



SPT Correlations Software (NovoSPT)

The standard penetration test (SPT) is an in-situ dynamic penetration test designed to provide information on the geotechnical engineering properties of soil.

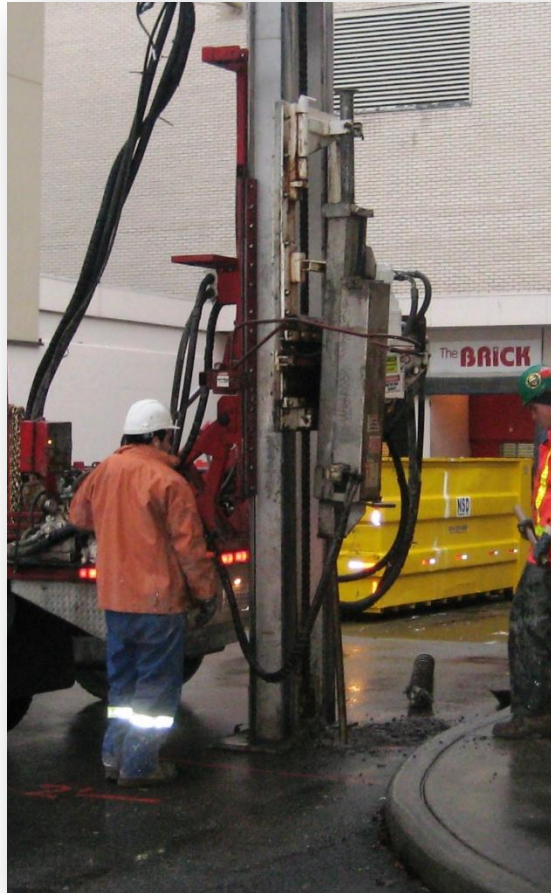
The test procedure is described in the British Standard BS EN ISO 22476-3 and ASTM D1586



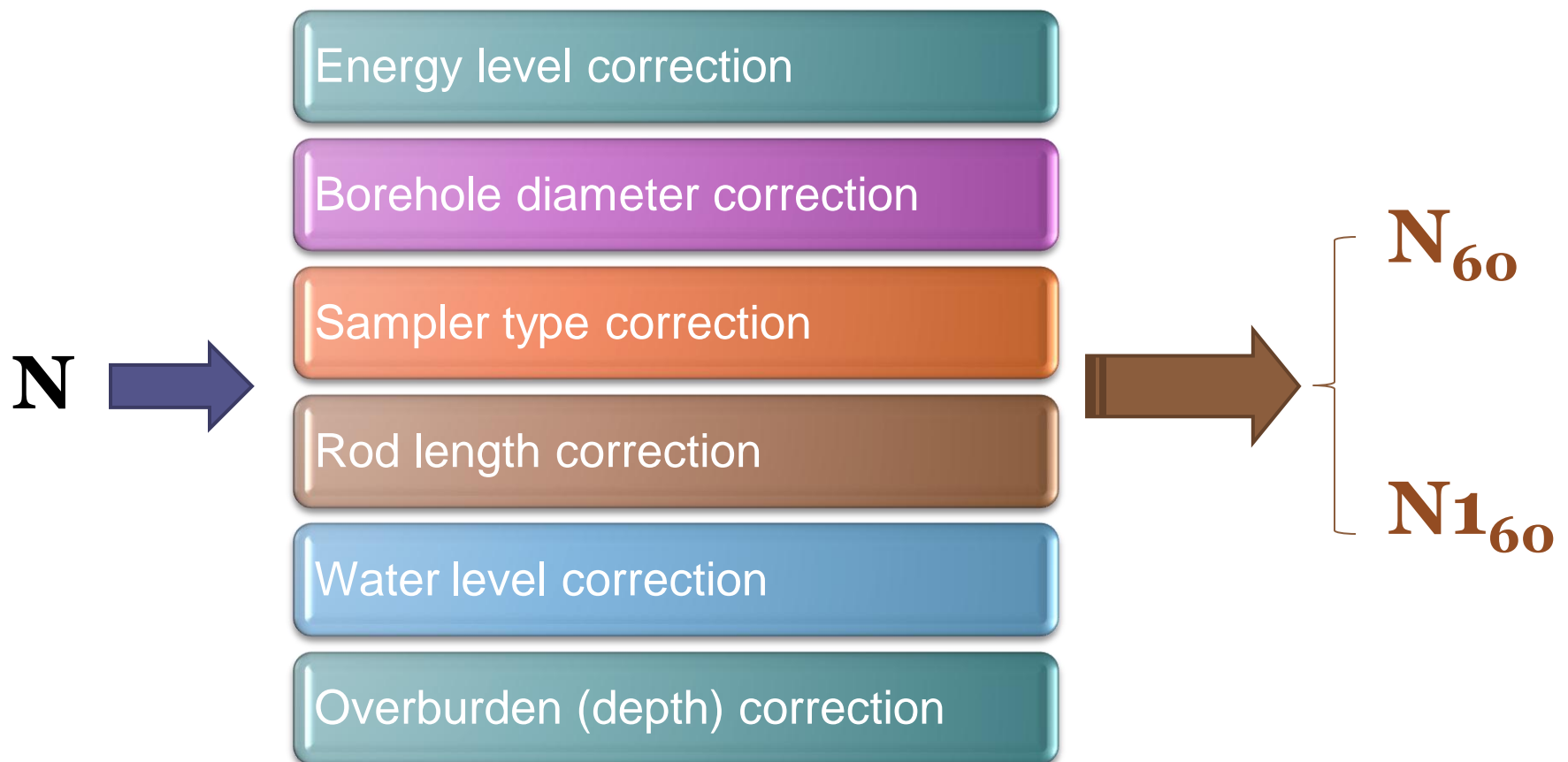
**... and still SPT is
the most popular
geotechnical field
investigation test**



