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Our Ref: OR/24243

STRUCTURAL CALCULATIONS

ON:	Old Lock House
FOR:	Mr J Chowen
DATE:	July 2024
PREPARED BY:	Eur Ing O Riha
CHECKED BY:	J Bray B.Eng (Hons)



Managing Director P J Goacher (B.Sc. (Hons.), C.Eng., MICE, M.I.Struct.E)
Director S Gray (B.Eng (Hons) PGCert, C.Eng, AIStructE, C.Build.E, MCABE)
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DESIGNER RISK ASSESSMENT

Project Title	**Project No.**	**Sheet No.**
Old Lock House, Lock Lane, Partridge Green	242423	DRA01
	Engineer: OR	Checked by: JB
Client	Date: July '24	Date: July '24
Mr J Chowen		

The following specific risks have been identified:

Ref	Risk	Action
1	Temporary Works	The contractor is to provide all necessary temporary propping & temporary works to safely undertake the work and maintain structural stability. The contractor is to be aware that the property may be occupied during construction and temporary works loading to consider this.
2	Confirmation of Structural Layout	The assumptions made within the calculations and drawing should be confirmed on site, prior to commencement of works. Any differences should be discussed with Structural Engineer, in order to check calculations.
3	Working at Height	All appropriate scaffold and edge protection should be put in place to ensure safety while working from height. Existing ceilings to be boarded during works to protect from falls between joists.
4	Asbestos	Any suspected Asbestos containing materials should be tested and removed by specialist contractors in accordance with HSE guidance.

Notes:
1. The works are to be carried out by an experienced competent contractor capable of managing general construction hazards.
2. The following list is limited to specific risks associated with the structural design and is to be read in conjunction with other relevant designer risk assessments.
3. The following list is not necessarily exhaustive and the contractor should carry out their own assessment of potential risks.
4. Comment is made in the Risk Assessment for future demolition and use of the building as a work place only if it is considered to be out of the ordinary.
5. The Client, designers and contractor shall be mindful of their Health and Safety obligations under the CDM (2015) Regulations.

Check list: (Delete if not applicable or considered a general site risk)

Temp. stability / propping	Access	Risks to General Public	Asbestos	Confined spaces	Future maintenance
Hidden / buried services	Material handling	Hot works	Working at height	COSHH	Dismantling / demolition

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JOB TITLE

**Old Lock House,
Lock Lane,
Partridge Green**

STANDARD DATA SHEET 1	Date July '24	Job No 24243	Data Sheet No 01
LOCATION	UNFACTORED LOADS	FACTOR γf	FACTORED LOADS
SLOPING ROOFS (Measured on Plan)			
Tiles	0.60 kN/m²	1.35	0.81 kN/m²
Battens and Felt	0.10 kN/m²	1.35	0.14 kN/m²
Rafters	0.10 kN/m²	1.35	0.14 kN/m²
Variable Load	0.75 kN/m²(max)	1.50	1.13 kN/m²
Total	1.55 kN/m²		2.22 kN/m²
FLAT ROOFS			
Chippings and Felt	0.32 kN/m²	1.35	0.43 kN/m²
Boards, Joists and Firrings	0.32 kN/m²	1.35	0.43 kN/m²
Soffit and Insulation	0.16 kN/m²	1.35	0.22 kN/m²
Variable Load	0.75 kN/m²	1.50	1.13 kN/m²
Total	1.55 kN/m²		2.21 kN/m²
ROOF SPACE			
Joists and Insulation	0.10 kN/m²	1.35	0.14 kN/m²
Soffit	0.15 kN/m²	1.35	0.20 kN/m²
Variable Load	0.25 kN/m²	1.50	0.38 kN/m²
Total	0.50 kN/m²		0.75 kN/m²
TIMBER FLOORS			
Boards and Joists	0.35 kN/m²	1.35	0.49 kN/m²
Soffit	0.15 kN/m²	1.35	0.21 kN/m²
Variable Load (Domestic)	1.50 kN/m²	1.50	2.40 kN/m²
Total	2.00 kN/m²		3.10 kN/m²
TIMBER STUD WALLS Internal			
Studding	0.10 kN/m²	1.35	0.14 kN/m²
Plasterboard and set x 2	0.30 kN/m²	1.35	0.40 kN/m²
	0.40 kN/m²		0.54 kN/m²
Internal			
Studding	0.10 kN/m²	1.35	0.14 kN/m²
Lath and plaster x 2	0.50 kN/m²	1.35	0.78 kN/m²
	0.60 kN/m²		0.82 kN/m²
External			
Studding	0.10 kN/m²	1.35	0.14 kN/m²
Plasterboard	0.15 kN/m²	1.35	0.20 kN/m²
Battens, Felt and Insulation	0.10 kN/m²	1.35	0.14 kN/m²
Tiles	0.60 kN/m²	1.35	0.81 kN/m²
	0.95 kN/m²		1.29 kN/m²

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JOB TITLE

**Old Lock House,
Lock Lane,
Partridge Green**

STANDARD DATA SHEET 2	Date Julu '24	Job No 24243	Data Sheet No 02
LOCATION	UNFACTORED LOADS	FACTOR γf	FACTORED LOADS
MASONRY WALLS			
100 Lightweight (aircrete) Block			
Block	1.00 kN/m²	1.35	1.35 kN/m²
Plaster x 2	0.50 kN/m²	1.35	0.68 kN/m²
	1.50 kN/m²		2.03 kN/m²
100 Medium Dense Block (3.6N)			
Block	1.50 kN/m²	1.35	2.02 kN/m²
Plaster x 2	0.50 kN/m²	1.35	0.68 kN/m²
	2.00 kN/m²		2.70 kN/m²
100 Dense Block (>7.3N)			
Block	2.00 kN/m²	1.35	2.70 kN/m²
Plaster x 2	0.50 kN/m²	1.35	0.68 kN/m²
	2.50 kN/m²		3.38 kN/m²
215 Block Party Wall			
Block	3.20 kN/m²	1.35	4.32 kN/m²
Plaster x 2	0.50 kN/m²	1.35	0.68 kN/m²
	3.70 kN/m²		5.20 kN/m²
215 Brick Party Wall			
Brick	4.50 kN/m²	1.35	6.07 kN/m²
Plaster x 2	0.50 kN/m²	1.35	0.68 kN/m²
	5.00 kN/m²		6.75 kN/m²
Cavity Wall			
Brick	2.25 kN/m²	1.35	3.03 kN/m²
Block - medium dense	1.50 kN/m²	1.35	2.02 kN/m²
Plaster	0.25 kN/m²	1.35	0.34 kN/m²
	4.00 kN/m²		5.39 kN/m²

