

S 3019

July 8th. 1999

**Temperature Data Recorded During a Natural Fire Test at
BRE Cardington on November 4th. 1998**

**RHS Edge Beams, Columns and Edge Beam to Column
Connections**

D. E. Wainman

British Steel plc
Swinden Technology Centre
Moorgate
Rotherham S60 3AR
Telephone: (01709) 820166
Fax: (01709) 825337

Temperature Data Recorded During a Natural Fire Test at BRE Cardington on November 4th. 1998

RHS Edge Beams, Columns and Edge Beam to Column Connections

D. E. Wainman

1) Introduction

On November 4th. 1998 a natural fire test was carried out on a loaded asymmetric Slimdek floor beam assembly at the Building Research Establishments Large Building Test Facility situated at Cardington near Bedford. The principal purpose of the test was to investigate the performance of the Slimdek floor system when subjected to a severe fire. Details of the test are contained in a report ⁽¹⁾ prepared by the BRE.

This technical memo gives details concerning the instrumentation of the RHS edge beams, the supporting columns and the edge beam to column connections, together with the data recorded for each and any relevant observations. Technical memos are also being prepared giving similar details and data for other parts of the assembly. ⁽²⁾ No attempt has been made to provide a detailed analysis of the data. This aspect of the work is currently on-going and will form the basis of future reports.

2) Test Compartment

Drawings prepared by the Steel Construction Institute for the construction of the nominally 12 metre square test compartment are reproduced in Appendix 1. The general layout is shown in the first of these, numbered BCF791/1/01. From this it may be seen that the floor slab was supported on a structural steel framework consisting of seven UC and two RHS column members together with four RHS edge beams, four ASB edge beams and two inverted 'Tee' section tie beams. The asymmetric Slimdek floor beam, (which was considered to be the principal component of the test assembly), was located across the full width of the compartment in two 6 metre spans between columns A2-B2 and B2-C2. The RHS edge beams were located between columns B1-C1, C1-C2, C2-C3 and B3-C3. The ASB edge beams and 'Tee' sections completed the steel framework.

The perimeter walls were constructed using Plasmor 'STRANLITE' block-work, the block dimensions being 440 x 215 x 190 mm, (length x depth x thickness). These extended to within approximately 300 mm of the concrete floor slab. In addition to forming the perimeter of the compartment they also provided protection to the column sections, all of which were external to the fire compartment, the block-work walls being built around their inside faces.

3) Instrumentation

All the thermocouples used to instrument the components covered by this report were Class 1, mineral insulated Type 'K', (Ni-Cr / Ni-Al), with insulated hot junctions and Inconel

600 sheaths. They were located with the hot junction at the mid-thickness of the relevant steel section. The thermocouples used for the RHS sections and the beam to column connections were all 1.5 mm diameter whilst those in the seven H section columns were all 3.0 mm diameter. Details concerning the instrumentation of the various components are given in the following sections :-

3.1 RHS Edge Beams

Temperature profiles were recorded at seventeen separate locations along the length of the RHS edge beams. These positions, coded R1 to R17, are shown in plan view in Figure 1. Fourteen positions around the perimeter of the RHS section were identified as positions at which temperatures should be recorded. These positions, identified as /01 to /14, are shown in Figure 2. The full profile of fourteen thermocouples was used only at measurement positions R1 and R7. At the remaining positions a reduced number of thermocouples were installed as indicated in Table 1.

3.2 Columns

Thermocouples were installed in the nine supporting column members at a level mid-way between the underside of the concrete floor slab and the top of the block-work perimeter walls. The measurement locations and cross sectional identifications for these thermocouples are shown in Figure 3. Positions /05 and /06 on column A2 were 1500 mm and 750 mm respectively from the base of the column. Although the columns on grid-line 'A' did not connect with any of the RHS edge beams, details and data for these columns have been included for the sake of completeness.

3.3 Edge Beam to Column Connections

Thermocouples were installed at fourteen locations in the vicinity of the connections between the RHS edge beams and the supporting columns. These were coded RC01 to RC14, their positions being as shown in plan view in Figure 1. At this point readers may find it useful to refer to the SCI construction drawings in Appendix 1 in order to visualise the following descriptions.

Thermocouples RC1 and RC8 were located mid-way between the lower pair of bolts connecting the edge beam end plate to the flange of the H section columns at grid-line positions B1 and B3 respectively. The hot junctions were located at the mid-thickness position of the end plates. (Refer to SCI drawing Nos. BCF791/1/02, Details 'A' and 'H' and BCF791/1/04, Section 1-1).

Similarly, thermocouples RC2 & 3 and RC6 & 7 were located mid-way between the lower pair of Holo-bolts connecting the edge beam end plates to the two internal faces of the SHS columns at grid-line positions C1 and C3 respectively. As before the hot junctions were located in the end plates. (Refer to SCI drawing Nos. BCF791/1/03, Details 'E' and 'D' and BCF791/01/09, Sections 9-9 and 11-11).

The arrangement around column C2 was very similar but involved a greater number of measurement positions as shown in Figure 4. Thermocouples RC4 and RC5 were located in the edge beam end plates mid-way between the lower pair of bolts connecting those plates to

the ones welded across the toes of the H section column. RC9 and RC10 were located in the UC toe plates directly in front of RC4 and RC5 respectively. Thermocouples RC11, RC12, RC13, and RC14 were all located in the welds fastening the toe plates to the column. RC11 and RC13 were situated on the fire side of the column, the other two being on the non fire side. These four thermocouples were also in line with the lower pair of bolts. (Refer to SCI drawing Nos. BCF791/1/03, Detail 'J' and BCF791/01/05, Section 7-7).

4) Thermal Data

The temperatures recorded at the various positions within the RHS edge beams, columns and connections are presented Tables 2 to 20. These contain the following information :-

For the RHS Edge Beams :-

| | |
|------------|--------------------------------------|
| Table 2(a) | Measurement positions R1/01 to R1/07 |
| Table 2(b) | Measurement positions R1/08 to R1/14 |
| Table 3 | Measurement positions at R2 |
| Table 4 | Measurement positions at R3 |
| Table 5 | Measurement positions at R4 |
| Table 6 | Measurement positions at R5 |
| Table 7 | Measurement positions at R6 |
| Table 8(a) | Measurement positions R7/01 to R7/07 |
| Table 8(b) | Measurement positions R7/08 to R7/14 |
| Table 9 | Measurement positions at R8 |
| Table 10 | Measurement positions at R9 |
| Table 11 | Measurement positions at R10 |
| Table 12 | Measurement positions at R11 |
| Table 13 | Measurement positions at R12 and R13 |
| Table 14 | Measurement positions at R14 |
| Table 15 | Measurement positions at R15 and R16 |
| Table 16 | Measurement positions at R17 |

For the Columns :-

| | |
|----------|--|
| Table 17 | Measurement positions on grid-line 'A' |
| Table 18 | Measurement positions on grid-line 'B' |
| Table 19 | Measurement positions on grid-line 'C' |

For the Edge Beam to Column Connections :-

| | |
|-------------|--------------------------------------|
| Table 20(a) | Measurement positions RC/01 to RC/07 |
| Table 20(b) | Measurement positions RC/08 to RC/14 |

All the data presented in Tables 2 to 20 are available on a single floppy disk, (Excel spreadsheet format), a copy of which is included with this document.

5) Commentary

Those involved with this particular test will be only too familiar with the problems surrounding it in terms of logging the thermal data. It will be recalled that there was a major error associated with the wiring of a large number of thermocouples which resulted in many of them being accidentally connected with the polarities reversed between them and the extension cables leading back to the data logger. This obviously resulted in all data being recorded on an increasingly negative scale until it exceeded the lower limit for which the data logger was calibrated, (about -200 Deg. C). Missing data therefore exist where the temperatures were beyond the recordable range of the instrument and these data have, regrettably, to be considered as irretrievably lost. As the steel work cooled down the temperatures came back within the recordable range, the time at which this occurred for any individual thermocouple being dependent on its position within the overall assembly.

In an attempt to salvage something from a very unfortunate, (and highly embarrassing), situation a conversion routine has been established which allows the negative data obtained during the test to be converted back to the positive values which would have been obtained had the thermocouples been wired correctly. Whilst it is not claimed that this is a perfect solution to the problem it is confidently believed that the routine is sufficiently accurate for the purposes of the present work. The values presented in the accompanying tables of data are those obtained after applying, (where required), such a correction.

However, not all the thermocouples were affected by the mis-connection error and at many positions complete sets of data were recorded throughout the test. The following sections describe in more detail the situation pertaining to various groups of thermocouples.

5.1 RHS Edge Beams

Measurement locations R1 to R8 contained 66 thermocouples, all of which were connected incorrectly. The data presented in Tables 2 to 9 are therefore those obtained after applying the conversion routine referred to above. In the case of the thermocouple at position R1/12 the data recorded throughout the test were very erratic. In view of this it has been decided not to include these values in the data presented in Table 2(b).

At measurement locations R7 and R8 the converted data values initially appeared to be satisfactory. However, as the test proceeded all the thermocouples began to generate wildly erratic data, a situation which persisted throughout the remainder of the test. The data presented in Tables 8 and 9 are therefore all that is considered to be reliable. It should also be noted that the thermocouple at position R7/12 was actually wired correctly and so the values shown in Table 8(b) are those actually recorded. However, after about 61 minutes the output from this thermocouple also became very erratic and no further useful data were obtained.

