PCA CONSULTING ENGINEERS
CIVIL
STRUCTURAL
CONSERVATION

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PROJECT: St Dubricius Church, Porlock

REF: 17274

DATE: March 2025

CALCULATIONS

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CALCULATION	CONTRACT St Dubricius Church, Porlock	REF: 17274
		DATE: Mar 2025
		SHEET: i

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CALCULATIONS	PROJECT:	St Dubricius Church, Porlock	PROJECT No:	17274
			DATE:	Mar 2025
			CALCULATIONS BY:	CAS
			CHECKED BY:	LS

STRUCTURAL SUMMARY

Assessment of existing structure for suitability for fixing PV panels to one side. The existing building is a Grade I listed church dating to 13th century. The structure consists of stone walls and timber trussed roofs in various arrangements. The PV panels are proposed to be fixed to the south slope of the roof over the nave.

The existing truss sections have been checked under existing and proposed loads.

Calculations to be read in conjunction with PCA covering report, dated March 2025.

STRUCTURAL STABILITY

Class 2a regarding disproportionate collapse. No measures other than those specified in the code standards. Anchor roof structure at max 1.25m centres.

All temporary support works should be considered by the contractor prior to commencement of the works to maintain short term stability.

ASSUMPTIONS

Existing walls and foundations are suitable for the revised loadings.

Listed Building Consent arranged by Others.

DESIGN REFERENCES

BS EN 1990:2002 + A1:2005 + NA	Basis of Structural Design
BS EN 1991-1-1:2002 + NA	General Actions
BS EN 1991-1-3:2003 + A1:2015 + NA	Snow Loads
BS EN 1991-1-4:2005 + A1:2010 + NA	Wind Actions
BS EN 1995-1-1-2004+ A2 + NA	Design of Timber Structures
BS EN 1996-1-1:2005+NA	Design of Masonry Structures

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DESIGNERS RISK ASSESSMENT/ RESIDUAL SIGNIFICANT RISK REGISTER

PROJECT:	St Dubricius Church, Porlock
JOB NO.:	**17274**
DATE:	March 2025
CLIENT:	Jonny Poland

PROJECT DESCRIPTION:

Assessment of existing roof structure for capacity for additional load from retrofitted PV panels. Structure is a Grade I listed church with stone walls and timber trussed roof.

PV panels to be installed on south slope of Nave Roof.

Works may require Listed Building Consent, arranged by Others.

The Contractor is to ensure short-term stability of the structure is maintained throughout works.

It is assumed that an asbestos report / survey has been carried out and the works deemed appropriate in this regard. The Client / Contractor must satisfy themselves that there are no asbestos containing materials with the area of work that will be disturbed or could potentially cause a hazard. More information can be found on the HSE website; www.hse.gov.uk/asbestos

If it is found that any of the assumptions or interpretations made at the calculations stage differ to that on site, the Engineer must be contacted immediately to ensure that specification and calculations are relevant.

No significant residual risks, or those that would be difficult to manage are evident over and above those normally expected to be managed by a competent contractor.

The following risks or work sequences identified are in addition (but not limited) to those which a competent Contractor would normally be expected to anticipate and cater for including: -
Temporary Works – Scaffolding, Excavations, Working at Height, COSHH requirements, etc

General Loadings

Existing

Roof pitch: 45 approx.

Dead Load

Roofing Tiles (Slate)	0.45 kN/m²
Softwood (C16 battens for slating and tiling)	0.03 kN/m²
Boarding	0.15 kN/m²
Slope =	0.63 kN/m²
Plan =	0.89 kN/m²

Live Load

H. Roofs not accessible except for normal maintenance and repair	0.60 kN/m²

Proposed

Roof pitch: 45 approx.

Dead Load

PV Panels	0.20 kN/m²
Roofing Tiles (Slate)	0.45 kN/m²
Softwood (C16 battens for slating and tiling)	0.03 kN/m²
Insulation	0.05 kN/m²
2 layers boarding	0.30 kN/m²
Slope without PV =	0.83 kN/m²
Plan without PV =	1.17 kN/m²
Slope with PV =	1.03 kN/m²
Plan with PV =	1.46 kN/m²

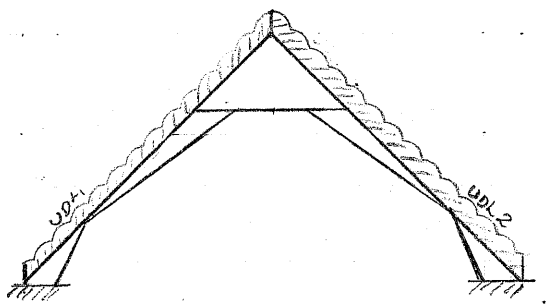
Live Load

H. Roofs not accessible except for normal maintenance and repair	0.60 kN/m²

ROOF TRUSS

EXISTING ROOF TRUSSES OVER NAVE

TRUSSES SPACED AT 300/350mm CENTRES. WORST CASE IS 350mm C/C.



EXISTING SECTIONS - ASSUMED:

- RAFTERS - 100 x 100 C24
- COLLAR - 100x100 C24
- STRUTS - 100x100 C24

LOADINGS

EXISTING - $UDL_1 = UDL_2$: DEAD = 0.63 x 0.35 = 0.22kN/m
LIVE = 0.6 x 0.35 = 0.21kN/m

UDL_1 - PROPOSED ROOF (0.35m hw) [WITHOUT PV PANELS]
DEAD = 0.83 x 0.35 = 0.29kN/m
LIVE = 0.6 x 0.35 = 0.21kN/m

UDL_2 - PROPOSED ROOF (0.35m hw): [WITH PV PANELS]
DEAD = 1.03 x 0.35 = 0.36kN/m
LIVE = 0.6 x 0.35 = 0.21kN/m

FROM COMPUTER ANALYSIS (QUICK FRAME & TEDDS):

EXISTING SECTIONS SUITABLE FOR REVISED LOAD.

HORIZONTAL LOAD AT SUPPORT INCREASES BY (1.81 − 1.51) = 0.3kN.

MAX DEFLECTIONS: HORIZONTAL = 2.4 − [1.0 + 1.0] = 0.4mm INCREASE

VERTICAL = 1.3 − 1.0 = 0.3mm

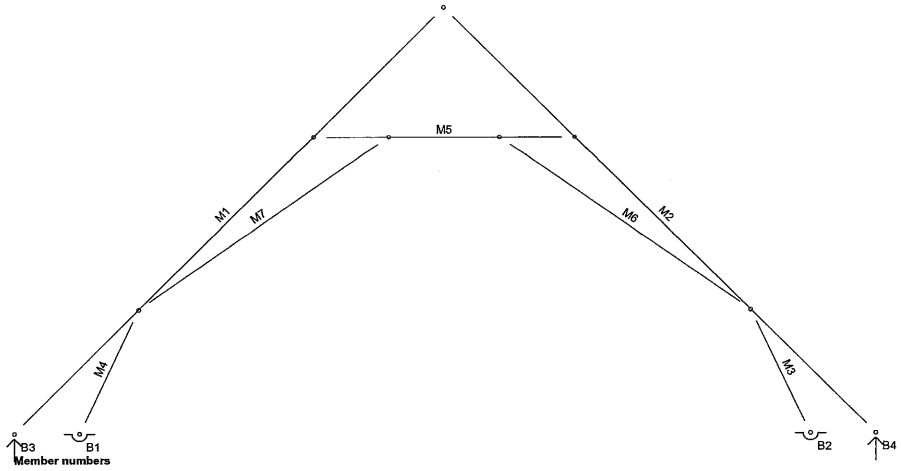
ROOF TRUSS

EXISTING SECTIONS SUITABLE FOR REVISED LOAD.

HORIZONTAL LOAD AT SUPPORTS INCREASES BY 0.3kN

HORIZONTAL DEFLECTION INCREASES BY 0.4mm

VERTICAL DEFLECTION INCREASES BY 0.3mm



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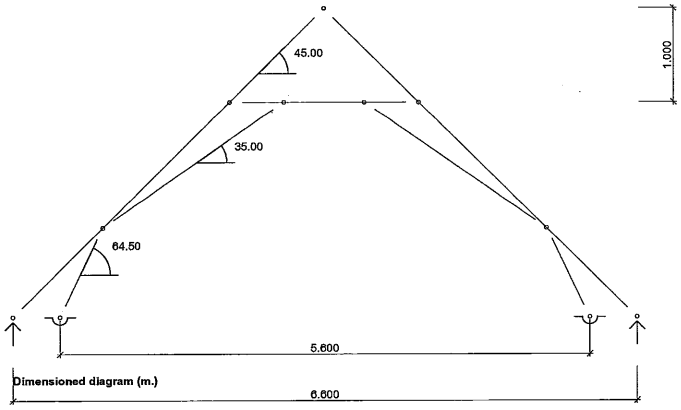

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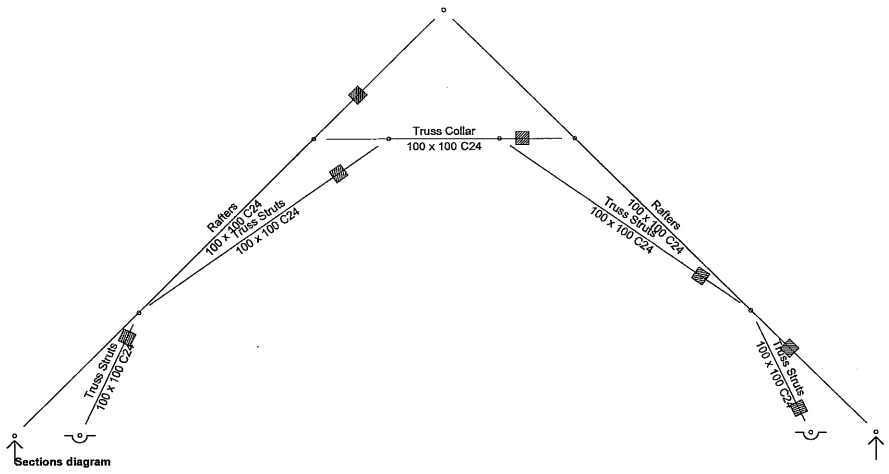

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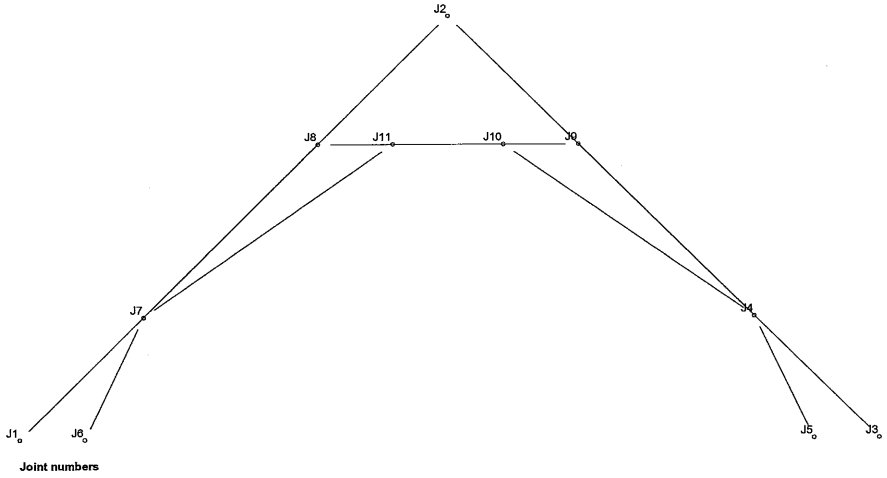

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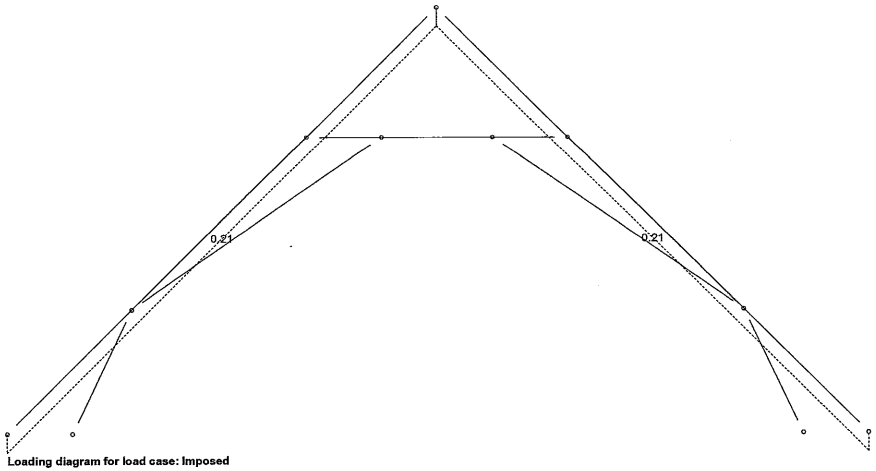

Loading diagram for load case: Imposed

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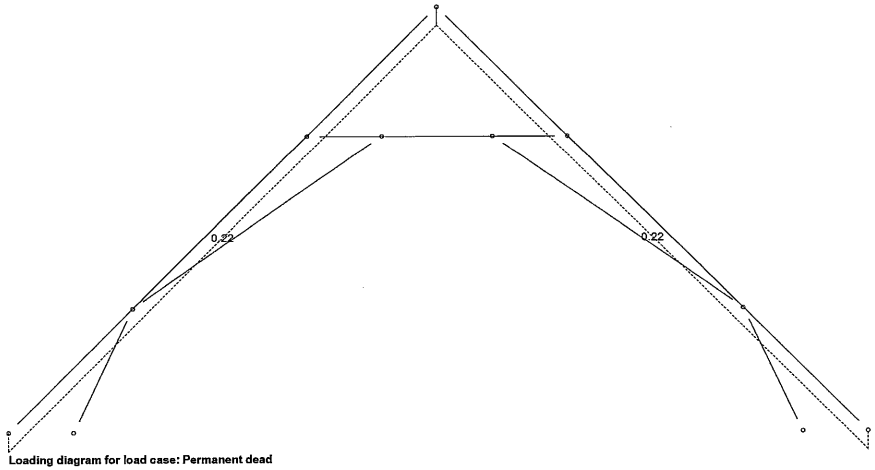

Loading diagram for load case: Permanent dead

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File : Roof frame	
Title : Roof Truss 17274 St Dubricius Church, Porlock	
Designed: CAS	Checked :

Section groups

Rafters - Timber - 100 x 100 C24

Depth	=	100.0 mm
E	=	11.00 kN/mm2
I	=	833.3 cm4
A	=	100.0 cm2

Truss Collar - Timber - 100 x 100 C24

Depth	=	100.0 mm
E	=	11.00 kN/mm2
I	=	833.3 cm4
A	=	100.0 cm2

Truss Struts - Timber - 100 x 100 C24

Depth	=	100.0 mm
E	=	11.00 kN/mm2
I	=	833.3 cm4
A	=	100.0 cm2

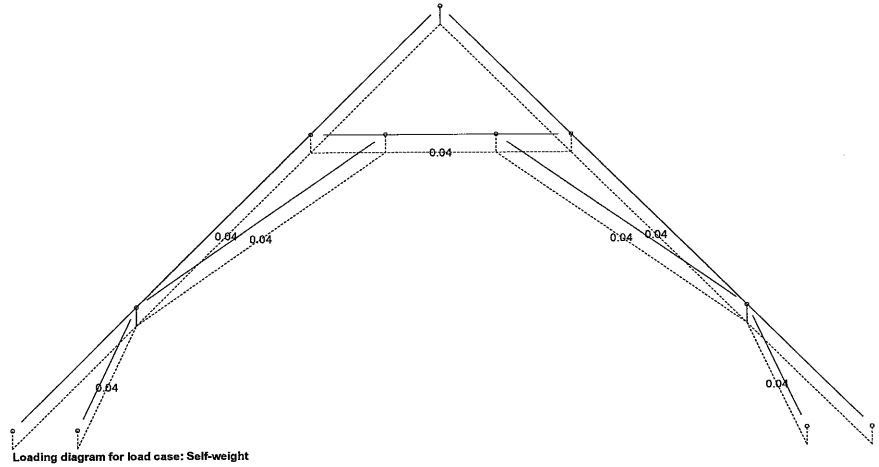
Joints

Name	X m	Y m
J1	0.000	0.000
J2	3.300	3.300
J3	6.600	0.000
J4	5.644	0.956
J5	6.100	0.000
J6	6.500	0.000
J7	0.956	0.956
J8	2.300	2.300
J9	4.300	2.300
J10	3.725	2.300
J11	2.875	2.300