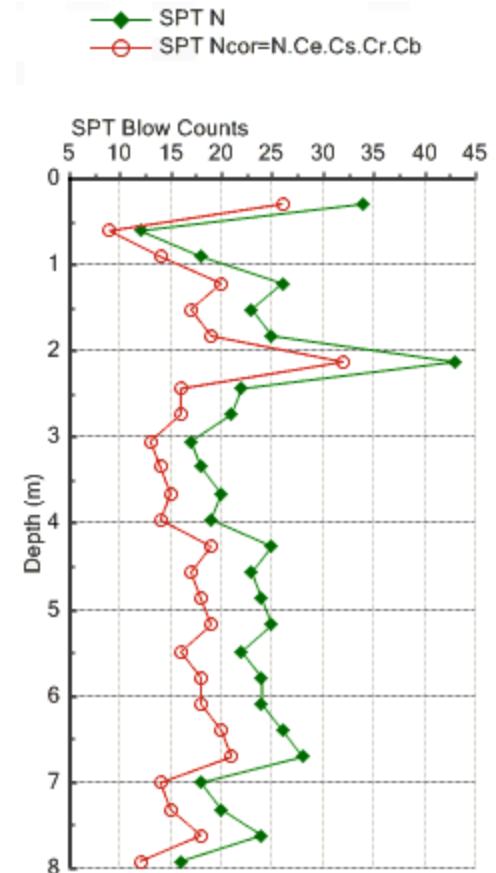
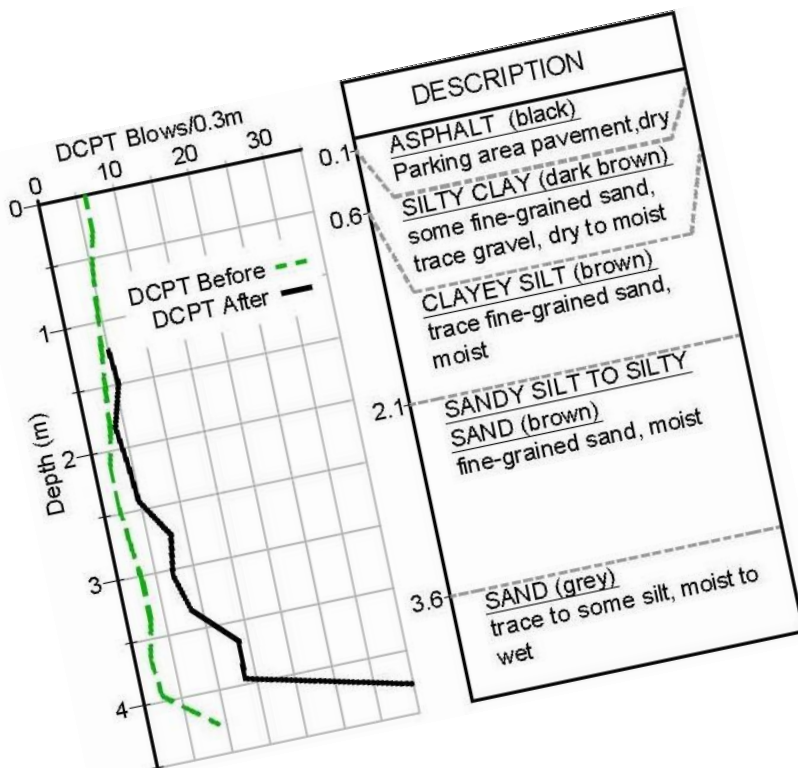
Various SPT equipments have been developed for different type of drill rigs and applications in different situations



SPT blow counts obtained from the field tests, must be corrected / normalized for:



How N_{60} and $N1_{60}$ are used in geotechnical engineering interpretations?



N_{60} and $N1_{60}$, magic numbers!



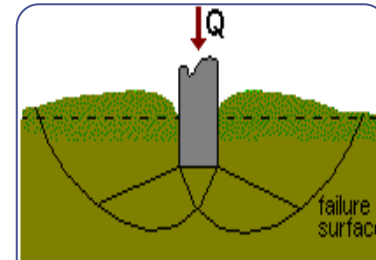
Geoscientists and researchers have carried out numerous efforts to correlate SPT blow counts to geotechnical soil properties:



Physical properties



Mechanical properties



Bearing capacity



Settlement analysis



Liquefaction analysis



Correlation to other penetrometers



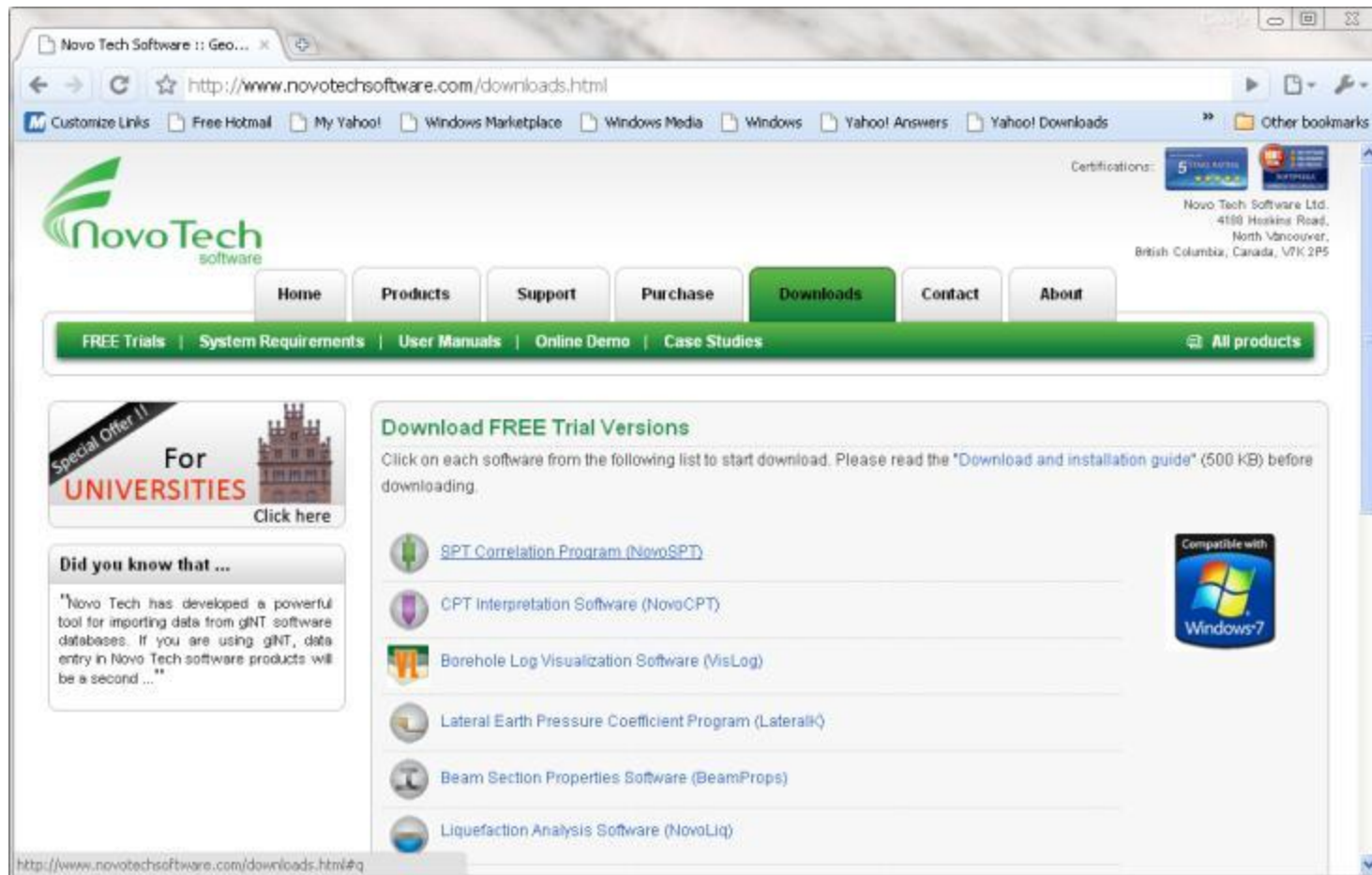
Introduction to encyclopedia of SPT correlations

