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Bearing Capacity of Non-cohesive Soil Formulas

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List of 18 Bearing Capacity of Non-cohesive Soil Formulas

Bearing Capacity of Non-cohesive Soil

1) Bearing Capacity Factor Dependent on Surcharge for Circular Footing

$$\text{fx } N_q = \frac{q_{fc} - (0.3 \cdot \gamma \cdot d_{\text{section}} \cdot N_\gamma)}{\sigma_s}$$

[Open Calculator !\[\]\(a870788d6ed9b8fd294b7654a8c8526b_img.jpg\)](#)

$$\text{ex } 1.843137 = \frac{127.8\text{kPa} - (0.3 \cdot 18\text{kN/m}^3 \cdot 5\text{m} \cdot 1.6)}{45.9\text{kN/m}^2}$$

2) Bearing Capacity Factor Dependent on Surcharge for Square Footing

$$\text{fx } N_q = \frac{q_{fc} - (0.4 \cdot \gamma \cdot B \cdot N_\gamma)}{\sigma_s}$$

[Open Calculator !\[\]\(c50c8b7b2cc2cf9ff925edec0ee94c0d_img.jpg\)](#)

$$\text{ex } 2.282353 = \frac{127.8\text{kPa} - (0.4 \cdot 18\text{kN/m}^3 \cdot 2\text{m} \cdot 1.6)}{45.9\text{kN/m}^2}$$



3) Bearing Capacity Factor Dependent on Surcharge for Strip Footing

$$fx \quad N_q = \frac{q_{fc} - (0.5 \cdot \gamma \cdot B \cdot N_\gamma)}{\sigma_s}$$

[Open Calculator !\[\]\(cbe80b694ebd74fcfe136a095b608235_img.jpg\)](#)

$$ex \quad 2.156863 = \frac{127.8\text{kPa} - (0.5 \cdot 18\text{kN/m}^3 \cdot 2\text{m} \cdot 1.6)}{45.9\text{kN/m}^2}$$

4) Bearing Capacity Factor Dependent on Unit Weight for Circular Footing

$$fx \quad N_\gamma = \frac{q_{fc} - (\sigma_s \cdot N_q)}{0.3 \cdot \gamma \cdot d_{\text{section}}}$$

[Open Calculator !\[\]\(3e2231b1ad3ca8da8658228c00dd08e0_img.jpg\)](#)

$$ex \quad 1.316333 = \frac{127.8\text{kPa} - (45.9\text{kN/m}^2 \cdot 2.01)}{0.3 \cdot 18\text{kN/m}^3 \cdot 5\text{m}}$$

5) Bearing Capacity Factor Dependent on Unit Weight for Square Footing

$$fx \quad N_\gamma = \frac{q_{fc} - (\sigma_s \cdot N_q)}{0.4 \cdot \gamma \cdot B}$$

[Open Calculator !\[\]\(0d5ec72f61334709c3fc9450209b754f_img.jpg\)](#)

$$ex \quad 2.468125 = \frac{127.8\text{kPa} - (45.9\text{kN/m}^2 \cdot 2.01)}{0.4 \cdot 18\text{kN/m}^3 \cdot 2\text{m}}$$



6) Bearing Capacity Factor Dependent on Unit Weight for Strip Footing

$$f_x \quad N_\gamma = \frac{q_{fc} - (\sigma_s \cdot N_q)}{0.5 \cdot \gamma \cdot B}$$

[Open Calculator !\[\]\(e78f798d4ea5c530c9db49e7d26e6b95_img.jpg\)](#)

$$ex \quad 1.9745 = \frac{127.8kPa - (45.9kN/m^2 \cdot 2.01)}{0.5 \cdot 18kN/m^3 \cdot 2m}$$

7) Bearing Capacity of Non Cohesive Soil for Circular Footing

$$f_x \quad q_{fc} = (\sigma_s \cdot N_q) + (0.3 \cdot \gamma \cdot d_{section} \cdot N_\gamma)$$

