STRUCTURAL CALCULATIONS

Project: Great Trill Farm – Truss Modifications

Reference: 21/7553

Client: Roland de Hauke

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DESIGN REQUIREMENTS

All designs carried out in accordance with the following documents as appropriate:

BS 648:1964	Weights of building materials
BS 6399:1996	Loading for buildings
BS 5977-1:1981	Method of assessment of load for lintels
BS 5628-1:2005	Structural use of unreinforced masonry
BS 5950-1:2000	Structural use of steelwork in buildings
BS 5268-2:2002	Structural use of timber
BS 8110-1:1997	Structural Use of Concrete
BS 8004:1986	Foundations
BS 8002:1994	Earth retaining structures

Other relevant documents also may be specified.

GENERAL NOTES

1. These calculations should not be taken by any party to represent an investigation into the whole structure. They are not intended as construction documents and any findings herein should be transferred to the construction drawings, except where specific sketch sheets have been allocated and referenced otherwise.
2. These calculations are not to be used for the purpose of ordering materials and should only be used for Building Regulations submissions.
3. The calculations have been prepared for and remain the sole property of the Client. They must not be reproduced, defaced, or passed onto any third party or used for any other purpose than originally intended.
4. Refer to construction notes and material specifications as set out on engineering drawings.
5. Calculations and drawings to be read in conjunction with Architects drawings, any inconsistencies should be reported.
6. The design and associated details prepared by Jon J Oates Ltd assume a competent Contractor will be entrusted with the work. No responsibility can be accepted for errors resulting from incorrect interpretation. Jon J Oates Ltd should be consulted in the event of any misunderstanding prior to construction.
7. If any site conditions or existing details are found that may affect the structural design, Jon J Oates Ltd are to be notified immediately.
8. The project requires the introduction of heavy structural elements such as steel beams or concrete lintels. The builder is to take into consideration the placement of all structural elements, ensuring that the method of lifting and placement is safely carried out. Responsibility for this element lies with the Contractor.
9. All construction products should be CE marked in accordance with current legislation.
10. Design of temporary works is the responsibility of the contractor. Propping loads can be advised.
11. Method statement and risk assessment should be produced by the Contractor, in compliance with relevant health and safety regulations.
12. Unless a ground investigation has been undertaken, all allowable bearing pressures are assumed based on typical values for the bearing strata, identified from geological maps or historical records where relevant. All foundations are to be constructed to Local Authority approval.

DISPROPORTIONATE COLLAPSE

1. The designer has an obligation to put in place measures to reduce the sensitivity of a building to disproportionate collapse, should an accident occur.
2. From Building Regulations Approved Document A, Table 11, the consequence class for this structure is consequence class 1. No additional specific measures are required, provided that the construction work is carried out in accordance with Building Regulations, all relevant drawings, and good practice.

SCOPE OF WORK

1. Design of truss modification to increase headroom.

PARTY WALL etc. ACT 1996

If part of the work is adjacent to the boundary, the adjacent neighbours right to support could be affected. The issues associated with Party Wall Act may need to be considered. This may include providing information to the adjoining owner, giving sufficient notice of works in compliance with the Act. If the following list applies to this project then the Party Wall Act will apply:

- Installing a new beam into a shared wall between properties.
- Demolishing, building, or under-pinning an existing shared wall.
- Building a new wall at or on the boundary or junction of two properties.
- Damp-proofing all the way through a party wall.
- Digging foundations that are within 3.0m of a Party Wall, where the new foundations are deeper than the existing ones.
- Where the new foundations are within 6.0m and lower than a 45º line from the bottom of the existing foundations.

LOADING

Pitched Roof - Slates (38.5 Degrees)

Roof pitch	*38.5*	*degrees*
Slates	0.35	kN/m^2
Treated battens	0.02	kN/m^2
Underlayment	0.01	kN/m^2
Insulation	0.05	kN/m^2
Timber joists	0.15	kN/m^2
Ceiling & services	0.15	kN/m^2
Total dead load on plan	**0.93**	**kN/m^2**
Uniform imposed load	0.75	kN/m^2
Imposed reduction factor	*0.72*	
Imposed load	**0.54**	**kN/m^2**

DESIGN SUMMARY

Truss loading

Purlins/ridge support 1.5m rafters

Truss centres = 3.35m

Load at purlin/ridge: 1.5 x 3.35 = 5.0m^2 roof load

5.0m^2 roof:

5.0 x 0.93 = 4.65 kN DL

5.0 x 0.54 = 2.70 kN IL

Existing truss analysis

Rafters

Axial = 27.6 kN

Shear = 5.4 kN

Bending = 3.0 kNm

King post

Axial = 12.4 kN (tension)

Webs

Axial = 9.8 kN

Tie

Axial = 20.7 kN (tension)

Shear = 0.1 kN

Bending = 0.4 kNm

Spread = 1.4mm

Proposed truss analysis 1 – new tie bolted to sides

Rafters

Axial = 27.6 kN 42.4 kN

Shear = 5.4 kN 17.6 kN

Bending = 3.0 kNm 23.3 kN

King post

Axial = 12.4 kN (tension) 26.7 kN (tension)

Webs

Axial = 9.8 kN 23.7 kN

Raised Tie

Axial = 40.5 kN (tension)

Shear = 13.3 kN

Bending = 6.4 kNm

Spread = 1.4mm 81.5mm

Spread too great – improve rafter stiffness

Flitch rafter

Try 250x10thk flitch plates either side (S275)

See CADS analysis for flitch check

MR = 25

Equivalent area = 145250 mm^2

Equivalent I_{xx} = 77406 cm^4

Refer to TSD analysis, improved rafter spread = 16.9mm – reasonable over span

Provide 250x10thk flitch plates either side of new tie position

Max allowable moment for timber beam = 10 kNm

Joints

Loads as previous

See CADS analysis, provide min 4M16 bolts for new tie

CADS & TEKLA STRUCTURAL DESIGNER CALCULATIONS

Flitch check

Calculations for timber flitched beam - type3 in accordance with BS5268:Pt 2:2002

Assumptions:

1. This calculation assumes a single line of bolts. These bolts should be placed along the centreline for shallow beams or staggered alternately depth/4 above and below in deeper beams.