NovoSPT (SPT Correlations Software)

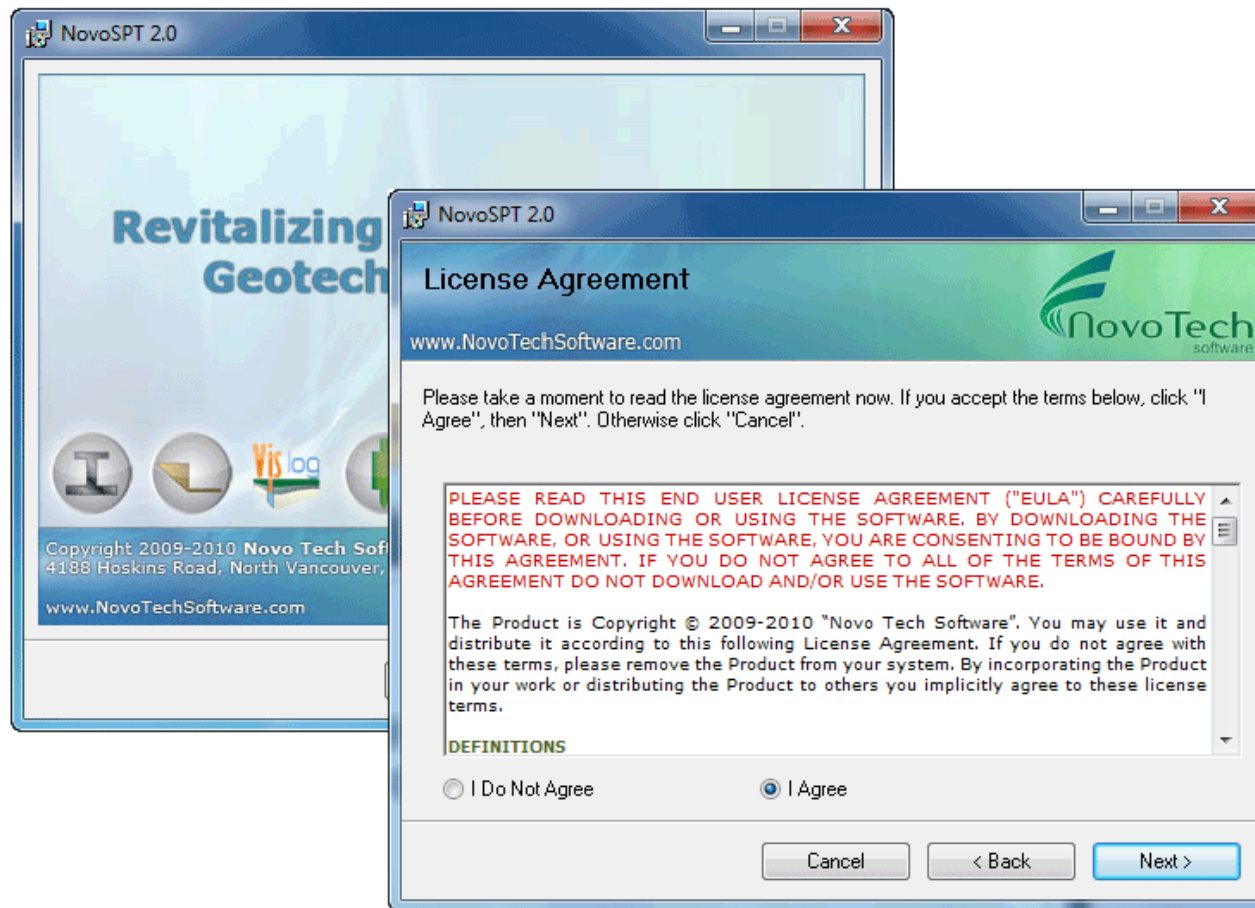
Designed & developed by:
Novo Tech Software Ltd.
Vancouver, Canada

