

Greening Structural Engineering Ltd.

Project

WOOTEN CHANGING.

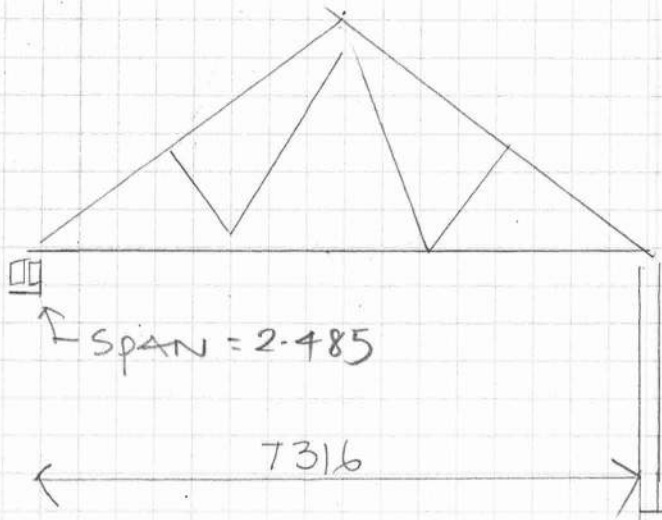
Job No.

2396

Title

LINTELS

7



LINTEL LOADS

TRUSSES $\frac{7.316}{2} \left(\frac{1}{\cos 25} + 0.25 \right)$

DL

4.95

LL

$\frac{7.3}{2} (0.6 + 0.25)$

3.10

Masonry $0.44 \times 0.215 \times 20$

1.89

KN/m 6.84

3.10

(2.485) TOTAL KN 16.9
 (1.025) TOTAL KN 7.0

7.7
3.18

KEYSTONE BOX 150 IS = 35 KN FOR 2850

15 KN FOR 1500

CASING CNTRK (1500mm)

KEYSTONE SL/K = 22 KN FOR 3000

16 KN FOR 1800

Greening Structural Engineering Ltd.

Project

WOOTTON CHANGING

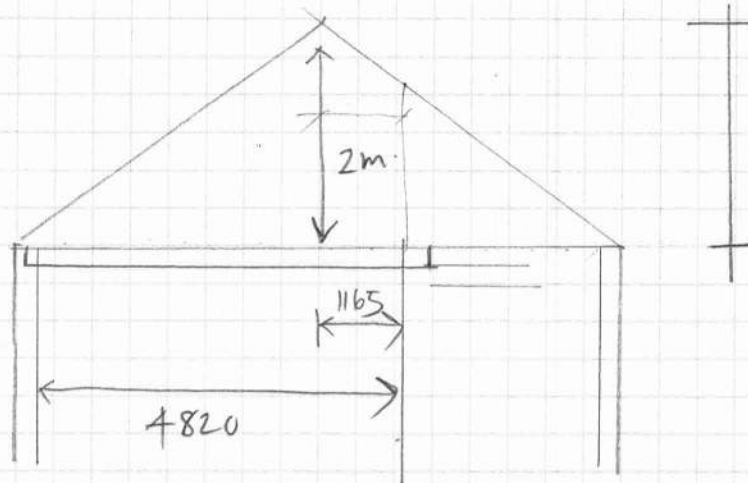
Job No.

