Title and description:	Structural design of a single storey rear extension with widening of the opening between the Living Room and extension at 12 Tavey Close, Valley Park, Chandlers Ford, SO53 4SN
Client:	Outlook Windows System Ltd
Issue No. 1	Issue date: 20/12/2023

Prepared by:

[redacted]

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For and on behalf of Romsey Structural Engineering Ltd

[redacted]

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Section A: General notes

A1. If in doubt - ASK! Read the following carefully.

A2. These calculations should be approved by the Local Authority Building Department or other Authorised Authority, before work commences. Work undertaken before Local Authority approval is granted is at the executor's own risk.

A3. All dimensions used in these calculations MUST be checked on site and any significant discrepancies reported to the Engineer.

A4. Romsey Structural Engineering Ltd accept no responsibility with regard to errors in the scaling of dimensions from drawings supplied by others or errors in dimensional information provided by others. Any discrepancies found must be highlighted to Romsey Structural Engineering Ltd and all other applicable parties.

A5. The lengths and spans used in these calculations are for design purposes only and should not be used as a basis for ordering materials. The Contractor should complete his own measured survey for ordering materials. Do not scale from the Engineer's drawings.

A6. Design responsibility is limited only to those elements of the structure specifically referred to in these calculations.

A7. It is strongly recommended that a competent and careful Contractor carries out the work and as such will be fully responsible for the design, installation and execution of all temporary works necessary to support the structure during the works, in accordance with HSE recommendations and BRE Good Practice Guidelines.

A8. The Contractor will be fully responsible for the design of all construction details. This includes for all setting out of structural items i.e. placement, position and levels (finished levels or otherwise). All steelwork connections are to be completed by the Main Contractor/Steel Fabricator unless otherwise noted or details provided.

A9. The Contractor will be responsible for the stability of the structure during the construction phase of the Works.

A10. Where new structural supports are to be provided to an existing structure, cracking to the existing structure may occur and require repair work to the existing finishes. To minimise cracking adequate temporary supports must be provided, to be installed in accordance with the HSE recommendations and BRE Good Practice Guidelines.

A11. These calculations are to be read in conjunction with; the latest relevant Drawings and/or Specification(s) from the Architect, Client, other Engineering and Specialist Suppliers or Subcontractors or any other applicable third party. If any discrepancies are found these should be raised with the relevant parties.

A12. If any conditions on site are found to conflict with or change the design contained in these calculations, these conditions should be brought to the attention of the Engineer as soon as possible.

A13. Any deviations from the materials specified in these calculations must be brought to the attention of the Engineer prior to ordering or construction.

Section B: Materials Specification and restraint straps

Structural steelwork

B1. COLUMN BASEPLATES

Baseplates to be secured to footings using 4No. M16 x 180mm long RAWLPLUG RAWLBOLT's, bonded using R-KEM II POLYESTER RESIN UNO. Clean drill holes thoroughly with a brush and hand pump at least 4 times before injecting the resin.

B2. COATINGS

INTERNAL: All steelwork not supporting the external leaf of brickwork should be coated with 75microns of Sherwin Williams macropoxy™ C400 or equivalent dry epoxy primer UNO.

CAVITY WALL OR EXTERIOR: All steelwork supporting the cavity wall or exposed to rain is to be hot dipped galvanised in accordance with BS EN ISO 1461: 2009 to a thickness of 85 micron UNO.

BELOW DPC: All steelwork below DPC (inc. fixings) is to be painted with 3 coats of "Black Jack" bitumastic emulsion (site finish) or galvanised.

B3. FIRE PROTECTION
Fire protection is to architects' details or by encasing in 1 layer of 12.5mm "Pink Board" or 2 layers of 12.5mm thick plasterboard UNO.

B4. All UB's, UC's and hollow sections to be S355JR UNO; PFC's, RSA's and plates to be S275JR UNO.

B5. All welds to be 6mm fillet UNO.

B6. All bolts to be zinc coated Grade 8.8 UNO.