At measurement location R9, thermocouples 11 and 13 were both wired correctly and so the data presented in Table 10 for these two items is exactly as recorded during the test. However, thermocouples 2, 4, 8 and 9 were incorrectly wired and the data shown in Table 10 is that obtained after applying the conversion routine.

Thermocouples at measurement positions R10 to R17 were, with one exception, wired correctly and the data shown in Tables 11 to 16 are exactly as recorded during the test. The

single exception is the thermocouple at position R17/08 which, inexplicably, was wired incorrectly. The data for this item in Table 16 are therefore those obtained after conversion.

5.2 Columns

The 35 thermocouples associated with the UC and RHS columns were all wired incorrectly. The data presented in Tables 17, 18 and 19 are therefore those obtained after applying the conversion routine.

In the case of thermocouples at positions A2/05, A2/06, B2/02 and B2/03 the recorded, (and therefore the converted), data were very erratic. In view of this it has been decided not to include them in the data presented here. It is worth noting that in the case of thermocouple positions A1/03 and A3/04 the recorded temperatures never exceeded the lower negative limit for the data logger and therefore there are no missing data for these two items.

After 734 minutes, (i.e. well into the cooling down phase of the test), the data associated with the five thermocouples in column C3 all started to behave erratically. No specific reasons have been identified which would account for why this occurred at such a late stage in the test. Never-the-less the values are considered to be unreliable and they have not been included in the data presented in Table 19. However, their omission should be of very little consequence.

5.3 Edge Beam to Column Connections

There were no apparent problems with the thermocouples at the connection positions RC1 to RC14. The data presented in Tables 20(a) and 20(b) are therefore exactly as recorded during the test.

6) References

- (1) T. Lennon & D.B. Moore
"Full Scale Fire Test on a Slimdek Floor System"
Building Research Establishment Report No. TCR 30/99 November 1998
- (2) D.E. Wainman
"The Temperatures Recorded in Five Indicative Assemblies Built Into a Block-work Wall During a Natural Fire Test at BRE Cardington on November 4th. 1998"
Technical Memo issued 30/04/99

TABLE 1

Thermocouple Positions for the RHS Edge Beams

| Measurement Position | Thermocouple Position on RHS Edge Beam Profile | | | | | | | | | | | | | |
|-------------------------|--|----|----|----|----|----|----|----|----|----|----|----|----|----|
| | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 |
| R1 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| R2 | | ■ | | ■ | | | | ■ | ■ | | ■ | | ■ | |
| R3 | | ■ | | ■ | | | | ■ | ■ | | ■ | | ■ | |
| R4 | | ■ | | ■ | | | | ■ | ■ | | ■ | | ■ | |
| R5 | | ■ | | ■ | | | | ■ | ■ | | ■ | | ■ | ■ |
| R6 | | ■ | | ■ | | | | ■ | ■ | | ■ | | ■ | ■ |
| R7 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| R8 | | ■ | | ■ | | | | ■ | ■ | | ■ | | ■ | |
| R9 | | ■ | | ■ | | | | ■ | ■ | | ■ | | ■ | |
| R10 | | ■ | | ■ | | | | ■ | ■ | | ■ | | ■ | |
| R11 | | ■ | | ■ | | | | ■ | ■ | | ■ | | ■ | |
| R12 | | ■ | | ■ | | | | ■ | ■ | | ■ | | ■ | |
| R13 | | ■ | | ■ | | | | ■ | ■ | | ■ | | ■ | |
| R14 | | ■ | | ■ | | | | ■ | ■ | | ■ | | ■ | |
| R15 | | ■ | | ■ | | | | ■ | ■ | | ■ | | ■ | |
| R16 | | ■ | | ■ | | | | ■ | ■ | | ■ | | ■ | |
| R17 | | ■ | | ■ | | | | ■ | ■ | | ■ | | ■ | |
| KEY | ■ THERMOCOUPLES INSTALLED AT THESE POSITIONS | | | | | | | | | | | | | |