Members

Name	Length m	Section group	Ends Leftjow'	Other	Joints
M1	4.667	Rafters	Pin	Pin	J1 Thro' 7, 8 to 2
M2	4.667	Rafters	Pin	Pin	J2 Thro' 9, 4 to 3
M3	1.059	Truss Struts	Pin	Pin	J4 to 5
M4	1.059	Truss Struts	Pin	Pin	J6 to 7
M5	2.000	Truss Collar	Pin	Pin	J8 Thro' 11, 10 to 9
M6	2.343	Truss Struts	Pin	Pin	J10 to 4
M7	2.343	Truss Struts	Pin	Pin	J7 to 11

Quikframe - Plane Frame Analysis **Release 9.40**



Loading diagram for load case: Self-weight

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Bases

Name	Joint	Horizontal kN/m	Vertical kN/m	Rotational kN.m/Rad
B1	J6	Fixed	Fixed	Pinned
B2	J5	Fixed	Fixed	Pinned
B3	J1	Free	Fixed	Pinned
B4	J3	Free	Fixed	Pinned

Load cases

Name	Type
Permanent dead	Permanent dead
Self-weight	Permanent dead
Imposed	Imposed

Load combinations

Name	Limit	Factor	Load case
Dead+Imposed ULS	ULS	1.35	Permanent dead
		1.35	Self-weight
		1.50	Imposed
Dead+Imposed SLS	SLS	1.00	Permanent dead
		1.00	Self-weight
		1.00	Imposed
Unfactored total dead	SLS	1.00	Permanent dead
		1.00	Self-weight
		0.00	Imposed
Unfactored imposed	SLS	0.00	Permanent dead
		0.00	Self-weight
		1.00	Imposed

Uniformly distributed loads

Load case : Permanent dead

Name	Member	Value kN/m	Direction
L8	M1	0.22	Vertical ↓
L9	M2	0.22	Vertical ↓

Uniformly distributed loads

Load case : Self-weight

Name	Member	Value kN/m	Direction	
L1	M1	0.04	Vertical ↓	Self weight
L2	M2	0.04	Vertical ↓	Self weight
L3	M3	0.04	Vertical ↓	Self weight
L4	M4	0.04	Vertical ↓	Self weight
L5	M5	0.04	Vertical ↓	Self weight
L6	M6	0.04	Vertical ↓	Self weight
L7	M7	0.04	Vertical ↓	Self weight

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Uniformly distributed loads

Load case : Imposed

Name	Member	Value kN/m	Direction
L10	M1	0.21	Vertical ↓
L11	M2	0.21	Vertical ↓

Forces - Linear elastic analysis

Loading combination: Dead+Imposed ULS

Member	Distance m	Measured from	Axial kN	Sense	Shear kN	Moment kN.m
M1	0.000	Left end	-0.12	Compression	0.12	0.00
	0.263	Left end	0.00		-0.00	0.02
	0.526	Left end	0.12	Tension	-0.12	0.00
	1.352	Left end	0.51	Tension	-0.51	-0.26
	1.352	Left end	-2.80	Compression	0.57	-0.26
	1.975	Left end	-2.51	Compression	0.28	0.00
	2.560	Left end	-2.23	Compression	-0.00	0.08
	3.144	Left end	-1.96	Compression	-0.28	-0.00
	3.253	Left end	-1.91	Compression	-0.33	-0.03
	3.253	Left end	-0.98	Compression	0.36	-0.03
	3.351	Left end	-0.93	Compression	0.31	0.00
	4.009	Left end	-0.62	Compression	0.00	0.10
	4.667	Left end	-0.31	Compression	-0.31	0.00
M2	0.000	Left end	-0.31	Compression	0.31	0.00
	0.658	Left end	-0.62	Compression	-0.00	0.10
	1.316	Left end	-0.93	Compression	-0.31	0.00
	1.414	Left end	-0.98	Compression	-0.36	-0.03
	1.414	Left end	-1.91	Compression	0.33	-0.03
	1.523	Left end	-1.96	Compression	0.28	-0.00
	2.107	Left end	-2.23	Compression	0.00	0.08
	2.692	Left end	-2.51	Compression	-0.28	0.00
	3.315	Left end	-2.80	Compression	-0.57	-0.26
	3.315	Left end	0.51	Tension	0.51	-0.26
	4.141	Left end	0.12	Tension	0.12	0.00
	4.404	Left end	0.00		0.00	0.02
	4.667	Left end	-0.12	Compression	-0.12	0.00
M3	0.000	Left end	-3.47	Compression	0.01	0.00
	0.529	Left end	-3.50	Compression	0.00	0.00
	1.059	Left end	-3.52	Compression	-0.01	0.00
M4	0.000	Left end	-3.52	Compression	0.01	0.00
	0.530	Left end	-3.50	Compression	-0.00	0.00
	1.059	Left end	-3.47	Compression	-0.01	0.00
M5	0.000	Left end	-1.14	Compression	0.17	0.00
	0.575	Left end	-1.14	Compression	0.14	0.09
	0.575	Left end	-1.07	Compression	0.02	0.09
	1.000	Left end	-1.07	Compression	0.00	0.10
	1.425	Left end	-1.07	Compression	-0.02	0.09
	1.425	Left end	-1.14	Compression	-0.14	0.09
	2.000	Left end	-1.14	Compression	-0.17	0.00
M6	0.000	Left end	0.13	Tension	0.05	0.00

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Forces - Linear elastic analysis

Loading combination: Dead+Imposed ULS

Member	Distance m	Measured from	Axial kN	Sense	Shear kN	Moment kN.m
	1.172	Left end	0.09	Tension	-0.00	0.03
	2.343	Left end	0.05	Tension	-0.05	0.00
M7	0.000	Left end	0.05	Tension	0.05	0.00
	1.171	Left end	0.09	Tension	0.00	0.03
	2.343	Left end	0.13	Tension	-0.05	0.00

Forces - Linear elastic analysis

Loading combination: Dead+Imposed SLS

Member	Distance m	Measured from	Axial kN	Sense	Shear kN	Moment kN.m
M1	0.000	Left end	-0.09	Compression	0.09	0.00
	0.261	Left end	0.00		-0.00	0.01
	0.522	Left end	0.09	Tension	-0.09	0.00
	1.352	Left end	0.36	Tension	-0.36	-0.19
	1.352	Left end	-1.98	Compression	0.40	-0.19
	1.977	Left end	-1.77	Compression	0.19	-0.00
	2.562	Left end	-1.58	Compression	-0.00	0.06
	3.147	Left end	-1.38	Compression	-0.19	0.00
	3.253	Left end	-1.35	Compression	-0.23	-0.02
	3.253	Left end	-0.69	Compression	0.25	-0.02
	3.348	Left end	-0.66	Compression	0.22	-0.00
	4.007	Left end	-0.44	Compression	0.00	0.07
	4.667	Left end	-0.22	Compression	-0.22	0.00
M2	0.000	Left end	-0.22	Compression	0.22	0.00
	0.660	Left end	-0.44	Compression	-0.00	0.07
	1.319	Left end	-0.66	Compression	-0.22	-0.00
	1.414	Left end	-0.69	Compression	-0.25	-0.02
	1.414	Left end	-1.35	Compression	0.23	-0.02
	1.520	Left end	-1.38	Compression	0.19	0.00
	2.105	Left end	-1.58	Compression	0.00	0.06
	2.690	Left end	-1.77	Compression	-0.19	-0.00
	3.315	Left end	-1.98	Compression	-0.40	-0.19
	3.315	Left end	0.36	Tension	0.36	-0.19
	4.145	Left end	0.09	Tension	0.09	0.00
	4.406	Left end	0.00		0.00	0.01
	4.667	Left end	-0.09	Compression	-0.09	0.00
M3	0.000	Left end	-2.46	Compression	0.01	0.00
	0.529	Left end	-2.48	Compression	0.00	0.00
	1.059	Left end	-2.50	Compression	-0.01	0.00
M4	0.000	Left end	-2.50	Compression	0.01	0.00
	0.530	Left end	-2.48	Compression	-0.00	0.00
	1.059	Left end	-2.46	Compression	-0.01	0.00
M5	0.000	Left end	-0.80	Compression	0.12	0.00
	0.575	Left end	-0.80	Compression	0.10	0.06
	0.575	Left end	-0.76	Compression	0.02	0.06
	1.000	Left end	-0.76	Compression	0.00	0.07

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Forces - Linear elastic analysis

Loading combination: Dead+Imposed SLS

Member	Distance m	Measured from	Axial kN	Sense	Shear kN	Moment kN.m
	1.425	Left end	-0.76	Compression	-0.02	0.06
	1.425	Left end	-0.80	Compression	-0.10	0.06
	2.000	Left end	-0.80	Compression	-0.12	0.00
M6	0.000	Left end	0.09	Tension	0.04	0.00
	1.172	Left end	0.06	Tension	-0.00	0.02
	2.343	Left end	0.03	Tension	-0.04	0.00
M7	0.000	Left end	0.03	Tension	0.04	0.00
	1.171	Left end	0.06	Tension	0.00	0.02
	2.343	Left end	0.09	Tension	-0.04	0.00

Reactions - Linear elastic analysis

Loading combination: Unfactored total dead

Base	Joint	Horizontal kN	Vertical kN	Moment kN.m
B1	J6	0.63 →	1.34 ↑	-0.00
B2	J5	-0.63 ←	1.34 ↑	-0.00
B3	J1	0.00	0.06 ↑	0.00
B4	J3	0.00	0.06 ↑	-0.00

Reactions - Linear elastic analysis

Loading combination: Unfactored imposed

Base	Joint	Horizontal kN	Vertical kN	Moment kN.m
B1	J6	0.44 →	0.92 ↑	0.00
B2	J5	-0.44 ←	0.92 ↑	0.00
B3	J1	0.00	0.06 ↑	0.00
B4	J3	0.00	0.06 ↑	-0.00

Member deflections - Linear elastic analysis

Loading combination: Dead+Imposed SLS

Member	Distance m	Measured from	Dx mm	Dy mm	Pz Rad
M1	0.000	Left end	-0.4 ←	0.0	0.0004 ↺
	0.778	Left end	-0.6 ←	0.2 ↑	0.0004 ↺
	1.556	Left end	-0.7 ←	0.3 ↓	-0.0005 ↻
	2.333	Left end	-0.3 ←	-0.2 ↓	-0.0007 ↻
	3.111	Left end	-0.0	-0.4 ↓	-0.0003 ↻
	3.889	Left end	0.1 →	-0.6 ↓	-0.0001 ↻
	4.667	Left end	-0.0	-0.4 ↓	0.0004 ↺
M2	0.000	Left end	0.0	-0.4 ↓	-0.0004 ↻
	0.778	Left end	-0.1 ←	-0.6 ↓	0.0001 ↺
	1.556	Left end	0.0	-0.4 ↓	0.0003 ↺
	2.333	Left end	0.3 →	-0.2 ↓	0.0007 ↺
	3.111	Left end	0.7 →	0.3 ↑	0.0005 ↺
	3.889	Left end	0.6 →	0.2 ↑	-0.0004 ↻

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File	: Roof frame		
Title	: Roof Truss 17274 St Dubricius Church, Porlock		
Designed: CAS		Checked :	

Member deflections - Linear elastic analysis

Loading combination: Dead+Imposed SLS

Member	Distance m	Measured from	Dx mm	Dy mm	Pz Rad
	4.667	Left end	0.4 →	-0.0	-0.0004 ↷
M3	0.000	Left end	0.7 →	0.3 ↑	-0.0007 ↷
	0.177	Left end	0.6 →	0.3 ↑	-0.0007 ↷
	0.353	Left end	0.5 →	0.2 ↑	-0.0007 ↷
	0.530	Left end	0.4 →	0.2 ↑	-0.0007 ↷
	0.706	Left end	0.2 →	0.1 ↑	-0.0007 ↷
	0.883	Left end	0.1 →	0.1 ↑	-0.0007 ↷
	1.059	Left end	0.0	0.0	-0.0007 ↷
M4	0.000	Left end	0.0	0.0	0.0007 ↶
	0.177	Left end	-0.1 ←	0.1 ↑	0.0007 ↶
	0.353	Left end	-0.2 ←	0.1 ↑	0.0007 ↶
	0.530	Left end	-0.4 ←	0.2 ↑	0.0007 ↶
	0.706	Left end	-0.5 ←	0.2 ↑	0.0007 ↶
	0.883	Left end	-0.6 ←	0.3 ↑	0.0007 ↶
	1.059	Left end	-0.7 ←	0.3 ↑	0.0007 ↶
M5	0.000	Left end	0.0	-0.4 ↓	-0.0005 ↷
	0.333	Left end	0.0	-0.6 ↓	-0.0004 ↷
	0.667	Left end	0.0	-0.7 ↓	-0.0002 ↷
	1.000	Left end	0.0	-0.8 ↓	0.0000
	1.333	Left end	-0.0	-0.7 ↓	0.0002 ↶
	1.667	Left end	-0.0	-0.6 ↓	0.0004 ↶
	2.000	Left end	-0.0	-0.4 ↓	0.0005 ↶
M6	0.000	Left end	-0.0	-0.7 ↓	0.0003 ↶
	0.391	Left end	0.1 →	-0.6 ↓	0.0004 ↶
	0.781	Left end	0.2 →	-0.5 ↓	0.0004 ↶
	1.172	Left end	0.3 →	-0.3 ↓	0.0005 ↶
	1.562	Left end	0.4 →	-0.1 ↓	0.0006 ↶
	1.953	Left end	0.5 →	0.1 ↑	0.0007 ↶
	2.343	Left end	0.7 →	0.3 ↑	0.0007 ↶
M7	0.000	Left end	-0.7 ←	0.3 ↑	-0.0007 ↷
	0.391	Left end	-0.5 ←	0.1 ↑	-0.0007 ↷
	0.781	Left end	-0.4 ←	-0.1 ↓	-0.0006 ↷
	1.172	Left end	-0.3 ←	-0.3 ↓	-0.0005 ↷
	1.562	Left end	-0.2 ←	-0.5 ↓	-0.0004 ↷
	1.953	Left end	-0.1 ←	-0.6 ↓	-0.0004 ↷
	2.343	Left end	0.0	-0.7 ↓	-0.0003 ↷

Member deflections - Linear elastic analysis

Loading combination: Unfactored total dead

Member	Distance m	Measured from	Dx mm	Dy mm	Pz Rad
M1	0.000	Left end	-0.3 ←	0.0	0.0003 ↶
	0.778	Left end	-0.4 ←	0.2 ↑	0.0003 ↶
	1.556	Left end	-0.4 ←	0.2 ↑	-0.0003 ↷
	2.333	Left end	-0.2 ←	-0.1 ↓	-0.0004 ↷
	3.111	Left end	-0.0	-0.3 ↓	-0.0002 ↷

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Designed: CAS		Checked :	