[Open Calculator !\[\]\(05be7c7a8995decd503647c99211f7c2_img.jpg\)](#)

$$ex \quad 135.459kPa = (45.9kN/m^2 \cdot 2.01) + (0.3 \cdot 18kN/m^3 \cdot 5m \cdot 1.6)$$

8) Bearing Capacity of Non Cohesive Soil for Square Footing

$$f_x \quad q_{fc} = (\sigma_s \cdot N_q) + (0.4 \cdot \gamma \cdot B \cdot N_\gamma)$$

[Open Calculator !\[\]\(fe3aebe81acea8d45108cd2768939da7_img.jpg\)](#)

$$ex \quad 115.299kPa = (45.9kN/m^2 \cdot 2.01) + (0.4 \cdot 18kN/m^3 \cdot 2m \cdot 1.6)$$

9) Bearing Capacity of Non Cohesive Soil for Strip Footing

$$f_x \quad q_{fc} = (\sigma_s \cdot N_q) + (0.5 \cdot \gamma \cdot B \cdot N_\gamma)$$

[Open Calculator !\[\]\(899d8b7697d64725bf017d3296cfcf1b_img.jpg\)](#)

$$ex \quad 121.059kPa = (45.9kN/m^2 \cdot 2.01) + (0.5 \cdot 18kN/m^3 \cdot 2m \cdot 1.6)$$



10) Diameter of Circular Footing given Bearing Capacity

$$\text{fx } d_{\text{section}} = \frac{q_{\text{fc}} - (\sigma_s \cdot N_q)}{0.3 \cdot N_\gamma \cdot \gamma}$$

[Open Calculator !\[\]\(e2376d476d06eb31946dc01a69a4403a_img.jpg\)](#)

$$\text{ex } 4.113542\text{m} = \frac{127.8\text{kPa} - (45.9\text{kN/m}^2 \cdot 2.01)}{0.3 \cdot 1.6 \cdot 18\text{kN/m}^3}$$

11) Effective Surcharge given Bearing Capacity of Non Cohesive Soil for Circular Footing

$$\text{fx } \sigma_s = \frac{q_{\text{fc}} - (0.3 \cdot \gamma \cdot d_{\text{section}} \cdot N_\gamma)}{N_q}$$

[Open Calculator !\[\]\(0b5e7e25e8775f7e7e80906ada4f0021_img.jpg\)](#)

$$\text{ex } 42.08955\text{kN/m}^2 = \frac{127.8\text{kPa} - (0.3 \cdot 18\text{kN/m}^3 \cdot 5\text{m} \cdot 1.6)}{2.01}$$

12) Effective Surcharge given Bearing Capacity of Non Cohesive Soil for Square Footing

$$\text{fx } \sigma_s = \frac{q_{\text{fc}} - (0.4 \cdot \gamma \cdot B \cdot N_\gamma)}{N_q}$$

[Open Calculator !\[\]\(bd3b31712ad9bab5a241210fa6925cdd_img.jpg\)](#)

$$\text{ex } 52.1194\text{kN/m}^2 = \frac{127.8\text{kPa} - (0.4 \cdot 18\text{kN/m}^3 \cdot 2\text{m} \cdot 1.6)}{2.01}$$



13) Effective Surcharge given Bearing Capacity of Non Cohesive Soil for Strip Footing

$$\text{fx } \sigma_s = \frac{q_{fc} - (0.5 \cdot \gamma \cdot B \cdot N_\gamma)}{N_q}$$

[Open Calculator !\[\]\(d3fb9f94af8b26d1c844efa9a98805b0_img.jpg\)](#)

$$\text{ex } 49.25373\text{kN/m}^2 = \frac{127.8\text{kPa} - (0.5 \cdot 18\text{kN/m}^3 \cdot 2\text{m} \cdot 1.6)}{2.01}$$

