR STEEL LAYOUT

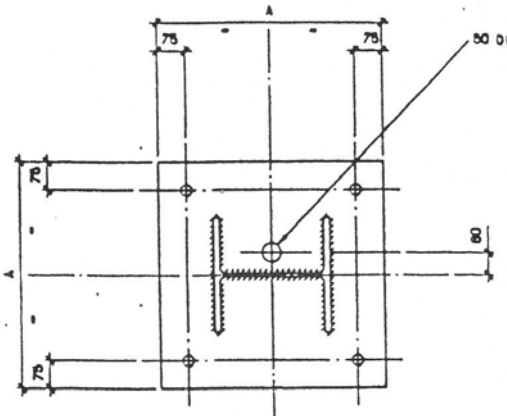
CARDINGTON BRE

PETER BRETT ASSOCIATES
CONSULTING ENGINEERS
pba
16 WESTCOTE ROAD READING BERKSHIRE RG3 2DE TEL 0734 500761 FAX 0734 597498

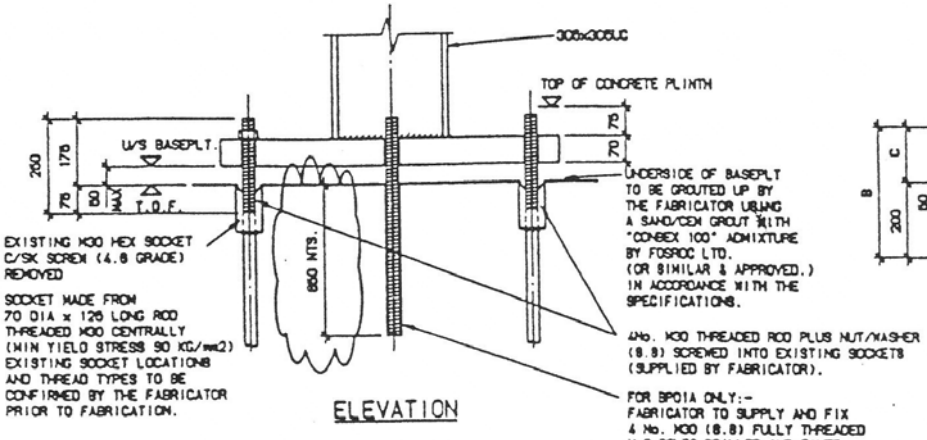
Scales	1:100	Drawing No	5992/04 F
Date 11/08/92	Drawn MJW		
Checked	Passed		



PLAN



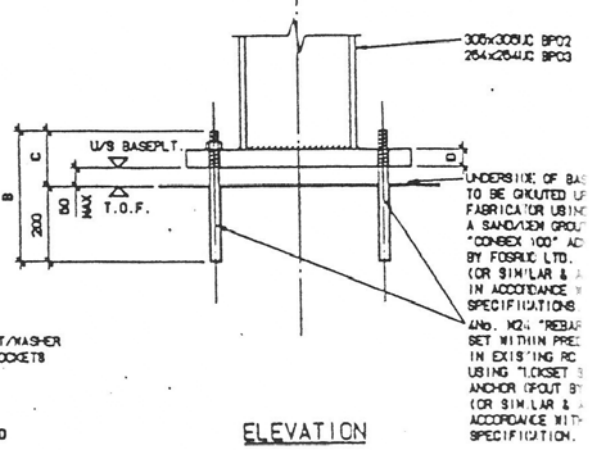
PLAN



ELEVATION

BASE PLATE DETAIL TYPE BP01 & BP01A & BP01B

T.O.F = TOP OF FOUNDATION

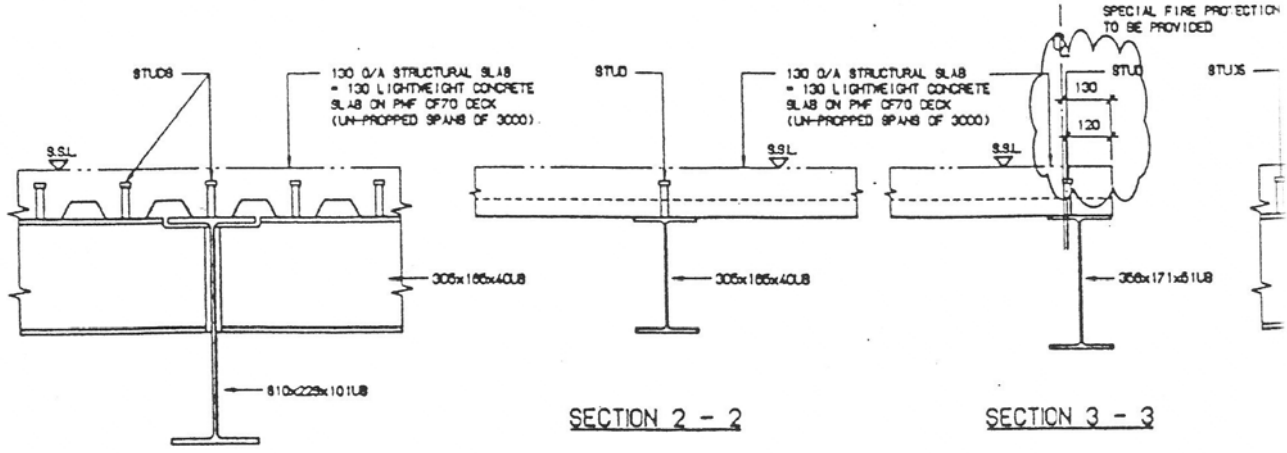


ELEVATION

BASE PLATE DETAIL TYPE BP02 & BP03 &

BASE PLATE SIZES FOR TYPES BP2 & BP3				
TYPE	A	B	C	D
BP02	750	360	150	80
BP03	650	315	115	40
BP06	900	375	175	70

NOTE:- ALL BASE PLATES TO BE GRADE 43 STEEL



SECTION 1 - 1

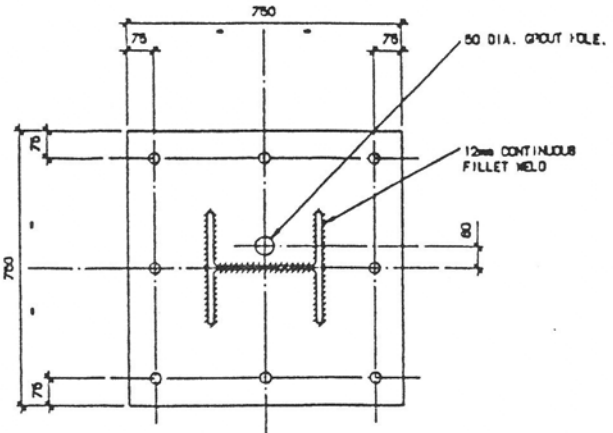
SECTION 2 - 2

SECTION 3 - 3

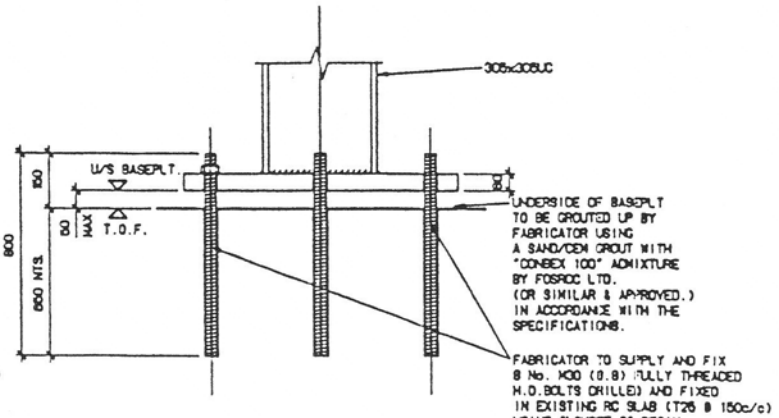
TYPICAL COMPOSITE DETAILS

SE

A. GROUT HOLE.

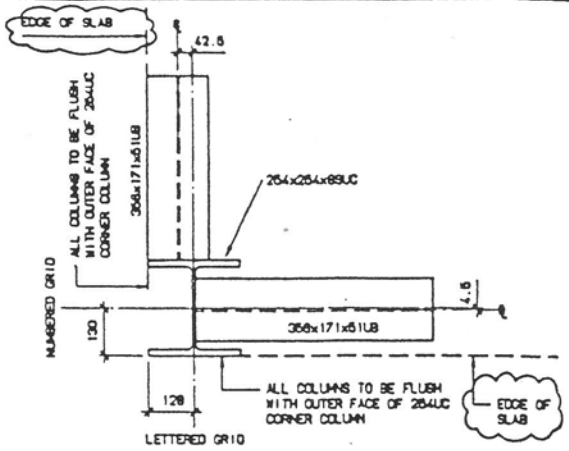


PLAN



ELEVATION

BASE PLATE DETAIL TYPE BP04



TYPICAL CORNER DETAIL SHOWING SETTING OUT

BRACED COLUMN BASEPLATES

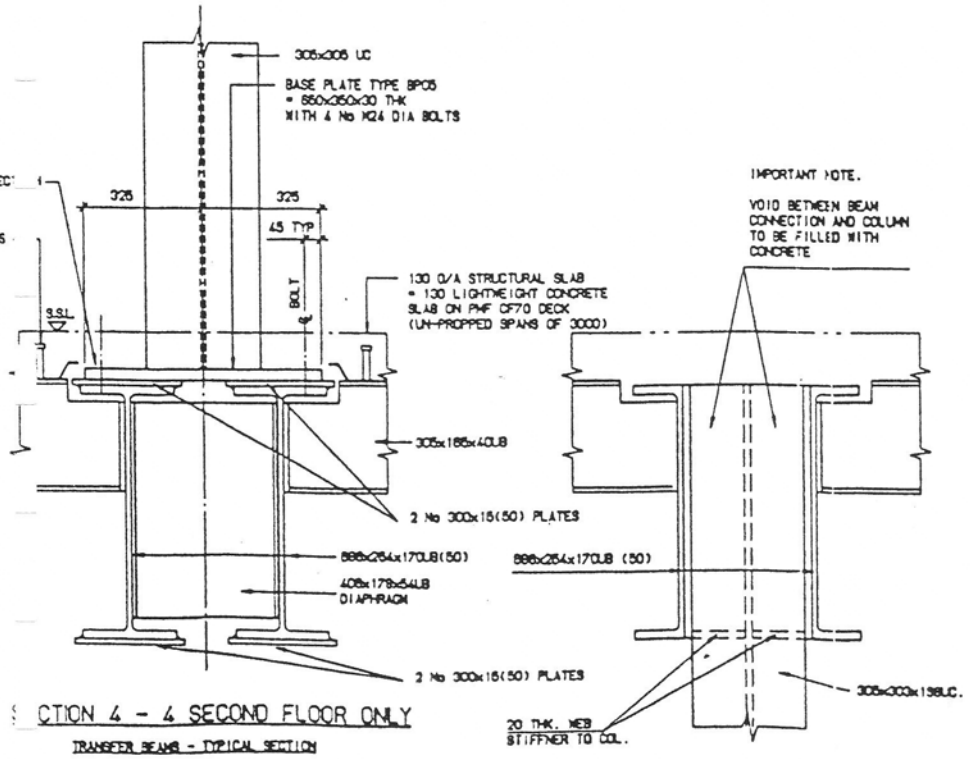
(REFERENCE IS MADE TO SKETCH No's 92086/SK - SK7 SHOWING EXISTING LOCATION OF BOLTS RELATIVE TO PROPOSED HOLES IN BASEPLATE)

1. WHERE AN OVERSIZED HOLE EXISTS THROUGH BASEPLATE THEN ALL VOIDS BETWEEN THE THREAD AND THE EDGE OF THE HOLE ARE TO BE FILLED WITH GROUT AND INSPECTED BY THE ENGINEER PRIOR TO THE WELDING OF ANY PLATES.
2. FOR 50/80mm DIA. OVERSIZED HOLE. - TACK WELD 120x120x15 THK. PLATE.

NOTE

1. DIAMOND DRILLING MAY BE USED IF EXISTING RAFT REINFORCEMENT CLASHES WITH HD BOLT LOCATIONS, BUT FINAL DRILLED HOLES MUST BE ROUGHENED PRIOR TO RESIN GROUTING.
2. ALL BASE PLATES TO BE CONCRETE CASED BY FABRICATOR WITH 75mm COVER.
3. COLUMN TO BASEPLATE CONNECTION TO BE 8mm FILLET WELD (FULL PROFILE) UNLESS NOTED OTHERWISE.
4. REFER TO SKETCH No's SK1 & SK2 FOR ANCON FIXING / SBFD ANCHOR FIXING DETAILS.

FOR GENERAL NOTES AND SECTION LOCATIONS REFER TO FLOOR LAYOUTS DRG Nos 5922/01-04



CTION 4 - 4 SECOND FLOOR ONLY

TRANSFER BEAMS - TYPICAL SECTION

DETAIL AT CONNECTION OF TRANSFER BEAM TO COLUMN

FOR CONSTRUCTION

ARCHITECT - PENTAR ARCHITECTS.

F	DETAIL ADDED. NOTES ADDED AS SHOWN.	15/12/92	jlc
E	BASE PLT TYPE BP01B & BP08 ADDED	18/11/92	jlc
	TEREADED RODS AMENDED.		
D	BPO3 BASEPLATE THICKNESS AMENDED	27/10/92	jlc
	WELD THICKNESS ADDED.		
C	PLATE ADDED TO SECTION 4 - 4	23/09/92	MB
B	ISSUED FOR BID.		
	HD BOLT DETAILS REVISED	23/09/92	MB
A	ISSUED FOR INFORMATION	13/08/92	MB
Mark	Revision	Date	Drawn

MULTI - STOREY STRUCTURAL AND FIRE TEST FACILITY

TYPICAL STEEL DETAILS

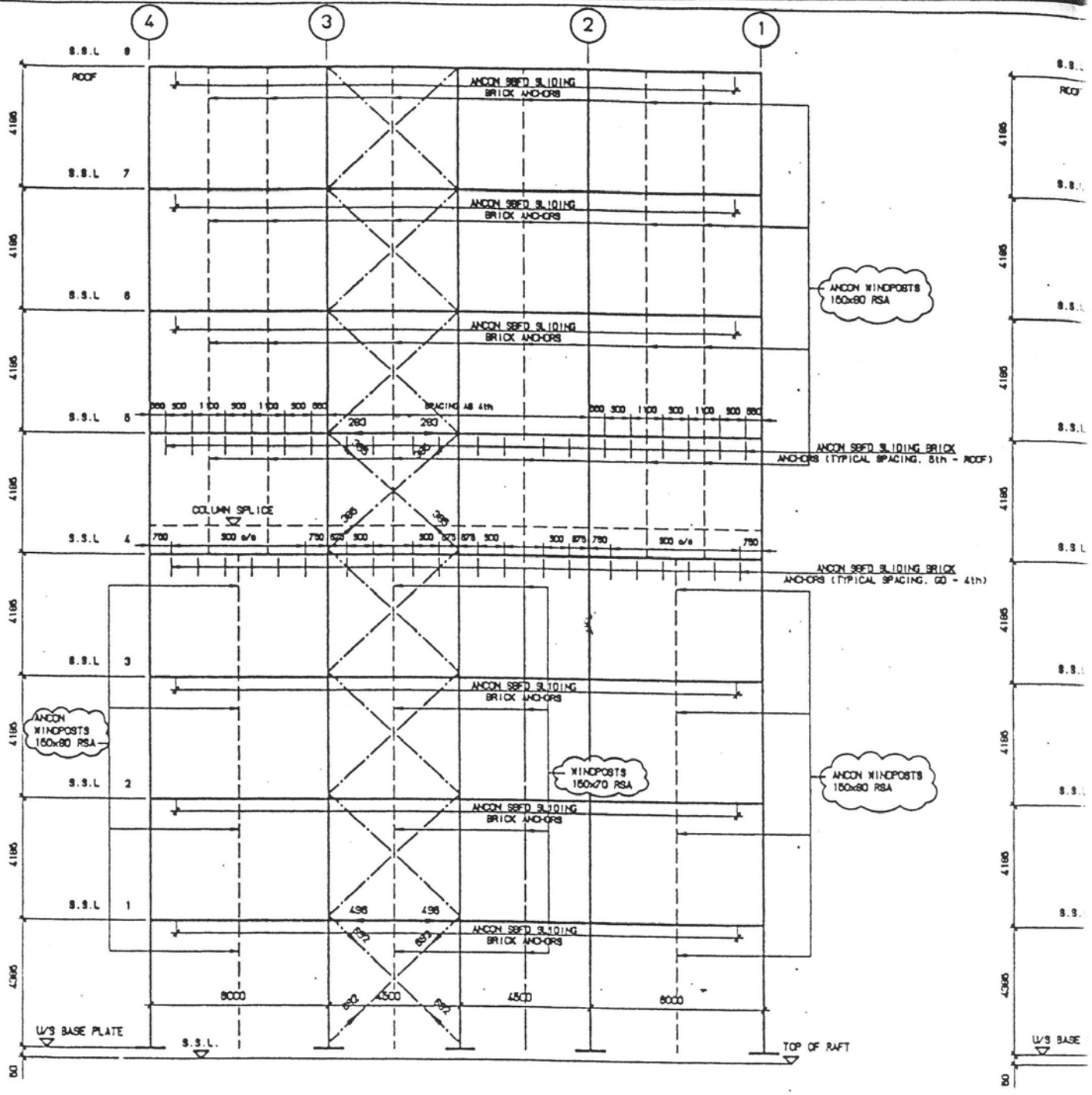
CARDINGTON bre

PETER BRETT ASSOCIATES
CONSULTING ENGINEERS

pba

16 WESTCOTE ROAD · READING · BERKSHIRE RG30 2DE · TEL 0734 500761 · FAX 0734 597498

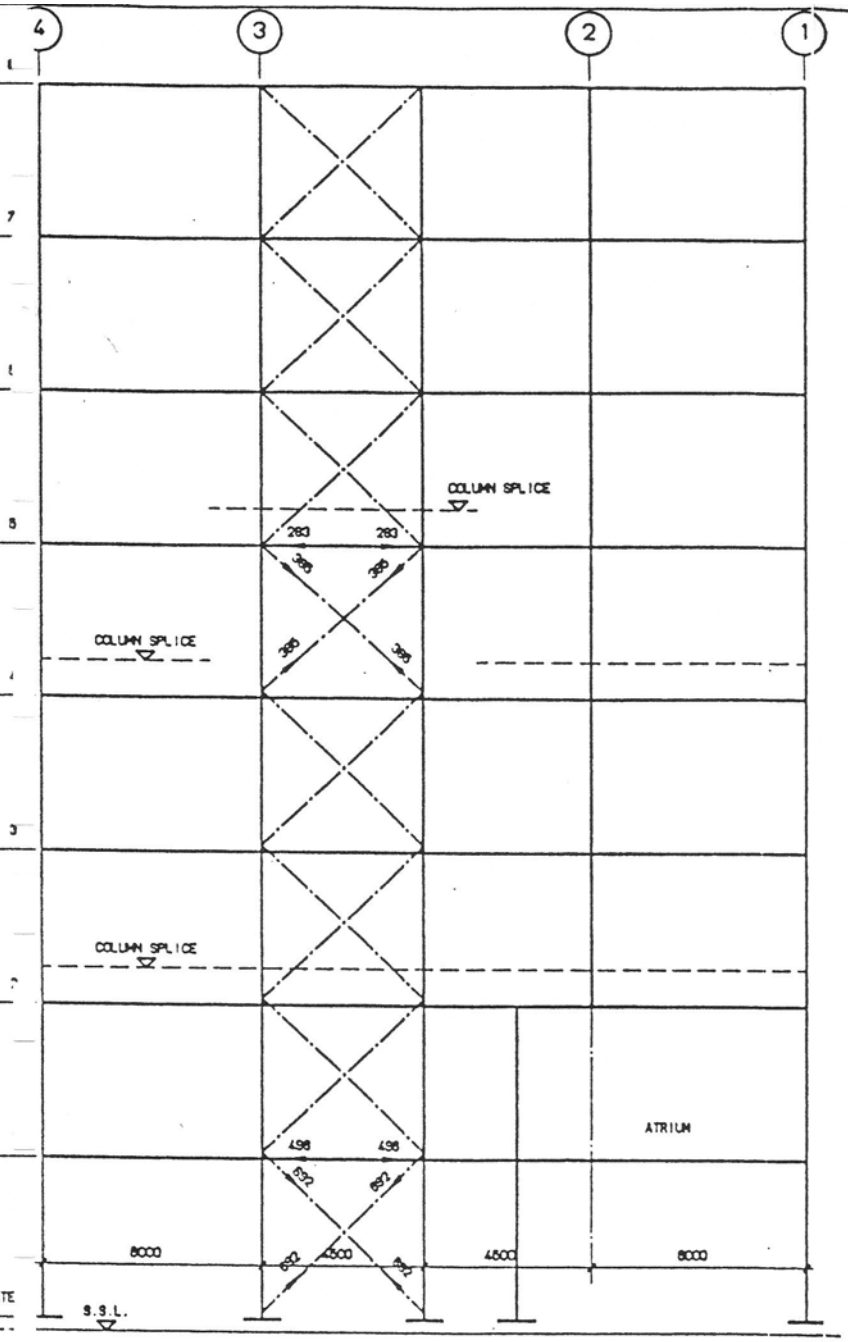
Scales	1:10		Drawing No
Date	11/08/92	Drawn MB	5992/05 F
Checked		Passed	



S.S.L = STRUCTURAL SLAB LEVEL

ELEVATION ON GRIDLINE A

ELEVATION ON GRIDLINE F SIMILAR BUT HANDED



ELEVATION ON GRIDLINE C

NOTE

ALL FORCES ARE ULTIMATE LOADS IN kN

SPLICE FORCES (TENSILE)

BRACED COLUMN SPLICE @ 4th / 5th	T = 620 kN ULT.
BRACED COLUMN SPLICE @ 2 nd	T = 1320 kN
NON BRACED EXTERNAL COL. SPLICE	T = 316 kN
NON BRACED INTERNAL COL. SPLICE	T = 430 kN
COLUMN C07 BASEPLATE	T = 860 kN

NOTE:

REFER TO SKETCH No s SK1 & SK2 FOR ANCON FIXING / SBFD ANCHOR FIXING DETAILS.

FOR GENERAL NOTES REFER TO FLOOR LAYOUTS DRG Nos 5992/01-04

ARCHITECT - PENTAR ARCHITECTS.

Mark	Revision	Date	Drawn
E	ANCON SBFD SPACINGS AMENDED.	15/12/92	jlc
D	ANCON POSTS TO ATRIUM OMITTED.	16/11/92	jlc
	SPLICE AT 5th FLOOR LOCATED.		
C	WIND POST ADDED WITHIN ATRIUM AREA.	30/10/92	jlc
B	ISSUED FOR BID		
	GRID NUMBERS ADDED	23/09/92	MB
A	ISSUED FOR INFORMATION	13/08/92	MB

MULTI - STOREY STRUCTURAL AND FIRE TEST FACILITY

ELEVATION ON GRIDLINE A

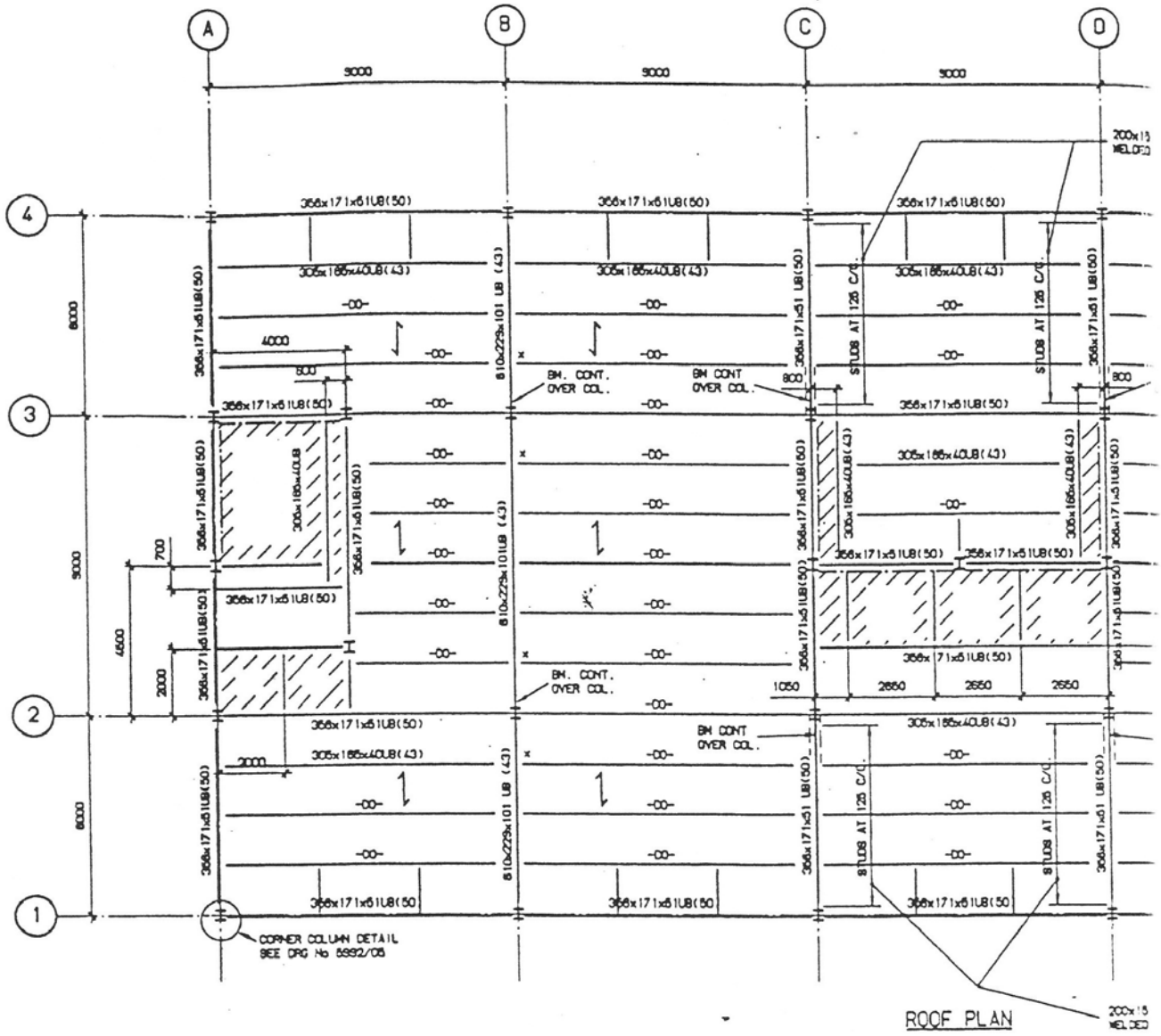
CARDINGTON bre

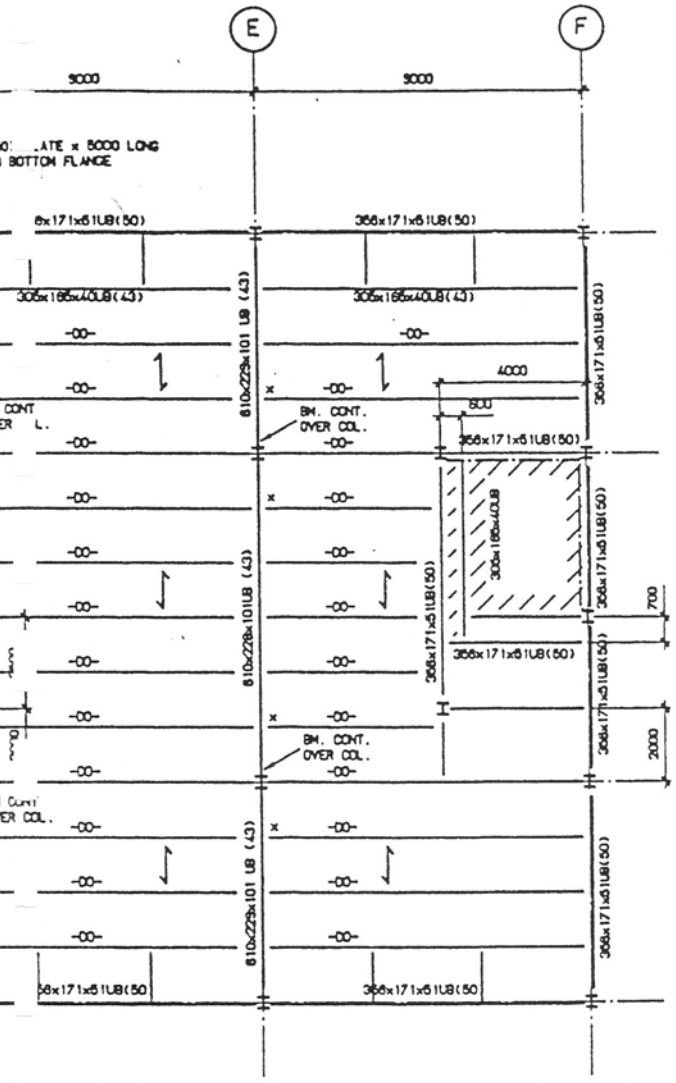
PETER BRETT ASSOCIATES
CONSULTING ENGINEERS

pba
16 WESTCOTE ROAD · READING · BERKSHIRE RG3 2DE · TEL 0734 500761 · FAX 0734 597498

Scales	1:100		Drawing No
Date	11/08/92	Drawn MB	5992/06 E
Checked		Passed	

FOR CONSTRUCTION


A
B
C
D
9000
9000
9000
4
3
2
1
8000
9000
6000
356x171x61UB(50)
305x165x40UB(43)
810x229x101 UB (43)
356x171x51 UB(50)
BM. CONT. OVER COL.
BM CONT OVER COL.
STUDS AT 125 C/C.
4000
800
700
4500
2000
1050
2650
CORNER COLUMN DETAIL SEE DRG No 5992/05
200x15 WELDED
ROOF PLAN



) TE x 5000 LONG
BOTTOM FLANGE

REFERENCE DRAWINGS:-

5.1

DRAWING No	TITLE/CONTENT
5992/08	FIRST FLOOR STEEL LAYOUT CONNECTION FORCES
09	SECOND FLOOR STEEL LAYOUT CONNECTION FORCES
10	THIRD - SEVENTH FLOOR STEEL LAYOUT CONNECTION FORCES
11	ROOF STEEL LAYOUT CONNECTION DETAILS

KEY

1. ALL BEAMS NOT NOTED ARE 254x146x31UB.
2. = VOID.
3. = ATRIUM WALKWAY BY OTHERS.
4. —·——·— = VERTICAL CROSS BRACED BAYS FOUNDATION TO FOURTH FLOOR = 250x16 FLATS (50) FOURTH TO ROOF = 200x10 FLATS (50) BRACING TO BE COINCIDENT WITH AXES OF COLUMN.
5. = = = = 2/8mm WEB PLATES
6. WEB STIFFENERS TO BE PROVIDED AT LOCATION OF CONTINUOUS BEAMS OVER COLUMN SUPPORTS.
7. FULL DEPTH FIN PLATE / STIFFENER DENOTED X
8. 4 No 18 DIA. HOLES TO BE PROVIDED IN TOP FLANGE FOR CRADLE SUPPORTS. (REFER SK 3)

GENERAL NOTES.

1.1 THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS, SERVICE ENGINEERS AND STRUCTURAL ENGINEERS DRAWINGS AND SPECIFICATIONS.

1.2 ALL DIMENSIONS ARE IN MILLIMETRES.

1.3 DIMENSIONS SHOULD NOT BE SCALED FROM THIS DRAWING.

1.4 ALL LEVELS ARE IN METRES AND UNLESS OTHERWISE NOTED ARE STRUCTURAL LEVELS.

STEELWORK:-

2.1 ALL STEEL TO BE BLAST CLEANED. NO PAINTING REQUIRED.

2.2 ALL STEELWORK TO BE GRADE 43B TO BS4360, TUBES 50C, UNLESS NOTED OTHERWISE.

2.3 THE STEELWORK CONTRACTOR SHALL BE RESPONSIBLE FOR STABILITY OF THE STRUCTURE DURING ALL STAGES OF ERECTION.

2.4 ALL BOLTS TO BE M20 (GRADE 8.8) UNLESS NOTED OTHERWISE

2.5 FRAME TO BE BRACED SIMPLE DESIGN. (BRACING AROUND CENTRAL CORE AND ESCAPE STAIRS)

2.6 P.B.A. TO COMPLETE OVERALL FRAMING PLAN, REACTIONS ETC. FABRICATOR TO PROVIDE THE CONNECTION CALCULATIONS TO PBA ACCEPTANCE USING ONE OF THE 3 "INDUSTRY" STANDARDS PROMOTED BY SCI/BCSA EXCEPT THE SECOND FLOOR TRANSFER STRUCTURE WHICH WILL BE DESIGNED AND DETAILED JOINTLY BY PBA AND THE FABRICATOR.

2.7 ALL PERIMETER BEAMS HAVE BEEN DESIGNED TO ALLOW FOR UP TO 200 THK SINGLE SKIN BLOCKWORK (DENSITY < 1400KG/m3) ANY ADDITIONAL CLADDING SHOULD NOT EXCEED AN UNFACTURED LOAD OF 1KN/m2 ON ELEVATION. FINAL SOLUTION TO BE CONFIRMED WITH PBA.

2.8 STEEL DESIGN STANDARD IS BS.5950.

2.9 FOR BID PURPOSES ADD 7.5% TO ALL COLUMN AND BEAM WEIGHTS TO ALLOW FOR CONNECTIONS, BASEPLATES & HD BOLTS.

DECKING:-

3.1 PMF DECKING TO BE CONTINUOUS OVER A MINIMUM OF 2 SPANS. SHEETS TO BE FIXED TO SUPPORTING STEEL WITH SHOT FIRED FIXINGS. A MINIMUM OF 2 No FIXINGS AT EACH END OF SHEET AT 500 CENTRES AND 1 No FIXING INTERMEDIATE SUPPORTS.

3.2 SEAMS BETWEEN PMF SHEETS TO BE EITHER RIVETED OR SPOT WELDED AT 1/4 SPAN POINTS.

3.3 JOINTS IN DECKING TO BE TAPED TO PREVENT GROUT LOSS.

3.4 PMF CF70 DECK (0.9mm) TO BE USED WITH 1 LAYER A142 MESH IN TOP. SEPERATE R.C. FLOOR PLAN TO BE USED FOR CONSTRUCTION.

3.5 95mm x 19 DIAMETER SHEAR STUDS OF 350N/mm2 MINIMUM YIELD STRESS ARE TO BE WELDED THROUGH THE DECKING TO ALL SUPPORT BEAMS AT 300 c/c U.N.O. WITH THE "NELSON" WELD THROUGH TECHNIQUE OR SIMILAR APPROVED. STUD WELDS TO BE CARRIED OUT BY APPROVED OPERATOR.

3.6 CONCRETE TO BE GRADE 35 LIGHT WEIGHT AGGREGATE.

4.1 FLOOR LOADINGS:-

DEAD:- SLAB 2.8 KN/m2
RAISED FLOOR 0.4 KN/m
SERVICES 0.25 KN/m2
CEILING 0.15 KN/m2
STEEL SELF WEIGHT 0.25 KN/m2
LIVE:- IMPOSED 2.5 KN/m2
PARTITIONS 1.0 KN/m2

ROOF LOADINGS:-

DEAD:- SLAB 2.8 KN/m2
50 SCREED 1.2 KN/m2
SERVICES 0.25 KN/m2
CEILING 0.15 KN/m2
STEEL SELF WEIGHT 0.25 KN/m2
LIVE:- PLANT 7.5 KN/m2
SUPER 0.5KN/m2

REFERENCE DRAWINGS:-

5.1

DRAWING No	TITLE/CONTENT
5992/01	GROUND FLOOR LAYOUT
02	FIRST FLOOR STEEL LAYOUT
03	SECOND FLOOR STEEL LAYOUT
04	THIRD - SEVENTH FLOOR STEEL LAYOUT
05	TYPICAL STEEL DETAILS
06	ELEVATION ON GRIDLINE A
07	ROOF STEEL LAYOUT.

ARCHITECT - PENTAR ARCHITECTS.

Mark	Revision	Date	Drawn
B	RESTRAINTS TO BOTTOM FLANGE OF 810 UB.	15/12/92	JLC
	ADDED. NOTE 7 ADDED.		
A	STUD SPACING AMENDED. BEAMS GRID C & D	13/11/92	JLC
	BETWEEN GRIDS 1 & 2 AND 3 & 4		
	WEB PLATES ADDED.		

MULTI - STOREY STRUCTURAL AND FIRE TEST FACILITY

ROOF STEEL LAYOUT

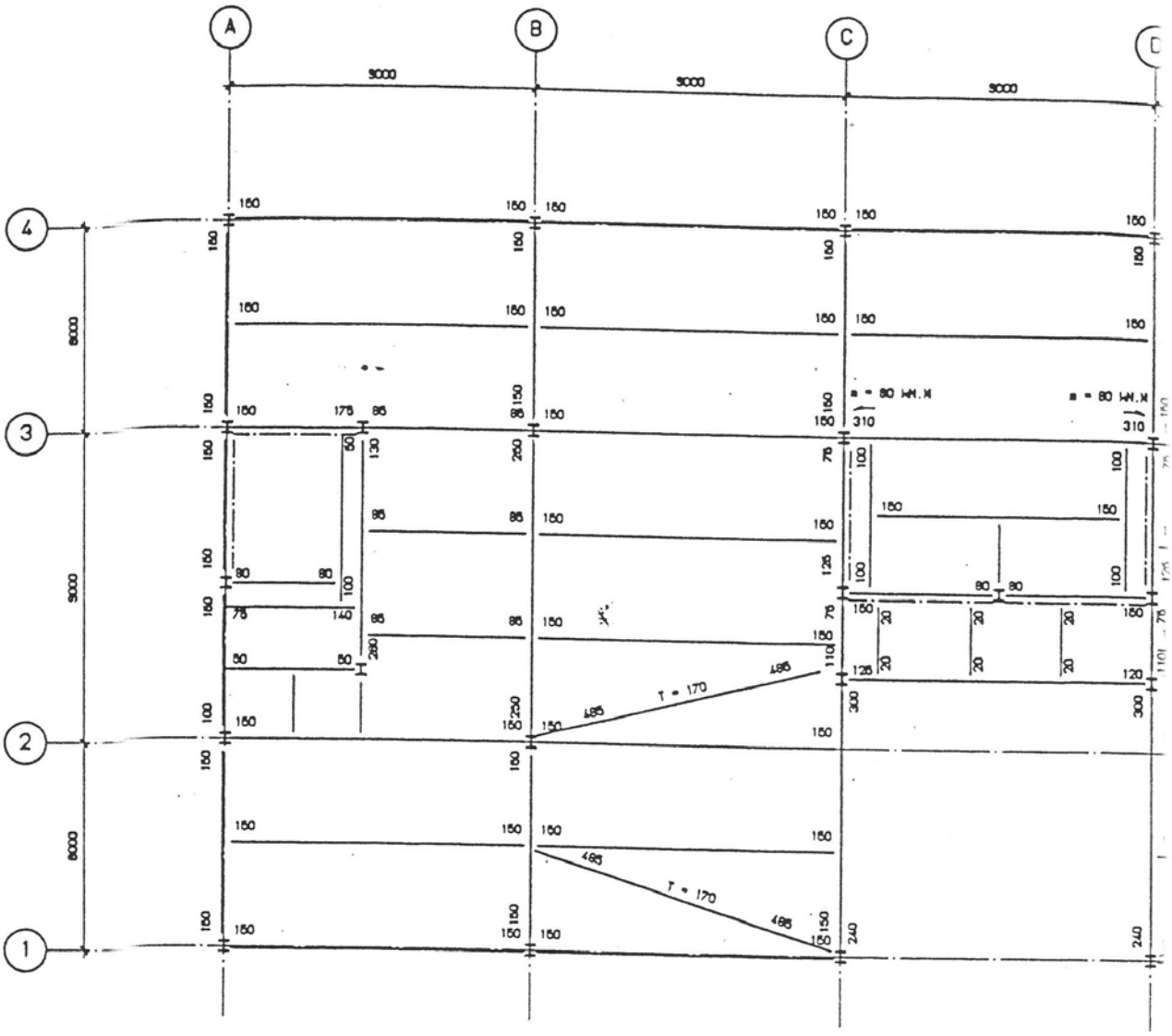
CARDINGTON bre

PETER BRETT ASSOCIATES
CONSULTING ENGINEERS

pba
16 WESTCOTE ROAD · READING · BERKSHIRE RG3 2DE · TEL 0734 500761 · FAX 0734 597496

Scales	1:100	Drawing No
Date 11/08/92	Drawn MJW	5992/07 B
Checked	Passed	

FOR CONSTRUCTION



ALL BEAM REACTIONS ARE ULTIMATE LOADS IN kN.

* ALL EDGE BEAM CONNECTIONS TO BE DESIGNED FOR
* ALL INTERNAL TIE BEAM CONNECTIONS TO BE DESIG

* NOTE: THESE FORCES NEED NOT BE CONSIDERED A

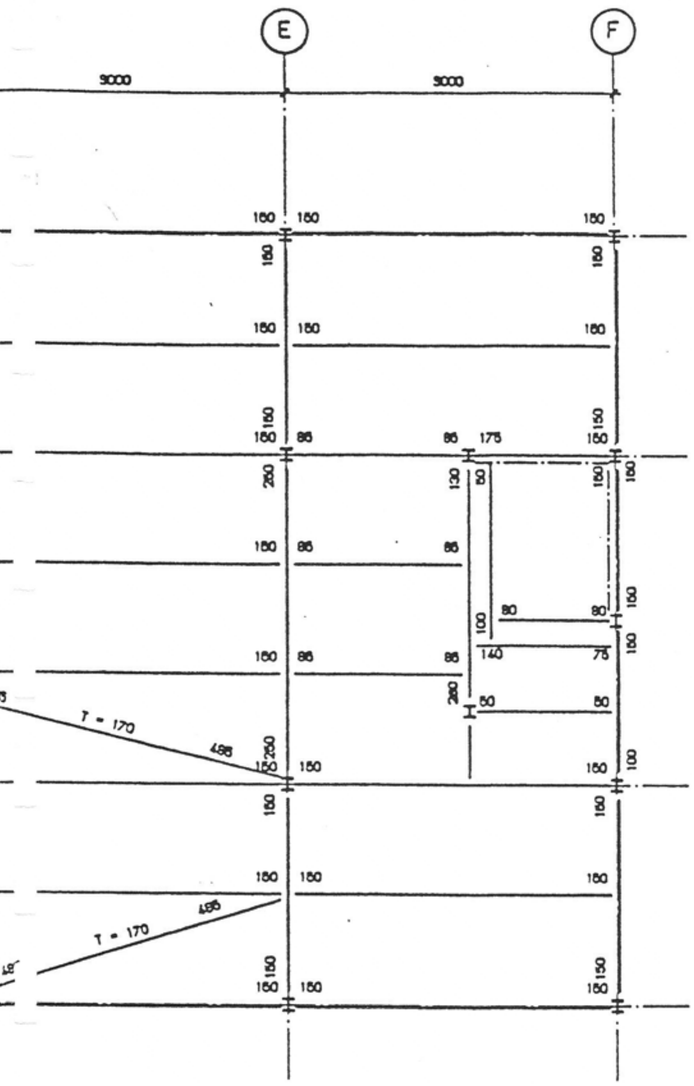
GENERAL NOTES.

1.1 THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS, SERVICE ENGINEERS AND STRUCTURAL ENGINEERS DRAWINGS AND SPECIFICATIONS.

1.2 ALL DIMENSIONS ARE IN MILLIMETRES.

1.3 DIMENSIONS SHOULD NOT BE SCALED FROM THIS DRAWING.

1.4 ALL LEVELS ARE IN METRES AND UNLESS OTHERWISE NOTED ARE STRUCTURAL LEVELS.



E| CE OF 75 kN (ULTIMATE)
EQ. . TENSION FORCE OF 75 kN (ULTIMATE)

OITIVE TO OTHER LOADS

ARCHITECT - PENTAR ARCHITECTS.

Mark	Revision	Date	Drawn
	COL GRID C & D / 2.0m OFFSET GD. 2	18/12.92	jlc
A	ORIENTATED. TIE FORCES AMENDED.		

MULTI - STOREY STRUCTURAL AND FIRE TEST FACILITY
FIRST FLOOR STEEL LAYOUT
CONNECTION FORCES.

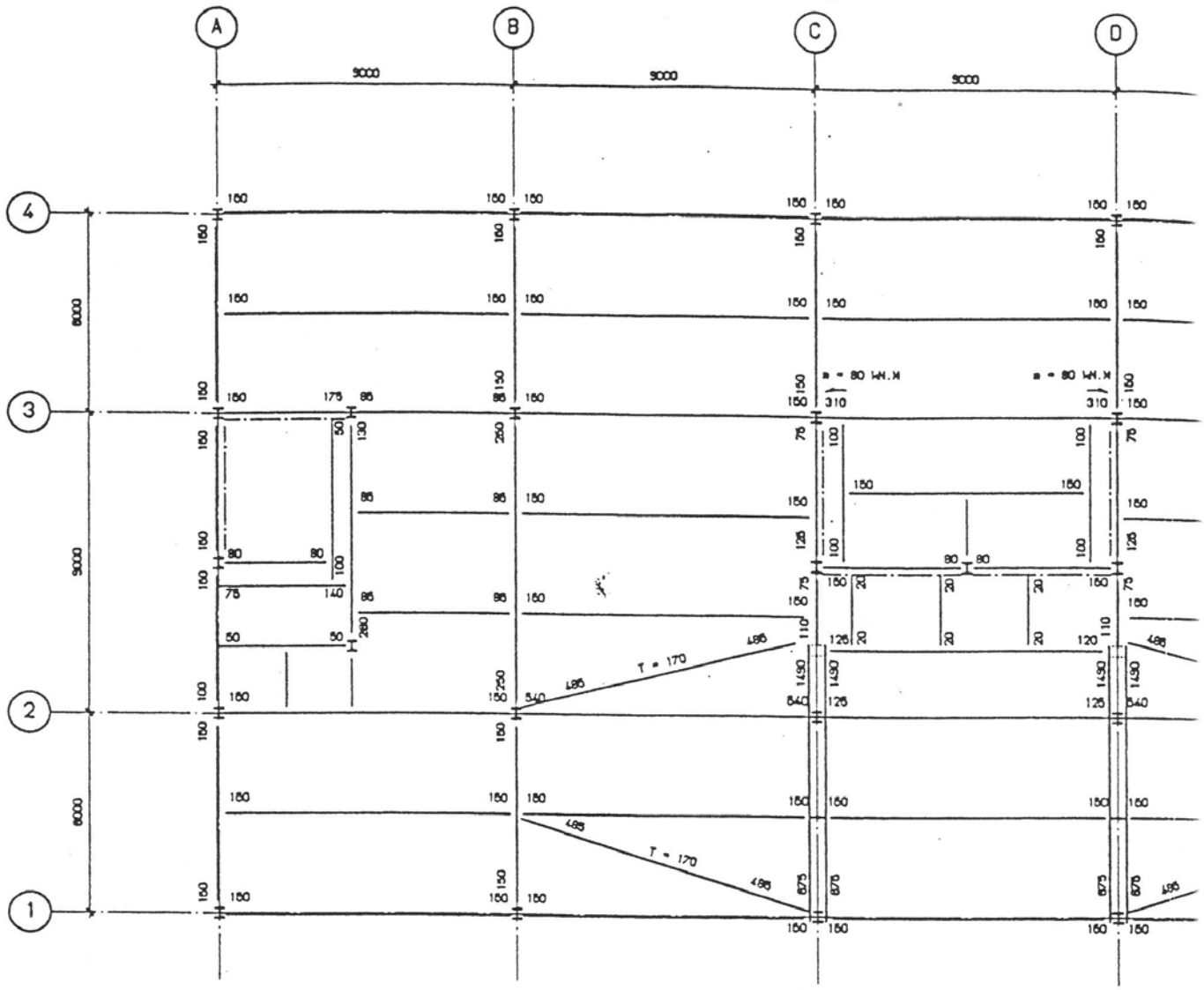
CARDINGTON bre

PETER BRETT ASSOCIATES
CONSULTING ENGINEERS

pba
16 WESTCOTE ROAD · READING · BERKSHIRE RG3 2DE · TEL 0734 500761 · FAX 0734 597498

Scales	1:100	Drawing No	
Date 08/11/92	Drawn jlc	5992/08	A
Checked	Passed		

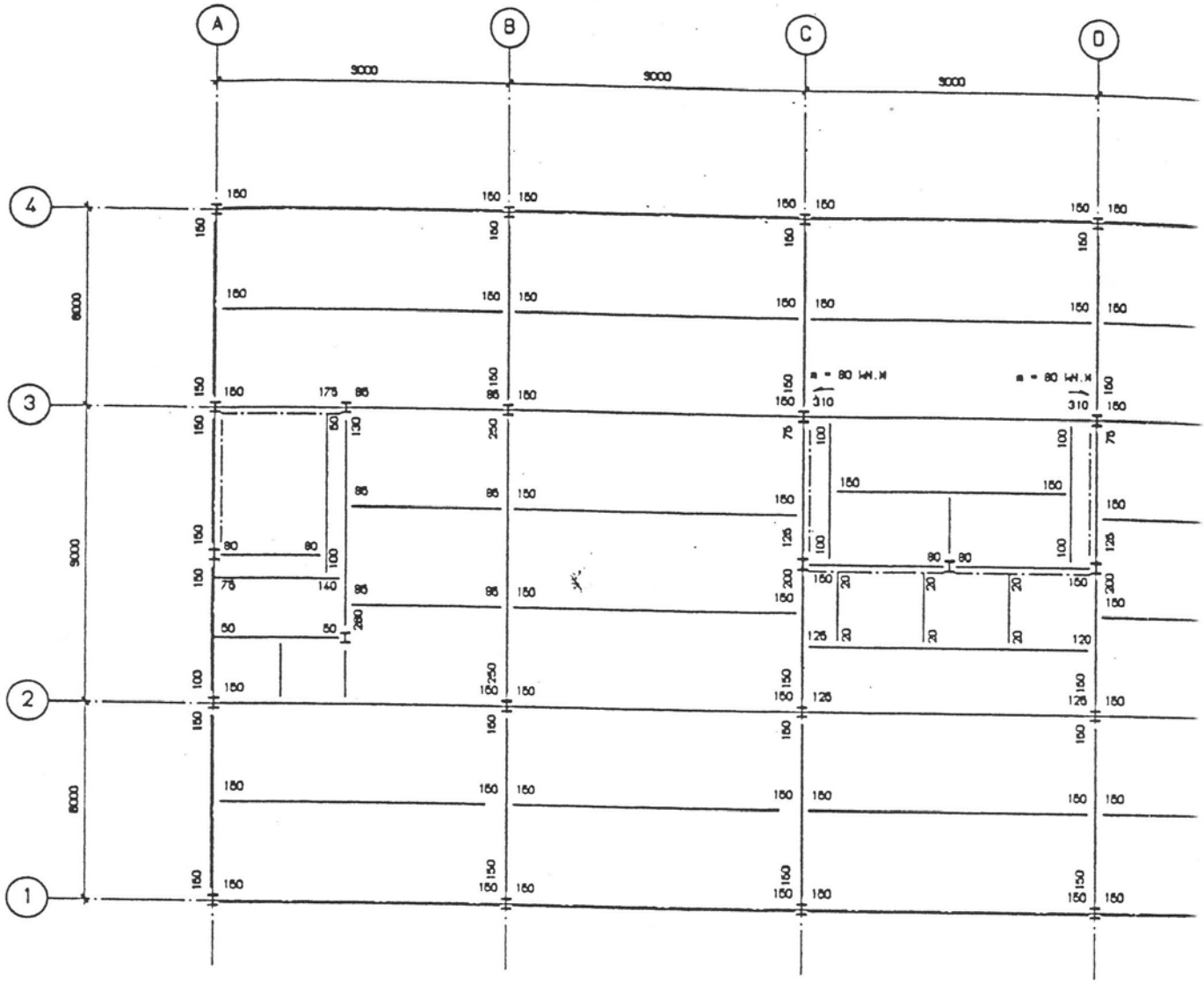
FOR CONSTRUCTION



ALL BEAM REACTIONS ARE ULTIMATE LOADS IN kN.