Concrete, masonry, mortars padstones

B7. PADSTONES
All padstones to be by Supreme Concrete UNO and are denoted inside this design package by their Supreme Concrete catalogue codes (e.g. PAD12). In new walls Bricktor® bed joint reinforcement should be provided in the first and second courses below all padstones and should extend no less than 600mm either side of the padstone (or one side for padstones next to openings). A 1:3 cement:sand mortar mix is to be used for bedding of padstones.

B8. BLOCKWORK
All new blockwork to be 7.3N hi-strength aerated lightweight blockwork UNO.

B9. Mortar mixes as follows:
General wall areas above the DPC – ratio of Cement : Lime : Sand = 1:1:5½
Below DPC or in chimney stacks – ratio of Masonry Cement to Sand = 1:3

B10. Movement joints to control cracking are to be provided in accordance with NHBC Standards and NHBC Technical Guidance Note 6.1/28.

B11. GEN 3 concrete to be used in trench fill foundations; RC30 in Pad Footings.

Structural timber

B12. DOUBLE/TRIPLE JOISTS & RAFTERS
Multiple timbers to be fixed using Timberlok or Carpenters Mate 8mm Hex Head Screws (88mm for double joists, 141mm for triple joists) UNO; each screw to be 40mm from the outside edge (top and bottom), and spaced at 400mm centres, staggered about centreline. Expanding D4 glue to be rollered on between the joists, to give 100% coverage of the joints.

B13. WALL-PLATES SUPPORTING LEAN-TO AND FLAT ROOFS
Wall-plates supporting flat roof joists or sloping rafters are to be 200x50mm C24 timber sections attached using M10 x 130mm zinc-plated threaded rod, fixed using R-KEM II polyester resin UNO. Bolts should be spaced at 200mm centres, staggered 60mm either-side of the centreline, UNO.

B14. All load-bearing timber to be treated with preservatives in accordance with BS5707-3.

B15. All fixings to be galvanised UNO.

B16. All timber C24 UNO.

B17. All joist hangers should be Simpson Strong-tie (fixed using the specified fasteners) or other CE marked alternatives.

Restraint Straps

B17. Adequate restraint strapping shall be provided to support the structure, distribute roof loads and prevent wind uplift. Strapping shall be in accordance with Approved Document A of the Building Regulations. Restraint straps are not shown on the attached drawings, but should be agreed on site with the Building Control Surveyor. UNO 100x50mm C24 timber wall plates are to be strapped to walls with 1000mm x 30mm x 5mm bent and galvanised mild steel straps at maximum 2.0m centres, fixed to internal wall faces.

Section C: Designers Risk Assessment

C1. As part of the obligations and responsibilities under the Construction (Design and Management) Regulations Romsey Structural Engineering Ltd have completed the following Designers Risk Assessment.

C2. Romsey Structural Engineering Ltd have considered and where possible avoided foreseeable risks in the preparation of the design contained within this document.

C3. The Designers Risk Assessment considers only those significant risks that would be beyond the normal, anticipated knowledge and experience of a competent contractor and not usually encountered in the contractors daily operation.

C4. Those risks are presented below and should be given due consideration by the Main Contractor.

Process	Hazard	Risk	Level of risk	Controls to be introduced in order to reduce the risk
The loading of the timber floors with materials for the completion of the works.	The possibility of overloading the floors causing collapse.	Death, serious injury.	High.	The storage of building materials on the floors shall not exceed 150kg/m^2 value, spread evenly.
Temporary works.	The possibility of collapse due to inadequate temporary supports.	Death, serious injury.	High.	Adequate temporary support required to support walls/floors above during the course of the installation of the beams. This temporary support structure is the responsibility of the contractor. Romsey Structural Engineering Ltd take no responsibility for anything other than the design of the beams.
Working at height.	Falling, tripping, falling objects.	Death, serious injury.	High.	Where access is required to height, scaffolding shall be put in place and all aspects of scaffolding, including security, will be the responsibility of the main contractor.
Manual handling and lifting of steels and other objects in excess of 20kg.	The possibility of injury to Operatives on the site.	Death, serious injury.	High.	Mechanical lifting aids to be provided. If access is problematic, or steel weight / length problematic, then splicing of beams to be provided, with splices designed on request of the Contractor by Romsey Structural Engineering Ltd.