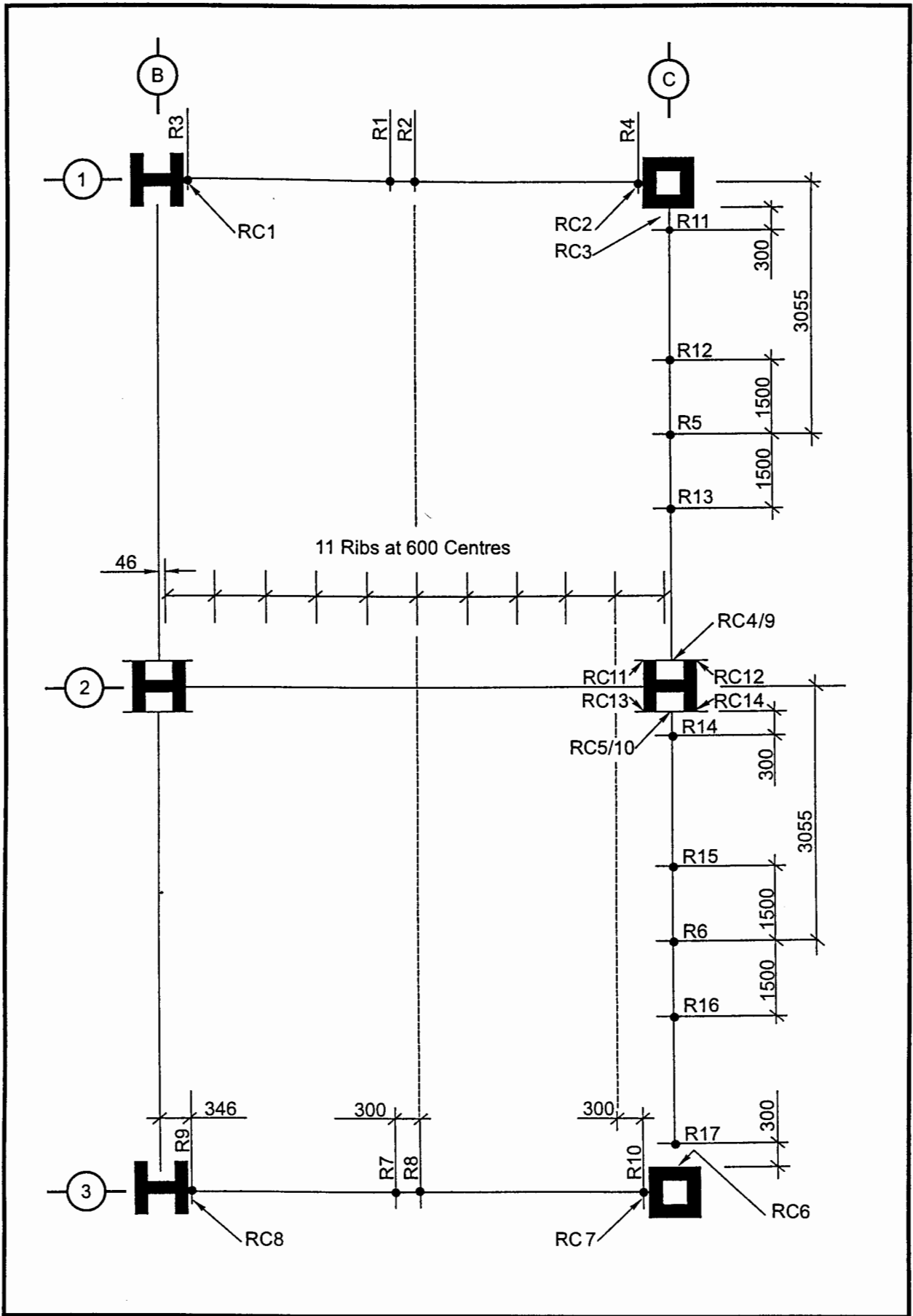


Fig. 1

Location of Thermocouples for RHS Edge Beams and Beam to Column Connections

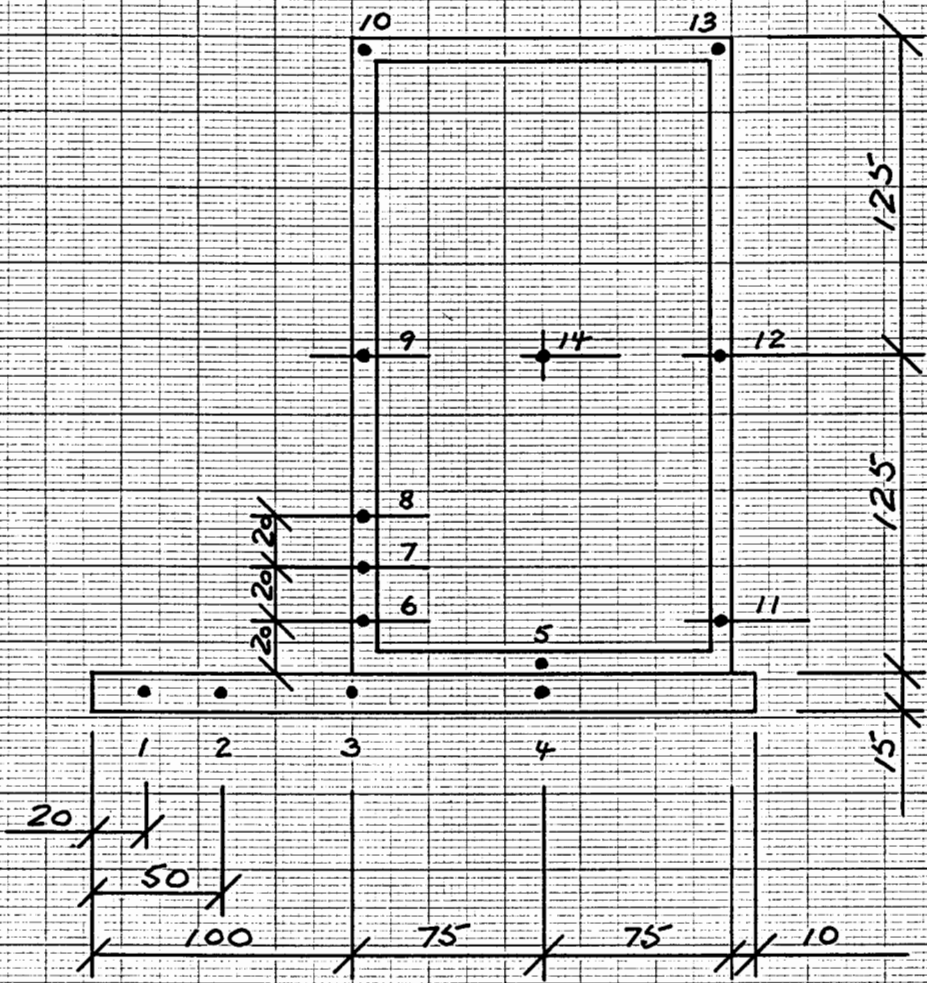


Fig. 2

Location and Identification of Thermocouples on the Cross Section of the RHS Edge Beams

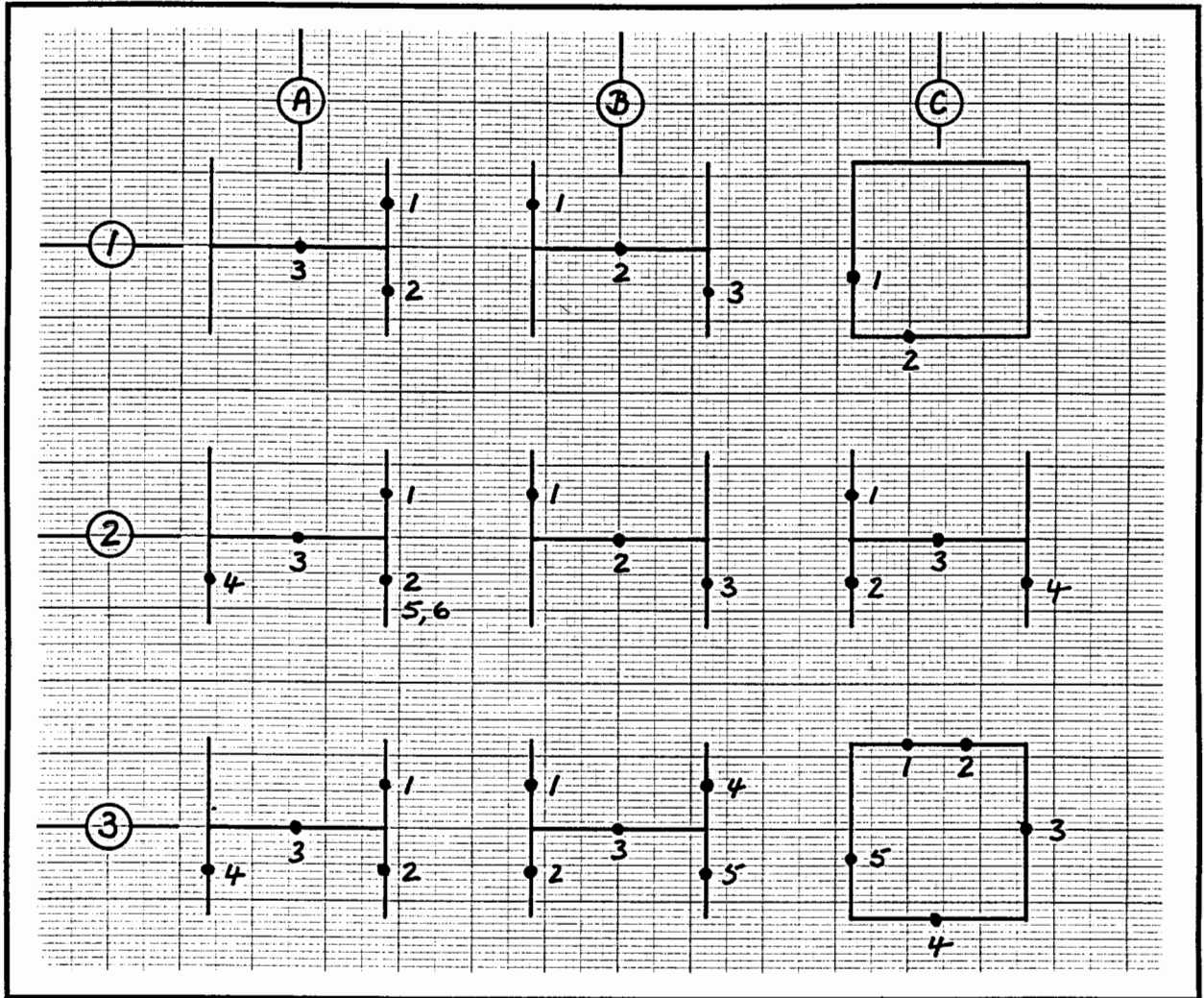


Fig. 3

Location and Identification of Thermocouples on the Cross Section of the UC and RHS Columns