* ALL EDGE BEAM CONNECTIONS TO BE DESIGNED FOR A TIE FORCE
* ALL INTERNAL TIE BEAM CONNECTIONS TO BE DESIGNED FOR A

* NOTE: THESE FORCES NEED NOT BE CONSIDERED AS ADDITIVE

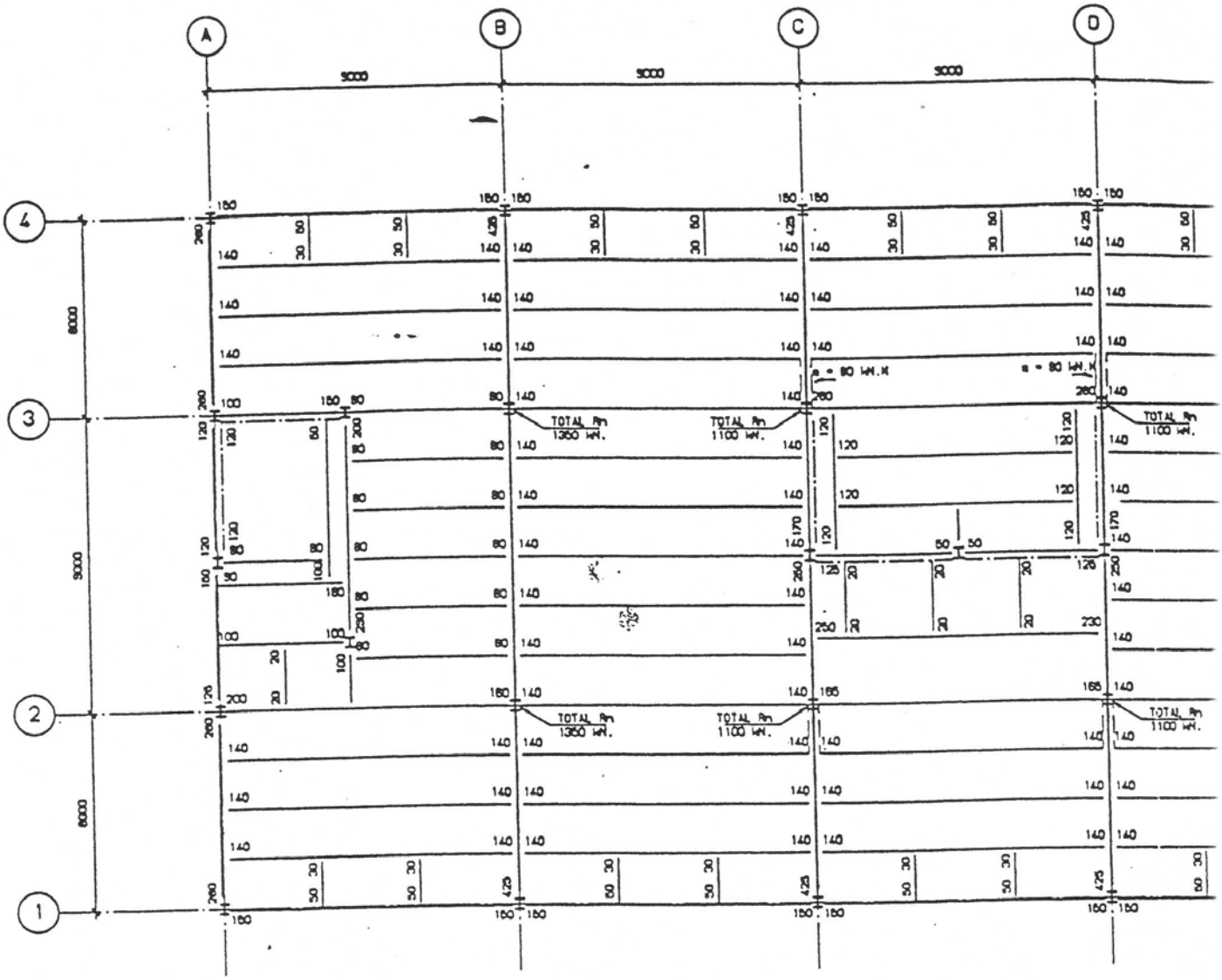


5 No FLOORS

ALL BEAM REACTIONS ARE ULTIMATE LOADS IN kN.

* ALL EDGE BEAM CONNECTIONS TO BE DESIGNED FOR A TIE FORCE OF
* ALL INTERNAL TIE BEAM CONNECTIONS TO BE DESIGNED FOR A TENS

* NOTE: THESE FORCES NEED NOT BE CONSIDERED AS ADDITIVE TO



ROOF PLAN

ALL BEAM REACTIONS ARE ULTIMATE LOADS IN kN.

- ALL EDGE BEAM CONNECTIONS TO BE DESIGNED FOR A TIE FORCE OF
- ALL INTERNAL TIE BEAM CONNECTIONS TO BE DESIGNED FOR A TENS
- NOTE: THESE FORCES NEED NOT BE CONSIDERED AS ADDITIVE TO

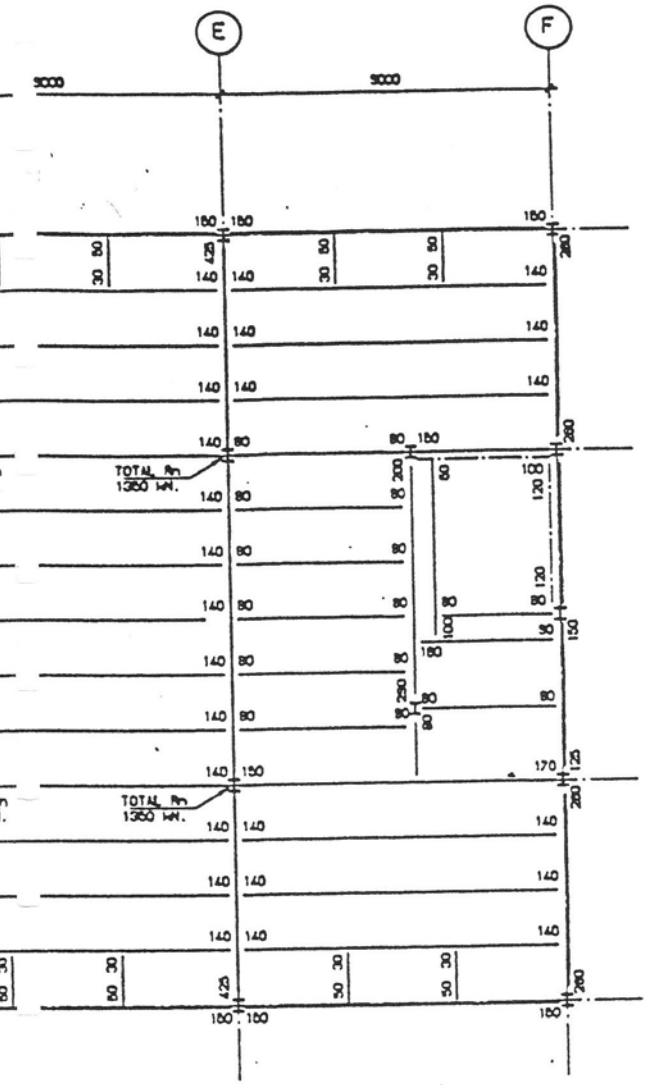
GENERAL NOTES.

1.1 THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS, SERVICE ENGINEERS AND STRUCTURAL ENGINEERS DRAWINGS AND SPECIFICATIONS.

1.2 ALL DIMENSIONS ARE IN MILLIMETRES.

1.3 DIMENSIONS SHOULD NOT BE SCALED FROM THIS DRAWING.

1.4 ALL LEVELS ARE IN METRES AND UNLESS OTHERWISE NOTED ARE STRUCTURAL LEVELS.



E C 15 kN (ULTIMATE)
TENSION FORCE OF 75 kN (ULTIMATE)

TO OTHER LOADS

ARCHITECT - PENTAR ARCHITECTS.

Mark	Revision	Date	Drawn
A	REACTION COLUMNS ADDED.	15/12/92	JJC
	TIE FORCES AMENDED.		

MULTI - STOREY STRUCTURAL AND FIRE TEST FACILITY
ROOF STEEL LAYOUT
CONNECTION DETAILS.

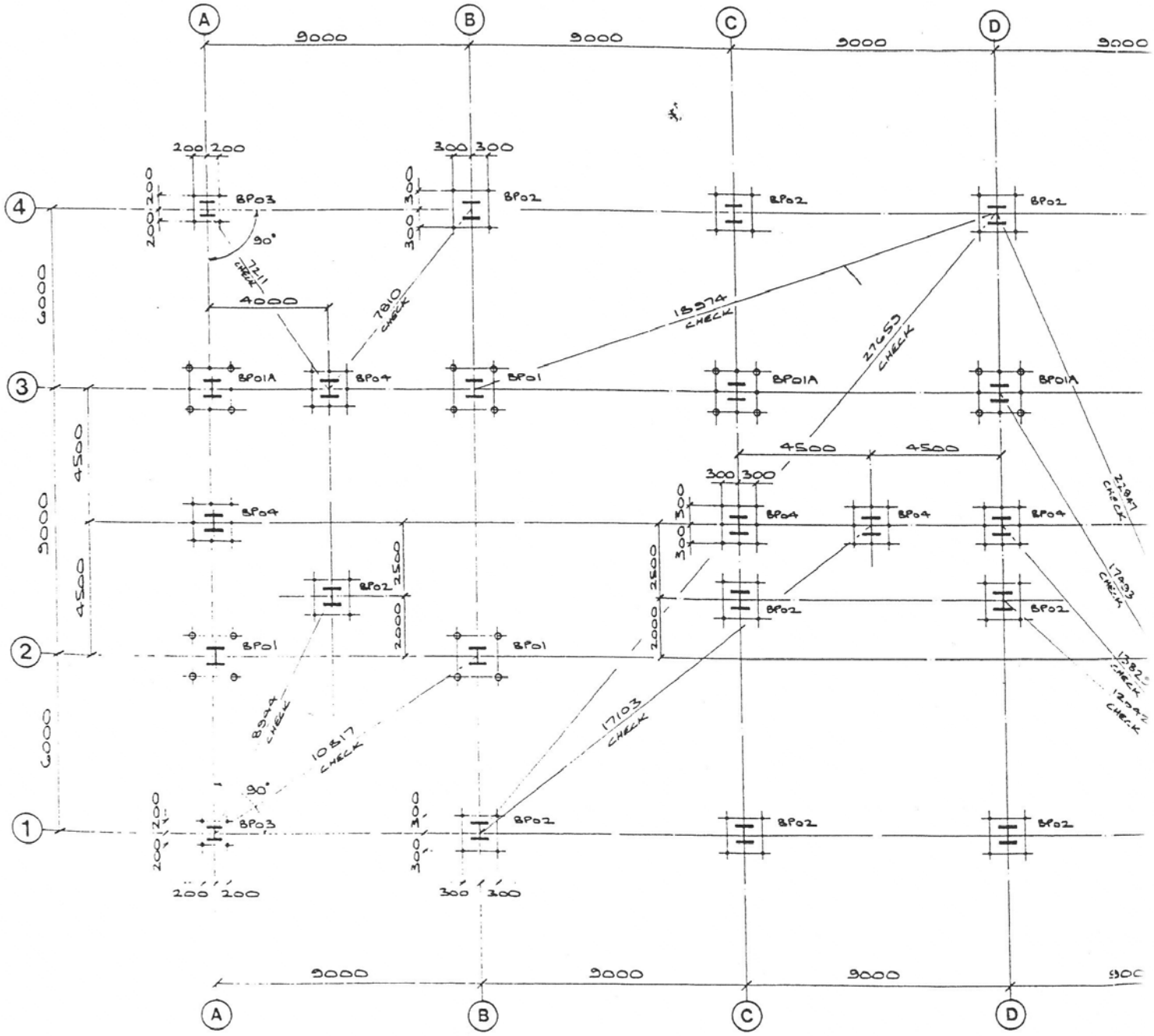
CARDINGTON bre

PETER BRETT ASSOCIATES
CONSULTING ENGINEERS

pba
16 WESTCOTE ROAD · READING · BERKSHIRE RG3 2DE · TEL 0734 500761 · FAX 0734 597498

Scales	1:100	Drawing No	5992/11 A
Date 11/08/92	Drawn KJW		
Checked	Passed		

FOR CONSTRUCTION



FOUNDATION PLAN

Specify Steel

DRAWING No.	920666/1 #B

CAUNTON

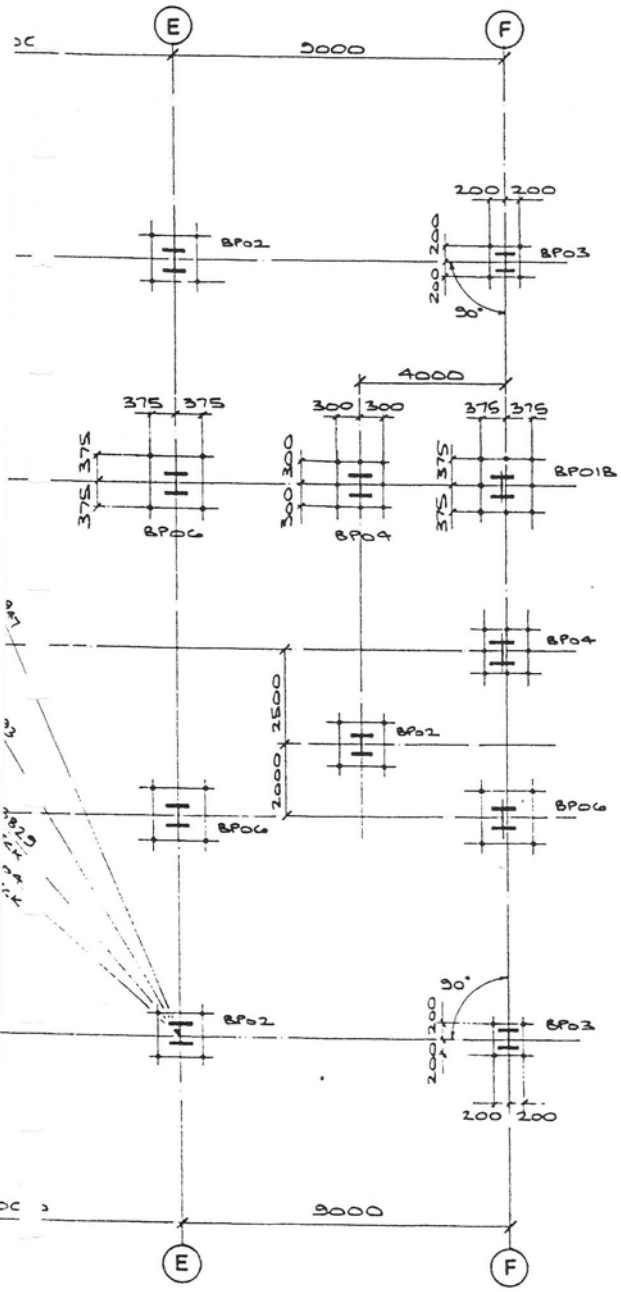
ENGINEERING LTD.

NATIONAL WORKSHOPS MOORGREEN NOTTINGHAM NG16 3QU
Telephone: 0773 531111 Fax: 0773 532020

CONTRACT:- 8 STORES TEST FACILITY		
CLIENT:- B.R.E. CARDINGTON		
DRAWN BY:- G. GRIFFITHS	DATE - 3-12-92	SCALE - 1:100
PAINT NOTE:		
HOLE DIA. UNLESS NOTED		CHECKED:
WELD PROCEDURE		

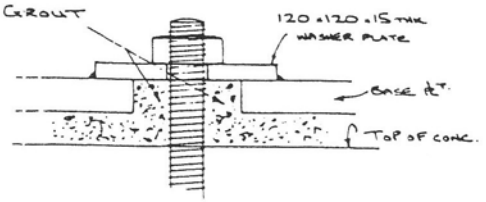
FABRICATION TOLERANCES
0-1000mm +OR-1mm
OVER 1000mm +OR-2mm

REV	DATE	SIG	DESCRIPTION	CHECKED	DATE
A	10/12/92	G.G.	HOLE DIA. & EMBEDMENT DEPTH REVISED		10.12.92
B	15/12/92	G.G.	NOTE ADDED RE. GROUTING BASE PLATES		15/2/93

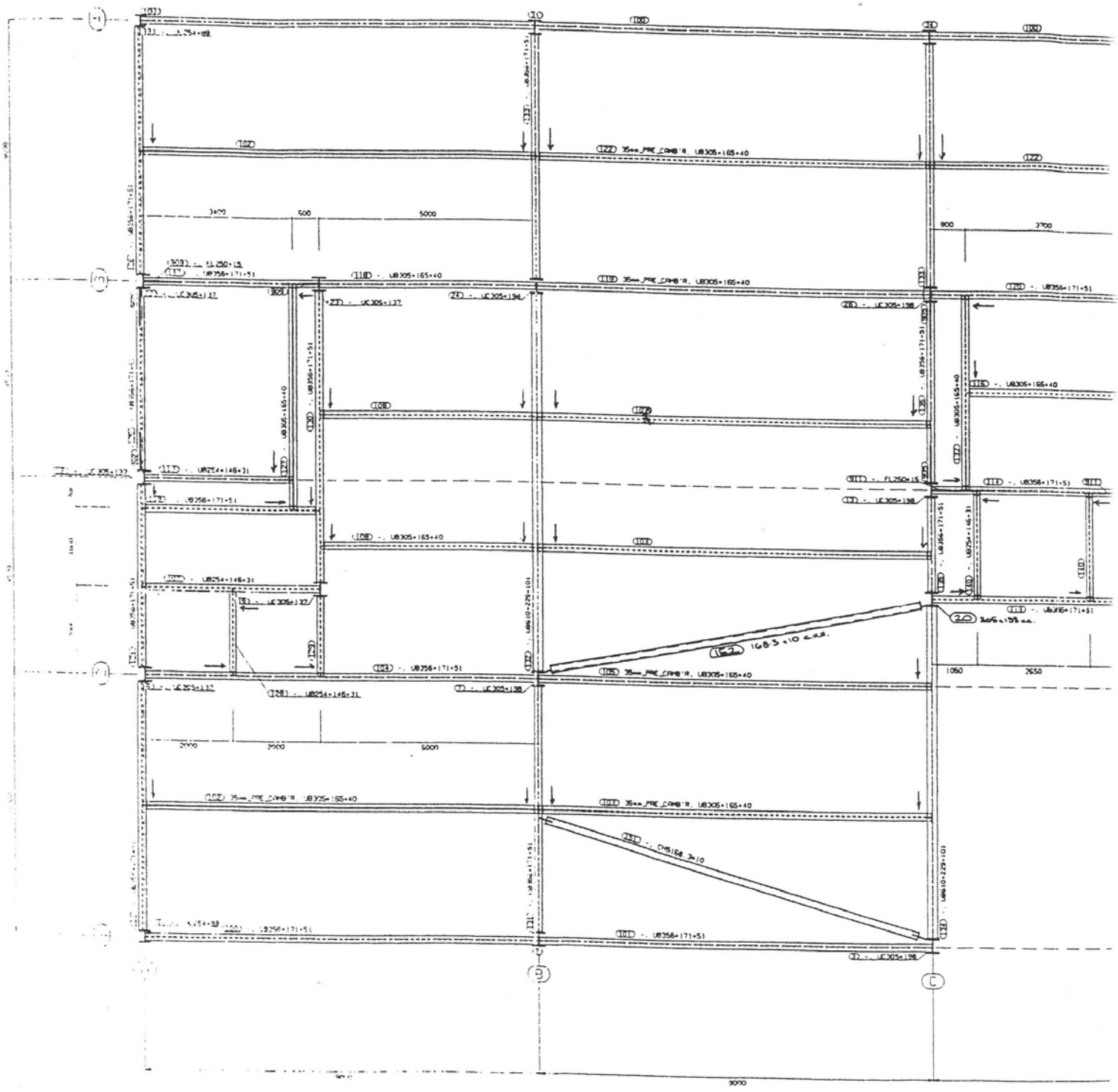


BASE PT. REF. No.	NUMBER OF BASES	No. OF HOLES TO DRILL/BASE	HOLE DIA. IN CONC.	SLUDGING SIZE	EMBEDMENT DEPTH
BP01	3	NO HOLES TO DRILL EXTG. M20 CAST IN SOCKETS	EXISTING CAST-IN SOCKETS	(12 No.) M30 x 275 Lg. (8.8)	75 m.m.
BP01A	3	12 No. EXTG. SOCKETS	—"—	12/M30 x 275 Lg.	75 m.m.
		3 x 4 = 12 TOTAL NEW BOLTS	38 DIA.	12/M30 x 850 mm (8.8)	650 m.m. A
BP01B	ONE	1 x 8 = 8 TOTAL	38 DIA.	8/M30 x 850 Lg. (8.8)	650 m.m. A
BP02	12	12 x 4 = 48 TOTAL	38 DIA.	48/M24 x 400 Lg. REBAR	200 m.m.
BP03	4	4 x 4 = 16 TOTAL	38 DIA.	16/M24 x 400 Lg. REBAR	200 m.m.
BP04	7	7 x 8 = 56 TOTAL	38 DIA.	56/M30 x 850 Lg. (8.8)	650 m.m. A
BP05	N.A.	N.A.	N.A.	N.A.	N.A.
BP06	3	3 x 4 = 12 TOTAL	38 DIA.	12/M24 x 400 Lg. REBAR	200 m.m.

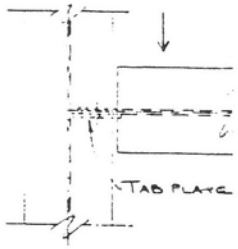
NOTE:- RE. ALL BRACED BAY COLUMNS
BASES REF BP01, BP01A, BP01B & BP04 TO HAVE 120 x 120 x 15 THK WASHER PLATES TACK WELDED TO BASE PLATES. BEFORE WASHER PLATES ARE WELDED IN POSITION THE OVERSIZED HOLES ARE TO BE FILLED WITH GROUT (P.B.A. ENGINEER TO CHECK PRIOR TO WELDING OF WASHER PLATE.)



DO N



PLAN ON 1ST



ENLARGED DETAIL SHOWING HOW SECONDARY BEAM CONNECTS TO TAB PLATE

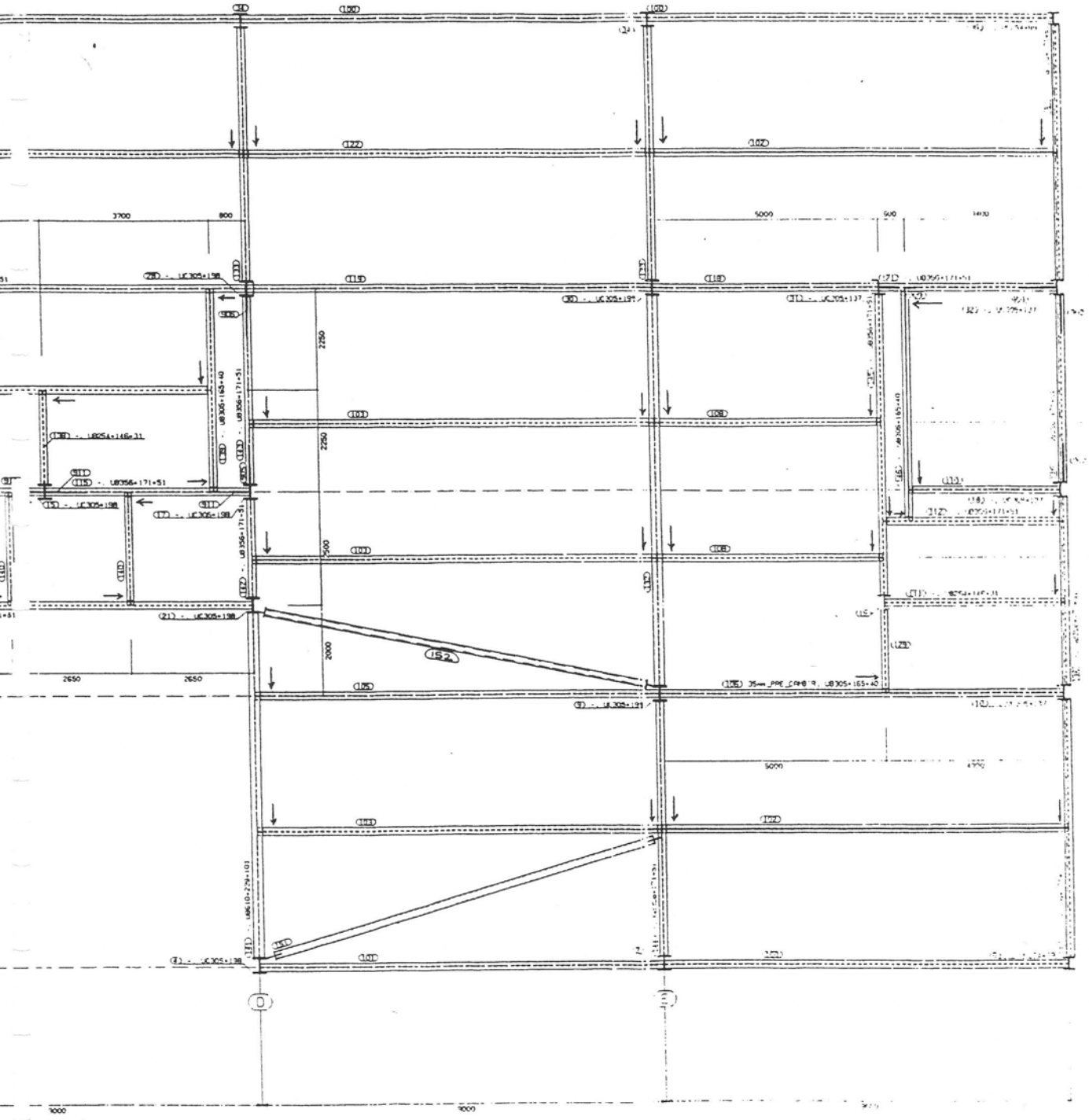
NOTES:

→ INDICATES DIRECTION FROM WHICH STEEL IS TO BE ERECTED.

ALL ENDS AND FACES MARKED 'E' TO FACE GRID LINE 1

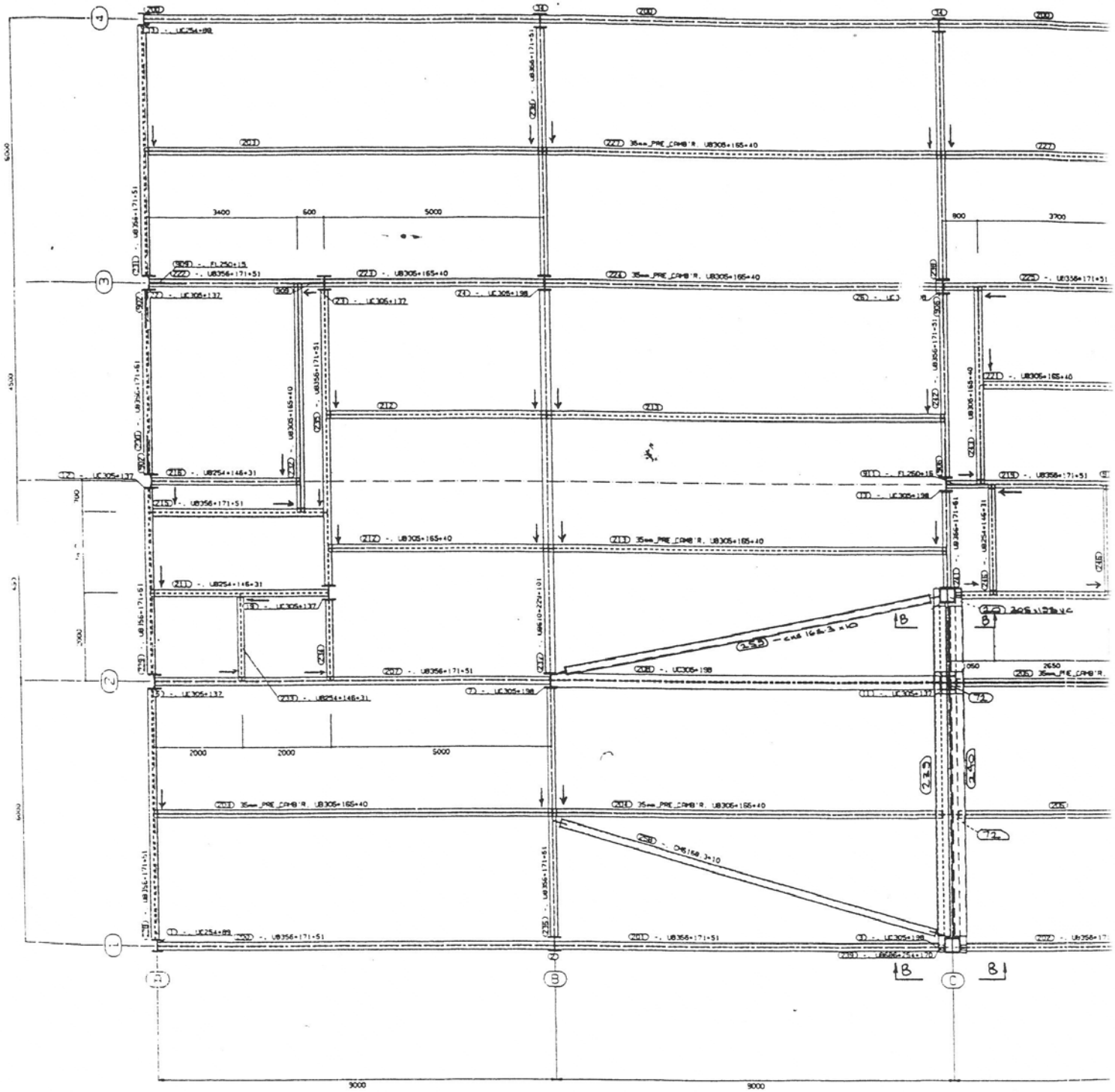
REV	DATE	BY	CHKD DATE	DESCRIPTION

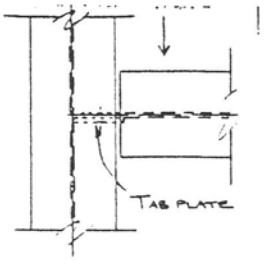
NOT SCALE



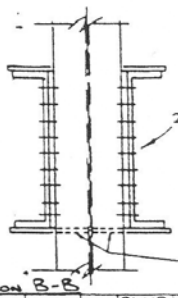
T FLOOR STEEL

CAUNTON ENGINEERING LTD
NATIONAL WORKSHOPS
MOOR[illegible]EN
NOTT[illegible]





ENLARGED DETAIL SHOWING HOW SECONDARY BEAM CONNECTS TO TAB PLATE



PLAN ON

NOTE:- TYPICAL 4NR 2No STIFF'S. MKD. (27) SITE WELDED AFTER FRAME BEEN ERECTE

BCSA
MEMBER OF THE BRITISH CONSTRUCTIONAL STEELWORK ASSOCIATION

STEEL CONSTRUCTION QUALITY ASSURANCE SCHEME BS 5750 PART 1 ISO 9000

NOTES:

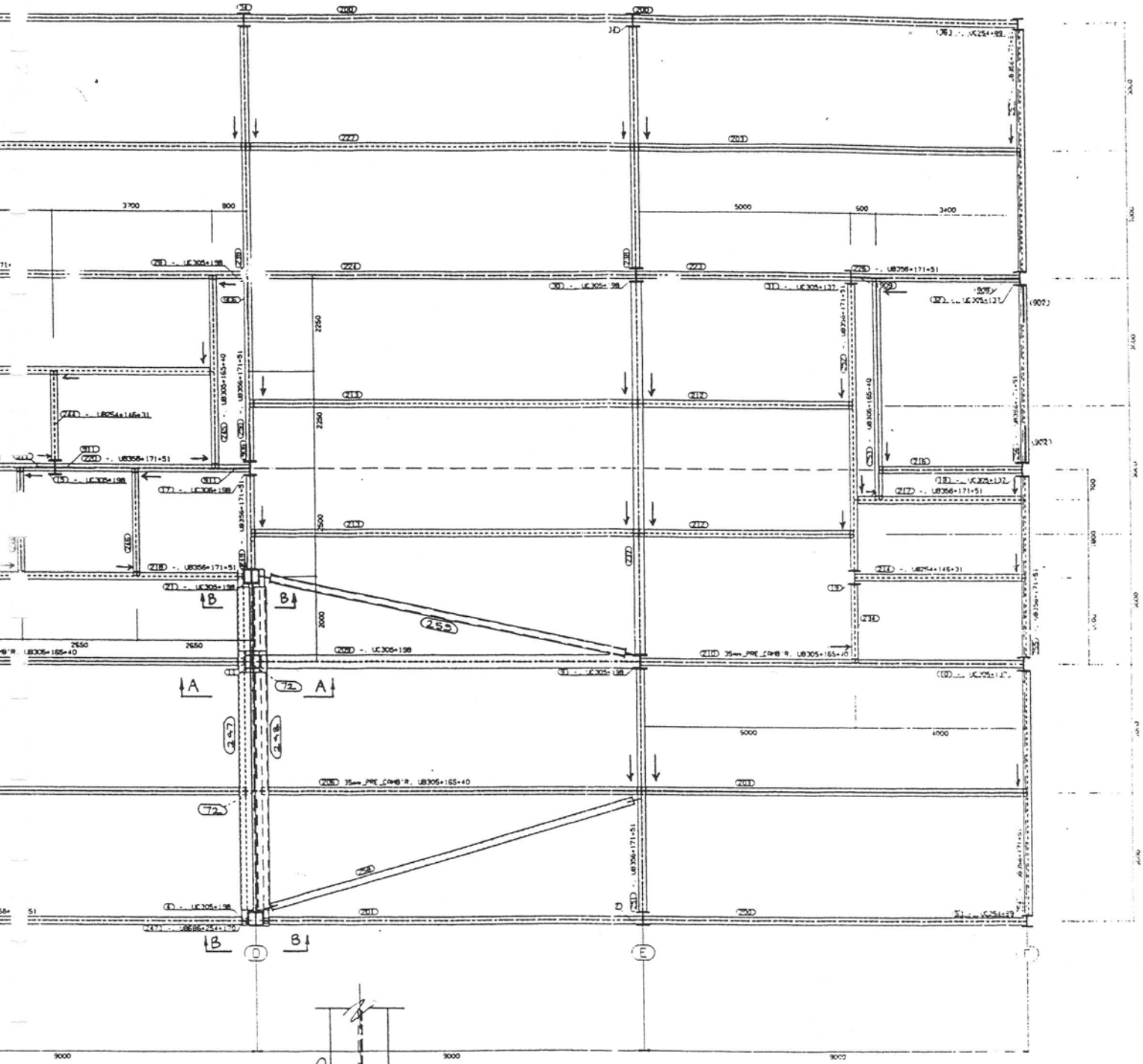
→ INDICATES DIRECTION FROM WHICH STEEL IS TO BE ERECTED

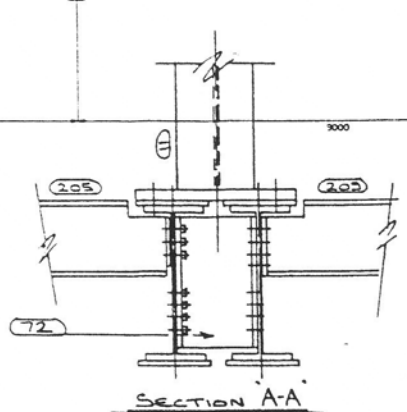
ALL ENDS AND FACES MARKED 'E' TO FACE GRID LINE 1

REV	DATE	BY	CHKD DATE	DESCRIPTION
A	14/11/92	C.G.		PLAN BRACING REDETERMINED

NOT SCALE

JOB No: 92066 | DRG No: 92066/4





SECTION A-A

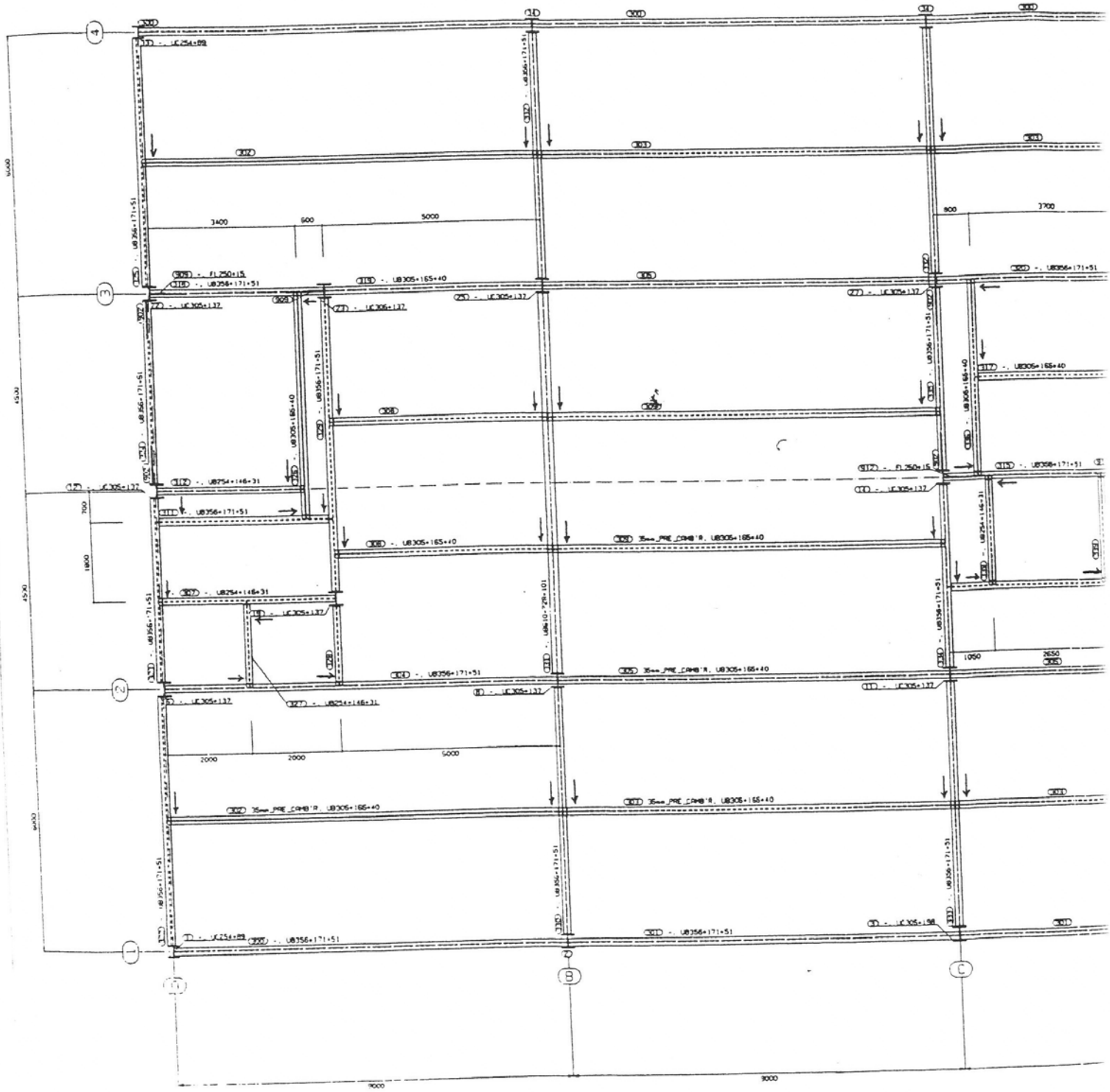
N 2ND FLOOR STEEL

H PLACES
TO BE
MAIN BEAMS
TED

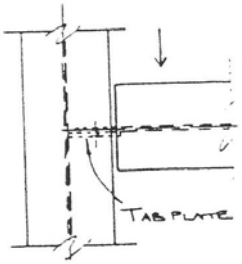
SECTION A-A ADDED

CAUNTON ENGINEERING LTD
NATIONAL WORKSHOPS
MOORGREEN
NOTTINGHAM NG16 3QU
TELEPHONE (0773) 531111
FAX (0773) 532020

DRG No: 92066/4 A		
JOB No	: 92066	DRAWN BY: DM. D
CLIENT	: B.R.E.	DATE: 03.12.92
CONTRACT	: TEST FACILITY	CHECKED:
SITE	: CAPDINGTON	APPROVED:
PAINT NOTE	: UNPAINTED - BLAST CLEANED	



PLAN ON



ENLARGED DETAIL SHOWING HOW SECONDARY BEAM CONNECTS TO TAB PLATE

BCSA
MEMBER OF THE BRITISH CONSTRUCTIONAL STEELWORK

STEEL CONSTRUCTION QUALITY ASSURANCE SCHEME BS 5750 PART 1 ISO 9000

NOTES:

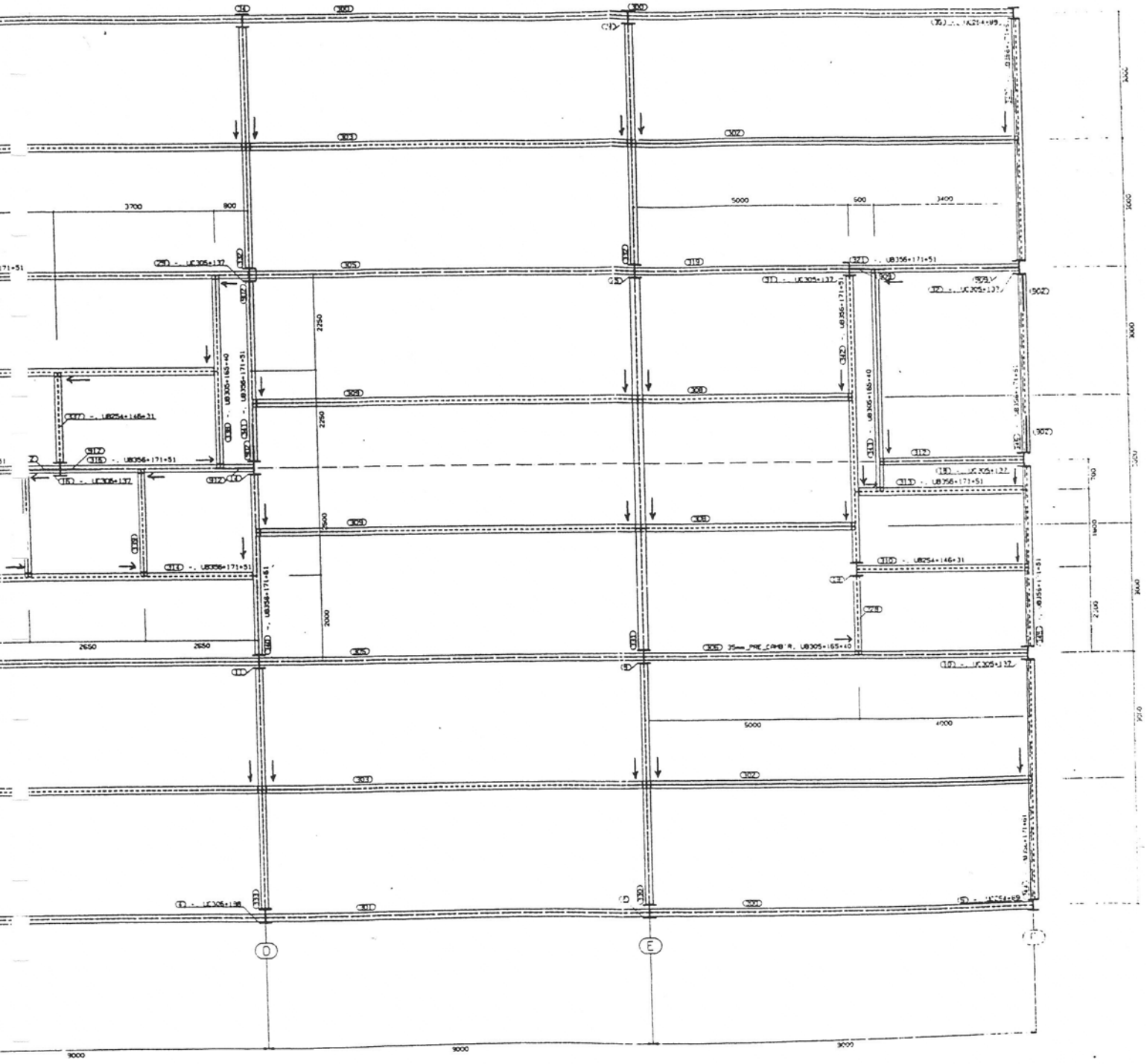
← INDICATES DIRECTION FROM WHICH STEEL IS TO BE ERECTED

ALL ENDS AND FACES MARKED 'E' TO FACE GRID LINE 1

REV	DATE	BY	CHKD DATE	DESCRIPTION

NUT SCALE

JOB No: 92066 DRG No: 92066/5

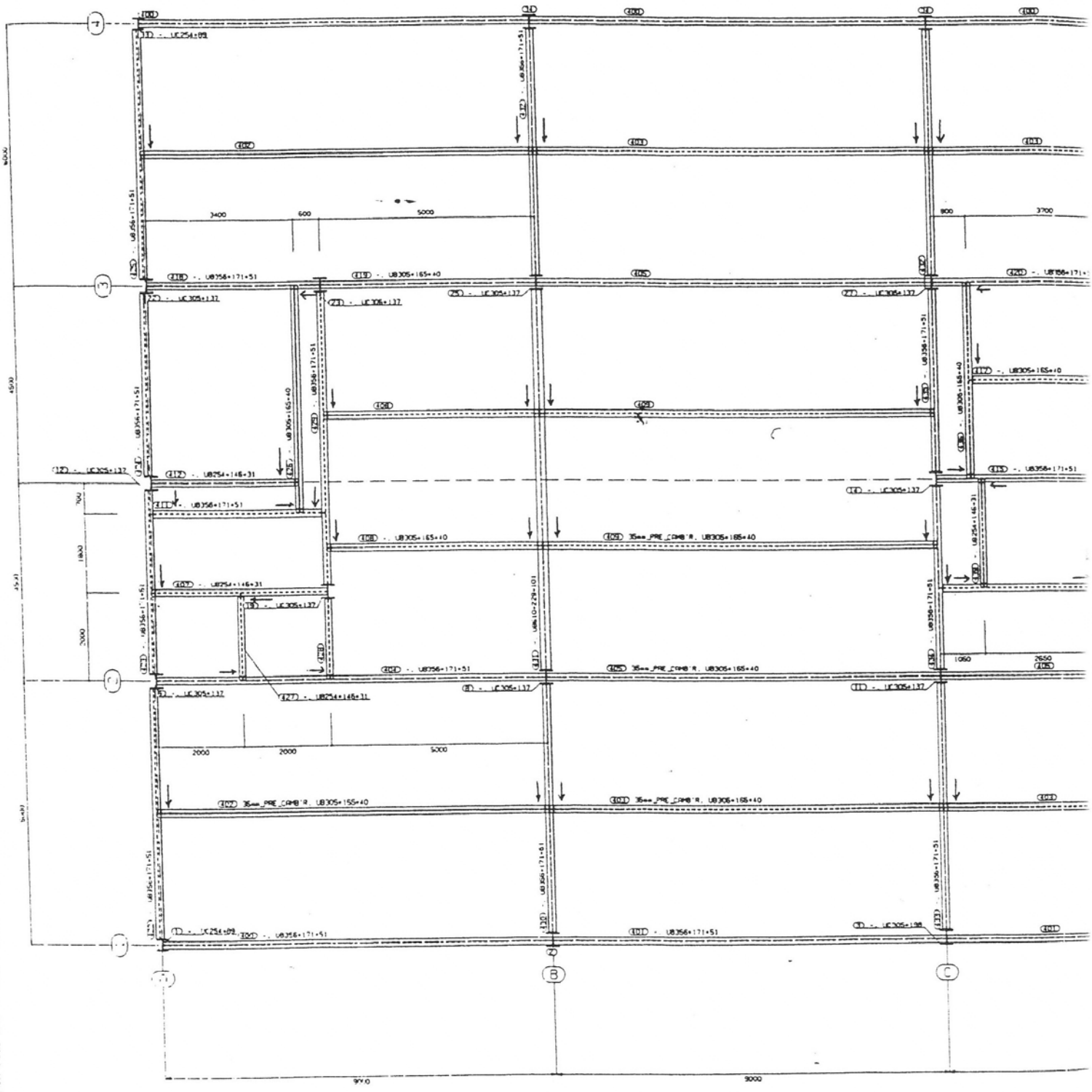


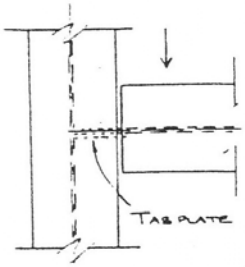
ON 3RD FLOOR STEEL

CAUNTON ENGINEERING LTD
NATIONAL WORKSHOPS
MOORGREEN
NOTTINGHAM NG16 3DU
TELEPHONE (0773) 531111

DRG No:	92066/5
JOB No	: 92066
CLIENT	: B.R.E.
CONTRACT	: TEST FACILITY
SITE	: CARDINGTON

DRAWN BY: DMS
DATE: 03.12.92
CHECKED: GJC
APPROVED:





ENLARGED DETAIL SHOWING HOW SECONDARY BEAM CONNECTS TO TAB PLATE

PLAN IN

SCSA
MEMBER OF THE BRITISH CONSTRUCTIONAL...

