structural and civil engineers

Project:

The Monal
Bradford Road
Cleckheaton

Job No:

157763

Client:

The Monal

Date:

May 2026

Revision:

D01

Structural Calculation Package

for building control purposes only, not for construction

J B Langley Associates Ltd
Unit 3B Link 606 Business Park
Bradford
West Yorkshire
BD6 1YA

T: 01274 973041

E: info@jblangley.co.uk
W: jblangley.co.uk

Registered in England:
Number 2471970

Calcs By / Date:

TEC / May 2026

Checked By / Date:

BJJ / May 2026

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Part ii

GUIDANCE NOTES

This document is intended to be accompanied and read in conjunction with J B Langley Associates Ltd Engineers drawings, along with all relevant Architects' drawings and all relevant documentation; it should all be read and understood prior to commencement of the work.

Any deviations from the proposals outlined within this document and accompanying Engineers drawings are to be approved by the Engineer prior to the work being undertaken. Any changes from the proposals made without the Engineer's consent are beyond the scope of the Engineers documents and the Engineer cannot be held liable for any adverse consequences of such changes. This calculations document has been carried based on the data / information provided by the Client and/or Architect. It is the responsibility of the Architect (where applicable) or Client to notify the Engineer when changes are made to the Architects drawings / details; this will enable the design / details to be reviewed and, where necessary, changes made.
Any changes made may incur additional design fees to be agreed with Client, and a minimum allowance of 1 working week for changes to be carried out should be allowed for.

Approval of these calculations and drawings by the Local Authority or Approved Inspector Building Control should be obtained prior to any ordering of material or fabrication; no liability is accepted for any changes that may be required because of commencing prior an approval being obtained. Any queries from the Local Authority or Approved Inspector Building Control are to be sent to the Engineer at the earliest opportunity to allow review and comment by the Engineer.

It should be noted that until the existing structure has been exposed it is not always possible to foresee the existing structural arrangement. This may include floor and roof span directions, construction materials and existing beam locations among other aspects; the Engineer will use their experienced judgement to make assumptions. These assumptions will be clearly outlined on the Engineers drawings, it is therefore advised to carry out investigative works as early as possible by a suitably qualified individual, prior to ordering of materials or fabrication, to avoid any delays on site when work commences.

While carrying out any investigative works an Asbestos R & D Survey should be instructed by the Client / Contractor and have been carried out prior to any intrusive surveys; Asbestos applies where the structure is pre year 2000 construction.

In addition, it is advised to carry out some form of ground investigation as early as possible to avoid any unexpected construction requirements which may cause delays on site e.g. reinforced raft or piled foundations.

GENERAL CONSTRUCTION NOTES

Any span / height dimensions shown in this document are for **CALCULATION PURPOSES ONLY** and are not to be used as a final dimension for the ordering of materials / fabrication of steelwork, these should be taken from site by Contractor.

All dimensions are to be checked on site by the Contractor / Fabricator. Any discrepancies between the information within the calculations or drawings and the dimensions on site, are to be reported to the engineer.

Temporary works are the sole responsibility of the Contractor, and the Contractor should consult a suitably qualified temporary works Engineer if required.

All parties are assumed to be aware of their responsibilities under the Construction Design and Management (CDM) Regulations 2015. If you are unsure of this, please contact the engineer; J B Langley Associates Ltd have not been instructed, nor will be acting as the Principal Designer.

J B Langley Associates Ltd take no responsibility for any elements outside of the scope of these calculations / drawings. For structural elements not covered by this document it is assumed that a design is being provided by others, if additional calculations / specifications are required then please contact J B Langley Associates Ltd.

All structural work must be carried out by a competent Contractor, and in accordance with the requirements of The Building Regulations Part A, the recommendations set out in BS8103 Parts 1-3 and set out in Managing health and safety in construction (L153), Regulation 8: "*those who carry out the work have the skills, knowledge, experience and, where they are an organisation, the organisational capability to carry out the work in a way that secures health and safety*"

This document is to be read in conjunction with the both the structural drawings and architectural drawings / details; any discrepancies should be reported to the Engineer immediately. Final steel levels and dimensions are to be confirmed by the Architectural Consultant and agreed on site with Contractor.