Member deflections - Linear elastic analysis

Loading combination: Unfactored total dead

Member	Distance m	Measured from	Dx mm	Dy mm	Pz Rad
	3.889	Left end	0.1 →	-0.4 ↓	-0.0000
	4.667	Left end	-0.0	-0.3 ↓	0.0002 ↶
M2	0.000	Left end	0.0	-0.3 ↓	-0.0002 ↷
	0.778	Left end	-0.1 ←	-0.4 ↓	0.0000
	1.556	Left end	0.0	-0.3 ↓	0.0002 ↶
	2.333	Left end	0.2 →	-0.1 ↓	0.0004 ↶
	3.111	Left end	0.4 →	0.2 ↑	0.0003 ↶
	3.889	Left end	0.4 →	0.2 ↑	-0.0003 ↷
	4.667	Left end	0.3 →	-0.0	-0.0003 ↷
M3	0.000	Left end	0.5 →	0.2 ↑	-0.0005 ↷
	0.177	Left end	0.4 →	0.2 ↑	-0.0005 ↷
	0.353	Left end	0.3 →	0.1 ↑	-0.0005 ↷
	0.530	Left end	0.2 →	0.1 ↑	-0.0005 ↷
	0.706	Left end	0.2 →	0.1 ↑	-0.0005 ↷
	0.883	Left end	0.1 →	0.0	-0.0005 ↷
	1.059	Left end	0.0	0.0	-0.0005 ↷
M4	0.000	Left end	0.0	0.0	0.0005 ↶
	0.177	Left end	-0.1 ←	0.0	0.0005 ↶
	0.353	Left end	-0.2 ←	0.1 ↑	0.0005 ↶
	0.530	Left end	-0.2 ←	0.1 ↑	0.0005 ↶
	0.706	Left end	-0.3 ←	0.1 ↑	0.0005 ↶
	0.883	Left end	-0.4 ←	0.2 ↑	0.0005 ↶
	1.059	Left end	-0.5 ←	0.2 ↑	0.0005 ↶
M5	0.000	Left end	0.0	-0.3 ↓	-0.0003 ↷
	0.333	Left end	0.0	-0.4 ↓	-0.0003 ↷
	0.667	Left end	0.0	-0.5 ↓	-0.0002 ↷
	1.000	Left end	0.0	-0.5 ↓	0.0000
	1.333	Left end	-0.0	-0.5 ↓	0.0002 ↶
	1.667	Left end	-0.0	-0.4 ↓	0.0003 ↶
	2.000	Left end	-0.0	-0.3 ↓	0.0003 ↶
M6	0.000	Left end	-0.0	-0.5 ↓	0.0001 ↶
	0.391	Left end	0.0	-0.4 ↓	0.0002 ↶
	0.781	Left end	0.1 →	-0.3 ↓	0.0002 ↶
	1.172	Left end	0.1 →	-0.2 ↓	0.0003 ↶
	1.562	Left end	0.2 →	-0.1 ↓	0.0004 ↶
	1.953	Left end	0.3 →	0.0	0.0005 ↶
	2.343	Left end	0.5 →	0.2 ↑	0.0005 ↶
M7	0.000	Left end	-0.5 ←	0.2 ↑	-0.0005 ↷
	0.391	Left end	-0.3 ←	0.0	-0.0005 ↷
	0.781	Left end	-0.2 ←	-0.1 ↓	-0.0004 ↷
	1.172	Left end	-0.1 ←	-0.2 ↓	-0.0003 ↷
	1.562	Left end	-0.1 ←	-0.3 ↓	-0.0002 ↷
	1.953	Left end	-0.0	-0.4 ↓	-0.0002 ↷
	2.343	Left end	0.0	-0.5 ↓	-0.0001 ↷

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File	: Roof frame		
Title	: Roof Truss 17274 St Dubricius Church, Porlock		
Designed: CAS		Checked :	

Member deflections - Linear elastic analysis

Loading combination: Unfactored imposed

Member	Distance m	Measured from	Dx mm	Dy mm	Pz Rad
M1	0.000	Left end	-0.1 ←	0.0	0.0001 ↶
	0.778	Left end	-0.2 ←	0.1 ↑	0.0002 ↶
	1.556	Left end	-0.2 ←	0.1 ↑	-0.0002 ↷
	2.333	Left end	-0.1 ←	-0.1 ↓	-0.0002 ↷
	3.111	Left end	-0.0	-0.2 ↓	-0.0001 ↷
	3.889	Left end	0.0	-0.2 ↓	-0.0000
	4.667	Left end	-0.0	-0.2 ↓	0.0001 ↶
M2	0.000	Left end	0.0	-0.2 ↓	-0.0001 ↷
	0.778	Left end	-0.0	-0.2 ↓	0.0000
	1.556	Left end	0.0	-0.2 ↓	0.0001 ↶
	2.333	Left end	0.1 →	-0.1 ↓	0.0002 ↶
	3.111	Left end	0.2 →	0.1 ↑	0.0002 ↶
	3.889	Left end	0.2 →	0.1 ↑	-0.0002 ↷
	4.667	Left end	0.1 →	-0.0	-0.0001 ↷
M3	0.000	Left end	0.3 →	0.1 ↑	-0.0003 ↷
	0.177	Left end	0.2 →	0.1 ↑	-0.0003 ↷
	0.353	Left end	0.2 →	0.1 ↑	-0.0003 ↷
	0.530	Left end	0.1 →	0.1 ↑	-0.0003 ↷
	0.706	Left end	0.1 →	0.0	-0.0003 ↷
	0.883	Left end	0.0	0.0	-0.0003 ↷
	1.059	Left end	0.0	0.0	-0.0003 ↷
M4	0.000	Left end	0.0	0.0	0.0003 ↶
	0.177	Left end	-0.0	0.0	0.0003 ↶
	0.353	Left end	-0.1 ←	0.0	0.0003 ↶
	0.530	Left end	-0.1 ←	0.1 ↑	0.0003 ↶
	0.706	Left end	-0.2 ←	0.1 ↑	0.0003 ↶
	0.883	Left end	-0.2 ←	0.1 ↑	0.0003 ↶
	1.059	Left end	-0.3 ←	0.1 ↑	0.0003 ↶
M5	0.000	Left end	0.0	-0.2 ↓	-0.0002 ↷
	0.333	Left end	0.0	-0.2 ↓	-0.0001 ↷
	0.667	Left end	0.0	-0.3 ↓	-0.0001 ↷
	1.000	Left end	0.0	-0.3 ↓	0.0000
	1.333	Left end	-0.0	-0.3 ↓	0.0001 ↶
	1.667	Left end	-0.0	-0.2 ↓	0.0001 ↶
	2.000	Left end	-0.0	-0.2 ↓	0.0002 ↶
M6	0.000	Left end	-0.0	-0.2 ↓	0.0002 ↶
	0.391	Left end	0.0	-0.2 ↓	0.0002 ↶
	0.781	Left end	0.1 →	-0.1 ↓	0.0002 ↶
	1.172	Left end	0.1 →	-0.1 ↓	0.0002 ↶
	1.562	Left end	0.2 →	-0.0	0.0002 ↶
	1.953	Left end	0.2 →	0.0	0.0002 ↶
	2.343	Left end	0.3 →	0.1 ↑	0.0002 ↶
M7	0.000	Left end	-0.3 ←	0.1 ↑	-0.0002 ↷
	0.391	Left end	-0.2 ←	0.0	-0.0002 ↷
	0.781	Left end	-0.2 ←	-0.0	-0.0002 ↷
	1.172	Left end	-0.1 ←	-0.1 ↓	-0.0002 ↷
	1.562	Left end	-0.1 ←	-0.1 ↓	-0.0002 ↷

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Designed: CAS		Checked :	

Member deflections - Linear elastic analysis

Loading combination: Unfactored imposed

Member	Distance m	Measured from	Dx mm	Dy mm	Pz Rad
	1.953	Left end	-0.0	-0.2 ↓	-0.0002 ↷
	2.343	Left end	0.0	-0.2 ↓	-0.0002 ↷

Joint deflections - Linear elastic analysis

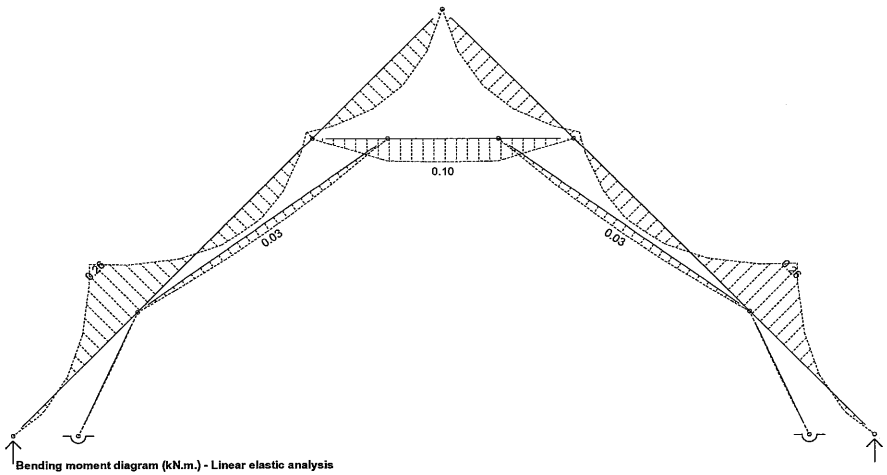
Loading combination: Unfactored total dead

Joint	Dx mm	Dy mm	Pz Rad
J1	-0.3 ←	0.0	0.0003 ↶
J2	0.0	-0.3 ↓	0.0002 ↶
J3	0.3 →	0.0	-0.0003 ↷
J4	0.5 →	0.2 ↑	0.0001 ↶
J5	0.0	0.0	-0.0005 ↷
J6	0.0	0.0	0.0005 ↶
J7	-0.5 ←	0.2 ↑	-0.0001 ↷
J8	0.0	-0.3 ↓	-0.0002 ↷
J9	-0.0	-0.3 ↓	0.0002 ↶
J10	-0.0	-0.5 ↓	0.0002 ↶
J11	0.0	-0.5 ↓	-0.0002 ↷

Joint deflections - Linear elastic analysis

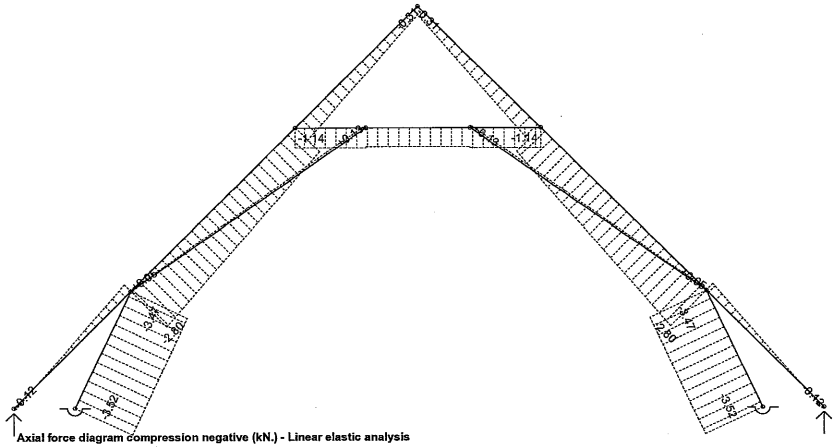
Loading combination: Unfactored imposed

Joint	Dx mm	Dy mm	Pz Rad
J1	-0.1 ←	0.0	0.0001 ↶
J2	0.0	-0.2 ↓	0.0001 ↶
J3	0.1 →	0.0	-0.0001 ↷
J4	0.3 →	0.1 ↑	0.0001 ↶
J5	0.0	0.0	-0.0003 ↷
J6	0.0	0.0	0.0003 ↶
J7	-0.3 ←	0.1 ↑	-0.0001 ↷
J8	0.0	-0.2 ↓	-0.0001 ↷
J9	-0.0	-0.2 ↓	0.0001 ↶
J10	-0.0	-0.2 ↓	0.0001 ↶
J11	0.0	-0.2 ↓	-0.0001 ↷



Bending moment diagram (kN.m.) - Linear elastic analysis
Loading combination: Dead+Imposed ULS

Quikframe - Plane Frame Analysis 9.40	**Quiksoft Limited** Tel: 08456 250 280 / 01202 805 220 Fax: 08456 250 281 email: info@quiksoft.co.uk web: www.quiksoft.co.uk	Printed : 01/04/2025	Sheet : 19
		File : Roof frame	
		Title : Roof Truss - 17274 St Dubricius Church, Porlock	
		Designed: CAS	Checked :



Axial force diagram compression negative (kN.) - Linear elastic analysis
Loading combination: Dead+Imposed ULS

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		File : Roof frame	
		Title : Roof Truss - 17274 St Dubricius Church, Porlock	
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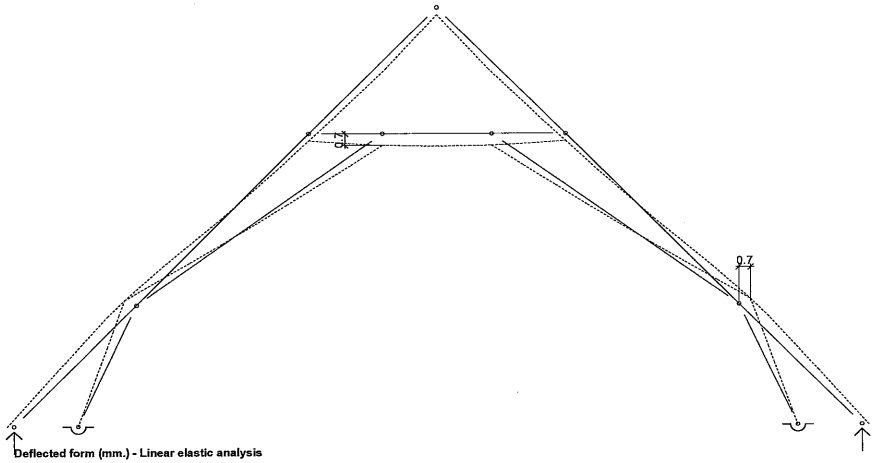

Deflected form (mm.) - Linear elastic analysis
Loading combination: Dead+Imposed SLS

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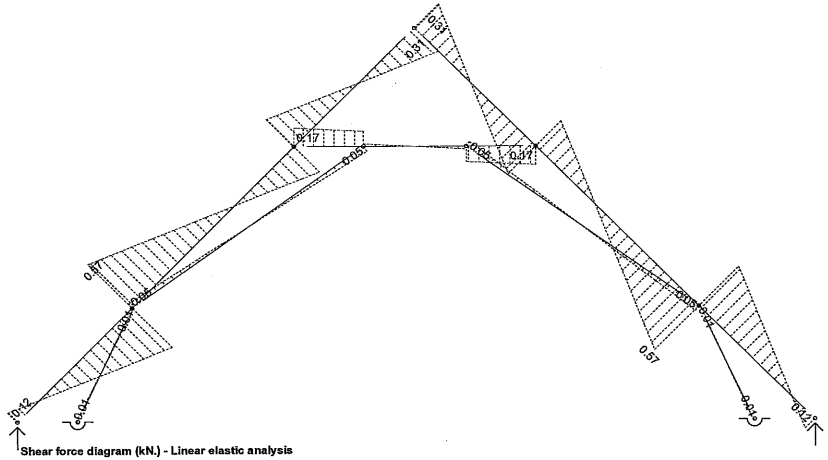
		File : Roof frame	
		Title : Roof Truss 17274 St Dubricius Church, Porlock	
		Designed: CAS	Checked :



Shear force diagram (kN.) - Linear elastic analysis
Loading combination: Dead+Imposed ULS

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		File : Roof frame	
		Title : Roof Truss 17274 St Dubricius Church, Porlock	
		Designed: CAS	Checked :