Designers Risk Assessment

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BEAMS OVER LIVING ROOM CAV. WALL

INNER BEAM LOAD = $1.43 \times 9.2 \times 0.5 + 0.56 \times 0.5 \times 7.9 + 2.0 \times 2.25 + 0.2$
$= 13.5$ KN/m

OUTER BEAM LOAD = $2.0 \times 2.0 + 1.47 \times 0.5 \times 4.1 + 0.2$
$= 7.2$ KN

BEAM REACTION = $4.7 \times 0.5 \times (13.5 + 7.2) = 48.6$ KN

ADDITIONAL FOUNDATION STRESS = $\frac{48.6}{0.6 \times (2 \times 1.5 + 0.2)} = 25.3$ KN/m²

Provide GOAL-POST FRAME USING 203x102x23 UB'S,
MAX DEF = 8.3mm
* COMPUTER SOLUTION AVAILABLE ON REQUEST *

CONNECTION MOMENT = 18.5 KN.m

BOLT FORCE = $\frac{18.5 \times 10^3}{0.2 \times 4} = 23$ KN

END-PLATE STRESS = $\frac{20 \times 46 \times 6}{100 \times 15^2} \times 10^3 = 2.5$ N/mm²

Provide 15mm THICK CAP-PLATE

ROOFLIGHT TRIMMERS

SPAN = 3.0m
$w = 0.8 \times 1.6 \times 0.5 + 1.47 \times 1.2 \times 0.5 + 0.15 = 1.672$ KN/m

PROVIDE 2 No 200x50 mm C24 , R = 2.51 KN

TRIPLE JOISTS : L = 4.05m , P = 5.02 KN @ 1.2m

Provide 3 No 200x50mm C24

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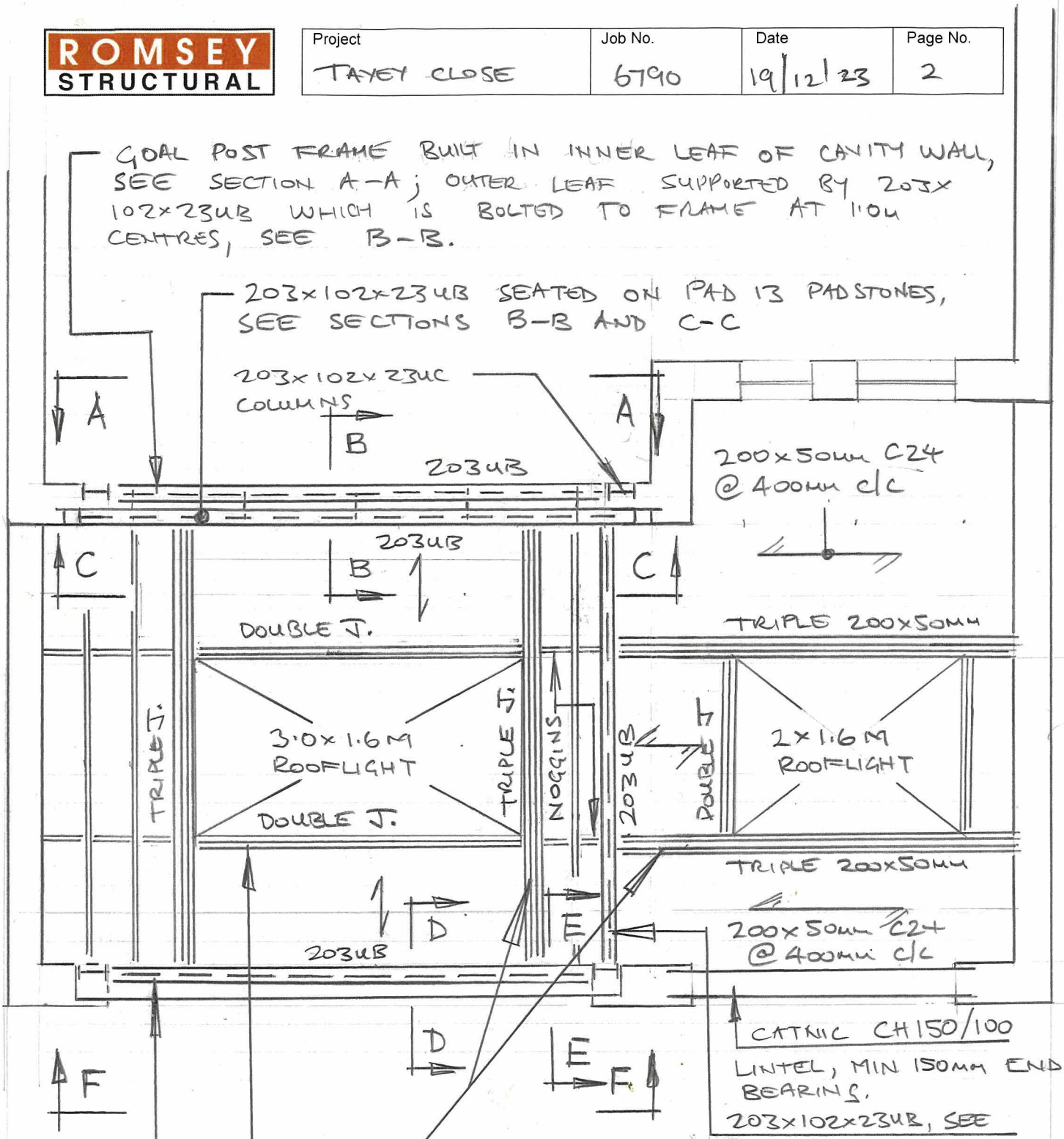
GOAL POST FRAME BUILT IN INNER LEAF OF CAVITY WALL, SEE SECTION A-A; OUTER LEAF SUPPORTED BY 203x 102x23UB WHICH IS BOLTED TO FRAME AT 1100 CENTRES, SEE B-B.

