

<b>McGregor</b>  <b>LANG</b>	<b>McGregor Lang Limited</b> <b>Consulting Structural Engineers</b>		Project No	ML05793																																																																																																
	Calculation sheet		Sheet No	01																																																																																																
Project :	Low Wood, Braithwaite Lane, Dacre.		Made By	JL-B																																																																																																
Part of Structure :	Proposed alterations.		Date	28.04.2023																																																																																																
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Project :

Low wood, Braithwaite Lane, Vauxc.

Made By

JS

Part of Structure :

Proposed alterations.

Date

28.04.2023

Consider the rafter - span  $4.10/2 = 2.05m$ .

$$load_p = (1.240 + 0.60) \times 0.40 = 0.74 \text{ kN/m}$$

$$BM_{-ax} = 0.74 \times 2.05^2 / 8 = 0.39 \text{ kNm}$$

$$S = 7.50 \times 1.1 \times 1.25 = 10.31 \text{ m}^2$$

$$Z_{xx} = 0.39 \times 10^6 / 10.31 \times 10^3 = 38 \text{ cm}^3$$

$$I_{xx} = \frac{5}{384} \times \frac{0.74}{10800} \times \frac{2050^4}{6.15} = 2.60 \times 10^6 \text{ m}^4$$

Provide = 50 x 150 c/b rafters @ 400cm.

Rafters to the N eave.

$$load_p = 0.40/2 + 0.30/2 \times (1.240 + 0.60) = 1.11 \text{ kN/m}$$

$$BM_{-ax} = 0.59 \text{ kNm}^3 \quad Z_{xx} = 88 \text{ cm}^3 \quad I_{xx} = 6.30 \times 10^6 \text{ m}^4$$

Provide = 2N° 50 x 150 c/b rafters

Consider the ridge beam - span 3.90m.

Loading

$$Self\ wt = 0.25 \text{ kN/m}$$

$$Roof = 2.05 \times 2 \times (1.240 + 0.60) = 7.55 \text{ kN/m}$$

$$BM_{-ax} = 7.80 \times 4.00^2 / 8 = 15.60 \text{ kNm}$$

$$S = 7.50 \times 1.25 = 9.38 \text{ m}^2 \quad Z_{xx} = 1664 \text{ cm}^3$$

too great for timber; adopt steel.

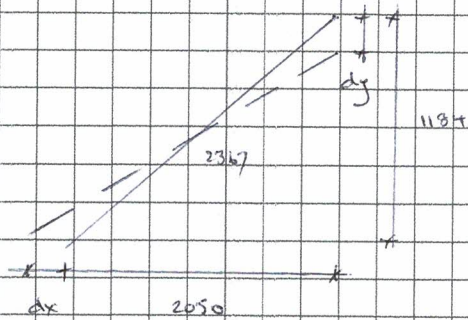
$$BM_{-ax} = (7.55 + 0.25) \times 1.50 \times 4.00^2 / 8 = 23.40 \text{ kNm}$$

Lt = restrained

$$I_{xx} = \frac{5}{384} \times \frac{7.80}{205 \cdot 10^3} \times \frac{400^4}{11.1} = 1142 \text{ cm}^4$$

Provide / consider 203 x 102 x 2305 - 2110 cm<sup>4</sup>

Consider the spread;



$$dy = (1142/2) (2110 \times 11.11) = 3mm$$

$$dx = \sqrt{[(1184 - 3.00)^2 - 2258^2]}^2 - 2050$$

$$= 1.33mm \text{ add } 1x \text{ } \rightarrow 0k$$

Provide 203 x 102 x 230B.

Consider the lintels.

Side lintel - span 1.10m

Load p

External leaf =  $0.150 \times 3.00 = 0.45 \text{ kWh}$

Internal leaf =  $0.150 \times 1.90 = 0.29 \text{ kWh}$  }  $2.18 \text{ kWh}$

Roof =  $(1.240 + 0.60) \times 2.05/2 = 1.89 \text{ kWh}$  }

$\Sigma = 2.63 \text{ kWh} \times 1.10 = 2.90 \text{ kJ}$

Provide = galvanic CH90/100T135 (100 casing)

End lintel - span 2.00m

Internal leaf =  $1.50 \times 1.90 = 2.85 \text{ kWh}$  }  $9.35 \text{ kWh}$

Ridge =  $15.60 / 1.20 \times 2 = 6.50 \text{ kWh}$  }

External leaf =  $1.50 \times 3.00 = 4.50 \text{ kWh}$

$\Sigma = 13.85 \times 2.00 = 27.70 \text{ kJ}$

Provide galvanic CH90/100T135 (45)

Check and confirm existing lintels are in order.

