Title: Extension to 3 Chapel Street, Barnsley | Date: March 07

## Design loadings

Factored load

### Roof

dead - Roofing Slates : 0.60 kN/m²
Ceil & battens : 0.13 "
Roof Timber : 0.20 "
Ceil/services/Insul : 0.30 "
1.23 kN/m² ×1.4 = 1.72 kN/m²

Imposed : 0.60 " ×1.6 = 0.96 "
1.83 kN/m² 2.68 kN/m²

### 1st & 2nd Floors

dead - Joists & boarding : 0.35 kN/m²
Ceil & Services : 0.25 "
0.60 kN/m² ×1.4 = 0.84 kN/m²

Imposed : 1.50 " ×1.6 = 2.40 "
Partitions : 1.0 " ×1.6 = 1.60 "
3.10 kN/m² 4.84 kN/m²

### Cavity Wall

- 102 Brick : 2.10 kN/m²
100 Block + plaster : 2.10 "
4.20 kN/m² ×1.4 = 5.88 kN/m²

### New Beams to opening between Breakfast Room & Kitchen

Span : 4.5m

Design load - Upper Roof : 2.68 × 4.5 × 2.0/2 : 12.1 kN
Lower Roof : 2.68 × 4.5 × 2.4/2 : 14.5 "
1st & 2nd Floor : 2(4.84 × 4.5 × 2.0/2) : 43.6 "
Cavity wall : 5.88 × 4.5 × 2.6 : 68.8 "
139 kN RN = 69.5 kN

BM : 139 × 4.5/8 = 78.2 kNm

Try 2 No. 254 × 146 × 37 UBs

Effective Length : 1.2(4.5 + 2 × 0.25) = 6.0 m

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Mb @ 6.0 : 2 x 51 : 102 K > 78.2K

2 No 254 x 146 x 37 UB bolted together with M16 Bolts + spacer tube @ 1/3 points

Check defl Up load 93K

$$I_{reqd} : \frac{5 \times 93 \times 10^3 \times 4500^3}{384 \times 205000 \times 10^4 \times 4500/325} : 3888 - 4$$

$I_{prov}$ : 2 x 5560 : 11,120 - 4

Check Bearing onto Masonry

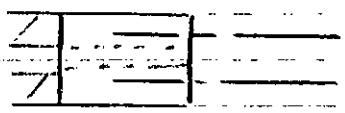
Reaction : 69.5K

Beams to have 225 - bearing onto 450 long x 225 dp padstone (width to suit cavity wall)

Check block inner leaf :

Allowable stress : 6.4/3.5 : 1.83 - L²

Try 450 long x 225 dp padstone



Stress under padstone along block leaf

$$\frac{69.5 \times 10^3}{2(450 \times 100)} : 0.77 - L^2$$

O.K

Roof Support pur - to extension

Max span : 8.8m

Design load : 2.68 x 8.8 x 4.7/2 : 56K

RN - 28K

BM : 56 x 8.8/8 : 62 K -

305 x 165 x 40 UB

$S_{reqd}$ : 62 x 10³/275 : 226 c³

S : 624 c³

J : 8520 - 4

Check defl Up load : 38K

$$I_{reqd} : \frac{5 \times 38 \times 10^3 \times 8800^3}{384 \times 205000 \times 10^4 \times 8800/325} : 6075 \text{ c}4$$



M8 bolt @ 500 c/c

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Check Bearings

- Onto Internal 140 Block wall

Allowable Stress: 5.3/3.5 = 1.51 - L²

Reaction: 2.68 × 10.8/2 × 4.7/2 = 34K

Try 300 × 140 × 150 dp padstone.

Stress under: 34 × 10³ / 300 × 140 = 0.80 - L²
0.K

300 × 140 × 150 padstone.

- Bearing onto external wall - 100 Block

Allowable Stress: 6.4/3.5 = 1.83 - L²

Reaction: 28K

Try 300 × 100 × 150 dp padstone.

Stress under: 28 × 10³ / 300 × 100 = 0.94 - L²
0.K

300 × 100 × 150 padstone.

Check Lintel over Cable Window to Breakfast Room Span: 2.4m

Unfactored part prem per lm: 19K

load UDL: 4.20 × 2.4 × 1.4 = 14K

BM: $\frac{19 \times 2.4}{4} + \frac{14 \times 2.4}{8}$ = 15.6 Kn

(conservative BM's - PL with distribute as a UDL).

Use Catnic Heavy Duty lintel
Ref CN14C
Allowable Moment: 22.5 Kn

Catnic Heavy Duty Lintel Ref CN14C

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Wind posts to 440 long piles to Breakfast Room front elevation

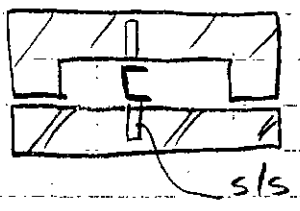
Wind Post height : 3.0m (Fandation to eaves)

Wind load : $0.7 \times 3.0 \times \left(\frac{1.81}{2} + 0.44 + \frac{1.02}{2}\right)$

$= 3.9\,kN$

Use Wincro 'C' windpost

85 x 60 x 4 SWL @ 3.0m = 4.45kN




Note: at eaves provide double rafter at each wind post position with plate fixing at manufacturers details

Windposts Wincro 'C' sections 85 x 60 x 4