203x102x23UB SEATED ON PAD 13 PADSTONES, SEE SECTIONS B-B AND C-C



GROUND FLOOR PLAN SHOWING STRUCTURE OVER

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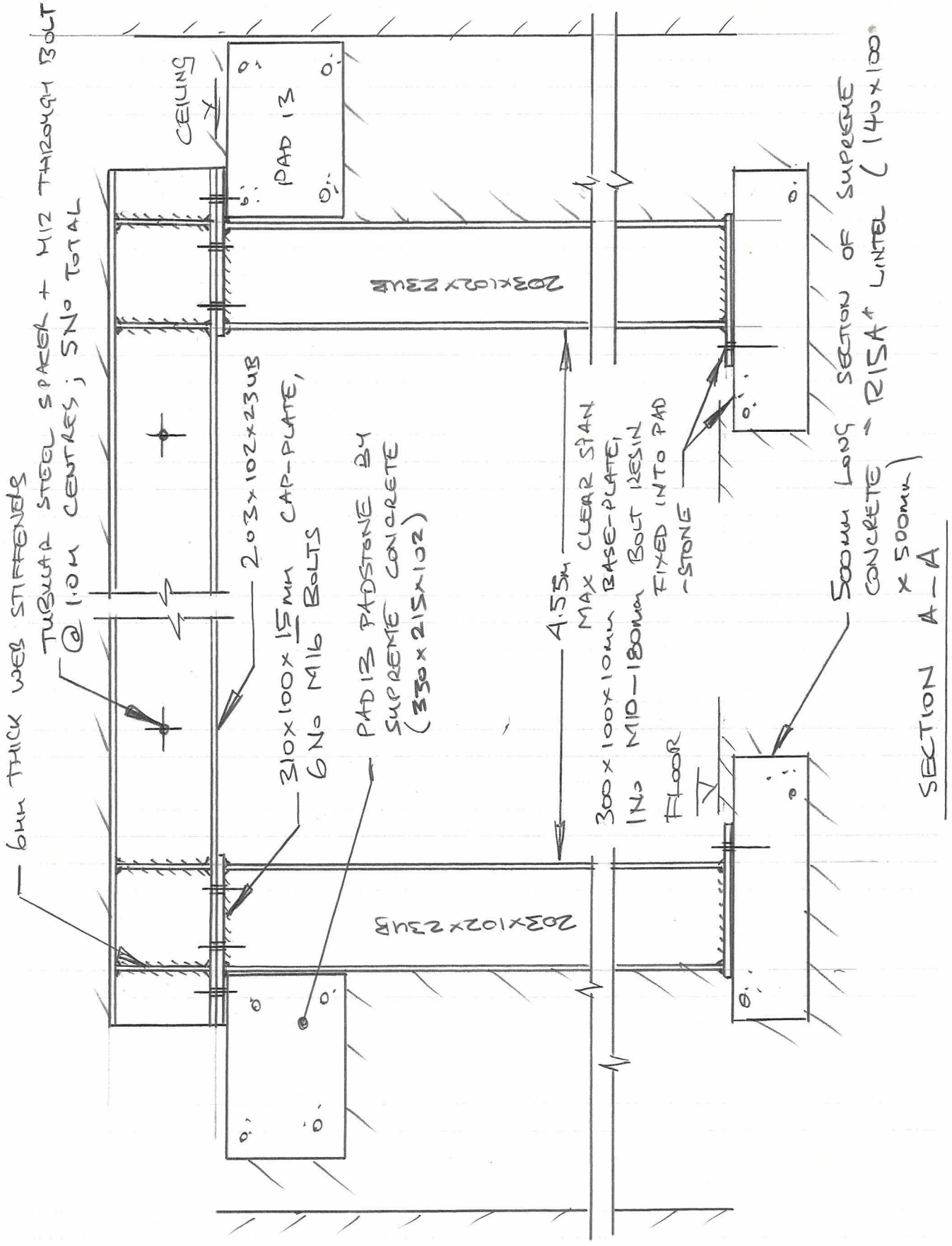