The client should be aware that where beams are installed within existing masonry structures it is likely that minor cracking will occur within the masonry above due to the load redistribution. It is recommended that the contractor allows to make suitable repairs within their contract.

All proprietary items specified within this document are to be installed in strict accordance with the manufacturer's recommendations and details. This includes items such as restraint straps, lintels, chemical / resin anchors and fixing brackets.

Any steelwork connections, unless detailed within this document or on the Engineers drawings are to be to the Fabricators design and detail; J B Langley will note / provide connection loads where applicable.

HEALTH & SAFETY

The aim of this section is to enable collation of Designer Risk Assessments from the Designers in the same format so that the Design Risk Management Register can be prepared and managed throughout the project by the Principal Designer.

All Designers are required to provide Design Risk Information with their designs in compliance with CDM Regulation 9(2)-9(4) which requires application of the General Principles of Prevention and consideration of The Workplace (Health, Safety and Welfare) Regulations 1992 (Regulation 9):

(2) When preparing or modifying a design the designer must take into account the general principles of prevention and any pre-construction information to eliminate, so far as is reasonably practicable, foreseeable risks to the health or safety of any person:

(a) carrying out or liable to be affected by construction work
(b) *maintaining or cleaning a structure or*
(c) *using a structure designed as a workplace*

(3) If it is not possible to eliminate these risks, the designer must, so far as is reasonably practicable:

(a) take steps to reduce or, if that is not possible, control the risks through the subsequent design process
(b) provide information about those risks to the principal designer and
(c) *ensure appropriate information is included in the health and safety file*

(4) A designer must take all reasonable steps to provide, with the design, sufficient information about the design, construction or maintenance of the structure, to adequately assist the client, other designers and contractors to comply with their duties under these Regulations.

Further guidance is available within L153 Managing health and safety in construction, pages 26-30 (paragraphs 72-93).

The general principles of prevention are set out in full in Appendix 1 of L153, but in summary they are to:

(a) avoid risks where possible
(b) evaluate those risks that cannot be avoided and
(c) put in place proportionate measures that control them at source

Ref	Activity / Hazard	Risk(s)	Initial Risk Rating	Design Mitigation Measures and Controls (Eliminate, Reduce, Information, and Control)	Information	Revised Risk Rating
A	**During Construction**					
1	Excavation / Groundwork	Contaminated material if found during the excavation works	**L**	Limit excavations as much as possible	Recommendations made within the SI Report are to be followed; PPE to be worn on site	**L**
2	Excavation / Groundwork	Collapse of excavation sides	**H**	Limit excavations as much as possible	Excavations to be battered back in line with ground conditions or temporary propping to be introduced	**M**
3	Construction of drainage	Working within open excavations	**H**	Limit excavations and drainage depths as much as practicable	Excavations to be battered back in line with ground conditions or temporary propping to be introduced	**M**
4	Lifting / moving of materials	Possible injury due to size / weight of materials	**M**	Weights of steelwork to be designed as low as possible	Mechanical aids to be used as much as possible	**M**

