

# Vale Consultancy

CONSULTING CIVIL & STRUCTURAL ENGINEERS

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## STRUCTURAL CALCULATIONS

Angus House  
Aberfan  
CF48 4TQ

Prepared for: Liam Taylor  
Project Ref: 23691

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**DOCUMENT CONTROL**

|                              |                                |
|------------------------------|--------------------------------|
| <b>Project:</b>              | Angus House, Aberfan, CF48 4TQ |
| <b>Client:</b>               | Liam Taylor                    |
| <b>Vale Consultancy Ref:</b> | 23691                          |

| <b>Issue</b> | <b>Prepared by</b>          | <b>Approved by</b>                                                       | <b>Date</b> | <b>Status</b> |
|--------------|-----------------------------|--------------------------------------------------------------------------|-------------|---------------|
| 01           | Louis Morgan<br>BEng (Hons) | Chris Danielsen<br><i>BEng (Hons) CEng MStructE</i><br>Regional Director | 19.12.2025  | First issue   |
| A            | Louis Morgan<br>BEng (Hons) | Matt Jones<br><i>MEng FStructE FICE CEng</i><br>Managing Director        | 17.03.2026  | Revision A    |
|              |                             |                                                                          |             |               |
|              |                             |                                                                          |             |               |

## **DESIGN STATEMENT**

The design has been completed in accordance with British Standards BS6399, BS5628 (Masonry), BS5268 (Timber) & BS 5950 (Steel).

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Information for this has been collated from survey/site visit and information provided by the client.

The design is for concrete trench fill strip foundations, to the property at the above address, with a suspended beam & block floor, a timber frame internal skin and changes in external level around the property.

The steel fabricator and contractor must check all site dimensions for the steel beams and posts prior to fabrication.

Existing & proposed blockwork assumed to have minimum 7.3N/mm<sup>2</sup> compressive strength.

Refer to our drawing 23691- Rev A V1(Retaining Wall & Foundation General Arrangement)A1 for references.

Foundations have been designed for an assumed bearing pressure of 75KN/m<sup>2</sup>, which is to be confirmed prior to the works.

All dimensions, weights, member lengths, member tables, and any other relevant design information contained within this package is for analysis, and design purposes only, for submission to building control, and must not be used for pricing or fabrication purposes. All queries are to be directed to the engineer prior to tendering, pricing or fabrication. All structural members dimensions need to be taken accurately on site by the contractor prior to fabrication.

***During any initial site visits performed by our Engineer, assumptions have to be made where structural elements may have been obscured by finishes. Opening up works should be undertaken prior to fabrication or construction of any structural members to confirm that the structural layout as indicated in our proposed sketches/detailed drawings is correct.***

***If there are any discrepancies, the Engineer MUST be informed immediately, and prior to proceeding with construction works on site.***

### **CDM Comments:**

- All temporary propping/support is to correspond to contractor's specification and details.

|                                                                                                                                                                                                                                |                                |            |          |            |                |            |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|------------|----------|------------|----------------|------------|
|  <b>Vale Consultancy</b><br><small>CONSULTING CIVIL &amp; STRUCTURAL ENGINEERS</small><br>29 Bocam Park<br>Old Field Road, Pencoed<br>CF35 5LJ | Project                        |            |          |            | Job Ref.       |            |
|                                                                                                                                                                                                                                | Angus House, Aberfan, CF48 4TQ |            |          |            | 23691          |            |
|                                                                                                                                                                                                                                | Section                        |            |          |            | Sheet no./rev. |            |
|                                                                                                                                                                                                                                | Design loadings                |            |          |            | 3              |            |
|                                                                                                                                                                                                                                | Calc. by                       | Date       | Chk'd by | Date       | App'd by       | Date       |
|                                                                                                                                                                                                                                | LM                             | 17/03/2026 | MJ       | 17/03/2026 | MJ             | 17/03/2026 |

### Angus House Road Design Loadings

Steel design calculations have been completed in accordance with BS5950.