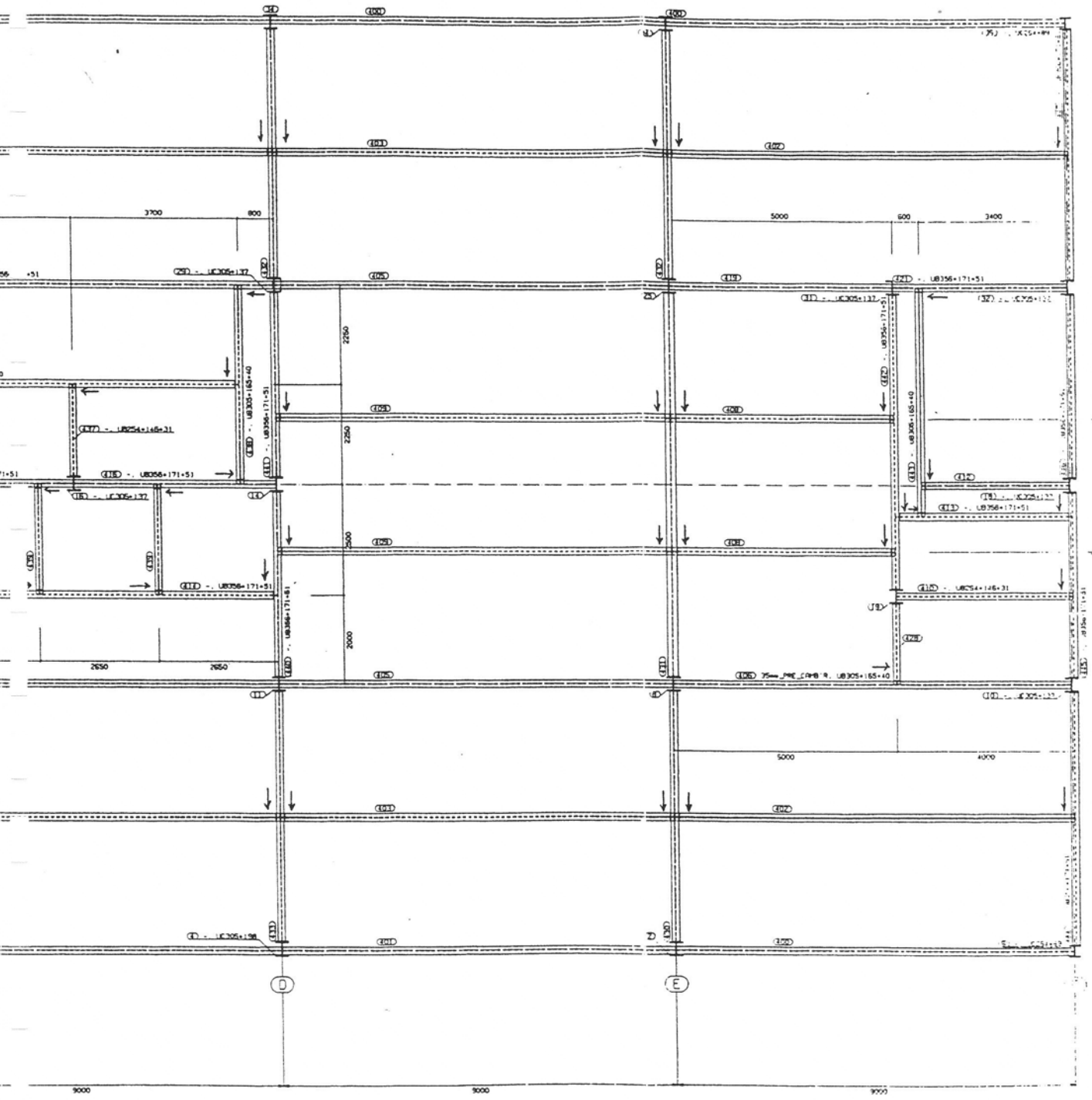
STEEL CONSTRUCTION QUALITY ASSURANCE SCHEME BS 5750 PART 1 ISO 9000

NOTES:

← INDICATES DIRECTION FROM WHICH STEEL IS TO BE ERECTED

ALL ENDS AND FACES MARKED 'E' TO FACE GRID LINE 1

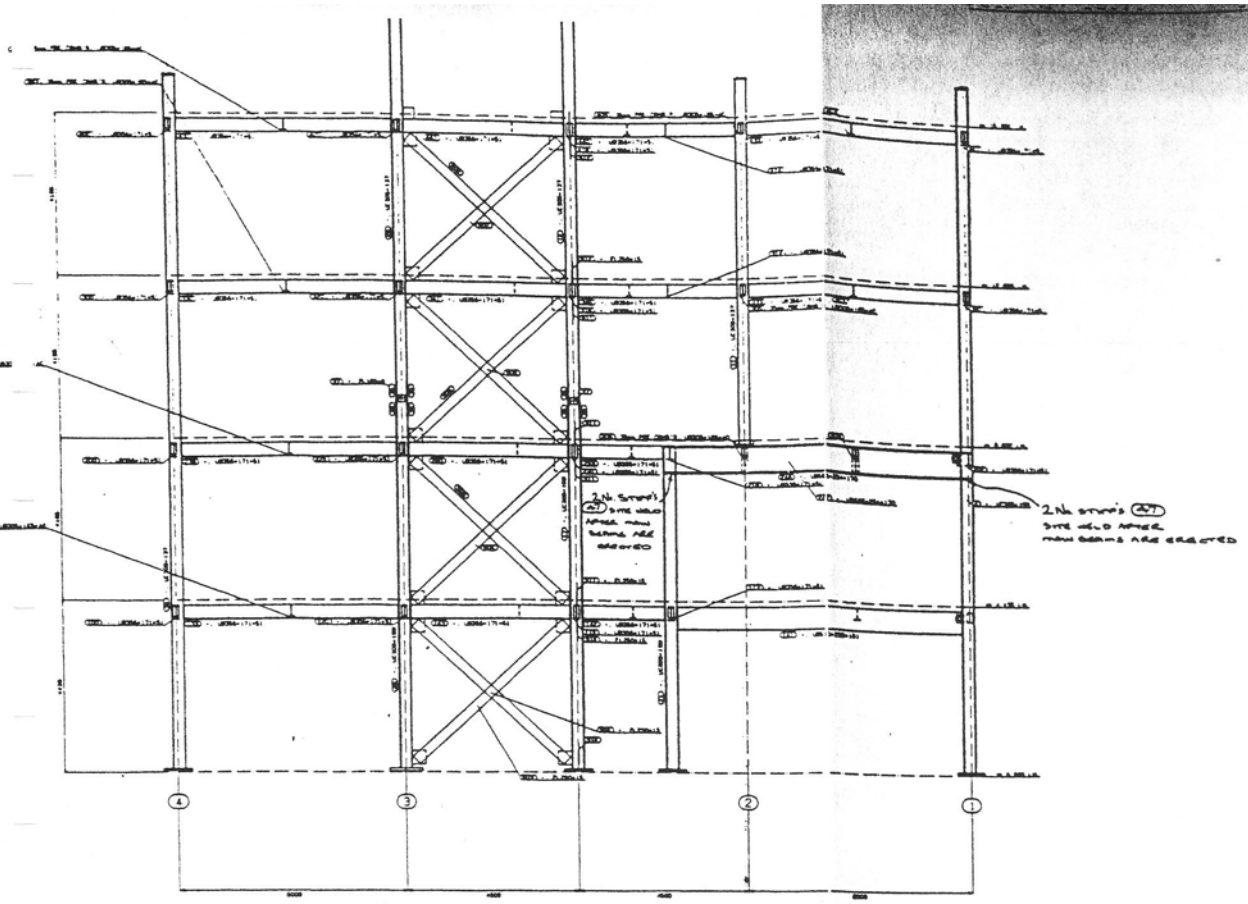
REV	DATE	BY	CHKD DATE	DESCRIPTION



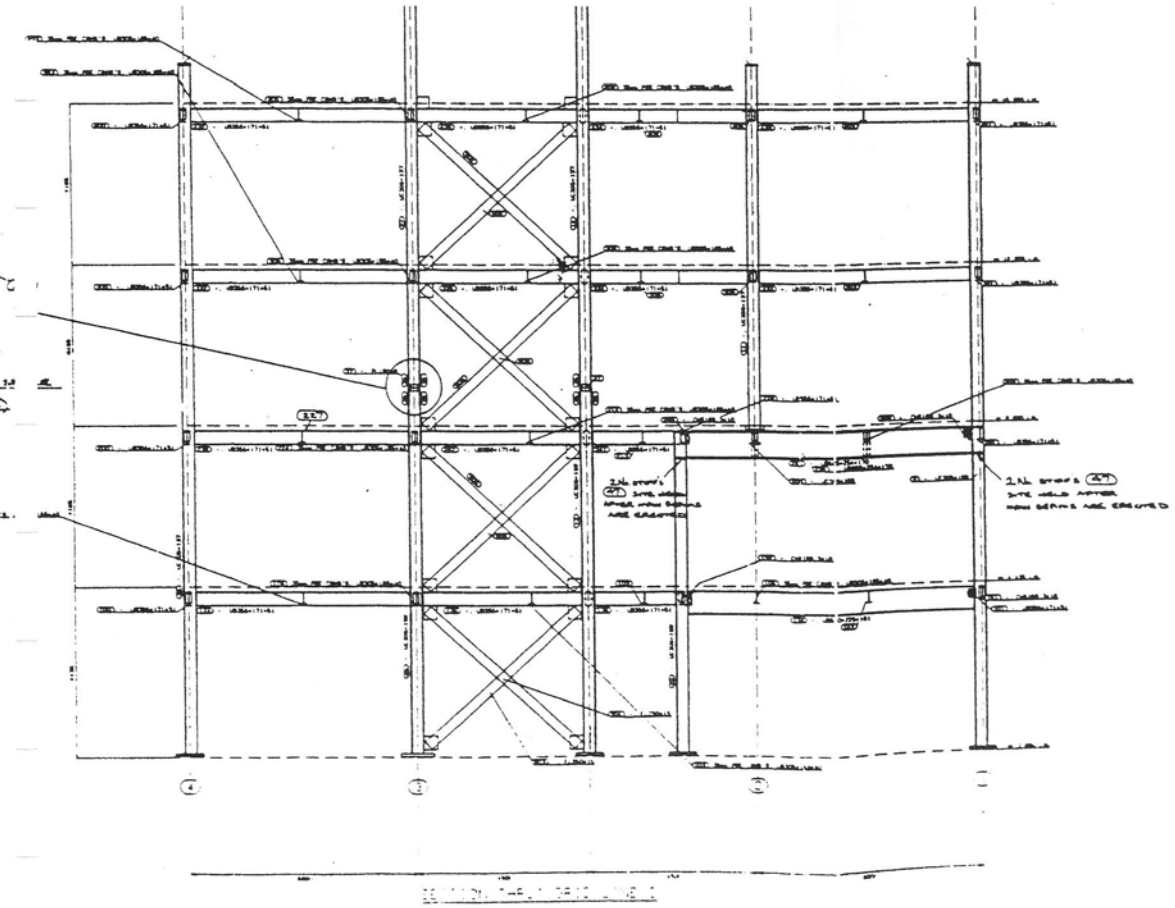
'D' 4TH FLOOR STEEL

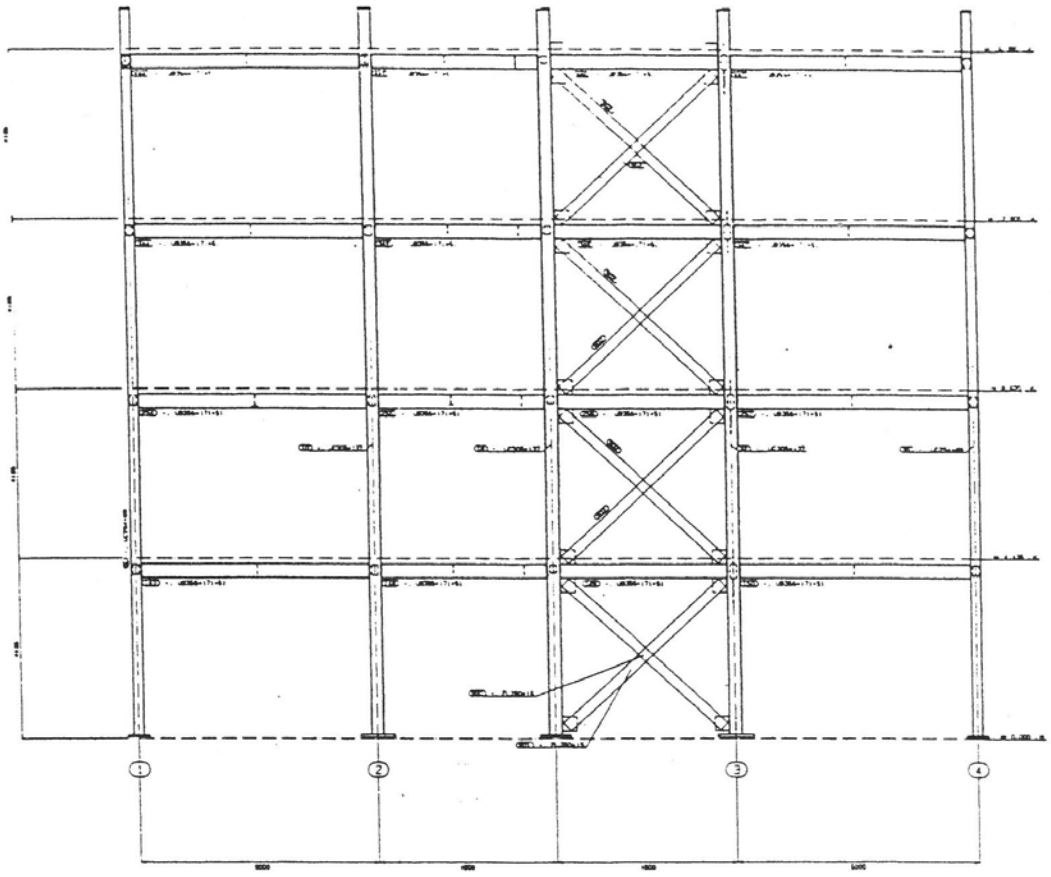
CAUNTON ENGINEERING LTD
NATIONAL WORKSHOPS
MOORGREEN
NOTTINGHAM NG16 3QU
TELEPHONE (0773) 531111

DRG No:	92066/6
JOB No	: 92066
CLIENT	: B.P.E.
CONTRACT	: TEST FACILITY
SITE	: CARDINGTON
DRAWN BY:	
DATE:	03.12.92
CHECKED:	
APPROVED:	

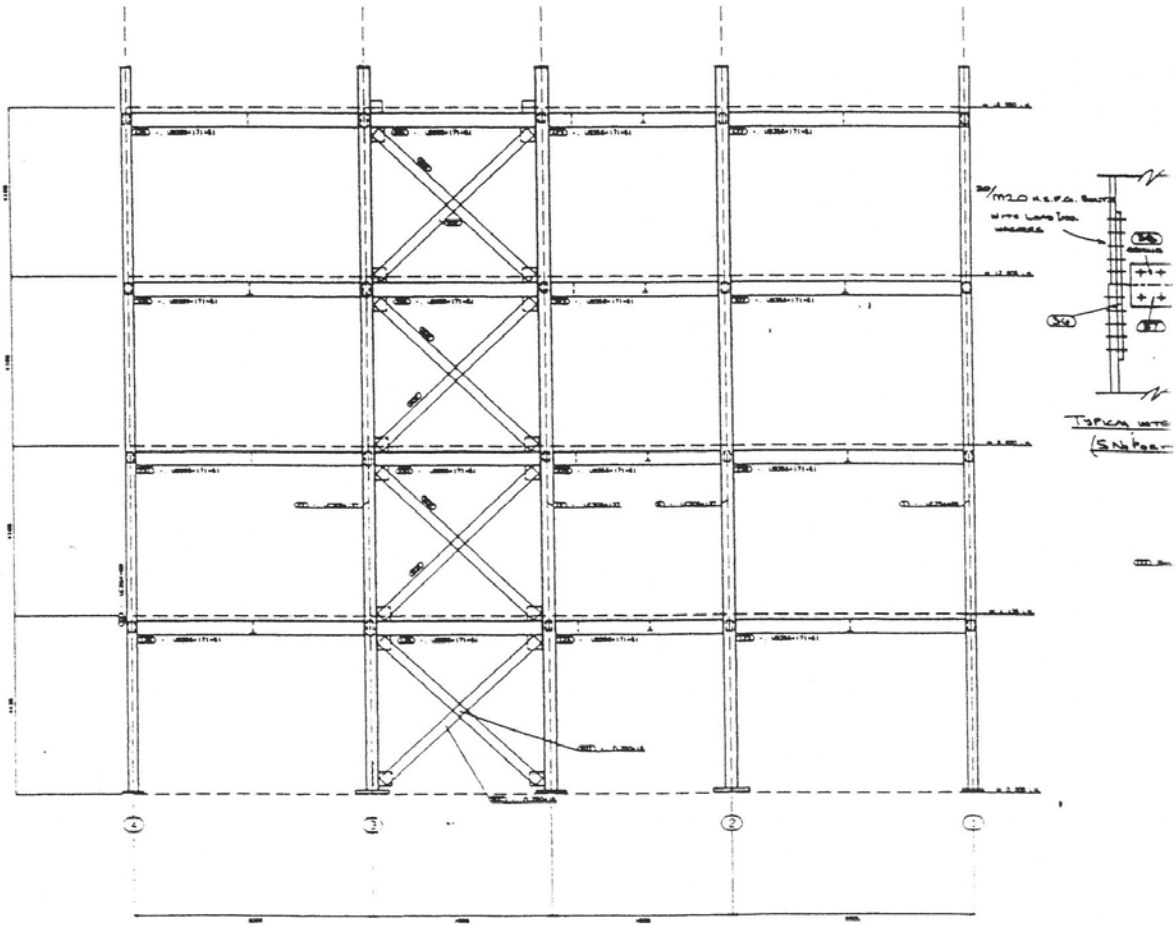


SECTION THRU' GRID LINE D





ELEVATION ON GRID LINE F

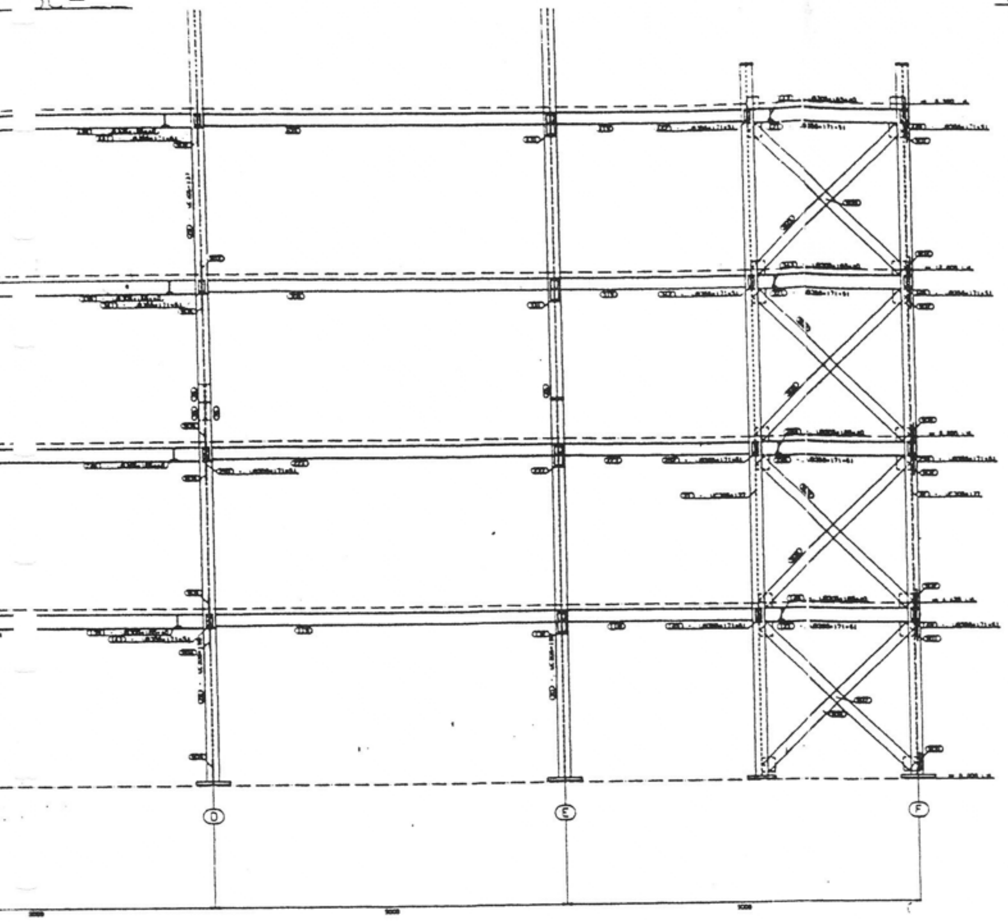


ELEVATION ON GRID LINE A

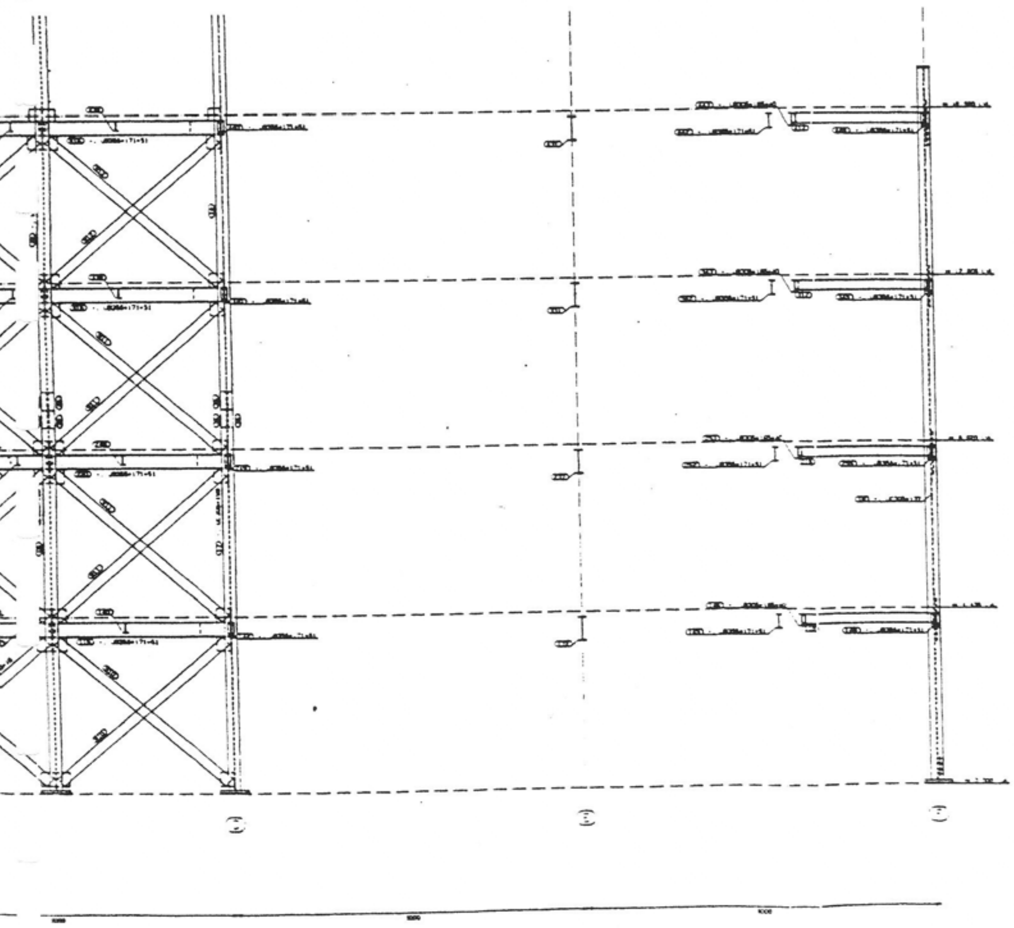
STEEL CONSTRUCTION NOTES
QUALITY ASSURANCE
BS EN ISO 9001
ISO 9000

REV	DATE	BY	CHK'D	DATE	DESCRIPTION

JOB No: 80068 DRG No: 80068 B

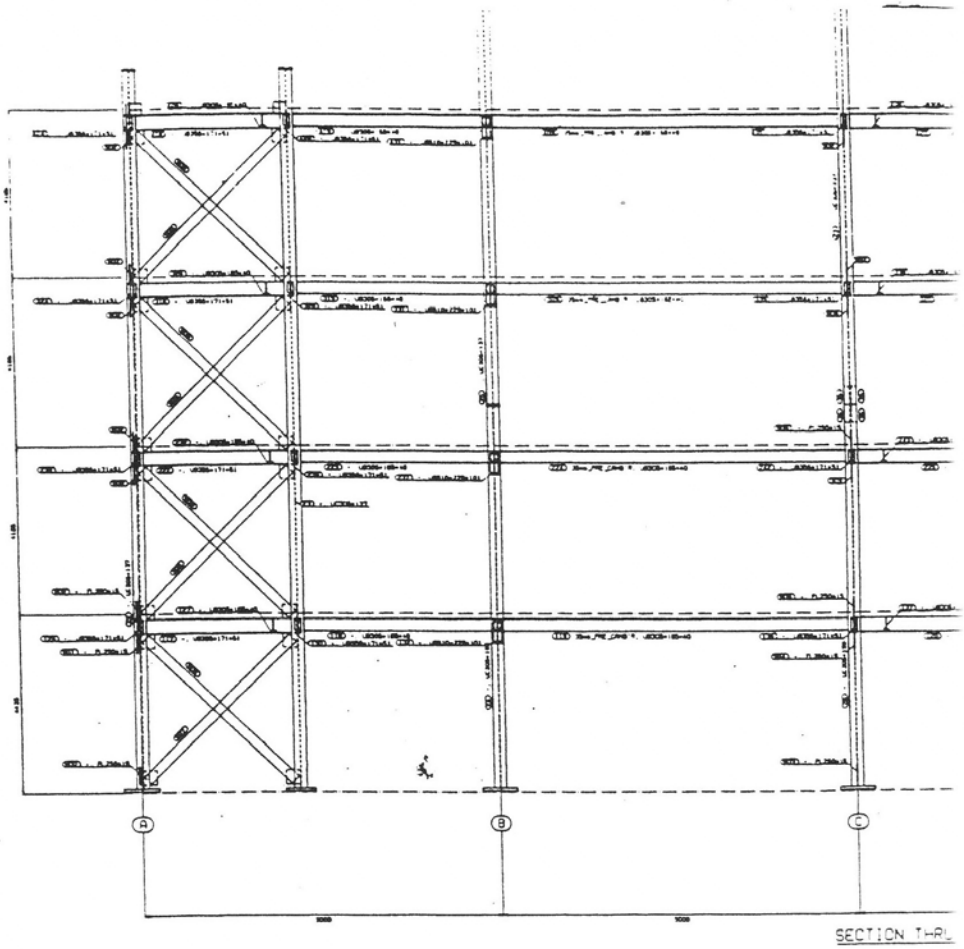


D LINE 3

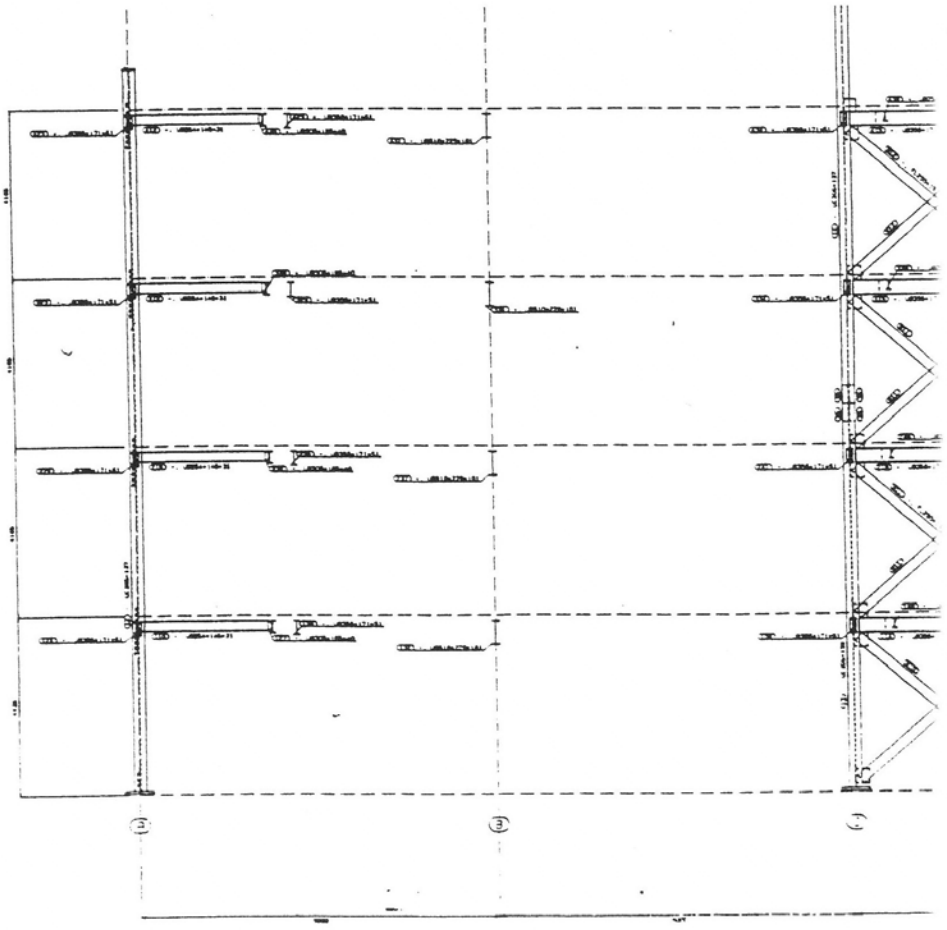


GRID LINE 2/3

DATE	BY	CHKD	DESCRIPTION

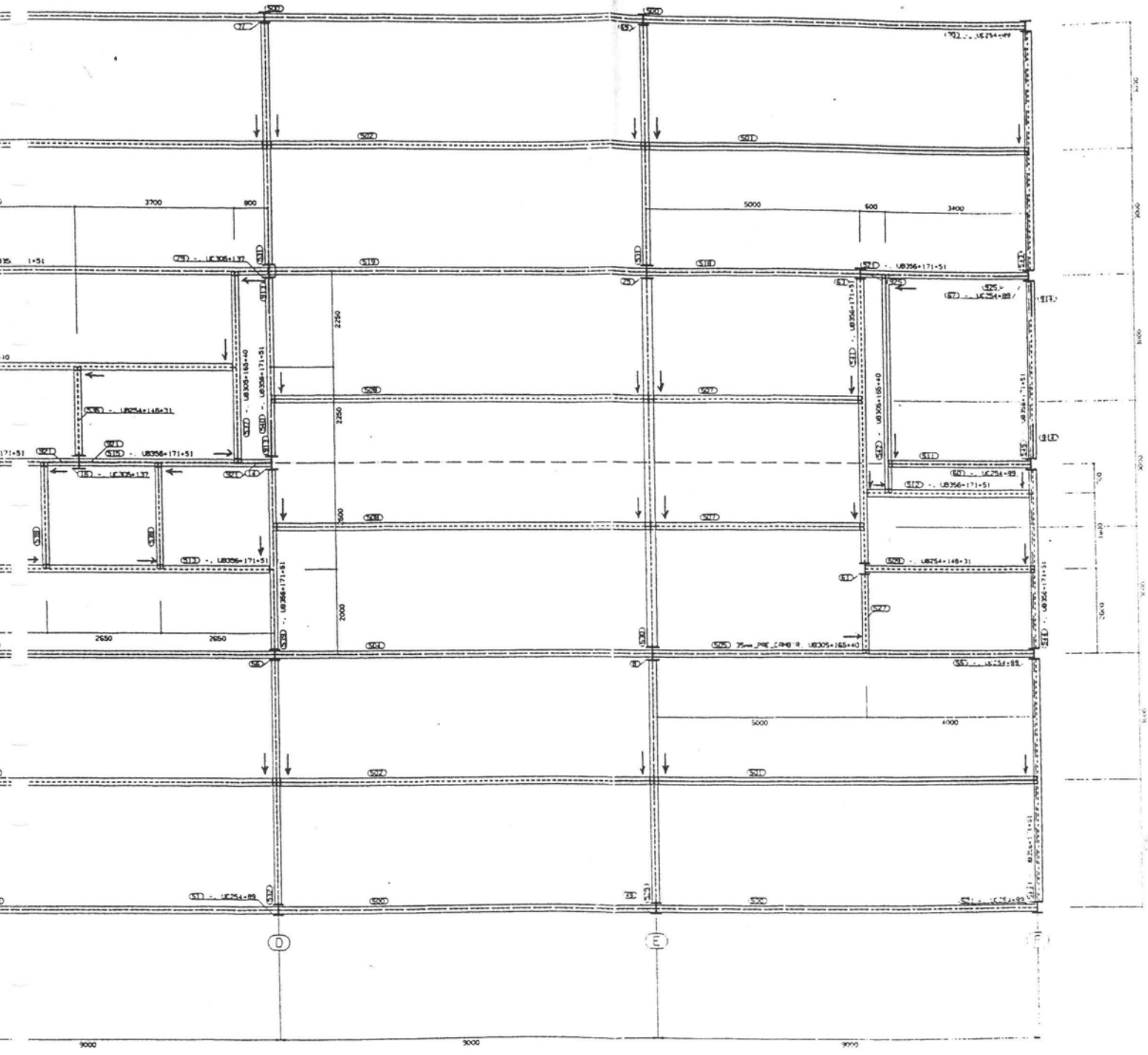


SECTION THRU



NOT SCALE

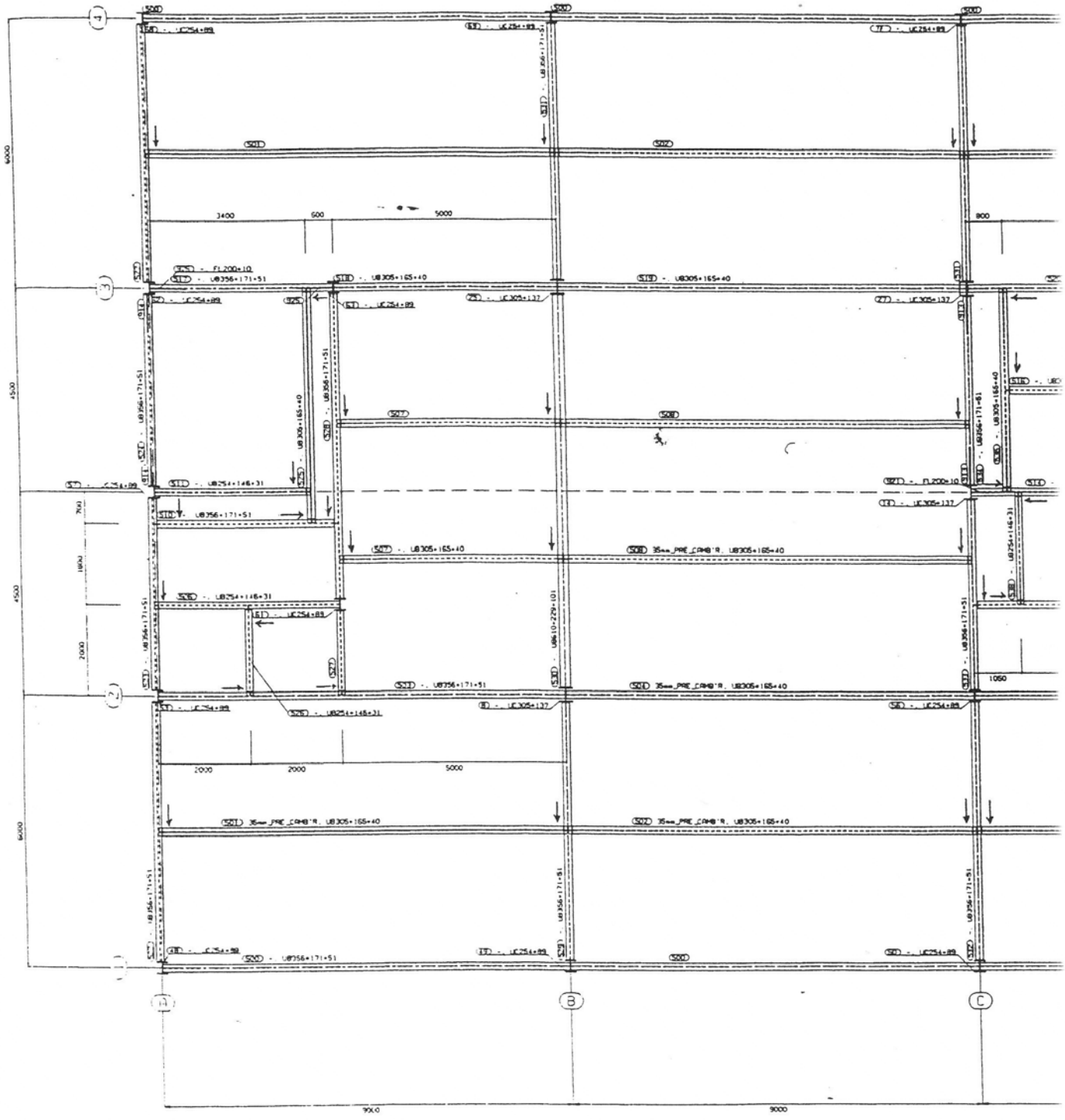
JOB No: 92066 | DRG No: 92066/10

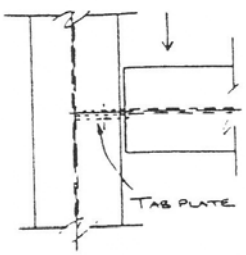


5TH FLOOR STEEL

CAUNTON ENGINEERING LTD
NATIONAL WORKSHOPS
MOORGREEN
NOTTINGHAM NG16 3DU
TELEPHONE (0773) 53111

DRG No:	92066/10
JOB No	: 92066
CLIENT	: B.R.E.
CONTRACT	: TEST FACILITY
SITE	: CADDINGTON
DRAWN BY	: JM/
DATE	: 08.12.9
CHECKED	: /10
APPROVED	:





ENLARGED DETAIL SHOWING HOW SECONDARY BEAM CONNECTS TO TAB PLATE

BCSA
MEMBER OF THE BRITISH CONSTRUCTIONAL

STEEL CONSTRUCTION QUALITY ASSURANCE SCHEME BS 5750 PART I ISO 9000

NOTES:

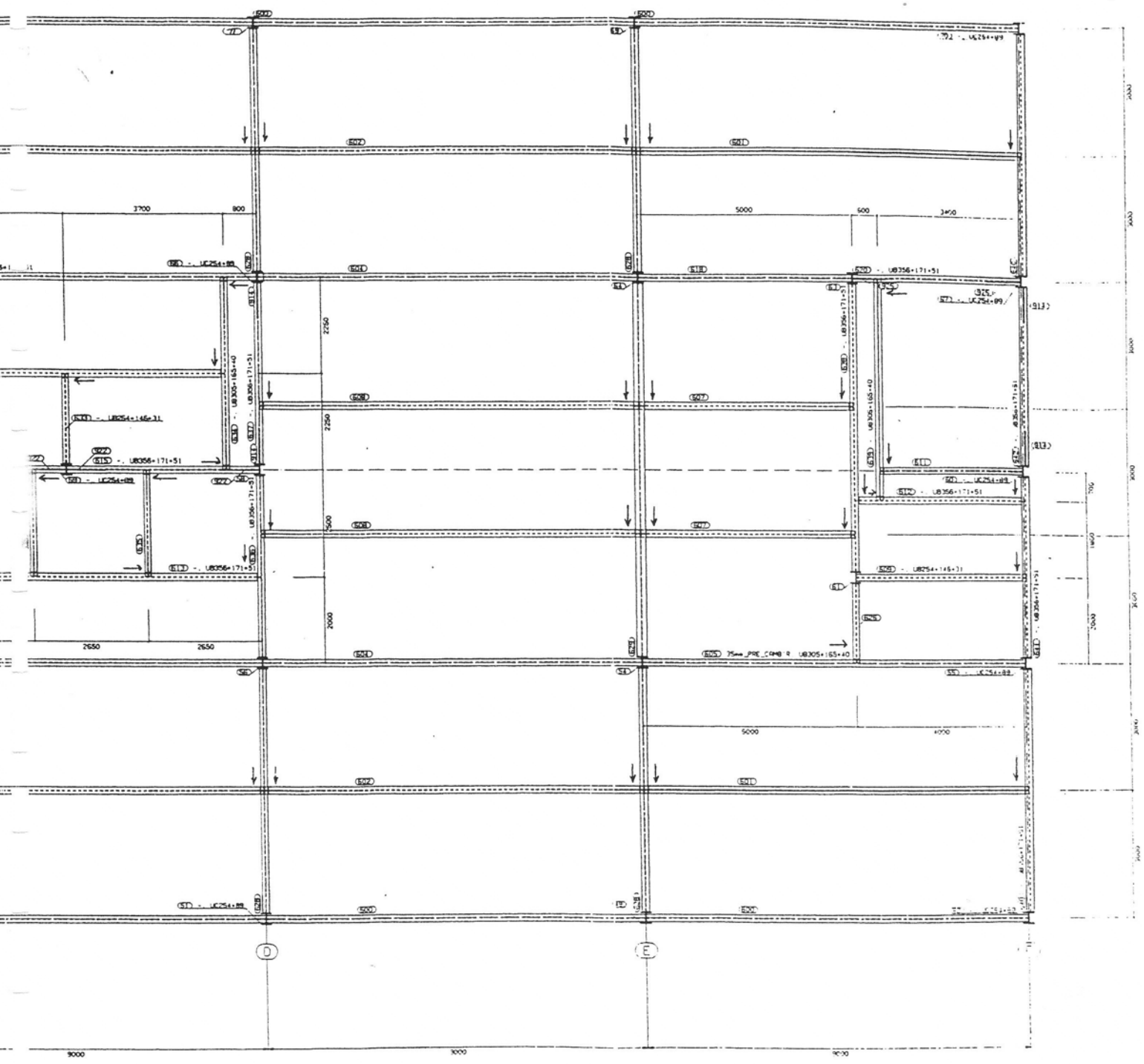
← INDICATES DIRECTION FROM WHICH STEEL IS TO BE ERECTED.

ALL ENDS AND FACES MARKED 'E' TO FACE GRID LINE 1

REV	DATE	BY	CHKD DATE	DESCR

NOT SCALE

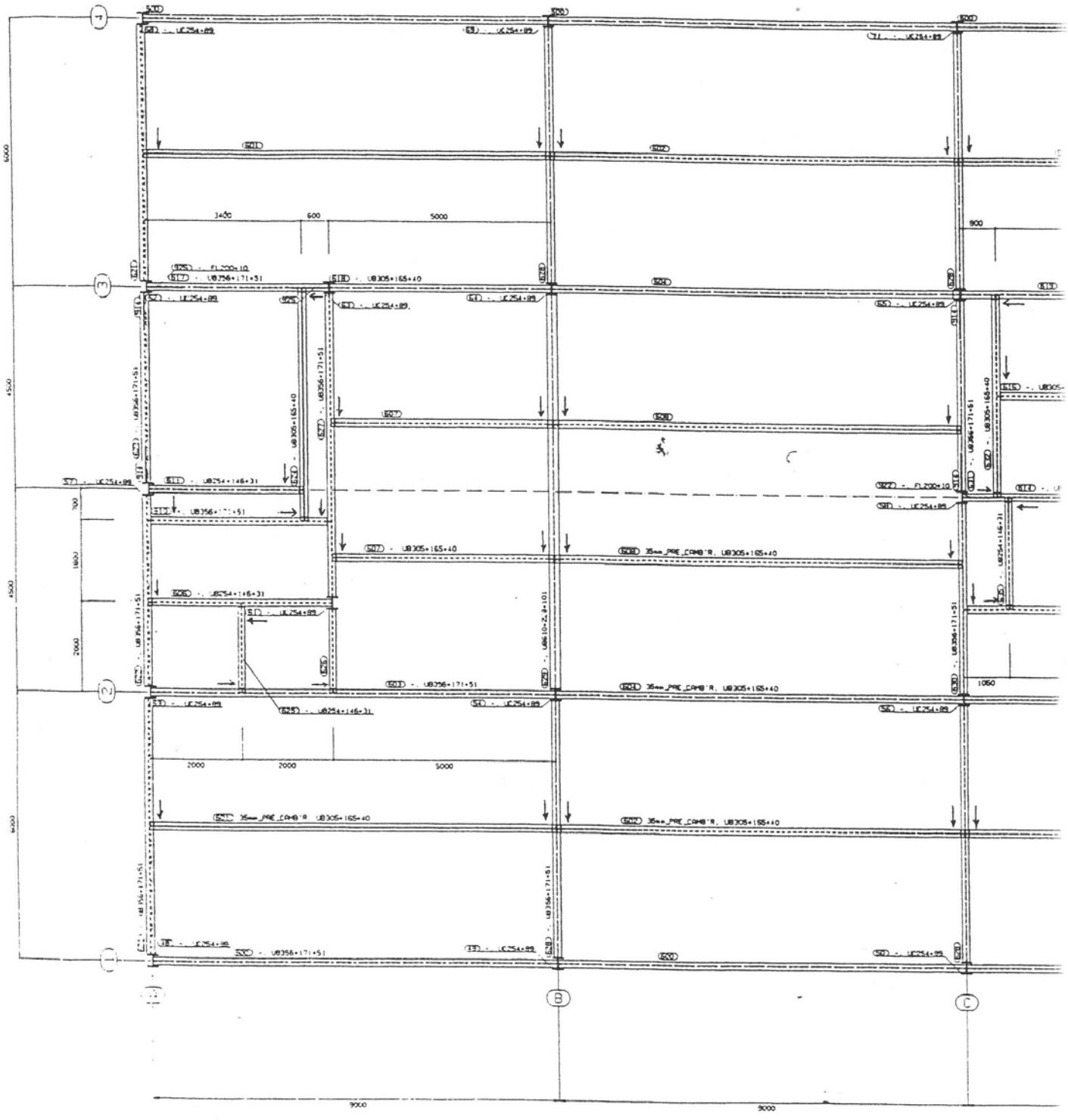
JOB No: 92066 DRG No: 92066/11

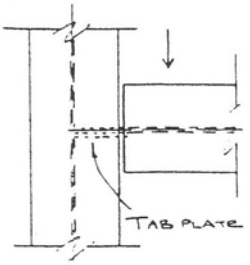


ON 6TH FLOOR STEEL

CAUNTON ENGINEERING LTD
NATIONAL WORKSHOPS
MOORGREEN
NOTTINGHAM NG16 3QU
TE (0773) 531111

DRG No: 92066/11	
JOB No : 92066	DRAWN BY: JM.S
CLIENT : B.P.E.	DATE: 08.12.9
CONTRACT : TEST FACILITY	CHECKED:
SITE : CARLINGTON	APPROVED:





ENLARGED DETAIL SHOWING HOW SECONDARY BEAM CONNECTS TO TAB PLATE

PL

BCSA
MEMBER OF THE BRITISH CONSTRUCTIONAL STEELWORK

STEEL CONSTRUCTION QUALITY ASSURANCE SCHEME BS 5750 PART 1 ISO 9000

NOTES:

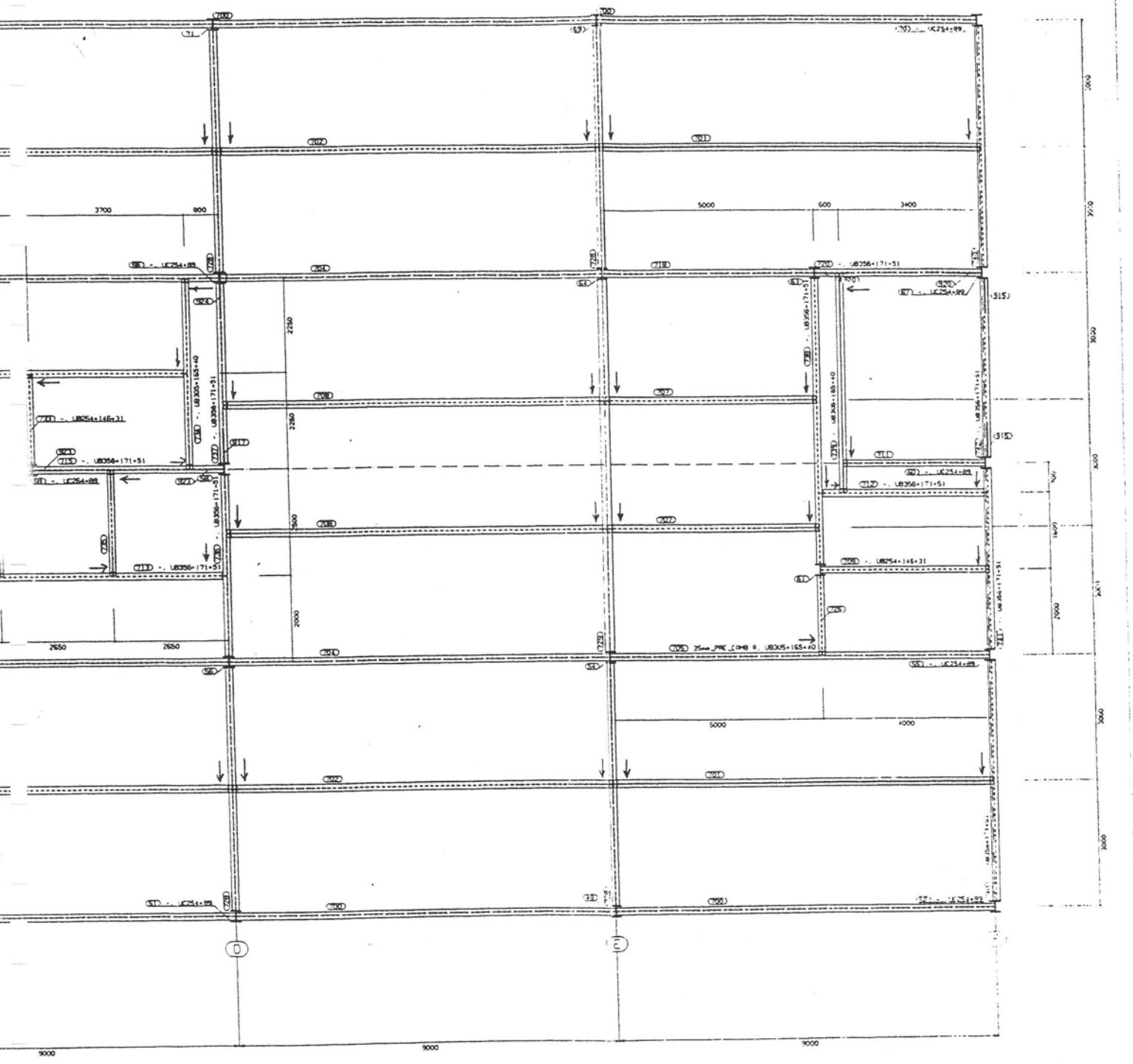
← INDICATES DIRECTION FROM WHICH STEEL IS TO BE ERECTED.

ALL ENDS AND FACES MARKED 'E' TO FACE GRID LINE 1

REV	DATE	BY	CHKD DATE	DESCRIP

N'T SCALE

JOB No: 92066 DRG No: 92066/12

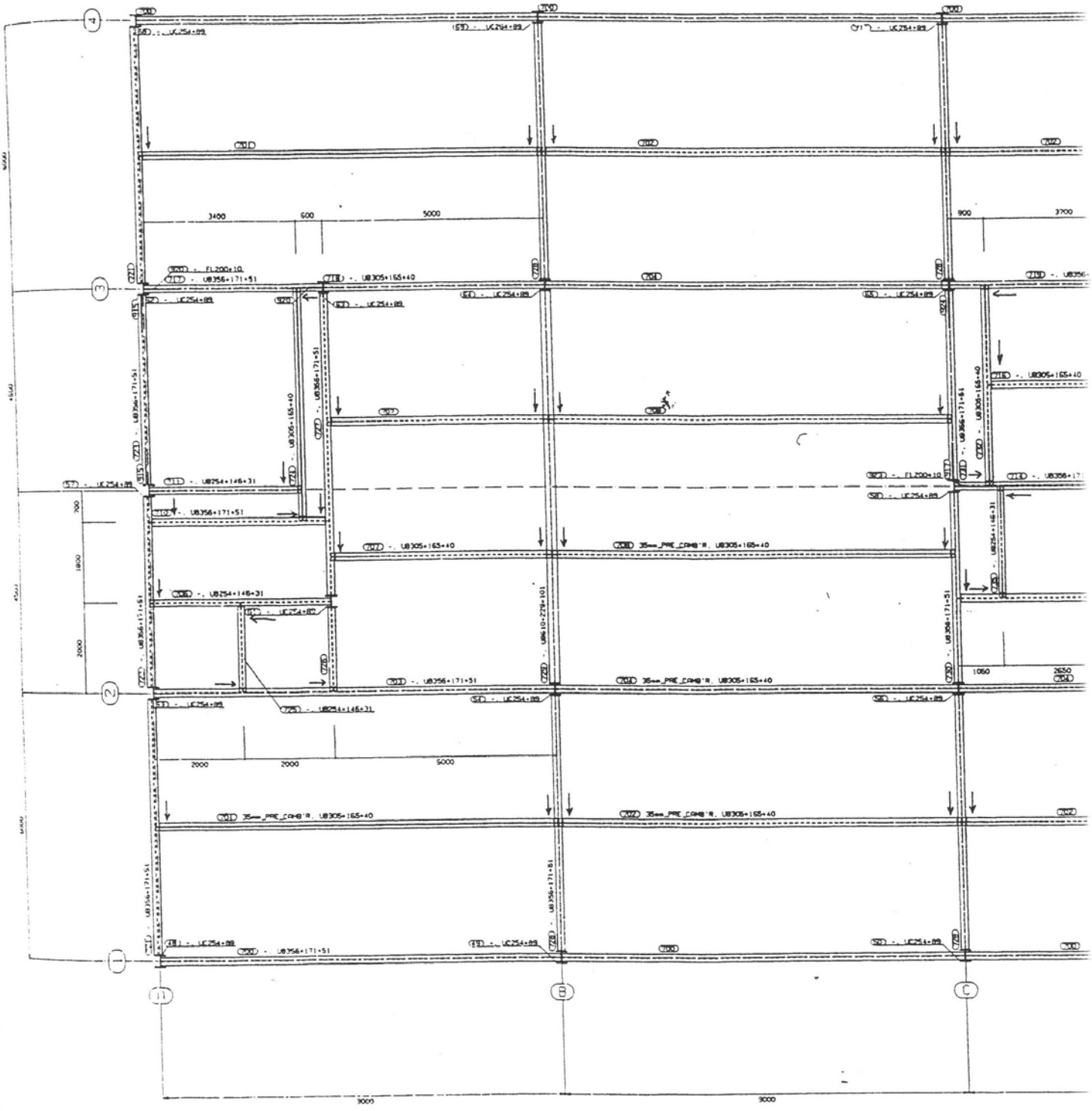


7 + FLOOR STEEL

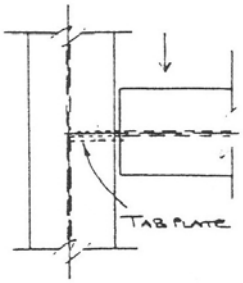
CAUNTON ENGINEERING LTD
NATIONAL WORKSHOPS
MOORGREEN
NOTTINGHAM NG16 3QU
TELEPHONE (0773) 531111

DRG No: 92066/12
JOB No : 92066
CLIENT : B.R.E.
CONTRACT : TEST FACILITY
SITE : CARDINGTON

DRAWN BY: JM/SJT
DATE: 08.12.92
CHECKED: 16/12/92
APPROVED:



PLAN



ENLARGED DETAIL SHOWING HOW SECONDARY BEAM CONNECTS TO TAB PLATE

MEMBER OF THE BRITISH CONSTRUCTIONAL

STEEL CONSTRUCTION QUALITY ASSURANCE SCHEME BS 5750 PART 1 ISO 9000

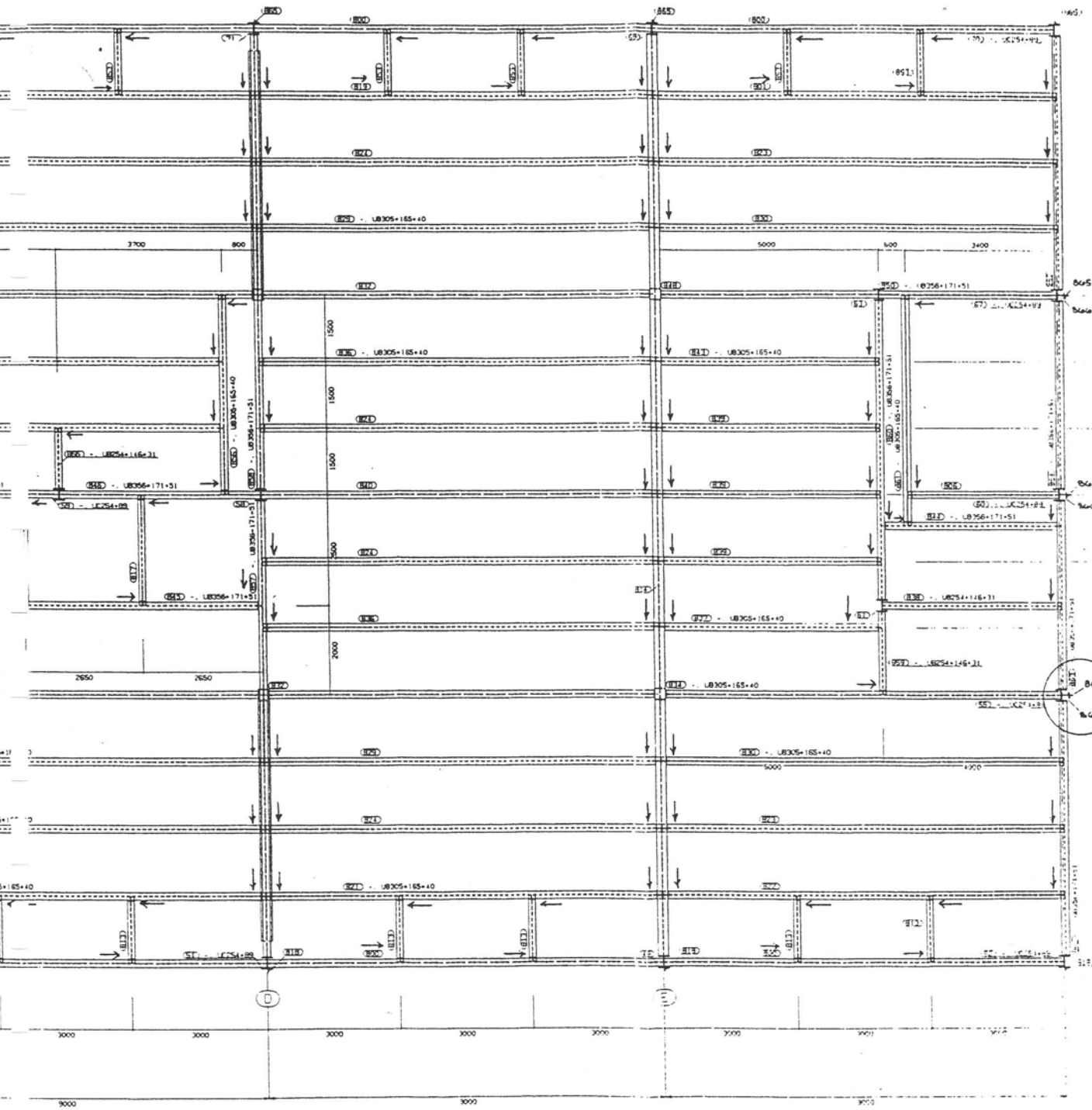
NOTES:

← INDICATES DIRECTION FROM WHICH STEEL IS TO BE ERECTED.