5	Temporary instability	Potential for structural collapse	**H**	Designed to be stable upon completion	Contractor should provide a method statement for the erection of the structure and structural elements including any temporary works	**M**
6	Craneage	Overturning of crane due to poor ground conditions	**H**	N/A	Contractor to determine ground conditions in proposed crane location and where necessary suitable compacted hardcore crane matt to be designed to form working platform	**M**
7	Working around existing services	Potential injury from service strike	**H**	N/A	Contractor shall survey and locate existing services prior to commencing works and ensure care is taken during works	**M**
8	Working at height	Potential fall from height	**H**	N/A	Contractor to provide method statements for work at height. Steelwork installation / erection to be undertaken by qualified steelwork erectors.	**M**
9	Working at height	Potential injury from falling objects	**H**	N/A	Contractor to provide method statement for use of equipment at height; No access to be granted to areas below active works at height.	**M**
10	Work in confined spaces	Potential for suffocation	**H**	N/A	All construction personnel working in confined spaces must have a valid 'confined spaced certificate' and works must not be carried out alone.	**M**
11	Site Working	Exposure to Asbestos and Asbestos based materials	**H**	N/A	Contractor to ensure a suitably qualified person has carried out an Asbestos R & D Survey, prior to any works on site.	**M**
B	**During Maintenance / Cleaning**					
1	Roof maintenance	Potential fall from heights	**H**	**N/A**	Fall arrest measures to be considered by the architect during the design phase	**M**
2	Cleaning and maintenance of windows / rainwater outlets	Potential fall from heights	**H**	**N/A**	Fall arrest measures/physical access to be considered by the architect during the design phase	**M**

PARTY WALL AGREEMENT

If any of the proposed works involve the following:

- works to or on an existing wall which is shared another property
- building on the boundary line with a neighbouring
- excavation near a neighbouring structure

then the client must confirm whether the works fall under the Party Wall Act; if it does, the Act requires the client to notify all affected neighbours of works. Refer to your Architect / this website for guidance: www.gov.uk/guidance/party-wall-etc-act-1996-guidance.

SCOPE OF WORKS

Structural calculations for the proposed rebuild of the existing gable façade.

DESIGN CODES

Design codes typically used and adhered to throughout this calculation document:

- NHBC
- BS 648: 1964 - Weights of Building Materials
- BS 6399: Pt 1: 1996 - Loadings for Buildings
- BS 6399: Pt 3: 1988 - Imposed Roof Loadings
- BS 5950: Pt 1: 2000 - Structural Steel
- BS 5628: Pt 1: 2005 - Masonry
- BS 5268: Pt 2: 2002 - Timber
- BS 8110: Pt 1: 1997 - Concrete

LOADINGS

Roof (Pitched)

Dead (kN/m²)

0.60	Roof finishes
0.05	Battens + Felt
0.05	Couter Battens
0.20	Timber Joists
0.05	Insulation
0.15	Ceiling (Plasterboard + Skim)
0.10	Services

1.20kN/m²

Imposed (kN/m²)

0.60	Snow / No Access (Maintenace only)

0.60kN/m²

Walls

Dead

2.60kN/m²	140mm stonework
2.20kN/m²	100mm brickwork
1.80kN/m²	100mm blockwork
0.25kN/m²	100mm timber studwork

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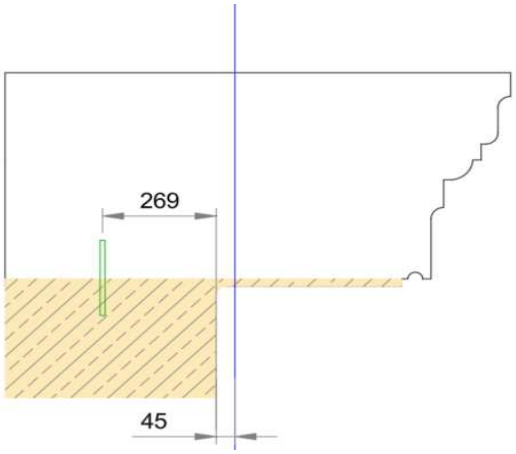
	Reinstatement Support		1
	CALCULATIONS	Calculation By: O. J. Smith	Date 27/05/2026

Ref.

