# Soil Investigation Report

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| PROJECT | **SAMAWA COMBINED CYCLE POWER PLANT PROJECT SAMAWA, IRAQ** |

Republic of IRAQ
Ministry of Electricity

| CONTRACTOR | NOMINATED SUB CONTRACTOR |
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| **GE POWER** | **ENKA** |

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ENGINEERING TESTS LABORATORY

# SAMAWA COMBINED CYCLE POWER PLANT PROJECT

# GEOTECHNICAL INVESTIGATION REPORT

**Report No. 2364**
**August 2017**

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GEOTECHNICAL INVESTIGATION REPORT

ANDREA
ENGINEERING TESTS LABORATORY

FOR

# SAMAWA COMBINED CYCLE POWER PLANT PROJECT

AT

# AL-MUTHANA GOVERNORATE

## REPORT NO. 2364

**August 2017**

BY


**ANDREA ENGINEERING TESTS LABORATORY**

*For Soil Investigation & Cons. Material Testing*

Al Wahda Dist.- Q 906 – Alley 10 - Build. No.(11) - Baghdad – Iraq
Tel: +964 790 133 6045 / +964 770 123 3278
Website : www.andrealab.com
E-mail : azad@andrealab.com

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REPORT ON SITE INVESTIGATION

FOR

SAMAWA COMBINED CYCLE POWER PLANT PROJECT

AT

AL-MUTHANA GOVERNORATE

# I. INTRODUCTION

This soil investigation was carried out at the request of the Contractor Messrs., ENKA INSAAT.

The purpose of this investigation was to explore the subsoil conditions of the proposed site to facilitate and evaluate the foundation design for the structures & facilities composing the Samawa Combined Cycle Power Plant at Al-Muthana Governorate.

Upon the completion of the soil investigation works, general and certain recommendations regarding the behavior of the soil with respect to the proposed system of foundations for the structures and other associated facilities of the Power Plant, should be furnished.

The field investigation was carried out between 1$^{th}$ May & 15$^{th}$ May 2017 and it included the following field activities:

- Drilling of Eighty - Nine (89) boreholes of (20 - 50) m depth, all from the existing natural ground level, and performing standard penetration test (SPT). The number of the boreholes is divided based on the depth as follows:

  - Two (2) boreholes to 50m depth,
  - Four (4) boreholes to 40m depth,
  - Thirty – Three (33) boreholes to 30m depth,
  - Thirty – Four (34) to 25m depth, and
  - Sixteen (16) boreholes to 20m depth.

- Installation of piezometers in Nine (9) pre-drilled boreholes (namely BH.7, BH.21, BH.37, BH.39, BH.41, BH.45, BH.47, BH.50 & BH.61), as a monitor wells for the prediction of the seasonal fluctuation in the ground water level through installing PVC pipes with (2.5”-3”) surrounded by filter material.

- Excavating of Six (6) Test Pits throughout the site at location identified by the Contractor to depths of (2.0) m depending on nature of the subsoil, and obtaining large bulk samples for various tests including modified compaction and California Bearing Ratio;

- Carrying out Static Cone Penetration Tests (CPT) at Forty – Five (45) spots onsite to depth of 20m from the NGL or refusal whichever achieved first, following (ASTM D 5778 - 12).

- Seismic survey carried out using Cross-Hole method at Five (5) locations throughout the site to depth of (30) m from NGL by means of Three (3) holes, as indicated on the site plan attached hereinafter.

- Carrying out Electrical Soil Resistivity Tests throughout the site using 4-pin Wenner method at Thirty – Five (35) different locations in two perpendicular directions. The tests will be performed at Five (5) spacing (0.75, 1.5, 3.0, 5.0 & 10.0) m, following (ASTM G-57).

The locations of the Boreholes, Test Pits, CPT, Seismic Cross - Hole & Soil's Electrical Resistivity were setup on the ground by ENKA's surveying staffs by means of coordination furnished by the Contractor in UTM System.

A general layout showing the site plan and the locations of Boreholes, Test Pits, CPT, Seismic Cross - Hole & Soil's Electrical Resistivity at the site is included in Appendix (A) of this report together with a table of coordinates provided by the Contractor for the locations where the tests were carried out.

At the laboratory, a program was developed to test the obtained samples in order to reveal the pertinent physical and mechanical properties of the soil as per the laboratory test schedule provided by the Contractor.

The subsoil strata encountered are described in the borehole logs attached in Appendix (B), together with the field test results.

The summary of the laboratory tests results for the samples collected from the boreholes are shown in Appendix (C) followed by Appendix (D) that shows the soil profile at the Test Pits locations with the summary of the laboratory test results for the samples collected from the Test Pits.

Appendix (E) is reserved for graphical presentation of the output data for the CPTu followed by Appendix (F) where the Shear Wave Velocities and Elasto-Dynamic properties of the soil that have been evaluated from seismic survey conducted on site by means of Cross- Hole Method, have been included.

Under Appendix (G) the Field Electrical Resistivity test results in table form has been presented.

Appendix (H) Load Pressure versus Settlement Curves

Appendix (I) Piezometer Data

Appendix (J) Pile Capacity Calculations

Appendix (K) Void Ratio versus Axial Pressure Curves

Appendix (L) Mohr's Circle Diagram & Stress/Strain Curves

Appendix (M) Settlement Calculations

Appendix (N) Liquefaction Analyses

## II. FIELD WORK

### 1. ***SOIL EXPLORATION***

a- Boring

The boring equipment used in carrying out the field work were four (4) multi drilling method rigs using Auger & Rotary drilling method using wash boring process.

This method uses rotation of the drill bit, with the simultaneous application of pressure to advance the hole. The water is then forced under pressure through the hollow of the drill rod & it emerges at high velocity through openings in the bit, to carrying out the eroded soil, and then rises through the annular space between the borehole sides and the drill rod.

The depths of borings (20 – 50) m were decided by the contractor to extend beyond the zone of influence of significant foundation pressure down to materials that were relatively incompressible.

As the type of foundation was not determined yet, in our opinion the depth of the boreholes extended to the point where

the net increase in stress due to the load action of the structure is either:

1. Less than 10% of the total surface load, or
2. Less than 5% of the overburden stress in the soil.

The method of drilling was carried out following the standards of the American Society for Testing and Materials (ASTM D1452-09 & D5783-12).

b- Sampling

(i) Disturbed Samples

The disturbed samples were obtained, per (ASTM D1586-11), at intervals of (1-2) meters, and as required to determine the classification of the soil layers.

The samples that were extracted by the Standard Split Spoon Sampler were also used as disturbed samples. All disturbed samples were sent to the Laboratory for further examination and testing.

(ii) Undisturbed Samples

Undisturbed samples were obtained at (2-3) meter intervals or change of strata to cover all cohesive layers.

Thin wall tube samplers (Shelby Tube) used according to (ASTM D-1587-11) for obtaining undisturbed samples.

After extraction, the samples were trimmed off, capped with paraffin wax, and sealed properly at both ends. The samples were then dispatched to the laboratory for further examination and testing.

c – In–Situ Testing

Standard Penetration Test (SPT)

In the course of drilling work, the consistency of the soil was measured at several depths by Standard Penetration Test (SPT).

The test was performed following (ASTM D1586-11).

The test involves recording the number of blows of 140 lbs. (63.5 kg) Standard Hammer with a 30-inch (76 cm) drop to drive the 2-inch (50.8 mm) diameter Standard Split Spoon Sampler a distance of 12 inches (30.5 cm) into the soil.

## 2. GROUND WATER OBSERVATION

The piezometers were installed at Nine (9) selected pre-drilled boreholes locations all around the site for observing of water table fluctuation, as the water table was encountered in various depths illustrated in the boreholes logs. The following step-by-step procedure was followed to install the piezometers:

- Slotted PVC pipes of 75 mm dia. were installed for lining the piezometers.
- Fine to medium grained aggregate used as a filter media surrounding the PVC pipes.
- Standard echo sounder used for measuring the ground water table level.
- The presence of ground water level at the boreholes was at different levels recorded and included in this final Geotechnical Report. It is expected that the Contractor engineering staffs to continue with this practice and record the ground water table levels on daily/weekly basis.

## 3. TEST PITS EXCAVATIONS

Six (6) Test Pits were excavated throughout the site using backhoe excavator, having surface area of not less than (3) $m^2$ with (2.0) m depth or down to water table level in the locations identified by the Contractor.

Small distributed sample together with large bulk samples were obtained from each test pit or at every change in strata.

The summary of the test results carried out over the samples collected from the test pits are shown in detail under Appendix (D).

## 4. STATIC CONE PENETRATION TEST

The electric Piezo-Cone Penetration testing (P-CPT or CPTu) is a continuous penetration probing carried out to derive several in-situ geotechnical properties of subsurface soil layers. The test is performed in general accordance with ASTM D 5778 - 12.

The P-CPT is carried out at a continuous penetration rate of 20mm/second, using a 200kN capacity electrical piezo cone, pushed with twin hydraulic rams mounted on a 20-Ton truck.

Electric piezo-cone has a projected area of 15cm$^2$, a 60° apex angle and 200cm$^2$ sleeve friction areas. It is equipped with electrical pressure sensors and readings of "tip resistance", "side friction resistance", friction ratio and pore pressure are measured continuously every 10mm penetration, in digital format into a computer, via electrical cables in the cone rods.

During the test the recorded data are displayed on the computer screen in real-time and stored directly into the hard drive for further processing and derivation of subsurface soil geotechnical parameters.

The P-CPT probe is continuously pushed into the subsurface to the desired depth or until refusal is encountered. Refusal criteria for P-CPT's are recorded at the following conditions (usually at encountering hard material or rock); Cone tip refusal, sleeve friction refusal, both and/or excessive inclination of cone rods above tolerance limits.

At the site in question, forty-five (45) locations were selected by the Contractor to carry out the Static Cone Penetration Test, to depth (20) m or refusal. The results of the test are reviewed in detail under Appendix (E) attached hereinafter.

## 5. ***SEISMIC SURVEY***

The seismic survey was carried out by cooperation with AMAK Geophysical Exploration and Scientific Appliance Company. A detailed description, procedure, geophysical survey results, with the discussion of the results have been presented as follows:

### 5.1 Introduction

The cross hole seismic method determines shear and compressional wave velocity versus depth profile. From these measurements, parameters, such as Poisson's ratios and Elastic Moduli, can be easily determined.

The compressional and shear seismic waves velocities are measured following ASTM D4428/D4428M-14 standard.

The Cross-Hole system is comprised of a borehole source capable of generating shear and compressional waves and a five components geophone receiver. These instruments are lowered to the same depth in two boreholes at about (3.0 – 5.0) meters apart on a line.

### 5.2 Cross Hole Seismic Test Equipment

The Geotomographie (www.geotomographie.de - Germany made) borehole seismic equipment's are used in this test. Terraloc Pro (ABEM, Sweden: www.abem.se ) is the seismic measuring instrument (seismograph). The details of these instruments are listed here below:

1. *Seismograph Instruments*: Terraloc Pro, 24 channels seismograph (www.abem.se).

2. *Borehole Sparker Equipment comprises*; (www.geotomographie.de)

*A- Basic Sparker Equipment comprises*
- Impulse generator IPG 1005 (1000J)
- Remote control RCU
- Common source adapter CSA with down hole cable (operational depth 100m)
- P-wave probe SBS-42
- Carrier rope on drum
- Spares [HV – cable (1), control cables (2), grounding cable (1), grounding hook (1), power cable (1) 7 tool box (1)]

*B- Downhole source SH-66 for SH-wave generation*.
- S Wave Source BIS-SH for Cross-hole Testing after ASTM D4428/D4428M-14 (BBSPS reuired)
- OD ~ 65 mm, Operational depth 65 m
- Appl. Borehole size 3 to 4 inch
- Connector to BBSPS, Pneumatic clamping incl. Air pump
- Cable marker every 1 m, source on drum and roller device

3. *Borehole Receiver Equipment comprises:* (*www*.geotomographie.de)

**A -** Borehole Geophone BGK 7 for 110 m with clamping device

Specifications
- outer tool diameter approx. 50 mm
- Tool length ~ 550 mm
- 7 standard geophones (15 Hz)
  (6 horizontal geophones with 30° angular positioning and 1 vertical geophone)
- 110 m pressure hose and downhole cable on drum for pneumatic clamping
- Applicable borehole size max. 90 mm
- Magnetic compass with surface display unit (2° azimutal resolution)
- Female connector to seismograph
- Toolbox and manual, air pump
- Cable marker every two meter
- Cable on drum

**B -** Borehole Geophone BGK 5 for 110 m with clamping device
Specifications
- outer tool diameter approx. 50 mm
- Tool length ~ 550 mm
- 5 standard geophones (15 Hz)
  (4 horizontal geophones with 45° angular positioning and 1 vertical geophone)
- 110 m pressure hose and downhole cable on drum for pneumatic clamping
- Applicable borehole size max. 90 mm
- Magnetic compass with surface display unit (2° azimutal resolution)
- Female connector to seismograph
- Toolbox and manual, air pump
- Cable marker every two meter

***4.*** *Portable Field generator (2.5 KV) and voltage regulator*

### 5.3 Boreholes for the Seismic Cross Hole Tests

The Seismic Survey was performed at Five (5) locations to depth of (30) m from NGL by means of Cross-Hole Method, to measure compression and shear wave velocities for the computation of the elasto-dynamic soil parameters.

The Shear wave velocities of the subsurface soil layers are measured down to a depth of 30.0 meters. At each test location, there is three boreholes along one direction. One borehole is for the sparker and the other two boreholes is for the geophone, i.e. it is a three-boreholes seismic cross-hole test.

The boreholes drilling and preparation were done by Andrea Engineering Tests Laboratory. At the first test location (CHT1), three boreholes were drilled with 3.20m meters apart and on a line.

The depth of the drilling was more than 30.0 meters in order to get the required 30.0 meters' depth. PVC casing of 4.0 inches in diameter was used. The bottom of this casing was closed to prevent sediments getting inside while lowering the casing. The space between the borehole wall and the PVC casing was filled (grouted) up to the top of the borehole.

The same procedure was followed for the other test point CHT2, CHT3, CHT4 & CHT5 which is located at the same site, but the directions were for three vertical and the other two horizontal with the distance between the transmitter and receiver boreholes is remains approximately 3.2m.

### 5.4 Field Work and Measurements:

Three boreholes of 30.0 meter depths are prepared with a PVC casing of 4.0 inches diameter. The sparker and the geophone probes are lowered inside the PVC casing at depths of 30 meters.

The 7 components geophone was lowered in the mid borehole while the 5 components geophone were lowered in third borehole. They are oriented to the right directions by using the magnetic compass.

All probes were anchored to the casing wall by air pressed into clamping unit (the rubber expands in direction to counter side the reference direction). The sparker probe is designed to generate horizontal shear and compressional seismic waves.

The traveling times for the generated seismic waves are detected by the geophone and measured by the seismograph and saved.

The work was continued with the other depths, the three probes pulled up in step wise at intervals of 1.0m. At each interval, a seismic record was taken and saved in seismograph hard disk memory.

The work continued with other depths. The probes pulled up in stepwise at every one meters. At each depth, there are two seismic records, which are usually saved in the seismograph hard disc memory.

### 5.5 Data Processing and Results

The picking of the first arrival times for both P-wave and S-wave is done for 150 seismic records. The picking and filtering are

done using the Terraloc instrument software (SEIS TW) in addition to ReFlexw ver. 4 and Tom Time software.

The velocities of P-Wave and S-wave were calculated depending on the first arrival and their differences between the two geophone boreholes, i.e.; the difference in the arrival times between the second geophone and first geophone.

Tables 1, 2, 3, 4 & 5 show the calculated compressional and shear velocities for the CHT1, CHT2, CHT3, CHT4 & CHT5 tests points respectively. Figs. 5, 6, 7, 8 & 9 shows the variation in shear wave velocities with depth for the five tested points CHT1, CHT2, CHT3, CHT4 & CHT5 respectively.

### 5.6 Elasto – Dyanmic Properties

The Elasto – dynamic moduli of subsurface soil layers were calculated using the recorded P-wave and S-wave velocities at each depth with their related densities. The general density log of each test point was calculated using Tezcan et. al. (2006) equation (Density = 16 + 0.002 * Vp), which showed values ranging from 1720 kg/m$^3$ to 2100 kg/m$^3$. Tables 6, 7, 8, 9 & 10 show the P-wave velocities, S-Wave velocities, and the calculated moduli parameters. The related familiar equations (listed below) are used for elastic moduli calculations.

$$\upsilon = \frac{V_p^2 - 2V_s^2}{2\left(V_p^2 - V_s^2\right)}$$ Poisson's Ratio

$G_d = P \cdot V_s^2$ Shear Modulus

$E_d = 2 \cdot G_d (1 + V)$ Young's Modulus

$B_d = E_d / (3 * (1 - 2. V))$ Bulk Modulus

Where:

$V_p$ is the propagation velocity of the compressional waves

$V_s$ is the propagation velocity of the shear waves

P is the bulk density of the material

The Seismic study results are presented under Appendix (F).

## 6. ***SOIL ELECTRICAL RESISTIVITY TESTS***

The field investigation includes soil resistivity test at Thirty – Five (35) selected locations in required directions.

The soil resistivity survey included the performance of four-pin Wenner test (according to ASTM G-57) at the selected locations with different spacing between the electrodes in two perpendicular directions as shown in the soil resistivity test results. The tests were performed at Five (5) spacing (0.75, 1.5, 3.0, 5.0 & 10.0) m.

The following formula calculated the soil electrical resistivity:

$$\rho = 2 \pi a R$$

Where: ρ = the resistivity to a depth of "a" in ohm cm
R = the soil resistance measurement in ohms
a = the distance between the electrodes in cm

Under Appendix (G), the Field Electrical Resistivity test results in table form are presented.

# III. LABORATORY TESTING

The testing programme included the following major tests on representative samples:

1. Visual Classification (ASTM D2488-09a)
2. Natural Moisture Content and Unit Weight. (ASTM D2216-10)
3. Specific Gravity. (ASTM D854-14)
4. Grain Size Distribution. (ASTM D422-07)
5. Liquid and Plastic Limits. (ASTM D4318-10)
6. Shear Test
   (i) Unconfined Compression Test. (ASTM D2166/D2166m-13)
   (ii) Triaxial Compression Test (UU) (ASTM D2850-03a)
   (iii) Direct Shear Test (ASTM D3080/D3080M-11)
7. Compressibility Test
   (i) Consolidation and Swelling Tests (ASTM D-2435-11)
8. Moisture content/Density relationship
   (i) (Modified Compaction Test) (ASTM D1557-12)
   (ii) California Bearing Ratio (CBR) (ASTM D1883-14)
9. Chemical Analysis on Soil
   (i) Sulphate Content as SO3 for soil
   (ii) Total soluble salt.
   (iii) Chloride content.

(iv) Organic Matter Content.
(v) pH

All the tests were conducted according to the current Standards of the American Society for Testing and Materials (ASTM), mentioned against each test. The test results are summarized in Appendix C.

## IV. DESCRIPTION OF SUBSOIL STRATA

The subsoil strata encountered at the investigated locations are detailed on the borehole logs, enclosed in Appendix "B", including the position of samples, standard penetration test results and ground water level at the time of boring together with the stratification of soil along the depth for investigated area.

The subsoil strata at the Power Plant's Project site which explored by Eighty – Nine (89) boreholes to (20 – 50) m depth consist mainly from following strata;

Soft to medium, with brownish and grayish visions in colors, (Sandy) lean to fat Silty CLAY with white spots of soluble salts and black traces of organic matter, (reddish) lines/traces of iron oxide compounds, white cement formation, together with white shiny sheets of mica minerals, as the second major layer.

- Loose to medium strengthens with depth to dense and very dense with brownish, greenish, and grayish appearances in colors, fine to medium grained (Clayey) Silty SAND with white spots of soluble salts and rusty spots of iron oxide compounds, white shiny sheets of mica minerals together with appreciable amount of cementation formation compounds, as one of the main layers and;
- Medium to stiff strengthens with depth to very stiff and hard, with brownish and grayish visions in colors, (Sandy) fat Silty CLAY with white spots of soluble salts and black traces of organic matter, (reddish) rusty lines/traces of iron oxide compounds, white cement formation, together with white shiny sheets of mica minerals, as the second major layer.

However, the profile could be divided into sub layers each one varies from the other in their strength and density along the depth of the borehole as shown in the boreholes logs.

The above description indeed, is a general overview for the subsoil profile and more detailed description is presented in Appendix "B" attached hereinafter.

From the values of specific gravity, passing # 200 sieves, consistency indices and according to the Unified Soil Classification System (USCS), the Silty CLAY soil layers are classified as CL & CH, i.e.; Silty Clay with moderate to high plasticity, while the SAND layers is categorized as SM & SC.

The water table was encountered, as observed during the time of exploration at deep levels in the range of (1.50 – 2.50) m, below the existing ground level. The water level measurement was conducted per ASTM D-4750.

## V. BEARING CAPACITY AND SETTLEMENT ANALYSES

Since structural damage may result from soil shear failure (collapse) as well as from excessive settlement, the following criteria must always be used in evaluating the bearing capacity:

1. Adequate factor of safety against failure.
2. Adequate margin against excessive settlement (usually 1" for isolated and strip foundations and 2" for raft foundations) *.

**** For mechanical and electrical structures, the settlement limits should be set by the manufacturer as that equipment would be very sensitive to movement.***

### 1. *Bearing Capacity Calculation Formulae for Foundations*

The bearing capacity could be evaluated from one of the following methods:

a. The bearing capacity is calculated according to Terzaghi equation with modification suggested by Meyerhof (1963)

$q_{ult} = CN_c + qN_q + 0.5\,\gamma\,B_\gamma\,N_\gamma$ continuous footing
$q_{ult} = 1.3\,CN_c + q\,N_q + 0.4\,\gamma\,B\,N_\gamma$ square footing
$q_{ult} = 1.3\,CN_c + q\,N_q + 0.6\,\gamma\,B\,N_\gamma$ round footing
$q_{ult} = CN_c\,S_c\,d_c + q\,N_q\,S_q\,d_q + 0.5\,\gamma\,B\,N_\gamma\,S_\gamma\,d_\gamma$ Meyerhof

$N_c$, $N_q$, $N_\gamma$ Bearing capacity factor
$S_c$, $S_q$, $S_\gamma$ Shape factors
$d_c$, $d_q$, $d_\gamma$ Depth factors

$$S_c = 1 + 0.2K_p\frac{B}{L} \qquad for\ any\ \emptyset$$

$$S_q = S_\gamma = 1 + 0.1K_p\frac{B}{L} \qquad \emptyset > 10^o$$

$$S_q = S_\gamma = 1 \qquad \emptyset = 0^o$$

$$d_c = 1 + 0.2\sqrt{K_p}\frac{D}{B} \qquad for\ any\ \emptyset$$

$$d_q = d_\gamma = 1 + 0.1\sqrt{K_p}\frac{D}{B} \qquad \emptyset > 10^o$$

$d_q = d_\gamma = 1$ $\emptyset = 0^o$

$K_p = tan^2(45 + \emptyset/2)$

b. Bearing capacity for foundation on undrained saturated clay for $\phi$ = 0, so the general expression will be:

$q_{ult} = CN_c + \gamma D_f$ (i.e. $N_q = 1$, $N\gamma = 0$)

$$(N_c)_{rectangular} = \left(1 + 0.2\frac{B}{L}\right)(N_c)_{Strip}$$ (Skempton formula)

c. The net allowable bearing capacity of clay or plastic silt is approximately equal to the unconfined compressive strength

Where:
$q_{ult} = CN_c + \gamma D_f$ for $\Phi=0$

The net ultimate bearing capacity ($q_{net}$) is defined as the pressure that can be supported at the base of the footing in excess of that at the same level due to the surrounding surcharge.

So,

$q_{net} = q_{ult} - \gamma D_f = CN_c + \gamma D_f - \gamma D_f$

$q_{net} = CN_c$ take F.O.S=3

$$q_{all} = \frac{CN_c}{3}$$

$C = \frac{q_{unconfined}}{2}$, usually $N_c \approx 6$, so

$q_{all} = \frac{q_{unconfined} \times 6}{2 \times 3}$, so

$$\boxed{q_{all} = q_{unconfined}}$$

Thus, the allowable bearing capacity of clay or plastic silt approximately equal to the unconfined compression strength.

d. The allowable bearing capacity which is calculated from SPT results using the following equation which is suitable for cohesionless soil for (25 mm) of settlement.

$q_{all}$ = N/0.08 {(B+0.3)/B}2(1+0.33Df/B) (Meyerhof 1965)
where:
$D_f$= Depth of foundation,
B =Width of foundation,


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N = No. of blows for SPT

The most reliable values of allowable bearing capacity which are adopted in this report was those values which evaluated from paragraph a, b, c & d and then taking the most critical value (minimum) to be the convenient allowable bearing capacity.

## 2. ***Settlement Calculation Formulae for Foundations***

a. Total settlement computation of foundation was calculated for net loading obtained by subtraction off overburden pressure from gross loading. In this case, gross loading, represents intensity of vertical dead load and a half of live loading at the base of a foundation.

- **Elastic Settlement** (Short term) may be expressed as below if the foundation is perfectly flexible:

$$S_e = q_o(\alpha B')\frac{1-\mu_s^2}{E_s} I_s F_s$$

Where:
$q_o$ = Net applied pressure on the foundation
$\mu_S$ = Poisson's ratio of soil
$E_S$ = Average modulus of elasticity of the soil under the foundation measured from Z = 0 to about z = 4B
$B'$ = B/2 for center of foundation and (B) for corner of foundation
$I_s$ = Shape factor (Steinbrenner, 1934)

Also,

$$S_e = \frac{q_o B_e I_G I_F I_E}{E_o}(1-\mu_S^2)$$

Where:
$I_G$ = Influence factor for the variation of $E_S$ with depth

$$= f(B = \frac{E_o}{KB_e}, \frac{H}{B_e})$$

$I_F$ = Foundation rigidity correction factor
$I_E$ = Foundation embedment correction factor

- **Consolidation settlement** of clayey soil could be calculated from the following parameters using the well-known equation of Terzaghi or Biot, which are:

  1. Initial void ratio
  2. Compression index.


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3. Preconsolidation pressure.

For over-consolidated clay, which a soil deposit that has subjected to an effective overburden pressure ( $P_c'$ ) greater than that the present effective pressure ( $P_o'$ ), i.e.; $P_c' > P_o'$ , then:

Case 1:

If $P_o' + \Delta P < P_c'$

$$S_c = \frac{Cr}{1+e_o} H \log_{10} \frac{P_o' + \Delta P}{P_o'}$$

Case 2:

If $P_o' + \Delta P > P_c'$

$$S_c = \frac{Cr}{1+e_o} H \log_{10} \frac{P_c'}{P_o'} + \frac{Cc}{1+e_o} H \log_{10} \frac{P_o' + \Delta P}{P_c'}$$

Case 3:

For normally consolidated stratum

$$S_c = \frac{Cc}{1+e_o} H \log_{10} \frac{P_o' + \Delta P}{P_o'}$$

Where:

$S_c$= consolidation settlement
$C_c$= compression index, determined from consolidation test.
$C_r$= recompression index, determined from consolidation test.
$P_c$= preconsolidation pressure, determined from consolidation test.
$e_0$= initial void ratio
$P_0$ = existing effective stress
H = thickness of the compressible layer
$\triangle P$ = vertical stress induced at center of layer by the net foundation pressure.

b. Swelling characteristics of soil was evaluated from odeometer consolidation device by two methods which are
   - free swell
   - swelling pressure

## VI. PILE CAPACITY CALCULATION FORMULAE

The ultimate bearing capacity of pile ($Q_u$) is made up of adhesion ($Q_s$) and end bearing ($Q_b$), (adhesion is often called skin friction) and is usually much greater than the end bearing in clay.

$Q_u = Q_s + Q_b$
$Q_u = \alpha C_u A_s + N_c C_{ub} A_b$
Where
$C_u$ = shear strength of soil adjacent to shaft
$\alpha$ = shaft adhesion factor taken as 2/3 =0.67
$A_s$ = surface area of pile shaft
$N_c$= bearing capacity factor (usually taken as = 9)
$C_{ub}$ = shear strength of soil (2/3)d below base where d= base diameter
$A_b$ = area of pile base.

As well, there are many methods, which suggested by Meyerhof (1965-1976) were used in calculating the carrying capacity of driven and bored piles depending on the results which are obtained from the standard penetration tests.

1. $Q_b = (4N)(L_b / B) A_b$ (ton ) for driven pile.
2. $Q_s = (0.1N) A_s = \sum f_s$ (ton) for driven pile.
3. $Q_b = (1.4N)(L_b / B) A_b$ (ton ) for bored pile.
4. $Q_s = (0.067N) A_s = \sum f_s$ (ton) for bored pile.
5. $Q_s = (0.5N) A_s = \sum f_s$ (ton) for bored pile in clay.

While

$Q_b$ = pile bearing resistance (ton)
$Q_s$ = pile skin friction (ton)
$A_s$ = pile surface area = Pile Perimeter X Length in subjective layer
$L_b$ = length of the part of pile that penetrated in bearing layer.
B = width or diameter of pile.
N = average number of blows of standard penetration test.

## VII. DISCUSSION OF RESULTS

A discussion of the results that are derived from field and laboratory testing carried out on site is as follows: -

Soil mechanics is the basis of foundation design. Application of soil mechanics to foundation design is necessary to study the stress distribution, and engineering properties of subsoil material.

The site subsoil at all the areas in question consists mainly of stratified deposits of (Sandy) Silty CLAY and (Clayey) Silty SAND layers.

The characteristics of the layers' strength have been described under Clause (IV) above with sufficient details.

white spots of soluble salts and (reddish) rusty spots, traces/ lines of iron oxide compounds, white shiny sheets of mica minerals together with appreciable amount of cementation formation compounds are frequently distributed in the strata in different amounts.

The water table encountered between (1.50 – 2.50) m below the natural ground level (NGL), which is considered shallow.

The fluctuation of water table with the seasons could be observed (rising during spring). Accordingly, the zone immediately above water table is greatly affected as far as strength and compressibility are concerned. As moisture increases, the strength decreases and compressibility increases.

Soil Chemical Properties

| | $SO_3$ % | TSS % | Cl % | OM % |
|---|---|---|---|---|
| Min | 0.11 | 0.43 | 0.06 | 0.30 |
| Max | 2.44 | 11.50 | 0.78 | 6.68 |
| Average | 0.62 | 2.73 | 0.21 | 2.45 |
| Limits %** | | 20 | | 12 |

The following precautions should be taken into consideration during construction:

- All concrete work in contact with soil should be coated with bituminous material,
- Pipes should be well fixed and laid then covered all around with permeable filter material to avoid any leakage problem.

The results of swelling characteristics of soil were evaluated from odometer consolidation device shows that the top soil has slight to moderate tendency with average value of 20 kPa.

In general, to avoid problems associated with foundation works on such a soil, two provisions are usually considered:

- Making the structure resistant to damage from soil movement by strengthening the structure to withstand movement, or

- Through compacting the top soil layer and/or the zone beneath the base of footing after the excavation work, to make even and adjust any irregularity occurred during excavation.

Also, in order to ensure the durability of the foundation in the long term, the following points must be well-considered and thoroughly paid attention to in the design process:

1. A factor of safety equal to three (3) is adopted for all calculations of bearing capacity formulae which is acceptable value.

2. Spreading a well compacted sub-base layer of at least (0.5) m thickness, beneath the base of foundation.

3. One of the most practical and economical methods is through the use of compaction control for the backfill of the zone around the foundation after being laid, with well compacted clayey layer of low permeability.

## VIII. PROPOSED FOUNDATION

Stability and safety of a structure depends upon proper design and performance of its foundation.

Taking into consideration the site condition, the soil properties, the type of structures, the loading distribution and the discussion of test result as explained in detail in the previous section, it was found that deep foundations (piled) should be considered as the only alternative for the structural foundations for the major structures due to the high expected applied pressure.

With the limited information made available to the Soil Investigation firm pertaining to the load and dimensions of the structures to be constructed at the proposed site, the analyses mentioned in section (V) are made to determine the allowable soil bearing capacity for the suitable foundations.

The allowable net soil bearing pressure for shallow foundations (spread, strip, continuous and raft foundations) with enough rigidity placed at depth of (1.0 – 2.0) m below NGL, cast on a well compacted sub-base layer having thickness of at least (0.5) m, was evaluated to be on the order of (55 – 65) kPa. The shallow foundations if considered, shall be for ***ancillary building*** only with care to the total/differential settlement remains within the permissible limits.

The above allowable net soil bearing capacity were evaluated using a factor of safety of (3.0) against bearing capacity failure, which means, the contact pressure will be sufficiency low in magnitude to keep load-induced deformation within the elastic range of the supporting soils.

The total/differential settlement for different structures can be evaluated when the design applied pressure; foundation dimensions and depth are provided.

However, as the applied pressure is to exceeds the allowable bearing capacity for almost all structures, deep foundation (piled) should be used.

The most suitable foundation system to be implemented in such cases is bored pile and the ultimate carrying capacity of the piles can be determined considering the ultimate resistance of the pile base (end bearing) and skin friction, depending on the results that obtained from the lab test and standard penetration test for required depth.

The use of bored piles of various dimensions as tabulated below, is practical due to the existence of medium to stiff CLAY and medium to dense SAND layer close to surface.

However, the maximum pile length required for foundation may be calculated depending on the results obtained from standard penetration test as well as from the weakest soil profile and lowest strength parameters encountered in the required layer.

The structures could be supported by piled foundation with tip of piles resting at the respective depths below the bottom soffit of the pile cap, and the estimated pile carrying capacity for different sizes, are shown in the following table:

| Pile type | Diameter (cm.) | Length below bottom soffit of Pile Cap (m.) | Allowable Carrying Capacity in Compression (Tons) | Allowable Carrying Capacity in Tension (Tons) |
|---|---|---|---|---|
| Bored Pile Concrete | Ø80 | 16 | 89 | 52 |
| | Ø80 | 23 | 147.5 | 90 |

To determine accurately the pile length and capacity, field pile loading test for sufficient number of piles (two for compression and another one for tension) could be carried out.

## IX. RECOMMENDATIONS

1. Deep foundations (pile) are possible scenarios for the structures and facilities composing the Power Plant's Project as the stress from the super structures/machinery to the supporting subsoil is expected to exceed the safe allowable bearing capacity

2. Shallow foundation (spread, strip, continuous or raft foundation) could be used for the ancillary structures only provided the applied load stress does not exceed the allowable bearing capacity with the conditions set in items (3) below are to be implemented before construction of the structures with care to settlement not to exceed the permissible limits.

   However, due to the interaction in design between the geotechnical and structural aspects, the final decision in type and depth of the foundation is the designer's choice.

3. As mentioned in item (1) above, for shallow foundations, a layer of compacted sub-base according to the specification with thickness of at least (0.5) m should be placed beneath the base of shallow foundations with following requirements:
4. 
   a. The value of CBR not less than 35% (ASTM D1883) at 95% of the max dry density established according to (ASTM D1557)
   b. Liquid limit 25 % maximum
   c. Plasticity index 6 % maximum
   d. Organic matter not more than 2 %
   e. SO3 not more than 5 %
   f. Total soluble salts not more than 10 %
   g. Gypsum content not more than 10.75 %

h. Relative compaction not less than 95 % modified

5. It is recommended to fill the zone around the foundation with a well compacted clayey layer of low permeability to confirm the required relative compaction ratio of 95% of MDD. The material shall meet the following specifications after (SORB/R5 - 2003):

| | | |
|---|---|---|
| a. | Organic matter content | < 12% |
| b. | Free of plant roots | |
| c. | Free of flammable materials | |
| d. | Maximum Gypsum/ TSS content | < 10% |
| e. | Liquid limit (LL) | < 55% |
| f. | Plasticity Index (PI) | < 30% |
| g. | Minimum MDD | > 1.7gm/cm$^3$ |
| h. | Minimum CBR | > 4 |

6. For the seismic activity, the area in questions has $Z_{factor}$ = 0.15, Zone (II) and soil type profile ($S_D$) as there is N-value > 15 & $q_u$ > 50KPa and average wave velocity is > 180m/sec. for top 100ft of the soil. However, as per the Contract, the design will be based on UBC 97 with Z=0.2.

7. The ground must be sloped away from structures as much as possible and this slope maintained so that runoff water will be carried away from adjacent to stand near foundations, but must be drained into lined ditches.

8. Areas that do not support roadways, paved areas, or under structures should be compacted to not less than 95% of maximum dry density in accordance with (ASTM D1557).

9. Water, sewer and gas lines installed in such a way that not make weakness in foundation and should be designed to absorb movement without breaking.

10. Sidewalk surrounding the structures should be constructed immediately after erection of the building.

11. All concrete work in contact with soil should be coated with bituminous material

12. The sub-grade layer for the road foundation can be conducted using the site soil after compaction according to (ASTM D-1557) & a relative compaction of 95% modified should be achieved during compaction.

13. The foundation for the structures imposing dynamic loads should be checked against vibration forces using dynamic parameters.

14. The water chemical analysis is shown below:

| pH | $SO_4$ (ppm) | TSS (ppm) | Cl (ppm) |
|---|---|---|---|
| 7.8 – 8.0 | 500 – 1800 | 1600 – 4800 | 150 - 500 |

15. TYPE OF CEMENT

- Type V sulphate resisting must be used in all concrete works that will be in contact with the soil.
- Minimum cement content should be 380 $Kg/m^3$ for foundations works.
- Maximum free water cement ratio of 0.45 by weight should be used.
- Vibrators must be used in order to densify the fresh concrete.

16. As calculated in Appendix N there won't be any liquefaction risk for the project site.

17. All major equipment and buildings will be bear on bored pile foundations. Miscellaneous buildings non sensitive to settlement will be laid on shallow/raft foundations.

## SUMMARY OF GEOTECHNICAL DESIGN PARAMETERS

| No | DESCRIPTION | UNITS | DESIGN VALUE |
|---|---|---|---|
| | **INPUT DATA FOR MAT FOUNDATION DESIGN (For Top Clay Layer)** | | |
| 1 | Allowable Net Soil Bearing Pressure (static) (for 25 mm max displacement) | kPa | 60 for B<4.5m (spread) |
| 2 | Allowable Net Soil Bearing Pressure (dynamic)) | kPa | 80 |
| 3 | Modulus of Vertical Subgrade Reaction (static) | $kN/m^3$ | 7200 |
| 4 | Modulus of Vertical Subgrade Reaction (dynamic) | $kN/m^3$ | 10800 |
| 5 | Modulus of Horizontal Subgrade Reaction (static) | $kN/m^3$ | 3600 |
| 6 | Modulus of Horizontal Subgrade Reaction (dynamic) | $kN/m^3$ | 5400 |
| 7 | Drained Angle of Friction | - | 25 |
| 8 | Undrained Angle of Friction | - | 0 |
| 9 | Unit Soil Weight (dry) | $kN/m^3$ | 14.4 |
| 10 | Saturated Unit Soil Weight | $kN/m^3$ | 19 |
| 11 | Submerged Unit Weight | $kN/m^3$ | 9 |
| 12 | Undrained Cohesion | $kN/m^2$ | 30-40 |
| 13 | Constrained Modulus | kPa | 6500 |
| 14 | Modulus of Elasticity | kPa | 7700 |
| 15 | Active Earth Pressure Coefficient | - | 0.406 |
| 16 | At Rest Pressure Coefficient | - | 0.577 |
| 17 | Passive Earth Pressure Coefficient | - | 2.464 |
| 18 | Dynamic Poisson's Ratio | - | 0.48 |
| 19 | Dynamic Shear Modulus | MPa | 61 |
| 20 | Dynamic Young Modulus | MPa | 183 |
| | **INPUT DATA FOR PILE FOUNDATION DESIGN** | | |
| 21 | Pile Type | - | Bored |
| 22 | Pile Cross Section and Size | m | 0.80 Dia. |
| 23 | Pile Length | m | 16-23 |

| | | | |
|---|---|---|---|
| 24 | Allowable Pile Bearing Capacity (horizontal) (for 12 mm max displacement) (For Free Head Single L=23m Pile) | kN | 160 |
| 25a | Allowable Pile Bearing Capacity (vertical) (for L= 16m Pile) | kN | 890 |
| 25b | Allowable Pile Bearing Capacity (vertical) (for L= 23m Pile) | kN | 1475 |
| 26.a | Pile Spring Constant For 6D Spacing(horizontal - static) | kN/m | 13300 |
| 26.b | Pile Spring Constant For 4D Spacing(horizontal - static) | kN/m | 9100 |
| 26.c | Pile Spring Constant For 3D Spacing(horizontal - static) | kN/m | 6900 |
| 27.a | Pile Spring Constant For 6D Spacing (horizontal - dynamic) | kN/m | 20000 |
| 27.b | Pile Spring Constant For 6D Spacing (horizontal - dynamic) | kN/m | 13600 |
| 27.c | Pile Spring Constant For 6D Spacing (horizontal - dynamic) | kN/m | 10400 |
| 28 | Pile Spring Constant (vertical- static) | kN/m | 127000 |
| 29 | Pile Spring Constant (vertical - dynamic) | kN/m | 190000 |
| | **GROUNDWATER DATA** | | |
| 30 | Average groundwater elevation based on piezometer data | m (msl) | 7.60 |
| 31 | Groundwater Properties (e.g. chemical attack to steel or concrete, etc) | | Refer to Table Pg. 23 |
| | | | |
| | **SPECIAL SOIL DATA** | | |
| 32 | Chemical Attack to Steel or Concrete Due to Soil Properties | | Type V, Sulphate Resistant |
| 33 | Use of Excavated Material for Backfilling | | Partially |
| | | | |
| | **SPECIAL CONSIDERATION** | | |
| 34 | Settlement of Foundations | | Sc<25 for Spread footing with B< 4.5m under applied pressure of 60 kPa |
| 35 | Liquefaction Potential | | None |

# APPENDIX (A)

# SITE PLAN

# &

# BOREHOLE LOCATIONS

| BOREHOLES | EAST (m) | NORTH (m) | Length (m) |
|---|---|---|---|
| BH01 | 340.500 | 323.750 | 30 |
| BH02 | 343.700 | 350.050 | 30 |
| BH03 | 350.900 | 350.050 | 40 |
| BH04 | 362.900 | 350.050 | 30 |
| BH05 | 350.000 | 365.050 | 30 |
| BH06 | 368.100 | 374.750 | 25 |
| BH07,P* | 350.000 | 399.829 | 30 |
| BH08 | 403.000 | 323.750 | 25 |
| BH09 | 406.200 | 350.050 | 30 |
| BH10 | 413.400 | 350.050 | 40 |
| BH11 | 425.400 | 350.050 | 30 |
| BH12 | 412.500 | 365.050 | 30 |
| BH13 | 430.600 | 374.750 | 25 |
| BH14 | 412.500 | 399.829 | 30 |
| BH15 | 465.500 | 323.750 | 30 |
| BH16 | 468.700 | 350.050 | 30 |
| BH17 | 475.900 | 350.050 | 40 |
| BH18 | 487.900 | 350.050 | 30 |
| BH19 | 475.000 | 365.050 | 30 |
| BH20 | 493.100 | 374.750 | 25 |
| BH21,P* | 475.000 | 399.829 | 30 |
| BH22 | 528.000 | 323.750 | 25 |
| BH23 | 531.200 | 350.050 | 30 |
| BH24 | 538.400 | 350.050 | 50 |
| BH25 | 550.400 | 350.050 | 30 |
| BH26 | 537.500 | 365.050 | 30 |
| BH27 | 555.600 | 374.750 | 25 |
| BH28 | 537.500 | 399.829 | 30 |

| BOREHOLES | EAST (m) | NORTH (m) | Length (m) |
|---|---|---|---|
| BH29 | 614.423 | 335.929 | 25 |
| BH30 | 603.620 | 391.081 | 25 |
| BH31 | 705.760 | 412.250 | 30 |
| BH32 | 705.760 | 350.498 | 30 |
| BH33 | 711.560 | 323.000 | 25 |
| BH34 | 748.400 | 397.750 | 40 |
| BH35 | 748.400 | 339.000 | 30 |
| BH36 | 773.180 | 368.575 | 30 |
| BH37,P* | 797.560 | 397.750 | 30 |
| BH38 | 797.560 | 339.000 | 30 |
| BH39,P* | 834.605 | 329.381 | 25 |
| BH40 | 832.710 | 395.415 | 30 |
| BH41,P* | 791.152 | 224.580 | 20 |
| BH42 | 386.158 | 189.892 | 20 |
| BH43 | 493.809 | 189.892 | 20 |
| BH44 | 564.251 | 237.618 | 25 |
| BH45,P* | 591.534 | 258.546 | 25 |
| BH46 | 591.277 | 198.545 | 25 |
| BH47,P* | 676.253 | 187.747 | 25 |
| BH48 | 681.023 | 261.660 | 25 |
| BH49 | 689.925 | 235.378 | 25 |
| BH50,P* | 355.524 | 502.675 | 20 |
| BH51 | 362.904 | 430.549 | 20 |
| BH52 | 430.364 | 477.185 | 25 |
| BH53 | 457.870 | 506.589 | 30 |
| BH54 | 457.379 | 491.614 | 30 |
| BH55 | 457.330 | 479.251 | 50 |
| BH56 | 457.109 | 466.830 | 30 |

| BOREHOLES | EAST (m) | NORTH (m) | Length (m) |
|---|---|---|---|
| BH57 | 466.859 | 430.350 | 30 |
| BH58 | 488.989 | 478.610 | 25 |
| BH59 | 552.000 | 510.000 | 30 |
| BH60 | 561.300 | 442.000 | 30 |
| BH61,P* | 581.300 | 495.300 | 20 |
| BH62 | 616.148 | 442.188 | 25 |
| BH63 | 641.047 | 482.492 | 25 |
| BH64 | 654.093 | 458.035 | 25 |
| BH65 | 757.020 | 495.425 | 25 |
| BH66 | 786.985 | 461.145 | 25 |
| BH67 | 352.655 | 466.658 | 20 |
| BH68 | 382.655 | 476.658 | 20 |
| BH69 | 518.909 | 446.330 | 20 |
| BH70 | 519.911 | 489.830 | 20 |
| BH71 | 552.000 | 477.000 | 30 |
| BH72 | 614.354 | 498.804 | 25 |
| BH73 | 706.880 | 471.265 | 25 |
| BH74 | 751.696 | 460.375 | 20 |
| BH75 | 793.960 | 488.895 | 25 |
| BH76 | 773.180 | 427.600 | 25 |
| BH77 | 705.760 | 381.100 | 30 |
| BH78 | 690.860 | 323.000 | 25 |
| BH79 | 748.400 | 368.175 | 25 |
| BH80 | 773.180 | 311.250 | 25 |
| BH81 | 797.560 | 368.175 | 25 |
| BH82 | 891.108 | 373.598 | 25 |
| BH83 | 806.320 | 257.904 | 20 |
| BH84 | 378.497 | 214.725 | 20 |
| BH85 | 437.574 | 214.725 | 20 |
| BH86 | 479.666 | 214.725 | 20 |
| BH87 | 541.574 | 214.725 | 20 |
| BH88 | 641.574 | 212.256 | 25 |
| BH89 | 730.874 | 212.256 | 25 |

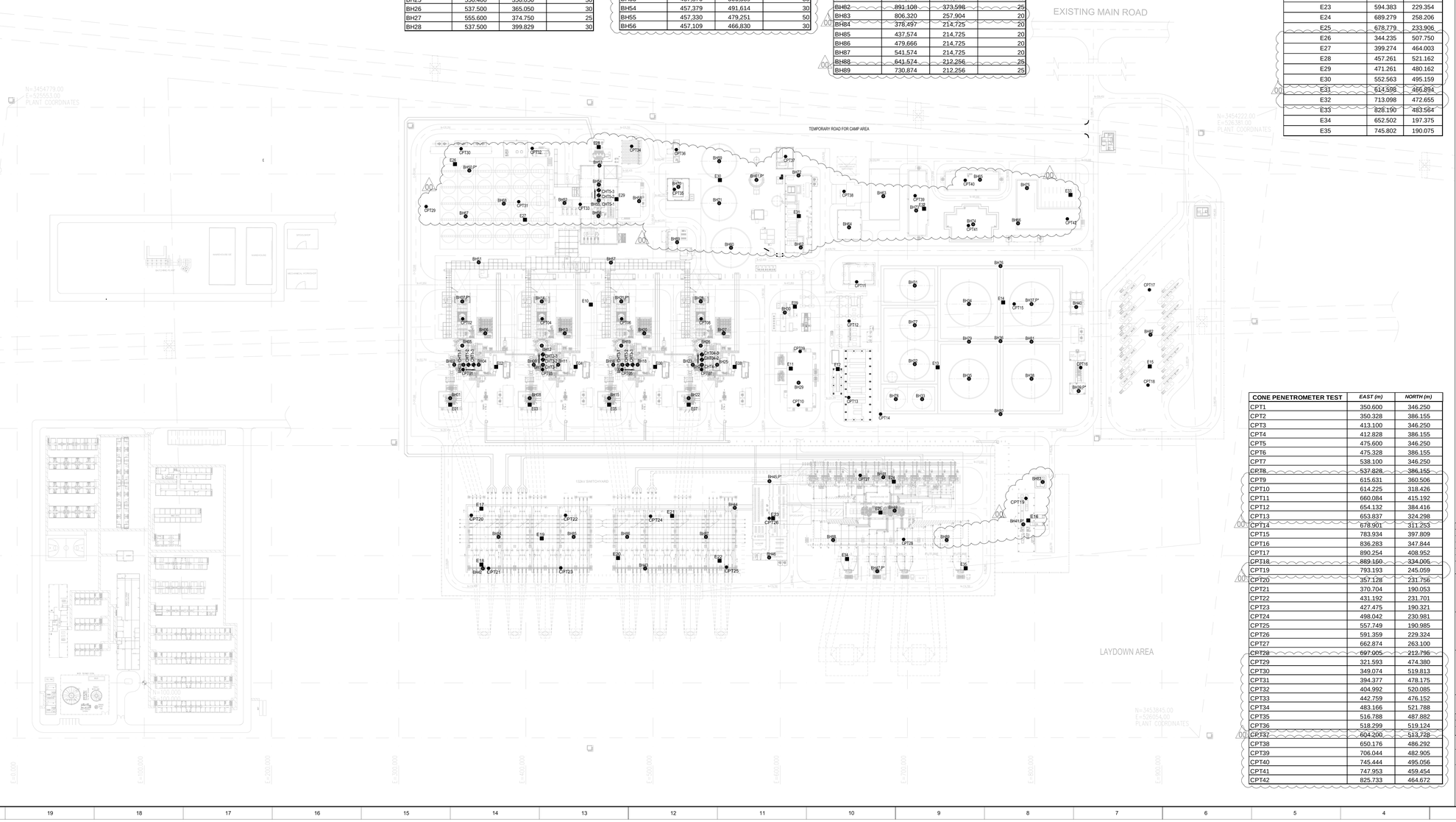
| SEISMIC CROSSHOLE TEST | EAST (m) | NORTH (m) |
|---|---|---|
| CHT1-1 | 350.900 | 350.050 |
| CHT1-2 | 354.900 | 350.050 |
| CHT1-3 | 358.900 | 350.050 |
| CHT2-1 | 413.400 | 350.050 |
| CHT2-2 | 413.400 | 354.050 |
| CHT2-3 | 413.400 | 358.050 |
| CHT3-1 | 475.900 | 350.050 |
| CHT3-2 | 479.900 | 350.050 |
| CHT3-3 | 483.900 | 350.050 |
| CHT4-1 | 538.400 | 350.050 |
| CHT4-2 | 538.400 | 354.050 |
| CHT4-3 | 538.400 | 358.050 |
| CHT5-1 | 457.330 | 479.251 |
| CHT5-2 | 457.330 | 483.251 |
| CHT5-3 | 457.330 | 487.251 |

| ELECTRICAL RESISTIVITY | EAST (m) | NORTH (m) |
|---|---|---|
| E01 | 340.500 | 318.650 |
| E02 | 376.600 | 348.350 |
| E03 | 403.000 | 318.650 |
| E04 | 439.100 | 348.350 |
| E05 | 465.500 | 318.650 |
| E06 | 501.600 | 348.350 |
| E07 | 528.000 | 318.650 |
| E08 | 564.100 | 348.350 |
| E09 | 611.484 | 395.714 |
| E10 | 451.100 | 397.350 |
| E11 | 608.300 | 347.053 |
| E12 | 645.252 | 346.670 |
| E13 | 723.778 | 348.048 |
| E14 | 775.278 | 399.048 |
| E15 | 890.539 | 348.757 |
| E16 | 795.065 | 227.667 |
| E17 | 365.032 | 236.942 |
| E18 | 365.032 | 192.942 |
| E19 | 412.468 | 213.528 |
| E20 | 472.470 | 198.113 |
| E21 | 514.970 | 231.263 |
| E22 | 552.320 | 196.013 |
| E23 | 594.383 | 229.354 |
| E24 | 689.279 | 258.206 |
| E25 | 678.779 | 233.906 |
| E26 | 344.235 | 507.750 |
| E27 | 399.274 | 464.003 |
| E28 | 457.261 | 521.162 |
| E29 | 471.261 | 480.162 |
| E30 | 552.563 | 495.159 |
| E31 | 614.598 | 466.894 |
| E32 | 713.098 | 472.655 |
| E33 | 826.190 | 483.564 |
| E34 | 652.502 | 197.375 |
| E35 | 745.802 | 190.075 |

## GENERAL NOTES :

1. All dimensions are in "mm".
2. All coordinates & elevations are in "m".

## REFERENCES :




| CONE PENETROMETER TEST | EAST (m) | NORTH (m) |
|---|---|---|
| CPT1 | 350.600 | 346.250 |
| CPT2 | 350.328 | 386.155 |
| CPT3 | 413.100 | 346.250 |
| CPT4 | 412.828 | 386.155 |
| CPT5 | 475.600 | 346.250 |
| CPT6 | 475.328 | 386.155 |
| CPT7 | 538.100 | 346.250 |
| CPT8 | 537.828 | 386.155 |
| CPT9 | 615.631 | 360.506 |
| CPT10 | 614.225 | 318.426 |
| CPT11 | 660.084 | 415.192 |
| CPT12 | 654.132 | 384.416 |
| CPT13 | 653.837 | 324.298 |
| CPT14 | 678.901 | 311.253 |
| CPT15 | 783.934 | 397.809 |
| CPT16 | 836.283 | 347.844 |
| CPT17 | 890.254 | 408.952 |
| CPT18 | 889.160 | 334.005 |
| CPT19 | 793.193 | 245.059 |
| CPT20 | 357.128 | 231.756 |
| CPT21 | 370.704 | 190.053 |
| CPT22 | 431.192 | 231.701 |
| CPT23 | 427.475 | 190.321 |
| CPT24 | 498.042 | 230.981 |
| CPT25 | 557.749 | 190.985 |
| CPT26 | 591.359 | 229.324 |
| CPT27 | 662.874 | 263.100 |
| CPT28 | 697.005 | 212.795 |
| CPT29 | 321.593 | 474.380 |
| CPT30 | 349.074 | 519.813 |
| CPT31 | 394.377 | 478.175 |
| CPT32 | 404.992 | 520.085 |
| CPT33 | 442.759 | 476.152 |
| CPT34 | 483.166 | 521.788 |
| CPT35 | 516.788 | 487.882 |
| CPT36 | 518.299 | 519.124 |
| CPT37 | 604.200 | 513.728 |
| CPT38 | 650.176 | 486.292 |
| CPT39 | 706.044 | 482.905 |
| CPT40 | 745.444 | 495.056 |
| CPT41 | 747.953 | 459.454 |
| CPT42 | 825.733 | 464.672 |

Revision History

| Rev. | Revision Date | BY | CHK | EGS | PEM | Brief Description |
|---|---|---|---|---|---|---|
| 00 | 10/04/2017 | A.C.P. | M.P. | F.D. | H.S. | ISSUED FOR CONSTRACTION |
| B | 10/02/2017 | A.C.P. | M.P. | F.D. | H.S. | ISSUED FOR REVIEW |

Description Current Vendor :

PROJECT

**SAMAWA COMBINED CYCLE POWER PLANT PROJECT**
**SAMAWA, IRAQ**

OWNER

Republic of IRAQ
Ministry of Electricity

CONTRACTOR: GE POWER

NOMINATED SUB CONTRACTOR: ENKA

MOE Contract Number :

CONTRACT NO: 2

Cross Checked

| Department | Name | Date | Signature |
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# APPENDIX (B)

# BOREHOLE LOGS

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# BOREHOLE LOG

**Site** .... *Samawa Combined Cycle P.P.* .... **Method of Boring** .... *Auger & Rotary* ....

**Borehole No.** ...... *01* ...... **Date** ....... *01/05/2017* .......

**X:** ..... *525714.241* ..... **Y:** ..... *3454394.992* ..... **Ground Level** ..... *9.797*.....

Water Table Level: 1.85

| Depth (m) | Thickness of Layer (m) | Soil Description |
|---|---|---|
| 0.0 – 1.0 | 1.0 | Loose light brown to brown fine grained Clayey Silty SAND with white spots of soluble salts . |
| 1.0 – 3.5 | 2.5 | Soft to medium brown fat Silty CLAY with gray pockets of fine Sand and white spots of soluble salts together with black traces of organic matter. |
| 3.5 – 5.5 | 2.0 | Loose to medium yellowish green to greenish gray fine grained Silty SAND. |
| 5.5 – 7.5 | 2.0 | Stiff greenish gray Sandy fat Silty CLAY with black spots of organic matter and rusty traces of iron oxide compounds. |
| 7.5 – 10.5 | 3.0 | Medium to dense gray to light greenish gray fine grained Clayey Silty SAND mixture with rusty traces of iron oxide compounds. |
| 10.5 – 14.0 | 3.5 | Very dense light brownish gray to yellowish gray fine to medium grained Silty SAND with rusty spots of iron oxide compounds. |
| 14.0 – 18.0 | 4.0 | Very stiff light gray Sandy fat Silty CLAY with reddish lines/traces of iron oxide compounds and a lot of white shiny sheets of mica minerals. |
| 18.0 – 20.0 | 2.0 | Very stiff to hard brownish gray fat Silty CLAY with some gray fine grained Sand & shiny crystals of quartz . |
| 20.0 – 24.0 | 4.0 | Very stiff light brownish gray Sandy fat Silty CLAY with shiny angular quartz pieces. |
| 24.0 – 25.5 | 1.5 | Very stiff green fat Silty CLAY with alot of white shiny crystallized sheets of mica minerals. |
| 25.5 – 27.0 | 1.5 | Hard light brown Sandy fat Silty CLAY with white cementation formation. |
| 27.0 – 30.5 | 3.5 | Very stiff light brown to brown fat Silty CLAY with gray pockets of fine grained Sand in parts. |

| Sample Depth (m) | Sample Type | SPT N-Value | Remarks |
|---|---|---|---|
| 0.5 | D | (5) | (2,3,4) |
| 1.5 | D | (4) | (2,2,3) |
| 2.0 | U | | |
| 3.0 | D | (3) | (2,2,2) |
| 4.5 | D | (14) | (5,7,8) |
| 6.0 | D | (17) | (6,7,11) |
| 7.5 | D | (23) | (7,10,14) |
| 9.0 | D | (56) | (12,25,31) |
| 10.5 | D | (60) | (10,27,33) |
| 12.0 | D | (79) | (15,37,42) |
| 13.5 | D | (100/26) | (19,39,50/8) |
| 15.0 | D | (35) | (10,17,18) |
| 16.5 | D | (42) | (17,19,23) |
| 18.0 | D | (53) | (22,25,28) |
| 19.5 | D | (75) | (31,36,39) |
| 21.0 | D | (33) | (17,14,19) |
| 22.5 | D | (37) | (13,15,22) |
| 24.0 | D | (47) | (12,18,29) |
| 25.5 | D | (100/25) | (28,34,50/6) |
| 27.0 | D | (38) | (9,16,22) |
| 28.5 | D | (47) | (10,19,28) |
| 30.0 | D | (61) | (12,24,37) |

Scale - 1 : 150 Undisturbed Sample - U Disturbed Sample : - D Bulk Sample - B Core Sample - C

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# BOREHOLE LOG

**Site** .... *Samawa Combined Cycle P.P.* .... **Method of Boring** .... *Auger & Rotary* ....

**Borehole No.** ..... *02*..... **Date** ..... *01/05/2017* .....

**X:** ..... *525731.530* ..... **Y:** ..... *3454415.042* ..... **Ground Level** ..... *9.700* .....

| Water Table Level | Depth (m) | Sample Type & Depth | Litho logy | Thickness of Layer (m) | Soil Description | SPT Value N- Value | Remarks |
|---|---|---|---|---|---|---|---|
| 1.85 | 0.50, 1.0, 1.5, 2.0 | D, U | | 2.0 | Medium brown to dark brown fat Silty CLAY with white spots of soluble salts & black traces of organic matter . | (8) | (3,4,7) |
| | 3.0, 4.0, 4.5, 5.0 | D, U, D | | 3.0 | Medium brown to grayish brown Sandy fat Silty CLAY with white spots of soluble salts and rusty lines of iron oxide compounds together with black traces of organic matter. | (6), (11) | (2,3,4), (3,5,7) |
| | 6.0, 6.5 | D | | 1.5 | Loose to medium greenish gray fine grained Clayey Silty SAND mixture. | (15) | (4,8,8) |
| | 7.0, 7.5, 8.0, 9.0, 9.5 | D, D | | 3.0 | Loose to medium light gray to light brownish gray fine to medium grained Silty SAND with rusty traces of iron oxide compounds and white spots of soluble salts. | (12), (14) | (3,6,7), (5,5,9) |
| | 10.0, 10.5, 11.0, 12.0, 13.0, 13.5 | D, D | | 4.0 | Medium to dense light brownish gray to yellowish gray fine to medium grained Silty SAND with rusty spots of iron oxide compounds. | (41), (33), (40) | (11,18,23), (10,14,19), (13,18,22) |
| | 14.0, 15.0, 16.0, 16.5, 17.0 | D, D, D | | 3.0, 2.0 | Dense to very dense fine to medium grained SAND with reddish lines/traces of iron oxide compounds and a lot of white shiny sheets of mica minerals together with little Silt fraction. | (64), (50/8) | (19,28,36), (50/8) |
| | 18.0, 19.0, 19.5, 20.0 | D, D | | 2.0 | Hard light yellowish brown fat Silty CLAY with shiny angular quartz pieces and white spots of carbonate compounds. | (50/12), (55) | (36,50/12), (17,23,32) |
| | 21.0, 22.0, 22.5, 23.0 | D, D | | 5.5 | Very stiff to hard light brown Sandy fat Silty CLAY with alot of white cementation formation and rusty spots of iron oxide compounds. | (50/11), (50/13) | (50/11), (50/13) |
| | 24.0, 25.0, 25.5, 26.0, 27.0 | D, D, D | | 3.5 | Very stiff dark grayish green mixture of Sandy fat Silty CLAY with white cementation formation. | (54), (57), (42) | (17,25,29), (15,27,30), (17,20,22) |
| | 28.0, 28.5, 29.0, 30.0 | D, D | | 3.0 | Very stiff to hard light brown to brown fat Silty CLAY with white spots of carbonate compounds. | (39), (50/12) | (8,14,25), (50/12) |

Scale - 1 : 150 Undisturbed Sample - U Disturbed Sample : - D Bulk Sample - B Core Sample - C

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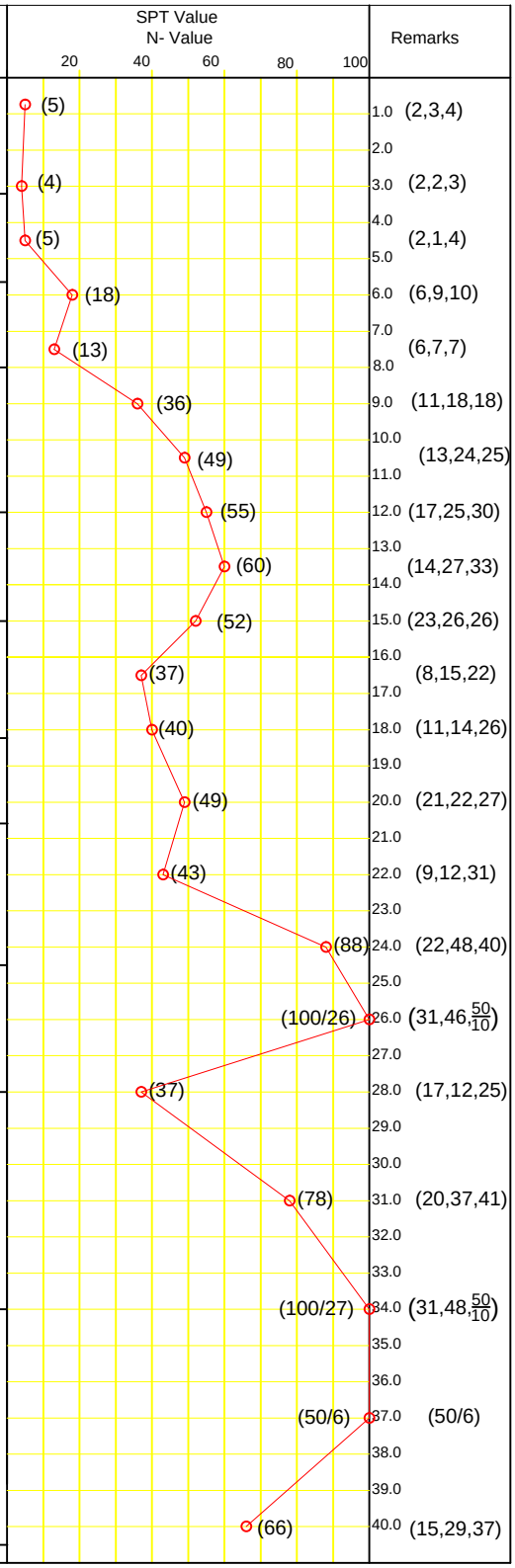
# BOREHOLE LOG

**Site** .... *Samawa Combined Cycle P.P.* .... **Method of Boring** .... *Auger & Rotary* ....

**Borehole No.** ..... *03* ..... **Date** ..... *05/05/2017* .....

**X:** ..... *525737.510* ..... **Y:** ..... *3454411.097*..... **Ground Level** ..... *9.685* .....

| Water Table Level | Depth (m) | Sample Type & Depth | Litho logy | Thickness of Layer (m) | Soil Description | SPT Value N- Value | Remarks |
|---|---|---|---|---|---|---|---|
| 2.0 | 0.75, 1.0, 1.5, 2.0, 3.0 | D, U, D | | 3.0 | Medium to soft brown to light brown fat Silty CLAY with white spots of soluble salts and black traces of organic matter. | (5), (4) | (2,3,4), (2,2,3) |
| | 4.0, 4.5, 5.0 | D | | 2.0 | Soft to medium brown to grayish brown fat Silty CLAY with rusty traces of iron oxide compounds. | (5) | (2,1,4) |
| | 6.0, 7.0, 7.5, 8.0 | D, D | | 3.0 | Loose to medium brownish gray fine grained Clayey Silty SAND mixture with black spots of organic matter. | (18), (13) | (6,9,10), (6,7,7) |
| | 9.0, 10.0, 10.5, 11.0, 12.0 | D, D, D | | 4.0 | Medium to dense grayish brown fine to medium grained Silty SAND with a lot of rusty spots of iron oxide compounds. | (36), (49), (55) | (11,18,18), (13,24,25), (17,25,30) |
| | 13.0, 13.5, 14.0, 15.0 | D, D | | 3.0 | Very dense greenish gray fine to medium grained Silty SAND. | (60), (52) | (14,27,33), (23,26,26) |
| | 16.0, 16.5, 17.0 | D, D | | 1.5 | Very stiff light grayish yellow Sandy fat Silty CLAY mixture with yellowish brown rusty traces of iron oxide compounds. | (37) | (8,15,22) |
| | 18.0, 19.0, 20.0 | D, D | | 3.5 | Dense to very dense brownish yellow fine grained Clayey Silty SAND mixture. | (40), (49) | (11,14,26), (21,22,27) |
| | 21.0, 22.0, 23.0, 24.0, 24.5 | D, D, D | | 4.5 | Very stiff green Sandy fat Silty CLAY with a lot of white shiny crystallized sheets of silica/mica minerals. | (43), (88) | (9,12,31), (22,48,40) |
| | 25.0, 26.0, 27.0, 28.0 | D, D | | 3.5 | Very dense light brown fine grained Clayey Silty SAND mixture with rusty spots of iron oxide compounds. | (100/26), (37) | (31,46,50/10), (17,12,25) |
| | 29.0, 30.0, 31.0, 32.0, 33.0, 34.0 | D, D | | 6.0 | Very stiff to hard brownish green Sandy fat Silty CLAY with a lot of white shiny crystallized silica sheets and rusty spots/lines of iron oxide compounds. | (78), (100/27) | (20,37,41), (31,48,50/10) |
| | 35.0, 36.0, 37.0, 38.0, 39.0, 40.0, 40.5 | D, D, D | | 6.5 | Hard yellowish green to light green Sandy fat Silty CLAY mixture with rusty traces of iron oxide compounds and white shiny sheets of silica minerals. | (50/6), (66) | (50/6), (15,29,37) |




Scale - 1 : 200 Undisturbed Sample - U Disturbed Sample : - D Bulk Sample - B Core Sample - C

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# BOREHOLE LOG

**Site** .... *Samawa Combined Cycle P.P.* .... **Method of Boring** .... *Auger & Rotary* ....

**Borehole No.** ..... *04* ..... **Date** ..... *04/05/2017* .....

**X:** ..... *525747.480* ..... **Y:** ..... *3454404.369* ..... **Ground Level** ..... *9.668* .....

| Water Table Level | Depth (m) | Sample Type & Depth | Litho logy | Thickness of Layer (m) | Soil Description | SPT Value N- Value | Remarks |
|---|---|---|---|---|---|---|---|
| 1.85 | 0.5, 1.0, 1.5, 2.0, 3.0 | D, U, D | | 3.5 | Medium brown fat Silty CLAY with little gray pockets of fine Sand and white spots of soluble salts together with black traces of organic matter. | (6), (11) | (2,4,5), (4,7,16) |
| | 4.0, 4.5, 5.0, 6.0 | U, D, D | | 2.5 | Loose to medium greenish gray fine grained Clayey Silty SAND mixture with black spots of organic matter and rusty traces of iron oxide compounds. | (20), (28) | (5,9,12), (7,13,16) |
| | 7.0, 7.5, 8.0, 9.0, 10.0, 10.5, 11.0 | D, D, D, D | | 5.0 | Medium, dense to very dense brownish gray fine to medium grained Silty SAND with rusty traces of iron oxide compounds. | (29), (80), (100/27) | (9,12,19), (18,25,50/13), (22,38,50/9) |
| | 12.0, 13.0, 13.5, 14.0 | D, D | | 3.0 | Very dense grayish light brown to yellowish green fine grained Silty SAND with rusty spots of iron oxide compounds and white cementation formation compounds. | (67), (74) | (20,32,35), (15,19,50/13) |
| | 15.0, 15.5 | D | | 1.5 | Hard yellowish green Sandy fat Silty CLAY with reddish rusty spots of iron oxide compounds. | (95) | (19,23,50/8) |
| | 16.0, 16.5, 17.0 | D | | 1.5 | Very dense light brown fine to medium grained Silty SAND. | (100/28) | (19,45,50/12) |
| | 18.0, 19.0, 20.0, 20.5 | D, D | | 3.5 | Very dense light brownish gray fine grained Clayey Silty SAND mixture with shiny angular quartz pieces and white cementation formation. | (91), (50/13) | (22,43,48), (50/13) |
| | 21.0, 22.0, 23.0, 24.0, 24.5 | D, D | | 4.0 | Hard greenish gray Sandy fat Silty CLAY mixture with alot of white shiny crystallized sheets of mica minerals and black spots of organic matter. | (83), (82) | (20,34,49), (28,39,43) |
| | 25.0, 26.0, 27.0, 28.0, 29.0, 30.0, 30.5 | D, D | | 6.0 | Hard light gray Sandy fat Silty CLAY with rusty spots of iron oxide compounds and white traces of cementation formation. | (74), (50/6) | (25,34,40), (50/6) |

Scale - 1 : 150 Undisturbed Sample - U Disturbed Sample : - D Bulk Sample - B Core Sample - C

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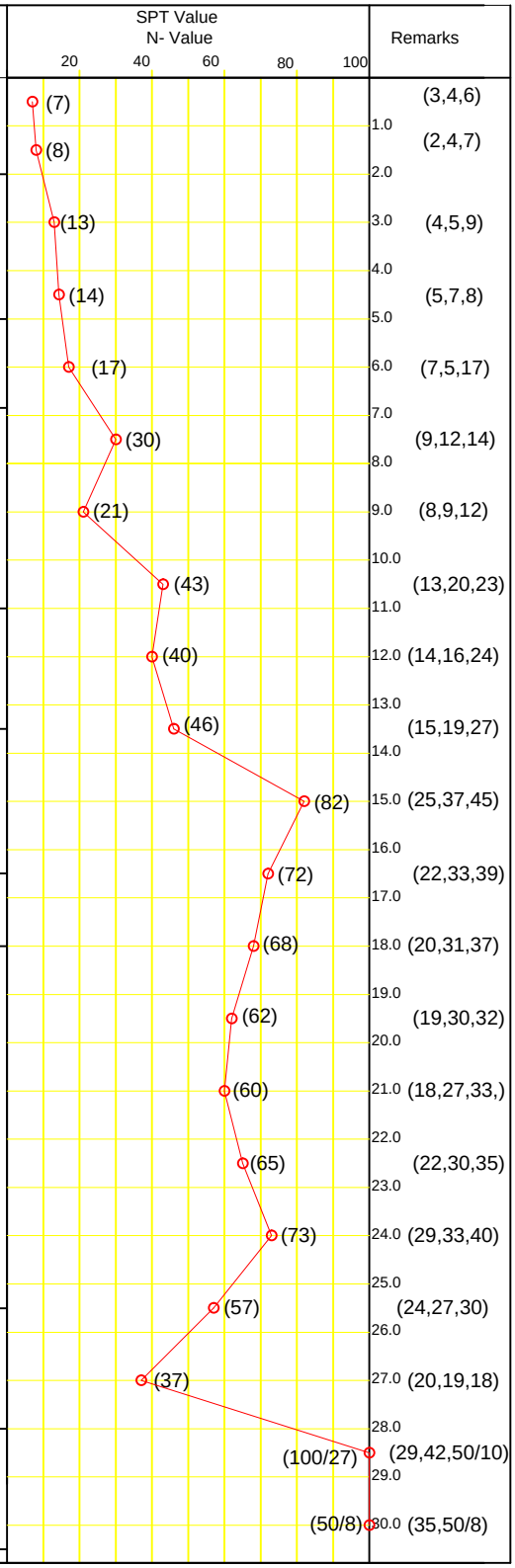
# BOREHOLE LOG

**Site** .... *Samawa Combined Cycle P.P.* .... **Method of Boring** .... *Auger & Rotary* ....

**Borehole No.** ..... *05*..... **Date** ..... *01/05/2017* .....

**X:** ..... *525745.236* ..... **Y:** ..... *3454423.922* ..... **Ground Level** ..... *9.744* .....

| Water Table Level | Depth (m) | Sample Type & Depth | Litho logy | Thickness of Layer (m) | Soil Description | SPT Value N- Value | Remarks |
|---|---|---|---|---|---|---|---|
| 1.85 | 0.5, 1.0, 1.5, 2.0 | D, U, D | | 2.0 | Medium brown to dark brown Sandy fat Silty CLAY with white spots of soluble salts . | (7), (8) | (3,4,6), (2,4,7) |
| | 3.0, 4.0, 4.5, 5.0 | D, U, D | | 3.0 | Medium to stiff brown fat Silty CLAY with white spots of soluble salts and rusty lines of iron oxide compounds together with black traces of organic matter. | (13), (14) | (4,5,9), (5,7,8) |
| | 6.0 | D | | 1.5 | Loose to medium yellowish green to greenish gray fine grained Clayey Silty SAND. | (17) | (7,5,17) |
| | 7.0, 7.5, 8.0, 9.0, 10.0, 10.5, 11.0 | D, D, D | | 4.5 | Medium to dense gray to light greenish gray fine to medium grained Silty SAND with rusty traces of iron oxide compounds and white spots of soluble salts. | (30), (21), (43) | (9,12,14), (8,9,12), (13,20,23) |
| | 12.0, 13.0, 13.5 | D, D | | 2.5 | Dense light brownish gray to yellowish gray fine grained Clayey Silty SAND with rusty spots of iron oxide compounds. | (40), (46) | (14,16,24), (15,19,27) |
| | 14.0, 15.0, 16.0, 16.5 | D, D | | 3.0 | Very stiff green mixture of Sandy fat Silty CLAY with reddish lines/traces of iron oxide compounds and a lot of white shiny sheets of mica minerals. | (82), (72) | (25,37,45), (22,33,39) |
| | 17.0, 18.0 | D, D | | 1.5 | Very dense greenish gray fine grained Silty SAND. | (68) | (20,31,37) |
| | 19.0, 19.5, 20.0, 21.0, 22.0, 22.5, 23.0, 24.0, 25.0, 25.5 | D, D, D, D, D, D | | 7.5 | Very stiff light brownish gray Sandy fat Silty CLAY with shiny angular quartz pieces. | (62), (60), (65), (73), (57) | (19,30,32), (18,27,33,), (22,30,35), (29,33,40), (24,27,30) |
| | 26.0, 27.0, 27.5 | D, D | | 2.0 | Very dense to dense grayish green fine grained Clayey Silty SAND mixture with white cementation formation. | (37) | (20,19,18) |
| | 28.0, 28.5, 29.0, 30.0, 30.5 | D, D | | 3.0 | Very stiff to hard light brown to brown fat Silty CLAY with gray pockets of fine grained Sand at top and white spots of carbonate compounds. | (100/27), (50/8) | (29,42,50/10), (35,50/8) |




Scale - 1 : 150 Undisturbed Sample - U Disturbed Sample : - D Bulk Sample - B Core Sample - C

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# BOREHOLE LOG

**Site** .... *Samawa Combined Cycle P.P.* .... **Method of Boring** .... *Auger & Rotary* ....

**Borehole No.** ..... *06* ..... **Date** ..... *02/05/2017* .....

**X:** ..... *525765.560* ..... **Y:** ..... *3454421.869* ..... **Ground Level** ..... *9.726* .....

| Water Table Level | Depth (m) | Sample Type & Depth | Litho logy | Thickness of Layer (m) | Soil Description | SPT Value N- Value | Remarks |
|---|---|---|---|---|---|---|---|
| 1.80 | 0.5, 1.0, 1.5, 2.0, 3.0, 4.0 | D, U, D, D | | 4.0 | Medium brown to dark brown fat Silty CLAY with black spots of organic matter & white traces of soluble salts. | (8), (6), (10) | (3,4,7), (2,4,5), (4,5,7) |
| | 4.5, 5.0, 6.0 | U, D, D | | 2.0 | Loose to medium grayish green fine grained Clayey Silty SAND mixture with rusty spots of iron oxide compounds and white spots of soluble salts. | (14), (28) | (5,6,9), (10,14,16) |
| | 7.5, 8.0, 9.0, 10.0 | D, D, D | | 4.5 | Medium, dense to very dense light gray to brownish gray fine grained Silty SAND with white shiny sheets of mica minerals. | (28), (80) | (10,12,17), (18,25,50/13) |
| | 10.5, 11.0, 12.0, 13.0 | D, D | | 3.0 | Dense to very dense brownish gray fine grained Clayey Silty SAND with white spots of soluble salts. | (32), (30) | (14,15,17), (10,12,18) |
| | 13.5, 14.0, 15.0 | D, D | | 2.0 | Very stiff brown Sandy fat Silty CLAY mixture with white spots of soluble salts. | (53), (59) | (17,21,32), (15,23,36) |
| | 16.0, 16.5, 17.0 | D | | 2.5 | Very dense light brownish gray fine grained Clayey Silty SAND mixture with white cementation formation. | (69) | (15,36,33) |
| | 18.0, 19.0, 19.5, 20.0, 21.0 | D, D, D | | 3.5 | Very stiff to hard brownish green Sandy fat Silty CLAY with a lot of white spots of cementation formation and rusty traces of iron oxide compounds. | (34), (83), (96) | (8,13,21), (16,25,50/12), (22,30,50/10) |
| | 22.0, 22.5, 23.0 | D | | 1.5 | Very dense brownish gray well cemented fine grained Clayey Silty SAND mixture with white cementation formation. | (50/13) | (50/13) |
| | 24.0, 25.0 | D, D | | 2.5 | Hard light brownish gray fat Silty CLAY with white cementation formation and brownish rusty lines/traces of iron oxide compounds. | (50/12), (50/14) | (29,50/12), (24,50/14) |

Scale - 1 : 150 Undisturbed Sample - U Disturbed Sample : - D Bulk Sample - B Core Sample - C

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# BOREHOLE LOG

**Site** .... *Samawa Combined Cycle P.P.* .... **Method of Boring** .... *Auger & Rotary* ....

**Borehole No.** ...... *07* ...... **Date** ....... *01/05/2017* .......

**X:** ..... *525764.614* ..... **Y:** ..... *3454452.792* ..... **Ground Level** ..... *10.068* .....

Water Table Level: 1.85

| Depth (m) | Thickness of Layer (m) | Soil Description |
|---|---|---|
| 0.0 – 3.5 | 3.5 | Medium brown to dark brown fat Silty CLAY with gray pockets of fine Sand and white spots of soluble salts together with black traces of organic matter. |
| 3.5 – 6.5 | 3.0 | Medium to stiff greenish gray Sandy fat Silty CLAY with black spots of organic matter and rusty traces of iron oxide compounds. |
| 6.5 – 10.5 | 4.0 | Medium,dense to very dense grayish green fine to medium grained Silty SAND with rusty traces of iron oxide compounds. |
| 10.5 – 12.0 | 1.5 | Very dense gray to yellowish gray fine grained Clayey Silty SAND with rusty spots of iron oxide compounds. |
| 12.0 – 14.0 | 2.0 | Very dense dark gray fine to medium grained Silty SAND. |
| 14.0 – 19.5 | 5.5 | Very stiff yellowish gray Sandy fat Silty CLAY with reddish lines/traces of iron oxide compounds and a lot of white cementation formation of gypsiferrous materials. |
| 19.5 – 24.5 | 5.0 | Very dense light brownish gray fine grained Clayey Silty SAND mixture with shiny angular quartz pieces and white cementation formation. |
| 24.5 – 27.0 | 2.5 | Very stiff to hard green Sandy fat Silty CLAY mixture with alot of white shiny crystallized sheets of mica minerals. |
| 27.0 – 30.5 | 3.5 | Very stiff to hard light brown to brown Sandy fat Silty CLAY mixture with rusty spots of iron oxide compounds. |

| Sample Depth (m) | Sample Type |
|---|---|
| 0.5 | D |
| 1.5 | D |
| 2.0 | U |
| 3.0 | D |
| 4.0 | U |
| 4.5 | D |
| 6.0 | D |
| 7.5 | D |
| 9.0 | D |
| 10.5 | D |
| 12.0 | D |
| 13.5 | D |
| 15.0 | D |
| 16.5 | D |
| 18.0 | D |
| 19.5 | D |
| 21.0 | D |
| 22.5 | D |
| 24.0 | D |
| 25.5 | D |
| 27.0 | D |
| 28.5 | D |
| 30.0 | D |

| Depth (m) | SPT Value N- Value | Remarks |
|---|---|---|
| 0.5 | (6) | (2,4,4) |
| 1.5 | (6) | (3,3,5) |
| 3.0 | (10) | (3,5,7) |
| 4.5 | (14) | (4,7,8) |
| 6.0 | (21) | (4,8,14) |
| 7.5 | (42) | (12,20,24) |
| 9.0 | (60) | (14,22,38) |
| 10.5 | (55) | (12,23,32) |
| 12.0 | (71) | (15,28,43) |
| 13.5 | (74) | (14,17,$\frac{50}{12}$) |
| 15.0 | (100/25) | (17,43,$\frac{50}{8}$) |
| 16.5 | (100/28) | (19,36,$\frac{50}{9}$) |
| 18.0 | (43) | (12,18,25) |
| 19.5 | (84) | (19,41,43) |
| 21.0 | (67) | (27,27,40) |
| 22.5 | (94) | (25,35,$\frac{50}{12}$) |
| 24.0 | (78) | (19,31,47) |
| 25.5 | (82) | (30,37,45) |
| 27.0 | (77) | (27,34,43) |
| 28.5 | (95) | (26,45,50) |
| 30.0 | (100/29) | (29,42,$\frac{50}{12}$) |

Scale - 1 : 150 Undisturbed Sample - U Disturbed Sample : - D Bulk Sample - B Core Sample - C

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# BOREHOLE LOG

**Site** .... *Samawa Combined Cycle P.P.* .... **Method of Boring** .... *Auger & Rotary* ....

**Borehole No.** ...... *08* ...... **Date** ....... *04/05/2017* .......

**X:** ..... *525766.153* ..... **Y:** ..... *3454359.981*..... **Ground Level** ..... *9.804* .....

Water Table Level: 1.80

| Depth (m) | Thickness of Layer (m) | Soil Description |
|---|---|---|
| 0.0 – 4.0 | 4.0 | Medium brown fat Silty CLAY with black spots of organic matter & white traces of soluble salts. |
| 4.0 – 6.5 | 2.5 | Medium brownish green fine grained Clayey Silty SAND mixture with rusty spots of iron oxide compounds. |
| 6.5 – 12.5 | 6.0 | Medium to dense brownish green to brownish gray fine to medium grained Silty SAND with white shiny sheets of mica minerals. |
| 12.5 – 19.5 | 7.0 | Very stiff brownish yellowish Sandy fat Silty CLAY mixture with white spots of soluble salts and rusty traces of iron oxide compounds. |
| 19.5 – 21.5 | 2.0 | Very stiff brownish gray fat Silty CLAY with a lot of white spots of cementation formation and rusty traces of iron oxide compounds. |
| 21.5 – 25.5 | 4.0 | Very stiff to hard light brownish green mixture of Sandy fat Silty CLAY with white cementation formation and brownish rusty lines/traces of iron oxide compounds. |

| Depth (m) | Sample Type | SPT N-Value | Remarks |
|---|---|---|---|
| 0.5 | D | (6) | (3,3,5) |
| 1.0 | U | | |
| 1.5 | D | (5) | (2,3,4) |
| 3.0 | D | (5) | (2,3,3) |
| 4.5 | D | (20) | (8,9,12) |
| 6.0 | D | (23) | (8,10,14) |
| 7.5 | D | (29) | (10,13,17) |
| 9.0 | D | (23) | (9,10,13) |
| 10.5 | D | (65) | (23,35,30) |
| 12.0 | D | (38) | (13,17,21) |
| 13.5 | D | (41) | (15,22,19) |
| 15.0 | D | (42) | (9,16,26) |
| 16.5 | D | (60) | (26,35,25) |
| 18.0 | D | (67) | (23,30,37) |
| 19.5 | D | (41) | (8,15,26) |
| 21.0 | D | (47) | (11,18,29) |
| 23.0 | D | (100) | (18,27,$\frac{50}{8}$) |
| 25.0 | D | (50/13) | (50/13) |

Scale - 1 : 150 Undisturbed Sample - U Disturbed Sample : - D Bulk Sample - B Core Sample - C

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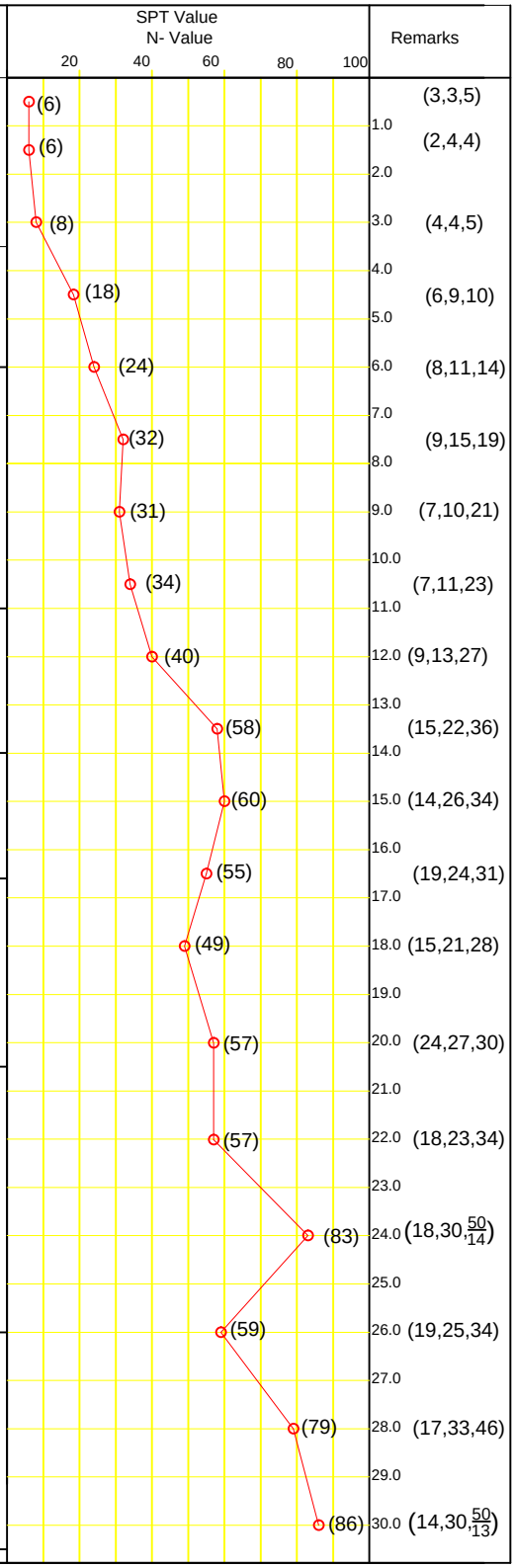
# BOREHOLE LOG

**Site** .... *Samawa Combined Cycle P.P.* .... **Method of Boring** .... *Auger & Rotary* ....

**Borehole No.** ..... *09* ..... **Date** ..... *05/05/2017* .....

**X:** ..... *525783.388* ..... **Y:** ..... *3454380.220* ..... **Ground Level** ..... *9.934* .....

| Water Table Level | Depth (m) | Sample Type & Depth | Litho logy | Thickness of Layer (m) | Soil Description | SPT Value N- Value | Remarks |
|---|---|---|---|---|---|---|---|
| 1.60 | 0.5, 1.0, 1.5, 2.0, 3.0 | D, D, U, D | | 3.5 | Medium brown to brownish gray lean Silty CLAY with gray pockets of fine Sand in parts and white spots of soluble salts together with black traces of organic matter. | (6), (6), (8) | (3,3,5), (2,4,4), (4,4,5) |
| | 4.0, 4.5, 5.0 | D | | 2.5 | Loose to medium yellowish green to greenish gray fine grained Clayey Silty SAND mixture. | (18) | (6,9,10) |
| | 6.0, 7.0, 7.5, 8.0, 9.0, 10.0, 10.5, 11.0 | D, D, D, D, D | | 5.0 | Medium to dense green to brownish gray fine grained Silty SAND with rusty traces of iron oxide compounds and white spots of soluble salts. | (24), (32), (31), (34) | (8,11,14), (9,15,19), (7,10,21), (7,11,23) |
| | 12.0, 13.0, 13.5, 14.0 | D, D | | 3.0 | Dense to very dense green to greenish gray fine to medium grained Clayey Silty SAND with rusty spots of iron oxide compounds. | (40), (58) | (9,13,27), (15,22,36) |
| | 15.0, 15.5 | D | | 1.5 | Very stiff light green Sandy fat Silty CLAY with reddish lines/traces of iron oxide compounds and a lot of white shiny sheets of mica minerals. | (60) | (14,26,34) |
| | 16.0, 16.5, 17.0, 18.0, 19.0, 20.0, 20.5 | D, D, D | | 5.0 | Very dense yellowish green fine grained Silty SAND with white shiny crystals of soluble salts. | (55), (49), (57) | (19,24,31), (15,21,28), (24,27,30) |
| | 21.0, 22.0, 23.0, 24.0, 25.0, 26.0 | D, D | | 5.5 | Very stiff to hard light brownish gray Sandy fat Silty CLAY with shiny angular quartz pieces and white spots of cementation formation. | (57), (83), (59) | (18,23,34), (18,30,50/14), (19,25,34) |
| | 27.0, 28.0, 29.0, 30.0, 30.5 | D, D, D | | 4.5 | Very stiff to hard light brown to brownish green fat Silty CLAY with gray pockets of fine grained Sand at top and white spots of cementation formation. | (79), (86) | (17,33,46), (14,30,50/13) |




Scale - 1 : 150 Undisturbed Sample - U Disturbed Sample : - D Bulk Sample - B Core Sample - C

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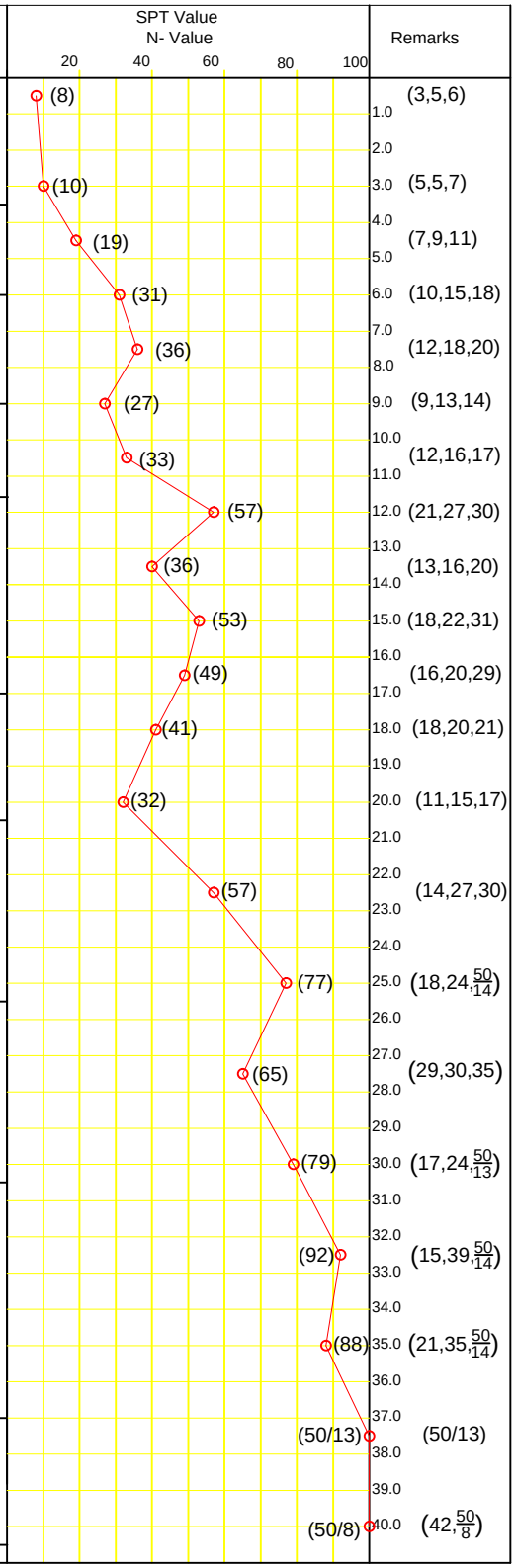
# BOREHOLE LOG

**Site** .... *Samawa Combined Cycle P.P.* .... **Method of Boring** .... *Auger & Rotary* ....

**Borehole No.** ..... *10* ..... **Date** ..... *01/05/2017* .....

**X:** ..... *525789.337*..... **Y:** ..... *3454376.212* ..... **Ground Level** ..... *9.894* .....

| Water Table Level | Depth (m) | Sample Type & Depth | Litho logy | Thickness of Layer (m) | Soil Description | SPT Value N- Value | Remarks |
|---|---|---|---|---|---|---|---|
| 2.0 | 0.5, 1.0, 1.5, 2.0, 3.0 | D, U, D | | 3.5 | Medium brown to light brown fat Silty CLAY with white spots of soluble salts and black traces of organic matter. | (8), (10) | (3,5,6), (5,5,7) |
| | 4.0, 4.5, 5.0 | D | | 2.5 | Loose to medium brownish gray fine to medium grained Silty SAND with black spots of organic matter. | (19) | (7,9,11) |
| | 6.0, 7.0, 7.5, 8.0 | D, D | | 3.0 | Medium to dense grayish brown fine grained Silty SAND with a lot of rusty spots of iron oxide compounds. | (31), (36) | (10,15,18), (12,18,20) |
| | 9.0, 10.0, 10.5, 11.0 | D, D | | 2.0 | Very stiff light brown Sandy fat Silty CLAY with rusty spots of iron oxide compounds. | (27), (33) | (9,13,14), (12,16,17) |
| | 12.0, 13.0, 13.5, 14.0, 15.0, 16.0, 16.5, 17.0 | D, D, D, D | | 6.0 | Dense to very dense greenish gray fine to medium grained Silty SAND with white spots of soluble salts and rusty traces of iron oxide compounds. | (57), (36), (53), (49) | (21,27,30), (13,16,20), (18,22,31), (16,20,29) |
| | 18.0, 19.0, 20.0 | D, D | | 3.5 | Very stiff dark green Sandy fat Silty CLAY mixture with yellowish brown rusty traces of iron oxide compounds. | (41), (32) | (18,20,21), (11,15,17) |
| | 21.0, 22.0, 22.5, 23.0, 24.0, 25.0 | D, D | | 5.0 | Very stiff to hard dark green Sandy fat Silty CLAY with a lot of white shiny crystallized sheets of mica minerals. | (57), (77) | (14,27,30), (18,24,$\frac{50}{14}$) |
| | 26.0, 27.0, 27.5, 28.0, 29.0, 30.0 | D, D | | 5.0 | Very stiff to hard light brown fat Silty CLAY with a lot of white shiny cementation formation and rusty spots/lines of iron oxide compounds. | (65), (79) | (29,30,35), (17,24,$\frac{50}{13}$) |
| | 31.0, 32.0, 32.5, 33.0, 34.0, 35.0, 36.0, 37.0 | D, D, D | | 7.5 | Hard dark green Sandy fat Silty CLAY mixture with rusty traces of iron oxide compounds and white shiny sheets of silica minerals. | (92), (88) | (15,39,$\frac{50}{14}$), (21,35,$\frac{50}{14}$) |
| | 37.5, 38.0, 39.0, 40.0 | D, D | | 2.5 | Very dense well cemented grayish green mixture of fine grained Clayey Silty SAND with rusty spots of iron oxide compounds. | (50/13), (50/8) | (50/13), (42,$\frac{50}{8}$) |




Scale - 1 : 200 Undisturbed Sample - U Disturbed Sample : - D Bulk Sample - B Core Sample - C

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# BOREHOLE LOG

**Site** .... *Samawa Combined Cycle P.P.* .... **Method of Boring** .... *Auger & Rotary* ....

**Borehole No.** ..... *11* ..... **Date** ..... *05/05/2017* .....

**X:** ..... *525799.392* ..... **Y:** ..... *3454369.411* ..... **Ground Level** ..... *9.961* .....

| Water Table Level | Depth (m) | Sample Type & Depth | Litho logy | Thickness of Layer (m) | Soil Description | SPT Value N- Value | Remarks |
|---|---|---|---|---|---|---|---|
| 1.60 | 0.5, 1.0, 1.5, 2.0, 3.0, 3.5, 4.0 | D, D, U, D | | 4.5 | Medium brown to brownish gray fat Silty CLAY with little gray pockets of fine Sand and white spots of soluble salts together with black traces of organic matter. | (7), (8), (9) | (2,4,6), (3,5,6), (4,5,5) |
| | 5.0, 6.0, 6.5, 7.0 | D, D, D | | 3.5 | Loose to medium green to greenish gray fine to medium grained Silty SAND with black spots of organic matter and rusty traces of iron oxide compounds. | (12), (29) | (5,6,7), (10,14,17) |
| | 8.0, 9.0, 9.5, 10.0, 11.0, 12.0 | D, D, D, D | | 4.5 | Very dense gray to light greenish gray fine grained Silty SAND with rusty traces of iron oxide compounds. | (78), (77), (77) | (16,32,50), (18,29,48), (20,31,46) |
| | 12.5, 13.0, 14.0, 15.0, 15.5, 16.0 | D, D, D | | 4.5 | Very dense light brownish gray to yellowish gray fine to medium grained Silty SAND with rusty spots of iron oxide compounds. | (78), (84), (71) | (18,29,49), (23,34,50), (19,29,42) |
| | 17.0, 18.0, 18.5, 19.0, 20.0, 21.0, 21.5, 22.0, 23.0, 24.0, 24.5, 25.0 | D, D, D, D, D, D | | 8.0 | Very stiff to hard yellowish light green Sandy fat Silty CLAY with reddish lines/traces of iron oxide compounds and a lot of white cementation formation of gypsiferous materials | (64), (50/10), (100/24), (50/14), (98), (50/11) | (22,30,34), (29,$\frac{50}{10}$), (30,44,$\frac{50}{8}$), (34,50/14), (28,41,$\frac{50}{13}$), (37,$\frac{50}{11}$) |
| | 26.0, 27.0, 27.5, 28.0, 29.0, 29.5, 30.0 | D, D, D, D | | 5.0 | Hard greenish gray fat Silty CLAY with white cementation formation and gray pockets of fine grained Sand in parts. | (50/9), (50/11), (50/14) | (42,$\frac{50}{9}$), (50/11), (50/14) |

Scale - 1 : 150 Undisturbed Sample - U Disturbed Sample : - D Bulk Sample - B Core Sample - C

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# BOREHOLE LOG

**Site** .... *Samawa Combined Cycle P.P.* .... **Method of Boring** .... *Auger & Rotary* ....

**Borehole No.** ..... *12* ..... **Date** ..... *03/05/2017* .....

**X:** ..... *525790.034* ..... **Y:** ..... *3454389.063* ..... **Ground Level** ..... *12.000* .....

| Water Table Level | Depth (m) | Sample Type & Depth | Litho logy | Thickness of Layer (m) | Soil Description | SPT Value N- Value | Remarks |
|---|---|---|---|---|---|---|---|
| 1.60 | 0.5, 1.0, 1.5, 2.0, 3.0 | D, U, D | | 3.5 | Medium to stiff brown to dark brown fat Silty CLAY with gray pockets of fine Sand at bottom and white spots of soluble salts together with black traces of organic matter. | (7), (12) | (3,4,6), (4,6,8) |
| | 4.0, 4.5, 5.0 | D | | 2.5 | Loose to medium light greenish gray fine grained Silty SAND with white spots of soluble salts. | (23) | (8,9,15) |
| | 6.0, 7.0, 7.5, 8.0, 9.0 | D, D, D | | 3.5 | Medium, dense to very dense green to greenish gray fine grained Silty SAND with rusty traces of iron oxide compounds and white spots of soluble salts. | (30), (48), (68) | (10,15,17), (11,19,32), (18,32,36) |
| | 10.0, 10.5, 11.0 | D | | 2.5 | Dense green to greenish gray fine to medium grained Clayey Silty SAND with rusty spots of iron oxide compounds. | (33) | (9,13,20) |
| | 12.0, 13.0, 13.5, 14.0 | D, D | | 3.0 | Very stiff to hard yellowish light green Sandy fat Silty CLAY mixture with reddish lines/traces of iron oxide compounds and a lot of white shiny sheets of mica minerals. | (38), (50/11) | (12,15,23), (50/11) |
| | 15.0, 16.0, 16.5, 17.0, 18.0, 19.0, 19.5 | D, D, D, D | | 4.5 | Dense to very dense yellowish green fine grained Clayey Silty SAND with white shiny crystals of soluble salts. | (37), (39), (54), (59) | (12,16,21), (15,16,23), (19,23,31), (17,26,33) |
| | 20.0, 21.0 | D | | 2.0 | Very dense brown to light brown fine grained Silty SAND with rusty spots of iron oxide compounds. | (76) | (27,38,38) |
| | 22.0, 22.5, 23.0, 24.0, 25.0, 25.5, 26.0 | D, D, D | | 4.5 | Very stiff to hard light brownish gray Sandy fat Silty CLAY with shiny angular quartz pieces and white spots of cementation formation. | (79), (88), (50/13) | (31,37,42), (32,39,49), (50/13) |
| | 27.0, 28.0, 25.5, 29.0, 30.0 | D, D, D, D | | 4.5 | Hard light brown to light grayish brown Sandy fat Silty CLAY mixture with white spots of cementation formation. | (50/13), (50/8), (50/4) | (37,50/13), (50/8), (50/4) |

Scale - 1 : 150 Undisturbed Sample - U Disturbed Sample : - D Bulk Sample - B Core Sample - C

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# BOREHOLE LOG

**Site** .... *Samawa Combined Cycle P.P.* .... **Method of Boring** .... *Auger & Rotary* ....

**Borehole No.** ..... *13* ..... **Date** ..... *05/05/2017* .....

**X:** ..... *525826.528* ..... **Y:** ..... *3454381.1482* ..... **Ground Level** ..... *12.000* .....

| Water Table Level | Depth (m) | Sample Type & Depth | Litho logy | Thickness of Layer (m) | Soil Description | SPT Value N- Value | Remarks |
|---|---|---|---|---|---|---|---|
| 2.0 | 0.5, 1.0, 1.5, 2.0 | D, U | | 3.0 | Medium brown Sandy fat Silty CLAY with black spots of organic matter & white traces of soluble salts. | (8) | (3,5,7) |
| | 3.0, 4.0, 4.5, 5.0, 6.0 | D, U, D, D | | 3.5 | Medium to stiff brown to grayish brown Sandy fat Silty CLAY with white spots of soluble salts and rusty lines of iron oxide compounds together with black traces of organic matter. | (13), (13), (28) | (4,6,9), (6,6,8), (7,11,18) |
| | 7.0, 7.5, 8.0, 9.0, 10.0 | D, D, D | | 4.0 | Medium, dense to very dense light gray to brownish gray fine grained Silty SAND with white shiny sheets of mica minerals. | (39), (77) | (15,18,23), (25,37,40) |
| | 10.5, 11.0, 12.0, 13.0 | D, D | | 3.5 | Very dense brownish gray fine to medium grained SAND with white spots of soluble salts & little Silt fraction. | (77), (85) | (28,34,45), (34,40,45) |
| | 14.0, 15.0, 16.0, 17.0, 18.0, 19.0, 20.0 | D, D, D, D | | 6.5 | Very dense light brownish gray well cemented fine grained Silty SAND mixture with white cementation formation. | (81), (93), (100/29), (96) | (30,37,44), (39,40,$\frac{50}{14}$), (28,40,$\frac{50}{11}$), (25,36,$\frac{50}{12}$) |
| | 21.0, 22.0, 22.5, 23.0, 24.0, 25.0 | D, D | | 5.0 | Hard light yellowish gray Sandy fat Silty CLAY with alot of white cementation formation and brownish rusty lines/traces of iron oxide compounds. | (98), (50/11) | (36,45,$\frac{50}{14}$), (50/11) |
| | 26.0, 27.0, 28.0, 29.0, 30.0 | | | | | | |

Scale - 1 : 150 Undisturbed Sample - U Disturbed Sample : - D Bulk Sample - B Core Sample - C

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# BOREHOLE LOG

**Site** .... *Samawa Combined Cycle P.P.* .... **Method of Boring** .... *Auger & Rotary* ....

**Borehole No.** ...... *14* ...... **Date** ....... *01/05/2017* .......

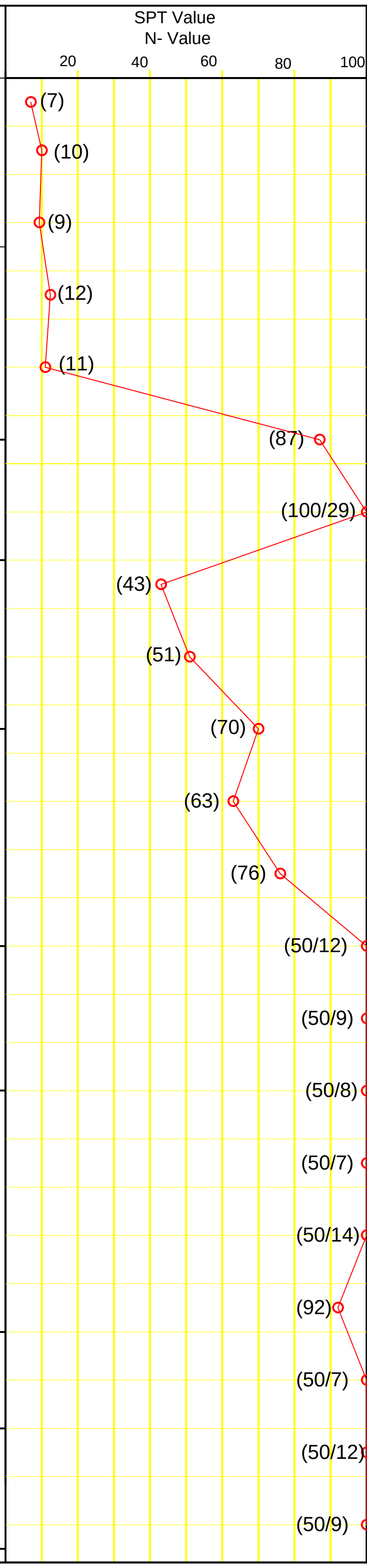
**X:** ..... *525816.458* ..... **Y:** ..... *3454417.938* ..... **Ground Level** ..... *10.065* .....

Water Table Level: 1.70

| Depth (m) | Thickness of Layer (m) | Soil Description |
|---|---|---|
| 0.0 – 3.5 | 3.5 | Medium brown to dark brown lean Silty CLAY with white spots of soluble salts and black traces of organic matter. |
| 3.5 – 7.5 | 4.0 | Medium to stiff brown fat Silty CLAY with black spots of organic matter and rusty traces of iron oxid compounds. |
| 7.5 – 9.5 | 2.0 | Very dense gray to light greenish gray fine to medium grained Silty SAND with rusty traces of iron oxide compounds. |
| 9.5 – 13.5 | 4.0 | Dense to very dense light gray to yellowish gray fine to medium grained Silty SAND with rusty spots of iron oxide compounds. |
| 13.5 – 18.0 | 4.5 | Very stiff to hard light gray Sandy fat Silty CLAY with rusty traces of iron oxide compounds and white shiny cementation formation compounds. |
| 18.0 – 21.0 | 3.0 | Hard light green fat Silty CLAY with some gray fine grained Sand & shiny crystals of soluble salts . |
| 21.0 – 26.0 | 5.0 | Hard dark green Sandy fat Silty CLAY with white shiny cementation formation compounds. |
| 26.0 – 27.0 | 1.5 | Very dense gray fine grained Clayey Silty SAND with white cementation formation. |
| 27.0 – 30.5 | 3.0 | Hard light gray Sandy fat Silty CLAY with rusty spots of iron oxide compounds. |

| Depth (m) | SPT N-Value | Remarks |
|---|---|---|
| 0.5 | (7) | (3,4,6) |
| 1.5 | (10) | (5,7,6) |
| 3.0 | (9) | (5,5,6) |
| 4.5 | (12) | (5,6,7) |
| 6.0 | (11) | (4,5,7) |
| 7.5 | (87) | (14,27,50/10) |
| 9.0 | (100/29) | (31,30,50/8) |
| 10.5 | (43) | (10,17,26) |
| 12.0 | (51) | (12,20,31) |
| 13.5 | (70) | (27,31,39) |
| 15.0 | (63) | (22,25,38) |
| 16.5 | (76) | (28,34,42) |
| 18.0 | (50/12) | (30,50/12) |
| 19.5 | (50/9) | (50/9) |
| 21.0 | (50/8) | (50/8) |
| 22.5 | (50/7) | (50/7) |
| 24.0 | (50/14) | (50/14) |
| 25.5 | (92) | (26,30,50/11) |
| 27.0 | (50/7) | (30,50/7) |
| 28.5 | (50/12) | (44,50/12) |
| 30.0 | (50/9) | (50/9) |

| Sample Type & Depth (m) | |
|---|---|
| 0.5 – 1.0 | D |
| 1.5 – 2.0 | D |
| 2.0 – 2.5 | U |
| 3.0 – 3.5 | D |
| 4.0 – 4.5 | U |
| 4.5 – 5.0 | D |
| 6.0 – 6.5 | D |
| 7.5 – 8.0 | D |
| 9.0 – 9.5 | D |
| 10.5 – 11.0 | D |
| 12.0 – 12.5 | D |
| 13.5 – 14.0 | D |
| 15.0 – 15.5 | D |
| 16.5 – 17.0 | D |
| 18.0 – 18.5 | D |
| 19.5 – 20.0 | D |
| 21.0 – 21.5 | D |
| 22.5 – 23.0 | D |
| 24.0 – 24.5 | D |
| 25.5 – 26.0 | D |
| 27.0 – 27.5 | D |
| 28.5 – 29.0 | D |
| 30.0 – 30.5 | D |




Scale - 1 : 150 Undisturbed Sample - U Disturbed Sample : - D Bulk Sample - B Core Sample - C

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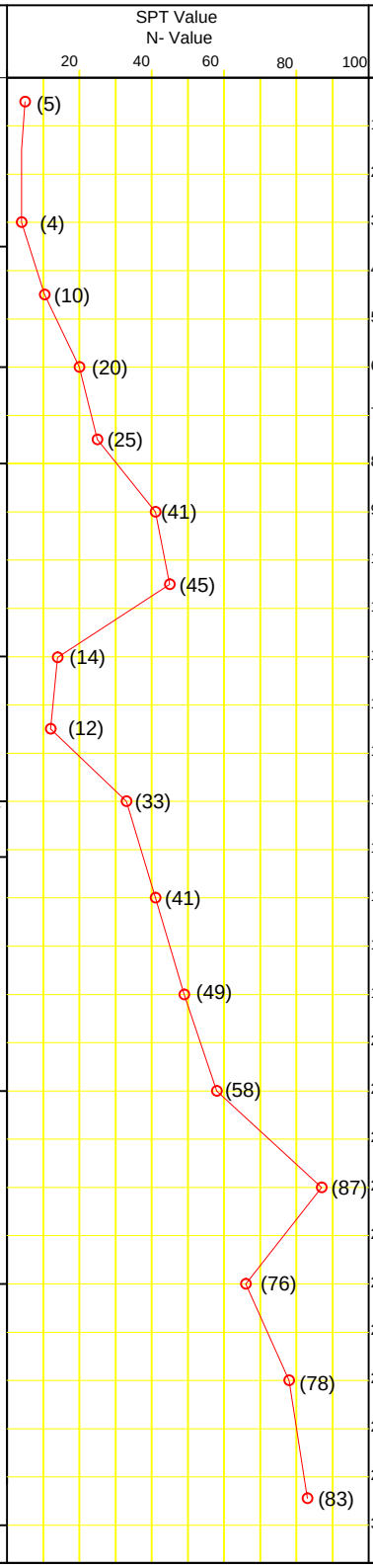
# BOREHOLE LOG

**Site** .... *Samawa Combined Cycle P.P.* .... **Method of Boring** .... *Auger & Rotary* ....

**Borehole No.** ..... *15* ..... **Date** ..... *01/05/2017* .....

**X:** .....*525817.983* ..... **Y:** ..... *3454325.165* ..... **Ground Level** ..... *9.870* .....

| Water Table Level | Depth (m) | Sample Type & Depth | Litho logy | Thickness of Layer (m) | Soil Description | SPT Value N- Value | Remarks |
|---|---|---|---|---|---|---|---|
| 1.85 | 0.5, 1.0, 1.5, 2.0, 3.0 | D, U, D | | 3.5 | Medium to soft brown fat Silty CLAY with white spots of soluble salts and with black traces of organic matter. | (5), (4) | (2,3,4), (3,2,3) |
| | 4.0, 4.5, 5.0, 6.0 | U, D | | 2.5 | Medium to stiff light green Sandy fat Silty CLAY with black spots of organic matter and rusty traces of iron oxide compounds. | (10), (20) | (4,4,6), (7,10,11) |
| | 7.0, 7.5, 8.0 | D, D | | 2.0 | Medium brownish green fine grained Clayey Silty SAND mixture with rusty traces of iron oxide compounds. | (25) | (9,13,13) |
| | 9.0, 10.0, 10.5, 11.0, 12.0 | D, D, D | | 4.0 | Dense light brownish gray to gray fine to medium grained Silty SAND with rusty spots of iron oxide compounds. | (41), (45), (14) | (15,19,22), (11,21,24), (5,7,7) |
| | 13.0, 13.5, 14.0 | D, D | | 2.0 | Stiff light gray Sandy lean Silty CLAY with white spots of carbonate compounds and a lot of white shiny sheets of mica minerals. | (12) | (3,5,7) |
| | 15.0, 15.5 | D | | 1.5 | Dense light brown fine grained Silty SAND. | (33) | (9,12,21) |
| | 16.0, 17.0, 18.0, 19.0, 20.0, 21.0 | D, D, D | | 5.5 | Very stiff brownish yellow Sandy fat Silty CLAY with white spots carbonate compounds . | (41), (49), (58) | (7,20,21), (12,18,31), (10,25,33) |
| | 22.0, 23.0, 24.0, 25.0 | D, D | | 4.0 | Very dense green fine grained Clayey Silty SAND with alot of white shiny crystallized sheets of mica minerals. | (87), (76) | (20,39,48), (19,33,43) |
| | 26.0, 27.0, 28.0, 29.0, 29.5, 30.0 | D, D, D | | 5.0 | Hard light brown Sandy fat Silty CLAY with white cementation formation and rusty traces of iron oxide compounds. | (78), (83) | (15,38,40), (23,39,44) |




Scale - 1 : 150 Undisturbed Sample - U Disturbed Sample : - D Bulk Sample - B Core Sample - C

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# BOREHOLE LOG

**Site** .... *Samawa Combined Cycle P.P.* .... **Method of Boring** .... *Auger & Rotary* ....

**Borehole No.** ...... *16* ...... **Date** ....... *03/05/2017* .......

**X:** .....*525835.335* ..... **Y:** ..... *3454345.331* ..... **Ground Level** ..... *9.840* .....

Water Table Level: 1.75

| Depth (m) | Thickness of Layer (m) | Soil Description |
|---|---|---|
| 0.0 – 4.5 | 4.5 | Medium brown fat Silty CLAY with gray pockets of fine Sand at bottom and white spots of soluble salts together with black traces of organic matter. |
| 4.5 – 6.5 | 2.0 | Medium to dense yellowish green fine grained Clayey Silty SAND mixture. |
| 6.5 – 9.5 | 3.0 | Dense to very dense grayish brown fine grained Silty SAND with rusty traces of iron oxide compounds and brown Silty Clay pockets in parts. |
| 9.5 – 14.0 | 4.5 | Dense to very dense light grayish brown fine to medium grained Silty SAND with rusty spots of iron oxide compounds. |
| 14.0 – 19.0 | 5.0 | Very stiff light greenish brown Sandy lean Silty CLAY mixture with reddish traces of iron oxide compounds and a lot of white spots of carbonate compounds. |
| 19.0 – 21.0 | 2.0 | Very dense light brownish gray fine grained Silty SAND with shiny angular quartz pieces. |
| 21.0 – 26.0 | 5.0 | Very stiff greenish gray fat Silty CLAY with a lot of white shiny spots of gypsiferrous materials. |
| 26.0 – 30.5 | 4.5 | Hard light brown Sandy fat Silty CLAY with white cementation formation and rusty traces of iron oxide compounds. |

| Sample Depth (m) | Sample Type | SPT N-Value | Remarks |
|---|---|---|---|
| 0.5 | D | (6) | (2,4,4) |
| 1.5 | U | | |
| 3.0 | D | (5) | (3,3,3) |
| 4.5 | D | (24) | (9,11,14) |
| 6.0 | D | (34) | (12,14,22) |
| 7.5 | D | (62) | (14,32,33) |
| 9.0 | D | (32) | (7,14,18) |
| 10.5 | D | (48) | (11,21,27) |
| 12.0 | D | (82) | (18,32,50) |
| 14.0 | D | (47) | (17,16,31) |
| 16.0 | D | (74) | (29,43,31) |
| 18.0 | D | (46) | (16,22,24) |
| 20.0 | D | (50/12) | (50/12) |
| 22.0 | D | (97) | (24,37,50/12) |
| 24.0 | D | (77) | (21,34,43) |
| 26.0 | D | (89) | (30,42,47) |
| 28.0 | D | (50/14) | (22,50/14) |
| 30.0 | D | (50/11) | (50/11) |

Scale - 1 : 150 Undisturbed Sample - U Disturbed Sample : - D Bulk Sample - B Core Sample - C

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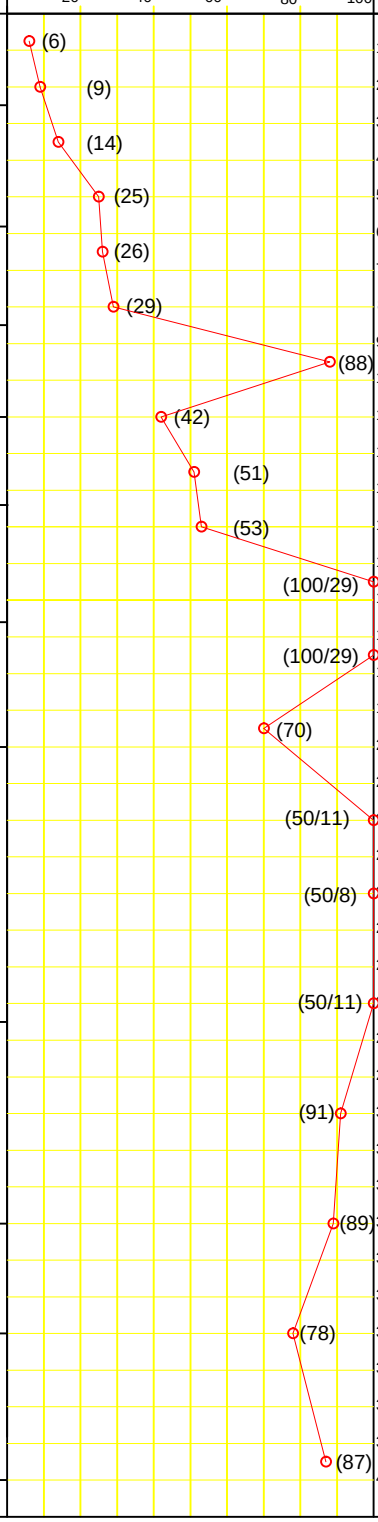
# BOREHOLE LOG

**Site** .... *Samawa Combined Cycle P.P.* .... **Method of Boring** .... *Auger & Rotary* ....

**Borehole No.** ..... *17* ..... **Date** ..... *03/05/2017* .....

**X:** ..... *525841.406* ..... **Y:** ..... *3454341.123* ..... **Ground Level** ..... *9.834* .....

| Water Table Level | Depth (m) | Sample Type & Depth | Litho logy | Thickness of Layer (m) | Soil Description | SPT Value N- Value | Remarks |
|---|---|---|---|---|---|---|---|
| 1.90 | 0.75, 1.0, 1.5, 2.0 | D, U, D | | 2.5 | Medium dark brown to brown fat Silty CLAY with gray pockets of Marly Clay and black spots of organic matter . | (6), (9) | (3,4,5), (3,5,8) |
| | 3.0, 3.5, 4.0, 4.5, 5.0 | D, U, D | | 2.5 | Medium to stiff brownish green fat Silty CLAY with fine grained Sand & white spots of soluble salts together with black spots of organic matter. | (14), (25) | (4,7,9), (8,11,15) |
| | 6.0, 6.5, 7.0, 8.0 | D, D | | 3.5 | Medium light grayish green fine grained Silty SAND with white shiny spots of soluble salts. | (26), (29) | (5,10,17), (9,14,17) |
| | 9.0, 9.5, 10.0 | D, D | | 2.5 | Dense to very dense grayish brown fine grained Clayey Silty SAND mixture. | (88) | (16,41,47) |
| | 11.0, 12.0, 12.5 | D, D | | 1.5 | Very stiff brown mixture of Sandy fat Silty CLAY with rusty spots of iron oxide compounds. | (42), (51) | (13,18,24), (15,21,30) |
| | 13.0, 14.0, 15.0, 15.5 | D, D, D | | 3.0 | Very dense grayish green to greenish gray mixture of fine grained Clayey Silty SAND with rusty traces/lines of iron oxide compounds. | (53), (100/29) | (17,29,24), (18,30,50/8) |
| | 16.0, 17.0, 17.5, 18.0, 19.0, 19.5, 20.0 | D, D, D | | 4.5 | Hard light green to brownish green Sandy fat Silty CLAY with white shiny sheets of silica minerals and rusty spots of iron oxide compounds. | (100/29), (70) | (20,42,50/12), (20,29,41) |
| | 21.0, 22.0, 23.0, 24.0, 25.0, 26.0, 27.0, 27.5 | D, D, D | | 7.5 | Hard light green fat Silty CLAY interbeded by gray fine grained Sand seams/pockets with white cementation formation and white crystals of mica minerals. | (50/11), (50/8), (50/11) | (50/11), (32,50/8), (40,50/11) |
| | 28.0, 29.0, 30.0, 31.0, 32.0, 33.0 | D, D | | 5.5 | Hard light brown Sandy fat Silty CLAY with rusty spots of iron oxide compounds and black traces of organic matter. | (91), (89) | (13,23,50/9), (22,39,50) |
| | 34.0, 35.0, 36.0 | D | | 3.0 | Very dense gray fine to medium grained Silty SAND with rusty spots of iron oxide compounds. | (78) | (32,36,42) |
| | 37.0, 38.0, 39.0, 39.5, 40.0 | D | | 4.0 | Very stiff to hard dark green Sandy fat Silty CLAY with grayish green pockets of Marly Clay. | (87) | (35,40,47) |




Scale - 1 : 200 Undisturbed Sample - U Disturbed Sample : - D Bulk Sample - B Core Sample - C

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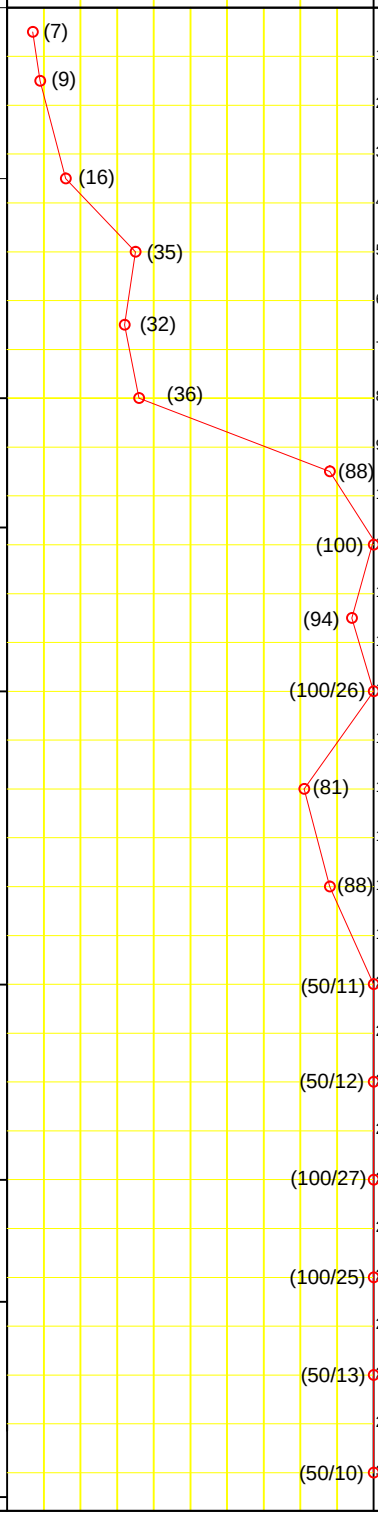
# BOREHOLE LOG

**Site** .... *Samawa Combined Cycle P.P.* .... **Method of Boring** .... *Auger & Rotary* ....

**Borehole No.** ..... *18* ..... **Date** ..... *05/05/2017* .....

**X:** ..... *525851.189* ..... **Y:** ..... *3454334.500* ..... **Ground Level** ..... *9.996* .....

| Water Table Level | Depth (m) | Sample Type & Depth | Litho logy | Thickness of Layer (m) | Soil Description | SPT Value N- Value | Remarks |
|---|---|---|---|---|---|---|---|
| 1.70 | 0.5, 1.0, 1.5, 2.0, 3.0 | D, D, U | | 3.5 | Medium brown to dark brown fat Silty CLAY with little gray pockets of fine Sand at bottom and white spots of soluble salts together with black traces of organic matter. | (7), (9) | (3,4,6), (4,5,8) |
| | 3.5, 4.0, 5.0, 6.0, 6.5, 7.0 | D, D, D | | 4.5 | Medium to dense yellowish green to greenish gray fine grained Silty SAND with black spots of organic matter and rusty traces of iron oxide compounds. | (16), (35), (32) | (8,12,17), (11,16,21), (11,14,20) |
| | 8.0, 9.0, 9.5, 10.0 | D, D | | 2.0 | Dense to very dense light gray to light greenish gray fine grained Clayey Silty SAND with rusty traces of iron oxide compounds. | (36), (88) | (12,15,23), (18,35,50/14) |
| | 11.0, 12.0, 12.5, 13.0 | D, D | | 4.0 | Very dense light brownish gray to yellowish gray fine to medium grained Silty SAND with rusty spots of iron oxide compounds. | (100), (94) | (26,41,50/12), (29,38,50/13) |
| | 14.0, 15.0, 16.0, 17.0, 18.0, 19.0, 20.0 | D, D, D | | 6.0 | Hard yellowish light green well cemented Sandy fat Silty CLAY mixture with reddish lines/traces of iron oxide compounds and a lot of white cementation formation of gypsiferous materials. | (100/26), (81), (88), (50/11) | (30,43,50/9), (16,26,50/13), (23,39,49), (50/11) |
| | 21.0, 22.0, 23.0 | D, D | | 4.0 | Hard grayish green fat Silty CLAY with some fine grained Sand and alot of white cementation formation compounds. | (50/12) | (50/12) |
| | 24.0, 25.0, 26.0 | D, D | | 2.5 | Hard greenish gray Sandy fat Silty CLAY with white cementation formation. | (100/27), (100/25) | (33,46,50/11), (36,42,50/8) |
| | 27.0, 28.0, 29.0, 30.0 | D, D, D | | 4.0 | Hard light brownish gray fat Silty CLAY with white cementation formation and rusty traces of iron oxide compounds. | (50/13), (50/10) | (50/13), (50/10) |




Scale - 1 : 150 Undisturbed Sample - U Disturbed Sample : - D Bulk Sample - B Core Sample - C

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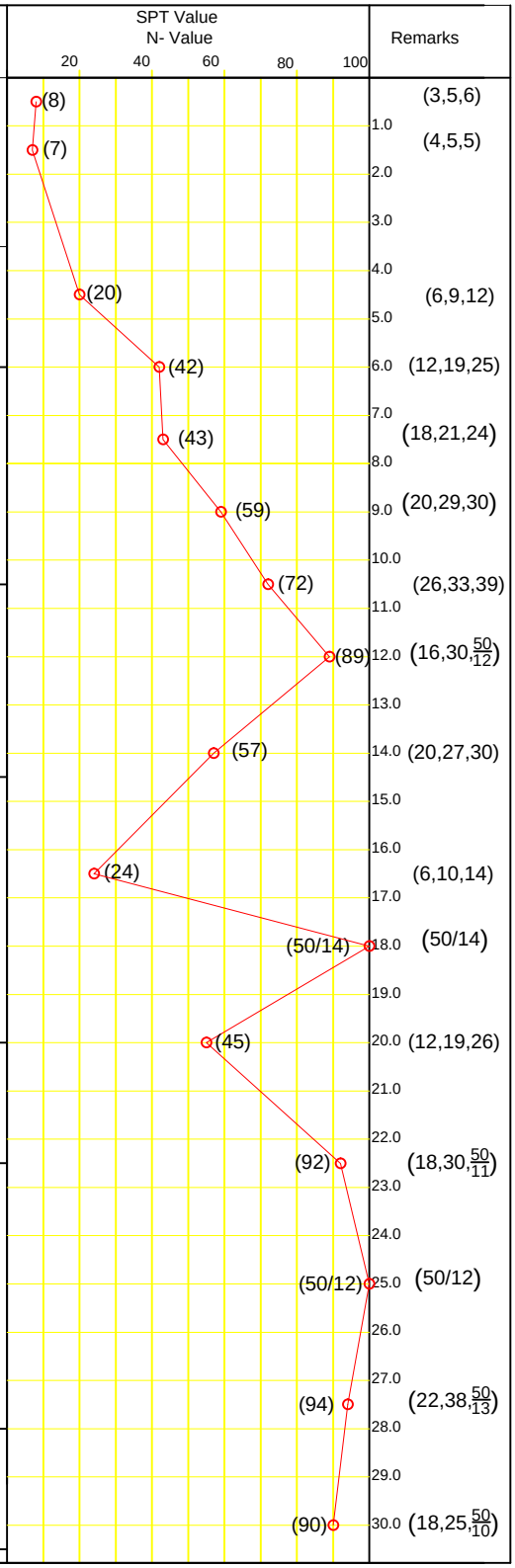
# BOREHOLE LOG

**Site** .... *Samawa Combined Cycle P.P.* .... **Method of Boring** .... *Auger & Rotary* ....

**Borehole No.** ..... *19* ..... **Date** ..... *01/05/2017* .....

**X:** ..... *525848.962* ..... **Y:** ..... *3454354.060* ..... **Ground Level** ..... *9.903* .....

| Water Table Level | Depth (m) | Sample Type & Depth | Litho logy | Thickness of Layer (m) | Soil Description | Remarks |
|---|---|---|---|---|---|---|
| 2.0 | 0.5, 1.0, 1.5, 2.0, 3.0 | D, D, U | | 3.5 | Medium brown to dark brown fat Silty CLAY with white spots of soluble salts and black traces of organic matter. | (3,5,6) (4,5,5) |
| | 4.0, 4.5, 5.0 | D | | 2.5 | Medium brown fine grained Clayey Silty SAND mixture with black spots of organic matter and rusty traces of iron oxid compounds. | (6,9,12) |
| | 6.0, 7.0, 7.5, 8.0, 9.0, 10.0 | D, D, D, D | | 4.5 | Dense to very dense gray to light grayish brown fine grained Silty SAND with rusty traces of iron oxide compounds. | (12,19,25) (18,21,24) (20,29,30) |
| | 10.5, 11.0, 12.0, 13.0, 14.0 | D, D, D | | 4.0 | Very dense light gray to brownish gray fine to medium grained SAND with little Silt fraction and rusty spots of iron oxide compounds. | (26,33,39) (16,30,50/12) (20,27,30) |
| | 15.0, 16.0, 16.5, 17.0, 18.0, 19.0, 20.0 | D, D, D | | 5.5 | Very stiff to hard light green Sandy fat Silty CLAY with rusty traces of iron oxide compounds and white shiny cementation formation compounds. | (6,10,14) (50/14) |
| | 21.0, 22.0, 22.5 | D | | 2.5 | Dense to very dense yellowish green fine grained Clayey Silty SAND mixture with shiny crystals of soluble salts . | (12,19,26) (18,30,50/11) |
| | 23.0, 24.0, 25.0, 26.0, 27.0, 27.5, 28.0 | D, D, D | | 5.5 | Hard dark green Sandy fat Silty CLAY with white shiny cementation formation compounds and rusty spots of iron oxide compounds. | (50/12) (22,38,50/13) |
| | 29.0, 30.0 | D | | 2.5 | Hard green to yellowish green fat Silty CLAY with rusty spots of iron oxide compounds and white traces of iron oxide compounds. | (18,25,50/10) |




Scale - 1 : 150 Undisturbed Sample - U Disturbed Sample : - D Bulk Sample - B Core Sample - C

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# BOREHOLE LOG

**Site** .... *Samawa Combined Cycle P.P.* .... **Method of Boring** .... *Auger & Rotary* ....

**Borehole No.** ...... *20* ...... **Date** ....... *06/05/2017* .......

**X:** ..... *525869.319* ..... **Y:** ..... *3454351.967* ..... **Ground Level** ..... *10.089* .....

Water Table Level: 1.90

| Depth (m) | Thickness of Layer (m) | Soil Description |
|---|---|---|
| 0.0 – 1.5 | 1.5 | Loose light brown to brown fine grained Clayey Silty SAND with white spots of soluble salts . |
| 1.5 – 4.0 | 2.5 | Medium brown fat Silty CLAY with white spots of soluble salts and black traces of organic matter together with rusty lines of iron oxide compounds. |
| 4.0 – 9.0 | 5.0 | Loose to medium brownish gray fine grained Silty SAND with white spots of soluble salts & rusty traces of iron oxide compounds. |
| 9.0 – 12.0 | 3.0 | Medium to dense light green fine grained Silty SAND with rusty spots of iron oxide compounds. |
| 12.0 – 15.5 | 3.5 | Dense to very dense light gray to gray fine to medium grained Silty SAND mixture with white shiny sheets of mica minerals. |
| 15.5 – 19.5 | 4.0 | Very stiff to hard yellowish gray Sandy fat Silty CLAY mixture with white shiny spots of gypsifferous materials & rusty spots of iron oxide compounds. |
| 19.5 – 25.5 | 6.0 | Hard light gray to gray mixture of Sandy fat Silty CLAY with a lot of white cementation formation of gypsifferous materials. |

| Depth (m) | SPT N-Value | Remarks |
|---|---|---|
| 1.0 | (7) | (4,5,5) |
| 3.0 | (8) | (3,4,5) |
| 4.5 | (12) | (4,6,7) |
| 6.0 | (29) | (9,15,16) |
| 7.5 | (28) | (12,13,16) |
| 9.0 | (27) | (8,10,17) |
| 10.5 | (35) | (19,17,18) |
| 12.0 | (45) | (15,20,25) |
| 13.5 | (59) | (21,25,34) |
| 15.0 | (68) | (22,30,38) |
| 16.5 | (63) | (20,25,38) |
| 18.0 | (50/14) | (50/14) |
| 19.5 | (50/13) | (50/13) |
| 21.0 | (50/8) | (34,50/8) |
| 23.0 | (50/10) | (50/10) |
| 25.0 | (50/12) | (50/12) |

| Sample Depth (m) | Sample Type |
|---|---|
| 0.75 | D |
| 1.5 | U |
| 3.0 | D |
| 4.5 | D |
| 6.0 | D |
| 7.5 | D |
| 9.0 | D |
| 10.5 | D |
| 12.0 | D |
| 13.5 | D |
| 15.0 | D |
| 16.5 | D |
| 18.0 | D |
| 19.5 | D |
| 21.0 | D |
| 23.0 | D |
| 25.0 | D |

Scale - 1 : 150 Undisturbed Sample - U Disturbed Sample : - D Bulk Sample - B Core Sample - C

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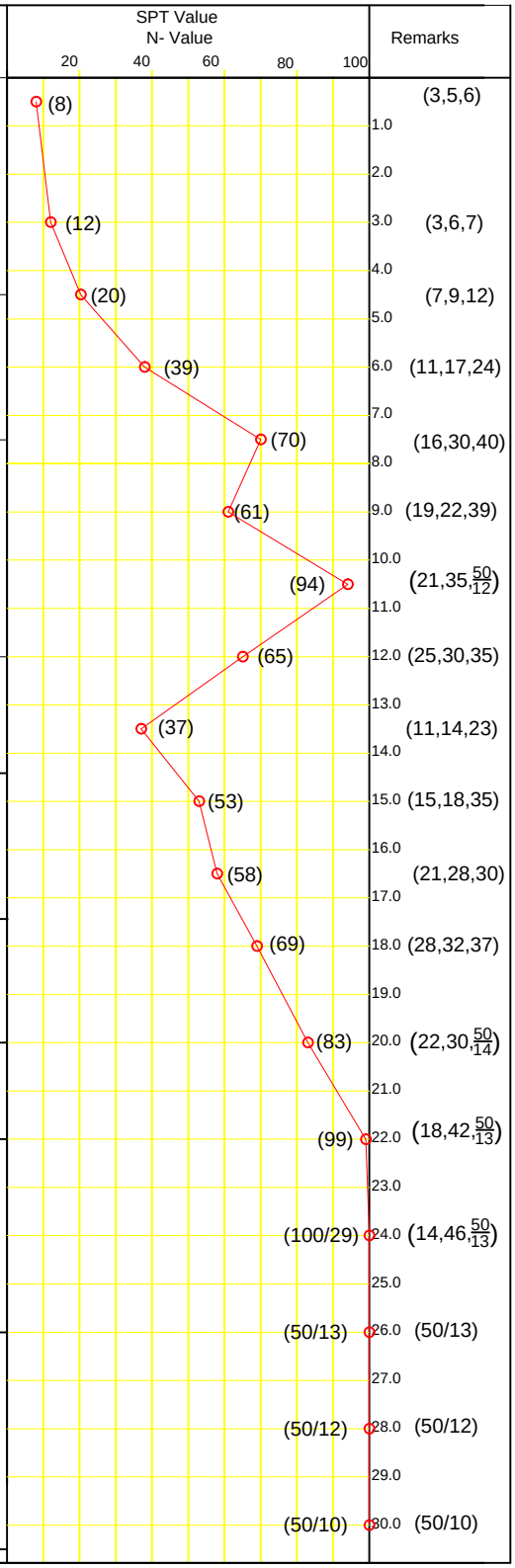
# BOREHOLE LOG

**Site** .... *Samawa Combined Cycle P.P.* .... **Method of Boring** .... *Auger & Rotary* ....

**Borehole No.** ..... *21* ..... **Date** ..... *03/05/2017* .....

**X:** ..... *525868.312* ..... **Y:** ..... *34543483.055* ..... **Ground Level** ..... *10.104* .....

| Water Table Level | Depth (m) | Sample Type & Depth | Litho logy | Thickness of Layer (m) | Soil Description | SPT Value N- Value | Remarks |
|---|---|---|---|---|---|---|---|
| 1.90 | 0.5, 1.0, 1.5, 2.0, 3.0, 4.0, 4.5 | D, U, D | | 4.5 | Medium to stiff brown fat Silty CLAY with white spots of soluble salts and black traces of organic matter. | (8), (12) | (3,5,6), (3,6,7) |
| | 4.5, 5.0, 6.0, 7.0, 7.5 | D, D | | 3.0 | Medium to dense yellowish green to greenish gray fine grained Silty SAND with rusty traces of iron oxide compounds.. | (20), (39) | (7,9,12), (11,17,24) |
| | 7.5, 8.0, 9.0, 10.0, 10.5, 11.0, 12.0 | D, D, D | | 4.5 | Very dense gray to brownish gray fine to medium grained SAND with little Silt fraction and rusty traces of iron oxide compounds. | (70), (61), (94) | (16,30,40), (19,22,39), (21,35,50/12) |
| | 12.0, 13.0, 13.5 | D, D | | 1.5 | Very dense light brownish gray to yellowish gray fine to medium grained Silty SAND with rusty spots of iron oxide compounds. | (65), (37) | (25,30,35), (11,14,23) |
| | 14.0, 15.0, 16.0, 16.5 | D, D, D | | 3.0 | Very stiff grayish brown to brownish gray Sandy fat Silty CLAY with reddish traces of iron oxide compounds and a lot of white shiny crystals of silica minerals. | (53), (58) | (15,18,35), (21,28,30) |
| | 17.0, 18.0, 19.0, 20.0 | D, D | | 3.5 | Very stiff to hard yellowish green mixture of Sandy fat Silty CLAY with shiny crystals of quartz . | (69), (83) | (28,32,37), (22,30,50/14) |
| | 21.0, 22.0 | D, D | | 2.0 | Very dense dark gray fine grained Clayey Silty SAND mixture with shiny spots of gypsiferrous materials. | (99) | (18,42,50/13) |
| | 23.0, 24.0, 25.0, 26.0 | D, D, D | | 4.0 | Hard grayish green Sandy fat Silty CLAY mixture with a lot of white shiny crystallized sheets of mica minerals. | (100/29), (50/13) | (14,46,50/13), (50/13) |
| | 27.0, 28.0, 29.0, 30.0, 30.5 | D, D, D | | 4.5 | Hard light green to greenish gray Sandy fat Silty CLAY with white cementation formation and rusty traces of iron oxide compounds. | (50/12), (50/10) | (50/12), (50/10) |




Scale - 1 : 150 Undisturbed Sample - U Disturbed Sample : - D Bulk Sample - B Core Sample - C

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# BOREHOLE LOG

**Site** .... *Samawa Combined Cycle P.P.* .... **Method of Boring** .... *Auger & Rotary* ....

**Borehole No.** ..... *22* ..... **Date** ..... *06/05/2017* .....

**X:** ..... *525869.764* ..... **Y:** ..... *3454290.333*..... **Ground Level** ..... *9.804* .....

| Water Table Level | Depth (m) | Sample Type & Depth | Litho logy | Thickness of Layer (m) | Soil Description | SPT Value N- Value | Remarks |
|---|---|---|---|---|---|---|---|
| 1.80 | 0.5, 1.0, 1.5, 2.0 | D, U | | 2.0 | Medium brown fat Silty CLAY with black spots of organic matter & white traces of soluble salts. | (10) | (5,6,8) |
| | 3.0, 4.0, 4.5, 5.0 | D, U, D | | 3.0 | Medium to stiff brown Sandy lean Silty CLAY with a lot of black spots of organic matter & white traces of soluble salts. | (20), (28) | (9,11,13), (11,14,16) |
| | 6.0, 7.0, 7.5, 8.0, 9.0, 10.0, 10.5 | D, D, D, D | | 1.5 | Medium to dense brownish green fine grained Clayey Silty SAND mixture with rusty spots of iron oxide compounds. | (34), (36) | (14,16,20), (13,17,21) |
| | 11.0, 12.0, 13.0, 13.5, 14.0, 15.0, 16.0, 16.5, 17.0, 18.0, 19.0, 19.5, 20.0, 21.0, 22.0, 23.0, 24.0, 25.0, 26.0, 27.0, 28.0, 29.0, 30.0 | D, D, D, D, D, D, D, D, D, D, D, D, D, D, D, D, D, D | | 4.0 | Dense grayish green to greenish gray fine to medium grained Silty SAND with white shiny sheets of mica minerals and rusty traces of iron oxide compounds. | (40), (35) | (17,18,22), (18,15,20) |
| | | | | 2.0 | Dense to very dense grayish green fine grained Clayey Silty SAND mixture. | (62) | (27,29,33) |
| | | | | 3.0 | Very dense grayish green to yellowish green fine grained Silty SAND with white spots of soluble salts and rusty traces of iron oxide compounds. | (70), (48) | (30,33,37), (25,25,23) |
| | | | | 4.0 | Very stiff yellowish green mixture of Sandy fat Silty CLAY with a lot of white spots of cementation formation and rusty traces of iron oxide compounds. | (61), (47), (51) | (30,29,32), (23,22,25), (20,22,29) |
| | | | | 1.5 | Very dense dark green fine grained Clayey Silty SAND mixture with white cementation formation compounds. | (50/11) | (50/11) |
| | | | | 4.5 | Hard dark brownish green mixture of Sandy fat Silty CLAY with white cementation formation and brownish rusty lines/traces of iron oxide compounds. | (50/12), (86) | (50/12), (22,33,$\frac{50}{14}$) |

Scale - 1 : 150 Undisturbed Sample - U Disturbed Sample : - D Bulk Sample - B Core Sample - C

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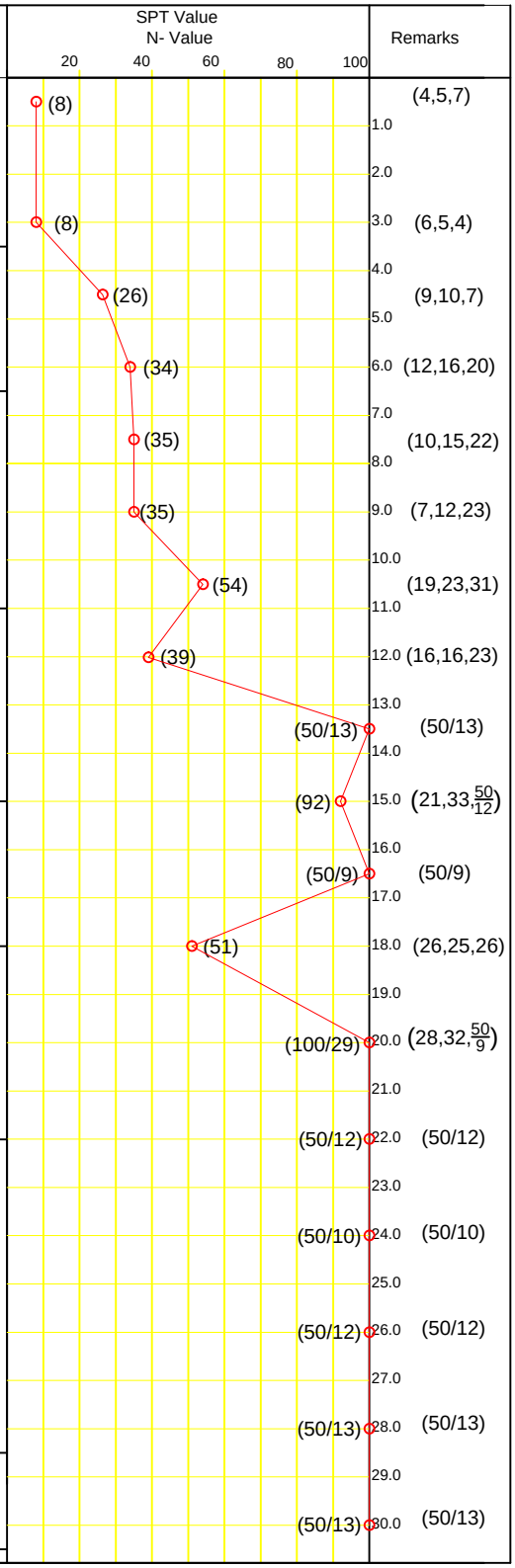
# BOREHOLE LOG

**Site** .... *Samawa Combined Cycle P.P.* .... **Method of Boring** .... *Auger & Rotary* ....

**Borehole No.** ..... *23* ..... **Date** ..... *06/05/2017* .....

**X:** .....*525887.029* ..... **Y:** ..... *3454310.358* ..... **Ground Level** ..... *9.876* .....

| Water Table Level | Depth (m) | Sample Type & Depth | Litho logy | Thickness of Layer (m) | Soil Description | SPT Value N- Value | Remarks |
|---|---|---|---|---|---|---|---|
| 1.85 | 0.5, 1.0, 1.5, 2.0, 3.0 | D, U, D | | 3.5 | Medium brown to grayish brown fat Silty CLAY with white spots of soluble salts and with black traces of organic matter. | (8), (8) | (4,5,7), (6,5,4) |
| | 4.0, 4.5, 5.0, 6.0 | D, D, D | | 3.0 | Medium to dense light greenish gray fine grained Silty SAND with black spots of organic matter and rusty traces of iron oxide compounds. | (26), (34) | (9,10,7), (12,16,20) |
| | 7.0, 7.5, 8.0, 9.0, 10.0, 10.5, 11.0 | D, D, D, D | | 4.5 | Dense to very dense light greenish gray fine grained Silty SAND with rusty spots of iron oxide compounds. | (35), (35), (54) | (10,15,22), (7,12,23), (19,23,31) |
| | 12.0, 13.0, 13.5, 14.0, 15.0 | D, D, D | | 4.0 | Dense to very dense greenish gray fine to medium grained Silty SAND with white spots of carbonate compounds and a lot of white shiny crystals of soluble salts. | (39), (50/13), (92) | (16,16,23), (50/13), (21,33,$\frac{50}{12}$) |
| | 16.0, 16.5, 17.0, 18.0 | D, D | | 3.0 | Hard yellowish light gray fat Silty CLAY with a lot of white cementation formation compounds. | (50/9), (51) | (50/9), (26,25,26) |
| | 19.0, 20.0, 21.0, 22.0 | D, D | | 4.0 | Very stiff to hard gray to light gray Sandy fat Silty CLAY with rusty spots of iron oxide compounds. | (100/29) | (28,32,$\frac{50}{9}$) |
| | 23.0, 24.0, 25.0, 26.0, 27.0, 28.0 | D, D, D, D | | 6.5 | Hard light gray to gray fat Silty CLAY with white cementation formation and greenish gray pockets of Marly Clay. | (50/12), (50/10), (50/12), (50/13) | (50/12), (50/10), (50/12), (50/13) |
| | 29.0, 30.0 | D | | 2.0 | Very dense brownish light gray well cemented fine to medium grained Silty SAND. | (50/13) | (50/13) |




Scale - 1 : 150 Undisturbed Sample - U Disturbed Sample : - D Bulk Sample - B Core Sample - C

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# BOREHOLE LOG

**Site** .... *Samawa Combined Cycle P.P.* .... **Method of Boring** .... *Auger & Rotary* ....

**Borehole No.** ..... *24* ..... **Date** ..... *12/05/2017* .....

**X:** ..... *525893.161* ..... **Y:** ..... *3454306.245* ..... **Ground Level** ..... *9.870* .....

| Water Table Level | Depth (m) | Sample Type & Depth | Litho logy | Thickness of Layer (m) | Soil Description | SPT Value N- Value | Remarks |
|---|---|---|---|---|---|---|---|
| 1.90 | 0.5, 1.0, 1.5, 2.0, 3.0 | D, U, D | | 3.5 | Medium brown fat Silty CLAY with white traces of soluble salts & black spots of organic matter/plant roots. | (8), (11) | (4,6,5), (3,6,7) |
| | 4.0, 4.5, 5.0 | D | | 1.5 | Medium to dense brownish green fine grained Clayey Silty SAND with white spots of soluble salts. | (35), (45) | (10,15,22), (15,21,26) |
| | 6.0, 7.0, 7.5, 8.0, 9.0 | D, D, D | | 4.5 | Dense to very dense brownish gray to grayish brown fine grained Silty SAND with rusty traces of iron oxide compounds & white spots of soluble salts. | (65), (100/27) | (30,31,37), (22,38,50/9) |
| | 10.0, 10.5, 11.0 | D | | 2.5 | | (100/26) | (26,43,50/9) |
| | 12.0, 13.0, 14.0 | D, D | | 2.0 | Very dense greenish gray fine grained Clayey Silty SAND mixture with white spots of soluble salts. | (99), (100/29) | (37,39,50/12), (35,40,50/11) |
| | 15.0, 16.0, 17.0 | D | | 4.5 | Very dense gray to light gray fine to medium grained Silty SAND with rusty spots of iron oxide compounds. | (90) | (23,34,50/13) |
| | 18.0, 19.0 | D | | | Very dense greenish gray fine grained SAND with little Silt fraction. | (100/26) | (29,48,50/10) |
| | 20.0, 21.0, 22.0, 22.5 | D | | 4.0 | Very dense brownish gray fine grained Silty SAND with rusty brown spots/lines of iron oxide compounds. | (80), (100/28) | (24,33,47), (29,42,50/11) |
| | 23.0, 24.0, 25.0 | D | | 2.5 | Very dense greenish gray fine grained SAND with little Silt fraction. | (100/26) | (34,47,50/10) |
| | 26.0, 27.0, 27.5, 28.0, 29.0, 30.0 | D | | 5.5 | Very dense yellowish green well cemented fine grained Clayey Silty SAND mixture with yellowish rusty spots of iron oxide compounds. | (50/13), (92) | (50/13), (27,43,49) |
| | 31.0, 32.0, 33.0 | D | | 3.0 | Very stiff dark green Sandy fat Silty CLAY with white spots of carbonate compounds & little black traces of organic matter. | (92) | (25,33,50/12) |
| | 34.0, 35.0, 36.0, 37.0, 38.0, 39.0, 40.0, 41.0, 42.0 | D, D | | 9.0 | Hard dark green fat Silty CLAY with black traces of organic matter & white spots of carbonate compounds together with fine grained Sand in parts. | (100/27), (50/10), (50/12) | (31,46,50/11), (50/10), (50/12) |
| | 43.0, 44.0, 45.0, 46.0 | D | | 5.5 | Hard grayish brown Sandy fat Silty CLAY with a lot of white spots of soluble salts & shiny sheets of silica minerals. | (100) | (32,45,50/13) |
| | 47.0, 47.5, 48.0, 49.0, 50.0 | D, D | | 2.5 | Hard light brown fat Silty CLAY with black spots of organic matter and a lot of white cementation formation compounds. | (100/23), (50/10) | (39,48,50/8), (40,50/10) |

Scale - 1 : 250 Undisturbed Sample - U Disturbed Sample : - D Bulk Sample - B Core Sample - C

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# BOREHOLE LOG

**Site** .... *Samawa Combined Cycle P.P.* .... **Method of Boring** .... *Auger & Rotary* ....

**Borehole No.** ..... *25* ..... **Date** ..... *08/05/2017* .....

**X:** ..... *525903.148* ..... **Y:** ..... *3454299.595* ..... **Ground Level** ..... *9.688* .....

| Water Table Level | Depth (m) | Sample Type & Depth | Litho logy | Thickness of Layer (m) | Soil Description | SPT Value N- Value | Remarks |
|---|---|---|---|---|---|---|---|
| | 0.5 | D | | 1.0 | Loose light brown to brown fine grained Clayey Silty SAND with white spots of soluble salts . | (5) | (2,3,4) |
| | 1.0 | U | | 1.0 | | (3) | (2,1,3) |
| 1.75 | 1.5 | D | | | | | |
| | 2.0 | | | 3.5 | Soft to medium brown lean Silty CLAY with gray pockets of fine Sand at bottom and white spots of soluble salts together with black traces of organic matter. | (5) | (2,3,3) |
| | 3.0 | D | | | | | |
| | 4.0 | U | | | | (24) | (10,12,13) |
| | 4.5 | D | | 4.5 | | | |
| | 5.0 | | | 1.5 | Medium greenish brown green fine grained Clayey Silty SAND mixture with white of soluble salts. | (29) | (9,15,14) |
| | 6.0 | D | | 6.0 | | | |
| | 7.0 | | | | | | |
| | 7.5 | D | | 4.5 | Medium dense to very dense brownish gray fine grained Silty SAND with rusty traces of iron oxide compounds and white spots of soluble salts. | (29) | (11,14,16) |
| | 8.0 | | | | | | |
| | 9.0 | D | | | | (57) | (21,27,30) |
| | 10.0 | | | | | | |
| | 10.5 | D | | 10.5 | | (34) | (12,15,19) |
| | 11.0 | | | 3.5 | Dense light grayish brown fine to medium grained SAND with rusty spots of iron oxide compounds and little Silt fraction. | | |
| | 12.0 | D | | | | (32) | (9,13,19) |
| | 13.0 | | | | | | |
| | 13.5 | D | | | | (39) | (8,17,22) |
| | 14.0 | | | 14.0 | | | |
| | 15.0 | D | | 1.5 | Dense brownish gray fine grained Clayey Silty SAND mixture. | (48) | (15,23,25) |
| | 16.0 | | | 15.5 | Very stiff light greenish brown Sandy fat Silty CLAY mixture with reddish traces of iron oxide compounds and a lot of white spots of carbonate compounds. | | |
| | 17.0 | D | | | | (88) | (17,22,$\frac{50}{9}$) |
| | 18.0 | | | 5.5 | | | |
| | 19.0 | D | | | | (57) | (19,27,30) |
| | 20.0 | | | | | | |
| | 21.0 | D | | 21.0 | | (72) | (18,33,39) |
| | 22.0 | | | | Very stiff to hard greenish gray Sandy fat Silty CLAY with a lot of white shiny spots of gypsiferrous materials. | | |
| | 23.0 | D | | 4.5 | | (79) | (22,39,40) |
| | 24.0 | | | | | | |
| | 25.0 | D | | | | (75) | (30,33,42) |
| | 26.0 | | | 25.5 | Very dense grayish light brown fine grained Clayey Silty SAND mixture with white cementation formation and rusty traces of iron oxide compounds. | | |
| | 27.0 | D | | 4.5 | | (50/10) | (32,$\frac{50}{10}$) |
| | 28.0 | | | | | | |
| | 29.0 | | | | | | |
| | 29.5 | D | | | | (50/13) | (50/13) |
| | 30.0 | | | 30.0 | | | |

SPT Value N- Value: 20, 40, 60, 80, 100

Scale - 1 : 150 Undisturbed Sample - U Disturbed Sample : - D Bulk Sample - B Core Sample - C

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# BOREHOLE LOG

**Site** .... *Samawa Combined Cycle P.P.* .... **Method of Boring** .... *Auger & Rotary* ....

**Borehole No.** ..... *26* ..... **Date** ..... *08/05/2017* .....

**X:** .....*525900.654* ..... **Y:** ..... *3454319.204* ..... **Ground Level** .....*9.758* .....

| Water Table Level | Depth (m) | Sample Type & Depth | Litho logy | Thickness of Layer (m) | Soil Description | SPT Value N- Value | Remarks |
|---|---|---|---|---|---|---|---|
| | 0.5, 1.0 | D | | | Medium to stiff light brown to brown lean Silty CLAY with white spots of soluble salts and black traces of organic matter. | (8) | (3,5,7) |
| 1.90 | 1.5, 2.0 | U | | 4.0 | | | |
| | 3.0 | D | | | | (12) | (4,6,8) |
| | 4.0 | | | 4.0 | Loose to medium yellowish green fine grained Silty SAND with rusty traces of iron oxide compounds. | (17) | (9,10,8) |
| | 4.5, 5.0 | D | | | | | |
| | 6.0 | D | | 3.5 | | (16) | (8,8,9) |
| | 7.0 | | | | | | |
| | 7.5 | D | | 7.5 | Very dense gray to brownish gray fine grained Clayey Silty SAND with rusty traces of iron oxide compounds and black spots of organic matter. | (52) | (13,22,35) |
| | 8.0 | | | 2.0 | | | |
| | 9.0 | D | | 9.5 | | (57) | (11,25,32) |
| | 10.0 | | | | Dense grayish brown fine grained Silty SAND with rusty spots of iron oxide compounds. | | |
| | 10.5 | D | | | | (40) | (16,18,22) |
| | 11.0 | | | 4.0 | | | |
| | 12.0 | D | | | | (32) | (7,12,20) |
| | 13.0 | | | | | | |
| | 13.5 | D | | 13.5 | Very stiff yellowish green Sandy fat Silty CLAY with reddish traces of iron oxide compounds and a lot of white shiny crystals of mica minerals. | (38) | (9,15,23) |
| | 14.0 | | | | | | |
| | 15.0 | D | | 3.5 | | (37) | (23,17,30) |
| | 16.0 | | | | | | |
| | 17.0 | D | | 17.0 | Dense to very dense green fine grained Clayey Silty SAND mixture with shiny spots of gypsiferrous materials. | (39) | (20,20,19) |
| | 18.0 | | | 2.5 | | | |
| | 19.0 | D | | 19.5 | | (53) | (15,22,31) |
| | 20.0 | | | | Very stiff to hard grayish green fat Silty CLAY with a lot of white shiny crystallized sheets of mica minerals. | | |
| | 21.0 | D | | | | (50/9) | (50/9) |
| | 22.0 | | | 4.0 | | | |
| | 23.0 | D | | 23.5 | | (47) | (13,18,29) |
| | 24.0 | | | | Very stiff to hard brown Sandy fat Silty CLAY mixture with white cementation formation and rusty traces of iron oxide compounds. | | |
| | 25.0 | D | | | | (62) | (20,27,35) |
| | 26.0 | | | | | | |
| | 27.0 | D | | 6.5 | | (90) | (24,31,$\frac{50}{12}$) |
| | 28.0 | | | | | | |
| | 29.0 | | | | | | |
| | 29.5 | D | | | | (78) | (20,36,42) |
| | 30.0 | | | 30.5 | | | |

Scale - 1 : 150 Undisturbed Sample - U Disturbed Sample : - D Bulk Sample - B Core Sample - C

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# BOREHOLE LOG

**Site** .... *Samawa Combined Cycle P.P.* .... **Method of Boring** .... *Auger & Rotary* ....

**Borehole No.** ..... *27* ..... **Date** ..... *13/05/2017* .....

**X:** ..... *525921.175* ..... **Y:** ..... *3454317.176* ..... **Ground Level** ..... *9.981* .....

| Water Table Level | Depth (m) | Sample Type & Depth | Litho logy | Thickness of Layer (m) | Soil Description | SPT Value N- Value | Remarks |
|---|---|---|---|---|---|---|---|
| 1.90 | 0.75, 1.0, 1.5, 2.0, 3.0, 4.0 | D, U, D | | 4.0 | Medium light brown to brown fat Silty CLAY with white spots of soluble salts and black traces of organic matter together with rusty lines of iron oxide compounds. | (8), (9) | (4,6,5), (3,5,5) |
| | 4.5, 5.0, 6.0 | D, D | | 2.5 | Loose to medium yellowish green fine grained Clayey Silty SAND mixture with white spots of soluble salts & rusty traces of iron oxide compounds. | (11), (30) | (10,15,19), (16,15,17) |
| | 7.0, 7.5, 8.0, 9.0, 10.0, 10.5, 11.0 | D, D, D, D | | 4.5 | Dense to very dense brownish gray to grayish brown fine grained Silty SAND with rusty spots of iron oxide compounds and little Clay fraction in parts. | (47), (93), (66) | (13,19,31), (17,40,50/14), (21,31,35) |
| | 12.0, 13.0, 14.0 | D, D | | 3.0 | Very stiff light brown Sandy fat Silty CLAY mixture with white shiny sheets of mica minerals. | (60), (62) | (12,20,40), (13,30,32) |
| | 15.0, 16.0, 17.0, 18.0 | D, D, D | | 4.5 | Very stiff to hard yellowish green Sandy fat Silty CLAY mixture with white shiny spots of gypsiferrous materials & rusty spots of iron oxide compounds. | (63), (72) | (20,29,34), (22,33,39) |
| | 19.0, 20.0, 21.0, 22.0, 23.0, 24.0, 24.5, 25.0 | D, D, D, D | | 6.5 | Hard green to dark green fat Silty CLAY with a lot of white cementation formation of gypsifferous materials and rusty traces of iron oxide compounds. | (93), (66), (84) | (24,31,50/11), (20,27,39), (26,35,49) |
| | 26.0, 27.0, 28.0, 29.0, 30.0 | | | | | | |

Scale - 1 : 150 Undisturbed Sample - U Disturbed Sample : - D Bulk Sample - B Core Sample - C

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# BOREHOLE LOG

**Site** .... *Samawa Combined Cycle P.P.* .... **Method of Boring** .... *Auger & Rotary* ....

**Borehole No.** ..... *28* ..... **Date** ..... *13/05/2017* .....

**X:** ..... *525920.123* ..... **Y:** ..... *3454348.123* ..... **Ground Level** ..... *10.276* .....

| Water Table Level | Depth (m) | Sample Type & Depth | Litho logy | Thickness of Layer (m) | Soil Description | SPT Value N- Value | Remarks |
|---|---|---|---|---|---|---|---|
| | 0.5 | D | | 1.0 | Loose light brown to brown fine grained Clayey Silty SAND with white spots of soluble salts . | (6) | (2,4,4) |
| 1.75 | 1.0, 1.5 | U | | 2.5 | Medium to soft light brown to grayish brown Sandy fat Silty CLAY with white spots of soluble salts and black traces of organic matter. | (4) | (2,2,3) |
| | 3.0, 3.5 | D | | 4.0 | Medium yellowish green to brownish gray fine to medium grained Silty SAND with rusty traces of iron oxide compounds and white spots of soluble salts. | (20) | (7,9,12) |
| | 4.5, 5.0 | D | | | | (17) | |
| | 6.0, 7.0 | D | | | | (23) | (8,8,10) |
| | 7.5, 8.0 | D | | 1.5 | Medium to dense light brownish gray fine grained Clayey Silty SAND mixture with rusty spots of iron oxide compounds. | (26) | (5,11,13) |
| | 9.0, 10.0 | D | | 5.0 | Dense to very dense grayish brown fine grained Silty SAND with reddish traces of iron oxide compounds and a lot of white cementation formation of gypsiferrous materials. | (43) | (4,8,18) |
| | 10.5, 11.0 | D | | | | (46) | (9,20,23) |
| | 12.0, 13.0 | D | | | | (52) | (6,21,25) |
| | 14.0, 15.0 | D | | 4.5 | Very stiff brown to yellowish green Sandy fat Silty CLAY with rusty spots of iron oxide compounds. | (30) | (12,24,28) |
| | 16.0, 17.0 | D | | | | (27) | (8,11,19) |
| | 18.0, 19.0 | D | | 2.0 | Very stiff dark green fat Silty CLAY with shiny shiny angular quartz pieces. | (35) | (5,10,17) |
| | 20.0, 21.0 | D | | 7.0 | Very stiff to hard yellowish green Sandy fat Silty CLAY with alot of white shiny crystallized sheets of mica minerals. | (54) | (7,13,22) |
| | 22.0, 23.0 | D | | | | (62) | (26,30,24) |
| | 24.0, 25.0 | D | | | | (99) | (20,29,33) |
| | 26.0, 27.0 | D | | 3.0 | Hard light brown mixture of Sandy fat Silty CLAY with white cementation formation and rusty spots of iron oxide compounds. | (50/14) | (28,39,50/12) |
| | 28.0, 29.0 | D | | | | | (50/14) |
| | 30.0 | D | | | | | |

Scale - 1 : 150 Undisturbed Sample - U Disturbed Sample : - D Bulk Sample - B Core Sample - C

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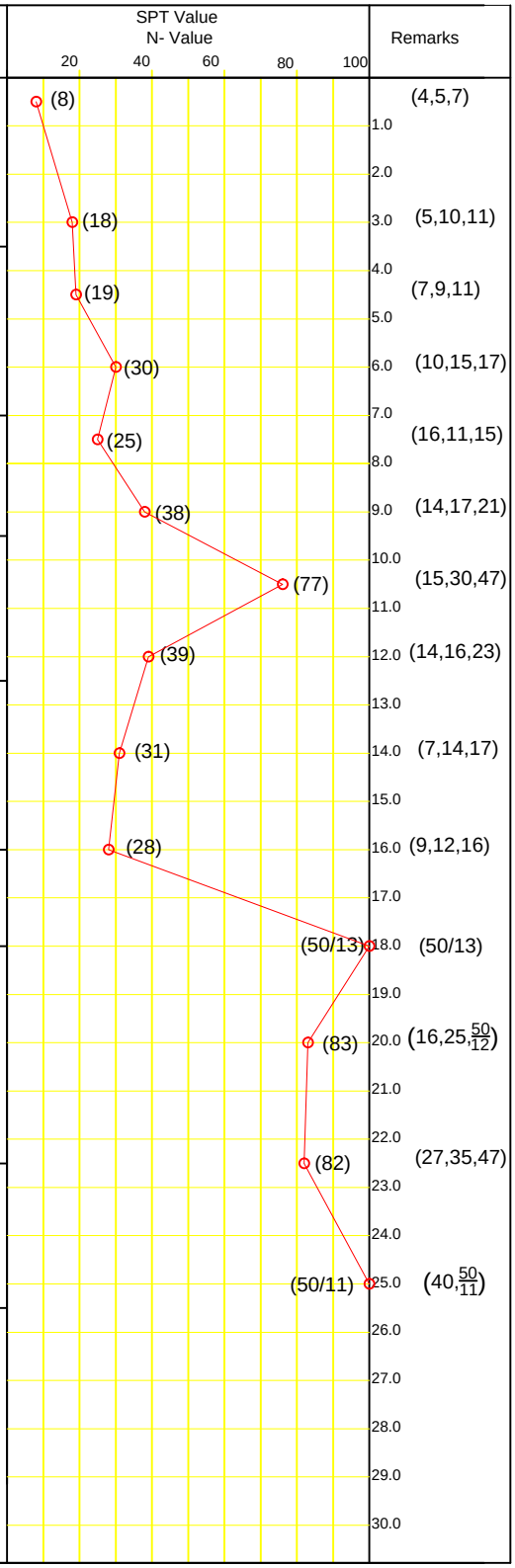
# BOREHOLE LOG

**Site** .... *Samawa Combined Cycle P.P.* .... **Method of Boring** .... *Auger & Rotary* ....

**Borehole No.** ..... *29* ..... **Date** ..... *13/05/2017* .....

**X:** ..... *525948.348* ..... **Y:** .....3454252.237 ..... **Ground Level** .....9.966 .....

| Water Table Level | Depth (m) | Sample Type & Depth | Lithology | Thickness of Layer (m) | Soil Description | SPT Value N- Value | Remarks |
|---|---|---|---|---|---|---|---|
| 1.80 | 0.5, 1.0, 1.5, 2.0 | D, U | | 3.5 | Medium to stiff brown to dark brown fat Silty CLAY with black spots of organic matter & white traces of soluble salts . | (8) | (4,5,7) |
| | 3.0, 4.0, 4.5, 5.0 | D, D | | 2.5 | Medium to dense light grayish green fine grained Clayey Silty SAND mixture with rusty spots of iron oxide compounds and white cementation formation. | (18), (19) | (5,10,11), (7,9,11) |
| | 6.0, 7.0, 7.5, 8.0 | D, D | | 3.5 | Medium to dense brownish gray fine to medium grained Silty SAND mixture with white shiny spots of soluble salts. | (30), (25) | (10,15,17), (16,11,15) |
| | 9.0, 10.0, 10.5, 11.0 | D, D | | 3.0 | Dense to very dense greenish gray fine to medium grained Clayey Silty SAND with rusty spots of iron oxide compounds. | (38), (77) | (14,17,21), (15,30,47) |
| | 12.0, 13.0, 14.0, 15.0 | D, D | | 3.5 | Dense grayish brown fine grained Silty SAND with white spots of soluble salts. | (39), (31) | (14,16,23), (7,14,17) |
| | 16.0, 17.0 | D | | 2.0 | Very stiff to hard yellowish green Sandy fat Silty CLAY mixture with white cementation formation. | (28) | (9,12,16) |
| | 18.0, 19.0, 20.0, 21.0, 22.0 | D, D | | 4.5 | Hard dark green mixture of Sandy fat Silty CLAY with a lot of white spots of cementation formation and rusty traces of iron oxide compounds. | (50/13), (83) | (50/13), (16,25,50/12) |
| | 22.5, 23.0, 24.0, 25.0 | D, D | | 3.0 | Hard yellowish green fat Silty CLAY with white cementation formation and black spots of organic matter. | (82), (50/11) | (27,35,47), (40,50/11) |




Scale - 1 : 150 Undisturbed Sample - U Disturbed Sample : - D Bulk Sample - B Core Sample - C

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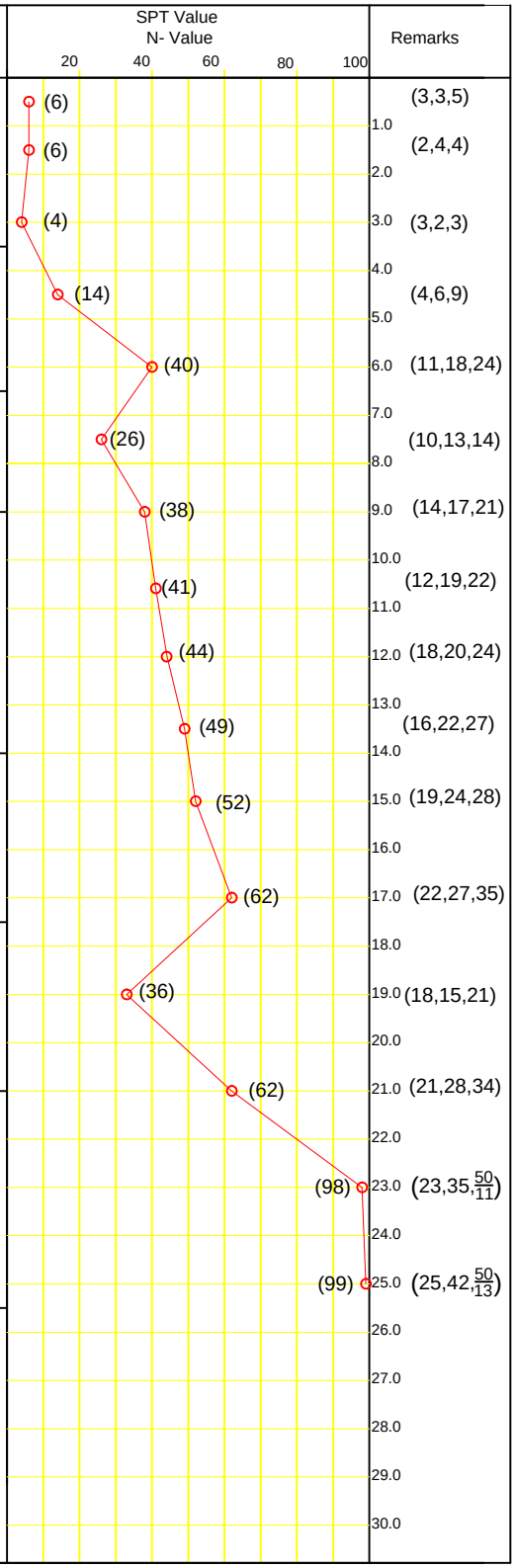
# BOREHOLE LOG

**Site** .... *Samawa Combined Cycle P.P.* .... **Method of Boring** .... *Auger & Rotary* ....

**Borehole No.** ..... *30* ..... **Date** ..... *03/05/2017* .....

***X:*** *.....525970.136* ..... ***Y:*** *.....3454304.042* ..... ***Ground Level*** *.....10.543* .....

| Water Table Level | Depth (m) | Sample Type & Depth | Litho logy | Thickness of Layer (m) | Soil Description | SPT Value N- Value | Remarks |
|---|---|---|---|---|---|---|---|
| 1.65 | 0.5, 1.0, 1.5, 2.0, 3.0 | D, U, D, D | | 3.5 | Medium to soft brown to dark brown fat Silty CLAY with black spots of organic matter & white traces of soluble salts. | (6), (6), (4) | (3,3,5), (2,4,4), (3,2,3) |
| | 4.0, 4.5, 5.0, 6.0 | D, D | | 3.0 | Loose, medium to dense grayish green fine grained Silty SAND with rusty spots of iron oxide compounds and white traces of soluble salts. | (14), (40) | (4,6,9), (11,18,24) |
| | 7.0, 7.5, 8.0, 9.0 | D, D | | 2.5 | Medium to dense gray to brownish gray fine to medium grained SAND with white shiny spots of soluble salts & little Silt fraction. | (26), (38) | (10,13,14), (14,17,21) |
| | 10.0, 10.5, 11.0, 12.0, 13.0, 13.5, 14.0 | D, D, D, D | | 5.0 | Dense to very dense grayish brown fine grained Silty SAND with white cementation formation. | (41), (44), (49) | (12,19,22), (18,20,24), (16,22,27) |
| | 15.0, 16.0, 17.0, 17.5 | D, D | | 3.5 | Very dense green fine grained Silty SAND with white cementation formation. | (52), (62) | (19,24,28), (22,27,35) |
| | 18.0, 19.0, 20.0, 21.0 | D, D | | 3.5 | Dense to very dense green fine grained Clayey Silty SAND with a lot of white spots of cementation formation and rusty traces of iron oxide compounds. | (36), (62) | (18,15,21), (21,28,34) |
| | 22.0, 23.0, 24.0, 25.0, 25.5 | D, D | | 4.5 | Very stiff to hard light green mixture of Sandy fat Silty CLAY with white cementation formation and brownish rusty lines/traces of iron oxide compounds. | (98), (99) | (23,35,50/11), (25,42,50/13) |




Scale - 1 : 150 Undisturbed Sample - U Disturbed Sample : - D Bulk Sample - B Core Sample - C

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# BOREHOLE LOG

**Site** .... *Samawa Combined Cycle P.P.* .... **Method of Boring** .... *Auger & Rotary* ....

**Borehole No.** ..... *31* ..... **Date** ..... *08/05/2017* .....

**X:** ..... *526066.715* ..... **Y:** ..... *3454264.585* ..... **Ground Level** .....*11.318* .....

| Water Table Level | Depth (m) | Sample Type & Depth | Litho logy | Thickness of Layer (m) | Soil Description | SPT Value N- Value | Remarks |
|---|---|---|---|---|---|---|---|
| 1.85 | 0.5, 1.0, 1.5, 2.0 | D, U | | 2.0 | Loose brown to grayish brown fine grained Clayey Silty SAND with white spots of soluble salts . | (8) | (2,5,6) |
| | 3.0, 3.5 | D | | 1.5 | Medium brown fat Silty CLAY with gray pockets of fine Sand and white spots of soluble salts together with black traces of organic matter. | (10) | (5,6,6) |
| | 4.0, 4.5, 5.0, 6.0, 7.0, 7.5, 8.0 | D | | 4.5 | Medium to dense greenish gray fine grained Silty SAND with white spots of soluble salts and rusty traces of iron oxide compounds. | (36), (48), (49) | (13,17,21), (13,22,28), (15,24,27) |
| | 9.0, 10.0, 10.5, 11.0 | D | | 3.0 | Dense to very dense gray to light greenish gray fine to medium grained SAND with rusty traces of iron oxide compounds & little Silt fraction. | (81), (78) | (25,39,42), (23,37,41) |
| | 12.0, 13.0, 14.0, 15.0, 16.0, 16.5 | D | | 5.5 | Very dense light brownish gray to yellowish gray fine, medium to coarse grained Silty SAND with rusty spots of iron oxide compounds and a lot of white cementation formation compounds. | (100/29), (100/27), (100/26) | (22,44,$\frac{50}{12}$), (31,47,$\frac{50}{11}$), (33,48,$\frac{50}{10}$) |
| | 17.0, 18.0, 19.0, 20.0, 21.0, 22.0, 22.5, 23.0 | D | | 6.5 | Very stiff to hard green Sandy fat Silty CLAY with shiny crystals of quartz & white cementation formation compounds. | (100/26), (50/13), (100) | (31,49,$\frac{50}{11}$), (50/13), (39,48,$\frac{50}{14}$) |
| | 24.0, 25.0, 25.5 | D | | 2.5 | Hard green Sandy fat Silty CLAY mixture with a lot of white shiny crystallized sheets of mica minerals and white cementation formation. | (86) | (17,27,$\frac{50}{12}$) |
| | 26.0, 27.0, 27.5, 28.0, 29.0, 30.0, 30.5 | D | | 5.0 | Hard light brown Sandy fat Silty CLAY with rusty spots of iron oxide compounds . | (100), (100/28) | (23,35,$\frac{50}{10}$), (27,33,$\frac{50}{8}$) |

Scale - 1 : 150 Undisturbed Sample - U Disturbed Sample : - D Bulk Sample - B Core Sample - C

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# BOREHOLE LOG

**Site** .... *Samawa Combined Cycle P.P.* .... **Method of Boring** .... *Auger & Rotary* ....

**Borehole No.** ..... *32* ..... **Date** ..... *12/05/2017* .....

**X:** ..... *526032.241* ..... **Y:** ..... *3454213.305* ..... **Ground Level** ..... *12.091*.....

| Water Table Level | Depth (m) | Sample Type & Depth | Litho logy | Thickness of Layer (m) | Soil Description | SPT Value N- Value | Remarks |
|---|---|---|---|---|---|---|---|
| 1.85 | 0.5, 1.0, 1.5, 2.0, 3.0 | D, D, U, D | | 3.5 | Medium brown fat Silty CLAY with gray pockets of fine Sand and white spots of soluble salts together with black traces of organic matter. | (6), (8), (9) | (2,4,5), (3,5,6), (4,4,7) |
| | 4.0, 4.5, 5.0 | D | | 1.5 | Loose to medium yellowish green to greenish gray fine grained Clayey Silty SAND mixture. | (32) | (13,15,19) |
| | 6.0, 7.0, 7.5, 8.0, 9.0 | D, D, D, D | | 4.5 | Dense to very dense green to light brownish green fine grained Silty SAND with rusty traces of iron oxide compounds. | (48), (57), (67) | (23,25,26), (24,27,33), (25,31,36) |
| | 10.0, 10.5, 11.0, 12.0, 13.0 | D, D | | 4.5 | Very dense light brownish green fine grained Clayey Silty SAND with white cementation formation and rusty spots of iron oxide compounds. | (99), (100/28) | (33,42,50/13), (27,44,50/11) |
| | 14.0, 15.0, 16.0 | D, D | | 2.5 | Very dense light gray fine grained Silty SAND with reddish rusty lines/traces of iron oxide compounds and a lot of white shiny sheets of mica minerals. | (91), (100/25) | (26,38,50/14), (29,46,50/9) |
| | 17.0, 18.0, 19.0 | D | | 3.5 | Hard light brownish green Sandy fat Silty CLAY with shiny crystals of quartz. | (50/10) | (50/10) |
| | 20.0, 21.0, 22.0, 22.5, 23.0, 24.0, 25.0 | D, D, D | | 5.5 | Very stiff to hard light brownish gray Sandy fat Silty CLAY mixture with shiny white cementation formation compounds. | (65), (93), (50/12) | (20,26,39), (29,40,50/14), (50/12) |
| | 26.0, 27.0, 27.5, 28.0, 29.0, 30.0 | D, D | | 5.0 | Hard light gray fat Silty CLAY with gray pockets of Marly Clay & rusty spots of iron oxide compounds. | (100), (50/10) | (23,37,50/11), (50/10) |

SPT Value N- Value: 20, 40, 60, 80, 100

Scale - 1 : 150 Undisturbed Sample - U Disturbed Sample : - D Bulk Sample - B Core Sample - C

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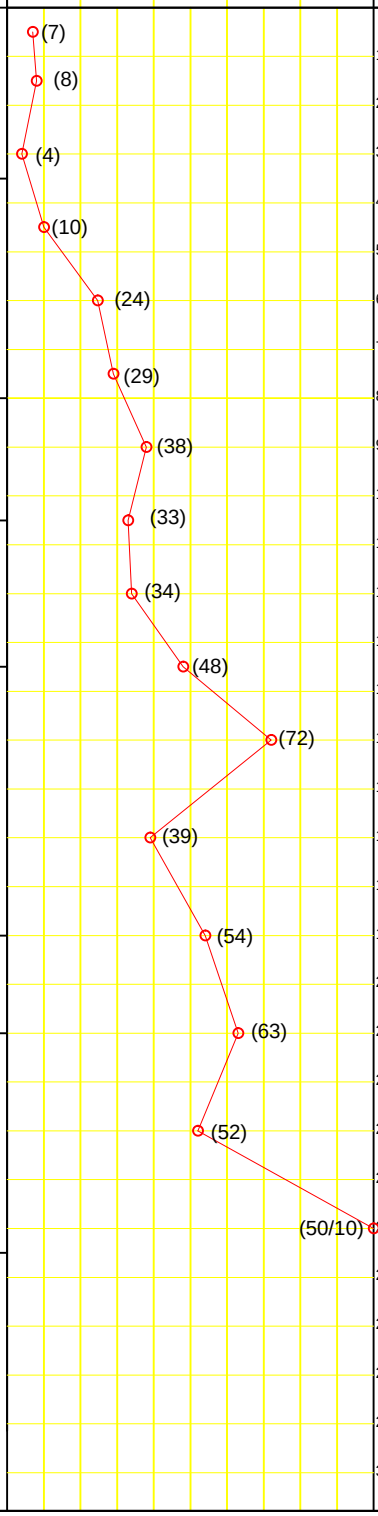
# BOREHOLE LOG

**Site** .... *Samawa Combined Cycle P.P.* .... **Method of Boring** .... *Auger & Rotary* ....

**Borehole No.** ..... *33* ..... **Date** ..... *07/05/2017* .....

**X:** ..... *526021.682* ..... **Y:** ..... *3454187.313* ..... **Ground Level** ..... *10.960* .....

| Water Table Level | Depth (m) | Sample Type & Depth | Litho logy | Thickness of Layer (m) | Soil Description | SPT Value N- Value | Remarks |
|---|---|---|---|---|---|---|---|
| 1.70 | 0.5, 1.0, 1.5, 2.0, 3.0 | D, U, D, D | | 3.5 | Medium to soft brown fat Silty CLAY with black spots of organic matter & white traces of soluble salts together with fine grained Sand pockets in parts. | (7), (8), (4) | (2,4,6), (3,6,6), (2,3,2) |
| | 4.0, 4.5, 5.0, 6.0, 7.0, 7.5 | D, D, D, D | | 4.5 | Loose to medium light green to yellowish green fine grained Silty SAND with brown Silty Clay pockets in parts and rusty traces of iron oxide compounds together with white spots of soluble salts. | (10), (24), (29) | (2,2,9), (9,12,13), (6,14,16) |
| | 8.0, 9.0, 10.0, 10.5 | D, D | | 2.5 | Medium to dense light brownish gray fine to medium grained SAND with white shiny sheets of mica minerals and little Silt fraction. | (38), (33) | (11,17,21), (10,15,18) |
| | 11.0, 12.0, 13.0, 13.5 | D, D | | 3.0 | Dense yellowish green fine to medium grained Silty SAND with white spots of soluble salts /gypsiferrous materials. | (34), (48) | (14,14,20), (12,23,25) |
| | 14.0, 15.0, 16.0, 17.0, 18.0, 19.0 | D, D, D | | 5.5 | Very stiff yellowish green mixture of Sandy fat Silty CLAY with white cementation formation and brownish rusty lines/traces of iron oxide compounds. | (72), (39), (54) | (16,33,42), (10,16,23), (19,23,31) |
| | 20.0, 21.0 | D | | 2.0 | Very dense yellowish green fine grained Clayey Silty SAND mixture. | (63) | (14,28,35) |
| | 22.0, 23.0, 24.0, 25.0, 25.5 | D, D, D | | 4.5 | Very stiff to hard brownish gray fat Silty CLAY with a lot of white cementation formation and rusty traces of iron oxide compounds. | (52), (50/10) | (15,19,33), (50/10) |




Scale - 1 : 150 Undisturbed Sample - U Disturbed Sample : - D Bulk Sample - B Core Sample - C

# BOREHOLE LOG

**Site** .... *Samawa Combined Cycle P.P.* .... **Method of Boring** .... *Auger & Rotary* ....

**Borehole No.** ...... *34* ...... **Date** ....... *09/05/2017* .......

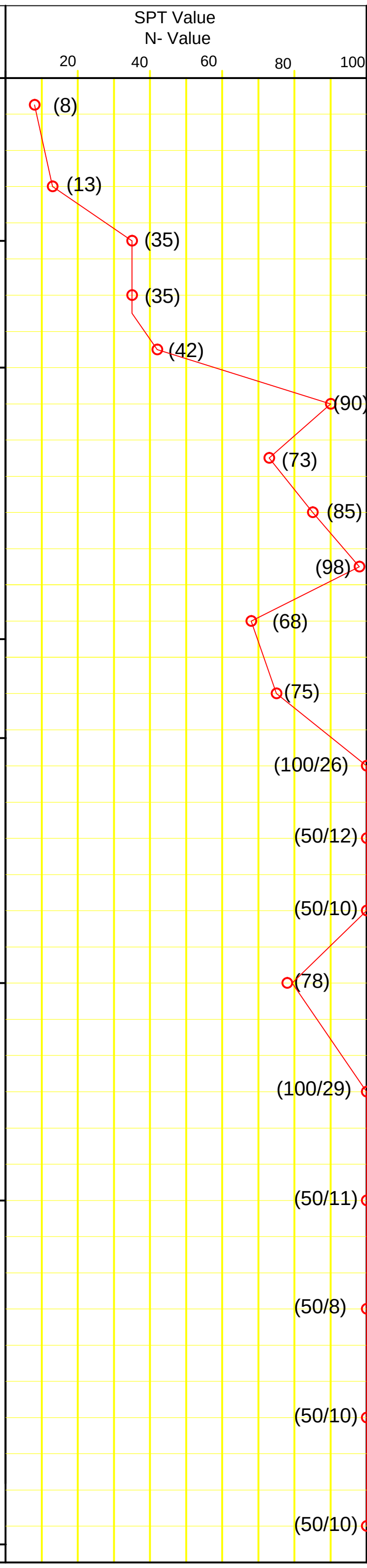
**X:** ..... *526093.948*..... **Y:** ..... *3454228.560* ..... **Ground Level** ..... *11.500* .....

Water Table Level: 1.80

| Depth (m) | Thickness of Layer (m) | Soil Description |
|---|---|---|
| 0.0 – 4.5 | 4.5 | Medium to stiff brown fat Silty CLAY with white spots of soluble salts and black traces of organic matter. |
| 4.5 – 8.0 | 3.5 | Dense brownish light green fine grained Silty SAND with white spots of cementation formation and rusty spots of iron oxide compounds. |
| 8.0 – 15.5 | 7.5 | Dense to very dense greenish gray fine to medium grained Silty SAND with a lot of white cementation formation compounds and brown rusty traces of iron oxide compounds. |
| 15.5 – 17.5 | 2.0 | Very dense light green fine grained Clayey Silty SAND mixture with white spots of soluble salts. |
| 17.5 – 25.0 | 7.5 | Very stiff to hard green to yellowish green Sandy fat Silty CLAY mixture with a lot of white shiny spots of soluble salts/gypsiferrous materials and rusty spots of iron oxide compounds. |
| 25.0 – 31.0 | 6.0 | Very stiff to hard brownish gray Sandy fat Silty CLAY with a lot of white shiny cementation formation compounds and rusty spots/lines of iron oxide compounds. |
| 31.0 – 40.5 | 9.5 | Hard light gray to light green fat Silty CLAY mixture with rusty traces of iron oxide compounds and white shiny sheets of mica minerals. |

Samples: D at 0.75–1.0; U at 1.5–2.0; D at each SPT depth below.

| Depth (m) | SPT N-Value | Remarks |
|---|---|---|
| 1.0 | (8) | (2,4,7) |
| 3.0 | (13) | (4,5,10) |
| 4.5 | (35) | (14,17,20) |
| 6.0 | (35) | (14,16,21) |
| 7.5 | (42) | (20,21,23) |
| 9.0 | (90) | (37,41,49) |
| 10.5 | (73) | (20,31,42) |
| 12.0 | (85) | (38,39,46) |
| 13.5 | (98) | (31,41,50/13) |
| 15.0 | (68) | (28,30,38) |
| 17.0 | (75) | (23,35,40) |
| 19.0 | (100/26) | (36,42,50/9) |
| 21.0 | (50/12) | (50/12) |
| 23.0 | (50/10) | (38,50/10) |
| 25.0 | (78) | (30,36,42) |
| 28.0 | (100/29) | (36,43,50/12) |
| 31.0 | (50/11) | (50/11) |
| 34.0 | (50/8) | (50/8) |
| 37.0 | (50/10) | (50/10) |
| 40.0 | (50/10) | (36,50/10) |




Scale - 1 : 200 Undisturbed Sample - U Disturbed Sample : - D Bulk Sample - B Core Sample - C

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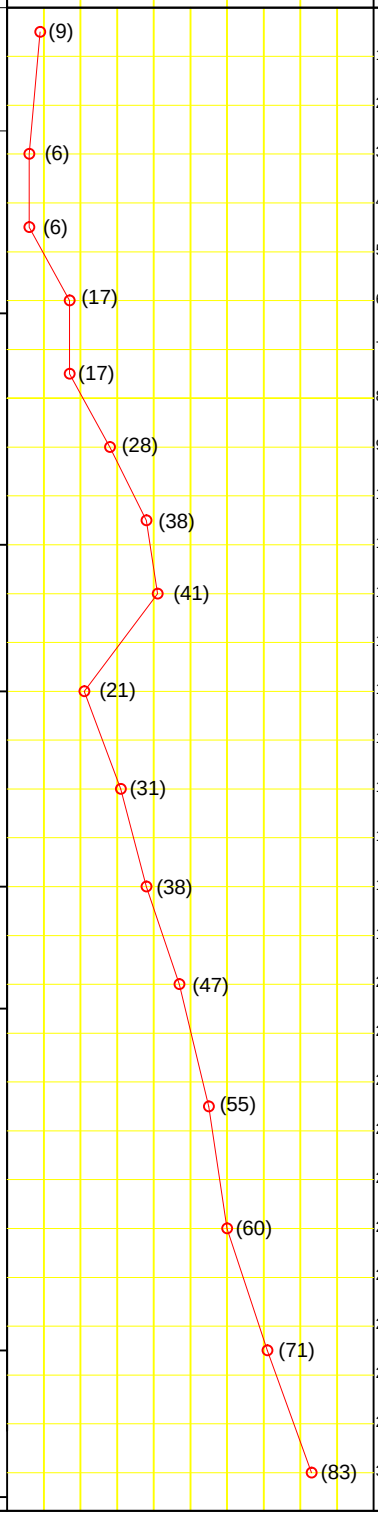
# BOREHOLE LOG

**Site** .... *Samawa Combined Cycle P.P.* .... **Method of Boring** .... *Auger & Rotary* ....

**Borehole No.** ..... *35* ..... **Date** ..... *09/05/2017* .....

**X:** .... *526061.123* ..... **Y:** ..... *3454179.845* ..... **Ground Level** ..... *11.360* .....

| Water Table Level | Depth (m) | Sample Type & Depth | Litho logy | Thickness of Layer (m) | Soil Description | SPT Value N- Value | Remarks |
|---|---|---|---|---|---|---|---|
| 1.85 | 0.5, 1.0, 1.5, 2.0 | D, U | | 2.0 | Loose brownish light green fine grained Clayey Silty SAND mixture with white spots of soluble salts and black traces of organic matter. | (9) | (3,5,8) |
| | 3.0, 4.0, 4.5, 5.0 | D, U, D | | 3.0 | Medium brown to brownish green fat Silty CLAY with fine grained Sand increases in amount with depth and black spots of organic matter together with rusty traces of iron oxide compounds. | (6), (6) | (2,3,4), (2,2,4) |
| | 6.0, 7.0, 7.5, 8.0, 9.0, 10.0, 10.5, 11.0 | D, D, D, D, D | | 6.0 | Medium to dense grayish green fine to medium grained Silty SAND with rusty traces of iron oxide compounds. | (17), (17), (28), (38) | (10,9,9), (7,8,10), (6,10,18), (12,17,21) |
| | 12.0, 13.0, 14.0 | D | | 3.0 | Dense gray to light greenish gray fine grained Clayey Silty SAND with rusty spots of iron oxide compounds. | (41), (21) | (18,22,19), (5,9,12) |
| | 15.0, 16.0, 17.0, 18.0 | D, D, D | | 4.0 | Stiff to very stiff brownish gray Sandy fat Silty CLAY with reddish lines/traces of iron oxide compounds and alot of white cementation formation of gypsiferrous materials. | (31), (38) | (8,11,20), (12,15,23) |
| | 19.0, 20.0, 20.5 | D, D | | 2.5 | Very stiff yellowish green Sandy fat Silty CLAY mixture with shiny angular quartz pieces and white cementation formation. | (47) | (18,20,27) |
| | 21.0, 22.0, 22.5, 23.0, 24.0, 25.0, 26.0, 27.0, 27.5 | D, D, D | | 7.0 | Very stiff to hard dark green Sandy fat Silty CLAY mixture with alot of white shiny crystallized sheets of mica minerals. | (55), (60), (71) | (21,25,30), (23,28,32), (23,34,37) |
| | 28.0, 29.0, 30.0, 30.5 | D, D | | 3.0 | Hard light brown Sandy fat Silty CLAY mixture with rusty spots of iron oxide compounds. | (83) | (19,22,$\frac{50}{11}$) |




Scale - 1 : 150 Undisturbed Sample - U Disturbed Sample : - D Bulk Sample - B Core Sample - C

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# BOREHOLE LOG

**Site** .... *Samawa Combined Cycle P.P.* .... **Method of Boring** .... *Auger & Rotary* ....

**Borehole No.** ..... *36* ..... **Date** ..... *13/05/2017* .....

**X:** ..... *526098.307* ..... **Y:** ..... *3454190.781* ..... **Ground Level** ..... *11.564* .....

| Water Table Level | Depth (m) | Sample Type & Depth | Litho logy | Thickness of Layer (m) | Soil Description | SPT Value N- Value | Remarks |
|---|---|---|---|---|---|---|---|
| 1.95 | 0.5, 1.0, 1.5, 2.0, 3.0, 4.0 | D, U, D | | 4.0 | Medium brown Sandy fat Silty CLAY with white spots of soluble salts and black traces of organic matter. | (6), (8) | (3,3,5), (4,5,5) |
| | 4.5, 5.0, 6.0, 7.0, 7.5 | D, D | | 3.5 | Medium to dense yellowish green to light gray fine to medium grained Silty SAND with black spots of organic matter and rusty traces of iron oxide compounds. | (25), (44), (59) | (10,11,15), (14,21,25), (16,23,29) |
| | 8.0, 9.0 | D, D | | 1.5 | Very dense gray to light greenish gray fine to medium grained SAND with rusty traces of iron oxide compounds & little Silt fraction. | (58) | (24,28,30) |
| | 10.0, 10.5, 11.0, 12.0, 13.0, 14.0 | D, D, D | | 5.0 | Very dense light brownish gray to yellowish gray fine grained Clayey Silty SAND with rusty spots of iron oxide compounds & white cementation formation. | (89), (100/27) | (26,39,50), (29,43,50/10) |
| | 15.0, 16.0, 16.5 | D, D | | 2.5 | Very dense brownish gray fine grained Silty SAND with alot of white cementation formation compounds. | (50/13), (100/29) | (50/13), (18,41,50/11) |
| | 17.0, 18.0, 19.0, 20.0, 21.0, 22.0, 22.5, 23.0 | D, D, D, D | | 6.5 | Hard yellowish green Sandy fat Silty CLAY with reddish lines/traces of iron oxide compounds and a lot of white cementation formation of gypsiferrous materials | (88), (92), (100/25) | (21,40,48), (19,42,50), (24,45,50/9) |
| | 24.0, 25.0, 26.0, 27.0, 27.5, 28.0, 29.0, 30.0, 30.5 | D, D, D, D | | 7.5 | Hard dark green to brownish green fat Silty CLAY with alot of white cementation formation and little gray pockets of fine grained Sand at bottom. | (93), (92), (100/29) | (27,34,50/12), (35,44,48), (29,40,50/11) |

Scale - 1 : 150 Undisturbed Sample - U Disturbed Sample : - D Bulk Sample - B Core Sample - C

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# BOREHOLE LOG

**Site** .... *Samawa Combined Cycle P.P.* .... **Method of Boring** .... *Auger & Rotary* ....

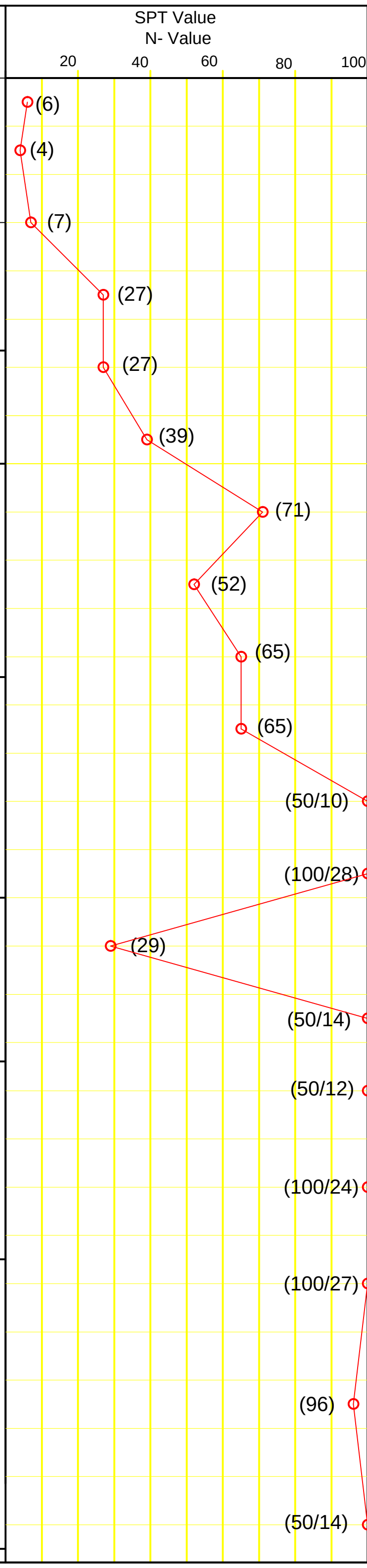
**Borehole No.** ...... *37* ...... **Date** ....... *09/05/2017* .......

**X:** ..... *526134.761* ..... **Y:** ..... *3454201.329* ..... **Ground Level** ..... *11.422* .....

Water Table Level: 1.85

| Depth (m) | Thickness of Layer (m) | Soil Description |
|---|---|---|
| 0.0 – 1.5 | 1.5 | Medium to soft brown to light brown fat Silty CLAY with gray pockets of fine Sand and white spots of soluble salts together with black traces of organic matter. |
| 1.5 – 4.5 | 3.0 | Soft to medium dark brown Sandy lean Silty CLAY with black spots of organic matter and rusty traces of iron oxide compounds. |
| 4.5 – 8.0 | 3.5 | Medium to dense light gray fine grained Silty SAND with rusty traces of iron oxide compounds. |
| 8.0 – 12.5 | 4.5 | Dense to very dense light grayish brown fine grained Silty SAND with rusty spots of iron oxide compounds. |
| 12.5 – 17.0 | 4.5 | Very dense dark gray fine to medium grained SAND with little Silt formation. |
| 17.0 – 20.0 | 3.0 | Very stiff to hard yellowish green Sandy fat Silty CLAY with reddish lines/traces of iron oxide compounds and a lot of white cementation formation of gypsiferrous materials. |
| 20.0 – 24.5 | 4.5 | Hard yellowish green to green Sandy fat Silty CLAY with shiny angular quartz pieces and white cementation formation. |
| 24.5 – 30.5 | 6.0 | Hard green fat Silty CLAY with alot of white shiny crystallized sheets of mica minerals and rusty spots of iron oxide compounds. |

| Sample Depth (m) | Sample Type | SPT N-Value | Remarks |
|---|---|---|---|
| 0.5 | D | (6) | (2,4,5) |
| 1.5 | D | (4) | (2,3,3) |
| 2.5 | U | | |
| 3.0 | D | (7) | (4,4,5) |
| 4.5 | D | (27) | (10,13,15) |
| 6.0 | D | (27) | (10,12,16) |
| 7.5 | D | (39) | (17,19,22) |
| 9.0 | D | (71) | (21,33,38) |
| 10.5 | D | (52) | (19,22,30) |
| 12.0 | D | (65) | (23,31,34) |
| 13.5 | D | (65) | (20,29,36) |
| 15.0 | D | (50/10) | (50/10) |
| 16.5 | D | (100/28) | (28,40,$\frac{50}{10}$) |
| 18.0 | D | (29) | (12,15,14) |
| 19.5 | D | (50/14) | (50/14) |
| 21.0 | D | (50/12) | (50/12) |
| 23.0 | D | (100/24) | (29,44,$\frac{50}{8}$) |
| 25.0 | D | (100/27) | (31,43,$\frac{50}{10}$) |
| 27.5 | D | (96) | (27,36,$\frac{50}{12}$) |
| 30.0 | D | (50/14) | (50/14) |




Scale - 1 : 150 Undisturbed Sample - U Disturbed Sample : - D Bulk Sample - B Core Sample - C

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# BOREHOLE LOG

**Site** .... *Samawa Combined Cycle P.P.* .... **Method of Boring** .... *Auger & Rotary* ....

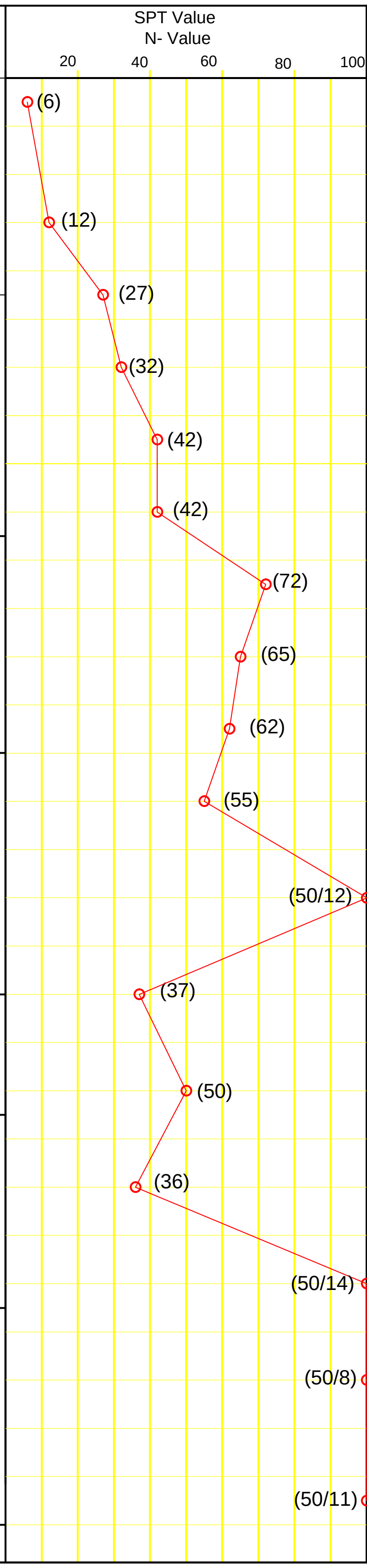
**Borehole No.** ...... *38* ...... **Date** ....... *08/05/2017* .......

**X:** ..... *526102.142* ..... **Y:** ..... *3454152.538* ..... **Ground Level** .... *11.520* .....

Water Table Level: 1.75

| Depth (m) | Thickness of Layer (m) | Soil Description |
|---|---|---|
| 0.0 – 4.5 | 4.5 | Medium to stiff grayish brown fat Silty CLAY with white spots of soluble salts and black traces of organic matter. |
| 4.5 – 9.5 | 5.0 | Medium to dense gray to greenish gray fine grained Clayey Silty SAND mixture with rusty traces of iron oxide compounds. |
| 9.5 – 14.0 | 4.5 | Dense to very dense light brownish gray to yellowish gray fine to medium grained Silty SAND with rusty spots of iron oxide compounds. |
| 14.0 – 19.0 | 5.0 | Very dense gray fine grained Clayey Silty SAND mixture with reddish rusty traces of iron oxide compounds and a lot of white cementation formation of gypsiferrous materials. |
| 19.0 – 21.5 | 2.5 | Dense to very dense light yellowish gray fine grained Clayey Silty SAND with shiny angular quartz pieces. |
| 21.5 – 25.5 | 4.0 | Very stiff to hard yellowish green Sandy fat Silty CLAY with alot of white shiny crystallized sheets of mica minerals. |
| 25.5 – 30.0 | 4.5 | Hard brownish gray Sandy fat Silty CLAY with white cementation formation and rusty spots of iron oxide compounds. |

| Sample Depth (m) | Sample Type | SPT N-Value | Remarks |
|---|---|---|---|
| 0.5 | D | (6) | (2,4,5) |
| 1.5 | U | | |
| 3.0 | D | (12) | (3,6,8) |
| 4.5 | D | (27) | (10,12,16) |
| 6.0 | D | (32) | (11,14,20) |
| 7.5 | D | (42) | (12,18,26) |
| 9.0 | D | (42) | (16,20,22) |
| 10.5 | D | (72) | (26,32,40) |
| 12.0 | D | (65) | (19,27,38) |
| 13.5 | D | (62) | (22,28,34) |
| 15.0 | D | (55) | (10,25,30) |
| 17.0 | D | (50/12) | (50/12) |
| 19.0 | D | (37) | (8,18,19) |
| 21.0 | D | (50) | (21,24,26) |
| 23.0 | D | (36) | (13,16,20) |
| 25.0 | D | (50/14) | (50/14) |
| 27.0 | D | (50/8) | (50/8) |
| 29.5 | D | (50/11) | (50/11) |




Scale - 1 : 150 Undisturbed Sample - U Disturbed Sample : - D Bulk Sample - B Core Sample - C

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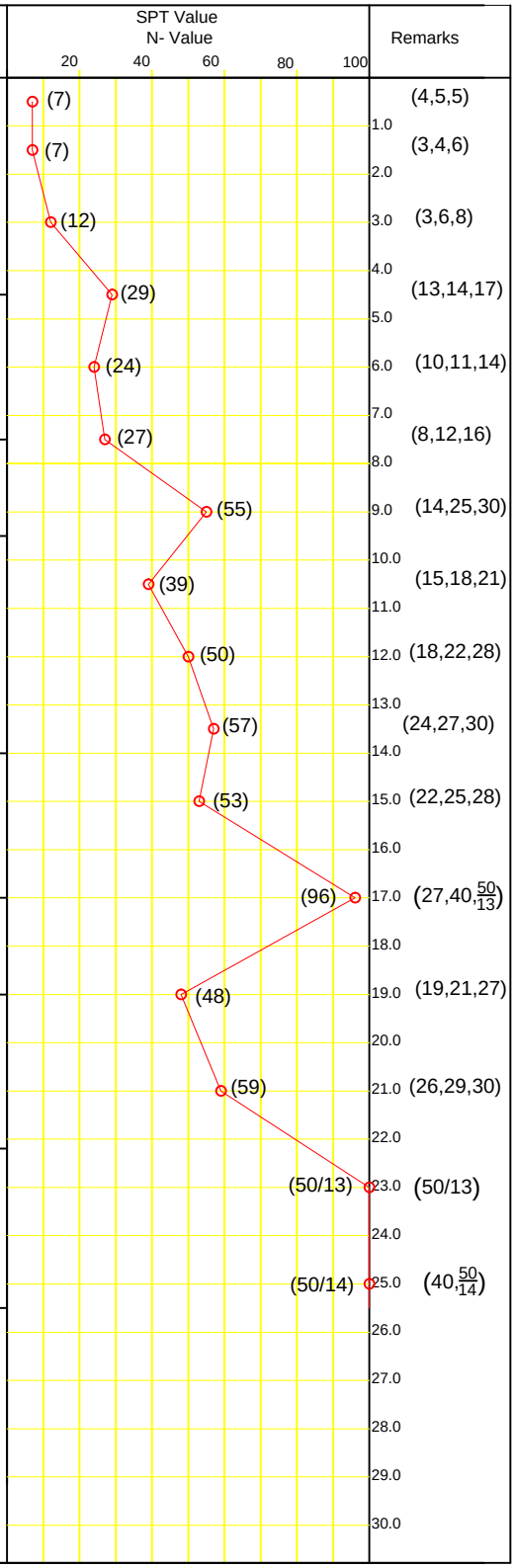
# BOREHOLE LOG

**Site** .... *Samawa Combined Cycle P.P.* .... **Method of Boring** .... *Auger & Rotary* ....

**Borehole No.** ..... *39* ..... **Date** ..... *07/05/2017* .....

**X:** ..... *526127.363* ..... **Y:** ..... *3454123.867* ..... **Ground Level** ..... *11.420* .....

| Water Table Level | Depth (m) | Sample Type & Depth | Litho logy | Thickness of Layer (m) | Soil Description | SPT Value N- Value | Remarks |
|---|---|---|---|---|---|---|---|
| 1.80 | 0.5, 1.0, 1.5, 2.0, 3.0, 4.0, 4.5 | D, U, D, D, D | | 4.5 | Medium brown fat Silty CLAY with black spots of organic matter & white traces of soluble salts together with little fine grained Sand in parts. | (7), (7), (12), (29) | (4,5,5), (3,4,6), (3,6,8), (13,14,17) |
| | 5.0, 6.0, 7.0, 7.5 | D, D, D | | 3.0 | Medium light green fine grained Silty SAND with rusty spots of iron oxide compounds and white cementation formation. | (24), (27) | (10,11,14), (8,12,16) |
| | 8.0, 9.0, 9.5 | D, D | | 2.0 | Medium to dense brownish gray fine grained Clayey Silty SAND mixture with white shiny spots of soluble salts. | (55) | (14,25,30) |
| | 10.0, 10.5, 11.0, 12.0, 13.0, 13.5, 14.0 | D, D, D, D | | 4.5 | Dense to very dense greenish gray fine to medium grained Silty SAND with rusty spots of iron oxide compounds. | (39), (50), (57) | (15,18,21), (18,22,28), (24,27,30) |
| | 15.0, 16.0, 17.0 | D, D | | 3.0 | Very dense brownish gray fine grained Clayey Silty SAND with white spots of soluble salts. | (53), (96) | (22,25,28), (27,40,50/13) |
| | 18.0, 19.0 | D | | 2.0 | Hard light green Sandy fat Silty CLAY mixture with white cementation formation. | (48) | (19,21,27) |
| | 20.0, 21.0, 21.5 | D, D | | 2.5 | Dense to very dense light green fine grained Clayey Silty SAND with a lot of white spots of cementation formation and rusty traces of iron oxide compounds. | (59) | (26,29,30) |
| | 23.0, 24.0, 25.0, 25.5 | D, D | | 4.0 | Hard light greenish gray mixture of Sandy fat Silty CLAY with white cementation formation and brownish rusty lines/traces of iron oxide compounds. | (50/13), (50/14) | (50/13), (40,50/14) |




Scale - 1 : 150 Undisturbed Sample - U Disturbed Sample : - D Bulk Sample - B Core Sample - C

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# BOREHOLE LOG

**Site** .... *Samawa Combined Cycle P.P.* .... **Method of Boring** .... *Auger & Rotary* ....

**Borehole No.** ..... *40* ..... **Date** ..... *08/05/2017* .....

**X:** ..... *526162.674* ..... **Y:** ..... *3454179.718* ..... **Ground Level** ..... *11.603* .....

| Water Table Level | Depth (m) | Sample Type & Depth | Litho logy | Thickness of Layer (m) | Soil Description | SPT Value N- Value | Remarks |
|---|---|---|---|---|---|---|---|
| 2.0 | 0.5, 1.0, 1.5, 2.0, 3.0 | D, U, D, D | | 3.5 | Medium brown fat Silty CLAY with fine grained Sand and black traces of organic matter together with white spots of soluble salts. | (8), (6), (8) | (3,4,7), (4,3,6), (4,4,5) |
| | 4.0, 4.5, 5.0, 6.0, 7.0, 7.5, 8.0 | D, D, D, D | | 4.5 | Medium to dense brownish gray fine grained Silty SAND with black spots of organic matter and white traces of soluble salts. | (39), (35), (50) | (12,18,21), (13,15,22), (17,23,30) |
| | 9.0, 10.0, 10.5, 11.0 | D, D | | 3.0 | Dense to very dense brownish gray Clayey Silty SAND with rusty traces/lines of iron oxide compounds. | (60), (56) | (15,26,34), (16,25,31) |
| | 12.0, 13.0, 13.5, 14.0, 15.0, 15.5 | D, D, D | | 4.5 | Very dense greenish gray to yellowish green fine grained Silty SAND with white spots of cementation formation. | (75), (73), (58) | (20,33,42), (15,25,48), (17,26,32) |
| | 16.0, 17.0, 18.0, 18.5 | D | | 3.0 | Very stiff to hard light green fat Silty CLAY with white spots of carbonate compounds & shiny sheets of mica minerals. | (50/9) | (50/9) |
| | 19.0, 20.0, 21.0 | D | | 2.5 | Very stiff green Sandy fat Silty CLAY with reddish spots of iron oxide compounds. | (62) | (31,30,32) |
| | 21.0, 22.0, 23.0 | D | | 1.5 | Very dense light green fine grained Clayey Silty SAND mixture with white spots of soluble salts. | (66), (50/10) | (38,37,29), (50/10) |
| | 23.0, 24.0, 25.0, 25.5 | D, D | | 2.5 | Hard light green to greenish gray Sandy fat Silty CLAY with rusty spots of iron oxide compounds and a lot of white shiny sheets of mica minerals. | (50/14) | (50/14) |
| | 26.0, 27.0, 27.5, 28.0, 29.0, 30.0, 30.5 | D, D | | 5.0 | Hard light green fat Silty CLAY with gray fine grained Sand in parts and white cementation formation compounds. | (50/10), (50/11) | (50/10), (50/11) |

Scale - 1 : 150 Undisturbed Sample - U Disturbed Sample : - D Bulk Sample - B Core Sample - C

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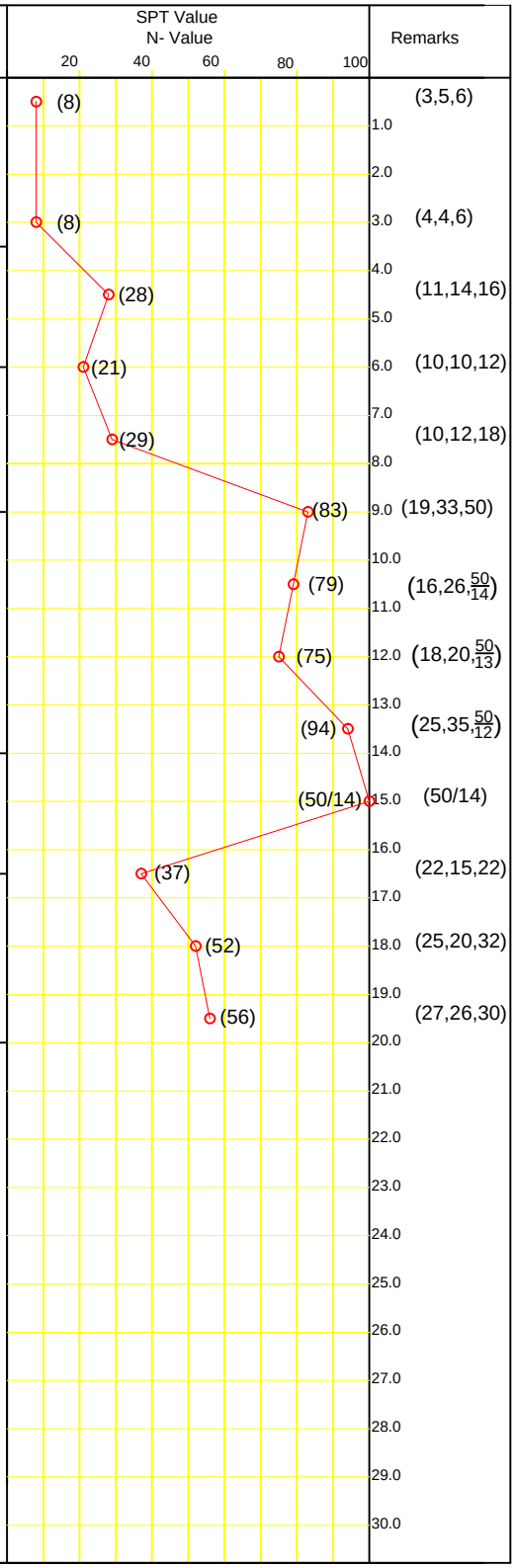
# BOREHOLE LOG

**Site** .... *Samawa Combined Cycle P.P.* .... **Method of Boring** .... *Auger & Rotary* ....

**Borehole No.** ..... *41* ..... **Date** ..... *07/05/2017* .....

**X:** ..... *526032.827* ..... **Y:** ..... *3454061.084* ..... **Ground Level** ..... *10.139* .....

| Water Table Level | Depth (m) | Sample Type & Depth | Litho logy | Thickness of Layer (m) | Soil Description | SPT Value N- Value | Remarks |
|---|---|---|---|---|---|---|---|
| 1.70 | 0.5, 1.0, 1.5, 2.0, 3.0 | D, U, D | | 3.5 | Medium dark brown to brown Sandy fat Silty CLAY with black spots of organic matter and rusty traces of iron oxide compounds together with white spots of soluble. | (8), (8) | (3,5,6), (4,4,6) |
| | 4.0, 4.5, 5.0 | D | | 2.5 | Loose to medium grayish green fine grained Clayey Silty SAND with white spots of soluble salts & reddish rusty traces of iron oxide compounds. | (28) | (11,14,16) |
| | 6.0, 7.0, 7.5, 8.0 | D, D | | 3.0 | Medium, to dense brownish gray to greenish gray fine grained Silty SAND with rusty spots of iron oxide compounds. | (21), (29) | (10,10,12), (10,12,18) |
| | 9.0, 10.0, 10.5, 11.0, 12.0, 13.0, 13.5, 14.0 | D, D, D, D | | 5.0 | Very dense grayish brown to light brown fine grained Silty SAND with white spots of soluble salts. | (83), (79), (75), (94) | (19,33,50), (16,26,50/14), (18,20,50/13), (25,35,50/12) |
| | 15.0, 16.0, 16.5 | D | | 2.5 | Very dense light brown fine to medium grained Silty SAND with white shiny crystal of soluble salts & reddish rusty traces of iron oxide compounds. | (50/14), (37) | (50/14), (22,15,22) |
| | 17.0, 18.0, 19.0, 19.5, 20.0 | D, D, D | | 3.5 | Very stiff light yellowish green fat Silty CLAY with white spots of cementation formation compound & some gray fine grained Sand. | (52), (56) | (25,20,32), (27,26,30) |




Scale - 1 : 150 Undisturbed Sample - U Disturbed Sample : - D Bulk Sample - B Core Sample - C

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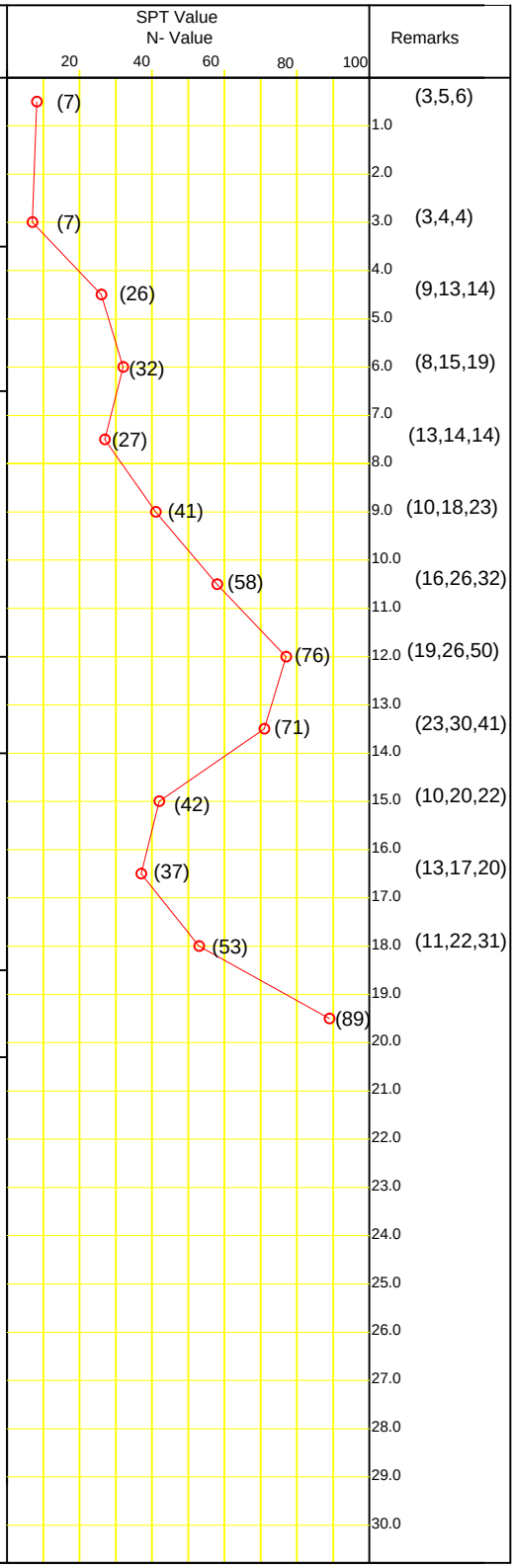
# BOREHOLE LOG

**Site** .... *Samawa Combined Cycle P.P.* .... **Method of Boring** .... *Auger & Rotary* ....

**Borehole No.** ..... *42* ..... **Date** ..... *04/05/2017* .....

**X:** ..... *525660.833* ..... **Y:** ..... *3454269.646* ..... **Ground Level** ..... *9.725* .....

| Water Table Level | Depth (m) | Sample Type & Depth | Lithology | Thickness of Layer (m) | Soil Description | SPT Value N- Value | Remarks |
|---|---|---|---|---|---|---|---|
| 1.55 | 0.5, 1.0, 1.5, 2.0, 3.0 | D, U, D | | 3.5 | Medium brown fat Silty CLAY with black spots of organic matter and rusty traces of iron oxide compounds. | (7), (7) | (3,5,6), (3,4,4) |
| | 4.0, 4.5, 5.0, 6.0 | U, D, D | | 3.0 | Medium to dense green fine grained Clayey Silty SAND with white spots of soluble salts & reddish rusty traces of iron oxide compounds. | (26), (32) | (9,13,14), (8,15,19) |
| | 7.0, 7.5, 8.0, 9.0, 10.0, 10.5, 11.0 | D, D, D, D | | 5.5 | Medium, dense to very dense brownish gray to greenish gray fine grained Silty SAND with rusty spots of iron oxide compounds. | (27), (41), (58) | (13,14,14), (10,18,23), (16,26,32) |
| | 12.0, 13.0, 13.5, 14.0 | D, D | | 2.0 | Very dense gray to brownish gray fine grained Silty SAND with white spots of cementation formation compound. | (76), (71) | (19,26,50), (23,30,41) |
| | 15.0, 16.0, 16.5, 17.0, 18.0 | D, D, D | | 4.5 | Very stiff yellowish green to greenish gray Sandy fat Silty CLAY mixture with white shiny crystal of soluble salts & reddish rusty traces of iron oxide compounds. | (42), (37), (53) | (10,20,22), (13,17,20), (11,22,31) |
| | 19.0, 19.5, 20.0 | D | | 1.5 | Very dense light gray fine to medium grained Silty SAND with white spots of soluble salts. | (89) | |




Scale - 1 : 150 Undisturbed Sample - U Disturbed Sample : - D Bulk Sample - B Core Sample - C

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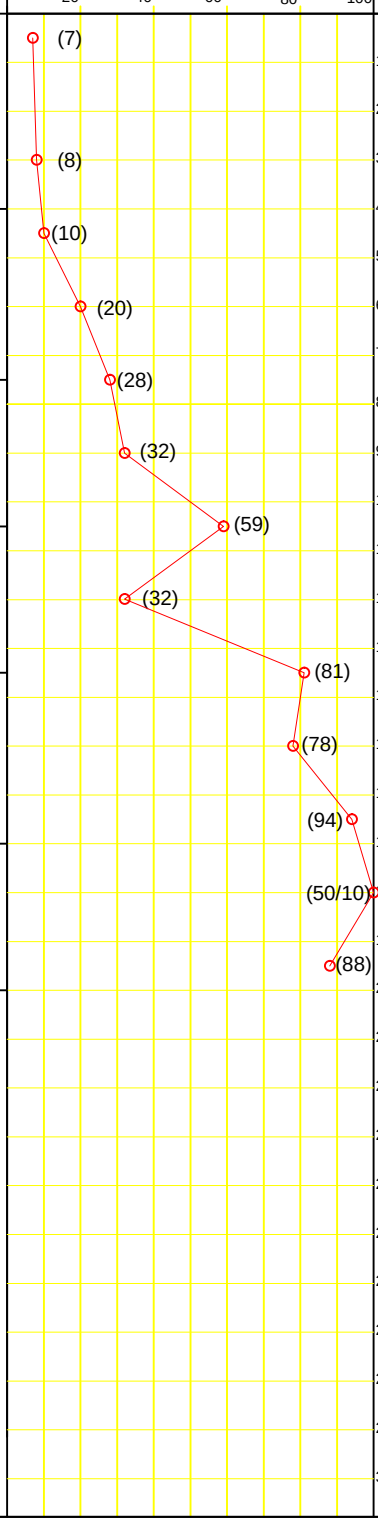
# BOREHOLE LOG

**Site** .... *Samawa Combined Cycle P.P.* .... **Method of Boring** .... *Auger & Rotary* ....

**Borehole No.** ..... *43* ..... **Date** ..... *04/05/2017* .....

**X:** ..... *525766.775* ..... **Y:** ..... *3454198.313* ..... **Ground Level** ..... *9.764* .....

| Water Table Level | Depth (m) | Sample Type & Depth | Litho logy | Thickness of Layer (m) | Soil Description | SPT Value N- Value | Remarks |
|---|---|---|---|---|---|---|---|
| 1.85 | 0.5, 1.0, 1.5, 2.0, 3.0, 4.0 | D, U, D | | 4.0 | Medium brown fat Silty CLAY with gray fine grained Sand at top and black spots of organic matter together with rusty traces of iron oxide compounds. | (7), (8) | (3,5,6), (4,4,5) |
| | 4.5, 5.0, 6.0, 7.0, 7.5 | D, D | | 3.5 | Loose to medium brownish green fine grained Silty SAND with white spots of soluble salts & reddish rusty traces of iron oxide compounds. | (10), (20), (28) | (3,5,6), (9,9,12), (12,14,16) |
| | 8.0, 9.0, 10.0, 10.5 | D, D | | 3.0 | Medium to dense brownish gray to greenish gray fine grained Silty SAND with rusty spots of iron oxide compounds. | (32), (59) | (12,16,16), (20,23,26) |
| | 11.0, 12.0, 13.0, 13.5 | D, D | | 3.0 | Very dense to dense light green fine grained Silty SAND with white spots of soluble salts. | (32), (81) | (17,16,16), (17,23,50/12) |
| | 14.0, 15.0, 16.0, 16.5, 17.0 | D, D, D | | 3.5 | Very stiff to hard yellowish green to light green Sandy fat Silty CLAY with white shiny crystal of soluble salts & reddish rusty traces of iron oxide compounds. | (78), (94) | (27,31,50/13), (25,38,50/13) |
| | 18.0, 19.0, 19.5, 20.0 | D, D | | 3.0 | Hard green to light greenish brown fat Silty CLAY with white spots of cementation formation compound. | (50/10), (88) | (50/10), (18,29,50/12) |




Scale - 1 : 150 Undisturbed Sample - U Disturbed Sample : - D Bulk Sample - B Core Sample - C

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# BOREHOLE LOG

**Site** .... *Samawa Combined Cycle P.P.* .... **Method of Boring** .... *Auger & Rotary* ....

**Borehole No.** ..... *44* ..... **Date** ..... *06/05/2017* .....

**X:** ..... *525851.778* ..... **Y:** ..... *3454198.604* ..... **Ground Level** ..... *9.825* .....

| Water Table Level | Depth (m) | Sample Type & Depth | Litho logy | Thickness of Layer (m) | Soil Description | SPT Value N- Value | Remarks |
|---|---|---|---|---|---|---|---|
| 1.50 | 0.5, 1.0, 1.5, 2.0 | D, U, D | | 3.0 | Medium brown to dark brown fat Silty CLAY with black spots of organic matter & white traces of soluble salts. | (6), (6), (6) | (3,3,6), (2,3,5), (3,3,4) |
| | 3.0, 4.0, 4.5, 5.0 | D, U, D | | 2.0 | Medium brown to brownish gray Sandy fat Silty CLAY with black spots of organic matter and rusty traces of iron oxide compounds. | (7) | (3,2,5) |
| | 6.0, 7.0, 7.5, 8.0 | D, D | | 3.0 | Medium grayish brown fine grained Clayey Silty SAND mixture with rusty spots of iron oxide compounds. | (19), (25) | (6,9,11), (8,10,16) |
| | 9.0, 10.0, 10.5, 11.0 | D, D | | 4.0 | Medium to dense gray to brownish gray fine grained Silty SAND with white shiny spots of soluble salts. | (43), (46) | (15,20,23), (12,21,25) |
| | 12.0, 13.0, 13.5, 14.0 | D, D | | 2.0 | Dense to very dense grayish brown fine grained Clayey Silty SAND mixture. | (32), (55) | (7,16,16), (9,24,31) |
| | 15.0, 16.0, 16.5, 17.0 | D, D | | 3.0 | Very stiff Sandy fat Silty CLAY with white spots of soluble salts/gypsiferrous materials. | (27), (33) | (8,12,15), (5,14,19) |
| | 18.0, 18.5 | D | | 1.5 | Very stiff light yellowish green fat Silty CLAY with white cementation formation. | (61) | (25,28,33) |
| | 19.0, 19.5, 20.0, 21.0, 21.5 | D, D | | 3.0 | Dense brownish gray fine grained Clayey Silty SAND with a lot of white spots of cementation formation and rusty traces of iron oxide compounds. | (48), (39) | (21,23,25), (8,13,26) |
| | 22.0, 22.5, 23.0, 24.0, 24.5, 25.0 | D, D | | 3.5 | Hard light brownish green mixture of Sandy fat Silty CLAY with white cementation formation and brownish rusty lines/traces of iron oxide compounds. | (100), (75) | (18,28,$\frac{50}{8}$), (20,33,42) |

Scale - 1 : 150 Undisturbed Sample - U Disturbed Sample : - D Bulk Sample - B Core Sample - C

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# BOREHOLE LOG

**Site** .... *Samawa Combined Cycle P.P.* .... **Method of Boring** .... *Auger & Rotary* ....

**Borehole No.** ..... *45* ..... **Date** ..... *06/05/2017* .....

**X:** ..... *525886.148* ..... **Y:** ..... *3454200.715* ..... **Ground Level** ..... *9.722* .....

| Water Table Level | Depth (m) | Sample Type & Depth | Litho logy | Thickness of Layer (m) | Soil Description | SPT Value N- Value | Remarks |
|---|---|---|---|---|---|---|---|
| 1.80 | 0.5, 1.0, 1.5, 2.0 | D, U, D | | 3.0 | Medium brown mixture of Sandy fat Silty CLAY with black spots of organic matter & white traces of soluble salts. | (8), (7) | (3,5,7), (2,4,6) |
| | 3.0, 4.0, 4.5, 5.0 | D, U, D | | 2.0 | Medium to stiff brown to brownish light gray Sandy fat Silty CLAY with black spots of organic matter and rusty traces of iron oxide compounds. | (7), (15) | (2,3,5), (3,7,9) |
| | 6.0, 7.0, 7.5 | D | | 2.5 | Medium grayish green fine grained Clayey Silty SAND mixture with rusty spots of iron oxide compounds. | (18), (39) | (5,8,11), (9,17,24) |
| | 8.0, 9.0 | D, D | | 1.5 | Stiff to very stiff grayish green Sandy fat Silty CLAY mixture with white spots of soluble salts. | (46) | (10,21,25) |
| | 10.0, 10.5, 11.0, 12.0, 13.0, 13.5, 14.0 | D, D, D | | 5.0 | Dense light gray to brownish gray fine grained Silty SAND with white shiny sheets of mica minerals. | (48), (30), (39) | (12,18,30), (9,13,17), (13,16,23) |
| | 15.0, 16.0, 16.5 | D, D | | 2.5 | Very stiff Sandy fat Silty CLAY with white spots of soluble salts. | (44), (100/29) | (7,19,25), (15,32,50/9) |
| | 17.0, 18.0 | D, D | | 1.5 | Hard light brownish gray fat Silty CLAY with white cementation formation. | (65) | (21,26,39) |
| | 19.0, 19.5, 20.0, 21.0 | D, D, D | | 3.0 | Very stiff brownish green Sandy fat Silty CLAY with a lot of white spots of cementation formation and rusty traces of iron oxide compounds. | (40), (70) | (25,16,24), (21,32,38) |
| | 22.0, 23.0, 24.0, 25.0, 25.5 | D, D, D | | 4.5 | Hard light brownish gray mixture of Sandy fat Silty CLAY with white cementation formation and brownish rusty lines/traces of iron oxide compounds. | (81), (100/28) | (20,23,50/12), (18,40,50/10) |

Scale - 1 : 150 Undisturbed Sample - U Disturbed Sample : - D Bulk Sample - B Core Sample - C

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# BOREHOLE LOG

**Site** .... *Samawa Combined Cycle P.P.* .... **Method of Boring** .... *Auger & Rotary* ....

**Borehole No.** ..... *46* ..... **Date** ..... *06/05/2017* .....

**X:** ..... *525852.465* ..... **Y:** ..... *3454151.112* ..... **Ground Level** ..... *9.567*.....

| Water Table Level | Depth (m) | Sample Type & Depth | Litho logy | Thickness of Layer (m) | Soil Description | SPT Value N- Value | Remarks |
|---|---|---|---|---|---|---|---|
| 1.80 | 0.5, 1.0, 1.5, 2.0, 3.0 | D, U, D, D | | 3.5 | Medium dark brown to brown fat Silty CLAY with black spots of organic matter & white traces of soluble salts. | (8), (13), (17) | (4,5,7), (4,8,11), (6,9,11) |
| | 4.0, 4.5, 5.0, 6.0 | U, D, D | | 3.0 | Medium to dense grayish brown fine grained Clayey Silty SAND mixture with rusty spots of iron oxide compounds. | (45), (41) | (12,18,29), (16,20,23) |
| | 7.0, 7.5, 8.0, 9.0, 10.0, 10.5, 11.0 | D, D, D, D | | 4.5 | Dense to very dense light grayish brown fine grained Silty SAND with white shiny spots of soluble salts and rusty traces of iron oxide compounds. | (99), (100/27), (80) | (24,40,50/11), (25,43,50/10), (33,39,41) |
| | 12.0, 13.0, 13.5, 14.0 | D, D | | 3.0 | Very dense brownish green to light green fine to medium grained SAND with a lot of white cementation formation. | (84), (99) | (20,31,50/14), (24,39,50/12) |
| | 15.0, 16.0, 16.5, 17.0, 18.0 | D, D, D | | 4.5 | Very stiff to hard dark green Sandy fat Silty CLAY mixture with white cementation formation compounds. | (93), (50/8), (94) | (25,34,50/12), (50/8), (39,44,50) |
| | 19.0, 19.5, 20.0, 21.0 | D, D | | 1.5 | Very dense brownish green fine grained Silty SAND with a lot of white spots of cementation formation and rusty traces of iron oxide compounds. | (50/10), (50/9) | (50/10), (50/9) |
| | 22.0, 22.5, 23.0, 24.0, 24.5, 25.0 | D, D | | 5.0 | Hard light brownish gray fat Silty CLAY with a lot of white cementation formation and brownish rusty lines/traces of iron oxide compounds. | (100/26), (50/13) | (21,43,50/9), (50/13) |

Scale - 1 : 150 Undisturbed Sample - U Disturbed Sample : - D Bulk Sample - B Core Sample - C

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# BOREHOLE LOG

**Site** .... *Samawa Combined Cycle P.P.* .... **Method of Boring** .... *Auger & Rotary* ....

**Borehole No.** ..... *47* ..... **Date** ..... *07/05/2017* .....

**X:** ..... *525916.928* ..... **Y:** ..... *3454126.571* ..... **Ground Level** ..... *9.792* .....

| Water Table Level | Depth (m) | Sample Type & Depth | Litho logy | Thickness of Layer (m) | Soil Description | SPT Value N- Value | Remarks |
|---|---|---|---|---|---|---|---|
| 1.70 | 0.5, 1.0, 1.5, 2.0 | D, U, D | | 2.5 | Medium to stiff brown fat Silty CLAY with black spots of organic matter & white traces of soluble salts. | (10), (13) | (4,6,8), (7,8,11) |
| | 3.0, 4.0, 4.5, 5.0 | D, D | | 3.5 | Dense light green to yellowish brown fine grained Silty SAND with rusty traces of iron oxide compounds and white spots of soluble salts. | (40), (38) | (12,21,26), (8,19,21) |
| | 6.0, 7.0, 7.5, 8.0, 9.0, 10.0, 10.5, 11.0 | D, D, D, D, D | | 6.0 | Dense to very dense light brown to yellowish brown fine grained Silty SAND with white shiny sheets of mica minerals. | (42), (51), (53), (90) | (10,20,24), (15,25,29), (14,21,32), (28,40,50) |
| | 12.0, 13.0, 13.5, 14.0, 15.0, 16.0 | D, D, D, D | | 4.5 | Very dense yellowish brown to yellowish gray fine to medium grained Silty SAND with white spots of soluble salts gypsiferrous materials. | (68), (76), (61) | (19,24,44), (13,30,46), (18,23,38) |
| | 16.5, 17.0, 18.0 | D, D | | 2.0 | Very dense yellowish green well cemented fine grained Clayey Silty SAND. | (50/8), (50/13) | (30,50/8), (40,50/13) |
| | 19.0, 19.5, 20.0, 21.0, 22.0, 22.5, 23.0 | D, D, D, D | | 5.5 | Hard dark brownish green mixture of Sandy fat Silty CLAY with white cementation formation and brownish rusty lines/traces of iron oxide compounds. | (100), (100/26), (50/10) | (35,41,50/12), (33,46,50/10), (50/10) |
| | 24.0, 24.5, 25.0 | D | | 1.0 | Very dense light brown fine grained Clayey Silty SAND with alot of white cementation formation. | (50/8) | (50/8) |

Scale - 1 : 150 Undisturbed Sample - U Disturbed Sample : - D Bulk Sample - B Core Sample - C

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# BOREHOLE LOG

**Site** .... *Samawa Combined Cycle P.P.* .... **Method of Boring** .... *Auger & Rotary* ....

**Borehole No.** ..... *48* ..... **Date** ..... *07/05/2017* .....

**X:** ..... *525962.166* ..... **Y:** ..... *3454153.426* ..... **Ground Level** ..... *10.498* .....

| Water Table Level | Depth (m) | Sample Type & Depth | Litho logy | Thickness of Layer (m) | Soil Description | SPT Value N- Value | Remarks |
|---|---|---|---|---|---|---|---|
| 1.90 | 0.5, 1.0, 1.5, 2.0 | D, U, D | | 3.0 | Medium brown fat Silty CLAY with black spots of organic matter & white traces of soluble salts. | (7), (6), (5) | (3,4,6), (2,3,5), (4,3,3) |
| | 3.0, 4.0, 4.5, 5.0, 6.0 | D, U, D, D | | 3.5 | Medium brown to brownish gray Sandy fat Silty CLAY with black spots of organic matter and rusty traces of iron oxide compounds. | (10), (18) | (5,4,6), (7,9,10) |
| | 7.0, 7.5, 8.0, 9.0, 10.0 | D, D, D | | 4.0 | Medium grayish green fine grained Silty SAND with rusty spots of iron oxide compounds and white spots of soluble salts. | (23), (23), (27) | (7,10,14), (11,11,12), (10,12,15) |
| | 10.5, 11.0, 12.0, 13.0 | D, D | | 2.0 | Medium to dense light gray to brownish gray fine to medium grained Silty SAND with white shiny sheets of mica minerals. | (35) | (15,16,19) |
| | 13.5, 14.0, 15.0 | D | | 2.5 | Dense greenish gray fine to medium grained SAND with white spots of soluble salts & little Silt fraction. | (41), (49) | (13,19,22), (15,22,27) |
| | 16.0, 16.5 | D | | 1.5 | Dense greenish light brown fine grained Clayey Silty SAND mixture. | (45) | (18,21,24) |
| | 17.0, 18.0 | D | | 1.5 | Very stiff light yellowish green Sandy fat Silty CLAY with white cementation formation. | (37) | (14,17,20) |
| | 19.0, 19.5, 20.0, 21.0 | D, D | | 2.0 | Dense to very dense brownish green fine grained Clayey Silty SAND with a lot of white spots of cementation formation and rusty traces of iron oxide compounds. | (50/13), (61) | (50/13), (25,28,33) |
| | 22.0, 23.0, 24.0, 25.0 | D, D | | 5.5 | Very stiff to hard brownish gray mixture of Sandy fat Silty CLAY with white cementation formation and brownish rusty lines/traces of iron oxide compounds. | (82), (68) | (21,29,$\frac{50}{14}$), (16,30,38) |

Scale - 1 : 150 Undisturbed Sample - U Disturbed Sample : - D Bulk Sample - B Core Sample - C

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# BOREHOLE LOG

**Site** .... *Samawa Combined Cycle P.P.* .... **Method of Boring** .... *Auger & Rotary* ....

**Borehole No.** ..... *49* ..... **Date** ..... *06/05/2017* .....

**X:** ..... *525954.878* ..... **Y:** ..... 3454126.571 ..... **Ground Level** .....10.772 .....

| Water Table Level | Depth (m) | Sample Type & Depth | Litho logy | Thickness of Layer (m) | Soil Description | SPT Value N- Value | Remarks |
|---|---|---|---|---|---|---|---|
| 1.60 | 0.5, 1.0, 1.5, 2.0, 3.0 | D, U, D, D | | 3.5 | Medium to stiff dark brown fat Silty CLAY with black spots of organic matter & white traces of soluble salts together with some fine fined Sand at bottom. | (7), (8), (19) | (2,4,6), (3,5,6), (7,9,13) |
| | 4.0, 4.5, 5.0, 6.0 | D, D | | 2.5 | Medium grayish green fine grained Clayey Silty SAND with rusty spots of iron oxide compounds and white spots of soluble salts. | (22), (22) | (10,11,12), (8,10,13) |
| | 7.0, 7.5, 8.0, 9.0, 10.0, 10.5 | D, D, D | | 4.5 | Medium to dense brownish gray fine to medium grained Silty SAND with white shiny sheets of mica minerals. | (29), (38), (34) | (13,15,16), (16,18,20), (13,16,18) |
| | 11.0, 12.0, 13.0, 13.5, 14.0, 15.0 | D, D, D, D | | 5.0 | Dense grayish green fine to medium grained Silty SAND with white cementation formation . | (43), (40), (46) | (17,19,24), (10,17,23), (17,22,24) |
| | 16.0, 16.5, 17.0, 18.0, 19.0, 19.5 | D, D, D | | 4.0 | Very stiff yellowish green Sandy fat Silty CLAY mixture with white spots of soluble salts and rusty traces of iron oxide compounds. | (62), (50), (51) | (24,30,32), (15,22,28), (18,21,30) |
| | 20.0, 21.0, 21.5 | D, D | | 2.0 | Very dense yellowish green to dark green mixture of Clayey Silty SAND with rusty spots of iron oxide compounds. | (47) | (20,21,26) |
| | 22.0, 22.5, 23.0 | D | | 1.5 | Very stiff to hard brownish green Sandy fat Silty CLAY with a lot of white spots of cementation formation and rusty traces of iron oxide compounds. | (67) | (26,30,37) |
| | 24.0, 24.5, 25.0 | D | | 2.0 | Very dense light grayish brown well cemented fine grained Silty SAND with alot of white cementation formation. | (50/13) | (50/12) |
| | 26.0, 27.0, 28.0, 29.0, 30.0 | | | | | | |

Scale - 1 : 150 Undisturbed Sample - U Disturbed Sample : - D Bulk Sample - B Core Sample - C

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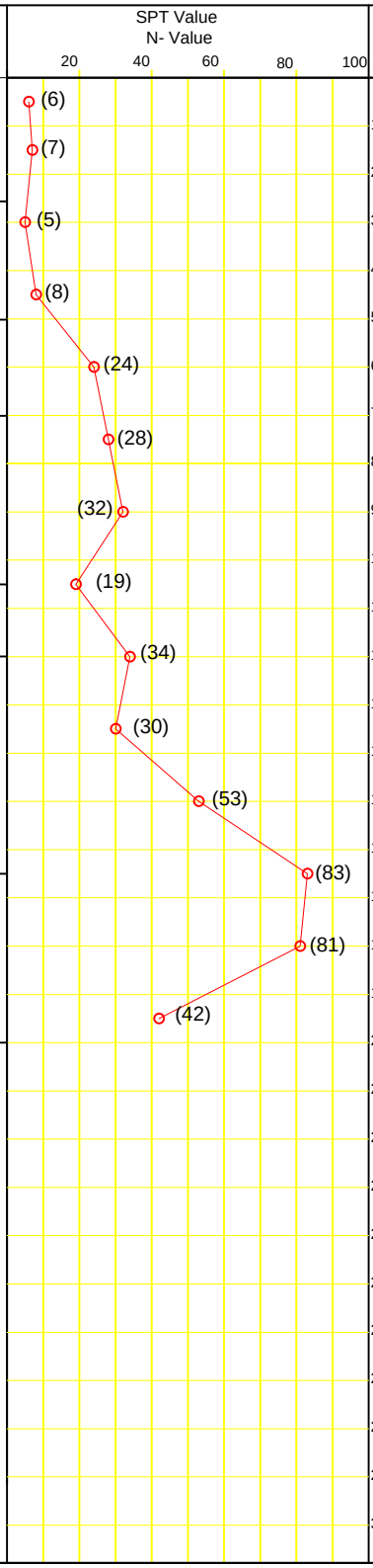
# BOREHOLE LOG

**Site** .... *Samawa Combined Cycle P.P.* .... **Method of Boring** .... *Auger & Rotary* ....

**Borehole No.** ..... *50* ..... **Date** ..... *02/05/2017* .....

**X:** ..... *525826.538* ..... **Y:** ..... *3454535.078*..... **Ground Level** ..... *10.167*.....

| Water Table Level | Depth (m) | Sample Type & Depth | Litho logy | Thickness of Layer (m) | Soil Description | SPT Value N- Value | Remarks |
|---|---|---|---|---|---|---|---|
| | 0.5 | D | | 1.0 | Loose brown to grayish brown fine grained Clayey Silty SAND mixture with white shiny traces of soluble salts. | (6) | (3,5,4) |
| | 1.0 | U | | | | | |
| | 1.5 | D | | | | (7) | (3,4,6) |
| 2.0 ▽ | 2.0 | | | 2.0 | | | |
| | 3.0 | D | | | Medium brown to grayish brown fat Silty CLAY with white spots of soluble salts and black traces of organic matter. | (5) | (2,3,3) |
| | 4.0 | | | | | | |
| | 4.5 | U | | 3.0 | | (8) | (4,3,5) |
| | 5.0 | D | | | | | |
| | 6.0 | D | | | Medium to stiff grayish brown Sandy fat Silty CLAY with black traces of organic matter. | (24) | (9,12,15) |
| | 7.0 | | | | | | |
| | 7.5 | D | | | Medium to dense light gray fine to medium grained Silty SAND with rusty traces of iron oxide compounds. | (28) | (11,14,15) |
| | 8.0 | | | 4.5 | | | |
| | 9.0 | D | | | | (32) | (6,15,17) |
| | 10.0 | | | | | | |
| | 10.5 | D | | | Stiff to very stiff brownish gray mixture of Sandy fat Silty CLAY. | (19) | (11,9,10) |
| | 11.0 | | | 1.5 | | | |
| | 12.0 | D | | | Dense to very dense gray to dark gray fine grained Silty SAND with yellowish rusty spots of iron oxide compounds. | (34) | (15,17,17) |
| | 13.0 | | | | | | |
| | 13.5 | D | | | | (30) | (12,15,15) |
| | 14.0 | | | 4.5 | | | |
| | 15.0 | D | | | | (53) | (18,23,50) |
| | 16.0 | | | | | | |
| | 16.5 | D | | | Hard to very stiff light brownish green to light green fat Silty CLAY with alot of white shiny sheets of mica minerals & rusty spots of iron oxide compounds. | (83) | (22,35,48) |
| | 17.0 | | | | | | |
| | 18.0 | D | | 3.5 | | (81) | (20,31,50) |
| | 19.0 | | | | | | |
| | 19.5 | D | | | | (42) | (13,19,23) |
| | 20.0 | | | | | | |
| | 21.0 | | | | | | |
| | 22.0 | | | | | | |
| | 23.0 | | | | | | |
| | 24.0 | | | | | | |
| | 25.0 | | | | | | |
| | 26.0 | | | | | | |
| | 27.0 | | | | | | |
| | 28.0 | | | | | | |
| | 29.0 | | | | | | |
| | 30.0 | | | | | | |




Scale - 1 : 150 Undisturbed Sample - U Disturbed Sample : - D Bulk Sample - B Core Sample - C

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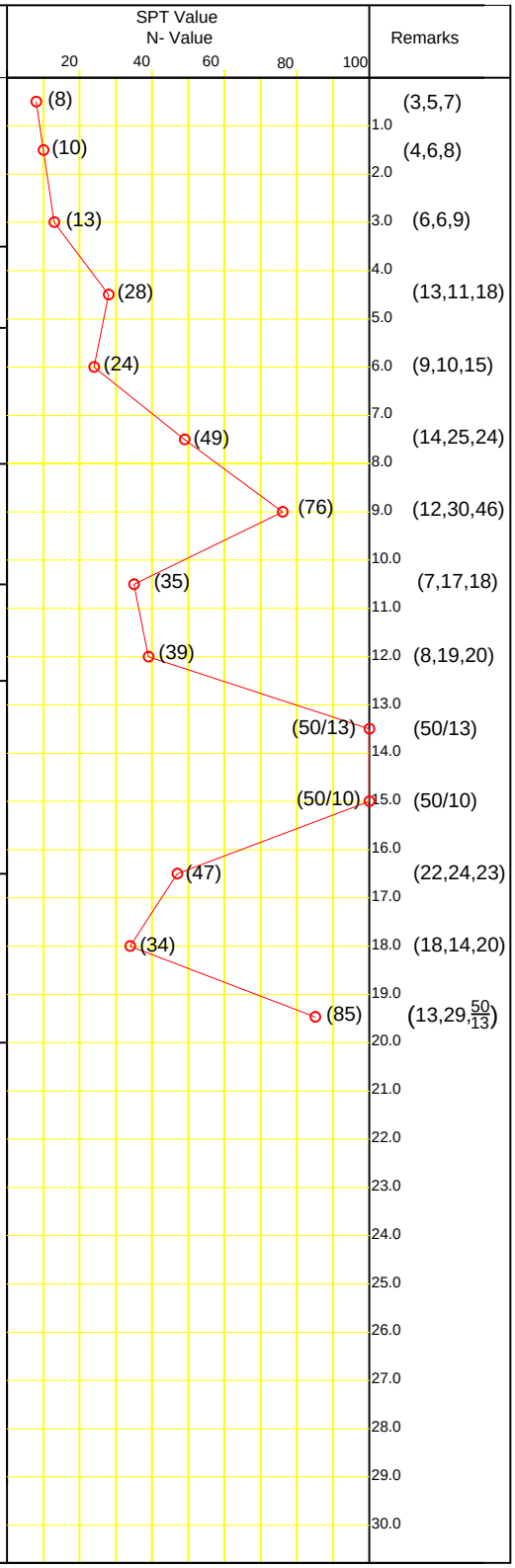
# BOREHOLE LOG

**Site** .... *Samawa Combined Cycle P.P.* .... **Method of Boring** .... *Auger & Rotary* ....

**Borehole No.** ..... *51* ..... **Date** ..... *02/05/2017* .....

**X:** ..... *525792.393* ..... **Y:** ..... *3454471.119* ..... **Ground Level** ..... *10.057*.....

| Water Table Level | Depth (m) | Sample Type & Depth | Litho logy | Thickness of Layer (m) | Soil Description | SPT Value N- Value | Remarks |
|---|---|---|---|---|---|---|---|
| 1.85 | 0.5, 1.0, 1.5, 2.0, 3.0, 4.0, 4.5, 5.0, 6.0, 7.0, 7.5, 8.0, 9.0, 10.0, 10.5, 11.0, 12.0, 13.0, 13.5, 14.0, 15.0, 16.0, 16.5, 17.0, 18.0, 19.0, 19.5, 20.0 | D, U, D, D, D, D, D, D, D, D, D, D, D, D, D, D | | 3.5 | Medium to stiff brown to dark brown fat Silty CLAY with white spots of soluble salts and black traces of organic matter. | (8), (10), (13) | (3,5,7), (4,6,8), (6,6,9) |
| | | | | 1.5 | Loose to medium light gray fine grained Clayey Silty SAND with white spots of soluble salts. | (28) | (13,11,18) |
| | | | | 3.0 | Medium to dense light brown fine to medium grained Silty SAND with rusty traces of iron oxide compounds. | (24), (49) | (9,10,15), (14,25,24) |
| | | | | 2.5 | Dense to very dense light brown fine grained Silty SAND with rusty spots of iron oxide compounds. | (76), (35) | (12,30,46), (7,17,18) |
| | | | | 2.0 | Stiff to very stiff brownish gray mixture of Sandy fat Silty CLAY. | (39) | (8,19,20) |
| | | | | 4.0 | Very stiff to hard reddish yellow fat Silty CLAY with a lot of white spots of cementation formation. | (50/13), (50/10), (47) | (50/13), (50/10), (22,24,23) |
| | | | | 3.5 | Very stiff dark green Sandy fat Silty CLAY with a lot of white shiny sheets of mica minerals & rusty spots of iron oxide compounds. | (34), (85) | (18,14,20), (13,29,$\frac{50}{13}$) |




Scale - 1 : 150 Undisturbed Sample - U Disturbed Sample : - D Bulk Sample - B Core Sample - C

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# BOREHOLE LOG

**Site** .... *Samawa Combined Cycle P.P.* .... **Method of Boring** .... *Auger & Rotary* ....

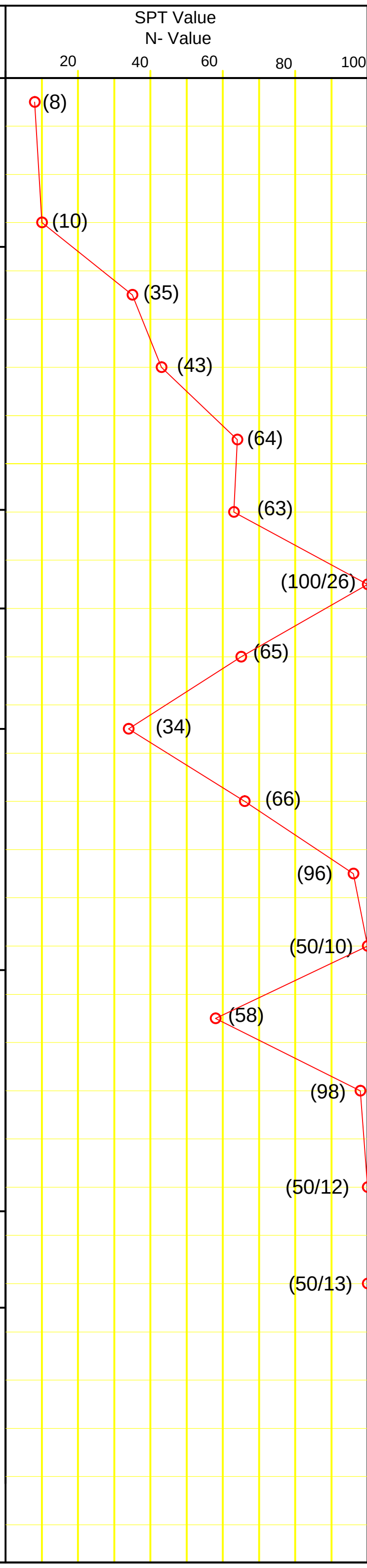
**Borehole No.** ...... *52* ...... **Date** ....... *02/05/2017* .......

