RDD

RYMER DESIGN & DETAILING

Building Control Calculations for Proposed Works

to

Showell Farm, Showell,
Chippenham. SN15 2NU.

for

Mr and Mrs Bennett

Project Ref: 1556
Issue Date: December 2023
Revision:

RYMER DESIGN & DETAILING
Richard Rymer
4 Moor Park, Neston, Corsham. SN13 9YJ

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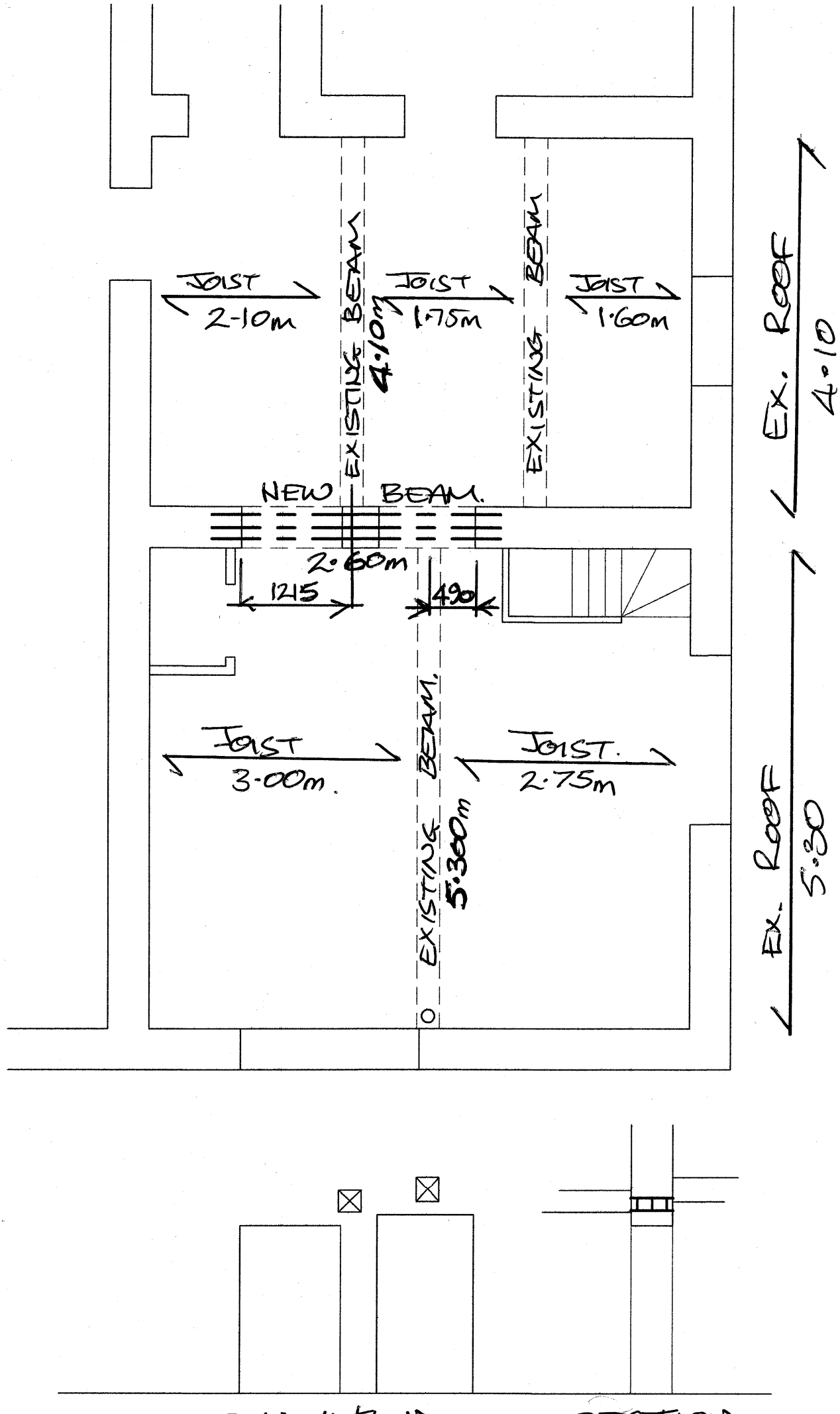
JOIST
2-10m
EXISTING BEAM
4.10m
JOIST
1.75m
EXISTING BEAM
JOIST
1.60m
EX. ROOF
4.10
NEW BEAM.
2.60m
1215
490
JOIST
3.00m.
EXISTING BEAM.
5.300m
JOIST.
2.75m
EX. ROOF
5.30
ELEVATION.
SECTION.

