



Andy Mann Structural Design Ltd
12 Whatton Drive, West Bridgford, Nottingham NG2 7UX
Tel: 0115 985 9386 Tel: 020 8150 6978
Web: www.amsd.co.uk Email: enquiries@amsd.co.uk

STRUCTURAL CALCULATIONS

Client:-

**Mr John Brannan
Broxtowe Borough Council Offices
Directorate of Housing, Leisure & Property
Foster Avenue
Beeston
Nottingham
NG9 1AB**

Proposed Works:-

**Proposed Structural Design at:
6 Hetley Road
Beeston
Nottingham
NG9 2QL**

Document Information	
Job Number:	JN2537
Report Status:	Approvals
Date of Issue:	19 March 2019
Author:	AM
Checked:	AM
Approved:	
Revision:	



Andy Mann Structural Design Ltd
 12 Whatton Drive, West Bridgford
 Nottingham NG2 7UX

Notts:0115 985 9386 London:020 8150 6978 Web:www.amsd.co.uk Email:enquiries@amsd.co.uk

PROJECT No. J02537	
SHEET No. 1	
DATE Mar 19	
PREPARED Am	CHECKED

PROJECT TITLE 6 Hetley Road

Introduction.

The proposal is to form a new extension, a number of designs are required including floor + bracing and steel beams. A site investigation has found a number of settlement cracks, to provide a sympathetic design a steel frame will be specified to limit the stress on the foundations.

Area loading

	DL kN/m ²	UL kN/m ²
<u>Roof</u> Tiles, rafters, ceiling Snow load BS6399	1.2 —	— 0.6
<u>Floor</u> Board, joists, ceiling live load BS6399	1.0 —	— 1.5
<u>Wall</u> Brick, render, plaster	4.8	—
<u>Wall</u> internal brick, plaster	2.8	—



PROJECT No. JNS2537	
SHEET No. 2	
DATE Mar 19	
PREPARED AM	CHECKED

PROJECT TITLE 6 Hettley Road	
---------------------------------	--

Timber Design.

Floor

Span = 3.6m.

Load from pg 1

use 63x170 c24 @ 400
50x200 c24 @ 400

T1

Span = 1.5m.

UDL = Floor $\frac{3.6}{2} \times (1.0, 1.5)$

DL
KOL

UL
KOL

1.8

2.7

use 2No. Floor joists bolted

T2

Span = 3.6m.

UDL = Floor 0.4 x (1.0, 1.5)
Stud 2.4 x (0.8, -)

0.4
2.0

0.6
-

2.4

0.6

T1 point load at 1.5m

→ 1.35 kN Dead
2.0 kN Live

use 152x89 UB 16



Andy Mann Structural Design Ltd
12 Whatton Drive, West Bridgford
Nottingham NG2 7UX

Notts: 0115 985 9386 London: 020 8150 6978 Web: www.amsd.co.uk Email: enquiries@amsd.co.uk

PROJECT No.	SN2537
SHEET No.	3
DATE	Mar 19

PROJECT TITLE	6 Ketley Road	PREPARED	CHECKED
		Am	

Rafters

Span = 2.4m

Load for p.g.

use 50x125 C16 @ 400

Hip

Span = 3.4m.

UDL max = roof $\frac{2.4}{2} \times 2 \times (1.2, 0.6)$

DL
kN/m

U
kN/m

2.88

1.44

use 2no. 50x200 C24 bolted

Beam 4

Span = 3.6m.

UDL = ceiling $\frac{4.8}{2} \times (0.8, 0.25)$

Pont load for hips + ridge

→ 3.3 + 3.3 + 3.6 = 10.2 kN Dead
1.7 + 1.7 + 1.8 = 5.1 kN Live.

use 152x152x30



Andy Mann Structural Design Ltd
 12 Whatton Drive, West Bridgford
 Nottingham NG2 7UX

Notts: 0115 985 9386 London: 020 8150 6978 Web: www.amsd.co.uk Email: enquiries@amsd.co.uk

PROJECT No. JN2537
SHEET No. 4
DATE Mar 19

PROJECT TITLE 6 Hekley Road	PREPARED Am	CHECKED
--------------------------------	----------------	---------

Steel Design

Beam 1

Span = 2.1 m

DL = Roof $\frac{7.0}{2} \times (1.2, 0.6)$

DL WL
WL WL

4.2 2.1

USE 152 x 89 US.16

Beam 2

Span = 4.0 m

DL = Floor $\frac{6.6}{2} \times (1.0, 1.5)$

Stud 2.4 x (0.8, -)

3.3 4.95

2.0 -

5.3 4.95

USE 203 x 133 US.25

Lintel 1

Span = 1.0 m

DL = Wall 2.4 x (4.8, -)

Floor $\frac{3.6}{2} \times (1.0, 1.5)$

Roof $\frac{3.6}{2} \times (1.2, 0.6)$

11.52 -
1.8 2.7

2.16 1.08

15.48 3.78

USE stressline SL90/100 HD



Andy Mann Structural Design Ltd
 12 Whatton Drive, West Bridgford
 Nottingham NG2 7UX

Notts: 0115 985 9386 London: 020 8150 6978 Web: www.amsd.co.uk Email: enquiries@amsd.co.uk

PROJECT No. JN2537	
SHEET No. 5	
DATE Mar 19	
PREPARED AM	CHECKED

PROJECT TITLE

6 Hetley Road

Masonry

Width = 5.4m

Height = 2.5m

Opening 1 = 1.0 x 1.25 @ 0.95, 0.9

2 = 1.0 x 1.25 @ 2.95, 0.9

DL
KWL

U
KWL

WDL = inner 0.5 x (2.4, -)

1.2

-

outer 0.5 x (2.0, -)

1.0

-

wind $x = 452729$
 $y = 337539$

→ 0.65 kN/m^2

Design acceptable.



Andy Mann Structural Design Ltd
 12 Whatton Drive, West Bridgford
 Nottingham NG2 7UX

Notts: 0115 985 9386 London: 020 8150 6978 Web: www.amsd.co.uk Email: enquiries@amsd.co.uk

PROJECT No.	JN2537
SHEET No.	6
DATE	Mar 19

PROJECT TITLE	PREPARED	CHECKED
6 Hetley Road	AM	

Beam 3

Span = 4.6m.

UDL = Floor $\frac{7.6}{2} \times (1.0, 1.5)$

Roof $\frac{7.6}{2} \times (1.2, 0.6)$

DL
K/L

W
K/L

3.8

5.7

4.56

2.28

8.36

7.98

Pol for 0m to 2.6m

→ Wall 2.6 x (4.8, -)

12.48

—

USE 203x203 UC 46 top beam, 152x152 UC 30
 Column, 203x203 UC 46 spreader.

<p>Andy Mann Structural Design Ltd 12 Whatton Drive, West Bridgford Nottingham, NG2 7UX Email : enquiries@amsd.co.uk Tel: (0115) 985 9386</p>	12761	<p>Job Ref : JN2537 6 Hetley Road Sheet : Timber / 7 Made by : AM Date : 19 March 2019 / Ver. 2018.15 Checked : Approved :</p>
--	-------	---

MasterKey : Timber Design
Joist Design to BS 5268 : Part 2
Floor Joist



Summary Design Data

Section Size	b = 47, h = 195, 195x47 in Strength Class C24
Section Properties (cm ² , cm ⁴ , cm ³)	Area 91.7, I _x 2904.2, Z 297.9
Specification	1 : Internal use in continuously heated building Medium Term loading, Load sharing
Joist data	Span 3.6 m, Spacing 0.4 m, Bearing length B 50, Distance to Bearing 100 mm
Joist loading	Dead load 1.0 kN/m ² , Live load 1.5 kN/m ²

Grade and Admissible Stresses (Strength Class C24)

$\sigma_{m,adm} = K_2 \cdot K_3 \cdot K_7 \cdot K_8 \cdot \sigma_m$	$1.00 \times 1.25 \times 1.05 \times 1.10 \times 7.50$	10.81 N/mm ²
$\sigma_{c,adm} = K_2 \cdot K_3 \cdot K_4 \cdot K_8 \cdot \sigma_c$	$1.00 \times 1.25 \times 1.20 \times 1.10 \times 1.90$	3.14 N/mm ²
$\tau_{adm} = K_2 \cdot K_3 \cdot K_8 \cdot \tau$	$1.00 \times 1.25 \times 1.10 \times 0.71$	0.98 N/mm ²
$E = K_2 \cdot E_{mean}$	1.00×10800	10800 N/mm ²

Design Loads

Density and Selfweight $w = (F_d + F_l) \cdot s + F_j$	Timber Density 420 kg/m ³ , F _j 0.04 kN/m $(1.00 + 1.50) \times 0.4 + 0.04$	1.04 kN/m
---	--	-----------

Bending Check

$M = w \cdot L^2 / 8$	$1.04 \times 3.6^2 / 8$	1.685 kN.m	
$\sigma_{m,a} = M / Z$	$1.685 / 297.86 \leq 10.81$	5.66 N/mm ²	OK

Shear and Bearing Check

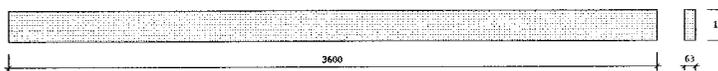
$F_v = w \cdot L / 2$	$1.04 \times 3.6 / 2$	1.872 kN	
$\tau_a = 1.5 F_v / \text{Area}$	$1.5 \times 1.872 / 91.65 \leq 0.98$	0.31 N/mm ²	OK
$\sigma_{ca} = F_v / (b \cdot B)$	$1.872 / (47 \times 50) \leq 3.14$	0.80 N/mm ²	OK

Deflection Check

$\delta_m = 5 \cdot w \cdot L^4 / (384 \cdot E \cdot I_x)$	$5 \times 1.04 \times 3.6^4 / (384 \times 10800 \times 2904.2)$	7.25 mm	
$\delta_s = 12 \cdot w \cdot L^2 / (5 \cdot E \cdot \text{Area})$	$12 \times 1.04 \times 3.6^2 / (5 \times 10800 \times 91.7)$	0.33 mm	
$\delta = \delta_m + \delta_s$	$7.25 + 0.33 \leq L / 333$ or 14mm	7.58 mm	OK

Andy Mann Structural Design Ltd 12 Whatton Drive, West Bridgford Nottingham, NG2 7UX Email : enquiries@amsd.co.uk Tel: (0115) 985 9386	12761	Job Ref : JN2537 6 Hetley Road Sheet : Timber / 8 Made by : AM Date : 19 March 2019 / Ver. 2018.15 Checked : Approved :
---	-------	--

MasterKey : Timber Design
Joist Design to BS 5268 : Part 2
Floor Joist (170mm)



Summary Design Data

Section Size	b = 63, h = 170, 170x63 in Strength Class C24
Section Properties (cm ² , cm ⁴ , cm ³)	Area 107.1, I _x 2579.3, Z 303.5
Specification	1 : Internal use in continuously heated building Medium Term loading, Load sharing
Joist data	Span 3.6 m, Spacing 0.4 m, Bearing length B 50, Distance to Bearing 100 mm
Joist loading	Dead load 1.0 kN/m ² , Live load 1.5 kN/m ²

Grade and Admissible Stresses (Strength Class C24)

$\sigma_{m,adm} = K_2 \cdot K_3 \cdot K_7 \cdot K_8 \cdot \sigma_m$	$1.00 \times 1.25 \times 1.06 \times 1.10 \times 7.50$	10.98 N/mm ²
$\sigma_{c,adm} = K_2 \cdot K_3 \cdot K_4 \cdot K_8 \cdot \sigma_c$	$1.00 \times 1.25 \times 1.20 \times 1.10 \times 1.90$	3.14 N/mm ²
$\tau_{adm} = K_2 \cdot K_3 \cdot K_8 \cdot \tau$	$1.00 \times 1.25 \times 1.10 \times 0.71$	0.98 N/mm ²
$E = K_2 \cdot E_{mean}$	1.00×10800	10800 N/mm ²

Design Loads

Density and Selfweight	Timber Density 420 kg/m ³ , F _j 0.04 kN/m	
$w = (F_d + F_l) \cdot s + F_j$	$(1.00 + 1.50) \times 0.4 + 0.04$	1.04 kN/m

Bending Check

$M = w \cdot L^2 / 8$	$1.04 \times 3.6^2 / 8$	1.685 kN.m	
$\sigma_{m,a} = M / Z$	$1.685 / 303.45 \leq 10.98$	5.55 N/mm ²	OK

Shear and Bearing Check

$F_v = w \cdot L / 2$	$1.04 \times 3.6 / 2$	1.872 kN	
$\tau_a = 1.5 F_v / \text{Area}$	$1.5 \times 1.872 / 107.1 \leq 0.98$	0.26 N/mm ²	OK
$\sigma_{ca} = F_v / (b \cdot B)$	$1.872 / (63 \times 50) \leq 3.14$	0.59 N/mm ²	OK

Deflection Check

$\delta_m = 5 \cdot w \cdot L^4 / (384 \cdot E \cdot I_x)$	$5 \times 1.04 \times 3.6^4 / (384 \times 10800 \times 2579.3)$	8.16 mm	
$\delta_s = 12 \cdot w \cdot L^2 / (5 \cdot E \cdot \text{Area})$	$12 \times 1.04 \times 3.6^2 / (5 \times 10800 \times 107.1)$	0.28 mm	
$\delta = \delta_m + \delta_s$	$8.16 + 0.28 \leq L / 333$ or 14mm	8.44 mm	OK

Andy Mann Structural Design Ltd 12 Whatton Drive, West Bridgford Nottingham, NG2 7UX Email : enquiries@amsd.co.uk Tel: (0115) 985 9386	12761	Job Ref : JN2537 6 Hetley Road Sheet : Timber / 9 Made by : AM Date : 19 March 2019 / Ver. 2018.15 Checked : Approved :
---	-------	--

MasterKey : Timber Design
Axial Load With Moment Design to BS 5268 : Part 2
T1: Span 1

Summary Design Data

Design Cases Covered	1-4
Deflection Cases Covered	1-4
Section Size	b = 94, h = 170, 170x94 in Strength Class C24
Section Properties (cm ² ,cm ³ ,cm)	Area 159.8, Zx 452.8, Zy 250.4, rx 4.91, ry 2.71
Specification	1 : Internal use in continuously heated building Medium Term loading, 2 pieces of softwood, Use minimum modulus
Integrated Design Critical Case	: All Spans Loaded (Ultimate: 1.0D1+1.0D2+1.0L1+1.0L2)
Member Details	F = 0.0 kN, L = 1.5 m, Lx = 1.5 m, Ly = 1.5 m, Lex = 1.0 Lx, Ley = 1.0 Ly Bearing length B 75, Distance to Bearing 150 mm

Grade and Admissible Stresses (Strength Class C24)