**X:** ..... *525874.411*..... **Y:** ..... *3454472.134* ..... **Ground Level** ..... *10.367*.....

Water Table Level: 2.0

| Depth (m) | Thickness of Layer (m) | Soil Description |
|---|---|---|
| 0.0 – 3.5 | 3.5 | Medium brown fat Silty CLAY with black spots of organic matter & white traces of soluble salts. |
| 3.5 – 9.0 | 5.5 | Medium to dense grayish green fine grained Silty SAND with rusty spots of iron oxide compounds and white spots of soluble salts. |
| 9.0 – 10.5 | 1.5 | Very dense brownish gray fine grained Clayey Silty SAND with white shiny sheets of mica minerals. |
| 10.5 – 13.5 | 3.0 | Very dense brownish gray fine to medium grained Silty SAND with white cementation formation . |
| 13.5 – 18.5 | 5.0 | Very stiff to hard yellowish green Sandy fat Silty CLAY with white spots of soluble salts. |
| 18.5 – 23.5 | 5.0 | Very stiff to hard brownish green fat Silty CLAY with a lot of white spots of cementation formation and rusty traces of iron oxide compounds. |
| 23.5 – 25.5 | 2.0 | Very dense light brown fine grained Clayey Silty SAND with alot of white cementation formation. |

| Sample Depth (m) | Sample Type | SPT N-Value | Remarks |
|---|---|---|---|
| 0.5 – 1.0 | D | (8) | (3,6,6) |
| 1.0 – 1.5 | U | | |
| 1.5 – 2.0 | D | | |
| 3.0 | D | (10) | (3,5,7) |
| 4.5 | D | (35) | (9,17,20) |
| 6.0 | D | (43) | (15,20,25) |
| 7.5 | D | (64) | (19,27,40) |
| 9.0 | D | (63) | (18,25,38) |
| 10.5 | D | (100/26) | (22,40,$\frac{50}{8}$) |
| 12.0 | D | (65) | (28,30,35) |
| 13.5 | D | (34) | (8,15,19) |
| 15.0 | D | (66) | (22,34,32) |
| 16.5 | D | (96) | (22,40,$\frac{50}{13}$) |
| 18.0 | D | (50/10) | (50/10) |
| 19.5 | D | (58) | (21,28,30) |
| 21.0 | D | (98) | (31,41,$\frac{50}{13}$) |
| 23.0 | D | (50/12) | (35,$\frac{50}{12}$) |
| 25.0 | D | (50/13) | (50/13) |




Scale - 1 : 150 Undisturbed Sample - U Disturbed Sample : - D Bulk Sample - B Core Sample - C

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# BOREHOLE LOG

**Site** .... *Samawa Combined Cycle P.P.* .... **Method of Boring** .... *Auger & Rotary* ....

**Borehole No.** ..... *53* ..... **Date** ..... *07/05/2017* .....

**X:** ..... *525913.710* **Y:** ..... *3454481.159* ..... **Ground Level** ..... *10.177* .....

| Water Table Level | Depth (m) | Sample Type & Depth | Litho logy | Thickness of Layer (m) | Soil Description | SPT Value N- Value | Remarks |
|---|---|---|---|---|---|---|---|
| | 0.5, 1.0 | D | | 2.0 | Loose grayish brown mixture of fine grained Clayey Silty SAND with white spots of soluble salts. | (9) | (4,5,8) |
| 1.85 | 1.5, 2.0 | U | | | | | |
| | 3.0 | D | | 2.5 | Soft to medium brown Sandy fat Silty CLAY with white spots of soluble salts and black traces of organic matter. | (4) | (3,2,3) |
| | 4.0, 4.5 | U, D | | | | (7) | (2,3,4) |
| | 5.0, 6.0 | D | | 2.0 | Loose to medium greenish gray fine grained Clayey Silty SAND mixture with black spots of organic matter and rusty traces of iron oxide compounds. | (17) | (6,9,9) |
| | 7.0, 7.5, 8.0 | D | | 4.5 | Medium to dense brownish gray fine to medium grained Silty SAND with rusty traces of iron oxide compounds. | (25) | (10,12,14) |
| | 9.0 | D | | | | (37) | (9,15,22) |
| | 10.0, 10.5, 11.0 | D | | | | (43) | (7,18,25) |
| | 12.0 | D | | 2.0 | Dense brownish green fine grained Clayey Silty SAND with rusty spots of iron oxide compounds and white cementation formation. | (47) | (18,26,21) |
| | 13.0, 13.5, 14.0 | D | | 1.5 | Very stiff brownish gray mixture of Sandy fat Silty CLAY with reddish rusty spots of iron oxide compounds. | (24) | (7,11,13) |
| | 15.0 | D | | 2.0 | Medium light brown fine grained Silty SAND with white cementation formation. | (27) | (7,12,15) |
| | 16.0, 16.5, 17.0 | D | | | | (23) | (10,10,13) |
| | 18.0 | D | | 6.0 | Very stiff to hard yellowish green Sandy fat Silty CLAY mixture with alot of white shiny crystallized sheets of mica minerals and black spots of organic matter. | (34) | (15,12,22) |
| | 19.0, 19.5, 20.0 | D | | | | (91) | (14,20,50/8) |
| | 21.0 | D | | | | (100/29) | (21,36,50/10) |
| | 22.0, 23.0 | D | | 2.0 | Hard light green fat Silty CLAY with rusty spots of iron oxide compounds and some fine grained Sand. | (92) | (27,39,50/14) |
| | 24.0, 25.0 | D | | 2.0 | Very dense greenish gray fine grained Clayey Silty SAND mixture with alot of white cementation formation. | (50/12) | (50/12) |
| | 26.0, 27.0 | D | | 3.0 | Very stiff to hard gray to light brownish gray Sandy fat Silty CLAY mixture with white cementation formation compounds. | (72) | (23,33,39) |
| | 28.0, 29.0, 29.5, 30.0 | D | | | | (100/25) | (30,41,50/8) |

Scale - 1 : 150 Undisturbed Sample - U Disturbed Sample : - D Bulk Sample - B Core Sample - C

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# BOREHOLE LOG

**Site** .... *Samawa Combined Cycle P.P.* .... **Method of Boring** .... *Auger & Rotary* ....

**Borehole No.** ...... *54* ...... **Date** ....... *04/05/2017* .......

**X:** ..... *525904.854* ..... **Y:** ..... *3454469.117* ..... **Ground Level** ..... *10.135* .....

Water Table Level: 1.60

| Depth of layer base (m) | Thickness of Layer (m) | Soil Description |
|---|---|---|
| 3.5 | 3.5 | Medium light brown to brown fat Silty CLAY with little gray pockets of fine Sand and white spots of soluble salts together with black traces of organic matter. |
| 5.0 | 1.5 | Loose to medium green to greenish gray fine grained Clayey Silty SAND with black spots of organic matter and rusty traces of iron oxide compounds. |
| 9.5 | 4.5 | Medium to dense gray to yellowish gray fine grained Silty SAND with rusty traces of iron oxide compounds. |
| 12.0 | 2.5 | Dense to very dense yellowish gray fine to medium grained Silty SAND with rusty spots of iron oxide compounds. |
| 12.0 | 3.0 | Stiff to very stiff light greenish gray Sandy fat Silty CLAY mixture with rusty spots of iron oxide compounds. |
| 17.0 | 2.0 | Dense gray to brownish gray fine grained Silty SAND with white cementation formation. |
| 18.5 | 1.5 | Dense yellowish light green fine grained Clayey Silty SAND mixture with reddish traces of iron oxide compounds and a lot of white cementation formation. |
| 23.5 | 5.0 | Very stiff to hard green to yellowish green Sandy fat Silty CLAY with a lot of white pockets of cementation formation compounds. |
| 30.0 | 6.5 | Very stiff to hard greenish gray Sandy fat Silty CLAY with white cementation formation and rusty spots of iron oxide compound. |

| Sample Depth (m) | Sample Type | SPT N-Value | Remarks |
|---|---|---|---|
| 0.5 | D | (7) | (2,4,6) |
| 1.5 | U | | |
| 3.0 | D | (6) | (3,3,4) |
| 4.5 | D | (22) | (7,11,12) |
| 6.0 | D | (19) | (10,11,9) |
| 7.5 | D | (25) | (7,11,15) |
| 9.0 | D | (34) | (8,15,19) |
| 10.5 | D | (84) | (16,23,50/11) |
| 12.0 | D | (21) | (5,8,13) |
| 13.5 | D | (53) | (17,21,32) |
| 15.0 | D | (46) | (13,17,29) |
| 16.5 | D | (31) | (8,14,17) |
| 18.0 | D | (42) | (16,19,23) |
| 19.5 | D | (34) | (17,13,21) |
| 21.0 | D | (100/29) | (28,30,50/8) |
| 23.0 | D | (84) | (17,20,50/10) |
| 25.0 | D | (59) | (19,28,31) |
| 27.0 | D | (53) | (23,25,28) |
| 29.5 | D | (52) | (21,25,27) |

Scale - 1 : 150 Undisturbed Sample - U Disturbed Sample : - D Bulk Sample - B Core Sample - C

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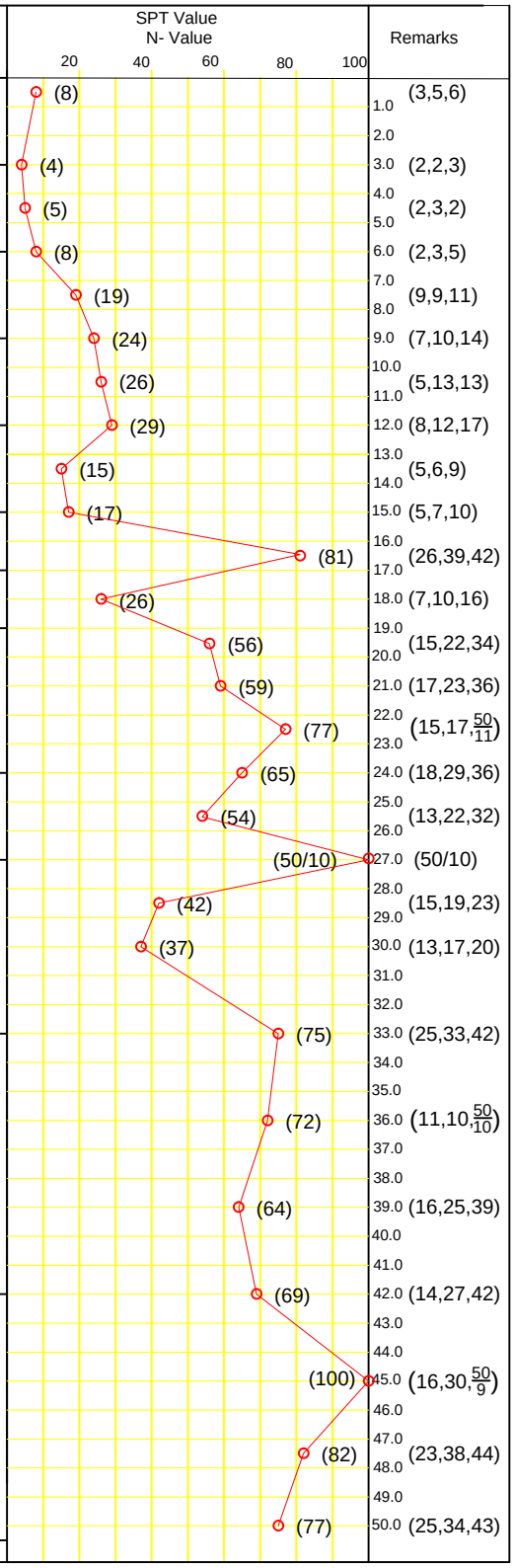
# BOREHOLE LOG

**Site** .... *Samawa Combined Cycle P.P.* .... **Method of Boring** .... *Auger & Rotary* ....

**Borehole No.** ..... *55* ..... **Date** ..... *03/05/2017* .....

**X:** ..... *525898.013* ..... **Y:** ..... *3454458.828* ..... **Ground Level** ..... *10.103* .....

| Water Table Level | Depth (m) | Sample Type & Depth | Litho logy | Thickness of Layer (m) | Soil Description | SPT Value N- Value | Remarks |
|---|---|---|---|---|---|---|---|
| 1.90 | 0.5, 1.0, 1.5, 2.0 | D, U | | 2.0 | Medium to soft light brown fat Silty CLAY with white traces of soluble salts & black spots of organic matter. | (8) | (3,5,6) |
| | 3.0, 4.0, 4.5, 5.0 | D, U, D | | 3.0 | Soft to medium brown fat Silty CLAY with white spots of soluble salts and black traces of organic matter. | (4), (5) | (2,2,3), (2,3,2) |
| | 6.0 | D | | 1.5 | | (8) | (2,3,5) |
| | 7.0, 7.5, 8.0, 9.0 | D, D | | 4.0 | Medium brownish gray Sandy lean Silty CLAY with a lot of black spots of organic matter. | (19), (24) | (9,9,11), (7,10,14) |
| | 10.0, 10.5, 11.0 | D | | | Medium greenish gray fine grained Silty SAND with white spots of soluble salts. | (26) | (5,13,13) |
| | 12.0, 13.0, 13.5, 14.0 | D, D | | 4.5 | Medium gray to light gray fine grained Silty SAND with white spots of soluble salts. | (29), (15) | (8,12,17), (5,6,9) |
| | 15.0, 16.0, 16.5 | D, D | | 1.5 | Very stiff brown to grayish brown Sandy fat Silty CLAY . | (17), (81) | (5,7,10), (26,39,42) |
| | 17.0, 18.0 | D | | 1.5 | Very dense gray fine grained Clayey Silty SAND mixture. | (26) | (7,10,16) |
| | 19.0, 19.5, 20.0, 21.0, 22.0, 22.5, 23.0 | D, D, D | | 6.0 | Very stiff to hard green Sandy fat Silty CLAY with white spots of carbonate compounds & little black traces of organic matter. | (56), (59), (77) | (15,22,34), (17,23,36), (15,17,$\frac{50}{11}$) |
| | 24.0, 25.0, 25.5, 26.0 | D, D | | 3.0 | Very stiff to hard green fat Silty CLAY with black spots of organic matter. | (65), (54) | (18,29,36), (13,22,32) |
| | 27.0, 28.0, 28.5, 29.0, 30.0, 31.0, 32.0 | D, D, D | | 6.0 | Very stiff to hard brown mixture of Sandy fat Silty CLAY with white spots of carbonate compounds & rusty traces of iron oxide compounds together with green pockets of Marl;y Clay. | (50/10), (42), (37) | (50/10), (15,19,23), (13,17,20) |
| | 33.0, 34.0, 35.0, 36.0, 37.0, 38.0, 39.0, 40.0, 41.0, 42.0 | D, D, D | | 9.0 | Very stiff to hard brown to light brown fat Silty CLAY with black traces of organic matter & white spots of carbonate compounds together with gray fine grained Sand at top. | (75), (72), (64), (69) | (25,33,42), (11,10,$\frac{50}{10}$), (16,25,39), (14,27,42) |
| | 43.0, 44.0, 45.0, 46.0, 47.0, 47.5, 48.0, 49.0, 50.0 | D, D, D, D | | 8.5 | Very stiff to hard light grayish green fat Silty CLAY with a lot of white spots of soluble salts & shiny sheets of silica minerals together with green pockets of Marly Clay. | (100), (82), (77) | (16,30,$\frac{50}{9}$), (23,38,44), (25,34,43) |




Scale - 1 : 250 Undisturbed Sample - U Disturbed Sample : - D Bulk Sample - B Core Sample - C

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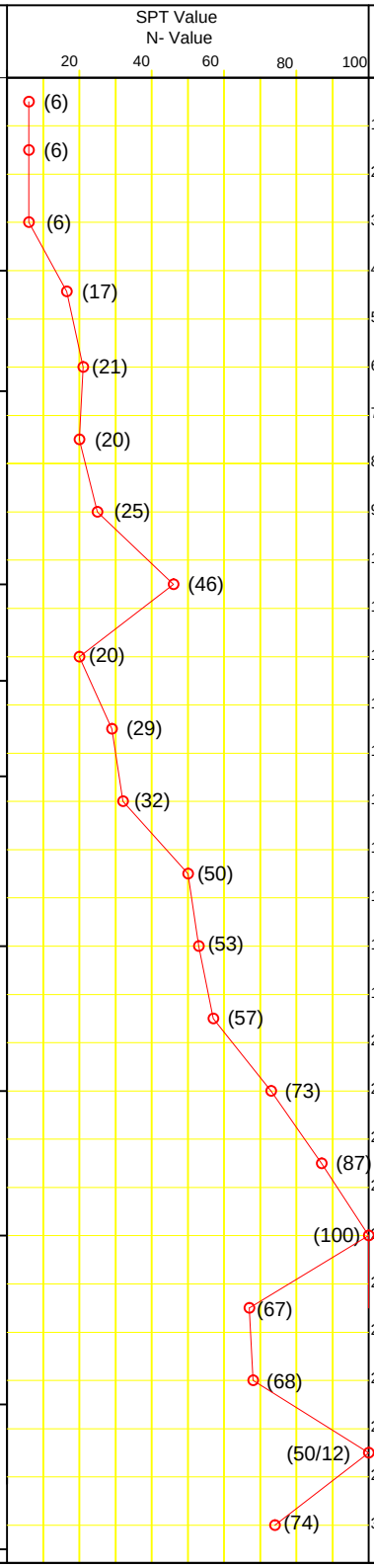
# BOREHOLE LOG

**Site** .... *Samawa Combined Cycle P.P.* .... **Method of Boring** .... *Auger & Rotary* ....

**Borehole No.** ..... *56* ..... **Date** ..... *02/05/2017* .....

**X:** ..... *525890.808* ..... **Y:** ..... *3454448.630* ..... **Ground Level** ..... *10.091* .....

| Water Table Level | Depth (m) | Sample Type & Depth | Litho logy | Thickness of Layer (m) | Soil Description | SPT Value N- Value | Remarks |
|---|---|---|---|---|---|---|---|
| 2.0 | 0.5, 1.0, 1.5, 2.0, 3.0, 4.0 | D, U, D, D | | 4.0 | Medium light brown to brown fat Silty CLAY with white spots of soluble salts & rusty traces of iron oxide compounds. | (6), (6), (6) | (3,4,5), (2,4,4), (3,3,4) |
| | 4.5, 5.0, 6.0 | U, D, D | | 2.5 | Medium light green to light gray fine grained Clayey Silty SAND with white traces of soluble salts & black spots of organic matter. | (17), (21) | (7,8,10), (10,10,12) |
| | 7.0, 7.5, 8.0, 9.0, 10.0, 10.5 | D, D, D | | 4.0 | Medium to dense gray to grayish brown fine grained Silty SAND with white spots of soluble salts and rusty traces of iron oxide compounds. | (20), (25), (46) | (8,9,12), (6,10,15), (12,21,25) |
| | 11.0, 12.0 | D, D | | 1.5 | Dense grayish brown fine grained Clayey Silty SAND with white spots of soluble salts. | (20) | (7,9,11) |
| | 13.0, 13.5, 14.0 | D | | 2.0 | Stiff light green Sandy fat Silty CLAY with a lot of white spots of gypsiferrous materials. | (29) | (8,12,17) |
| | 15.0, 16.0, 16.5, 17.0, 18.0 | D, D | | 4.0 | Stiff to very stiff brown Sandy fat Silty CLAY with rusty spots of iron oxide compounds and white crystal of mica minerals. | (32), (50), (53) | (10,13,19), (25,21,29), (18,25,28) |
| | 19.0, 19.5, 20.0, 21.0 | D, D | | 3.0 | Very stiff yellowish green fat Silty CLAY with white spots of soluble salts and some fine grained Sand | (57), (73) | (16,27,30), (15,23,50) |
| | 22.0, 22.5, 23.0 | D, D | | 2.0 | Very stiff to hard gray Sandy fat Silty CLAY with white spots of soluble salts and rusty traces of iron oxide compounds. | (87), (100) | (19,38,49), (17,40,50/12) |
| | 24.0, 25.0, 25.5, 26.0, 27.0 | D, D, D | | 4.5 | Hard to very stiff green fat Silty CLAY interbeded by thin seams pockets of fine grained Sand with white traces of carbonate comopunds. | (67), (68) | (15,25,42), (17,29,39) |
| | 28.0, 28.5, 29.0, 30.0 | D, D, D | | 3.0 | Hard greenish brown to brownish green Sandy fat Silty CLAY with rusty traces of iron oxide compounds and white shiny crystallized silica minerals spots. | (50/12), (74) | (50/12), (27,35,39) |




Scale - 1 : 150 Undisturbed Sample - U Disturbed Sample : - D Bulk Sample - B Core Sample - C

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# BOREHOLE LOG

**Site** .... *Samawa Combined Cycle P.P.* .... **Method of Boring** .... *Auger & Rotary* ....

**Borehole No.** ..... *57* ..... **Date** ..... *02/05/2017* .....

**X:** ..... *525878.531* ..... **Y:** ..... *3454412.998* ..... **Ground Level** ..... *10.175* .....

| Water Table Level | Depth (m) | Sample Type & Depth | Litho logy | Thickness of Layer (m) | Soil Description | SPT Value N- Value | Remarks |
|---|---|---|---|---|---|---|---|
| | 0.5 | D | | 1.0 | Loose brown fine grained Clayey Silty SAND with white spots of soluble salts. | (8) | (3,5,6) |
| | 1.0 | U | | | | (7) | (2,4,6) |
| | 1.5 | D | | | | | |
| 2.0 ▽ | 2.0 | | | 2.5 | Medium brown fat Silty CLAY with gray pockets of fine Sand and white spots of soluble salts together with black traces of organic matter. | (14) | (3,8,9) |
| | 3.0 | D | | | | | |
| | 3.5 | | | | | | |
| | 4.0 | U | | 2.0 | Stiff brownish gray fat Silty CLAY with black spots of organic matter and rusty traces of iron oxide compounds. | (18) | (6,8,11) |
| | 4.5 | D | | | | | |
| | 5.0 | | | | | | |
| | 5.5 | | | | | | |
| | 6.0 | D | | | | (35) | (8,12,25) |
| | 7.0 | | | 3.5 | Medium to dense gray to brownish gray fine grained Clayey Silty SAND with rusty traces of iron oxide compounds. | (47) | (12,22,27) |
| | 7.5 | D | | | | | |
| | 8.0 | | | | | | |
| | 9.0 | D | | | | (94) | (19,35,50/12) |
| | 9.0 | | | 4.5 | Very dense light brownish gray fine to medium grained Silty SAND with rusty spots of iron oxide compounds. | | |
| | 10.0 | | | | | | |
| | 10.5 | D | | | | (72) | (22,30,42) |
| | 11.0 | | | | | | |
| | 12.0 | D | | | | (70) | (16,32,38) |
| | 13.0 | | | | | | |
| | 13.5 | D | | | | (73) | (14,40,33) |
| | 13.5 | | | 1.5 | Very stiff to hard light green Sandy fat Silty CLAY with reddish lines/traces of iron oxide compounds and a lot of white shiny sheets of mica minerals. | | |
| | 14.0 | | | | | | |
| | 15.0 | D | | | | (61) | (19,28,33) |
| | 15.0 | | | 3.0 | Very dense brownish gray to grayish brown fine grained Silty SAND with rusty spots of iron oxide compound. | | |
| | 16.0 | | | | | | |
| | 16.5 | D | | | | (50/11) | (50/11) |
| | 17.0 | | | | | | |
| | 18.0 | D | | | | (71) | (17,33,39) |
| | 18.0 | | | 2.0 | Very stiff to hard light gray Sandy fat Silty CLAY with shiny crystals of soluble salts. | | |
| | 19.0 | | | | | | |
| | 20.0 | D | | | | (76) | (20,35,41) |
| | 20.0 | | | 1.5 | Very dense light brownish gray fine grained Silty SAND with shiny angular quartz pieces. | | |
| | 21.0 | | | | | | |
| | 21.5 | D | | | | (89) | (22,39,50) |
| | 21.5 | | | 6.0 | Hard yellowish green Sandy fat Silty CLAY with alot of white shiny crystallized sheets of mica minerals and white cementation formation. | | |
| | 22.0 | | | | | | |
| | 23.0 | D | | | | (50/13) | (50/13) |
| | 24.0 | | | | | | |
| | 24.5 | D | | | | (50/8) | (50/8) |
| | 25.0 | | | | | | |
| | 26.0 | D | | | | (50/11) | (50/11) |
| | 27.0 | | | | | | |
| | 27.5 | D | | | | (76) | (20,31,45) |
| | 27.5 | | | 2.5 | Hard light brown to brown fat Silty CLAY with gray pockets of fine grained Sand in parts and a lot of white spots of gypsiferrous materials. | | |
| | 28.0 | | | | | | |
| | 29.0 | | | | | | |
| | 29.5 | D | | | | (96) | (23,40,50/13) |
| | 30.0 | | | | | | |

Scale - 1 : 150 Undisturbed Sample - U Disturbed Sample : - D Bulk Sample - B Core Sample - C

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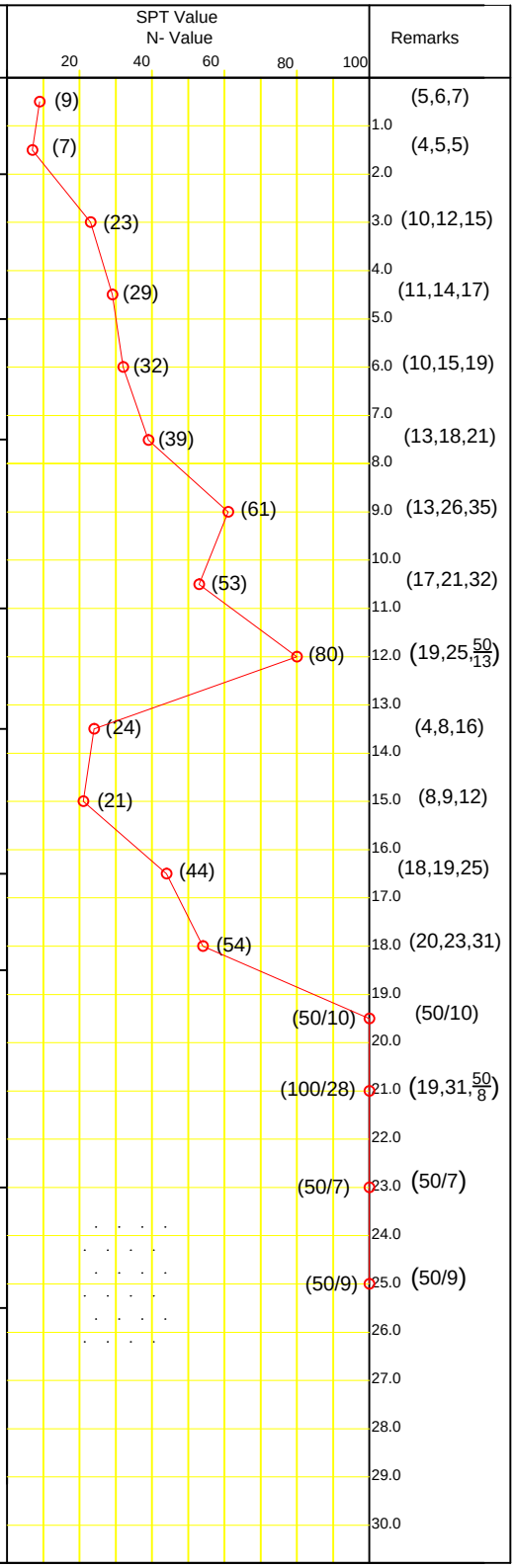
# BOREHOLE LOG

**Site** .... *Samawa Combined Cycle P.P.* .... **Method of Boring** .... *Auger & Rotary* ....

**Borehole No.** ..... *58* ..... **Date** ..... *02/05/2017* .....

**X:** ..... *525923.806* ..... **Y:** ..... *3454440.479* ..... **Ground Level** ..... *10.873* .....

| Water Table Level | Depth (m) | Sample Type & Depth | Litho logy | Thickness of Layer (m) | Soil Description | SPT Value N- Value | Remarks |
|---|---|---|---|---|---|---|---|
| 1.80 | 0.5, 1.0, 1.5, 2.0 | D, U, D | | 2.0 | Medium brown Sandy fat Silty CLAY with black spots of organic matter & white traces of soluble salts. | (9), (7) | (5,6,7), (4,5,5) |
| | 3.0, 4.0, 4.5, 5.0 | D, U, D | | 3.0 | Medium to stiff brown fat Silty CLAY with alot of black spots of organic matter & white traces of soluble salts. | (23), (29) | (10,12,15), (11,14,17) |
| | 6.0, 7.0, 7.5 | D | | 2.5 | Medium to dense grayish brown fine grained Clayey Silty SAND mixture with rusty spots of iron oxide compounds. | (32), (39) | (10,15,19), (13,18,21) |
| | 8.0, 9.0, 10.0, 10.5, 11.0 | D, D, D | | 3.5 | Dense to very dense grayish brown fine to medium grained Silty SAND with white shiny sheets of mica minerals and rusty traces of iron oxide compounds. | (61), (53) | (13,26,35), (17,21,32) |
| | 12.0, 13.0, 13.5 | D, D | | 2.5 | Very dense grayish green to yellowish green fine grained Silty SAND with white spots of soluble salts and rusty traces of iron oxide compounds. | (80), (24) | (19,25,50/13), (4,8,16) |
| | 14.0, 15.0, 16.0, 16.5 | D, D | | 3.0 | Stiff to very stiff brownish gray mixture of Sandy fat Silty CLAY with a lot of white spots of cementation formation and rusty traces of iron oxide compounds. | (21), (44) | (8,9,12), (18,19,25) |
| | 17.0, 18.0, 18.5 | D, D | | 2.0 | Very stiff light yellow to greenish yellow fat Silty CLAY with rusty spots of iron oxide compounds. | (54) | (20,23,31) |
| | 19.0, 19.5, 20.0, 21.0, 22.0, 23.0 | D, D | | 4.5 | Hard dark brownish green mixture of Sandy fat Silty CLAY with white cementation formation and brownish rusty lines/traces of iron oxide compounds. | (50/10), (100/28), (50/7) | (50/10), (19,31,50/8), (50/7) |
| | 24.0, 25.0, 25.5 | D | | 2.5 | Very dense dark green fine grained Clayey Silty SAND mixture with white cementation formation compounds. | (50/9) | (50/9) |




Scale - 1 : 150 Undisturbed Sample - U Disturbed Sample : - D Bulk Sample - B Core Sample - C

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# BOREHOLE LOG

**Site** .... *Samawa Combined Cycle P.P.* .... **Method of Boring** .... *Auger & Rotary* ....

**Borehole No.** ..... *59* ..... **Date** ..... *12/05/2017* .....

**X:** ..... *525993.696* ..... **Y:** ..... *3454431.451*..... **Ground Level** ..... *11.566* .....

| Water Table Level | Depth (m) | Sample Type & Depth | Litho logy | Thickness of Layer (m) | Soil Description | SPT Value N- Value | Remarks |
|---|---|---|---|---|---|---|---|
| 2.0 | 0.5, 1.0, 1.5, 2.0, 3.0 | D, U, D | | 3.5 | Medium brown fat Silty CLAY with white spots of soluble salts and black traces of organic matter together with gray fine grained Sand at bottom. | (8), (6) | (4,4,7), (3,3,4) |
| | 4.0, 4.5, 5.0, 6.0 | D, D | | 3.0 | Loose to medium green fine grained Silty SAND with white spots of soluble salts and rusty traces of iron oxide compounds. | (14), (22) | (7,8,9), (8,10,13) |
| | 7.0, 7.5, 8.0, 9.0 | D, D | | 2.5 | Medium to dense green to light green fine grained Silty SAND with rusty traces of iron oxide compounds. | (38), (45) | (12,17,21), (13,20,25) |
| | 10.0, 10.5, 11.0 | D, D | | 2.0 | Dense to very dense light green to brownish green fine grained Clayey Silty SAND mixture. | (52), (52) | (20,25,27), (18,23,29) |
| | 12.0, 13.0, 13.5, 14.0 | D, D | | 3.0 | Very dense brownish gray fine to medium grained Silty SAND with rusty spots of iron oxide compounds. | (60) | (25,28,32) |
| | 15.0, 16.0, 16.5, 17.0, 18.0 | D, D, D | | 4.0 | Very stiff to hard green Sandy fat Silty CLAY with rusty traces of iron oxide compounds and white shiny cementation formation compounds. | (50/13), (100/28), (50/14) | (50/13), (29,43,50/11), (50/14) |
| | 19.0, 20.0, 21.0, 22.0, 22.5, 23.0 | D, D, D | | 4.5 | Hard dark green Sandy fat Silty CLAY with white shiny cementation formation compounds and rusty spots of iron oxide compounds. | (50/10), (50/12) | (50/10), (50/12) |
| | 24.0, 25.0, 26.0 | D | | 3.0 | Very dense light green well cemented fine grained Clayey Silty SAND mixture with shiny crystals of soluble salts . | (50/8) | (50/8) |
| | 27.0, 27.5, 28.0, 29.0, 30.0 | D, D | | 5.0 | Hard gray to yellowish green fat Silty CLAY with rusty spots of iron oxide compounds and white traces of iron oxide compounds. | (94), (50/8) | (24,35,50/12), (50/8) |

Scale - 1 : 150 Undisturbed Sample - U Disturbed Sample : - D Bulk Sample - B Core Sample - C

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# BOREHOLE LOG

**Site** .... *Samawa Combined Cycle P.P.* .... **Method of Boring** .... *Auger & Rotary* ....

**Borehole No.** ..... *60* ..... **Date** ..... *12/05/2017* .....

**X:** ..... *525963.422* ..... **Y:** ..... *3454369.768* ..... **Ground Level** ..... *10.851* .....

| Water Table Level | Depth (m) | Sample Type & Depth | Litho logy | Thickness of Layer (m) | Soil Description | SPT Value N- Value | Remarks |
|---|---|---|---|---|---|---|---|
| 1.90 | 0.5, 1.0, 1.5, 2.0 | D, U | | 2.0 | Loose brown to grayish brown fine grained Clayey Silty SAND with white spots of soluble salts . | (10), (4) | (4,6,8) |
| | 3.0, 4.0, 4.5 | D, U, D | | 2.5 | Medium to soft brown fat Silty CLAY with white spots of soluble salts and black traces of organic matter. | (18) | (2,3,2) |
| | 5.0, 6.0, 7.0, 7.5 | D, D | | 3.0 | Medium yellowish green to green fine grained Silty SAND with rusty traces of iron oxide compounds. | (24), (29) | (6,8,11) (8,10,15) |
| | 8.0, 9.0 | D, D | | 1.5 | Medium to dense brownish green fine grained Clayey Silty SAND with little rusty traces of iron oxide compounds. | (21) | (7,14,17) (9,10,11) |
| | 10.0, 10.5, 11.0, 12.0, 12.5 | D, D | | 3.5 | Medium to dense brownish gray to brownish light green fine to medium grained Silty SAND with white spots of soluble salts. | (36), (45) | (12,15,21) (8,13,32) |
| | 13.0, 14.0, 14.5 | D | | 2.0 | Dense to very dense light brownish gray fine grained Clayey Silty SAND with rusty spots of iron oxide compounds. | (64) | (15,32,32) |
| | 15.0, 16.0, 17.0, 18.0 | D | | 3.5 | Very stiff to hard yellowish light green Sandy fat Silty CLAY with reddish traces of iron oxide compounds and a lot of white shiny crystals of silica minerals. | (88), (50) | (18,29,50/12) (11,19,31) |
| | 19.0, 20.0, 20.5 | D, D | | 2.5 | Very stiff yellowish green fat Silty CLAY with shiny crystals of quartz and reddish rusty traces of iron oxide compounds. | (49) | (13,19,30) |
| | 21.0, 22.0, 22.5, 23.0 | D | | 2.5 | Very dense light green fine grained Clayey Silty SAND mixture with shiny spots of gypsiferrous materials. | (79) | (28,33,46) |
| | 24.0, 25.0, 26.0, 27.0, 27.5 | D | | 4.5 | Hard grayish green Sandy fat Silty CLAY mixture with a lot of white shiny crystallized sheets of mica minerals. | (82), (89) | (22,40,42) (26,30,50/12) |
| | 28.0, 29.0, 30.0, 30.5 | D | | 3.0 | Hard light green to greenish gray fat Silty CLAY with white cementation formation and rusty traces of iron oxide compounds together with fine grained Sand. | (100/26) | (20,41,50/9) |

Scale - 1 : 150 Undisturbed Sample - U Disturbed Sample : - D Bulk Sample - B Core Sample - C

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# BOREHOLE LOG

**Site** .... *Samawa Combined Cycle P.P.* .... **Method of Boring** .... *Auger & Rotary* ....

**Borehole No.** ..... *61* ..... **Date** ..... *12/05/2017* .....

**X:** ..... *526009.714* ..... **Y:** ..... *3454402.960* ..... **Ground Level** ..... *11.412* .....

| Water Table Level | Depth (m) | Sample Type & Depth | Litho logy | Thickness of Layer (m) | Soil Description | SPT Value N- Value | Remarks |
|---|---|---|---|---|---|---|---|
| 1.85 | 0.5, 1.0, 1.5, 2.0, 3.0, 4.0, 4.5, 5.0, 6.0, 7.0, 7.5, 8.0, 9.0, 10.0, 10.5, 11.0, 12.0, 13.0, 14.0, 15.0, 16.0, 17.0, 18.0, 19.0, 20.0, 21.0, 22.0, 23.0, 24.0, 25.0, 26.0, 27.0, 28.0, 29.0, 30.0 | D, U, D, U, D, D, D, D, D, D, D, D, D, D, D | | 3.5 | Medium brown lean Silty CLAY with white spots of soluble salts and black traces of organic matter. | (7), (8), (14), (27), (35), (22), (43), (44), (57), (50/14), (78), (69) | (3,4,6), (4,5,5), (6,8,7), (10,14,14), (12,16,21), (9,13,9), (24,19,24), (20,21,23), (14,27,30), (50/14), (14,20,50/12), (23,29,40) |
| | | | | 1.5 | Medium to stiff grayish brown Sandy fat Silty CLAY mixture with white spots of soluble salts and black traces of organic matter. | | |
| | | | | 4.0 | Medium to dense light grayish green fine grained mixture of Clayey Silty SAND with rusty traces of iron oxide compounds. | | |
| | | | | 1.5 | Medium to dense grayish green fine grained Silty SAND with rusty spots of iron oxide compounds. | | |
| | | | | 2.0 | Dense brownish gray mixture of fine grained Clayey Silty SAND with white spots of cementation formation. | | |
| | | | | 4.0 | Very stiff to hard brownish yellow Sandy fat Silty CLAY mixture with a lot of white spots of cementation formation. | | |
| | | | | 2.0 | Very dense yellowish green well cemented fine grained Clayey Silty SAND mixture. | | |
| | | | | 2.0 | Very stiff to hard light green Sandy fat Silty CLAY with a lot of white shiny sheets of mica minerals & rusty spots of iron oxide compounds. | | |

SPT Value N- Value: 20, 40, 60, 80, 100

Scale - 1 : 150 Undisturbed Sample - U Disturbed Sample : - D Bulk Sample - B Core Sample - C

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# BOREHOLE LOG

**Site** .... *Samawa Combined Cycle P.P.* .... **Method of Boring** .... *Auger & Rotary* ....

**Borehole No.** ..... *62* ..... **Date** ..... *13/05/2017* .....

**X:** ..... *526009.080* ..... **Y:** ..... *3454339.422* ..... **Ground Level** ..... *11.258* .....

| Water Table Level | Depth (m) | Sample Type & Depth | Litho logy | Thickness of Layer (m) | Soil Description | SPT Value N- Value | Remarks |
|---|---|---|---|---|---|---|---|
| 1.80 | 0.5, 1.0, 1.5, 2.0 | D, U | | 2.0 | Medium dark brown Sandy fat Silty CLAY with black spots of organic matter & white traces of soluble salts. | (7) | (3,5,5) |
| | 3.0, 4.0, 4.5 | D, U, D | | 2.5 | Medium brown to brownish gray fat Silty CLAY with black spots of organic matter and white tiny marine shell pieces. | (6) | (3,3,4) |
| | 5.0, 6.0, 7.0, 7.5 | D, D | | 3.0 | Medium yellowish green fine grained Clayey Silty SAND mixture with rusty spots of iron oxide compounds. | (15), (17), (22) | (4,7,9), (6,8,8), (10,10,13) |
| | 8.0, 9.0, 10.0, 10.5, 11.0, 12.0 | D, D, D | | 4.5 | Medium to dense light gray to gray fine grained Silty SAND with white shiny sheets of mica minerals. | (22), (25), (35) | (7,9,13), (8,11,14), (10,16,19) |
| | 13.0, 13.5, 14.0 | D, D | | 2.0 | Dense gray to light gray fine grained Silty SAND with alot of white cementation formation. | (40) | (13,18,22) |
| | 15.0, 16.0, 16.5, 17.0, 18.0 | D, D, D, D | | 4.0 | Very stiff light brown Sandy fat Silty CLAY with white spots of soluble salts and rusty traces of iron oxide compounds. | (49), (44), (28) | (18,22,27), (16,21,23), (10,11,17) |
| | 19.0, 19.5, 20.0, 21.0, 22.0, 23.0 | D, D, D, D | | 5.0 | Very stiff yellowish green to light green Sandy fat Silty CLAY with a lot of white spots of cementation formation and rusty traces of iron oxide compounds. | (37), (37), (87) | (15,16,21), (13,12,25), (10,17,50/8) |
| | 24.0, 25.0, 25.5, 26.0, 27.0, 28.0, 29.0, 30.0 | D, D | | 2.5 | Hard greenish green mixture of Sandy fat Silty CLAY with white cementation formation and brownish rusty lines/traces of iron oxide compounds together with black spots of organic matter. | (63) | (18,27,36) |

Scale - 1 : 150 Undisturbed Sample - U Disturbed Sample : - D Bulk Sample - B Core Sample - C

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# BOREHOLE LOG

**Site** .... *Samawa Combined Cycle P.P.* .... **Method of Boring** .... *Auger & Rotary* ....

**Borehole No.** ..... *63* ..... **Date** ..... *11/05/2017* .....

**X:** ..... *526085.470* ..... **Y:** ..... *3454336.608* ..... **Ground Level** ..... *11.420* .....

| Water Table Level | Depth (m) | Sample Type & Depth | Litho logy | Thickness of Layer (m) | Soil Description | SPT Value N- Value | Remarks |
|---|---|---|---|---|---|---|---|
| 1.80 | 0.5, 1.0, 1.5, 2.0, 3.0 | D, U, D, D | | 3.5 | Medium light brown to brown fat Silty CLAY with black spots of organic matter & white traces of soluble salts. | (10), (11), (8) | (3,6,8), (4,6,10), (4,4,6) |
| | 4.0, 4.5, 5.0, 6.0 | U, D, D | | 3.0 | Medium brown to brownish light gray Sandy fat Silty CLAY with black spots of organic matter and rusty traces of iron oxide compounds. | (5), (6) | (1,2,3), (2,2,4) |
| | 7.0, 7.5, 8.0 | D | | 2.5 | Loose to medium gray fine grained Clayey Silty SAND mixture with rusty spots of iron oxide compounds. | (24) | (9,10,15) |
| | 9.0, 10.0, 10.5, 11.0, 12.0, 13.0, 13.5, 14.0 | D, D, D, D, D | | 5.0 | Very dense light gray fine to medium grained Silty SAND with white shiny sheets of mica minerals and alot of white cementation formation compounds. | (58), (51), (53), (60) | (14,19,39), (15,20,31), (22,25,28), (16,28,22) |
| | 15.0, 16.0, 17.0, 17.5 | D, D, D | | 3.5 | Very stiff to hard yellowish green Sandy fat Silty CLAY with white spots of cementation formation and rusty traces of iron oxide compounds. | (50/8), (69) | (50/8), (21,22,47) |
| | 18.0, 19.0, 20.0, 21.0, 21.5 | D, D, D | | 4.0 | Very stiff to hard brownish green Sandy fat Silty CLAY with a lot of white spots of cementation formation and rusty traces of iron oxide compounds. | (38), (50/7) | (10,13,25), (50/7) |
| | 22.0, 23.0, 23.5 | D | | 2.0 | Very dense yellowish green to dark green mixture of Clayey Silty SAND with rusty spots of iron oxide compounds. | (64) | (22,20,44) |
| | 24.0, 25.0, 25.5 | D | | 2.0 | Hard light brownish gray mixture of Sandy fat Silty CLAY with white cementation formation and brownish rusty lines/traces of iron oxide compounds. | (50/10) | (50/10) |

Scale - 1 : 150 Undisturbed Sample - U Disturbed Sample : - D Bulk Sample - B Core Sample - C

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# BOREHOLE LOG

**Site** .... *Samawa Combined Cycle P.P.* .... **Method of Boring** .... *Auger & Rotary* ....

**Borehole No.** ..... *64* ..... **Date** ..... *12/05/2017* .....

***X:*** *.....526049..445* ..... ***Y:*** *.....3454331.389* ..... ***Ground Level*** *.....11.363.....*

| Water Table Level | Depth (m) | Sample Type & Depth | Litho logy | Thickness of Layer (m) | Soil Description | SPT Value N- Value | Remarks |
|---|---|---|---|---|---|---|---|
| 1.65 | 0.5, 1.0, 1.5, 2.0 | D, U | | 2.0 | Loose grayish brown mixture of fine grained Clayey Silty SAND with white spots of soluble salts. | (9) | (4,6,7) |
| | 3.0, 4.0, 4.5 | D, U | | 2.5 | Medium brown to dark brown fat Silty CLAY with black spots of organic matter & white traces of soluble salts. | (11), (9) | (5,5,8), (4,4,5) |
| | 5.0, 6.0 | D | | 1.5 | Loose to medium light gray fine grained Clayey Silty SAND with rusty spots of iron oxide compounds and white traces of soluble salts. | (22) | (9,10,13) |
| | 7.0, 7.5, 8.0, 9.0 | D | | 3.0 | Medium, dense to very dense gray to brownish gray fine to medium grained Silty SAND with white shiny spots of soluble salts & little Silt fraction. | (55), (65) | (25,28,30), (27,30,35) |
| | 10.0, 10.5 | D | | 1.5 | Very dense grayish brown fine grained Clayey Silty SAND with white cementation formation. | (56) | (17,26,30) |
| | 11.0, 12.0, 13.0, 13.5, 14.0, 15.0 | D | | 5.0 | Very dense brownish gray fine to medium grained Silty SAND with alot of white cementation formation. | (69), (66), (53) | (28,36,33), (23,31,35), (22,25,28) |
| | 16.0, 17.0, 18.0, 19.0, 20.0, 21.0 | D | | 5.5 | Very stiff light green to brownish gray Sandy fat Silty CLAY with a lot of white spots of cementation formation and rusty traces of iron oxide compounds. | (68), (36), (50/12) | (30,31,37), (14,15,21), (50/12) |
| | 22.0, 23.0, 23.5 | D | | 2.5 | Hard light grayish green mixture of Sandy fat Silty CLAY with white cementation formation and brownish rusty lines/traces of iron oxide compounds. | (50/14) | (50/14) |
| | 24.0, 25.0, 25.5 | D | | 2.0 | Very dense light brown mixture of fine grained Clayey Silty SAND with alot of white cementation formation compounds. | (50/10) | (50/10) |
| | 26.0, 27.0, 28.0, 29.0, 30.0 | | | | | | |

Scale - 1 : 150 Undisturbed Sample - U Disturbed Sample : - D Bulk Sample - B Core Sample - C

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# BOREHOLE LOG

**Site** .... *Samawa Combined Cycle P.P.* .... **Method of Boring** .... *Auger & Rotary* ....

**Borehole No.** ..... *65* ..... **Date** ..... *10/05/2017* .....

**X:** .....*526155.677* ..... **Y:** .....3454304.869 ..... **Ground Level** .....11.414 .....

| Water Table Level | Depth (m) | Sample Type & Depth | Litho logy | Thickness of Layer (m) | Soil Description | SPT Value N- Value | Remarks |
|---|---|---|---|---|---|---|---|
| 1.80 | 0.5, 1.0, 1.5, 2.0 | D, U, D | | 2.0 | Medium brown Sandy fat Silty CLAY with black spots of organic matter & white traces of soluble salts . | (6), (5) | (2,4,5), (3,3,4) |
| | 3.0, 4.0, 4.5 | D, U, D | | 2.5 | Medium to soft brown fat Silty CLAY with rusty spots of iron oxide compounds and white cementation formation. | (3), (5) | (1,2,2), (2,2,3) |
| | 5.0, 6.0 | D | | 2.0 | Medium brownish gray Sandy lean Silty CLAY with white shiny spots of soluble salts. | (10) | (4,5,6) |
| | 7.0, 7.5, 8.0, 9.0, 10.0, 10.5, 11.0 | D, D, D | | 4.5 | Medium, dense to very dense brownish gray fine to medium grained SAND with little Silt fraction and rusty spots of iron oxide compounds. | (26), (38), (57) | (10,12,15), (15,22,30), (24,25,32) |
| | 12.0, 13.0, 13.5, 14.0, 15.0 | D, D | | 4.0 | Very dense green fine grained Silty SAND with white spots of soluble salts and reddish traces of iron oxide compounds. | (53), (62), (70) | (26,24,29), (22,27,35), (25,33,37) |
| | 16.0, 17.0, 17.5 | D, D | | 2.5 | Very stiff to hard yellowish light green fat Silty CLAY with white cementation formation. | (50/13) | (50/13) |
| | 18.0, 19.0, 20.0, 21.0, 21.5 | D, D | | 4.0 | Very stiff to hard dark gray mixture of Sandy fat Silty CLAY with a lot of white spots of cementation formation and rusty traces of iron oxide compounds. | (49), (50/10) | (11,24,25), (50/10) |
| | 22.0, 23.0, 23.5 | D | | 2.0 | Very dense light green well cementation fine grained Clayey Silty SAND mixture | (50/14) | (50/14) |
| | 24.0, 25.0, 25.5 | D | | 2.0 | Hard yellowish green Sandy fat Silty CLAY with white cementation formation and black spots of organic matter. | (50/9) | (50/9) |

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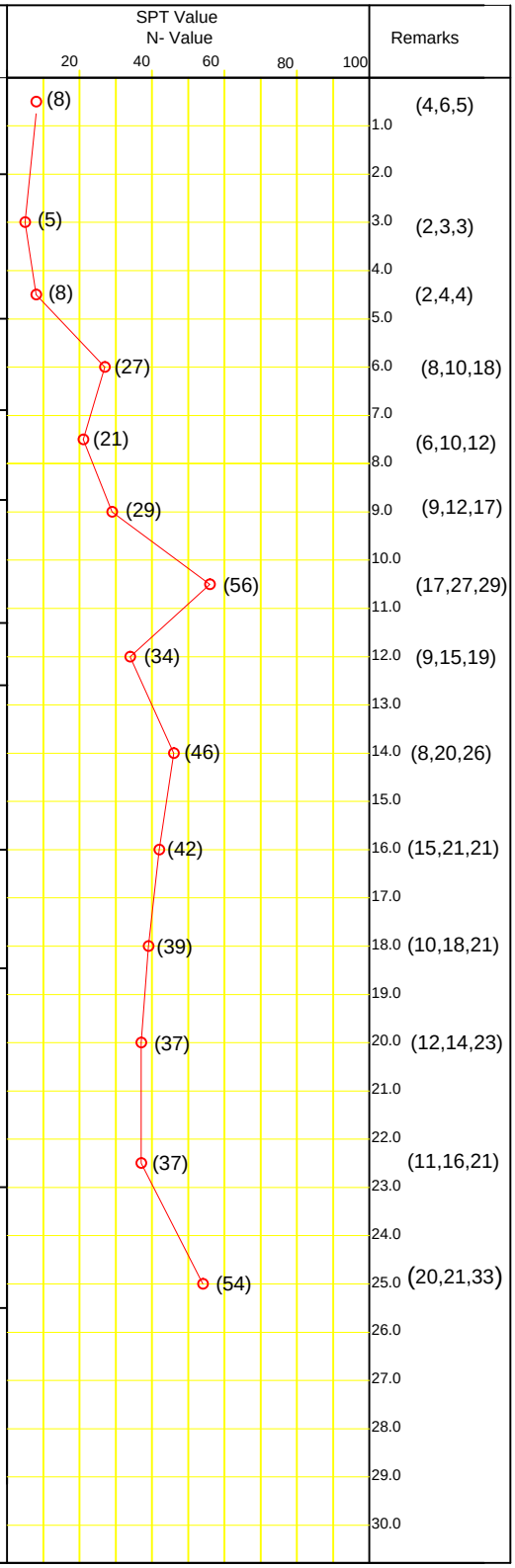
# BOREHOLE LOG

**Site** .... *Samawa Combined Cycle P.P.* .... **Method of Boring** .... *Auger & Rotary* ....

**Borehole No.** ..... *66* ..... **Date** ..... *09/05/2017* .....

**X:** ..... *526161.409* ..... **Y:** ..... *3454259.716* ..... **Ground Level** ..... *11.423* .....

| Water Table Level | Depth (m) | Sample Type & Depth | Litho logy | Thickness of Layer (m) | Soil Description | SPT Value N- Value | Remarks |
|---|---|---|---|---|---|---|---|
| 1.90 | 0.5, 1.0, 1.5, 2.0 | D, U | | 1.5 | Medium dark brown Sandy fat Silty CLAY with white spots of soluble salts and black traces of organic matter. | (8) | (4,6,5) |
| | 3.0, 4.0, 4.5, 5.0 | D, U, D | | 3.5 | Medium brown lean Silty CLAY with white spots of soluble salts and black spots of organic matter. | (5), (8) | (2,3,3), (2,4,4) |
| | 6.0, 6.5 | D | | 1.5 | Loose to medium yellowish green gray fine grained Clayey Silty SAND with white spots of soluble salts. | (27) | (8,10,18) |
| | 7.5, 8.0 | D | | 1.5 | Stiff to very stiff grayish green Sandy fat Silty CLAY mixture with white spots of soluble salts. | (21) | (6,10,12) |
| | 9.0, 10.0, 10.5, 11.0 | D | | 2.5 | Medium, dense to very dense brownish gray fine grained Clayey Silty SAND with rusty spots of iron oxide compounds. | (29), (56) | (9,12,17), (17,27,29) |
| | 12.0, 12.0 | D | | 1.5 | Very dense grayish brown fine grained Silty SAND. | (34) | (9,15,19) |
| | 13.0, 14.0, 15.0, 16.0 | D | | 4.0 | Very stiff brown Sandy fat Silty CLAY mixture with white shiny sheets of mica minerals. | (46), (42) | (8,20,26), (15,21,21) |
| | 17.0, 18.0, 18.0 | D | | 2.0 | Very stiff light green Sandy fat Silty CLAY mixture with white shiny spots of gypsiferrous materials & rusty spots of iron oxide compounds. | (39) | (10,18,21) |
| | 19.0, 20.0, 21.0, 22.0, 22.5, 23.0 | D | | 5.0 | Very stiff green to dark green Sandy fat Silty CLAY with a lot of white cementation formation of gypsiferrous materials and rusty traces of iron oxide compounds. | (37), (37) | (12,14,23), (11,16,21) |
| | 24.0, 25.0, 25.5 | D | | 2.5 | Very stiff light brownish green fat Silty CLAY with rusty spots of iron oxide compounds. | (54) | (20,21,33) |




Scale - 1 : 150 Undisturbed Sample - U Disturbed Sample : - D Bulk Sample - B Core Sample - C

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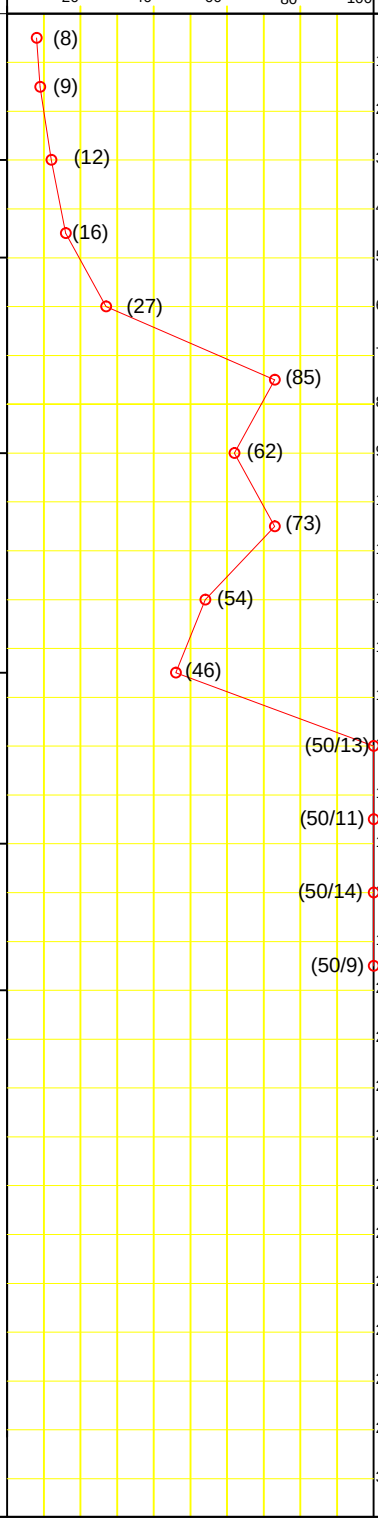
# BOREHOLE LOG

**Site** .... *Samawa Combined Cycle P.P.* .... **Method of Boring** .... *Auger & Rotary* ....

**Borehole No.** ..... *67* ..... **Date** ..... *02/05/2017* .....

**X:** ..... *525804.087*..... **Y:** ..... *3454506.871* ..... **Ground Level** ..... *9.974* .....

| Water Table Level | Depth (m) | Sample Type & Depth | Litho logy | Thickness of Layer (m) | Soil Description | SPT Value N- Value | Remarks |
|---|---|---|---|---|---|---|---|
| 2.0 | 0.5, 1.0, 1.5, 2.0 | D, U, D | | 2.0 | Medium brown fat Silty CLAY interbeded by thin seams of fine grained Sand with black spots of organic matter and white shiny traces of soluble salts. | (8), (9) | (3,5,6), (4,6,7) |
| | 3.0, 4.0, 4.5, 5.0 | D, U, D | | 3.0 | Medium brown fat Silty CLAY with rusty spots of iron oxide compounds and white traces of soluble salts.. | (12), (16) | (3,6,8), (7,9,8) |
| | 6.0, 7.0, 7.5, 8.0, 9.0 | D, D, D | | 4.0 | Medium, dense to very dense brownish green to brownish dark gray fine grained Silty SAND with rusty spots of iron oxide compounds. | (27), (85), (62) | (10,13,15), (15,39,50), (17,23,39) |
| | 10.0, 10.5, 11.0, 12.0, 13.0, 13.5 | D, D, D | | 4.5 | Very dense brownish gray fine grained Silty SAND with white spots of soluble salts & rusty traces of iron oxide compounds. | (73), (54), (46) | (19,31,42), (12,19,35), (15,19,27) |
| | 14.0, 15.0, 16.0, 16.5, 17.0 | D, D, D | | 3.5 | Very stiff to hard brown fat Silty CLAY with alot of white cementation formation compounds and rusty traces of iron oxide compounds. | (50/13), (50/11) | (50/13), (39,50/11) |
| | 18.0, 19.0, 19.5, 20.0 | D, D | | 3.0 | Very stiff yellowish green fat Silty CLAY with some fine grained Sand and reddish rusty traces of iron oxide compounds together with white pockets of gypsiferrous materials. | (50/14), (50/9) | (37,50/14), (20,50/9) |




Scale - 1 : 150 Undisturbed Sample - U Disturbed Sample : - D Bulk Sample - B Core Sample - C

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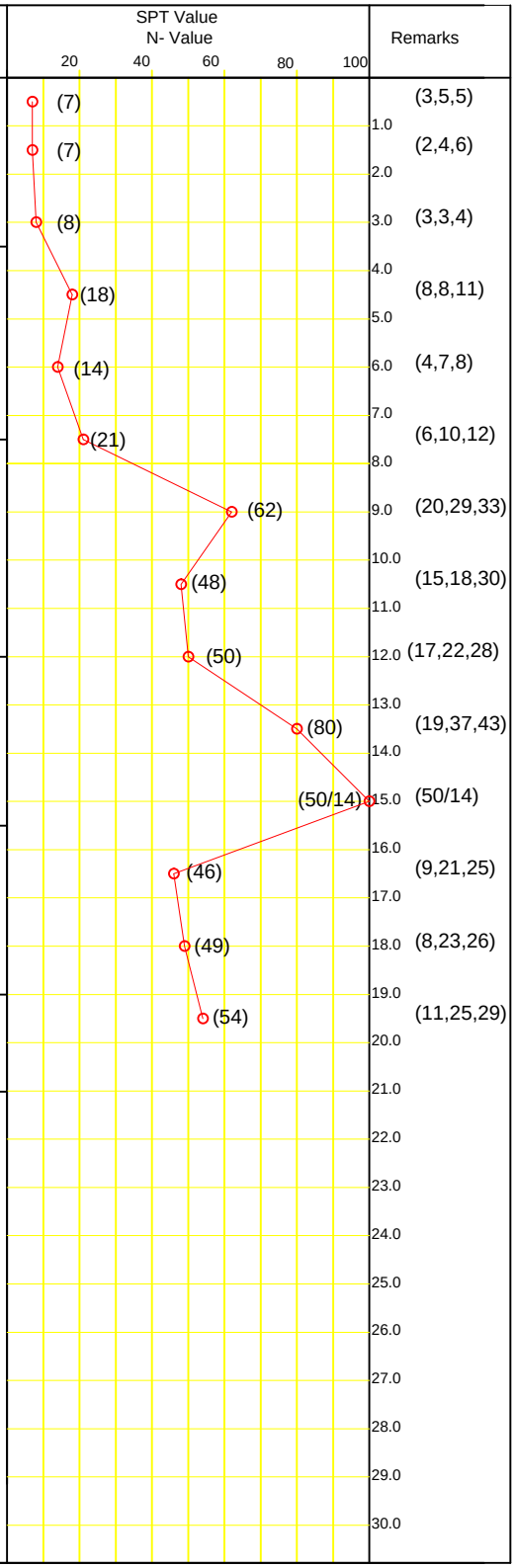
# BOREHOLE LOG

**Site** .... *Samawa Combined Cycle P.P.* .... **Method of Boring** .... *Auger & Rotary* ....

**Borehole No.** ..... *68* ..... **Date** ..... *02/05/2017* .....

**X:** ..... *525834.628*..... **Y:** ..... *3454498.371* ..... **Ground Level** .....*10.165* .....

| Water Table Level | Depth (m) | Sample Type & Depth | Litho logy | Thickness of Layer (m) | Soil Description | SPT Value N- Value | Remarks |
|---|---|---|---|---|---|---|---|
| 1.85 | 0.5, 1.0, 1.5, 2.0, 3.0 | D, U, D, D | | 3.5 | Medium brown fat Silty CLAY with gray fine grained Sand in parts and black spots of organic matter together with rusty traces of iron oxide compounds. | (7), (7), (8) | (3,5,5), (2,4,6), (3,3,4) |
| | 4.0, 4.5, 5.0, 6.0, 7.0, 7.5 | D, D, D | | 4.0 | Loose to medium green fine grained Silty SAND with white spots of soluble salts & reddish rusty traces of iron oxide compounds. | (18), (14), (21) | (8,8,11), (4,7,8), (6,10,12) |
| | 8.0, 9.0, 10.0, 10.5, 11.0, 12.0 | D, D, D, D | | 4.5 | Medium, dense to very dense brownish gray to greenish gray fine grained Silty SAND with rusty spots of iron oxide compounds. | (62), (48), (50) | (20,29,33), (15,18,30), (17,22,28) |
| | 13.0, 13.5, 14.0, 15.0, 15.5 | D, D, D | | 3.5 | Very dense gray to brownish gray fine grained Silty SAND with white spots of soluble salts. | (80), (50/14) | (19,37,43), (50/14) |
| | 16.0, 16.5, 17.0 | D, D | | 1.5 | Very stiff brown to brownish gray Sandy fat Silty CLAY mixture with white shiny crystal of soluble salts & reddish rusty traces of iron oxide compounds. | (46), (49) | (9,21,25), (8,23,26) |
| | 18.0, 19.0, 19.5, 20.0 | D, D, D | | 3.0 | Very stiff brown to dark grayish brown fat Silty CLAY with white spots of silica minerals. | (54) | (11,25,29) |




Scale - 1 : 150 Undisturbed Sample - U Disturbed Sample : - D Bulk Sample - B Core Sample - C

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# BOREHOLE LOG

**Site** .... *Samawa Combined Cycle P.P.* .... **Method of Boring** .... *Auger & Rotary* ....

**Borehole No.** ..... *69* ..... **Date** ..... *13/05/2017* .....

**X:** ..... *525930.623* ..... **Y:** ..... *3454397.022* ..... **Ground Level** .....*10.354* .....

| Water Table Level | Depth (m) | Sample Type & Depth | Litho logy | Thickness of Layer (m) | Soil Description | SPT Value N- Value | Remarks |
|---|---|---|---|---|---|---|---|
| | 0.5 | D | | 1.5 | Loose grayish brown mixture of fine grained Clayey Silty SAND with white spots of soluble salts. | (9) | (3,6,7) |
| 1.85 | 1.5 | U | | 2.0 | Medium brown fat Silty CLAY with black spots of organic matter and reddish rusty traces of iron oxide compounds. | (5) | (2,3,3) |
| | 3.0 | D | | 4.0 | Loose to medium green fine grained Silty SAND with white spots of soluble salts & reddish rusty traces of iron oxide compounds. | (20) | (5,8,13) |
| | 4.5 | D | | | | (15) | (7,7,9) |
| | 6.0 | D | | | | (22) | (8,11,12) |
| | 7.5 | D | | 3.0 | Medium to dense green to greenish gray fine to medium grained Silty SAND with rusty spots of iron oxide compounds. | (35) | (12,17,18) |
| | 9.0 | D | | | | (25) | (14,11,14) |
| | 10.5 | D | | 4.0 | Medium to dense gray to brownish gray fine to medium grained Silty SAND with white spots of soluble salts. | (32) | (10,14,18) |
| | 12.0 | D | | | | (31) | (12,12,19) |
| | 14.0 | D | | 3.5 | Very stiff to hard light green Sandy fat Silty CLAY mixture with white shiny crystal of soluble salts & reddish rusty traces of iron oxide compounds. | (94) | (15,28,50/10) |
| | 16.0 | D | | | | (85) | (12,40,45) |
| | 18.0 | D | | 2.5 | Very stiff light brownish green to grayish green fat Silty CLAY with green pockets of Marly Clay and white spots of carbonate compounds. | (79) | (31,37,42) |
| | 20.0 | D | | | | | |

SPT Value N- Value: 20, 40, 60, 80, 100

Scale - 1 : 150 Undisturbed Sample - U Disturbed Sample : - D Bulk Sample - B Core Sample - C

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# BOREHOLE LOG

**Site** .... *Samawa Combined Cycle P.P.* .... **Method of Boring** .... *Auger & Rotary* ....

**Borehole No.** ...... *70* ...... **Date** ....... *07/05/2017* .......

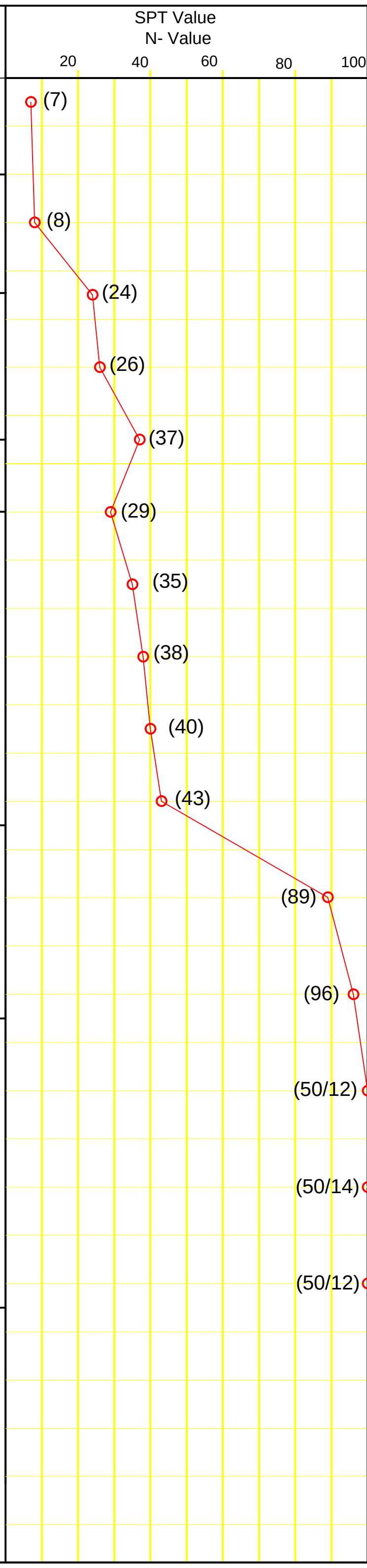
**X:** ..... *525955.865* ..... **Y:** ..... *3454432.681* ..... **Ground Level** ..... *11.254* .....

Water Table Level: 2.0

| Depth (m) | Thickness of Layer (m) | Soil Description |
|---|---|---|
| 0.0 – 2.0 | 2.0 | Medium brown to light brown Sandy lean Silty CLAY mixture with white shiny traces of soluble salts. |
| 2.0 – 4.0 | 2.0 | Medium brown to grayish brown fat Silty CLAY with white spots of soluble salts and black traces of organic matter. |
| 4.0 – 7.5 | 3.5 | Medium to dense light gray fine to medium grained Silty SAND with rusty traces of iron oxide compounds. |
| 7.5 – 9.0 | 1.5 | Dense brownish gray fine to medium grained SAND with little Silt fraction. |
| 9.0 – 15.5 | 6.5 | Dense grayish brown to gray fine to medium grained Silty SAND with yellowish rusty spots of iron oxide compounds and white cementation formation compounds. |
| 15.5 – 19.5 | 4.0 | Very stiff to hard light yellowish green Sandy fat Silty CLAY with a lot of white cementation formation compounds & rusty spots of iron oxide compounds. |
| 19.5 – 25.5 | 6.0 | Hard green to yellowish green Sandy fat Silty CLAY with a lot of white cementation formation compounds. |

| Sample Depth (m) | Sample Type |
|---|---|
| 0.5 – 1.0 | D |
| 1.5 – 2.0 | U |
| 3.0 – 3.5 | D |
| 3.5 – 4.0 | U |
| 4.5 – 5.0 | D |
| 6.0 – 6.5 | D |
| 7.5 – 8.0 | D |
| 9.0 – 9.5 | D |
| 10.5 – 11.0 | D |
| 12.0 – 12.5 | D |
| 13.5 – 14.0 | D |
| 15.0 – 15.5 | D |
| 17.0 – 17.5 | D |
| 19.0 – 19.5 | D |
| 21.0 – 21.5 | D |
| 23.0 – 23.5 | D |
| 25.0 – 25.5 | D |

| Depth (m) | SPT Value N-Value | Remarks |
|---|---|---|
| 0.5 | (7) | (3,4,6) |
| 3.0 | (8) | (4,4,5) |
| 4.5 | (24) | (6,11,14) |
| 6.0 | (26) | (10,12,15) |
| 7.5 | (37) | (12,17,22) |
| 9.0 | (29) | (10,13,16) |
| 10.5 | (35) | (17,13,22) |
| 12.0 | (38) | (17,18,20) |
| 13.5 | (40) | (15,19,21) |
| 15.0 | (43) | (19,20,23) |
| 17.0 | (89) | (18,24,$\frac{50}{10}$) |
| 19.0 | (96) | (22,36,$\frac{50}{12}$) |
| 21.0 | (50/12) | (50/12) |
| 23.0 | (50/14) | (50/14) |
| 25.0 | (50/12) | (50/12) |




Scale - 1 : 150 Undisturbed Sample - U Disturbed Sample : - D Bulk Sample - B Core Sample - C

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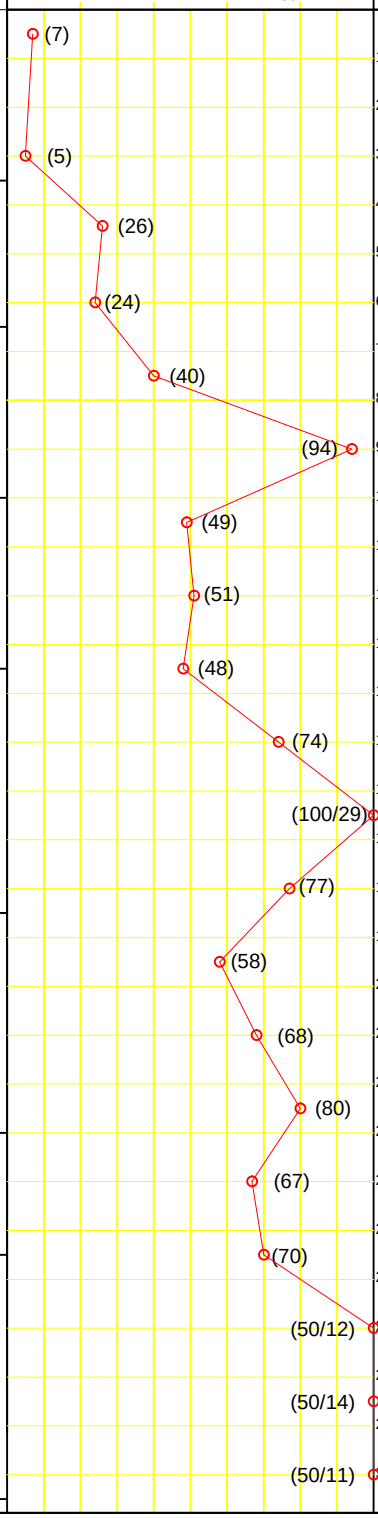
# BOREHOLE LOG

**Site** .... *Samawa Combined Cycle P.P.* .... **Method of Boring** .... *Auger & Rotary* ....

**Borehole No.** ..... *71* ..... **Date** ..... *12/05/2017* .....

**X:** ..... *525975.260* ..... **Y:** ..... *3454403. 992* ..... **Ground Level** ..... *11. 448* .....

| Water Table Level | Depth (m) | Sample Type & Depth | Litho logy | Thickness of Layer (m) | Soil Description | SPT Value N- Value | Remarks |
|---|---|---|---|---|---|---|---|
| 2.0 | 0.5, 1.0, 1.5, 2.0, 3.0 | D, U, D | | 3.5 | Medium brown fat Silty CLAY with white spots of soluble salts & rusty traces of iron oxide compounds together with little black spots of organic matter. | (7), (5) | (3,4,6), (4,4,2) |
| | 4.0, 4.5, 5.0, 6.0 | D, D | | 3.0 | Medium green to grayish green fine grained Clayey Silty SAND with white traces of soluble salts & black spots of organic matter. | (26), (24) | (8,11,16), (12,14,11) |
| | 7.0, 7.5, 8.0, 9.0 | D, D | | 2.5 | Medium to dense yellowish green fine grained SAND with white spots of soluble salts and rusty traces of iron oxide compounds together with little Silt fraction. | (40), (94) | (15,19,13), (16,35,50/12) |
| | 10.0, 10.5, 11.0, 12.0, 13.0, 13.5 | D, D, D | | 4.5 | Very dense brownish gray fine to medium grained SAND with white spots of soluble salts and little Silt fraction. | (49), (51), (48) | (13,25,24), (17,23,28), (15,19,29) |
| | 14.0, 15.0, 16.0, 16.5, 17.0, 18.0 | D, D, D, D | | 5.0 | Dense to very dense grayish brown to brownish gray fine grained Silty SAND with rusty spots of iron oxide compounds and white crystal of mica minerals. | (74), (100/29), (77) | (30,34,40), (29,39,50/11), (28,29,48) |
| | 19.0, 19.5, 20.0, 21.0, 22.0, 22.5, 23.0 | D, D, D, D | | 4.5 | Very stiff yellowish green Sandy fat Silty CLAY with white spots of soluble salts and rusty traces of iron oxide compounds. | (58), (68), (80) | (17,20,38), (24,28,40), (19,37,43) |
| | 24.0, 25.0, 25.5 | D, D | | 2.5 | Very dense light gray fine grained Clayey Silty SAND mixture with white traces of carbonate compounds. | (67), (70) | (21,32,35), (15,29,41) |
| | 26.0, 27.0, 28.0, 28.5, 29.0, 30.0 | D, D, D, D | | 5.0 | Very stiff to hard greenish brown to brownish green Sandy fat Silty CLAY with rusty traces of iron oxide compounds and white shiny crystallized silica minerals spots. | (50/12), (50/14), (50/11) | (50/12), (50/14), (50/11) |




Scale - 1 : 150 Undisturbed Sample - U Disturbed Sample : - D Bulk Sample - B Core Sample - C

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# BOREHOLE LOG

**Site** .... *Samawa Combined Cycle P.P.* .... **Method of Boring** .... *Auger & Rotary* ....

**Borehole No.** ..... *72* ..... **Date** ..... *13/05/2017* .....

**X:** ..... *526039.152* ..... **Y:** ..... *3454387.352* ..... **Ground Level** ..... *11.391* .....

| Water Table Level | Depth (m) | Sample Type & Depth | Litho logy | Thickness of Layer (m) | Soil Description | SPT Value N- Value | Remarks |
|---|---|---|---|---|---|---|---|
| 1.70 | 0.5, 1.0, 1.5, 2.0, 3.0 | D, U, D, D | | 3.5 | Medium brown Sandy lean Silty CLAY with black spots of organic matter & white traces of soluble salts . | (8), (6), (8) | (2,5,6), (3,4,4), (4,4,5) |
| | 4.0, 4.5, 5.0, 6.0, 7.0, 7.5 | D, D, D, D | | 4.5 | Medium to dense brownish gray fine grained Silty SAND with brown Silty Clay pockets in parts and rusty traces of iron oxide compounds together with white spots of soluble salts. | (18), (43), (37) | (7,9,10), (13,20,25), (10,17,22) |
| | 8.0, 9.0, 10.0, 10.5, 11.0, 12.0, 13.0, 13.5 | D, D, D, D, D | | 5.5 | Dense to very dense brownish gray fine to medium grained Silty SAND with white spots of soluble salts /gypsiferrous materials and rusty traces of iron oxide compounds. | (76), (66), (60), (66) | (11,23,50/14), (15,28,38), (18,26,34), (21,29,37) |
| | 14.0, 15.0, 16.0, 16.5, 17.0 | D, D, D | | 3.5 | Very dense yellowish green fine grained Clayey Silty SAND mixture with white cementation formation. | (66), (77) | (25,31,35), (23,36,41) |
| | 18.0, 19.0, 19.5, 20.0, 21.0 | D, D, D | | 4.0 | Very stiff to hard yellowish green mixture of Sandy fat Silty CLAY with white cementation formation and brownish rusty lines/traces of iron oxide compounds. | (50/8), (91), (100/25) | (50/8), (31,42,49), (37,45,50/9) |
| | 22.0, 23.0, 24.0, 25.0, 26.0, 27.0, 28.0, 29.0, 30.0 | D, D, D | | 4.5 | Hard brownish dark green Sandy fat Silty CLAY with a lot of white cementation formation and rusty traces of iron oxide compounds. | (50/10), (50/12) | (50/10), (50/12) |

Scale - 1 : 150 Undisturbed Sample - U Disturbed Sample : - D Bulk Sample - B Core Sample - C

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# BOREHOLE LOG

**Site** .... *Samawa Combined Cycle P.P.* .... **Method of Boring** .... *Auger & Rotary* ....

**Borehole No.** ..... *73* ..... **Date** ..... *11/05/2017* .....

**X:** .....*526100.566* ..... **Y:** .....*3454312.924* ..... **Ground Level** .....*11.413* .....

| Water Table Level | Depth (m) | Sample Type & Depth | Litho logy | Thickness of Layer (m) | Soil Description | SPT Value N- Value | Remarks |
|---|---|---|---|---|---|---|---|
| | 0.5, 1.0 | D | | 1.0 | Medium brown mixture of Sandy lean Silty CLAY with black spots of organic matter & white traces of soluble salts. | (6), (5) | (2,4,5), (2,2,5) |
| 2.0 | 1.5, 2.0, 3.0, 4.0, 4.5, 5.0 | U, D, D, U, D | | 5.0 | Medium brown to grayish brown fat Silty CLAY with black spots of organic matter and rusty traces of iron oxide compounds. | (10), (9) | (5,6,5), (4,4,5) |
| | 6.0, 7.0, 7.5, 8.0 | D, D | | 2.0 | Loose to medium grayish green fine grained Clayey Silty SAND mixture with rusty spots of iron oxide compounds. | (5), (14) | (2,2,3), (2,6,9) |
| | 9.0, 10.0, 10.5, 11.0 | D, D | | 3.0 | Medium to dense light green to brownish green fine grained SAND with white shiny sheets of mica minerals & little Silt fraction. | (29), (54) | (10,12,17), (18,23,31) |
| | 12.0, 13.0, 13.5, 14.0, 15.0, 16.0 | D, D, D, D | | 6.0 | Dense to very dense brownish light green to light green fine grained Silty SAND with white spots of soluble salts and reddish rusty traces of iron oxide compounds. | (60), (59), (46) | (31,28,32), (26,29,30), (20,21,25) |
| | 17.0, 18.0, 19.0, 20.0 | D, D | | 4.0 | Hard light green fat Silty CLAY with a lot of white spots of cementation formation and rusty spots of iron oxide compounds. | (50/10), (97) | (50/10), (23,37,50/12) |
| | 21.0, 22.0, 23.0 | D, D | | 2.5 | Very dense dark green fine grained Clayey Silty SAND mixture with white cementation formation compounds. | (100/26), (72) | (21,39,50/8), (34,34,38) |
| | 24.0, 25.0, 26.0 | D | | 2.0 | Hard light brownish gray mixture of Sandy fat Silty CLAY with white cementation formation and brownish rusty lines/traces of iron oxide compounds. | (50/10) | (50/10) |
| | 27.0, 28.0, 29.0, 30.0 | | | | | | |

Scale - 1 : 150 Undisturbed Sample - U Disturbed Sample : - D Bulk Sample - B Core Sample - C

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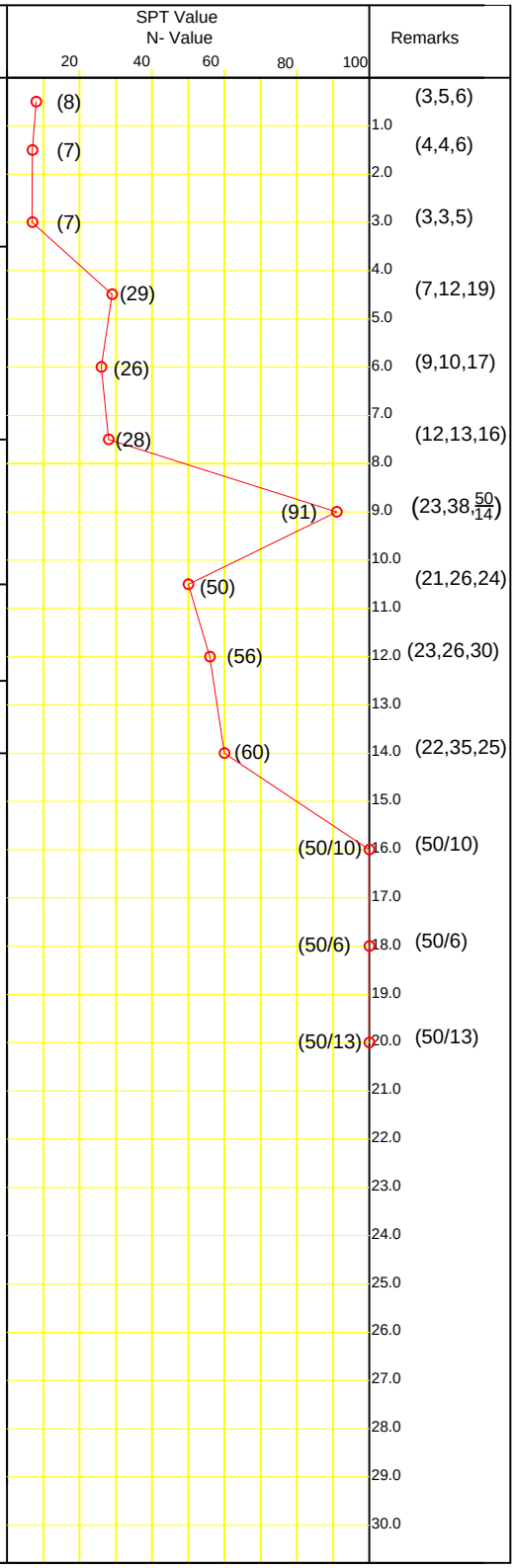
# BOREHOLE LOG

**Site** .... *Samawa Combined Cycle P.P.* .... **Method of Boring** .... *Auger & Rotary* ....

**Borehole No.** ..... *74* ..... **Date** ..... *10/05/2017* .....

**X:** .....*526131.682* ..... **Y:** ..... *3454278.810* ..... **Ground Level** ..... *11.535* .....

| Water Table Level | Depth (m) | Sample Type & Depth | Litho logy | Thickness of Layer (m) | Soil Description | SPT Value N- Value | Remarks |
|---|---|---|---|---|---|---|---|
| 1.85 | 0.5, 1.0, 1.5, 2.0, 3.0 | D, U, D, D | | 3.5 | Medium brown fat Silty CLAY with little gray fine grained Sand in parts and black spots of organic matter together with rusty traces of iron oxide compounds. | (8), (7), (7) | (3,5,6), (4,4,6), (3,3,5) |
| | 4.0, 4.5, 5.0, 6.0, 7.0, 7.5 | D, D, D | | 4.0 | Loose to medium green fine grained Silty SAND with white spots of soluble salts & reddish rusty traces of iron oxide compounds. | (29), (26), (28) | (7,12,19), (9,10,17), (12,13,16) |
| | 8.0, 9.0, 10.0, 10.5 | D, D, D | | 3.0 | Medium, dense to very dense green to brownish gray fine grained Silty SAND with rusty spots of iron oxide compounds. | (91) | (23,38,50/14) |
| | 11.0, 12.0 | D, D | | 1.5 | Very dense brownish green fine to medium grained SAND with little Silt fraction. | (50), (56) | (21,26,24), (23,26,30) |
| | 13.0, 14.0 | D | | 2.0 | Very dense light green fine grained Silty SAND with white spots of soluble salts. | (60) | (22,35,25) |
| | 15.0, 16.0 | D | | 2.5 | Very stiff to hard brown to brownish gray fat Silty CLAY with some fine grained Sand & reddish rusty traces of iron oxide compounds. | (50/10) | (50/10) |
| | 17.0, 18.0, 19.0, 20.0 | D, D, D | | 4.0 | Hard grayish brown Sandy fat Silty CLAY mixture with white spots of silica minerals. | (50/6), (50/13) | (50/6), (50/13) |




Scale - 1 : 150 Undisturbed Sample - U Disturbed Sample : - D Bulk Sample - B Core Sample - C

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# BOREHOLE LOG

**Site** .... *Samawa Combined Cycle P.P.* .... **Method of Boring** .... *Auger & Rotary* ....

**Borehole No.** ..... *75* ..... **Date** ..... *09/05/2017* .....

**X:** ....*526182.655* ..... **Y:** .....*3454287.900* ..... **Ground Level** .....*11.371* .....

| Water Table Level | Depth (m) | Sample Type & Depth | Litho logy | Thickness of Layer (m) | Soil Description | SPT Value N- Value | Remarks |
|---|---|---|---|---|---|---|---|
| 2.0 | 0.5, 1.0, 1.5, 2.0 | D, U | | 3.0 | Medium brown mixture of Sandy lean Silty CLAY with black spots of organic matter & white traces of soluble salts. | (8) | (3,5,7) |
| | 3.0 | D | | 2.0 | Medium to stiff brown to brownish gray fat Silty CLAY with black spots of organic matter and rusty traces of iron oxide compounds. | (9) | (3,5,6) |
| | 4.0, 4.5, 5.0 | U, D | | | | (14) | (4,6,9) |
| | 6.0, 7.0, 7.5, 8.0, 9.0 | D | | 4.5 | Stiff to very stiff brownish gray Sandy lean Silty CLAY mixture with white spots of soluble salts. | (24), (37), (32) | (10,12,13), (15,18,21), (12,14,18) |
| | 10.0, 10.5, 11.0, 12.0 | D | | 3.0 | Dense light green to brownish green fine grained Silty SAND with white shiny sheets of mica minerals. | (37), (47) | (14,17,20), (17,21,26) |
| | 13.0, 14.0 | D | | 2.0 | Dense grayish green fine grained mixture of Clayey Silty SAND with white cementation formation. | (47) | (13,18,29) |
| | 15.0, 16.0, 17.0, 18.0, 19.0, 20.0 | D | | 5.5 | Very stiff brownish green mixture of Sandy fat Silty CLAY with a lot of white spots of cementation formation and rusty traces of iron oxide compounds. | (58), (62), (46) | (11,27,31), (13,29,33), (16,20,26) |
| | 21.0, 22.0, 22.5, 23.0 | D | | 3.0 | Dense to very dense gray to dark gray fine grained Silty SAND with yellowish rusty spots of iron oxide compounds. | (54) | (20,24,30) |
| | 24.0, 25.0, 25.5 | D | | 2.5 | Very stiff to hard light brownish gray mixture of Sandy fat Silty CLAY with white cementation formation . | (67) | (25,32,35) |

Scale - 1 : 150 Undisturbed Sample - U Disturbed Sample : - D Bulk Sample - B Core Sample - C

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# BOREHOLE LOG

**Site** .... *Samawa Combined Cycle P.P.* .... **Method of Boring** .... *Auger & Rotary* ....

**Borehole No.** ..... *76* ..... **Date** ..... *09/05/2017* .....

***X:*** *.....526131.181* ..... ***Y:*** *.....3454239.617* ..... ***Ground Level*** ..... *11.699* .....

| Water Table Level | Depth (m) | Sample Type & Depth | Litho logy | Thickness of Layer (m) | Soil Description | SPT Value N- Value | Remarks |
|---|---|---|---|---|---|---|---|
| 1.65 | 0.5, 1.0, 1.5, 2.0 | D, U | | 2.0 | Loose brown to grayish brown fine grained Clayey Silty SAND mixture with white shiny traces of soluble salts. | (11) | (4,7,8) |
| | 3.0, 4.0, 4.5 | D | | 2.5 | Medium brown fat Silty CLAY with black spots of organic matter & white traces of soluble salts. | (8) | (4,4,6) |
| | 5.0, 6.0, 7.0, 7.5, 8.0 | D | | 3.5 | Loose to medium grayish green fine grained Silty SAND with rusty spots of iron oxide compounds and white traces of soluble salts. | (25), (28), (30) | (9,11,15), (10,12,17), (11,14,18) |
| | 9.0, 10.0, 10.5 | D | | 2.5 | Dense to very dense brownish green fine to medium grained SAND with white shiny spots of soluble salts & little Silt fraction. | (67) | (20,22,45) |
| | 11.0, 12.0, 13.0, 13.5, 14.0 | D | | 3.5 | Very dense grayish brown fine grained Silty SAND with white cementation formation and rusty spots of iron oxide compounds. | (94), (59), (63) | (23,38,$\frac{50}{13}$), (20,29,30), (25,28,35) |
| | 15.0, 16.0, 17.0, 17.5 | D | | 3.5 | Very stiff to hard brownish gray Sandy fat Silty CLAY mixture with white cementation formation. | (93), (50/10) | (22,34,$\frac{50}{12}$), (50/10) |
| | 18.0, 19.0, 20.0, 21.0, 22.0, 23.0 | D | | 5.5 | Very stiff to hard light green mixture of Sandy fat Silty CLAY with white cementation formation and brownish rusty lines/traces of iron oxide compounds. | (50/11), (100/26) | (50/11), (34,40,$\frac{50}{8}$) |
| | 24.0, 25.0, 25.5 | D | | 2.5 | Very dense green fine grained Clayey Silty SAND mixture with a lot of white spots of cementation formation and rusty traces of iron oxide compounds. | (100), (50/10) | (21,37,$\frac{50}{11}$), (50/10) |

SPT Value N- Value: 20, 40, 60, 80, 100

Scale - 1 : 150 Undisturbed Sample - U Disturbed Sample : - D Bulk Sample - B Core Sample - C

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# BOREHOLE LOG

**Site** .... *Samawa Combined Cycle P.P.* .... **Method of Boring** .... *Auger & Rotary* ....

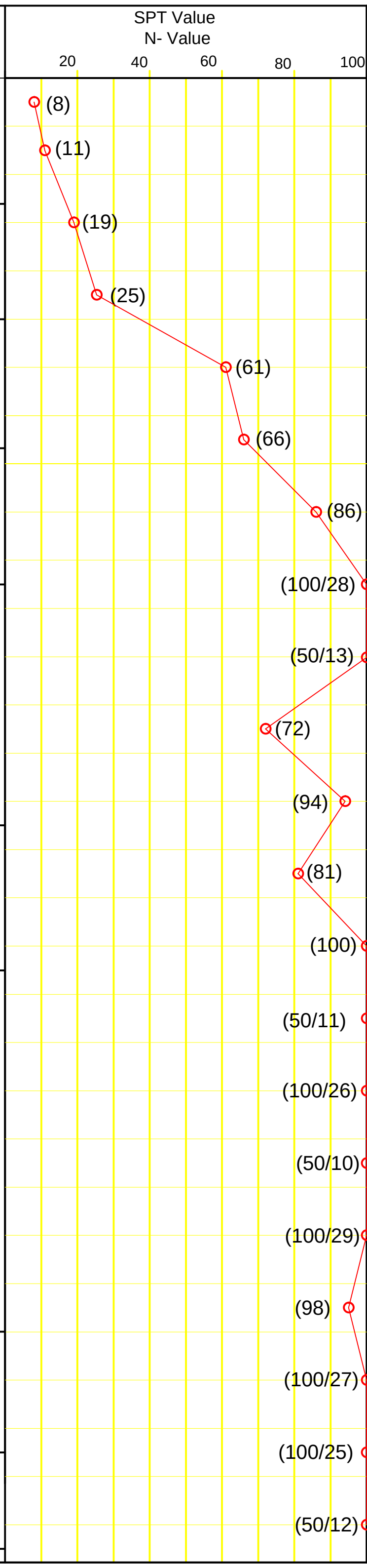
**Borehole No.** ...... *77* ...... **Date** ....... *08/05/2017* .......

**X:** .....*526049.283* ..... **Y:** ..... *3454238.753* ..... **Ground Level** ..... *11.578* .....

Water Table Level: 2.40

| Depth (m) | Thickness of Layer (m) | Soil Description |
|---|---|---|
| 0.0 – 2.0 | 2.0 | Medium light brown to brown fat Silty CLAY with white spots of soluble salts and with black traces of organic matter. |
| 2.0 – 3.5 | 1.5 | Medium to stiff brown to brownish light gray Sandy fat Silty CLAY with black spots of organic matter and rusty traces of iron oxide compounds. |
| 3.5 – 6.5 | 3.0 | Medium, dense to very dense light greenish gray fine grained Silty SAND with black spots of organic matter and rusty traces of iron oxide compounds. |
| 6.5 – 10.5 | 4.0 | Very dense yellowish brown to yellowish gray fine to medium grained Silty SAND with rusty spots of iron oxide compounds. |
| 10.5 – 15.5 | 5.0 | Very dense greenish gray to gray fine grained Silty SAND with white spots of carbonate compounds and a lot of white shiny crystals of soluble salts. |
| 15.5 – 18.5 | 3.0 | Hard light gray Sandy fat Silty CLAY mixture with a lot of white cementation formation compounds. |
| 18.5 – 26.0 | 7.5 | Hard light gray to gray fat Silty CLAY with white cementation formation and greenish gray pockets of Marly Clay. |
| 26.0 – 28.5 | 2.5 | Very dense brownish light gray well cemented fine to medium grained Silty SAND. |
| 28.5 – 30.5 | 2.0 | Hard gray to light gray Sandy fat Silty CLAY with rusty spots of iron oxide compounds. |

| Sample Depth (m) | Sample Type | SPT N-Value | Remarks |
|---|---|---|---|
| 0.5 | D | (8) | (4,5,7) |
| 1.0 | U | | |
| 1.5 | D | (11) | (5,7,9) |
| 3.0 | D | (19) | (8,10,12) |
| 4.5 | D | (25) | (10,11,15) |
| 6.0 | D | (61) | (26,28,36) |
| 7.5 | D | (66) | (21,30,39) |
| 9.0 | D | (86) | (28,30,50/13) |
| 10.5 | D | (100/28) | (31,48,50/12) |
| 12.0 | D | (50/13) | (50/13) |
| 13.5 | D | (72) | (28,35,37) |
| 15.0 | D | (94) | (21,41,50/14) |
| 16.5 | D | (81) | (26,36,45) |
| 18.0 | D | (100) | (26,34,50/10) |
| 19.5 | D | (50/11) | (50/11) |
| 21.0 | D | (100/26) | (23,38,50/8) |
| 25.5 | D | (50/10) | (50/10) |
| 24.0 | D | (100/29) | (27,43,50/12) |
| 25.5 | D | (98) | (32,41,50/13) |
| 27.0 | D | (100/27) | (29,35,50/8) |
| 28.5 | D | (100/25) | (34,45,50/9) |
| 30.0 | D | (50/12) | (50/12) |

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|---|---|---|---|---|
| Scale - 1 : 150 | Undisturbed Sample - U | Disturbed Sample : - D | Bulk Sample - B | Core Sample - C |

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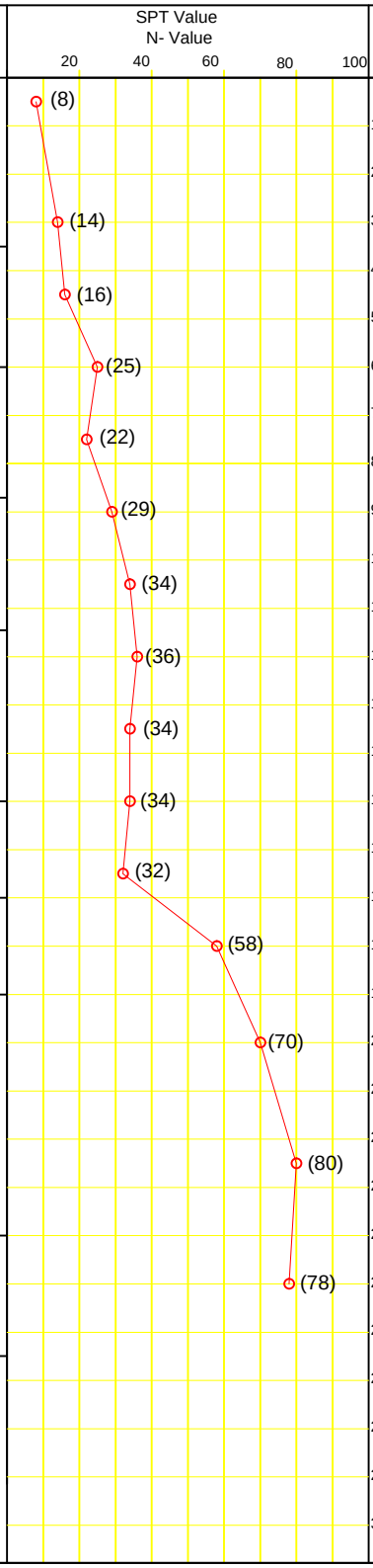
# BOREHOLE LOG

**Site** .... *Samawa Combined Cycle P.P.* .... **Method of Boring** .... *Auger & Rotary* ....

**Borehole No.** ..... *78* ..... **Date** ..... *07/05/2017* .....

**X:** .....*526004.545* ..... **Y:** .....3454198.804 ..... **Ground Level** ..... 10.550 .....

| Water Table Level | Depth (m) | Sample Type & Depth | Litho logy | Thickness of Layer (m) | Soil Description | SPT Value N- Value | Remarks |
|---|---|---|---|---|---|---|---|
| 2.60 | 0.5, 1.0, 1.5, 2.0, 3.0 | D, U, D | | 3.5 | Medium to stiff dark brown to brown fat Silty CLAY with black spots of organic matter & white traces of soluble salts . | (8), (14) | (4,5,6), (7,7,9) |
| | 4.0, 4.5, 5.0 | U, D | | 1.5 | Stiff grayish brown Sandy fat Silty CLAY mixture with rusty spots of iron oxide compounds and white cementation formation. | (16) | (6,6,11) |
| | 6.0, 7.0, 7.5, 8.0 | D, D | | 2.5 | Medium greenish gray fine to medium grained Clayey Silty SAND mixture with white shiny sheets of mica minerals spots of soluble salts. | (25), (22) | (10,13,13), (8,11,12) |
| | 9.0, 10.0, 10.5, 11.0 | D, D | | 3.5 | Medium to dense brownish green fine to medium grained SAND with rusty spots of iron oxide compounds & little Silt fraction. | (29), (34) | (9,13,15), (12,16,18) |
| | 12.0, 13.0, 13.5, 14.0 | D, D | | 4.0 | Dense grayish brown fine to medium grained Silty SAND with white spots of soluble salts. | (36), (34) | (15,17,19), (12,16,18) |
| | 15.0, 16.0, 16.5 | D, D | | 1.5 | Very stiff yellowish green Sandy fat Silty CLAY mixture with white cementation formation. | (34), (32) | (10,13,21), (12,15,17) |
| | 17.0, 18.0 | D | | 1.5 | Very dense light gray fine grained Clayey Silty SAND mixture with white traces of carbonate compounds. | (58) | (24,28,30) |
| | 19.0, 20.0, 21.0, 22.0, 22.5, 23.0 | D, D | | 6.0 | Hard dark green mixture of Sandy fat Silty CLAY with a lot of white spots of cementation formation and rusty traces of iron oxide compounds. | (70), (80) | (29,32,38), (17,22,50/12) |
| | 24.0, 25.0, 25.5 | D | | 1.5 | Very dense green fine grained Clayey Silty SAND mixture with rusty spots of iron oxide compounds & white traces of soluble salts. | (78) | (15,25,50/14) |




Scale - 1 : 150 Undisturbed Sample - U Disturbed Sample : - D Bulk Sample - B Core Sample - C

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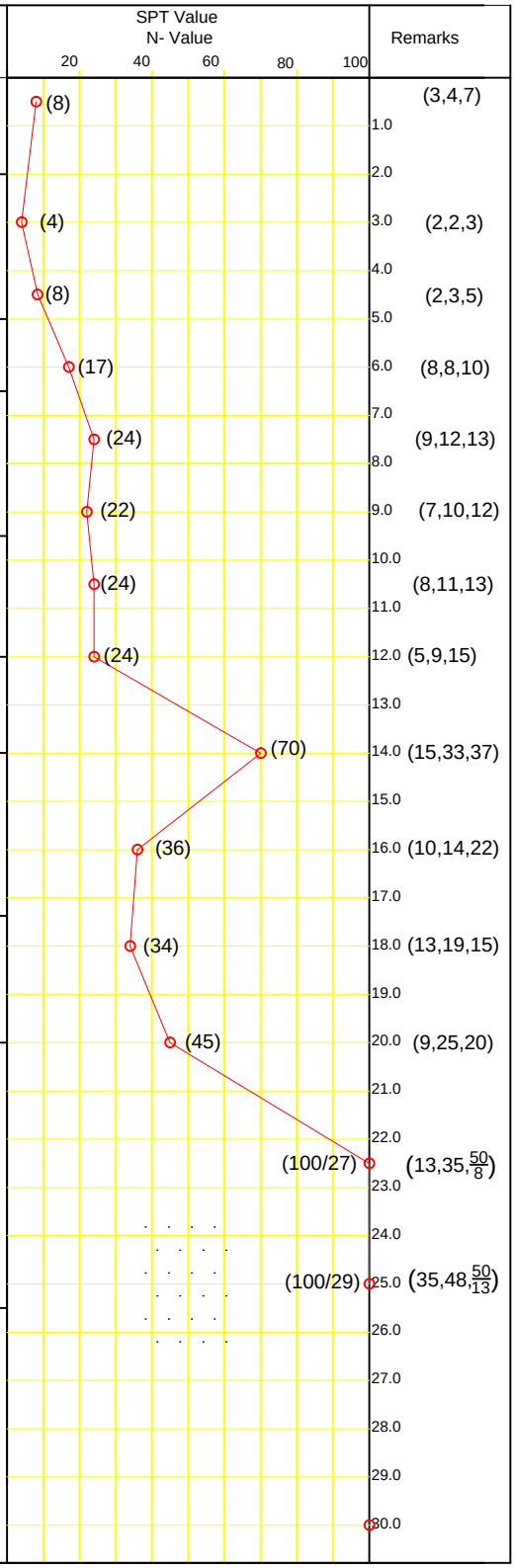
# BOREHOLE LOG

**Site** .... *Samawa Combined Cycle P.P.* .... **Method of Boring** .... *Auger & Rotary* ....

**Borehole No.** ..... *79*..... **Date** ..... *09/05/2017* .....

**X:** ..... *526077.461* ..... **Y:** ..... *3454204.151* ..... **Ground Level** ..... *11.678* .....

| Water Table Level | Depth (m) | Sample Type & Depth | Litho logy | Thickness of Layer (m) | Soil Description | SPT Value N- Value | Remarks |
|---|---|---|---|---|---|---|---|
| | 0.5, 1.0, 1.5, 2.0 | D, U | | 2.0 | Medium brown Sandy lean Silty CLAY with white spots of soluble salts & black traces of organic matter . | (8) | (3,4,7) |
| 2.70 | 3.0, 4.0, 4.5, 5.0 | D, U, D | | 3.0 | Soft to medium brown to grayish brown fat Silty CLAY with white spots of soluble salts and rusty lines of iron oxide compounds together with black traces of organic matter. | (4), (8) | (2,2,3), (2,3,5) |
| | 6.0, 6.5 | D | | 1.5 | Loose to medium greenish gray fine grained Clayey Silty SAND mixture. | (17) | (8,8,10) |
| | 7.0, 7.5, 8.0, 9.0, 9.5 | D, D, D | | 3.0 | Medium light gray to light brownish gray fine to medium grained Silty SAND with rusty traces of iron oxide compounds and white spots of soluble salts. | (24), (22) | (9,12,13), (7,10,12) |
| | 10.0, 10.5, 11.0 | D | | 1.5 | Medium light brownish gray to yellowish gray fine to medium grained SAND with rusty spots of iron oxide compounds & little Silt fraction. | (24) | (8,11,13) |
| | 12.0, 13.0, 14.0 | D | | 3.0 | Medium brownish gray fine grained Clayey Silty SAND mixture. | (24), (70) | (5,9,15), (15,33,37) |
| | 15.0, 16.0, 17.0 | D | | 2.0 | Very dense brownish light gray fine to medium grained Silty SAND with reddish lines/traces of iron oxide compounds and a lot of white shiny sheets of mica minerals. | (36) | (10,14,22) |
| | 18.0, 19.0, 20.0 | D | | 4.0 | Very stiff brown Sandy fat Silty CLAY with shiny angular quartz pieces and white spots of carbonate compounds. | (34), (45) | (13,19,15), (9,25,20) |
| | 21.0, 22.0, 22.5, 23.0, 24.0, 25.0, 25.5 | D, D | | 5.5 | Very stiff to hard green Sandy fat Silty CLAY mixture with alot of white cementation formation and rusty spots of iron oxide compounds. | (100/27), (100/29) | (13,35,$\frac{50}{8}$), (35,48,$\frac{50}{13}$) |




Scale - 1 : 150 Undisturbed Sample - U Disturbed Sample : - D Bulk Sample - B Core Sample - C

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# BOREHOLE LOG

**Site** .... *Samawa Combined Cycle P.P.* .... **Method of Boring** .... *Auger & Rotary* ....

**Borehole No.** ..... *80* ..... **Date** ..... *07/05/2017* .....

**X:** ..... *526066.203* ..... **Y:** ..... *3454143.177* ..... **Ground Level** ..... *11.650* .....

| Water Table Level | Depth (m) | Sample Type & Depth | Litho logy | Thickness of Layer (m) | Soil Description | SPT Value N- Value | Remarks |
|---|---|---|---|---|---|---|---|
| | 0.5, 1.0 | D | | 2.0 | Medium light brown Sandy lean Silty CLAY with white spots of soluble salts and black traces of organic matter | (8) | (4,6,5) |
| | 1.5, 2.0 | U | | 2.0 | | | |
| 2.40 | 3.0 | D | | 2.0 | Medium brown fat Silty CLAY with rusty spots of iron oxide & black traces of organic matter. | (6) | (2,3,4) |
| | 4.0, 4.5 | D | | 3.5 | Loose to medium grayish green gray fine grained Clayey Silty SAND with white spots of soluble salts & rusty traces of iron oxide compounds. | (14) | (7,6,9) |
| | 5.0, 6.0 | D | | | | (10) | (5,5,6) |
| | 7.0, 7.5 | D | | 4.5 | Dense to very dense brownish gray to grayish brown fine grained Silty SAND with rusty spots of iron oxide compounds and Clay fraction in parts. | (48) | (13,22,29) |
| | 8.0, 9.0 | D | | | | (61) | (10,26,35) |
| | 10.0, 10.5 | D | | | | (60) | (17,29,31) |
| | 11.0, 12.0 | D | | 1.5 | Dense grayish green fine grained Clayey silty SAND mixture with white spots of iron soluble salts. | (48) | (13,23,25) |
| | 13.0, 13.5 | D | | 2.0 | Very dense light green fine grained Silty SAND with white spots of soluble salts. | (73) | (10,11,50/10) |
| | 14.0, 15.0 | D | | 4.0 | Very stiff yellowish green Sandy fat Silty CLAY mixture with white shiny spots of gypsifferous materials & rusty spots of iron oxide compounds. | (59) | (19,24,35) |
| | 16.0, 17.0 | D | | | | (27) | (7,12,15) |
| | 18.0, 19.0 | D | | 6.0 | Very stiff to hard green to dark green Sandy fat Silty CLAY with a lot of white cementation formation of gypsifferous materials and rusty traces of iron oxide compounds. | (54) | (15,21,33) |
| | 20.0, 21.0 | D | | | | (46) | (13,19,27) |
| | 22.0, 23.0 | D | | | | (57) | (20,24,33) |
| | 24.0, 25.0 | D | | | | (50/10) | (50/10) |
| | 26.0, 27.0, 28.0, 29.0, 30.0 | | | | | | |

Scale - 1 : 150 Undisturbed Sample - U Disturbed Sample : - D Bulk Sample - B Core Sample - C

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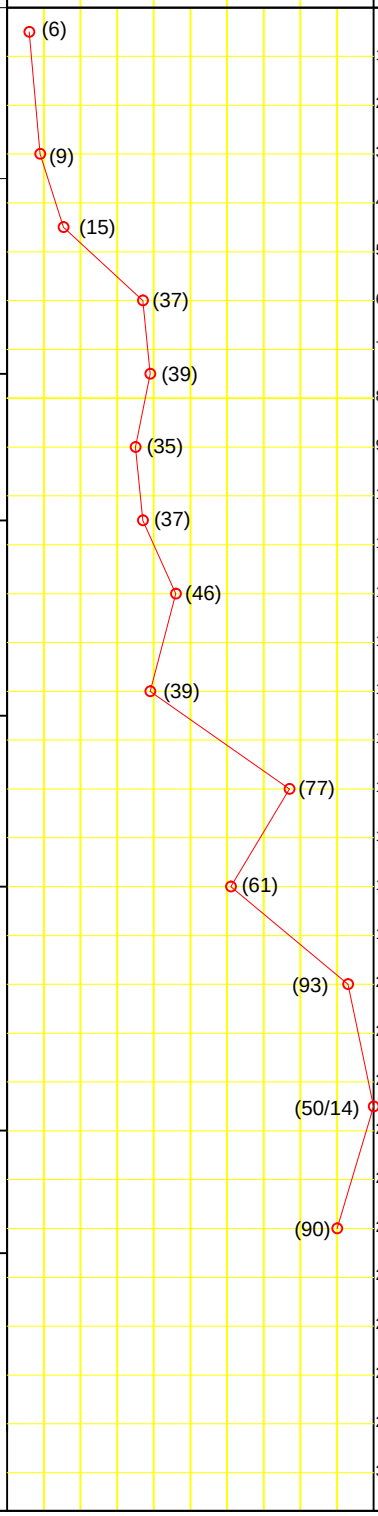
# BOREHOLE LOG

**Site** .... *Samawa Combined Cycle P.P.* .... **Method of Boring** .... *Auger & Rotary* ....

**Borehole No.** ..... *81* ..... **Date** ..... *08/05/2017* .....

**X:** ..... *526118.274* ..... **Y:** ..... *3454176.653* ..... **Ground Level** ..... *11.595* ....

| Water Table Level | Depth (m) | Sample Type & Depth | Litho logy | Thickness of Layer (m) | Soil Description | SPT Value N- Value | Remarks |
|---|---|---|---|---|---|---|---|
| 2.15 | 0.5, 1.0, 1.5, 2.0, 3.0 | D, U, D | | 3.5 | Medium brown fat Silty CLAY with white spots of soluble salts and black traces of organic matter. | (6), (9) | (2,3,6), (2,4,6) |
| | 4.0, 4.5, 5.0, 6.0, 7.0, 7.5 | D, D, D | | 4.0 | Medium to dense light green to brownish green fine grained Silty SAND with black spots of organic matter and rusty traces of iron oxide compounds. | (15), (37), (39) | (4,7,9), (10,18,21), (12,18,23) |
| | 8.0, 9.0, 10.0, 10.5 | D, D, D | | 3.0 | Dense green to light brownish gray fine grained Clayey Silty SAND mixture with rusty traces of iron oxide compounds. | (35), (37) | (13,15,20), (11,16,21) |
| | 11.0, 12.0, 13.0, 14.0 | D, D, D | | 4.0 | Dense light brownish green to brownish dark gray fine grained Silty SAND with rusty spots of iron oxide compounds. | (46), (39) | (16,20,26), (11,18,21) |
| | 15.0, 16.0, 16.5 | D | | 2.0 | Dense to very dense brownish dark gray fine grained Clayey Silty SAND with reddish lines/traces of iron oxide compounds and a lot of white shiny sheets of mica minerals. | (77) | (14,20,50/14) |
| | 17.0, 18.0, 19.0, 20.0, 21.0, 22.0, 22.5, 23.0 | D, D, D, D | | 6.5 | Very stiff to hard yellowish light green Sandy fat Silty CLAY with shiny angular quartz pieces. | (61), (93), (50/14) | (10,28,33), (23,37,50/13), (50/14) |
| | 24.0, 25.0, 25.5 | D | | 2.5 | Hard gray fat Silty CLAY with alot of white shiny crystallized sheets of mica minerals. | (90) | (17,28,50/11) |




Scale - 1 : 150 Undisturbed Sample - U Disturbed Sample : - D Bulk Sample - B Core Sample - C

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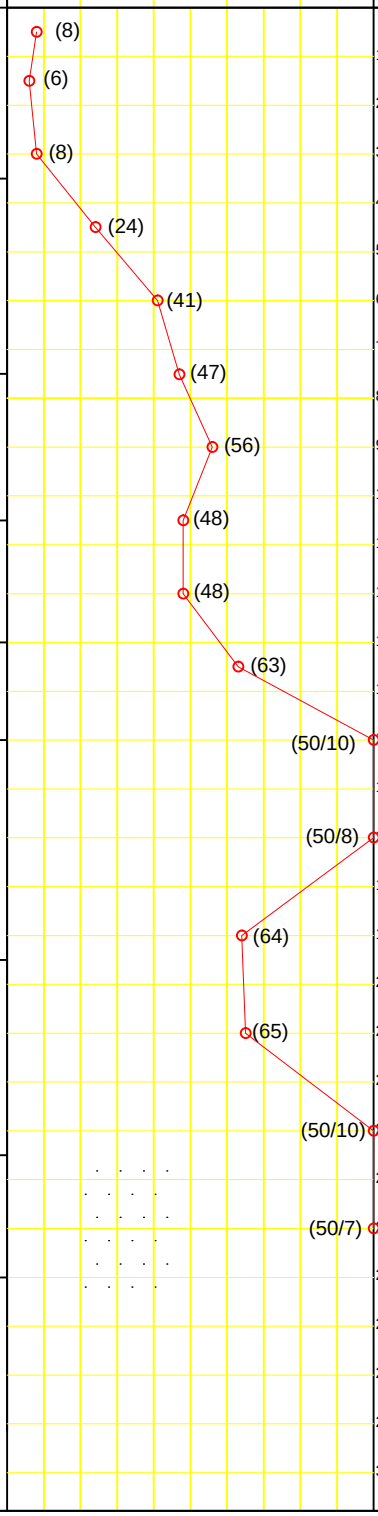
# BOREHOLE LOG

**Site** .... *Samawa Combined Cycle P.P.* .... **Method of Boring** .... *Auger & Rotary* ....

**Borehole No.** ..... *82* ..... **Date** ..... *08/05/2017* .....

**X:** ..... *526198.925* ..... **Y:** ..... *3454129.018* ..... **Ground Level** ..... *11.474* .....

| Water Table Level | Depth (m) | Sample Type & Depth | Litho logy | Thickness of Layer (m) | Soil Description | SPT Value N- Value | Remarks |
|---|---|---|---|---|---|---|---|
| 2.20 | 0.5, 1.0, 1.5, 2.0, 3.0 | D, U, D, D | | 3.5 | Medium light brown to brown fat Silty CLAY with black spots of organic matter & white traces of soluble salts. | (8), (6), (8) | (5,6,6), (3,4,5), (4,4,6) |
| | 4.0, 4.5, 5.0, 6.0, 7.0, 7.5 | D, D, D | | 4.0 | Medium to dense grayish brown fine to medium grained Silty SAND with rusty spots of iron oxide compounds and white traces of soluble salts. | (24), (41), (47) | (10,12,13), (14,19,24), (17,22,27) |
| | 8.0, 9.0, 10.0, 10.5 | D, D, D | | 3.0 | Dense to very dense grayish brown fine grained Silty SAND with white shiny sheets of mica minerals and rusty traces of iron oxide compounds. | (56), (48) | (19,30,26), (18,20,28) |
| | 11.0, 12.0, 12.5 | D, D | | 2.0 | Very dense grayish green to yellowish green fine to medium grained SAND with white spots of soluble salts and little Silt fraction. | (48) | (12,18,30) |
| | 13.0, 13.5, 14.0, 15.0 | D, D | | 2.5 | Very dense dark green fine grained Clayey Silty SAND mixture with white cementation formation compounds. | (63), (50/10) | (16,26,37), (50/10) |
| | 16.0, 17.0, 18.0, 19.0, 19.5 | D, D, D | | 4.5 | Hard yellowish gray mixture of Sandy fat Silty CLAY with a lot of white spots of cementation formation and rusty traces of iron oxide compounds. | (50/8), (64) | (50/8), (25,29,35) |
| | 20.0, 21.0, 22.0, 23.0, 23.5 | D, D, D | | 4.0 | Very stiff to hard brownish green mixture of Sandy fat Silty CLAY with white cementation formation and brownish rusty lines/traces of iron oxide compounds. | (65), (50/10) | (28,34,31), (50/10) |
| | 24.0, 25.0, 25.5 | D, D | | 2.0 | Very dense light grayish brown fine grained Clayey Silty SAND mixture with white cementation formation compounds. | (50/7) | (50/7) |
| | 26.0, 27.0, 28.0, 29.0, 30.0 | | | | | | |




Scale - 1 : 150 Undisturbed Sample - U Disturbed Sample : - D Bulk Sample - B Core Sample - C

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# BOREHOLE LOG

**Site** .... *Samawa Combined Cycle P.P.* .... **Method of Boring** .... *Auger & Rotary* ....

**Borehole No.** ..... *83* ..... **Date** ..... *07/05/2017* .....

**X:** ..... *526063.971* ..... **Y:** ..... *3454080.339*..... **Ground Level** ..... *10.626* .....

| Water Table Level | Depth (m) | Sample Type & Depth | Litho logy | Thickness of Layer (m) | Soil Description | SPT Value N- Value | Remarks |
|---|---|---|---|---|---|---|---|
| 2.40 | 0.5, 1.0, 1.5, 2.0, 3.0 | D, U | | 3.0 | Medium to stiff brown fat Silty CLAY with white spots of soluble salts and black traces of organic matter. | (7), (16) | (3,5,5) |
| | 3.0, 4.0, 4.5, 5.0 | D, U, D | | 2.0 | Stiff to very stiff grayish brown Sandy fat Silty CLAY with black traces of organic matter. | (28) | (6,8,11), (9,13,17) |
| | 6.0, 7.0, 7.5, 8.0 | D, D | | 3.0 | Medium, dense to very dense light gray fine to medium grained SAND with rusty traces of iron oxide compounds & little Silt fraction. | (48), (66) | (15,21,30), (18,21,48) |
| | 9.0, 10.0, 10.5, 11.0, 12.0 | D, D, D | | 4.0 | Very dense brownish gray to light gray fine grained Silty SAND with rusty spots of iron oxide compounds. | (90), (78), (92) | (19,34,50/13), (20,32,46), (25,39,50/14) |
| | 13.0, 14.0 | D | | 2.0 | Very dense gray to light gray fine to medium grained SAND with yellowish rusty spots of iron oxide compounds. | (50/11) | (50/11) |
| | 15.0, 16.0 | D | | 2.0 | Very dense light gray fine grained Silty SAND with white cementation formation. | (100) | (29,40,50/12) |
| | 17.0, 18.0, 19.0, 20.0 | D, D, D | | 4.5 | Hard yellowish green to light green Sandy fat Silty CLAY with alot of white shiny sheets of mica minerals & rusty spots of iron oxide compounds. | (100/25), (100/28) | (23,46,50/9), (25,43,50/11) |

Scale - 1 : 150 Undisturbed Sample - U Disturbed Sample : - D Bulk Sample - B Core Sample - C

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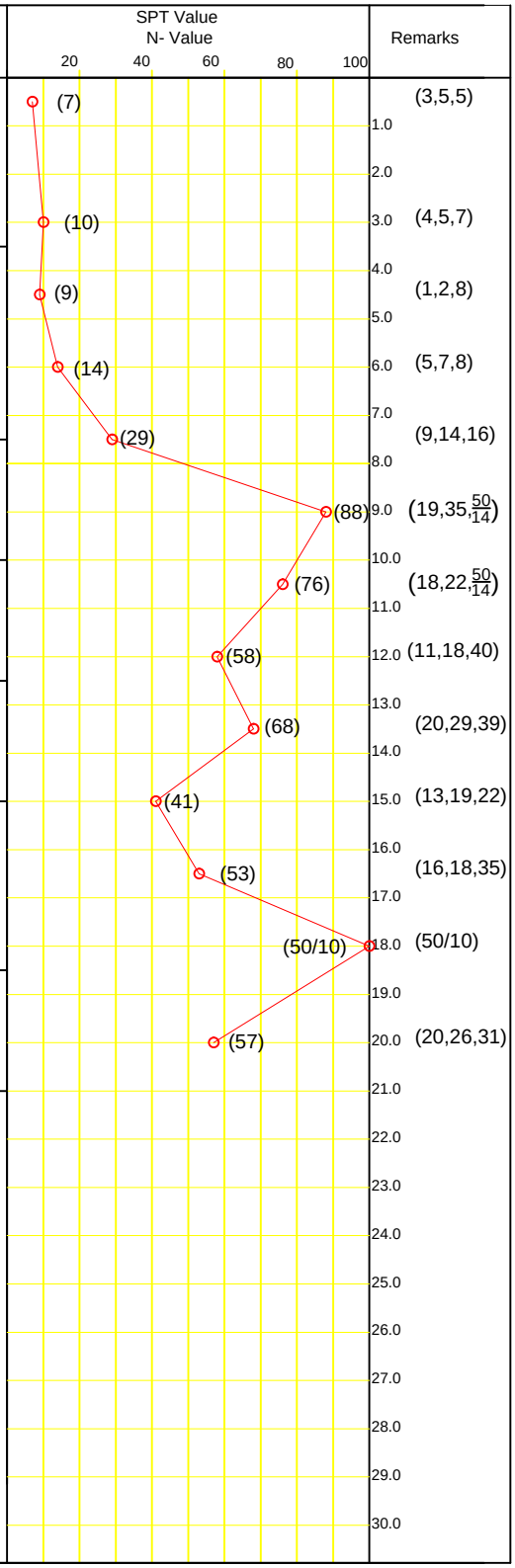
# BOREHOLE LOG

**Site** .... *Samawa Combined Cycle P.P.* .... **Method of Boring** .... *Auger & Rotary* ....

**Borehole No.** ..... *84* ..... **Date** ..... *04/05/2017* .....

**X:** ..... *525684.848* ..... **Y:** ..... *3454283.378* ..... **Ground Level** ..... *9.841* .....

| Water Table Level | Depth (m) | Sample Type & Depth | Litho logy | Thickness of Layer (m) | Soil Description | SPT Value N- Value | Remarks |
|---|---|---|---|---|---|---|---|
| 2.20 | 0.5, 1.0, 1.5, 2.0, 3.0 | D, U, D | | 3.5 | Medium dark brown fat Silty CLAY with gray fine grained Sand in parts and black spots of organic matter together with rusty traces of iron oxide compounds. | (7), (10) | (3,5,5), (4,5,7) |
| | 4.0, 4.5, 5.0, 6.0, 7.0 | D, D | | 4.0 | Loose to medium green fine grained Clayey Silty SAND with white spots of soluble salts & reddish rusty traces of iron oxide compounds. | (9), (14) | (1,2,8), (5,7,8) |
| | 7.5, 8.0, 9.0 | D, D | | 2.0 | Medium, dense to very dense light gray to grayish brown fine grained Silty SAND with rusty spots of iron oxide compounds. | (29), (88) | (9,14,16), (19,35,50/14) |
| | 10.5, 11.0, 12.0 | D, D | | 3.0 | Very dense brownish gray to light brown fine to medium grained SAND with little Silt fraction and rusty spots of iron oxide compounds. | (76), (58) | (18,22,50/14), (11,18,40) |
| | 13.0, 13.5, 14.0 | D | | 2.5 | Very dense gray to brownish gray fine grained Silty SAND with white spots of soluble salts. | (68) | (20,29,39) |
| | 15.0, 16.0, 16.5, 17.0, 18.0 | D, D, D | | 3.5 | Very stiff to hard yellow to yellowish green Sandy fat Silty CLAY mixture with white shiny crystal of soluble salts & reddish rusty traces of iron oxide compounds. | (41), (53), (50/10) | (13,19,22), (16,18,35), (50/10) |
| | 19.0, 20.0 | D | | 2.0 | Very stiff light brownish gray fat Silty CLAY with white spots of silica minerals and some gray fine grained Sand. | (57) | (20,26,31) |




Scale - 1 : 150 Undisturbed Sample - U Disturbed Sample : - D Bulk Sample - B Core Sample - C

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# BOREHOLE LOG

**Site** .... *Samawa Combined Cycle P.P.* .... **Method of Boring** .... *Auger & Rotary* ....

**Borehole No.** ..... *85* ..... **Date** ..... *04/05/2017* .....

**X:** ..... *525733.957*..... **Y:** ..... *3454250.379* ..... **Ground Level** ..... *9.873* .....

| Water Table Level | Depth (m) | Sample Type & Depth | Litho logy | Thickness of Layer (m) | Soil Description | SPT Value N- Value | Remarks |
|---|---|---|---|---|---|---|---|
| 2.10 | 0.5, 1.0, 1.5, 2.0, 3.0 | D, U, D | | 3.5 | Medium brown fat Silty CLAY with gray fine grained Sand in parts and black spots of organic matter together with rusty traces of iron oxide compounds. | (8), (11) | (4,5,6), (3,6,7) |
| | 4.0, 4.5, 5.0 | U, D | | 1.5 | Medium to stiff grayish brown Sandy fat Silty CLAY with black traces of organic matter. | (24) | (8,10,13) |
| | 6.0, 7.0, 7.5, 8.0 | D, D | | 3.0 | Medium grayish green fine grained Silty SAND with white spots of soluble salts & reddish rusty traces of iron oxide compounds. | (28), (35) | (8,12,18), (13,16,21) |
| | 9.0, 10.0, 10.5, 11.0, 12.0, 13.0, 13.5 | D, D, D, D | | 5.5 | Dense to very dense brownish green to light green fine grained Silty SAND with rusty spots of iron oxide compounds. | (55), (52), (56), (62) | (15,24,31), (20,23,29), (17,23,33), (17,27,35) |
| | 14.0, 15.0 | D, D | | 1.5 | Very dense yellowish brown fine grained Clayey Silty SAND mixture with white spots of soluble salts. | (86) | (30,39,47) |
| | 16.0, 16.5, 17.0, 18.0, 19.0, 20.0 | D, D, D | | 5.5 | Very stiff to hard yellowish green to light green Sandy fat Silty CLAY mixture with white shiny crystal of soluble salts & reddish rusty traces of iron oxide compounds. | (62), (100/28), (100/26) | (30,30,32), (42,49,50/13), (28,46,50/10) |

Scale - 1 : 150 Undisturbed Sample - U Disturbed Sample : - D Bulk Sample - B Core Sample - C

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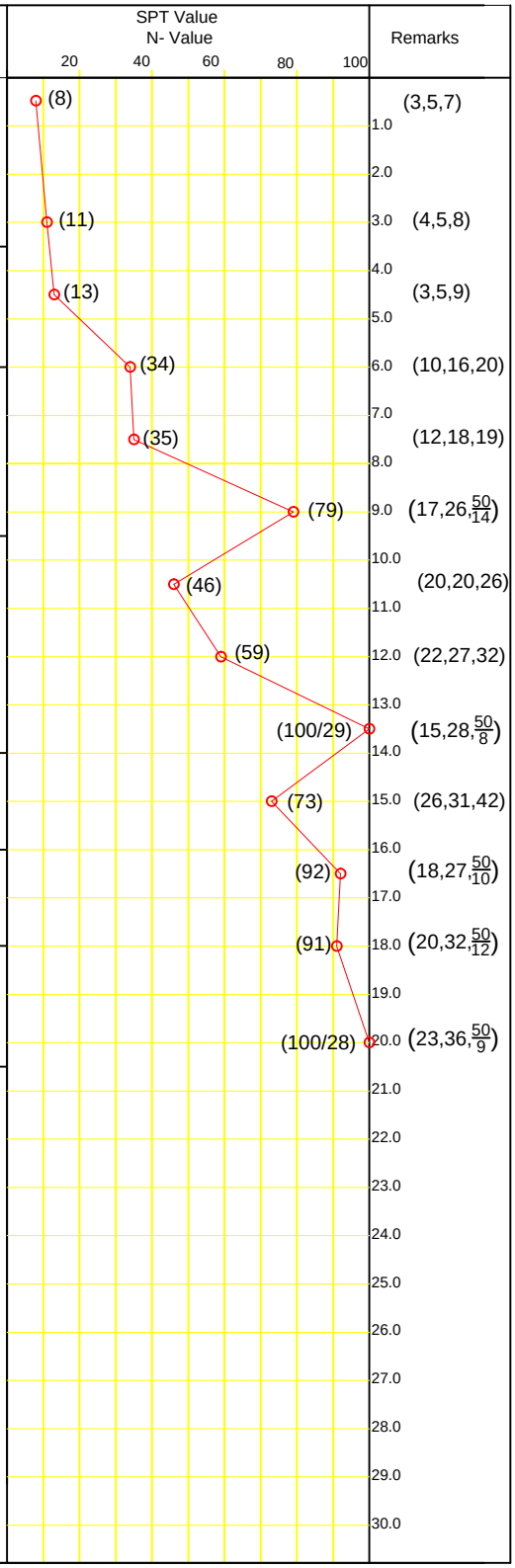
# BOREHOLE LOG

**Site** .... *Samawa Combined Cycle P.P.* .... **Method of Boring** .... *Auger & Rotary* ....

**Borehole No.** ..... *86* ..... **Date** ..... *04/05/2017* .....

**X:** ..... *525768.910* ..... **Y:** ..... *3454226.898*..... **Ground Level** ..... *9.836*.....

| Water Table Level | Depth (m) | Sample Type & Depth | Litho logy | Thickness of Layer (m) | Soil Description | SPT Value N- Value | Remarks |
|---|---|---|---|---|---|---|---|
| 2.0 | 0.5, 1.0, 1.5, 2.0, 3.0 | D, U, D | | 3.5 | Medium brown fat Silty CLAY with white spots of soluble salts and black traces of organic matter. | (8), (11) | (3,5,7), (4,5,8) |
| | 4.0, 4.5, 5.0 | U, D | | 1.5 | Medium to stiff grayish brown Sandy fat Silty CLAY with black traces of organic matter. | (13) | (3,5,9) |
| | 6.0, 7.0, 7.5, 8.0, 9.0 | D, D, D | | 4.5 | Medium to dense greenish gray fine to medium grained Silty SAND with rusty traces of iron oxide compounds and white spots of soluble salts. | (34), (35), (79) | (10,16,20), (12,18,19), (17,26,$\frac{50}{14}$) |
| | 10.0, 10.5, 11.0, 12.0, 13.0, 13.5, 14.0 | D, D, D, D | | 4.5 | Dense to very dense gray to dark gray fine grained Silty SAND with yellowish rusty spots of iron oxide compounds. | (46), (59), (100/29) | (20,20,26), (22,27,32), (15,28,$\frac{50}{8}$) |
| | 15.0, 16.0 | D | | 1.5 | Very dense brownish gray fine grained Clayey Silty SAND mixture with white cementation formation. | (73) | (26,31,42) |
| | 16.5, 17.0 | D | | 1.5 | Very dense brownish gray fine to medium grained Silty SAND with white spots of soluble salts. | (92) | (18,27,$\frac{50}{10}$) |
| | 18.0, 19.0, 20.0 | D, D | | 3.5 | Hard light brownish green to light green fat Silty CLAY with alot of fine grained Sand and white shiny cementation formation compounds. | (91), (100/28) | (20,32,$\frac{50}{12}$), (23,36,$\frac{50}{9}$) |




Scale - 1 : 150 Undisturbed Sample - U Disturbed Sample : - D Bulk Sample - B Core Sample - C

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# BOREHOLE LOG

**Site** .... *Samawa Combined Cycle P.P.* .... **Method of Boring** .... *Auger & Rotary* ....

**Borehole No.** ..... *87* ..... **Date** ..... *04/05/2017* .....

**X:** ..... *525820.173*..... **Y:** ..... *3454192.871* ..... **Ground Level** ..... *9.634* .....

| Water Table Level | Depth (m) | Sample Type & Depth | Litho logy | Thickness of Layer (m) | Soil Description | SPT Value N- Value | Remarks |
|---|---|---|---|---|---|---|---|
| 1.70 | 0.5, 1.0, 1.5, 2.0 | D, U | | 2.0 | Medium brown fat Silty CLAY with black spots of organic matter and white shiny traces of soluble salts. | (8) | (3,5,6) |
| | 3.0, 4.0, 4.5, 5.0 | D, U, D | | 3.0 | Medium to stiff brownish green Sandy fat Silty CLAY with rusty spots of iron oxide compounds and white traces of soluble salts. | (14), (22) | (5,7,10), (7,10,13) |
| | 6.0, 7.0, 7.5 | D | | 2.5 | Medium, to dense brownish green fine grained Silty SAND with rusty spots of iron oxide compounds. | (17) | (11,6,12) |
| | 8.0, 9.0, 10.0, 10.5, 11.0 | D, D, D | | 3.5 | Dense to very dense brownish dark gray fine to medium grained SAND with white spots of soluble salts & rusty traces of iron oxide compounds together with little Silt fraction. | (33), (90), (43) | (10,14,21), (23,31,$\frac{50}{12}$), (15,18,25) |
| | 12.0, 13.0, 13.5, 14.0, 15.0 | D, D | | 4.0 | Dense to very dense brownish gray to light green fine grained Silty SAND with white spots of soluble salts. | (44), (45) | (12,20,24), (16,19,26) |
| | 16.0, 16.5, 17.0, 18.0 | D, D | | 3.0 | Very stiff yellowish green Sandy fat Silty CLAY with alot of white cementation formation compounds and rusty traces of iron oxide compounds. | (54), (55), (54) | (19,23,31), (21,25,32), (14,22,32) |
| | 19.0, 19.5, 20.0 | D | | 1.0, 1.0 | Very dense brownish green fine grained Silty SAND with a lot of white spots of cementation formation. | (72) | (11,17,$\frac{50}{13}$) |
| | 21.0, 22.0, 23.0, 24.0, 25.0, 26.0, 27.0, 28.0, 29.0, 30.0 | | | | Very stiff to hard yellowish green Sandy fat Silty CLAY with reddish rusty traces of iron oxide compounds and white pockets of gypsiferrous materials. | | |

Scale - 1 : 150 Undisturbed Sample - U Disturbed Sample : - D Bulk Sample - B Core Sample - C

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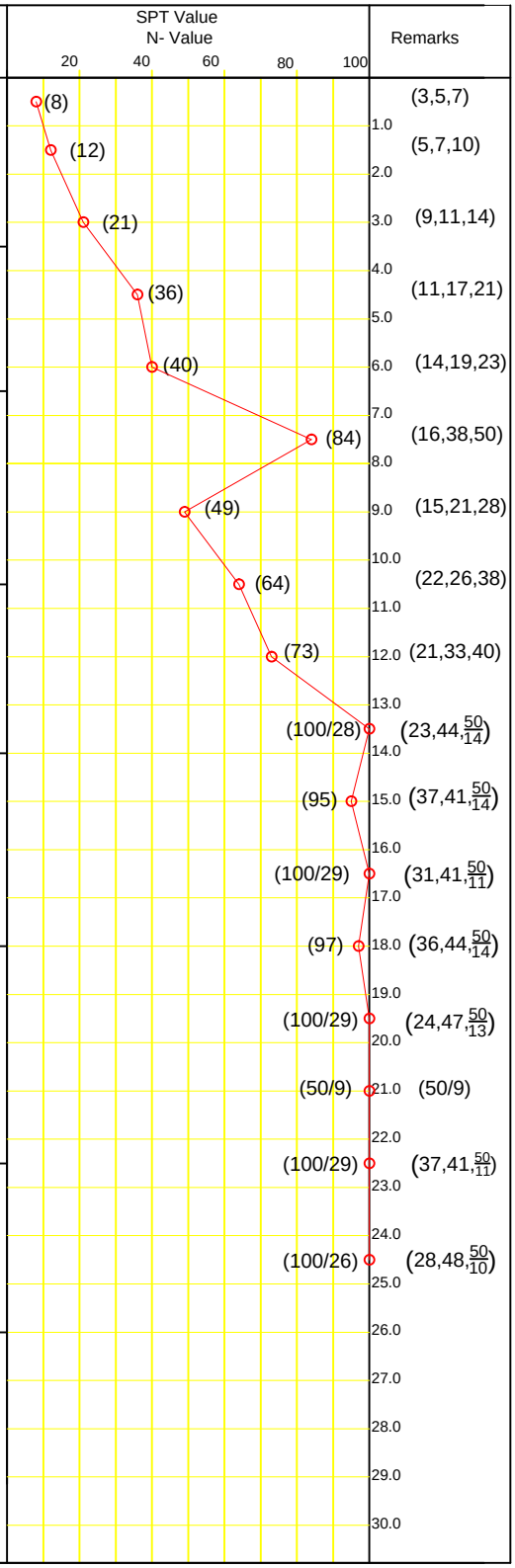
# BOREHOLE LOG

**Site** .... *Samawa Combined Cycle P.P.* .... **Method of Boring** .... *Auger & Rotary* ....

**Borehole No.** ..... *88* ..... **Date** ..... *06/05/2017* .....

**X:** ..... *525901.831* ..... **Y:** ..... *3454134.417* ..... **Ground Level** ..... *9.538* .....

| Water Table Level | Depth (m) | Sample Type & Depth | Litho logy | Thickness of Layer (m) | Soil Description | SPT Value N- Value | Remarks |
|---|---|---|---|---|---|---|---|
| 1.60 | 0.5, 1.0, 1.5, 2.0, 3.0 | D, U, D, D | | 3.5 | Medium to stiff brown fat Silty CLAY with black spots of organic matter & white traces of soluble salts together with little fine grained Sand at top. | (8), (12), (21) | (3,5,7), (5,7,10), (9,11,14) |
| | 4.0, 4.5, 5.0, 6.0 | U, D, D | | 3.0 | Medium to desne grayish green fine grained Clayey Silty SAND mixture with rusty spots of iron oxide compounds and white traces of soluble salts. | (36), (40) | (11,17,21), (14,19,23) |
| | 7.0, 7.5, 8.0, 9.0 | D, D | | 4.0 | Very dense light green to brownish gray fine grained SAND with little fine fraction of Silt and white shiny sheets of mica minerals. | (84), (49) | (16,38,50), (15,21,28) |
| | 10.0, 10.5, 11.0, 12.0 | D, D | | 3.5 | Very dense gray to light gray fine grained Silty SAND with rusty spots of iron oxide compounds. | (64), (73) | (22,26,38), (21,33,40) |
| | 13.0, 13.5, 14.0, 15.0, 16.0, 16.5, 17.0 | D, D, D | | 4.0 | Very dense brownish green to light brown well cemented fine to medium grained SAND with white cementation formation & little Silt fraction. | (100/28), (95), (100/29) | (23,44,50/14), (37,41,50/14), (31,41,50/11) |
| | 18.0, 19.0, 19.5, 20.0, 21.0, 22.0 | D, D, D | | 4.5 | Hard light green Sandy fat Silty CLAY mixture with a lot of white spots of cementation formation and rusty traces of iron oxide compounds. | (97), (100/29), (50/9) | (36,44,50/14), (24,47,50/13), (50/9) |
| | 22.5, 23.0, 24.0, 24.5, 25.0 | D, D, D | | 2.5 | Hard greenish gray fat Silty CLAY with white cementation formation and brownish rusty lines/traces of iron oxide compounds together with black spots of organic matter. | (100/29), (100/26) | (37,41,50/11), (28,48,50/10) |




Scale - 1 : 150 Undisturbed Sample - U Disturbed Sample : - D Bulk Sample - B Core Sample - C

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# BOREHOLE LOG

**Site** .... *Samawa Combined Cycle P.P.* .... **Method of Boring** .... *Auger & Rotary* ....

**Borehole No.** ..... *89* ..... **Date** ..... *07/05/2017* .....

**X:** ..... *525975.864* ..... **Y:** ..... *3454084.524* ..... **Ground Level** ..... *9.993*.....

| Water Table Level | Depth (m) | Sample Type & Depth | Litho logy | Thickness of Layer (m) | Soil Description | SPT Value N- Value | Remarks |
|---|---|---|---|---|---|---|---|
| 2.10 | 0.5, 1.0, 1.5, 2.0 | D, U, D | | 3.0 | Medium to stiff dark brown to brown fat Silty CLAY with black spots of organic matter & white traces of soluble salts. | (8), (13) | (4,5,6), (4,7,11) |
| | 3.0, 4.0, 4.5, 5.0 | D, D | | 2.0 | Medium to dense gray fine grained Silty SAND with rusty spots of iron oxide compounds and white traces of soluble salts. | (32), (43) | (10,17,21), (12,20,25) |
| | 6.0, 7.0, 7.5, 8.0, 9.0 | D, D, D, D | | 3.0 | Dense to very dense light brownish gray fine to medium grained SAND with white shiny spots of soluble salts and rusty traces of iron oxide compounds together with little Silt fraction. | (31), (100), (65) | (11,14,19), (21,31,50/10), (27,31,34) |
| | 10.0, 10.5, 11.0, 12.0 | D, D, D | | 4.5 | Very dense greenish gray to grayish green fine to medium grained Silty SAND with a lot of white cementation formation. | (81), (100) | (35,38,43), (18,40,50/12) |
| | 13.0, 13.5, 14.0, 15.0 | D, D | | 2.5 | Very dense light greenish brown fine to medium grained SAND with white cementation formation compounds & little Silt fraction. | (97), (94) | (19,34,50/13), (18,28,50/10) |
| | 16.0, 16.5, 17.0 | D, D | | 1.5 | Very dense grayish green fine grained Silty SAND with rusty spots of iron oxide compounds. | (56) | (16,24,32) |
| | 18.0, 19.0, 19.5, 20.0 | D, D, D | | 3.5 | Hard green Sandy fat Silty CLAY mixture with a lot of white cementation formation and brownish rusty lines/traces of iron oxide compounds. | (79), (100/27) | (21,33,46), (20,39,50/9) |

Scale - 1 : 150 Undisturbed Sample - U Disturbed Sample : - D Bulk Sample - B Core Sample - C

# APPENDIX (C)

# LABORATORY TEST RESULTS

# ON SOIL SAMPLES

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# SUMMARY OF TEST RESULTS

Site: Samawa Combined Cycle P.P
Borehole No.: 1


Date: May, 2017

| Location of Specimen | | | | Index Properties | | | Natural Water Content % | Dry Density KN/m$^3$ | Specific Gravity | Strength Tests | | | Consolidation Test | | | | Swelling Pressure kPa | Sieve Analysis % Passing No. 200 | Chemical Test | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Unconfined Compression kPa | Direct Shear | | | | | | | | | | | | |
| B.H. No. | Sample No. | Depth (m) | Sample Type | LL % | PL % | PI % | | | | | Cohesion kPa | Friction Angle | $e_o$ | $P_c$ | $C_c$ | $C_r$ | | | $SO_3$ % | TSS % | Cl % | OM % | PH |
| **1** | 1 | 0.5-1.0 | DS | 41 | 22 | 19 | | | | | | | | | | | | 45.6 | | | | | |
| | 2 | 1.5-2.0 | DS | 52 | 21 | 31 | | | | | | | | | | | | | | | | | |
| | 3 | 2.0-2.5 | US | | | | 29.3 | 14.0 | 2.71 | 41 | | | 0.957 | 105 | 0.28 | 0.046 | 19 | 91.7 | | | | | |
| | 4 | 3.0-3.5 | DS | | | | | | | | | | | | | | | 88.4 | 0.52 | 5.32 | 0.28 | 4.77 | 7.9 |
| | 5 | 4.5-5.0 | DS | Non Plastic | | | | | | | | | | | | | | 28.6 | | | | | |
| | 6 | 6.0-6.5 | DS | 57 | 25 | 32 | 24.8 | | | | | | | | | | | 70.4 | | | | | |
| | 7 | 7.5-8.0 | DS | 43 | 23 | 20 | | | | | | | | | | | | | 0.14 | 0.96 | 0.06 | 1.82 | 8.0 |
| | 8 | 9.0-9.5 | DS | | | | 22.7 | | | | | | | | | | | 42.3 | | | | | |
| | 9 | 10.5-11.0 | DS | Non Plastic | | | | | 2.66 | | | | | | | | | 17.2 | | | | | |
| | 11 | 13.5-14.0 | DS | | | | 19.2 | 16.3 | | | 0 | 36°* | | | | | | 16.1 | | | | | |
| | 12 | 15.0-15.5 | DS | 66 | 29 | 37 | | | | | | | | | | | | | | | | | |
| | 13 | 16.5-17.0 | DS | | | | | | | | | | | | | | | 57.2 | | | | | |
| | 14 | 18.0-18.5 | DS | 75 | 33 | 42 | 24.3 | | | | | | | | | | | | | | | | |
| | 15 | 19.5-20.0 | DS | | | | | | 2.74 | | | | | | | | | 90.8 | | | | | |
| | 16 | 21.0-21.5 | DS | 72 | 31 | 41 | | | | | | | | | | | | 76.1 | | | | | |
| | 17 | 22.5-23.0 | DS | | | | 25.0 | | | | | | | | | | | 69.8 | | | | | |
| | 18 | 24.0-24.5 | DS | 78 | 33 | 45 | | | | | | | | | | | | 93.9 | | | | | |
| | 19 | 25.5-26.0 | DS | | | | | | | | | | | | | | | 59.3 | | | | | |
| | 20 | 27.0-27.5 | DS | 69 | 30 | 39 | 24.6 | | | | | | | | | | | | | | | | |
| | 22 | 30.0-30.5 | DS | | | | | | | | | | | | | | | 95.2 | | | | | |

* Remolded Sample

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# SUMMARY OF TEST RESULTS

Site: Samawa Combined Cycle P.P
Borehole No.: 02


Date: May, 2017

| Location of Specimen | | | | Index Properties | | | Natural Water Content % | Dry Density KN/m$^3$ | Specific Gravity | Strength Tests | | | Consolidation Test | | | | Swelling Pressure kPa | Sieve Analysis % Passing No. 200 | Chemical Test | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Unconfined Compression kPa | Triaxial Compression | | | | | | | | | | | | |
| B.H. No. | Sample No. | Depth (m) | Sample Type | LL % | PL % | PI % | | | | | Cohesion kPa | Friction Angle | $e_o$ | $P_c$ | $C_c$ | $C_r$ | | | $SO_3$ % | TSS % | Cl % | OM % | PH |
| **02** | 1 | 0.5-1.0 | DS | | | | | | | | | | | | | | | 96.8 | | | | | |
| | 2 | 1.5-2.0 | US | 62 | 25 | 37 | 31.6 | 13.8 | 2.72 | 67 | | | 0.883 | 110 | 0.28 | 0.046 | 16 | | | | | | |
| | 3 | 3.0-3.5 | DS | | | | | | | | | | | | | | | 72.7 | 0.61 | 3.52 | 0.23 | 3.78 | 8.0 |
| | 4 | 4.0-4.5 | US | 56 | 24 | 32 | 28.4 | 14.7 | 2.70 | | 43 | 4.5° | 0.814 | 125 | 0.26 | 0.039 | | | | | | | |
| | 5 | 4.5-5.0 | DS | | | | | | | | | | | | | | | 54.3 | | | | | |
| | 6 | 6.0-6.5 | DS | 46 | 24 | 22 | 26.2 | | | | | | | | | | | 40.3 | 0.21 | 1.44 | 0.09 | 0.84 | 8.1 |
| | 7 | 7.5-8.0 | DS | | | | | | 2.67 | | | | | | | | | 16.5 | | | | | |
| | 8 | 9.0-9.5 | DS | Non plastic | | | 23.1 | | | | | | | | | | | | | | | | |
| | 9 | 10.5-11.0 | DS | | | | | | | | | | | | | | | 20.7 | | | | | |
| | 10 | 12.0-12.5 | DS | Non plastic | | | 20.4 | 15.5 | | | 0 | 31°* | | | | | | | | | | | |
| | 11 | 13.5-14.0 | DS | Non plastic | | | | | | | | | | | | | | 11.7 | | | | | |
| | 12 | 15.0-15.5 | DS | | | | | | 2.65 | | | | | | | | | 6.8 | | | | | |
| | 13 | 16.5-17.0 | DS | 89 | 31 | 58 | | | | | | | | | | | | | | | | | |
| | 14 | 18.0-18.5 | DS | | | | 24.7 | | | | | | | | | | | 91.4 | | | | | |
| | 15 | 19.5-20.0 | DS | | | | | | | | | | | | | | | 71.9 | | | | | |
| | 17 | 22.5-23.0 | DS | 78 | 32 | 46 | | | | | | | | | | | | | | | | | |
| | 18 | 24.0-24.5 | DS | | | | 25.3 | | | | | | | | | | | 73.6 | | | | | |
| | 20 | 27.0-27.5 | DS | 85 | 34 | 51 | | | 2.73 | | | | | | | | | 60.7 | | | | | |
| | 21 | 28.5-29.0 | DS | | | | 23.8 | | | | | | | | | | | 94.8 | | | | | |
| | 22 | 30.0-30.5 | DS | 72 | 29 | 43 | | | | | | | | | | | | | | | | | |

* Direct Shear on Remolded Samples

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# SUMMARY OF TEST RESULTS

Site: Samawa Combined Cycle P.P
Borehole No.: 03


Date: May, 2017

| Location of Specimen | | | | Index Properties | | | Natural Water Content % | Dry Density KN/m$^3$ | Specific Gravity | Strength Tests | | | Consolidation Test | | | | Swelling Pressure kPa | Sieve Analysis % Passing No. 200 | Chemical Test | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Unconfined Compression kPa | Triaxial Compression | | | | | | | | | | | | |
| B.H. No. | Sample No. | Depth (m) | Sample Type | LL % | PL % | PI % | | | | | Cohesion kPa | Friction Angle | $e_o$ | $P_c$ | $C_c$ | $C_r$ | | | $SO_3$ % | TSS % | Cl % | OM % | PH |
| **03** | 1 | 0.75-1.25 | DS | | | | | | | | | | | | | | | 98.1 | | | | | |
| | 2 | 1.5-2.0 | US | 68 | 27 | 41 | 28.7 | 14.7 | 2.71 | | 25 | 0° | 0.948 | 105 | 0.32 | 0.053 | 13 | | 1.14 | 3.84 | 0.28 | 3.92 | 7.9 |
| | 3 | 3.0-3.5 | DS | 55 | 22 | 33 | | | | | | | | | | | | | | | | | |
| | 4 | 4.5-5.0 | DS | | | | 30.2 | | | | | | | | | | | 94.3 | | | | | |
| | 5 | 6.0-6.5 | DS | | | | | | | | | | | | | | | 43.3 | | | | | |
| | 6 | 7.5-8.0 | DS | 38 | 20 | 18 | | | 2.67 | | | | | | | | | | 0.59 | 1.76 | 0.17 | 1.34 | 8.0 |
| | 7 | 9.0-9.5 | DS | | | | 21.9 | 15.3 | | | 0 | 29°* | | | | | | 15.9 | | | | | |
| | 8 | 10.5-11.0 | DS | Non plastic | | | | | | | | | | | | | | | | | | | |
| | 9 | 12.0-12.5 | DS | Non plastic | | | | | | | | | | | | | | | | | | | |
| | 10 | 13.5-14.0 | DS | | | | 19.7 | | | | | | | | | | | 16.9 | | | | | |
| | 11 | 15.0-15.5 | DS | 71 | 28 | 43 | | | | | | | | | | | | | | | | | |
| | 12 | 16.5-17.0 | DS | 40 | 19 | 21 | | | 2.68 | | | | | | | | | | | | | | |
| | 13 | 18.0-18.5 | DS | | | | 20.8 | 16.4 | | | 5 | 30.5°* | | | | | | 44.7 | | | | | |
| | 14 | 20.0-20.5 | DS | | | | | | | | | | | | | | | 66.5 | | | | | |
| | 16 | 24.0-24.5 | DS | 91 | 35 | 56 | 26.9 | | | | | | | | | | | | | | | | |
| | 17 | 26.0-26.5 | DS | 39 | 21 | 18 | | | | | | | | | | | | 36.3 | | | | | |
| | 18 | 28.0-28.5 | DS | | | | 24.4 | | | | | | | | | | | 64.8 | | | | | |
| | 19 | 31.0-31.5 | DS | 83 | 32 | 51 | | | 2.72 | | | | | | | | | | | | | | |
| | 20 | 34.0-34.5 | DS | | | | 25.6 | | | | | | | | | | | 58.2 | | | | | |
| | 22 | 40.0-40.5 | DS | 88 | 35 | 53 | | | | | | | | | | | | | | | | | |

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# SUMMARY OF TEST RESULTS

Site: Samawa Combined Cycle P.P
Borehole No.: 04


Date: May, 2017

| Location of Specimen | | | | Index Properties | | | Natural Water Content % | Dry Density KN/m$^3$ | Specific Gravity | Strength Tests | | | Consolidation Test | | | | Swelling Pressure kPa | Sieve Analysis % Passing No. 200 | Chemical Test | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Unconfined Compression kPa | Direct Shear | | | | | | | | | | | | |
| B.H. No. | Sample No. | Depth (m) | Sample Type | LL % | PL % | PI % | | | | | Cohesion kPa | Friction Angle | $e_o$ | $P_c$ | $C_c$ | $C_r$ | | | $SO_3$ % | TSS % | Cl % | OM % | PH |
| **04** | 1 | 0.5-1.0 | DS | 52 | 23 | 29 | | | | | | | | | | | | | | | | | |
| | 2 | 1.5-2.0 | US | | | | 26.1 | 15.2 | 2.71 | 62 | | | 0.772 | 115 | 0.22 | 0.036 | 23 | 96.2 | | | | | |
| | 3 | 3.0-3.5 | DS | 54 | 24 | 30 | | | | | | | | | | | | | 0.40 | 2.81 | 0.16 | 2.54 | 8.0 |
| | 4 | 4.0-4.5 | US | 42 | 23 | 19 | 24.7 | 14.9 | | | 12 | 18° | | | | | | | | | | | |
| | 5 | 4.5-5.0 | DS | | | | | | | | | | | | | | | 48.9 | | | | | |
| | 6 | 6.0-6.5 | DS | Non plastic | | | | | 2.67 | | | | | | | | | | 0.14 | 1.32 | 0.07 | 0.66 | 8.1 |
| | 7 | 7.5-8.0 | DS | | | | 22.4 | 15.1 | | | 0 | 26°* | | | | | | 17.3 | | | | | |
| | 9 | 10.5-11.0 | DS | | | | | | | | | | | | | | | 15.6 | | | | | |
| | 10 | 12.0-12.5 | DS | Non plastic | | | | | | | | | | | | | | | | | | | |
| | 11 | 13.5-14.0 | DS | | | | 18.5 | | | | | | | | | | | 23.8 | | | | | |
| | 12 | 15.0-15.5 | DS | 94 | 38 | 56 | | | | | | | | | | | | 68.3 | | | | | |
| | 13 | 16.5-17.0 | DS | Non plastic | | | | | 2.66 | | | | | | | | | 18.2 | | | | | |
| | 14 | 18.0-18.5 | DS | | | | 20.2 | | | | | | | | | | | 43.9 | | | | | |
| | 15 | 20.0-20.5 | DS | 37 | 19 | 18 | | | | | | | | | | | | 33.7 | | | | | |
| | 16 | 22.0-22.5 | DS | 75 | 32 | 43 | | | 2.73 | | | | | | | | | | | | | | |
| | 17 | 24.0-24.5 | DS | | | | 24.7 | | | | | | | | | | | 79.5 | | | | | |
| | 18 | 27.0-27.5 | DS | 69 | 28 | 41 | | | | | | | | | | | | | | | | | |
| | 19 | 30.0-30.5 | DS | | | | 25.2 | | | | | | | | | | | 80.8 | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | |

* Remolded Sample

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# SUMMARY OF TEST RESULTS

Site: Samawa Combined Cycle P.P
Borehole No.: 05


Date: May, 2017

| Location of Specimen | | | | Index Properties | | | Natural Water Content % | Dry Density KN/m$^3$ | Specific Gravity | Strength Tests | | | Consolidation Test | | | | Swelling Pressure kPa | Sieve Analysis % Passing No. 200 | Chemical Test | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Unconfined Compression kPa | Triaxial Compression | | | | | | | | | | | | |
| B.H. No. | Sample No. | Depth (m) | Sample Type | LL % | PL % | PI % | | | | | Cohesion kPa | Friction Angle | $e_o$ | $P_c$ | $C_c$ | $C_r$ | | | $SO_3$ % | TSS % | Cl % | OM % | PH |
| **05** | 1 | 0.5-1.0 | DS | | | | | | | | | | | | | | | 81.4 | | | | | |
| | 2 | 1.0-1.5 | US | | | | 29.8 | 13.8 | 2.70 | | 33 | 2.5° | 0.982 | 115 | 0.29 | 0.038 | 23 | | | | | | |
| | 3 | 1.5-2.0 | DS | 54 | 23 | 31 | | | | | | | | | | | | 78.3 | | | | | |
| | 4 | 3.0-3.5 | DS | 64 | 27 | 37 | | | | | | | | | | | | | 0.63 | 3.32 | 0.23 | 2.94 | 7.9 |
| | 5 | 4.0-4.5 | US | | | | 30.3 | 13.3 | 2.72 | 88 | | | 0.854 | 130 | 0.27 | 0.042 | | | | | | | |
| | 6 | 4.5-5.0 | DS | | | | | | | | | | | | | | | 96.8 | | | | | |
| | 7 | 6.0-6.5 | DS | 40 | 22 | 18 | | | | | | | | | | | | 41.7 | 0.31 | 1.64 | 0.12 | 1.04 | 8.0 |
| | 8 | 7.5-8.0 | DS | | | | 21.8 | | | | | | | | | | | 22.8 | | | | | |
| | 10 | 10.5-11.0 | DS | Non plastic | | | | | 2.66 | | | | | | | | | | | | | | |
| | 11 | 12.0-12.5 | DS | 43 | 21 | 22 | | | | | | | | | | | | 47.2 | | | | | |
| | 12 | 13.5-14.0 | DS | | | | 24.4 | | | | | | | | | | | 56.3 | | | | | |
| | 13 | 15.0-15.5 | DS | 92 | 36 | 56 | | | | | | | | | | | | | | | | | |
| | 14 | 16.5-17.0 | DS | Non plastic | | | 20.6 | 16.2 | | | 0 | 39°* | | | | | | 20.1 | | | | | |
| | 15 | 18.0-18.5 | DS | | | | | | 2.72 | | | | | | | | | 63.3 | | | | | |
| | 17 | 21.0-21.5 | DS | 72 | 29 | 43 | | | | | | | | | | | | | | | | | |
| | 19 | 24.0-24.5 | DS | | | | 25.3 | | | | | | | | | | | 59.7 | | | | | |
| | 20 | 25.5-26.0 | DS | 45 | 21 | 24 | | | | | | | | | | | | | | | | | |
| | 21 | 27.0-27.5 | DS | | | | | | 2.69 | | | | | | | | | 45.4 | | | | | |
| | 22 | 28.5-29.0 | DS | 77 | 32 | 45 | | | | | | | | | | | | | | | | | |
| | 23 | 30.0-30.5 | DS | | | | 24.2 | | | | | | | | | | | 92.4 | | | | | |

* Direct Shear on Remolded Samples

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# SUMMARY OF TEST RESULTS

Site: Samawa Combined Cycle P.P
Borehole No.: 06


Date: May, 2017

| Location of Specimen | | | | Index Properties | | | Natural Water Content % | Dry Density KN/m$^3$ | Specific Gravity | Strength Tests | | | Consolidation Test | | | | Swelling Pressure kPa | Sieve Analysis % Passing No. 200 | Chemical Test | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Unconfined Compression kPa | Direct Shear | | | | | | | | | | | | |
| B.H. No. | Sample No. | Depth (m) | Sample Type | LL % | PL % | PI % | | | | | Cohesion kPa | Friction Angle | $e_o$ | $P_c$ | $C_c$ | $C_r$ | | | $SO_3$ % | TSS % | Cl % | OM % | PH |
| **06** | 1 | 0.5-1.0 | DS | 58 | 26 | 32 | | | | | | | | | | | | | | | | | |
| | 2 | 1.0-1.5 | US | | | | 28.6 | 14.7 | 2.71 | 62 | | | 0.868 | 120 | 0.28 | 0.031 | 12 | | 1.14 | 5.04 | 0.32 | 3.51 | 7.8 |
| | 3 | 1.5-2.0 | DS | | | | | | | | | | | | | | | 94.7 | | | | | |
| | 4 | 3.0-3.5 | DS | 69 | 27 | 42 | | | | | | | | | | | | | | | | | |
| | 5 | 4.0-4.5 | US | | | | 26.2 | 14.5 | | | 7 | 16.5° | | | | | | 48.2 | | | | | |
| | 6 | 4.5-5.0 | DS | 41 | 19 | 22 | | | | | | | | | | | | | 0.21 | 1.28 | 0.08 | 1.26 | 8.0 |
| | 7 | 6.0-6.5 | DS | | | | | | 2.66 | | | | | | | | | 27.4 | | | | | |
| | 9 | 9.0-9.5 | DS | Non plastic | | | 19.1 | | | | | | | | | | | 16.2 | | | | | |
| | 10 | 10.5-11.0 | DS | 39 | 20 | 19 | | | | | | | | | | | | 44.4 | | | | | |
| | 11 | 12.0-12.5 | DS | | | | 22.0 | 15.8 | | | 0 | 35°* | | | | | | 36.3 | | | | | |
| | 12 | 13.5-14.0 | DS | | | | | | 2.72 | | | | | | | | | 52.8 | | | | | |
| | 13 | 15.0-15.5 | DS | 55 | 23 | 32 | | | | | | | | | | | | | | | | | |
| | 14 | 16.5-17.0 | DS | 43 | 22 | 21 | | | | | | | | | | | | 38.8 | | | | | |
| | 15 | 18.0-18.5 | DS | | | | 23.8 | | | | | | | | | | | 72.5 | | | | | |
| | 17 | 21.0-21.5 | DS | 72 | 29 | 43 | | | | | | | | | | | | | | | | | |
| | 18 | 22.5-23.0 | DS | 37 | 18 | 19 | | | 2.69 | | | | | | | | | 35.4 | | | | | |
| | 19 | 24.0-24.5 | DS | | | | 25.2 | | | | | | | | | | | 89.9 | | | | | |
| | 20 | 25.0-25.5 | DS | 76 | 27 | 49 | | | | | | | | | | | | | | | | | |
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*Remolded Samples

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# SUMMARY OF TEST RESULTS

Site: Samawa Combined Cycle P.P
Borehole No.: 07


Date: May, 2017

| Location of Specimen | | | | Index Properties | | | Natural Water Content % | Dry Density KN/m$^3$ | Specific Gravity | Strength Tests | | | Consolidation Test | | | | Swelling Pressure kPa | Sieve Analysis % Passing No. 200 | Chemical Test | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Unconfined Compression kPa | Triaxial Compression | | | | | | | | | | | | |
| B.H. No. | Sample No. | Depth (m) | Sample Type | LL % | PL % | PI % | | | | | Cohesion kPa | Friction Angle | $e_o$ | $P_c$ | $C_c$ | $C_r$ | | | $SO_3$ % | TSS % | Cl % | OM % | PH |
| **07** | 1 | 0.5-1.0 | DS | 61 | 26 | 35 | | | | | | | | | | | | | | | | | |
| | 2 | 1.5-2.0 | DS | | | | | | | | | | | | | | | 96.2 | 1.41 | 5.62 | 0.43 | 2.85 | 7.8 |
| | 3 | 2.0-2.5 | US | | | | 30.6 | 13.8 | 2.71 | | 29 | 2° | 0.991 | 115 | 0.32 | 0.048 | 24 | | | | | | |
| | 5 | 4.0-4.5 | US | | | | 28.2 | 14.2 | 2.72 | 106 | | | 0.976 | 135 | 0.30 | 0.042 | 36 | | | | | | |
| | 6 | 4.5-5.0 | DS | 63 | 25 | 38 | | | | | | | | | | | | | 0.71 | 3.88 | 0.24 | 4.51 | 7.9 |
| | 7 | 6.0-6.5 | DS | | | | | | | | | | | | | | | 78.5 | | | | | |
| | 8 | 7.5-8.0 | DS | Non plastic | | | 20.2 | | | | | | | | | | | | | | | | |
| | 9 | 9.0-9.5 | DS | | | | | | | | | | | | | | | 16.9 | | | | | |
| | 10 | 10.5-11.0 | DS | 44 | 21 | 23 | 22.1 | | | | | | | | | | | 49.0 | | | | | |
| | 11 | 12.0-12.5 | DS | | | | | | 2.66 | | | | | | | | | 22.3 | | | | | |
| | 12 | 13.5-14.0 | DS | Non plastic | | | 19.6 | 16.1 | | | 0 | 38°* | | | | | | | | | | | |
| | 13 | 15.0-15.0 | DS | 83 | 31 | 52 | | | | | | | | | | | | 66.8 | | | | | |
| | 15 | 18.0-18.5 | DS | | | | 23.9 | | | | | | | | | | | 68.9 | | | | | |
| | 16 | 19.5-20.0 | DS | | | | | | 2.68 | | | | | | | | | 44.7 | | | | | |
| | 18 | 22.5-23.0 | DS | 42 | 22 | 20 | | | | | | | | | | | | | | | | | |
| | 19 | 24.0-24.5 | DS | | | | 21.4 | | | | | | | | | | | 48.5 | | | | | |
| | 20 | 25.5-26.0 | DS | 93 | 36 | 57 | | | 2.74 | | | | | | | | | 57.8 | | | | | |
| | 21 | 27.0-27.5 | DS | 74 | 31 | 43 | | | | | | | | | | | | | | | | | |
| | 23 | 30.0-30.5 | DS | | | | 24.6 | | | | | | | | | | | 64.8 | | | | | |
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Website: www.andrealab.com Email: azad@andrealab.com

# SUMMARY OF TEST RESULTS

Site: Samawa Combined Cycle P.P
Borehole No.: 08


Date: May, 2017

| Location of Specimen | | | | Index Properties | | | Natural Water Content % | Dry Density KN/m$^3$ | Specific Gravity | Strength Tests | | | Consolidation Test | | | | Swelling Pressure kPa | Sieve Analysis % Passing No. 200 | Chemical Test | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Unconfined Compression kPa | Triaxial Compression | | | | | | | | | | | | |
| B.H. No. | Sample No. | Depth (m) | Sample Type | LL % | PL % | PI % | | | | | Cohesion kPa | Friction Angle | $e_o$ | $P_c$ | $C_c$ | $C_r$ | | | $SO_3$ % | TSS % | Cl % | OM % | PH |
| **08** | 1 | 0.5-1.0 | DS | 53 | 23 | 30 | | | | | | | | | | | | | 1.52 | 5.41 | 0.48 | 3.56 | 7.8 |
| | 2 | 1.0-1.5 | US | | | | 29.8 | 14.2 | 2.71 | 59 | 27 | 0° | 0.802 | 120 | 0.29 | 0.051 | 14 | | | | | | |
| | 3 | 1.5-2.0 | DS | | | | | | | | | | | | | | | 97.0 | | | | | |
| | 4 | 3.0-3.5 | DS | 55 | 24 | 31 | | | | | | | | | | | | | | | | | |
| | 5 | 4.5-5.0 | DS | | | | 25.4 | | | | | | | | | | | 39.6 | 0.17 | 1.64 | 0.06 | 0.73 | 8.0 |
| | 6 | 6.0-6.5 | DS | 38 | 19 | 19 | | | | | | | | | | | | | | | | | |
| | 7 | 7.5-8.0 | DS | | | | 21.7 | 15.0 | | | 0 | 30.5°* | | | | | | 18.3 | | | | | |
| | 9 | 10.5-11.0 | DS | Non plastic | | | | | | | | | | | | | | | | | | | |
| | 10 | 12.0-12.5 | DS | | | | | | 2.66 | | | | | | | | | 21.9 | | | | | |
| | 11 | 13.5-14.0 | DS | 82 | 31 | 51 | 25.8 | | | | | | | | | | | 61.4 | | | | | |
| | 13 | 16.5-17.0 | DS | | | | | | | | | | | | | | | 71.3 | | | | | |
| | 14 | 18.0-18.5 | DS | 90 | 34 | 56 | | | | | | | | | | | | | | | | | |
| | 15 | 19.5-20.0 | DS | | | | 25.9 | | | | | | | | | | | 86.7 | | | | | |
| | 16 | 21.0-21.5 | DS | 78 | 29 | 49 | | | 2.74 | | | | | | | | | | | | | | |
| | 17 | 23.0-23.5 | DS | 84 | 30 | 54 | | | | | | | | | | | | | | | | | |
| | 18 | 25.0-25.5 | DS | | | | 24.7 | | | | | | | | | | | 57.8 | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | |
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Website: www.andrealab.com Email: azad@andrealab.com

# SUMMARY OF TEST RESULTS

Site: Samawa Combined Cycle P.P
Borehole No.: 09


Date: May, 2017

| Location of Specimen | | | | Index Properties | | | Natural Water Content % | Dry Density KN/m$^3$ | Specific Gravity | Strength Tests | | | Consolidation Test | | | | Swelling Pressure kPa | Sieve Analysis % Passing No. 200 | Chemical Test | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Unconfined Compression kPa | Triaxial Compression | | | | | | | | | | | | |
| B.H. No. | Sample No. | Depth (m) | Sample Type | LL % | PL % | PI % | | | | | Cohesion kPa | Friction Angle | $e_o$ | $P_c$ | $C_c$ | $C_r$ | | | $SO_3$ % | TSS % | Cl % | OM % | PH |
| **09** | 1 | 0.5-1.0 | DS | 48 | 23 | 25 | | | | | | | | | | | | | 0.75 | 3.42 | 0.23 | 3.37 | 7.9 |
| | 2 | 1.5-2.0 | DS | | | | | | | | | | | | | | | 97.2 | | | | | |
| | 3 | 2.0-2.5 | US | | | | 30.5 | 13.4 | 2.71 | 55 | 26 | 0° | 1.049 | 135 | 0.31 | 0.037 | 32 | | | | | | |
| | 4 | 3.0-3.5 | DS | 45 | 24 | 21 | | | | | | | | | | | | | | | | | |
| | 5 | 4.5-5.0 | DS | 41 | 22 | 19 | | | | | | | | | | | | 38.7 | 0.22 | 1.12 | 0.10 | 0.54 | 8.0 |
| | 6 | 6.0-6.5 | DS | | | | | | 2.67 | | | | | | | | | 23.7 | | | | | |
| | 7 | 7.5-8.0 | DS | | | | 20.2 | 14.9 | | | 0 | 28°* | | | | | | 16.8 | | | | | |
| | 9 | 10.5-11.0 | DS | Non plastic | | | | | | | | | | | | | | | | | | | |
| | 10 | 12.0-12.5 | DS | | | | | | | | | | | | | | | 33.9 | | | | | |
| | 11 | 13.5-14.0 | DS | 36 | 19 | 17 | | | | | | | | | | | | | | | | | |
| | 12 | 15.0-15.5 | DS | 66 | 27 | 39 | 23.9 | | | | | | | | | | | 62.4 | | | | | |
| | 13 | 16.5-17.0 | DS | | | | | | 2.65 | | | | | | | | | 16.7 | | | | | |
| | 15 | 20.0-20.5 | DS | Non plastic | | | | | | | | | | | | | | 17.2 | | | | | |
| | 16 | 22.0-22.5 | DS | | | | 25.1 | | | | | | | | | | | 67.7 | | | | | |
| | 17 | 24.0-24.5 | DS | 88 | 33 | 55 | | | | | | | | | | | | | | | | | |
| | 18 | 26.0-26.5 | DS | | | | 26.3 | | 2.73 | | | | | | | | | 96.1 | | | | | |
| | 20 | 30.0-30.5 | DS | 81 | 32 | 49 | | | | | | | | | | | | | | | | | |
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# SUMMARY OF TEST RESULTS

Site: Samawa Combined Cycle P.P
Borehole No.: 10


Date: May, 2017

| Location of Specimen | | | | Index Properties | | | Natural Water Content % | Dry Density KN/m$^3$ | Specific Gravity | Strength Tests | | | Consolidation Test | | | | Swelling Pressure kPa | Sieve Analysis % Passing No. 200 | Chemical Test | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Unconfined Compression kPa | Triaxial Compression | | | | | | | | | | | | |
| B.H. No. | Sample No. | Depth (m) | Sample Type | LL % | PL % | PI % | | | | | Cohesion kPa | Friction Angle | $e_o$ | $P_c$ | $C_c$ | $C_r$ | | | $SO_3$ % | TSS % | Cl % | OM % | PH |
| **10** | 1 | 0.5-1.0 | DS | | | | | | | | | | | | | | | 94.2 | | | | | |
| | 2 | 1.5-2.0 | US | | | | 30.6 | 14.2 | 2.72 | 70 | 38 | 2° | 0.876 | 115 | 0.27 | 0.034 | 18 | | | | | | |
| | 3 | 3.0-3.5 | DS | 68 | 25 | 43 | | | | | | | | | | | | | 0.61 | 3.62 | 0.18 | 4.22 | 8.0 |
| | 4 | 4.5-5.0 | DS | Non plastic | | | | | | | | | | | | | | 16.1 | | | | | |
| | 5 | 6.0-6.5 | DS | | | | 23.8 | | | | | | | | | | | 27.8 | 0.18 | 1.76 | 0.08 | 0.82 | 8.1 |
| | 6 | 7.5-8.0 | DS | Non plastic | | | | | 2.67 | | | | | | | | | | | | | | |
| | 7 | 9.0-10.0 | DS | 65 | 26 | 39 | | | | | | | | | | | | 80.4 | | | | | |
| | 8 | 10.5-11.0 | DS | | | | 25.7 | | | | | | | | | | | 66.4 | | | | | |
| | 9 | 12.0-12.5 | DS | | | | | | 2.66 | | | | | | | | | 16.9 | | | | | |
| | 11 | 15.0-15.5 | DS | Non plastic | | | 19.6 | 15.8 | | | 0 | 34.5°* | | | | | | | | | | | |
| | 13 | 18.0-18.5 | DS | 67 | 27 | 40 | | | | | | | | | | | | | | | | | |
| | 14 | 20.0-20.45 | DS | | | | | | | | | | | | | | | 59.2 | | | | | |
| | 15 | 22.5-23.0 | DS | 70 | 28 | 42 | 24.8 | | | | | | | | | | | | | | | | |
| | 16 | 25.0-25.5 | DS | | | | | | | | | | | | | | | 72.6 | | | | | |
| | 17 | 27.5-28.0 | DS | | | | | | 2.73 | | | | | | | | | 94.9 | | | | | |
| | 18 | 30.0-30.5 | DS | 76 | 31 | 45 | 26.1 | | | | | | | | | | | | | | | | |
| | 19 | 32.5-33.0 | DS | | | | | | | | | | | | | | | 69.3 | | | | | |
| | 21 | 37.5-38.0 | DS | 73 | 29 | 44 | | | | | | | | | | | | | | | | | |
| | 22 | 40.0-405 | DS | 42 | 19 | 23 | 20.9 | | | | | | | | | | | 37.2 | | | | | |
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# SUMMARY OF TEST RESULTS

Site: Samawa Combined Cycle P.P
Borehole No.: 11


Date: May, 2017

| Location of Specimen | | | | Index Properties | | | Natural Water Content % | Dry Density KN/m$^3$ | Specific Gravity | Strength Tests | | | Consolidation Test | | | | Swelling Pressure kPa | Sieve Analysis % Passing No. 200 | Chemical Test | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Unconfined Compression kPa | Direct Shear | | | | | | | | | | | | |
| B.H. No. | Sample No. | Depth (m) | Sample Type | LL % | PL % | PI % | | | | | Cohesion kPa | Friction Angle | $e_o$ | $P_c$ | $C_c$ | $C_r$ | | | $SO_3$ % | TSS % | Cl % | OM % | PH |
| **11** | 1 | 0.5-1.0 | DS | 55 | 24 | 31 | | | | | | | | | | | | | | | | | |
| | 2 | 1.5-2.0 | DS | | | | | | | | | | | | | | | 93.7 | | | | | |
| | 3 | 2.0-2.5 | US | 52 | 23 | 29 | 28.6 | 14.3 | 2.72 | 77 | | | 0.876 | 125 | 0.26 | 0.039 | 34 | | 1.08 | 4.12 | 0.32 | 2.33 | 7.9 |
| | 4 | 3.5-4.0 | DS | | | | | | | | | | | | | | | 94.1 | | | | | |
| | 5 | 5.0-5.5 | DS | | | | | | | | | | | | | | | 16.2 | 0.18 | 1.41 | 0.08 | 0.81 | 8.1 |
| | 6 | 6.5-7.0 | DS | Non plastic | | | 22.9 | 15.6 | | | 0 | 31.5°* | | | | | | | | | | | |
| | 7 | 8.0-8.5 | DS | | | | | | 2.67 | | | | | | | | | 18.7 | | | | | |
| | 9 | 11.0-11.5 | DS | Non plastic | | | | | | | | | | | | | | 15.9 | | | | | |
| | 10 | 12.5-13.0 | DS | Non plastic | | | | | | | | | | | | | | | | | | | |
| | 12 | 15.5-16.0 | DS | | | | 17.6 | 16.2 | | | 0 | 39°* | | | | | | 22.1 | | | | | |
| | 13 | 17.0-17.5 | DS | 91 | 34 | 57 | | | | | | | | | | | | | | | | | |
| | 15 | 20.0-20.5 | DS | | | | | | 2.72 | | | | | | | | | 81.6 | | | | | |
| | 17 | 23.0-23.5 | DS | 84 | 31 | 53 | 25.5 | | | | | | | | | | | | | | | | |
| | 18 | 24.5-25.0 | DS | | | | | | | | | | | | | | | 65.9 | | | | | |
| | 19 | 26.0-26.5 | DS | 64 | 25 | 39 | | | | | | | | | | | | | | | | | |
| | 21 | 29.5-30.0 | DS | | | | 24.7 | | 2.73 | | | | | | | | | 87.4 | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | |
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Website: www.andrealab.com Email: azad@andrealab.com

# SUMMARY OF TEST RESULTS

Site: Samawa Combined Cycle P.P
Borehole No.: 12


Date: May, 2017

| Location of Specimen | | | | Index Properties | | | Natural Water Content % | Dry Density KN/m$^3$ | Specific Gravity | Strength Tests | | | Consolidation Test | | | | Swelling Pressure kPa | Sieve Analysis % Passing No. 200 | Chemical Test | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Unconfined Compression kPa | Triaxial Compression | | | | | | | | | | | | |
| B.H. No. | Sample No. | Depth (m) | Sample Type | LL % | PL % | PI % | | | | | Cohesion kPa | Friction Angle | $e_o$ | $P_c$ | $C_c$ | $C_r$ | | | $SO_3$ % | TSS % | Cl % | OM % | PH |
| **12** | 1 | 0.5-1.0 | DS | | | | | | | | | | | | | | | 96.1 | | | | | |
| | 2 | 1.5-2.0 | US | | | | 27.9 | 14.4 | 2.72 | 77 | 36 | 3° | 0.828 | 110 | 0.28 | 0.037 | 24 | | 1.38 | 5.12 | 0.43 | 2.27 | 7.8 |
| | 3 | 3.0-3.5 | DS | 60 | 28 | 32 | | | | | | | | | | | | | | | | | |
| | 4 | 4.5-5.0 | DS | Non plastic | | | | | | | | | | | | | | 21.8 | 0.23 | 1.72 | 0.10 | 1.31 | 8.0 |
| | 5 | 6.0-6.5 | DS | | | | 19.8 | 15.8 | | | 0 | 27°* | | | | | | 29.4 | | | | | |
| | 7 | 9.0-9.5 | DS | Non plastic | | | | | 2.66 | | | | | | | | | 21.9 | | | | | |
| | 8 | 10.5-11.0 | DS | 38 | 19 | 19 | | | | | | | | | | | | 37.2 | | | | | |
| | 9 | 12.0-12.5 | DS | 65 | 24 | 41 | 26.5 | | | | | | | | | | | | | | | | |
| | 10 | 13.5-14.0 | DS | | | | | | | | | | | | | | | 54.1 | | | | | |
| | 11 | 15.0-15.5 | DS | | | | | | 2.68 | | | | | | | | | 39.6 | | | | | |
| | 13 | 18.0-18.5 | DS | 39 | 21 | 18 | 25.1 | | | | | | | | | | | | | | | | |
| | 14 | 19.5-20.0 | DS | Non plastic | | | | | | | | | | | | | | | | | | | |
| | 15 | 21.0-21.5 | DS | | | | 20.7 | 16.4 | | | 0 | 38.5°* | | | | | | 26.6 | | | | | |
| | 16 | 22.5-23.0 | DS | 85 | 29 | 56 | | | | | | | | | | | | | | | | | |
| | 18 | 25.5-26.0 | DS | | | | | | 2.74 | | | | | | | | | 56.8 | | | | | |
| | 19 | 27.0-27.5 | DS | 79 | 31 | 48 | | | | | | | | | | | | | | | | | |
| | 21 | 30.0-30.5 | DS | | | | 24.3 | | | | | | | | | | | 62.3 | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | |
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Website: www.andrealab.com Email: azad@andrealab.com

# SUMMARY OF TEST RESULTS

Site: Samawa Combined Cycle P.P
Borehole No.: 13


Date: May, 2017

| Location of Specimen | | | | Index Properties | | | Natural Water Content % | Dry Density KN/m$^3$ | Specific Gravity | Strength Tests | | | Consolidation Test | | | | Swelling Pressure kPa | Sieve Analysis % Passing No. 200 | Chemical Test | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Unconfined Compression kPa | Triaxial Compression | | | | | | | | | | | | |
| B.H. No. | Sample No. | Depth (m) | Sample Type | LL % | PL % | PI % | | | | | Cohesion kPa | Friction Angle | $e_o$ | $P_c$ | $C_c$ | $C_r$ | | | $SO_3$ % | TSS % | Cl % | OM % | PH |
| **13** | 1 | 0.5-1.0 | DS | 53 | 22 | 31 | | | | | | | | | | | | | 0.45 | 3.72 | 0.14 | 1.72 | 8.0 |
| | 2 | 1.5-2.0 | US | | | | 26.8 | 14.8 | 2.70 | 81 | | | 0.782 | 100 | 0.27 | 0.026 | 10 | 68.3 | | | | | |
| | 3 | 3.0-3.5 | DS | 58 | 25 | 33 | | | | | | | | | | | | | | | | | |
| | 4 | 4.0-4.5 | US | | | | 26.2 | 15.1 | 2.71 | | 53 | 3.5° | 0.721 | 130 | 0.25 | 0.034 | | | | | | | |
| | 5 | 4.5-5.0 | DS | | | | | | | | | | | | | | | 75.1 | 0.99 | 4.16 | 0.31 | 2.57 | 7.9 |
| | 6 | 6.0-6.5 | DS | 60 | 24 | 36 | | | | | | | | | | | | | | | | | |
| | 7 | 7.5-8.0 | DS | | | | 23.4 | | | | | | | | | | | 16.2 | | | | | |
| | 8 | 9.0-9.5 | DS | Non plastic | | | | | | | | | | | | | | | | | | | |
| | 9 | 10.5-11.0 | DS | Non plastic | | | 19.4 | 16.0 | | | 0 | 41°* | | | | | | | | | | | |
| | 10 | 12.0-12.5 | DS | | | | | | 2.65 | | | | | | | | | 8.7 | | | | | |
| | 11 | 14.0-14.5 | DS | | | | | | | | | | | | | | | 17.9 | | | | | |
| | 13 | 18.0-18.5 | DS | Non plastic | | | 20.5 | | | | | | | | | | | | | | | | |
| | 14 | 20.0-20.5 | DS | | | | | | 2.67 | | | | | | | | | 28.5 | | | | | |
| | 15 | 22.5-23.0 | DS | 69 | 27 | 42 | | | | | | | | | | | | | | | | | |
| | 16 | 25.0-25.5 | DS | | | | 24.9 | | | | | | | | | | | 62.0 | | | | | |

* Direct Shear on Remolded Samples

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# SUMMARY OF TEST RESULTS

Site: Samawa Combined Cycle P.P
Borehole No.: 14


Date: May, 2017

| Location of Specimen | | | | Index Properties | | | Natural Water Content % | Dry Density KN/m$^3$ | Specific Gravity | Strength Tests | | | Consolidation Test | | | | Swelling Pressure kPa | Sieve Analysis % Passing No. 200 | Chemical Test | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Unconfined Compression kPa | Triaxial Compression | | | | | | | | | | | | |
| B.H. No. | Sample No. | Depth (m) | Sample Type | LL % | PL % | PI % | | | | | Cohesion kPa | Friction Angle | $e_o$ | $P_c$ | $C_c$ | $C_r$ | | | $SO_3$ % | TSS % | Cl % | OM % | PH |
| **14** | 1 | 0.5-1.0 | DS | | | | | | | | | | | | | | | 95.7 | | | | | |
| | 2 | 1.5-2.0 | DS | 46 | 20 | 26 | | | | | | | | | | | | | 0.44 | 3.04 | 0.14 | 3.81 | 8.0 |
| | 3 | 2.0-2.5 | US | | | | 28.5 | 14.1 | 2.70 | | 42 | 3° | 0.844 | 120 | 0.19 | 0.032 | 12 | | | | | | |
| | 4 | 3.0-3.5 | DS | 48 | 21 | 27 | | | | | | | | | | | | 97.0 | | | | | |
| | 5 | 4.0-4.5 | US | | | | 27.7 | 14.6 | 2.72 | 97 | | | 0.779 | 135 | 0.25 | 0.042 | | | 0.58 | 2.52 | 0.16 | 1.33 | 8.0 |
| | 7 | 6.0-6.5 | DS | | | | | | | | | | | | | | | 94.8 | | | | | |
| | 8 | 7.5-8.0 | DS | Non plastic | | | | | | | | | | | | | | | | | | | |
| | 9 | 9.0-9.5 | DS | | | | | | | | | | | | | | | 15.9 | | | | | |
| | 10 | 10.5-11.0 | DS | Non plastic | | | 21.1 | 16.7 | | | 0 | 37.5°* | | | | | | | | | | | |
| | 11 | 12.0-12.5 | DS | | | | | | 2.66 | | | | | | | | | 21.6 | | | | | |
| | 12 | 13.5-14.0 | DS | 73 | 29 | 44 | | | | | | | | | | | | 79.1 | | | | | |
| | 14 | 16.5-17.0 | DS | | | | 26.0 | | | | | | | | | | | 57.4 | | | | | |
| | 15 | 18.0-18.5 | DS | | | | | | 2.73 | | | | | | | | | 87.9 | | | | | |
| | 16 | 19.5-20.0 | DS | 76 | 31 | 45 | | | | | | | | | | | | | | | | | |
| | 17 | 21.0-21.5 | DS | | | | 24.6 | | | | | | | | | | | 76.6 | | | | | |
| | 19 | 24.0-24.5 | DS | 56 | 25 | 31 | | | | | | | | | | | | | | | | | |
| | 20 | 25.5-26.0 | DS | | | | 25.1 | | | | | | | | | | | 68.3 | | | | | |
| | 21 | 27.0-27.5 | DS | Non plastic | | | | | 2.69 | | | | | | | | | 34.8 | | | | | |
| | 22 | 28.5-29.0 | DS | 69 | 30 | 39 | | | | | | | | | | | | | | | | | |
| | 23 | 30.0-30.5 | DS | | | | 23.8 | | | | | | | | | | | 65.9 | | | | | |

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# SUMMARY OF TEST RESULTS

Site: Samawa Combined Cycle P.P
Borehole No.: 15


Date: May, 2017

| Location of Specimen | | | | Index Properties | | | Natural Water Content % | Dry Density KN/m$^3$ | Specific Gravity | Strength Tests | | | Consolidation Test | | | | Swelling Pressure kPa | Sieve Analysis % Passing No. 200 | Chemical Test | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Unconfined Compression kPa | Triaxial Compression | | | | | | | | | | | | |
| B.H. No. | Sample No. | Depth (m) | Sample Type | LL % | PL % | PI % | | | | | Cohesion kPa | Friction Angle | $e_o$ | $P_c$ | $C_c$ | $C_r$ | | | $SO_3$ % | TSS % | Cl % | OM % | PH |
| **15** | 1 | 0.5-1.0 | DS | 55 | 23 | 32 | | | | | | | | | | | | | | | | | |
| | 2 | 1.5-2.0 | US | | | | 29.9 | 14.0 | 2.72 | 47 | | | 0.852 | 125 | 0.31 | 0.061 | 13 | 97.4 | | | | | |
| | 3 | 3.0-3.5 | DS | 60 | 24 | 36 | | | | | | | | | | | | | 0.94 | 3.87 | 0.30 | 2.98 | 7.9 |
| | 4 | 4.0-4.5 | US | | | | 27.8 | 14.4 | 2.71 | | 38 | 4° | 0.797 | 135 | 0.26 | 0.047 | | | | | | | |
| | 5 | 4.5-5.0 | DS | 64 | 26 | 38 | | | | | | | | | | | | 73.1 | | | | | |
| | 6 | 6.0-6.5 | DS | | | | | | | | | | | | | | | 37.7 | 0.27 | 1.62 | 0.11 | 1.18 | 8.0 |
| | 7 | 7.5-8.0 | DS | 41 | 22 | 19 | | | 2.67 | | | | | | | | | | | | | | |
| | 8 | 9.0-9.5 | DS | | | | 20.9 | 15.9 | | | 0 | 34°* | | | | | | 16.9 | | | | | |
| | 9 | 10.5-11.0 | DS | Non plastic | | | | | | | | | | | | | | | | | | | |
| | 10 | 12.0-12.5 | DS | 39 | 17 | 22 | | | | | | | | | | | | | | | | | |
| | 11 | 13.5-14.0 | DS | | | | 23.8 | | | | | | | | | | | 58.2 | | | | | |
| | 12 | 15.0-15.5 | DS | Non plastic | | | | | 2.66 | | | | | | | | | 15.2 | | | | | |
| | 13 | 17.0-17.5 | DS | | | | | | | | | | | | | | | 54.9 | | | | | |
| | 14 | 19.0-19.5 | DS | 84 | 29 | 55 | 25.7 | | | | | | | | | | | | | | | | |
| | 15 | 21.0-21.5 | DS | | | | | | | | | | | | | | | 48.3 | | | | | |
| | 16 | 23.0-23.5 | DS | 43 | 20 | 23 | | | 2.70 | | | | | | | | | | | | | | |
| | 17 | 25.0-25.5 | DS | 64 | 29 | 35 | | | | | | | | | | | | | | | | | |
| | 19 | 29.5-30.0 | DS | | | | 23.5 | | | | | | | | | | | 74.6 | | | | | |
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# SUMMARY OF TEST RESULTS

Site: Samawa Combined Cycle P.P
Borehole No.: 16


Date: May, 2017

| Location of Specimen | | | | Index Properties | | | Natural Water Content % | Dry Density KN/m$^3$ | Specific Gravity | Strength Tests | | | Consolidation Test | | | | Swelling Pressure kPa | Sieve Analysis % Passing No. 200 | Chemical Test | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Unconfined Compression kPa | Triaxial Compression | | | | | | | | | | | | |
| B.H. No. | Sample No. | Depth (m) | Sample Type | LL % | PL % | PI % | | | | | Cohesion kPa | Friction Angle | $e_o$ | $P_c$ | $C_c$ | $C_r$ | | | $SO_3$ % | TSS % | Cl % | OM % | PH |
| **16** | 1 | 0.5-1.0 | DS | 51 | 22 | 29 | | | | | | | | | | | | | | | | | |
| | 2 | 1.5-2.0 | US | | | | 28.6 | 14.3 | 2.70 | 61 | 29 | 0° | 0.838 | 125 | 0.30 | 0.043 | 39 | | | | | | |
| | 3 | 3.0-3.5 | DS | | | | | | | | | | | | | | | 95.7 | 0.63 | 3.36 | 0.28 | 4.46 | 7.9 |
| | 4 | 4.5-5.0 | DS | 40 | 19 | 21 | | | | | | | | | | | | | | | | | |
| | 5 | 6.0-6.5 | DS | | | | | | 2.68 | | | | | | | | | 46.8 | 0.14 | 1.12 | 0.08 | 0.56 | 8.1 |
| | 6 | 7.5-8.0 | DS | | | | 22.5 | 15.7 | | | 0 | 36.5°* | | | | | | 25.2 | | | | | |
| | 7 | 9.0-9.5 | DS | Non plastic | | | | | | | | | | | | | | | | | | | |
| | 8 | 10.5-11.0 | DS | Non plastic | | | 19.9 | | | | | | | | | | | | | | | | |
| | 9 | 12.0-12.5 | DS | | | | | | 2.66 | | | | | | | | | 23.3 | | | | | |
| | 10 | 14.0-14.5 | DS | 47 | 25 | 22 | | | | | | | | | | | | | | | | | |
| | 12 | 18.0-18.5 | DS | | | | 25.1 | | | | | | | | | | | 61.3 | | | | | |
| | 13 | 20.0-20.5 | DS | Non plastic | | | | | | | | | | | | | | 22.7 | | | | | |
| | 14 | 22.0-22.5 | DS | 78 | 32 | 46 | | | 2.73 | | | | | | | | | 93.9 | | | | | |
| | 15 | 24.0-24.5 | DS | | | | 26.0 | | | | | | | | | | | 88.7 | | | | | |
| | 16 | 26.0-26.5 | DS | 67 | 28 | 39 | | | | | | | | | | | | | | | | | |
| | 18 | 23.0-23.5 | DS | | | | 24.2 | | | | | | | | | | | 57.4 | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | |
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# SUMMARY OF TEST RESULTS

Site: Samawa Combined Cycle P.P
Borehole No.: 17


Date: May, 2017

| Location of Specimen | | | | Index Properties | | | Natural Water Content % | Dry Density KN/m$^3$ | Specific Gravity | Strength Tests | | | Consolidation Test | | | | Swelling Pressure kPa | Sieve Analysis % Passing No. 200 | Chemical Test | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Unconfined Compression kPa | Triaxial Compression | | | | | | | | | | | | |
| B.H. No. | Sample No. | Depth (m) | Sample Type | LL % | PL % | PI % | | | | | Cohesion kPa | Friction Angle | $e_o$ | $P_c$ | $C_c$ | $C_r$ | | | $SO_3$ % | TSS % | Cl % | OM % | PH |
| **17** | 1 | 0.75-1.25 | DS | 61 | 25 | 36 | | | | | | | | | | | | | | | | | |
| | 2 | 1.5-2.0 | US | | | | 27.5 | 14.2 | 2.72 | 75 | | | 0.845 | 120 | 0.25 | 0.048 | 13 | | | | | | |
| | 3 | 2.0-2.5 | DS | | | | | | | | | | | | | | | 94.3 | 1.02 | 3.92 | 0.31 | 3.44 | 7.9 |
| | 4 | 3.5-4.0 | DS | 65 | 24 | 41 | | | | | | | | | | | | | | | | | |
| | 5 | 4.5-5.0 | US | | | | 26.1 | 14.9 | 2.71 | | 59 | 4° | 0.763 | 140 | 0.23 | 0.044 | | 87.7 | | | | | |
| | 6 | 5.0-5.5 | DS | Non plastic | | | | | | | | | | | | | | 25.9 | 0.17 | 1.36 | 0.09 | 0.68 | 8.1 |
| | 7 | 8.0-8.5 | DS | | | | 22.7 | | 2.67 | | | | | | | | | 23.4 | | | | | |
| | 9 | 9.5-10.0 | DS | 42 | 19 | 23 | | | | | | | | | | | | 43.5 | | | | | |
| | 10 | 11.0-11.5 | DS | 59 | 25 | 34 | | | | | | | | | | | | 67.2 | | | | | |
| | 11 | 12.5-13.0 | DS | | | | 21.3 | 16.4 | | | 6 | 29.5°* | | | | | | 41.9 | | | | | |
| | 12 | 14.0-14.5 | DS | 39 | 20 | 19 | | | | | | | | | | | | | | | | | |
| | 13 | 15.5-16.0 | DS | | | | | | | | | | | | | | | 60.3 | | | | | |
| | 15 | 19.5-20.0 | DS | 82 | 31 | 51 | 25.2 | | 2.72 | | | | | | | | | | | | | | |
| | 16 | 22.0-22.5 | DS | 85 | 29 | 56 | | | | | | | | | | | | | | | | | |
| | 17 | 27.0-27.5 | DS | | | | 24.7 | | | | | | | | | | | 94.8 | | | | | |
| | 18 | 30.0-30.5 | DS | 71 | 28 | 43 | | | | | | | | | | | | 69.7 | | | | | |
| | 20 | 33.0-33.5 | DS | Non plastic | | | | | 2.66 | | | | | | | | | 21.7 | | | | | |
| | 21 | 36.0-36.5 | DS | | | | 25.6 | | | | | | | | | | | 78.8 | | | | | |
| | 22 | 39.5-40.0 | DS | 68 | 29 | 39 | | | | | | | | | | | | | | | | | |
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# SUMMARY OF TEST RESULTS

Site: Samawa Combined Cycle P.P
Borehole No.: 18


Date: May, 2017

| Location of Specimen | | | | Index Properties | | | Natural Water Content % | Dry Density KN/m$^3$ | Specific Gravity | Strength Tests | | | Consolidation Test | | | | Swelling Pressure kPa | Sieve Analysis % Passing No. 200 | Chemical Test | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Unconfined Compression kPa | Triaxial Compression | | | | | | | | | | | | |
| B.H. No. | Sample No. | Depth (m) | Sample Type | LL % | PL % | PI % | | | | | Cohesion kPa | Friction Angle | $e_o$ | $P_c$ | $C_c$ | $C_r$ | | | $SO_3$ % | TSS % | Cl % | OM % | PH |
| **18** | 1 | 0.5-1.0 | DS | 56 | 25 | 31 | | | | | | | | | | | | | | | | | |
| | 2 | 1.5-2.0 | DS | | | | | | | | | | | | | | | 97.1 | | | | | |
| | 3 | 2.0-2.5 | US | | | | 28.1 | 15.2 | 2.71 | 89 | 42 | 4° | 0.818 | 125 | 0.28 | 0.054 | 25 | | 0.18 | 1.28 | 0.08 | 0.75 | 8.1 |
| | 4 | 3.5-4.0 | DS | Non plastic | | | | | | | | | | | | | | | | | | | |
| | 6 | 6.5-7.0 | DS | | | | | | | | | | | | | | | 23.6 | 0.21 | 1.32 | 0.10 | 0.73 | 8.0 |
| | 7 | 8.0-8.5 | DS | | | | 20.5 | | | | | | | | | | | 32.9 | | | | | |
| | 8 | 9.5-10.0 | DS | 39 | 21 | 18 | | | | | | | | | | | | | | | | | |
| | 9 | 11.0-11.5 | DS | Non plastic | | | 18.6 | 16.2 | | | 0 | 39°* | | | | | | | | | | | |
| | 10 | 12.5-13.0 | DS | | | | | | 2.66 | | | | | | | | | 15.1 | | | | | |
| | 11 | 14.0-14.5 | DS | 80 | 34 | 46 | | | | | | | | | | | | | | | | | |
| | 13 | 18.0-18.5 | DS | | | | 23.7 | | | | | | | | | | | 52.7 | | | | | |
| | 14 | 20.0-20.5 | DS | 87 | 36 | 51 | | | 2.73 | | | | | | | | | | | | | | |
| | 15 | 22.0-22.5 | DS | | | | 25.0 | | | | | | | | | | | 86.4 | | | | | |
| | 16 | 24.0-24.5 | DS | 76 | 31 | 45 | | | | | | | | | | | | | | | | | |
| | 17 | 26.0-26.5 | DS | | | | | | | | | | | | | | | 69.2 | | | | | |
| | 18 | 28.0-28.5 | DS | 70 | 28 | 42 | | | 2.74 | | | | | | | | | | | | | | |
| | 19 | 30.0-30.5 | DS | | | | 24.6 | | | | | | | | | | | 91.3 | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | |
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# SUMMARY OF TEST RESULTS

Site: Samawa Combined Cycle P.P
Borehole No.: 19


Date: May, 2017

| Location of Specimen | | | | Index Properties | | | Natural Water Content % | Dry Density KN/m$^3$ | Specific Gravity | Strength Tests | | | Consolidation Test | | | | Swelling Pressure kPa | Sieve Analysis % Passing No. 200 | Chemical Test | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Unconfined Compression kPa | Direct Shear | | | | | | | | | | | | |
| B.H. No. | Sample No. | Depth (m) | Sample Type | LL % | PL % | PI % | | | | | Cohesion kPa | Friction Angle | $e_o$ | $P_c$ | $C_c$ | $C_r$ | | | $SO_3$ % | TSS % | Cl % | OM % | PH |
| **19** | 1 | 0.5-1.0 | DS | 58 | 25 | 33 | | | | | | | | | | | | | 0.76 | 4.52 | 0.23 | 4.24 | 7.9 |
| | 2 | 1.5-2.0 | DS | | | | | | | | | | | | | | | 97.8 | | | | | |
| | 3 | 3.0-3.5 | US | 61 | 24 | 37 | 29.4 | 14.1 | 2.71 | 68 | | | 0.856 | 135 | 0.34 | 0.061 | 24 | | | | | | |
| | 4 | 4.5-5.0 | DS | 43 | 22 | 21 | | | | | | | | | | | | 48.0 | 0.43 | 3.61 | 0.14 | 4.08 | 8.0 |
| | 5 | 6.0-6.5 | DS | | | | | | | | | | | | | | | 20.7 | | | | | |
| | 6 | 7.5-8.0 | DS | Non plastic | | | 22.8 | | | | | | | | | | | | | | | | |
| | 7 | 9.0-9.5 | DS | | | | | | 2.66 | | | | | | | | | 18.2 | | | | | |
| | 8 | 10.5-11.0 | DS | Non plastic | | | | | | | | | | | | | | | | | | | |
| | 10 | 14.0-14.5 | DS | | | | 16.9 | 16.3 | | | 0 | 41°* | | | | | | 10.6 | | | | | |
| | 11 | 16.5-17.0 | DS | | | | | | 2.72 | | | | | | | | | 56.4 | | | | | |
| | 12 | 18.0-18.5 | DS | 74 | 31 | 43 | 23.9 | | | | | | | | | | | | | | | | |
| | 13 | 20.0-20.5 | DS | 40 | 22 | 18 | | | | | | | | | | | | 45.1 | | | | | |
| | 14 | 22.5-23.0 | DS | 88 | 34 | 54 | | | | | | | | | | | | | | | | | |
| | 16 | 27.5-28.0 | DS | | | | 24.3 | | | | | | | | | | | 82.4 | | | | | |
| | 17 | 30.0-30.5 | DS | 71 | 31 | 40 | | | 2.73 | | | | | | | | | 89.3 | | | | | |

* Remolded Samples

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Website: www.andrealab.com Email: azad@andrealab.com

# SUMMARY OF TEST RESULTS

Site: Samawa Combined Cycle P.P
Borehole No.: 20


Date: May, 2017

| Location of Specimen | | | | Index Properties | | | Natural Water Content % | Dry Density KN/m$^3$ | Specific Gravity | Strength Tests | | | Consolidation Test | | | | Swelling Pressure kPa | Sieve Analysis % Passing No. 200 | Chemical Test | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Unconfined Compression kPa | Triaxial Compression | | | | | | | | | | | | |
| B.H. No. | Sample No. | Depth (m) | Sample Type | LL % | PL % | PI % | | | | | Cohesion kPa | Friction Angle | $e_o$ | $P_c$ | $C_c$ | $C_r$ | | | $SO_3$ % | TSS % | Cl % | OM % | PH |
| **20** | 1 | 0.75-1.25 | DS | 42 | 21 | 21 | | | | | | | | | | | | 48.7 | | | | | |
| | 2 | 1.5-2.0 | US | | | | 27.8 | 14.8 | 2.71 | 72 | 33 | 3° | 0.794 | 120 | 0.23 | 0.042 | 11 | 97.2 | 2.21 | 8.41 | 0.43 | 3.93 | 7.7 |
| | 3 | 3.0-3.5 | DS | 54 | 26 | 28 | | | | | | | | | | | | | | | | | |
| | 4 | 4.5-5.0 | DS | | | | | | | | | | | | | | | 15.8 | | | | | |
| | 5 | 6.0-6.5 | DS | Non plastic | | | | | 2.67 | | | | | | | | | | 0.18 | 1.24 | 0.07 | 0.66 | 8.0 |
| | 6 | 7.5-8.0 | DS | | | | 22.8 | 15.5 | | | 0 | 27.5°* | | | | | | 16.3 | | | | | |
| | 7 | 9.0-9.5 | DS | Non plastic | | | | | | | | | | | | | | | | | | | |
| | 8 | 10.5-11.0 | DS | | | | | | | | | | | | | | | 18.6 | | | | | |
| | 9 | 12.0-12.5 | DS | | | | 20.5 | 16.4 | | | 0 | 36°* | | | | | | 15.7 | | | | | |
| | 11 | 15.0-15.5 | DS | Non plastic | | | | | 2.66 | | | | | | | | | | | | | | |
| | 12 | 16.5-17.0 | DS | | | | 24.1 | | | | | | | | | | | 75.8 | | | | | |
| | 13 | 18.0-18.5 | DS | 73 | 29 | 44 | | | | | | | | | | | | | | | | | |
| | 14 | 19.5-20.0 | DS | | | | | | | | | | | | | | | 63.5 | | | | | |
| | 16 | 23.0-23.5 | DS | 69 | 30 | 39 | 24.6 | | | | | | | | | | | | | | | | |
| | 17 | 25.0-25.5 | DS | | | | | | 2.72 | | | | | | | | | 67.0 | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | |
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* Direct Shear on Remolded Samples

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Website: www.andrealab.com Email: azad@andrealab.com

# SUMMARY OF TEST RESULTS

Site: Samawa Combined Cycle P.P
Borehole No.: 21


Date: May, 2017

| Location of Specimen | | | | Index Properties | | | Natural Water Content % | Dry Density KN/m$^3$ | Specific Gravity | Strength Tests | | | Consolidation Test | | | | Swelling Pressure kPa | Sieve Analysis % Passing No. 200 | Chemical Test | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Unconfined Compression kPa | Direct Shear | | | | | | | | | | | | |
| B.H. No. | Sample No. | Depth (m) | Sample Type | LL % | PL % | PI % | | | | | Cohesion kPa | Friction Angle | $e_o$ | $P_c$ | $C_c$ | $C_r$ | | | $SO_3$ % | TSS % | Cl % | OM % | PH |
| **21** | 1 | 0.5-1.0 | DS | 54 | 25 | 29 | | | | | | | | | | | | | 0.43 | 2.78 | 0.15 | 3.34 | 8.0 |
| | 2 | 1.5-2.0 | US | | | | 26.8 | 14.8 | 2.72 | 91 | | | 0.776 | 100 | 0.23 | 0.058 | 9 | | | | | | |
| | 3 | 3.0-3.5 | DS | | | | | | | | | | | | | | | 98.1 | | | | | |
| | 4 | 4.5-5.0 | DS | Non plastic | | | | | | | | | | | | | | | 0.34 | 2.09 | 0.11 | 2.81 | 8.1 |
| | 5 | 6.0-6.5 | DS | | | | 21.5 | | | | | | | | | | | 16.9 | | | | | |
| | 6 | 7.5-8.0 | DS | Non plastic | | | | | 2.65 | | | | | | | | | 10.4 | | | | | |
| | 8 | 10.5-11.0 | DS | | | | 19.6 | 16.2 | | | 0 | 36.5°* | | | | | | 6.7 | | | | | |
| | 9 | 12.0-12.5 | DS | Non plastic | | | | | | | | | | | | | | 16.1 | | | | | |
| | 10 | 13.5-14.0 | DS | 52 | 22 | 30 | | | | | | | | | | | | | | | | | |
| | 11 | 15.0-15.5 | DS | | | | 23.7 | | | | | | | | | | | 74.8 | | | | | |
| | 12 | 16.5-17.0 | DS | 66 | 27 | 39 | | | 2.72 | | | | | | | | | | | | | | |
| | 13 | 18.0-18.5 | DS | | | | | | | | | | | | | | | 54.3 | | | | | |
| | 14 | 20.0-20.5 | DS | Non plastic | | | 20.5 | 16.4 | | | 0 | 39°* | | | | | | 34.9 | | | | | |
| | 15 | 22.0-22.5 | DS | 93 | 36 | 57 | | | | | | | | | | | | | | | | | |
| | 16 | 24.0-24.5 | DS | | | | | | 2.71 | | | | | | | | | 62.6 | | | | | |
| | 17 | 26.0-26.5 | DS | 84 | 32 | 52 | | | | | | | | | | | | | | | | | |
| | 19 | 30.0-30.5 | DS | | | | 22.9 | | | | | | | | | | | 77.8 | | | | | |
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* Remolded Samples

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Website: www.andrealab.com Email: azad@andrealab.com

# SUMMARY OF TEST RESULTS

Site: Samawa Combined Cycle P.P
Borehole No.: 22


Date: May, 2017

| Location of Specimen | | | | Index Properties | | | Natural Water Content % | Dry Density KN/m$^3$ | Specific Gravity | Strength Tests | | | Consolidation Test | | | | Swelling Pressure kPa | Sieve Analysis % Passing No. 200 | Chemical Test | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Unconfined Compression kPa | Triaxial Compression | | | | | | | | | | | | |
| B.H. No. | Sample No. | Depth (m) | Sample Type | LL % | PL % | PI % | | | | | Cohesion kPa | Friction Angle | $e_o$ | $P_c$ | $C_c$ | $C_r$ | | | $SO_3$ % | TSS % | Cl % | OM % | PH |
| **22** | 1 | 0.5-1.0 | DS | 58 | 26 | 32 | | | | | | | | | | | | | 0.64 | 3.76 | 0.26 | 2.24 | 7.9 |
| | 2 | 1.5-2.0 | US | | | | 29.4 | 14.4 | 2.72 | | 48 | 2.5° | 0.842 | 115 | 0.23 | 0.029 | 8 | 96.9 | | | | | |
| | 3 | 3.0-3.5 | DS | 46 | 22 | 24 | | | | | | | | | | | | | | | | | |
| | 4 | 4.0-4.5 | US | | | | 25.7 | 15.3 | 2.69 | 126 | | | 0.753 | 130 | 0.17 | 0.026 | | 63.7 | | | | | |
| | 5 | 4.5-5.0 | DS | 41 | 19 | 22 | | | | | | | | | | | | | | | | | |
| | 6 | 6.0-6.5 | DS | 40 | 21 | 19 | | | | | | | | | | | | 45.6 | | | | | |
| | 7 | 7.5-8.0 | DS | Non plastic | | | | | 2.66 | | | | | | | | | | 0.18 | 1.76 | 0.09 | 0.93 | 8.1 |
| | 8 | 9.0-9.5 | DS | | | | 21.6 | | | | | | | | | | | 25.8 | | | | | |
| | 9 | 10.5-11.0 | DS | 37 | 18 | 19 | | | | | | | | | | | | | | | | | |
| | 10 | 12.0-12.5 | DS | | | | | | | | | | | | | | | 39.8 | | | | | |
| | 11 | 13.5-14.0 | DS | | | | 19.8 | 16.2 | | | 0 | 38°* | | | | | | 21.5 | | | | | |
| | 12 | 15.0-15.5 | DS | Non plastic | | | | | 2.65 | | | | | | | | | 16.7 | | | | | |
| | 13 | 16.5-17.0 | DS | | | | | | | | | | | | | | | 53.2 | | | | | |
| | 14 | 18.0-18.5 | DS | 73 | 26 | 47 | 24.4 | | | | | | | | | | | | | | | | |
| | 15 | 19.5-20.0 | DS | Non plastic | | | | | | | | | | | | | | 33.8 | | | | | |
| | 16 | 21.0-21.5 | DS | 76 | 31 | 45 | | | 2.73 | | | | | | | | | | | | | | |
| | 18 | 25.0-25.5 | DS | | | | 22.9 | | | | | | | | | | | 72.4 | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | |
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# SUMMARY OF TEST RESULTS

Site: Samawa Combined Cycle P.P
Borehole No.: 23


Date: May, 2017

| Location of Specimen | | | | Index Properties | | | Natural Water Content % | Dry Density KN/m$^3$ | Specific Gravity | Strength Tests | | | Consolidation Test | | | | Swelling Pressure kPa | Sieve Analysis % Passing No. 200 | Chemical Test | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Unconfined Compression kPa | Triaxial Compression | | | | | | | | | | | | |
| B.H. No. | Sample No. | Depth (m) | Sample Type | LL % | PL % | PI % | | | | | Cohesion kPa | Friction Angle | $e_o$ | $P_c$ | $C_c$ | $C_r$ | | | $SO_3$ % | TSS % | Cl % | OM % | PH |
| **23** | 1 | 0.5-1.0 | DS | 57 | 25 | 32 | | | | | | | | | | | | | | | | | |
| | 2 | 1.5-2.0 | US | | | | 28.2 | 15.0 | 2.72 | 86 | 38 | 2.5° | 0.868 | 120 | 0.23 | 0.054 | 16 | 94.3 | 1.23 | 5.04 | 0.41 | 4.84 | 7.9 |
| | 3 | 3.0-3.5 | DS | 61 | 26 | 35 | | | | | | | | | | | | | | | | | |
| | 4 | 4.5-5.0 | DS | | | | | | 2.68 | | | | | | | | | 26.8 | 0.19 | 1.36 | 0.09 | 0.75 | 8.1 |
| | 5 | 6.0-6.5 | DS | Non plastic | | | 24.7 | | | | | | | | | | | | | | | | |
| | 6 | 7.5-8.0 | DS | | | | | | | | | | | | | | | 28.1 | | | | | |
| | 8 | 10.5-11.0 | DS | Non plastic | | | | | 2.66 | | | | | | | | | 25.4 | | | | | |
| | 9 | 12.0-12.5 | DS | | | | 21.8 | 15.9 | | | 0 | 35°* | | | | | | 18.3 | | | | | |
| | 10 | 13.5-14.0 | DS | Non plastic | | | | | | | | | | | | | | | | | | | |
| | 11 | 15.0-15.5 | DS | | | | | | | | | | | | | | | 91.8 | | | | | |
| | 12 | 16.5-17.0 | DS | 77 | 29 | 48 | 25.6 | | | | | | | | | | | | | | | | |
| | 13 | 18.0-18.5 | DS | | | | | | 2.71 | | | | | | | | | 64.9 | | | | | |
| | 14 | 20.0-20.5 | DS | 75 | 28 | 47 | | | | | | | | | | | | 74.2 | | | | | |
| | 15 | 22.0-22.5 | DS | | | | 26.3 | | | | | | | | | | | 94.0 | | | | | |
| | 17 | 26.0-26.5 | DS | 97 | 34 | 53 | | | | | | | | | | | | | | | | | |
| | 18 | 28.0-28.5 | DS | | | | | | 2.73 | | | | | | | | | 95.3 | | | | | |
| | 19 | 30.0-30.5 | DS | Non plastic | | | 18.9 | | | | | | | | | | | 20.6 | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | |
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* Direct Shear on Remolded Samples

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# SUMMARY OF TEST RESULTS

Site: Samawa Combined Cycle P.P
Borehole No.: 24


Date: May, 2017

| Location of Specimen | | | | Index Properties | | | Natural Water Content % | Dry Density KN/m$^3$ | Specific Gravity | Strength Tests | | | Consolidation Test | | | | Swelling Pressure kPa | Sieve Analysis % Passing No. 200 | Chemical Test | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Unconfined Compression kPa | Direct Shear | | | | | | | | | | | | |
| B.H. No. | Sample No. | Depth (m) | Sample Type | LL % | PL % | PI % | | | | | Cohesion kPa | Friction Angle | $e_o$ | $P_c$ | $C_c$ | $C_r$ | | | $SO_3$ % | TSS % | Cl % | OM % | PH |
| **24** | 1 | 0.5-1.0 | DS | | | | | | | | | | | | | | | 97.9 | | | | | |
| | 2 | 1.5-2.0 | US | | | | 26.6 | 15.4 | 2.71 | 89 | | | 0.850 | 125 | 0.27 | 0.036 | 24 | | 0.70 | 3.72 | 0.23 | 5.21 | 8.0 |
| | 3 | 3.0-3.5 | DS | 61 | 24 | 37 | | | | | | | | | | | | | | | | | |
| | 4 | 4.5-5.0 | DS | 42 | 22 | 20 | 23.1 | | | | | | | | | | | 40.1 | 0.14 | 1.24 | 0.07 | 0.82 | 8.1 |
| | 5 | 6.0-6.5 | DS | | | | | | 2.67 | | | | | | | | | 15.2 | | | | | |
| | 7 | 9.0-9.5 | DS | Non plastic | | | 21.6 | 15.9 | | | 0 | 38°* | | | | | | | | | | | |
| | 8 | 10.5-11.0 | DS | 37 | 19 | 18 | | | | | | | | | | | | 35.5 | | | | | |
| | 9 | 12.0-12.5 | DS | Non plastic | | | | | | | | | | | | | | 19.1 | | | | | |
| | 10 | 14.0-14.5 | DS | | | | 14.9 | | 2.65 | | | | | | | | | 6.8 | | | | | |
| | 12 | 18.0-18.5 | DS | Non plastic | | | | | | | | | | | | | | 12.6 | | | | | |
| | 13 | 20.0-20.5 | DS | Non plastic | | | | | | | | | | | | | | 25.6 | | | | | |
| | 14 | 22.5-23.0 | DS | Non plastic | | | 16.2 | 16.6 | | | 0 | 41°* | | | | | | 7.8 | | | | | |
| | 15 | 25.0-25.5 | DS | | | | | | 2.68 | | | | | | | | | 31.7 | | | | | |
| | 17 | 30.0-30.5 | DS | 36 | 19 | 17 | 18.2 | | | | | | | | | | | 34.8 | | | | | |
| | 18 | 33.0-33.5 | DS | 78 | 27 | 51 | | | | | | | | | | | | | | | | | |
| | 19 | 36.0-36.5 | DS | | | | 24.5 | | | | | | | | | | | 88.3 | | | | | |
| | 21 | 42.0-42.5 | DS | 83 | 31 | 52 | | | | | | | | | | | | | | | | | |
| | 22 | 45.0-45.5 | DS | | | | 25.3 | | | | | | | | | | | 63.7 | | | | | |
| | 23 | 47.5-48.0 | DS | 66 | 28 | 38 | | | 2.73 | | | | | | | | | | | | | | |
| | 24 | 50.0-50.5 | DS | 50 | 26 | 24 | | | | | | | | | | | | 90.9 | | | | | |

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# SUMMARY OF TEST RESULTS

Site: Samawa Combined Cycle P.P
Borehole No.: 25


Date: May, 2017

| Location of Specimen | | | | Index Properties | | | Natural Water Content % | Dry Density KN/m$^3$ | Specific Gravity | Strength Tests | | | Consolidation Test | | | | Swelling Pressure kPa | Sieve Analysis % Passing No. 200 | Chemical Test | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Unconfined Compression kPa | Triaxial Compression | | | | | | | | | | | | |
| B.H. No. | Sample No. | Depth (m) | Sample Type | LL % | PL % | PI % | | | | | Cohesion kPa | Friction Angle | $e_o$ | $P_c$ | $C_c$ | $C_r$ | | | $SO_3$ % | TSS % | Cl % | OM % | PH |
| **25** | 1 | 0.5-1.0 | DS | 43 | 23 | 20 | | | | | | | | | | | | 49.2 | | | | | |
| | 2 | 1.0-1.5 | US | | | | 29.8 | 14.8 | 2.71 | | 27 | 0° | 0.916 | 90 | 0.28 | 0.038 | 12 | | | | | | |
| | 3 | 1.5-2.0 | DS | | | | | | | | | | | | | | | 96.9 | 1.31 | 5.36 | 0.41 | 4.47 | 7.9 |
| | 4 | 3.0-3.5 | DS | 40 | 22 | 18 | | | | | | | | | | | | | | | | | |
| | 5 | 4.0-4.5 | US | | | | 26.2 | 15.4 | 2.70 | 104 | | | 0.796 | 125 | 0.22 | 0.029 | | | | | | | |
| | 6 | 4.5-5.0 | DS | 38 | 21 | 17 | | | | | | | | | | | | 33.3 | | | | | |
| | 7 | 6.0-6.5 | DS | Non plastic | | | | | | | | | | | | | | | 0.18 | 1.12 | 0.07 | 0.94 | 8.1 |
| | 9 | 9.0-9.5 | DS | | | | 20.8 | 15.9 | | | 0 | 34.5°* | | | | | | 16.4 | | | | | |
| | 10 | 10.5-11.0 | DS | Non plastic | | | | | 2.66 | | | | | | | | | 12.3 | | | | | |
| | 12 | 13.5-14.0 | DS | | | | | | | | | | | | | | | 5.8 | | | | | |
| | 13 | 15.0-15.5 | DS | 41 | 22 | 19 | 21.3 | | | | | | | | | | | 37.8 | | | | | |
| | 14 | 17.0-17.5 | DS | | | | | | 2.71 | | | | | | | | | 52.1 | | | | | |
| | 15 | 19.0-19.5 | DS | 63 | 27 | 36 | | | | | | | | | | | | | | | | | |
| | 16 | 21.0-21.5 | DS | 84 | 28 | 56 | 25.8 | | | | | | | | | | | | | | | | |
| | 18 | 25.0-25.5 | DS | | | | | | 2.72 | | | | | | | | | 59.4 | | | | | |
| | 19 | 27.0-27.5 | DS | | | | 20.2 | | | | | | | | | | | 35.8 | | | | | |
| | 20 | 29.5-30.0 | DS | 41 | 20 | 21 | | | | | | | | | | | | 48.5 | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | |
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* Remolded Sample

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Website: www.andrealab.com Email: azad@andrealab.com

# SUMMARY OF TEST RESULTS

Site: Samawa Combined Cycle P.P
Borehole No.: 26


Date: May, 2017

| Location of Specimen | | | | Index Properties | | | Natural Water Content % | Dry Density KN/m$^3$ | Specific Gravity | Strength Tests | | | Consolidation Test | | | | Swelling Pressure kPa | Sieve Analysis % Passing No. 200 | Chemical Test | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Unconfined Compression kPa | Triaxial Compression | | | | | | | | | | | | |
| B.H. No. | Sample No. | Depth (m) | Sample Type | LL % | PL % | PI % | | | | | Cohesion kPa | Friction Angle | $e_o$ | $P_c$ | $C_c$ | $C_r$ | | | $SO_3$ % | TSS % | Cl % | OM % | PH |
| **26** | 1 | 0.5-1.0 | DS | | | | | | | | | | | | | | | 97.2 | | | | | |
| | 2 | 1.5-2.0 | US | 45 | 20 | 25 | 28.8 | 15.1 | 2.71 | 91 | 42 | 3° | 0.806 | 125 | 0.24 | 0.033 | 26 | | | | | | |
| | 3 | 3.0-3.5 | DS | | | | | | | | | | | | | | | 89.3 | 0.64 | 3.72 | 0.21 | 3.66 | 8.0 |
| | 4 | 4.5-5.0 | DS | | | | 24.3 | | | | | | | | | | | 27.4 | | | | | |
| | 5 | 6.0-6.5 | DS | Non plastic | | | | | | | | | | | | | | | | | | | |
| | 6 | 7.5-8.0 | DS | | | | | | 2.67 | | | | | | | | | 35.1 | | | | | |
| | 7 | 9.0-9.5 | DS | 39 | 20 | 19 | 21.7 | | | | | | | | | | | | 0.37 | 1.69 | 0.12 | 2.41 | 8.1 |
| | 8 | 10.5-11.0 | DS | | | | | | | | | | | | | | | 21.8 | | | | | |
| | 9 | 12.0-12.5 | DS | Non plastic | | | 19.6 | 16.2 | | | 0 | 37.5°* | | | | | | 29.2 | | | | | |
| | 10 | 13.5-14.0 | DS | | | | | | 2.72 | | | | | | | | | 71.2 | | | | | |
| | 11 | 15.0-15.5 | DS | 81 | 27 | 54 | | | | | | | | | | | | | | | | | |
| | 12 | 17.0-17.5 | DS | | | | 22.1 | | | | | | | | | | | 42.7 | | | | | |
| | 13 | 19.0-19.5 | DS | 44 | 23 | 21 | | | | | | | | | | | | 47.9 | | | | | |
| | 14 | 21.0-21.5 | DS | | | | 25.3 | | | | | | | | | | | 58.9 | | | | | |
| | 15 | 23.0-23.5 | DS | 96 | 30 | 66 | | | 2.74 | | | | | | | | | | | | | | |
| | 16 | 25.0-25.5 | DS | 82 | 33 | 49 | | | | | | | | | | | | | | | | | |
| | 18 | 29.5-30.0 | DS | | | | 24.5 | | | | | | | | | | | 90.8 | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | |
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Website: www.andrealab.com Email: azad@andrealab.com

# SUMMARY OF TEST RESULTS

Site: Samawa Combined Cycle P.P
Borehole No.: 27


Date: May, 2017

| Location of Specimen | | | | Index Properties | | | Natural Water Content % | Dry Density KN/m$^3$ | Specific Gravity | Strength Tests | | | Consolidation Test | | | | Swelling Pressure kPa | Sieve Analysis % Passing No. 200 | Chemical Test | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Unconfined Compression kPa | Direct Shear | | | | | | | | | | | | |
| B.H. No. | Sample No. | Depth (m) | Sample Type | LL % | PL % | PI % | | | | | Cohesion kPa | Friction Angle | $e_o$ | $P_c$ | $C_c$ | $C_r$ | | | $SO_3$ % | TSS % | Cl % | OM % | PH |
| **27** | 1 | 0.75-1.25 | DS | 53 | 22 | 31 | | | | | | | | | | | | | 1.53 | 6.12 | 0.48 | 2.59 | 7.8 |
| | 2 | 1.5-2.0 | US | | | | 27.8 | 15.3 | 2.72 | 90 | | | 0.866 | 120 | 0.26 | 0.035 | 22 | | | | | | |
| | 3 | 3.0-3.5 | DS | 55 | 23 | 32 | | | | | | | | | | | | 93.8 | | | | | |
| | 4 | 4.5-5.0 | DS | | | | 23.8 | | | | | | | | | | | 37.1 | 0.27 | 1.28 | 0.11 | 0.82 | 8.0 |
| | 5 | 6.0-6.5 | DS | 40 | 19 | 21 | | | 2.67 | | | | | | | | | | | | | | |
| | 6 | 7.5-8.0 | DS | | | | 20.4 | 16.0 | | | 0 | 33°* | | | | | | 27.9 | | | | | |
| | 8 | 10.5-11.0 | DS | Non plastic | | | | | | | | | | | | | | 21.7 | | | | | |
| | 9 | 12.0-12.5 | DS | 67 | 26 | 41 | | | 2.72 | | | | | | | | | 54.8 | | | | | |
| | 10 | 14.0-14.5 | DS | | | | 25.2 | | | | | | | | | | | 73.7 | | | | | |
| | 12 | 18.0-18.5 | DS | 89 | 30 | 59 | | | | | | | | | | | | | | | | | |
| | 13 | 20.0-20.5 | DS | | | | 24.5 | | | | | | | | | | | 87.2 | | | | | |
| | 15 | 24.5-25.0 | DS | 85 | 31 | 54 | | | 2.74 | | | | | | | | | 93.9 | | | | | |

*Remolded Samples

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# SUMMARY OF TEST RESULTS

Site: Samawa Combined Cycle P.P
Borehole No.: 28


Date: May, 2017

| Location of Specimen | | | | Index Properties | | | Natural Water Content % | Dry Density KN/m$^3$ | Specific Gravity | Strength Tests | | | Consolidation Test | | | | Swelling Pressure kPa | Sieve Analysis % Passing No. 200 | Chemical Test | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Unconfined Compression kPa | Triaxial Compression | | | | | | | | | | | | |
| B.H. No. | Sample No. | Depth (m) | Sample Type | LL % | PL % | PI % | | | | | Cohesion kPa | Friction Angle | $e_o$ | $P_c$ | $C_c$ | $C_r$ | | | $SO_3$ % | TSS % | Cl % | OM % | PH |
| **28** | 1 | 0.5-1.0 | DS | 42 | 20 | 22 | | | | | | | | | | | | 46.9 | | | | | |
| | 2 | 1.5-2.0 | US | 56 | 23 | 33 | 32.8 | 13.9 | 2.71 | 52 | 24 | 0° | 1.063 | 95 | 0.34 | 0.045 | 27 | | | | | | |
| | 3 | 3.0-3.5 | DS | | | | | | | | | | | | | | | 72.8 | 0.33 | 2.36 | 0.12 | 2.36 | 8.0 |
| | 4 | 4.5-5.0 | DS | Non plastic | | | | | | | | | | | | | | 20.2 | | | | | |
| | 5 | 6.0-6.5 | DS | | | | 24.2 | | 2.67 | | | | | | | | | 27.6 | 0.34 | 3.03 | 0.12 | 2.85 | 8.0 |
| | 6 | 7.5-8.0 | DS | 36 | 19 | 17 | | | | | | | | | | | | 38.2 | | | | | |
| | 7 | 9.0-9.5 | DS | | | | 22.1 | 15.7 | | | 0 | 34.5°* | | | | | | 19.2 | | | | | |
| | 9 | 12.0-12.5 | DS | Non plastic | | | | | 2.66 | | | | | | | | | 15.5 | | | | | |
| | 10 | 14.0-14.5 | DS | 98 | 31 | 67 | 25.0 | | | | | | | | | | | 59.0 | | | | | |
| | 12 | 18.0-18.5 | DS | | | | | | | | | | | | | | | 81.1 | | | | | |
| | 13 | 20.0-20.5 | DS | 91 | 32 | 59 | | | | | | | | | | | | 87.5 | | | | | |
| | 14 | 22.5-23.0 | DS | | | | 25.9 | | | | | | | | | | | 62.8 | | | | | |
| | 15 | 25.0-25.5 | DS | 79 | 31 | 48 | | | 2.72 | | | | | | | | | 58.2 | | | | | |
| | 16 | 27.5-28.0 | DS | | | | 23.8 | | | | | | | | | | | 51.9 | | | | | |
| | 17 | 30.0-30.5 | DS | 73 | 29 | 44 | | | | | | | | | | | | 55.6 | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | |
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* Direct Shear on Remolded Samples