CODES OF PRACTICE USED IN DESIGNS

CONCRETE	BS EN 1992-1-1 incl. NA
STEELWORK	BS EN 1993-1-1, BS EN 1993-1-8 incl. NA
MASONRY	BS EN 1996-1-1, BS EN 1996-2, BS EN 1996-3 incl. NA
TIMBER	BE EN
LOADING FOR BUILDINGS	BS EN 1991-1-1, BS EN 1991-1-BS EN 1991-1-3, BS EN 1991-1-4 incl. NA

Refer to Data Sheet 3 for standard construction notes.

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JOB TITLE
Old Lock House, Lock Lane, Partridge Green

STANDARD DATA SHEET 3	Date July '24	Job No 24243	Data Sheet No 03

CONSTRUCTION NOTES:

1) All loadings are standard loadings. Confirmation of existing materials and weights to be undertaken by others on site.
2) Calculations prepared in accordance with Architect's drawings.
3) No works should be undertaken on site until Building Regulations Approval has been granted.
4) The builder and owner are reminded that works on or adjacent to a party wall or boundary will be subject to the Party Wall etc. Act 1996 and approval from the adjoining owner must be sought 2 months prior to commencing works. Further information can be provided by this Company if required.
5) All dimensions to be taken on site and not scaled from the drawings or sketches. All details and dimensions relating to subcontractors or suppliers work must be checked and agreed between the subcontractor or supplier and the general contractor.
6) The drawings, details and sketches to be read in conjunction with all relevant Architects' and Engineers' drawings and specifications.
7) Works to comply with current Codes of Practice, British Standards and Building Regulations.
8) Contractor to expose structure to confirm span directions, support locations and details, footings etc. and to verify that all assumptions made by the Engineer are correct prior to ordering any materials or carrying out any works on site.
9) Steelwork to have two coats of red oxide primer generally and to have two further coats of bitumen paint where supported at external walls unless indicated otherwise.
10) All internal steelwork to be clad to comply with minimum fire resistance according to table B4 in Building Regulation Approved Documents B1 or B2.
11) Where timbers are bolted together the bolt holes are to be drilled no more than 2mm diameter larger than bolt diameter. Holes to be at right angles to line of timbers. The bolts are to be tightened until local crushing is apparent around the 51mm square plate washers. If timbers are not touching then timber packers are to be installed full depth of the joists/rafters to make up the gap.
12) Bearing of all new foundations to be 1000mm below external ground or to level of base of foundations to main building, whichever is deeper, unless indicated otherwise on drawings. Foundation details may have to be altered if ground conditions prove to be different from those assumed in the calculations, i.e. poorer ground conditions, obstructions or existing structures.
    Footings may be required to go deeper if trees are, or recently have been, in close proximity to the building.
    All foundations to be confirmed on site by the Building Control Officer.
13) All underpinning works to be checked and approved by the Local Authority Building Control Officer and to be carried out in accordance with our specification for underpinning.
    Foundation details may have to be altered if ground conditions prove to be different from those assumed in the calculations, i.e. poorer ground conditions, obstructions or existing structures.
    Footings may be required to go deeper if trees are, or recently have been, in close proximity to the building.

The works are to be carried out in accordance with the Construction, Design and Management Regulations 2007. The Client and contractors should ensure they comply with their duties as set out in the regulations. Refer to HSC document Managing Health and Safety in Construction (CDM 2007), Approved Code of Practice for further details.

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Job Title: OLD LOOKHOUSE

Designed by	Checked by	Date	Job no.	Sheet no.
[redacted]	[redacted]	JULY '24	24243	04

LOADING TO BAK TRUSS

mal SPACING = (2690 + 2915)/2 = 2.8m

HIGHER PURLIN :