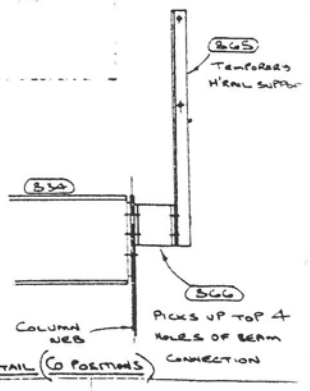
ALL FINS AND FACES MARKED 'E' TO FACE GRID LINE 1

REV	DATE	BY	CHKD DATE	DESCRIPTIO

NOT SCALE



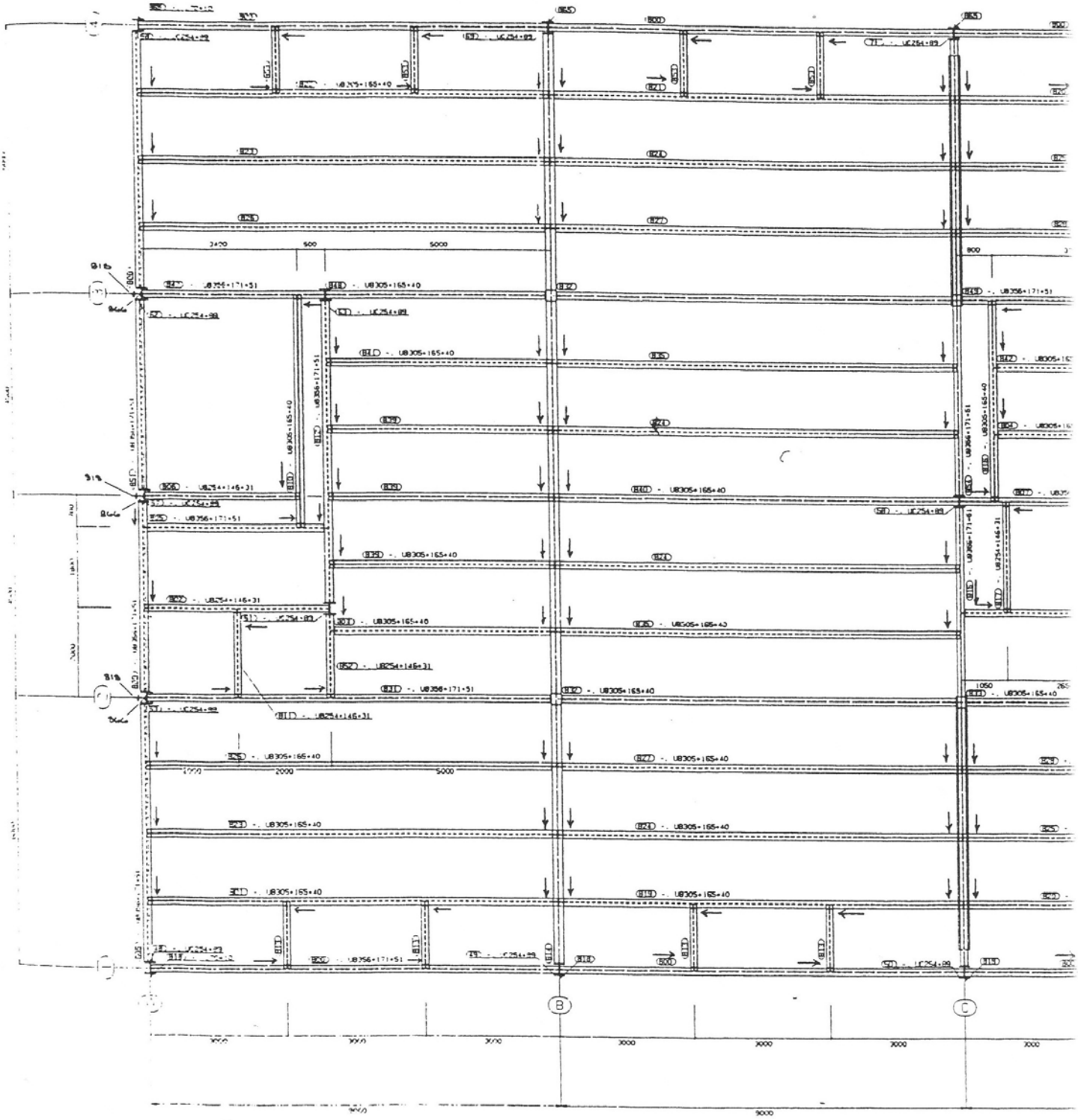
TH FLOOR STEEL

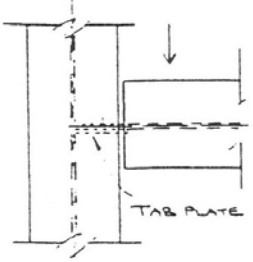


TYPICAL DETAIL (6 POSITIONS)

CAUNTON ENGINEERING LTD
NATIONAL WORKSHOPS
MOORGREEN
NOTTINGHAM NG16 3QH
TELEPHONE (0773) 531111

JOB No: 32066/13
JOB No: 32066
CLIENT: B.R.E.
CONTRACT: TFSI FACILITY
SITE: CUMBERNAULD
DRAWN BY: DM/EDT
DATE: 08.12.92
CHECKED: 10/12/92
APPROVED:





ENLARGED DETAIL SHOWING HOW SECONDARY BEAM CONNECTS TO TAB PLATE

PLAN

MEMBER OF THE BRITISH CONSTRUCTIONAL

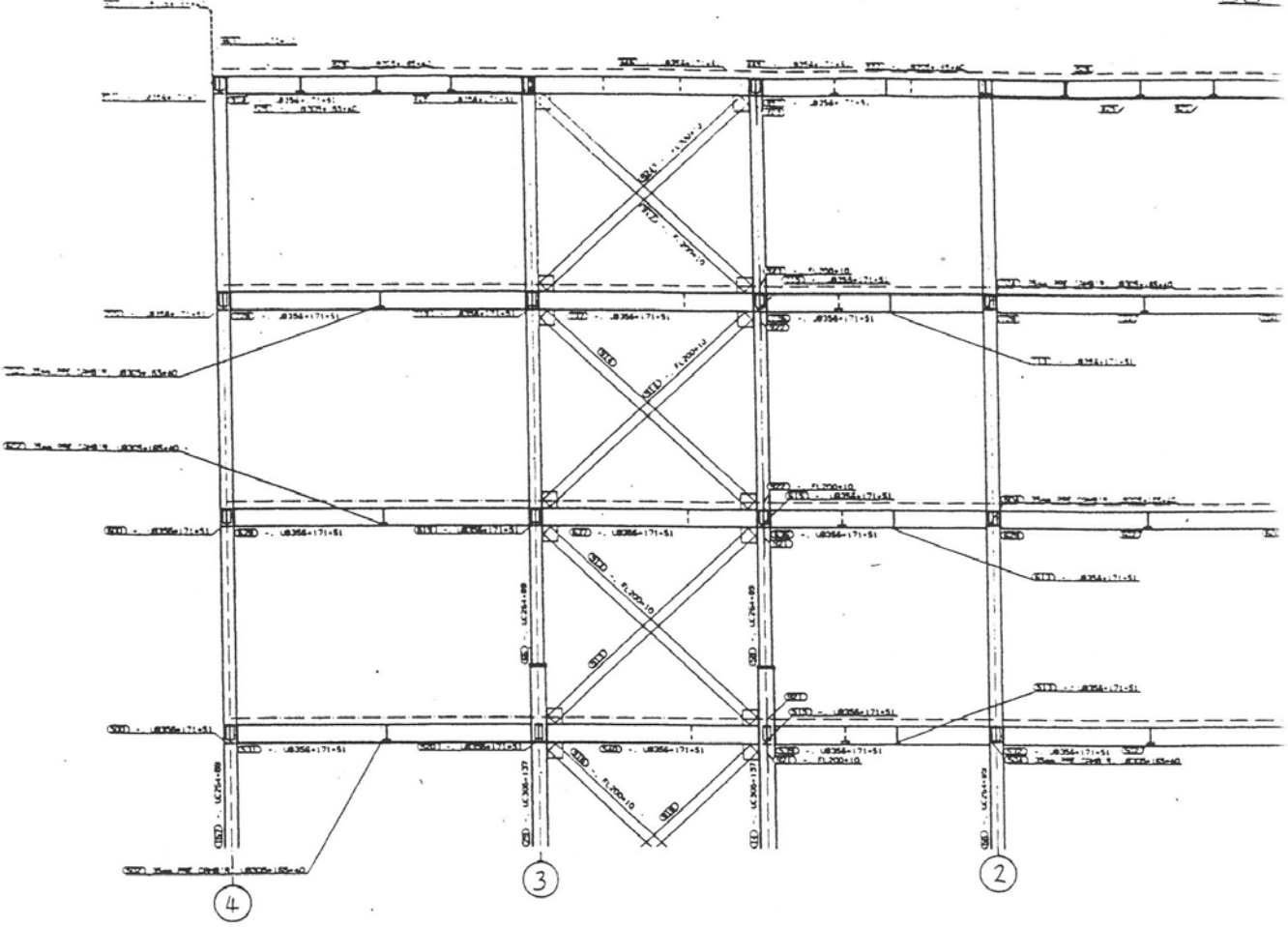
STEEL CONSTRUCTION QUALITY ASSURANCE SCHEME BS 5750 PART 1 ISO 9000

NOTES:

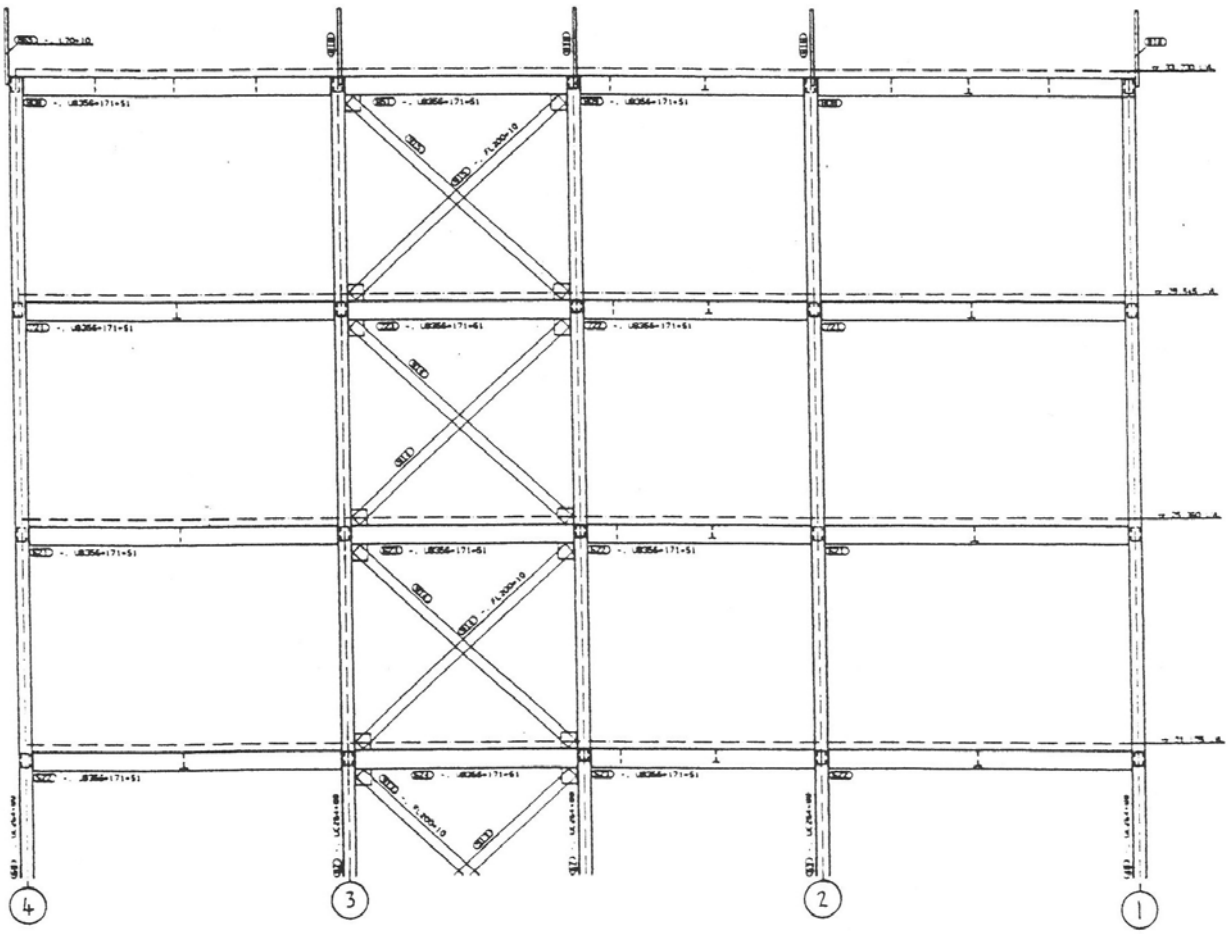
← INDICATES DIRECTION FROM WHICH STEEL IS TO BE ERECTED

ALL ENDS AND FACES MARKED 'E' TO FACE GRID LINE 1

REV	DATE	BY	CHKD DATE	DESCRIPTI



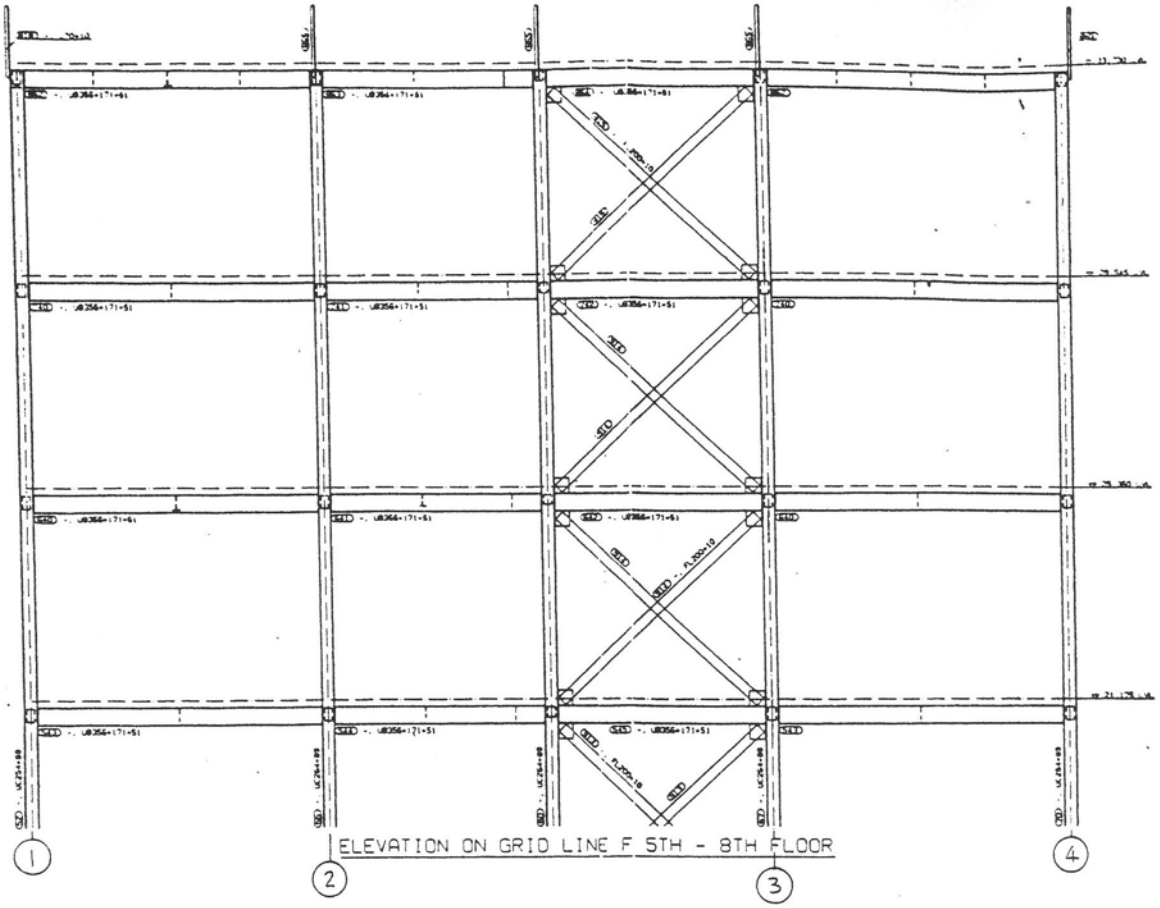
SECTION THRU' GRID LINE D 5TH - 8TH FLOOR



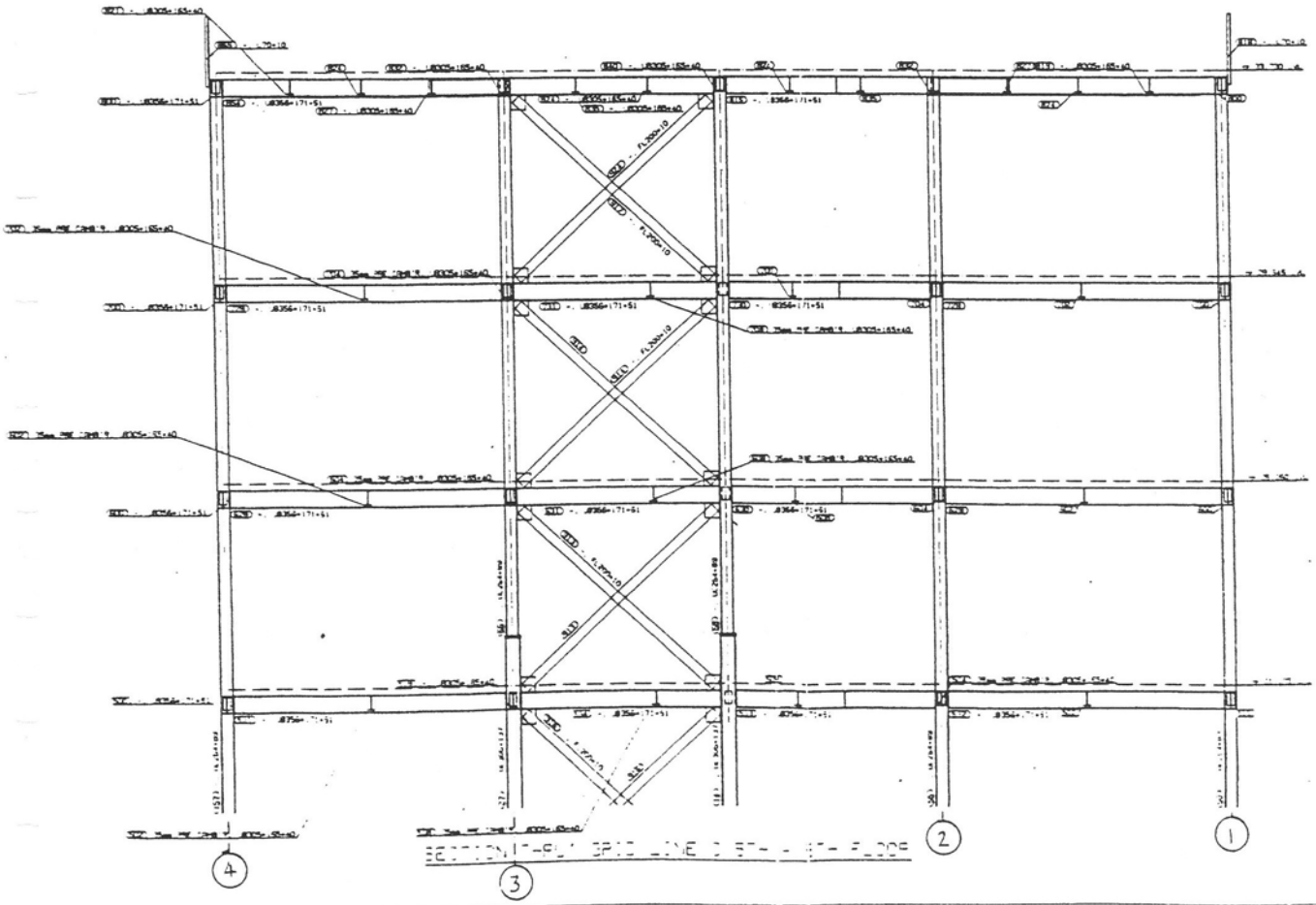
ELEVATION ON GRID LINE A 5TH - 8TH FLOOR

STEEL CONSTRUCTION NOTES:
QUALITY ASSURANCE SCHEME
BS 5750 PART 1
ISO 9000

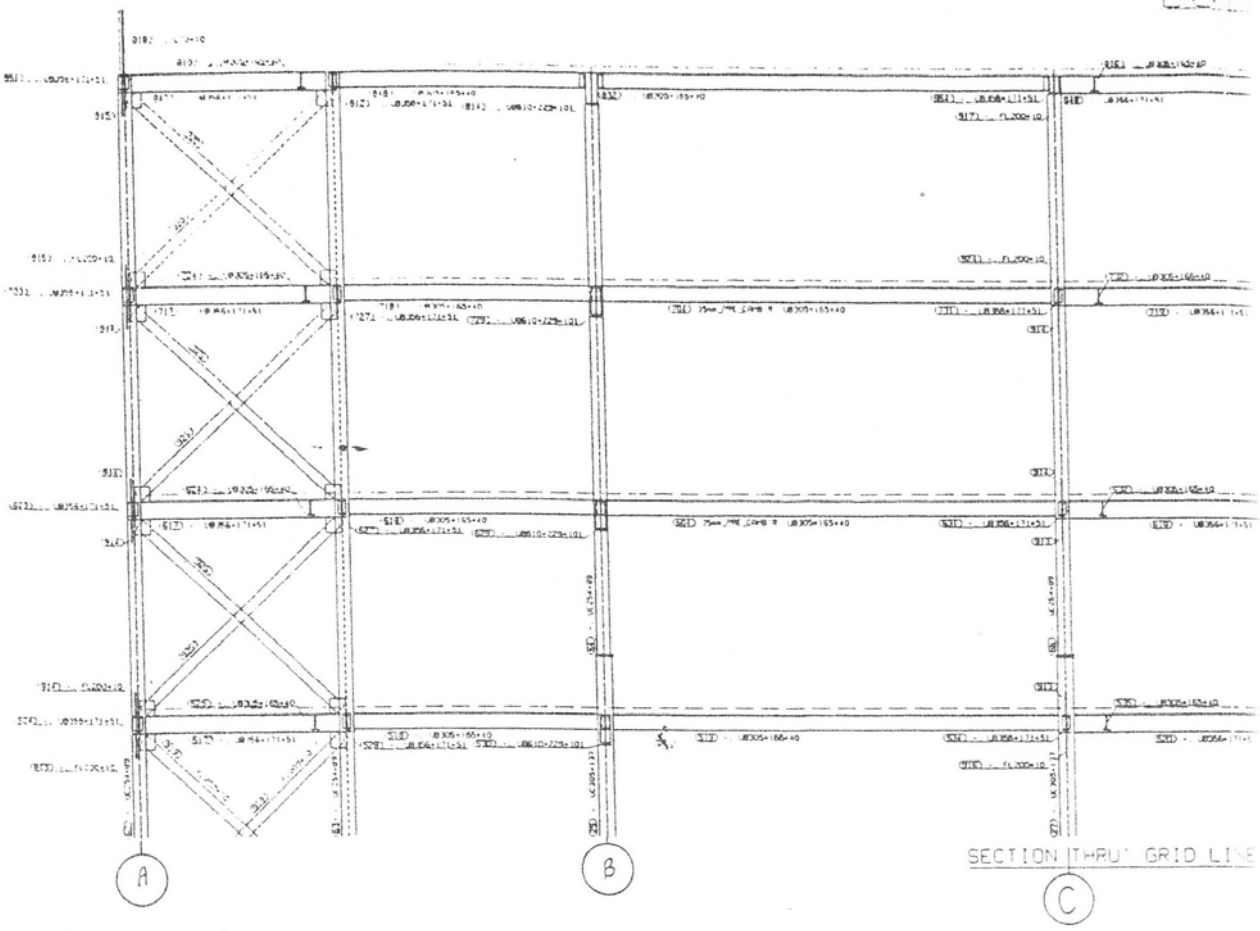
REV	DATE	BY	CHKD	DATE	DESCRIPTION



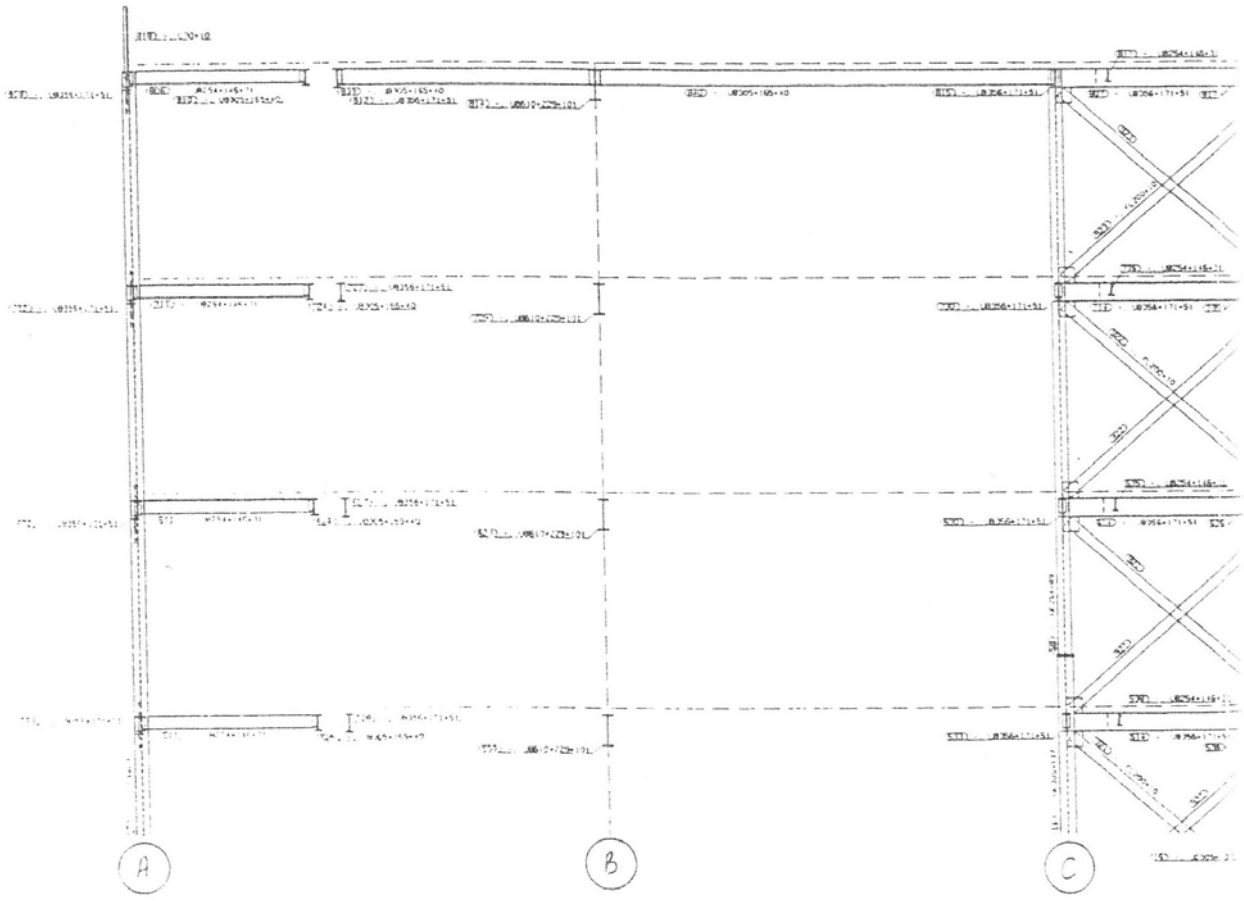
ELEVATION ON GRID LINE F 5TH - 8TH FLOOR



SECTION ON GRID LINE D 5TH - 8TH FLOOR

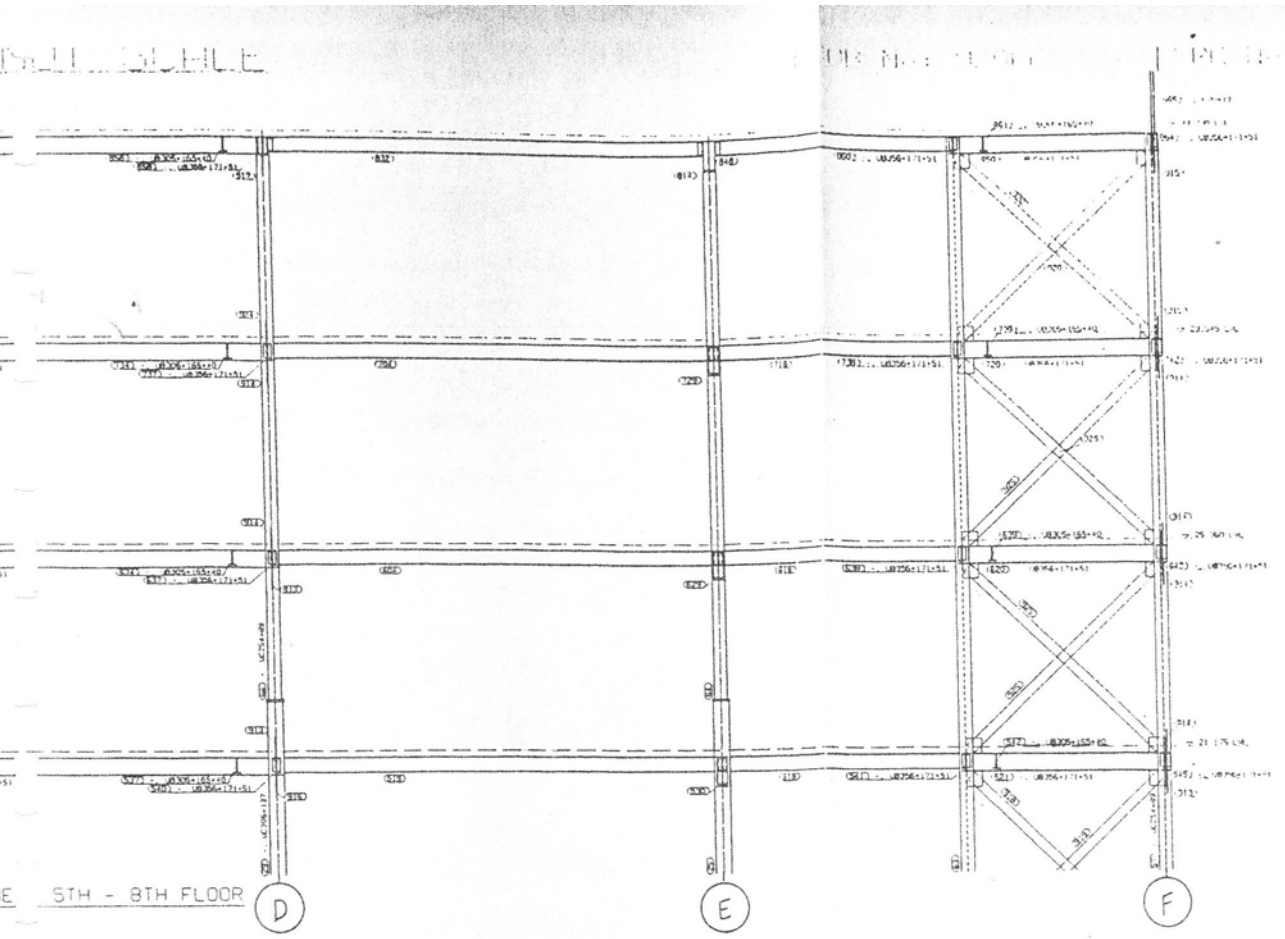


SECTION THRU' GRID LINE

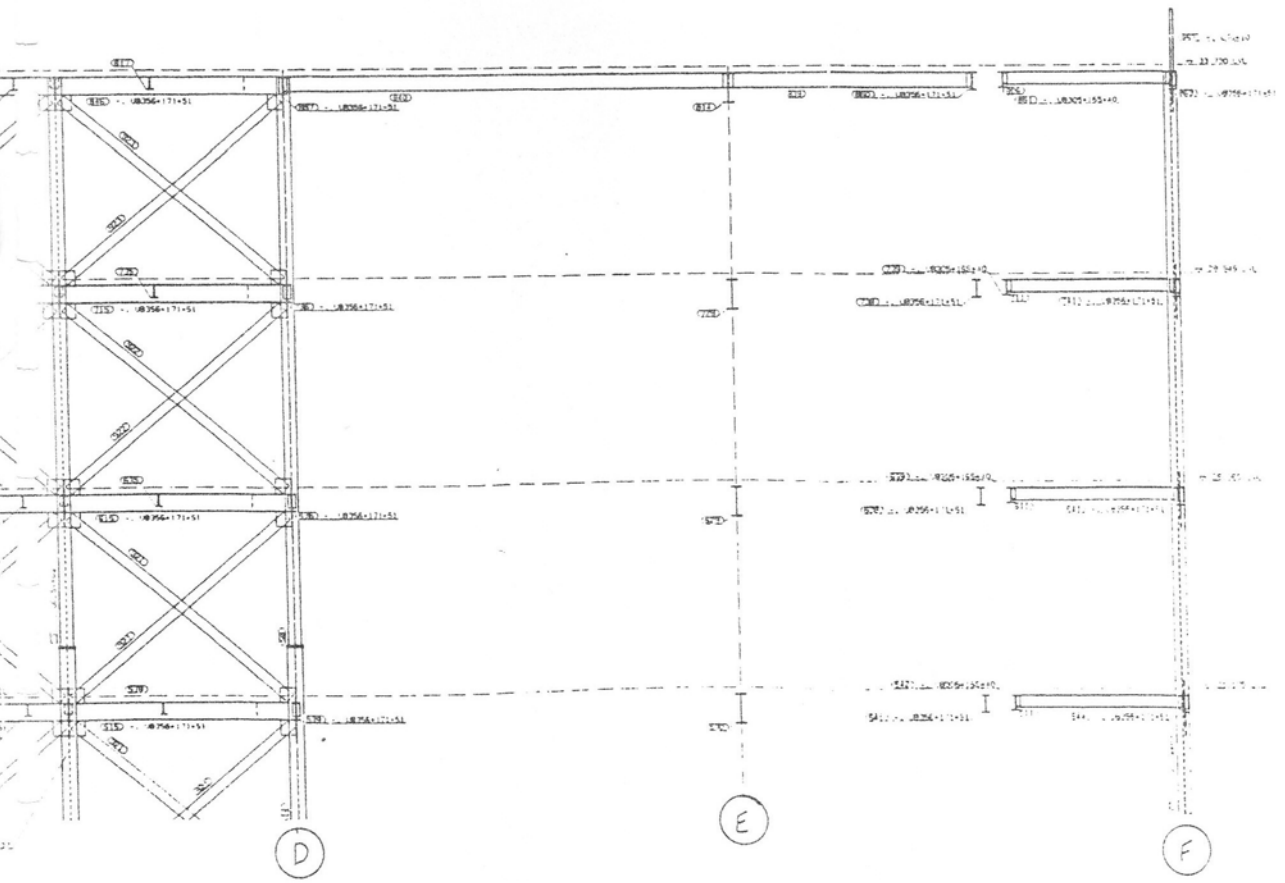


SECTION THRU' GRID

REV	DATE	BY	CHKD DATE	DESCRIPTION



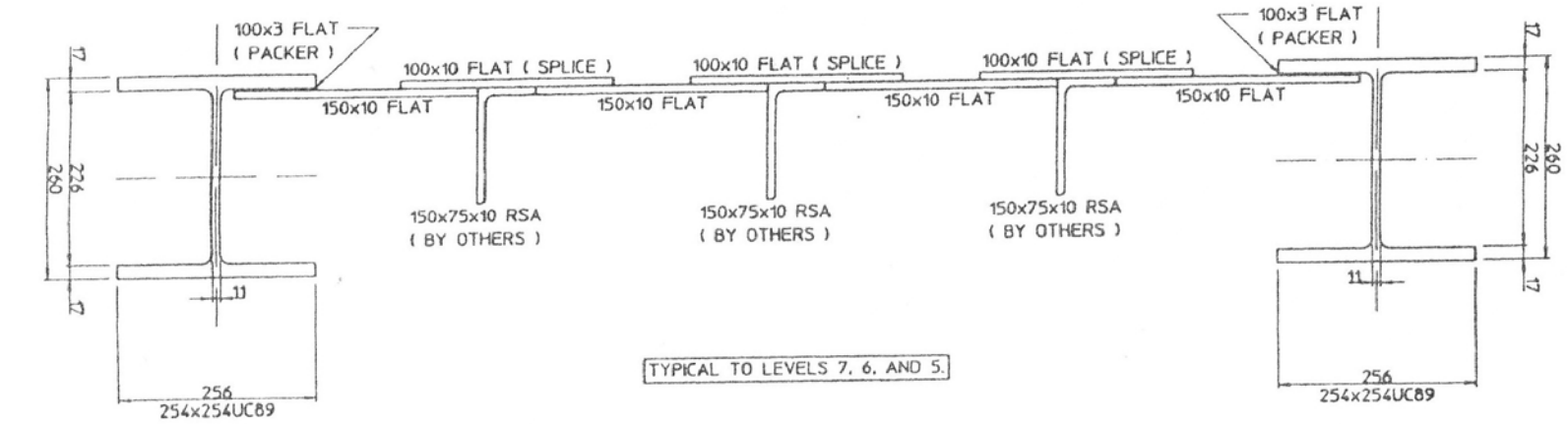
E 5TH - 8TH FLOOR

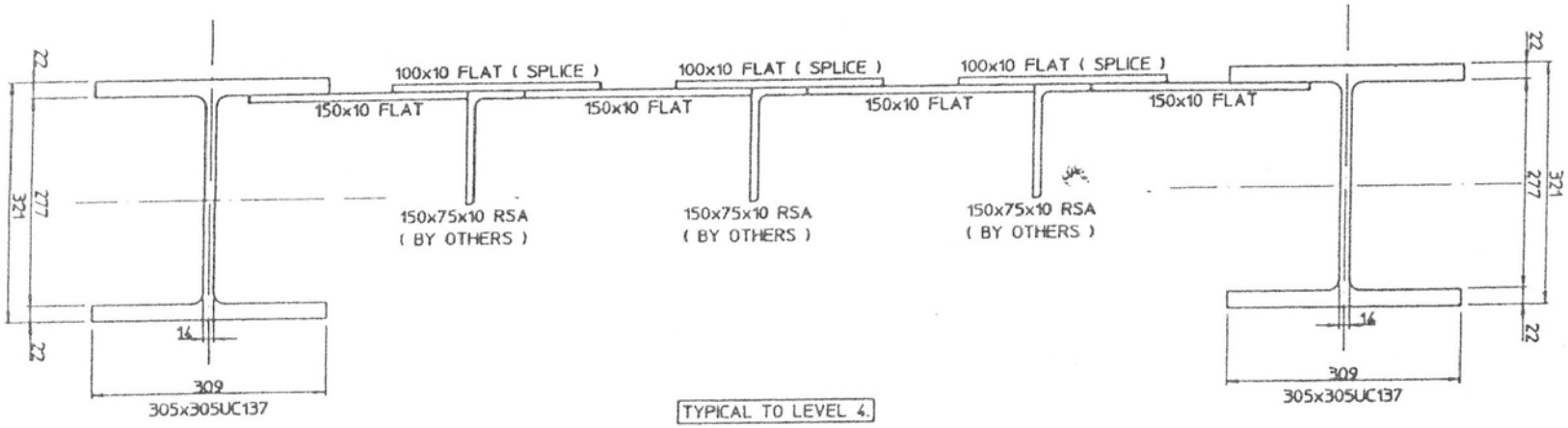


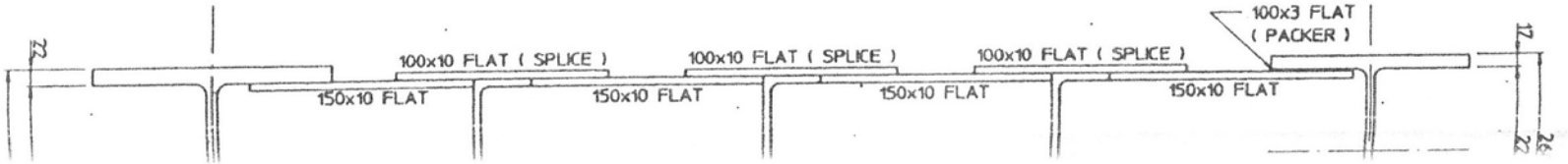
ERES 2/3 5TH - 8TH FLOOR

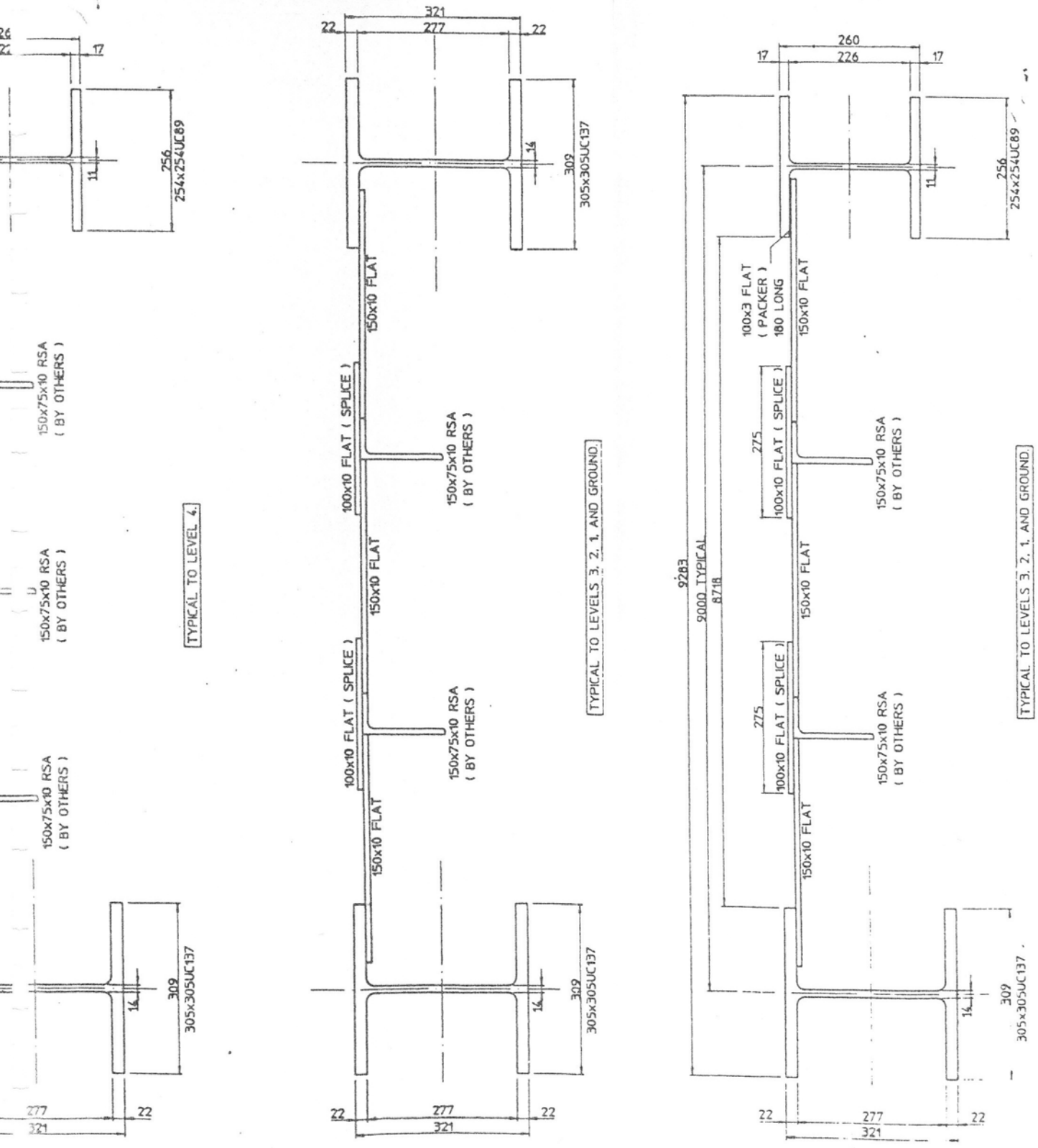
CRUNTON ENGINEERING LTD
NATIONAL WORKSHOPS
MOORGREEN
NOTTINGHAM NG16 3AA
TELEPHONE (0773) 531111

DATE | REVISION | ISS | DATE | REVISION | NOTES | FINISH UNLESS NOTED





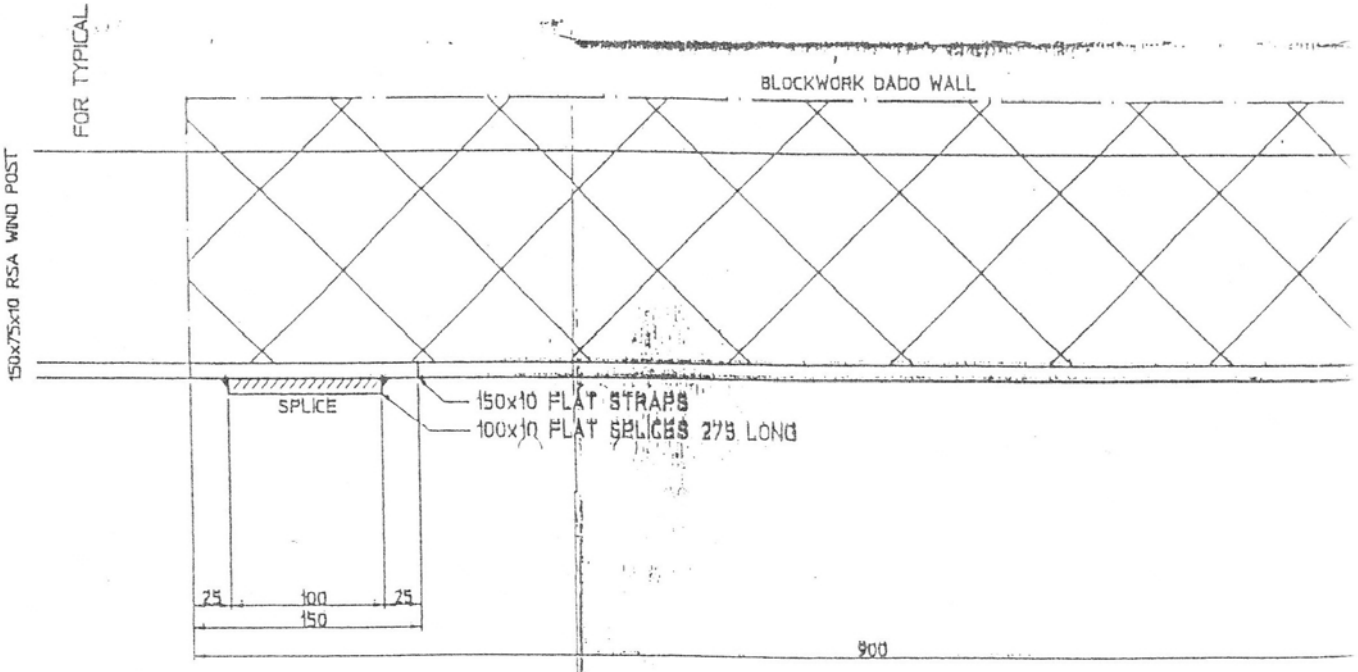




	Convoy Installations Limited FABRICATION AND INSTALLATION OF STRUCTURAL STEELWORK Also Light Mechanical Handling Equipment, erection and testing of Light Overhead Cranes, Runways, etc	ADDRESS 18 UNION STREET LUTON LU1 3AN BEDFORDSHIRE PHONE (0582) 453538 FAX (0582) 404118	TITLE TYPICAL SECTIONS SHOWING DADO WALL HEAD RESTRAINT DETAILS BUILDING RESEARCH ESTABLISHMENT CARDINGTON, BEDFORDSHIRE.	DRAWN BY A SYMONS DATE 11 OCTOBER 1993 SCALE 1:5 DRAWING NUMBER Q/6710/01 ISSUE