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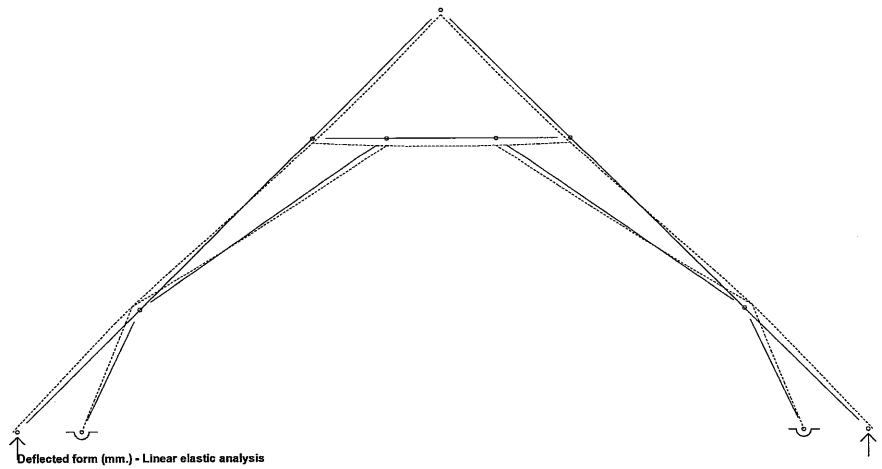

Deflected form (mm.) - Linear elastic analysis
Loading combination: Unfactored total dead

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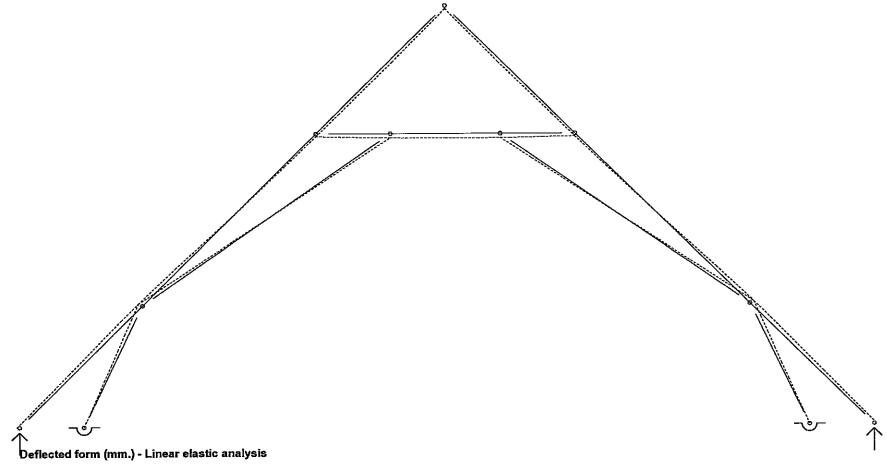
		File : Roof frame	
		Title : Roof Truss - 17274 St Dubricius Church, Porlock	
Quikframe - Plane Frame Analysis 9.40		Designed: CAS	Checked :



Deflected form (mm.) - Linear elastic analysis
Loading combination: Unfactored imposed

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		Title : Roof Truss - 17274 St Dubricius Church, Porlock	
Quikframe - Plane Frame Analysis 9.40		Designed: CAS	Checked :

TIMBER MEMBER DESIGN (EN1995-1-1:2004)

In accordance with EN1995-1-1:2004 + A2:2014 incorporating corrigendum June 2006 and the UK national annex

Tedds calculation version 2.2.23

Design summary

Overall design utilisation 0.446

Overall design status PASS

Rafters results summary	Unit	Capacity	Maximum	Utilisation	Result
Compressive stress	N/mm²	8.4	0.3	0.033	PASS
Bending stress	N/mm²	10.4	1.8	0.173	PASS
Shear stress	N/mm²	1.6	0.1	0.084	PASS
Bending and axial force				0.174	PASS
Column stability check				0.446	PASS
Beam stability check				0.303	PASS
Collar results summary	**Unit**	**Capacity**	**Maximum**	**Utilisation**	**Result**
Compressive stress	N/mm²	8.4	0.1	0.014	PASS
Bending stress	N/mm²	10.4	0.6	0.058	PASS
Shear stress	N/mm²	1.6	0.0	0.028	PASS
Bending and axial force				0.058	PASS
Column stability check				0.083	PASS
Beam stability check				0.029	PASS
Upper Strut results summary	**Unit**	**Capacity**	**Maximum**	**Utilisation**	**Result**
Tensile stress	N/mm²	6.3	0.0	0.003	PASS
Bending stress	N/mm²	10.4	0.2	0.017	PASS
Shear stress	N/mm²	1.6	0.0	0.007	PASS
Bending and axial force				0.020	PASS
Beam stability check				0.017	PASS
Lower Strut results summary	**Unit**	**Capacity**	**Maximum**	**Utilisation**	**Result**
Compressive stress	N/mm²	8.4	0.4	0.042	PASS
Shear stress	N/mm²	1.6	0.0	0.001	PASS
Column stability check				0.046	PASS

Rafters

Partial factor for material properties and resistances

Partial factor γ_M = **2.000**

Member details

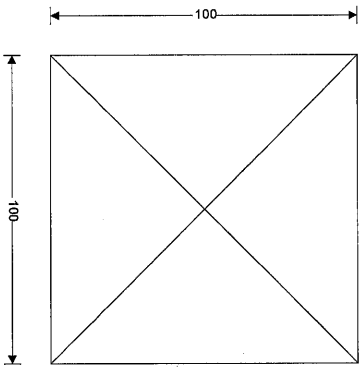
Load duration Medium-term Service class 2

Timber section details

Number of timber sections N = **1**

Breadth of sections b = **100** mm Depth of sections h = **100** mm

Timber strength class **C24**



100x100 timber section
Cross-sectional area, A, 10000 mm^2
Section modulus, W_y, 166666.7 mm^3
Section modulus, W_z, 166667 mm^3
Second moment of area, I_y, 8333333 mm^4
Second moment of area, I_z, 8333333 mm^4
Radius of gyration, i_y, 28.9 mm
Radius of gyration, i_z, 28.9 mm
Timber strength class C24
Characteristic bending strength, $f_{m,k}$, 24 N/mm^2
Characteristic shear strength, $f_{v,k}$, 4 N/mm^2
Characteristic compression strength parallel to grain, $f_{c,0,k}$, 21 N/mm^2
Characteristic compression strength perpendicular to grain, $f_{c,90,k}$, 2.5 N/mm^2
Characteristic tension strength parallel to grain, $f_{t,0,k}$, 14.5 N/mm^2
Mean modulus of elasticity, $E_{0,mean}$, 11000 N/mm^2
Fifth percentile modulus of elasticity, $E_{0,05}$, 7400 N/mm^2
Shear modulus of elasticity, G_{mean}, 690 N/mm^2
Characteristic density, ρ_k, 350 kg/m^3
Mean density, ρ_{mean}, 420 kg/m^3

Span details

Unbraced length - Major axis L_y = **4700** mm
Effective length - Major axis $L_{e,y}$ = L_y = **4700** mm
Unbraced length - Minor axis L_z = **4700** mm
Effective length - Minor axis $L_{e,z}$ = L_z = **4700** mm
Bearing length L_b = **100** mm

Analysis results

Design bending moment $M_{y,d}$ = **0.3** kNm $M_{z,d}$ = **0** kNm
Design shear force $F_{y,d}$ = **0.6** kN $F_{z,d}$ = **0** kN
Design axial compression force P_d = **2.8** kN

Check compression parallel to the grain - cl.6.1.4

Design compressive stress $\sigma_{c,0,d}$ = **0.280** N/mm^2 Design compressive strength $f_{c,0,d}$ = **8.400** N/mm^2
Utilisation = **0.033**

PASS - Design parallel compression strength exceeds design parallel compression stress

Check shear force - Section 6.1.7

Design shear stress $\tau_{y,d}$ = **0.134** N/mm^2 Design shear strength $f_{v,y,d}$ = **1.600** N/mm^2
Utilisation = **0.084**

PASS - Design shear strength exceeds design shear stress

Check bending moment - Section 6.1.6

Design bending stress $\sigma_{m,y,d}$ = **1.8** N/mm^2 Design bending strength $f_{m,y,d}$ = **10.411** N/mm^2
Utilisation = **0.173**

PASS - Design bending strength exceeds design bending stress

Check combined bending and axial tension - Section 6.2.3

Utilisation = **0.174**

PASS - Combined bending and axial compression utilisation is acceptable

Check columns subjected to either compression or combined compression and bending - cl.6.3.2

Effective length for y-axis $L_{e,y}$ = **4700** mm Relative slenderness ratio $\lambda_{rel,y}$ = **2.761**
Effective length for z-axis $L_{e,z}$ = **4700** mm Relative slenderness ratio $\lambda_{rel,z}$ = **2.761**

Both $\lambda_{rel,y}$ > 0.3 and $\lambda_{rel,z}$ > 0.3, column stability check is required

Utilisation = **0.446**

PASS - Column stability is acceptable

Check beams subjected to either bending or combined bending and compression - cl.6.3.3

Utilisation = **0.303**

PASS - Beam stability is acceptable

Collar

Partial factor for material properties and resistances

Partial factor γ_M = **2.000**

Member details

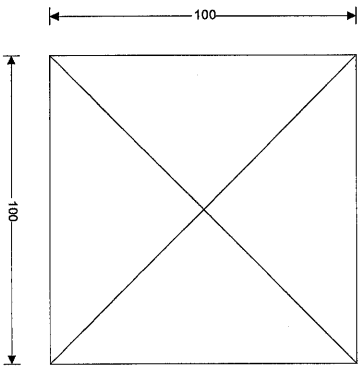
Load duration Medium-term Service class 2

Timber section details

Number of timber sections N = **1**

Breadth of sections b = **100** mm Depth of sections h = **100** mm

Timber strength class **C24**



100x100 timber section
Cross-sectional area, A, 10000 mm²
Section modulus, W_y, 166666.7 mm³
Section modulus, W_z, 166667 mm³
Second moment of area, I_y, 8333333 mm⁴
Second moment of area, I_z, 8333333 mm⁴
Radius of gyration, i_y, 28.9 mm
Radius of gyration, i_z, 28.9 mm
Timber strength class C24
Characteristic bending strength, $f_{m,k}$, 24 N/mm²
Characteristic shear strength, $f_{v,k}$, 4 N/mm²
Characteristic compression strength parallel to grain, $f_{c,0,k}$, 21 N/mm²
Characteristic compression strength perpendicular to grain, $f_{c,90,k}$, 2.5 N/mm²
Characteristic tension strength parallel to grain, $f_{t,0,k}$, 14.5 N/mm²
Mean modulus of elasticity, $E_{0,mean}$, 11000 N/mm²
Fifth percentile modulus of elasticity, $E_{0,05}$, 7400 N/mm²
Shear modulus of elasticity, G_{mean}, 690 N/mm²
Characteristic density, ρ_k, 350 kg/m³
Mean density, ρ_{mean}, 420 kg/m³

Span details

Unbraced length - Major axis L_y = **2000** mm

Effective length - Major axis $L_{e,y} = L_y$ = **2000** mm

Unbraced length - Minor axis L_z = **2000** mm

Effective length - Minor axis $L_{e,z} = L_z$ = **2000** mm

Bearing length L_b = **100** mm

Analysis results

Design bending moment $M_{y,d}$ = **0.1** kNm $M_{z,d}$ = **0** kNm

Design shear force $F_{y,d}$ = **0.2** kN $F_{z,d}$ = **0** kN

Design axial compression force P_d = **1.2** kN

Check compression parallel to the grain - cl.6.1.4

Design compressive stress $\sigma_{c,0,d}$ = **0.120** N/mm² Design compressive strength $f_{c,0,d}$ = **8.400** N/mm²

Utilisation = **0.014**

PASS - Design parallel compression strength exceeds design parallel compression stress

Check shear force - Section 6.1.7

Design shear stress $\tau_{y,d}$ = **0.045** N/mm² Design shear strength $f_{v,y,d}$ = **1.600** N/mm²

Utilisation = **0.028**

PASS - Design shear strength exceeds design shear stress

Check bending moment - Section 6.1.6

Design bending stress $\sigma_{m,y,d}$ = **0.6** N/mm² Design bending strength $f_{m,y,d}$ = **10.411** N/mm²

Utilisation = **0.058**

PASS - Design bending strength exceeds design bending stress

Check combined bending and axial tension - Section 6.2.3

Utilisation = **0.058**

PASS - Combined bending and axial compression utilisation is acceptable

Check columns subjected to either compression or combined compression and bending - cl.6.3.2

Effective length for y-axis $L_{e,y}$ = **2000** mm Relative slenderness ratio $\lambda_{rel,y}$ = **1.175**

Effective length for z-axis $L_{e,z}$ = **2000** mm Relative slenderness ratio $\lambda_{rel,z}$ = **1.175**

Both $\lambda_{rel,y}$ > 0.3 and $\lambda_{rel,z}$ > 0.3, column stability check is required

Utilisation = **0.083**

PASS - Column stability is acceptable

Check beams subjected to either bending or combined bending and compression - cl.6.3.3

Utilisation = **0.029**

PASS - Beam stability is acceptable

Upper Strut

Partial factor for material properties and resistances

Partial factor γ_M = **2.000**

Member details

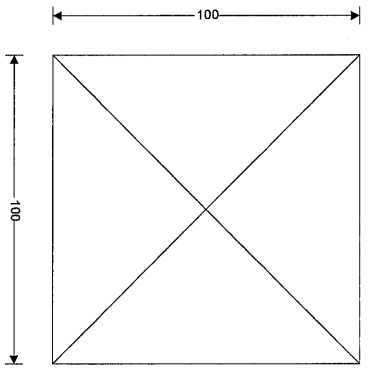
Load duration Medium-term Service class 2

Timber section details

Number of timber sections N = **1**

Breadth of sections b = **100** mm Depth of sections h = **100** mm

Timber strength class **C24**



100x100 timber section
Cross-sectional area, A, 10000 mm²
Section modulus, W_y, 166666.7 mm³
Section modulus, W_z, 166667 mm³
Second moment of area, I_y, 8333333 mm⁴
Second moment of area, I_z, 8333333 mm⁴
Radius of gyration, i_y, 28.9 mm
Radius of gyration, i_z, 28.9 mm
Timber strength class C24
Characteristic bending strength, $f_{m,k}$, 24 N/mm²
Characteristic shear strength, $f_{v,k}$, 4 N/mm²
Characteristic compression strength parallel to grain, $f_{c,0,k}$, 21 N/mm²
Characteristic compression strength perpendicular to grain, $f_{c,90,k}$, 2.5 N/mm²
Characteristic tension strength parallel to grain, $f_{t,0,k}$, 14.5 N/mm²
Mean modulus of elasticity, $E_{0,mean}$, 11000 N/mm²
Fifth percentile modulus of elasticity, $E_{0,05}$, 7400 N/mm²
Shear modulus of elasticity, G_{mean}, 690 N/mm²
Characteristic density, ρ_k, 350 kg/m³
Mean density, ρ_{mean}, 420 kg/m³

Span details

Unbraced length - Major axis L_y = **2400** mm

Effective length - Major axis $L_{e,y}$ = L_y = **2400** mm

Unbraced length - Minor axis L_z = **2400** mm

Effective length - Minor axis $L_{e,z}$ = L_z = **2400** mm

Bearing length L_b = **100** mm

Analysis results

Design bending moment $M_{y,d}$ = **0.03** kNm $M_{z,d}$ = **0** kNm

Design shear force $F_{y,d}$ = **0.05** kN $F_{z,d}$ = **0** kN

Design axial tension force P_d = **0.2** kN

Check tension parallel to the grain - Section 6.1.2

Design tensile stress $\sigma_{t,0,d}$ = **0.020** N/mm^2 Design tensile strength $f_{t,0,d}$ = **6.290** N/mm^2

Utilisation = **0.003**

PASS - Design tensile strength exceeds design tensile stress

Check shear force - Section 6.1.7

Design shear stress $\tau_{y,d}$ = **0.011** N/mm^2 Design shear strength $f_{v,y,d}$ = **1.600** N/mm^2

Utilisation = **0.007**

PASS - Design shear strength exceeds design shear stress

Check bending moment - Section 6.1.6

Design bending stress $\sigma_{m,y,d}$ = **0.18** N/mm^2 Design bending strength $f_{m,y,d}$ = **10.411** N/mm^2