tributary length : l_t = 1/2 x 2.0 + 1/2 x 2.0 = 2.0m

DL = 1/2 2.8m x 2.0 x 0.8 = 2.25kN

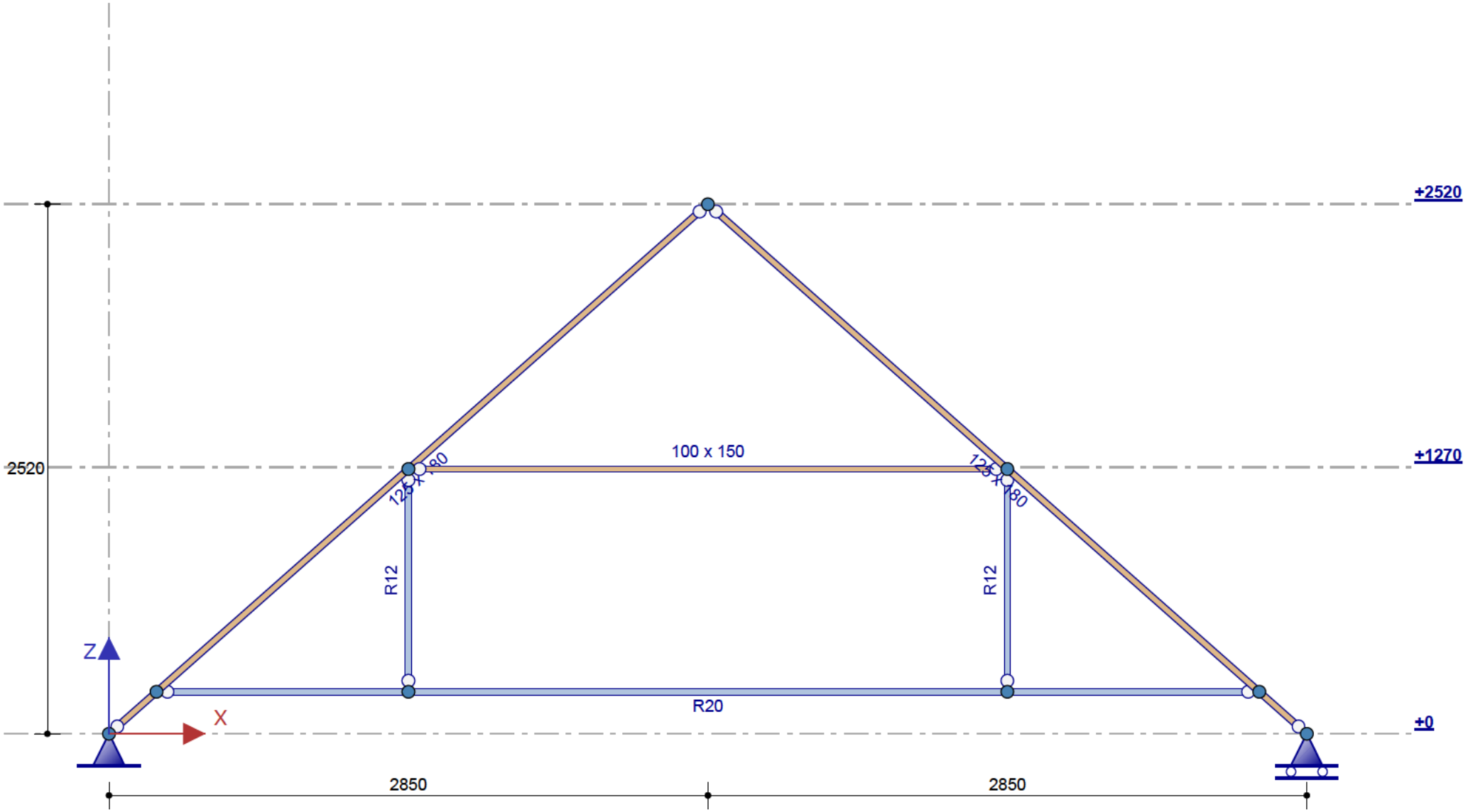
LL = 1/2 2.8m x 2.0 x 0.75 = 2.1kN

LOWER PURLIN l_t = 1/2 x 1.6m + 1/2 x 2.8m = 2.2m

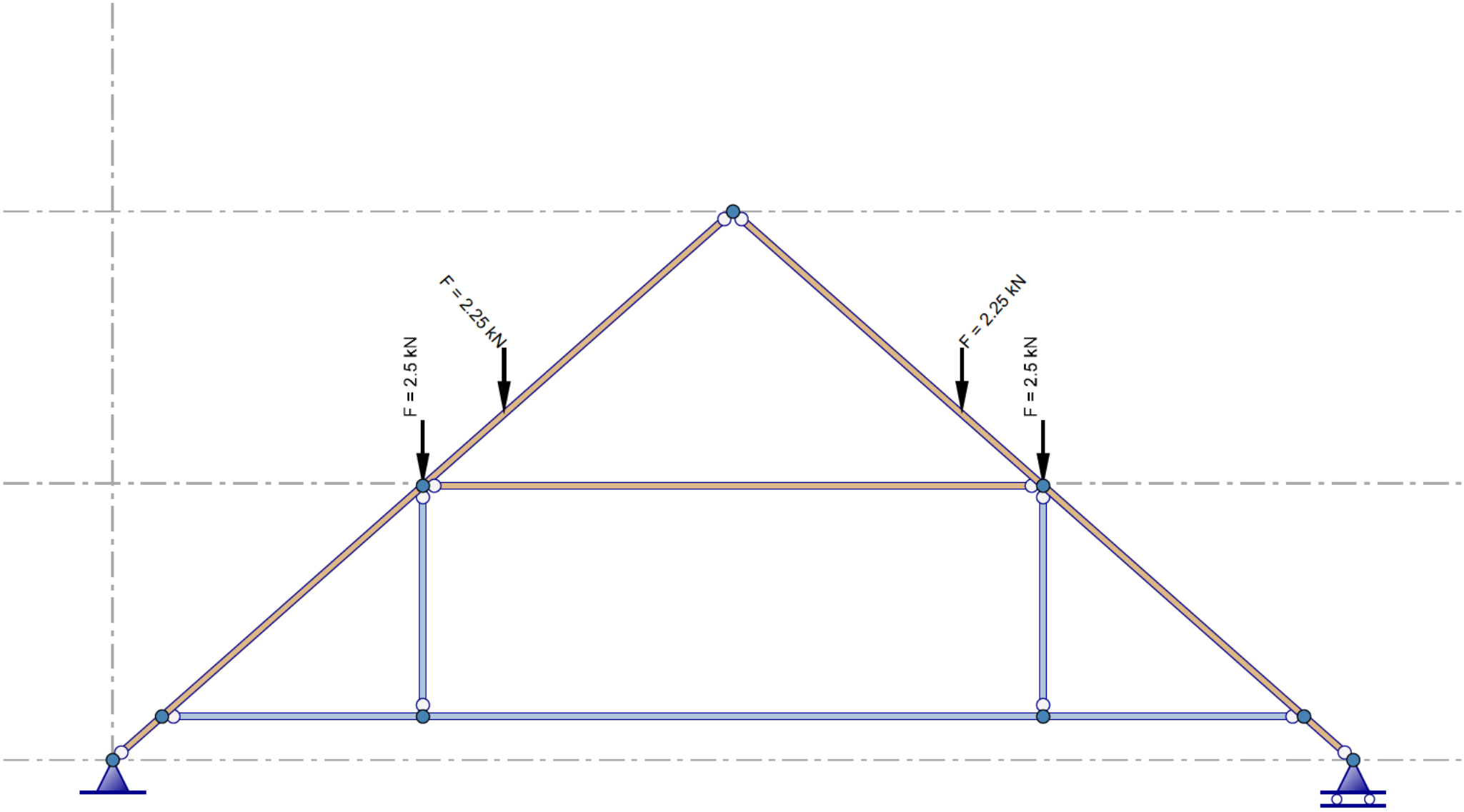