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RYMER DESIGN & DETAILING

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Project name : Showell Farm, Showell
Project Ref : 1556
Sheet Number : 01
Date : December 2023
Calc. By : R. Rymer

LOADINGS

	kN/m² G_K	kN/m² Q_K
Tiled Pitched Roof;		
Tiles, battens, felt, rafters,	0.8	
Joists, insulation, ceiling & plaster skim	0.41	
Live Load Roof		0.6
Roof	0.8	0.6
Ceiling	0.41	0.25
Flat roof;		
Single ply membrane	0.15	
Insulation	0.1	
Plywood and battens	0.2	
Timber rafters	0.1	
ceiling & plaster skim	0.22	
Live Load including snow		0.6
	0.77	0.6
General floor load:		
Floor boards, joists, insulation, ceiling and skim	0.79	
Domestic live load		1.5
	0.79	1.5
Beam and block floor:		
75 screed and finishes	1.65	
150dp pcc beam and block floor	2.1	
Domestic live load		1.5
	3.75	1.5
Internal;		
2No plaster finish	0.44	
Timber stud and insulation	0.56	
	1.0 kN/m	
External cavity;		
102 Brick	2.16	
50 Insulation	0.05	
100 Block	1.65	
Plaster finish	0.22	
	4.08	
Solid rubble stone wall;		
plaster finish	0.22	
450 rubble stone wall	9.00	
	9.22	

All dimensions are for design purposes only and are not to be used for fabrication or building work.

Structural member sizes calculated are minimum and can be replaced with larger elements. Any changes to be reported to Rymer Design.

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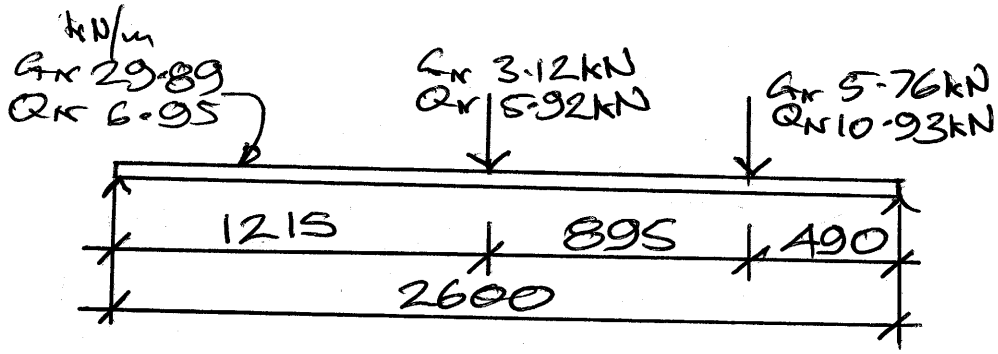
Project name : Showell Farm, Showell
Project Reference : 1556
Sheet Number : 02
Date : December 2023
Calc. By : R.Rymer

NEW BEAM

SPAN = 2.60m.

LOAD		G_K kN/m	Q_K kN/m
ROOF.	$\frac{0.8}{\cos 40} \times \frac{5.3+4.1}{2}$ (4.7)	4.91	
	$\frac{0.75}{\cos 40} \times \frac{5.3+4.1}{2}$ (4.7)		4.60
LOFT.	$0.41 \times \frac{5.3+4.1}{2}$ (4.7)	1.93	
	$0.5 \times \frac{5.3+4.1}{2}$ (4.7)		2.35
KITCHEN BEAM	$0.79 \times 2.75 \times 5.3/2$	5.76kN	
	$1.5 \times 2.75 \times 5.3/2$		10.93kN
DINING ROOM BEAM	$0.79 \times \left(\frac{2.1+1.75}{2}\right) \times 4.1/2$ (1.925)	3.12kN	
	$1.5 \times \left(\frac{2.1+1.75}{2}\right) \times 4.1/2$		5.92kN.
WALL	9.22×2.5	23.05	
		29.89	6.95.



