

# **SPECIFICATION**

**for**

**Rear Extension to Dwelling**

**at**

**72, Ffynnon Dawel,**

**Aberdulais,**

**Neath**

**February 2020**

## **ROOF CONSTRUCTION**

New roof constructions to consist of 175 x 50 Grade C24 rafters, pitch to be minimum of 17.5 degrees and to be accurately established on site prior to works commencing.

Wind bracing shall be provided as detailed in Technical Bulletin Number 1 produced by the Truss Plate Association Ltd., and current Building Regulations.

Roof covering to be concrete interlocking tile to match existing fixed in accordance with manufacturer's instructions to 38 x 25mm treated softwood battens on VPU breathable felt to BS 5534. Hip tiles to be smooth faced clay or concrete angular tiles bedded in tinted cement mortar.

Ceilings to be 12.5mm or 15mm plasterboards to BS 1230 Part 1, screwed to underside of rafters to form vaulted ceiling plaster skim finish to provide 30mins fire resistance.

All structural timber to be Grade GS treated with tanlith preservative treatment in accordance with BS 5268 Part 5 (1977).

All carcassing and first fix softwood timbers in roof or in positions exposed to possible dampness are to be pressure impregnated to BS 5268 Part 5 with severity rating high.

All soffits and fascia boards to be uPVC to BS 7619 incorporating a minimum 25mm continuous air vent with insect proof mesh screen, to allow cross ventilation of roof void areas conforming to Approved Document F Part F2.

Roof voids to be insulated with Kingspan insulation batts laid between rafters, to achieve a U-Value of 0.15W/m<sup>2</sup>K.

Rainwater goods to be uPVC complying with BS 4576 Part 1. Rainwater gutters to be 100mm with 68mm diameter rainwater pipes all clipped and bracketed strictly in accordance with manufacturer's specification.

## **EXTERNAL WALLS**

Cavity walls to be 325mm thick, comprising outer skin of facing quality brickwork to match existing, 125mm cavity with 75mm Kingspan (or similar) rigid insulation batts, with inner skin of 100mm thick Class A dense concrete block. Cavity wall to achieve a minimum U-Value of 0.21 W/m<sup>2</sup>K.

Wall ties to be stainless steel vertical twist type at 450mm vertical and 600mm horizontal centres, staggered and doubled up at all openings. All ties to be to BS 1243 and fixed in accordance with BS 5628. Cavities to be closed at eaves, cills and jambs with Thermabate (or similar) closers incorporating a DPC. Cavity to be adequately firestopped at eaves level using a suitable non-combustible material such as Rockwool cavity wall batts. Below ground level, cavity to be filled to within 150 of DPC with lean mix concrete to BS 5328.

Provide Hyload DPC by Ruberoid at 150mm above outside ground level and to all vertical and horizontal openings in accordance with BS 743 and CP 121. Lintels over all external openings to be IG or Catnic lintels incorporating a DPC. See steel calculations for sizes of structural steel.

### **WALL FINISHES**

External block work walls to receive 2 Nr coats of cement render with dash finish to match existing.

Internal block work walls to receive 2 number coats of sand cement render with plaster skim finish.

Provide architectural skirting to BS 1186 Part 3 to client's choice to all walls. Backs of skirting shall be knotted and primed prior to fixing. All softwood to receive one coat of primer, two coats of undercoat and one coat of gloss finishing paint to BS 5358.

All plastered walls and ceilings to receive one thinned coat and two full coats of vinyl matt emulsion to BS 7719.

### **FOUNDATIONS**

Foundations to be 600 x 300mm concrete strip type, 30N/mm<sup>2</sup> strength concrete, with nominal A142 fabric mesh in bottom, to a minimum depth of 750mm below ground level, and below invert level of any adjacent drains. Actual depth of foundations to be determined following examination of the sub-grade site condition.

### **FLOORS**

Ground floor construction to achieve U-Value of 0.22 W/m<sup>2</sup>K comprising 65mm thick cement mortar screed on 75mm thick Kingspan (or similar) insulation batts on 1200 gauge Visqueen damp proof membrane on 100mm thick concrete oversite slab to BS 5328 on 150mm thick well compacted Type 1 granular sub base material. Additional layers of fill to be compacted in 225mm layers.

### **WINDOWS AND DOORS**

New doors to be uPVC double glazed units to BS 6375, incorporating draft proof trickle vents. External doors to be fitted complete with all ironmongery. Any glazing below 1500mm to be toughened glass. Door size to comply with requirements of Approved Document M. Glazing to be as for windows and to achieve a minimum U Value of 1.8W/m<sup>2</sup>K.

Provide 3 Nr Velux Rooflights to new roof.

### **STORM WATER DRAINAGE**

Downpipes to discharge to uPVC roddable back inlet gulleys. All pipework to be 'Osma' 110mm uPVC below ground quality pipes bedded on and encased in granular material to BS

882, laid to fall as specified by manufacturer. Storm water to discharge to soakaway located 5.0m from building.

### **FOUL WATER DRAINAGE**

All foul water to discharge to existing sewer.