All rights reserved





1- Easily download the software from our website

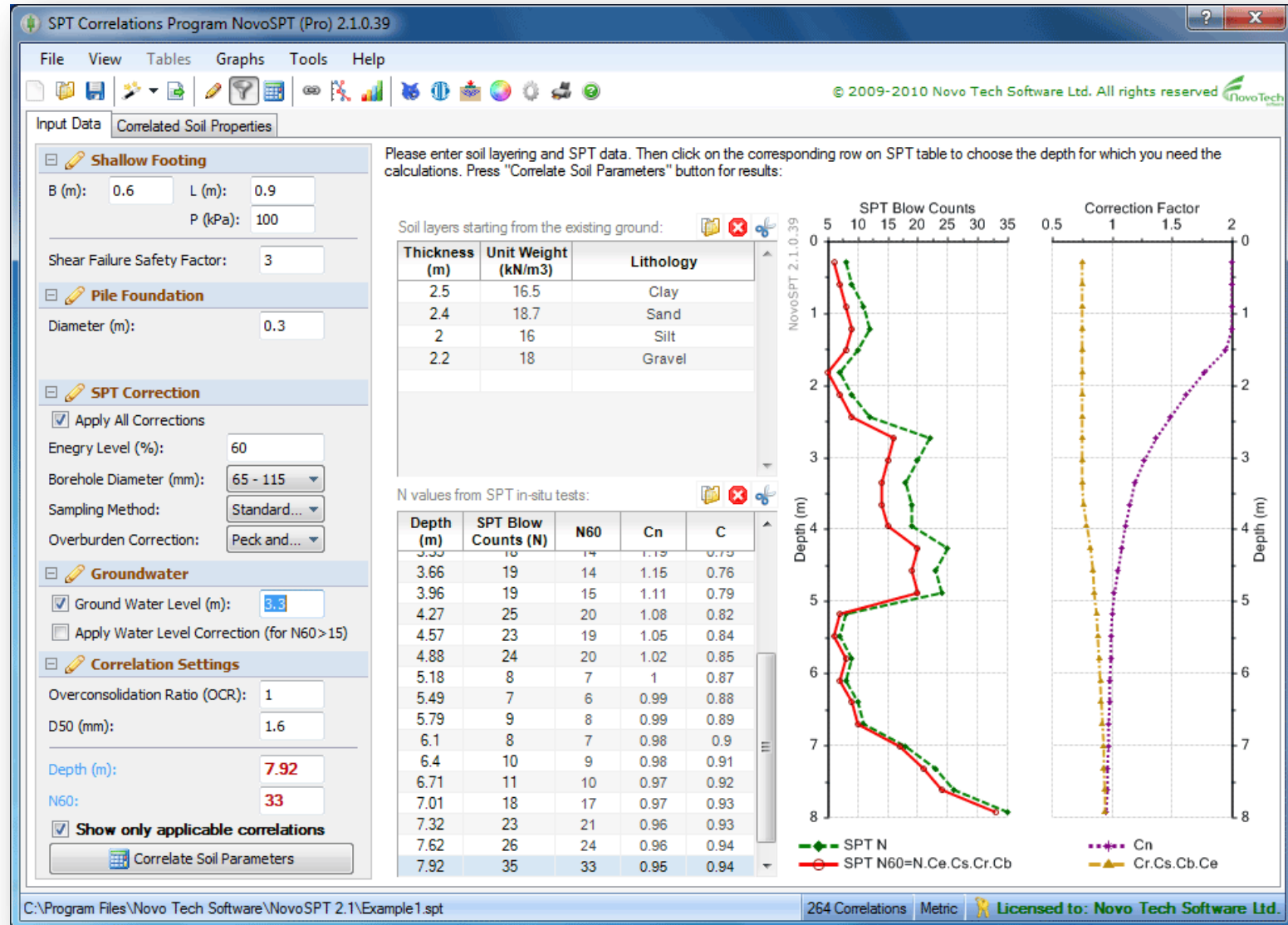


2- Quick installation

NovoSPT

More than 260 correlations are in palm of your hand

Input Data



Correlated Parameters

SPT Correlations Program NovoSPT (Pro) 2.1.0.39

File View Tables Graphs Tools Help

Input Data Correlated Soil Properties

Following correlations are calculated for $Z=7.92$ m Effective Stress = 91.18 kPa
 $N_{60}=33$, $N_{1(60)}=31$ after Peck and Bazaraa, 1969

Show all SPT correlations for: Shear Wave Velocity (V_s) 33 Depth Correlation Show Statistics

Choose parameter

Turn off/on correlations which are not applicable to your soil type or region

Schematic soil profile

CLAY (2.5 m)

SAND (2.4 m)

SILT (2 m)

GRAVEL (2.2 m)

Save as image

264 Correlations Metric Licensed to: Novo Tech Software Ltd.

Correlation	Clay	Silt	Sand	Grvl	Comments	Ref#	Var.
<input checked="" type="checkbox"/> Kanai et al., 1966						57	N60
<input checked="" type="checkbox"/> Imai et al., 1975					for all soils	57	N60
<input checked="" type="checkbox"/> Imai and Yoshimura, 1970					for all soils	57,49	N60
<input checked="" type="checkbox"/> Imai and Yoshimura, 1975					from 192 samples	31	N60
<input checked="" type="checkbox"/> Imai and Tonouchi, 1982					for gravel		N60
<input checked="" type="checkbox"/> Imai and Tonouchi, 1982					for all soils	57	N60
<input checked="" type="checkbox"/> Imai and Tonouchi, 1982					for Holocene sands and gravels	34	N60
<input checked="" type="checkbox"/> Ohta and Goto, 1978					for Holocene gravels	34	N60
<input checked="" type="checkbox"/> Ohta and Goto, 1978					for Pleistocene sands and gravels	34	N60
<input checked="" type="checkbox"/> Ohta and Goto, 1978					for Pleistocene gravels	34	N60
<input checked="" type="checkbox"/> Ohba and Toriuma, 1970						49,57	N60
<input checked="" type="checkbox"/> Iyisan					for all soils	13,57	N60
<input checked="" type="checkbox"/> Tomio Inazaki, 2006					Public Works Research Institute of Japan	36	N60
<input checked="" type="checkbox"/> Baziar, Fallah, Razeghi and Khorasani, 1998					for all soils in Iran (function of depth)	58	N1(60)
<input checked="" type="checkbox"/> Tami and Yamazaki, 1998					function of depth		N1(60)

List of all correlations for a soil parameter, plus the country where field data was collected

Soil Type Filter (new in version 2.1)