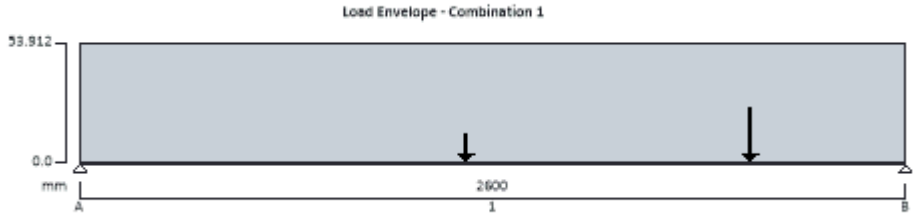
$F = 82.3kN$

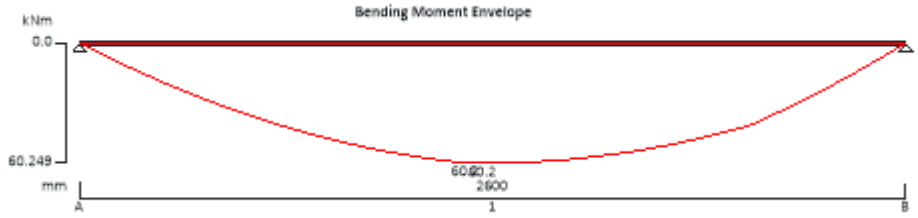
$F = 97.3kN$.

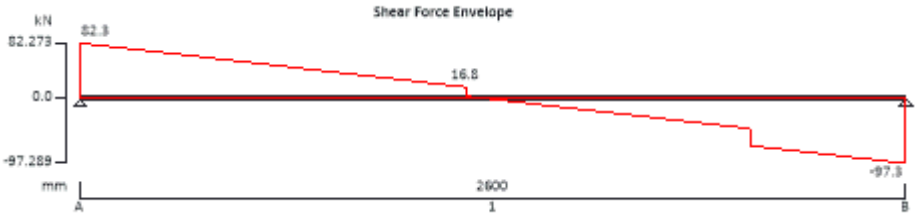
STEEL BEAM ANALYSIS & DESIGN (BS5950)

In accordance with BS5950-1:2000 incorporating Corrigendum No.1

TEDDS calculation version 3.0.07







Support conditions

Support A	Vertically restrained
	Rotationally free
Support B	Vertically restrained
	Rotationally free

Applied loading

Beam loads	Dead self weight of beam × 1
	Dead point load 3.12 kN at 1215 mm
	Imposed point load 5.92 kN at 1215 mm
	Dead point load 5.76 kN at 2110 mm
	Imposed point load 10.93 kN at 2110 mm
	Dead full UDL 29.89 kN/m
	Imposed full UDL 6.95 kN/m

Load combinations

Load combination 1	Support A	Dead × 1.40
		Imposed × 1.60
		Dead × 1.40

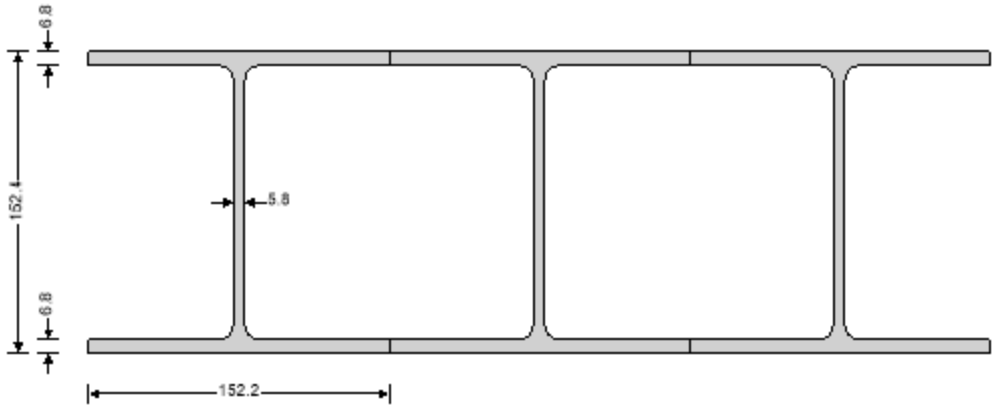
		Imposed × 1.60
	Support B	Dead × 1.40
		Imposed × 1.60

