User Manual

CIVILAB 2023

BEARING CAPACITY: CONE PENETRATION TEST

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How to use CiviLab to calculate the bearing capacity from cone penetration test results?

I- NF P 94 261 (Eurocode 7)

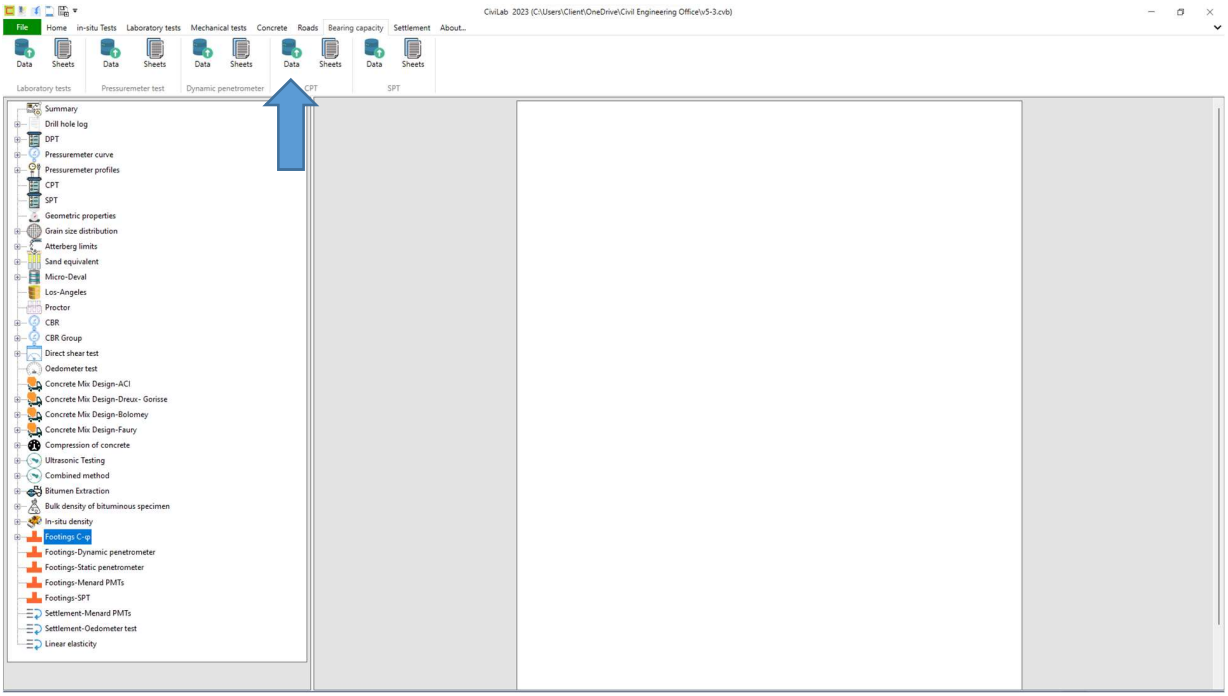
I-1- Test Data:

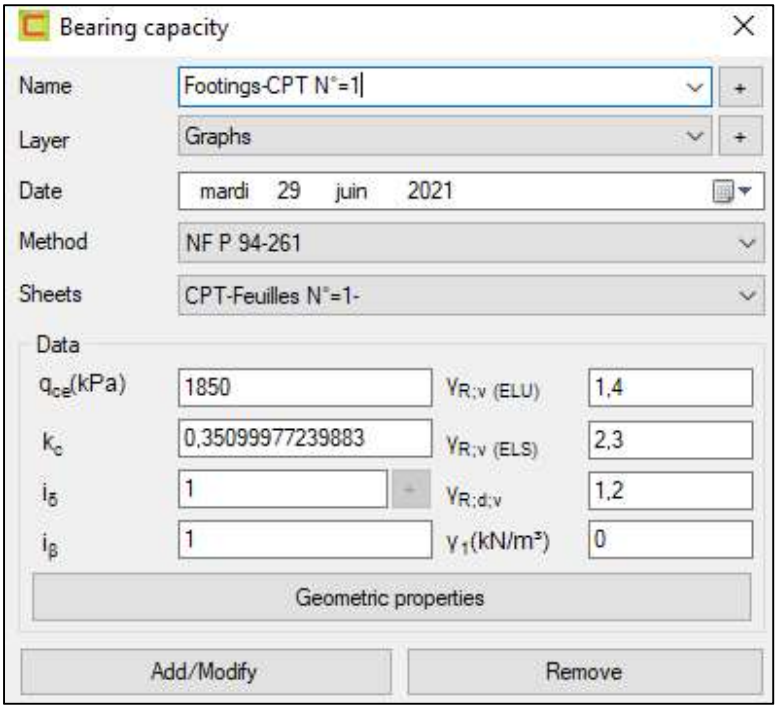
Click on the "Data" button in the “Static penetrometer” panel, then input:

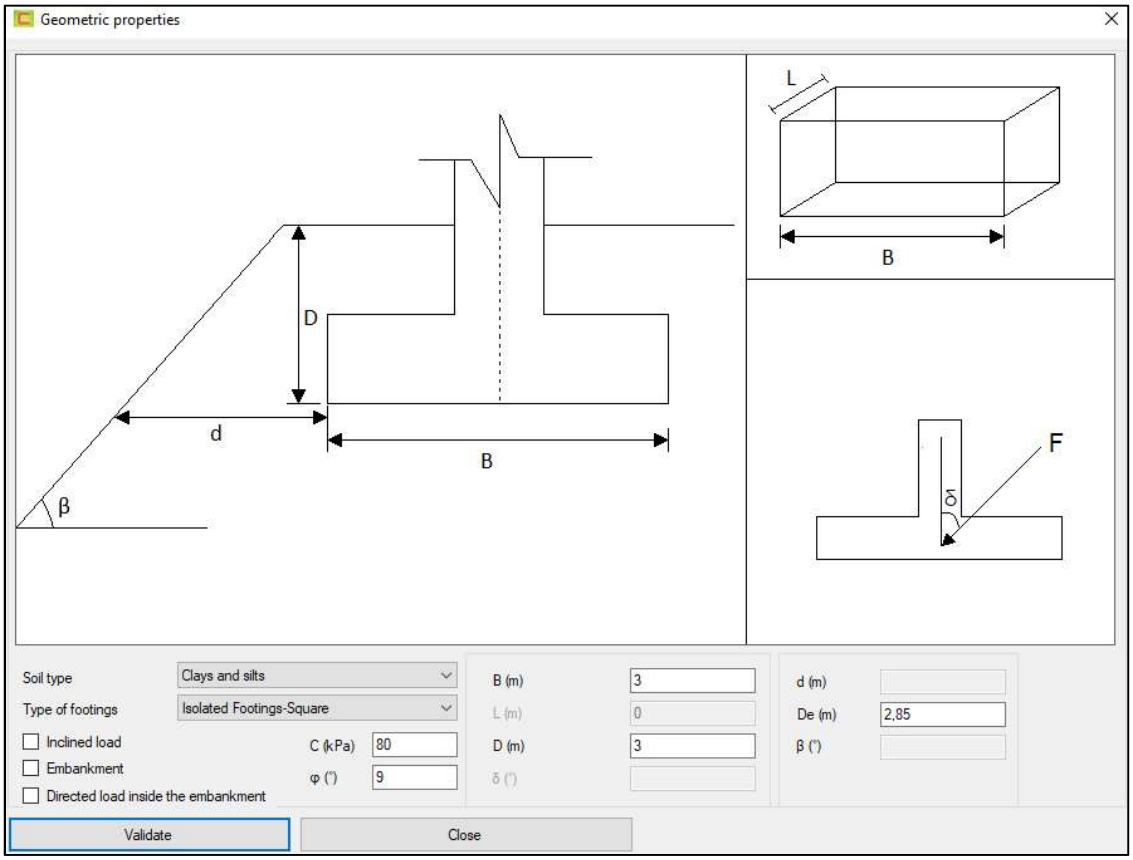
- The test name;
- Select the test date;
- Select the layer;
- The standard (NF P 94 261)
- Select the CPT Sheet
- The equivalent cone resistance q_c
- The soil density γ1
- The value of the partial factor allowing the calculation of the lift at ULS ($\gamma_{R;\ v(ULS)}$) (PS: the value proposed by CiviLab is that recommended by standard NF P 94 261).
- The value of the partial factor allowing the calculation of the lift at SLS ($\gamma_{R;\ v\ (SLS)}$) (PS: the value proposed by CiviLab is that recommended by standard NF P 94 261)
- The model coefficient associated with the calculation method used ($\gamma_{R;\ d;\ v}$) (PS: the value proposed by CiviLab is that recommended by standard NF P 94 261)
- Click on the "Geometric properties" button then:
    - Select the soil type
    - Select the footing type
    - C and ϕ
    - Enter the data of the geometric shape of the footing (B, L, D)
    - Depth D_e
    - If the foundation is near an embankment, check the corresponding box and enter the values for:
        - The angle of inclination β