2396

Title

Beam A

2



BEAM LOADS

MASONRY
140 BLOCK
BRICK

INNER		OUTER	
DL	LL	DL	LL

5.04

4.0

REACTIONS 12.7 kN

10.25 kN

SEE PAGE 3-4 FOR STEEL DESIGN

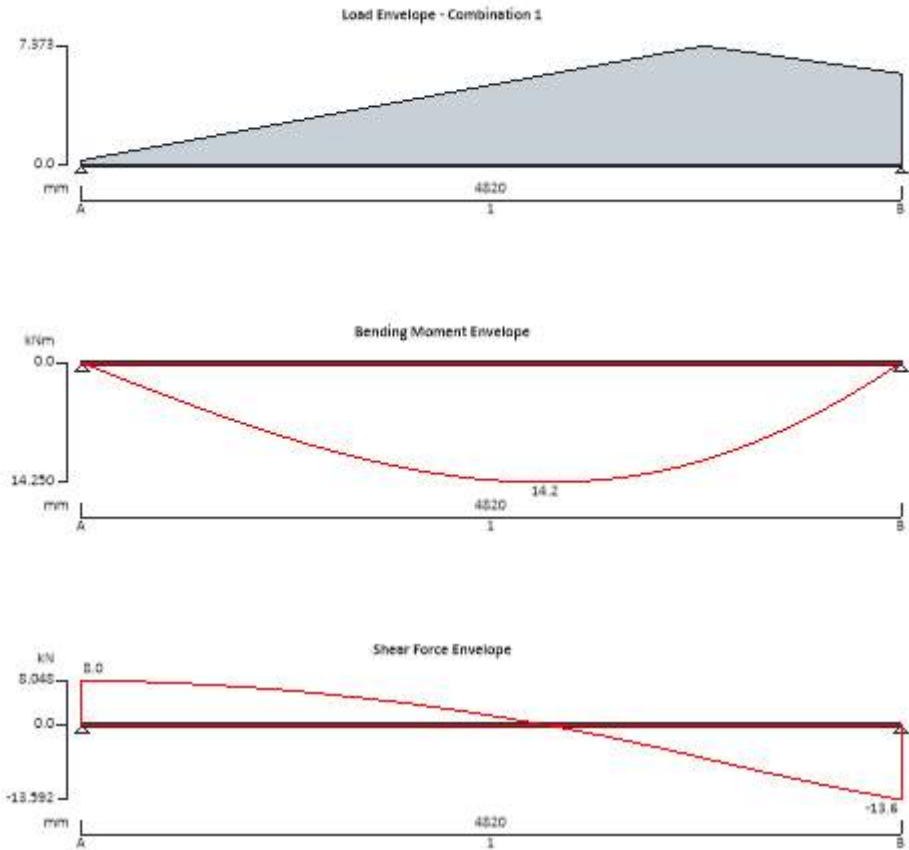
SEE PAGE 5-6 & 7 FOR BEARING

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	JG	15/09/2023				

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 partial VDL 0 kN/m at 0 mm to 5.04 kN/m at 3658 mm Dead partial VDL 5.04 kN/m at 3658 mm to 3.821 kN/m at 4820 mm
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Load combinations

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

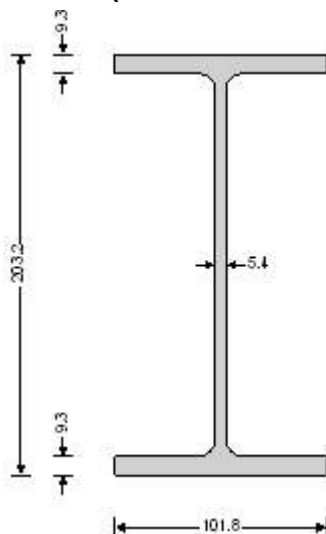
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Analysis results

Maximum moment	$M_{max} = 14.2 \text{ kNm}$	$M_{min} = 0 \text{ kNm}$
Maximum shear	$V_{max} = 8 \text{ kN}$	$V_{min} = -13.6 \text{ kN}$
Deflection	$\delta_{max} = 5.6 \text{ mm}$	$\delta_{min} = 0 \text{ mm}$
Maximum reaction at support A	$R_{A_max} = 8 \text{ kN}$	$R_{A_min} = 8 \text{ kN}$
Unfactored dead load reaction at support A	$R_{A_Dead} = 5.7 \text{ kN}$	
Maximum reaction at support B	$R_{B_max} = 13.6 \text{ kN}$	$R_{B_min} = 13.6 \text{ kN}$
Unfactored dead load reaction at support B	$R_{B_Dead} = 9.7 \text{ kN}$	

Section details

Section type	UKB 203x102x23 (Tata Steel Advance)	Steel grade	S275
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Classification of cross sections - Section 3.5

Tensile strain coefficient	$\varepsilon = 1.00$	Section classification	Plastic
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Shear capacity - Section 4.2.3