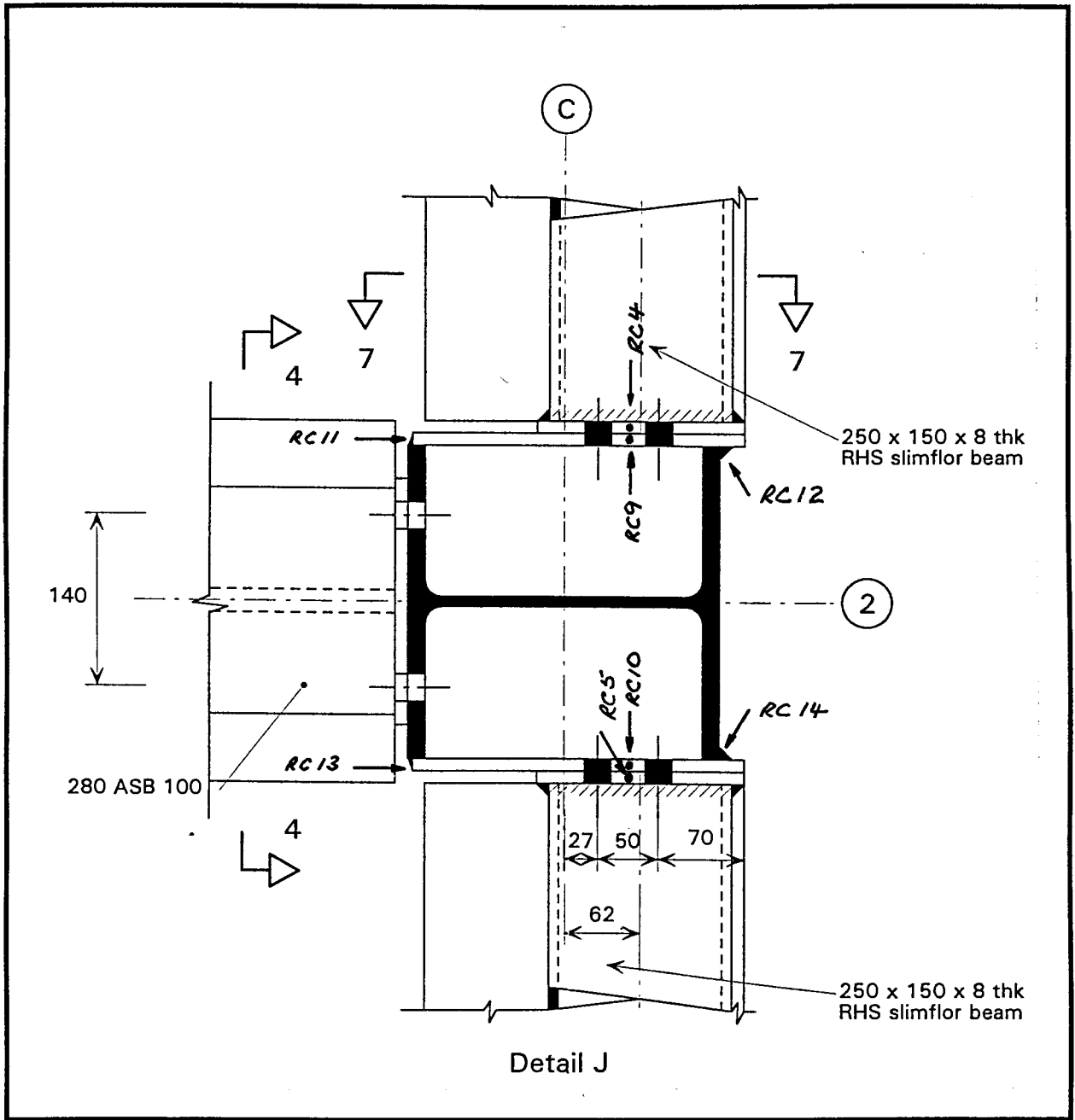


Fig. 4 Location and Identification of Thermocouples Around Column C2

APPENDIX 1

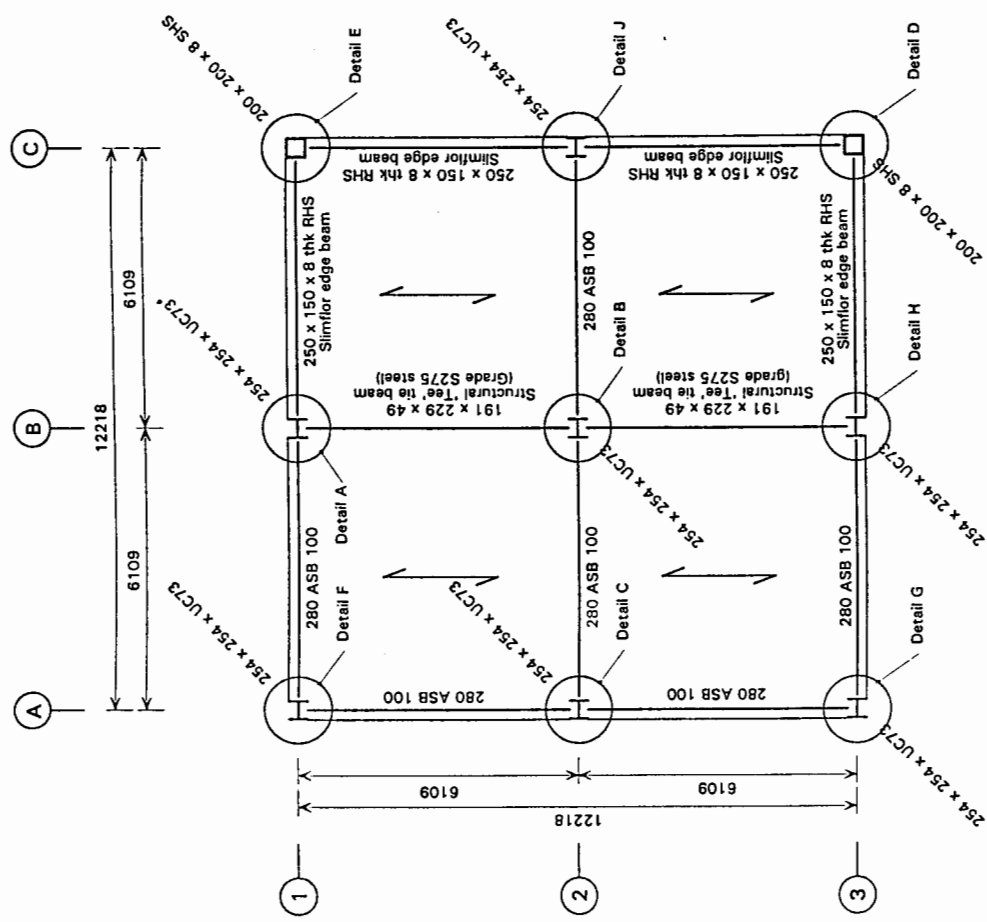
STEEL CONSTRUCTION INSTITUTE DRAWINGS

BCF791/1/01 -- BCF791/1/09

(Reproduced with their permission)

Notes

1. All dimensions in mm
2. Do not scale from this drawing. Work only to figured dimensions.
3. The contractor is to verify all dimensions on site prior to commencing the work.
4. All errors and omissions to be reported to the engineer.
5. All structural sections to be BSEN10025 S355, unless otherwise noted.
6. All structural hollow sections to be BSEN10210 S355J2H unless noted otherwise.
7. All welds to be 6 mm fillet welds and constructed using grade E43 electrodes in accordance with BS 639
8. All bolts to be 60 mm long fully threaded M20 grade 8.8 in accordance with BS 3692, unless noted otherwise.
9. All structural concrete to be grade C30 NWC in accordance with BS 8110
10. All reinforcement bars to be grade 460 in accordance with BS 4449
11. Abbreviations:
 SSL - Structural Slab Level
 UC - Universal Column
 RHS - Rectangular Hollow Section
 ASB - Asymmetric Slimflor Beam
 NWC - Normal Weight Concrete
12. \swarrow indicates span of 295 deep composite slab cast on top of SD225 deck by PMF
13. For details refer to drawing numbers BCF791/1/02 & 03
14. Fabrication drawings to be sent for approval by the engineer.



| | | |
|---|----------|--|
| B | 27/01/98 | Issued for construction |
| A | 19/11/97 | Columns on C1 & C3chg'd, & general notes amended |
| | | Preliminary |

The copyright of this drawing is the property of The Steel Construction Institute and it must not be reproduced in whole or part without written consent

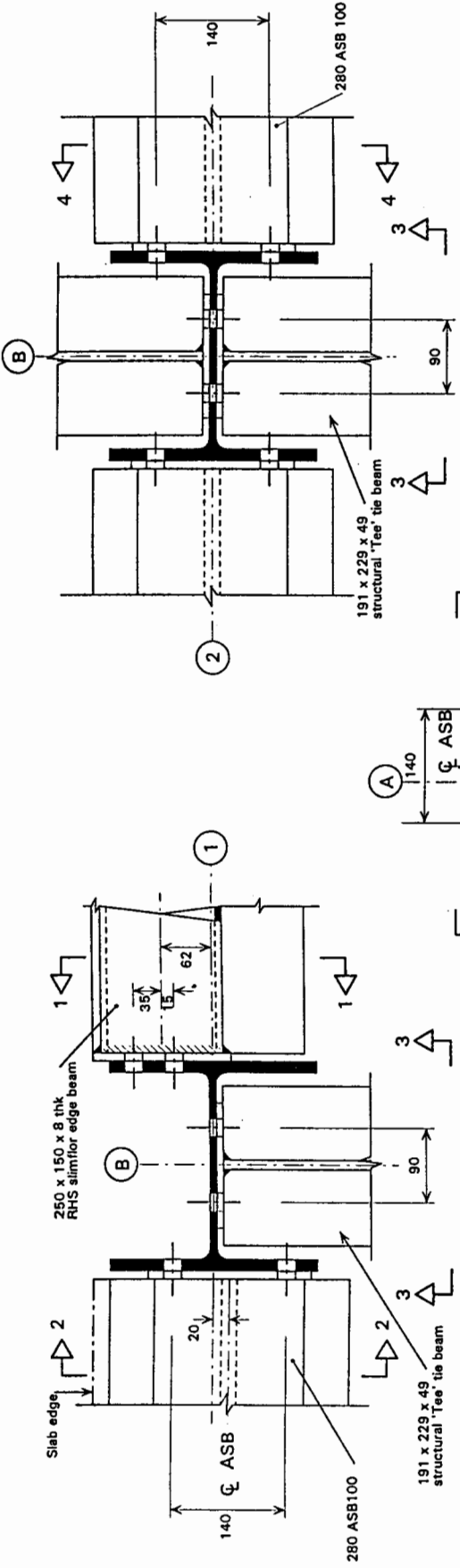
Drawn by **FMS** Scale: 1:100 Date 24/10/97
 Checked by **SJH**
 Approved **JWR**

BCF791/1/01

**Natural Fire Slimdek Test
 General Arrangement**

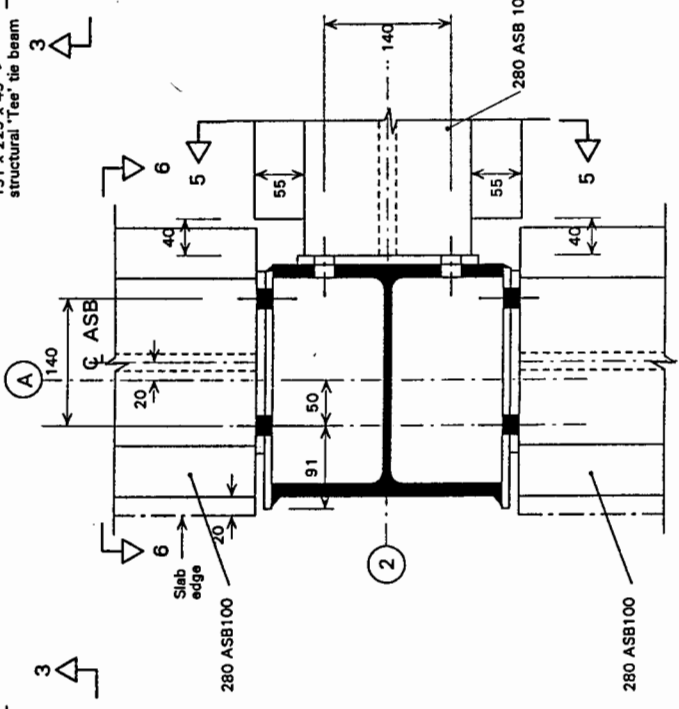
The Steel Construction Institute
 Silkwood Park Ascot Berks SL5 7QN
 Tel (01344) 623345 Fax (01344) 622944





Detail A
(Detail H similar but handed)