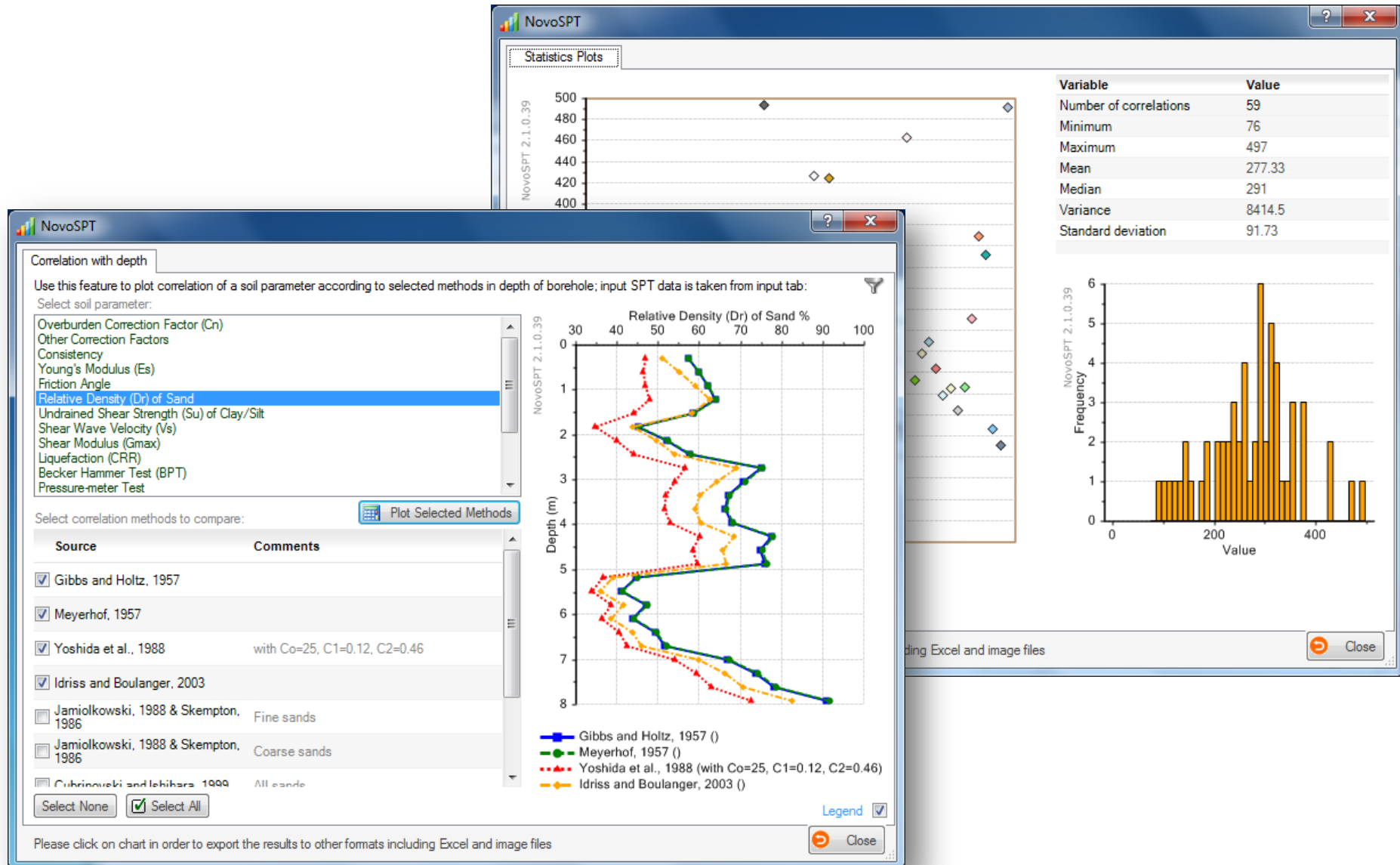
Annotations for the interface:

- if selected, correlation participates in statistics analysis
- source of correlation (scientist name)
- country in which the correlation is developed
- correlated value
- soil type for which, correlation is valid
- select soil parameter
- comments for this correlation
- reference # for correlation
- shows if N60 is used in correlation or N1(60)

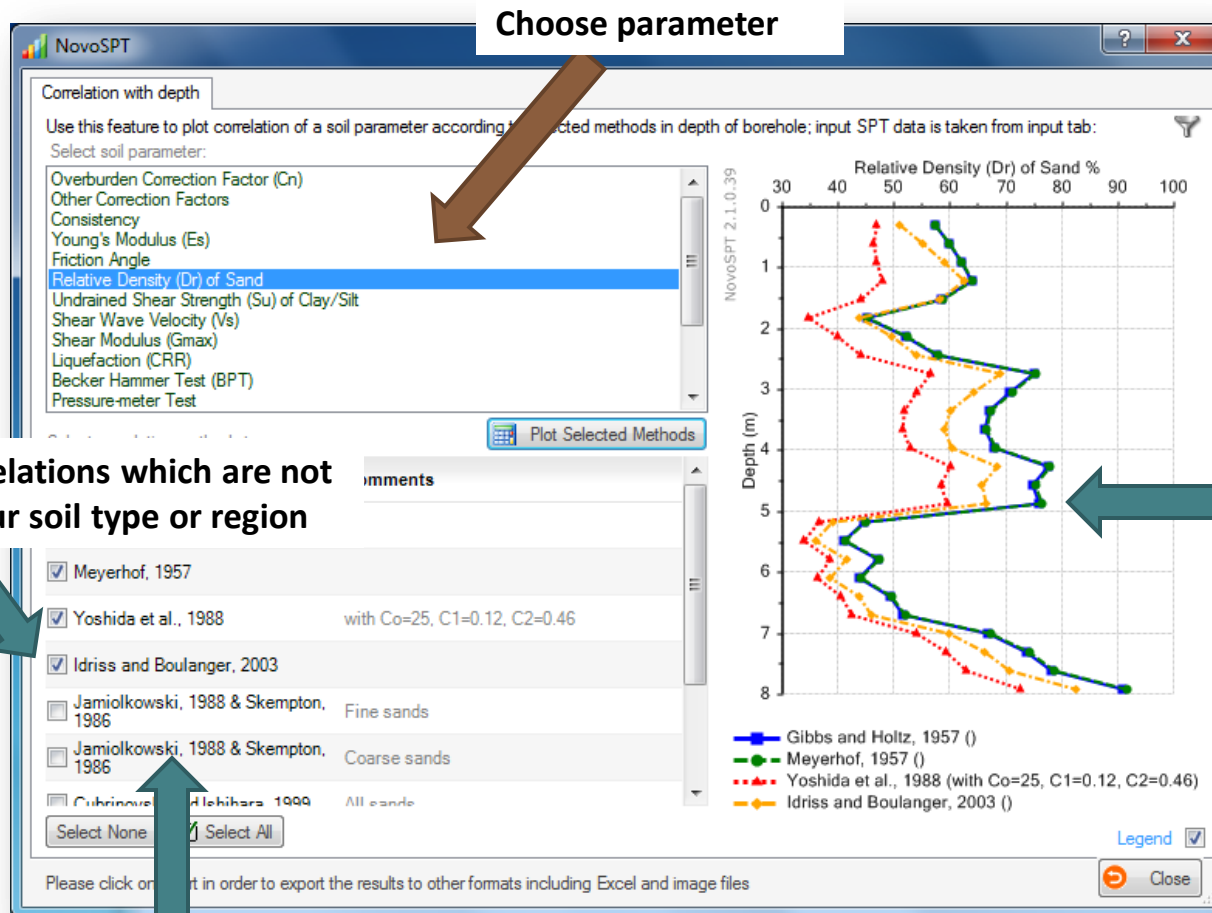
Show all SPT correlations for: Shear Wave Velocity (Vs)		Depth Correlation				Show Statistics		
Shear Wave Velocity (Vs) m/s		Clay	Silt	Sand	Grvl	Comments	Ref#	Var.
<input checked="" type="checkbox"/> JRA, 1980	145			✓		for sands	40	N60
<input checked="" type="checkbox"/> Ohba and Toriuma, 1970	146	✓	✓	✓	✓		49,57	N60
<input checked="" type="checkbox"/> Iyisan	130	✓	✓	✓	✓	for all soils	13,57	N60
<input checked="" type="checkbox"/> Tomio Inazaki, 2006	185	✓	✓	✓	✓	Public Works Research Institute of Japan	36	N60
<input checked="" type="checkbox"/> Baziar, Fallah, Razeghi and Khorasani, 1998	153	✓	✓	✓	✓	for all soils in Iran (function of depth)	58	N1(60)