2. The load transfer is always perpendicular to the grain.

Beam general details

Length of beam	L	=	3 m
Length of bearing	l_b	=	150 mm
Beam location	b_l	=	single
No. of timber pieces	np	=	1
Load duration	l_{dur}	=	Medium

Steel plate details

Thickness of plate	b_s	=	10 mm
Depth of plate	d_s	=	250 mm
Steel grade	S_{cs}	=	275

Timber details

Timber type	Tim_{type}	=	Planed All Round
Softwood			
Depth of timber	d	=	270 mm
Width of timber	b	=	75 mm
Strength class	S_{cr}	=	C30

Service class s_{class} = Covered & heated / unheated

Loading & Analysis

Load Description	Type	A	B	C	Gk	Qk
	Point	1.5			31.0	0.0

Maximum span bending moment M = 23.25 kNm
Maximum design shear force F_{ve} = 15.5 kN

Timber stresses from BS 5268 table 8 to 15

Bending parallel to grain b_{parg} = 11 N/mm^2
Shear parallel to grain s_{parg} = 1.2 N/mm^2
Compression perpendicular to grain c_{perg} = 2.7 N/mm^2
Mean modulus of elasticity E_{mean} = 12300 N/mm^2
Minimum modulus of elasticity E_{min} = 8200 N/mm^2

Modification factor K2 for timber

Bending parallel to grain K_{2ben} = 1
Compression perpendicular to grain K_{2per} = 1
Shear parallel to grain K_{2shr} = 1
Mean & min modulus of elasticity K_{2mod} = 1

Section properties

Modulus of elasticity of timber (modified)
E = E_{min}*K_{2mod}
= 8200*1
= 8200 N/mm^2

Modulus of elasticity of steel E_{st} = 205000 N/mm^2

Modular ratio m_r = E_{st}/E
= 205000/8200
= 25

Equivalent area of the section E_A = (m_r*2*b_s*d_s)+(b*d)
= (25*2*10*250)+(75*270)
= 145250 mm^2

Inertia of timber about X-axis I_t = b*d^3/12
= 75*(270)^3/12
= 123018750 mm^4

Modified I of steel about X-axis I_s = m_r*2*b_s*d_s^{3}/12
= 25*2*10*(250)^3/12
= 651041666.667 mm^4

Total of inertia about X-axis in equivalent timber
I_{xx} = I_t+I_s
= (1.23*10^8)+(6.51*10^8)
= 774060500 mm^4

Distance to edge of steel plate Y_s = (d_s/2)
= (250/2)
= 125 mm

Distance to edge of timber Y_t = (d/2)
= (270/2)
= 135 mm

Extreme fibre is timber section Y_c = Y_t
= 135 mm

Distance from centroid to steel edge

	Y_n	$= Y_s$
		= 125 mm
Section modulus to top edge of timber		
	Z_c	$= I_{xx}/Y_c$
		$= (7.741*10^8)/135$
		$= 5733781.481\ mm^3$

Permissible timber stress

Bending stress	σ_d	$= K_{2ben}*K3*K7*K8*b_{parg}$
		= 1*1.25*1.012*1*11
		$= 13.91\ N/mm^2$
Shear stress	τ_d	$= K_{2shr}*K3*K8*s_{parg}$
		= 1*1.25*1*1.2
		$= 1.5\ N/mm^2$
Compression perpendicular to grain	σ_{ad}	$= K_{2per}*K3*K8*K4*c_{perg}$
		= 1*1.25*1*1*2.7
		$= 3.375\ N/mm^2$

Permissible steel plate stresses (as per BS 449,part:2,Table 2)

Bending stresses for steel plate	σ_{bp}	$= 180\ N/mm^2$
Allowable bearing stress	σ_{ds}	$= 210\ N/mm^2$
Shear stress of steel	τ_s	$= 125\ N/mm^2$

Check for bending stresses

Applied bending stress in timber	σ_t	$= M*10^6/Z_c$
		$= 23.25*10^6/5733782$
		$= 4.055\ N/mm^2$
Applied bending stress in steel	σ_s	$= \sigma_t*m_r*Y_n/Y_c$
		= 4.055*25*125/135
		$= 93.864\ N/mm^2$

Applied bending stress in timber within permissible stress. Section is safe.
Applied bending stress in steel within permissible stress. Section is safe.

Check for deflection (including shear deflection as required by clause 2.10.7)

Deflection inclusive of shear	D_{max}	= Dmax
		= 3.115 mm
Limiting deflection	DEL_{lim}	$= 0.003*SPAN*10^3$
		$= 0.003*3*10^3$
		= 9 mm

Section is safe

Check for shear stresses (no notch permitted)

Permissible shear force on timber	τ_{tp}	$= 2*\tau_d*b*d/(3*1000)$
		= 2*1.5*75*270/(3*1000)
		= 20.25 kN

Shear capacity of timber alone is greater than applied shear force. Section is safe.

Check for bearing force

Timber bearing stress on support	σ_{ba_T}	$= (F_{ve}*1000)/(l_b*b)$
		= (15.5*1000)/(150*75)
		$= 1.378\ N/mm^2$
Permissible bearing	σ_{ad}	$= K_{2per}*K3*K8*K4*c_{perg}$
		= 1*1.25*1*1*2.7
		$= 3.375\ N/mm^2$

Bearing stress is less than permissible timber stress. Section is safe.

Section is adequate - Passes all checks

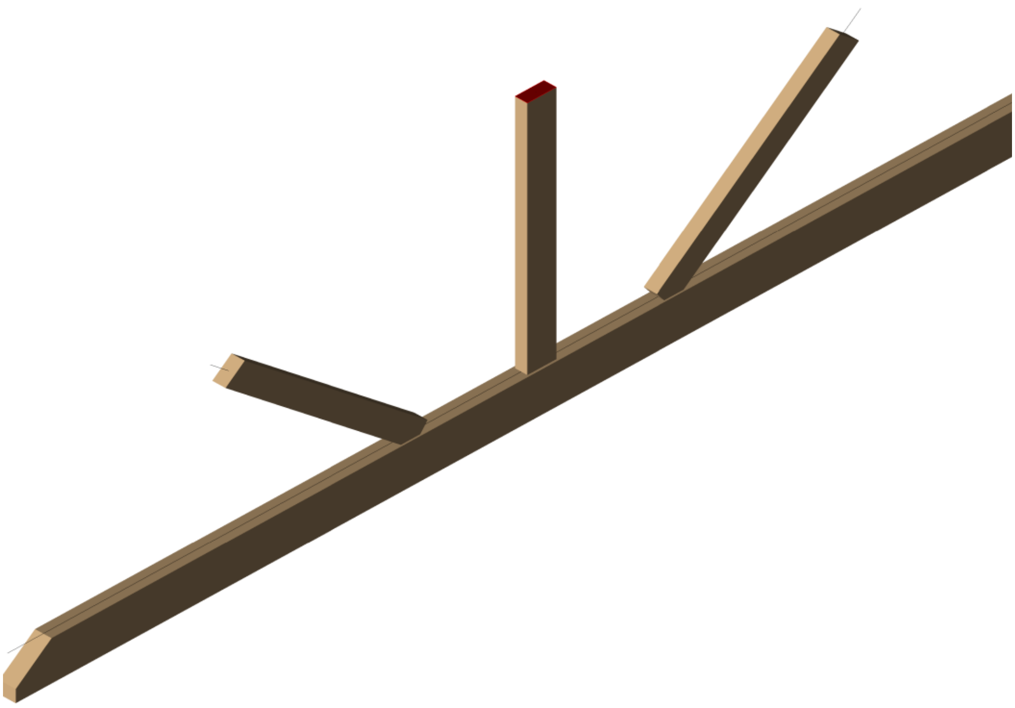
Provide 250x10thk plates either side of rafter