Detail B



Detail C

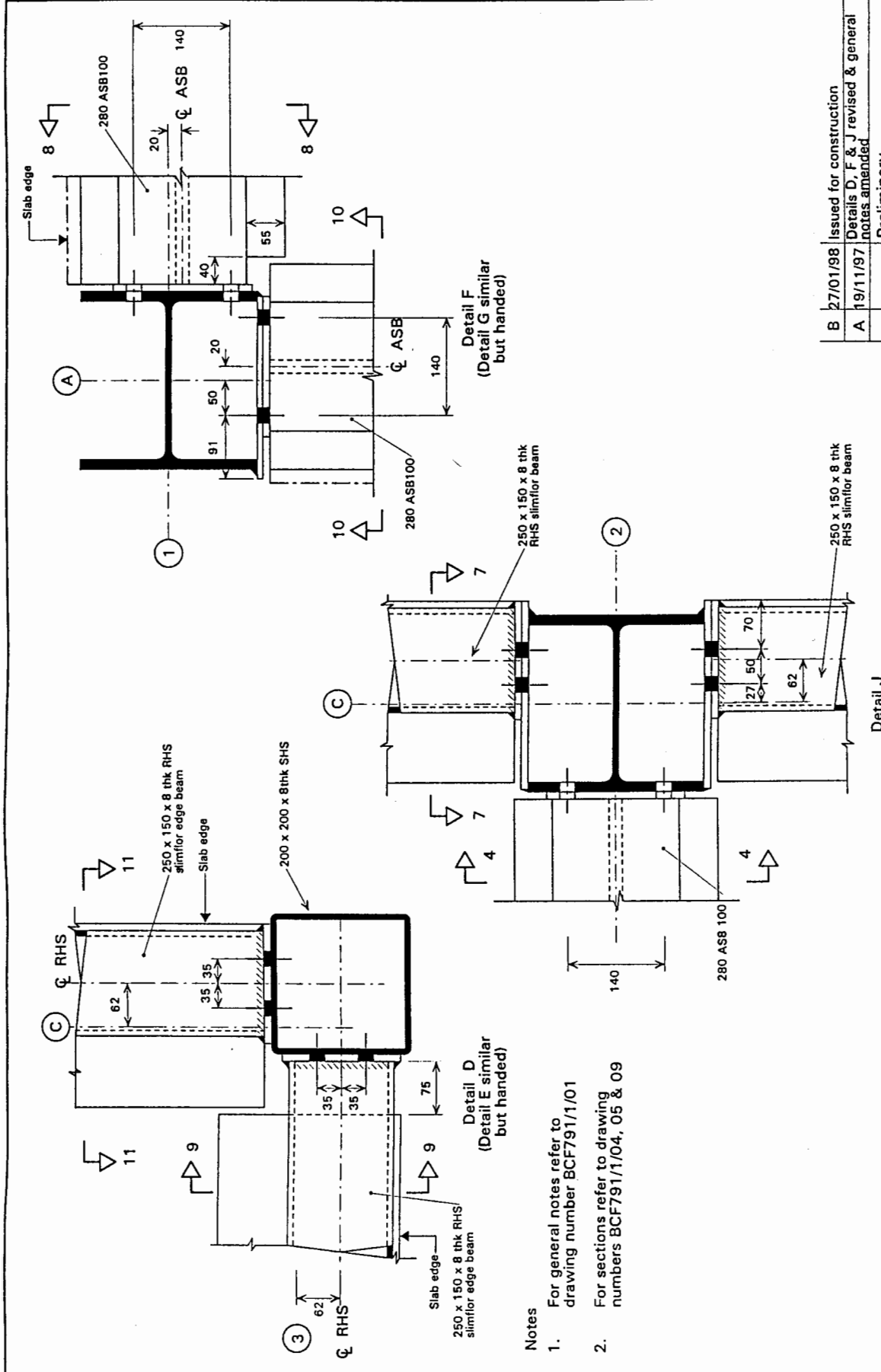
- Notes
1. For general notes refer to drawing number BCF791/1/01
 2. For sections refer to drawing numbers BCF791/1/04, 05 & 09

| | | |
|-------------|----------|----------------------------------|
| B | 27/01/98 | Issued for construction |
| A | 19/11/97 | Detail C revised & notes amended |
| Preliminary | | |
| Drawn by | FMS | Scale |
| Checked by | SJH | Date 24/10/97 |
| Approved | JWR | BCF791/1/02 |

The copyright of this drawing is the property of The Steel Construction Institute and it must not be reproduced in whole or part without written consent

The Steel Construction Institute
 Silkwood Park Ascot Berks SL5 7QN
 Tel (0)344 623345 Fax (0)344 622944

Title
Natural Fire Slimdek Test Details (Sheet 1 of 2)



Notes

- For general notes refer to drawing number BCF791/1/01
- For sections refer to drawing numbers BCF791/1/04, 05 & 09

Detail F
(Detail G similar but handed)

