

STRUCTURAL CALCULATIONS:

MOUNT VERNON HOSPITAL

W HERTS WARDS 10 - 11

AT

Rickmansworth Rd

Northwood

HA6 2RN

Client: **THE HILLINGDON HOSPITALS NHS FOUNDATION TRUST**

Structural Engineer: **Wareham & Associates**

Job No: **25-2735**

Rev: **-**

Date: **Aug 2025**

	Calculation Sheet	Project/Sheet No.
	Client: THE HILLINGDON HOSPITALS NHS FOUNDATION TRUST	Prepared by: GB
	Project: MT VERNON HOSPITAL – W HERTS WARDS 10 - 11	Checked by: DW
	Element: STRUCTURE	Date: AUG 2025

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- Loading pg 5 – 16
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	Client: THE HILLINGDON HOSPITALS NHS FOUNDATION TRUST	Prepared by: GB
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INTRODUCTION:

Part of the project at Wards 10 and 11 include re-roofing following the removal of the existing asbestos-cement sheeting. The existing site is located within the grounds of Mount Vernon Hospital at an altitude of over 100m.

A structural check has therefore been carried out to assess the suitability of the existing roof steel trusses to support the new sinusoidal metal sheeting. With the reduced loading from the proposed new sheeting, it is the wind load analysis that is considered critical in addition to the dead and imposed loading.

The wind load for the buildings has been assessed using Tedds software and a manual check has also been conducted to verify the outputs.

The two critical wind load cases include wind on the side of the buildings (west wind) and wind on the gable end (south wind). Both cases induce suction on the roof, and the analysis confirms that the net uplift at the supports of the roof trusses is adequately resisted by the self-weight of the roof eaves reinforced concrete ring beam. The Tedds computer truss analysis for the wind load cases has also been manually checked to verify the outputs.

The net lateral wind load reactions are adequately resisted by the cross-wall configuration of the internal partitions and the general arrangement of the building layout.



Wards 10-11

	Calculation Sheet		Project/Sheet No.
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Technical References

The structural design analysis and calculations for the project have been based principally on the following British Standards, technical references, and specialist manufacturers/suppliers:

- BS 5268: Structural use of timber.
- BS 5628: Code of practice for the use of masonry.
- BS 5950: Structural use of steelwork in buildings.
- BS 5977: Lintels.
- BS 6399: Loading for buildings.
- BS 8002: Code of Practice for Retaining Walls.
- BS 8004: Code of practice for foundations.
- BS 8103: Structural design of low rise buildings.
- BS 8110: Structural use of concrete.
- BS 8500-1: Concrete – Methods of specifying and guidance for the specifier.
- British Geological Society Borehole Logs.
- Building Regulations.
- ICE Specification For Piling & Embedded Retaining Walls.
- National Structural Concrete Specification for Building Construction.
- National Structural Steelwork Specification.
- NHBC Standards.
- Trada Span tables for dwellings.
- Design of Wood Structures – Donald E Breyer.
- Practical Guide to Structural Robustness and Disproportionate Collapse in Buildings - IStructE
- Roof Construction and Loft Conversion – C. N. Mindham.
- Steelwork Designers' Manual – SCI.
- Structural Foundation Designers' Manual – Curtin, Shaw, Parkinson, Golding.
- Timber Designers' Manual – E. C. Ozelton & J.A. Baird.
- Ancon masonry support.
- Cordek Ground Heave Protection.
- Lindapter Structural Fixings & Clamps.
- Unistrut Metal Framing.

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LOADING DATA

Roof

Dead load –

Corrugate steel sheet	0.081 kN/m ² C -	on plan
Ceiling & services	0.110 kN/m²	
Roof purlins	0.060	
Ceiling purlins	0.034	
Truss self-wt	<u>0.033 kN/m²</u>	
DL	=	0.208 kN/m ² C

Live load –

LL	=	0.6 kN/m ² C -	on plan
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	Calculation Sheet	Project/Sheet No.
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WIND LOADING

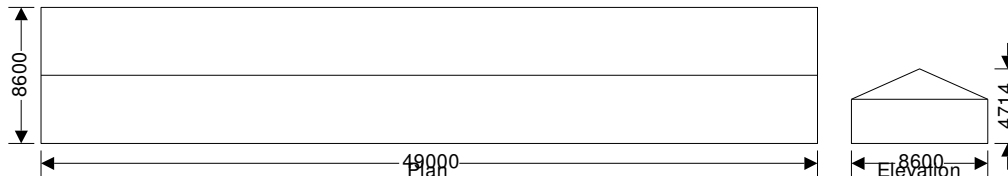
West wind: see next sheet.

 Wareham & Associates Ltd 1-3 The Avenue Lightwater Surrey GU18 5RF	Project Mount Vernon Hospital Ward 10 & 11				Job no. 25-2735	
	Calcs for Roof Wind Load Assessment				Start page no./Revision C 4	
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WIND LOADING (EN1991-1-4)

In accordance with EN1991-1-3:2005+A1:2010 and the UK national annex

TEDDS calculation version 3.0.19



Building data

Type of roof	Duopitch
Length of building	L = 49000 mm
Width of building	W = 8600 mm
Height to eaves	H = 2800 mm
Pitch of roof	α_0 = 24.0 deg
Total height	h = 4714 mm

Basic values

Location	London
Wind speed velocity (Figure NA.1)	$V_{b,map}$ = 20.0 m/s
Distance to shore	L_{shore} = 150.00 km
Altitude above sea level	A_{alt} = 120.0 m
Altitude factor	$C_{alt} = A_{alt} \times 0.001 m^{-1} + 1$ = 1.120
Fundamental basic wind velocity	$V_{b,0} = V_{b,map} \times C_{alt}$ = 22.4 m/s
Direction factor	C_{dir} = 0.99
Season factor	C_{season} = 1.00
Shape parameter K	K = 0.2
Exponent n	n = 0.5
Air density	ρ = 1.226 kg/m ³
Probability factor	$C_{prob} = [(1 - K \times \ln(-\ln(1-p)))/(1 - K \times \ln(-\ln(0.98)))]^n$ = 1.00
Basic wind velocity (Exp. 4.1)	$V_b = C_{dir} \times C_{season} \times V_{b,0} \times C_{prob}$ = 22.2 m/s
Reference mean velocity pressure	$q_b = 0.5 \times \rho \times V_b^2$ = 0.301 kN/m ²

Orography

Orography factor not significant	C_o = 1.0
Terrain category	Country
Displacement height (sheltering effect excluded)	h_{dis} = 0 mm

The velocity pressure for the windward face of the building with a 0 degree wind is to be considered as 1 part as the height h is less than b (cl.7.2.2)

The velocity pressure for the windward face of the building with a 90 degree wind is to be considered as 1 part as the height h is less than b (cl.7.2.2)

Peak velocity pressure - windward wall - Wind 0 deg and roof

Reference height (at which q is sought)	z = 2800 mm
Displacement height (sheltering effects excluded)	h_{dis} = 0 mm
Exposure factor (Figure NA.7)	C_e = 1.58
Peak velocity pressure	$q_p = C_e \times q_b$ = 0.48 kN/m ²

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Structural factor

Structural damping	$\delta_s = 0.100$
Height of element	$h_{part} = 2800$ mm
Size factor (Table NA.3)	$C_s = 0.858$
Dynamic factor (Figure NA.9)	$C_d = 1.000$
Structural factor	$C_s C_d = C_s \times C_d = 0.858$

Peak velocity pressure - windward wall - Wind 90 deg and roof

Reference height (at which q is sought)	$z = 4714$ mm
Displacement height (sheltering effects excluded)	$h_{dis} = 0$ mm
Exposure factor (Figure NA.7)	$C_e = 1.87$
Peak velocity pressure	$q_p = C_e \times q_b = 0.56$ kN/m ²

Structural factor

Structural damping	$\delta_s = 0.100$
Height of element	$h_{part} = 4714$ mm
Size factor (Table NA.3)	$C_s = 0.930$
Dynamic factor (Figure NA.9)	$C_d = 1.017$
Structural factor	$C_s C_d = C_s \times C_d = 0.946$

Structural factor - roof 0 deg

Structural damping	$\delta_s = 0.100$
Height of element	$h_{part} = 4714$ mm
Size factor (Table NA.3)	$C_s = 0.856$
Dynamic factor (Figure NA.9)	$C_d = 1.000$
Structural factor	$C_s C_d = C_s \times C_d = 0.856$

Peak velocity pressure for internal pressure

Peak velocity pressure – internal (as roof press.)	$q_{p,i} = 0.56$ kN/m ²
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Pressures and forces

Net pressure	$p = C_s C_d \times q_p \times C_{pe} - q_{p,i} \times C_{pi}$
Net force	$F_w = p_w \times A_{ref}$

Roof load case 1 - Wind 0, $C_{pi} 0.20$, $-C_{pe}$

Zone	Ext pressure coefficient C_{pe}	Peak velocity pressure q_p , (kN/m ²)	Net pressure p (kN/m ²)	Area A_{ref} (m ²)	Net force F_w (kN)
F (-ve)	-0.74	0.56	-0.47	4.87	-2.29
G (-ve)	-0.62	0.56	-0.41	45.71	-18.86
H (-ve)	-0.28	0.56	-0.25	180.07	-44.69
I (-ve)	-0.50	0.56	-0.35	180.07	-63.84
J (-ve)	-1.06	0.56	-0.63	50.57	-31.62

Total vertical net force $F_{w,v} = -147.35$ kN

Total horizontal net force $F_{w,h} = 12.05$ kN

Walls load case 1 - Wind 0, $C_{pi} 0.20$, $-C_{pe}$

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Zone	Ext pressure coefficient C_{pe}	Peak velocity pressure q_p , (kN/m ²)	Net pressure p (kN/m ²)	Area A_{ref} (m ²)	Net force F_w (kN)
A	-1.20	0.56	-0.69	6.07	-4.21
B	-0.80	0.56	-0.50	26.24	-13.13
D	0.74	0.48	0.19	137.20	26.07
E	-0.38	0.48	-0.27	137.20	-36.81

Overall loading

Equiv leeward net force for overall section

$$F_l = F_{w,wE} = \mathbf{-36.8 \text{ kN}}$$

Net windward force for overall section

$$F_w = F_{w,wD} = \mathbf{26.1 \text{ kN}}$$

Lack of correlation (cl.7.2.2(3) – Note)

$$f_{corr} = \mathbf{0.85} \text{ as } h/W \text{ is } 0.548$$

Overall loading overall section

$$F_{w,D} = f_{corr} \times (F_w - F_l + F_{w,h}) = \mathbf{63.7 \text{ kN}}$$

Roof load case 2 - Wind 0, c_{pi} -0.3, $+c_{pe}$

Zone	Ext pressure coefficient C_{pe}	Peak velocity pressure q_p , (kN/m ²)	Net pressure p (kN/m ²)	Area A_{ref} (m ²)	Net force F_w (kN)
F (+ve)	0.56	0.56	0.44	4.87	2.14
G (+ve)	0.38	0.56	0.35	45.71	16.13
H (+ve)	0.32	0.56	0.32	180.07	58.34
I (+ve)	-0.50	0.56	-0.07	180.07	-13.02
J (+ve)	-1.06	0.56	-0.34	50.57	-17.35

Total vertical net force

$$F_{w,v} = \mathbf{42.25 \text{ kN}}$$

Total horizontal net force

$$F_{w,h} = \mathbf{43.51 \text{ kN}}$$

Walls load case 2 - Wind 0, c_{pi} -0.3, $+c_{pe}$

Zone	Ext pressure coefficient C_{pe}	Peak velocity pressure q_p , (kN/m ²)	Net pressure p (kN/m ²)	Area A_{ref} (m ²)	Net force F_w (kN)
A	-1.20	0.56	-0.41	6.07	-2.50
B	-0.80	0.56	-0.22	26.24	-5.73
D	0.74	0.48	0.47	137.20	64.79
E	-0.38	0.48	0.01	137.20	1.91