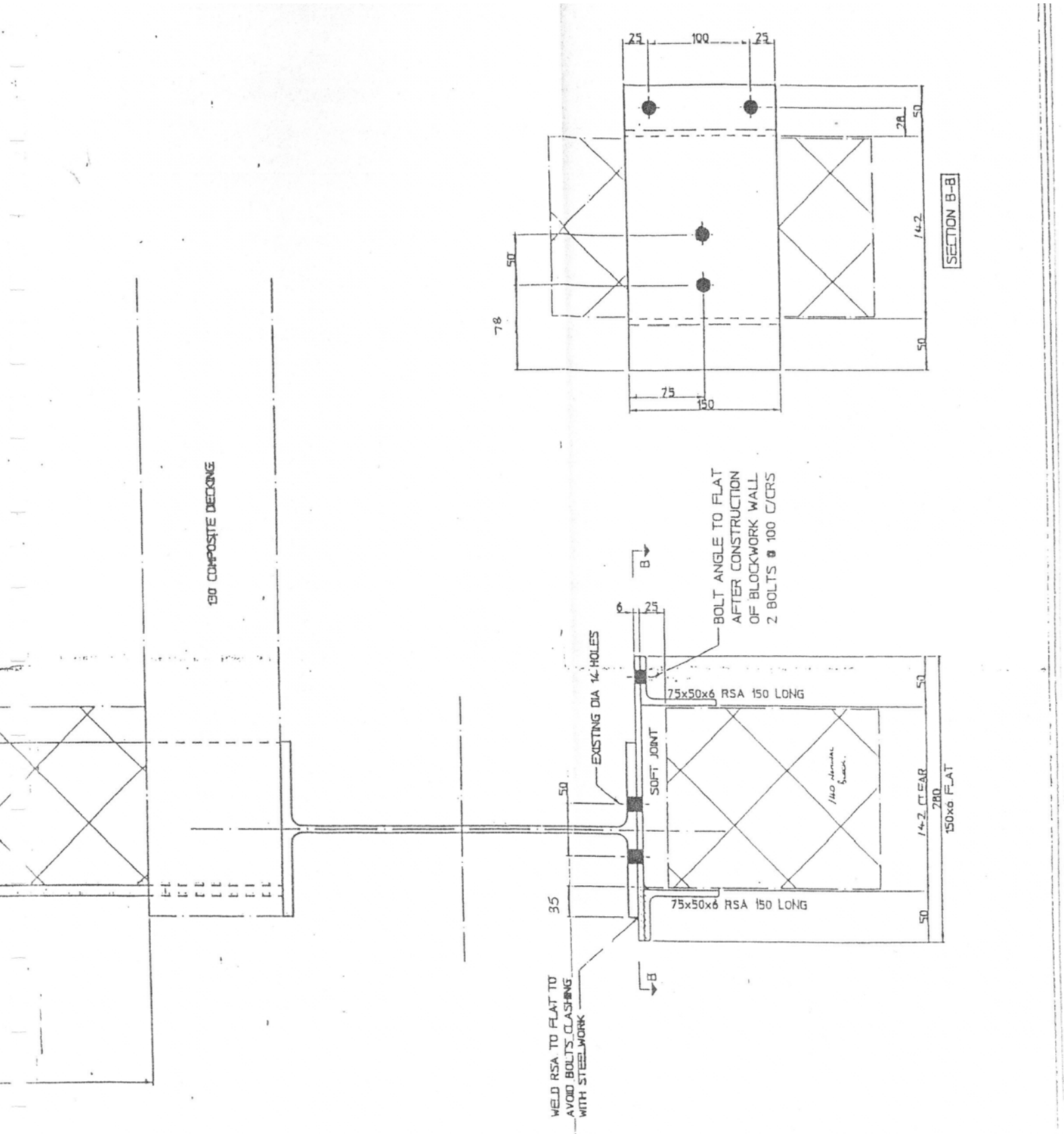
FOR TYPICAL SECTIONS SEE DRAWING No. 0/6710/01

A

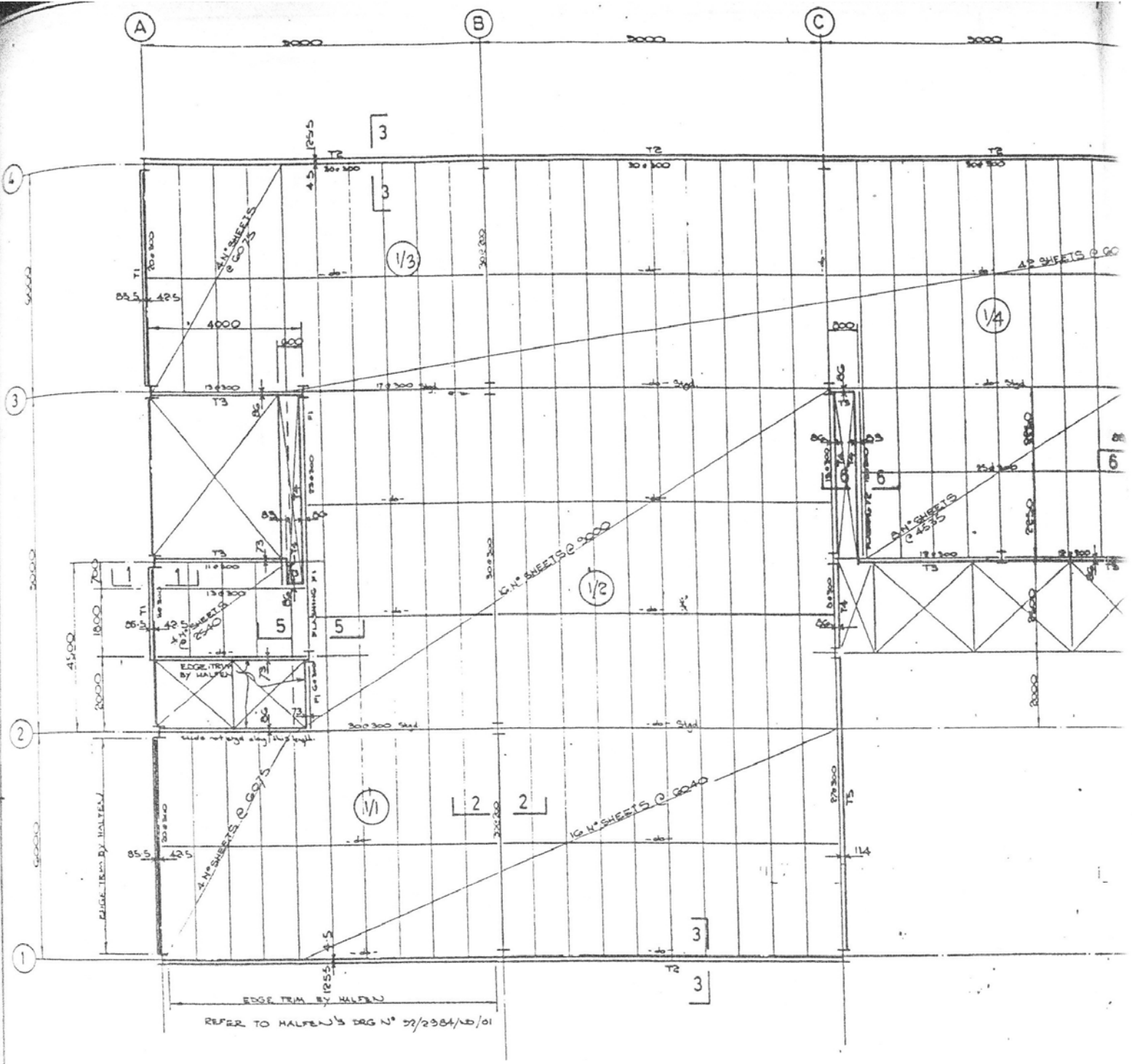


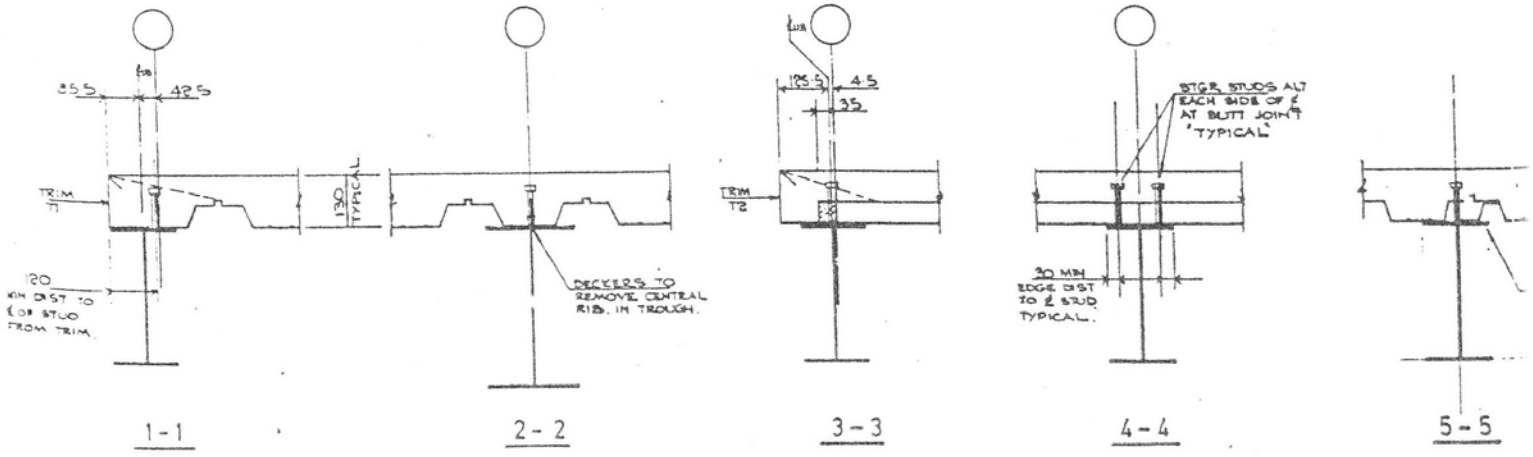
A

DATE	REVISION	ISS	DATE	REVISION	NOTES	FINISH UNLESS NOTED

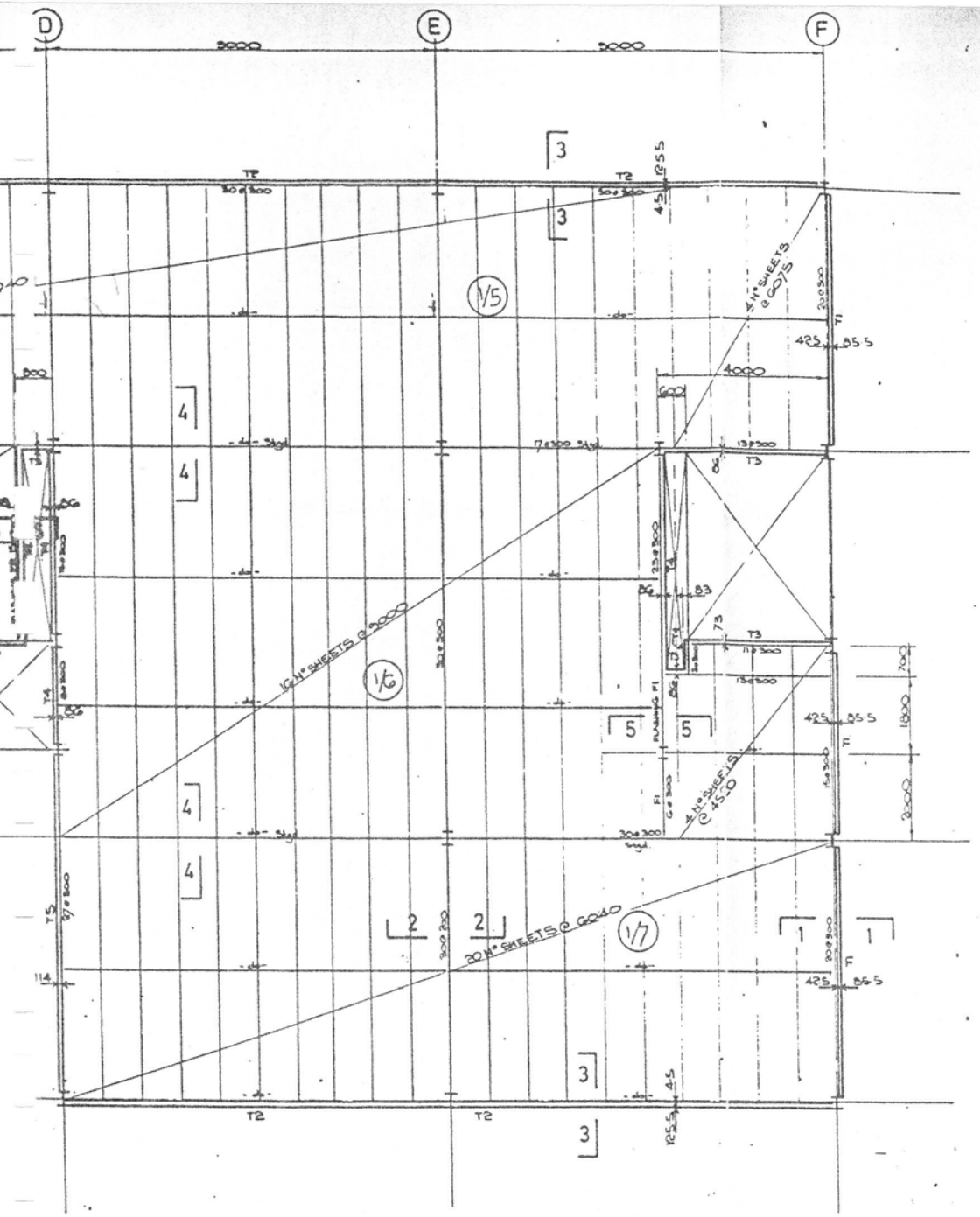


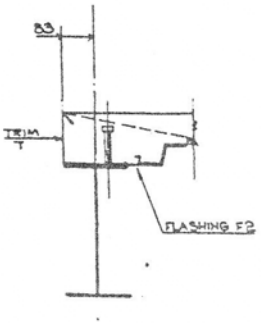
Envoy Installations Limited	FABRICATION AND INSTALLATION OF STRUCTURAL STEELWORK Also Light Mechanical Handling Equipment, erection and testing of Light Overhead Cranes, Runways, etc	ADDRESS 18 UNION STREET LUTON LU1 3AN BEDFORDSHIRE PHONE (0582) 453538 FAX (0582) 404116	TITLE TYPICAL SECTION SHOWING DADO AND HEAD RESTRAINT DETAILS BUILDING RESEARCH ESTABLISHMENT CARDINGTON, BEDFORDSHIRE.	DRAWN BY A SYMONS DATE 11 OCTOBER 1993 SCALE 1:5 DRAWING NUMBER Q/6710/02 ISSUE 'A'

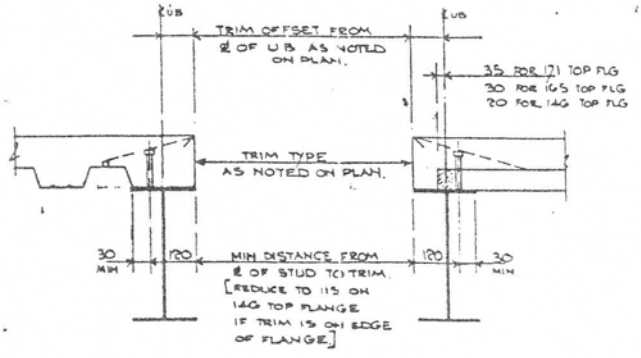

A
B
C
1
2
3
4
1/1
1/2
1/3
1/4
EDGE TRIM BY HALFEN
REFER TO HALFEN'S DRG N° 57/2984/LD/01
EDGE TRIM BY HALFEN


TRIM
120
MIN DIST TO ℄ OF STUD FROM TRIM.
DECKERS TO REMOVE CENTRAL RIB IN TROUGH.
TRIM
STGR STUDS ALT EACH SIDE OF ℄ AT BUTT JOINT 'TYPICAL'
20 MIN EDGE DIST TO ℄ STUD TYPICAL.

1-1 2-2 3-3 4-4 5-5







6 - 6

TYPICAL EDGE DETAILS

ADDITIONAL NOTES:

A1. Concrete to be Grade 35 light-weight (Lytag or similar approved) with a maximum density of 1900 kg/m3.

A2. All floors to be reinforced with one layer of A142 mesh laid with lower bars bearing on ribs of steel decking.

A3. Joints in decking and between decking and structural steelwork to be sealed to prevent grout loss from concrete.

NOTES:

All dimensions must be checked on site and not scaled from this drawing.

GENERAL NOTES

1. This drawing is to be read in conjunction with all other relevant drawings, details and specifications.
2. All decking to be CF70x0.9 unless otherwise stated.
3. The decking acts as a permanent formwork and tensile reinforcement in the bottom of the slab only.

   The design is in accordance with BS 5950 Part 4.
4. The decking will not act as tensile reinforcement to a cantilever or other situation where tensile reinforcement stresses are in the upper surface of the slab. The design and supply of reinforcement in this situation is by others.
5. The overall depth of the slab is 130 mm NON-COMPOSITE/COMPOSITE. In addition to the self-weight for LIGHTWEIGHT/NORMAL-WEIGHT concrete.

   The Design Loads of the COMPOSITE slab are:

LIVE LOAD	2.5 kN/m2
PARTITIONS	1.0 kN/m2
FLOOR FINISHES	0.4 kN/m2
CEILING FINISHES	0.15 kN/m2
SERVICES	0.25 kN/m2

6. The composite slab has been designed only to carry those partitions considered in PMP design calculations.
7. Fire rating for composite slab 1½ hours
8. Unless instructed otherwise it is assumed that there is no requirement for PMP decking to provide lateral restraint to the beams. (BS 5950 Part 3)
9. Advice on the design of composite slabs and fire resistance may be obtained from PMP Technical Department.
10. All decking to have a minimum bearing of 50mm on structural steelwork and concrete and 75mm on all other materials.
11. No decking is to be cut down to a single span without consultation with PMP Limited design office.
12. Decking fixed to steelwork must be secured using fixings at 300mm centres at each end and 300mm centres over intermediate supports. The fixings are to be either HILTI X-HS/XFP nails or XF77 fixings HSD.
13. Temporary supports (by others) are required where indicated on plan thus:-
14. Concrete must not be allowed to be hooped or dropped from a height onto the deck.
15. For spans exceeding 6.0m with temporary props required, the propping arrangement is to be in place prior to commencement of deck laying.
16. Spreader Beams are to be provided in the propping arrangement - no isolated props are to be permitted.
17. Slots cut in the deck for beam encasement are by the main contractor. The maximum size of slot to be 150mm wide without the removal or part thereof of the rib.
18. Decking to be notched around columns as required with support provided by others.
19. Trapezoidal sheets to be side stitched at 1.00m centres using self tapping screws.
20. Supplementary bar reinforcement is required in the slab where holes not trimmed by structural steelwork around 300mm transverse to deck span. The design and supply of reinforcement is to be by others.
21. Edge trim is dimensioned on plan from the centre line of the beam to the edge of concrete slab.
22. Edge shutter to be secured at 750mm with restraint straps
23. Stud welding to be carried out in accordance with SCI booklet "Good Practice in Composite Floor Construction".
24. Studs shown are 19 mm diameter x 95 mm height U.N.O.
25. Numbers shown thus 6@300mm beside indicate the number of equally spaced studs.

C	7 JUL 93	ADDITIONAL NOTES ADDED (A1 etc.)
B	15 JAN 93	POSITION OF HOLES FROM GRIDLINES NOTE 7 AMENDED
A	22 DEC 92	MINOR AMENDMENTS CONSTRUCTION ISSUE
	Date	Revisions

Composite Profiles
15 Moor Road, Broadstone,
Dorset BH18 8AZ
Telephone 0202 659237
Facsimile 0202 659288

Client
CAUNTON Engineering Limited

Job Title
CARDINGTON B.R.E.
MULTI-STOREY STRUCTURAL AND FIRE TEST FACILITY

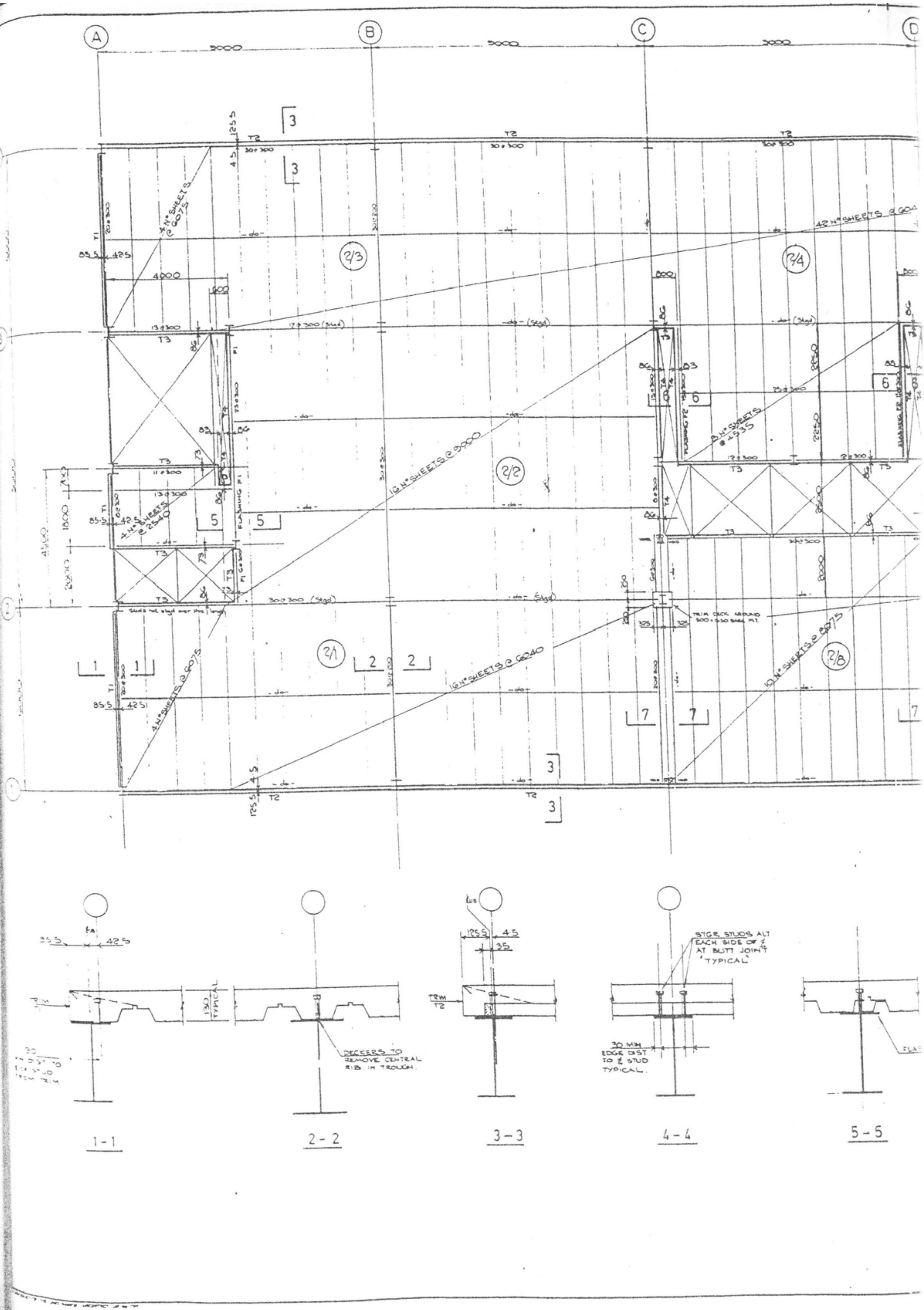
Drawing Title
FIRST FLOOR LEVEL DECKING LAYOUT

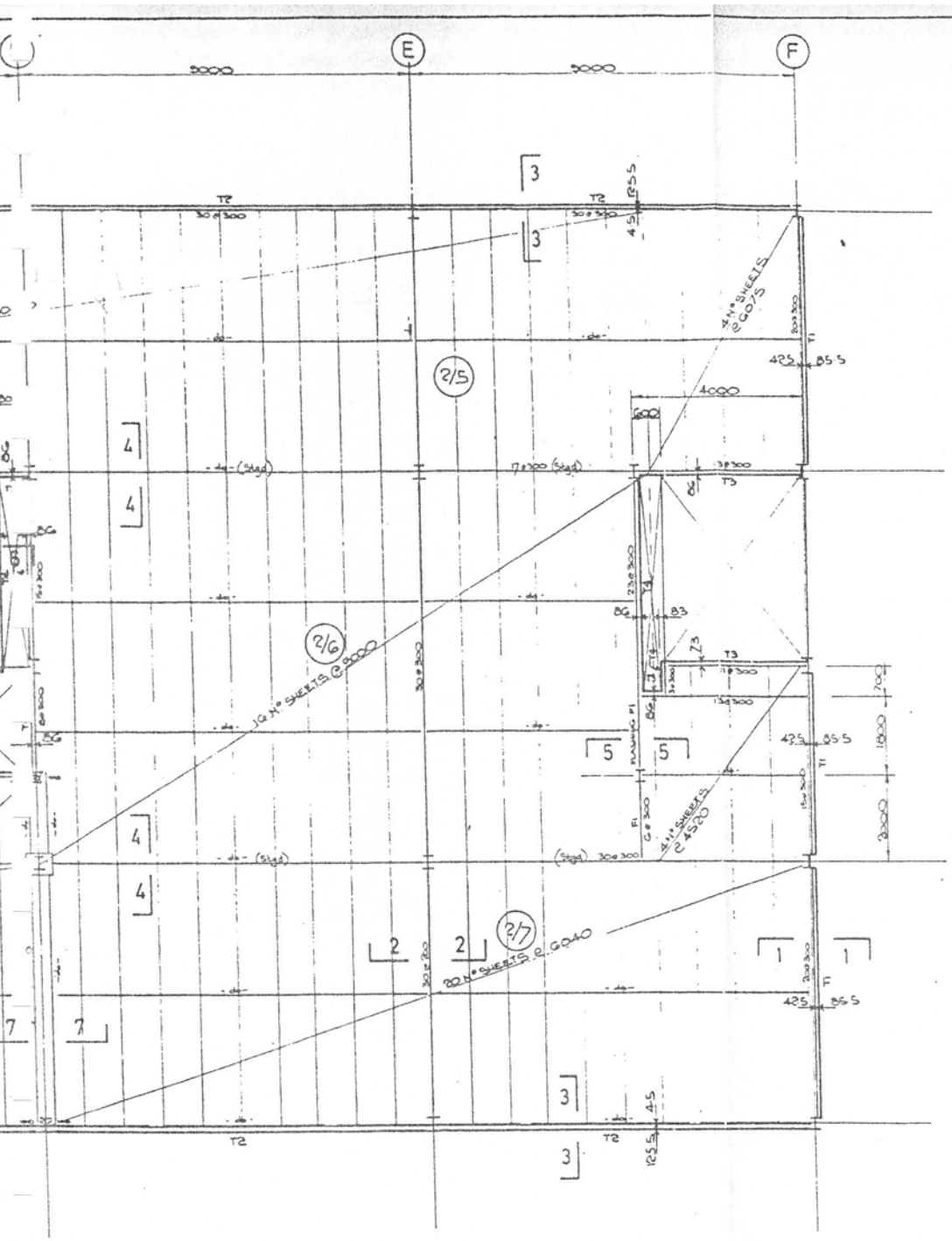
Scale 1:75 1:10

Date 1 Dec 92 Drawn by K.S.

Drg. No. R1112/01 Rev. C

884 x 841mm A1


A
B
C
D
5000
5000
5000
T1
T2
T3
T4
30@300
2/1
2/2
2/3
2/4
2/8
4 Nº SHEETS @ 6075
42 Nº SHEETS @ 6040
16 Nº SHEETS @ 3000
16 Nº SHEETS @ 6040
10 Nº SHEETS @ 6075
8 Nº SHEETS @ 4535
4 Nº SHEETS @ 2540
4000
600
800
-do-
-do- (Stgd)
30@300 (Stgd)
17@300 (Stgd)
FLASHING F1
TRIM DECK AROUND 300 x 450 BASE PLT.
DECKERS TO REMOVE CENTRAL RIB IN TROUGH.
STGR STUDS ALT EACH SIDE OF ℄ AT BUTT JOINT 'TYPICAL'
30 MIN EDGE DIST TO ℄ STUD TYPICAL.
130 TYPICAL
TRIM
TRIM T2
85.5
42.5
125.5
45
35
1-1
2-2
3-3
4-4
5-5



NOTES

All dimensions must be checked on site and not scaled from this drawing.

GENERAL NOTES

1. This drawing is to be read in conjunction with all other relevant drawings, details and specifications.
2. All decking to be CF70(0.9) unless otherwise stated.
3. The decking acts as a permanent formwork and tensile reinforcement in the bottom of the slab only.

   The design is in accordance with BS 5950 Part 4.
4. The decking will not act as tensile reinforcement to a cantilever or other situation where tensile reinforcement stresses are in the upper surface of the slab. The design and supply of reinforcement in this situation is by others.
5. The overall depth of the slab is 130 mm NON-COMPOSITE/COMPOSITE. In addition is the self-weight for LIGHTWEIGHT/NORMAL WEIGHT concrete.

   The Design Loads of the COMPOSITE slab are:-

LIVE LOAD	2.5 KN/m2
PARTITIONS	1.0 KN/m2
FLOOR FINISHES	0.4 KN/m2
CEILING FINISHES	0.15 KN/m2
SERVICES	0.25 KN/m2

   The composite slab has been designed only to carry those partitions considered in PMF design calculations.
6. Fire rating for composite slab 1½ hours
7. Unless horizontal alternative is to assumed that there is no requirement for PMF decking to provide lateral restraint to the beams. (BUILDING CONTROL)
8. Advice on the design of composite slabs and fire resistance may be obtained from PMF Technical Department.
9. All decking to have a minimum bearing of 10mm on structural steelwork and concrete and 75mm on all other materials.
10. No decking is to be cut down to a single span without consultation with PMF Limited design office.
11. Decking fixed to steelwork must be secured using fixings at 150mm centres at each end and 300mm centres over intermediate supports. The fixings are to be either HILTI X-EDN/EDP nails or SFIT fixings SDF5.
12. Temporary supports (by others) are required where indicated on plan thus:-
13. Concrete must not be allowed to be heaped or dropped from a height onto the deck.
14. For spans exceeding 4.0m with temporary props required, the propping arrangement is to be in place prior to commencement of deck laying.
15. Spreader beams are to be provided in the propping arrangement - no isolated props are to be permitted.
16. Slots cut in the deck for base encasement are by the main contractor. The maximum size of slot to be 150mm wide without the removal or part thereof of the ribs.
17. Decking to be notched around columns as required with support provided by others.
18. Trapezoidal sheets to be side stitched at 1.00m centres using self tapping screws.
19. Supplementary bar reinforcement is required in the slab where holes not trimmed by structural steelwork exceed 300mm transverse to deck span. The design and supply of reinforcement is to be by others.
20. Edge trim is dimensioned on plan from the centre line of the deck to the edge of concrete slab.
21. Edge shutter to be secured at 750mm with restraint straps
22. Stud welding to be carried out in accordance with SCI booklet "Good Practice in Composite Floor Construction".
23. Studs shown are 19 mm diameter x 95 mm height N.A.S.
24. Numbers shown thus 16@300mm beside indicate the number of equally spaced studs.

C	7 JUL 93	'ADDITIONAL NOTES' ADDED (B/ref.)
B	15 JAN 93	NOTE 7 AMENDED.
A	22 DEC 92	MINOR AMENDMENTS CONSTRUCTION ISSUE
	Date	Revisions

Composite Profiles
15 Moor Road, Broadstone.
Dorset BH18 8AZ
Telephone 0202 659237
Facsimile 0202 659288

Client
CAUNTON Engineering Limited

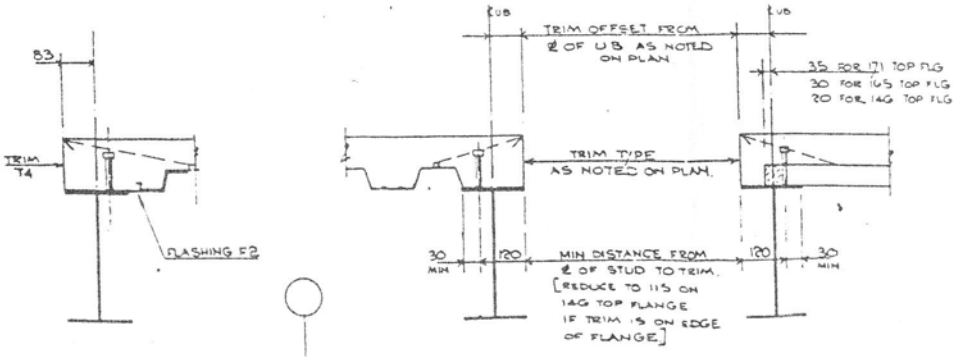
Job Title
CARDINGTON B.R.E.
MULTI-STOREY STRUCTURAL AND FIRE TEST FACILITY

Drawing Title
SECOND FLOOR LEVEL DECKING LAYOUT

Scale 1:75 1:10

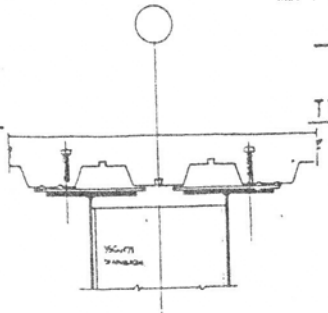
Date 1 Dec

Drg. No R1



6 - 6

TYPICAL EDGE DETAILS



ADDITIONAL NOTES:

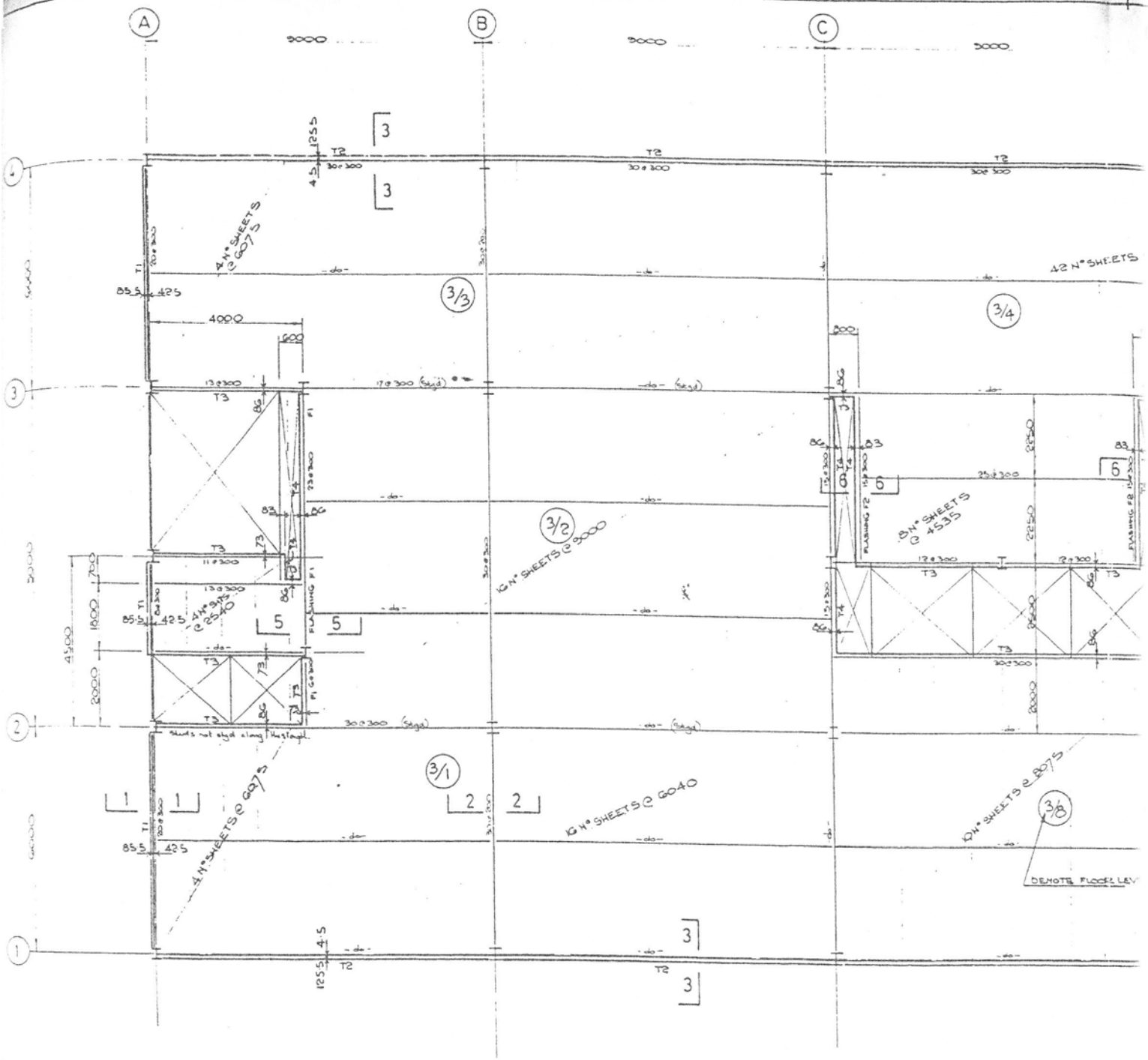
A1 Concrete to be Grade 35 light-weight (Lytag or similar approved) with a maximum density of 1900 kg/m3.

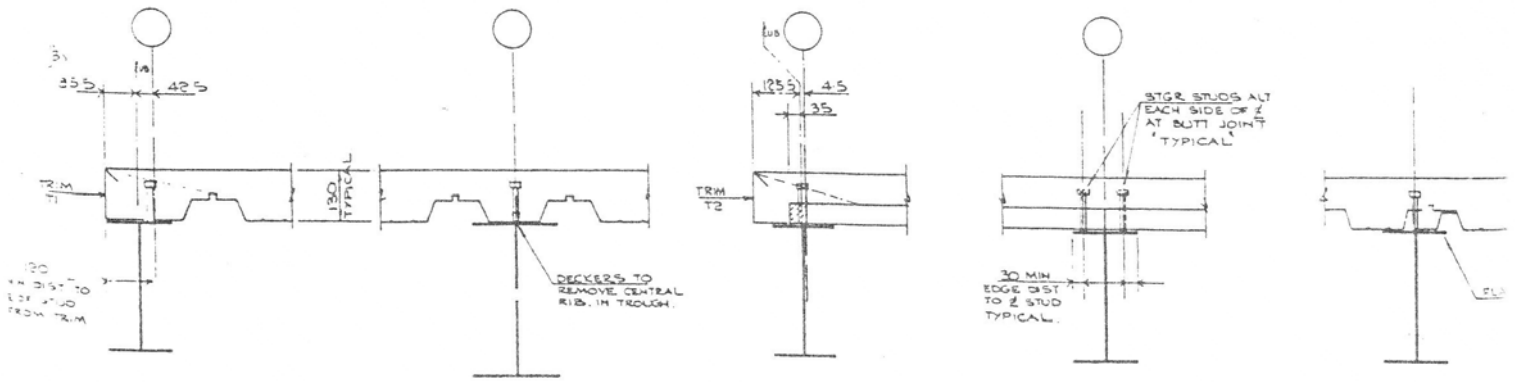
A2 All floors to be reinforced with one layer of A142 mesh laid with lower bars bearing on ribs of steel decking.

A3 Joints in decking and between decking and structural steelwork to be sealed to prevent grout loss from concrete.

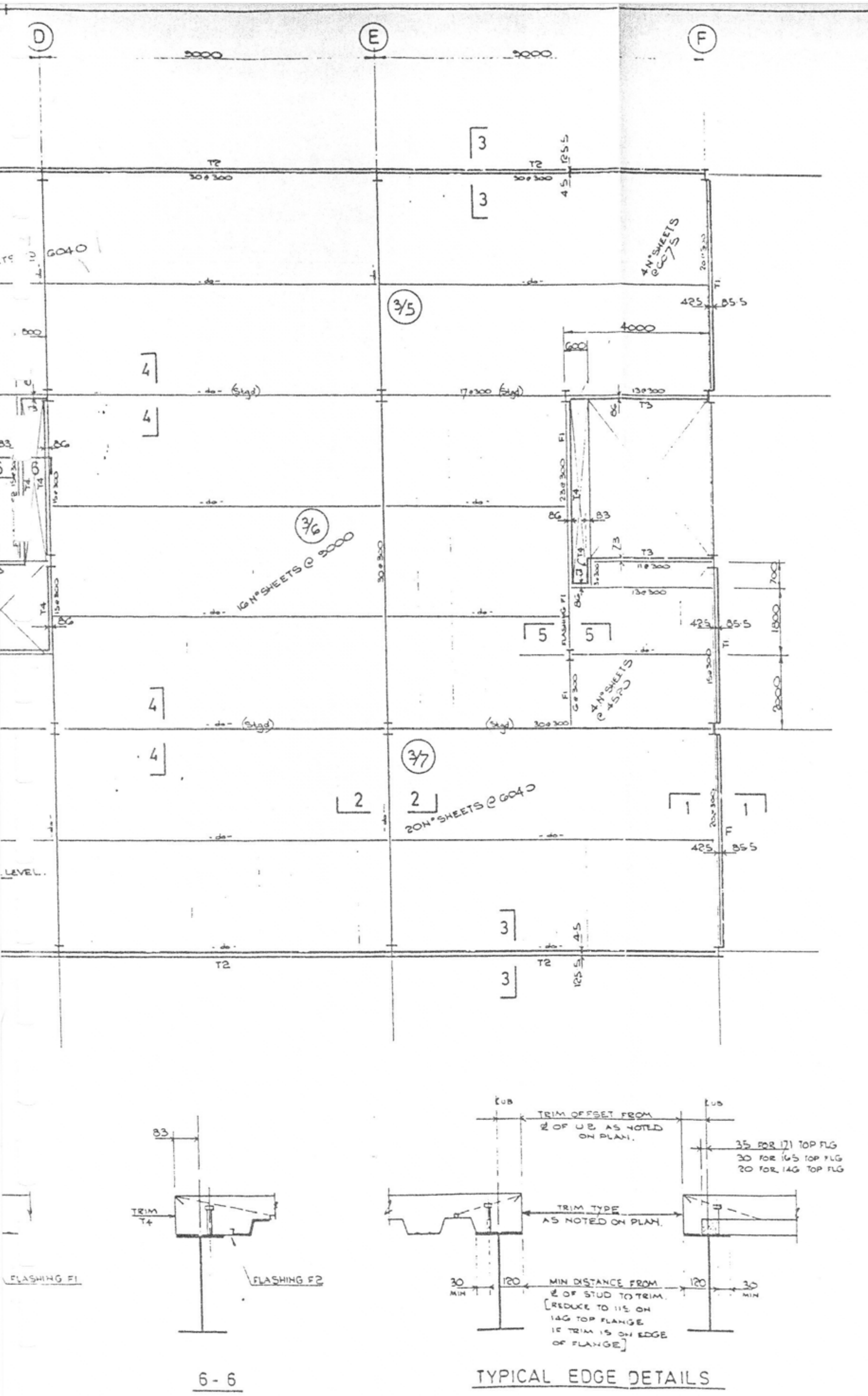
A4 Floor 2 only Decking at 4 No. locations marked 'VOID' to be cut out to allow concreting of void as required by detail at connection of transfer beam to column" on P.B.A. Drg. No 5992/05

7 + 7


A
B
C
3000
3000
3000
42 N° SHEETS
4 N° SHEETS @ 6075
10 N° SHEETS @ 9000
10 N° SHEETS @ 6040
10 N° SHEETS @ 8075
8 N° SHEETS @ 4535
4 N° SHEETS @ 6075
4 N° SHEETS @ 2540
3/1
3/2
3/3
3/4
3/8
DENOTE FLOOR LEV
FLASHING F1
FLASHING F2
studs not shown along this edge


TRIM
130 TYPICAL
DECKERS TO REMOVE CENTRAL RIB IN TROUGH
TRIM T2
STGR STUDS ALT EACH SIDE OF ℄ AT BUTT JOINT 'TYPICAL'
30 MIN EDGE DIST TO ℄ STUD TYPICAL

1 - 1 2 - 2 3 - 3 4 - 4 5 - 5



NOTES

All dimensions must be checked on site and not scaled from this drawing

1. This drawing is to be read in conjunction with all other relevant drawings, details and specifications.
2. All decking to be CF70 ( ) unless otherwise stated
3. The decking acts as a permanent formwork and tensile reinforcement in the bottom of the slab only.

   The design is in accordance with BS 5950 Part 4.
4. The decking will not act as tensile reinforcement to a cantilever or other situation where tensile reinforcement stresses are in the upper surface of the slab. The design and supply of reinforcement in this situation is by others.
5. The overall depth of the slab is 130 of ~~non-composite~~ COMPOSITE. In addition is the self-weight for LIGHTWEIGHT/~~NORMAL WEIGHT~~ concrete.

   The Design Loads of the COMPOSITE slab are:-

LIVE LOAD	2.5	kN/m2
PARTITIONS	1.0	kN/m2
FLOOR FINISHES	0.4	kN/m2
CEILING FINISHES	0.15	kN/m2
SERVICES	0.25	kN/m2

   The composite slab has been designed only to carry those partitions considered in PMF design calculations.
6. Fire rating for composite slab 1½ hours
7. ~~Unless instructed otherwise it is assumed that there is no requirement for~~ PMF decking to provide lateral restraint to the beams. (during construction)
8. Advice on the design of composite slabs and fire resistance may be obtained from PMF Technical Department.
9. All decking to have a minimum bearing of 50mm on structural steelwork and concrete and 75mm on all other materials.
10. No decking is to be cut down to a single span without consultation with PMF Limited design office.
11. Decking fixed to steelwork must be secured using fixings at 300mm centres at each end and 300mm centres over intermediate supports. The fixings are to be either HILTI ENP/EMP nails or SPIT fixings SBR.
12. Temporary supports (by others) are required where indicated on plan thus:-
13. Concrete must not be allowed to be heaped or dropped from a height onto the deck.
14. For spans exceeding 4.0m with temporary props required, the propping arrangement is to be in place prior to commencement of deck laying.
15. Spreader beams are to be provided in the propping arrangement - no isolated props are to be permitted.
16. Slots cut in the deck for beam encasement are by the main contractor. The maximum size of slot to be 100mm wide without the removal or part thereof of the ribs.
17. Decking to be notched around columns as required with support provided by others.
18. Trapezoidal sheets to be side stitched at 1.00m centres using self tapping screws.
19. Supplementary bar reinforcement is required in the slab where holes not trimmed by structural steelwork exceed 300mm transverse to deck span. The design and supply of reinforcement is to be by others.
20. Edge trim is dimensioned on plan from the centre line of the beam to the edge of concrete slab.
21. Edge shutter to be secured at 750mm with restraint straps
22. Stud welding to be carried out in accordance with SCI booklet "Good Practice in Composite Floor Construction".
23. Studs shown are 19 mm diameter x 95 mm height L.A.W.
24. Numbers shown thus 16@300 on beams indicate the number of equally spaced studs.

	Date	Revisions
C	7 Jul 93	ADDITIONAL NOTES ADDED (A1-A3)
B	15 JAN 93	SECT 1-1 & NOTE 7 AMENDED
A	22 DEC 92	MINOR AMENDMENTS [illegible]

Composite Profiles
15 Moor Road, Broadstone,
Dorset BH18 8AZ
Telephone 0202 659237
Facsimile 0202 659288

Client
CAUNTON Engineering Limited

Job Title
CARDINGTON B.R.E.
MULTI-STOREY STRUCTURAL AND FIRE TEST FACILITY

Drawing Title
THIRD TO SEVENTH FLOOR LEVELS [5N° THUS] DECKING LAYOUT

Scale 1:75 1:10

Date 1 Dec 92 | Drawn by K.S.

Drg No R1112 / 03 | Rev C

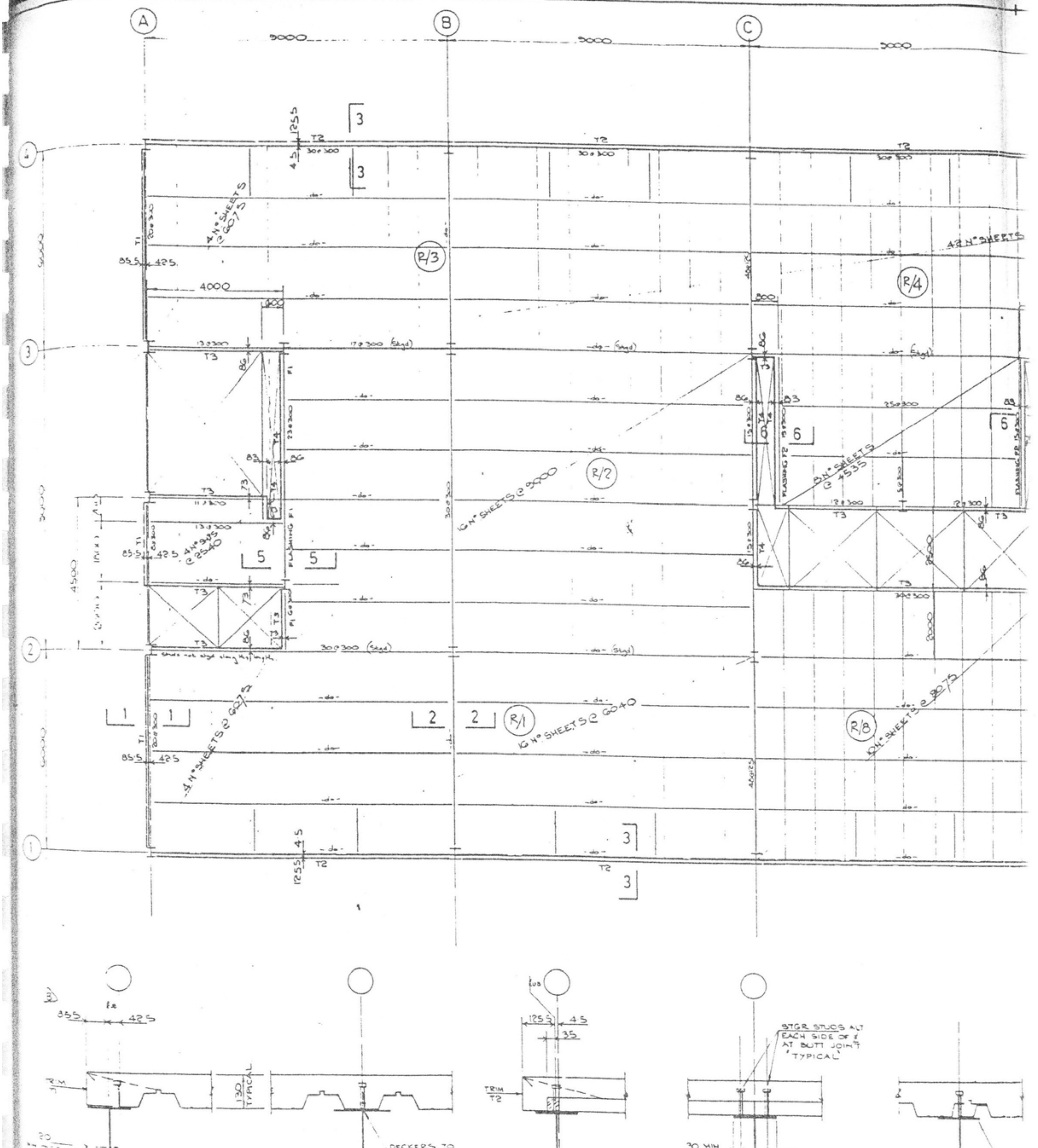
ADDITIONAL NOTES:

A1. Concrete to be Grade 35 light-weight (Lytag or similar approved) with a maximum density of 1900 kg/m3

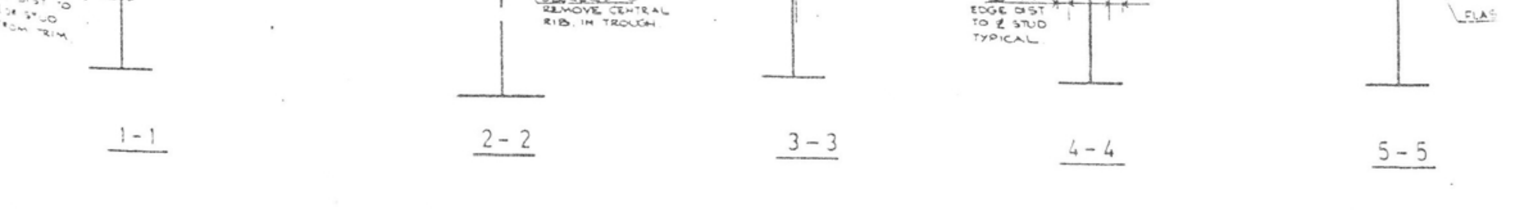
A2. All floors to be reinforced with one layer of A142 mesh laid with lower bars bearing on ribs of steel decking

A3. Joints in decking and between decking and structural steelwork to be sealed to prevent grout loss from concrete

594 x 841mm A1

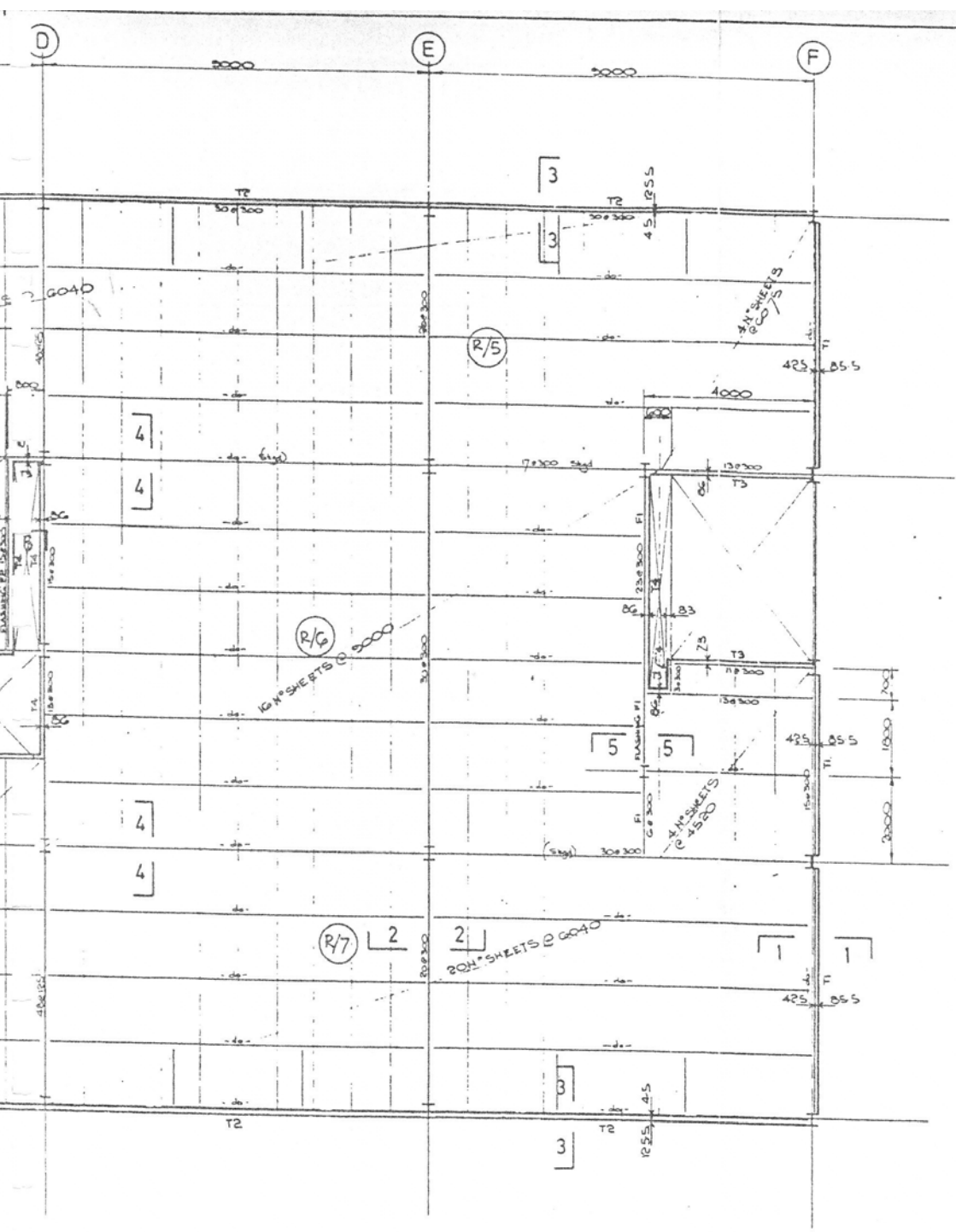


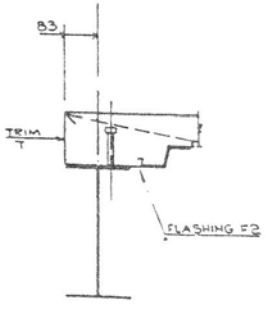
A
B
C
5000
4 N° SHEETS @ 6075
42 N° SHEETS
R/3
R/4
4000
800
R/2
16 N° SHEETS @ 9900
8 N° SHEETS @ 4535
4 N° SHEETS @ 2540
FLASHING F1
FLASHING F2
- do -
- do - (Stgd)
300 @ 300 (Stgd)
R/1
16 N° SHEETS @ 6040
4 N° SHEETS @ 6075
R/8
10 N° SHEETS @ 9075
T1
T2
T3
T4
85.5
42.5
125.5
4.5
1
2
3
4
5
6



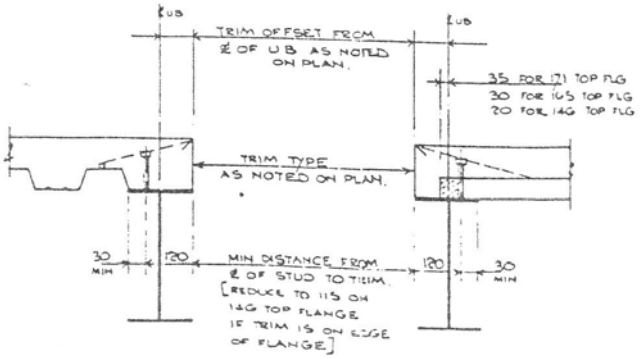
85.5
42.5
TRIM
130 TYPICAL
DECKERS TO REMOVE CENTRAL RIB IN TROUGH
125.5
4.5
35
TRIM T2
STGR STUDS ALT EACH SIDE OF ℄ AT BUTT JOINT TYPICAL
30 MIN EDGE DIST TO ℄ STUD TYPICAL
FLAS

1-1 2-2 3-3 4-4 5-5





6 - 6



TYPICAL EDGE DETAILS

ADDITIONAL NOTES:

A1 Concrete to be Grade 35 light-weight (Lytag or similar approved) with a maximum density of 1900 kg/m3

A2 All floors to be reinforced with one layer of A142 mesh laid with lower bars bearing on nbs of steel decking

A3 Joints in decking and between decking and structural steelwork to be sealed to prevent grout loss from concrete.