All waste pipes and fittings to be in accordance with BS 3380 and BS 5255 and installed to BS 5572. All deep sealed traps to be to BS 3943.

All drainage below ground to be 100mm uPVC Osma (or similar) to BS 4660 or BS 5481 laid strictly in accordance with manufacturer's instructions and Approved Document H of the Building Regulations 2002. Drains to be laid to a minimum fall of 1 in 40 at a minimum depth of 0.6m, bedded on granular material to BS 882.

Where drains pass through walls or foundations provide 2 number 100 x 150 x 450mm concrete lintels over pipe giving a minimum 50mm clearance all around pipe with both sides masked with a rigid sheet material. Any drain passing under a floor or within 1.0m of a building to be encased in 150mm of concrete.

Inspection Chambers (minimum internal size 450 x 450mm) to be either preformed uPVC chambers or 225mm thick engineering brick to BS 3921. Base to be 150mm thick concrete slab, fitted with standard air tight medium duty frame and cover to BS EN 124. Half round channels to be used in chambers with branches discharging into channel at or above the level of the horizontal diameter. Channel and branches should be benched up to at least the top of the outgoing pipe and at a slope of 1 in 12. The benching should be rounded at the channel with a radius of at least 25mm.

### **SANITARY FITTINGS**

Hot and cold water distribution pipework to be 15 and 22mm diameter copper pipes fixed to solid backgrounds with clips. Stop taps to be fitted under sink units. All pipework to be installed strictly in accordance with requirements of Dŵr Cymru's requirements and current legislation to BS 6700.

Kitchen sink and units to be to client's specification and in accordance with BS 1195 and BS 4875.

### **CENTRAL HEATING**

Extend central heating system. All heating works to be carried out strictly in accordance with the requirements of Approved Document J of the Building Regulations 2002. Provide thermostatic valves to all radiators. System to be installed by a 'Gas Safe' registered contractor.

### **ELECTRICAL INSTALLATION**

To be fully in accordance with the Regulations of the I.E.E. (18<sup>th</sup> Edition), to BS 7671 and undertaken by an approved electrician, registered on a competent persons scheme. Completion

certificates to be submitted to Building Control. All power and lighting points to be at locations agreed with client. All sockets and switches to be located at a height between 450 and 1200mm above floor level. Lighting to be energy efficient lights as supplied by Lampholder (ref [www.lampholder.co.uk](http://www.lampholder.co.uk)).

### **EXTERNAL WORKS**

Make good any disturbance to external surfaces to client's satisfaction.

**ALL WORKS TO COMPLY WITH THE BUILDING REGULATIONS (2012).**

**ALL MEASUREMENTS ARE GIVEN IN MILLIMETERS UNLESS OTHERWISE STATED AND SHOULD BE CHECKED ON SITE PRIOR TO COMMENCEMENT OF WORKS.**

Design to BS 5950

February 2020

- (1) 2 NR Beams between Kitchen and Extension  
 (2) 1 NR Beam over new doors in extension.

Beams at (1)

$$\text{Clear Span (Worst Case)} = 3450$$

$$\text{Design Span} = 3450 + \frac{k_b}{2} = 3625 \text{ mm}$$

Loading Criteria

$$\text{Roof DL} = 0.75 \text{ kN/m}^2; \text{ IL} = 0.75 \text{ kN/m}^2$$

$$1\text{st} \text{ FR DL} = 0.50 \text{ kN/m}^2; \text{ IL} = 1.50 \text{ kN/m}^2$$

$$\text{Wall DL} = 2.2 \text{ kN/m}^2$$

Loads

|                             |    |                                        |                      |
|-----------------------------|----|----------------------------------------|----------------------|
| Roof                        | DL | $0.75 \times 3.5 \times 3.625 = 9.51$  | $\times 1.4 = 13.32$ |
|                             | IL | $0.75 \times 3.5 \times 3.625 = 9.51$  | $\times 1.6 = 15.22$ |
| 1st FR                      | DL | $0.50 \times 1.45 \times 3.625 = 2.63$ | $\times 1.4 = 3.68$  |
|                             | IL | $1.50 \times 1.45 \times 3.625 = 7.88$ | $\times 1.6 = 12.62$ |
| Wall                        | DL | $2.20 \times 2.4 \times 3.625 = 19.14$ | $\times 1.4 = 26.80$ |
| $\Sigma = 71.64 \text{ kN}$ |    |                                        |                      |

$$M_x = \frac{Wl}{8} = \frac{71.64 \times 3.625}{8} = 32.46 \text{ kNm}$$

Select Beam Size 203 x 133 x 30 UB.Section Properties

$$k = 6.4$$

$$r_{yy} = 3.17$$

$$D = 206.8$$

$$x = 21.5$$

$$I = 2896$$

$$S_x = 314$$

Check Bending

$$M_x < M_b \quad M_b = P_b \cdot S_x$$

$$Pb = ? \quad \lambda = \frac{k_e}{r_{yy}} = \frac{3625}{3.17 \times 10} = 114.4$$