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# SUMMARY OF TEST RESULTS

Site: Samawa Combined Cycle P.P
Borehole No.: 29


Date: May, 2017

| Location of Specimen | | | | Index Properties | | | Natural Water Content % | Dry Density KN/m$^3$ | Specific Gravity | Strength Tests | | | Consolidation Test | | | | Swelling Pressure kPa | Sieve Analysis % Passing No. 200 | Chemical Test | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Unconfined Compression kPa | Triaxial Compression | | | | | | | | | | | | |
| B.H. No. | Sample No. | Depth (m) | Sample Type | LL % | PL % | PI % | | | | | Cohesion kPa | Friction Angle | $e_o$ | $P_c$ | $C_c$ | $C_r$ | | | $SO_3$ % | TSS % | Cl % | OM % | PH |
| **29** | 1 | 0.5-1.0 | DS | | | | | | | | | | | | | | | 89.4 | | | | | |
| | 2 | 1.5-2.0 | US | 62 | 24 | 38 | 34.3 | 13.4 | 2.71 | | 27 | 0° | 0.991 | 115 | 0.33 | 0.058 | 18 | | 0.95 | 3.96 | 0.34 | 2.93 | 7.9 |
| | 3 | 3.0-3.5 | DS | | | | | | | | | | | | | | | 94.8 | | | | | |
| | 4 | 4.5-5.0 | DS | 41 | 22 | 19 | | | | | | | | | | | | 33.6 | | | | | |
| | 5 | 6.0-6.5 | DS | | | | 22.9 | | 2.66 | | | | | | | | | 17.1 | 0.17 | 1.32 | 0.08 | 0.89 | 8.1 |
| | 7 | 9.0-9.5 | DS | Non plastic | | | | | | | | | | | | | | | | | | | |
| | 8 | 10.5-11.0 | DS | 37 | 20 | 17 | 20.4 | | | | | | | | | | | | | | | | |
| | 9 | 12.0-12.5 | DS | | | | | | 2.67 | | | | | | | | | 36.6 | | | | | |
| | 10 | 14.0-14.5 | DS | Non plastic | | | 19.4 | | | | 0 | 38°* | | | | | | 28.0 | | | | | |
| | 11 | 16.0-16.5 | DS | 84 | 32 | 52 | | | | | | | | | | | | 61.7 | | | | | |
| | 12 | 18.0-18.5 | DS | | | | | | 2.73 | | | | | | | | | 56.3 | | | | | |
| | 13 | 20.0-20.5 | DS | 88 | 33 | 55 | 24.6 | | | | | | | | | | | | | | | | |
| | 14 | 22.5-23.0 | DS | | | | | | | | | | | | | | | 86.6 | | | | | |
| | 15 | 25.0-25.5 | DS | 78 | 31 | 47 | 24.2 | | | | | | | | | | | | | | | | |

* Direct Shear on Remolded Samples

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# SUMMARY OF TEST RESULTS

Site: Samawa Combined Cycle P.P
Borehole No.: 30


Date: May, 2017

| Location of Specimen | | | | Index Properties | | | Natural Water Content % | Dry Density KN/m$^3$ | Specific Gravity | Strength Tests | | | Consolidation Test | | | | Swelling Pressure kPa | Sieve Analysis % Passing No. 200 | Chemical Test | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Unconfined Compression kPa | Triaxial Compression | | | | | | | | | | | | |
| B.H. No. | Sample No. | Depth (m) | Sample Type | LL % | PL % | PI % | | | | | Cohesion kPa | Friction Angle | $e_o$ | $P_c$ | $C_c$ | $C_r$ | | | $SO_3$ % | TSS % | Cl % | OM % | PH |
| **30** | 1 | 0.5-1.0 | DS | | | | | | | | | | | | | | | 88.7 | | | | | |
| | 2 | 1.0-1.5 | US | 54 | 23 | 31 | 34.1 | 15.0 | 2.71 | 49 | 25 | 0° | 1.014 | 120 | 0.30 | 0.031 | 13 | | | | | | |
| | 3 | 1.5-2.0 | DS | | | | | | | | | | | | | | | 98.1 | | | | | |
| | 4 | 3.0-3.5 | DS | 52 | 23 | 29 | | | | | | | | | | | | | 0.34 | 2.41 | 0.11 | 2.15 | 8.0 |
| | 5 | 4.5-5.0 | DS | | | | 23.6 | | | | | | | | | | | 15.9 | | | | | |
| | 6 | 6.0-6.5 | DS | Non plastic | | | | | 2.67 | | | | | | | | | | 0.17 | 1.32 | 0.09 | 0.72 | 8.1 |
| | 7 | 7.5-8.0 | DS | Non plastic | | | | | | | | | | | | | | 5.6 | | | | | |
| | 8 | 9.0-9.5 | DS | | | | 20.4 | | | | | | | | | | | 16.9 | | | | | |
| | 9 | 10.5-11.0 | DS | Non plastic | | | | | | | | | | | | | | | | | | | |
| | 11 | 13.5-14.0 | DS | | | | 19.3 | 16.8 | | | 0 | 39°* | | | | | | | | | | | |
| | 12 | 15.0-15.5 | DS | Non plastic | | | | | 2.66 | | | | | | | | | 18.8 | | | | | |
| | 13 | 17.0-17.5 | DS | | | | | | | | | | | | | | | 23.7 | | | | | |
| | 14 | 19.0-19.5 | DS | 38 | 19 | 19 | 20.1 | | | | | | | | | | | 34.2 | | | | | |
| | 15 | 21.0-21.5 | DS | | | | | | 2.72 | | | | | | | | | 58.8 | | | | | |
| | 17 | 25.0-25.5 | DS | 71 | 29 | 42 | 25.2 | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | |
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* Direct Shear on Remolded Samples

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# SUMMARY OF TEST RESULTS

Site: Samawa Combined Cycle P.P
Borehole No.: 31


Date: May, 2017

| Location of Specimen | | | | Index Properties | | | Natural Water Content % | Dry Density KN/m$^3$ | Specific Gravity | Strength Tests | | | Consolidation Test | | | | Swelling Pressure kPa | Sieve Analysis % Passing No. 200 | Chemical Test | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Unconfined Compression kPa | Direct Shear | | | | | | | | | | | | |
| B.H. No. | Sample No. | Depth (m) | Sample Type | LL % | PL % | PI % | | | | | Cohesion kPa | Friction Angle | $e_o$ | $P_c$ | $C_c$ | $C_r$ | | | $SO_3$ % | TSS % | Cl % | OM % | PH |
| **31** | 1 | 0.5-1.0 | DS | 42 | 19 | 23 | | | 2.68 | | | | | | | | | 39.8 | | | | | |
| | 2 | 1.5-2.0 | US | | | | 28.0 | 14.1 | | | 0 | 18° | | | | | | | | | | | |
| | 3 | 3.0-3.5 | DS | 58 | 24 | 34 | | | | | | | | | | | | 90.7 | 0.78 | 2.48 | 0.22 | 4.26 | 7.9 |
| | 4 | 4.5-5.0 | DS | | | | | | 2.67 | | | | | | | | | 16.7 | | | | | |
| | 6 | 7.5-8.0 | DS | Non plastic | | | 21.6 | | | | | | | | | | | 15.9 | 0.21 | 1.12 | 0.10 | 0.79 | 8.0 |
| | 7 | 9.0-9.5 | DS | | | | | | | | | | | | | | | 11.6 | | | | | |
| | 8 | 10.5-11.0 | DS | Non plastic | | | | | 2.65 | | | | | | | | | | | | | | |
| | 9 | 12.0-12.5 | DS | | | | 19.4 | 16.3 | | | 0 | 40.5°* | | | | | | 19.4 | | | | | |
| | 11 | 16.0-16.5 | DS | Non plastic | | | | | | | | | | | | | | 22.1 | | | | | |
| | 12 | 18.0-18.5 | DS | | | | 24.6 | | | | | | | | | | | 59.7 | | | | | |
| | 14 | 22.5-23.0 | DS | 90 | 26 | 61 | | | 2.72 | | | | | | | | | 76.2 | | | | | |
| | 15 | 25.0-25.5 | DS | 82 | 32 | 50 | 25.3 | | | | | | | | | | | 56.3 | | | | | |
| | 16 | 27.5-28.0 | DS | 60 | 27 | 33 | | | | | | | | | | | | | | | | | |
| | 17 | 30.0-30.5 | DS | | | | 23.7 | | | | | | | | | | | 64.6 | | | | | |

* Remolded Samples

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# SUMMARY OF TEST RESULTS

Site: Samawa Combined Cycle P.P
Borehole No.: 32


Date: May, 2017

| Location of Specimen | | | | Index Properties | | | Natural Water Content % | Dry Density KN/m$^3$ | Specific Gravity | Strength Tests | | | Consolidation Test | | | | Swelling Pressure kPa | Sieve Analysis % Passing No. 200 | Chemical Test | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Unconfined Compression kPa | Triaxial compression | | | | | | | | | | | | |
| B.H. No. | Sample No. | Depth (m) | Sample Type | LL % | PL % | PI % | | | | | Cohesion kPa | Friction Angle | $e_o$ | $P_c$ | $C_c$ | $C_r$ | | | $SO_3$ % | TSS % | Cl % | OM % | PH |
| **32** | 1 | 0.5-1.0 | DS | 52 | 23 | 29 | | | | | | | | | | | | | 0.73 | 2.48 | 0.26 | 2.57 | 7.9 |
| | 2 | 1.5-2.0 | DS | | | | | | | | | | | | | | | 91.7 | | | | | |
| | 3 | 2.0-2.5 | US | 61 | 26 | 35 | 33.4 | 13.0 | 2.71 | 43 | 29 | 0° | 0.906 | 130 | 0.29 | 0.053 | 21 | | | | | | |
| | 4 | 3.0-3.5 | DS | | | | | | | | | | | | | | | 98.0 | | | | | |
| | 5 | 4.5-5.0 | DS | 44 | 22 | 22 | | | | | | | | | | | | 42.9 | 0.12 | 0.72 | 0.06 | 0.46 | 8.1 |
| | 6 | 6.0-6.5 | DS | | | | 22.7 | | 2.67 | | | | | | | | | 16.4 | | | | | |
| | 8 | 9.0-9.5 | DS | Non plastic | | | | | | | | | | | | | | | | | | | |
| | 9 | 10.5-11.0 | DS | 37 | 19 | 18 | | | | | | | | | | | | | | | | | |
| | 10 | 12.0-12.5 | DS | | | | 21.5 | 16.2 | | | 8 | 30°* | | | | | | 38.7 | | | | | |
| | 11 | 14.0-14.5 | DS | | | | | | 2.66 | | | | | | | | | 15.2 | | | | | |
| | 12 | 16.0-16.5 | DS | Non plastic | | | | | | | | | | | | | | | | | | | |
| | 13 | 18.0-18.5 | DS | 76 | 29 | 47 | | | | | | | | | | | | 78.3 | | | | | |
| | 14 | 20.0-20.5 | DS | | | | 24.2 | | | | | | | | | | | 57.2 | | | | | |
| | 16 | 25.0-25.5 | DS | 89 | 31 | 58 | | | | | | | | | | | | | | | | | |
| | 17 | 27.5-28.0 | DS | | | | 23.6 | | | | | | | | | | | 95.8 | | | | | |
| | 18 | 30.0-30.5 | DS | 72 | 31 | 41 | | | 2.71 | | | | | | | | | | | | | | |
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* Direct Shear on Remolded Samples

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# SUMMARY OF TEST RESULTS

Site: Samawa Combined Cycle P.P
Borehole No.: 33


Date: May, 2017

| Location of Specimen | | | | Index Properties | | | Natural Water Content % | Dry Density KN/m$^3$ | Specific Gravity | Strength Tests | | | Consolidation Test | | | | Swelling Pressure kPa | Sieve Analysis % Passing No. 200 | Chemical Test | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Unconfined Compression kPa | Triaxial compression | | | | | | | | | | | | |
| B.H. No. | Sample No. | Depth (m) | Sample Type | LL % | PL % | PI % | | | | | Cohesion kPa | Friction Angle | $e_o$ | $P_c$ | $C_c$ | $C_r$ | | | $SO_3$ % | TSS % | Cl % | OM % | PH |
| **33** | 1 | 0.5-1.0 | DS | | | | | | | | | | | | | | | 87.4 | | | | | |
| | 2 | 1.0-1.5 | US | 50 | 22 | 28 | 29.3 | 14.1 | 2.72 | | 33 | 3° | 0.882 | 95 | 0.36 | 0.066 | 14 | | | | | | |
| | 3 | 1.5-2.0 | DS | | | | | | | | | | | | | | | 97.7 | 1.07 | 3.52 | 0.32 | 3.04 | 7.8 |
| | 4 | 3.0-3.5 | DS | 54 | 23 | 31 | 30.6 | | | | | | | | | | | | | | | | |
| | 5 | 4.5-5.0 | DS | Non plastic | | | | | 2.66 | | | | | | | | | 18.7 | | | | | |
| | 7 | 7.5-8.0 | DS | | | | 23.8 | | | | | | | | | | | 29.1 | 0.17 | 0.96 | 0.09 | 1.05 | 8.0 |
| | 8 | 9.0-9.5 | DS | Non plastic | | | | | | | | | | | | | | 7.7 | | | | | |
| | 9 | 10.5-11.0 | DS | | | | 20.5 | 16.4 | | | 0 | 32.5°* | | | | | | 15.4 | | | | | |
| | 10 | 12.0-12.5 | DS | Non plastic | | | | | | | | | | | | | | 16.8 | | | | | |
| | 11 | 13.5-14.0 | DS | | | | 24.9 | | | | | | | | | | | 79.2 | | | | | |
| | 13 | 17.0-17.5 | DS | 89 | 26 | 63 | | | | | | | | | | | | 53.4 | | | | | |
| | 14 | 19.0-19.5 | DS | 42 | 23 | 19 | | | | | | | | | | | | 46.2 | | | | | |
| | 15 | 21.0-21.5 | DS | | | | 25.5 | | | | | | | | | | | 95.8 | | | | | |
| | 17 | 25.0-25.5 | DS | 64 | 29 | 35 | | | 2.73 | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | |
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* Direct Shear on Remolded Samples

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# SUMMARY OF TEST RESULTS

Site: Samawa Combined Cycle P.P
Borehole No.: 34


Date: May, 2017

| Location of Specimen | | | | Index Properties | | | Natural Water Content % | Dry Density KN/m$^3$ | Specific Gravity | Strength Tests | | | Consolidation Test | | | | Swelling Pressure kPa | Sieve Analysis % Passing No. 200 | Chemical Test | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Unconfined Compression kPa | Direct Shear | | | | | | | | | | | | |
| B.H. No. | Sample No. | Depth (m) | Sample Type | LL % | PL % | PI % | | | | | Cohesion kPa | Friction Angle | $e_o$ | $P_c$ | $C_c$ | $C_r$ | | | $SO_3$ % | TSS % | Cl % | OM % | PH |
| **34** | 1 | 0.75-1.25 | DS | | | | | | | | | | | | | | | 96.2 | | | | | |
| | 2 | 1.5-2.0 | US | | | | 32.3 | 14.0 | 2.72 | 62 | | | 1.092 | 115 | 0.24 | 0.042 | 37 | | 1.79 | 4.76 | 0.46 | 1.68 | 7.8 |
| | 3 | 3.0-3.5 | DS | 67 | 24 | 43 | | | | | | | | | | | | | | | | | |
| | 4 | 4.5-5.0 | DS | | | | | | 2.66 | | | | | | | | | 16.4 | | | | | |
| | 6 | 7.5-8.0 | DS | Non plastic | | | 22.9 | 15.8 | | | 0 | 30.5°* | | | | | | 18.3 | 0.18 | 0.96 | 0.11 | 0.79 | 8.0 |
| | 7 | 9.0-9.5 | DS | Non plastic | | | | | | | | | | | | | | | | | | | |
| | 9 | 12.0-12.5 | DS | | | | 20.6 | 16.3 | | | 0 | 35°* | | | | | | 15.7 | | | | | |
| | 11 | 15.0-15.5 | DS | | | | | | 2.67 | | | | | | | | | 22.4 | | | | | |
| | 12 | 17.0-17.5 | DS | 37 | 18 | 19 | 21.3 | | | | | | | | | | | 39.1 | | | | | |
| | 13 | 19.0-19.5 | DS | 65 | 29 | 36 | | | | | | | | | | | | | | | | | |
| | 15 | 23.0-23.5 | DS | | | | 24.7 | | | | | | | | | | | 54.6 | | | | | |
| | 16 | 25.0-25.5 | DS | 57 | 23 | 34 | | | | | | | | | | | | | | | | | |
| | 17 | 28.0-28.5 | DS | | | | 25.8 | | | | | | | | | | | 75.3 | | | | | |
| | 18 | 31.0-31.5 | DS | | | | | | 2.73 | | | | | | | | | 91.8 | | | | | |
| | 19 | 34.0-34.5 | DS | 83 | 32 | 51 | | | | | | | | | | | | | | | | | |
| | 20 | 37.0-37.5 | DS | | | | 25.0 | | | | | | | | | | | 93.1 | | | | | |
| | 21 | 40.0-40.5 | DS | 79 | 31 | 48 | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | |
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* Remolded Samples

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Website: www.andrealab.com Email: azad@andrealab.com

# SUMMARY OF TEST RESULTS

Site: Samawa Combined Cycle P.P
Borehole No.: 35


Date: May, 2017

| Location of Specimen | | | | Index Properties | | | Natural Water Content % | Dry Density KN/m$^3$ | Specific Gravity | Strength Tests | | | Consolidation Test | | | | Swelling Pressure kPa | Sieve Analysis % Passing No. 200 | Chemical Test | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Unconfined Compression kPa | Direct Shear | | | | | | | | | | | | |
| B.H. No. | Sample No. | Depth (m) | Sample Type | LL % | PL % | PI % | | | | | Cohesion kPa | Friction Angle | $e_o$ | $P_c$ | $C_c$ | $C_r$ | | | $SO_3$ % | TSS % | Cl % | OM % | PH |
| **35** | 1 | 0.5-1.0 | DS | 46 | 20 | 26 | | | | | | | | | | | | | 0.37 | 1.64 | 0.14 | 1.28 | 7.9 |
| | 2 | 1.5-2.0 | US | | | | 28.5 | 14.1 | 2.69 | | 8 | 14.5° | 0.838 | 95 | 0.14 | 0.021 | 0 | 41.9 | | | | | |
| | 3 | 3.0-3.5 | DS | 54 | 23 | 31 | | | | | | | | | | | | 92.3 | | | | | |
| | 4 | 4.0-4.5 | US | | | | 29.8 | 13.9 | 2.72 | 68 | | | 0.864 | 120 | 0.29 | 0.052 | 14 | | | | | | |
| | 5 | 4.5-5.0 | DS | 58 | 26 | 32 | | | | | | | | | | | | | 0.41 | 1.04 | 0.13 | 6.56 | 8.0 |
| | 6 | 6.0-6.5 | DS | | | | | | | | | | | | | | | 15.8 | | | | | |
| | 8 | 9.0-9.5 | DS | | | | 21.9 | 14.7 | | | 0 | 31°* | | | | | | 18.2 | | | | | |
| | 9 | 10.5-11.0 | DS | Non plastic | | | | | 2.67 | | | | | | | | | | | | | | |
| | 10 | 12.0-12.5 | DS | | | | 22.8 | | | | | | | | | | | 35.3 | | | | | |
| | 11 | 14.0-14.5 | DS | 67 | 26 | 41 | | | | | | | | | | | | | | | | | |
| | 12 | 16.0-16.5 | DS | | | | 25.5 | | | | | | | | | | | 61.8 | | | | | |
| | 13 | 18.0-18.5 | DS | 75 | 28 | 47 | | | | | | | | | | | | | | | | | |
| | 14 | 20.0-20.5 | DS | | | | | | 2.71 | | | | | | | | | 58.5 | | | | | |
| | 15 | 22.5-23.0 | DS | | | | 24.2 | | | | | | | | | | | 71.1 | | | | | |
| | 16 | 25.0-25.5 | DS | 86 | 33 | 53 | | | | | | | | | | | | | | | | | |
| | 17 | 27.5-28.0 | DS | 79 | 31 | 48 | | | | | | | | | | | | | | | | | |
| | 18 | 30.0-30.5 | DS | | | | 22.9 | | | | | | | | | | | 59.4 | | | | | |

* Remolded Samples

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# SUMMARY OF TEST RESULTS

Site: Samawa Combined Cycle P.P
Borehole No.: 36


Date: May, 2017

| Location of Specimen | | | | Index Properties | | | Natural Water Content % | Dry Density KN/m$^3$ | Specific Gravity | Strength Tests | | | Consolidation Test | | | | Swelling Pressure kPa | Sieve Analysis % Passing No. 200 | Chemical Test | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Unconfined Compression kPa | Triaxial Compression | | | | | | | | | | | | |
| B.H. No. | Sample No. | Depth (m) | Sample Type | LL % | PL % | PI % | | | | | Cohesion kPa | Friction Angle | $e_o$ | $P_c$ | $C_c$ | $C_r$ | | | $SO_3$ % | TSS % | Cl % | OM % | PH |
| **36** | 1 | 0.5-1.0 | DS | 51 | 22 | 29 | | | | | | | | | | | | | | | | | |
| | 2 | 1.5-2.0 | US | | | | 30.6 | 14.0 | 2.70 | | 31 | 3.5° | 0.844 | 115 | 0.27 | 0.045 | 14 | 80.1 | 0.74 | 2.84 | 0.21 | 2.33 | 7.9 |
| | 3 | 3.0-3.5 | DS | 55 | 23 | 32 | | | | | | | | | | | | | | | | | |
| | 4 | 4.5-5.0 | DS | | | | | | 2.66 | | | | | | | | | 15.2 | | | | | |
| | 5 | 6.0-6.5 | DS | Non plastic | | | 23.2 | | | | | | | | | | | | 0.18 | 0.76 | 0.08 | 0.62 | 8.1 |
| | 6 | 7.5-8.0 | DS | Non plastic | | | | | | | | | | | | | | 10.9 | | | | | |
| | 7 | 9.0-9.5 | DS | | | | | | | | | | | | | | | 44.8 | | | | | |
| | 9 | 12.0-12.5 | DS | 41 | 22 | 19 | | | 2.68 | | | | | | | | | 45.3 | | | | | |
| | 10 | 14.0-14.5 | DS | | | | 20.3 | 16.4 | | | 0 | 37.5°* | | | | | | 25.0 | | | | | |
| | 11 | 16.0-16.5 | DS | Non plastic | | | | | | | | | | | | | | | | | | | |
| | 12 | 18.0-18.5 | DS | | | | 2.44 | | | | | | | | | | | 79.5 | | | | | |
| | 14 | 22.5-23.0 | DS | 76 | 29 | 47 | | | | | | | | | | | | | | | | | |
| | 15 | 25.0-25.5 | DS | 93 | 36 | 57 | | | 2.74 | | | | | | | | | | | | | | |
| | 17 | 30.0-30.5 | DS | | | | 23.5 | | | | | | | | | | | 90.3 | | | | | |

* Direct Shear on Remolded Samples

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# SUMMARY OF TEST RESULTS

Site: Samawa Combined Cycle P.P
Borehole No.: 37


Date: May, 2017

| Location of Specimen | | | | Index Properties | | | Natural Water Content % | Dry Density KN/m$^3$ | Specific Gravity | Strength Tests | | | Consolidation Test | | | | Swelling Pressure kPa | Sieve Analysis % Passing No. 200 | Chemical Test | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Unconfined Compression kPa | Direct Shear | | | | | | | | | | | | |
| B.H. No. | Sample No. | Depth (m) | Sample Type | LL % | PL % | PI % | | | | | Cohesion kPa | Friction Angle | $e_o$ | $P_c$ | $C_c$ | $C_r$ | | | $SO_3$ % | TSS % | Cl % | OM % | PH |
| **37** | 1 | 0.5-1.0 | DS | 52 | 23 | 29 | | | | | | | | | | | | 87.5 | | | | | |
| | 2 | 1.5-2.0 | DS | | | | | | | | | | | | | | | 77.9 | | | | | |
| | 3 | 2.5-3.0 | US | | | | 29.4 | 14.1 | 2.69 | 54 | | | 0.902 | 115 | 0.22 | 0.034 | 8 | | | | | | |
| | 4 | 3.0-3.5 | DS | 47 | 21 | 26 | | | | | | | | | | | | | 0.15 | 0.96 | 0.07 | 1.81 | 8.1 |
| | 5 | 4.5-5.0 | DS | Non plastic | | | | | | | | | | | | | | | | | | | |
| | 6 | 6.0-6.5 | DS | | | | 21.6 | | | | | | | | | | | 19.7 | | | | | |
| | 7 | 7.5-8.0 | DS | Non plastic | | | | | 2.66 | | | | | | | | | | 0.17 | 0.95 | 0.08 | 0.63 | 8.0 |
| | 8 | 9.0-9.5 | DS | | | | 20.8 | | | | | | | | | | | 19.3 | | | | | |
| | 10 | 12.0-12.5 | DS | Non plastic | | | | | | | | | | | | | | | | | | | |
| | 11 | 13.5-14.0 | DS | | | | 18.4 | 16.7 | | | 0 | 41°* | | | | | | 11.3 | | | | | |
| | 13 | 16.5-17.0 | DS | Non plastic | | | | | 2.65 | | | | | | | | | 9.6 | | | | | |
| | 14 | 18.0-18.5 | DS | 81 | 30 | 51 | | | | | | | | | | | | | | | | | |
| | 15 | 19.5-20.0 | DS | | | | 23.4 | | | | | | | | | | | 75.4 | | | | | |
| | 16 | 21.0-21.5 | DS | | | | | | 2.72 | | | | | | | | | 71.7 | | | | | |
| | 17 | 23.0-23.5 | DS | 85 | 32 | 53 | | | | | | | | | | | | | | | | | |
| | 18 | 25.0-25.5 | DS | | | | 24.7 | | | | | | | | | | | 91.8 | | | | | |
| | 20 | 30.0-30.5 | DS | 77 | 29 | 48 | | | | | | | | | | | | 89.3 | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | |
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* Remolded Samples

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# SUMMARY OF TEST RESULTS

Site: Samawa Combined Cycle P.P
Borehole No.: 38


Date: May, 2017

| Location of Specimen | | | | Index Properties | | | Natural Water Content % | Dry Density KN/m$^3$ | Specific Gravity | Strength Tests | | | Consolidation Test | | | | Swelling Pressure kPa | Sieve Analysis % Passing No. 200 | Chemical Test | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Unconfined Compression kPa | Triaxial Compression | | | | | | | | | | | | |
| B.H. No. | Sample No. | Depth (m) | Sample Type | LL % | PL % | PI % | | | | | Cohesion kPa | Friction Angle | $e_o$ | $P_c$ | $C_c$ | $C_r$ | | | $SO_3$ % | TSS % | Cl % | OM % | PH |
| **38** | 1 | 0.5-1.0 | DS | 57 | 24 | 33 | | | | | | | | | | | | | | | | | |
| | 2 | 1.5-2.0 | US | | | | 29.9 | 13.9 | 2.72 | | 29 | 2.5° | 0.882 | 120 | 0.24 | 0.037 | 8 | 98.1 | 1.12 | 3.62 | 0.29 | 5.87 | 7.8 |
| | 3 | 3.0-3.5 | DS | 61 | 25 | 36 | | | | | | | | | | | | | | | | | |
| | 4 | 4.5-5.0 | DS | 46 | 22 | 24 | | | | | | | | | | | | | | | | | |
| | 5 | 6.0-6.5 | DS | | | | 23.2 | | | | | | | | | | | 40.2 | 0.14 | 0.56 | 0.11 | 1.54 | 8.0 |
| | 7 | 9.0-9.5 | DS | | | | | | 2.67 | | | | | | | | | 39.7 | | | | | |
| | 8 | 10.5-11.0 | DS | Non plastic | | | 21.7 | 15.9 | | | 0 | 35°* | | | | | | | | | | | |
| | 10 | 13.5-14.0 | DS | | | | | | | | | | | | | | | 13.7 | | | | | |
| | 11 | 15.0-15.5 | DS | | | | 20.6 | | | | | | | | | | | 34.6 | | | | | |
| | 12 | 17.0-17.5 | DS | 39 | 19 | 20 | | | | | | | | | | | | | | | | | |
| | 13 | 19.0-20.0 | DS | 43 | 21 | 22 | | | 2.68 | | | | | | | | | 45.8 | | | | | |
| | 14 | 21.0-21.5 | DS | | | | 22.5 | | | | | | | | | | | 35.6 | | | | | |
| | 15 | 23.0-23.5 | DS | 93 | 29 | 64 | | | | | | | | | | | | | | | | | |
| | 16 | 25.0-25.5 | DS | | | | 24.8 | | | | | | | | | | | 70.8 | | | | | |
| | 17 | 27.0-27.5 | DS | 69 | 28 | 41 | | | | | | | | | | | | 57.2 | | | | | |
| | 18 | 29.5-30.0 | DS | | | | | | 2.72 | | | | | | | | | 51.8 | | | | | |

* Direct Shear on Remolded Samples

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# SUMMARY OF TEST RESULTS

Site: Samawa Combined Cycle P.P
Borehole No.: 39


Date: May, 2017

| Location of Specimen | | | | Index Properties | | | Natural Water Content % | Dry Density KN/m$^3$ | Specific Gravity | Strength Tests | | | Consolidation Test | | | | Swelling Pressure kPa | Sieve Analysis % Passing No. 200 | Chemical Test | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Unconfined Compression kPa | Triaxial Compression | | | | | | | | | | | | |
| B.H. No. | Sample No. | Depth (m) | Sample Type | LL % | PL % | PI % | | | | | Cohesion kPa | Friction Angle | $e_o$ | $P_c$ | $C_c$ | $C_r$ | | | $SO_3$ % | TSS % | Cl % | OM % | PH |
| **39** | 1 | 0.5-1.0 | DS | 53 | 22 | 31 | | | | | | | | | | | | 90.2 | | | | | |
| | 2 | 1.0-1.5 | US | | | | 34.3 | 13.3 | 2.72 | 64 | 27 | 0° | 1.058 | 115 | 0.36 | 0.072 | 11 | | 1.09 | 3.61 | 0.28 | 2.38 | 7.9 |
| | 3 | 1.5-2.0 | DS | | | | | | | | | | | | | | | 94.8 | | | | | |
| | 4 | 3.0-3.5 | DS | 58 | 23 | 35 | 27.9 | | | | | | | | | | | | | | | | |
| | 5 | 4.5-5.0 | DS | Non plastic | | | | | | | | | | | | | | | 0.39 | 1.72 | 0.15 | 0.97 | 8.0 |
| | 6 | 6.0-6.5 | DS | | | | 23.4 | 14.5 | | | 0 | 28°* | | | | | | 17.8 | | | | | |
| | 7 | 7.5-8.0 | DS | 40 | 21 | 19 | | | 2.67 | | | | | | | | | 37.2 | | | | | |
| | 8 | 9.0-9.5 | DS | | | | | | | | | | | | | | | 31.9 | | | | | |
| | 9 | 10.5-11.0 | DS | Non plastic | | | 19.7 | | | | | | | | | | | 15.8 | | | | | |
| | 11 | 13.5-14.0 | DS | | | | | | 2.66 | | | | | | | | | 15.7 | | | | | |
| | 12 | 15.0-15.5 | DS | Non plastic | | | | | | | | | | | | | | 31.1 | | | | | |
| | 13 | 17.0-17.5 | DS | 76 | 31 | 45 | 24.1 | | | | | | | | | | | 55.6 | | | | | |
| | 14 | 19.0-19.5 | DS | 43 | 19 | 24 | | | | | | | | | | | | | | | | | |
| | 15 | 21.0-21.5 | DS | | | | | | | | | | | | | | | 38.8 | | | | | |
| | 16 | 23.0-23.5 | DS | 94 | 31 | 63 | 25.7 | | | | | | | | | | | | | | | | |
| | 17 | 25.0-25.5 | DS | | | | | | 2.73 | | | | | | | | | 68.6 | | | | | |

* Direct Shear on Remolded Samples

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# SUMMARY OF TEST RESULTS

Site: Samawa Combined Cycle P.P
Borehole No.: 40


Date: May, 2017

| Location of Specimen | | | | Index Properties | | | Natural Water Content % | Dry Density KN/m$^3$ | Specific Gravity | Strength Tests | | | Consolidation Test | | | | Swelling Pressure kPa | Sieve Analysis % Passing No. 200 | Chemical Test | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Unconfined Compression kPa | Direct Shear | | | | | | | | | | | | |
| B.H. No. | Sample No. | Depth (m) | Sample Type | LL % | PL % | PI % | | | | | Cohesion kPa | Friction Angle | $e_o$ | $P_c$ | $C_c$ | $C_r$ | | | $SO_3$ % | TSS % | Cl % | OM % | PH |
| **40** | 1 | 0.5-1.0 | DS | 51 | 24 | 27 | | | | | | | | | | | | | | | | | |
| | 2 | 1.0-1.5 | US | | | | 29.4 | 13.7 | 2.72 | 59 | | | 0.884 | 110 | 0.29 | 0.047 | 21 | 91.8 | 0.89 | 2.39 | 0.26 | 3.09 | 7.9 |
| | 3 | 1.5-2.0 | DS | 50 | 22 | 28 | | | | | | | | | | | | | | | | | |
| | 4 | 3.0-3.5 | DS | | | | 27.8 | | | | | | | | | | | 88.6 | | | | | |
| | 5 | 4.5-5.0 | DS | Non plastic | | | | | | | | | | | | | | 23.8 | | | | | |
| | 7 | 7.5-8.0 | DS | | | | | | 2.66 | | | | | | | | | 18.5 | 0.16 | 0.88 | 0.07 | 0.95 | 8.1 |
| | 8 | 9.0-9.5 | DS | 37 | 20 | 17 | 21.2 | | | | | | | | | | | | | | | | |
| | 9 | 10.5-11.0 | DS | | | | | | | | | | | | | | | 34.5 | | | | | |
| | 10 | 12.0-12.5 | DS | Non plastic | | | | | 2.66 | | | | | | | | | | | | | | |
| | 12 | 15.0-15.5 | DS | | | | 20.4 | 16.5 | | | 0 | 36.5°* | | | | | | 29.0 | | | | | |
| | 13 | 17.0-17.5 | DS | 75 | 27 | 48 | | | | | | | | | | | | 96.9 | | | | | |
| | 14 | 19.0-19.5 | DS | 84 | 26 | 58 | 25.6 | | | | | | | | | | | 75.1 | | | | | |
| | 15 | 21.0-21.5 | DS | | | | | | | | | | | | | | | 38.2 | | | | | |
| | 16 | 23.0-23.5 | DS | | | | | | 2.72 | | | | | | | | | 52.8 | | | | | |
| | 17 | 25.0-25.5 | DS | 80 | 29 | 51 | | | | | | | | | | | | | | | | | |
| | 18 | 27.5-28.0 | DS | | | | 25.7 | | | | | | | | | | | 95.0 | | | | | |
| | 19 | 30.0-30.5 | DS | 73 | 27 | 46 | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | |
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* Remolded Samples

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# SUMMARY OF TEST RESULTS

Site: Samawa Combined Cycle P.P
Borehole No.: 41


Date: May, 2017

| Location of Specimen | | | | Index Properties | | | Natural Water Content % | Dry Density KN/m$^3$ | Specific Gravity | Strength Tests | | | Consolidation Test | | | | Swelling Pressure kPa | Sieve Analysis % Passing No. 200 | Chemical Test | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Unconfined Compression kPa | Direct Shear | | | | | | | | | | | | |
| B.H. No. | Sample No. | Depth (m) | Sample Type | LL % | PL % | PI % | | | | | Cohesion kPa | Friction Angle | $e_o$ | $P_c$ | $C_c$ | $C_r$ | | | $SO_3$ % | TSS % | Cl % | OM % | PH |
| **41** | 1 | 0.5-1.0 | DS | 50 | 22 | 28 | | | | | | | | | | | | | | | | | |
| | 2 | 1.5-2.0 | US | | | | 29.8 | 14.4 | 2.71 | 72 | | | 0.839 | 115 | 0.26 | 0.048 | 15 | 77.4 | 1.64 | 4.84 | 0.43 | 1.88 | 7.8 |
| | 3 | 3.0-3.5 | DS | 54 | 23 | 31 | | | | | | | | | | | | | | | | | |
| | 4 | 4.5-5.0 | DS | 45 | 22 | 23 | 22.1 | | | | | | | | | | | 38.6 | 0.45 | 1.48 | 0.15 | 0.78 | 8.0 |
| | 5 | 6.0-6.5 | DS | | | | | | 2.67 | | | | | | | | | 24.7 | | | | | |
| | 6 | 7.5-8.0 | DS | Non plastic | | | | | | | | | | | | | | 21.3 | | | | | |
| | 7 | 9.0-9.5 | DS | | | | 20.6 | 16.2 | | | 0 | 36.5°* | | | | | | 17.5 | | | | | |
| | 9 | 12.0-12.5 | DS | | | | | | 2.66 | | | | | | | | | 23.4 | | | | | |
| | 10 | 13.5-14.0 | DS | Non plastic | | | | | | | | | | | | | | | | | | | |
| | 11 | 15.0-15.5 | DS | Non plastic | | | 18.8 | | | | | | | | | | | 16.4 | | | | | |
| | 12 | 16.5-17.0 | DS | 61 | 23 | 38 | | | | | | | | | | | | | | | | | |
| | 14 | 19.5-20.0 | DS | | | | 24.2 | | | | | | | | | | | 86.2 | | | | | |

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# SUMMARY OF TEST RESULTS

Site: Samawa Combined Cycle P.P
Borehole No.: 42


Date: May, 2017

| Location of Specimen | | | | Index Properties | | | Natural Water Content % | Dry Density KN/m$^3$ | Specific Gravity | Strength Tests | | | Consolidation Test | | | | Swelling Pressure kPa | Sieve Analysis % Passing No. 200 | Chemical Test | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Unconfined Compression kPa | Triaxial Compression | | | | | | | | | | | | |
| B.H. No. | Sample No. | Depth (m) | Sample Type | LL % | PL % | PI % | | | | | Cohesion kPa | Friction Angle | $e_o$ | $P_c$ | $C_c$ | $C_r$ | | | $SO_3$ % | TSS % | Cl % | OM % | PH |
| **42** | 1 | 0.5-1.0 | DS | 65 | 24 | 41 | | | | | | | | | | | | | | | | | |
| | 2 | 1.5-2.0 | US | | | | 29.8 | 14.9 | 2.72 | 75 | 31 | 0° | 0.998 | 110 | 0.34 | 0.056 | 33 | | 1.07 | 4.48 | 0.37 | 4.39 | 7.8 |
| | 3 | 3.0-3.5 | DS | 59 | 23 | 36 | | | | | | | | | | | | 94.8 | | | | | |
| | 4 | 4.0-4.5 | US | | | | 28.2 | 14.6 | 2.72 | | 9 | 17°* | 0.870 | 130 | 0.13 | 0.021 | | 47.6 | | | | | |
| | 5 | 4.5-5.0 | DS | 44 | 20 | 24 | | | | | | | | | | | | | | | | | |
| | 6 | 6.0-6.5 | DS | | | | 21.6 | | | | | | | | | | | 36.3 | 0.16 | 1.04 | 0.08 | 1.55 | 8.0 |
| | 7 | 7.5-8.0 | DS | Non plastic | | | | | | | | | | | | | | 23.2 | | | | | |
| | 9 | 10.5-11.0 | DS | | | | | | 2.66 | | | | | | | | | 18.1 | | | | | |
| | 10 | 12.0-12.5 | DS | | | | 19.8 | 16.3 | | | 0 | 38°* | | | | | | 16.9 | | | | | |
| | 11 | 13.5-14.0 | DS | Non plastic | | | | | | | | | | | | | | | | | | | |
| | 12 | 15.0-15.5 | DS | | | | 24.2 | | | | | | | | | | | 56.2 | | | | | |
| | 14 | 18.0-18.5 | DS | 94 | 32 | 62 | | | 2.73 | | | | | | | | | | | | | | |
| | 15 | 19.5-20.0 | DS | Non plastic | | | | | | | | | | | | | | 17.5 | | | | | |

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# SUMMARY OF TEST RESULTS

Site: Samawa Combined Cycle P.P
Borehole No.: 43


Date: May, 2017

| Location of Specimen | | | | Index Properties | | | Natural Water Content % | Dry Density KN/m$^3$ | Specific Gravity | Strength Tests | | | Consolidation Test | | | | Swelling Pressure kPa | Sieve Analysis % Passing No. 200 | Chemical Test | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Unconfined Compression kPa | Direct Shear | | | | | | | | | | | | |
| B.H. No. | Sample No. | Depth (m) | Sample Type | LL % | PL % | PI % | | | | | Cohesion kPa | Friction Angle | $e_o$ | $P_c$ | $C_c$ | $C_r$ | | | $SO_3$ % | TSS % | Cl % | OM % | PH |
| **43** | 1 | 0.5-1.0 | DS | | | | | | | | | | | | | | | 86.3 | 0.89 | 3.96 | 0.28 | 4.51 | 7.9 |
| | 2 | 1.5-2.0 | US | 50 | 23 | 27 | 30.2 | 14.1 | 2.72 | 66 | | | 1.078 | 95 | 0.28 | 0.040 | 19 | | | | | | |
| | 3 | 3.0-3.5 | DS | | | | | | | | | | | | | | | 91.7 | 0.54 | 3.52 | 0.23 | 3.72 | 7.9 |
| | 4 | 4.5-5.0 | DS | | | | 24.1 | | | | | | | | | | | 21.6 | | | | | |
| | 5 | 6.0-6.5 | DS | Non plastic | | | | | | | | | | | | | | | | | | | |
| | 6 | 7.5-8.0 | DS | Non plastic | | | 21.7 | | | | | | | | | | | 24.2 | | | | | |
| | 7 | 9.0-9.5 | DS | | | | | | 2.66 | | | | | | | | | 16.8 | | | | | |
| | 8 | 10.5-11.0 | DS | Non plastic | | | 20.5 | 15.9 | | | 0 | 36°* | | | | | | | | | | | |
| | 9 | 12.0-12.5 | DS | | | | | | | | | | | | | | | 19.6 | | | | | |
| | 10 | 13.5-14.0 | DS | 97 | 34 | 63 | 25.6 | | | | | | | | | | | 76.0 | | | | | |
| | 12 | 16.5-17.0 | DS | | | | | | 2.73 | | | | | | | | | 71.9 | | | | | |
| | 13 | 18.0-18.5 | DS | 81 | 29 | 52 | | | | | | | | | | | | | | | | | |
| | 14 | 19.5-20.0 | DS | | | | 24.8 | | | | | | | | | | | 86.8 | | | | | |

* Remolded Samples

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# SUMMARY OF TEST RESULTS

Site: Samawa Combined Cycle P.P
Borehole No.: 44


Date: May, 2017

| Location of Specimen | | | | Index Properties | | | Natural Water Content % | Dry Density KN/m$^3$ | Specific Gravity | Strength Tests | | | Consolidation Test | | | | Swelling Pressure kPa | Sieve Analysis % Passing No. 200 | Chemical Test | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Unconfined Compression kPa | Triaxial Compression | | | | | | | | | | | | |
| B.H. No. | Sample No. | Depth (m) | Sample Type | LL % | PL % | PI % | | | | | Cohesion kPa | Friction Angle | $e_o$ | $P_c$ | $C_c$ | $C_r$ | | | $SO_3$ % | TSS % | Cl % | OM % | PH |
| **44** | 1 | 0.5-1.0 | DS | | | | | | | | | | | | | | | 86.1 | | | | | |
| | 2 | 1.0-1.5 | US | | | | 28.2 | 14.3 | 2.72 | 63 | 29 | 0° | 0.834 | 100 | 0.26 | 0.048 | 24 | | 1.09 | 2.68 | 0.31 | 2.66 | 7.8 |
| | 3 | 1.5-2.0 | DS | 52 | 21 | 31 | | | | | | | | | | | | 89.6 | | | | | |
| | 4 | 3.0-3.5 | DS | 56 | 23 | 33 | | | | | | | | | | | | | 0.21 | 2.12 | 0.11 | 4.92 | 8.0 |
| | 5 | 4.0-4.5 | US | | | | 28.7 | 14.1 | 2.71 | 71 | | | 0.792 | 125 | 0.23 | 0.043 | | | | | | | |
| | 6 | 4.5-5.0 | DS | | | | | | | | | | | | | | | 72.2 | | | | | |
| | 7 | 6.0-6.5 | DS | 37 | 20 | 17 | | | | | | | | | | | | | | | | | |
| | 8 | 7.5-8.0 | DS | | | | | | 2.67 | | | | | | | | | 33.7 | | | | | |
| | 9 | 9.0-9.5 | DS | | | | 21.4 | 16.0 | | | 0 | 34.5°* | | | | | | 28.1 | | | | | |
| | 10 | 10.5-11.0 | DS | Non plastic | | | | | | | | | | | | | | | | | | | |
| | 11 | 12.0-12.5 | DS | 43 | 21 | 22 | | | | | | | | | | | | 37.4 | | | | | |
| | 12 | 13.5-14.0 | DS | | | | 21.9 | | 2.68 | | | | | | | | | 46.2 | | | | | |
| | 13 | 15.0-15.5 | DS | | | | | | | | | | | | | | | 55.8 | | | | | |
| | 14 | 16.5-17.0 | DS | 88 | 37 | 51 | 24.8 | | | | | | | | | | | | | | | | |
| | 15 | 18.0-18.5 | DS | 74 | 31 | 43 | | | 2.73 | | | | | | | | | 89.6 | | | | | |
| | 16 | 19.5-20.0 | DS | | | | 21.8 | | | | | | | | | | | 36.2 | | | | | |
| | 17 | 21.0-21.5 | DS | 42 | 19 | 23 | | | | | | | | | | | | | | | | | |
| | 18 | 22.5-23.0 | DS | | | | | | | | | | | | | | | 56.9 | | | | | |
| | 19 | 24.5-25.0 | DS | 79 | 33 | 46 | 25.0 | | | | | | | | | | | 68.1 | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | |
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* Direct Shear on Remolded Samples

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# SUMMARY OF TEST RESULTS

Site: Samawa Combined Cycle P.P
Borehole No.: 45


Date: May, 2017

| Location of Specimen | | | | Index Properties | | | Natural Water Content % | Dry Density KN/m$^3$ | Specific Gravity | Strength Tests | | | Consolidation Test | | | | Swelling Pressure kPa | Sieve Analysis % Passing No. 200 | Chemical Test | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Unconfined Compression kPa | Triaxial Compression | | | | | | | | | | | | |
| B.H. No. | Sample No. | Depth (m) | Sample Type | LL % | PL % | PI % | | | | | Cohesion kPa | Friction Angle | $e_o$ | $P_c$ | $C_c$ | $C_r$ | | | $SO_3$ % | TSS % | Cl % | OM % | PH |
| **45** | 1 | 0.5-1.0 | DS | | | | | | | | | | | | | | | 66.7 | | | | | |
| | 2 | 1.0-1.5 | US | | | | 25.2 | 14.8 | 2.70 | | 31 | 3.5° | 0.876 | 110 | 0.24 | 0.039 | 12 | | | | | | |
| | 3 | 1.5-2.0 | DS | 55 | 22 | 33 | | | | | | | | | | | | | 1.67 | 5.46 | 0.43 | 3.72 | 7.8 |
| | 4 | 3.0-3.5 | DS | | | | | | | | | | | | | | | 82.6 | | | | | |
| | 5 | 4.0-4.5 | US | 59 | 24 | 35 | 27.4 | 14.6 | 2.71 | 94 | | | 0.821 | 125 | 0.22 | 0.036 | | | | | | | |
| | 6 | 4.5-5.0 | DS | | | | | | | | | | | | | | | 70.8 | 0.86 | 3.09 | 0.26 | 3.86 | 7.9 |
| | 7 | 6.0-6.5 | DS | 39 | 21 | 18 | 25.8 | | | | | | | | | | | 38.4 | | | | | |
| | 8 | 7.5-8.0 | DS | 53 | 24 | 29 | | | | | | | | | | | | 54.7 | | | | | |
| | 9 | 9.0-9.5 | DS | | | | 21.7 | 15.7 | | | 0 | 28°* | | | | | | 26.7 | | | | | |
| | 11 | 12.0-12.5 | DS | Non Plastic | | | | | | | | | | | | | | | | | | | |
| | 12 | 13.5-14.0 | DS | | | | | | 2.67 | | | | | | | | | 24.5 | | | | | |
| | 13 | 15.0-15.5 | DS | 80 | 31 | 49 | 26.1 | | | | | | | | | | | 79.2 | | | | | |
| | 14 | 16.5-17.0 | DS | 76 | 33 | 43 | | | | | | | | | | | | 91.6 | | | | | |
| | 15 | 18.0-18.5 | DS | | | | 24.5 | | | | | | | | | | | 71.7 | | | | | |
| | 16 | 19.5-20.0 | DS | 68 | 29 | 39 | | | | | | | | | | | | | | | | | |
| | 17 | 21.0-21.5 | DS | | | | | | 2.72 | | | | | | | | | 65.8 | | | | | |
| | 19 | 25.0-25.5 | DS | 65 | 28 | 37 | 25.0 | | | | | | | | | | | 60.3 | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | |
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Website: www.andrealab.com Email: azad@andrealab.com

# SUMMARY OF TEST RESULTS

Site: Samawa Combined Cycle P.P
Borehole No.: 46


Date: May, 2017

| Location of Specimen | | | | Index Properties | | | Natural Water Content % | Dry Density KN/m$^3$ | Specific Gravity | Strength Tests | | | Consolidation Test | | | | Swelling Pressure kPa | Sieve Analysis % Passing No. 200 | Chemical Test | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Unconfined Compression kPa | Triaxial Compression | | | | | | | | | | | | |
| B.H. No. | Sample No. | Depth (m) | Sample Type | LL % | PL % | PI % | | | | | Cohesion kPa | Friction Angle | $e_o$ | $P_c$ | $C_c$ | $C_r$ | | | $SO_3$ % | TSS % | Cl % | OM % | PH |
| **46** | 1 | 0.5-1.0 | DS | 53 | 22 | 31 | | | | | | | | | | | | | | | | | |
| | 2 | 1.0-1.5 | US | | | | 28.4 | 13.9 | 2.71 | 78 | 36 | 3° | 0.808 | 115 | 0.24 | 0.044 | 24 | 97.1 | 1.85 | 4.52 | 0.53 | 4.37 | 7.7 |
| | 3 | 1.5-2.0 | DS | | | | | | | | | | | | | | | 98.2 | | | | | |
| | 4 | 3.0-3.5 | DS | 64 | 23 | 41 | | | | | | | | | | | | | | | | | |
| | 5 | 4.0-4.5 | US | | | | 24.7 | 14.8 | | | 7 | 21°* | | | | | | 43.3 | | | | | |
| | 6 | 4.5-5.0 | DS | 40 | 19 | 21 | | | | | | | | | | | | | 0.16 | 0.43 | 0.08 | 0.73 | 8.0 |
| | 7 | 6.0-6.5 | DS | | | | 21.5 | | 2.66 | | | | | | | | | 32.8 | | | | | |
| | 8 | 7.5-8.0 | DS | Non plastc | | | | | | | | | | | | | | 15.9 | | | | | |
| | 10 | 10.5-11.0 | DS | | | | | | | | | | | | | | | 25.5 | | | | | |
| | 11 | 12.0-12.5 | DS | Non plastc | | | 18.7 | 16.3 | | | 0 | 39°* | | | | | | 6.9 | | | | | |
| | 12 | 13.5-14.0 | DS | | | | | | 2.65 | | | | | | | | | 11.2 | | | | | |
| | 13 | 15.0-15.5 | DS | 99 | 34 | 65 | | | | | | | | | | | | 56.1 | | | | | |
| | 15 | 18.0-18.5 | DS | | | | 25.3 | | | | | | | | | | | 69.4 | | | | | |
| | 16 | 19.5-20.0 | DS | Non plastc | | | | | 2.66 | | | | | | | | | 23.3 | | | | | |
| | 17 | 21.0-21.5 | DS | 97 | 31 | 66 | | | | | | | | | | | | 92.8 | | | | | |
| | 19 | 24.5-25.0 | DS | | | | 25.6 | | | | | | | | | | | 87.7 | | | | | |

* Direct Shear on Remolded Samples

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# SUMMARY OF TEST RESULTS

Site: Samawa Combined Cycle P.P
Borehole No.: 47


Date: May, 2017

| Location of Specimen | | | | Index Properties | | | Natural Water Content % | Dry Density KN/m$^3$ | Specific Gravity | Strength Tests | | | Consolidation Test | | | | Swelling Pressure kPa | Sieve Analysis % Passing No. 200 | Chemical Test | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Unconfined Compression kPa | Triaxial Compression | | | | | | | | | | | | |
| B.H. No. | Sample No. | Depth (m) | Sample Type | LL % | PL % | PI % | | | | | Cohesion kPa | Friction Angle | $e_o$ | $P_c$ | $C_c$ | $C_r$ | | | $SO_3$ % | TSS % | Cl % | OM % | PH |
| **47** | 1 | 0.5-1.0 | DS | | | | | | | | | | | | | | | 94.3 | | | | | |
| | 2 | 1.0-1.5 | US | | | | 26.8 | 15.1 | 2.71 | 94 | 44 | 3.5° | 0.772 | 115 | 0.16 | 0.033 | 9 | | 1.92 | 6.61 | 0.63 | 4.76 | 7.7 |
| | 3 | 1.5-2.0 | DS | 58 | 23 | 35 | | | | | | | | | | | | | | | | | |
| | 4 | 3.0-3.5 | DS | | | | 21.4 | | | | | | | | | | | 18.2 | | | | | |
| | 5 | 4.5-5.0 | DS | Non plastic | | | | | | | | | | | | | | | 0.16 | 0.88 | 0.10 | 1.54 | 8.0 |
| | 6 | 6.0-6.5 | DS | Non plastic | | | | | 2.65 | | | | | | | | | 16.4 | | | | | |
| | 8 | 9.0-9.5 | DS | | | | 20.1 | 15.8 | | | 0 | 36°* | | | | | | 21.8 | | | | | |
| | 9 | 10.5-11.0 | DS | Non plastic | | | | | | | | | | | | | | | | | | | |
| | 10 | 12.0-12.5 | DS | | | | 18.7 | | | | | | | | | | | 19.7 | | | | | |
| | 12 | 15.0-15.5 | DS | Non plastic | | | | | 2.66 | | | | | | | | | 17.9 | | | | | |
| | 13 | 16.5-17.0 | DS | 42 | 21 | 21 | | | | | | | | | | | | | | | | | |
| | 14 | 18.0-18.5 | DS | | | | 19.6 | | | | | | | | | | | 36.6 | | | | | |
| | 15 | 19.5-20.0 | DS | 91 | 33 | 58 | | | | | | | | | | | | | | | | | |
| | 17 | 22.5-23.0 | DS | | | | 23.8 | | 2.71 | | | | | | | | | 57.5 | | | | | |
| | 18 | 24.5-25.0 | DS | 46 | 21 | 25 | | | | | | | | | | | | 39.8 | | | | | |

* Direct Shear on Remolded Samples

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# SUMMARY OF TEST RESULTS

Site: Samawa Combined Cycle P.P
Borehole No.: 48


Date: May, 2017

| Location of Specimen | | | | Index Properties | | | Natural Water Content % | Dry Density KN/m$^3$ | Specific Gravity | Strength Tests | | | Consolidation Test | | | | Swelling Pressure kPa | Sieve Analysis % Passing No. 200 | Chemical Test | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Unconfined Compression kPa | Triaxial Compression | | | | | | | | | | | | |
| B.H. No. | Sample No. | Depth (m) | Sample Type | LL % | PL % | PI % | | | | | Cohesion kPa | Friction Angle | $e_o$ | $P_c$ | $C_c$ | $C_r$ | | | $SO_3$ % | TSS % | Cl % | OM % | PH |
| **48** | 1 | 0.5-1.0 | DS | 54 | 22 | 32 | | | | | | | | | | | | | | | | | |
| | 2 | 1.0-1.5 | US | | | | 29.9 | 14.3 | 2.72 | 68 | | | 0.844 | 120 | 0.24 | 0.038 | 39 | | | | | | |
| | 3 | 1.5-2.0 | DS | | | | | | | | | | | | | | | 97.8 | 1.02 | 4.92 | 0.38 | 4.86 | 7.8 |
| | 4 | 3.0-3.5 | DS | 62 | 23 | 39 | | | | | | | | | | | | | | | | | |
| | 5 | 4.0-4.5 | US | | | | 28.3 | 14.7 | 2.70 | | 39 | 4° | 0.802 | 135 | 0.22 | 0.031 | | 61.1 | | | | | |
| | 7 | 6.0-6.5 | DS | | | | | | | | | | | | | | | 65.3 | 0.24 | 1.48 | 0.12 | 1.04 | 7.9 |
| | 8 | 7.5-8.0 | DS | Non plastic | | | | | | | | | | | | | | | | | | | |
| | 9 | 9.0-9.5 | DS | | | | 21.9 | | | | | | | | | | | 19.4 | | | | | |
| | 10 | 10.5-11.0 | DS | Non plastic | | | | | | | | | | | | | | 21.3 | | | | | |
| | 11 | 12.0-12.5 | DS | | | | | | 2.66 | | | | | | | | | 17.9 | | | | | |
| | 12 | 13.5-14.0 | DS | Non plastic | | | 18.4 | 16.3 | | | 0 | 40.5°* | | | | | | 8.7 | | | | | |
| | 13 | 15.0-15.5 | DS | 42 | 19 | 23 | | | | | | | | | | | | 38.4 | | | | | |
| | 14 | 16.5-17.0 | DS | 73 | 29 | 44 | | | | | | | | | | | | 57.3 | | | | | |
| | 15 | 18.0-18.5 | DS | | | | 22.1 | | 2.68 | | | | | | | | | 34.4 | | | | | |
| | 16 | 19.5-20.0 | DS | 45 | 20 | 25 | | | | | | | | | | | | 40.3 | | | | | |
| | 17 | 21.0-21.5 | DS | | | | 25.0 | | | | | | | | | | | 79.1 | | | | | |
| | 19 | 25.0-25.5 | DS | 69 | 24 | 45 | | | 2.73 | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | |
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* Direct Shear on Remolded Samples

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Website: www.andrealab.com Email: azad@andrealab.com

# SUMMARY OF TEST RESULTS

Site: Samawa Combined Cycle P.P
Borehole No.: 49


Date: May, 2017

| Location of Specimen | | | | Index Properties | | | Natural Water Content % | Dry Density KN/m$^3$ | Specific Gravity | Strength Tests | | | Consolidation Test | | | | Swelling Pressure kPa | Sieve Analysis % Passing No. 200 | Chemical Test | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Unconfined Compression kPa | Triaxial Compression | | | | | | | | | | | | |
| B.H. No. | Sample No. | Depth (m) | Sample Type | LL % | PL % | PI % | | | | | Cohesion kPa | Friction Angle | $e_o$ | $P_c$ | $C_c$ | $C_r$ | | | $SO_3$ % | TSS % | Cl % | OM % | PH |
| **49** | 1 | 0.5-1.0 | DS | 53 | 21 | 32 | | | | | | | | | | | | | | | | | |
| | 2 | 1.0-1.5 | US | | | | 34.1 | 14.9 | 2.72 | 58 | 31 | 0° | 1.140 | 105 | 0.39 | 0.053 | 17 | 98.1 | | | | | |
| | 3 | 1.5-2.0 | DS | 52 | 22 | 30 | | | | | | | | | | | | | 0.62 | 3.48 | 0.26 | 4.49 | 7.9 |
| | 4 | 3.0-3.5 | DS | | | | 24.9 | | | | | | | | | | | 88.6 | | | | | |
| | 5 | 4.5-5.0 | DS | 41 | 19 | 22 | | | | | | | | | | | | 34.7 | | | | | |
| | 6 | 6.0-6.5 | DS | Non plastic | | | | | 2.66 | | | | | | | | | 16.3 | 0.19 | 0.84 | 0.11 | 1.83 | 8.0 |
| | 8 | 9.0-9.5 | DS | | | | 19.7 | 16.0 | | | 0 | 36°* | | | | | | 20.2 | | | | | |
| | 9 | 10.5-11.0 | DS | Non plastic | | | | | | | | | | | | | | | | | | | |
| | 11 | 13.5-14.0 | DS | | | | 18.6 | | | | | | | | | | | 17.3 | | | | | |
| | 12 | 15.0-15.5 | DS | Non plastic | | | | | | | | | | | | | | 15.6 | | | | | |
| | 13 | 16.5-17.0 | DS | | | | | | 2.71 | | | | | | | | | 77.9 | | | | | |
| | 14 | 18.0-18.5 | DS | 95 | 32 | 63 | 26.1 | | | | | | | | | | | | | | | | |
| | 15 | 19.5-20.0 | DS | Non plastic | | | | | | | | | | | | | | 30.1 | | | | | |
| | 16 | 21.0-21.5 | DS | | | | | | 2.67 | | | | | | | | | 37.4 | | | | | |
| | 17 | 22.5-23.0 | DS | 64 | 28 | 36 | 24.7 | | | | | | | | | | | 55.9 | | | | | |
| | 18 | 24.5-25.0 | DS | Non plastic | | | | | | | | | | | | | | 11.8 | | | | | |

* Direct Shear on Remolded Samples

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Website: www.andrealab.com Email: azad@andrealab.com

# SUMMARY OF TEST RESULTS

Site: Samawa Combined Cycle P.P
Borehole No.: 50


Date: May, 2017

| Location of Specimen | | | | Index Properties | | | Natural Water Content % | Dry Density KN/m$^3$ | Specific Gravity | Strength Tests | | | Consolidation Test | | | | Swelling Pressure kPa | Sieve Analysis % Passing No. 200 | Chemical Test | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Unconfined Compression kPa | Triaxial Compression | | | | | | | | | | | | |
| B.H. No. | Sample No. | Depth (m) | Sample Type | LL % | PL % | PI % | | | | | Cohesion kPa | Friction Angle | $e_o$ | $P_c$ | $C_c$ | $C_r$ | | | $SO_3$ % | TSS % | Cl % | OM % | PH |
| **50** | 1 | 0.5-1.0 | DS | 40 | 18 | 22 | | | | | | | | | | | | 47.5 | | | | | |
| | 2 | 1.0-1.5 | US | 54 | 25 | 29 | 22.5 | 15.1 | 2.72 | 69 | | | 0.864 | 110 | 0.27 | 0.053 | 23 | | 2.22 | 7.21 | 0.76 | 2.93 | 7.7 |
| | 3 | 1.5-2.0 | DS | | | | | | | | | | | | | | | 95.8 | | | | | |
| | 4 | 3.0-3.5 | DS | 59 | 26 | 33 | | | | | | | | | | | | | | | | | |
| | 5 | 4.0-4.5 | US | | | | 29.1 | 13.7 | 2.71 | | 42 | 2.5° | 1.034 | 130 | 0.36 | 0.064 | | | | | | | |
| | 6 | 4.5-5.0 | DS | 62 | 27 | 35 | | | | | | | | | | | | 81.6 | 0.48 | 4.52 | 0.26 | 5.54 | 7.8 |
| | 7 | 6.0-6.5 | DS | | | | | | | | | | | | | | | 22.2 | | | | | |
| | 9 | 9.0-9.5 | DS | Non Plastic | | | 23.6 | 14.9 | | | 0 | 28°* | | | | | | | | | | | |
| | 10 | 10.5-11.0 | DS | 68 | 30 | 38 | | | | | | | | | | | | 62.7 | | | | | |
| | 11 | 12.0-12.5 | DS | | | | | | 2.67 | | | | | | | | | 30.1 | | | | | |
| | 13 | 15.0-15.5 | DS | Non Plastic | | | 19.3 | | | | | | | | | | | 28.4 | | | | | |
| | 14 | 16.5-17.0 | DS | | | | | | | | | | | | | | | 90.4 | | | | | |
| | 16 | 19.5-20.0 | DS | 83 | 31 | 52 | 25.1 | | | | | | | | | | | | | | | | |

* Direct Shear on Remolded Sample

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# SUMMARY OF TEST RESULTS

Site: Samawa Combined Cycle P.P
Borehole No.: 51


Date: May, 2017

| Location of Specimen | | | | Index Properties | | | Natural Water Content % | Dry Density KN/m$^3$ | Specific Gravity | Strength Tests | | | Consolidation Test | | | | Swelling Pressure kPa | Sieve Analysis % Passing No. 200 | Chemical Test | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Unconfined Compression kPa | Triaxial Compression | | | | | | | | | | | | |
| B.H. No. | Sample No. | Depth (m) | Sample Type | LL % | PL % | PI % | | | | | Cohesion kPa | Friction Angle | $e_o$ | $P_c$ | $C_c$ | $C_r$ | | | $SO_3$ % | TSS % | Cl % | OM % | PH |
| **51** | 1 | 0.5-1.0 | DS | 58 | 25 | 33 | | | | | | | | | | | | | | | | | |
| | 2 | 1.0-1.5 | US | | | | 28.2 | 14.8 | 2.71 | 91 | 41 | 3° | 0.864 | 115 | 0.21 | 0.037 | 16 | 94.9 | 0.43 | 2.98 | 0.16 | 3.32 | 7.9 |
| | 3 | 1.5-2.0 | DS | | | | | | | | | | | | | | | 92.6 | | | | | |
| | 4 | 3.0-3.5 | DS | 65 | 27 | 38 | 27.3 | | | | | | | | | | | | | | | | |
| | 5 | 4.5-5.0 | DS | 38 | 21 | 17 | | | | | | | | | | | | 32.8 | 0.14 | 1.22 | 0.07 | 0.93 | 8.1 |
| | 6 | 6.0-6.5 | DS | | | | | | 2.66 | | | | | | | | | 17.3 | | | | | |
| | 7 | 7.5-8.0 | DS | Non Plastic | | | 20.6 | 15.9 | | | 0 | 34.5°* | | | | | | | | | | | |
| | 8 | 9.0-9.5 | DS | Non Plastic | | | | | | | | | | | | | | 16.4 | | | | | |
| | 9 | 10.5-11.0 | DS | 50 | 21 | 29 | | | | | | | | | | | | | | | | | |
| | 10 | 12.0-12.5 | DS | | | | 24.7 | | | | | | | | | | | 82.9 | | | | | |
| | 11 | 13.5-14.0 | DS | 74 | 26 | 48 | | | | | | | | | | | | | | | | | |
| | 12 | 15.0-15.5 | DS | | | | | | 2.73 | | | | | | | | | 96.0 | | | | | |
| | 13 | 16.5-17.0 | DS | | | | 25.2 | | | | | | | | | | | 55.9 | | | | | |
| | 15 | 19.5-20.0 | DS | 79 | 29 | 50 | | | | | | | | | | | | 70.1 | | | | | |

* Direct Shear on Remolded Samples

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Website: www.andrealab.com Email: azad@andrealab.com

# SUMMARY OF TEST RESULTS

Site: Samawa Combined Cycle P.P
Borehole No.: 52


Date: May, 2017

| Location of Specimen | | | | Index Properties | | | Natural Water Content % | Dry Density KN/m$^3$ | Specific Gravity | Strength Tests | | | Consolidation Test | | | | Swelling Pressure kPa | Sieve Analysis % Passing No. 200 | Chemical Test | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Unconfined Compression kPa | Triaxial Compression | | | | | | | | | | | | |
| B.H. No. | Sample No. | Depth (m) | Sample Type | LL % | PL % | PI % | | | | | Cohesion kPa | Friction Angle | $e_o$ | $P_c$ | $C_c$ | $C_r$ | | | $SO_3$ % | TSS % | Cl % | OM % | PH |
| **52** | 1 | 0.5-1.0 | DS | | | | | | | | | | | | | | | 88.3 | | | | | |
| | 2 | 1.0-1.5 | US | 55 | 22 | 33 | 26.6 | 15.6 | 2.72 | 96 | 44 | 2.5° | 0.781 | 120 | 0.26 | 0.036 | 18 | | | | | | |
| | 3 | 1.5-2.0 | DS | | | | | | | | | | | | | | | 96.7 | 1.76 | 6.04 | 0.54 | 3.35 | 7.8 |
| | 4 | 3.0-3.5 | DS | 59 | 23 | 36 | 27.2 | | | | | | | | | | | | | | | | |
| | 5 | 4.5-5.0 | DS | | | | | | 2.67 | | | | | | | | | 26.8 | | | | | |
| | 7 | 7.5-8.0 | DS | Non Plastic | | | 19.6 | | | | | | | | | | | 22.7 | 0.49 | 2.78 | 0.19 | 2.08 | 8.0 |
| | 8 | 9.0-9.5 | DS | 35 | 19 | 16 | | | | | | | | | | | | 33.4 | | | | | |
| | 9 | 10.5-11.0 | DS | | | | 18.3 | 16.4 | | | 0 | 36°* | | | | | | 27.9 | | | | | |
| | 10 | 12.0-12.5 | DS | Non Plastic | | | | | | | | | | | | | | 13.8 | | | | | |
| | 11 | 13.5-14.0 | DS | | | | 24.4 | | | | | | | | | | | 54.4 | | | | | |
| | 13 | 16.5-17.0 | DS | 94 | 33 | 61 | | | 2.73 | | | | | | | | | 76.3 | | | | | |
| | 14 | 18.0-18.5 | DS | | | | 25.6 | | | | | | | | | | | 57.8 | | | | | |
| | 15 | 19.5-20.0 | DS | 87 | 31 | 56 | | | | | | | | | | | | | | | | | |
| | 17 | 23.0-23.5 | DS | | | | | | | | | | | | | | | 88.5 | | | | | |
| | 18 | 25.0-25.5 | DS | Non Plastic | | | 18.9 | | 2.67 | | | | | | | | | 31.5 | | | | | |

* Direct Shear on Remolded Samples

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# SUMMARY OF TEST RESULTS

Site: Samawa Combined Cycle P.P
Borehole No.: 53


Date: May, 2017

| Location of Specimen | | | | Index Properties | | | Natural Water Content % | Dry Density KN/m$^3$ | Specific Gravity | Strength Tests | | | Consolidation Test | | | | Swelling Pressure kPa | Sieve Analysis % Passing No. 200 | Chemical Test | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Unconfined Compression kPa | Direct Shear | | | | | | | | | | | | |
| B.H. No. | Sample No. | Depth (m) | Sample Type | LL % | PL % | PI % | | | | | Cohesion kPa | Friction Angle | $e_o$ | $P_c$ | $C_c$ | $C_r$ | | | $SO_3$ % | TSS % | Cl % | OM % | PH |
| **53** | 1 | 0.5-1.0 | DS | | | | | | | | | | | | | | | 36.8 | | | | | |
| | 2 | 1.5-2.0 | US | 39 | 21 | 18 | 26.0 | 14.2 | | | 11 | 14° | | | | | | | | | | | |
| | 3 | 3.0-3.5 | DS | | | | | | | | | | | | | | | 72.9 | 0.45 | 2.16 | 0.19 | 3.72 | 7.9 |
| | 4 | 4.0-4.5 | US | 52 | 23 | 29 | 29.6 | 14.3 | 2.71 | 63 | | | 0.855 | 120 | 0.27 | 0.043 | 23 | | | | | | |
| | 5 | 4.5-5.0 | DS | 41 | 19 | 22 | | | | | | | | | | | | | 0.37 | 1.89 | 0.14 | 2.45 | 8.0 |
| | 6 | 6.0-6.5 | DS | | | | 21.8 | | | | | | | | | | | 34.2 | | | | | |
| | 7 | 7.5-8.0 | DS | | | | | | 2.67 | | | | | | | | | 23.5 | | | | | |
| | 9 | 10.5-11.0 | DS | Non Plastic | | | | | | | | | | | | | | | | | | | |
| | 10 | 12.0-12.5 | DS | 38 | 20 | 18 | 19.6 | | | | | | | | | | | 44.2 | | | | | |
| | 11 | 13.5-14.0 | DS | 59 | 25 | 34 | | | | | | | | | | | | 54.1 | | | | | |
| | 12 | 15.0-15.5 | DS | | | | 20.7 | 15.7 | | | 0 | 28°* | | | | | | 28.1 | | | | | |
| | 13 | 16.5-17.0 | DS | Non Plastic | | | | | 2.66 | | | | | | | | | 30.2 | | | | | |
| | 14 | 18.0-18.5 | DS | 76 | 30 | 46 | | | | | | | | | | | | | | | | | |
| | 16 | 21.0-21.5 | DS | | | | 24.9 | | | | | | | | | | | 68.7 | | | | | |
| | 17 | 23.0-23.5 | DS | 86 | 32 | 54 | | | | | | | | | | | | 87.5 | | | | | |
| | 18 | 25.0-25.5 | DS | 40 | 18 | 22 | | | 2.68 | | | | | | | | | 42.6 | | | | | |
| | 19 | 27.0-27.5 | DS | | | | 23.8 | | | | | | | | | | | 74.4 | | | | | |
| | 20 | 30.0-30.5 | DS | 72 | 27 | 45 | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | |

* Remolded Samples

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# SUMMARY OF TEST RESULTS

Site: Samawa Combined Cycle P.P
Borehole No.: 54


Date: May, 2017

| Location of Specimen | | | | Index Properties | | | Natural Water Content % | Dry Density KN/m$^3$ | Specific Gravity | Strength Tests | | | Consolidation Test | | | | Swelling Pressure kPa | Sieve Analysis % Passing No. 200 | Chemical Test | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Unconfined Compression kPa | Triaxial Compression | | | | | | | | | | | | |
| B.H. No. | Sample No. | Depth (m) | Sample Type | LL % | PL % | PI % | | | | | Cohesion kPa | Friction Angle | $e_o$ | $P_c$ | $C_c$ | $C_r$ | | | $SO_3$ % | TSS % | Cl % | OM % | PH |
| **54** | 1 | 0.5-1.0 | DS | 56 | 24 | 32 | | | | | | | | | | | | | 2.44 | 11.50 | 0.78 | 3.38 | 7.7 |
| | 2 | 1.5-2.0 | US | | | | 28.3 | 14.7 | 2.72 | 82 | 32 | 3° | 0.872 | 100 | 0.32 | 0.061 | 20 | | 1.63 | 4.88 | 0.43 | 3.14 | 7.8 |
| | 3 | 3.0-3.5 | DS | | | | | | | | | | | | | | | 97.8 | | | | | |
| | 4 | 4.5-5.0 | DS | 38 | 19 | 19 | 20.5 | | | | | | | | | | | 34.7 | | | | | |
| | 5 | 6.0-6.5 | DS | Non Plastic | | | | | | | | | | | | | | 20.8 | | | | | |
| | 7 | 9.0-9.5 | DS | | | | 21.1 | 15.6 | | | 0 | 33.5°* | | | | | | 22.3 | | | | | |
| | 8 | 10.5-11.0 | DS | Non Plastic | | | | | | | | | | | | | | 18.1 | | | | | |
| | 9 | 12.0-12.5 | DS | | | | | | 2.71 | | | | | | | | | 61.2 | | | | | |
| | 10 | 13.5-14.0 | DS | 71 | 28 | 43 | 24.5 | | | | | | | | | | | 68.8 | | | | | |
| | 11 | 15.0-15.5 | DS | Non Plastic | | | | | | | | | | | | | | 15.3 | | | | | |
| | 12 | 16.5-17.0 | DS | | | | | | 2.66 | | | | | | | | | 28.5 | | | | | |
| | 13 | 18.0-18.5 | DS | 43 | 22 | 21 | 20.7 | | | | | | | | | | | 40.2 | | | | | |
| | 14 | 19.5-20.0 | DS | 79 | 32 | 47 | | | 2.74 | | | | | | | | | | | | | | |
| | 16 | 23.0-23.5 | DS | | | | 23.9 | | | | | | | | | | | 79.8 | | | | | |
| | 17 | 25.0-25.5 | DS | 83 | 33 | 50 | | | | | | | | | | | | 62.4 | | | | | |
| | 19 | 29.5-20.0 | DS | | | | 24.4 | | | | | | | | | | | 69.3 | | | | | |

* Direct Shear on Remolded Samples

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# SUMMARY OF TEST RESULTS

Site: Samawa Combined Cycle P.P
Borehole No.: 55


Date: May, 2017

| Location of Specimen | | | | Index Properties | | | Natural Water Content % | Dry Density KN/m$^3$ | Specific Gravity | Strength Tests | | | Consolidation Test | | | | Swelling Pressure kPa | Sieve Analysis % Passing No. 200 | Chemical Test | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Unconfined Compression kPa | Triaxial Compression | | | | | | | | | | | | |
| B.H. No. | Sample No. | Depth (m) | Sample Type | LL % | PL % | PI % | | | | | Cohesion kPa | Friction Angle | $e_o$ | $P_c$ | $C_c$ | $C_r$ | | | $SO_3$ % | TSS % | Cl % | OM % | PH |
| **55** | 1 | 0.5-1.0 | DS | 57 | 23 | 34 | | | | | | | | | | | | | | | | | |
| | 2 | 1.5-2.0 | US | | | | 27.3 | 15.0 | 2.72 | 65 | | | 0.848 | 110 | 0.34 | 0.059 | 28 | 97.1 | 0.79 | 3.64 | 0.27 | 3.17 | 7.8 |
| | 3 | 3.0-3.5 | DS | 54 | 21 | 33 | | | | | | | | | | | | | | | | | |
| | 4 | 4.0-4.5 | US | | | | 29.8 | 14.5 | 2.72 | | 29 | 0° | 0.832 | 125 | 0.29 | 0.047 | | 94.2 | 0.71 | 2.72 | 0.22 | 3.76 | 7.9 |
| | 6 | 6.0-6.5 | DS | 36 | 19 | 17 | | | | | | | | | | | | 66.8 | | | | | |
| | 7 | 7.5-8.0 | DS | Non Plastic | | | | | | | | | | | | | | | | | | | |
| | 8 | 9.0-9.5 | DS | | | | 22.4 | 15.6 | | | 0 | 28°* | | | | | | 25.9 | | | | | |
| | 9 | 10.5-11.0 | DS | Non Plastic | | | | | | | | | | | | | | 21.7 | | | | | |
| | 11 | 13.5-14.0 | DS | | | | | | 2.67 | | | | | | | | | 25.2 | | | | | |
| | 12 | 15.0-15.5 | DS | 51 | 22 | 29 | 25.1 | | | | | | | | | | | 63.6 | | | | | |
| | 13 | 16.5-17.0 | DS | 42 | 19 | 23 | | | | | | | | | | | | 45.8 | | | | | |
| | 14 | 18.0-18.5 | DS | | | | 26.3 | | | | | | | | | | | 80.1 | | | | | |
| | 16 | 21.0-21.5 | DS | 92 | 34 | 58 | | | | | | | | | | | | 74.6 | | | | | |
| | 18 | 24.0-24.5 | DS | 86 | 29 | 57 | | | | | | | | | | | | | | | | | |
| | 19 | 25.5-26.0 | DS | | | | 25.7 | | | | | | | | | | | 96 | | | | | |
| | 20 | 27.0-27.5 | DS | 78 | 29 | 49 | | | | | | | | | | | | 79.4 | | | | | |
| | 22 | 30.0-30.5 | DS | | | | | | 2.72 | | | | | | | | | 71.7 | | | | | |
| | 23 | 33.0-33.5 | DS | | | | 26.0 | | | | | | | | | | | 89.4 | | | | | |
| | 25 | 39.0-39.5 | DS | 98 | 35 | 63 | | | | | | | | | | | | | | | | | |
| | 26 | 42.0-42.5 | DS | | | | | | 2.73 | | | | | | | | | 92.3 | | | | | |
| | 27 | 45.0-45.0 | DS | | | | 25.4 | | | | | | | | | | | 98.0 | | | | | |
| | 29 | 50.0-50.5 | DS | 88 | 31 | 57 | | | | | | | | | | | | 95.4 | | | | | |

* Direct Shear on Remolded Samples

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# SUMMARY OF TEST RESULTS

Site: Samawa Combined Cycle P.P
Borehole No.: 56


Date: May, 2017

| Location of Specimen | | | | Index Properties | | | Natural Water Content % | Dry Density KN/m$^3$ | Specific Gravity | Strength Tests | | | Consolidation Test | | | | Swelling Pressure kPa | Sieve Analysis % Passing No. 200 | Chemical Test | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Unconfined Compression kPa | Direct Shear | | | | | | | | | | | | |
| B.H. No. | Sample No. | Depth (m) | Sample Type | LL % | PL % | PI % | | | | | Cohesion kPa | Friction Angle | $e_o$ | $P_c$ | $C_c$ | $C_r$ | | | $SO_3$ % | TSS % | Cl % | OM % | PH |
| **56** | 1 | 0.5-1.0 | DS | 56 | 23 | 33 | | | | | | | | | | | | | | | | | |
| | 2 | 1.0-1.5 | US | | | | 29.8 | 15.0 | 2.72 | 71 | | | 0.962 | 105 | 0.27 | 0.045 | 18 | | 1.31 | 5.08 | 0.42 | 2.78 | 7.8 |
| | 3 | 1.5-2.0 | DS | | | | | | | | | | | | | | | 98.2 | | | | | |
| | 4 | 3.0-3.5 | DS | 54 | 22 | 31 | | | | | | | | | | | | | | | | | |
| | 5 | 4.0-4.5 | US | | | | 24.1 | 15.2 | | | 7 | 19° | | | | | | 39.2 | 0.88 | 3.21 | 0.28 | 2.94 | 7.9 |
| | 7 | 6.0-6.5 | DS | 44 | 21 | 23 | | | | | | | | | | | | 42.3 | | | | | |
| | 8 | 7.5-8.0 | DS | Non Plastic | | | | | 2.67 | | | | | | | | | | | | | | |
| | 9 | 9.0-9.5 | DS | | | | 20.4 | 15.8 | | | 0 | 27°* | | | | | | 26.5 | | | | | |
| | 10 | 10.5-11.0 | DS | 37 | 19 | 18 | | | | | | | | | | | | 34.2 | | | | | |
| | 11 | 12.0-12.5 | DS | | | | | | | | | | | | | | | 54.3 | | | | | |
| | 12 | 13.5-14.0 | DS | 80 | 29 | 51 | 24.6 | | | | | | | | | | | 70.8 | | | | | |
| | 13 | 15.0-15.5 | DS | 77 | 28 | 49 | | | | | | | | | | | | | | | | | |
| | 14 | 16.5-17.0 | DS | | | | | | 2.72 | | | | | | | | | 73.6 | | | | | |
| | 15 | 18.0-18.5 | DS | | | | 25.7 | | | | | | | | | | | 90.4 | | | | | |
| | 16 | 19.5-20.0 | DS | 93 | 31 | 62 | | | | | | | | | | | | | | | | | |
| | 17 | 21.0-21.5 | DS | 85 | 32 | 53 | | | | | | | | | | | | | | | | | |
| | 18 | 22.5-23.0 | DS | | | | 24.8 | | | | | | | | | | | 70.6 | | | | | |
| | 19 | 24.0-24.5 | DS | 76 | 27 | 49 | | | | | | | | | | | | | | | | | |
| | 21 | 27.0-27.5 | DS | | | | | | 2.74 | | | | | | | | | 93.1 | | | | | |
| | 22 | 28.5-29.0 | DS | 69 | 26 | 43 | | | | | | | | | | | | | | | | | |
| | 23 | 30.0-30.5 | DS | | | | 24.1 | | | | | | | | | | | 80.2 | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | |

* Remolded Samples

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Website: www.andrealab.com Email: azad@andrealab.com

# SUMMARY OF TEST RESULTS

Site: Samawa Combined Cycle P.P
Borehole No.: 57


Date: May, 2017

| Location of Specimen | | | | Index Properties | | | Natural Water Content % | Dry Density KN/m$^3$ | Specific Gravity | Strength Tests | | | Consolidation Test | | | | Swelling Pressure kPa | Sieve Analysis % Passing No. 200 | Chemical Test | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Unconfined Compression kPa | Triaxial Compression | | | | | | | | | | | | |
| B.H. No. | Sample No. | Depth (m) | Sample Type | LL % | PL % | PI % | | | | | Cohesion kPa | Friction Angle | $e_o$ | $P_c$ | $C_c$ | $C_r$ | | | $SO_3$ % | TSS % | Cl % | OM % | PH |
| **57** | 1 | 0.5-1.0 | DS | 43 | 22 | 21 | | | | | | | | | | | | 46.2 | | | | | |
| | 2 | 1.0-1.5 | US | | | | 28.9 | 15.4 | 2.71 | | 34 | 3.5° | 0.944 | 110 | 0.31 | 0.033 | 25 | | | | | | |
| | 3 | 1.5-2.0 | DS | | | | | | | | | | | | | | | 96.8 | | | | | |
| | 4 | 3.0-3.5 | DS | 55 | 23 | 32 | | | | | | | | | | | | | 0.81 | 3.68 | 0.31 | 5.74 | 7.8 |
| | 5 | 4.0-4.5 | US | | | | 29.7 | 14.8 | 2.72 | 121 | | | 0.826 | 125 | 0.28 | 0.041 | | | | | | | |
| | 6 | 4.5-5.0 | DS | 59 | 25 | 34 | | | | | | | | | | | | 95.3 | | | | | |
| | 7 | 6.0-6.5 | DS | | | | 21.9 | | | | | | | | | | | 36.6 | | | | | |
| | 8 | 7.5-8.0 | DS | 39 | 18 | 21 | | | 2.67 | | | | | | | | | | 0.62 | 1.76 | 0.22 | 0.98 | 7.9 |
| | 9 | 9.0-9.5 | DS | | | | 18.4 | | | | | | | | | | | 16.9 | | | | | |
| | 11 | 12.0-12.5 | DS | Non Plastic | | | | | | | | | | | | | | | | | | | |
| | 12 | 13.5-14.0 | DS | 64 | 27 | 37 | | | | | | | | | | | | 79.3 | | | | | |
| | 13 | 15.0-15.5 | DS | | | | 18.7 | 16.6 | | | 0 | 39°* | | | | | | 18.1 | | | | | |
| | 14 | 16.5-17.0 | DS | Non Plastic | | | | | 2.66 | | | | | | | | | 22.5 | | | | | |
| | 15 | 18.0-18.5 | DS | 74 | 29 | 45 | | | | | | | | | | | | 68.2 | | | | | |
| | 16 | 20.0-20.5 | DS | Non Plastic | | | 19.4 | | | | | | | | | | | 15.8 | | | | | |
| | 17 | 21.5-22.0 | DS | 90 | 36 | 54 | | | | | | | | | | | | | | | | | |
| | 20 | 26.0-26.5 | DS | | | | 24.8 | | | | | | | | | | | 77.2 | | | | | |
| | 21 | 27.5-28.0 | DS | | | | | | 2.73 | | | | | | | | | 94.1 | | | | | |
| | 22 | 29.5-30.0 | DS | 79 | 30 | 49 | | | | | | | | | | | | | | | | | |
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* Direct Shear on Remolded Samples

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Website: www.andrealab.com Email: azad@andrealab.com

# SUMMARY OF TEST RESULTS

Site: Samawa Combined Cycle P.P
Borehole No.: 58


Date: May, 2017

| Location of Specimen | | | | Index Properties | | | Natural Water Content % | Dry Density KN/m$^3$ | Specific Gravity | Strength Tests | | | Consolidation Test | | | | Swelling Pressure kPa | Sieve Analysis % Passing No. 200 | Chemical Test | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Unconfined Compression kPa | Triaxial Compression | | | | | | | | | | | | |
| B.H. No. | Sample No. | Depth (m) | Sample Type | LL % | PL % | PI % | | | | | Cohesion kPa | Friction Angle | $e_o$ | $P_c$ | $C_c$ | $C_r$ | | | $SO_3$ % | TSS % | Cl % | OM % | PH |
| **58** | 1 | 0.5-1.0 | DS | 52 | 23 | 29 | | | | | | | | | | | | | | | | | |
| | 2 | 1.0-1.5 | US | | | | 30.6 | 14.6 | 2.71 | 57 | | | 0.798 | 95 | 0.24 | 0.029 | 23 | 97.6 | | | | | |
| | 3 | 1.5-2.0 | DS | 56 | 24 | 32 | | | | | | | | | | | | | 0.36 | 1.58 | 0.14 | 3.96 | 7.9 |
| | 4 | 3.0-3.5 | DS | | | | | | | | | | | | | | | 94.9 | | | | | |
| | 5 | 4.0-4.5 | US | | | | 26.4 | 15.3 | 2.72 | | 61 | 4° | 0.707 | 115 | 0.23 | 0.042 | | | | | | | |
| | 6 | 4.5-5.0 | DS | 63 | 22 | 41 | | | | | | | | | | | | | | | | | |
| | 7 | 6.0-6.5 | DS | 44 | 21 | 23 | | | | | | | | | | | | 44.2 | 0.21 | 0.68 | 0.09 | 0.64 | 8.0 |
| | 8 | 7.5-8.0 | DS | | | | 20.9 | | | | | | | | | | | 21.3 | | | | | |
| | 10 | 10.5-11.0 | DS | Non Plastic | | | | | 2.66 | | | | | | | | | 17.2 | | | | | |
| | 11 | 12.0-12.5 | DS | Non Plastic | | | 21.1 | 16.5 | | | 0 | 38.5°* | | | | | | 23.1 | | | | | |
| | 12 | 13.5-14.0 | DS | | | | | | | | | | | | | | | 59.5 | | | | | |
| | 13 | 15.0-15.5 | DS | 78 | 29 | 49 | | | | | | | | | | | | | | | | | |
| | 14 | 16.5-17.0 | DS | | | | 25.4 | | | | | | | | | | | 92.7 | | | | | |
| | 15 | 18.0-18.5 | DS | 93 | 27 | 66 | | | 2.73 | | | | | | | | | | | | | | |
| | 16 | 19.5-20.0 | DS | | | | 24.2 | | | | | | | | | | | 58.1 | | | | | |
| | 17 | 21.0-21.5 | DS | 82 | 34 | 48 | | | | | | | | | | | | | | | | | |
| | 18 | 23.0-23.5 | DS | | | | 20.6 | | | | | | | | | | | 37.8 | | | | | |
| | 19 | 25.0-25.5 | DS | 41 | 22 | 19 | | | 2.68 | | | | | | | | | | | | | | |
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* Direct Shear on Remolded Samples

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Website: www.andrealab.com Email: azad@andrealab.com

# SUMMARY OF TEST RESULTS

Site: Samawa Combined Cycle P.P
Borehole No.: 59


Date: June, 2017

| Location of Specimen | | | | Index Properties | | | Natural Water Content % | Dry Density KN/m$^3$ | Specific Gravity | Strength Tests | | | Consolidation Test | | | | Swelling Pressure kPa | Sieve Analysis % Passing No. 200 | Chemical Test | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Unconfined Compression kPa | Triaxial Compression | | | | | | | | | | | | |
| B.H. No. | Sample No. | Depth (m) | Sample Type | LL % | PL % | PI % | | | | | Cohesion kPa | Friction Angle | $e_o$ | $P_c$ | $C_c$ | $C_r$ | | | $SO_3$ % | TSS % | Cl % | OM % | PH |
| **59** | 1 | 0.5-1.0 | DS | | | | | | | | | | | | | | | 86.8 | | | | | |
| | 2 | 1.5-2.0 | US | 54 | 22 | 32 | 31.4 | 14.7 | 2.72 | 77 | 33 | 2.5° | 0.894 | 110 | 0.28 | 0.049 | 24 | | | | | | |
| | 3 | 3.0-3.5 | DS | | | | | | | | | | | | | | | 94.9 | 1.91 | 4.92 | 0.58 | 2.19 | 7.8 |
| | 4 | 4.5-5.0 | DS | | | | 23.2 | | | | | | | | | | | 16.8 | | | | | |
| | 5 | 6.0-6.5 | DS | Non Plastic | | | | | | | | | | | | | | | 0.22 | 1.04 | 0.10 | 0.67 | 8.0 |
| | 6 | 7.5-8.0 | DS | Non Plastic | | | | | 2.66 | | | | | | | | | 25.6 | | | | | |
| | 7 | 9.0-9.5 | DS | 36 | 19 | 17 | 21.3 | | | | | | | | | | | | | | | | |
| | 8 | 10.5-11.0 | DS | | | | | | | | | | | | | | | 36.7 | | | | | |
| | 9 | 12.0-12.5 | DS | Non Plastic | | | | | | | | | | | | | | | | | | | |
| | 10 | 13.5-14.0 | DS | | | | 19.4 | 16.3 | | | 0 | 37°* | | | | | | 25.5 | | | | | |
| | 11 | 15.0-15.5 | DS | 78 | 28 | 50 | | | 2.72 | | | | | | | | | | | | | | |
| | 12 | 16.5-17.0 | DS | | | | 24.1 | | | | | | | | | | | 81.6 | | | | | |
| | 13 | 18.0-18.5 | DS | 91 | 32 | 59 | | | | | | | | | | | | | | | | | |
| | 14 | 20.0-20.5 | DS | | | | 25.2 | | | | | | | | | | | 73 | | | | | |
| | 15 | 22.5-23.0 | DS | 40 | 21 | 19 | | | | | | | | | | | | | | | | | |
| | 16 | 25.0-25.5 | DS | | | | | | 2.68 | | | | | | | | | 42.8 | | | | | |
| | 17 | 27.5-28.0 | DS | | | | 24.7 | | | | | | | | | | | 91.1 | | | | | |
| | 18 | 30.0-30.5 | DS | 76 | 28 | 48 | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | |
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* Direct Shear on Remolded Samples

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# SUMMARY OF TEST RESULTS

Site: Samawa Combined Cycle P.P
Borehole No.: 60


Date: June, 2017

| Location of Specimen | | | | Index Properties | | | Natural Water Content % | Dry Density KN/m$^3$ | Specific Gravity | Strength Tests | | | Consolidation Test | | | | Swelling Pressure kPa | Sieve Analysis % Passing No. 200 | Chemical Test | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Unconfined Compression kPa | Direct Shear | | | | | | | | | | | | |
| B.H. No. | Sample No. | Depth (m) | Sample Type | LL % | PL % | PI % | | | | | Cohesion kPa | Friction Angle | $e_o$ | $P_c$ | $C_c$ | $C_r$ | | | $SO_3$ % | TSS % | Cl % | OM % | PH |
| **60** | 1 | 0.5-1.0 | DS | | | | | | | | | | | | | | | 32.7 | | | | | |
| | 2 | 1.5-2.0 | US | 37 | 18 | 19 | 28.2 | 14.3 | | | 0 | 17° | | | | | | | 0.21 | 1.28 | 0.11 | 1.76 | 8.0 |
| | 3 | 3.0-3.5 | DS | | | | | | | | | | | | | | | 98.2 | | | | | |
| | 4 | 4.0-4.5 | US | | | | 28.7 | 14.7 | 2.72 | 54 | | | 0.921 | 110 | 0.33 | 0.056 | 18 | | | | | | |
| | 5 | 4.5-5.0 | DS | Non Plastic | | | | | | | | | | | | | | | 0.43 | 2.33 | 0.13 | 2.75 | 7.9 |
| | 6 | 6.0-6.5 | DS | | | | 22.1 | | | | | | | | | | | 24.9 | | | | | |
| | 7 | 7.5-8.0 | DS | 42 | 19 | 23 | | | | | | | | | | | | 37.6 | | | | | |
| | 8 | 9.0-9.5 | DS | | | | | | 2.67 | | | | | | | | | 28.7 | | | | | |
| | 10 | 12.0-12.5 | DS | Non Plastic | | | 20.3 | 15.6 | | | 0 | 34°* | | | | | | 15.9 | | | | | |
| | 11 | 14.0-14.5 | DS | 39 | 20 | 19 | | | | | | | | | | | | 36.1 | | | | | |
| | 12 | 16.0-16.5 | DS | 75 | 27 | 48 | 25.1 | | | | | | | | | | | 67.8 | | | | | |
| | 13 | 18.0-18.5 | DS | 91 | 28 | 63 | | | | | | | | | | | | | | | | | |
| | 14 | 20.0-20.5 | DS | | | | 24.7 | | | | | | | | | | | 90.2 | | | | | |
| | 15 | 22.5-23.0 | DS | 45 | 21 | 24 | | | 2.69 | | | | | | | | | 49.8 | | | | | |
| | 16 | 25.0-25.5 | DS | 59 | 25 | 34 | | | | | | | | | | | | 80.3 | | | | | |
| | 17 | 27.5-28.0 | | | | | 25.4 | | | | | | | | | | | 88.7 | | | | | |
| | 18 | 30.0-30.5 | | 70 | 26 | 44 | | | 2.72 | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | |
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* Remolded Samples

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Website: www.andrealab.com Email: azad@andrealab.com

# SUMMARY OF TEST RESULTS

Site: Samawa Combined Cycle P.P
Borehole No.: 61


Date: June, 2017

| Location of Specimen | | | | Index Properties | | | Natural Water Content % | Dry Density KN/m$^3$ | Specific Gravity | Strength Tests | | | Consolidation Test | | | | Swelling Pressure kPa | Sieve Analysis % Passing No. 200 | Chemical Test | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Unconfined Compression kPa | Triaxial Compression | | | | | | | | | | | | |
| B.H. No. | Sample No. | Depth (m) | Sample Type | LL % | PL % | PI % | | | | | Cohesion kPa | Friction Angle | $e_o$ | $P_c$ | $C_c$ | $C_r$ | | | $SO_3$ % | TSS % | Cl % | OM % | PH |
| **61** | 1 | 0.5-1.0 | DS | | | | | | | | | | | | | | | 90.4 | | | | | |
| | 2 | 1.5-2.0 | US | 43 | 22 | 21 | 26.8 | 14.8 | 2.70 | 83 | | | 0.751 | 110 | 0.21 | 0.031 | 31 | | | | | | |
| | 3 | 3.0-3.5 | DS | | | | | | | | | | | | | | | 97.1 | 0.82 | 2.88 | 0.26 | 3.11 | 7.9 |
| | 4 | 4.0-4.5 | US | 56 | 22 | 34 | 27.6 | 15.2 | 2.71 | | 42 | 4.5° | 0.793 | 125 | 0.25 | 0.036 | | | | | | | |
| | 5 | 4.5-5.0 | DS | | | | | | | | | | | | | | | 66.8 | | | | | |
| | 6 | 6.0-6.5 | DS | 42 | 20 | 22 | 23.5 | | 2.67 | | | | | | | | | | 0.19 | 1.08 | 0.10 | 0.77 | 8.1 |
| | 7 | 7.5-8.0 | DS | | | | | | | | | | | | | | | 37.1 | | | | | |
| | 8 | 9.0-9.5 | DS | Non Plastic | | | 20.3 | 15.5 | | | 0 | 26°* | | | | | | 28.2 | | | | | |
| | 9 | 10.5-11.0 | DS | | | | | | 2.67 | | | | | | | | | 35.8 | | | | | |
| | 10 | 12.0-12.5 | DS | 38 | 18 | 20 | | | | | | | | | | | | | | | | | |
| | 11 | 14.0-14.5 | DS | | | | 25.60 | | | | | | | | | | | 78.6 | | | | | |
| | 12 | 16.0-16.5 | DS | 77 | 29 | 48 | | | | | | | | | | | | | | | | | |
| | 13 | 18.0-18.5 | DS | 44 | 20 | 24 | | | 2.68 | | | | | | | | | 47.1 | | | | | |
| | 14 | 20.0-20.5 | DS | 81 | 28 | 53 | 24.7 | | | | | | | | | | | 70.9 | | | | | |

* Direct Shear on Remolded Samples

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Website: www.andrealab.com Email: azad@andrealab.com

# SUMMARY OF TEST RESULTS

Site: Samawa Combined Cycle P.P
Borehole No.: 62


Date: June, 2017

| Location of Specimen | | | | Index Properties | | | Natural Water Content % | Dry Density KN/m$^3$ | Specific Gravity | Strength Tests | | | Consolidation Test | | | | Swelling Pressure kPa | Sieve Analysis % Passing No. 200 | Chemical Test | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Unconfined Compression kPa | Triaxial Compression | | | | | | | | | | | | |
| B.H. No. | Sample No. | Depth (m) | Sample Type | LL % | PL % | PI % | | | | | Cohesion kPa | Friction Angle | $e_o$ | $P_c$ | $C_c$ | $C_r$ | | | $SO_3$ % | TSS % | Cl % | OM % | PH |
| **62** | 1 | 0.5-1.0 | DS | 54 | 23 | 31 | | | | | | | | | | | | | | | | | |
| | 2 | 1.5-2.0 | US | | | | 28.7 | 14.3 | 2.70 | | 33 | 2° | 0.903 | 110 | 0.26 | 0.039 | 19 | 72.8 | | | | | |
| | 3 | 3.0-3.5 | DS | 65 | 26 | 39 | | | | | | | | | | | | 91.6 | | | | | |
| | 4 | 4.0-4.5 | US | | | | 28.5 | 14.7 | 2.72 | 71 | | | 0.842 | 125 | 0.28 | 0.044 | | | 0.14 | 0.96 | 0.08 | 0.78 | 8.1 |
| | 5 | 4.5-5.0 | DS | 45 | 21 | 24 | | | | | | | | | | | | 44.4 | | | | | |
| | 6 | 6.0-6.5 | DS | | | | | | | | | | | | | | | 39.2 | | | | | |
| | 7 | 7.5-8.0 | DS | Non Plastic | | | 23.2 | | | | | | | | | | | | 0.21 | 1.32 | 0.11 | 1.09 | 8.0 |
| | 9 | 10.5-11.0 | DS | | | | | | 2.66 | | | | | | | | | 22.8 | | | | | |
| | 10 | 12.0-12.5 | DS | Non Plastic | | | | | | | | | | | | | | | | | | | |
| | 11 | 13.5-14.0 | DS | | | | 21.8 | 15.8 | | | 0 | 33.5°* | | | | | | 25.7 | | | | | |
| | 12 | 15.0-15.5 | DS | | | | | | | | | | | | | | | 79.1 | | | | | |
| | 13 | 16.5-17.0 | DS | 83 | 31 | 52 | | | | | | | | | | | | | | | | | |
| | 14 | 18.0-18.5 | DS | 88 | 32 | 56 | 25.5 | | | | | | | | | | | 71.2 | | | | | |
| | 16 | 21.0-21.5 | DS | | | | | | 2.72 | | | | | | | | | 54.2 | | | | | |
| | 17 | 23.0-23.5 | DS | | | | 24.3 | | | | | | | | | | | 65.7 | | | | | |
| | 18 | 25.0-25.5 | DS | 71 | 28 | 43 | | | | | | | | | | | | | | | | | |

* Direct Shear on Remolded Samples

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# SUMMARY OF TEST RESULTS

Site: Samawa Combined Cycle P.P
Borehole No.: 63


Date: June, 2017

| Location of Specimen | | | | Index Properties | | | Natural Water Content % | Dry Density KN/m$^3$ | Specific Gravity | Strength Tests | | | Consolidation Test | | | | Swelling Pressure kPa | Sieve Analysis % Passing No. 200 | Chemical Test | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Unconfined Compression kPa | Triaxial Compression | | | | | | | | | | | | |
| B.H. No. | Sample No. | Depth (m) | Sample Type | LL % | PL % | PI % | | | | | Cohesion kPa | Friction Angle | $e_o$ | $P_c$ | $C_c$ | $C_r$ | | | $SO_3$ % | TSS % | Cl % | OM % | PH |
| **63** | 1 | 0.5-1.0 | DS | 53 | 22 | 31 | | | | | | | | | | | | | | | | | |
| | 2 | 1.0-1.5 | US | | | | 27.7 | 14.7 | 2.72 | 86 | | | 0.823 | 110 | 0.27 | 0.046 | 24 | 94.3 | | | | | |
| | 3 | 1.5-2.0 | DS | 57 | 24 | 33 | | | | | | | | | | | | | | | | | |
| | 4 | 3.0-3.5 | DS | | | | | | | | | | | | | | | 96.7 | 0.45 | 2.96 | 0.17 | 3.69 | 7.9 |
| | 5 | 4.0-4.5 | US | | | | 29.4 | 14.0 | 2.71 | | 31 | 3° | 0.906 | 120 | 0.32 | 0.054 | | | | | | | |
| | 6 | 4.5-5.0 | DS | 63 | 25 | 38 | | | | | | | | | | | | | | | | | |
| | 7 | 6.0-6.5 | DS | | | | | | | | | | | | | | | 82.1 | | | | | |
| | 8 | 7.5-8.0 | DS | 39 | 21 | 18 | 21.7 | | | | | | | | | | | 38.4 | 1.61 | 3.95 | 0.43 | 1.58 | 7.8 |
| | 9 | 9.0-9.5 | DS | | | | | | | | | | | | | | | 24.3 | | | | | |
| | 10 | 10.5-11.0 | DS | Non Plastic | | | 19.9 | 15.9 | | | 0 | 38°* | | | | | | | | | | | |
| | 112 | 13.5-14.0 | DS | | | | | | 2.67 | | | | | | | | | 23.9 | | | | | |
| | 13 | 15.0-15.5 | DS | 86 | 29 | 57 | | | | | | | | | | | | | | | | | |
| | 14 | 17.0-17.5 | DS | | | | 23.8 | | | | | | | | | | | 70.2 | | | | | |
| | 15 | 19.0-19.5 | DS | 79 | 28 | 51 | | | | | | | | | | | | | | | | | |
| | 16 | 21.0-21.5 | DS | | | | | | 2.73 | | | | | | | | | 75.8 | | | | | |
| | 17 | 23.0-23.5 | DS | 41 | 22 | 19 | 20.5 | | | | | | | | | | | 37.2 | | | | | |
| | 18 | 25.0-25.5 | DS | 74 | 27 | 47 | | | | | | | | | | | | 62.7 | | | | | |

* Direct Shear on Remolded Samples

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# SUMMARY OF TEST RESULTS

Site: Samawa Combined Cycle P.P
Borehole No.: 64


Date: June, 2017

| Location of Specimen | | | | Index Properties | | | Natural Water Content % | Dry Density KN/m$^3$ | Specific Gravity | Strength Tests | | | Consolidation Test | | | | Swelling Pressure kPa | Sieve Analysis % Passing No. 200 | Chemical Test | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Unconfined Compression kPa | Direct Shear | | | | | | | | | | | | |
| B.H. No. | Sample No. | Depth (m) | Sample Type | LL % | PL % | PI % | | | | | Cohesion kPa | Friction Angle | $e_o$ | $P_c$ | $C_c$ | $C_r$ | | | $SO_3$ % | TSS % | Cl % | OM % | PH |
| **64** | 1 | 0.5-1.0 | DS | | | | | | | | | | | | | | | 34.2 | | | | | |
| | 2 | 1.5-2.0 | US | 40 | 21 | 19 | 21.8 | 14.1 | | | 6 | 12° | | | | | | | 0.11 | 0.88 | 0.06 | 1.92 | 8.1 |
| | 3 | 3.0-3.5 | DS | | | | | | | | | | | | | | | 94.7 | | | | | |
| | 4 | 4.0-4.5 | US | 59 | 25 | 34 | 27.9 | 14.5 | 2.72 | 79 | | | 0.839 | 130 | 0.26 | 0.052 | 20 | | | | | | |
| | 5 | 4.5-5.0 | DS | 38 | 19 | 19 | | | | | | | | | | | | 39.7 | | | | | |
| | 6 | 6.0-6.5 | DS | | | | | | | | | | | | | | | 21.6 | 0.21 | 1.23 | 0.10 | 0.87 | 8.0 |
| | 7 | 7.5-8.0 | DS | Non Plastic | | | 18.7 | 16.0 | | | 0 | 37.5°* | | | | | | | | | | | |
| | 8 | 9.0-9.5 | DS | Non Plastic | | | | | | | | | | | | | | 32.8 | | | | | |
| | 9 | 10.5-11.0 | DS | | | | | | 2.65 | | | | | | | | | 15.7 | | | | | |
| | 10 | 12.0-12.5 | DS | Non Plastic | | | 19.3 | | | | | | | | | | | | | | | | |
| | 12 | 15.0-15.5 | DS | | | | | | | | | | | | | | | 20.5 | | | | | |
| | 13 | 17.0-17.5 | DS | 91 | 32 | 59 | | | | | | | | | | | | | | | | | |
| | 14 | 19.0-19.5 | DS | | | | 26.2 | | 2.73 | | | | | | | | | 77.4 | | | | | |
| | 15 | 21.0-21.5 | DS | | | | | | | | | | | | | | | 57.3 | | | | | |
| | 16 | 23.0-23.5 | DS | 78 | 27 | 51 | 24.8 | | | | | | | | | | | | | | | | |
| | 17 | 25.0-25.5 | DS | 42 | 19 | 23 | | | | | | | | | | | | 35.4 | | | | | |

* Remolded Samples

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# SUMMARY OF TEST RESULTS

Site: Samawa Combined Cycle P.P
Borehole No.: 65


Date: June, 2017

| Location of Specimen | | | | Index Properties | | | Natural Water Content % | Dry Density KN/m$^3$ | Specific Gravity | Strength Tests | | | Consolidation Test | | | | Swelling Pressure kPa | Sieve Analysis % Passing No. 200 | Chemical Test | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Unconfined Compression kPa | Triaxial Compression | | | | | | | | | | | | |
| B.H. No. | Sample No. | Depth (m) | Sample Type | LL % | PL % | PI % | | | | | Cohesion kPa | Friction Angle | $e_o$ | $P_c$ | $C_c$ | $C_r$ | | | $SO_3$ % | TSS % | Cl % | OM % | PH |
| **65** | 1 | 0.5-1.0 | DS | | | | | | | | | | | | | | | 64.7 | | | | | |
| | 2 | 1.0-1.5 | US | | | | 29.8 | 14.1 | 2.71 | 61 | | | 0.876 | 105 | 0.27 | 0.042 | 29 | | 0.45 | 3.96 | 0.18 | 2.87 | 7.9 |
| | 3 | 1.5-2.0 | DS | 55 | 24 | 31 | | | | | | | | | | | | | | | | | |
| | 4 | 3.0-3.5 | DS | | | | | | | | | | | | | | | 96.8 | | | | | |
| | 5 | 4.0-4.5 | US | 61 | 23 | 38 | 31.4 | 13.6 | 2.72 | | 27 | 0° | 0.961 | 115 | 0.34 | 0.059 | | | | | | | |
| | 6 | 4.5-5.0 | DS | | | | | | | | | | | | | | | 65.3 | 0.38 | 4.24 | 0.14 | 5.07 | 8.0 |
| | 7 | 6.0-6.5 | DS | 41 | 20 | 21 | | | | | | | | | | | | | | | | | |
| | 8 | 7.5-8.0 | DS | | | | | | 2.65 | | | | | | | | | 8.2 | | | | | |
| | 10 | 10.5-11.0 | DS | Non Plastic | | | | | | | | | | | | | | 10.6 | | | | | |
| | 11 | 12.0-12.5 | DS | Non Plastic | | | 18.8 | 16.3 | | | 0 | 40.5°* | | | | | | | | | | | |
| | 12 | 13.5-14.0 | DS | | | | | | 2.66 | | | | | | | | | 21.4 | | | | | |
| | 13 | 15.0-15.5 | DS | 97 | 34 | 63 | | | | | | | | | | | | | | | | | |
| | 14 | 17.0-17.5 | DS | | | | 25.4 | | | | | | | | | | | 94.2 | | | | | |
| | 15 | 19.0-19.5 | DS | 82 | 29 | 53 | | | | | | | | | | | | | | | | | |
| | 16 | 21.0-21.5 | DS | | | | | | 2.72 | | | | | | | | | 68.2 | | | | | |
| | 17 | 23.0-23.5 | DS | 43 | 19 | 24 | 21.3 | | | | | | | | | | | 39.8 | | | | | |
| | 18 | 25.0-25.5 | DS | 64 | 28 | 36 | | | | | | | | | | | | 56.2 | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | |
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* Direct Shear on Remolded Samples

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# SUMMARY OF TEST RESULTS

Site: Samawa Combined Cycle P.P
Borehole No.: 66


Date: June, 2017

| Location of Specimen | | | | Index Properties | | | Natural Water Content % | Dry Density KN/m$^3$ | Specific Gravity | Strength Tests | | | Consolidation Test | | | | Swelling Pressure kPa | Sieve Analysis % Passing No. 200 | Chemical Test | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Unconfined Compression kPa | Triaxial Compression | | | | | | | | | | | | |
| B.H. No. | Sample No. | Depth (m) | Sample Type | LL % | PL % | PI % | | | | | Cohesion kPa | Friction Angle | $e_o$ | $P_c$ | $C_c$ | $C_r$ | | | $SO_3$ % | TSS % | Cl % | OM % | PH |
| **66** | 1 | 0.5-1.0 | DS | 51 | 22 | 29 | | | | | | | | | | | | 64.8 | | | | | |
| | 2 | 1.5-2.0 | US | | | | 32.4 | 14.0 | 2.70 | 52 | | | 1.066 | 115 | 0.34 | 0.046 | 21 | 89.6 | | | | | |
| | 3 | 3.0-3.5 | DS | 43 | 19 | 24 | | | | | | | | | | | | | 0.33 | 2.92 | 0.13 | 2.59 | 7.9 |
| | 4 | 4.0-4.5 | US | 36 | 19 | 17 | 28.6 | 14.3 | 2.69 | | 34 | 3° | 0.859 | 125 | 0.24 | 0.031 | | | | | | | |
| | 5 | 4.5-5.0 | DS | | | | | | | | | | | | | | | 91.5 | | | | | |
| | 6 | 6.0-6.5 | DS | Non Plastic | | | | | | | | | | | | | | 33.1 | 0.17 | 0.89 | 0.08 | 0.67 | 8.1 |
| | 7 | 7.5-8.0 | DS | 54 | 22 | 32 | 26.2 | | | | | | | | | | | 76.8 | | | | | |
| | 8 | 9.0-9.5 | DS | | | | | | 2.67 | | | | | | | | | 39.5 | | | | | |
| | 9 | 10.5-11.0 | DS | Non Plastic | | | 18.4 | 16.2 | | | 0 | 37°* | | | | | | 16.9 | | | | | |
| | 10 | 12.0-12.5 | DS | 75 | 26 | 49 | | | | | | | | | | | | | | | | | |
| | 11 | 14.0-14.5 | DS | | | | 24.7 | | | | | | | | | | | 75.4 | | | | | |
| | 12 | 16.0-16.5 | DS | 87 | 31 | 56 | | | | | | | | | | | | 79.1 | | | | | |
| | 13 | 18.0-18.5 | DS | 99 | 38 | 61 | | | 2.73 | | | | | | | | | | | | | | |
| | 15 | 22.5-23.0 | DS | | | | 24.3 | | | | | | | | | | | 68.9 | | | | | |
| | 16 | 25.0-25.5 | DS | 80 | 28 | 52 | | | | | | | | | | | | 90.2 | | | | | |

* Direct Shear on Remolded Samples

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# SUMMARY OF TEST RESULTS

Site: Samawa Combined Cycle P.P
Borehole No.: 67


Date: May, 2017

| Location of Specimen | | | | Index Properties | | | Natural Water Content % | Dry Density KN/m$^3$ | Specific Gravity | Strength Tests | | | Consolidation Test | | | | Swelling Pressure kPa | Sieve Analysis % Passing No. 200 | Chemical Test | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Unconfined Compression kPa | Triaxial Compression | | | | | | | | | | | | |
| B.H. No. | Sample No. | Depth (m) | Sample Type | LL % | PL % | PI % | | | | | Cohesion kPa | Friction Angle | $e_o$ | $P_c$ | $C_c$ | $C_r$ | | | $SO_3$ % | TSS % | Cl % | OM % | PH |
| **67** | 1 | 0.5-1.0 | DS | 51 | 24 | 27 | | | | | | | | | | | | | | | | | |
| | 2 | 1.0-1.5 | US | | | | 27.7 | 14.5 | 2.70 | 59 | | | 0.756 | 100 | 0.22 | 0.035 | 24 | | | | | | |
| | 3 | 1.5-2.0 | DS | | | | | | | | | | | | | | | 90.4 | 0.25 | 2.32 | 0.11 | 1.97 | 8.0 |
| | 4 | 3.0-3.5 | DS | 57 | 26 | 31 | | | | | | | | | | | | | | | | | |
| | 5 | 4.0-4.5 | US | | | | 30.3 | 13.6 | 2.72 | | 39 | 2° | 0.921 | 125 | 0.26 | 0.049 | | | | | | | |
| | 6 | 4.5-5.0 | DS | | | | | | | | | | | | | | | 92.4 | 0.38 | 3.04 | 0.13 | 3.67 | 7.9 |
| | 7 | 6.0-6.5 | DS | Non Plastic | | | | | | | 0 | 33.5°* | | | | | | 16.9 | | | | | |
| | 8 | 7.5-8.0 | DS | | | | 21.8 | 15.7 | | | | | | | | | | 17.8 | | | | | |
| | 9 | 9.0-9.5 | DS | Non Plastic | | | | | | | | | | | | | | | | | | | |
| | 11 | 12.0-12.5 | DS | | | | | | 2.66 | | | | | | | | | 16.3 | | | | | |
| | 12 | 13.5-14.0 | DS | | | | 23.9 | | | | | | | | | | | 96.3 | | | | | |
| | 14 | 16.5-17.0 | DS | 58 | 22 | 36 | | | | | | | | | | | | | | | | | |
| | 15 | 18.0-18.5 | DS | | | | 24.4 | | | | | | | | | | | 88.9 | | | | | |
| | 16 | 19.5-20.0 | DS | 64 | 28 | 37 | | | | | | | | | | | | | | | | | |

* Direct Shear on Remolded Sample

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# SUMMARY OF TEST RESULTS

Site: Samawa Combined Cycle P.P
Borehole No.: 68


Date: May, 2017

| Location of Specimen | | | | Index Properties | | | Natural Water Content % | Dry Density KN/m$^3$ | Specific Gravity | Strength Tests | | | Consolidation Test | | | | Swelling Pressure kPa | Sieve Analysis % Passing No. 200 | Chemical Test | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Unconfined Compression kPa | Direct Shear | | | | | | | | | | | | |
| B.H. No. | Sample No. | Depth (m) | Sample Type | LL % | PL % | PI % | | | | | Cohesion kPa | Friction Angle | $e_o$ | $P_c$ | $C_c$ | $C_r$ | | | $SO_3$ % | TSS % | Cl % | OM % | PH |
| **68** | 1 | 0.5-1.0 | DS | 55 | 24 | 31 | | | | | | | | | | | | 87.8 | 1.27 | 5.42 | 0.41 | 3.65 | 7.8 |
| | 2 | 1.0-1.5 | US | | | | 27.5 | 14.6 | 2.71 | 62 | | | 0.938 | 115 | 0.33 | 0.052 | 14 | | | | | | |
| | 3 | 1.5-2.0 | DS | | | | | | | | | | | | | | | 94.1 | | | | | |
| | 4 | 3.0-3.5 | DS | 60 | 27 | 33 | 24.8 | | | | | | | | | | | | | | | | |
| | 5 | 4.5-5.0 | DS | | | | | | 2.66 | | | | | | | | | 20.3 | | | | | |
| | 6 | 6.0-6.5 | DS | Non Plastic | | | | | | | | | | | | | | | 0.19 | 1.48 | 0.10 | 0.88 | 8.0 |
| | 7 | 7.5-8.0 | DS | | | | 20.6 | 15.2 | | | 0 | 27.5°* | | | | | | 18.3 | | | | | |
| | 9 | 10.5-11.0 | DS | Non Plastic | | | | | | | | | | | | | | | | | | | |
| | 10 | 12.0-12.5 | DS | | | | 18.9 | | | | | | | | | | | 17.2 | | | | | |
| | 12 | 15.0-15.5 | DS | Non Plastic | | | | | | | | | | | | | | 27.3 | | | | | |
| | 13 | 16.5-17.0 | DS | 73 | 29 | 44 | | | | | | | | | | | | 74.1 | | | | | |
| | 14 | 18.0-18.5 | DS | 89 | 35 | 54 | 24.8 | | | | | | | | | | | | | | | | |
| | 15 | 19.5-20.0 | DS | | | | | | 2.74 | | | | | | | | | 91.3 | | | | | |

* Remolded Sample

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# SUMMARY OF TEST RESULTS

Site: Samawa Combined Cycle P.P
Borehole No.: 69


Date: June, 2017

| Location of Specimen | | | | Index Properties | | | Natural Water Content % | Dry Density KN/m$^3$ | Specific Gravity | Strength Tests | | | Consolidation Test | | | | Swelling Pressure kPa | Sieve Analysis % Passing No. 200 | Chemical Test | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Unconfined Compression kPa | Direct Shear | | | | | | | | | | | | |
| B.H. No. | Sample No. | Depth (m) | Sample Type | LL % | PL % | PI % | | | | | Cohesion kPa | Friction Angle | $e_o$ | $P_c$ | $C_c$ | $C_r$ | | | $SO_3$ % | TSS % | Cl % | OM % | PH |
| **69** | 1 | 0.5-1.0 | DS | 41 | 19 | 22 | | | | | | | | | | | | 41.6 | 0.25 | 2.32 | 0.11 | 1.97 | 7.9 |
| | 2 | 1.5-2.0 | US | | | | 29.3 | 13.9 | 2.72 | 55 | | | 0.917 | 115 | 0.30 | 0.053 | 28 | 92.3 | | | | | |
| | 3 | 3.0-3.5 | DS | 66 | 27 | 39 | | | | | | | | | | | | | | | | | |
| | 4 | 4.5-5.0 | DS | | | | | | | | | | | | | | | 27.6 | 0.38 | 3.04 | 0.14 | 3.67 | 7.9 |
| | 5 | 6.0-6.5 | DS | Non Plastic | | | 21.4 | 15.3 | | | 0 | 18.5°* | | | | | | | | | | | |
| | 6 | 7.5-8.0 | DS | | | | | | 2.66 | | | | | | | | | 16.2 | | | | | |
| | 7 | 9.0-9.5 | DS | Non Plastic | | | | | | | | | | | | | | | | | | | |
| | 8 | 10.5-11.0 | DS | | | | | | | | | | | | | | | 15.9 | | | | | |
| | 10 | 14.0-14.5 | DS | Non Plastic | | | 19.4 | 16.7 | | | 0 | 32°* | | | | | | 17.6 | | | | | |
| | 11 | 16.0-16.5 | DS | 80 | 28 | 52 | | | | | | | | | | | | | | | | | |
| | 12 | 18.0-18.5 | DS | | | | | | 2.73 | | | | | | | | | 94.8 | | | | | |
| | 13 | 20.0-20.5 | DS | 86 | 31 | 55 | 24.6 | | | | | | | | | | | | | | | | |

* Remolded Samples

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# SUMMARY OF TEST RESULTS

Site: Samawa Combined Cycle P.P
Borehole No.: 70


Date: June, 2017

| Location of Specimen | | | | Index Properties | | | Natural Water Content % | Dry Density KN/m$^3$ | Specific Gravity | Strength Tests | | | Consolidation Test | | | | Swelling Pressure kPa | Sieve Analysis % Passing No. 200 | Chemical Test | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Unconfined Compression kPa | Triaxial Compression | | | | | | | | | | | | |
| B.H. No. | Sample No. | Depth (m) | Sample Type | LL % | PL % | PI % | | | | | Cohesion kPa | Friction Angle | $e_o$ | $P_c$ | $C_c$ | $C_r$ | | | $SO_3$ % | TSS % | Cl % | OM % | PH |
| **70** | 1 | 0.5-1.0 | DS | | | | | | | | | | | | | | | | | | | | |
| | 2 | 1.5-2.0 | US | 47 | 21 | 26 | 27.1 | 14.4 | 2.70 | | 32 | 3.5° | 0.788 | 95 | 0.23 | 0.041 | 15 | 70.8 | | | | | |
| | 3 | 3.0-3.5 | DS | | | | | | | | | | | | | | | 92.6 | 0.26 | 2.01 | 0.11 | 4.79 | 8.0 |
| | 4 | 3.5-4.0 | US | 58 | 25 | 33 | 28.3 | 14.6 | 2.72 | 79 | | | 0.829 | 110 | 0.28 | 0.053 | | | | | | | |
| | 5 | 4.5-5.0 | DS | | | | | | | | | | | | | | | 22.2 | | | | | |
| | 6 | 6.0-6.5 | DS | Non Plastic | | | | | | | | | | | | | | | 0.11 | 0.46 | 0.07 | 0.75 | 8.1 |
| | 7 | 7.5-8.0 | DS | Non Plastic | | | 17.9 | 16.1 | | | 0 | 39°* | | | | | | 10.1 | | | | | |
| | 8 | 9.0-9.5 | DS | | | | | | 2.66 | | | | | | | | | 19.0 | | | | | |
| | 10 | 12.0-12.5 | DS | Non Plastic | | | | | | | | | | | | | | 16.6 | | | | | |
| | 12 | 15.0-15.5 | DS | | | | 19.6 | | | | | | | | | | | 24.7 | | | | | |
| | 13 | 17.0-17.5 | DS | 98 | 25 | 63 | | | | | | | | | | | | | | | | | |
| | 14 | 19.0-19.5 | DS | | | | 24.2 | | | | | | | | | | | 60.2 | | | | | |
| | 15 | 21.0-21.5 | DS | 79 | 29 | 50 | | | 2.72 | | | | | | | | | | | | | | |
| | 17 | 25.0-25.5 | DS | | | | 23.8 | | | | | | | | | | | 67.1 | | | | | |

* Direct Shear on Remolded Sample

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# SUMMARY OF TEST RESULTS

Site: Samawa Combined Cycle P.P
Borehole No.: 71


Date: June, 2017

| Location of Specimen | | | | Index Properties | | | Natural Water Content % | Dry Density KN/m$^3$ | Specific Gravity | Strength Tests | | | Consolidation Test | | | | Swelling Pressure kPa | Sieve Analysis % Passing No. 200 | Chemical Test | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Unconfined Compression kPa | Triaxial Compression | | | | | | | | | | | | |
| B.H. No. | Sample No. | Depth (m) | Sample Type | LL % | PL % | PI % | | | | | Cohesion kPa | Friction Angle | $e_o$ | $P_c$ | $C_c$ | $C_r$ | | | $SO_3$ % | TSS % | Cl % | OM % | PH |
| **71** | 1 | 0.5-1.0 | DS | 54 | 23 | 31 | | | | | | | | | | | | | | | | | |
| | 2 | 1.5-2.0 | US | | | | 32.1 | 13.8 | 2.71 | 49 | 27 | 0° | 1.092 | 120 | 0.31 | 0.049 | 27 | | 0.41 | 1.92 | 0.15 | 0.30 | 8.0 |
| | 3 | 3.0-3.5 | DS | | | | | | | | | | | | | | | 98.9 | | | | | |
| | 4 | 4.5-5.0 | DS | 42 | 19 | 23 | | | | | | | | | | | | | 0.24 | 1.68 | 0.10 | 0.94 | 8.1 |
| | 5 | 6.0-6.5 | DS | | | | 22.6 | | | | | | | | | | | 38.8 | | | | | |
| | 6 | 7.5-8.0 | DS | Non Plastic | | | | | 2.66 | | | | | | | | | 10.2 | | | | | |
| | 7 | 9.0-9.5 | DS | Non Plastic | | | | | | | | | | | | | | | | | | | |
| | 9 | 12.0-12.5 | DS | | | | 19.7 | 16.4 | | | 0 | 36.5°* | | | | | | 10.8 | | | | | |
| | 10 | 13.5-14.0 | DS | | | | | | 2.67 | | | | | | | | | 18.3 | | | | | |
| | 12 | 16.5-17.0 | DS | Non Plastic | | | | | | | | | | | | | | | | | | | |
| | 13 | 18.0-18.5 | DS | | | | 19.3 | | | | | | | | | | | 15.8 | | | | | |
| | 14 | 19.5-20.0 | DS | | | | | | 2.72 | | | | | | | | | 61.6 | | | | | |
| | 16 | 22.5-23.0 | DS | 83 | 29 | 54 | 24.2 | | | | | | | | | | | | | | | | |
| | 17 | 24.0-24.5 | DS | 36 | 17 | 19 | 21.6 | 16.7 | | | 0 | 39°* | | | | | | 34.4 | | | | | |
| | 18 | 25.5-26.0 | DS | | | | | | 2.73 | | | | | | | | | 71.8 | | | | | |
| | 20 | 28.5-29.0 | DS | 96 | 31 | 65 | | | | | | | | | | | | | | | | | |
| | 21 | 30.0-30.5 | DS | | | | 24.7 | | | | | | | | | | | 76.3 | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | |
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* Direct Shear on Remolded Sample

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Website: www.andrealab.com Email: azad@andrealab.com

# SUMMARY OF TEST RESULTS

Site: Samawa Combined Cycle P.P
Borehole No.: 72


Date: June, 2017

| Location of Specimen | | | | Index Properties | | | Natural Water Content % | Dry Density KN/m$^3$ | Specific Gravity | Strength Tests | | | Consolidation Test | | | | Swelling Pressure kPa | Sieve Analysis % Passing No. 200 | Chemical Test | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Unconfined Compression kPa | Direct Shear | | | | | | | | | | | | |
| B.H. No. | Sample No. | Depth (m) | Sample Type | LL % | PL % | PI % | | | | | Cohesion kPa | Friction Angle | $e_o$ | $P_c$ | $C_c$ | $C_r$ | | | $SO_3$ % | TSS % | Cl % | OM % | PH |
| **72** | 1 | 0.5-1.0 | DS | | | | | | | | | | | | | | | 58.3 | | | | | |
| | 2 | 1.0-1.5 | US | 44 | 21 | 23 | 29.8 | 13.9 | 2.69 | 62 | | | 0.886 | 110 | 0.19 | 0.029 | 9 | | | | | | |
| | 3 | 1.5-2.0 | DS | | | | | | | | | | | | | | | 78.2 | 0.43 | 2.62 | 0.14 | 4.77 | 8.0 |
| | 4 | 3.0-3.5 | DS | 41 | 20 | 21 | 26.8 | | | | | | | | | | | | | | | | |
| | 5 | 4.5-5.0 | DS | Non Plastic | | | | | | | | | | | | | | 21.8 | 0.62 | 1.28 | 0.21 | 1.02 | 7.9 |
| | 7 | 7.5-8.0 | DS | | | | 21.3 | 15.6 | | | 0 | 32°* | | | | | | 15.4 | | | | | |
| | 8 | 9.0-9.5 | DS | Non Plastic | | | | | | | | | | | | | | | | | | | |
| | 10 | 12.0-12.5 | DS | | | | | | 2.66 | | | | | | | | | 20.7 | | | | | |
| | 11 | 13.5-14.0 | DS | Non Plastic | | | 19.8 | 16.4 | | | 0 | 38.5°* | | | | | | | | | | | |
| | 13 | 16.5-17.0 | DS | | | | | | | | | | | | | | | 35.3 | | | | | |
| | 14 | 18.0-18.5 | DS | | | | 25.0 | | | | | | | | | | | 83.8 | | | | | |
| | 15 | 19.5-20.0 | DS | 81 | 31 | 50 | | | 2.74 | | | | | | | | | | | | | | |
| | 16 | 21.0-21.5 | DS | 91 | 32 | 59 | | | | | | | | | | | | | | | | | |
| | 18 | 25.0-25.5 | DS | | | | 24.2 | | | | | | | | | | | 80.0 | | | | | |

* Remolded Samples

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# SUMMARY OF TEST RESULTS

Site: Samawa Combined Cycle P.P
Borehole No.: 73


Date: June, 2017

| Location of Specimen | | | | Index Properties | | | Natural Water Content % | Dry Density KN/m$^3$ | Specific Gravity | Strength Tests | | | Consolidation Test | | | | Swelling Pressure kPa | Sieve Analysis % Passing No. 200 | Chemical Test | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Unconfined Compression kPa | Triaxial Compression | | | | | | | | | | | | |
| B.H. No. | Sample No. | Depth (m) | Sample Type | LL % | PL % | PI % | | | | | Cohesion kPa | Friction Angle | $e_o$ | $P_c$ | $C_c$ | $C_r$ | | | $SO_3$ % | TSS % | Cl % | OM % | PH |
| **73** | 1 | 0.5-1.0 | DS | 46 | 22 | 24 | | | | | | | | | | | | 64.3 | | | | | |
| | 2 | 1.0-1.5 | US | | | | 30.4 | 13.7 | 2.71 | 56 | | | 0.938 | 105 | 0.33 | 0.056 | 34 | | | | | | |
| | 3 | 1.5-2.0 | DS | | | | | | | | | | | | | | | 97.6 | | | | | |
| | 4 | 3.0-3.5 | DS | 52 | 23 | 29 | | | | | | | | | | | | | 0.37 | 2.44 | 0.14 | 2.32 | 8.0 |
| | 5 | 4.0-4.5 | US | | | | 28.9 | 14.4 | 2.72 | | 43 | 3° | 0.872 | 125 | 0.29 | 0.052 | | 93.6 | | | | | |
| | 6 | 4.5-5.0 | DS | 50 | 23 | 27 | | | | | | | | | | | | | | | | | |
| | 7 | 6.0-6.5 | DS | 41 | 21 | 19 | | | | | | | | | | | | 48.4 | | | | | |
| | 8 | 7.5-8.0 | DS | | | | 20.2 | | | | | | | | | | | 36.1 | 1.94 | 4.44 | 0.42 | 1.23 | 7.8 |
| | 9 | 9.0-9.5 | DS | | | | | | 2.65 | | | | | | | | | 10.2 | | | | | |
| | 10 | 10.5-11.0 | DS | Non Plastic | | | 18.7 | 16.4 | | | 0 | 41°* | | | | | | | | | | | |
| | 11 | 12.0-12.5 | DS | | | | | | | | | | | | | | | 19.7 | | | | | |
| | 13 | 15.0-15.5 | DS | Non Plastic | | | | | | | | | | | | | | | | | | | |
| | 14 | 17.0-17.5 | DS | 84 | 26 | 58 | 24.3 | | | | | | | | | | | | | | | | |
| | 15 | 19.0-19.5 | DS | | | | | | 2.73 | | | | | | | | | 95.1 | | | | | |
| | 16 | 21.0-21.5 | DS | 46 | 22 | 24 | | | | | | | | | | | | | | | | | |
| | 17 | 23.0-23.5 | DS | | | | 19.6 | | | | | | | | | | | 47.8 | | | | | |
| | 18 | 25.0-25.5 | DS | 66 | 29 | 37 | | | | | | | | | | | | 69.6 | | | | | |

* Direct Shear on Remolded Sample

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# SUMMARY OF TEST RESULTS

Site: Samawa Combined Cycle P.P
Borehole No.: 74


Date: June, 2017

| Location of Specimen | | | | Index Properties | | | Natural Water Content % | Dry Density KN/m$^3$ | Specific Gravity | Strength Tests | | | Consolidation Test | | | | Swelling Pressure kPa | Sieve Analysis % Passing No. 200 | Chemical Test | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Unconfined Compression kPa | Triaxial Compression | | | | | | | | | | | | |
| B.H. No. | Sample No. | Depth (m) | Sample Type | LL % | PL % | PI % | | | | | Cohesion kPa | Friction Angle | $e_o$ | $P_c$ | $C_c$ | $C_r$ | | | $SO_3$ % | TSS % | Cl % | OM % | PH |
| **74** | 1 | 0.5-1.0 | DS | | | | | | | | | | | | | | | 87.9 | | | | | |
| | 2 | 1.0-1.5 | US | 55 | 24 | 31 | 28.9 | 14.0 | 2.72 | 68 | 31 | 3° | 0.896 | 100 | 0.29 | 0.048 | 28 | | | | | | |
| | 3 | 1.5-2.0 | DS | | | | | | | | | | | | | | | 95.6 | | | | | |
| | 4 | 3.0-3.5 | DS | 52 | 22 | 30 | | | | | | | | | | | | | | | | | |
| | 5 | 4.5-5.0 | DS | Non Plastic | | | 21.6 | | | | | | | | | | | | 0.21 | 1.06 | 0.11 | 0.85 | 8.0 |
| | 6 | 6.0-6.5 | DS | | | | | | 2.66 | | | | | | | | | 15.7 | | | | | |
| | 7 | 7.5-8.0 | DS | Non Plastic | | | | | | | | | | | | | | | | | | | |
| | 8 | 9.0-9.5 | DS | | | | 18.2 | 16.6 | | | 0 | 39°* | | | | | | 15.3 | 1.71 | 4.36 | 0.51 | 1.18 | 7.8 |
| | 9 | 10.5-11.0 | DS | Non Plastic | | | | | | | | | | | | | | 8.9 | | | | | |
| | 10 | 12.0-12.5 | DS | Non Plastic | | | 17.8 | | | | | | | | | | | 21.8 | | | | | |
| | 11 | 14.0-14.5 | DS | 95 | 35 | 60 | | | 2.73 | | | | | | | | | | | | | | |
| | 12 | 16.0-16.5 | DS | | | | 25.2 | | | | | | | | | | | 85.8 | | | | | |
| | 13 | 18.0-18.5 | DS | 77 | 28 | 49 | | | | | | | | | | | | | | | | | |
| | 14 | 20.0-20.5 | DS | | | | 23.9 | | | | | | | | | | | 71.6 | | | | | |

* Direct Shear on Remolded Sample

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# SUMMARY OF TEST RESULTS

Site: Samawa Combined Cycle P.P
Borehole No.: 75


Date: June, 2017

| Location of Specimen | | | | Index Properties | | | Natural Water Content % | Dry Density KN/m$^3$ | Specific Gravity | Strength Tests | | | Consolidation Test | | | | Swelling Pressure kPa | Sieve Analysis % Passing No. 200 | Chemical Test | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Unconfined Compression kPa | Triaxial Compression | | | | | | | | | | | | |
| B.H. No. | Sample No. | Depth (m) | Sample Type | LL % | PL % | PI % | | | | | Cohesion kPa | Friction Angle | $e_o$ | $P_c$ | $C_c$ | $C_r$ | | | $SO_3$ % | TSS % | Cl % | OM % | PH |
| **75** | 1 | 0.5-1.0 | DS | 42 | 20 | 22 | | | | | | | | | | | | 78.2 | | | | | |
| | 2 | 1.5-2.0 | US | | | | 26.6 | 15.6 | 2.71 | 87 | | | 0.834 | 95 | 0.24 | 0.045 | 8 | | 0.37 | 3.61 | 0.12 | 3.75 | 8.0 |
| | 3 | 3.0-3.5 | DS | 57 | 23 | 34 | | | | | | | | | | | | 98.1 | | | | | |
| | 4 | 4.0-4.5 | US | | | | 27.9 | 14.9 | 2.72 | | 52 | 3.5° | 0.776 | 110 | 0.26 | 0.041 | | | | | | | |
| | 5 | 4.5-5.0 | DS | 54 | 23 | 31 | | | | | | | | | | | | | 0.24 | 3.32 | 0.10 | 3.45 | 8.1 |
| | 6 | 6.0-6.5 | DS | 43 | 22 | 21 | | | | | | | | | | | | 82.9 | | | | | |
| | 8 | 9.0-9.5 | DS | | | | 25.5 | | | | | | | | | | | 81.1 | | | | | |
| | 9 | 10.5-11.0 | DS | Non Plastic | | | | | 2.66 | | | | | | | | | | | | | | |
| | 10 | 12.0-12.5 | DS | | | | 19.3 | 16.2 | | | 0 | 37°* | | | | | | 22.3 | | | | | |
| | 11 | 14.0-14.5 | DS | 38 | 20 | 18 | | | | | | | | | | | | 43.6 | | | | | |
| | 12 | 16.0-16.5 | DS | | | | 24.6 | | | | | | | | | | | 58.8 | | | | | |
| | 13 | 18.0-18.5 | DS | 80 | 28 | 52 | | | | | | | | | | | | | | | | | |
| | 14 | 20.0-20.5 | DS | Non Plastic | | | | | 2.66 | | | | | | | | | 15.1 | | | | | |
| | 15 | 22.5-23.0 | DS | | | | 18.8 | | | | | | | | | | | 21.2 | | | | | |
| | 16 | 25.0-25.5 | DS | 71 | 26 | 45 | | | | | | | | | | | | 69.1 | | | | | |

* Direct Shear on Remolded Sample

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# SUMMARY OF TEST RESULTS

Site: Samawa Combined Cycle P.P
Borehole No.: 76


Date: June, 2017

| Location of Specimen | | | | Index Properties | | | Natural Water Content % | Dry Density KN/m$^3$ | Specific Gravity | Strength Tests | | | Consolidation Test | | | | Swelling Pressure kPa | Sieve Analysis % Passing No. 200 | Chemical Test | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Unconfined Compression kPa | Direct Shear | | | | | | | | | | | | |
| B.H. No. | Sample No. | Depth (m) | Sample Type | LL % | PL % | PI % | | | | | Cohesion kPa | Friction Angle | $e_o$ | $P_c$ | $C_c$ | $C_r$ | | | $SO_3$ % | TSS % | Cl % | OM % | PH |
| **76** | 1 | 0.5-1.0 | DS | 44 | 23 | 21 | | | | | | | | | | | | | | | | | |
| | 2 | 1.5-2.0 | US | | | | 27.2 | 14.3 | | | 9 | 12° | | | | | | 43.2 | 0.22 | 0.84 | 0.09 | 1.57 | 8.1 |
| | 3 | 3.0-3.5 | DS | 55 | 22 | 33 | | | | | | | | | | | | 95.8 | | | | | |
| | 4 | 4.5-5.0 | DS | Non Plastic | | | | | 2.67 | | | | | | | | | | 0.11 | 0.84 | 0.06 | 0.87 | 8.1 |
| | 6 | 7.5-8.0 | DS | | | | 22.3 | | | | | | | | | | | 17.4 | | | | | |
| | 7 | 9.0-9.5 | DS | Non Plastic | | | | | | | | | | | | | | 10.4 | | | | | |
| | 8 | 10.5-11.0 | DS | | | | 17.8 | 16.6 | | | 0 | 42°* | | | | | | 15.6 | | | | | |
| | 10 | 13.5-14.0 | DS | Non Plastic | | | | | 2.66 | | | | | | | | | | | | | | |
| | 11 | 15.0-15.5 | DS | | | | 24.8 | | | | | | | | | | | 61.1 | | | | | |
| | 12 | 17.0-17.5 | DS | 81 | 28 | 53 | | | | | | | | | | | | | | | | | |
| | 13 | 19.0-19.5 | DS | | | | | | 2.72 | | | | | | | | | 59.6 | | | | | |
| | 14 | 21.0-21.5 | DS | 75 | 27 | 48 | 25.0 | | | | | | | | | | | | | | | | |
| | 15 | 23.0-23.5 | DS | 40 | 22 | 18 | | | | | | | | | | | | 35.9 | | | | | |
| | 16 | 25.0-25.5 | DS | | | | 20.2 | | | | | | | | | | | 33.9 | | | | | |

* Remolded Samples

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# SUMMARY OF TEST RESULTS

Site: Samawa Combined Cycle P.P
Borehole No.: 77


Date: May, 2017

| Location of Specimen | | | | Index Properties | | | Natural Water Content % | Dry Density KN/m$^3$ | Specific Gravity | Strength Tests | | | Consolidation Test | | | | Swelling Pressure kPa | Sieve Analysis % Passing No. 200 | Chemical Test | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Unconfined Compression kPa | Direct Shear | | | | | | | | | | | | |
| B.H. No. | Sample No. | Depth (m) | Sample Type | LL % | PL % | PI % | | | | | Cohesion kPa | Friction Angle | $e_o$ | $P_c$ | $C_c$ | $C_r$ | | | $SO_3$ % | TSS % | Cl % | OM % | PH |
| **77** | 1 | 0.5-1.0 | DS | 51 | 22 | 29 | | | | | | | | | | | | | | | | | |
| | 2 | 1.0-1.5 | US | | | | 26.9 | 14.9 | 2.72 | 81 | | | 0.803 | 115 | 0.27 | 0.048 | 31 | 97.2 | 0.92 | 2.41 | 0.29 | 2.56 | 7.9 |
| | 3 | 1.5-2.0 | DS | 53 | 23 | 30 | | | | | | | | | | | | | | | | | |
| | 4 | 3.0-3.5 | DS | 58 | 23 | 35 | 25.4 | | | | | | | | | | | 69.3 | | | | | |
| | 5 | 4.5-5.0 | DS | Non Plastic | | | | | | | | | | | | | | | 0.12 | 0.52 | 0.08 | 0.61 | 8.1 |
| | 6 | 6.0-6.5 | DS | | | | 20.3 | 15.8 | | | 0 | 37°* | | | | | | 15.7 | | | | | |
| | 7 | 7.5-8.0 | DS | | | | | | 2.66 | | | | | | | | | 25.6 | | | | | |
| | 8 | 9.0-9.5 | DS | Non Plastic | | | | | | | | | | | | | | | | | | | |
| | 9 | 10.5-11.0 | DS | | | | 17.6 | | | | | | | | | | | 28.4 | | | | | |
| | 11 | 13.5-14.0 | DS | | | | | | 2.67 | | | | | | | | | 22.8 | | | | | |
| | 12 | 15.0-15.5 | DS | Non Plastic | | | 19.4 | 16.7 | | | 0 | 42°* | | | | | | | | | | | |
| | 13 | 16.5-17.0 | DS | | | | 23.6 | | | | | | | | | | | 58.0 | | | | | |
| | 14 | 18.0-18.5 | DS | 84 | 31 | 53 | | | | | | | | | | | | 67.3 | | | | | |
| | 15 | 19.5-20.0 | DS | | | | 25.1 | | | | | | | | | | | 71.6 | | | | | |
| | 17 | 22.5-23.0 | DS | 96 | 39 | 57 | | | 2.73 | | | | | | | | | | | | | | |
| | 19 | 25.5-26.0 | DS | 66 | 26 | 40 | | | | | | | | | | | | 74.8 | | | | | |
| | 20 | 27.0-27.5 | DS | Non Plastic | | | 16.7 | | | | | | | | | | | 26.1 | | | | | |
| | 21 | 28.5-29.0 | DS | 68 | 29 | 39 | | | | | | | | | | | | | | | | | |
| | 22 | 30.0-30.5 | DS | | | | | | | | | | | | | | | 65.9 | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | |

* Remolded Samples

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# SUMMARY OF TEST RESULTS

Site: Samawa Combined Cycle P.P
Borehole No.: 78


Date: May, 2017

| Location of Specimen | | | | Index Properties | | | Natural Water Content % | Dry Density KN/m$^3$ | Specific Gravity | Strength Tests | | | Consolidation Test | | | | Swelling Pressure kPa | Sieve Analysis % Passing No. 200 | Chemical Test | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Unconfined Compression kPa | Triaxial Compression | | | | | | | | | | | | |
| B.H. No. | Sample No. | Depth (m) | Sample Type | LL % | PL % | PI % | | | | | Cohesion kPa | Friction Angle | $e_o$ | $P_c$ | $C_c$ | $C_r$ | | | $SO_3$ % | TSS % | Cl % | OM % | PH |
| **78** | 1 | 0.5-1.0 | DS | 51 | 23 | 28 | | | | | | | | | | | | | 0.77 | 2.88 | 0.29 | 4.18 | 7.9 |
| | 2 | 1.5-2.0 | US | | | | 31.9 | 14.3 | 2.70 | | 32 | 3.5° | 1.072 | 105 | 0.34 | 0.047 | 24 | 97.8 | | | | | |
| | 3 | 3.0-3.5 | DS | 54 | 25 | 29 | | | | | | | | | | | | | | | | | |
| | 4 | 4.0-4.5 | US | 57 | 24 | 33 | 27.1 | 15.2 | 2.71 | 117 | | | 0.790 | 125 | 0.23 | 0.032 | | | | | | | |
| | 5 | 4.5-5.0 | DS | | | | | | | | | | | | | | | 57.4 | | | | | |
| | 6 | 6.0-6.5 | DS | 39 | 20 | 19 | | | | | | | | | | | | 41.3 | 0.23 | 1.08 | 0.11 | 1.83 | 8.0 |
| | 7 | 7.5-8.0 | DS | Non Plastic | | | 23.1 | 14.2 | | | 0 | 27.5°* | | | | | | 10.1 | | | | | |
| | 9 | 10.5-11.0 | DS | | | | | | 2.65 | | | | | | | | | 10.5 | | | | | |
| | 10 | 12.0-12.5 | DS | Non Plastic | | | | | | | | | | | | | | 20.7 | | | | | |
| | 11 | 13.5-14.0 | DS | | | | 19.7 | | | | | | | | | | | 12.4 | | | | | |
| | 12 | 15.0-15.5 | DS | 64 | 28 | 36 | | | | | | | | | | | | | | | | | |
| | 13 | 16.5-17.0 | DS | 41 | 19 | 22 | | | | | | | | | | | | 34.2 | | | | | |
| | 14 | 18.0-18.5 | DS | | | | 23.9 | | 2.72 | | | | | | | | | 75.8 | | | | | |
| | 16 | 22.5-23.0 | DS | 77 | 31 | 46 | | | | | | | | | | | | | | | | | |
| | 17 | 25.0-25.5 | DS | 43 | 20 | 23 | 20.2 | | | | | | | | | | | 41.8 | | | | | |

* Direct Shear on Remolded Sample

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# SUMMARY OF TEST RESULTS

Site: Samawa Combined Cycle P.P
Borehole No.: 79


Date: May, 2017

| Location of Specimen | | | | Index Properties | | | Natural Water Content % | Dry Density KN/m$^3$ | Specific Gravity | Strength Tests | | | Consolidation Test | | | | Swelling Pressure kPa | Sieve Analysis % Passing No. 200 | Chemical Test | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Unconfined Compression kPa | Triaxial Compression | | | | | | | | | | | | |
| B.H. No. | Sample No. | Depth (m) | Sample Type | LL % | PL % | PI % | | | | | Cohesion kPa | Friction Angle | $e_o$ | $P_c$ | $C_c$ | $C_r$ | | | $SO_3$ % | TSS % | Cl % | OM % | PH |
| **79** | 1 | 0.5-1.0 | DS | 45 | 21 | 24 | | | | | | | | | | | | | | | | | |
| | 2 | 1.5-2.0 | US | | | | 31.2 | 13.8 | 2.69 | 61 | | | 0.924 | 115 | 0.18 | 0.031 | 11 | 59.7 | | | | | |
| | 3 | 3.0-3.5 | DS | 50 | 22 | 28 | | | | | | | | | | | | | | | | | |
| | 4 | 4.0-4.5 | US | | | | 29.4 | 14.2 | 2.71 | | 34 | 3° | 0.912 | 125 | 0.28 | 0.054 | | 92.4 | 0.77 | 2.72 | 0.24 | 3.79 | 7.9 |
| | 5 | 4.5-5.0 | DS | 56 | 24 | 32 | | | | | | | | | | | | | | | | | |
| | 6 | 6.0-6.5 | DS | | | | 23.5 | | | | | | | | | | | 32.8 | | | | | |
| | 7 | 7.5-8.0 | DS | Non Plastic | | | | | 2.66 | | | | | | | | | 18.7 | 0.21 | 1.09 | 0.12 | 0.75 | 8.0 |
| | 8 | 9.0-9.5 | DS | | | | 20.4 | | | | | | | | | | | | | | | | |
| | 9 | 10.5-11.0 | DS | Non Plastic | | | | | | | | | | | | | | 10.5 | | | | | |
| | 10 | 12.0-12.5 | DS | 36 | 19 | 17 | | | | | | | | | | | | 33.7 | | | | | |
| | 11 | 14.0-14.5 | DS | Non Plastic | | | 18.6 | 16.5 | | | 0 | 39°* | | | | | | 15.9 | | | | | |
| | 12 | 16.0-16.5 | DS | 86 | 32 | 54 | | | | | | | | | | | | | | | | | |
| | 13 | 18.0-18.5 | DS | | | | | | 2.72 | | | | | | | | | 68.5 | | | | | |
| | 14 | 20.0-20.5 | DS | | | | 24.4 | | | | | | | | | | | 54.9 | | | | | |
| | 16 | 25.0-25.5 | DS | 60 | 25 | 35 | | | | | | | | | | | | | | | | | |

* Direct Shear on Remolded Sample

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# SUMMARY OF TEST RESULTS

Site: Samawa Combined Cycle P.P
Borehole No.: 80


Date: May, 2017

| Location of Specimen | | | | Index Properties | | | Natural Water Content % | Dry Density KN/m$^3$ | Specific Gravity | Strength Tests | | | Consolidation Test | | | | Swelling Pressure kPa | Sieve Analysis % Passing No. 200 | Chemical Test | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Unconfined Compression kPa | Direct Shear | | | | | | | | | | | | |
| B.H. No. | Sample No. | Depth (m) | Sample Type | LL % | PL % | PI % | | | | | Cohesion kPa | Friction Angle | $e_o$ | $P_c$ | $C_c$ | $C_r$ | | | $SO_3$ % | TSS % | Cl % | OM % | PH |
| **80** | 1 | 0.5-1.0 | DS | 44 | 21 | 23 | | | | | | | | | | | | | | | | | |
| | 2 | 1.5-2.0 | US | | | | 27.6 | 14.8 | 2.69 | 64 | | | 0.857 | 110 | 0.20 | 0.032 | 9 | 55.4 | 0.33 | 1.88 | 0.12 | 2.08 | 8.0 |
| | 3 | 3.0-3.5 | DS | 56 | 23 | 33 | | | | | | | | | | | | 90.2 | | | | | |
| | 4 | 4.5-5.0 | DS | | | | | | | | | | | | | | | 38.9 | | | | | |
| | 5 | 6.0-6.5 | DS | 37 | 18 | 19 | 20.5 | | | | | | | | | | | | 0.46 | 2.35 | 0.16 | 1.87 | 7.9 |
| | 6 | 7.5-8.0 | DS | Non Plastic | | | | | 2.67 | | | | | | | | | 27.8 | | | | | |
| | 8 | 10.5-11.0 | DS | | | | 18.6 | 16.2 | | | 0 | 37°* | | | | | | 18.9 | | | | | |
| | 9 | 12.0-12.5 | DS | 40 | 19 | 21 | | | | | | | | | | | | 37.0 | | | | | |
| | 10 | 13.5-14.0 | DS | Non Plastic | | | 19.0 | | | | | | | | | | | 28.6 | | | | | |
| | 11 | 15.0-15.5 | DS | | | | | | 2.66 | | | | | | | | | 24.3 | | | | | |
| | 12 | 17.0-17.5 | DS | | | | 25.6 | | | | | | | | | | | 53.4 | | | | | |
| | 13 | 19.0-19.5 | DS | 72 | 29 | 43 | | | 2.73 | | | | | | | | | | | | | | |
| | 14 | 21.0-21.5 | DS | 55 | 24 | 31 | | | | | | | | | | | | | | | | | |
| | 16 | 25.0-25.5 | DS | | | | 24.1 | | | | | | | | | | | 70.5 | | | | | |

* Remolded Samples

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# SUMMARY OF TEST RESULTS

Site: Samawa Combined Cycle P.P
Borehole No.: 81


Date: May, 2017

| Location of Specimen | | | | Index Properties | | | Natural Water Content % | Dry Density KN/m$^3$ | Specific Gravity | Strength Tests | | | Consolidation Test | | | | Swelling Pressure kPa | Sieve Analysis % Passing No. 200 | Chemical Test | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Unconfined Compression kPa | Direct Shear | | | | | | | | | | | | |
| B.H. No. | Sample No. | Depth (m) | Sample Type | LL % | PL % | PI % | | | | | Cohesion kPa | Friction Angle | $e_o$ | $P_c$ | $C_c$ | $C_r$ | | | $SO_3$ % | TSS % | Cl % | OM % | PH |
| **81** | 1 | 0.5-1.0 | DS | 56 | 25 | 31 | | | | | | | | | | | | 86.6 | | | | | |
| | 2 | 1.5-2.0 | US | 62 | 28 | 34 | 30.3 | 13.9 | 2.71 | 69 | | | 1.008 | 95 | 0.29 | 0.049 | 24 | | 1.23 | 3.48 | 0.37 | 4.24 | 7.9 |
| | 3 | 3.0-3.5 | DS | | | | | | | | | | | | | | | 97.8 | | | | | |
| | 4 | 4.5-5.0 | DS | | | | 23.8 | | | | | | | | | | | 19.7 | | | | | |
| | 5 | 6.0-6.5 | DS | Non Plastic | | | | | | | | | | | | | | | 0.19 | 0.96 | 0.10 | 0.99 | 8.0 |
| | 6 | 7.5-8.0 | DS | 34 | 18 | 16 | | | 2.67 | | | | | | | | | 32.8 | | | | | |
| | 7 | 9.0-9.5 | DS | | | | 20.4 | | | | | | | | | | | 34.4 | | | | | |
| | 8 | 10.5-11.0 | DS | Non Plastic | | | | | | | | | | | | | | | | | | | |
| | 10 | 14.0-14.5 | DS | | | | 19.2 | 16.4 | | | 0 | 35.5°* | | | | | | 27.3 | | | | | |
| | 11 | 16.0-16.5 | DS | 42 | 19 | 23 | | | | | | | | | | | | 43.4 | | | | | |
| | 12 | 18.0-18.5 | DS | | | | | | 2.73 | | | | | | | | | 82.2 | | | | | |
| | 14 | 22.5-23.0 | DS | 98 | 36 | 62 | 25.8 | | | | | | | | | | | | | | | | |
| | 15 | 25.0-25.5 | DS | 79 | 31 | 48 | | | | | | | | | | | | 95.8 | | | | | |

* Remolded Samples

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# SUMMARY OF TEST RESULTS

Site: Samawa Combined Cycle P.P
Borehole No.: 82


Date: May, 2017

| Location of Specimen | | | | Index Properties | | | Natural Water Content % | Dry Density KN/m$^3$ | Specific Gravity | Strength Tests | | | Consolidation Test | | | | Swelling Pressure kPa | Sieve Analysis % Passing No. 200 | Chemical Test | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Unconfined Compression kPa | Triaxial Compression | | | | | | | | | | | | |
| B.H. No. | Sample No. | Depth (m) | Sample Type | LL % | PL % | PI % | | | | | Cohesion kPa | Friction Angle | $e_o$ | $P_c$ | $C_c$ | $C_r$ | | | $SO_3$ % | TSS % | Cl % | OM % | PH |
| **82** | 1 | 0.5-1.0 | DS | 52 | 23 | 29 | | | | | | | | | | | | | | | | | |
| | 2 | 1.0-1.5 | US | | | | 29.3 | 14.1 | 2.72 | | 31 | 2° | 0.984 | 105 | 0.36 | 0.059 | 27 | 93.8 | | | | | |
| | 3 | 1.5-2.0 | DS | 55 | 23 | 32 | | | | | | | | | | | | | | | | | |
| | 4 | 3.0-3.5 | DS | | | | 27.6 | | | | | | | | | | | 89.7 | 1.16 | 3.28 | 0.36 | 2.08 | 7.9 |
| | 5 | 4.5-5.0 | DS | | | | | | 2.66 | | | | | | | | | 14.0 | | | | | |
| | 6 | 6.0-6.5 | DS | Non Plastic | | | 20.4 | | | | | | | | | | | | 0.48 | 1.43 | 0.18 | 0.47 | 8.0 |
| | 7 | 7.5-8.0 | DS | | | | | | | | | | | | | | | 12.9 | | | | | |
| | 8 | 9.0-9.5 | DS | Non Plastic | | | | | | | | | | | | | | 24.3 | | | | | |
| | 9 | 10.5-11.0 | DS | | | | 18.8 | 16.3 | | | 0 | 38.5°* | | | | | | 12.2 | | | | | |
| | 10 | 12.0-12.5 | DS | Non Plastic | | | | | 2.65 | | | | | | | | | | | | | | |
| | 11 | 13.5-14.0 | DS | 42 | 20 | 22 | | | | | | | | | | | | 38.3 | | | | | |
| | 12 | 15.0-15.5 | DS | | | | 23.9 | | | | | | | | | | | 60.1 | | | | | |
| | 14 | 19.0-19.5 | DS | 87 | 32 | 55 | | | 2.71 | | | | | | | | | | | | | | |
| | 15 | 21.0-21.5 | DS | 76 | 29 | 47 | | | | | | | | | | | | | | | | | |
| | 16 | 23.0-23.5 | DS | | | | 24.5 | | | | | | | | | | | 66.3 | | | | | |
| | 17 | 25.0-25.5 | DS | 44 | 23 | 21 | | | | | | | | | | | | 40.8 | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | |
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* Direct Shear on Remolded Sample

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# SUMMARY OF TEST RESULTS

Site: Samawa Combined Cycle P.P
Borehole No.: 83


Date: May, 2017

| Location of Specimen | | | | Index Properties | | | Natural Water Content % | Dry Density KN/m$^3$ | Specific Gravity | Strength Tests | | | Consolidation Test | | | | Swelling Pressure kPa | Sieve Analysis % Passing No. 200 | Chemical Test | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Unconfined Compression kPa | Triaxial Compression | | | | | | | | | | | | |
| B.H. No. | Sample No. | Depth (m) | Sample Type | LL % | PL % | PI % | | | | | Cohesion kPa | Friction Angle | $e_o$ | $P_c$ | $C_c$ | $C_r$ | | | $SO_3$ % | TSS % | Cl % | OM % | PH |
| **83** | 1 | 0.5-1.0 | DS | | | | | | | | | | | | | | | 96.7 | | | | | |
| | 2 | 1.0-1.5 | US | 51 | 23 | 29 | 27.0 | 14.8 | 2.71 | 79 | | | 0.836 | 100 | 0.18 | 0.029 | 22 | | | | | | |
| | 3 | 1.5-2.0 | DS | | | | | | | | | | | | | | | 80.6 | 1.21 | 4.20 | 0.38 | 5.36 | 7.9 |
| | 4 | 3.0-3.5 | DS | | | | 26.2 | 15.4 | 2.71 | | 66 | 4.5° | 0.728 | 130 | 0.25 | 0.041 | | | | | | | |
| | 5 | 4.5-5.0 | DS | 50 | 22 | 28 | | | | | | | | | | | | 64.8 | | | | | |
| | 6 | 7.5-8.0 | DS | | | | 20.1 | | | | | | | | | | | 7.4 | 0.22 | 1.41 | 0.10 | 1.12 | 8.0 |
| | 7 | 9.0-9.5 | DS | Non Plastic | | | | | | | | | | | | | | 12.8 | | | | | |
| | 8 | 10.5-11.0 | DS | Non Plastic | | | 17.4 | | | | | | | | | | | | | | | | |
| | 9 | 12.0-12.5 | DS | | | | | | 2.66 | | | | | | | | | 21.3 | | | | | |
| | 10 | 13.5-14.0 | DS | Non Plastic | | | 16.9 | 17.1 | | | 0 | 42°* | | | | | | 5.6 | | | | | |
| | 11 | 16.5-17.0 | DS | Non Plastic | | | | | | | | | | | | | | 18.1 | | | | | |
| | 12 | 18.0-18.5 | DS | | | | 24.4 | | | | | | | | | | | 58.9 | | | | | |
| | 14 | 19.5-20.0 | DS | 74 | 28 | 46 | | | 2.72 | | | | | | | | | | | | | | |

* Direct Shear on Remolded Sample

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# SUMMARY OF TEST RESULTS

Site: Samawa Combined Cycle P.P
Borehole No.: 84


Date: May, 2017

| Location of Specimen | | | | Index Properties | | | Natural Water Content % | Dry Density KN/m$^3$ | Specific Gravity | Strength Tests | | | Consolidation Test | | | | Swelling Pressure kPa | Sieve Analysis % Passing No. 200 | Chemical Test | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Unconfined Compression kPa | Direct Shear | | | | | | | | | | | | |
| B.H. No. | Sample No. | Depth (m) | Sample Type | LL % | PL % | PI % | | | | | Cohesion kPa | Friction Angle | $e_o$ | $P_c$ | $C_c$ | $C_r$ | | | $SO_3$ % | TSS % | Cl % | OM % | PH |
| **84** | 1 | 0.5-1.0 | DS | | | | | | | | | | | | | | | 89.4 | | | | | |
| | 2 | 1.0-1.5 | US | 51 | 22 | 29 | 28.6 | 14.5 | 2.72 | 74 | | | 0.838 | 120 | 0.32 | 0.051 | 12 | | | | | | |
| | 3 | 1.5-2.0 | DS | | | | | | | | | | | | | | | 95.2 | 1.02 | 4.56 | 0.36 | 2.29 | 7.9 |
| | 4 | 3.0-3.5 | DS | 43 | 21 | 22 | | | 2.68 | | | | | | | | | 41.4 | | | | | |
| | 5 | 4.5-5.0 | DS | | | | 19.4 | | | | | | | | | | | 48.6 | 0.87 | 3.09 | 0.28 | 1.76 | 8.0 |
| | 6 | 7.5-8.0 | DS | Non Plastic | | | | | | | | | | | | | | 21.1 | | | | | |
| | 7 | 9.0-9.5 | DS | | | | 16.9 | 16.5 | | | 0 | 38°* | | | | | | 15.9 | | | | | |
| | 8 | 10.5-11.0 | DS | Non Plastic | | | | | | | | | | | | | | | | | | | |
| | 9 | 12.0-12.5 | DS | | | | | | | | | | | | | | | 11.0 | | | | | |
| | 10 | 13.5-14.0 | DS | Non Plastic | | | 17.6 | | | | | | | | | | | 25.3 | | | | | |
| | 11 | 16.5-17.0 | DS | 91 | 35 | 56 | | | 2.73 | | | | | | | | | 75.2 | | | | | |
| | 13 | 18.0-18.5 | DS | | | | 23.9 | | | | | | | | | | | 60.3 | | | | | |
| | 14 | 19.5-20.0 | DS | 75 | 31 | 44 | | | | | | | | | | | | 86.1 | | | | | |

* Remolded Samples

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# SUMMARY OF TEST RESULTS

Site: Samawa Combined Cycle P.P
Borehole No.: 85


Date: May, 2017

| Location of Specimen | | | | Index Properties | | | Natural Water Content % | Dry Density KN/m$^3$ | Specific Gravity | Strength Tests | | | Consolidation Test | | | | Swelling Pressure kPa | Sieve Analysis % Passing No. 200 | Chemical Test | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Unconfined Compression kPa | Triaxial Compression | | | | | | | | | | | | |
| B.H. No. | Sample No. | Depth (m) | Sample Type | LL % | PL % | PI % | | | | | Cohesion kPa | Friction Angle | $e_o$ | $P_c$ | $C_c$ | $C_r$ | | | $SO_3$ % | TSS % | Cl % | OM % | PH |
| **85** | 1 | 0.5-1.0 | DS | 58 | 25 | 33 | | | | | | | | | | | | | | | | | |
| | 2 | 1.5-2.0 | US | | | | 32.1 | 14.0 | 2.72 | 80 | | | 0.943 | 125 | 0.37 | 0.061 | 26 | 96.9 | 0.53 | 3.84 | 0.26 | 3.69 | 8.0 |
| | 3 | 3.0-3.5 | DS | 63 | 26 | 37 | | | | | | | | | | | | | | | | | |
| | 4 | 4.0-4.5 | US | | | | 27.5 | 14.9 | 2.71 | | 62 | 4° | 0.776 | 140 | 0.24 | 0.046 | | | | | | | |
| | 5 | 4.5-5.0 | DS | 57 | 23 | 34 | | | | | | | | | | | | 79.1 | | | | | |
| | 6 | 6.0-6.5 | DS | | | | 21.3 | | | | | | | | | | | 20.8 | | | | | |
| | 7 | 7.5-8.0 | DS | Non Plastic | | | | | | | | | | | | | | | 0.22 | 1.32 | 0.09 | 1.15 | 8.1 |
| | 8 | 9.0-9.5 | DS | Non Plastic | | | | | | | | | | | | | | 15.7 | | | | | |
| | 10 | 12.0-12.5 | DS | | | | 18.7 | 16.4 | | | 0 | 36°* | | | | | | 15.6 | | | | | |
| | 11 | 13.5-14.0 | DS | 36 | 17 | 19 | | | | | | | | | | | | 34.3 | | | | | |
| | 12 | 15.0-15.5 | DS | 93 | 32 | 61 | | | | | | | | | | | | | | | | | |
| | 13 | 16.5-17.0 | DS | | | | 25.1 | | | | | | | | | | | 54.1 | | | | | |
| | 15 | 20.0-20.5 | DS | 85 | 31 | 54 | | | | | | | | | | | | 63.0 | | | | | |

* Direct Shear on Remolded Sample

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# SUMMARY OF TEST RESULTS

Site: Samawa Combined Cycle P.P
Borehole No.: 86


Date: May, 2017

| Location of Specimen | | | | Index Properties | | | Natural Water Content % | Dry Density KN/m$^3$ | Specific Gravity | Strength Tests | | | Consolidation Test | | | | Swelling Pressure kPa | Sieve Analysis % Passing No. 200 | Chemical Test | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Unconfined Compression kPa | Triaxial Compression | | | | | | | | | | | | |
| B.H. No. | Sample No. | Depth (m) | Sample Type | LL % | PL % | PI % | | | | | Cohesion kPa | Friction Angle | $e_o$ | $P_c$ | $C_c$ | $C_r$ | | | $SO_3$ % | TSS % | Cl % | OM % | PH |
| **86** | 1 | 0.5-1.0 | DS | | | | | | | | | | | | | | | 95.7 | 0.89 | 4.07 | 0.29 | 3.82 | 7.9 |
| | 2 | 1.5-2.0 | US | 52 | 23 | 29 | 29.8 | 14.1 | 2.71 | | 35 | 3° | 0.876 | 115 | 0.28 | 0.046 | 27 | | | | | | |
| | 3 | 3.0-3.5 | DS | | | | | | | | | | | | | | | 97.1 | | | | | |
| | 4 | 4.0-4.5 | US | | | | 28.2 | 14.6 | 2.70 | 108 | | | 0.832 | 130 | 0.24 | 0.035 | | 80.2 | | | | | |
| | 5 | 4.5-5.0 | DS | 61 | 24 | 37 | | | | | | | | | | | | | 0.72 | 3.52 | 0.22 | 2.96 | 8.0 |
| | 6 | 6.0-6.5 | DS | | | | 22.4 | 15.5 | | | 0 | 32°* | | | | | | 17.9 | | | | | |
| | 8 | 9.0-9.5 | DS | Non Plastic | | | | | | | | | | | | | | | | | | | |
| | 9 | 10.5-11.0 | DS | Non Plastic | | | | | 2.66 | | | | | | | | | 19.0 | | | | | |
| | 11 | 13.5-14.0 | DS | | | | 17.8 | | | | | | | | | | | 16.7 | | | | | |
| | 12 | 15.0-15.5 | DS | 38 | 20 | 18 | | | | | | | | | | | | 39.4 | | | | | |
| | 13 | 16.5-17.0 | DS | Non Plastic | | | | | | | | | | | | | | 20.5 | | | | | |
| | 14 | 18.0-18.5 | DS | | | | 25.2 | | | | | | | | | | | 85.9 | | | | | |
| | 15 | 20.0-20.5 | DS | 89 | 31 | 58 | | | 2.73 | | | | | | | | | | | | | | |

* Direct Shear on Remolded Sample

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# SUMMARY OF TEST RESULTS

Site: Samawa Combined Cycle P.P
Borehole No.: 87


Date: May, 2017

| Location of Specimen | | | | Index Properties | | | Natural Water Content % | Dry Density KN/m$^3$ | Specific Gravity | Strength Tests | | | Consolidation Test | | | | Swelling Pressure kPa | Sieve Analysis % Passing No. 200 | Chemical Test | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Unconfined Compression kPa | Triaxial Compression | | | | | | | | | | | | |
| B.H. No. | Sample No. | Depth (m) | Sample Type | LL % | PL % | PI % | | | | | Cohesion kPa | Friction Angle | $e_o$ | $P_c$ | $C_c$ | $C_r$ | | | $SO_3$ % | TSS % | Cl % | OM % | PH |
| **87** | 1 | 0.5-1.0 | DS | 52 | 23 | 29 | | | | | | | | | | | | | | | | | |
| | 2 | 1.5-2.0 | US | | | | 33.3 | 13.4 | 2.72 | 81 | | | 0.972 | 115 | 0.30 | 0.056 | 24 | 98.1 | 0.36 | 2.24 | 0.13 | 4.34 | 8.0 |
| | 3 | 3.0-3.5 | DS | 58 | 25 | 33 | | | | | | | | | | | | | | | | | |
| | 4 | 4.0-4.5 | US | | | | 28.4 | 14.6 | 2.71 | | 47 | 4° | 0.863 | 125 | 0.22 | 0.039 | | 70.3 | | | | | |
| | 5 | 4.5-5.0 | DS | 57 | 26 | 31 | | | | | | | | | | | | | | | | | |
| | 6 | 6.0-6.5 | DS | Non Plastic | | | | | | | | | | | | | | 15.1 | 0.53 | 2.98 | 0.19 | 3.71 | 8.0 |
| | 7 | 7.5-8.0 | DS | | | | 19.8 | | | | | | | | | | | 6.4 | | | | | |
| | 9 | 10.5-11.0 | DS | Non Plastic | | | | | 2.65 | | 0 | 38.5°* | | | | | | 9.8 | | | | | |
| | 10 | 12.0-12.5 | DS | Non Plastic | | | | | | | | | | | | | | | | | | | |
| | 11 | 13.5-14.0 | DS | | | | 18.4 | 16.0 | | | | | | | | | | 17.4 | | | | | |
| | 12 | 15.0-15.5 | DS | 64 | 27 | 37 | | | | | | | | | | | | | | | | | |
| | 13 | 16.5-17.0 | DS | | | | 23.6 | | | | | | | | | | | 57.3 | | | | | |
| | 14 | 18.0-18.5 | DS | Non Plastic | | | | | 2.66 | | | | | | | | | 20.2 | | | | | |
| | 15 | 19.5-20.0 | DS | 59 | 26 | 33 | 24.2 | | | | | | | | | | | 66.8 | | | | | |

* Direct Shear on Remolded Sample

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# SUMMARY OF TEST RESULTS

Site: Samawa Combined Cycle P.P
Borehole No.: 88


Date: May, 2017

| Location of Specimen | | | | Index Properties | | | Natural Water Content % | Dry Density KN/m$^3$ | Specific Gravity | Strength Tests | | | Consolidation Test | | | | Swelling Pressure kPa | Sieve Analysis % Passing No. 200 | Chemical Test | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Unconfined Compression kPa | Direct Shear | | | | | | | | | | | | |
| B.H. No. | Sample No. | Depth (m) | Sample Type | LL % | PL % | PI % | | | | | Cohesion kPa | Friction Angle | $e_o$ | $P_c$ | $C_c$ | $C_r$ | | | $SO_3$ % | TSS % | Cl % | OM % | PH |
| **88** | 1 | 0.5-1.0 | DS | | | | | | | | | | | | | | | 96.0 | | | | | |
| | 2 | 1.0-1.5 | US | 59 | 25 | 34 | 27.6 | 14.7 | 2.72 | 104 | | | 0.976 | 110 | 0.29 | 0.037 | 32 | | 0.64 | 2.81 | 0.27 | 3.19 | 7.9 |
| | 3 | 1.5-2.0 | DS | | | | | | | | | | | | | | | 95.2 | | | | | |
| | 4 | 3.0-3.5 | DS | 66 | 24 | 42 | | | | | | | | | | | | | | | | | |
| | 5 | 4.0-4.5 | US | 39 | 21 | 18 | 23.5 | 15.2 | | | 8 | 23°* | | | | | | 41.8 | | | | | |
| | 6 | 4.5-5.0 | DS | | | | | | | | | | | | | | | 33.6 | 0.32 | 0.92 | 0.12 | 0.99 | 8.0 |
| | 7 | 6.0-6.5 | DS | Non Plastic | | | | | | | | | | | | | | | | | | | |
| | 8 | 7.5-8.0 | DS | | | | 18.9 | 16.2 | | | 0 | 39.5°* | | | | | | 12.6 | | | | | |
| | 9 | 9.0-9.5 | DS | Non Plastic | | | | | 2.64 | | | | | | | | | 6.5 | | | | | |
| | 10 | 10.5-11.0 | DS | | | | 19.3 | | | | | | | | | | | 19.3 | | | | | |
| | 12 | 13.5-14.0 | DS | Non Plastic | | | | | | | | | | | | | | 24.6 | | | | | |
| | 13 | 15.0-15.5 | DS | Non Plastic | | | | | | | | | | | | | | | | | | | |
| | 14 | 16.5-17.0 | DS | | | | 17.4 | | | | | | | | | | | 9.7 | | | | | |
| | 15 | 18.0-18.5 | DS | 89 | 27 | 62 | | | | | | | | | | | | | | | | | |
| | 17 | 21.0-21.5 | DS | | | | | | 2.72 | | | | | | | | | 75.0 | | | | | |
| | 18 | 22.5-23.0 | DS | 77 | 28 | 49 | | | | | | | | | | | | | | | | | |
| | 19 | 24.5-25.0 | DS | | | | 23.9 | | | | | | | | | | | 94.8 | | | | | |

* Remolded Samples

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# SUMMARY OF TEST RESULTS

Site: Samawa Combined Cycle P.P
Borehole No.: 89


Date: May, 2017

| Location of Specimen | | | | Index Properties | | | Natural Water Content % | Dry Density KN/m$^3$ | Specific Gravity | Strength Tests | | | Consolidation Test | | | | Swelling Pressure kPa | Sieve Analysis % Passing No. 200 | Chemical Test | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Unconfined Compression kPa | Direct Shear | | | | | | | | | | | | |
| B.H. No. | Sample No. | Depth (m) | Sample Type | LL % | PL % | PI % | | | | | Cohesion kPa | Friction Angle | $e_o$ | $P_c$ | $C_c$ | $C_r$ | | | $SO_3$ % | TSS % | Cl % | OM % | PH |
| **89** | 1 | 0.5-1.0 | DS | 54 | 22 | 32 | | | | | | | | | | | | | | | | | |
| | 2 | 1.0-1.5 | US | | | | 25.7 | 15.5 | 2.72 | 94 | | | 0.810 | 120 | 0.24 | 0.033 | 23 | 98.1 | | | | | |
| | 3 | 1.5-2.0 | DS | 57 | 23 | 34 | | | | | | | | | | | | | 1.04 | 4.68 | 0.71 | 6.68 | 7.9 |
| | 4 | 3.0-3.5 | DS | | | | 21.8 | | | | | | | | | | | 19.3 | | | | | |
| | 5 | 4.5-5.0 | DS | Non Plastic | | | | | | | | | | | | | | | 0.12 | 0.48 | 0.08 | 0.72 | 8.1 |
| | 6 | 6.0-6.5 | DS | | | | 18.5 | 16.1 | | | 0 | 34°* | | | | | | 13.8 | | | | | |
| | 7 | 7.5-8.0 | DS | Non Plastic | | | | | 2.65 | | | | | | | | | | | | | | |
| | 8 | 9.0-9.5 | DS | Non Plastic | | | 19.0 | | | | | | | | | | | 28.4 | | | | | |
| | 10 | 12.0-12.5 | DS | | | | | | | | | | | | | | | 23.4 | | | | | |
| | 11 | 13.5-14.0 | DS | Non Plastic | | | 17.4 | 16.8 | | | 0 | 40.5°* | | | | | | 7.4 | | | | | |
| | 12 | 15.0-15.5 | DS | Non Plastic | | | | | 2.66 | | | | | | | | | 28.0 | | | | | |
| | 13 | 16.5-17.0 | DS | 88 | 29 | 59 | | | | | | | | | | | | 57.6 | | | | | |
| | 15 | 19.5-20.0 | DS | | | | 22.9 | | | | | | | | | | | 55.3 | | | | | |

* Remolded Samples

# APPENDIX (D)

# TEST PIT LOGS
# &
# LABORATORY TEST RESULTS

ANDREA
ENGINEERING TESTS LABORATORY
Website: www.andrealab.com Email: azad@andrealab.com

# TEST PIT LOG

**Site** .... *Samawa Combined Cycle PP* .... **Method of Boring** ..... *Excavation* .....

**Test Pit No.** ..... *1* ..... **Ground Level** ..... *NGL* ..... **Date** ..... *13/05/2017* ....

| Water Table Level | Depth (m) | Sample Type & Depth | Litho logy | Thickness of Layer (m) | Soil Description | Remarks |
|---|---|---|---|---|---|---|
| | 0.5<br>1.0<br>1.5<br>2.0<br>3.0 | B<br>B | | 2.0<br>2.0 | Light grayish brown to light brown Sandy lean Silty CLAY mixture with white spots of soluble salts & black traces of organic matter. | |

**Test Pit No.** ..... *2* ..... **Ground Level** ..... *NGL* ..... **Date** ..... *13/05/2017* .....

| Water Table Level | Depth (m) | Sample Type & Depth | Litho logy | Thickness of Layer (m) | Soil Description | Remarks |
|---|---|---|---|---|---|---|
| | 0.5<br>1.0<br>1.5<br>2.0<br>3.0 | B<br>B | | 2.0<br>2.0 | Light grayish brown Sandy lean Silty CLAY mixture with a lot of black spots of organic matter and little white traces of soluble salts. | |

**Test Pit No.** ..... *3* ..... **Ground Level** ..... *NGL* ..... **Date** ..... *13/05/2017* .....

| Water Table Level | Depth (m) | Sample Type & Depth | Litho logy | Thickness of Layer (m) | Soil Description | Remarks |
|---|---|---|---|---|---|---|
| | 0.5<br>1.0<br>1.5<br>2.0<br>3.0 | B<br>B | | 2.0<br>2.0 | Brown to light brown lean Silty CLAY with white traces of soluble salts and black spots of organic matter together with little rusty lines of iron oxide compounds. | |

Scale - 1 : 100 Undisturbed Sample - U Disturbed Sample : - D Bulk Sample - B Core Sample - C

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# TEST PIT LOG

**Site** .... *Samawa Combined Cycle PP* .... **Method of Boring** ..... *Excavation* .....

**Test Pit No.** ..... *4* ..... **Ground Level** ..... *NGL* ..... **Date** ..... *13/05/2017* ....

| Water Table Level | Depth (m) | Sample Type & Depth | Litho logy | Thickness of Layer (m) | Soil Description | Remarks |
|---|---|---|---|---|---|---|
| | 0.5<br>1.0<br>1.5<br>2.0<br>3.0 | B<br>B | | 2.0<br>2.0 | Light grayish brown Sandy lean Silty CLAY mixture with little white spots of soluble salts & black spots of organic matter. | |

**Test Pit No.** ..... *5* ..... **Ground Level** ..... *NGL* ..... **Date** ..... *13/05/2017* .....

| Water Table Level | Depth (m) | Sample Type & Depth | Litho logy | Thickness of Layer (m) | Soil Description | Remarks |
|---|---|---|---|---|---|---|
| | 0.5<br>1.0<br>1.5<br>2.0<br>3.0 | B<br>B | | 2.0<br>2.0 | Brown to grayish brown fat Silty CLAY with some fine grained Sand and black spots of organic matter together with some white traces of soluble salts and rusty lines/spots of iron oxide compounds. | |

**Test Pit No.** ..... *6* ..... **Ground Level** ..... *NGL* ..... **Date** ..... *13/05/2017* .....

| Water Table Level | Depth (m) | Sample Type & Depth | Litho logy | Thickness of Layer (m) | Soil Description | Remarks |
|---|---|---|---|---|---|---|
| | 0.5<br>1.0<br>1.5<br>2.0<br>3.0 | B<br>B | | 2.0<br>2.0 | Grayish brown to brown lean Silty CLAY with little fine grained Sand and black spots of organic matter together with white traces of soluble salts. | |

Scale - 1 : 100 Undisturbed Sample - U Disturbed Sample : - D Bulk Sample - B Core Sample - C

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# SUMMARY OF TEST RESULTS

Site: Samawa Combined Cycle PP

Test Pit No.: 1, 2 & 3

Sheet: 1 of 2

Date: June, 2017

| Location of Specimen | | | | Index Properties | | | Natural Water Content % | Sieve Analysis & Hydrometer Tests | | | | Specific Gravity | Compaction Test | | CBR | Chemical Test | | | | | USCS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T.P. No. | Sample No. | Depth (m) | Sample Type | LL % | PL % | PI % | | Gravel % | Sand % | Silt % | Clay % | | Max. Dry Density $KN/m^3$ | Optimum Water Content % | | $SO_3$ % | TSS % | Cl % | OM % | PH | |
| **1** | 1 | 0.5-1.0 | BS | 36 | 19 | 17 | 21.7 | 3 | 39 | 26 | 32 | | 18.02 | 10.8 | 6.3 | | | | | | CL |
| | 2 | 1.5-2.0 | BS | 39 | 21 | 18 | 24.2 | 2 | 34 | 28 | 36 | 2.69 | | | | 0.21 | 1.24 | 0.10 | 2.24 | 8.0 | |
| | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | |
| **2** | 1 | 0.5-1.0 | BS | 38 | 20 | 18 | 20.4 | 4 | 34 | 27 | 35 | 2.70 | | | | 0.15 | 0.63 | 0.09 | 1.44 | 8.1 | CL |
| | 2 | 1.5-2.0 | BS | 41 | 22 | 19 | 24.6 | 3 | 29 | 30 | 38 | | 18.26 | 11.7 | 5.9 | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | |
| **3** | 1 | 0.5-1.0 | BS | 39 | 22 | 17 | 19.6 | 5 | | 44 | 51 | | 17.37 | 12.2 | 4.2 | | | | | | CL |
| | 2 | 1.5-2.0 | BS | 44 | 21 | 23 | 23.3 | 2 | | 45 | 53 | 2.71 | | | | 0.23 | 1.16 | 0.11 | 3.36 | 8.0 | |
| | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | |

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# SUMMARY OF TEST RESULTS

Site: Samawa Combined Cycle PP

Test Pit No.: 4, 5 & 6

Sheet: 2 of 2

Date: June, 2017

| Location of Specimen | | | | Index Properties | | | Natural Water Content % | Sieve Analysis & Hydrometer Tests | | | | Specific Gravity | Compaction Test | | CBR | Chemical Test | | | | | USCS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T.P. No. | Sample No. | Depth (m) | Sample Type | LL % | PL % | PI % | | Gravel % | Sand % | Silt % | Clay % | | Max. Dry Density $KN/m^3$ | Optimum Water Content % | | $SO_3$ % | TSS % | Cl % | OM % | PH | |
| **4** | 1 | 0.5-1.0 | BS | 37 | 19 | 18 | 18.9 | 2 | 27 | 32 | 39 | | 17.83 | 12.4 | 4.7 | | | | | | CL |
| | 2 | 1.5-2.0 | BS | 39 | 20 | 19 | 23.8 | 20 | | 36 | 44 | 2.69 | | | | 0.18 | 0.86 | 0.10 | 1.71 | 8.1 | |
| | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | |
| **5** | 1 | 0.5-1.0 | BS | 39 | 18 | 21 | 20.4 | 14 | | 39 | 47 | | 17.69 | 13.1 | 6.1 | | | | | | CL |
| | 2 | 1.5-2.0 | BS | 42 | 20 | 22 | 24.5 | 11 | | 41 | 48 | 2.71 | | | | 0.54 | 2.28 | 0.21 | 5.52 | 7.9 | |
| | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | |
| **6** | 1 | 0.5-1.0 | BS | 50 | 23 | 27 | 21.1 | 12 | | 39 | 49 | 2.72 | | | | 0.38 | 2.88 | 0.14 | 3.33 | 8.0 | CH |
| | 2 | 1.5-2.0 | BS | 53 | 24 | 29 | 24.9 | 9 | | 42 | 49 | | 17.53 | 12.7 | 5.6 | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | |

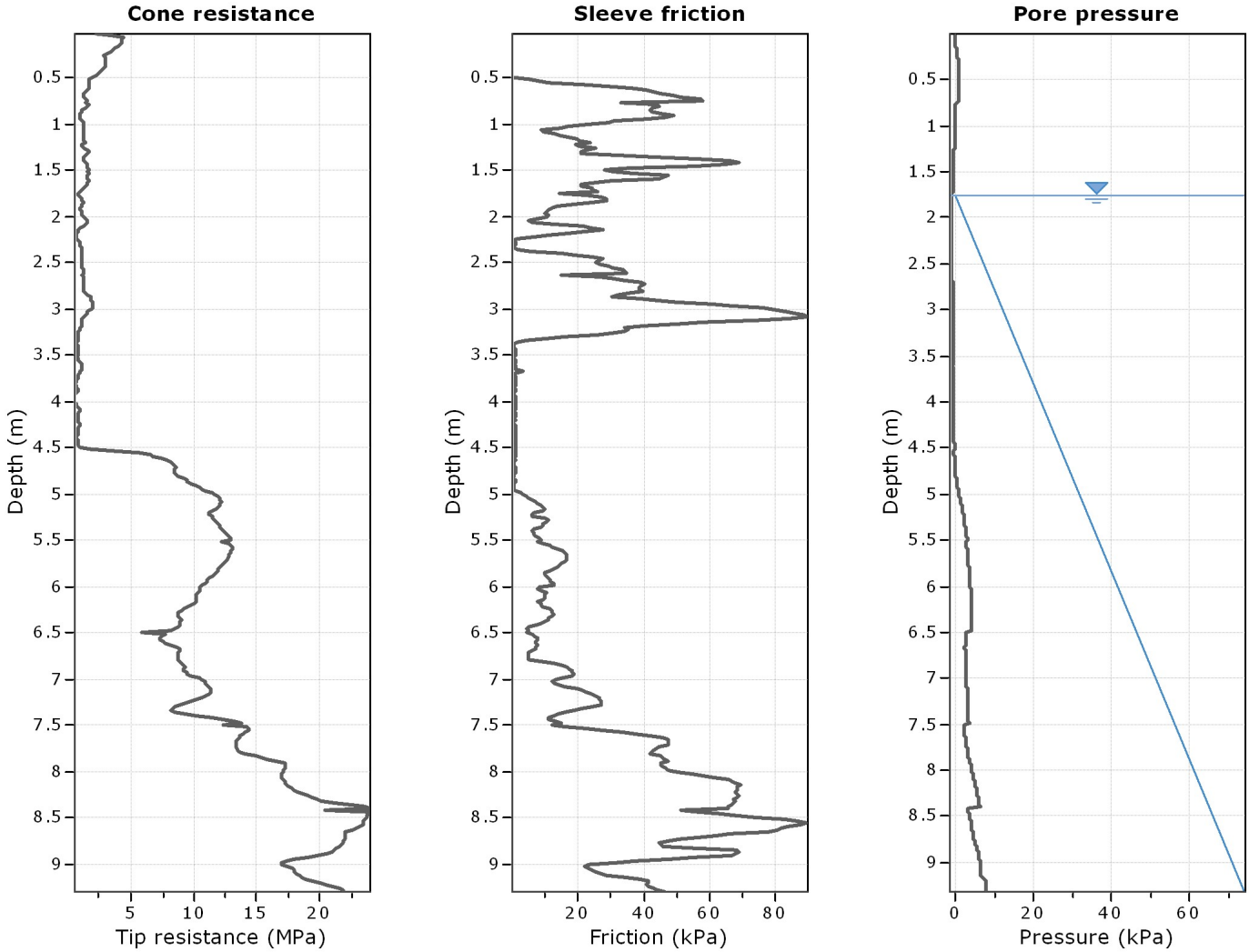
# APPENDIX (E)

# GRAPHICAL PRESENTATION
# OF
# THE OUTPUT DATA FOR THE CPT

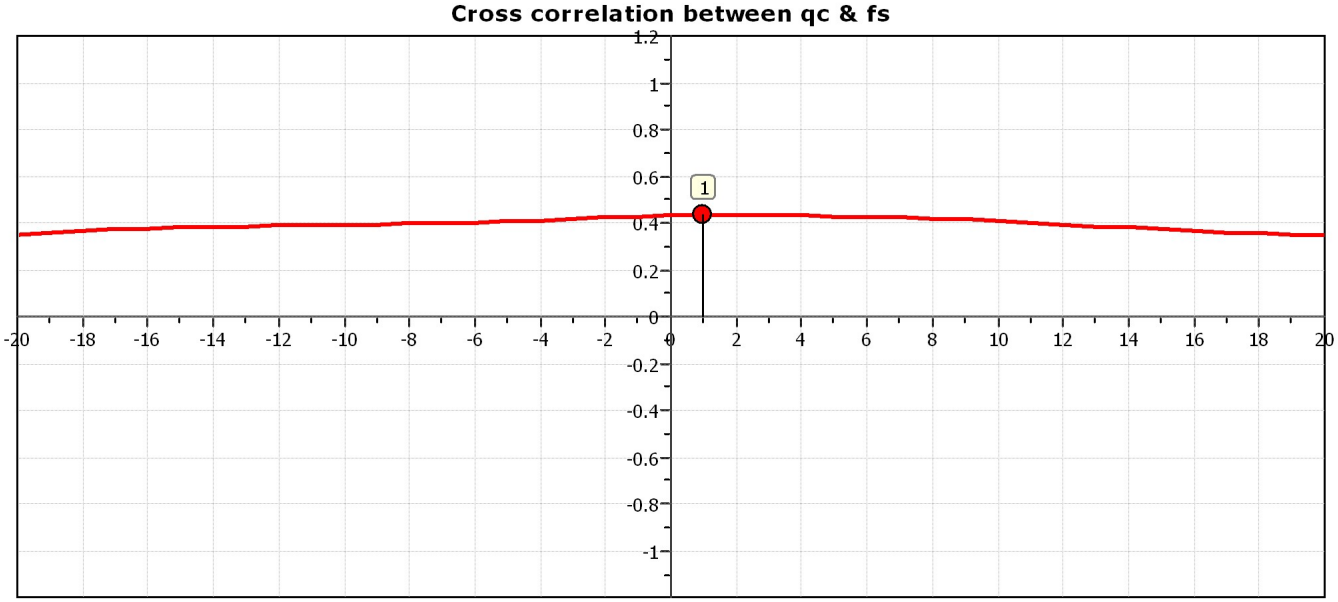
**Andrea Engineering Tests Laboratory**
Geotechnical Explorations Services
Baghdad
http://www.andrealab.com

**CPT: SAMAWA CCPP_1**
Total depth: 9.30 m, Date: 13/05/2017
Surface Elevation: 9.70 m
Coords: N 3484408.043, E 525735.19
Cone Type: Icone ELCI-CFXYP20-10-AR-Piezocone
Cone Operator: Eng. Mohammed - Eng. Maysara

**Project:** **Samawa Combined Cycle Power Plant**
**Location:** **Samawa Governorate for ENKA Insaat ve Sanayi A.S.**



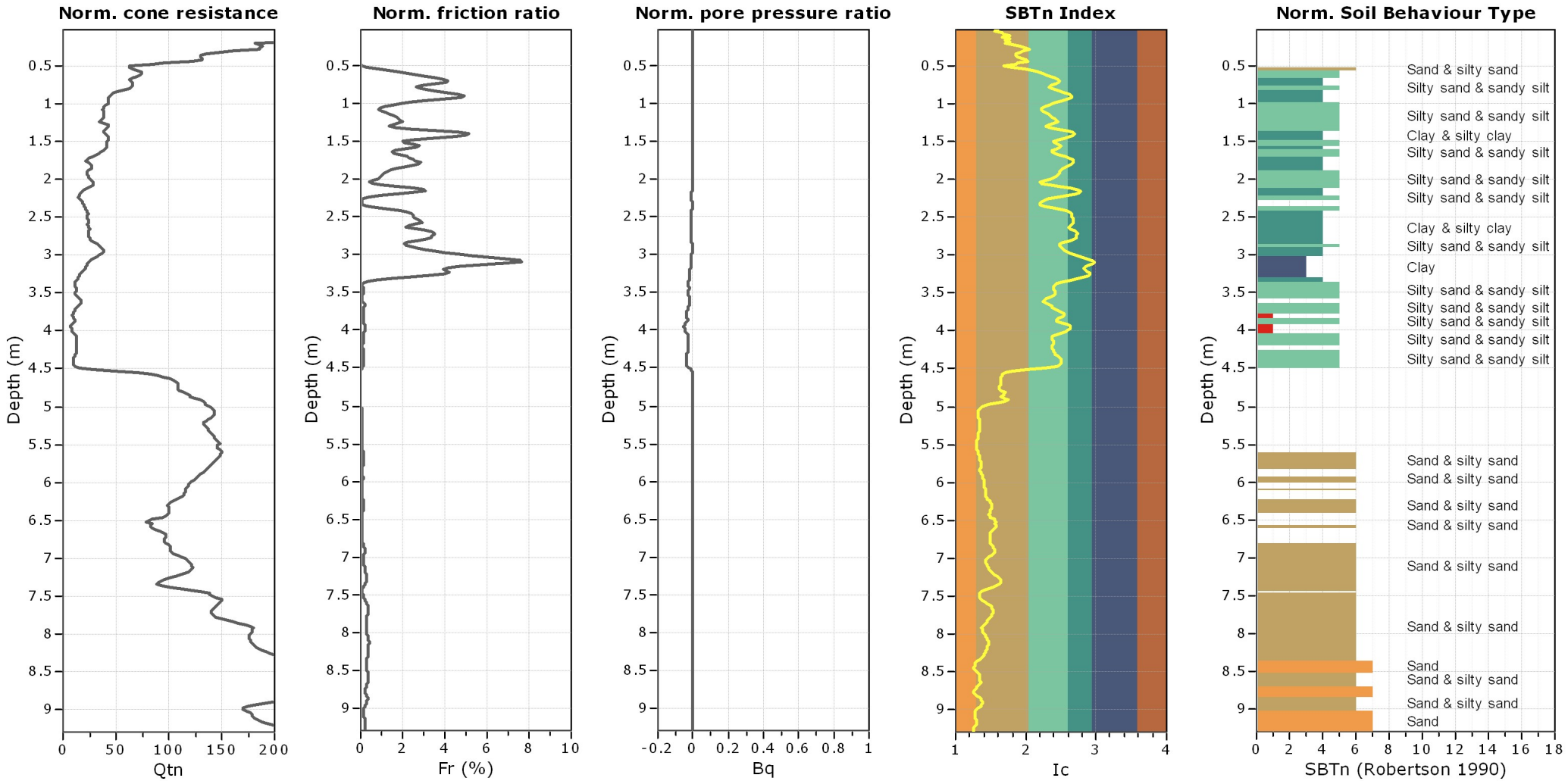

The plot below presents the cross correlation coeficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two sucessive CPT measurements).



**Andrea Engineering Tests Laboratory**
Geotechnical Explorations Services
Baghdad
http://www.andrealab.com

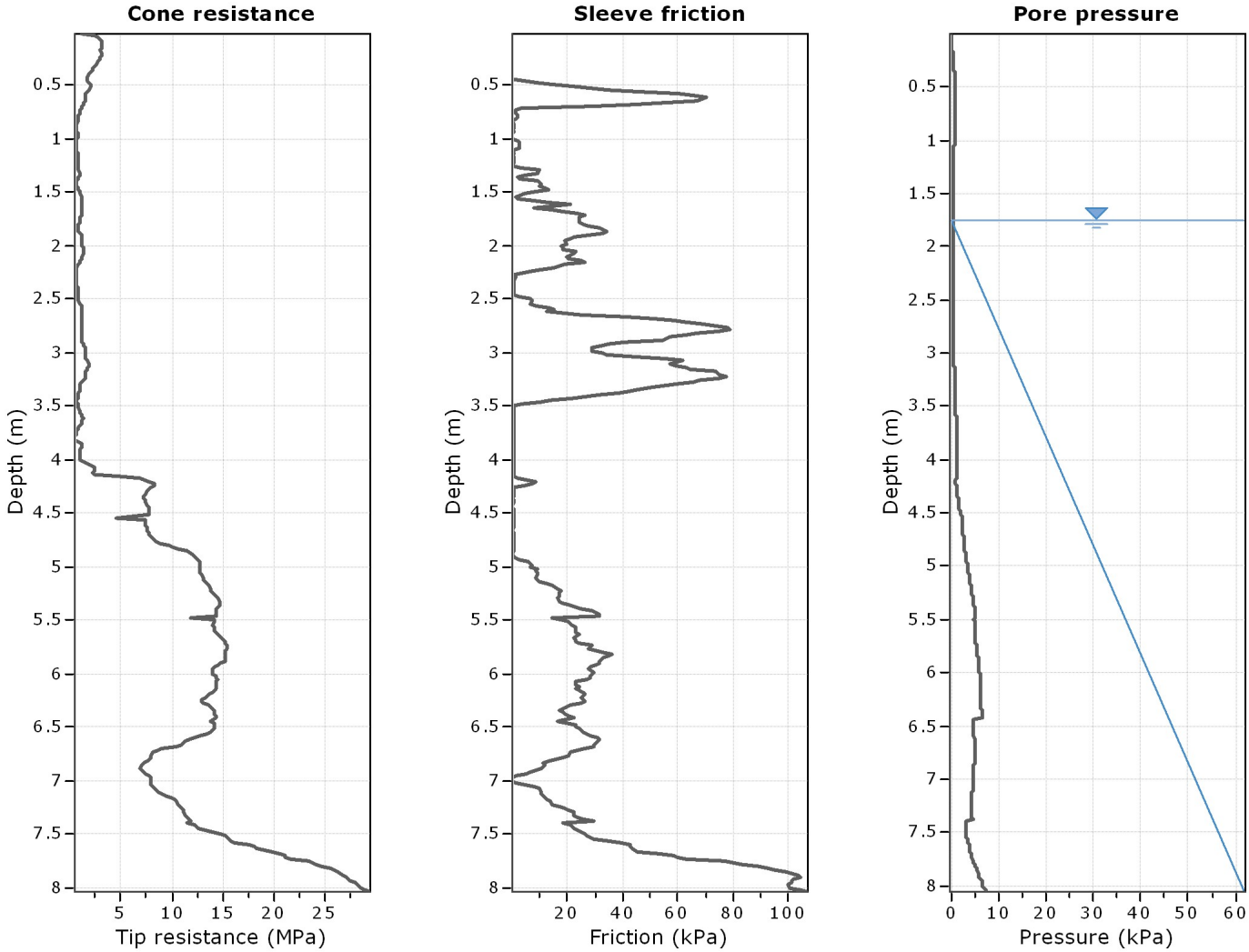
**CPT: SAMAWA CCPP_1**
Total depth: 9.30 m, Date: 13/05/2017
Surface Elevation: 9.70 m
Coords: N 3484408.043, E 525735.19
Cone Type: Icone ELCI-CFXYP20-10-AR-Piezocone
Cone Operator: Eng. Mohammed - Eng. Maysara

**Project:** **Samawa Combined Cycle Power Plant**
**Location:** **Samawa Governorate for ENKA Insaat ve Sanayi A.S.**

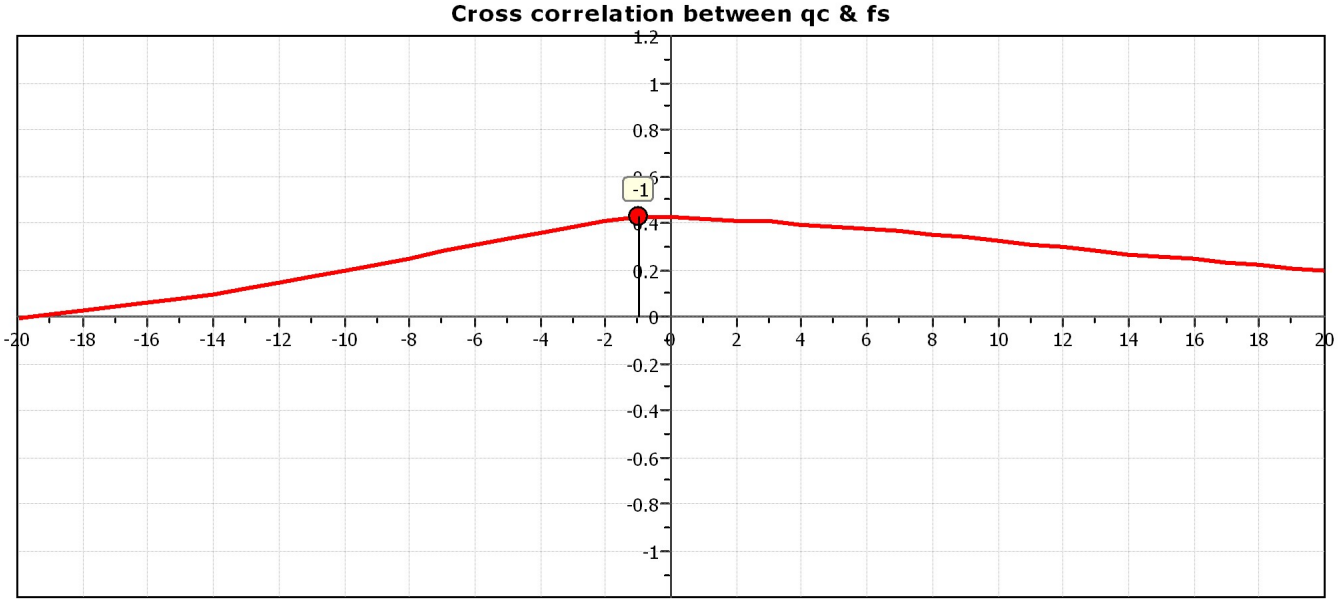



**SBTn legend**

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained




The plot below presents the cross correlation coeficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two sucessive CPT measurements).



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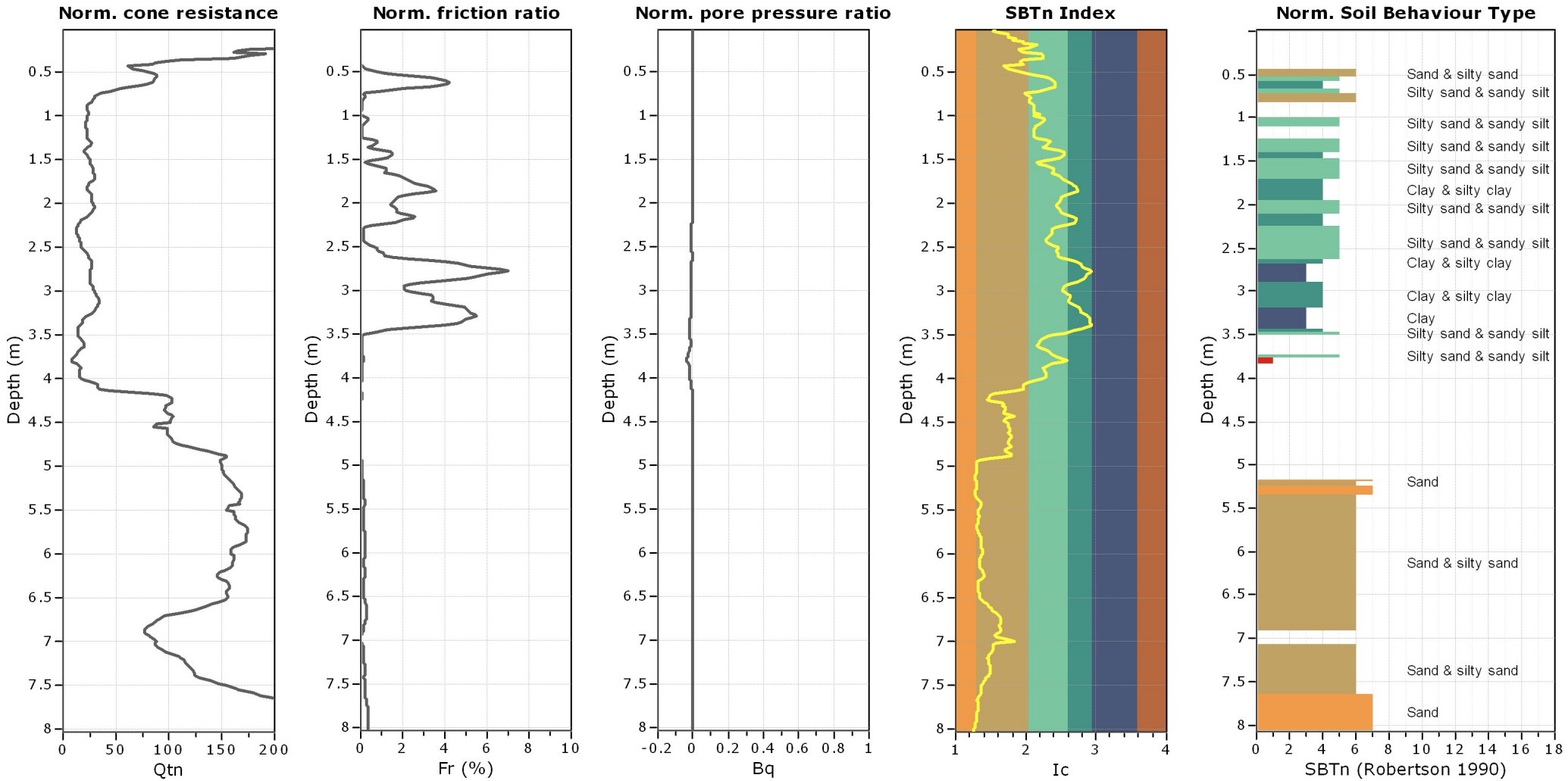
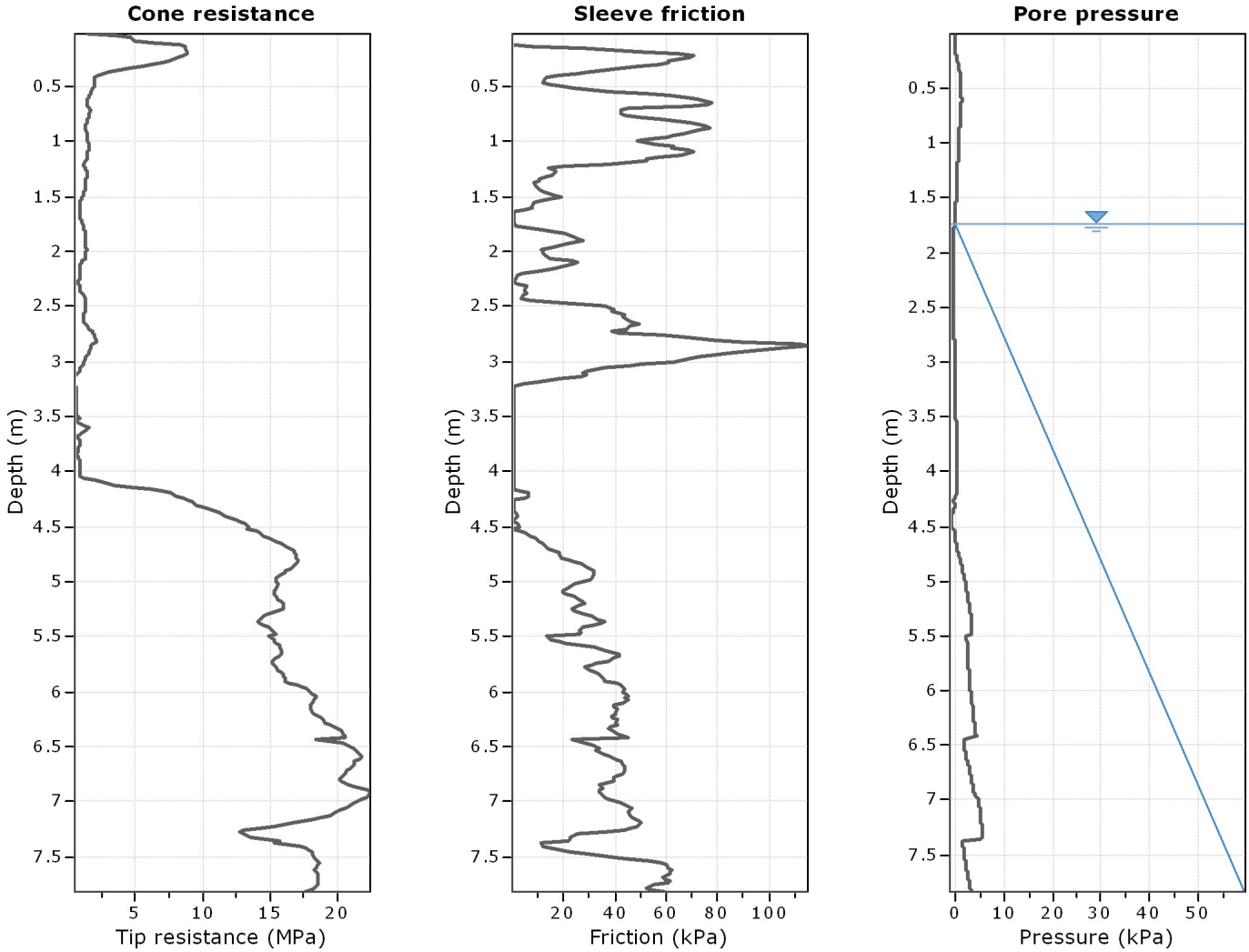
**CPT: SAMAWA CCPP_2**
Total depth: 8.04 m, Date: 13/05/2017
Surface Elevation: 9.89 m
Coords: N 3454441.315, E 525757.221
Cone Type: Icone ELCI-CFXYP20-10-AR-Piezocone
Cone Operator: Eng. Mohammed - Eng. Maysara

**Project:** **Samawa Combined Cycle Power Plant**
**Location:** **Samawa Governorate for ENKA Insaat ve Sanayi A.S.**

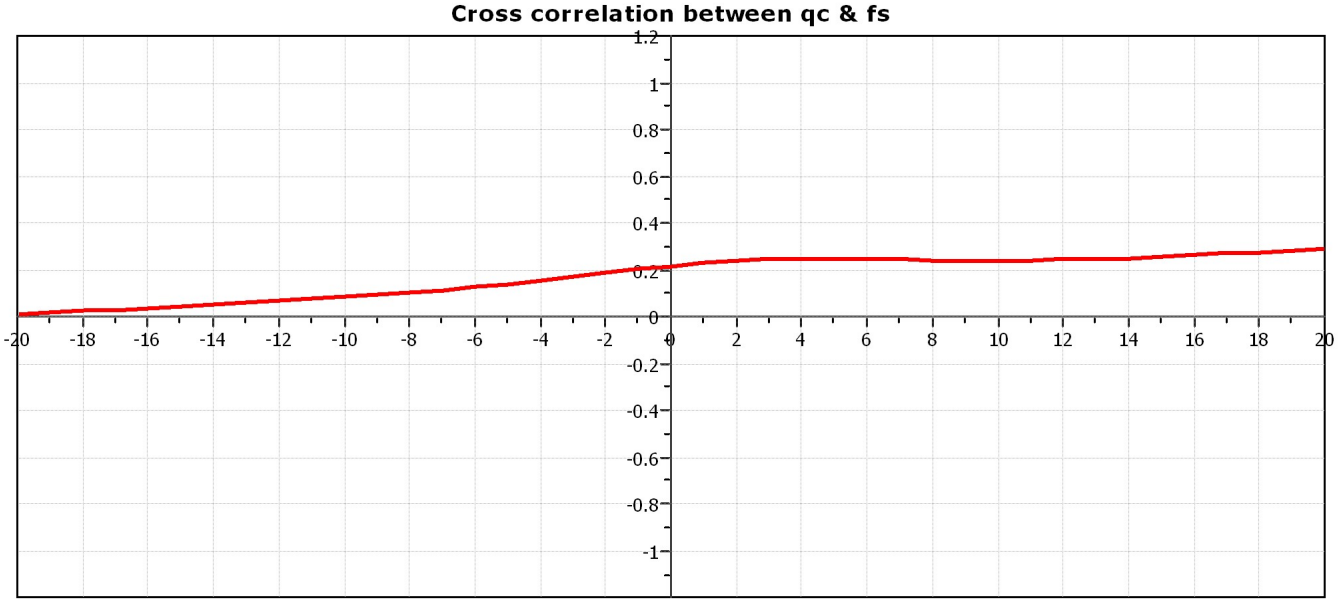



**SBTn legend**

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained




The plot below presents the cross correlation coeficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two sucessive CPT measurements).



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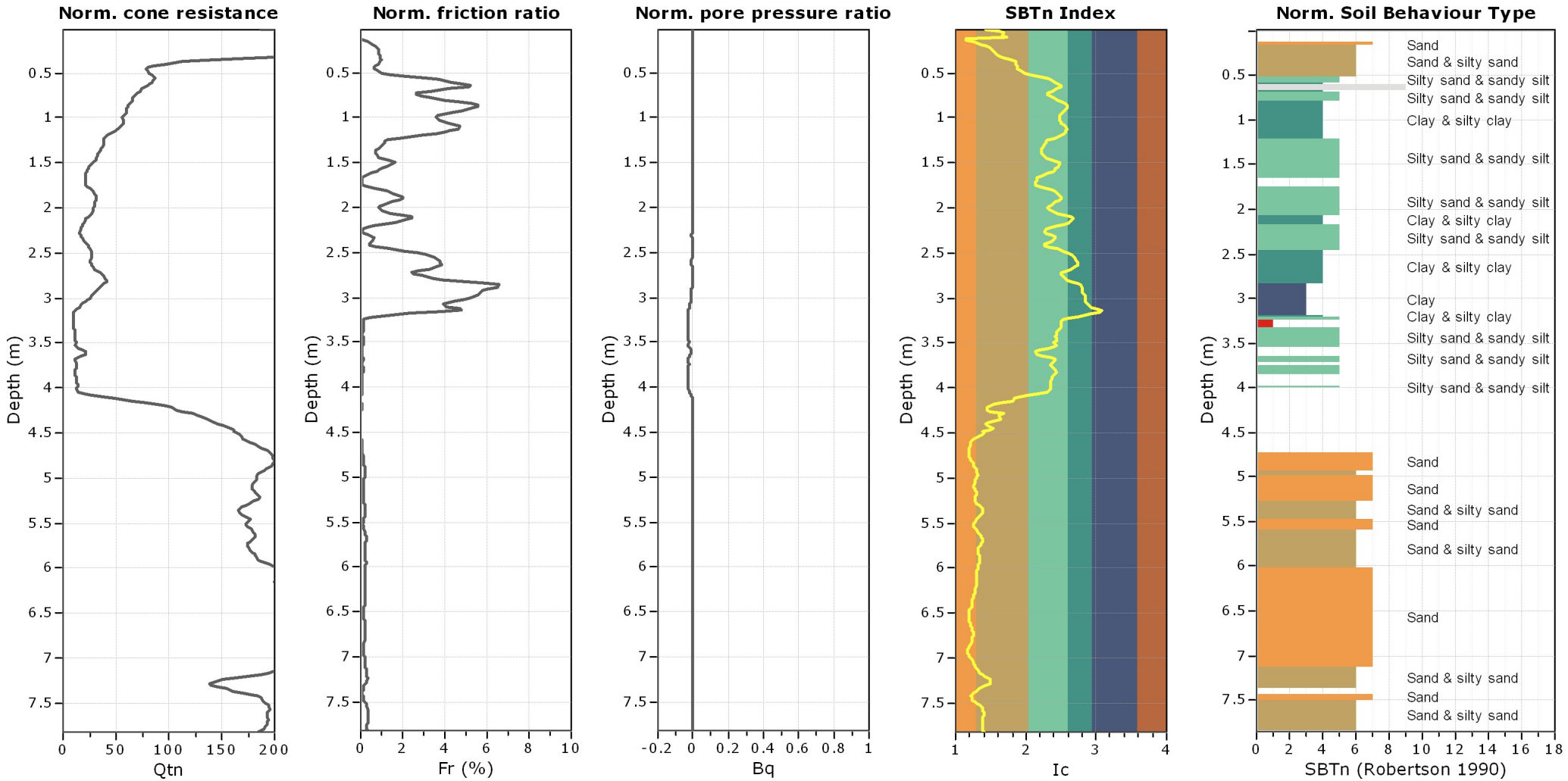
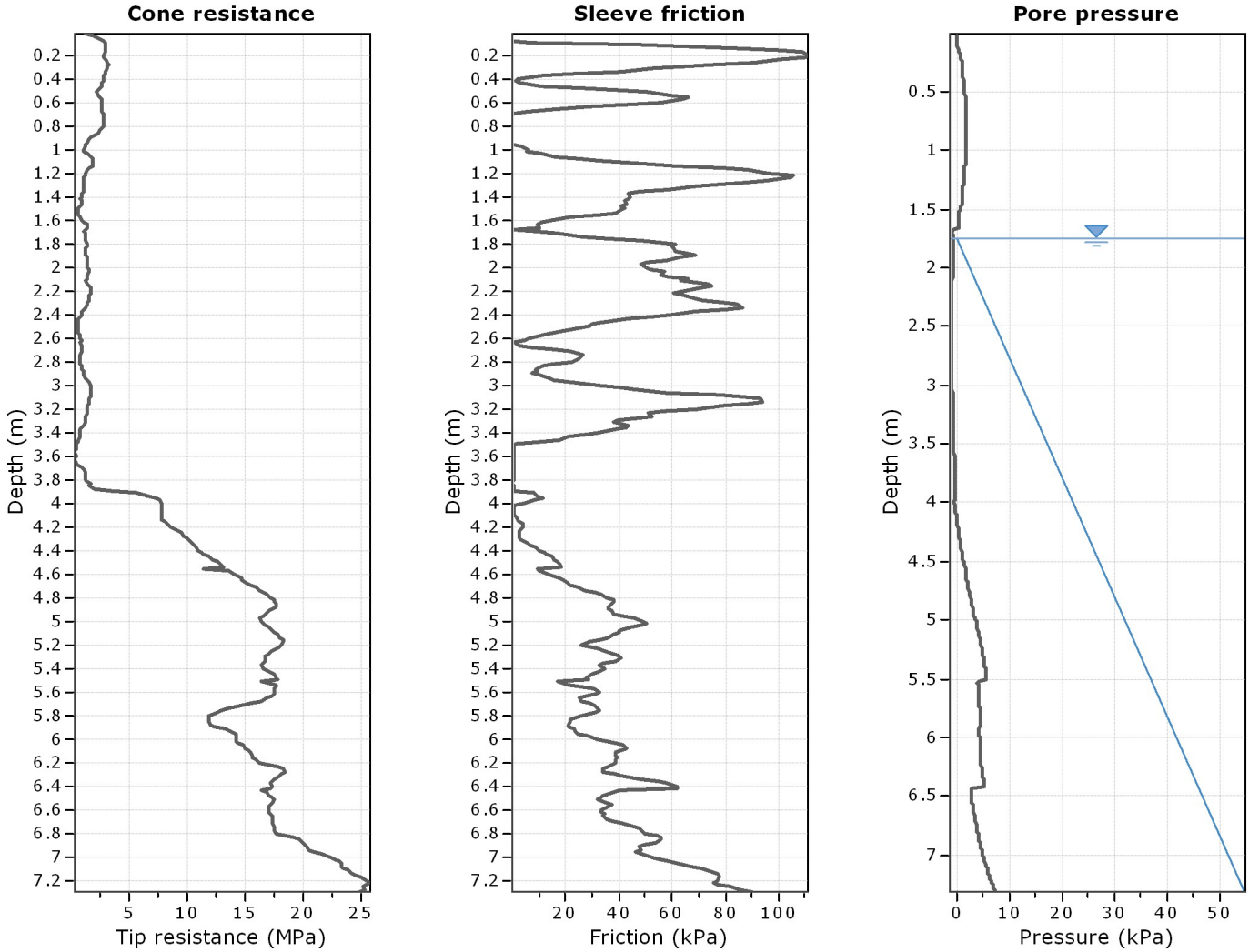
**CPT: SAMAWA CCPP_3**
Total depth: 7.82 m, Date: 13/05/2017
Surface Elevation: 9.89 m
Coords: N 3454373.121, E 525787.026
Cone Type: Icone ELCI-CFXYP20-10-AR-Piezocone
Cone Operator: Eng. Mohammed - Eng. Maysara

**Project:** **Samawa Combined Cycle Power Plant**
**Location:** **Samawa Governorate for ENKA Insaat ve Sanayi A.S.**

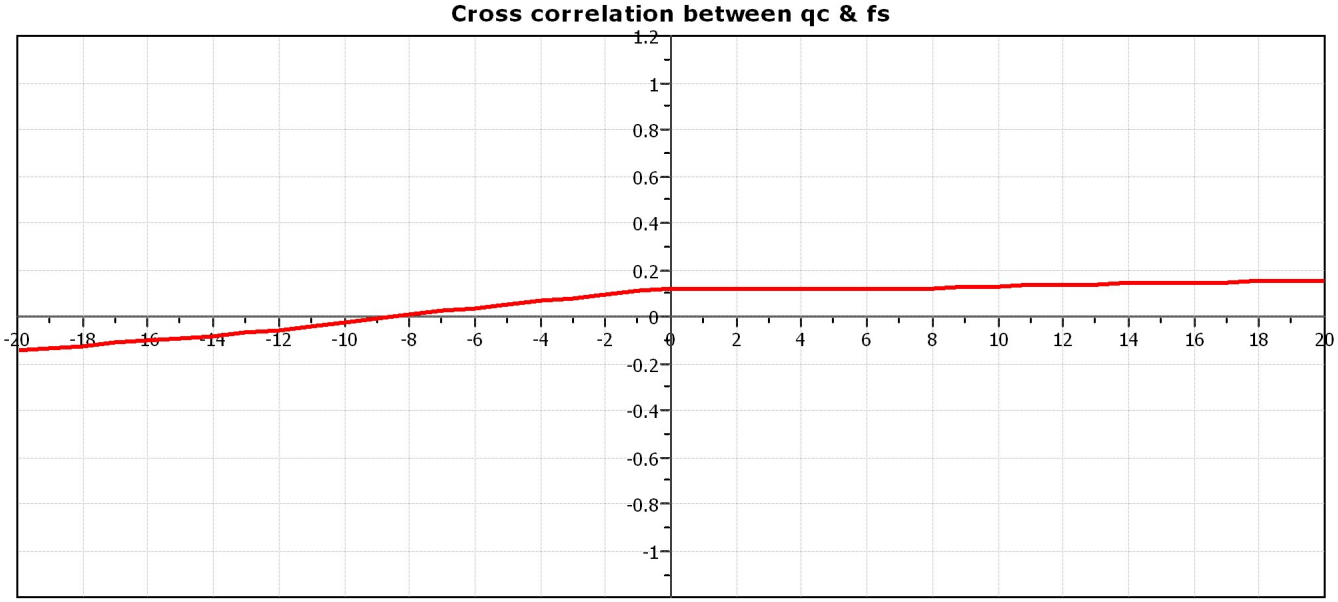



**SBTn legend**

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained




The plot below presents the cross correlation coeficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two sucessive CPT measurements).



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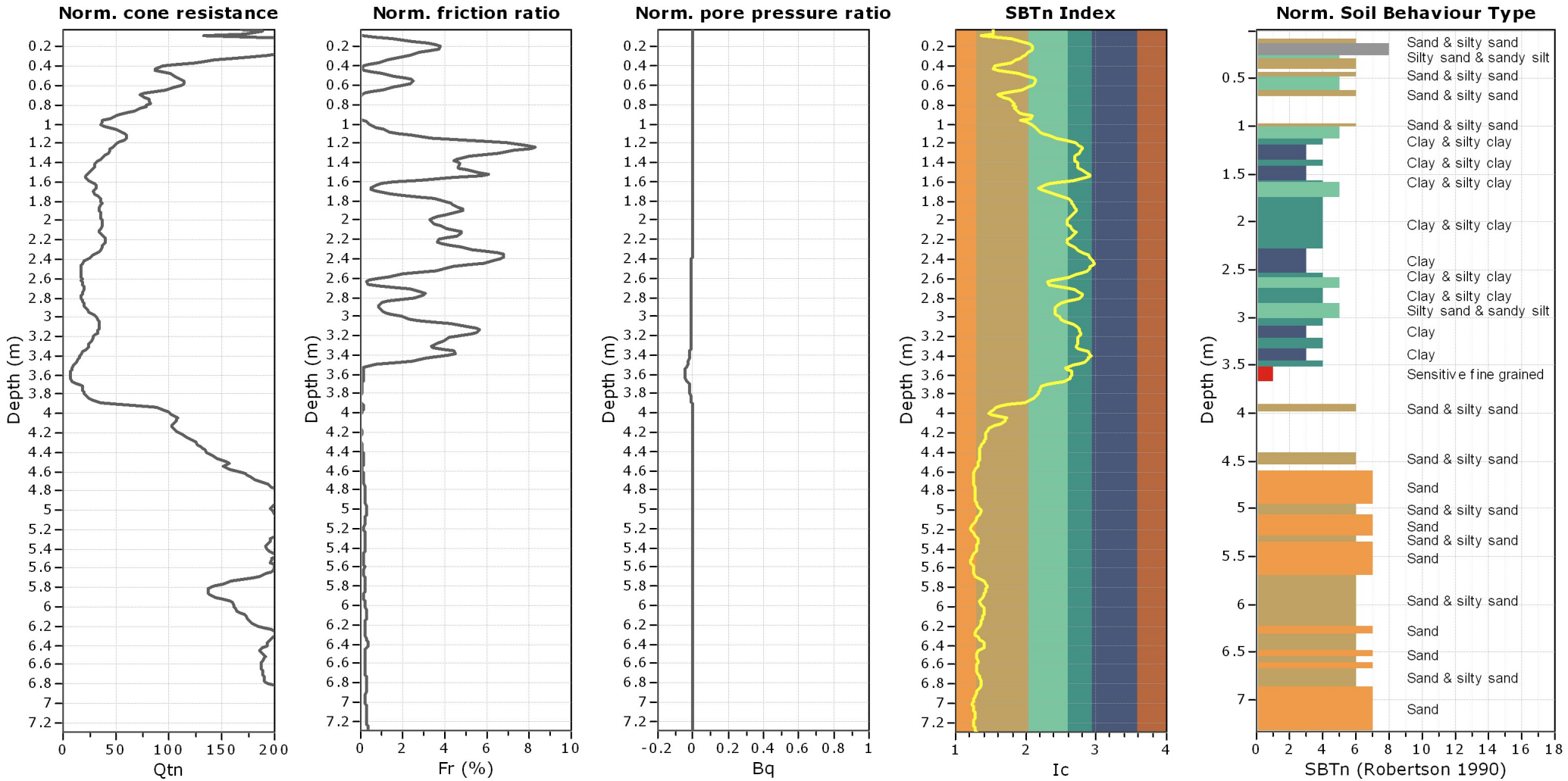
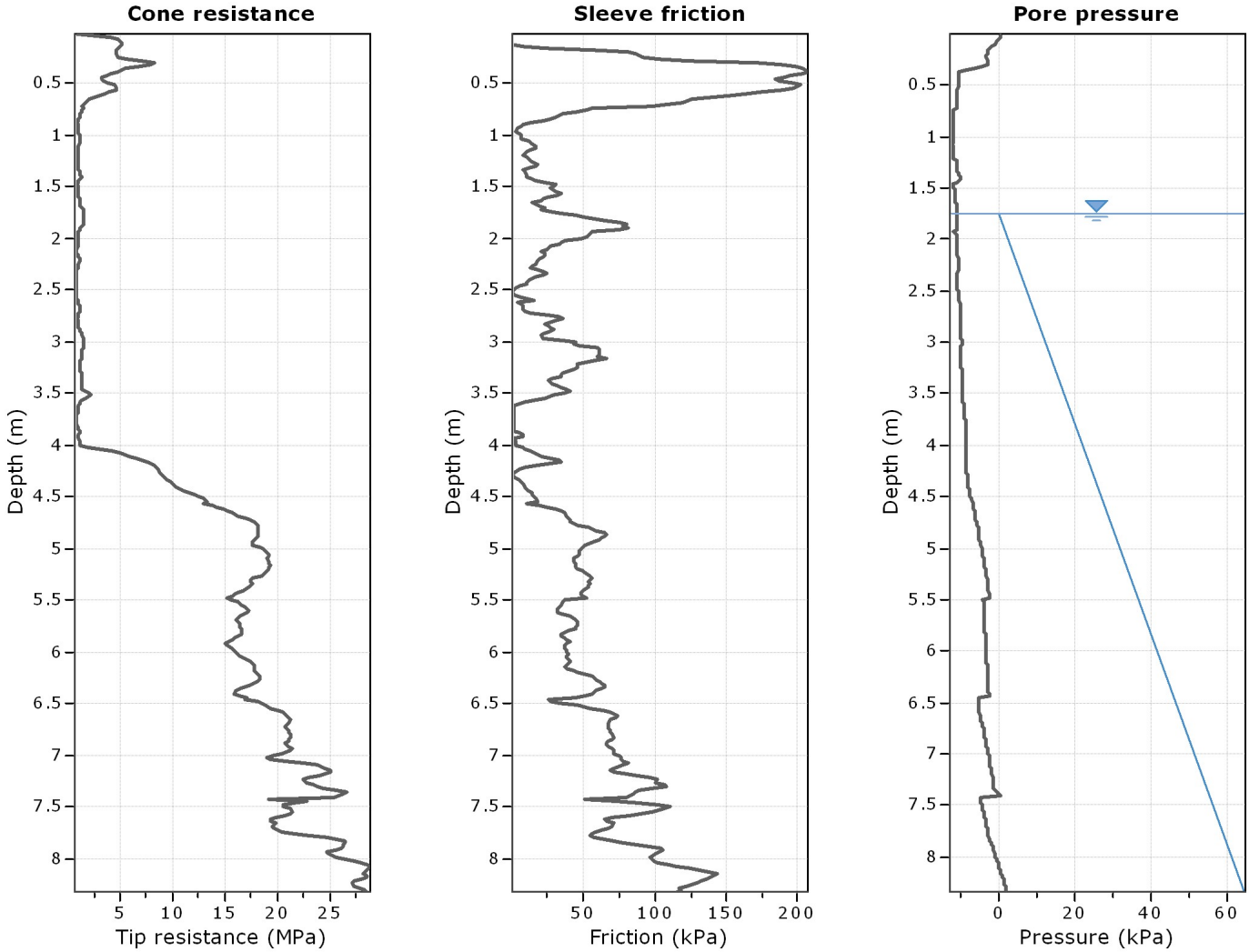
Baghdad
http://www.andrealab.com

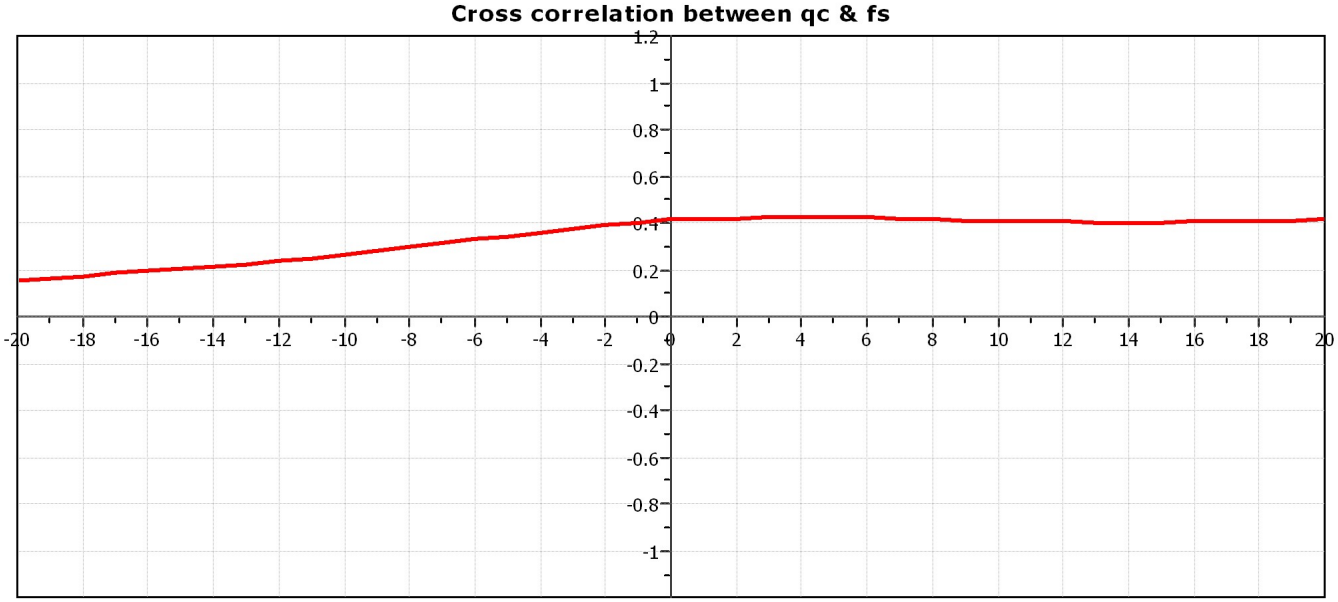
**CPT: SAMAWA CCPP_4A**
Total depth: 7.30 m, Date: 13/05/2017
Surface Elevation: 12.00 m
Coords: N 3454415.391, E 525809.086
Cone Type: Icone ELCI-CFXYP20-10-AR-Piezocone
Cone Operator: Eng. Mohammed - Eng. Maysara

**Project:** **Samawa Combined Cycle Power Plant**
**Location:** **Samawa Governorate for ENKA Insaat ve Sanayi A.S.**






The plot below presents the cross correlation coeficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two sucessive CPT measurements).



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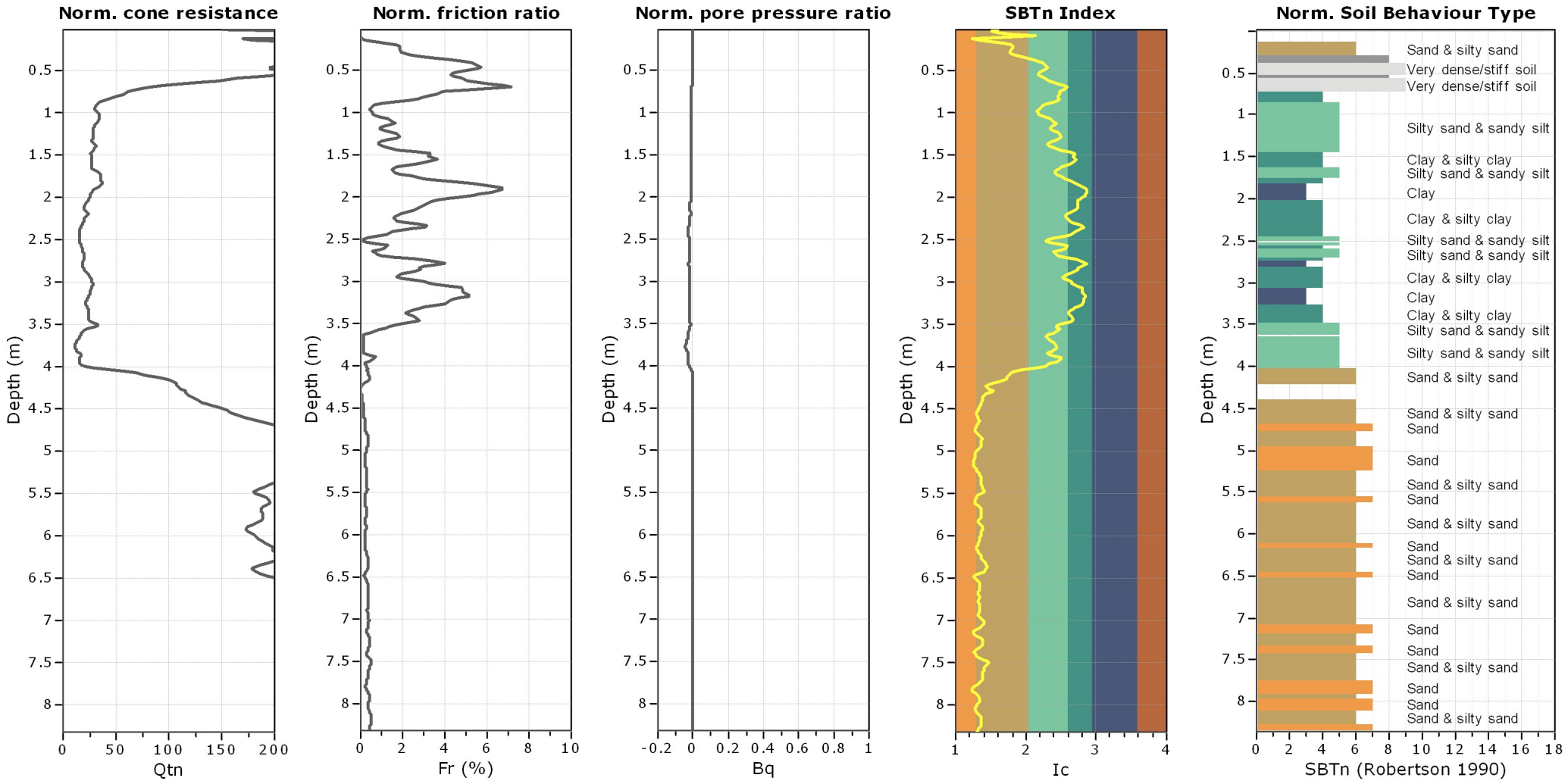
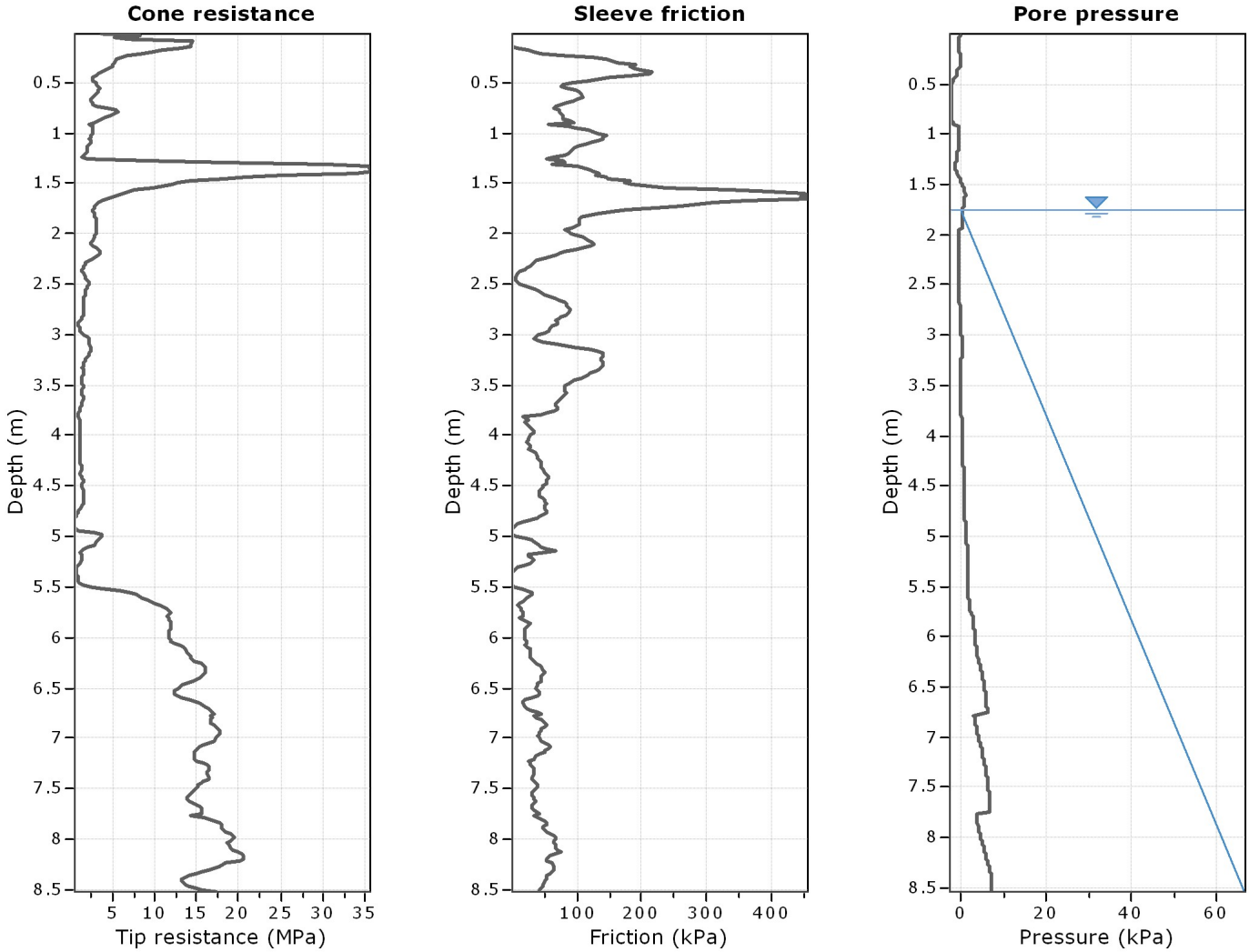
**CPT: SAMAWA CCPP_4B**
Total depth: 8.32 m, Date: 13/05/2017
Surface Elevation: 12.00 m
Coords: N 3454383.859, E 525828.121
Cone Type: Icone ELCI-CFXYP20-10-AR-Piezocone
Cone Operator: Eng. Mohammed - Eng. Maysara

**Project:** **Samawa Combined Cycle Power Plant**
**Location:** **Samawa Governorate for ENKA Insaat ve Sanayi A.S.**

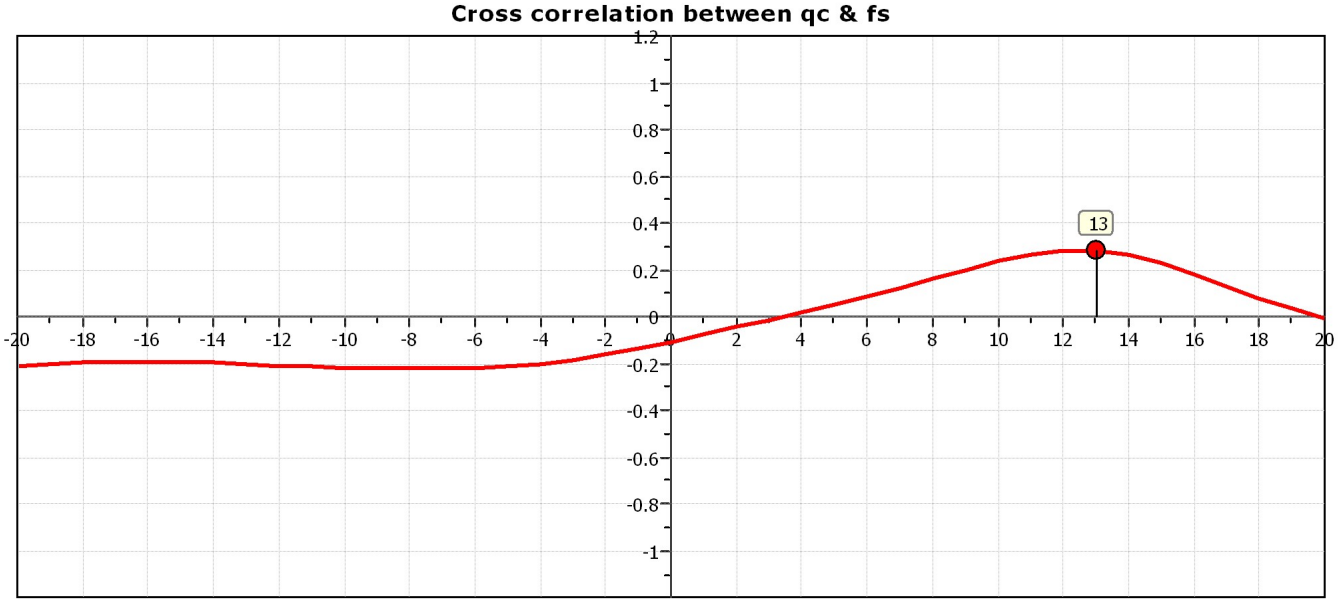



**SBTn legend**

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained




The plot below presents the cross correlation coeficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two sucessive CPT measurements).