$\sigma_{mx.adm} = K_2.K_3.K_{7x}.K_8.\sigma_m$	$1.00 \times 1.25 \times 1.06 \times 1.00 \times 7.50$	9.98 N/mm ²
$\sigma_{my.adm} = K_2.K_3.K_{7y}.K_8.\sigma_m$	$1.00 \times 1.25 \times 1.14 \times 1.00 \times 7.50$	10.65 N/mm ²
$\sigma_{c.adm} = K_2.K_3.K_4.K_8.\sigma_c$	$1.00 \times 1.25 \times 1.14 \times 1.00 \times 1.90$	2.71 N/mm ²
$\tau_{adm} = K_2.K_3.K_8.\tau$	$1.00 \times 1.25 \times 1.00 \times 0.71$	0.89 N/mm ²
$E = K_2.K_9.E_{min}$	$1.00 \times 1.14 \times 7200$	8208 N/mm ²

Axial Load with Moments Check

Critical Design Location	X = 0.750		
$\sigma_{mx.a} = Mx/Zx$	$1.283 / 452.77 \leq 9.98$	2.83 N/mm ²	OK
$\sigma_{mx}/\sigma_{mx.adm}$	$2.83/9.98$	0.284	OK

Shear and Bearing Check

Critical Design Location	X = 0.000		
$\tau_a = 1.5 Fv / \text{Area}$	$1.5 \times 3.424 / 159.8 \leq 0.89$	0.32 N/mm ²	OK
$\sigma_{cax} = Fvx / (b.Bx)$	$3.424 / (94 \times 75) \leq 2.71$	0.49 N/mm ²	OK

Deflection Check

Critical Load Case 001 : All Spans Loaded (Ultimate: 1.0D1+1.0D2+1.0L1+1.0L2)			
$\delta = \delta_m + \delta_s$	In-span $1.14 \leq L/333$	1.14 mm	OK

Andy Mann Structural Design Ltd

12761

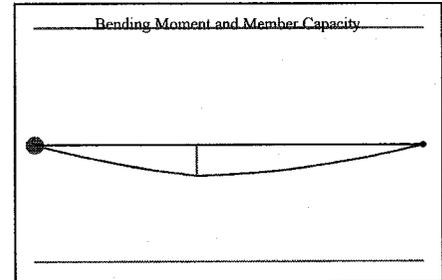
12 Whatton Drive, West Bridgford
Nottingham, NG2 7UX
Email : enquiries@amsd.co.uk
Tel: (0115) 985 9386

Job Ref : JN2537 6 Hetley Road
Sheet : Steel / 10
Made by : AM
Date : 19 March 2019 / Ver. 2018.15
Checked :
Approved :

Axial with Moments (Member)**T2: Span 1****Span 1 in Load Case 1****Member Loading and Member Forces**

Loading Combination : 1 UT + 1.4 D1 + 1.6 L1

D1 UDLW -000.158 (kN/m)
D1 UDLY -002.400 (kN/m)
L1 UDLY -000.600 (kN/m)
D1 PY -001.350 1.500 (kN,m)
L1 PY -002.000 1.500 (kN,m)

**Member Forces in Load Case 1 and Maximum Deflection from Load Case 3**

Span No.	Axial Force (kN)	Shear Force (kN)		Bending Moment (kN.m)		Maximum Moment (kN.m @ m)	Maximum Deflection (mm @ m)
		End1	End2	End1	End2		
1	0.00C	11.14	-10.29	0.00	0.00	11.61 @ 1.500	5.86 @ 1.763

Classification and Properties (BS 5950: 2000)

Section (15.95 kg/m) 152x89 UB 16 [S 355]
Class = Fn(b/T,d/t,py,F,Mx,My) 5.76, 27.07, 355, 0, 11.61, 0 (Axial: Non-Slender) Plastic
Auto Design Load Cases 1

Moment Capacity Check Mc

Fv/Pv 4.332 / 146.075 = 0.03 Low Shear
Mc = py.Sxx ≤ 1.2 py.Zxx 355 x 123.3 ≤ 1.2 x 355 x 109.61 = 43.772 kN.m
MA/Mc 11.605 / 43.772 = 0.265 OK

Equivalent Uniform Moment Factor m_{LT}

m_{LT} = 0.2 + (15M₂ + 5M₃ + 15M₄) / M_{max} 0.2 + (15x8 + 5x11 + 15x7) / 12 ≥ 0.44 0.883 Table 18

Lateral Buckling Check Mb

Le = 1.2 L 1.2 x 3.6 = 4.32 m
λ = Le/ryy 4.32 / 2.11 = 204.74 OK
v = Fn(x, Le, ryy, λ) 19.589, 4.32, 2.11, 204.74 0.627 Table 19
λ_{LT} = u.v.λ.√βw 0.892 x 0.627 x 204.74√1 = 114.6
pb = Fn(py, λ_{LT}) 355, 114.6 112.06 N/mm² Table 16
Mb = Sxx.pb ≤ Mc 123.3 x 112.06 ≤ 43.772 = 13.818 kN.m
MA/(Mb/m_{LT}) 11.605 / (13.818 / 0.883) = 0.742 OK

Deflection Check - Load Case 3

In-span δ ≤ Span/360 5.86 ≤ 3600 / 360 5.86 mm OK

Andy Mann Structural Design Ltd 12 Whatton Drive, West Bridgford Nottingham, NG2 7UX Email : enquiries@amsd.co.uk Tel: (0115) 985 9386	12761	Job Ref : JN2537 6 Hetley Road Sheet : Timber / 1\1 Made by : AM Date : 19 March 2019 / Ver. 2018.15 Checked : Approved :
---	-------	--

MasterKey : Timber Design
Joist Design to BS 5268 : Part 2
Rafter



Summary Design Data

Section Size	b = 47, h = 122, 122x47 in Strength Class C16
Section Properties (cm ² , cm ⁴ , cm ³)	Area 57.3, I _x 711.2, Z 116.6
Specification	1 : Internal use in continuously heated building Medium Term loading, Load sharing
Joist data	Span 2.4 m, Spacing 0.4 m, Bearing length B 50, Distance to Bearing 100 mm
Joist loading	Dead load 1.2 kN/m ² , Live load 0.6 kN/m ²

Grade and Admissible Stresses (Strength Class C16)

$\sigma_{m,adm} = K_2 \cdot K_3 \cdot K_7 \cdot K_8 \cdot \sigma_m$	$1.00 \times 1.25 \times 1.10 \times 1.10 \times 5.30$	8.05 N/mm ²
$\sigma_{c,adm} = K_2 \cdot K_3 \cdot K_4 \cdot K_8 \cdot \sigma_c$	$1.00 \times 1.25 \times 1.20 \times 1.10 \times 1.70$	2.81 N/mm ²
$\tau_{adm} = K_2 \cdot K_3 \cdot K_8 \cdot \tau$	$1.00 \times 1.25 \times 1.10 \times 0.67$	0.92 N/mm ²
$E = K_2 \cdot E_{mean}$	1.00×8800	8800 N/mm ²

Design Loads

Density and Selfweight	Timber Density 370 kg/m ³ , F _j 0.02 kN/m	
$w = (F_d + F_l) \cdot s + F_j$	$(1.20 + 0.60) \times 0.4 + 0.02$	0.74 kN/m

Bending Check

$M = w \cdot L^2 / 8$	$0.74 \times 2.4^2 / 8$	0.533 kN.m	
$\sigma_{m,a} = M / Z$	$0.533 / 116.59 \leq 8.05$	4.57 N/mm ²	OK

Shear and Bearing Check

$F_v = w \cdot L / 2$	$0.74 \times 2.4 / 2$	0.888 kN	
$\tau_a = 1.5 F_v / \text{Area}$	$1.5 \times 0.888 / 57.34 \leq 0.92$	0.23 N/mm ²	OK
$\sigma_{ca} = F_v / (b \cdot B)$	$0.888 / (47 \times 50) \leq 2.81$	0.38 N/mm ²	OK

Deflection Check

$\delta_m = 5 \cdot w \cdot L^4 / (384 \cdot E \cdot I_x)$	$5 \times 0.74 \times 2.4^4 / (384 \times 8800 \times 711.2)$	5.11 mm	
$\delta_s = 12 \cdot w \cdot L^2 / (5 \cdot E \cdot \text{Area})$	$12 \times 0.74 \times 2.4^2 / (5 \times 8800 \times 57.3)$	0.20 mm	
$\delta = \delta_m + \delta_s$	$5.11 + 0.20 \leq L / 333$ or 14mm	5.31 mm	OK

Andy Mann Structural Design Ltd

12761

12 Whatton Drive, West Bridgford
Nottingham, NG2 7UX
Email : enquiries@amsd.co.uk
Tel: (0115) 985 9386

Job Ref : JN2537 6 Hetley Road
Sheet : Timber / 12
Made by : AM
Date : 19 March 2019 / Ver. 2018.15
Checked :
Approved :

MasterKey : Timber Design
Axial Load With Moment Design to BS 5268 : Part 2
Hip: Span 1

Summary Design Data

Design Cases Covered	1-4
Deflection Cases Covered	1-4
Section Size	b = 94, h = 195, 195x94 in Strength Class C24
Section Properties (cm ² , cm ³ , cm)	Area 183.3, Z _x 595.7, Z _y 287.2, r _x 5.63, r _y 2.71
Specification	1 : Internal use in continuously heated building Medium Term loading, Use minimum modulus
Integrated Design Critical Case	: All Spans Loaded (Ultimate: 1.0D1+1.0D2+1.0L1+1.0L2)
Member Details	F = 0.0 kN, L = 3.4 m, L _x = 3.4 m, L _y = 3.4 m, L _{ex} = 1.0 L _x , L _{ey} = 1.0 L _y Bearing length B 75, Distance to Bearing 150 mm

Grade and Admissible Stresses (Strength Class C24)

$\sigma_{mx.adm} = K_2.K_3.K_{7x}.K_8.\sigma_m$	$1.00 \times 1.25 \times 1.05 \times 1.00 \times 7.50$	9.83 N/mm ²
$\sigma_{my.adm} = K_2.K_3.K_{7y}.K_8.\sigma_m$	$1.00 \times 1.25 \times 1.14 \times 1.00 \times 7.50$	10.65 N/mm ²
$\sigma_{c.adm} = K_2.K_3.K_4.K_8.\sigma_c$	$1.00 \times 1.25 \times 1.14 \times 1.00 \times 1.90$	2.71 N/mm ²
$\tau_{adm} = K_2.K_3.K_8.\tau$	$1.00 \times 1.25 \times 1.00 \times 0.71$	0.89 N/mm ²
$E = K_2.K_9.E_{min}$	$1.00 \times 1.00 \times 7200$	7200 N/mm ²

Axial Load with Moments Check

Critical Design Location	X = 1.437		
$\sigma_{mx.a} = Mx/Zx$	$3.311 / 595.73 \leq 9.83$	5.56 N/mm ²	OK
$\sigma_{mx}/\sigma_{mx.adm}$	5.56/9.83	0.566	OK

Shear and Bearing Check

Critical Design Location	X = 0.000		
$\tau_a = 1.5 F_v / \text{Area}$	$1.5 \times 5.025 / 183.3 \leq 0.89$	0.41 N/mm ²	OK
$\sigma_{cax} = F_v x / (b.Bx)$	$5.025 / (94 \times 75) \leq 2.71$	0.71 N/mm ²	OK

Deflection Check

Critical Load Case 001 : All Spans Loaded (Ultimate: 1.0D1+1.0D2+1.0L1+1.0L2)			
$\delta = \delta_m + \delta_s$	In-span $9.79 \leq L/333$	9.79 mm	OK

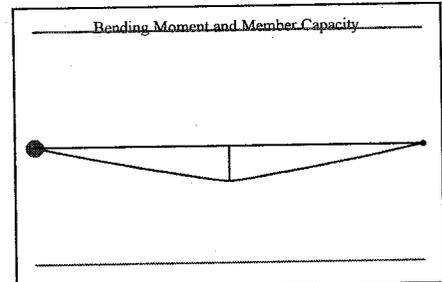
Andy Mann Structural Design Ltd 12 Whatton Drive, West Bridgford Nottingham, NG2 7UX Email : enquiries@amsd.co.uk Tel: (0115) 985 9386	12761	Job Ref : JN2537 6 Hetley Road Sheet : Steel / 13 Made by : AM Date : 19 March 2019 / Ver. 2018.15 Checked : Approved :
---	-------	--

Axial with Moments (Member) Beam 4: Span 1 Span 1 in Load Case 1

Member Loading and Member Forces

Loading Combination : 1 UT + 1.4 D1 + 1.6 L1

D1 UDLW	-000.298	(kN/m)
D1 UDLY	-001.920	(kN/m)
L1 UDLY	-000.600	(kN/m)
D1 PY	-010.200 1.800	(kN, m)
L1 PY	-005.100 1.800	(kN, m)



Member Forces in Load Case 1 and Maximum Deflection from Load Case 3

Span No.	Axial Force (kN)	Shear Force (kN)		Bending Moment (kN.m)		Maximum Moment (kN.m @ m)	Maximum Deflection (mm @ m)
		End1	End2	End1	End2		
1	0.00C	18.54	-18.54	0.00	0.00	26.78 @ 1.800	5.87 @ 1.800

Classification and Properties (BS 5950: 2000)

Section (30.03 kg/m)	152x152 UC 30 [S 355]	(Axial: Non-Slender)	Compact
Class = Fn(b/T, d/t, py, F, Mx, My)	8.13, 19.02, 355, 0, 26.78, 0		
Auto Design Load Cases	1		

Moment Capacity Check Mc

Fv/Pv	11.22 / 218.197 =	0.051	Low Shear
Mc = py.Sxx ≤ 1.2 py.Zxx	355 x 247.7 ≤ 1.2 x 355 x 221.94 =	87.934 kN.m	
MA/Mc	26.78 / 87.934 =	0.305	OK

Equivalent Uniform Moment Factor mLT

$m_{LT} = 0.2 + (.15M_2 + .5M_3 + .15M_4) / M_{max}$	$0.2 + (.15 \times 15 + .5 \times 27 + .15 \times 15) / 27 \geq 0.44$	0.868	Table 18
--	---	-------	----------

Lateral Buckling Check Mb

Le = 1.2 L	1.2 x 3.6 =	4.32 m	
$\lambda = Le / r_{yy}$	4.32 / 3.83	112.79	OK
v = Fn (x, Le, ryy, λ)	15.946, 4.32, 3.83, 112.79	0.731	Table 19
$\lambda_{LT} = u.v.\lambda.\sqrt{\beta_w}$	0.849 x 0.731 x 112.79	70.01	
pb = Fn (py, λLT)	355, 70.01	221.64 N/mm ²	Table 16
Mb = Sxx.pb ≤ Mc	247.7 x 221.64 ≤ 87.934 =	54.901 kN.m	
MA/(Mb/mLT)	26.78 / (54.901 / 0.868)	0.424	OK