Detail J

Detail A

Detail B

Detail C

Detail D

Detail E

Detail G

Detail H

Detail I

Detail J

Detail K

Detail L

Detail M

Detail N

Detail O

Detail P

Detail Q

Detail R

Detail S

Detail T

Detail U

Detail V

Detail W

Detail X

Detail Y

Detail Z

Detail AA

Detail AB

Detail AC

Detail AD

Detail AE

Detail AF

Detail AG

Detail AH

Detail AI

Detail AJ

Detail AK

Detail AL

Detail AM

Detail AN

Detail AO

Detail AP

Detail AQ

Detail AR

Detail AS

Detail AT

Detail AU

Detail AV

Detail AW

Detail AX

Detail AY

Detail AZ

Detail BA

Detail BB

Detail BC

Detail BD

Detail BE

Detail BF

Detail BG

Detail BH

Detail BI

Detail BJ

Detail BK

Detail BL

Detail BM

Detail BN

Detail BO

Detail BP

Detail BQ

Detail BR

Detail BS

Detail BT

Detail BU

Detail BV

Detail BW

Detail BX

Detail BY

Detail BZ

Detail CA

Detail CB

Detail CC

Detail CD

Detail CE

Detail CF

Detail CG

Detail CH

Detail CI

Detail CJ

Detail CK

Detail CL

Detail CM

Detail CN

Detail CO

Detail CP

Detail CQ

Detail CR

Detail CS

Detail CT

Detail CU

Detail CV

Detail CW

Detail CX

Detail CY

Detail CZ

Detail DA

Detail DB

Detail DC

Detail DD

Detail DE

Detail DF

Detail DG

Detail DH

Detail DI

Detail DJ

Detail DK

Detail DL

Detail DM

Detail DN

Detail DO

Detail DP

Detail DQ

Detail DR

Detail DS

Detail DT

Detail DU

Detail DV

Detail DW

Detail DX

Detail DY

Detail DZ

Detail EA

Detail EB

Detail EC

Detail ED

Detail EE

Detail EF

Detail EG

Detail EH

Detail EI

Detail EJ

Detail EK

Detail EL

Detail EM

Detail EN

Detail EO

Detail EP

Detail EQ

Detail ER

Detail ES

Detail ET

Detail EU

Detail EV

Detail EW

Detail EX

Detail EY

Detail EZ

Detail FA

Detail FB

Detail FC

Detail FD

Detail FE

Detail FF

Detail FG

Detail FH

Detail FI

Detail FJ

Detail FK

Detail FL

Detail FM

Detail FN

Detail FO

Detail FP

Detail FQ

Detail FR

Detail FS

Detail FT

Detail FU

Detail FV

Detail FW

Detail FX

Detail FY

Detail FZ

Detail GA

Detail GB

Detail GC

Detail GD

Detail GE

Detail GF

Detail GG

Detail GH

Detail GI

Detail GJ

Detail GK

Detail GL

Detail GM

Detail GN

Detail GO

Detail GP

Detail GQ

Detail GR

Detail GS

Detail GT

Detail GU

Detail GV

Detail GW

Detail GX

Detail GY

Detail GZ

Detail HA

Detail HB

Detail HC

Detail HD

Detail HE

Detail HF

Detail HG

Detail HH

Detail HI

Detail HJ

Detail HK

Detail HL

Detail HM

Detail HN

Detail HO

Detail HP

Detail HQ

Detail HR

Detail HS

Detail HT

Detail HU

Detail HV

Detail HW

Detail HX

Detail HY

Detail HZ

Detail IA

Detail IB

Detail IC

Detail ID

Detail IE

Detail IF

Detail IG

Detail IH

Detail II

Detail IJ

Detail IK

Detail IL

Detail IM

Detail IN

Detail IO

Detail IP

Detail IQ

Detail IR

Detail IS

Detail IT

Detail IU

Detail IV

Detail IW

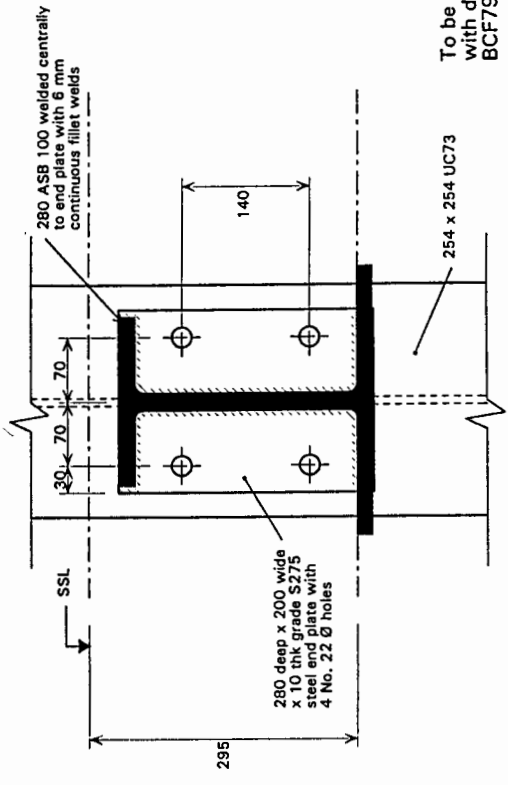
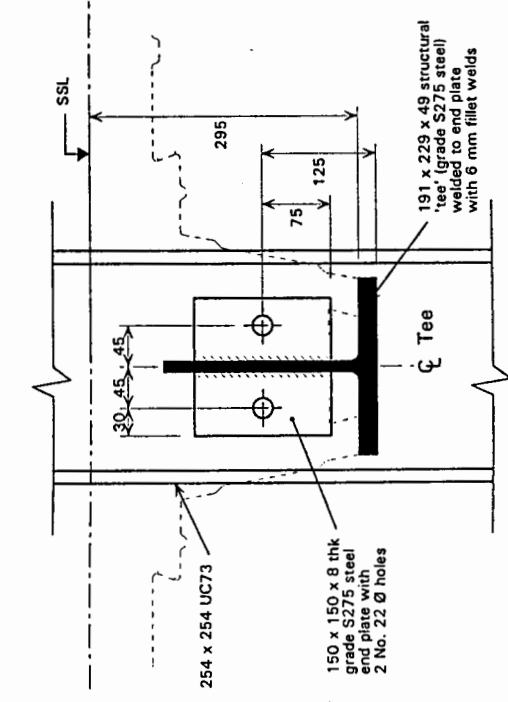
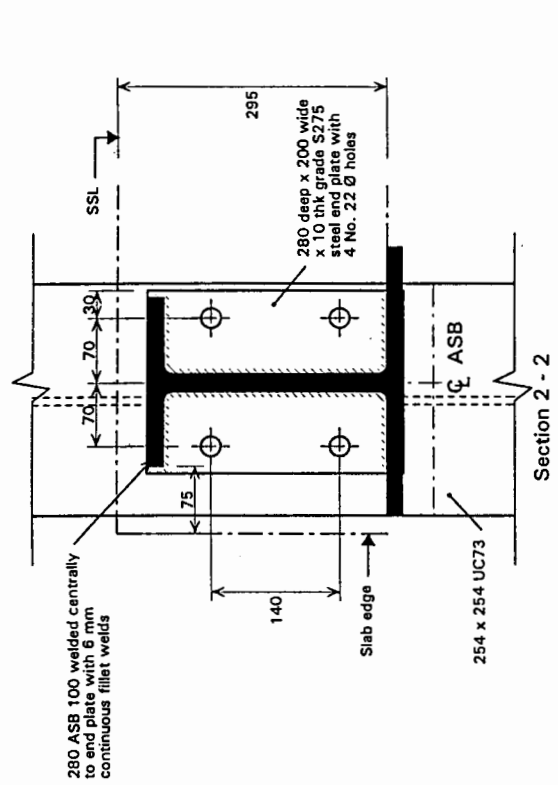
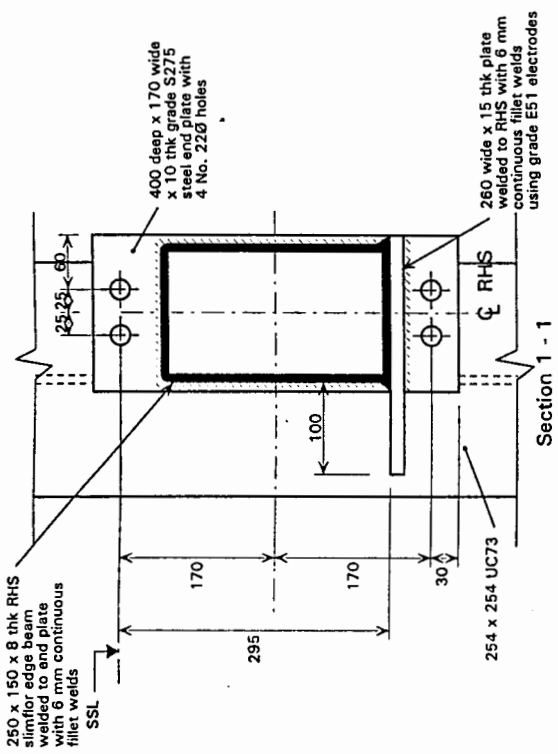
Detail IX

Detail IY

Detail IZ

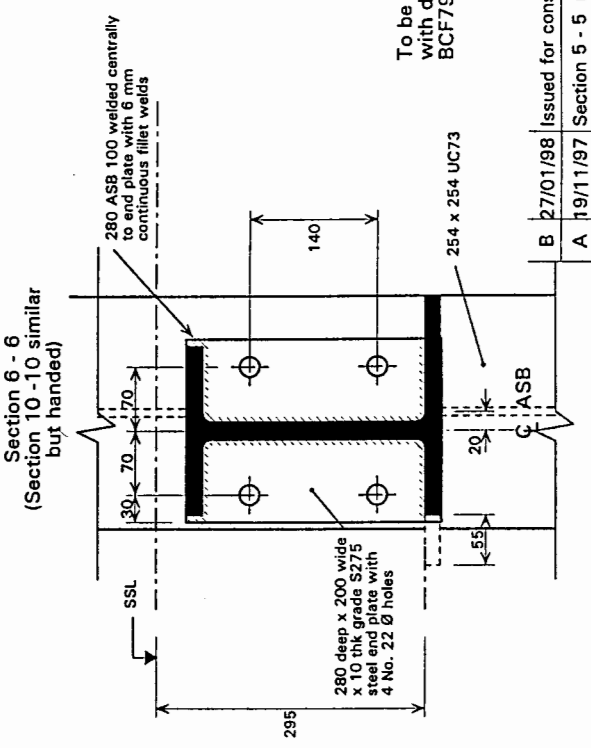
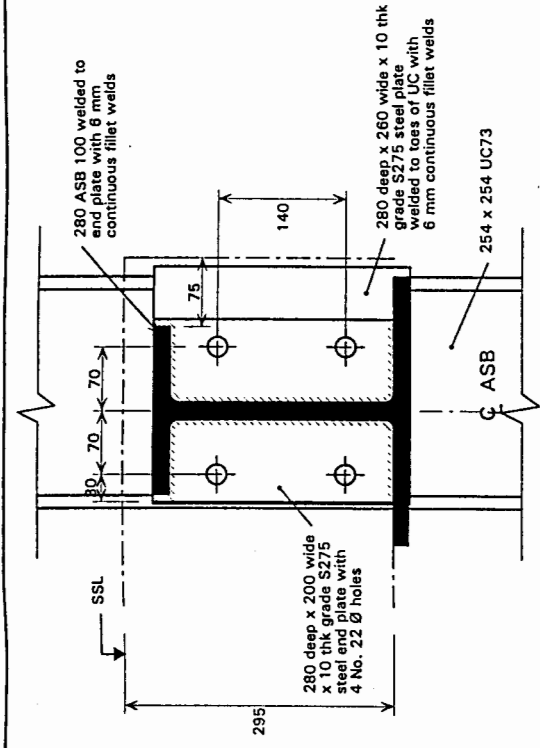
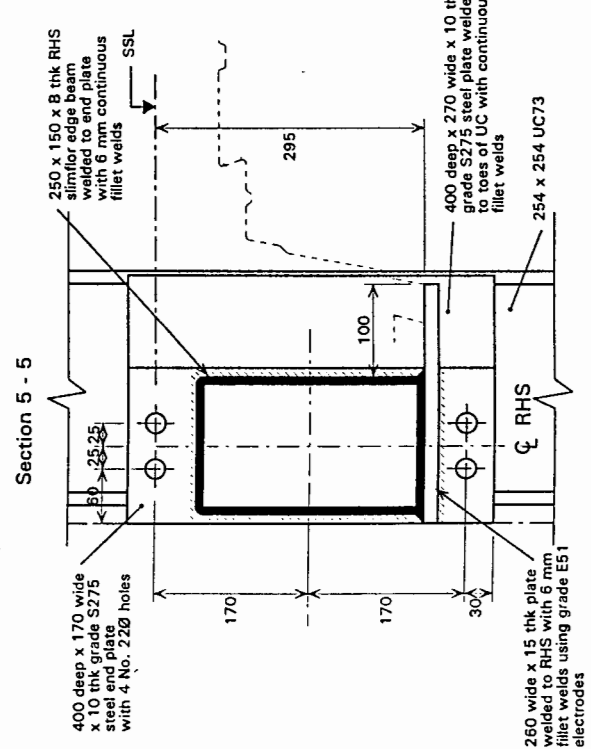
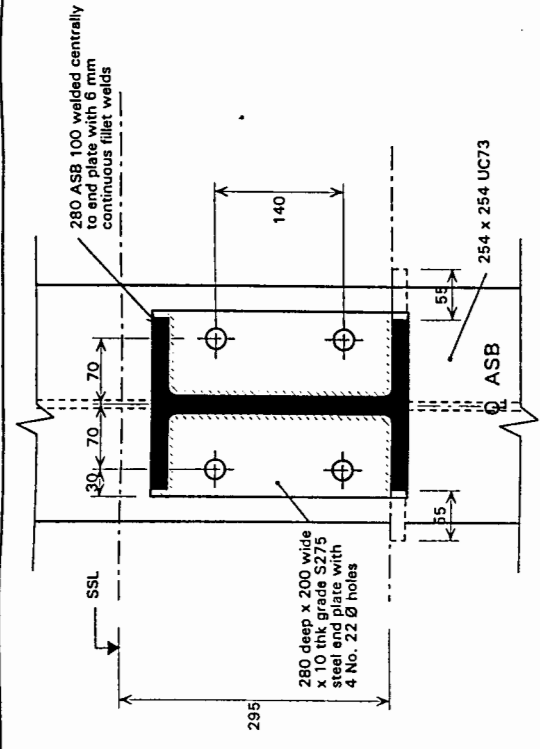
Detail JA

