

27, Swan Road, Baglan.**Calculations for Supporting Beams to external wall.**

The Client wishes to knock through the existing external wall of the main house into the existing lean-to utility room to form one larger kitchen.

There will be a 3.1m clear opening in the external cavity wall between the existing Kitchen and the existing Utility Room. It is proposed to provide steel supporting beams to each leaf of this wall. Beams will be joined together but will be designed as separate supporting elements.

The beams will be supported on precast concrete padstones.

New beams are to be grade 43 steel primed and painted ready for installation and to be in accordance with NHBC Standards 6.4 and 6.5. They are to have 1 hour FR in line with the Architect's Specification

All dimensions are taken from Architect's drawings and are to be confirmed on site.

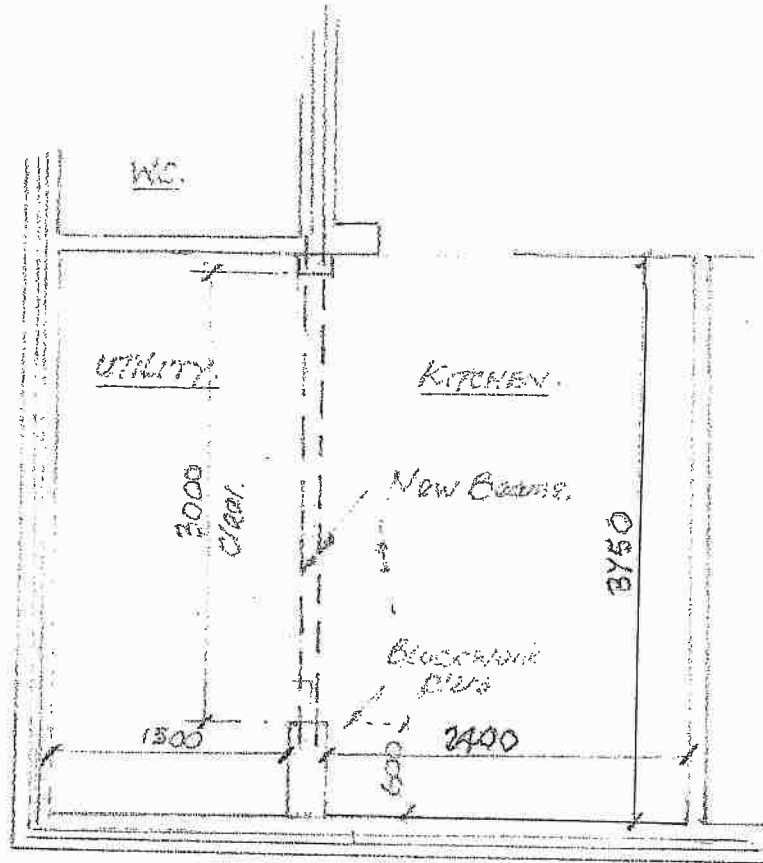
The purpose of these calculations is to determine the size of the new beams and their supporting padstones

Demolition and installation of the new works is to be carried out in a safe manner. All temporary works, propping, lifting etc. must be designed and installed by competent persons to the approval of the supervising authority.

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Location

27, SWAN ROAD



PLAN

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Location

27. SWAN ROAD.



GABLE ELEVATIONS

LOADINGS.

Live Load, roofs - 0.75 kN/m^2

Dead load main roof:-

Tiles	0.5 kN/m^2
Battens/Felt.	$0.04 "$
Rafters.	0.08
Ceiling joists	0.08
P/Board/skin	0.15
Insulation/services	0.15
Σ	<u>1.00 kN/m^2</u>

External Wall

100 b/wk + render.	2.5 kN/m^2
100 block + plaster.	$2.2 "$
Σ	<u>4.7 kN/m^2</u>

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Location

27. SWAN RD.,

Dead Load Utility Roof.