14) Unit Weight of Non Cohesive Soil given Bearing Capacity of Circular Footing

$$\text{fx } \gamma = \frac{q_{fc} - (\sigma_s \cdot N_q)}{0.3 \cdot N_\gamma \cdot d_{\text{section}}}$$

[Open Calculator !\[\]\(e1d6102fe77919492c04879c8450f1f5_img.jpg\)](#)

$$\text{ex } 14.80875\text{kN/m}^3 = \frac{127.8\text{kPa} - (45.9\text{kN/m}^2 \cdot 2.01)}{0.3 \cdot 1.6 \cdot 5\text{m}}$$

15) Unit Weight of Non Cohesive Soil given Bearing Capacity of Square Footing

$$\text{fx } \gamma = \frac{q_{fc} - (\sigma_s \cdot N_q)}{0.4 \cdot N_\gamma \cdot B}$$

[Open Calculator !\[\]\(ab4e2b3fc7e7887b7a72f548aa6f5e60_img.jpg\)](#)

$$\text{ex } 27.76641\text{kN/m}^3 = \frac{127.8\text{kPa} - (45.9\text{kN/m}^2 \cdot 2.01)}{0.4 \cdot 1.6 \cdot 2\text{m}}$$



16) Unit Weight of Non Cohesive Soil given Bearing Capacity of Strip Footing

$$fx \quad \gamma = \frac{q_{fc} - (\sigma_s \cdot N_q)}{0.5 \cdot N_\gamma \cdot B}$$

[Open Calculator !\[\]\(9dfdaff1d86ba3c1f8353b4d1b61b8c5_img.jpg\)](#)

$$ex \quad 22.21313 \text{ kN/m}^3 = \frac{127.8 \text{ kPa} - (45.9 \text{ kN/m}^2 \cdot 2.01)}{0.5 \cdot 1.6 \cdot 2 \text{ m}}$$

17) Width of Square Footing given Bearing Capacity

$$fx \quad B = \frac{q_{fc} - (\sigma_s \cdot N_q)}{0.4 \cdot N_\gamma \cdot \gamma}$$

[Open Calculator !\[\]\(2b376d1a92330ab09dad2665d2f89bf5_img.jpg\)](#)

$$ex \quad 3.085156 \text{ m} = \frac{127.8 \text{ kPa} - (45.9 \text{ kN/m}^2 \cdot 2.01)}{0.4 \cdot 1.6 \cdot 18 \text{ kN/m}^3}$$

18) Width of Strip Footing given Bearing Capacity

$$fx \quad B = \frac{q_{fc} - (\sigma_s \cdot N_q)}{0.5 \cdot N_\gamma \cdot \gamma}$$

[Open Calculator !\[\]\(c444627dab9fee9a1550c053ffaaaae2_img.jpg\)](#)

$$ex \quad 2.468125 \text{ m} = \frac{127.8 \text{ kPa} - (45.9 \text{ kN/m}^2 \cdot 2.01)}{0.5 \cdot 1.6 \cdot 18 \text{ kN/m}^3}$$



Variables Used

- **B** Width of Footing (Meter)
- **d_{section}** Diameter of Section (Meter)
- **N_q** Bearing Capacity Factor dependent on Surcharge
- **N_γ** Bearing Capacity Factor dependent on Unit Weight
- **q_{fc}** Ultimate Bearing Capacity in Soil (Kilopascal)
- **γ** Unit Weight of Soil (Kilonewton per Cubic Meter)
- **σ_s** Effective Surcharge in KiloPascal (Kilonewton per Square Meter)



Constants, Functions, Measurements used

- **Measurement: Length** in Meter (m)
Length Unit Conversion 
- **Measurement: Pressure** in Kilopascal (kPa), Kilonewton per Square Meter (kN/m²)
Pressure Unit Conversion 
- **Measurement: Specific Weight** in Kilonewton per Cubic Meter (kN/m³)
Specific Weight Unit Conversion 



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