- The distance d
- If the load is inclined, check the corresponding box and enter the angle value δ
- If the load is directed inside the embankment, check the corresponding box
- Click on the “validate” button, then CiviLab automatically calculates the corresponding factors.

Click on the "Add / Modify" button




Bearing capacity
Name
Footings-CPT N°=1
Layer
Graphs
Date
mardi 29 juin 2021
Method
NF P 94-261
Sheets
CPT-Feuilles N°=1-
Data
qce(kPa)
1850
kc
0,35099977239883
iδ
1
iβ
1
γR;v (ELU)
1,4
γR;v (ELS)
2,3
γR;d;v
1,2
γ1(kN/m³)
0
Geometric properties
Add/Modify
Remove

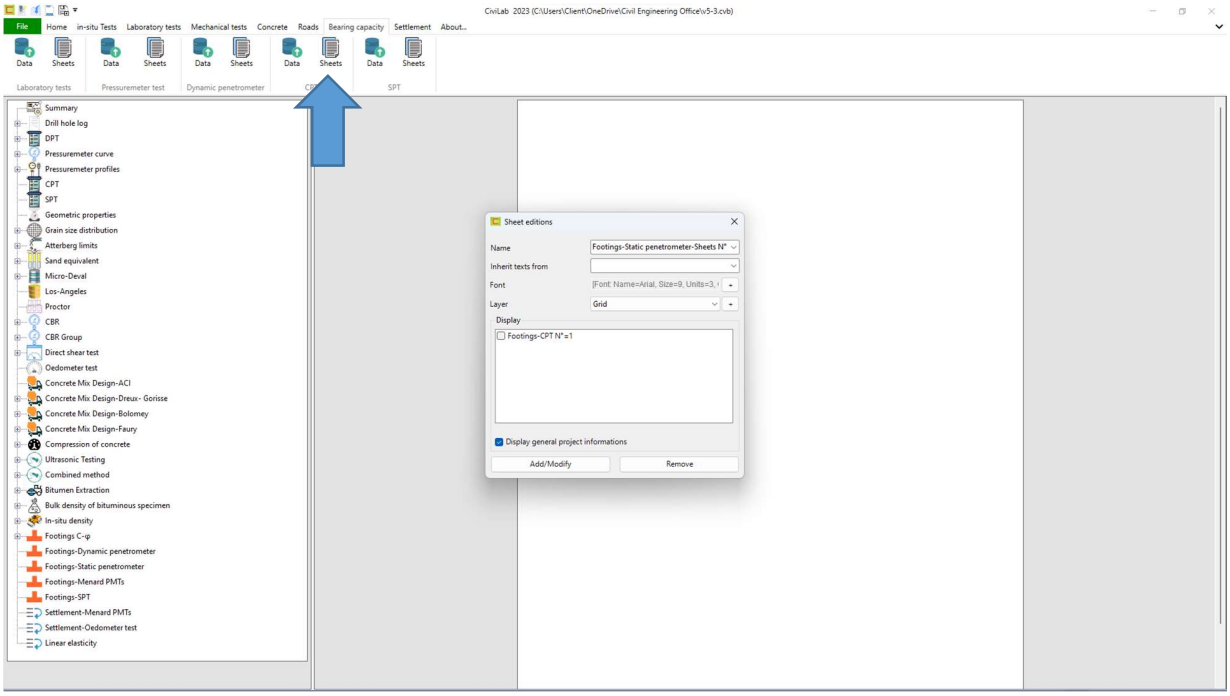

Geometric properties
L
B
D
d
B
β
F
δ
Soil type
Clays and silts
Type of footings
Isolated Footings-Square
Inclined load
Embankment
Directed load inside the embankment
C (kPa)
80
φ (°)
9
B (m)
3
L (m)
0
D (m)
3
δ (°)
d (m)
De (m)
2,85
β (°)
Validate
Close

I-2- Add a sheet :

