

RLR-MSC-10-1XX-T-RM-0001\_P03

## Reading Civic Centre; Library Relocation

### Cartwheel boys restoration – Feasibility & Schedule of works

#### INTRODUCTION

As part of the Reading Council civic centre refurbishment and extension to relocate the central library within, it is proposed to restore the cartwheel boys sculpture and affix to the South elevation of the newly formed entrance foyer extension to the civic centre building. This document outlines the methodology to restore the cartwheel boys sculpture in relation to planning permission ref 231495 condition 4.

#### PLANNING CONDITION

*No commencement of works beyond foundation level shall take place until a feasibility study including a schedule of works as appropriate for the installation of the 'Cartwheeling Boys' sculpture or other decorative artwork has been submitted to and approved in writing by the Local Planning Authority. The feasibility study shall include full materials details, a detailed schedule of works and a timetable for installation of the artwork proposed. The artwork shall then be in provided in accordance with the approved feasibility study, including the timetable for installation.*

*REASON: as the precise details of this aspect of the proposal are not available at the time of determination and to ensure that this element of the south elevation of the extension is completed to provide high quality design that maintains and enhances the appearance of this area of Reading, in accordance with Policy CC7 (Design and the Public Realm) of the Reading Borough Local Plan (2019).*

#### BACKGROUND

In February 2022, the *Cartwheeling Boys* sculpture was destroyed during Storm Eunice. The pieces of the *Cartwheeling Boys* have been stored and the Council is committed to repairing them and restoring them as part of the new Civic Offices and Central Library. The *Boys* are incomplete and require repair and relocating to their new permanent home. The sculpture is currently being stored at the Bennet Road dept in Reading, ready for the restoration process to commence.



Fig.1 above: Photo of former cartwheel boys, prior to storm damage in February 2022



Fig.2 above: Photo of cartwheel boys stored at Bennet Road site, taken July 2024

**ORGANISATIONS INVOLVED**

|                            |                                         |
|----------------------------|-----------------------------------------|
| <b>Employer</b>            | Reading Borough Council Arts Department |
| <b>Sculping designer</b>   | Affable Design Company                  |
| <b>Foundry</b>             | AB Fine Art                             |
| <b>Main Contractor</b>     | Morgan Sindall Construction             |
| <b>Structural Engineer</b> | Glanville Consulting                    |

**PROPOSAL**

The current proposal is to affix the cartwheeling boys sculpture onto the Southern wall of the new entrance foyer extension to the civic centre building. The sculpture shall sit off the wall cladding by approximately 15mm. A recess in the external wall cladding is proposed, with a projecting plinth for the sculpture to visually sit upon. Architectural linear lighting is to be provided to the top of the wall recess to provide a subtle downwash of light onto the sculpture.

Two metal plaques will be provided, as per the original sculpture installation. Furthermore, the Dusseldorf Association have requested an additional interpretation board be provided to explain the installation of the Cartwheeling Boys sculpture within the new Civic Office space

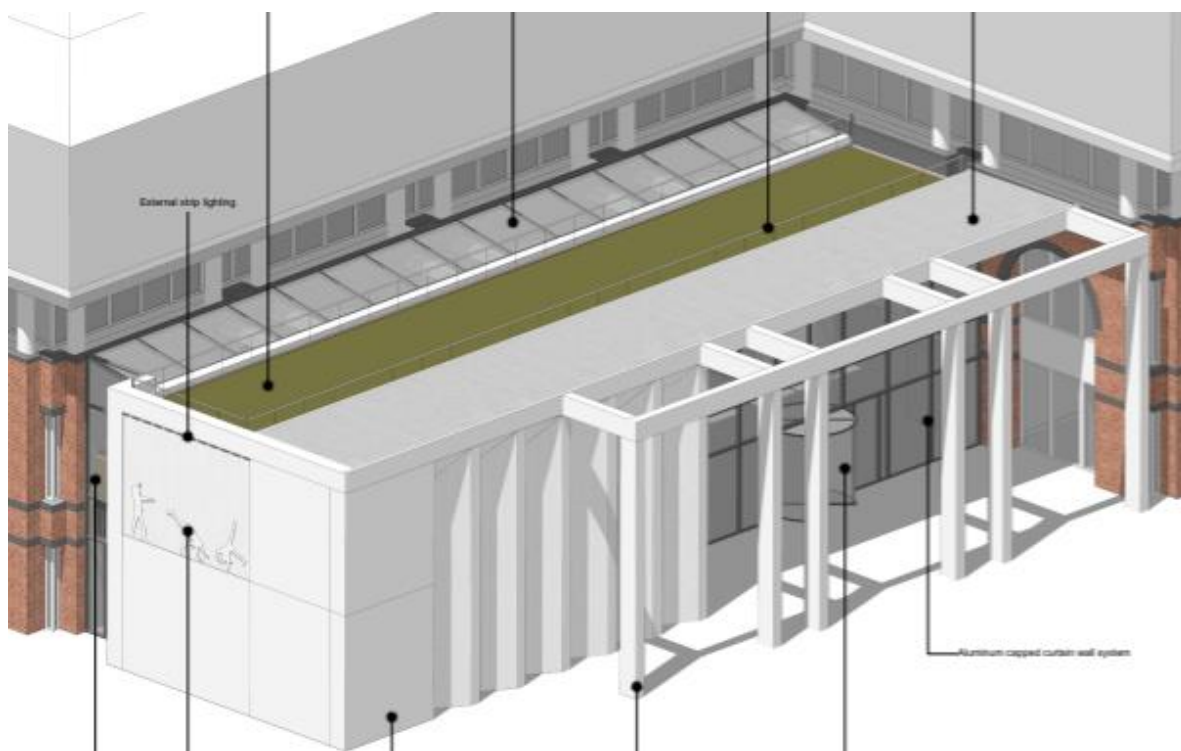


Fig.3 above – early CGI of the extension and location of sculpture to South elevation

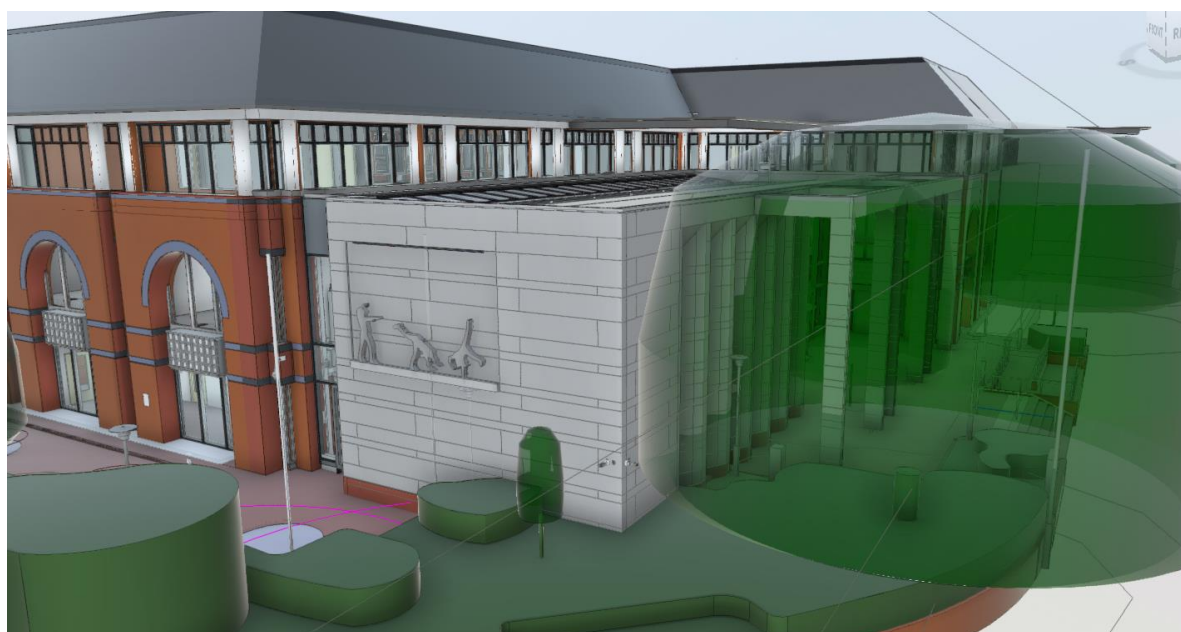


Fig.4 above – developed technical design model of the sculpture location within external wall.

## SUMMARY WORK STAGES

Phase 1A - Digitally scan and process the data of the remaining sculpture parts

Phase 1B- Digitally sculpt and render missing parts of the sculpture

Phase 1C - Physically output broken parts of the sculpture for supply to the foundry

Phase 2A – Recasting missing sections

Phase 2B – Repair & jointing

Phase 2C – Surface treatment

Phase 3A – Delivery to civic centre building

Phase 3B - installation

## DETAILED METHOD STATEMENT

### Phase 1A Digital Scan

Digitally scanning the remaining parts of the sculpture will involve visiting the sculpture at the foundry with an Artec scanner. The remaining parts of the sculpture need to be accessible in a large, evenly lit space and all sides/angles of the parts must be viewable

Following the digital capture of the information, the scans will need to be processed using Artec's Artec Studio software. This will take several days and may necessitate a return visit to capture more information if the fidelity of the data is unsatisfactory.

### Phase 1B Digital Sculpt

Once the data has been processed it is taken into the ZBrush software and the missing elements of the sculpture are recreated using as much photographic reference of the original sculpture (prior to damage) as possible.

When the missing elements have been created, visual renders of the repaired sculpture will be generated for approval by the project stakeholders. At this stage detailed information can be passed to the foundry that will provide information such as the volume of the missing parts and the exact dimensions of the missing parts. Furthermore, the sculpture outline is also to be provided to Morgan Sindall at this stage for the final design coordination of the box frame support to be undertaken.

### Phase 1C Physical Moulding

When all parties are satisfied with the new elements, the digital information can be turned into physical parts for the foundry by forming poly patterns using 3D printing or CNC machined as appropriate.

### Phase 2A Recasting Missing Sections

AB Fine Art will undertake the recasting of the missing sections using the lost wax method of casting. Newly carved poly patterns for the missing sections are to be provided to AB Fine Art. All sections to be cast in Aluminium Alloy Ingot LM26 to match existing. Any welding will make use of high quality 4043 Aluminium TIG rods which colour match to the LM26 castings. The alloy is also less sensitive to weld cracking and produces brighter, almost smut-free welds.

## Phase 2B Repair and Joining

The missing sections will be cast, finished, welded to the original sections, then chased to eliminate any evidence of the process.