Utilisation = **0.017**

PASS - Design bending strength exceeds design bending stress

Check combined bending and axial tension - Section 6.2.3

Utilisation = **0.02**

PASS - Combined bending and axial tension utilisation is acceptable

Check beams subjected to either bending or combined bending and compression - cl.6.3.3

Utilisation = **0.017**

PASS - Beam stability is acceptable

Lower Strut

Partial factor for material properties and resistances

Partial factor γ_M = **2.000**

Member details

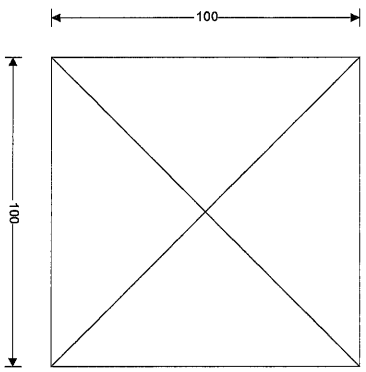
Load duration Medium-term Service class 2

Timber section details

Number of timber sections N = **1**

Breadth of sections b = **100** mm Depth of sections h = **100** mm

Timber strength class **C24**



100x100 timber section
Cross-sectional area, A, 10000 mm^2
Section modulus, W_y, 166666.7 mm^3
Section modulus, W_z, 166667 mm^3
Second moment of area, I_y, 8333333 mm^4
Second moment of area, I_z, 8333333 mm^4
Radius of gyration, i_y, 28.9 mm
Radius of gyration, i_z, 28.9 mm
Timber strength class C24
Characteristic bending strength, $f_{m,k}$, 24 N/mm^2
Characteristic shear strength, $f_{v,k}$, 4 N/mm^2
Characteristic compression strength parallel to grain, $f_{c,0,k}$, 21 N/mm^2
Characteristic compression strength perpendicular to grain, $f_{c,90,k}$, 2.5 N/mm^2
Characteristic tension strength parallel to grain, $f_{t,0,k}$, 14.5 N/mm^2
Mean modulus of elasticity, $E_{0,mean}$, 11000 N/mm^2
Fifth percentile modulus of elasticity, $E_{0,05}$, 7400 N/mm^2
Shear modulus of elasticity, G_{mean}, 690 N/mm^2
Characteristic density, ρ_k, 350 kg/m^3
Mean density, ρ_{mean}, 420 kg/m^3

Span details

Unbraced length - Major axis L_y = **1100** mm

Effective length - Major axis $L_{e,y}$ = L_y = **1100** mm

Unbraced length - Minor axis L_z = **1100** mm

Effective length - Minor axis $L_{e,z}$ = L_z = **1100** mm

Bearing length L_b = **100** mm

Analysis results

Design shear force $F_{y,d}$ = **0.01** kN $F_{z,d}$ = **0** kN

Design axial compression force P_d = **3.5** kN

Check compression parallel to the grain - cl.6.1.4

Design compressive stress $\sigma_{c,0,d}$ = **0.350** N/mm^2 Design compressive strength $f_{c,0,d}$ = **8.400** N/mm^2

Utilisation = **0.042**

PASS - Design parallel compression strength exceeds design parallel compression stress

Check shear force - Section 6.1.7

Design shear stress $\tau_{y,d}$ = **0.002** N/mm^2 Design shear strength $f_{v,y,d}$ = **1.600** N/mm^2

Utilisation = **0.001**

PASS - Design shear strength exceeds design shear stress

Check columns subjected to either compression or combined compression and bending - cl.6.3.2

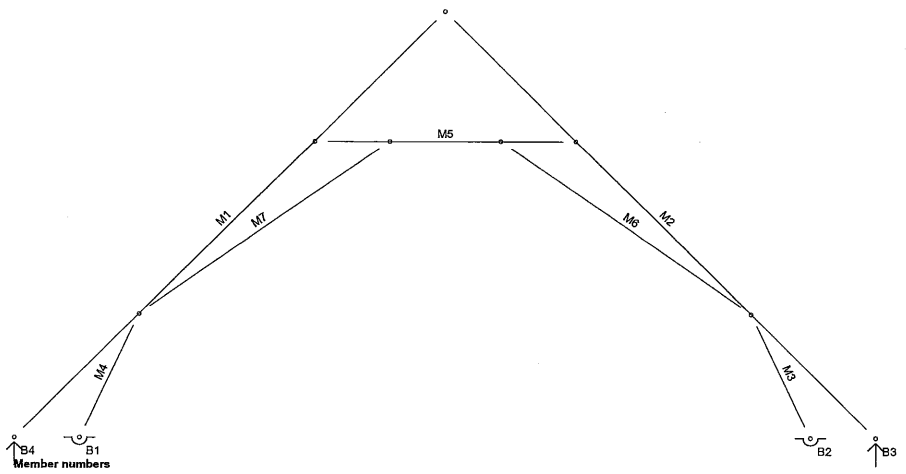
Effective length for y-axis $L_{e,y}$ = **1100** mm Relative slenderness ratio $\lambda_{rel,y}$ = **0.646**

Effective length for z-axis $L_{e,z}$ = **1100** mm Relative slenderness ratio $\lambda_{rel,z}$ = **0.646**

Both $\lambda_{rel,y}$ > 0.3 and $\lambda_{rel,z}$ > 0.3, column stability check is required

Utilisation = **0.046**

PASS - Column stability is acceptable



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		Title : Roof Truss - Proposed 17274 St Dubricius Church, Porlock	
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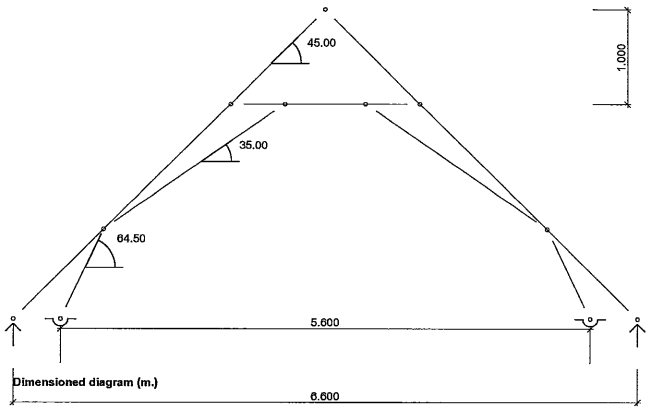

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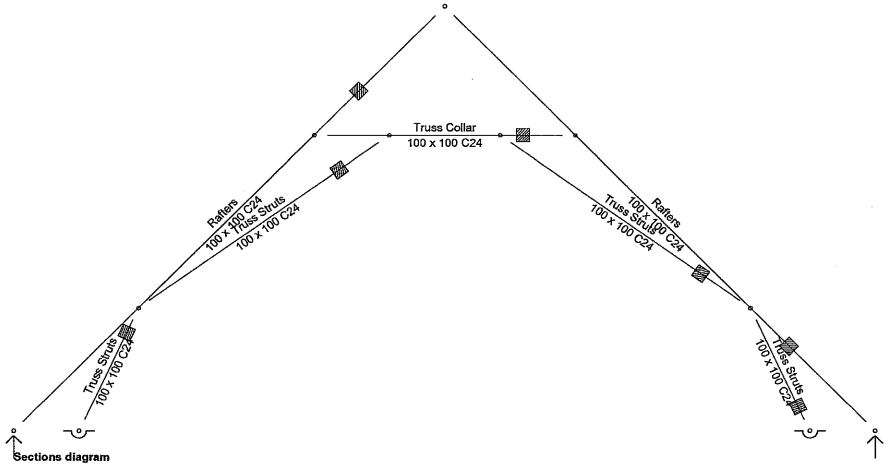

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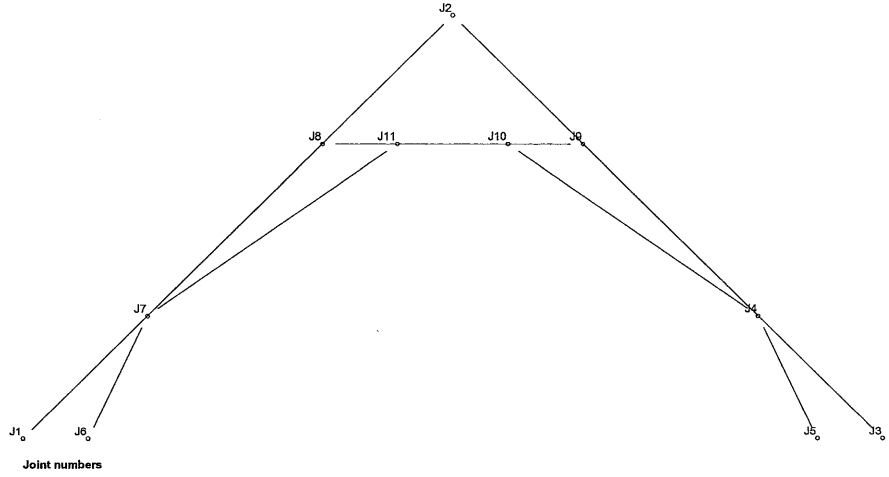

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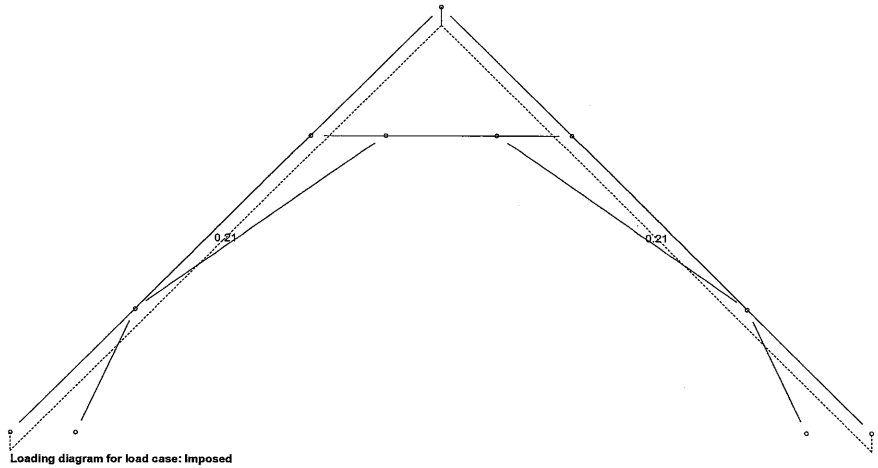

Loading diagram for load case: Permanent dead

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Loading diagram for load case: Imposed

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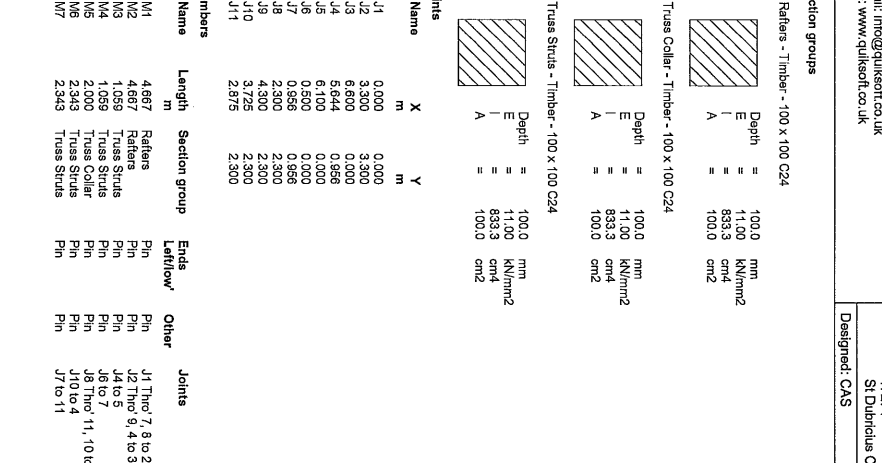

Loading diagram for load case: Self-weight

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Title : Roof Truss - Proposed 17274 St Dubricius Church, Porlock	
Designed: CAS	Checked :

Section groups

Rafters - Timber - 100 x 100 C24

Depth	=	100.0 mm
E	=	11.00 kN/mm2
I	=	833.3 cm4
A	=	100.0 cm2

Truss Collar - Timber - 100 x 100 C24

Depth	=	100.0 mm
E	=	11.00 kN/mm2
I	=	833.3 cm4
A	=	100.0 cm2

Truss Struts - Timber - 100 x 100 C24

Depth	=	100.0 mm
E	=	11.00 kN/mm2
I	=	833.3 cm4
A	=	100.0 cm2

Joints

Name	X m	Y m
J1	0.000	0.000
J2	3.300	3.300
J3	6.600	0.000
J4	5.644	0.956
J5	6.100	0.000
J6	0.500	0.000
J7	0.956	0.956
J8	2.300	2.300
J9	4.300	2.300
J10	3.725	2.300
J11	2.875	2.300

Members

Name	Length m	Section group	Ends Left/low'	Other	Joints
M1	4.667	Rafters	Pin	Pin	J1 Thro' 7, 8 to 2
M2	4.667	Rafters	Pin	Pin	J2 Thro' 9, 4 to 3
M3	1.059	Truss Struts	Pin	Pin	J4 to 5
M4	1.059	Truss Struts	Pin	Pin	J6 to 7
M5	2.000	Truss Collar	Pin	Pin	J8 Thro' 11, 10 to 9
M6	2.343	Truss Struts	Pin	Pin	J10 to 4
M7	2.343	Truss Struts	Pin	Pin	J7 to 11

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Bases

Name	Joint	Horizontal kN/m	Vertical kN/m	Rotational kN.m/Rad
B1	J6	Fixed	Fixed	Pinned
B2	J5	Fixed	Fixed	Pinned
B3	J3	Free	Fixed	Pinned
B4	J1	Free	Fixed	Pinned

Load cases

Name	Type
Permanent dead	Permanent dead
Self-weight	Permanent dead
Imposed	Imposed

Load combinations

Name	Limit	Factor	Load case
Dead+Imposed ULS	ULS	1.35	Permanent dead
		1.35	Self-weight
		1.50	Imposed
Dead+Imposed SLS	SLS	1.00	Permanent dead
		1.00	Self-weight
		1.00	Imposed
Unfactored total dead	SLS	1.00	Permanent dead
		1.00	Self-weight
		0.00	Imposed
Unfactored imposed	SLS	0.00	Permanent dead
		0.00	Self-weight
		1.00	Imposed

Uniformly distributed loads

Load case : Permanent dead

Name	Member	Value kN/m	Direction
L8	M1	0.30	Vertical ↓
L9	M2	0.36	Vertical ↓

Uniformly distributed loads

Load case : Self-weight

Name	Member	Value kN/m	Direction	
L1	M1	0.04	Vertical ↓	Self weight
L2	M2	0.04	Vertical ↓	Self weight
L3	M3	0.04	Vertical ↓	Self weight
L4	M4	0.04	Vertical ↓	Self weight
L5	M5	0.04	Vertical ↓	Self weight
L6	M6	0.04	Vertical ↓	Self weight
L7	M7	0.04	Vertical ↓	Self weight