Analysis results

Maximum moment	M_{max} = **60.2** kNm	M_{min} = **0** kNm
Maximum shear	V_{max} = **82.3** kN	V_{min} = **-97.3** kN
Deflection	δ_{max} = **3.8** mm	δ_{min} = **0** mm
Maximum reaction at support A	R_{A_max} = **82.3** kN	R_{A_min} = **82.3** kN
Unfactored dead load reaction at support A	R_{A_Dead} = **42.5** kN	
Unfactored imposed load reaction at support A	$R_{A_Imposed}$ = **14.2** kN	
Maximum reaction at support B	R_{B_max} = **97.3** kN	R_{B_min} = **97.3** kN
Unfactored dead load reaction at support B	R_{B_Dead} = **45.9** kN	
Unfactored imposed load reaction at support B	$R_{B_Imposed}$ = **20.7** kN	

Section details

Section type **3 x UC 152x152x23 (British Steel Section Range 2022 (BS4-1))** Steel grade **S275**



Classification of cross sections - Section 3.5

Tensile strain coefficient ε = **1.00** Section classification **Semi-compact**

Shear capacity - Section 4.2.3

Design shear force F_v = **97.3** kN Design shear resistance P_v = **437.5** kN

PASS - Design shear resistance exceeds design shear force

Moment capacity - Section 4.2.5

Design bending moment M = **60.2** kNm Moment capacity low shear M_c = **145.4** kNm

Buckling resistance moment - Section 4.3.6.4

Buckling resistance moment M_b = **107** kNm M_b / m_{LT} = **115.9** kNm

PASS - Buckling resistance moment exceeds design bending moment

Check vertical deflection - Section 2.5.2

Consider deflection due to dead and imposed loads

Limiting deflection δ_{lim} = **7.222** mm Maximum deflection δ = **3.761** mm

PASS - Maximum deflection does not exceed deflection limit

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BEAM BEARING.

$F_L = 82.3kN$; $F_R = 97.3kN$.

440 RUBBLE STONE WALL

$f_k = 0.67N/mm^2$.

$$\text{PADSTONE}_L = \frac{82.3 \times 10^3}{0.67 \times 440} = 280mm$$

USE 300lg x 440wd x 215dp

PADSTONE.

$$\text{PADSTONE}_R = \frac{97.3 \times 10^3}{0.67 \times 440} = 331mm$$

USE 400lg x 440wd x 300dp

PADSTONE.

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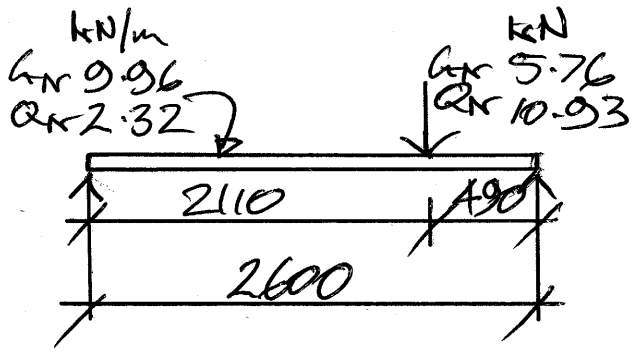
Calc. By	: R.Rymer

CHECK OUTER BEAMS WITH POINT LOAD.