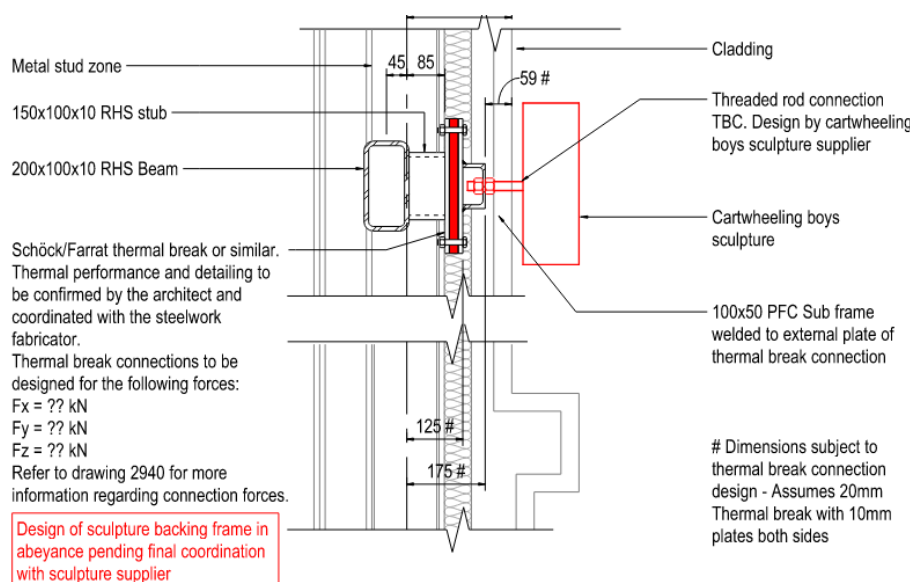
## Phase 2C Surface Treatment

Once assembled and complete, the surface will be lightly blasted to uniform the finish. Upon completion, the surface will be sealed with a clear microcrystalline wax such as Renaissance Wax.

## Phase 2D Fixing brackets

Morgan Sindall and the structural engineer, Glanville Consulting, shall be responsible for the design of the fixing brackets back to the primary structural frame of the new civic centre extension. It is proposed the fixing bracket be in the form of a hot-rolled steel stub-beam affixed to the primary structural frame. The steel stub-beams will project through the external wall lining into the cladding support zone, behind the cladding panels.

A rectangular steel box frame shall be fabricated by Morgan Sindall and delivered to AB Fine Art. AB Fine Art shall affix the refurbished sculptures onto the box frame with stainless steel rods. Isolating pads will be used to protect against bio-metallic corrosion as required. Refer to proposed fixing drawings in Appendix B



## DETAIL 19 - TYPICAL BACKING FRAME SUPPORT FOR SCULPTURE

1 : 10

Fig.5 above – Intent structural fixing section detail

## Phase 3A Delivery to site

AB Fine Art shall organise for the refurbished sculpture, mounted onto the box frame, to be transported back to the Reading civic centre site ready for installation.

## Phase 3B installation

Mtec, appointed by AB Fine Art, shall install the sculpture on site. The sculpture, mounted onto the box frame, shall be lifted into position, with the box frame being affixed to the projecting stub columns. Lifting will be via lorry loader or crane by Mtec, exact methodology to be determined following site visit once the new extension steelwork has been erected.

Following installation of the sculptures, the wall cladding installation can be completed by Morgan Sindall to conceal the box frame substructure.

## PROGRAMME OF WORKS

Approximate timescales for each of the processes involve the following:

- Digital scan – 1-2 weeks
- Digital sculpt – 2-3 weeks
- Mould Making – 1-2 weeks
- Wax & Spruing – 1-2 weeks
- Shelling & Casting – 3 weeks
- Finishing, Blasting & Waxing – 5-8 weeks
- Installation – 1 week

The anticipated programme is for the design stage to commence in October 2024 the refurbishment December 2024 and the sculpture will be installed on the civic centre new extension wall by December 2025, prior to occupation of the wider civic centre library relocation development.

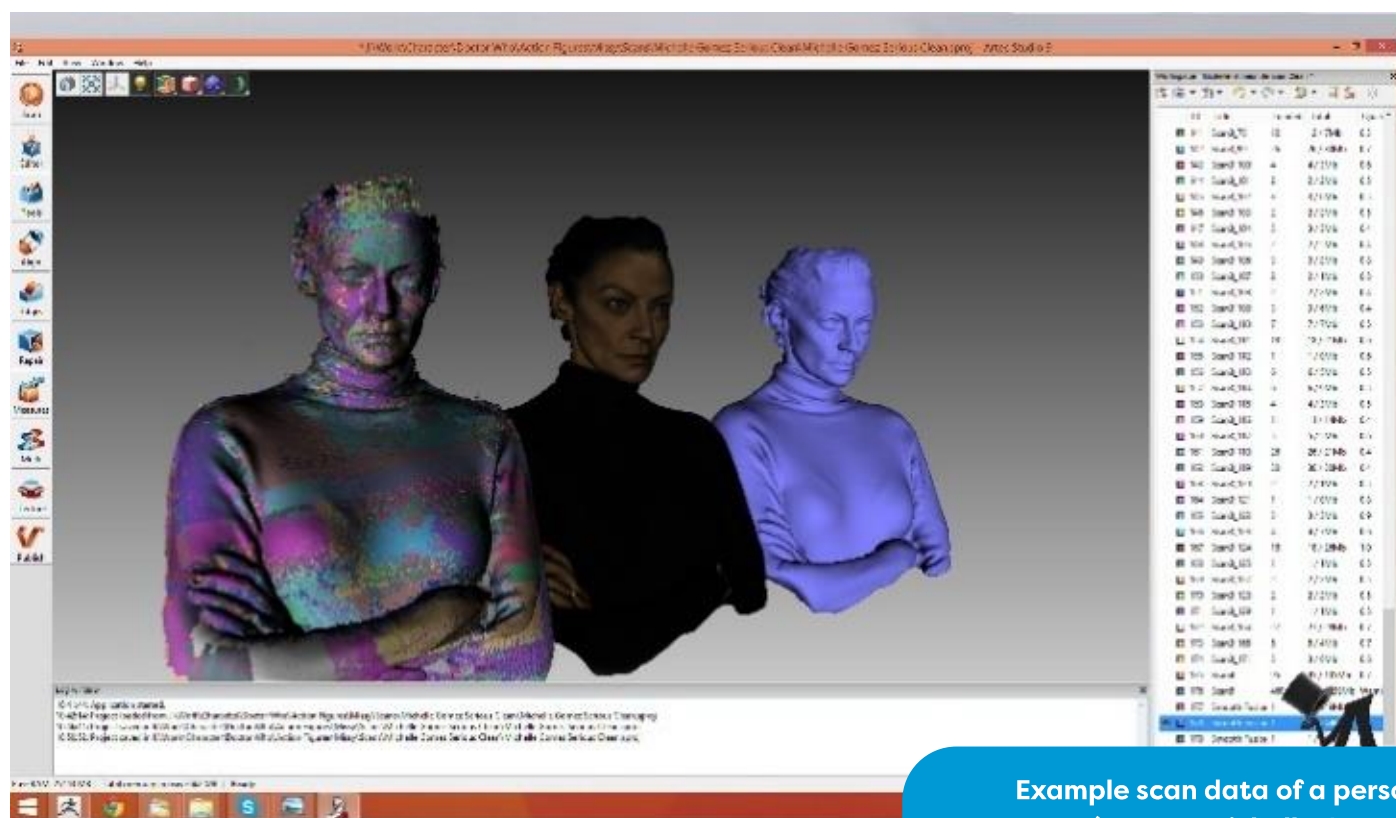
## APPENDIX A – GLOSSARY OF TERMS

### 3D Scanning

The process of capturing a dimensionally accurate set of 3D information for an object in the real world and turning it into digital information that can be manipulated in a computer. There are three types of scanner we could use:

- i. Structured Light – A handheld device projects a pattern on to the subject and a high-speed camera photographs the subject. 3D information is extrapolated from the distortion of the pattern
- ii. Photogrammetry – 85 or more synchronised stills cameras simultaneously photograph the subject. 3D information is extrapolated from the photographs.
- iii. LIDAR – A pulsed laser captures 3D information by calculating the distance between the scanner and the subject.

I generally scan with an Artec structured light device because they are portable and afford flexibility for travelling to where a subject is.



Example scan data of a person  
(actress Michelle Gomez)

### Rapid Prototyping

A catch-all term that refers to all forms of turning digital information into real-world objects. The two most common techniques employed are '3D Printing' and 'Computer Numerical Control (CNC) Machining'

### 3D Printing

The process of turning 3D information on a computer into an object in the real world. 3D 'parts' or 'prints' are formed in layers. Different systems employ different materials to form these layers. 3D printers can create parts from a variety of materials including plastics such as nylon or ABS (Acrylonitrile Butadiene Styrene) used in Fused Deposition Modelling (FDM) where a nozzle extrudes molten plastic in layers to build the 3D object. Some printers

build layers using UV cured polyurethane resin, powder bed printers can print in metal or plastic by fusing powder grains together with focused heat or light energy.



A 3D printed 'Cyberman'

### **CNC Machining**

A computer controlled cutting device physically carves a solid material (wood, polyurethane resin, plastic or metal) in order to turn 3D digital information into a real object.

### **Pattern, Part, Model, Sculpt or Master**

A real-world 3D replica of the final object.

### **Mold, Tool or Tooling**

A special type of container used to give shape to solidified liquid. You pour the appropriate liquid into the mold (molten metal, liquid polyurethane resin or wax) and once the material is hard, and has been removed from the container, the resulting object is an exact replica of the object the mold was made from, but made of the new material.