Detail JB



To be read in conjunction
with drawings
BCF791/1/02 & 03

| | | | |
|---|-----|---------------------------|----------|
| A 27/01/98 | | Issued for construction | |
| Preliminary | | Preliminary | |
| Drawn by | FMS | Scale | 1:5 |
| Checked by | SJH | Date | 24/10/97 |
| Approved | JWR | BCF791/1/04 | |
| <p>The copyright of this drawing is the property of The Steel Construction Institute and it must not be reproduced in whole or part without written consent</p> | | | |
| The Steel Construction Institute | | Natural Fire Slimdek Test | |
| Silwood Park Ascot Berks SL5 7QN | | Sections (Sheet 1 of 3) | |
| Tel (01344) 623345 Fax (01344) 622944 | | Title | |



To be read in conjunction with drawings BCF791/1/02 & 03

| | | | | | | |
|---|----------|-------------------------|-------------|-----|-------------|----------|
| B | 27/01/98 | Issued for construction | Scale | 1:5 | Date | 24/10/97 |
| A | 19/11/97 | Section 5 - 5 revised | Drawn by | FMS | Checked by | SJH |
| | | | Approved | JWR | BCF791/1/05 | |
| | | | Preliminary | | | |

The copyright of this drawing is the property of The Steel Construction Institute and it must not be reproduced in whole or part without written consent

Natural Fire Slimdek Test Sections (Sheet 2 of 3)

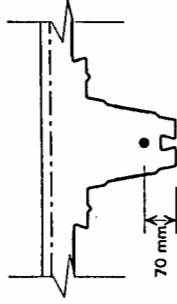


The Steel Construction Institute
 Silwood Park Ascot Berks SL5 7DN
 Tel (01344) 623345 Fax (01344) 622944

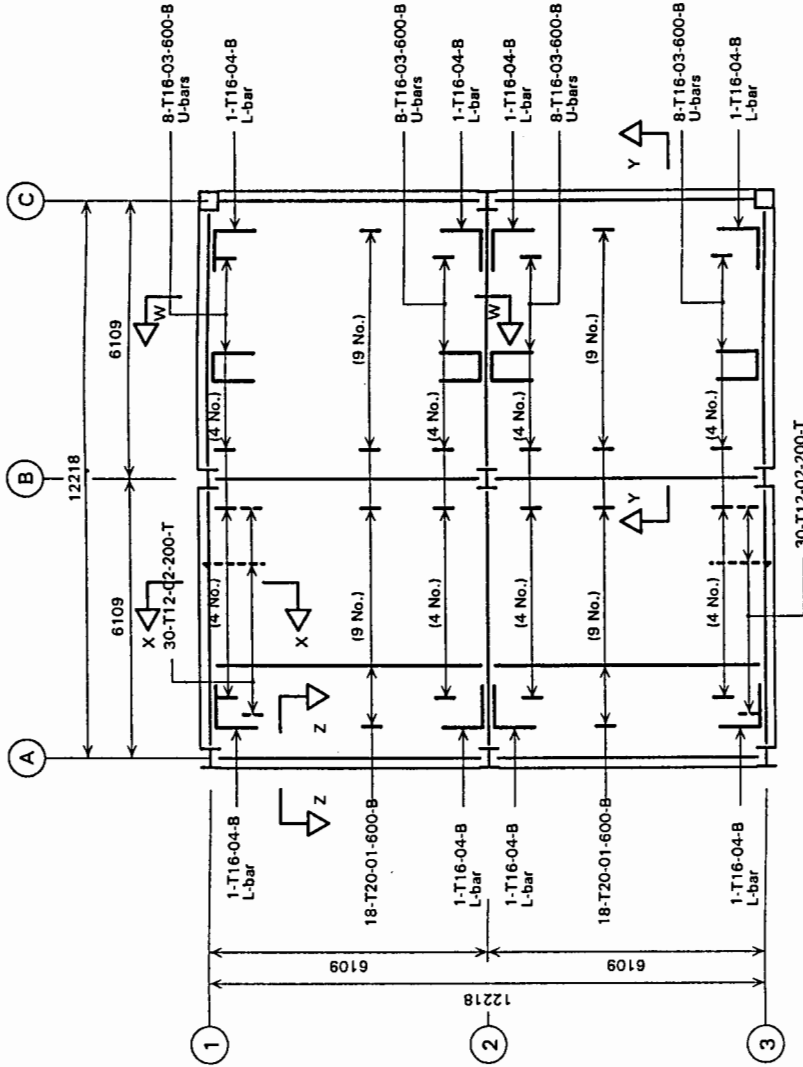
Notes

1. For general notes refer to drawing number BCF791/1/01
2. This drawing is to be read in conjunction with bar bending schedule number 791/01
3. For sections and general arrangement of the fabric reinforcement refer to drawing number BCF/1/07

Cover:
T = 20 mm
End = 20 mm



Typical axis distance
for bar mark 01



Plan - Main Reinforcement Bars

| | | | | |
|---|------------|---|-------------|---------------|
| B | 27/01/98 | Issued for construction | Scale 1:100 | Date 24/10/97 |
| A | 19/11/97 | Reinforcement between B1 & C3 revised, & general amendments | | |
| | | Preliminary | | |
| | Drawn by | FMS | | |
| | Checked by | SJH | | |
| | Approved | CGB | | |

The copyright of this drawing is the property of The Steel Construction Institute and it must not be reproduced in whole or part without written consent

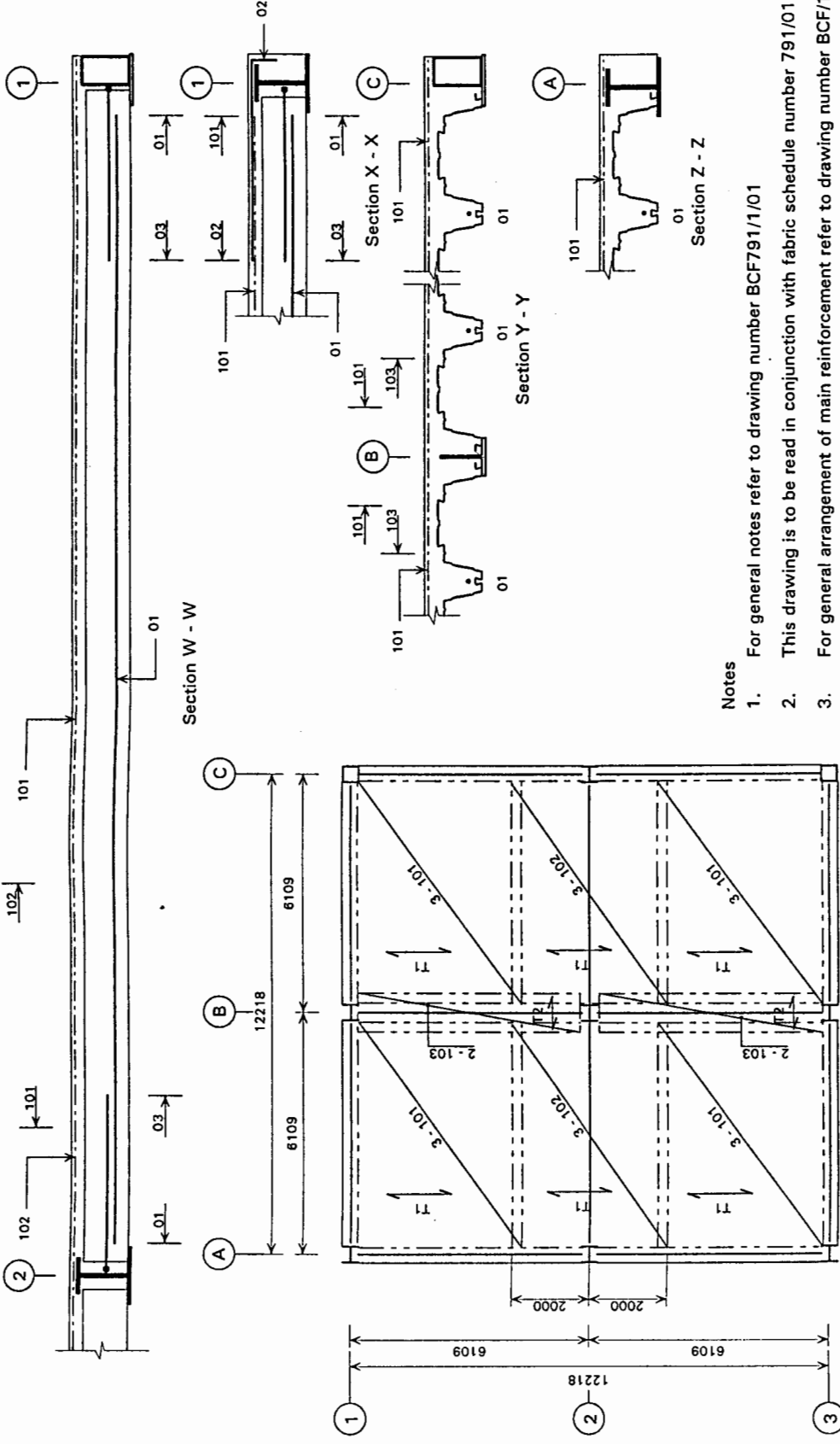
Title



The Steel Construction Institute
Silwood Park Ascot Berks SL5 7QN
Tel (01344) 623345 Fax (01344) 622944