Overall loading

Equiv leeward net force for overall section

$$F_l = F_{w,wE} = \mathbf{1.9 \text{ kN}}$$

Net windward force for overall section

$$F_w = F_{w,wD} = \mathbf{64.8 \text{ kN}}$$

Lack of correlation (cl.7.2.2(3) – Note)

$$f_{corr} = \mathbf{0.85} \text{ as } h/W \text{ is } 0.548$$

Overall loading overall section

$$F_{w,D} = f_{corr} \times (F_w - F_l + F_{w,h}) = \mathbf{90.4 \text{ kN}}$$

Roof load case 3 - Wind 90, c_{pi} 0.20, $-c_{pe}$

Zone	Ext pressure coefficient C_{pe}	Peak velocity pressure q_p , (kN/m ²)	Net pressure p (kN/m ²)	Area A_{ref} (m ²)	Net force F_w (kN)
F (-ve)	-1.36	0.56	-0.84	4.05	-3.40
G (-ve)	-1.26	0.56	-0.79	4.05	-3.18
H (-ve)	-0.60	0.56	-0.43	32.38	-14.03
I (-ve)	-0.46	0.56	-0.36	420.80	-150.83

Total vertical net force

$F_{w,v} = -156.61$ kN

Total horizontal net force

$F_{w,h} = 0.00$ kN

Walls load case 3 - Wind 90, c_{pi} 0.20, $-c_{pe}$

Zone	Ext pressure coefficient c_{pe}	Peak velocity pressure q_p , (kN/m ²)	Net pressure p (kN/m ²)	Area A_{ref} (m ²)	Net force F_w (kN)
A	-1.20	0.48	-0.65	4.82	-3.15
B	-0.80	0.48	-0.47	19.26	-9.13
C	-0.50	0.48	-0.34	113.12	-38.29
D	0.70	0.56	0.26	32.31	8.43
E	-0.30	0.56	-0.27	32.31	-8.82

Overall loading

Equiv leeward net force for overall section

$F_l = F_{w,wE} = -8.8$ kN

Net windward force for overall section

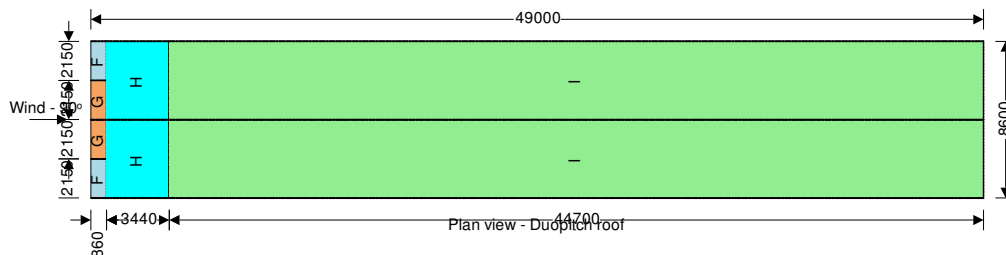
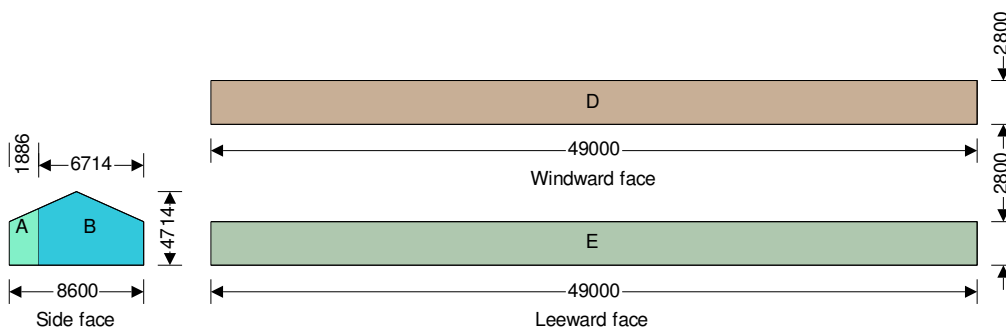
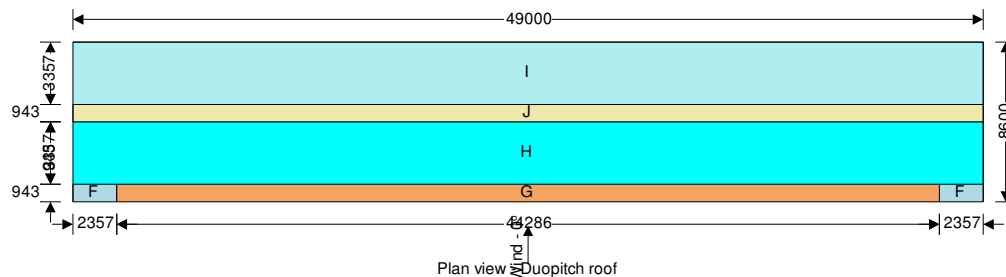
$F_w = F_{w,wD} = 8.4$ kN

Lack of correlation (cl.7.2.2(3) – Note)

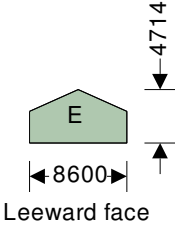
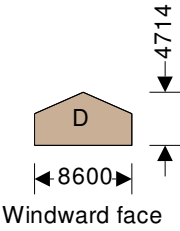
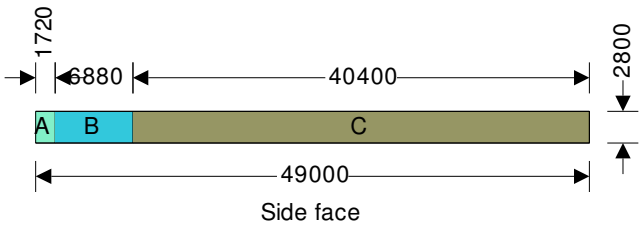
$f_{corr} = 0.85$ as h/L is 0.096

Overall loading overall section

$F_{w,D} = f_{corr} \times (F_w - F_l + F_{w,h}) = 14.7$ kN



Tekla Tedds Wareham & Associates Ltd 1-3 The Avenue Lightwater Surrey GU18 5RF	Project				Job no.	
	Mount Vernon Hospital Ward 10 & 11				25-2735	
	Calcs for				Start page no./Revision	
	Roof Wind Load Assessment				C 8	
Calcs by		Calcs date	Checked by	Checked date	Approved by	Approved date
DW		08/08/2025				



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South wind: see next sheet.

 Wareham & Associates Ltd 1-3 The Avenue Lightwater Surrey GU18 5RF	Project Mount Vernon Hospital Ward 10 & 11				Job no. 25-2735	
	Calcs for Roof Wind Load Assessment - Southerly Wind (Gable)				Start page no./Revision C 5	
	Calcs by DW	Calcs date 14/08/2025	Checked by GB	Checked date 14/08/2025	Approved by	Approved date

WIND LOADING (EN1991-1-4)

In accordance with EN1991-1-3:2005+A1:2010 and the UK national annex

TEDDS calculation version 3.0.19



Building data

Type of roof	Duopitch
Length of building	L = 49000 mm
Width of building	W = 8600 mm
Height to eaves	H = 2800 mm
Pitch of roof	α_0 = 24.0 deg
Total height	h = 4714 mm

Basic values

Location	London
Wind speed velocity (Figure NA.1)	$V_{b,map}$ = 20.0 m/s
Distance to shore	L_{shore} = 90.00 km
Altitude above sea level	A_{alt} = 120.0 m
Altitude factor	$C_{alt} = A_{alt} \times 0.001m^{-1} + 1$ = 1.120
Fundamental basic wind velocity	$V_{b,0} = V_{b,map} \times C_{alt}$ = 22.4 m/s
Direction factor	C_{dir} = 0.85
Season factor	C_{season} = 1.00
Shape parameter K	K = 0.2
Exponent n	n = 0.5
Air density	ρ = 1.226 kg/m ³
Probability factor	$C_{prob} = [(1 - K \times \ln(-\ln(1-p)))/(1 - K \times \ln(-\ln(0.98)))]^n$ = 1.00
Basic wind velocity (Exp. 4.1)	$V_b = C_{dir} \times C_{season} \times V_{b,0} \times C_{prob}$ = 19.0 m/s
Reference mean velocity pressure	$q_b = 0.5 \times \rho \times V_b^2$ = 0.222 kN/m ²

Orography

Orography factor not significant	C_o = 1.0
Terrain category	Country
Displacement height (sheltering effect excluded)	h_{dis} = 0mm

The velocity pressure for the windward face of the building with a 90 degree wind is to be considered as 1 part as the height h is less than b (cl.7.2.2)

Peak velocity pressure - windward wall - Wind 90 deg

Reference height (at which q is sought)	z = 4714 mm
Displacement height (sheltering effects excluded)	h_{dis} = 0 mm
Exposure factor (Figure NA.7)	C_e = 1.88
Peak velocity pressure	$q_p = C_e \times q_b$ = 0.42 kN/m ²

Structural factor

Structural damping	δ_s = 0.100
Height of element	h_{part} = 4714 mm
Size factor (Table NA.3)	C_s = 0.930

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Dynamic factor (Figure NA.9)

$$C_d = 1.017$$

Structural factor

$$C_s C_d = C_s \times C_d = 0.946$$

Peak velocity pressure - roof

Reference height (at which q is sought)

$$z = 2800 \text{ mm}$$

Displacement height (sheltering effects excluded)

$$h_{dis} = 0 \text{ mm}$$

Exposure factor (Figure NA.7)

$$C_e = 1.59$$

Peak velocity pressure

$$q_p = C_e \times q_b = 0.35 \text{ kN/m}^2$$

Peak velocity pressure for internal pressure

Peak velocity pressure – internal (as roof press.)

$$q_{p,i} = 0.42 \text{ kN/m}^2$$

Pressures and forces

Net pressure

$$p = C_s C_d \times q_p \times C_{pe} - q_{p,i} \times C_{pi}$$

Net force

$$F_w = p_w \times A_{ref}$$

Roof load case 1 - Wind 90, C_{pi} 0.20, $-C_{pe}$

Zone	Ext pressure coefficient C_{pe}	Peak velocity pressure q_p , (kN/m ²)	Net pressure p (kN/m ²)	Area A_{ref} (m ²)	Net force F_w (kN)
F (-ve)	-1.36	0.42	-0.62	4.05	-2.51
G (-ve)	-1.26	0.42	-0.58	4.05	-2.35
H (-ve)	-0.60	0.42	-0.32	32.38	-10.37
I (-ve)	-0.46	0.42	-0.26	420.80	-111.49

Total vertical net force

$$F_{w,v} = -115.76 \text{ kN}$$

Total horizontal net force

$$F_{w,h} = 0.00 \text{ kN}$$

Walls load case 1 - Wind 90, C_{pi} 0.20, $-C_{pe}$

Zone	Ext pressure coefficient C_{pe}	Peak velocity pressure q_p , (kN/m ²)	Net pressure p (kN/m ²)	Area A_{ref} (m ²)	Net force F_w (kN)
A	-1.20	0.35	-0.48	4.82	-2.33
B	-0.80	0.35	-0.35	19.26	-6.75
C	-0.50	0.35	-0.25	113.12	-28.31
D	0.70	0.42	0.19	32.31	6.23
E	-0.30	0.42	-0.20	32.31	-6.52

Overall loading

Equiv leeward net force for overall section

$$F_l = F_{w,wE} = -6.5 \text{ kN}$$

Net windward force for overall section

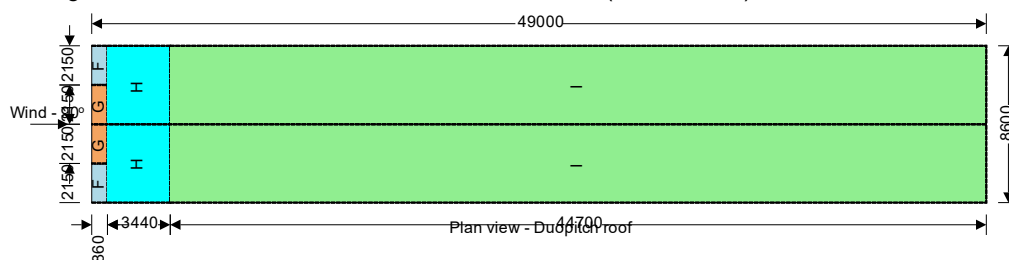
$$F_w = F_{w,wD} = 6.2 \text{ kN}$$

Lack of correlation (cl.7.2.2(3) – Note)

$$f_{corr} = 0.85 \text{ as } h/L \text{ is } 0.096$$

Overall loading overall section

$$F_{w,D} = f_{corr} \times (F_w - F_l + F_{w,h}) = 10.8 \text{ kN}$$





Wareham & Associates Ltd
1-3 The Avenue
Lightwater
Surrey GU18 5RF

Project

Mount Vernon Hospital Ward 10 & 11

Job no.

