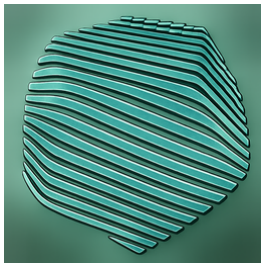
BAKHTI SOFTWARE



Nourin

User manual — The geotechnical agent of CiviLab 2027

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1. Introduction

1.1 What Nourin is

Nourin is the geotechnical agent built into **CiviLab 2027**. It works directly on the tests and sheets of your project:

- it **checks** test sheets and flags doubtful entries, out-of-range values and inconsistencies;
- it **interprets** results and writes the interpretation comment;
- it **calculates** the bearing capacity and settlement of foundations, step by step in depth;
- it **writes** the project geotechnical report and the concrete mix design report, as editable Word documents;
- it **answers** soil mechanics and geotechnical questions, with identified references.

1.2 A deterministic method

Nourin's interpretations and reports rely on **deterministic approaches**: Nourin reads what CiviLab has calculated, applies the definitions of the standards (classifications, categories, thresholds) and flags what is wrong. No formula is reinvented and no result is made up.

> **Note:** Nourin assists the engineer; it does not replace them. Always review interpretations and reports before issuing them. The engineer's signature remains their own.

1.3 The twenty tasks

Family	Tasks
Soil test interpretation	Atterberg limits; grain size classification (LCPC and GTR); Proctor; CBR; CBR study on a group of tests; oedometer test; direct shear
Aggregates and quality control	Sand equivalent; Los Angeles; Micro-Deval; pressuremeter test quality control
Boreholes and lithology	Drill hole log and RQD; column drill hole log
Foundation calculations	Dynamic probing (DPT); cone penetration test (CPT and CPTu); SPT; Menard pressuremeter
Document production	Geotechnical report; concrete mix design report; borehole location figure

2. Getting started

2.1 Requirements

- CiviLab 2027 activated, with the **Nourin** option (monthly, six-month or yearly subscription).
- An Internet connection: requests are analysed on the Nourin server.
- Microsoft Word (or compatible software) to open the generated reports.

2.2 Entering the Nourin key

1. In CiviLab, click **Home > Nourin > API > Input Nourin Key**.
2. The file `Documents\CiviLab\NourinKey.txt` opens in Notepad: paste your key, save and close Notepad.
3. CiviLab reloads Nourin with the new key.

Home > Nourin > API > Help opens a video showing these steps.

2.3 Opening the Nourin panel

Click **Home > Nourin > Nourin**. The panel opens to the right of the sheet and the status bar shows **Nourin is online**. A second click (or the panel's close button) closes the panel; the status bar then shows **Nourin is offline**.

The panel contains:

- the **Context** line, showing the sheet Nourin is working on;
- the conversation (your requests and Nourin's answers);
- the input box for your requests.

2.4 Nourin's language

Nourin answers in the CiviLab interface language: **English** or **French**. With a Spanish or Italian interface, Nourin answers in English. Word reports are written in the language of the conversation.

3. Working with Nourin

3.1 The context: the selected sheet

Nourin works on the **active sheet**. Before an analysis request, select the sheet in the project explorer (or display it): its name appears on the **Context** line.

If no sheet is selected, Nourin answers: “Please select a test sheet (CPT, pressuremeter, SPT...) so I can analyze it.”

3.2 Making a request

Type your request in plain language and confirm. Examples:

Request	What Nourin does
“Analyse this sheet”	Chooses the task that matches the active sheet type and runs it
“Interpret the Atterberg limits”	Test interpretation (WL, PI, plasticity class, position on the chart)
“Classify this soil according to GTR”	LCPC / GTR grain size classification
“Calculate the bearing capacity of this footing”	Foundation calculation from the sheet’s test (DPT, CPT, SPT, pressuremeter)
“Check this pressuremeter test”	Test quality control (calibrations, consistency of pressures)
“Write the geotechnical report”	Complete project report, zone by zone
“Write the concrete mix design report”	Mix design document (Dreux-Gorisse, Bolomey, Faury or ACI 211.1)
“What is the creep pressure?”	Geotechnical answer with references

> **Tip:** “Analyse this sheet” is enough in most cases: Nourin recognises the test type of the active sheet.