Project :

Low Wood, Braithwaite Lane, Dacre

Made By

23

Part of Structure :

Proposed attachments.

Date

28-04-2023

Consider the ground floor

Floor joists - span 4.00m

$$\text{load} = (0.65 + 1.50) \times 0.40 = 0.86 \text{ kN/m}$$

$$M_{max} = 1.72 \text{ kNm} \quad \sigma = 8.25 \text{ N/mm}^2 \quad Z_{xx} = 209 \text{ cm}^3$$

$$I_{xx} = \frac{5}{384} \times \frac{0.86}{10800} \times \frac{4000^4}{12} = 22.12 \times 10^4 \text{ m}^4$$

Provide = 50 x 200 C24 @ 400c/c

$$(I_{xx} = 29.94 \times 10^4 \text{ m}^4; \quad Z_{xx} = 304 \text{ cm}^3)$$

Bison floor 1/2 or 1/3 (Self wt 2.15)

Consider the foundations

Load

$$\text{Wall} = (3.00 + 1.90) \times 4.00 = 19.60 \text{ kN}$$

$$\text{Roof} = 2.05/2 \times (1.240 + 0.60) = 1.89 \text{ kN}$$

$$\text{Floor} = (2.15 + 1.80 + 0.25 + 1.50) \times 4.10/2 = 11.70 \text{ kN}$$

} 33.20 kN

$$\text{Foundation} = 1.00 \times 0.60 \times 1.00 \times (24 - 18) = 3.60 \text{ kN}$$

$$\bar{z} = (3.60 + 33.20) / 0.60 = 61.33 \text{ N/mm}^2 \text{ soil}$$

Provide min 600 wide foundations

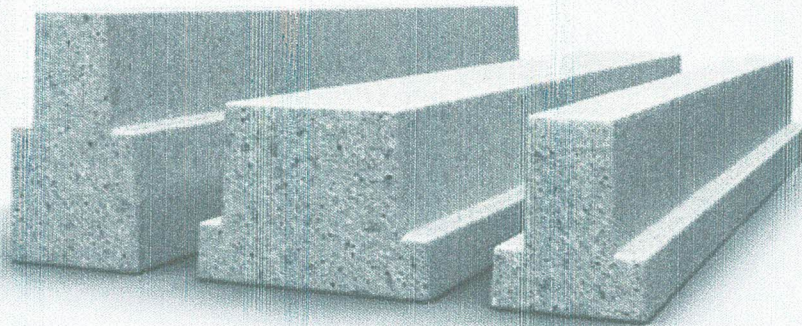
Formation level

Sycamore 22m moderate water demand, assume medium shrinkage

Distance			Formation (min)
7:00	1.55	-0.15	1.40 m
8:00	1.50	-0.15	1.35 m
9:00	1.40	-0.15	1.25 m
10:00	1.35	-0.15	1.20 m
11:00	1.30	-0.15	1.15 m
12:00	1.20	-0.15	1.05 m