Design shear force	$F_v = 13.6 \text{ kN}$	Design shear resistance	$P_v = 181.1 \text{ kN}$
<i>PASS - Design shear resistance exceeds design shear force</i>			

Moment capacity - Section 4.2.5

Design bending moment	$M = 14.2 \text{ kNm}$	Moment capacity low shear	$M_c = 64.4 \text{ kNm}$
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Buckling resistance moment - Section 4.3.6.4

Buckling resistance moment	$M_b = 17.6 \text{ kNm}$	$M_b / m_{LT} = 19.4 \text{ kNm}$
<i>PASS - Buckling resistance moment exceeds design bending moment</i>		

Check vertical deflection - Section 2.5.2

Consider deflection due to dead and imposed loads

Limiting deflection	$\delta_{lim} = 13.389 \text{ mm}$	Maximum deflection	$\delta = 5.575 \text{ mm}$
<i>PASS - Maximum deflection does not exceed deflection limit</i>			

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MASONRY BEARING DESIGN TO BS5628-1:2005

TEDDS calculation version 1.0.08

Masonry details

Masonry type

Compressive strength

Least horiz dim of units

Masonry units

Partial safety factor

Leaf thickness

Wall height

Aggregate concrete blocks (25% or less formed voids)

$p_{unit} = 3.6 \text{ N/mm}^2$

$l_{unit} = 100 \text{ mm}$

Category II

$\gamma_m = 3.5$

$t = 100 \text{ mm}$

$h = 2400 \text{ mm}$

Mortar designation

Height of units

Construction control

Characteristic strength

Effective wall thickness

Effective height of wall

ii

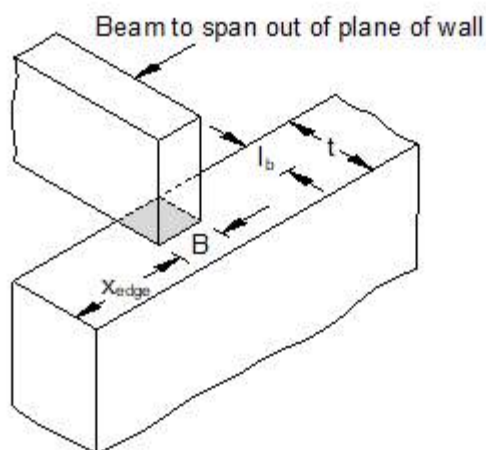
$h_{unit} = 215 \text{ mm}$

Normal

$f_k = 3.5 \text{ N/mm}^2$

$t_{ef} = 100 \text{ mm}$

$h_{ef} = 2400 \text{ mm}$



Bearing details

Beam spanning out of plane of wall

Width of bearing

$B = 400 \text{ mm}$

Length of bearing

$l_b = 100 \text{ mm}$

Edge distance

$x_{edge} = 1000 \text{ mm}$

Loading details

Concentrated dead load

$G_k = 23 \text{ kN}$

Concentrated imposed load

$Q_k = 0 \text{ kN}$

Design concentrated load

$F = 32.1 \text{ kN}$

Distributed dead load

$g_k = 0.0 \text{ kN/m}$

Distributed imposed load

$q_k = 0.0 \text{ kN/m}$

Design distributed load

$f = 0.0 \text{ kN/m}$

Masonry bearing type

Bearing type

Type 2

Bearing safety factor

$\gamma_{bear} = 1.50$

Check design bearing without a spreader

Design bearing stress

$f_{ca} = 0.803 \text{ N/mm}^2$

Allowable bearing stress

$f_{cp} = 1.500 \text{ N/mm}^2$

PASS - Allowable bearing stress exceeds design bearing stress

Check design bearing at $0.4 \times h$ below the bearing level

Design bearing stress

$f_{ca} = 0.138 \text{ N/mm}^2$

Allowable bearing stress

$f_{cp} = 0.605 \text{ N/mm}^2$

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PASS - Allowable bearing stress at 0.4 × h below bearing level exceeds design bearing stress

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MASONRY BEARING DESIGN TO BS5628-1:2005