Click on the "Sheets" button in the “Static penetrometer” panel and input:

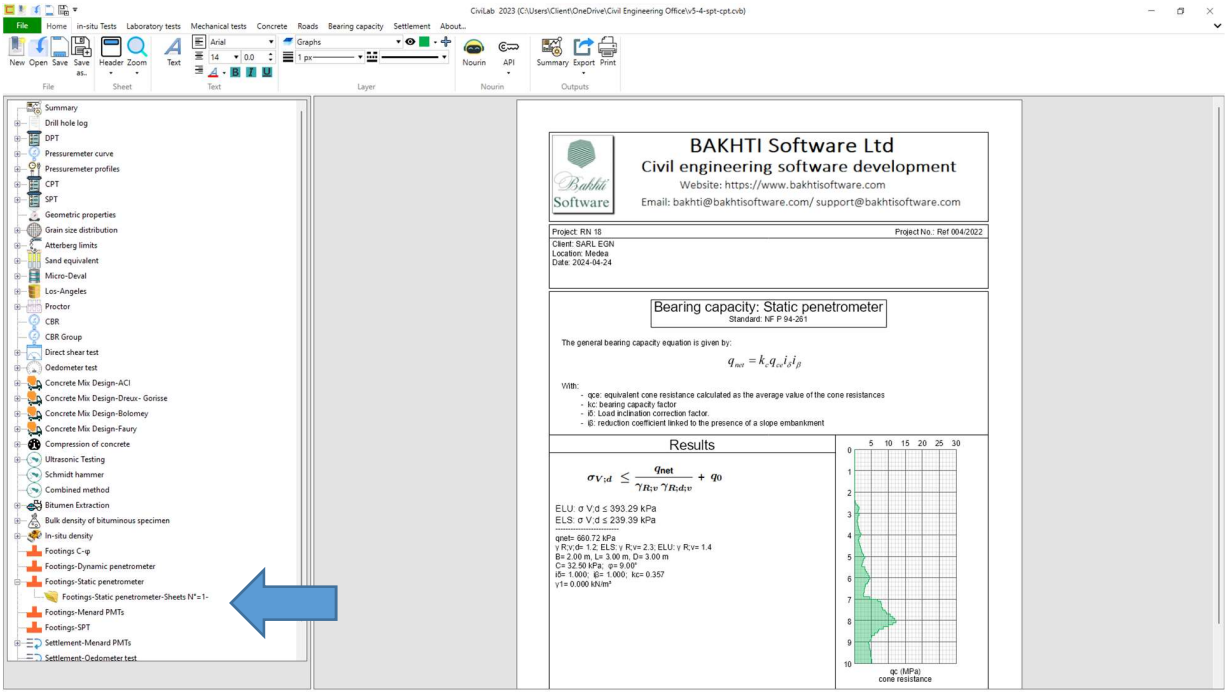
- The sheet name;
- Select the font;
- Select the layer used in the background drawing;
- Select the tests;
- To display general project information’s check the corresponding box;

Then click on "Add/Modify" button



I-3- Display the report

To display the report, click on the sheet name in the tree view



To export or print the report, click on "Home" tab, then click the appropriate button in the outputs panel (Print or Export button)

Test report:

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a

Project: RN 18 Project No.: Ref 004/2022

b

Client: SARL EGN
Location: Medea
Date: 2024-04-24

c

Bearing capacity: Static penetrometer

Standard: NF P 94-261

The general bearing capacity equation is given by:

$$q_{net} = k_c q_{ce} i_\delta i_\beta$$

d

With:

- qce: equivalent cone resistance calculated as the average value of the cone resistances
- kc: bearing capacity factor
- iδ: Load inclination correction factor.
- iβ: reduction coefficient linked to the presence of a slope embankment

Results

$$\sigma_{V;d} \leq \frac{q_{net}}{\gamma_{R;v}\,\gamma_{R;d;v}} + q_0$$

ELU: σ V;d ≤ 393.29 kPa
ELS: σ V;d ≤ 239.39 kPa

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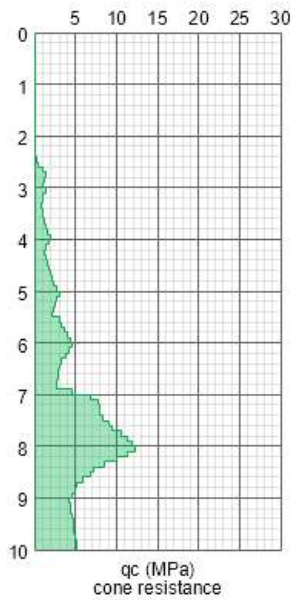
qnet= 660.72 kPa
γ R;v;d= 1.2; ELS: γ R;v= 2.3; ELU: γ R;v= 1.4
B= 2.00 m, L= 3.00 m, D= 3.00 m
C= 32.50 kPa; φ= 9.00°
iδ= 1.000; iβ= 1.000; kc= 0.357
γ1= 0.000 kN/m³



Software: CiviLab 2023

a. **Sheet Header Presentation:** To import or modify the sheet header, go to the "Home" tab and select the "Header" button.

b. Project Name and Reference: These details can be entered from the project's general information found in the File menu.

c. Area for Displaying Test Information: Test information can be input within this area from the Test Information window (to show it click on the “+” button next to the name of the test on Data window) and project's general information window.

d. Area for results: this area is designated to visualize the test results.