3.3 Parameters requested by Nourin

Some tasks need data that are not on the sheet (for example the width and depth of a footing). Nourin then asks for them:

> The following parameters are required: - footing width B - embedment depth D
> Please provide these values to continue.

Simply answer in the input box, for example “B = 2 m, D = 1.5 m”. Long tasks are split into named steps (for example, for classification: basic grain size data, grading coefficients Cu and Cc, Atterberg limits, GTR parameters).

For **optional** parameters, answer **continue** to run the calculation with the default values, or give the values you want.

3.4 The result

The result appears in the panel: calculated values, tables by depth step, interpretation comment, warnings. Each interpretation can be **exported** separately, ready to be attached to the file.

When Nourin detects an error in the sheet, it explains it and proposes a solution (for example, for a pressuremeter test: “the calibration pressure is higher than the pressure read”, with the reference to the standard).

4. Soil test interpretation

For each task: select the test sheet in the project explorer, then ask “Analyse this sheet”. Nourin does not recalculate the test: it reads the values calculated by CiviLab, applies the definitions of the standards and writes the interpretation.

4.1 Atterberg limits

Sheet: Atterberg limits.

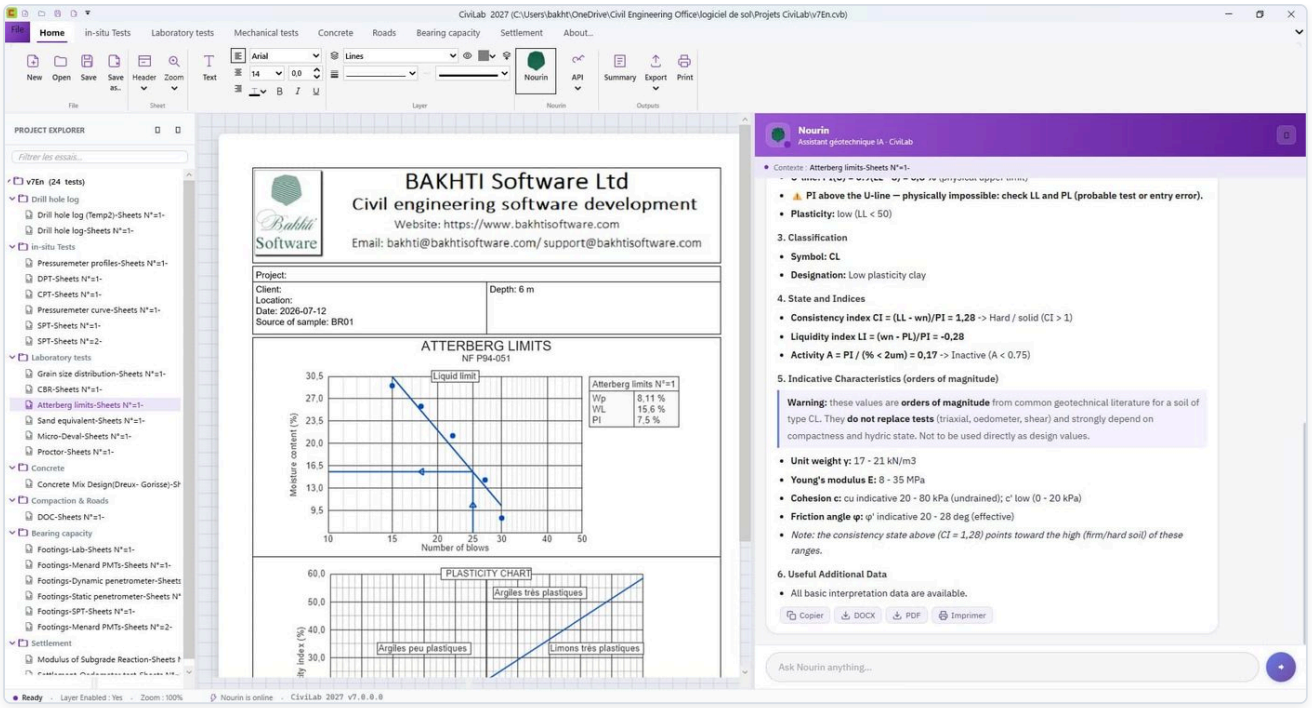
What Nourin reads: the liquid limit WL from the regression on the test points; the plastic limit WP and the plasticity index PI; the apparatus (Casagrande cup at 25 blows, cone at 20 mm under BS or 17 mm under NF P 94-052-1); the reference chart chosen (Casagrande 1948, BS or ASTM).