DL = 1.4m x 2.2m x 0.8 = 2.5kN

LL = 1.4m x 2.2m x 0.75 = 2.3kN

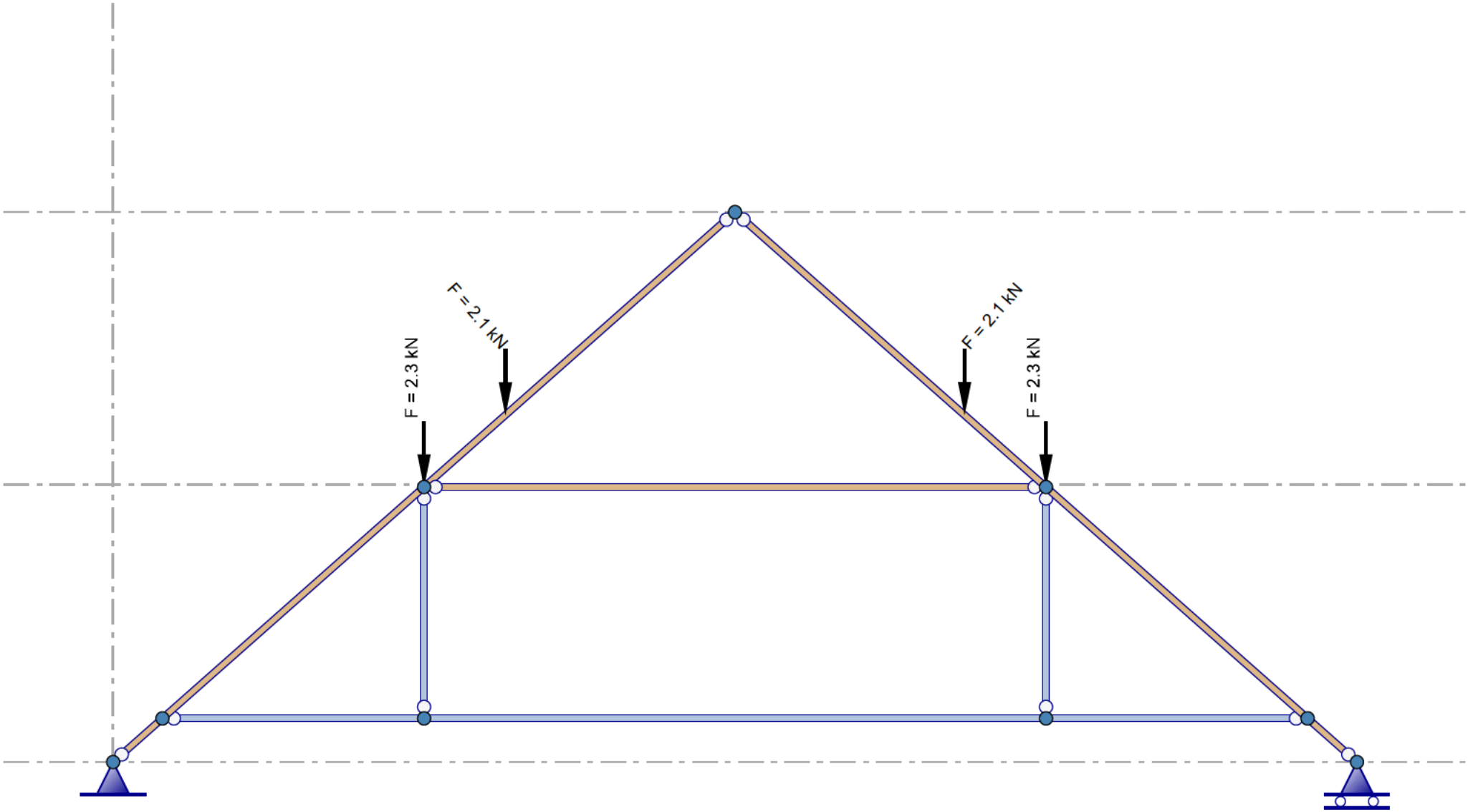
SEE NEXT PAGES FOR ANALYSIS



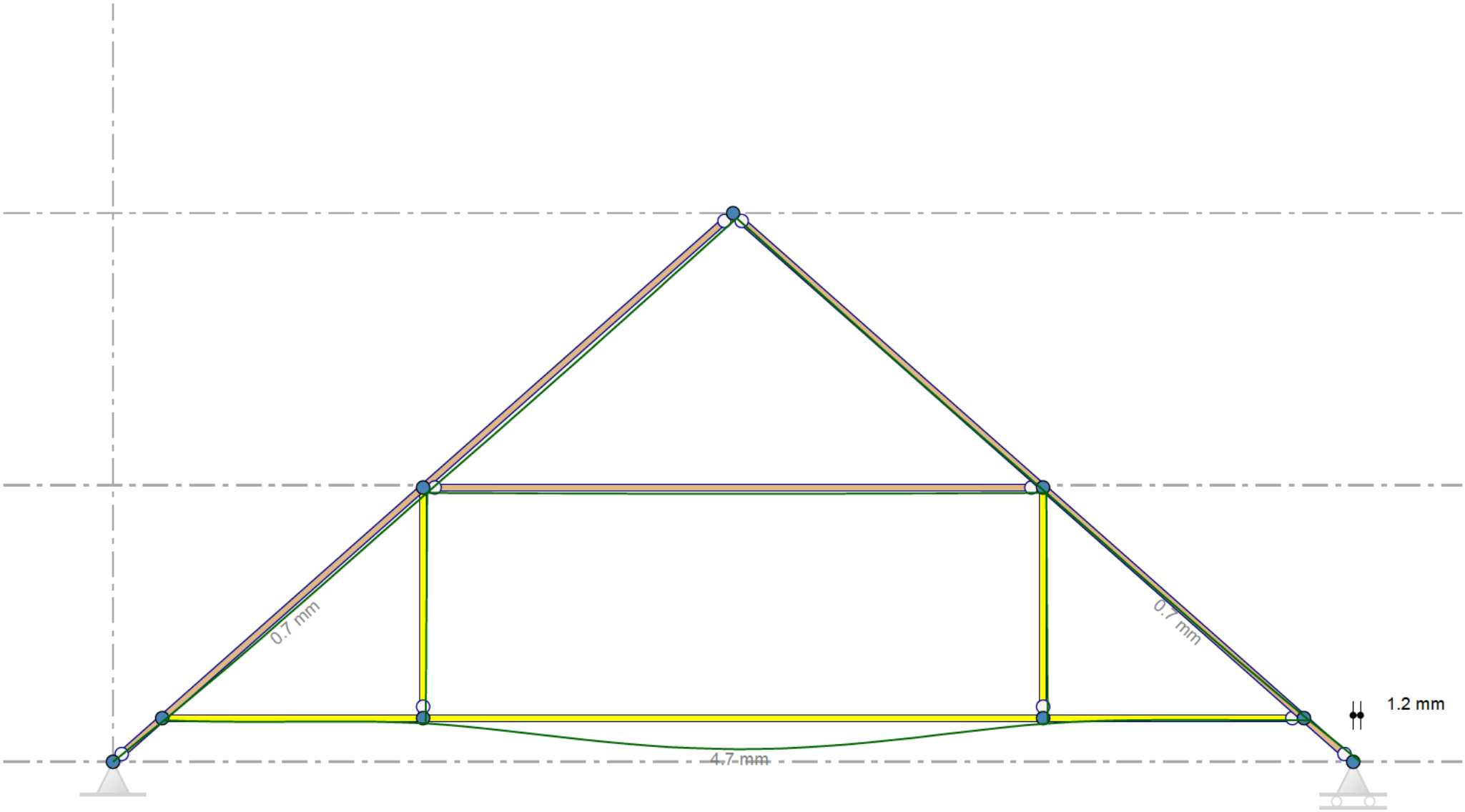
Scheme of the structure



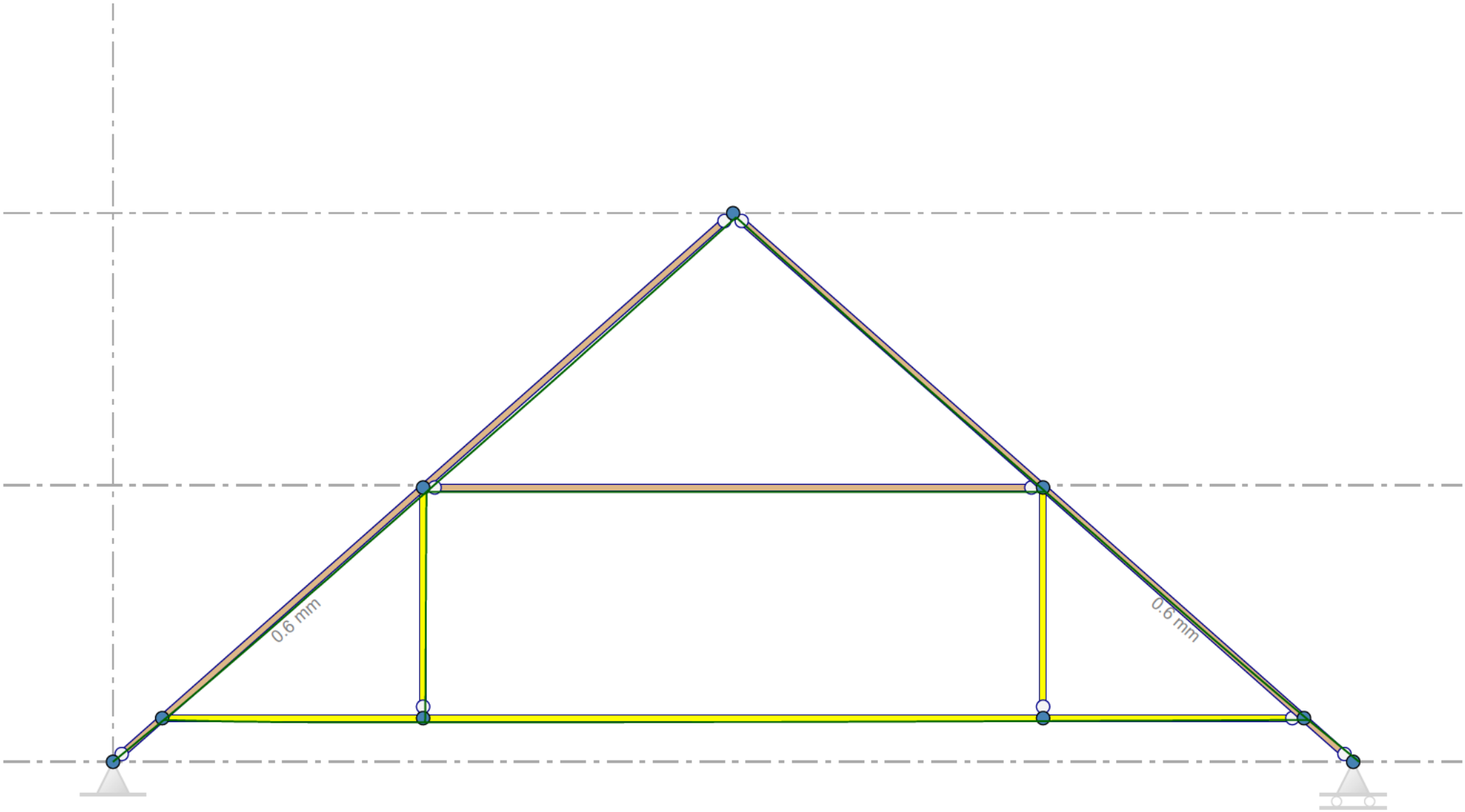
Dead load