$$\therefore \text{From table 19(b)} \quad Pb = 159 \text{ N/mm}^2$$

$$\therefore Mb = 159 \times 314 \times 10^{-3} = 49.93 \text{ kN.m}$$

$$\therefore Mb > M_{ex} \checkmark \text{ OK in Bending}$$

#### • Check Shear

$$\text{Max}^m \text{ SF} = \frac{71.64}{2} = 35.82 \text{ kN}$$

$$P_v = 0.6 \cdot P_y \cdot A_v \quad A_v = t \cdot D$$

$$\therefore P_v = 0.6 \times 275 \times 6.4 \times 206.8 \times 10^{-3} = 218.4 \text{ kN}$$

$$\therefore P_v > \text{Max}^m \text{ SF} \checkmark \text{ OK in Shear}$$

#### • Check Deflection

$$\delta_{\text{allow}} = \frac{L}{360} = \frac{3625}{360} = 10.07 \text{ mm}$$

$$\delta_{\text{actual}} = \frac{5}{384} \cdot \frac{W L^3}{EI} \quad W = w/FIL = 17.39 \text{ kN}$$

$$\therefore \delta_{\text{act}} = \frac{5}{384} \times \frac{17.39 \times 3.625^3 \times 10^2}{205 \times 2896 \times 10^7} = 1.82 \text{ mm}$$

$$\therefore \delta_{\text{act}} < \delta_{\text{allow}} \checkmark \text{ OK in Deflection}$$

#### • Check Bearing at Supports

Allow min<sup>m</sup> end bearing of 175 mm.

$$\sigma = \frac{L}{A} = \frac{35.82 \times 10^3}{175 \times 133} = 1.54 \text{ N/mm}^2 \checkmark \text{ OK}$$

Provide p.c. concrete padstones at supports

$\therefore$  OK to use 2x 203x133x30 UB's (bolted together)

### Beam at (2)

$$\text{Clear Span} = 5900 \text{ mm}$$

$$\text{Design Span} = 5900 + \frac{t_b}{2} = 6075 \text{ mm}$$

### Loading Criteria

$$\text{Roof DL} = 0.75 \text{ kN/m}^2 ; \text{IL} = 0.75 \text{ kN/m}^2$$

$$\text{Wall DL} = 2.2 \text{ kN/m}^2$$

### Loads

$$\text{Roof DL} \quad 0.75 \times 1.85 \times 6.075 = 8.43 \times 1.4 = 11.8$$

$$\text{IL} \quad 0.75 \times 1.85 \times 6.075 = 8.43 \times 1.6 = 13.5$$

$$\text{Wall DL} \quad 2.20 \times 0.3 \times 6.075 = 4.01 \times 1.4 = 5.6$$

$$\Sigma = 30.9 \text{ kN}$$

$$M_x = \frac{Wl}{8} = \frac{30.9 \times 6.075}{8} = 23.5 \text{ kN.m}$$

Select Beam Size (oversize beam chosen to minimise deflection)

203 x 203 x 40 UC

### Section Properties

$$t = 7.2$$

$$r_{yy} = 5.13$$

$$D = 203.2$$

$$\alpha = 17.7$$

$$I = 4568$$

$$S_x = 497$$

### • Check Bending

$$M_x < M_b$$

$$M_b = P_b \cdot S_x$$

$$P_b = ?$$

$$x = \frac{L}{r_{yy}} = \frac{6075}{5.13 \times 10} = 118.4$$

$$\therefore \text{From table 19(b)} \quad P_b = 167 \text{ N/mm}^2$$

$$\therefore M_b = 167 \times 497 \times 10^{-3} = 83.0 \text{ kN.m}$$

$$\therefore M_b > M_x \quad \checkmark \text{ ok in Bending.}$$

Page 3

- Check Shear

$$\text{MAX}^m \text{ SF} = 15.45 \text{ kN}$$

$$P_v = 0.6 \cdot P_v \cdot A_v \quad A_v = t \cdot b$$

$$P_v = 0.6 \times 275 \times 7.2 \times 203.2 \times 10^{-3} = 241.4 \text{ kN}$$

$$\therefore P_v > \text{MAX}^m \text{ SF} \checkmark \text{ OK in Shear}$$

- Check Deflection

$$\delta_{\text{allow}} = \frac{L}{360} = \frac{6075}{360} = 16.87 \text{ mm}$$

$$\delta_{\text{actual}} = \frac{5}{384} \frac{W L^3}{EI} \quad W = U/F \cdot IL = 8.43 \text{ kN}$$

$$\delta_{\text{act}} = \frac{5}{384} \times \frac{8.43 \times 6.075^3 \times 10^{12}}{205 \times 4568 \times 10^7} = 2.63 \text{ mm}$$

$$\therefore \delta_{\text{act}} < \delta_{\text{allow}} \checkmark \text{ OK in Deflection}$$

- Check Bearing at Supports

Allow min<sup>m</sup> end bearing of 175mm

$$\sigma = \frac{L}{A} = \frac{15.45 \times 10^3}{175 \times 203} = 0.43 \text{ N/mm}^2 \checkmark \text{ OK}$$

Provide p-c concrete padstones at supports

$$\therefore \text{OK to use } 1\text{N}^2 \text{ } 203 \times 203 \times 446 \text{ UC}$$

END.