What Nourin produces:

- the position of the soil relative to the A-line: PI = 0.73 (WL − 20);
- the plasticity class and the consistency state of the soil;
- the comparison with the indicative ranges of the soil type, flagging what falls outside the expected range;
- the interpretation comment, in French or English.

> **Note:** Nourin does not derive c, φ, E or γ from the limits: these parameters cannot be obtained from an identification test.

References: NF P 94-052-1, BS 1377-2, Casagrande chart (1948).



CiviLab 2027 screen — Soil test interpretation

4.2 LCPC and GTR grain size classification

Sheet: Grain size distribution.

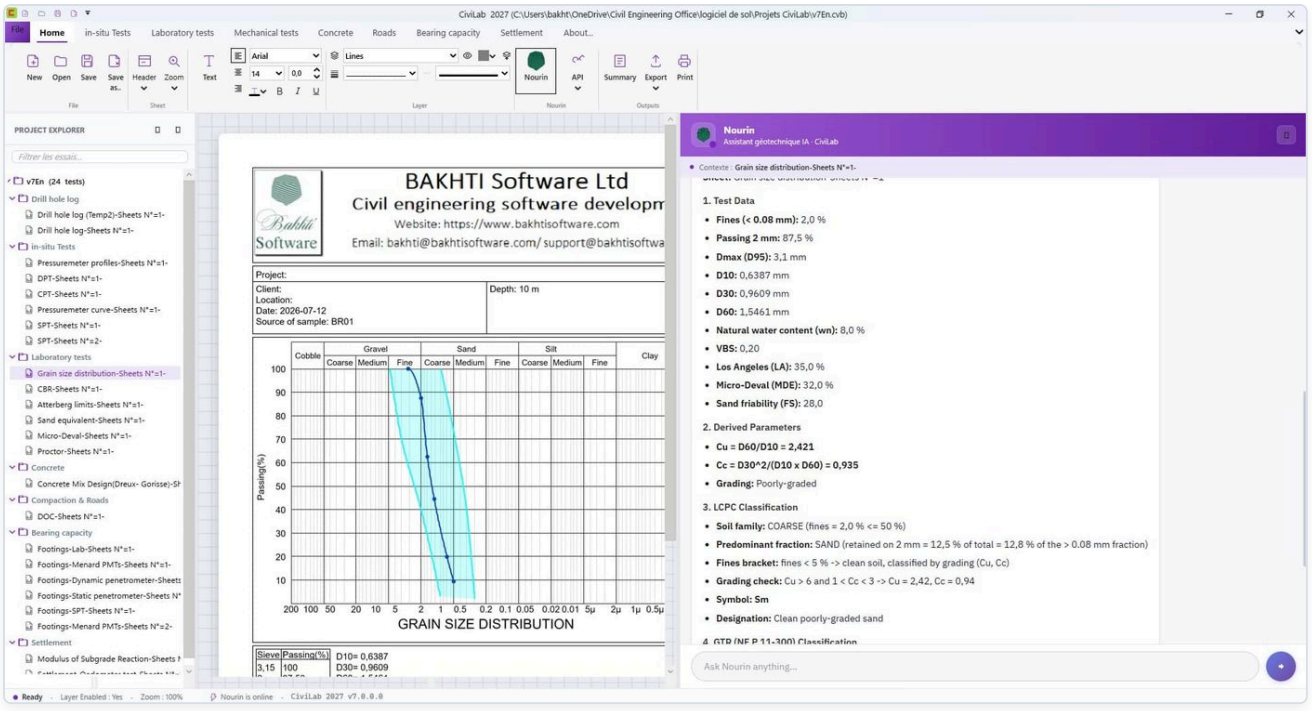
What Nourin reads: the retained and passing values of the sheet; the passing at 0.08 mm, 2 mm, 50 mm and 80 mm; the methylene blue value VBS and the plasticity index when available; the natural moisture content, the IPI and the consistency index.