25-2735

Calcs for

Roof Wind Load Assessment - Southerly Wind (Gable)

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C 7

Calcs by

DW

Calcs date

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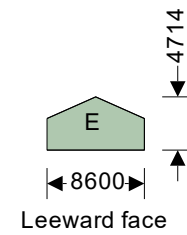
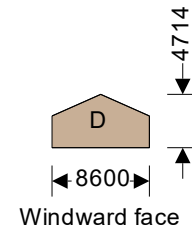
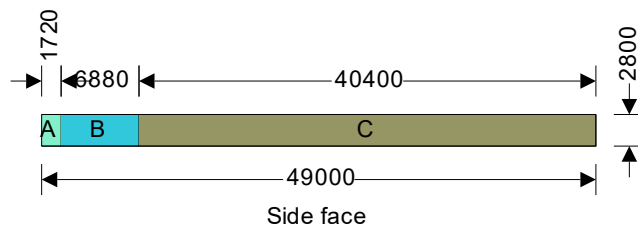
GB

Checked date

14/08/2025

Approved by

Approved date



	Calculation Sheet		Project/Sheet No.
	Client: THE HILLINGDON HOSPITALS NHS FOUNDATION TRUST		Prepared by: GB
	Project: MT VERNON HOSPITAL – W HERTS WARDS 10 - 11		Checked by: DW
	Element: STRUCTURE		Date: AUG 2025

Wind load manual check:

WIND LOADING

Basic Wind Speed (Vb) = 20.2 m/s Mt Vernon Hospital
 Site Altitude = 106m
 Nearest distance to sea = 90km–south; 150km–west

Topographical Factor (Sa) = 1.106



W Herts Ward 10-11 roof -

H = 4.7m B x D = 8.6m x 49m

H < B - Building cannot be divided into parts vertically

Vb = 20.2
 Vs = Vb . Sa . Sd . Ss . Sp
 = 20.2 x 1.106 x 0.99 x 1.0 x 1.0 = 22.12 – west
 20.2 x 1.106 x 0.85 x 1.0 x 1.0 = 18.99 – south

Ve = Vs . Sb
 = 22.12 x 1.45 - west
 18.99 x 1.46 - south
 = 32.07 m/s - west; 27.73 m/s - south

qs = 0.613 . Ve²
 = 0.613 x 32.07² /1000
 = 0.65 kN/m² - west; 0.48 kN/m² - south

P = 0.85 q Cp (1+Cr) overall load

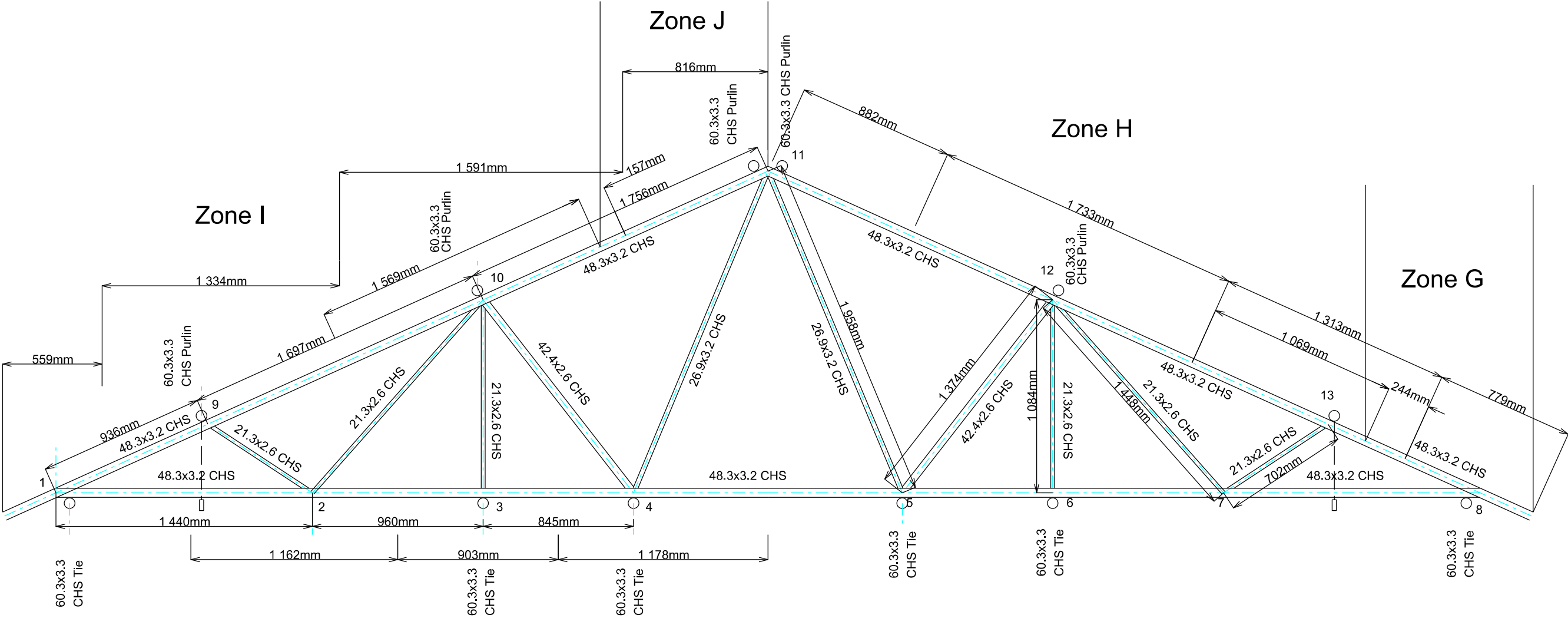
Net surface pressure = qs . Cp . Ca
 = 0.65 x Cp x 0.83 = 0.54 Cp - west - (0.56 Cp with Tedds)
 0.48 x Cp x 0.83 = 0.40 CP - south - (0.42 Cp with Tedds)

	Calculation Sheet	Project/Sheet No.
	Client: THE HILLINGDON HOSPITALS NHS FOUNDATION TRUST	Prepared by: GB
	Project: MT VERNON HOSPITAL – W HERTS WARDS 10 - 11	Checked by: DW
	Element: STRUCTURE	Date: AUG 2025

ROOF ANALYSIS:

Roof truss analysis carried out using Tedds software - see next sheet.

Case 1: Wind 0 Cpi 0.2, -cpe	-0.35	-0.63	-0.25	-0.41
Case 2: Wind 0 Cpi -0.3, +cpe	-0.07	-0.34	+0.32	+0.35
Case 3: Wind 90 Cpi 0.2, -cpe (Zone H)	-0.32	-0.32	-0.32	-0.32
Case 3: Wind 90 Cpi 0.2, -cpe (Zone I)	-0.26	-0.26	-0.26	-0.26



MVH WARD 10/11 TYPICAL ROOF TRUSS

	Calculation Sheet	Project/Sheet No.
	Client: THE HILLINGDON HOSPITALS NHS FOUNDATION TRUST	Prepared by: GB
	Project: MT VERNON HOSPITAL – W HERTS WARDS 10 - 11	Checked by: DW
	Element: STRUCTURE	Date: AUG 2025

Roof truss analysis carried out using Tedds software - see next sheet.

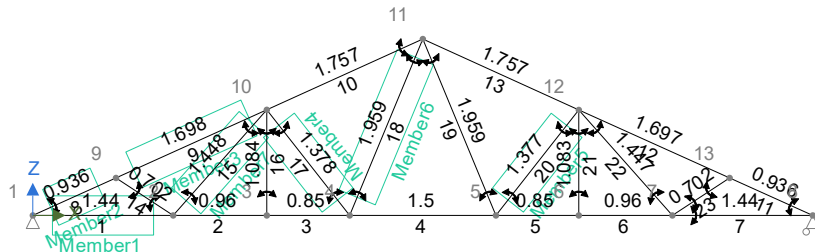
 Wareham & Associates Ltd 1-3 The Avenue Lightwater Surrey GU18 5RF	Project THH Mount Vernon Hospital				Job no. 25-2735	
	Calcs for Ward 10/11 Roof Truss Check - Sinusoidal Decking				Start page no./Revision C 8	
	Calcs by DW	Calcs date 13/08/2025	Checked by GB	Checked date 14/08/2025	Approved by	Approved date

ANALYSIS

Tedds calculation version 1.0.23

Geometry

Geometry (m) - Steel (BS5950)



Materials

Name	Density (kg/m ³)	Youngs Modulus kN/mm ²	Shear Modulus kN/mm ²	Thermal Coefficient °C ⁻¹
Steel (BS5950)	7850	205	78.8	0.000012

Sections

Name	Area (cm ²)	Moment of inertia		Shear area	
		Major (cm ⁴)	Minor (cm ⁴)	A _y (cm ²)	A _z (cm ²)
CHS 48.3x3.2	5	12	12	2	2
CHS 26.9x3.2	2	2	2	1	1
CHS 21.3x2.6	2	1	1	1	1
CHS 42.4x2.6	3	6	6	2	2

Nodes

Node	Co-ordinates		Freedom			Coordinate system		Spring		
	X (m)	Z (m)	X	Z	Rot.	Name	Angle (°)	X (kN/m)	Z (kN/m)	Rot. kNm/°
1	0	0	Fixed	Fixed	Free		0	0	0	0
2	1.44	0	Free	Free	Free		0	0	0	0
3	2.4	0	Free	Free	Free		0	0	0	0
4	3.25	0	Free	Free	Free		0	0	0	0
5	4.75	0	Free	Free	Free		0	0	0	0
6	5.6	0	Free	Free	Free		0	0	0	0
7	6.56	0	Free	Free	Free		0	0	0	0
8	8	0	Free	Fixed	Free		0	0	0	0
9	0.853	0.385	Free	Free	Free		0	0	0	0
10	2.4	1.084	Free	Free	Free		0	0	0	0
11	4	1.81	Free	Free	Free		0	0	0	0
12	5.6	1.083	Free	Free	Free		0	0	0	0
13	7.147	0.385	Free	Free	Free		0	0	0	0

Elements

Element	Length (m)	Nodes		Section	Material	Releases			Rotated
		Start	End			Start moment	End moment	Axial	
1	1.44	1	2	CHS 48.3x3.2	Steel (BS5950)	Fixed	Fixed	Fixed	