Truss Analyses

Timber

Beams

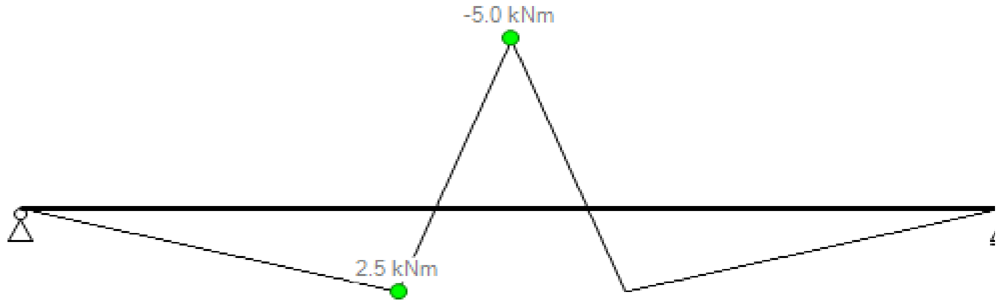
TB 1.1/2/#14-1.1/2/#15



TB 1.1/2/#14-1.1/2/#15

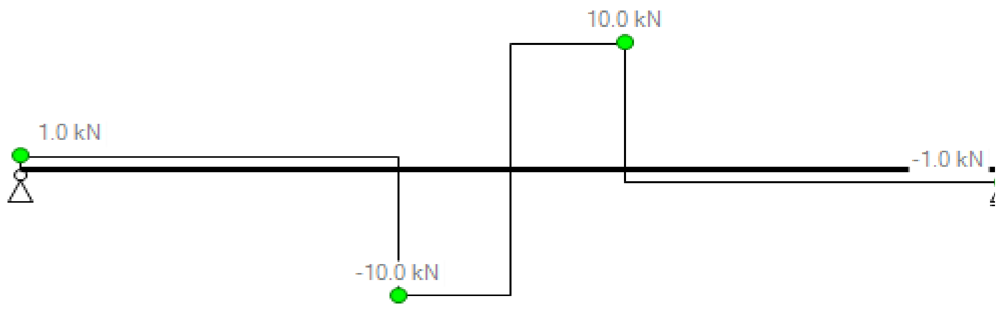
Bending Moment Diagram, First-order linear, Strength Factors

Major



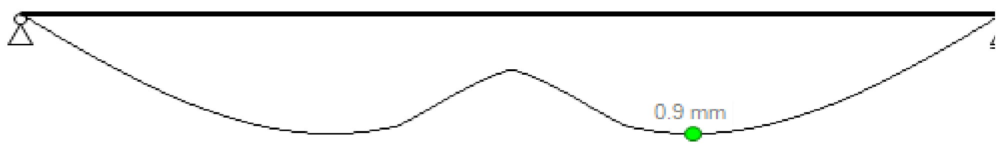
Combination: 1 Combination. Major Moment for TB 1.1/2/#14-1.1/2/#15

Shear Force Diagram, First-order linear, Strength Factors
Major



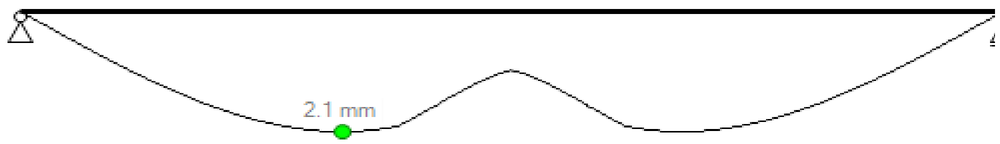
Combination: 1 Combination. Major Shear for TB 1.1/2/#14-1.1/2/#15

Deflected Shape Diagram, First-order linear
Major



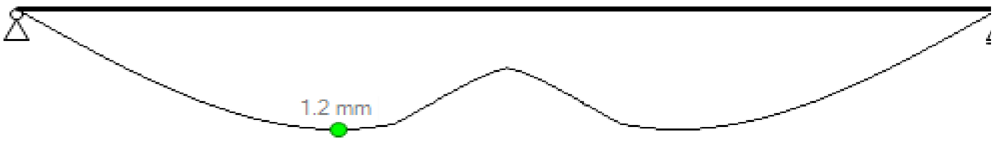
Loadcase: 1 Self weight - excluding slabs. Major Deflection for TB 1.1/2/#14-1.1/2/#15

Loadcase: 2 Slab self weight. Major Deflection for TB 1.1/2/#14-1.1/2/#15



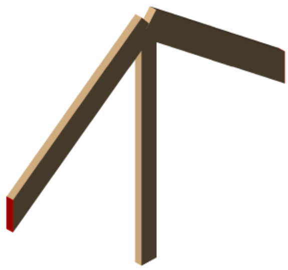
Loadcase: 3 Dead. Major Deflection for TB 1.1/2/#14-1.1/2/#15

Loadcase: 4 Services, Major Deflection for TB 1.1/2/#14-1.1/2/#15



Loadcase: 5 Imposed, Major Deflection for TB 1.1/2/#14-1.1/2/#15

TB 1.1/C/2-2/C/2



TB 1.1/C/2-2/C/2

Bending Moment Diagram, First-order linear, Strength Factors

Major

Combination: 1 Combination. Major Moment for TB 1.1/C/2-2/C/2

Shear Force Diagram, First-order linear, Strength Factors

Major

Combination: 1 Combination. Major Shear for TB 1.1/C/2-2/C/2

Deflected Shape Diagram, First-order linear

Major

Loadcase: 1 Self weight - excluding slabs. Major Deflection for TB 1.1/C/2-2/C/2

Loadcase: 2 Slab self weight. Major Deflection for TB 1.1/C/2-2/C/2

Loadcase: 3 Dead, Major Deflection for TB 1 1/C/2-2/C/2

Loadcase: 4 Services, Major Deflection for TB 1 1/C/2-2/C/2

Loadcase: 5 Imposed, Major Deflection for TB 1 1/C/2-2/C/2

TB 1/C/1-2/C/1

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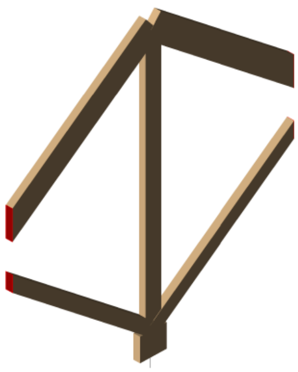
	Great Trill Farm – Truss Modifications		21/7553	
Jon J Oates Ltd	Section		Sheet no./rev.	
Woodhouse Farm	Structural Engineering Calculations		12	
Hawkchurch, Axminster	Calc. by	Date	Chk'd by	Date	App'd by	Date
Devon	JC	08/07/2021	JJO	08/07/2021	JJO	08/07/2021



TB 1/C/1-2/C/1

Bending Moment Diagram, First-order linear, Strength Factors

Major

Combination: 1 Combination. Major Moment for TB 1/C/1-2/C/1

Shear Force Diagram, First-order linear, Strength Factors

Major

Combination: 1 Combination. Major Shear for TB 1/C/1-2/C/1

Deflected Shape Diagram, First-order linear

Major

Loadcase: 1 Self weight - excluding slabs. Major Deflection for TB 1/C/1-2/C/1

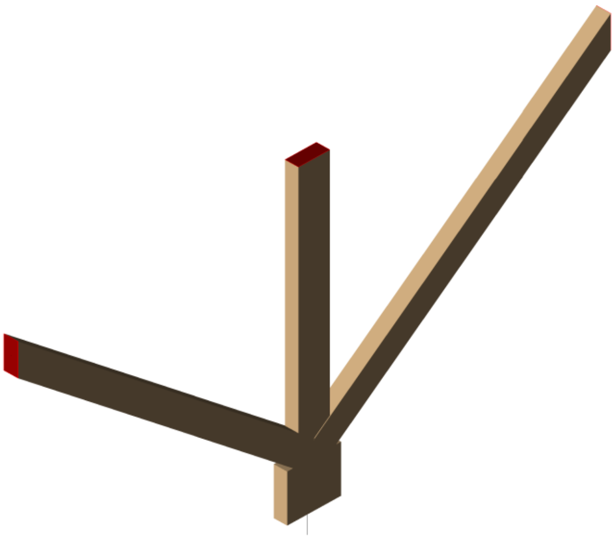
Loadcase: 2 Slab self weight. Major Deflection for TB 1/C/1-2/C/1