All dimensions stated in the following calculations are for design purposes only and not for use for fabrication or construction purposes. All dimensions must be checked by a competent contractor prior to fabrication or construction and any discrepancies found are to be reported to the design engineer.

#### Design Loadings

##### 1. Roof 35° Pitch

|                            |   |                                                                                  |
|----------------------------|---|----------------------------------------------------------------------------------|
| Dead Loading:              |   |                                                                                  |
| Tiles                      | = | 0.45 kN/m <sup>2</sup>                                                           |
| Insulation, Felt & Battens | = | 0.10 kN/m <sup>2</sup>                                                           |
| Truss or Purlins/Rafters   | = | 0.20 kN/m <sup>2</sup>                                                           |
| Plasterboard & skim        | = | 0.15 kN/m <sup>2</sup>                                                           |
|                            |   | <u>0.90 kN/m<sup>2</sup> /cos (35) = 1.10kN/m<sup>2</sup> Total Dead Loading</u> |
| -----                      |   |                                                                                  |
| Imposed Loading:           |   |                                                                                  |
| Snow                       | = | <u>0.60 kN/m<sup>2</sup> Total Live Loading</u>                                  |
|                            |   | -----                                                                            |

##### 2. Walls

|               |   |                                                 |
|---------------|---|-------------------------------------------------|
| Dead Loading: |   |                                                 |
| Render        | = | 0.15 kN/m <sup>2</sup>                          |
| 100mm masonry | = | 2.20 kN/m <sup>2</sup>                          |
| Insulation    | = | 0.10 kN/m <sup>2</sup>                          |
| Timber stud   | = | 0.20 kN/m <sup>2</sup>                          |
| Plaster       | = | 0.15 kN/m <sup>2</sup>                          |
|               |   | <u>2.80 kN/m<sup>2</sup> Total Dead Loading</u> |
| -----         |   |                                                 |

##### 3. First Floor

|                          |   |                                                 |
|--------------------------|---|-------------------------------------------------|
| Dead Loading:            |   |                                                 |
| Boarding                 | = | 0.15 kN/m <sup>2</sup>                          |
| Insulation               | = | 0.05 kN/m <sup>2</sup>                          |
| Joists                   | = | 0.15 kN/m <sup>2</sup>                          |
| Plaster and skim Ceiling | = | 0.15 kN/m <sup>2</sup>                          |
|                          |   | <u>0.50 kN/m<sup>2</sup> Total Dead Loading</u> |
| -----                    |   |                                                 |
| Imposed Loading:         |   |                                                 |
| Residential              | = | <u>1.50 kN/m<sup>2</sup> Total Live Loading</u> |
|                          |   | -----                                           |

##### 4. Ground Floor

|                    |   |                                                 |
|--------------------|---|-------------------------------------------------|
| Dead Loading:      |   |                                                 |
| 75mm Screed        | = | 1.80 kN/m <sup>2</sup>                          |
| Insulation         | = | 0.20 kN/m <sup>2</sup>                          |
| 150mm Beam & Block | = | 2.50 kN/m <sup>2</sup>                          |
|                    |   | <u>4.50 kN/m<sup>2</sup> Total Dead Loading</u> |
| -----              |   |                                                 |
| Imposed Loading:   |   |                                                 |
| Residential        | = | <u>1.50 kN/m<sup>2</sup> Total Live Loading</u> |



### ANGUS HOUSE, ABERFAN

#### EXTERNAL STRIP FOUNDATION LOADINGS

Ext wall  $G_n = 2.80 \text{ kN/m}^2 \times 6.0 \text{ m} = 16.80 \text{ kN/m}$

Roof  $G_n = 1.10 \text{ kN/m}^2 \times 7.0 \text{ m} / 2 = 3.85 \text{ kN/m}$

$$Q_n = 0.60 \text{ kN/m}^2 \times 7.0 \text{ m} / 2 = 2.10 \text{ kN/m}$$

First floor  $G_n = 0.50 \text{ kN/m}^2 \times 3.60 \text{ m} / 2 = 0.90 \text{ kN/m}$