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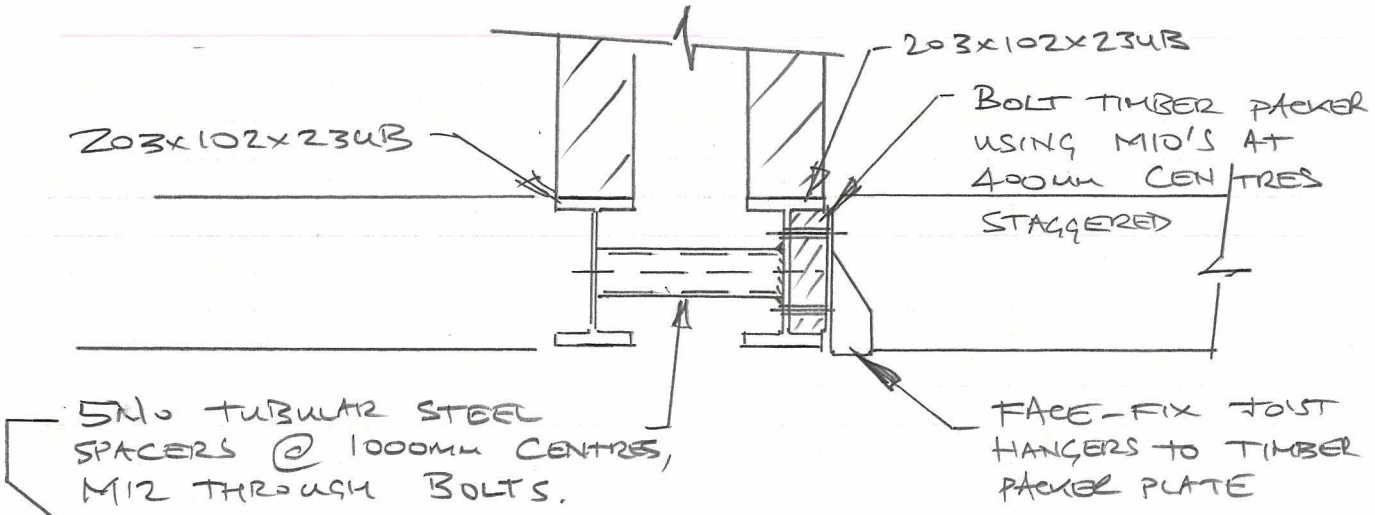