Output

Corbel Location 1 - Overturning Check



Area of stone: 616373 mm² / m — Source - CAD Drawings

Distance from centroid of mass to face of support = 45 mm

Weight of Ashlar Stone: 24kN/m²

Weight of stone = 14.793 kN / m

Safe allowable bearing strength Ashlar Stone: 0.3N/mm² — Cautious value

Width of stone required at outermost face to support weight:

14.793 kN / m / (0.3 N/mm² x 1000mm) = **0.049** m

= 49 mm

Overturning:

Eccentricity = 45 + 49 / 2 = 70 mm

Moment = 70 mm x 14.793 kN / m = 1.0304 kNm/m

Dowel Only Resistance Required (Pull Out)

Dowel Centres: 750 mm

Dowel Eccentricity: 269 mm - 49 / 2 = 244 mm

1.0304 kNm/m x 0.75 m / 0.244 m = **3.1627 kN** — Test to 2x on site Pull Out

Form ref:

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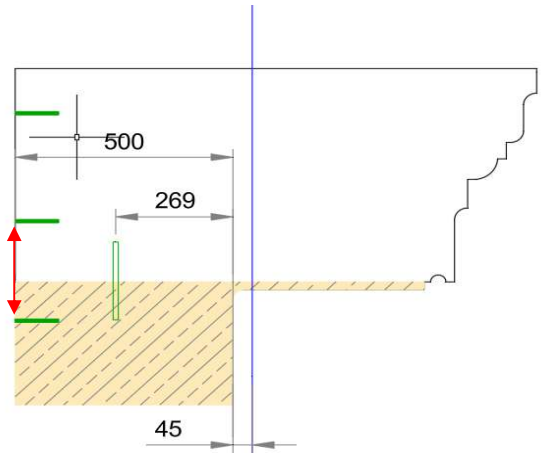
	Reinstatement Support		2
	CALCULATIONS	Calculation By: O. J. Smith	Date 27/05/2026

Ref.

Output

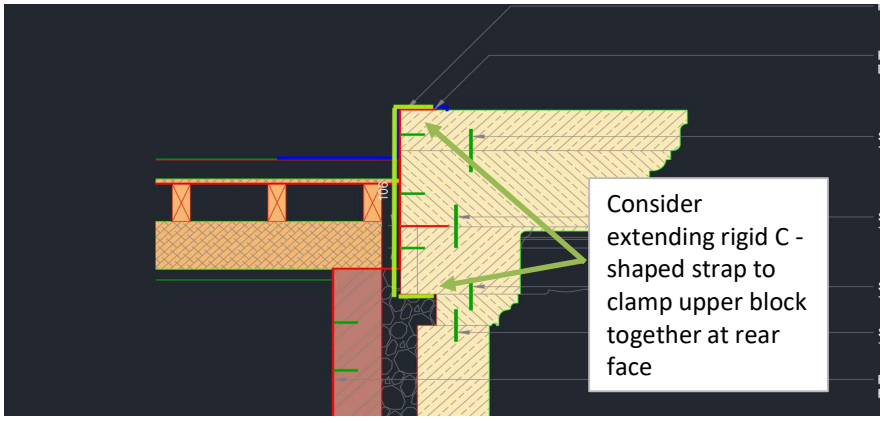
Likely too high to demonstrate resistance (1-2kN)

Consider shear resistance required between rear dowels offering restraint:



1.0304 kNm/m x 0.75 m / 0.500 m = **1.5456 kN**

100mm edge - breakout risk



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	Reinstatement Support	3
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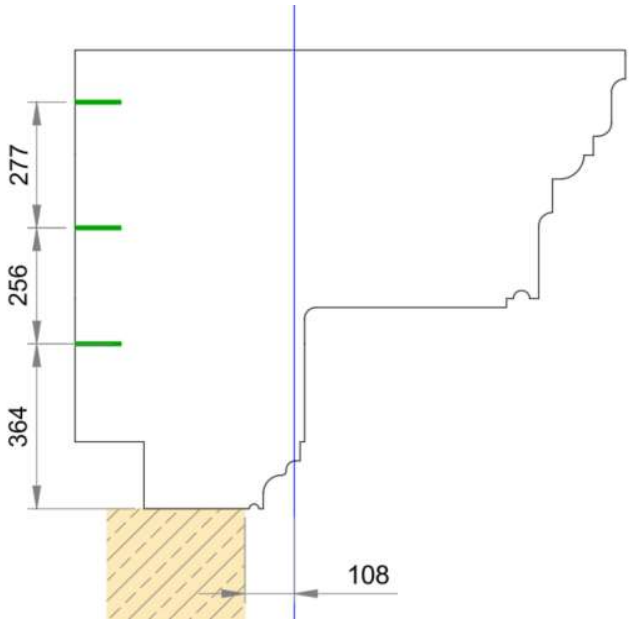
Ref.