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Element	Length (m)	Nodes		Section	Material	Releases			Rotated
		Start	End			Start moment	End moment	Axial	
2	0.96	2	3	CHS 48.3x3.2	Steel (BS5950)	Fixed	Fixed	Fixed	
3	0.85	3	4	CHS 48.3x3.2	Steel (BS5950)	Fixed	Fixed	Fixed	
4	1.5	4	5	CHS 48.3x3.2	Steel (BS5950)	Fixed	Fixed	Fixed	
5	0.85	5	6	CHS 48.3x3.2	Steel (BS5950)	Fixed	Fixed	Fixed	
6	0.96	6	7	CHS 48.3x3.2	Steel (BS5950)	Fixed	Fixed	Fixed	
7	1.44	7	8	CHS 48.3x3.2	Steel (BS5950)	Free	Fixed	Fixed	
8	0.936	1	9	CHS 48.3x3.2	Steel (BS5950)	Free	Fixed	Fixed	
9	1.698	9	10	CHS 48.3x3.2	Steel (BS5950)	Fixed	Fixed	Fixed	
10	1.757	10	11	CHS 48.3x3.2	Steel (BS5950)	Fixed	Free	Fixed	
11	0.936	8	13	CHS 48.3x3.2	Steel (BS5950)	Free	Fixed	Fixed	
12	1.697	13	12	CHS 48.3x3.2	Steel (BS5950)	Fixed	Fixed	Fixed	
13	1.757	12	11	CHS 48.3x3.2	Steel (BS5950)	Fixed	Fixed	Fixed	
14	0.702	2	9	CHS 21.3x2.6	Steel (BS5950)	Free	Free	Fixed	
15	1.448	2	10	CHS 21.3x2.6	Steel (BS5950)	Free	Free	Fixed	
16	1.084	3	10	CHS 21.3x2.6	Steel (BS5950)	Free	Free	Fixed	
17	1.378	4	10	CHS 42.4x2.6	Steel (BS5950)	Free	Free	Fixed	
18	1.959	4	11	CHS 26.9x3.2	Steel (BS5950)	Free	Free	Fixed	
19	1.959	5	11	CHS 26.9x3.2	Steel (BS5950)	Free	Free	Fixed	
20	1.377	5	12	CHS 42.4x2.6	Steel (BS5950)	Free	Free	Fixed	
21	1.083	6	12	CHS 21.3x2.6	Steel (BS5950)	Free	Free	Fixed	
22	1.447	7	12	CHS 21.3x2.6	Steel (BS5950)	Free	Free	Fixed	
23	0.702	7	13	CHS 21.3x2.6	Steel (BS5950)	Free	Free	Fixed	

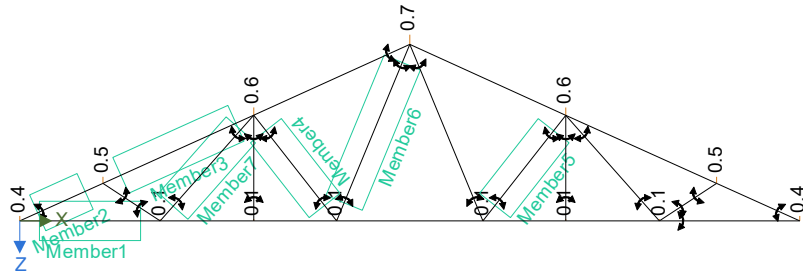
Members

Name	Elements	
	Start	End
Member1	1	1
Member2	8	8
Member3	9	9
Member4	17	17
Member5	20	20
Member6	18	18
Member7	15	15

Loading

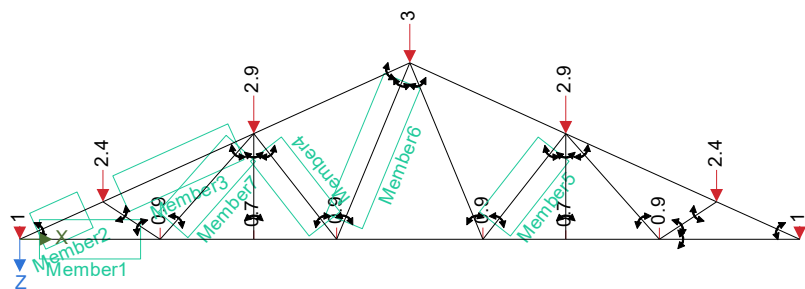
Self weight included

Permanent 1 - Loading (kN)

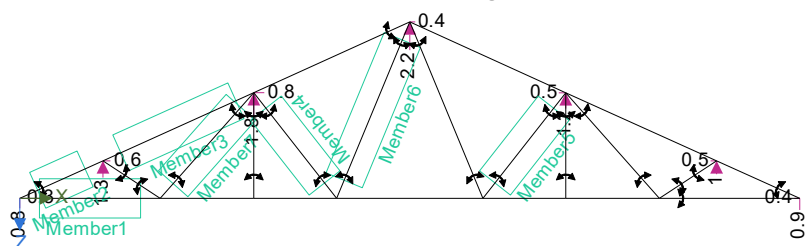


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	THH Mount Vernon Hospital				25-2735	
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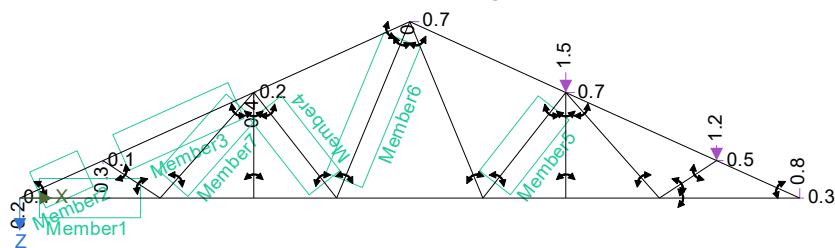
Imposed - Loading (kN)



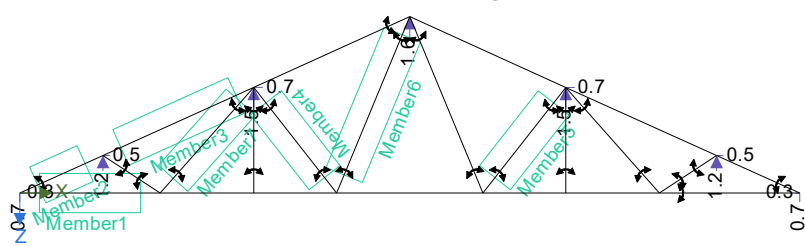
Wind1 - Loading (kN)



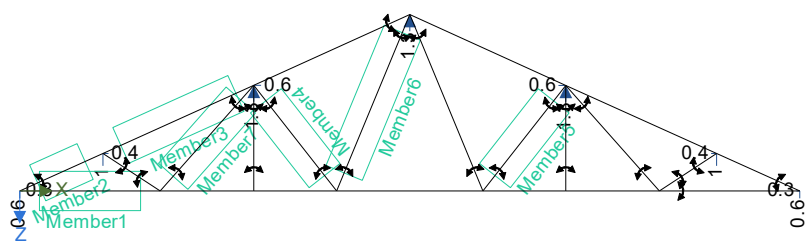
Wind 2 - Loading (kN)



Wind 3 - Loading (kN)

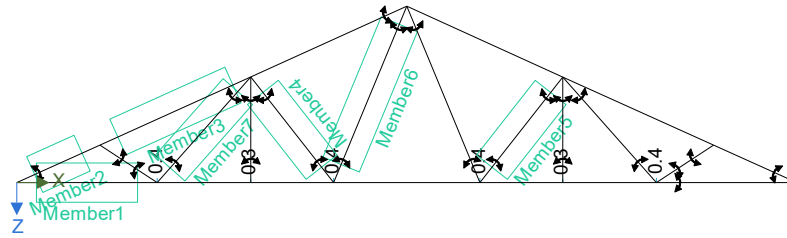


Wind 4 - Loading (kN)



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Permanent 2 - Loading (kN)



Load combination factors

Load combination	Self Weight	Permanent 1	Imposed	Wind1	Wind 2	Wind 3	Wind 4	Permanent 2
1.4D (Strength)	1.40	1.40						1.40
1.4D + 1.6I + 1.6RI (Strength)	1.40	1.40	1.60					1.40
1.0D + 1.0I + 1.0RI (Service)	1.00	1.00	1.00					1.00
1.4D + 1.6I (Strength)	1.40	1.40	1.60					1.40
1.0D + 1.0I (Service)	1.00	1.00	1.00					1.00
1.2D + 1.2I + 1.2W1 (Strength)	1.20	1.20	1.20	1.20				1.20
1.2D + 1.2I + 1.2W2 (Strength)	1.20	1.20	1.20		1.20			1.20
1.2D + 1.2I + 1.2W3 (Strength)	1.20	1.20	1.20			1.20		1.20
1.0D + 1.0I + 1.0 W1 (Service)	1.00	1.00	1.00	1.00				1.00
1.0D + 1.0I + 1.0W2 (Service)	1.00	1.00	1.00		1.00			1.00
1.0D + 1.0I + 1.0W3 (Service)	1.00	1.00	1.00			1.00		1.00
1.0D + 1.4W1 (Strength)	1.00	1.00		1.40				
1.0D + 1.4W2 (Strength)	1.00	1.00			1.40			
1.0D + 1.4W3 (Strength)	1.00	1.00				1.40		
1.2D + 1.2I + 1.2W4 (Strength)	1.20	1.20	1.20				1.20	1.20
1.0D + 1.0I + 1.0W4 (Service)	1.00	1.00	1.00				1.00	1.00
1.0D + 1.4W4 (Strength)	1.00	1.00					1.40	

Node loads

Node	Load case	Force		Moment (kNm)
		X (kN)	Z (kN)	
11	Permanent 1	0	0.7	0
10	Permanent 1	0	0.6	0
12	Permanent 1	0	0.6	0
9	Permanent 1	0	0.5	0
13	Permanent 1	0	0.5	0
1	Permanent 1	0	0.4	0
8	Permanent 1	0	0.4	0
2	Permanent 1	0	0.1	0
3	Permanent 1	0	0.1	0
4	Permanent 1	0	0.1	0
5	Permanent 1	0	0.1	0
6	Permanent 1	0	0.1	0

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Node	Load case	Force		Moment (kNm)
		X (kN)	Z (kN)	
7	Permanent 1	0	0.1	0
11	Imposed	0	3	0
10	Imposed	0	2.9	0
12	Imposed	0	2.9	0
9	Imposed	0	2.4	0
13	Imposed	0	2.4	0
1	Imposed	0	1	0
8	Imposed	0	1	0
2	Imposed	0	0.9	0
3	Imposed	0	0.7	0
4	Imposed	0	0.9	0
5	Imposed	0	0.9	0
6	Imposed	0	0.7	0
7	Imposed	0	0.9	0
9	Wind1	-0.6	-1.3	0
10	Wind1	-0.8	-1.8	0
11	Wind1	-0.4	-2.2	0
12	Wind1	0.5	-1.2	0
13	Wind1	0.5	-1	0
1	Wind1	-0.3	-0.8	0
8	Wind1	0.4	-0.9	0
9	Wind 2	-0.1	-0.3	0
10	Wind 2	-0.2	-0.4	0
11	Wind 2	-0.7	0	0
12	Wind 2	-0.7	1.5	0
13	Wind 2	-0.5	1.2	0
1	Wind 2	-0.1	-0.2	0
8	Wind 2	-0.3	0.8	0
9	Wind 3	-0.5	-1.2	0
10	Wind 3	-0.7	-1.5	0
11	Wind 3	0	-1.6	0
12	Wind 3	-0.7	-1.5	0
13	Wind 3	-0.5	-1.2	0
1	Wind 3	-0.3	-0.7	0
8	Wind 3	0.3	-0.7	0
1	Wind 4	-0.3	-0.6	0
9	Wind 4	-0.4	-1	0
10	Wind 4	-0.6	-1.3	0
11	Wind 4	0	-1.3	0
12	Wind 4	0.6	-1.3	0
13	Wind 4	0.4	-1	0
8	Wind 4	0.3	-0.6	0
2	Permanent 2	0	0.4	0
3	Permanent 2	0	0.3	0
4	Permanent 2	0	0.4	0

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	Calcs by DW	Calcs date 13/08/2025	Checked by GB	Checked date 14/08/2025	Approved by	Approved date