What Nourin produces:

- the LCPC class: gravel or sand, clean or clayey, well or poorly graded;
- the coefficients Cu and Cc, interpolated on the curve;
- the GTR class: A, B, C1/C2, D, R1 to R6 for rocks, F1 to F9 for special soils;
- the moisture state (ts, s, m, h, th) and the full symbol, for example **B21 m** or **A2 h**;
- the list of parameters missing to remove an indeterminacy.

The task runs in steps (basic grain size data, grading coefficients Cu and Cc, Atterberg limits, GTR parameters). All GTR parameters are optional: answer **continue** to classify with the available data; Nourin states explicitly what remains undetermined.

References: NF P 11-300 (GTR), LCPC classification, BS 1377-2.



CiviLab 2027 screen — Soil test interpretation

4.3 Proctor test

Sheet: Proctor.

What Nourin reads: the test points and the coefficients of the polynomial fitted by CiviLab; the test type (standard or modified) and the polynomial degree; the particle density and the mould volume; the project units (kN/m³, t/m³ or pcf).

What Nourin produces:

- the optimum: optimum moisture content and maximum dry density;
- the width of the curve at 98 % of γd max, an indicator of the compaction margin;
- the shape of the curve and the sensitivity of the soil to moisture content;
- the GTR moisture state of the material;
- the compaction conclusions.

The polynomial is not refitted: Nourin uses exactly the curve produced by CiviLab.

References: NF P 94-093, NF P 11-300 (GTR).

4.4 CBR test

Sheet: CBR.

What Nourin reads: the CBR value and the loads at the two reference penetrations (13.35 and 19.93 kN at 2.5 and 5 mm under NF; 6.9 and 10.3 MPa at 2.54 and 5.08 mm under ASTM); the moisture content and dry density of the specimen; the project CBR requirement.

What Nourin produces:

- the governing CBR between the two penetrations;
- the bearing capacity of the subgrade and its suitability as a capping layer;
- the corresponding deformation modulus;
- compliance with the contractual requirement;
- inconsistencies between index, moisture content and density.

References: NF P 94-078, ASTM D1883-99, AASHTO T 193, NF P 11-300, AASHTO 1993.

4.5 CBR study on a group of tests

Sheet: CBR Group.

What Nourin reads: all the specimens of the group (CBR value, moisture content, dry density); the type and correction of each test; the standard and modified Proctor optima of the same material; the project CBR requirement.

What Nourin produces: the variation of CBR with moulding moisture content; the position of each specimen relative to the Proctor optimum; the CBR value to adopt for design; the conclusion on compliance.

References: NF P 94-078, NF P 94-093, ASTM D1883-99, AASHTO T 193.

4.6 Oedometer test

Sheet: Oedometer test.

What Nourin reads: the e - log σ′ curve and the steps; the indices Cc and Cs and the preconsolidation stress σ′p; the oedometric moduli Eoed and the coefficients mv; the consolidation curves of each step.

What Nourin produces:

- the consolidation state: normally consolidated, overconsolidated or underconsolidated;
- the coefficient of consolidation cv, by the Taylor and Casagrande methods;

- the settlement time from Terzaghi's theory, t = Tv · H² / cv, in readable units;
- the void ratio interpolated at a given stress;
- the steps whose curve does not allow cv to be determined.

References: XP P 94-090-1 (annexes A and B), Terzaghi consolidation theory.

