

**Scope of services**

Structural design of steel beam and bearing design checks on existing load bearing masonry walls, to allow removal of internal masonry partition wall at ground floor level (beam to support retained 4" masonry partition between bedroom and bathroom above, 1st floor joists and loft level joists run parallel to wall). Removal of wall to allow installation of kitchen / diner in an open-plan arrangement.

**Codes of Practise**

- # Masonry design, BSEN1996 (EC6) & BS5628
- # Steelwork design, BSEN1993 (EC3) & BS5950

Appendix A

For structural layout, details & specification refer to Appendix A

Appendix 1.0

For load takedown table, refer to Appendix 1.0

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**Flat roof rafter design (Rear extension)**

Span = 2.200m

- Dead Load = 1.0 (less swgt rafters) = 0.85 kN/m<sup>2</sup>
- Imposed Load (small building roof) = 0.75 kN/m<sup>2</sup>

Appendix 2.0

# From design output reference Appendix 2.0, provide: **125x47 Gr C24 flat roof rafters at 400mm crs**

**Flat roof lantern trimmer design (Rear extension)**

Span = 2.200m

# Assumed lantern weight 150Kg (2.0m Long x 1.0m Wide)

Secondary trimmer point loads at 600mm and 1600mm:

- Dead =  $[1.0 \times 0.660 \div 2 \times (2.0 \div 2)] + [1.5 \div 2 \div 2 \text{ (lantern)}] = 0.71 \text{ kN}$
- Imposed =  $[0.75 \times 0.660 \div 2 \times (2.0 \div 2)] + [0.75 \times 1.0 \div 2 \times 2.0 \div 2 \text{ (lantern)}] = 0.60 \text{ kN}$

Primary trimmer UDL's:

# Lantern (PUDL, 660 - 1660mm):

- Dead Load =  $1.5 \div 2 \div 2 = 0.38 \text{ kN/m}$ , • Imposed Load  $0.75 \times 0.4 = 0.30 \text{ kN/m}$

# Roof (parallel): • Dead =  $1.0 \times 0.4 \div 2 = 0.20 \text{ kN/m}$ , • Imposed =  $0.75 \times 0.4 \div 2 = 0.15 \text{ kN/m}$

Appendix 3.0

# From design output reference Appendix 3.0, provide:

**2No.125x47 Gr C24 Trimmers to long span side of lantern, bolted as per note 2.2 on Appendix A notes**

**Reactions:** • Dead = 1.2 kN, • Imposed = 1.0 kN, • ULS = 2.9 kN

**Steel Beam Design (Support to rear wall / main roof)**

# Span = 2.8m

**Inner leaf beam**

Loading

# 1st floor (assumed):

• Dead =  $0.65 \times (3.750 \div 2) = 1.22 \text{ kN/m}$ , • Imposed =  $1.50 \times (3.750 \div 2) = 2.81 \text{ kN/m}$

# Roof trusses:

• Dead =  $1.23 \times (7.360 \div 2) = 4.53 \text{ kN/m}$ , • Imposed =  $0.75 + 0.60 \times (7.360 \div 2) = 4.97 \text{ kN/m}$

# Masonry wall over: • Dead =  $1.3 \times 2.6 = 2.47 \text{ kN/m}$

Appendix  
4.0

From analysis and design output, Appendix 4.0, provide:

**178x102UB19 Gr S275**

Reactions

• Dead = 11.7 kN, • Imposed = 10.8 kN, • ULS = 32.0 kN

**Outer leaf beam**

Loading

# Flat roof rafters:

• Dead =  $1.0 \times 2.2 \div 2 = 1.1 \text{ kN/m}$ , • Imposed =  $0.75 \times 2.2 \div 2 = 0.83 \text{ kN/m}$

# Facing brickwork: • Dead =  $2.15 \times 2.6 = 5.6 \text{ kN/m}$

Appendix  
5.0

From analysis and design output, Appendix 5.0, provide:

**178x102UB19 Gr S275**

Reactions:

• Dead = 9.6 kN, • Imposed = 1.6 kN, • ULS = 14.7 kN

**Beam GB1 Bearing Design (Inner Beam)**

Loading

• SLS Load, • Dead = 11.7 kN, • Imposed = 10.8 kN,

• Masonry capacity, assumed = 3.6N internal load bearing blockwork, beam bearing onto wall in-plane, 300mm end bearing.

Appendix  
6.0

# From design and analysis output, Appendix 6.0:

**Provide 400mm Lg x 100mm Wide x 25mm mild steel bearing plate on non-shrink mortar bed**

**Beam GB1 Bearing Design (Outer Beam)**

Loading

• SLS Load, • Dead = 9.6 kN, • Imposed = 1.6 kN,

• Masonry capacity, assumed = 20N external facing brickwork, beam bearing onto wall in-plane, 200mm end bearing.

Appendix  
6.0

# From design and analysis output, Appendix 6.0: **No bearing plate required. For even bearing on**

**masonry provide 250mm Lg x 100mm Wide x 20mm mild steel bearing plate on non-shrink mortar bed**

**Beam GB2 Design (Masonry support over bi-fold doors)**

# Span = 3750mm

Loading

# Wall - Outer leaf =  $2.15 \times 0.50 = 1.08$  kN/m (on plate)

# Wall inner leaf =  $1.3 \times 0.35 = 0.46$  kN/m

# Roof (inner leaf):

• Dead =  $1.00 \times 2.2 \div 2 = 1.10$  kN/m, • Imposed =  $0.75 \times 2.2 \div 2 = 0.83$  kN/m

# From Design output Appendix 7.0, provide:

**152x152UC30 Gr S275 beam with 280mm Wd x 8mm thick MS FLT bottom flange plate (5mm f.w. both sides to beam), 135mm plate projection based on 100mm cavity (CAVITY TBC)**

**Reactions**

(Inner leaf):

• Dead = 4.95 kN, • Imposed = 1.56 kN, • ULS = 9.0 kN

**SHS Post Design**

The existing wall to the conservatory has no return and thus the wall does not possess sufficient lateral stability, thus it is proposed to add a wind post which in turn will support the beam over the new door opening.

Loading

• ULS load = 9.0 kN

• Bending moment =  $9.0 \times (0.15 \div 2 + 0.1) + 0.65 \times 2.0 \div 2 \times 2.5 \div 2 = 2.4$  kNm

Appendix

7.0

# From Appendix 7.0, **Provide: 80x80x5.0 SHS Gr S355 post**

(Cap plate to u/s column, baseplate to be set onto existing foundation - Refer to Detail A, Appendix A)