TEDDS calculation version 1.0.08

Masonry details

Masonry type

Compressive strength

Least horiz dim of units

Masonry units

Partial safety factor

Leaf thickness

Wall height

Aggregate concrete blocks (25% or less formed voids)

$p_{unit} = 3.6 \text{ N/mm}^2$

$l_{unit} = 100 \text{ mm}$

Category II

$\gamma_m = 3.5$

$t = 100 \text{ mm}$

$h = 2400 \text{ mm}$

Mortar designation

Height of units

Construction control

Characteristic strength

Effective wall thickness

Effective height of wall

ii

$h_{unit} = 215 \text{ mm}$

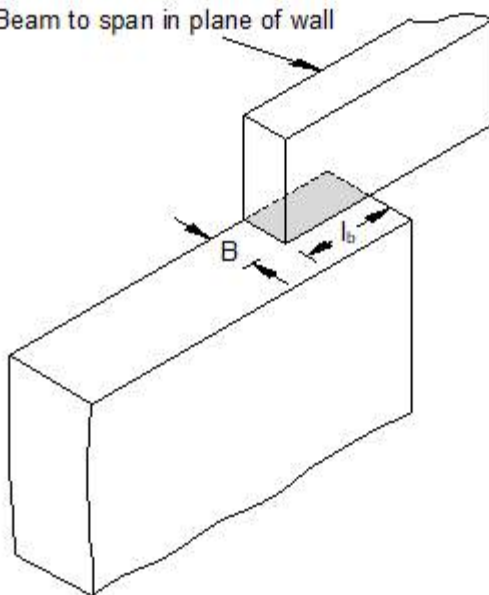
Normal

$f_k = 3.5 \text{ N/mm}^2$

$t_{ef} = 100 \text{ mm}$

$h_{ef} = 2400 \text{ mm}$

Beam to span in plane of wall



Bearing details

Beam spanning in plane of wall

Width of bearing

$B = 100 \text{ mm}$

Length of bearing

$l_b = 150 \text{ mm}$

Loading details

Concentrated dead load

$G_k = 13 \text{ kN}$

Concentrated imposed load

$Q_k = 0 \text{ kN}$

Design concentrated load

$F = 17.8 \text{ kN}$

Distributed dead load

$g_k = 0.0 \text{ kN/m}$

Distributed imposed load

$q_k = 0.0 \text{ kN/m}$

Design distributed load

$f = 0.0 \text{ kN/m}$

Masonry bearing type

Bearing type

Type 2

Bearing safety factor

$\gamma_{bear} = 1.50$

Check design bearing without a spreader

Design bearing stress

$f_{ca} = 1.185 \text{ N/mm}^2$

Allowable bearing stress

$f_{cp} = 1.500 \text{ N/mm}^2$

PASS - Allowable bearing stress exceeds design bearing stress

Check design bearing at $0.4 \times h$ below the bearing level

Design bearing stress

$f_{ca} = 0.160 \text{ N/mm}^2$

Allowable bearing stress

$f_{cp} = 0.605 \text{ N/mm}^2$

PASS - Allowable bearing stress at $0.4 \times h$ below bearing level exceeds design bearing stress

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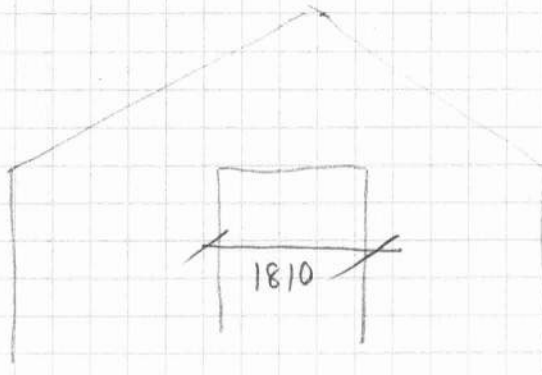
Job No.

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Title

LINTAS

8



		INNER	outer.
		DL	DL
MASONRY	$1.760 \times 0.1 \times 18 \times 20$ KN/m	3.168	3.52
TOTAL KN		5.74	6.4 KN

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