Deflection Check - Load Case 3

In-span δ ≤ Span/360	5.87 ≤ 3600 / 360	5.87 mm	OK
----------------------	-------------------	---------	----

Andy Mann Structural Design Ltd

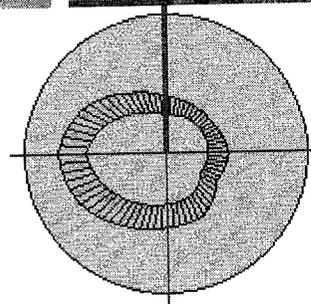
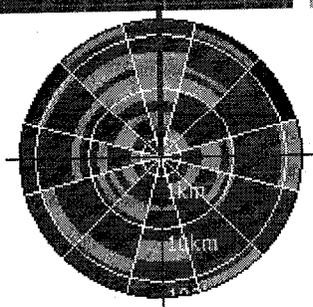
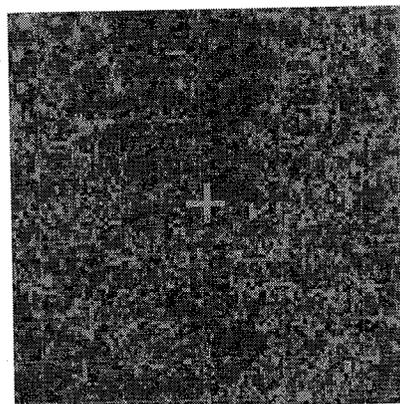
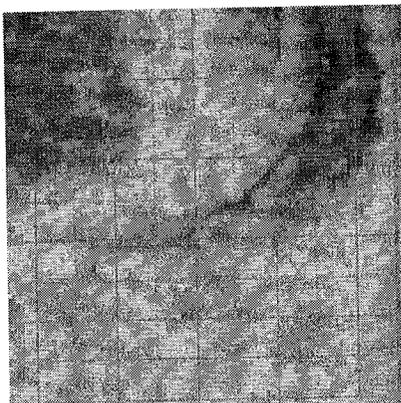
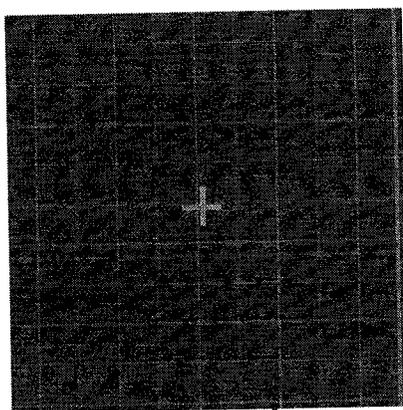
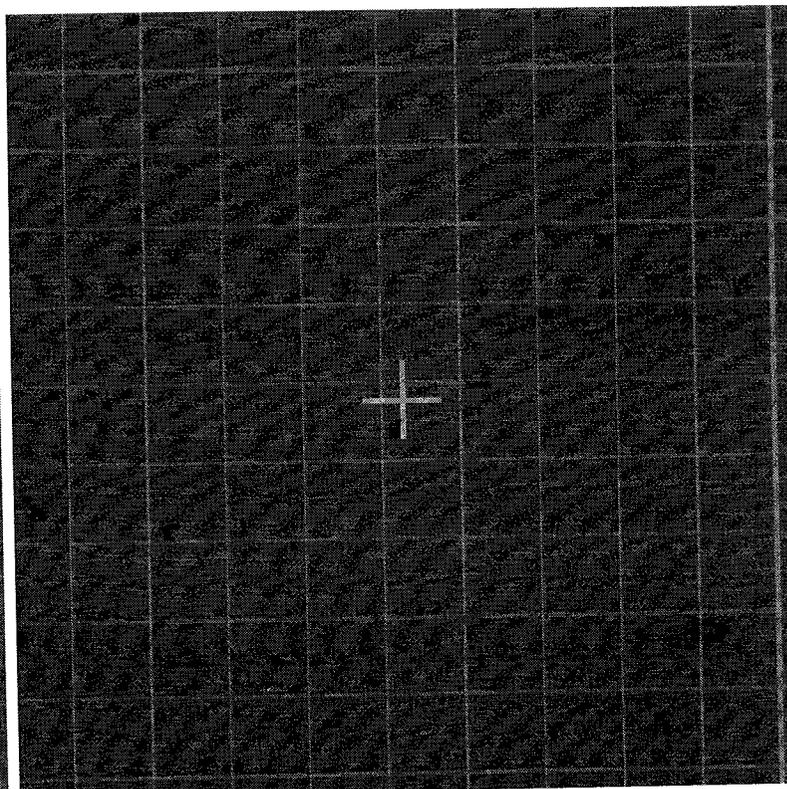
12 Whatton Drive, West Bridgford
 Nottingham, NG2 7UX
 Email : enquiries@amsd.co.uk
 Tel: (0115) 985 9386

12760

Job Ref : JN2537 6 Hetley Road
 Sheet : Wind / 14
 Made by : AM
 Date : 19 March 2019 / Ver. 2018.15
 Checked :
 Approved :

Wind Loading to BS 6399 - Part 2 Results for site at SK527375 - Altitude 50 m Wind Reference 1 Using the Designer's Guide Method

				HP		
			HT	HU		
			HY	HZ		
NA	NB	NC	ND			
NF	NG	NH	NJ	NK		
NL	NM	NN	NO			
	NR	NS	NT	NU		
	NW	NX	NY	NZ		
		SC	SD	SE	TA	
		SH	SJ	SK	TF	TG
	SM	SN	SO	SP	TL	TM
	SR	SS	ST	SU	TQ	TR
SV	SW	SX	SY	SZ	TV	



Andy Mann Structural Design Ltd

12 Whatton Drive, West Bridgford
 Nottingham, NG2 7UX
 Email : enquiries@amsd.co.uk
 Tel: (0115) 985 9386

12760

Job Ref : JN2537 6 Hetley Road
 Sheet : Wind / 15
 Made by : AM
 Date : 19 March 2019 / Ver. 2018.15
 Checked :
 Approved :

Site Basic Data

Location and Base wind speed	BREVe site data for SK527375 - Base wind speed, Vb 21.9 m/s
Site Range	500 m
Altitude and Obstructions	Site altitude 50 m - Shelter effect from obstructions is not included
Seasonal factor, Ss	Season length is All year - Seasonal factor, Ss 1.000
Annual risk and probability factor	Design annual risk 0.02 - Probability factor, Sp 1.000
Topographic Increments	Topographic increment from internal parameters
Heights and Diagonals (m)	Heights above ground 3 and 6, Diagonals 5

Direction Factors - Using UK direction Factors

Direction (°N)	0	30	60	90	120	150	180	210	240	270	300	330
Direction factor, Sd	0.780	0.730	0.730	0.740	0.730	0.800	0.850	0.930	1.000	0.990	0.910	0.820

Topography

Crest Height (m)	13.0	14.0	23.0	27.0	36.7	32.0	9.0	8.0	8.0	18.7	14.0	16.0
Site Location (m)	980.0	800.0	-999.0	0.0	0.0	0.0	999.0	999.0	999.0	999.0	100.0	0.0
Upwind Length (m)	520.0	700.0	9200.0	491.0	543.0	400.0	257.0	213.0	200.0	533.0	200.0	291.0
Downwind Length (m)	10000	10000	10000	10000	10000	582.0	10000	10000	10000	10000	10000	200.0
Base Altitude (m)	37.0	36.0	35.0	38.0	28.3	29.0	41.0	42.0	50.0	45.0	50.0	45.0
Upwind Slope	0.025	0.020	0.003	0.055	0.068	0.080	0.035	0.038	0.040	0.035	0.070	0.055

Designer's Guide Method

Direction (°N)	0	30	60	90	120	150	180	210	240	270	300	330
Direction factor, Sd	0.780	0.730	0.730	0.740	0.730	0.800	0.850	0.930	1.000	0.990	0.910	0.820
Distance to Sea (km)	200.0	150.0	101.9	200.0	200.0	200.0	200.0	200.0	200.0	200.0	145.8	200.0
Distance in Town (km)	1.5	0.0	0.0	1.5	1.5	1.5	1.5	3.5	5.5	0.0	1.5	2.5
Altitude factor, Sa	1.037	1.036	1.035	1.038	1.028	1.029	1.041	1.042	1.050	1.045	1.050	1.045
Obstructions Height, Ho (m)	10.0	2.5	2.5	10.0	10.0	10.0	10.0	10.0	10.0	2.5	10.0	10.0
Obstructions Spacing, Xo (m)	20.0	4.0	4.0	20.0	20.0	20.0	20.0	20.0	20.0	4.0	20.0	20.0
Displacement Height, Hd (m)	8.0	2.0	2.0	8.0	8.0	8.0	8.0	8.0	8.0	2.0	8.0	8.0

Height Above Ground = 3.0 m

Direction (°N)	0	30	60	90	120	150	180	210	240	270	300	330
Effective height, He (m)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Topographic increment, Sh	0.010	0.013	0.004	0.110	0.135	0.160	0.000	0.000	0.000	0.015	0.071	0.109
a = 5.000, t(s)	2.4	2.0	2.0	2.2	2.3	2.0	2.1	2.0	1.9	1.5	1.9	2.1
a = 5.000, Sg	1.116	1.225	1.215	1.204	1.185	1.215	1.152	1.114	1.121	1.235	1.204	1.170
a = 5.000, Ve (m/s)	19.8	20.3	20.1	20.3	19.5	21.9	22.3	23.7	25.8	28.0	25.2	22.0
a = 5.000, q (N/m²)	239.5	252.2	247.6	251.6	232.6	293.9	305.5	342.9	407.7	479.6	389.4	295.6

Height Above Ground = 6.0 m

Direction (°N)	0	30	60	90	120	150	180	210	240	270	300	330
Effective height, He (m)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Topographic increment, Sh	0.010	0.013	0.004	0.109	0.134	0.157	0.000	0.000	0.000	0.015	0.071	0.107
a = 5.000, t(s)	1.8	1.7	1.7	1.7	1.8	1.6	1.6	1.6	1.4	1.2	1.4	1.6
a = 5.000, Sg	1.350	1.418	1.406	1.460	1.438	1.473	1.392	1.346	1.353	1.428	1.457	1.417
a = 5.000, Ve (m/s)	23.9	23.5	23.3	24.6	23.6	26.6	27.0	28.6	31.1	32.4	30.5	26.6
a = 5.000, q (N/m²)	350.3	338.2	332.0	369.7	342.5	432.3	445.9	500.1	593.8	641.7	569.9	433.6

Andy Mann Structural Design Ltd

12 Whatton Drive, West Bridgford
 Nottingham, NG2 7UX
 Email : enquiries@amsd.co.uk
 Tel: (0115) 985 9386

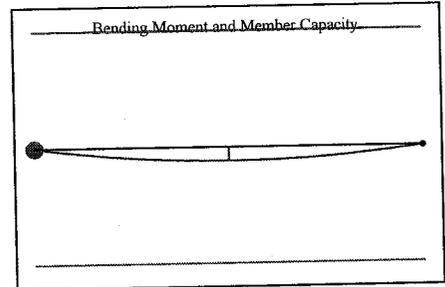
12761

Job Ref : JN2537 6 Hetley Road
 Sheet : Steel / 16
 Made by : AM
 Date : 19 March 2019 / Ver. 2018.15
 Checked :
 Approved :

Axial with Moments (Member) Beam 1: Span 1 Span 1 in Load Case 1

Member Loading and Member Forces

Loading Combination : 1 UT + 1.4 D1 + 1.6 L1
 D1 UDLW -000.158 (kN/m)
 D1 UDLY -004.200 (kN/m)
 L1 UDLY -002.100 (kN/m)



Member Forces in Load Case 1 and Maximum Deflection from Load Case 3							
Span No.	Axial Force (kN)	Shear Force (kN)		Bending Moment (kN.m)		Maximum Moment (kN.m @ m)	Maximum Deflection (mm @ m)
		End1	End2	End1	End2		
1	0.00C	9.93	-9.93	0.00	0.00	5.22 @ 1.050	0.95 @ 1.050

Classification and Properties (BS 5950: 2000)

Section (15.95 kg/m) 152x89 UB 16 [S 355]
 Class = Fn(b/T,d/t,py,F,Mx,My) 5.76, 27.07, 355, 0, 5.21, 0 (Axial: Non-Slender) Plastic
 Auto Design Load Cases 1

Moment Capacity Check Mc

Fv/Pv 0.001 / 146.075 = 0 Low Shear
 Mc = py.Sxx ≤ 1.2 py.Zxx 355 x 123.3 ≤ 1.2 x 355 x 109.61 = 43.772 kN.m
 MA/Mc 5.214 / 43.772 = 0.119 OK

Equivalent Uniform Moment Factor mLT

$m_{LT} = 0.2 + (15M_2 + 5M_3 + 15M_4) / M_{max}$ 0.2 + (.15x4 + .5x5 + .15x4) / 5 ≥ 0.44 0.925 Table 18

Lateral Buckling Check Mb

Le = 1.2 L 1.2 x 2.1 = 2.52 m
 $\lambda = Le / r_{yy}$ 2.52 / 2.11 = 119.43 OK
 v = Fn(x, Le, ryy, λ) 19.589, 2.52, 2.11, 119.43 Table 19
 $\lambda_{LT} = u.v.\lambda.\sqrt{\beta_w}$ 0.892 x 0.769 x 119.43√1 = 81.97
 pb = Fn(py, λ_{LT}) 355, 81.97 183.86 N/mm² Table 16
 Mb = Sxx.pb ≤ Mc 123.3 x 183.86 ≤ 43.772 = 22.670 kN.m
 MA/(Mb/m_{LT}) 5.214 / (22.67 / 0.925) = 0.213 OK

Deflection Check - Load Case 3

In-span δ ≤ Span/360 0.95 ≤ 2100 / 360 0.95 mm OK

Andy Mann Structural Design Ltd

12761

12 Whatton Drive, West Bridgford
Nottingham, NG2 7UX
Email : enquiries@amsd.co.uk
Tel: (0115) 985 9386

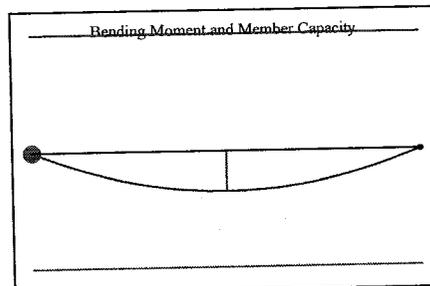
Job Ref : JN2537 6 Hetley Road
Sheet : Steel / 17
Made by : AM
Date : 19 March 2019 / Ver. 2018.15
Checked :
Approved :