$$Q_n = 1.50 \text{ kN/m}^2 \times 3.60 \text{ m} / 2 = 2.70 \text{ kN/m}$$

Ground floor  $G_n = 4.50 \text{ kN/m}^2 \times 3.60 \text{ m} / 2 = 8.10 \text{ kN/m}$

$$Q_n = 1.50 \text{ kN/m}^2 \times 3.60 \text{ m} / 2 = 2.70 \text{ kN/m}$$

TOTAL  $G_n = 29.65 \text{ kN/m}$  ,  $Q_n = 7.50 \text{ kN/m}$

FOR ALLOWABLE  $75 \text{ kN/m}^2$  BEARING PRESSURE, 900mm WIDE TRENCH FSH STRIP OK/

#### INTERNAL STRIP FOUNDATION LOADINGS

Int wall (Sub)  $G_n = 4.80 \text{ kN/m}^2 \times 0.75 \text{ m} = 3.60 \text{ kN/m}$

First floor  $G_n = 0.50 \text{ kN/m}^2 \times 6.80 \text{ m} / 2 = 1.70 \text{ kN/m}$

$$Q_n = 1.50 \text{ kN/m}^2 \times 6.80 \text{ m} / 2 = 5.10 \text{ kN/m}$$

Ground floor  $G_n = 4.50 \text{ kN/m}^2 \times 6.80 \text{ m} / 2 = 15.30 \text{ kN/m}$

$$Q_n = 1.50 \text{ kN/m}^2 \times 6.80 \text{ m} / 2 = 5.10 \text{ kN/m}$$

Int wall (Stud)  $G_n = 0.60 \text{ kN/m}^2 \times 2.80 \text{ m} = 1.70 \text{ kN/m}$

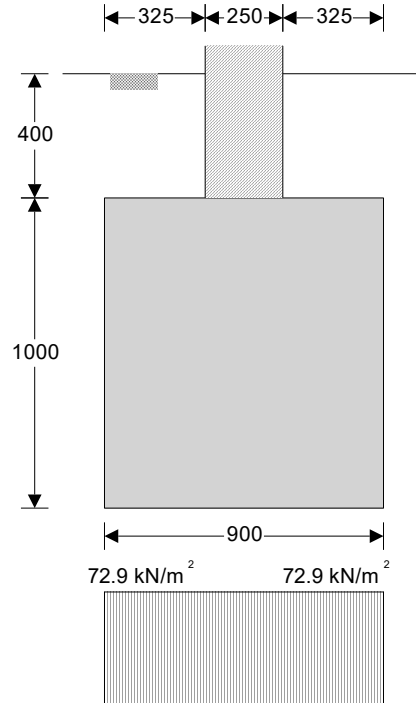
TOTAL  $G_n = 22.30 \text{ kN/m}$  ,  $Q_n = 10.20 \text{ kN/m}$

FOR ALLOWABLE  $75 \text{ kN/m}^2$  BEARING PRESSURE, 750mm WIDE TRENCH STRIP OK/

|                                                    |                          |                  |                            |                              |                             |
|----------------------------------------------------|--------------------------|------------------|----------------------------|------------------------------|-----------------------------|
| Project<br>Angus House, Aberfan                    |                          |                  |                            | Job no.<br>23691             |                             |
| Calcs for<br>External trench fill strip foundation |                          |                  |                            | Start page no./Revision<br>5 |                             |
| Calcs by<br>LM                                     | Calcs date<br>17/03/2026 | Checked by<br>MJ | Checked date<br>17/03/2026 | Approved by<br>MJ            | Approved date<br>17/03/2026 |

## STRIP FOOTING ANALYSIS AND DESIGN (BS8110-1:1997)

Tedds calculation version 2.0.07



### Strip footing details

Width of strip footing  
Depth of strip footing  
Depth of soil over strip footing  
Density of concrete

$B = 900$  mm  
 $h = 1000$  mm  
 $h_{\text{soil}} = 400$  mm  
 $\rho_{\text{conc}} = 23.6$  kN/m<sup>3</sup>

