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Terzaghi's Analysis: Purely Cohesive Soil Formulas

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List of 23 Terzaghi's Analysis: Purely Cohesive Soil Formulas

Terzaghi's Analysis: Purely Cohesive Soil

1) Angle of Shearing Resistance given Bearing Capacity Factor

Open Calculator

fx $$\varphi = a\cot\left(\frac{N_c}{N_q - 1}\right)$$

ex $$6.340192^\circ = a\cot\left(\frac{9}{2.0 - 1}\right)$$

2) Bearing Capacity Factor Dependent on Cohesion for Cohesive Soil given Depth of Footing

Open Calculator

fx $$N_c = \frac{q_f - ((\gamma \cdot D) \cdot N_q)}{C_s}$$

ex $$4.728 = \frac{60\text{kPa} - ((18\text{kN/m}^3 \cdot 1.01\text{m}) \cdot 2.0)}{5.0\text{kPa}}$$

3) Bearing Capacity Factor Dependent on cohesion for Purely Cohesive Soil

Open Calculator

fx $$N_c = \frac{q_f - ((\sigma_s) \cdot N_q)}{C_s}$$

ex $$-6.36 = \frac{60\text{kPa} - ((45.9\text{kN/m}^2) \cdot 2.0)}{5.0\text{kPa}}$$

4) Bearing Capacity Factor Dependent on cohesion given Angle of Shearing Resistance

Open Calculator

fx $$N_c = (N_q - 1) \cdot \cot((\varphi))$$

ex $$1 = (2.0 - 1) \cdot \cot((45^\circ))$$

5) Bearing Capacity Factor Dependent on Surcharge for Cohesive Soil given Depth of Footing

Open Calculator

fx $$N_q = \frac{q_f - (C_s \cdot N_c)}{\gamma \cdot D}$$

ex $$0.825083 = \frac{60\text{kPa} - (5.0\text{kPa} \cdot 9)}{18\text{kN/m}^3 \cdot 1.01\text{m}}$$

6) Bearing Capacity Factor Dependent on Surcharge for Purely Cohesive Soil

Open Calculator

fx $$N_q = \frac{q_f - (C_s \cdot N_c)}{\sigma_s}$$

ex $$0.326797 = \frac{60\text{kPa} - (5.0\text{kPa} \cdot 9)}{45.9\text{kN/m}^2}$$

7) Bearing Capacity Factor Dependent on Surcharge given Angle of Shearing Resistance

Open Calculator

fx $$N_q = \left(\frac{N_c}{\cot\left(\frac{\varphi \cdot \pi}{180}\right)} \right) + 1$$

ex $$1.123378 = \left(\frac{9}{\cot\left(\frac{45^\circ \cdot \pi}{180}\right)} \right) + 1$$

8) Bearing Capacity Factor Dependent on Weight given Passive Earth Pressure Coefficient

Open Calculator

fx $$N_\gamma = \left(\frac{\tan((\varphi))}{2} \right) \cdot \left(\left(\frac{K_P}{(\cos(\varphi))^2} \right) - 1 \right)$$

ex $$1.6 = \left(\frac{\tan((45^\circ))}{2} \right) \cdot \left(\left(\frac{2.1}{(\cos(45^\circ))^2} \right) - 1 \right)$$

9) Bearing Capacity for Purely Cohesive Soil

Open Calculator

$$q_f = ((C_s \cdot N_c) + (\sigma_s \cdot N_q))$$

$$136.8\text{kPa} = ((5.0\text{kPa} \cdot 9) + (45.9\text{kN/m}^2 \cdot 2.0))$$

10) Bearing Capacity for Purely Cohesive Soil given Depth of Footing

Open Calculator

$$q_f = ((C_s \cdot N_c) + ((\gamma \cdot D) \cdot N_q))$$

$$81.36\text{kPa} = ((5.0\text{kPa} \cdot 9) + ((18\text{kN/m}^3 \cdot 1.01\text{m}) \cdot 2.0))$$

11) Bearing Capacity for Purely Cohesive Soil given Unit Weight of Soil

Open Calculator

$$q_f = (5.7 \cdot C_s) + \sigma_s$$

$$74.4\text{kPa} = (5.7 \cdot 5.0\text{kPa}) + 45.9\text{kN/m}^2$$

12) Bearing Capacity for Purely Cohesive Soil given Value of Bearing Capacity Factor

Open Calculator

$$q_f = ((C_s \cdot 5.7) + (\sigma_s))$$

$$74.4\text{kPa} = ((5.0\text{kPa} \cdot 5.7) + (45.9\text{kN/m}^2))$$

13) Cohesion of Soil for Purely Cohesive Soil given Depth of Footing

Open Calculator

$$C_s = \frac{q_f - ((\gamma \cdot D) \cdot N_q)}{N_c}$$

$$2.626667\text{kPa} = \frac{60\text{kPa} - ((18\text{kN/m}^3 \cdot 1.01\text{m}) \cdot 2.0)}{9}$$