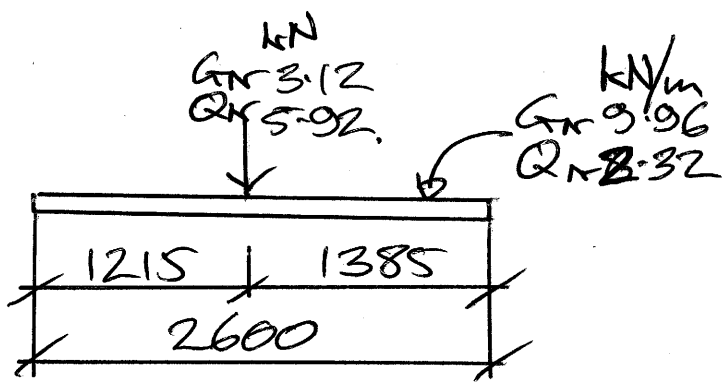
29.89 ÷ 3 = 9.96kN/m

6.95 ÷ 3 = 2.32kN/m

KITCHEN SIDE



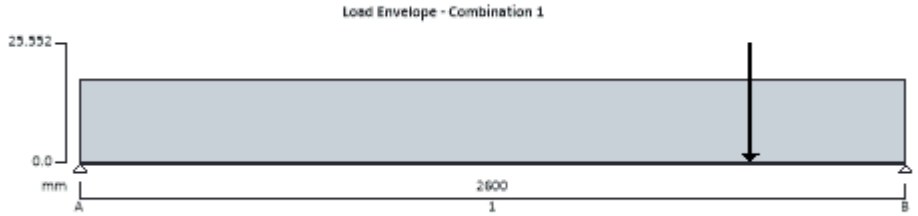
DINING SIDE

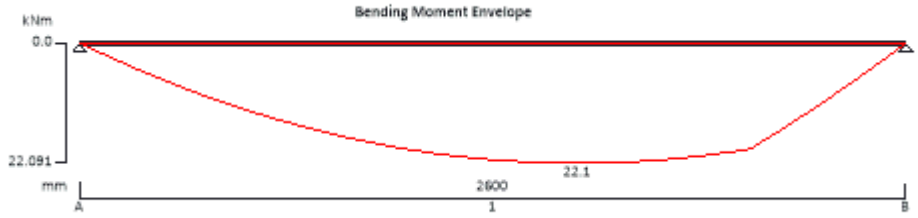


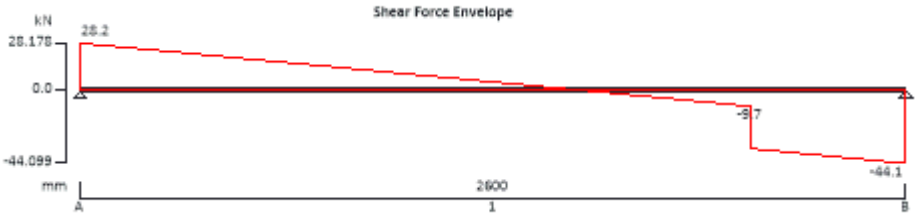
STEEL BEAM ANALYSIS & DESIGN (BS5950)

In accordance with BS5950-1:2000 incorporating Corrigendum No.1

TEDDS calculation version 3.0.07







Support conditions

Support A	Vertically restrained
	Rotationally free
Support B	Vertically restrained
	Rotationally free

Applied loading

Beam loads	Dead self weight of beam × 1
	Dead point load 5.76 kN at 2110 mm
	Imposed point load 10.93 kN at 2110 mm
	Dead full UDL 9.96 kN/m
	Imposed full UDL 2.32 kN/m