Node	Load case	Force		Moment (kNm)
		X (kN)	Z (kN)	
5	Permanent 2	0	0.4	0
6	Permanent 2	0	0.3	0
7	Permanent 2	0	0.4	0

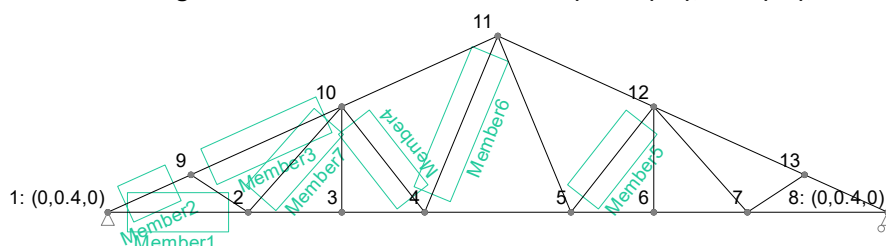
Results

Total base reactions

Load case/combination	Force	
	FX (kN)	FZ (kN)
Self Weight	0	0.8
Permanent 1	0	4.5
Imposed	0	20.7
Wind1	0.7	-9.1
Wind 2	2.7	2.6
Wind 3	2.4	-8.4
Wind 4	0	-6.8
Permanent 2	0	2
1.4D (Strength)	0	10.2
1.4D + 1.6I + 1.6RI (Strength)	0	43.3
1.0D + 1.0I + 1.0RI (Service)	0	28
1.4D + 1.6I (Strength)	0	43.3
1.0D + 1.0I (Service)	0	28
1.2D + 1.2I + 1.2W1 (Strength)	0.9	22.6
1.2D + 1.2I + 1.2W2 (Strength)	3.2	36.7
1.2D + 1.2I + 1.2W3 (Strength)	2.9	23.5
1.0D + 1.0I + 1.0 W1 (Service)	0.7	18.9
1.0D + 1.0I + 1.0W2 (Service)	2.7	30.6
1.0D + 1.0I + 1.0W3 (Service)	2.4	19.6
1.0D + 1.4W1 (Strength)	1	-7.4
1.0D + 1.4W2 (Strength)	3.7	9
1.0D + 1.4W3 (Strength)	3.4	-6.4
1.2D + 1.2I + 1.2W4 (Strength)	0	25.4
1.0D + 1.0I + 1.0W4 (Service)	0	21.2
1.0D + 1.4W4 (Strength)	0	-4.2

Reactions

Self Weight - Local node reactions - Node: (Horiz (kN), Vert (kN), Mom (kNm))

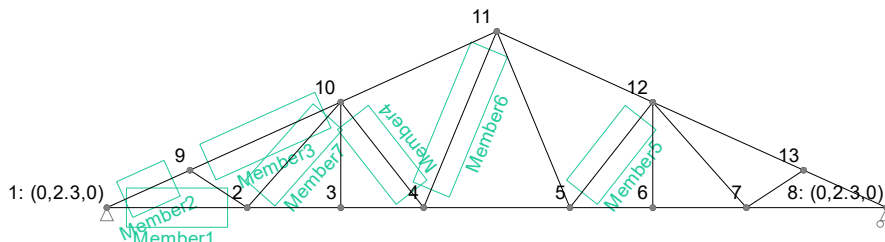


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Load case: Self Weight

Node	Force		Moment My (kNm)
	Fx (kN)	Fz (kN)	
1	0	0.4	0
8	0	0.4	0

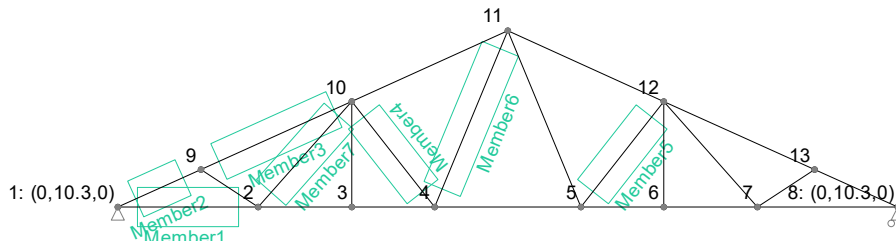
Permanent 1 - Local node reactions - Node: (Horiz (kN), Vert (kN), Mom (kNm))



Load case: Permanent 1

Node	Force		Moment My (kNm)
	Fx (kN)	Fz (kN)	
1	0	2.3	0
8	0	2.3	0

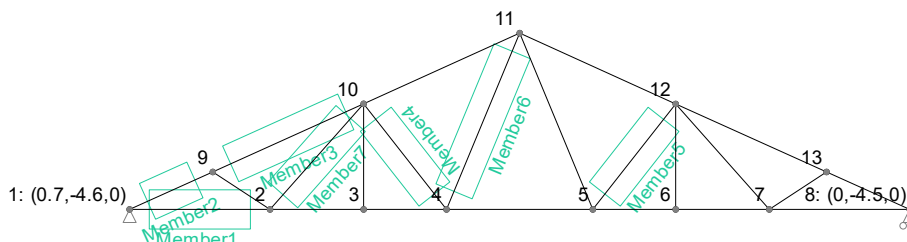
Imposed - Local node reactions - Node: (Horiz (kN), Vert (kN), Mom (kNm))



Load case: Imposed

Node	Force		Moment My (kNm)
	Fx (kN)	Fz (kN)	
1	0	10.3	0
8	0	10.3	0

Wind1 - Local node reactions - Node: (Horiz (kN), Vert (kN), Mom (kNm))

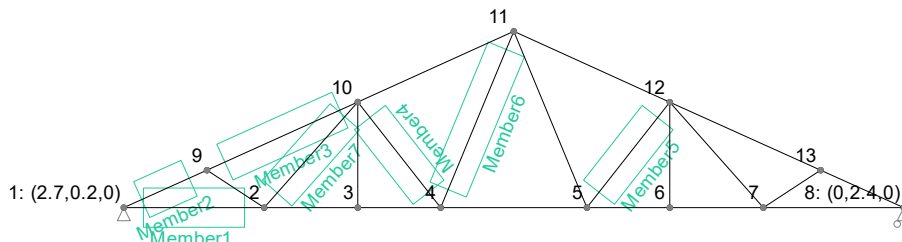


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	Calcs by DW	Calcs date 13/08/2025	Checked by GB	Checked date 14/08/2025	Approved by	Approved date

Load case: Wind1

Node	Force		Moment My (kNm)
	Fx (kN)	Fz (kN)	
1	0.7	-4.6	0
8	0	-4.5	0

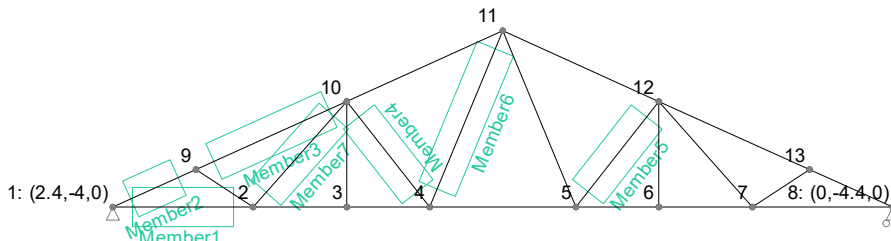
Wind 2 - Local node reactions - Node: (Horiz (kN), Vert (kN), Mom (kNm))



Load case: Wind 2

Node	Force		Moment My (kNm)
	Fx (kN)	Fz (kN)	
1	2.7	0.2	0
8	0	2.4	0

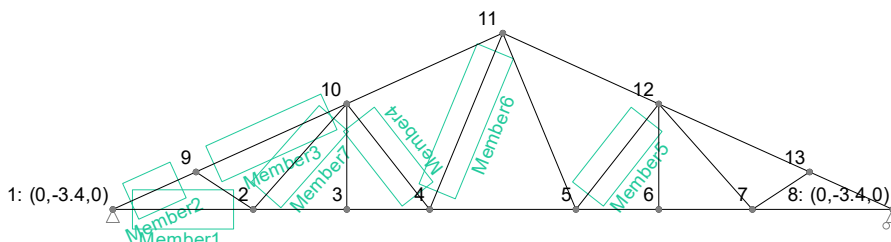
Wind 3 - Local node reactions - Node: (Horiz (kN), Vert (kN), Mom (kNm))



Load case: Wind 3

Node	Force		Moment My (kNm)
	Fx (kN)	Fz (kN)	
1	2.4	-4	0
8	0	-4.4	0

Wind 4 - Local node reactions - Node: (Horiz (kN), Vert (kN), Mom (kNm))

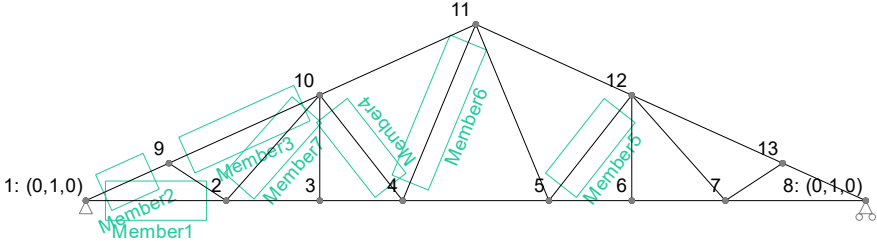


 Wareham & Associates Ltd 1-3 The Avenue Lightwater Surrey GU18 5RF	Project THH Mount Vernon Hospital				Job no. 25-2735	
	Calcs for Ward 10/11 Roof Truss Check - Sinusoidal Decking				Start page no./Revision C 16	
	Calcs by DW	Calcs date 13/08/2025	Checked by GB	Checked date 14/08/2025	Approved by	Approved date

Load case: Wind 4

Node	Force		Moment My (kNm)
	Fx (kN)	Fz (kN)	
1	0	-3.4	0
8	0	-3.4	0

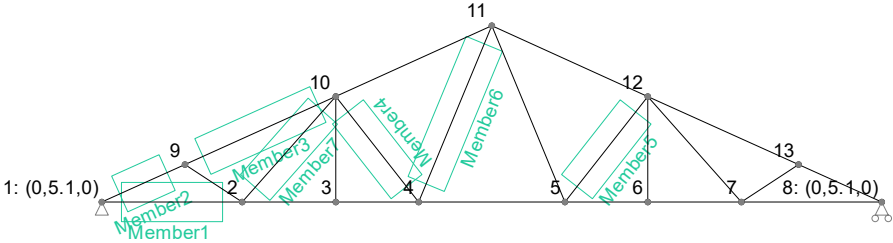
Permanent 2 - Local node reactions - Node: (Horiz (kN), Vert (kN), Mom (kNm))



Load case: Permanent 2

Node	Force		Moment My (kNm)
	Fx (kN)	Fz (kN)	
1	0	1	0
8	0	1	0

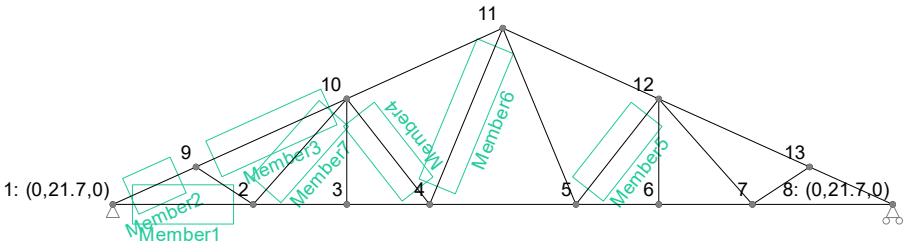
1.4D (Strength) - Local node reactions - Node: (Horiz (kN), Vert (kN), Mom (kNm))



Load combination: 1.4D (Strength)

Node	Force		Moment My (kNm)
	Fx (kN)	Fz (kN)	
1	0	5.1	0
8	0	5.1	0

1.4D + 1.6I + 1.6RI (Strength) - Local node reactions - Node: (Horiz (kN), Vert (kN), Mom (kNm))