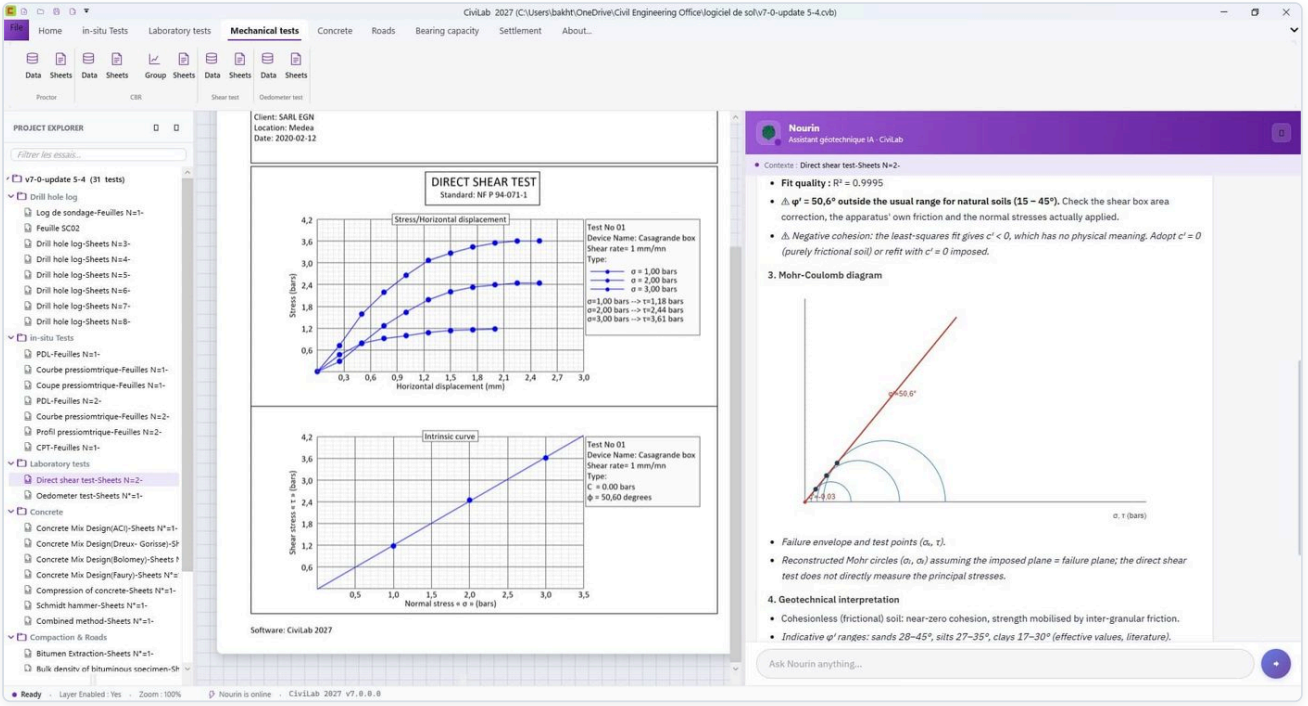
4.7 Direct shear

Sheet: Shear test.

What Nourin reads: the normal stress - shear stress pairs at failure; the regression line (intercept and slope); the standard, apparatus and speed; the stress units.

What Nourin produces: the cohesion c′ and the friction angle φ′; a check of the alignment of the failure points and the flagging of an outlier; Mohr's circles and the intrinsic line; a comparison with the usual ranges of the soil type; the interpretation and the identification sheet of the test.

References: NF P 94-071-1, ASTM D3080-04, NA 16218.



CiviLab 2027 screen — Soil test interpretation

5. Aggregates and quality control

5.1 Sand equivalent

Sheet: Sand equivalent.

What Nourin reads: the heights h_1 (flocculate) and h_2 (sand read with the piston) of each test; the number of tests; the project cleanliness requirement.

What Nourin produces:

- SE = 100 · h_2 / h_1 for each test, then the average;
- the nature of the sand: clayey (SE < 60), slightly clayey (60 to 70), clean (70 to 80) or very clean (SE ≥ 80);
- the consequences for concrete (shrinkage, swelling, lack of plasticity) and compliance with the requirement.

References: NF EN 933-8.

5.2 Los Angeles

Sheet: Los-Angeles.

What Nourin reads: the initial mass and the retained mass after the test; the granular class and the number of balls; the standard and the project requirement.