### Load details

Load width  
Load eccentricity

$b = 250$  mm  
 $e_P = 0$  mm

### Soil details

Density of soil  
Design shear strength  
Design base friction  
Allowable bearing pressure

$\rho_{\text{soil}} = 20.0$  kN/m<sup>3</sup>  
 $\phi' = 25.0$  deg  
 $\delta = 19.3$  deg  
 $P_{\text{bearing}} = 75$  kN/m<sup>2</sup>

### Axial loading on strip footing

Dead axial load  
Imposed axial load  
Wind axial load  
Total axial load

$P_G = 29.7$  kN/m  
 $P_Q = 7.5$  kN/m  
 $P_W = 0.0$  kN/m  
 $P = 37.2$  kN/m

### Foundation loads

Dead surcharge load  
Imposed surcharge load  
Strip footing self weight  
Soil self weight

$F_{\text{Gsur}} = 0.000$  kN/m<sup>2</sup>  
 $F_{\text{Qsur}} = 0.000$  kN/m<sup>2</sup>  
 $F_{\text{swt}} = h \times \rho_{\text{conc}} = 23.600$  kN/m<sup>2</sup>  
 $F_{\text{soil}} = h_{\text{soil}} \times \rho_{\text{soil}} = 8.000$  kN/m<sup>2</sup>

|                                                    |                          |                  |                            |                              |                             |
|----------------------------------------------------|--------------------------|------------------|----------------------------|------------------------------|-----------------------------|
| Project<br>Angus House, Aberfan                    |                          |                  |                            | Job no.<br>23691             |                             |
| Calcs for<br>External trench fill strip foundation |                          |                  |                            | Start page no./Revision<br>6 |                             |
| Calcs by<br>LM                                     | Calcs date<br>17/03/2026 | Checked by<br>MJ | Checked date<br>17/03/2026 | Approved by<br>MJ            | Approved date<br>17/03/2026 |

Total foundation load

$$F = B \times (F_{Gsur} + F_{Qsur} + F_{swt} + F_{soil}) = \mathbf{28.4 \text{ kN/m}}$$

#### Calculate base reaction

Total base reaction

$$T = F + P = \mathbf{65.6 \text{ kN/m}}$$

Eccentricity of base reaction in x

$$e_T = (P \times e_P + M + H \times h) / T = \mathbf{0 \text{ mm}}$$

**Base reaction acts within middle third of base**

#### Calculate base pressures

$$q_1 = (T / B) \times (1 - 6 \times e_T / B) = \mathbf{72.878 \text{ kN/m}^2}$$

$$q_2 = (T / B) \times (1 + 6 \times e_T / B) = \mathbf{72.878 \text{ kN/m}^2}$$

Minimum base pressure

$$q_{min} = \min(q_1, q_2) = \mathbf{72.878 \text{ kN/m}^2}$$

Maximum base pressure

$$q_{max} = \max(q_1, q_2) = \mathbf{72.878 \text{ kN/m}^2}$$

**PASS - Maximum base pressure is less than allowable bearing pressure**

#### Material details

Characteristic strength of concrete

$$f_{cu} = \mathbf{30 \text{ N/mm}^2}$$

#### Calculate base lengths

Left hand length

$$B_L = B / 2 + e_P = \mathbf{450 \text{ mm}}$$

Right hand length

$$B_R = B / 2 - e_P = \mathbf{450 \text{ mm}}$$

#### Calculate rate of change of base pressure

Length of base reaction

$$B_x = B = \mathbf{900 \text{ mm}}$$

Rate of change of base pressure

$$C_x = (q_1 - q_2) / B_x = \mathbf{0.000 \text{ kN/m}^2/\text{m}}$$

#### Calculate minimum depth of unreinforced strip footing

Average pressure to left of strip footing

$$q_L = q_1 - C_x \times (B_L - b / 2) / 2 = \mathbf{72.878 \text{ kN/m}^2}$$

Minimum depth to left of strip footing

$$h_{Lmin} = (B_L - b / 2) \times \max(0.15 \times [(q_L / 1 \text{ kN/m}^2)^2 / (f_{cu} / 1 \text{ N/mm}^2)]^{1/4}, 1) = \mathbf{325 \text{ mm}}$$