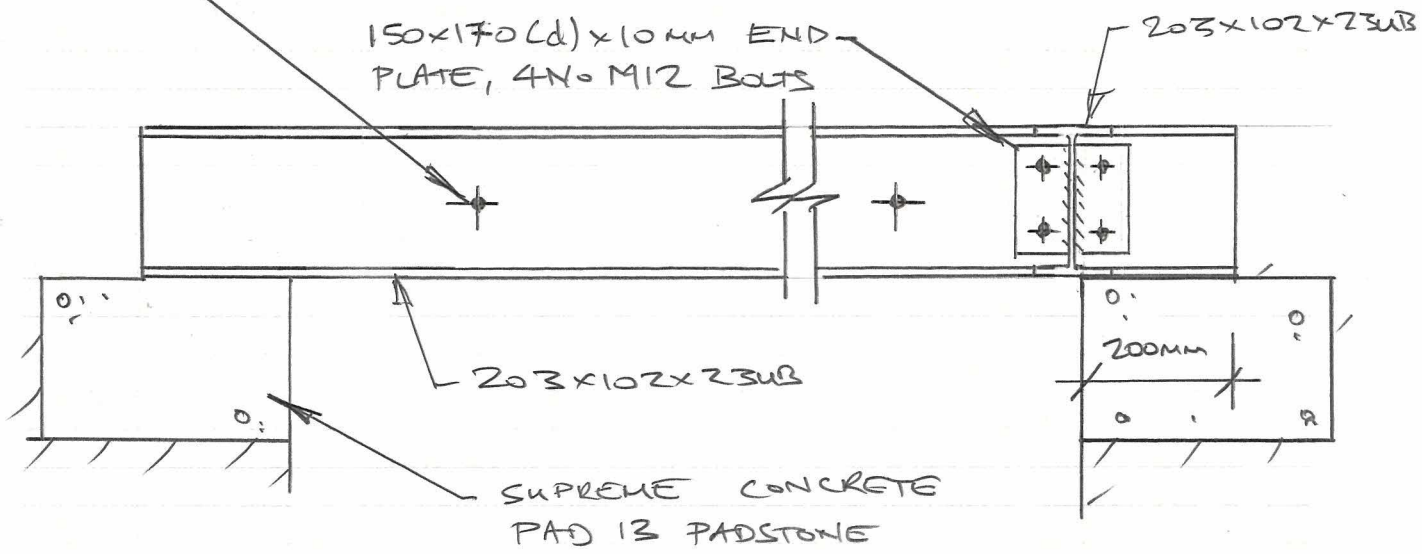
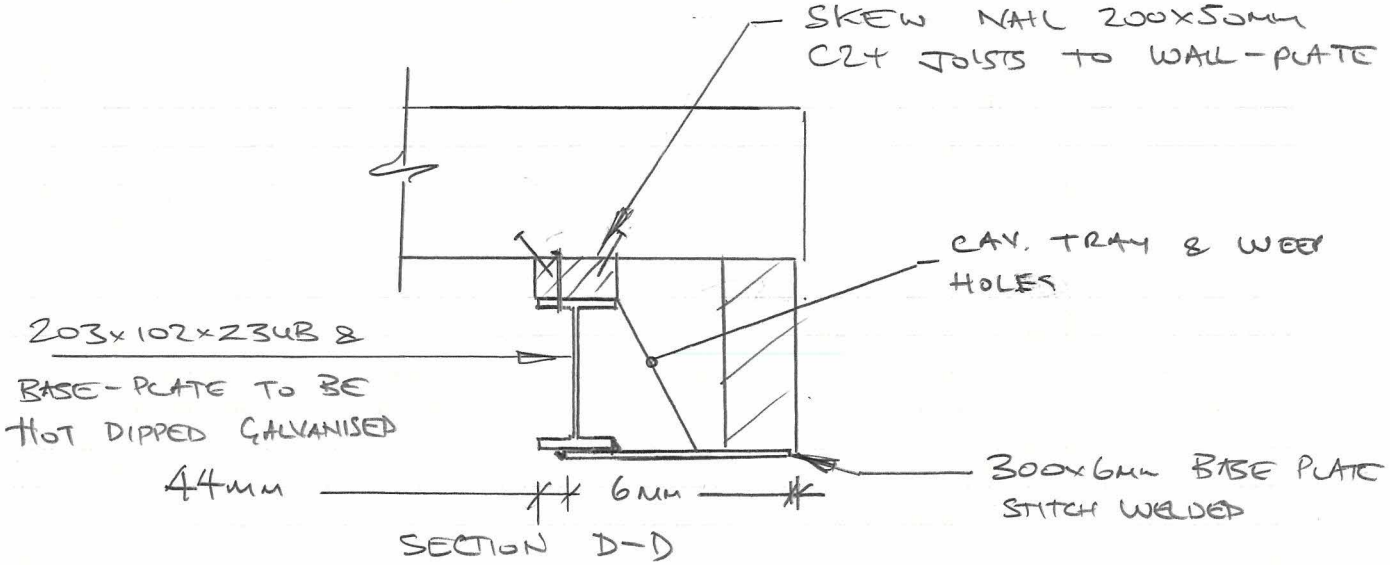