Axial with Moments (Member)
Beam 2: Span 1
Span 1 in Load Case 1

Member Loading and Member Forces

Loading Combination : 1 UT + 1.4 D1 + 1.6 L1

D1 UDLW -000.249 (kN/m)
D1 UDLY -005.300 (kN/m)
L1 UDLY -004.950 (kN/m)

**Member Forces in Load Case 1 and Maximum Deflection from Load Case 3**

Span No.	Axial Force (kN)	Shear Force (kN)		Bending Moment (kN.m)		Maximum Moment (kN.m @ m)	Maximum Deflection (mm @ m)
		End1	End2	End1	End2		
1	0.00C	31.38	-31.38	0.00	0.00	31.38 @ 2.000	7.29 @ 2.000

Classification and Properties (BS 5950: 2000)

Section (25.09 kg/m) 203x133 UB 25 [S 355]
Class = Fn(b/T,d/l,py,F,Mx,My) 8.54, 30.25, 355, 0, 31.38, 0
Auto Design Load Cases 1
(Axial: Non-Slender) Compact

Moment Capacity Check Mc

Fv/Pv 0.001 / 246.705 = 0 Low Shear
Mc = py.Sxx ≤ 1.2 py.Zxx 355 x 257.7 ≤ 1.2 x 355 x 230.42 = 91.484 kN.m
MA/Mc 31.376 / 91.484 = 0.343 OK

Equivalent Uniform Moment Factor m_{LT}

m_{LT} = 0.2 + (15M₂ + 5M₃ + 15M₄) / M_{max} 0.2 + (15x24 + 5x31 + 15x24) / 31 ≥ 0.44 0.925 Table 18

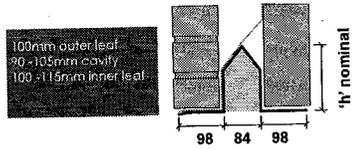
Lateral Buckling Check Mb

Le = 1.2 L 1.2 x 4 = 4.8 m
λ = Le/ryy 4.8 / 3.11 154.34 OK
v = Fn(x, Le, ryy, λ) 25.404, 4.8, 3.11, 154.34 0.77 Table 19
λ_{LT} = u.v.λ.√βw 0.878 x 0.77 x 154.34√1 104.32
pb = Fn(py, λ_{LT}) 355, 104.32 130.12 N/mm² Table 16
Mb = Sxx.pb ≤ Mc 257.7 x 130.12 ≤ 91.484 = 33.531 kN.m
MA/(Mb/m_{LT}) 31.376 / (33.531 / 0.925) 0.866 OK

Deflection Check - Load Case 3

In-span δ ≤ Span/360 7.29 ≤ 4000 / 360 7.29 mm OK

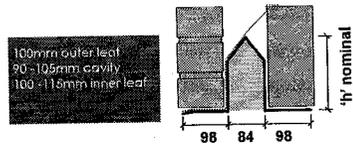
SL90



Not suitable to support precast concrete floors, attic trusses, heavy point loads.

STANDARD LENGTHS (mm)	600	1350	1650	1950	2250	2550	3150	4050	4350
Intels are available in increments of 150mm	1200	1500	1800	2100	2400	3000	3900	4200	4800
Nominal Height "h" (mm)	95	113	134	140	153	190	190	225	225
Weights (kg/m)	6.9	7.4	8.1	8.3	8.7	9.9	14.8	16.5	19.8
SWL 1:1/3:1 (kN)	16	17	22	23	24	28	28	28	28
SWL 19:1 (kN)	12	13	17	18	19	22	22	22	22
RM (kNm)	2.2	2.9	4.5	5.6	6.8	10.0	13.3	16.2	16.2

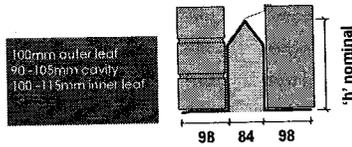
SL90 HD



Not suitable to support precast concrete floors, attic trusses, heavy point loads.

STANDARD LENGTHS (mm)	600	1350	1680	2250	2850	3300	3750	4050
Intels are available in increments of 150mm	1200	1500	2100	2700	3150	3600	3900	4200
Nominal Height "h" (mm)	140	153	190	190	225	225	225	225
Weights (kg/m)	8.3	8.7	9.9	14.8	16.5	16.5	16.5	19.8
SWL 1:1/3:1 (kN)	42	40	41	41	41	35	33	33
SWL 19:1 (kN)	33	31	32	32	32	27	26	26
RM (kNm)	5.6	6.8	10.0	13.3	15.5	15.5	15.5	16.2

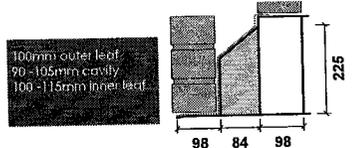
SL90 HDX



Not suitable to support precast concrete floors, attic trusses, heavy point loads.

STANDARD LENGTHS (mm)	600	1350	1650	1950	2400
Intels are available in increments of 150mm	1200	1500	1800	2250	2700
Nominal Height "h" (mm)	153	185	190	225	225
Weights (kg/m)	8.7	9.7	14.8	16.5	19.8
SWL 1:1/3:1 (kN)	51	53	64	59	50
SWL 19:1 (kN)	40	41	50	46	39
RM (kNm)	6.8	9.0	13.3	15.5	16.2

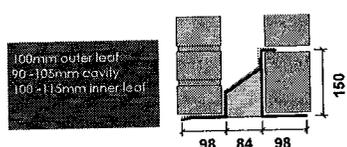
SL90 XHD 225



Suitable to support precast concrete floors, attic trusses, and point loads.

STANDARD LENGTHS (mm)	600	2250	2850	3450	4050
Intels are available in increments of 150mm	2100	2700	3300	3900	4200
Nominal Height "h" (mm)	225	225	225	225	225
Weights (kg/m)	27.8	27.8	27.8	27.8	27.8
SWL 5:1 (kN)	79	60	49	41	40
SWL 19:1 (kN)	66	51	41	34	33
RM (kNm)	20.6	20.6	20.6	20.6	20.6

SL90 CXHD 150

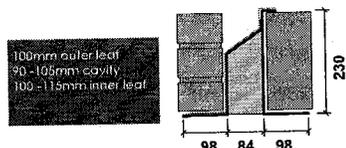


Suitable to support precast concrete floors, attic trusses, and point loads.

STANDARD LENGTHS (mm)	600	1950	2250	2550
Intels are available in increments of 150mm	1800	2100	2400	2700
Nominal Height "h" (mm)	156	156	156	156
Weights (kg/m)	17.0	17.0	17.0	17.0
SWL 5:1 (kN)	72	62	53	41
SWL 19:1 (kN)	61	52	45	34
RM (kNm)	12.6	12.6	12.6	12.6

See additional installation requirements on page 5.

SL90 CXHD 225



Suitable to support precast concrete floors, attic trusses, and point loads.

STANDARD LENGTHS (mm)	600	1950	3150	4050	4650	4950
Intels are available in increments of 150mm	1800	3000	3900	4500	4800	5100
Nominal Height "h" (mm)	236	236	236	236	236	236
Weights (kg/m)	20.7	20.7	20.7	20.7	20.7	20.7
SWL 5:1 (kN)	89	71	55	42	37	32
SWL 19:1 (kN)	75	60	46	40	35	30
RM (kNm)	21.5	21.5	21.5	20.5	20.5	20.5

See additional installation requirements on page 5.

CAVITY 90

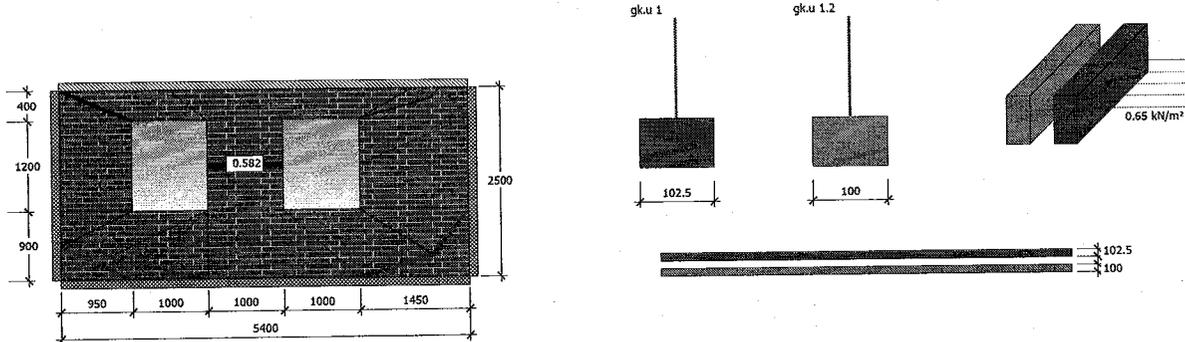
Andy Mann Structural Design Ltd

12 Whatton Drive, West Bridgford
 Nottingham, NG2 7UX
 Email : enquiries@amsd.co.uk
 Tel: (0115) 985 9386

12761

Job Ref : JN2537 6 Hetley Road
 Sheet : Masonry / 19
 Made by : AM
 Date : 19 March 2019 / Ver. 2018.15
 Checked :
 Approved :

Two Way Spanning, Vertically and Laterally Loaded, Cavity Wall Design to BS EN 1996-1-1:2005 Rear Elevation



Summary of Design Data

EuroCode National Annex	Using UK values:A1 2012		
Wall Dimensions	h=2.500 m, hef=2.059 m (Eqn. 5.8), L=5.400 m, Lef=5.400 m		
Support Conditions	Bottom Cont., Top Simple, Left Cont., Right Cont.		
Lateral Loads	Wx=0.65 kN/m²		
Cavity Wall (mm)	t1=102.5, t2=100, tef=127.6		
Limiting Dimensions	$\lambda = 16.1 < \lambda_{lim} = 27$, $L/t_{ef} = 42.3$, $H/t_{ef} = 19.6$, Hence $H/t_{ef} < 49.4$	0.598	OK

Outer-Leaf Design

Partial Safety Factor (γ_{mc}/γ_{mf})	Construction Class 2, Unit Manufacture II	3/2.7	Table NA.1
Unit Material	Clay water absorption > 12%, Group 1, $\gamma = 20$ kN/m³ Normalised mean compressive strength $f_b = 20$ N/mm²		
Mortar Material	M4, $f_m = 4$ N/mm²		
Compressive Strength (f_k)	$k = 0.5, \alpha = 0.7, \beta = 0.3$	6.17 N/mm²	Table NA.4
Loads from above	Dead Load=1.0 kN/m		
Section Properties	Area=1025 cm²/m, $Z_p = 1751$ cm³/m		
Flexural Strength f_{xk2} (Perpendicular)		0.9 N/mm²	Table NA.6
Flexural Strength f_{xk1} (Parallel)	$f_{xk1} = 0.3$, $g_d = 0.035$ N/mm² $f_{xk1} = f_{xk1} + \min(g_d, 0.2 \cdot f_k / \gamma_{mc}) \gamma_{mf}$	0.394 N/mm²	Table NA.6
Critical axial compressive case	$1.35(\gamma_{tk} \cdot h + g_{ku})$		
Max local stress @	$X = 2.255$ m, $Y = 1.25$ m < f_k / γ_{mc}	0.11 N/mm²	OK
Critical axial buckling case	$1.35(\gamma_{tk} \cdot h + g_{ku}) + 0.75(W_x)$		
Max axial buckling force @	$X = 2.45$ m, $Y = 1.25$ m averaged over width of 1 m	10.73 kN/m	
Moments from Lateral Load	$M_{wx, top} = 0.000$ kN.m, $M_{wx, mid} = 0.050$ kN.m		
Capacity reduction factor top, Φ	$e_x = 0.0$ mm, $h_{ef} = 2500$ mm, $t_{ef} = 127.6$ mm, $t = 102.5$ mm	0.892	
Capacity reduction factor mid, Φ_m	Creep coef. = 1.5, $e_{hm} = 0.043$ mm, $h_{ef} = 2.500$	0.628	
$Fr = \Phi \cdot f_k \cdot t_k / \gamma_{mc}$	$0.628 \times 6.17 \times 102.5 / 3$	132.5 kN/m	
F_d / Fr	$10.7 / 132.5$	0.081	OK
$M_{ro} = f_{xk2} \cdot Z_p / \gamma_{mf}$	$0.9 \times 1751 / 2.7$	0.584 kN.m/m	
$M_{ro} = f_{xk1} \cdot Z_b / \gamma_{mf}$	$0.394 \times 1751 / 2.7$	0.255 kN.m/m	

Inner-Leaf Design

Partial Safety Factor (γ_{mc}/γ_{mf})	Construction Class 2, Unit Manufacture II	3/2.7	Table NA.1
Unit Material	Concrete Blocks, Group 2, $\gamma = 20$ kN/m³ Normalised mean compressive strength $f_b = 20$ N/mm²		
Mortar Material	M4, $f_m = 4$ N/mm²		
Unit Ratio	Unit height=215, Least horizontal dimensions=100	2.15	
Compressive Strength (f_k)	$k = 0.7, \alpha = 0.7, \beta = 0.3$	8.64 N/mm²	Table NA.4
Loads from above	Dead Load=1.2 kN/m		
Section Properties	Area=1000 cm²/m, $Z_p = 1667$ cm³/m		
Flexural Strength f_{xk2} (Perpendicular)		0.9 N/mm²	Table NA.6
Flexural Strength f_{xk1} (Parallel)	$f_{xk1} = 0.25$, $g_d = 0.037$ N/mm² $f_{xk1} = f_{xk1} + \min(g_d, 0.2 \cdot f_k / \gamma_{mc}) \gamma_{mf}$	0.35 N/mm²	Table NA.6
Critical axial compressive case	$1.35(\gamma_{tk} \cdot h + g_{ku})$		
Max local stress @	$X = 2.26$ m, $Y = 1.25$ m < f_k / γ_{mc}	0.12 N/mm²	OK