- This new feature shows each correlation is applicable to what soil type
- User can filter and show only the correlations applicable to that soil type, at each depth

Correlated Parameters



Correlation Along Borehole Depth



List of all correlation methods

Import SPT data from gINT files

Database structure

NovoTech SmartSync 2.1.0.39

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4449 Hastings Street

Project data

Table: PROJECT

Project title field: Name

Depth unit (help): ft

Soil layers data

Table: LITHOLOGY

Soil symbol field: Graphic

From depth field: Depth (ft)

To depth field: Bottom (ft)

Boreholes data

Table: POINT

Borehole title field: PointID

Ground water field: GW_Level (ft)

Coordinates

Table: POINT

X field: North (ft)

Y field: East (ft)

Z field: Elevation (ft)

Available boreholes:

AH08-1
AH08-2
AH08-3

Coordinates:

X =
Y =
Z =

In-situ test data

Test

SPT

Blow counts and penetrations are stored in:

☒ Separate fields

☐ Same fields (e.g. 23/15cm)

☒ Consider blow counts more than this, as refusal: 50

☐ Consider total penetration less than this, as refusal: 1

☐ Remove refusals from dataset

[Preview SPT Data!](#)

Blow count fields: [Help](#)

☐ Length

☒ Value

Penetration fields (if applicable):

☐ Length

☐ Value

Table: BLOW_COUNT

Depth field: Depth (ft)