Average pressure to right of strip footing

$$q_R = q_2 + C_x \times (B_R - b / 2) / 2 = \mathbf{72.878 \text{ kN/m}^2}$$

Minimum depth to right of strip footing

$$h_{Rmin} = (B_R - b / 2) \times \max(0.15 \times [(q_R / 1 \text{ kN/m}^2)^2 / (f_{cu} / 1 \text{ N/mm}^2)]^{1/4}, 1) = \mathbf{325 \text{ mm}}$$

Minimum depth of unreinforced strip footing

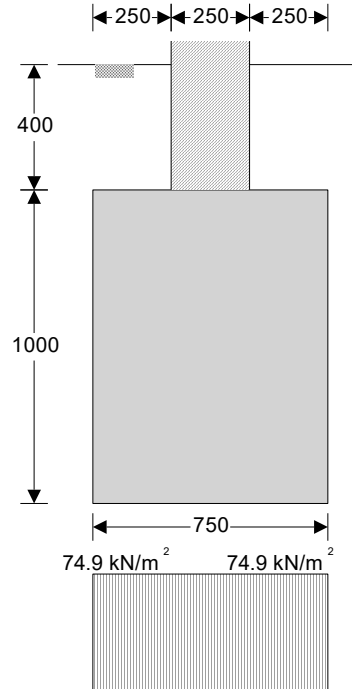
$$h_{min} = \max(h_{Lmin}, h_{Rmin}, 300 \text{ mm}) = \mathbf{325 \text{ mm}}$$

**PASS - Unreinforced strip footing depth is greater than minimum**

|                                                           |                                 |                         |                                   |                                     |                                    |
|-----------------------------------------------------------|---------------------------------|-------------------------|-----------------------------------|-------------------------------------|------------------------------------|
| Project<br><b>Angus House, Aberfan</b>                    |                                 |                         |                                   | Job no.<br><b>23691</b>             |                                    |
| Calcs for<br><b>Internal trench fill strip foundation</b> |                                 |                         |                                   | Start page no./Revision<br><b>7</b> |                                    |
| Calcs by<br><b>LM</b>                                     | Calcs date<br><b>17/03/2026</b> | Checked by<br><b>MJ</b> | Checked date<br><b>17/03/2026</b> | Approved by<br><b>MJ</b>            | Approved date<br><b>17/03/2026</b> |

## STRIP FOOTING ANALYSIS AND DESIGN (BS8110-1:1997)

Tedds calculation version 2.0.07



### Strip footing details

Width of strip footing  
Depth of strip footing  
Depth of soil over strip footing  
Density of concrete

$B = 750 \text{ mm}$   
 $h = 1000 \text{ mm}$   
 $h_{\text{soil}} = 400 \text{ mm}$   
 $\rho_{\text{conc}} = 23.6 \text{ kN/m}^3$

### Load details

Load width  
Load eccentricity

$b = 250 \text{ mm}$   
 $e_P = 0 \text{ mm}$

### Soil details

Density of soil  
Design shear strength  
Design base friction  
Allowable bearing pressure

$\rho_{\text{soil}} = 20.0 \text{ kN/m}^3$   
 $\phi' = 25.0 \text{ deg}$   
 $\delta = 19.3 \text{ deg}$   
 $P_{\text{bearing}} = 75 \text{ kN/m}^2$

### Axial loading on strip footing

Dead axial load  
Imposed axial load  
Wind axial load  
Total axial load

$P_G = 22.3 \text{ kN/m}$   
 $P_Q = 10.2 \text{ kN/m}$   
 $P_W = 0.0 \text{ kN/m}$   
 $P = 32.5 \text{ kN/m}$

### Foundation loads

Dead surcharge load  
Imposed surcharge load  
Strip footing self weight  
Soil self weight