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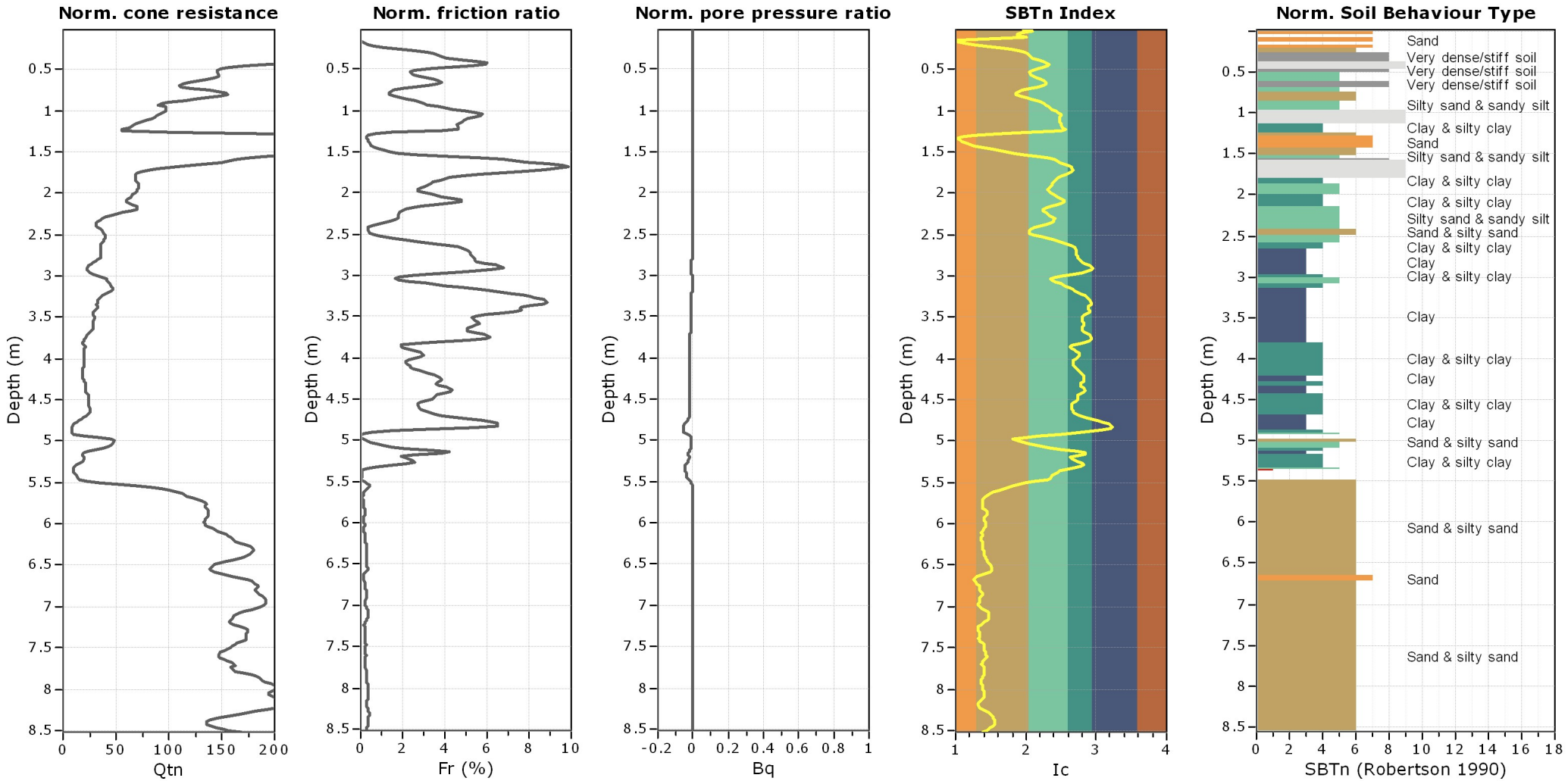
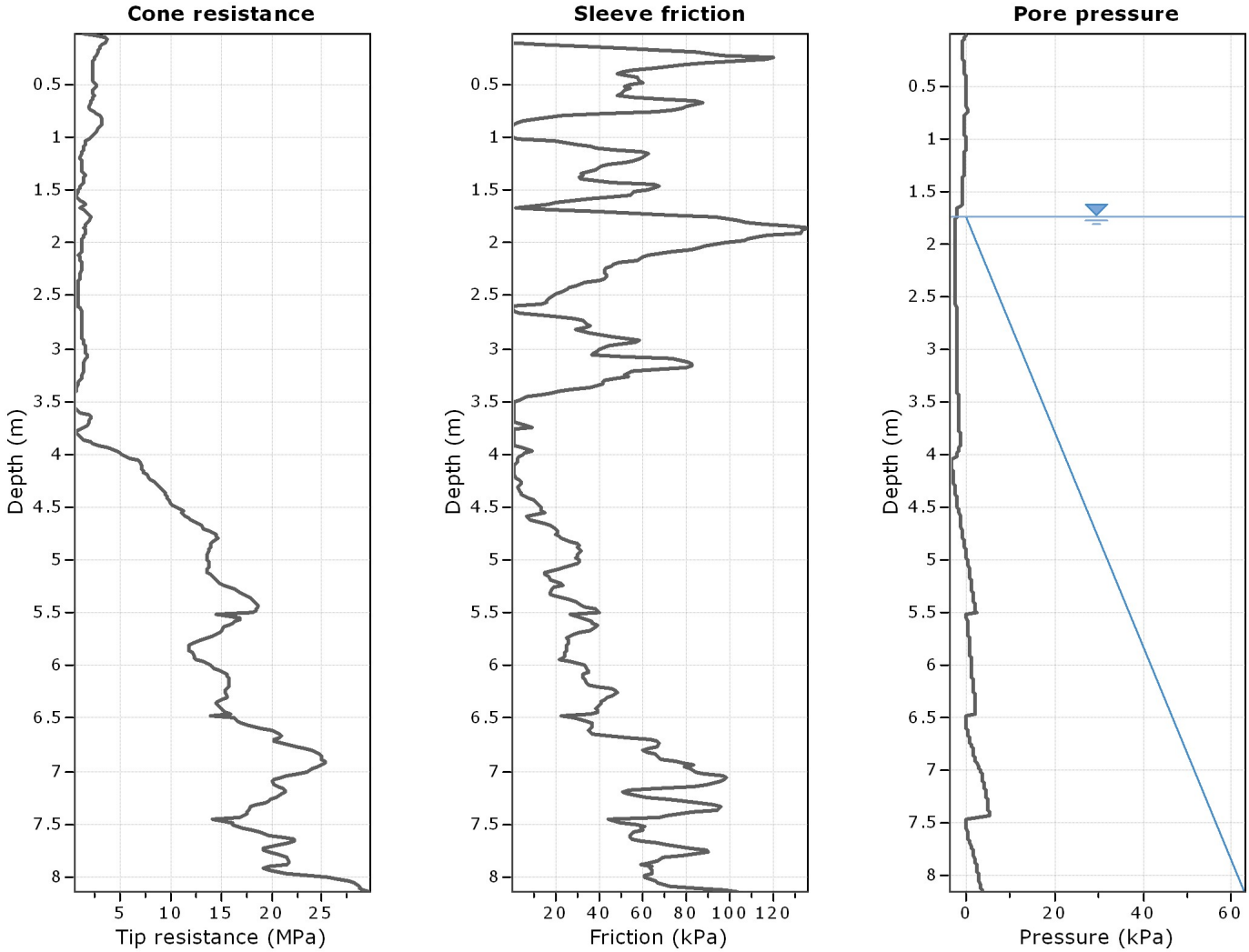
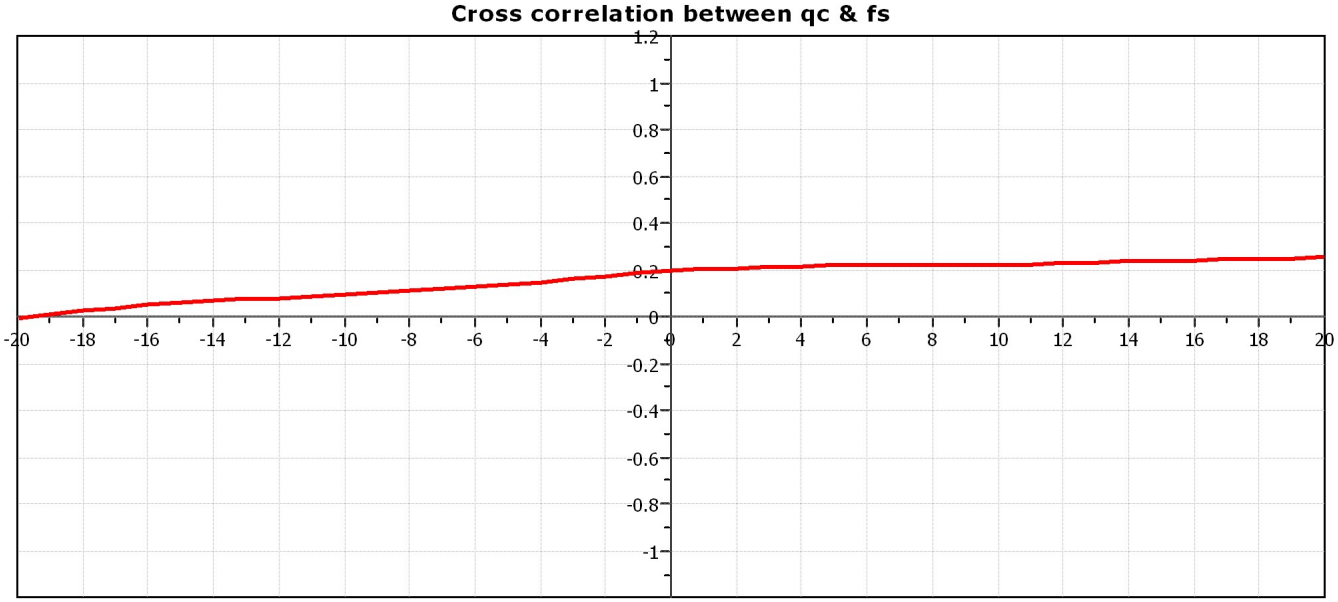
**CPT: SAMAWA CCPP_4 Inside**
Total depth: 8.52 m, Date: 13/05/2017
Surface Elevation: 0.00 m
Coords: N 0.0, E 0.0
Cone Type: Icone ELCI-CFXYP20-10-AR-Piezocone
Cone Operator: Eng. Mohammed - Eng. Maysara

**Project:** **Samawa Combined Cycle Power Plant**
**Location:** **Samawa Governorate for ENKA Insaat ve Sanayi A.S.**






The plot below presents the cross correlation coeficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two sucessive CPT measurements).



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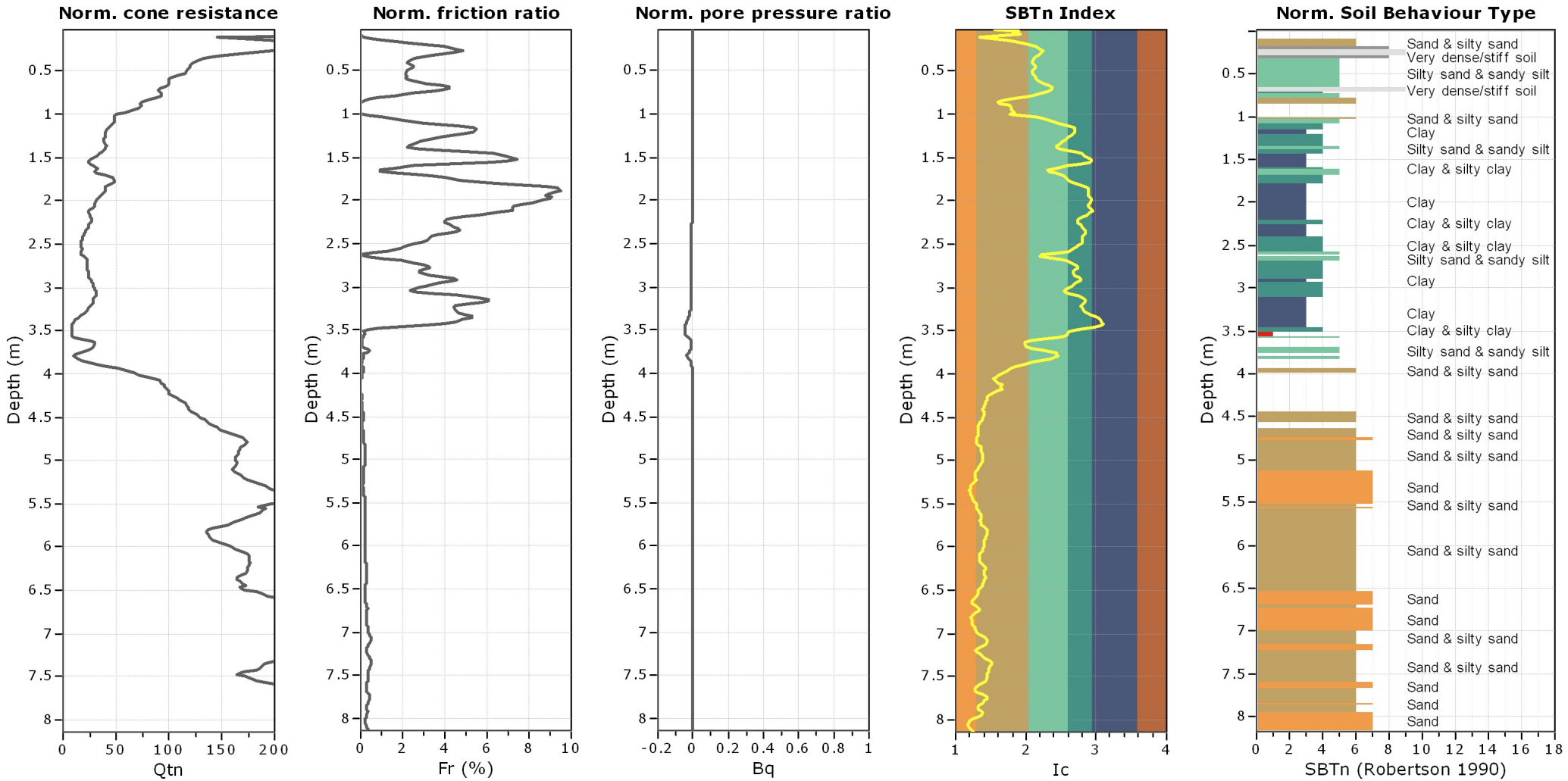
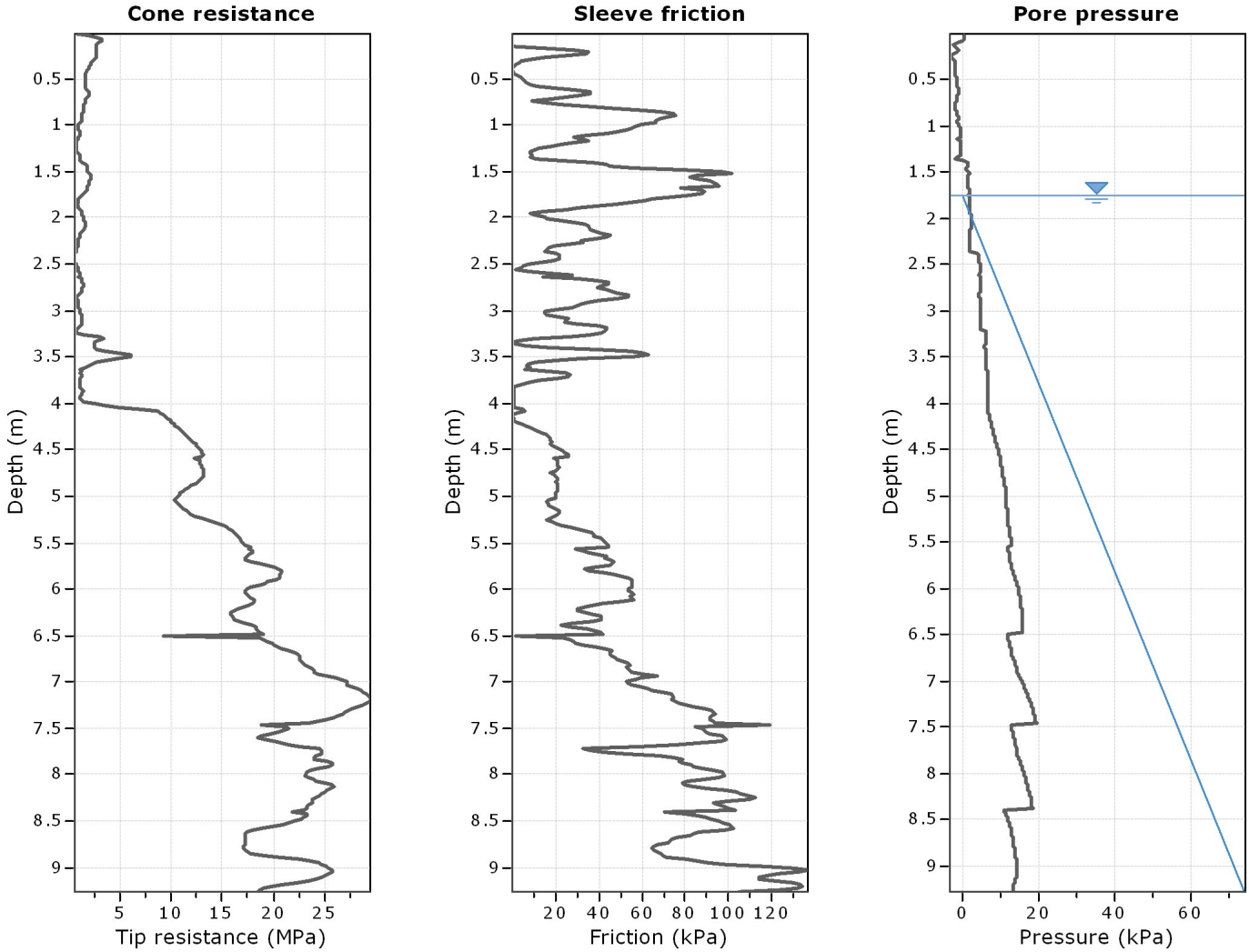
**CPT: SAMAWA CCPP_4 Outside**
Total depth: 8.14 m, Date: 13/05/2017
Surface Elevation: 0.00 m
Coords: N 0.0, E 0.0
Cone Type: Icone ELCI-CFXYP20-10-AR-Piezocone
Cone Operator: Eng. Mohammed - Eng. Maysara

**Project:** **Samawa Combined Cycle Power Plant**
**Location:** **Samawa Governorate for ENKA Insaat ve Sanayi A.S.**

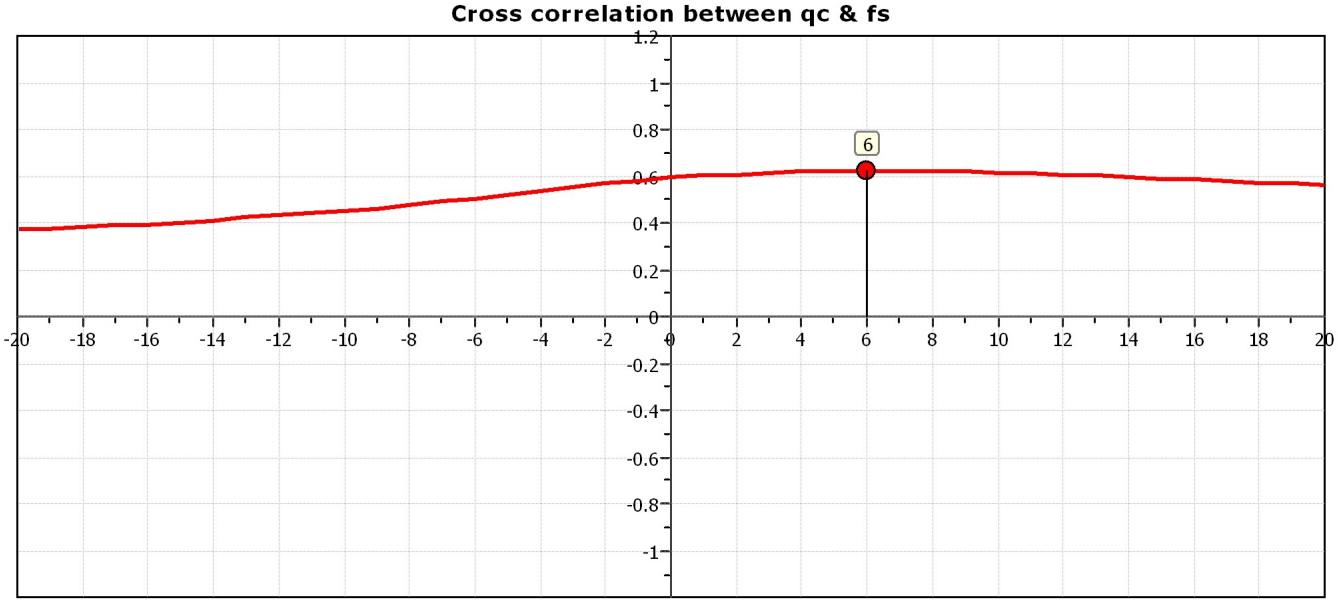



**SBTn legend**

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained




The plot below presents the cross correlation coeficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two sucessive CPT measurements).



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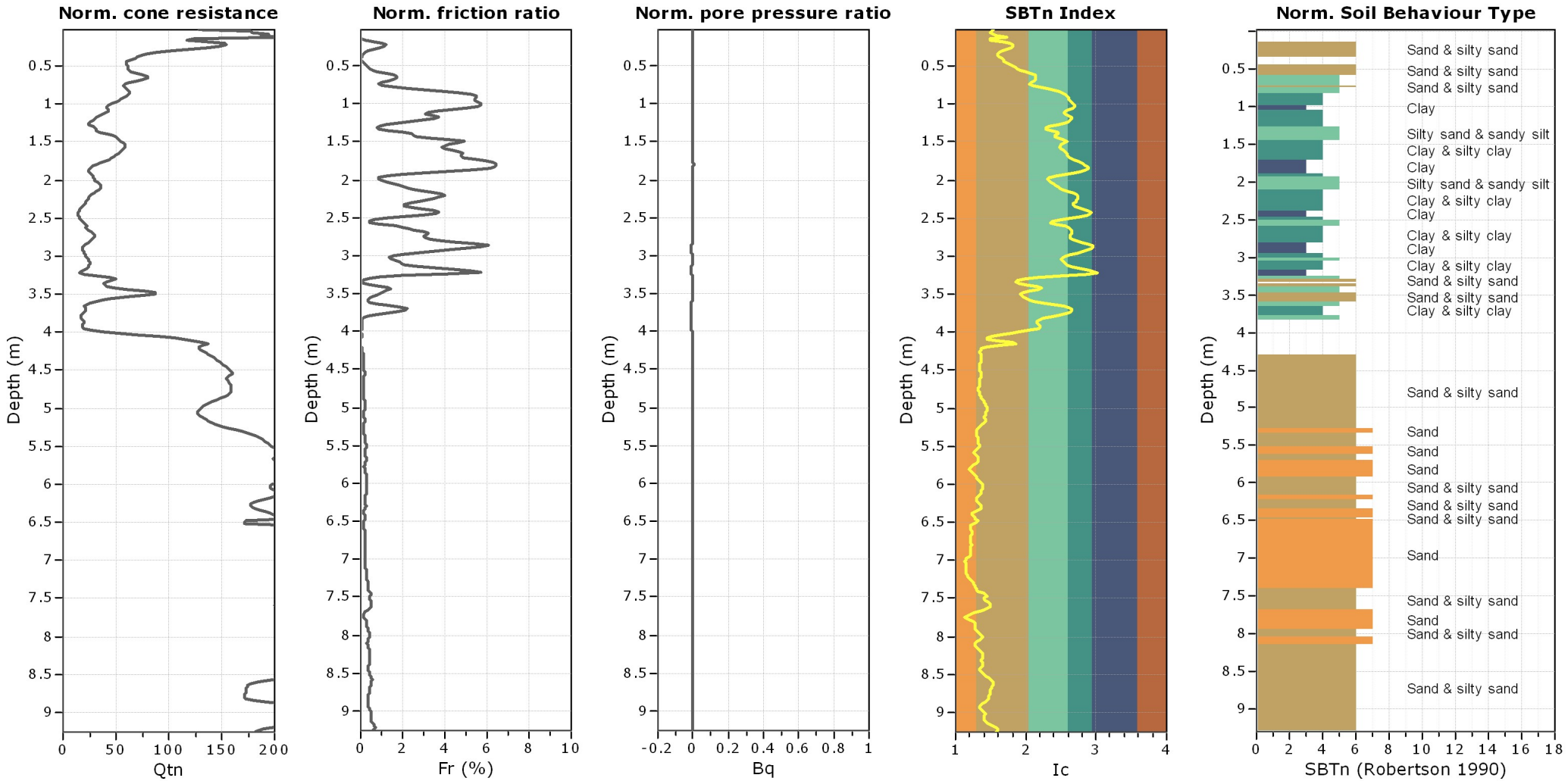
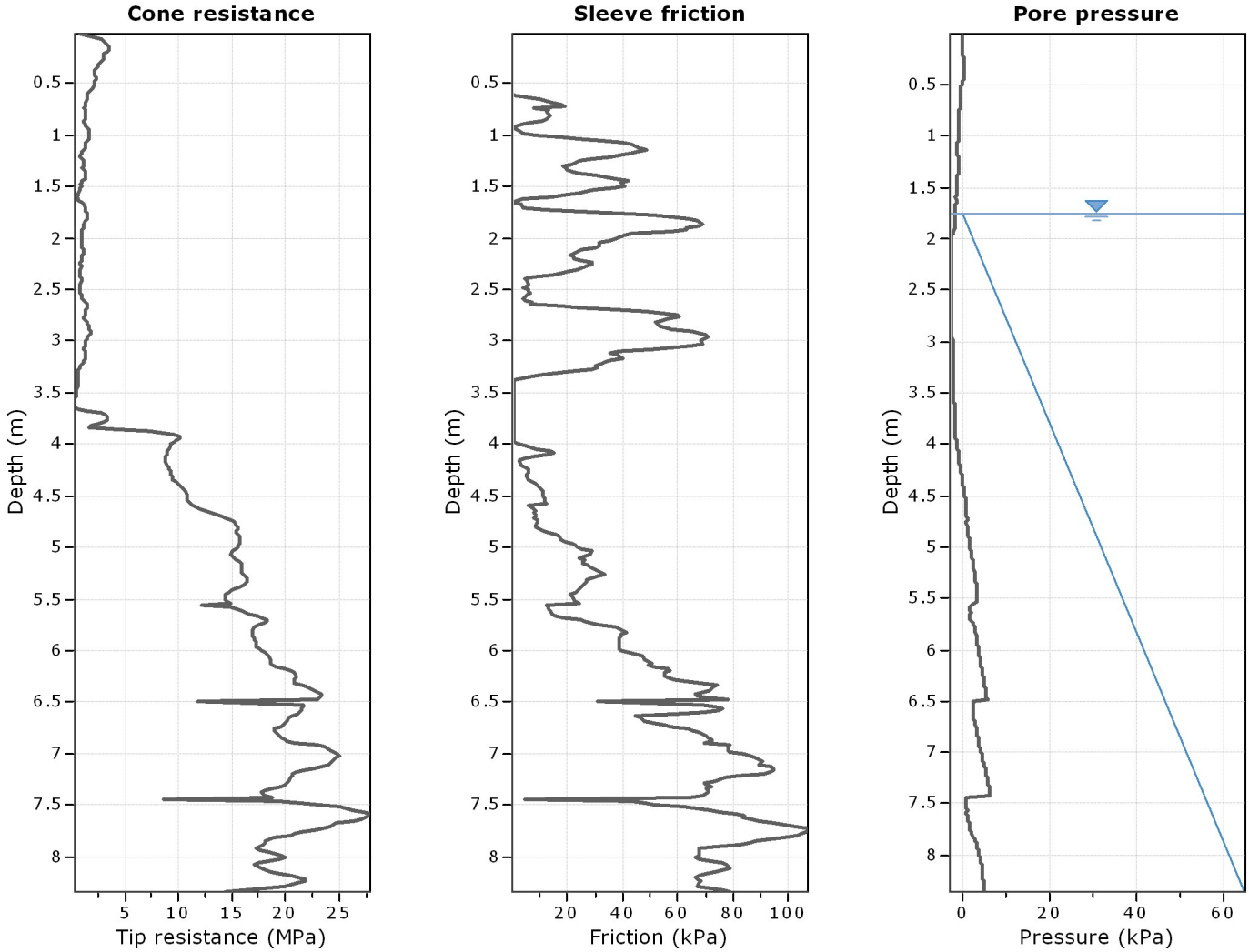
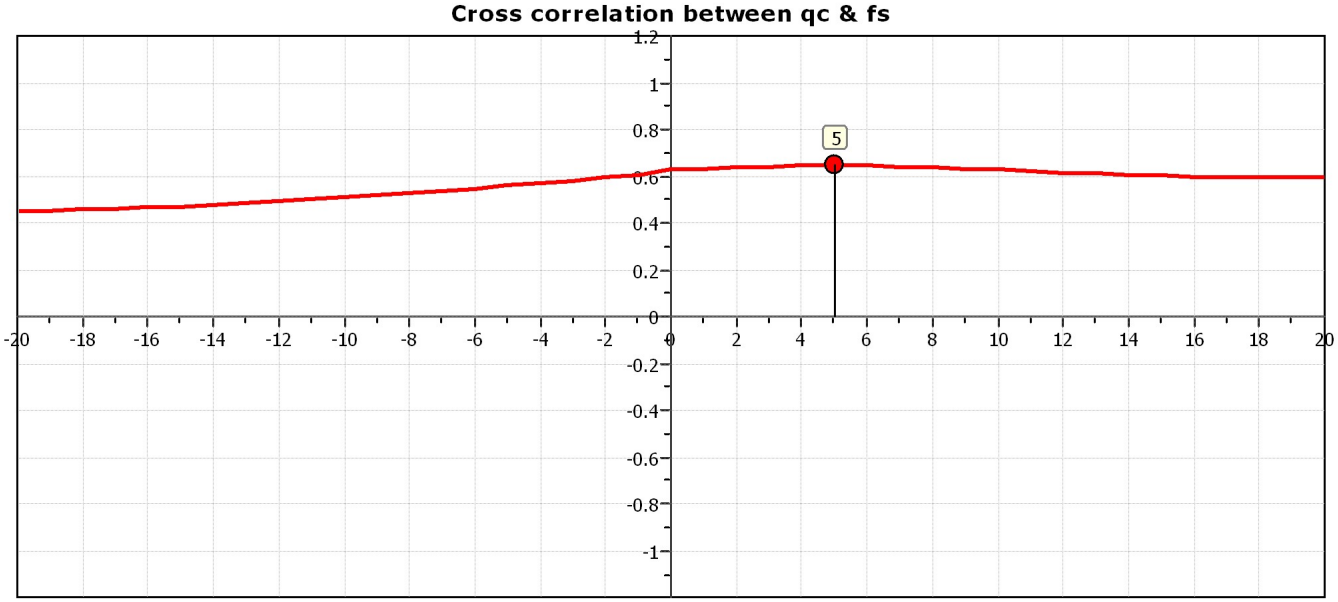
**CPT: SAMAWA CCPP_5**
Total depth: 9.26 m, Date: 13/05/2017
Surface Elevation: 9.90 m
Coords: N 3454338.203, E 525838.951
Cone Type: Icone ELCI-CFXYP20-10-AR-Piezocone
Cone Operator: Eng. Mohammed - Eng. Maysara

**Project:** **Samawa Combined Cycle Power Plant**
**Location:** **Samawa Governorate for ENKA Insaat ve Sanayi A.S.**






The plot below presents the cross correlation coeficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two sucessive CPT measurements).



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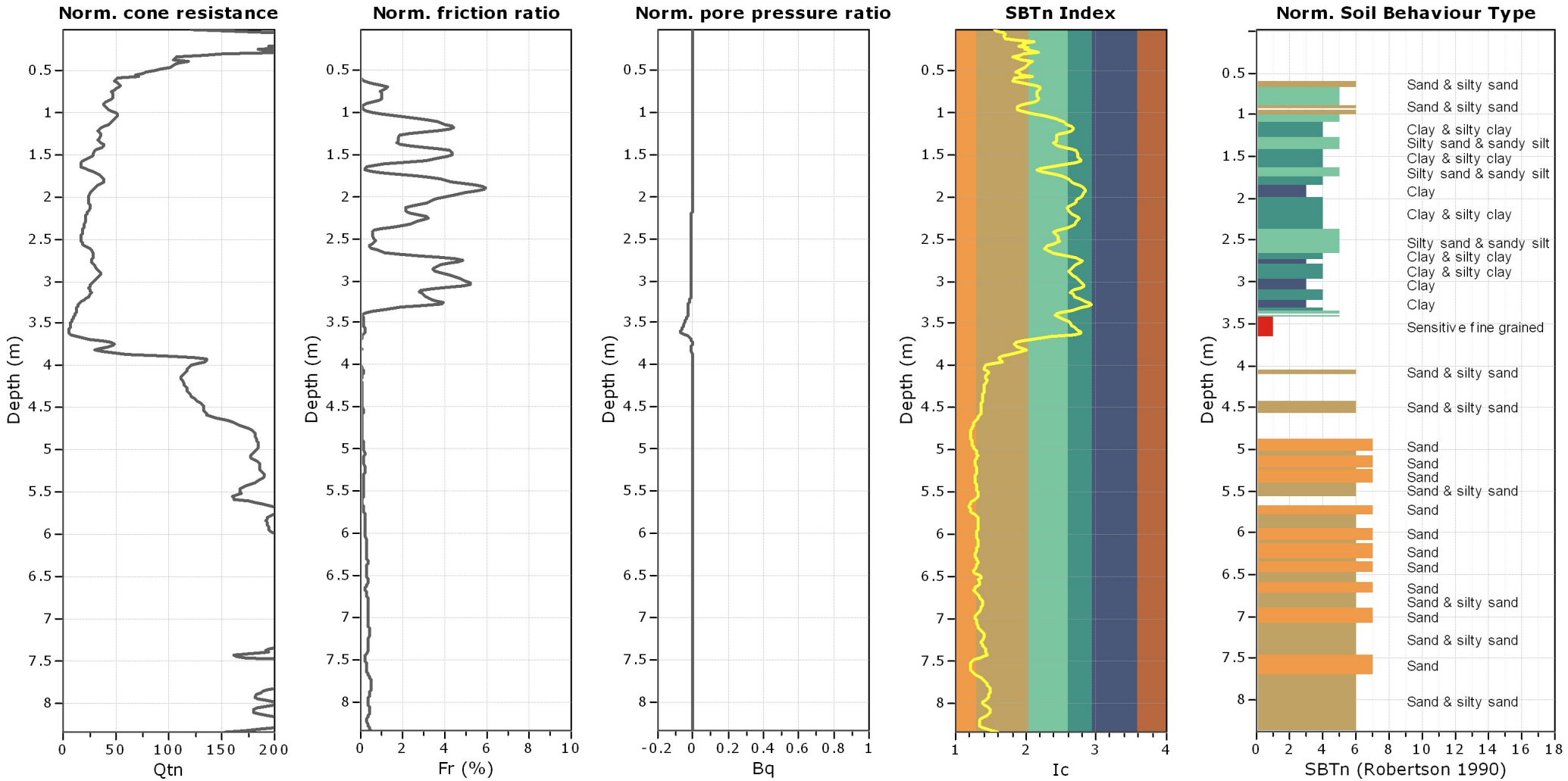
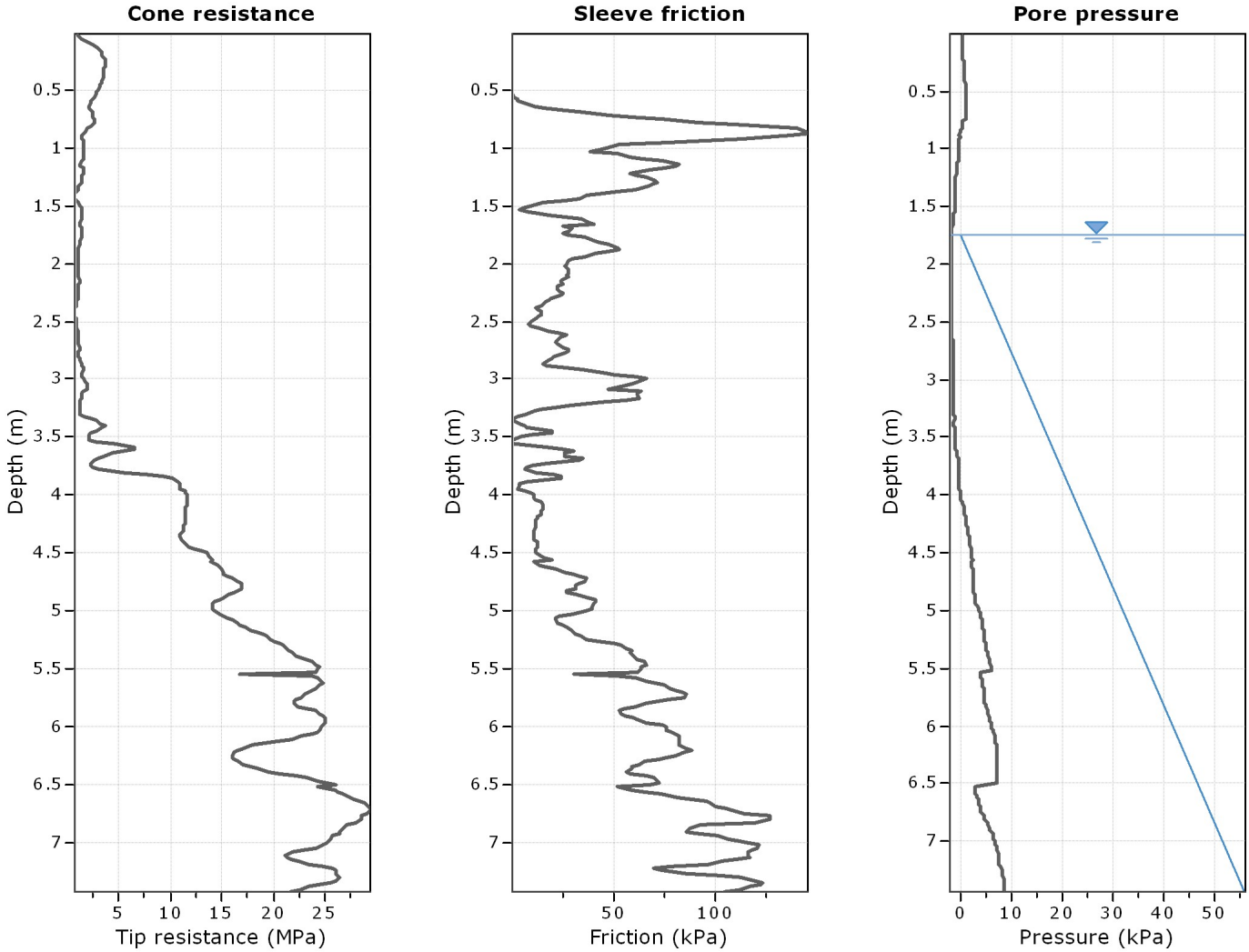
**CPT: SAMAWA CCPP_6**
Total depth: 8.34 m, Date: 13/05/2017
Surface Elevation: 10.63 m
Coords: N 3454371.45, E 525860.993
Cone Type: Icone ELCI-CFXYP20-10-AR-Piezocone
Cone Operator: Eng. Mohammed - Eng. Maysara

**Project:** **Samawa Combined Cycle Power Plant**
**Location:** **Samawa Governorate for ENKA Insaat ve Sanayi A.S.**

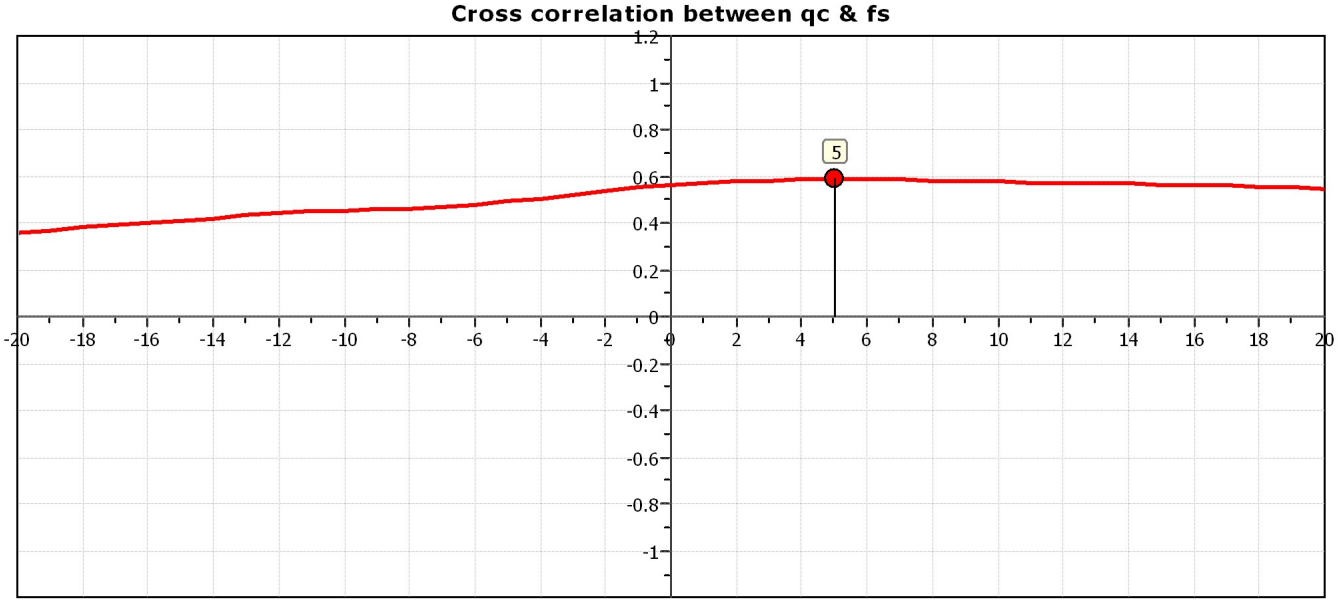



**SBTn legend**

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained




The plot below presents the cross correlation coeficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two sucessive CPT measurements).



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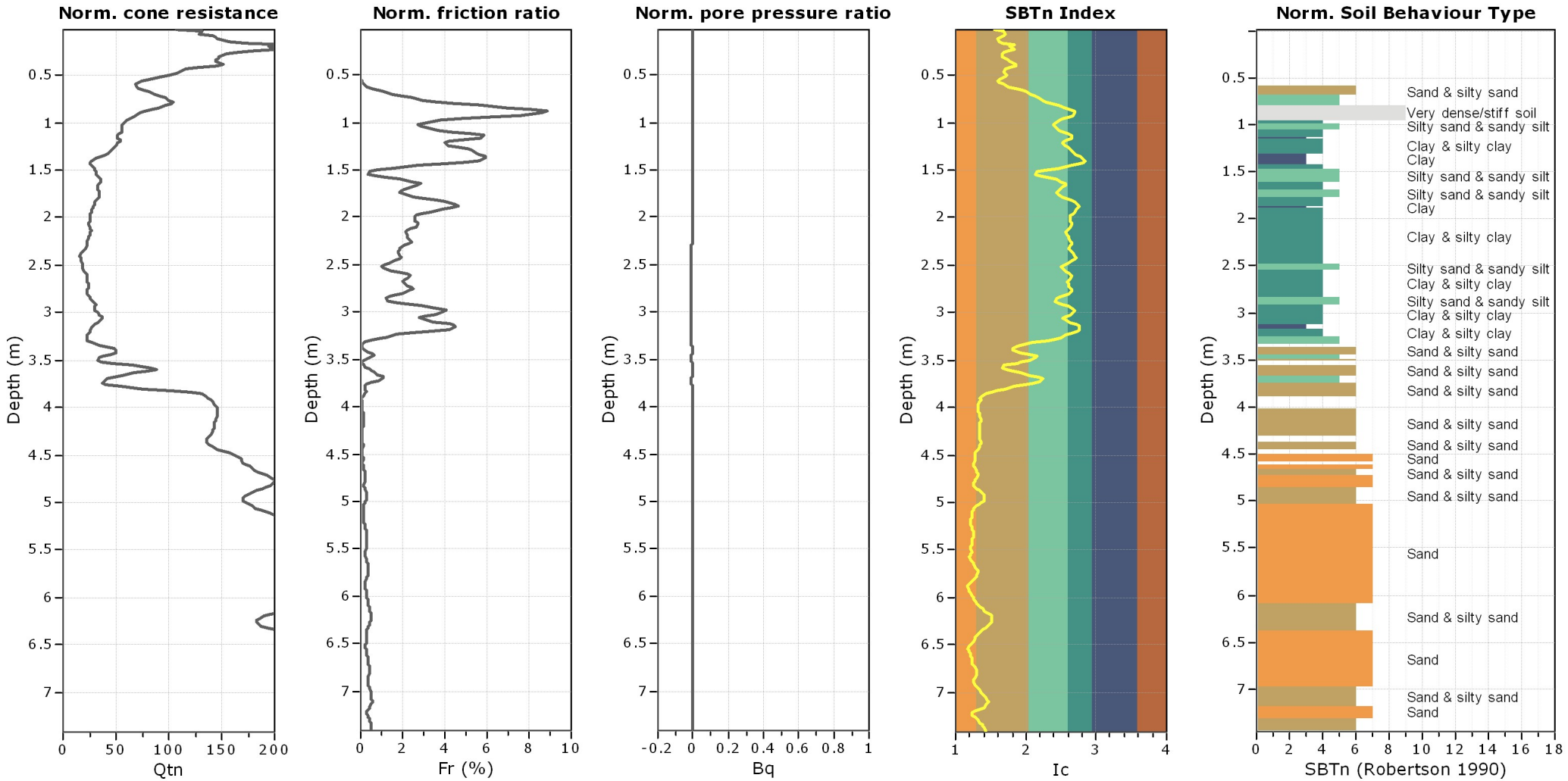
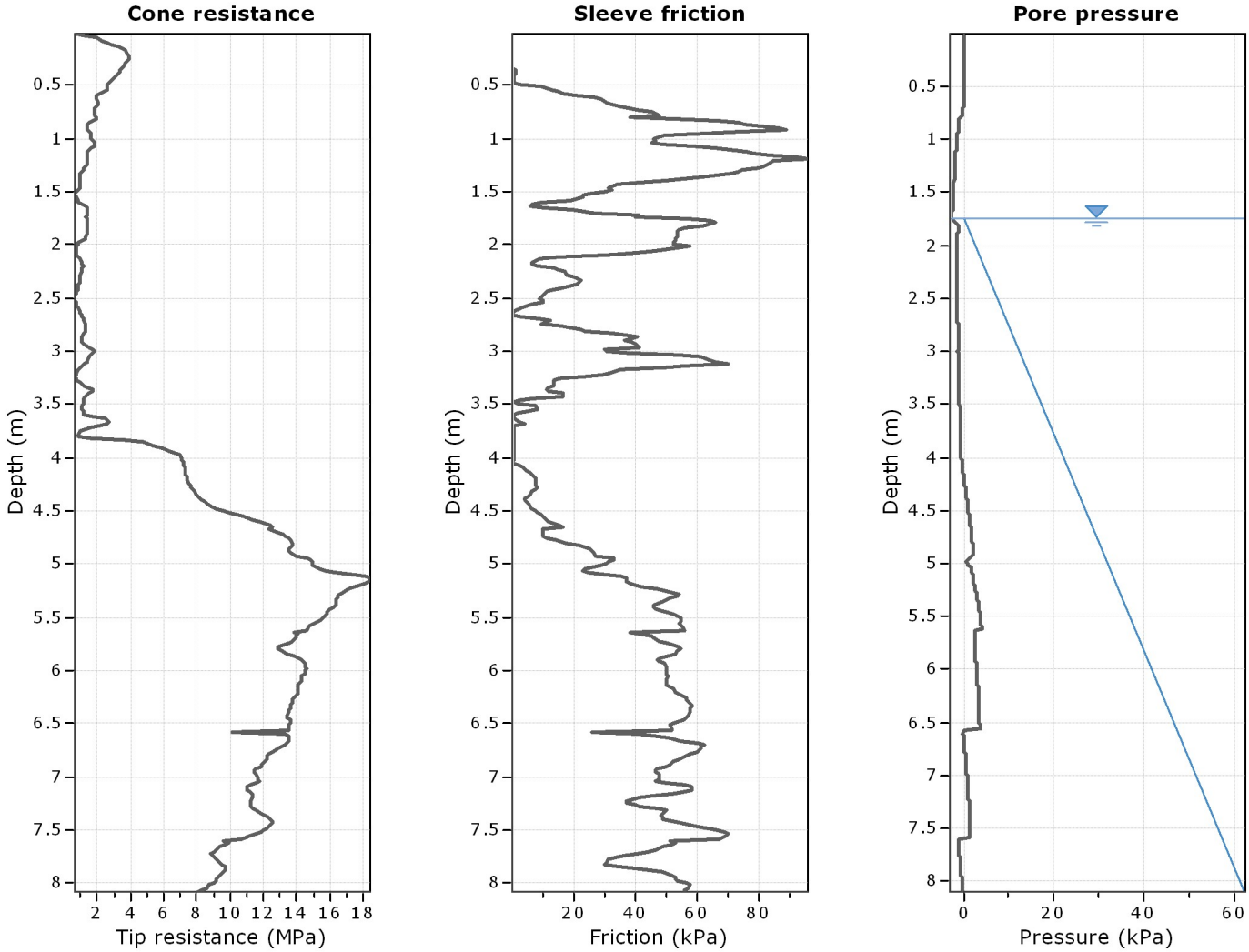
**CPT: SAMAWA CCPP_7**
Total depth: 7.42 m, Date: 13/05/2017
Surface Elevation: 9.85 m
Coords: N 3454303.399, E 525890.717
Cone Type: Icone ELCI-CFXYP20-10-AR-Piezocone
Cone Operator: Eng. Mohammed - Eng. Maysara

**Project:** **Samawa Combined Cycle Power Plant**
**Location:** **Samawa Governorate for ENKA Insaat ve Sanayi A.S.**

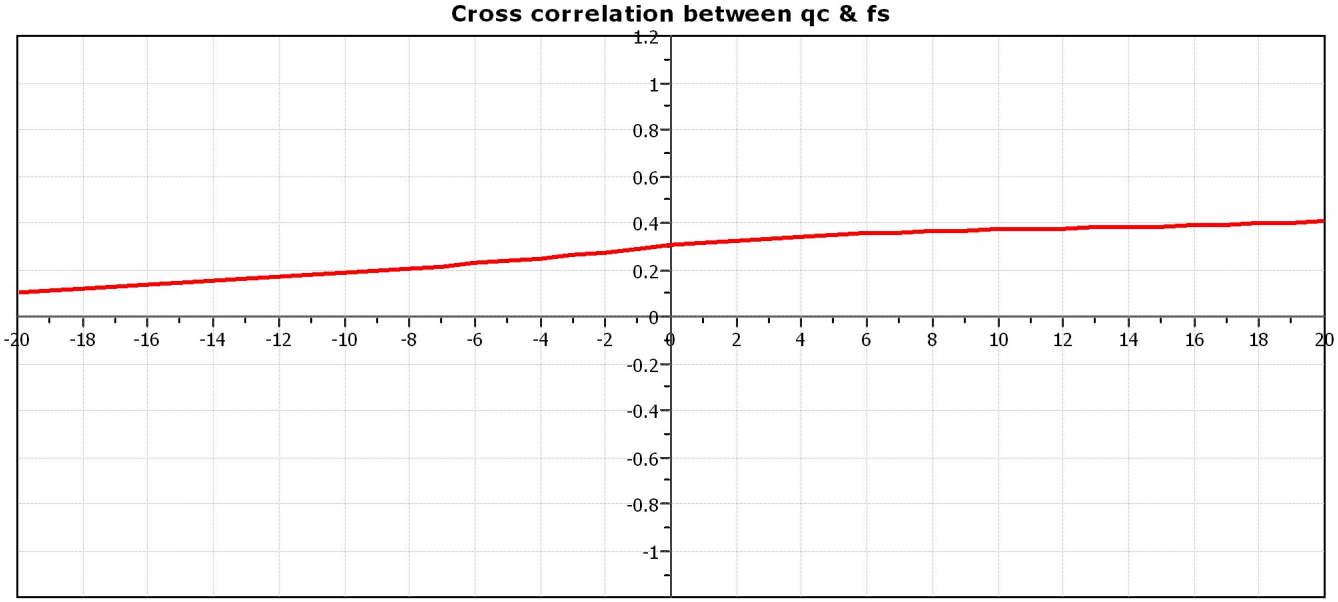



**SBTn legend**

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained




The plot below presents the cross correlation coeficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two sucessive CPT measurements).



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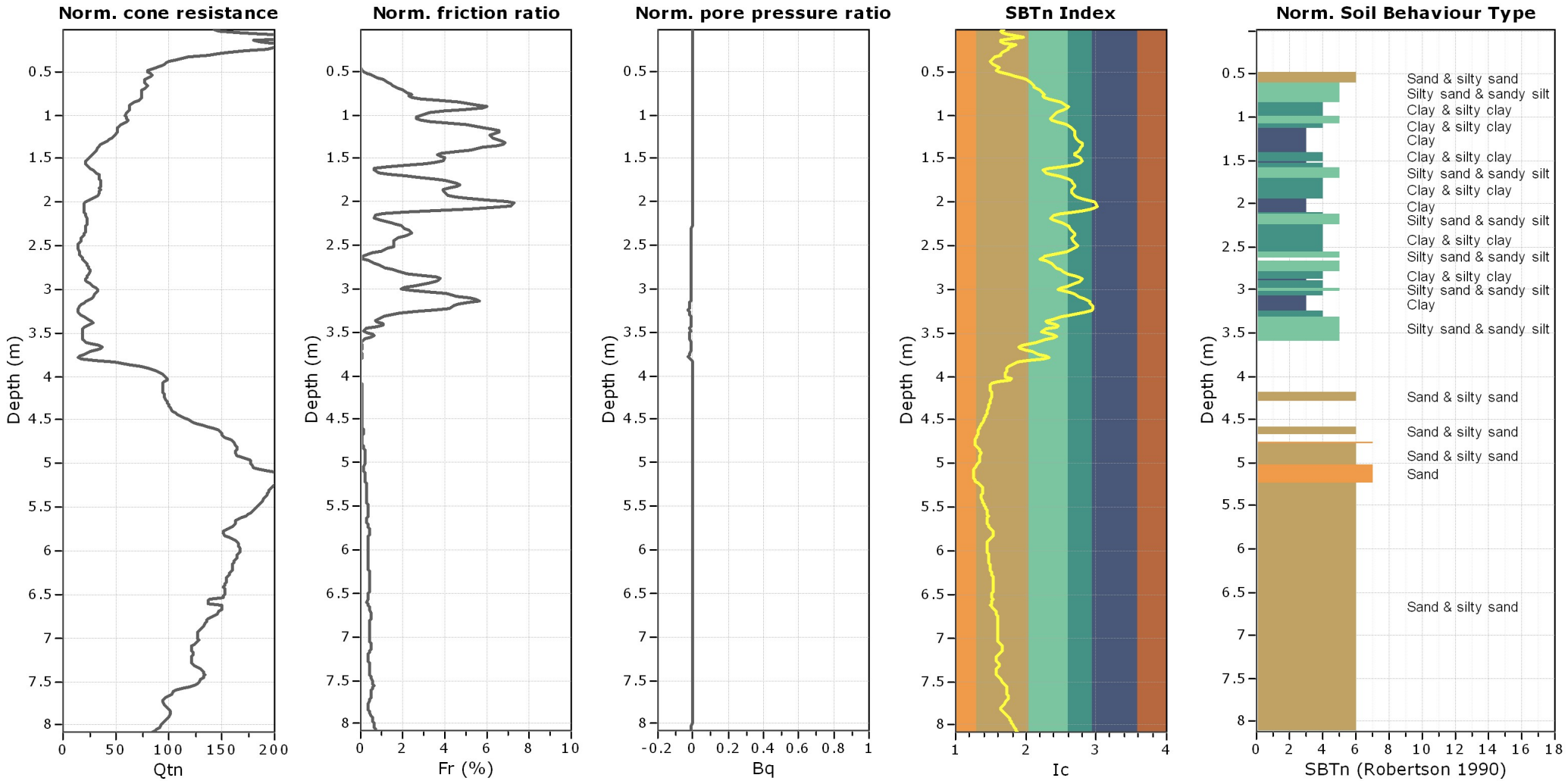
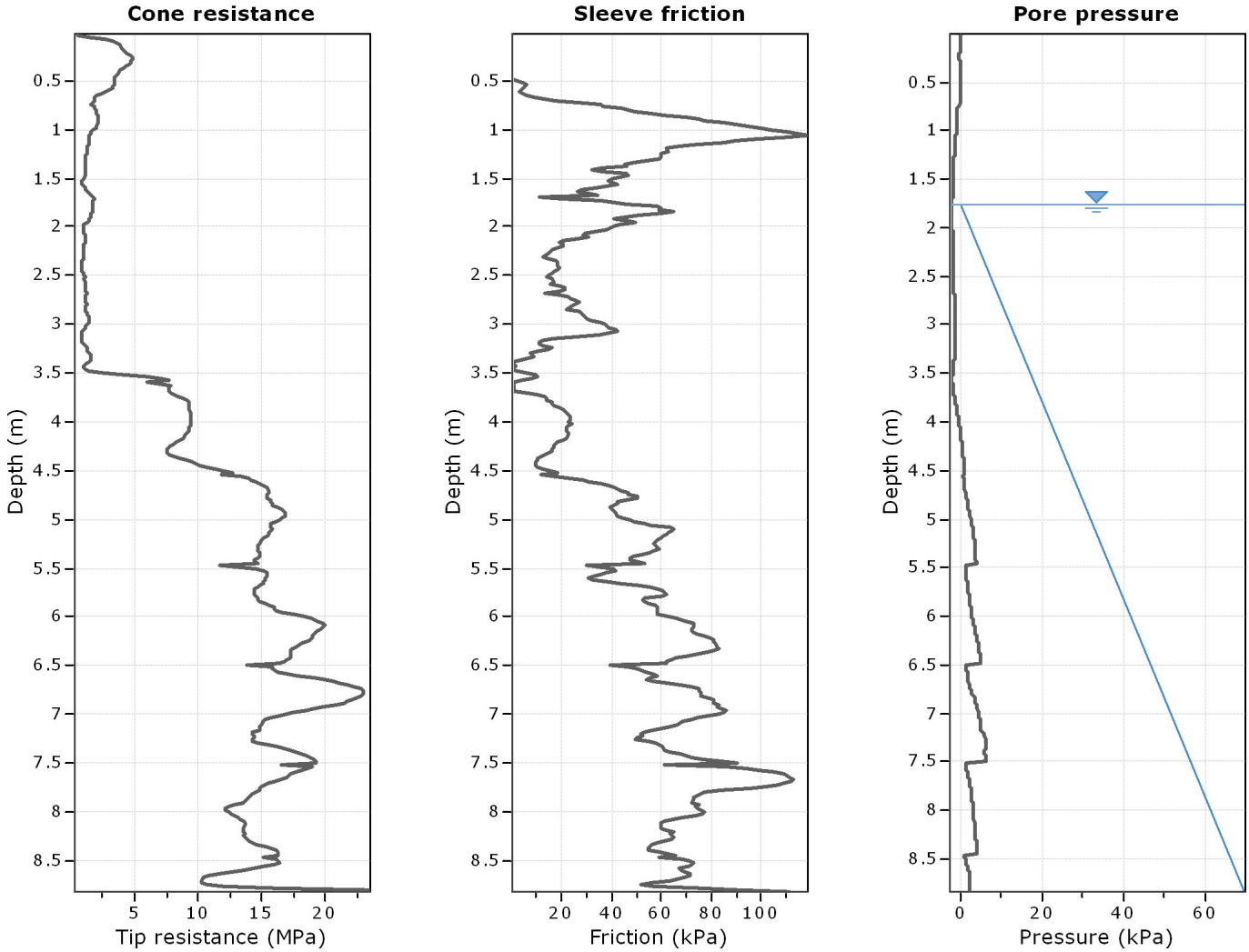
**CPT: SAMAWA CCPP_8**
Total depth: 8.08 m, Date: 13/05/2017
Surface Elevation: 10.00 m
Coords: N 3454336.619, E 525912.801
Cone Type: Icone ELCI-CFXYP20-10-AR-Piezocone
Cone Operator: Eng. Mohammed - Eng. Maysara

**Project:** **Samawa Combined Cycle Power Plant**
**Location:** **Samawa Governorate for ENKA Insaat ve Sanayi A.S.**

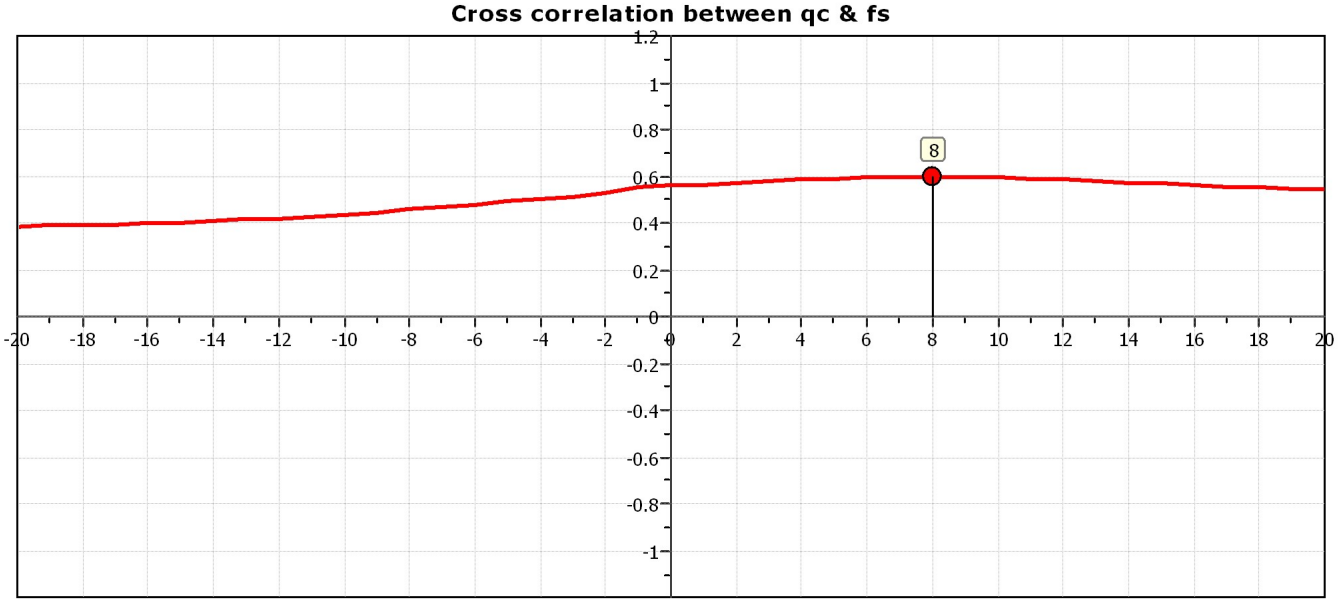



**SBTn legend**

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained




The plot below presents the cross correlation coeficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two sucessive CPT measurements).



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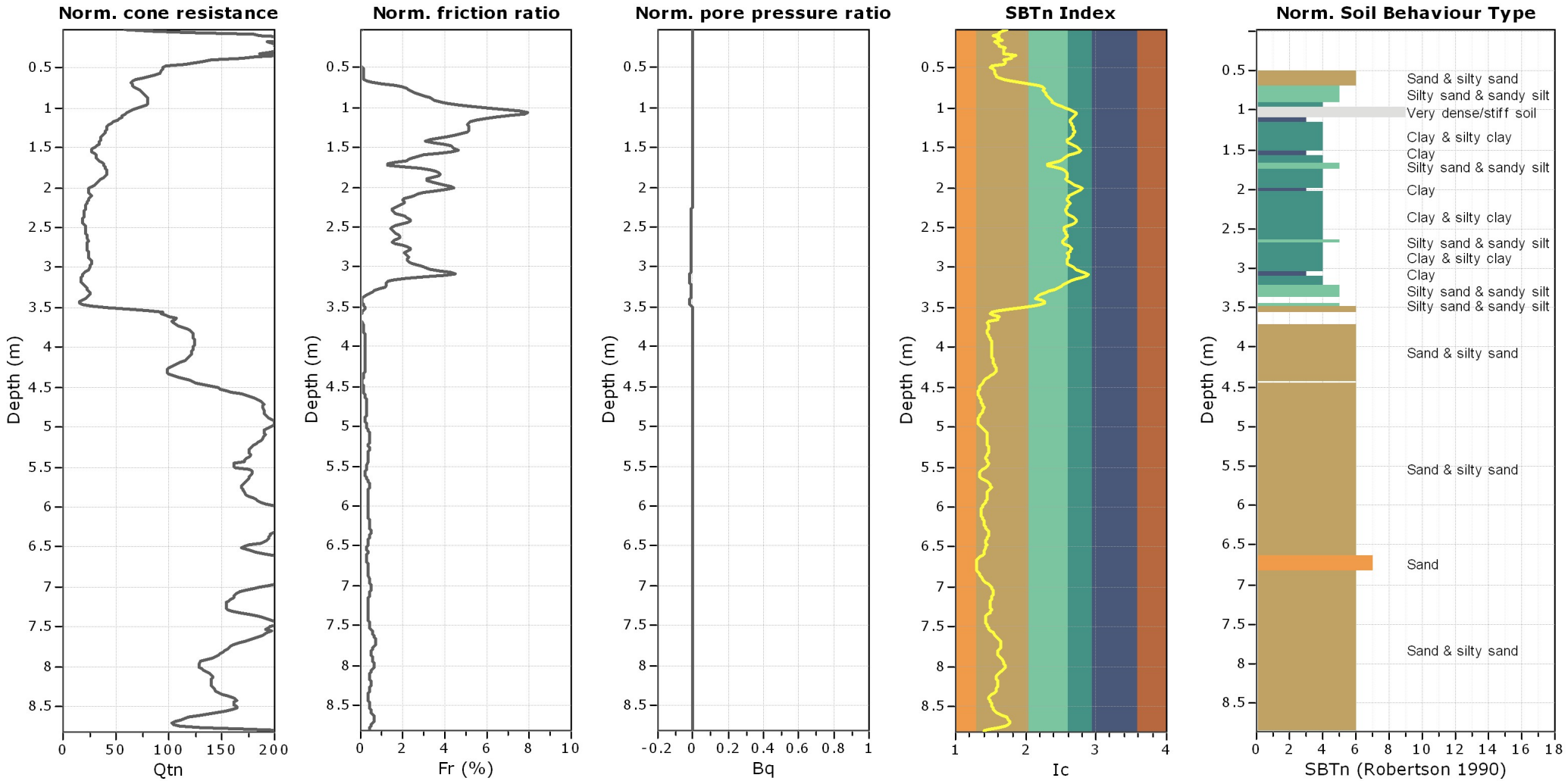
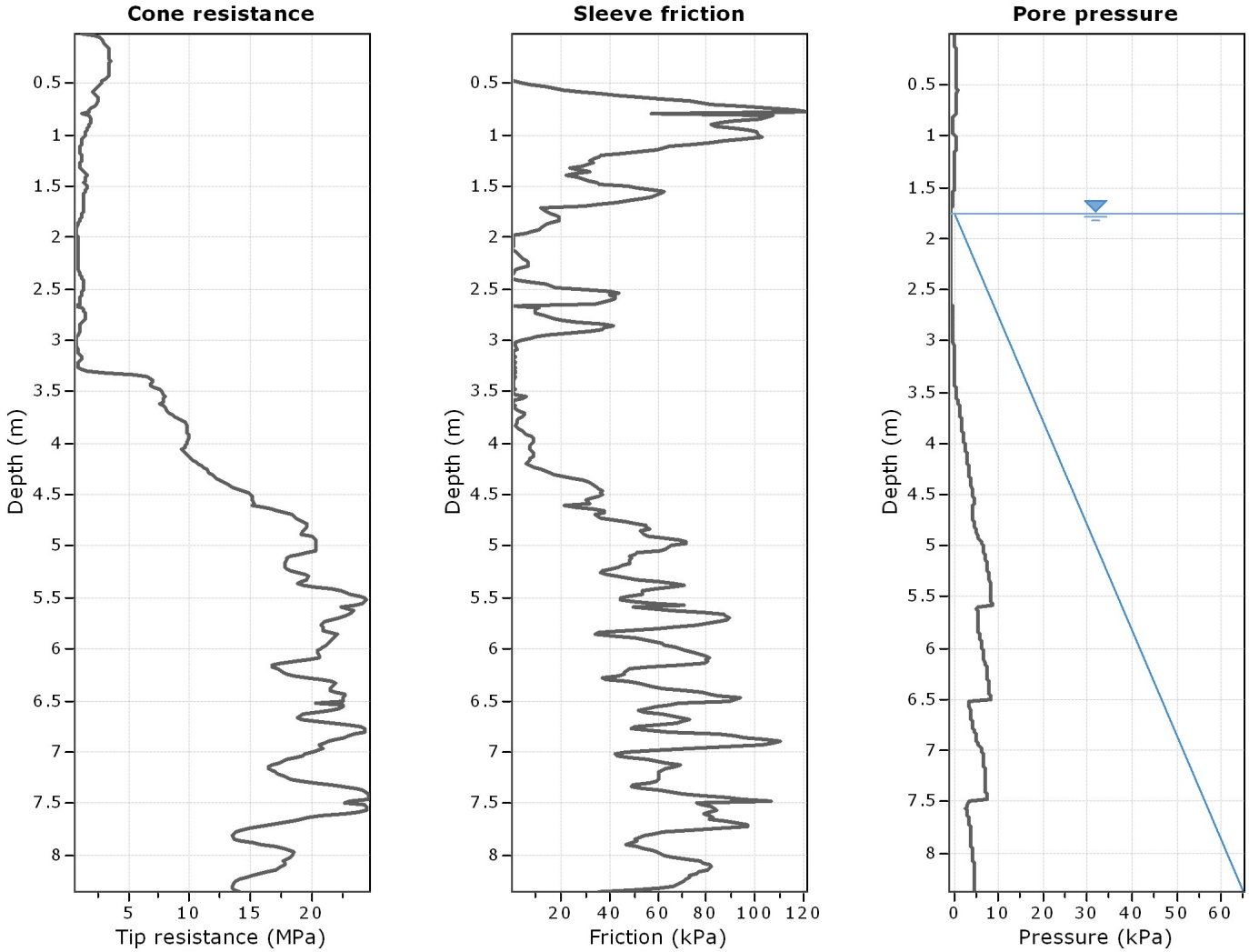
**CPT: SAMAWA CCPP_9**
Total depth: 8.82 m, Date: 13/05/2017
Surface Elevation: 11.08 m
Coords: N 3454271.769, 525963.045
Cone Type: Icone ELCI-CFXYP20-10-AR-Piezocone
Cone Operator: Eng. Mohammed - Eng. Maysara

**Project:** **Samawa Combined Cycle Power Plant**
**Location:** **Samawa Governorate for ENKA Insaat ve Sanayi A.S.**

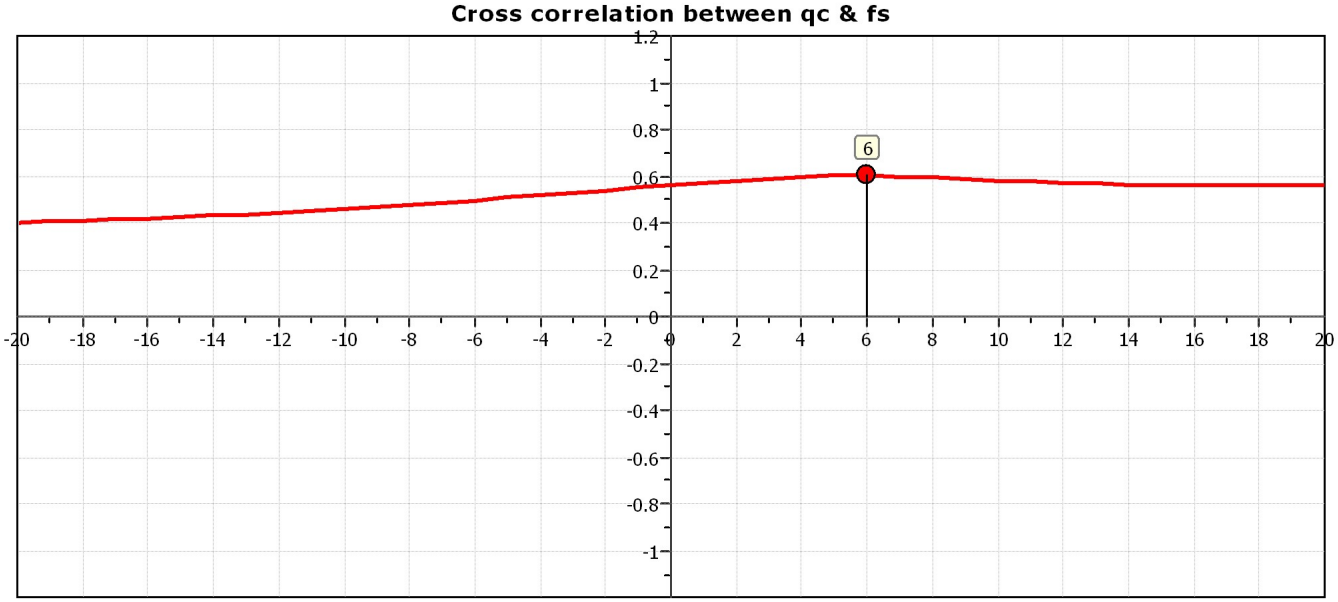



**SBTn legend**

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained




The plot below presents the cross correlation coeficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two sucessive CPT measurements).



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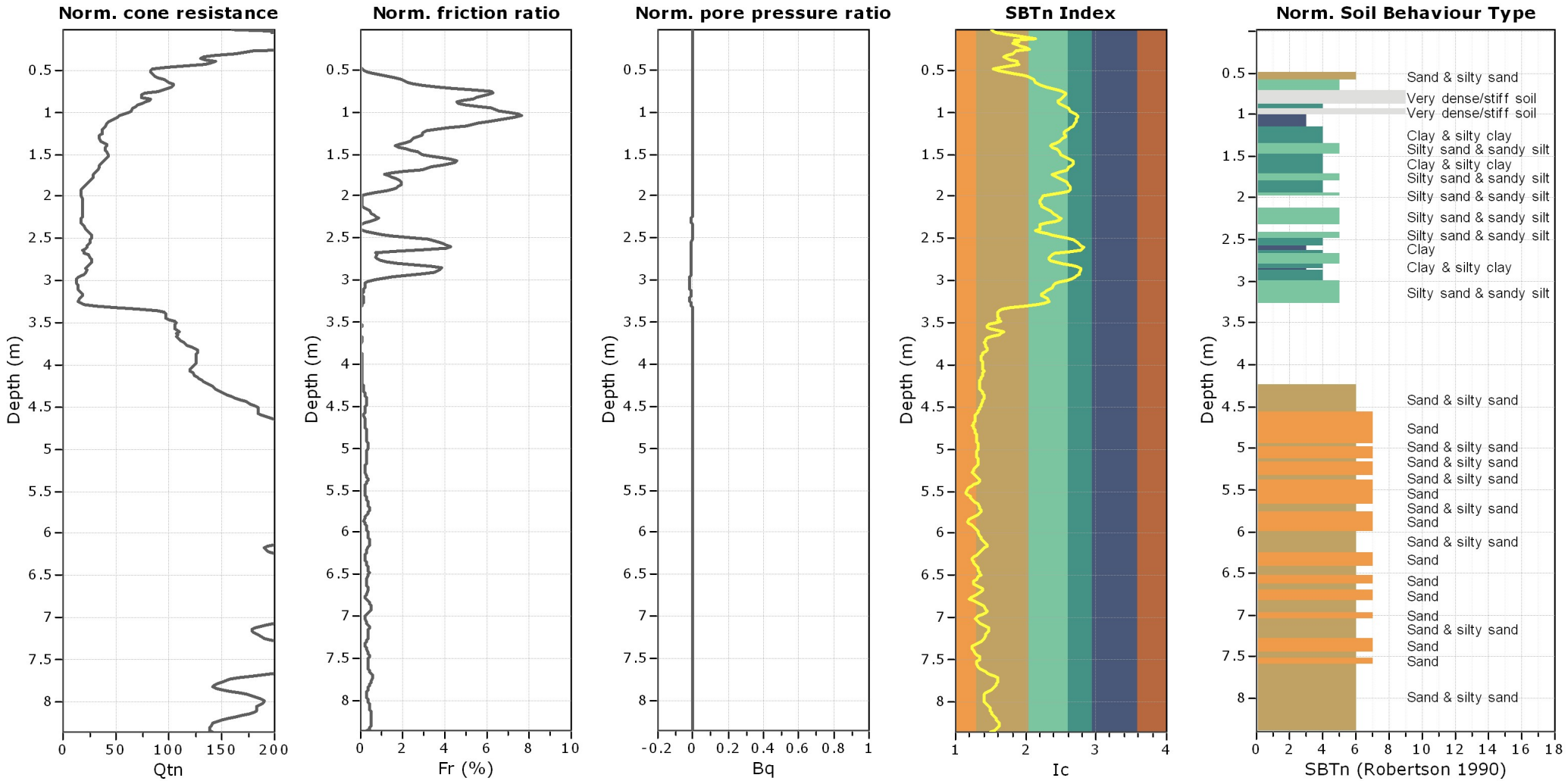
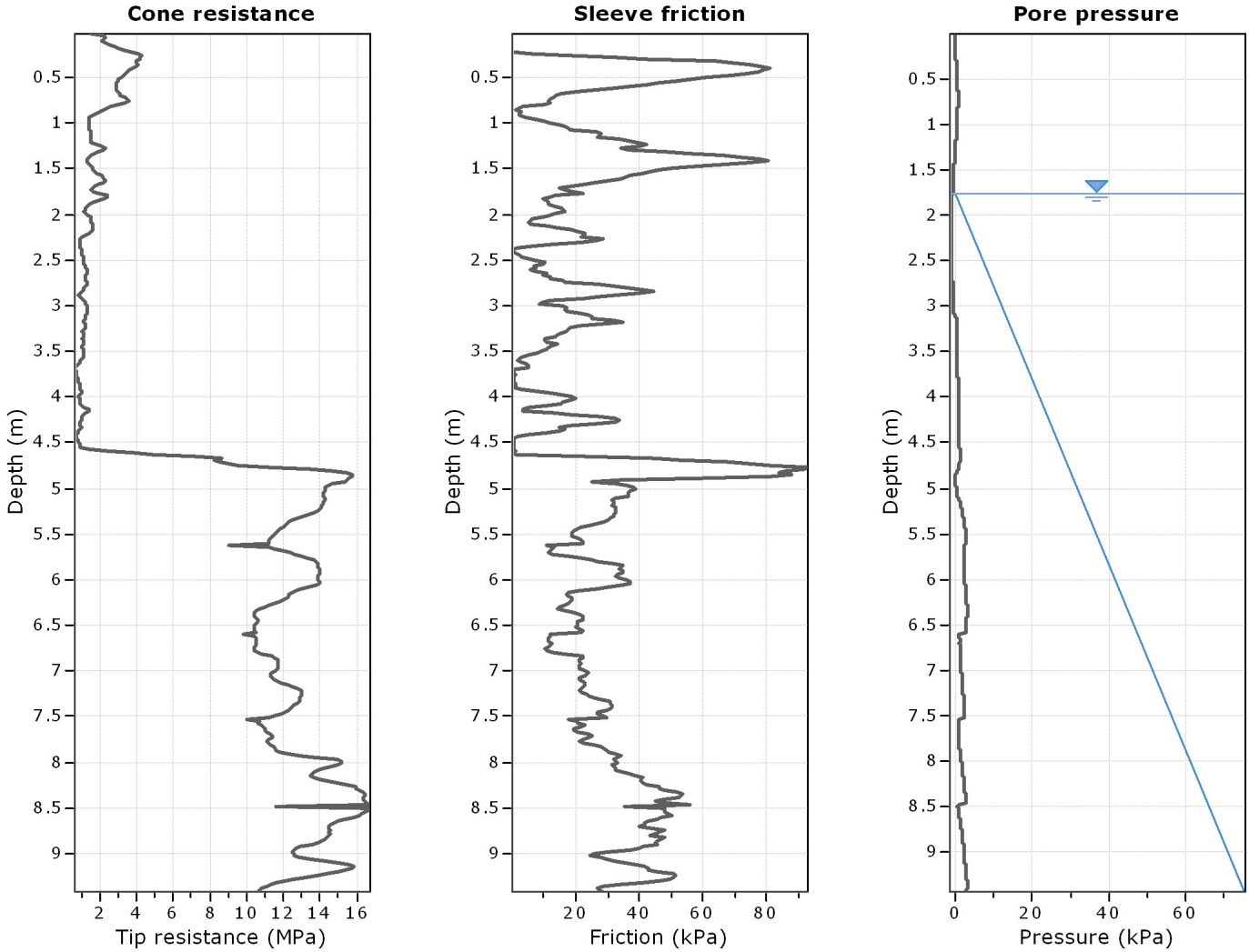
**CPT: SAMAWA CCPP_10**
Total depth: 8.36 m, Date: 13/05/2017
Surface Elevation: 9.94 m
Coords: N 3454237.823, E 525938.468
Cone Type: Icone ELCI-CFXYP20-10-AR-Piezocone
Cone Operator: Eng. Mohammed - Eng. Maysara

**Project:** **Samawa Combined Cycle Power Plant**
**Location:** **Samawa Governorate for ENKA Insaat ve Sanayi A.S.**

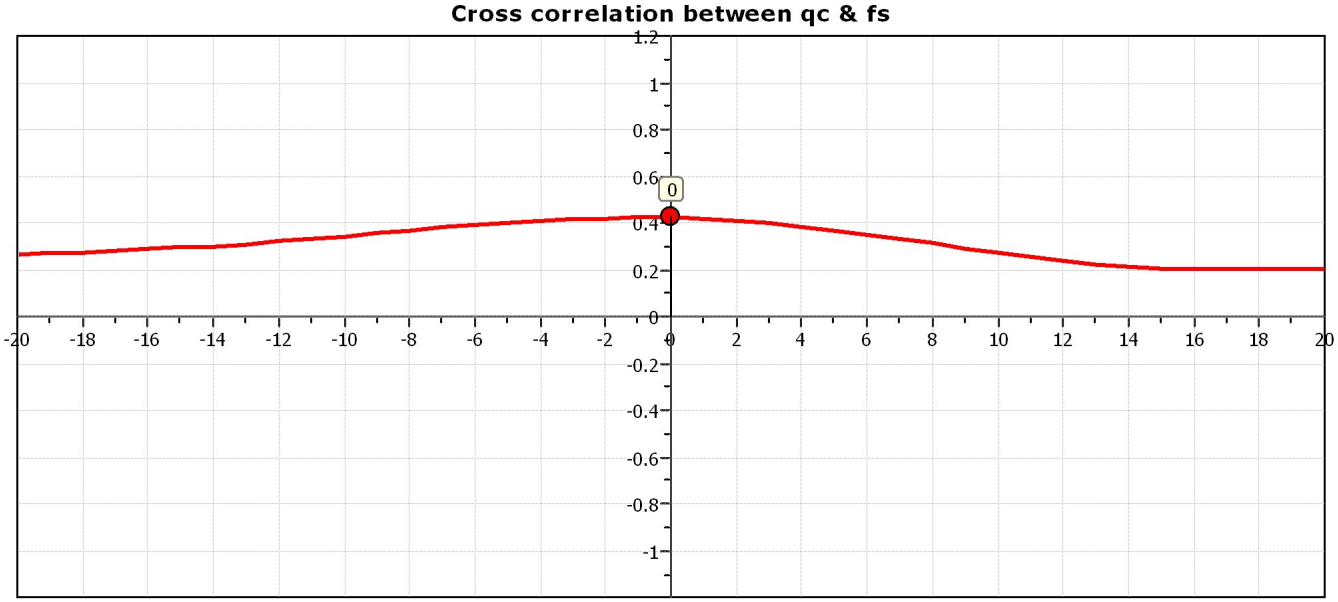



**SBTn legend**

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained




The plot below presents the cross correlation coeficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two sucessive CPT measurements).



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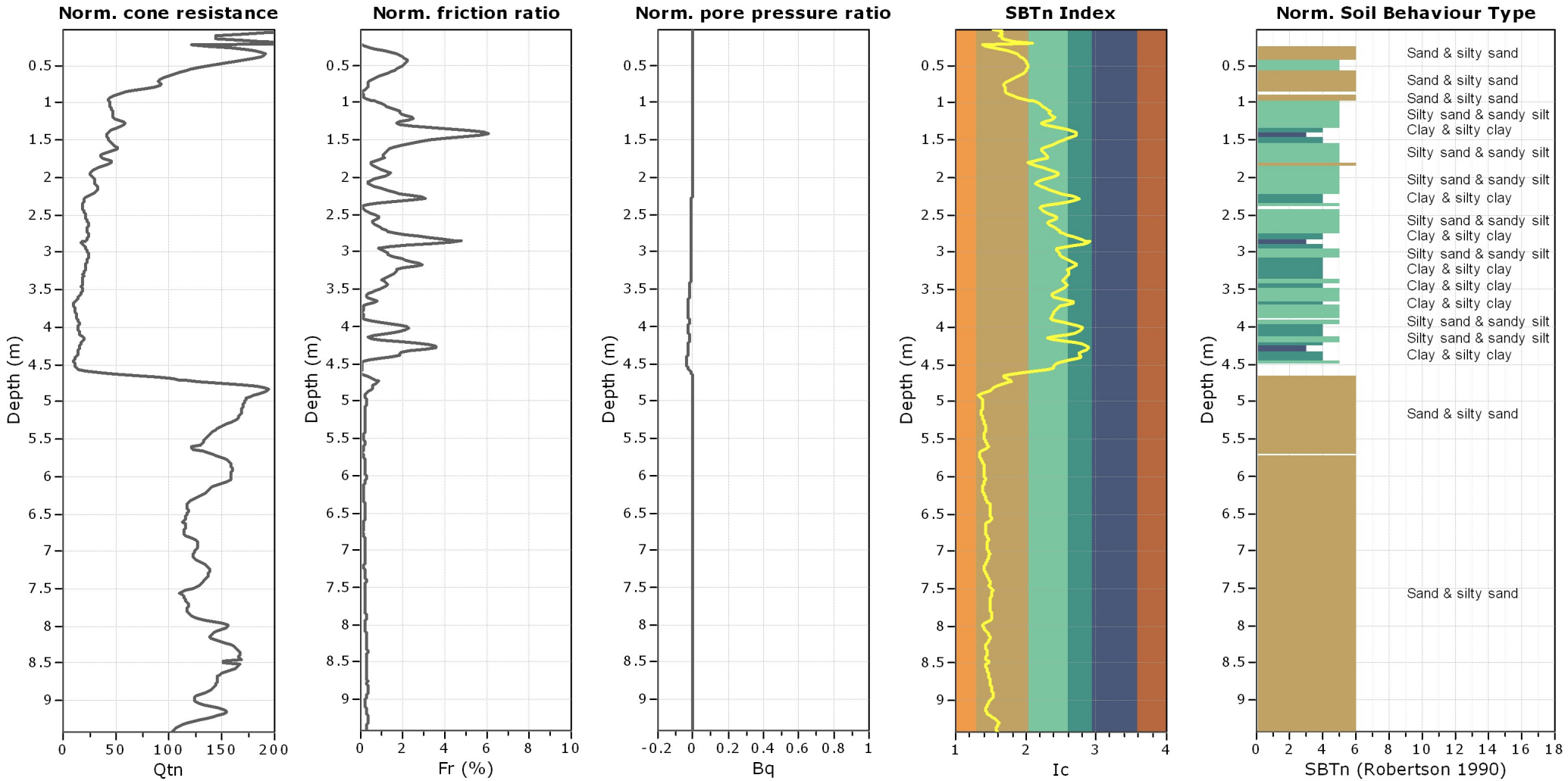
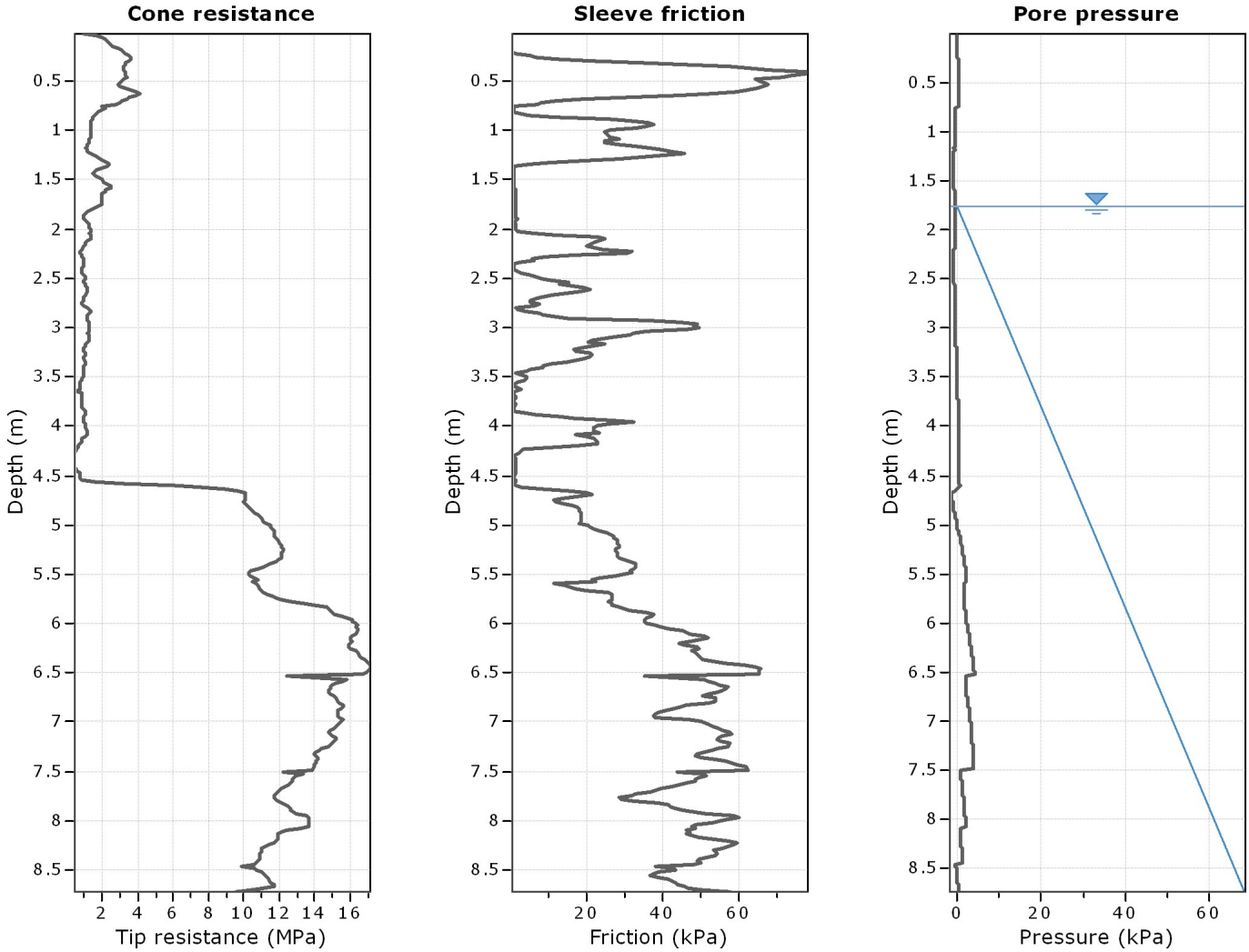
**CPT: SAMAWA CCPP_11**
Total depth: 9.42 m, Date: 13/05/2017
Surface Elevation: 11.46 m
Coords: N 3454292.421, E 526030.498
Cone Type: Icone ELCI-CFXYP20-10-AR-Piezocone
Cone Operator: Eng. Mohammed - Eng. Maysara

**Project:** **Samawa Combined Cycle Power Plant**
**Location:** **Samawa Governorate for ENKA Insaat ve Sanayi A.S.**

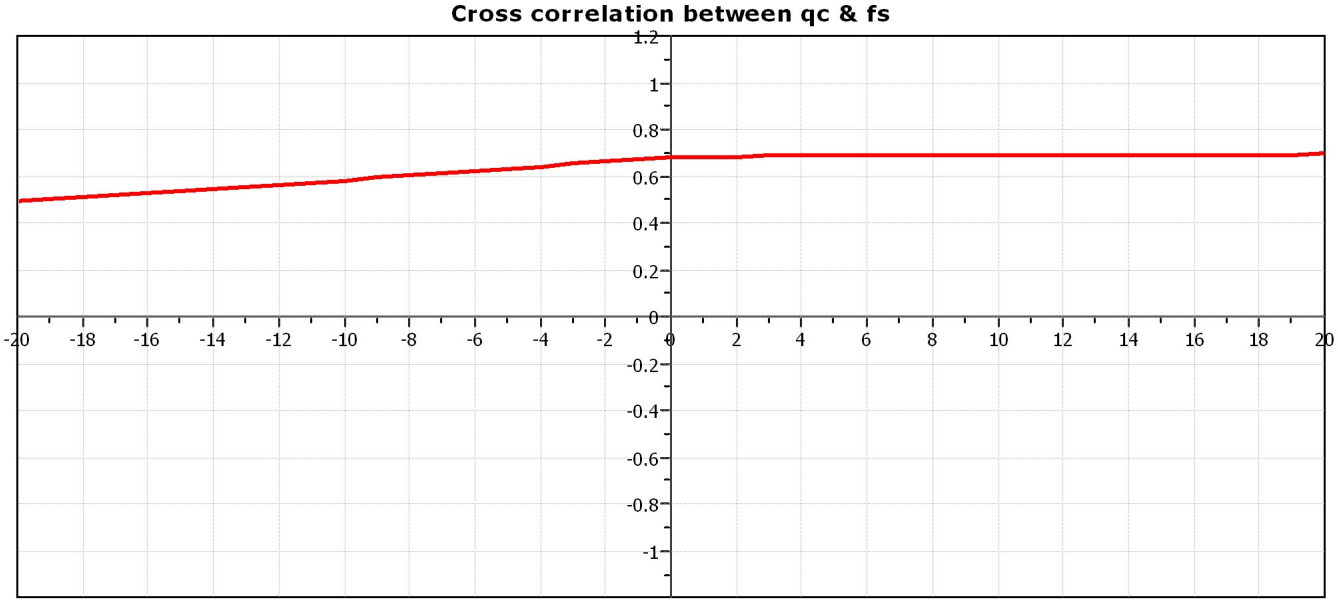



**SBTn legend**

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained




The plot below presents the cross correlation coeficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two sucessive CPT measurements).



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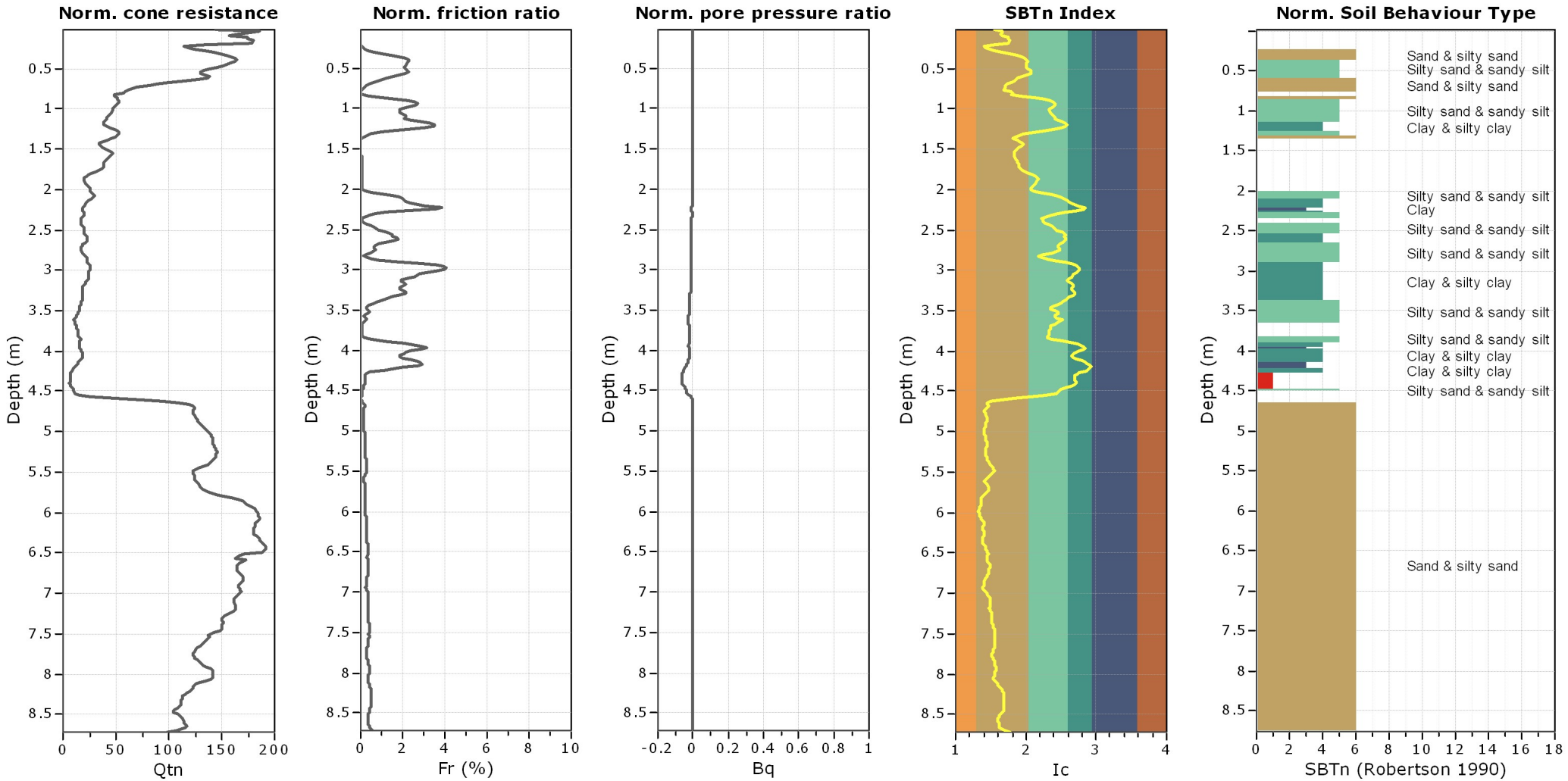
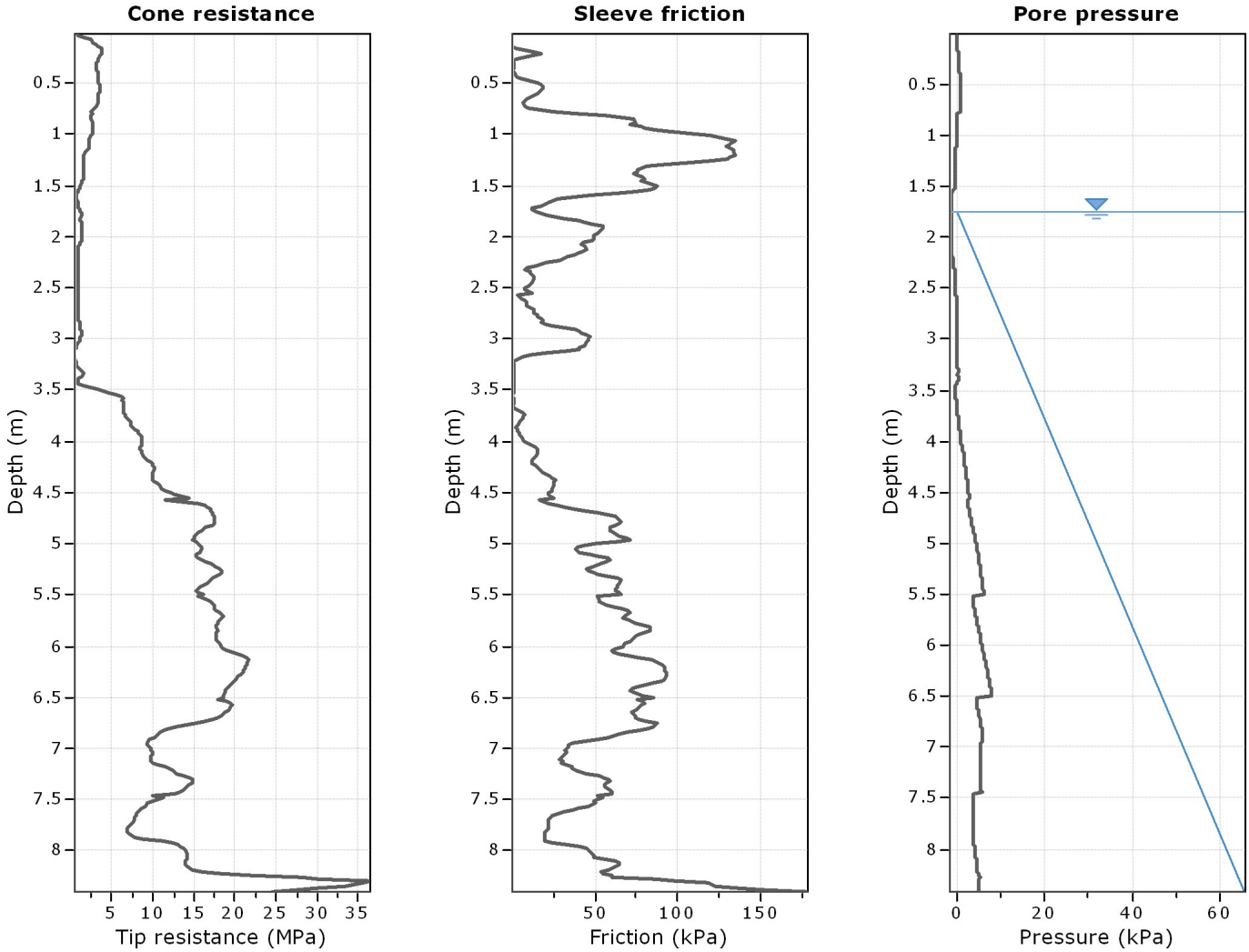
**CPT: SAMAWA CCPP_12**
Total depth: 8.72 m, Date: 13/05/2017
Surface Elevation: 11.36 m
Coords: N 3454270.234, E 526008.313
Cone Type: Icone ELCI-CFXYP20-10-AR-Piezocone
Cone Operator: Eng. Mohammed - Eng. Maysara

**Project:** **Samawa Combined Cycle Power Plant**
**Location:** **Samawa Governorate for ENKA Insaat ve Sanayi A.S.**

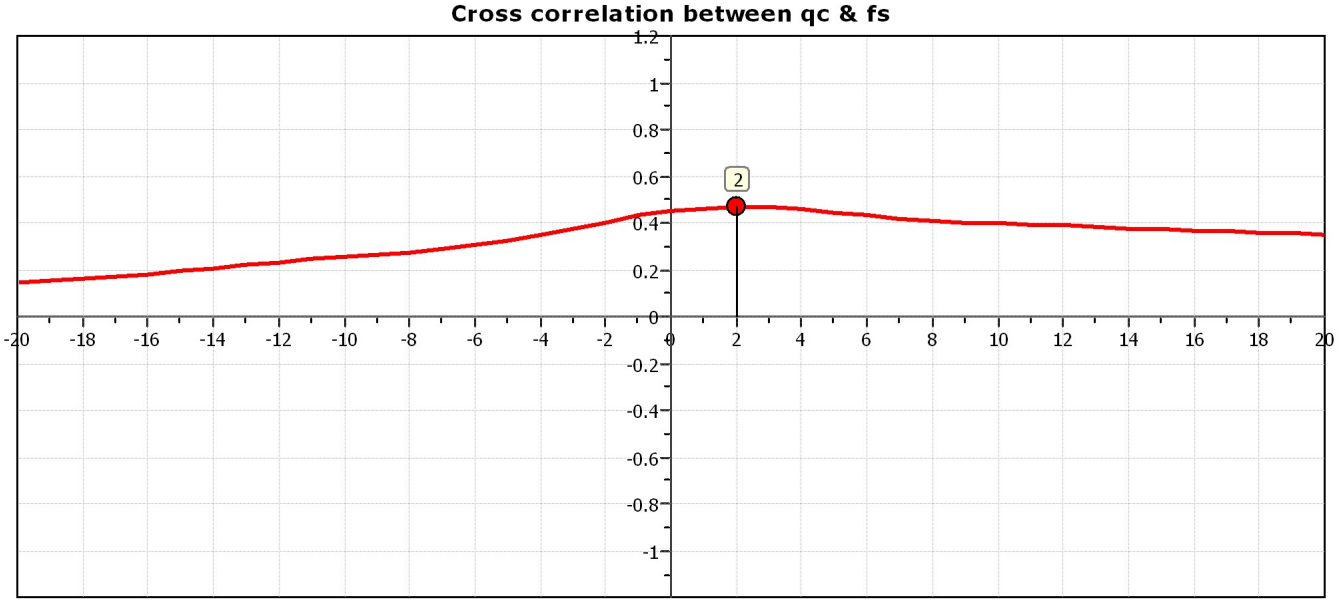



**SBTn legend**

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained




The plot below presents the cross correlation coeficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two sucessive CPT measurements).



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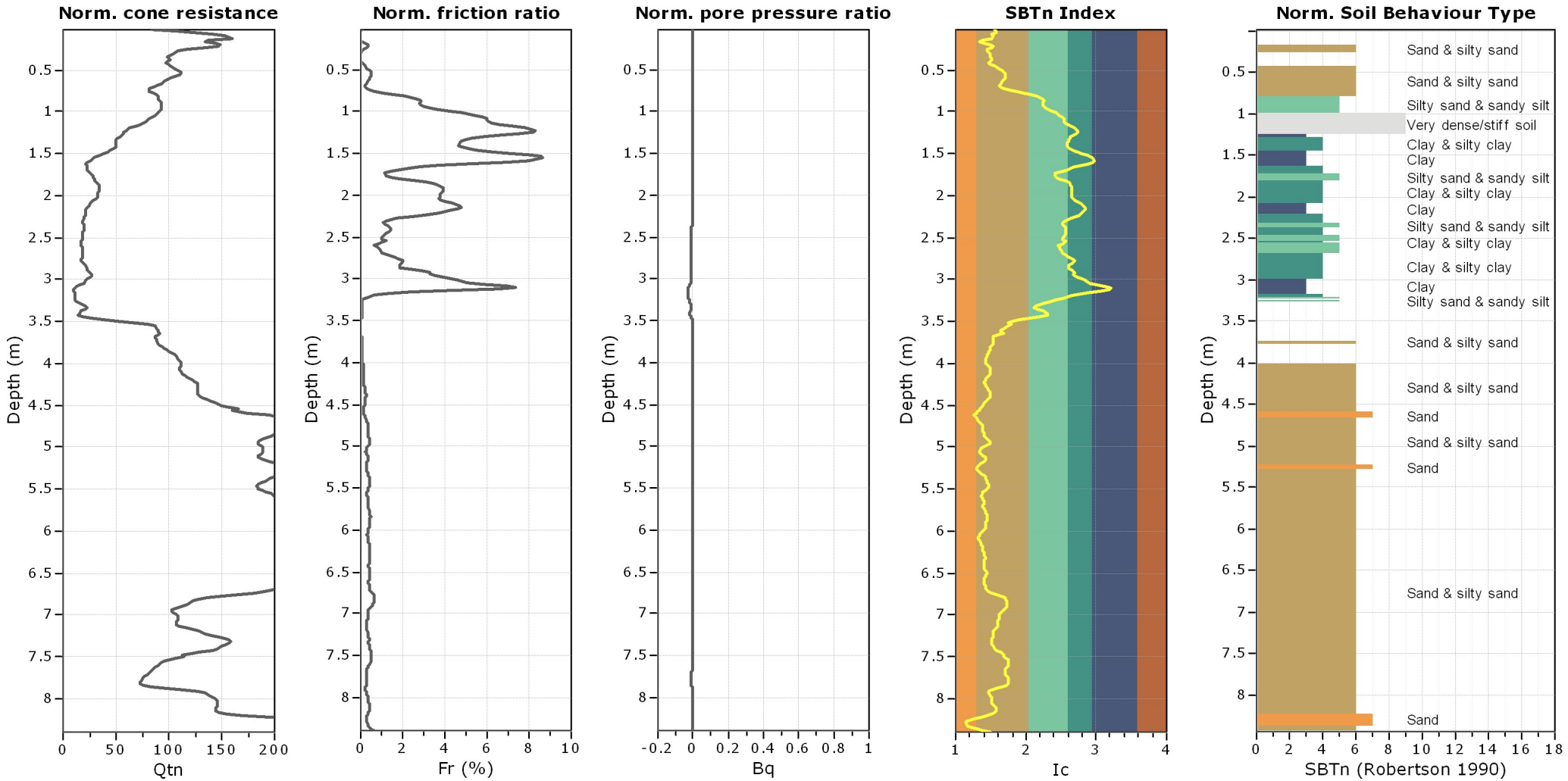
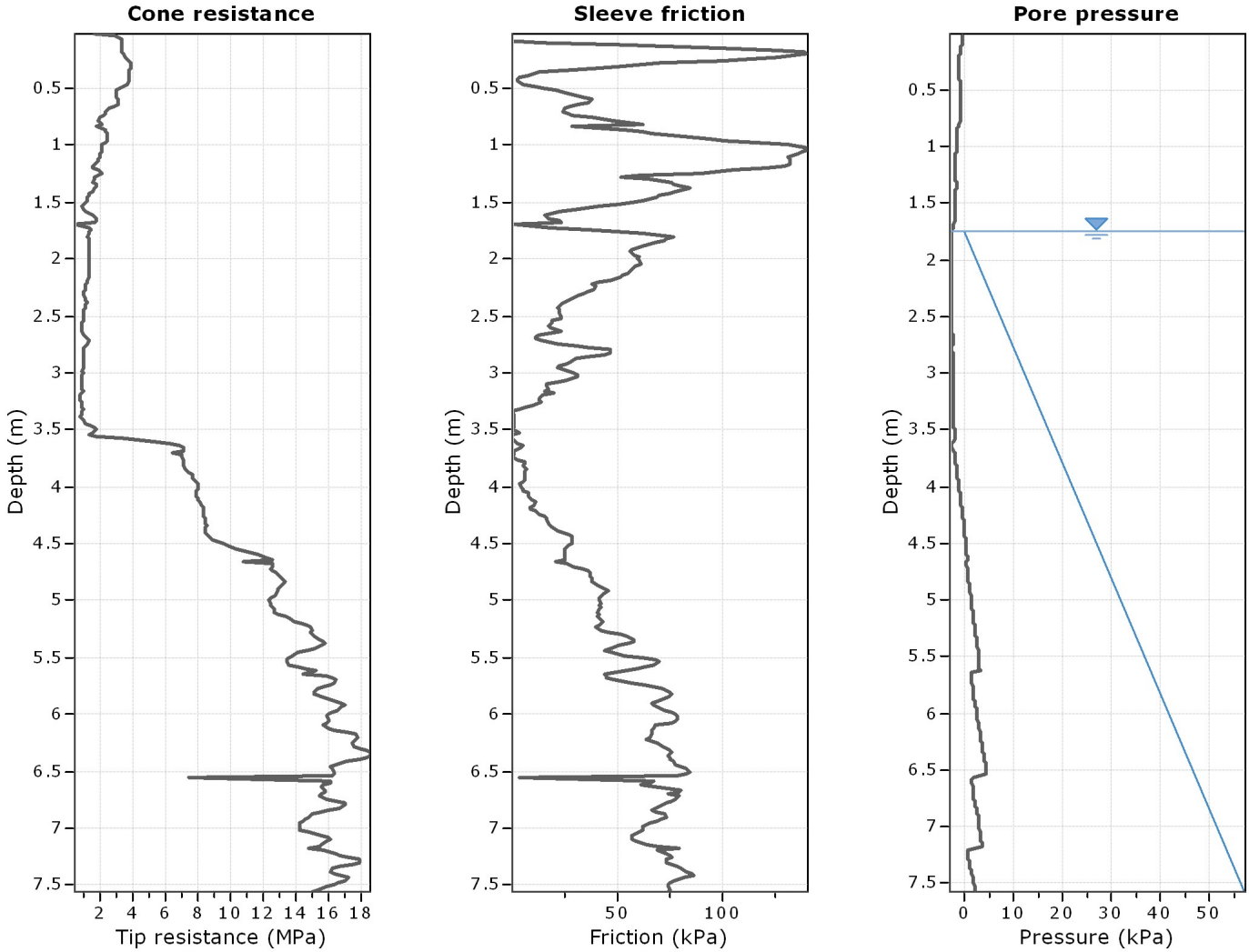
**CPT: SAMAWA CCPP_13**
Total depth: 8.40 m, Date: 13/05/2017
Surface Elevation: 10.14 m
Coords: N 3454220.508, E 525974.532
Cone Type: Icone ELCI-CFXYP20-10-AR-Piezocone
Cone Operator: Eng. Mohammed - Eng. Maysara

**Project:** **Samawa Combined Cycle Power Plant**
**Location:** **Samawa Governorate for ENKA Insaat ve Sanayi A.S.**

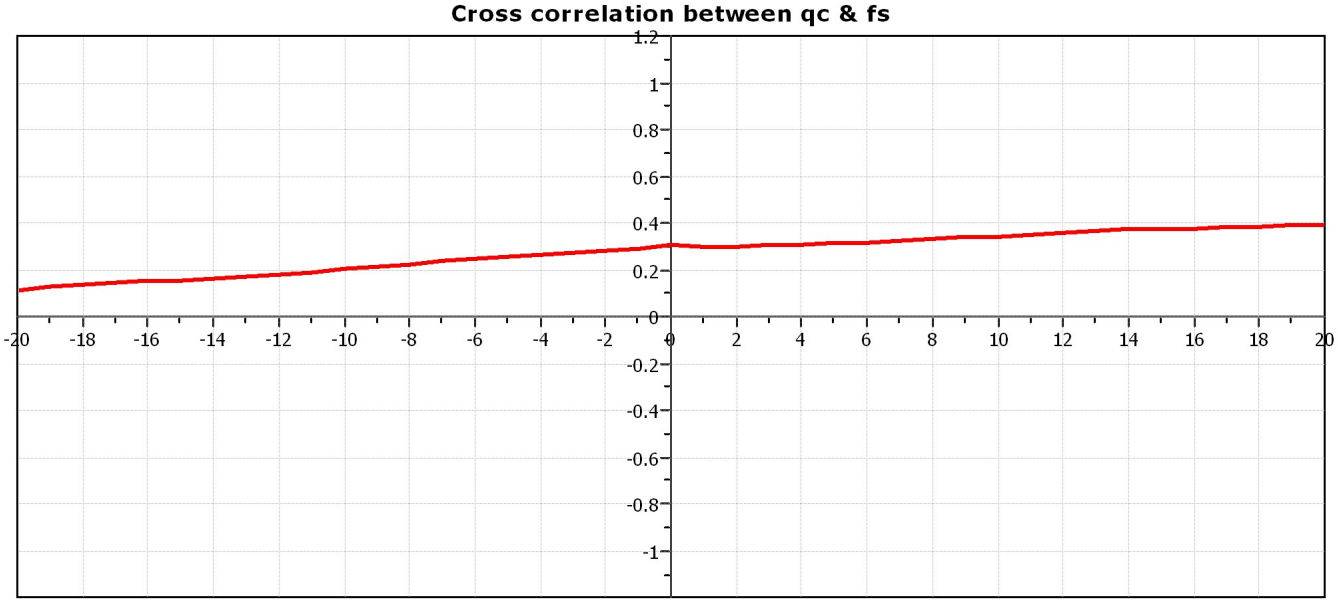



**SBTn legend**

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained




The plot below presents the cross correlation coeficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two sucessive CPT measurements).



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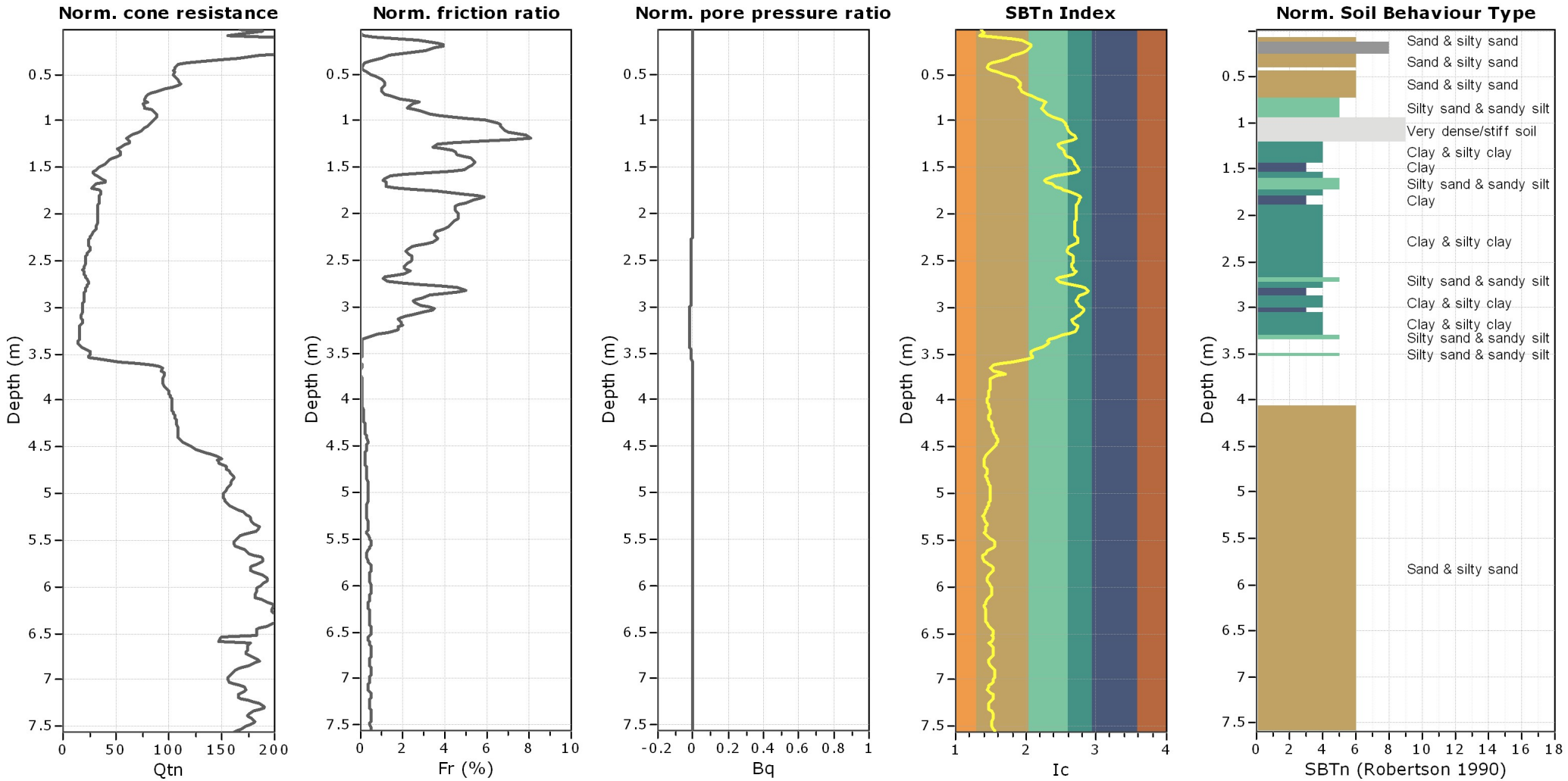
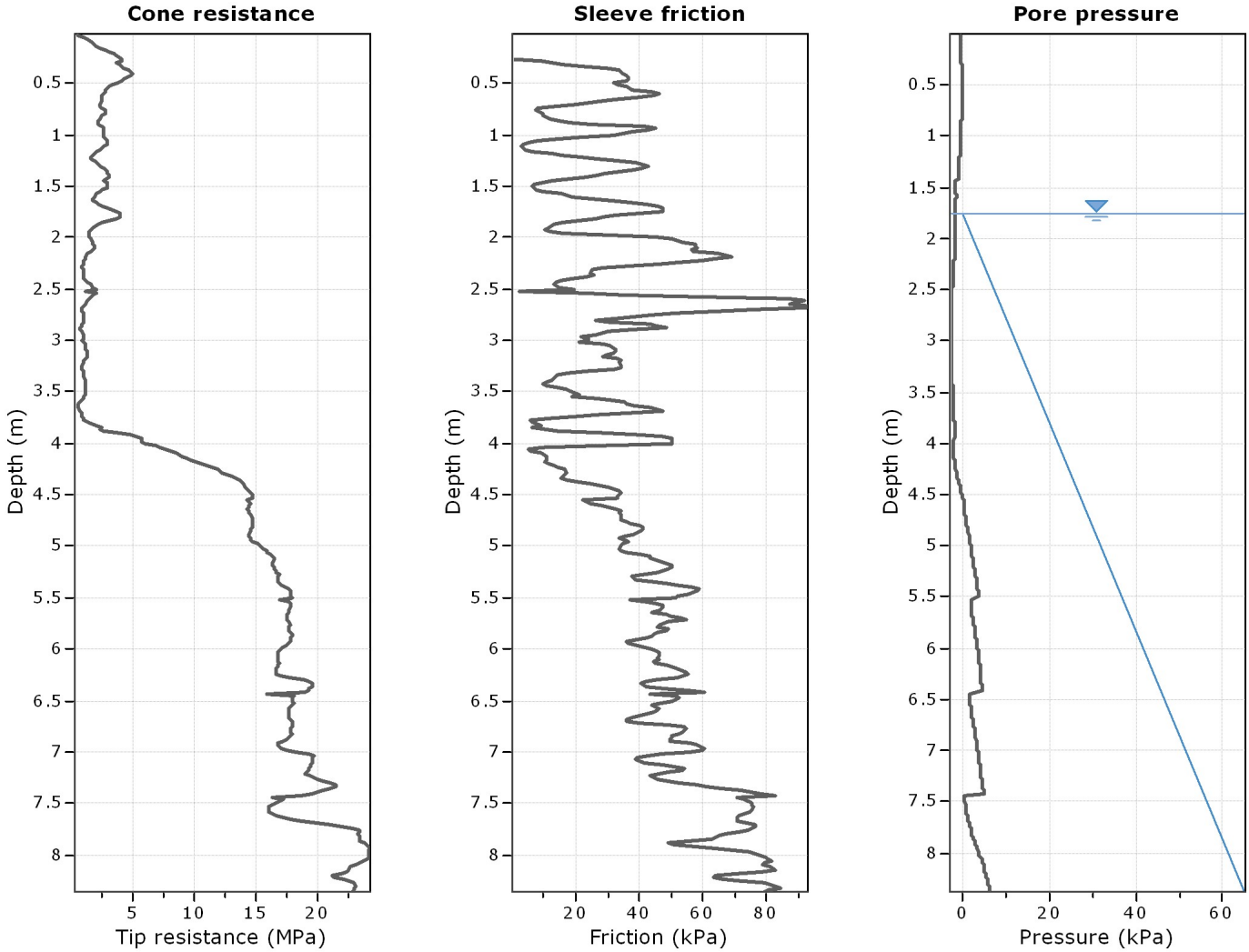
**CPT: SAMAWA CCPP_14**
Total depth: 7.56 m, Date: 13/05/2017
Surface Elevation: 10.11 m
Coords: N 3454195.778, E 525988.054
Cone Type: Icone ELCI-CFXYP20-10-AR-Piezocone
Cone Operator: Eng. Mohammed - Eng. Maysara

**Project:** **Samawa Combined Cycle Power Plant**
**Location:** **Samawa Governorate for ENKA Insaat ve Sanayi A.S.**

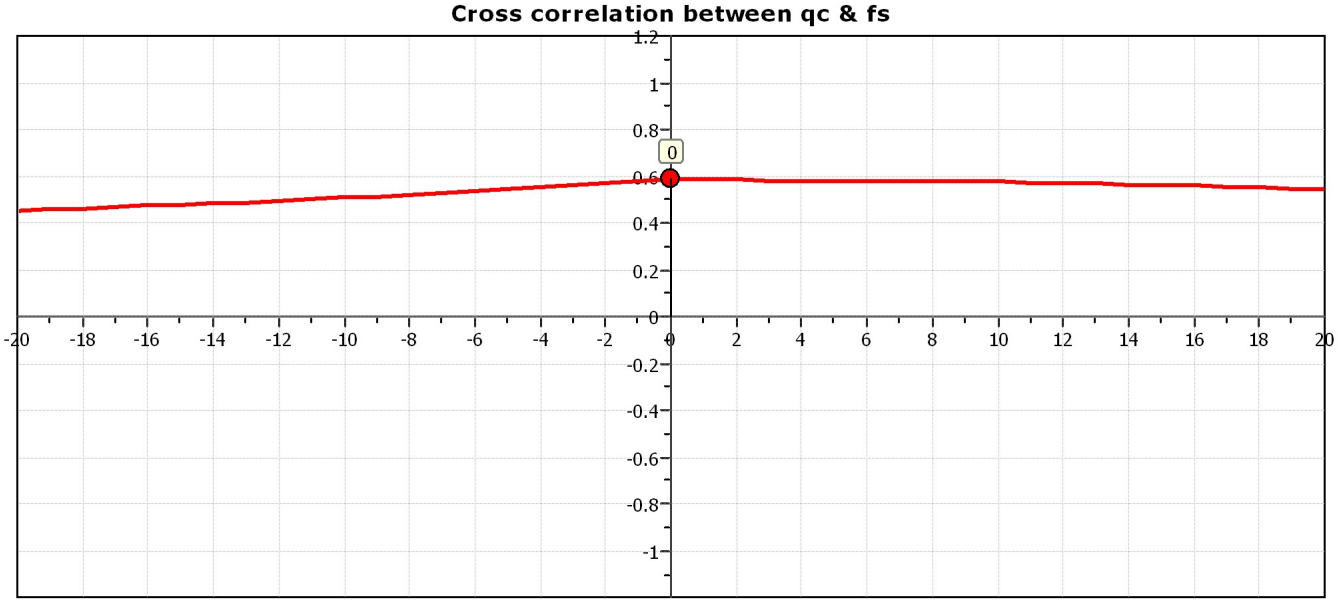



**SBTn legend**

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained




The plot below presents the cross correlation coeficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two sucessive CPT measurements).



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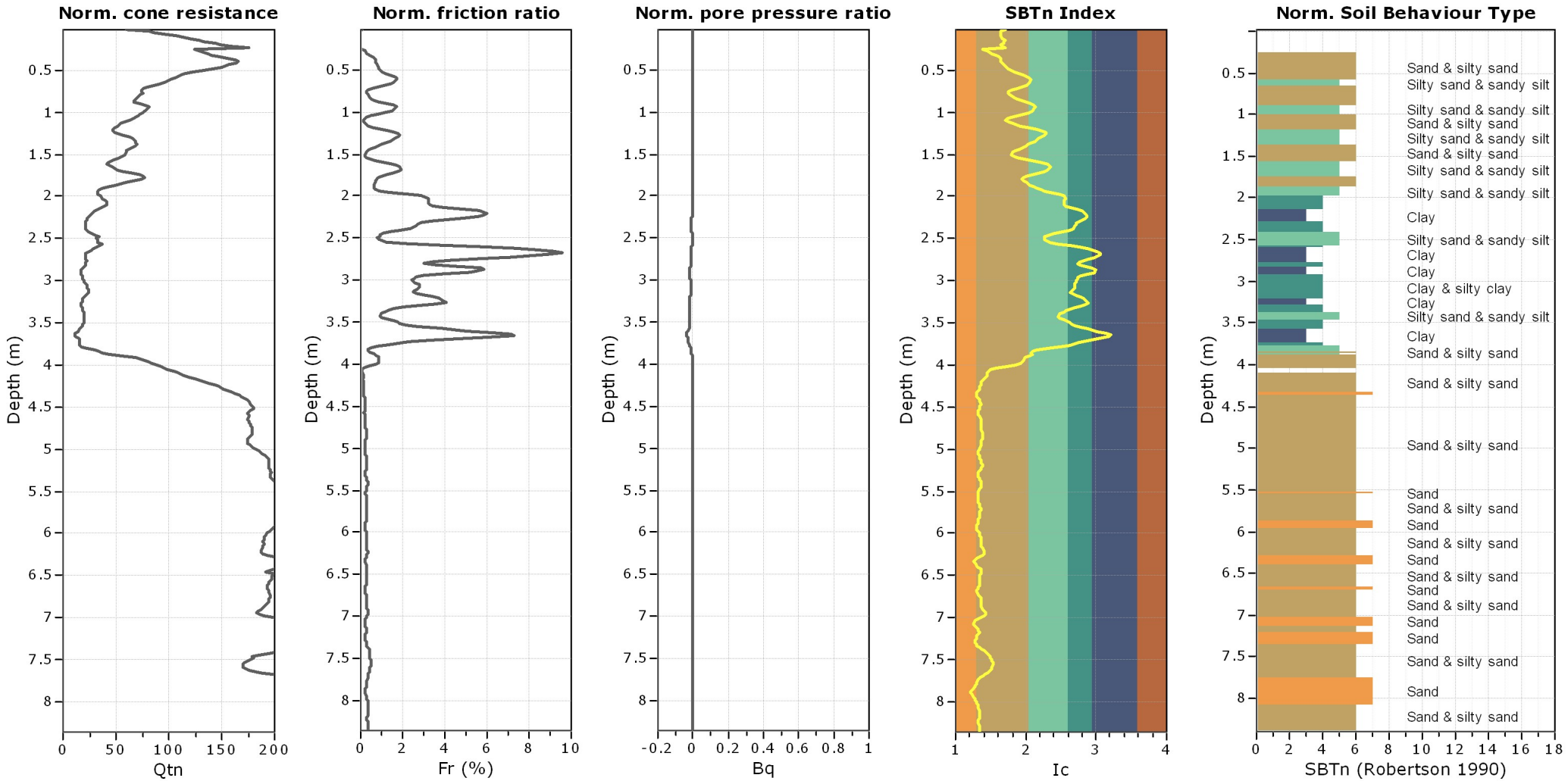
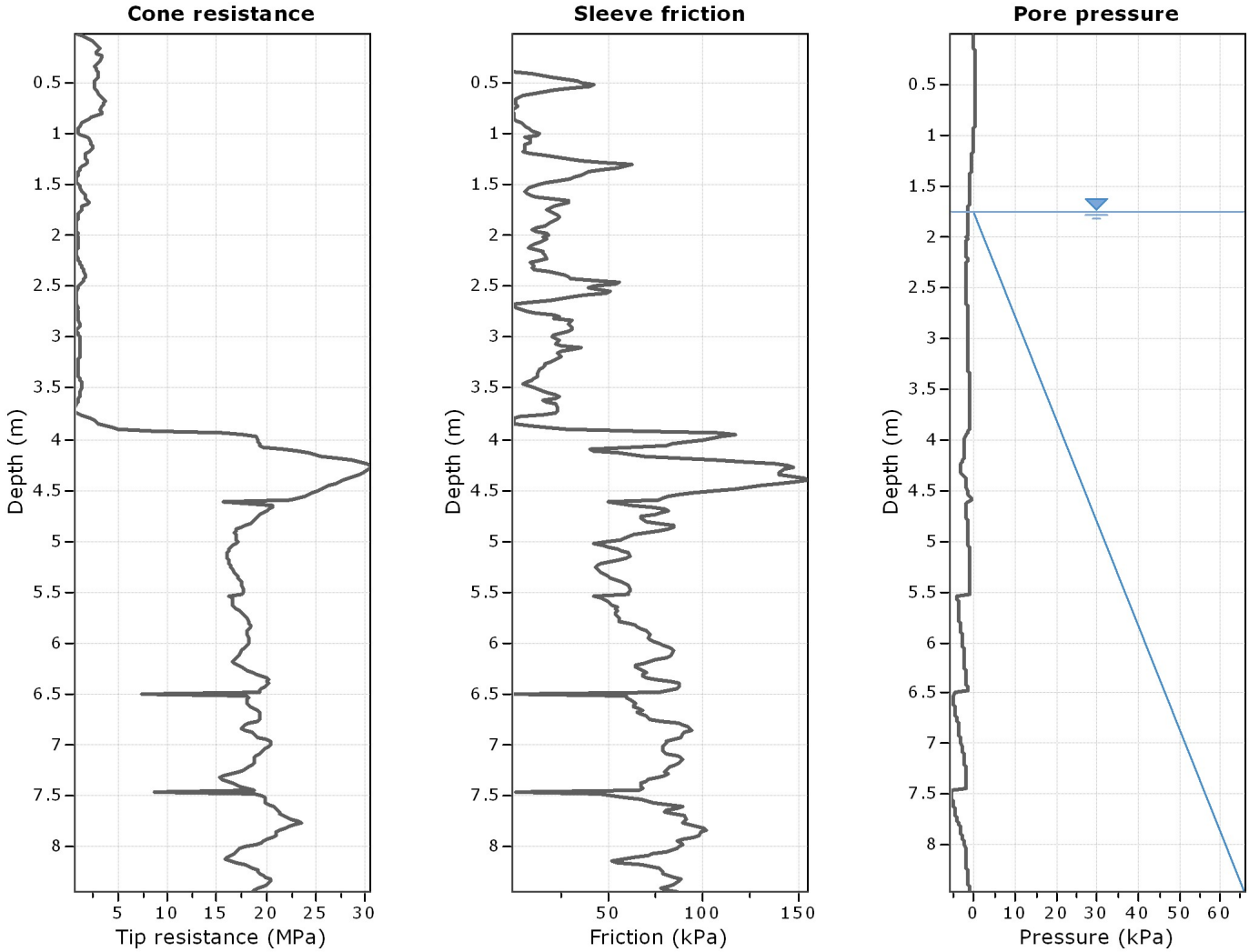
**CPT: SAMAWA CCPP_15**
Total depth: 8.36 m, Date: 13/05/2017
Surface Elevation: 11.34 m
Coords: N 3454208.814, E 526123.464
Cone Type: Icone ELCI-CFXYP20-10-AR-Piezocone
Cone Operator: Eng. Mohammed - Eng. Maysara

**Project:** **Samawa Combined Cycle Power Plant**
**Location:** **Samawa Governorate for ENKA Insaat ve Sanayi A.S.**

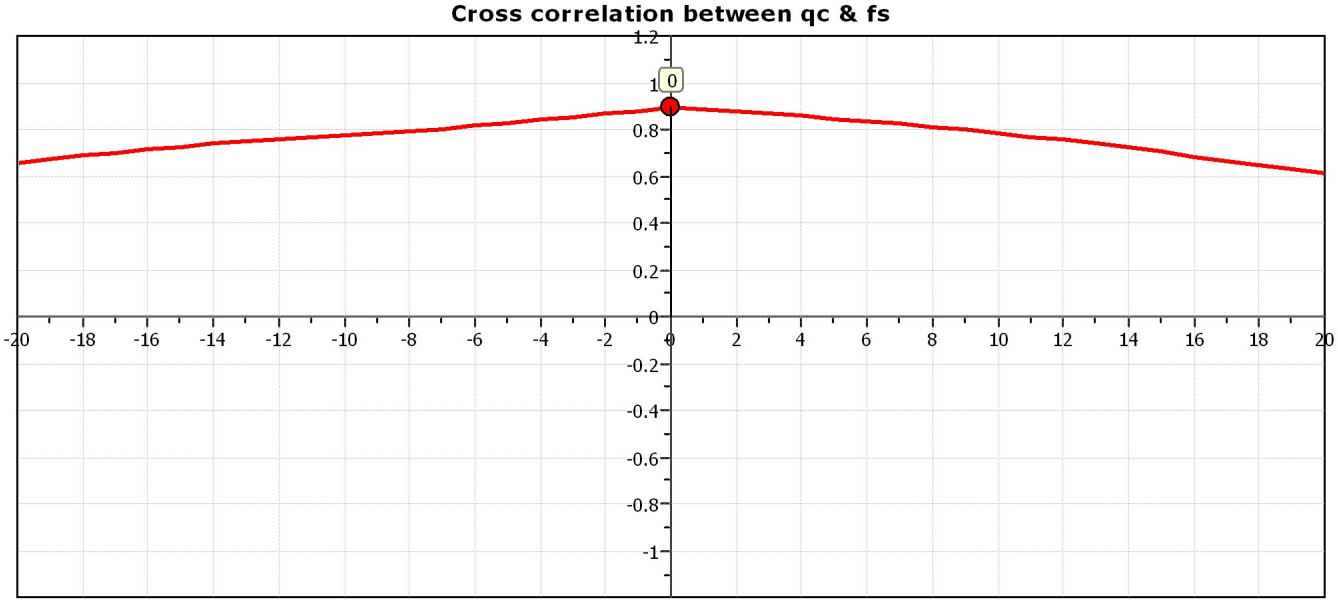



**SBTn legend**

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained




The plot below presents the cross correlation coeficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two sucessive CPT measurements).



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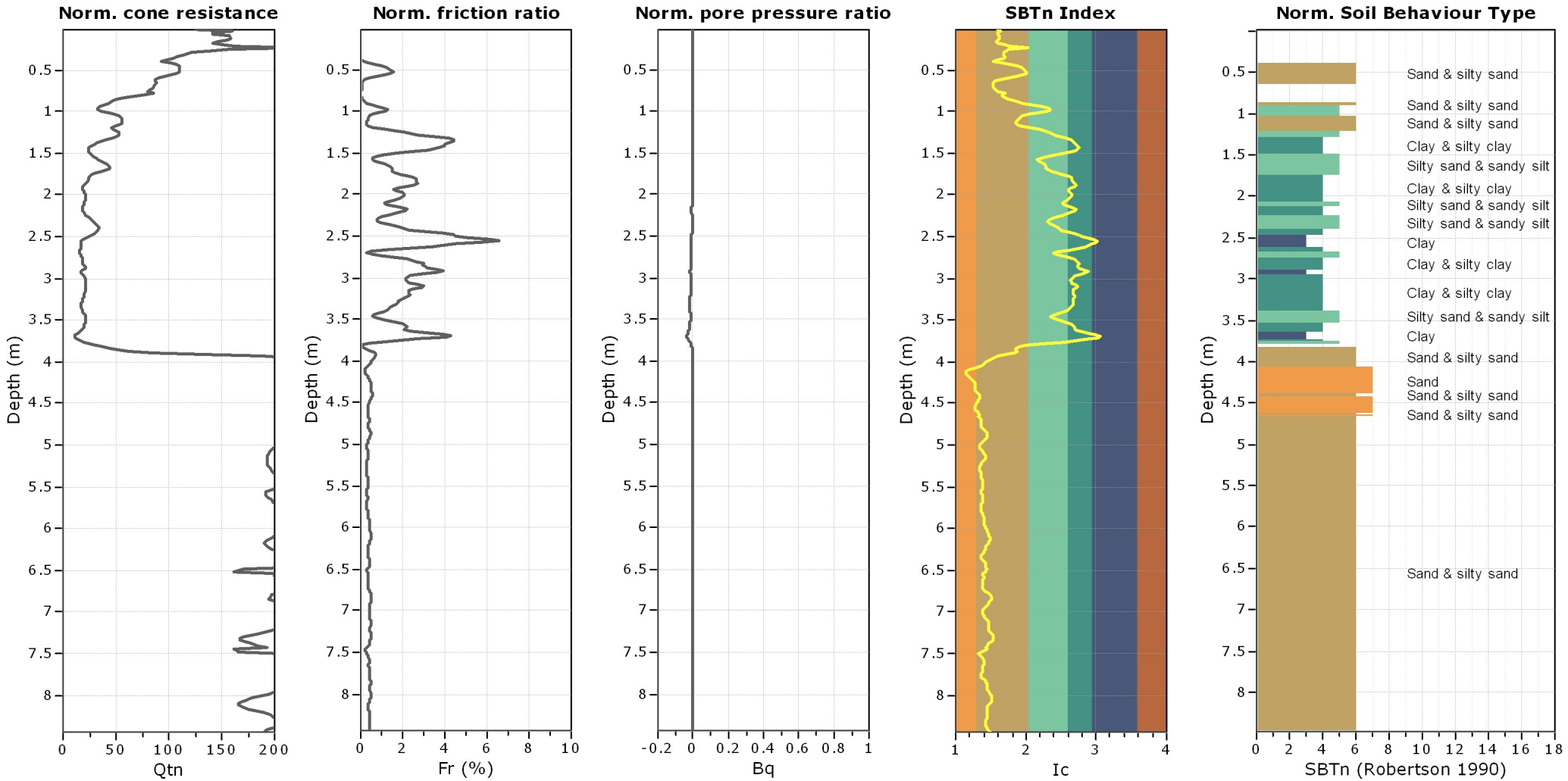
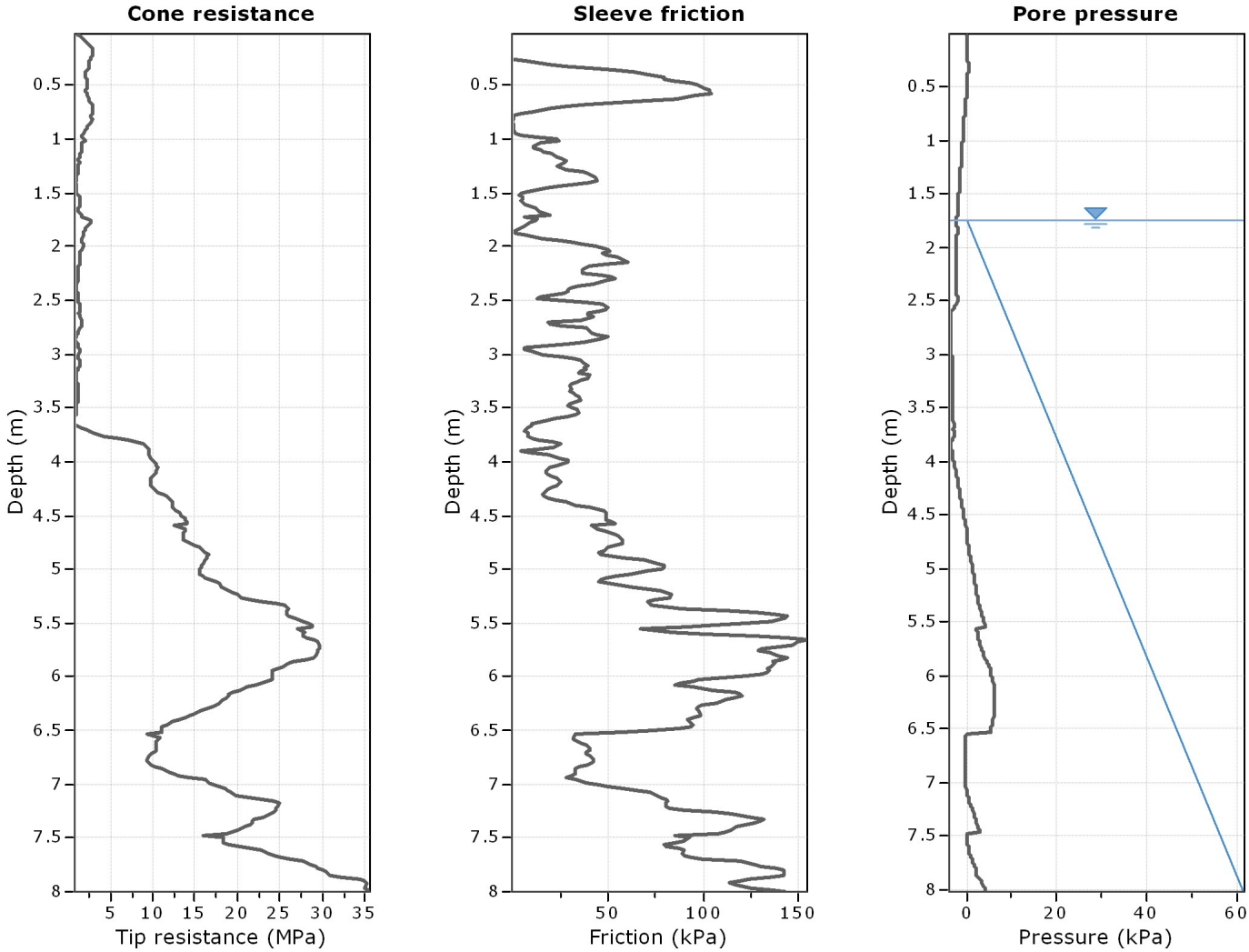
**CPT: SAMAWA CCPP_16**
Total depth: 8.44 m, Date: 13/05/2017
Surface Elevation: 11.56 m
Coords: N 3454138.256, E 526139.082
Cone Type: Icone ELCI-CFXYP20-10-AR-Piezocone
Cone Operator: Eng. Mohammed - Eng. Maysara

**Project:** **Samawa Combined Cycle Power Plant**
**Location:** **Samawa Governorate for ENKA Insaat ve Sanayi A.S.**

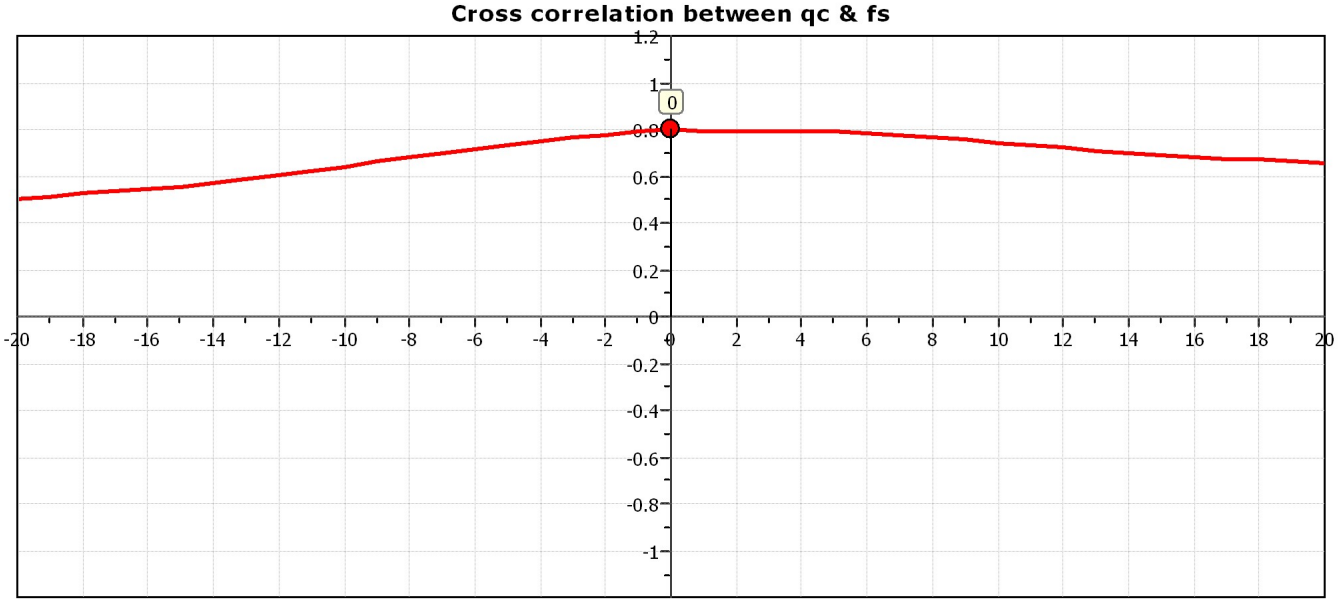



**SBTn legend**

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained




The plot below presents the cross correlation coeficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two sucessive CPT measurements).



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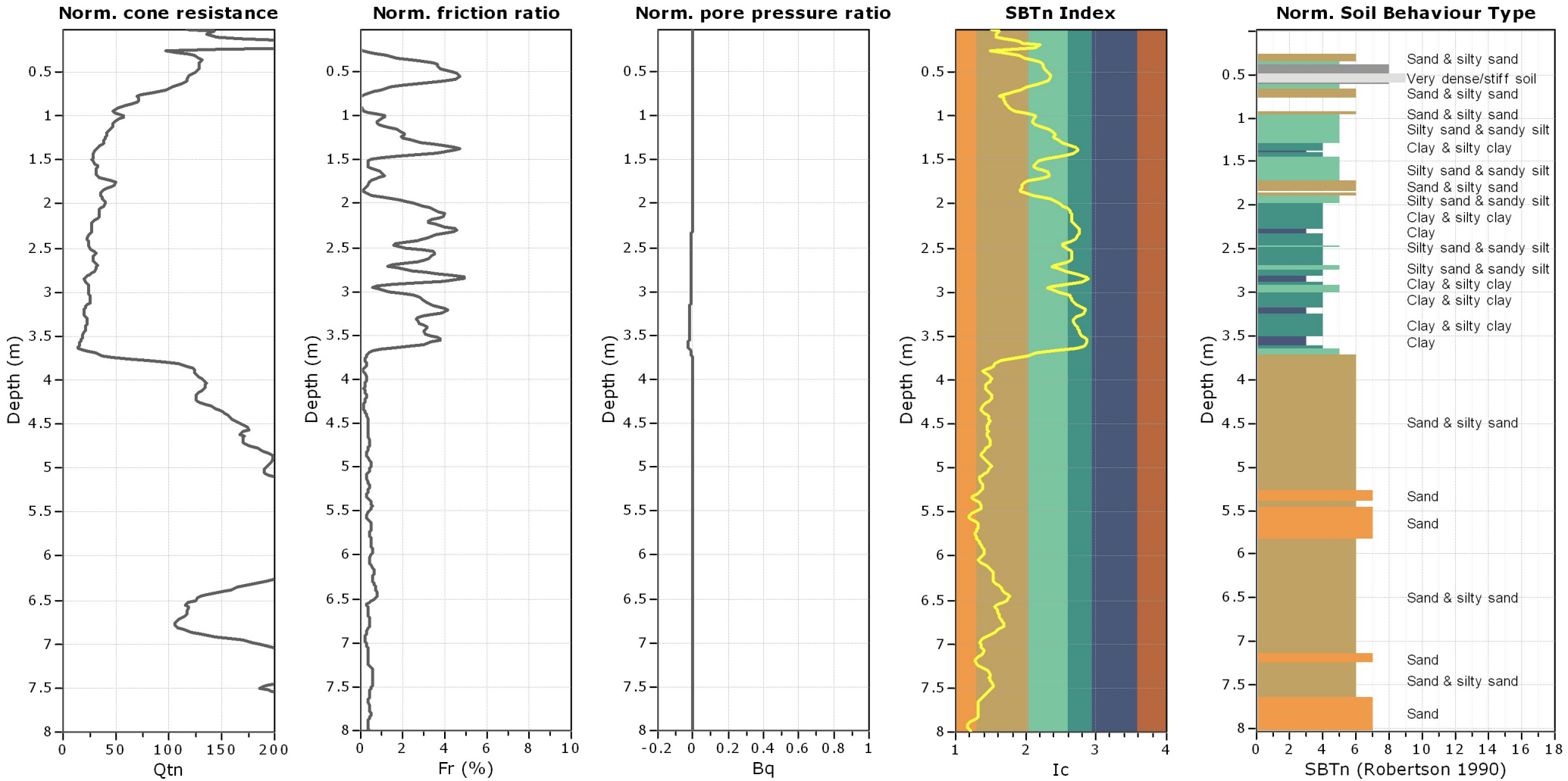
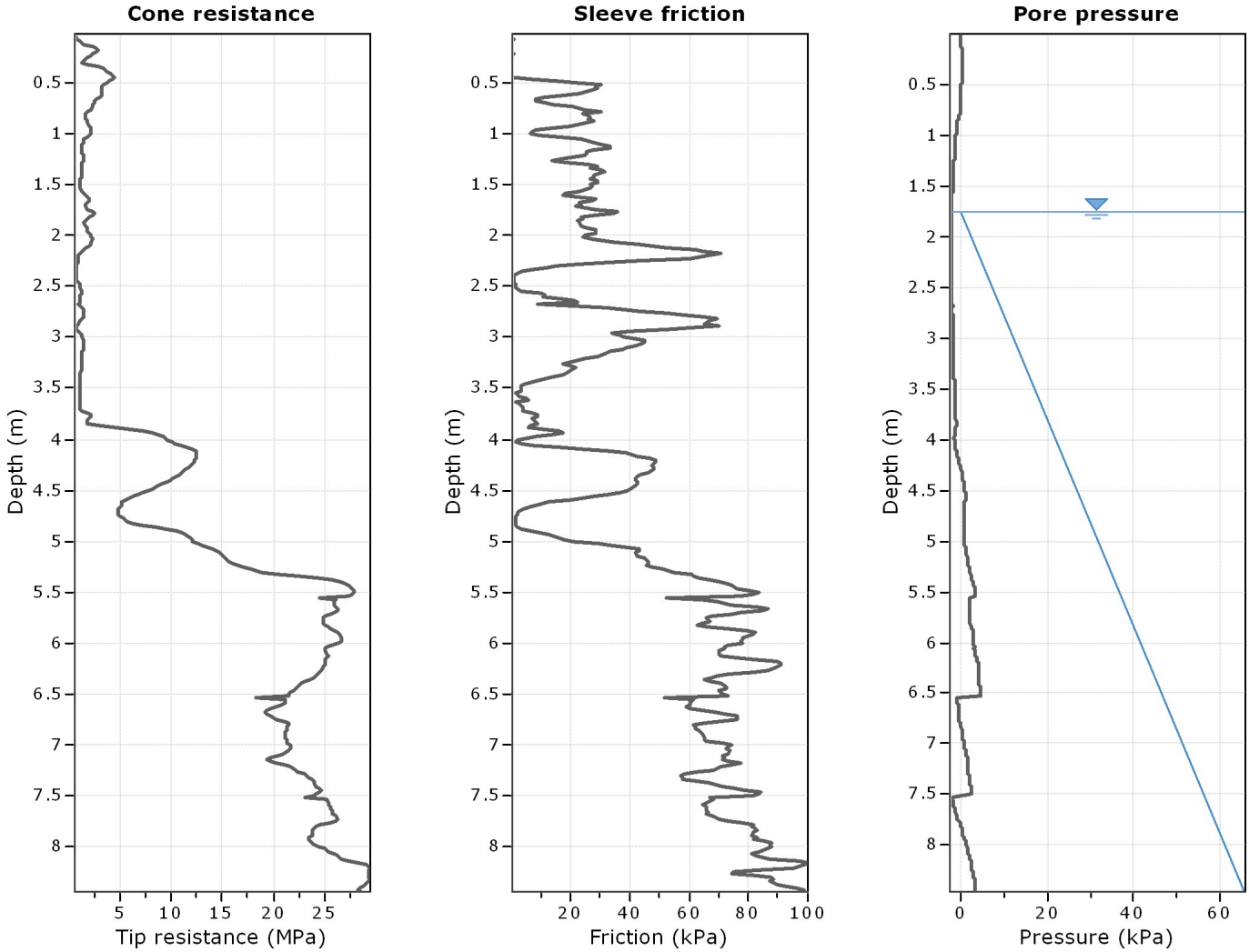
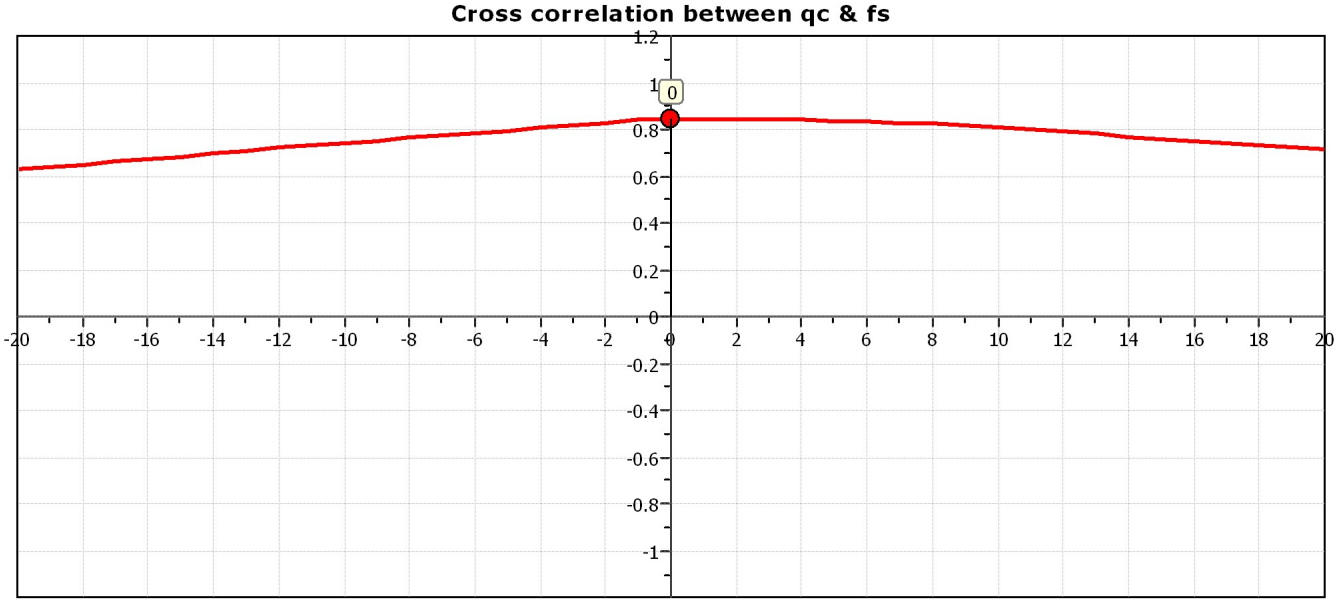
**CPT: SAMAWA CCPP_17**
Total depth: 8.00 m, Date: 13/05/2017
Surface Elevation: 11.58 m
Coords: N 3454158.854, E 526217.921
Cone Type: Icone ELCI-CFXYP20-10-AR-Piezocone
Cone Operator: Eng. Mohammed - Eng. Maysara

**Project:** **Samawa Combined Cycle Power Plant**
**Location:** **Samawa Governorate for ENKA Insaat ve Sanayi A.S.**






The plot below presents the cross correlation coeficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two sucessive CPT measurements).



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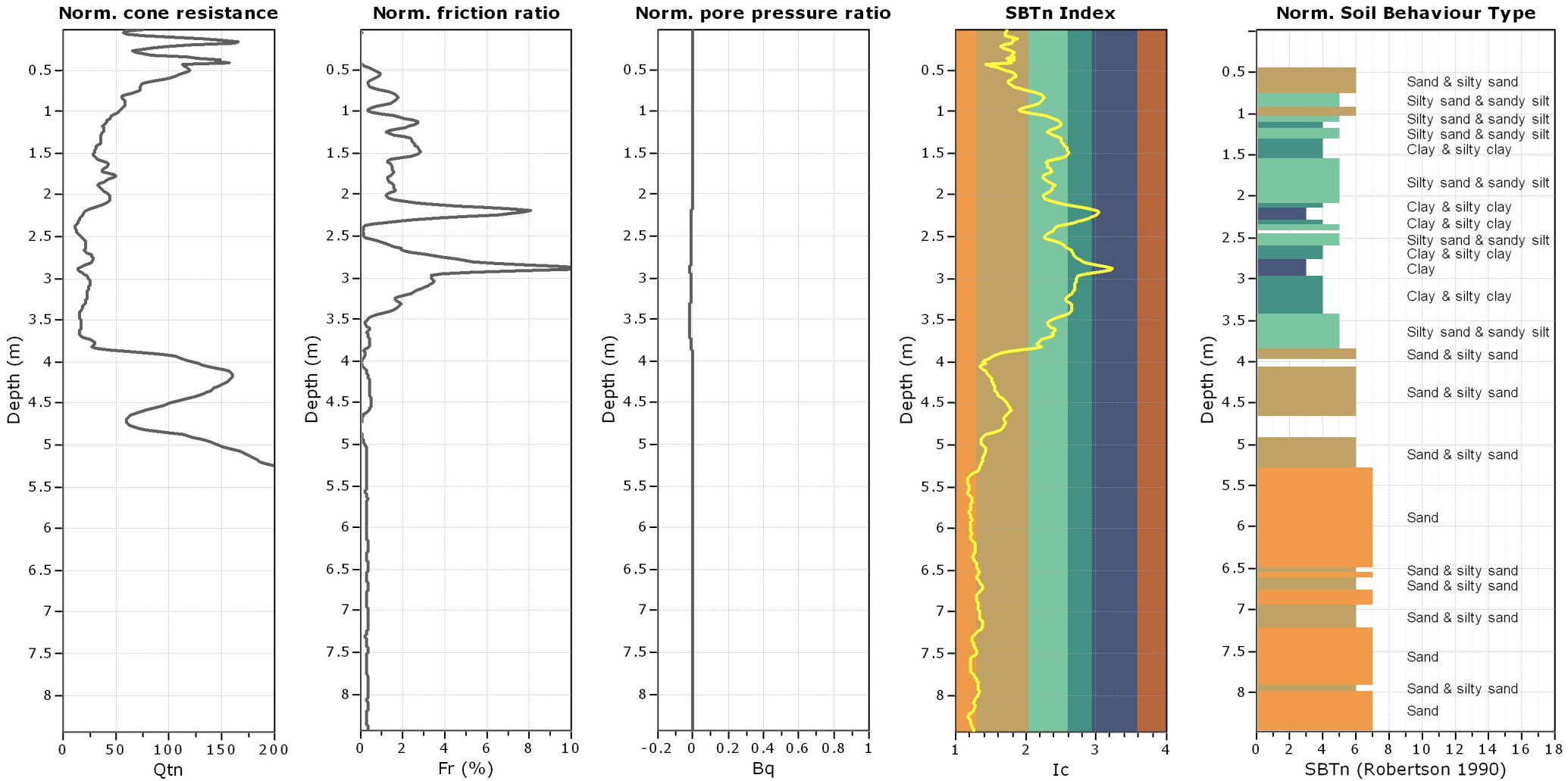
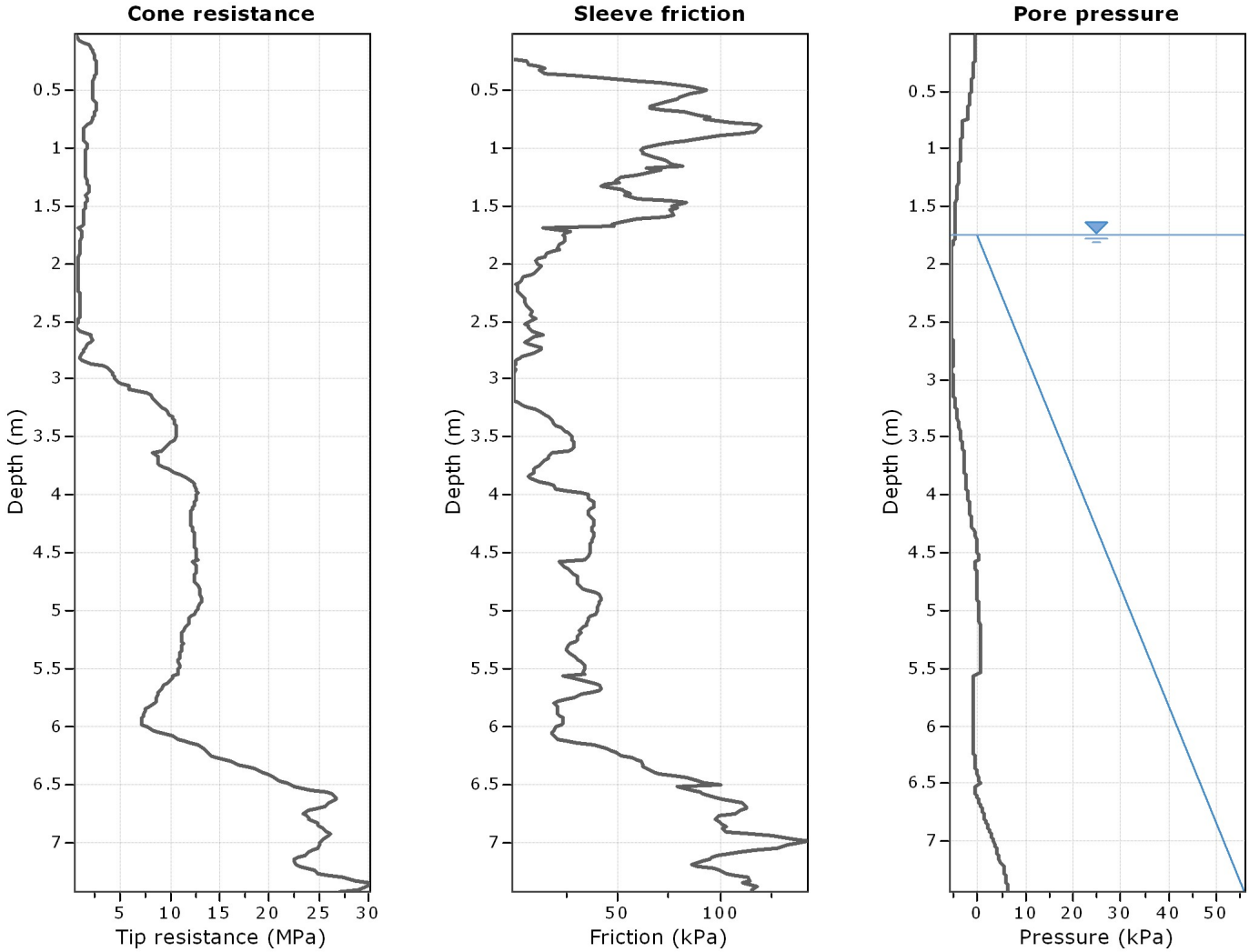
**CPT: SAMAWA CCPP_18**
Total depth: 8.44 m, Date: 13/05/2017
Surface Elevation: 11.37 m
Coords: N 3454097.158, E 526175.181
Cone Type: Icone ELCI-CFXYP20-10-AR-Piezocone
Cone Operator: Eng. Mohammed - Eng. Maysara

**Project:** **Samawa Combined Cycle Power Plant**
**Location:** **Samawa Governorate for ENKA Insaat ve Sanayi A.S.**

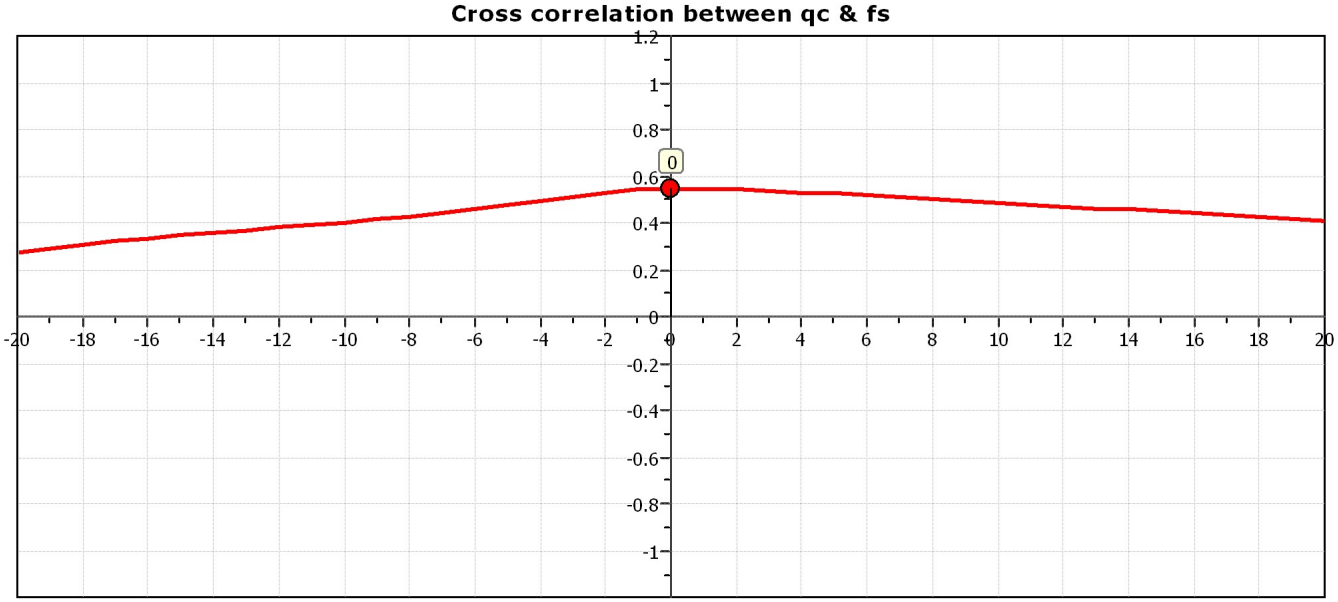



**SBTn legend**

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained




The plot below presents the cross correlation coeficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two sucessive CPT measurements).



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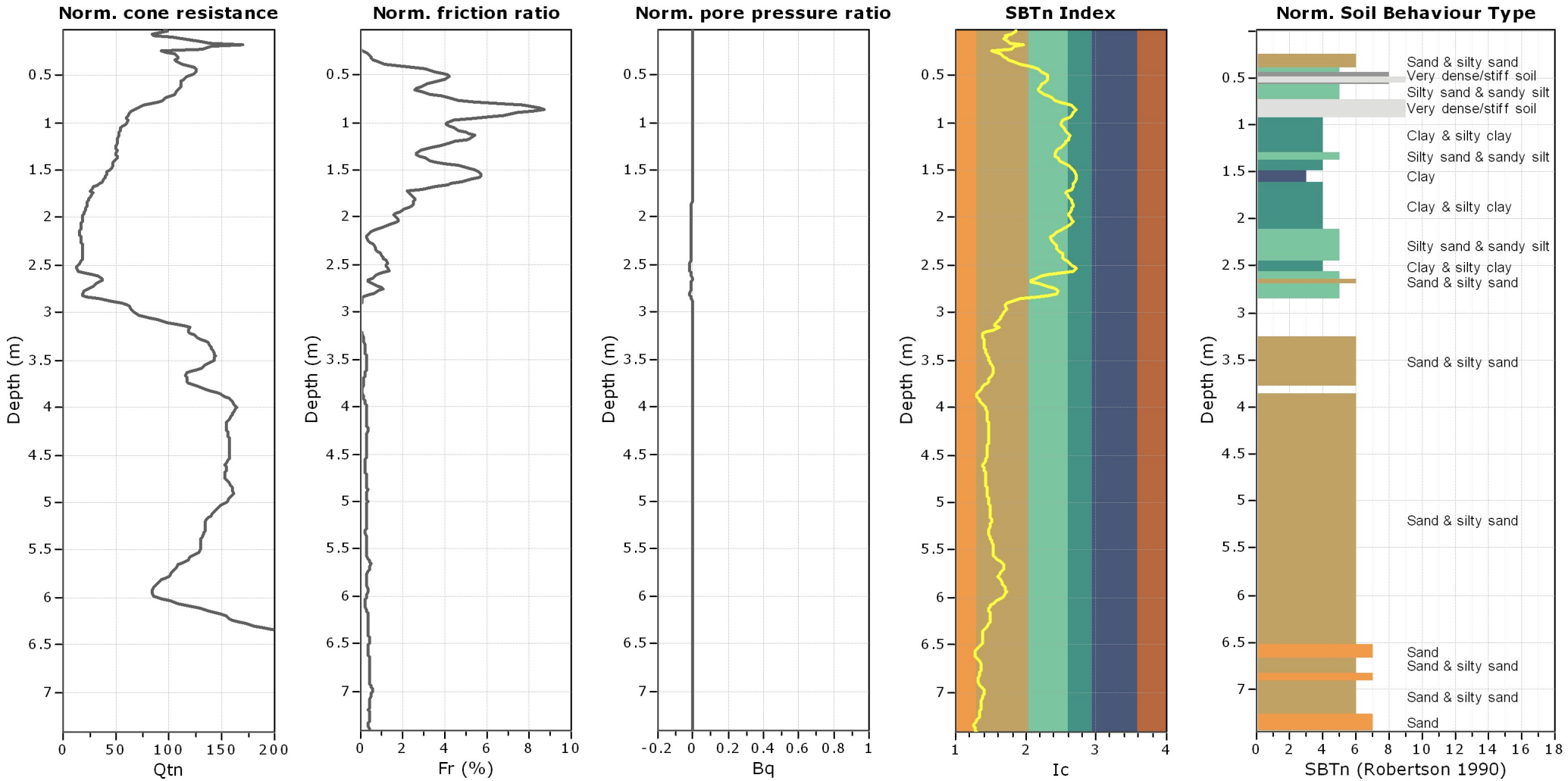
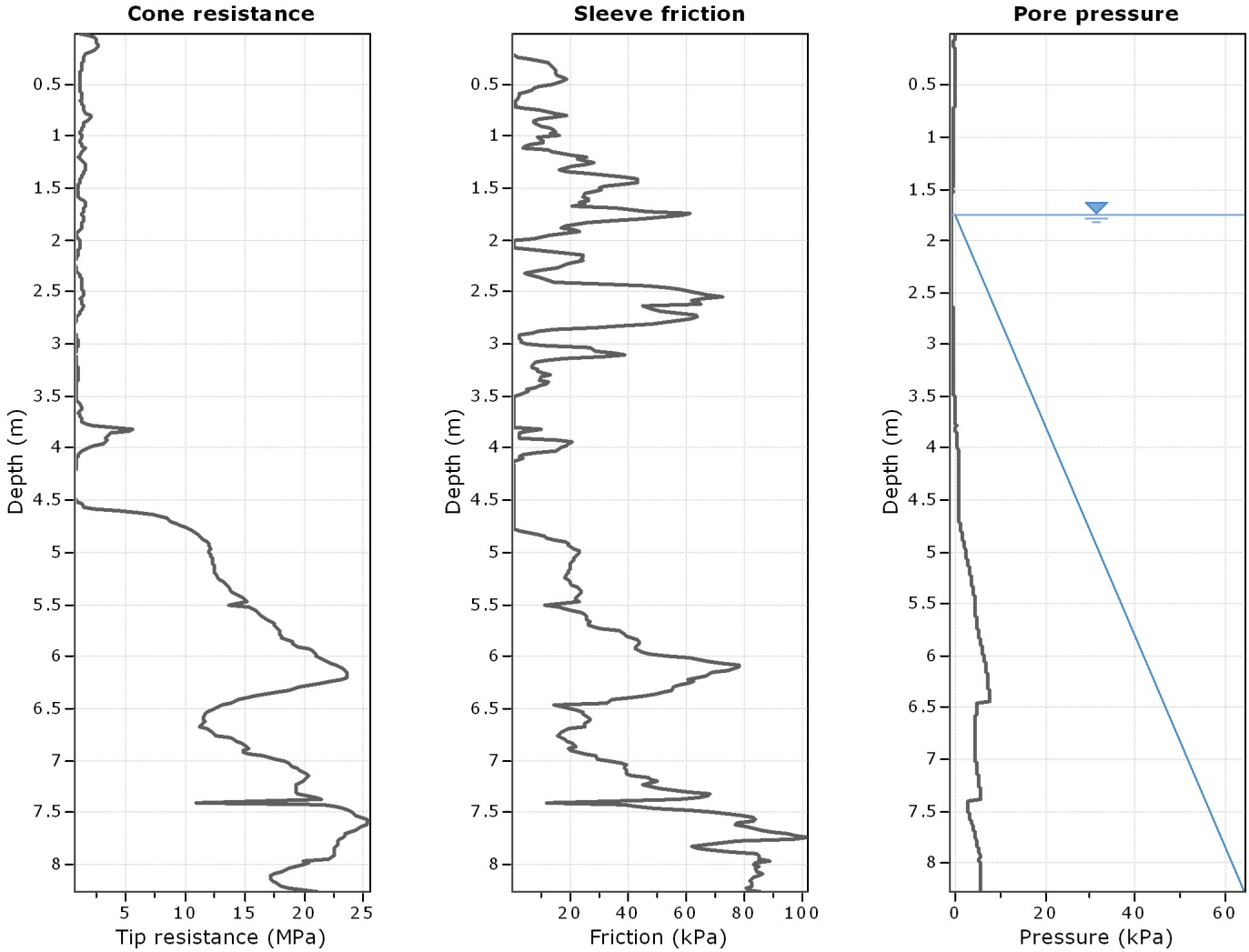
**CPT: SAMAWA CCPP_19**
Total depth: 7.42 m, Date: 13/05/2017
Surface Elevation: 10.41 m
Coords: N 3454077.159, E 526046.049
Cone Type: Icone ELCI-CFXYP20-10-AR-Piezocone
Cone Operator: Eng. Mohammed - Eng. Maysara

**Project:** **Samawa Combined Cycle Power Plant**
**Location:** **Samawa Governorate for ENKA Insaat ve Sanayi A.S.**

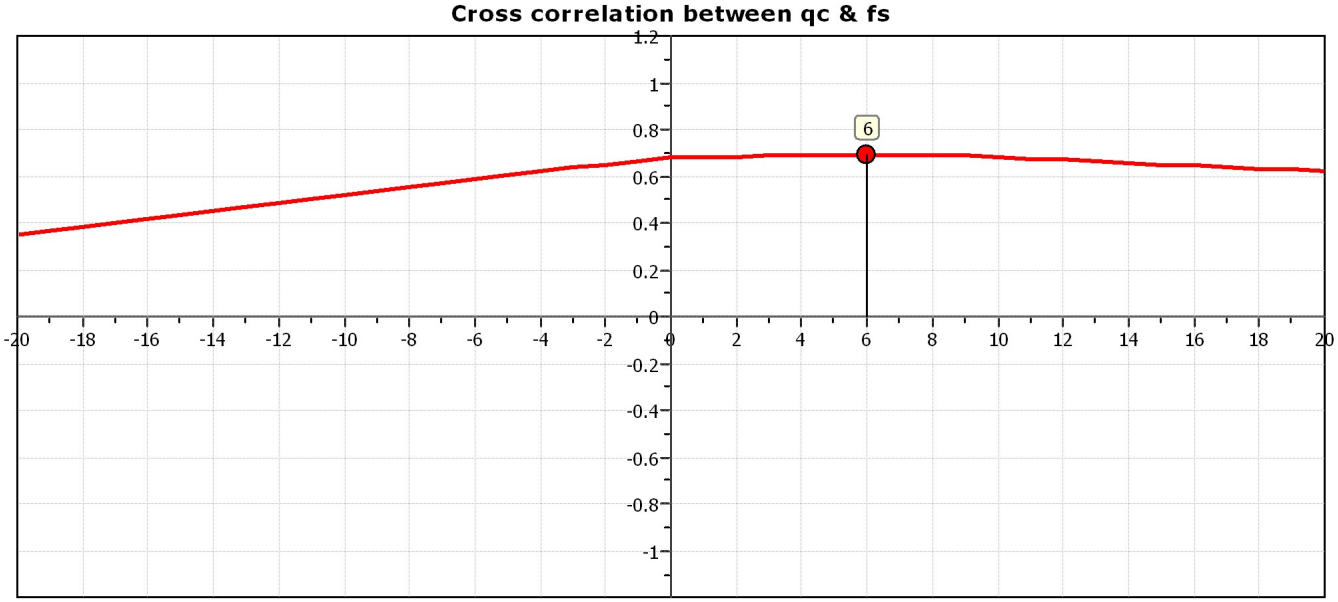



**SBTn legend**

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained




The plot below presents the cross correlation coeficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two sucessive CPT measurements).



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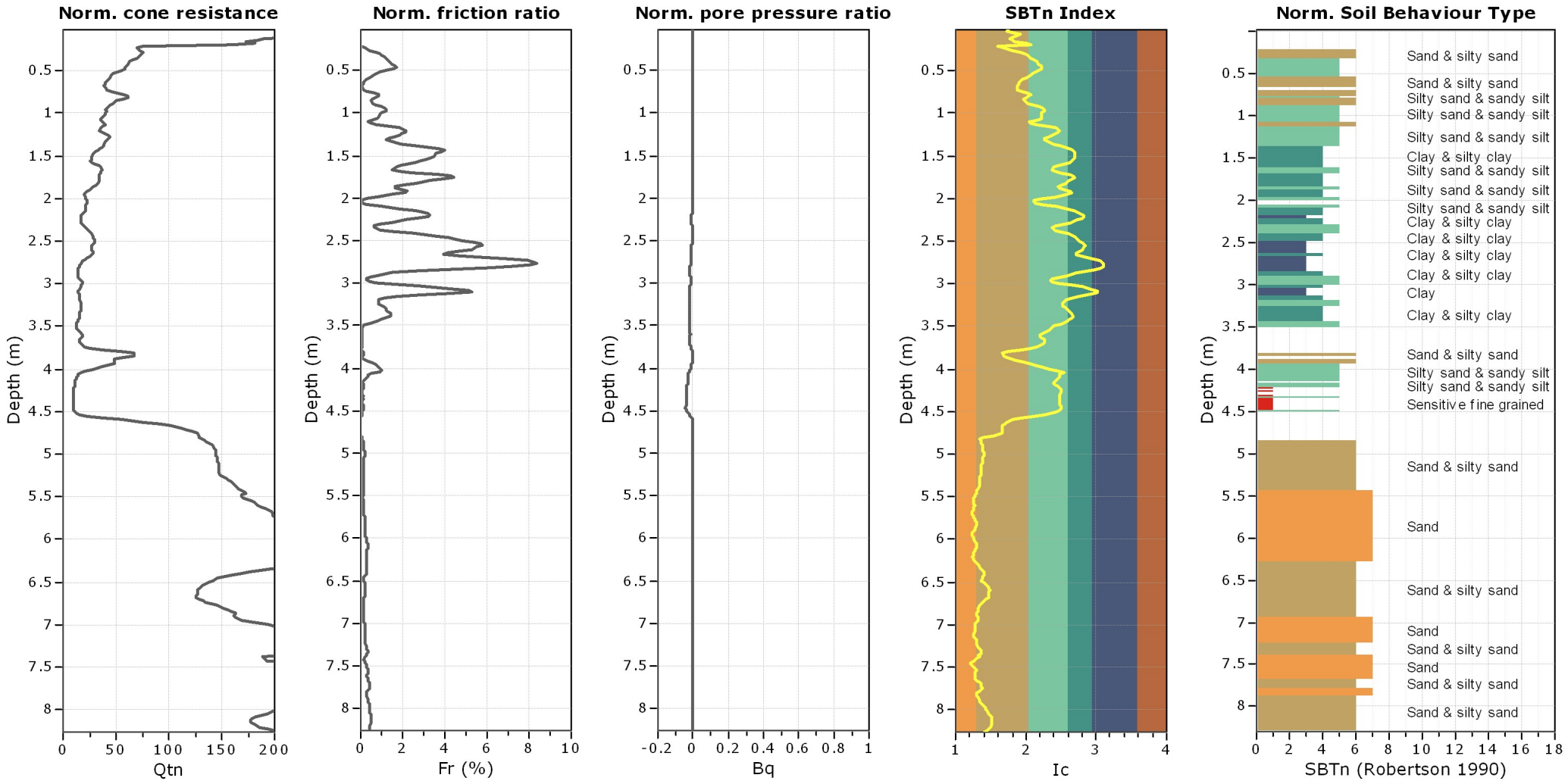
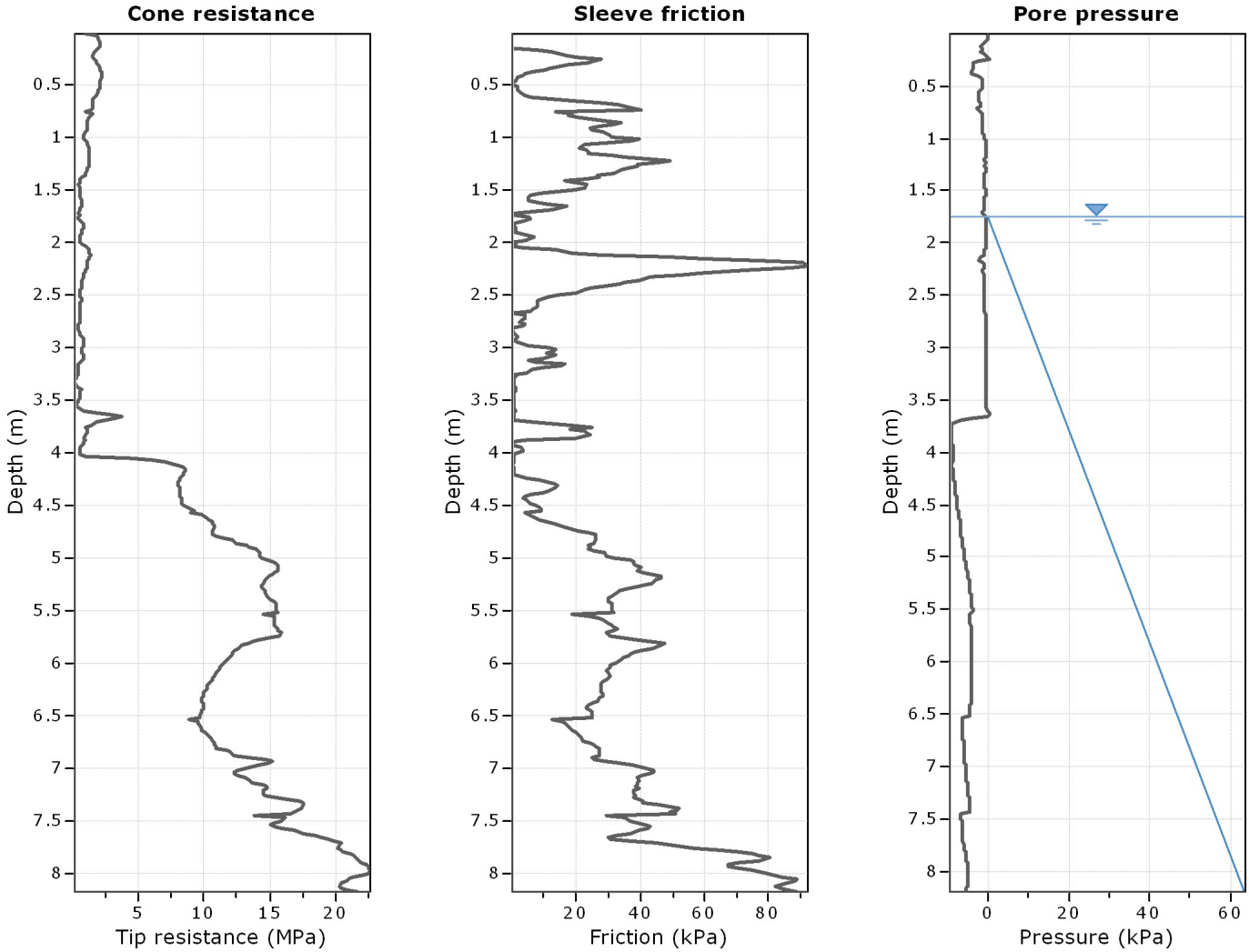
**CPT: SAMAWA CCPP_20**
Total depth: 8.26 m, Date: 13/05/2017
Surface Elevation: 9.87 m
Coords: N 3454309.385, E 525676.728
Cone Type: Icone ELCI-CFXYP20-10-AR-Piezocone
Cone Operator: Eng. Mohammed - Eng. Maysara

**Project:** **Samawa Combined Cycle Power Plant**
**Location:** **Samawa Governorate for ENKA Insaat ve Sanayi A.S.**

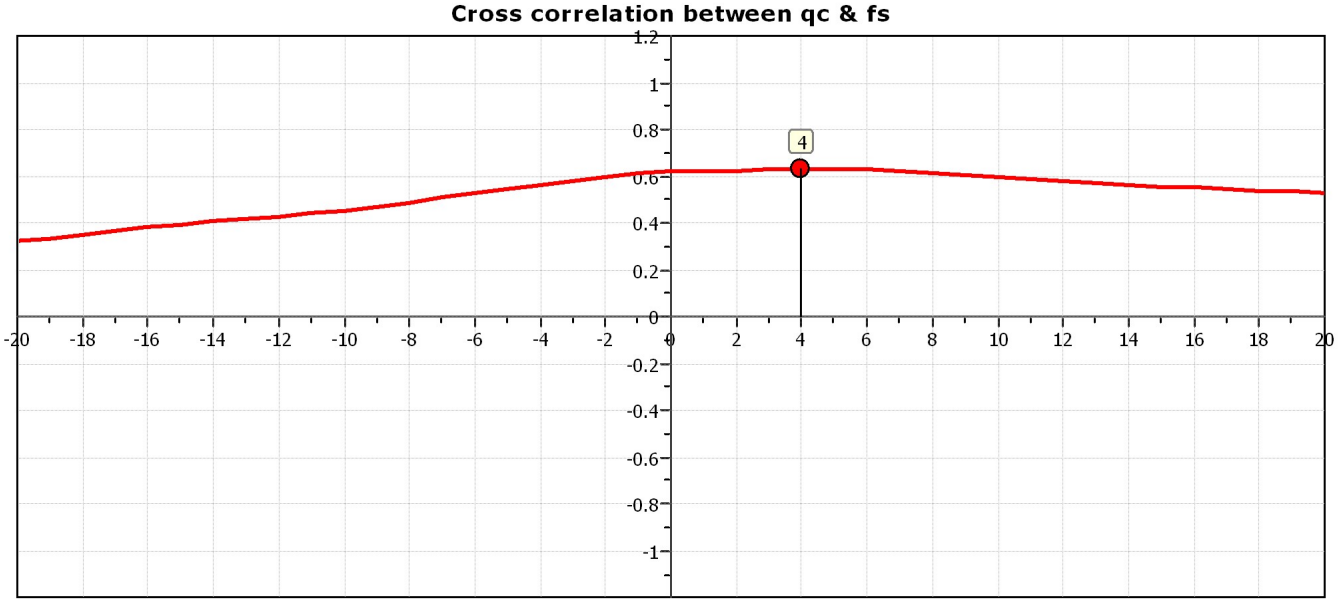



**SBTn legend**

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained




The plot below presents the cross correlation coeficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two sucessive CPT measurements).



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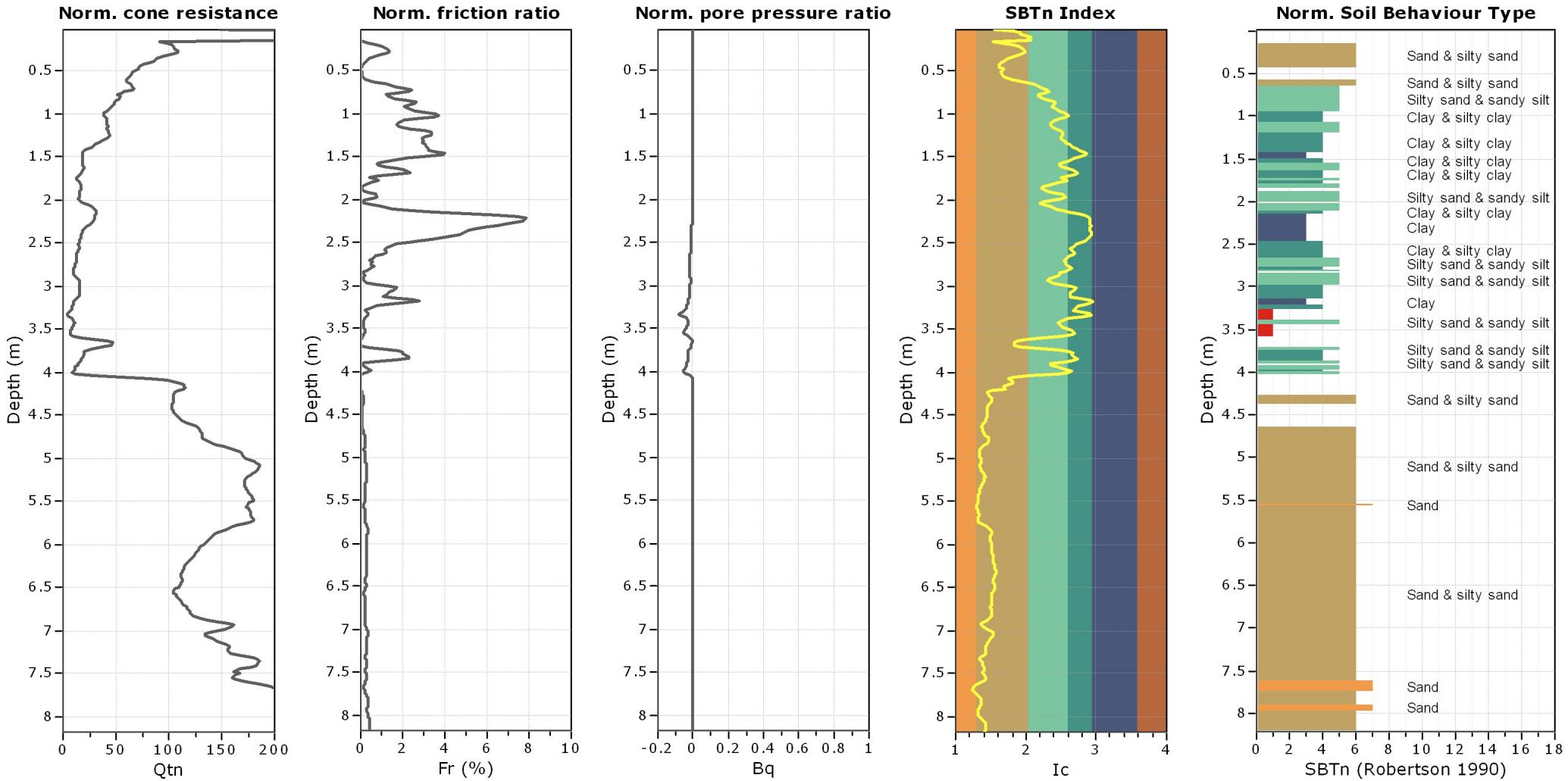
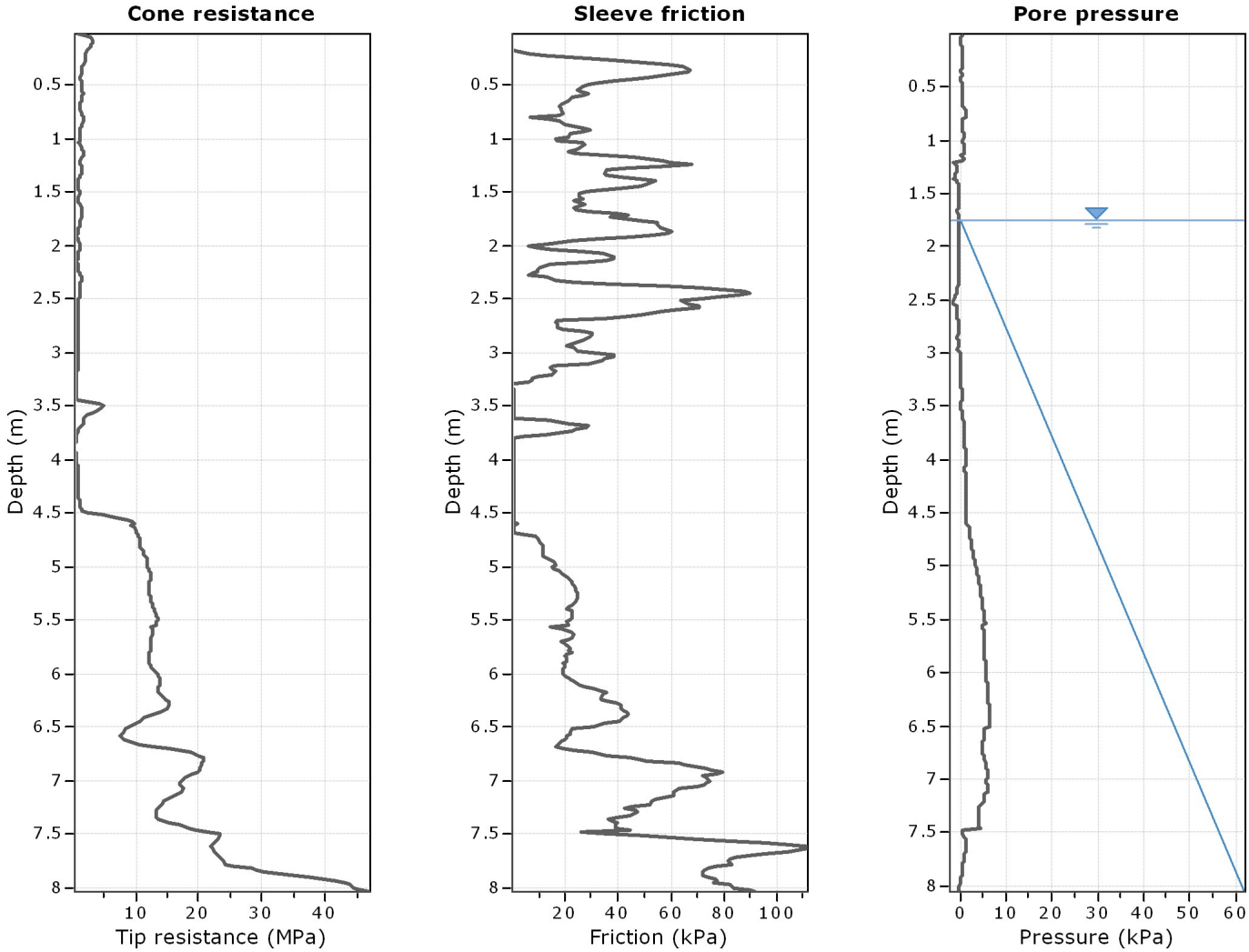
**CPT: SAMAWA CCPP_21**
Total depth: 8.18 m, Date: 13/05/2017
Surface Elevation: 9.71 m
Coords: N 3454267.166, E 525664.688
Cone Type: Icone ELCI-CFXYP20-10-AR-Piezocone
Cone Operator: Eng. Mohammed - Eng. Maysara

**Project:** **Samawa Combined Cycle Power Plant**
**Location:** **Samawa Governorate for ENKA Insaat ve Sanayi A.S.**

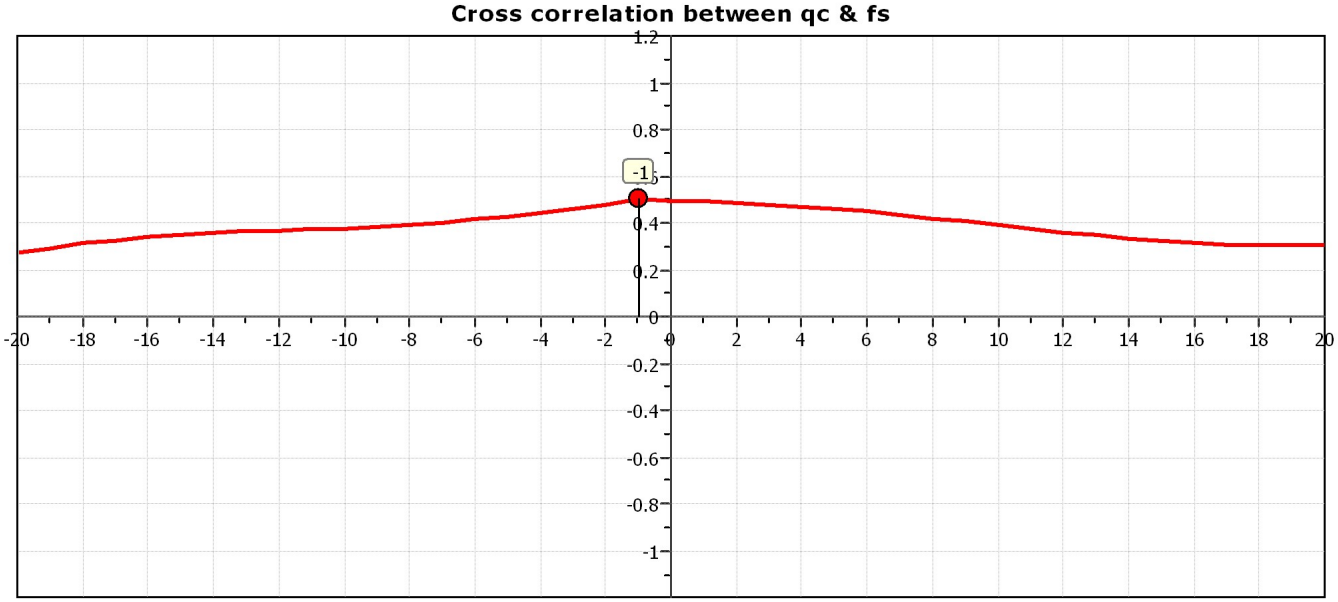



**SBTn legend**

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained




The plot below presents the cross correlation coeficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two sucessive CPT measurements).



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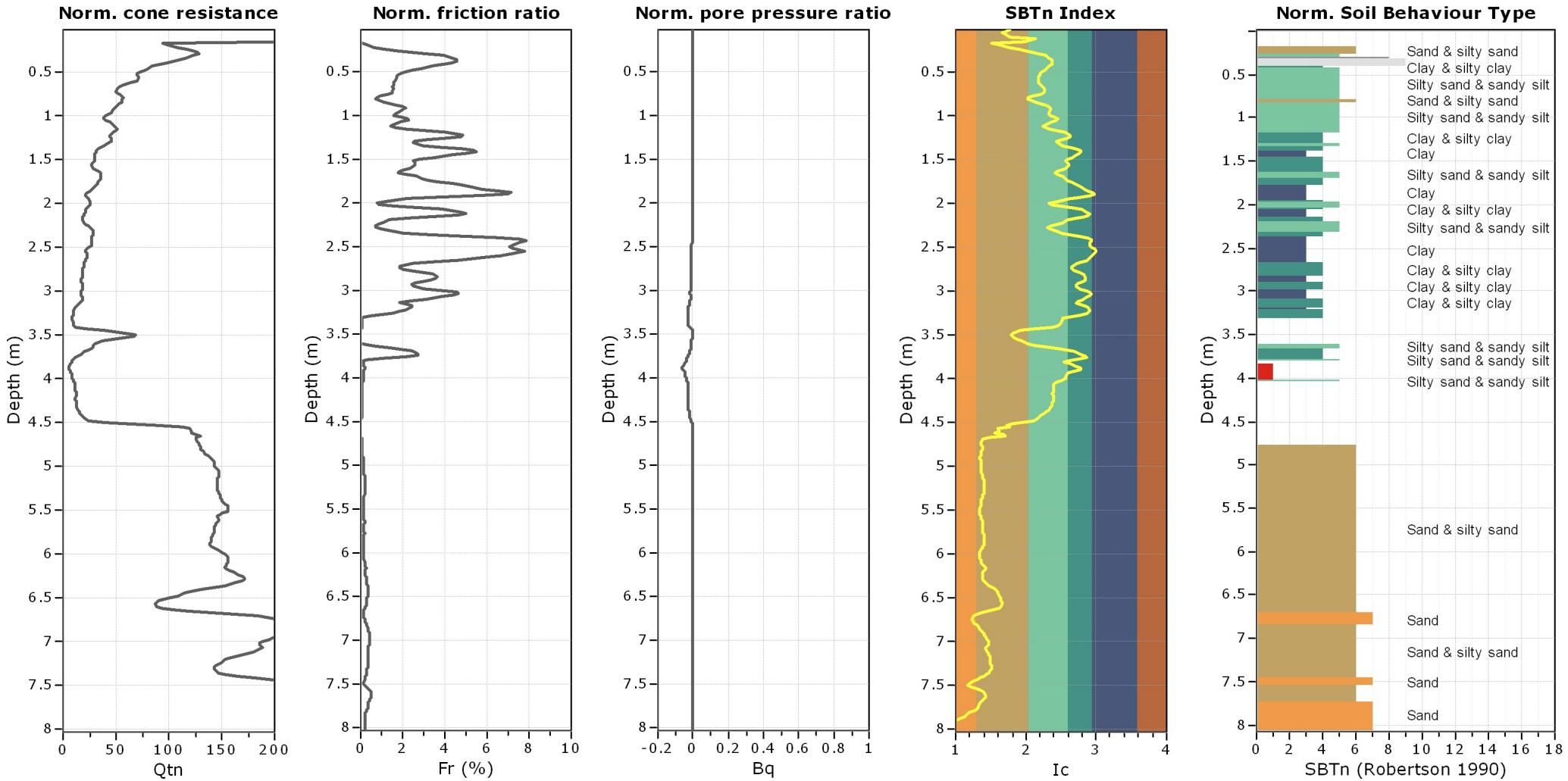
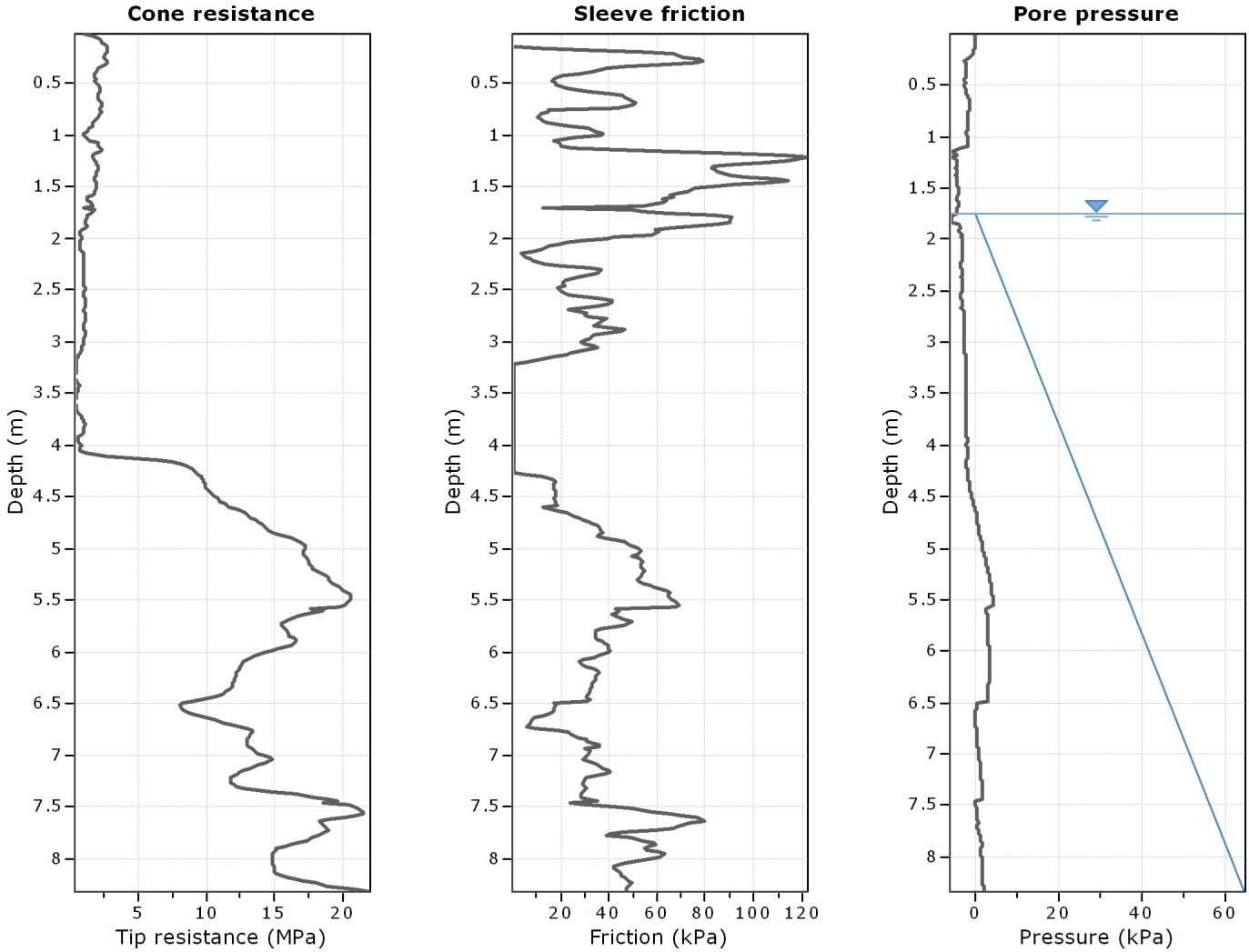
**CPT: SAMAWA CCPP_22**
Total depth: 8.04 m, Date: 13/05/2017
Surface Elevation: 9.92 m
Coords: N 3454268.039, E 525738.094
Cone Type: Icone ELCI-CFXYP20-10-AR-Piezocone
Cone Operator: Eng. Mohammed - Eng. Maysara

**Project:** **Samawa Combined Cycle Power Plant**
**Location:** **Samawa Governorate for ENKA Insaat ve Sanayi A.S.**

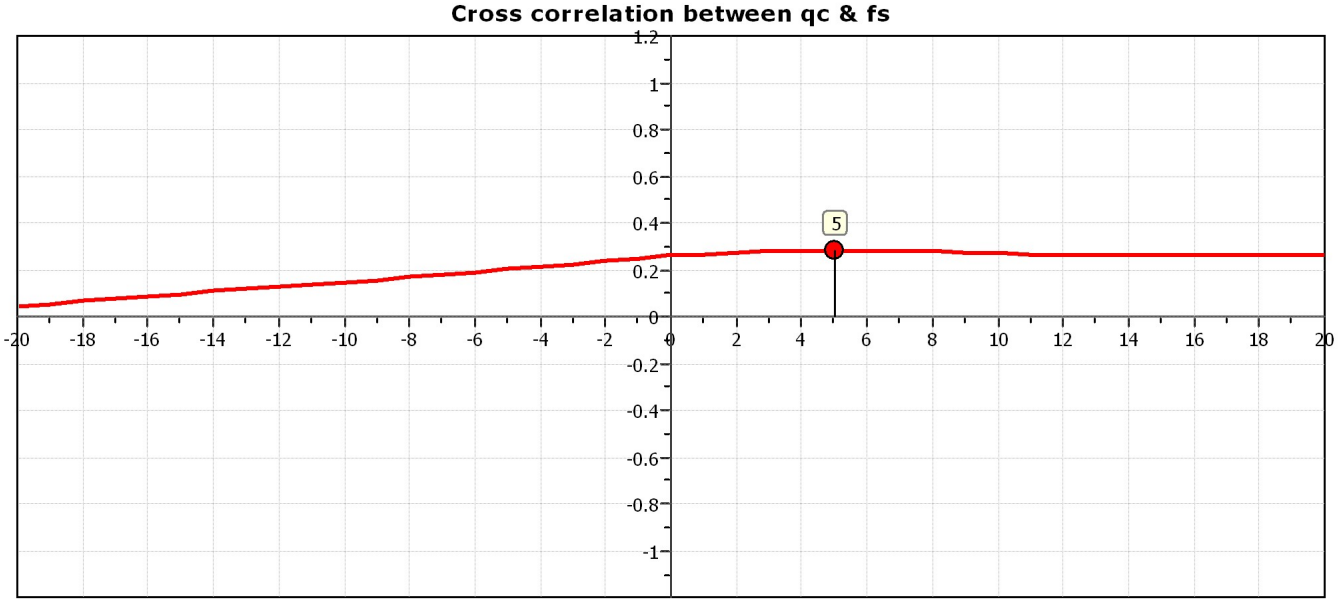



**SBTn legend**

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained




The plot below presents the cross correlation coeficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two sucessive CPT measurements).



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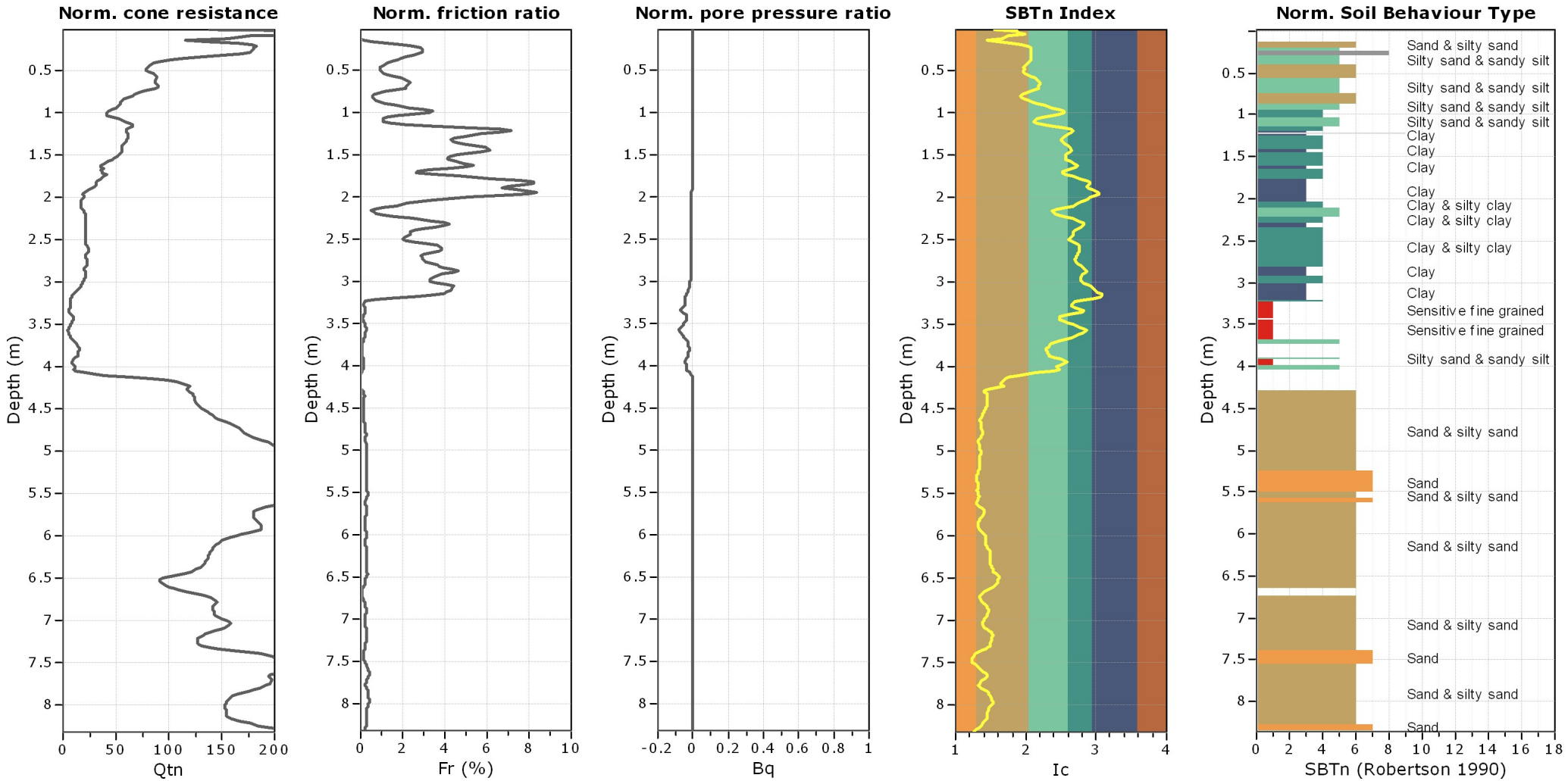
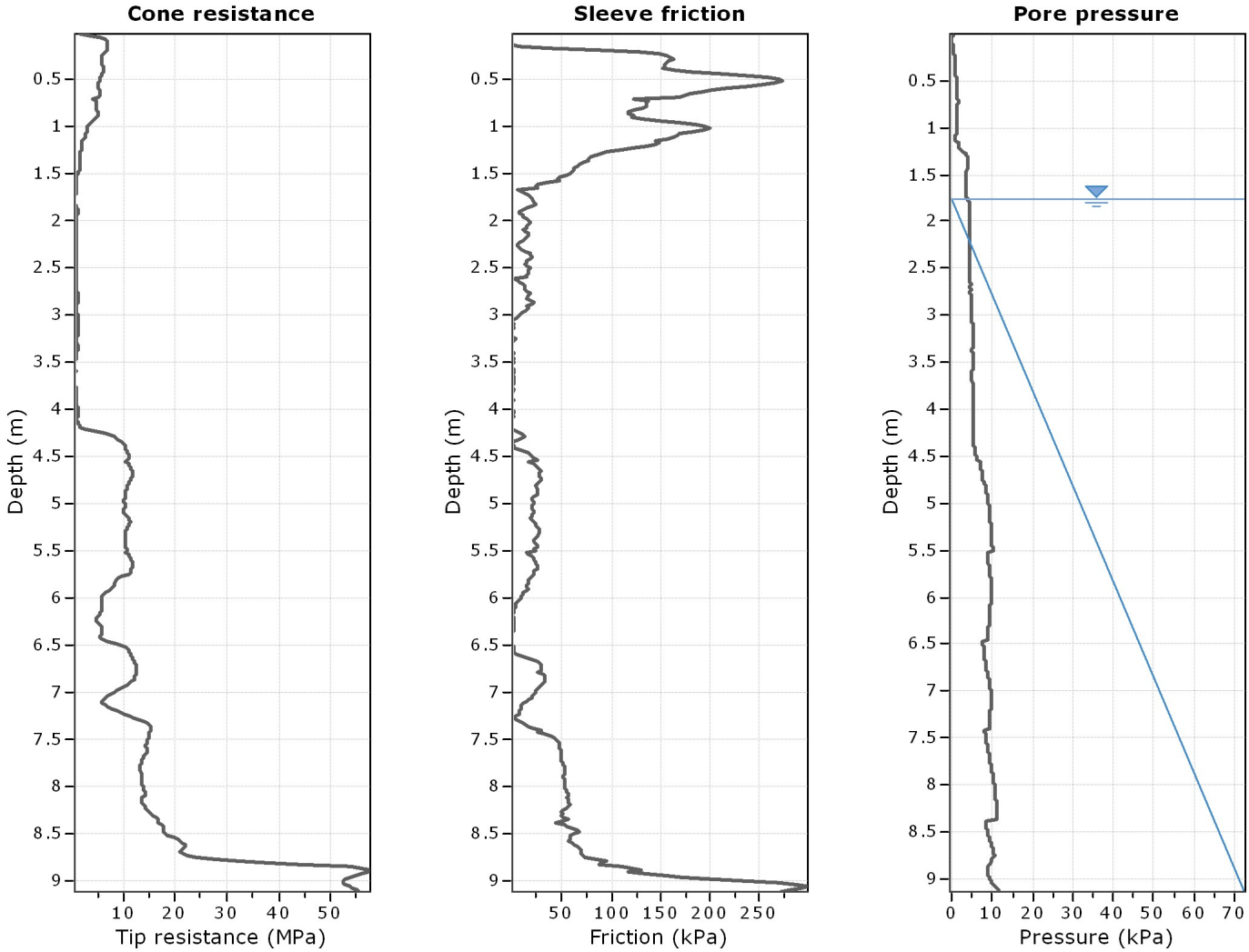
**CPT: SAMAWA CCPP_23**
Total depth: 8.32 m, Date: 13/05/2017
Surface Elevation: 9.99 m
Coords: N 3454235.7, E 525712.012
Cone Type: Icone ELCI-CFXYP20-10-AR-Piezocone
Cone Operator: Eng. Mohammed - Eng. Maysara

**Project:** **Samawa Combined Cycle Power Plant**
**Location:** **Samawa Governorate for ENKA Insaat ve Sanayi A.S.**

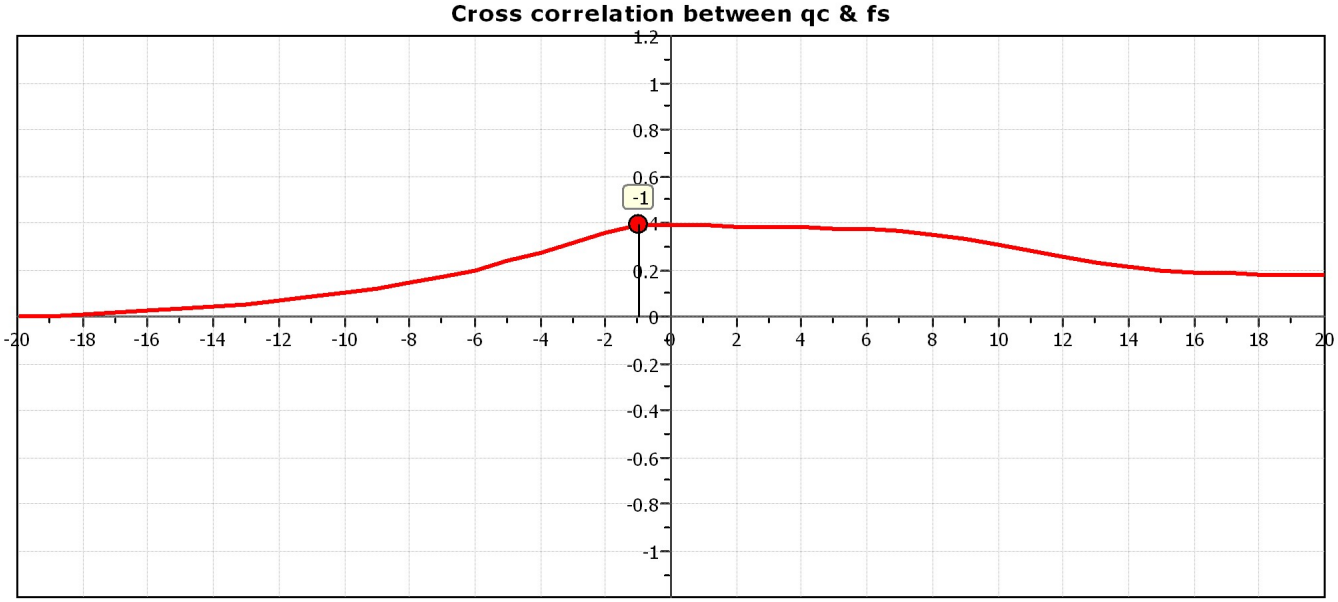



**SBTn legend**

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained




The plot below presents the cross correlation coeficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two sucessive CPT measurements).



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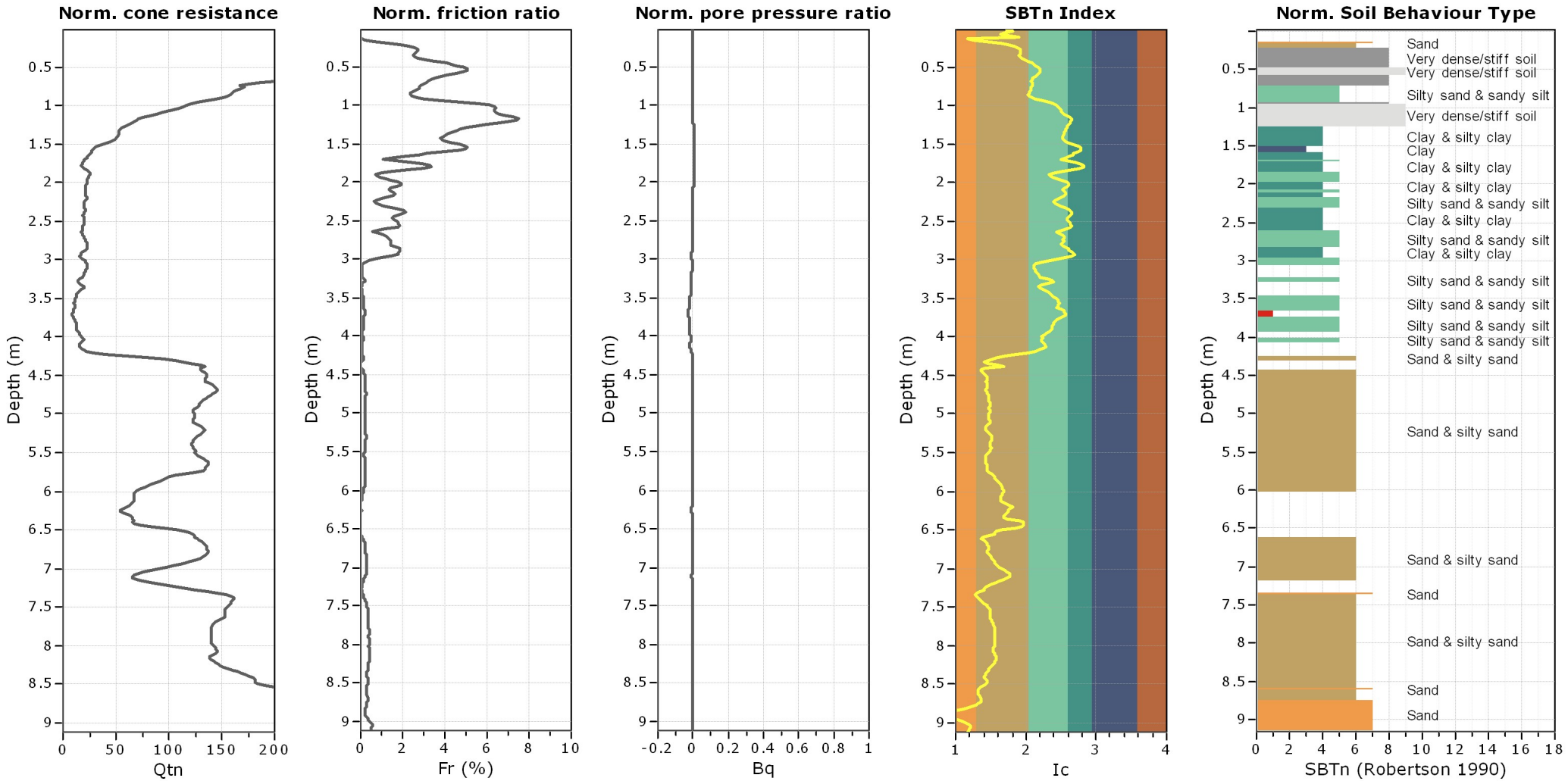
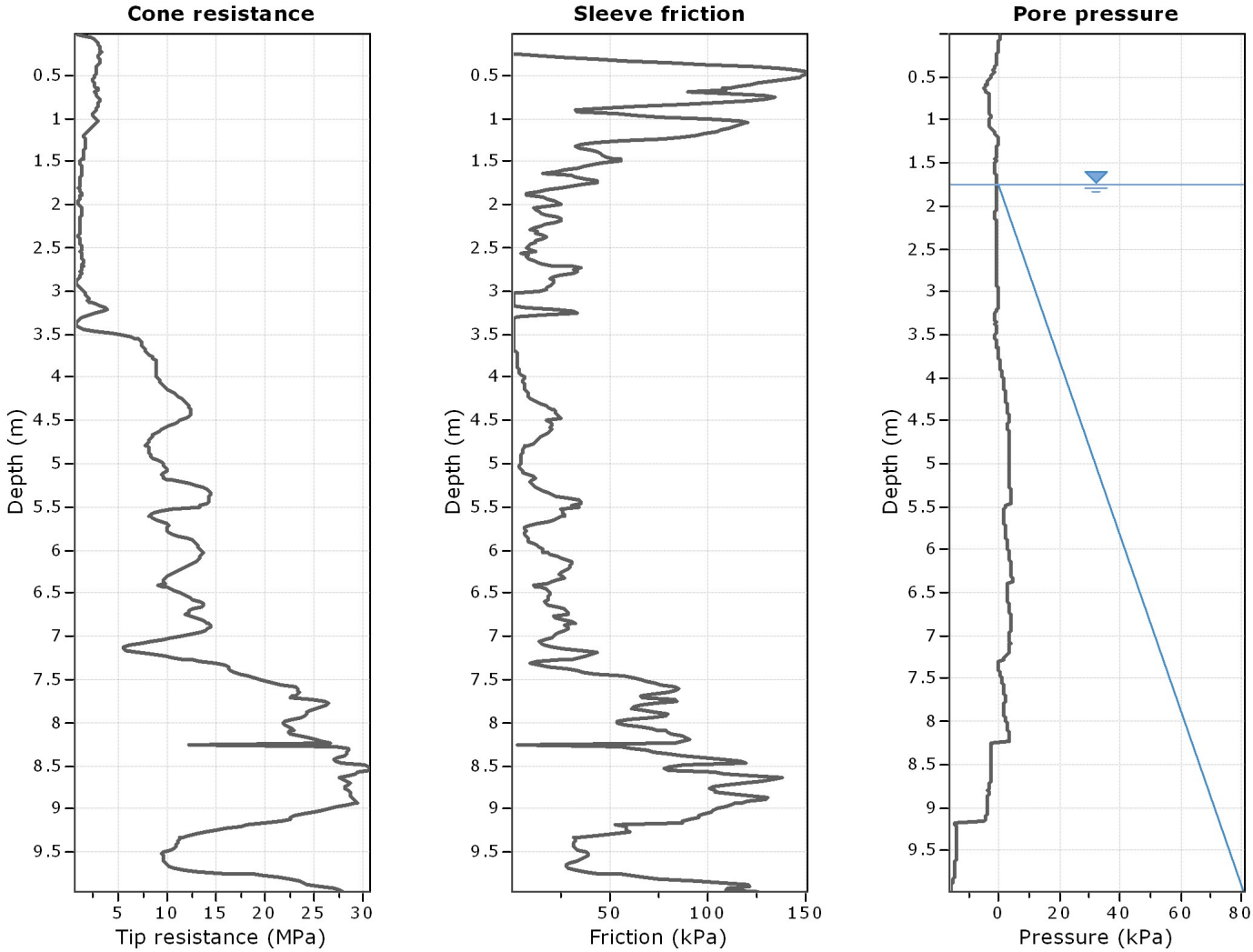
**CPT: SAMAWA CCPP_24**
Total depth: 9.12 m, Date: 13/05/2017
Surface Elevation: 9.75 m
Coords: N 3454230.201, E 525793.199
Cone Type: Icone ELCI-CFXYP20-10-AR-Piezocone
Cone Operator: Eng. Mohammed - Eng. Maysara

**Project:** **Samawa Combined Cycle Power Plant**
**Location:** **Samawa Governorate for ENKA Insaat ve Sanayi A.S.**

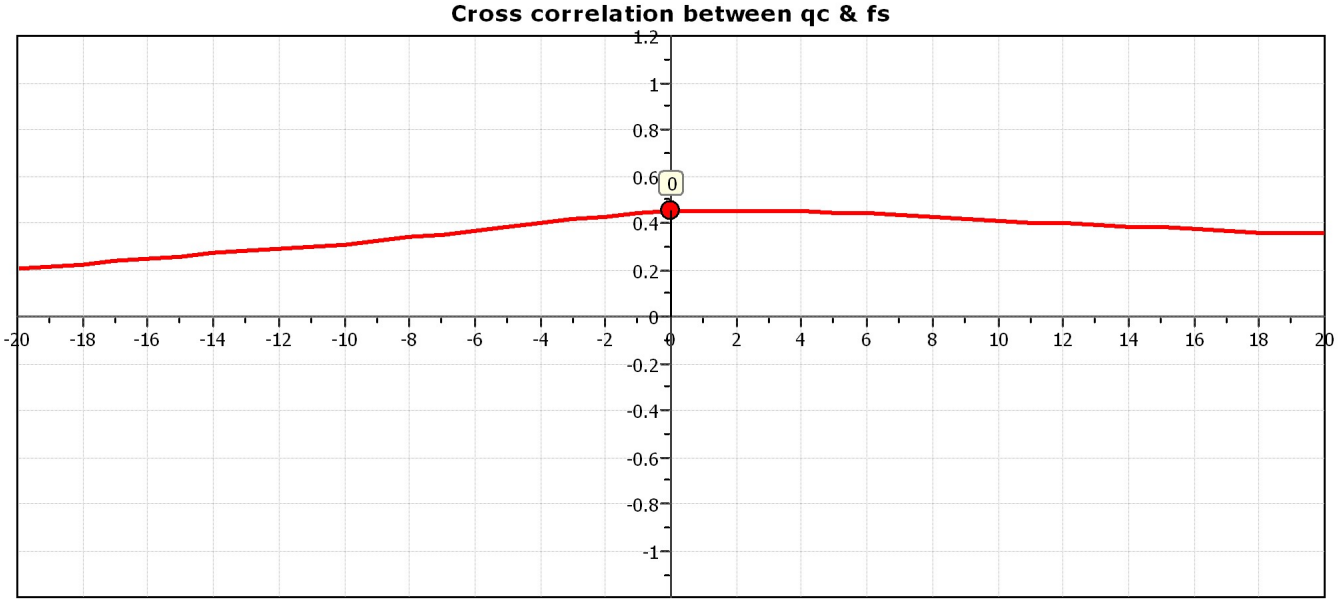



**SBTn legend**

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained




The plot below presents the cross correlation coeficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two sucessive CPT measurements).



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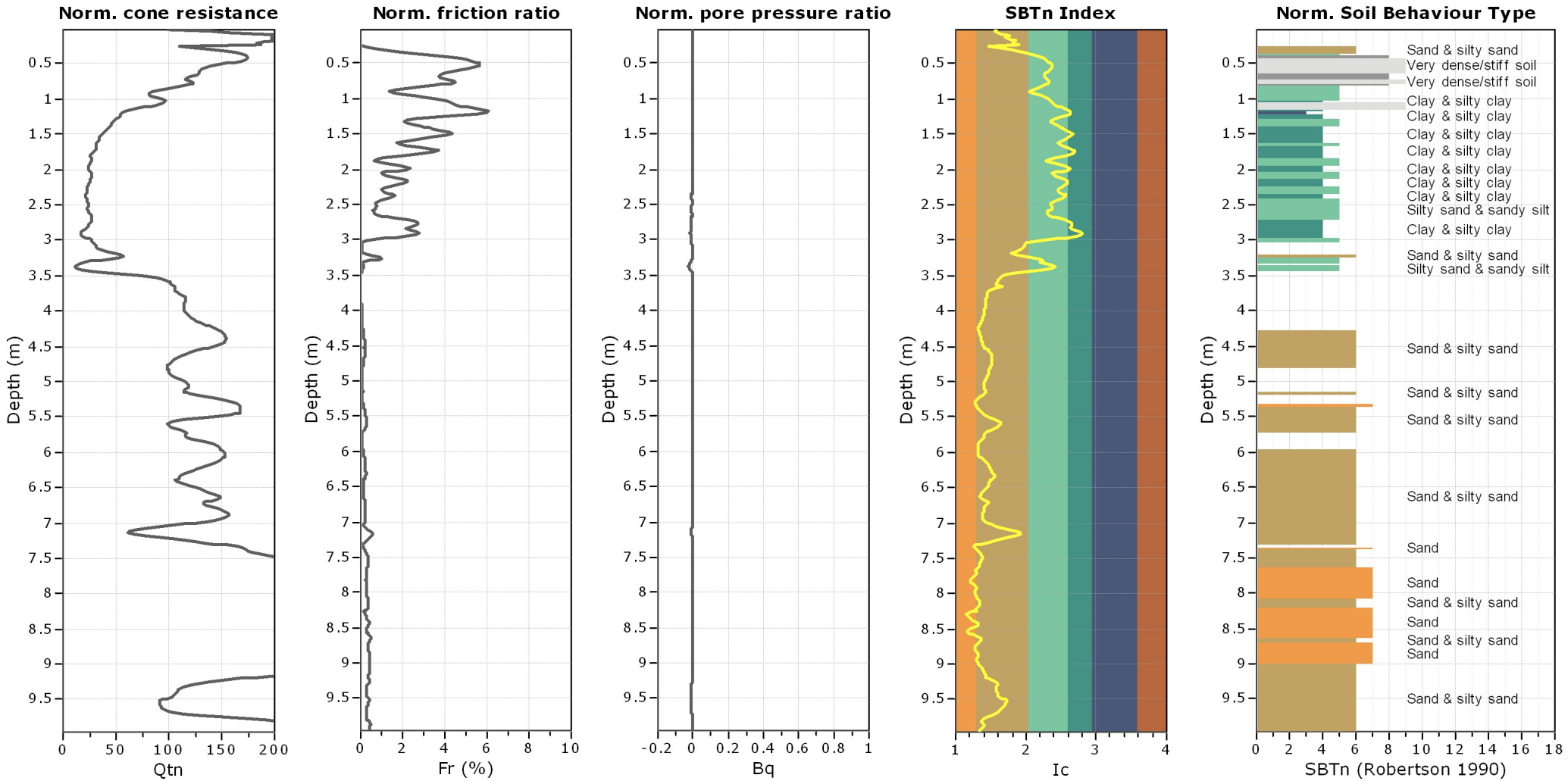
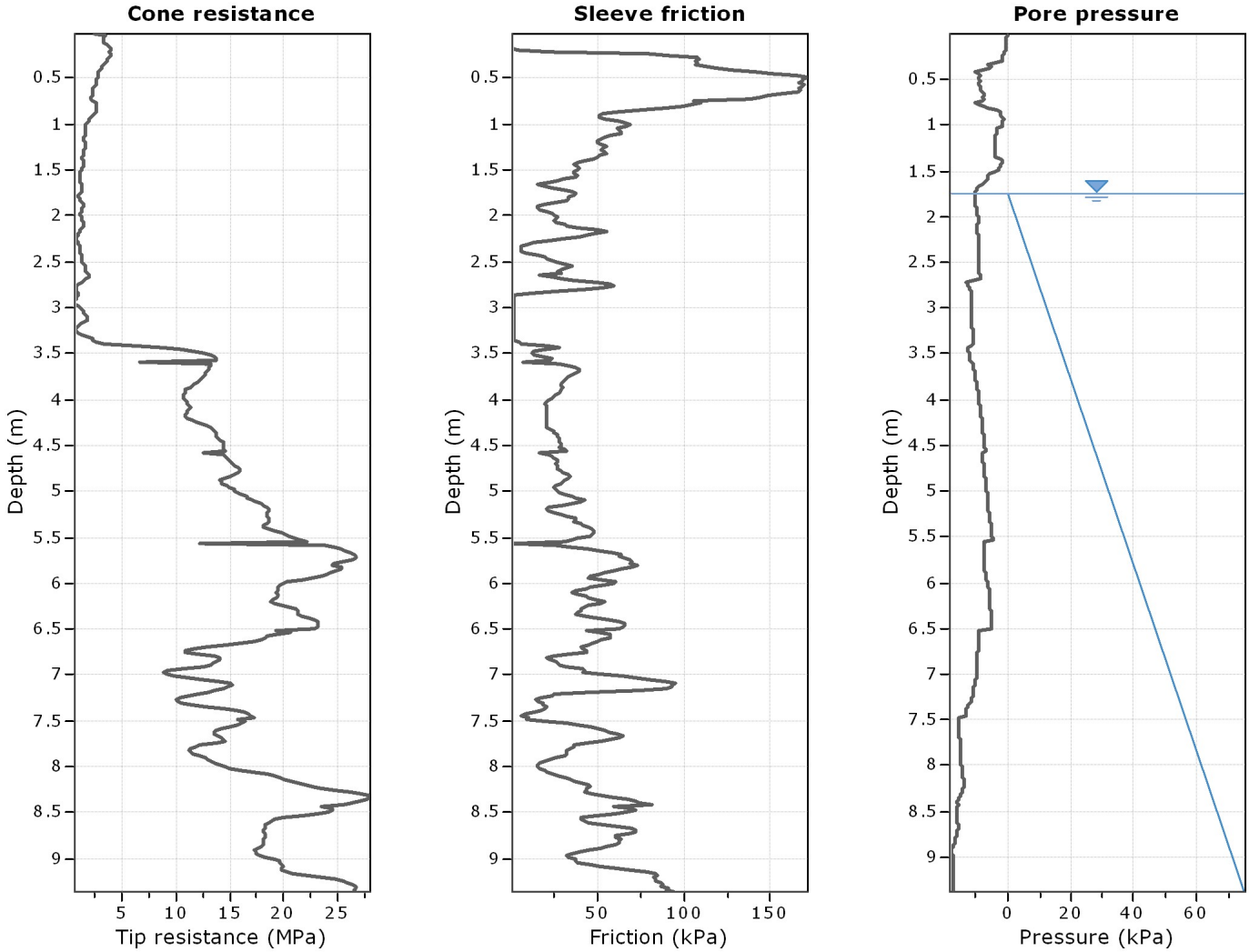
**CPT: SAMAWA CCPP_25**
Total depth: 9.96 m, Date: 13/05/2017
Surface Elevation: 9.75 m
Coords: N 3454163.583, E 525820.41
Cone Type: Icone ELCI-CFXYP20-10-AR-Piezocone
Cone Operator: Eng. Mohammed - Eng. Maysara

**Project:** **Samawa Combined Cycle Power Plant**
**Location:** **Samawa Governorate for ENKA Insaat ve Sanayi A.S.**

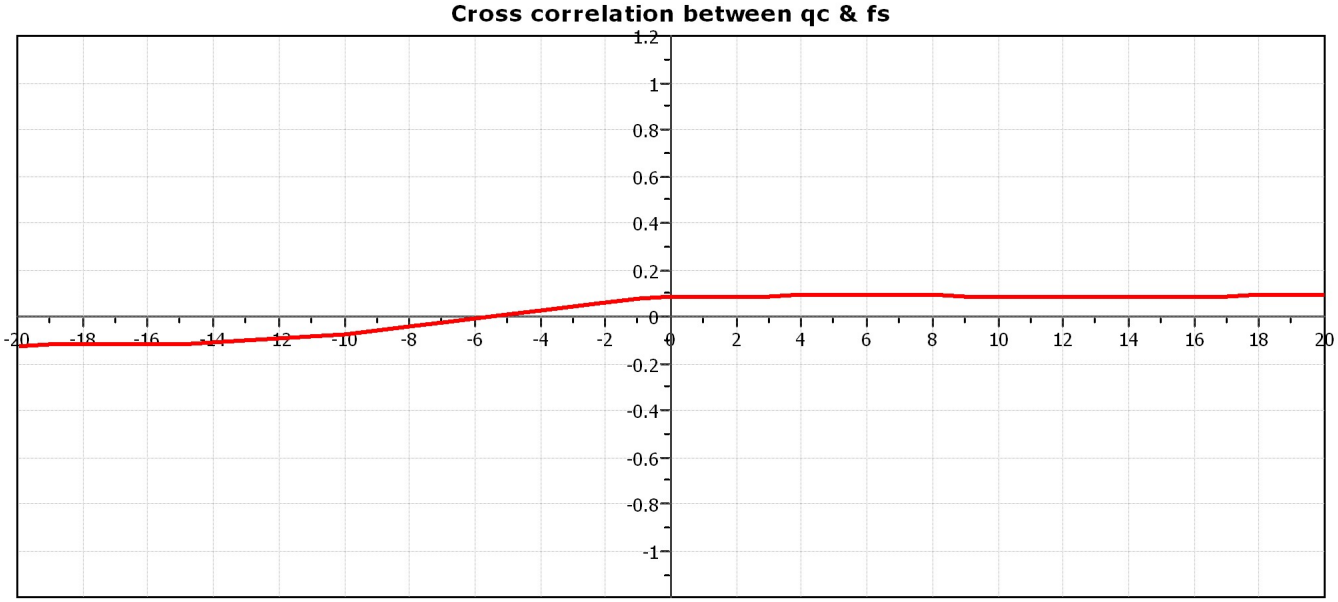



**SBTn legend**

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained




The plot below presents the cross correlation coeficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two sucessive CPT measurements).



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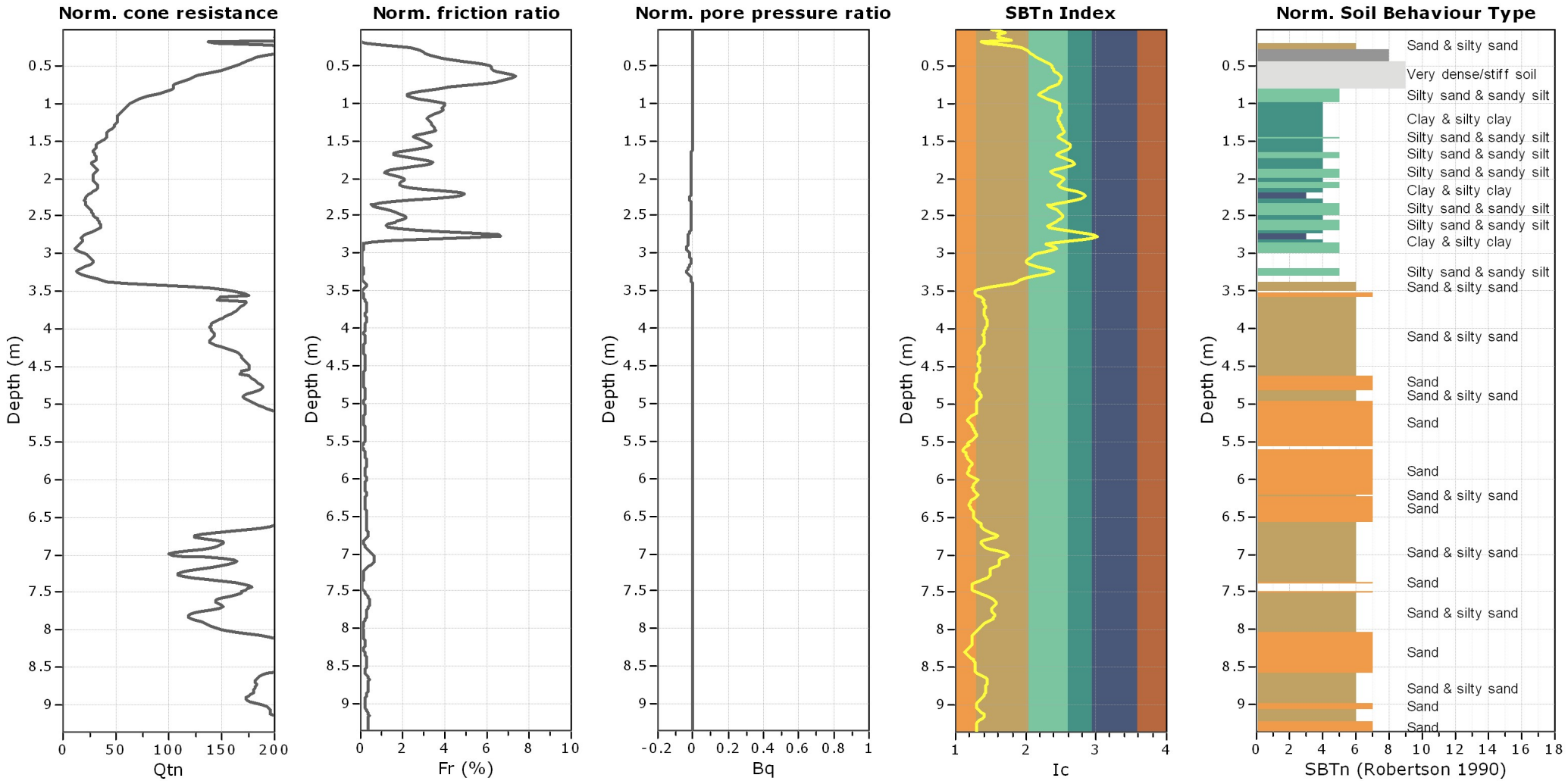
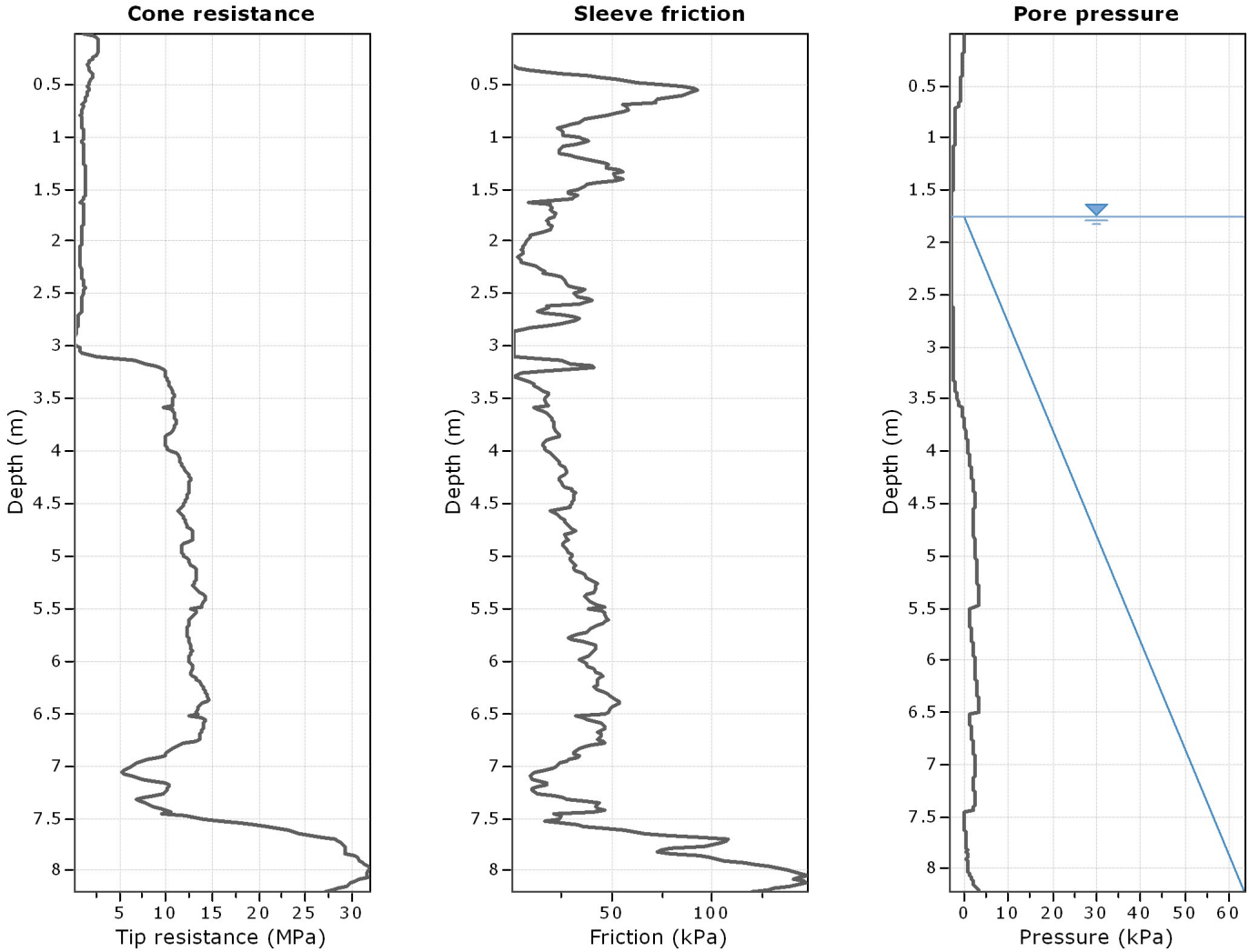
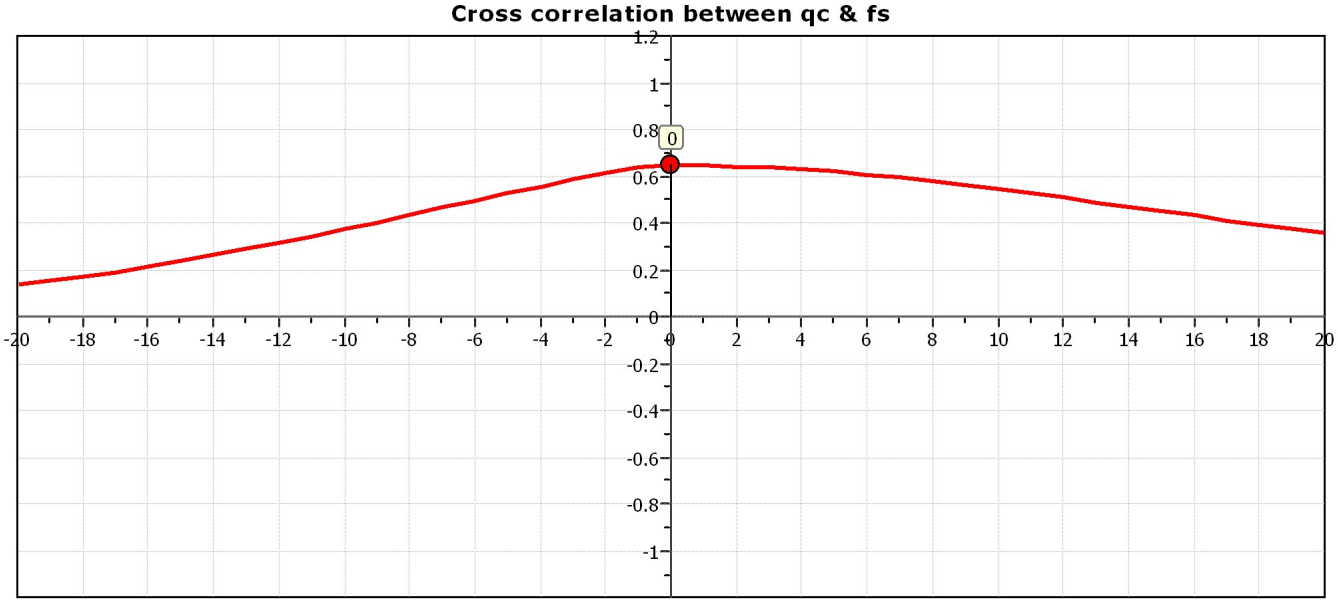
**CPT: SAMAWA CCPP_26**
Total depth: 9.36 m, Date: 13/05/2017
Surface Elevation: 9.86 m
Coords: N 3454176.564, E 525869.651
Cone Type: Icone ELCI-CFXYP20-10-AR-Piezocone
Cone Operator: Eng. Mohammed - Eng. Maysara

**Project:** **Samawa Combined Cycle Power Plant**
**Location:** **Samawa Governorate for ENKA Insaat ve Sanayi A.S.**






The plot below presents the cross correlation coeficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two sucessive CPT measurements).