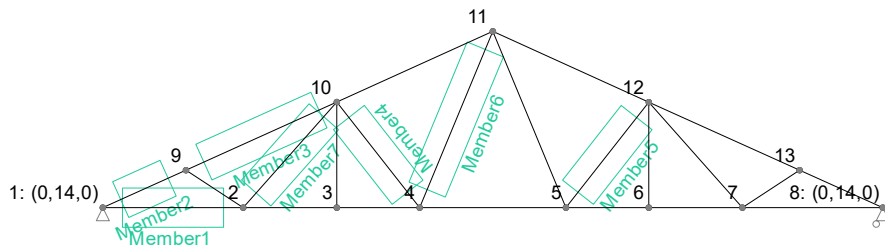


 Wareham & Associates Ltd 1-3 The Avenue Lightwater Surrey GU18 5RF	Project THH Mount Vernon Hospital				Job no. 25-2735	
	Calcs for Ward 10/11 Roof Truss Check - Sinusoidal Decking				Start page no./Revision C 17	
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Load combination: 1.4D + 1.6I + 1.6RI (Strength)

Node	Force		Moment My (kNm)
	Fx (kN)	Fz (kN)	
1	0	21.7	0
8	0	21.7	0

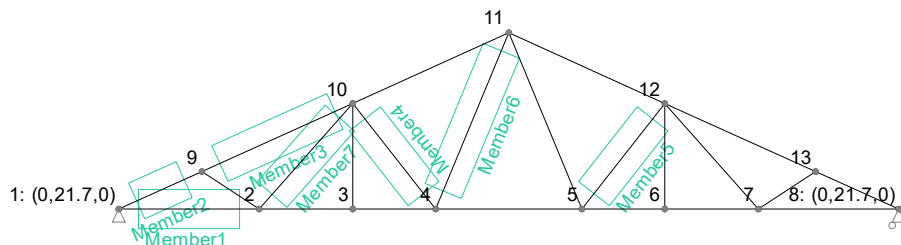
1.0D + 1.0I + 1.0RI (Service) - Local node reactions - Node: (Horiz (kN), Vert (kN), Mom (kNm))



Load combination: 1.0D + 1.0I + 1.0RI (Service)

Node	Force		Moment My (kNm)
	Fx (kN)	Fz (kN)	
1	0	14	0
8	0	14	0

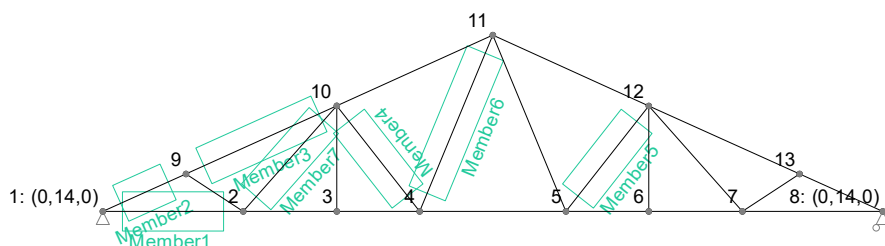
1.4D + 1.6I (Strength) - Local node reactions - Node: (Horiz (kN), Vert (kN), Mom (kNm))



Load combination: 1.4D + 1.6I (Strength)

Node	Force		Moment My (kNm)
	Fx (kN)	Fz (kN)	
1	0	21.7	0
8	0	21.7	0

1.0D + 1.0I (Service) - Local node reactions - Node: (Horiz (kN), Vert (kN), Mom (kNm))

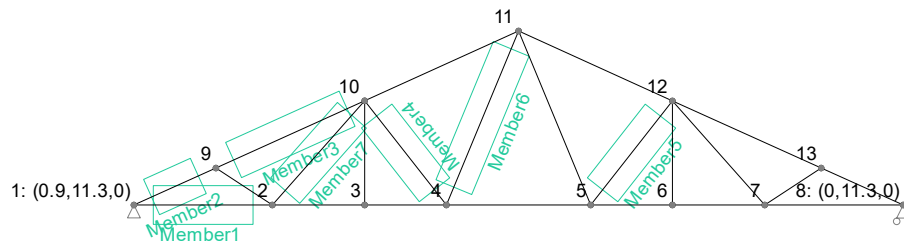


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	Calcs for Ward 10/11 Roof Truss Check - Sinusoidal Decking				Start page no./Revision C 18	
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Load combination: 1.0D + 1.0I (Service)

Node	Force		Moment My (kNm)
	Fx (kN)	Fz (kN)	
1	0	14	0
8	0	14	0

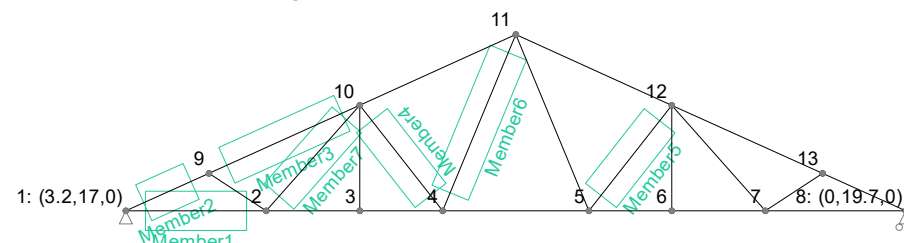
1.2D + 1.2I + 1.2W1 (Strength) - Local node reactions - Node: (Horiz (kN), Vert (kN), Mom (kNm))



Load combination: 1.2D + 1.2I + 1.2W1 (Strength)

Node	Force		Moment My (kNm)
	Fx (kN)	Fz (kN)	
1	0.9	11.3	0
8	0	11.3	0

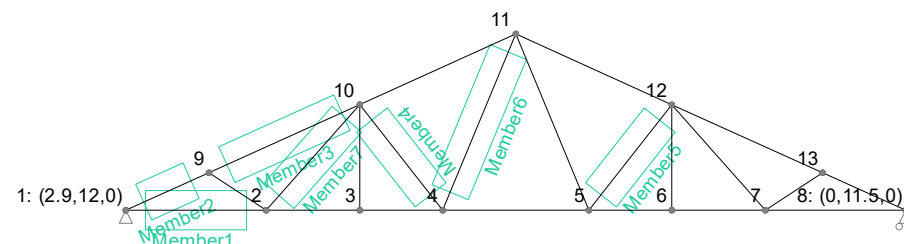
1.2D + 1.2I + 1.2W2 (Strength) - Local node reactions - Node: (Horiz (kN), Vert (kN), Mom (kNm))



Load combination: 1.2D + 1.2I + 1.2W2 (Strength)

Node	Force		Moment My (kNm)
	Fx (kN)	Fz (kN)	
1	3.2	17	0
8	0	19.7	0

1.2D + 1.2I + 1.2W3 (Strength) - Local node reactions - Node: (Horiz (kN), Vert (kN), Mom (kNm))

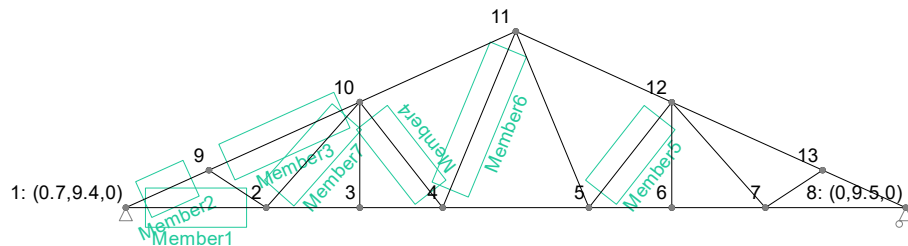


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Load combination: 1.2D + 1.2I + 1.2W3 (Strength)

Node	Force		Moment My (kNm)
	Fx (kN)	Fz (kN)	
1	2.9	12	0
8	0	11.5	0

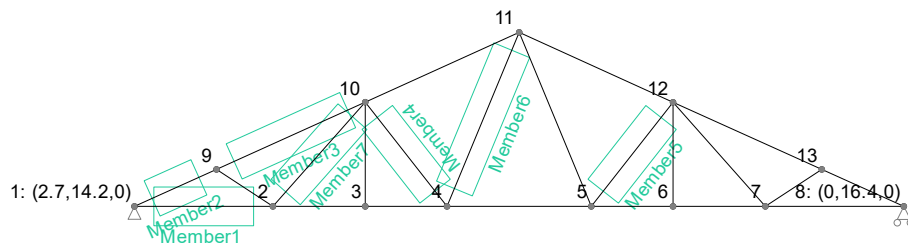
1.0D + 1.0I + 1.0 W1 (Service) - Local node reactions - Node: (Horiz (kN), Vert (kN), Mom (kNm))



Load combination: 1.0D + 1.0I + 1.0 W1 (Service)

Node	Force		Moment My (kNm)
	Fx (kN)	Fz (kN)	
1	0.7	9.4	0
8	0	9.5	0

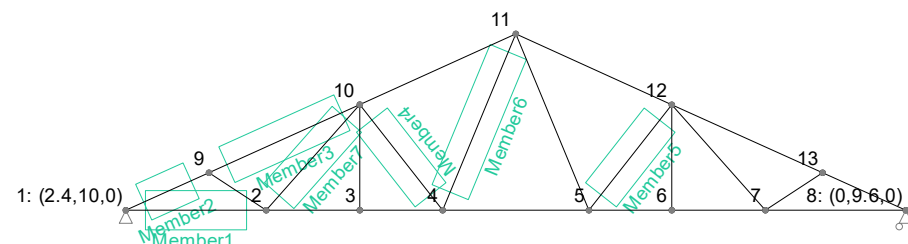
1.0D + 1.0I + 1.0W2 (Service) - Local node reactions - Node: (Horiz (kN), Vert (kN), Mom (kNm))



Load combination: 1.0D + 1.0I + 1.0W2 (Service)

Node	Force		Moment My (kNm)
	Fx (kN)	Fz (kN)	
1	2.7	14.2	0
8	0	16.4	0

1.0D + 1.0I + 1.0W3 (Service) - Local node reactions - Node: (Horiz (kN), Vert (kN), Mom (kNm))

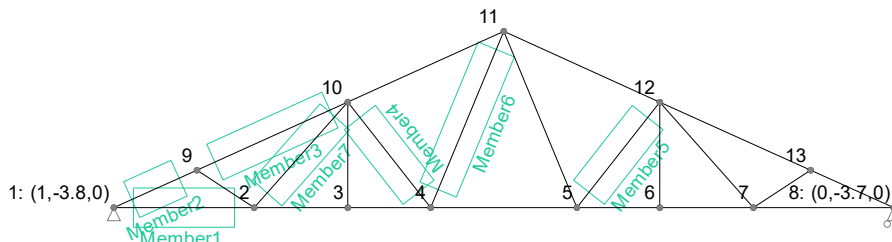


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Load combination: 1.0D + 1.0I + 1.0W3 (Service)

Node	Force		Moment My (kNm)
	Fx (kN)	Fz (kN)	
1	2.4	10	0
8	0	9.6	0

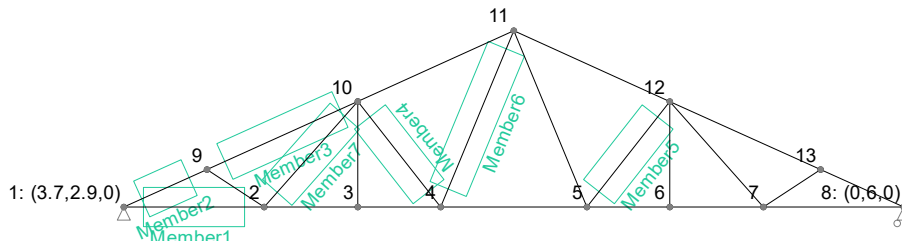
1.0D + 1.4W1 (Strength) - Local node reactions - Node: (Horiz (kN), Vert (kN), Mom (kNm))



Load combination: 1.0D + 1.4W1 (Strength)