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Uniformly distributed loads

Load case : Imposed

Name	Member	Value kN/m	Direction
L10	M1	0.21	Vertical ↓
L11	M2	0.21	Vertical ↓

Forces - Linear elastic analysis

Loading combination: Dead+Imposed ULS

Member	Distance m	Measured from	Axial kN	Sense	Shear kN	Moment kN.m
M1	0.000	Left end	-0.09	Compression	0.09	0.00
	0.163	Left end	0.00		-0.00	0.01
	0.326	Left end	0.09	Tension	-0.09	-0.00
	1.352	Left end	0.65	Tension	-0.65	-0.38
	1.352	Left end	-3.13	Compression	0.71	-0.38
	2.111	Left end	-2.71	Compression	0.29	-0.00
	2.645	Left end	-2.42	Compression	0.00	0.08
	3.179	Left end	-2.13	Compression	-0.29	-0.00
	3.253	Left end	-2.09	Compression	-0.33	-0.02
	3.253	Left end	-1.16	Compression	0.40	-0.02
	3.312	Left end	-1.12	Compression	0.37	0.00
	3.990	Left end	-0.75	Compression	-0.00	0.13
	4.667	Left end	-0.38	Compression	-0.37	0.00
M2	0.000	Left end	-0.37	Compression	0.38	0.00
	0.630	Left end	-0.75	Compression	0.00	0.12
	1.261	Left end	-1.14	Compression	-0.38	0.00
	1.414	Left end	-1.23	Compression	-0.47	-0.07
	1.414	Left end	-2.56	Compression	0.48	-0.07
	1.567	Left end	-2.65	Compression	0.39	0.00
	2.203	Left end	-3.03	Compression	-0.00	0.12
	2.839	Left end	-3.42	Compression	-0.39	0.00
	3.315	Left end	-3.71	Compression	-0.67	-0.25
	3.315	Left end	0.60	Tension	0.60	-0.25
	3.931	Left end	0.22	Tension	0.22	-0.00
	4.299	Left end	-0.00		-0.00	0.04
	4.667	Left end	-0.22	Compression	-0.22	0.00
M3	0.000	Left end	-4.19	Compression	0.01	0.00
	0.529	Left end	-4.21	Compression	0.00	0.00
	1.059	Left end	-4.24	Compression	-0.01	0.00
M4	0.000	Left end	-4.24	Compression	0.01	0.00
	0.530	Left end	-4.21	Compression	-0.00	0.00
	1.059	Left end	-4.19	Compression	-0.01	0.00
M5	0.000	Left end	-1.18	Compression	0.14	0.00
	0.575	Left end	-1.18	Compression	0.10	0.07
	0.575	Left end	-1.28	Compression	0.11	0.07
	1.425	Left end	-1.28	Compression	0.06	0.14
	1.425	Left end	-1.61	Compression	-0.23	0.14
	2.000	Left end	-1.61	Compression	-0.26	0.00
M6	0.000	Left end	0.44	Tension	0.05	0.00
	1.172	Left end	0.40	Tension	-0.00	0.03

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Forces - Linear elastic analysis

Loading combination: Dead+Imposed ULS

Member	Distance m	Measured from	Axial kN	Sense	Shear kN	Moment kN.m
	2.343	Left end	0.37	Tension	-0.05	0.00
M7	0.000	Left end	-0.16	Compression	0.05	0.00
	1.171	Left end	-0.13	Compression	0.00	0.03
	2.343	Left end	-0.09	Compression	-0.05	0.00

Forces - Linear elastic analysis

Loading combination: Dead+Imposed SLS

Member	Distance m	Measured from	Axial kN	Sense	Shear kN	Moment kN.m
M1	0.000	Left end	-0.06	Compression	0.06	0.00
	0.157	Left end	-0.00		0.00	0.00
	0.314	Left end	0.06	Tension	-0.06	0.00
	1.352	Left end	0.47	Tension	-0.47	-0.27
	1.352	Left end	-2.22	Compression	0.51	-0.27
	2.118	Left end	-1.92	Compression	0.21	-0.00
	2.651	Left end	-1.72	Compression	0.00	0.06
	3.184	Left end	-1.51	Compression	-0.21	-0.00
	3.253	Left end	-1.48	Compression	-0.23	-0.02
	3.253	Left end	-0.82	Compression	0.29	-0.02
	3.308	Left end	-0.80	Compression	0.26	0.00
	3.988	Left end	-0.54	Compression	-0.00	0.09
	4.667	Left end	-0.27	Compression	-0.26	0.00
M2	0.000	Left end	-0.26	Compression	0.27	0.00
	0.630	Left end	-0.54	Compression	0.00	0.09
	1.261	Left end	-0.81	Compression	-0.27	-0.00
	1.414	Left end	-0.88	Compression	-0.34	-0.05
	1.414	Left end	-1.83	Compression	0.34	-0.05
	1.566	Left end	-1.89	Compression	0.28	-0.00
	2.204	Left end	-2.17	Compression	-0.00	0.09
	2.842	Left end	-2.44	Compression	-0.28	0.00
	3.315	Left end	-2.65	Compression	-0.48	-0.18
	3.315	Left end	0.42	Tension	0.42	-0.18
	3.926	Left end	0.16	Tension	0.16	0.00
	4.296	Left end	0.00		0.00	0.03
	4.667	Left end	-0.16	Compression	-0.16	0.00
M3	0.000	Left end	-2.99	Compression	0.01	0.00
	0.529	Left end	-3.01	Compression	0.00	0.00
	1.059	Left end	-3.03	Compression	-0.01	0.00
M4	0.000	Left end	-3.03	Compression	0.01	0.00
	0.530	Left end	-3.01	Compression	-0.00	0.00
	1.059	Left end	-2.99	Compression	-0.01	0.00
M5	0.000	Left end	-0.83	Compression	0.10	0.00
	0.575	Left end	-0.83	Compression	0.07	0.05
	0.575	Left end	-0.92	Compression	0.08	0.05
	1.425	Left end	-0.92	Compression	0.05	0.10
	1.425	Left end	-1.15	Compression	-0.17	0.10

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Forces - Linear elastic analysis

Loading combination: Dead+Imposed SLS

Member	Distance m	Measured from	Axial kN	Sense	Shear kN	Moment kN.m
	2.000	Left end	-1.15	Compression	-0.19	0.00
M6	0.000	Left end	0.32	Tension	0.04	0.00
	1.172	Left end	0.29	Tension	-0.00	0.02
	2.343	Left end	0.26	Tension	-0.04	0.00
M7	0.000	Left end	-0.13	Compression	0.04	0.00
	1.171	Left end	-0.10	Compression	0.00	0.02
	2.343	Left end	-0.07	Compression	-0.04	0.00

Reactions - Linear elastic analysis

Loading combination: Unfactored total dead

Base	Joint	Horizontal kN	Vertical kN	Moment kN.m
B1	J6	0.86 →	1.82 ↑	-0.00
B2	J5	-0.86 ←	1.82 ↑	-0.00
B3	J3	0.00	0.16 ↑	0.00
B4	J1	0.00	0.02 ↑	0.00

Reactions - Linear elastic analysis

Loading combination: Unfactored imposed

Base	Joint	Horizontal kN	Vertical kN	Moment kN.m
B1	J6	0.44 →	0.92 ↑	0.00
B2	J5	-0.44 ←	0.92 ↑	0.00
B3	J3	0.00	0.06 ↑	-0.00
B4	J1	0.00	0.06 ↑	0.00

Member deflections - Linear elastic analysis

Loading combination: Dead+Imposed SLS

Member	Distance m	Measured from	Dx mm	Dy mm	Pz Rad
M1	0.000	Left end	-0.9 ←	0.0	0.0011 ↻
	0.778	Left end	-1.5 ←	0.6 ↑	0.0009 ↻
	1.556	Left end	-1.7 ←	0.7 ↑	-0.0006 ↺
	2.333	Left end	-1.2 ←	0.2 ↑	-0.0010 ↺
	3.111	Left end	-0.7 ←	-0.2 ↓	-0.0006 ↺
	3.889	Left end	-0.4 ←	-0.6 ↓	-0.0003 ↺
	4.667	Left end	-0.5 ←	-0.5 ↓	0.0002 ↻
M2	0.000	Left end	-0.5 ←	-0.5 ↓	-0.0007 ↺
	0.778	Left end	-0.7 ←	-0.8 ↓	-0.0001 ↺
	1.556	Left end	-0.7 ←	-0.7 ↓	0.0001 ↻
	2.333	Left end	-0.6 ←	-0.6 ↓	0.0006 ↻
	3.111	Left end	-0.1 ←	-0.1 ↓	0.0007 ↻
	3.889	Left end	-0.0	-0.0	-0.0001 ↺
	4.667	Left end	0.0	-0.0	0.0001 ↻

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Member deflections - Linear elastic analysis

Loading combination: Dead+Imposed SLS

Member	Distance m	Measured from	Dx mm	Dy mm	Pz Rad
M3	0.000	Left end	-0.0	-0.1 ↓	0.0001 ↺
	0.177	Left end	-0.0	-0.0	0.0001 ↺
	0.353	Left end	-0.0	-0.0	0.0001 ↺
	0.530	Left end	-0.0	-0.0	0.0001 ↺
	0.706	Left end	-0.0	-0.0	0.0001 ↺
	0.883	Left end	-0.0	-0.0	0.0001 ↺
	1.059	Left end	0.0	0.0	0.0001 ↺
M4	0.000	Left end	0.0	0.0	0.0018 ↺
	0.177	Left end	-0.3 ←	0.1 ↑	0.0018 ↺
	0.353	Left end	-0.6 ←	0.3 ↑	0.0018 ↺
	0.530	Left end	-0.9 ←	0.4 ↑	0.0018 ↺
	0.706	Left end	-1.2 ←	0.5 ↑	0.0018 ↺
	0.883	Left end	-1.4 ←	0.7 ↑	0.0018 ↺
	1.059	Left end	-1.7 ←	0.8 ↑	0.0018 ↺
M5	0.000	Left end	-0.7 ←	-0.3 ↓	-0.0008 ↻
	0.333	Left end	-0.7 ←	-0.6 ↓	-0.0007 ↻
	0.667	Left end	-0.7 ←	-0.8 ↓	-0.0005 ↻
	1.000	Left end	-0.7 ←	-0.9 ↓	-0.0003 ↻
	1.333	Left end	-0.7 ←	-1.0 ↓	0.0000
	1.667	Left end	-0.7 ←	-0.9 ↓	0.0003 ↺
	2.000	Left end	-0.7 ←	-0.8 ↓	0.0005 ↺
M6	0.000	Left end	-0.7 ←	-1.0 ↓	0.0003 ↺
	0.391	Left end	-0.6 ←	-0.9 ↓	0.0003 ↺
	0.781	Left end	-0.5 ←	-0.8 ↓	0.0004 ↺
	1.172	Left end	-0.4 ←	-0.6 ↓	0.0005 ↺
	1.562	Left end	-0.3 ←	-0.5 ↓	0.0006 ↺
	1.953	Left end	-0.2 ←	-0.3 ↓	0.0006 ↺
	2.343	Left end	-0.0	-0.1 ↓	0.0007 ↺
M7	0.000	Left end	-1.7 ←	0.8 ↑	-0.0010 ↻
	0.391	Left end	-1.5 ←	0.5 ↑	-0.0010 ↻
	0.781	Left end	-1.3 ←	0.2 ↑	-0.0009 ↻
	1.172	Left end	-1.1 ←	-0.1 ↓	-0.0008 ↻
	1.562	Left end	-1.0 ←	-0.3 ↓	-0.0007 ↻
	1.953	Left end	-0.8 ←	-0.5 ↓	-0.0006 ↻
	2.343	Left end	-0.7 ←	-0.7 ↓	-0.0006 ↻

Member deflections - Linear elastic analysis

Loading combination: Unfactored total dead

Member	Distance m	Measured from	Dx mm	Dy mm	Pz Rad
M1	0.000	Left end	-0.8 ←	0.0	0.0009 ↺
	0.778	Left end	-1.3 ←	0.5 ↑	0.0008 ↺
	1.556	Left end	-1.5 ←	0.7 ↑	-0.0004 ↻
	2.333	Left end	-1.1 ←	0.3 ↑	-0.0008 ↻
	3.111	Left end	-0.7 ←	-0.1 ↓	-0.0005 ↻
	3.889	Left end	-0.5 ←	-0.3 ↓	-0.0003 ↻
	4.667	Left end	-0.5 ←	-0.4 ↓	0.0001 ↺

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Member deflections - Linear elastic analysis

Loading combination: Unfactored total dead

Member	Distance m	Measured from	Dx mm	Dy mm	Pz Rad
M2	0.000	Left end	-0.5 ←	-0.4 ↓	-0.0005 ↻
	0.778	Left end	-0.7 ←	-0.6 ↓	-0.0002 ↻
	1.556	Left end	-0.7 ←	-0.6 ↓	-0.0000
	2.333	Left end	-0.6 ←	-0.5 ↓	0.0003 ↺
	3.111	Left end	-0.4 ←	-0.2 ↓	0.0005 ↺
	3.889	Left end	-0.2 ←	-0.1 ↓	0.0001 ↺
	4.667	Left end	-0.1 ←	-0.0	0.0002 ↺
M3	0.000	Left end	-0.3 ←	-0.2 ↓	0.0003 ↺
	0.177	Left end	-0.3 ←	-0.1 ↓	0.0003 ↺
	0.353	Left end	-0.2 ←	-0.1 ↓	0.0003 ↺
	0.530	Left end	-0.2 ←	-0.1 ↓	0.0003 ↺
	0.706	Left end	-0.1 ←	-0.1 ↓	0.0003 ↺
	0.883	Left end	-0.1 ←	-0.0	0.0003 ↺
	1.059	Left end	0.0	0.0	0.0003 ↺
M4	0.000	Left end	0.0	0.0	0.0015 ↺
	0.177	Left end	-0.2 ←	0.1 ↑	0.0015 ↺
	0.353	Left end	-0.5 ←	0.2 ↑	0.0015 ↺
	0.530	Left end	-0.7 ←	0.3 ↑	0.0015 ↺
	0.706	Left end	-1.0 ←	0.5 ↑	0.0015 ↺
	0.883	Left end	-1.2 ←	0.6 ↑	0.0015 ↺
	1.059	Left end	-1.5 ←	0.7 ↑	0.0016 ↺
M5	0.000	Left end	-0.7 ←	-0.1 ↓	-0.0006 ↻
	0.333	Left end	-0.7 ←	-0.3 ↓	-0.0006 ↻
	0.667	Left end	-0.7 ←	-0.5 ↓	-0.0005 ↻
	1.000	Left end	-0.7 ←	-0.6 ↓	-0.0003 ↻
	1.333	Left end	-0.7 ←	-0.7 ↓	-0.0001 ↻
	1.667	Left end	-0.7 ←	-0.7 ↓	0.0002 ↺
	2.000	Left end	-0.7 ←	-0.6 ↓	0.0003 ↺
M6	0.000	Left end	-0.7 ←	-0.7 ↓	0.0001 ↺
	0.391	Left end	-0.7 ←	-0.7 ↓	0.0001 ↺
	0.781	Left end	-0.6 ←	-0.6 ↓	0.0002 ↺
	1.172	Left end	-0.6 ←	-0.6 ↓	0.0003 ↺
	1.562	Left end	-0.5 ←	-0.4 ↓	0.0004 ↺
	1.953	Left end	-0.4 ←	-0.3 ↓	0.0005 ↺
	2.343	Left end	-0.3 ←	-0.2 ↓	0.0005 ↺
M7	0.000	Left end	-1.5 ←	0.7 ↑	-0.0008 ↻
	0.391	Left end	-1.3 ←	0.4 ↑	-0.0006 ↻
	0.781	Left end	-1.1 ←	0.2 ↑	-0.0007 ↻
	1.172	Left end	-1.0 ←	-0.0	-0.0006 ↻
	1.562	Left end	-0.9 ←	-0.2 ↓	-0.0005 ↻
	1.953	Left end	-0.8 ←	-0.3 ↓	-0.0004 ↻
	2.343	Left end	-0.7 ←	-0.5 ↓	-0.0004 ↻

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Member deflections - Linear elastic analysis