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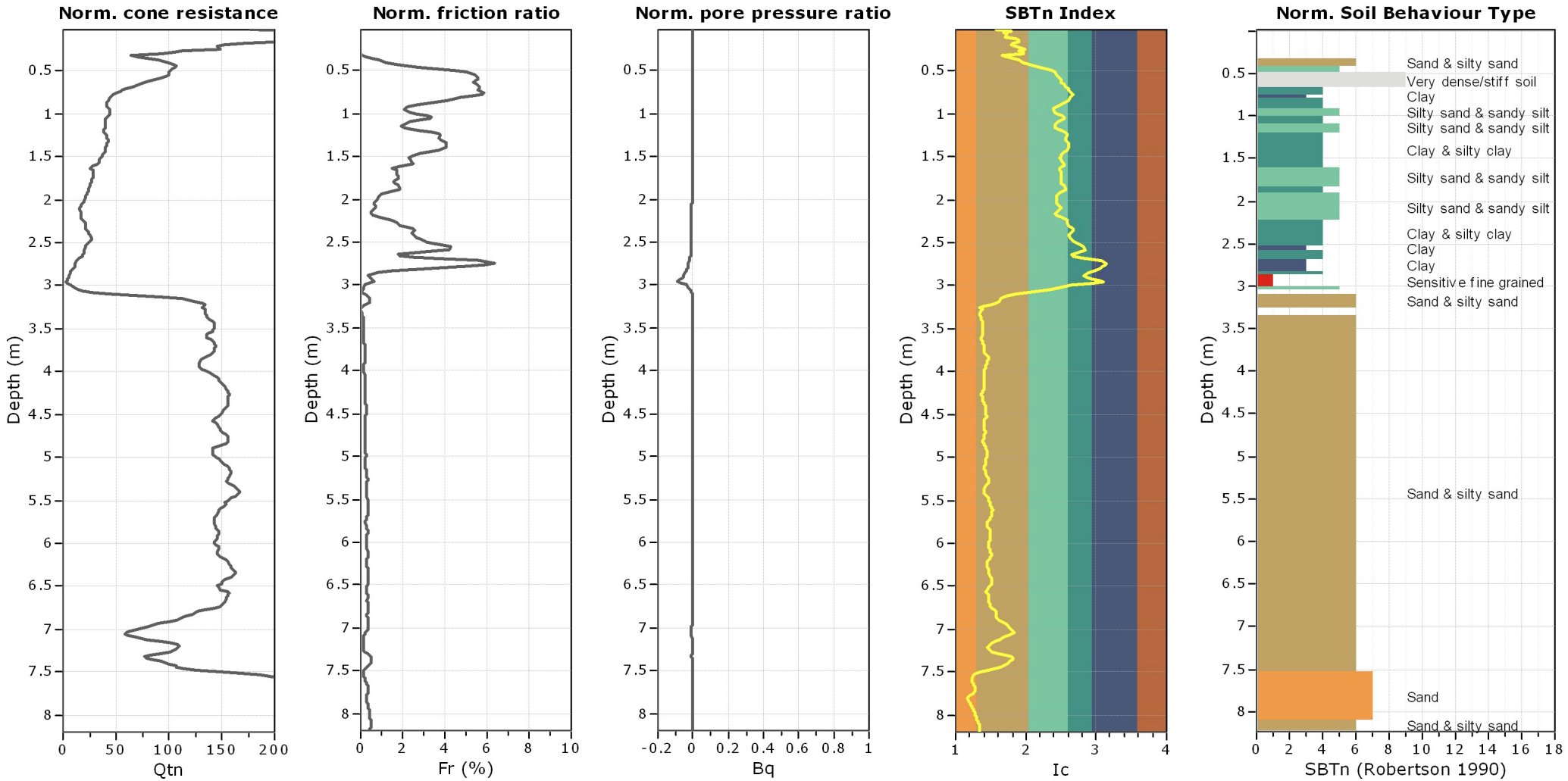
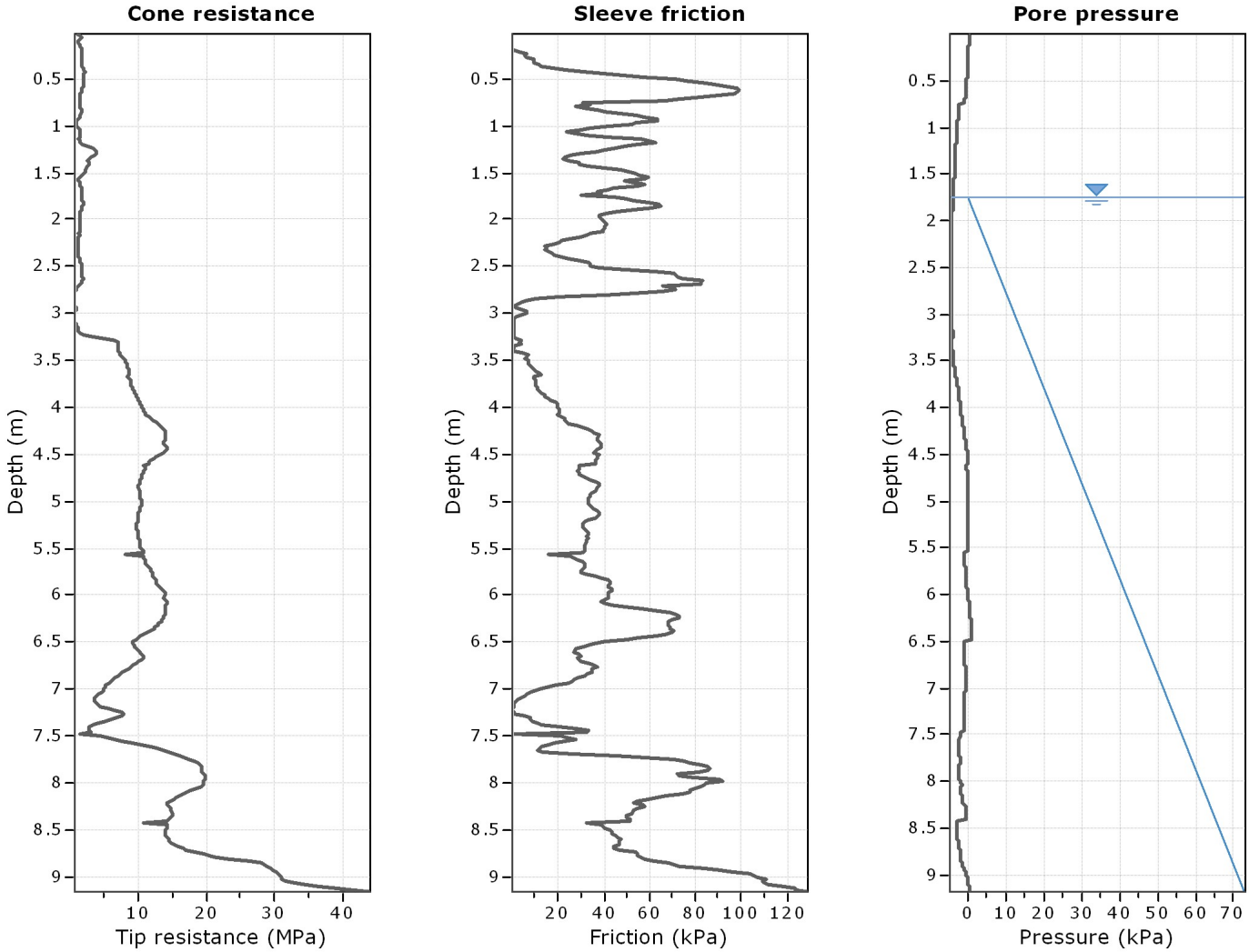
**CPT: SAMAWA CCPP_27**
Total depth: 8.20 m, Date: 13/05/2017
Surface Elevation: 9.90 m
Coords: N 3454164.682, E 525947.834
Cone Type: Icone ELCI-CFXYP20-10-AR-Piezocone
Cone Operator: Eng. Mohammed - Eng. Maysara

**Project:** **Samawa Combined Cycle Power Plant**
**Location:** **Samawa Governorate for ENKA Insaat ve Sanayi A.S.**

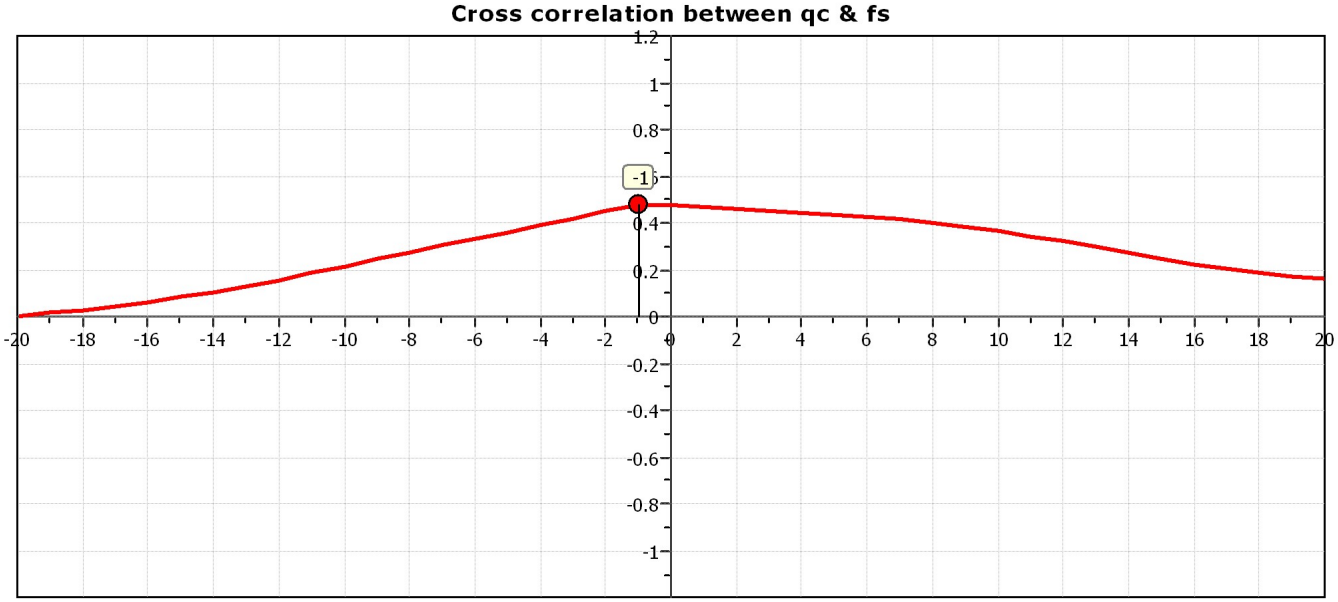



**SBTn legend**

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained




The plot below presents the cross correlation coeficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two sucessive CPT measurements).



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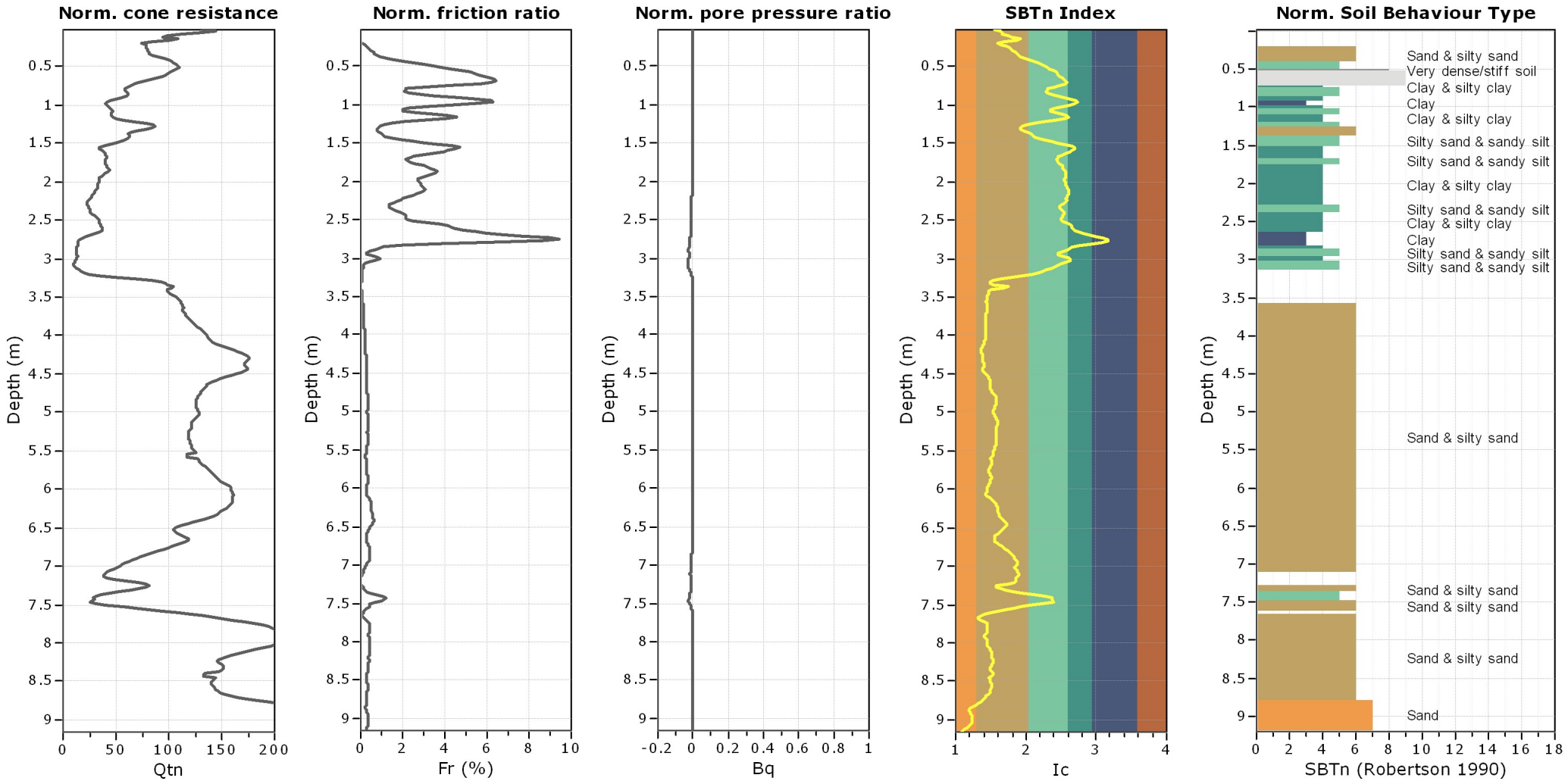
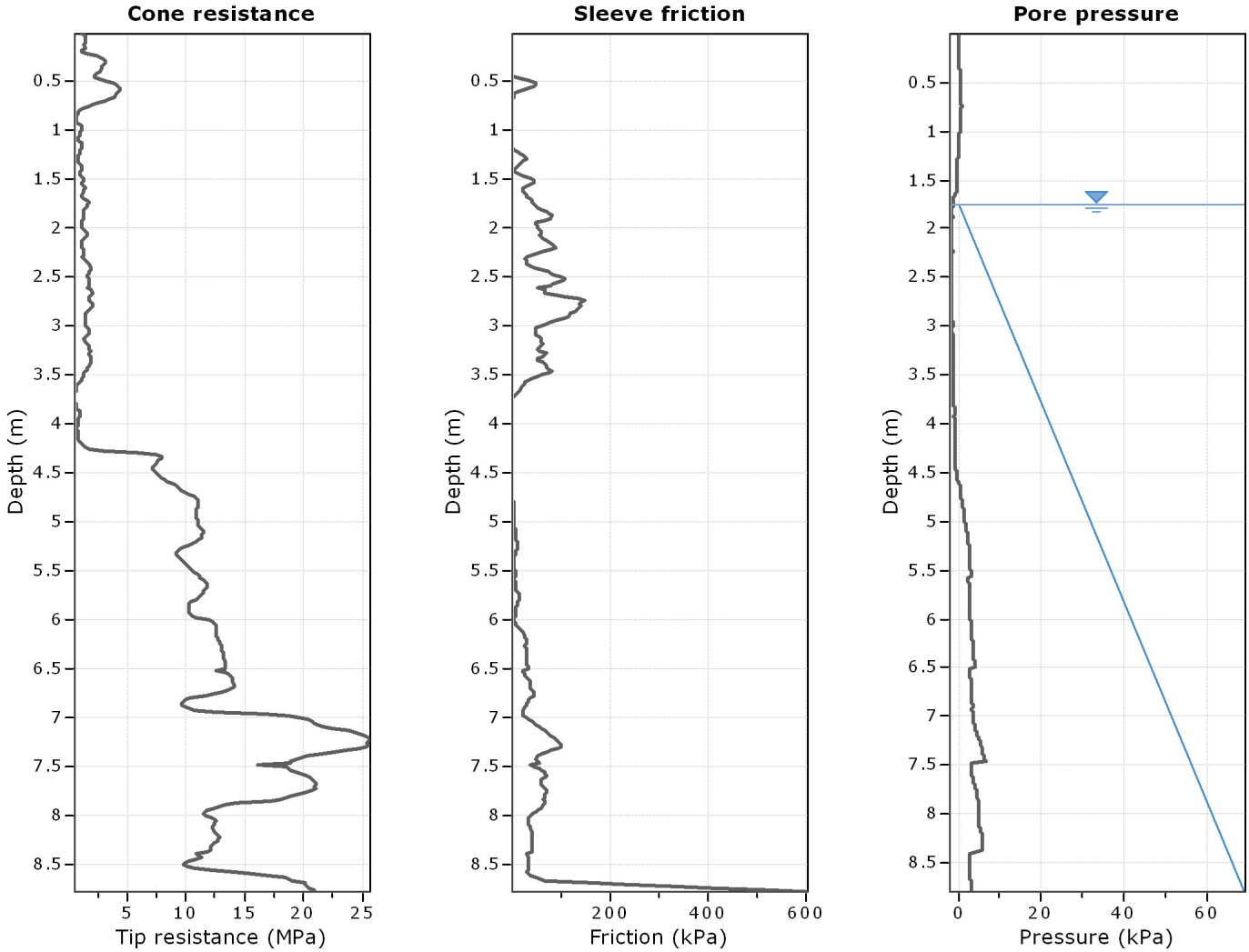
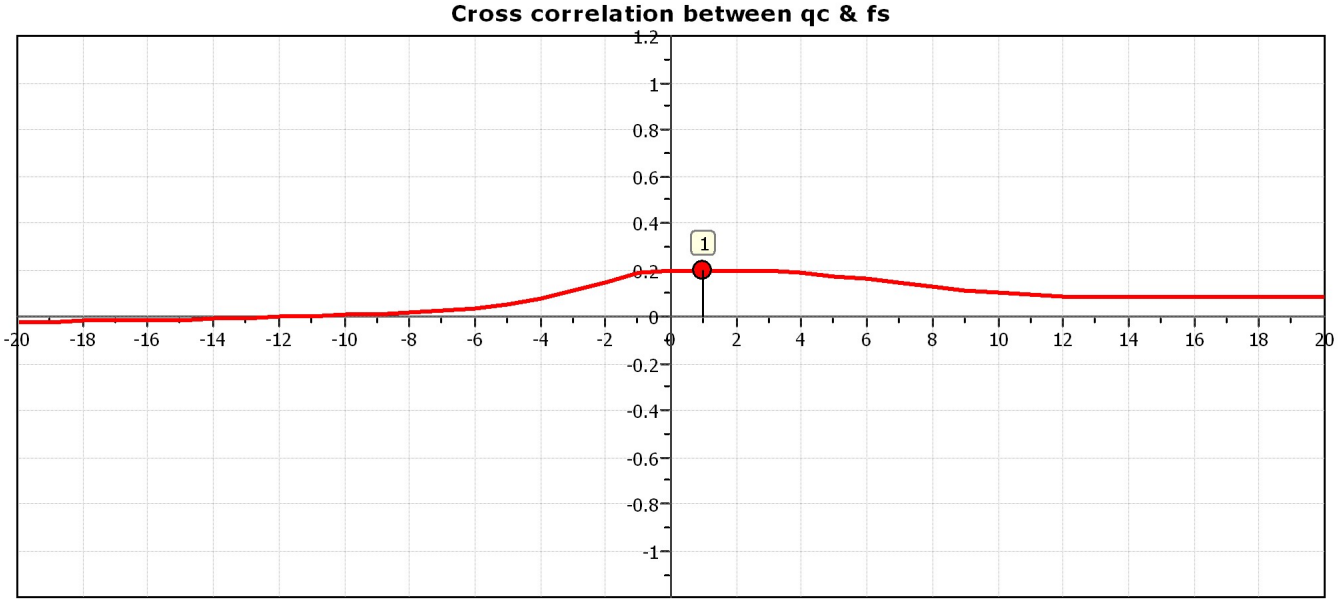
**CPT: SAMAWA CCPP_28**
Total depth: 9.16 m, Date: 13/05/2017
Surface Elevation: 10.06 m
Coords: N 3454103.937, E 525948.19
Cone Type: Icone ELCI-CFXYP20-10-AR-Piezocone
Cone Operator: Eng. Mohammed - Eng. Maysara

**Project:** **Samawa Combined Cycle Power Plant**
**Location:** **Samawa Governorate for ENKA Insaat ve Sanayi A.S.**






The plot below presents the cross correlation coeficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two sucessive CPT measurements).



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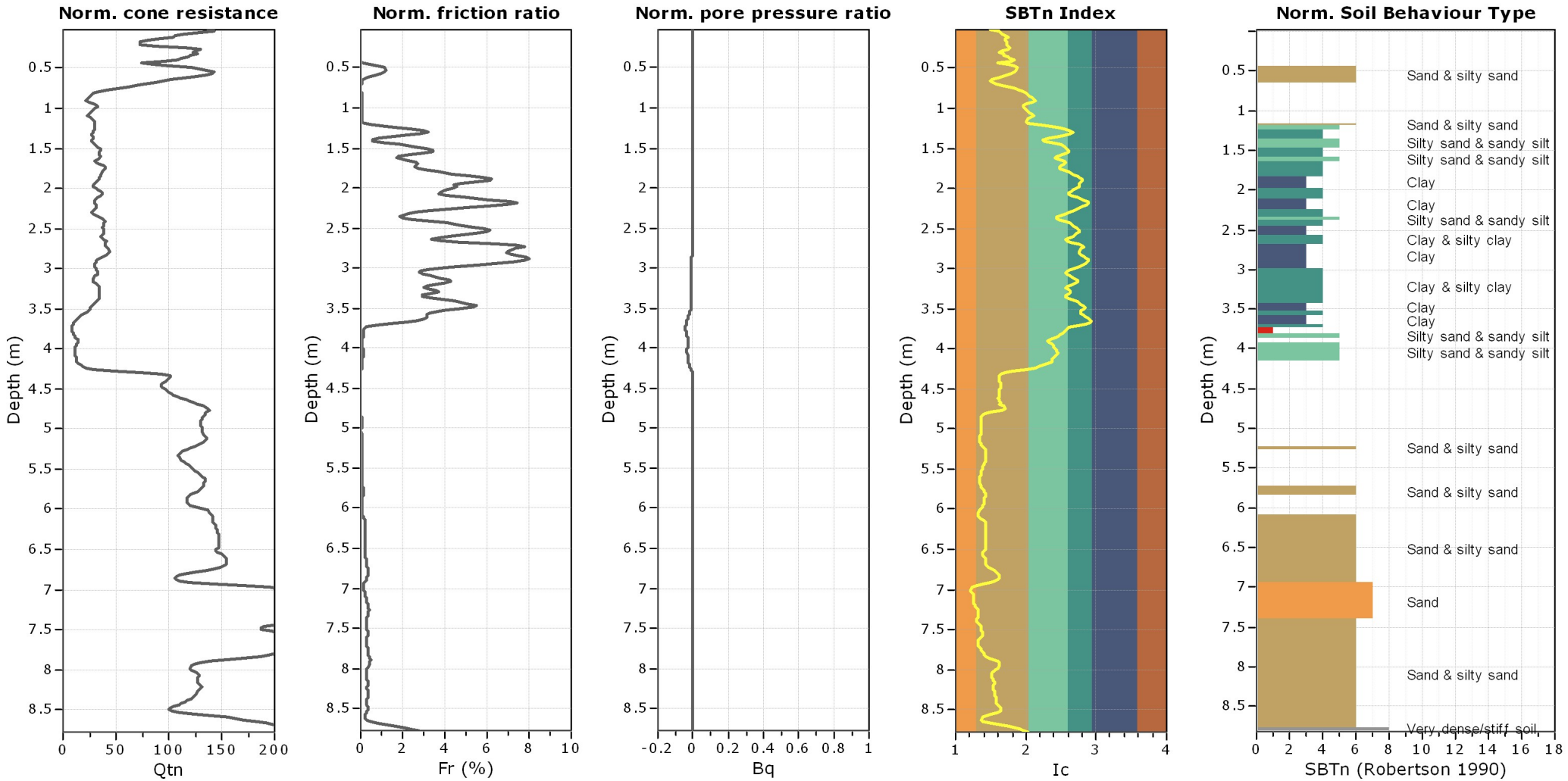
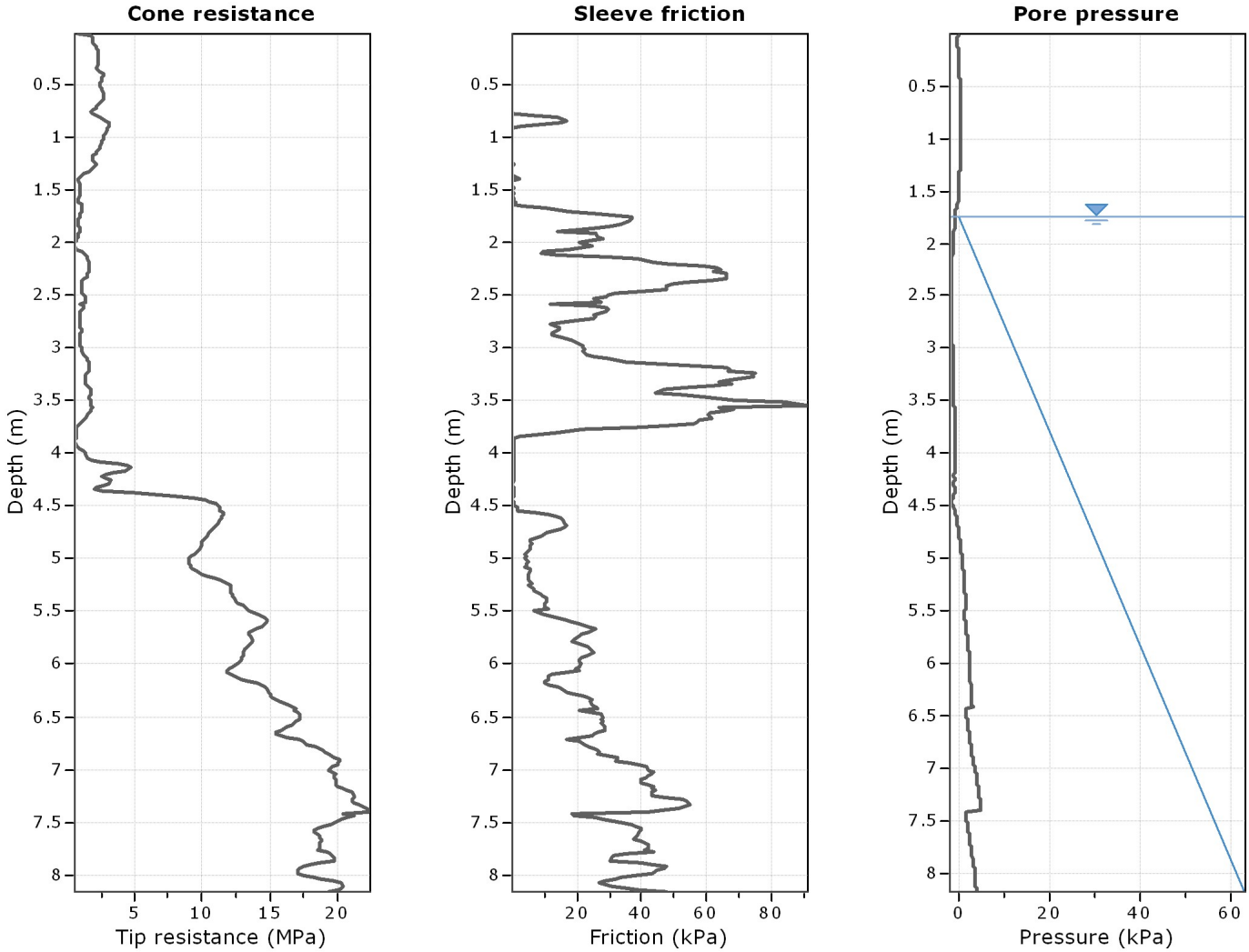
**CPT: SAMAWA CCPP_29**
Total depth: 8.78 m, Date: 13/05/2017
Surface Elevation: 9.76 m
Coords: N 3454530.361, E 525782.607
Cone Type: Icone ELCI-CFXYP20-10-AR-Piezocone
Cone Operator: Eng. Mohammed - Eng. Maysara

**Project:** **Samawa Combined Cycle Power Plant**
**Location:** **Samawa Governorate for ENKA Insaat ve Sanayi A.S.**

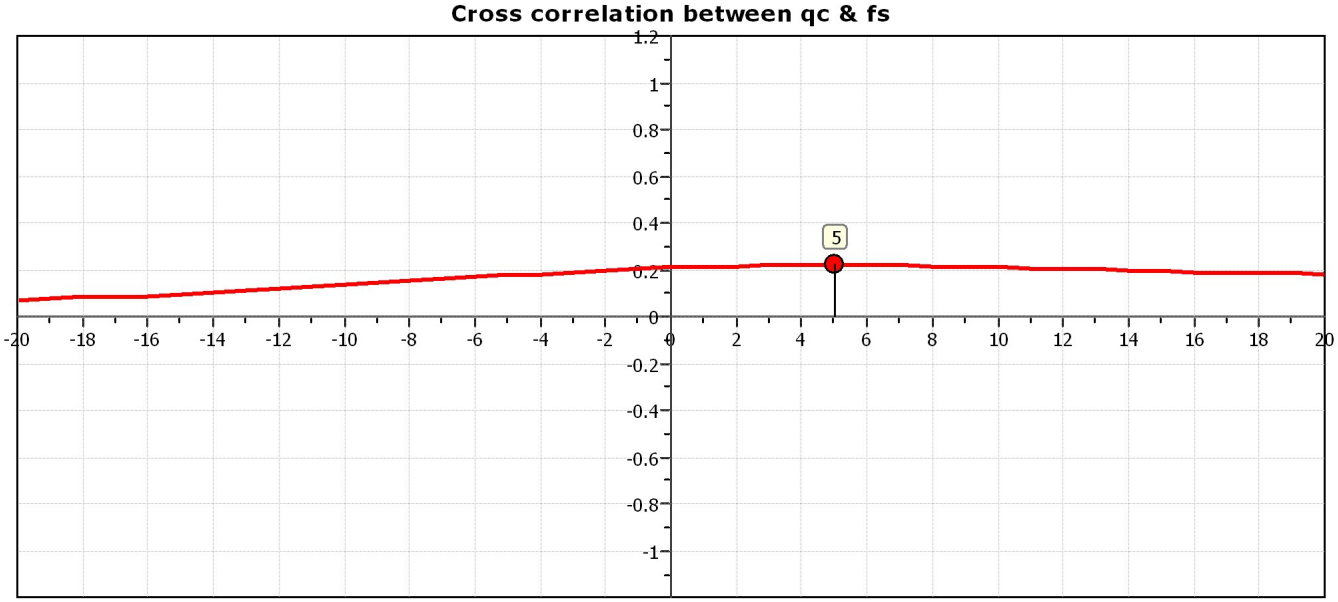



**SBTn legend**

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained




The plot below presents the cross correlation coeficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two sucessive CPT measurements).



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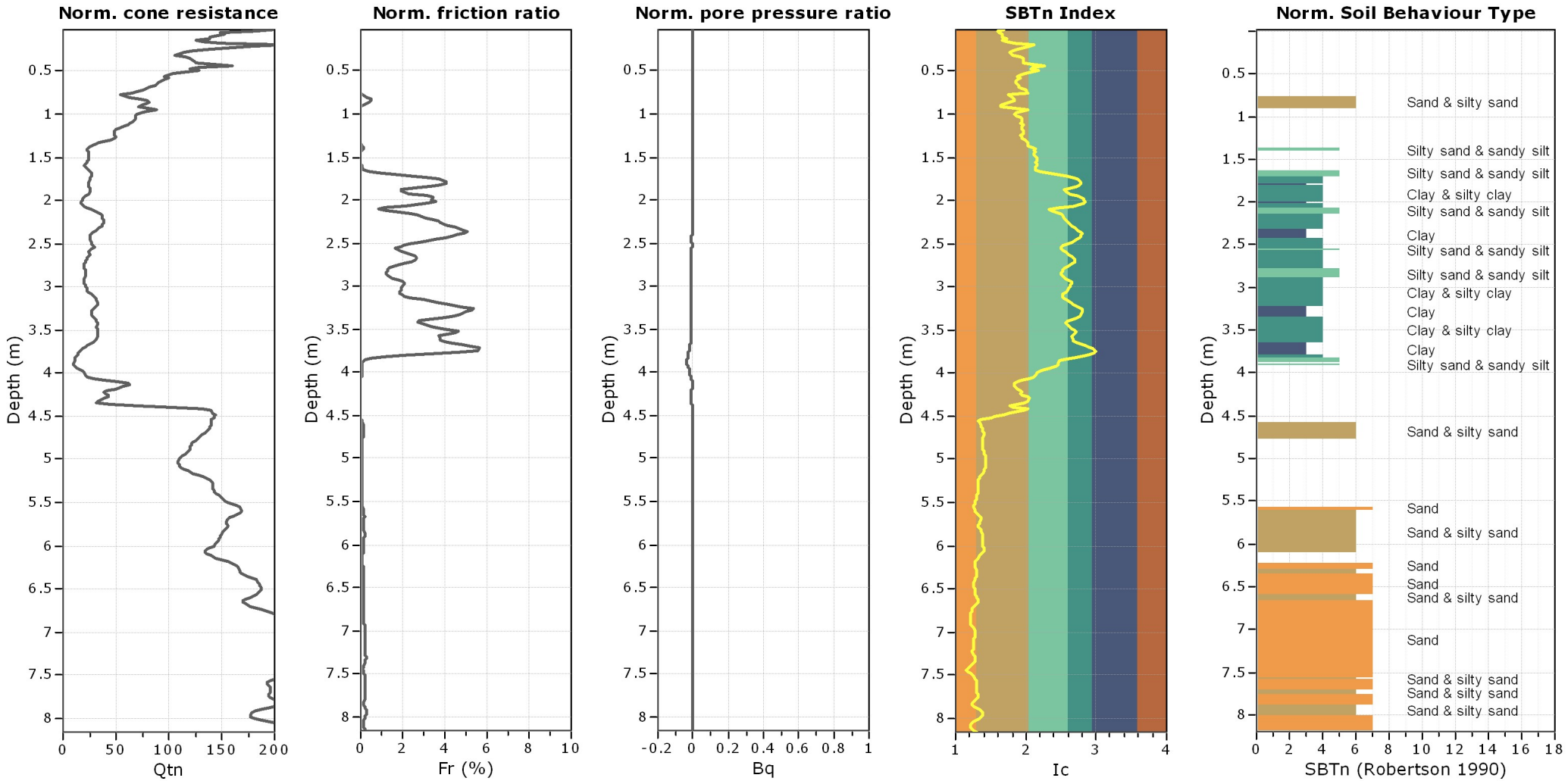
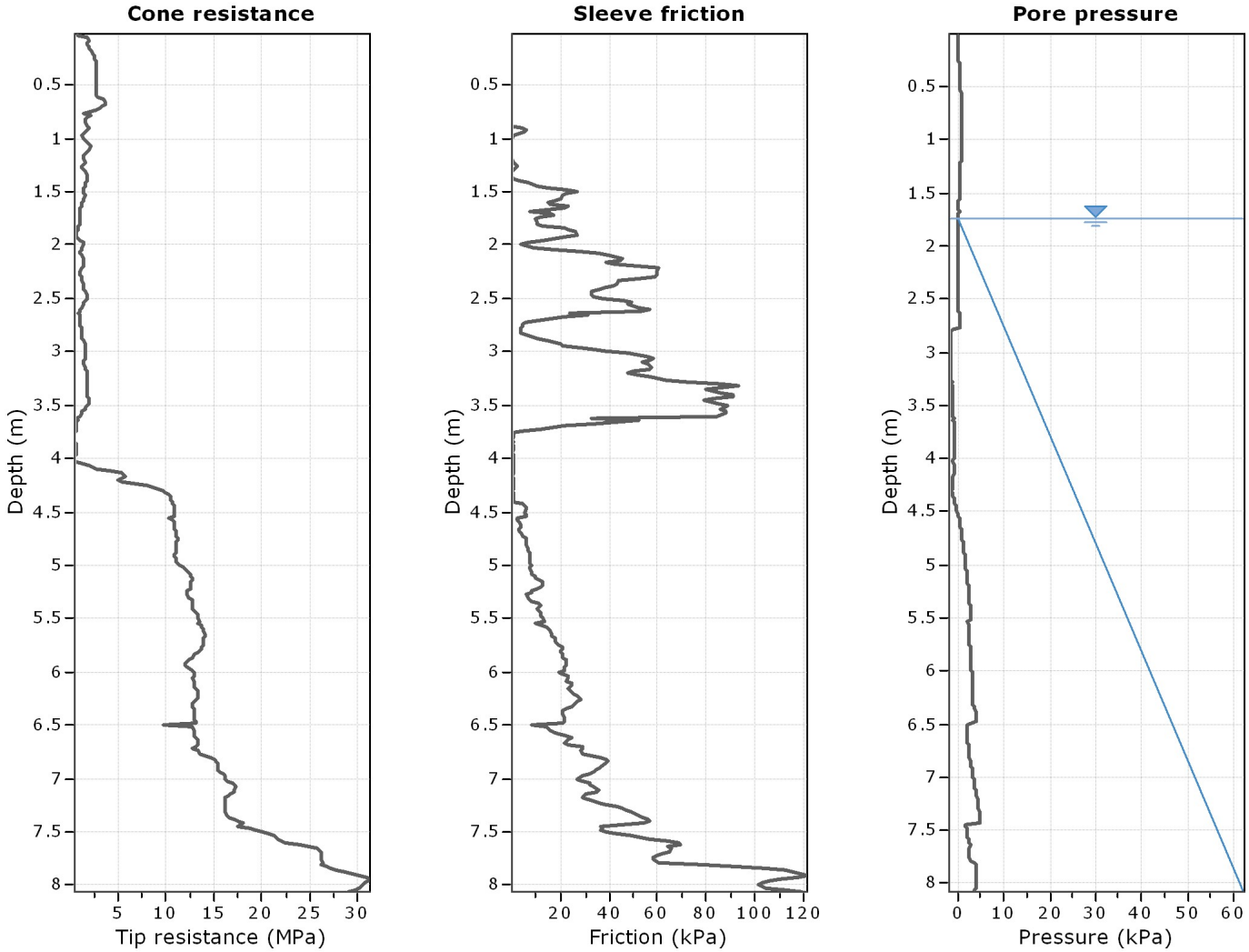
**CPT: SAMAWA CCPP_30**
Total depth: 8.16 m, Date: 13/05/2017
Surface Elevation: 10.29 m
Coords: N 3454552.895, E 525830.880
Cone Type: Icone ELCI-CFXYP20-10-AR-Piezocone
Cone Operator: Eng. Mohammed - Eng. Maysara

**Project:** **Samawa Combined Cycle Power Plant**
**Location:** **Samawa Governorate for ENKA Insaat ve Sanayi A.S.**

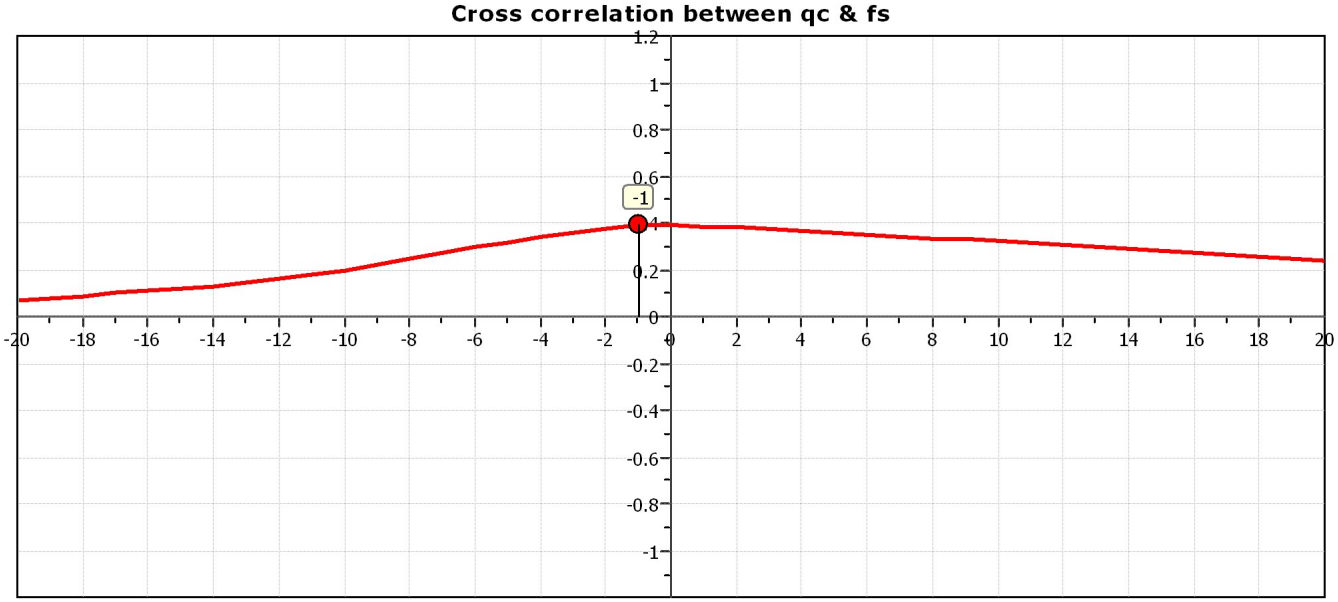



**SBTn legend**

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained




The plot below presents the cross correlation coeficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two sucessive CPT measurements).



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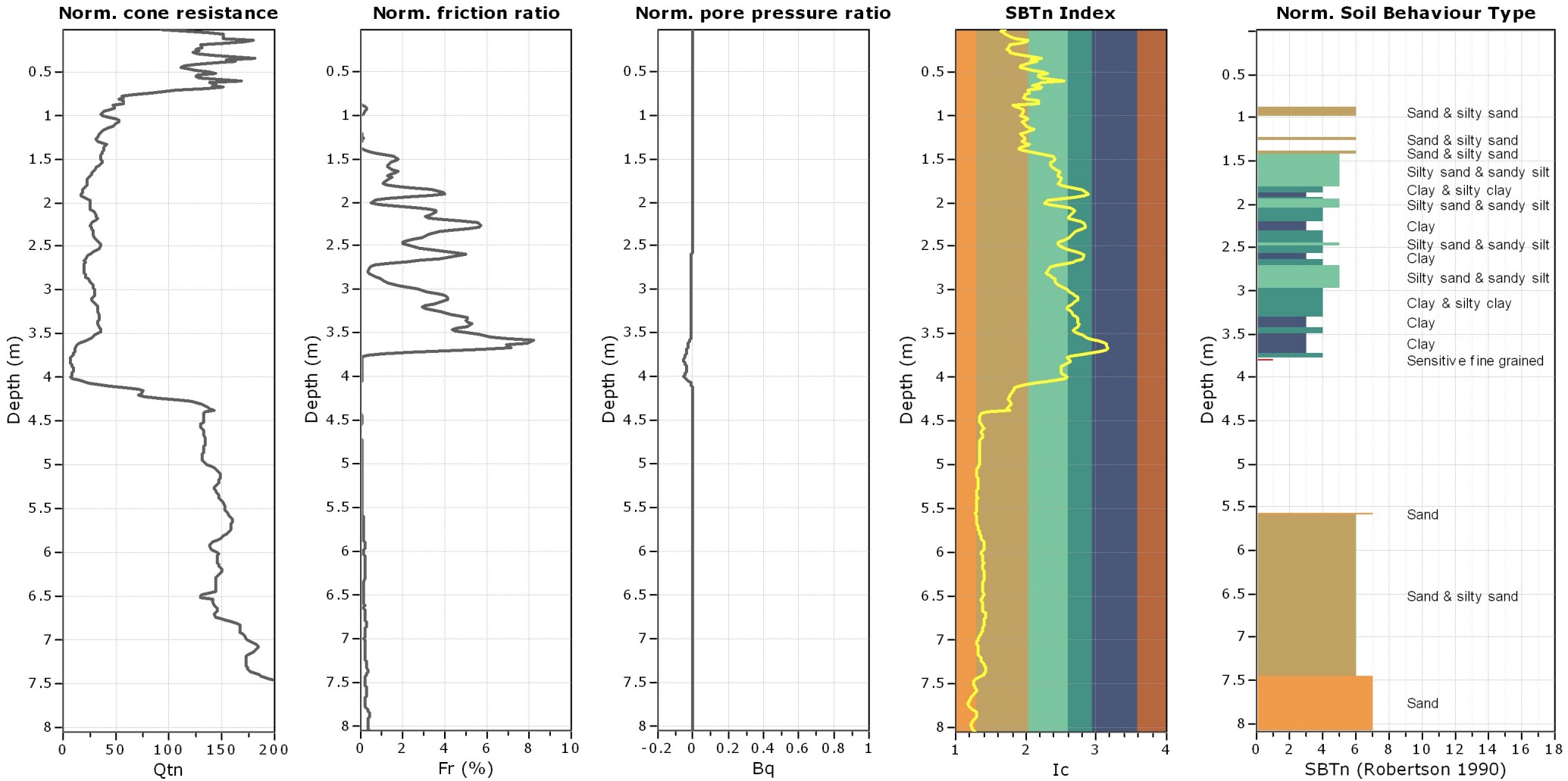
**CPT: SAMAWA CCPP_31**
Total depth: 8.06 m, Date: 13/05/2017
Surface Elevation: 10.12 m
Coords: N 3454492.935, E 525845.101
Cone Type: Icone ELCI-CFXYP20-10-AR-Piezocone
Cone Operator: Eng. Mohammed - Eng. Maysara

**Project:** **Samawa Combined Cycle Power Plant**
**Location:** **Samawa Governorate for ENKA Insaat ve Sanayi A.S.**

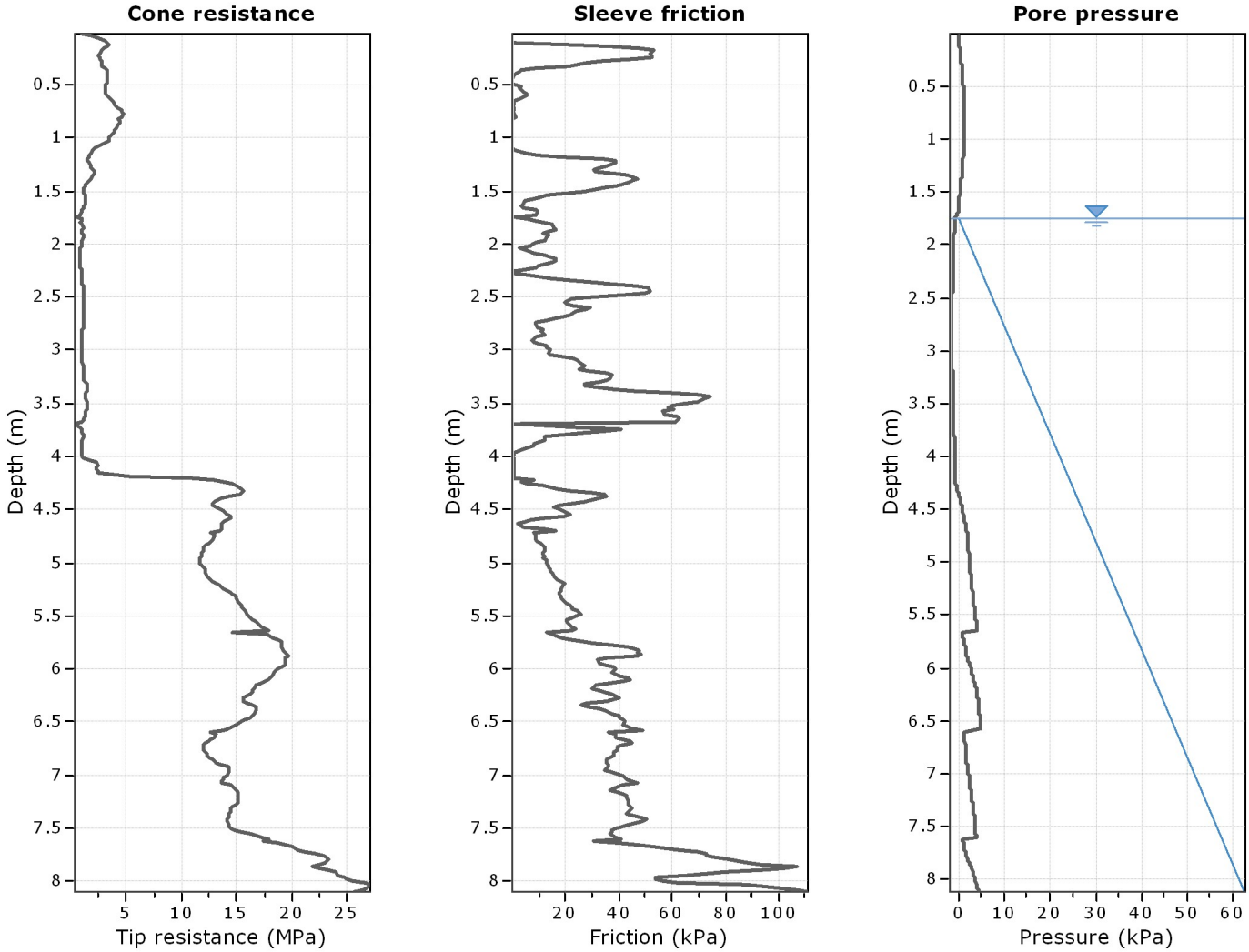



**SBTn legend**

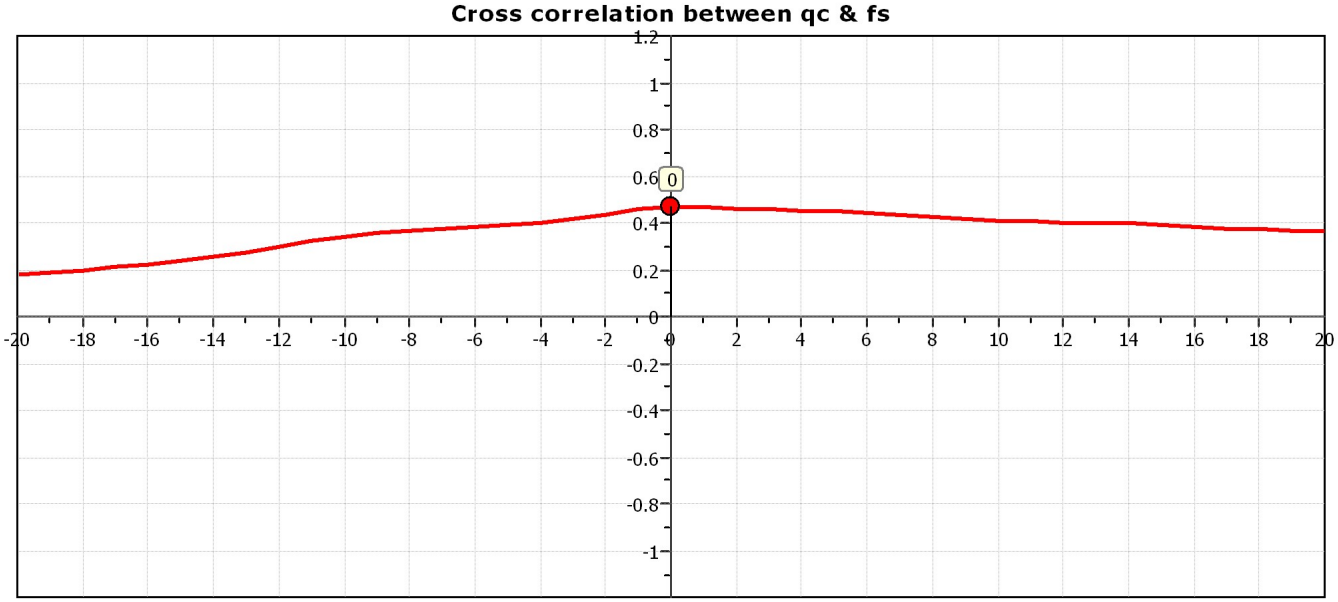
1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

**CPT: SAMAWA CCPP_32**
Total depth: 8.10 m, Date: 13/05/2017
Surface Elevation: 10.32 m
Coords: N 3454521.878, E 525877.298
Cone Type: Icone ELCI-CFXYP20-10-AR-Piezocone
Cone Operator: Eng. Mohammed - Eng. Maysara

**Project:** **Samawa Combined Cycle Power Plant**
**Location:** **Samawa Governorate for ENKA Insaat ve Sanayi A.S.**




The plot below presents the cross correlation coeficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two sucessive CPT measurements).



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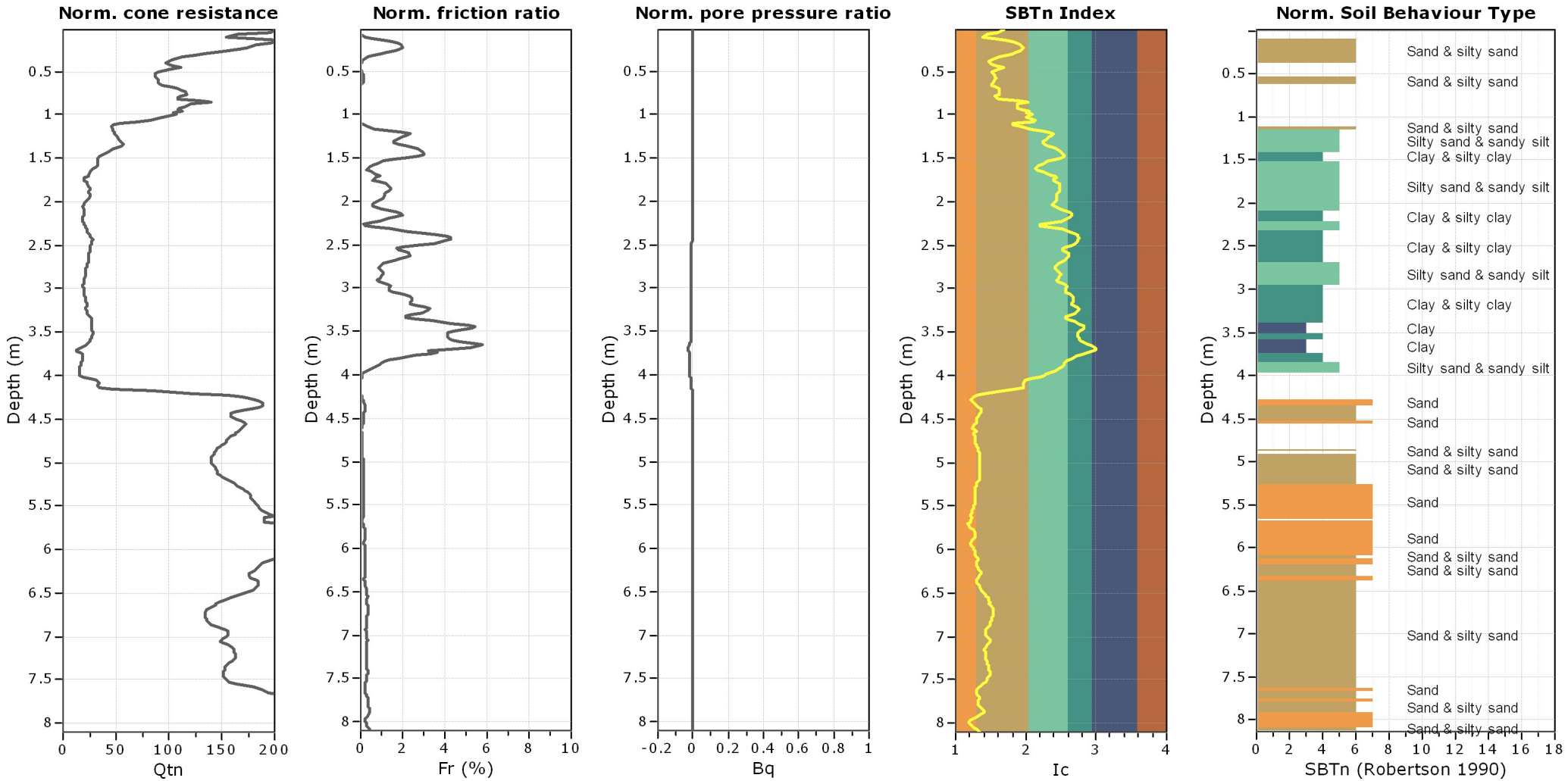
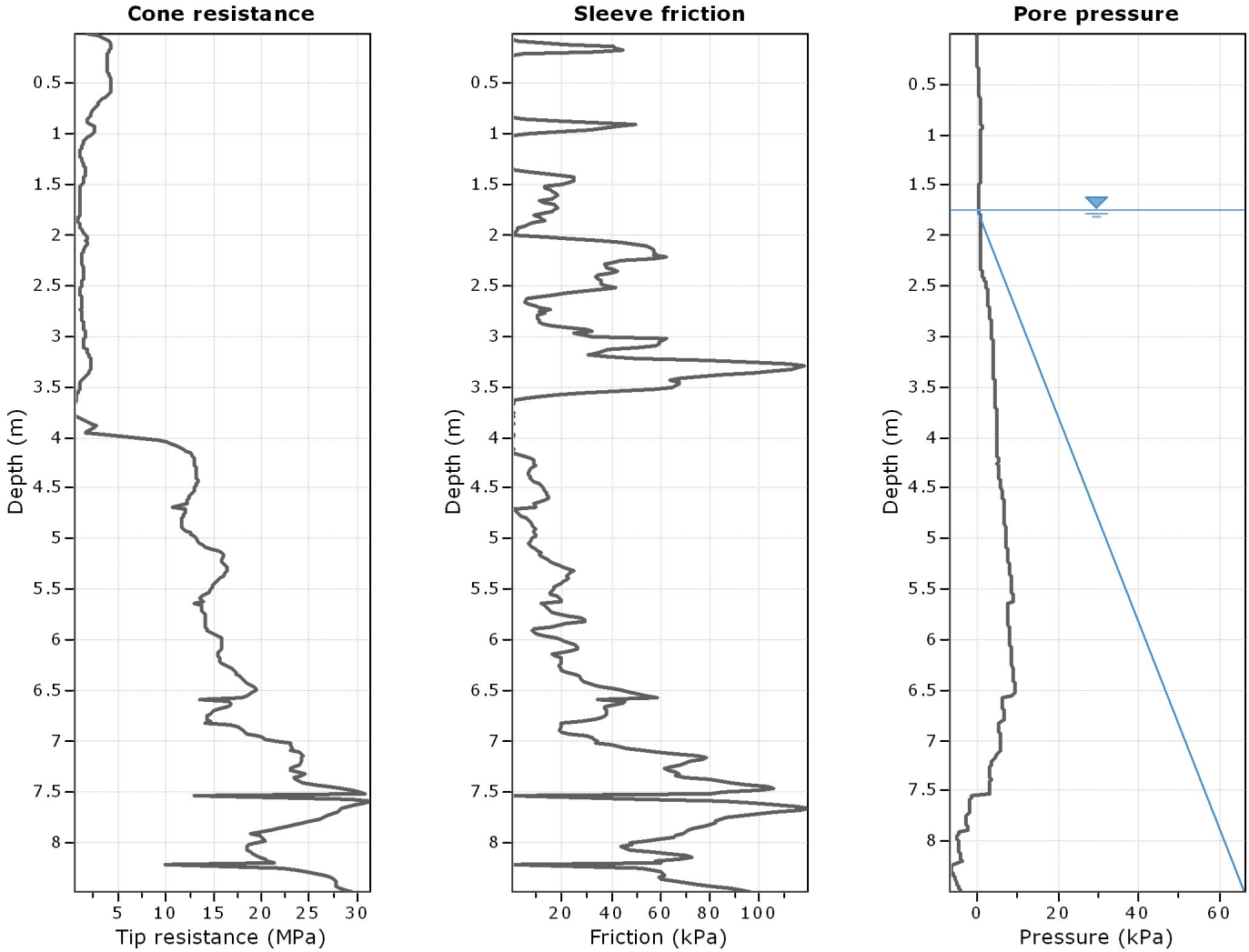
**CPT: SAMAWA CCPP_32**
Total depth: 8.10 m, Date: 13/05/2017
Surface Elevation: 10.32 m
Coords: N 3454521.878, E 525877.298
Cone Type: Icone ELCI-CFXYP20-10-AR-Piezocone
Cone Operator: Eng. Mohammed - Eng. Maysara

**Project:** **Samawa Combined Cycle Power Plant**
**Location:** **Samawa Governorate for ENKA Insaat ve Sanayi A.S.**

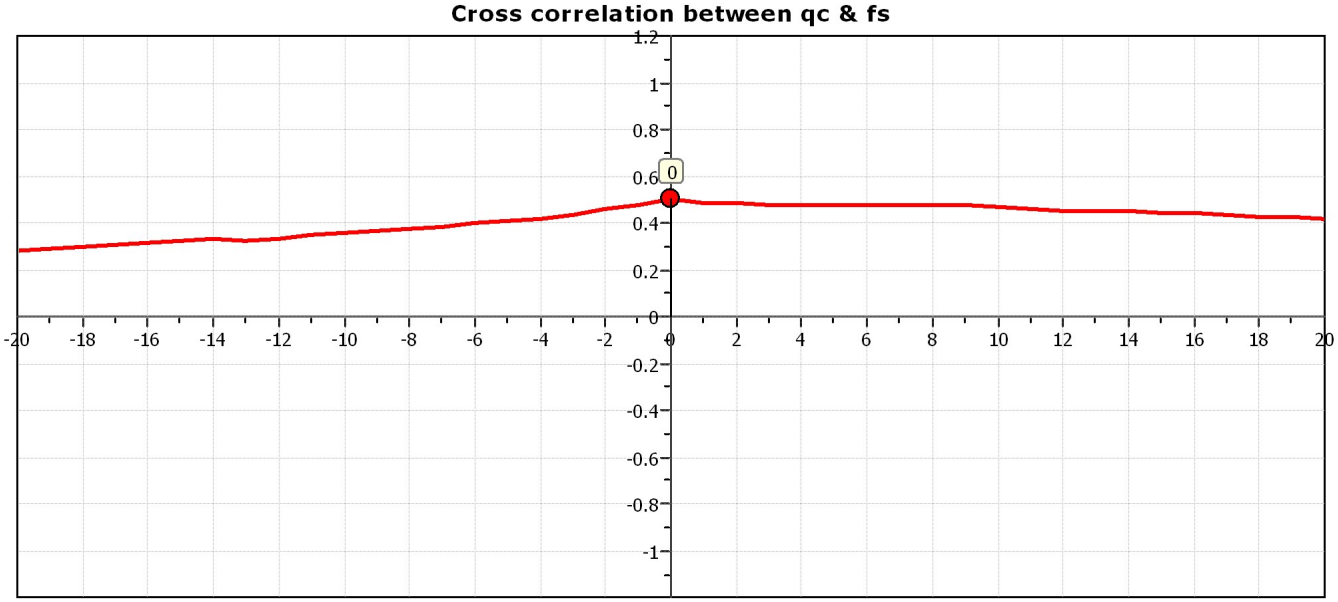



**SBTn legend**

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained




The plot below presents the cross correlation coeficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two sucessive CPT measurements).



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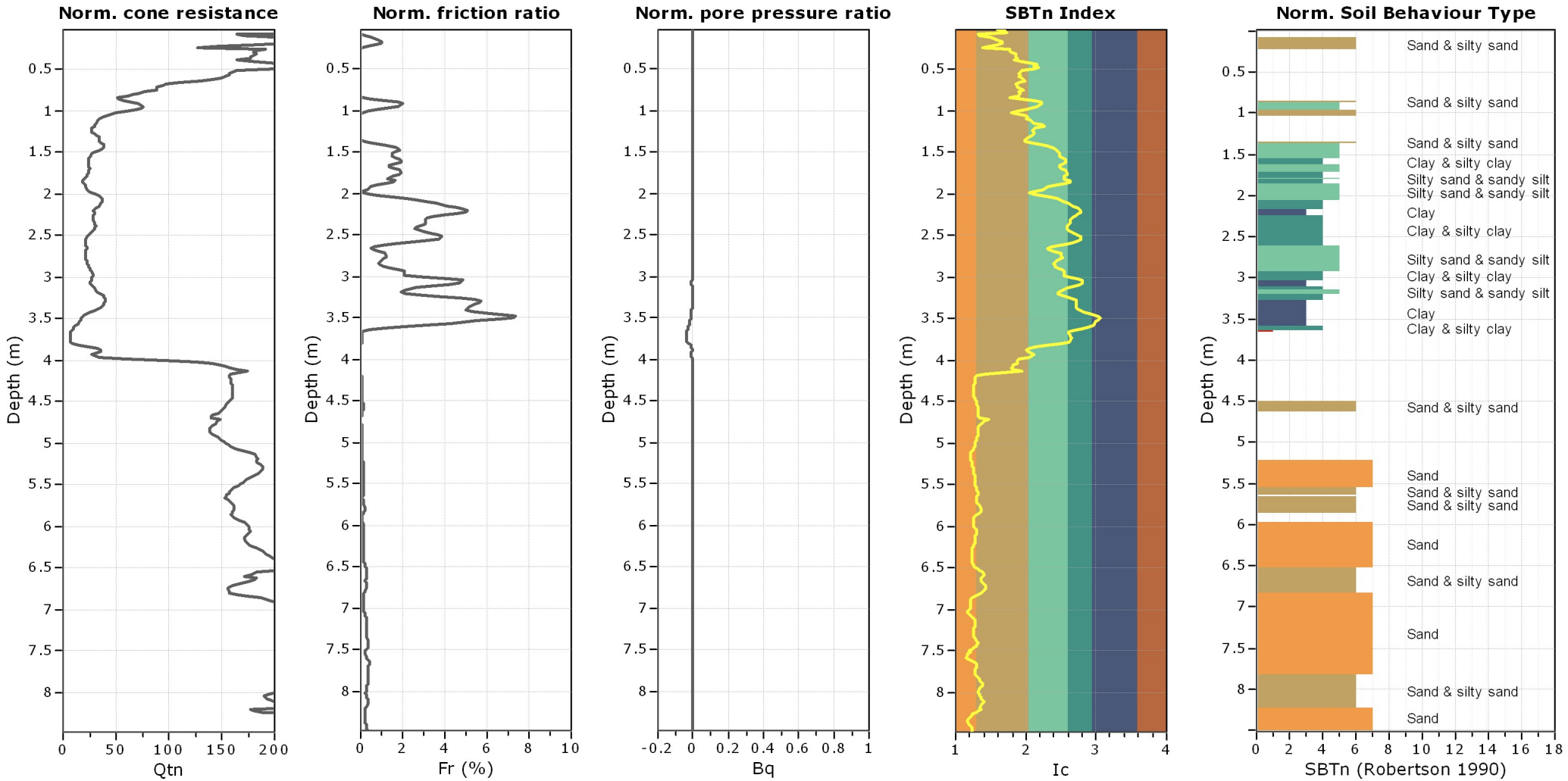
**CPT: SAMAWA CCPP_33**
Total depth: 8.48 m, Date: 13/05/2017
Surface Elevation: 10.18 m
Coords: N 3454464.394, E 525884.123
Cone Type: Icone ELCI-CFXYP20-10-AR-Piezocone
Cone Operator: Eng. Mohammed - Eng. Maysara

**Project:** **Samawa Combined Cycle Power Plant**
**Location:** **Samawa Governorate for ENKA Insaat ve Sanayi A.S.**




**SBTn legend**

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

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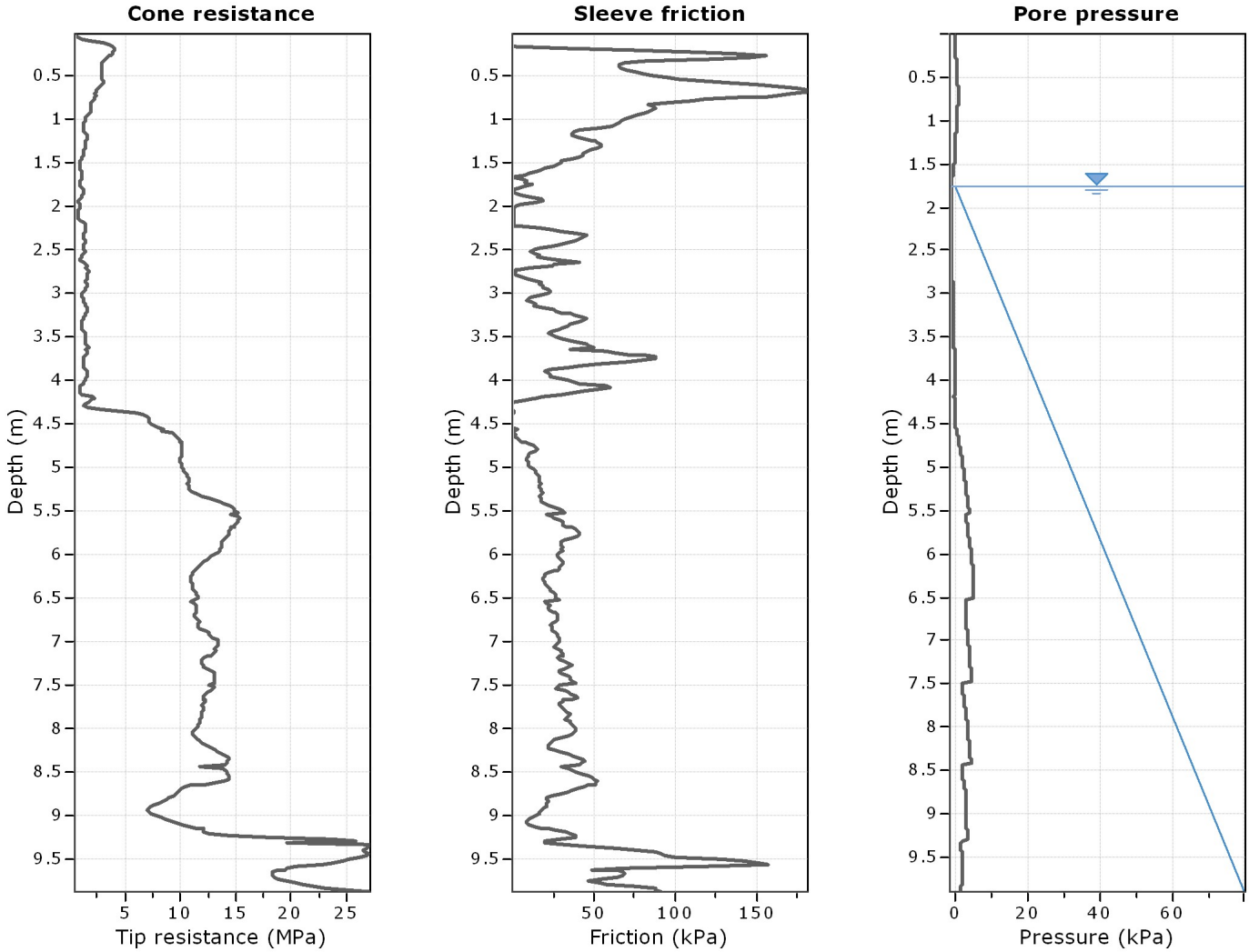
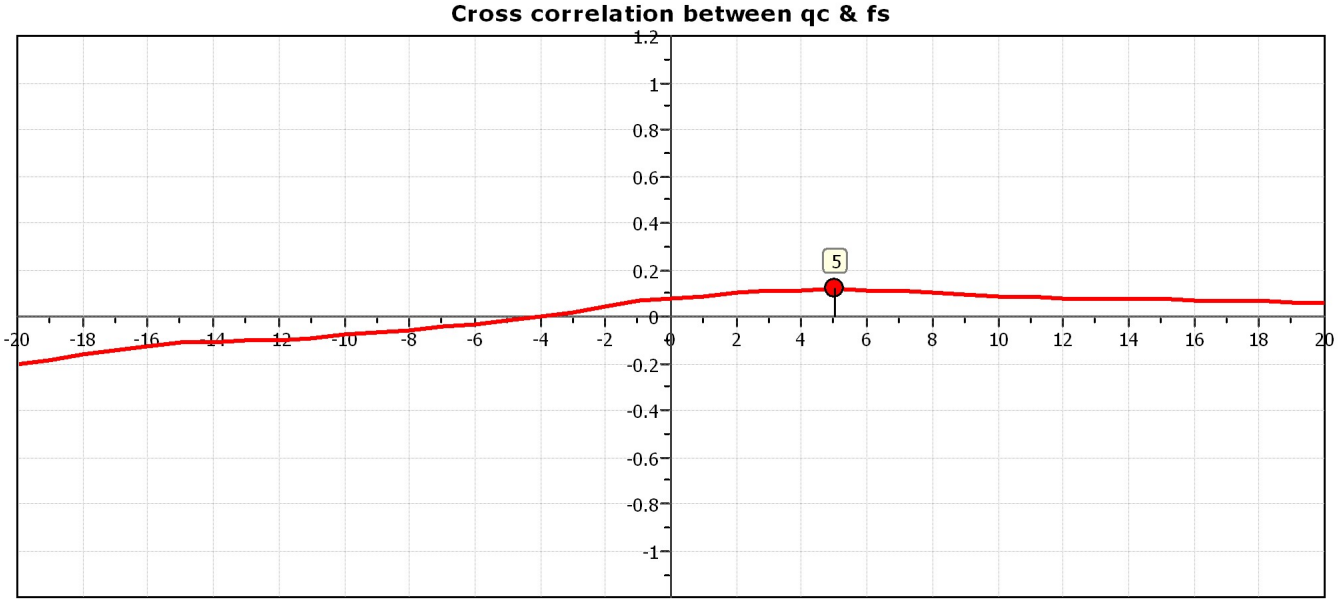
**CPT: SAMAWA CCPP_34**
Total depth: 9.88 m, Date: 13/05/2017
Surface Elevation: 11.17 m
Coords: N 3454479.667, E 525943.107
Cone Type: Icone ELCI-CFXYP20-10-AR-Piezocone
Cone Operator: Eng. Mohammed - Eng. Maysara

**Project:** **Samawa Combined Cycle Power Plant**
**Location:** **Samawa Governorate for ENKA Insaat ve Sanayi A.S.**




The plot below presents the cross correlation coeficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two sucessive CPT measurements).



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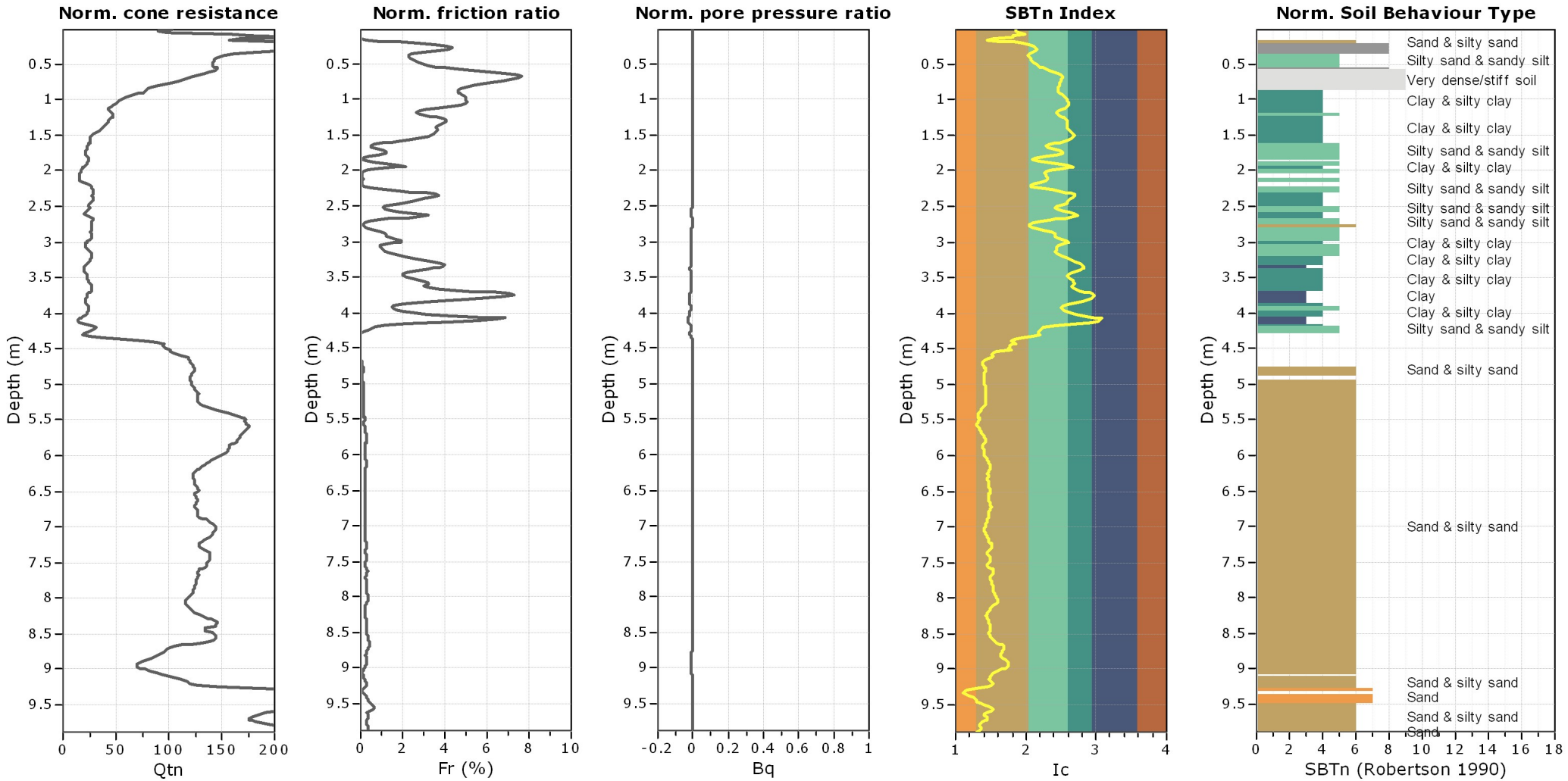
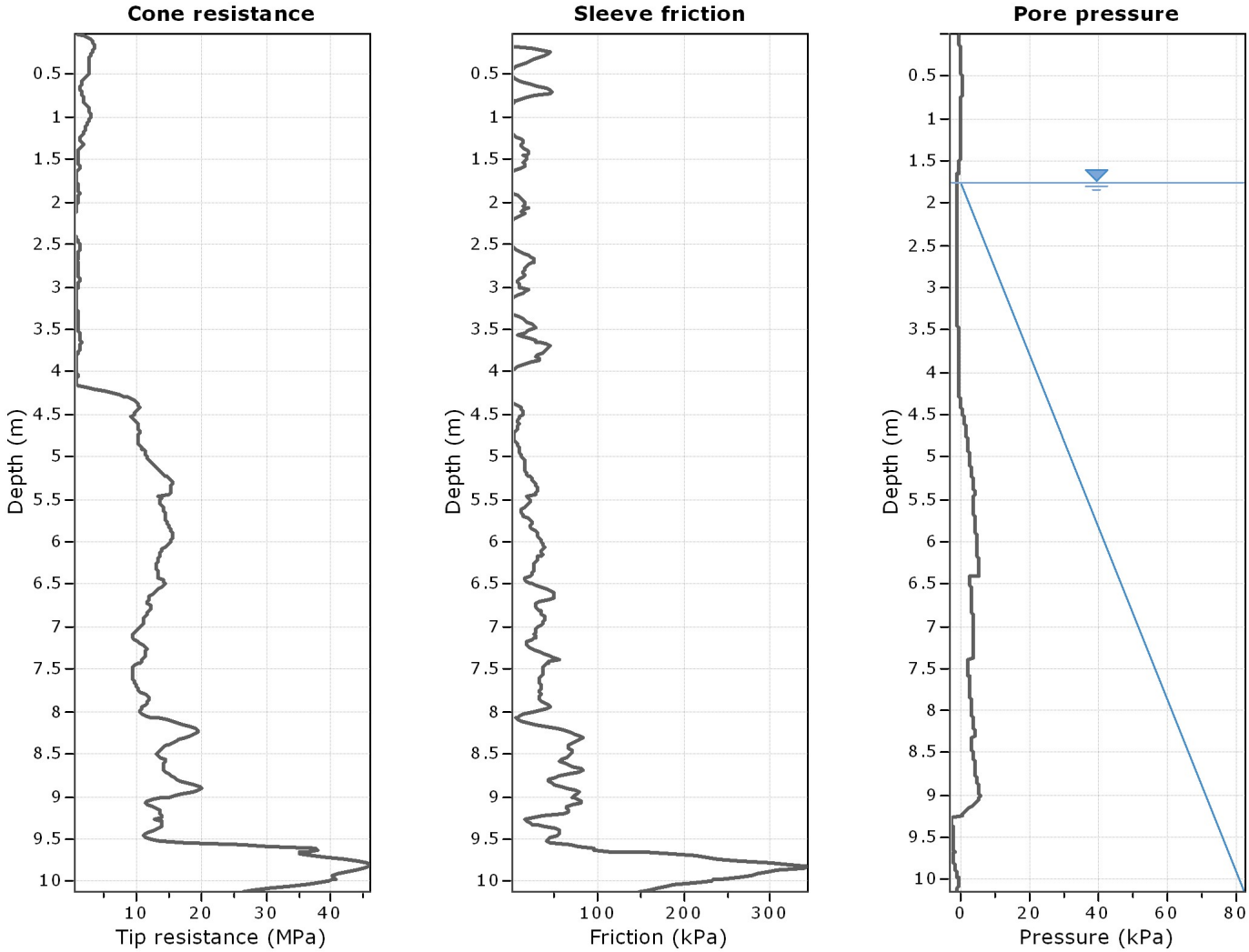
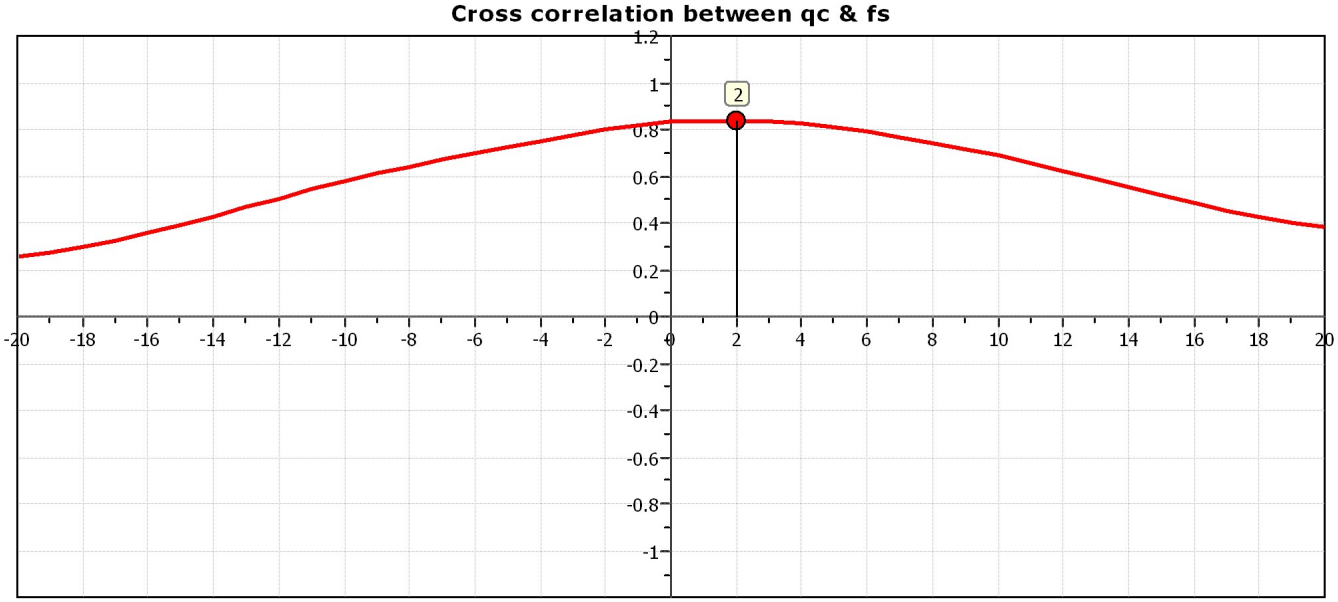
**CPT: SAMAWA CCPP_34**
Total depth: 9.88 m, Date: 13/05/2017
Surface Elevation: 11.17 m
Coords: N 3454479.667, E 525943.107
Cone Type: Icone ELCI-CFXYP20-10-AR-Piezocone
Cone Operator: Eng. Mohammed - Eng. Maysara

**Project:** **Samawa Combined Cycle Power Plant**
**Location:** **Samawa Governorate for ENKA Insaat ve Sanayi A.S.**






The plot below presents the cross correlation coeficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two sucessive CPT measurements).



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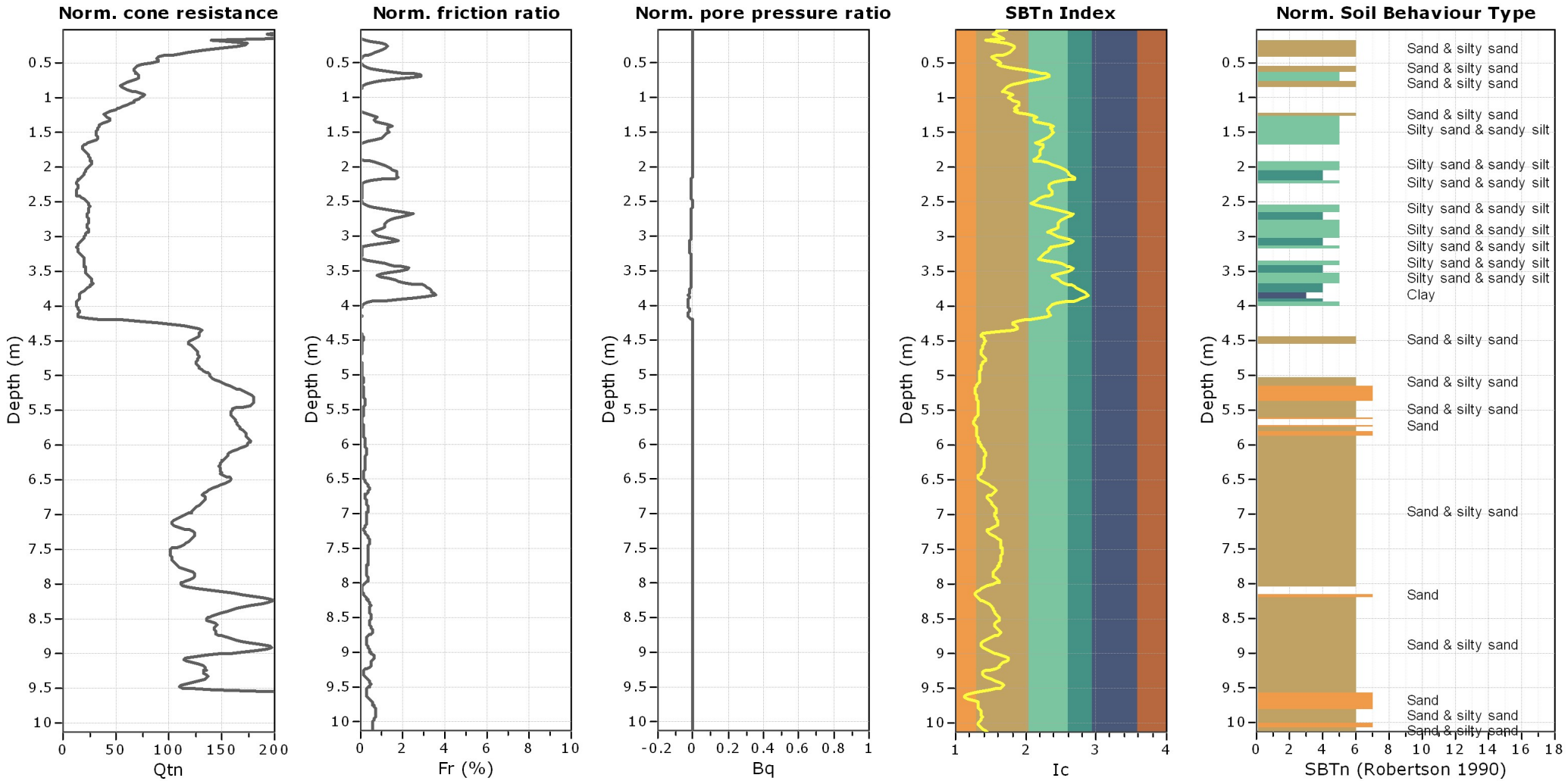
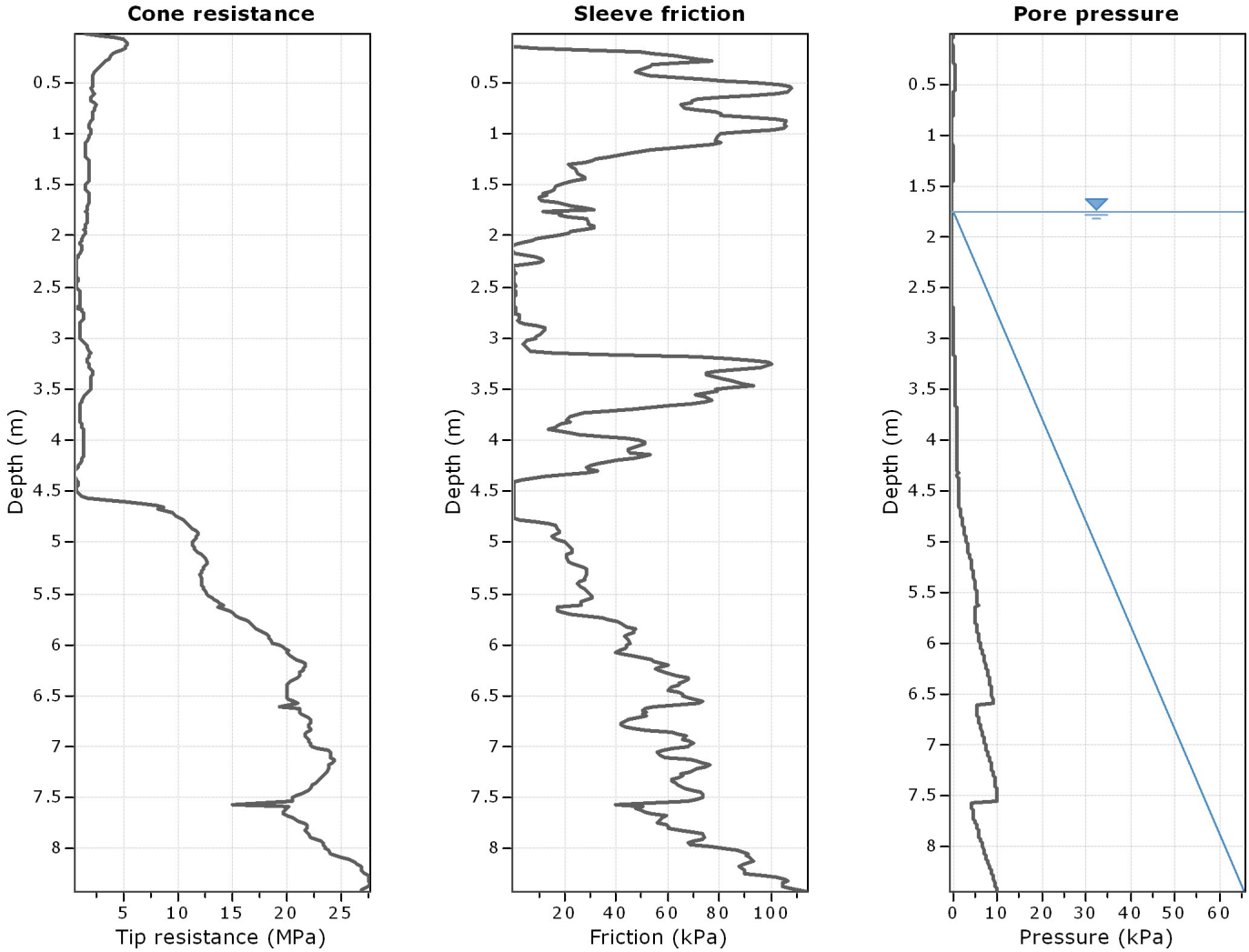
**CPT: SAMAWA CCPP_35**
Total depth: 10.12 m, Date: 13/05/2017
Surface Elevation: 11.25 m
Coords: N 3454432.696, E 525952.156
Cone Type: Icone ELCI-CFXYP20-10-AR-Piezocone
Cone Operator: Eng. Mohammed - Eng. Maysara

**Project:** **Samawa Combined Cycle Power Plant**
**Location:** **Samawa Governorate for ENKA Insaat ve Sanayi A.S.**

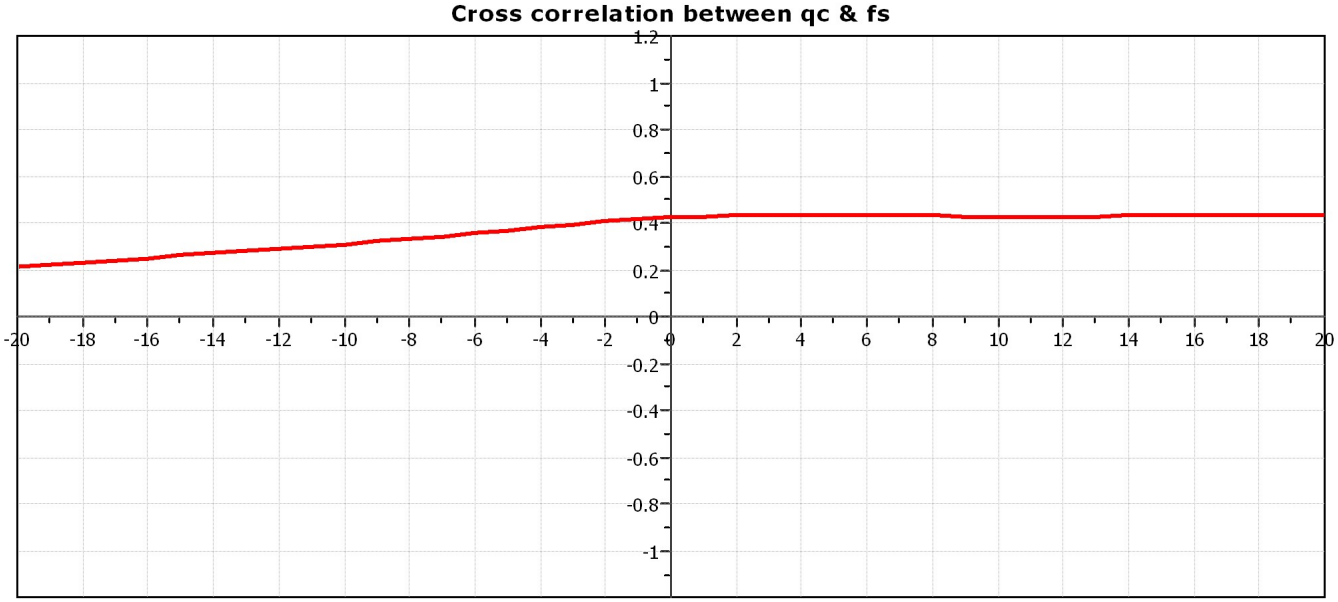



**SBTn legend**

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained




The plot below presents the cross correlation coeficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two sucessive CPT measurements).



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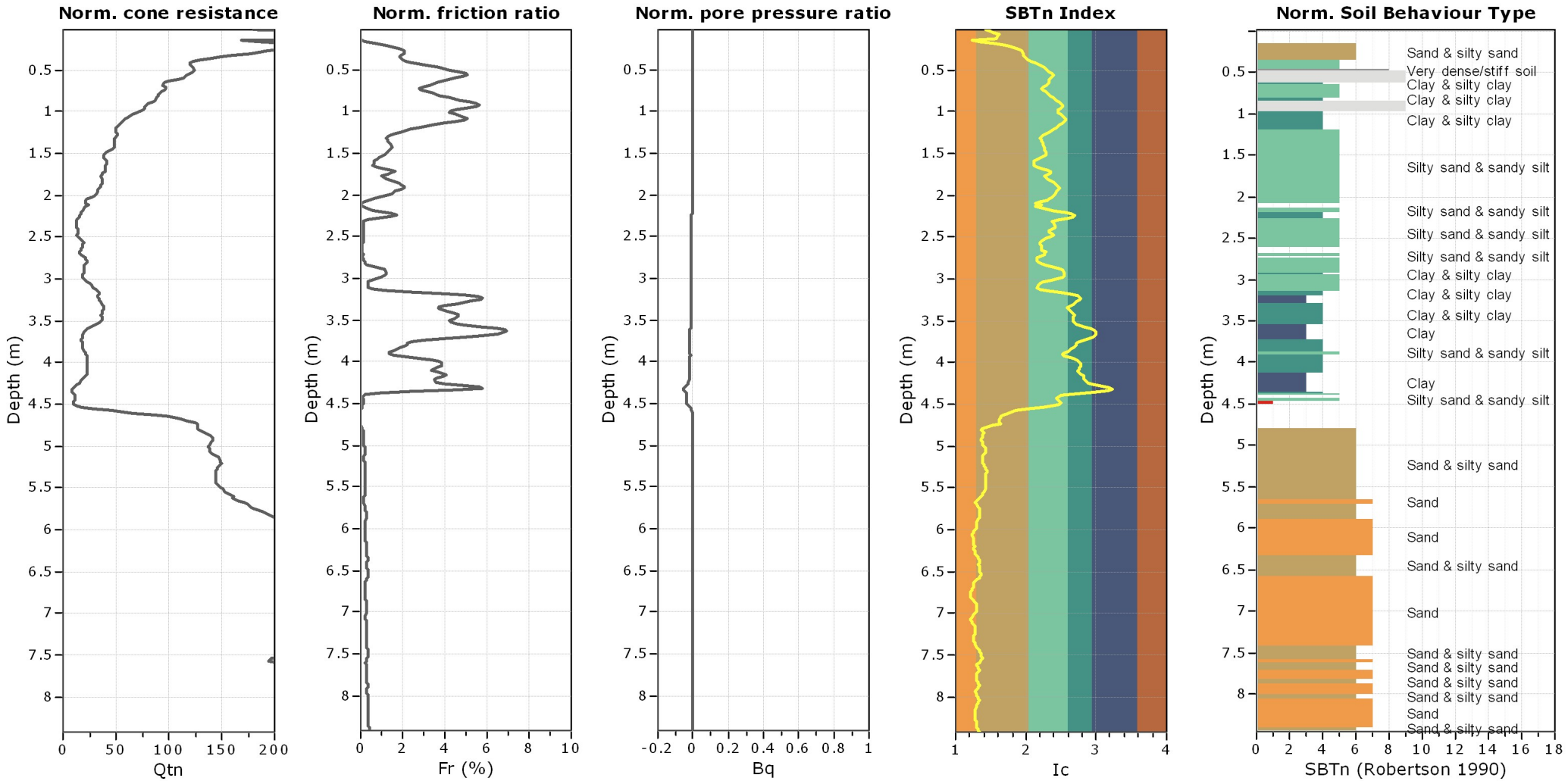
**CPT: SAMAWA CCPP_36**
Total depth: 8.42 m, Date: 13/05/2017
Surface Elevation: 11.21 m
Coords: N 3454457.913, E 525970.795
Cone Type: Icone ELCI-CFXYP20-10-AR-Piezocone
Cone Operator: Eng. Mohammed - Eng. Maysara

**Project:** **Samawa Combined Cycle Power Plant**
**Location:** **Samawa Governorate for ENKA Insaat ve Sanayi A.S.**




**SBTn legend**

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

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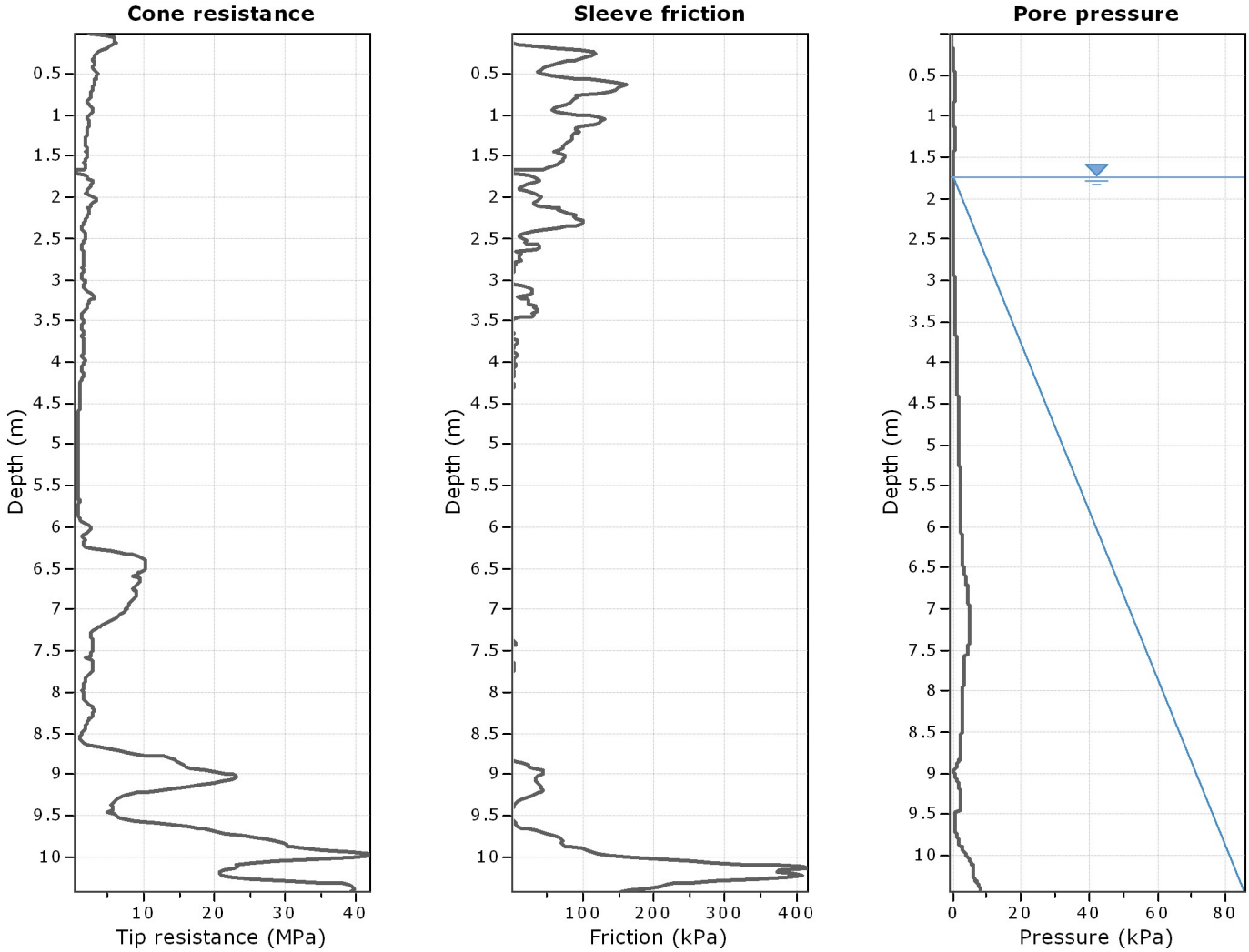
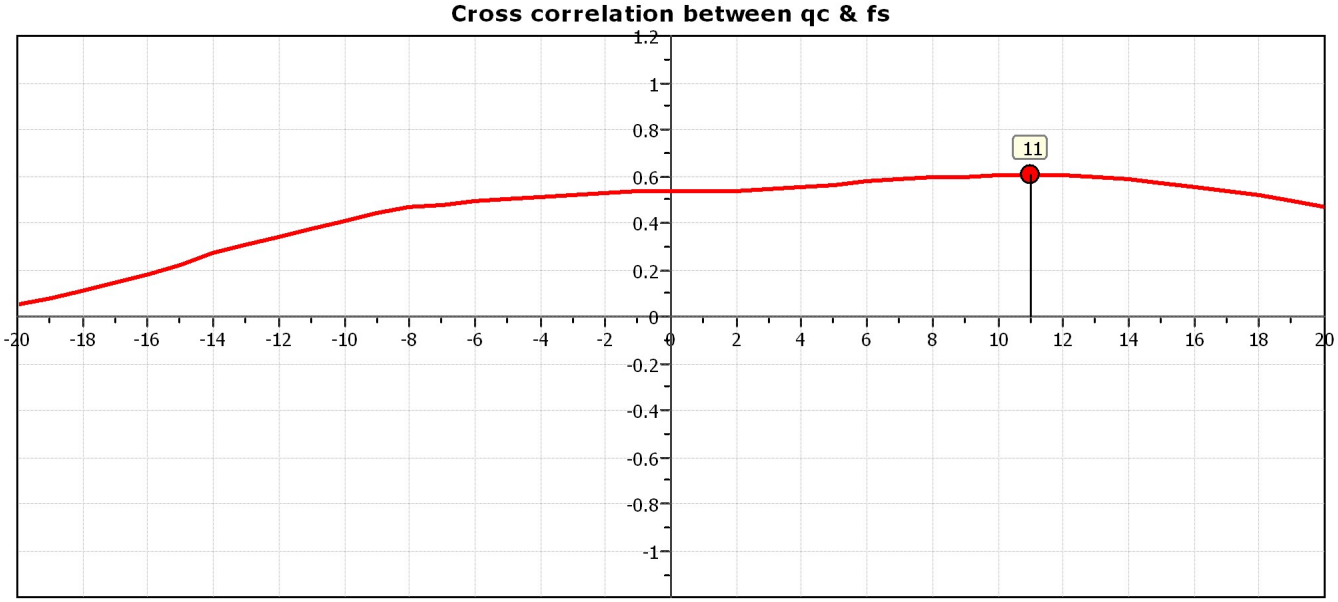
**CPT: SAMAWA CCPP_37**
Total depth: 10.42 m, Date: 13/05/2017
Surface Elevation: 11.25 m
Coords: N 3454405.411, E 526039.150
Cone Type: Icone ELCI-CFXYP20-10-AR-Piezocone
Cone Operator: Eng. Mohammed - Eng. Maysara

**Project:** **Samawa Combined Cycle Power Plant**
**Location:** **Samawa Governorate for ENKA Insaat ve Sanayi A.S.**




The plot below presents the cross correlation coeficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two sucessive CPT measurements).



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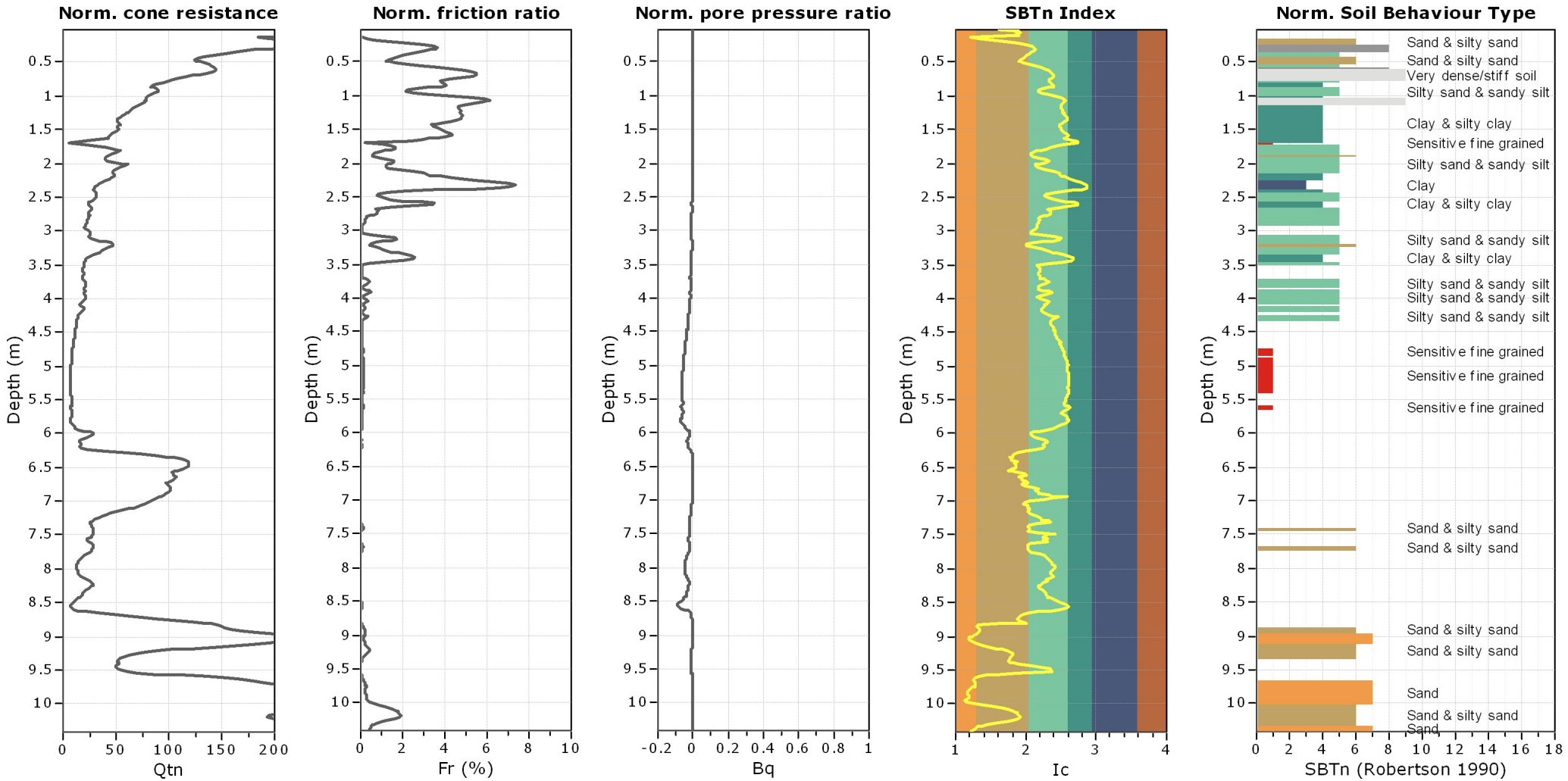
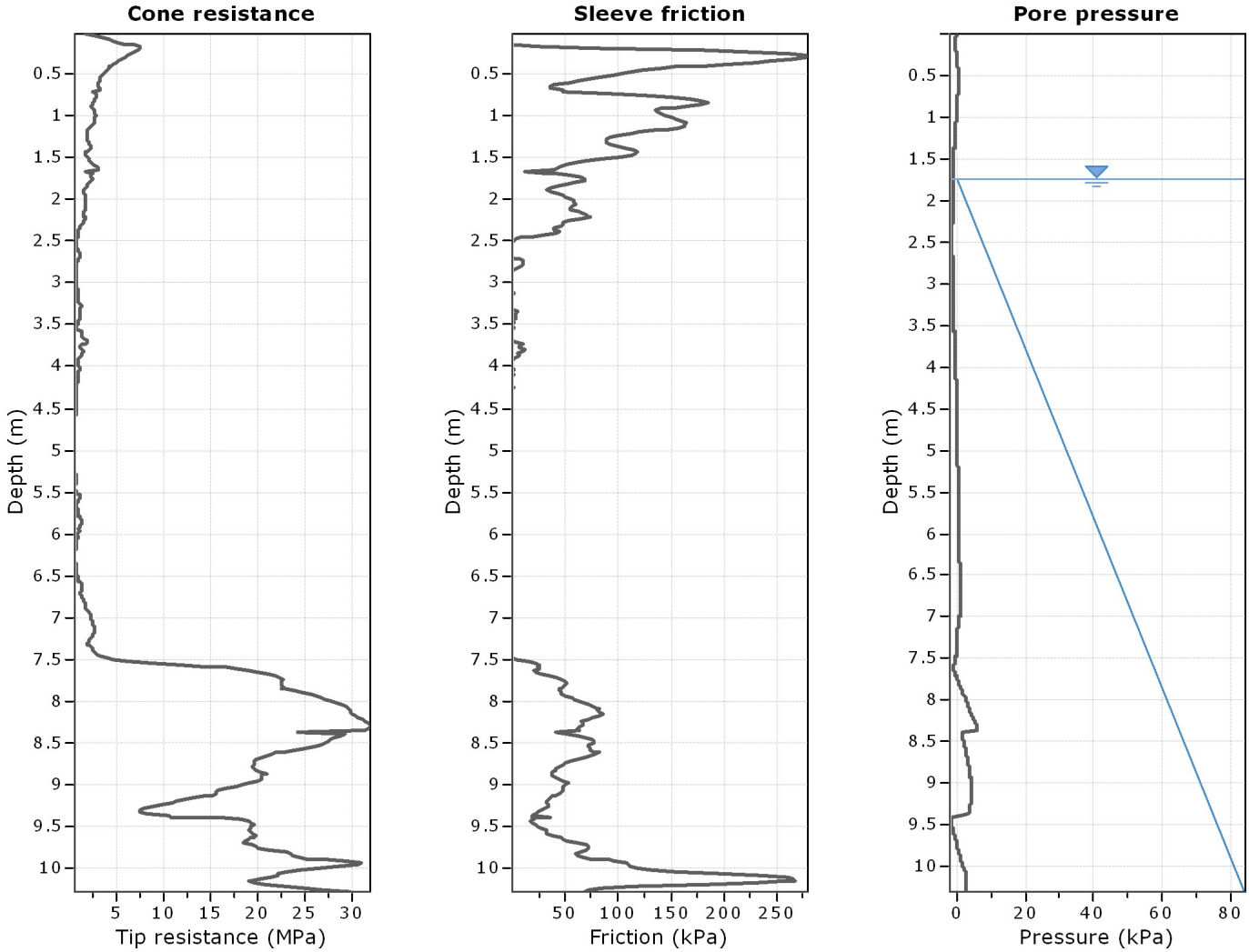
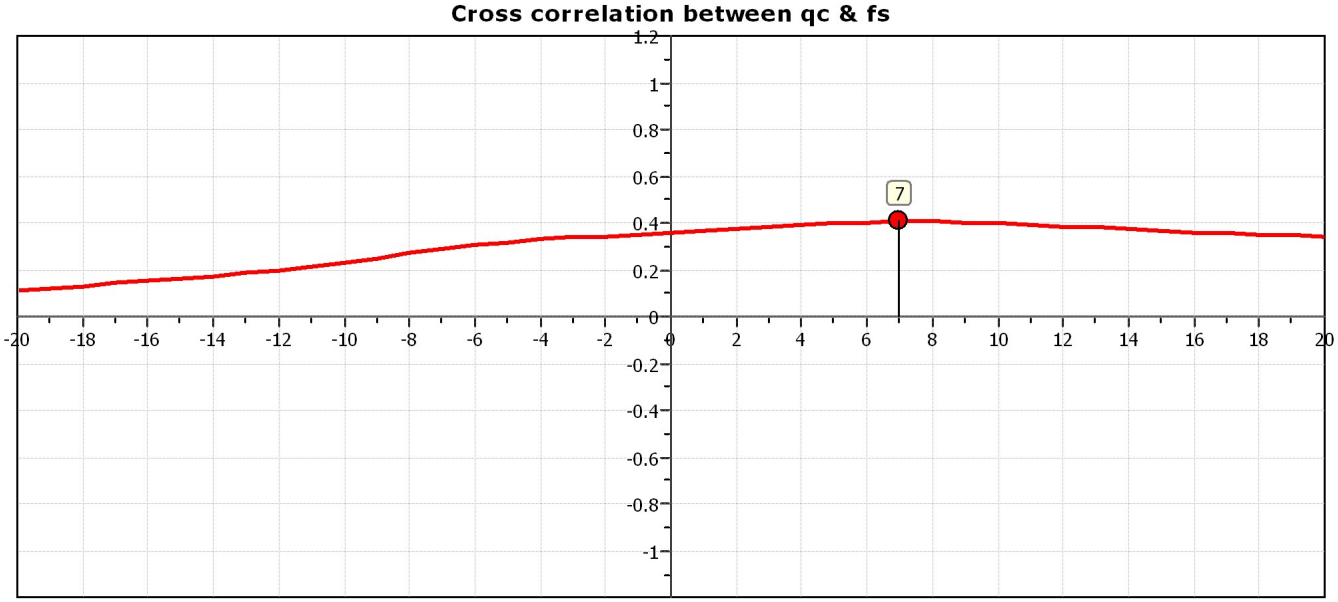
**CPT: SAMAWA CCPP_37**
Total depth: 10.42 m, Date: 13/05/2017
Surface Elevation: 11.25 m
Coords: N 3454405.411, E 526039.150
Cone Type: Icone ELCI-CFXYP20-10-AR-Piezocone
Cone Operator: Eng. Mohammed - Eng. Maysara

**Project:** **Samawa Combined Cycle Power Plant**
**Location:** **Samawa Governorate for ENKA Insaat ve Sanayi A.S.**






The plot below presents the cross correlation coeficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two sucessive CPT measurements).



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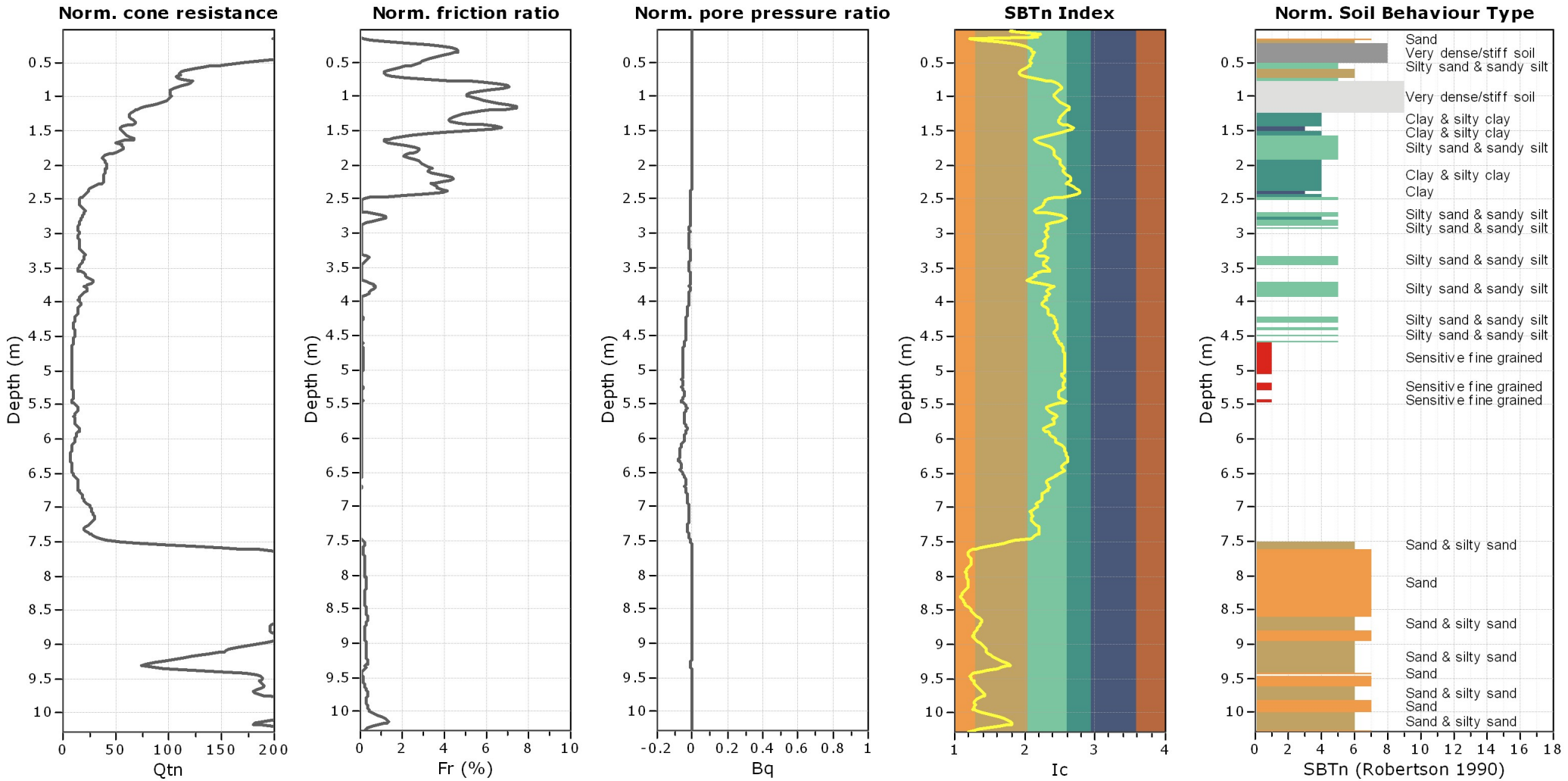
**CPT: SAMAWA CCPP_38**
Total depth: 10.28 m, Date: 13/05/2017
Surface Elevation: 11.42 m
Coords: N 3454356.941, E 526061.951
Cone Type: Icone ELCI-CFXYP20-10-AR-Piezocone
Cone Operator: Eng. Mohammed - Eng. Maysara

**Project:** **Samawa Combined Cycle Power Plant**
**Location:** **Samawa Governorate for ENKA Insaat ve Sanayi A.S.**




**SBTn legend**

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

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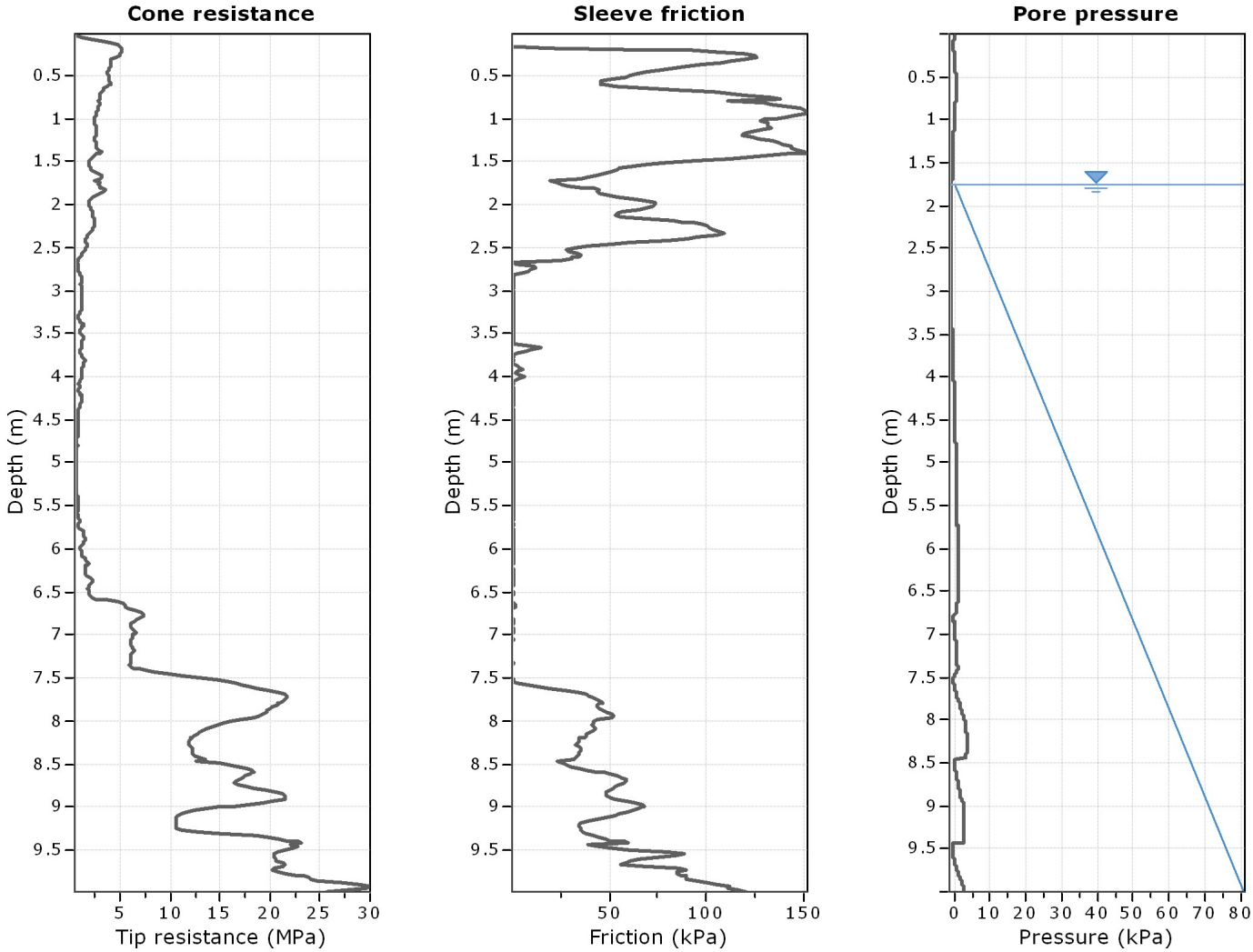
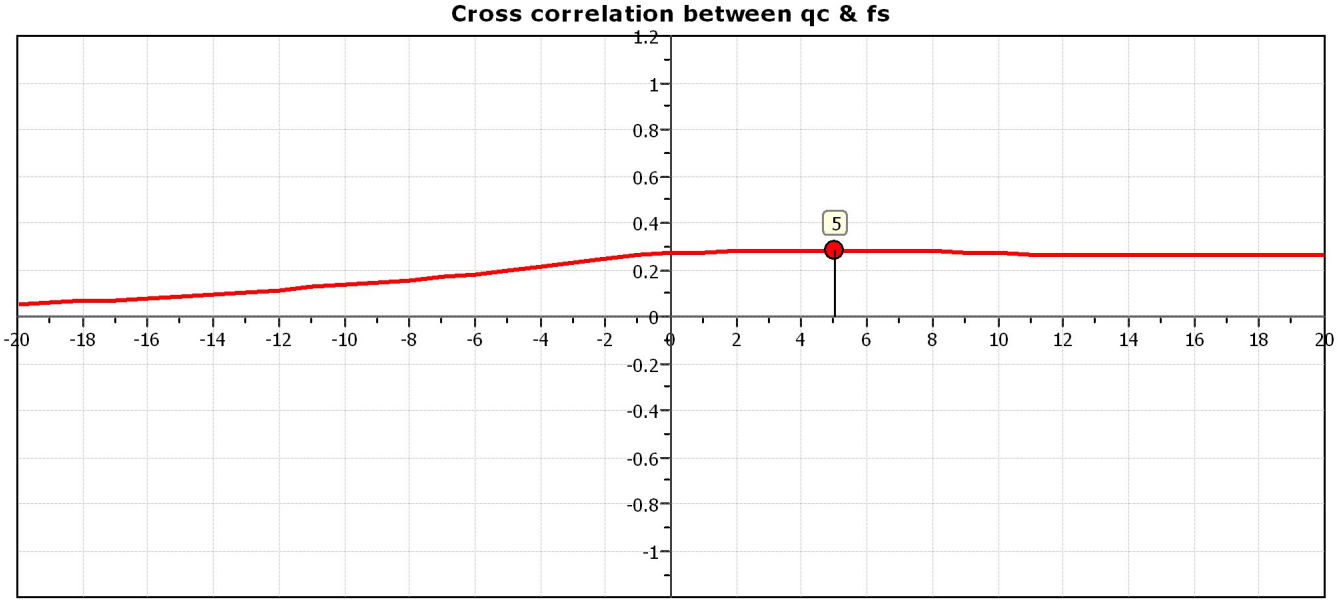
**CPT: SAMAWA CCPP_39**
Total depth: 9.98 m, Date: 13/05/2017
Surface Elevation: 11.29 m
Coords: N 3454322.977, E 526106.465
Cone Type: Icone ELCI-CFXYP20-10-AR-Piezocone
Cone Operator: Eng. Mohammed - Eng. Maysara

**Project:** **Samawa Combined Cycle Power Plant**
**Location:** **Samawa Governorate for ENKA Insaat ve Sanayi A.S.**




The plot below presents the cross correlation coeficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two sucessive CPT measurements).



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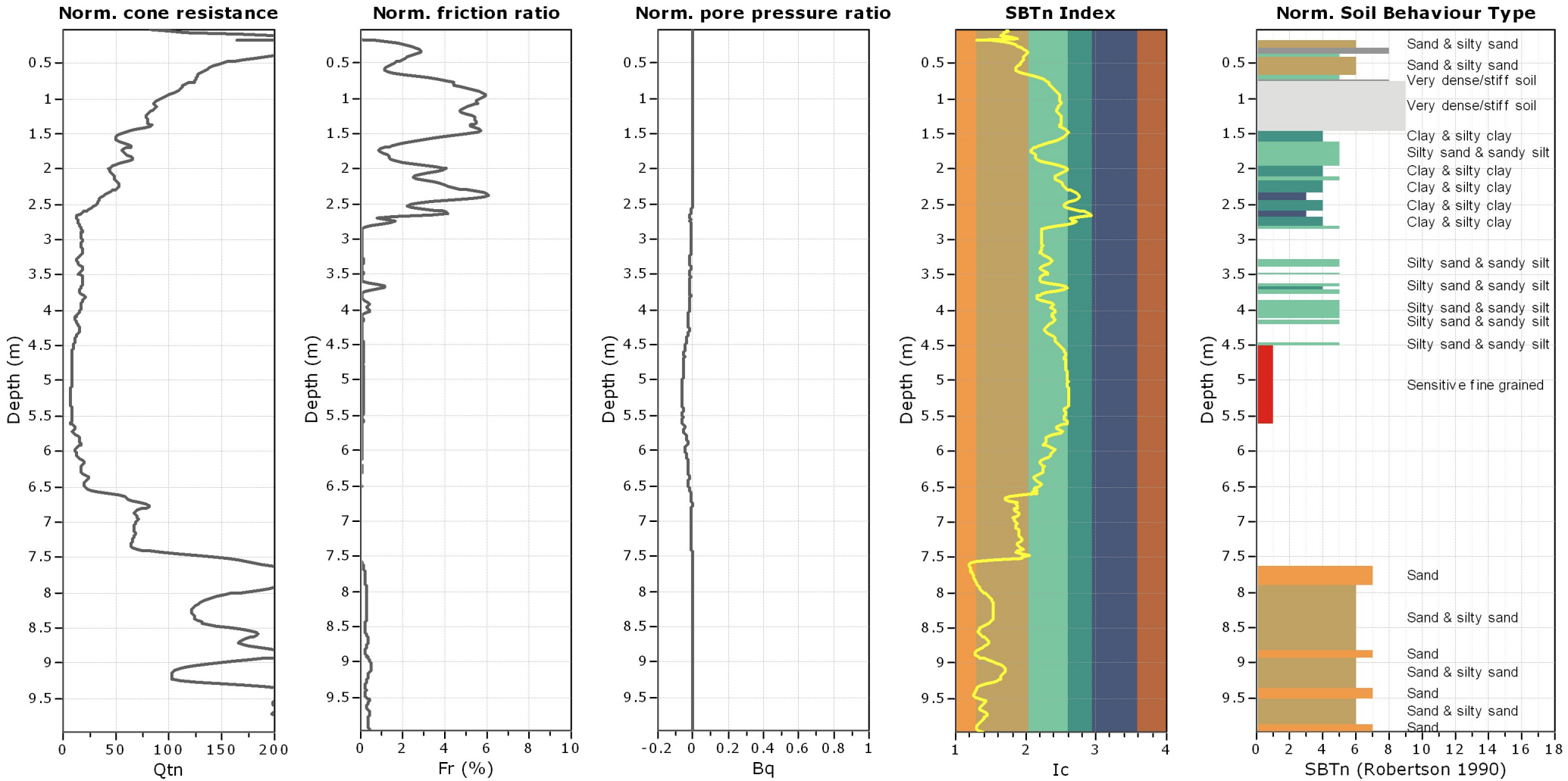
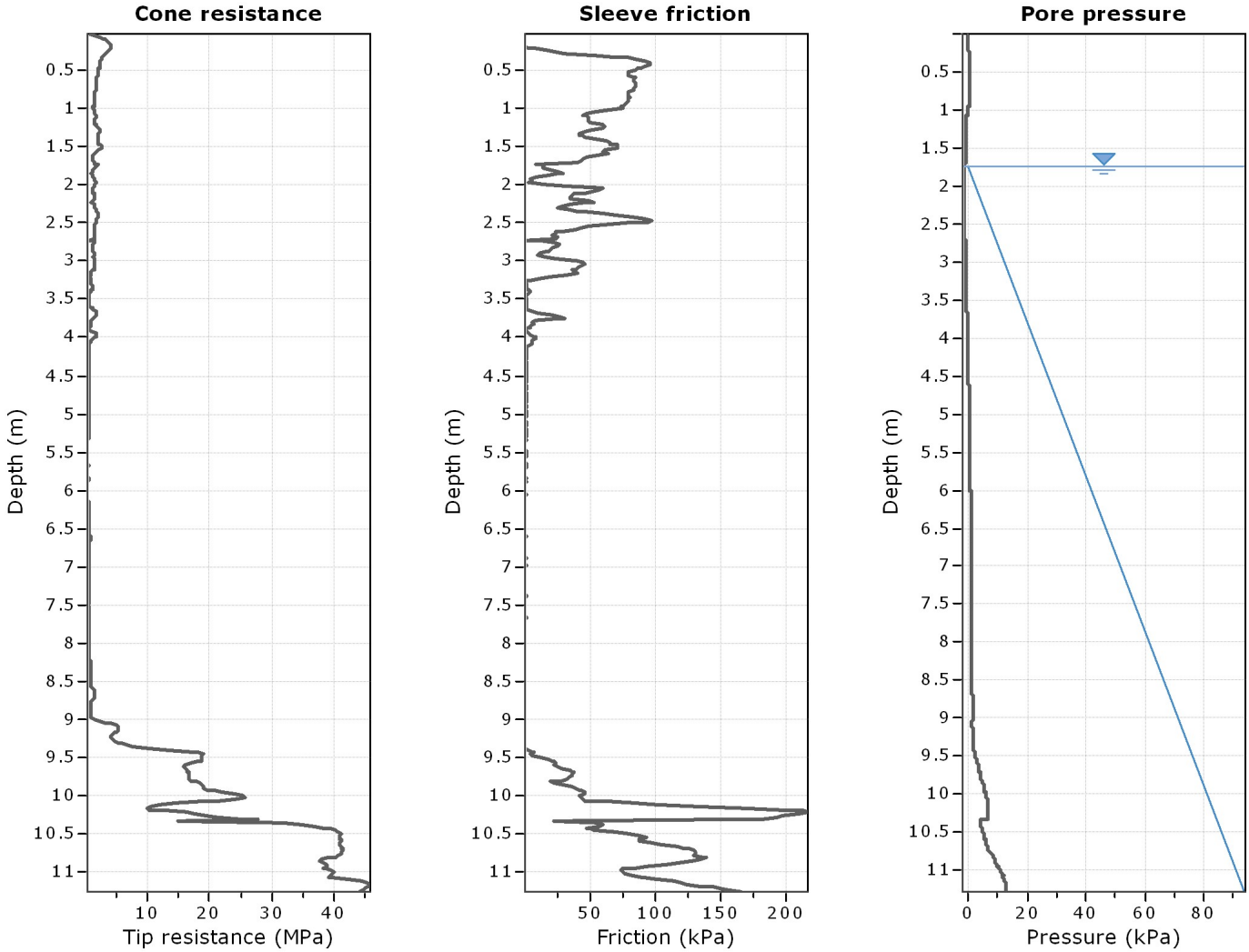
**CPT: SAMAWA CCPP_39**
Total depth: 9.98 m, Date: 13/05/2017
Surface Elevation: 11.29 m
Coords: N 3454322.977, E 526106.465
Cone Type: Icone ELCI-CFXYP20-10-AR-Piezocone
Cone Operator: Eng. Mohammed - Eng. Maysara

**Project:** **Samawa Combined Cycle Power Plant**
**Location:** **Samawa Governorate for ENKA Insaat ve Sanayi A.S.**

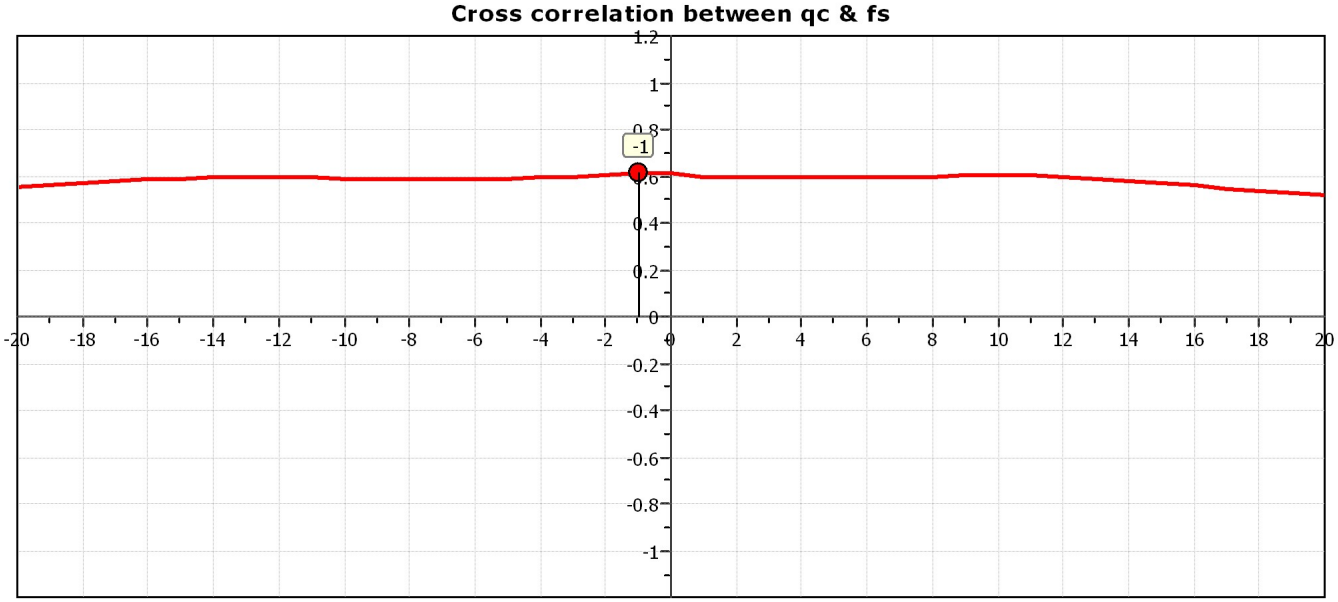



**SBTn legend**

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained




The plot below presents the cross correlation coeficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two sucessive CPT measurements).



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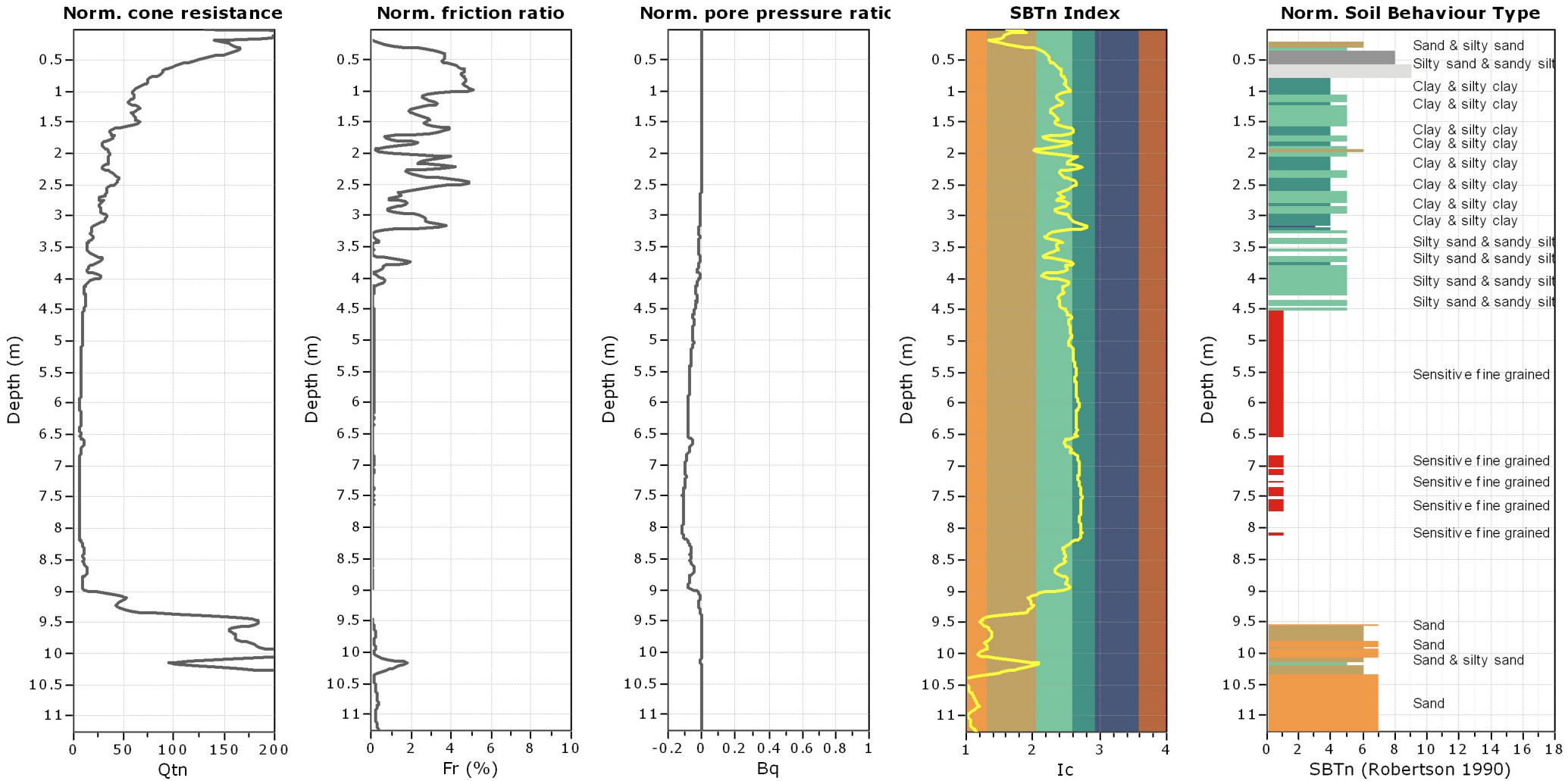
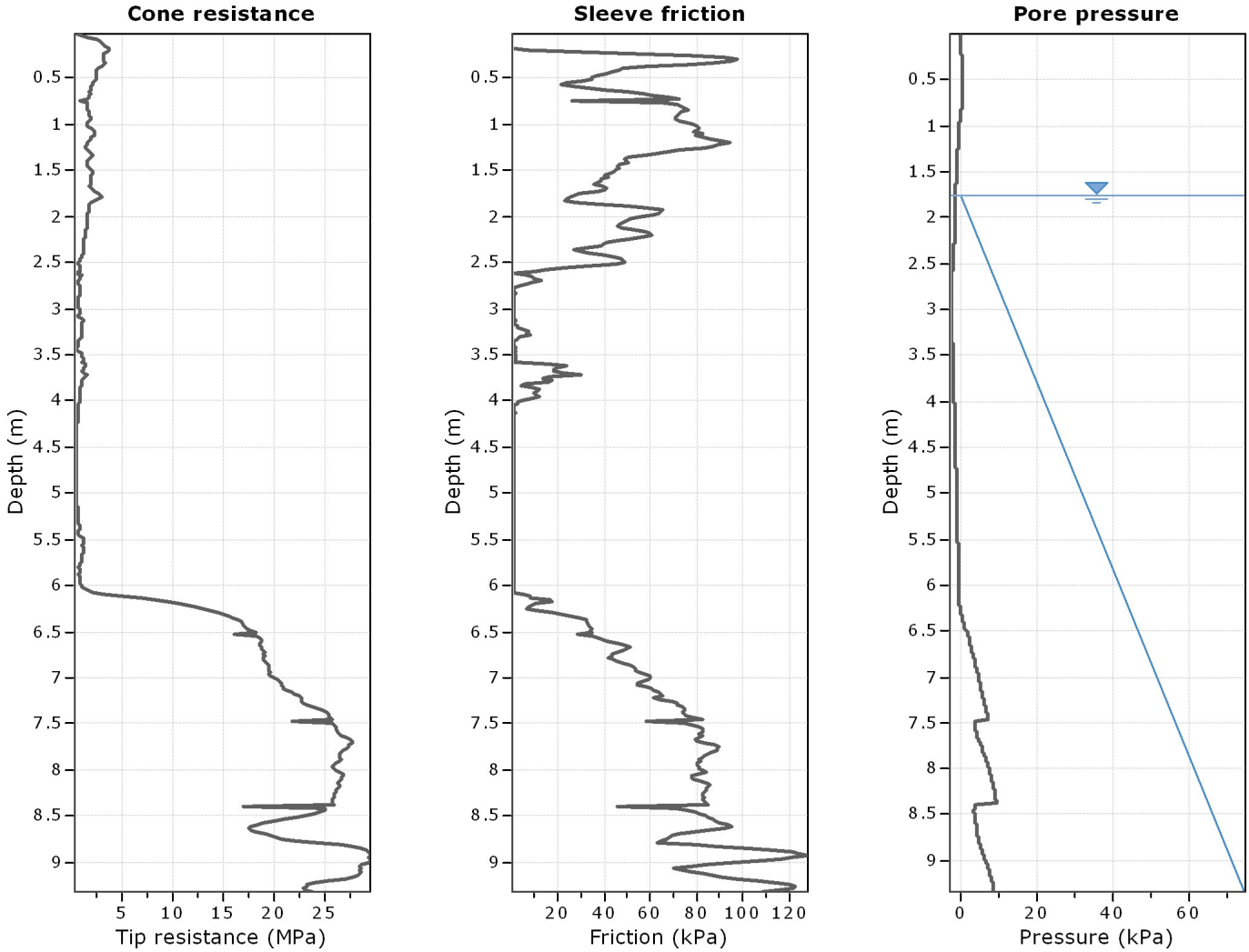
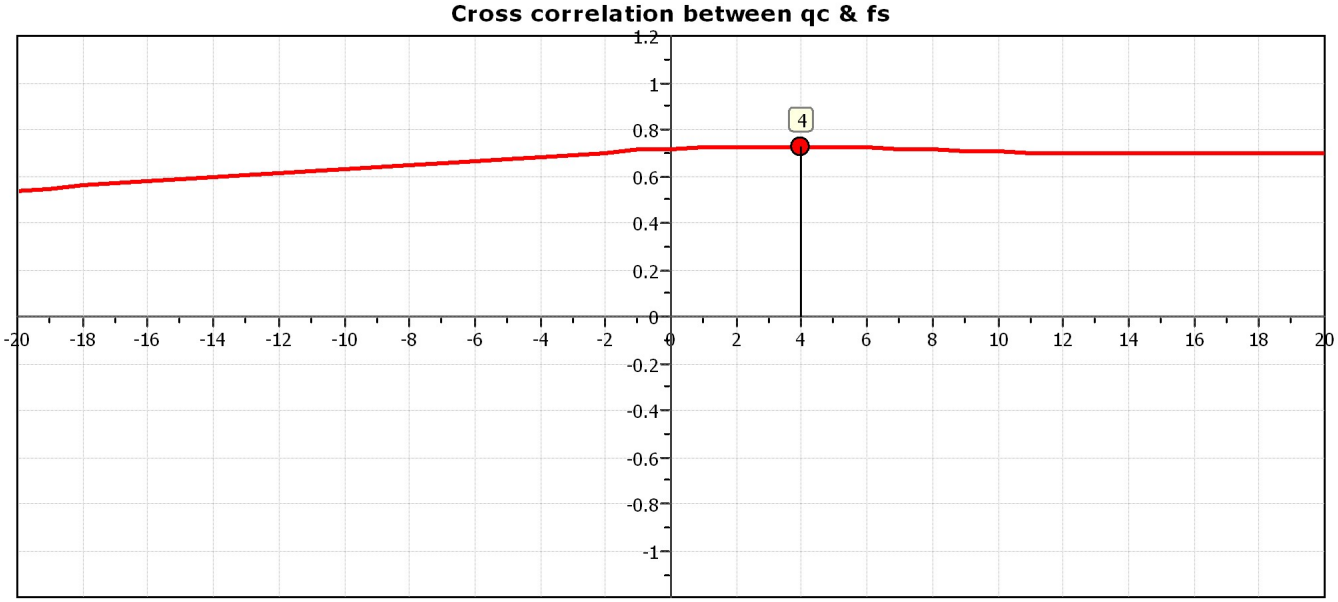
**CPT: SAMAWA CCPP_40**
Total depth: 11.26 m, Date: 13/05/2017
Surface Elevation: 11.45 m
Coords: N 3454311.142, E 526145.855
Cone Type: Icone ELCI-CFXYP20-10-AR-Piezocone
Cone Operator: Eng. Mohammed - Eng. Maysara

**Project:** **Samawa Combined Cycle Power Plant**
**Location:** **Samawa Governorate for ENKA Insaat ve Sanayi A.S.**






The plot below presents the cross correlation coeficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two sucessive CPT measurements).



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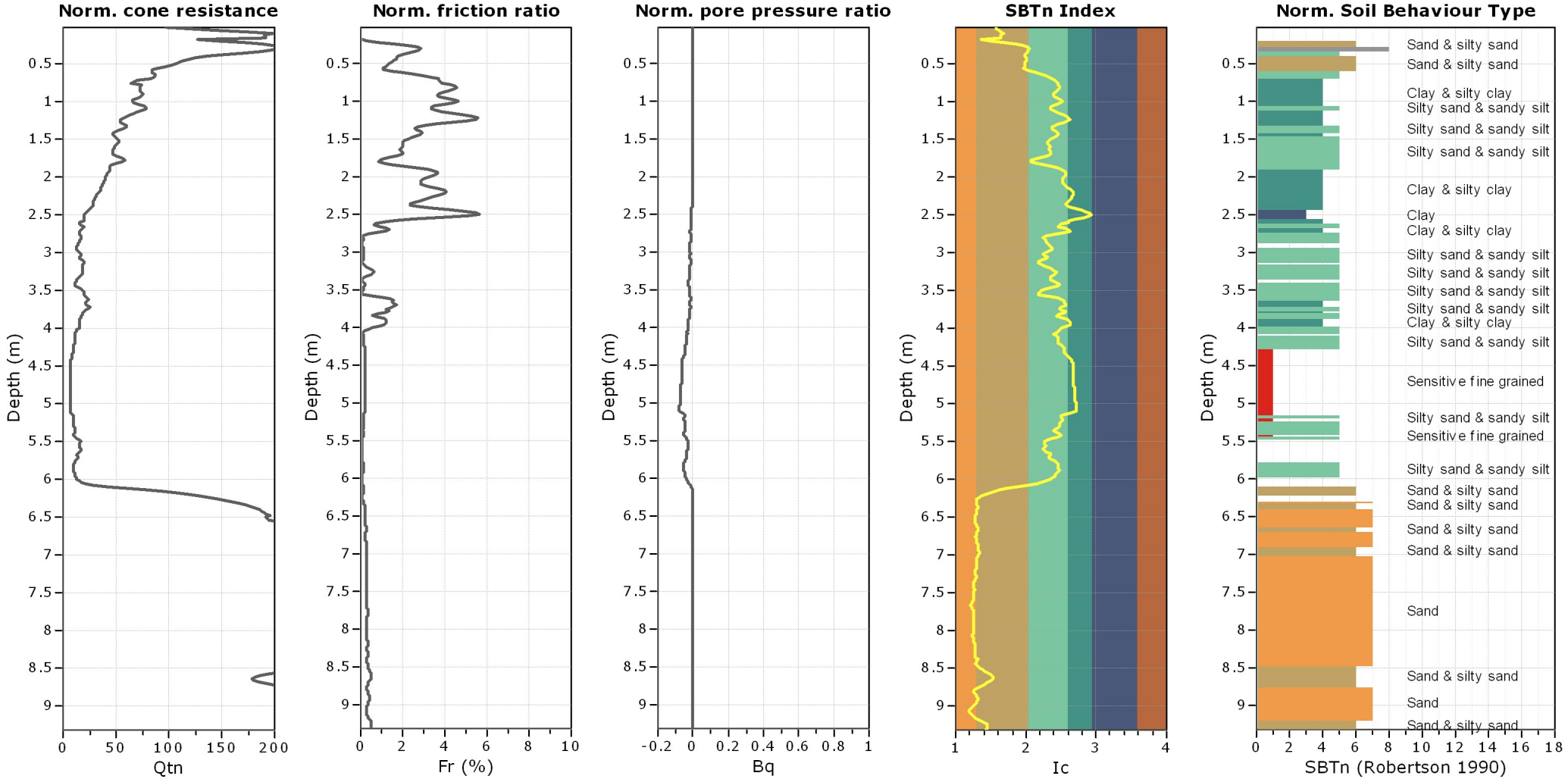
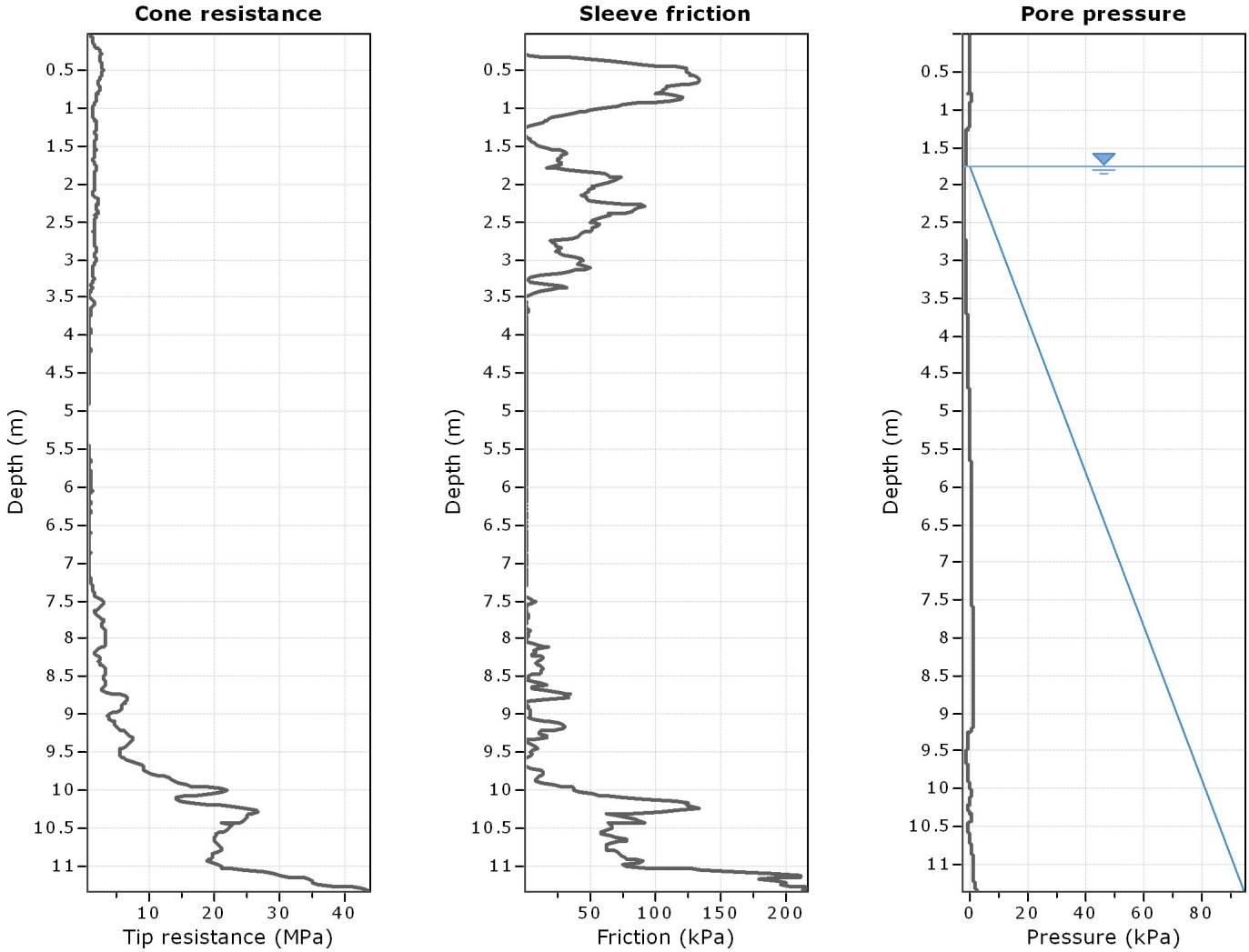
**CPT: SAMAWA CCPP_41**
Total depth: 9.32 m, Date: 13/05/2017
Surface Elevation: 11.53 m
Coords: N 3454280.092, E 526128.111
Cone Type: Icone ELCI-CFXYP20-10-AR-Piezocone
Cone Operator: Eng. Mohammed - Eng. Maysara

**Project:** **Samawa Combined Cycle Power Plant**
**Location:** **Samawa Governorate for ENKA Insaat ve Sanayi A.S.**

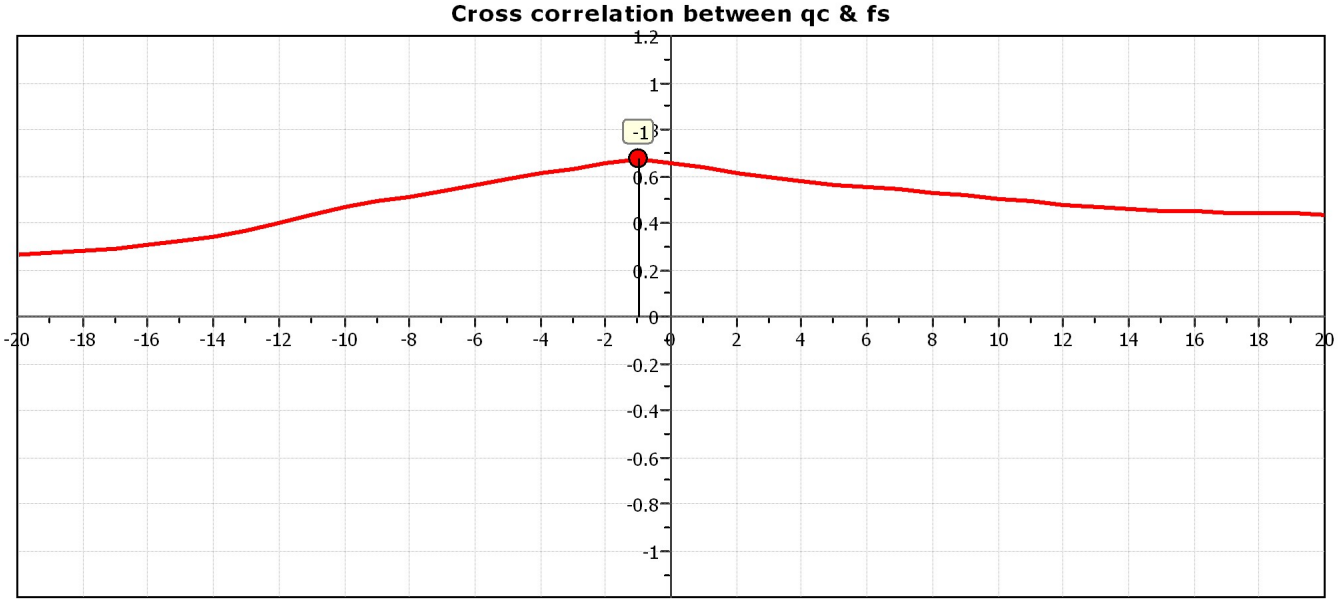



**SBTn legend**

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained




The plot below presents the cross correlation coeficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two sucessive CPT measurements).



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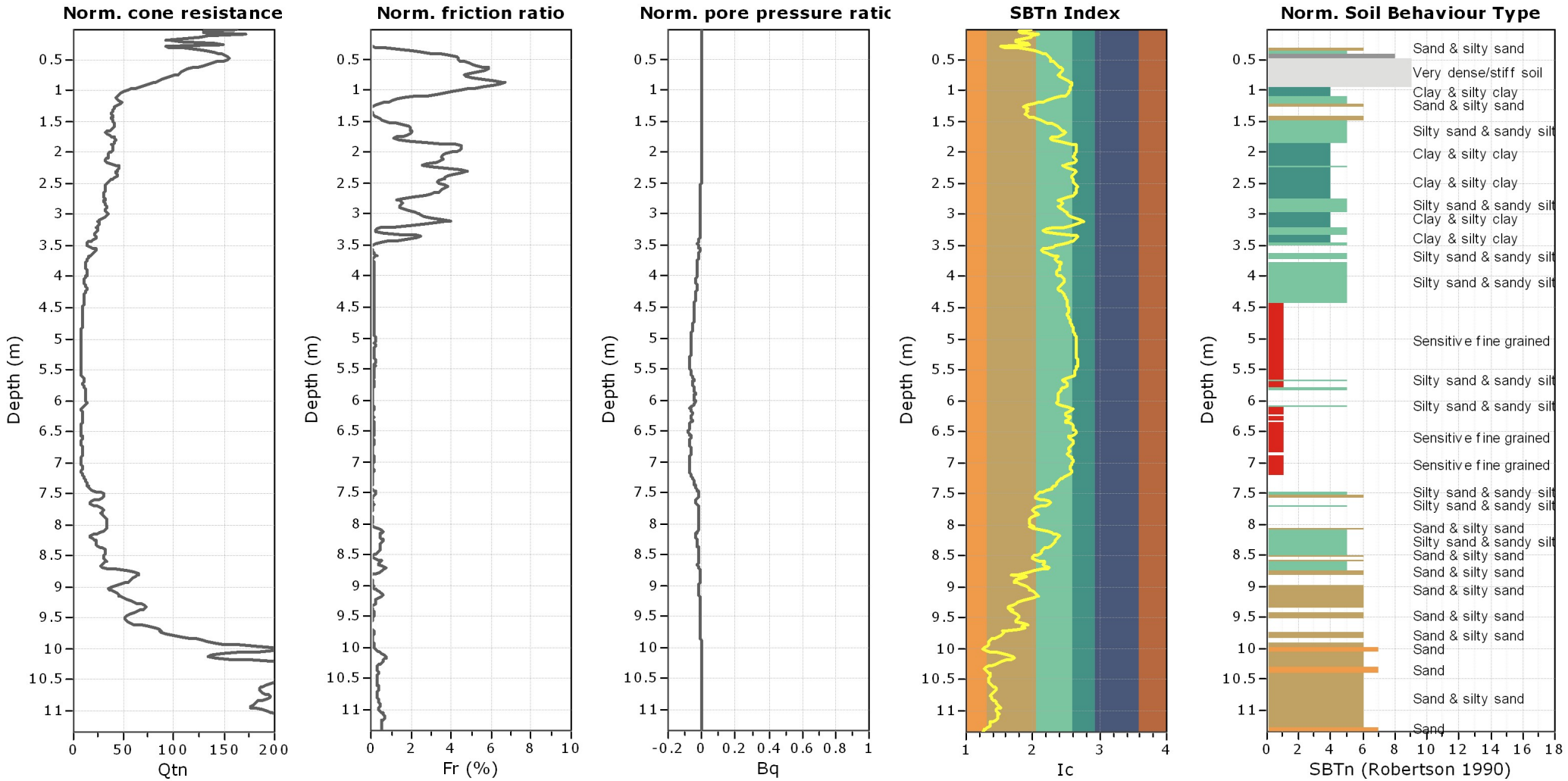
**CPT: SAMAWA CCPP_42**
Total depth: 11.34 m, Date: 13/05/2017
Surface Elevation: 11.41 m
Coords: N 3454241.063, E 526195.516
Cone Type: Icone ELCI-CFXYP20-10-AR-Piezocone
Cone Operator: Eng. Mohammed - Eng. Maysara

**Project:** **Samawa Combined Cycle Power Plant**
**Location:** **Samawa Governorate for ENKA Insaat ve Sanayi A.S.**




**SBTn legend**

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

# APPENDIX (F)

# SHEAR WAVE VELOCITIES
# AND
# ELASTO-DYNAMIC PROPERTIES
# OF SOIL
# CROSS HOLE METHOD

# APPENDIX (F)

# SHEAR WAVE VELOCITIES
# AND
# ELASTO-DYNAMIC PROPERTIES
# OF SOIL
# CROSS HOLE METHOD

**Table 1**
**Compressional and Shear Waves Velocities for CHT1 Test Point, At Samawa CCPP**

| *Depth (meters)* | *Vp (m/sec)* | *Vs (m/sec)* |
|---|---|---|
| 1 | 662.88 | 145.83 |
| 2 | 694.44 | 144.63 |
| 3 | 732.22 | 152.97 |
| 4 | 705.65 | 152.17 |
| 5 | 1650.94 | 236.49 |
| 6 | 1458.33 | 169.90 |
| 7 | 1388.89 | 197.89 |
| 8 | 1500.00 | 223.21 |
| 9 | 1515.15 | 224.55 |
| 10 | 1562.50 | 233.46 |
| 11 | 1562.50 | 317.80 |
| 12 | 1470.59 | 270.76 |
| 13 | 1442.31 | 288.46 |
| 14 | 1470.59 | 291.83 |
| 15 | 1470.59 | 295.86 |
| 16 | 1282.05 | 267.86 |
| 17 | 1219.51 | 253.38 |
| 18 | 1485.15 | 356.72 |
| 19 | 1764.71 | 473.19 |
| 20 | 1744.19 | 450.45 |
| 21 | 1807.23 | 483.87 |
| 22 | 1630.43 | 511.95 |
| 23 | 1515.15 | 294.70 |
| 24 | 1388.89 | 410.96 |
| 25 | 1388.89 | 384.62 |
| 26 | 1546.39 | 421.35 |
| 27 | 1704.55 | 348.84 |
| 28 | 1851.85 | 405.41 |
| 29 | 1948.05 | 441.18 |
| 30 | 1923.08 | 428.57 |

**Table 2**
**Compressional and Shear Waves Velocities for CHT2 Test Point, At Samawa CCPP**

| *Depth (meters)* | *Vp (m/sec)* | *Vs (m/sec)* |
|---|---|---|
| 1 | 612.88 | 146.86 |
| 2 | 626.24 | 142.48 |
| 3 | 728.22 | 151.57 |
| 4 | 718.89 | 152.72 |
| 5 | 863.01 | 208.61 |
| 6 | 926.47 | 236.84 |
| 7 | 1125.00 | 235.07 |
| 8 | 1260.00 | 207.24 |
| 9 | 1431.82 | 240.46 |
| 10 | 1536.59 | 331.58 |
| 11 | 1369.57 | 221.83 |
| 12 | 1312.50 | 228.26 |
| 13 | 1431.82 | 271.55 |
| 14 | 2250.00 | 370.59 |
| 15 | 2045.45 | 283.27 |
| 16 | 1968.75 | 300.57 |
| 17 | 1944.44 | 386.03 |
| 18 | 1831.40 | 338.35 |
| 19 | 2350.75 | 333.69 |
| 20 | 2386.36 | 369.72 |
| 21 | 2625.00 | 439.94 |
| 22 | 2625.00 | 556.54 |
| 23 | 2157.53 | 552.63 |
| 24 | 1968.75 | 463.24 |
| 25 | 1993.67 | 436.29 |
| 26 | 2466.42 | 444.82 |
| 27 | 2582.03 | 455.23 |
| 28 | 2466.42 | 450.89 |
| 29 | 2448.15 | 450.27 |
| 30 | 2503.79 | 452.12 |

**Table 3**
**Compressional and Shear Waves Velocities for CHT3 Test Point, At Samawa CCPP**

| *Depth (meters)* | *Vp (m/sec)* | *Vs (m/sec)* |
|---|---|---|
| 1 | 840.91 | 138.27 |
| 2 | 596.77 | 142.53 |
| 3 | 1250.00 | 162.00 |
| 4 | 1128.05 | 198.50 |
| 5 | 1170.89 | 252.56 |
| 6 | 1156.25 | 257.66 |
| 7 | 1250.00 | 268.90 |
| 8 | 1321.43 | 257.66 |
| 9 | 1321.43 | 260.56 |
| 10 | 1423.08 | 284.62 |
| 11 | 1360.29 | 311.97 |
| 12 | 1350.36 | 293.19 |
| 13 | 1504.07 | 291.80 |
| 14 | 1412.21 | 295.53 |
| 15 | 1350.36 | 369.26 |
| 16 | 1360.29 | 349.06 |
| 17 | 1267.12 | 388.66 |
| 18 | 1241.61 | 359.92 |
| 19 | 1149.07 | 390.30 |
| 20 | 1275.86 | 402.17 |
| 21 | 1284.72 | 462.50 |
| 22 | 1312.06 | 486.84 |
| 23 | 1850.00 | 560.61 |
| 24 | 1681.82 | 521.13 |
| 25 | 2055.56 | 528.57 |
| 26 | 2055.56 | 544.12 |
| 27 | 2176.47 | 569.23 |
| 28 | 2466.67 | 596.77 |
| 29 | 2176.47 | 578.13 |
| 30 | 2126.44 | 572.76 |

**Table 4**
**Compressional and Shear Waves Velocities for CHT4 Test Point, At Samawa CCPP**

| *Depth (meters)* | *Vp (m/sec)* | *Vs (m/sec)* |
|---|---|---|
| 1 | 1312.00 | 156.19 |
| 2 | 1223.88 | 178.45 |
| 3 | 1372.38 | 282.03 |
| 4 | 1344.26 | 232.62 |
| 5 | 1291.34 | 255.85 |
| 6 | 1271.32 | 274.25 |
| 7 | 1484.16 | 308.85 |
| 8 | 1484.16 | 267.76 |
| 9 | 1532.71 | 324.43 |
| 10 | 1525.58 | 319.07 |
| 11 | 1561.90 | 340.96 |
| 12 | 1554.50 | 347.09 |
| 13 | 1754.01 | 395.18 |
| 14 | 1690.72 | 368.95 |
| 15 | 1511.52 | 404.94 |
| 16 | 1413.79 | 423.77 |
| 17 | 1470.85 | 351.93 |
| 18 | 1895.95 | 381.40 |
| 19 | 1952.38 | 431.58 |
| 20 | 1885.06 | 404.44 |
| 21 | 2246.58 | 407.96 |
| 22 | 2050.00 | 403.44 |
| 23 | 1726.32 | 380.95 |
| 24 | 1717.28 | 380.07 |
| 25 | 1918.13 | 405.44 |
| 26 | 1958.28 | 431.58 |
| 27 | 2078.87 | 434.94 |
| 28 | 2246.58 | 447.36 |
| 29 | 2136.23 | 428.38 |
| 30 | 2178.82 | 441.16 |

**Table 5**
**Compressional and Shear Waves Velocities for CHT5 Test Point, At Samawa CCPP**

| *Depth (meters)* | *Vp (m/sec)* | *Vs (m/sec)* |
|---|---|---|
| 1 | 1304.35 | 173.08 |
| 2 | 1216.22 | 146.94 |
| 3 | 1363.64 | 194.81 |
| 4 | 1406.25 | 202.25 |
| 5 | 1440.00 | 247.25 |
| 6 | 1636.36 | 292.68 |
| 7 | 1538.46 | 289.86 |
| 8 | 1730.77 | 301.51 |
| 9 | 1747.57 | 312.50 |
| 10 | 1764.71 | 315.79 |
| 11 | 1910.99 | 382.20 |
| 12 | 1871.79 | 354.37 |
| 13 | 1754.81 | 313.30 |
| 14 | 1906.01 | 337.96 |
| 15 | 2147.06 | 363.18 |
| 16 | 1862.24 | 388.71 |
| 17 | 1901.04 | 390.37 |
| 18 | 1798.03 | 388.71 |
| 19 | 2027.78 | 403.31 |
| 20 | 2339.74 | 395.45 |
| 21 | 2253.09 | 369.81 |
| 22 | 2765.15 | 442.96 |
| 23 | 2625.90 | 460.86 |
| 24 | 2433.33 | 506.94 |
| 25 | 2310.13 | 504.84 |
| 26 | 2253.09 | 462.79 |
| 27 | 2242.02 | 460.86 |
| 28 | 2422.21 | 473.34 |
| 29 | 2487.38 | 478.88 |
| 30 | 2556.69 | 492.79 |

## Table -6 Cross hole Seismic Test Results of CHT1 Test Point, At Samawa CCPP

| Depth (meters) | Vp (m/sec) | Vs (m/sec) | Density (Kg/m$^3$) | Poisson's Ratio | Shear Modulus $G_d$ (MPa) | Young Modulus Ed (MPa) | Bulk Modulus $B_d$ (MPa) |
|---|---|---|---|---|---|---|---|
| 1 | 662.88 | 145.83 | 1732.58 | 0.47 | 36.847 | 108.668 | 712.178 |
| 2 | 694.44 | 144.63 | 1738.89 | 0.48 | 36.373 | 107.469 | 790.087 |
| 3 | 732.22 | 152.97 | 1746.44 | 0.48 | 40.868 | 120.738 | 881.853 |
| 4 | 705.65 | 152.17 | 1741.13 | 0.48 | 40.319 | 118.991 | 813.210 |
| 5 | 1650.94 | 236.49 | 1930.19 | 0.49 | 107.947 | 321.581 | 5117.020 |
| 6 | 1458.33 | 169.90 | 1891.67 | 0.49 | 54.607 | 163.069 | 3950.267 |
| 7 | 1388.89 | 197.89 | 1877.78 | 0.49 | 73.534 | 219.078 | 3524.211 |
| 8 | 1500.00 | 223.21 | 1900.00 | 0.49 | 94.667 | 281.857 | 4148.778 |
| 9 | 1515.15 | 224.55 | 1903.03 | 0.49 | 95.957 | 285.715 | 4240.814 |
| 10 | 1562.50 | 233.46 | 1912.50 | 0.49 | 104.241 | 310.342 | 4530.202 |
| 11 | 1562.50 | 317.80 | 1912.50 | 0.48 | 193.152 | 571.122 | 4411.653 |
| 12 | 1470.59 | 270.76 | 1894.12 | 0.48 | 138.858 | 411.701 | 3911.132 |
| 13 | 1442.31 | 288.46 | 1888.46 | 0.48 | 157.139 | 464.870 | 3718.956 |
| 14 | 1470.59 | 291.83 | 1894.12 | 0.48 | 161.311 | 477.319 | 3881.194 |
| 15 | 1470.59 | 295.86 | 1894.12 | 0.48 | 165.796 | 490.394 | 3875.214 |
| 16 | 1282.05 | 267.86 | 1856.41 | 0.48 | 133.193 | 393.499 | 2873.709 |
| 17 | 1219.51 | 253.38 | 1843.90 | 0.48 | 118.380 | 349.798 | 2584.431 |
| 18 | 1485.15 | 356.72 | 1897.03 | 0.47 | 241.393 | 709.400 | 3862.357 |
| 19 | 1764.71 | 473.19 | 1952.94 | 0.46 | 437.273 | 1277.946 | 5498.792 |
| 20 | 1744.19 | 450.45 | 1948.84 | 0.46 | 395.430 | 1158.031 | 5401.483 |
| 21 | 1807.23 | 483.87 | 1961.45 | 0.46 | 459.235 | 1342.244 | 5793.918 |
| 22 | 1630.43 | 511.95 | 1926.09 | 0.45 | 504.804 | 1459.200 | 4447.078 |
| 23 | 1515.15 | 294.70 | 1903.03 | 0.48 | 165.269 | 489.310 | 4148.397 |
| 24 | 1388.89 | 410.96 | 1877.78 | 0.45 | 317.133 | 920.969 | 3199.413 |
| 25 | 1388.89 | 384.62 | 1877.78 | 0.46 | 277.778 | 810.262 | 3251.886 |
| 26 | 1546.39 | 421.35 | 1909.28 | 0.46 | 338.963 | 989.705 | 4113.760 |
| 27 | 1704.55 | 348.84 | 1940.91 | 0.48 | 236.184 | 698.228 | 5324.351 |
| 28 | 1851.85 | 405.41 | 1970.37 | 0.47 | 323.837 | 955.211 | 6325.317 |
| 29 | 1948.05 | 441.18 | 1989.61 | 0.47 | 387.251 | 1140.818 | 7034.050 |
| 30 | 1923.08 | 428.57 | 1984.62 | 0.47 | 364.521 | 1074.513 | 6853.526 |

## Table -7 Cross hole Seismic Test Results of CHT2 Test Point, At Samawa CCPP

| Depth (meters) | Vp (m/sec) | Vs (m/sec) | Density (Kg/m$^3$) | Poisson's Ratio | Shear Modulus $G_d$ (MPa) | Young Modulus Ed (MPa) | Bulk Modulus $B_d$ (MPa) |
|---|---|---|---|---|---|---|---|
| 1 | 612.88 | 146.86 | 1722.58 | 0.47 | 37.154 | 109.199 | 597.494 |
| 2 | 626.24 | 142.48 | 1725.25 | 0.47 | 35.023 | 103.158 | 629.895 |
| 3 | 728.22 | 151.57 | 1745.64 | 0.48 | 40.103 | 118.493 | 872.244 |
| 4 | 718.89 | 152.72 | 1743.78 | 0.48 | 40.672 | 120.095 | 846.957 |
| 5 | 863.01 | 208.61 | 1772.60 | 0.47 | 77.140 | 226.633 | 1217.368 |
| 6 | 926.47 | 236.84 | 1785.29 | 0.47 | 100.145 | 293.432 | 1398.877 |
| 7 | 1125.00 | 235.07 | 1825.00 | 0.48 | 100.850 | 297.945 | 2175.299 |
| 8 | 1260.00 | 207.24 | 1852.00 | 0.49 | 79.538 | 236.403 | 2834.184 |
| 9 | 1431.82 | 240.46 | 1886.36 | 0.49 | 109.070 | 324.044 | 3721.814 |
| 10 | 1536.59 | 331.58 | 1907.32 | 0.48 | 209.699 | 618.856 | 4223.757 |
| 11 | 1369.57 | 221.83 | 1873.91 | 0.49 | 92.213 | 274.156 | 3391.964 |
| 12 | 1312.50 | 228.26 | 1862.50 | 0.48 | 97.042 | 288.099 | 3079.058 |
| 13 | 1431.82 | 271.55 | 1886.36 | 0.48 | 139.101 | 412.113 | 3681.772 |
| 14 | 2250.00 | 370.59 | 2050.00 | 0.49 | 281.538 | 836.764 | 10002.741 |
| 15 | 2045.45 | 283.27 | 2009.09 | 0.49 | 161.217 | 480.499 | 8190.848 |
| 16 | 1968.75 | 300.57 | 1993.75 | 0.49 | 180.123 | 536.070 | 7487.564 |
| 17 | 1944.44 | 386.03 | 1988.89 | 0.48 | 296.382 | 876.984 | 7124.543 |
| 18 | 1831.40 | 338.35 | 1966.28 | 0.48 | 225.096 | 667.332 | 6294.790 |
| 19 | 2350.75 | 333.69 | 2070.15 | 0.49 | 230.504 | 686.772 | 11132.322 |
| 20 | 2386.36 | 369.72 | 2077.27 | 0.49 | 283.946 | 844.854 | 11450.916 |
| 21 | 2625.00 | 439.94 | 2125.00 | 0.49 | 411.296 | 1222.000 | 14094.184 |
| 22 | 2625.00 | 556.54 | 2125.00 | 0.48 | 658.184 | 1943.574 | 13765.000 |
| 23 | 2157.53 | 552.63 | 2031.51 | 0.46 | 620.426 | 1817.714 | 8629.337 |
| 24 | 1968.75 | 463.24 | 1993.75 | 0.47 | 427.833 | 1258.424 | 7157.285 |
| 25 | 1993.67 | 436.29 | 1998.73 | 0.47 | 380.454 | 1122.225 | 7437.144 |
| 26 | 2466.42 | 444.82 | 2093.28 | 0.48 | 414.184 | 1228.627 | 12181.654 |
| 27 | 2582.03 | 455.23 | 2116.41 | 0.48 | 438.600 | 1301.729 | 13525.038 |
| 28 | 2466.42 | 450.89 | 2093.28 | 0.48 | 425.562 | 1261.973 | 12166.483 |
| 29 | 2448.15 | 450.27 | 2089.63 | 0.48 | 423.663 | 1256.154 | 11959.164 |
| 30 | 2503.79 | 452.12 | 2100.76 | 0.48 | 429.422 | 1273.791 | 12596.990 |

## Table -8 Cross hole Seismic Test Results of CHT3 Test Point, At Samawa CCPP

| Depth (meters) | Vp (m/sec) | Vs (m/sec) | Density (Kg/m$^3$) | Poisson's Ratio | Shear Modulus $G_d$ (MPa) | Young Modulus Ed (MPa) | Bulk Modulus $B_d$ (MPa) |
|---|---|---|---|---|---|---|---|
| 1 | 840.91 | 138.27 | 1768.18 | 0.49 | 33.803 | 100.470 | 1205.260 |
| 2 | 596.77 | 142.53 | 1719.35 | 0.47 | 34.927 | 102.668 | 565.761 |
| 3 | 1250.00 | 162.00 | 1850.00 | 0.49 | 48.549 | 144.819 | 2825.893 |
| 4 | 1128.05 | 198.50 | 1825.61 | 0.48 | 71.932 | 213.496 | 2227.169 |
| 5 | 1170.89 | 252.56 | 1834.18 | 0.48 | 116.996 | 345.278 | 2358.616 |
| 6 | 1156.25 | 257.66 | 1831.25 | 0.47 | 121.574 | 358.371 | 2286.125 |
| 7 | 1250.00 | 268.90 | 1850.00 | 0.48 | 133.764 | 394.801 | 2712.273 |
| 8 | 1321.43 | 257.66 | 1864.29 | 0.48 | 123.768 | 366.411 | 3090.343 |
| 9 | 1321.43 | 260.56 | 1864.29 | 0.48 | 126.572 | 374.597 | 3086.603 |
| 10 | 1423.08 | 284.62 | 1884.62 | 0.48 | 152.665 | 451.634 | 3613.072 |
| 11 | 1360.29 | 311.97 | 1872.06 | 0.47 | 182.202 | 536.491 | 3221.122 |
| 12 | 1350.36 | 293.19 | 1870.07 | 0.48 | 160.747 | 474.289 | 3195.722 |
| 13 | 1504.07 | 291.80 | 1900.81 | 0.48 | 161.847 | 479.211 | 4084.245 |
| 14 | 1412.21 | 295.53 | 1882.44 | 0.48 | 164.406 | 485.687 | 3535.038 |
| 15 | 1350.36 | 369.26 | 1870.07 | 0.46 | 254.992 | 744.368 | 3070.062 |
| 16 | 1360.29 | 349.06 | 1872.06 | 0.46 | 228.093 | 668.200 | 3159.934 |
| 17 | 1267.12 | 388.66 | 1853.42 | 0.45 | 279.965 | 810.822 | 2602.574 |
| 18 | 1241.61 | 359.92 | 1848.32 | 0.45 | 239.439 | 696.350 | 2530.116 |
| 19 | 1149.07 | 390.30 | 1829.81 | 0.43 | 278.736 | 799.857 | 2044.361 |
| 20 | 1275.86 | 402.17 | 1855.17 | 0.44 | 300.063 | 867.084 | 2619.811 |
| 21 | 1284.72 | 462.50 | 1856.94 | 0.43 | 397.212 | 1132.492 | 2535.292 |
| 22 | 1312.06 | 486.84 | 1862.41 | 0.42 | 441.420 | 1253.781 | 2617.568 |
| 23 | 1850.00 | 560.61 | 1970.00 | 0.45 | 619.130 | 1794.788 | 5916.818 |
| 24 | 1681.82 | 521.13 | 1936.36 | 0.45 | 525.864 | 1521.741 | 4775.876 |
| 25 | 2055.56 | 528.57 | 2011.11 | 0.46 | 561.880 | 1645.856 | 7748.392 |
| 26 | 2055.56 | 544.12 | 2011.11 | 0.46 | 595.418 | 1741.389 | 7703.675 |
| 27 | 2176.47 | 569.23 | 2035.29 | 0.46 | 659.483 | 1930.028 | 8761.926 |
| 28 | 2466.67 | 596.77 | 2093.33 | 0.47 | 745.519 | 2190.205 | 11742.746 |
| 29 | 2176.47 | 578.13 | 2035.29 | 0.46 | 680.253 | 1989.120 | 8734.233 |
| 30 | 2126.44 | 572.76 | 2025.29 | 0.46 | 664.393 | 1941.207 | 8271.952 |

## Table -9 Cross hole Seismic Test Results of CHT4 Test Point, At Samawa CCPP

| Depth (meters) | Vp (m/sec) | Vs (m/sec) | Density ($Kg/m^3$) | Poisson's Ratio | Shear Modulus $G_d$ (MPa) | Young Modulus Ed (MPa) | Bulk Modulus $B_d$ (MPa) |
|---|---|---|---|---|---|---|---|
| 1 | 1312.00 | 156.19 | 1862.40 | 0.49 | 45.434 | 135.649 | 3145.252 |
| 2 | 1223.88 | 178.45 | 1844.78 | 0.49 | 58.749 | 174.971 | 2684.928 |
| 3 | 1372.38 | 282.03 | 1874.48 | 0.48 | 149.097 | 440.716 | 3331.670 |
| 4 | 1344.26 | 232.62 | 1868.85 | 0.48 | 101.131 | 300.271 | 3242.252 |
| 5 | 1291.34 | 255.85 | 1858.27 | 0.48 | 121.641 | 359.953 | 2936.576 |
| 6 | 1271.32 | 274.25 | 1854.26 | 0.48 | 139.462 | 411.580 | 2811.002 |
| 7 | 1484.16 | 308.85 | 1896.83 | 0.48 | 180.937 | 534.621 | 3936.979 |
| 8 | 1484.16 | 267.76 | 1896.83 | 0.48 | 135.989 | 403.393 | 3996.909 |
| 9 | 1532.71 | 324.43 | 1906.54 | 0.48 | 200.674 | 592.610 | 4211.284 |
| 10 | 1525.58 | 319.07 | 1905.12 | 0.48 | 193.947 | 572.969 | 4175.369 |
| 11 | 1561.90 | 340.96 | 1912.38 | 0.47 | 222.317 | 655.826 | 4368.920 |
| 12 | 1554.50 | 347.09 | 1910.90 | 0.47 | 230.209 | 678.548 | 4310.703 |
| 13 | 1754.01 | 395.18 | 1950.80 | 0.47 | 304.652 | 897.666 | 5595.544 |
| 14 | 1690.72 | 368.95 | 1938.14 | 0.47 | 263.834 | 778.309 | 5188.484 |
| 15 | 1511.52 | 404.94 | 1902.30 | 0.46 | 311.930 | 911.672 | 3930.278 |
| 16 | 1413.79 | 423.77 | 1882.76 | 0.45 | 338.112 | 980.959 | 3312.463 |
| 17 | 1470.85 | 351.93 | 1894.17 | 0.47 | 234.604 | 689.564 | 3785.054 |
| 18 | 1895.95 | 381.40 | 1979.19 | 0.48 | 287.898 | 851.552 | 6730.616 |
| 19 | 1952.38 | 431.58 | 1990.48 | 0.47 | 370.747 | 1093.194 | 7092.951 |
| 20 | 1885.06 | 404.44 | 1977.01 | 0.48 | 323.382 | 954.540 | 6594.020 |
| 21 | 2246.58 | 407.96 | 2049.32 | 0.48 | 341.071 | 1011.581 | 9888.339 |
| 22 | 2050.00 | 403.44 | 2010.00 | 0.48 | 327.162 | 968.304 | 8010.809 |
| 23 | 1726.32 | 380.95 | 1945.26 | 0.47 | 282.306 | 832.466 | 5420.800 |
| 24 | 1717.28 | 380.07 | 1943.46 | 0.47 | 280.738 | 827.753 | 5357.015 |
| 25 | 1918.13 | 405.44 | 1983.63 | 0.48 | 326.070 | 962.959 | 6863.431 |
| 26 | 1958.28 | 431.58 | 1991.66 | 0.47 | 370.967 | 1093.962 | 7143.109 |
| 27 | 2078.87 | 434.94 | 2015.77 | 0.48 | 381.328 | 1126.528 | 8203.173 |
| 28 | 2246.58 | 447.36 | 2049.32 | 0.48 | 410.132 | 1213.461 | 9796.257 |
| 29 | 2136.23 | 428.38 | 2027.25 | 0.48 | 372.022 | 1100.480 | 8755.249 |
| 30 | 2178.82 | 441.16 | 2035.76 | 0.48 | 396.214 | 1171.703 | 9136.043 |

## Table -10 Cross hole Seismic Test Results of CHT5 Test Point, At Samawa CCPP

| Depth (meters) | Vp (m/sec) | Vs (m/sec) | Density (Kg/m$^3$) | Poisson's Ratio | Shear Modulus $G_d$ (MPa) | Young Modulus Ed (MPa) | Bulk Modulus $B_d$ (MPa) |
|---|---|---|---|---|---|---|---|
| 1 | 1304.35 | 173.08 | 1860.87 | 0.49 | 55.744 | 166.231 | 3091.616 |
| 2 | 1216.22 | 146.94 | 1843.24 | 0.49 | 39.797 | 118.803 | 2673.429 |
| 3 | 1363.64 | 194.81 | 1872.73 | 0.49 | 71.068 | 211.724 | 3387.586 |
| 4 | 1406.25 | 202.25 | 1881.25 | 0.49 | 76.951 | 229.226 | 3617.645 |
| 5 | 1440.00 | 247.25 | 1888.00 | 0.48 | 115.421 | 342.756 | 3761.062 |
| 6 | 1636.36 | 292.68 | 1927.27 | 0.48 | 165.097 | 489.833 | 4940.502 |
| 7 | 1538.46 | 289.86 | 1907.69 | 0.48 | 160.277 | 474.931 | 4301.546 |
| 8 | 1730.77 | 301.51 | 1946.15 | 0.48 | 176.919 | 525.219 | 5593.933 |
| 9 | 1747.57 | 312.50 | 1949.51 | 0.48 | 190.382 | 564.858 | 5699.995 |
| 10 | 1764.71 | 315.79 | 1952.94 | 0.48 | 194.753 | 577.817 | 5822.153 |
| 11 | 1910.99 | 382.20 | 1982.20 | 0.48 | 289.552 | 856.591 | 6852.725 |
| 12 | 1871.79 | 354.37 | 1974.36 | 0.48 | 247.935 | 734.587 | 6586.816 |
| 13 | 1754.81 | 313.30 | 1950.96 | 0.48 | 191.506 | 568.213 | 5752.352 |
| 14 | 1906.01 | 337.96 | 1981.20 | 0.48 | 226.291 | 671.527 | 6895.697 |
| 15 | 2147.06 | 363.18 | 2029.41 | 0.49 | 267.685 | 795.170 | 8998.394 |
| 16 | 1862.24 | 388.71 | 1972.45 | 0.48 | 298.030 | 880.514 | 6442.993 |
| 17 | 1901.04 | 390.37 | 1980.21 | 0.48 | 301.768 | 892.019 | 6754.035 |
| 18 | 1798.03 | 388.71 | 1959.61 | 0.48 | 296.090 | 873.752 | 5940.444 |
| 19 | 2027.78 | 403.31 | 2005.56 | 0.48 | 326.230 | 965.252 | 7811.637 |
| 20 | 2339.74 | 395.45 | 2067.95 | 0.49 | 323.387 | 960.651 | 10889.596 |
| 21 | 2253.09 | 369.81 | 2050.62 | 0.49 | 280.437 | 833.548 | 10035.834 |
| 22 | 2765.15 | 442.96 | 2153.03 | 0.49 | 422.456 | 1256.241 | 15898.931 |
| 23 | 2625.90 | 460.86 | 2125.18 | 0.48 | 451.368 | 1339.760 | 14052.028 |
| 24 | 2433.33 | 506.94 | 2086.67 | 0.48 | 536.258 | 1584.443 | 11640.374 |
| 25 | 2310.13 | 504.84 | 2062.03 | 0.47 | 525.537 | 1550.254 | 10303.663 |
| 26 | 2253.09 | 462.79 | 2050.62 | 0.48 | 439.196 | 1298.241 | 9824.156 |
| 27 | 2242.02 | 460.86 | 2048.40 | 0.48 | 435.067 | 1286.006 | 9716.567 |
| 28 | 2422.21 | 473.34 | 2084.44 | 0.48 | 467.013 | 1382.497 | 11606.993 |
| 29 | 2487.38 | 478.88 | 2097.48 | 0.48 | 481.008 | 1424.509 | 12335.888 |
| 30 | 2556.69 | 492.79 | 2111.34 | 0.48 | 512.728 | 1518.400 | 13117.518 |

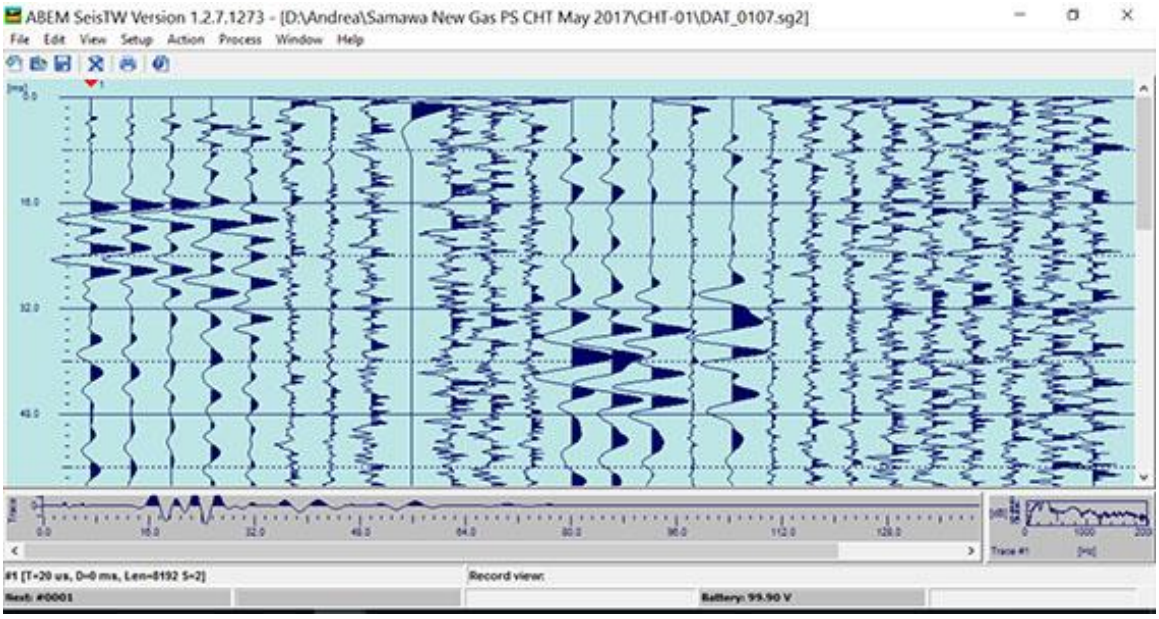



Fig.-1 shows seismic record of CHT1 test point at depth 7.0 meters

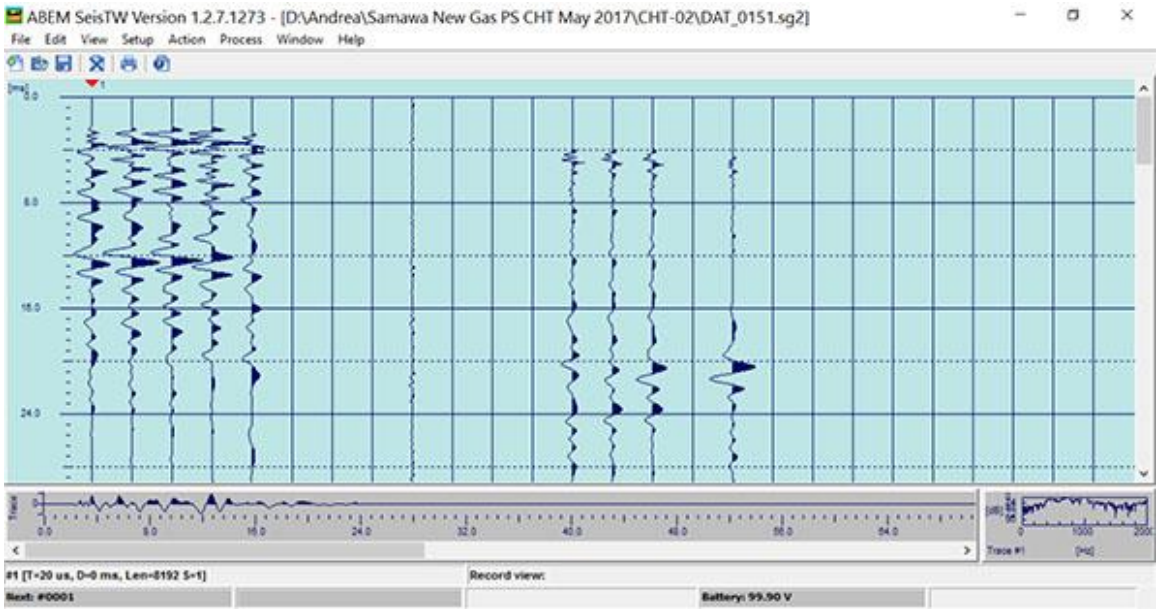



Fig.-2 shows seismic record of CHT2 test point at depth 15.0 meters.

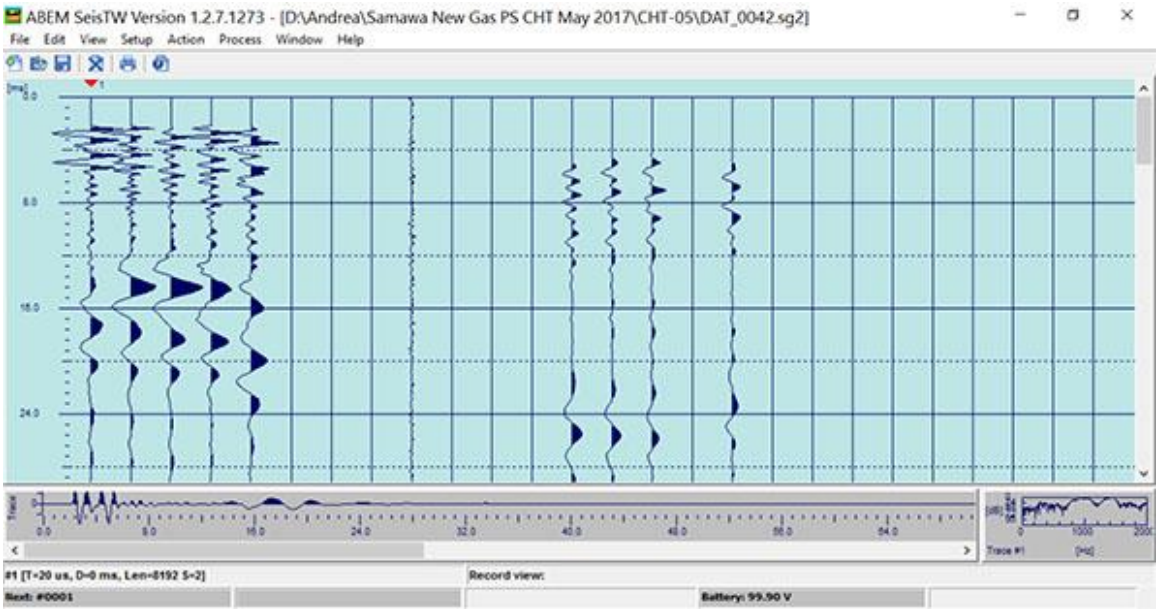



Fig.-3 shows seismic records of CHT5 at depth 10.0 meters

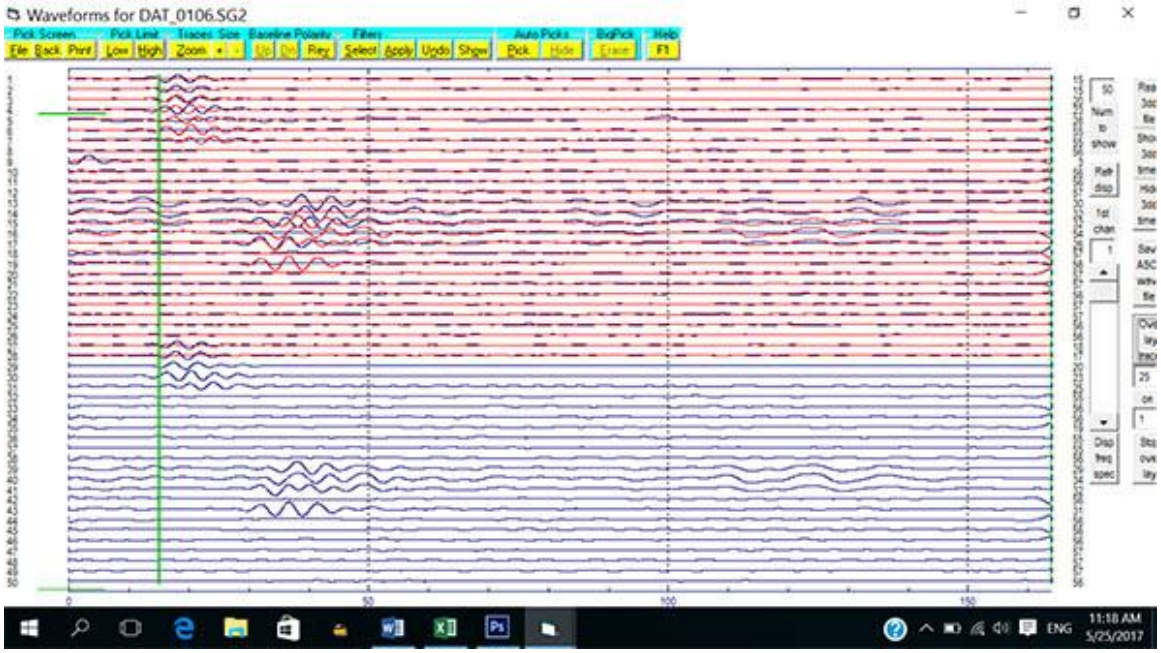



Fig.-4 shows seismic record of CHT4 at depth 8.0 meters

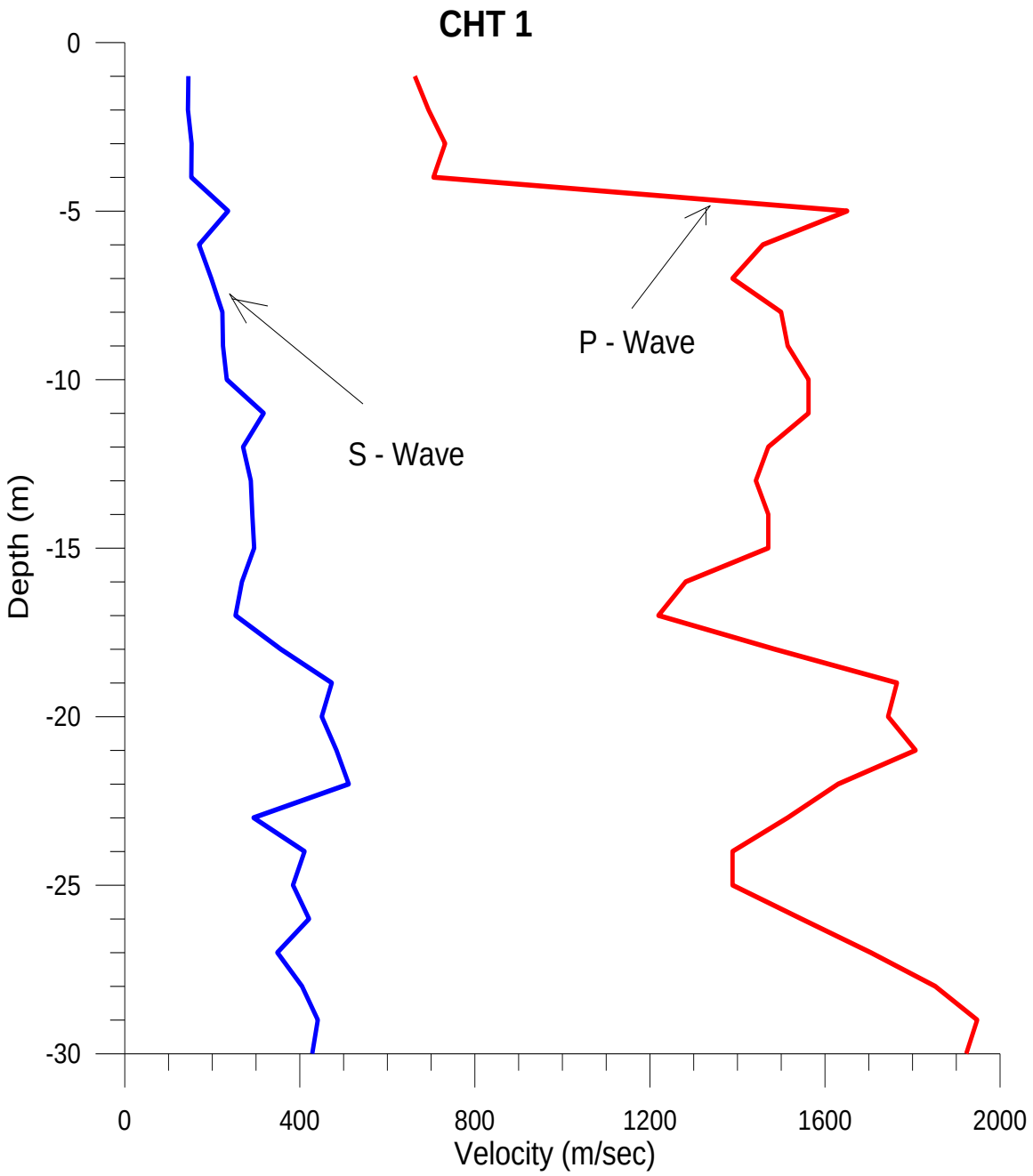



Fig.-5 P-Wave and S- Wave curves of CHT1 cross hole test

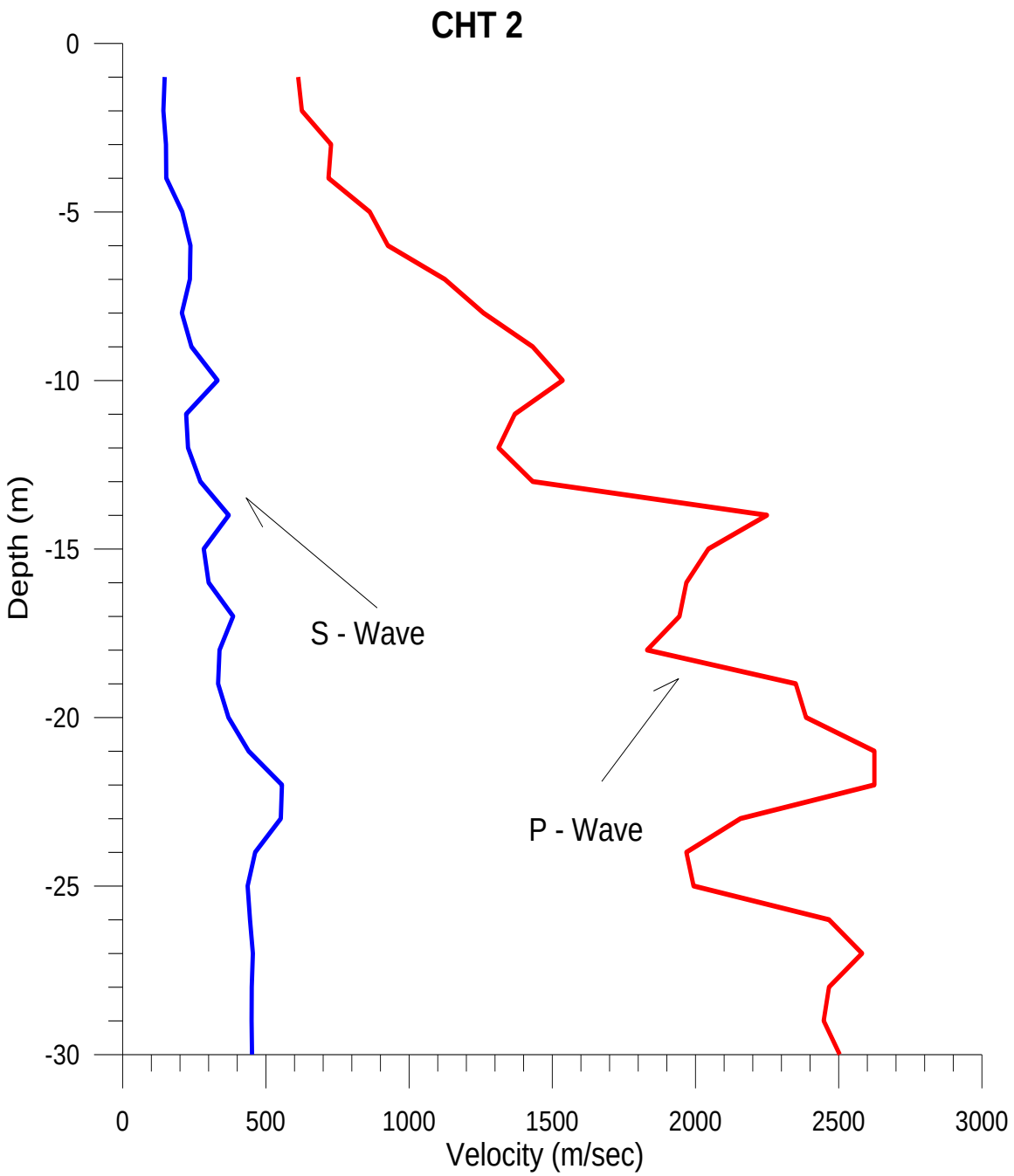



Fig.-6 P-Wave and S- Wave curves of CHT2 cross hole test

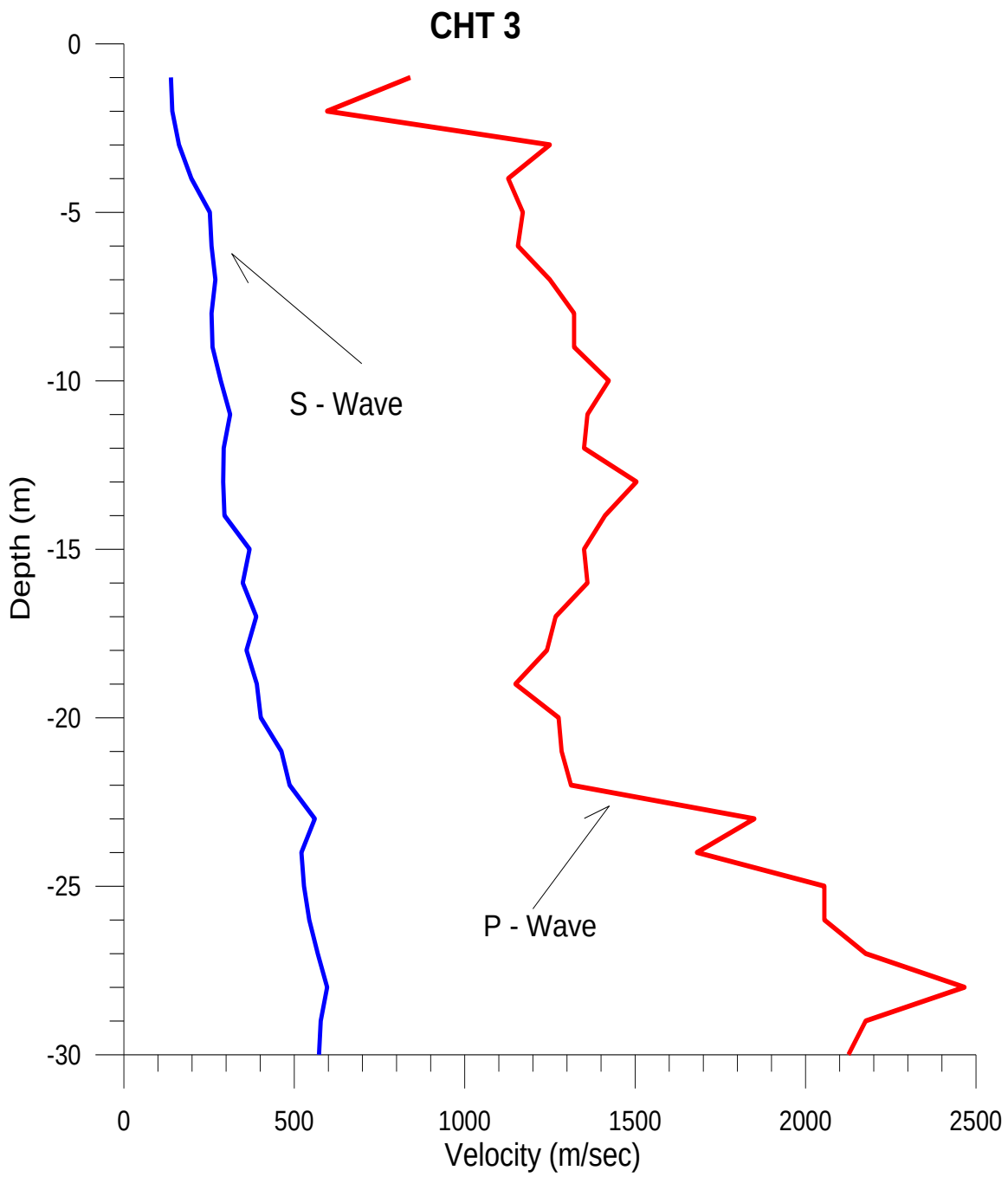



Fig.-7 P-Wave and S- Wave curves of CHT3 cross hole test

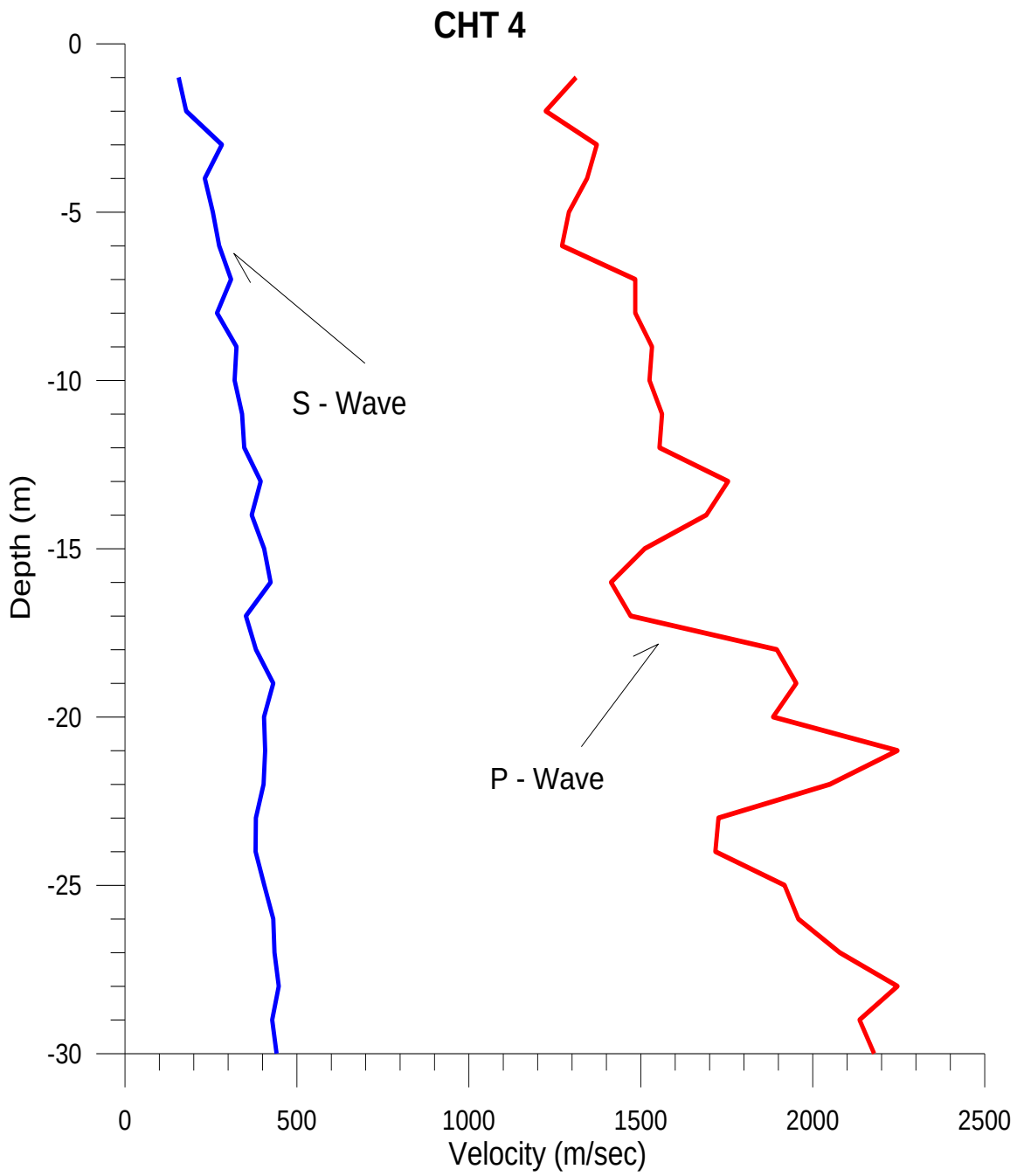



Fig.-8 P-Wave and S- Wave curves of CHT4 cross hole test

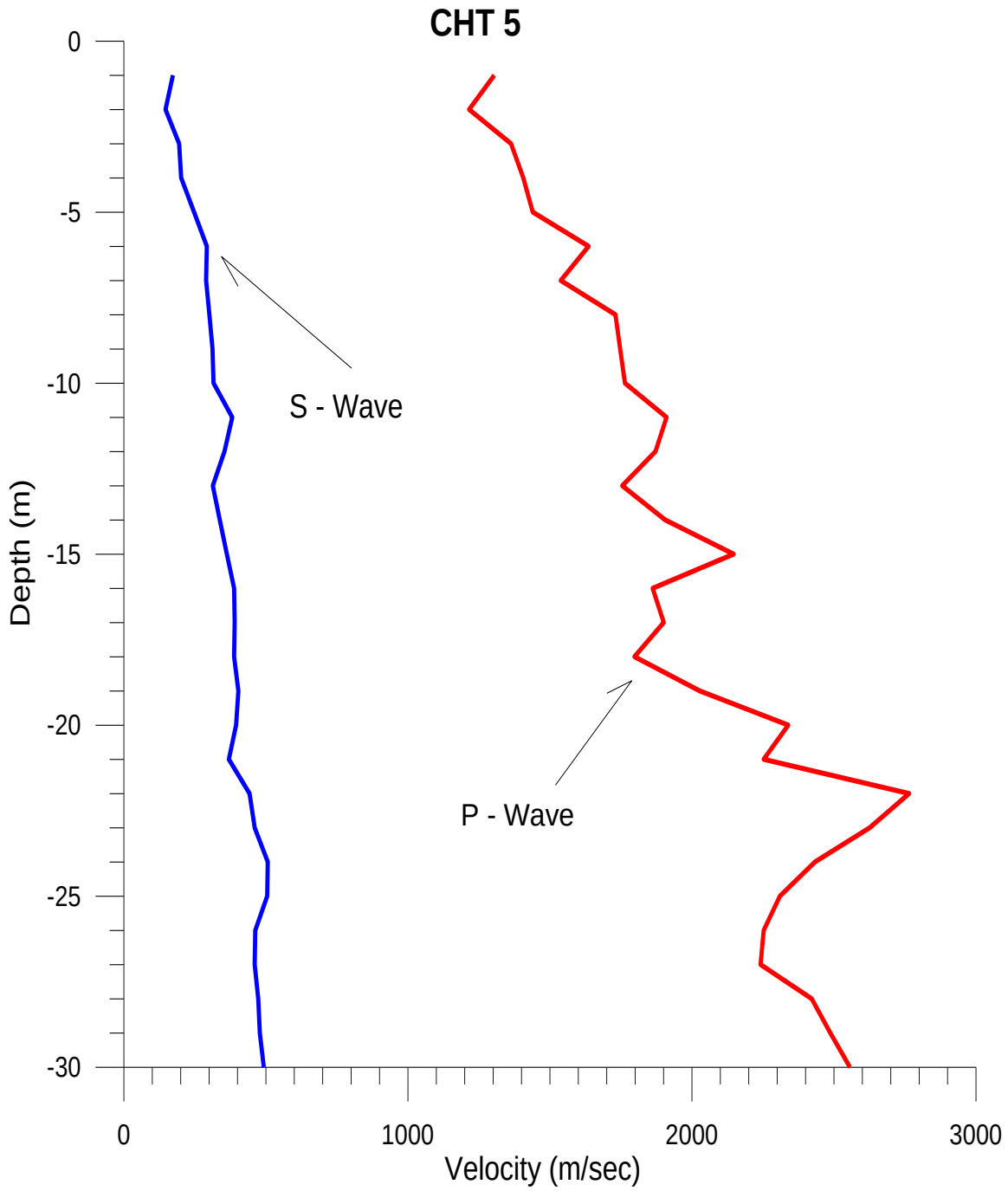



Fig.-9 P-Wave and S- Wave curves of CHT5 cross hole test

# APPENDIX (G)

# SOIL ELECTRICAL RESISITIVITY TEST RESULTS

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# RESISTIVITY TEST RESULTS

**Site:** Samawa Combined Cycle P.P

| LINE NO. | SPACING 'a' (cm) | RESISTANCE 'R' In Ohms (Ω) | | RESISTIVITY 'ρ' In Ohms cm | |
|---|---|---|---|---|---|
| | | N-S | E-W | N-S | E-W |
| ER1 | 75 | 0.06 | 0.07 | 28 | 33 |
| | 150 | 0.02 | 0.02 | 19 | 19 |
| | 300 | 0.00 | 0.01 | 0 | 19 |
| | 600 | 0.00 | 0.00 | 0 | 0 |
| | 1200 | 0.00 | 0.00 | 0 | 0 |
| ER2 | 75 | 0.25 | 0.20 | 118 | 94 |
| | 150 | 0.08 | 0.06 | 75 | 57 |
| | 300 | 0.02 | 0.02 | 38 | 38 |
| | 600 | 0.00 | 0.00 | 0 | 0 |
| | 1200 | 0.00 | 0.00 | 0 | 0 |
| ER3 | 75 | 0.42 | 0.34 | 198 | 160 |
| | 150 | 0.09 | 0.06 | 85 | 57 |
| | 300 | 0.01 | 0.01 | 19 | 19 |
| | 600 | 0.00 | 0.00 | 0 | 0 |
| | 1200 | 0.00 | 0.00 | 0 | 0 |
| ER4 | 75 | 0.10 | 0.10 | 47 | 47 |
| | 150 | 0.05 | 0.04 | 47 | 38 |
| | 300 | 0.02 | 0.01 | 38 | 19 |
| | 600 | 0.00 | 0.00 | 0 | 0 |
| | 1200 | 0.00 | 0.00 | 0 | 0 |
| ER5 | 75 | 0.12 | 0.13 | 57 | 61 |
| | 150 | 0.06 | 0.07 | 57 | 66 |
| | 300 | 0.01 | 0.01 | 19 | 19 |
| | 600 | 0.00 | 0.00 | 0 | 0 |
| | 1200 | 0.00 | 0.00 | 0 | 0 |
| ER6 | 75 | 0.13 | 0.16 | 61 | 75 |
| | 150 | 0.05 | 0.06 | 47 | 57 |
| | 300 | 0.01 | 0.01 | 19 | 19 |
| | 600 | 0.00 | 0.00 | 0 | 0 |
| | 1200 | 0.00 | 0.00 | 0 | 0 |

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# RESISTIVITY TEST RESULTS

**Site:** Samawa Combined Cycle P.P

| LINE NO. | SPACING 'a' (cm) | RESISTANCE 'R' In Ohms (Ω) | | RESISTIVITY 'ρ' In Ohms cm | |
|---|---|---|---|---|---|
| | | N-S | E-W | N-S | E-W |
| ER7 | 75 | 0.08 | 0.08 | 38 | 38 |
| | 150 | 0.03 | 0.03 | 28 | 28 |
| | 300 | 0.01 | 0.01 | 19 | 19 |
| | 600 | 0.00 | 0.00 | 0 | 0 |
| | 1200 | 0.00 | 0.00 | 0 | 0 |
| ER8 | 75 | 0.17 | 0.22 | 80 | 104 |
| | 150 | 0.04 | 0.07 | 38 | 66 |
| | 300 | 0.01 | 0.01 | 19 | 19 |
| | 600 | 0.00 | 0.00 | 0 | 0 |
| | 1200 | 0.00 | 0.00 | 0 | 0 |
| ER9 | 75 | 0.25 | 0.25 | 118 | 118 |
| | 150 | 0.12 | 0.13 | 113 | 122 |
| | 300 | 0.05 | 0.04 | 94 | 75 |
| | 600 | 0.01 | 0.01 | 38 | 38 |
| | 1200 | 0.00 | 0.00 | 0 | 0 |
| ER10 | 75 | 0.11 | 0.11 | 52 | 52 |
| | 150 | 0.05 | 0.05 | 47 | 47 |
| | 300 | 0.00 | 0.01 | 0 | 19 |
| | 600 | 0.00 | 0.00 | 0 | 0 |
| | 1200 | 0.00 | 0.00 | 0 | 0 |
| ER11 | 75 | 0.28 | 0.16 | 132 | 75 |
| | 150 | 0.09 | 0.06 | 85 | 57 |
| | 300 | 0.02 | 0.01 | 38 | 19 |
| | 600 | 0.00 | 0.00 | 0 | 0 |
| | 1200 | 0.00 | 0.00 | 0 | 0 |
| ER12 | 75 | 0.20 | 0.19 | 94 | 89 |
| | 150 | 0.10 | 0.08 | 94 | 75 |
| | 300 | 0.04 | 0.03 | 75 | 57 |
| | 600 | 0.01 | 0.01 | 38 | 38 |
| | 1200 | 0.00 | 0.00 | 0 | 0 |

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# RESISTIVITY TEST RESULTS

**Site:** Samawa Combined Cycle P.P

| LINE NO. | SPACING 'a' (cm) | RESISTANCE 'R' In Ohms (Ω) | | RESISTIVITY 'ρ' In Ohms cm | |
|---|---|---|---|---|---|
| | | N-S | E-W | N-S | E-W |
| ER13 | 75 | 1.20 | 1.13 | 565 | 532 |
| | 150 | 0.43 | 0.43 | 405 | 405 |
| | 300 | 0.12 | 0.11 | 226 | 207 |
| | 600 | 0.08 | 0.09 | 301 | 339 |
| | 1200 | 0.02 | 0.02 | 151 | 151 |
| ER14 | 75 | 2.77 | 2.71 | 1305 | 1276 |
| | 150 | 0.98 | 0.98 | 923 | 923 |
| | 300 | 0.13 | 0.22 | 245 | 414 |
| | 600 | 0.07 | 0.07 | 264 | 264 |
| | 1200 | 0.02 | 0.02 | 151 | 151 |
| ER15 | 75 | 0.59 | 0.75 | 278 | 353 |
| | 150 | 0.20 | 0.19 | 188 | 179 |
| | 300 | 0.05 | 0.05 | 94 | 94 |
| | 600 | 0.01 | 0.01 | 38 | 38 |
| | 1200 | 0.00 | 0.01 | 0 | 75 |
| ER16 | 75 | 0.11 | 0.16 | 52 | 75 |
| | 150 | 0.08 | 0.08 | 75 | 75 |
| | 300 | 0.02 | 0.02 | 38 | 38 |
| | 600 | 0.00 | 0.00 | 0 | 0 |
| | 1200 | 0.00 | 0.00 | 0 | 0 |
| ER17 | 75 | 0.06 | 0.06 | 28 | 28 |
| | 150 | 0.03 | 0.03 | 28 | 28 |
| | 300 | 0.01 | 0.01 | 19 | 19 |
| | 600 | 0.00 | 0.00 | 0 | 0 |
| | 1200 | 0.00 | 0.00 | 0 | 0 |
| ER18 | 75 | 0.12 | 0.12 | 57 | 57 |
| | 150 | 0.05 | 0.05 | 47 | 47 |
| | 300 | 0.01 | 0.01 | 19 | 19 |
| | 600 | 0.00 | 0.00 | 0 | 0 |
| | 1200 | 0.00 | 0.00 | 0 | 0 |

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# RESISTIVITY TEST RESULTS

**Site:** Samawa Combined Cycle P.P

| LINE NO. | SPACING 'a' (cm) | RESISTANCE 'R' In Ohms (Ω) | | RESISTIVITY 'ρ' In Ohms cm | |
|---|---|---|---|---|---|
| | | N-S | E-W | N-S | E-W |
| ER19 | 75 | 0.08 | 0.08 | 38 | 38 |
| | 150 | 0.03 | 0.03 | 28 | 28 |
| | 300 | 0.00 | 0.00 | 0 | 0 |
| | 600 | 0.00 | 0.00 | 0 | 0 |
| | 1200 | 0.00 | 0.00 | 0 | 0 |
| ER20 | 75 | 0.10 | 0.11 | 47 | 52 |
| | 150 | 0.05 | 0.05 | 47 | 47 |
| | 300 | 0.01 | 0.01 | 19 | 19 |
| | 600 | 0.00 | 0.00 | 0 | 0 |
| | 1200 | 0.00 | 0.00 | 0 | 0 |
| ER21 | 75 | 0.21 | 0.23 | 99 | 108 |
| | 150 | 0.10 | 0.10 | 94 | 94 |
| | 300 | 0.03 | 0.03 | 57 | 57 |
| | 600 | 0.01 | 0.00 | 38 | 0 |
| | 1200 | 0.00 | 0.00 | 0 | 0 |
| ER22 | 75 | 0.51 | 0.56 | 240 | 264 |
| | 150 | 0.12 | 0.14 | 113 | 132 |
| | 300 | 0.02 | 0.03 | 38 | 57 |
| | 600 | 0.00 | 0.00 | 0 | 0 |
| | 1200 | 0.00 | 0.00 | 0 | 0 |
| ER23 | 75 | 0.63 | 0.92 | 297 | 433 |
| | 150 | 0.15 | 0.12 | 141 | 113 |
| | 300 | 0.04 | 0.03 | 75 | 57 |
| | 600 | 0.01 | 0.01 | 38 | 38 |
| | 1200 | 0.00 | 0.00 | 0 | 0 |
| ER24 | 75 | 0.19 | 0.18 | 89 | 85 |
| | 150 | 0.06 | 0.05 | 57 | 47 |
| | 300 | 0.01 | 0.01 | 19 | 19 |
| | 600 | 0.00 | 0.00 | 0 | 0 |
| | 1200 | 0.00 | 0.00 | 0 | 0 |

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# RESISTIVITY TEST RESULTS

**Site:** Samawa Combined Cycle P.P

| LINE NO. | SPACING 'a' (cm) | RESISTANCE 'R' In Ohms (Ω) | | RESISTIVITY 'ρ' In Ohms cm | |
|---|---|---|---|---|---|
| | | N-S | E-W | N-S | E-W |
| ER25 | 75 | 0.09 | 0.08 | 42 | 38 |
| | 150 | 0.03 | 0.04 | 28 | 38 |
| | 300 | 0.01 | 0.01 | 19 | 19 |
| | 600 | 0.00 | 0.00 | 0 | 0 |
| | 1200 | 0.00 | 0.00 | 0 | 0 |
| ER26 | 75 | 0.16 | 0.15 | 75 | 71 |
| | 150 | 0.07 | 0.06 | 66 | 57 |
| | 300 | 0.02 | 0.02 | 38 | 38 |
| | 600 | 0.00 | 0.00 | 0 | 0 |
| | 1200 | 0.00 | 0.00 | 0 | 0 |
| ER27 | 75 | 0.11 | 0.12 | 52 | 57 |
| | 150 | 0.06 | 0.07 | 57 | 66 |
| | 300 | 0.02 | 0.02 | 38 | 38 |
| | 600 | 0.00 | 0.00 | 0 | 0 |
| | 1200 | 0.00 | 0.00 | 0 | 0 |
| ER28 | 75 | 0.24 | 0.21 | 113 | 99 |
| | 150 | 0.16 | 0.14 | 151 | 132 |
| | 300 | 0.08 | 0.07 | 151 | 132 |
| | 600 | 0.02 | 0.02 | 75 | 75 |
| | 1200 | 0.00 | 0.00 | 0 | 0 |
| ER29 | 75 | 0.23 | 0.21 | 108 | 99 |
| | 150 | 0.10 | 0.09 | 94 | 85 |
| | 300 | 0.03 | 0.03 | 57 | 57 |
| | 600 | 0.01 | 0.01 | 38 | 38 |
| | 1200 | 0.00 | 0.00 | 0 | 0 |
| ER30 | 75 | 0.43 | 0.46 | 203 | 217 |
| | 150 | 0.18 | 0.23 | 170 | 217 |
| | 300 | 0.07 | 0.08 | 132 | 151 |
| | 600 | 0.02 | 0.02 | 75 | 75 |
| | 1200 | 0.00 | 0.00 | 0 | 0 |

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# RESISTIVITY TEST RESULTS

**Site:** Samawa Combined Cycle P.P

| LINE NO. | SPACING 'a' (cm) | RESISTANCE 'R' In Ohms (Ω) | | RESISTIVITY 'ρ' In Ohms cm | |
|---|---|---|---|---|---|
| | | N-S | E-W | N-S | E-W |
| ER31 | 75 | 0.79 | 0.72 | 372 | 339 |
| | 150 | 0.54 | 0.54 | 509 | 509 |
| | 300 | 0.29 | 0.28 | 546 | 528 |
| | 600 | 0.13 | 0.12 | 490 | 452 |
| | 1200 | 0.08 | 0.08 | 603 | 603 |
| ER32 | 75 | 0.38 | 0.36 | 179 | 170 |
| | 150 | 0.15 | 0.18 | 141 | 170 |
| | 300 | 0.04 | 0.03 | 75 | 57 |
| | 600 | 0.01 | 0.01 | 38 | 38 |
| | 1200 | 0.00 | 0.00 | 0 | 0 |
| ER33 | 75 | 0.23 | 0.25 | 108 | 118 |
| | 150 | 0.08 | 0.09 | 75 | 85 |
| | 300 | 0.02 | 0.02 | 38 | 38 |
| | 600 | 0.00 | 0.00 | 0 | 0 |
| | 1200 | 0.00 | 0.00 | 0 | 0 |
| ER34 | 75 | 0.12 | 0.12 | 57 | 57 |
| | 150 | 0.06 | 0.06 | 57 | 57 |
| | 300 | 0.02 | 0.02 | 38 | 38 |
| | 600 | 0.00 | 0.00 | 0 | 0 |
| | 1200 | 0.00 | 0.00 | 0 | 0 |
| ER35 | 75 | 0.15 | 0.14 | 71 | 66 |
| | 150 | 0.06 | 0.05 | 57 | 47 |
| | 300 | 0.01 | 0.01 | 19 | 19 |
| | 600 | 0.00 | 0.00 | 0 | 0 |
| | 1200 | 0.00 | 0.00 | 0 | 0 |

Instrument Operator : Eng. Ali Al-Shamsy

Date : 07.05.2017 Time : 9:15 am

Weather Conditions : Sunny

Temperature : 40° C Site Humidity (%) :

# APPENDIX (H)

# LOAD PRESSURE VS SETTLEMENT CURVES

# APPENDIX (I)

# PIEZOMETER DATA

## *Samawa Combined Cycle Power Plant*

Water Table Level for the Piezometer

| Item No. | Piezometer No. | Water Level (m) |
|---|---|---|
| 1 | P. 07 | 2.70 |
| 2 | P. 21 | 2.45 |
| 3 | P. 37 | 3.93 |
| 4 | P. 39 | 3.82 |
| 5 | P. 41 | 2.51 |
| 6 | P. 45 | 2.12 |
| 7 | P. 47 | 2.00 |
| 8 | P. 50 | 2.20 |
| 9 | P. 61 | 3.65 |

| Item No. | Piezometer No. | Water Depth(m) | Borehole El.(m) | Water Elevation(m) |
|---|---|---|---|---|
| 1 | P.07 | 2.7 | 10 | 7.3 |
| 2 | P.21 | 2.45 | 10.1 | 7.65 |
| 3 | P.37 | 3.93 | 11.42 | 7.49 |
| 4 | P.39 | 3.82 | 11.42 | 7.6 |
| 5 | P.41 | 2.51 | 10.13 | 7.62 |
| 6 | P.45 | 2.12 | 9.72 | 7.6 |
| 7 | P.47 | 2 | 9.8 | 7.8 |
| 8 | P.50 | 2.2 | 10.17 | 7.97 |
| 9 | P.61 | 3.65 | 11.4 | 7.75 |

# APPENDIX (J)

# PILE CAPACITY CALCULATIONS

# Annex-1 - Pile Capacity Calculation

**SAMAWA BORED PILE CALCULATION RESULTS**

Bearing capacity calculations have been carried out for

- Bored Pile Diameter 80 cm and of Length(L) 23m for power block,tank, WTP area.
- Bored Pile Diameter 80 cm and of Length(L) 16m for electrical and non process building area, GIS Building area.

Bearing capacity calculation for axial loads are calculated

- For compression bearing capacity using factor of safety on side friction capacity and bearing capacity 2.5 and 3 respectively and,
- For uplift bearing capacity using factor of safety applied on side friction capacity 2.5 are presented below.

**A) Non Process Building Area (L=16m)**

**A1. Non Process Building Area (Clay Base)**

A1.1)Axial Allowable Loads

Axial Compression Allowable Bearing Capacity= 999 kN
Axial Uplift Allowable Bearing Capacity= 691 kN

A1. 2) Horizontal Load Capacity for Free Head Pile

Horizontal allowable lateral load is 155kN for 1.2 cm lateral top deflection. Maximum sectional moment : Mmax=308kN-m
Horizontal ultimate lateral capacity is 240kN for 2.5 cm top deflection. Maximum sectional moment : 546kN-m

**A2. Non Process Building Area (Sand Base)**

A2.1)Axial Allowable Loads

Axial Compression Allowable Bearing Capacity= 921 kN
Axial Uplift Allowable Bearing Capacity= 637 kN

A2. 2) Horizontal Load Capacity for Free Head Pile

Horizontal allowable lateral load is 160kN for 1.2 cm lateral top deflection. Maximum sectional moment : Mmax=319kN-m
Horizontal ultimate lateral capacity is 240kN for 2.5 cm top deflection. Maximum sectional moment : 557kN-m

**B) Pipe Rack Building Area(L=16m)**

B1)Axial Allowable Loads

Axial Compression Allowable Bearing Capacity= 886 kN
Axial Uplift Allowable Bearing Capacity= 489 kN

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

B2) Horizontal Load Capacity for Free Head Pile

Horizontal allowable lateral load is 155kN for 1.2 cm lateral top deflection. Maximum sectional moment : Mmax=294kN-m
Horizontal ultimate lateral capacity is 240kN for 2.5 cm top deflection. Maximum sectional moment : 537kN-m

**C) Electrical Building Area(L=16m)**

C1)Axial Allowable Loads

Axial Compression Allowable Bearing Capacity= 909 kN
Axial Uplift Allowable Bearing Capacity= 491 kN

C2) Horizontal Load Capacity for Free Head Pile

Horizontal allowable lateral load is 165kN for 1.2 cm lateral top deflection. Maximum sectional moment : Mmax=330kN-m
Horizontal ultimate lateral capacity is 260kN for 2.5 cm top deflection. Maximum sectional moment : 620kN-m

**D) GIS Building Area (L=16m)**

**D.1) GIS Building Area (Clay Base)**
D1.1)Axial Allowable Loads

Axial Compression Allowable Bearing Capacity= 895kN
Axial Uplift Allowable Bearing Capacity= 474 kN

D1.2) Horizontal Load Capacity for Free Head Pile

Horizontal allowable lateral load is 170kN for 1.2 cm lateral top deflection. Maximum sectional moment : Mmax=346kN-m
Horizontal ultimate lateral capacity is 270kN for 2.5 cm top deflection. Maximum sectional moment : 652kN-m

**D.2) GIS Building Area (Sand Base)**
D2.1)Axial Allowable Loads

Axial Compression Allowable Bearing Capacity= 837 kN
Axial Uplift Allowable Bearing Capacity= 458 kN

D2.2) Horizontal Load Capacity for Free Head Pile

Horizontal allowable lateral load is 170kN for 1.2 cm lateral top deflection. Maximum sectional moment : Mmax=346kN-m
Horizontal ultimate lateral capacity is 265kN for 2.5 cm top deflection. Maximum sectional moment : 636kN-m

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

**E) STG Area (L=23m)**

**E.1) STG Area (Clay Base)**
E1.1)Axial Allowable Loads

Axial Compression Allowable Bearing Capacity= 1445 kN
Axial Uplift Allowable Bearing Capacity= 1046 kN

E1.2) Horizontal Load Capacity for Free Head Pile

Horizontal allowable lateral load is 165kN for 1.2 cm lateral top deflection. Maximum sectional moment : Mmax=341kN-m
Horizontal ultimate lateral capacity is 260kN for 2.5 cm top deflection. Maximum sectional moment : 639kN-m

**E.2) STG Area (Sand Base)**
E2.1)Axial Allowable Loads

Axial Compression Allowable Bearing Capacity= 1540kN
Axial Uplift Allowable Bearing Capacity= 1058 kN

E2.2) Horizontal Load Capacity for Free Head Pile

Horizontal allowable lateral load is 145kN for 1.2 cm lateral top deflection. Maximum sectional moment : Mmax=350kN-m
Horizontal ultimate lateral capacity is 235kN for 2.5 cm top deflection. Maximum sectional moment : 639kN-m

**F) Water Treatment Plant Area (L=23m)**

**F.1) Water Treatment Plant Area (Clay Base-1)**
F1.1)Axial Allowable Loads

Axial Compression Allowable Bearing Capacity= 1478 kN
Axial Uplift Allowable Bearing Capacity= 1087 kN

F1.2) Horizontal Load Capacity for Free Head Pile

Horizontal allowable lateral load is 160kN for 1.2 cm lateral top deflection. Maximum sectional moment : Mmax=330kN-m
Horizontal ultimate lateral capacity is 250kN for 2.5 cm top deflection. Maximum sectional moment : 615kN-m

**F.2) Water Treatment Plant Area (Clay Base-2)**
F2.1)Axial Allowable Loads

Axial Compression Allowable Bearing Capacity= 1504kN
Axial Uplift Allowable Bearing Capacity= 1184 kN

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

F2.2) Horizontal Load Capacity for Free Head Pile

Horizontal allowable lateral load is 170kN for 1.2 cm lateral top deflection. Maximum sectional moment : Mmax=353kN-m
Horizontal ultimate lateral capacity is 275kN for 2.5 cm top deflection. Maximum sectional moment : 662kN-m

**F.3) Water Treatment Plant Area (Sand Base)**
F3.1)Axial Allowable Loads

Axial Compression Allowable Bearing Capacity= 1445kN
Axial Uplift Allowable Bearing Capacity= 1084 kN

F3.2) Horizontal Load Capacity for Free Head Pile

Horizontal allowable lateral load is 170kN for 1.2 cm lateral top deflection. Maximum sectional moment : Mmax=362kN-m
Horizontal ultimate lateral capacity is 275kN for 2.5 cm top deflection. Maximum sectional moment : 683kN-m

**G) Tank Area (L=23m)**

**G.1) Tank Area (Clay Base-1)**
G1.1)Axial Allowable Loads

Axial Compression Allowable Bearing Capacity= 1496 kN
Axial Uplift Allowable Bearing Capacity= 1135 kN

G1.2) Horizontal Load Capacity for Free Head Pile

Horizontal allowable lateral load is 165kN for 1.2 cm lateral top deflection. Maximum sectional moment : Mmax=339kN-m
Horizontal ultimate lateral capacity is 255kN for 2.5 cm top deflection. Maximum sectional moment : 620kN-m

**G.2) Tank Area (Clay Base-2)**
G2.1)Axial Allowable Loads

Axial Compression Allowable Bearing Capacity= 1413kN
Axial Uplift Allowable Bearing Capacity= 1056 kN

G2.2) Horizontal Load Capacity for Free Head Pile

Horizontal allowable lateral load is 160kN for 1.2 cm lateral top deflection. Maximum sectional moment : Mmax=323kN-m
Horizontal ultimate lateral capacity is 255kN for 2.5 cm top deflection. Maximum sectional moment : 616kN-m

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

**G.3) Tank Area(Sand Base)**
G3.1)Axial Allowable Loads

Axial Compression Allowable Bearing Capacity= 1650kN
Axial Uplift Allowable Bearing Capacity= 1151 kN

G3.2) Horizontal Load Capacity for Free Head Pile

Horizontal allowable lateral load is 155kN for 1.2 cm lateral top deflection. Maximum sectional moment : Mmax=305kN-m
Horizontal ultimate lateral capacity is 245kN for 2.5 cm top deflection. Maximum sectional moment : 573kN-m

**H) Switchyard Area (L=23m)**

**H.1) Switchyard Area (Clay Base)**
H1.1)Axial Allowable Loads

Axial Compression Allowable Bearing Capacity= 1462 kN
Axial Uplift Allowable Bearing Capacity= 1075 kN

H1.2) Horizontal Load Capacity for Free Head Pile

Horizontal allowable lateral load is 160kN for 1.2 cm lateral top deflection. Maximum sectional moment : Mmax=314kN-m
Horizontal ultimate lateral capacity is 245kN for 2.5 cm top deflection. Maximum sectional moment : 564kN-m

**H.2) Switchyard Area (Sand Base)**
H2.1)Axial Allowable Loads

Axial Compression Allowable Bearing Capacity= 1498kN
Axial Uplift Allowable Bearing Capacity= 902 kN

H2.2) Horizontal Load Capacity for Free Head Pile

Horizontal allowable lateral load is 160kN for 1.2 cm lateral top deflection. Maximum sectional moment : Mmax=315kN-m
Horizontal ultimate lateral capacity is 250kN for 2.5 cm top deflection. Maximum sectional moment : 583kN-m

**I) GTG Area (L=23m)**
**I.1) GTG Area 1**

**I.1.1) GTG Area (Clay Base)**
I.1.1.1)Axial Allowable Loads

Axial Compression Allowable Bearing Capacity= 1532 kN
Axial Uplift Allowable Bearing Capacity= 1196 kN

I.1.1.2) Horizontal Load Capacity for Free Head Pile

Horizontal allowable lateral load is 165kN for 1.2 cm lateral top deflection. Maximum sectional moment : Mmax=345kN-m
Horizontal ultimate lateral capacity is 265kN for 2.5 cm top deflection. Maximum sectional moment : 649kN-m

**I.1.2) GTG Area (Sand Base)**
I.1.2.1)Axial Allowable Loads

Axial Compression Allowable Bearing Capacity= 1547kN
Axial Uplift Allowable Bearing Capacity= 788 kN

I.1.2.2) Horizontal Load Capacity for Free Head Pile

Horizontal allowable lateral load is 245kN for 1.2 cm lateral top deflection. Maximum sectional moment : Mmax=469kN-m
Horizontal ultimate lateral capacity is 395kN for 2.5 cm top deflection. Maximum sectional moment : 849kN-m

**I.2) GTG Area 2**

I.2.1)Axial Allowable Loads

Axial Compression Allowable Bearing Capacity= 1496 kN
Axial Uplift Allowable Bearing Capacity= 1128 kN

I.2.2) Horizontal Load Capacity for Free Head Pile

Horizontal allowable lateral load is 160kN for 1.2 cm lateral top deflection. Maximum sectional moment : Mmax=333kN-m
Horizontal ultimate lateral capacity is 260kN for 2.5 cm top deflection. Maximum sectional moment : 641kN-m

**I.3) GTG Area 3**

I.3.1)Axial Allowable Loads

Axial Compression Allowable Bearing Capacity= 1540 kN
Axial Uplift Allowable Bearing Capacity= 1168 kN

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

I.3.2) Horizontal Load Capacity for Free Head Pile

Horizontal allowable lateral load is 150kN for 1.2 cm lateral top deflection. Maximum sectional moment : Mmax=296kN-m
Horizontal ultimate lateral capacity is 240kN for 2.5 cm top deflection. Maximum sectional moment : 558kN-m

**I.4) GTG Area 4**

**I.4.1) GTG Area (Clay Base)**
I.1.1.1)Axial Allowable Loads

Axial Compression Allowable Bearing Capacity= 1514 kN
Axial Uplift Allowable Bearing Capacity= 1203 kN

I.4.1.2) Horizontal Load Capacity for Free Head Pile

Horizontal allowable lateral load is 145kN for 1.2 cm lateral top deflection. Maximum sectional moment : Mmax=279kN-m
Horizontal ultimate lateral capacity is 225kN for 2.5 cm top deflection. Maximum sectional moment : 516kN-m

**I.4.2) GTG Area (Sand Base)**
I.4.2.1)Axial Allowable Loads

Axial Compression Allowable Bearing Capacity= 1468kN
Axial Uplift Allowable Bearing Capacity= 880 kN

I.4.2.2) Horizontal Load Capacity for Free Head Pile

Horizontal allowable lateral load is 145kN for 1.2 cm lateral top deflection. Maximum sectional moment : Mmax=279kN-m
Horizontal ultimate lateral capacity is 225kN for 2.5 cm top deflection. Maximum sectional moment : 516kN-m

**CONCLUSION**

The analysis for bored pile of diameter 80cm and of length 16m and 23m carried out at Dhi Qar Power Plant For 16m piles :

- an allowable axial bearing capacity of 890 kN in average with a maximum and minimum value of 999 and 837kN.
- an allowable axial uplift capacity of 520 kN in average with a maximum and minimum value of 691 and 458kN.