Output

Full Corbel Location 2 - Overturning Check



Area of stone: 808382 mm² / m — Source - CAD Drawings

Distance from centroid of mass to face of support = 108 mm

Weight of Ashlar Stone: 24kN/m²

Weight of stone = 19.401 kN / m

Safe allowable bearing strength Ashlar Stone: 0.3N/mm² — Cautious value

Width of stone required at outermost face to support weight:

19.401 kN / m / (0.3 N/mm² x 1000mm) = **0.065** m

= 65 mm

Overturning:

Eccentricity = 108 + 65 / 2 = 140 mm

Moment = 140 mm x 19.401 kN / m = 2.7227 kNm/m

Overturning per centre at 0 mm = 0 kNm

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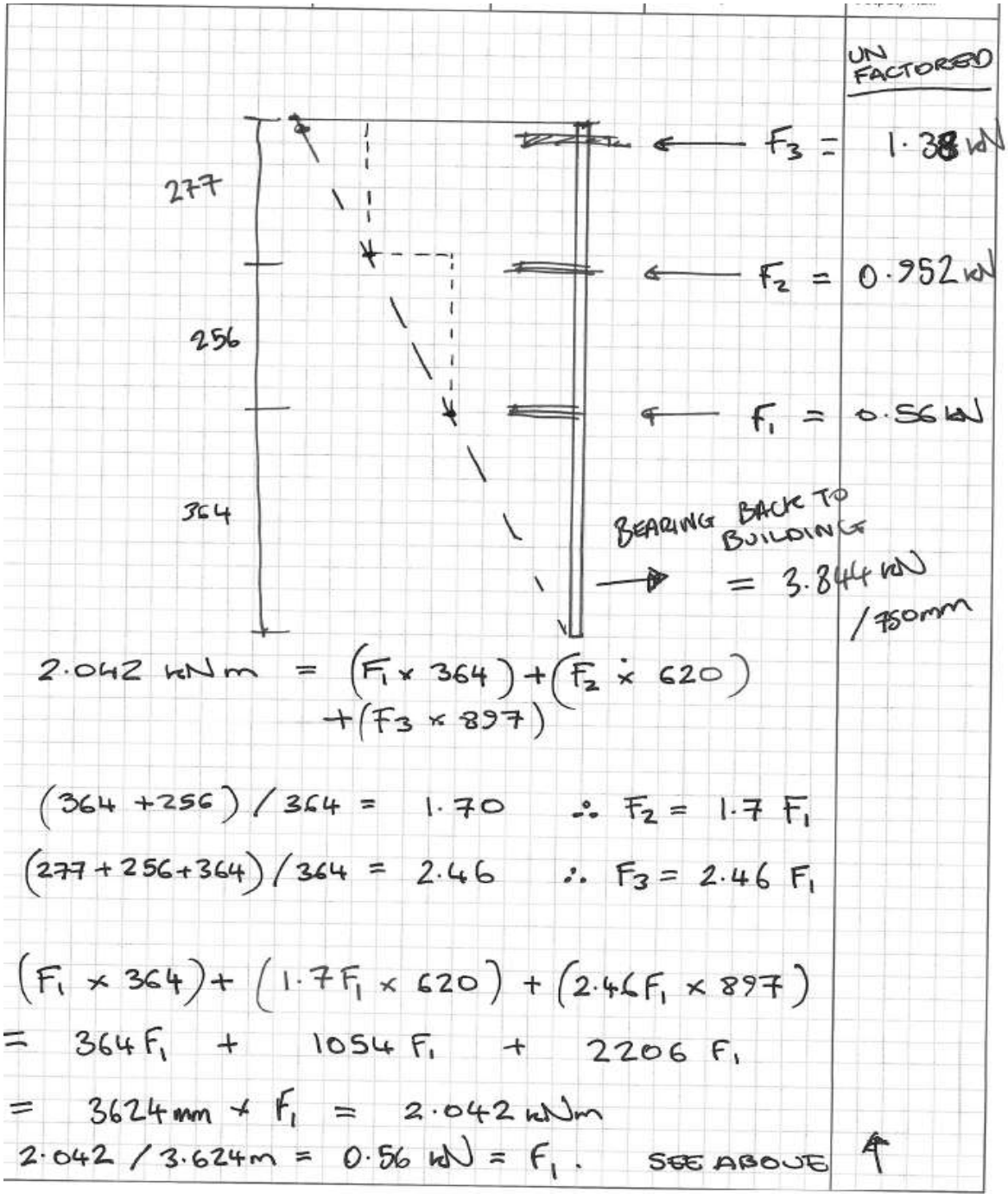
	Reinstatement Support		4
	CALCULATIONS	Calculation By: O. J. Smith	Date 27/05/2026