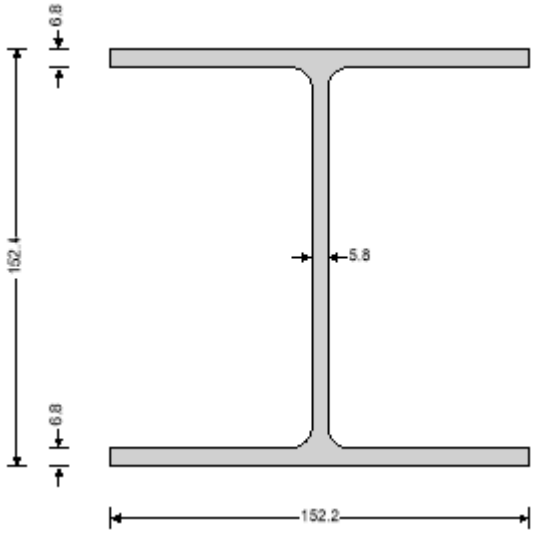
Load combinations

Load combination 1	Support A	Dead × 1.40
		Imposed × 1.60
		Dead × 1.40
		Imposed × 1.60
	Support B	Dead × 1.40

			Imposed × 1.60
Analysis results			
Maximum moment	M_{max} = **22.1** kNm	M_{min} = **0** kNm	
Maximum shear	V_{max} = **28.2** kN	V_{min} = **-44.1** kN	
Deflection	δ_{max} = **4.2** mm	δ_{min} = **0** mm	
Maximum reaction at support A	R_{A_max} = **28.2** kN	R_{A_min} = **28.2** kN	
Unfactored dead load reaction at support A	R_{A_Dead} = **14.3** kN		
Unfactored imposed load reaction at support A	$R_{A_Imposed}$ = **5.1** kN		
Maximum reaction at support B	R_{B_max} = **44.1** kN	R_{B_min} = **44.1** kN	
Unfactored dead load reaction at support B	R_{B_Dead} = **17.9** kN		
Unfactored imposed load reaction at support B	$R_{B_Imposed}$ = **11.9** kN		

Section details

Section type **UC 152x152x23 (British Steel Section Range 2022 (BS4-1))** Steel grade **S275**



Classification of cross sections - Section 3.5

Tensile strain coefficient ε = **1.00** Section classification **Semi-compact**

Shear capacity - Section 4.2.3

Design shear force F_v = **44.1** kN Design shear resistance P_v = **145.8** kN

PASS - Design shear resistance exceeds design shear force

Moment capacity - Section 4.2.5

Design bending moment M = **22.1** kNm Moment capacity low shear M_c = **48.5** kNm

Buckling resistance moment - Section 4.3.6.4

Buckling resistance moment M_b = **35.7** kNm M_b / m_{LT} = **38.6** kNm

PASS - Buckling resistance moment exceeds design bending moment

Check vertical deflection - Section 2.5.2

Consider deflection due to dead and imposed loads

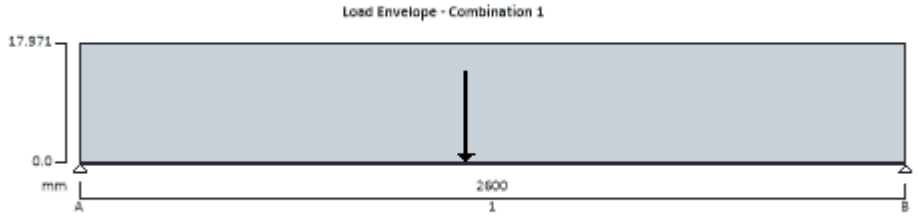
Limiting deflection δ_{lim} = **7.222** mm Maximum deflection δ = **4.201** mm

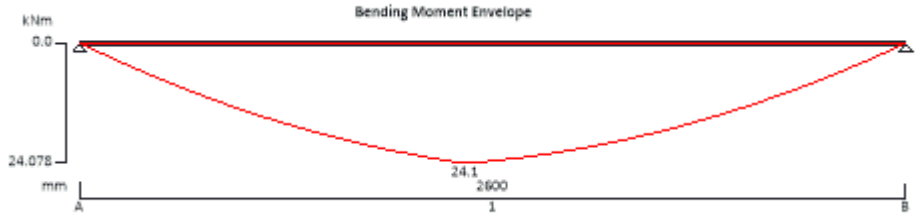
PASS - Maximum deflection does not exceed deflection limit