For 23m piles :

- an allowable axial bearing capacity of 1475 kN in average with a maximum and minimum value of 1650 and 1410kN.
- an allowable axial uplift capacity of 900 kN in average with a maximum and minimum value of 1160 and 780kN.

The lateral capacity is mainly influenced by top clay layer. The mean undrained cohesion for this layer 37 kPa with a median value of 35 kPa. The lateral capacity of 80 cm diameter bored pile for mean 35 undrained cohesion provides:

Horizontal allowable lateral load is 160kN for 1.2 cm lateral top deflection. Maximum sectional moment : Mmax=330kN-m
Horizontal ultimate lateral capacity is 260kN for 2.5 cm top deflection. Maximum sectional moment : 641kN-m, for single free head pile.
Pile lateral allowable and ultimate load capacity to use in the project are provided in the following table.

| SAMAWA POWER PLANT PROJECT FREE HEAD PILE IN GROUP | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Pile Sections | Allowable Axial Load | Case No | SINGLE PILE | | Spacing | GROUP EFFECT | | | | LEAD ROW PILE'S | | | | TRAILING ROW PILE'S | | | |
| | | | Horizontal Disp. | H | | P multiplier | | H (kN) | | Mmax | Tmax | Section Depth Mmax | Depth for 0 displacement. | Mmax | Tmax | Section Depth Mmax | Depth for 0 displacement. |
| (cm) | (kN) | | (mm) | (kN) | (m) | Lead Row | Trailing Row | Lead Row | Trailing Row | (kN-m) | (kN) | m | m | (kN-m) | (kN) | m | m |
| Diameter 80 | 1475 | Ultimate | 25 | 260 | 3D | 0.8 | 0.4 | 207 | 137 | 515 | 207 | 4.0 | 11.0 | 410 | 137 | 4.5 | 11.5 |
| | | | | | 4D | 0.87 | 0.6 | 217 | 172 | 525 | 217 | 4 | 10.5 | 460 | 172 | 4.0 | 11.0 |
| | | Allowable | 12 | 160 | 3D | 0.8 | 0.4 | 130 | 83 | 275 | 130 | 4 | 11.0 | 210 | 83 | 4.5 | 11.5 |
| | | | | | 4D | 0.87 | 0.6 | 136 | 109 | 280 | 136 | 3.75 | 10.0 | 250 | 109 | 4.0 | 11.0 |

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

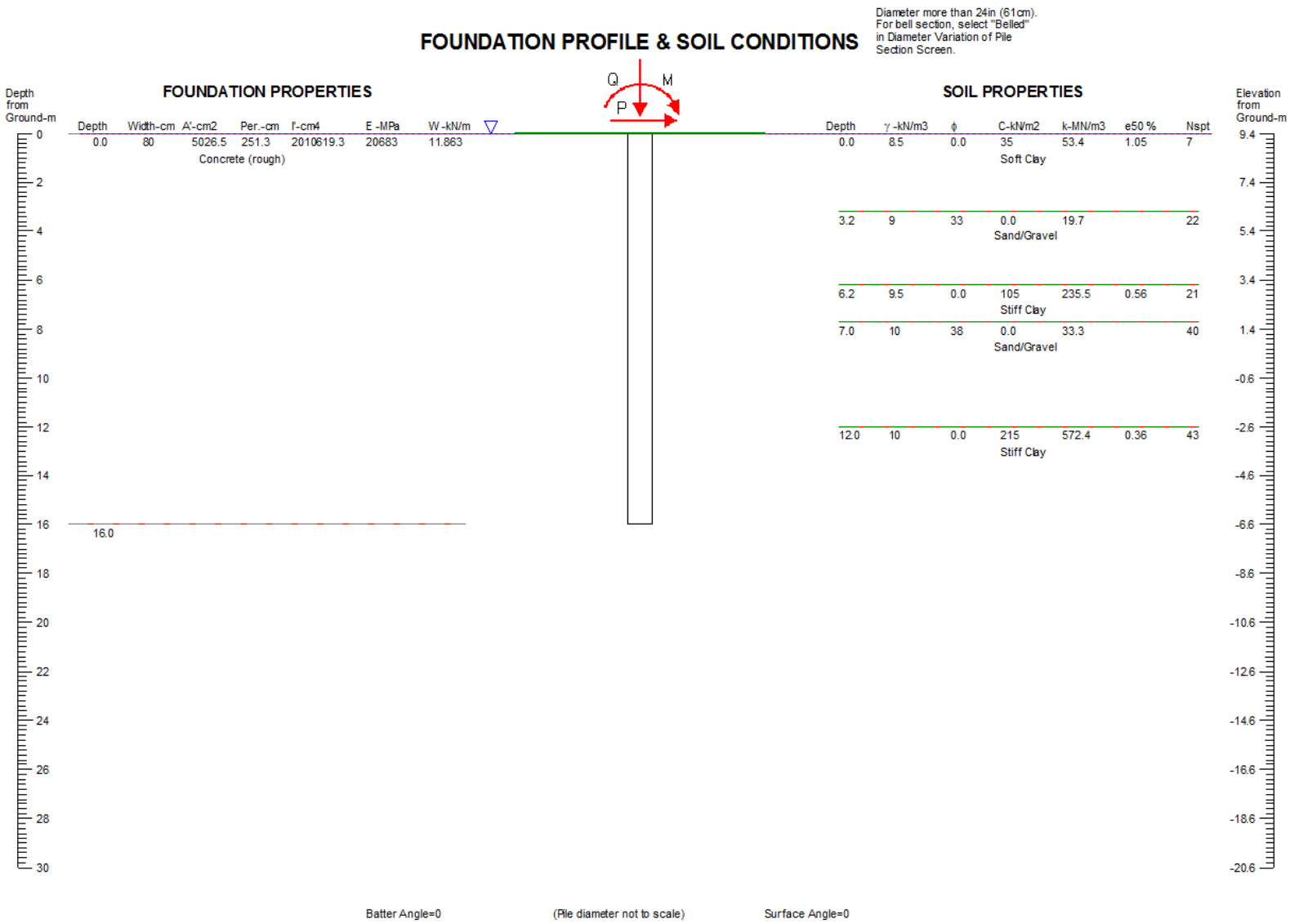
**Samawa Pile Bearing Capacity Calculations -1**

Bored Pile Diameter 80 cm , Length 16m
Pile bearing capacity calculation for axial loads
For compression bearing capacity factor of Safety applied on side friction capacity and bearing capacity is 2.5 and 3 respectively
For uplift bearing capacity factor of safety applied on side friction capacity is 2.5

**A1)NON-PROCESS BUILDING AREA (CLAY BASE)**

**A1.1) Axial Allowable Loads**
Axial Compression Allowable Bearing Capacity= 999 kN
Axial Allowable Uplift Capacity= 691 kN

**A1.2)Horizontal Load Capacity for Free Head Pile**
Horizontal allowable lateral load is 155kN for 1.2 cm lateral top deflection. Maximum sectional moment : Mmax=308kN-m
Horizontal ultimate lateral capacity is 240kN for 2.5 cm top deflection. Maximum sectional moment : 546kN-m

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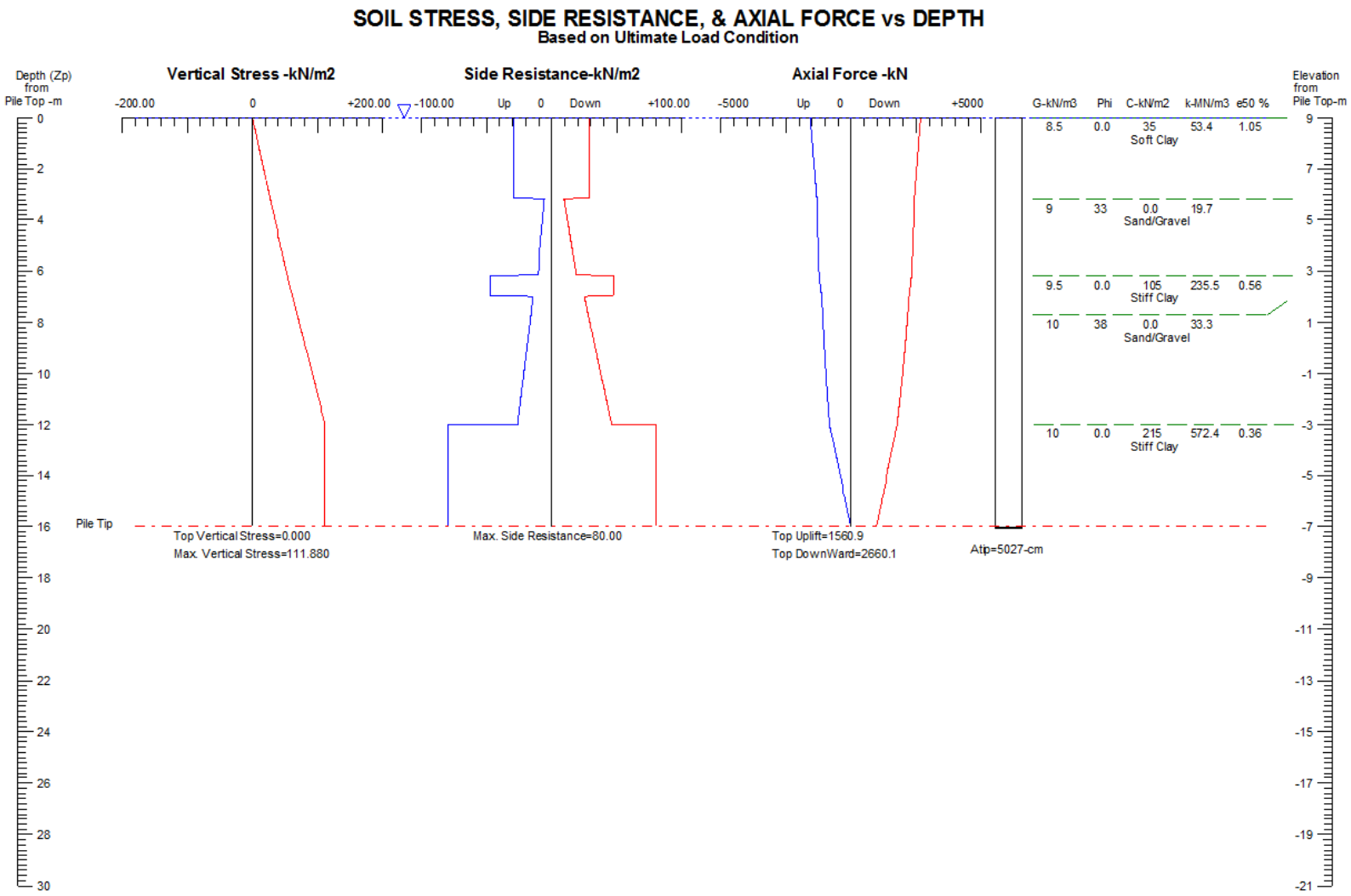
**Samawa Power Plant Project**
**Non Process Building Area**

**Figure 1**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

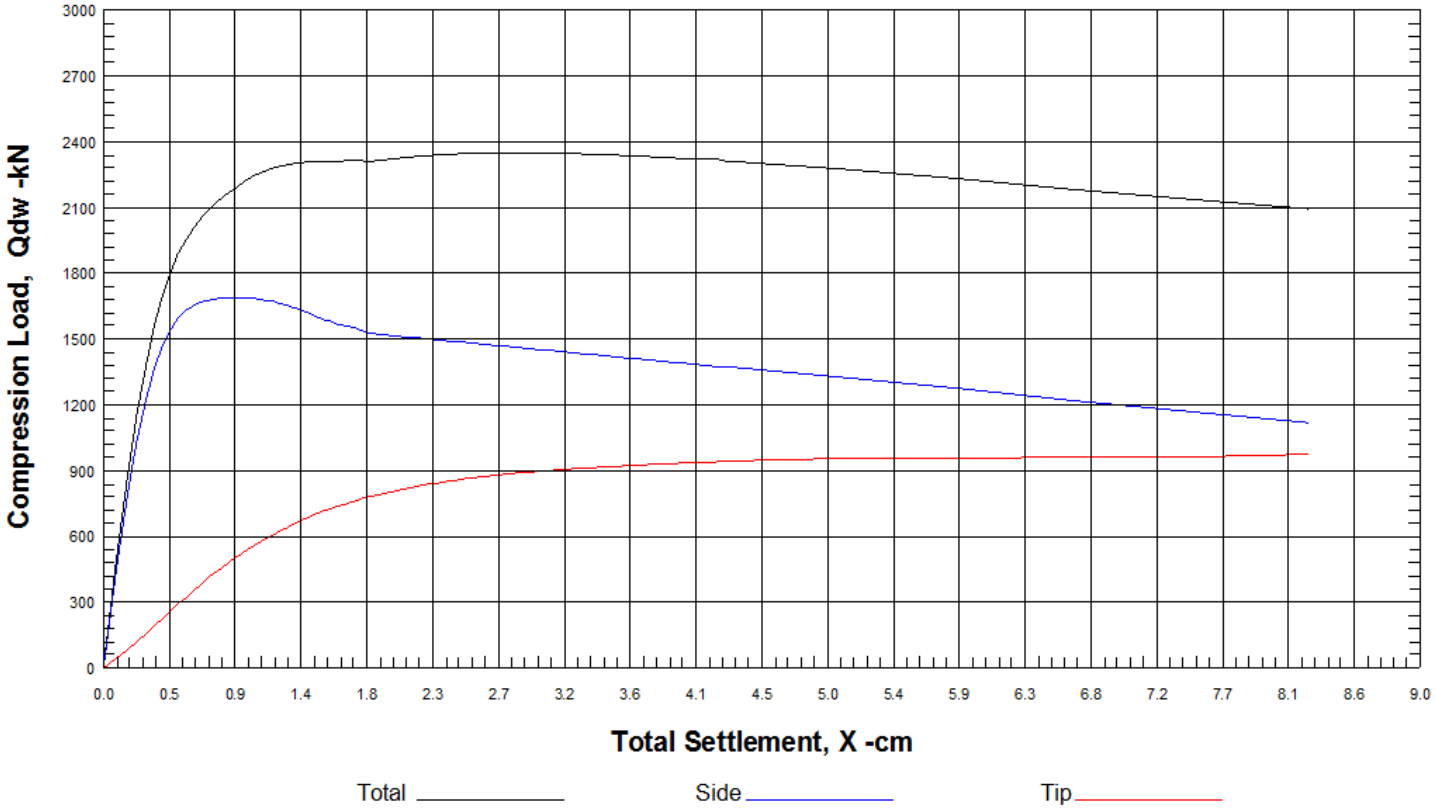



CivilTech Software

**Samawa Power Plant Project**
**Non Process Building Area**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

## Vertical Load vs. Total Settlement

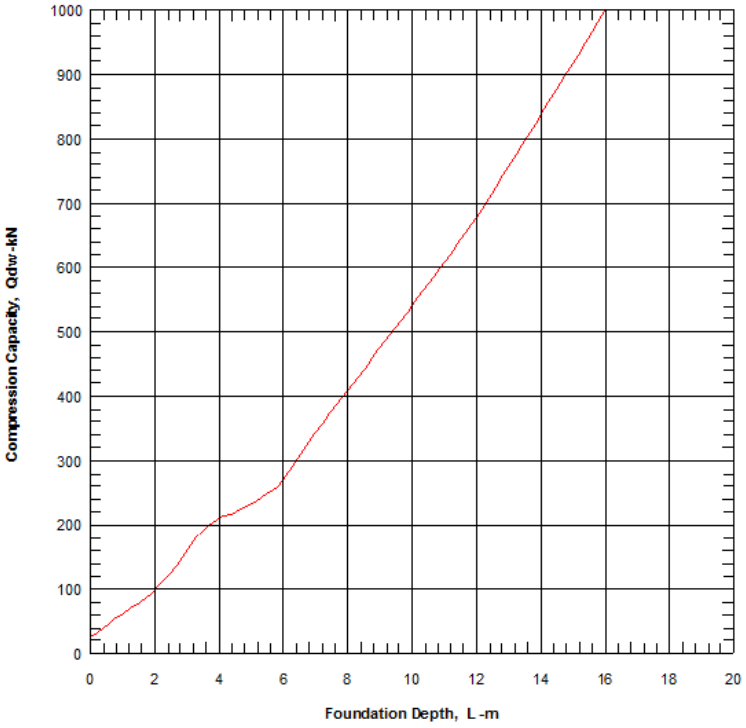


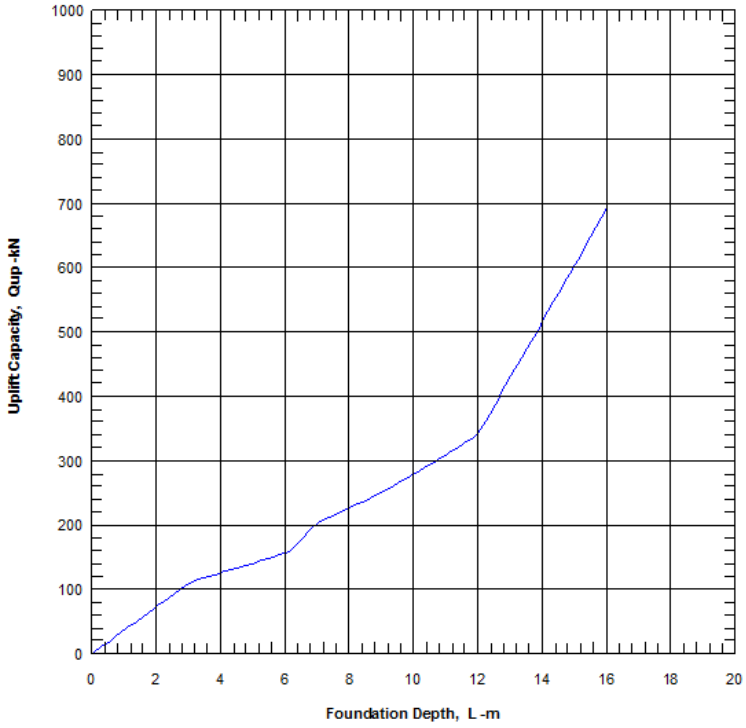

CivilTech Software

**Samawa Power Plant Project**
**Non Process Building Area**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

# ALLOWABLE CAPACITY vs FOUNDATION DEPTH

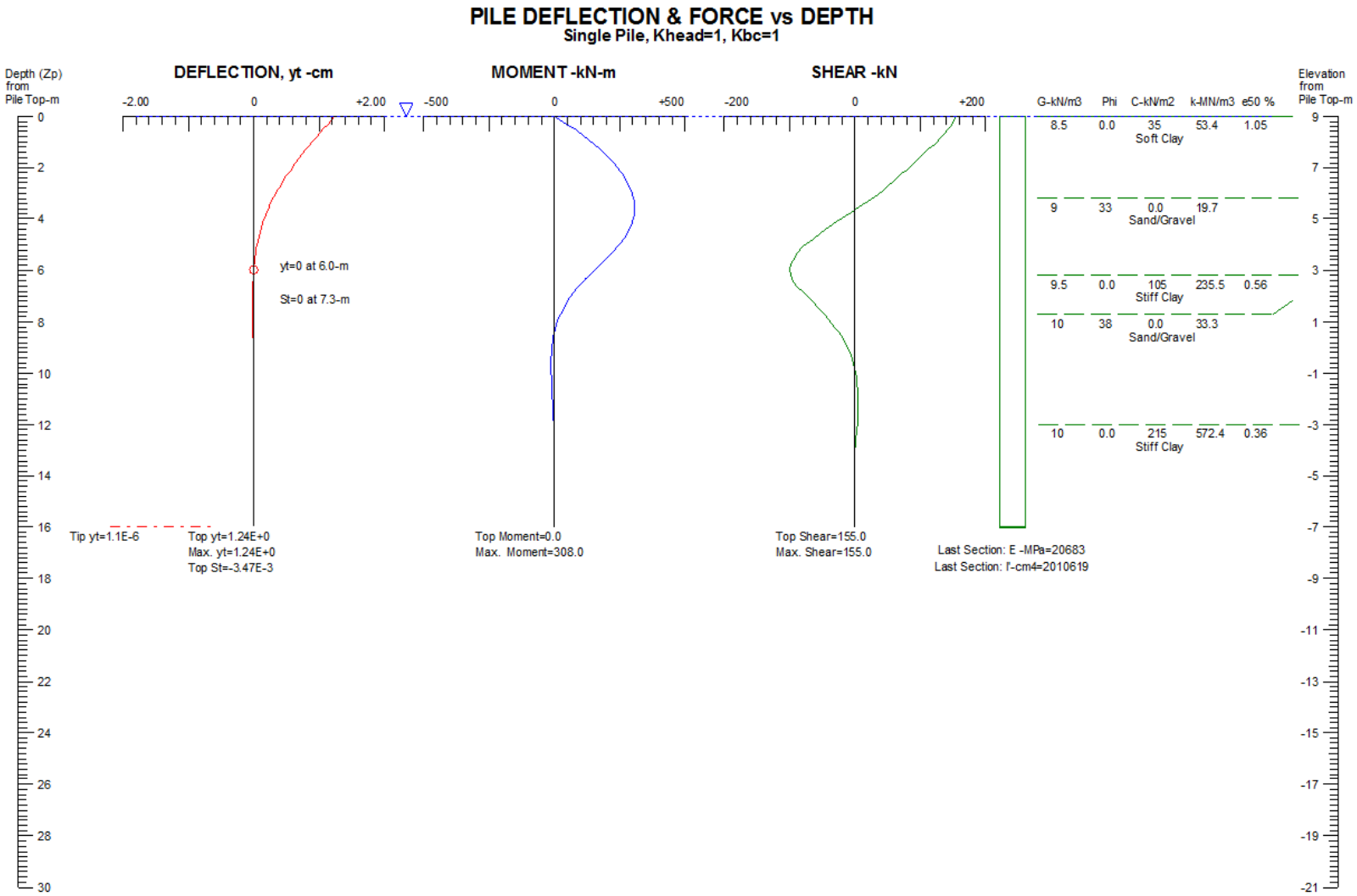



CivilTech Software

**Samawa Power Plant Project**
**Non Process Building Area**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB



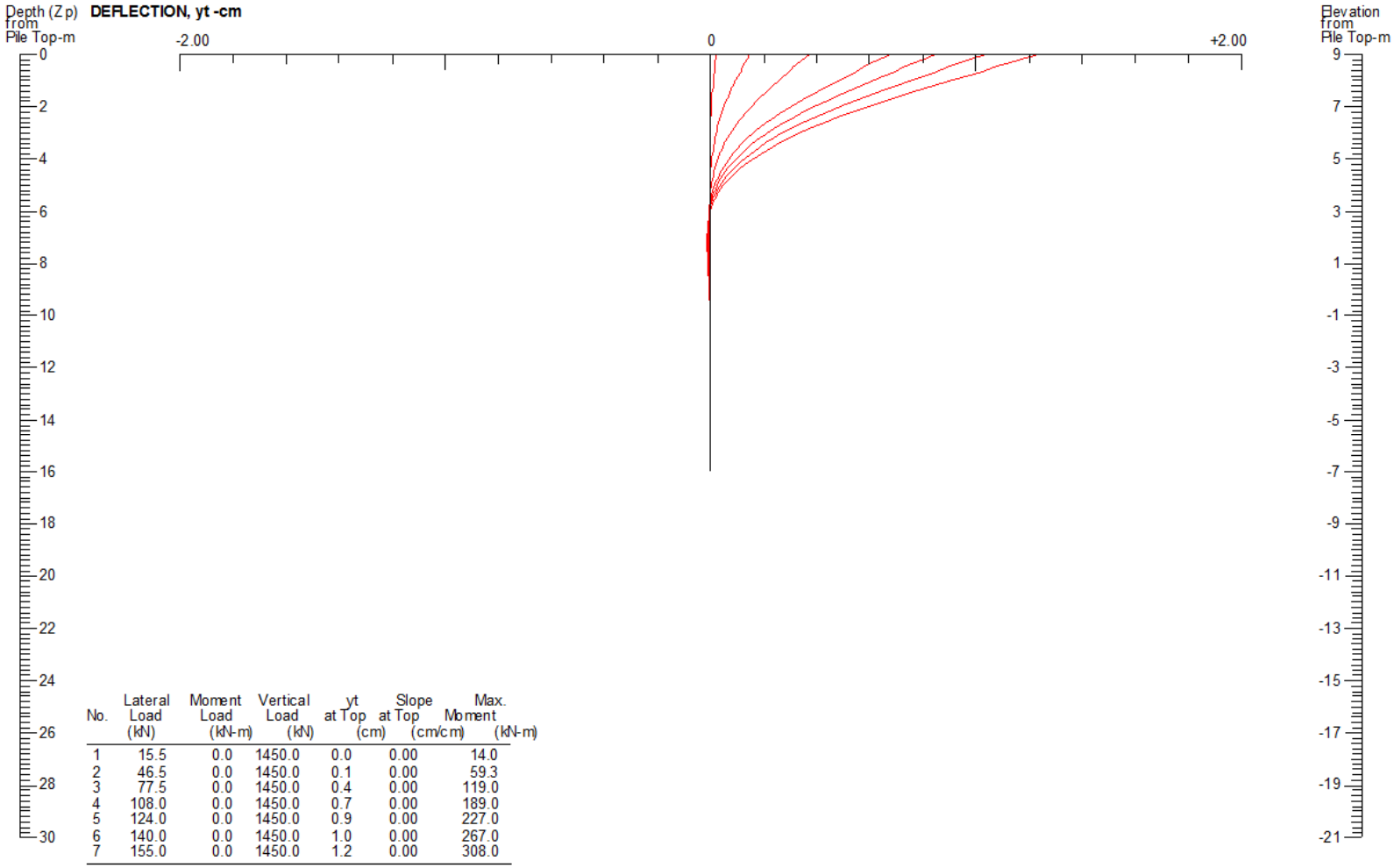

**CivilTech Software**

**Samawa Power Plant Project**
**Non Process Building Area**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

## PILE DEFLECTION vs LOADING

Single Pile, Khead=1, Kbc=1

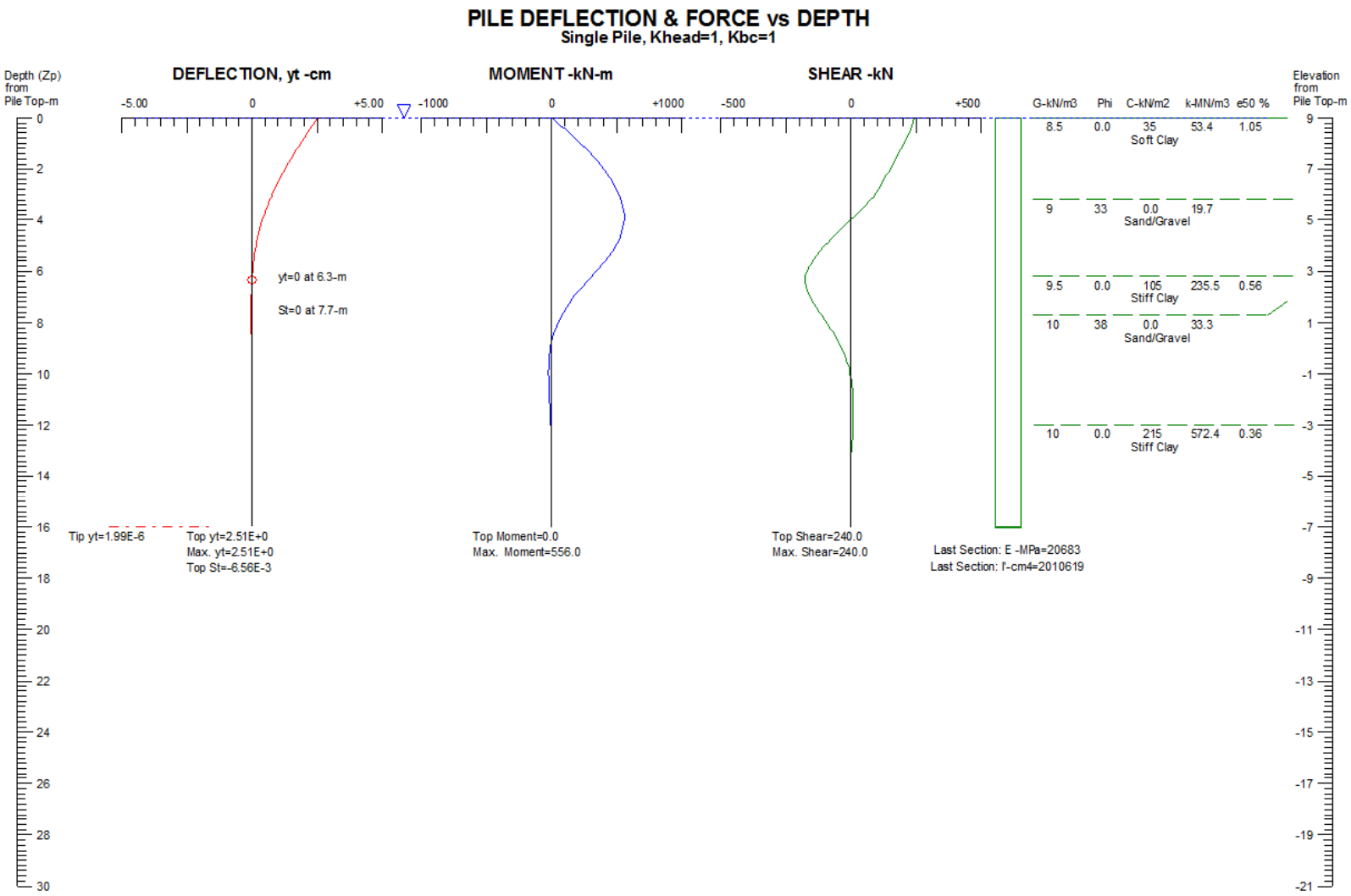



| No. | Lateral Load (kN) | Moment Load (kN-m) | Vertical Load (kN) | yt at Top (cm) | Slope at Top (cm/cm) | Max. Moment (kN-m) |
|---|---|---|---|---|---|---|
| 1 | 15.5 | 0.0 | 1450.0 | 0.0 | 0.00 | 14.0 |
| 2 | 46.5 | 0.0 | 1450.0 | 0.1 | 0.00 | 59.3 |
| 3 | 77.5 | 0.0 | 1450.0 | 0.4 | 0.00 | 119.0 |
| 4 | 108.0 | 0.0 | 1450.0 | 0.7 | 0.00 | 189.0 |
| 5 | 124.0 | 0.0 | 1450.0 | 0.9 | 0.00 | 227.0 |
| 6 | 140.0 | 0.0 | 1450.0 | 1.0 | 0.00 | 267.0 |
| 7 | 155.0 | 0.0 | 1450.0 | 1.2 | 0.00 | 308.0 |

*CivilTech Software*

**Samawa Power Plant Project**
**Non Process Building Area**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

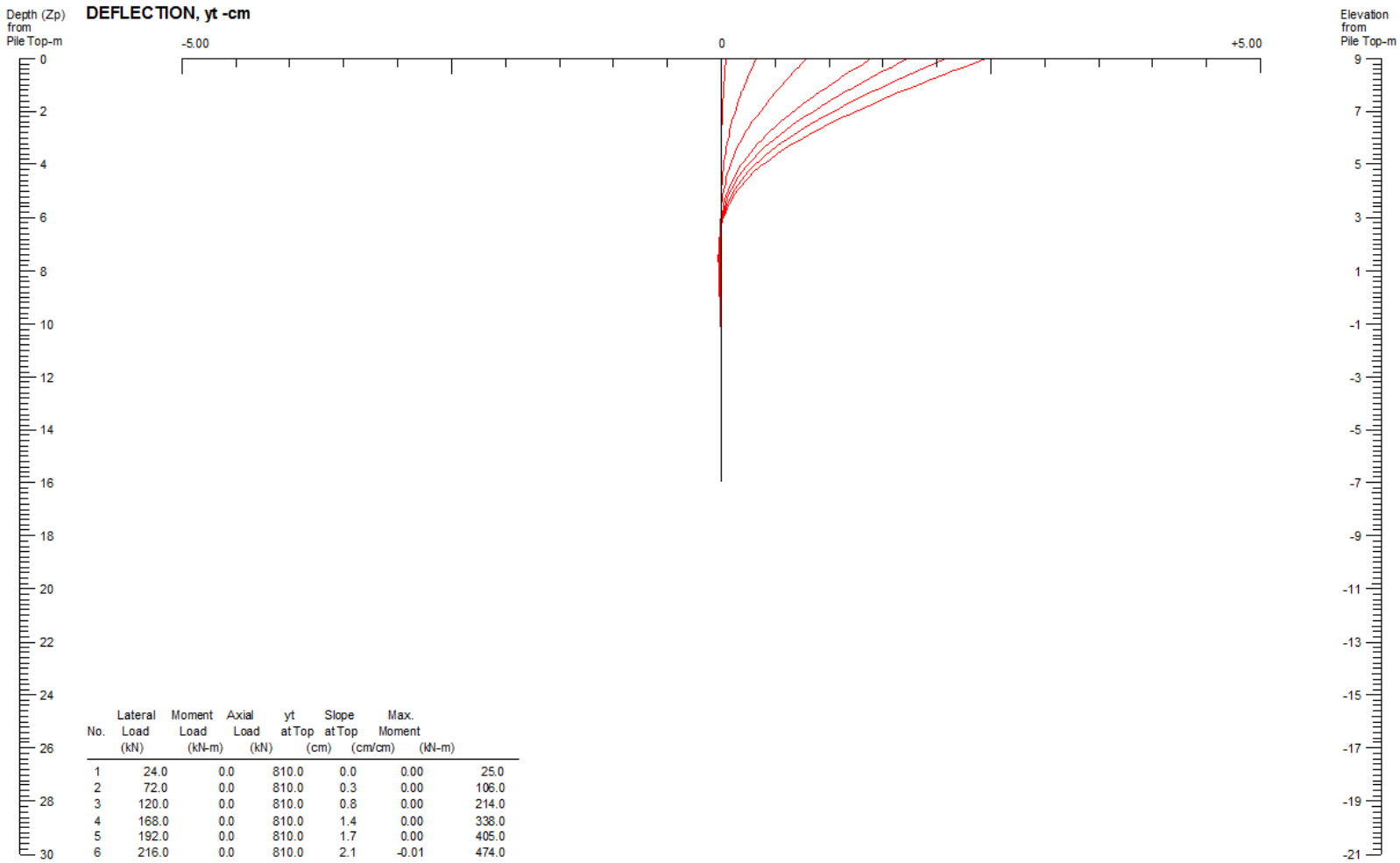



**CivilTech Software**

**Samawa Power Plant Project**
**Non Process Building Area**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

## PILE DEFLECTION vs LOADING
Single Pile, Khead=1, Kbc=1




| No. | Lateral Load (kN) | Moment Load (kN-m) | Axial Load (kN) | yt at Top (cm) | Slope at Top (cm/cm) | Max. Moment (kN-m) |
|---|---|---|---|---|---|---|
| 1 | 24.0 | 0.0 | 810.0 | 0.0 | 0.00 | 25.0 |
| 2 | 72.0 | 0.0 | 810.0 | 0.3 | 0.00 | 106.0 |
| 3 | 120.0 | 0.0 | 810.0 | 0.8 | 0.00 | 214.0 |
| 4 | 168.0 | 0.0 | 810.0 | 1.4 | 0.00 | 338.0 |
| 5 | 192.0 | 0.0 | 810.0 | 1.7 | 0.00 | 405.0 |
| 6 | 216.0 | 0.0 | 810.0 | 2.1 | -0.01 | 474.0 |
| 7 | 240.0 | 0.0 | 810.0 | 2.5 | -0.01 | 546.0 |

*CivilTech Software*

**Samawa Power Plant Project**
**Non Process Building Area**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

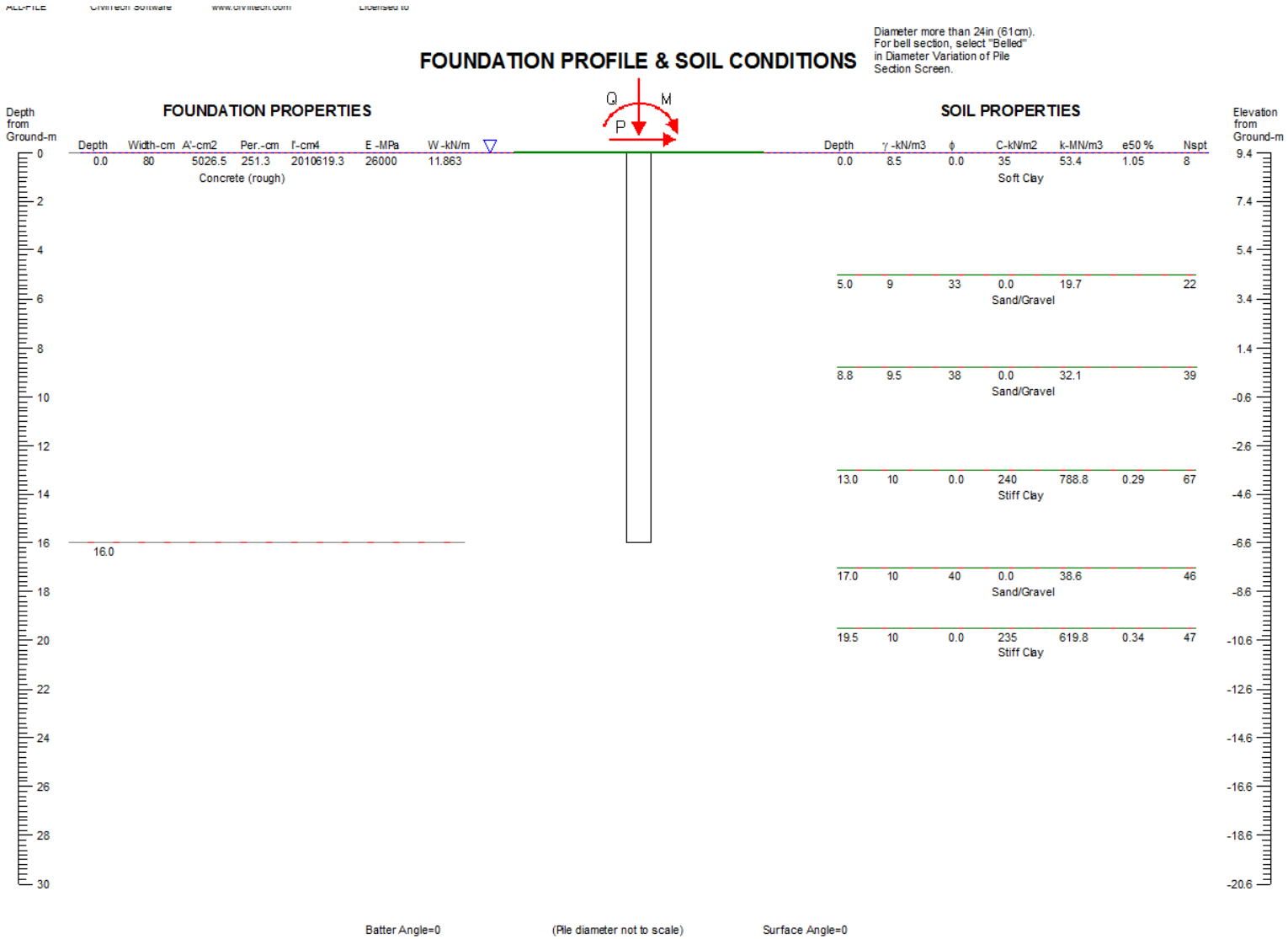
## A2) NON-PROCESS BUILDING AREA (SAND BASE)

### A2.1) Axial Allowable Loads

Axial Compression Allowable Bearing Capacity= 921 kN
Axial Allowable Uplift Capacity= 637 kN

### A2.2)Horizontal Load Capacity for Free Head Pile

Horizontal allowable lateral load is 160kN for 1.2 cm lateral top deflection. Maximum sectional moment : Mmax=319kN-m
Horizontal ultimate lateral capacity is 240kN for 2.5 cm top deflection. Maximum sectional moment : 557kN-m

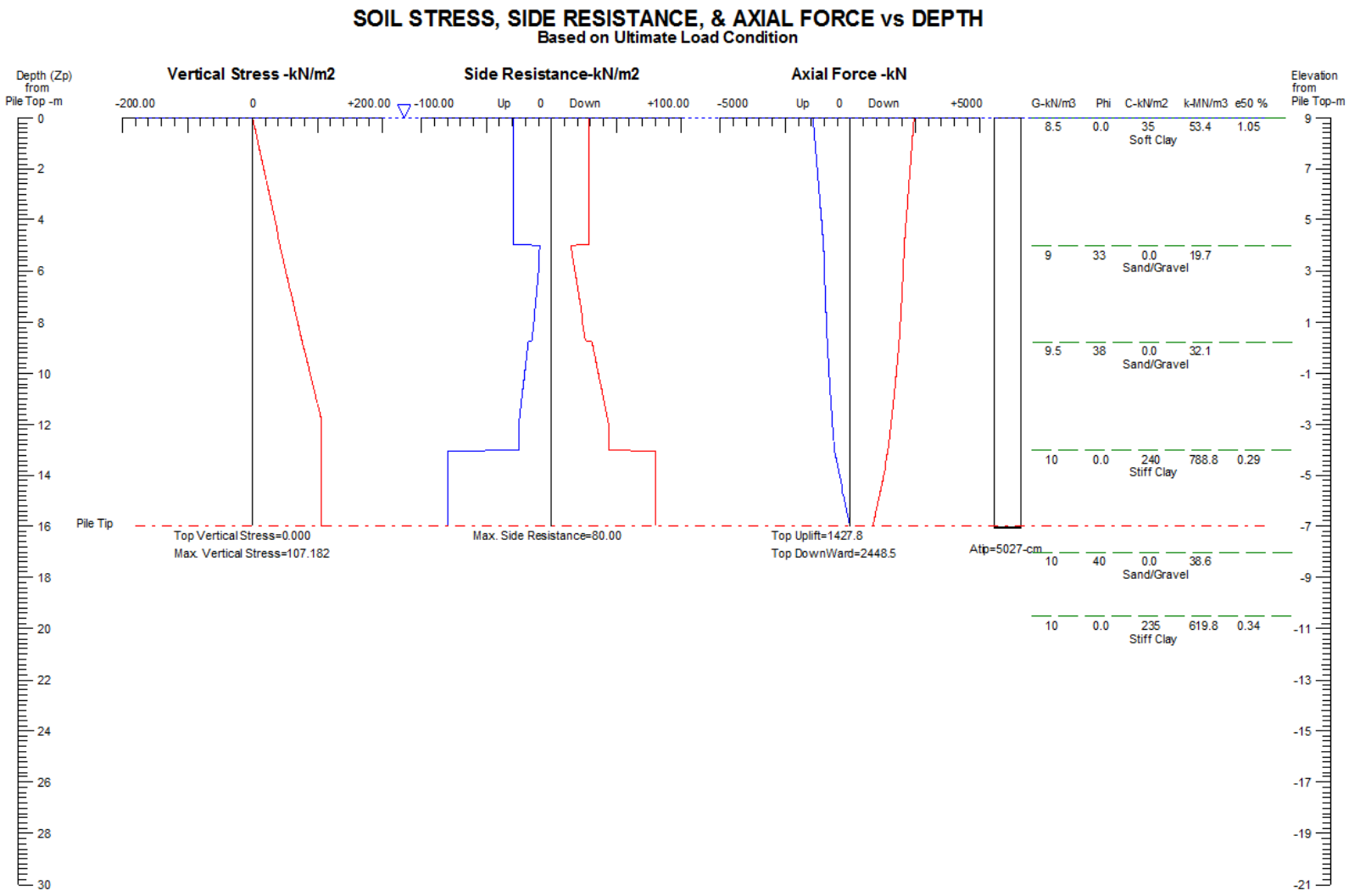



CivilTech Software

**Samawa Power Plant Project**
**Non Process Building Area**

**Figure 1**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

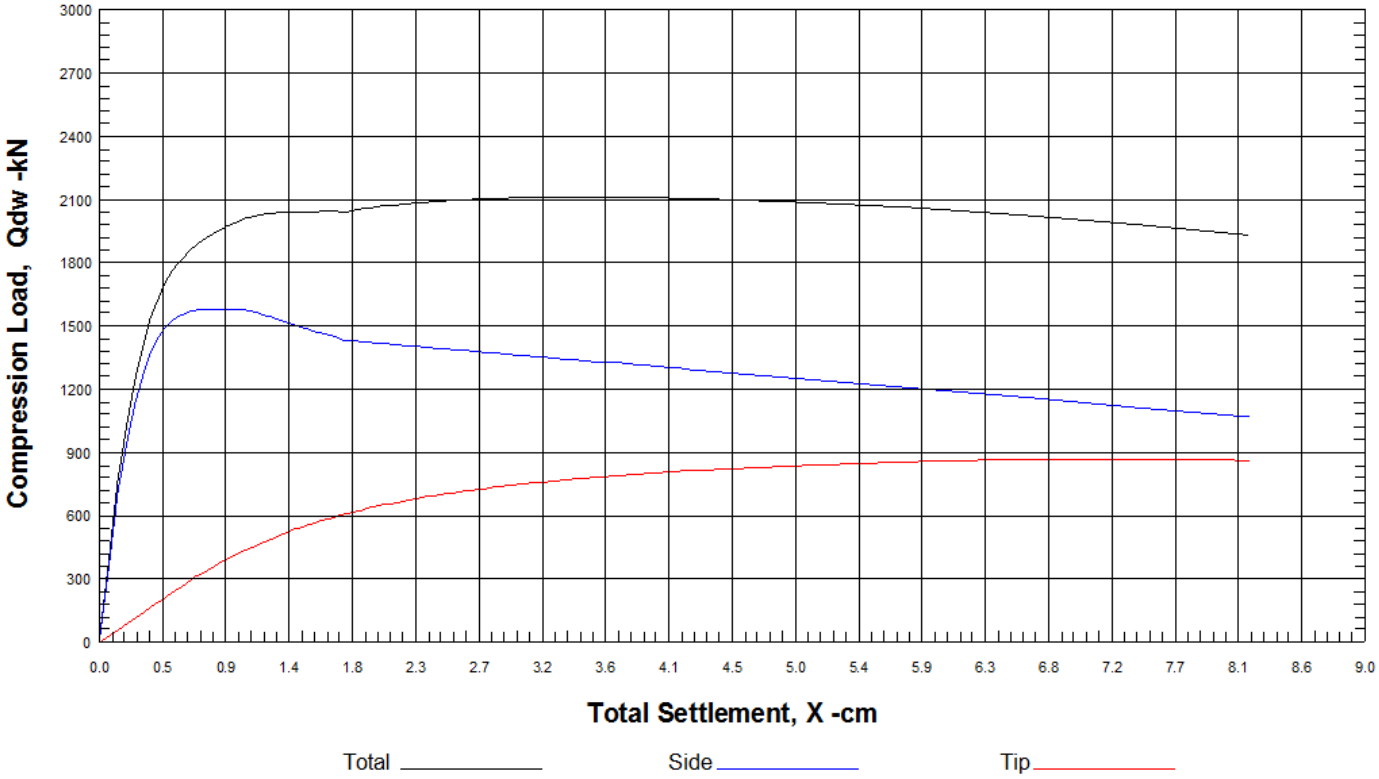



**CivilTech Software**

**Samawa Power Plant Project**
**Non Process Building Area**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

## Vertical Load vs. Total Settlement

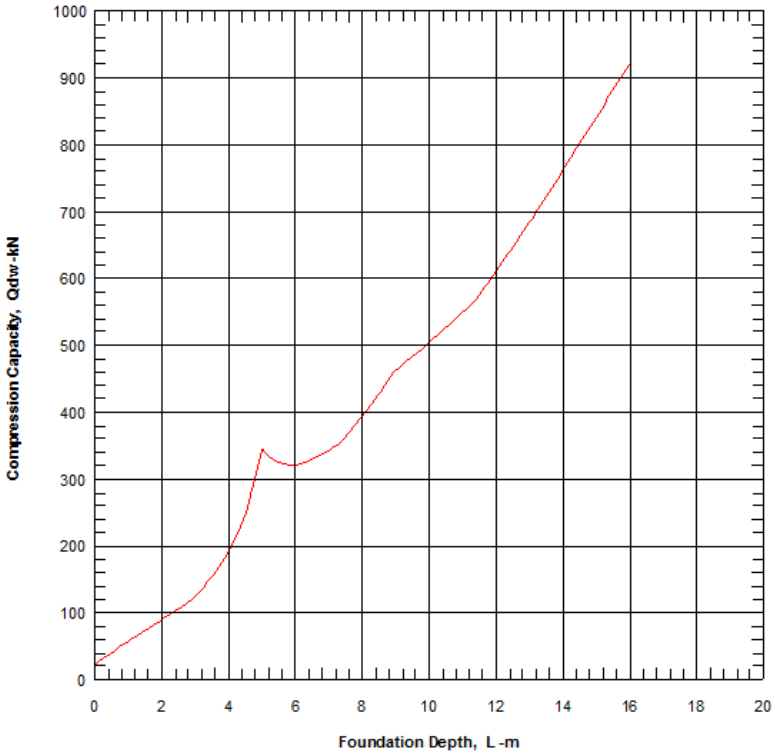


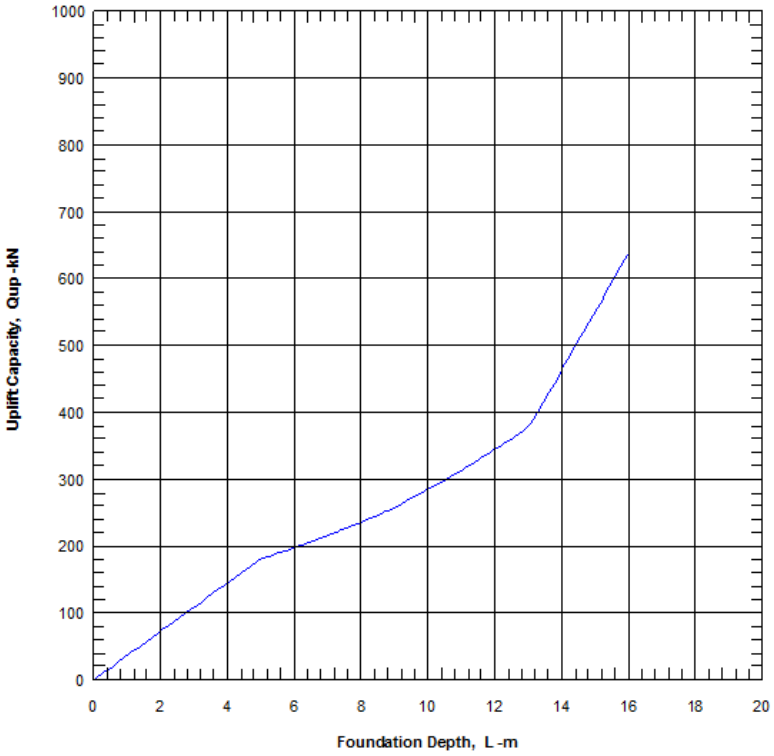

CivilTech Software

**Samawa Power Plant Project**
**Non Process Building Area**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

# ALLOWABLE CAPACITY vs FOUNDATION DEPTH

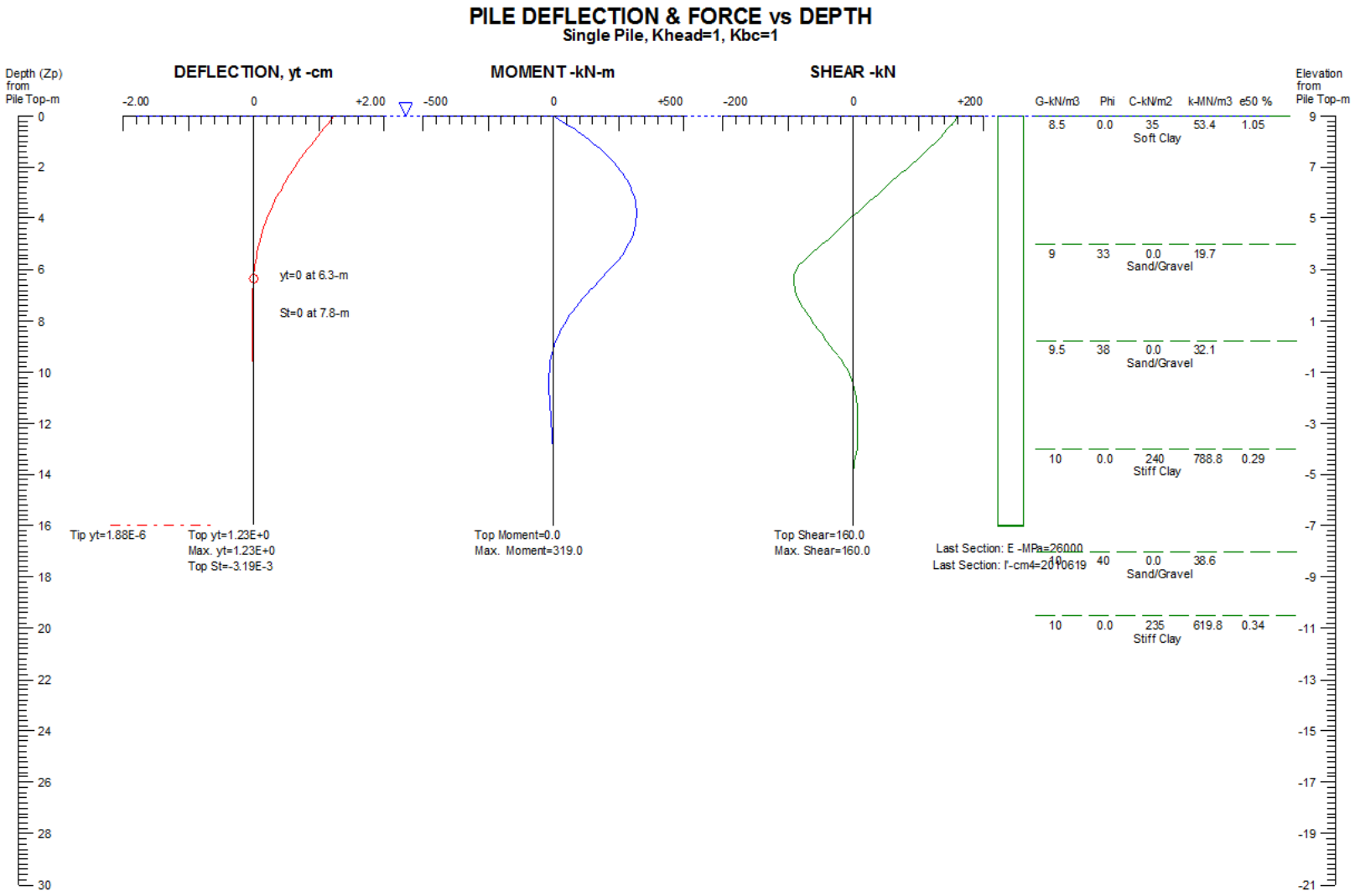



CivilTech Software

**Samawa Power Plant Project**
**Non Process Building Area**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

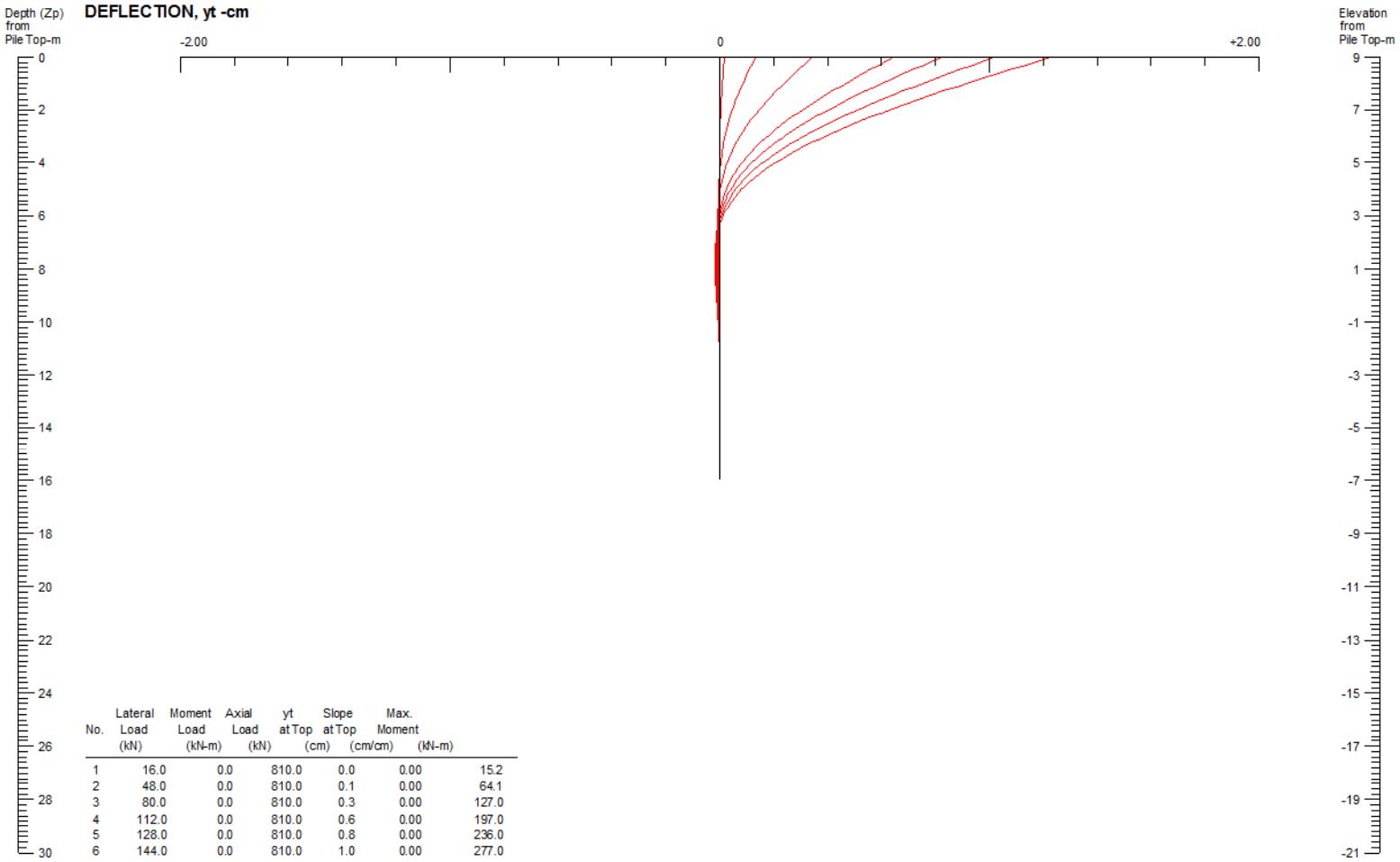



**CivilTech Software**

**Samawa Power Plant Project**
**Non Process Building Area**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

## PILE DEFLECTION vs LOADING
Single Pile, Khead=1, Kbc=1

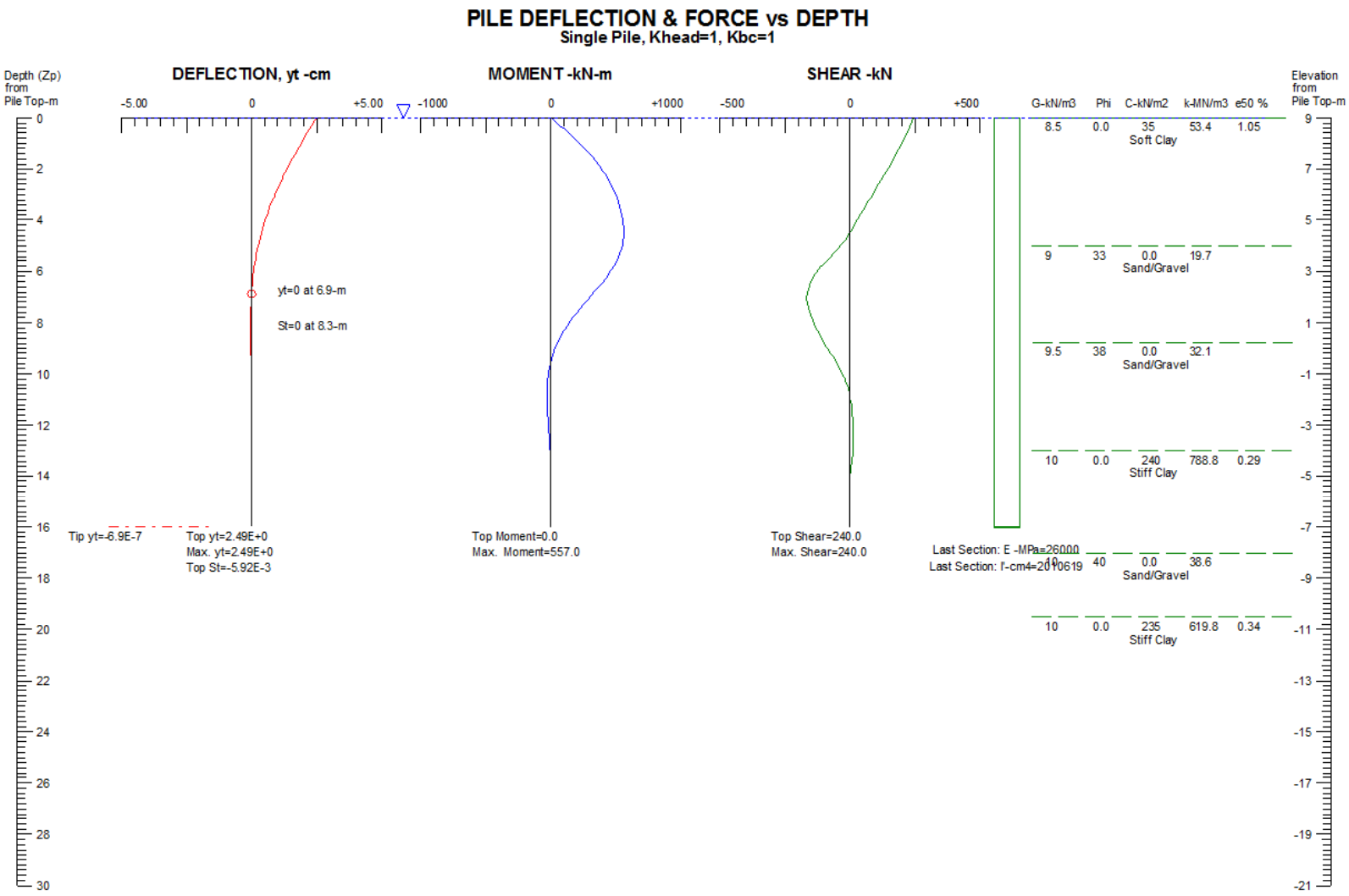



| No. | Lateral Load (kN) | Moment Load (kN-m) | Axial Load (kN) | yt at Top (cm) | Slope at Top (cm/cm) | Max. Moment (kN-m) |
|---|---|---|---|---|---|---|
| 1 | 16.0 | 0.0 | 810.0 | 0.0 | 0.00 | 15.2 |
| 2 | 48.0 | 0.0 | 810.0 | 0.1 | 0.00 | 64.1 |
| 3 | 80.0 | 0.0 | 810.0 | 0.3 | 0.00 | 127.0 |
| 4 | 112.0 | 0.0 | 810.0 | 0.6 | 0.00 | 197.0 |
| 5 | 128.0 | 0.0 | 810.0 | 0.8 | 0.00 | 236.0 |
| 6 | 144.0 | 0.0 | 810.0 | 1.0 | 0.00 | 277.0 |
| 7 | 160.0 | 0.0 | 810.0 | 1.2 | 0.00 | 319.0 |

*CivilTech Software*

**Samawa Power Plant Project**
**Non Process Building Area**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

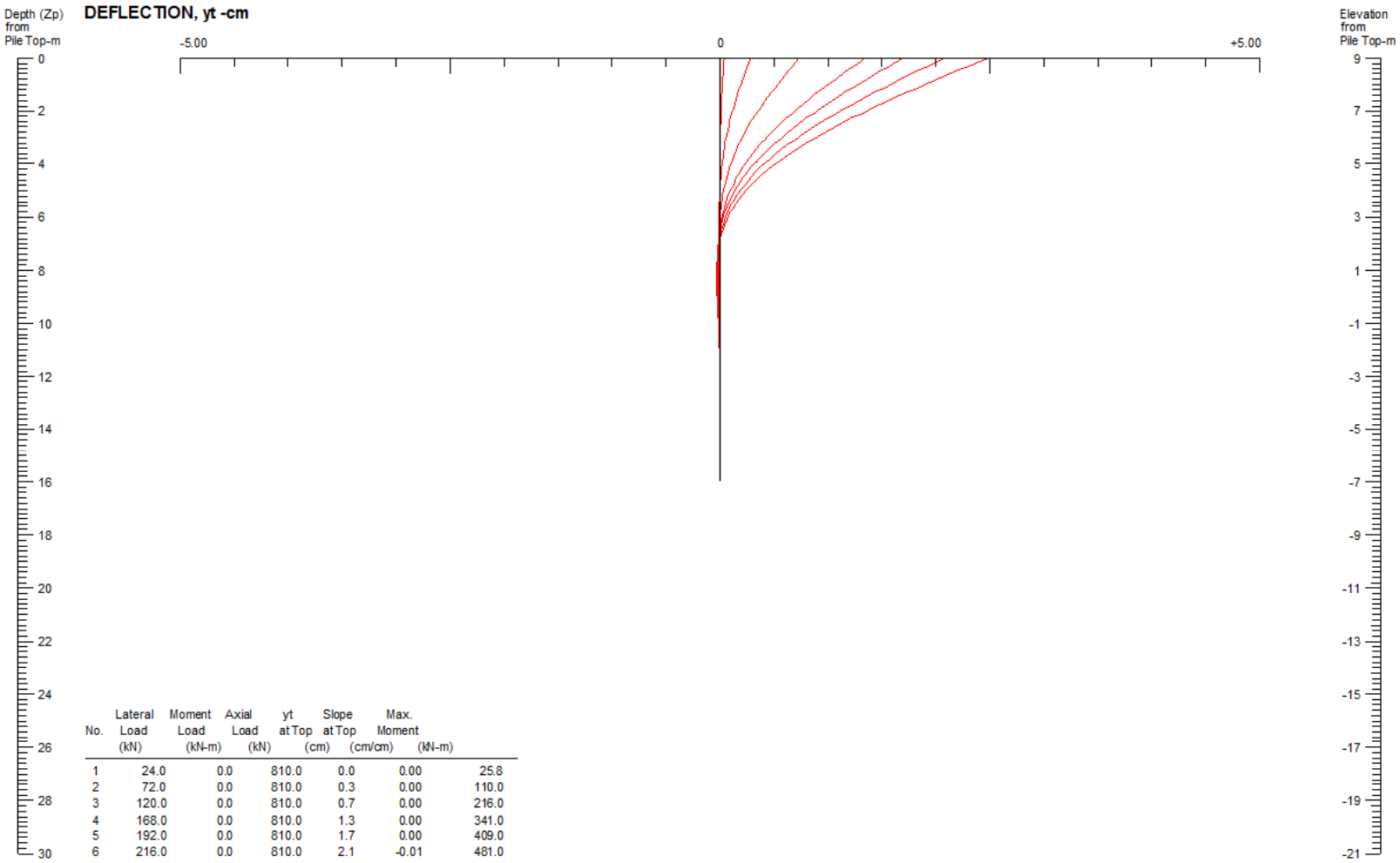



**CivilTech Software**

**Samawa Power Plant Project**
**Non Process Building Area**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

## PILE DEFLECTION vs LOADING
**Single Pile, Khead=1, Kbc=1**




| No. | Lateral Load (kN) | Moment Load (kN-m) | Axial Load (kN) | yt at Top (cm) | Slope at Top (cm/cm) | Max. Moment (kN-m) |
|---|---|---|---|---|---|---|
| 1 | 24.0 | 0.0 | 810.0 | 0.0 | 0.00 | 25.8 |
| 2 | 72.0 | 0.0 | 810.0 | 0.3 | 0.00 | 110.0 |
| 3 | 120.0 | 0.0 | 810.0 | 0.7 | 0.00 | 216.0 |
| 4 | 168.0 | 0.0 | 810.0 | 1.3 | 0.00 | 341.0 |
| 5 | 192.0 | 0.0 | 810.0 | 1.7 | 0.00 | 409.0 |
| 6 | 216.0 | 0.0 | 810.0 | 2.1 | -0.01 | 481.0 |
| 7 | 240.0 | 0.0 | 810.0 | 2.5 | -0.01 | 557.0 |

***CivilTech Software***

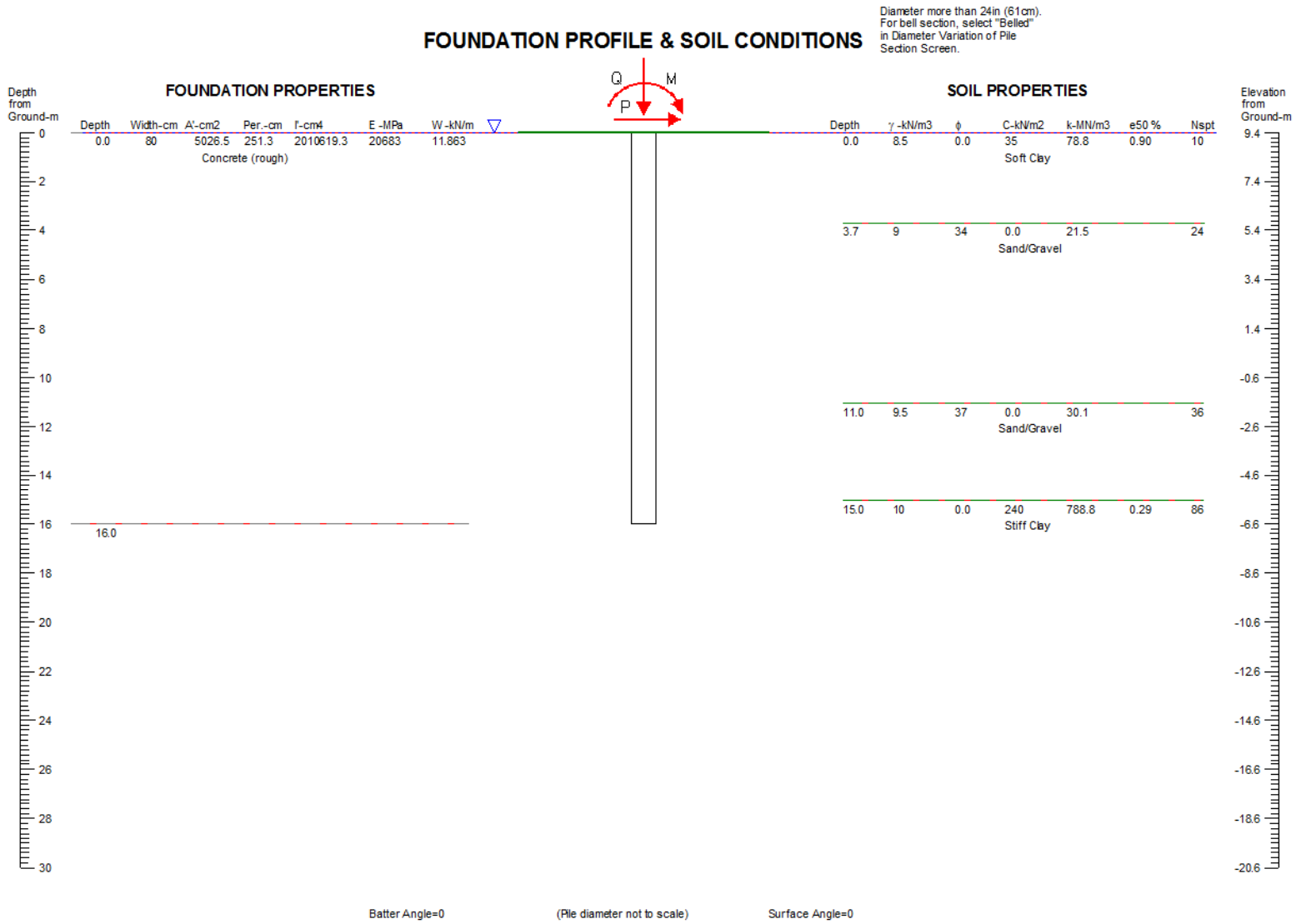
**Samawa Power Plant Project**
**Non Process Building Area**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

**B) PIPE RACK BUILDING**

**B1) Axial Allowable Loads**
Axial Compression Allowable Bearing Capacity= 886 kN
Axial Allowable Uplift Capacity= 489 kN

**B2)Horizontal Load Capacity for Free Head Pile**
Horizontal allowable lateral load is 155kN for 1.2 cm lateral top deflection. Maximum sectional moment : Mmax=294kN-m
Horizontal ultimate lateral capacity is 240kN for 2.5 cm top deflection. Maximum sectional moment : 537kN-m



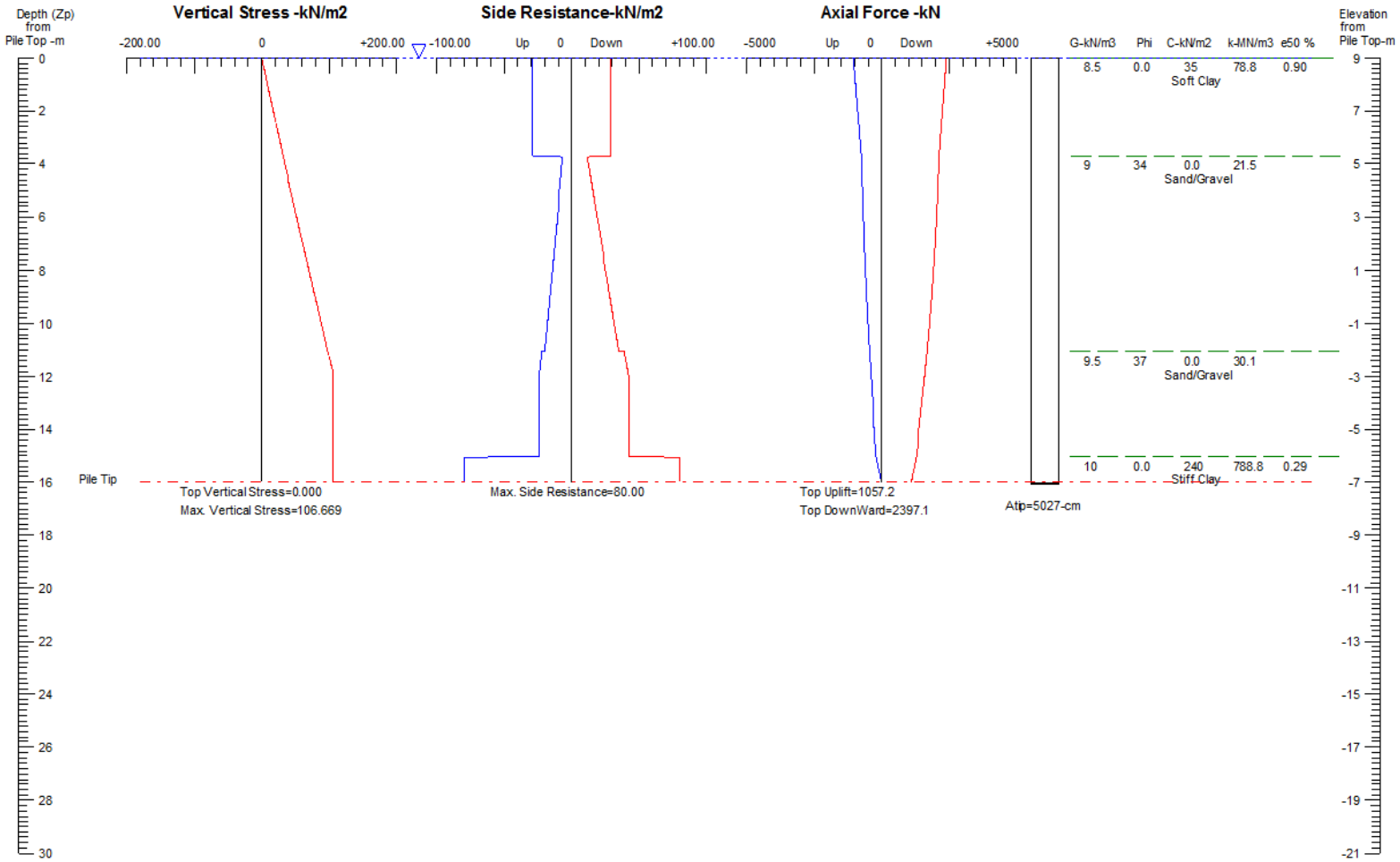

CivilTech Software

**Samawa Power Plant Project**
**Pipe Rack Building Area**

**Figure 1**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

## SOIL STRESS, SIDE RESISTANCE, & AXIAL FORCE vs DEPTH
**Based on Ultimate Load Condition**

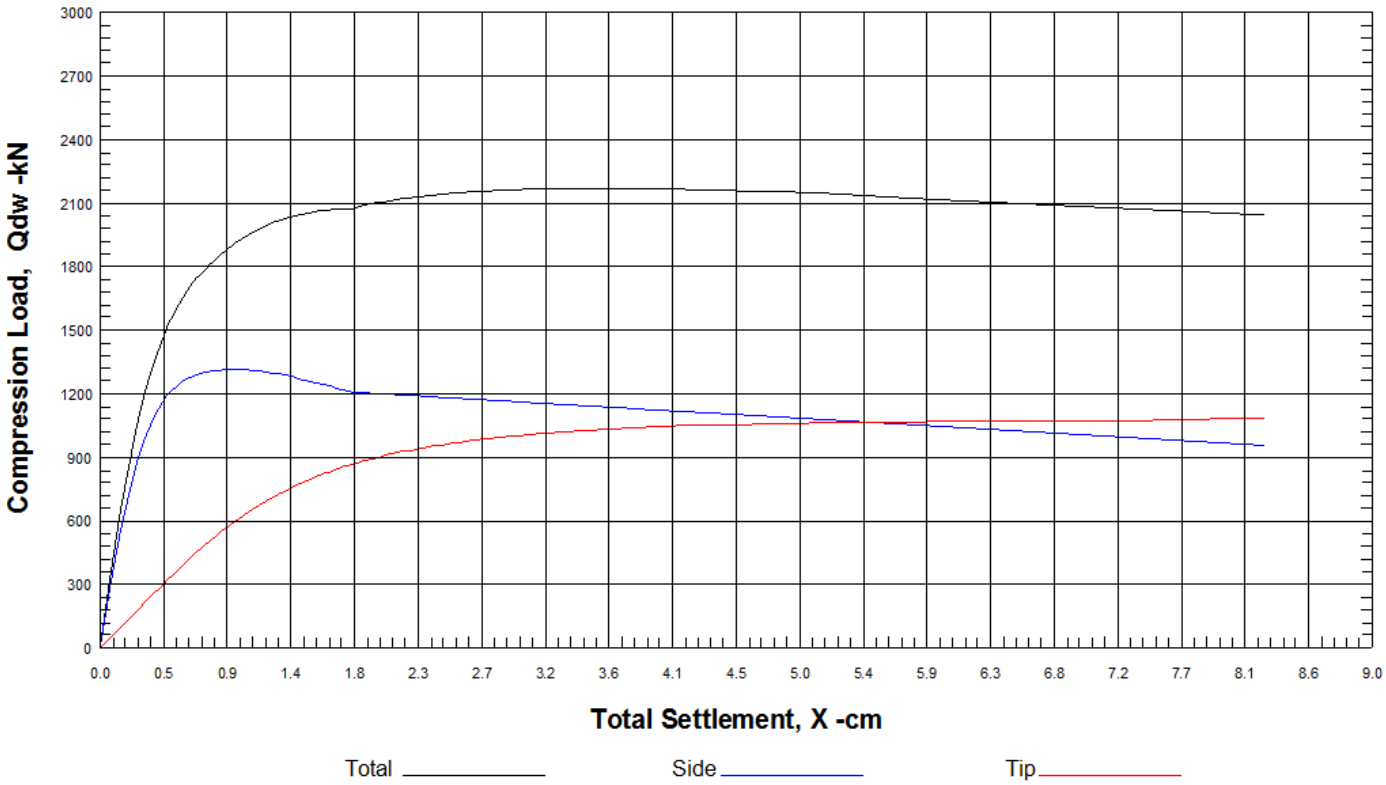



**CivilTech Software**

**Samawa Power Plant Project**
**Pipe Rack Building Area**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

## Vertical Load vs. Total Settlement

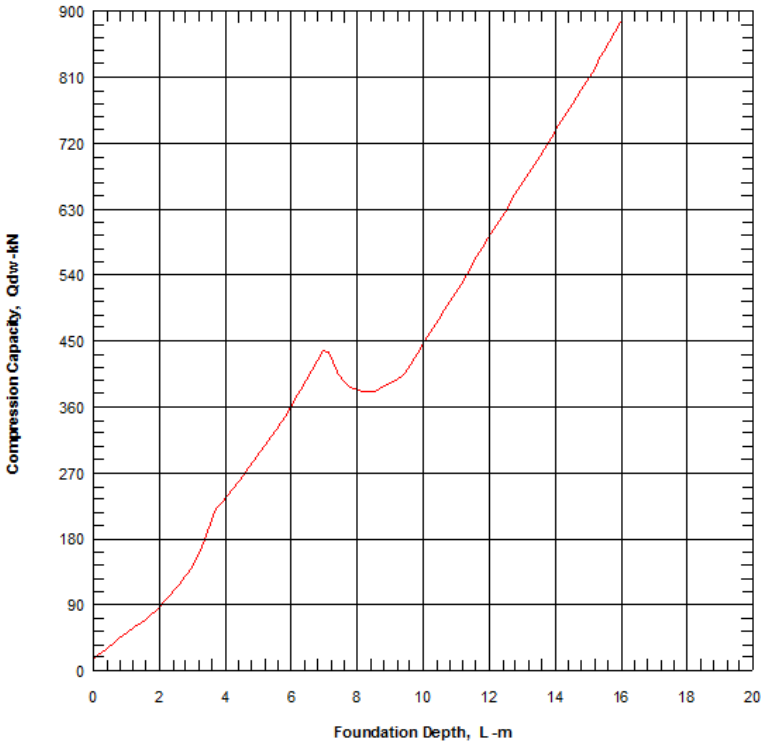


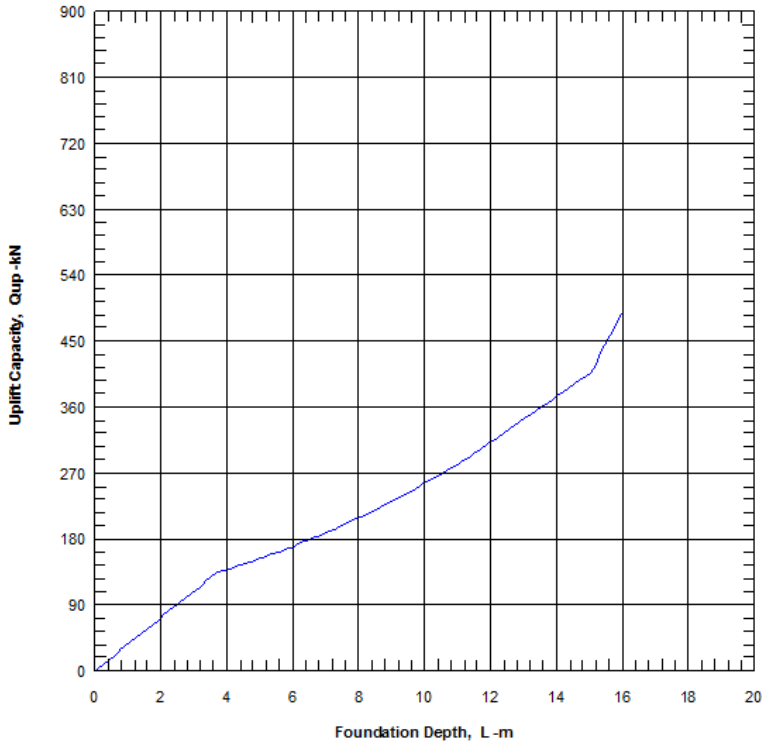

CivilTech Software

**Samawa Power Plant Project**
**Pipe Rack Building Area**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

# ALLOWABLE CAPACITY vs FOUNDATION DEPTH

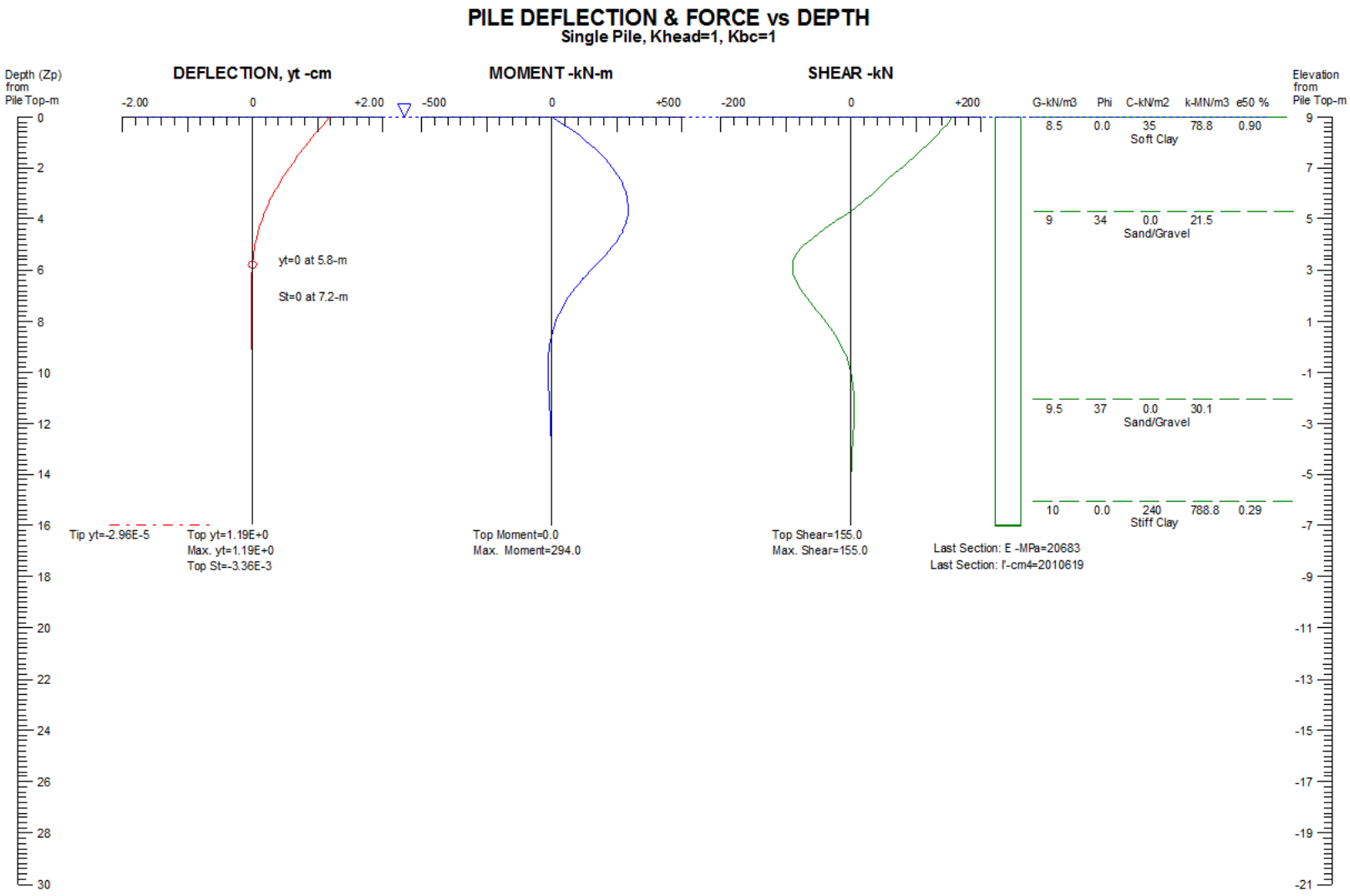



CivilTech Software

**Samawa Power Plant Project**
**Pipe Rack Building Area**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

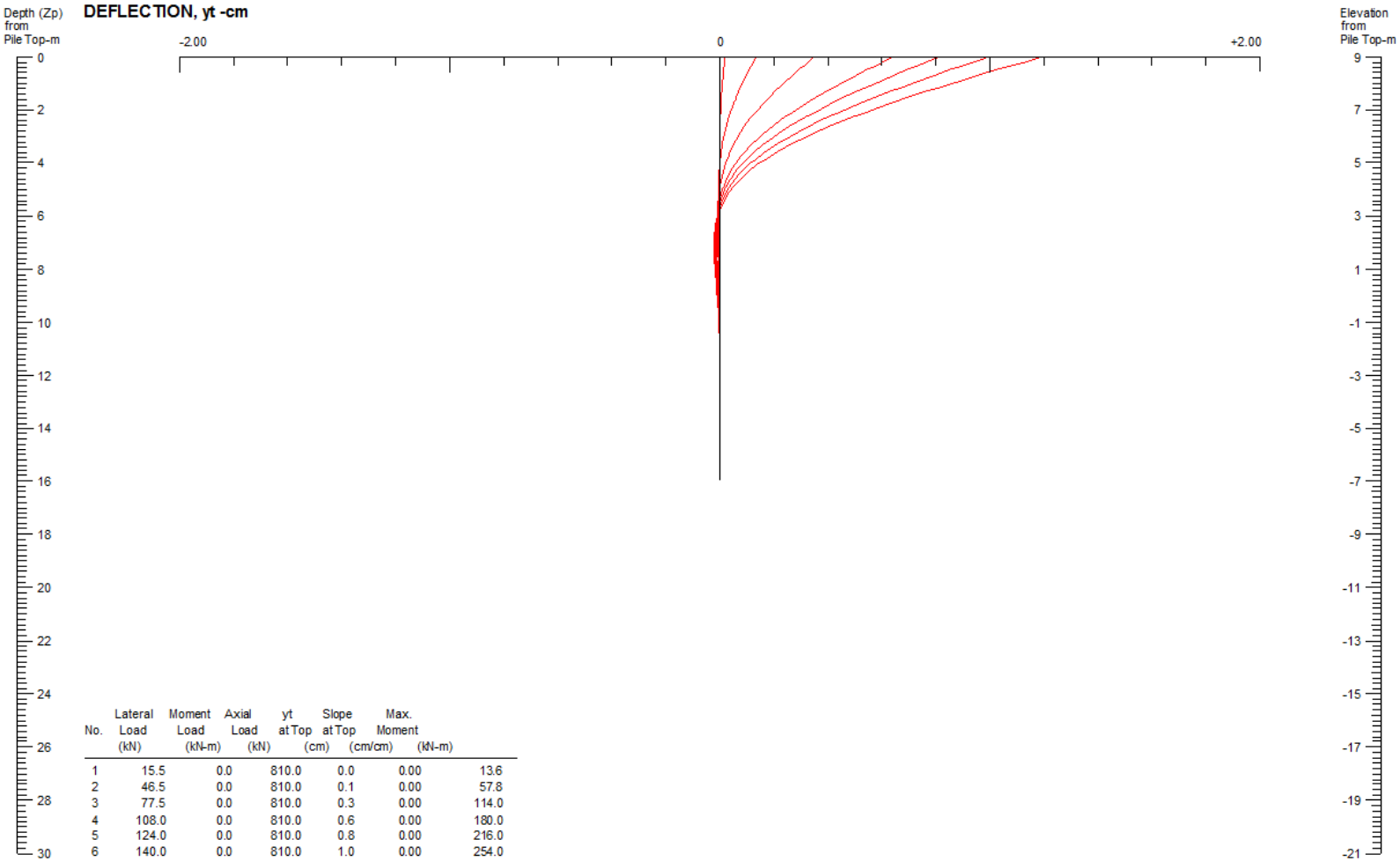



CivilTech Software

**Samawa Power Plant Project**
**Pipe Rack Building Area**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

## PILE DEFLECTION vs LOADING
Single Pile, Khead=1, Kbc=1

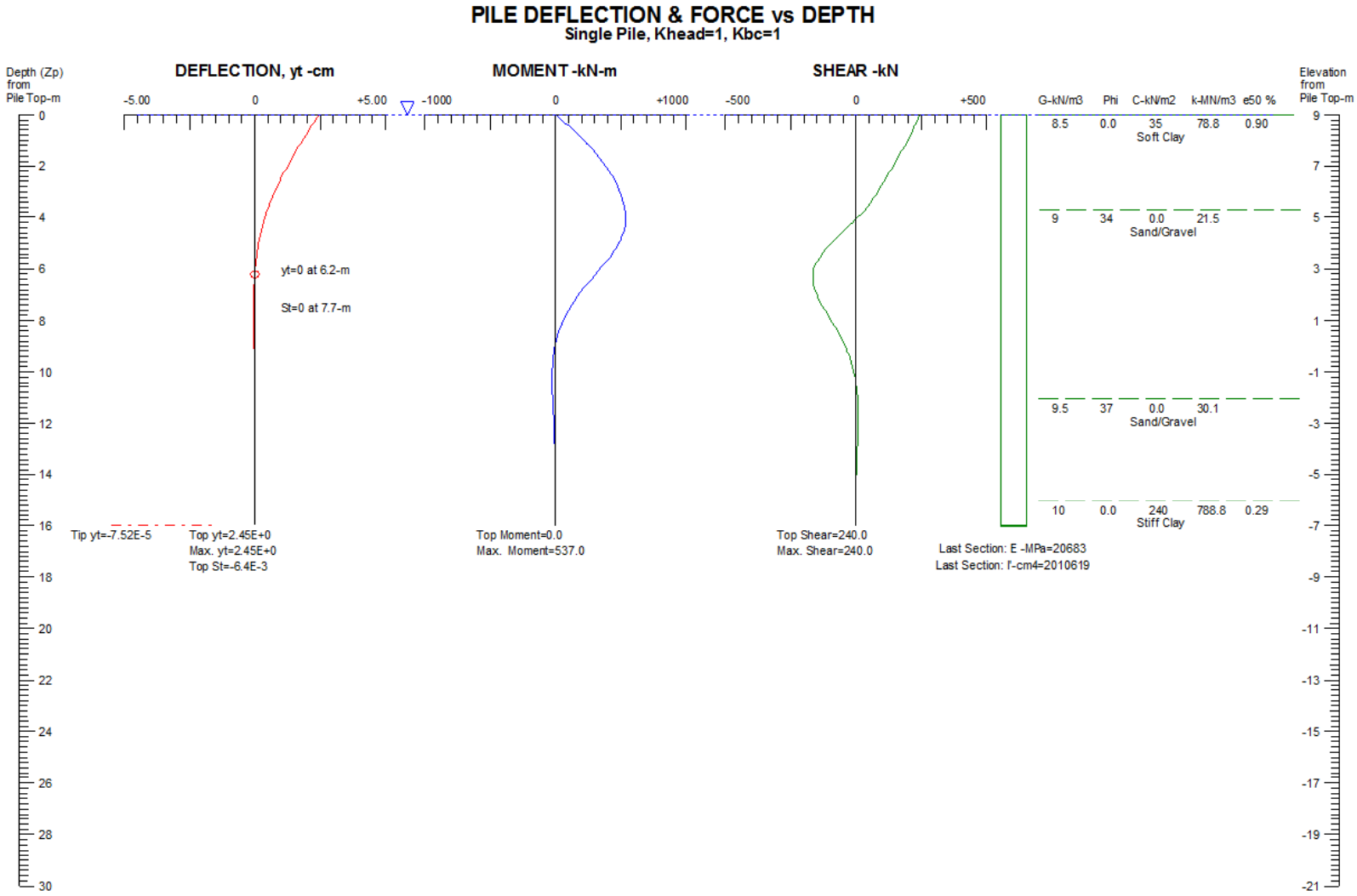



| No. | Lateral Load (kN) | Moment Load (kN-m) | Axial Load (kN) | yt at Top (cm) | Slope at Top (cm/cm) | Max. Moment (kN-m) |
|---|---|---|---|---|---|---|
| 1 | 15.5 | 0.0 | 810.0 | 0.0 | 0.00 | 13.6 |
| 2 | 46.5 | 0.0 | 810.0 | 0.1 | 0.00 | 57.8 |
| 3 | 77.5 | 0.0 | 810.0 | 0.3 | 0.00 | 114.0 |
| 4 | 108.0 | 0.0 | 810.0 | 0.6 | 0.00 | 180.0 |
| 5 | 124.0 | 0.0 | 810.0 | 0.8 | 0.00 | 216.0 |
| 6 | 140.0 | 0.0 | 810.0 | 1.0 | 0.00 | 254.0 |
| 7 | 155.0 | 0.0 | 810.0 | 1.2 | 0.00 | 294.0 |

*CivilTech Software*

**Samawa Power Plant Project**
**Pipe Rack Building Area**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

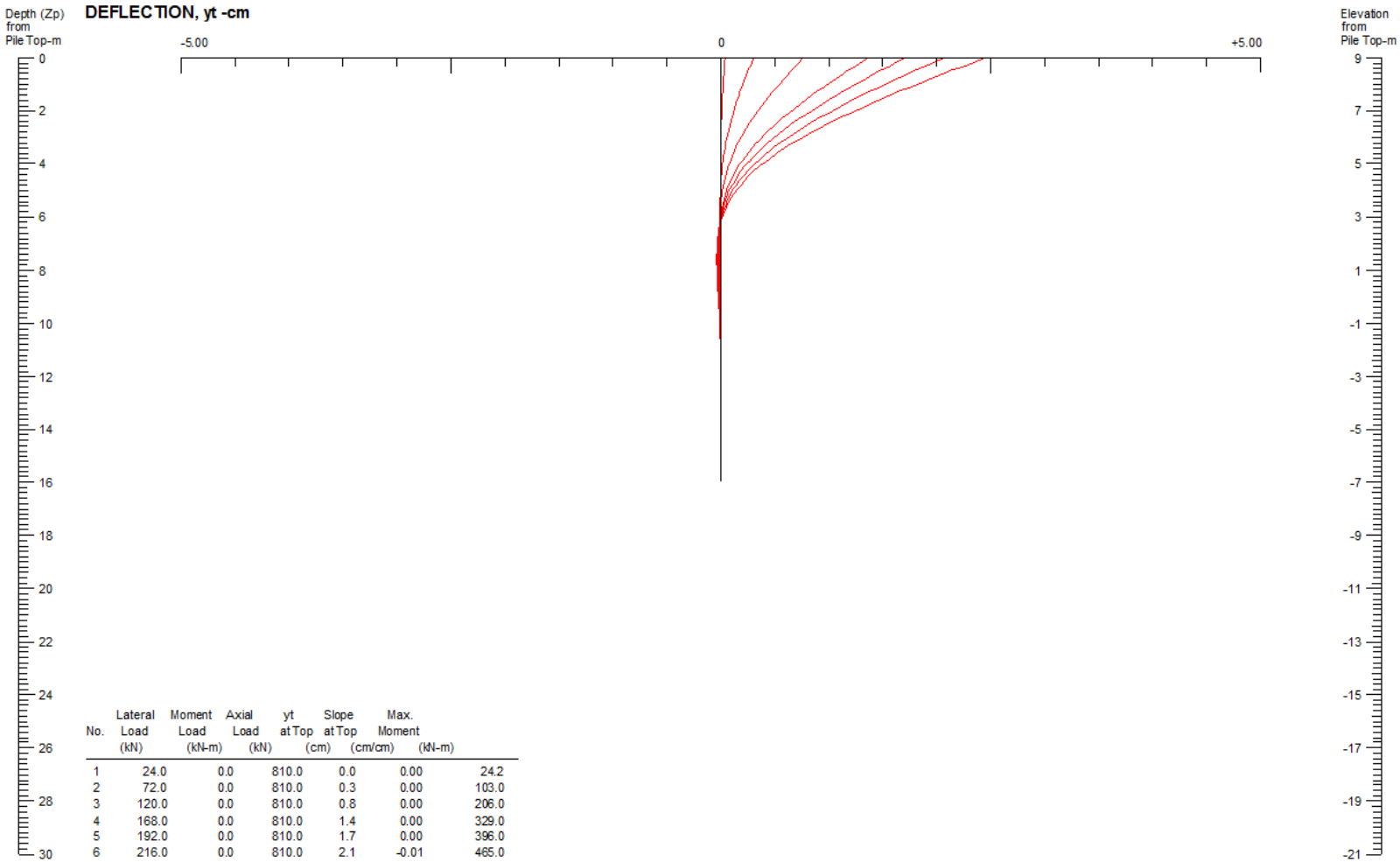



CivilTech Software

**Samawa Power Plant Project**
**Pipe Rack Building Area**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

## PILE DEFLECTION vs LOADING
Single Pile, Khead=1, Kbc=1




| No. | Lateral Load (kN) | Moment Load (kN-m) | Axial Load (kN) | yt at Top (cm) | Slope at Top (cm/cm) | Max. Moment (kN-m) |
|---|---|---|---|---|---|---|
| 1 | 24.0 | 0.0 | 810.0 | 0.0 | 0.00 | 24.2 |
| 2 | 72.0 | 0.0 | 810.0 | 0.3 | 0.00 | 103.0 |
| 3 | 120.0 | 0.0 | 810.0 | 0.8 | 0.00 | 206.0 |
| 4 | 168.0 | 0.0 | 810.0 | 1.4 | 0.00 | 329.0 |
| 5 | 192.0 | 0.0 | 810.0 | 1.7 | 0.00 | 396.0 |
| 6 | 216.0 | 0.0 | 810.0 | 2.1 | -0.01 | 465.0 |
| 7 | 240.0 | 0.0 | 810.0 | 2.5 | -0.01 | 537.0 |

*CivilTech Software*

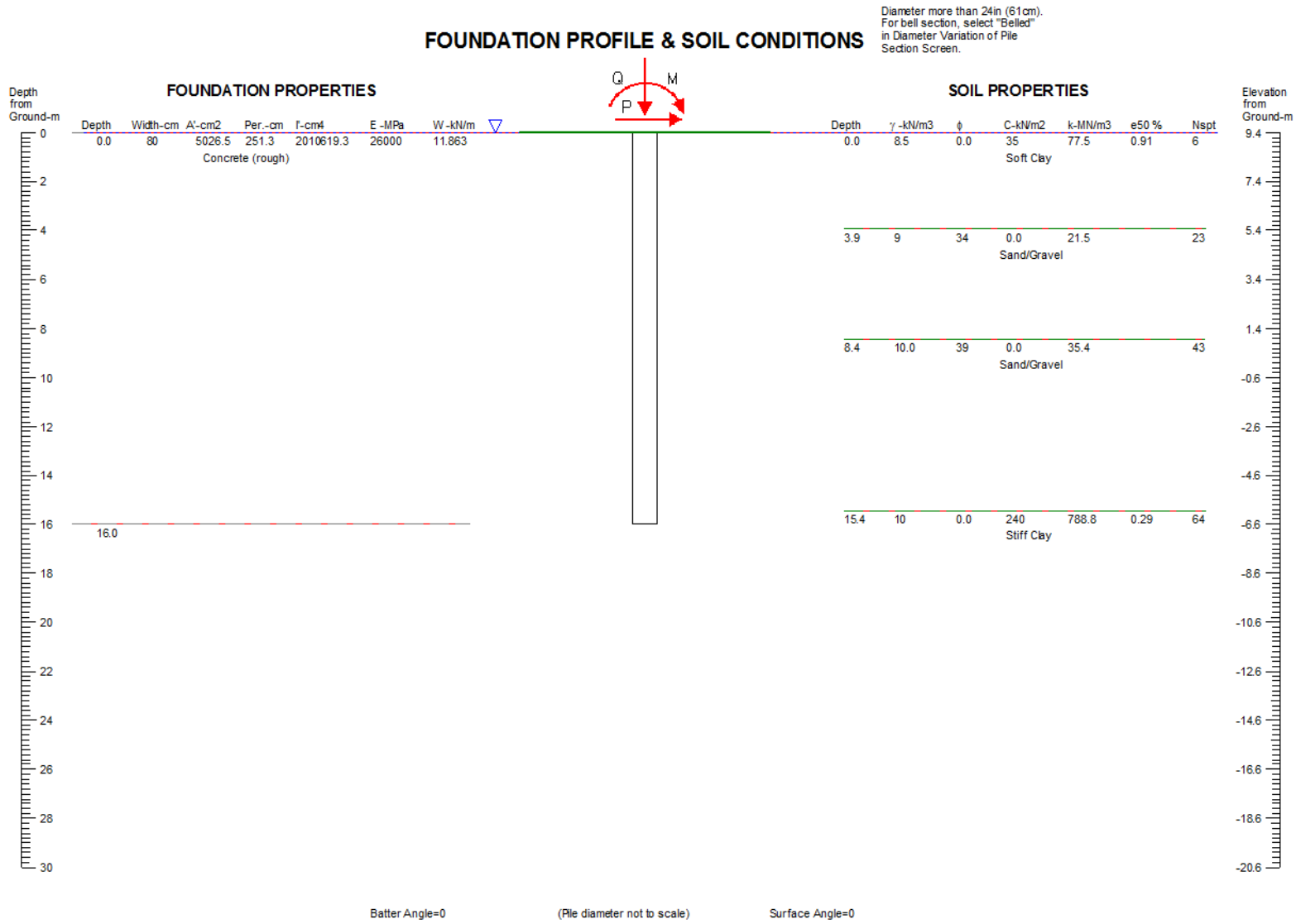
**Samawa Power Plant Project**
**Pipe Rack Building Area**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

**C) ELECTRICAL BUILDING AREA**

**C1) Axial Allowable Loads**
Axial Compression Allowable Bearing Capacity= 909 kN
Axial Allowable Uplift Capacity= 491 kN

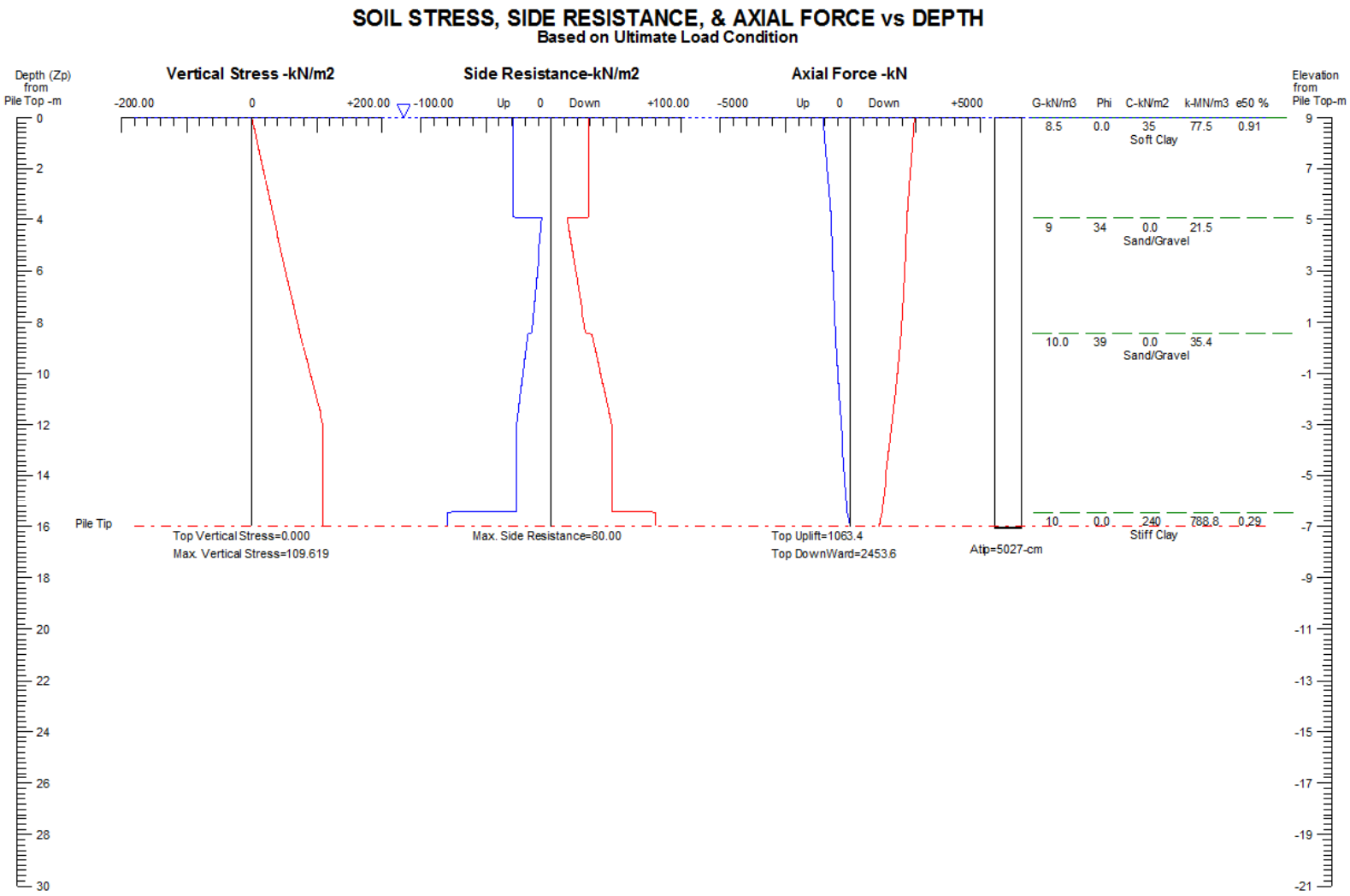
**C2)Horizontal Load Capacity for Free Head Pile**
Horizontal allowable lateral load is 165kN for 1.2 cm lateral top deflection. Maximum sectional moment : Mmax=330kN-m
Horizontal ultimate lateral capacity is 260kN for 2.5 cm top deflection. Maximum sectional moment : 620kN-m




CivilTech Software

**Samawa Power Plant Project**
**Electrical Building Area**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

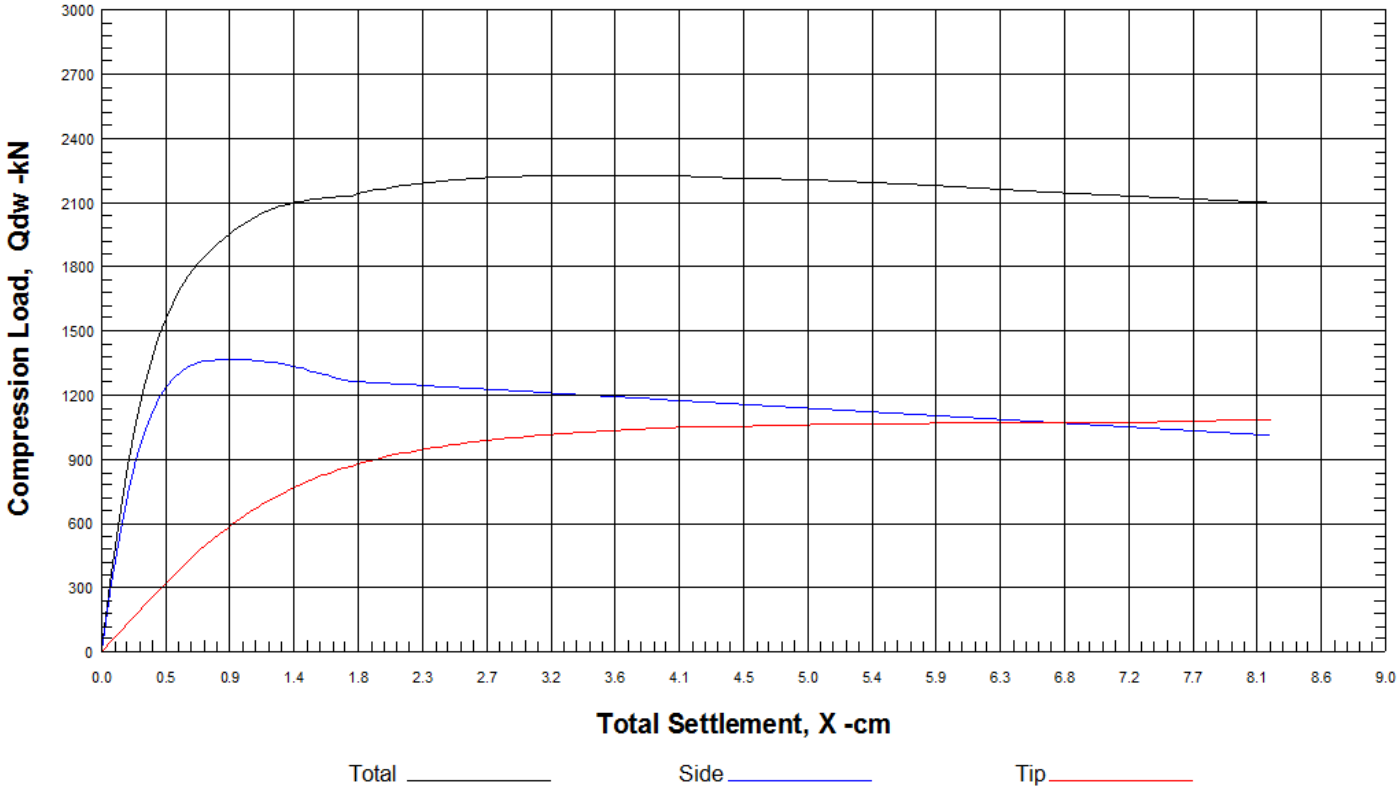



**CivilTech Software**

**Samawa Power Plant Project**
**Electrical Building Area**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

## Vertical Load vs. Total Settlement

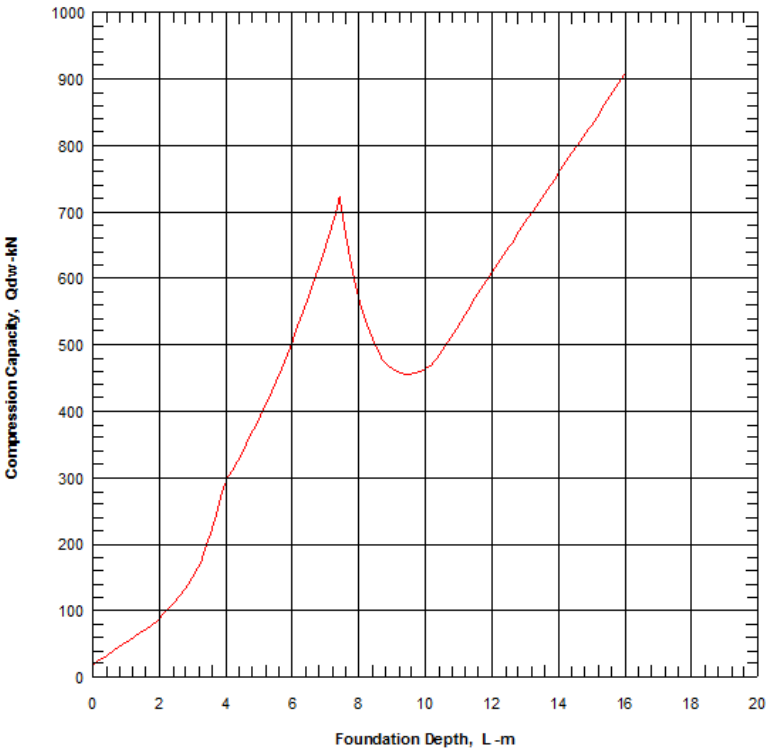


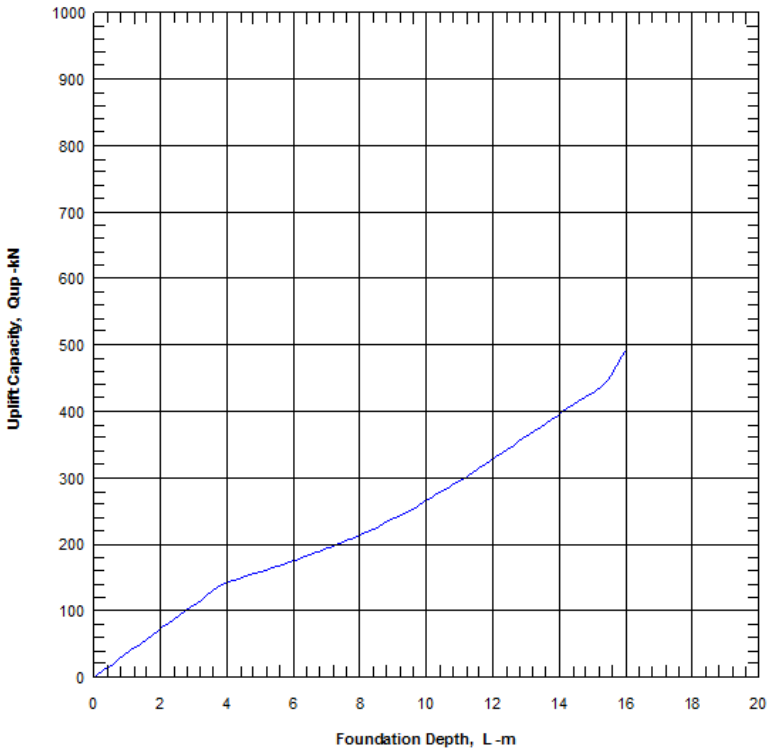

CivilTech Software

**Samawa Power Plant Project**
**Electrical Building Area**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

# ALLOWABLE CAPACITY vs FOUNDATION DEPTH

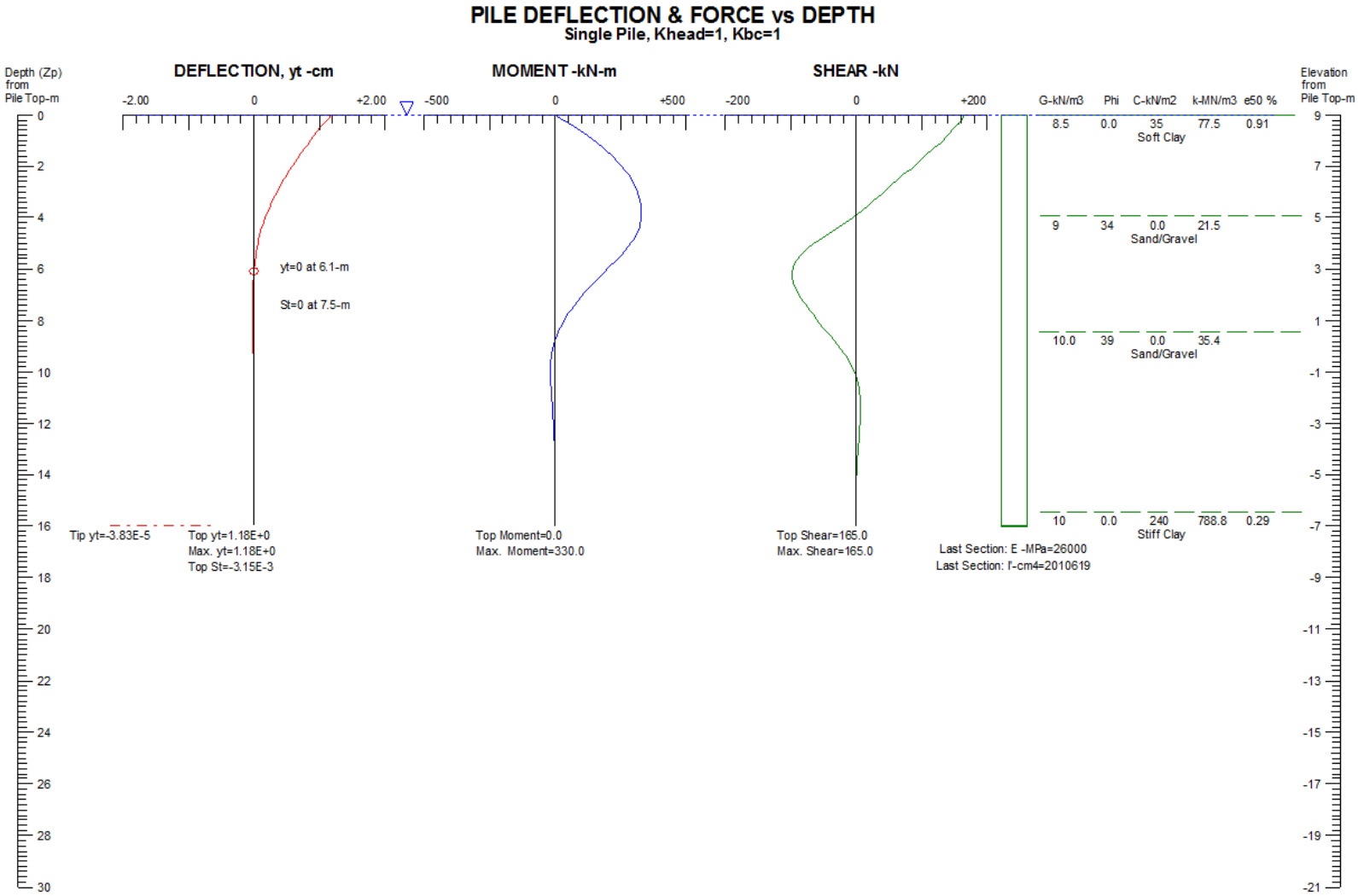



CivilTech Software

**Samawa Power Plant Project**
**Electrical Building Area**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

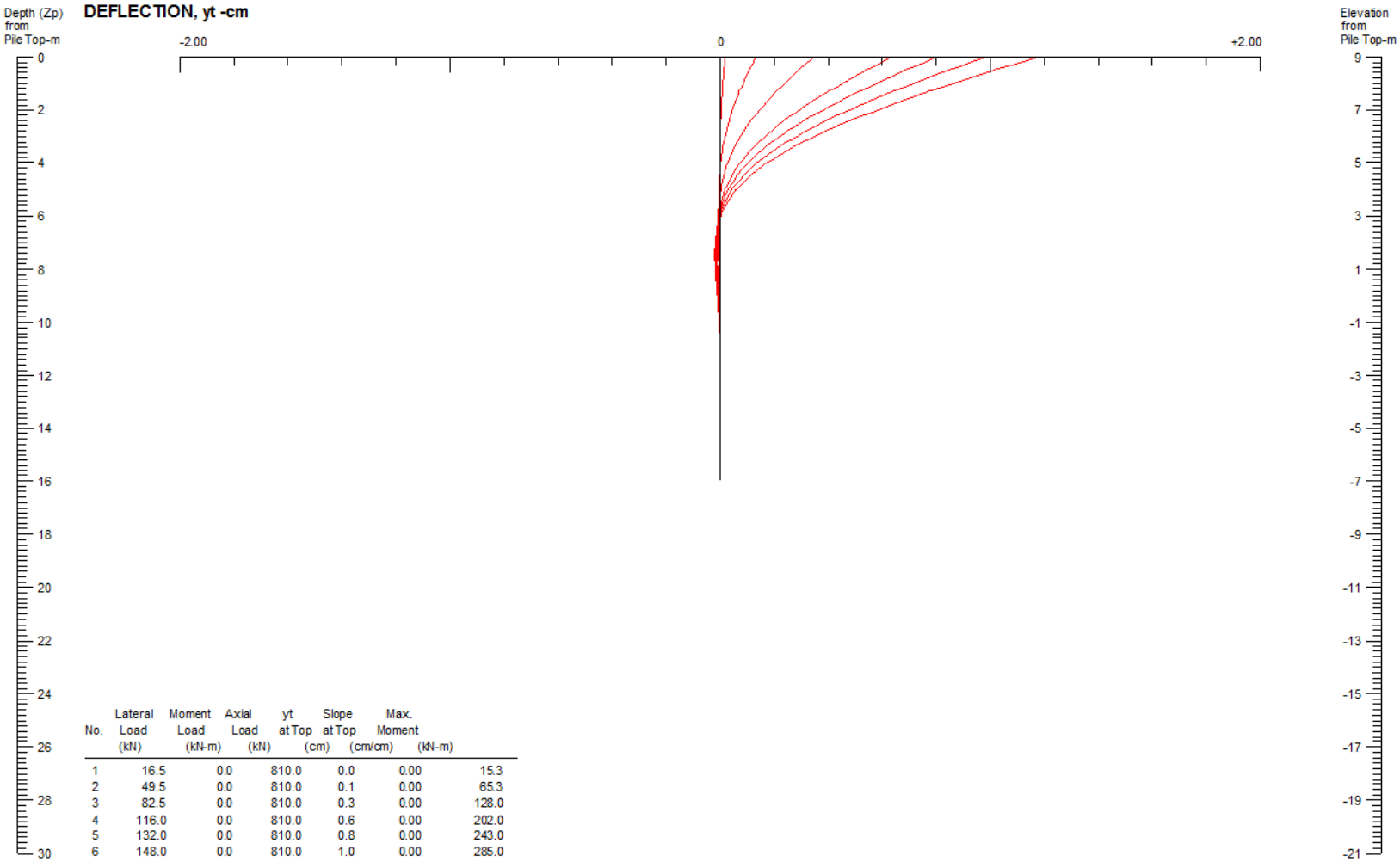



**CivilTech Software**

**Samawa Power Plant Project**
**Electrical Building Area**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

## PILE DEFLECTION vs LOADING
Single Pile, Khead=1, Kbc=1

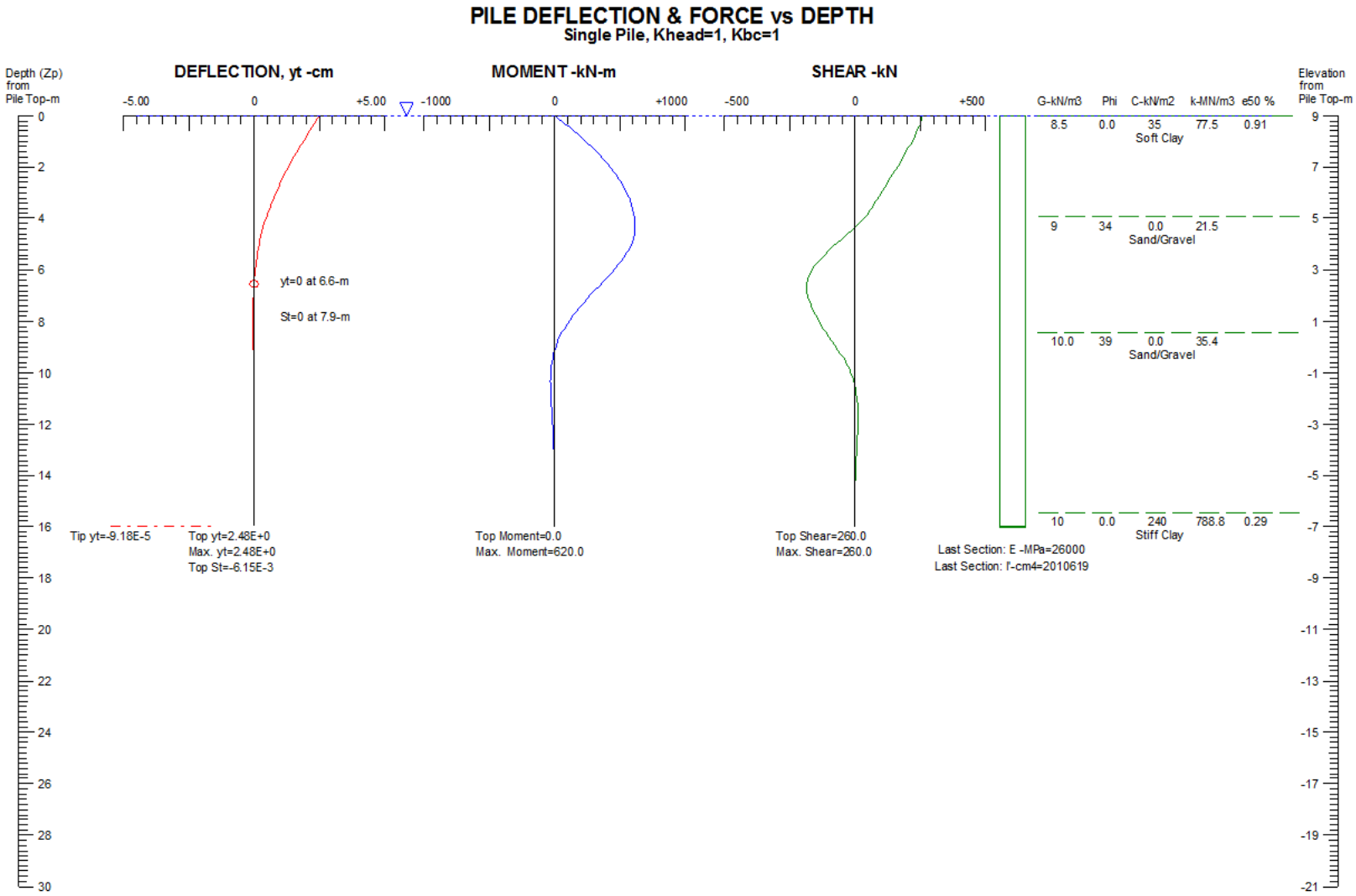



| No. | Lateral Load (kN) | Moment Load (kN-m) | Axial Load (kN) | yt at Top (cm) | Slope at Top (cm/cm) | Max. Moment (kN-m) |
|---|---|---|---|---|---|---|
| 1 | 16.5 | 0.0 | 810.0 | 0.0 | 0.00 | 15.3 |
| 2 | 49.5 | 0.0 | 810.0 | 0.1 | 0.00 | 65.3 |
| 3 | 82.5 | 0.0 | 810.0 | 0.3 | 0.00 | 128.0 |
| 4 | 116.0 | 0.0 | 810.0 | 0.6 | 0.00 | 202.0 |
| 5 | 132.0 | 0.0 | 810.0 | 0.8 | 0.00 | 243.0 |
| 6 | 148.0 | 0.0 | 810.0 | 1.0 | 0.00 | 285.0 |
| 7 | 165.0 | 0.0 | 810.0 | 1.2 | 0.00 | 330.0 |

*CivilTech Software*

**Samawa Power Plant Project**
**Electrical Building Area**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

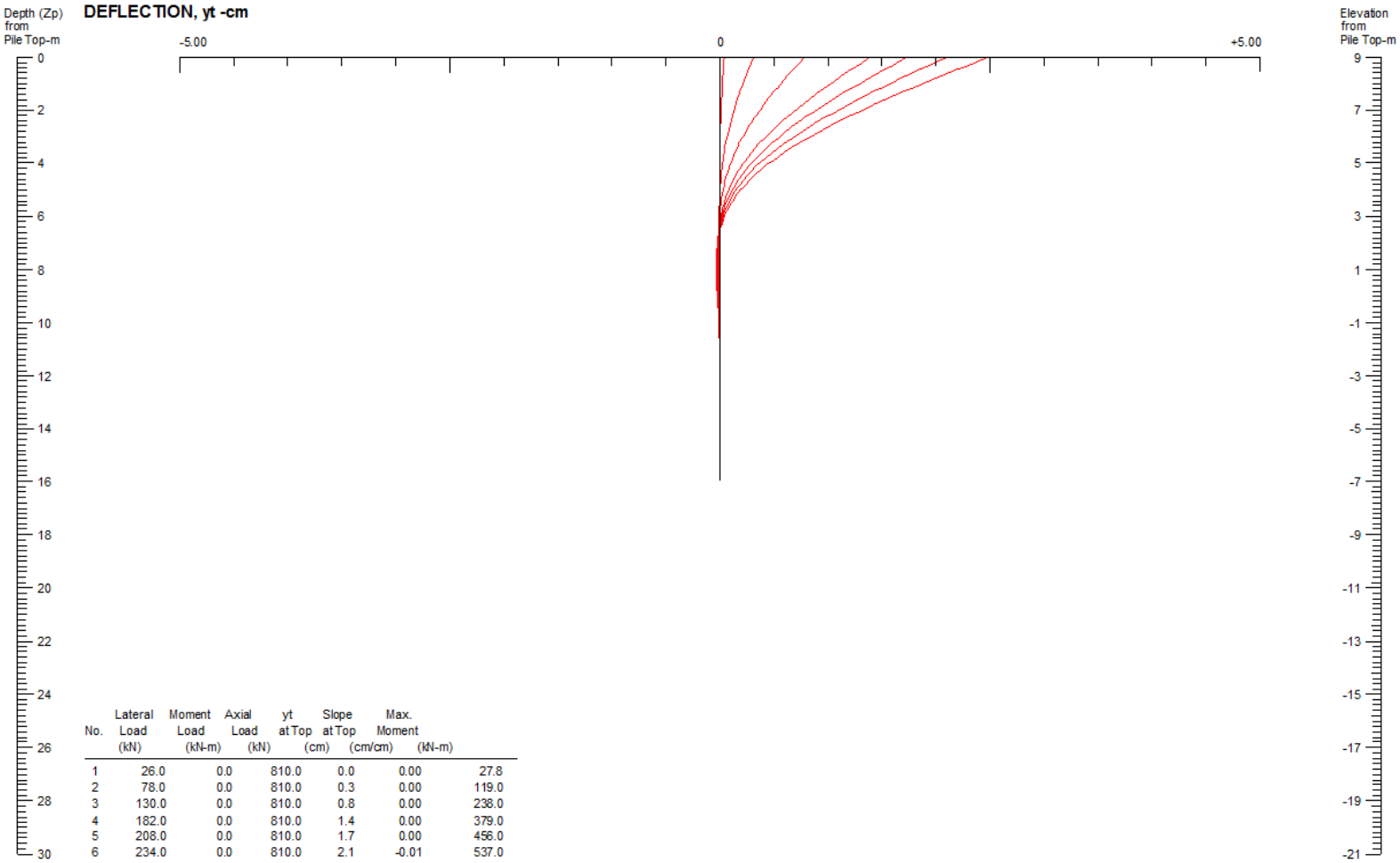



CivilTech Software

**Samawa Power Plant Project**
**Electrical Building Area**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

## PILE DEFLECTION vs LOADING
Single Pile, Khead=1, Kbc=1




| No. | Lateral Load (kN) | Moment Load (kN-m) | Axial Load (kN) | yt at Top (cm) | Slope at Top (cm/cm) | Max. Moment (kN-m) |
|---|---|---|---|---|---|---|
| 1 | 26.0 | 0.0 | 810.0 | 0.0 | 0.00 | 27.8 |
| 2 | 78.0 | 0.0 | 810.0 | 0.3 | 0.00 | 119.0 |
| 3 | 130.0 | 0.0 | 810.0 | 0.8 | 0.00 | 238.0 |
| 4 | 182.0 | 0.0 | 810.0 | 1.4 | 0.00 | 379.0 |
| 5 | 208.0 | 0.0 | 810.0 | 1.7 | 0.00 | 456.0 |
| 6 | 234.0 | 0.0 | 810.0 | 2.1 | -0.01 | 537.0 |
| 7 | 260.0 | 0.0 | 810.0 | 2.5 | -0.01 | 620.0 |

*CivilTech Software*

**Samawa Power Plant Project**
**Electrical Building Area**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

**D) GIS BUILDING AREA**

**D1)GIS Building Area (Clay Base)**

**D1.1) Axial Allowable Loads**

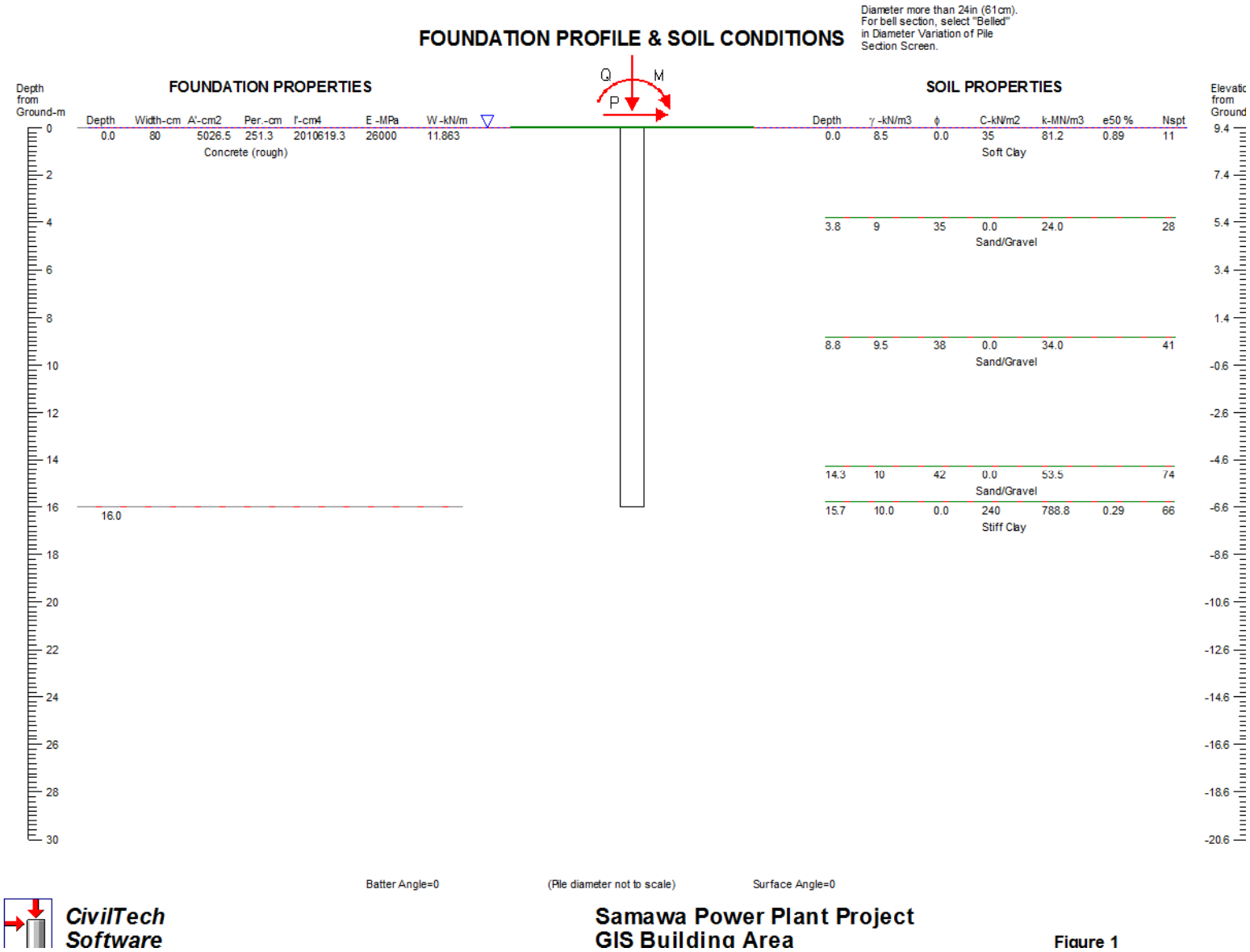
Axial Compression Allowable Bearing Capacity= 895 kN

Axial Allowable Uplift Capacity= 474 kN

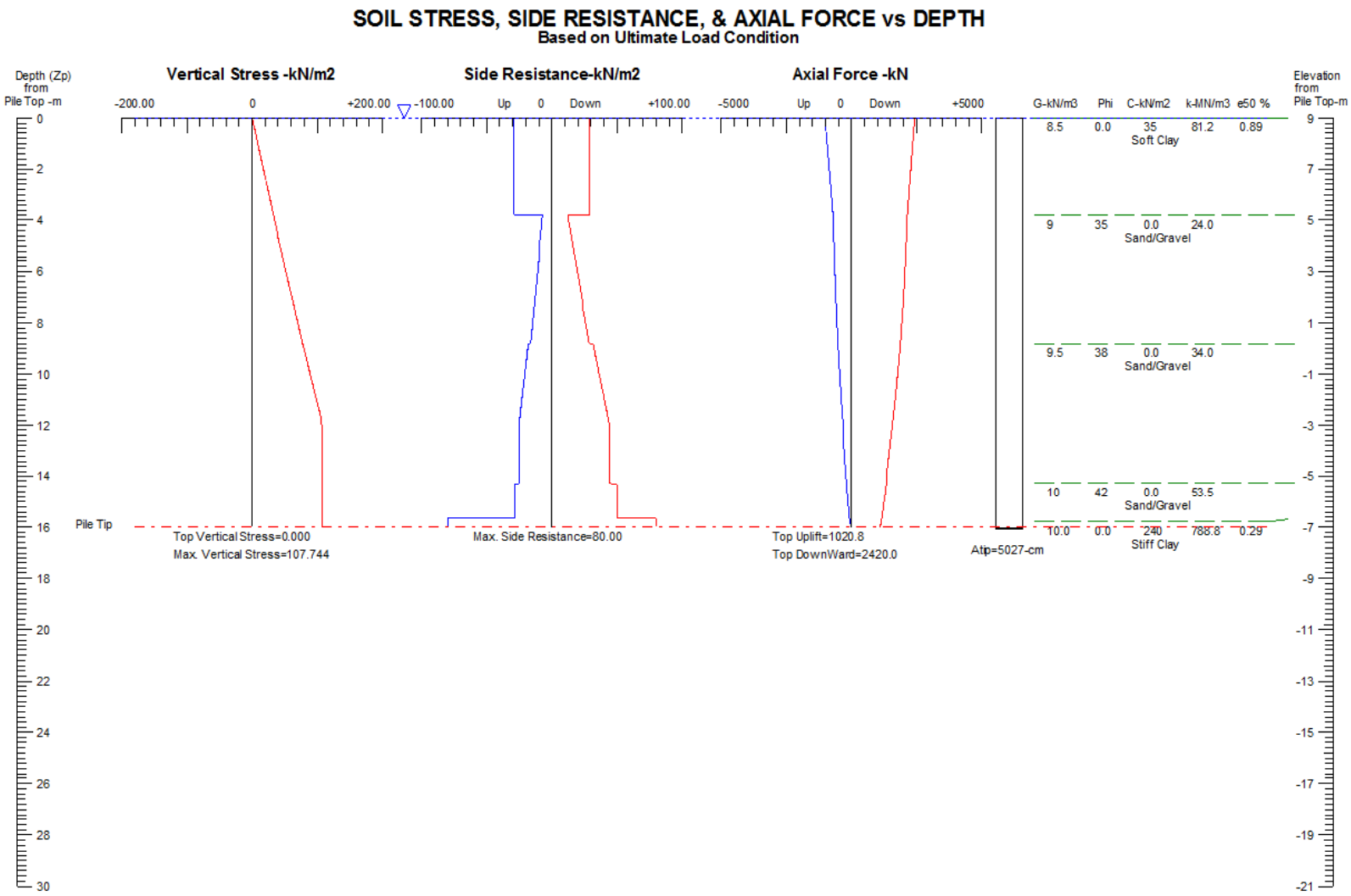
**D1.2)Horizontal Load Capacity for Free Head Pile**

Horizontal allowable lateral load is 170kN for 1.2 cm lateral top deflection. Maximum sectional moment : Mmax=346kN-m

Horizontal ultimate lateral capacity is 270kN for 2.5 cm top deflection. Maximum sectional moment : 652kN-m




Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

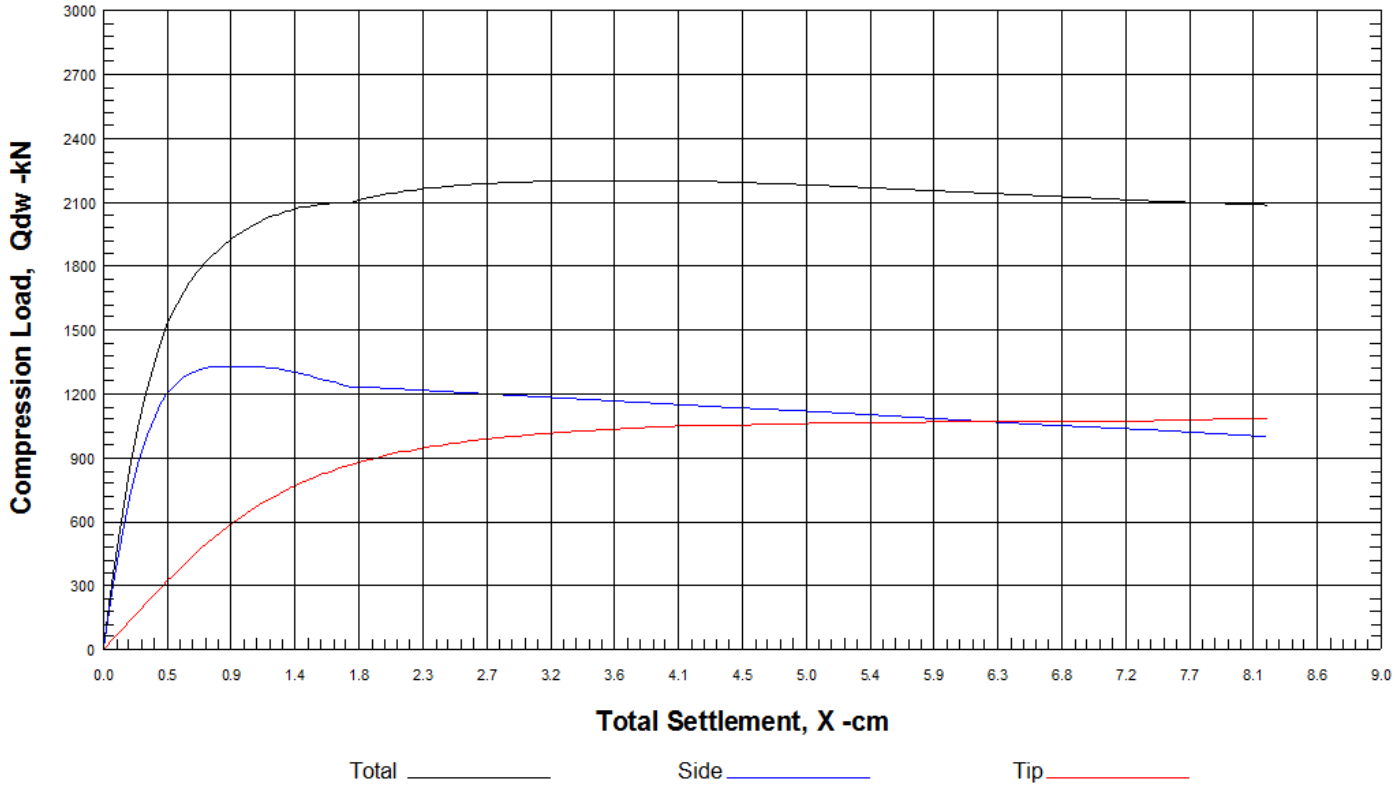



**CivilTech Software**

**Samawa Power Plant Project**
**GIS Building Area**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

## Vertical Load vs. Total Settlement

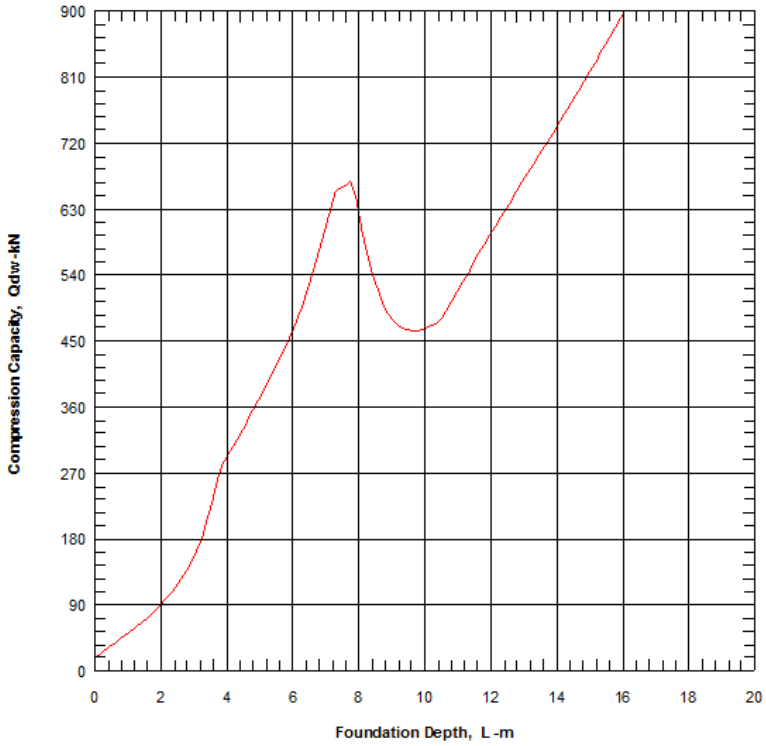


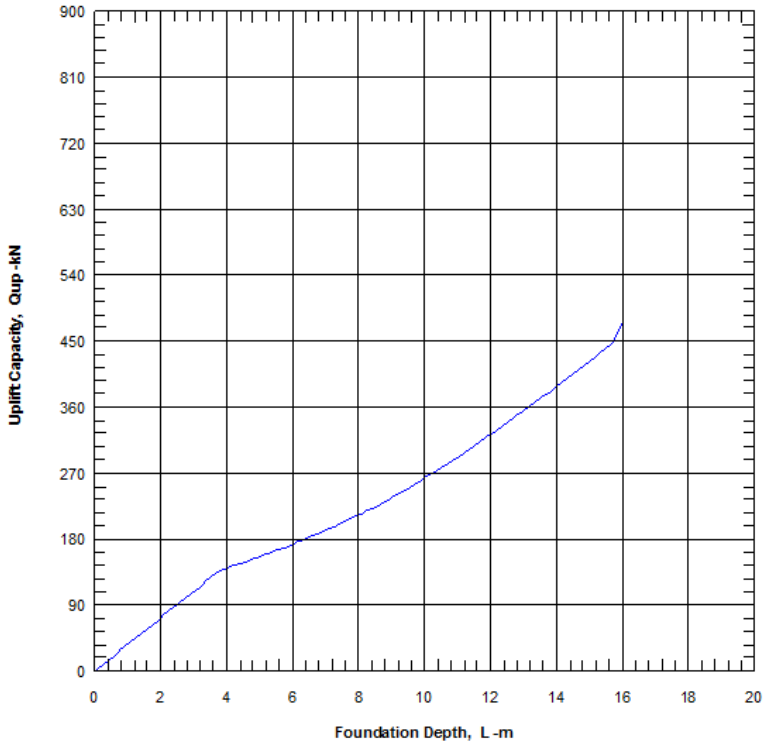

CivilTech Software

**Samawa Power Plant Project**
**GIS Building Area**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

# ALLOWABLE CAPACITY vs FOUNDATION DEPTH

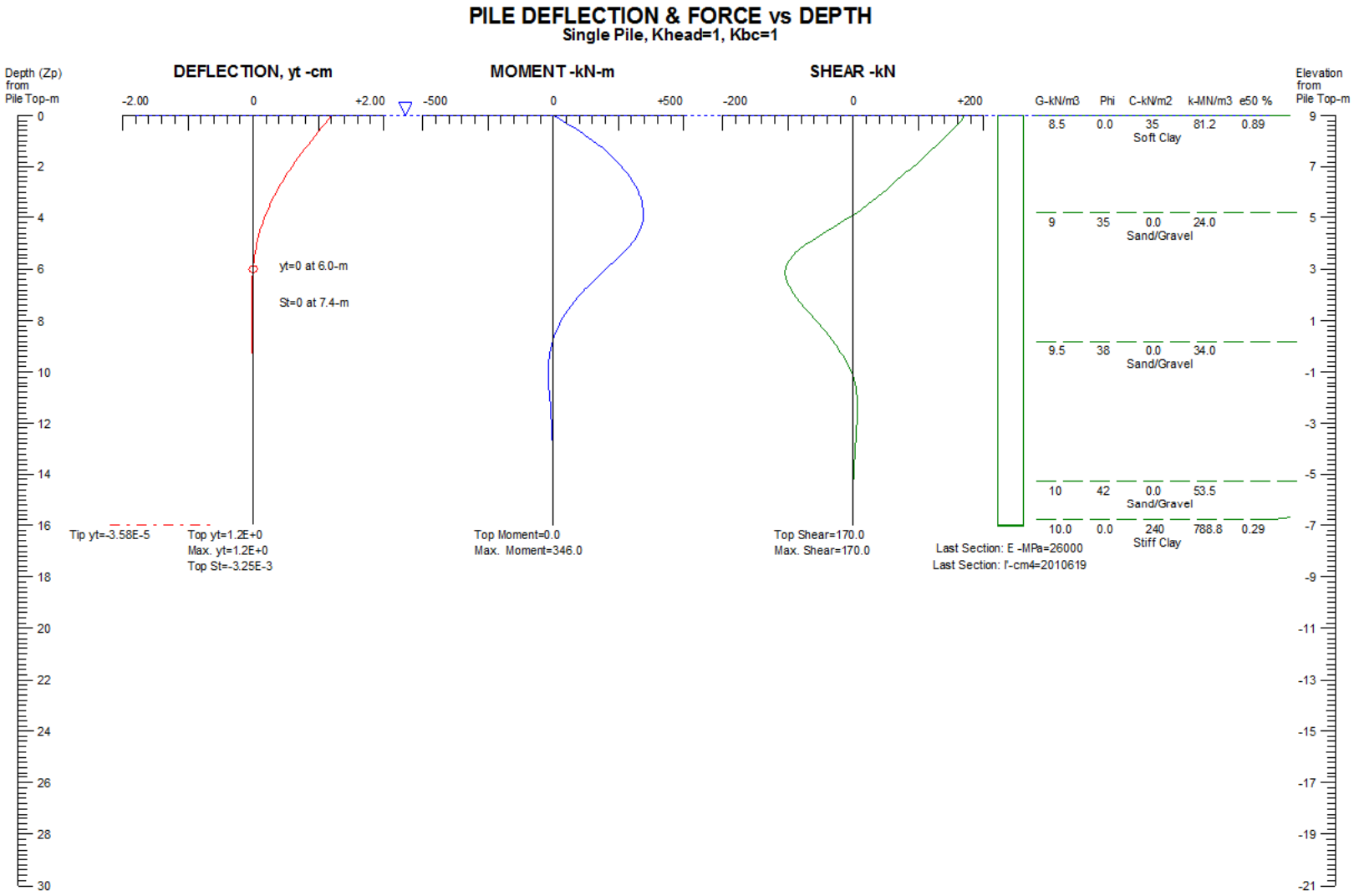



CivilTech Software

**Samawa Power Plant Project**
**GIS Building Area**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

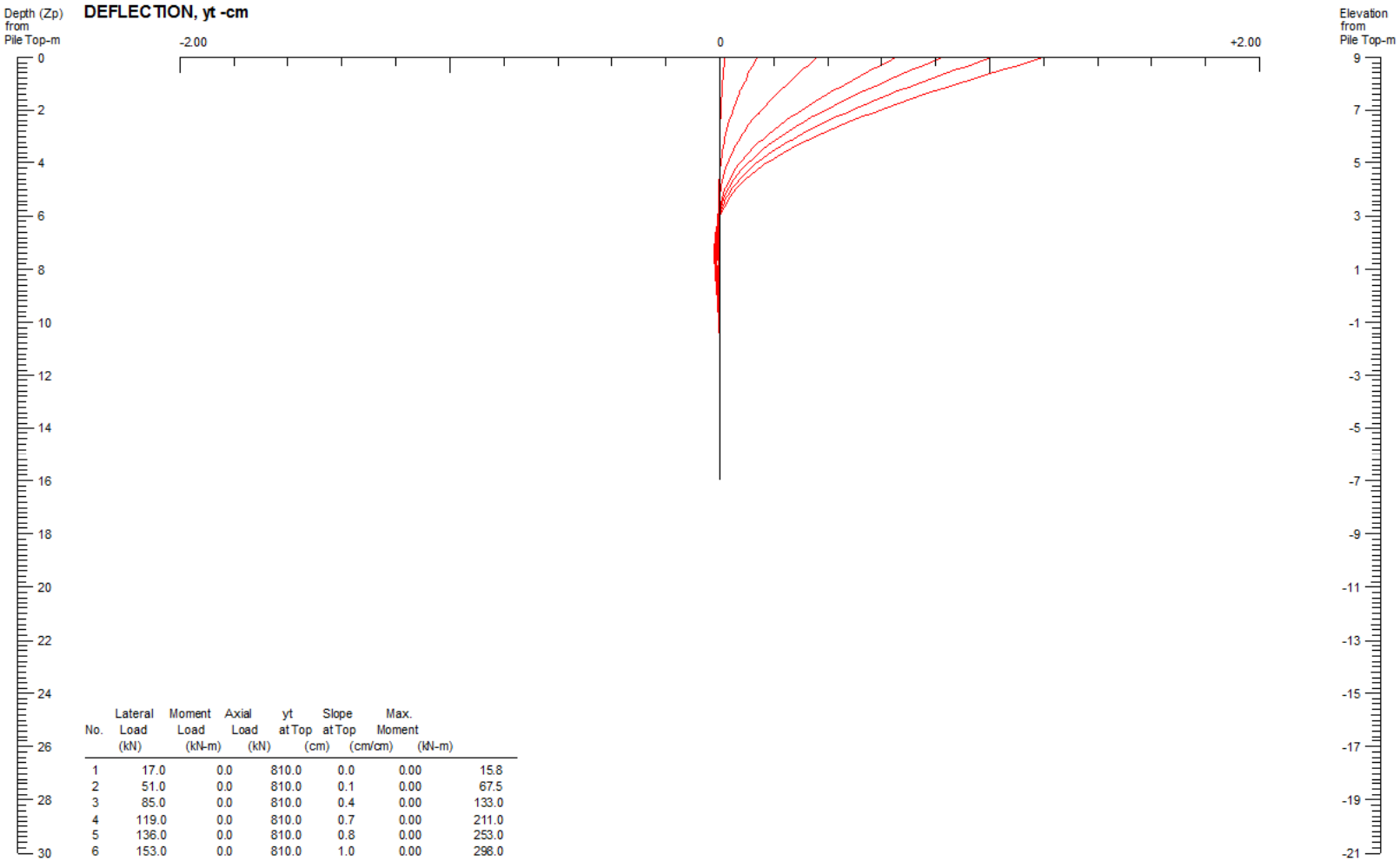



CivilTech Software

**Samawa Power Plant Project**
**GIS Building Area (Clay Base)**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

## PILE DEFLECTION vs LOADING
Single Pile, Khead=1, Kbc=1




| No. | Lateral Load (kN) | Moment Load (kN-m) | Axial Load (kN) | yt at Top (cm) | Slope at Top (cm/cm) | Max. Moment (kN-m) |
|---|---|---|---|---|---|---|
| 1 | 17.0 | 0.0 | 810.0 | 0.0 | 0.00 | 15.8 |
| 2 | 51.0 | 0.0 | 810.0 | 0.1 | 0.00 | 67.5 |
| 3 | 85.0 | 0.0 | 810.0 | 0.4 | 0.00 | 133.0 |
| 4 | 119.0 | 0.0 | 810.0 | 0.7 | 0.00 | 211.0 |
| 5 | 136.0 | 0.0 | 810.0 | 0.8 | 0.00 | 253.0 |
| 6 | 153.0 | 0.0 | 810.0 | 1.0 | 0.00 | 298.0 |
| 7 | 170.0 | 0.0 | 810.0 | 1.2 | 0.00 | 346.0 |

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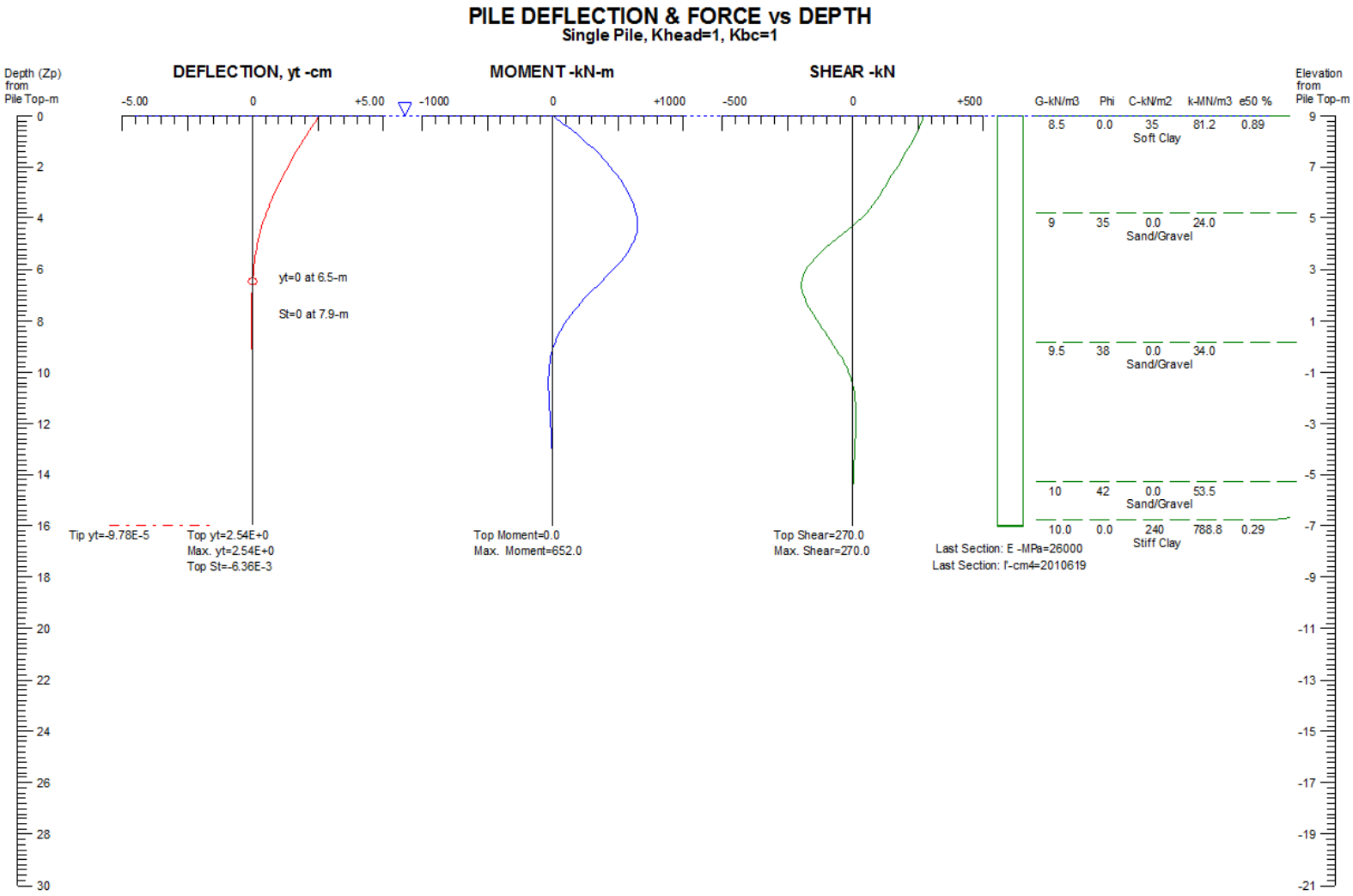
**Samawa Power Plant Project**
**GIS Building Area (Clay Base)**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

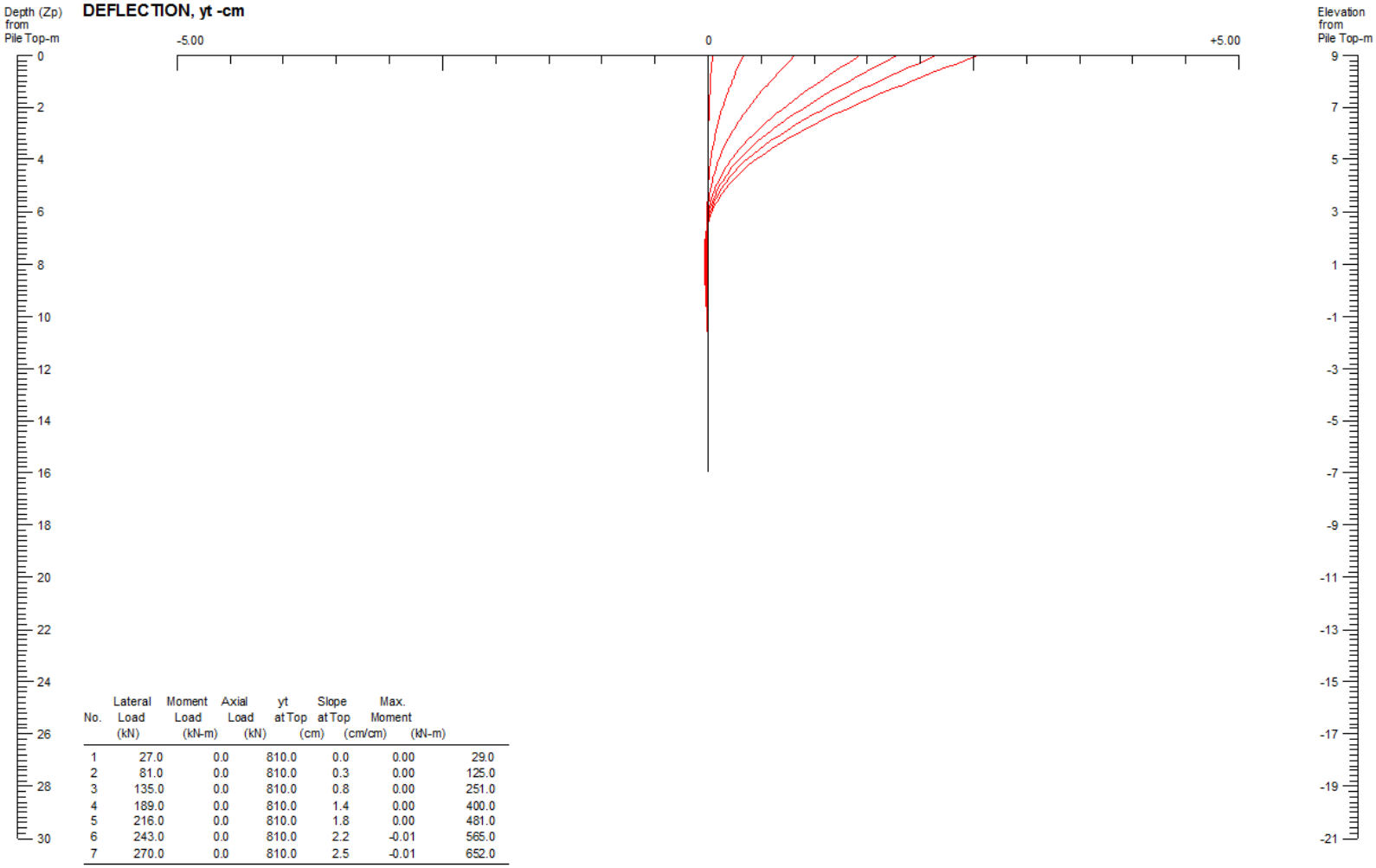



**CivilTech Software**

**Samawa Power Plant Project**
**GIS Building Area (Clay Base)**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

## PILE DEFLECTION vs LOADING
Single Pile, Khead=1, Kbc=1




| No. | Lateral Load (kN) | Moment Load (kN-m) | Axial Load (kN) | yt at Top (cm) | Slope at Top (cm/cm) | Max. Moment (kN-m) |
|---|---|---|---|---|---|---|
| 1 | 27.0 | 0.0 | 810.0 | 0.0 | 0.00 | 29.0 |
| 2 | 81.0 | 0.0 | 810.0 | 0.3 | 0.00 | 125.0 |
| 3 | 135.0 | 0.0 | 810.0 | 0.8 | 0.00 | 251.0 |
| 4 | 189.0 | 0.0 | 810.0 | 1.4 | 0.00 | 400.0 |
| 5 | 216.0 | 0.0 | 810.0 | 1.8 | 0.00 | 481.0 |
| 6 | 243.0 | 0.0 | 810.0 | 2.2 | -0.01 | 565.0 |
| 7 | 270.0 | 0.0 | 810.0 | 2.5 | -0.01 | 652.0 |

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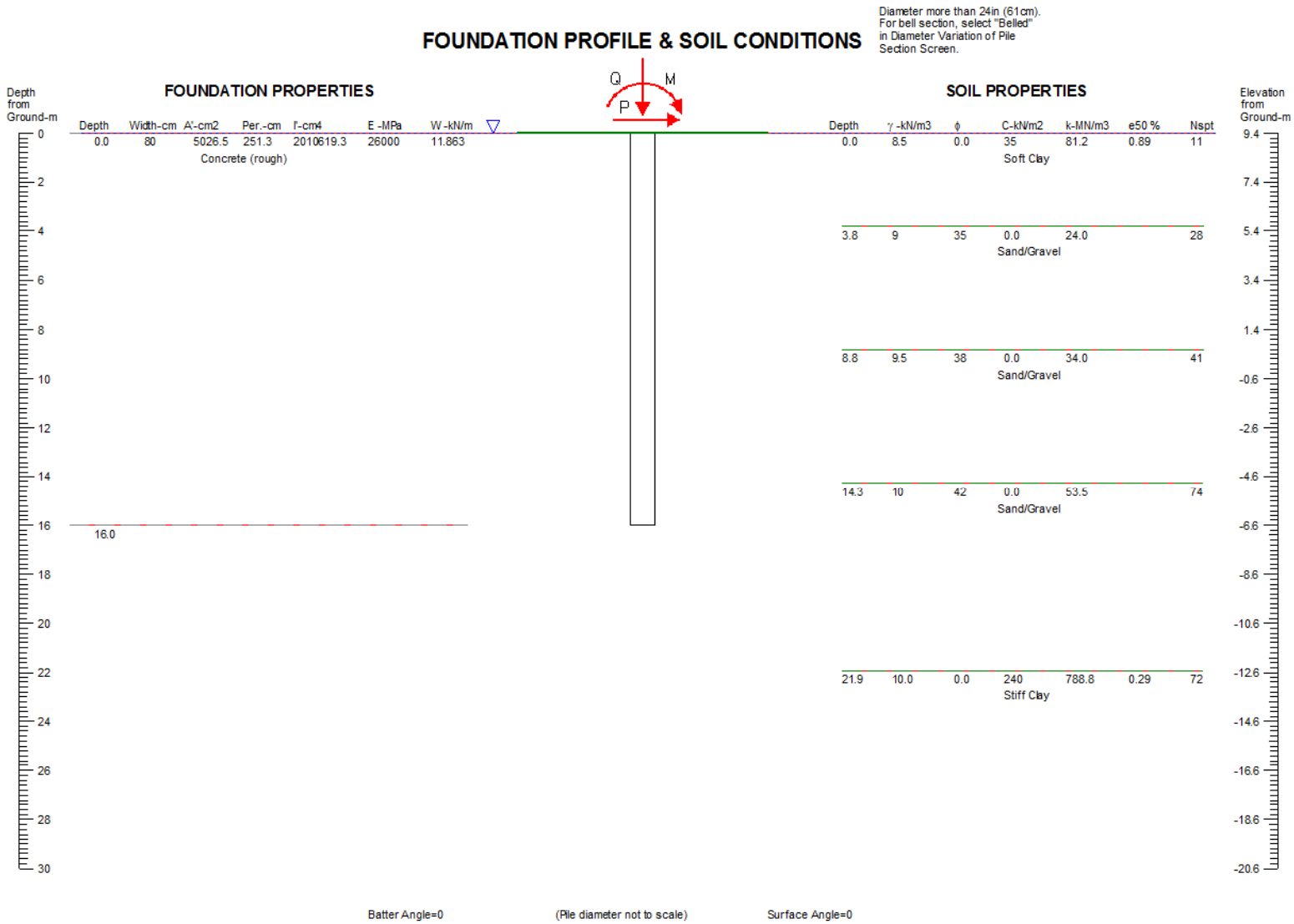
**Samawa Power Plant Project**
**GIS Building Area (Clay Base)**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

**D2)GIS Building Area (Sand Base)**

**D2.1) Axial Allowable Loads**
Axial Compression Allowable Bearing Capacity= 837 kN
Axial Allowable Uplift Capacity= 458kN

**D2.2)Horizontal Load Capacity for Free Head Pile**
Horizontal allowable lateral load is 170kN for 1.2 cm lateral top deflection. Maximum sectional moment : Mmax=346kN-m
Horizontal ultimate lateral capacity is 265kN for 2.5 cm top deflection. Maximum sectional moment : 636kN-m

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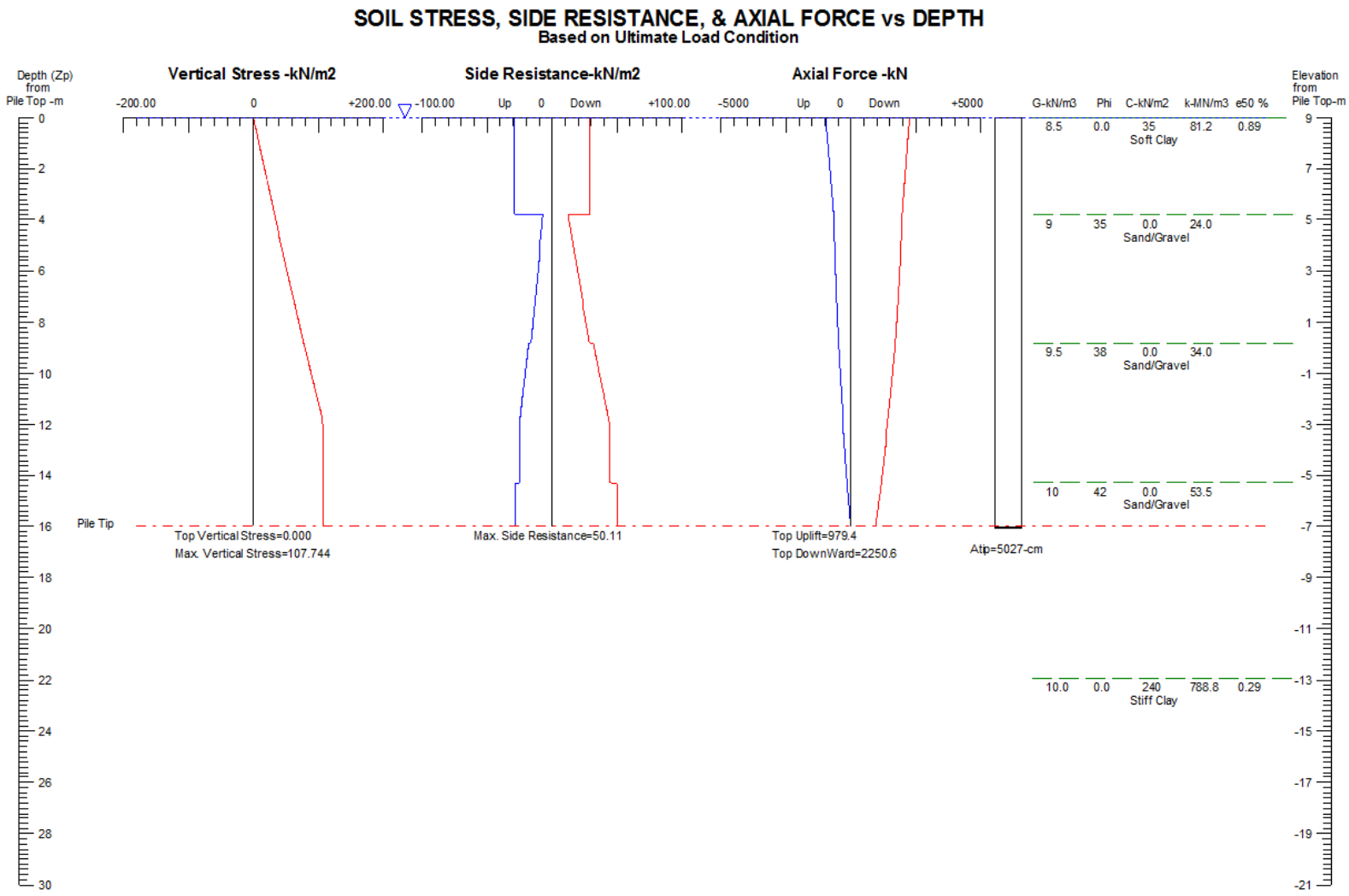
**Samawa Power Plant Project**
**GIS Building Area (Sand Base)**

**Figure 1**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

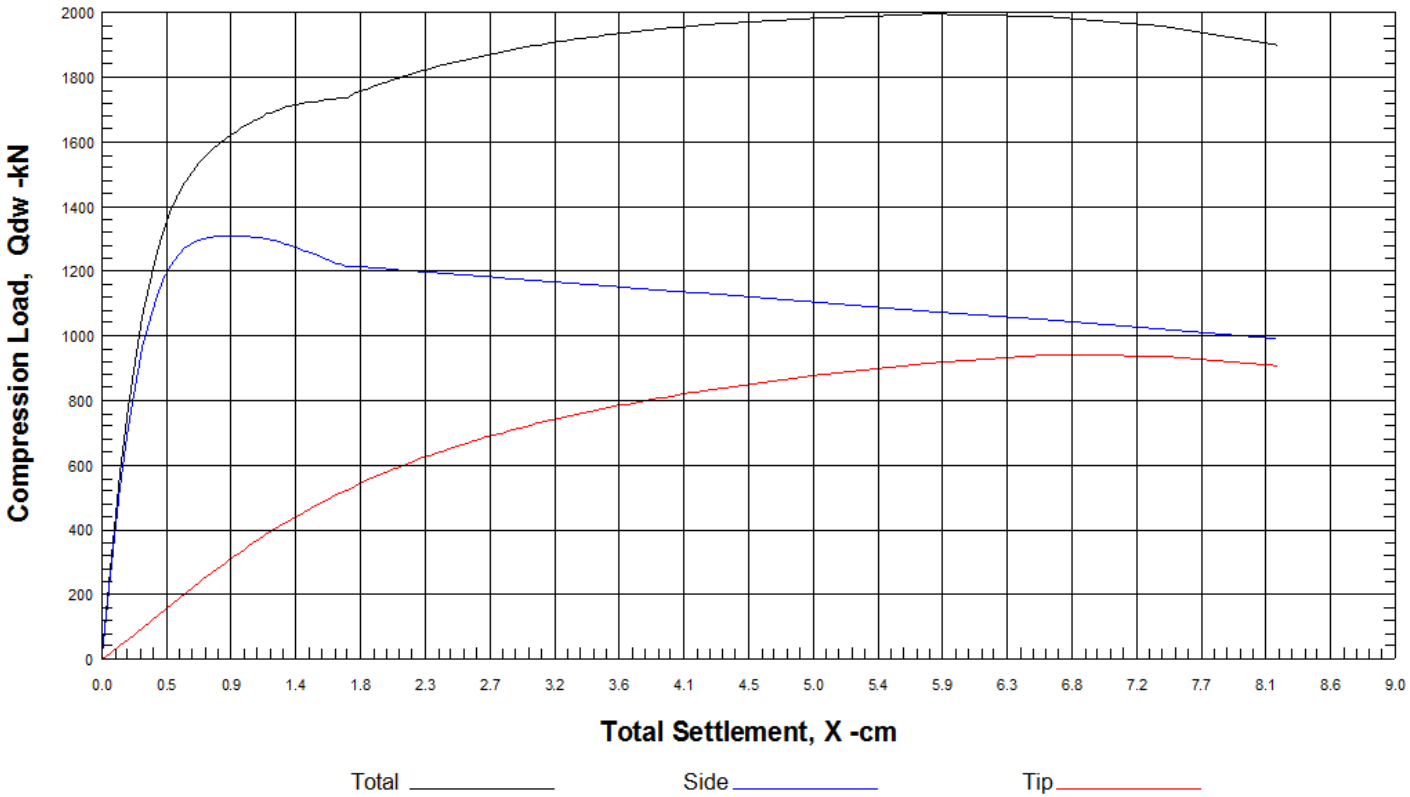



CivilTech Software

**Samawa Power Plant Project**
**GIS Building Area (Sand Base)**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

## Vertical Load vs. Total Settlement

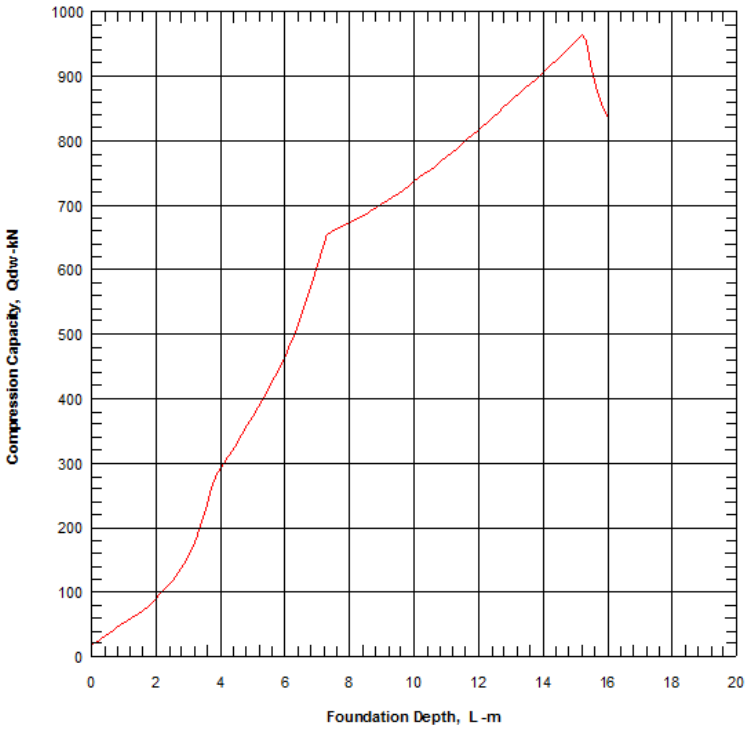


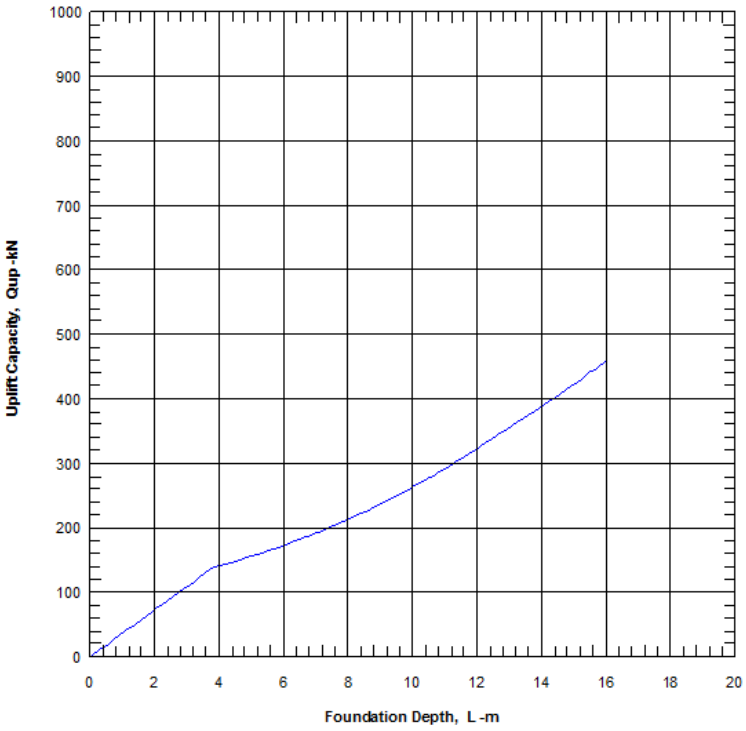

CivilTech Software

**Samawa Power Plant Project**
**GIS Building Area (Sand Base)**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

# ALLOWABLE CAPACITY vs FOUNDATION DEPTH

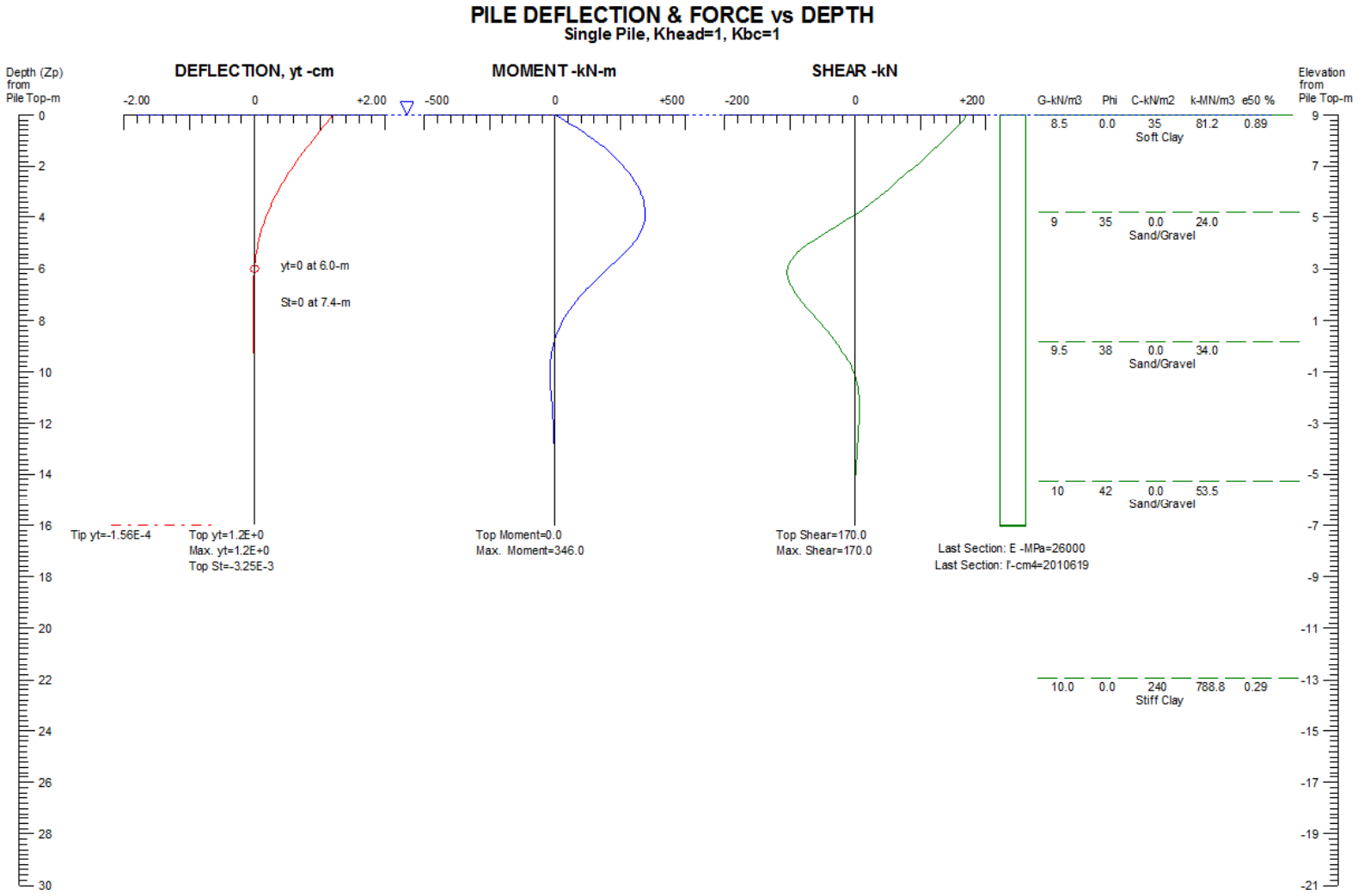



CivilTech Software

**Samawa Power Plant Project**
**GIS Building Area (Sand Base)**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

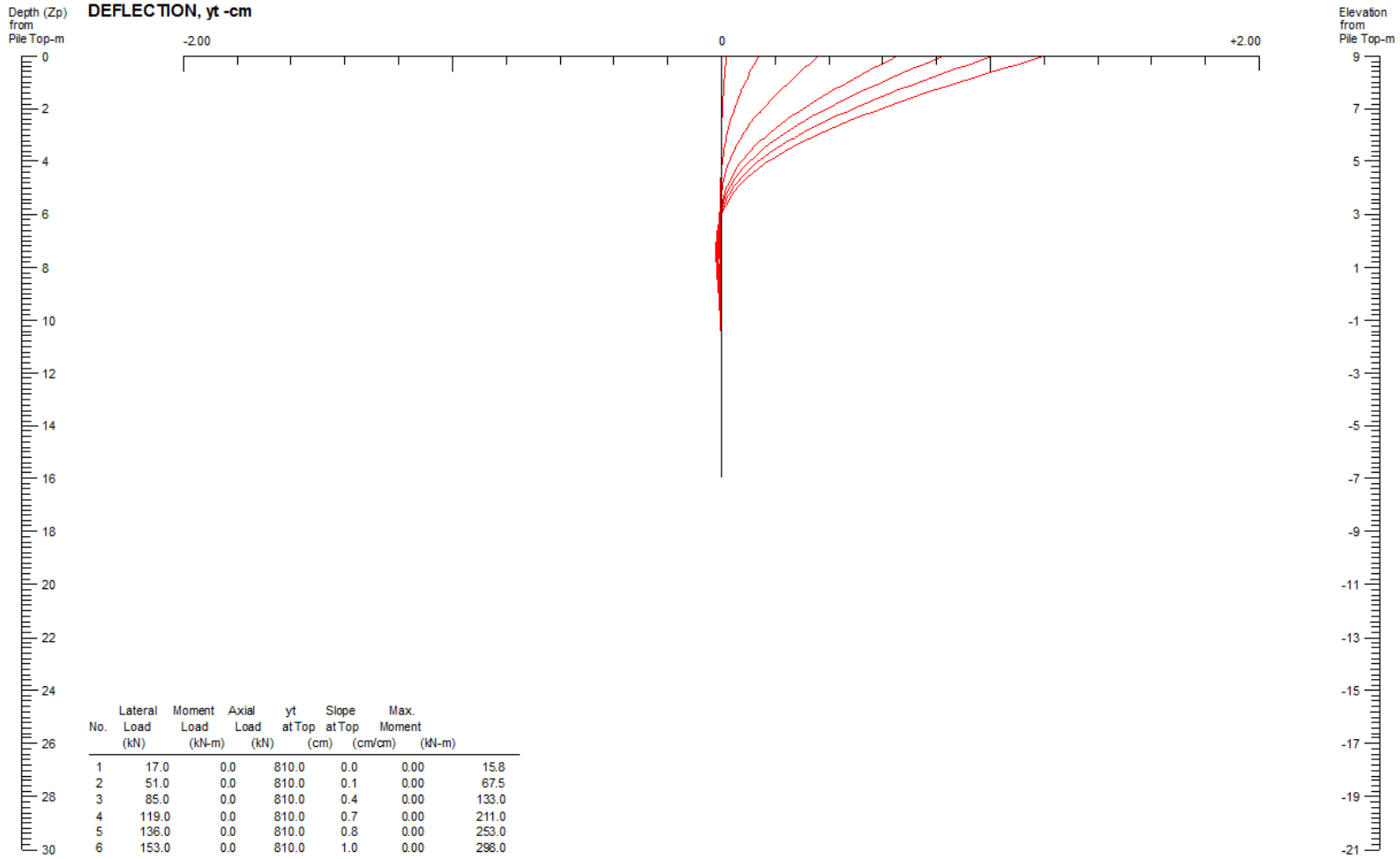



**CivilTech Software**

**Samawa Power Plant Project**
**GIS Building Area (Sand Base)**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

## PILE DEFLECTION vs LOADING
Single Pile, Khead=1, Kbc=1

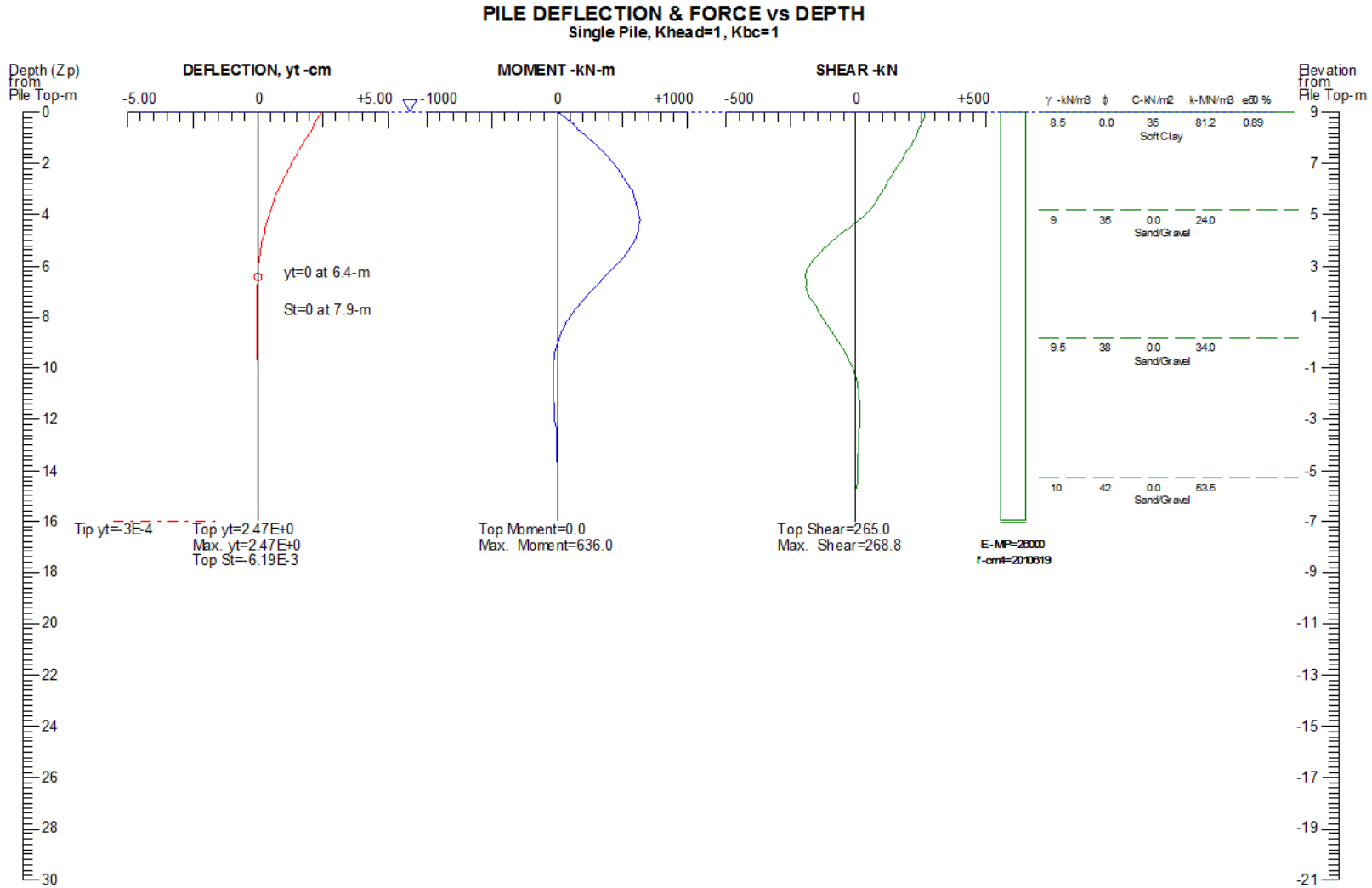



| No. | Lateral Load (kN) | Moment Load (kN-m) | Axial Load (kN) | yt at Top (cm) | Slope at Top (cm/cm) | Max. Moment (kN-m) |
|---|---|---|---|---|---|---|
| 1 | 17.0 | 0.0 | 810.0 | 0.0 | 0.00 | 15.8 |
| 2 | 51.0 | 0.0 | 810.0 | 0.1 | 0.00 | 67.5 |
| 3 | 85.0 | 0.0 | 810.0 | 0.4 | 0.00 | 133.0 |
| 4 | 119.0 | 0.0 | 810.0 | 0.7 | 0.00 | 211.0 |
| 5 | 136.0 | 0.0 | 810.0 | 0.8 | 0.00 | 253.0 |
| 6 | 153.0 | 0.0 | 810.0 | 1.0 | 0.00 | 296.0 |
| 7 | 170.0 | 0.0 | 810.0 | 1.2 | 0.00 | 346.0 |

*CivilTech Software*

**Samawa Power Plant Project**
**GIS Building Area (Sand Base)**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

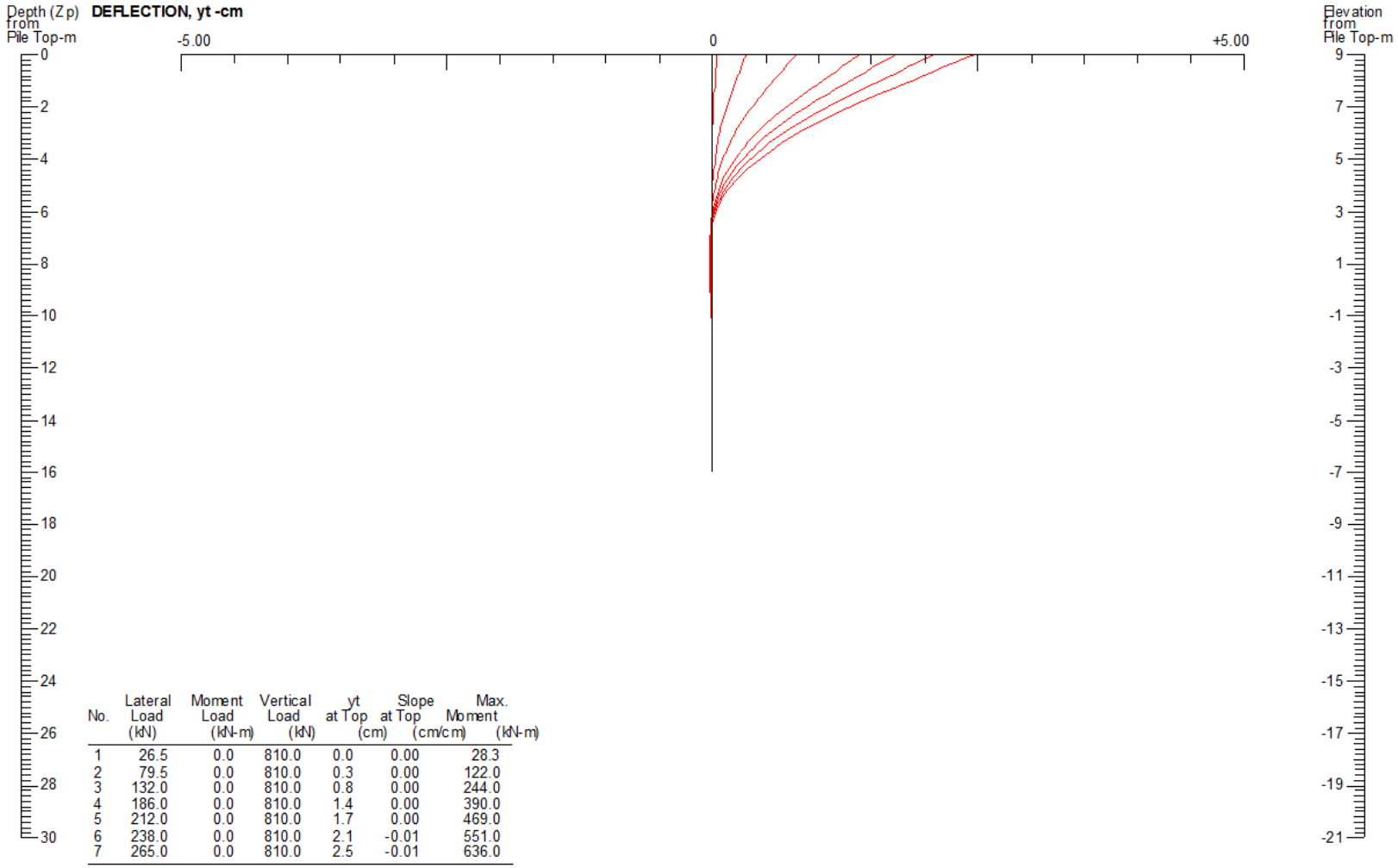



**CivilTech Software**

**Samawa Power Plant Project**
**GIS Building Area (Sand Base)**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

## PILE DEFLECTION vs LOADING
Single Pile, Khead=1, Kbc=1




| No. | Lateral Load (kN) | Moment Load (kN-m) | Vertical Load (kN) | yt at Top (cm) | Slope at Top (cm/cm) | Max. Moment (kN-m) |
|---|---|---|---|---|---|---|
| 1 | 26.5 | 0.0 | 810.0 | 0.0 | 0.00 | 28.3 |
| 2 | 79.5 | 0.0 | 810.0 | 0.3 | 0.00 | 122.0 |
| 3 | 132.0 | 0.0 | 810.0 | 0.8 | 0.00 | 244.0 |
| 4 | 186.0 | 0.0 | 810.0 | 1.4 | 0.00 | 390.0 |
| 5 | 212.0 | 0.0 | 810.0 | 1.7 | 0.00 | 469.0 |
| 6 | 238.0 | 0.0 | 810.0 | 2.1 | -0.01 | 551.0 |
| 7 | 265.0 | 0.0 | 810.0 | 2.5 | -0.01 | 636.0 |

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**Samawa Power Plant Project**
**GIS Building Area (Sand Base)**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

**Samawa Pile Bearing Capacity Calculations -2**

Bored Pile Diameter 80 cm , Length 23m
Pile bearing capacity calculation for axial loads
For compression bearing capacity factor of Safety applied on side friction capacity and bearing capacity is 2.5 and 3 respectively
For uplift bearing capacity factor of safety applied on side friction capacity is 2.5

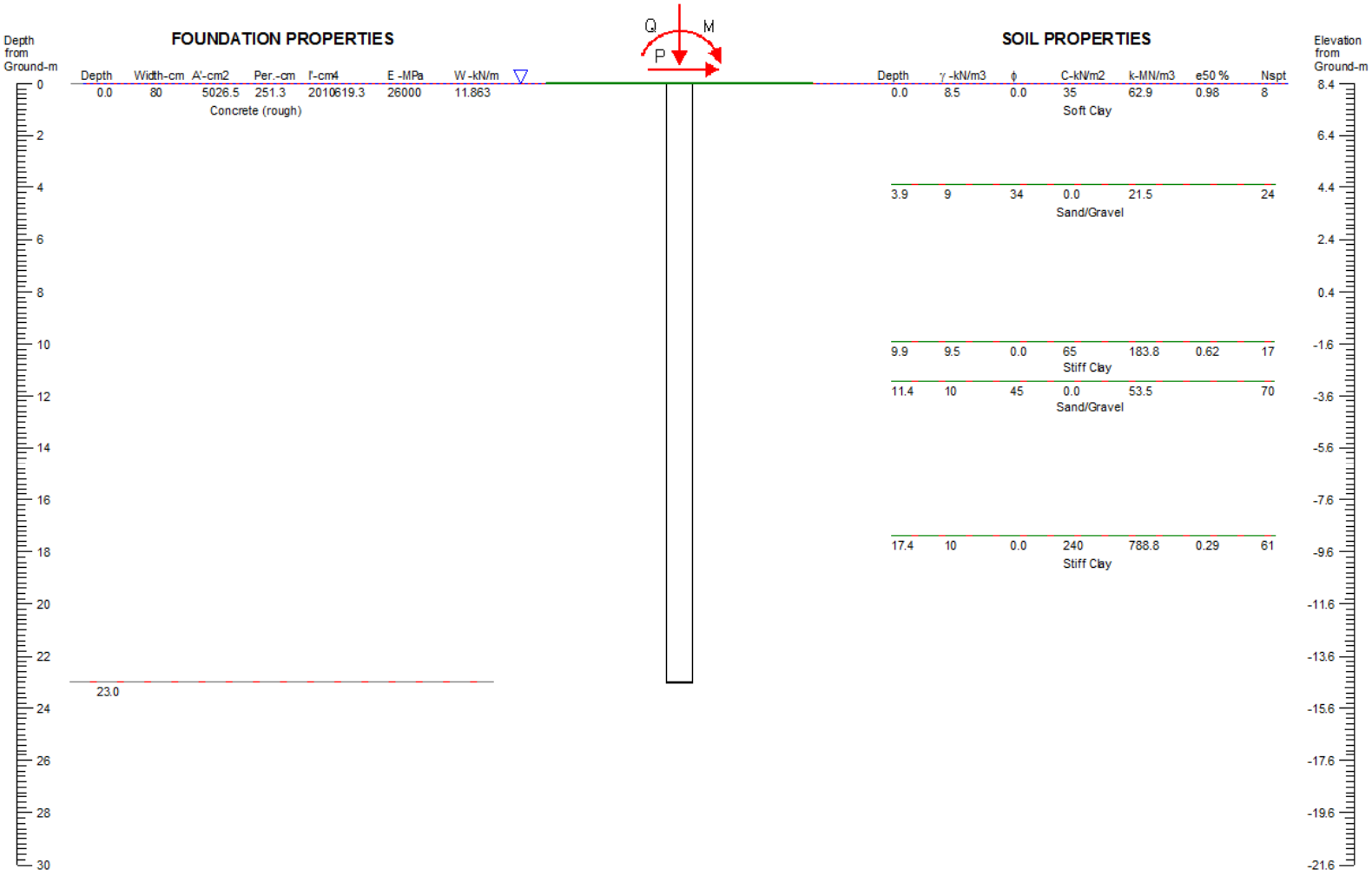
**E)STG AREA**
**E1) STG AREA (Clay Base)**

**E.1.1) Axial Allowable Loads**
Axial Compression Allowable Bearing Capacity= 1445 kN
Axial Allowable Uplift Capacity= 1046 kN

**E.1.2)Horizontal Load Capacity for Free Head Pile**
Horizontal allowable lateral load is 165kN for 1.2 cm lateral top deflection. Maximum sectional moment : Mmax=341kN-m
Horizontal ultimate lateral capacity is 260kN for 2.5 cm top deflection. Maximum sectional moment : 639kN-m

## FOUNDATION PROFILE & SOIL CONDITIONS

Diameter more than 24in.(61cm).
For bell section, select "Belled"
in Diameter Variation of Pile
Section Screen.

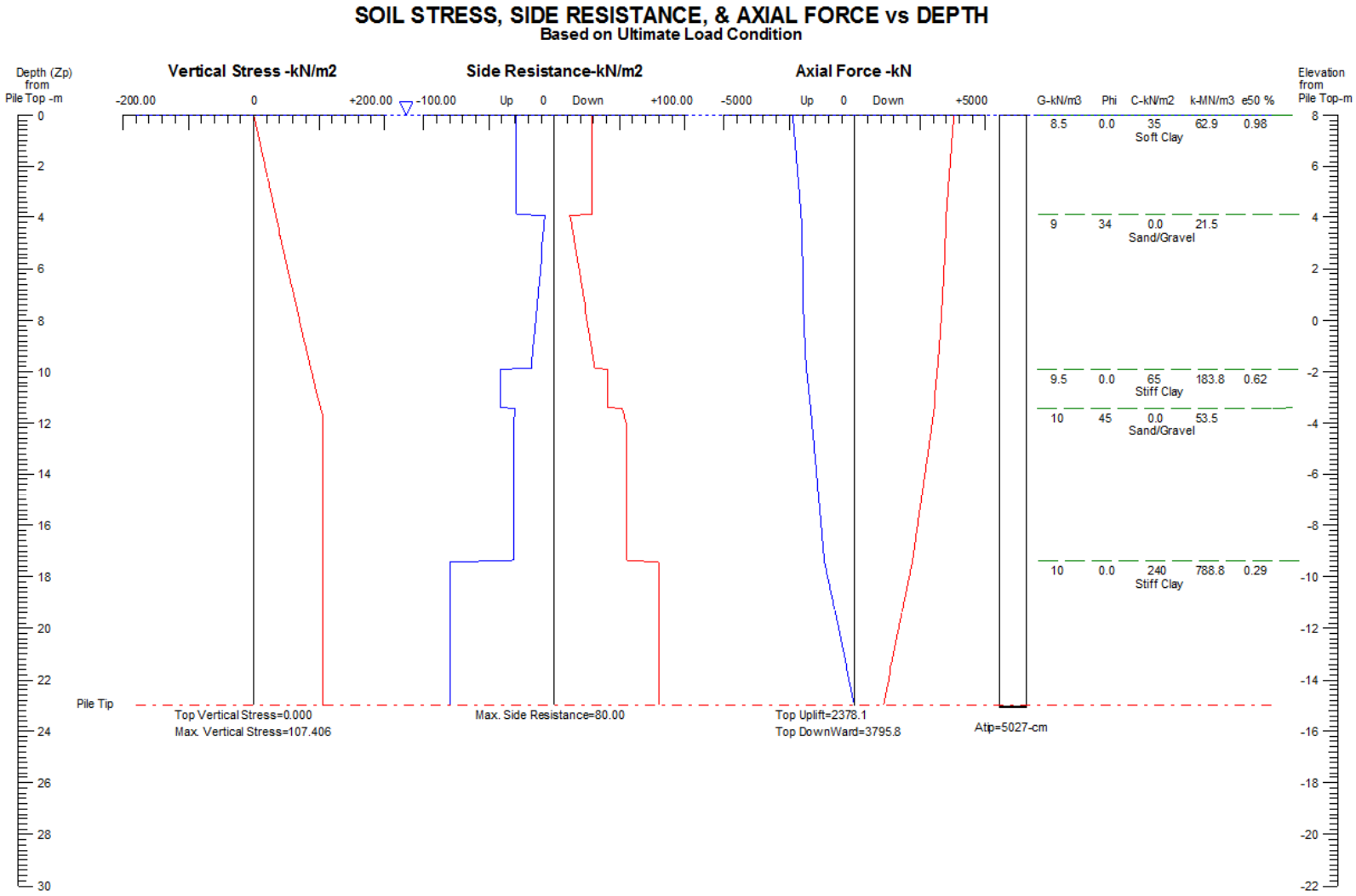



Batter Angle=0 (Pile diameter not to scale) Surface Angle=0

**CivilTech Software**

**Samawa Power Plant Project**
**STG Area(Clay Base)**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

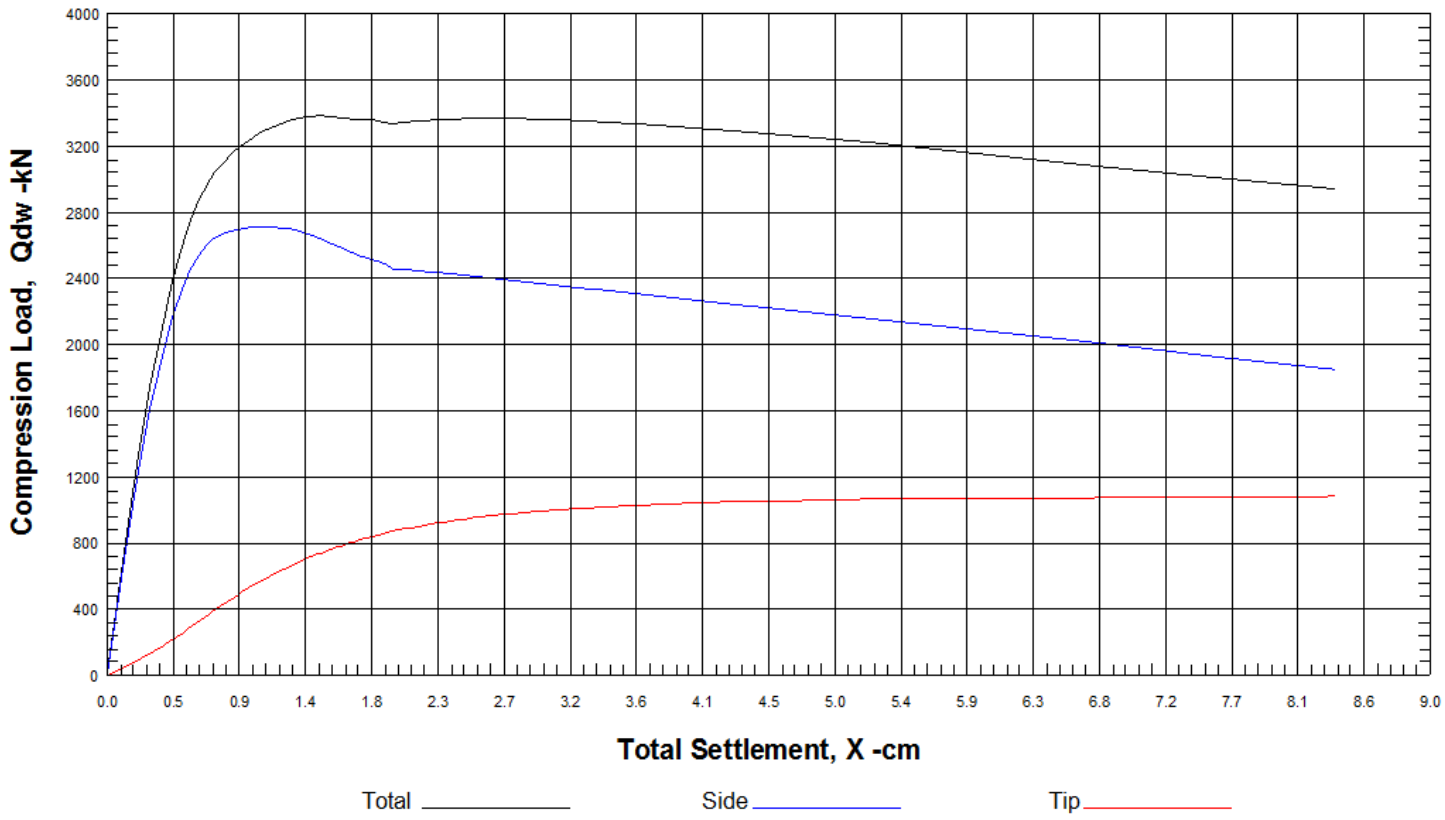



CivilTech Software

**Samawa Power Plant Project**
**STG Area(Clay Base)**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

## Vertical Load vs. Total Settlement

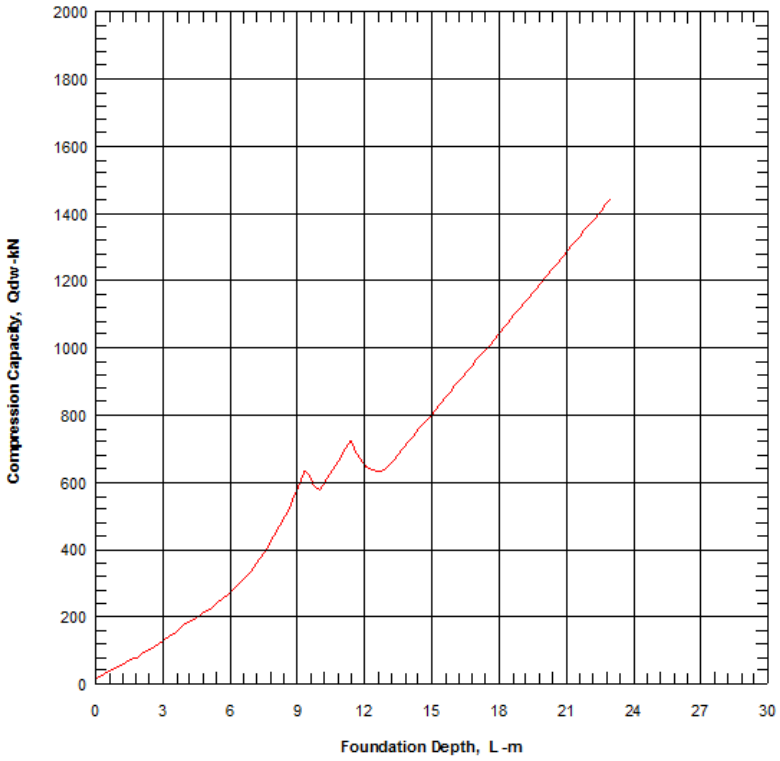


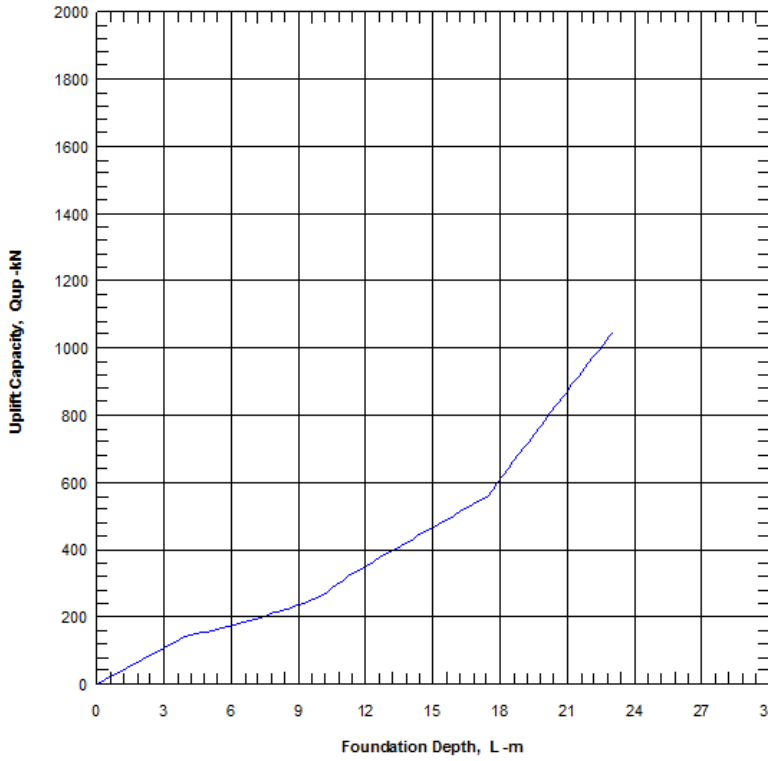

CivilTech Software

**Samawa Power Plant Project**
**STG Area(Clay Base)**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

# ALLOWABLE CAPACITY vs FOUNDATION DEPTH

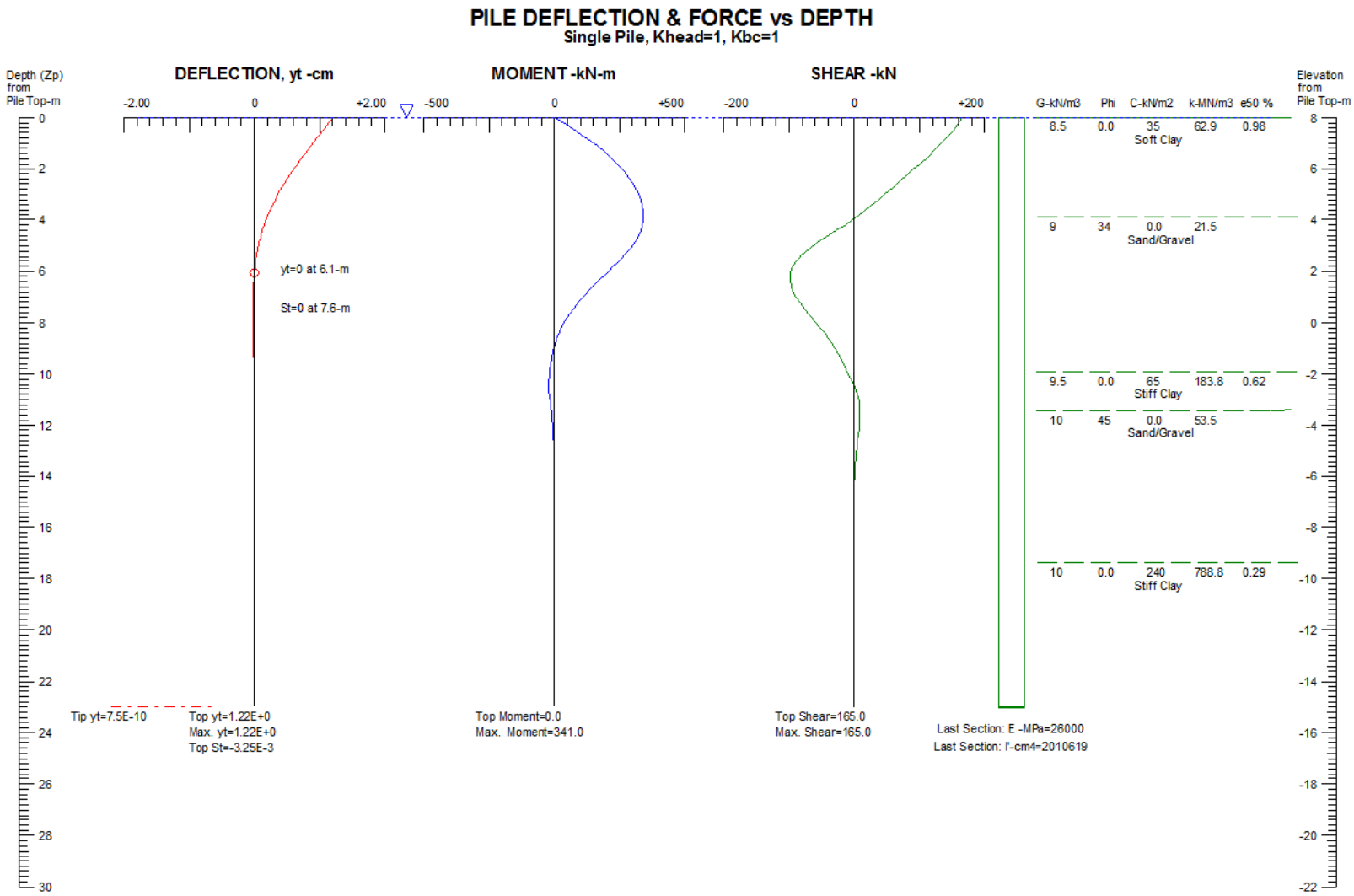



CivilTech Software

**Samawa Power Plant Project**
**STG Area(Clay Base)**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

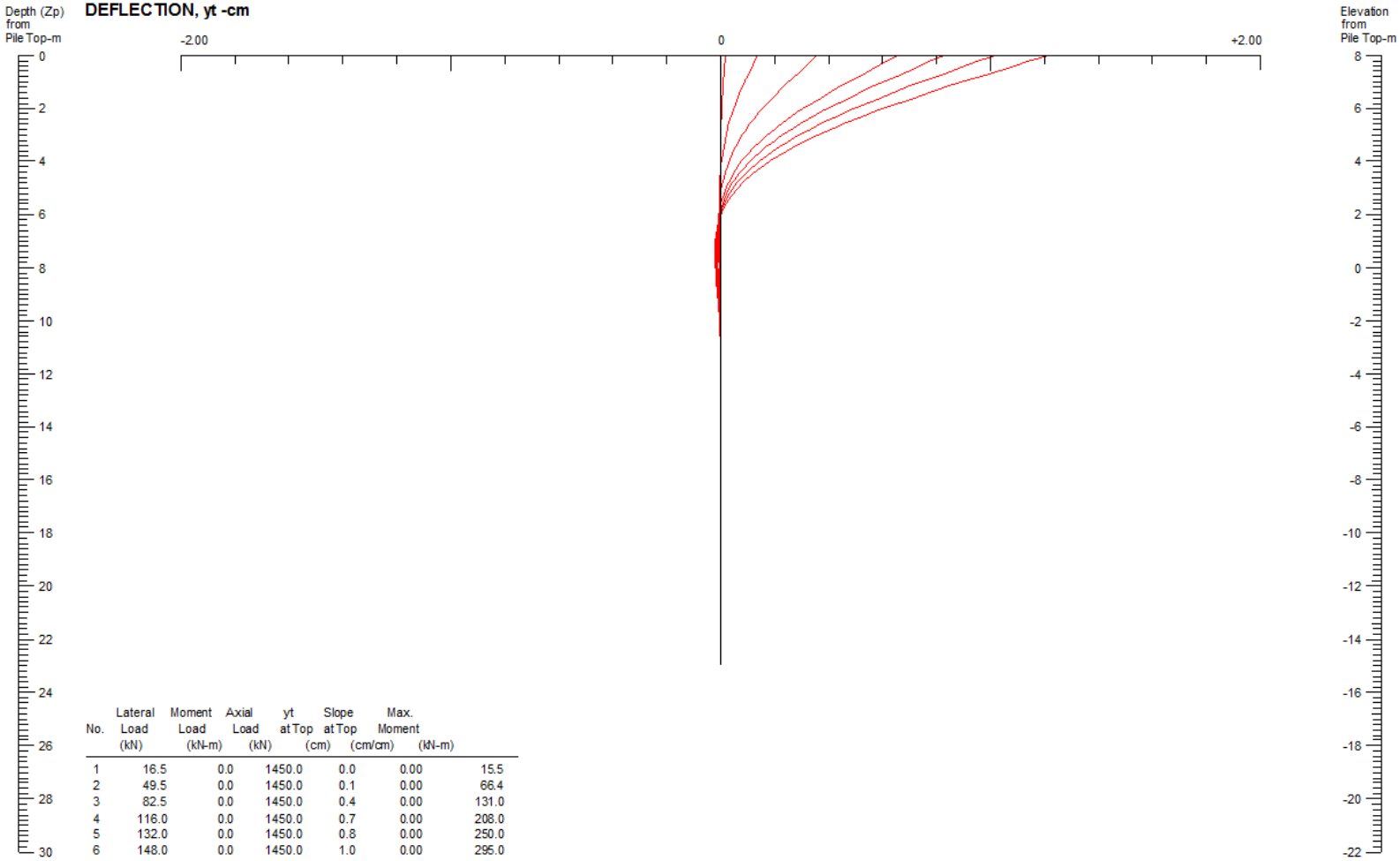



CivilTech Software

**Samawa Power Plant Project**
**STG Area(Clay Base)**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

## PILE DEFLECTION vs LOADING
Single Pile, Khead=1, Kbc=1




| No. | Lateral Load (kN) | Moment Load (kN-m) | Axial Load (kN) | yt at Top (cm) | Slope at Top (cm/cm) | Max. Moment (kN-m) |
|---|---|---|---|---|---|---|
| 1 | 16.5 | 0.0 | 1450.0 | 0.0 | 0.00 | 15.5 |
| 2 | 49.5 | 0.0 | 1450.0 | 0.1 | 0.00 | 66.4 |
| 3 | 82.5 | 0.0 | 1450.0 | 0.4 | 0.00 | 131.0 |
| 4 | 116.0 | 0.0 | 1450.0 | 0.7 | 0.00 | 208.0 |
| 5 | 132.0 | 0.0 | 1450.0 | 0.8 | 0.00 | 250.0 |
| 6 | 148.0 | 0.0 | 1450.0 | 1.0 | 0.00 | 295.0 |
| 7 | 165.0 | 0.0 | 1450.0 | 1.2 | 0.00 | 341.0 |

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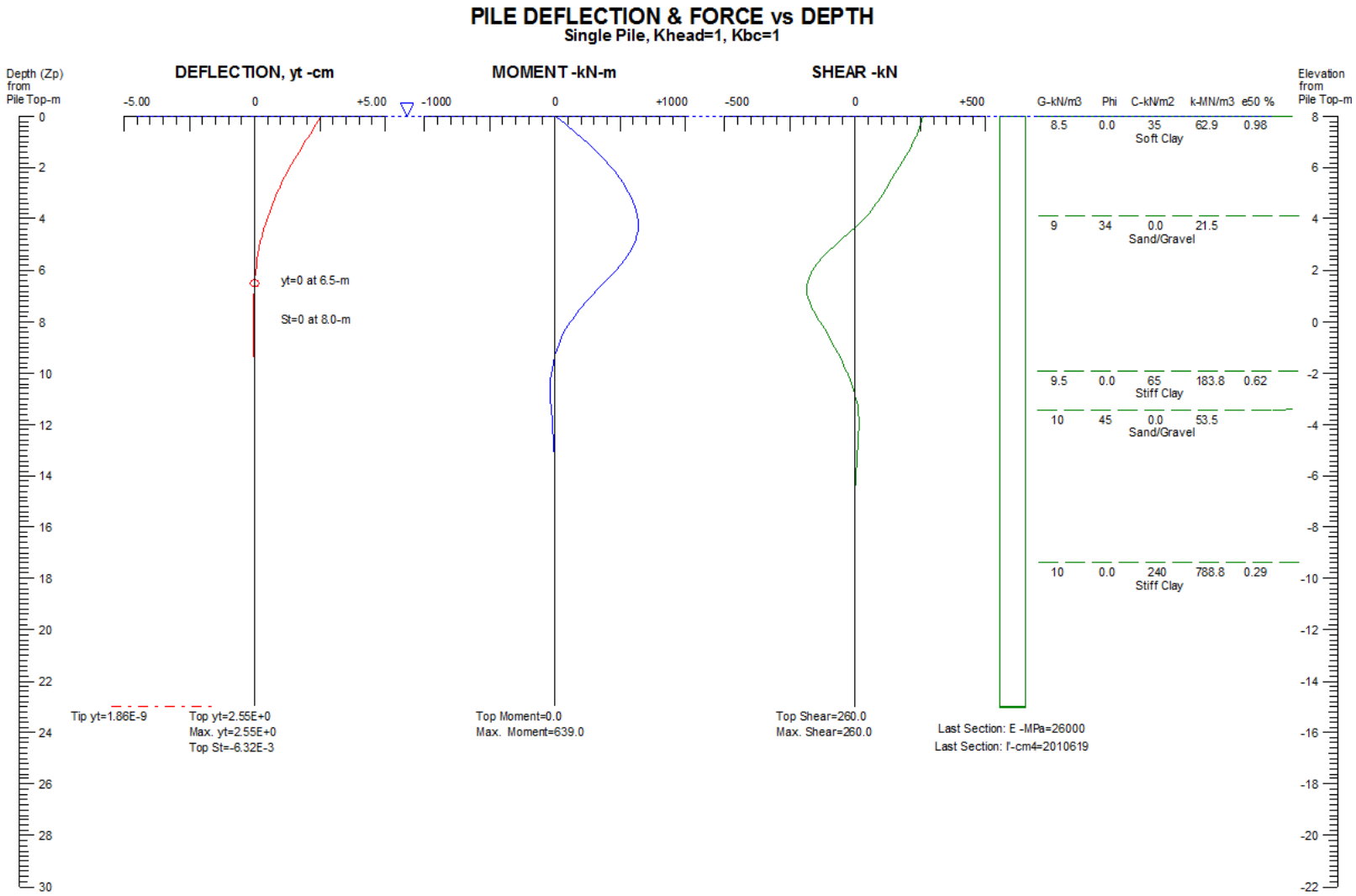
**Samawa Power Plant Project**
**STG Area(Clay Base)**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

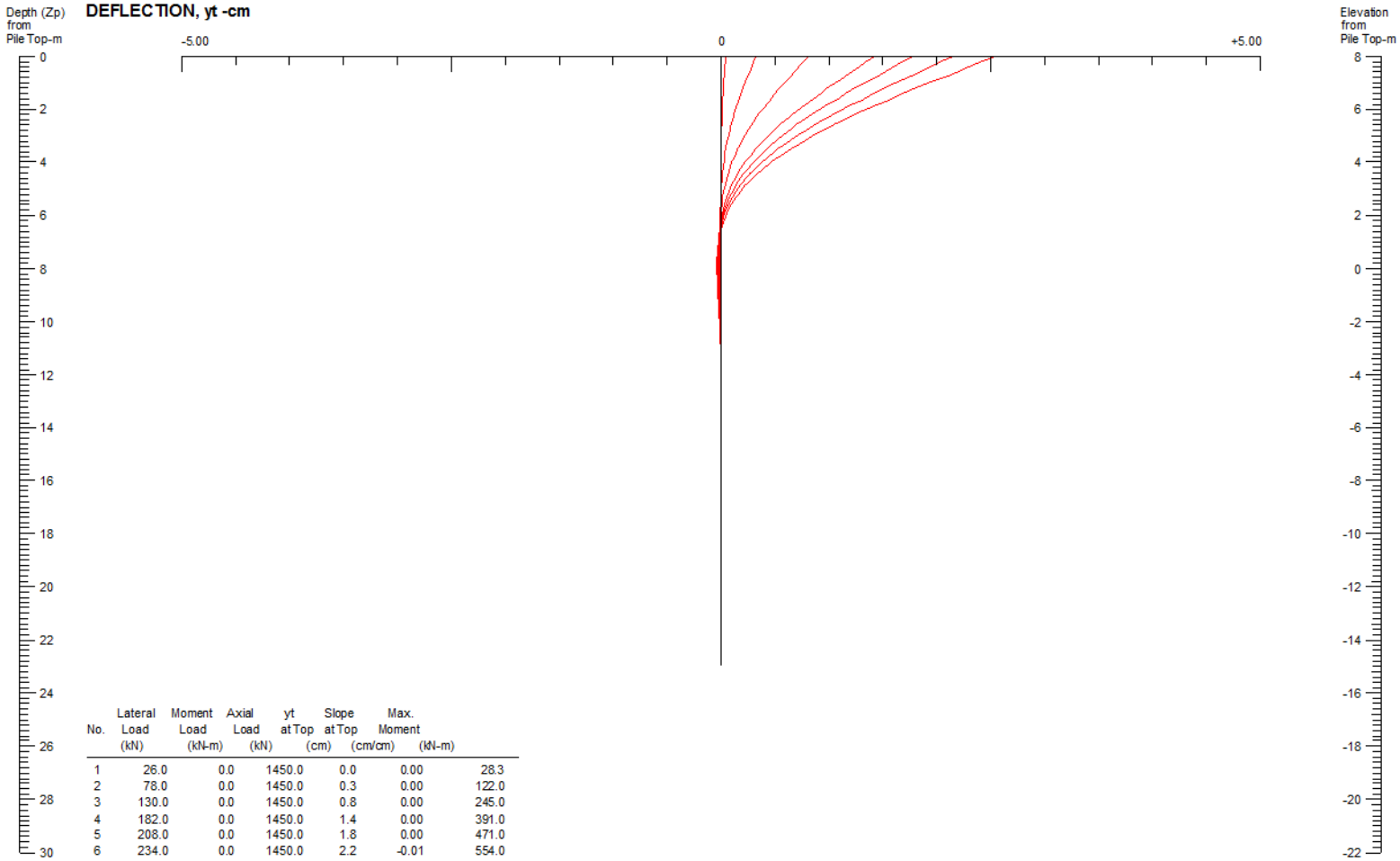



**CivilTech Software**

**Samawa Power Plant Project**
**STG Area(Clay Base)**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

## PILE DEFLECTION vs LOADING
Single Pile, Khead=1, Kbc=1




| No. | Lateral Load (kN) | Moment Load (kN-m) | Axial Load (kN) | yt at Top (cm) | Slope at Top (cm/cm) | Max. Moment (kN-m) |
|---|---|---|---|---|---|---|
| 1 | 26.0 | 0.0 | 1450.0 | 0.0 | 0.00 | 28.3 |
| 2 | 78.0 | 0.0 | 1450.0 | 0.3 | 0.00 | 122.0 |
| 3 | 130.0 | 0.0 | 1450.0 | 0.8 | 0.00 | 245.0 |
| 4 | 182.0 | 0.0 | 1450.0 | 1.4 | 0.00 | 391.0 |
| 5 | 208.0 | 0.0 | 1450.0 | 1.8 | 0.00 | 471.0 |
| 6 | 234.0 | 0.0 | 1450.0 | 2.2 | -0.01 | 554.0 |
| 7 | 260.0 | 0.0 | 1450.0 | 2.5 | -0.01 | 639.0 |

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**Samawa Power Plant Project**
**STG Area(Clay Base)**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

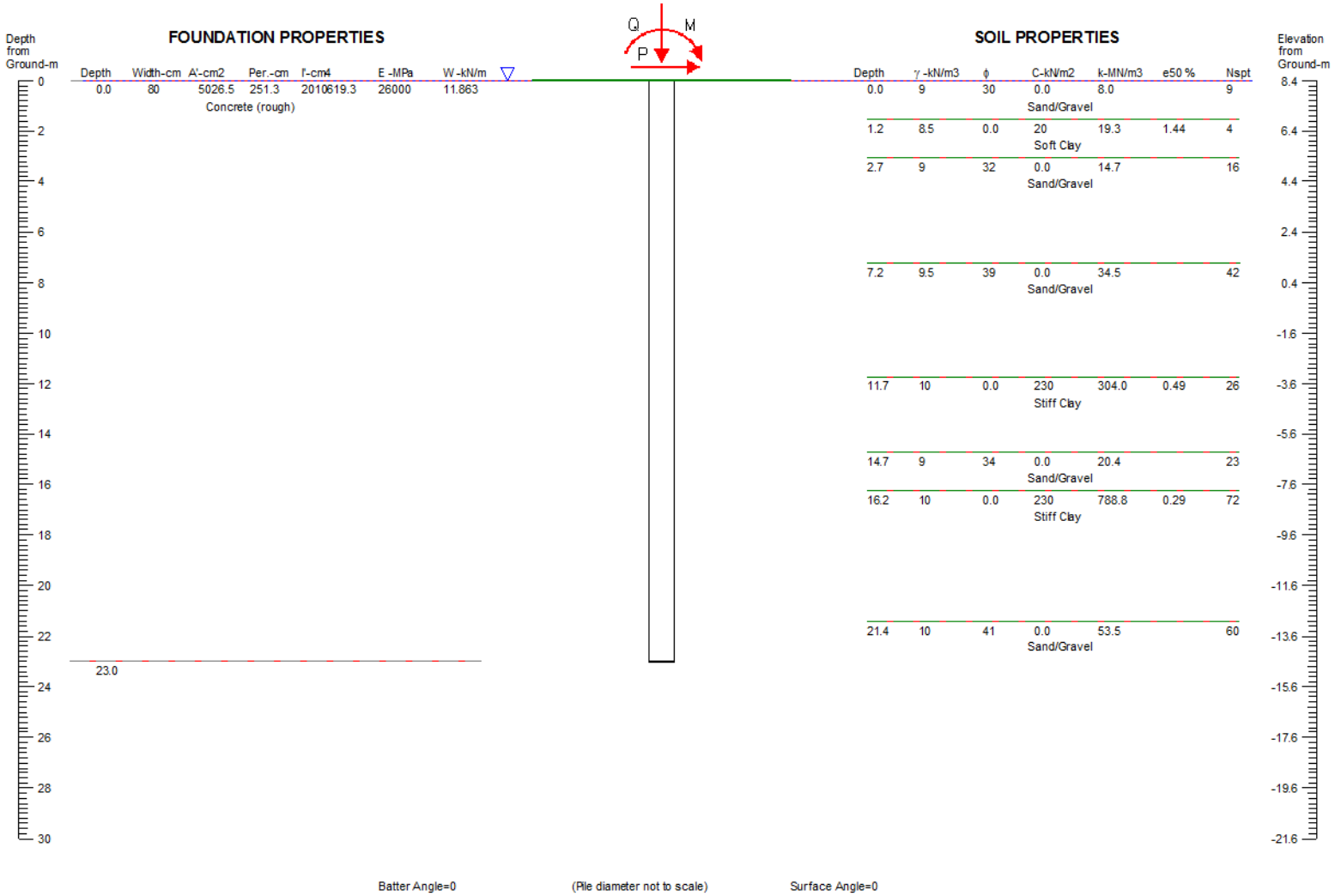
**E2) STG AREA (Sand Base)**

**E.2.1) Axial Allowable Loads**
Axial Compression Allowable Bearing Capacity= 1540 kN
Axial Allowable Uplift Capacity= 1058 kN

**E.2.2)Horizontal Load Capacity for Free Head Pile**
Horizontal allowable lateral load is 145kN for 1.2 cm lateral top deflection. Maximum sectional moment : Mmax=350kN-m
Horizontal ultimate lateral capacity is 235kN for 2.5 cm top deflection. Maximum sectional moment : 639kN-m

## FOUNDATION PROFILE & SOIL CONDITIONS

Diameter more than 24in (61cm).
For bell section, select "Belled"
in Diameter Variation of Pile
Section Screen.