Andy Mann Structural Design Ltd

12761

12 Whatton Drive, West Bridgford
 Nottingham, NG2 7UX
 Email : enquiries@amsd.co.uk
 Tel: (0115) 985 9386

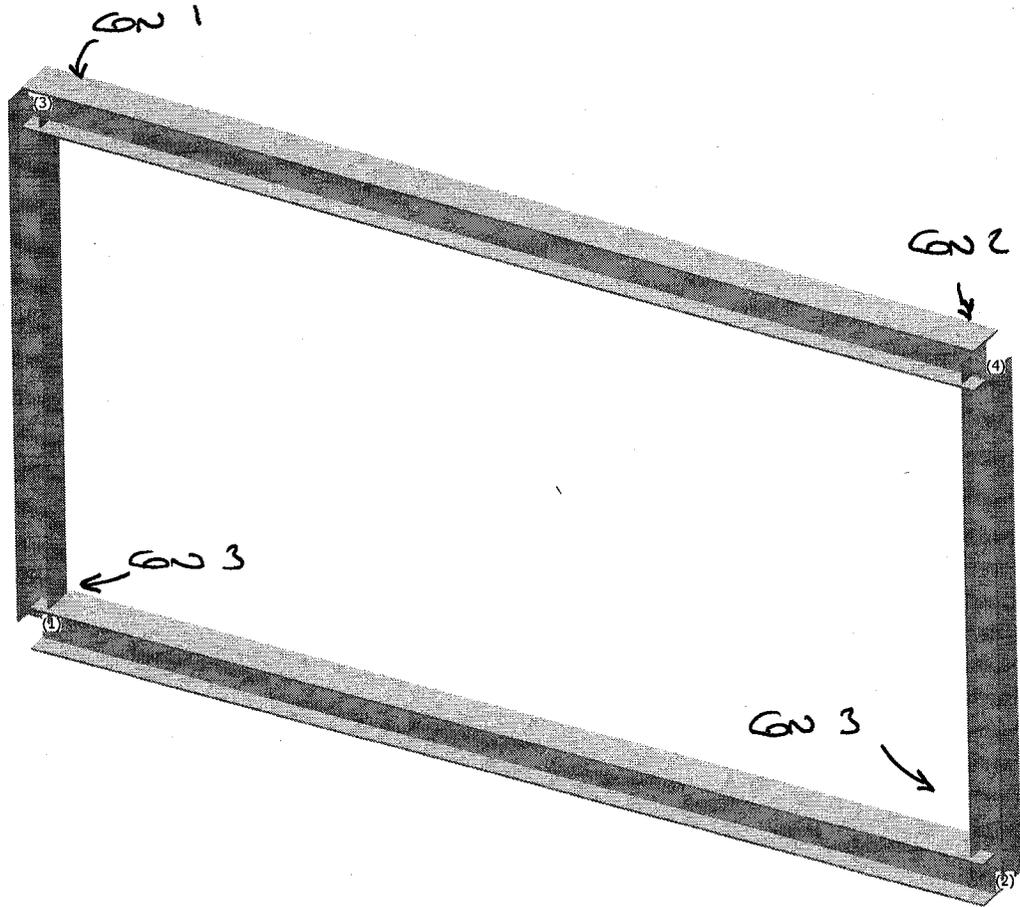
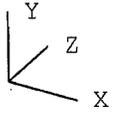
Job Ref : JN2537 6 Hetley Road
 Sheet : Masonry / 20
 Made by : AM
 Date : 19 March 2019 / Ver. 2018.15
 Checked :
 Approved :

Critical axial buckling case	$1.35(\gamma_{tk}.h+gku)+0.75(W_x)$		
Max axial buckling force @	X=2.45 m, Y=1.25 m averaged over width of 1 m	11.07kN/m	
Moments from Lateral Load	$M_{wx,top}=0.000$ kN.m, $M_{wx,mid}=0.065$ kN.m		
Capacity reduction factor top, Φ	$e_x=0.0$ mm, $h_{ef}=2500$ mm, $t_{ef}=127.6$ mm, $t=100.0$ mm	0.889	
Capacity reduction factor mid, Φ_m	Creep coef. =1.5, $e_{hm} = 0.043$ mm, $h_{ef} = 2.500$	0.625	
$F_r = \Phi \cdot f_k \cdot t_k / \gamma_{mc}$	$0.625 \times 8.64 \times 100 / 3$	180.1 kN/m	
Fd/Fr	11.1/180.1	0.061	OK
$M_{ri} = f_{yk2} \cdot Z_p / \gamma_{mf}$	$0.9 \times 1667 / 2.7$	0.556 kN.m/m	
$M_{ri} = f_{yk1} \cdot Z_b / \gamma_{mf}$	$0.35 \times 1667 / 2.7$	0.216 kN.m/m	

Design for Lateral Loads

Design Lateral Load Wd	1.5 Wx	0.975 kN/m ²	
Yield Line Analysis	Load Factor, λ_p	1.719	
$U_t = 1 / \lambda_p$	1 / 1.719	0.582	OK

<p>Andy Mann Structural Design Ltd 12 Whatton Drive, West Bridgford Nottingham, NG2 7UX Email : enquiries@amsd.co.uk Tel: (0115) 985 9386</p>	<p>12761 Job Ref : JN2537 6 Hetley Road Sheet : Steel / 21 Made by : AM Date : 19 March 2019 / Ver. 2018.15 Checked : Approved :</p>
--	--



Frame Geometry - (Full Frame) - 3D Front View

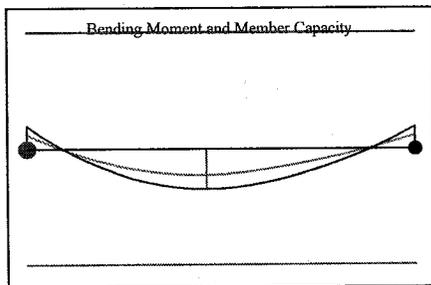
Not to Scale

Andy Mann Structural Design Ltd 12 Whatton Drive, West Bridgford Nottingham, NG2 7UX Email : enquiries@amsd.co.uk Tel: (0115) 985 9386	12761	Job Ref : JN2537 6 Hetley Road Sheet : Steel / 22 Made by : AM Date : 19 March 2019 / Ver. 2018.15 Checked : Approved :
---	-------	--

Axial with Moments (Member)
Beam 3
Member 3 (N.3-N.4) @ Level 2 in Load Case 4

Member Loading and Member Forces

Loading Combination : 1 UT + 1.4 D1 + 1.6 L1 + 1.4 W1
 D1 UDLY -008.360 (kN/m)
 L1 UDLY -007.980 (kN/m)
 D1 PDLY -032.500 0.000 2.600 (kN, m, m)



Mem ber No.	Node End1 End2	Axial Force (kN)	Torque Moment (kN.m)	Shear Force (kN)		Bending Moment (kN.m)		Maximum Moment (kN.m @ m)		Maximum Deflection (mm @ m)
				x-x	y-y	x-x	y-y	x-x	y-y	
3	3 4	16.69C 16.69C	0.00 0.00	89.15 -68.92	0.00 0.00	-34.10 -33.07	0.00 0.00	60.58 2.134	@	8.41 2.229

Classification and Properties (BS 5950: 2000)

Section (46.1 kg/m) 203x203 UC 46 [S 355]
 Class = Fn(b/T,d/t,py,F,Mx,My) 9.25, 22.33, 355, 16.69, 60.58, 0 (Axial: Non-Slender) SemiComp
 Effective Properties Area=58.73 cm², Sxx=490.42(497.4) cm³, Syy=219.36(230.9) cm³
 Auto Design Load Cases 1, 4 & 6

Local Capacity Check

Fvx/Pvx 0.044 / 311.628 = 0 Low Shear
 Mcx = py.Sxx ≤ 1.2 py.Zxx 355 x 490.42 ≤ 1.2 x 355 x 449.87 = 174.099 kN.m
 Pz = Ag.py 58.73 x 355 = 2084.915 kN
 n = F/Pz 16.69 / 2084.915 = 0.008 OK
 F/Ag.py + Mx/Mcx + My/Mcy 16.69 / 2084.915 + 60.578 / 174.099 + 0 = 0.356 OK

Compression Resistance Pc

λx = Lex/rxx 100x1x4.6/8.82 = 52.2 OK
 Pcx = Area.pcx 58.73x292.485/10 = 1717.762 kN Table 24 b
 λy = Ley/ryy 100x1x4.6/5.14 = 89.5 OK
 Pcy = Area.pcy 58.73x163.93/10 = 962.777 kN Table 24 c

Equivalent Uniform Moment Factors mL/T, mx, my and myx

m_{L/T} = 0.2 + (.15M₂ + .5M₃ + .15M₄)/M_{max} 0.2 + (.15x41 + .5x60 + .15x30)/61 ≥ 0.44 0.87 Table 18
 m_y = 0.2 + (.1M₂ + .6M₃ + .1M₄)/M_{max} 0.2 + (.1x0 + .6x0 + .1x0)/0 ≥ .8x0/0 1 Table 26
 m_x = 0.2 + (.1M₂ + .6M₃ + .1M₄)/M_{max} 0.2 + (.1x41 + .6x60 + .1x30)/61 ≥ .8x61/61 0.91 Table 26
 m_{yx} = 0.2 + (.1M₂ + .6M₃ + .1M₄)/M_{max} 0.2 + (.1x0 + .6x0 + .1x0)/0 ≥ .8x0/0 1 Table 26

Lateral Buckling Check Mb

Le = 1.0 L 1 x 4.6 = 4.6 m
 λ = Le/ryy 4.6 / 5.14 = 89.49 OK
 v = Fn (x,Le,ryy,λ) 17.71, 4.6, 5.14, 89.49 0.814 Table 19
 λ_{L/T} = u.v.λ.√βw 0.847 x 0.814 x 89.49√0.986 61.27
 pb = Fn (py,λ_{L/T}) 355, 61.27 252.05 N/mm² Table 16
 Mb = Sxx.pb ≤ Mc 490.42 x 252.05 ≤ 174.099 = 123.609 kN.m

Simplified Approach

py.Zx 355x449.87 159.704 kN.m
 F/Pc + mx.Mx/py.Zx 16.69/962.777 + 0.91x60.6/159.7 0.363 OK
 F/Pcy + mL/T.M_{L/T}/Mb 16.69/962.777 + 0.87x60.6/123.6 0.444 OK

More Exact Approach

Max = Mcx / (1 + .5F/Pcx) 174.1 / (1 + .5x16.7/1717.8) 173.257 kN.m

<p>Andy Mann Structural Design Ltd 12761 12 Whatton Drive, West Bridgford Nottingham, NG2 7UX Email : enquiries@amsd.co.uk Tel: (0115) 985 9386</p>	<p>Job Ref : JN2537 6 Hetley Road Sheet : Steel / 23 Made by : AM Date : 19 March 2019 / Ver. 2018.15 Checked : Approved :</p>
---	---

F/Pcx+mx.Mx/Max	16.7/1717.8+0.91x60.6/173.3	0.328	OK
F/Pcy+m _{LT} .M _{LT} /Mb	16.7/962.8+0.87x60.6/123.6	0.444	OK

Deflection Check - Load Case 3

In-span $\delta \leq \text{Span}/360$	8.41 \leq 4600 / 360	8.41 mm	OK
---------------------------------------	------------------------	---------	----

Andy Mann Structural Design Ltd

12 Whatton Drive, West Bridgford
 Nottingham, NG2 7UX
 Email : enquiries@amsd.co.uk
 Tel: (0115) 985 9386

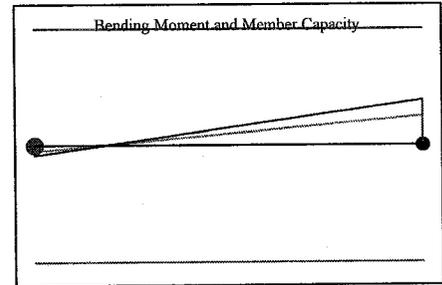
12761

Job Ref : JN2537 6 Hetley Road
 Sheet : Steel / 24
 Made by : AM
 Date : 19 March 2019 / Ver. 2018.15
 Checked :
 Approved :

**Axial with Moments (Member)
 Column 1 & 2 (Box Frame)
 Member 1 (N.1-N.3) @ Level 2 in Load Case 4**

Member Loading and Member Forces

Loading Combination : 1 UT + 1.4 D1 + 1.6 L1 + 1.4 W1



Member Forces in Load Case 4 and Maximum Deflection from Load Case 3

Member No.	Node End1 End2	Axial Force (kN)	Torque Moment (kN.m)	Shear Force (kN)		Bending Moment (kN.m)		Maximum Moment (kN.m @ m)		Maximum Deflection (mm @ m)
				x-x	y-y	x-x	y-y	x-x	y-y	
1	1 3	89.15C 89.15C	0.00 0.00	-16.69 -16.69	0.00 0.00	7.63 -34.10	0.00 0.00			2.09 @ 1.525

Classification and Properties (BS 5950: 2000)

Section (30.03 kg/m) 152x152 UC 30 [S 355]
 Class = Fn(b/T,d/t,py,F,Mx,My) 8.13, 19.02, 355, 89.15, 34.1, 0 (Axial: Non-Slender) Compact
 Auto Design Load Cases 1, 4 & 6

Local Capacity Check

Fvx/Pvx 16.69 / 218.197 = 0.076 Low Shear
 Mcx = py.Sxx ≤ 1.2 py.Zxx 355 x 247.7 ≤ 1.2 x 355 x 221.94 = 87.934 kN.m
 Pz = Ag.py 38.26 x 355 = 1358.23 kN
 n = F/Pz 89.151 / 1358.23 = 0.066 OK
 Srx = Fn(Sxx, n) 247.7, 0.066 245.27 cm³
 Mrx = Srx.py 245.27 x 355 87.072 kN.m
 (Mx/Mrx)^{Z1} + (My/Mry)^{Z2} (34.099/87.072)² + (0)¹ = 0.153 OK

Compression Resistance Pc

λx = Lex/rxx 100x1x2.5/6.76 = 37 OK
 Pcx = Area.pcx 38.26x323.311/10 = 1236.989 kN Table 24 b
 λy = Ley/ryy 100x1x2.5/3.83 = 65.3 OK
 Pcy = Area.pcy 38.26x230.94/10 = 883.559 kN Table 24 c

Equivalent Uniform Moment Factors mL T, mx, my and myx

mLT = 0.2 + (.15M2 + .5M3 + .15M4) / Mmax 0.2 + (.15x3 + .5x13 + .15x24) / 34 ≥ 0.44 0.511 Table 18
 my = 0.2 + (.1M2 + .6M3 + .1M4) / Mmax 0.2 + (.1x0 + .6x0 + .1x0) / 0 ≥ .8x0/0 1 Table 26
 mx = 0.2 + (.1M2 + .6M3 + .1M4) / Mmax 0.2 + (.1x-3 + .6x-13 + .1x-24) / 34 ≥ .8x24/34 0.555 Table 26
 myx = 0.2 + (.1M2 + .6M3 + .1M4) / Mmax 0.2 + (.1x0 + .6x0 + .1x0) / 0 ≥ .8x0/0 1 Table 26

Lateral Buckling Check Mb

Le = 1.00 L 1 x 2.5 = 2.5 m
 λ = Le/ryy 2.5 / 3.83 = 65.27 OK
 v = Fn (x, Le, ryy, λ) 15.946, 2.5, 3.83, 65.27 0.859 Table 19
 λLT = u.v.λ.√βw 0.849 x 0.859 x 65.27√1 = 47.6
 pb = Fn (py, λLT) 355, 47.6 299.98 N/mm² Table 16
 Mb = Sxx.pb ≤ Mc 247.7 x 299.98 ≤ 87.934 = 74.306 kN.m