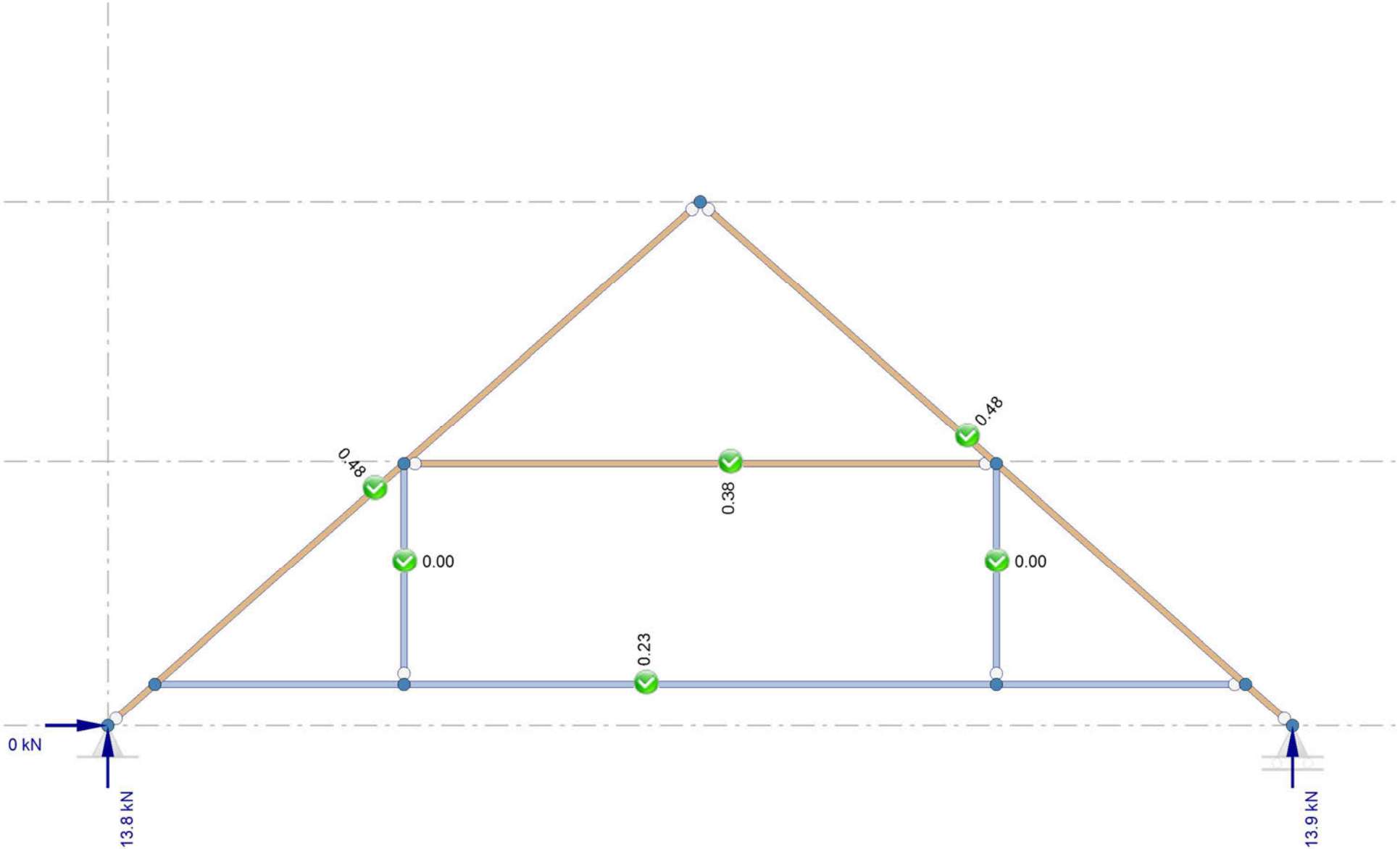
Live load



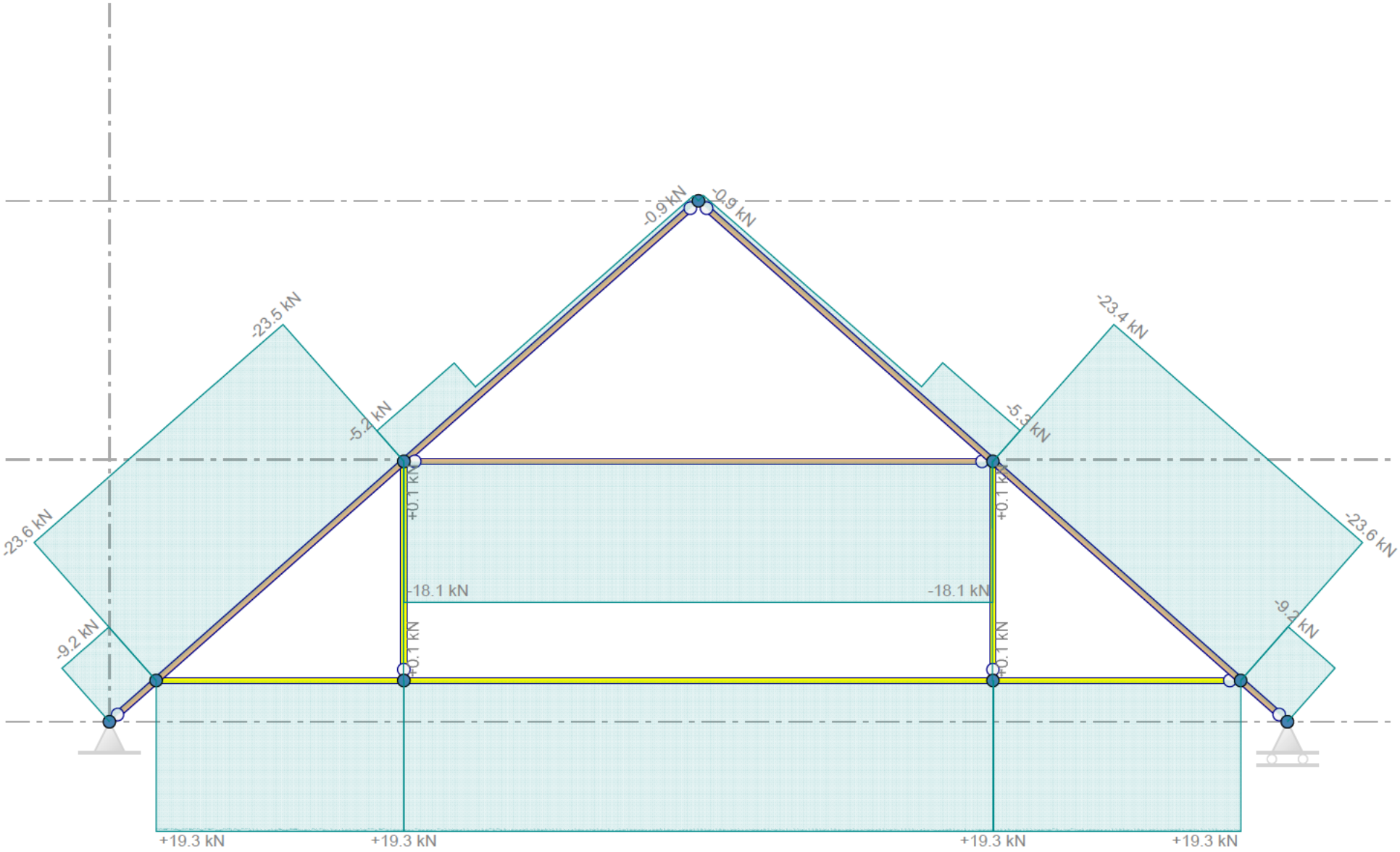
Deflection – dead loads



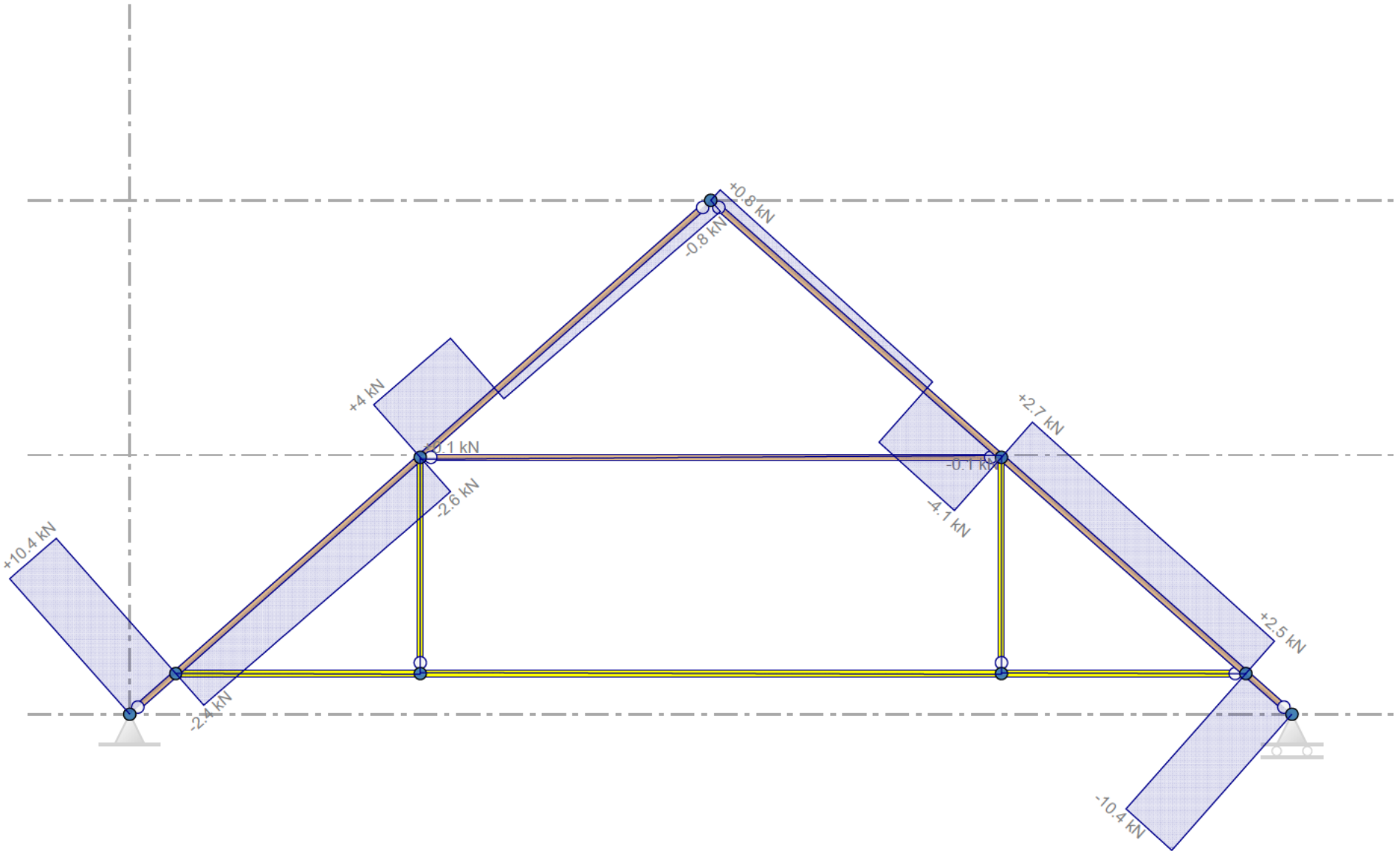
Deflection – live loads



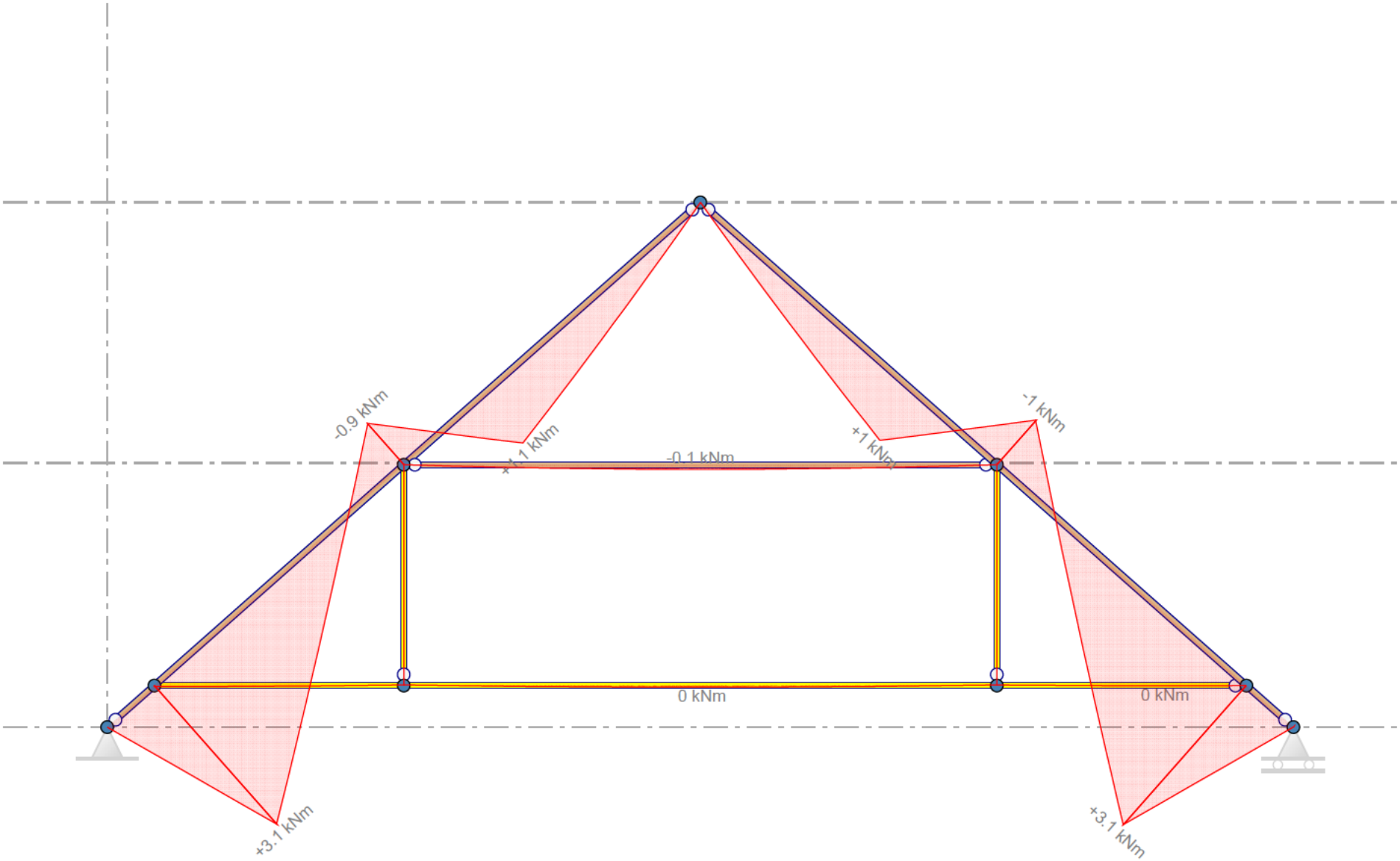
Unity check


-0.9 kN
-0.9 kN
-23.5 kN
-23.4 kN
-5.4 kN