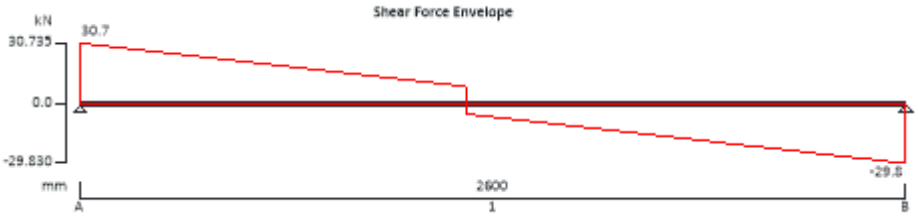
STEEL BEAM ANALYSIS & DESIGN (BS5950)

In accordance with BS5950-1:2000 incorporating Corrigendum No.1

TEDDS calculation version 3.0.07







Support conditions

Support A	Vertically restrained
	Rotationally free
Support B	Vertically restrained
	Rotationally free

Applied loading

Beam loads	Dead self weight of beam × 1
	Dead point load 3.12 kN at 1215 mm
	Imposed point load 5.92 kN at 1215 mm
	Dead full UDL 9.96 kN/m
	Imposed full UDL 2.32 kN/m

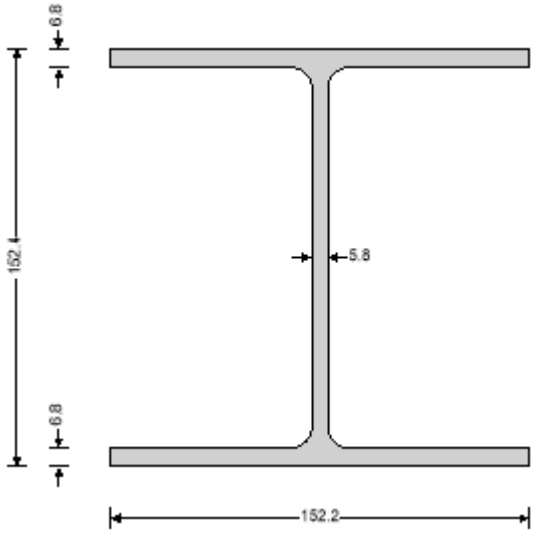
Load combinations

Load combination 1	Support A	Dead × 1.40
		Imposed × 1.60
		Dead × 1.40
		Imposed × 1.60
	Support B	Dead × 1.40

		Imposed × 1.60
Analysis results		
Maximum moment	M_{max} = **24.1** kNm	M_{min} = **0** kNm
Maximum shear	V_{max} = **30.7** kN	V_{min} = **-29.8** kN
Deflection	δ_{max} = **4.2** mm	δ_{min} = **0** mm
Maximum reaction at support A	R_{A_max} = **30.7** kN	R_{A_min} = **30.7** kN
Unfactored dead load reaction at support A	R_{A_Dead} = **14.9** kN	
Unfactored imposed load reaction at support A	$R_{A_Imposed}$ = **6.2** kN	
Maximum reaction at support B	R_{B_max} = **29.8** kN	R_{B_min} = **29.8** kN
Unfactored dead load reaction at support B	R_{B_Dead} = **14.7** kN	
Unfactored imposed load reaction at support B	$R_{B_Imposed}$ = **5.8** kN	

Section details

Section type **UC 152x152x23 (British Steel Section Range 2022 (BS4-1))** Steel grade **S275**



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Tensile strain coefficient ε = **1.00** Section classification **Semi-compact**

Shear capacity - Section 4.2.3

Design shear force F_v = **30.7** kN Design shear resistance P_v = **145.8** kN

PASS - Design shear resistance exceeds design shear force

Moment capacity - Section 4.2.5

Design bending moment M = **24.1** kNm Moment capacity low shear M_c = **48.5** kNm

Buckling resistance moment - Section 4.3.6.4

Buckling resistance moment M_b = **35.7** kNm M_b / m_{LT} = **40.2** kNm

PASS - Buckling resistance moment exceeds design bending moment

Check vertical deflection - Section 2.5.2

Consider deflection due to dead and imposed loads

Limiting deflection δ_{lim} = **7.222** mm Maximum deflection δ = **4.188** mm

PASS - Maximum deflection does not exceed deflection limit