Loading combination: Unfactored imposed

Member	Distance m	Measured from	Dx mm	Dy mm	Pz Rad
M1	0.000	Left end	-0.1 ←	0.0	0.0001 ↺
	0.778	Left end	-0.2 ←	0.1 ↑	0.0002 ↺
	1.556	Left end	-0.2 ←	0.1 ↑	-0.0002 ↻
	2.333	Left end	-0.1 ←	-0.1 ↓	-0.0002 ↻
	3.111	Left end	-0.0	-0.2 ↓	-0.0001 ↻
	3.889	Left end	0.0	-0.2 ↓	-0.0000
	4.667	Left end	-0.0	-0.2 ↓	0.0001 ↺
M2	0.000	Left end	0.0	-0.2 ↓	-0.0001 ↻
	0.778	Left end	-0.0	-0.2 ↓	0.0000
	1.556	Left end	0.0	-0.2 ↓	0.0001 ↺
	2.333	Left end	0.1 →	-0.1 ↓	0.0002 ↺
	3.111	Left end	0.2 →	0.1 ↑	0.0002 ↺
	3.889	Left end	0.2 →	0.1 ↑	-0.0002 ↻
	4.667	Left end	0.1 →	-0.0	-0.0001 ↻
M3	0.000	Left end	0.3 →	0.1 ↑	-0.0003 ↻
	0.177	Left end	0.2 →	0.1 ↑	-0.0003 ↻
	0.353	Left end	0.2 →	0.1 ↑	-0.0003 ↻
	0.530	Left end	0.1 →	0.1 ↑	-0.0003 ↻
	0.706	Left end	0.1 →	0.0	-0.0003 ↻
	0.883	Left end	0.0	0.0	-0.0003 ↻
	1.059	Left end	0.0	0.0	-0.0003 ↻
M4	0.000	Left end	0.0	0.0	0.0003 ↺
	0.177	Left end	-0.0	0.0	0.0003 ↺
	0.353	Left end	-0.1 ←	0.0	0.0003 ↺
	0.530	Left end	-0.1 ←	0.1 ↑	0.0003 ↺
	0.706	Left end	-0.2 ←	0.1 ↑	0.0003 ↺
	0.883	Left end	-0.2 ←	0.1 ↑	0.0003 ↺
	1.059	Left end	-0.3 ←	0.1 ↑	0.0003 ↺
M5	0.000	Left end	0.0	-0.2 ↓	-0.0002 ↻
	0.333	Left end	0.0	-0.2 ↓	-0.0001 ↻
	0.667	Left end	0.0	-0.3 ↓	-0.0001 ↻
	1.000	Left end	0.0	-0.3 ↓	0.0000
	1.333	Left end	-0.0	-0.3 ↓	0.0001 ↺
	1.667	Left end	-0.0	-0.2 ↓	0.0001 ↺
	2.000	Left end	-0.0	-0.2 ↓	0.0002 ↺
M6	0.000	Left end	-0.0	-0.2 ↓	0.0002 ↺
	0.391	Left end	0.0	-0.2 ↓	0.0002 ↺
	0.781	Left end	0.1 →	-0.1 ↓	0.0002 ↺
	1.172	Left end	0.1 →	-0.1 ↓	0.0002 ↺
	1.562	Left end	0.2 →	-0.0	0.0002 ↺
	1.953	Left end	0.2 →	0.0	0.0002 ↺
	2.343	Left end	0.3 →	0.1 ↑	0.0002 ↺
M7	0.000	Left end	-0.3 ←	0.1 ↑	-0.0002 ↻
	0.391	Left end	-0.2 ←	0.0	-0.0002 ↻
	0.781	Left end	-0.2 ←	-0.0	-0.0002 ↻
	1.172	Left end	-0.1 ←	-0.1 ↓	-0.0002 ↻
	1.562	Left end	-0.1 ←	-0.1 ↓	-0.0002 ↻

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Member deflections - Linear elastic analysis

Loading combination: Unfactored imposed

Member	Distance m	Measured from	Dx mm	Dy mm	Pz Rad
	1.953	Left end	-0.0	-0.2 ↓	-0.0002 ↻
	2.343	Left end	0.0	-0.2 ↓	-0.0002 ↻

Joint deflections - Linear elastic analysis

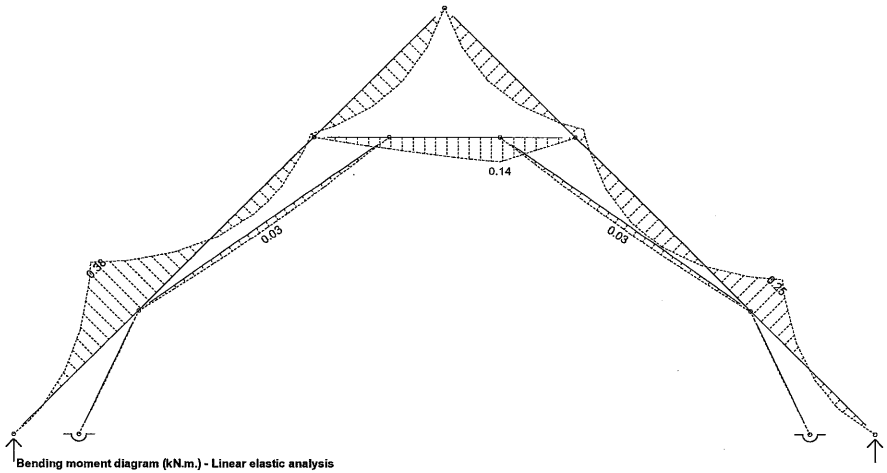
Loading combination: Unfactored total dead

Joint	Dx mm	Dy mm	Pz Rad
J1	-0.8 ←	0.0	0.0009 ↺
J2	-0.5 ←	-0.4 ↓	0.0001 ↺
J3	-0.1 ←	0.0	0.0002 ↺
J4	-0.3 ←	-0.2 ↓	0.0004 ↺
J5	0.0	0.0	0.0003 ↺
J6	0.0	0.0	0.0015 ↺
J7	-1.5 ←	0.7 ↑	0.0000
J8	-0.7 ←	-0.1 ↓	-0.0005 ↻
J9	-0.7 ←	-0.6 ↓	-0.0000
J10	-0.7 ←	-0.7 ↓	0.0000
J11	-0.7 ←	-0.5 ↓	-0.0005 ↻

Joint deflections - Linear elastic analysis

Loading combination: Unfactored imposed

Joint	Dx mm	Dy mm	Pz Rad
J1	-0.1 ←	0.0	0.0001 ↺
J2	0.0	-0.2 ↓	0.0001 ↺
J3	0.1 →	0.0	-0.0001 ↻
J4	0.3 →	0.1 ↑	0.0001 ↺
J5	0.0	0.0	-0.0003 ↻
J6	0.0	0.0	0.0003 ↺
J7	-0.3 ←	0.1 ↑	-0.0001 ↻
J8	0.0	-0.2 ↓	-0.0001 ↻
J9	-0.0	-0.2 ↓	0.0001 ↺
J10	-0.0	-0.2 ↓	0.0001 ↺
J11	0.0	-0.2 ↓	-0.0001 ↻



Bending moment diagram (kN.m.) - Linear elastic analysis
Loading combination: Dead+Imposed ULS

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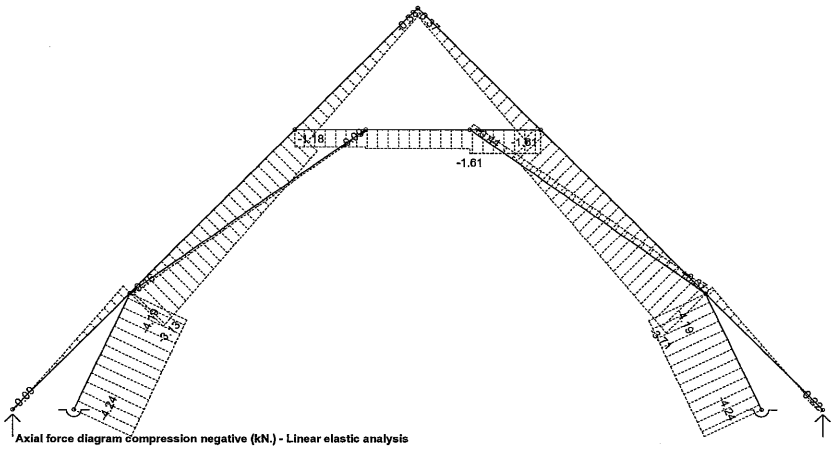

Axial force diagram compression negative (kN.) - Linear elastic analysis
Loading combination: Dead+Imposed ULS

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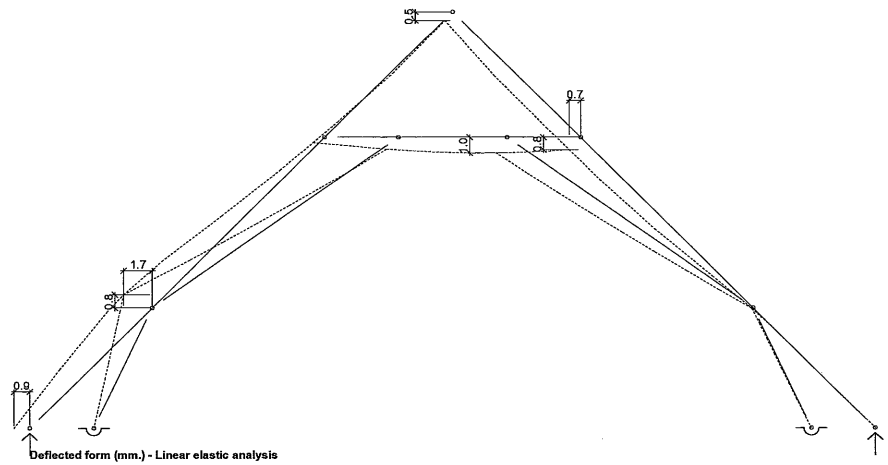
		Title : Roof Truss - Proposed 17274 St Dubricius Church, Porlock	
		Designed: CAS	Checked :



Deflected form (mm.) - Linear elastic analysis
Loading combination: Dead+Imposed SLS

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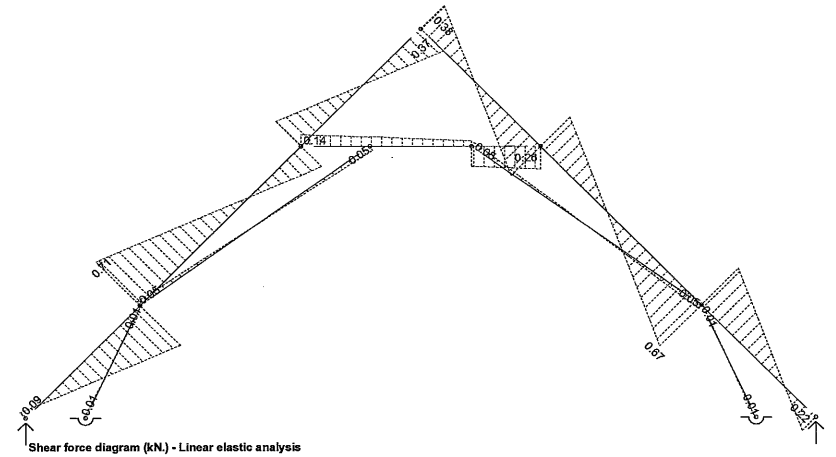
		Designed: CAS	Checked :



Shear force diagram (kN.) - Linear elastic analysis
Loading combination: Dead+Imposed ULS

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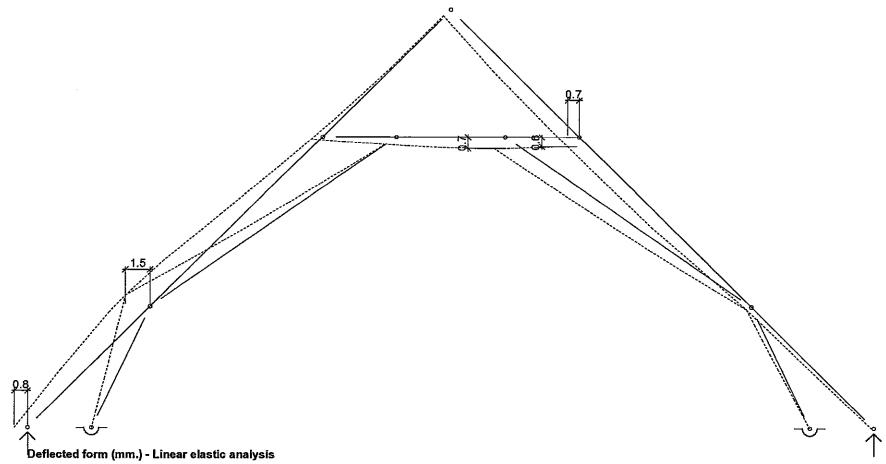
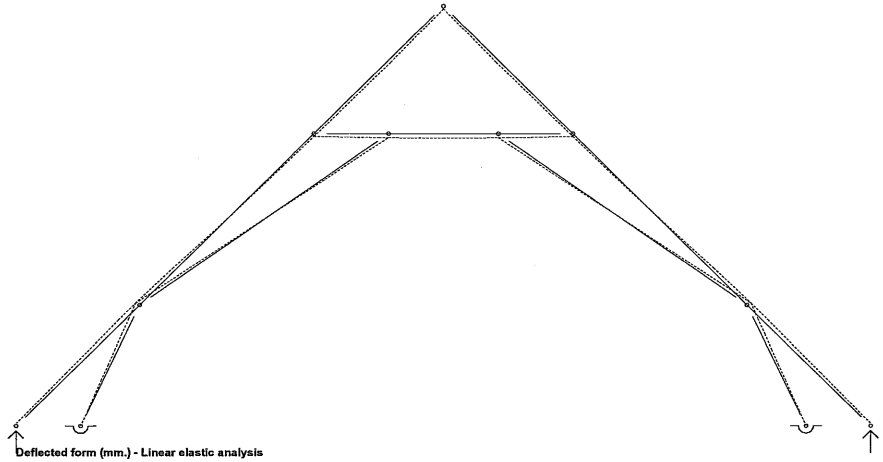
		Title : Roof Truss - Proposed 17274 St Dubricius Church, Porlock	
		Designed: CAS	Checked :



Deflected form (mm.) - Linear elastic analysis
Loading combination: Unfactored total dead

	Quiksoft Limited	Printed : 01/04/2025	Sheet : 21
	Tel: 08456 250 280 / 01202 805 220 Fax: 08456 250 281 email: info@quiksoft.co.uk web: www.quiksoft.co.uk	File : Roof frame proposed	
		Title : Roof Truss - Proposed 17274 St Dubricius Church, Porlock	
Quikframe - Plane Frame Analysis 9.40		Designed: CAS	Checked :



Deflected form (mm.) - Linear elastic analysis
Loading combination: Unfactored imposed

	Quiksoft Limited	Printed : 01/04/2025	Sheet : 22
	Tel: 08456 250 280 / 01202 805 220 Fax: 08456 250 281 email: info@quiksoft.co.uk web: www.quiksoft.co.uk	File : Roof frame proposed	
		Title : Roof Truss - Proposed 17274 St Dubricius Church, Porlock	
Quikframe - Plane Frame Analysis 9.40		Designed: CAS	Checked :

TIMBER MEMBER DESIGN (EN1995-1-1:2004)

In accordance with EN1995-1-1:2004 + A2:2014 incorporating corrigendum June 2006 and the UK national annex

Tedds calculation version 2.2.23

Design summary

Overall design utilisation 0.533

Overall design status PASS

Rafters results summary	**Unit**	**Capacity**	**Maximum**	**Utilisation**	**Result**
Compressive stress	N/mm²	8.4	0.4	0.044	PASS
Bending stress	N/mm²	10.4	1.8	0.173	PASS
Shear stress	N/mm²	1.6	0.2	0.098	PASS
Bending and axial force				0.175	PASS
Column stability check				0.533	PASS
Beam stability check				0.390	PASS
Collar results summary	**Unit**	**Capacity**	**Maximum**	**Utilisation**	**Result**
Compressive stress	N/mm²	8.4	0.2	0.019	PASS
Bending stress	N/mm²	10.4	1.2	0.115	PASS
Shear stress	N/mm²	1.6	0.1	0.042	PASS
Bending and axial force				0.116	PASS
Column stability check				0.149	PASS
Beam stability check				0.047	PASS
Upper Strut results summary	**Unit**	**Capacity**	**Maximum**	**Utilisation**	**Result**
Tensile stress	N/mm²	6.3	0.1	0.008	PASS
Bending stress	N/mm²	10.4	0.2	0.017	PASS
Shear stress	N/mm²	1.6	0.0	0.007	PASS
Bending and axial force				0.025	PASS
Beam stability check				0.017	PASS
Lower Strut results summary	**Unit**	**Capacity**	**Maximum**	**Utilisation**	**Result**
Compressive stress	N/mm²	8.4	0.4	0.051	PASS
Shear stress	N/mm²	1.6	0.0	0.001	PASS
Column stability check				0.057	PASS