### **Sculpting**

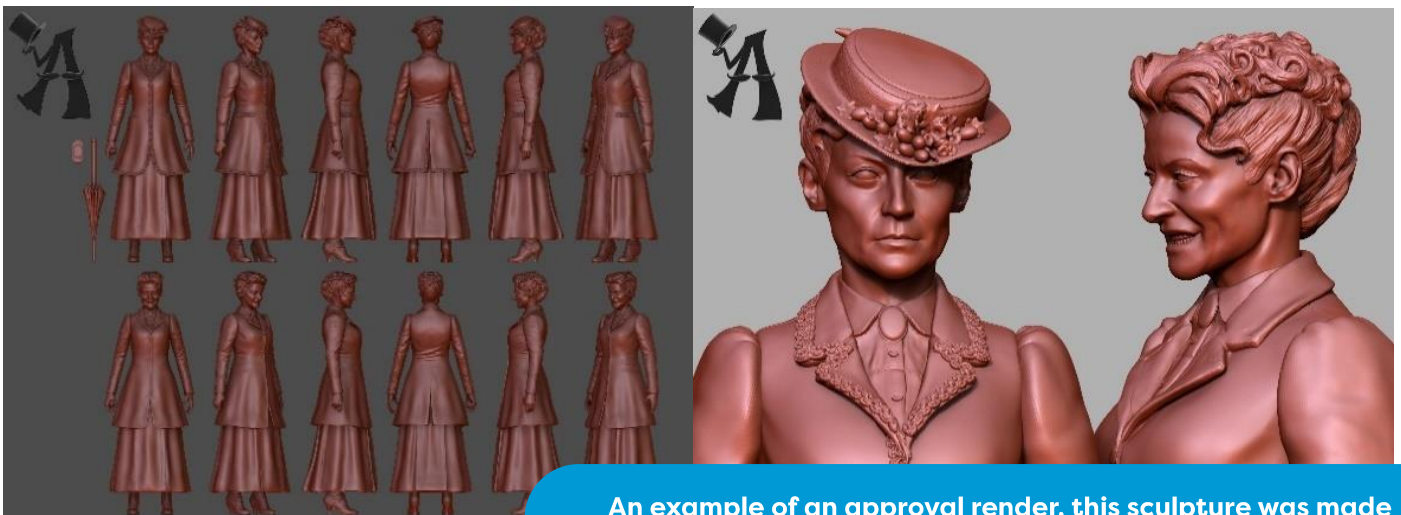
The process of creating a 3D form. I am a digital sculptor, I use the software ZBrush, on my computer, to create digital models of 3D objects that are then turned into physical 'real world' objects. A proportionally accurate digital model can be created for two purposes; the first is to generate visuals for approval and the second it to produce a physical output that can be used to repair the statue.



An image of a digital sculpture captured from within ZBrush, this sculpture was made using the scan data captured above.

### Render or Rendering

Producing a visual image from 3D digital information in a computer for the purpose of evaluating and approving the 3D form.



An example of an approval render, this sculpture was made using the scan data captured above.

## APPENDIX B – INTENT FIXING DETAIL DRAWINGS

1. This drawing must not be scaled; work to figured dimensions only
2. This drawing is to be read in conjunction with all relevant drawings, documents and specification

For general notes please refer to drawing:-  
RLR-GLA-35-XX-DR-CS-2000 & 2001

| Beam Schedule |                 |
|---------------|-----------------|
| Beam Ref.     | Size (mm)       |
| B1            | UB203x102x23    |
| B2            | UB203x133x25    |
| B3            | UB203x133x30    |
| B4            | UB254x146x31    |
| B5            | UB305x165x40    |
| B7            | UB457x152x52    |
| B8            | UB457x191x67    |
| B9            | UB457x191x89    |
| B10           | UB533x210x82    |
| B11           | UB762x267x134   |
| B12           | UC203x203x46    |
| B13           | UC203x203x60    |
| B14           | UC203x203x86    |
| B20           | PFC150x75x18    |
| B21           | PFC200x75x23    |
| B22           | PFC200x90x30    |
| B24           | RHS300x200x8.0  |
| B25           | RS125x75x10     |
| B26           | RS150x75x10     |
| B27           | RSA200x100x10   |
| B28           | RSA200x150x12   |
| B30           | PFC100x50x10    |
| B31           | RSA200x200x16   |
| B32           | RHS200x100x10.0 |
| B33           | UC203x203x52    |
| B34           | RHS250x150x10.0 |
| B35           | UB533x210x92    |
| B36           | UB356x171x51    |
| BR1           | CHS60.3x5       |
| BR2           | CHS76.1x6.3     |
| BR3           | CHS114.3x6.3    |

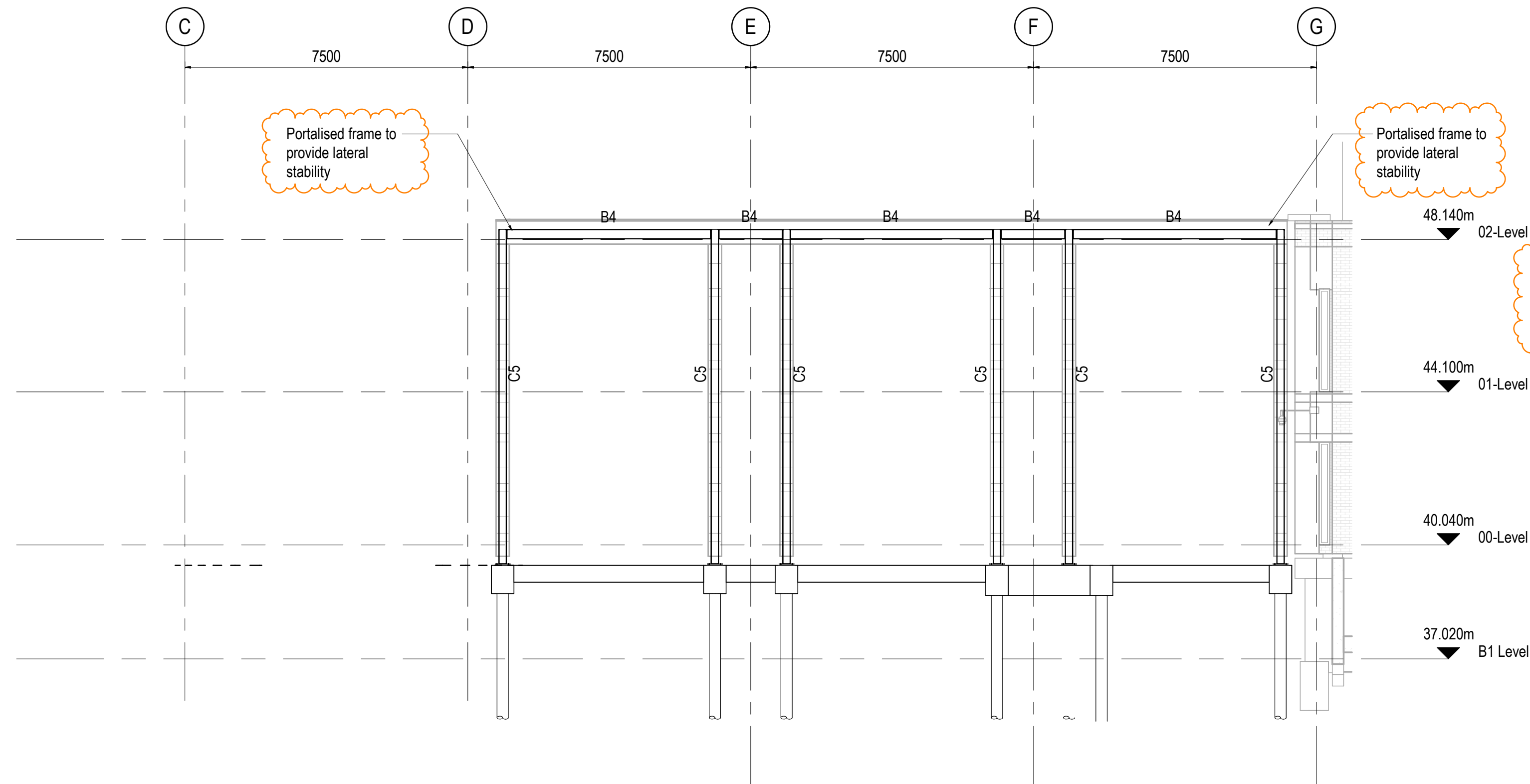
| Column Schedule |                 |
|-----------------|-----------------|
| Column Ref.     | Size (mm)       |
| C1              | UC152x152x23    |
| C2              | UC152x152x30    |
| C3              | UC152x152x37    |
| C4              | UC152x152x44    |
| C5              | UC203x203x46    |
| C6              | UC203x203x52    |
| C7              | UC203x203x60    |
| C8              | CHS219.1x10     |
| C9              | RHS200x100x10.0 |
| C10             | CHS273x10       |
| C11             | RHS200x150x10.0 |
| C12             | UC254x254x73    |
| C13             | PFC100x50x10    |

|     |                    |          |      |      |
|-----|--------------------|----------|------|------|
| C01 | Construction Issue | 11.10.24 | M.C. | E.H. |
| Rev | Description        | Date     | By   | Chkd |

**Glanville**  
Survey > Plan > Engineer

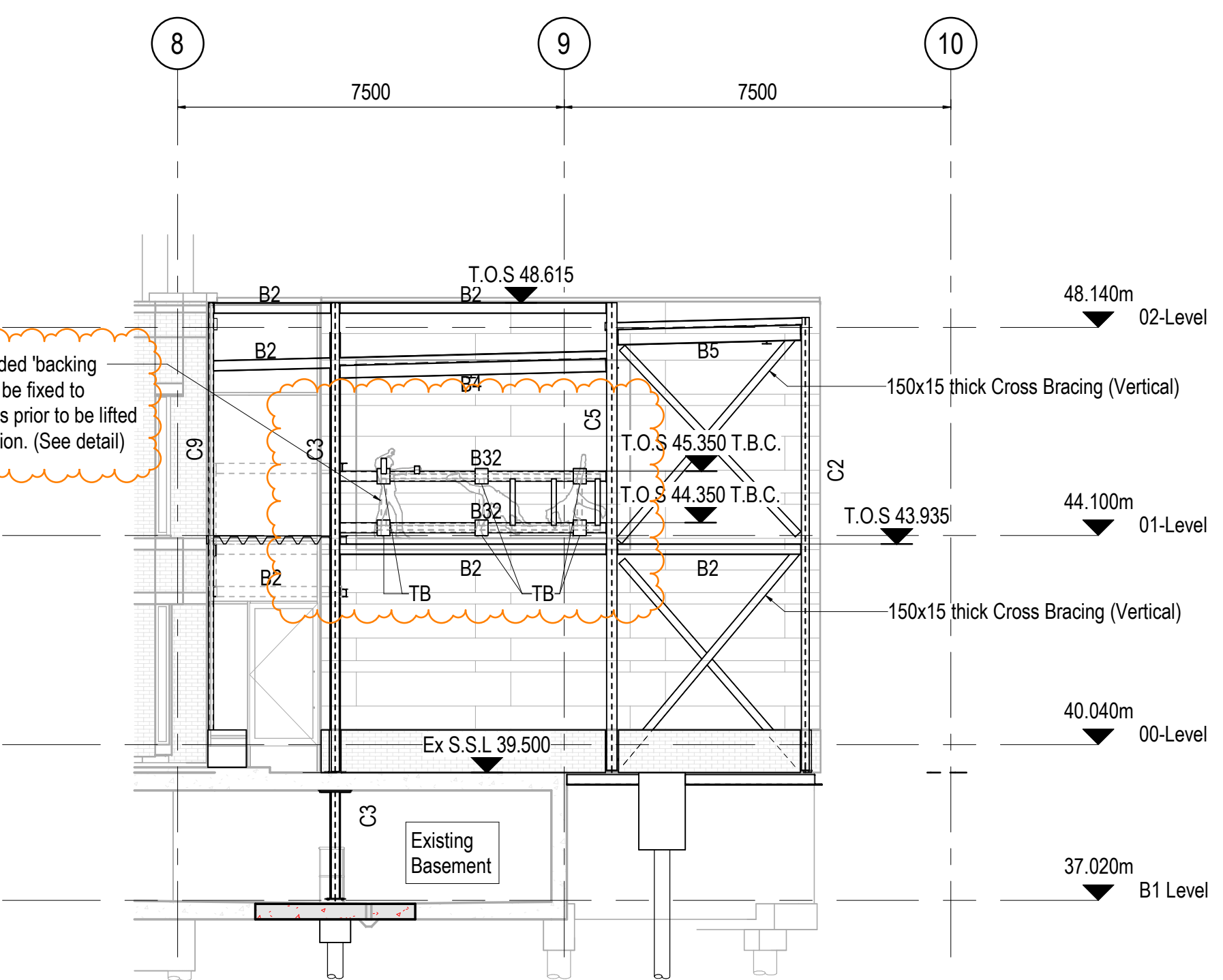
Civil Engineering  
Structural Engineering  
Transport Planning  
Highways Engineering  
Building Surveying  
Geomatics  
Hertfordshire | Oxfordshire | Cambridgeshire | Bristol

