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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

Open Calculator

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

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

2) Bearing Capacity Factor Dependent on Surcharge for Square Footing

Open Calculator

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

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

3) Bearing Capacity Factor Dependent on Surcharge for Strip Footing

Open Calculator

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

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

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

Open Calculator

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

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

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

Open Calculator

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

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

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

Open Calculator

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

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

7) Bearing Capacity of Non Cohesive Soil for Circular Footing

Open Calculator

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

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

8) Bearing Capacity of Non Cohesive Soil for Square Footing

Open Calculator

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

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

9) Bearing Capacity of Non Cohesive Soil for Strip Footing

Open Calculator

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

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

10) Diameter of Circular Footing given Bearing Capacity

Open Calculator

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

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

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

Open Calculator

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

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

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

Open Calculator

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

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

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

Open Calculator

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

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

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

Open Calculator

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

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

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

Open Calculator

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

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

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

Open Calculator

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

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

17) Width of Square Footing given Bearing Capacity

Open Calculator

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

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

18) Width of Strip Footing given Bearing Capacity

Open Calculator

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

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

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/m^2)
  Pressure Unit Conversion
- Measurement: **Specific Weight** in Kilonewton per Cubic Meter (kN/m^3)
  Specific Weight Unit Conversion

Check other formula lists

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