Ref.



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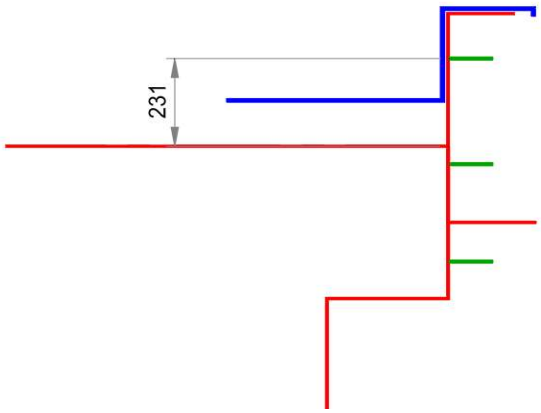
	Reinstatement Support		5
	CALCULATIONS	Calculation By: O. J. Smith	Date 27/05/2026

Ref.		Output
	Maximum Dowel Force = 1.38kN (Unfactored)	Test to 2x on site Pull Out
	Backing Plate	
		
	By inspection the central rigid support will likely attract the majority of loading from F3	
	Bar to F3 (1.38kN) to be checked for bending in cantilever	
	Moment = 0.231m x 1.38kN = 0.3188 kNm	
	Strap Plate Size: Depth: **10** mm Width: **100** mm	
	Section Modulus Sxx = b x h² / 6 = 1666.7 mm³	
	Grade S355 Py = 275 **N/mm²**	
	Moment Capacity = **Py x Sxx =** 0.4583 kNm	
	FOS = 1.4378	1.35 adequate for dead load
	Suitable for C shape clamp force of 1.5kN at 150mm (0.225kNm)	

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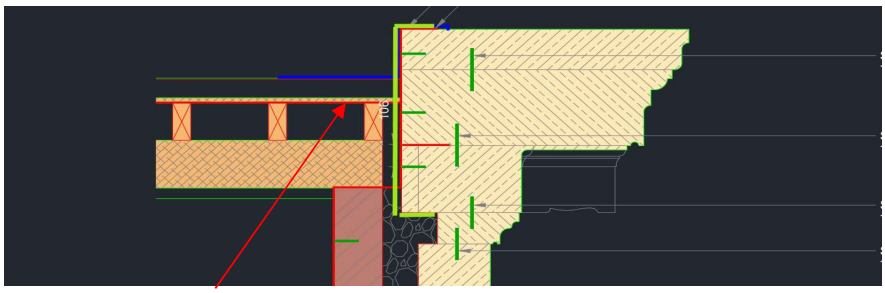
Output

Restraint Requirements: Roof



Strap on rafters central to the dowel group likely to attract the majority of loading

Loading per strap = 3.84kN.

