

Important Design of Two Way Slab System and Footing Formulas PDF



Formulas Examples with Units

List of 12 Important Design of Two Way Slab System and Footing Formulas

1) Design of Two Way Slab System Formulas

1.1) Concrete Shear Strength at Critical Sections Formula

Formula

$$V = \left(2 \cdot (f_c)^{\frac{1}{2}} \right) \cdot d' \cdot b_o$$

Example with Units

$$41.8282 \text{ Pa} = \left(2 \cdot (15 \text{ MPa})^{\frac{1}{2}} \right) \cdot 10 \text{ mm} \cdot 0.54 \text{ m}$$

Evaluate Formula

1.2) Equation for Punching Shear Design Formula

Formula

$$\phi V_n = \phi \cdot (V_c + V_s)$$

Example with Units

$$161.5 \text{ MPa} = 0.85 \cdot (90 \text{ MPa} + 100 \text{ MPa})$$

Evaluate Formula

1.3) Maximum Slab thickness Formula

Formula

$$h = \left(\frac{l_n}{36} \right) \cdot \left(0.8 + \frac{f_{y\text{steel}}}{200000} \right)$$

Example with Units

$$3509.1889 \text{ mm} = \left(\frac{101 \text{ mm}}{36} \right) \cdot \left(0.8 + \frac{250 \text{ MPa}}{200000} \right)$$

Evaluate Formula

2) Footing Formulas

2.1) Maximum Moment for Symmetrical Concrete Wall Footing Formula

Formula

$$M'_{\text{max}} = \left(\frac{P}{8} \right) \cdot (b - t)^2$$

Example with Units

$$85.6411 \text{ N}^* \text{m} = \left(\frac{11.76855 \text{ Pa}}{8} \right) \cdot (0.2 \text{ m} - 7.83 \text{ m})^2$$

Evaluate Formula

2.2) Tensile Bending Stress at Bottom when Footing is Deep Formula

Formula

$$B = \left(6 \cdot \frac{M}{D^2} \right)$$

Example with Units

$$12997.7493 \text{ N}^* \text{mm} = \left(6 \cdot \frac{500.5 \text{ N}}{15.2 \text{ m}^2} \right)$$

Evaluate Formula



2.3) Uniform Pressure on Soil given Maximum Moment Formula

Formula

$$P = \frac{8 \cdot M'_{\max}}{(b - t)^2}$$

Example with Units

$$6.8722 \text{ Pa} = \frac{8 \cdot 50.01 \text{ N}\cdot\text{m}}{(0.2 \text{ m} - 7.83 \text{ m})^2}$$

Evaluate Formula 

3) Partial Safety Factors for Loads Formulas

3.1) Basic Load Effect given Ultimate Strength for Applied Wind Loads Formula

Formula

$$DL = \frac{U - (1.3 \cdot W)}{0.9}$$

Example with Units

$$12.1111 \text{ kN/m}^2 = \frac{20 \text{ kN/m}^2 - (1.3 \cdot 7 \text{ kN/m}^2)}{0.9}$$

Evaluate Formula 

3.2) Basic Load Effect given Ultimate Strength for Unapplied Wind and Earthquake Loads Formula

Formula

$$DL = \frac{U - (1.7 \cdot LL)}{1.4}$$

Example with Units

$$8.2143 \text{ kN/m}^2 = \frac{20 \text{ kN/m}^2 - (1.7 \cdot 5 \text{ kN/m}^2)}{1.4}$$

Evaluate Formula 

3.3) Live Load Effect given Ultimate Strength for Unapplied Wind and Earthquake Loads Formula

Formula

$$LL = \frac{U - (1.4 \cdot DL)}{1.7}$$

Example with Units

$$3.5212 \text{ kN/m}^2 = \frac{20 \text{ kN/m}^2 - (1.4 \cdot 10.01 \text{ kN/m}^2)}{1.7}$$

Evaluate Formula 

3.4) Ultimate Strength when Wind and Earthquake Loads are not Applied Formula

Formula

$$U = (1.4 \cdot DL) + (1.7 \cdot LL)$$

Example with Units

$$22.514 \text{ kN/m}^2 = (1.4 \cdot 10.01 \text{ kN/m}^2) + (1.7 \cdot 5 \text{ kN/m}^2)$$

Evaluate Formula 

3.5) Ultimate Strength when Wind Loads are Applied Formula

Formula

$$U = (0.9 \cdot DL) + (1.3 \cdot W)$$

Example with Units

$$18.109 \text{ kN/m}^2 = (0.9 \cdot 10.01 \text{ kN/m}^2) + (1.3 \cdot 7 \text{ kN/m}^2)$$

Evaluate Formula 

3.6) Wind Load Effect given Ultimate Strength for Applied Wind Loads Formula

Formula

$$W = \frac{U - (0.9 \cdot DL)}{1.3}$$

Example with Units

$$8.4546 \text{ kN/m}^2 = \frac{20 \text{ kN/m}^2 - (0.9 \cdot 10.01 \text{ kN/m}^2)}{1.3}$$

Evaluate Formula 



Variables used in list of Design of Two Way Slab System and Footing Formulas above

- **b** Width of Footing (Meter)
- **B** Tensile Bending Stress (Newton Millimeter)
- **b_o** Perimeter of Critical Section (Meter)
- **d'** Distance from Compression to Centroid Reinforcement (Millimeter)
- **D** Depth of Footing (Meter)
- **DL** Dead Load (Kilonewton per Square Meter)
- **f_c** 28 Day Compressive Strength of Concrete (Megapascal)
- **f_{ysteel}** Yield Strength of Steel (Megapascal)
- **h** Maximum Slab Thickness (Millimeter)
- **l_n** Length of Clear Span in Long Direction (Millimeter)
- **LL** Live Load (Kilonewton per Square Meter)
- **M** Factored Moment (Newton)
- **M'max** Maximum Moment (Newton Meter)
- **P** Uniform Pressure on Soil (Pascal)
- **t** Wall Thickness (Meter)
- **U** Ultimate Strength (Kilonewton per Square Meter)
- **V** Shear Strength of Concrete at Critical Section (Pascal)
- **V_c** Nominal Shear Strength of Concrete (Megapascal)
- **V_s** Nominal Shear Strength by Reinforcement (Megapascal)
- **W** Wind Load (Kilonewton per Square Meter)
- **φ** Capacity Reduction Factor
- **φV_n** Punching Shear (Megapascal)

Constants, Functions, Measurements used in list of Design of Two Way Slab System and Footing Formulas above

- **Measurement: Length** in Millimeter (mm), Meter (m)
Length Unit Conversion 
- **Measurement: Pressure** in Pascal (Pa), Megapascal (MPa), Kilonewton per Square Meter (kN/m²)
Pressure Unit Conversion 
- **Measurement: Force** in Newton (N)
Force Unit Conversion 
- **Measurement: Moment of Force** in Newton Meter (N*m)
Moment of Force Unit Conversion 
- **Measurement: Bending Moment** in Newton Millimeter (N*mm)
Bending Moment Unit Conversion 
- **Measurement: Stress** in Megapascal (MPa)
Stress Unit Conversion 



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