|                       |                                            |            |          |                           |           |                      |     |
|-----------------------|--------------------------------------------|------------|----------|---------------------------|-----------|----------------------|-----|
| Client :              | Morgan Sindall                             |            |          |                           |           |                      |     |
| Project :             | Reading Library Relocation                 |            |          |                           |           |                      |     |
| Title :               | Building Elevations<br>General Arrangement |            |          |                           |           |                      |     |
| Engineer :            | E.H.                                       | Director : | T.W.     | Date :                    | June 2024 |                      |     |
| Phase :               | RIBA Stage 5                               |            | Status : | S4                        | Scale :   | As indicated<br>@ A1 |     |
| Glanville Project No. |                                            | 8230592    |          |                           |           |                      |     |
| Drawing No.           |                                            |            |          | RRLR-GLA-35-1XX-D-CS-2420 |           | Rev :                | C01 |



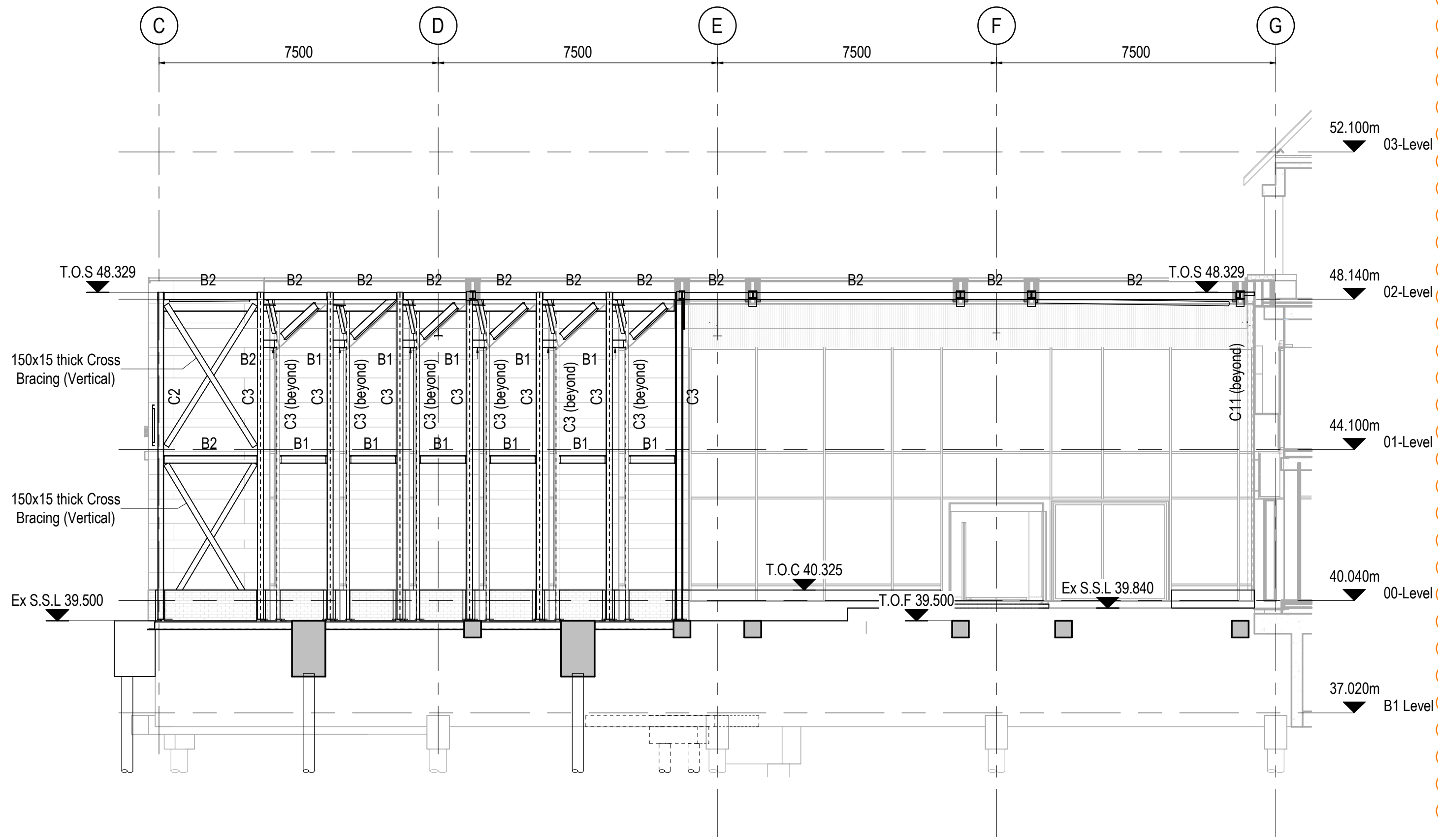
ELEVATION ON GL 10

1:100



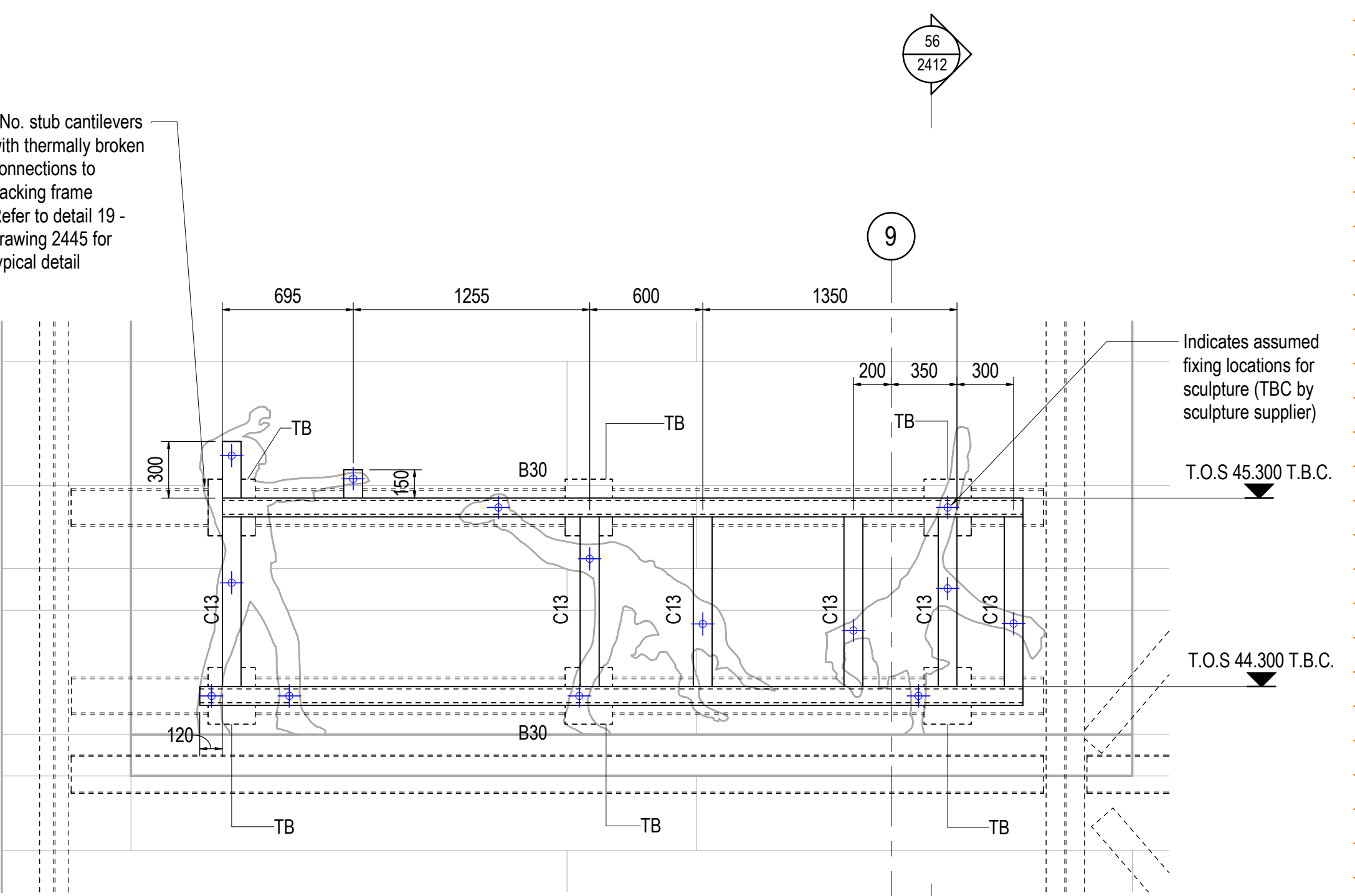
ELEVATION ON GL C

1:100



ELEVATION ON FRONT

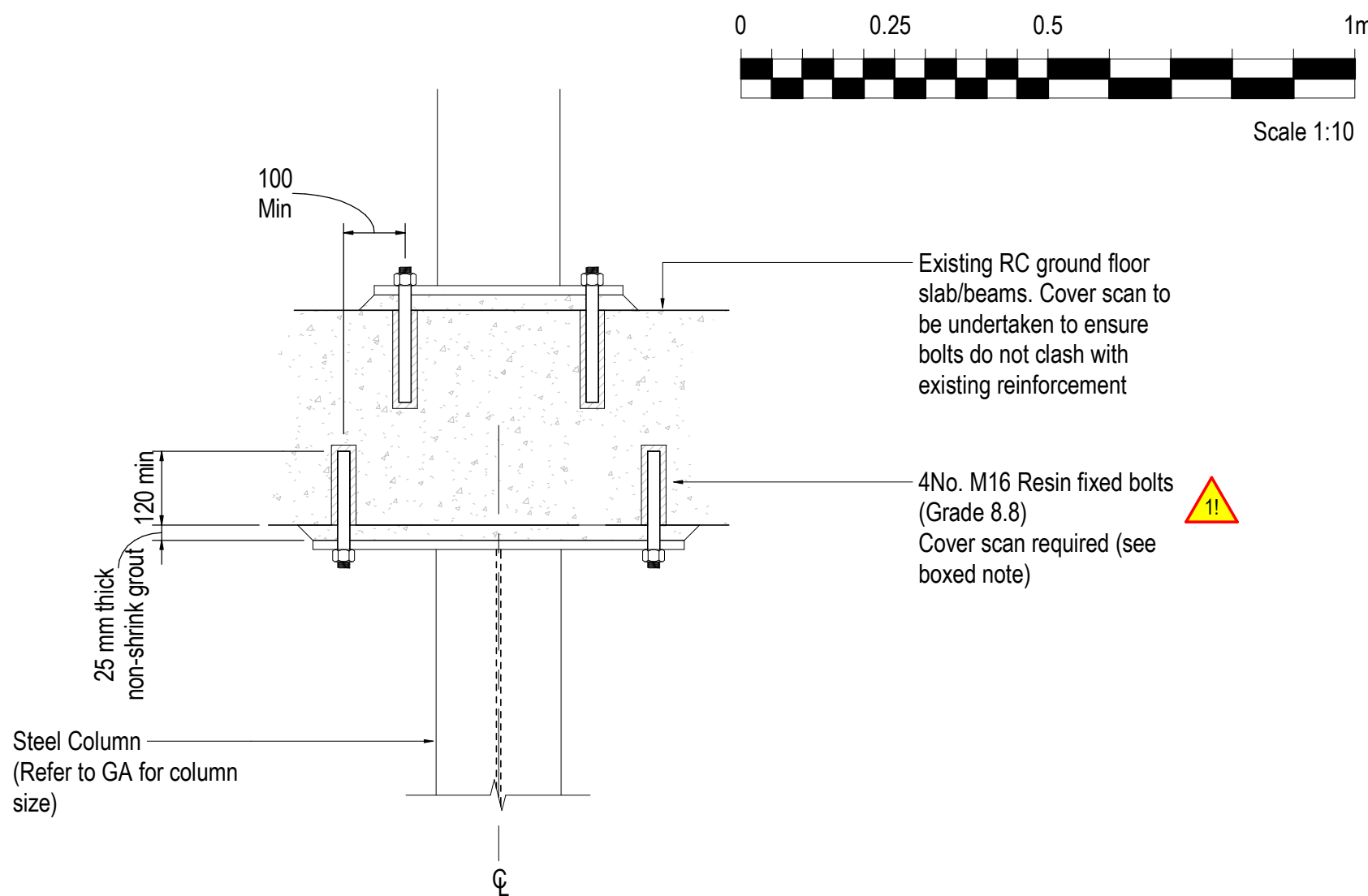
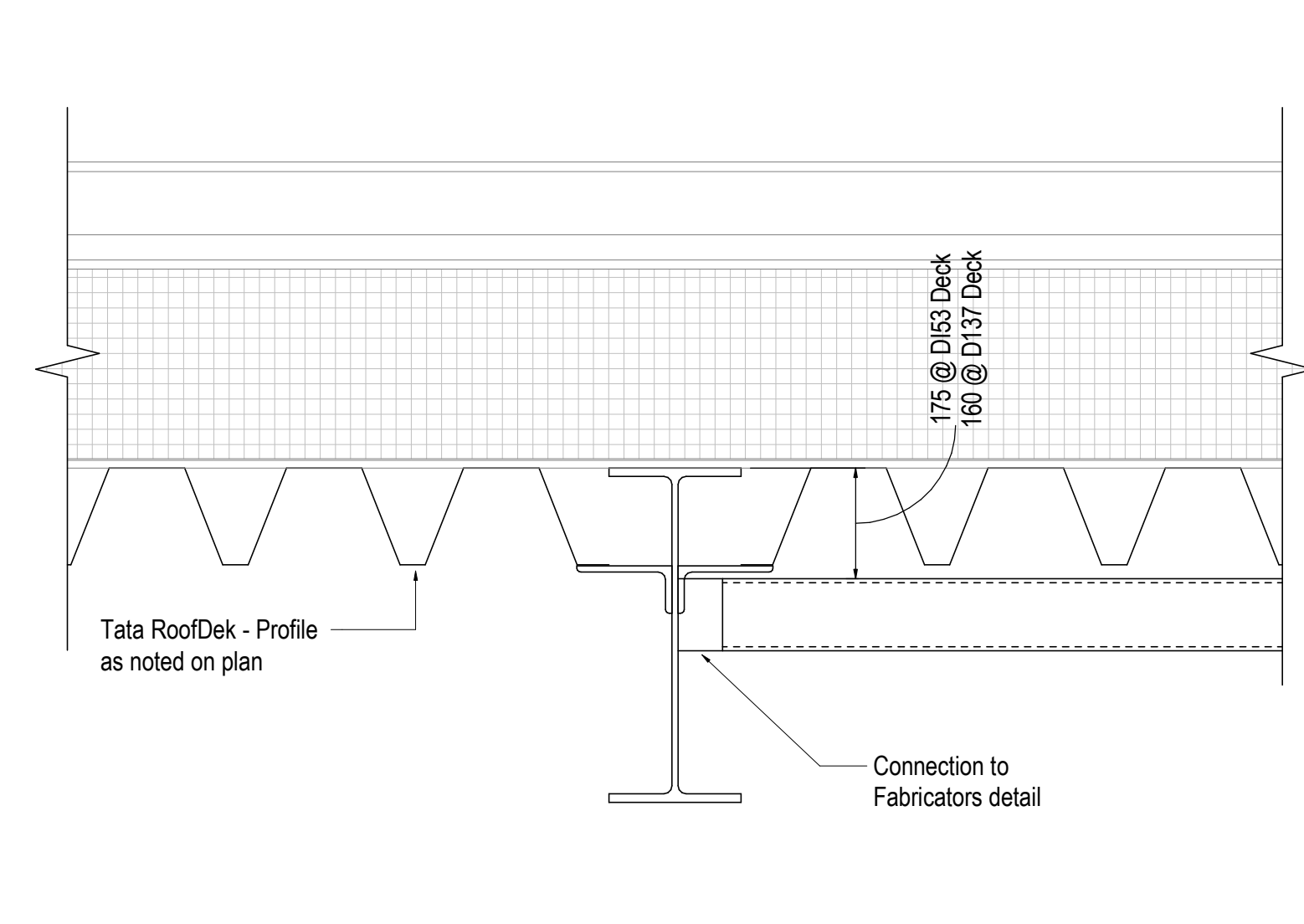
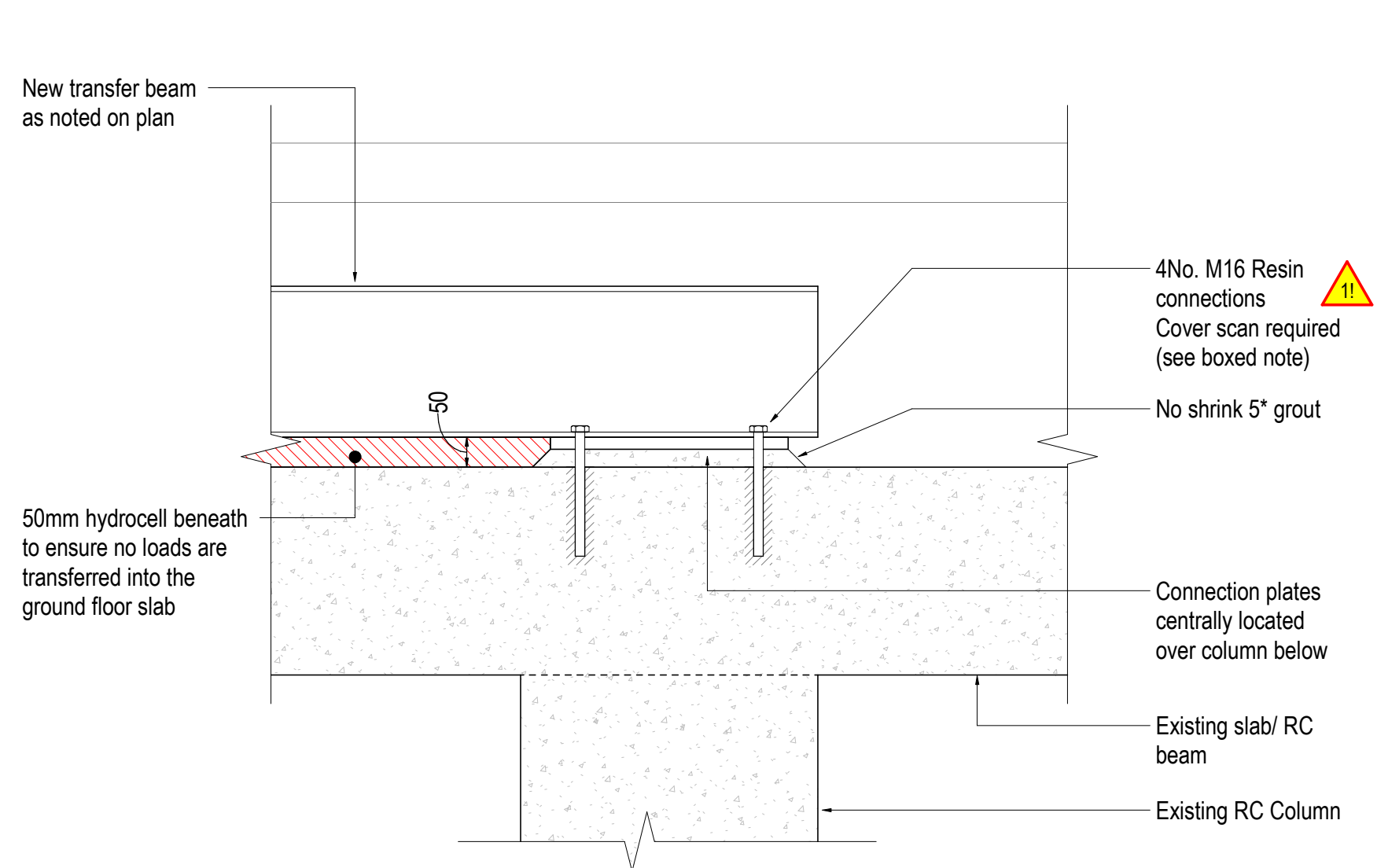
1:100