What Nourin produces: the LA coefficient and the resistance to fragmentation; the LA category under EN 12620 (concrete), EN 13242 (unbound mixtures) and EN 13043 (asphalt); the compatible uses; compliance with the requirement.

References: EN 1097-2, EN 12620, EN 13242, EN 13043, NF P 11-300.

5.3 Micro-Deval

Sheet: Micro-Deval.

What Nourin reads: the initial mass, the retained mass after the test and the abrasive load; the granular class and the test type (wet or dry); the standard and the project requirement.

What Nourin produces: the MDE coefficient = 100 · m / M and the wear resistance; the MDE category under EN 12620, EN 13242 and EN 13043; the compatible uses; compliance with the requirement.

References: EN 1097-1, EN 12620, EN 13242, EN 13043, NF P 11-300.

5.4 Pressuremeter test quality control

Sheet: Pressuremeter curve.

Nourin does not recalculate the test: it **checks** it. Each value produced by CiviLab is compared with the others, and anything physically inconsistent is flagged.

What Nourin reads: the corrected curve (p60, V60, V60-30); the raw data of each step; Em, pl, pl* and pf*; σv, σh and the limit volumes.

What Nourin produces:

- a check of the presence and validity of the calibrations;
- a check of the consistency between modulus, limit pressure and creep pressure;
- the separation between **major anomalies** (doubtful test) and **warnings** (test usable with reservations);
- the control report, step by step.

No value is changed: Nourin flags, the engineer decides.

6. Boreholes

6.1 Drill hole log and RQD

Sheet: Drill hole log.

What Nourin reads: the intervals and their depths; the recovery and RQD of each run; the lithological descriptions written by the operator.

What Nourin produces:

- the rock quality according to Deere (1964) (an RQD below 25 % indicates very poor quality);
- a check of the lithological vocabulary against a bilingual French-English geotechnical lexicon;
- the correction of safe typing errors (spaces, case, punctuation) and the flagging of the rest, without changing it;
- the borehole summary.

Substantive corrections are never applied automatically: they are proposed, with a safeguard against false positives.

References: NF P 94-500, RQD (Deere, 1964).

6.2 Column drill hole log

Sheet: Drill hole log (Temp2).

What Nourin reads: each column of the log and its values; the column labels defined by the operator; the descriptions in the lithology columns.

What Nourin produces: the processing of text columns one by one, without mixing columns; detection of the language and a vocabulary check; the closest correction proposed; only safe clean-ups applied, the rest being flagged.

7. Foundation calculations

Nourin calculates the bearing capacity and settlement of a shallow foundation from the selected sheet, **by depth step**, which helps choose the founding level. It asks for the footing dimensions (width B, length L, embedment depth D) and, depending on the case, the loads (q, V).

7.1 Dynamic probing (DPT)

Sheet: DPT.

What Nourin reads: the dynamic resistance profile and the penetrometer type; the geometry B, L, D; the safety factor and the correlation coefficient β (between 5 and 7); the service load and the unit system.

What Nourin produces: the failure stress from the Cassan and Sanglerat correlation; the allowable stress over the requested depth range; a check of the service load; the result table by depth step.

References: NF P 94-261, Cassan and Sanglerat correlation.

7.2 Cone penetration test (CPT and CPTu)

Sheet: CPT.