NOTES.

All dimensions must be checked on site and not scaled from this drawing.

GENERAL NOTES

1 This Drawing is to be read in conjunction with all other relevant drawings, details and specifications.

2 All decking to be CF70 x 0.9 unless otherwise stated.

3 The decking acts as a permanent formwork and tensile reinforcement in the bottom of the slab only.

The design is in accordance with BS 5950 Part 4.

4 The decking will not act as tensile reinforcement to a cantilever or other situation where tensile reinforcement stresses are in the upper surface of the slab. The design and supply of reinforcement in this situation is by others.

5 The overall depth of the slab is 130 as non-composite COMPOSITE. In addition is the self-weight for LIGHTWEIGHT/NORMAL WEIGHT concrete.

The Design Loads of the COMPOSITE slab are:-

LIVE LOAD	7.5 KN/m2
PARTITIONS	1.0 KN/m2
FLOOR FINISHES	1.2 KN/m2
CEILING FINISHES	0.15 KN/m2
SERVICES	0.25 KN/m2

The composite slab has been designed only to carry those partitions considered in PMF design calculations.

6 Fire rating for composite slab 1½ hours

7 Erection instructions attached to be observed and temporary propping for PMF decking to provide lateral restraint to the beams. (Building Code).

8 Advice on the design of composite slabs and fire resistance may be obtained from PMF Technical Department.

9 All decking to have a minimum bearing of 50mm on structural steelwork and concrete and 75mm on all other materials.

10 No decking is to be cut down to a single span without consultation with PMF limited design office.

11 Decking fixed to steelwork must be secured using fixings at 300mm centres at each end and 300mm centres over intermediate supports. The fixings are to be either HILTI DX9/DX7 nails or EJOT fixings BX3.

12 Temporary supports (by others) are required where indicated on plan thus:-

13 Concrete must not be allowed to be heaped or dropped from a height onto the deck.

14 For spans exceeding 4.0m with temporary props required, the propping arrangement is to be in place prior to commencement of deck laying.

15 Spreader beams are to be provided in the propping arrangement - no isolated props are to be permitted.

16 Slots cut in the deck for beam encasement are by the main contractor. The maximum size of slot to be 140mm wide without the removal of part thereof of the ribs.

17 Decking to be notched around columns as required with support provided by others.

18 Trapezoidal sheets to be side stitched at 1.000 centres using self tapping screws.

19 Supplementary bar reinforcement is required in the slab where holes not trimmed by structural steelwork exceed 300mm transverse to deck span. The design and supply of reinforcement is to be by others.

20 Edge trim is dimensioned on plan from the centre line of the beam to the edge of concrete slab.

21 Edge shutter to be secured at 750mm with restraint straps

22 Stud welding to be carried out in accordance with SCI booklet "Good Practice in Composite Floor Construction".

23 Studs shown are 19 mm diameter x 95 mm height L.A.O.

24 Numbers shown thus 6@300mm beside indicate the number of equally spaced studs.

	Date	Revisions
C	7 JUL 93	ADDITIONAL NOTES ADDED (BY TEL.)
B	15 JAN 93	SECTION 1-1 & NOTE 7 AMENDED
A	22 DEC 92	MAJOR AMENDED CONSTRUCTION ISSUE

Composite Profiles
15 Moor Road, Broadstone,
Dorset BH18 8AZ
Telephone 0202 659237
Facsimile 0202 659288

Client
CAUNTON Engineering Limited

Job Title
CARDINGTON B.R.E.
MULTI-STOREY STRUCTURAL AND FIRE TEST FACILITY

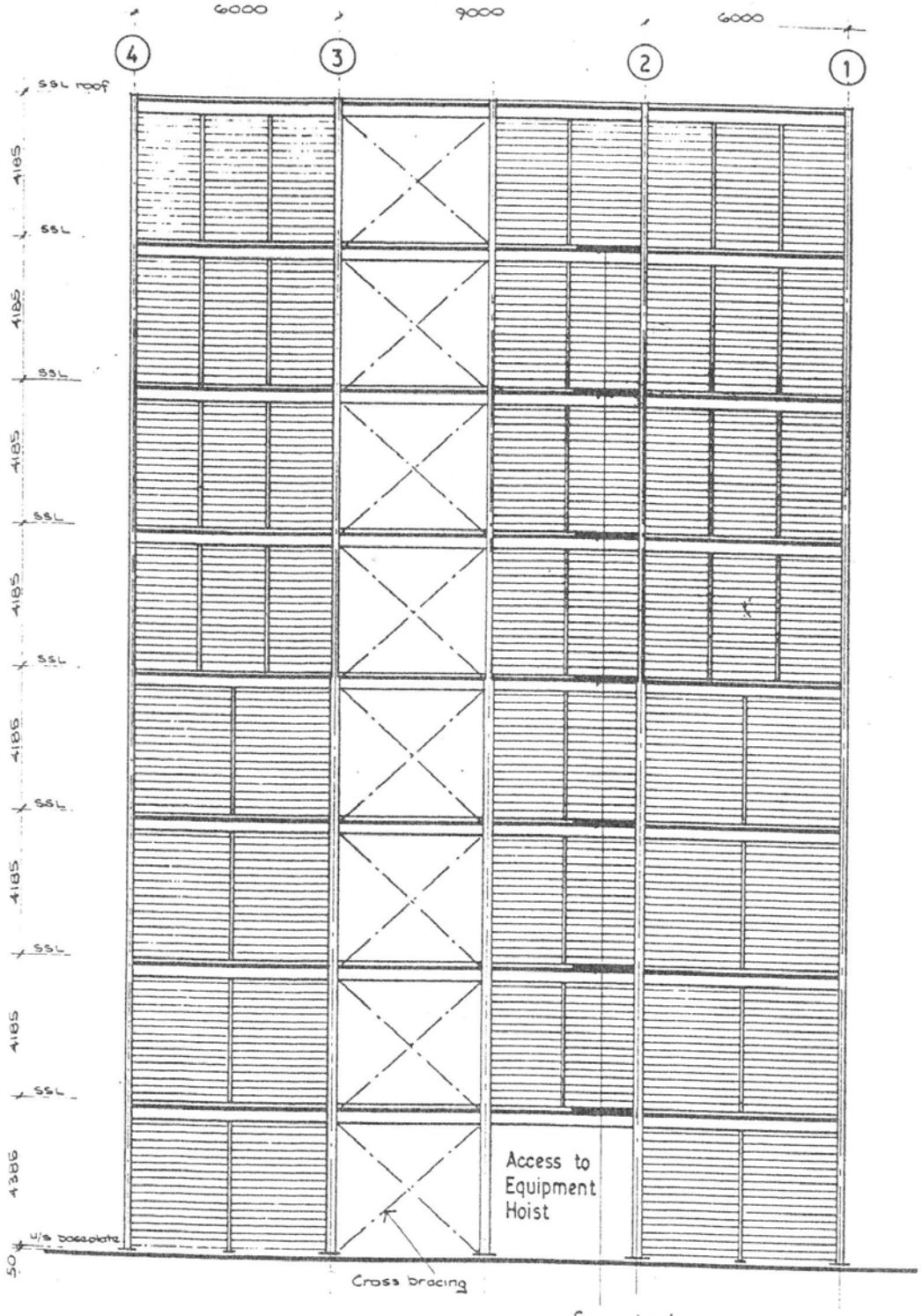
Drawing Title
ROOF LEVEL
DECKING LAYOUT

Scale 1:75 1:10

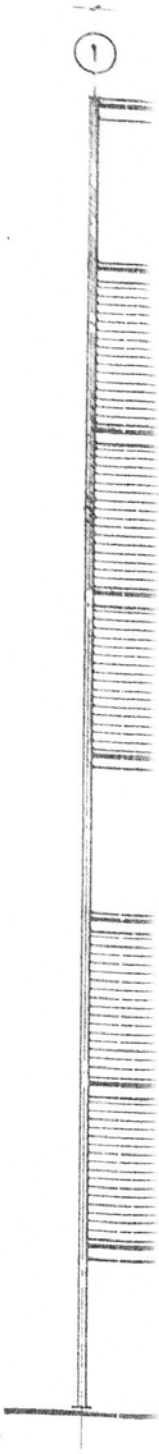
Date 1 Dec 92 Drawn by K.S.

Drg. No R1112/04 Rev C

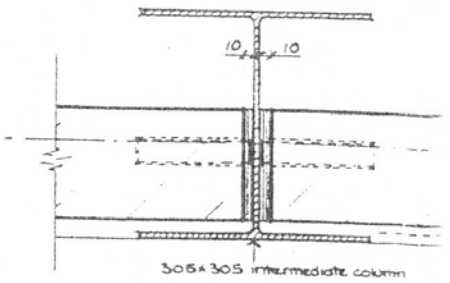
594 x 841mm A1



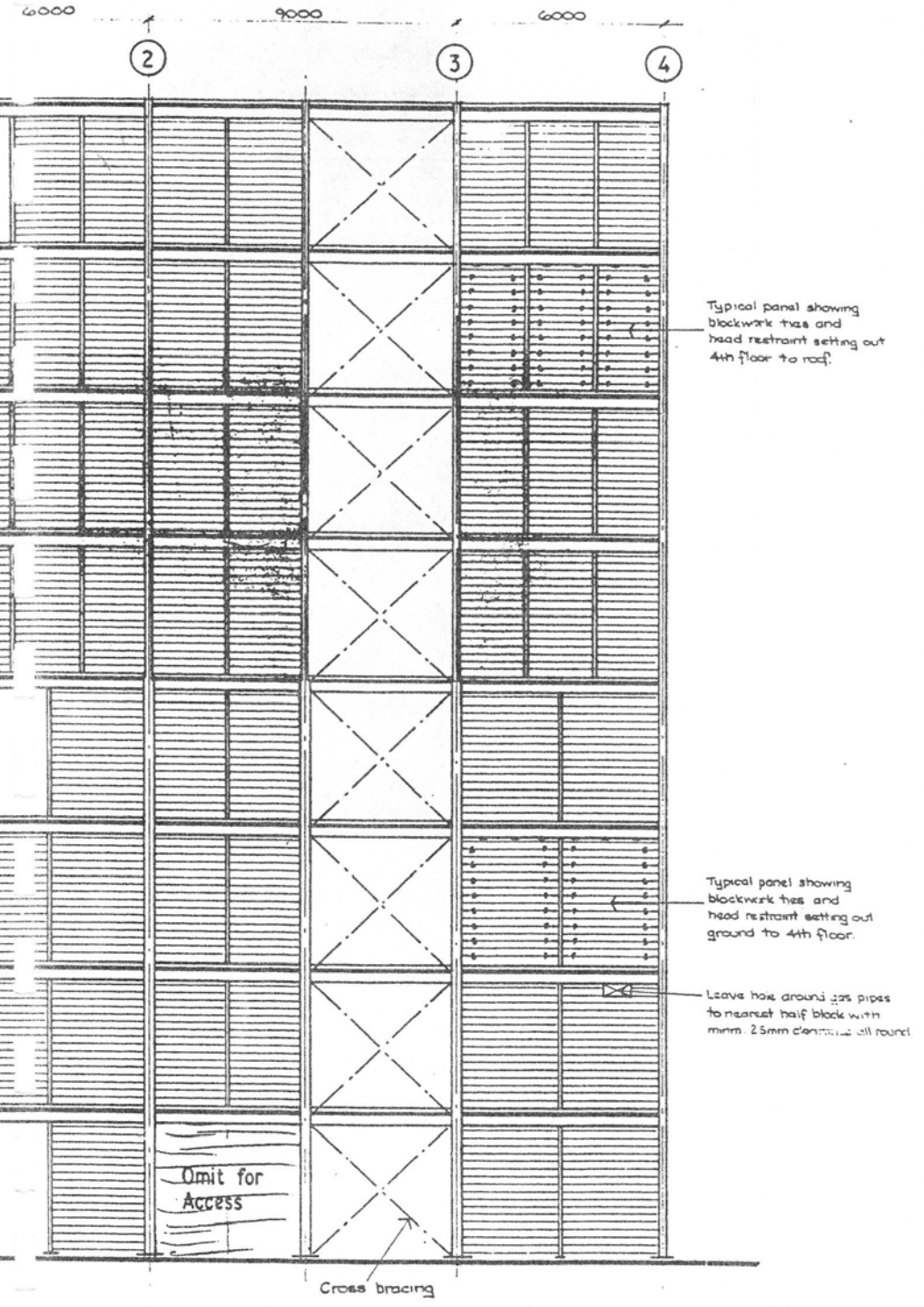
ELEVATION ON GRIDLINE A



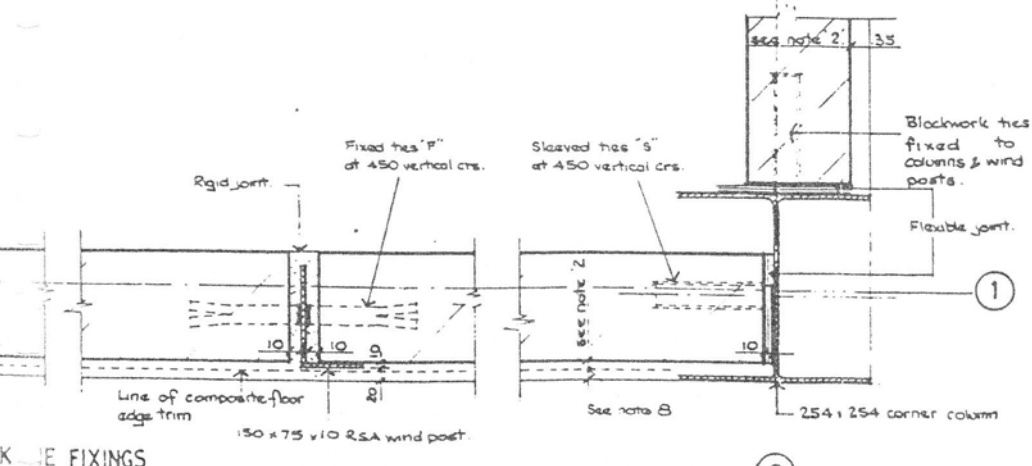
ELEVAT



PLAN DETAILS SHOWING BLOCKWORK



AT N ON GRIDLINE F

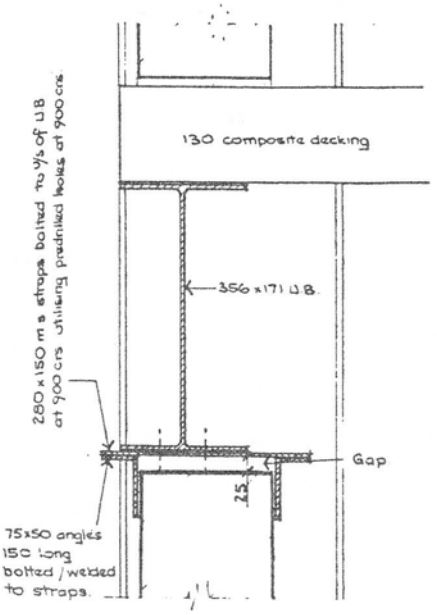


K E FIXINGS

DRAWING No
TE/9202/001 A

NOTES

1. Figured dimensions only are to be taken from this drawing.



BLOCKWORK HEAD RESTRAINT

2. All blockwork to be "Lignacite" or similar approved either 440 x 215 x 190 x 3 N/mm² (max. laid density 1470 kg/m³). OR 440 x 215 x 140 x 7 N/mm² (max. laid density 2000 kg/m³). No special finish required.
3. Mortar to be type (iii) 1:1:5/6 to BS 5000 Pt 3 1989.
4. Where blockwork bears on steelwork, shot fire "Expamet" or similar approved to steelwork to provide a key for the mortar bed.
   Blockwork coursing to be maintained across the facade.
5. All windposts to be supplied and fitted by others.
6. M.S. blockwork ties and restraints acceptable throughout.
7. Blockwork tie fixings to steelwork to have a minimum working load capacity in shear of 0·7 kN.
8. Blockwork to be laid in a continuous straight line between adjacent columns parallel to the line between the outside faces of the columns. The line of the outside face of the walls on G.L.'s 1 & 4 to be set to the inner most face of the dado rail head restraint (Ref CA1/3).
9. The top courses of blocks on G.L's A & F are to be uncut. Cut blocks necessary to form the correct fit to the beam soffit are to be laid immediately below the top course (Ref CA1/3).

Panels adjacent to 1/F deleted. Notes 8 & 9 added. Hole for gas pipes added. Plan details & head restraint revised.	2/12/93	G.P.		A
TENDER ISSUE	23/7/93	JW		
REVISION	DATE	INL	APP'D	No
SCALE 1:100 & 1:5	Drawn G.P		Date JUNE '93	
	Checked JW		Date 23/7/93	

APPROVED

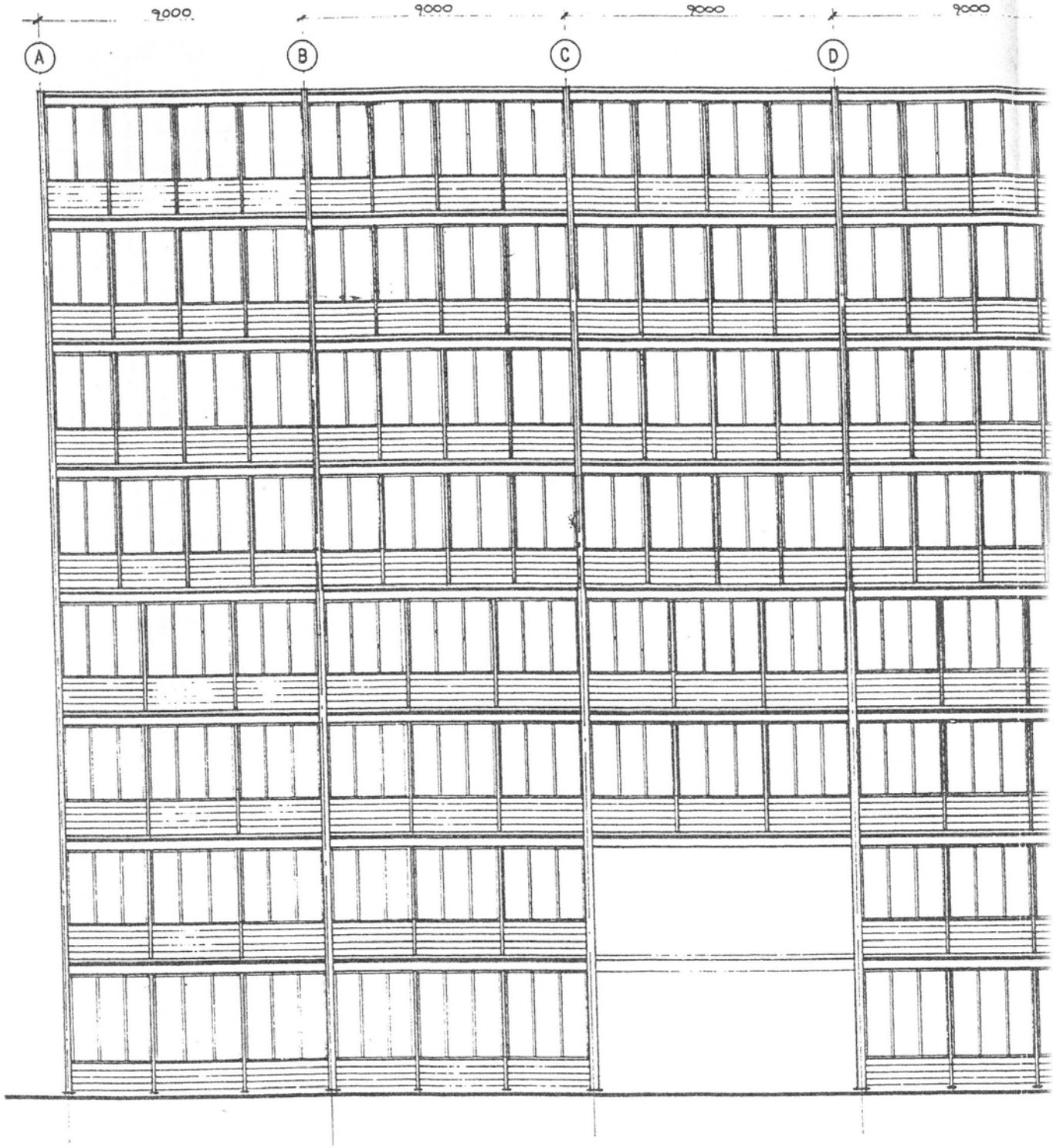
PROJECT
B.R.E. CARDINGTON - TEST FACILITY

DRAWING TITLE
END ELEVATIONS & BLOCKWORK RESTRAINT DETAILS

Taywood Engineering Limited
345 Ruislip Road,
Southall, Middlesex. UB1 2QX
Tel. 081-578 2366

DRAWING No.
TE/9202/001 A

SIZE A1



ELEVATION ON GRIDLINE 1

DRAWING No
TE/9202/002 A

NOTES

1 Figured dimensions only are to be taken from this drawing.

2. For details of blockwork tie fixings refer to drawing No TE/9202/001.

3 For blockwork and mortar types refer to drg. No TE/9202/001.

Panels adjacent to grid 1/F deleted	2/12/93	G.P.		A
TENDER ISSUE	23/7/93	AJW		
REVISION	DATE	INL	APP'D	No
SCALE 1:100	Drawn G.P		Date JUNE '93	
	Checked AJW		Date 23/7/93	

APPROVED

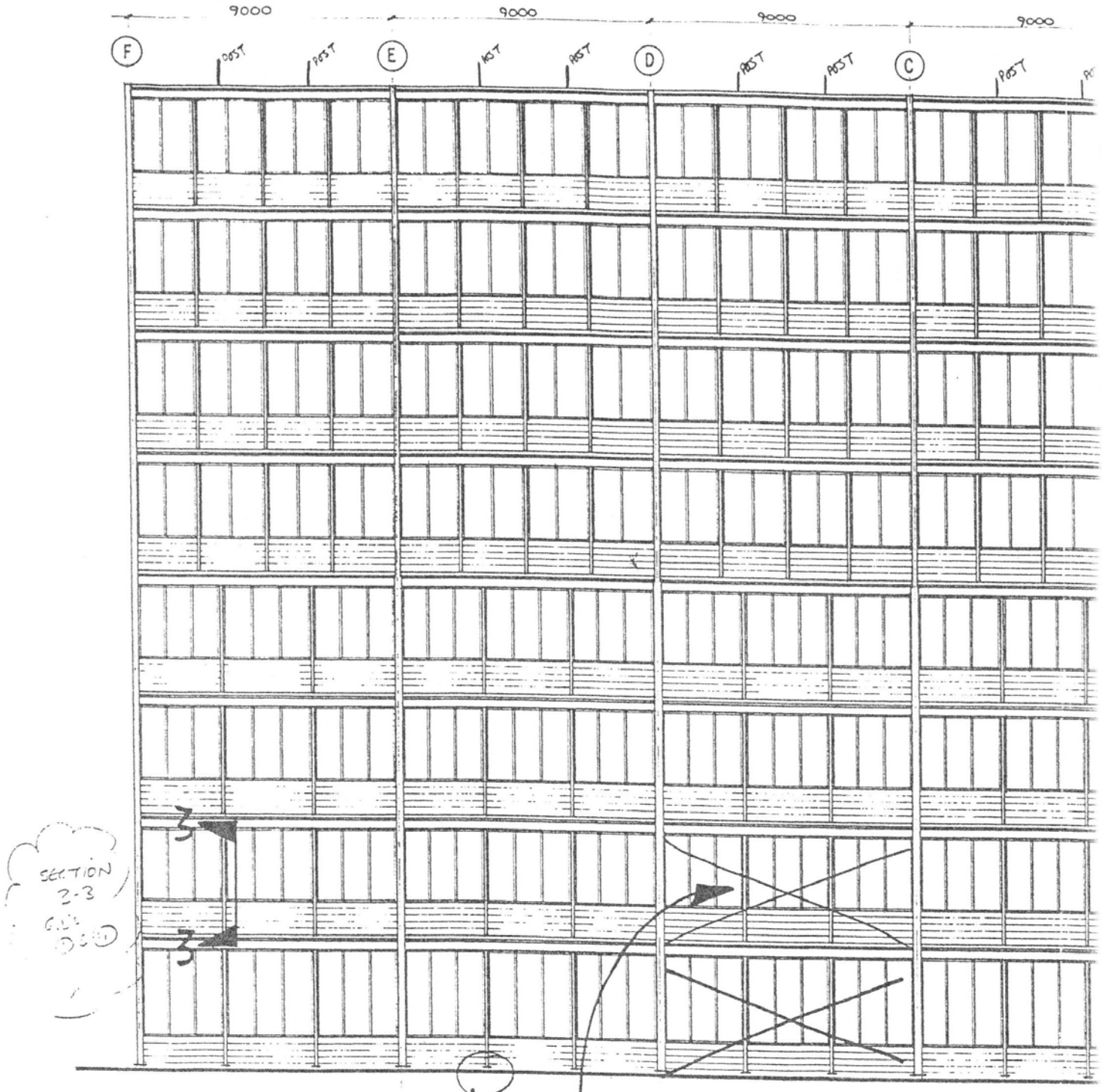
PROJECT
B.R.E. CARDINGTON - TEST FACILITY

DRAWING TITLE
FRONT ELEVATION

Taywood Engineering Limited
345 Ruislip Road,
Southall, Middlesex. UB1 2QX
Tel. 081-578 2366

DRAWING No.
TE/9202/002 A

SIZE A1



ELEVATION ON GRIDLINE 4/1 (HANDED)

G.L. ① ONLY (ATRIUM)

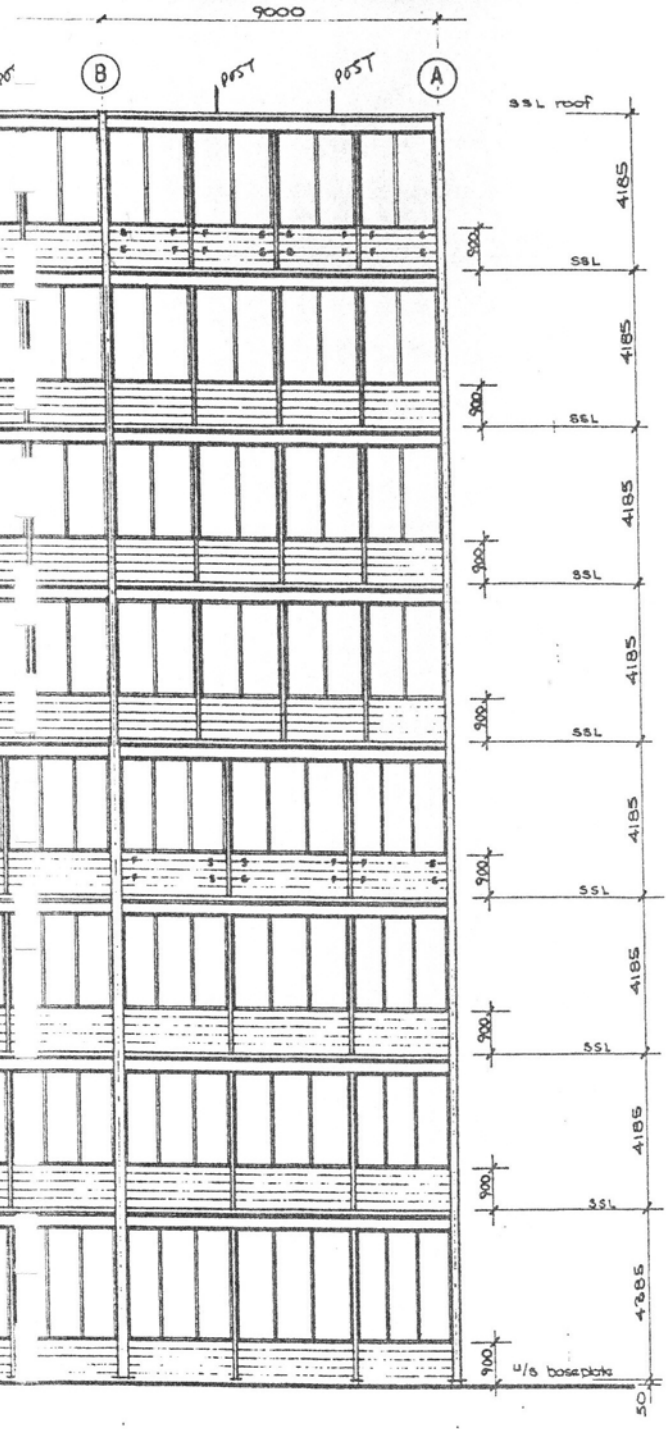
LEAVE OPEN ?

G.L ① + Ⓔ

Yes

e.g. Bolt baseplate to concrete for all WP's on g.floor (Provide detail for approval)

PRELIMINARY



SKETCH BRE/WP/DWG/4

WINDPOST LOCATIONS

ROOF POST LOCATIONS

DRAWING No
TE/9202/003

NOTES

1. Figured dimensions only are to be taken from this drawing.
2. For details of blockwork tie fixings refer to drawing No TE/9202/001.
3. For blockwork and mortar types refer to drg No TE/9202/001.

PRELIMINARY

REVISION	DATE	INL	APP'D	No
SCALE 1:100	Drawn G.P		Date JUNE '93	
	Checked		Date	

APPROVED

PROJECT
B.R.E CARDINGTON - TEST FACILITY

DRAWING TITLE
REAR ELEVATION

Taywood Engineering Limited
345 Ruislip Road,
Southall, Middlesex. UB1 2QX
Tel. 081-578 2366

DRAWING No
TE/9202/003

SIZE A1

Table 1 : Lackenby steelwork testing results

Bar marking	Cast number	Section	Yield strength (N/mm^2)	UTS (N/mm^2)	Elongation (%)
737723	7C27212	305*305*198UC	394	525	27
157412	7C27212	305*305*198UC	391	534	27
157413	7C27212	305*305*198UC	387	535	23
737730	7C14793	305*305*137UC	399	533	27
157420	7C14793	305*305*137UC	390	548	27
737729	7C27067	305*305*137UC	389	512	27
158082	7C27833	610*229*101UB	315	482	27
158083	7C27833	610*229*101UB	313	483	24
157665	7C15290	686*254*170UB	390	526	25

Table 2 : Shelton steelwork testing results (356*171*51UB)

	A			B			C			D			E			F		
	YS	UTS	Elg	YS	UTS	Elg	YS	UTS	Elg	YS	UTS	Elg	YS	UTS	Elg	YS	UTS	Elg
	N/ mm^2		%	N/ mm^2		%	N/ mm^2		%	N/ mm^2		%	N/ mm^2		%	N/ mm^2		%
1	402	556	23							390	543	29	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	391	542	28	-	-	-	-	-	-
2	418	552	27							387	538	27	-	-	-	-	-	-
3	393	542	28							382	530	27	-	-	-	-	-	-
4	395	541	22							376	530	27	-	-	-	-	-	-
5	392	554	29							374	531	27	-	-	-	-	-	-
6	387	541	24							375	534	28	-	-	-	-	-	-
7	401	555	26							390	541	29	-	-	-	-	-	-
8	391	548	23							395	549	27	-	-	-	-	-	-
9	?	?	?	?	?	?	?	?	?	?	?	?	-	-	-	-	-	-
10	396	547	25										384	532	29	-	-	-
11	396	550	25							389	544	29	-	-	-	-	-	-
12	392	544	25							387	545	29	-	-	-	-	-	-
13	390	540	27							385	535	26	-	-	-	-	-	-
14	389	543	25							383	542	27	-	-	-	-	-	-
15	371	519	25							371	530	27	-	-	-	-	-	-
16	379	529	25							381	536	29	-	-	-	-	-	-
17	390	540	24							379	541	25	387	507	28	-	-	-
18	394	554	25										399	544	28	-	-	-
19	386	531	26										379	514	28	-	-	-
20	399	549	25										381	527	26	379	527	27
21	393	541	25										393	539	25	-	-	-
22	399	556	24										398	545	26	?	?	?
23	382	535	24													384	535	28
24	393	548	25													379	530	29
25	404	551	25													390	547	27
26	399	551	27										395	543	27	-	-	-
27	383	535	24	397	537	29							?	?	?	-	-	-
28	391	548	26										388	538	26	-	-	-
29	396	549	24										413	561	28	-	-	-
30	397	550	25										397	542	28	-	-	-

Notes:

There are two results for 1D.

There are no results for bar 9.

There shouldn't be a bar 10E according to John Dowling (JD), but one is marked in the building.

There shouldn't be both 17D and 17E, infact no bars marked 17E appear in the building.

Ditto 22E and 22F.

There is a bar 22F in the building but the results are for 22E.

There should be a bar 27E according to JD but none are marked in the building, 27A and 27B are marked.

There are bars marked 3F and 33F identified in the building, the latter being particularly curious.

Table 3 : Shelton steelwork testing results (254*254*89UC)

	A			B			C			D			E		
	YS	UTS	Elg	YS	UTS	Elg	YS	UTS	Elg	YS	UTS	Elg	YS	UTS	Elg
	N/ mm^2		%	N/ mm^2		%	N/ mm^2		%	N/ mm^2		%	N/ mm^2		%
1	391	554	31										?	?	?
2	393	558	25										?	?	?
3	?	?	?										?	?	?
4	381	555	26										392	548	27
5	384	543	24										?	?	?
6	384	540	28	378	532	27	-	-	-	-	-	-	-	-	-
	379	538	25	-	-	-	-	-	-	-	-	-	-	-	-
7	385	541	26										390	537	28
8	379	537	27	359	528	29	-	-	-	-	-	-	-	-	-

Notes:
1E, 2E, 3A, 3E and 5E are missing
There are two values for 6A

Table 4 : Scunthorpe steelwork testing results (average of 3 tests per bar)

Cast number	Bar number	Yield strength (N/mm^2)	UTS (N/mm^2)	Elongation (%)
64415	501	312	476	27
64415	506	310	475	26
64415	507	315	475	27
64415	509	318	474	28
64415	511	314	475	27
64415	513	311	472	28
64415	516	316	472	27
64415	518	313	476	28
64415	521	313	472	27
64415	523	316	473	28
64415	525	313	475	28
64415	526	297	472	28
64415	527	309	475	30
64419	530	304	473	28
64419	531	317	476	28
64419	533	309	472	27
64419	535	310	474	28
64419	537	308	472	27
64419	538	309	470	28
64419	539	315	474	25
64419	540	311	475	27
64419	542	304	473	28
64419	544	308	464	26
64419	545	310	470	28
64419	546	309	473	29
64419	547	306	472	29
64419	548	311	474	27
64419	550	299	466	28
64419	552	306	464	27
64419	555	299	472	29
64419	557	301	475	27
64419	559	299	463	27
64419	560	307	473	29
64419	561	312	476	28
64419	562	309	473	27
64419	563	312	471	27
64419	564	299	473	27
64419	565	307	472	28
64419	567	302	469	28
64419	569	298	468	28
64419	571	305	467	28
64419	573	300	470	28
64419	575	310	467	29
64419	577	304	465	26
64419	581	291	469	28
64419	605	311	469	27

Table 5 : Mill release results for members marked with cast numbers only

Bar marking	Source	Section	Yield strength (N/mm^2)	UTS (N/mm^2)	Elongation (%)
4572	Shelton	356*171*51UB	412	550	21
737721	Lackenby	305*305*198UC	391	534	27
157419	Lackenby	305*305*137UC	389	512	27
63988	Scunthorpe	254*146*31UB	342	499	26
64419	Scunthorpe	305*165*40UB	302	471	28

Table 6 : Average results of nut and bolt testing.

Diameter (mm)	Length (mm)	Tensile Strength (N/mm^2)	Elongation (%)
		Average	Average
M24	120	851	17.7
M24	80	849	17.5
M20	50	881	15.3
M20	70	888	15.3
M20	80	897	15.6
M20	90	888	15.6
M20	100	877	15.8
M20	110	859	16.0

Table 7 : Column base plate details

Column Ref.	Floor	Square dimension (mm)	Thickness of Base Plate (mm)	Weld leg length (mm)	Number of bolts	Type of bolt	Depth drilled into slab (mm)
A1	G	550	40	6	4	M24 Rebar	200
A2	G	900	70	6	4	M30 (8.8) FT	125 (S)
A2/3	G	750	60	12	8	M30 (8.8) FT	650
A3	G	900	70	12	4	M30 (8.8) FT	650
A4	G	550	40	6	4	M24 Rebar	200
A/B2/3	G	750	60	6	4	M24 Rebar	200
A/B3	G	750	60	12	8	M30 (8.8) FT	650
B1	G	750	60	6	4	M24 Rebar	200
B2	G	900	70	6	4	M30 (8.8) FT	125 (S)
B3	G	900	70	6	4	M30 (8.8) FT	125 (S)
B4	G	750	60	6	4	M24 Rebar	200
C1	G	750	60	6	4	M24 Rebar	200
C2	2	500*650	40	6	8	M24 (8.8)	N/A
C2	G	750	60	6	4	M24 Rebar	200
C2/3	G	750	60	12	8	M30 (8.8) FT	650
C3	G	900	70	12	4	M30 (8.8) FT	650
C4	G	750	60	6	4	M24 Rebar	200
C/D2/3	G	750	60	12	8	M30 (8.8) FT	650
all remaining are mirror images of the above except							
E2	G	900	70	6	4	M24 Rebar	200
E3	G	900	70	6	4	M24 Rebar	200
F2	G	900	70	6	4	M24 Rebar	200
F3	G	900	70	12	8	M30 (8.8) FT	650
Key	-	-	-	-	-	FT=Fully Threaded	S=M30 socket

Table 8 : Specification of different styles of splice used.

		Dimensions of plates (mm)			Number of bolts		
Splice type Ref. number	Splice type, C&B or W&F	Cap and Base plates (C & B)	Web cover plate (W & F)	Flange cover plate	Cap and Base plates	Web cover plate	...per flange cover plate
1	C&B	350*370&30Thk	-	-	6	-	-
2	C&B	350*370&35Thk	-	-	4	-	-
3	C&B	350*350&20Thk	-	-	6	-	-
4	C&B	350*350&25Thk	-	-	6	-	-
5	C&B	350*350&30Thk	-	-	4	-	-
6	C&B	280*280&20Thk	-	-	4	-	-
7	W&F	-	180*180&6Thk	130*900&12Thk	-	4	5

Table 9 : The location and type of splice used on each column.

Column Ref.	Splice on floor	splice from..	to..	Type of Splice
A1	4th	254*254*89	254*254*89	6
A2	4th	305*305*137	254*254*89	3
A2/3	4th	305*305*137	254*254*89	4
A3	4th	305*305*137	254*254*89	4
A4	4th	254*254*89	254*254*89	6
A/B2/3	4th	305*305*137	254*254*89	3
A/B3	4th	305*305*137	254*254*89	4
B1	4th	305*305*137	254*254*89	5
B2	2nd	305*305*198	305*305*137	1
	5th	305*305*137	254*254*89	3
B3	2nd	305*305*198	305*305*137	1
	5th	305*305*137	254*254*89	3
B4	4th	305*305*137	254*254*89	5
C1	4th	305*305*198	254*254*89	2
C2	4th	305*305*137	254*254*89	3
C2/3	2nd	305*305*198	305*305*137	7
	5th	305*305*137	254*254*89	4
C3	2nd	305*305*198	305*305*137	7
	5th	305*305*137	254*254*89	4
C4	4th	305*305*137	254*254*89	5
C/D2/3	2nd	305*305*198	305*305*137	7
	5th	305*305*137	254*254*89	4
The east end of the building is a mirror image of the west.				

Table 8 : Specification of different styles of splice used.

		Dimensions of plates (mm)			Number of bolts		
Splice type Ref. number	Splice type, C&B or W&F	Cap and Base plates (C & B)	Web cover plate (W & F)	Flange cover plate	Cap and Base plates	Web cover plate	...per flange cover plate
1	C&B	350*370&30Thk	-	-	6	-	-
2	C&B	350*370&35Thk	-	-	4	-	-
3	C&B	350*350&20Thk	-	-	6	-	-
4	C&B	350*350&25Thk	-	-	6	-	-
5	C&B	350*350&30Thk	-	-	4	-	-
6	C&B	280*280&20Thk	-	-	4	-	-
7	W&F	-	180*180&6Thk	130*900&12Thk	-	4	5

Table 9 : The location and type of splice used on each column.

Column Ref.	Splice on floor	splice from..	to..	Type of Splice
A1	4th	254*254*89	254*254*89	6
A2	4th	305*305*137	254*254*89	3
A2/3	4th	305*305*137	254*254*89	4
A3	4th	305*305*137	254*254*89	4
A4	4th	254*254*89	254*254*89	6
A/B2/3	4th	305*305*137	254*254*89	3
A/B3	4th	305*305*137	254*254*89	4
B1	4th	305*305*137	254*254*89	5
B2	2nd	305*305*198	305*305*137	1
	5th	305*305*137	254*254*89	3
B3	2nd	305*305*198	305*305*137	1
	5th	305*305*137	254*254*89	3
B4	4th	305*305*137	254*254*89	5
C1	4th	305*305*198	254*254*89	2
C2	4th	305*305*137	254*254*89	3
C2/3	2nd	305*305*198	305*305*137	7
	5th	305*305*137	254*254*89	4
C3	2nd	305*305*198	305*305*137	7
	5th	305*305*137	254*254*89	4
C4	4th	305*305*137	254*254*89	5
C/D2/3	2nd	305*305*198	305*305*137	7
	5th	305*305*137	254*254*89	4
The east end of the building is a mirror image of the west.				

Table 10 : Standard Column to Beam connections.

Supporting Column	Supported Member	Thickness of End plate (mm)	Size of Fillet weld	Number of Bolts	Exceptions
305*305*198UC	610*229*101UB	10	6	14	None
	356*171*51UB	8	6	8	C3 (E), D3 (W) Floors 1-2
	305*165*40UB	8	6	8	None
	305*305*198UC	12	8	8	None
305*305*137UC	610*229*101UB	10	6	14	None
	356*171*51UB	8	6	8	C3 (E), D3 (W) Floors 2-5
	305*165*40UB	8	6	8	None
	254*146*31UB	8	6	6	None
254*254*89UC	610*229*101UB	10	6	14	None
	356*171*51UB	8	6	8	C3(E), D3(W), Floors 5-7, C1(N), C4(S), D1(N), D4(S) Roof
	305*165*40UB	8	6	8	None
	254*146*31UB	8	6	6	None
Exceptions:					**location**
305*305*198UC	356*171*51UB	20	8	8	C3 (E), D3 (W) Floors 1-2
305*305*137UC	356*171*51UB	20	8	8	C3 (E), D3 (W) Floors 2-5
254*254*89UC	356*171*51UB	20	8	8	C3(E), D3(W), Floors 5-7
254*254*89UC	356*171*51UB	8	6	10	C1(N), C4(S), D1(N), D4(S) Roof

Table 11 : Standard Beam to Beam connections.

Supported Member	Supporting Member	Thickness of Fin Plate (mm)	Size of Fillet weld (mm)	Number of bolts
254*146*31UB	254*146*31UB	?	?	?
254*146*31UB	305*165*40UB	10	8	3
254*146*31UB	356*171*51UB	?	?	?
305*165*40UB	254*146*31UB	10	8	3
305*165*40UB	305*165*40UB	10	8	4
305*165*40UB	356*171*51UB	10	8	4
305*165*40UB	610*229*101UB	10	8	4
356*171*51UB	356*171*51UB	10	8	4

Table 12 : Second floor transfer structure beam to beam connection details

Supported Member	Type of plate	Thickness of Plate (mm)	Size of Fillet weld (mm)	Number of bolts
305*305*198UC	End	12	8	8
305*165*40UB	End	8	6	6
356*171*51UB	Fin	10	8	4

Table 13 : Primary beam connection to continuous beams at roof level

Supported Member	Supporting Member	Thickness of Toe Plate (mm)	Thickness of Fin/End Plate (mm)	Size of Fillet weld (mm)	Number of bolts
356*171*51UB	610*229*101UB	10	10 (F)	8	4
305*165*40UB	610*229*101UB	10	10 (F)	8	4
356*171*51UB	356*171*51UB	20	20 (E)	8	8
305*165*40UB	356*171*51UB	10	10 (F)	8	4

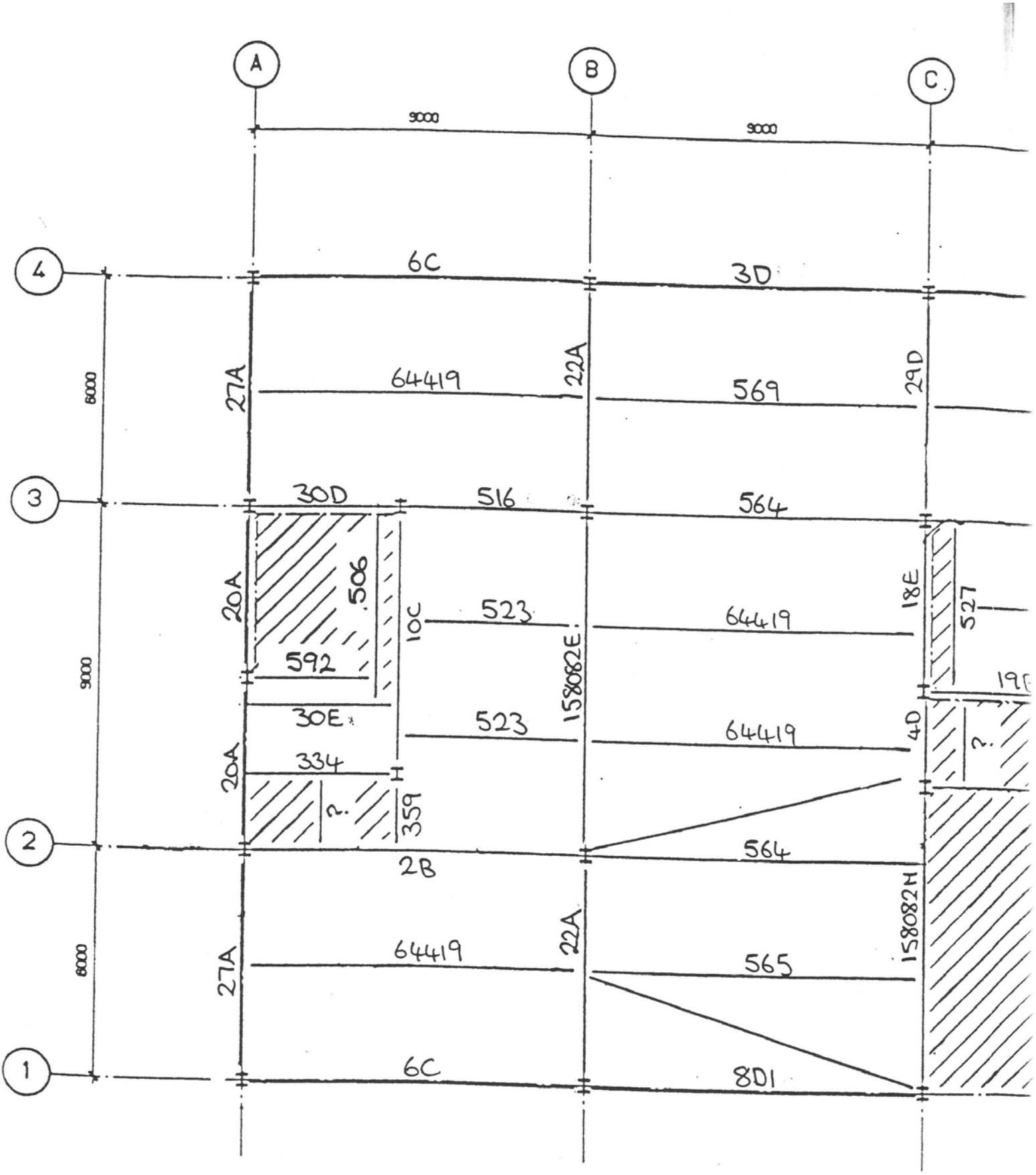
Table 14 : Average results of reinforcement mesh testing.