Depth (ft)	N60
0	4
1	6
2	16
3	10
4	37
5	29
6	42
7	50
8	50
9	50
10	50
11	50

Depth output unit: m

☒ Remember the settings

Cancel Import

6.096(ft) N=50 N=100

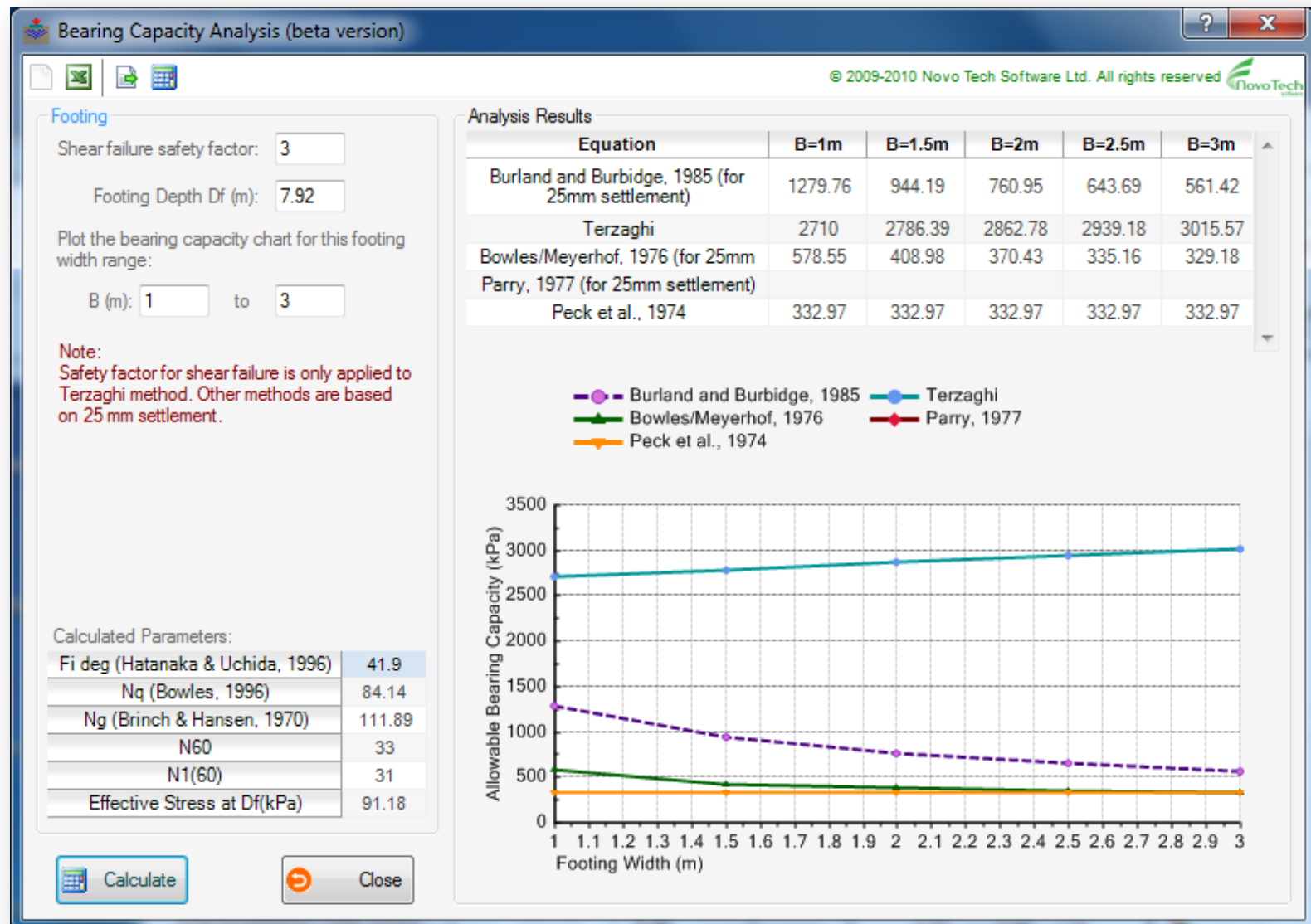
Schematic soil layers and SPT plot

CL
SC
SM
SM
TILL

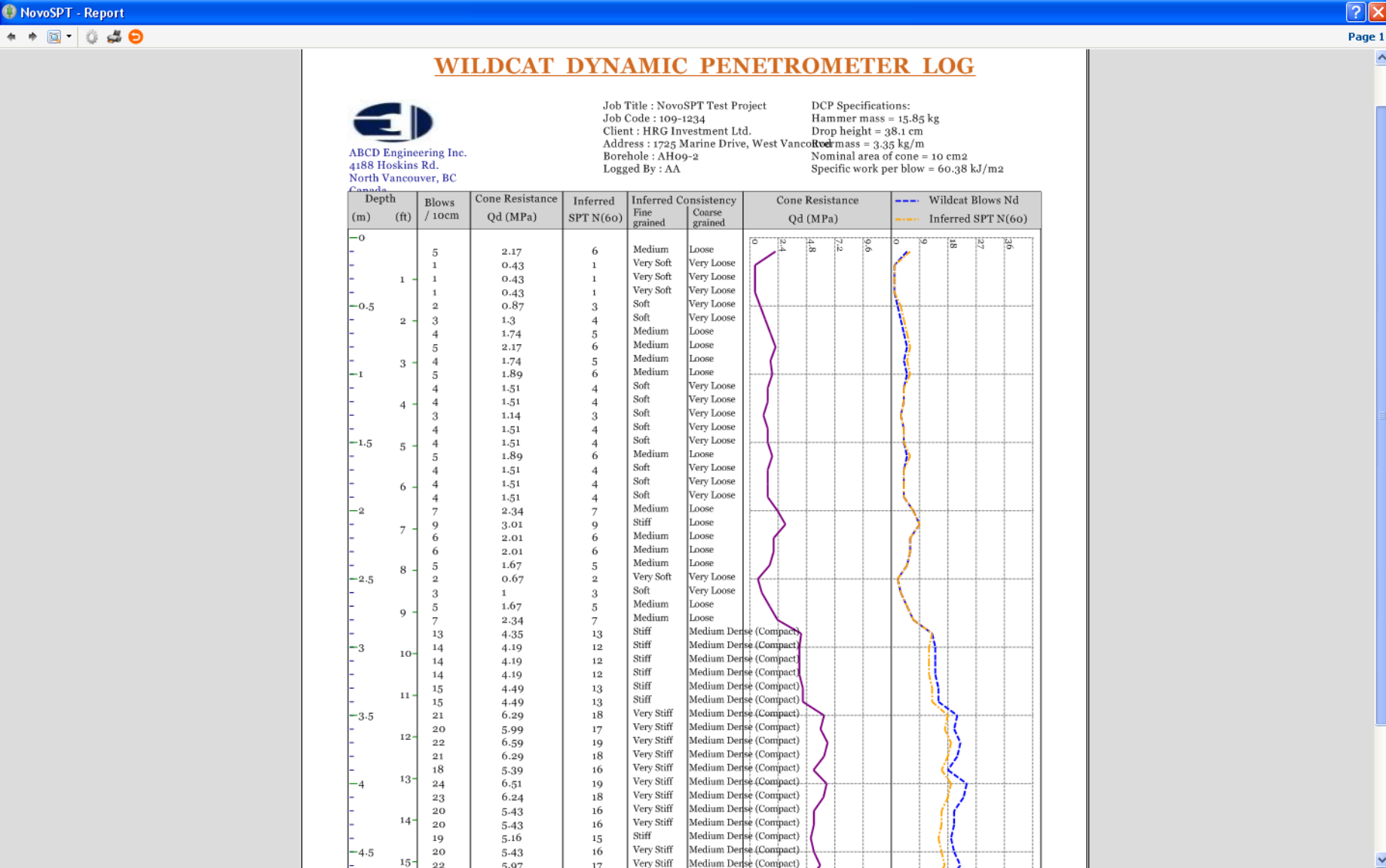
All type of SPT data storage are supported

SPT blow counts for selected borehole

Bearing Capacity / Settlement Analysis



Wildcat Penetrometer Module



Report Manager

Print Manager

☒ Print Input Data (SPT data, soil layers, charts)

☒ Print All Correlations for $Z=0.3$, $N_{60}=6$



Select parameters:

- ☐ Overburden Correction Factor (C_n)
- ☐ Other Correction Factors
- ☐ Consistency
- ☒ Young's Modulus (E_s)
- ☒ Friction Angle of Sands
- ☒ Relative Density (D_r) of Sand
- ☐ Undrained Shear Strength (S_u) of Clay/Silt
- ☒ Shear Wave Velocity (V_s)
- ☒ Shear Modulus (G_{max})
- ☐ Liquefaction (CRR)
- ☐ Becker Hammer Test (BPT)
- ☐ Pressure-meter Test
- ☐ Bearing Capacity of Piles
- ☐ Bearing Capacity of Footings on Sand (q_a)
- ☒ Settlement of Footing on Sands (S)
- ☐ Other Soil Parameters

☒ Print Correlation in Depth of Borehole

Select methods for Shear Wave Velocity (V_s):