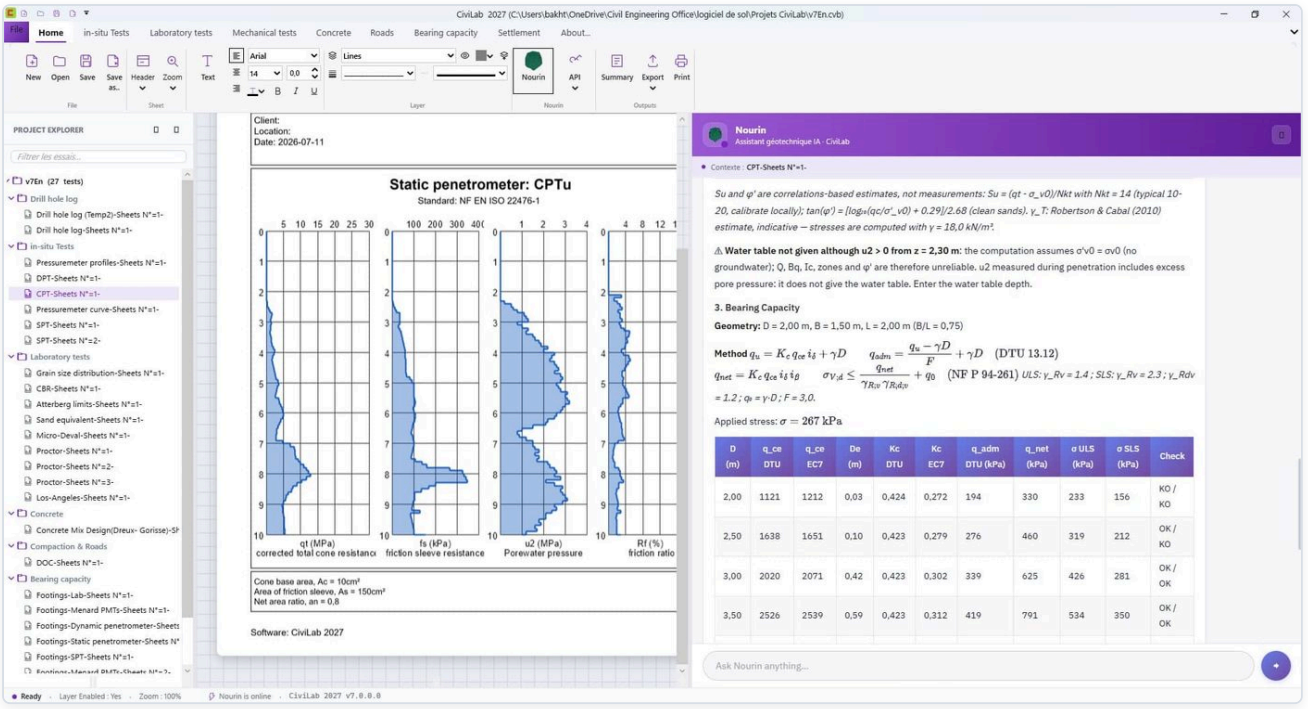
What Nourin reads: the qc profile and the sleeve friction; the pore pressure u2 for a CPTu (hence qt); the footing geometry and the unit weight profile; the profile units, recognised automatically when values are ambiguous.

What Nourin produces:

- the soil behaviour type on the Robertson charts (1986 and 2010) for a CPT;
- the normalised index Ic of Jefferies and Davies for a CPTu, from Bq, F and Q;
- the grouping of contiguous points of the same type into homogeneous layers;
- the bearing capacity at each embedment depth according to DTU 13.12 and NF P 94-261;
- the Robertson and Campanella (1983) correlation in sands.

Normalised values require the measurement of u2: Nourin only produces them for a genuine CPTu.

References: NF P 94-261, DTU 13.12, Robertson charts (1986, 2010), Jefferies and Davies, Robertson and Campanella (1983).



CiviLab 2027 screen — Foundation calculations

7.3 SPT

Sheet: SPT.

What Nourin reads: the N, N60 and (N1)60 profile corrected by CiviLab; the geometry B and D; the service load and the unit system.

What Nourin produces: two tables by 0.5 m step:

- the allowable bearing pressure for 25 mm settlement according to Meyerhof (1956) and Bowles (1977), with the depth factor Kd = min(1 + 0.33 D/B; 1.33), and the settlement under the service load by inverting the Meyerhof relation;
- the soil parameters: friction angle φ′ according to Hatanaka and Uchida (1996), undrained cohesion Su according to Stroud (1974) and Hara et al. (1974).

References: NF P 94-116, NA 5229, Meyerhof (1956), Bowles (1977), Hatanaka and Uchida (1996), Stroud (1974), Hara et al. (1974).

7.4 Menard pressuremeter

Sheet: Pressuremeter profile.