Design of sculpture backing frame in abeyance pending final coordination with sculpture supplier

DETAIL ELEVATION ON BACKING FRAME

1:25

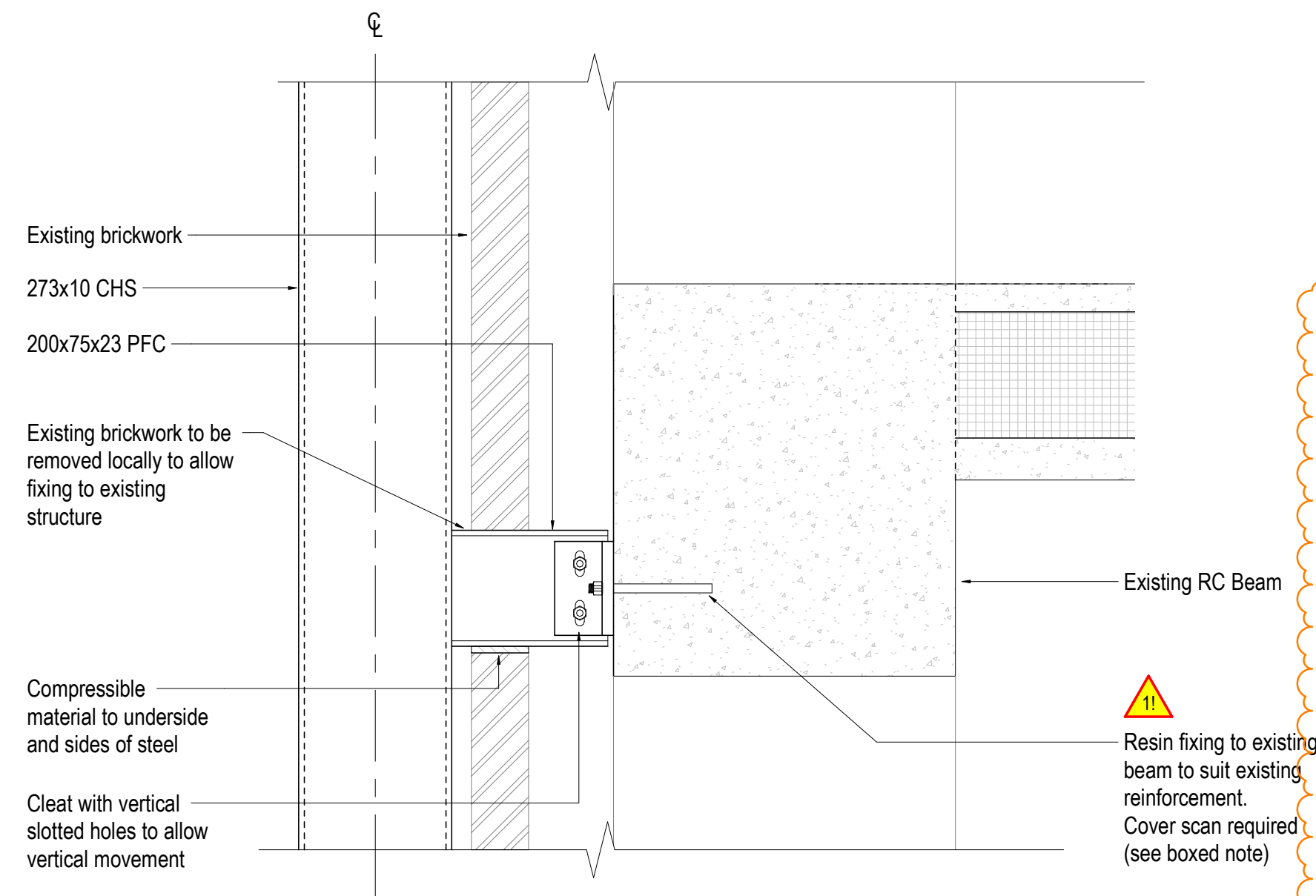
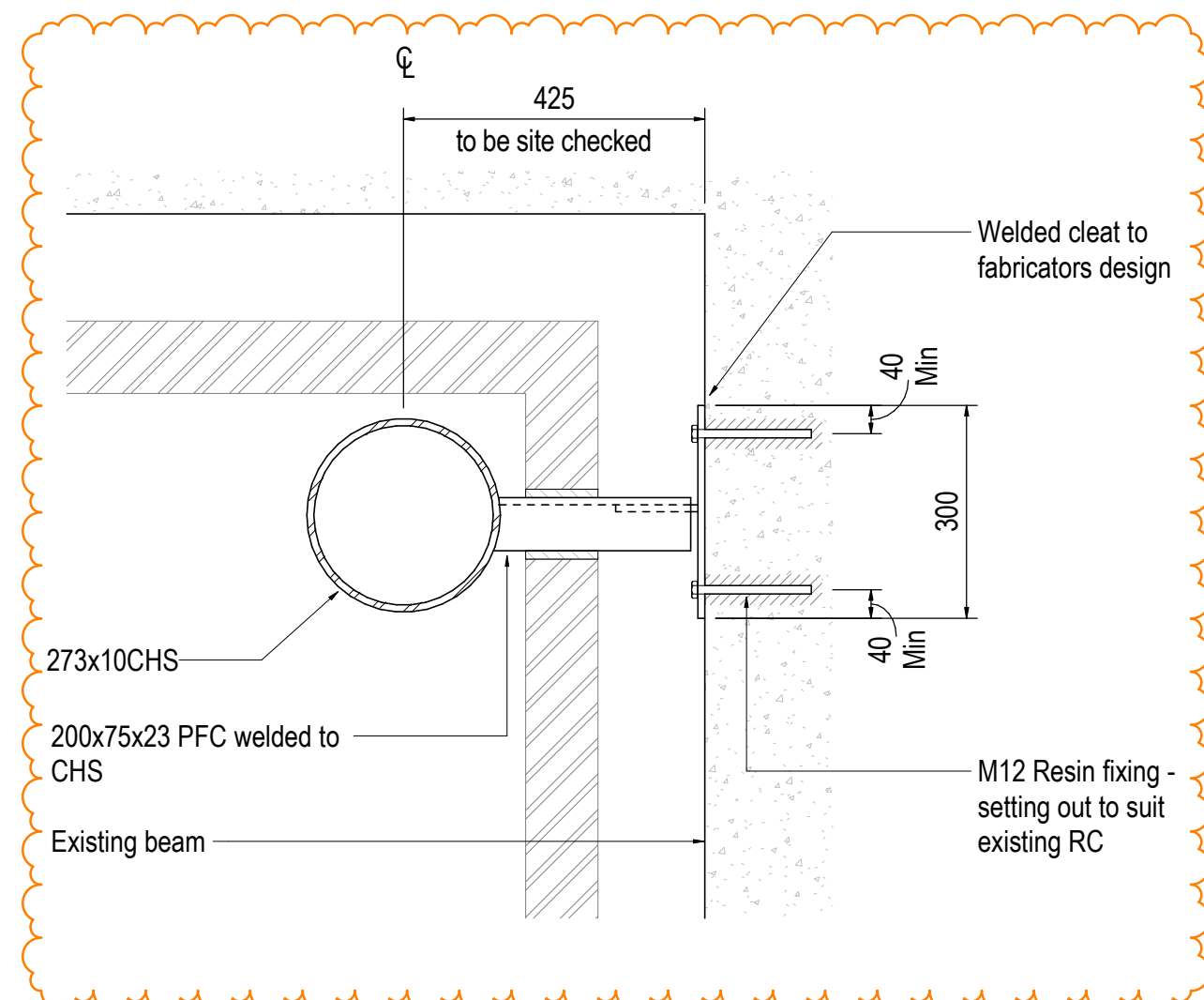


1. This drawing must not be scaled; work to figured dimensions only
  2. This drawing is to be read in conjunction with all relevant drawings, documents and specification
- For general notes please refer to drawing:-  
RLR-GLA-35-XX-DR-CS-2000 & 2001
- ⚠ Undertake cover meter survey (or similar) prior to drilling and fixing resin anchors to determine location of existing reinforcement. Bolts to be located such that no reinforcing bars are cut through. Pilot hole to be drilled initially to ensure evasion of reinforcement prior to installation of resin anchors.
- All 2D and 3D representation of existing structural elements have been taken from information shown on historic record drawings and Glanville. Consultants cannot be held responsible for any inaccuracies to the as-built condition found during the execution of the works. Any deviation from the arrangements shown should be reported so the implications can be assessed.