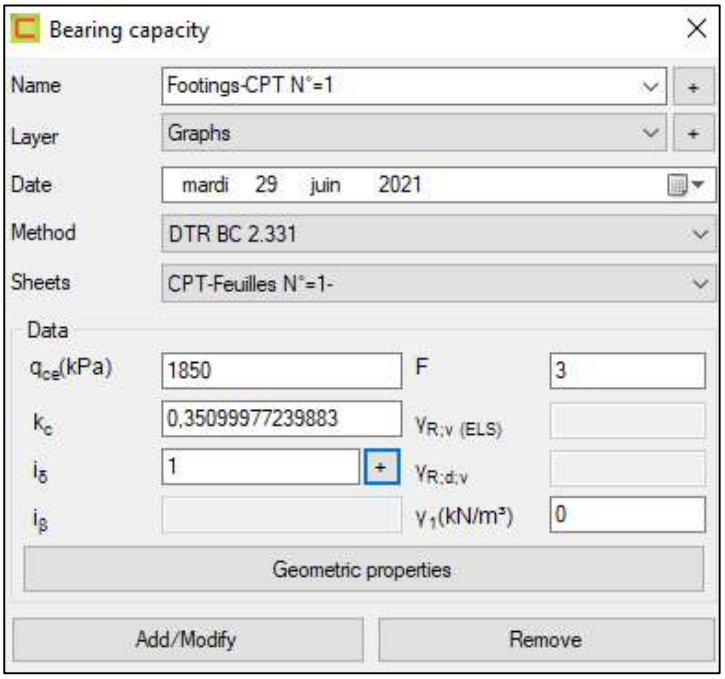
II- DTR BC 2.331 et DTU 13.12

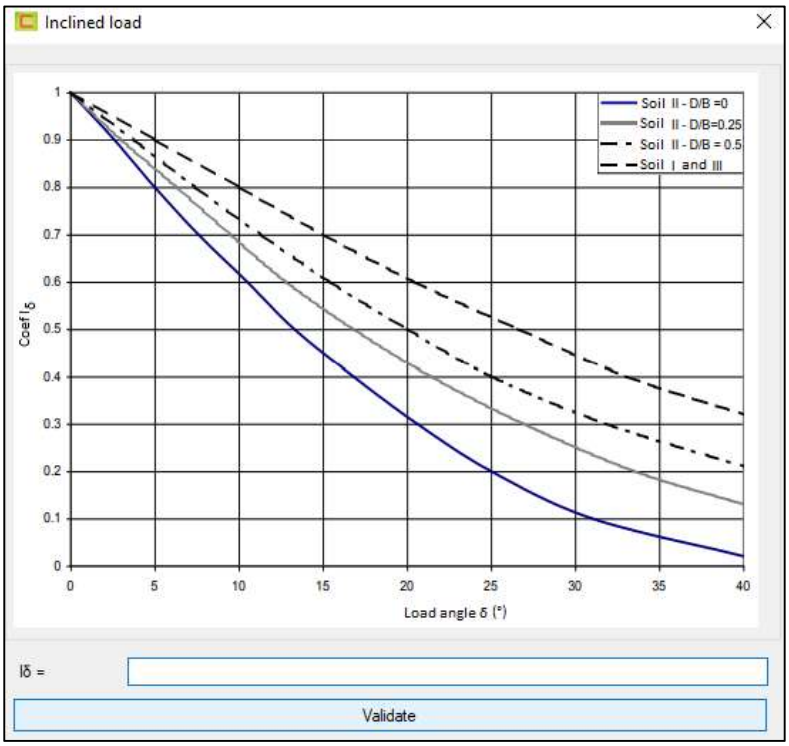
II-1- Test Data:

Click on the "Data" button in the “Static penetrometer” panel, then input:

- The test name;
- Select the test date;
- Select the layer;
- The standard (DTR BC 2.331 or DTU 13.12)
- Select the CPT Sheet
- The equivalent cone resistance q_c
- The soil density γ1
- The safety factor F
- Enter the value of the reduction coefficient linked to the inclination or click on the "+" button and choose the corresponding value "from the graph"
- Click on the "Geometric properties" button then:
    - Select the soil type
    - Select the footing type
    - The Cohesion C
    - Enter the data of the geometric shape of the footing (B, L, D)
    - Depth D_e
    - Click on the “validate” button, then CiviLab automatically calculates the corresponding factors.

Click on the "Add / Modify" button





II-2- Add sheet (same as section I-2)

II-3- Display report (same as section I-3)

II-4- Test report :

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Project: Suivi RN 18 | Project No.: Ref 008/2020

Client: DTP
Location: Medea
Date: 2021-06-29

Bearing capacity: Static penetrometer

Standard: DTR BC 2.331

The general bearing capacity equation is given by

$$q_u = K_c \, q_{ce} \, i_\delta + \gamma_1 D$$

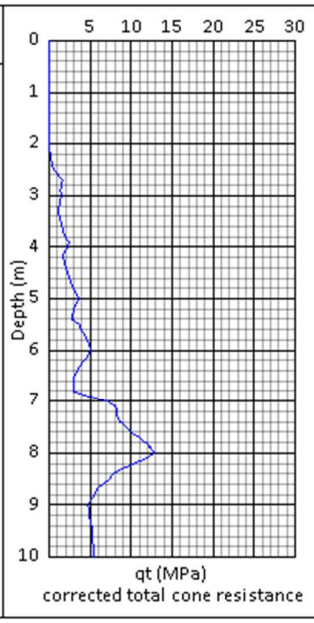
With:

- qce: equivalent cone resistance calculated as the average value of the cone resistances
- kc: bearing capacity factor
- iδ: Load inclination correction factor.
- γ1: The soil density
- D: The embedding depth

Results

$$q_{adm} = \frac{q_u - \gamma_1 D}{F} + \gamma_1 D \qquad F \geq 3$$

qadm = 216,45 kPa
qu= 649,35 kPa
F= 3
B= 3,00 m, D= 3,00 m
C= 80,00 kPa; ϕ= 0,00°
iδ= 1,000; kc= 0,351
γ1= 0,000 kN/m³



Software: CiviLab 2022