SECTION B-B



SECTION C-C



SECTION D-D

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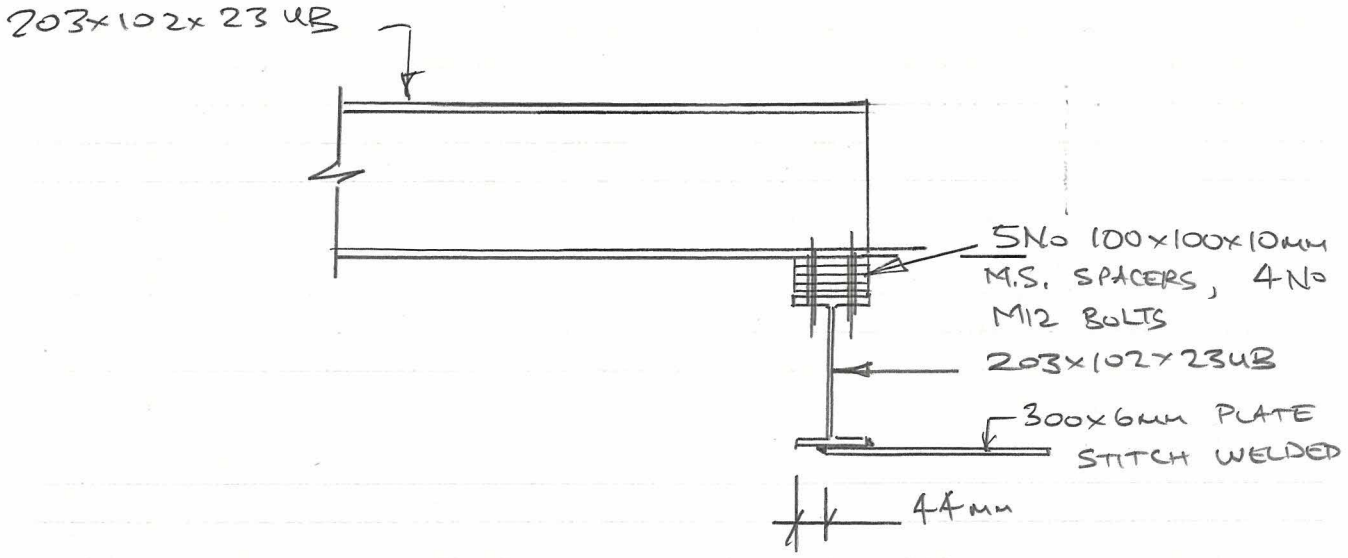
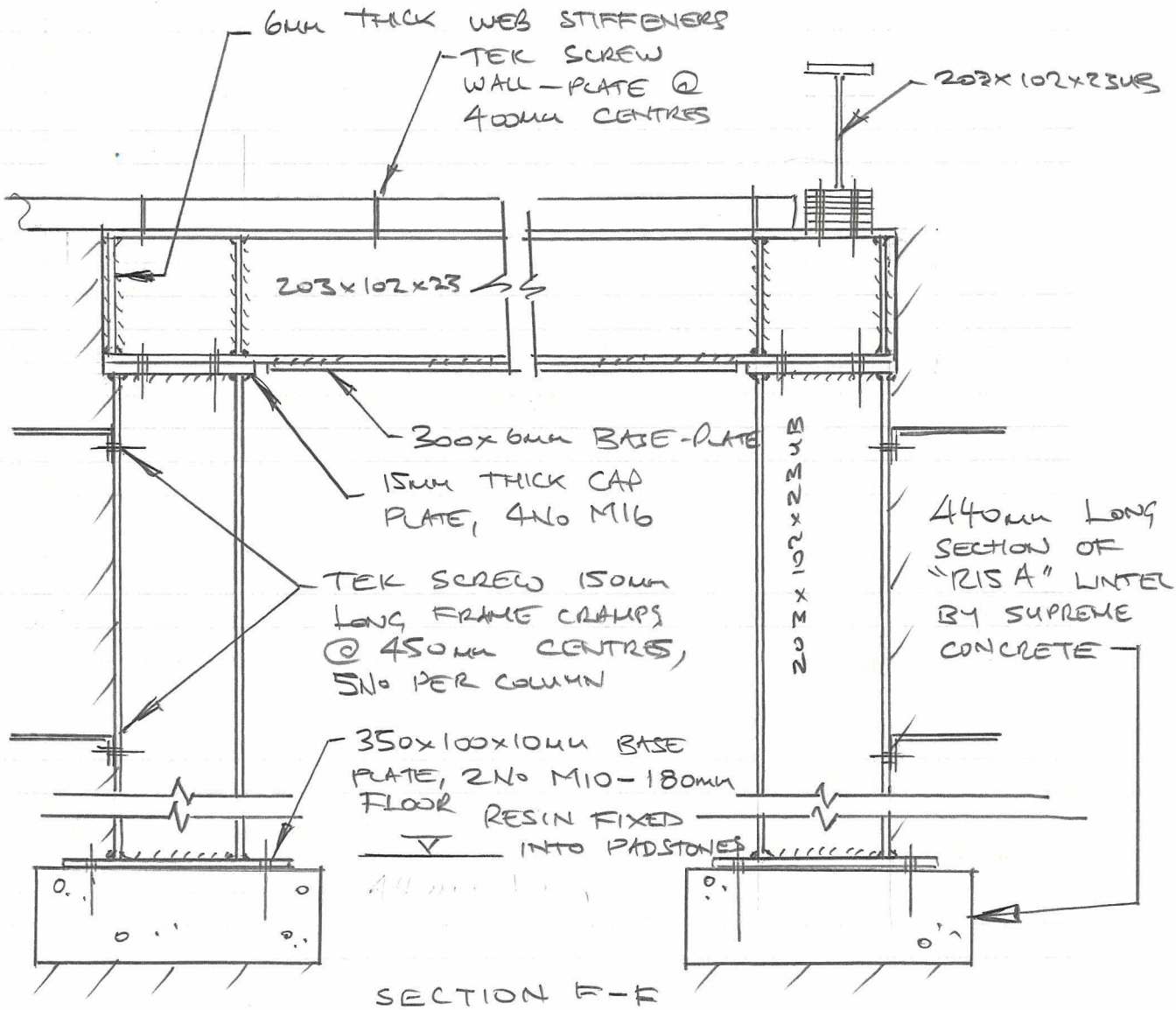


SECTION E-E



SECTION F-F