Loadcase: 3 Dead. Major Deflection for TB 1/C/1-2/C/1

Loadcase: 4 Services, Major Deflection for TB 1/C/1-2/C/1

Loadcase: 5 Imposed, Major Deflection for TB 1/C/1-2/C/1

TB 1/C/1-Base/C/1



TB 1/C/1-Base/C/1

Bending Moment Diagram, First-order linear, Strength Factors

Major

Combination: 1 Combination. Major Moment for TB 1/C/1-Base/C/1

Shear Force Diagram, First-order linear, Strength Factors

Major

Combination: 1 Combination. Major Shear for TB 1/C/1-Base/C/1

Deflected Shape Diagram, First-order linear

Major

Loadcase: 1 Self weight - excluding slabs. Major Deflection for TB 1/C/1-Base/C/1

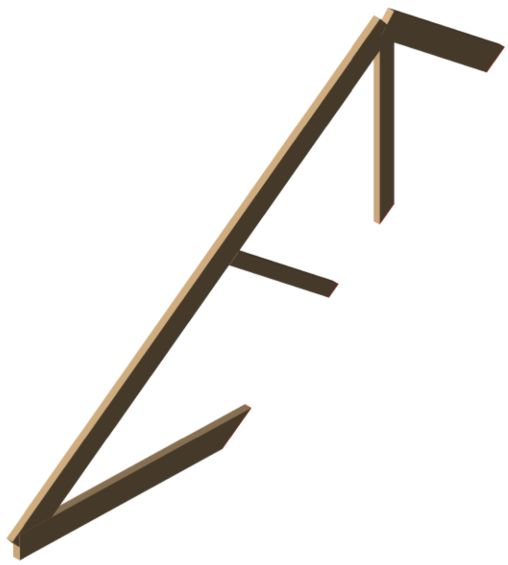
Loadcase: 2 Slab self weight. Major Deflection for TB 1/C/1-Base/C/1

Loadcase: 3 Dead. Major Deflection for TB 1/C/1-Base/C/1

Loadcase: 4 Services, Major Deflection for TB 1/C/1-Base/C/1

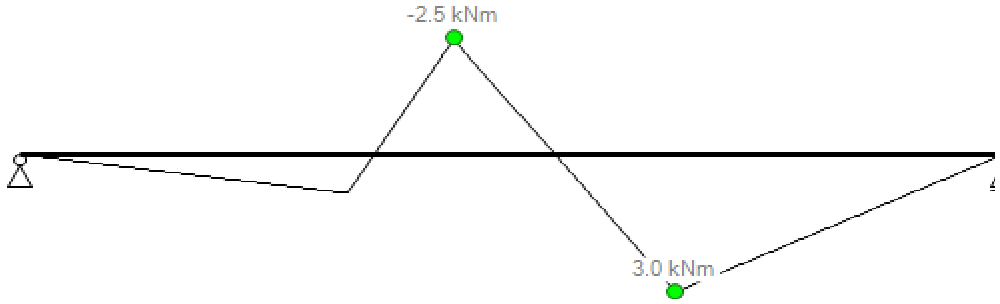
Loadcase: 5 Imposed, Major Deflection for TB 1/C/1-Base/C/1

TB 2/C/1-Base/A/1



TB 2/C/1-Base/A/1

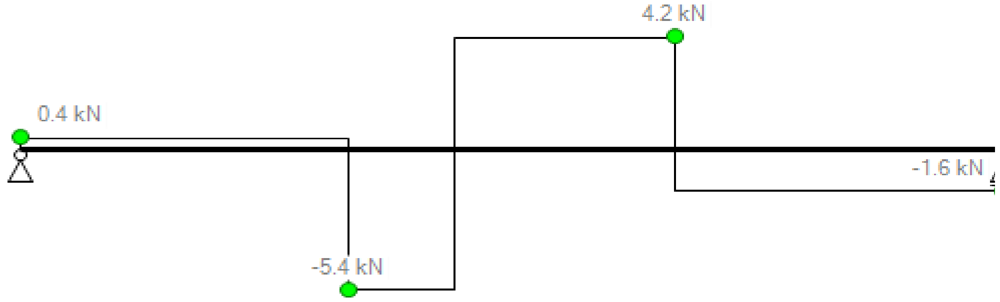
Bending Moment Diagram, First-order linear, Strength Factors
Major



Combination: 1 Combination. Major Moment for TB 2/C/1-Base/A/1

Shear Force Diagram, First-order linear, Strength Factors

Major



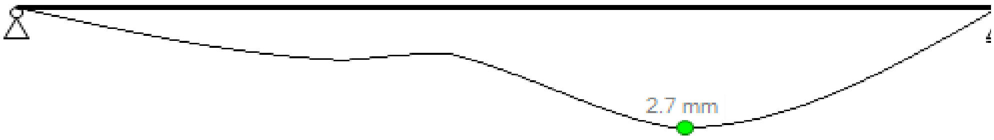
Combination: 1 Combination. Major Shear for TB 2/C/1-Base/A/1

Deflected Shape Diagram, First-order linear

Major

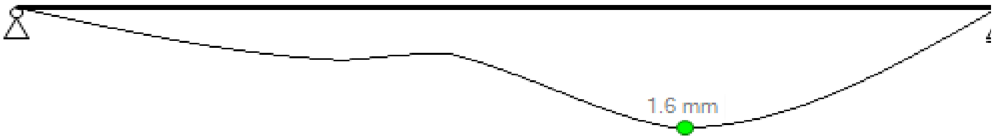
Loadcase: 1 Self weight - excluding slabs. Major Deflection for TB 2/C/1-Base/A/1

Loadcase: 2 Slab self weight. Major Deflection for TB 2/C/1-Base/A/1



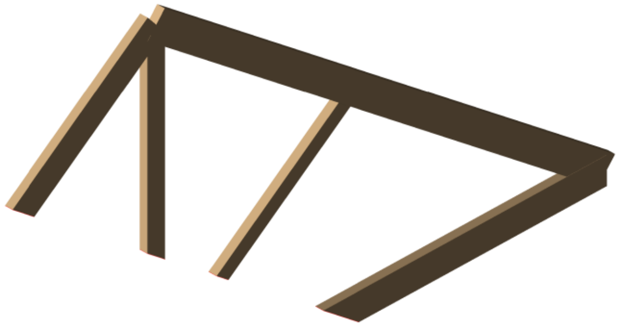
Loadcase: 3 Dead, Major Deflection for TB 2/C/1-Base/A/1