What Nourin reads: the profile of moduli Em and net limit pressures pl*; the moduli divided into sixteen slices of thickness B/2 below the footing; the geometry and applied stress; the CiviLab functions for the equivalent embedment height and the bearing capacity factor.

What Nourin produces:

- the equivalent embedment height De and the bearing capacity factor kp;
- the bearing capacity at each depth, by 0.5 m step;
- the settlement by the Menard pressuremeter method over the sixteen slices;
- interpolation of missing moduli and flagging of slices without data;
- a check of the applied stress.

> **Note:** manually entered pressuremeter profiles (Em, Pf*, Pl* table, CiviLab 7.1) are handled like profiles built from tests. For these profiles σh is not known: Nourin uses the net values entered directly.

References: NF P 94-261, DTU 13.12, Menard pressuremeter method.

8. Reports

8.1 Geotechnical report

Ask “Write the geotechnical report”. This is the end of the chain: the interpreted tests become a structured report, ready to be reviewed and signed.

What Nourin reads: all the interpreted sheets of the project; the project zones and the zone number of each test; the test sheets as drawn by CiviLab; missing parameters, completed from the other sheets of the same sample.

Sequence:

1. **Zone by zone**, Nourin asks for the foundation parameters of the zone (D, B, L, q, V). Answer with the values, or:
   - **skip** (or **continue**, **no**): next zone without parameters;
   - **skip all**: ignore all remaining zones.
2. **Sheet by sheet**, Nourin may ask for details; the same answers **skip** and **skip all** apply. Before asking, it looks for the value in the other sheets of the same sample.
3. Nourin builds the cover page (with the laboratory logo), a real Word table of contents, chapters by investigation zone, and places in the appendix the **actual sheet** of each test (no graph is redrawn), with its interpretation, as well as the borehole **location figure**.

The result is an editable Word document.

> **Tip:** for a complete report, first fill in the project zones and locate each test on the map (**File > The project general informations** and the **Data** button of the tests). Tests without a zone are grouped separately.

8.2 Concrete mix design report

Select a mix design sheet and ask “Write the mix design report”.

What Nourin reads: the method (Dreux-Gorisse, Bolomey, Faury or ACI 211.1); the calculated dosages (cement, water, sand, gravels G1, G2 and G3); the water-cement ratio and the fresh concrete density; the grading of each component.

What Nourin produces: the cover page, the table of contents and the chapters; the summary (sheet, method, cement, water, sand, gravels, ratio, density); in the appendix the detailed sheet of the method (designation, percentage, mass and adjustment) and

the sieve / component cross table. Values are read from the sheet, without recalculation.

8.3 Borehole location figure

What Nourin reads: the coordinates of each borehole; the project zones and their order; the frame containing all the points.

What Nourin produces: it downloads the base map (Google Static Maps if a key is configured, OpenStreetMap otherwise), places each borehole, colours the points by zone, labels each borehole with a white halo readable on any background, and shows the base map attribution in the legend. The figure is inserted automatically into the geotechnical report.



CiviLab 2027 screen — Reports

9. Geotechnical questions

Any question that is not a calculation request is treated as a knowledge question: definitions, test methods, interpretation of parameters, orders of magnitude. Answers rely on **identified references** (standards, textbooks).

Examples:

- “What is the difference between pf and pl?”
- “How do I choose the rheological factor α for a clay?”
- “What does an RQD of 40 % mean?”

10. Messages and troubleshooting

Message	Cause	Solution
Please select a test sheet...	No active sheet	Select the sheet in the project explorer
The interpretation of the ... test by Nourin is not available in this version	Test type not yet supported	Use the CiviLab results; the task will be added in a later version
Server unreachable. Please try again.	No connection to the server	Check the Internet connection, then try again
Nourin is offline	Panel closed, or key missing	**Home > Nourin > Nourin**; check the key (**API > Input Nourin Key**)
No active collection. Please start a new request.	Answer sent while no question was pending	Make a new request

11. Subscription and support

- Nourin is offered as an add-on to the CiviLab licence: **$99 per month**, **$500 for six months** or **$900 for one year**.
- Website: **www.bakhtisoftware.com** (detailed pages for each Nourin task, videos, contact).