Node	Force		Moment My (kNm)
	Fx (kN)	Fz (kN)	
1	1	-3.8	0
8	0	-3.7	0

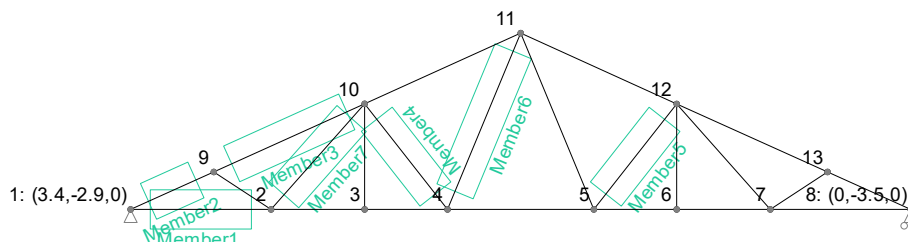
1.0D + 1.4W2 (Strength) - Local node reactions - Node: (Horiz (kN), Vert (kN), Mom (kNm))



Load combination: 1.0D + 1.4W2 (Strength)

Node	Force		Moment My (kNm)
	Fx (kN)	Fz (kN)	
1	3.7	2.9	0
8	0	6	0

1.0D + 1.4W3 (Strength) - Local node reactions - Node: (Horiz (kN), Vert (kN), Mom (kNm))

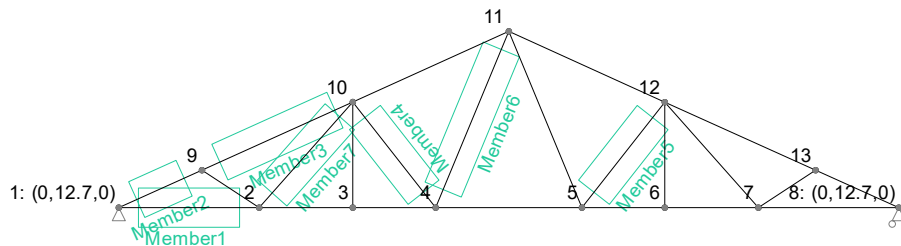


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	Calcs for Ward 10/11 Roof Truss Check - Sinusoidal Decking				Start page no./Revision C 21	
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Load combination: 1.0D + 1.4W3 (Strength)

Node	Force		Moment My (kNm)
	Fx (kN)	Fz (kN)	
1	3.4	-2.9	0
8	0	-3.5	0

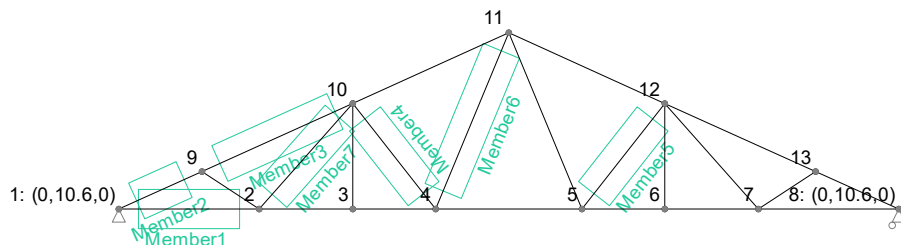
1.2D + 1.2I + 1.2W4 (Strength) - Local node reactions - Node: (Horiz (kN), Vert (kN), Mom (kNm))



Load combination: 1.2D + 1.2I + 1.2W4 (Strength)

Node	Force		Moment My (kNm)
	Fx (kN)	Fz (kN)	
1	0	12.7	0
8	0	12.7	0

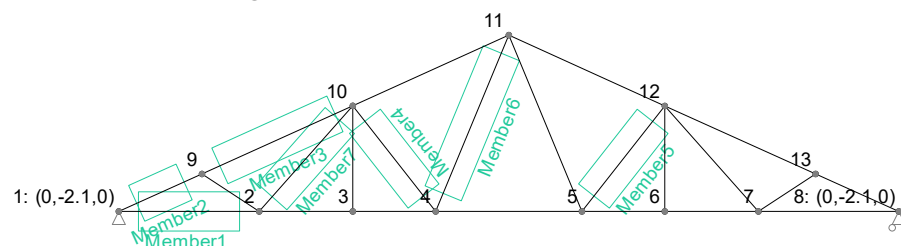
1.0D + 1.0I + 1.0W4 (Service) - Local node reactions - Node: (Horiz (kN), Vert (kN), Mom (kNm))



Load combination: 1.0D + 1.0I + 1.0W4 (Service)

Node	Force		Moment My (kNm)
	Fx (kN)	Fz (kN)	
1	0	10.6	0
8	0	10.6	0

1.0D + 1.4W4 (Strength) - Local node reactions - Node: (Horiz (kN), Vert (kN), Mom (kNm))



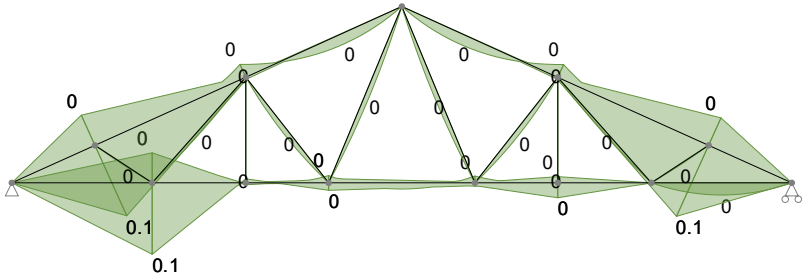
 Wareham & Associates Ltd 1-3 The Avenue Lightwater Surrey GU18 5RF	Project THH Mount Vernon Hospital				Job no. 25-2735	
	Calcs for Ward 10/11 Roof Truss Check - Sinusoidal Decking				Start page no./Revision C 22	
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Load combination: 1.0D + 1.4W4 (Strength)

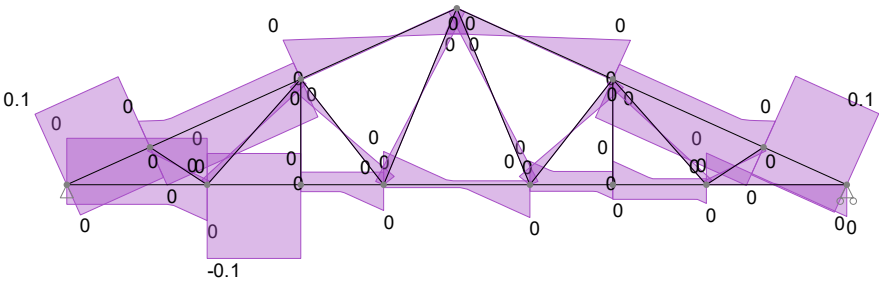
Node	Force		Moment My (kNm)
	Fx (kN)	Fz (kN)	
1	0	-2.1	0
8	0	-2.1	0

Forces

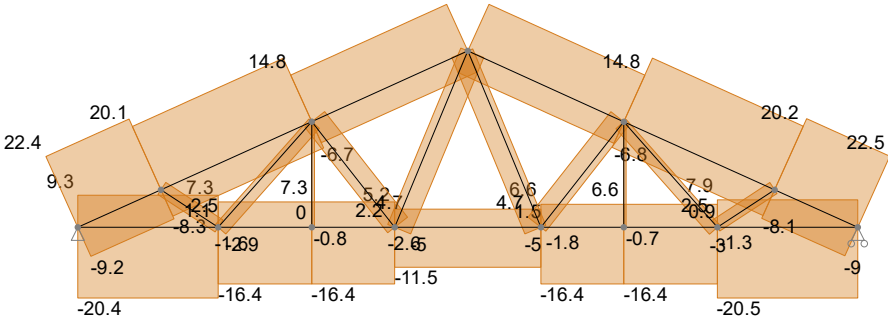
All load cases - Moment envelope (kNm)



All load cases - Shear envelope (kN)



All load cases - Axial force envelope (kN)



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Element results

Envelope - All load cases

Element	Shear force		Moment			
	Pos (m)	Max abs (kN)	Pos (m)	Max (kNm)	Pos (m)	Min (kNm)
1	0	0	1.44	0.1	1.44	0
2	0	-0.1	0	0.1	0	0
3	0.85	0	0.85	0	0.85	0
4	0	0	0	0	0	0
5	0	0	0.85	0	0	0
6	0	0	0	0	0	0
7	1.44	0	0.72	0	1.44	0
8	0	0.1 (max abs)	0.936	0.1 (max)	0.936	0 (min)
9	0	0	0	0.1 (max)	0	0 (min)
10	0	0	1.065	0	0	0
11	0	0.1 (max abs)	0.936	0.1 (max)	0.936	0
12	0	0	0	0.1 (max)	0	0
13	0	0	1.065	0	0	0
14	0.702	0	0.351	0	0	0
15	0	0	0.724	0	0	0
16	0	0	0	0	0	0
17	1.378	0	0.689	0	1.378	0
18	1.959	0	0.98	0	1.959	0
19	1.959	0	0.98	0	1.959	0
20	1.377	0	0.688	0	1.377	0
21	0	0	0	0	0	0
22	1.447	0	0.724	0	0	0
23	0	0	0.351	0	0	0

Envelope - All load cases

Element	Axial force			
	Pos (m)	Max (kN)	Pos (m)	Min (kN)
1	0	9.3	0	-20.4
2	0	7.3	0	-16.4
3	0	7.3	0	-16.4
4	0	5.2	0	-11.5
5	0	6.6	0	-16.4
6	0	6.6	0	-16.4
7	0	7.9	0	-20.5 (min)
8	0	22.4	0	-9.2
9	0	20.1	0	-8.3
10	0	14.8	0	-6.7
11	0	22.5 (max)	0	-9
12	0	20.2	0	-8.1
13	0	14.8	0	-6.8
14	0	2.5	0	-1.6
15	0	1.1	0	-2.9
16	0	0	0	-0.8

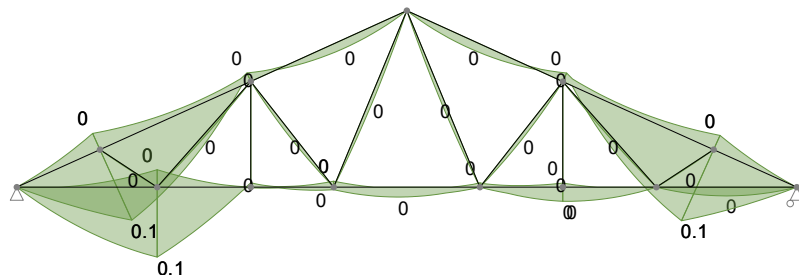
 Wareham & Associates Ltd 1-3 The Avenue Lightwater Surrey GU18 5RF	Project THH Mount Vernon Hospital				Job no. 25-2735	
	Calcs for Ward 10/11 Roof Truss Check - Sinusoidal Decking				Start page no./Revision C 25	
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Element	Axial force			
	Pos (m)	Max (kN)	Pos (m)	Min (kN)
17	0	4.7	0	-2.6
18	0	2.2	0	-5
19	0	1.5	0	-5
20	0	4.7	0	-1.8
21	0	0	0	-0.7
22	0	0.9	0	-3
23	0	2.5	0	-1.3