$F_{G_{\text{sur}}} = 0.000 \text{ kN/m}^2$   
 $F_{Q_{\text{sur}}} = 0.000 \text{ kN/m}^2$   
 $F_{\text{swt}} = h \times \rho_{\text{conc}} = 23.600 \text{ kN/m}^2$   
 $F_{\text{soil}} = h_{\text{soil}} \times \rho_{\text{soil}} = 8.000 \text{ kN/m}^2$

|                                                    |                          |                  |                            |                              |                             |
|----------------------------------------------------|--------------------------|------------------|----------------------------|------------------------------|-----------------------------|
| Project<br>Angus House, Aberfan                    |                          |                  |                            | Job no.<br>23691             |                             |
| Calcs for<br>Internal trench fill strip foundation |                          |                  |                            | Start page no./Revision<br>8 |                             |
| Calcs by<br>LM                                     | Calcs date<br>17/03/2026 | Checked by<br>MJ | Checked date<br>17/03/2026 | Approved by<br>MJ            | Approved date<br>17/03/2026 |

Total foundation load

$$F = B \times (F_{Gsur} + F_{Qsur} + F_{swt} + F_{soil}) = \mathbf{23.7 \text{ kN/m}}$$

#### Calculate base reaction

Total base reaction

$$T = F + P = \mathbf{56.2 \text{ kN/m}}$$

Eccentricity of base reaction in x

$$e_T = (P \times e_P + M + H \times h) / T = \mathbf{0 \text{ mm}}$$

**Base reaction acts within middle third of base**

#### Calculate base pressures

$$q_1 = (T / B) \times (1 - 6 \times e_T / B) = \mathbf{74.933 \text{ kN/m}^2}$$

$$q_2 = (T / B) \times (1 + 6 \times e_T / B) = \mathbf{74.933 \text{ kN/m}^2}$$

Minimum base pressure

$$q_{min} = \min(q_1, q_2) = \mathbf{74.933 \text{ kN/m}^2}$$

Maximum base pressure

$$q_{max} = \max(q_1, q_2) = \mathbf{74.933 \text{ kN/m}^2}$$

**PASS - Maximum base pressure is less than allowable bearing pressure**

#### Material details

Characteristic strength of concrete

$$f_{cu} = \mathbf{30 \text{ N/mm}^2}$$

#### Calculate base lengths

Left hand length

$$B_L = B / 2 + e_P = \mathbf{375 \text{ mm}}$$

Right hand length

$$B_R = B / 2 - e_P = \mathbf{375 \text{ mm}}$$

#### Calculate rate of change of base pressure

Length of base reaction

$$B_x = B = \mathbf{750 \text{ mm}}$$

Rate of change of base pressure

$$C_x = (q_1 - q_2) / B_x = \mathbf{0.000 \text{ kN/m}^2/\text{m}}$$

#### Calculate minimum depth of unreinforced strip footing

Average pressure to left of strip footing

$$q_L = q_1 - C_x \times (B_L - b / 2) / 2 = \mathbf{74.933 \text{ kN/m}^2}$$

Minimum depth to left of strip footing

$$h_{Lmin} = (B_L - b / 2) \times \max(0.15 \times [(q_L / 1 \text{ kN/m}^2)^2 / (f_{cu} / 1 \text{ N/mm}^2)]^{1/4}, 1) = \mathbf{250 \text{ mm}}$$

Average pressure to right of strip footing

$$q_R = q_2 + C_x \times (B_R - b / 2) / 2 = \mathbf{74.933 \text{ kN/m}^2}$$

Minimum depth to right of strip footing

$$h_{Rmin} = (B_R - b / 2) \times \max(0.15 \times [(q_R / 1 \text{ kN/m}^2)^2 / (f_{cu} / 1 \text{ N/mm}^2)]^{1/4}, 1) = \mathbf{250 \text{ mm}}$$

Minimum depth of unreinforced strip footing

$$h_{min} = \max(h_{Lmin}, h_{Rmin}, 300 \text{ mm}) = \mathbf{300 \text{ mm}}$$

**PASS - Unreinforced strip footing depth is greater than minimum**