14) Cohesion of Soil for Purely Cohesive Soil given Unit Weight of Soil

Open Calculator

$$C_s = \frac{q_f - (\gamma \cdot D)}{5.7}$$

$$7.336842\text{kPa} = \frac{60\text{kPa} - (18\text{kN/m}^3 \cdot 1.01\text{m})}{5.7}$$

15) Cohesion of Soil given Bearing Capacity for Purely Cohesive Soil

Open Calculator

$$C_s = \frac{q_f - (\sigma_s \cdot N_q)}{N_c}$$

$$-3.533333\text{kPa} = \frac{60\text{kPa} - (45.9\text{kN/m}^2 \cdot 2.0)}{9}$$

16) Cohesion of Soil given Value of Bearing Capacity Factor

Open Calculator

$$C_s = \frac{q_f - (\sigma_s)}{5.7}$$

$$2.473684\text{kPa} = \frac{60\text{kPa} - (45.9\text{kN/m}^2)}{5.7}$$

17) Depth of Footing given Bearing Capacity for Purely Cohesive Soil

Open Calculator

$$D = \frac{q_f - (C_s \cdot N_c)}{\gamma \cdot N_q}$$

$$0.416667\text{m} = \frac{60\text{kPa} - (5.0\text{kPa} \cdot 9)}{18\text{kN/m}^3 \cdot 2.0}$$

18) Depth of Footing given Value of Bearing Capacity Factor

Open Calculator

$$D = \frac{q_f - (C_s \cdot 5.7)}{\gamma}$$

$$1.75\text{m} = \frac{60\text{kPa} - (5.0\text{kPa} \cdot 5.7)}{18\text{kN/m}^3}$$

19) Effective Surcharge given Bearing Capacity for Purely Cohesive Soil

Open Calculator

$$\sigma_s = \frac{q_f - (C_s \cdot N_c)}{N_q}$$

$$7.5\text{kN/m}^2 = \frac{60\text{kPa} - (5.0\text{kPa} \cdot 9)}{2.0}$$

20) Effective Surcharge given Value of Bearing Capacity Factor

Open Calculator

$$\sigma_s = q_f - (5.7 \cdot C_s)$$

$$31.5\text{kN/m}^2 = 60\text{kPa} - (5.7 \cdot 5.0\text{kPa})$$

21) Passive Earth Pressure Coefficient given Bearing Capacity Factor

Open Calculator

$$K_P = \left(\left(\frac{N_\gamma}{\frac{\tan((\varphi))}{2}}\right) + 1\right) \cdot (\cos((\varphi)))^2$$

$$2.1 = \left(\left(\frac{1.6}{\frac{\tan((45^\circ))}{2}}\right) + 1\right) \cdot (\cos((45^\circ)))^2$$

22) Unit Weight of Soil given Bearing Capacity for Purely Cohesive Soil

Open Calculator

fx $$\gamma = \frac{q_f - (C_s \cdot N_c)}{D \cdot N_q}$$

ex $$7.425743\text{kN/m}^3 = \frac{60\text{kPa} - (5.0\text{kPa} \cdot 9)}{1.01\text{m} \cdot 2.0}$$

23) Unit Weight of Soil given Value of Bearing Capacity Factor

Open Calculator

fx $$\gamma = \frac{q_f - (C_s \cdot 5.7)}{D}$$

ex $$31.18812\text{kN/m}^3 = \frac{60\text{kPa} - (5.0\text{kPa} \cdot 5.7)}{1.01\text{m}}$$

Variables Used

- C_s Cohesion of Soil *(Kilopascal)*
- D Depth of Footing *(Meter)*
- K_P Coefficient of Passive Pressure
- N_c Bearing Capacity Factor dependent on Cohesion
- N_q Bearing Capacity Factor dependent on Surcharge
- N_γ Bearing Capacity Factor dependent on Unit Weight
- q_f Ultimate Bearing Capacity *(Kilopascal)*
- γ Unit Weight of Soil *(Kilonewton per Cubic Meter)*
- σ_s Effective Surcharge in KiloPascal *(Kilonewton per Square Meter)*
- φ Angle of Shearing Resistance *(Degree)*

Constants, Functions, Measurements used

- Constant: **pi**, 3.14159265358979323846264338327950288
  Archimedes' constant
- Function: **acot**, acot(Number)
  Inverse trigonometric cotangent function
- Function: **cos**, cos(Angle)
  Trigonometric cosine function
- Function: **cot**, cot(Angle)
  Trigonometric cotangent function
- Function: **tan**, tan(Angle)
  Trigonometric tangent function
- Measurement: **Length** in Meter (m)
  Length Unit Conversion
- Measurement: **Pressure** in Kilopascal (kPa), Kilonewton per Square Meter (kN/m²)
  Pressure Unit Conversion
- Measurement: **Angle** in Degree (°)
  Angle Unit Conversion
- Measurement: **Specific Weight** in Kilonewton per Cubic Meter (kN/m³)
  Specific Weight Unit Conversion

Check other formula lists

- **Terzaghi's Analysis: Purely Cohesive Soil Formulas**
- **Terzaghi's Analysis: Water Table is Below the Base of Footing Formulas**

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