Combined Axial Compression and Bending to Annex I

nb = mL T.MLT / Mb 0.511x-34.1/74.3 0.234
 rc = Fc / Pcy 89.2/883.6 0.101
 λr = (nbλLT + rcλy) / (nb + rc) (0.234*47.6 + 0.101*65.3) / (0.234 + 0.101) 52.917
 λro = 17.15ε (2nb + rc) / (nb + rc) 17.15*0.88(2*0.234 + 0.101) / (0.234 + 0.101) 25.646
 Mob = Mb(1 - Fc/Pcy) 74.306(1 - 89.2/883.6) 66.808

Andy Mann Structural Design Ltd

12761

12 Whatton Drive, West Bridgford

Nottingham, NG2 7UX

Email : enquiries@amsd.co.uk

Tel: (0115) 985 9386

Job Ref : JN2537 6 Hetley Road

Sheet : Steel / 25

Made by : AM

Date : 19 March 2019 / Ver. 2018.15

Checked :

Approved :

$M_{xy} = M_{cx}(1-F_c/P_{cy})^{1/2}$	87.934(1-89.2/883.6) ^{1/2}	83.379	
$M_{ox} = M_{cx}(1-F_c/P_{cx})/(1+0.5F_c/P_{cx})$	87.934(1-89.2/1237)/(1+0.5•89.2/1237)	78.758	
$M_{oy} = M_{cy}(1-F_c/P_{cy})/(1+k_y(F_c/P_{cy}))$	31.281(1-89.2/883.6)/(1+1.0(89.2/883.6))	25.547	
$M_{ab} = \text{fn}(\lambda_x, \lambda_y, \epsilon, M_{xy}, M_{ob})$	52.917, 25.646, 0.880, 83.379, 66.808	75.991	
$M_{ax} = \text{fn}(\lambda_x, \epsilon, M_{rx}, M_{ox})$	36.982, 0.880, 87.072, 78.758	84.060	
$M_{ay} = \text{fn}(\lambda_y, \epsilon, M_{ry}, M_{oy})$	65.274, 0.880, 31.281, 25.547	26.519	
$m_x \cdot M_x / M_{ax}$	0.555x34.1/84.1	0.225	OK
$m_{LT} \cdot M_{LT} / M_{ab}$	0.511x-34.1/76	0.229	OK
$m_x \cdot M_x / M_{ax}$	0.555x34.1/84.1	0.225	OK
Compare with Simplified to 4.8.3.3	0.341, 0.335, 0.335	0.341	
Compare with MoreExact to 4.8.3.3	0.295, 0.335, 0.221	0.335	

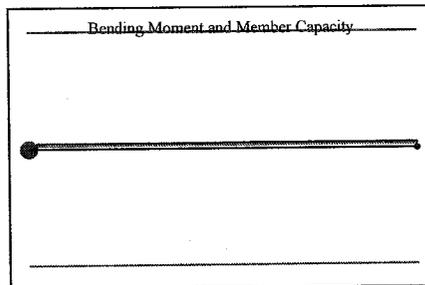
Deflection Check - Load Case 3

In-span $\delta \leq \text{Span}/360$	$2.09 \leq 2500 / 360$	2.09 mm	OK
---------------------------------------	------------------------	---------	----

Andy Mann Structural Design Ltd 12 Whatton Drive, West Bridgford Nottingham, NG2 7UX Email : enquiries@amsd.co.uk Tel: (0115) 985 9386	12761	Job Ref : JN2537 6 Hetley Road Sheet : Steel / 26 Made by : AM Date : 19 March 2019 / Ver. 2018.15 Checked : Approved :
---	-------	--

**Axial with Moments (Member)
 Spreader
 Member 4 (N.1-N.2) @ Level 1 in Load Case 4**

Member Loading and Member Forces
 Loading Combination : 1 UT + 1.4 D1 + 1.6 L1 + 1.4 W1



Member Forces in Load Case 4 and Maximum Deflection from Load Case 3										
Mem ber No.	Node End1 End2	Axial Force (kN)	Torque Moment (kN.m)	Shear Force (kN)		Bending Moment (kN.m)		Maximum Moment (kN.m @ m)		Maximum Deflection (mm @ m)
				x-x	y-y	x-x	y-y	x-x	y-y	
4	1 2	0.00C 0.00C	0.00 0.00	-0.22 -0.22	0.00 0.00	-7.63 -8.66	0.00 0.00			1.57 @ 2.346

Classification and Properties (BS 5950: 2000)

Section (46.1 kg/m) 203x203 UC 46 [S 355]
 Class = Fn(b/T,d/t,py,F,Mx,My) 9.25, 22.33, 355, 0, 8.66, 0 (Axial: Non-Slender) SemiComp
 Effective Properties Area=58.73 cm², Sxx=490.42(497.4) cm³, Syy=219.36(230.9) cm³
 Auto Design Load Cases 1, 4 & 6

Moment Capacity Check Mc

Fv/Pv 0.224 / 311.628 = 0.001 Low Shear
 Mc = py.Sxx ≤ 1.2 py.Zxx 355 x 490.42 ≤ 1.2 x 355 x 449.87 = 174.099 kN.m
 MA/Mc -8.655 / 174.099 = 0.050 OK

Equivalent Uniform Moment Factor mLT

mLT = 0.2 + (.15M2 + .5M3 + .15M4) / Mmax 0.2 + (.15x8 + .5x8 + .15x8) / 9 ≥ 0.44 0.952 Table 18

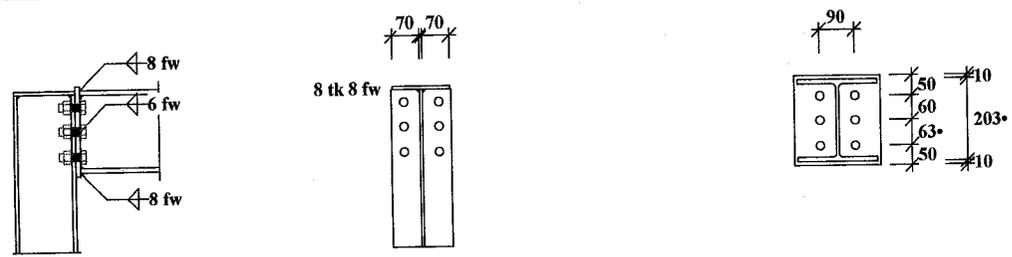
Lateral Buckling Check Mb

Le = 1.0 L 1 x 4.6 = 4.6 m
 λ = Le/ryy 4.6 / 5.14 = 89.49 OK
 v = Fn(x,Le,ryy,λ) 17.71, 4.6, 5.14, 89.49 = 0.814 Table 19
 λLT = u.v.λ.√βw 0.847 x 0.814 x 89.49√0.986 = 61.27
 pb = Fn(py,λLT) 355, 61.27 = 252.05 N/mm² Table 16
 Mb = Sxx.pb ≤ Mc 490.42 x 252.05 ≤ 174.099 = 123.609 kN.m
 MA/(Mb/mLT) 8.655 / (123.609 / 0.952) = 0.067 OK

Deflection Check - Load Case 3

In-span δ ≤ Span/360 1.57 ≤ 4600 / 360 1.57 mm OK

<p>Andy Mann Structural Design Ltd 12 Whatton Drive, West Bridgford Nottingham, NG2 7UX Email : enquiries@amsd.co.uk Tel: (0115) 985 9386</p>	12761	<p>Job Ref : JN2537 6 Hetley Road Sheet : Steel / 27 Made by : AM Date : 19 March 2019 / Ver. 2018.15 Checked : Approved :</p>
--	-------	---



Welds grd E 35 Plates S 275
 Beam 203x203 UC 46 [S355]
 Column 152x152 UC 30 [S355]

End-Plate 223 x 220 x 12 mm (5 kg)
 6 No. M20 Grade 8.8 Bolts in 21 mm holes

Con 1 - Beam 1 to Column 2
Eaves joint at : N.3 - Level 2 : Member 3 (N.3-N.4)
Beam to Column Flange End-Plated Connection to BS 5950
Loading Case 001 : Dead plus Live (Ultimate)
Basic Data

Integrated Applied Forces at Column/Right Rafter Interface

Resultant Forces M, Fv, F	27.2 kNm, 85.8 kN, 16.7 kN
Load directions	Top of Joint in Tension, Rafter moving Down and in Compression.
Design to	BS 5950-1: 2000 and the SCI Green Book: SCI-P-207/95

Basic Dimensions

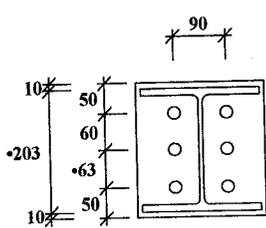
Column-152x152UC30 [36]	D=157.6, B=152.9, T=9.4, t=6.5, r=7.6, py=355
Beam-203x203UC46 [36]	D=203.2, B=203.6, T=11.0, t=7.2, r=10.2, py=355
Bolts 20 mm Ø in 21 mm holes	Grade 8.8 Bolts
Plates S 275, Welds E 35	
Rafter Capacities Mc, Fvc, Fc	176.6 kN.m, 311.6 kN, 2084.9 kN

Fvc = 311.6 kN OK

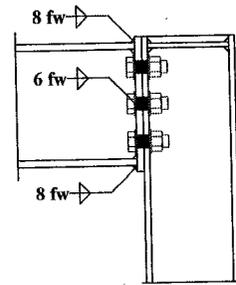
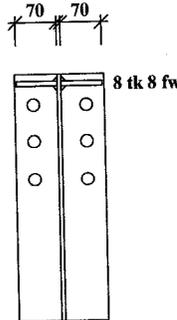
Summary of Results (Unity Ratios)

Moment Capacity 32.0 kNm (for 2 rows of bolts) (Modified Applied Moment Mm=25.6 kNm)	0.80	OK
Moment Capacity 28.2 kNm (for the 1 rows of bolts required in the tension zone)	0.91	OK
Shear Capacity	0.22	OK
Column Tension Stiffener at row 0	0.62	OK
Flange Welds	0.28	OK
Web Welds	0.72	OK
Column Tension Stiffener at row 0	0.12, 0.35, 0.16, 0.29, 0.62	
Flange Welds	0.28	
Web Welds	0.31, 0.72	

<p>Andy Mann Structural Design Ltd 12 Whatton Drive, West Bridgford Nottingham, NG2 7UX Email : enquiries@amsd.co.uk Tel: (0115) 985 9386</p>	12761	<p>Job Ref : JN2537 6 Hetley Road Sheet : Steel / Z8 Made by : AM Date : 19 March 2019 / Ver. 2018.15 Checked : Approved :</p>
--	-------	---



End-Plate 223 x 220 x 12 mm (5 kg)
6 No. M20 Grade 8.8 Bolts in 21 mm holes



Welds grd E 35 Plates S 275
 Beam 203x203 UC 46 [S355]
 Column 152x152 UC 30 [S355]
 Top 10 above top flange

Con 2 - Beam 3 to Column 1
Eaves joint at : N.4 - Level 2 : Member 3 (N.3-N.4)
Beam to Column Flange End-Plated Connection to BS 5950
Loading Case 001 : Dead plus Live (Ultimate)
Basic Data

Integrated Applied Forces at Column/Left Rafter Interface

Resultant Forces M, Fv, F 27.7 kNm, 67.0 kN, 16.7 kN
 Load directions Top of Joint in Tension, Rafter moving Down and in Compression.
 Design to BS 5950-1: 2000 and the SCI Green Book: SCI-P-207/95

Basic Dimensions

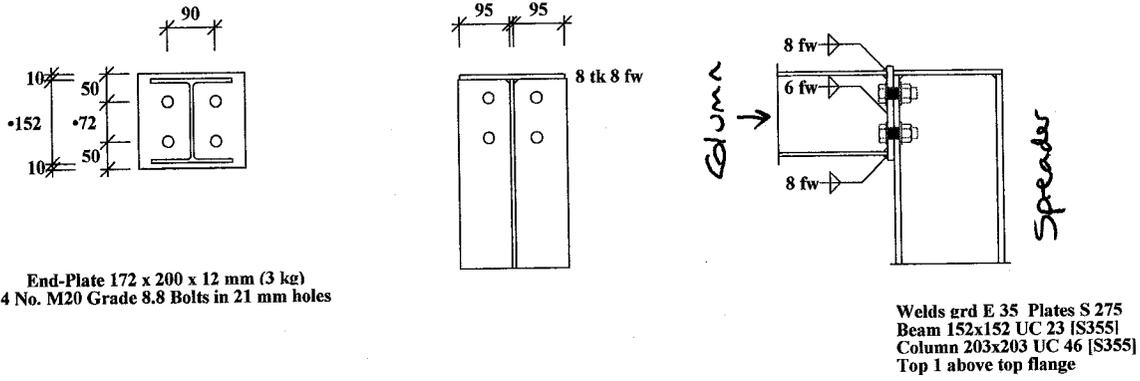
Column-152x152UC30 [36] D=157.6, B=152.9, T=9.4, t=6.5, r=7.6, py=355
 Beam-203x203UC46 [36] D=203.2, B=203.6, T=11.0, t=7.2, r=10.2, py=355
 Bolts 20 mm Ø in 21 mm holes Grade 8.8 Bolts
 Plates S 275, Welds E 35
 Rafter Capacities Mc, Fvc, Fc 176.6 kN.m, 311.6 kN, 2084.9 kN

Fvc = 311.6 kN OK

Summary of Results (Unity Ratios)

Moment Capacity 32.0 kNm (for 2 rows of bolts) (Modified Applied Moment Mm=26.1 kNm)	0.81	OK
Moment Capacity 28.2 kNm (for the 1 rows of bolts required in the tension zone)	0.93	OK
Shear Capacity	0.15	OK
Column Tension Stiffener at row 0	0.40	OK
Flange Welds	0.29	OK
Web Welds	0.57	OK

<p>Andy Mann Structural Design Ltd 12 Whatton Drive, West Bridgford Nottingham, NG2 7UX Email : enquiries@amsd.co.uk Tel: (0115) 985 9386</p>	12761	<p>Job Ref : JN2537 6 Hetley Road Sheet : Steel / 29 Made by : AM Date : 19 March 2019 / Ver. 2018.15 Checked : Approved :</p>
--	-------	---



Con 3 - Column 1 & 2 to Spreader
Beam to Column Flange End-Plated Connection to BS 5950
Loading Case 001 Dead plus Live (Ultimate)
Basic Data