# BEAM AND BLOCK - LOAD-SPAN TABLES

Technical Datasheet



BISON REF	BEAM SIZE (MM)	EFFECTIVE BEAM CENTRES (MM)	SLAB SELF WEIGHT KN/M <sup>2</sup>	SPANS INDICATED BELOW ALLOW FOR CHARACTERISTIC IMPOSED LOAD PLUS SELF WEIGHT PLUS 1.8KN/M <sup>2</sup> FOR FINISHES					
				CHARACTERISTIC IMPOSED LOAD KN/M <sup>2</sup>					
				1.5	2.0	2.5	3	4	5
				Clear span (m)					
IJ1	150 x 125	525	1.86	4.10	3.90	3.75	3.60	3.35	3.10
IJ2	150 x 125	413	1.96	4.55	4.35	4.20	4.00	3.75	3.50
IJ3	150 x 125	300	2.15	5.30	5.05	4.85	4.65	4.35	4.10
RDJ4	150 x 215	615	2.10	5.35	5.10	4.90	4.75	4.40	4.15
RDJ5	150 x 215	503	2.25	5.85	5.60	5.40	5.20	4.85	4.55
RDJ6	150 x 215	390	2.47	6.45	6.25	6.05	5.80	5.45	5.15
TJ1	225 x 135	535	2.30	6.45	6.15	5.90	5.70	5.35	5.00
TJ2	225 x 135	422	2.51	7.10	6.80	6.55	6.35	5.95	5.60
TJ3	225 x 135	310	2.89	7.75	7.75	7.45	7.20	6.80	6.40
				$\psi_0=0.7$	$\psi_1=0.5$	$\psi_2=0.3$	$\psi_0=0.7$	$\psi_1=0.7$	$\psi_2=0.6$
				Category A/B - Domestic, residential / office areas				Category C/D - Congregation areas /shopping	
FLOOR CATEGORY OF USE (FROM BS EN 1991-1-1:2002). USED FOR DETERMINING THE COMBINATION OF ACTIONS FACTORS									

Project :

Low wood, Braithwaite Lane, Dacre.

Made By

ISJ

Part of Structure :

Proposed alterations

Date

12-05-2023

Recessed for the inlets to the side - span 1.10m

Internal leaf

$$\begin{aligned} \text{Wall} &= 0.15 \times 1.90 = 0.285 \text{ m} \\ \text{Roof} &= (1.240 + 0.60) \times 2.05 / 2 = 1.89 \text{ m} \end{aligned} \quad \left. \vphantom{\begin{aligned} \text{Wall} \\ \text{Roof} \end{aligned}} \right\} 2.18 \text{ m}$$

$$\begin{aligned} \text{BM-ax} &= 2.18 \times 1.10^2 / 8 = 0.33 \text{ Wm} \times 1.50 = 0.50 \text{ Wm} \\ \text{Lr} &= 1.40 \times 1.10 + 0.15 \times 2 = 1.84 \text{ m} \times 1.50 = 2.76 \text{ W:m} \end{aligned}$$

$$I_{xx} = \frac{5}{384} \times \frac{2.18}{205 \cdot 10^3} \times \frac{1.10^4}{3.05} = 10 \text{ cm}^4$$

Provide = 100 x 100 x 8 RSA (145 cm<sup>4</sup> / 435)  
150 x 150 x 10 RSA

End Inlet

$$\text{Internal leaf} = 9.35 \times 1.10 = 13.10 \text{ m}$$

$$\begin{aligned} \text{BM-ax} &= 2.00^2 / 8 \times 13.10 = 6.55 \text{ Wm} \\ \text{Lr} &= 3.10 \text{ m} \end{aligned}$$

$$I_{xx} = \frac{5}{384} \times \frac{9.35}{205 \cdot 10^3} \times \frac{2.00^4}{5.56} = 171 \text{ cm}^4$$

Provide = 150 x 150 x 10 RSA (624 / 10-95)

Consider the knock through - span 2.70m

Woodip

$$\begin{aligned} \text{Wall} &= 2.80 \times (0.60 \times 20) \times 1.40 = 47.04 \text{ m} \\ \text{Roof} &= 6.00 / 2 \times (1.240 \times 1.40 + 1.60 \times 0.60) = 8.10 \text{ m} \\ \text{Ceiling} &= 6.00 / 2 \times (1.40 \times 0.525 + 1.60 \times 0.25) = 3.46 \text{ m} \\ \text{Floor} &= \text{say } 6.00 / 2 \times (1.40 \times 0.65 + 1.60 \times 1.50) = 9.93 \text{ m} \end{aligned}$$

$$\text{Say } 4N^{\circ} \text{ beam } \therefore \text{ say } (47.04 / 4) + (8.10 + 3.46 + 9.93) / 2 = ;$$

$$\text{Worst case load} = 11.76 + 10.75 = 22.51 \text{ m}$$

$$\text{BM-ax} = 20.51 \text{ Wm} \quad \text{Lr} = 4.08 \text{ m} \quad I_{xx} = 725 \text{ cm}^4$$

Provide 4N<sup>o</sup> 152 x 152 x 230C  
(I<sub>xx</sub> = 1250 cm<sup>4</sup>; M<sub>b,ty</sub> = 30 Wm; )