Natural Fire Slimdek Test
Reinforcement General Arrangement

BCF791/1/06



- Notes**
1. For general notes refer to drawing number BCF791/1/01
 2. This drawing is to be read in conjunction with fabric schedule number 791/01
 3. For general arrangement of main reinforcement refer to drawing number BCF/1/06

Cover:
 T1 = 20 mm
 T2 = 26 mm
 Minimum mesh lap = 250 mm

Plan - Top fabric

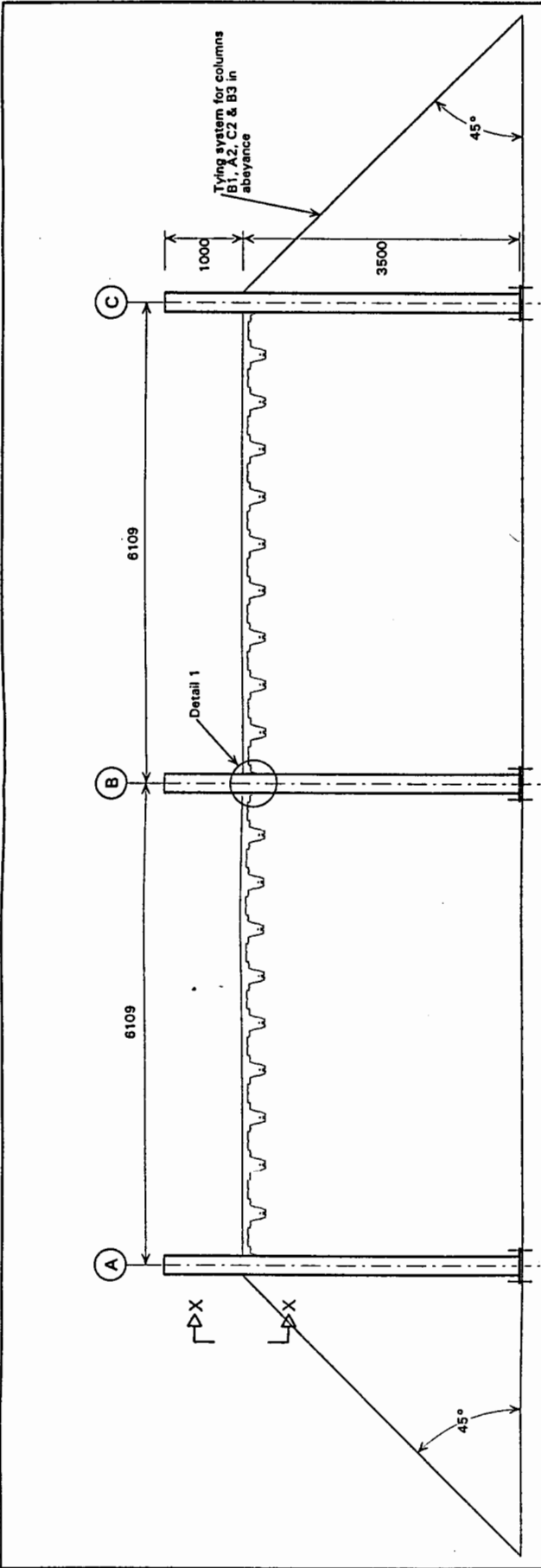
| | | | | | | | |
|---|----------|---|------------|-----|-------|------|-------------|
| B | 27/01/98 | Issued for construction | Drawn by | FMS | Scale | Date | 24/10/97 |
| A | 19/11/97 | Mesh layout between B1 & C3 revised, sections amended | Checked by | SJH | | | BCF791/1/07 |
| | | | Approved | CGB | | | |

The copyright of this drawing is the property of The Steel Construction Institute and it must not be reproduced in whole or part without written consent

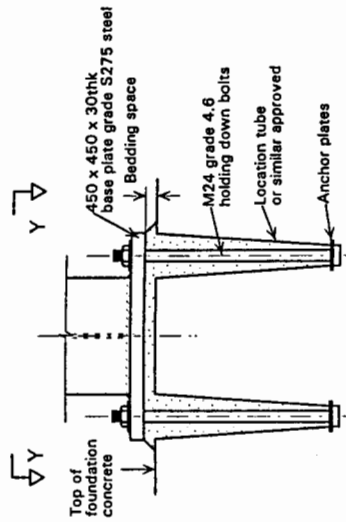
Natural Fire Slimdek Test
Fabric General Arrangement & Sections



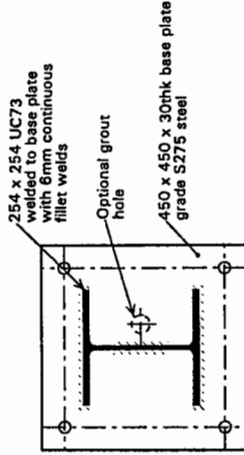
The Steel Construction Institute
 Silwood Park Ascot Berks SL5 7QN
 Tel (0344) 623345 Fax (0344) 622944



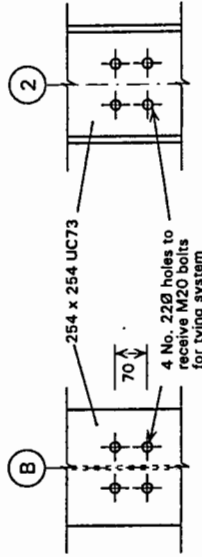
Elevation along grid line 3



Section Y - Y



Section X - X
(Bolt arrangement similar for column C2)



Detail 1
(Bolt arrangement similar for column B1)

Typical column base detail

B 27/01/98 Issued for construction

| | | |
|--------------|----------------|-----------------|
| Preliminary | Scale | Date 24/10/97 |
| Drawn by FMS | Checked by SJH | Approved by GMN |
| BCF791/11/08 | | |

The copyright of this drawing is the property of The Steel Construction Institute and it must not be reproduced in whole or part without written consent

Natural Fire Slimdek Test Typical Base Plate & Tying Details

Title



The Steel Construction Institute
Silwood Park Ascot Berks SL5 7QN
Tel (0344) 623345 Fax (0344) 622944

To be read in conjunction
with drawings
BCF791/1/02 & 03

| | | | | | |
|------------|----------|-------------------------|-------------|------|----------|
| B | 27/01/98 | Issued for construction | Preliminary | | |
| Drawn by | FMS | Scale | 1:5 | Date | 24/10/97 |
| Checked by | SJH | BCF791/1/09 | | | |
| Approved | JWR | | | | |

The copyright of this drawing is the property of The Steel Construction Institute and it must not be reproduced in whole or part without written consent

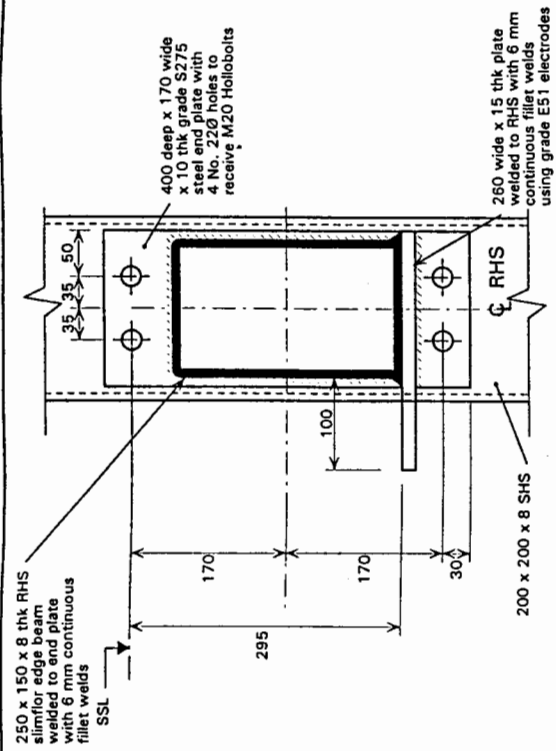
Natural Fire Slimdek Test Sections (Sheet 3 of 3)

Title



The Steel Construction Institute
Silwood Park Ascot Berks SL5 7QN
Tel (01344) 623345 Fax (01344) 622944

P:\BCF791\10000001.dwg 24/10/97



Section 9 - 9
(Section 11 - 11 similar
but handed)