Loadcase: 4 Services, Major Deflection for TB 2/C/1-Base/A/1



Loadcase: 5 Imposed, Major Deflection for TB 2/C/1-Base/A/1

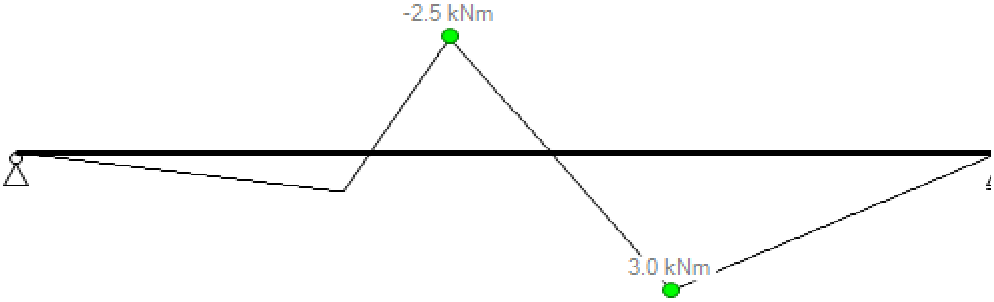
TB 2/C/1-Base/E/1



TB 2/C/1-Base/E/1

Bending Moment Diagram, First-order linear, Strength Factors

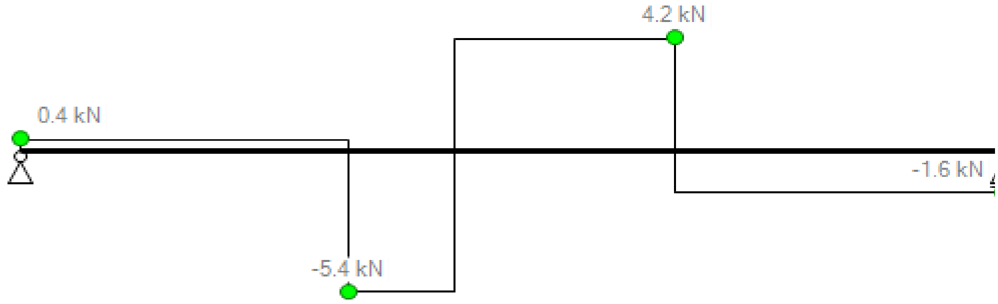
Major



Combination: 1 Combination. Major Moment for TB 2/C/1-Base/E/1

Shear Force Diagram, First-order linear, Strength Factors

Major

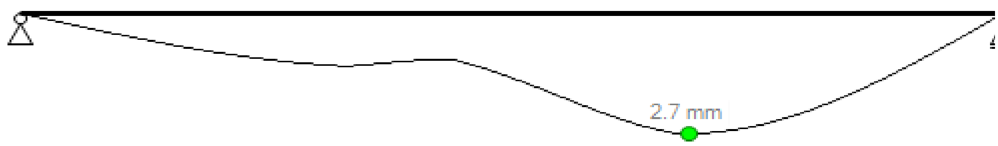


Combination: 1 Combination. Major Shear for TB 2/C/1-Base/E/1

Deflected Shape Diagram, First-order linear
Major

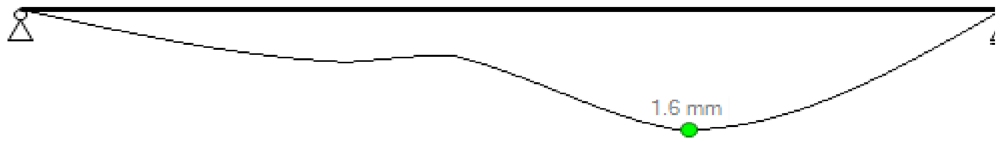
Loadcase: 1 Self weight - excluding slabs. Major Deflection for TB 2/C/1-Base/E/1

Loadcase: 2 Slab self weight. Major Deflection for TB 2/C/1-Base/E/1



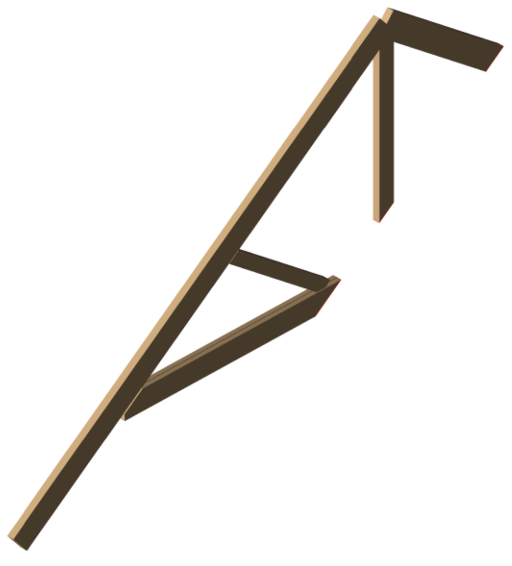
Loadcase: 3 Dead. Major Deflection for TB 2/C/1-Base/E/1

Loadcase: 4 Services, Major Deflection for TB 2/C/1-Base/E/1



Loadcase: 5 Imposed, Major Deflection for TB 2/C/1-Base/E/1

TB 2/C/2-Base/A/2



TB 2/C/2-Base/A/2

Bending Moment Diagram, First-order linear, Strength Factors

Major

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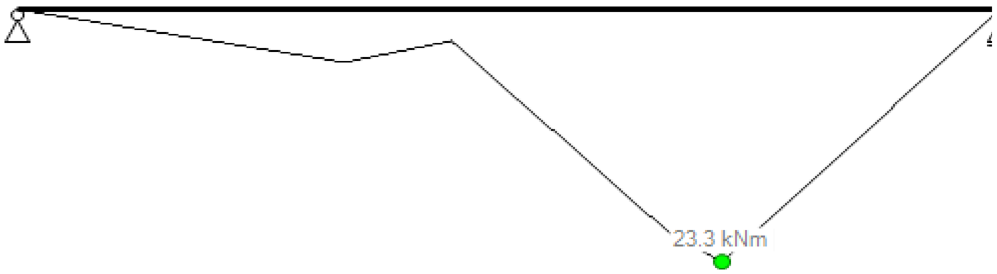
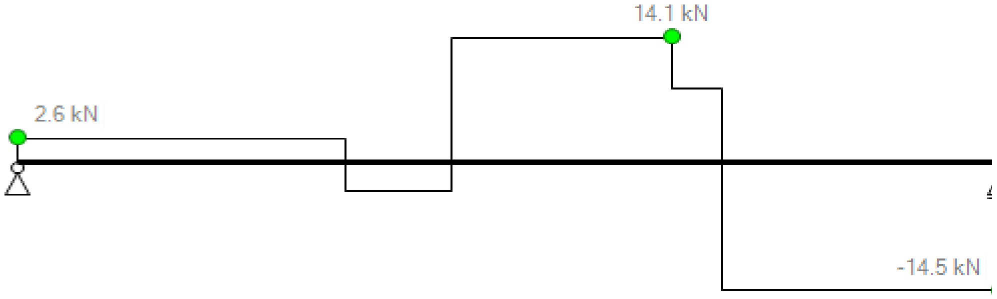
	Section Structural Engineering Calculations				Sheet no./rev. 23	
	Calc. by JC	Date 08/07/2021	Chk'd by JJO	Date 08/07/2021	App'd by JJO	Date 08/07/2021