User Defined Applied Forces at Column/Left Rafter Interface

Resultant Forces M, Fv, F 20.0 kNm, 20.0 kN, 70.0 kN
 Load directions Top of Joint in Tension, Rafter moving Down and in Compression.
 Design to BS 5950-1: 2000 and the SCI Green Book: SCI-P-207/95

Basic Dimensions

Column-203x203UC46 [36]	D=203.2, B=203.6, T=11.0, t=7.2, r=10.2, py=355		
Beam-152x152UC23 [36]	D=152.4, B=152.2, T=6.8, t=5.8, r=7.6, py=355		
Bolts 20 mm Ø in 21 mm holes	Grade 8.8 Bolts		
Plates S 275, Welds E 35			
Rafter Capacities Mc, Fvc, Fc	64.6 kN.m, 188.3 kN, 1038.0 kN	Mc = 64.6 kN.m	OK

Summary of Results (Unity Ratios)

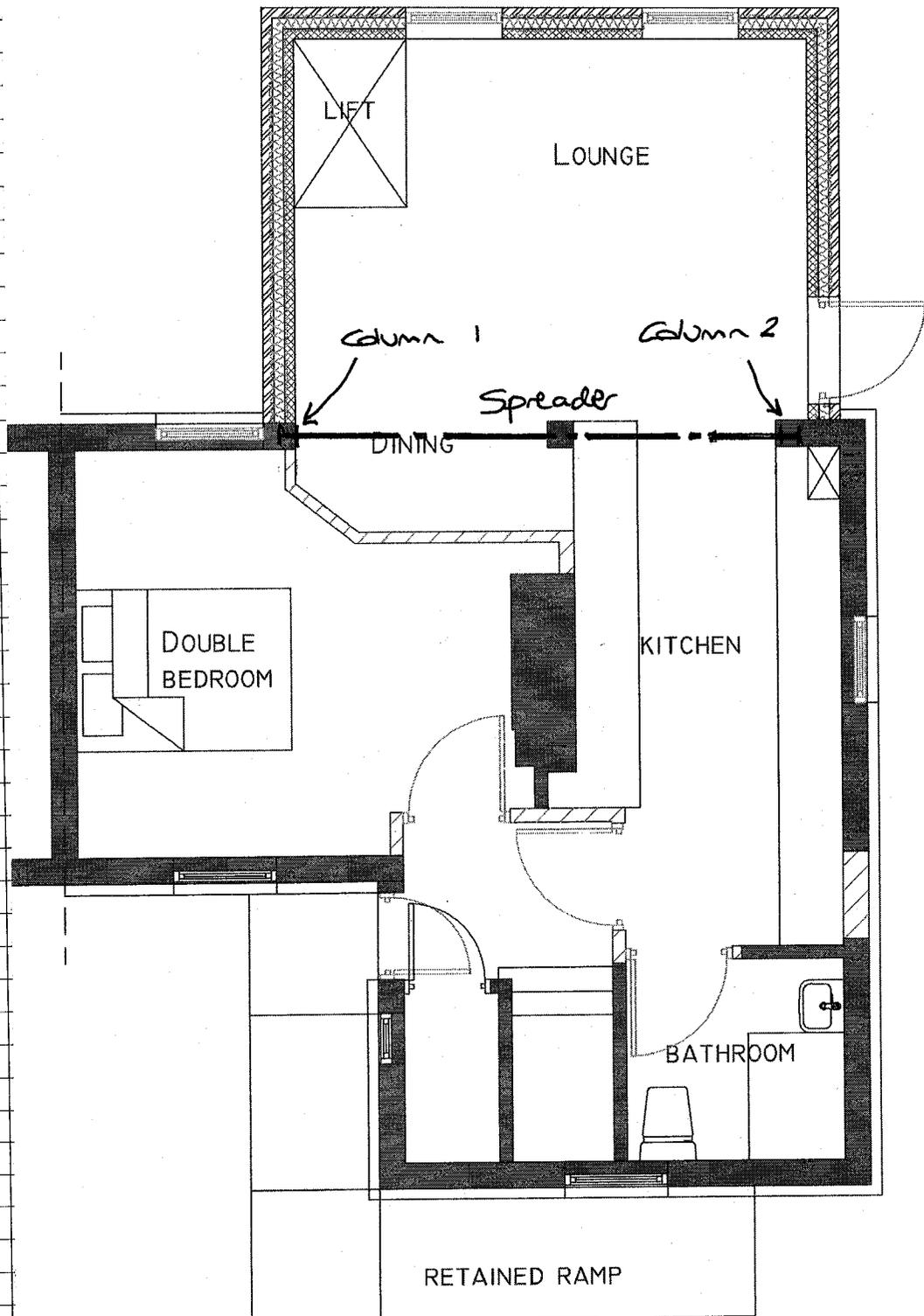
Moment Capacity 22.4 kNm (for 1 rows of bolts) (Modified Applied Moment Mm=14.9 kNm)	0.66	OK
Shear Capacity	0.08	OK
Column Tension Stiffener at row 0	0.00, 0.28, 0.10, 0.24, 0.49	OK
Flange Welds	0.33	OK
Web Welds	0.36, 0.54	OK

PROJECT No.	JN2537
SHEET No.	30
DATE	Mar 19
PREPARED	Am
CHECKED	

Notts:0115 985 9386 London:020 8150 6978 Web:www.amsd.co.uk Email:enquiries@amsd.co.uk

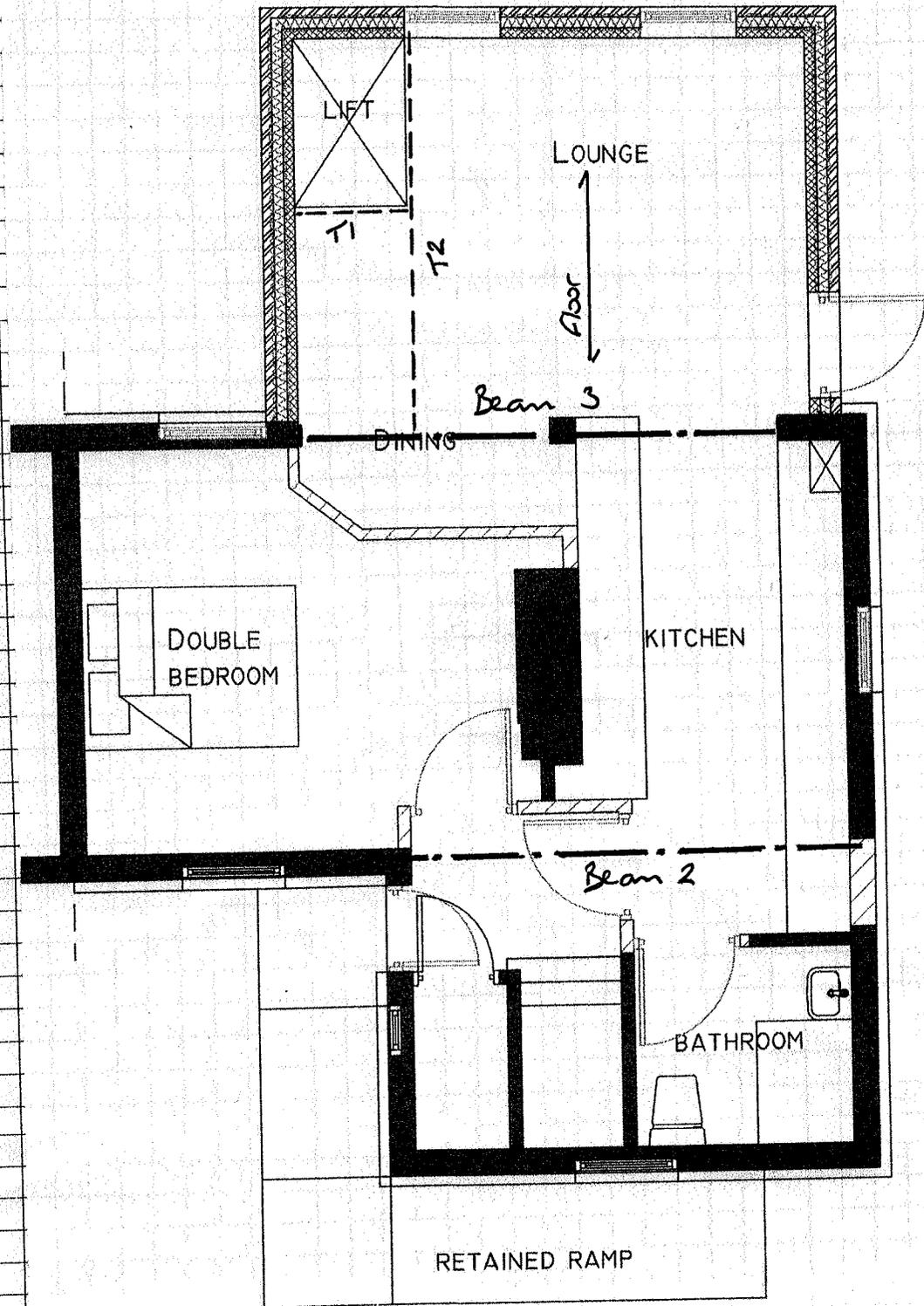
PROJECT TITLE
6 Hebley Road

Sketch Plan - Foundation



PROJECT TITLE
6 Hebley Road

Sketch Plan Ground Floor

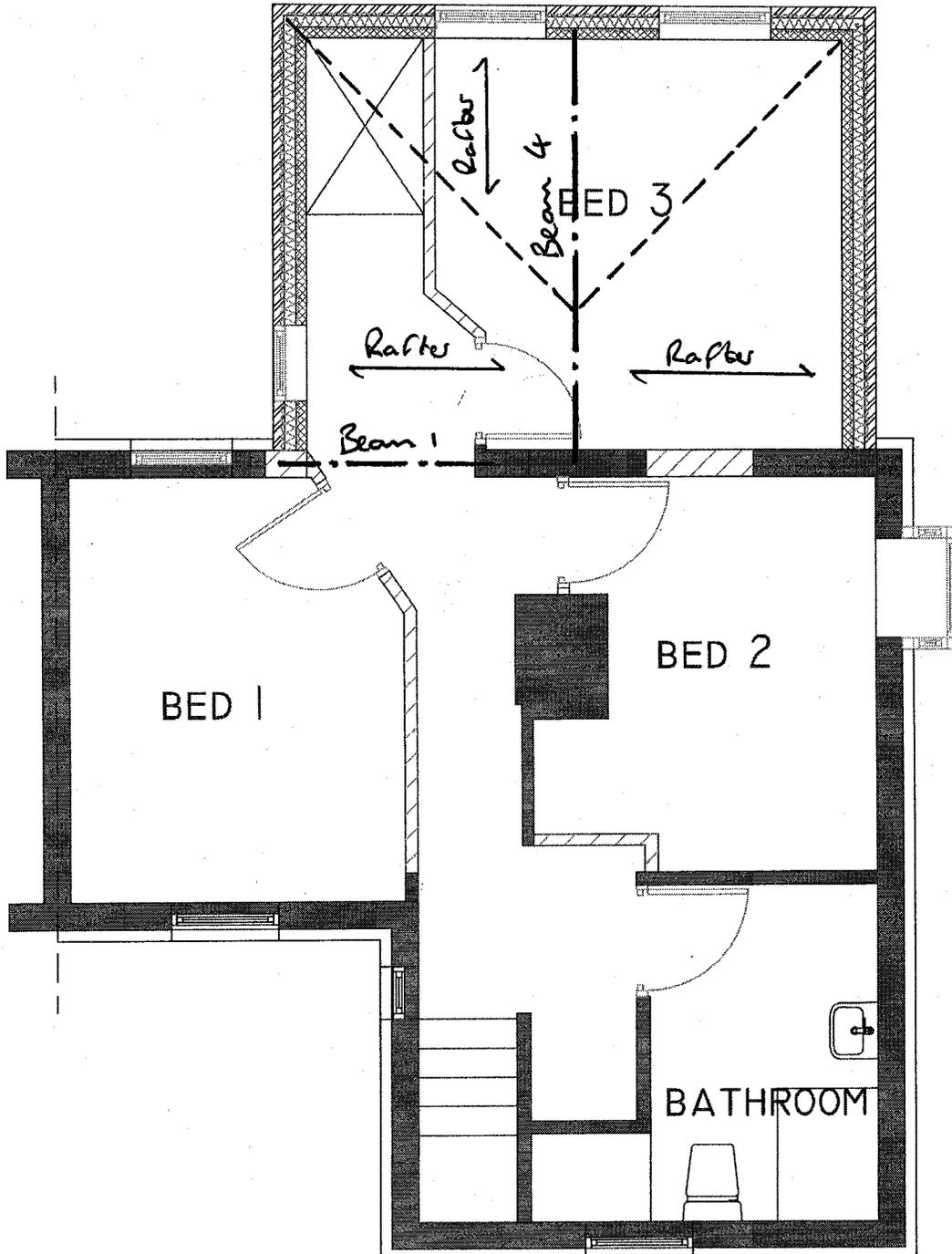


PROJECT No.	JN2537
SHEET No.	32
DATE	Mar 19
PREPARED	AM
CHECKED	

Notts:0115 985 9386 London:020 8150 6978 Web:www.amsd.co.uk Email:enquiries@amsd.co.uk

PROJECT TITLE
6 Hekley Road

Sketch Plan - 1st Floor





Andy Mann Structural Design Ltd
 12 Whatton Drive, West Bridgford
 Nottingham NG2 7UX

Notts:0115 985 9386 London:020 8150 6978 Web:www.amsd.co.uk Email:enquiries@amsd.co.uk