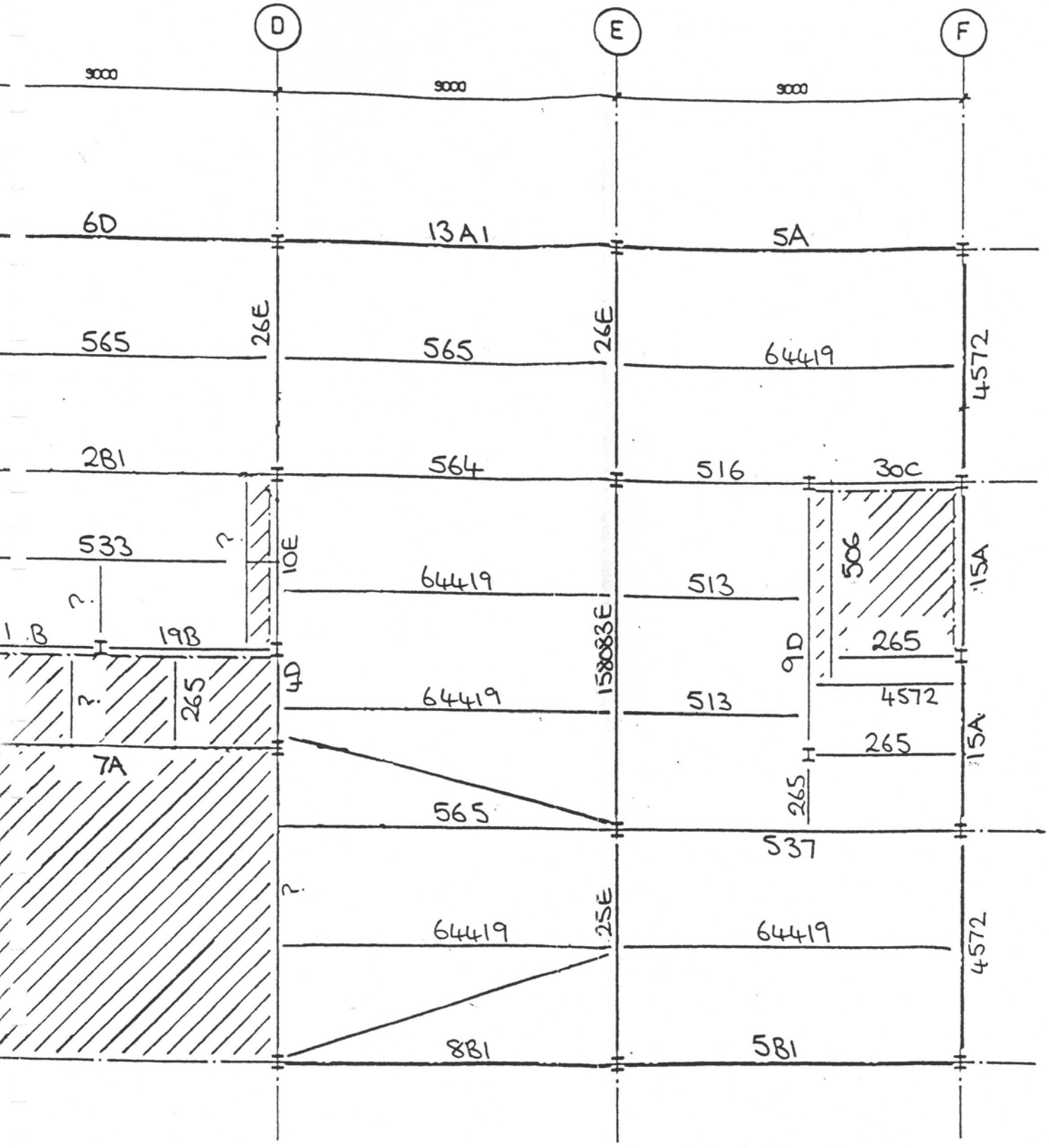
0.2% Proof Stress (N/mm^2)	Maximum Stress (N/mm^2)	Elongation (%)	Weld strength (kN)
629	732	14.3	14.2

Table 15 : Average 7 and 28 day cube crushing strength of concrete from the floors.

Floor	Crushing strength (N/mm^2)	
	7 day	28 day
1	41.3	48.0
2	25.5	45.8
3	26.6	45.5
4	24.3	46.7
5	26.5	50.7
6	28.3	48.2
7	26.2	48.7
8	25.2	43.7
all floors	28.0	47.1
all floors excluding floor 1	26.1	47.0

Figures


A
B
C
9000
9000
4
3
2
1
8000
9000
8000
6C
3D
27A
64419
22A
569
29D
30D
516
564
20A
506
10C
523
64419
18E
527
592
30E
523
158082E
64419
4D
20A
334
?
359
564
2B
158082H
27A
64419
22A
565
6C
8D1

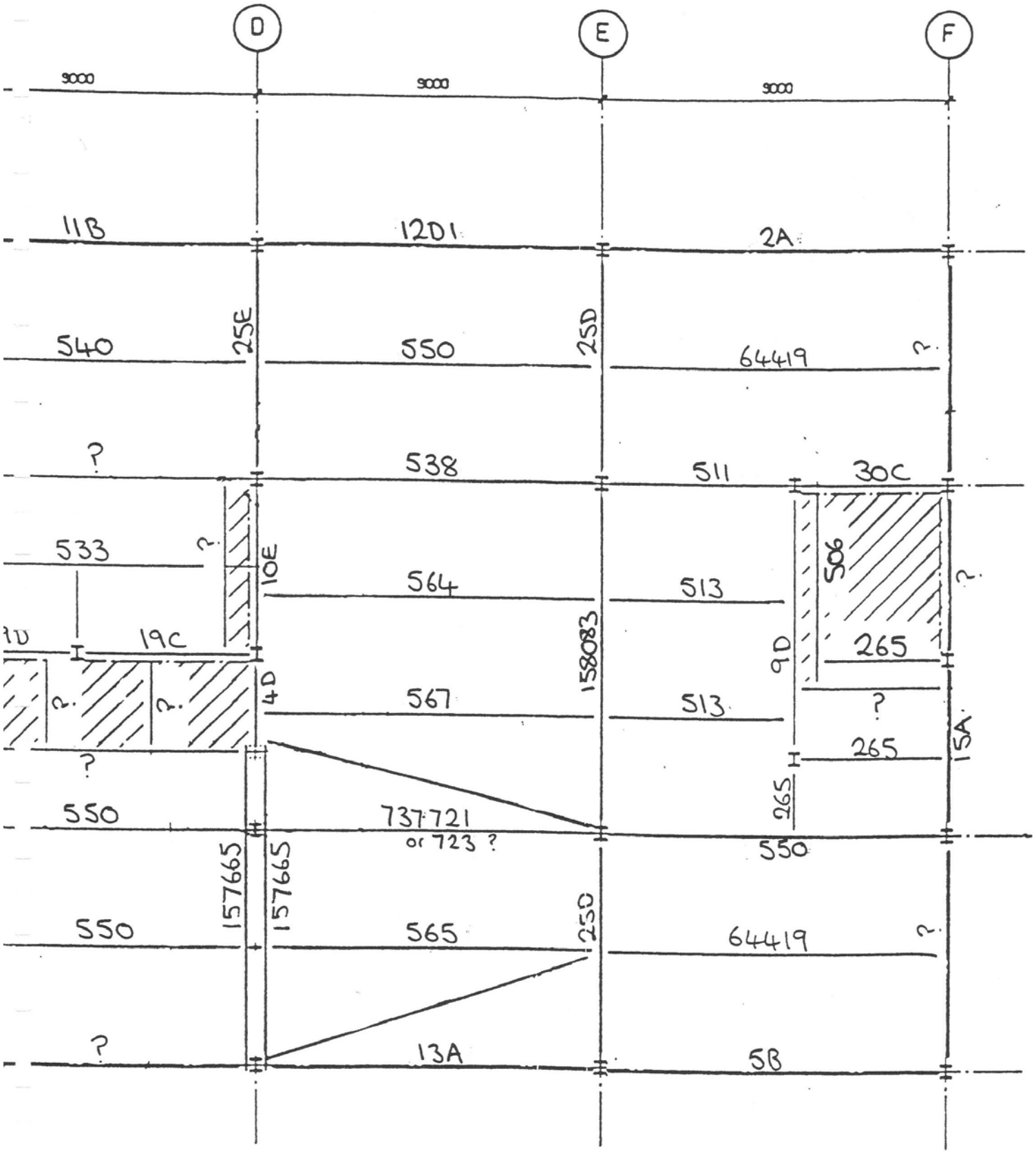


FLOOR 1

Cardington LBTF Steelwork Testing
Member Identification Plan
Figure 1

Key :

" Test result available
Value interpolated from other results
Value available from mill release certificates
? No marking identified on member

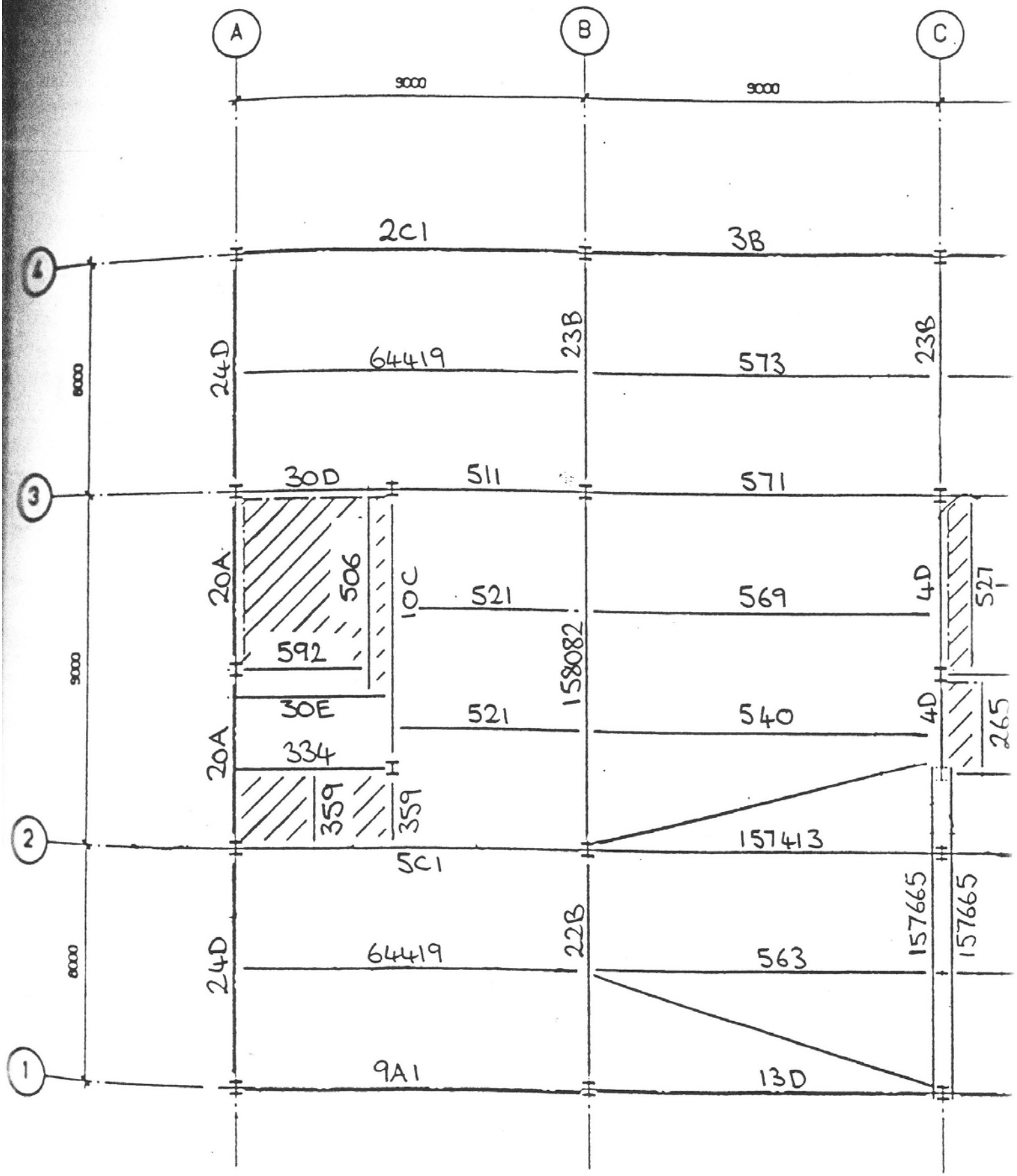


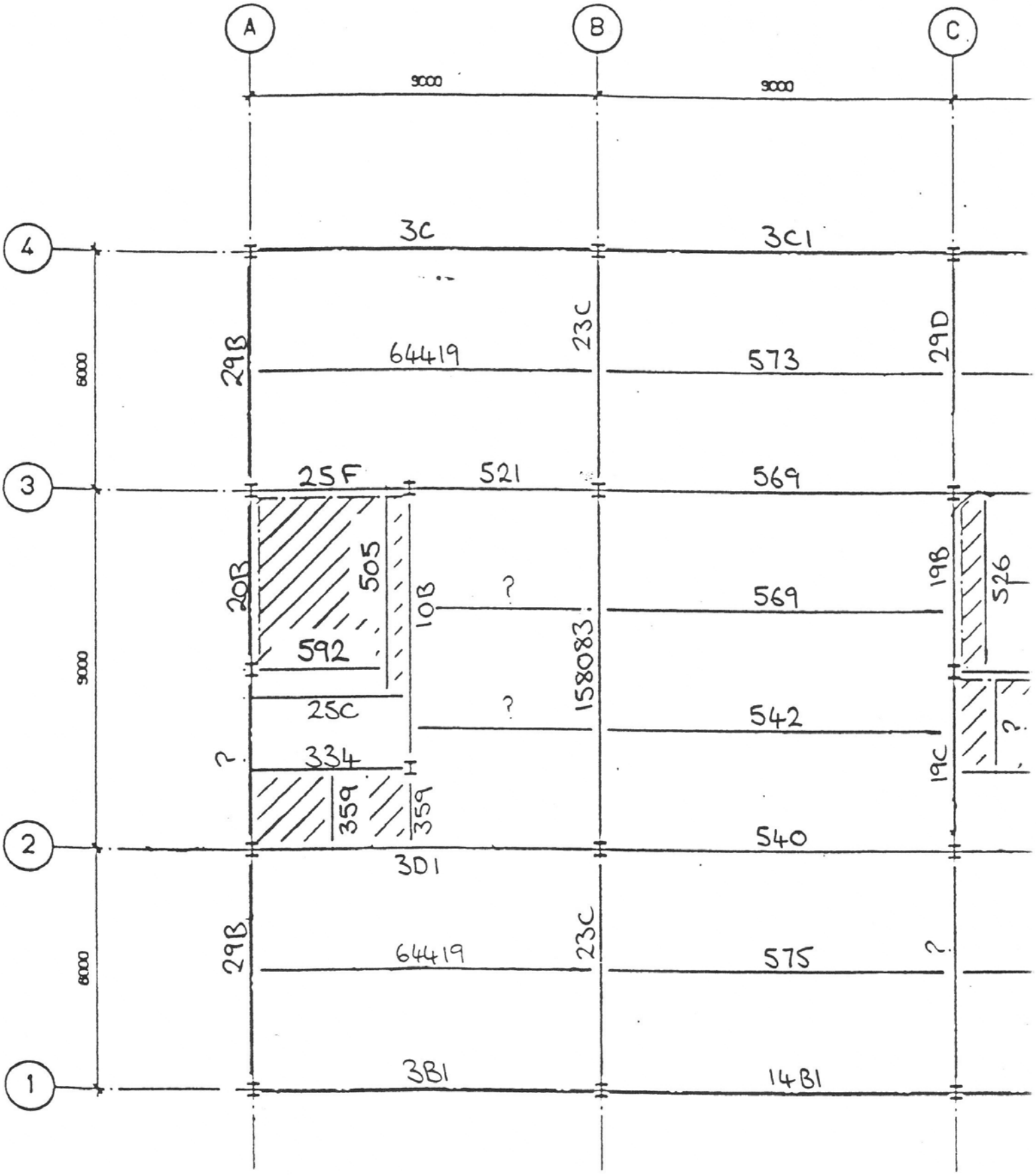
FLOOR 2

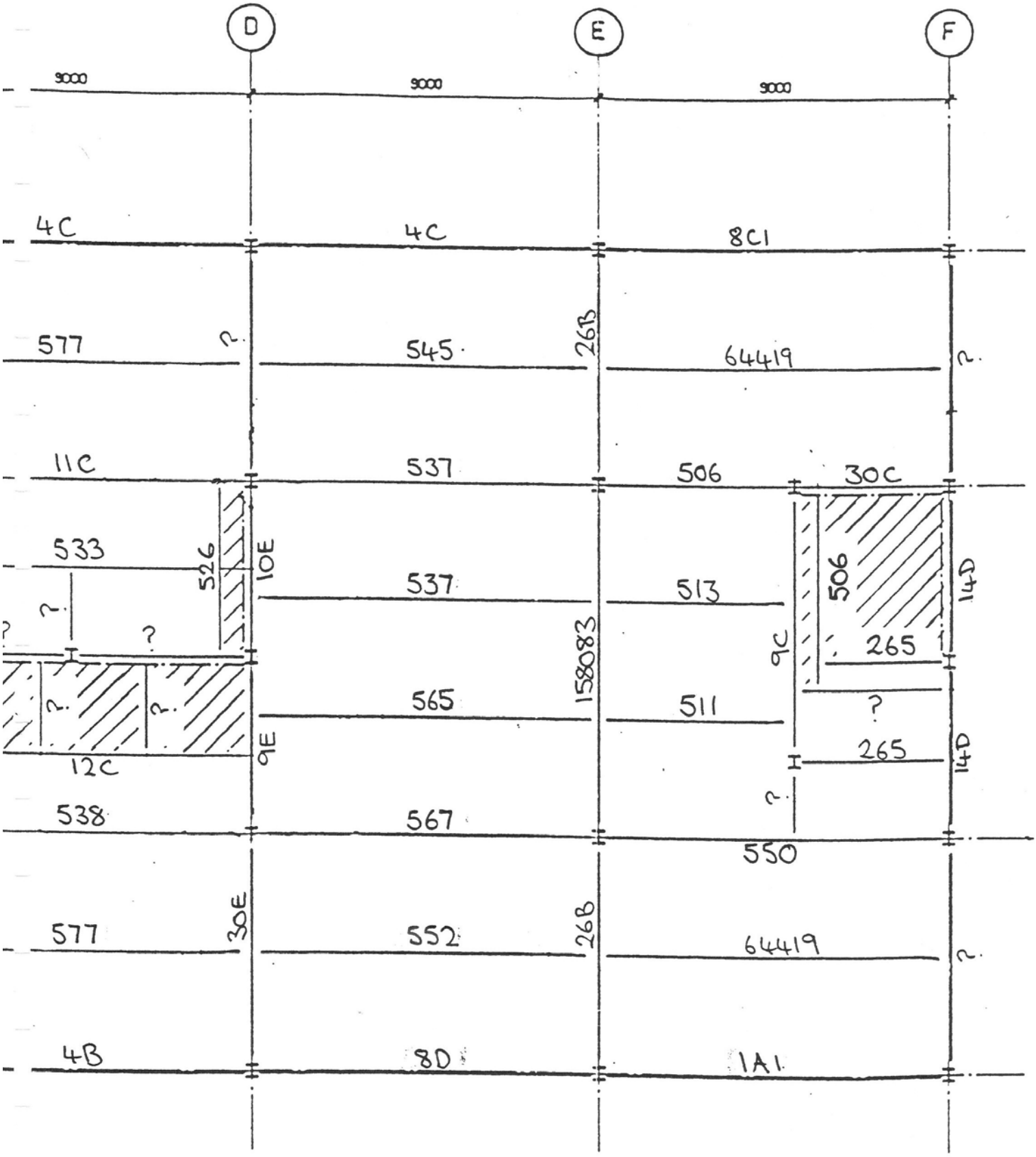
Cardington LBTF Steelwork Testing
Member Identification Plan
Figure 2

Key :

Test result available
Value interpolated from other results
Value available from mill release certificates
? No marking identified on member


A
B
C
9000
9000
4
3
2
1
8000
9000
8000
2C1
3B
24D
64419
23B
573
23B
30D
511
571
20A
506
10C
521
569
4D
527
592
158082
30E
521
540
4D
265
20A
334
359
359
157413
5C1
157665
157665
24D
64419
22B
563
9A1
13D

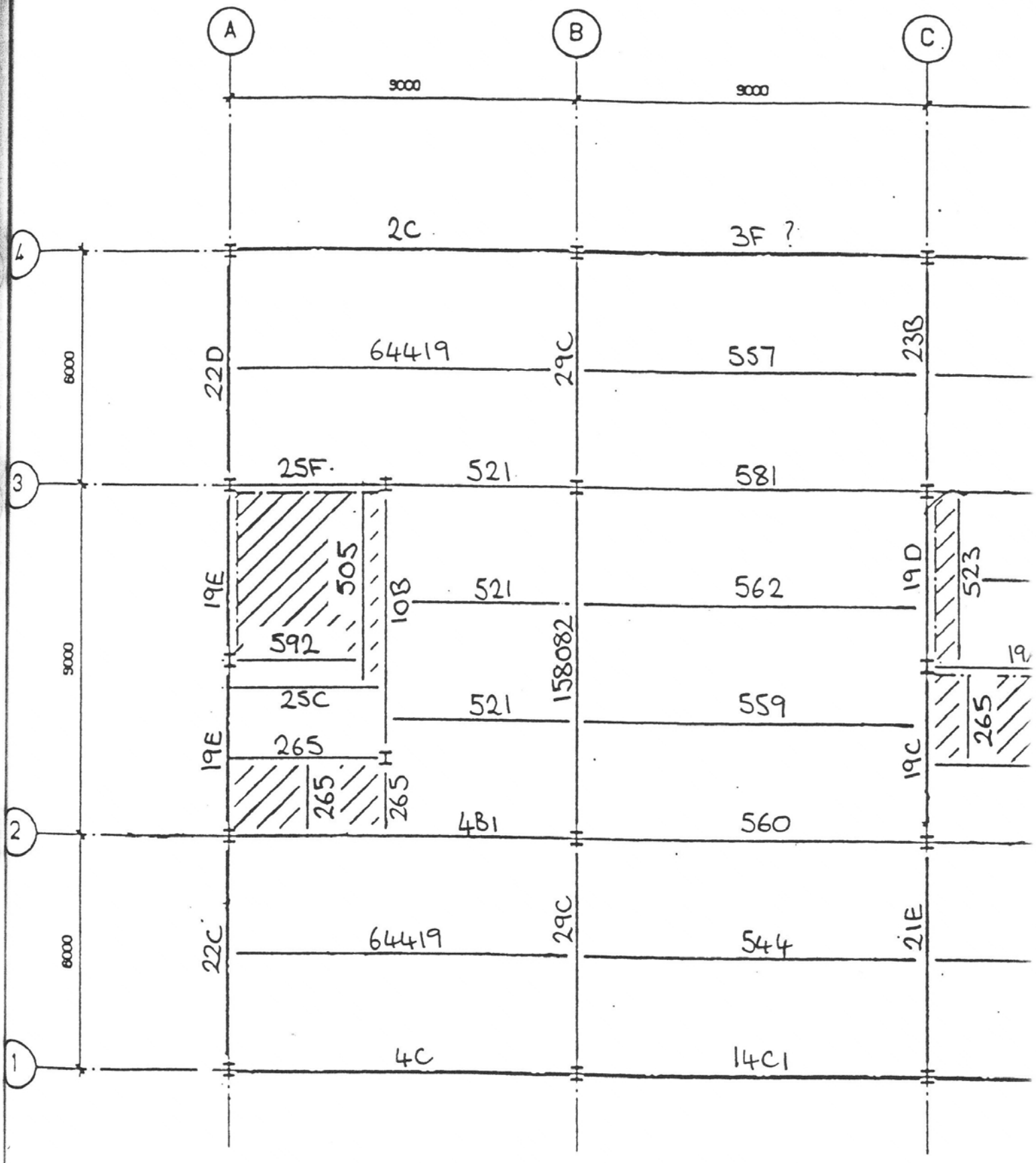

A
B
C
9000
9000
4
3
2
1
6000
9000
6000
3C
3C1
29B
64419
23C
573
29D
25F
521
569
20B
505
592
10B
?
569
198
526
158083
25C
?
542
?
334
?
359
359
19C
?
540
3D1
29B
64419
23C
575
?
3B1
14B1

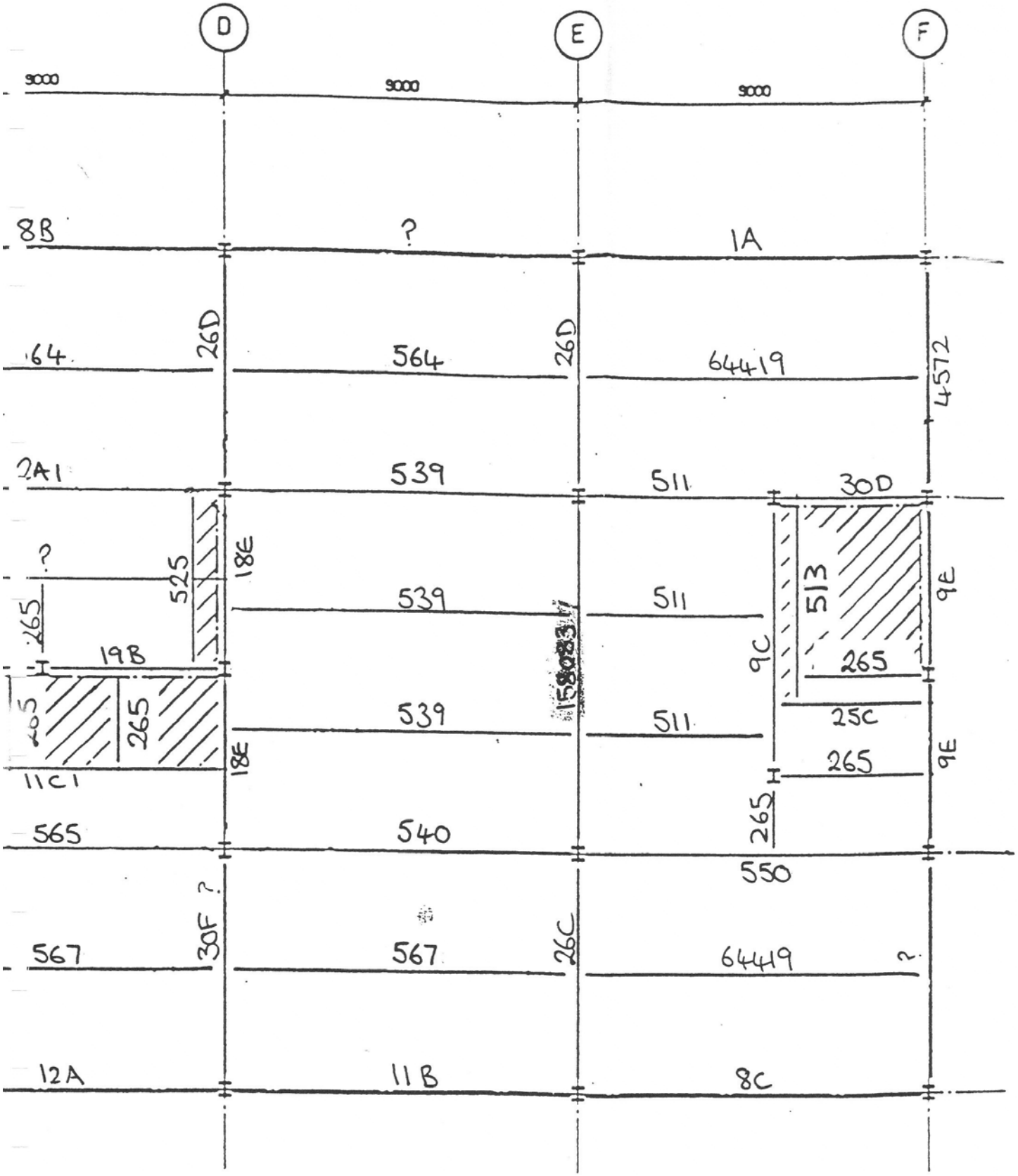


Cardington LBTF Steelwork Testing
Member Identification Plan
Figure 3

Key :

—	Test result available
	Value interpolated from other results
	Value available from mill release certificates
?	No marking identified on member


A
B
C
9000
9000
4
3
2
1
8000
9000
8000
2C
3F ?
64419
557
22D
29C
23B
25F.
521
581
505
108
592
521
562
19E
19D
523
158082
25C
521
559
265
265
265
19C
265
481
560
64419
544
22C
29C
21E
4C
14C1



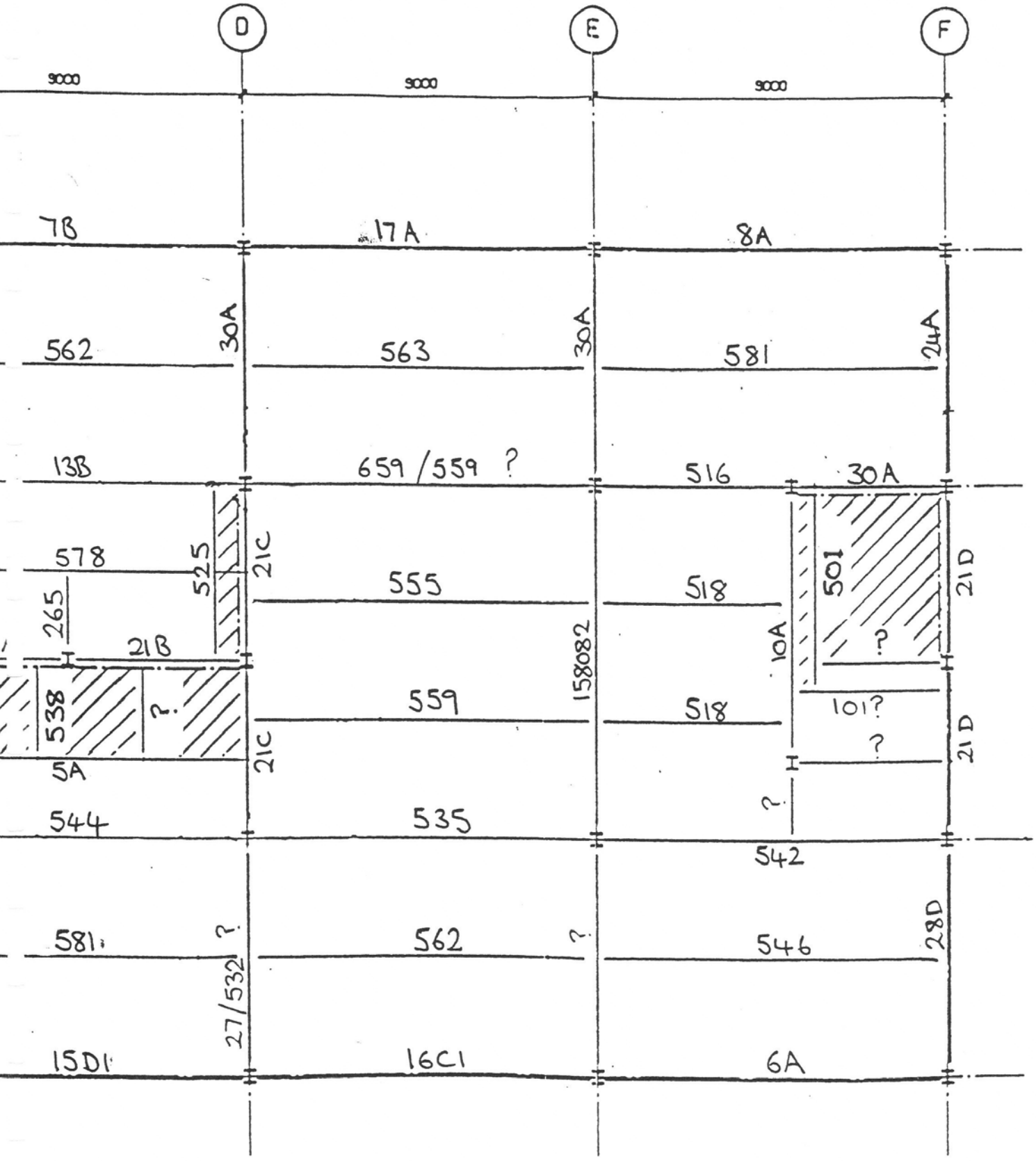
FLOOR 4

Cardington LBTF Steelwork Testing
Member Identification Plan
Figure 4

Key :

Test result available
Value interpolated from other results
Value available from mill release certificates
? No marking identified on member


A
B
C
9000
9000
8000
9000
8000
12B
2B1
24A
561
29E
571
29E
30A
535
561
210?
501
10A
501
552
21C
525
?
101?
518
158082
557
538
19E
525
520
63988
17D
6B1
542
522 ?
547
2D1
561
27 ?
16A1
15C1

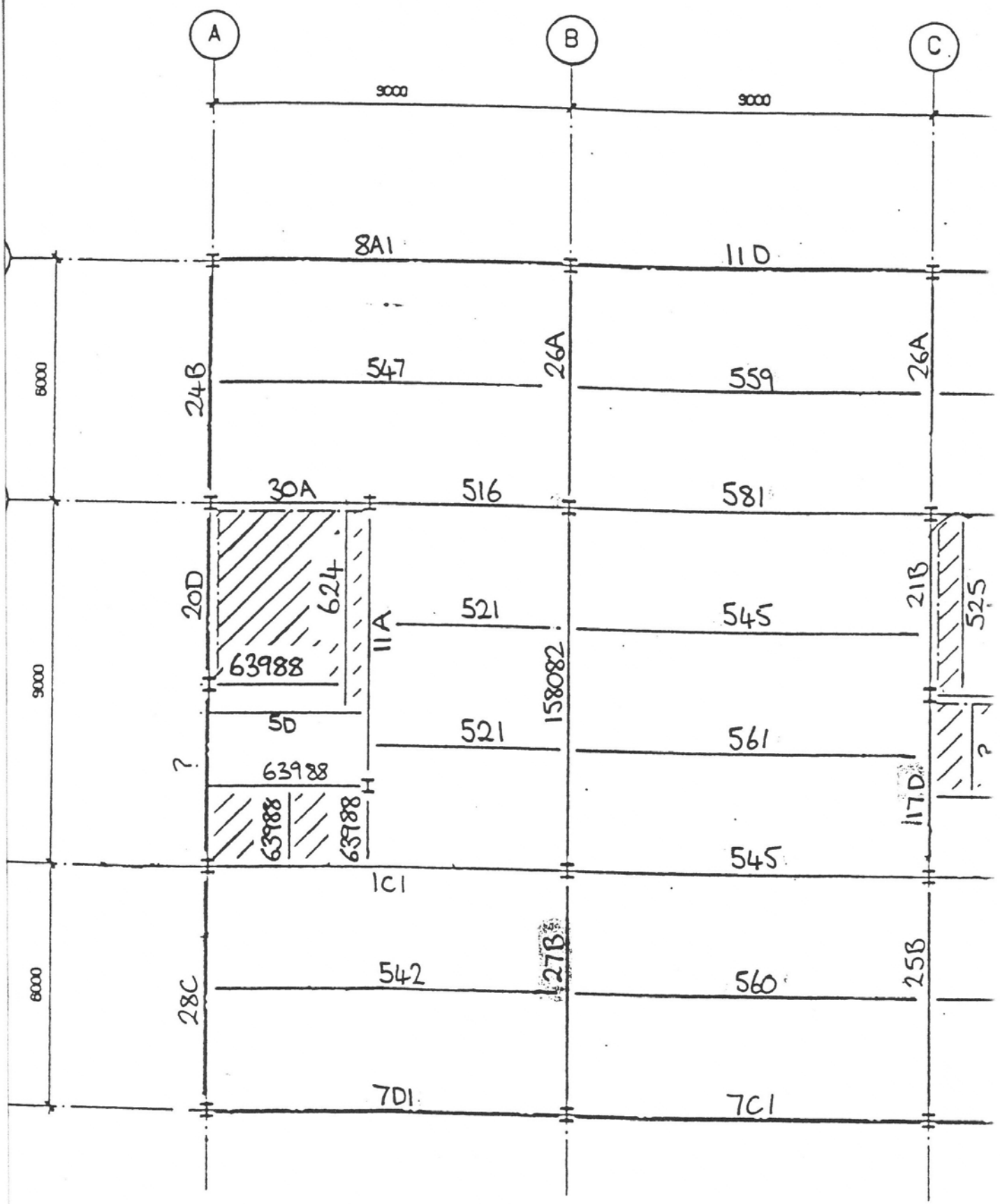


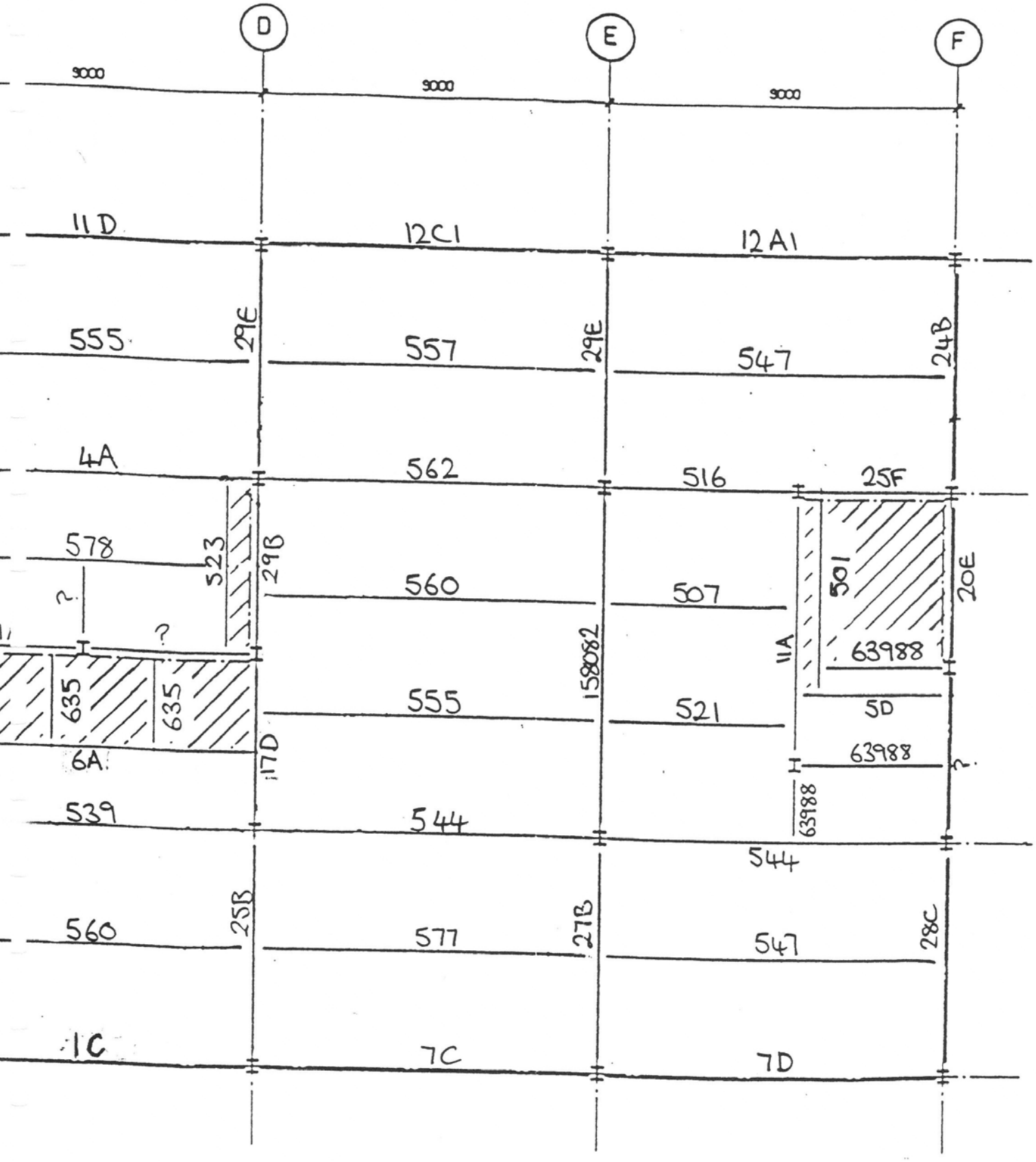
FLOOR 5

Cardington LBTF Steelwork Testing
Member Identification Plan
Figure 5

Key :

Test result available
Value interpolated from other results
Value available from mill release certificates
? No marking identified on member


A
B
C
9000
9000
8000
9000
8000
8A1
11D
24B
547
26A
559
26A
30A
516
581
20D
624
63988
11A
521
545
158082
21B
525
5D
521
561
63988
63988
63988
545
1C1
28C
542
27B
560
25B
7D1
7C1

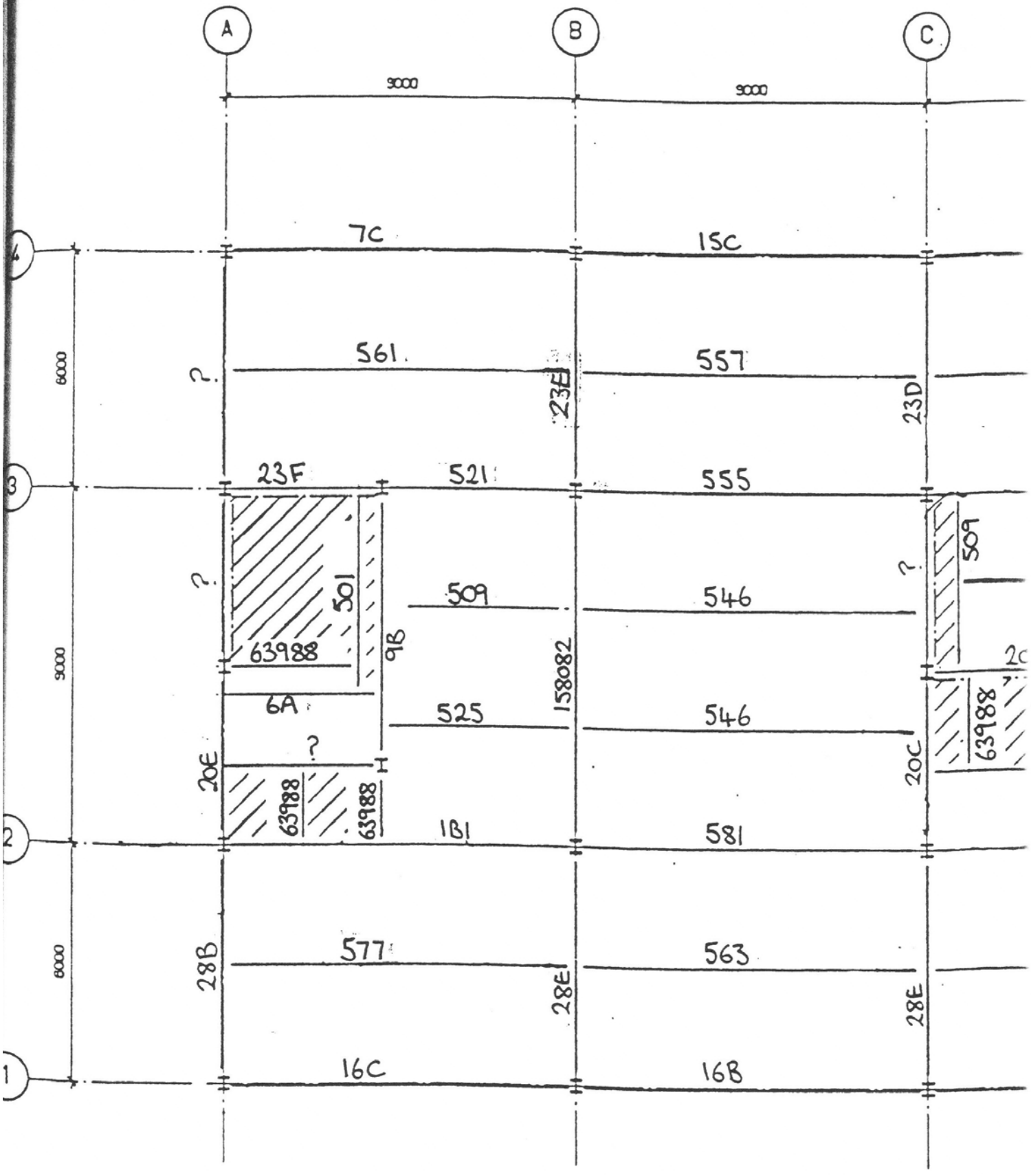


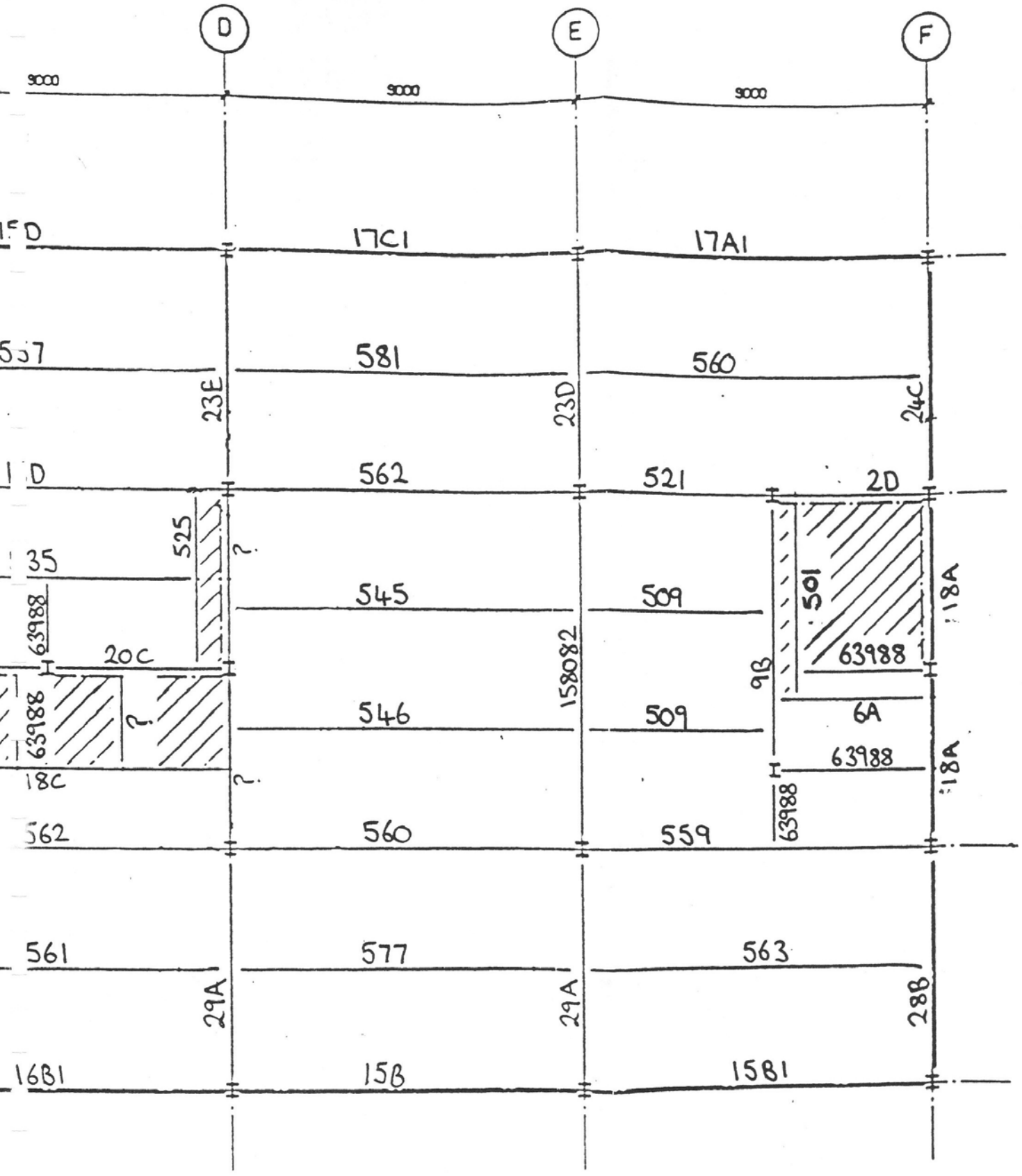
FLOOR 6

Cardington LBTF Steelwork Testing
Member Identification Plan
Figure 6

Key :

	Test result available
	Value interpolated from other results
	Value available from mill release certificates
?	No marking identified on member


A
B
C
9000
9000
4
3
2
1
8000
9000
8000
7C
15C
561
557
?
23E
23D
23F
521
555
509
?
501
509
546
63988
98
158082
6A
525
546
20E
?
H
63988
63988
20C
63988
181
581
28B
577
563
28E
28E
16C
16B

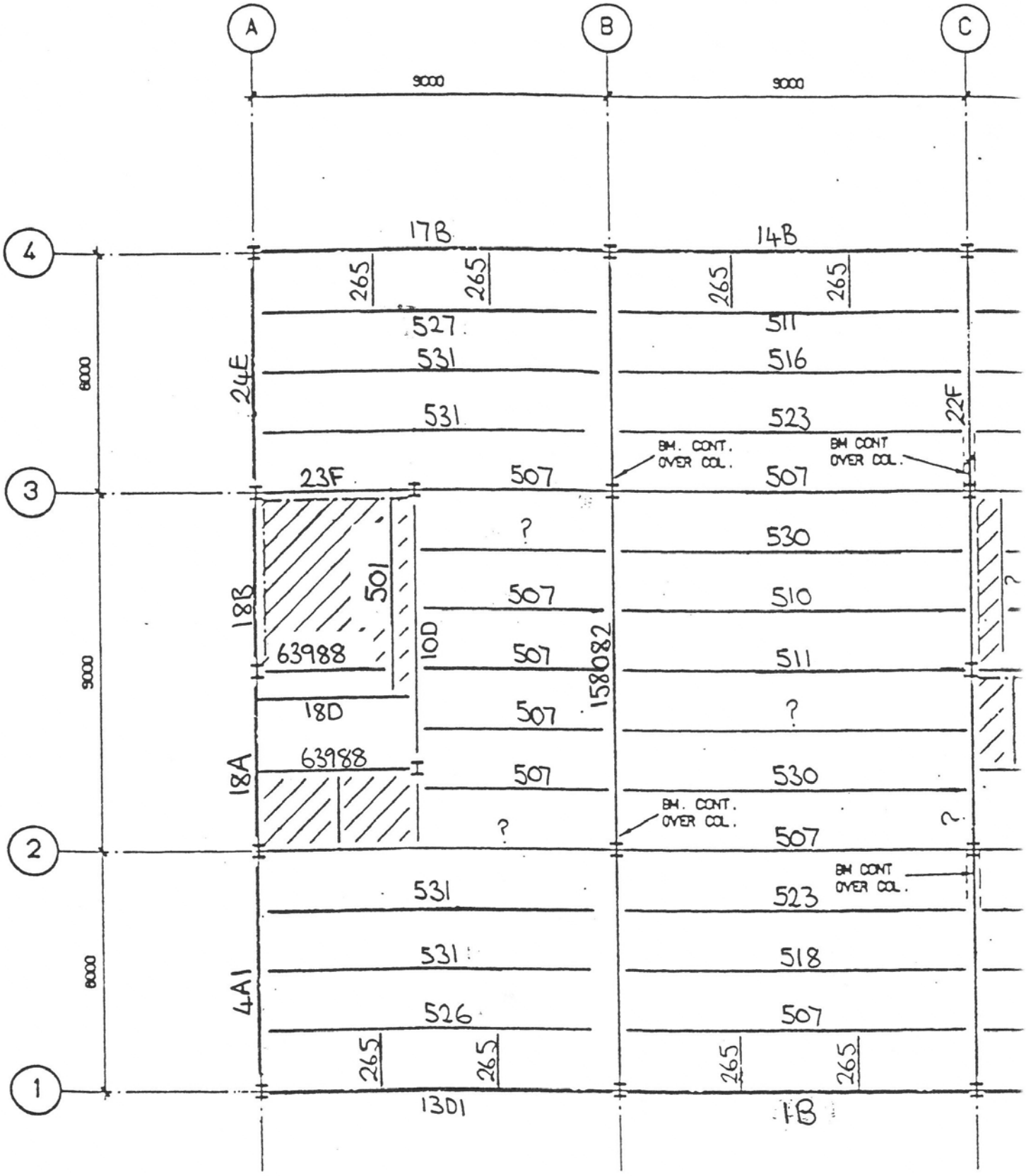


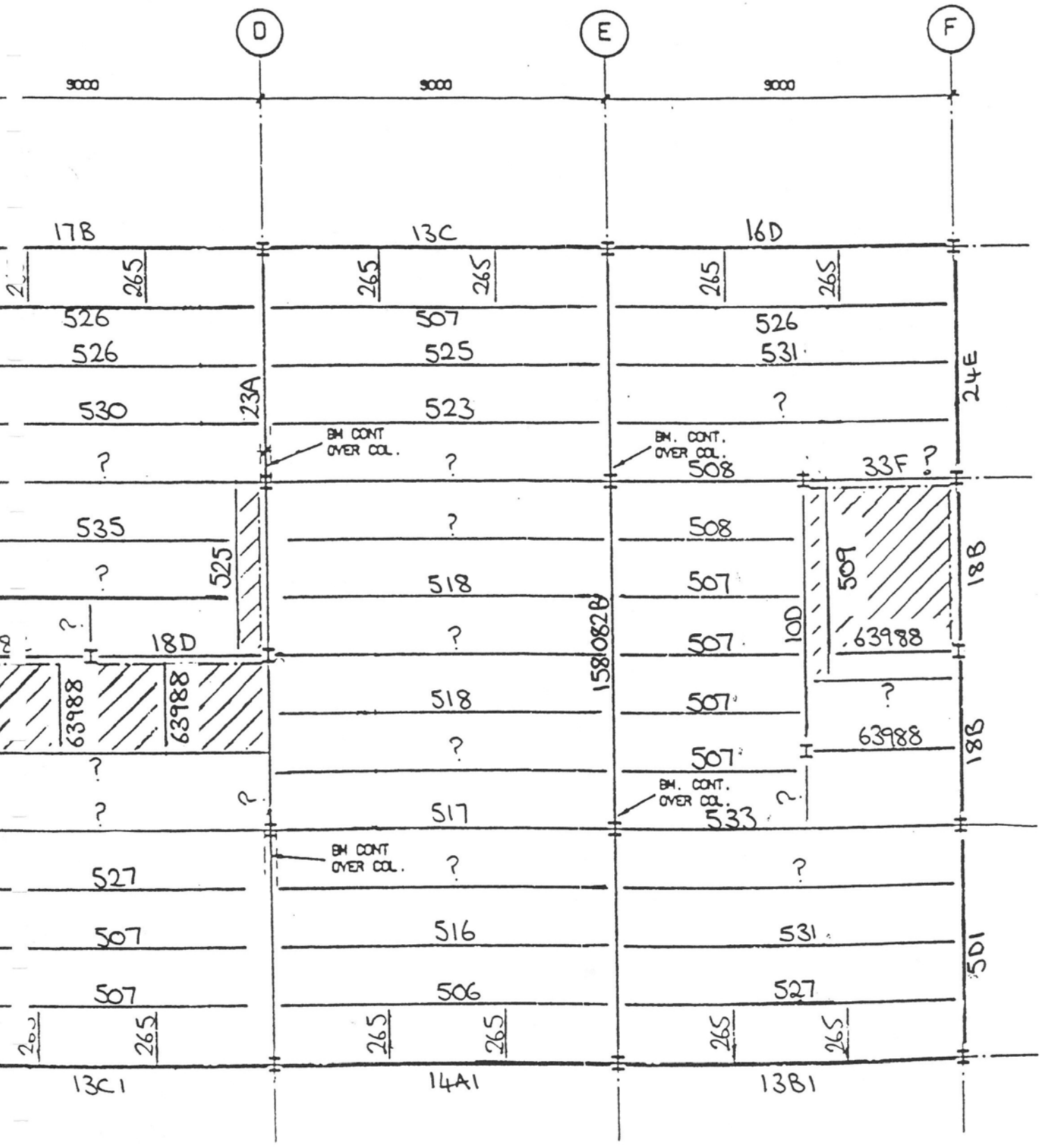
FLOOR 7

Cardington LBTF Steelwork Testing
Member Identification Plan
Figure 7

Key:

Test result available
· Value interpolated from other results
Value available from mill release certificates
? No marking identified on member


A
B
C
9000
9000
4
3
2
1
8000
9000
8000
17B
14B
265
265
265
265
527
511
531
516
24E
531
523
22F
BM. CONT. OVER COL.
BM CONT OVER COL.
23F
507
507
?
530
18B
501
507
510
63988
10D
507
511
158082
18D
507
?
18A
63988
507
530
BM. CONT. OVER COL.
?
507
?
BM CONT OVER COL.
531
523
531
518
4A1
526
507
265
265
265
265
1301
1B

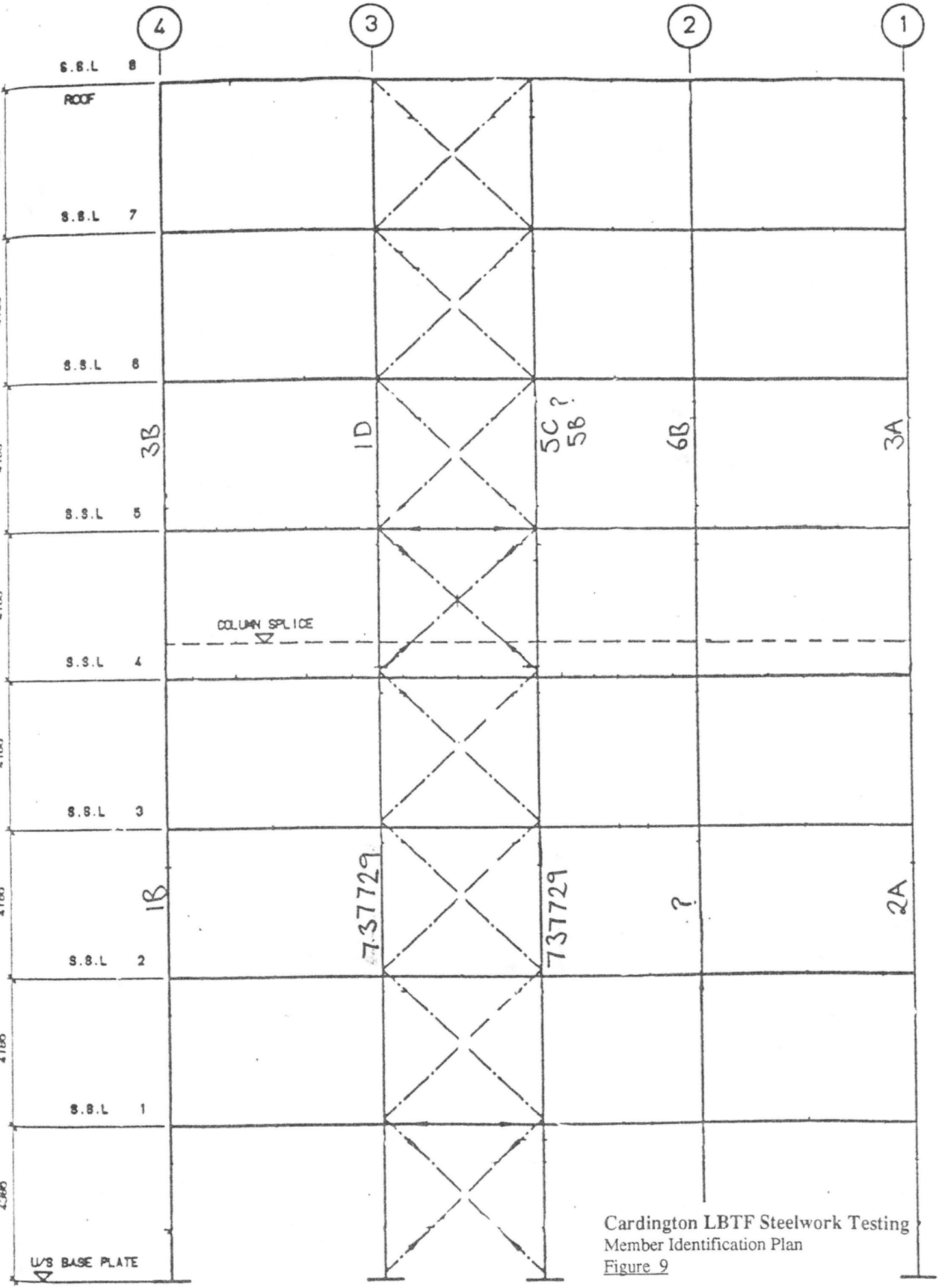


ROOF PLAN

Cardington LBTF Steelwork Testing
Member Identification Plan
Figure 8

Key :

Test result available
Value interpolated from other results
Value available from mill release certificates
? No marking identified on member

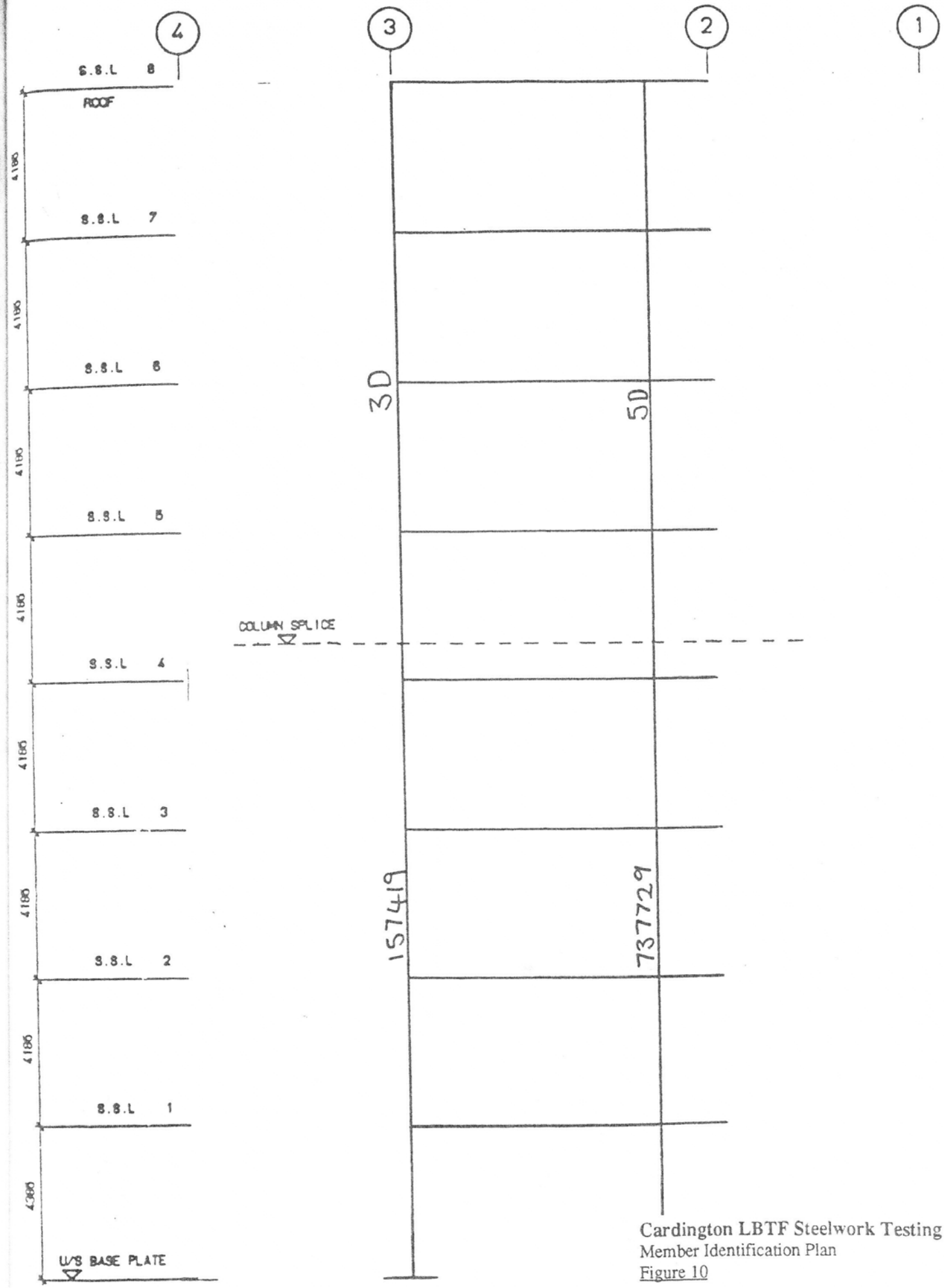


ELEVATION ON GRIDLINE A

Cardington LBTF Steelwork Testing
Member Identification Plan
Figure 9

Key :

Test result available
Value interpolated from other results
Value available from mill release certificates
? No marking identified on member

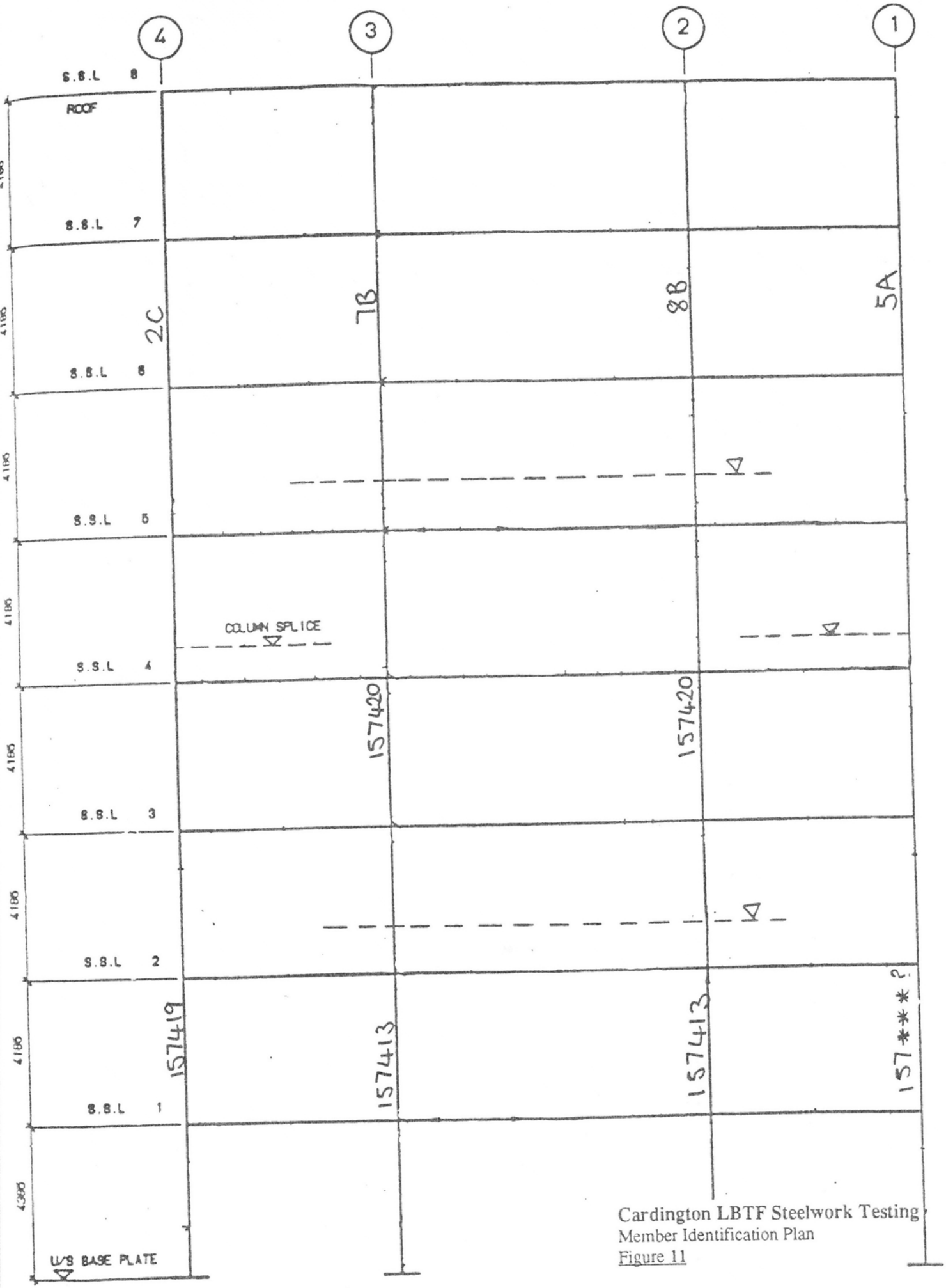


ELEVATION ON GRIDLINE A/B

Cardington LBTF Steelwork Testing
Member Identification Plan
Figure 10

Key :

Test result available
Value interpolated from other results
Value available from mill release certificate
? No marking identified on member

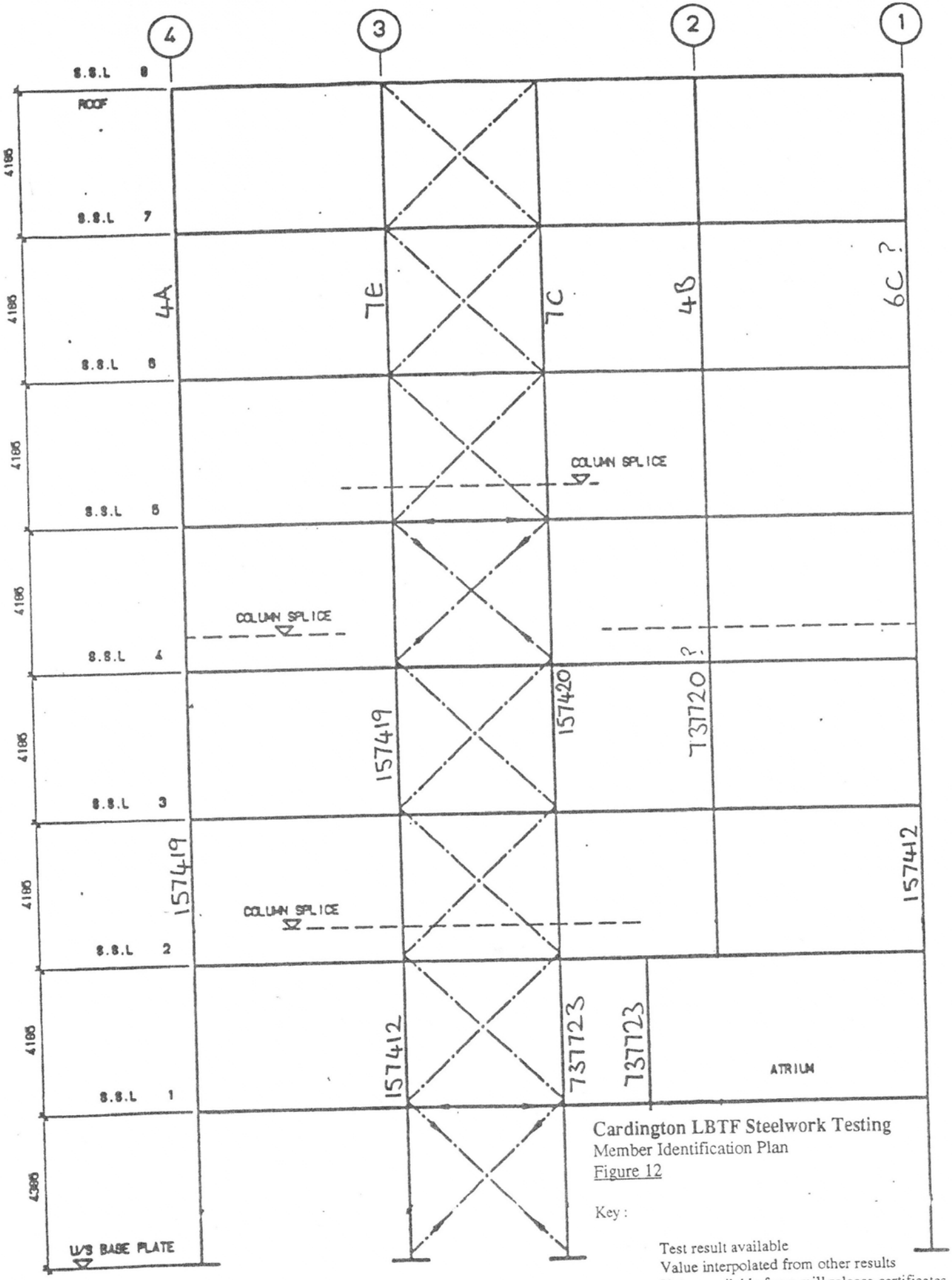


ELEVATION ON GRIDLINE B

Cardington LBTF Steelwork Testing
Member Identification Plan
Figure 11

Key :

Test result available
Value interpolated from other results
Value available from mill release certificate
? No marking identified on member

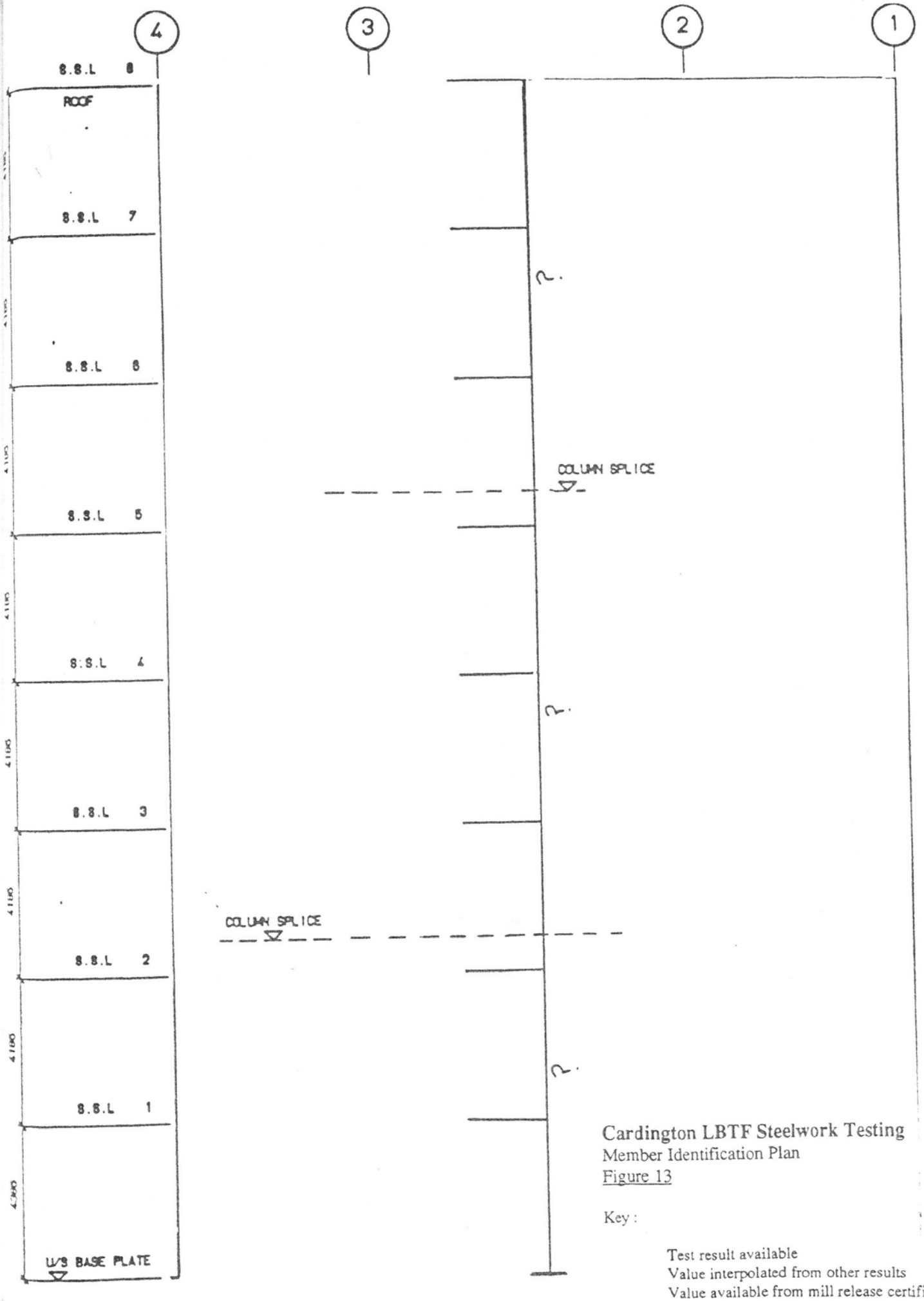


Cardington LBTF Steelwork Testing
Member Identification Plan
Figure 12

Key :

Test result available
Value interpolated from other results
Value available from mill release certificates
? No marking identified on member

ELEVATION ON GRIDLINE C

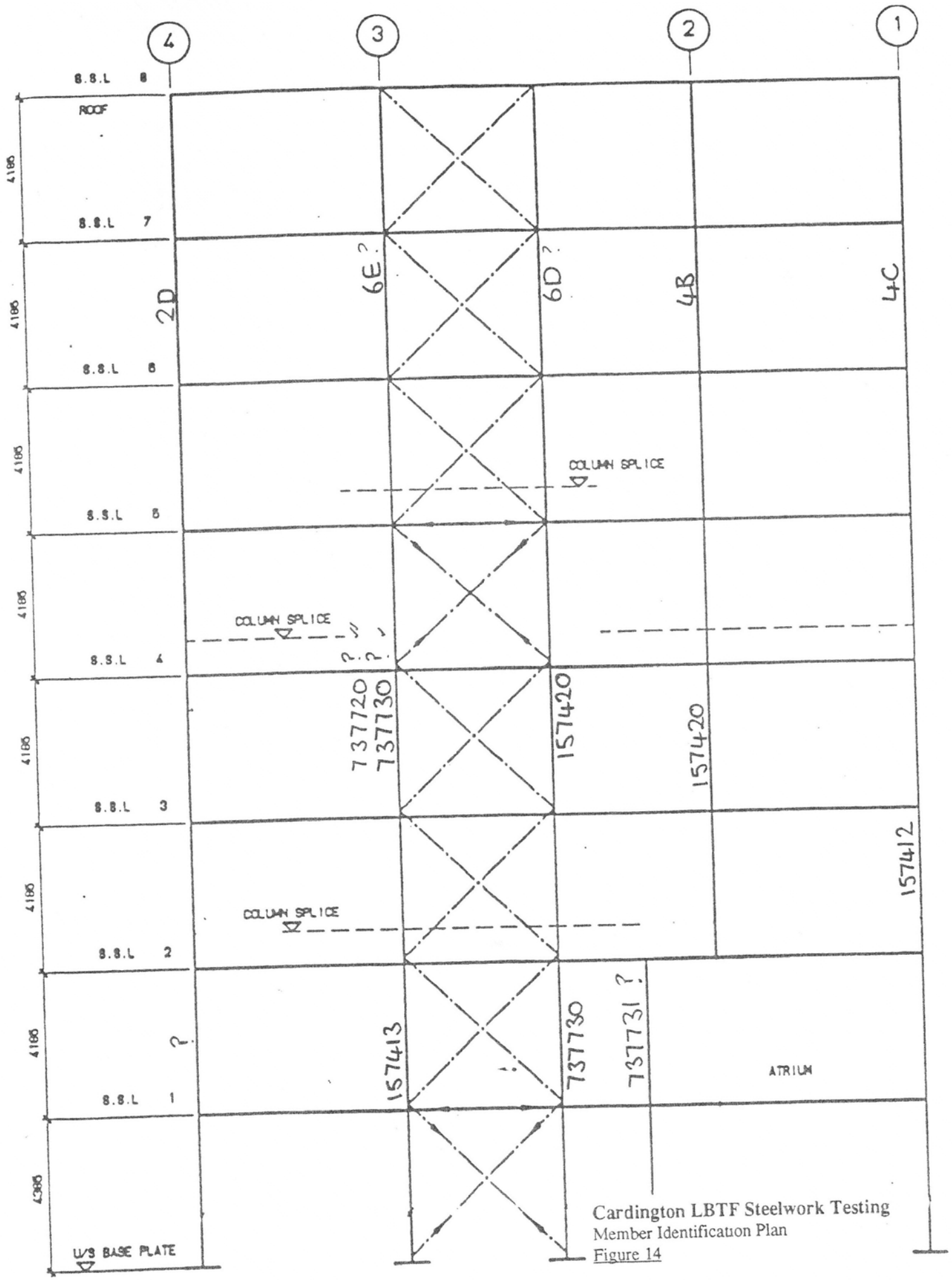


Cardington LBTF Steelwork Testing
Member Identification Plan
Figure 13

Key :

Test result available
Value interpolated from other results
Value available from mill release certificates
? No marking identified on member

ELEVATION ON GRIDLINE C/D

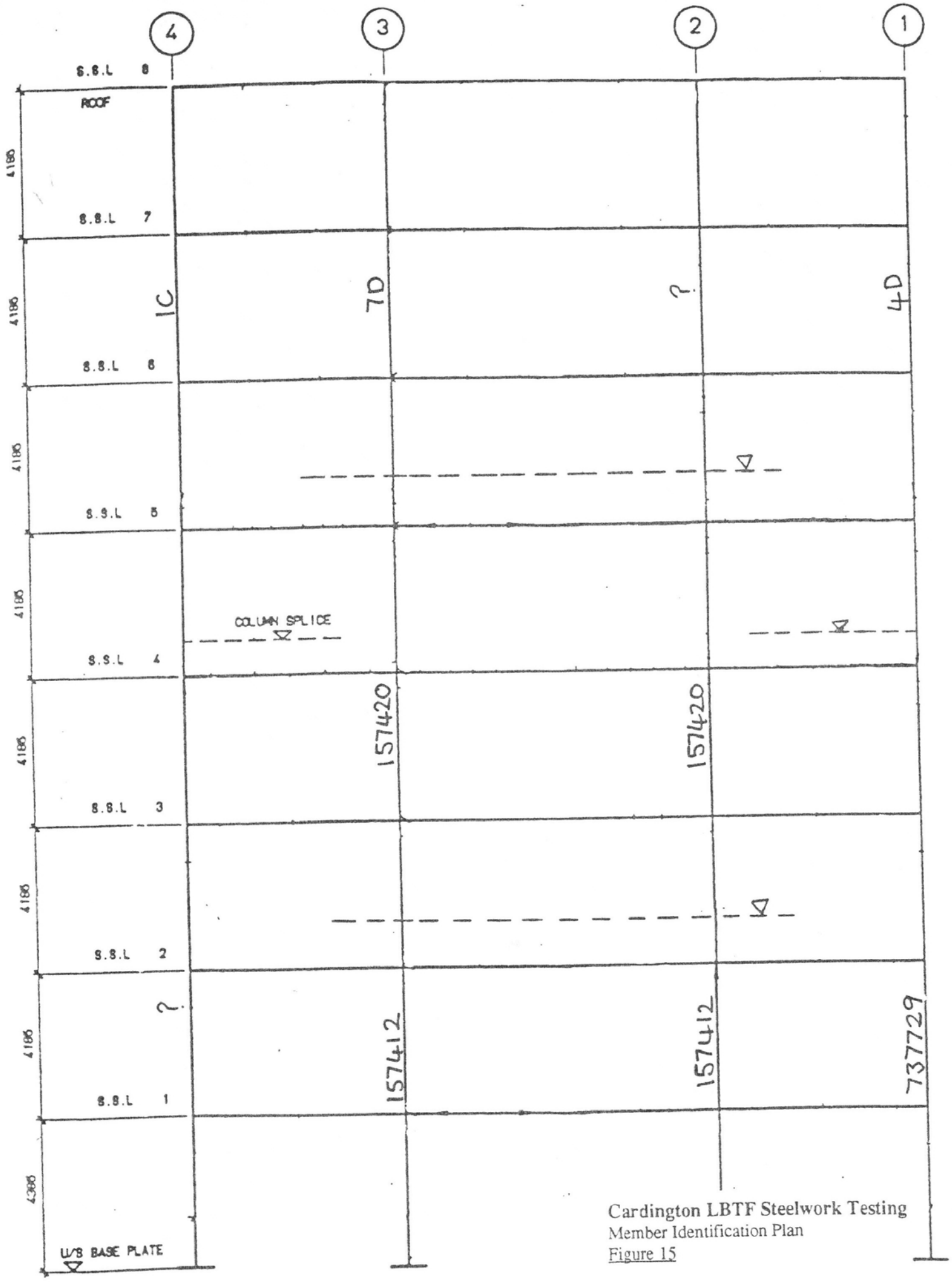


Cardington LBTF Steelwork Testing
Member Identificaton Plan
Figure 14

Key :

Test result available
Value interpolated from other results
Value available from mill release certificates
? No marking identified on member

ELEVATION ON GRIDLINE D

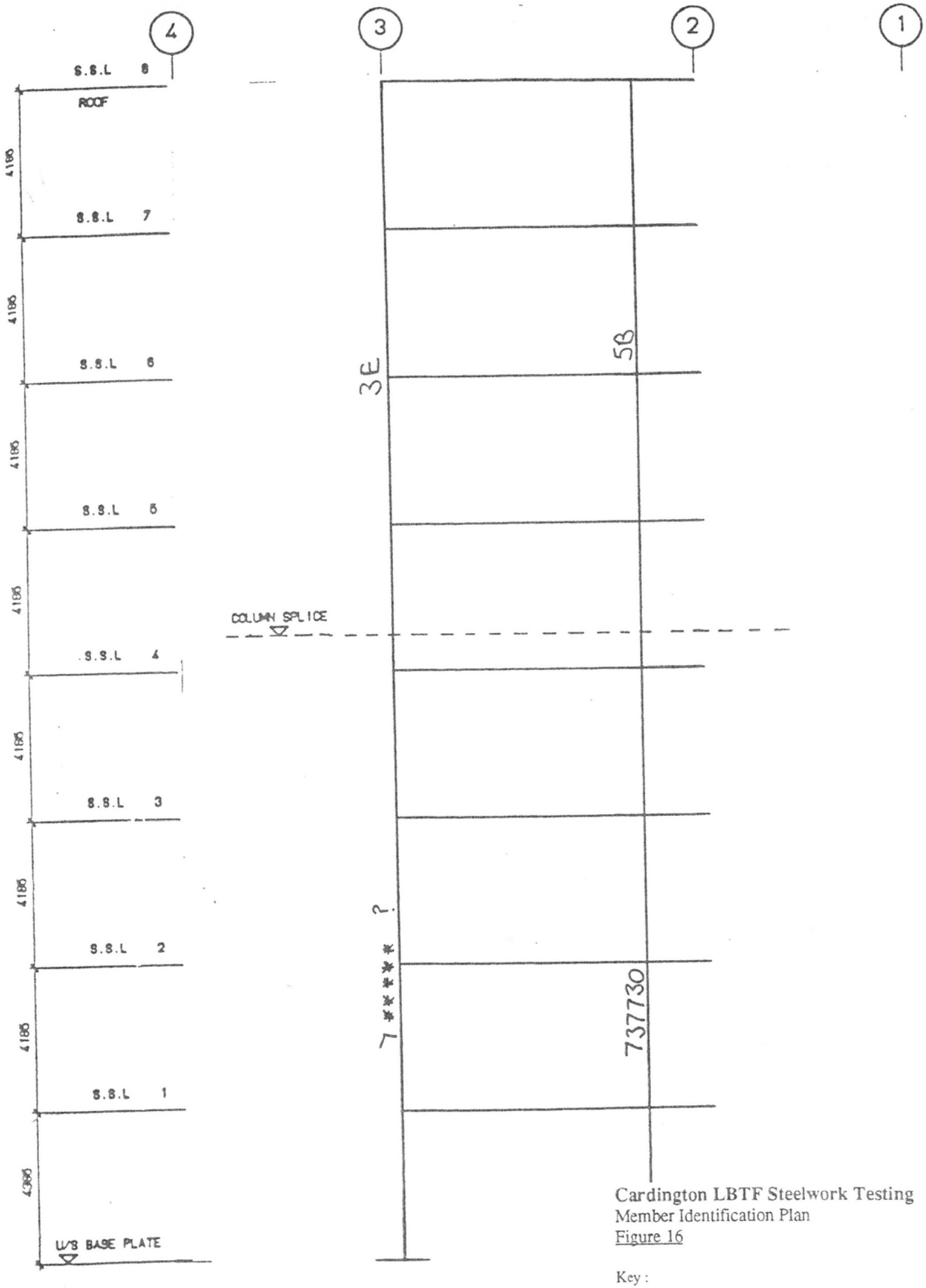


ELEVATION ON GRIDLINE E

Cardington LBTF Steelwork Testing
Member Identification Plan
Figure 15

Key :

Test result available
Value interpolated from other results
Value available from mill release certificates
? No marking identified on member

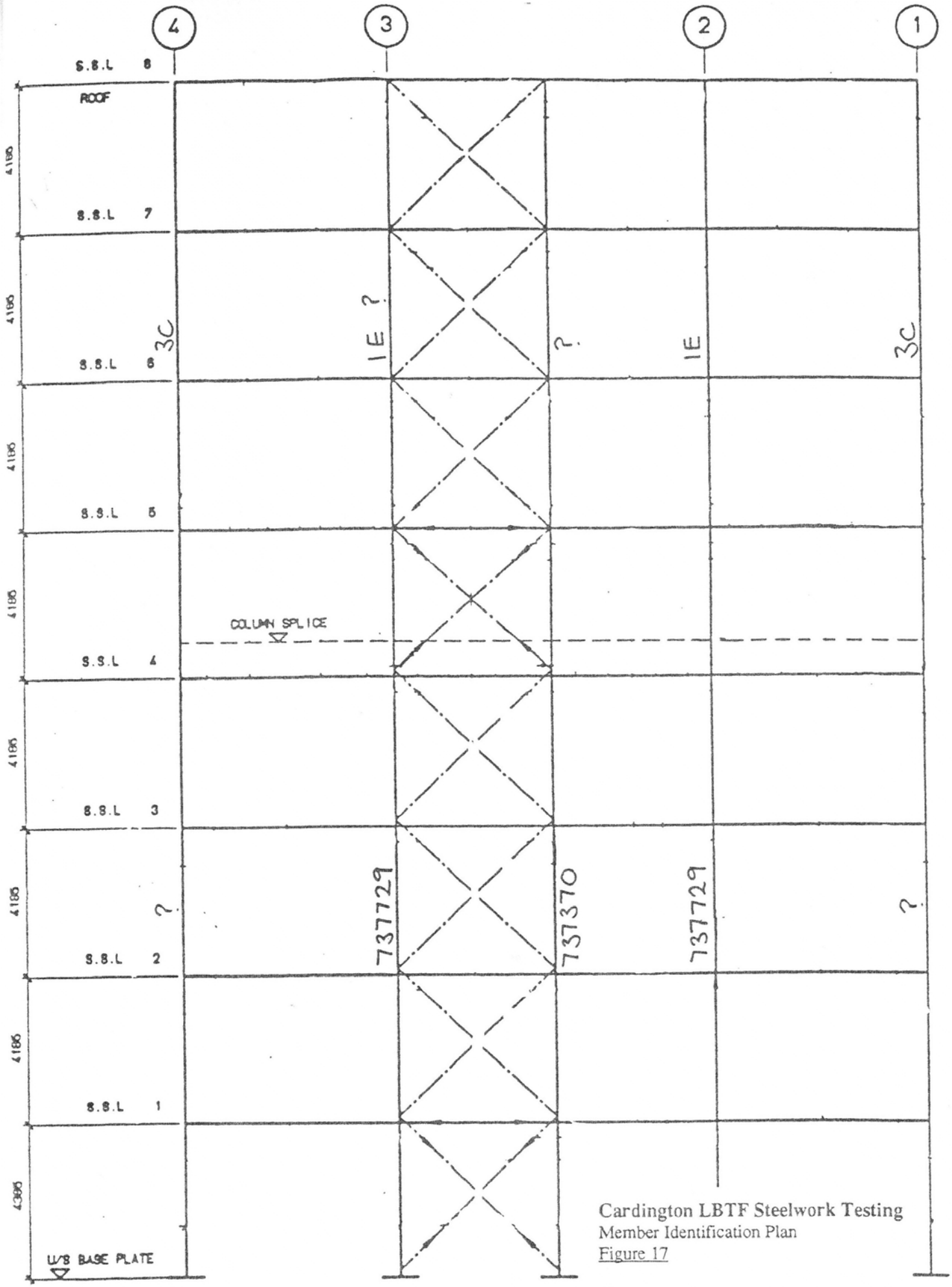


ELEVATION ON GRIDLINE E/F

Cardington LBTF Steelwork Testing
Member Identification Plan
Figure 16

Key :

Test result available
Value interpolated from other results
Value available from mill release certificates
? No marking identified on member



Cardington LBTF Steelwork Testing
Member Identification Plan
Figure 17

Key :

Test result available
Value interpolated from other results
Value available from mill release certificates
? No marking identified on member

ELEVATION ON GRIDLINE F

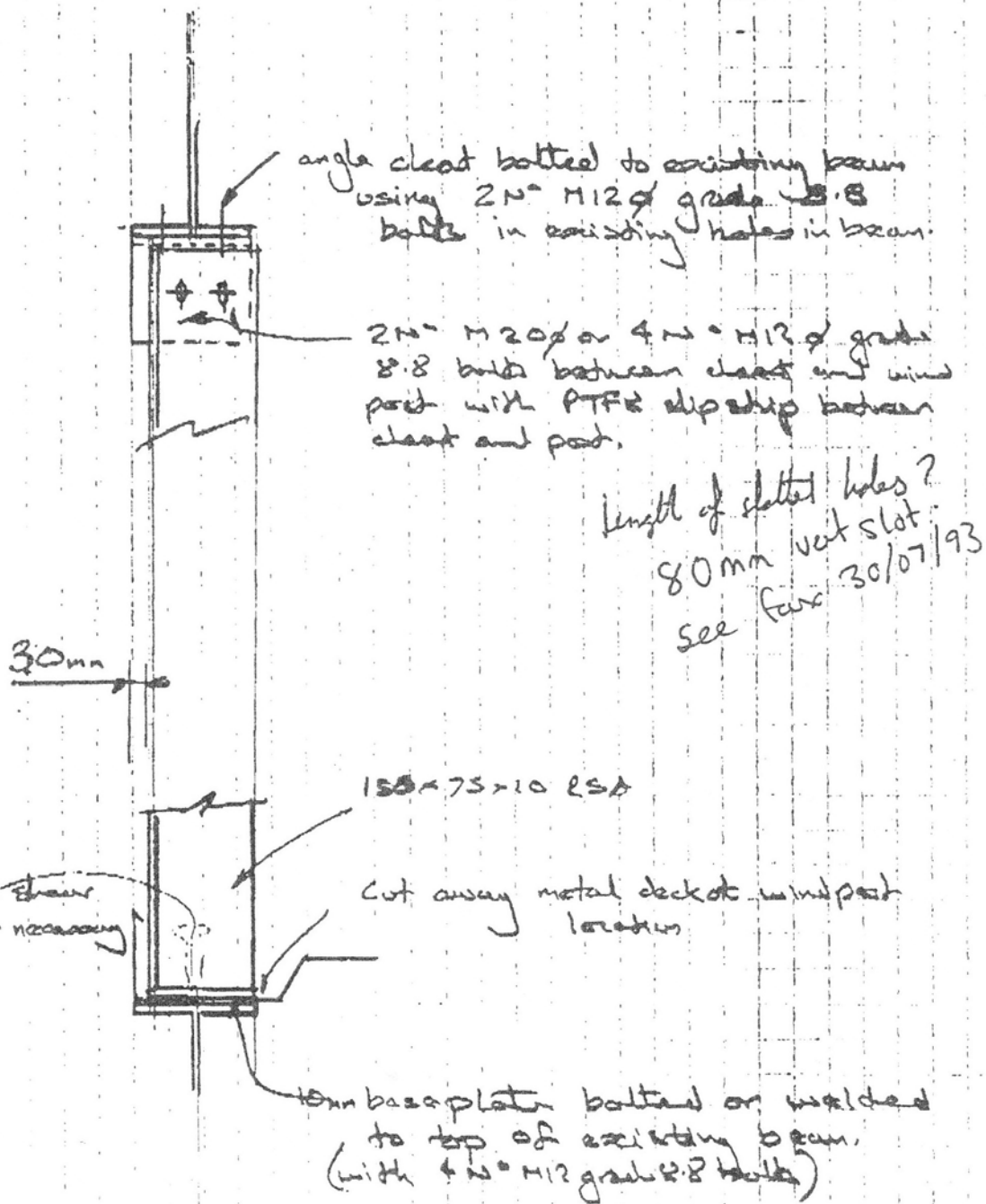
Sketches

Job No.

SKETCH NO : SK 1 BRE

Page No.

NB THIS IS A BRE REF. NO.



Wind post fixing details gridlines A and F

INITIALS

PETER BRETT ASSOCIATES

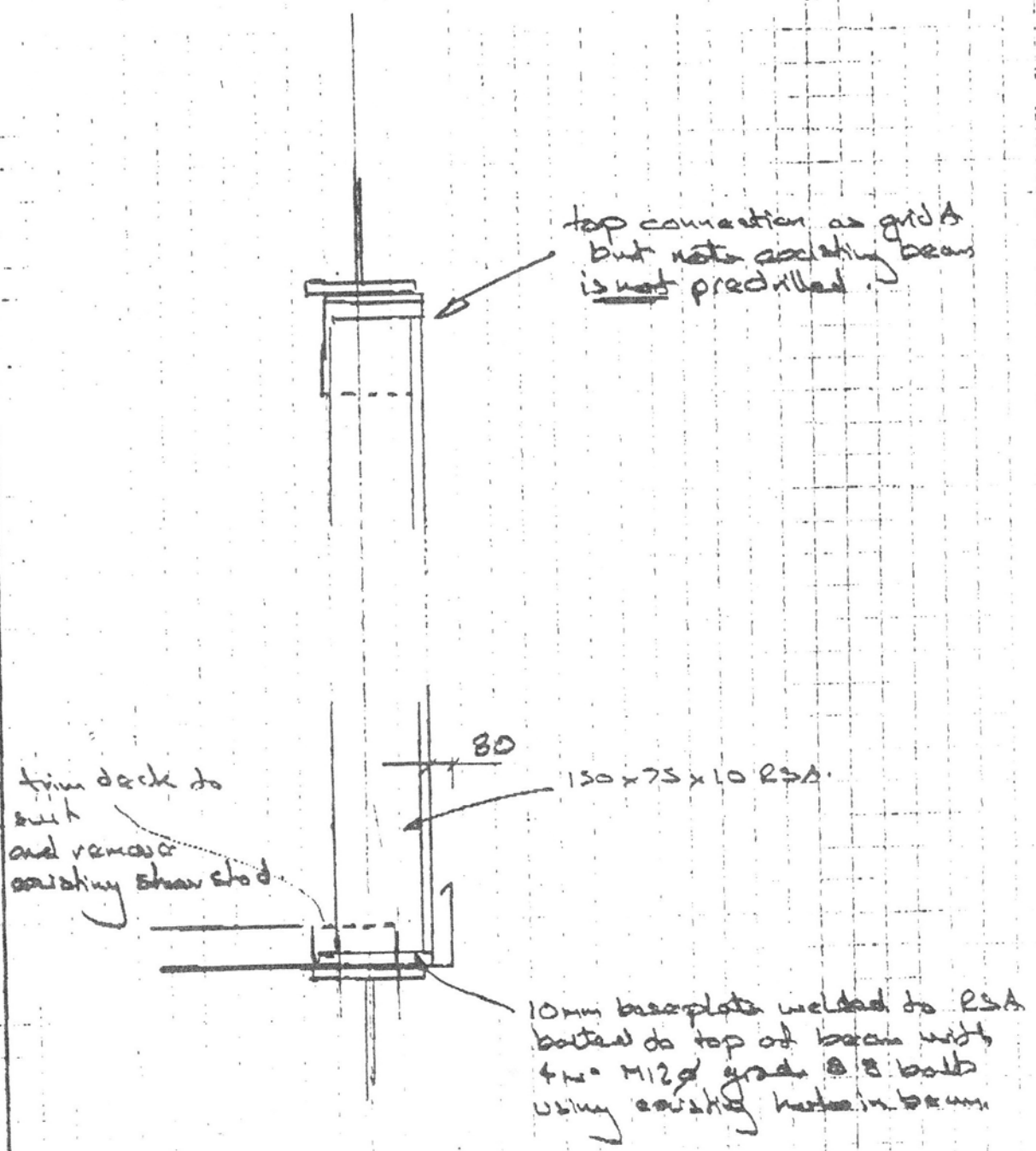
0272251813

Job No.

SKETCH NO : SK 2 BRE

Page No.

NB. THIS IS A BRE REF. NO.



Windpost fixing details grid lines 1 and 4.

INITIALS

PETER BRETT ASSOCIATES

Appendices

Appendix A : Cardington LBTF Drawing List

Drawing No.	Drawing Title	Issue
5992/01	Ground floor steel layout	Peter Brett Assoc
5992/02	First floor steel layout	Peter Brett Assoc
5992/03	Second floor steel layout	Peter Brett Assoc
5992/04	Third to Seventh floor steel layout	Peter Brett Assoc
5992/05	Typical Steel Details	Peter Brett Assoc
5992/06	Elevation on Gridline A	Peter Brett Assoc
5992/07	Roof Steel Layout	Peter Brett Assoc
5992/08	First floor steel layout Connection Forces	Peter Brett Assoc
5992/09	Second floor steel layout Connection Forces	Peter Brett Assoc
5992/10	Third to Seventh floor steel layout Connection Forces	Peter Brett Assoc
5992/11	Roof Steel Layout Connection Details	Peter Brett Assoc
6101/01	Contractors areas & access routes	Peter Brett Assoc
6101/02	Existing services layout	Peter Brett Assoc
6101/03	Surface water drainage layout	Peter Brett Assoc
6101/04	G.A. & Details of raft foundation	Peter Brett Assoc
92066/1	Foundation Plan	Caunton Enginee
92066/2	Isometric view of steel frame	Caunton Enginee
92066/3	Plan on 1st floor steel	Caunton Enginee
92066/4	Plan on 2nd floor steel	Caunton Enginee
92066/5	Plan on 3rd floor steel	Caunton Enginee
92066/6	Plan on 4th floor steel	Caunton Enginee
92066/7	Elevation on grid lines A & F and sections thru' grid lines C & D	Caunton Enginee
92066/8	Section thru' grid lines 2/3	Caunton Enginee
92066/10	Plan on 5th floor steel	Caunton Enginee
92066/11	Plan on 6th floor steel	Caunton Enginee
92066/12	Plan on 7th floor steel	Caunton Enginee
92066/13	Plan on 8th floor steel	Caunton Enginee
92066/15	Section thru' grid lines 2/3 5th-8th floor	Caunton Enginee
Q/6710/01	Typical sections showing Dado wall head restraint details	Convoy Installatic
Q/6710/02	Typical section showing Dado wall head restraint details	Convoy Installatic
R1112/01	First floor level Decking Layout	Composite Profile
R1112/02	Second floor level Decking Layout	Composite Profile
R1112/03	Third to Seventh floor levels Decking Layout	Composite Profile
R1112/04	Roof level Decking Layout	Composite Profile
TE/9202/001	End Elevations & Blockwork Restraint Details	Taywood Enginee
TE/9202/002	Front Elevation	Taywood Enginee
TE/9202/003	Rear Elevation	Taywood Enginee
Annotated drawings and others		
Member indentification plans for the steelwork testing		Plans prepared b
Crack survey of composite concrete floors		Survey conducte
Negatives of drawings R1112/01 to R1112/04		

Compiled 4/7/94 by PNRB
Updated 19/9/94 by PNRB

	Issue Date	Issued for	Rev.	Rev. Date	Clip No.
	16/12/92	Construction	F	14/12/92	1
	16/12/92	Construction	F	14/12/92	1
	16/12/92	Construction	F	14/12/92	1
	16/12/92	Construction	F	10/12/92	1
	16/12/92	Construction	F	15/12/92	1
	16/12/92	Construction	E	15/12/92	1
	16/12/92	Construction	B	15/12/92	1
	16/12/92	Construction	A	15/12/92	1
	16/12/92	Construction	A	15/12/92	1
	16/12/92	Construction	A	15/12/92	1
	16/12/92	Construction	A	15/12/92	1
	07/05/92	Construction	A	07/05/92	2
	07/05/92	Construction	A	07/05/92	2
	07/05/92	Construction	A	07/05/92	2
	07/05/92	Construction	A	07/05/92	2
Ltd			B	15/12/92	4
d					5
Ltd					3
Ltd			A	14/12/92	3
d					3
Ltd					3
Ltd					5
d					5
Ltd					3
Ltd					3
d					3
d					3
Ltd					4
					6
Ltd.			A		6
	22/12/92	Construction	C	07/07/93	7
	22/12/92	Construction	C	07/07/93	7
	22/12/92	Construction	C	07/07/93	7
	22/12/92	Construction	C	07/07/93	7
Ltd.	23/07/93	Tender	A	02/12/93	8
Ltd.	23/07/93	Tender	A	02/12/93	8
Ltd.	00/06/93	Preliminary			8
Dowling of British Steel					23
atrick Bravery of BRE from 12th to 19th July 1994					24
					25

Appendix B : Details of rolling mill test procedure

To be supplied by John Dowling of British Steel (0642 474111).