Combination: 1 Combination. Major Moment for TB 2/C/2-Base/A/2

Shear Force Diagram, First-order linear, Strength Factors

Major



Combination: 1 Combination. Major Shear for TB 2/C/2-Base/A/2

Deflected Shape Diagram, First-order linear

Major

Loadcase: 1 Self weight - excluding slabs. Major Deflection for TB 2/C/2-Base/A/2

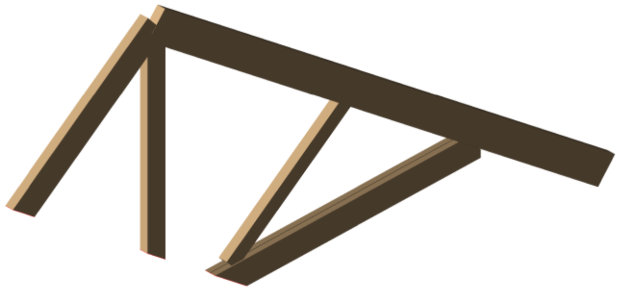
Loadcase: 2 Slab self weight. Major Deflection for TB 2/C/2-Base/A/2

Loadcase: 3 Dead, Major Deflection for TB 2/C/2-Base/A/2

Loadcase: 4 Services, Major Deflection for TB 2/C/2-Base/A/2

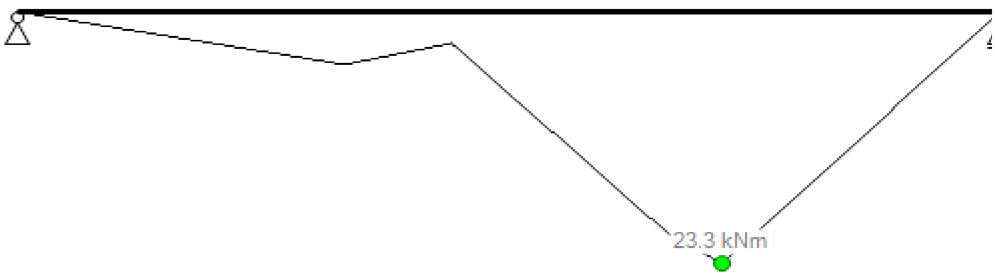
Loadcase: 5 Imposed, Major Deflection for TB 2/C/2-Base/A/2

TB 2/C/2-Base/E/2



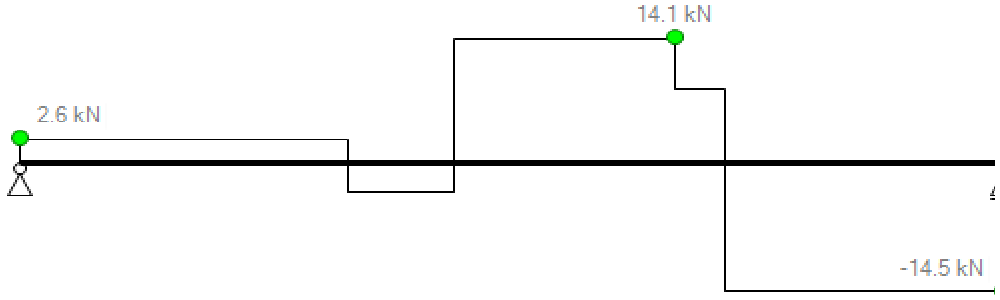
TB 2/C/2-Base/E/2

Bending Moment Diagram, First-order linear, Strength Factors
Major



Combination: 1 Combination. Major Moment for TB 2/C/2-Base/E/2

Shear Force Diagram, First-order linear, Strength Factors
Major

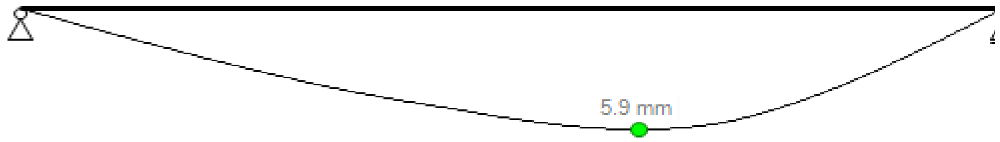


Combination: 1 Combination. Major Shear for TB 2/C/2-Base/E/2

Deflected Shape Diagram, First-order linear
Major

Loadcase: 1 Self weight - excluding slabs. Major Deflection for TB 2/C/2-Base/E/2

Loadcase: 2 Slab self weight. Major Deflection for TB 2/C/2-Base/E/2



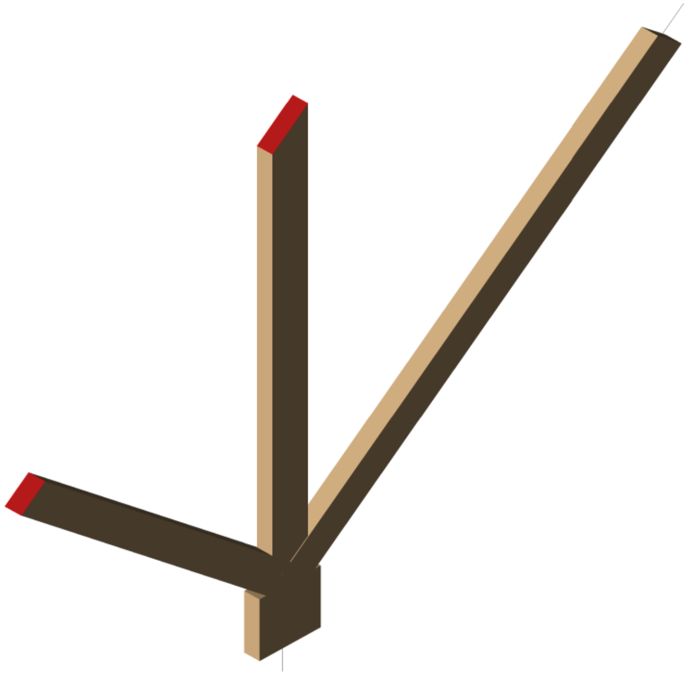
Loadcase: 3 Dead. Major Deflection for TB 2/C/2-Base/E/2

Jon J Oates Ltd Consulting Structural Engineers	Project				Job Ref.	
Jon J Oates Ltd	Great Trill Farm – Truss Modifications				21/7553	
Woodhouse Farm	Section Structural Engineering Calculations				Sheet no./rev. 27	
Hawkchurch, Axminster	Calc. by	Date	Chk'd by	Date	App'd by	Date
Devon	JC	08/07/2021	JJO	08/07/2021	JJO	08/07/2021