**DETAIL 10 (TRANSFER STEEL PLATE)**  
1:10

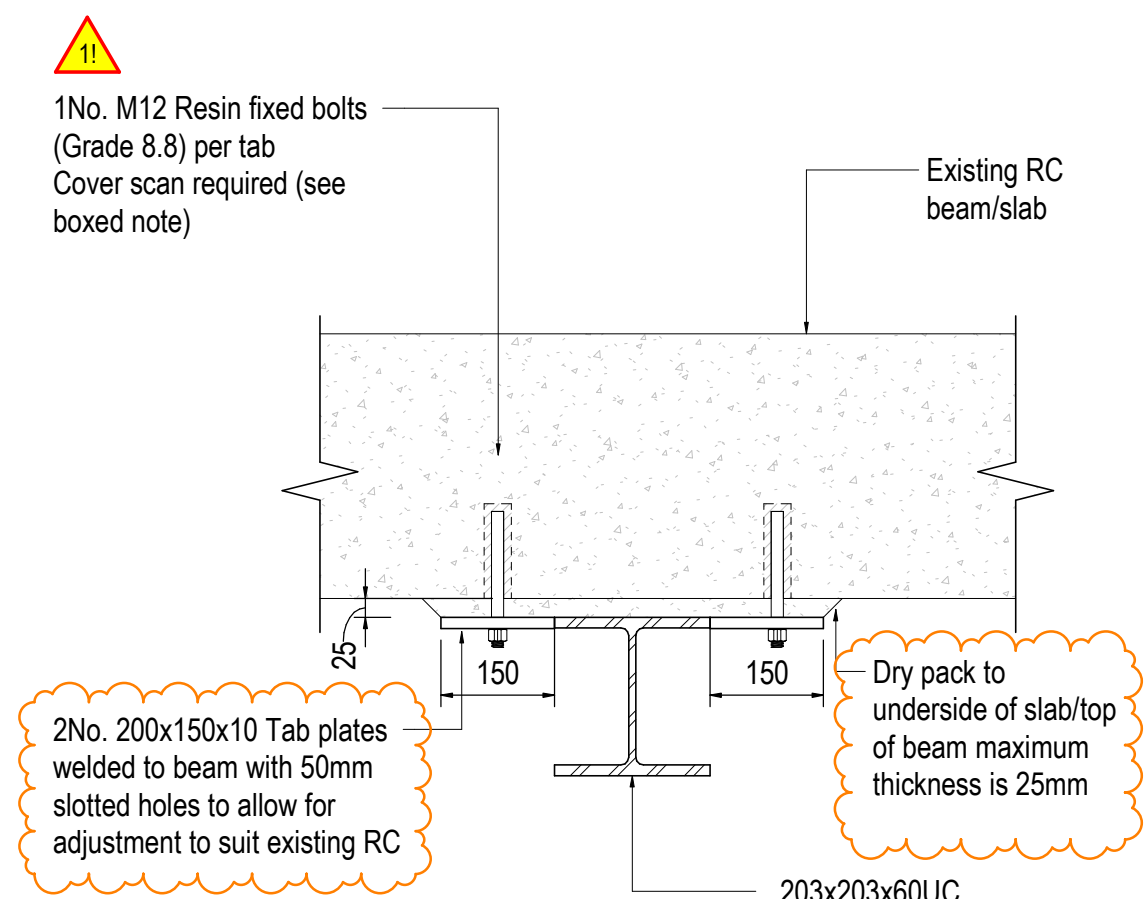
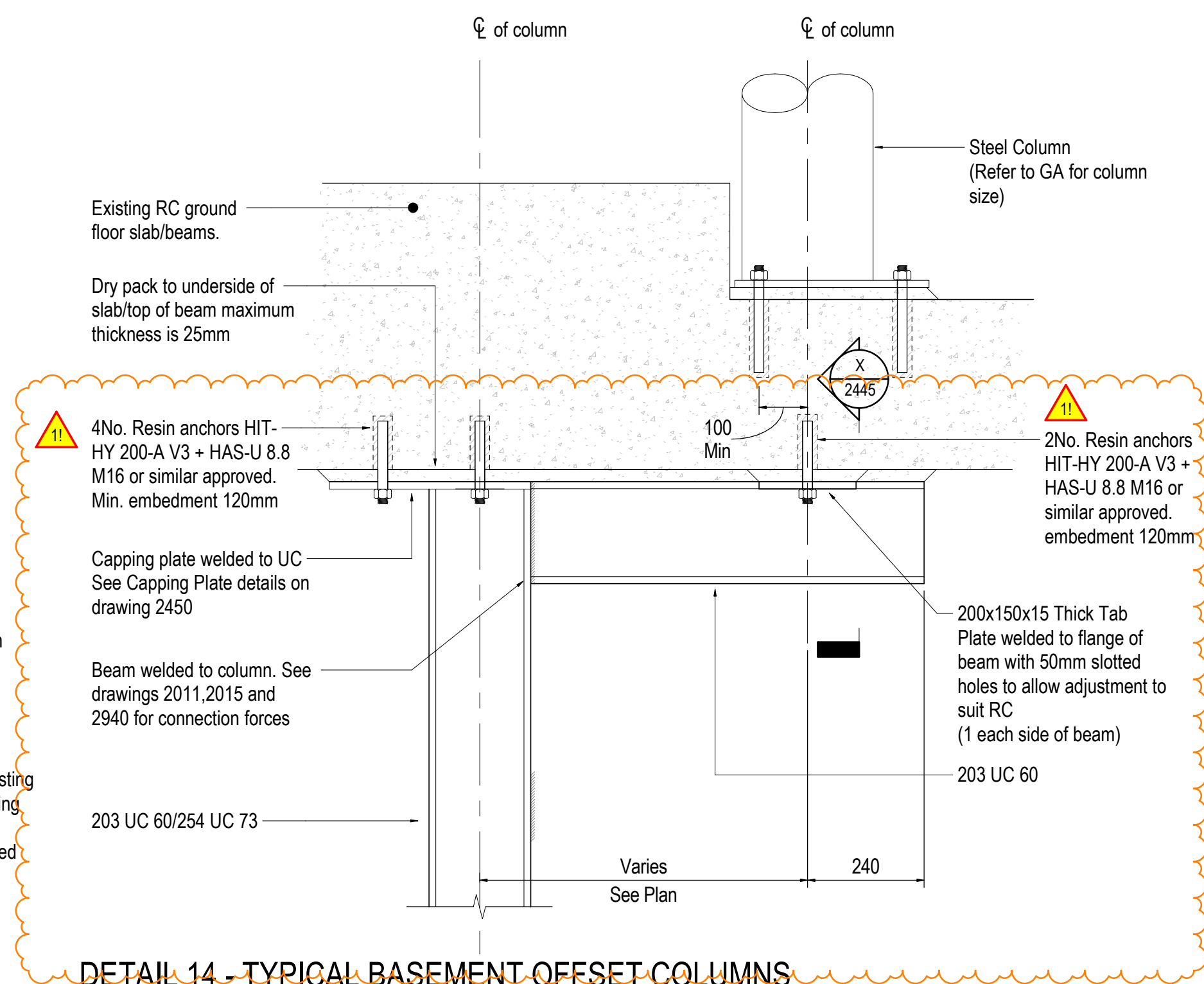
**DETAIL 11 - TYPICAL HORIZONTAL BRACING**  
1:10