### FOUNDATION PROPERTIES

| Depth | Width-cm | A'-cm2 | Per.-cm | I'-cm4 | E -MPa | W -kN/m |
|---|---|---|---|---|---|---|
| 0.0 | 80 | 5026.5 | 251.3 | 2010619.3 | 26000 | 11.863 |
| Concrete (rough) | | | | | | |

### SOIL PROPERTIES

| Depth | γ -kN/m3 | ϕ | C-kN/m2 | k-MN/m3 | e50 % | Nspt | |
|---|---|---|---|---|---|---|---|
| 0.0 | 9 | 30 | 0.0 | 8.0 | | 9 | Sand/Gravel |
| 1.2 | 8.5 | 0.0 | 20 | 19.3 | 1.44 | 4 | Soft Clay |
| 2.7 | 9 | 32 | 0.0 | 14.7 | | 16 | Sand/Gravel |
| 7.2 | 9.5 | 39 | 0.0 | 34.5 | | 42 | Sand/Gravel |
| 11.7 | 10 | 0.0 | 230 | 304.0 | 0.49 | 26 | Stiff Clay |
| 14.7 | 9 | 34 | 0.0 | 20.4 | | 23 | Sand/Gravel |
| 16.2 | 10 | 0.0 | 230 | 788.8 | 0.29 | 72 | Stiff Clay |
| 21.4 | 10 | 41 | 0.0 | 53.5 | | 60 | Sand/Gravel |

Batter Angle=0 (Pile diameter not to scale) Surface Angle=0

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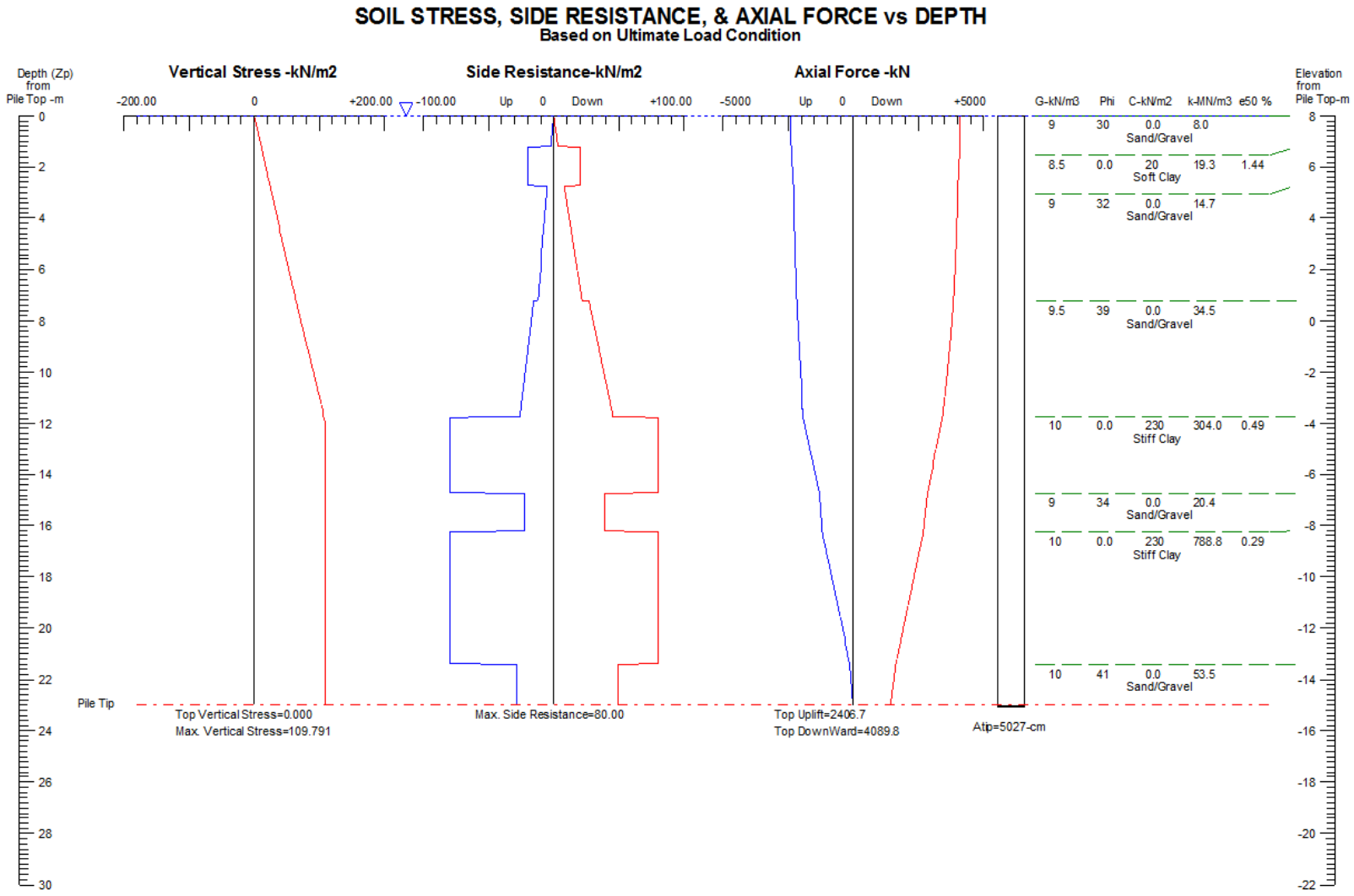
**Samawa Power Plant Project**
**STG Area (Sand Base)**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

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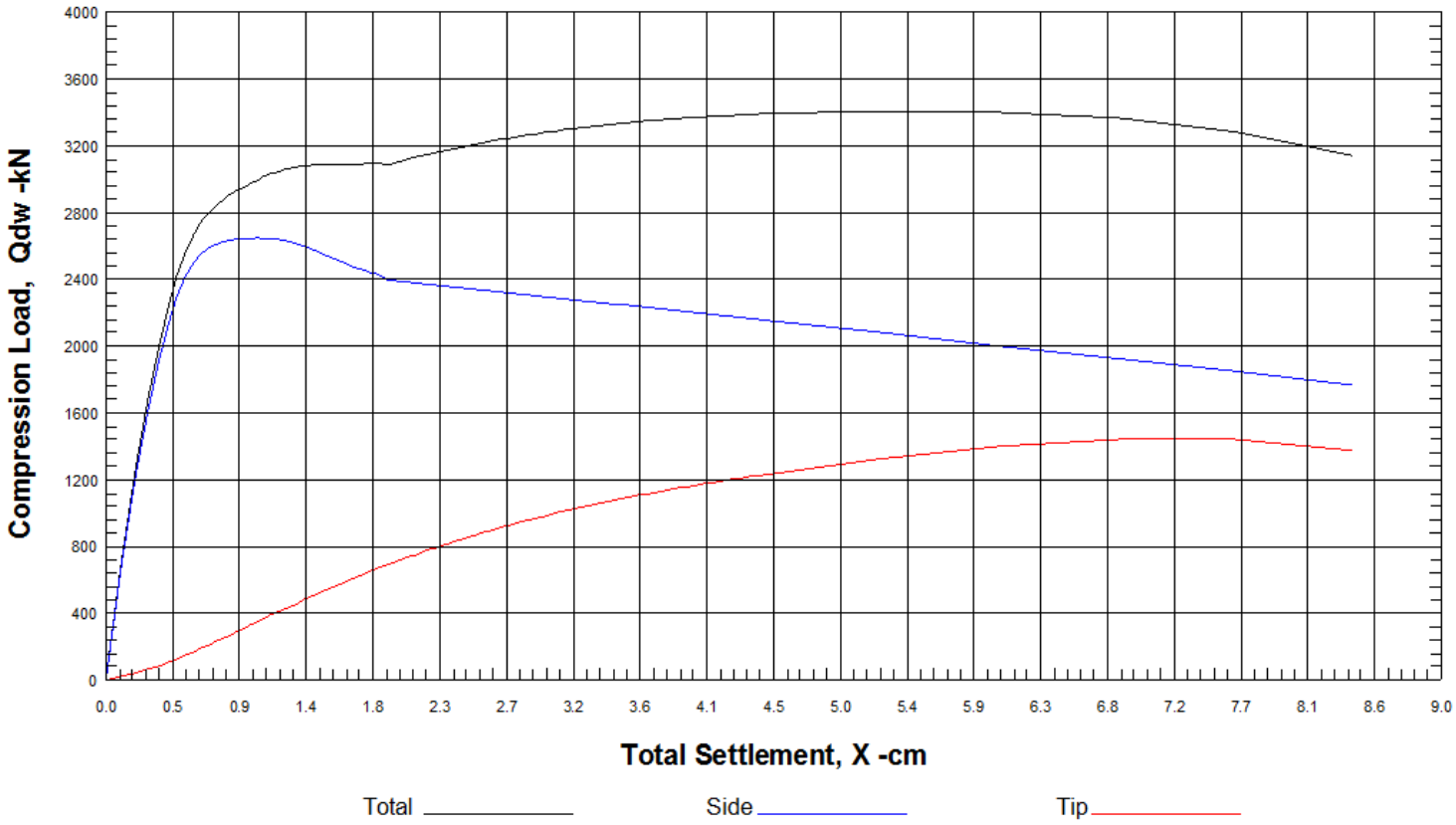
**Samawa Power Plant Project**
**STG Area (Sand Base)**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

## Vertical Load vs. Total Settlement

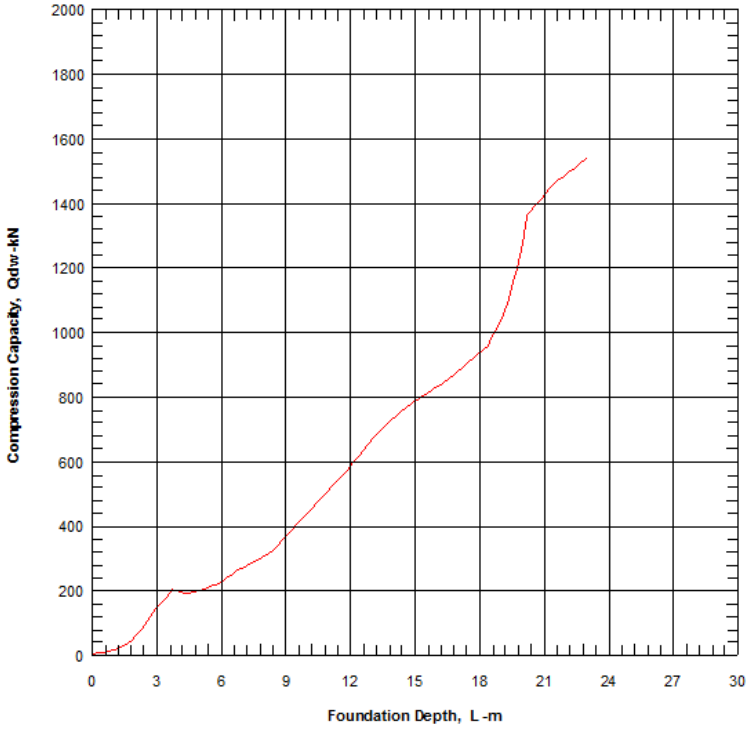


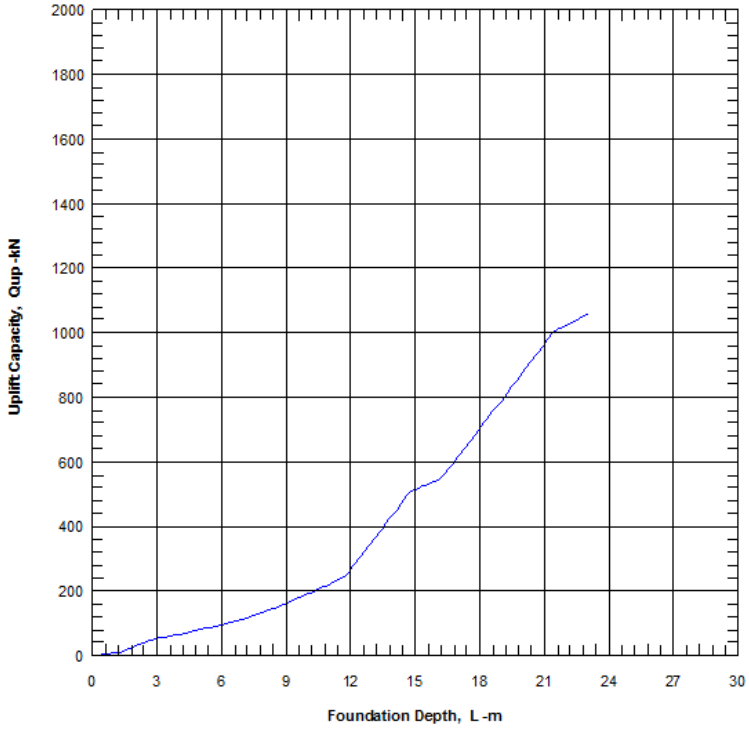

CivilTech Software

**Samawa Power Plant Project**
**STG Area (Sand Base)**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

# ALLOWABLE CAPACITY vs FOUNDATION DEPTH

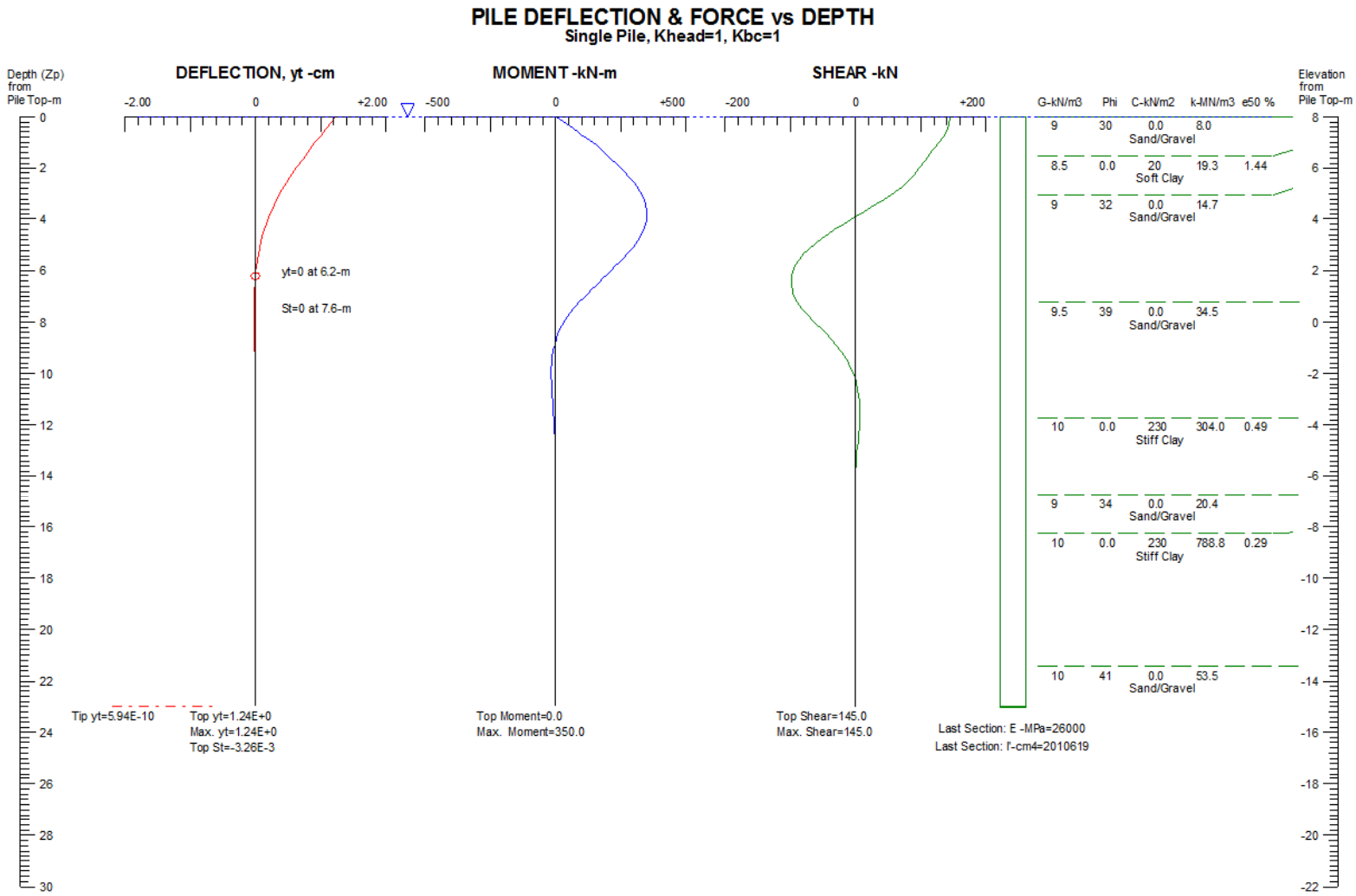



CivilTech Software

**Samawa Power Plant Project**
**STG Area (Sand Base)**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

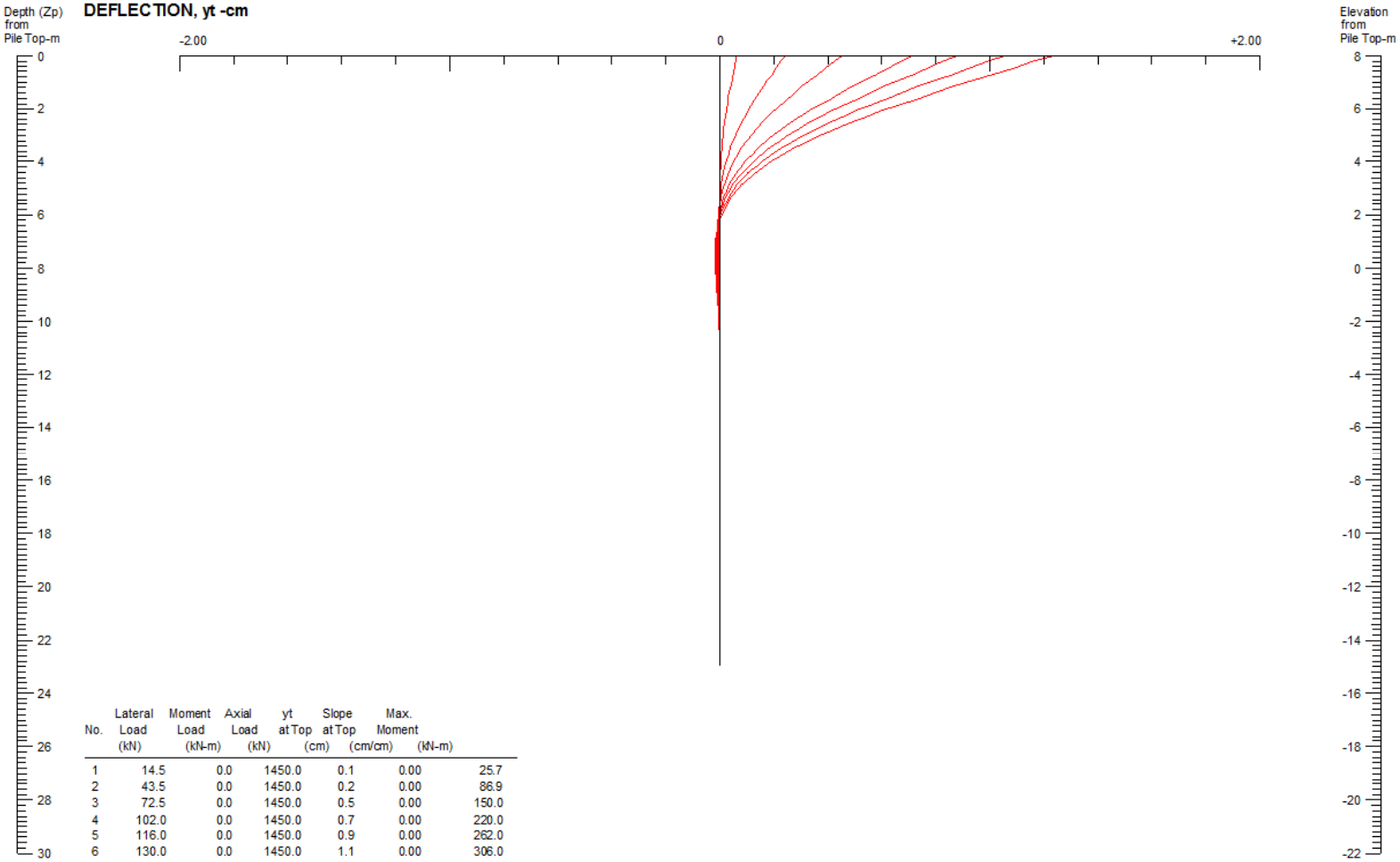



CivilTech Software

**Samawa Power Plant Project**
**STG Area (Sand Base)**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

## PILE DEFLECTION vs LOADING
Single Pile, Khead=1, Kbc=1

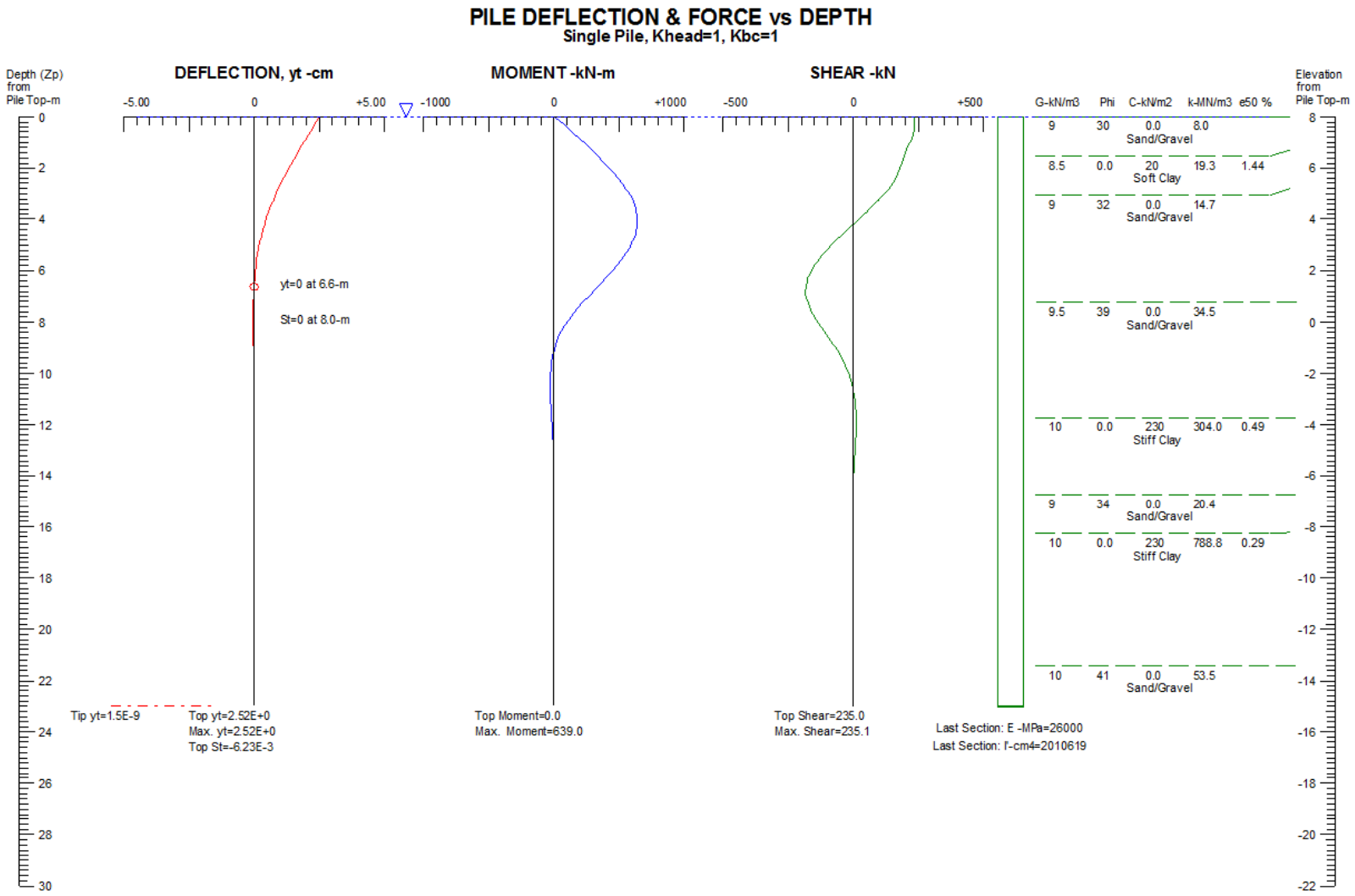



| No. | Lateral Load (kN) | Moment Load (kN-m) | Axial Load (kN) | yt at Top (cm) | Slope at Top (cm/cm) | Max. Moment (kN-m) |
|---|---|---|---|---|---|---|
| 1 | 14.5 | 0.0 | 1450.0 | 0.1 | 0.00 | 25.7 |
| 2 | 43.5 | 0.0 | 1450.0 | 0.2 | 0.00 | 86.9 |
| 3 | 72.5 | 0.0 | 1450.0 | 0.5 | 0.00 | 150.0 |
| 4 | 102.0 | 0.0 | 1450.0 | 0.7 | 0.00 | 220.0 |
| 5 | 116.0 | 0.0 | 1450.0 | 0.9 | 0.00 | 262.0 |
| 6 | 130.0 | 0.0 | 1450.0 | 1.1 | 0.00 | 306.0 |
| 7 | 145.0 | 0.0 | 1450.0 | 1.2 | 0.00 | 350.0 |

*CivilTech Software*

**Samawa Power Plant Project**
**STG Area (Sand Base)**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

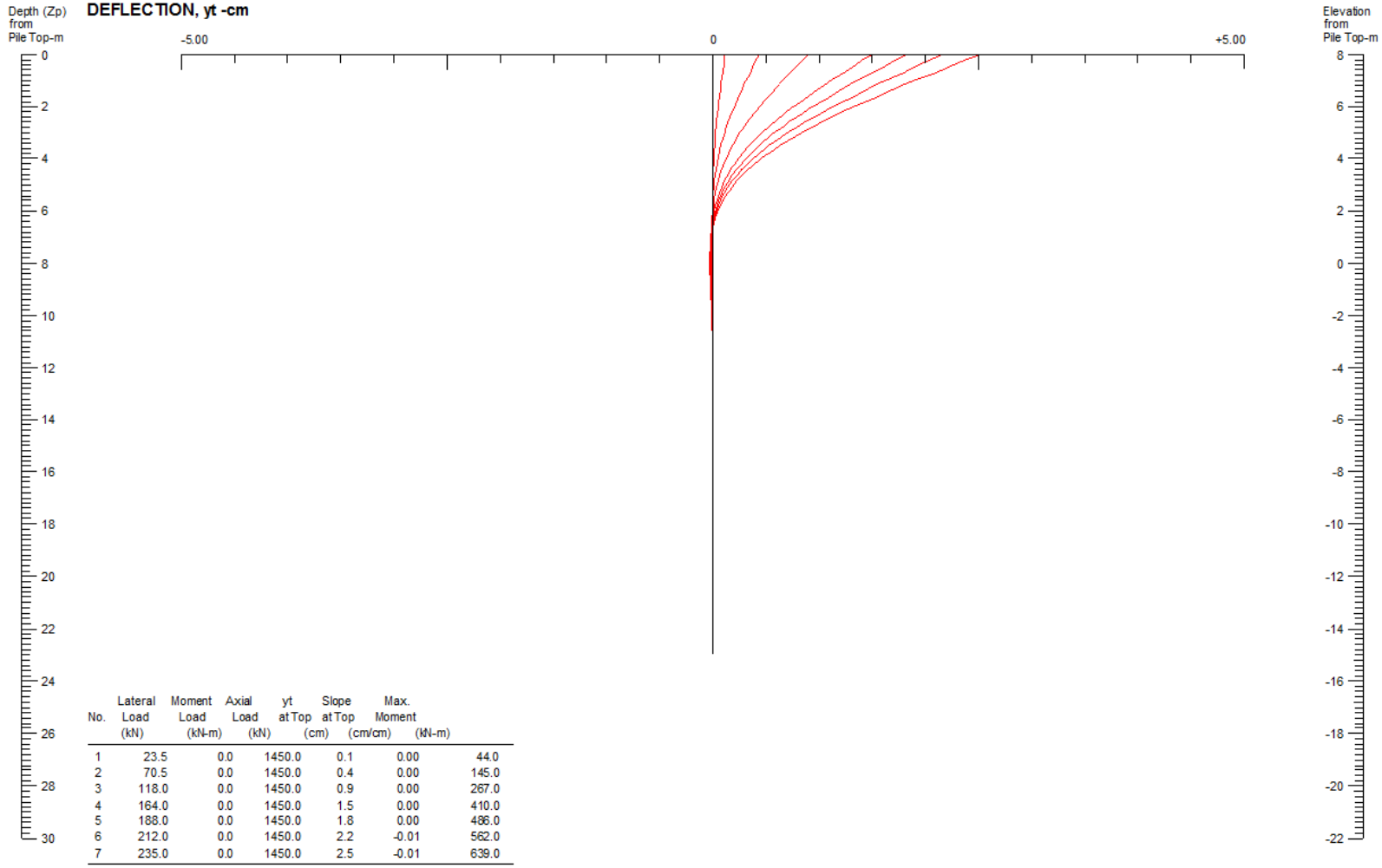



CivilTech Software

**Samawa Power Plant Project**
**STG Area (Sand Base)**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

## PILE DEFLECTION vs LOADING
Single Pile, Khead=1, Kbc=1




| No. | Lateral Load (kN) | Moment Load (kN-m) | Axial Load (kN) | yt at Top (cm) | Slope at Top (cm/cm) | Max. Moment (kN-m) | |
|---|---|---|---|---|---|---|---|
| 1 | 23.5 | 0.0 | 1450.0 | 0.1 | 0.00 | | 44.0 |
| 2 | 70.5 | 0.0 | 1450.0 | 0.4 | 0.00 | | 145.0 |
| 3 | 118.0 | 0.0 | 1450.0 | 0.9 | 0.00 | | 267.0 |
| 4 | 164.0 | 0.0 | 1450.0 | 1.5 | 0.00 | | 410.0 |
| 5 | 188.0 | 0.0 | 1450.0 | 1.8 | 0.00 | | 486.0 |
| 6 | 212.0 | 0.0 | 1450.0 | 2.2 | -0.01 | | 562.0 |
| 7 | 235.0 | 0.0 | 1450.0 | 2.5 | -0.01 | | 639.0 |

*CivilTech Software*

**Samawa Power Plant Project**
**STG Area (Sand Base)**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

**F2) Water Treatment Area**

**F.1) Water Treatment Area (Clay Base-1)**

**F.1.1) Axial Allowable Loads**

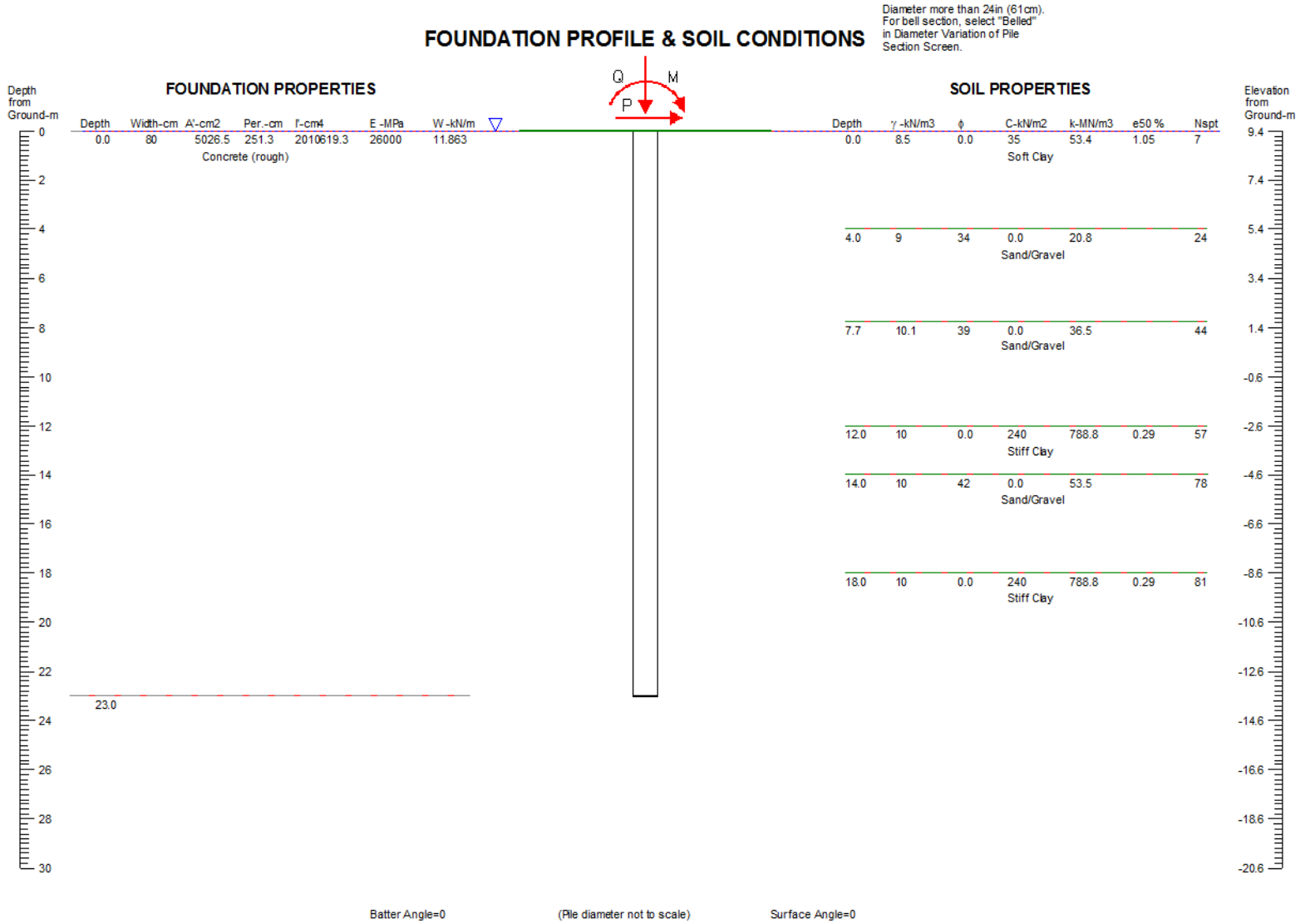
Axial Compression Allowable Bearing Capacity= 1478 kN

Axial Allowable Uplift Capacity= 1087 kN

**F.1.2)Horizontal Load Capacity for Free Head Pile**

Horizontal allowable lateral load is 160kN for 1.2 cm lateral top deflection. Maximum sectional moment : Mmax=330kN-m

Horizontal ultimate lateral capacity is 250kN for 2.5 cm top deflection. Maximum sectional moment : 615kN-m

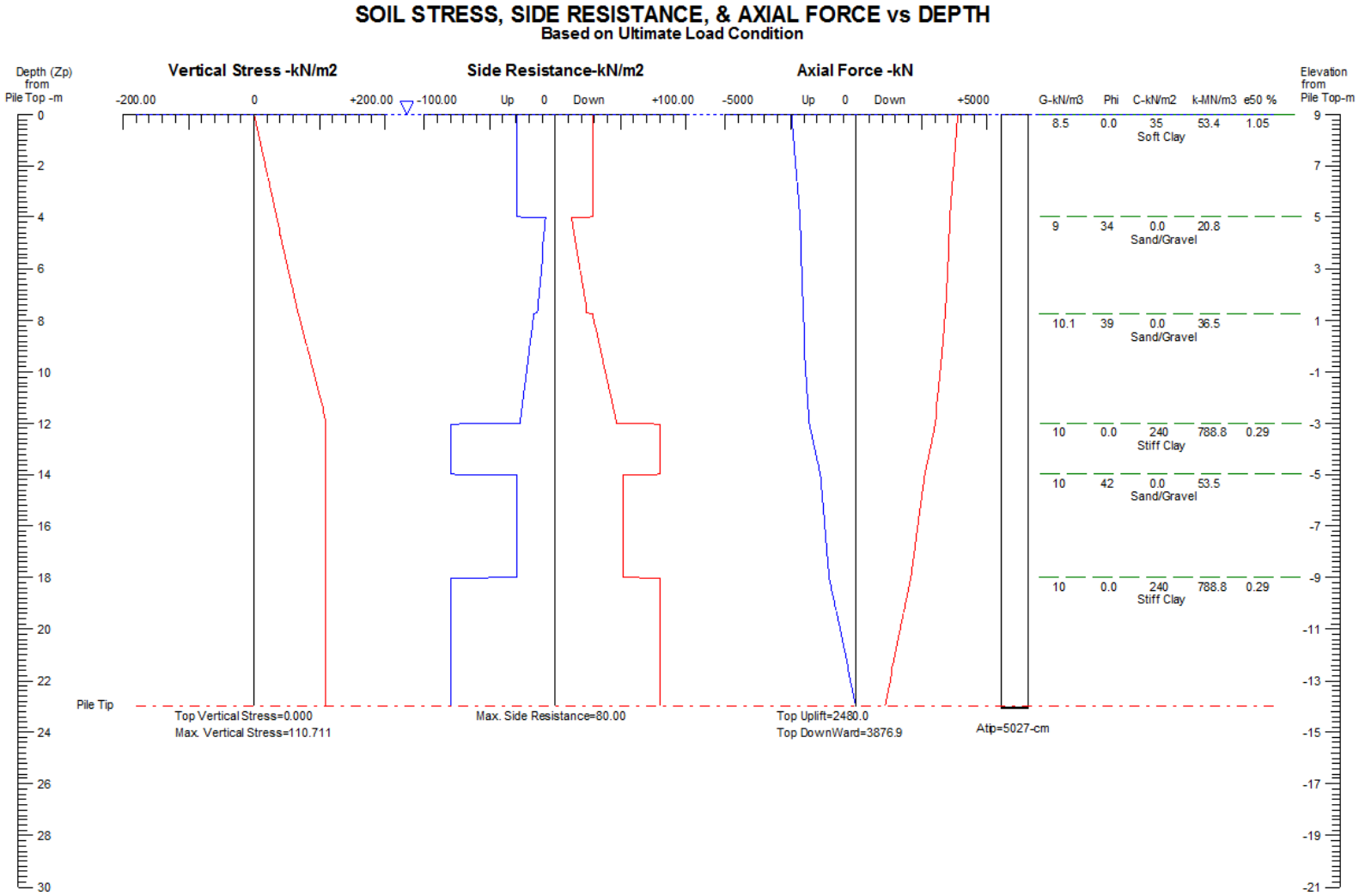



CivilTech Software

**Samawa Power Plant Project**
**Water Treatment Area (Clay Base 1)**

**Figure 1**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

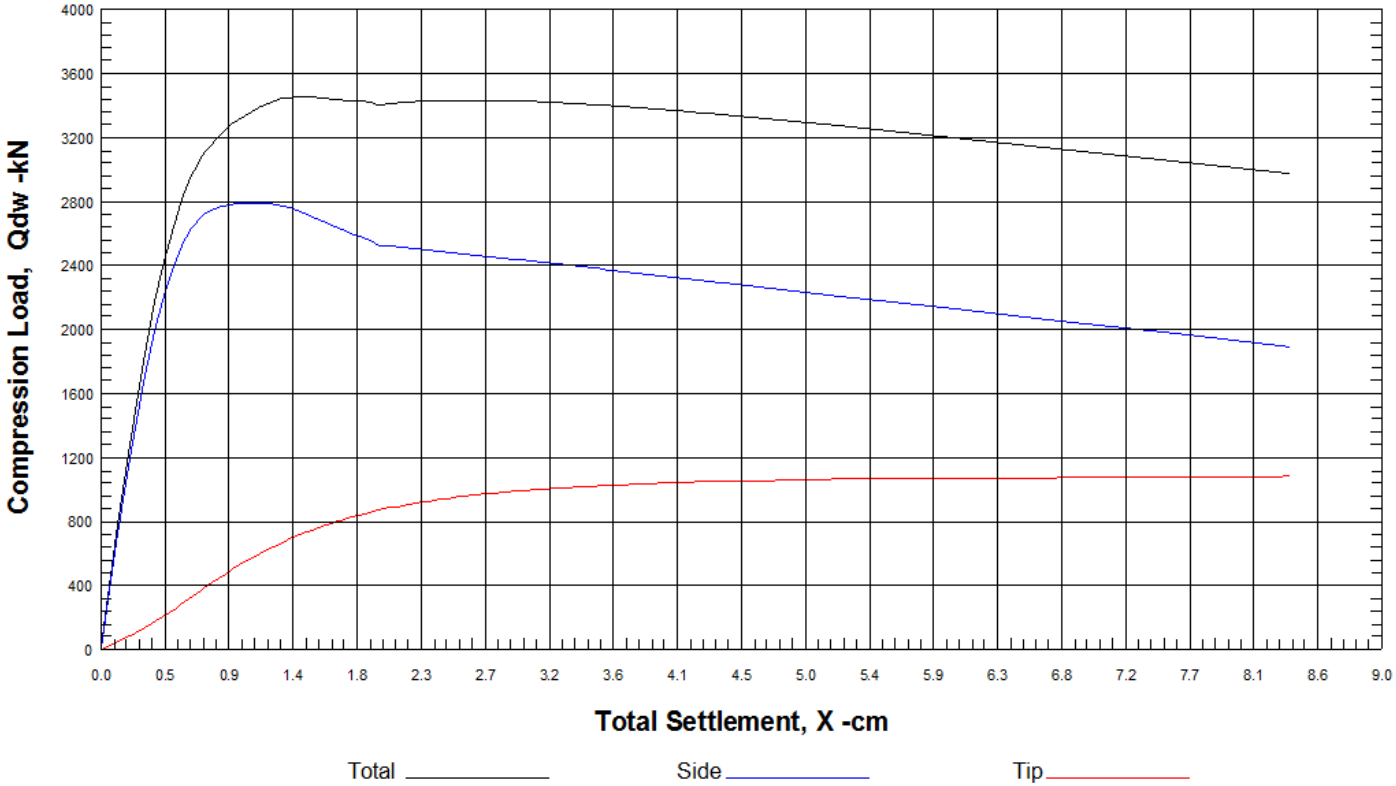



**CivilTech Software**

**Samawa Power Plant Project**
**Water Treatment Area (Clay Base 1)**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

## Vertical Load vs. Total Settlement

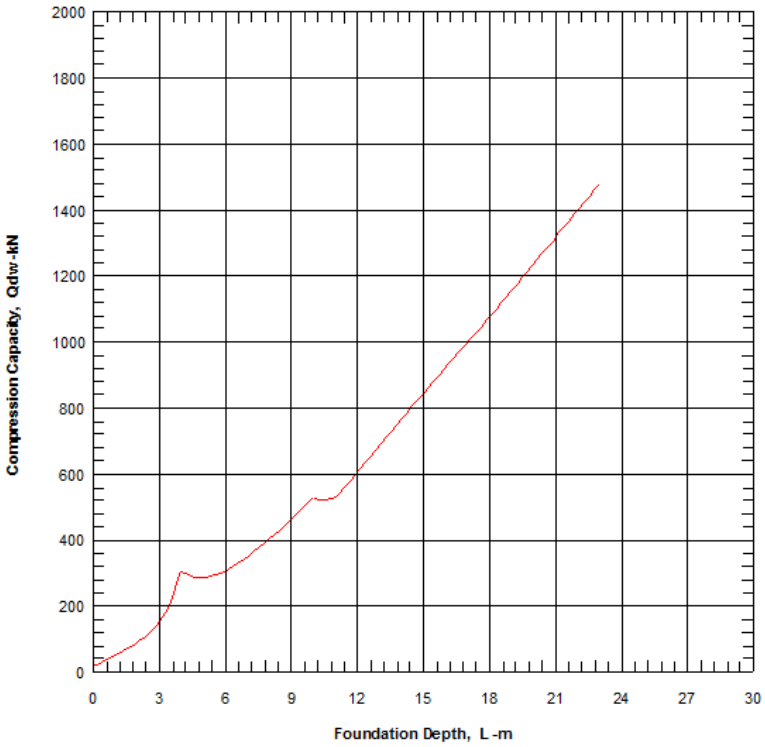


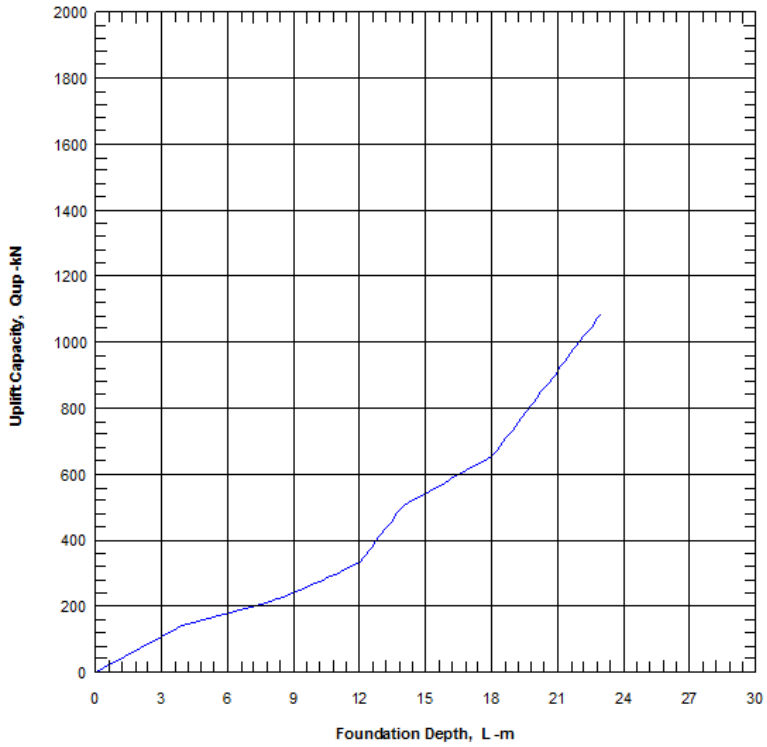

CivilTech Software

**Samawa Power Plant Project**
**Water Treatment Area (Clay Base 1)**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

# ALLOWABLE CAPACITY vs FOUNDATION DEPTH

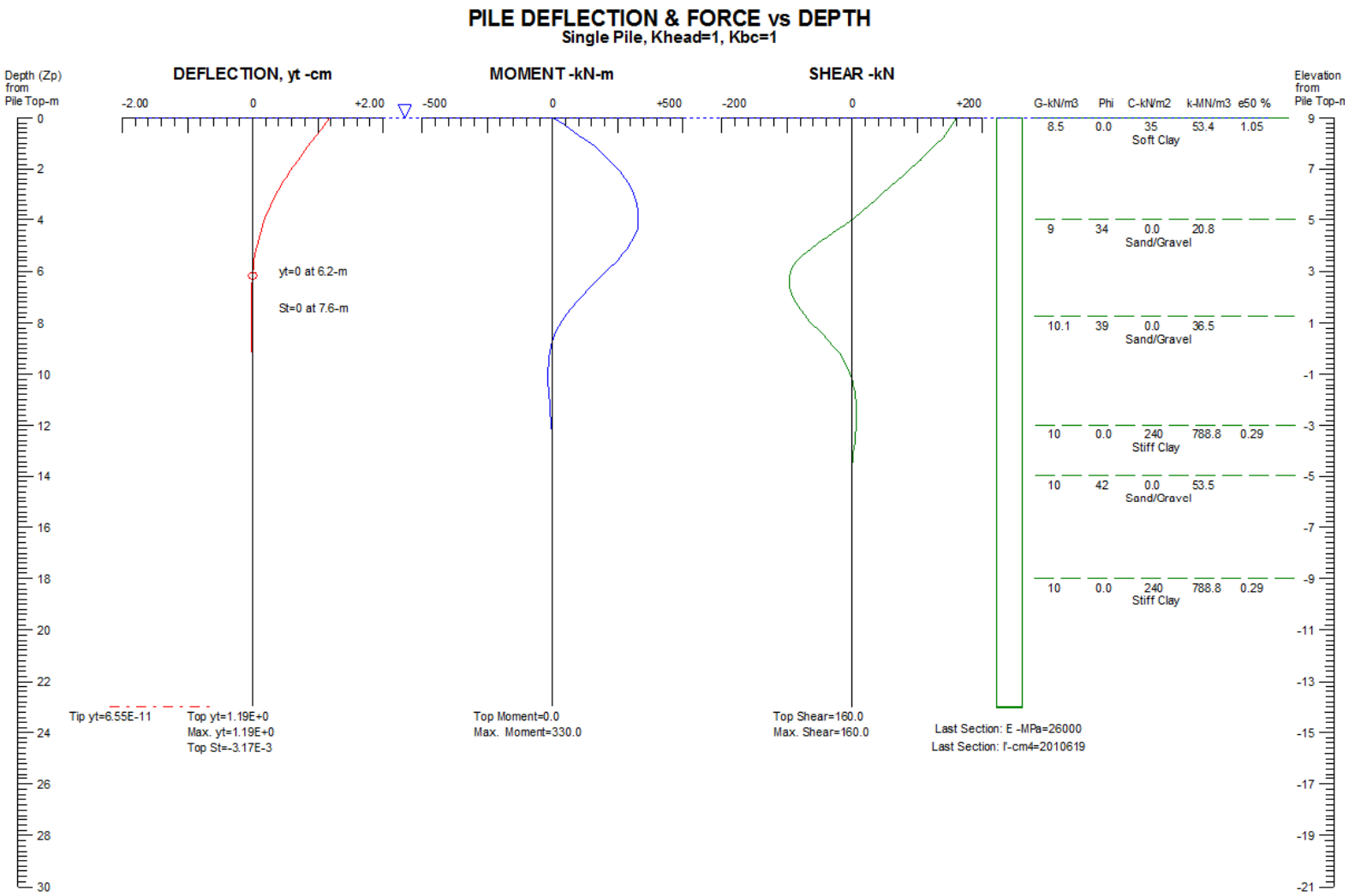



CivilTech Software

**Samawa Power Plant Project**
**Water Treatment Area (Clay Base 1)**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

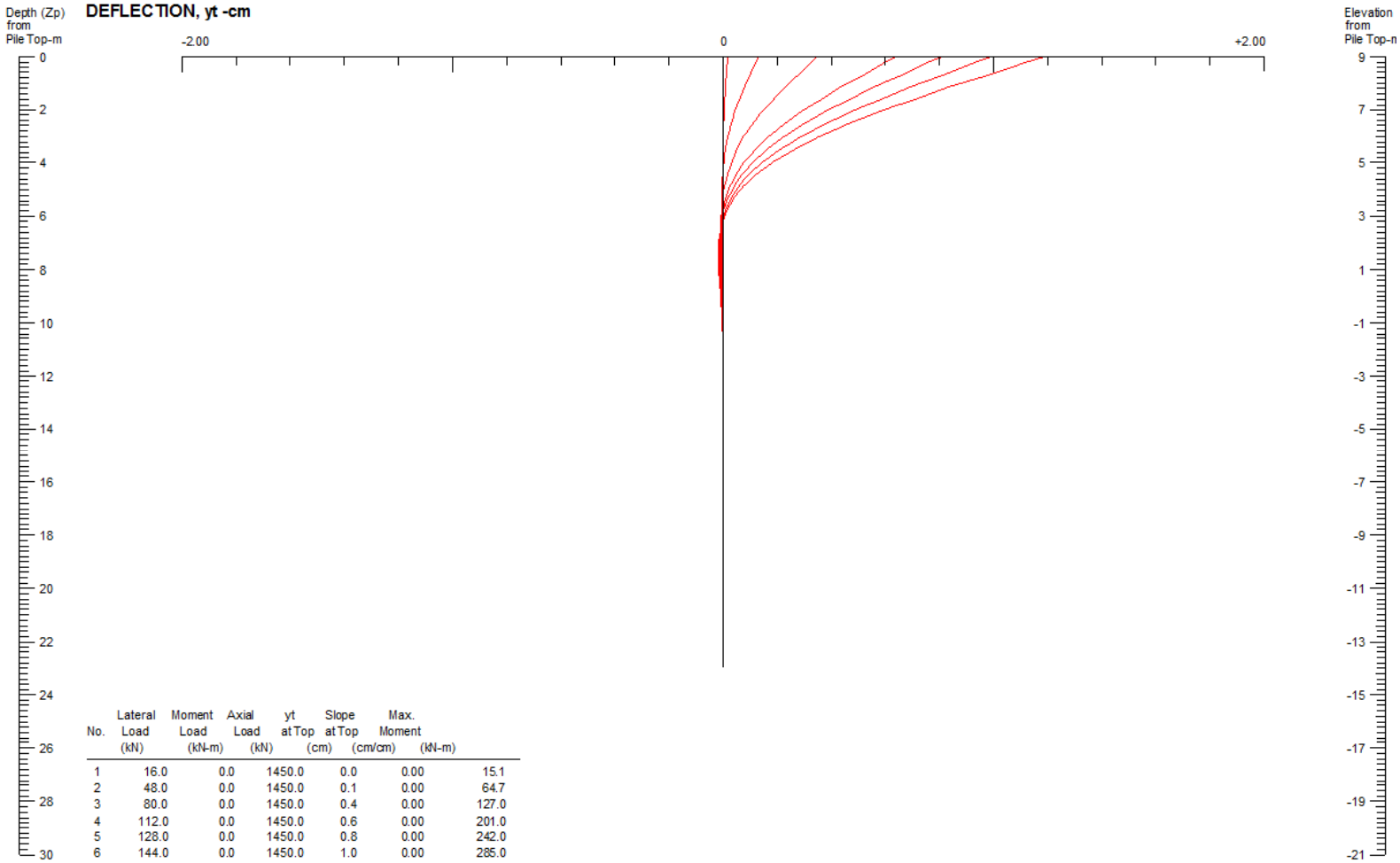



**CivilTech Software**

**Samawa Power Plant Project**
**Water Treatment Area (Clay Base 1)**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

## PILE DEFLECTION vs LOADING
Single Pile, Khead=1, Kbc=1

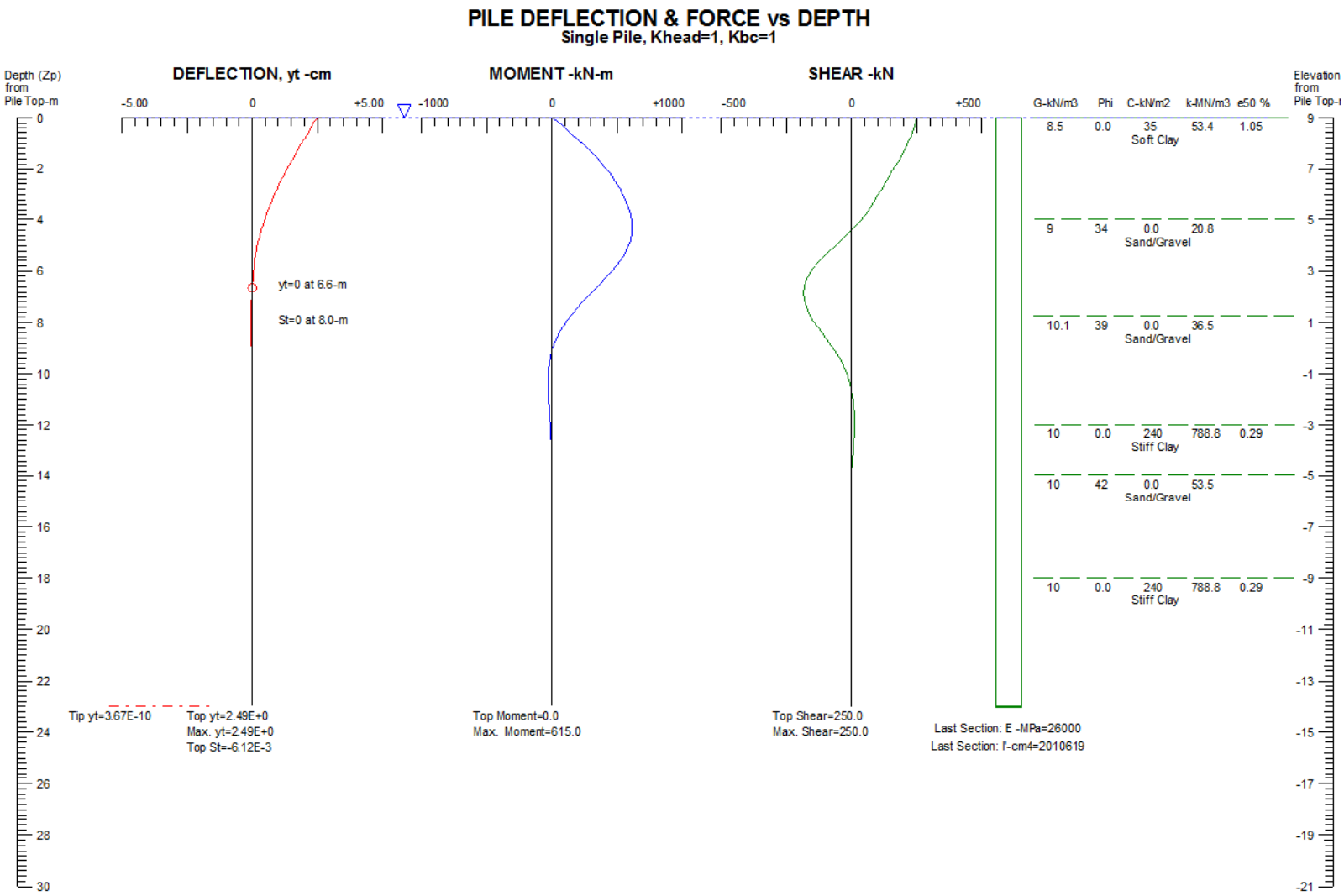



| No. | Lateral Load (kN) | Moment Load (kN-m) | Axial Load (kN) | yt at Top (cm) | Slope at Top (cm/cm) | Max. Moment (kN-m) |
|---|---|---|---|---|---|---|
| 1 | 16.0 | 0.0 | 1450.0 | 0.0 | 0.00 | 15.1 |
| 2 | 48.0 | 0.0 | 1450.0 | 0.1 | 0.00 | 64.7 |
| 3 | 80.0 | 0.0 | 1450.0 | 0.4 | 0.00 | 127.0 |
| 4 | 112.0 | 0.0 | 1450.0 | 0.6 | 0.00 | 201.0 |
| 5 | 128.0 | 0.0 | 1450.0 | 0.8 | 0.00 | 242.0 |
| 6 | 144.0 | 0.0 | 1450.0 | 1.0 | 0.00 | 285.0 |
| 7 | 160.0 | 0.0 | 1450.0 | 1.2 | 0.00 | 330.0 |

*CivilTech Software*

**Samawa Power Plant Project**
**Water Treatment Area (Clay Base 1)**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

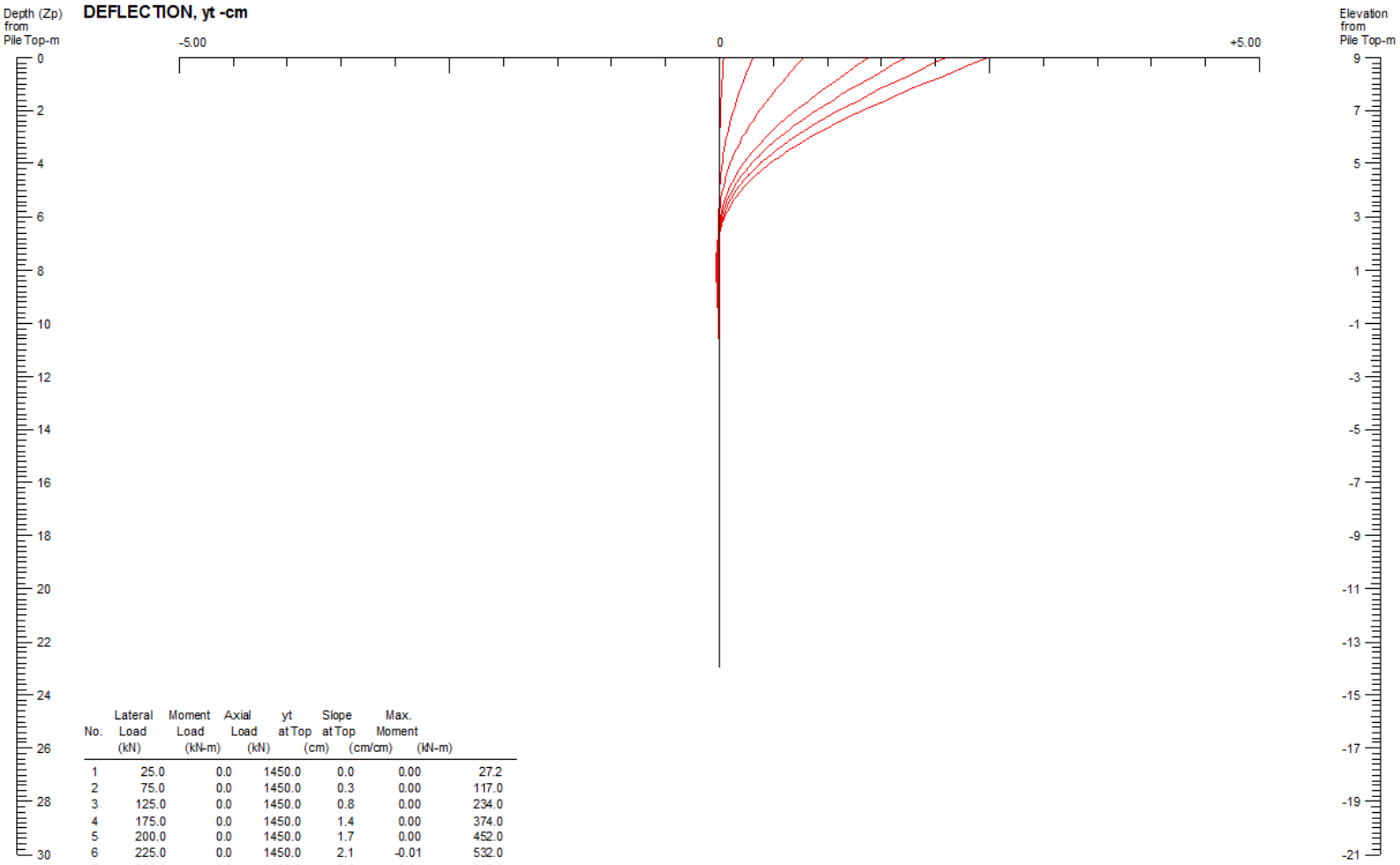



**CivilTech Software**

**Samawa Power Plant Project**
**Water Treatment Area (Clay Base 1)**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

## PILE DEFLECTION vs LOADING
Single Pile, Khead=1, Kbc=1




| No. | Lateral Load (kN) | Moment Load (kN-m) | Axial Load (kN) | yt at Top (cm) | Slope at Top (cm/cm) | Max. Moment (kN-m) |
|---|---|---|---|---|---|---|
| 1 | 25.0 | 0.0 | 1450.0 | 0.0 | 0.00 | 27.2 |
| 2 | 75.0 | 0.0 | 1450.0 | 0.3 | 0.00 | 117.0 |
| 3 | 125.0 | 0.0 | 1450.0 | 0.8 | 0.00 | 234.0 |
| 4 | 175.0 | 0.0 | 1450.0 | 1.4 | 0.00 | 374.0 |
| 5 | 200.0 | 0.0 | 1450.0 | 1.7 | 0.00 | 452.0 |
| 6 | 225.0 | 0.0 | 1450.0 | 2.1 | -0.01 | 532.0 |
| 7 | 250.0 | 0.0 | 1450.0 | 2.5 | -0.01 | 615.0 |

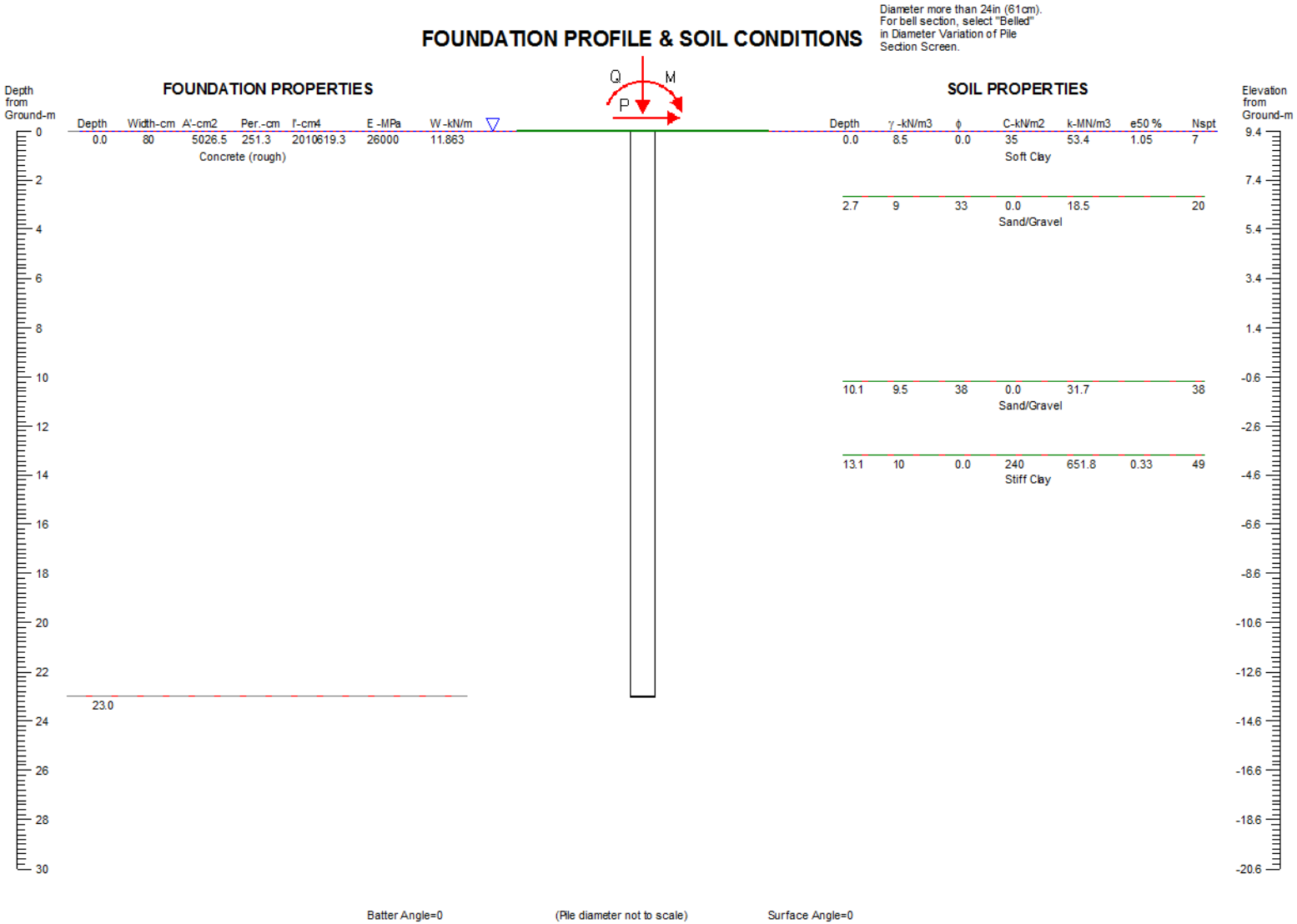
*CivilTech Software*

**Samawa Power Plant Project**
**Water Treatment Area (Clay Base 1)**

**F.2) Water Treatment Area (Clay Base-2)**

**F.2.1) Axial Allowable Loads**
Axial Compression Allowable Bearing Capacity= 1504 kN
Axial Allowable Uplift Capacity= 1184 kN

**F.2.2)Horizontal Load Capacity for Free Head Pile**
Horizontal allowable lateral load is 170kN for 1.2 cm lateral top deflection. Maximum sectional moment : Mmax=353kN-m
Horizontal ultimate lateral capacity is 275kN for 2.5 cm top deflection. Maximum sectional moment : 662kN-m

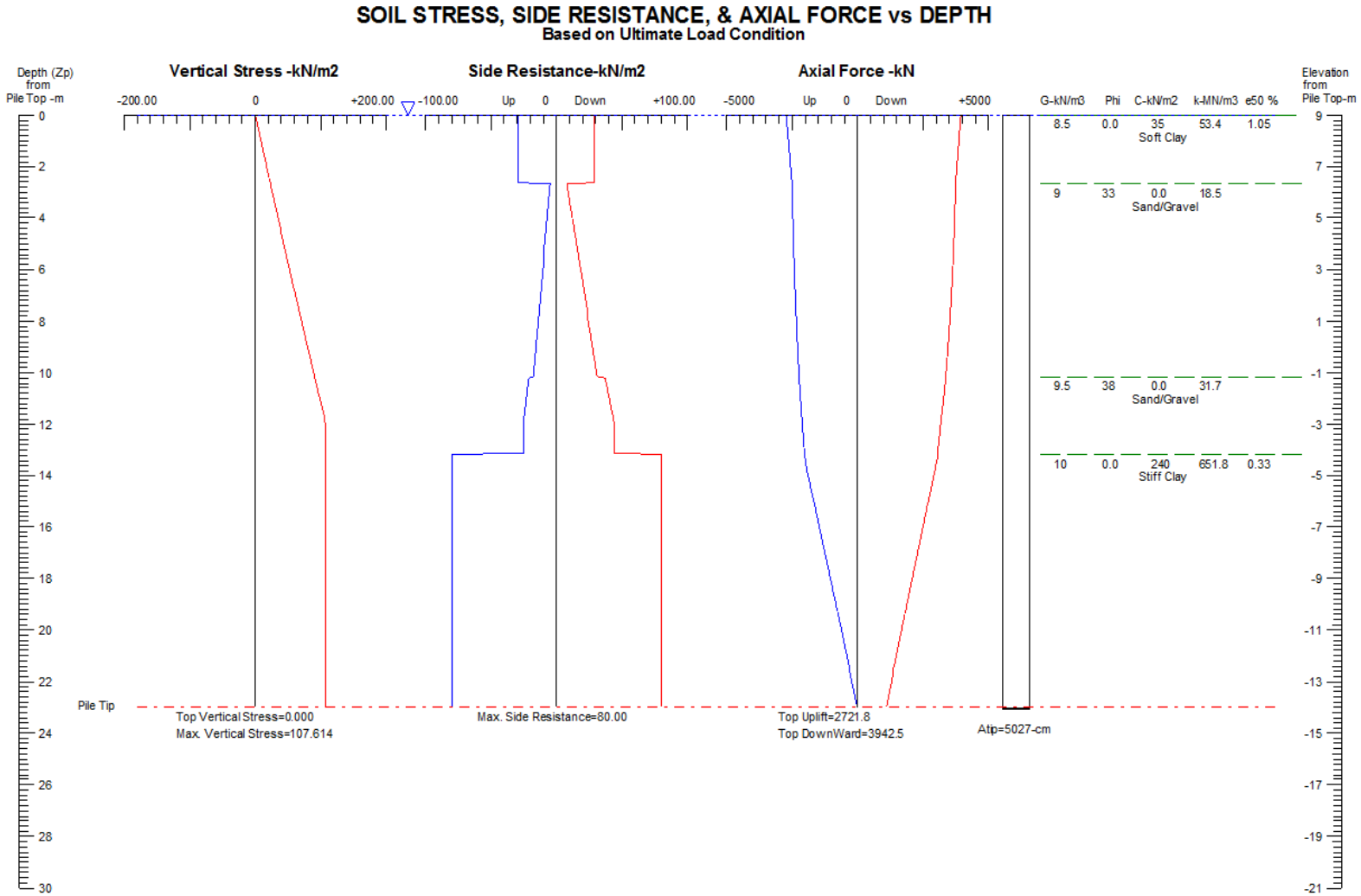



CivilTech Software

**Samawa Power Plant Project**
**Water Treatment Area (Clay Base 2)**

**Figure 1**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

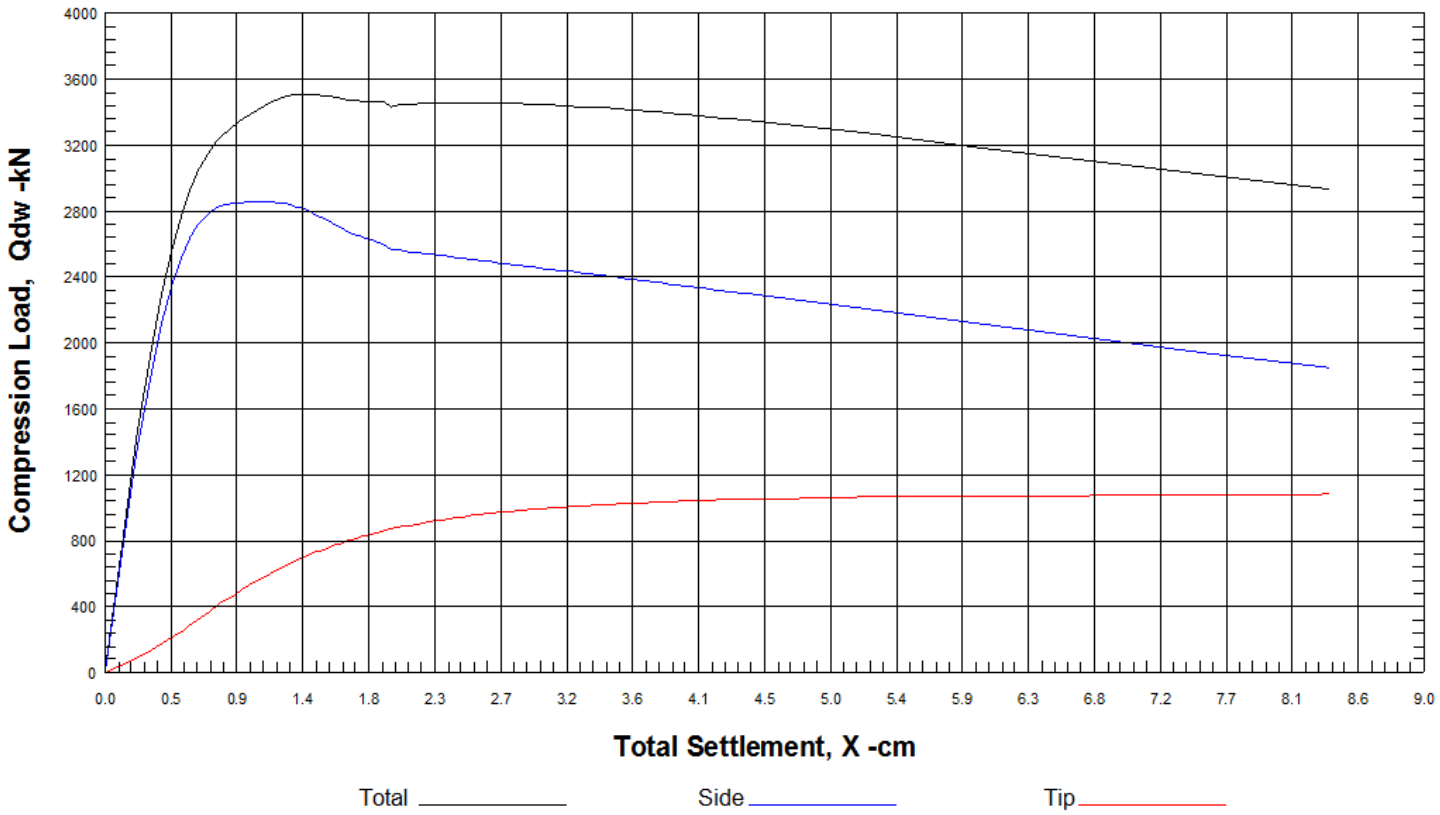



CivilTech Software

**Samawa Power Plant Project**
**Water Treatment Area (Clay Base 2)**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

## Vertical Load vs. Total Settlement

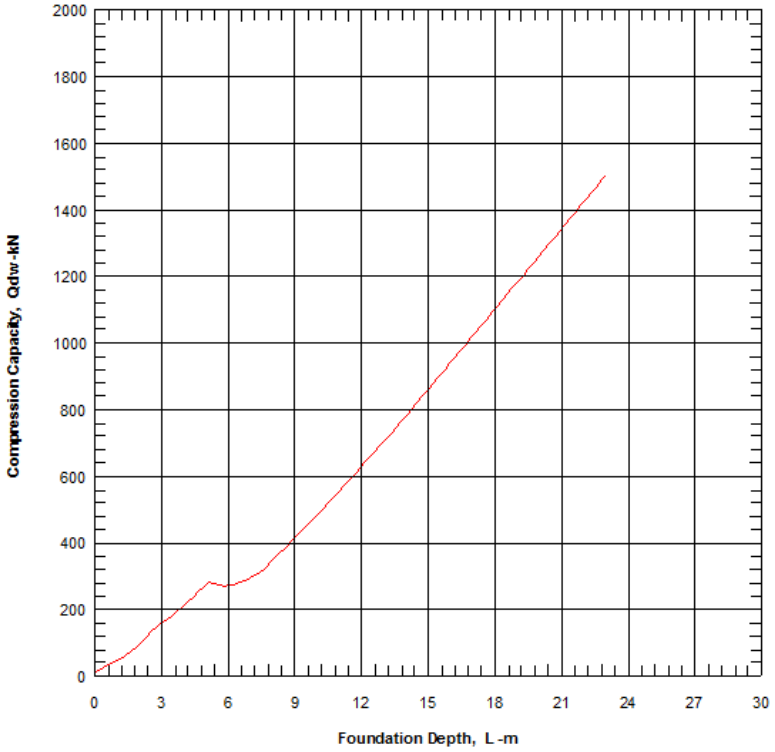


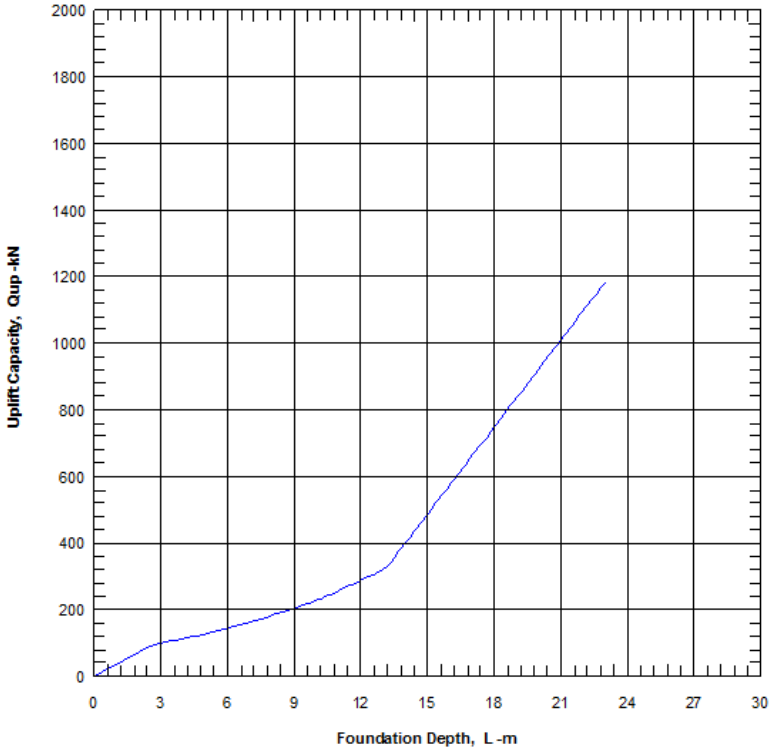

CivilTech Software

**Samawa Power Plant Project**
**Water Treatment Area (Clay Base 2)**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

# ALLOWABLE CAPACITY vs FOUNDATION DEPTH

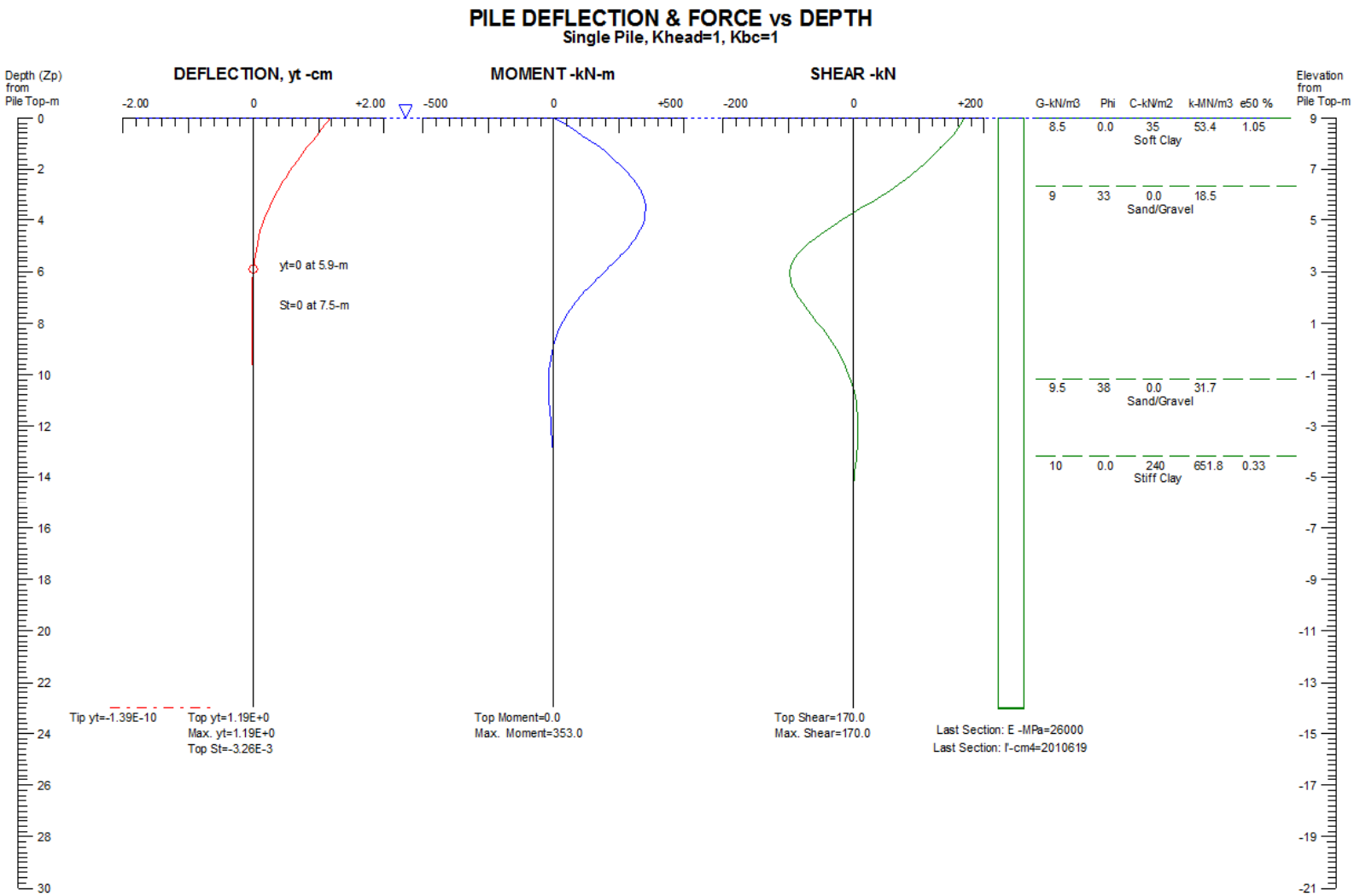



CivilTech Software

**Samawa Power Plant Project**
**Water Treatment Area (Clay Base 2)**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

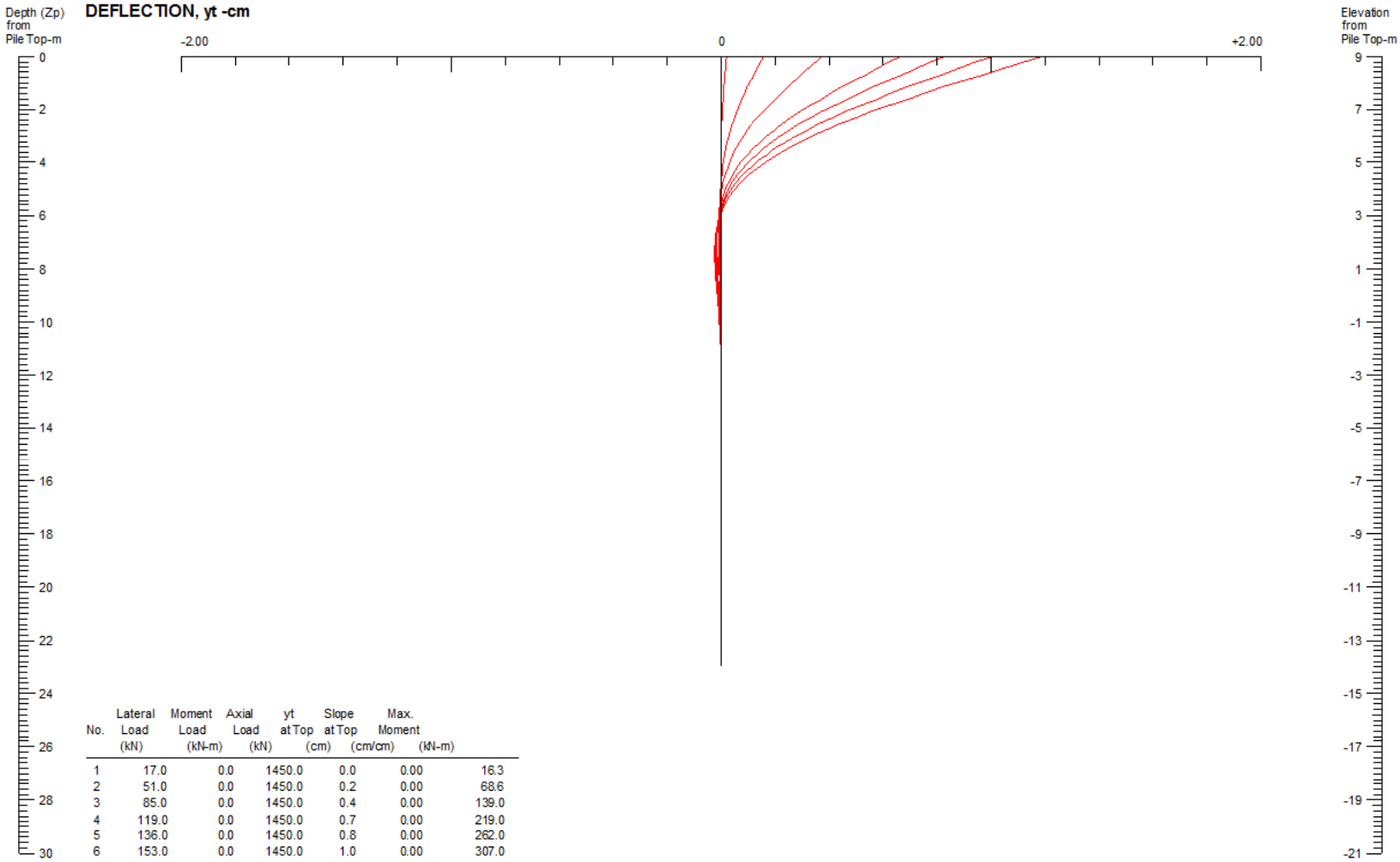



CivilTech Software

**Samawa Power Plant Project**
**Water Treatment Area (Clay Base 2)**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

## PILE DEFLECTION vs LOADING
Single Pile, Khead=1, Kbc=1




| No. | Lateral Load (kN) | Moment Load (kN-m) | Axial Load (kN) | yt at Top (cm) | Slope at Top (cm/cm) | Max. Moment (kN-m) |
|---|---|---|---|---|---|---|
| 1 | 17.0 | 0.0 | 1450.0 | 0.0 | 0.00 | 16.3 |
| 2 | 51.0 | 0.0 | 1450.0 | 0.2 | 0.00 | 68.6 |
| 3 | 85.0 | 0.0 | 1450.0 | 0.4 | 0.00 | 139.0 |
| 4 | 119.0 | 0.0 | 1450.0 | 0.7 | 0.00 | 219.0 |
| 5 | 136.0 | 0.0 | 1450.0 | 0.8 | 0.00 | 262.0 |
| 6 | 153.0 | 0.0 | 1450.0 | 1.0 | 0.00 | 307.0 |
| 7 | 170.0 | 0.0 | 1450.0 | 1.2 | 0.00 | 353.0 |

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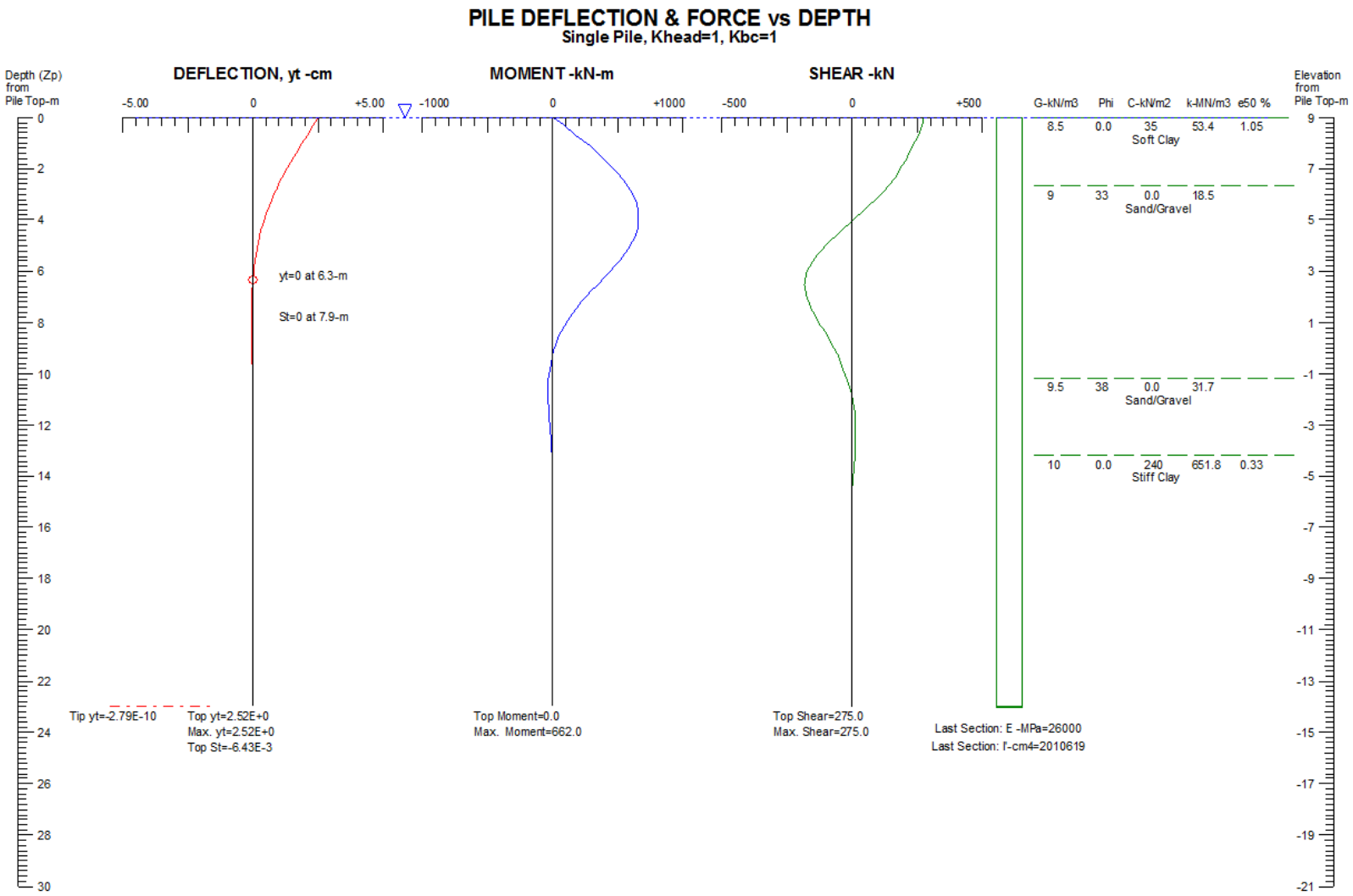
**Samawa Power Plant Project**
**Water Treatment Area (Clay Base 2)**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

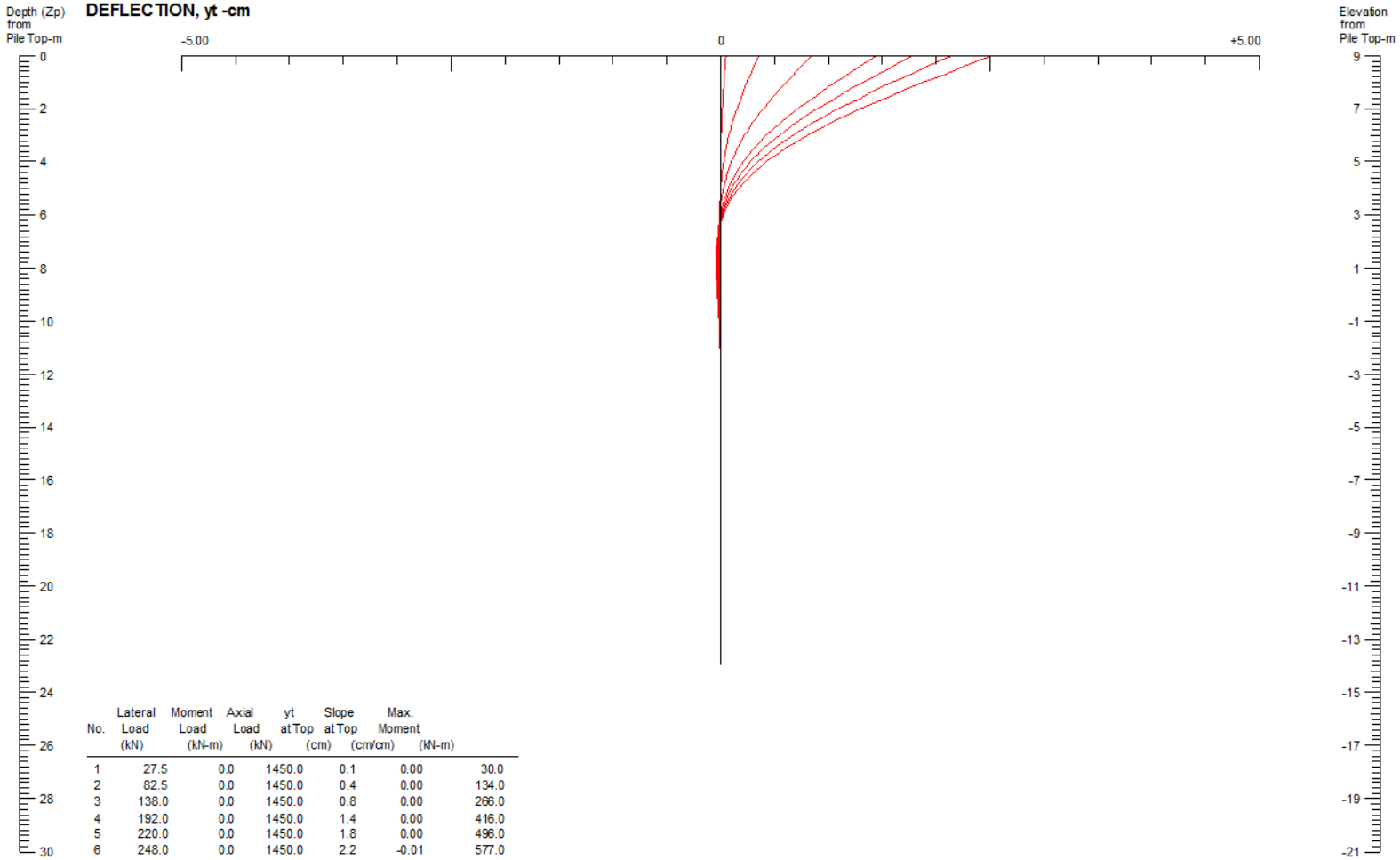



CivilTech Software

**Samawa Power Plant Project**
**Water Treatment Area (Clay Base 2)**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

## PILE DEFLECTION vs LOADING
Single Pile, Khead=1, Kbc=1




| No. | Lateral Load (kN) | Moment Load (kN-m) | Axial Load (kN) | yt at Top (cm) | Slope at Top (cm/cm) | Max. Moment (kN-m) |
|---|---|---|---|---|---|---|
| 1 | 27.5 | 0.0 | 1450.0 | 0.1 | 0.00 | 30.0 |
| 2 | 82.5 | 0.0 | 1450.0 | 0.4 | 0.00 | 134.0 |
| 3 | 138.0 | 0.0 | 1450.0 | 0.8 | 0.00 | 266.0 |
| 4 | 192.0 | 0.0 | 1450.0 | 1.4 | 0.00 | 416.0 |
| 5 | 220.0 | 0.0 | 1450.0 | 1.8 | 0.00 | 496.0 |
| 6 | 248.0 | 0.0 | 1450.0 | 2.2 | -0.01 | 577.0 |
| 7 | 275.0 | 0.0 | 1450.0 | 2.5 | -0.01 | 662.0 |

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**Samawa Power Plant Project**
**Water Treatment Area (Clay Base 2)**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

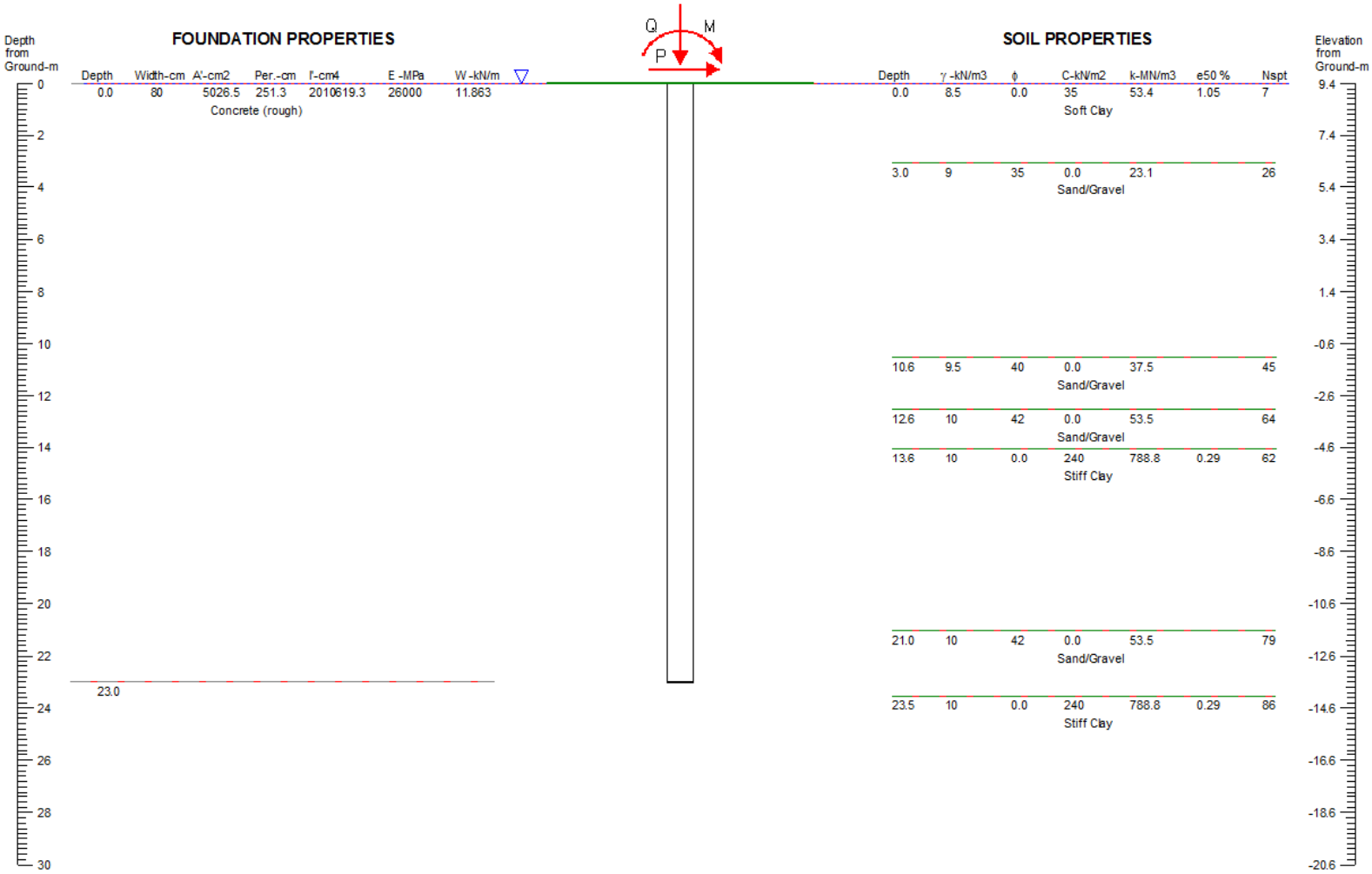
**F.3) Water Treatment Area (Sand Base)**

**F.3.1) Axial Allowable Loads**
Axial Compression Allowable Bearing Capacity= 1445 kN
Axial Allowable Uplift Capacity= 1084 kN

**F.3.2)Horizontal Load Capacity for Free Head Pile**
Horizontal allowable lateral load is 170kN for 1.2 cm lateral top deflection. Maximum sectional moment : Mmax=362kN-m
Horizontal ultimate lateral capacity is 275kN for 2.5 cm top deflection. Maximum sectional moment : 683kN-m

## FOUNDATION PROFILE & SOIL CONDITIONS

Diameter more than 24in (61cm).
For bell section, select "Belled"
in Diameter Variation of Pile
Section Screen.




Batter Angle=0 (Pile diameter not to scale) Surface Angle=0

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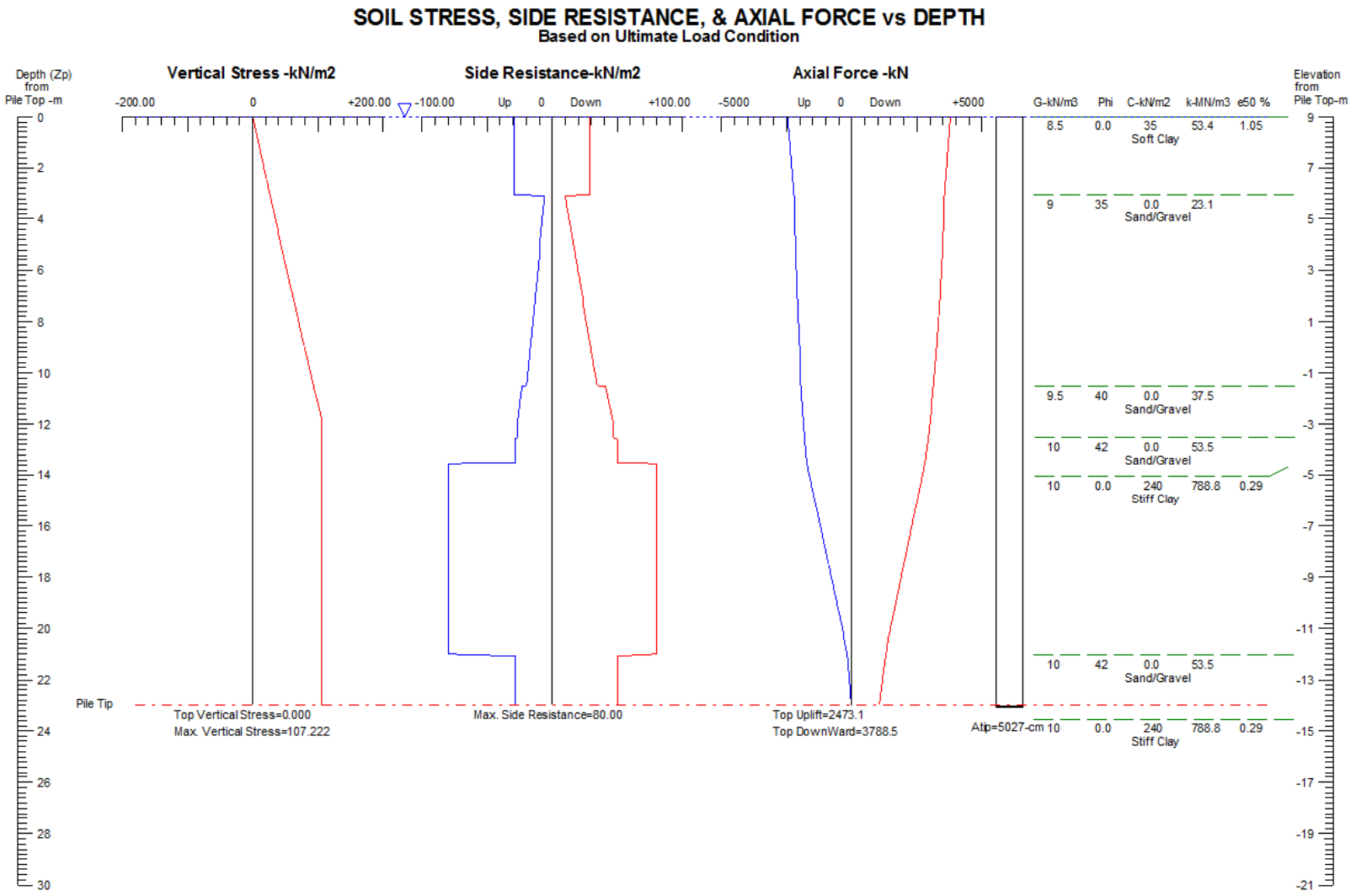
**Samawa Power Plant Project**
**Water Treatment Area (Sand Base)**

**Figure 1**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

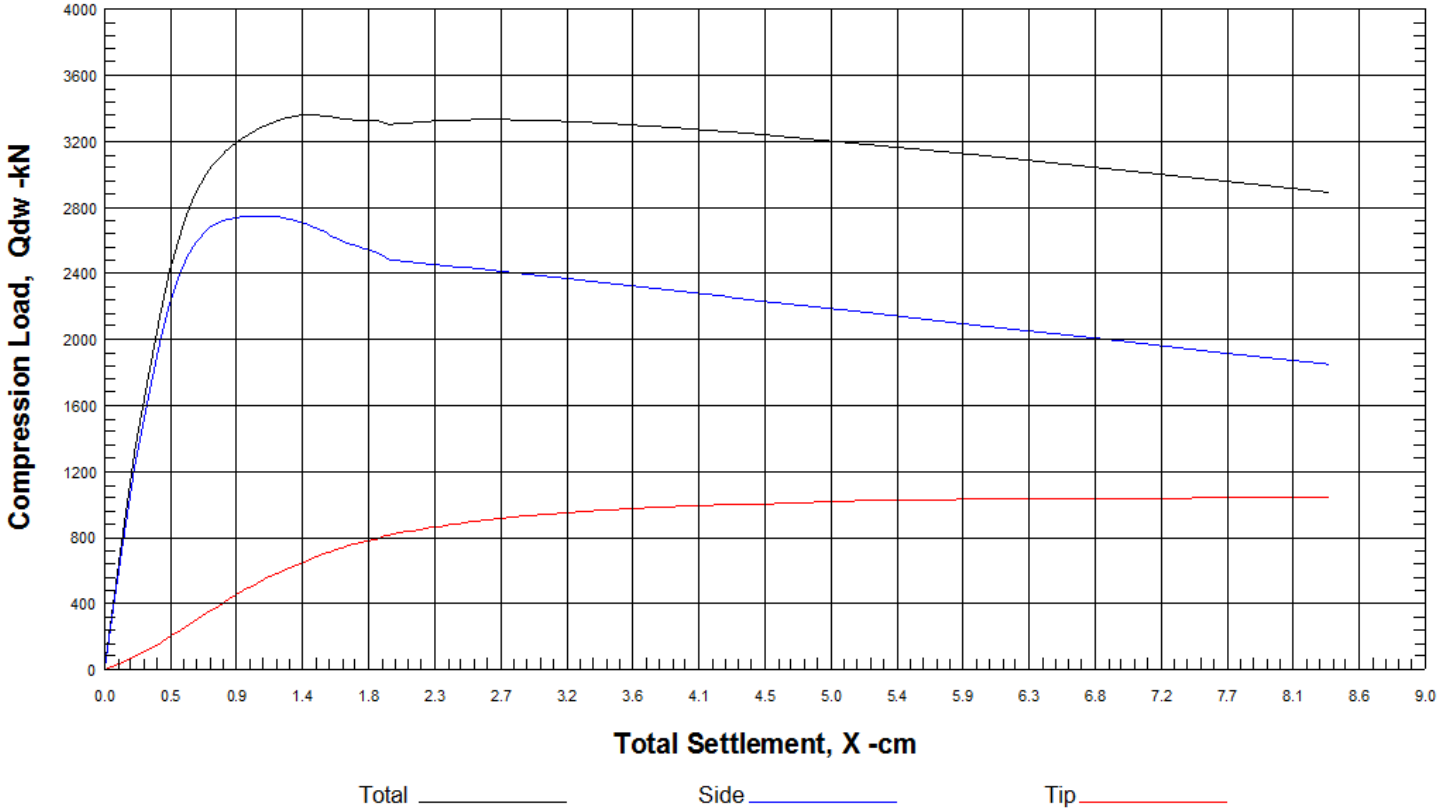



CivilTech Software

**Samawa Power Plant Project**
**Water Treatment Area (Sand Base)**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

## Vertical Load vs. Total Settlement

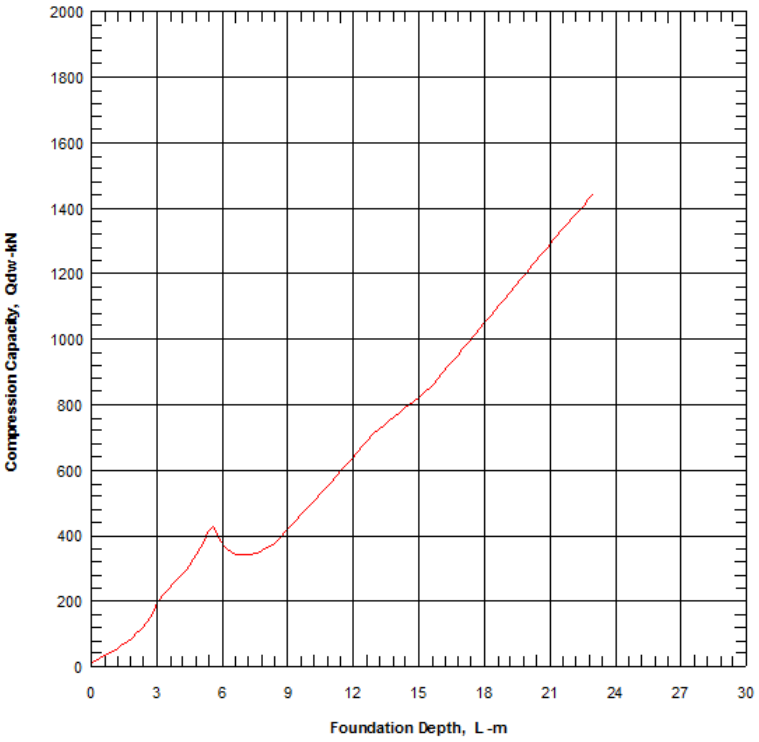


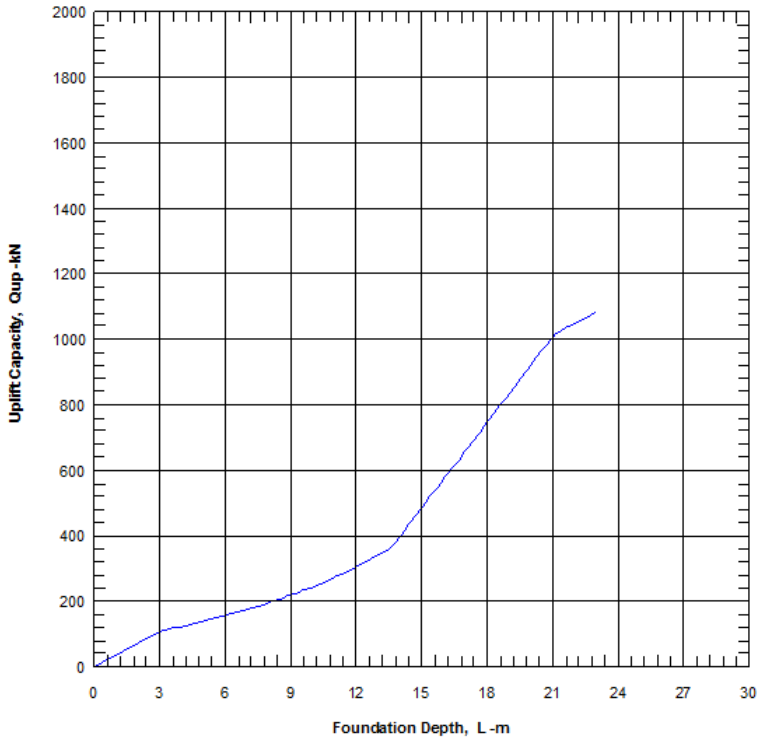

CivilTech Software

**Samawa Power Plant Project**
**Water Treatment Area (Sand Base)**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

# ALLOWABLE CAPACITY vs FOUNDATION DEPTH

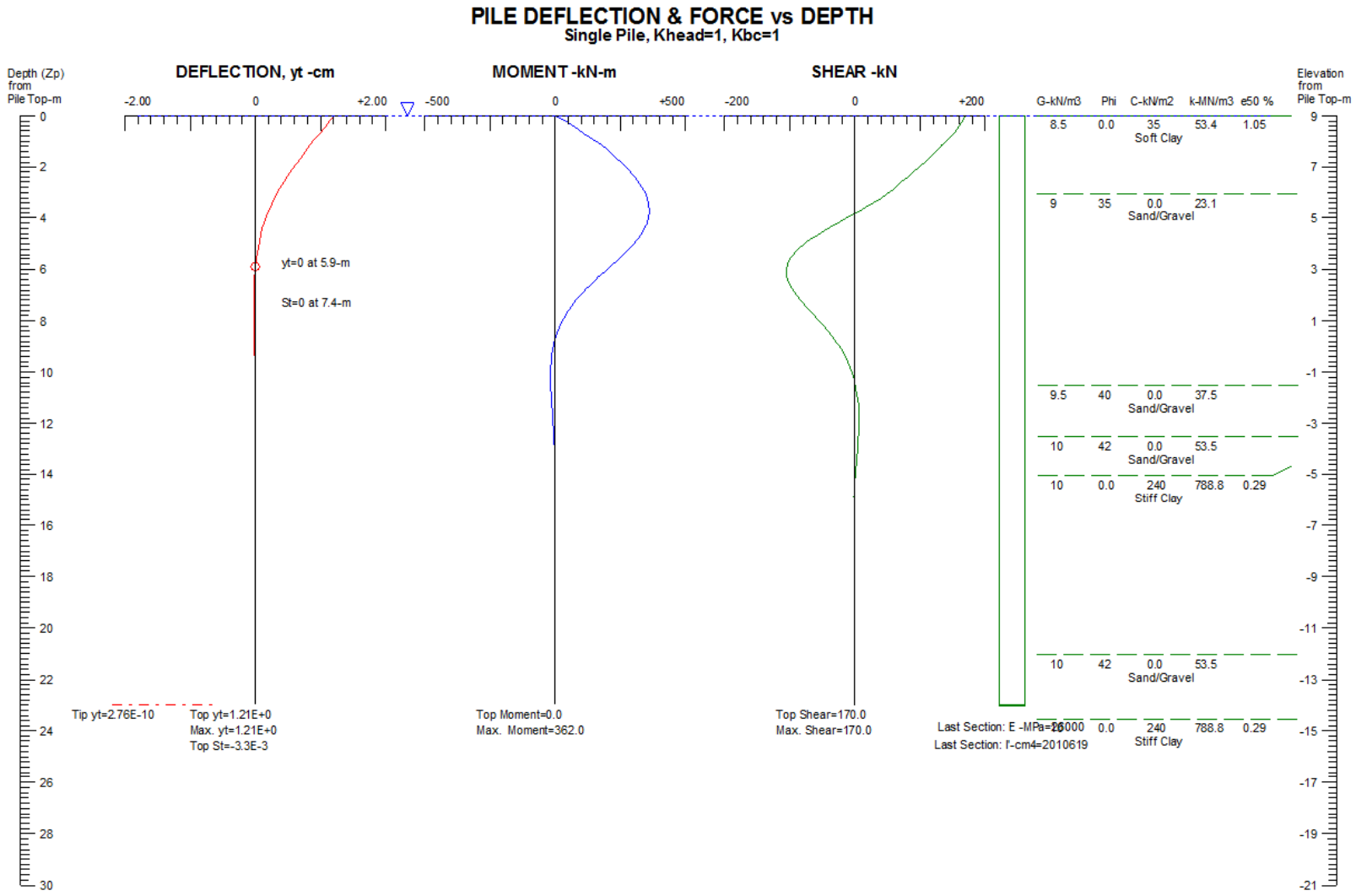



CivilTech Software

**Samawa Power Plant Project**
**Water Treatment Area (Sand Base)**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

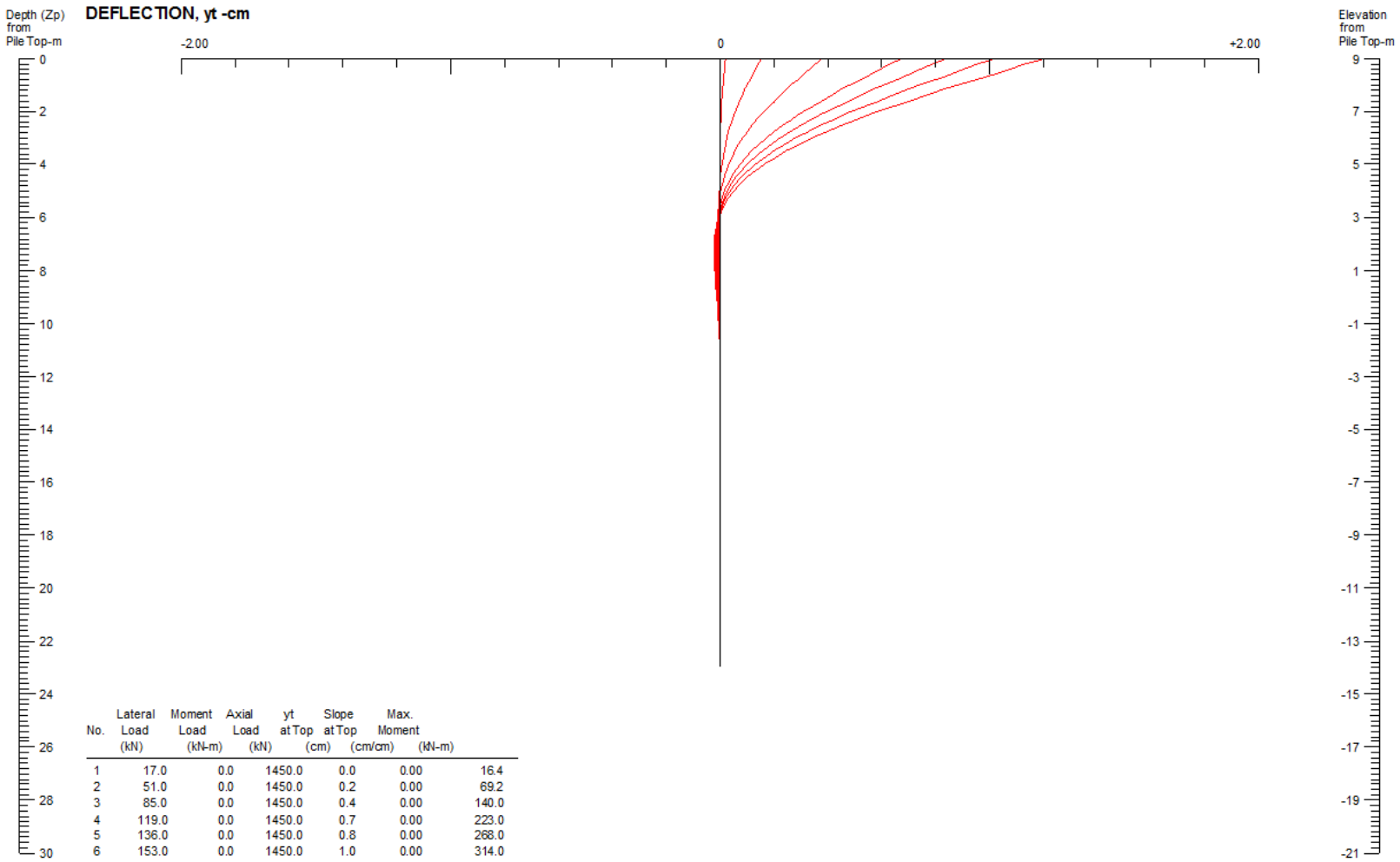



**CivilTech Software**

**Samawa Power Plant Project**
**Water Treatment Area (Sand Base)**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

## PILE DEFLECTION vs LOADING
Single Pile, Khead=1, Kbc=1




| No. | Lateral Load (kN) | Moment Load (kN-m) | Axial Load (kN) | yt at Top (cm) | Slope at Top (cm/cm) | Max. Moment (kN-m) |
|---|---|---|---|---|---|---|
| 1 | 17.0 | 0.0 | 1450.0 | 0.0 | 0.00 | 16.4 |
| 2 | 51.0 | 0.0 | 1450.0 | 0.2 | 0.00 | 69.2 |
| 3 | 85.0 | 0.0 | 1450.0 | 0.4 | 0.00 | 140.0 |
| 4 | 119.0 | 0.0 | 1450.0 | 0.7 | 0.00 | 223.0 |
| 5 | 136.0 | 0.0 | 1450.0 | 0.8 | 0.00 | 268.0 |
| 6 | 153.0 | 0.0 | 1450.0 | 1.0 | 0.00 | 314.0 |
| 7 | 170.0 | 0.0 | 1450.0 | 1.2 | 0.00 | 362.0 |

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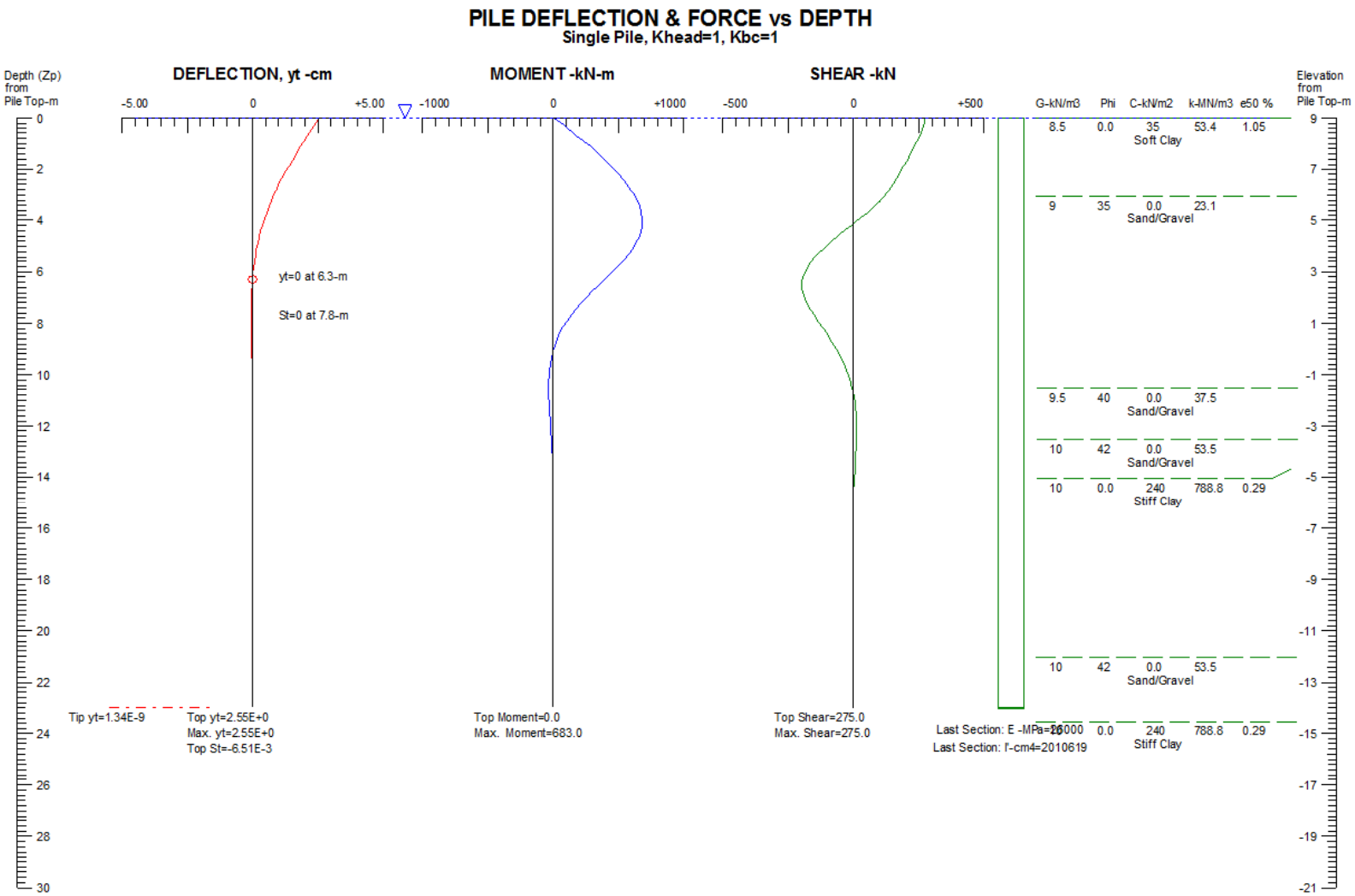
**Samawa Power Plant Project**
**Water Treatment Area (Sand Base)**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

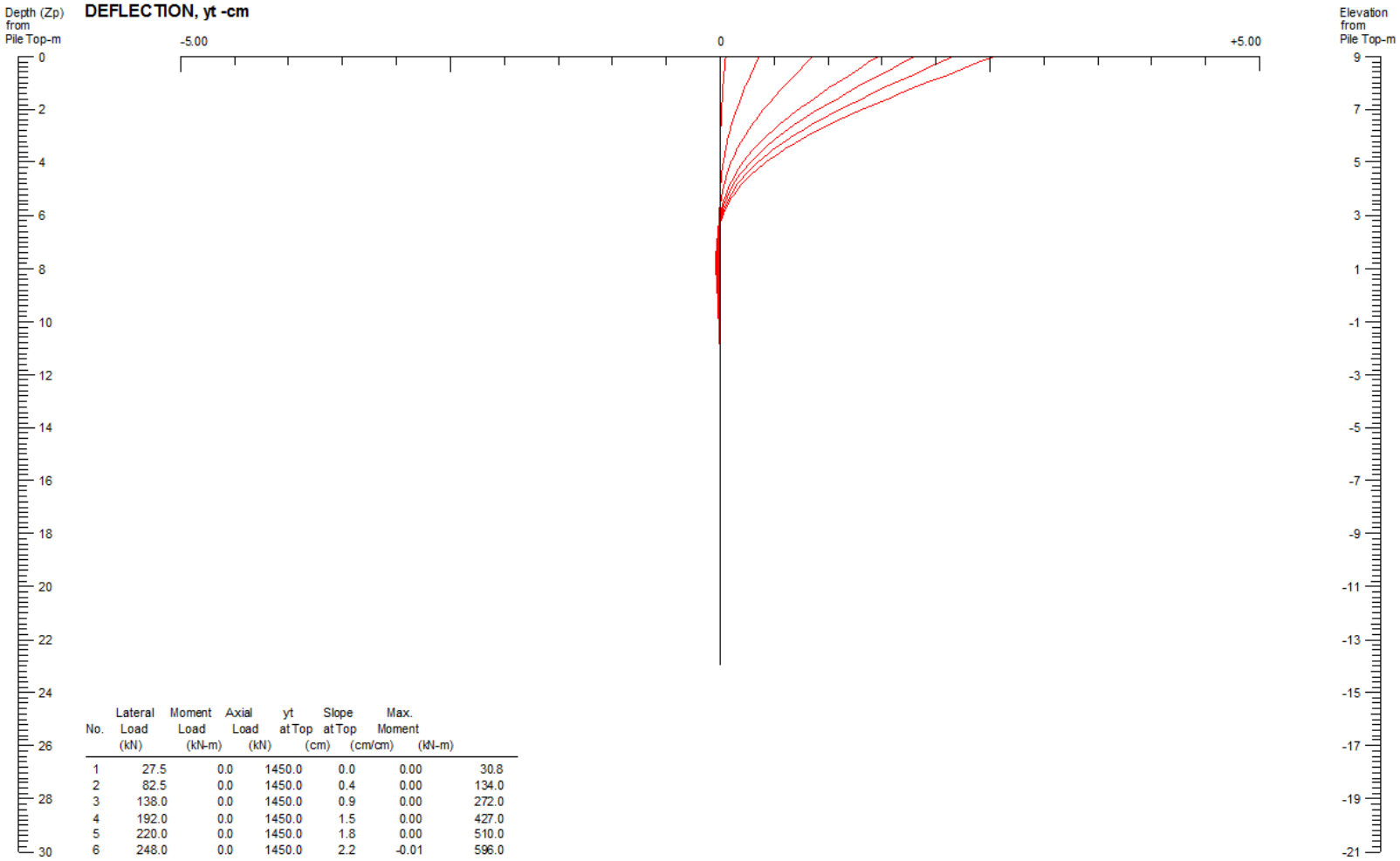



**CivilTech Software**

**Samawa Power Plant Project**
**Water Treatment Area (Sand Base)**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

## PILE DEFLECTION vs LOADING
Single Pile, Khead=1, Kbc=1




| No. | Lateral Load (kN) | Moment Load (kN-m) | Axial Load (kN) | yt at Top (cm) | Slope at Top (cm/cm) | Max. Moment (kN-m) |
|---|---|---|---|---|---|---|
| 1 | 27.5 | 0.0 | 1450.0 | 0.0 | 0.00 | 30.8 |
| 2 | 82.5 | 0.0 | 1450.0 | 0.4 | 0.00 | 134.0 |
| 3 | 138.0 | 0.0 | 1450.0 | 0.9 | 0.00 | 272.0 |
| 4 | 192.0 | 0.0 | 1450.0 | 1.5 | 0.00 | 427.0 |
| 5 | 220.0 | 0.0 | 1450.0 | 1.8 | 0.00 | 510.0 |
| 6 | 248.0 | 0.0 | 1450.0 | 2.2 | -0.01 | 596.0 |
| 7 | 275.0 | 0.0 | 1450.0 | 2.5 | -0.01 | 683.0 |

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**Samawa Power Plant Project**
**Water Treatment Area (Sand Base)**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

**G) Tank Area**

**G.1) Tank Area (Clay Base-1)**

**G.1.1) Axial Allowable Loads**

Axial Compression Allowable Bearing Capacity= 1496 kN

Axial Allowable Uplift Capacity= 1135 kN

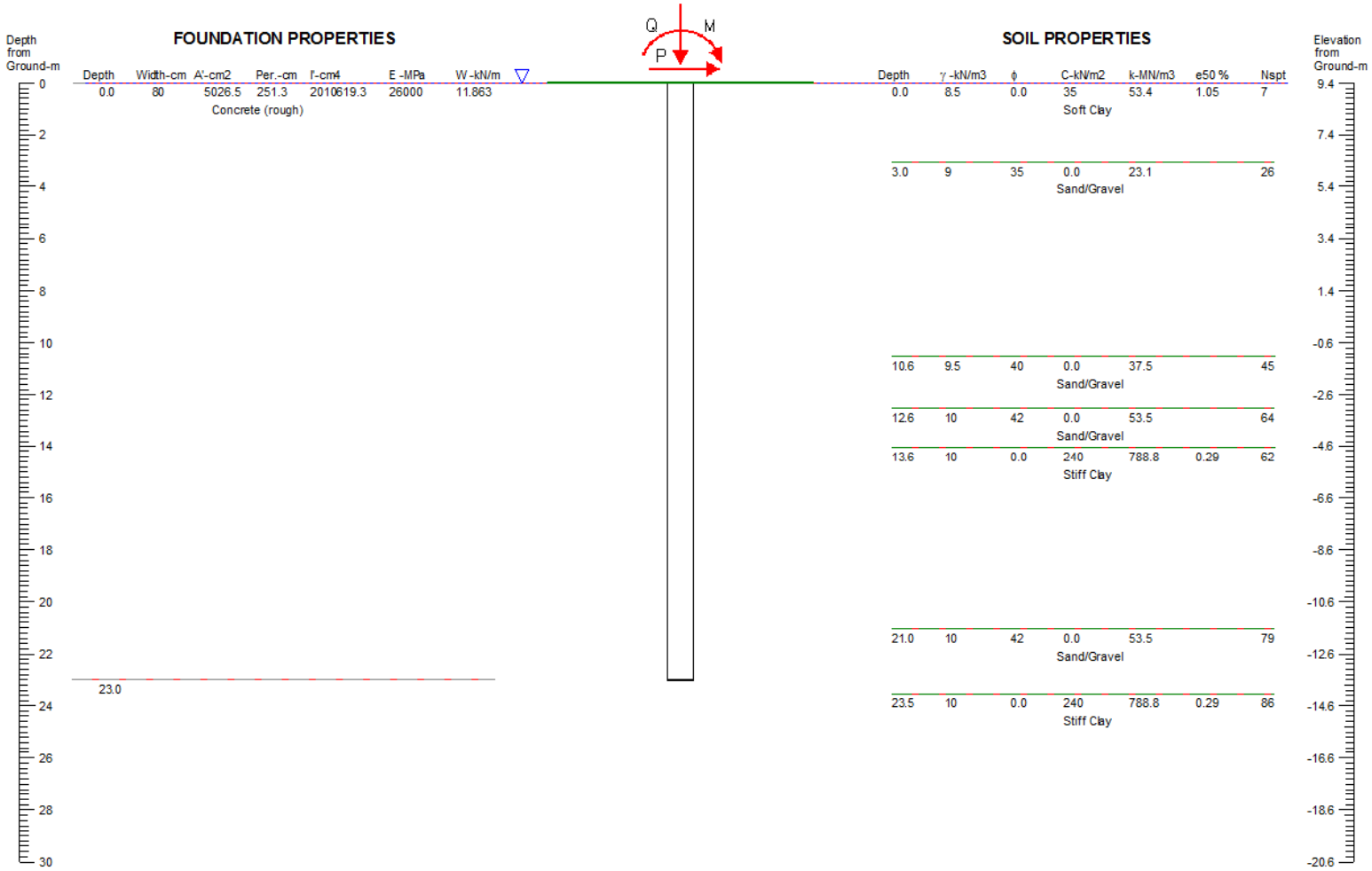
**G.1.2)Horizontal Load Capacity for Free Head Pile**

Horizontal allowable lateral load is 165kN for 1.2 cm lateral top deflection. Maximum sectional moment : Mmax=339kN-m

Horizontal ultimate lateral capacity is 255kN for 2.5 cm top deflection. Maximum sectional moment : 620kN-m

## FOUNDATION PROFILE & SOIL CONDITIONS

Diameter more than 24in (61cm).
For bell section, select "Belled"
in Diameter Variation of Pile
Section Screen.




Batter Angle=0 (Pile diameter not to scale) Surface Angle=0

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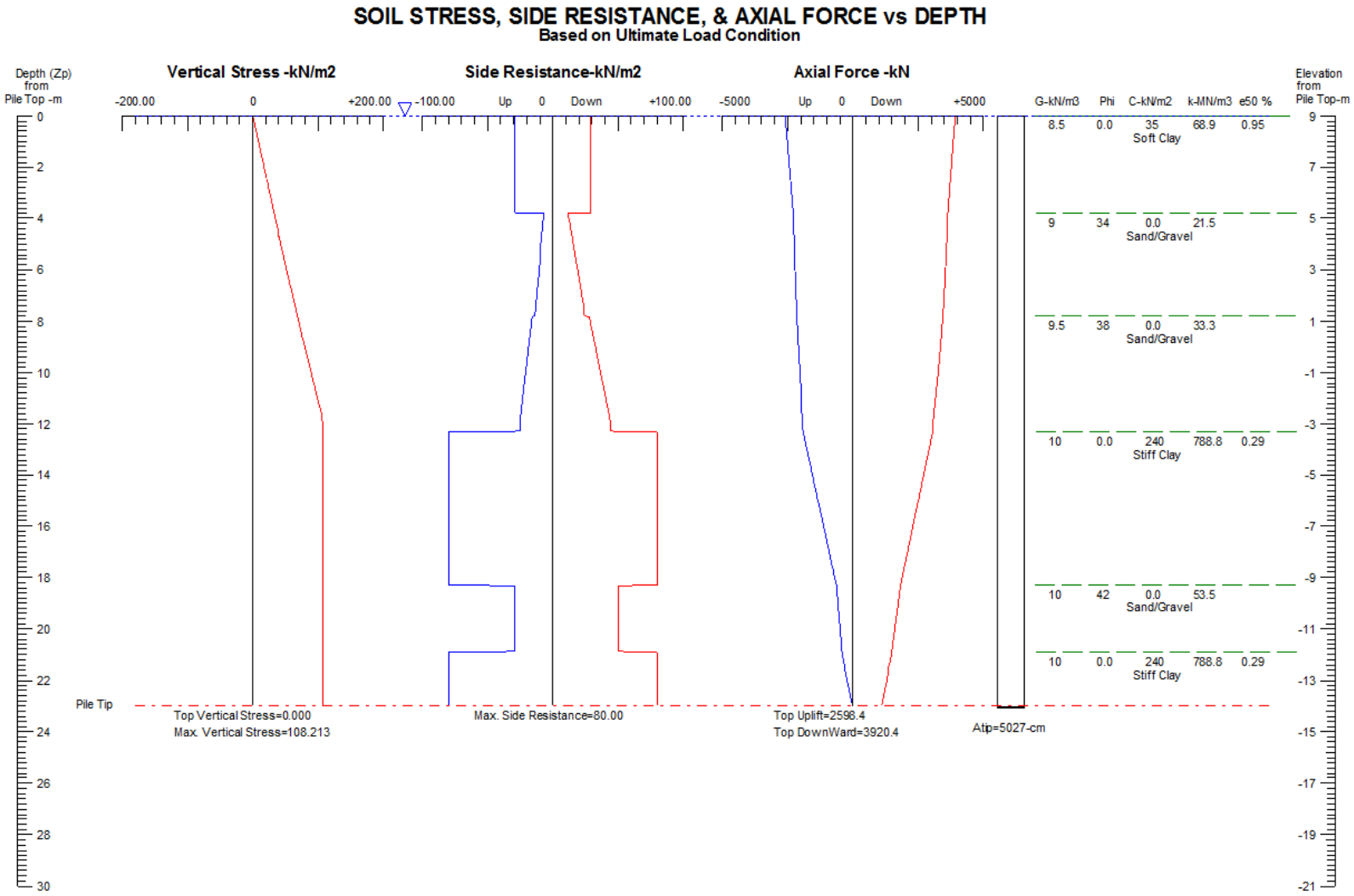
**Samawa Power Plant Project**
**Water Treatment Area (Sand Base)**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

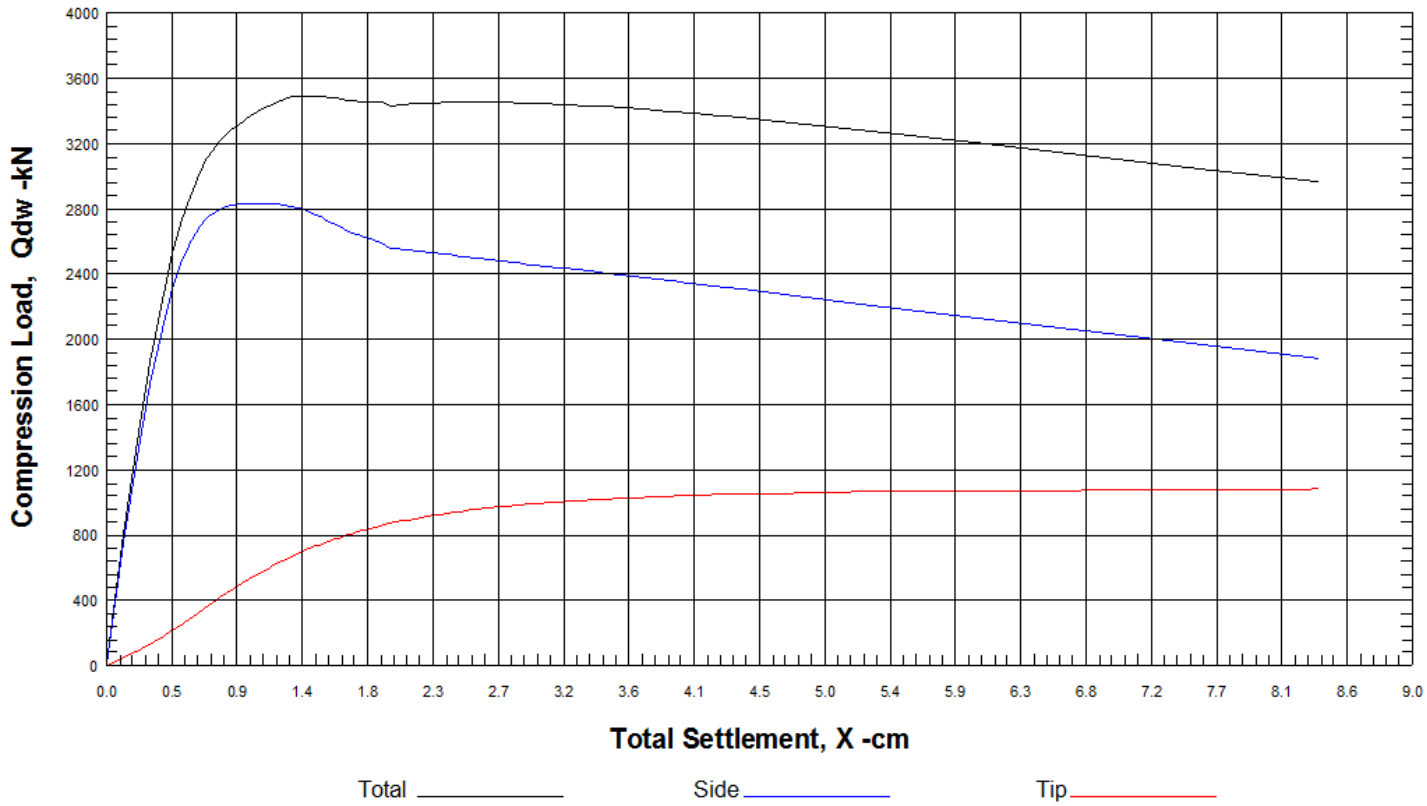



**CivilTech Software**

**Samawa Power Plant Project**
**Tank Area (Clay Base-1)**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

## Vertical Load vs. Total Settlement

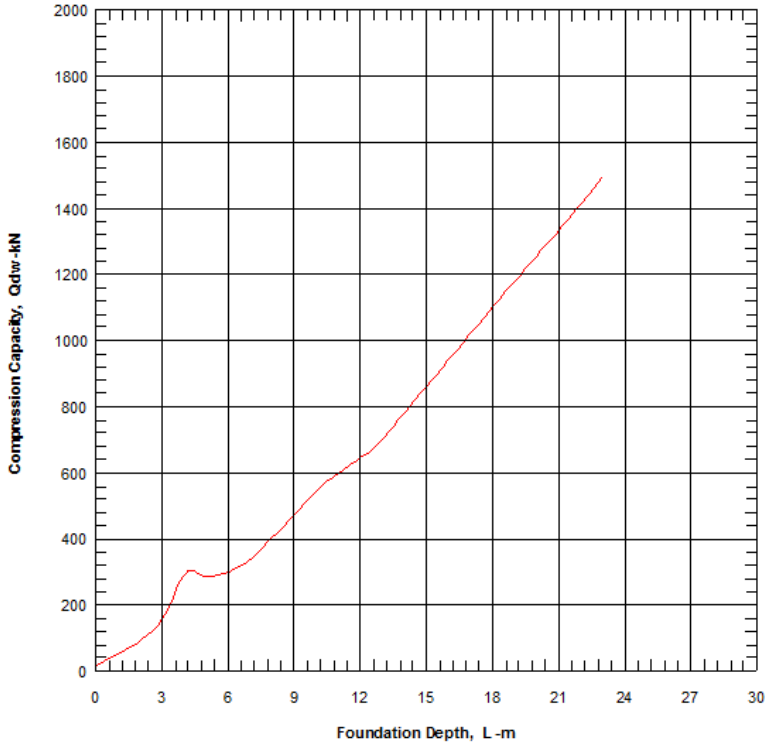


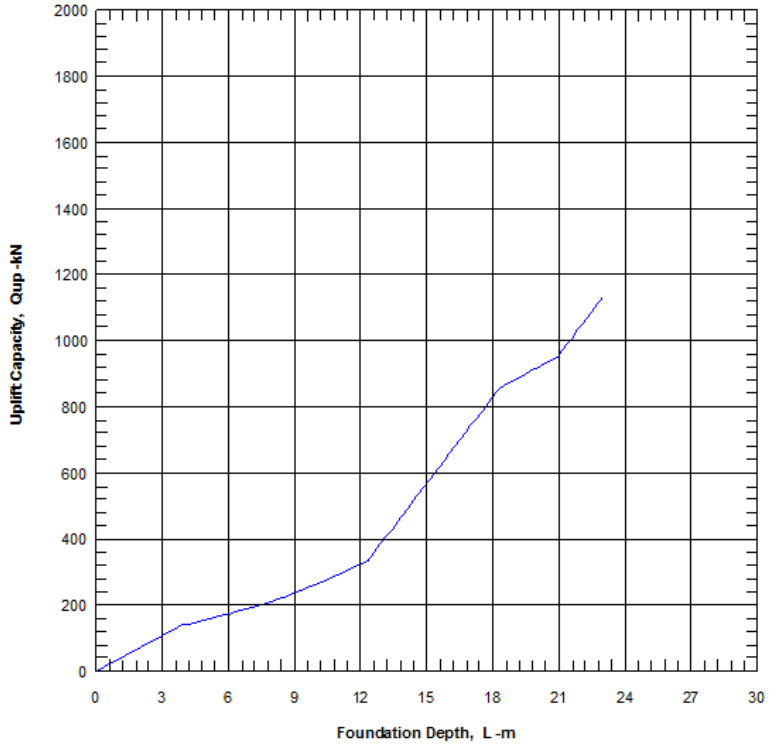

CivilTech Software

**Samawa Power Plant Project**
**Tank Area (Clay Base-1)**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

# ALLOWABLE CAPACITY vs FOUNDATION DEPTH

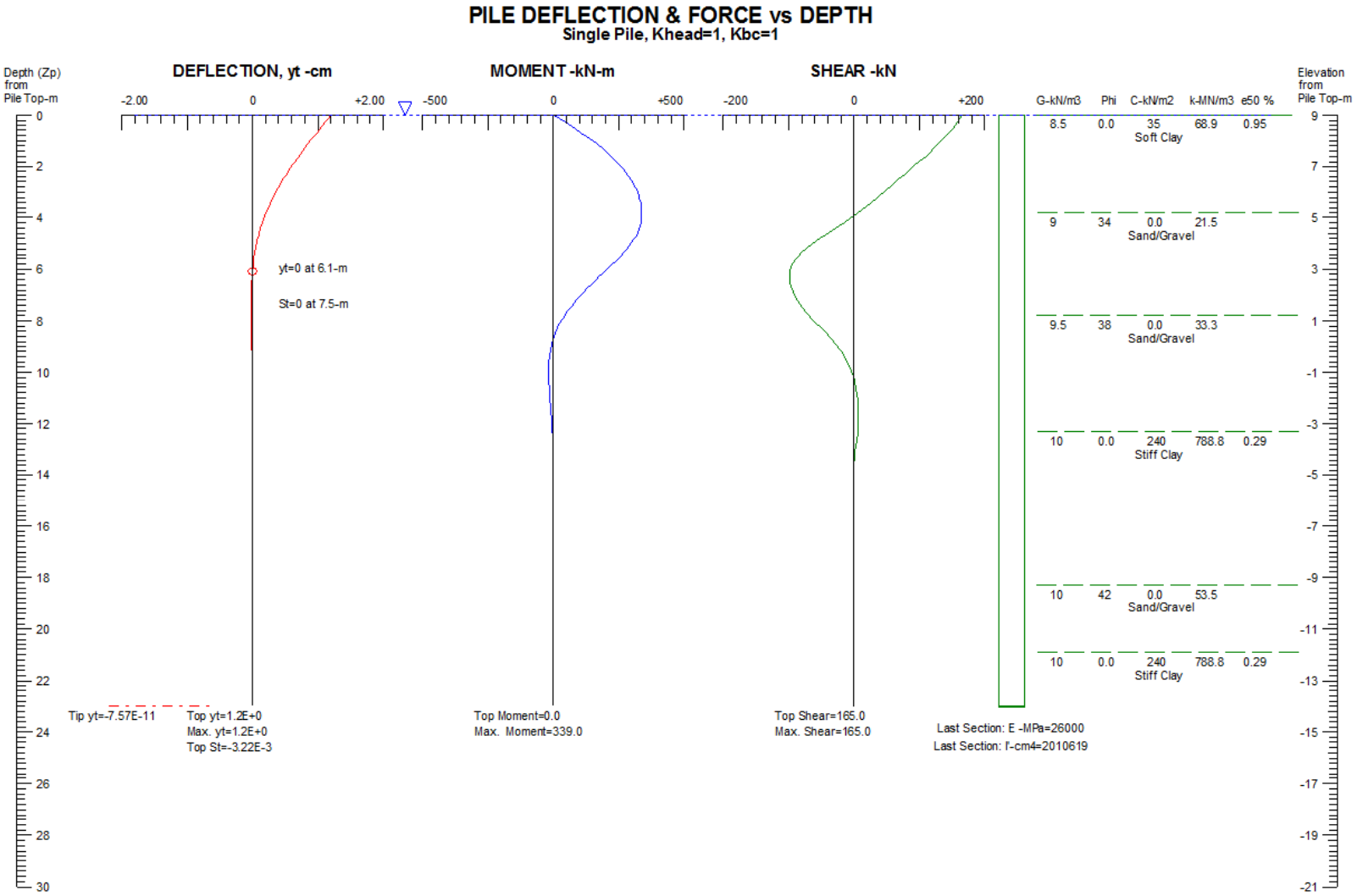



CivilTech Software

**Samawa Power Plant Project**
**Tank Area (Clay Base-1)**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

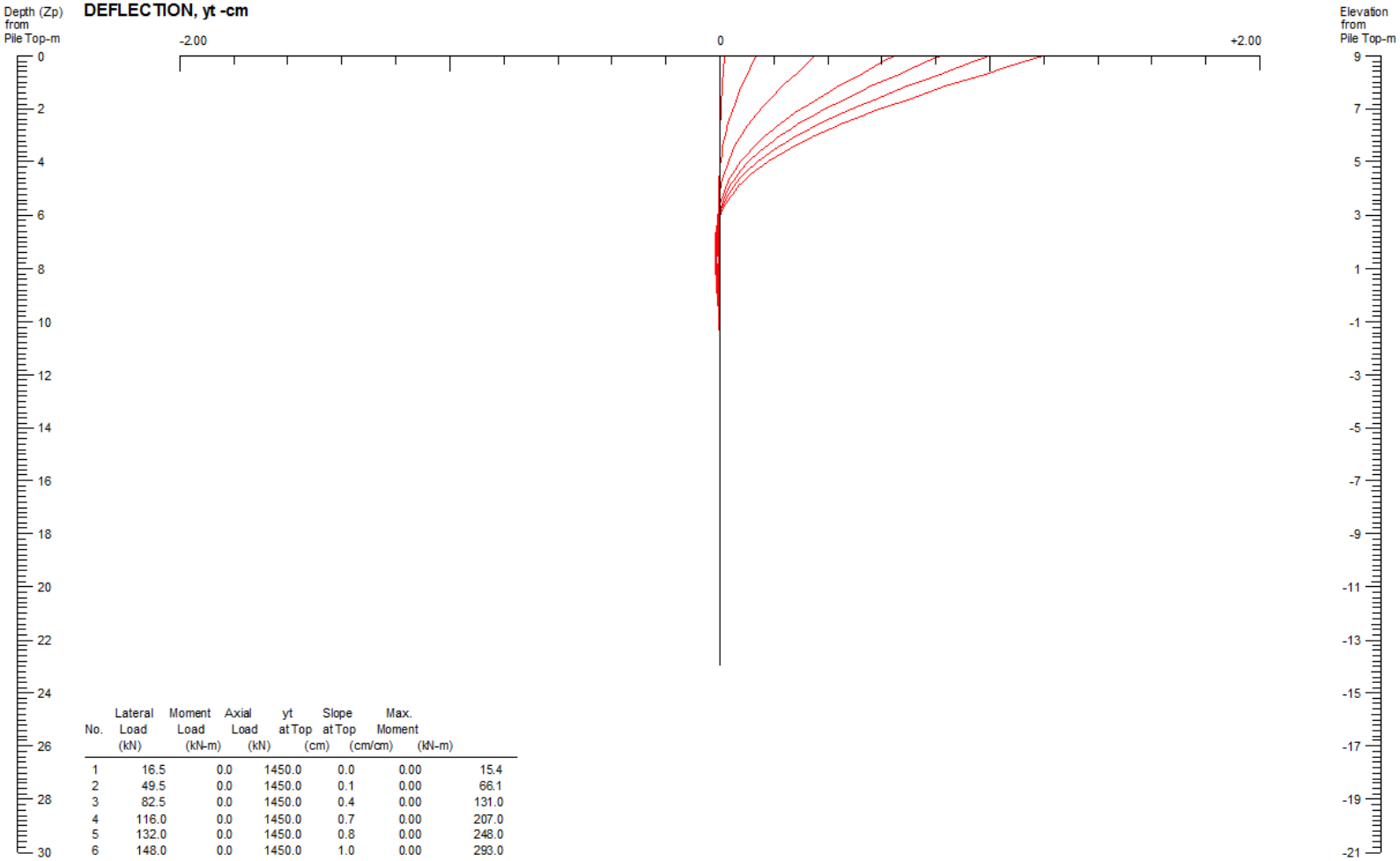



**CivilTech Software**

**Samawa Power Plant Project**
**Tank Area (Clay Base-1)**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

## PILE DEFLECTION vs LOADING
Single Pile, Khead=1, Kbc=1

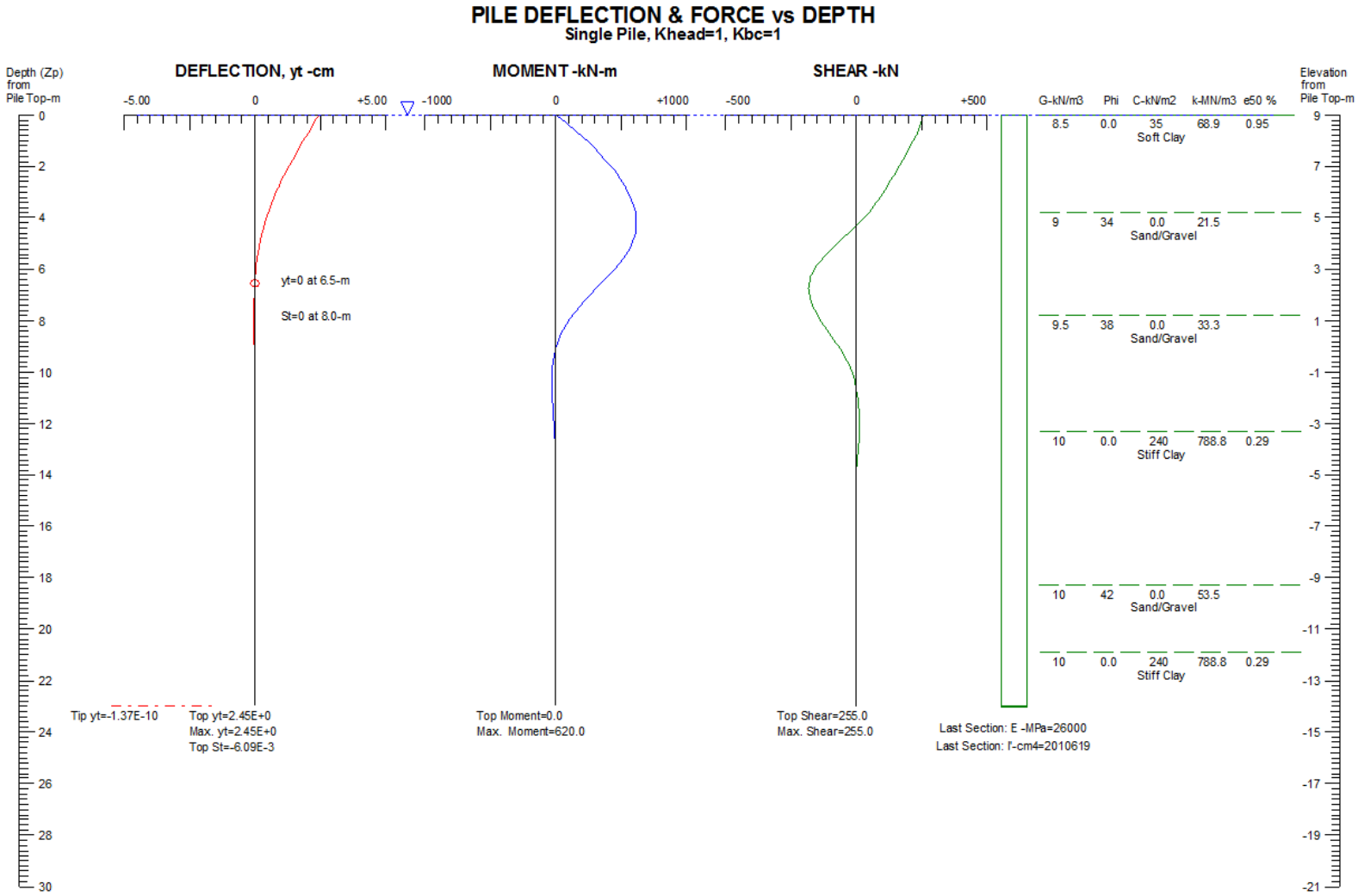



| No. | Lateral Load (kN) | Moment Load (kN-m) | Axial Load (kN) | yt at Top (cm) | Slope at Top (cm/cm) | Max. Moment (kN-m) |
|---|---|---|---|---|---|---|
| 1 | 16.5 | 0.0 | 1450.0 | 0.0 | 0.00 | 15.4 |
| 2 | 49.5 | 0.0 | 1450.0 | 0.1 | 0.00 | 66.1 |
| 3 | 82.5 | 0.0 | 1450.0 | 0.4 | 0.00 | 131.0 |
| 4 | 116.0 | 0.0 | 1450.0 | 0.7 | 0.00 | 207.0 |
| 5 | 132.0 | 0.0 | 1450.0 | 0.8 | 0.00 | 248.0 |
| 6 | 148.0 | 0.0 | 1450.0 | 1.0 | 0.00 | 293.0 |
| 7 | 165.0 | 0.0 | 1450.0 | 1.2 | 0.00 | 339.0 |

*CivilTech Software*

**Samawa Power Plant Project**
**Tank Area (Clay Base-1)**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

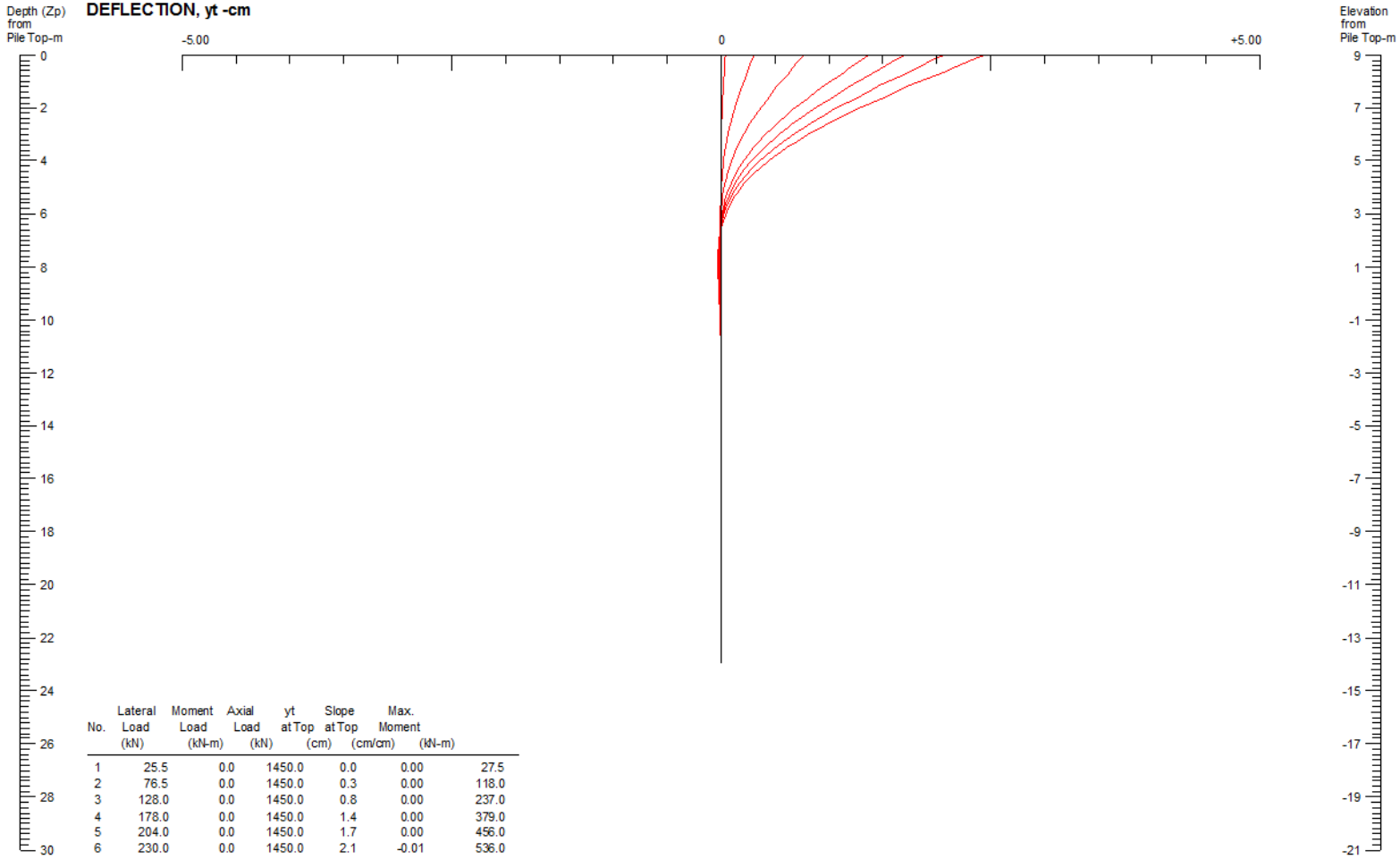



CivilTech Software

**Samawa Power Plant Project**
**Tank Area (Clay Base-1)**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

## PILE DEFLECTION vs LOADING
Single Pile, Khead=1, Kbc=1




| No. | Lateral Load (kN) | Moment Load (kN-m) | Axial Load (kN) | yt at Top (cm) | Slope at Top (cm/cm) | Max. Moment (kN-m) |
|---|---|---|---|---|---|---|
| 1 | 25.5 | 0.0 | 1450.0 | 0.0 | 0.00 | 27.5 |
| 2 | 76.5 | 0.0 | 1450.0 | 0.3 | 0.00 | 118.0 |
| 3 | 128.0 | 0.0 | 1450.0 | 0.8 | 0.00 | 237.0 |
| 4 | 178.0 | 0.0 | 1450.0 | 1.4 | 0.00 | 379.0 |
| 5 | 204.0 | 0.0 | 1450.0 | 1.7 | 0.00 | 456.0 |
| 6 | 230.0 | 0.0 | 1450.0 | 2.1 | -0.01 | 536.0 |
| 7 | 255.0 | 0.0 | 1450.0 | 2.5 | -0.01 | 620.0 |

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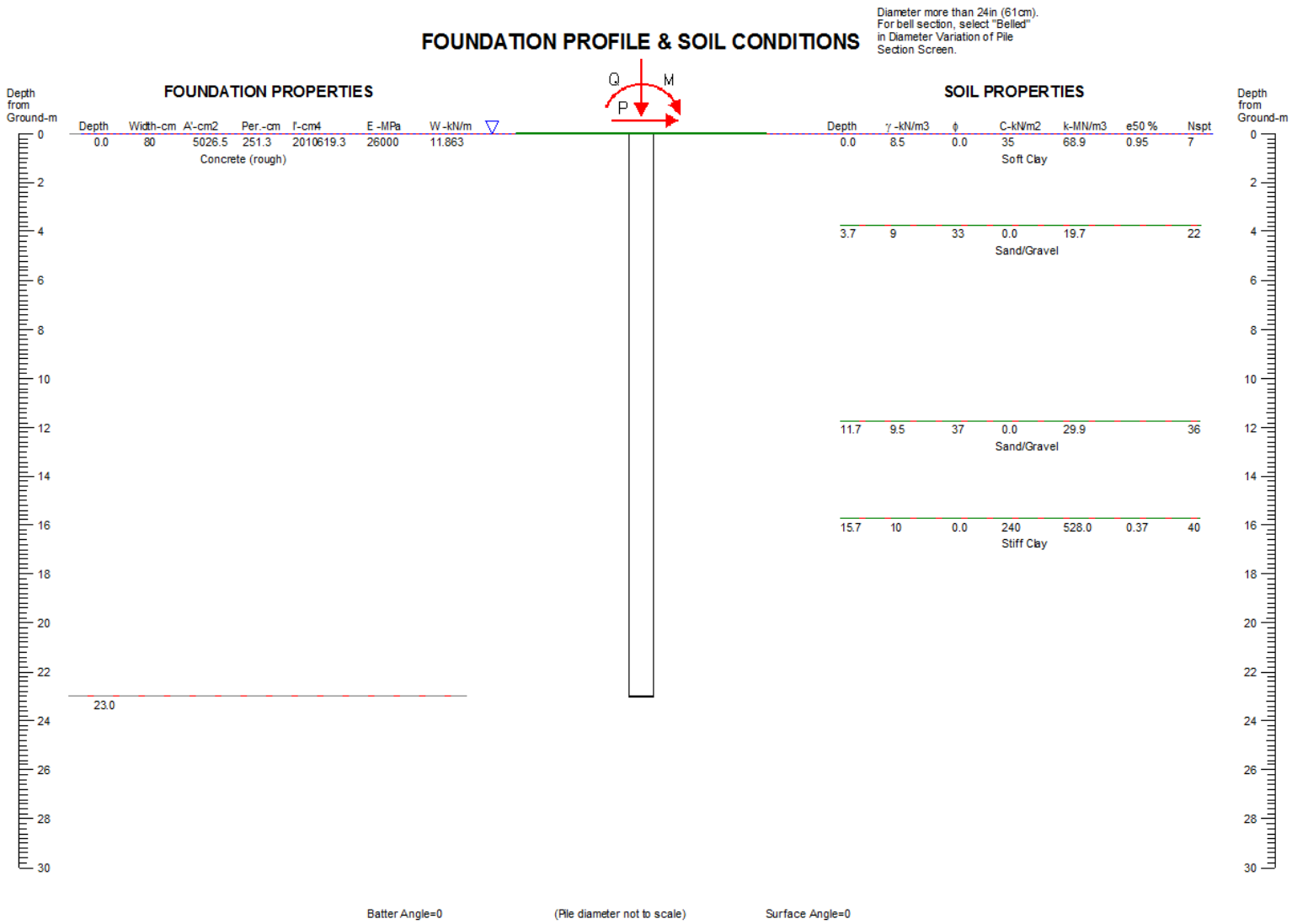
**Samawa Power Plant Project**
**Tank Area (Clay Base-1)**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

**G.2) Tank Area (Clay Base-2)**

**G.2.1) Axial Allowable Loads**
Axial Compression Allowable Bearing Capacity= 1413 kN
Axial Allowable Uplift Capacity= 1056 kN

**G.2.2)Horizontal Load Capacity for Free Head Pile**
Horizontal allowable lateral load is 160kN for 1.2 cm lateral top deflection. Maximum sectional moment : Mmax=323kN-m
Horizontal ultimate lateral capacity is 255kN for 2.5 cm top deflection. Maximum sectional moment : 616kN-m

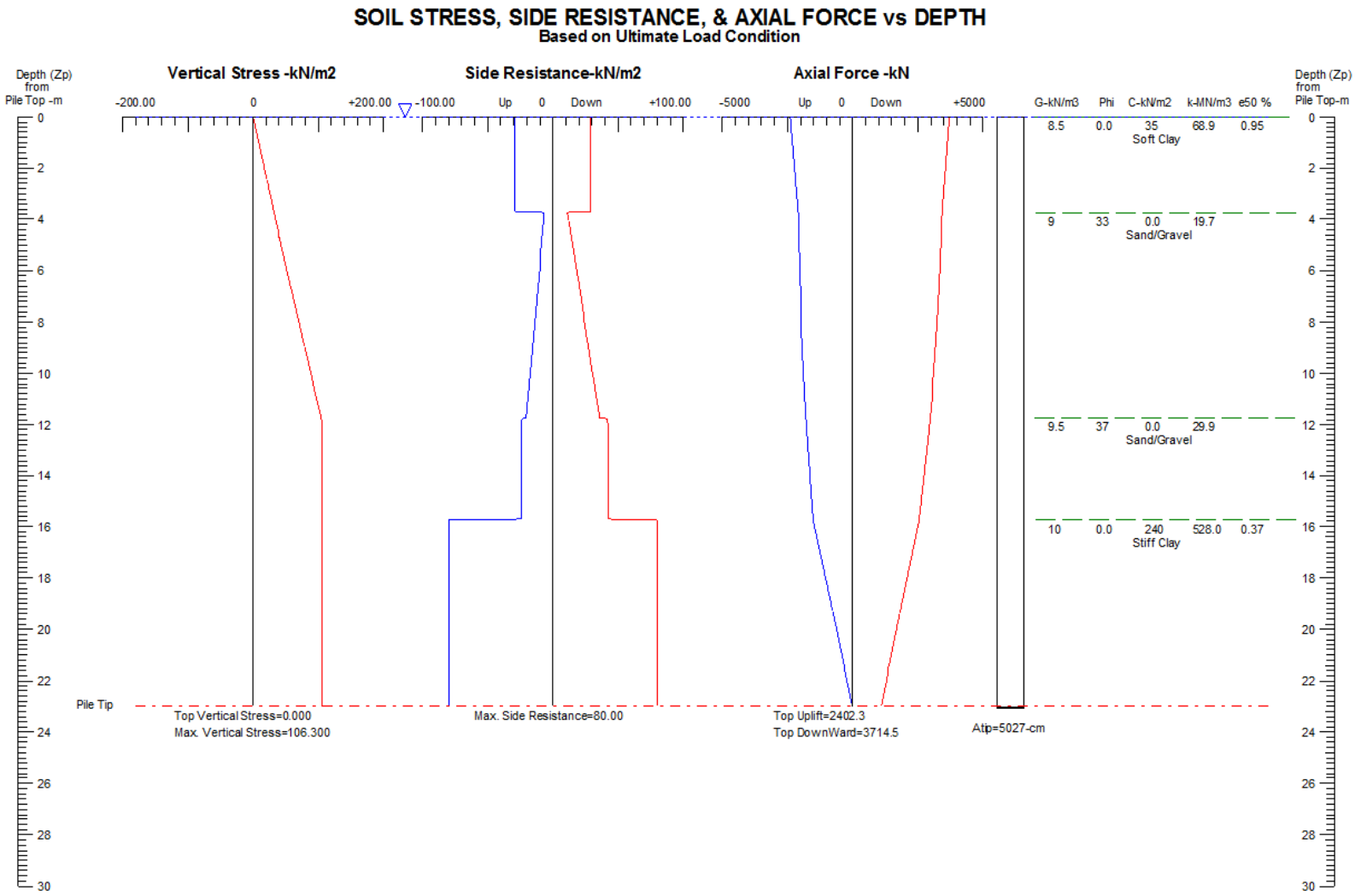



CivilTech Software

**Samawa Power Plant Project**
**Tank Area (Clay Base -2 )**

**Figure 1**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

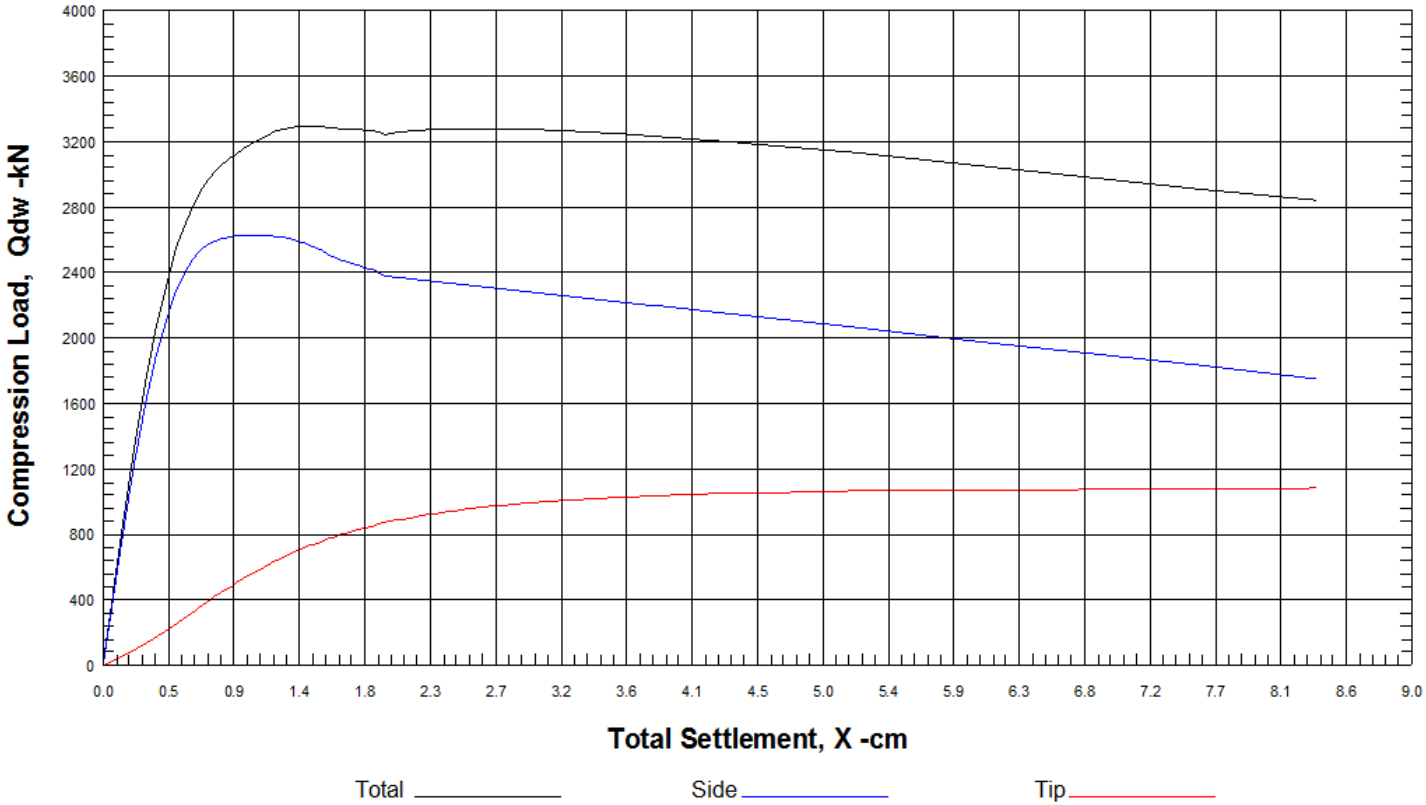



CivilTech Software

**Samawa Power Plant Project**
**Tank Area (Clay Base -2 )**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

## Vertical Load vs. Total Settlement

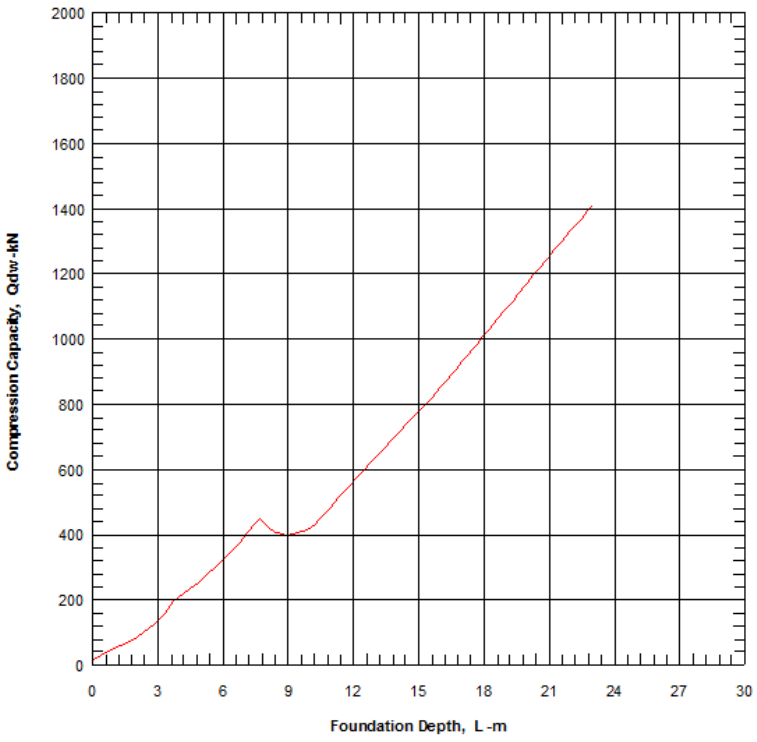


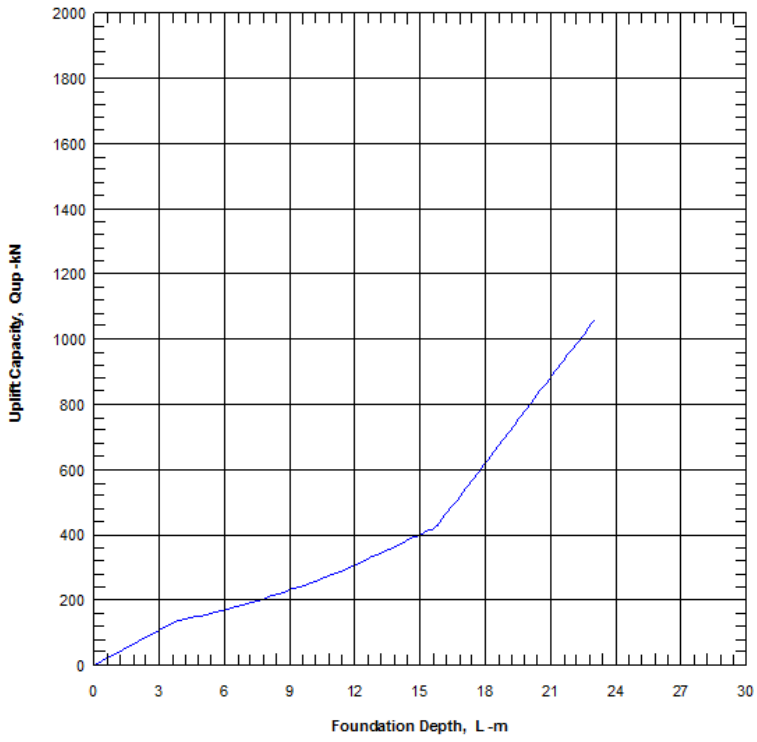

CivilTech Software

**Samawa Power Plant Project**
**Tank Area (Clay Base -2 )**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

# ALLOWABLE CAPACITY vs FOUNDATION DEPTH

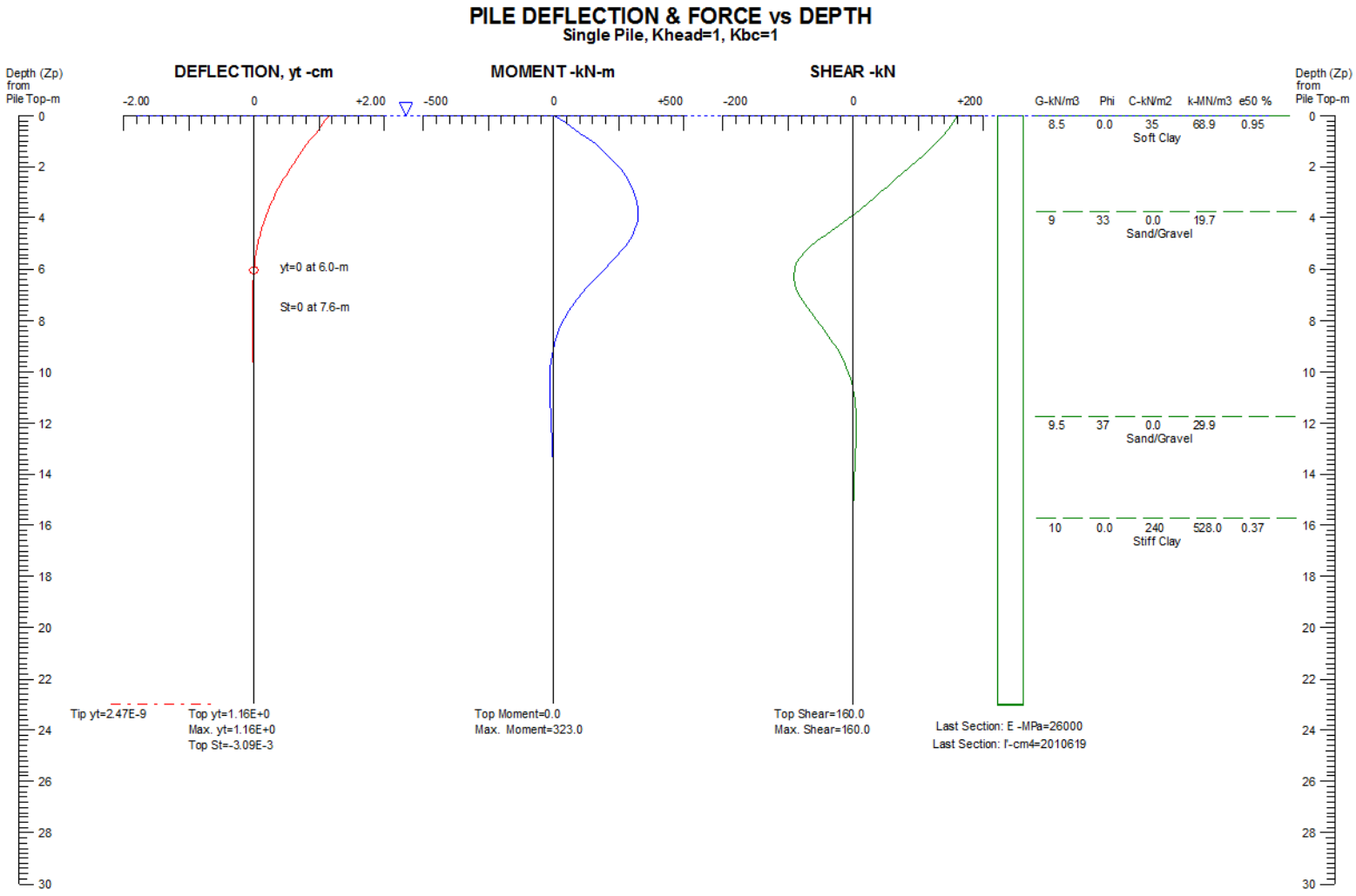



CivilTech Software

**Samawa Power Plant Project**
**Tank Area (Clay Base -2 )**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

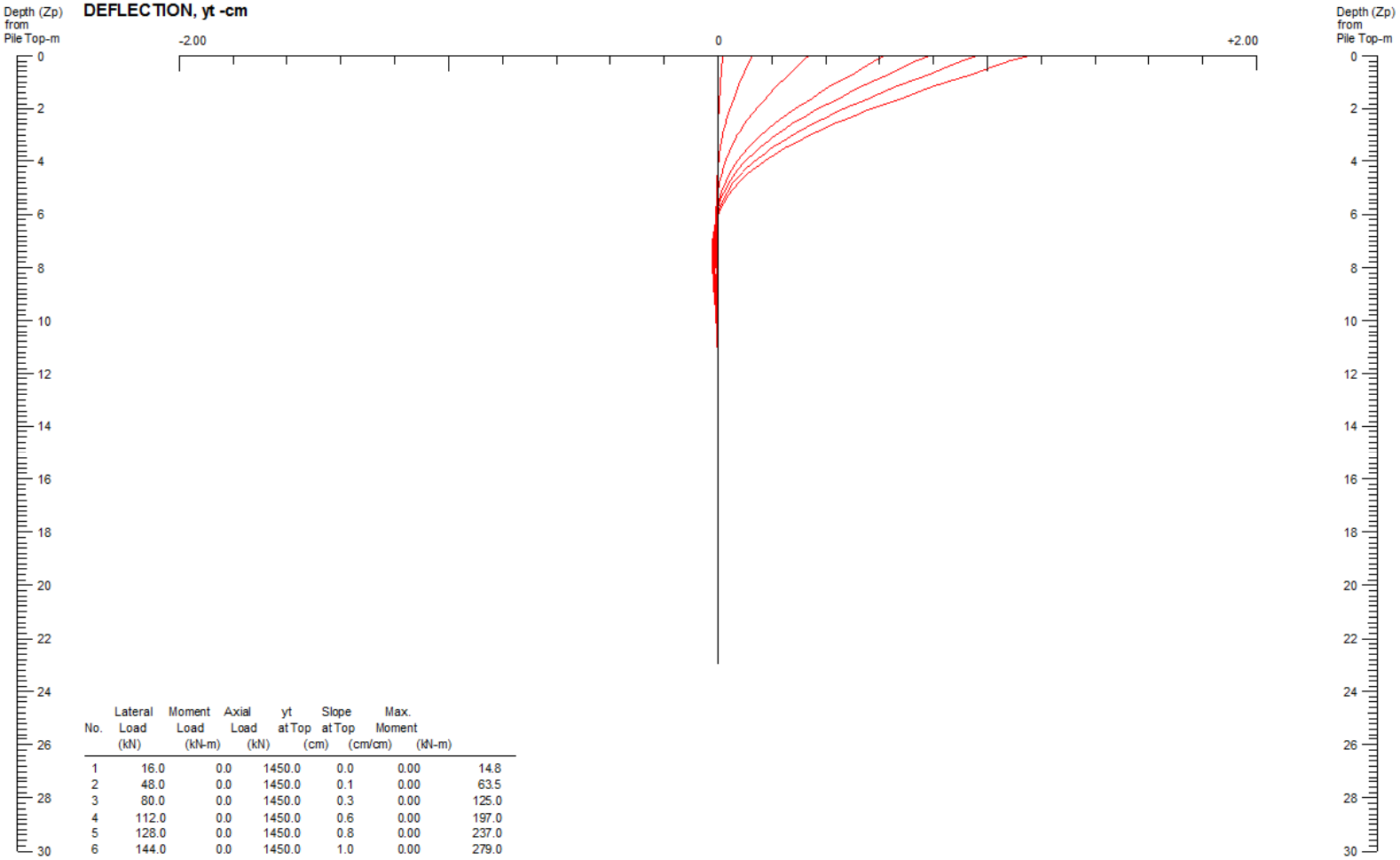



CivilTech Software

**Samawa Power Plant Project**
**Tank Area (Clay Base -2 )**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

## PILE DEFLECTION vs LOADING
Single Pile, Khead=1, Kbc=1




| No. | Lateral Load (kN) | Moment Load (kN-m) | Axial Load (kN) | yt at Top (cm) | Slope at Top (cm/cm) | Max. Moment (kN-m) |
|---|---|---|---|---|---|---|
| 1 | 16.0 | 0.0 | 1450.0 | 0.0 | 0.00 | 14.8 |
| 2 | 48.0 | 0.0 | 1450.0 | 0.1 | 0.00 | 63.5 |
| 3 | 80.0 | 0.0 | 1450.0 | 0.3 | 0.00 | 125.0 |
| 4 | 112.0 | 0.0 | 1450.0 | 0.6 | 0.00 | 197.0 |
| 5 | 128.0 | 0.0 | 1450.0 | 0.8 | 0.00 | 237.0 |
| 6 | 144.0 | 0.0 | 1450.0 | 1.0 | 0.00 | 279.0 |
| 7 | 160.0 | 0.0 | 1450.0 | 1.2 | 0.00 | 323.0 |

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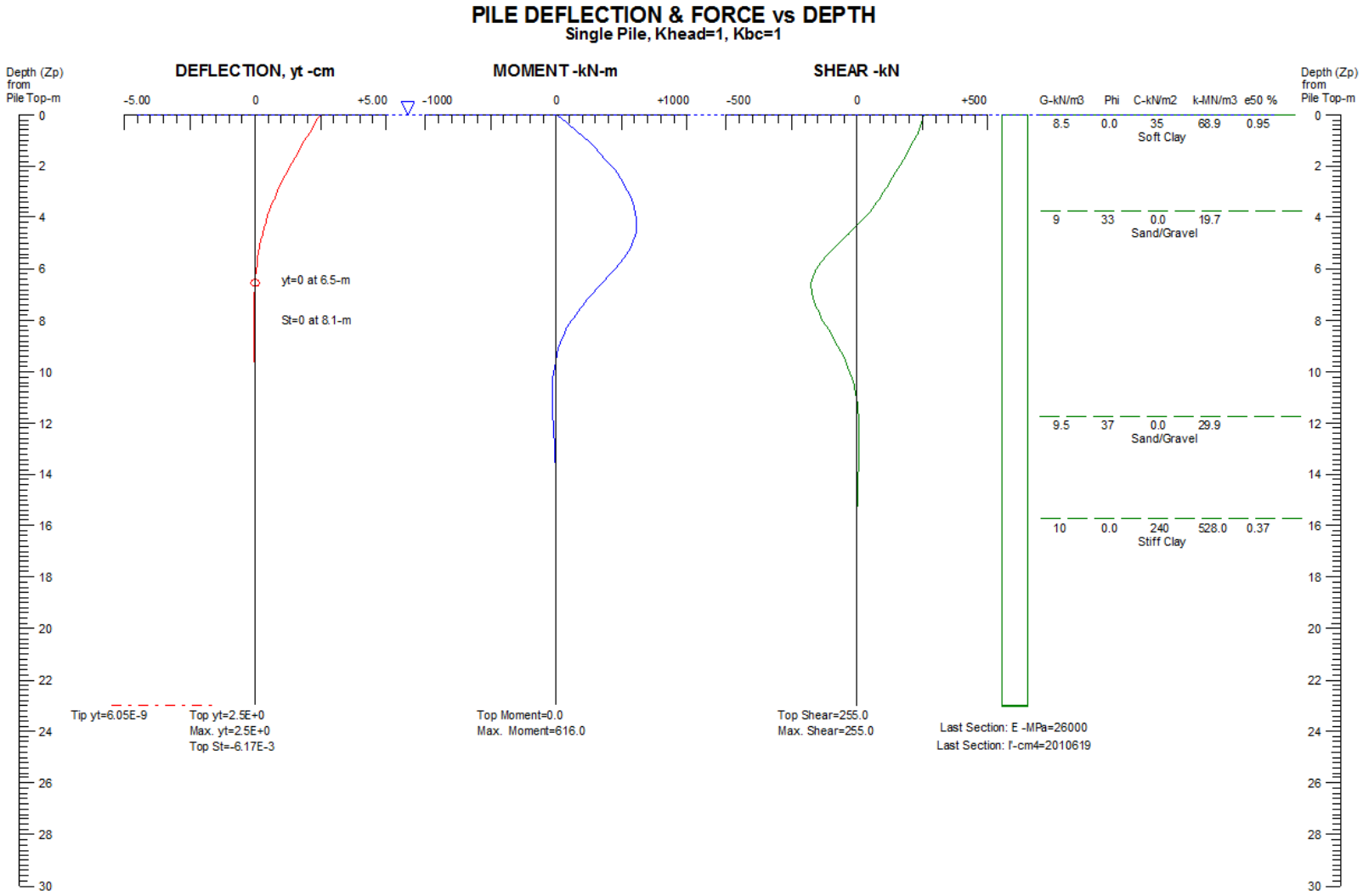
**Samawa Power Plant Project**
**Tank Area (Clay Base -2 )**

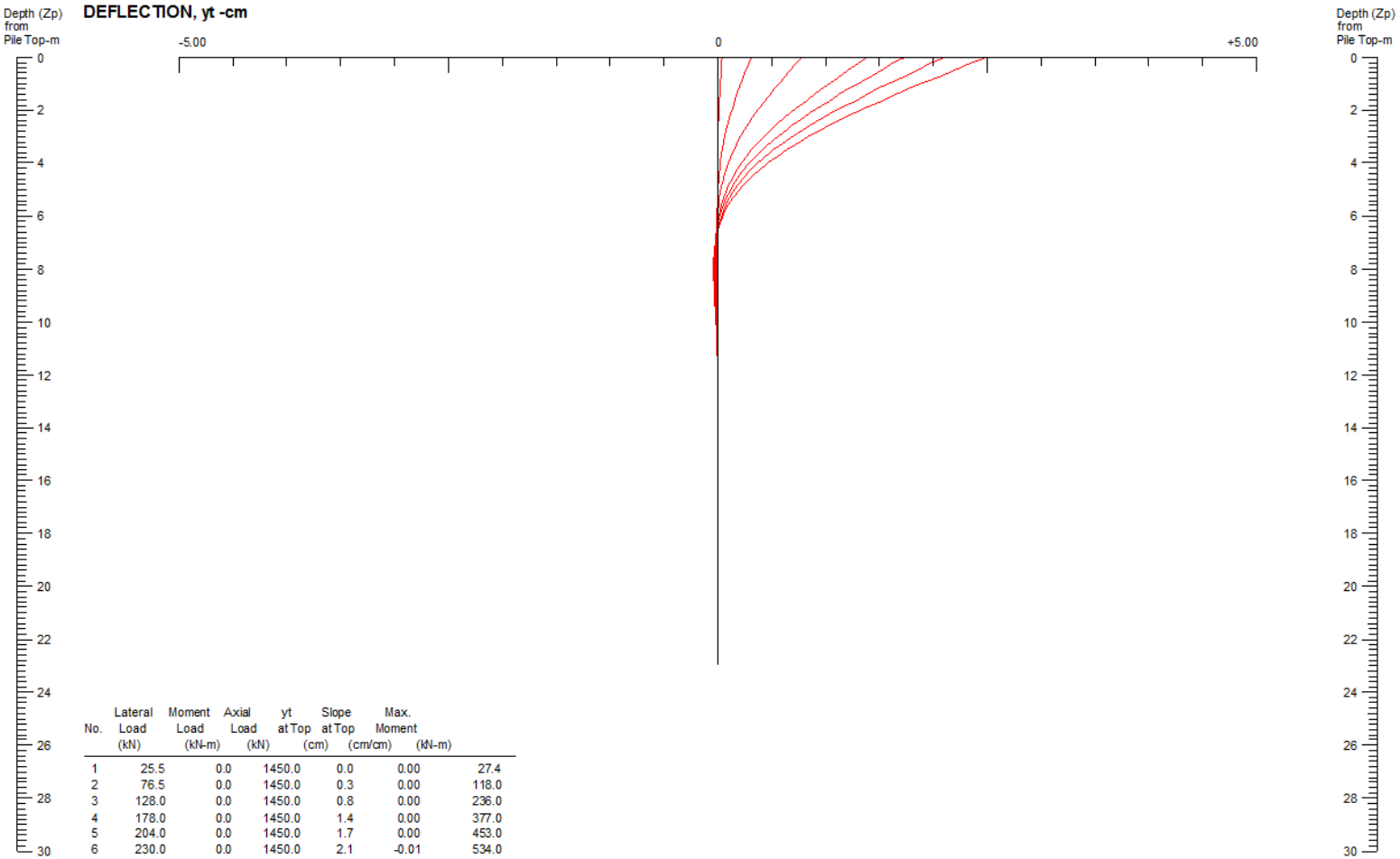



**CivilTech Software**

**Samawa Power Plant Project**
**Tank Area (Clay Base -2 )**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

## PILE DEFLECTION vs LOADING
Single Pile, Khead=1, Kbc=1




| No. | Lateral Load (kN) | Moment Load (kN-m) | Axial Load (kN) | yt at Top (cm) | Slope at Top (cm/cm) | Max. Moment (kN-m) |
|---|---|---|---|---|---|---|
| 1 | 25.5 | 0.0 | 1450.0 | 0.0 | 0.00 | 27.4 |
| 2 | 76.5 | 0.0 | 1450.0 | 0.3 | 0.00 | 118.0 |
| 3 | 128.0 | 0.0 | 1450.0 | 0.8 | 0.00 | 236.0 |
| 4 | 178.0 | 0.0 | 1450.0 | 1.4 | 0.00 | 377.0 |
| 5 | 204.0 | 0.0 | 1450.0 | 1.7 | 0.00 | 453.0 |
| 6 | 230.0 | 0.0 | 1450.0 | 2.1 | -0.01 | 534.0 |
| 7 | 255.0 | 0.0 | 1450.0 | 2.5 | -0.01 | 616.0 |

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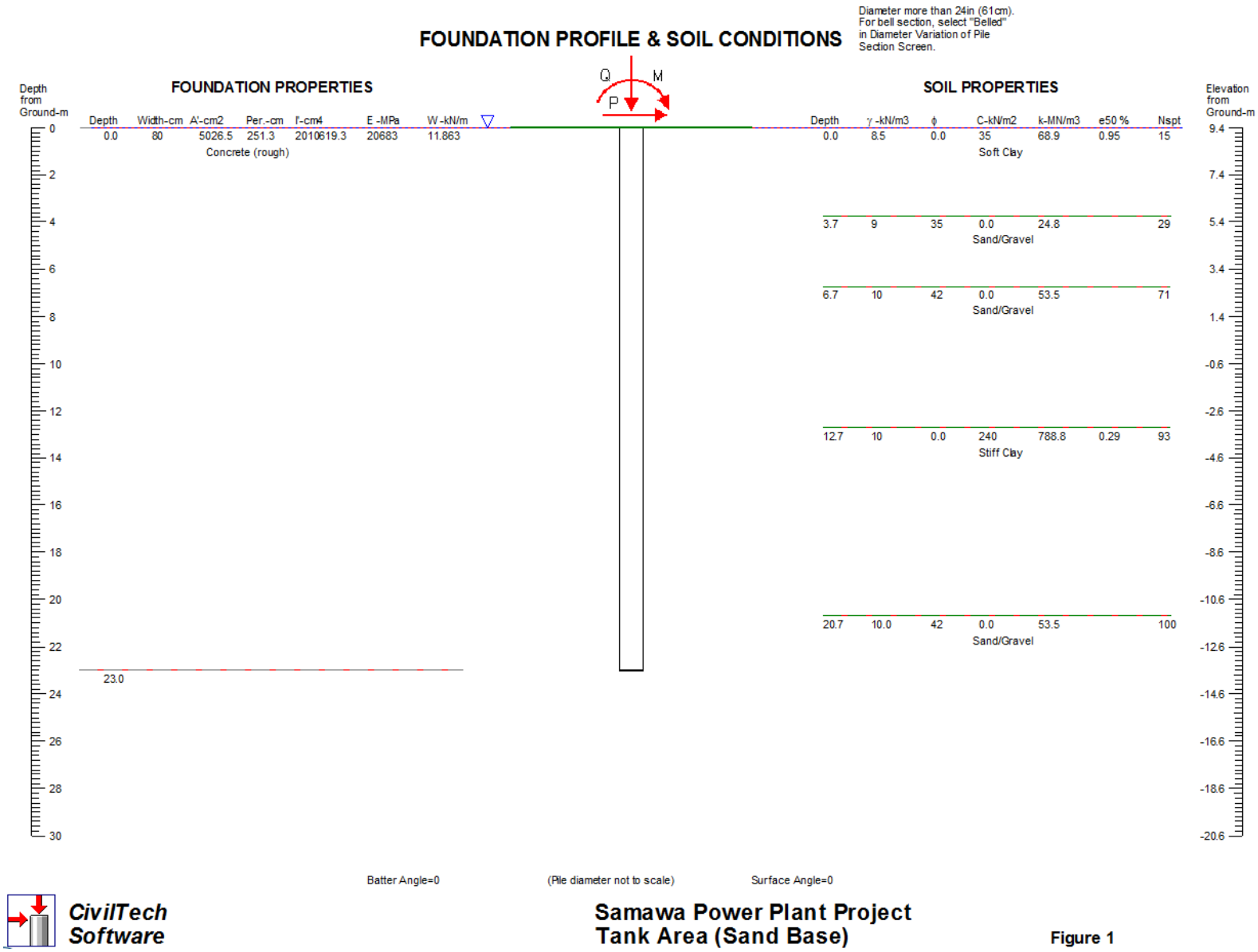
**Samawa Power Plant Project**
**Tank Area (Clay Base -2 )**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

**G.3) Tank Area (Sand Base)**

**G.3.1) Axial Allowable Loads**
Axial Compression Allowable Bearing Capacity= 1650 kN
Axial Allowable Uplift Capacity= 1151 kN

**G.3.2)Horizontal Load Capacity for Free Head Pile**
Horizontal allowable lateral load is 155kN for 1.2 cm lateral top deflection. Maximum sectional moment : Mmax=305kN-m
Horizontal ultimate lateral capacity is 245kN for 2.5 cm top deflection. Maximum sectional moment : 573kN-m

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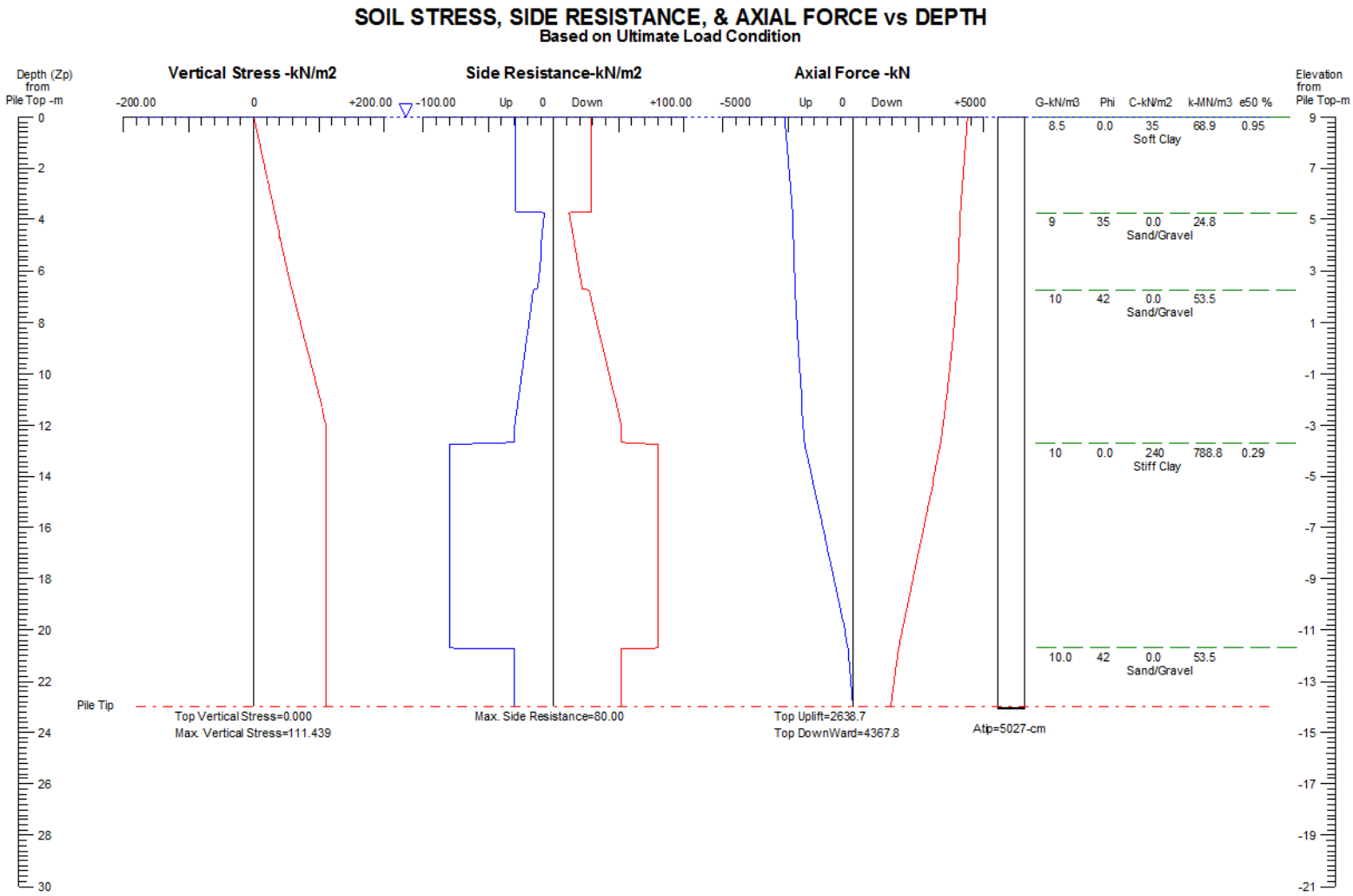
**Samawa Power Plant Project**
**Tank Area (Sand Base)**

**Figure 1**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

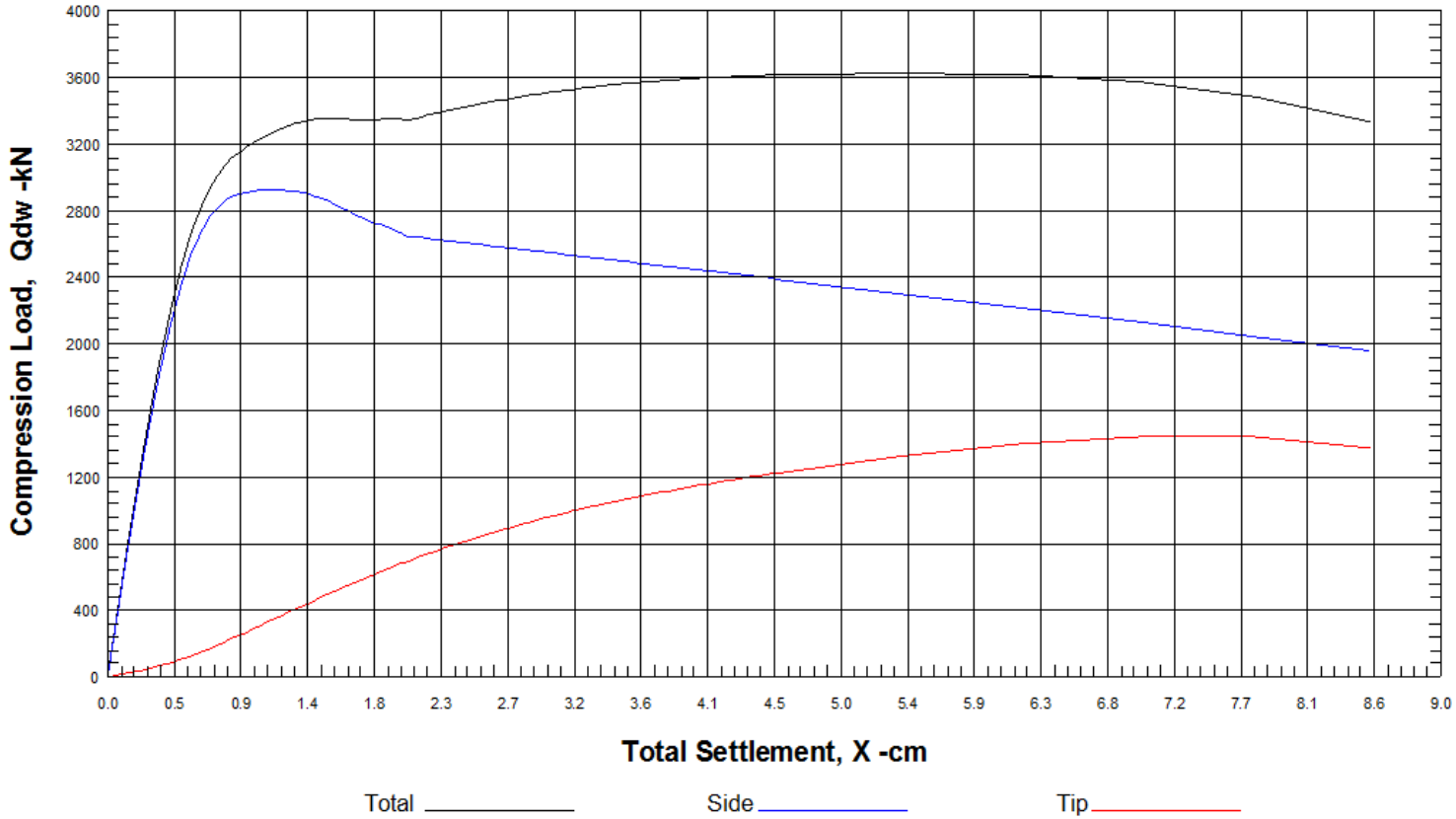



**CivilTech Software**

**Samawa Power Plant Project**
**Tank Area (Sand Base)**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

## Vertical Load vs. Total Settlement

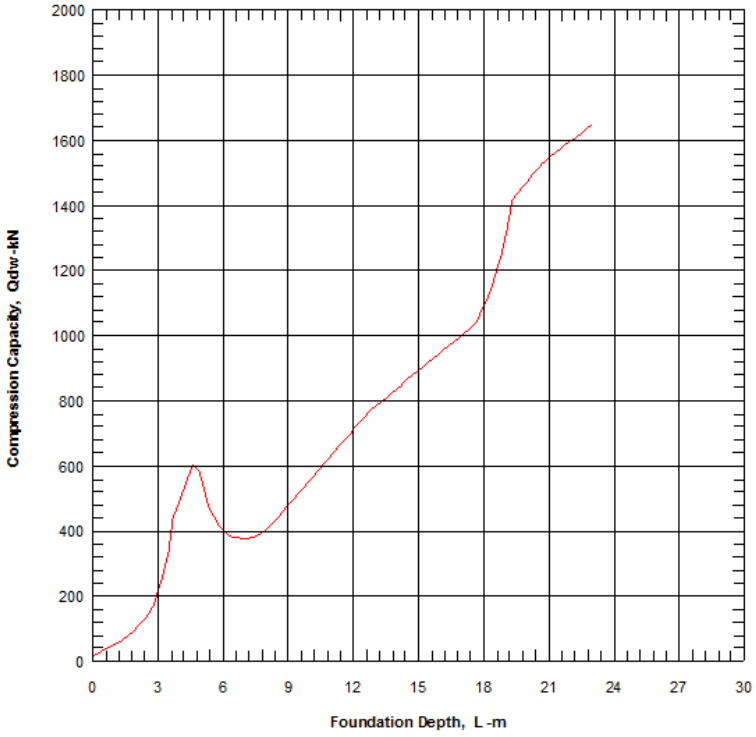


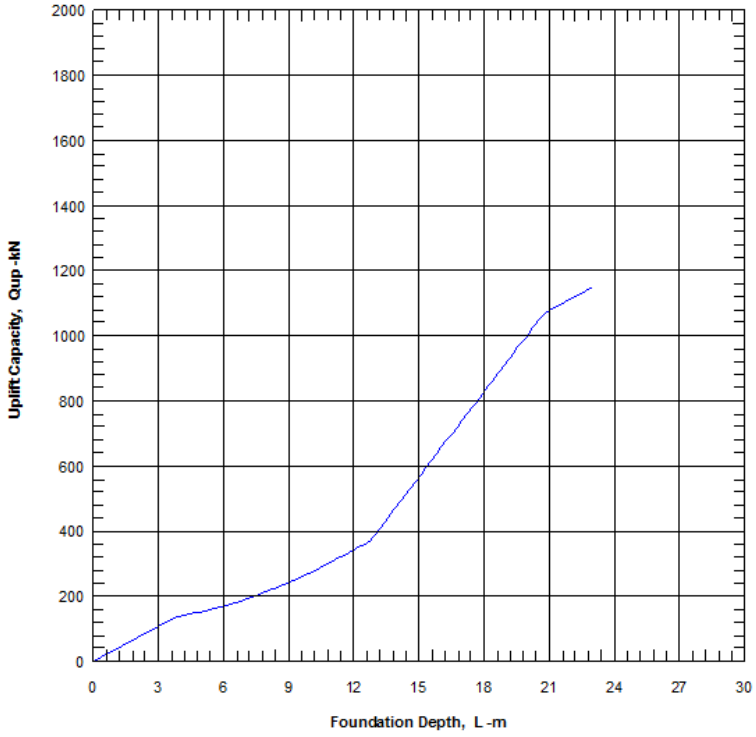

CivilTech Software

**Samawa Power Plant Project**
**Tank Area (Sand Base)**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

# ALLOWABLE CAPACITY vs FOUNDATION DEPTH

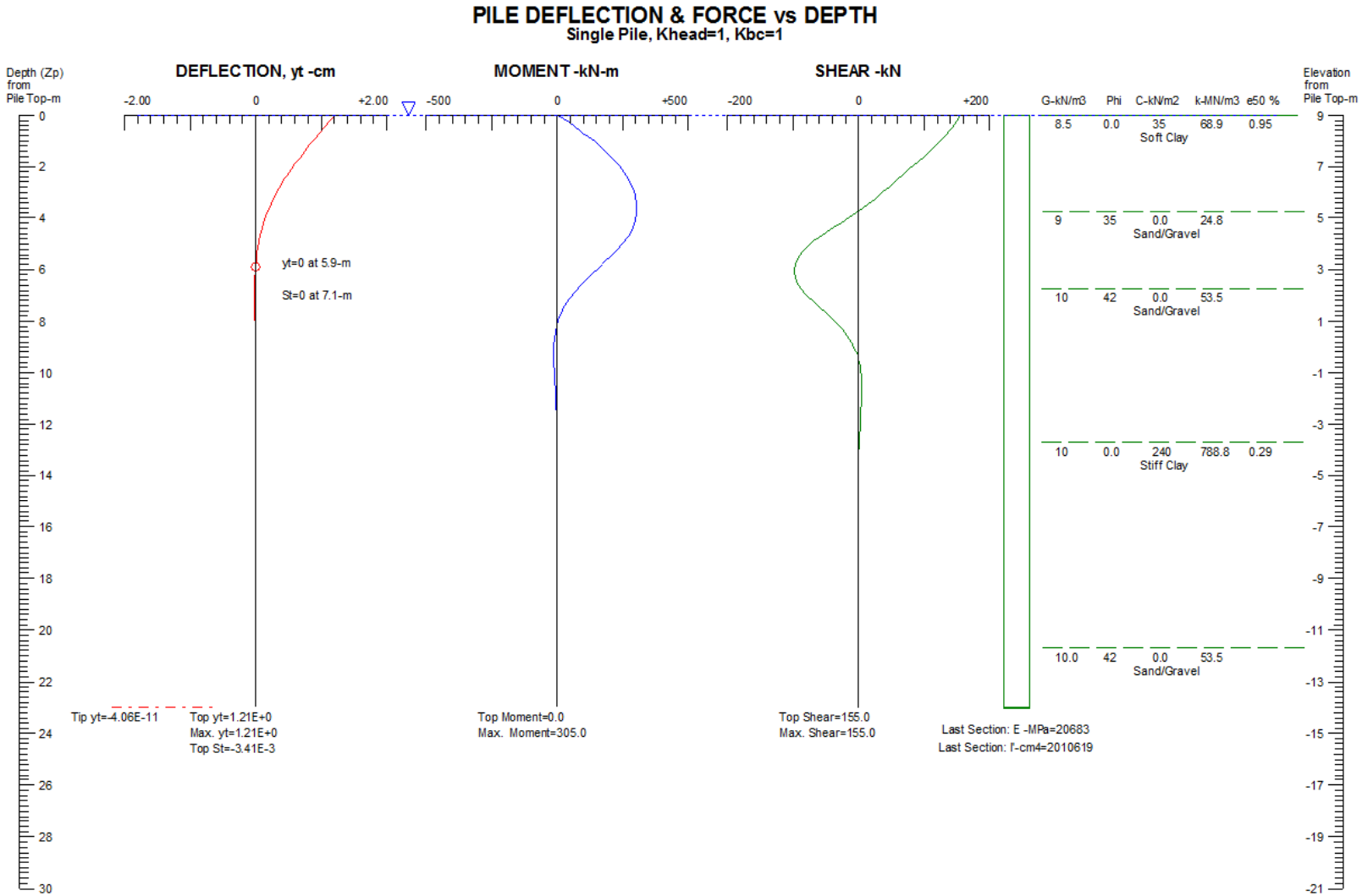



CivilTech Software

**Samawa Power Plant Project**
**Tank Area (Sand Base)**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

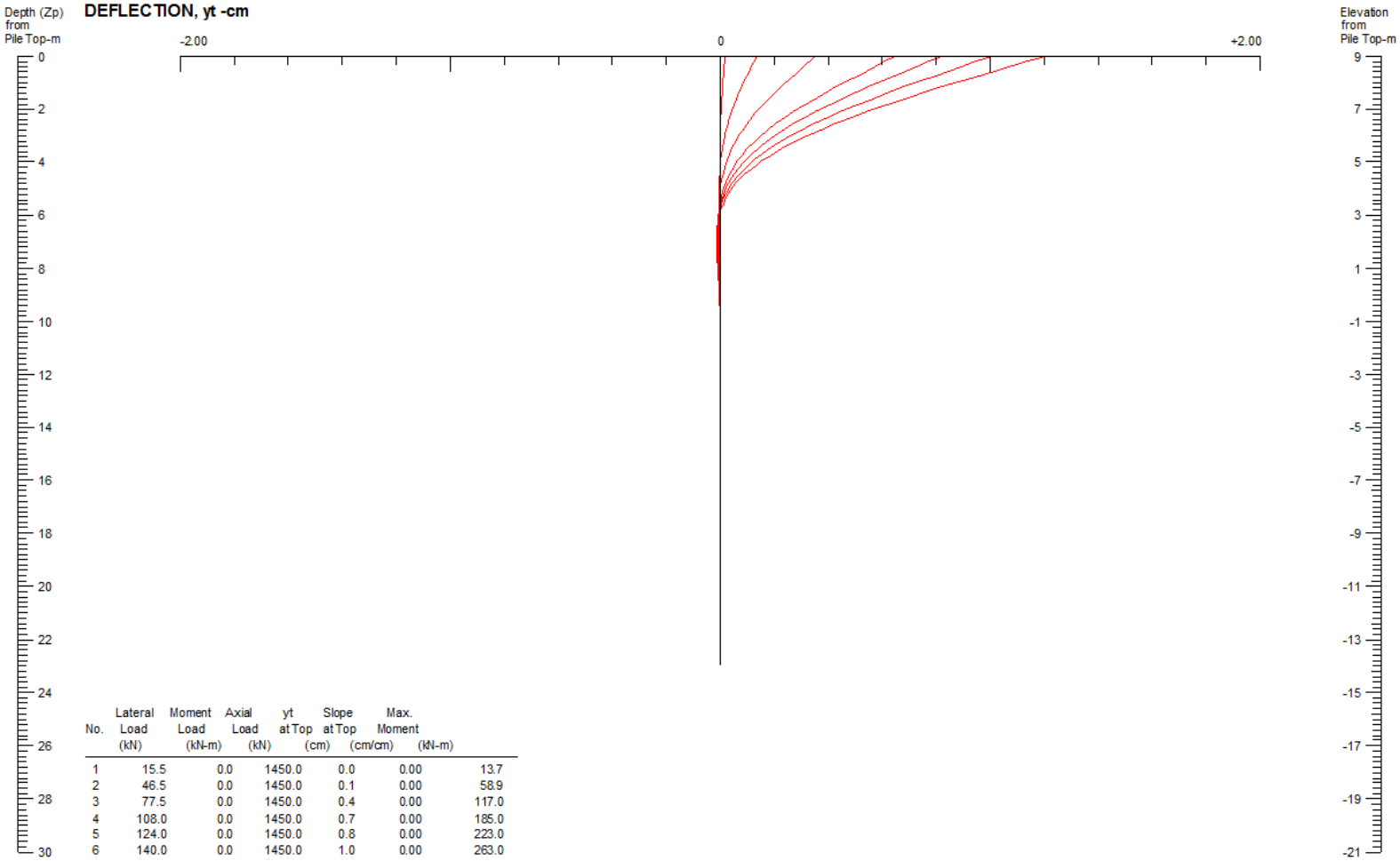



CivilTech Software

**Samawa Power Plant Project**
**Tank Area (Sand Base)**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

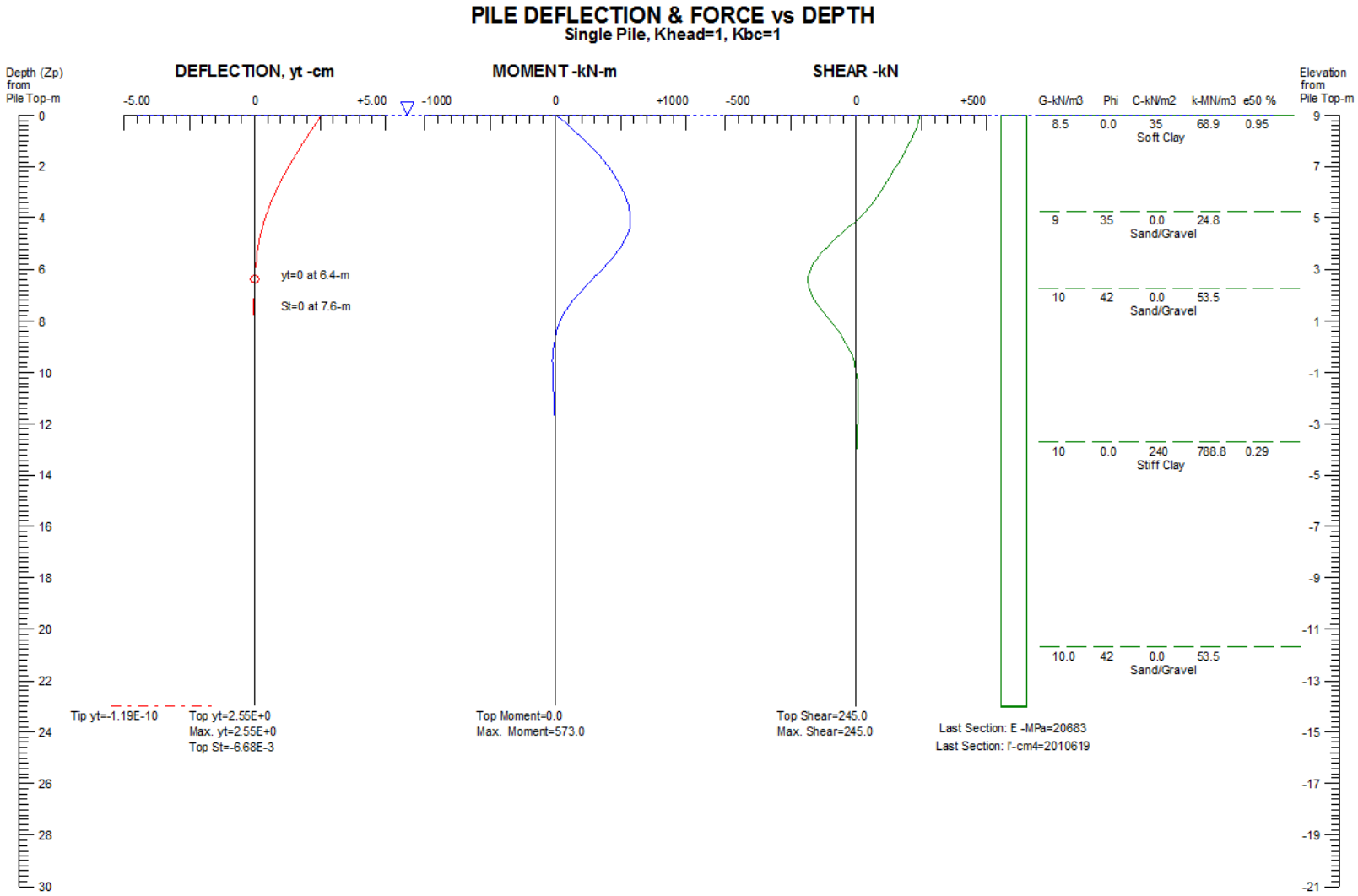
## PILE DEFLECTION vs LOADING
Single Pile, Khead=1, Kbc=1




| No. | Lateral Load (kN) | Moment Load (kN-m) | Axial Load (kN) | yt at Top (cm) | Slope at Top (cm/cm) | Max. Moment (kN-m) |
|---|---|---|---|---|---|---|
| 1 | 15.5 | 0.0 | 1450.0 | 0.0 | 0.00 | 13.7 |
| 2 | 46.5 | 0.0 | 1450.0 | 0.1 | 0.00 | 58.9 |
| 3 | 77.5 | 0.0 | 1450.0 | 0.4 | 0.00 | 117.0 |
| 4 | 108.0 | 0.0 | 1450.0 | 0.7 | 0.00 | 185.0 |
| 5 | 124.0 | 0.0 | 1450.0 | 0.8 | 0.00 | 223.0 |
| 6 | 140.0 | 0.0 | 1450.0 | 1.0 | 0.00 | 263.0 |
| 7 | 155.0 | 0.0 | 1450.0 | 1.2 | 0.00 | 305.0 |

*CivilTech Software*

**Samawa Power Plant Project**
**Tank Area (Sand Base)**

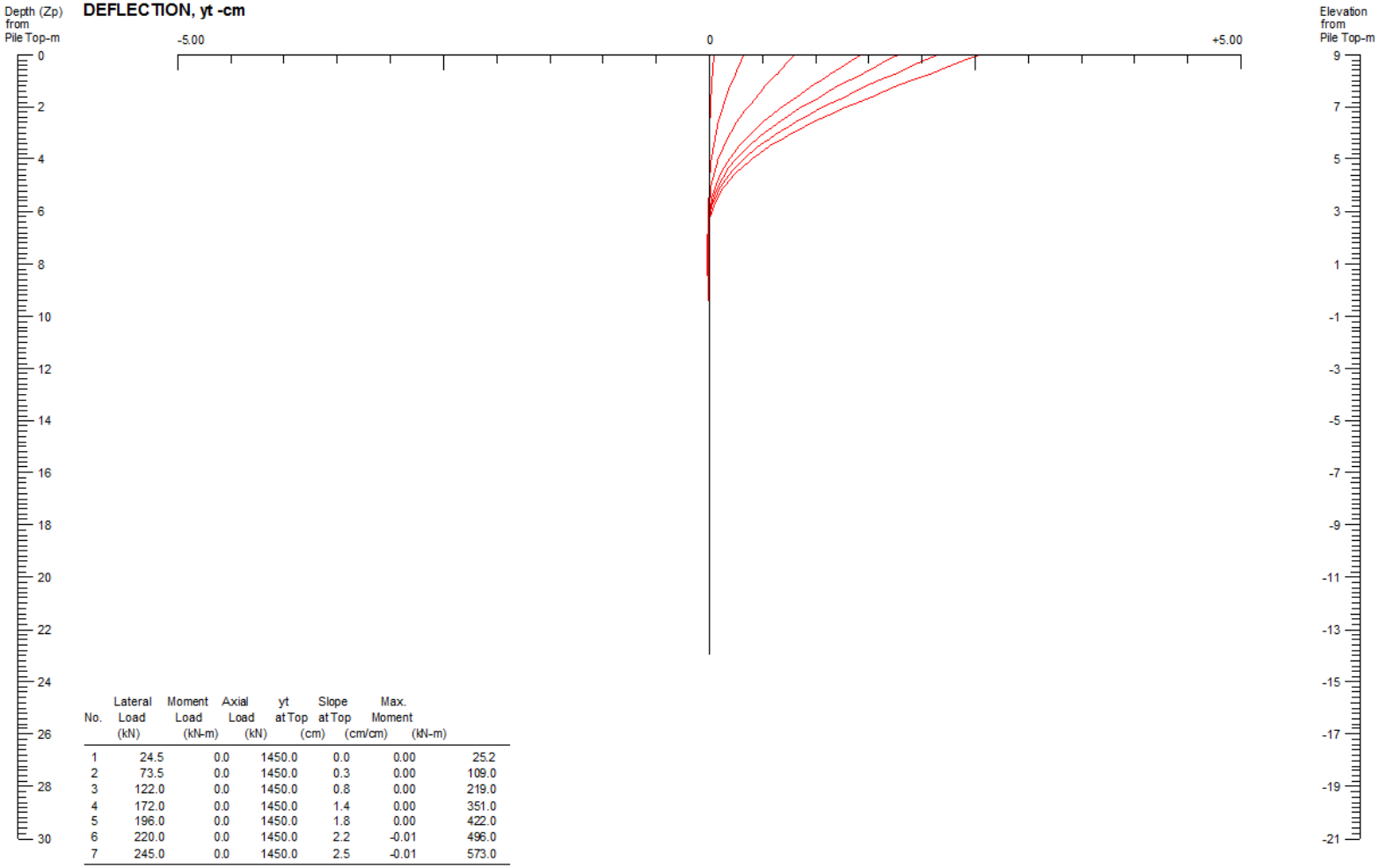



**CivilTech Software**

**Samawa Power Plant Project**
**Tank Area (Sand Base)**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

## PILE DEFLECTION vs LOADING
Single Pile, Khead=1, Kbc=1




| No. | Lateral Load (kN) | Moment Load (kN-m) | Axial Load (kN) | yt at Top (cm) | Slope at Top (cm/cm) | Max. Moment (kN-m) |
|---|---|---|---|---|---|---|
| 1 | 24.5 | 0.0 | 1450.0 | 0.0 | 0.00 | 25.2 |
| 2 | 73.5 | 0.0 | 1450.0 | 0.3 | 0.00 | 109.0 |
| 3 | 122.0 | 0.0 | 1450.0 | 0.8 | 0.00 | 219.0 |
| 4 | 172.0 | 0.0 | 1450.0 | 1.4 | 0.00 | 351.0 |
| 5 | 196.0 | 0.0 | 1450.0 | 1.8 | 0.00 | 422.0 |
| 6 | 220.0 | 0.0 | 1450.0 | 2.2 | -0.01 | 496.0 |
| 7 | 245.0 | 0.0 | 1450.0 | 2.5 | -0.01 | 573.0 |

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**Samawa Power Plant Project**
**Tank Area (Sand Base)**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

**H) Switchyard Area**

**H. 1) Switchyard Area (Clay Base)**

**H.1.1) Axial Allowable Loads**

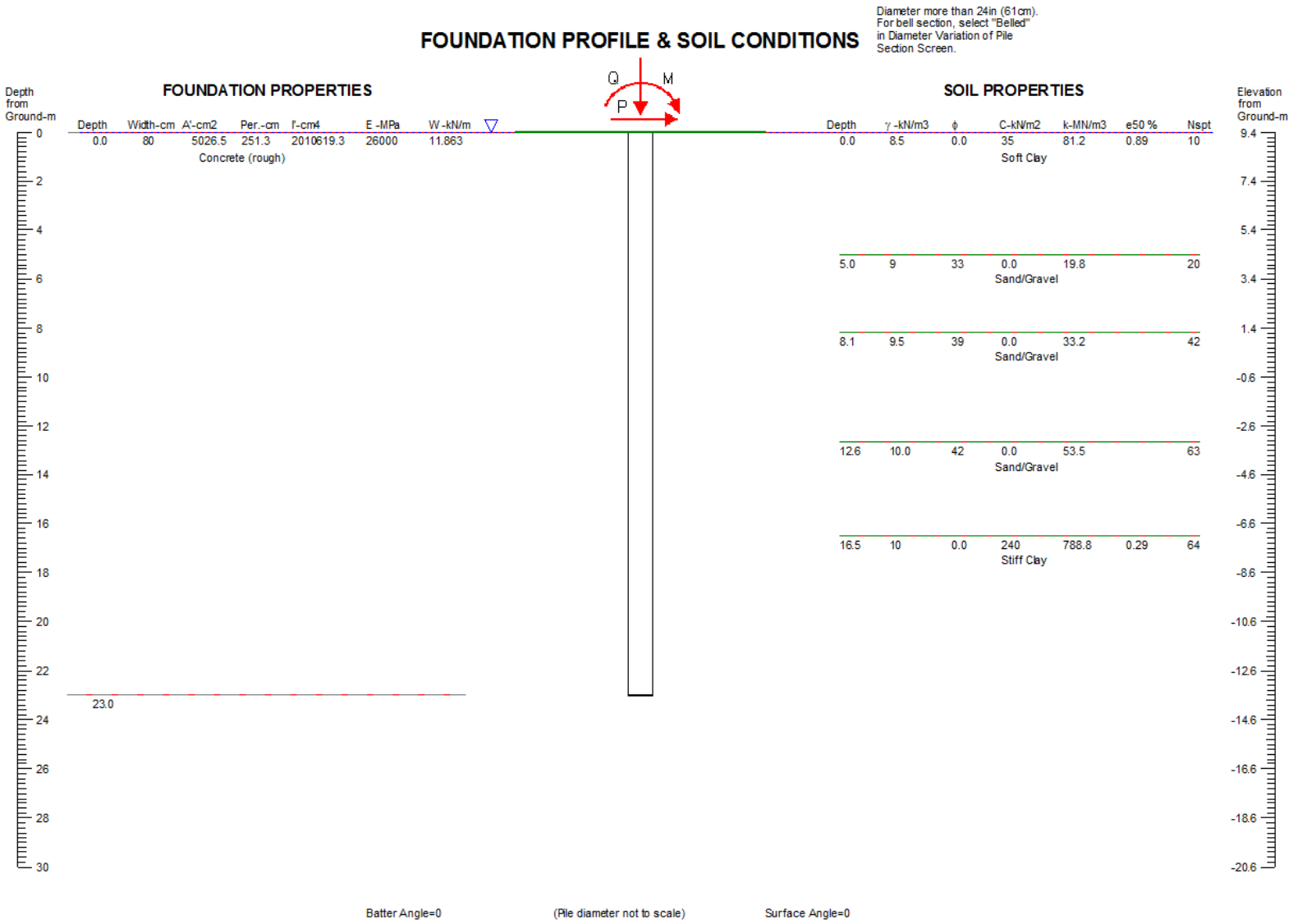
Axial Compression Allowable Bearing Capacity= 1462 kN

Axial Allowable Uplift Capacity= 1075 kN

**H.1.2)Horizontal Load Capacity for Free Head Pile**

Horizontal allowable lateral load is 160kN for 1.2 cm lateral top deflection. Maximum sectional moment : Mmax=314kN-m

Horizontal ultimate lateral capacity is 245kN for 2.5 cm top deflection. Maximum sectional moment : 564kN-m

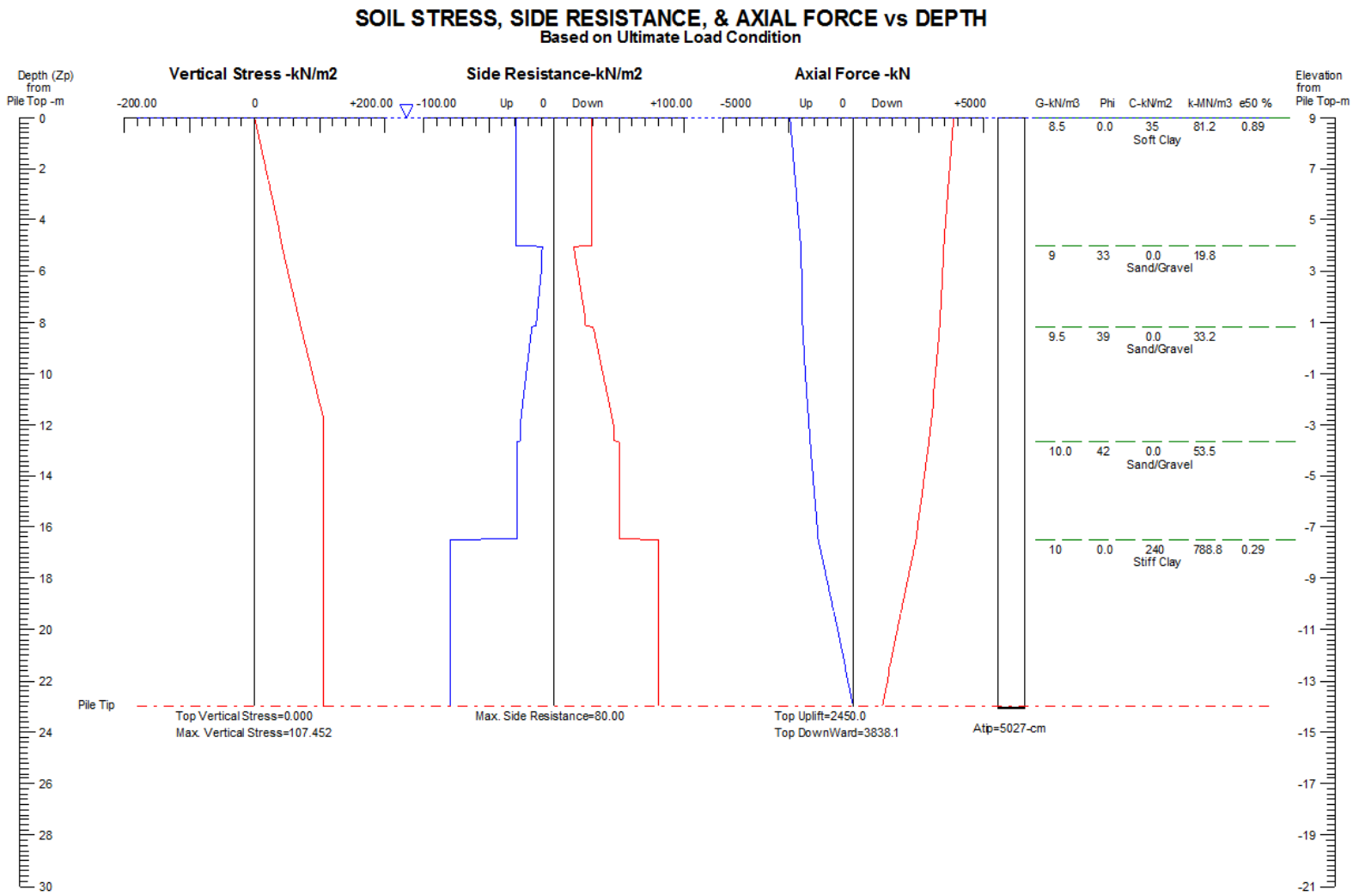



CivilTech Software

**Samawa Power Plant Project**
**Switchyard Area (Clay Base)**

**Figure 1**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

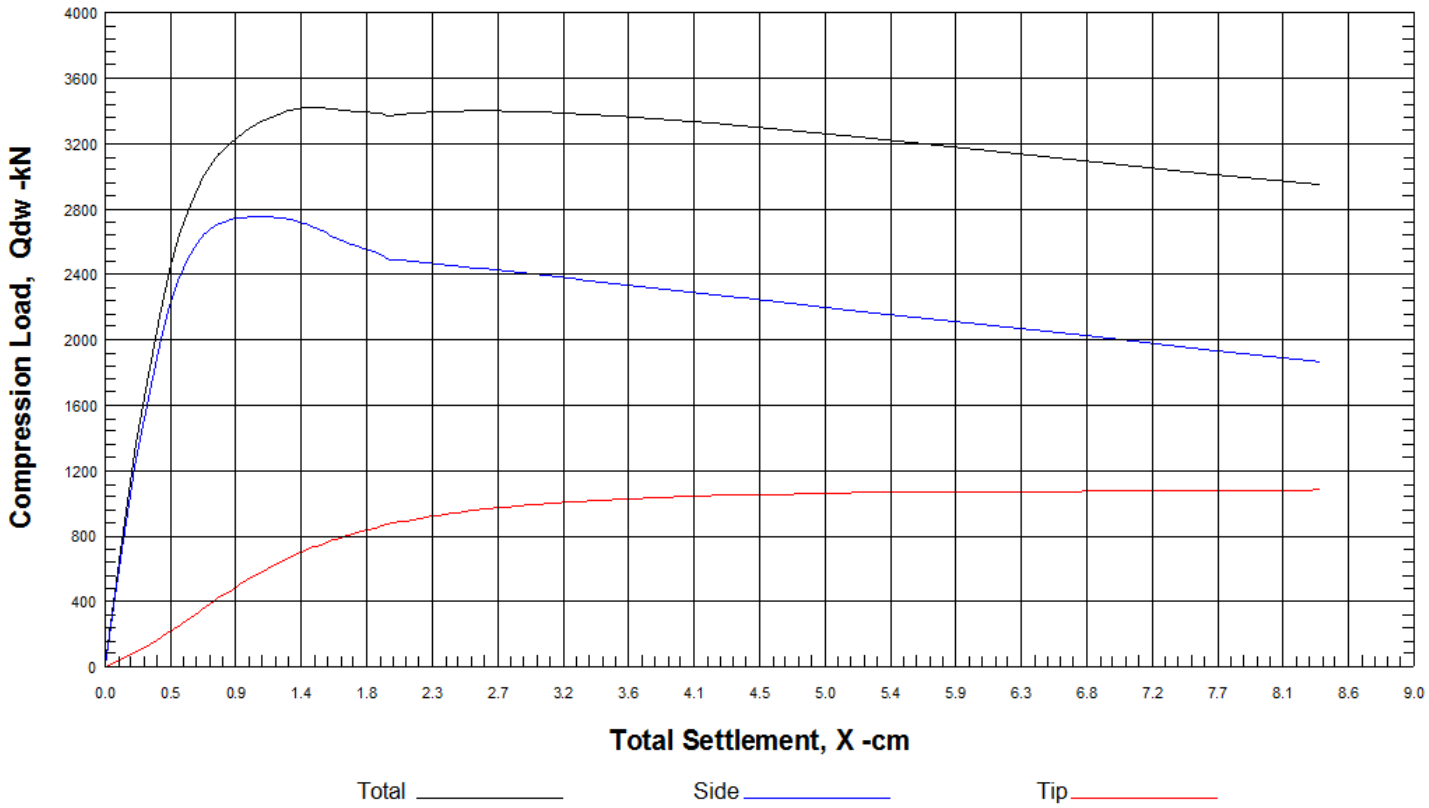



**CivilTech Software**

**Samawa Power Plant Project**
**Switchyard Area (Clay Base)**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

## Vertical Load vs. Total Settlement

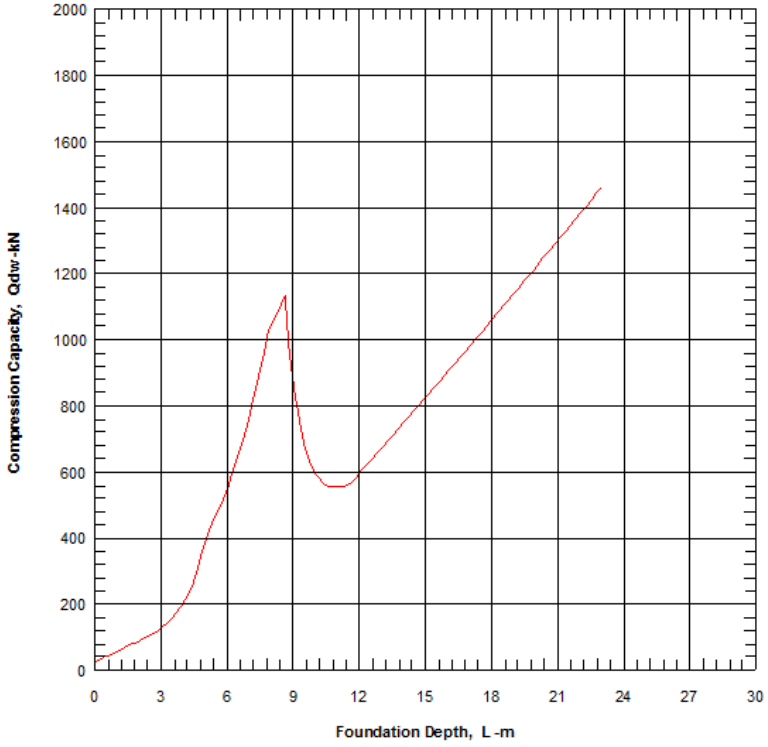


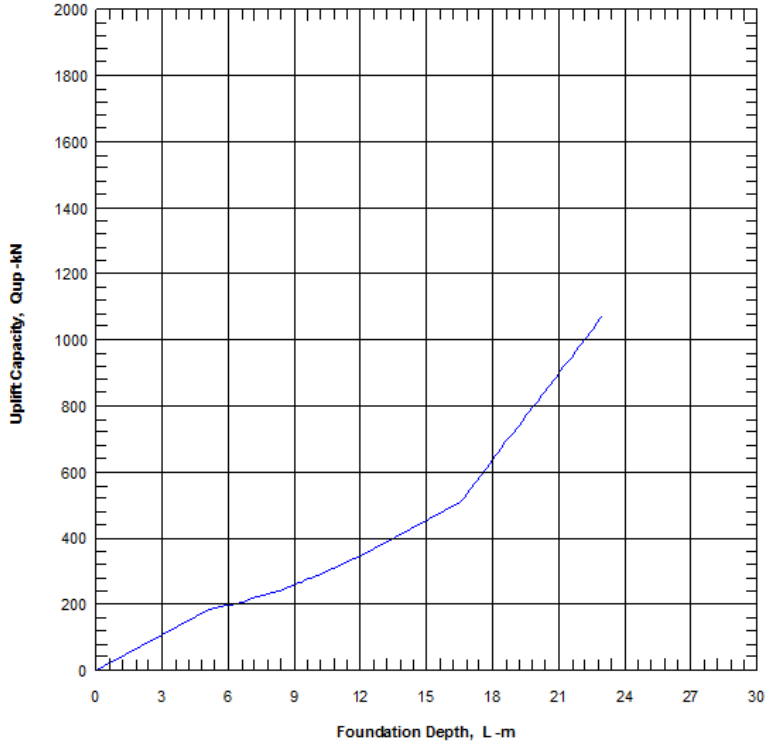

CivilTech Software

**Samawa Power Plant Project**
**Switchyard Area (Clay Base)**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

# ALLOWABLE CAPACITY vs FOUNDATION DEPTH

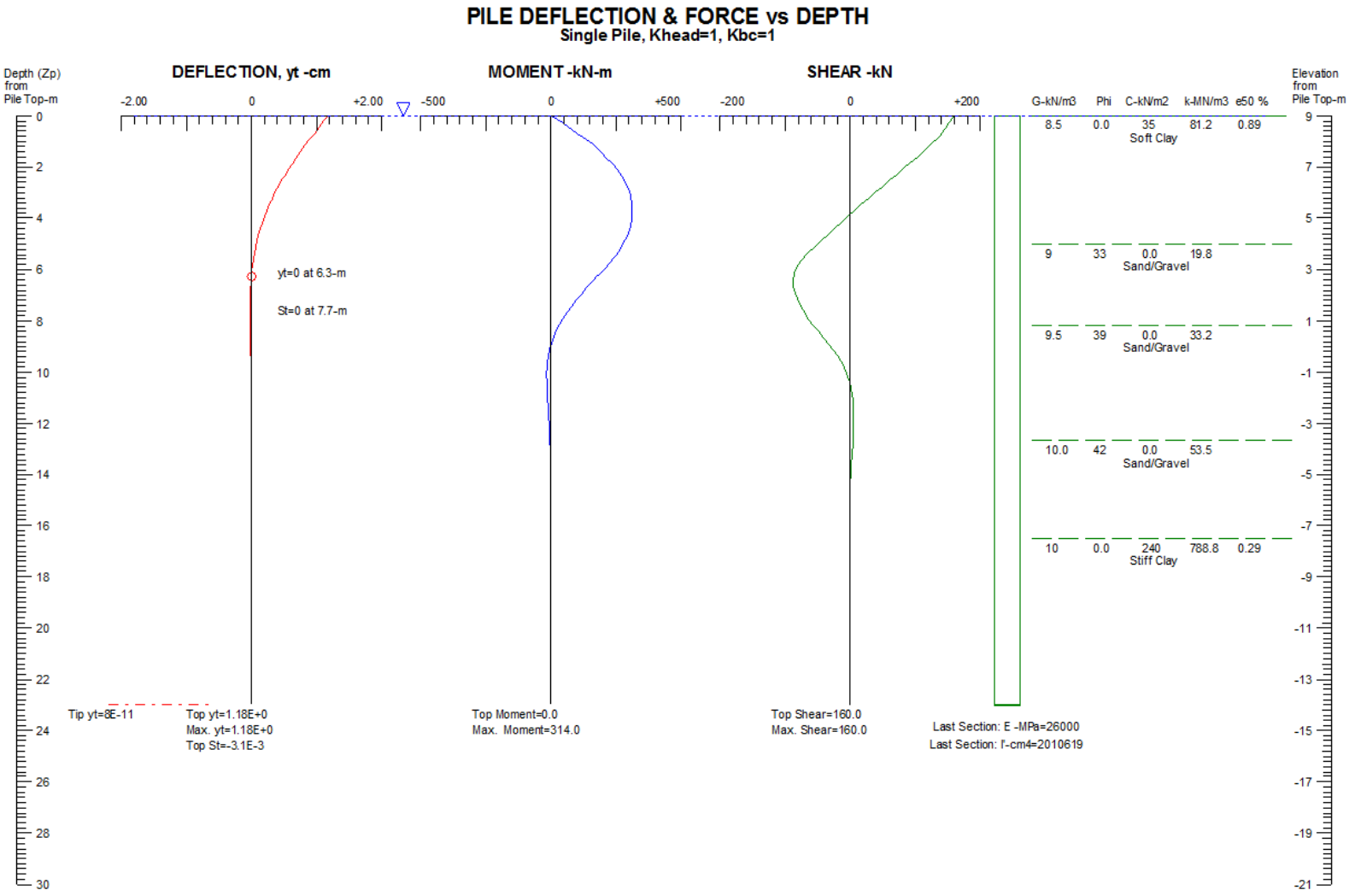



CivilTech Software

**Samawa Power Plant Project**
**Switchyard Area (Clay Base)**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

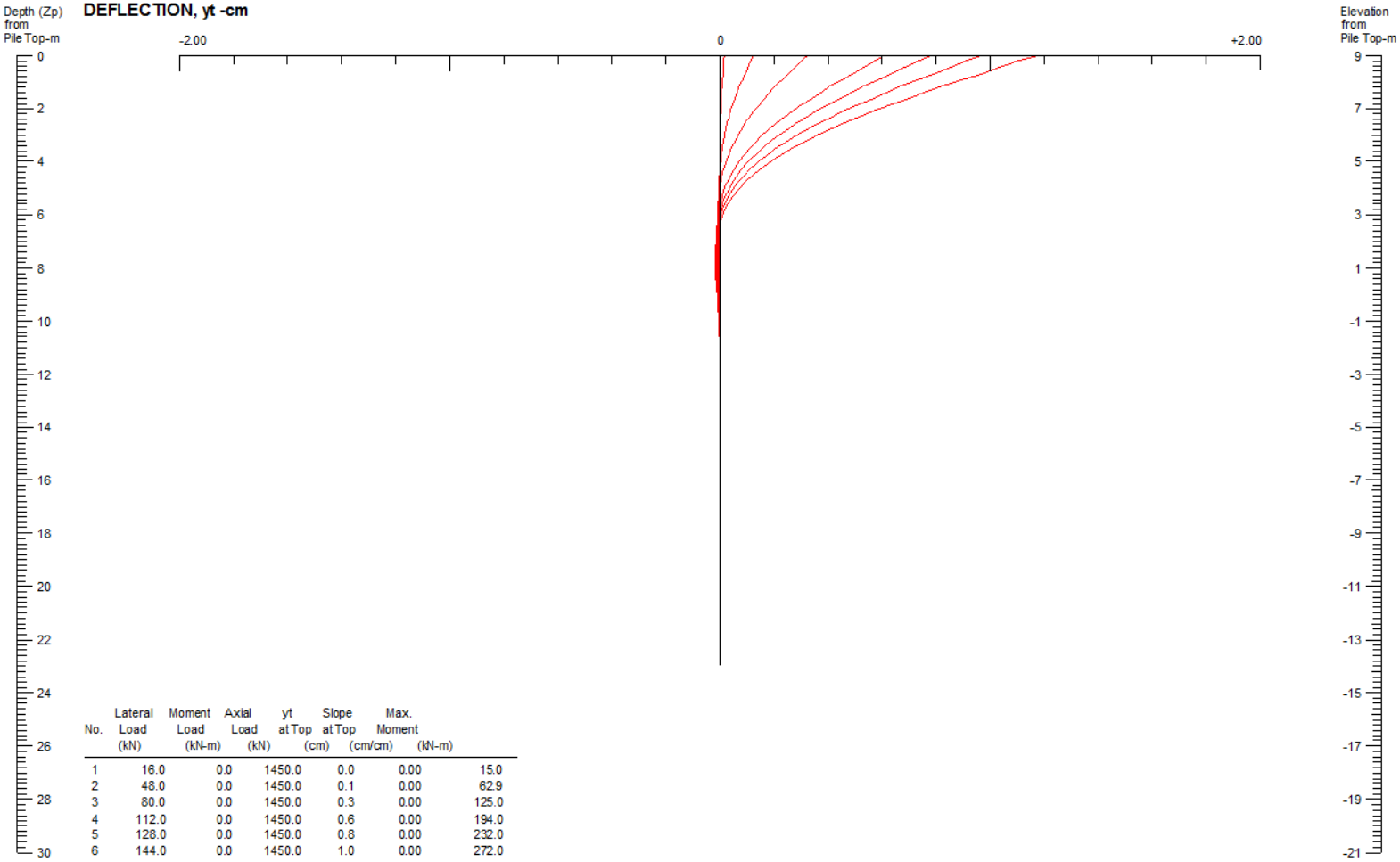



**CivilTech Software**

**Samawa Power Plant Project**
**Switchyard Area (Clay Base)**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

## PILE DEFLECTION vs LOADING
Single Pile, Khead=1, Kbc=1

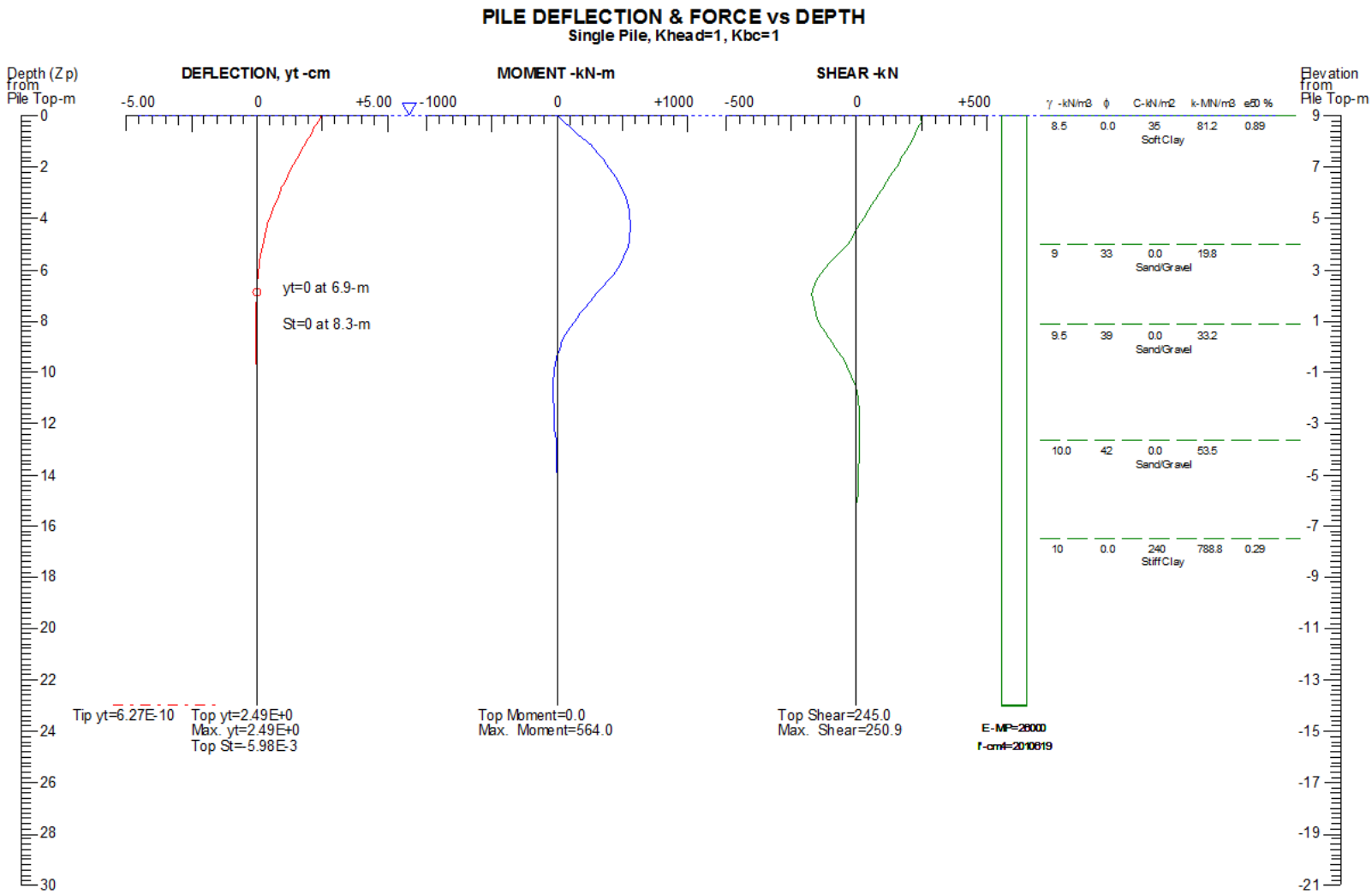



| No. | Lateral Load (kN) | Moment Load (kN-m) | Axial Load (kN) | yt at Top (cm) | Slope at Top (cm/cm) | Max. Moment (kN-m) |
|---|---|---|---|---|---|---|
| 1 | 16.0 | 0.0 | 1450.0 | 0.0 | 0.00 | 15.0 |
| 2 | 48.0 | 0.0 | 1450.0 | 0.1 | 0.00 | 62.9 |
| 3 | 80.0 | 0.0 | 1450.0 | 0.3 | 0.00 | 125.0 |
| 4 | 112.0 | 0.0 | 1450.0 | 0.6 | 0.00 | 194.0 |
| 5 | 128.0 | 0.0 | 1450.0 | 0.8 | 0.00 | 232.0 |
| 6 | 144.0 | 0.0 | 1450.0 | 1.0 | 0.00 | 272.0 |
| 7 | 160.0 | 0.0 | 1450.0 | 1.2 | 0.00 | 314.0 |