Loadcase: 4 Services, Major Deflection for TB 2/C/2-Base/E/2

Loadcase: 5 Imposed, Major Deflection for TB 2/C/2-Base/E/2

TB /%20-1/C/1



TB /%20-1/C/1

Bending Moment Diagram, First-order linear, Strength Factors
Major

Combination: 1 Combination. Major Moment for TB /%20-1/C/1

Shear Force Diagram, First-order linear, Strength Factors

Jon J Oates Ltd Consulting Structural Engineers	Project				Job Ref.	
	Great Trill Farm – Truss Modifications				21/7553	
Jon J Oates Ltd Woodhouse Farm Hawkchurch, Axminster Devon	Section				Sheet no./rev.	
	Structural Engineering Calculations				29	
	Calc. by	Date	Chk'd by	Date	App'd by	Date
	JC	08/07/2021	JJO	08/07/2021	JJO	08/07/2021

Major

Combination: 1 Combination. Major Shear for TB /%20-1/C/1

Deflected Shape Diagram, First-order linear

Major

Loadcase: 1 Self weight - excluding slabs. Major Deflection for TB /%20-1/C/1

Loadcase: 2 Slab self weight. Major Deflection for TB /%20-1/C/1

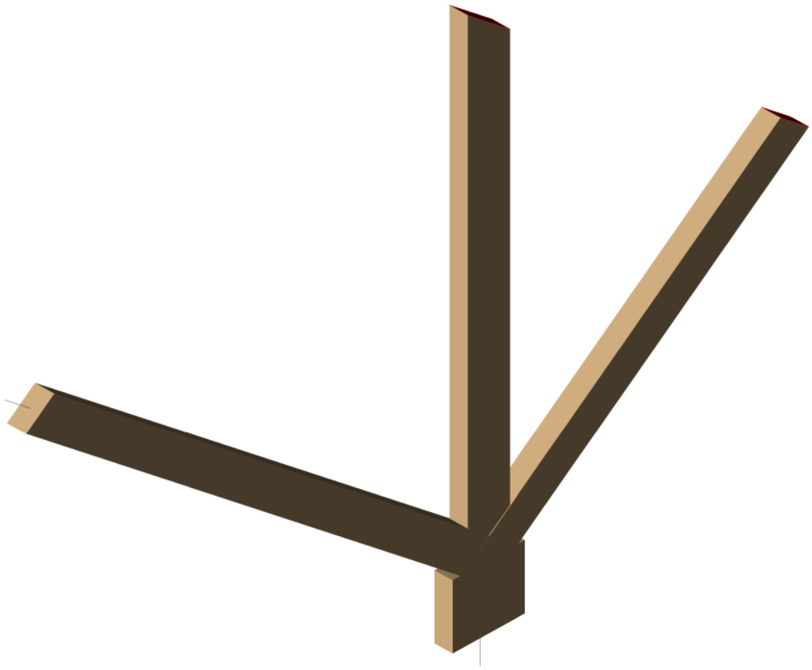
Loadcase: 3 Dead. Major Deflection for TB /%20-1/C/1

Loadcase: 4 Services, Major Deflection for TB /%20-1/C/1

Loadcase: 5 Imposed, Major Deflection for TB /%20-1/C/1

TB /%21-1/C/1

Jon J Oates Ltd Consulting Structural Engineers	Project			Job Ref.	
	Great Trill Farm – Truss Modifications			21/7553	
Jon J Oates Ltd Woodhouse Farm	Section Structural Engineering Calculations			Sheet no./rev. 31	
Hawkchurch, Axminster Devon	Calc. by JC	Date 08/07/2021	Chk'd by JJO	Date 08/07/2021	App'd by JJO	Date 08/07/2021



TB /%21-1/C/1

Bending Moment Diagram, First-order linear, Strength Factors

Major

Combination: 1 Combination. Major Moment for TB /%21-1/C/1

Shear Force Diagram, First-order linear, Strength Factors

Major

Combination: 1 Combination. Major Shear for TB /%21-1/C/1

Deflected Shape Diagram, First-order linear

Major

Loadcase: 1 Self weight - excluding slabs. Major Deflection for TB /%21-1/C/1

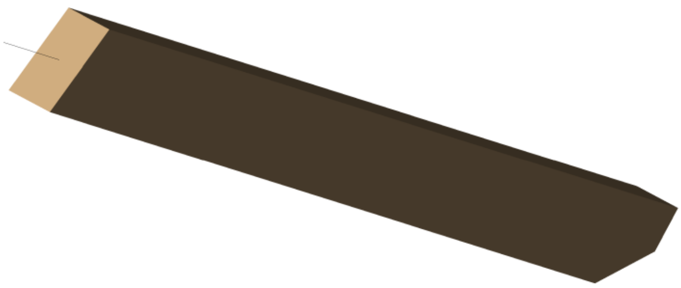
Loadcase: 2 Slab self weight. Major Deflection for TB /%21-1/C/1

Loadcase: 3 Dead. Major Deflection for TB /%21-1/C/1

Loadcase: 4 Services. Major Deflection for TB /%21-1/C/1

Loadcase: 5 Imposed. Major Deflection for TB /%21-1/C/1

TB /%22-1.1/2/#16



TB /%22-1.1/2/#16

Bending Moment Diagram, First-order linear, Strength Factors

Major

Combination: 1 Combination. Major Moment for TB /%22-1.1/2/#16

Shear Force Diagram, First-order linear, Strength Factors

Major

Combination: 1 Combination. Major Shear for TB /%22-1.1/2/#16

Deflected Shape Diagram, First-order linear

Major

Loadcase: 1 Self weight - excluding slabs. Major Deflection for TB /%22-1.1/2/#16

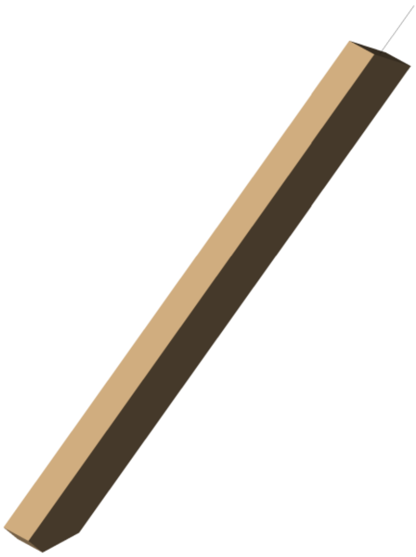
Loadcase: 2 Slab self weight. Major Deflection for TB /%22-1.1/2/#16

Loadcase: 3 Dead. Major Deflection for TB /%22-1.1/2/#16

Loadcase: 4 Services, Major Deflection for TB /%22-1.1/2/#16

Loadcase: 5 Imposed, Major Deflection for TB /%22-1.1/2/#16

TB /%23-1.1/2/#17



TB /%23-1.1/2/#17

Bending Moment Diagram, First-order linear, Strength Factors

Major

Combination: 1 Combination. Major Moment for TB /%23-1.1/2/#17

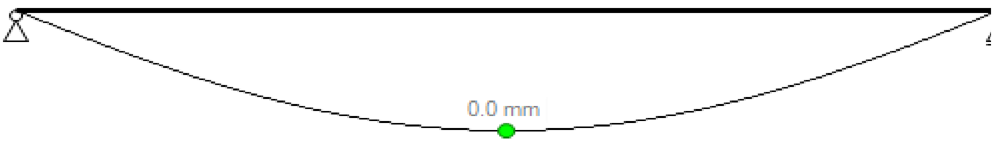
Shear Force Diagram, First-order linear, Strength Factors