-5.3 kN
-23.6 kN
-23.6 kN
+0.1 kN
+0.1 kN
-18.1 kN
-18.1 kN
-9.2 kN
-9.2 kN
+0.1 kN
+0.1 kN
+19.3 kN
+19.3 kN
+19.3 kN
+19.3 kN

Axial force



Shear force



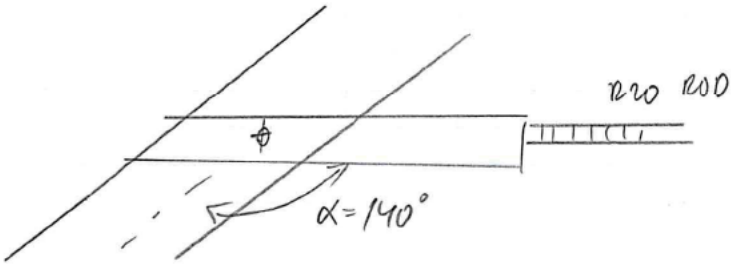
Moments

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Job Title: OLDLOCK HOUSE

Designed by	Checked by	Date	Job no.	Sheet no.
[redacted]	[redacted]	JULY'24	24243	14

ROOF DETAIL



→ N = 19.3 kN

STR M20 8.8 BOLT. $k_{mod} = 0.9$

$f_{uk} = 800 N/mm^2$

$\alpha = 41°$

$M_{y,k} = 579 \times 10^3$ Nmm ; $f_{h,0k} = 31.82 N/mm^2$

$f_{h,2k} = 29.29 N/mm^2$

failure (h).

$F_k = 1.15\sqrt{2 \times 579 \times 10^3 \times 29.29 \times 20} = 29.96 kN$

$F_d = 0.9 \times 29.96 / 1.3 = 20.74 kN$ ∴ OK

PROVIDE M20 gr 8.8 BOLT

EDGE DISTANCE $a_{4,c} = (2 + 2\sin\alpha)d = 3.3 \times 20 = 65$ ∴ OK