Loading to roof structure per metre = 5.1 kN/m

Design Loading per metre = 6.9 kN/m

If loading 3 No. Timbers, loading per timber = 2.3 kN/m

Drawing shows 175 x 75 timbers. See Calculation.

Assuming C24 timber grade, rafters will need to be secured at 2.5m intervals to resist bending. Use tying straps unless diaphagm action can be assumed.

Straps must tie back to a sufficient number of rafters to provide 5.1kN/m horizontal resistance.

Secondary straps can be omitted where adequate ridges/purlins are located in their place

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	Subject	Sheet No.
	Timber Rafter Check (Weak Axis)	7
	CALCULATIONS — Calculation By: O. J. Smith	Date 27/05/2026

Ref.		Output
	Beam Selection: 175 x 75 Type: Softwood	
	Timber Grade: C24	
	Application: Cold Roofs, Ground Floors, External Protected	
	Service Class: 2	
	Duration: Permanent (> 10 years)	
	Support Condition: Simply Supported with UDL	
	Section Properties	
	Bending strength, $f_{m,k}$ = 24 N/mm² Shear strength, $f_{v,k}$ = 2.5 N/mm²	
	Compressive Strength, perpendicular to the grain, $f_{c,90,k}$ = 2.5 N/mm²	
BS-EN 336 & BS-EN 390	Section Depth, d = 173 mm Section Breadth, b = 74 mm	Allows for sawing / planing tolerances
	I_{zz} = 5841979 mm⁴ Z_{zz} = 157891 mm³	
	E = 11000 N/mm² L = 2.50 m	
	l_{ef} = 2.25 m	
BS EN 1995-1-1	**Modification Factors & Partial Factors**	
Section 3:	Deformation factor, k_{def} = **0.80** Load duration factor, k_{mod} = **0.60**	
Section 6:	Crack factor, k_{cr} = **0.67** Lateral buckling factor, k_{crit} = **1.00**	k_{crit} Taken from tables derived from EC5 6.3.3
	Depth factor, k_h = **1.00** System strength factor, k_{sys} = **1.10**	
	Notched beams factor, k_v = **1.00** Support bearing factor, $k_{c,90}$ = **1.50**	
Table 2.3	Material Properties, γ_m = **1.30**	
BS EN 1995-1-1 6.1.6	**Bending Stress**	
	Design Bending Moment, M_{Ed} = 1.80 kNm	(W= 2.3) WL²/8
	Design Bending Stress, $\sigma_{m,y,d} = \frac{M_{Ed} \times z}{I_{zz}}$ = 11.38 N/mm²	z = b / 2

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	Timber Rafter Check (Weak Axis)	8
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Ref.		Output
	Design Bending Strength, $f_{m,d}$ = (k_{crit} x k_{sys} x k_{mod} x k_h) x $f_{m,k}$ / γ_m 12.18 N/mm²	
	$\frac{\sigma_{m,y,d}}{f_{m,y,d}}$ = 0.93 Utilisation: 93.4%	Therefore OK!
BS EN 1995-1-1 6.1.7	**Shear Stress**	
	Design Shear Force, V_{Ed} = 2.88 kN	WL/2
	Design Bending Stress, $\tau_{,d}$ = $\frac{3V_{Ed}}{2A}$ = 0.34 N/mm²	
	Design Shear Strength, $f_{v,d}$ = (k_v x k_{sys} x k_{mod} x k_{cr}) x $f_{v,k}$ / γ_m = 0.85 N/mm²	
	$\frac{\tau_d}{f_{v,d}}$ = 0.40 Utilisation: 39.6%	Therefore OK!

Summary of Utilisations	
Check	% Utilised
Bending Stress	93.4%
Shear Stress	39.6%