Major

Combination: 1 Combination. Major Shear for TB /%23-1.1/2/#17

Deflected Shape Diagram, First-order linear

Major



Loadcase: 1 Self weight - excluding slabs. Major Deflection for TB /%23-1.1/2/#17

Loadcase: 2 Slab self weight. Major Deflection for TB /%23-1.1/2/#17

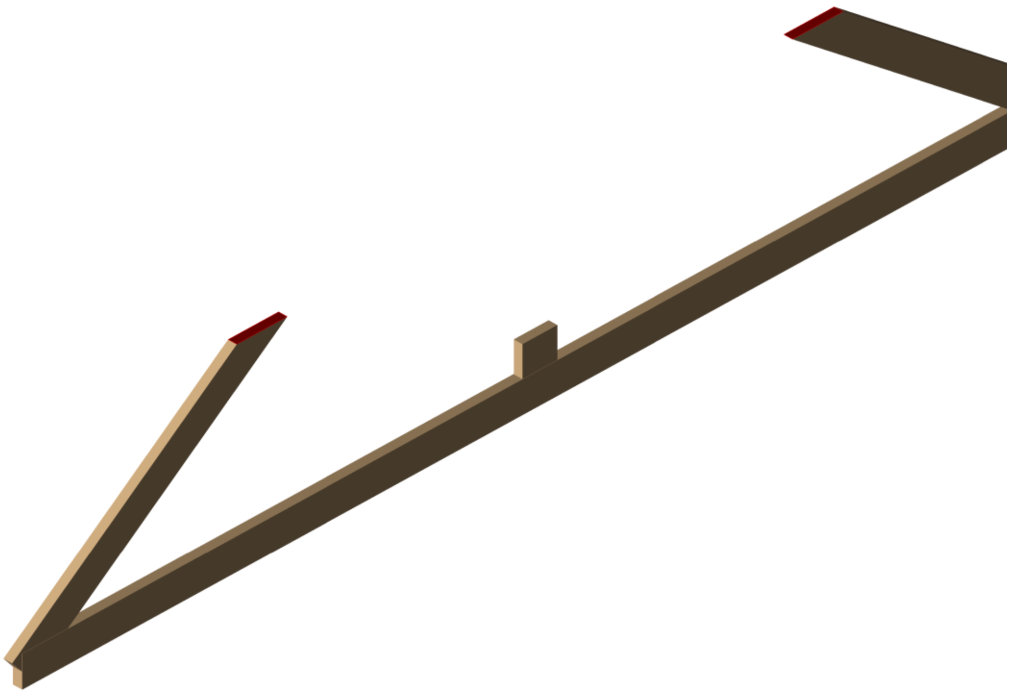
Jon J Oates Ltd Consulting Structural Engineers Jon J Oates Ltd Woodhouse Farm Hawkchurch, Axminster Devon	Project Great Trill Farm – Truss Modifications			Job Ref. 21/7553	
	Section Structural Engineering Calculations			Sheet no./rev. 37	
	Calc. by JC	Date 08/07/2021	Chk'd by JJO	Date 08/07/2021	App'd by JJO	Date 08/07/2021

Loadcase: 3 Dead, Major Deflection for TB /%23-1 1/2/#17

Loadcase: 4 Services, Major Deflection for TB /%23-1 1/2/#17

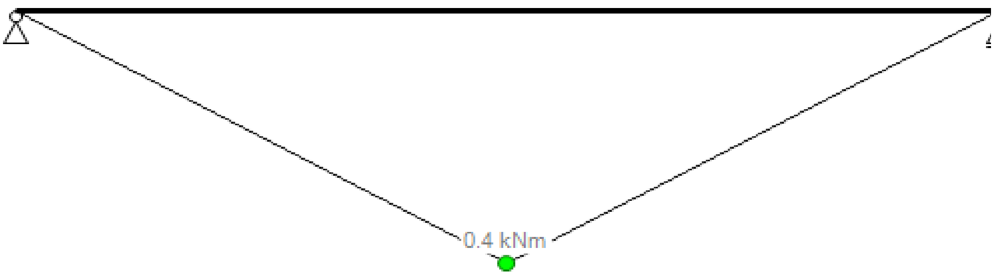
Loadcase: 5 Imposed, Major Deflection for TB /%23-1 1/2/#17

TB Base/A/1-Base/E/1



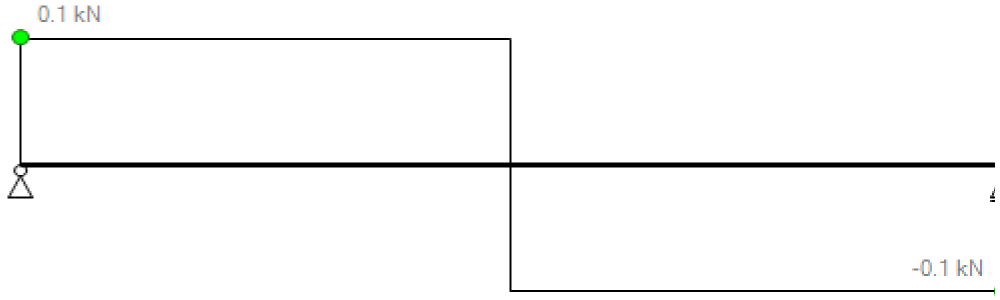
TB Base/A/1-Base/E/1

Bending Moment Diagram, First-order linear, Strength Factors
Major



Combination: 1 Combination. Major Moment for TB Base/A/1-Base/E/1

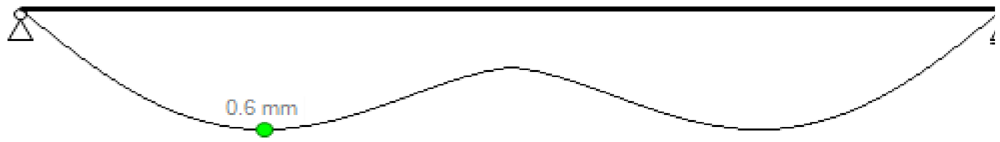
Shear Force Diagram, First-order linear, Strength Factors
Major



Combination: 1 Combination. Major Shear for TB Base/A/1-Base/E/1

Deflected Shape Diagram, First-order linear

Major

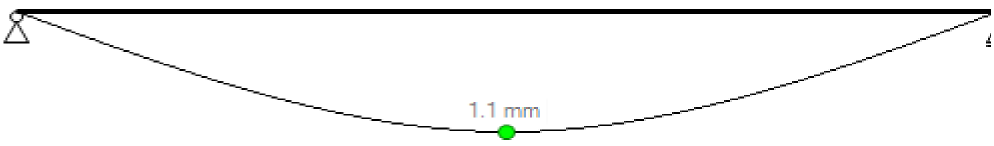


Loadcase: 1 Self weight - excluding slabs. Major Deflection for TB Base/A/1-Base/E/1

Loadcase: 2 Slab self weight. Major Deflection for TB Base/A/1-Base/E/1

Loadcase: 3 Dead. Major Deflection for TB Base/A/1-Base/E/1

Loadcase: 4 Services, Major Deflection for TB Base/A/1-Base/E/1



Loadcase: 5 Imposed, Major Deflection for TB Base/A/1-Base/E/1