Envelope - All load cases

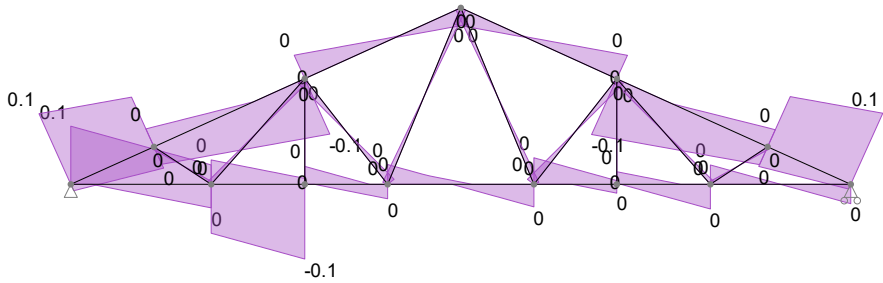
Element	Deflection			
	Pos (m)	Max (mm)	Pos (m)	Min (mm)
1	1.44	3.3	1.44	-1.4
2	0.96	3.8	0.96	-1.6
3	0.85	3.9	0.85	-1.6
4	0.707	4 (max)	0.37	-1.6 (min)
5	0	3.9	0	-1.6
6	0	3.8	0	-1.5
7	0	3.3	0	-1.3
8	0.936	2.7	0.936	-1.1
9	1.531	3.8	1.418	-1.6
10	0	3.8	0	-1.6
11	0.936	2.1	0.936	-0.8
12	1.507	3.2	1.697	-1.3
13	0	3.2	0.321	-1.3
14	0	2.6	0	-1.1
15	1.448	3.2	1.448	-1.4
16	1.084	1	1.084	-0.4
17	0	1.9	0	-0.8
18	1.959	2.1	0	-0.9
19	1.959	0.8	1.959	-0.3
20	0	3.1	0	-1.2
21	0	1	0	-0.4
22	1.447	2.2	1.447	-0.9
23	0	3.4	0	-1.3

Strength combinations - Moment envelope (kNm)

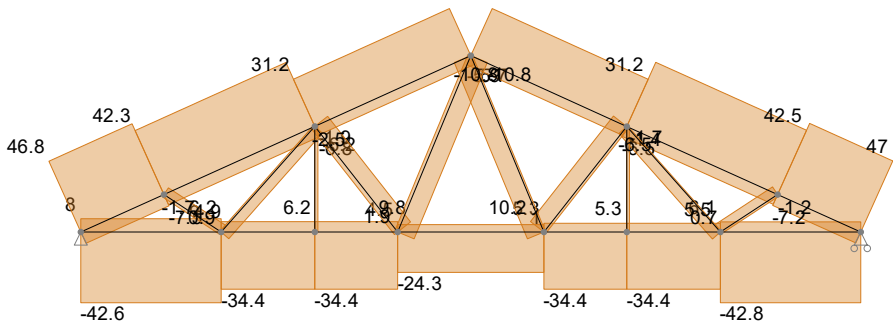


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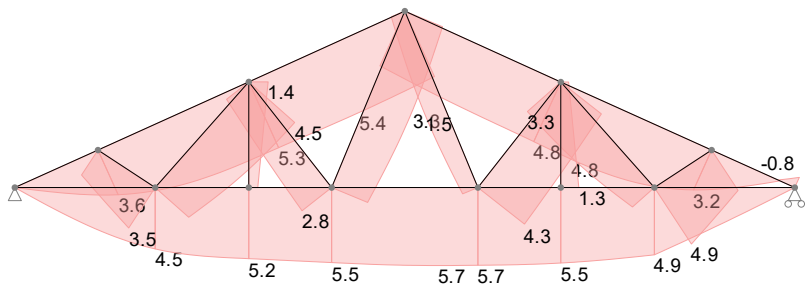
Strength combinations - Shear envelope (kN)



All combinations - Axial force envelope (kN)



Service combinations - Deflection envelope (mm)



Member results

Envelope - Strength combinations

Member	Shear force		Moment			
	Pos (m)	Max abs (kN)	Pos (m)	Max (kNm)	Pos (m)	Min (kNm)
Member1	0	0.1	1.44	0.1	1.44	0 (min)
Member2	0	0.1 (max abs)	0.936	0.1 (max)	0.936	0 (min)
Member3	1.698	-0.1	0	0.1 (max)	0	0 (min)
Member4	1.378	0	0.689	0	1.378	0
Member5	1.377	0	0.688	0	1.377	0
Member6	1.959	0	0.98	0	1.959	0
Member7	0	0	0.724	0	0	0

Envelope - All combinations

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Member	Axial force			
	Pos (m)	Max (kN)	Pos (m)	Min (kN)
Member1	0	8	0	-42.6 (min)
Member2	0	46.8 (max)	0.936	-7.5
Member3	0	42.3	1.698	-6.8
Member4	0	9.8	1.378	-2.5
Member5	0	10.2	1.377	-1.4
Member6	0	1.9	1.959	-10.8
Member7	0	0.9	1.448	-6.2

Envelope - Service combinations

Member	Deflection			
	Pos (m)	Max (mm)	Pos (m)	Min (mm)
Member1	1.44	4.5	0	0
Member2	0.936	3.6	0	0
Member3	1.698	5.3 (max)	0	2.5
Member4	0	2.8	1.378	1.4
Member5	0	4.3	1.377	2.5
Member6	1.055	3.3	0	2
Member7	1.448	4.5	0	2.3

Element results

Envelope - Strength combinations

Element	Shear force		Moment			
	Pos (m)	Max abs (kN)	Pos (m)	Max (kNm)	Pos (m)	Min (kNm)
1	0	0.1	1.44	0.1	1.44	0 (min)
2	0.96	-0.1	0	0.1	0	0 (min)
3	0	0	0.667	0	0.85	0
4	1.5	0	0.661	0	0	0
5	0	0	0.85	0	0	0
6	0.96	0	0.044	0	0	0
7	0	0	0.72	0	1.44	0
8	0	0.1 (max abs)	0.936	0.1 (max)	0.936	0 (min)
9	1.698	-0.1	0	0.1 (max)	0	0 (min)
10	0	0	1.02	0	0	0
11	0	0.1 (max abs)	0.936	0.1 (max)	0.936	0
12	1.697	-0.1	0	0.1 (max)	0	0
13	0	0	1.024	0	0	0
14	0	0	0.351	0	0	0
15	0	0	0.724	0	0	0
16	0	0	0	0	0	0
17	1.378	0	0.689	0	1.378	0
18	1.959	0	0.98	0	1.959	0
19	1.959	0	0.98	0	1.959	0
20	1.377	0	0.688	0	1.377	0
21	0	0	0	0	0	0
22	0	0	0.724	0	0	0

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Element	Shear force		Moment			
	Pos (m)	Max abs (kN)	Pos (m)	Max (kNm)	Pos (m)	Min (kNm)
23	0	0	0.351	0	0	0

Envelope - All combinations

Element	Axial force			
	Pos (m)	Max (kN)	Pos (m)	Min (kN)
1	0	8	0	-42.6
2	0	6.2	0	-34.4
3	0	6.2	0	-34.4
4	0	4.5	0	-24.3
5	0	5.3	0	-34.4
6	0	5.3	0	-34.4
7	0	6.1	0	-42.8 (min)
8	0	46.8	0.936	-7.5
9	0	42.3	1.698	-6.8
10	0	31.2	1.757	-5.7
11	0	47 (max)	0.936	-7.2
12	0	42.5	1.697	-6.5
13	0	31.2	1.757	-5.9
14	0	4.9	0.702	-1.7
15	0	0.9	1.448	-6.2
16	0	-0.1	1.084	-1.9
17	0	9.8	1.378	-2.5
18	0	1.9	1.959	-10.8
19	0	1	1.959	-10.8
20	0	10.2	1.377	-1.4
21	0	-0.2	1.083	-1.7
22	0	0.7	1.447	-6.5
23	0	5.5	0.702	-1.2

Envelope - Service combinations

Element	Deflection			
	Pos (m)	Max (mm)	Pos (m)	Min (mm)
1	1.44	4.5	0	0
2	0.96	5.2	0	3.1
3	0.85	5.5	0	3.6
4	1.094	5.7 (max)	0	3.7
5	0	5.7	0.85	3.6
6	0	5.5	0.96	3.2
7	0	4.9	1.44	0
8	0.936	3.6	0	0
9	1.698	5.3	0	2.5
10	0.91	5.4	1.757	3.5
11	0.936	3.2	0	-0.8 (min)
12	1.274	4.8	0	2
13	0	4.8	1.757	2.9

 Wareham & Associates Ltd 1-3 The Avenue Lightwater Surrey GU18 5RF	Project THH Mount Vernon Hospital				Job no. 25-2735	
	Calcs for Ward 10/11 Roof Truss Check - Sinusoidal Decking				Start page no./Revision C 29	
	Calcs by DW	Calcs date 13/08/2025	Checked by GB	Checked date 14/08/2025	Approved by	Approved date

Element	Deflection			
	Pos (m)	Max (mm)	Pos (m)	Min (mm)
14	0	3.5	0.702	1.5
15	1.448	4.5	0	2.3
16	1.084	1.4	0	0.4
17	0	2.8	1.378	1.4
18	1.055	3.3	0	2
19	0.907	1.5	1.959	0.7
20	0	4.3	1.377	2.5
21	0	1.3	1.083	0.3
22	1.447	3.3	0	1.3
23	0	4.9	0.702	2.3

	Calculation Sheet	Project/Sheet No.
	Client: THE HILLINGDON HOSPITALS NHS FOUNDATION TRUST	Prepared by: GB
	Project: MT VERNON HOSPITAL – W HERTS WARDS 10 - 11	Checked by: DW
	Element: STRUCTURE	Date: AUG 2025

Roof wind analysis manual check:

Roof - south wind - internal truss after gable

From Tedds wind analysis,

$$\begin{aligned} \text{Total force} &= (H: 10.37 \times 3.050/3.44) - \text{from slope} \\ \text{Wind load/truss} &= 9.194 \text{ kN C} \end{aligned}$$

Reactions each side at 50% and 50%,

$$R1 = 0.5 \times 9.194 \times \sin 66 = 4.200 \text{ kN C} \quad \text{vertical uplift}$$

Dead load –

Corrugate steel sheet	0.081 kN/m ²
Ceiling & services	0.110 kN/m²
Roof purlins	0.060
Ceiling purlins	0.034
Truss self-wt	<u>0.033 kN/m²</u>
Total	= 0.208 kN/m ² C

$$\text{Dead load reactions} = 0.208 \text{ kN/m}^2 \times 3.05 \times 8.6/2 = 2.728 \text{ kN C}$$

$$\text{Net uplift} = 4.200 - 2.728 = 1.472 \text{ kN C}$$

$$\text{Ult uplift} = 1.4(4.200) - 1.0(2.728) = 3.2 \text{ kN} < 4.0 \text{ kN ring beam sw - OK}$$

	Calculation Sheet		Project/Sheet No.
	Client: THE HILLINGDON HOSPITALS NHS FOUNDATION TRUST		Prepared by: GB
	Project: MT VERNON HOSPITAL – W HERTS WARDS 10 - 11		Checked by: DW
	Element: <u>STRUCTURE</u>		Date: AUG 2025

Roof - west wind - internal truss

From Tedds wind analysis,

$$\text{Total vertical force} = [G: 18.86] \sin 66 + [H, I, J: 140.15] \sin 66$$

$$17.229 + 128.033$$

$$\text{Wind load/truss} = 17.229 \times 3.05/44.286 + 128.033 \times 3.05/49.000$$

$$1.187 + 7.969$$

$$= 9.156 \text{ kN C}$$

Reactions each side at 50% and 50%,

$$R1 = 0.5 \times 9.156 = 4.578 \text{ kN C vertical uplift}$$

Dead load –

Corrugate steel sheet 0.081 kN/m²

~~Ceiling & services 0.110 kN/m²~~

Roof purlins 0.060

Ceiling purlins 0.034

Truss self-wt 0.033 kN/m²

$$\text{Total} = 0.208 \text{ kN/m}^2 \text{ C}$$

$$\text{Dead load reactions} = 0.208 \text{ kN/m}^2 \times 3.05 \times 8.6/2 = 2.728 \text{ kN C}$$

$$\text{Net uplift} = 4.578 - 2.728 = 1.850 \text{ kN C}$$

$$\text{Ult uplift} = 1.4(4.578) - 1.0(2.728) = 3.7 \text{ kN} < 4.0 \text{ kN ring beam sw - OK}$$