PROJECT No. JN2537
SHEET No. 33
DATE Mar 19
PREPARED AM
CHECKED

PROJECT TITLE 6 Hetley Road

Sketch Plan Note

Rafters = 50 x 125 C16 @ 400 c/c

Hip = 2No. 50 x 200 C24 bolted

Door = 63 x 170 C24 @ 400 or 50 x 200 C24 @ 400 c/c

T1 = 2No. Floor joists

T2 = 152 x 89 UB 16

Beam 1 = 152 x 89 UB 16

Beam 2 = 203 x 133 UB 25

Beam 3 = 203 x 203 UC 46

Beam 4 = 152 x 152 UC 30

Column 1+2 = 152 x 152 UC 30

Spreader = 203 x 203 UC 46

Lintel 1 = Stressline S690 40

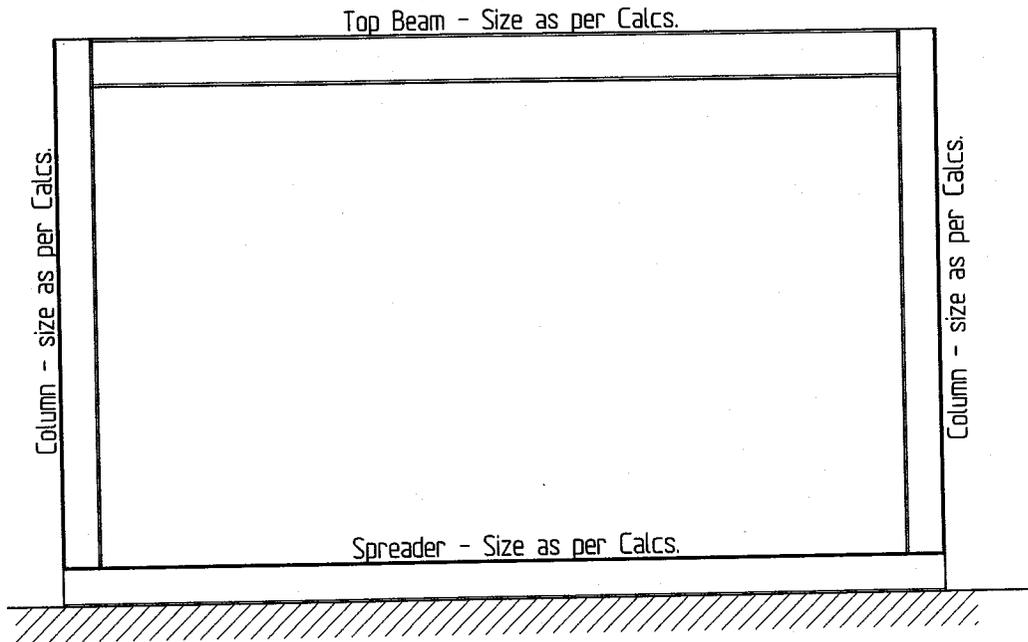


Andy Mann Structural Design Ltd
12 Whatton Drive, West Bridgford
Nottingham NG2 7UX

Notts:0115 985 9386 London:020 8150 6978 Web:www.amsd.co.uk Email:enquiries@amsd.co.uk

PROJECT No. JN2537	
SHEET No. 34	
DATE Mar 19	
PREPARED AM	CHECKED

PROJECT TITLE
6 Hetley Road, Nottingham

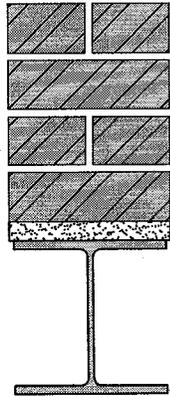


Box Frame Elevation (NTS)

PROJECT No. JN2537	
SHEET No. 35	
DATE Mar 19	
PREPARED AM	CHECKED

PROJECT TITLE
6 Hetley Road, Nottingham

Box Frame - Top Section (NTS)

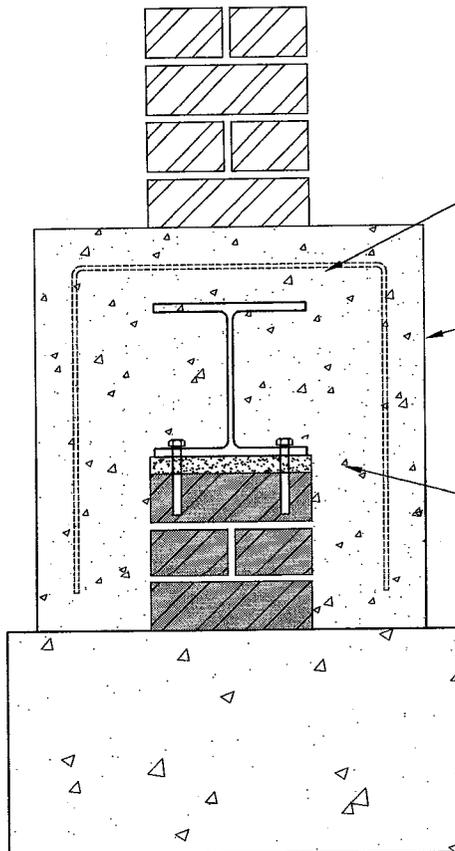


New steel beam to be shimmed and grouted to ensure it is loaded along full length.

Top plate (wall width minus 30mm) to be welded to top flange to support wall over. Beam/plate located central to wall.

Steel sizes as per calculations.

Box Frame - Bottom Section (NTS)



Steel sizes as per calculations.

Concrete encase beam (once frame is installed) to a thickness of 100mm minimum, use D98 wrapping mesh as shown (50mm cover).

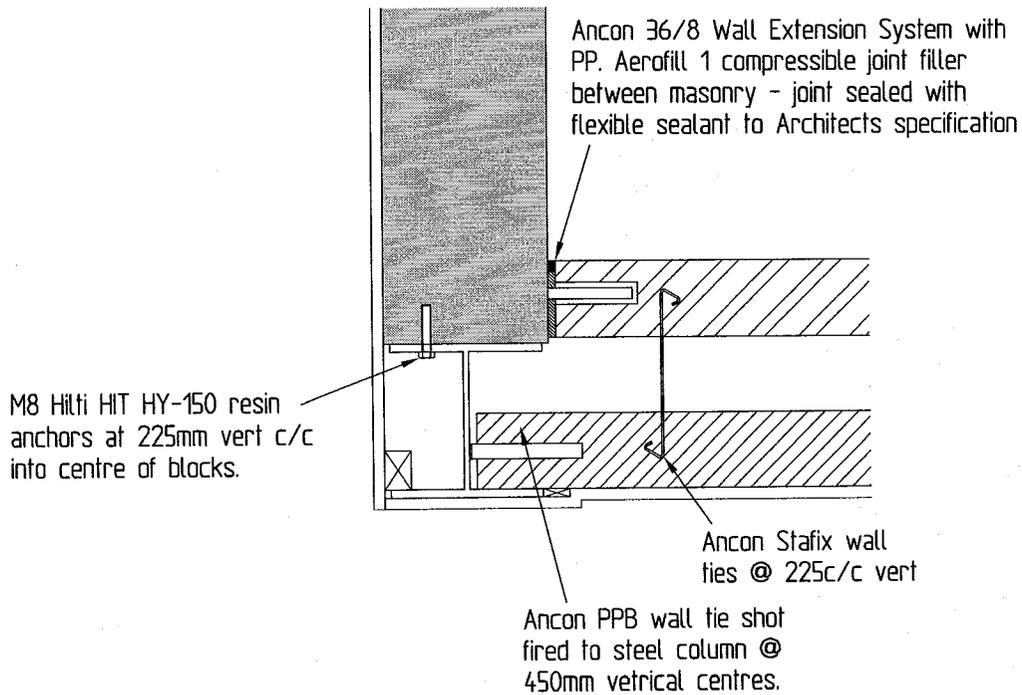
8mm plate (wall width minus 30mm) to be welded to bottom flange of spreader beam to bear onto wall, if built directly from foundation then spreader plate is not required. Beam/plate to be shimmed and grouted onto wall or foundation. Nominally bolt down using 6 No. M10 resin anchors in pairs (2 at each end, 2 in middle).

Existing foundations to be investigated for suitability and remaining depth below beam bearing level to ensure load distribution and integrity.

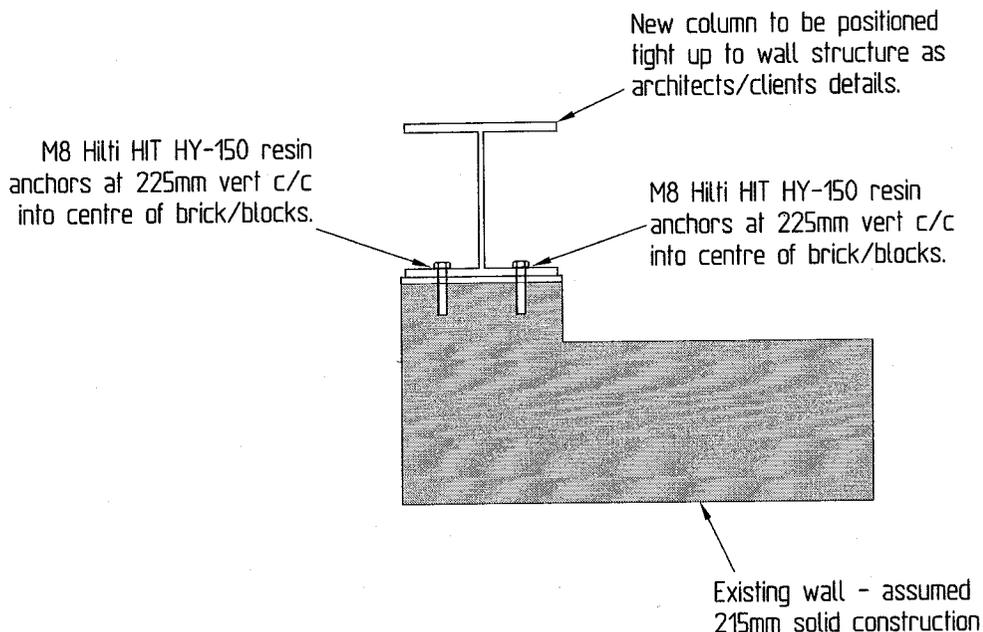
PROJECT No. JN2537	
SHEET No. 36	
DATE Mar 19	
PREPARED AM	CHECKED

PROJECT TITLE
6 Hetley Road, Nottingham

Column 1 Tie Details - Column Positioned Within Inner Leaf



Column 2 Tie Details



PROJECT No. S/JN2537	
SHEET No. 37	
DATE Mar 19	
PREPARED Am	CHECKED

PROJECT TITLE

6 Hetley Road

General Notes

- 1) This drawing is to be read in conjunction with all other relevant architect's and specialist's drawings and details.
- 2) Do not scale from this or any other Andy Mann Structural Design Ltd drawing or calculation sheets.
- 3) All dimensions to be checked on site prior to construction or fabrication.
- 4) All dimensions, levels and setting-out to be confirmed by architect.
- 5) All steel beams to bear onto 3 course 100x215x440 blue engineering brick padstones or 100x440x25 M.S. spreader plates U.N.O
- 6) Unless noted otherwise Building Control/Inspector to be satisfied with existing masonry and foundations for new applied loadings.
- 7) Any dimensions displayed within this document are design lengths only and are not for construction. Contractor to take all dimensions on site.
- 8) The principle contractor should provide lintels and flexible sleeves where drains run through walls or foundations.

Temporary Works

- 1) The main contractor will be responsible for all temporary works. A specialist subcontractor should be appointed to design and install all temporary works to adequately support all applied loads.
- 2) The contractor shall take all appropriate measures to avoid causing instability or damage to existing structures, surface finishes etc.

Excavations and Filling

- 1) All trenches and pits excavated for the construction of drainage and foundations must be adequately supported at all times to safeguard the stability of adjacent structures and plant and the safety and welfare of site operatives.
- 2) All work in open excavations and confined spaces shall be carried out in accordance with current health & safety regulations.
- 3) All stone fill shall be clean, well graded, crushed stone, 50mm down and shall be laid and compacted in layers not exceeding 150mm in thickness.
- 4) Contractor to ensure that excavations remain free from standing water.

Concrete Works

- 1) All concrete shall conform to the requirements of BS EN 206-1 and BS 8500-1:2006 and BS 8500-2:2006.
- 2) All designed concrete to BS 8110:1997.
- 3) All concrete shall be placed and compacted in accordance with BS 8110:1997.
- 4) All bar reinforcement shall be to BS 4449:2005 and scheduled to BS 8666:2005.
- 5) All fabric reinforcement shall be to BS 4483:2005 and minimum lap length shall be 450mm.
- 6) All spacers and/or chairs shall conform to BS 7973-1:2001.
- 7) All reinforcement shall be sufficiently supported, positioned and restrained using proprietary chairs and spacers to be placed in accordance with BS 7973-2.
- 8) The concrete cover requirements shall be minimum 40mm to all reinforcement (u.n.o) if cast within formwork, cover shall be min. 75mm if cast against ground.
- 9) All concrete to foundations shall be class FND 2.
- 10) Beam and block to comply with BS 5628-3 2001.

Steel Work

- 1) All structural steel work is to be grade S355 to BS EN 10025, unless noted otherwise, fabricated and erected in accordance with BS 5950:2001. All steelwork is to be shotblast cleaned to SA 2.5 and primed with total DFT=75 microns. Steelwork to have all scuffs repaired on site and all built in steelwork to be painted with two coats bituminous paint. Exposed steelwork treated with oil based undercoat and gloss, colour to be agreed. Connections to be designed by fabricator to the loads indicated on the drawings/calculations.
- 2) Bolts to all structural connections to be grade 8.8 unless noted otherwise.
- 3) All fire protection to steel work to architect's specification and details.
- 4) Steel work contractor/fabricator is to provide two copies of fabrication drawings for approval by Andy Mann Structural Design Ltd and the architect, include any connection details and calculations prior to fabrication.
- 5) Steel work fabricator shall check the detailed arrangement of all structural members to ensure potential clashes are eliminated prior to fabrication. Any anomalies shall be brought to the attention of the engineer.
- 6) Any exposed steelwork shall be hot dip galvanised to BS EN ISO 1461:2009.
- 7) Top 10mm plate to support walls to ensure max overhang of brick of 15mm - TBC contractor.
- 8) All steelwork should be supplied fabricated in accordance with BS EN 1090-1 and BS EN 1090-2. All steelwork to be fabricated to Execution Class 2 (EXC2).

Masonry

- 1) All block work below first floor level shall be 7N/mm² blocks in class 3 mortar (no lime).
- 2) All facing brickwork shall be to architect's specification and shall be broken up into panels using expansion joints.
- 3) All block work above first floor level to be 3.5N/mm².
- 4) Mortar for above ground works shall be class 3.
- 5) Wall ties shall be installed strictly in accordance with manufacturer's recommendations. Masonry secured to steelwork with suitable fixings @225mm vertical c/c.
- 6) Movement joints to be located every 6m in blockwork and 12m to brickwork. Joints sealed using 15mm hydrocell or equivalent filler and 15x15mm polysulphate sealant to architect's requirements.

Timber

- 1) All structural timber shall be stress graded to BS 5268 and shall be either C16 or C24 timber as noted on the drawings/calculations.
- 2) All fixings i.e. truss clips, framing anchors, etc. shall be galvanised/theradized.
- 3) All timbers shall be preservative treated.
- 4) Multiple joists to be bolted together using M10 gr.8.8 bolts @500 c/c with 40mm washers and toothed plate connectors. U.N.O
- 5) Trusses to comply with BS 5268-3 2006
- 6) Recommend dormers to be lined with 9mm ply screwed to joists/studs @ 150c/c with 5mm screws for stability to be confirmed by Building Inspector on site.
- 7) Unless noted otherwise trimming to velux as follows:
1 No rafter removed = double rafters to sides
2 No rafters removed = treble rafters to sides
3 No rafters removed = quadruple rafters to sides