**DETAIL 12 - TYPICAL FIXING TO U/S OF EXISTING SLAB**  
1:10



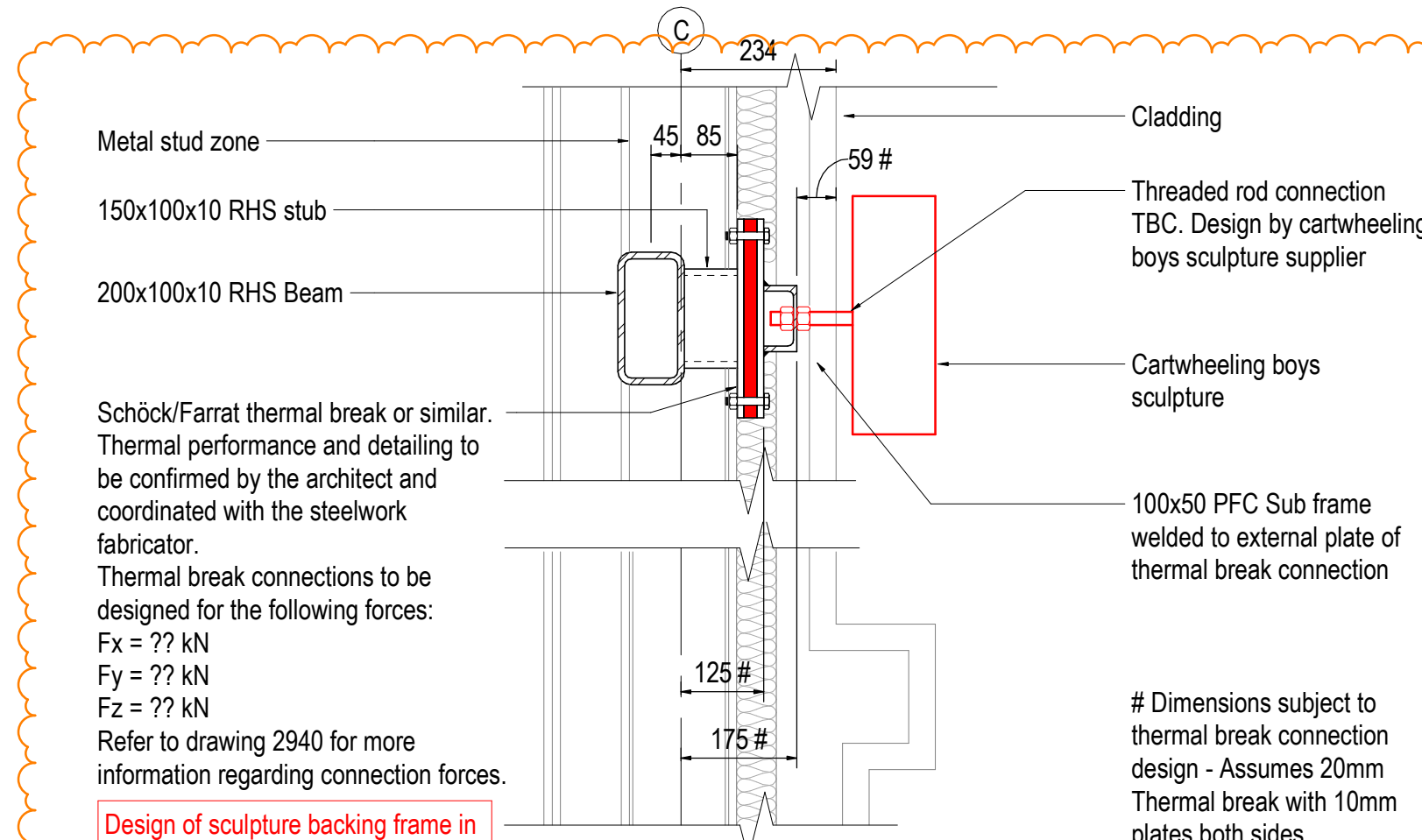
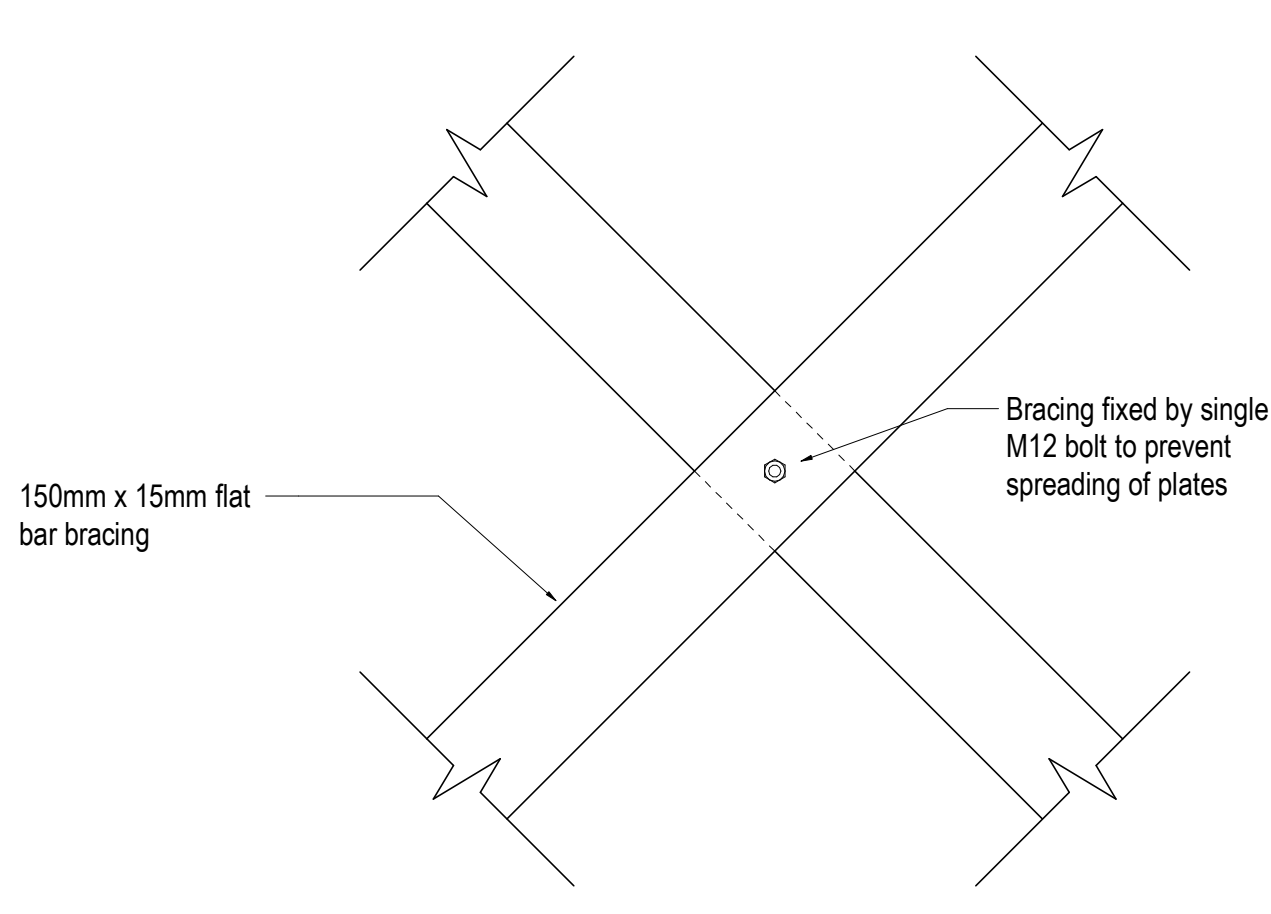
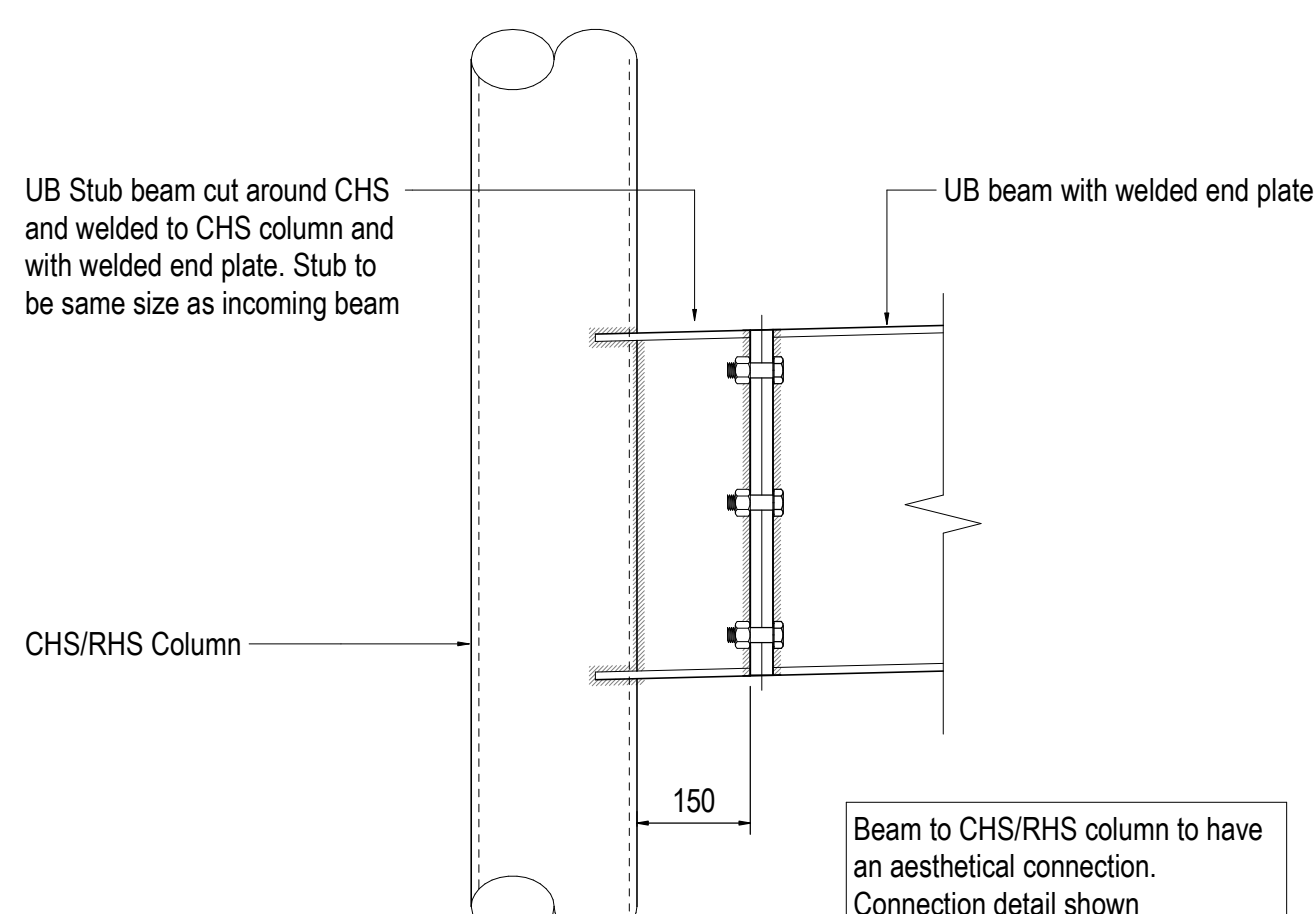
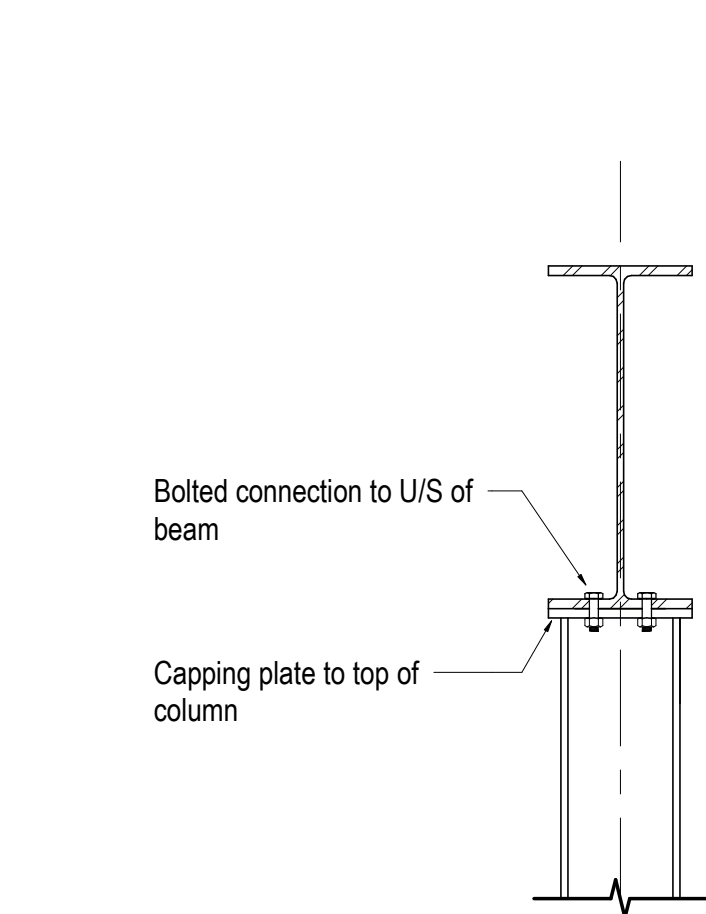
**DETAIL 13 ON PLAN**  
1:10

**DETAIL 13 IN SECTION**  
1:10



**DETAIL 14 - TYPICAL BASEMENT OFFSET COLUMNS**  
1:10

**SECTION X-X (TYPICAL TAB PLATES)**  
1:10



**DETAIL 16 - INDICATIVE HEAD CONNECTION**  
1:10

**DETAIL 17 - INDICATIVE CONNECTIONS ALONG GRILINE 8**  
1:10

**INDICATIVE CROSS BRACING FIXING DETAIL**  
1:10

**DETAIL 19 - TYPICAL BACKING FRAME SUPPORT FOR SCULPTURE**  
1:10

|                                                                                                                                                                                        |                    |          |      |           |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|----------|------|-----------|
| C01                                                                                                                                                                                    | Construction Issue | 11.10.24 | M.C. | E.H.      |
| Rev                                                                                                                                                                                    | Description        | Date     | By   | Chkd      |
|                                                                                                                                                                                        |                    |          |      |           |
| Civil Engineering    Highways Engineering<br>Structural Engineering    Building Surveying<br>Transport Planning    Geomatics<br>Hertfordshire   Oxfordshire   Cambridgeshire   Bristol |                    |          |      |           |
| Client : Morgan Sindall                                                                                                                                                                |                    |          |      |           |
| Project : Reading Library Relocation                                                                                                                                                   |                    |          |      |           |
| Title : Typical Details Sheet 1                                                                                                                                                        |                    |          |      |           |
| Engineer : E.H.    Director : T.W.    Date : June 2024<br>Phase : RIBA Stage 5    Status : S4    Scale : 1:10 @ A1<br>Glanville Project No. 8230592                                    |                    |          |      |           |
| Drawing No. RLR-GLA-32-1XX-D-CS-2445                                                                                                                                                   |                    |          |      | Rev : C01 |