Rafters

Partial factor for material properties and resistances

Partial factor γ_M = **2.000**

Member details

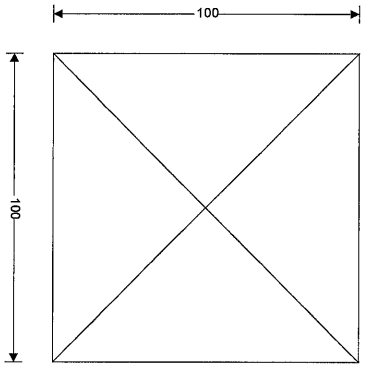
Load duration Medium-term Service class 2

Timber section details

Number of timber sections N = **1**

Breadth of sections b = **100** mm Depth of sections h = **100** mm

Timber strength class **C24**



100x100 timber section
Cross-sectional area, A, 10000 mm²
Section modulus, W_y, 166666.7 mm³
Section modulus, W_z, 166667 mm³
Second moment of area, I_y, 8333333 mm⁴
Second moment of area, I_z, 8333333 mm⁴
Radius of gyration, i_y, 28.9 mm
Radius of gyration, i_z, 28.9 mm
Timber strength class C24
Characteristic bending strength, $f_{m,k}$, 24 N/mm²
Characteristic shear strength, $f_{v,k}$, 4 N/mm²
Characteristic compression strength parallel to grain, $f_{c,0,k}$, 21 N/mm²
Characteristic compression strength perpendicular to grain, $f_{c,90,k}$, 2.5 N/mm²
Characteristic tension strength parallel to grain, $f_{t,0,k}$, 14.5 N/mm²
Mean modulus of elasticity, $E_{0,mean}$, 11000 N/mm²
Fifth percentile modulus of elasticity, $E_{0,05}$, 7400 N/mm²
Shear modulus of elasticity, G_{mean}, 690 N/mm²
Characteristic density, ρ_k, 350 kg/m³
Mean density, ρ_{mean}, 420 kg/m³

Span details

Unbraced length - Major axis L_y = **4700** mm
Effective length - Major axis $L_{e,y} = L_y$ = **4700** mm
Unbraced length - Minor axis L_z = **4700** mm
Effective length - Minor axis $L_{e,z} = L_z$ = **4700** mm
Bearing length L_b = **100** mm

Analysis results

Design bending moment $M_{y,d}$ = **0.3** kNm $M_{z,d}$ = **0** kNm
Design shear force $F_{y,d}$ = **0.7** kN $F_{z,d}$ = **0** kN
Design axial compression force P_d = **3.7** kN

Check compression parallel to the grain - cl.6.1.4

Design compressive stress $\sigma_{c,0,d}$ = **0.370** N/mm² Design compressive strength $f_{c,0,d}$ = **8.400** N/mm²
Utilisation = **0.044**

PASS - Design parallel compression strength exceeds design parallel compression stress

Check shear force - Section 6.1.7

Design shear stress $\tau_{y,d}$ = **0.157** N/mm² Design shear strength $f_{v,y,d}$ = **1.600** N/mm²
Utilisation = **0.098**

PASS - Design shear strength exceeds design shear stress

Check bending moment - Section 6.1.6

Design bending stress $\sigma_{m,y,d}$ = **1.8** N/mm² Design bending strength $f_{m,y,d}$ = **10.411** N/mm²
Utilisation = **0.173**

PASS - Design bending strength exceeds design bending stress

Check combined bending and axial tension - Section 6.2.3

Utilisation = **0.175**

PASS - Combined bending and axial compression utilisation is acceptable

Check columns subjected to either compression or combined compression and bending - cl.6.3.2

Effective length for y-axis $L_{e,y}$ = **4700** mm Relative slenderness ratio $\lambda_{rel,y}$ = **2.761**
Effective length for z-axis $L_{e,z}$ = **4700** mm Relative slenderness ratio $\lambda_{rel,z}$ = **2.761**

Both $\lambda_{rel,y}$ > 0.3 and $\lambda_{rel,z}$ > 0.3, column stability check is required

Utilisation = **0.533**

PASS - Column stability is acceptable

Check beams subjected to either bending or combined bending and compression - cl.6.3.3

Utilisation = **0.39**

PASS - Beam stability is acceptable

Collar

Partial factor for material properties and resistances

Partial factor γ_M = **2.000**

Member details

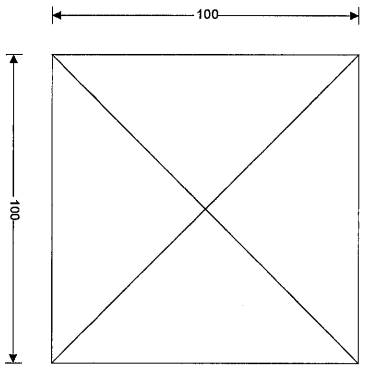
Load duration Medium-term Service class 2

Timber section details

Number of timber sections N = **1**

Breadth of sections b = **100** mm Depth of sections h = **100** mm

Timber strength class **C24**



100x100 timber section
Cross-sectional area, A, 10000 mm²
Section modulus, W_y, 166666.7 mm³
Section modulus, W_z, 166667 mm³
Second moment of area, I_y, 8333333 mm⁴
Second moment of area, I_z, 8333333 mm⁴
Radius of gyration, i_y, 28.9 mm
Radius of gyration, i_z, 28.9 mm
Timber strength class C24
Characteristic bending strength, $f_{m,k}$, 24 N/mm²
Characteristic shear strength, $f_{v,k}$, 4 N/mm²
Characteristic compression strength parallel to grain, $f_{c,0,k}$, 21 N/mm²
Characteristic compression strength perpendicular to grain, $f_{c,90,k}$, 2.5 N/mm²
Characteristic tension strength parallel to grain, $f_{t,0,k}$, 14.5 N/mm²
Mean modulus of elasticity, $E_{0,mean}$, 11000 N/mm²
Fifth percentile modulus of elasticity, $E_{0,05}$, 7400 N/mm²
Shear modulus of elasticity, G_{mean}, 690 N/mm²
Characteristic density, ρ_k, 350 kg/m³
Mean density, ρ_{mean}, 420 kg/m³

Span details

Unbraced length - Major axis L_y = **2000** mm

Effective length - Major axis $L_{e,y} = L_y$ = **2000** mm

Unbraced length - Minor axis L_z = **2000** mm

Effective length - Minor axis $L_{e,z} = L_z$ = **2000** mm

Bearing length L_b = **100** mm

Analysis results

Design bending moment $M_{y,d}$ = **0.2** kNm $M_{z,d}$ = **0** kNm

Design shear force $F_{y,d}$ = **0.3** kN $F_{z,d}$ = **0** kN

Design axial compression force P_d = **1.6** kN

Check compression parallel to the grain - cl.6.1.4

Design compressive stress $\sigma_{c,0,d}$ = **0.160** N/mm² Design compressive strength $f_{c,0,d}$ = **8.400** N/mm²

Utilisation = **0.019**

PASS - Design parallel compression strength exceeds design parallel compression stress

Check shear force - Section 6.1.7

Design shear stress $\tau_{y,d}$ = **0.067** N/mm² Design shear strength $f_{v,y,d}$ = **1.600** N/mm²

Utilisation = **0.042**

PASS - Design shear strength exceeds design shear stress

Check bending moment - Section 6.1.6

Design bending stress $\sigma_{m,y,d}$ = **1.2** N/mm² Design bending strength $f_{m,y,d}$ = **10.411** N/mm²

Utilisation = **0.115**

PASS - Design bending strength exceeds design bending stress

Check combined bending and axial tension - Section 6.2.3

Utilisation = **0.116**

PASS - Combined bending and axial compression utilisation is acceptable

Check columns subjected to either compression or combined compression and bending - cl.6.3.2

Effective length for y-axis $L_{e,y}$ = **2000** mm Relative slenderness ratio $\lambda_{rel,y}$ = **1.175**

Effective length for z-axis $L_{e,z}$ = **2000** mm Relative slenderness ratio $\lambda_{rel,z}$ = **1.175**

Both $\lambda_{rel,y}$ > 0.3 and $\lambda_{rel,z}$ > 0.3, column stability check is required

Utilisation = **0.149**

PASS - Column stability is acceptable

Check beams subjected to either bending or combined bending and compression - cl.6.3.3

Utilisation = **0.047**

PASS - Beam stability is acceptable

Upper Strut

Partial factor for material properties and resistances

Partial factor γ_M = **2.000**

Member details

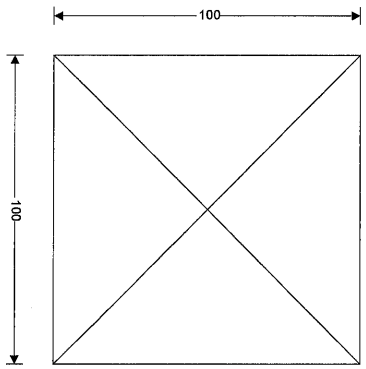
Load duration Medium-term Service class 2

Timber section details

Number of timber sections N = **1**

Breadth of sections b = **100** mm Depth of sections h = **100** mm

Timber strength class **C24**



100x100 timber section
Cross-sectional area, A, 10000 mm²
Section modulus, W_y, 166666.7 mm³
Section modulus, W_z, 166667 mm³
Second moment of area, I_y, 8333333 mm⁴
Second moment of area, I_z, 8333333 mm⁴
Radius of gyration, i_y, 28.9 mm
Radius of gyration, i_z, 28.9 mm
Timber strength class C24
Characteristic bending strength, $f_{m,k}$, 24 N/mm²
Characteristic shear strength, $f_{v,k}$, 4 N/mm²
Characteristic compression strength parallel to grain, $f_{c,0,k}$, 21 N/mm²
Characteristic compression strength perpendicular to grain, $f_{c,90,k}$, 2.5 N/mm²
Characteristic tension strength parallel to grain, $f_{t,0,k}$, 14.5 N/mm²
Mean modulus of elasticity, $E_{0,mean}$, 11000 N/mm²
Fifth percentile modulus of elasticity, $E_{0,05}$, 7400 N/mm²
Shear modulus of elasticity, G_{mean}, 690 N/mm²
Characteristic density, ρ_k, 350 kg/m³
Mean density, ρ_{mean}, 420 kg/m³

Span details

Unbraced length - Major axis L_y = **2400** mm

Effective length - Major axis $L_{e,y}$ = L_y = **2400** mm

Unbraced length - Minor axis L_z = **2400** mm

Effective length - Minor axis $L_{e,z}$ = L_z = **2400** mm

Bearing length L_b = **100** mm

Analysis results

Design bending moment $M_{y,d}$ = **0.03** kNm $M_{z,d}$ = **0** kNm

Design shear force $F_{y,d}$ = **0.05** kN $F_{z,d}$ = **0** kN

Design axial tension force P_d = **0.5** kN

Check tension parallel to the grain - Section 6.1.2

Design tensile stress $\sigma_{t,0,d}$ = **0.050** N/mm^2 Design tensile strength $f_{t,0,d}$ = **6.290** N/mm^2

Utilisation = **0.008**

PASS - Design tensile strength exceeds design tensile stress

Check shear force - Section 6.1.7

Design shear stress $\tau_{y,d}$ = **0.011** N/mm^2 Design shear strength $f_{v,y,d}$ = **1.600** N/mm^2

Utilisation = **0.007**

PASS - Design shear strength exceeds design shear stress

Check bending moment - Section 6.1.6

Design bending stress $\sigma_{m,y,d}$ = **0.18** N/mm^2 Design bending strength $f_{m,y,d}$ = **10.411** N/mm^2

Utilisation = **0.017**

PASS - Design bending strength exceeds design bending stress

Check combined bending and axial tension - Section 6.2.3

Utilisation = **0.025**

PASS - Combined bending and axial tension utilisation is acceptable

Check beams subjected to either bending or combined bending and compression - cl.6.3.3

Utilisation = **0.017**

PASS - Beam stability is acceptable

Lower Strut

Partial factor for material properties and resistances

Partial factor γ_M = **2.000**

Member details

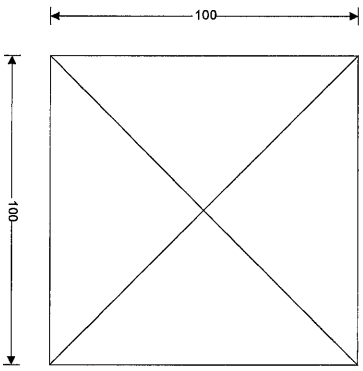
Load duration Medium-term Service class 2

Timber section details

Number of timber sections N = **1**

Breadth of sections b = **100** mm Depth of sections h = **100** mm

Timber strength class **C24**



100x100 timber section
Cross-sectional area, A, 10000 mm^2
Section modulus, W_y, 166666.7 mm^3
Section modulus, W_z, 166667 mm^3
Second moment of area, I_y, 8333333 mm^4
Second moment of area, I_z, 8333333 mm^4
Radius of gyration, i_y, 28.9 mm
Radius of gyration, i_z, 28.9 mm
Timber strength class C24
Characteristic bending strength, $f_{m,k}$, 24 N/mm^2
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Characteristic compression strength perpendicular to grain, $f_{c,90,k}$, 2.5 N/mm^2
Characteristic tension strength parallel to grain, $f_{t,0,k}$, 14.5 N/mm^2
Mean modulus of elasticity, $E_{0,mean}$, 11000 N/mm^2
Fifth percentile modulus of elasticity, $E_{0,05}$, 7400 N/mm^2
Shear modulus of elasticity, G_{mean}, 690 N/mm^2
Characteristic density, ρ_k, 350 kg/m^3
Mean density, ρ_{mean}, 420 kg/m^3

Span details

Unbraced length - Major axis L_y = **1100** mm

Effective length - Major axis $L_{e,y}$ = L_y = **1100** mm

Unbraced length - Minor axis L_z = **1100** mm

Effective length - Minor axis $L_{e,z}$ = L_z = **1100** mm

Bearing length L_b = **100** mm

Analysis results

Design shear force $F_{y,d}$ = **0.01** kN $F_{z,d}$ = **0** kN

Design axial compression force P_d = **4.3** kN

Check compression parallel to the grain - cl.6.1.4

Design compressive stress $\sigma_{c,0,d}$ = **0.430** N/mm^2 Design compressive strength $f_{c,0,d}$ = **8.400** N/mm^2

Utilisation = **0.051**

PASS - Design parallel compression strength exceeds design parallel compression stress

Check shear force - Section 6.1.7

Design shear stress $\tau_{y,d}$ = **0.002** N/mm^2 Design shear strength $f_{v,y,d}$ = **1.600** N/mm^2

Utilisation = **0.001**

PASS - Design shear strength exceeds design shear stress

Check columns subjected to either compression or combined compression and bending - cl.6.3.2

Effective length for y-axis $L_{e,y}$ = **1100** mm Relative slenderness ratio $\lambda_{rel,y}$ = **0.646**

Effective length for z-axis $L_{e,z}$ = **1100** mm Relative slenderness ratio $\lambda_{rel,z}$ = **0.646**

Both $\lambda_{rel,y}$ > 0.3 and $\lambda_{rel,z}$ > 0.3, column stability check is required

Utilisation = **0.057**

PASS - Column stability is acceptable