Chippings + felt	- 0.42 kN/m ²
T & G Boards	0.12 "
Joists	0.08
R/Board + Skim	0.15
Insulation	0.03
Σ	<u>0.80 kN/m²</u>

Live Load 1st Floor - 1.5 kN/m²

Dead Load 1st Floor:-

Boards	- 0.12
Joists	0.10
R/Board + Skim	0.15
Services	0.03
Σ	<u>0.40 kN/m²</u>

Load to inner beam

Roof, Live:- $0.75 \times 6.5/2 = 2.44 \text{ kN/m}$

Dead:- $1.0 \times 6.5/2 = 3.25 "$

1st Floor Live $1.5 \times 2.4/2 = 1.8 "$

Dead $0.4 \times 2.4/2 = 0.48 "$

Int Skin of ext wall $2.2 \times 2.5 \text{ approx} = 5.50$

13.47 kN/m

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Location

27. Swan Rd.

Load to outer beam.

Utility Roof: Live - $0.75 \times 1.5/2 = 0.56$

Dead - $0.8 \times 1.5/2 = 0.60$

Ext Skin of cary wall - $2.5 \times 2.5 = 6.25$
7.41 kN/m

For ease of construction design for worst case (13.47 kN/m) so both beams are the same.

Max service moment (eff span 3.3 m).

$= \frac{13.47 \times 3.3^2}{8} = \underline{\underline{18.3 \text{ kNm}}}$

Try 305x102x25 UB.

$I_{xx} = 287.9 \text{ cm}^4$; $r_{yy} = 1.96 \text{ cm}$; $I_{xx} = 4387 \text{ cm}^4$

$D/T = 45$; $L/r_{yy} = \frac{330}{1.96} = 168$

Table 3a
B3 449

permissible stress in bending, p_{bc} , = 68 N/mm^2

Actual " " " $f_{bc} = \frac{18.3 \times 10^3}{287.9} = 63.5 \text{ N/mm}^2$

OK.

Check Deflection (under all loads).

$\delta = \frac{5}{384} \times \frac{(13.47 \times 3.0) 10^3 \times 3300^3}{210000 \times 4387 \times 10^4} = 2.0 \text{ mm.} \therefore \text{OK.}$
 $\left(< \frac{L}{360} \right)$

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27. Swan Rd.,

Padstones.

$$12 \times 17 \times 3 \frac{1}{2} = 20 \text{ kN.}$$

20 x 2.

20 20 kN.

305 x 102 x 25 UB x 2.

200 x 200 x 6 m.s. plate
welded to U/s beams.

330 x 300 x 140
p.c. cone. padstone.

Max. bearing stress under metal plate

$$= \frac{40 \times 10^3 \times 1.6^*}{200 \times 280} = 1.14 \text{ N/mm}^2 < f_{cu} \times 0.4 \text{ OK}$$

* all loads
taken as
live.

Max stress on blockwork beneath padstones.

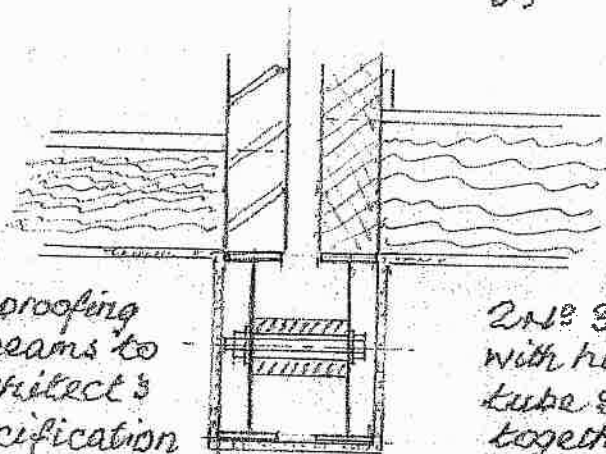
$$= \frac{40 \times 10^3 \times 1.6^*}{330 \times 300} = 0.65 \text{ N/mm}^2$$

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fig 5

$$f_k = 3.2 \text{ N/mm}^2 \text{ (table 2b)} \quad \gamma_m = 3.5 \text{ (table 4)}$$

permissible stress on blockwork

$$= 1.25 \times \frac{3.2}{3.5} = 1.14 \text{ N/mm}^2 > 0.65 \therefore \text{OK.}$$



Fireproofing
to beams to
Architect's
Specification

2N^o 305 x 102 x 25 UB^s
with hardwood or steel
tube spacers bolted
together with 10 mm ϕ
bolts at 900 c/s (4N^o).