- ☐ Kanai et al., 1966(for all soils)
- ☐ Imai et al., 1975(for all soils)
- ☒ Imai, 1977(for all soils)
- ☐ Imai, 1977(for sands)
- ☐ Imai, 1977(for clays)
- ☐ Jinan, 1987(for all soils)
- ☒ Imai and Yoshimura, 1970(for all soils)
- ☐ Imai and Yoshimura, 1975(from 192 samples)
- ☐ Imai and Tonouchi, 1982(for gravel)
- ☒ Imai and Tonouchi, 1982(for all soils)
- ☐ Ohta et al., 1972(for sand)
- ☐ Ohta and Goto, 1978(for Holocene clays)
- ☒ Ohta and Goto, 1978(for Holocene sands)
- ☐ Ohta and Goto, 1978(for Holocene sands and gravels)
- ☐ Ohta and Goto, 1978(for Holocene gravels)
- ☐ Ohta and Goto, 1978(for Pleistocene clays)
- ☐ Ohta and Goto, 1978(for Pleistocene sands)
- ☐ Ohta and Goto, 1978(for Pleistocene sands and gravels)
- ☐ Ohta and Goto, 1978(for Pleistocene gravels)
- ☐ JRA, 1980(for clays)

 **Print**  **Cancel**

User manual (Help)

Input Data

All data entry in **NovoSPT** is performed in **Input Data** tab. This data can be categorized into the following groups:

Shallow Footing: This data is used for calculating bearing capacity of shallow footings based on shear failure or settlement criteria (based on method). Footing size and load as well as safety factor against shear failure should be specified. Please notice that **depth of footing (Df)** is considered to be the **depth (Z)** selected by user on SPT table.

» Results are presented in "**Correlated Soil Properties**" tab when "**Bearing capacity of footings on sand (qa)**" items is selected from the list.

Pile Foundation: Diameter of the pile should be specified in order to estimate the friction and end bearing of the piles based on SPT blow counts. Please notice that **pile length** is considered to be the **depth (Z)** selected by user on SPT table.

» Results are presented in "**Correlated Soil Properties**" tab when "**Bearing capacity of piles**" items is selected from the list.

SPT Correction: The following corrections should be applied on SPT number (N) to obtain N_{60} and $N_{1(60)}$ numbers:

- Energy level: this will adjust the SPT equipment energy to standard 60% energy. This correction factor is named **Ce** in **NovoSPT**.
- Borehole diameter: size of the borehole affects the SPT blow counts. This correction factor is named **Cb** in **NovoSPT**.
- Sampling method: some SPT samplers have a liner. This will affect the SPT blow counts and its correction factor is called **Cs** in **NovoSPT**.
- Rod length: this correction factor is called **Cr** and depends on length of SPT rods which is approximately equal to the depth of the test. The following formula proposed by Dr. Cetin is used in **NovoSPT**:

$$C_R = \frac{1}{0.989860781 + \frac{4.31663223}{z^2}} \quad \text{for } z \geq 3$$

- Overburden stress: this corrections is usually called as "depth correction factor" or **Cn** and depends on overburden stress due to soil, at the test depth.

Please choose your favorite method for each correction factor. The following formula is used to calculate the correction factors at each depth:

$$C = C_e \cdot C_b \cdot C_s \cdot C_r \quad N_{60} = C \cdot N \quad N_{1(60)} = C_n \cdot N_{60}$$

All the above-mentioned factors as well as N_{60} and $N_{1(60)}$ are plotted versus depth and presented on screen.

» Results for C_n corrections are presented in "**Correlated Soil Properties**" tab when "**Overburden correction factor (cn)**" items is selected from the list.

Ground Water: The groundwater level affects the calculation of effective overburden stress (σ'_v) used in the correlations. In addition, user can choose to apply the water level correction on SPT blow counts, as proposed by Terzaghi. This correction is recommended for $N \geq 15$ in silty sands:

$$N_{cor} = 15 + 0.5(N_{60} - 15)$$

Correlation Settings: Some SPT correlations depend on OCR and D_{50} of the soil. Please enter your best estimation of these values. One important point when

Customer Testimonials



Richard S. Kessler, PE, DGE
(United States)

I am a relatively new user of NovoSPT. I have found it easy to use and useful in day-to-day Geotechnical Engineering tasks. Particularly impressive and time saving is its ability to retrieve input directly from gINT data files. Most importantly, I have found the responsiveness to support requests including those suggesting additions to the library of correlations to be exceptional



Jose Carlos Andrada
A2 Ingenieria
(Paraguay)

I downloaded and used the free trial version of NovoSPT and I must say that I really loved your software. I find it really usefull and I checked several results and they seem to be accurate, so I must congratulate you for this great software



Miles Davis
Quantum Geotechnical Ltd.
(United Kingdom)

Most excellent, many, many thanks for NovoSPT. It works perfectly. This is a great bit of software. I shall say to you what I have said to Salvatore (president of gINT Software) on a number of occasions, if you offer tech support like that you'll go far. It was nicely unexpected to get a reply at all, let alone have the problem solved within a day. Hats off to you!

Nc

the
es

Our other software solutions:



Cone Penetration Test (CPT) Interpretation Software (NovoCPT): for interpretation of CPTu including liquefaction analysis, foundation settlement analysis and pile bearing capacity analysis (LCPC) tools.



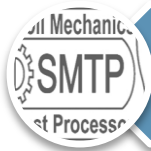
Liquefaction Analysis Program (NovoLiq): based on 10 different methods for calculating Cyclic Resistance Ratio (CRR), with more than 55 options for other formulas, including post-liquefaction lateral displacement and settlement ...



VisLog: This powerful program is designed for visualizing geotechnical/geological borehole logs and automatically drawing soil profiles. 3D environment and easy zoom and rotation features make it so easy to work with VisLog...



Beam Section Properties (BeamProps): This software is used to calculate beam section properties such as area, moment of inertia, radius of gyration, etc. for more than 25 sections and shapes...



SMTP: is a comprehensive solution for processing soil mechanics laboratory tests such as sieve test, Aterberg limits, moisture and density, direct shear, triaxial, compaction, permeability, etc and designing borehole logs.



LateralIK: Calculating lateral earth pressure coefficient program in static (Rankine/ Coulomb) and earthquake (Mononobe/ Okabe) conditions ...



Peysanj: A complete set of geotechnical modules for bearing capacity and settlement of shallow footings, pressure-meter test, plate load test, liquefaction analysis, lateral earth pressure coefficients, and more ...



Thank you for watching

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www.NovoTechSoftware.com