*CivilTech Software*

**Samawa Power Plant Project**
**Switchyard Area (Clay Base)**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

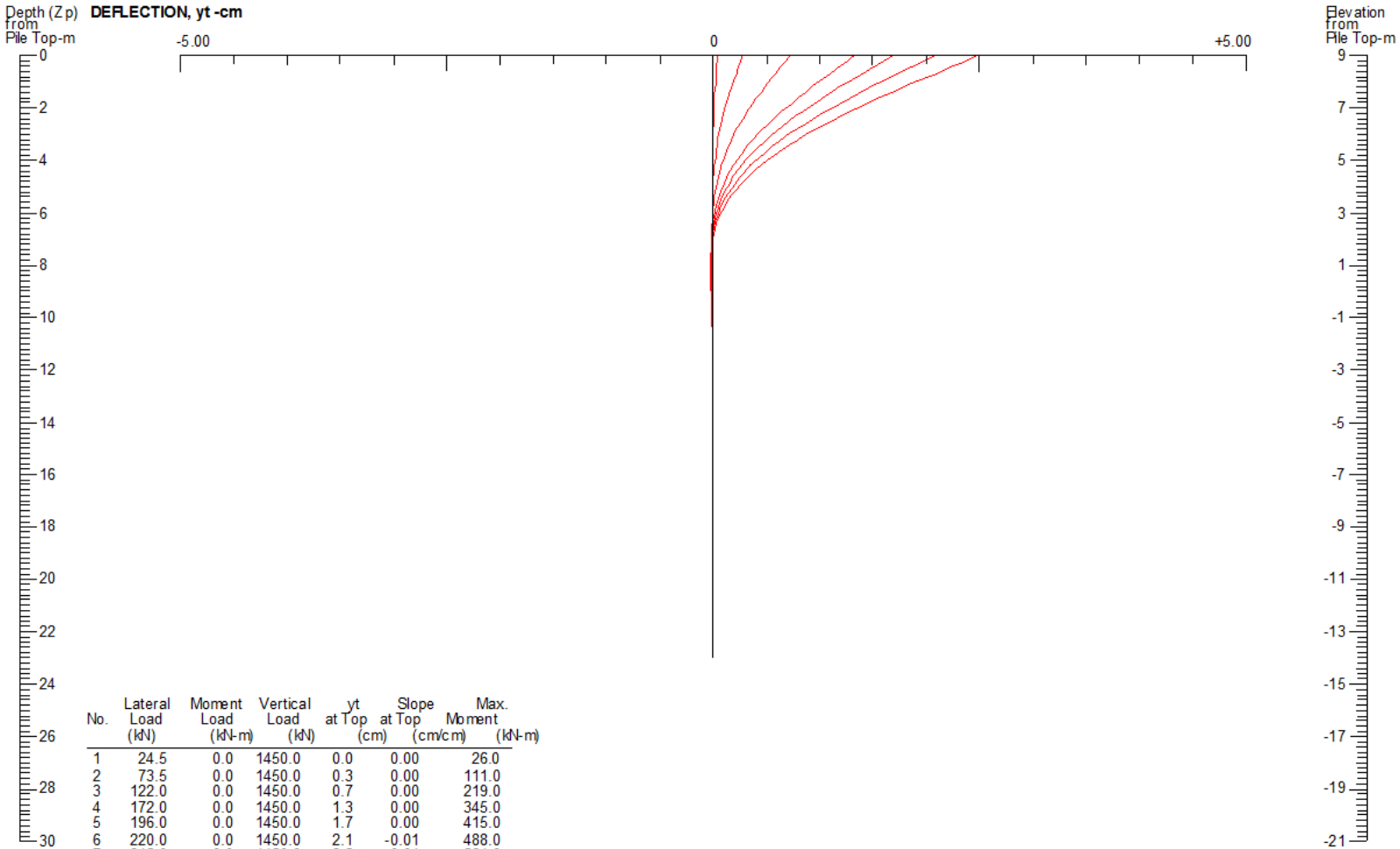



**CivilTech Software**

**Samawa Power Plant Project**
**Switchyard Area (Clay Base)**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

**PILE DEFLECTION vs LOADING**
**Single Pile, Khead=1, Kbc=1**




| No. | Lateral Load (kN) | Moment Load (kN-m) | Vertical Load (kN) | yt at Top (cm) | Slope at Top (cm/cm) | Max. Moment (kN-m) |
|---|---|---|---|---|---|---|
| 1 | 24.5 | 0.0 | 1450.0 | 0.0 | 0.00 | 26.0 |
| 2 | 73.5 | 0.0 | 1450.0 | 0.3 | 0.00 | 111.0 |
| 3 | 122.0 | 0.0 | 1450.0 | 0.7 | 0.00 | 219.0 |
| 4 | 172.0 | 0.0 | 1450.0 | 1.3 | 0.00 | 345.0 |
| 5 | 196.0 | 0.0 | 1450.0 | 1.7 | 0.00 | 415.0 |
| 6 | 220.0 | 0.0 | 1450.0 | 2.1 | -0.01 | 488.0 |
| 7 | 245.0 | 0.0 | 1450.0 | 2.5 | -0.01 | 564.0 |

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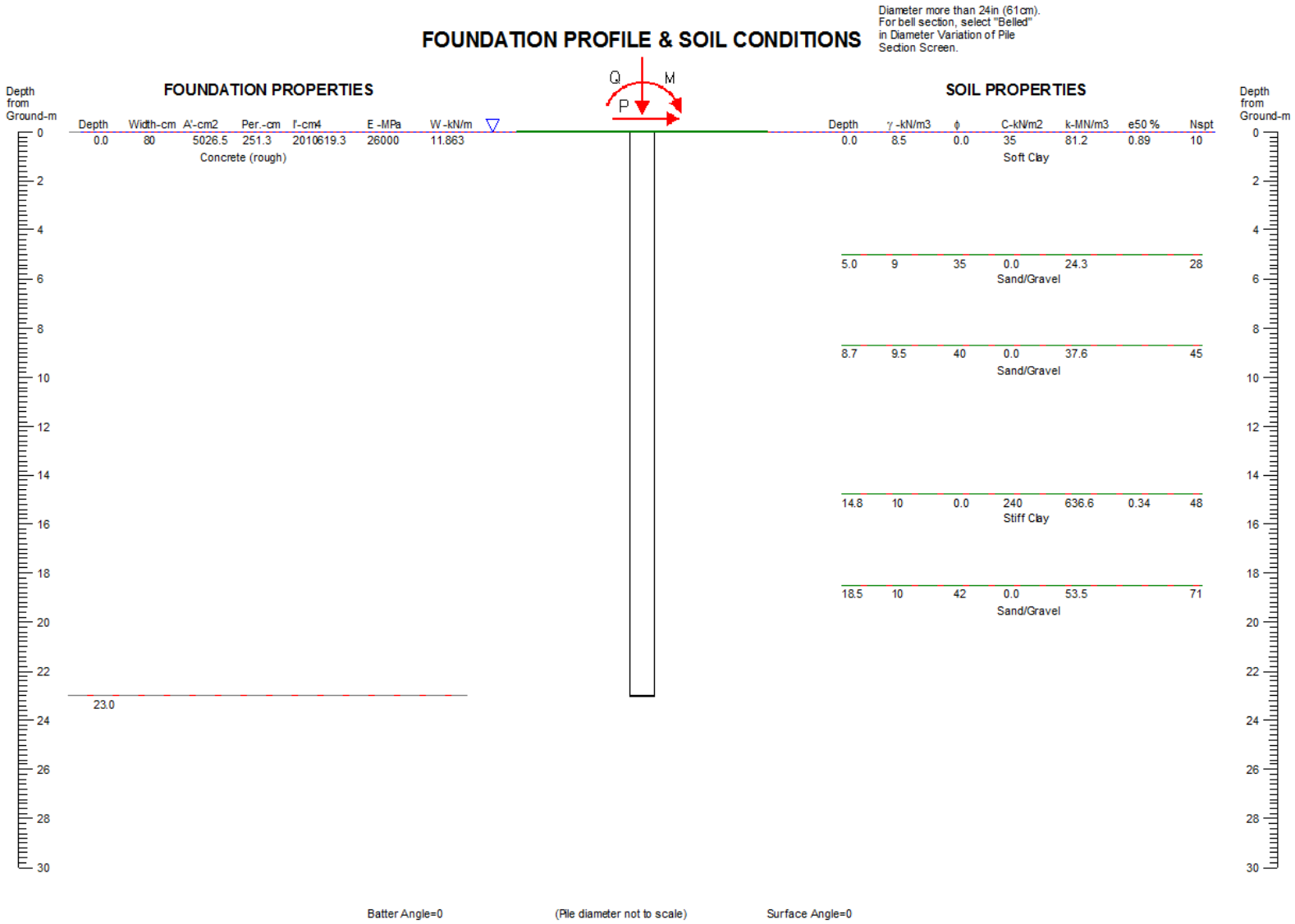
**Samawa Power Plant Project**
**Switchyard Area (Clay Base)**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

**H. 2) Switchyard Area (Sand Base)**

**H. 2.1) Axial Allowable Loads**
Axial Compression Allowable Bearing Capacity= 1498kN
Axial Allowable Uplift Capacity= 902 kN

**H. 2.2)Horizontal Load Capacity for Free Head Pile**
Horizontal allowable lateral load is 160kN for 1.2 cm lateral top deflection. Maximum sectional moment : Mmax=315kN-m
Horizontal ultimate lateral capacity is 250kN for 2.5 cm top deflection. Maximum sectional moment : 583kN-m

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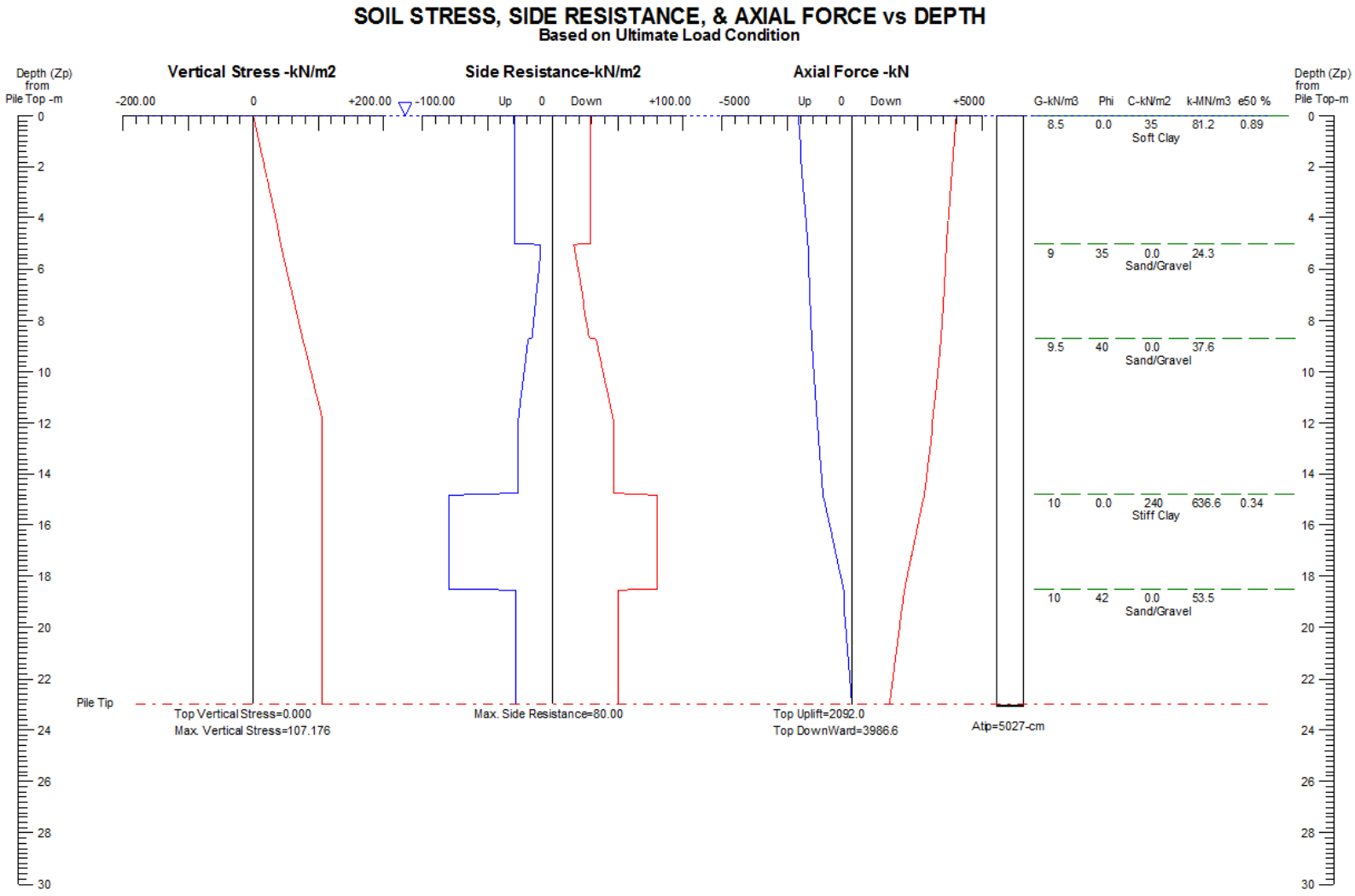
**Samawa Power Plant Project**
**Switchyard Area (Sand Base)**

**Figure 1**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

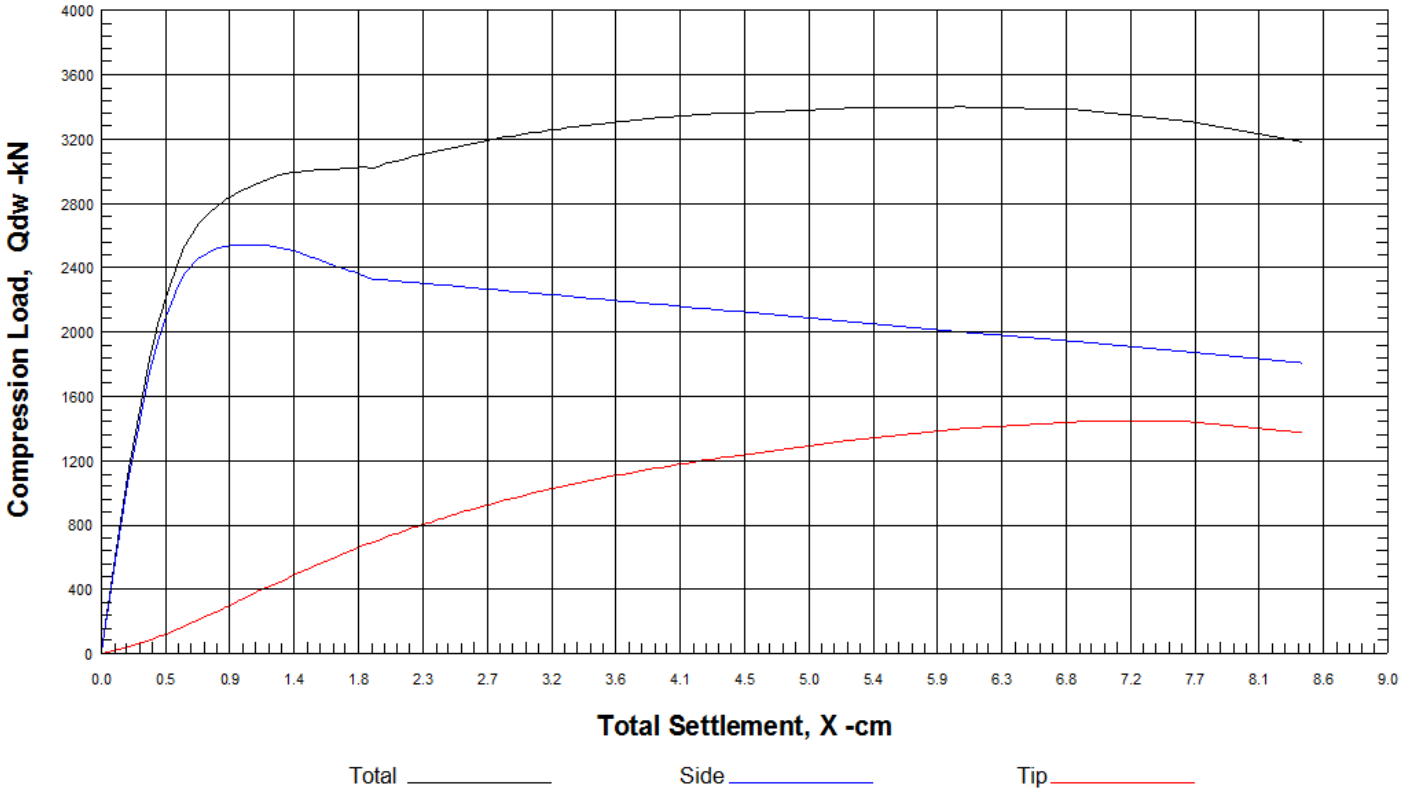



CivilTech Software

**Samawa Power Plant Project**
**Switchyard Area (Sand Base)**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

## Vertical Load vs. Total Settlement

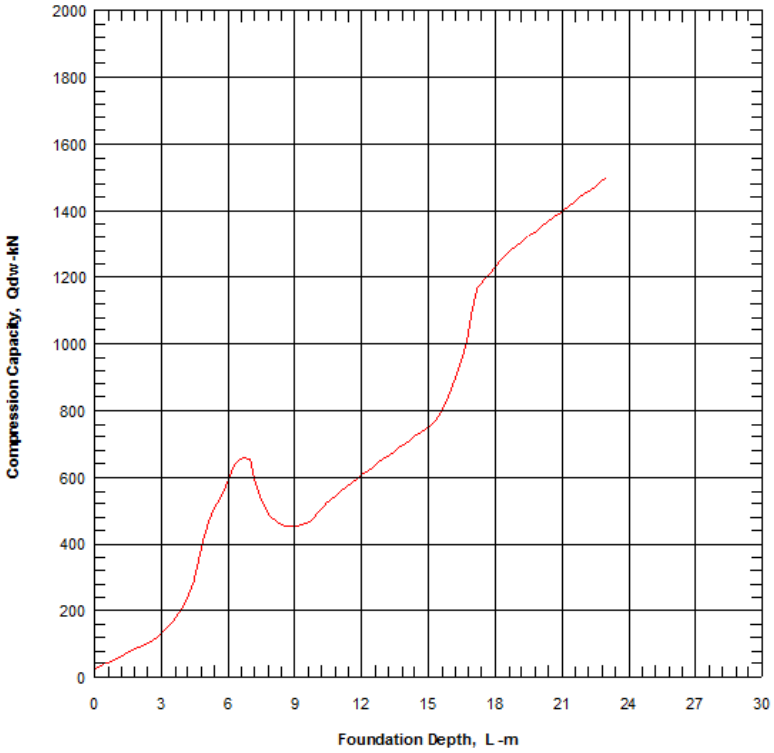


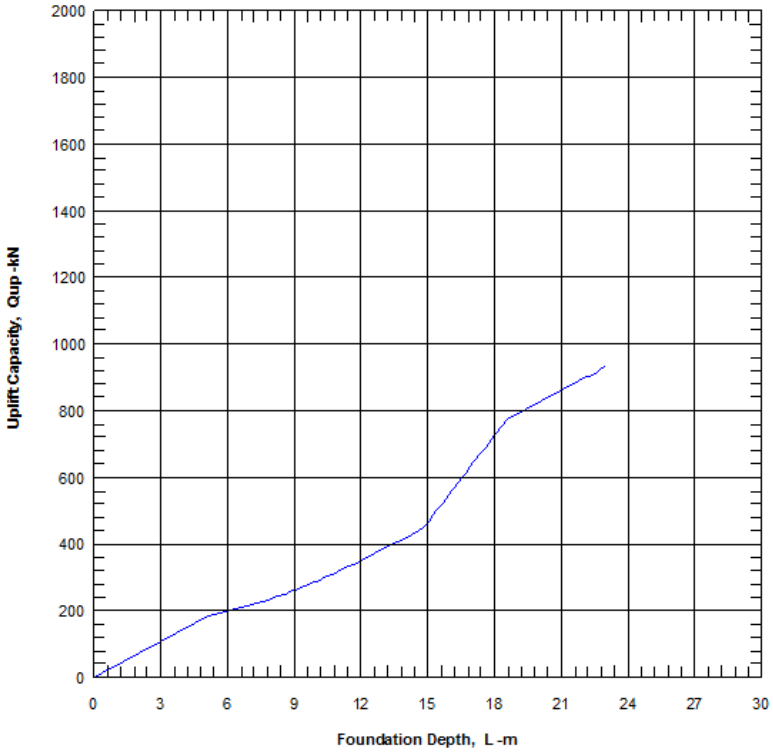

CivilTech Software

**Samawa Power Plant Project**
**Switchyard Area (Sand Base)**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

# ALLOWABLE CAPACITY vs FOUNDATION DEPTH

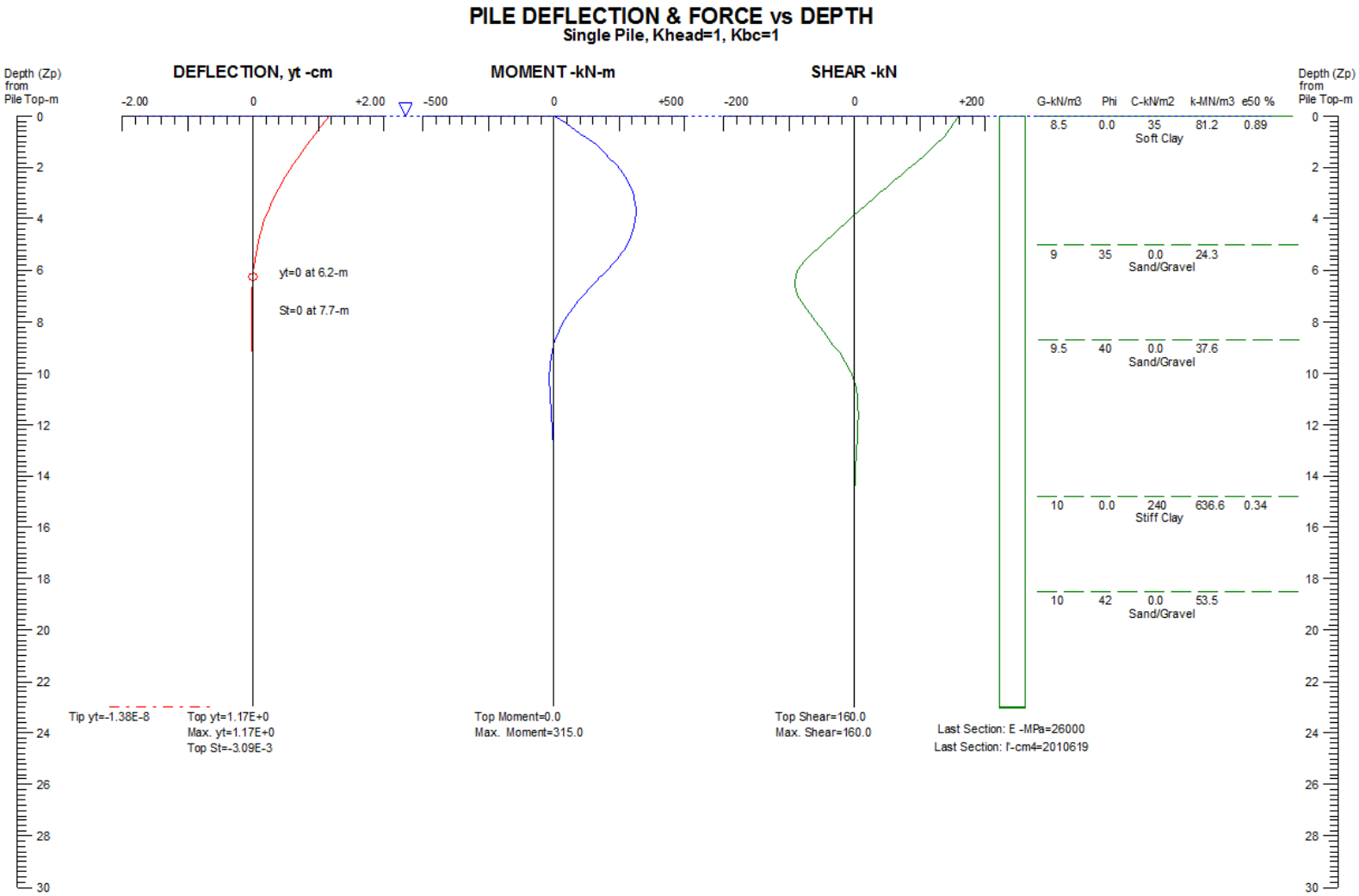



CivilTech Software

**Samawa Power Plant Project**
**Switchyard Area (Sand Base)**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

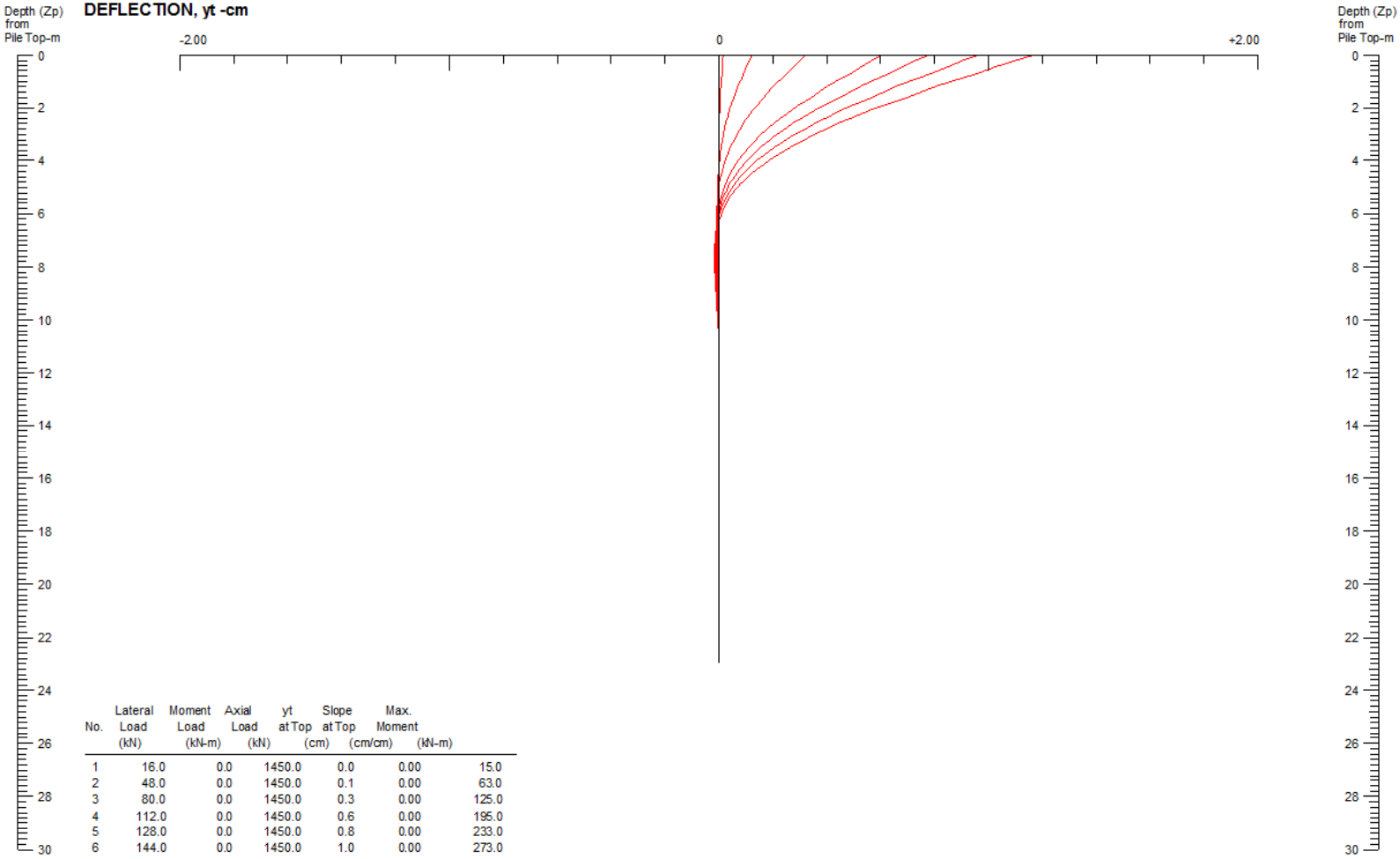



CivilTech Software

**Samawa Power Plant Project**
**Switchyard Area (Sand Base)**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

## PILE DEFLECTION vs LOADING
Single Pile, Khead=1, Kbc=1




| No. | Lateral Load (kN) | Moment Load (kN-m) | Axial Load (kN) | yt at Top (cm) | Slope at Top (cm/cm) | Max. Moment (kN-m) |
|---|---|---|---|---|---|---|
| 1 | 16.0 | 0.0 | 1450.0 | 0.0 | 0.00 | 15.0 |
| 2 | 48.0 | 0.0 | 1450.0 | 0.1 | 0.00 | 63.0 |
| 3 | 80.0 | 0.0 | 1450.0 | 0.3 | 0.00 | 125.0 |
| 4 | 112.0 | 0.0 | 1450.0 | 0.6 | 0.00 | 195.0 |
| 5 | 128.0 | 0.0 | 1450.0 | 0.8 | 0.00 | 233.0 |
| 6 | 144.0 | 0.0 | 1450.0 | 1.0 | 0.00 | 273.0 |
| 7 | 160.0 | 0.0 | 1450.0 | 1.2 | 0.00 | 315.0 |

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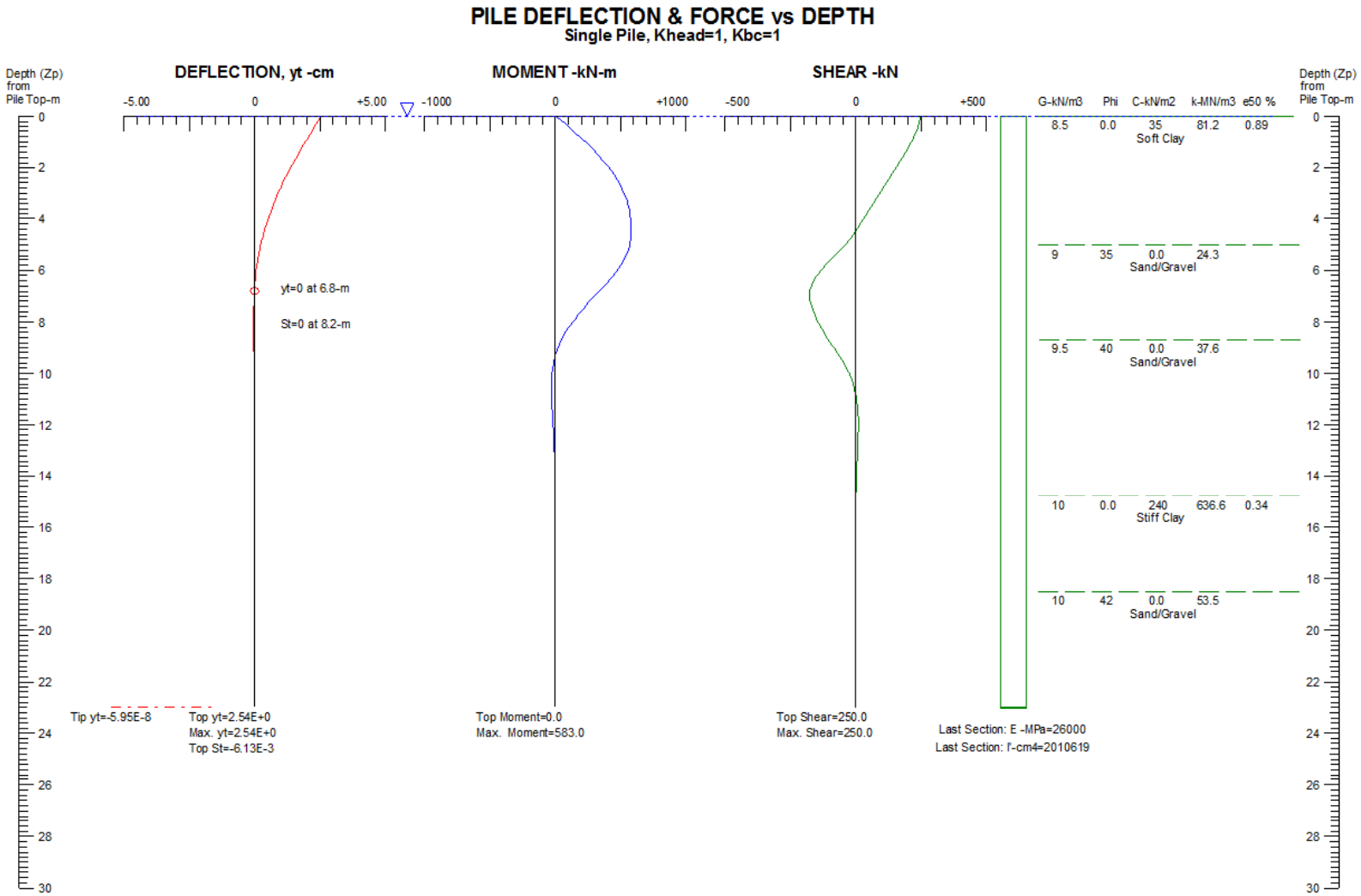
**Samawa Power Plant Project**
**Switchyard Area (Sand Base)**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

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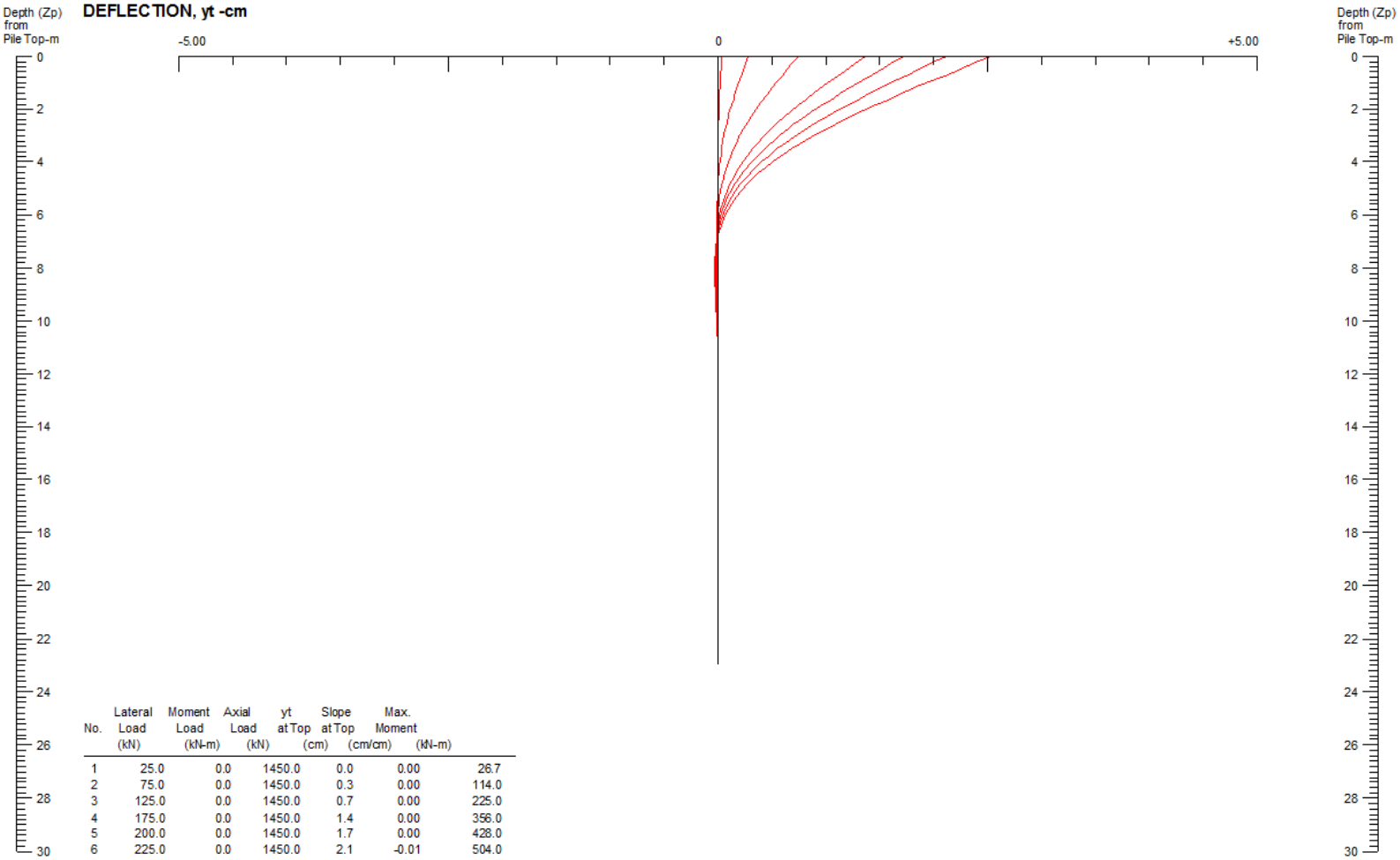
**Samawa Power Plant Project**
**Switchyard Area (Sand Base)**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

## PILE DEFLECTION vs LOADING
Single Pile, Khead=1, Kbc=1




| No. | Lateral Load (kN) | Moment Load (kN-m) | Axial Load (kN) | yt at Top (cm) | Slope at Top (cm/cm) | Max. Moment (kN-m) |
|---|---|---|---|---|---|---|
| 1 | 25.0 | 0.0 | 1450.0 | 0.0 | 0.00 | 26.7 |
| 2 | 75.0 | 0.0 | 1450.0 | 0.3 | 0.00 | 114.0 |
| 3 | 125.0 | 0.0 | 1450.0 | 0.7 | 0.00 | 225.0 |
| 4 | 175.0 | 0.0 | 1450.0 | 1.4 | 0.00 | 356.0 |
| 5 | 200.0 | 0.0 | 1450.0 | 1.7 | 0.00 | 428.0 |
| 6 | 225.0 | 0.0 | 1450.0 | 2.1 | -0.01 | 504.0 |
| 7 | 250.0 | 0.0 | 1450.0 | 2.5 | -0.01 | 583.0 |

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**Samawa Power Plant Project**
**Switchyard Area (Sand Base)**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

**I) GTG Area**

**I.1) GTG Area -1**

**I.1.1) GTG Area -1 (Clay Base)**

**I. 1.1.1) Axial Allowable Loads**

Axial Compression Allowable Bearing Capacity= 1532 kN

Axial Allowable Uplift Capacity= 1196 kN

**I. 1.1.2)Horizontal Load Capacity for Free Head Pile**

Horizontal allowable lateral load is 165kN for 1.2 cm lateral top deflection. Maximum sectional moment : Mmax=345kN-m

Horizontal ultimate lateral capacity is 265kN for 2.5 cm top deflection. Maximum sectional moment : 649kN-m

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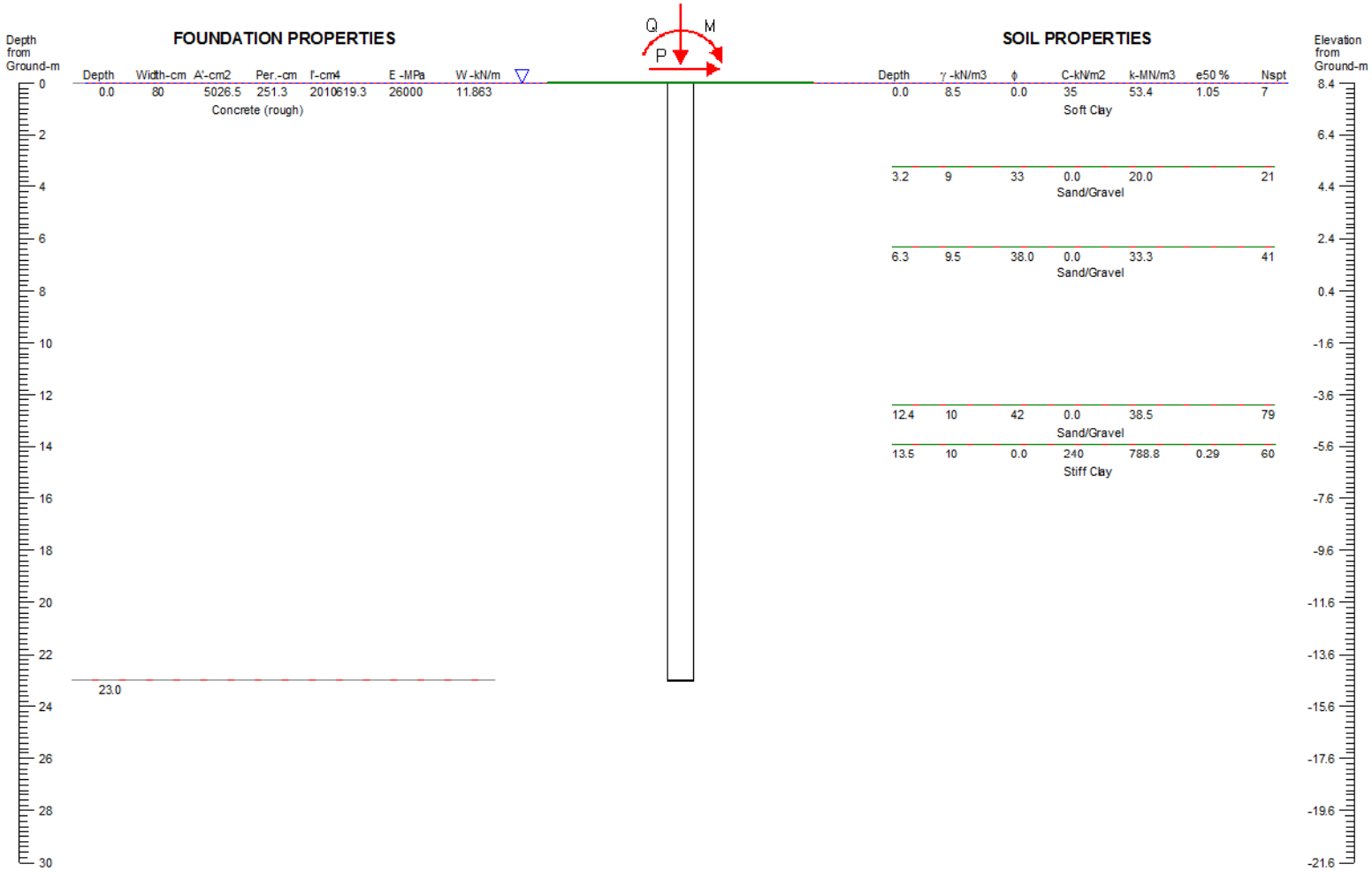
## FOUNDATION PROFILE & SOIL CONDITIONS

Diameter more than 24in (61cm).
For bell section, select "Belled"
in Diameter Variation of Pile
Section Screen.




Batter Angle=0 (Pile diameter not to scale) Surface Angle=0

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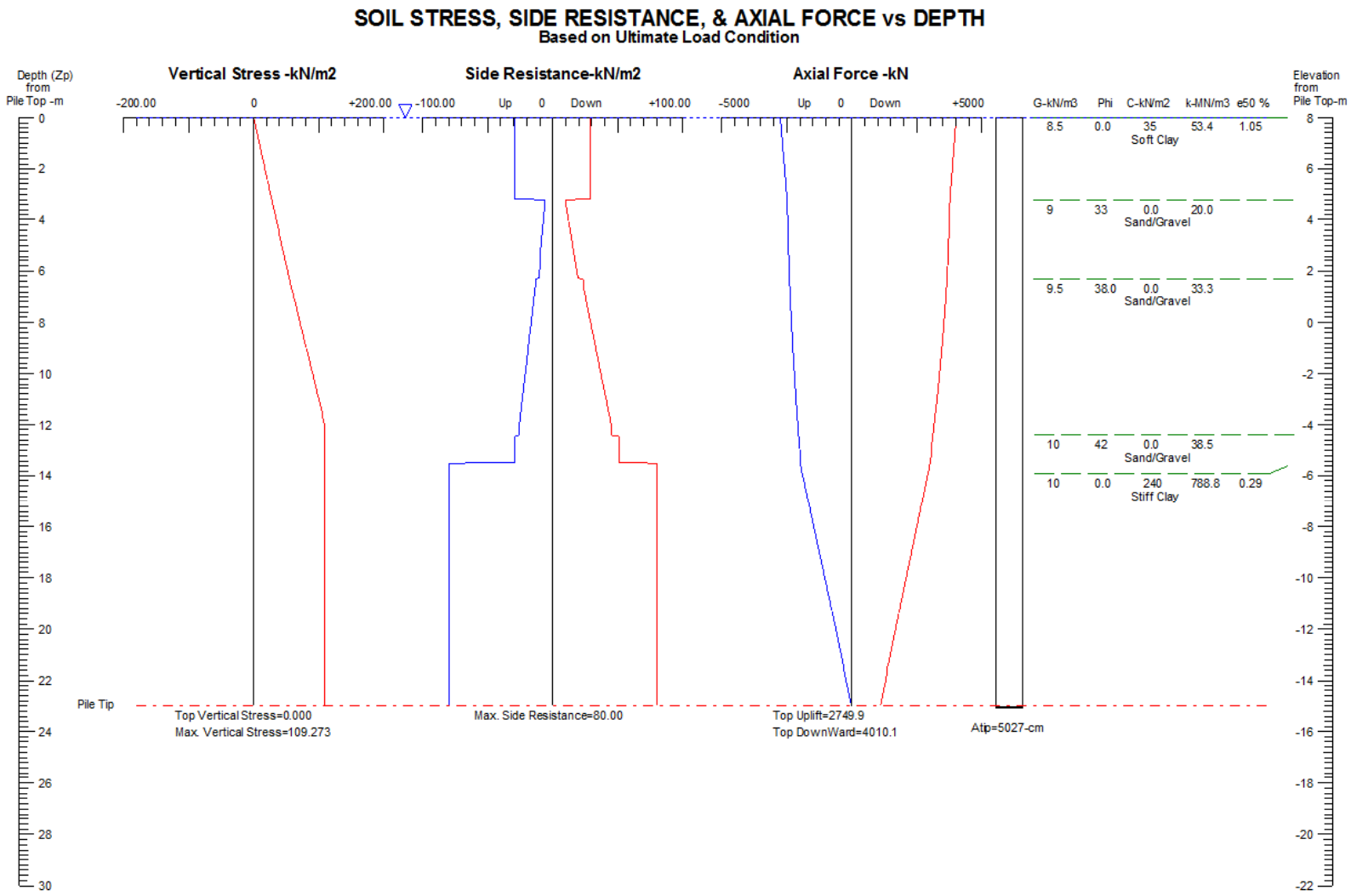
**Samawa Power Plant Project**
**GTG_Area_1_ClayBase**

**Figure 1**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

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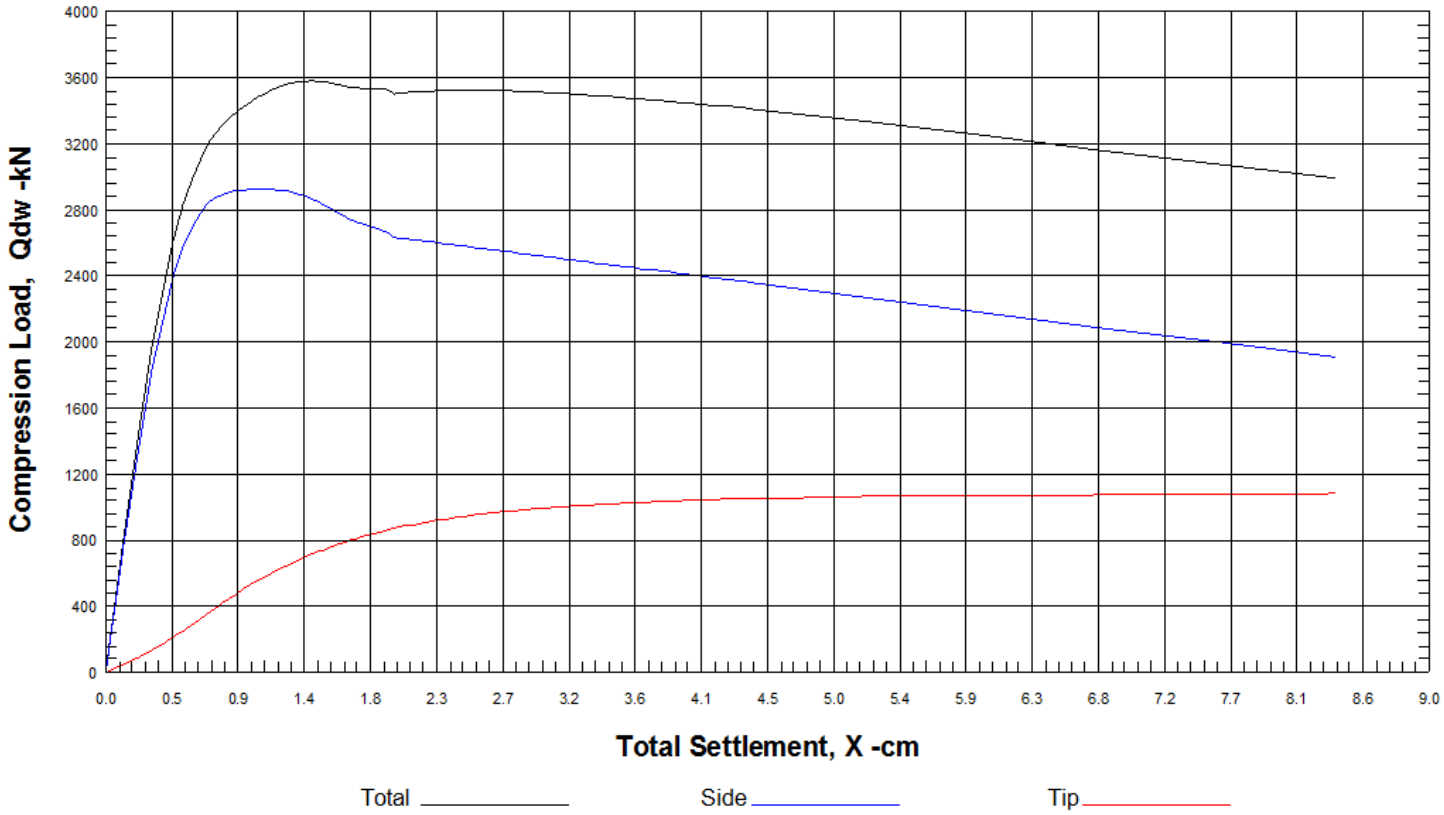
**Samawa Power Plant Project**
**GTG_Area_1_ClayBase**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

## Vertical Load vs. Total Settlement

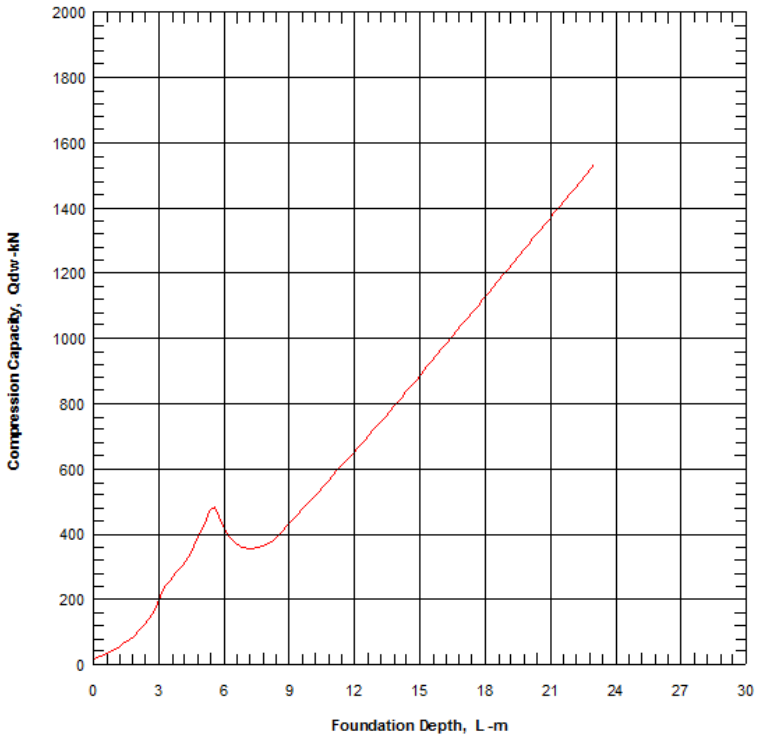


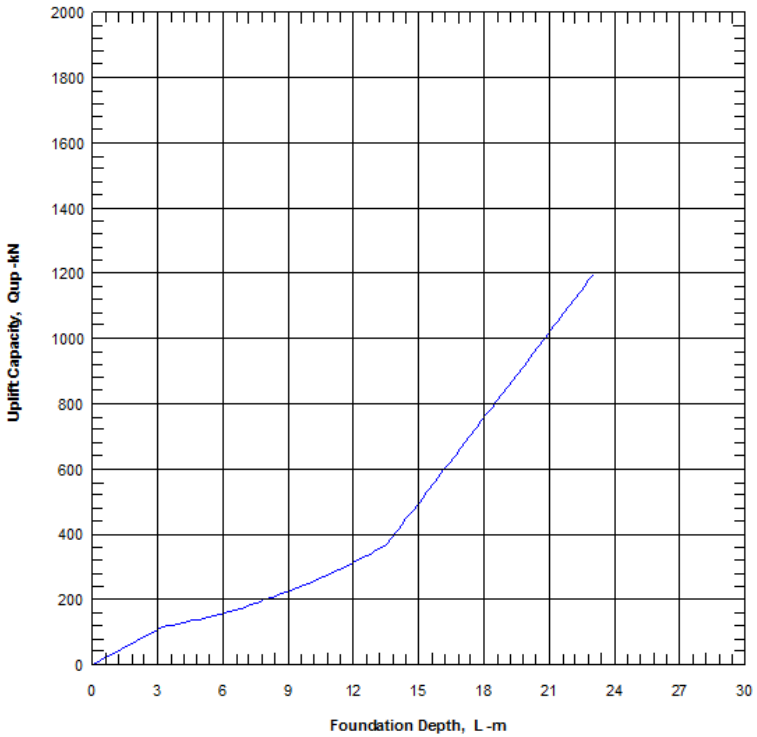

CivilTech Software

**Samawa Power Plant Project**
**GTG_Area_1_ClayBase**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

# ALLOWABLE CAPACITY vs FOUNDATION DEPTH

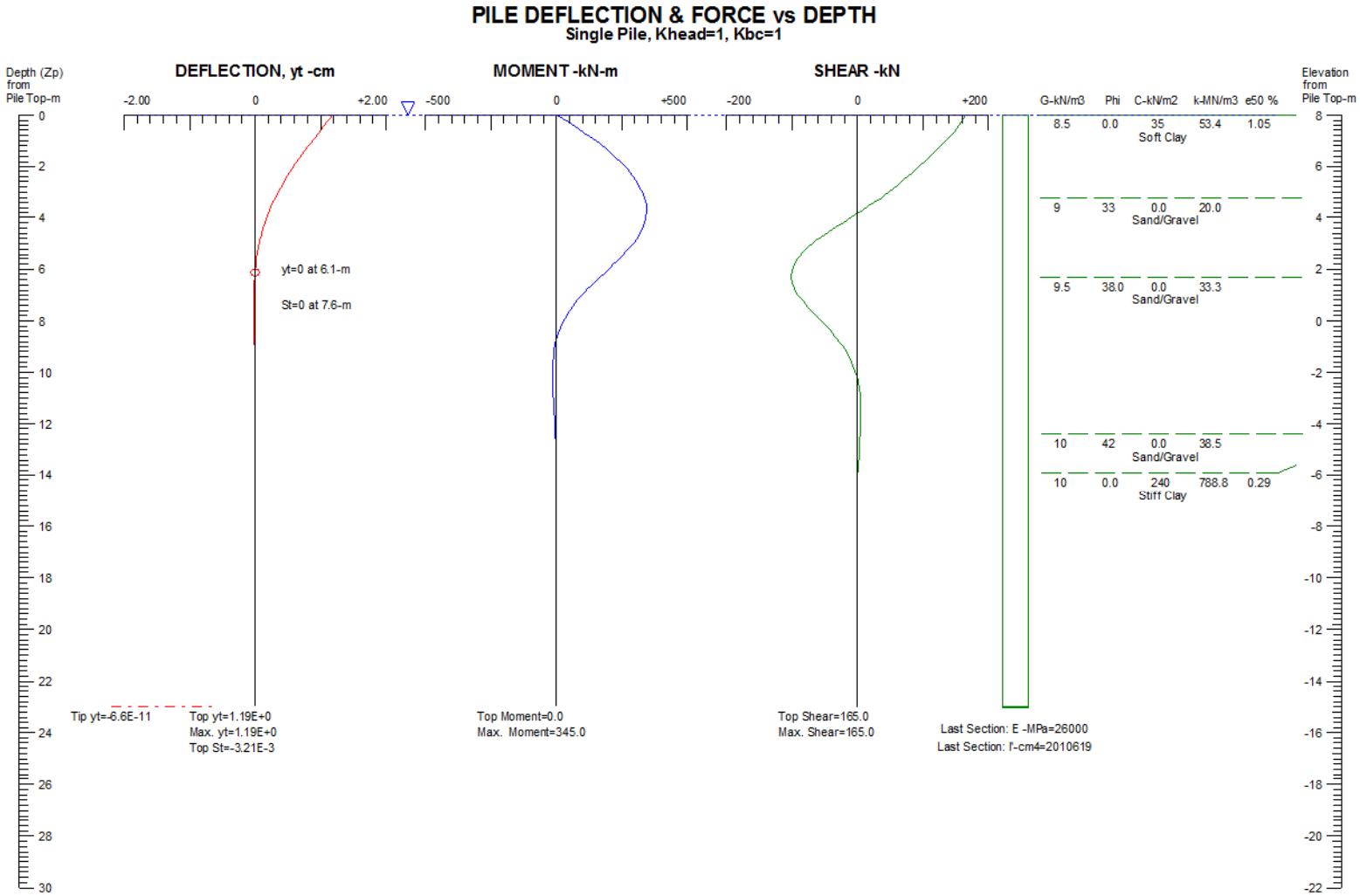



CivilTech Software

**Samawa Power Plant Project**
**GTG_Area_1_ClayBase**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

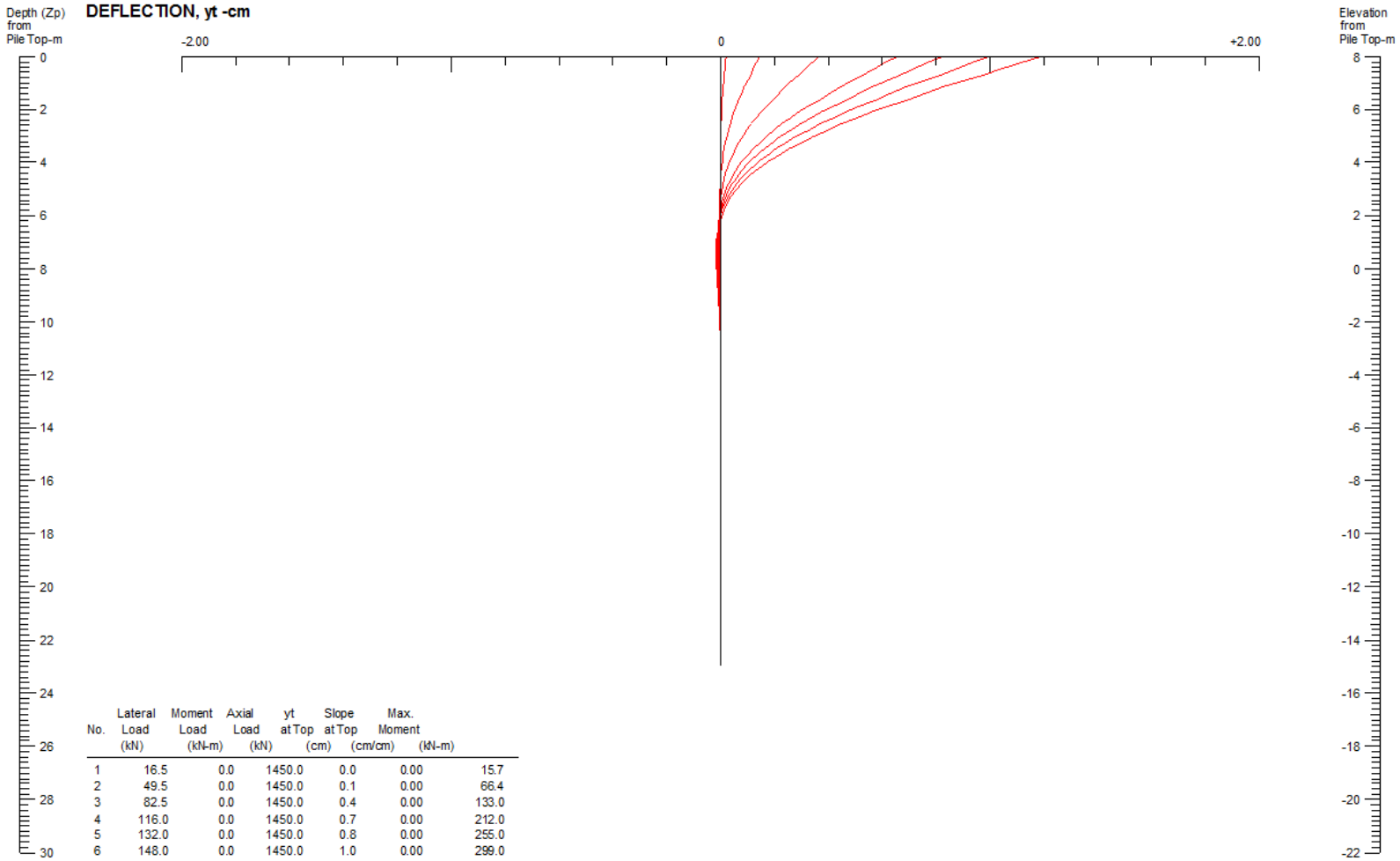



**CivilTech Software**

**Samawa Power Plant Project**
**GTG_Area_1_ClayBase**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

## PILE DEFLECTION vs LOADING
Single Pile, Khead=1, Kbc=1

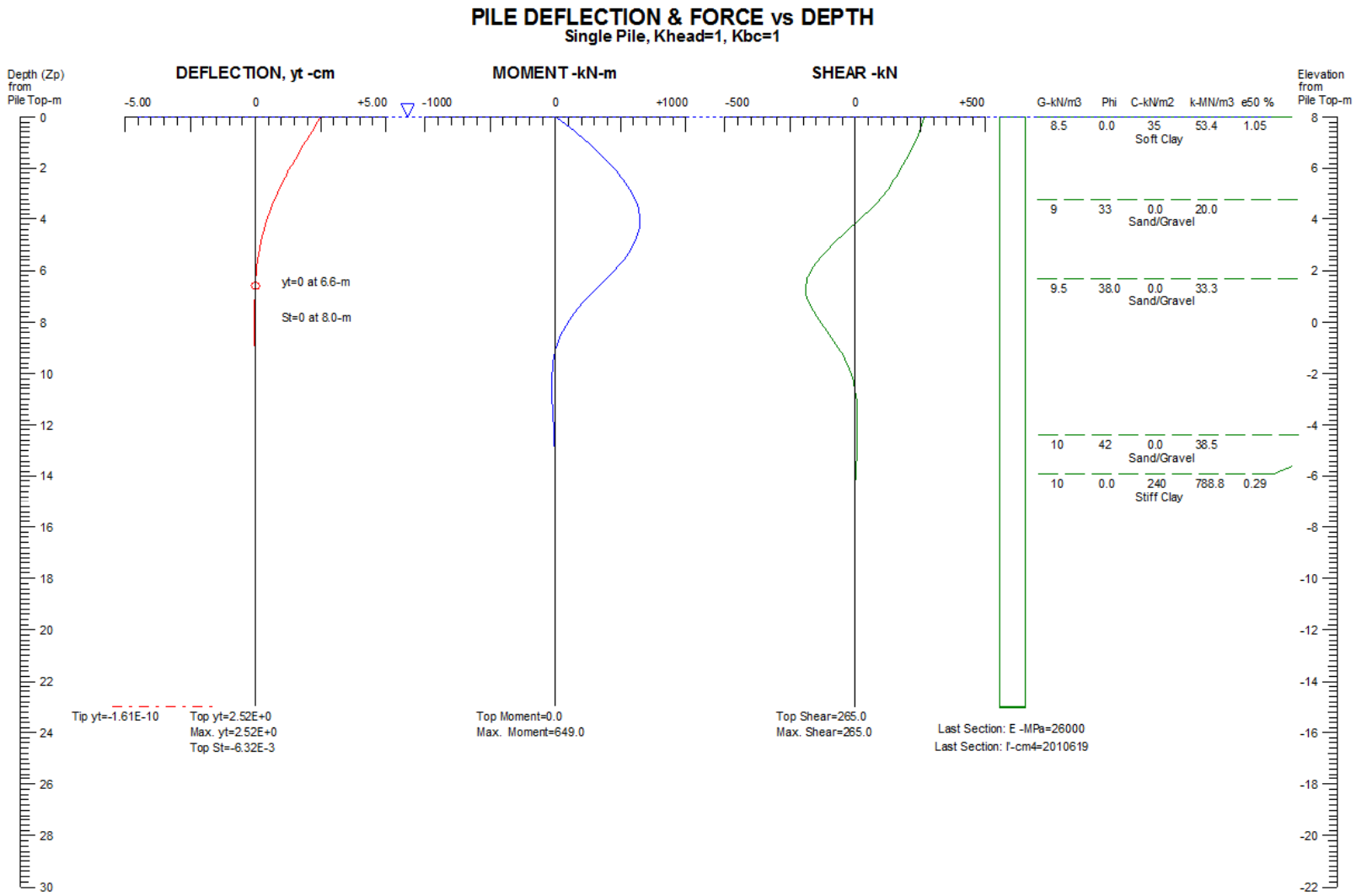



| No. | Lateral Load (kN) | Moment Load (kN-m) | Axial Load (kN) | yt at Top (cm) | Slope at Top (cm/cm) | Max. Moment (kN-m) |
|---|---|---|---|---|---|---|
| 1 | 16.5 | 0.0 | 1450.0 | 0.0 | 0.00 | 15.7 |
| 2 | 49.5 | 0.0 | 1450.0 | 0.1 | 0.00 | 66.4 |
| 3 | 82.5 | 0.0 | 1450.0 | 0.4 | 0.00 | 133.0 |
| 4 | 116.0 | 0.0 | 1450.0 | 0.7 | 0.00 | 212.0 |
| 5 | 132.0 | 0.0 | 1450.0 | 0.8 | 0.00 | 255.0 |
| 6 | 148.0 | 0.0 | 1450.0 | 1.0 | 0.00 | 299.0 |
| 7 | 165.0 | 0.0 | 1450.0 | 1.2 | 0.00 | 345.0 |

*CivilTech Software*

**Samawa Power Plant Project**
**GTG_Area_1_ClayBase**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

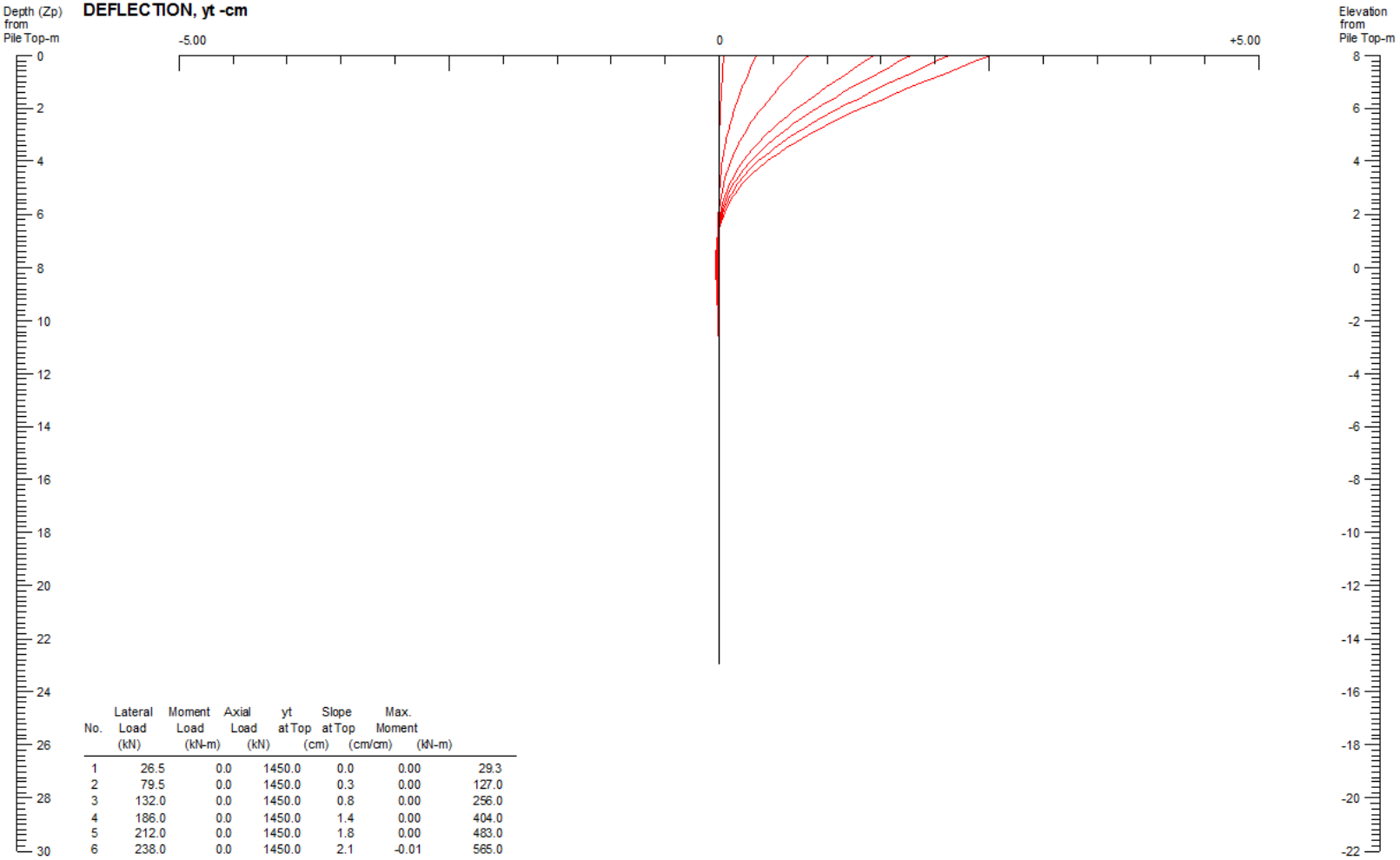



**CivilTech Software**

**Samawa Power Plant Project**
**GTG_Area_1_ClayBase**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

## PILE DEFLECTION vs LOADING
Single Pile, Khead=1, Kbc=1




| No. | Lateral Load (kN) | Moment Load (kN-m) | Axial Load (kN) | yt at Top (cm) | Slope at Top (cm/cm) | Max. Moment (kN-m) |
|---|---|---|---|---|---|---|
| 1 | 26.5 | 0.0 | 1450.0 | 0.0 | 0.00 | 29.3 |
| 2 | 79.5 | 0.0 | 1450.0 | 0.3 | 0.00 | 127.0 |
| 3 | 132.0 | 0.0 | 1450.0 | 0.8 | 0.00 | 256.0 |
| 4 | 186.0 | 0.0 | 1450.0 | 1.4 | 0.00 | 404.0 |
| 5 | 212.0 | 0.0 | 1450.0 | 1.8 | 0.00 | 483.0 |
| 6 | 238.0 | 0.0 | 1450.0 | 2.1 | -0.01 | 565.0 |
| 7 | 265.0 | 0.0 | 1450.0 | 2.5 | -0.01 | 649.0 |

*CivilTech Software*

**Samawa Power Plant Project**
**GTG_Area_1_ClayBase**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

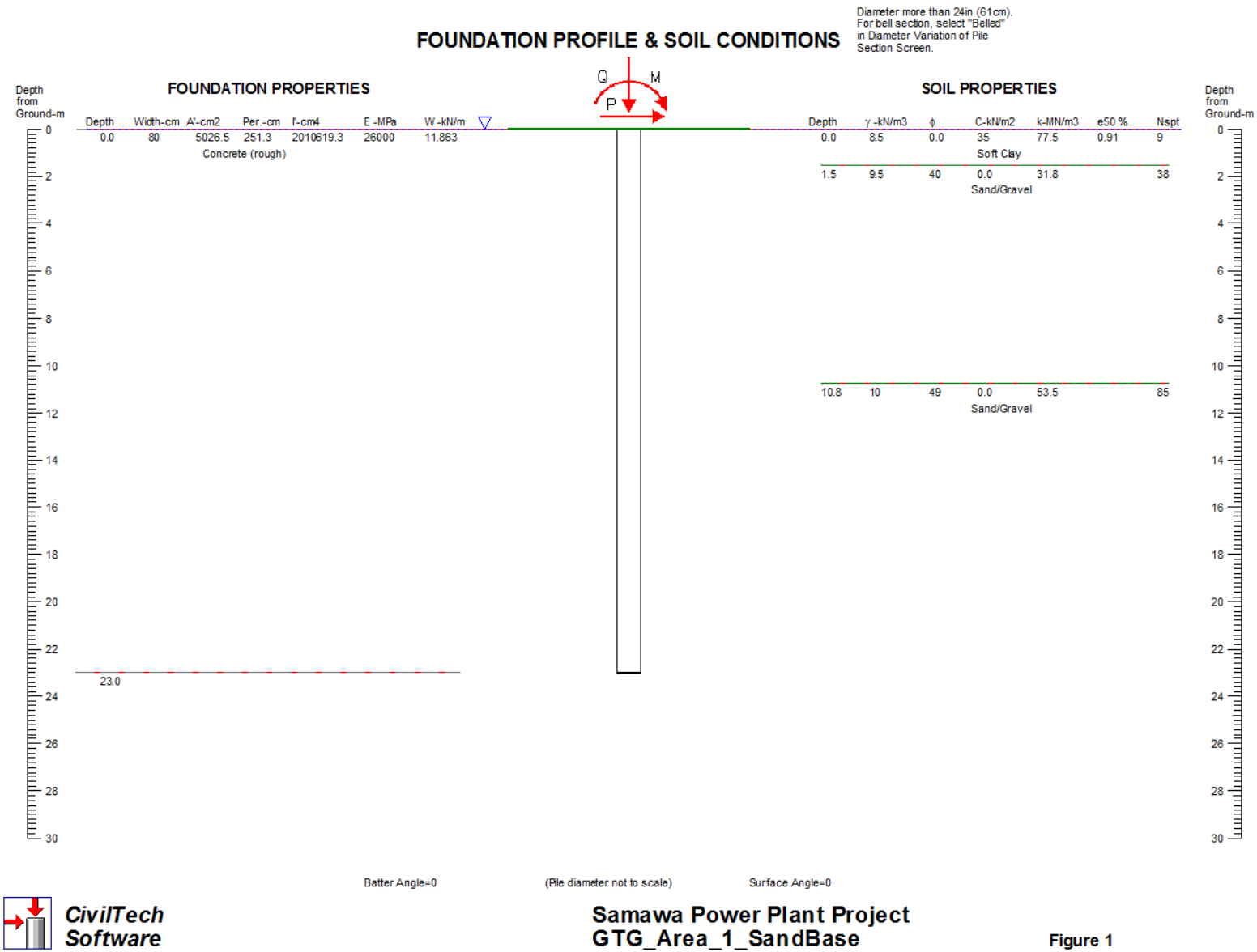
**I. 1.2) GTG Area -1 (Sand Base)**

**I. 1.2.1) Axial Allowable Loads**

Axial Compression Allowable Bearing Capacity= 1547 kN
Axial Allowable Uplift Capacity= 788 kN

**I. 1.2.2)Horizontal Load Capacity for Free Head Pile**

Horizontal allowable lateral load is 245kN for 1.2 cm lateral top deflection. Maximum sectional moment : Mmax=469kN-m
Horizontal ultimate lateral capacity is 395kN for 2.5 cm top deflection. Maximum sectional moment : 849kN-m

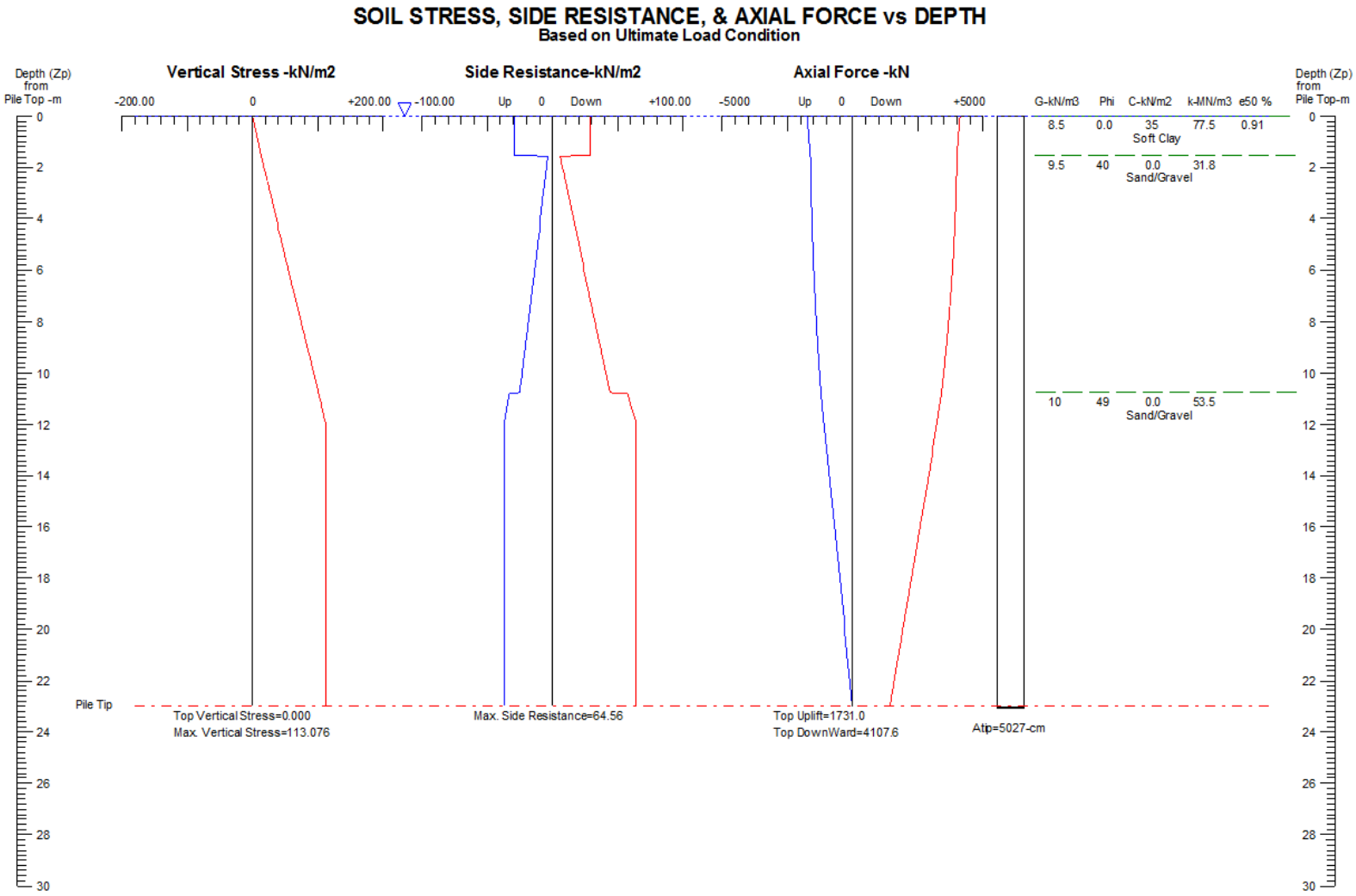



CivilTech Software

**Samawa Power Plant Project**
**GTG_Area_1_SandBase**

**Figure 1**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

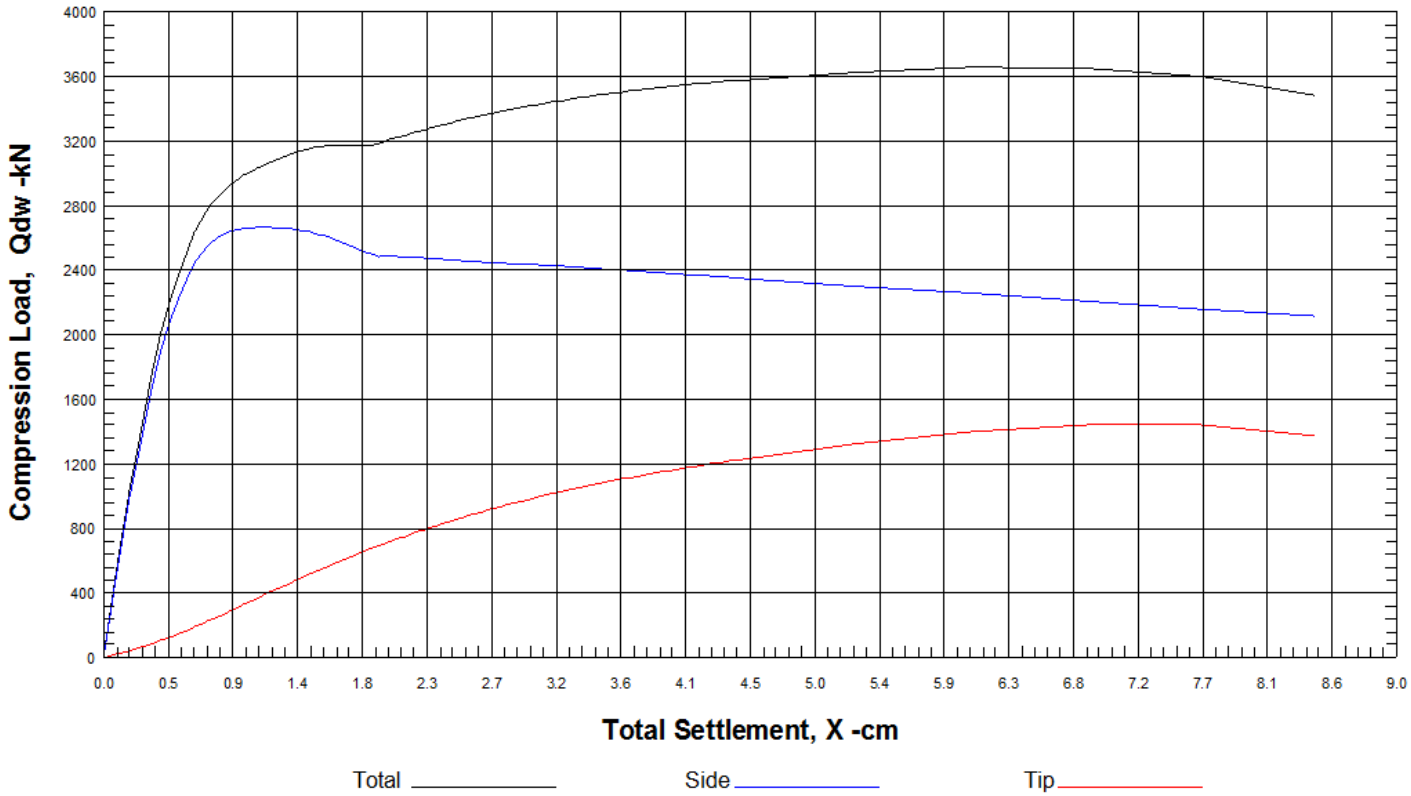



CivilTech Software

**Samawa Power Plant Project**
**GTG_Area_1_SandBase**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

## Vertical Load vs. Total Settlement

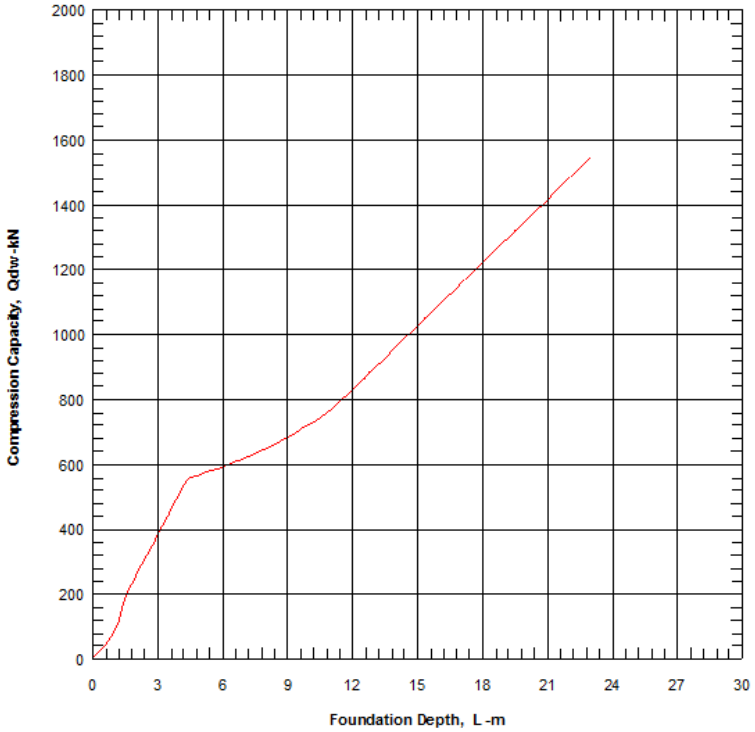


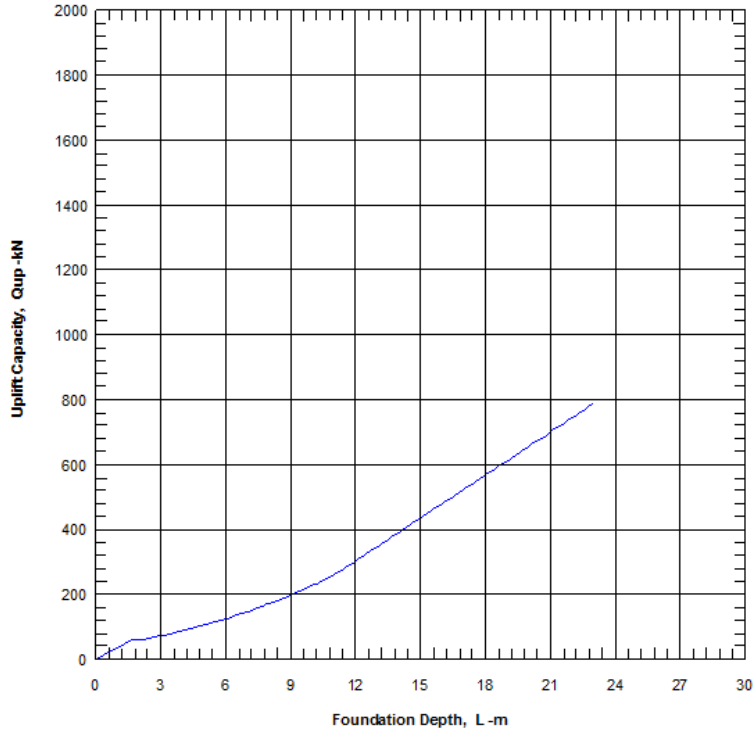

CivilTech Software

**Samawa Power Plant Project**
**GTG_Area_1_SandBase**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

# ALLOWABLE CAPACITY vs FOUNDATION DEPTH

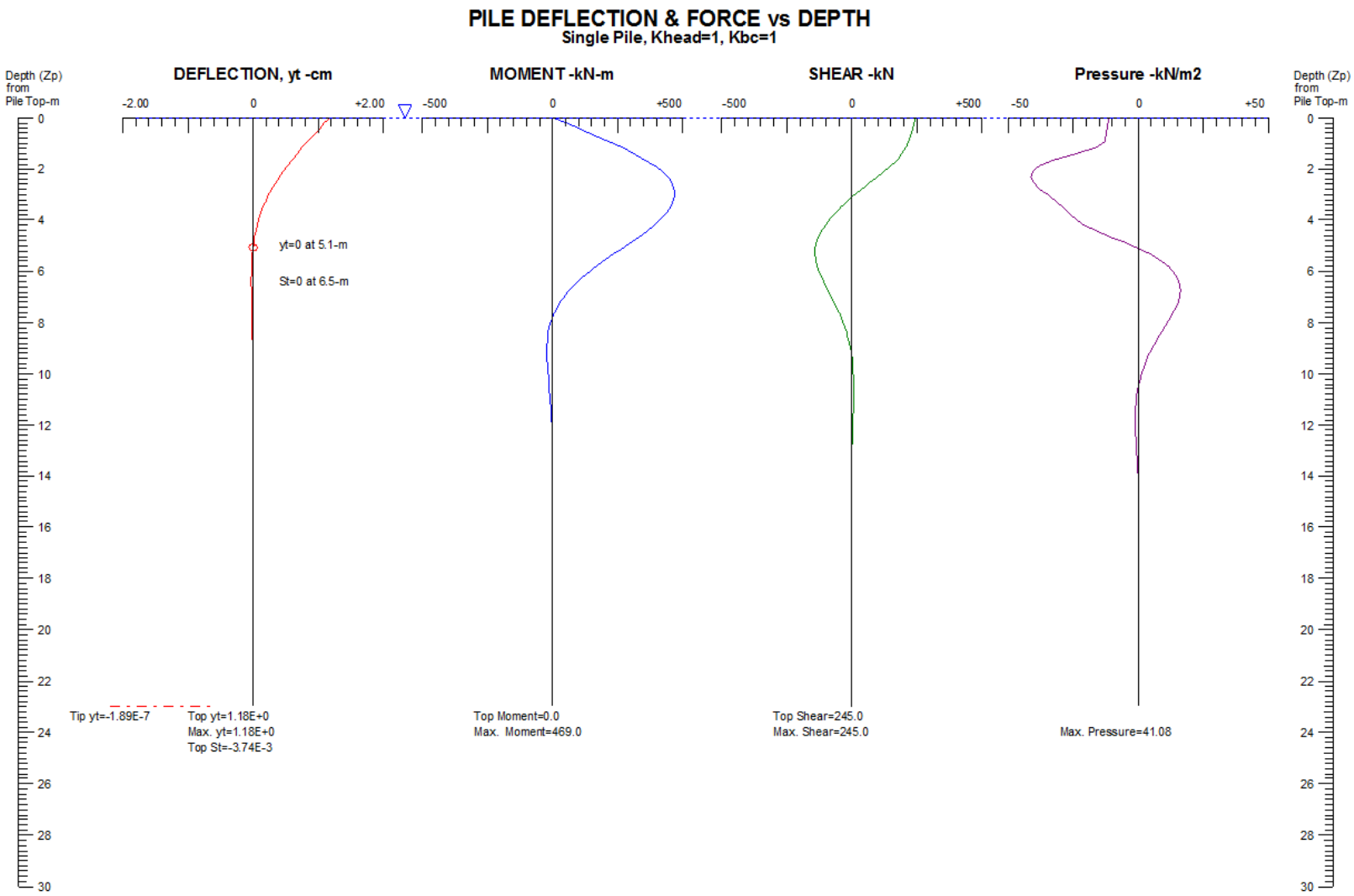



CivilTech Software

**Samawa Power Plant Project**
**GTG_Area_1_SandBase**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

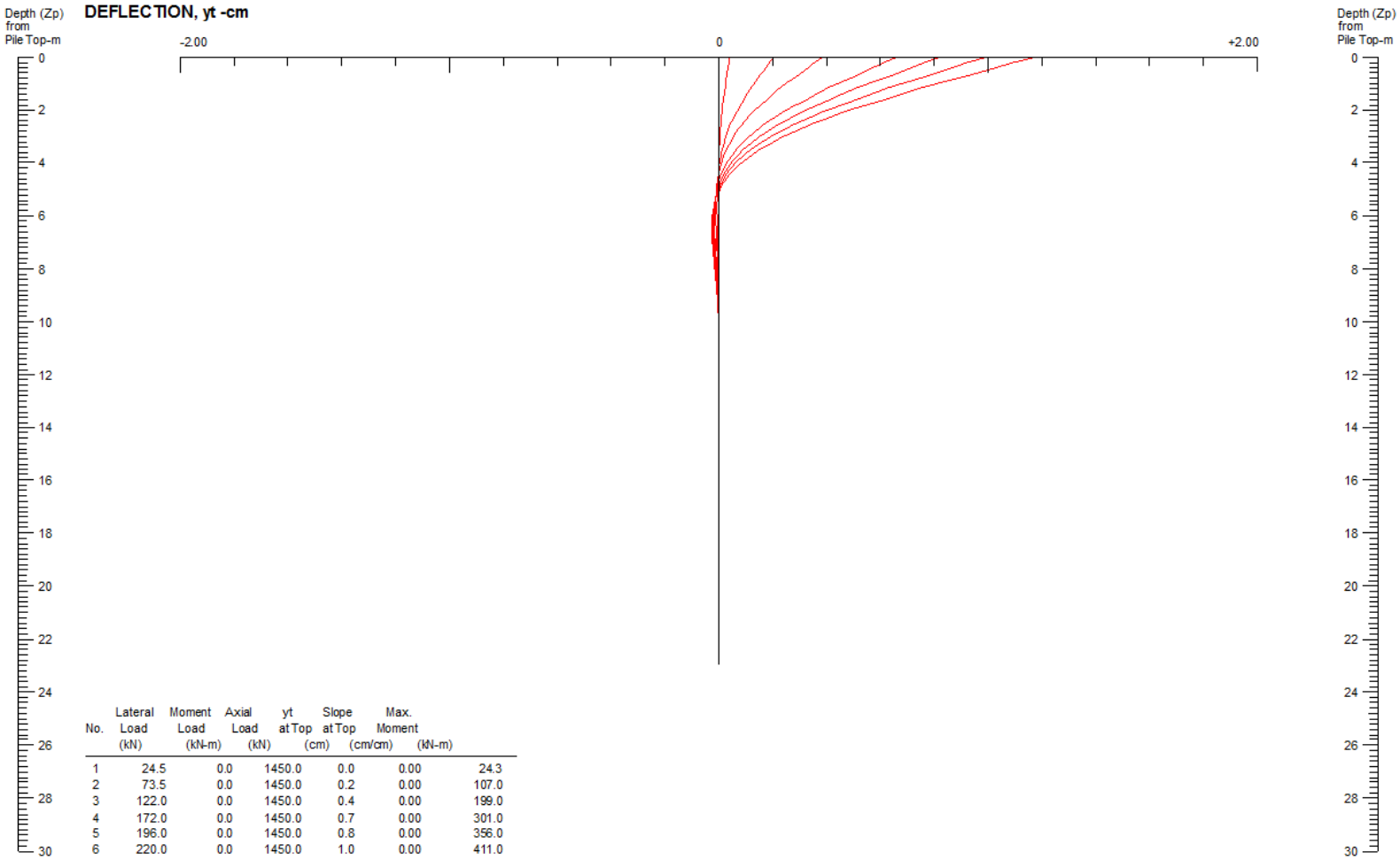



**CivilTech Software**

**Samawa Power Plant Project**
**GTG_Area_1_SandBase**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

## PILE DEFLECTION vs LOADING
Single Pile, Khead=1, Kbc=1

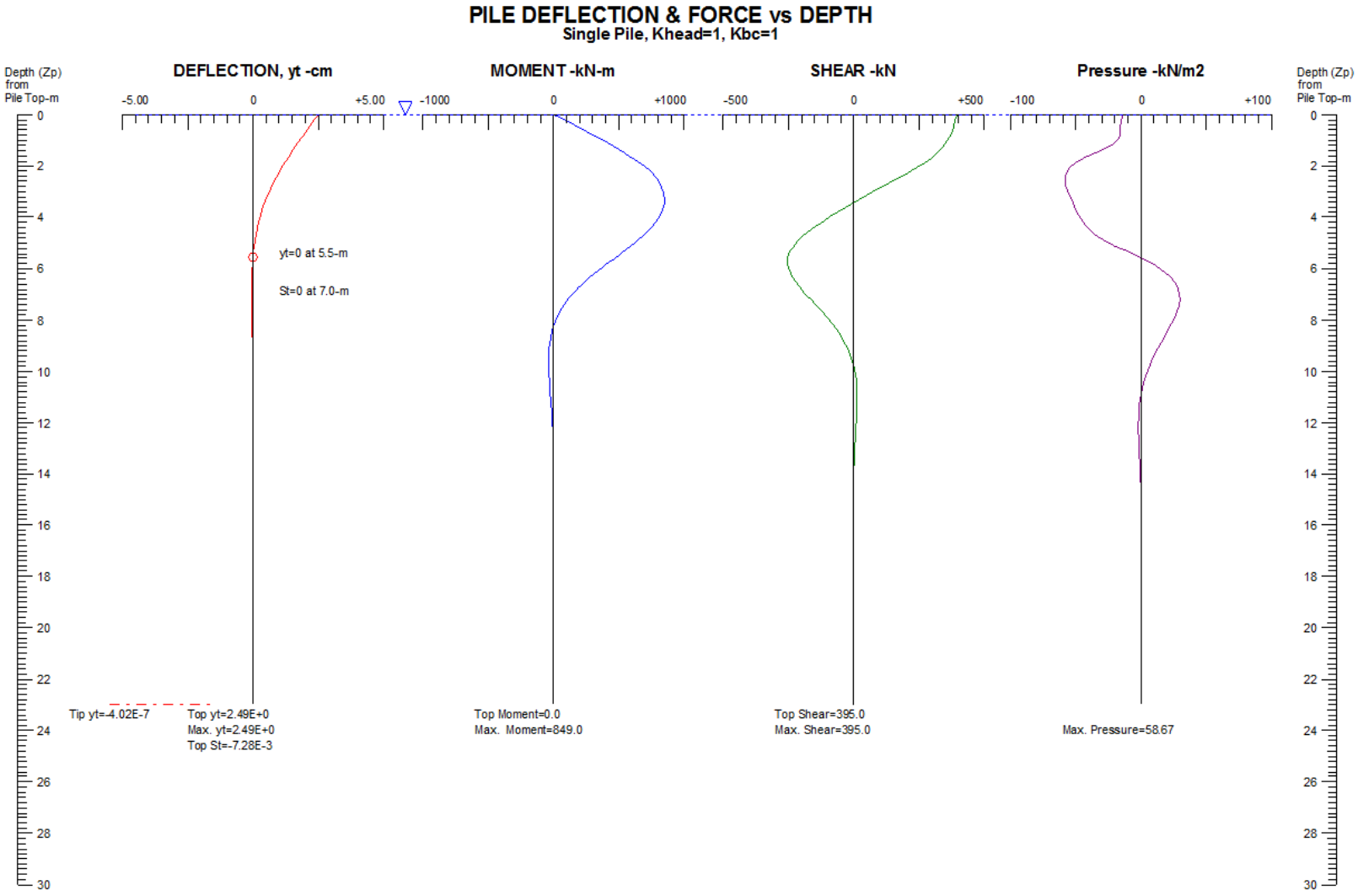



| No. | Lateral Load (kN) | Moment Load (kN-m) | Axial Load (kN) | yt at Top (cm) | Slope at Top (cm/cm) | Max. Moment (kN-m) |
|---|---|---|---|---|---|---|
| 1 | 24.5 | 0.0 | 1450.0 | 0.0 | 0.00 | 24.3 |
| 2 | 73.5 | 0.0 | 1450.0 | 0.2 | 0.00 | 107.0 |
| 3 | 122.0 | 0.0 | 1450.0 | 0.4 | 0.00 | 199.0 |
| 4 | 172.0 | 0.0 | 1450.0 | 0.7 | 0.00 | 301.0 |
| 5 | 196.0 | 0.0 | 1450.0 | 0.8 | 0.00 | 356.0 |
| 6 | 220.0 | 0.0 | 1450.0 | 1.0 | 0.00 | 411.0 |
| 7 | 245.0 | 0.0 | 1450.0 | 1.2 | 0.00 | 469.0 |

*CivilTech Software*

**Samawa Power Plant Project**
**GTG_Area_1_SandBase**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

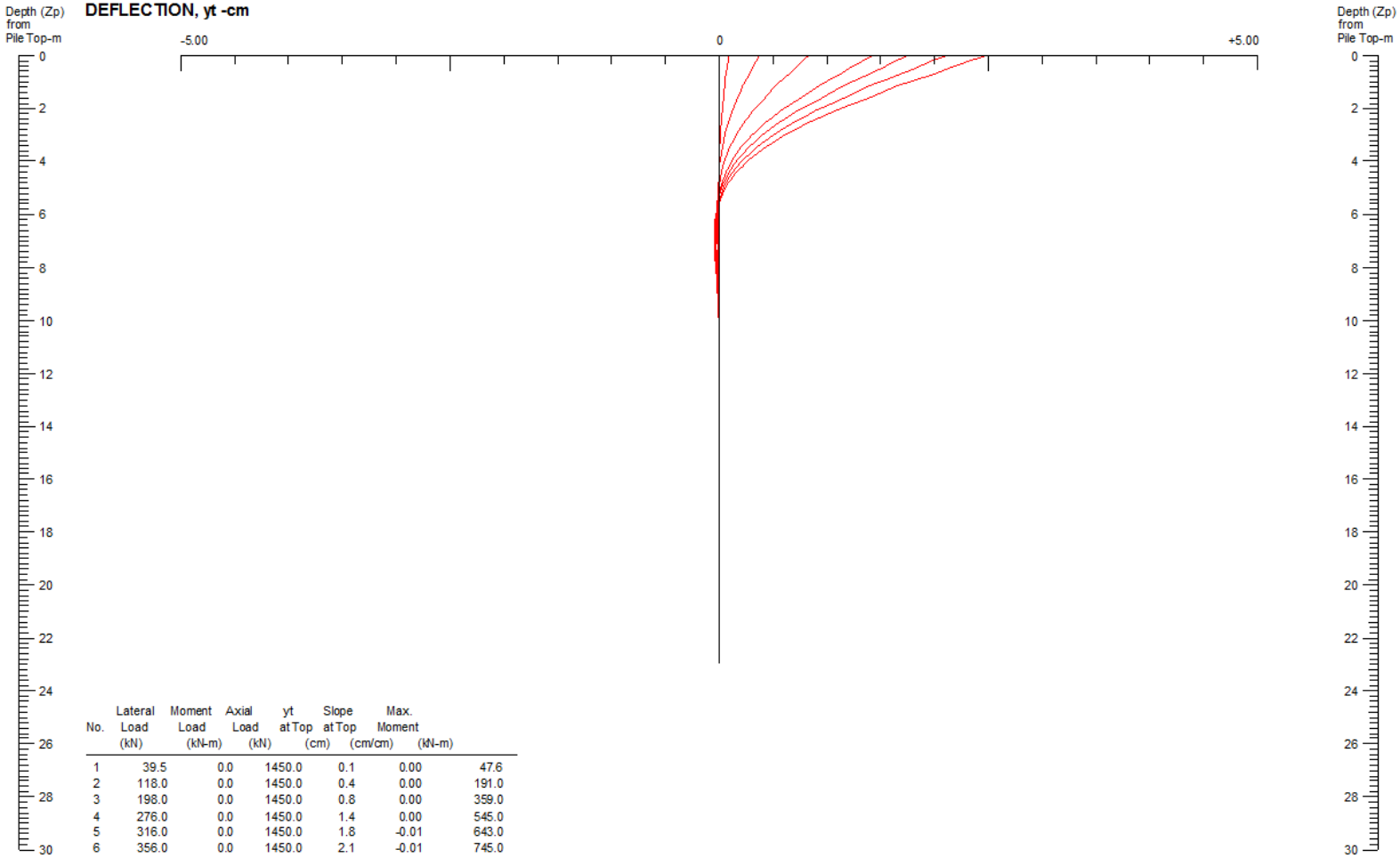



**CivilTech Software**

**Samawa Power Plant Project**
**GTG_Area_1_SandBase**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

## PILE DEFLECTION vs LOADING
Single Pile, Khead=1, Kbc=1




| No. | Lateral Load (kN) | Moment Load (kN-m) | Axial Load (kN) | yt at Top (cm) | Slope at Top (cm/cm) | Max. Moment (kN-m) |
|---|---|---|---|---|---|---|
| 1 | 39.5 | 0.0 | 1450.0 | 0.1 | 0.00 | 47.6 |
| 2 | 118.0 | 0.0 | 1450.0 | 0.4 | 0.00 | 191.0 |
| 3 | 198.0 | 0.0 | 1450.0 | 0.8 | 0.00 | 359.0 |
| 4 | 276.0 | 0.0 | 1450.0 | 1.4 | 0.00 | 545.0 |
| 5 | 316.0 | 0.0 | 1450.0 | 1.8 | -0.01 | 643.0 |
| 6 | 356.0 | 0.0 | 1450.0 | 2.1 | -0.01 | 745.0 |
| 7 | 395.0 | 0.0 | 1450.0 | 2.5 | -0.01 | 849.0 |

*CivilTech Software*

**Samawa Power Plant Project**
**GTG_Area_1_SandBase**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

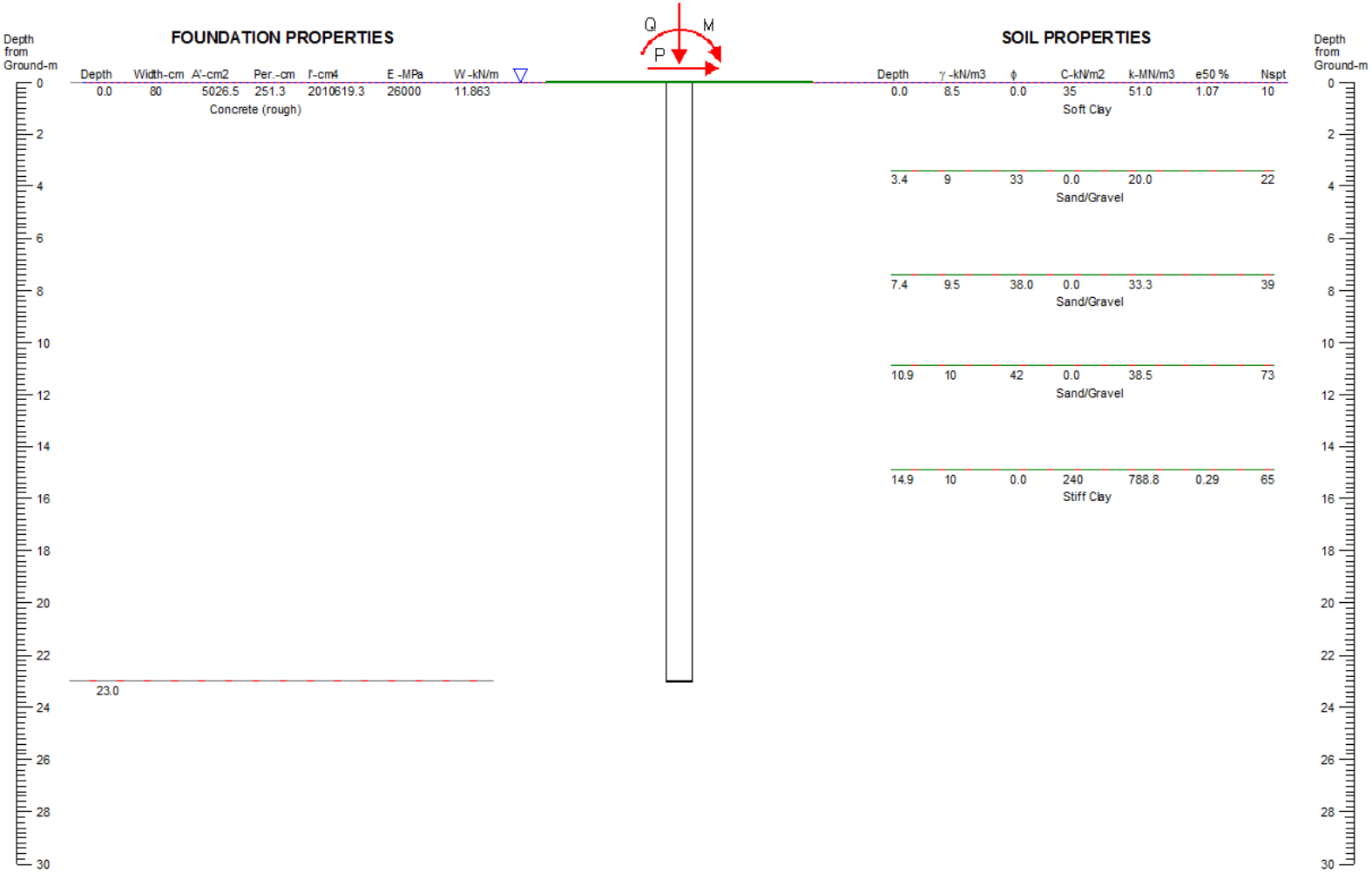
**I.2) GTG Area -2**

**I.2.1) Axial Allowable Loads**
Axial Compression Allowable Bearing Capacity= 1496 kN
Axial Allowable Uplift Capacity= 1128 kN

**I.2.2)Horizontal Load Capacity for Free Head Pile**
Horizontal allowable lateral load is 160kN for 1.2 cm lateral top deflection. Maximum sectional moment : Mmax=333kN-m
Horizontal ultimate lateral capacity is 260kN for 2.5 cm top deflection. Maximum sectional moment : 641kN-m

## FOUNDATION PROFILE & SOIL CONDITIONS

Diameter more than 24in (61cm).
For bell section, select "Belled"
in Diameter Variation of Pile
Section Screen.



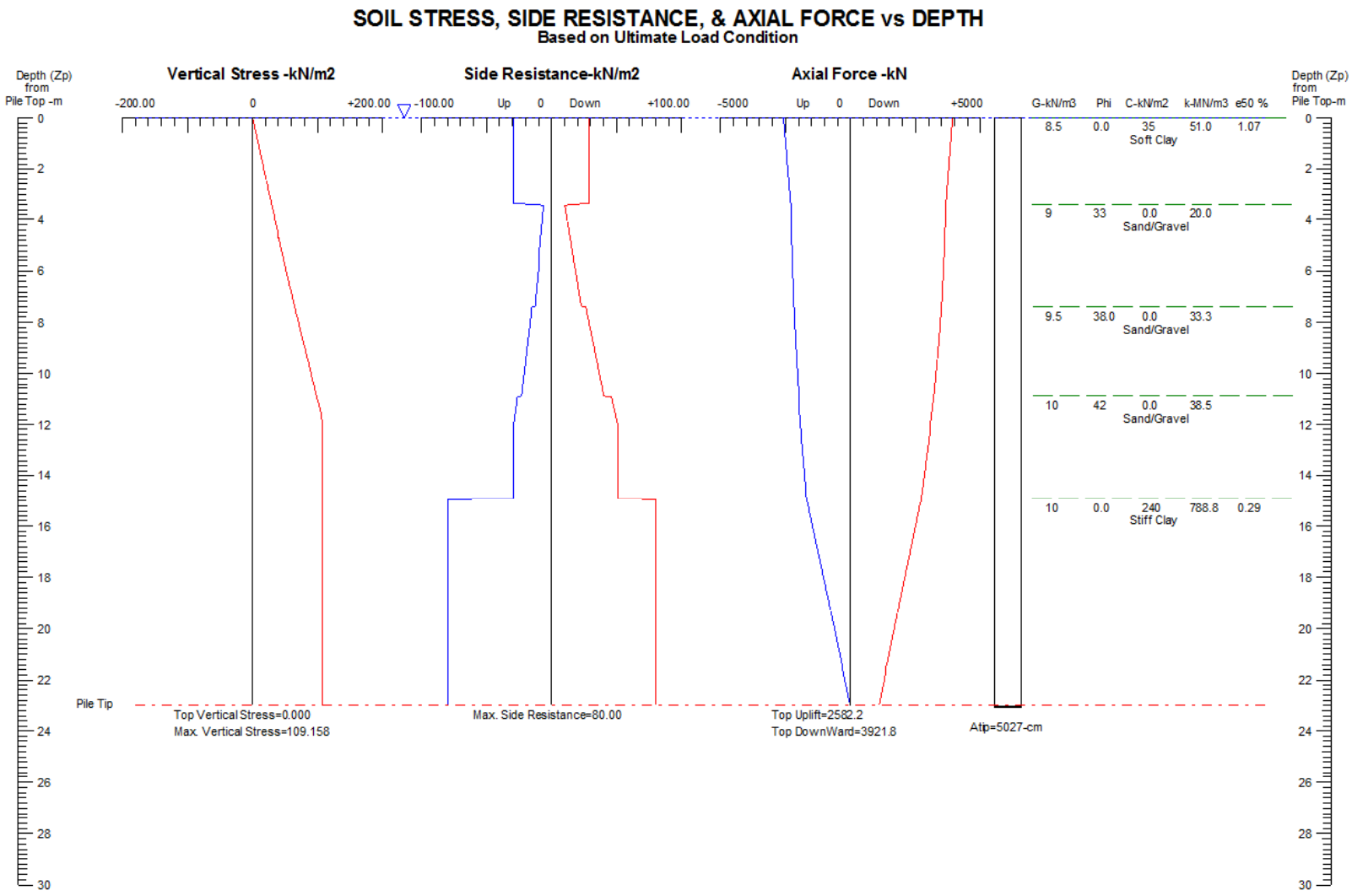

Batter Angle=0 (Pile diameter not to scale) Surface Angle=0

**CivilTech Software**

**Samawa Power Plant Project**
**GTG_Area_2**

**Figure 1**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

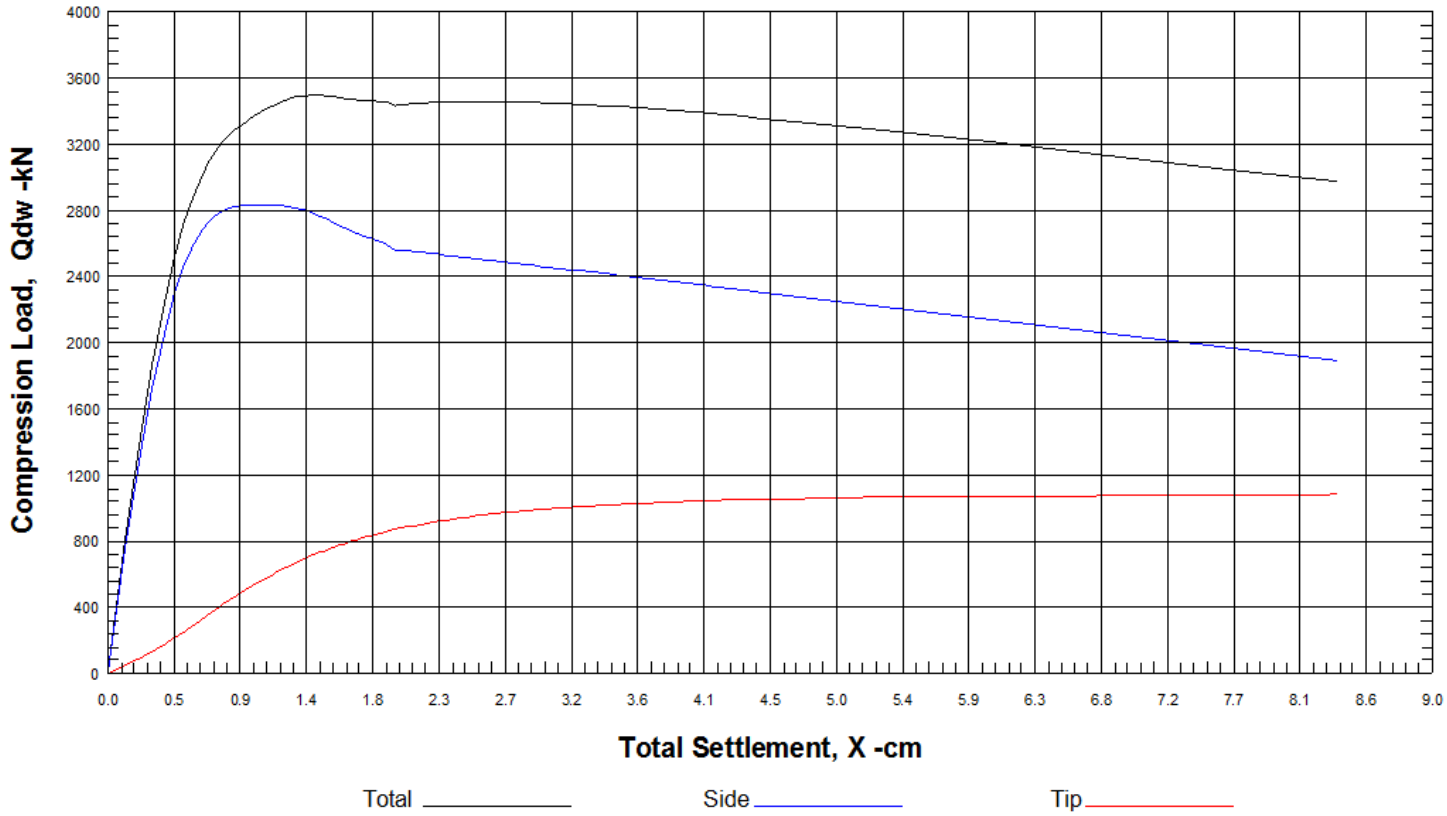



**CivilTech Software**

**Samawa Power Plant Project**
**GTG_Area_2**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

## Vertical Load vs. Total Settlement

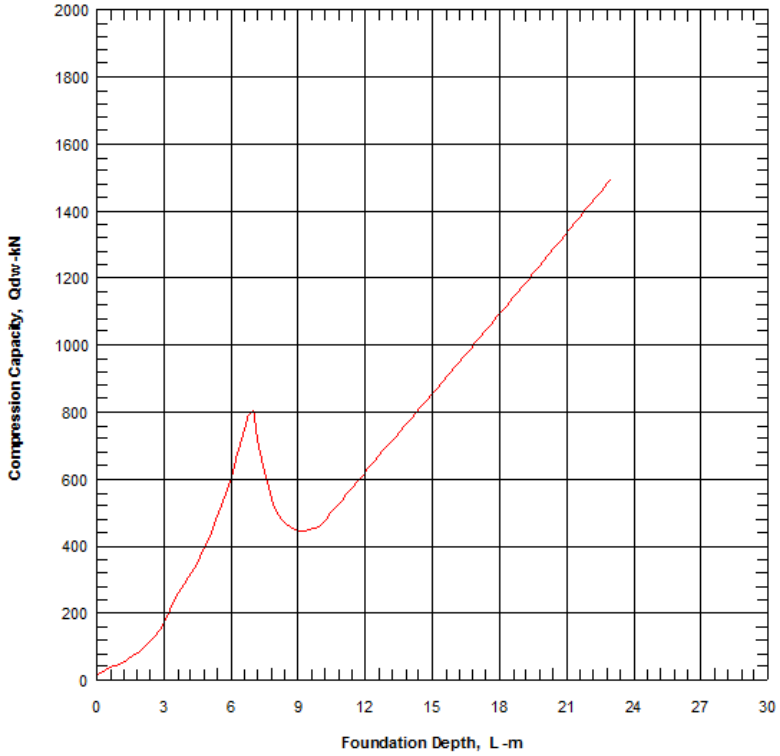


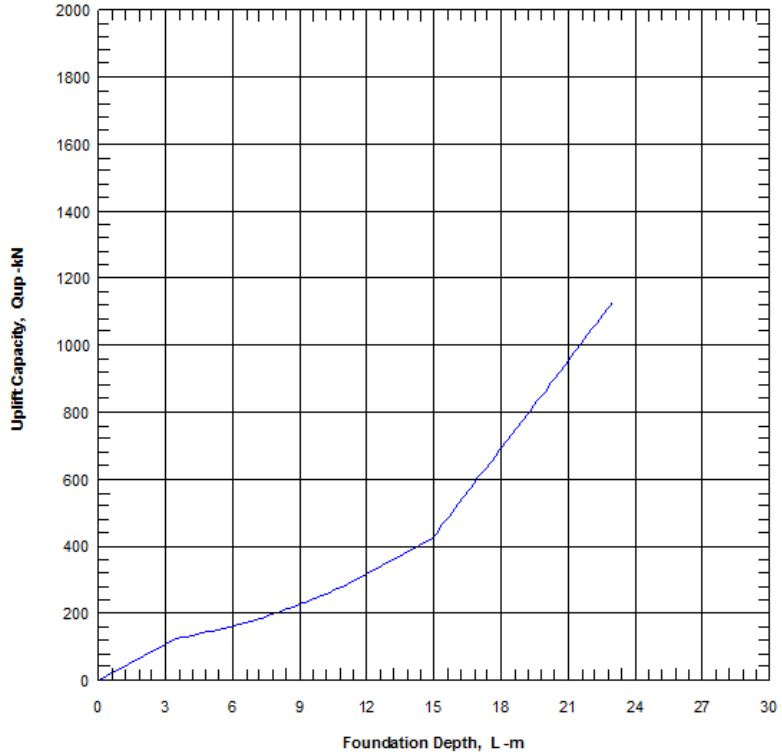

CivilTech Software

**Samawa Power Plant Project**
**GTG_Area_2**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

# ALLOWABLE CAPACITY vs FOUNDATION DEPTH

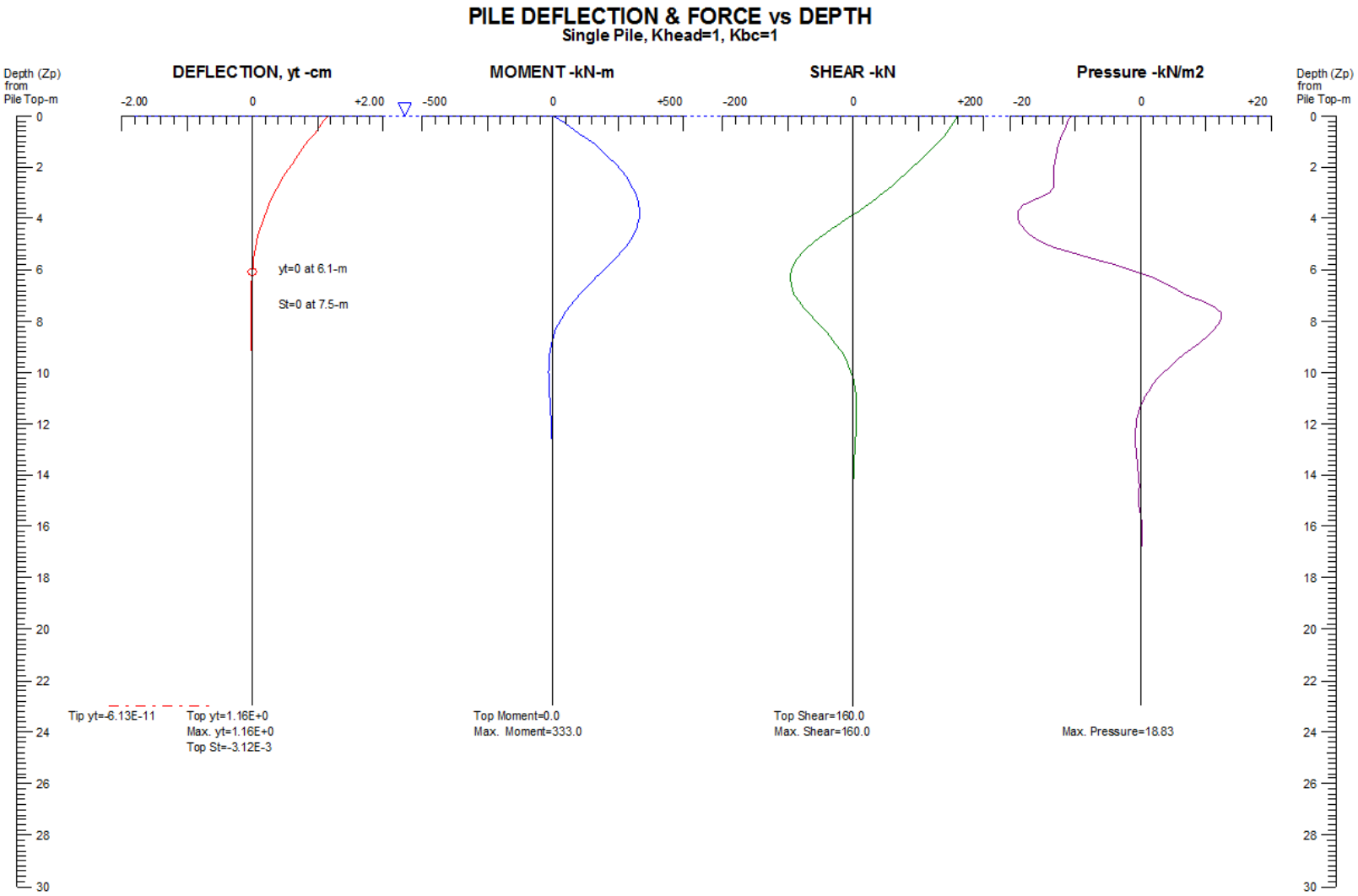



CivilTech Software

**Samawa Power Plant Project**
**GTG_Area_2**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

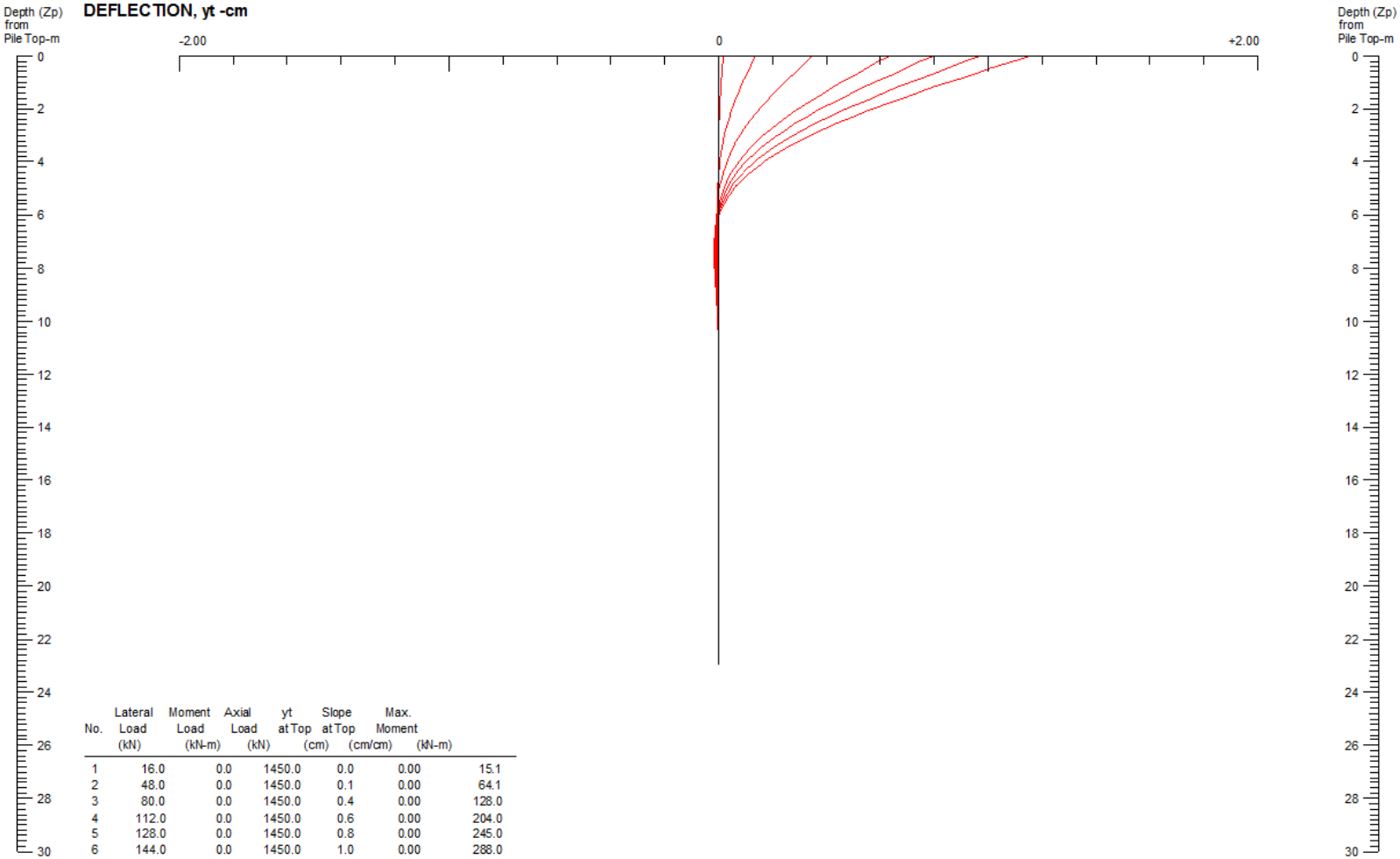



**CivilTech Software**

**Samawa Power Plant Project**
**GTG_Area_2**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

## PILE DEFLECTION vs LOADING
Single Pile, Khead=1, Kbc=1

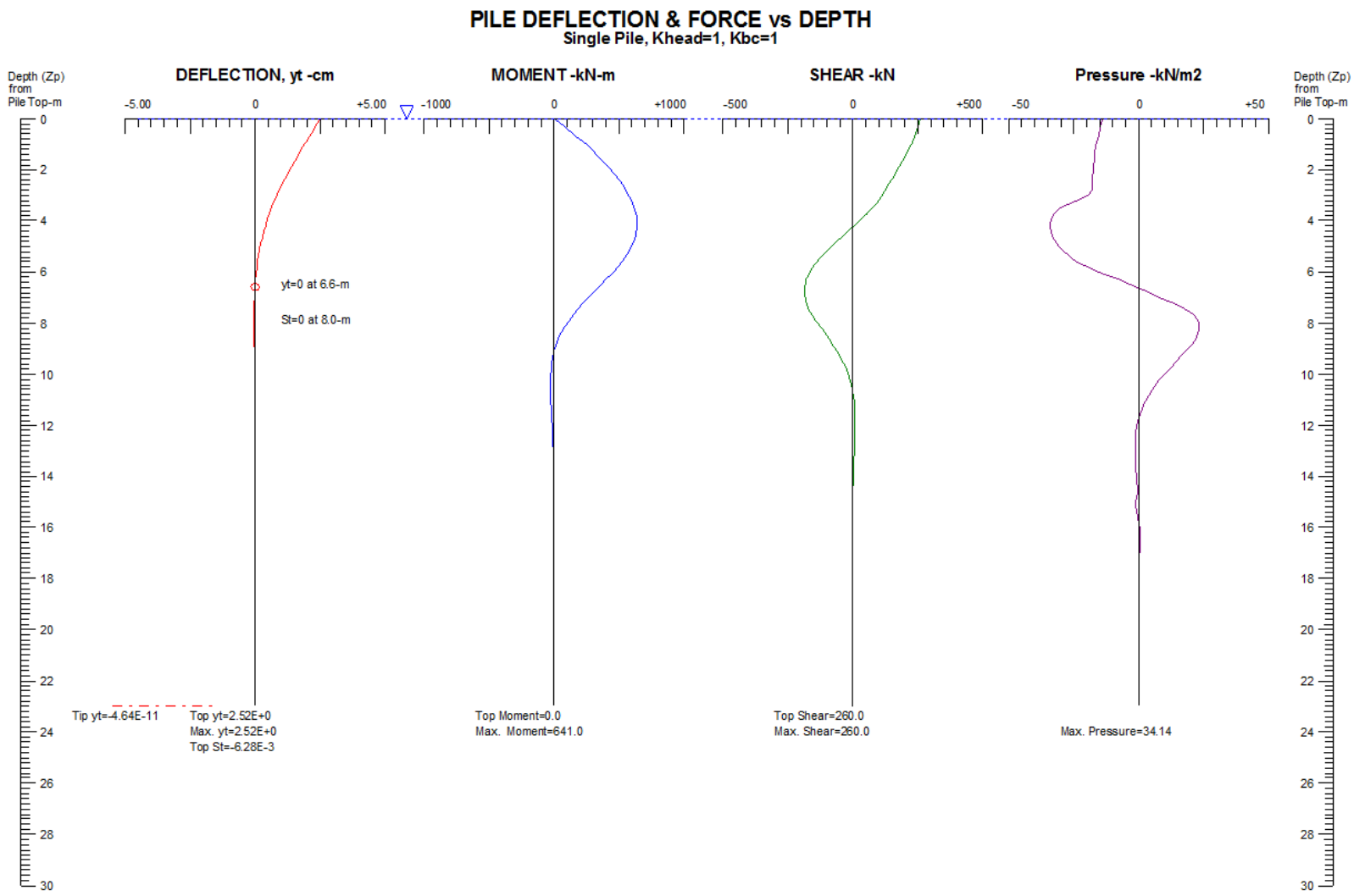



| No. | Lateral Load (kN) | Moment Load (kN-m) | Axial Load (kN) | yt at Top (cm) | Slope at Top (cm/cm) | Max. Moment (kN-m) |
|---|---|---|---|---|---|---|
| 1 | 16.0 | 0.0 | 1450.0 | 0.0 | 0.00 | 15.1 |
| 2 | 48.0 | 0.0 | 1450.0 | 0.1 | 0.00 | 64.1 |
| 3 | 80.0 | 0.0 | 1450.0 | 0.4 | 0.00 | 128.0 |
| 4 | 112.0 | 0.0 | 1450.0 | 0.6 | 0.00 | 204.0 |
| 5 | 128.0 | 0.0 | 1450.0 | 0.8 | 0.00 | 245.0 |
| 6 | 144.0 | 0.0 | 1450.0 | 1.0 | 0.00 | 288.0 |
| 7 | 160.0 | 0.0 | 1450.0 | 1.2 | 0.00 | 333.0 |

*CivilTech Software*

**Samawa Power Plant Project**
**GTG_Area_2**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

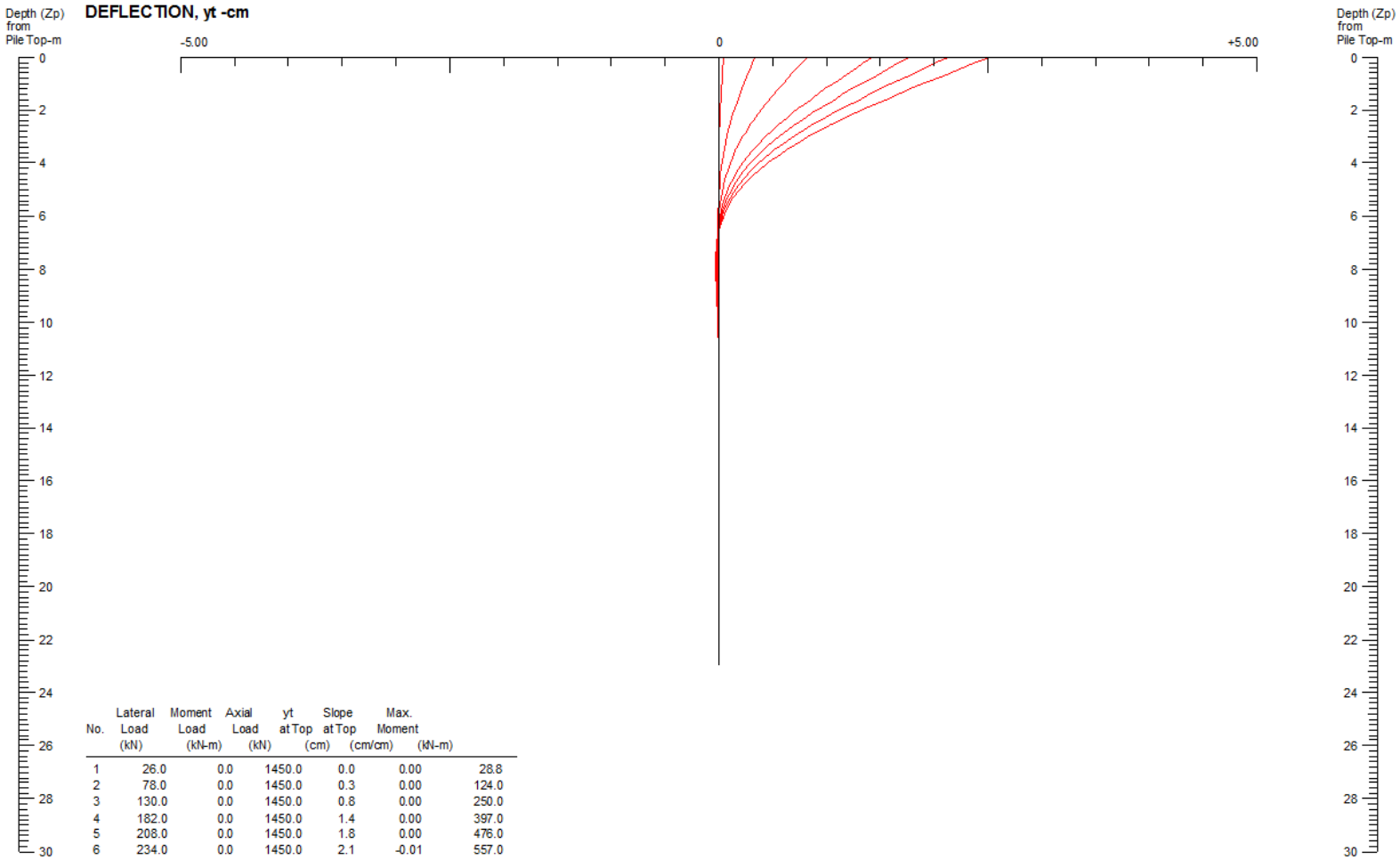



CivilTech Software

**Samawa Power Plant Project**
**GTG_Area_2**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

## PILE DEFLECTION vs LOADING
Single Pile, Khead=1, Kbc=1




| No. | Lateral Load (kN) | Moment Load (kN-m) | Axial Load (kN) | yt at Top (cm) | Slope at Top (cm/cm) | Max. Moment (kN-m) |
|---|---|---|---|---|---|---|
| 1 | 26.0 | 0.0 | 1450.0 | 0.0 | 0.00 | 28.8 |
| 2 | 78.0 | 0.0 | 1450.0 | 0.3 | 0.00 | 124.0 |
| 3 | 130.0 | 0.0 | 1450.0 | 0.8 | 0.00 | 250.0 |
| 4 | 182.0 | 0.0 | 1450.0 | 1.4 | 0.00 | 397.0 |
| 5 | 208.0 | 0.0 | 1450.0 | 1.8 | 0.00 | 476.0 |
| 6 | 234.0 | 0.0 | 1450.0 | 2.1 | -0.01 | 557.0 |
| 7 | 260.0 | 0.0 | 1450.0 | 2.5 | -0.01 | 641.0 |

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**Samawa Power Plant Project**
**GTG_Area_2**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

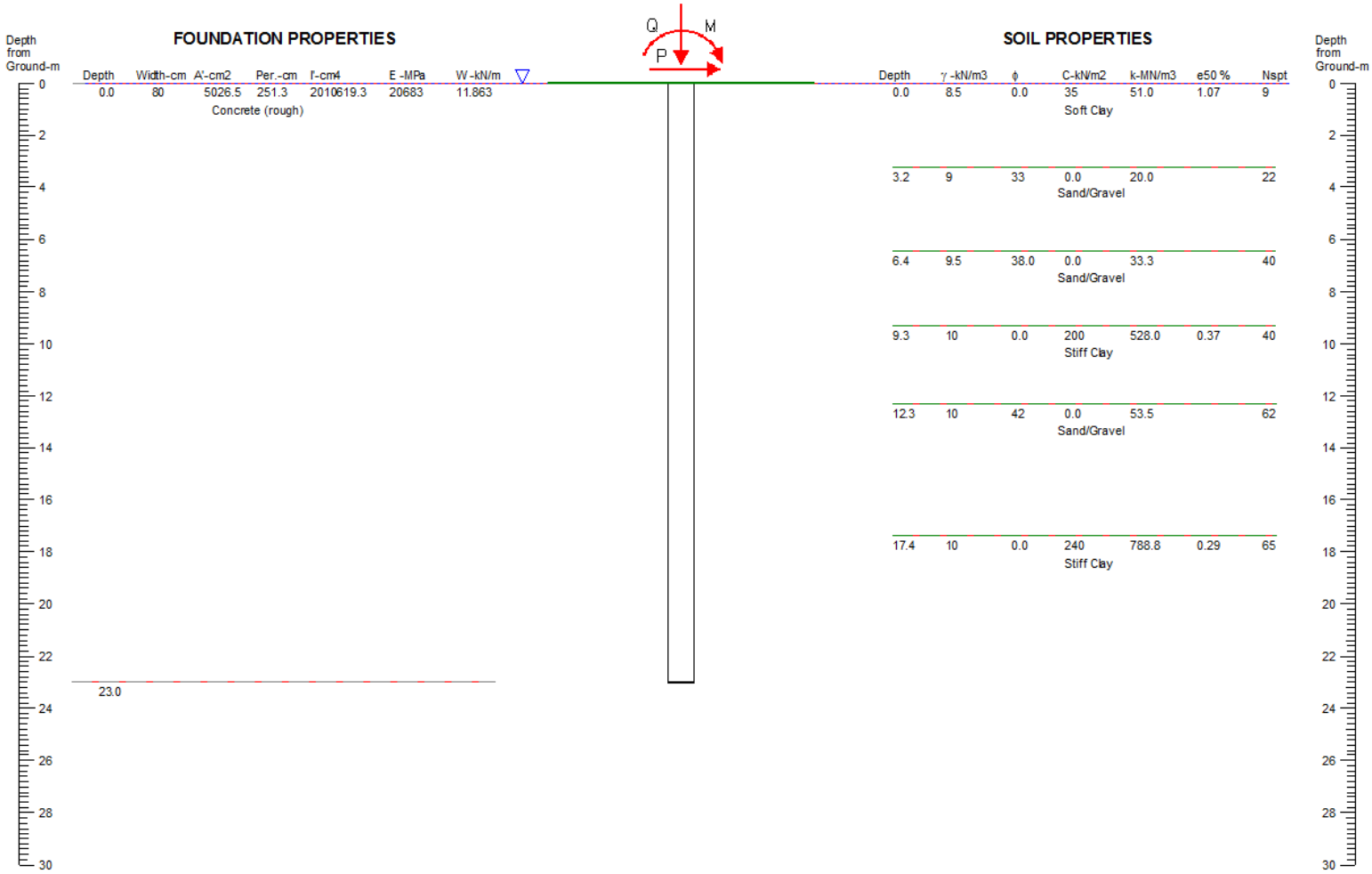
**I. 3) GTG Area -3**

**I. 3.1) Axial Allowable Loads**
Axial Compression Allowable Bearing Capacity= 1540 kN
Axial Allowable Uplift Capacity= 1168 kN

**I. 3.2)Horizontal Load Capacity for Free Head Pile**
Horizontal allowable lateral load is 150kN for 1.2 cm lateral top deflection. Maximum sectional moment : Mmax=296kN-m
Horizontal ultimate lateral capacity is 240kN for 2.5 cm top deflection. Maximum sectional moment : 558kN-m

## FOUNDATION PROFILE & SOIL CONDITIONS

Diameter more than 24in (61cm).
For bell section, select "Belled"
in Diameter Variation of Pile
Section Screen.




Batter Angle=0 (Pile diameter not to scale) Surface Angle=0

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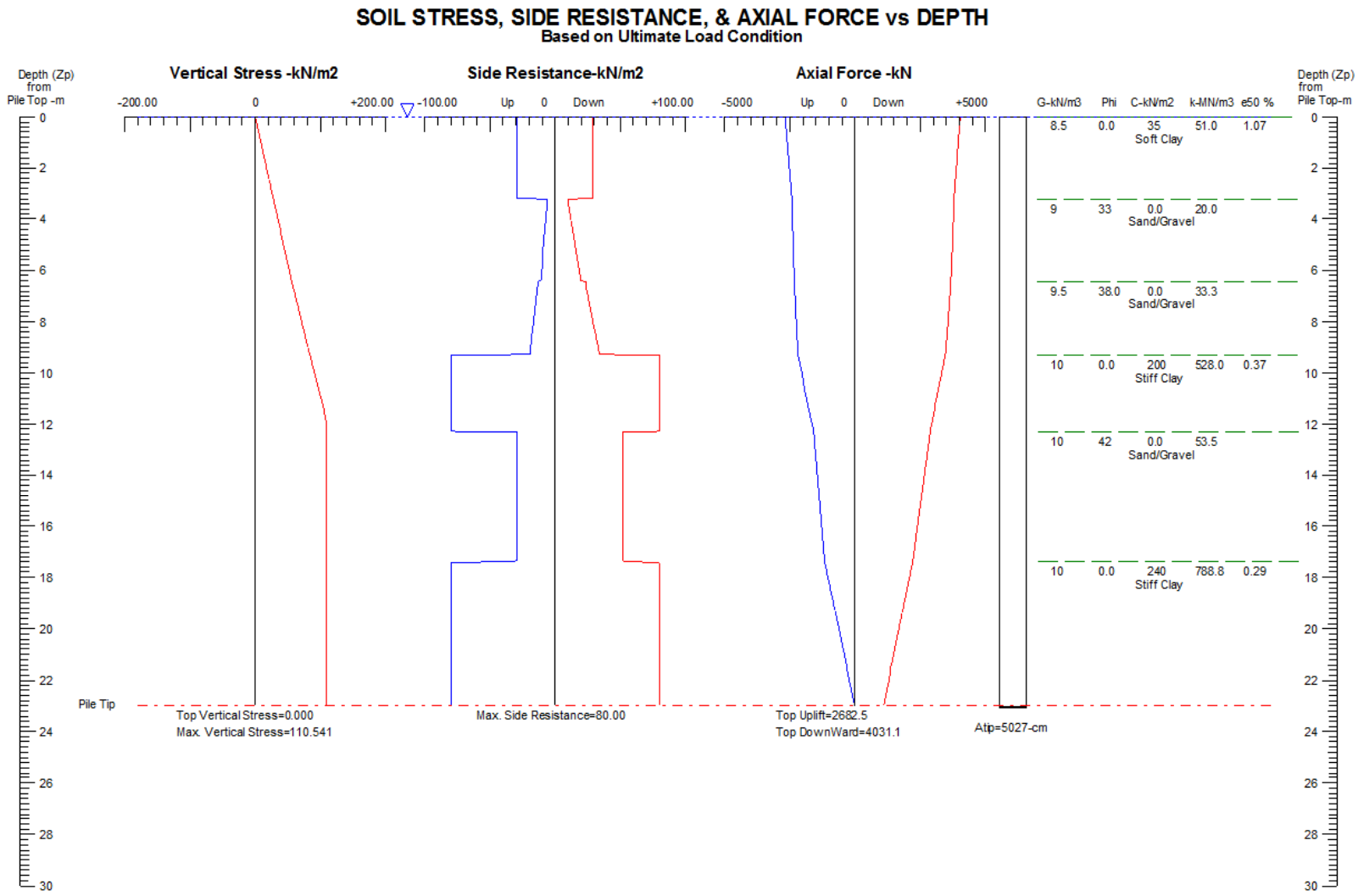
**Samawa Power Plant Project**
**GTG_Area_3**

**Figure 1**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

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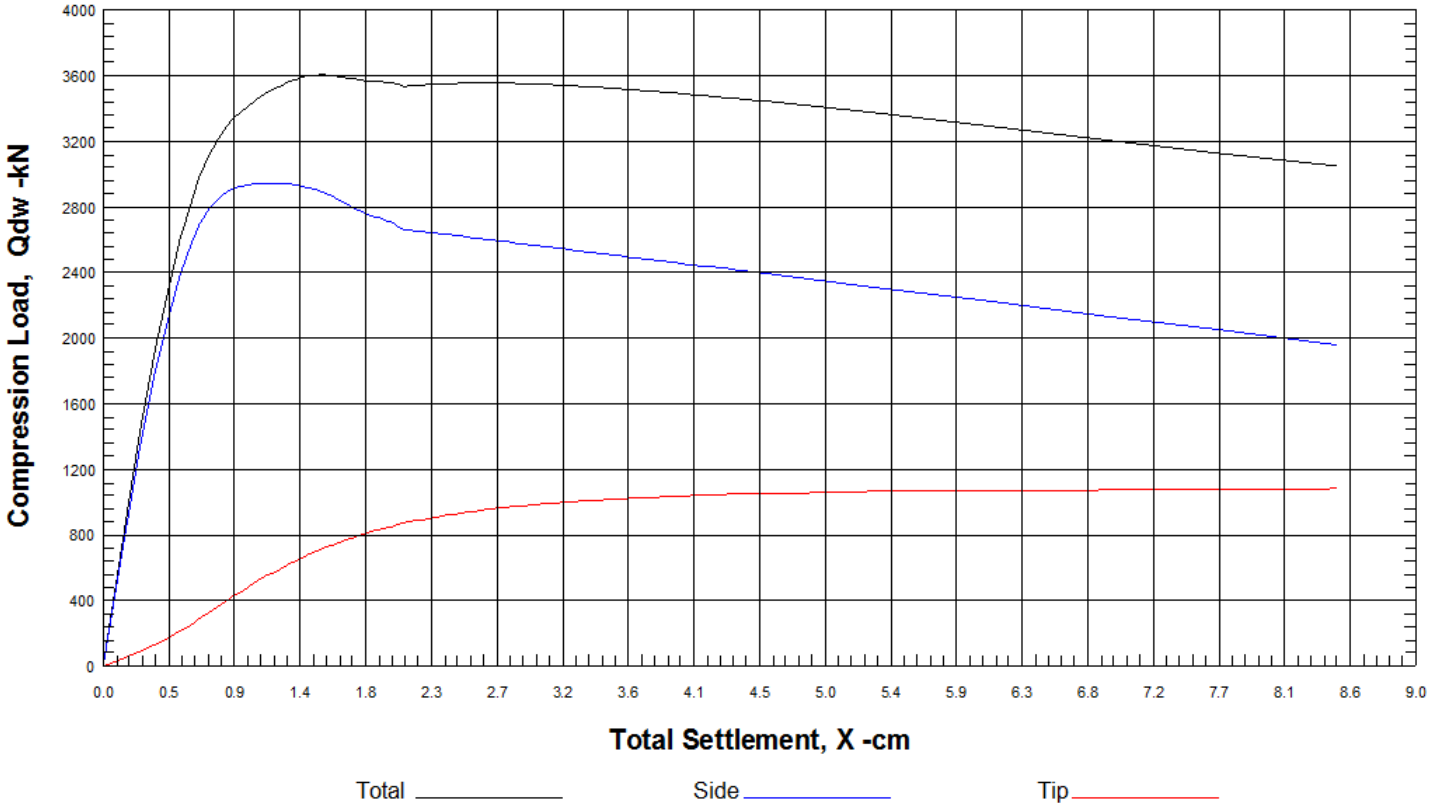
**Samawa Power Plant Project**
**GTG_Area_3**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

## Vertical Load vs. Total Settlement

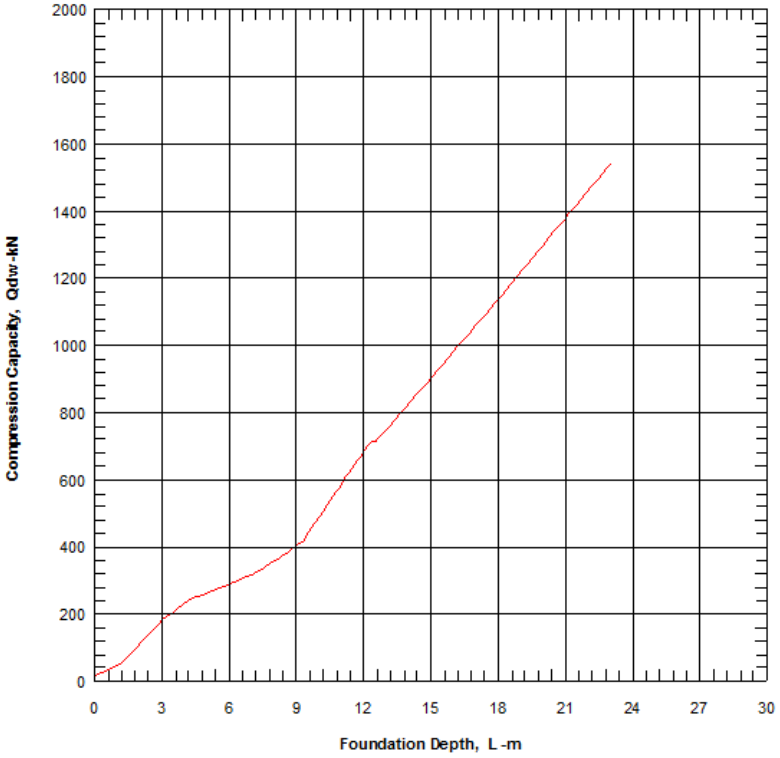


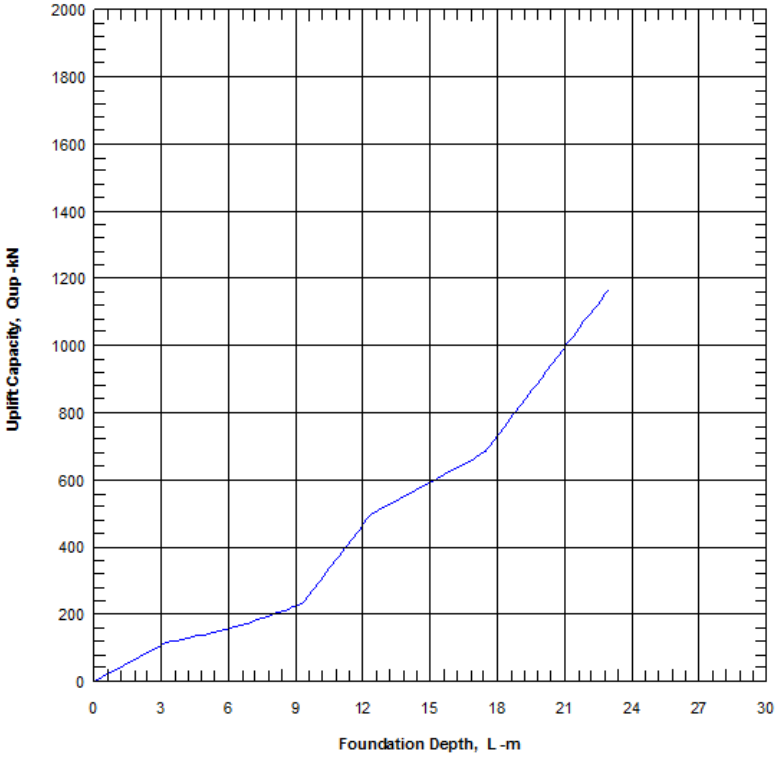

CivilTech Software

**Samawa Power Plant Project**
**GTG_Area_3**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

# ALLOWABLE CAPACITY vs FOUNDATION DEPTH

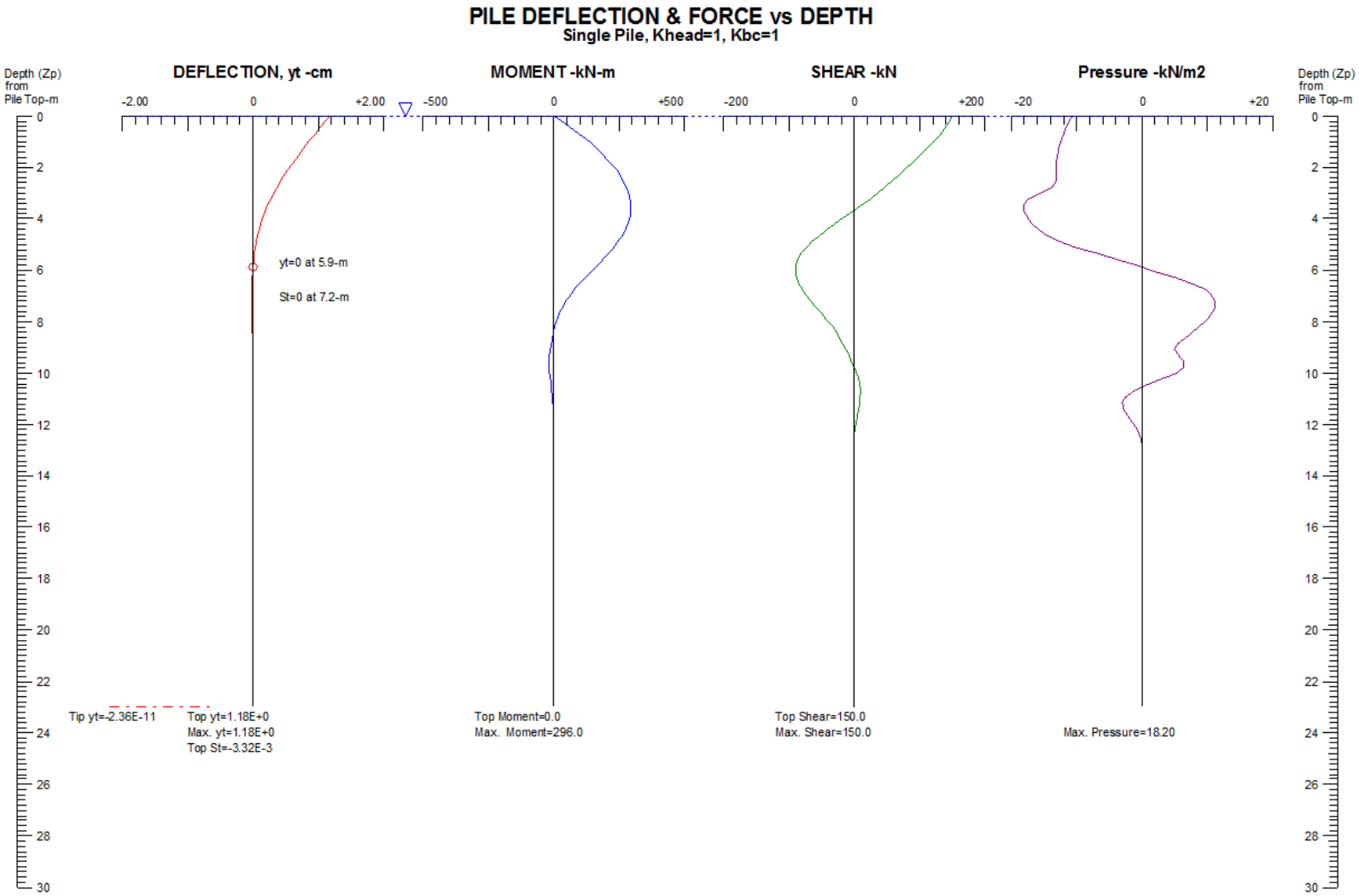



CivilTech Software

**Samawa Power Plant Project**
**GTG_Area_3**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

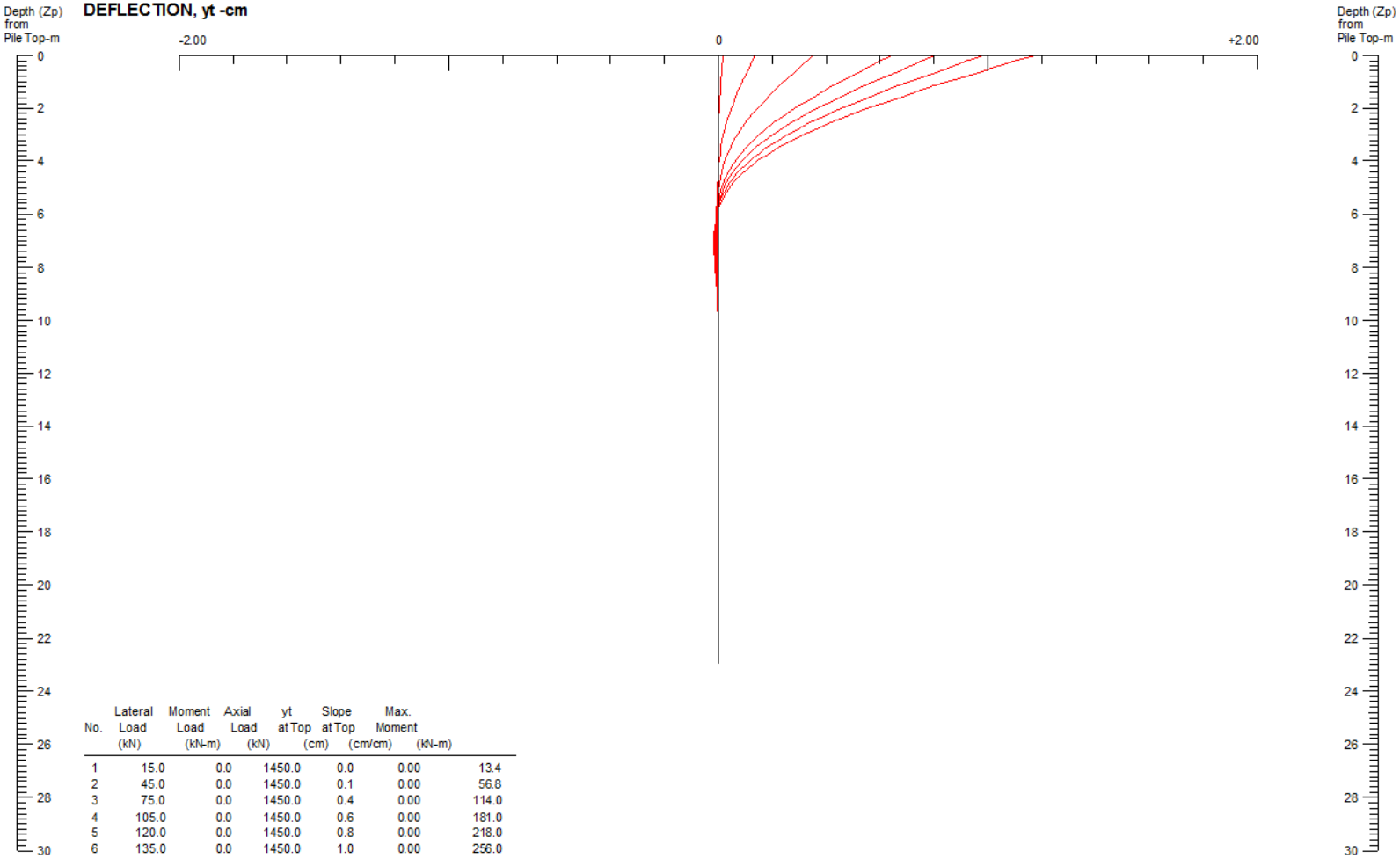



CivilTech Software

**Samawa Power Plant Project**
**GTG_Area_3**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

## PILE DEFLECTION vs LOADING
Single Pile, Khead=1, Kbc=1

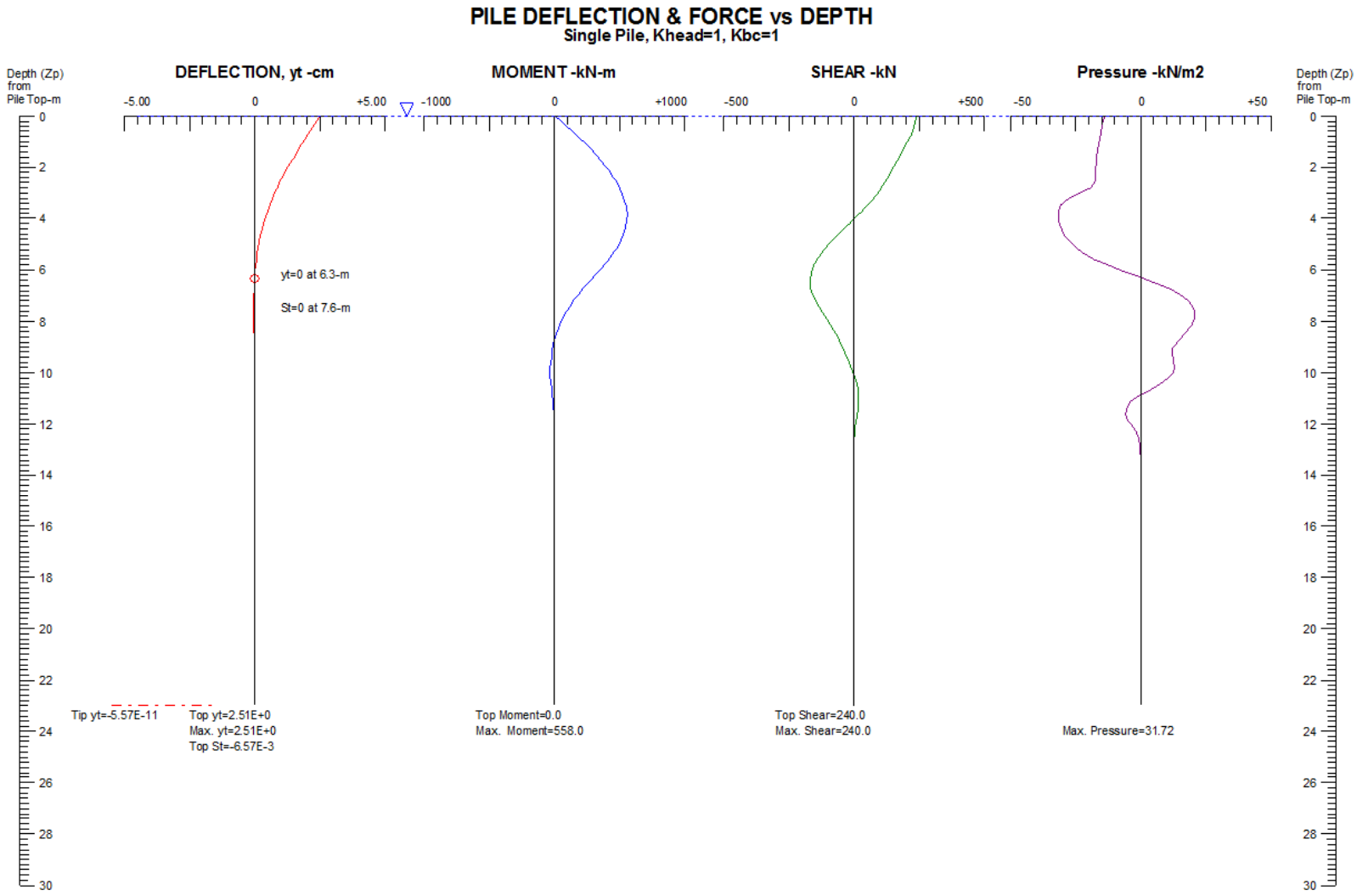



| No. | Lateral Load (kN) | Moment Load (kN-m) | Axial Load (kN) | yt at Top (cm) | Slope at Top (cm/cm) | Max. Moment (kN-m) |
|---|---|---|---|---|---|---|
| 1 | 15.0 | 0.0 | 1450.0 | 0.0 | 0.00 | 13.4 |
| 2 | 45.0 | 0.0 | 1450.0 | 0.1 | 0.00 | 56.8 |
| 3 | 75.0 | 0.0 | 1450.0 | 0.4 | 0.00 | 114.0 |
| 4 | 105.0 | 0.0 | 1450.0 | 0.6 | 0.00 | 181.0 |
| 5 | 120.0 | 0.0 | 1450.0 | 0.8 | 0.00 | 218.0 |
| 6 | 135.0 | 0.0 | 1450.0 | 1.0 | 0.00 | 256.0 |
| 7 | 150.0 | 0.0 | 1450.0 | 1.2 | 0.00 | 296.0 |

*CivilTech Software*

**Samawa Power Plant Project**
**GTG_Area_3**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

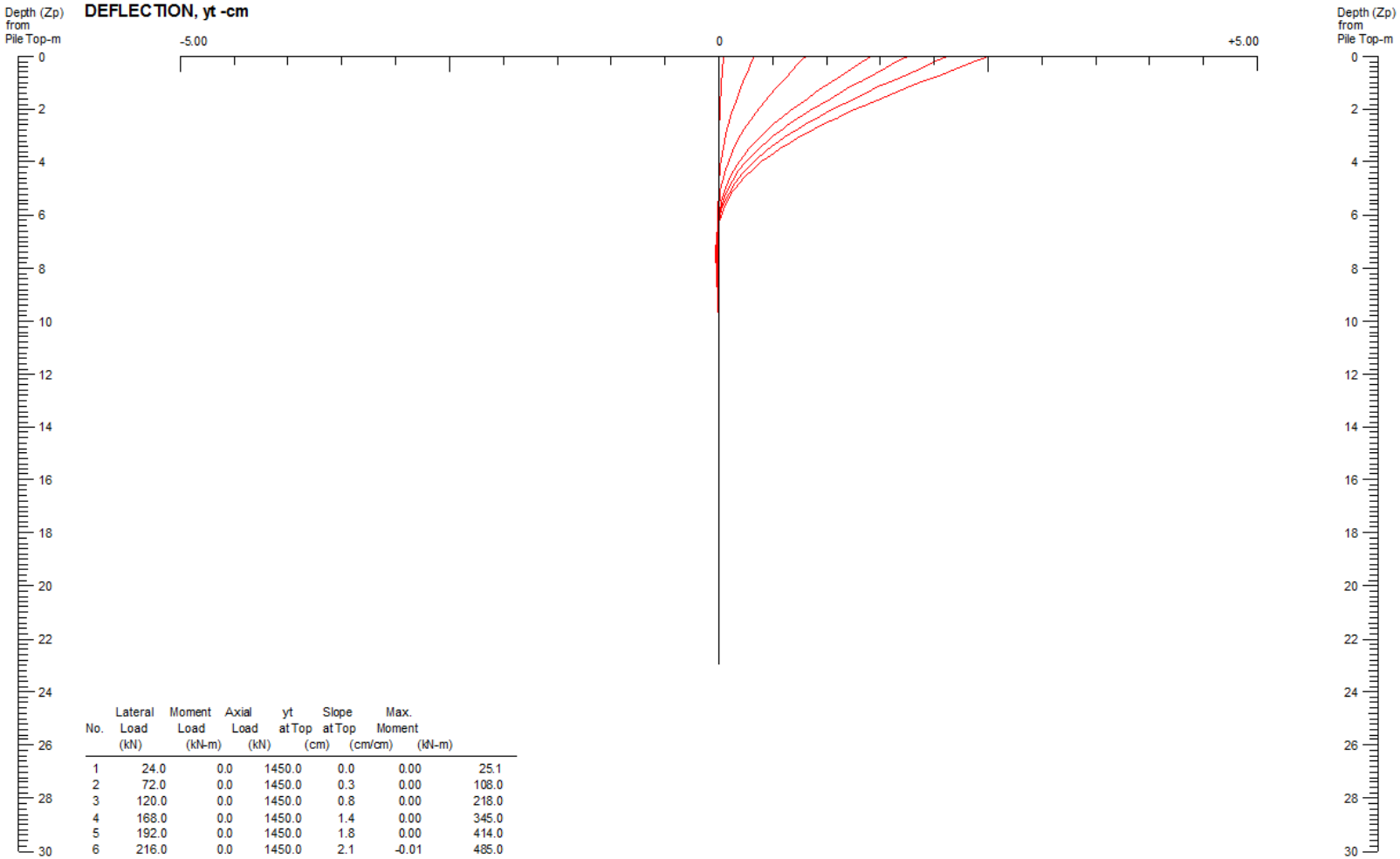



CivilTech Software

**Samawa Power Plant Project**
**GTG_Area_3**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

## PILE DEFLECTION vs LOADING
Single Pile, Khead=1, Kbc=1




| No. | Lateral Load (kN) | Moment Load (kN-m) | Axial Load (kN) | yt at Top (cm) | Slope at Top (cm/cm) | Max. Moment (kN-m) |
|---|---|---|---|---|---|---|
| 1 | 24.0 | 0.0 | 1450.0 | 0.0 | 0.00 | 25.1 |
| 2 | 72.0 | 0.0 | 1450.0 | 0.3 | 0.00 | 108.0 |
| 3 | 120.0 | 0.0 | 1450.0 | 0.8 | 0.00 | 218.0 |
| 4 | 168.0 | 0.0 | 1450.0 | 1.4 | 0.00 | 345.0 |
| 5 | 192.0 | 0.0 | 1450.0 | 1.8 | 0.00 | 414.0 |
| 6 | 216.0 | 0.0 | 1450.0 | 2.1 | -0.01 | 485.0 |
| 7 | 240.0 | 0.0 | 1450.0 | 2.5 | -0.01 | 558.0 |

*CivilTech Software*

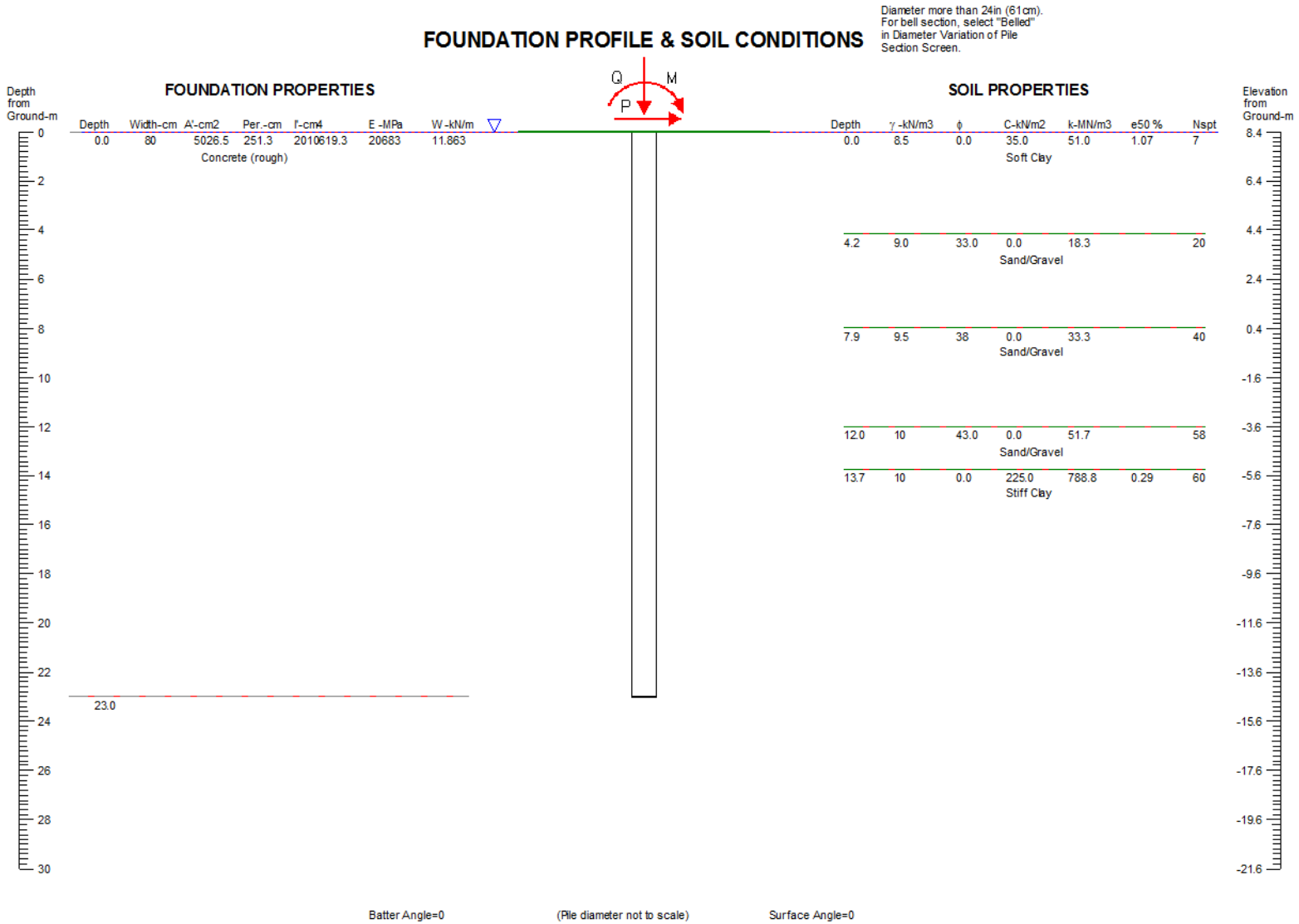
**Samawa Power Plant Project**
**GTG_Area_3**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

**I. 4) GTG Area -4**
**I.4.1) GTG Area -4 (Clay Base)**

**I.4.1.1) Axial Allowable Loads**
Axial Compression Allowable Bearing Capacity= 1514 kN
Axial Allowable Uplift Capacity= 1203 kN

**I.4.1.2)Horizontal Load Capacity for Free Head Pile**
Horizontal allowable lateral load is 145kN for 1.2 cm lateral top deflection. Maximum sectional moment : Mmax=279kN-m
Horizontal ultimate lateral capacity is 225kN for 2.5 cm top deflection. Maximum sectional moment : 516kN-m

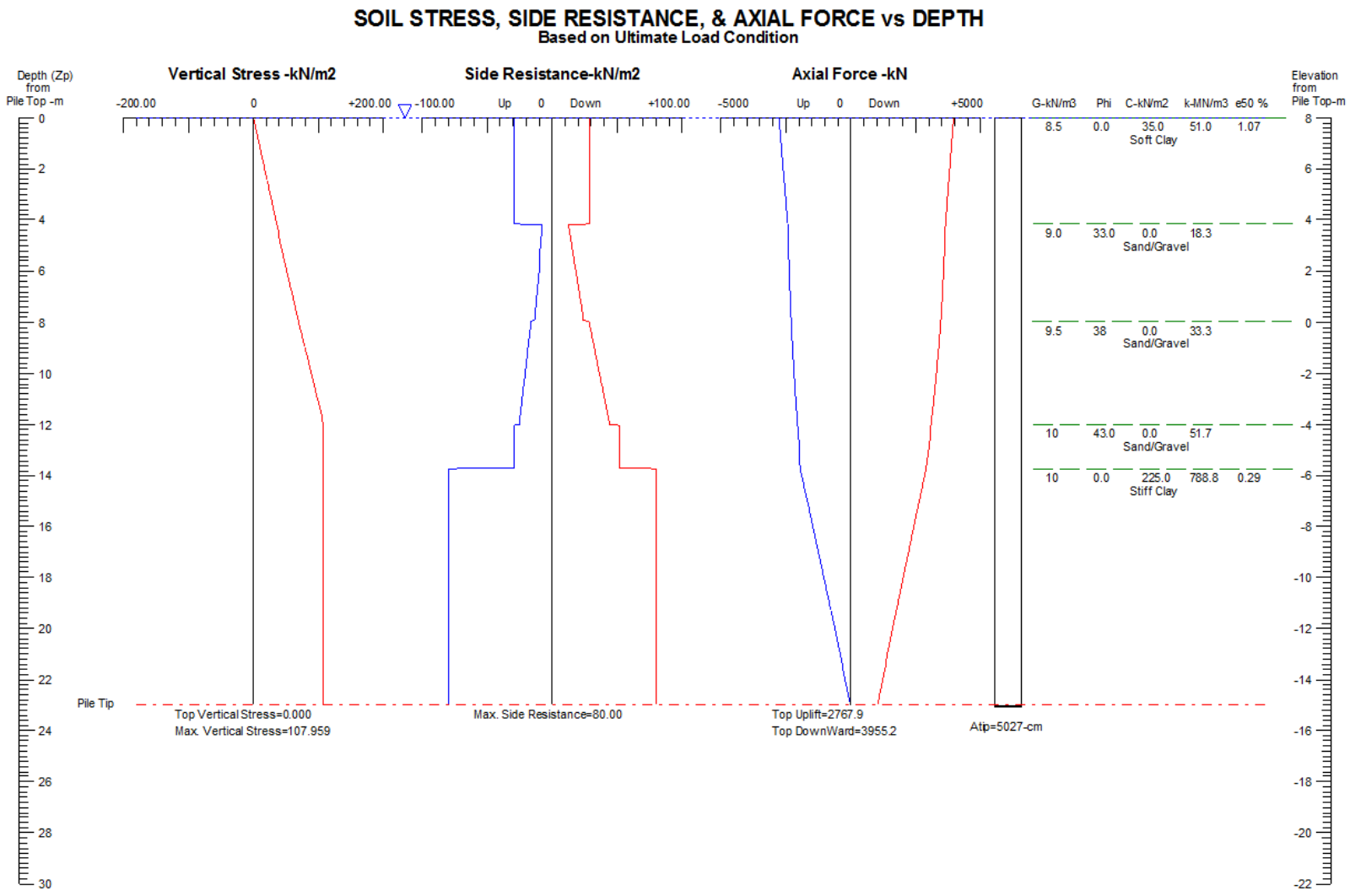



CivilTech Software

**Samawa Power Plant Project**
**GTG_Area_4(Clay Base)**

**Figure 1**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

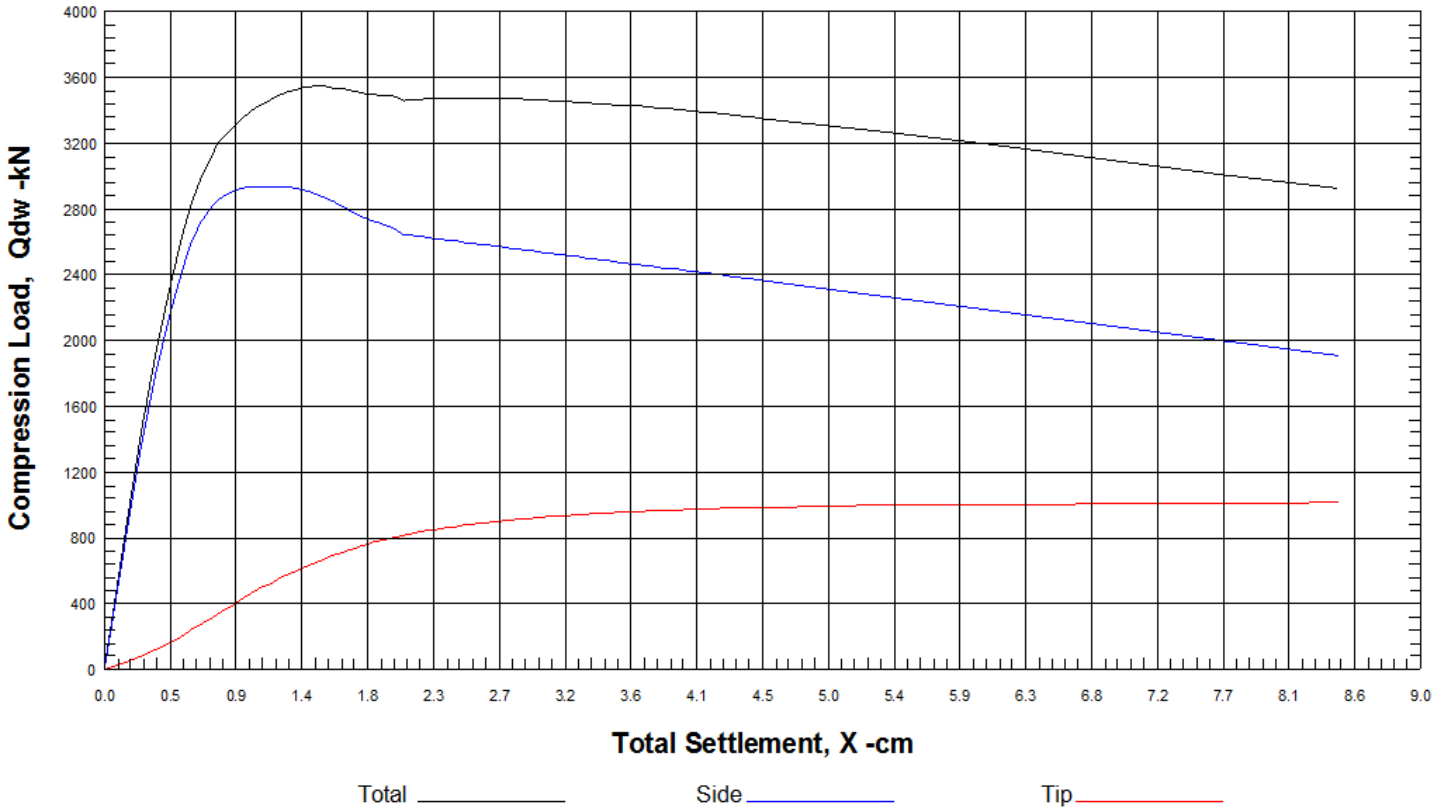



CivilTech Software

**Samawa Power Plant Project**
**GTG_Area_4(Clay Base)**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

## Vertical Load vs. Total Settlement

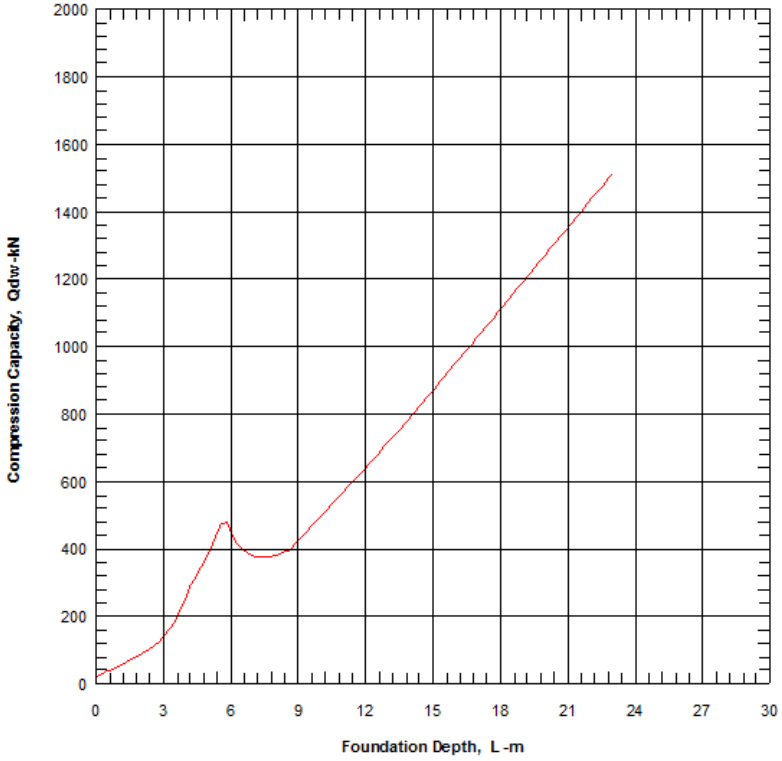


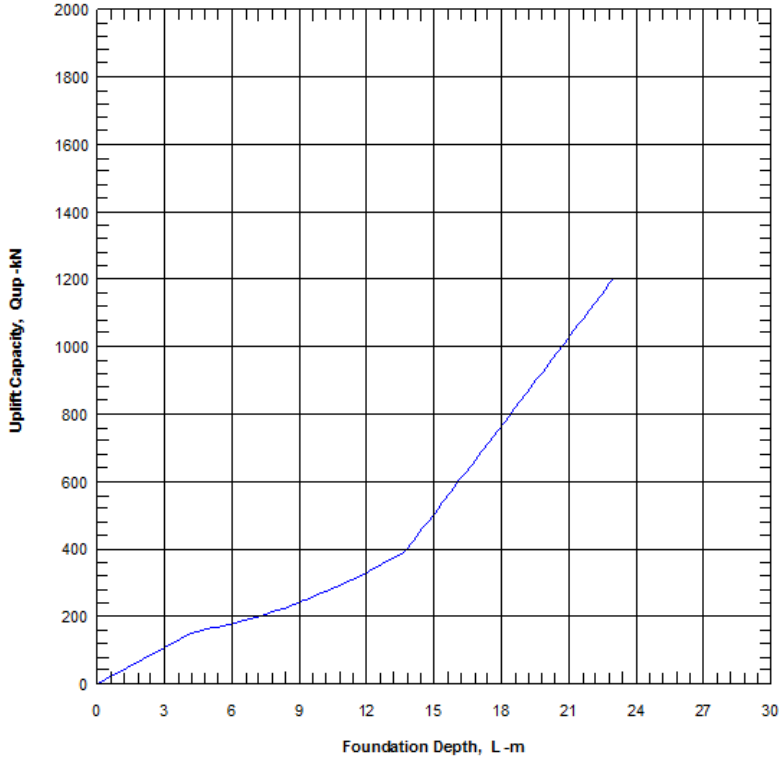

CivilTech Software

**Samawa Power Plant Project**
**GTG_Area_4(Clay Base)**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

# ALLOWABLE CAPACITY vs FOUNDATION DEPTH

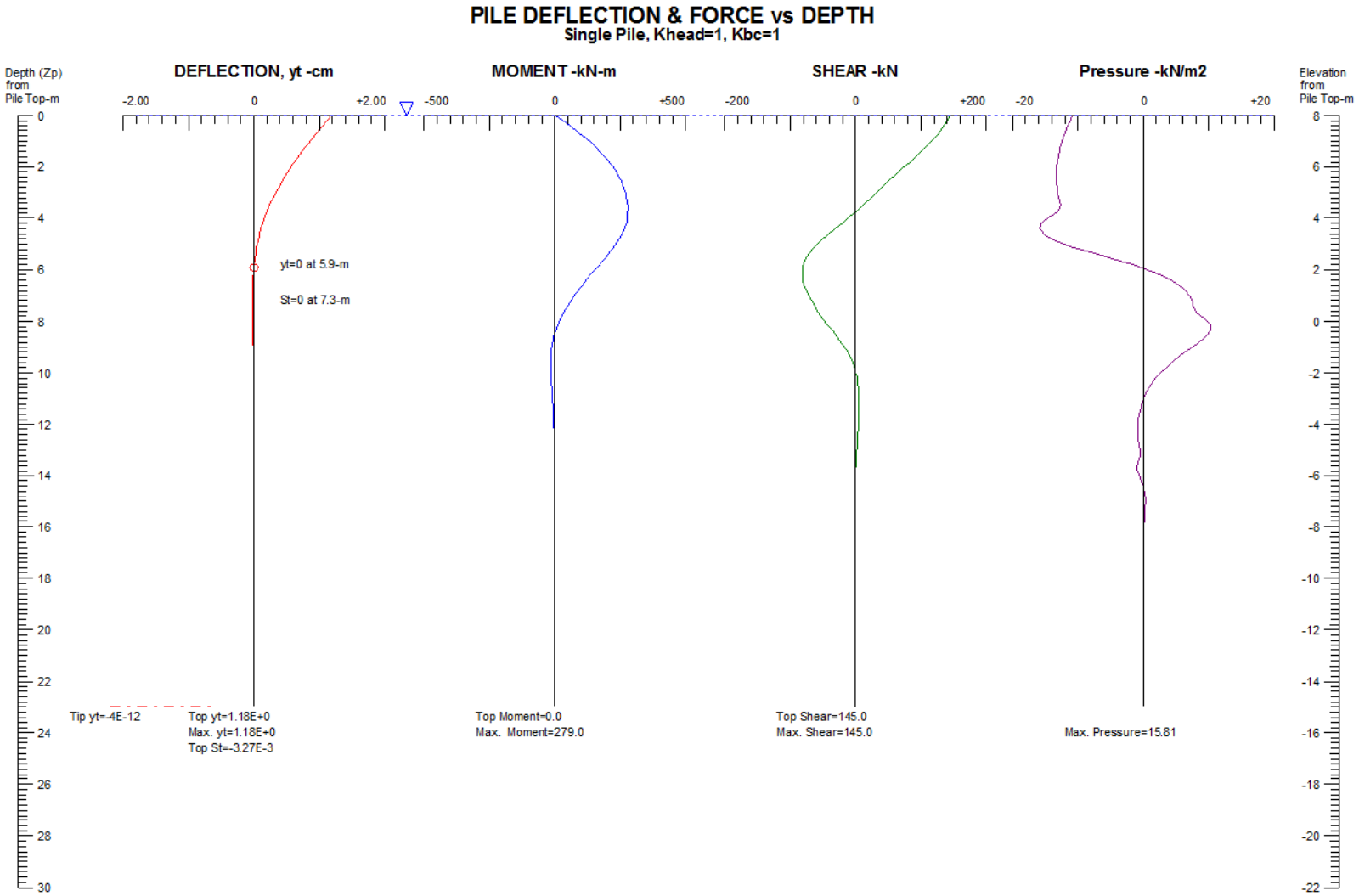



CivilTech Software

**Samawa Power Plant Project**
**GTG_Area_4(Clay Base)**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

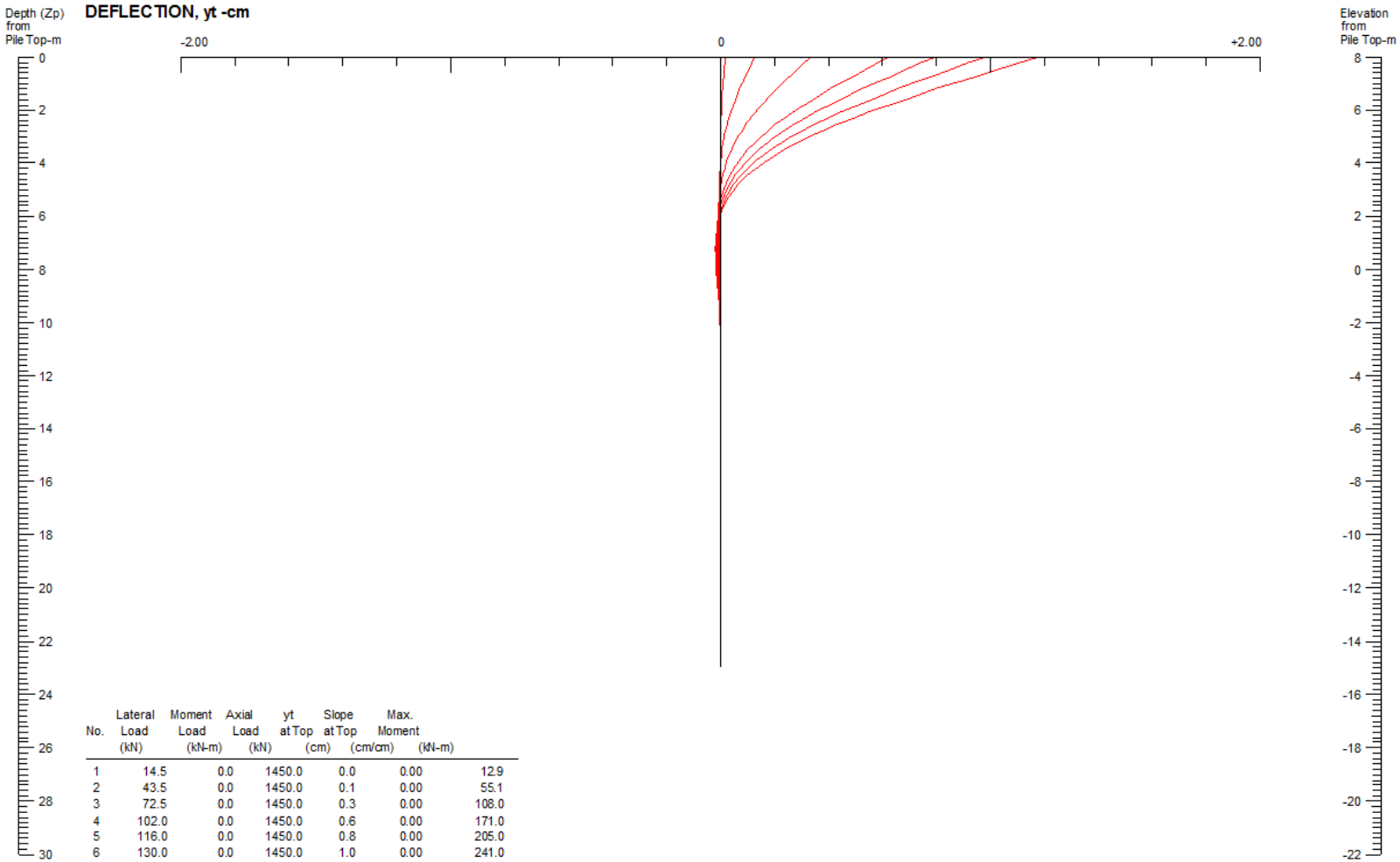



CivilTech Software

**Samawa Power Plant Project**
**GTG_Area_4(Clay Base)**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

## PILE DEFLECTION vs LOADING
Single Pile, Khead=1, Kbc=1

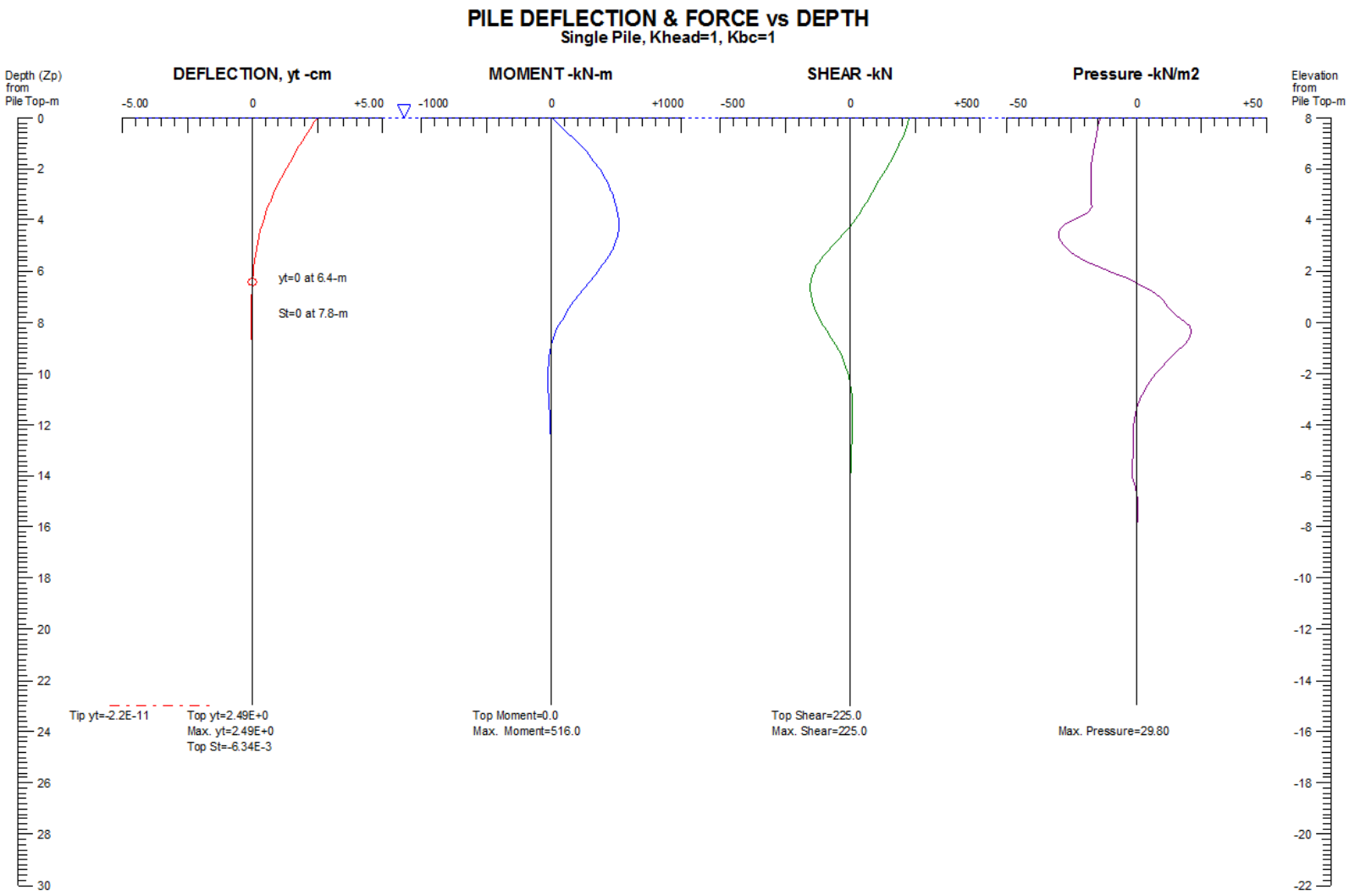



| No. | Lateral Load (kN) | Moment Load (kN-m) | Axial Load (kN) | yt at Top (cm) | Slope at Top (cm/cm) | Max. Moment (kN-m) |
|---|---|---|---|---|---|---|
| 1 | 14.5 | 0.0 | 1450.0 | 0.0 | 0.00 | 12.9 |
| 2 | 43.5 | 0.0 | 1450.0 | 0.1 | 0.00 | 55.1 |
| 3 | 72.5 | 0.0 | 1450.0 | 0.3 | 0.00 | 108.0 |
| 4 | 102.0 | 0.0 | 1450.0 | 0.6 | 0.00 | 171.0 |
| 5 | 116.0 | 0.0 | 1450.0 | 0.8 | 0.00 | 205.0 |
| 6 | 130.0 | 0.0 | 1450.0 | 1.0 | 0.00 | 241.0 |
| 7 | 145.0 | 0.0 | 1450.0 | 1.2 | 0.00 | 279.0 |

*CivilTech Software*

**Samawa Power Plant Project**
**GTG_Area_4(Clay Base)**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

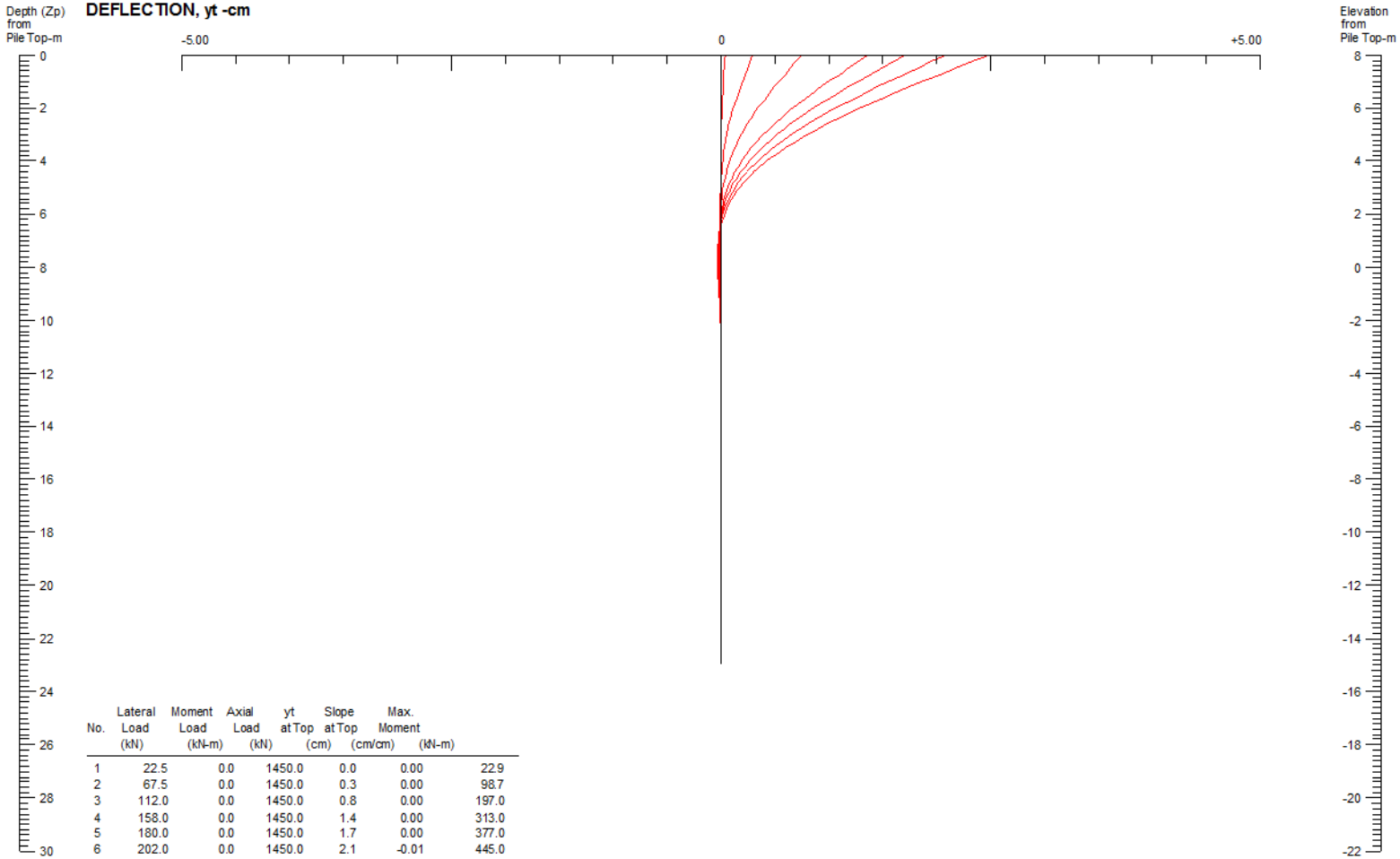



**CivilTech Software**

**Samawa Power Plant Project**
**GTG_Area_4(Clay Base)**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

## PILE DEFLECTION vs LOADING
Single Pile, Khead=1, Kbc=1




| No. | Lateral Load (kN) | Moment Load (kN-m) | Axial Load (kN) | yt at Top (cm) | Slope at Top (cm/cm) | Max. Moment (kN-m) |
|---|---|---|---|---|---|---|
| 1 | 22.5 | 0.0 | 1450.0 | 0.0 | 0.00 | 22.9 |
| 2 | 67.5 | 0.0 | 1450.0 | 0.3 | 0.00 | 98.7 |
| 3 | 112.0 | 0.0 | 1450.0 | 0.8 | 0.00 | 197.0 |
| 4 | 158.0 | 0.0 | 1450.0 | 1.4 | 0.00 | 313.0 |
| 5 | 180.0 | 0.0 | 1450.0 | 1.7 | 0.00 | 377.0 |
| 6 | 202.0 | 0.0 | 1450.0 | 2.1 | -0.01 | 445.0 |
| 7 | 225.0 | 0.0 | 1450.0 | 2.5 | -0.01 | 516.0 |

*CivilTech Software*

**Samawa Power Plant Project**
**GTG_Area_4(Clay Base)**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

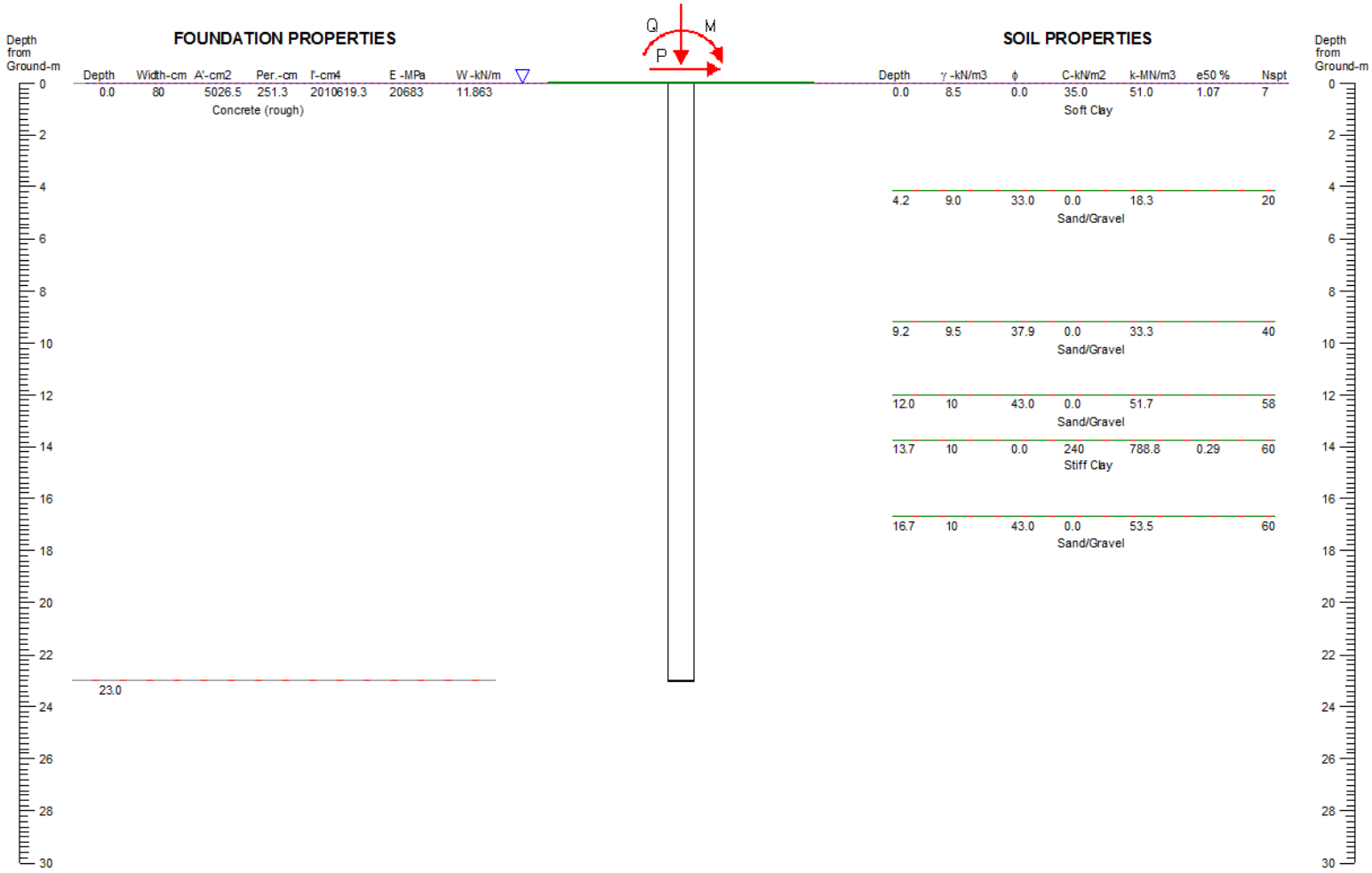
**I. 4.2) GTG Area -4 (Sand Base)**

**I.4.2.1) Axial Allowable Loads**
Axial Compression Allowable Bearing Capacity= 1468 kN
Axial Allowable Uplift Capacity= 880 kN

**I.4.2.2)Horizontal Load Capacity for Free Head Pile**
Horizontal allowable lateral load is 145kN for 1.2 cm lateral top deflection. Maximum sectional moment : Mmax=279kN-m
Horizontal ultimate lateral capacity is 225kN for 2.5 cm top deflection. Maximum sectional moment : 516kN-m

## FOUNDATION PROFILE & SOIL CONDITIONS

Diameter more than 24in (61cm).
For bell section, select "Belled"
in Diameter Variation of Pile
Section Screen.



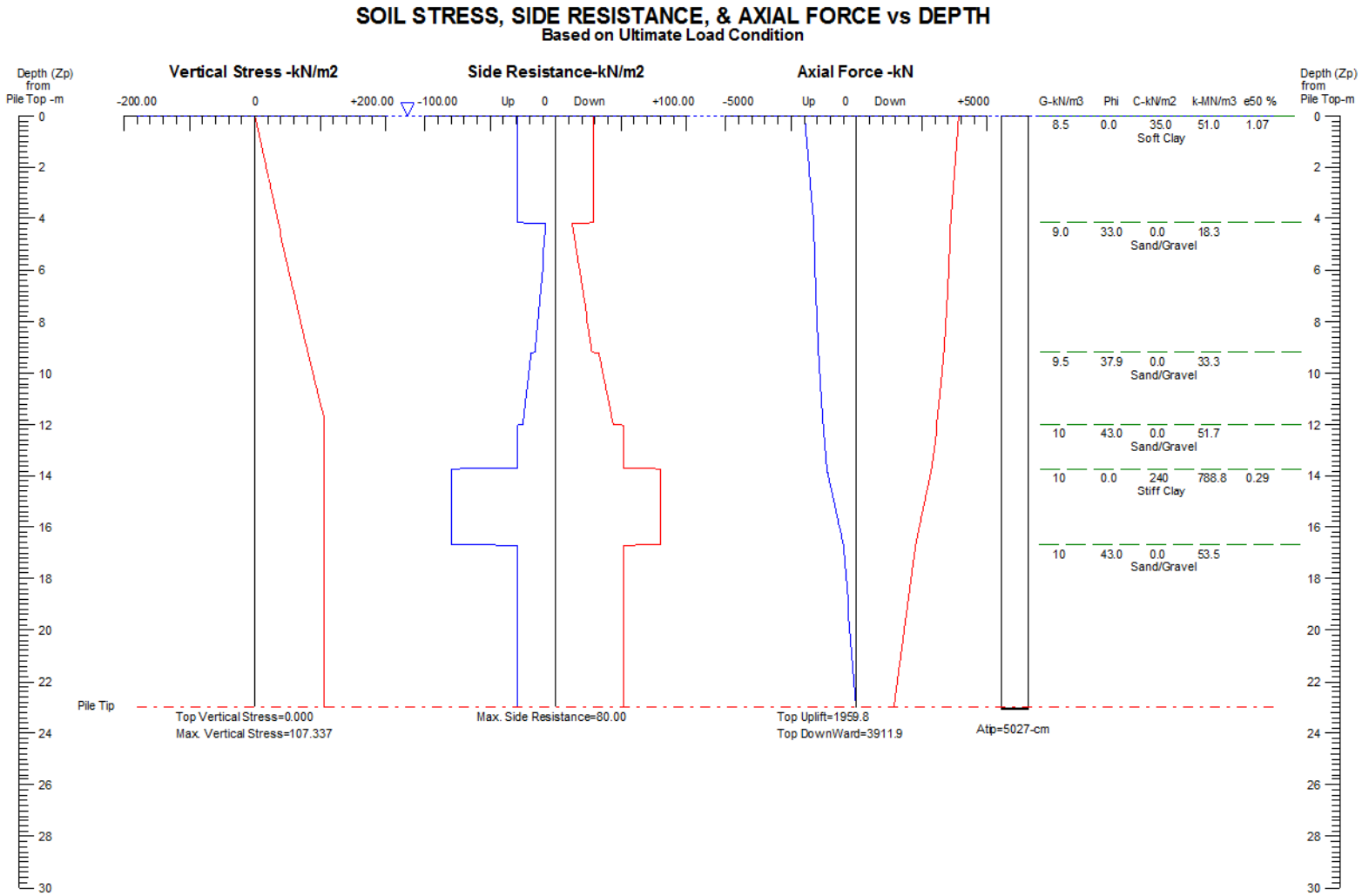

Batter Angle=0 (Pile diameter not to scale) Surface Angle=0

CivilTech Software

**Samawa Power Plant Project**
**GTG Area-4 (Sand Base)**

**Figure 1**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

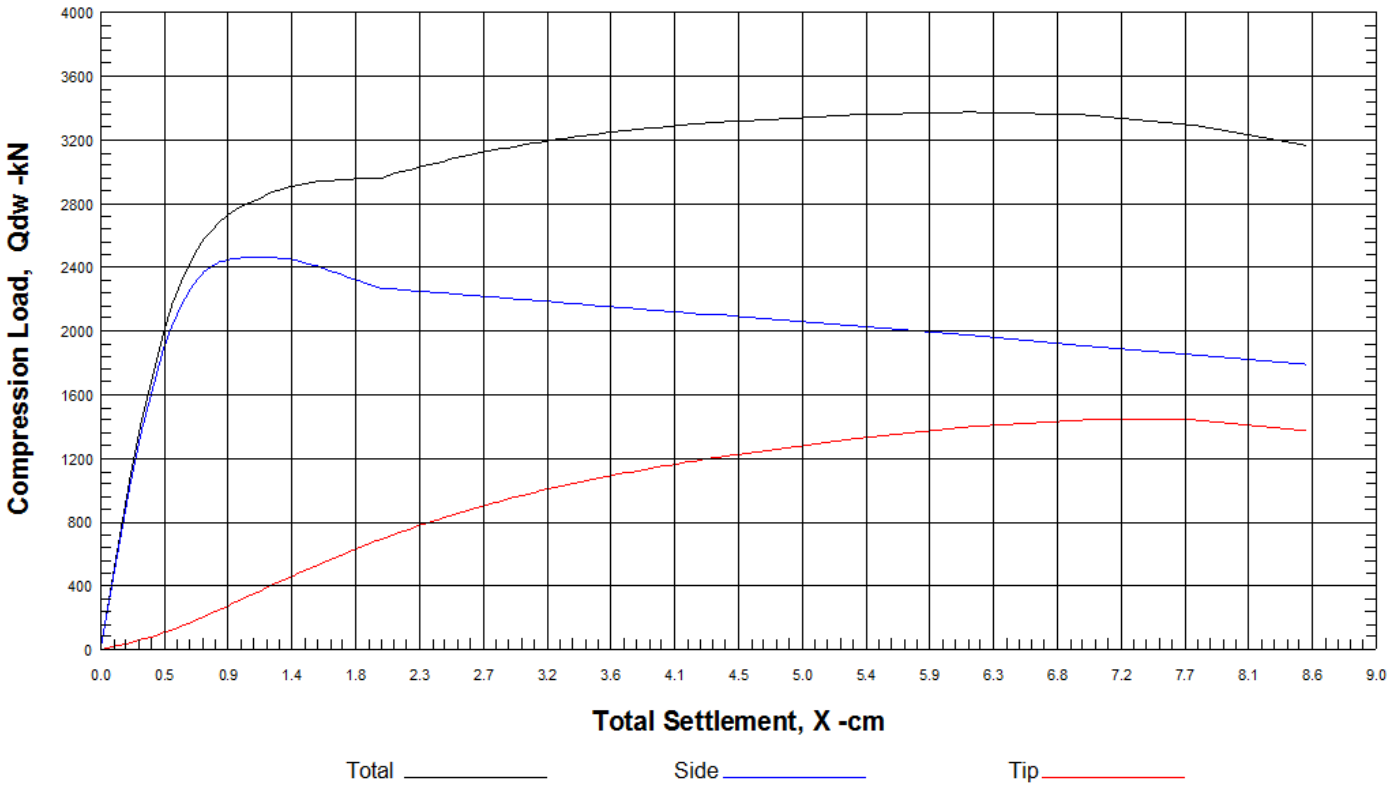



CivilTech Software

**Samawa Power Plant Project**
**GTG Area-4 (Sand Base)**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

## Vertical Load vs. Total Settlement

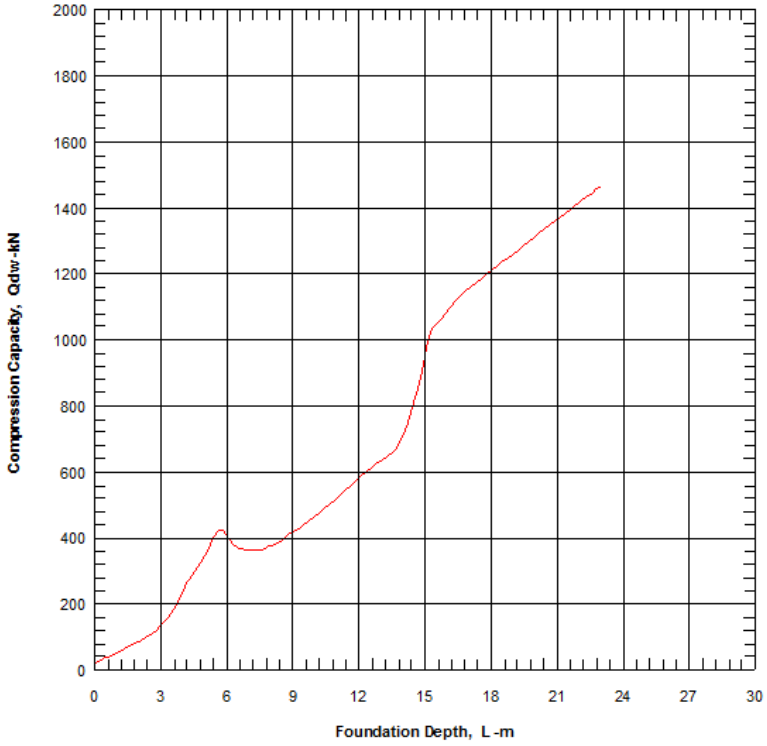


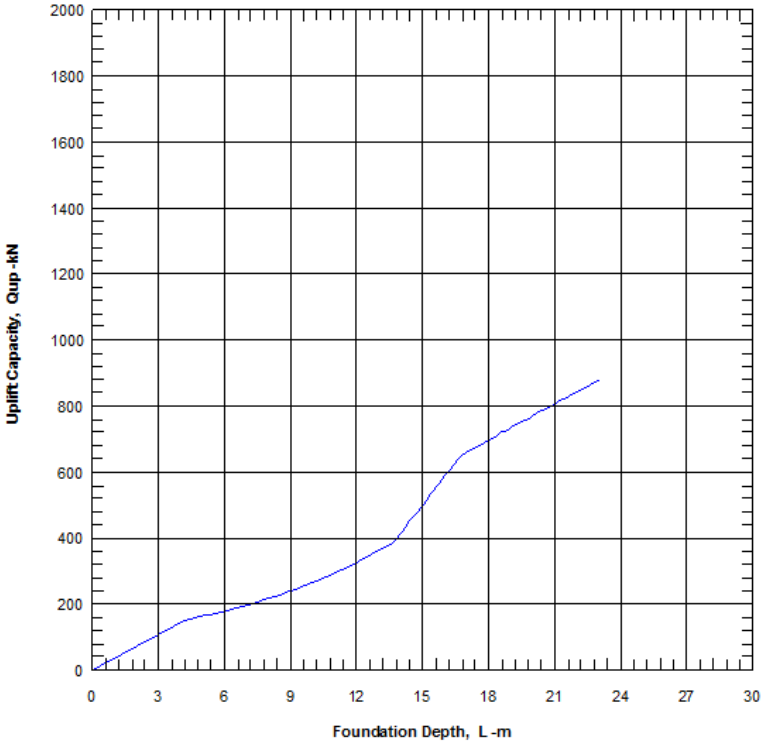

CivilTech Software

**Samawa Power Plant Project**
**GTG Area-4 (Sand Base)**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

# ALLOWABLE CAPACITY vs FOUNDATION DEPTH

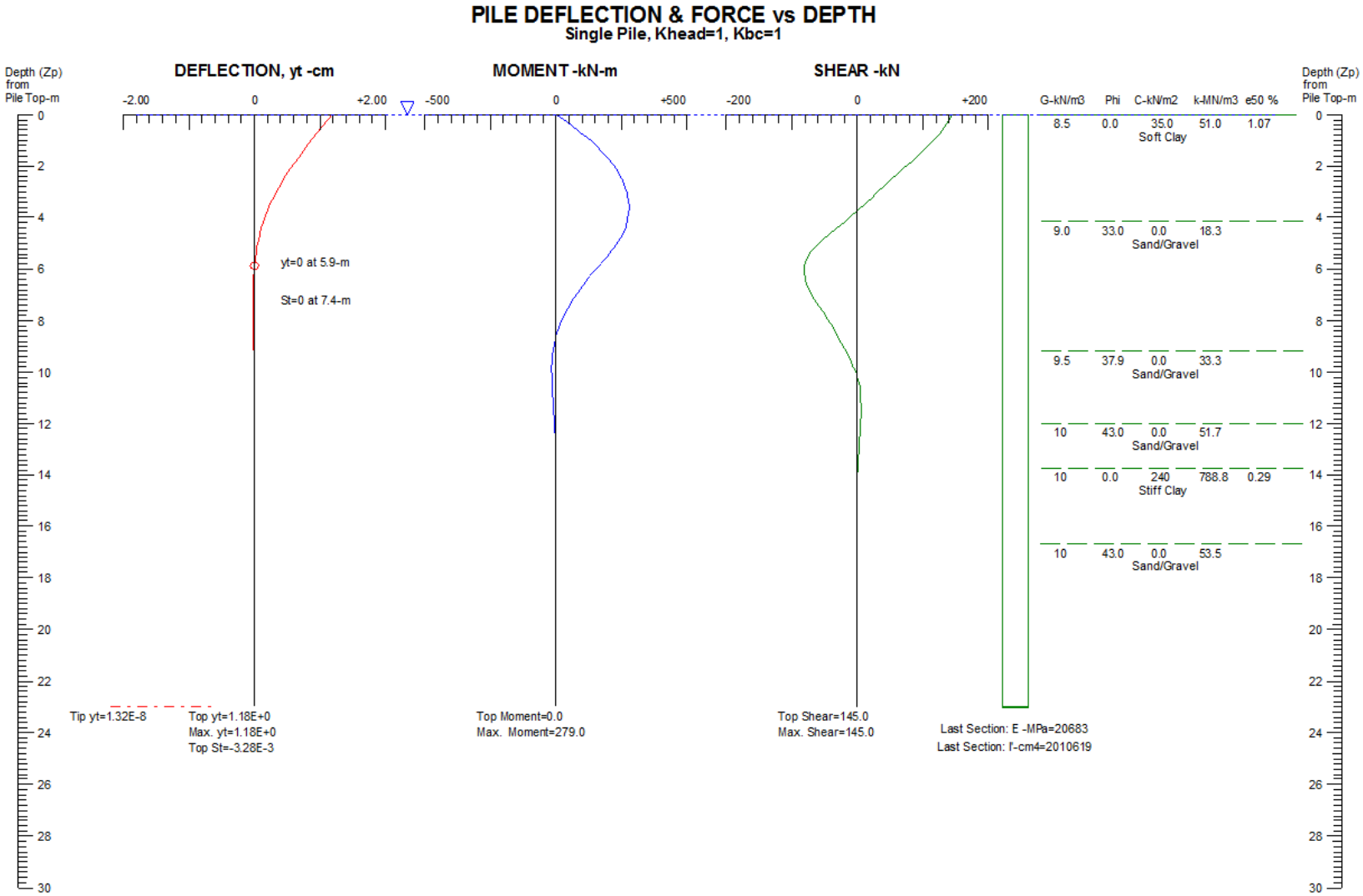



CivilTech Software

**Samawa Power Plant Project**
**GTG Area-4 (Sand Base)**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

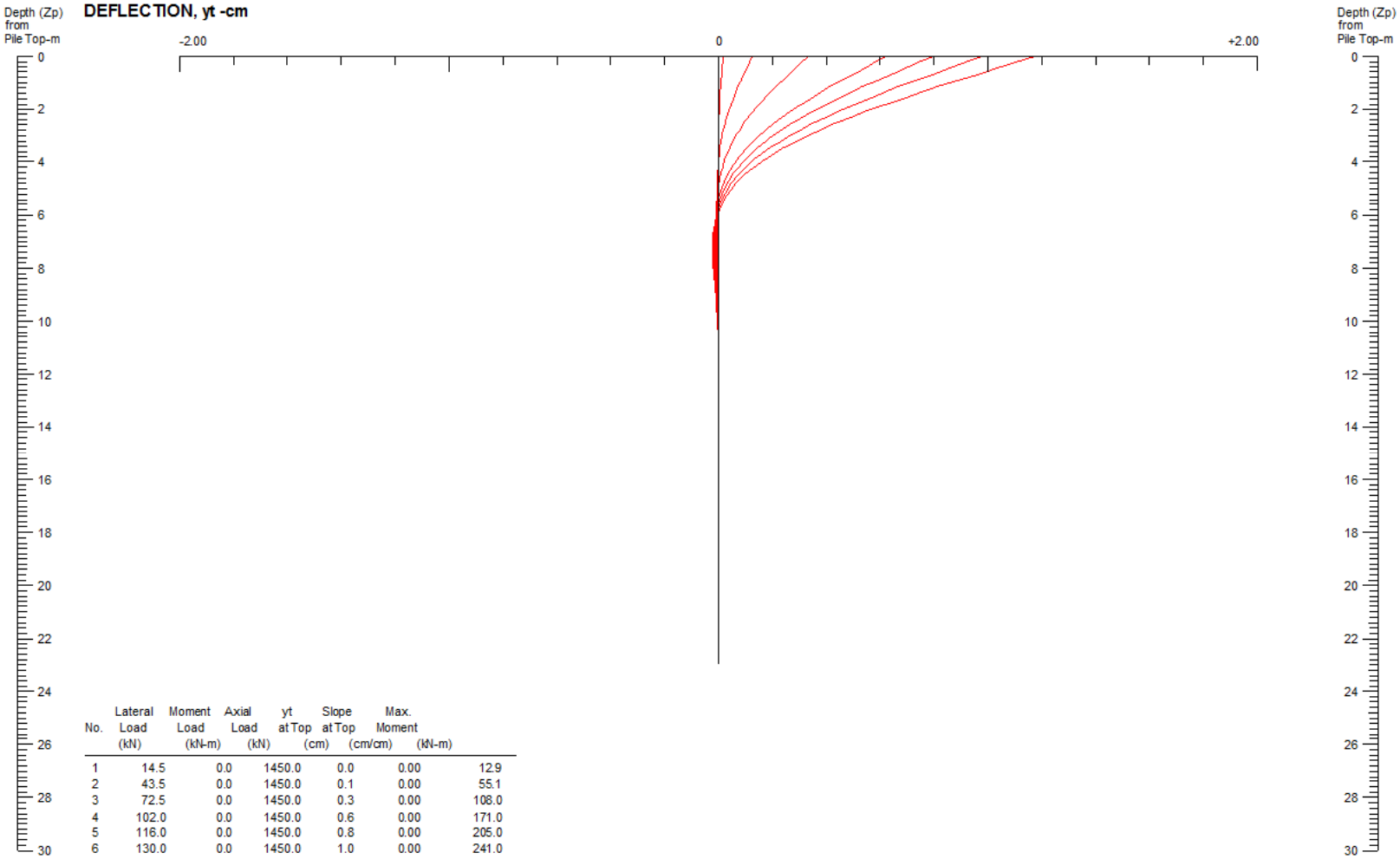



CivilTech Software

**Samawa Power Plant Project**
**GTG Area-4 (Sand Base)**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

## PILE DEFLECTION vs LOADING
Single Pile, Khead=1, Kbc=1

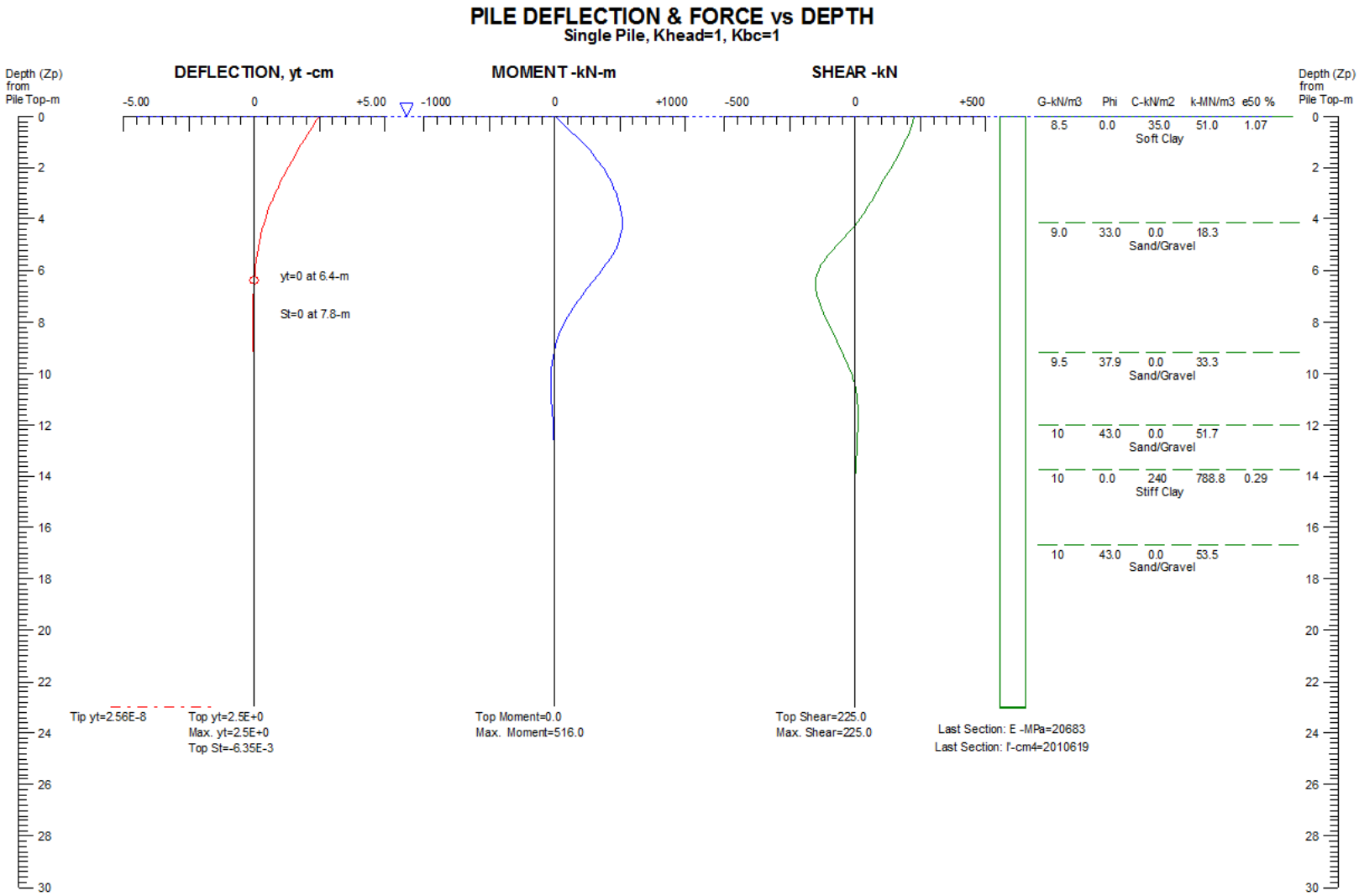



| No. | Lateral Load (kN) | Moment Load (kN-m) | Axial Load (kN) | yt at Top (cm) | Slope at Top (cm/cm) | Max. Moment (kN-m) |
|---|---|---|---|---|---|---|
| 1 | 14.5 | 0.0 | 1450.0 | 0.0 | 0.00 | 12.9 |
| 2 | 43.5 | 0.0 | 1450.0 | 0.1 | 0.00 | 55.1 |
| 3 | 72.5 | 0.0 | 1450.0 | 0.3 | 0.00 | 108.0 |
| 4 | 102.0 | 0.0 | 1450.0 | 0.6 | 0.00 | 171.0 |
| 5 | 116.0 | 0.0 | 1450.0 | 0.8 | 0.00 | 205.0 |
| 6 | 130.0 | 0.0 | 1450.0 | 1.0 | 0.00 | 241.0 |
| 7 | 145.0 | 0.0 | 1450.0 | 1.2 | 0.00 | 279.0 |

*CivilTech Software*

**Samawa Power Plant Project**
**GTG Area-4 (Sand Base)**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

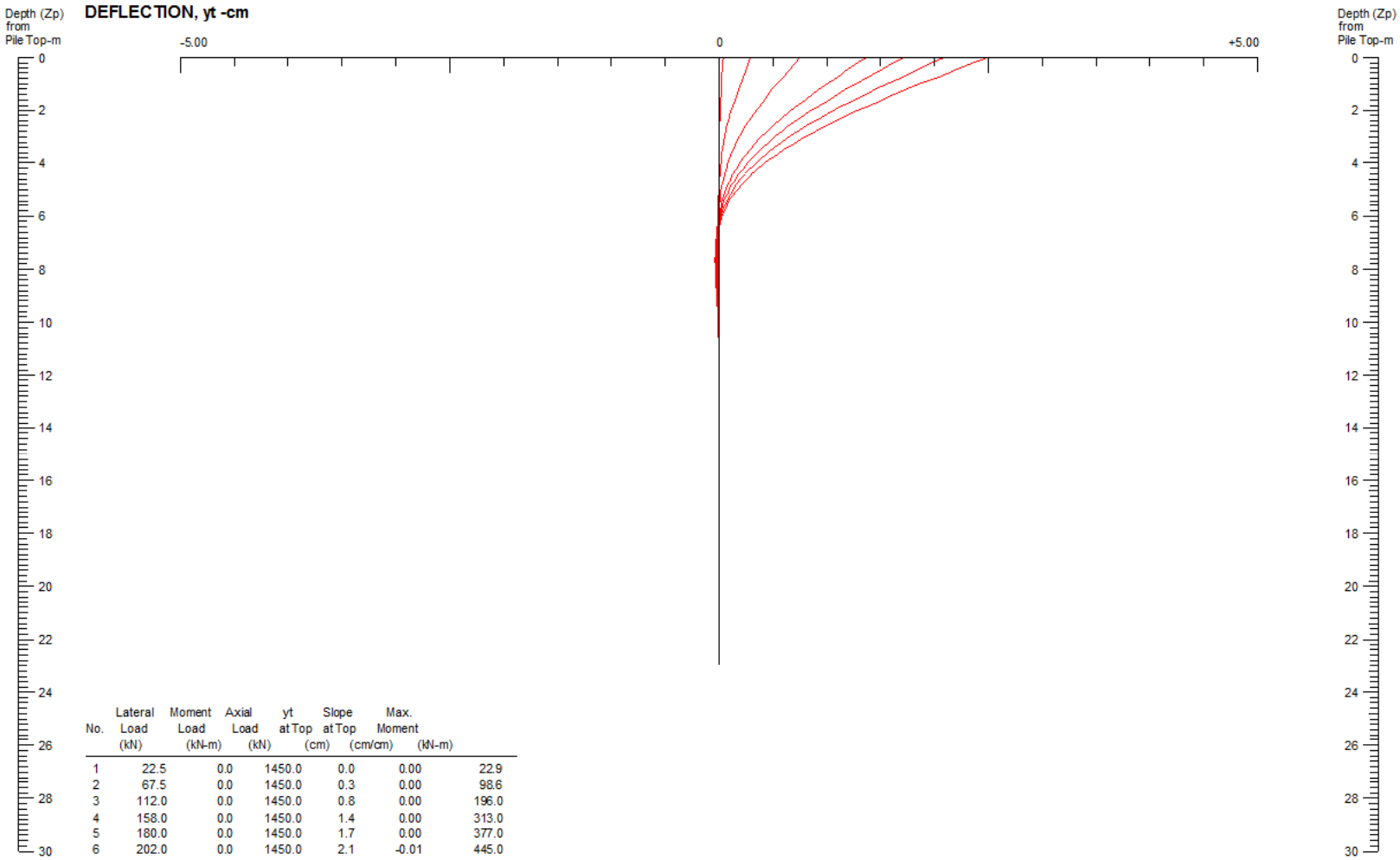



**CivilTech Software**

**Samawa Power Plant Project**
**GTG Area-4 (Sand Base)**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

## PILE DEFLECTION vs LOADING
Single Pile, Khead=1, Kbc=1




| No. | Lateral Load (kN) | Moment Load (kN-m) | Axial Load (kN) | yt at Top (cm) | Slope at Top (cm/cm) | Max. Moment (kN-m) |
|---|---|---|---|---|---|---|
| 1 | 22.5 | 0.0 | 1450.0 | 0.0 | 0.00 | 22.9 |
| 2 | 67.5 | 0.0 | 1450.0 | 0.3 | 0.00 | 98.6 |
| 3 | 112.0 | 0.0 | 1450.0 | 0.8 | 0.00 | 196.0 |
| 4 | 158.0 | 0.0 | 1450.0 | 1.4 | 0.00 | 313.0 |
| 5 | 180.0 | 0.0 | 1450.0 | 1.7 | 0.00 | 377.0 |
| 6 | 202.0 | 0.0 | 1450.0 | 2.1 | -0.01 | 445.0 |
| 7 | 225.0 | 0.0 | 1450.0 | 2.5 | -0.01 | 516.0 |

*CivilTech Software*

**Samawa Power Plant Project**
**GTG Area-4 (Sand Base)**

Depths are related to elevation of 8.40m for GTG, HRSG and STG Areas; 9.40m for Tank Area and Water Treatment Area and 9.40mWS&STR&NPB

## Annex 2 - Sections For Calculation

# GTG Area 4

**Section for Calculation (SC) (Sand Base)**

| SC | Ground Level | N SPT | Nspt aver. |
|---|---|---|---|
| | 9.75 | Blows/30cm | Wll/Ip |

Clay CH
ϒ = 18.5kN/m3
Cu= 35 kPa
Nspt= 7

4.25

Med dns Sand
ϒ = 19.0kN/m3
Φ = 33 FC:27
Nspt= 20

-0.8

Dense Sand
ϒ = 19.5kN/m3
Φ = 38 FC:16
Nspt= 40

-3.6

V. Dense Sand
ϒ = 20.0kN/m3
Φ = 43 FC:7
Nspt= 58

-5.3

Hard CH
ϒ = 20.0kN/m3
Cu= 240 kPa
Nspt= 60

-8.3

V. Dense Sand
ϒ = 20.0kN/m3
Φ = 43
Nspt= 60

-20.3

Hard CH
ϒ = 20.0kN/m3
Cu= 240 kPa
Nspt= 70

-30

Note: Liquefaction Analysis is performed for this section.

**Section for Calculation (SC) (Clay Base)**

| SC | Ground Level | N SPT | Nspt aver. |
|---|---|---|---|
| | 9.75 | Blows/30cm | Wll/Ip |

Clay CH
ϒ = 18.5kN/m3
Cu= 35 kPa
Nspt= 7

4.25

Med dns Sand
ϒ = 19.0kN/m3
Φ = 33 FC:27
Nspt= 20

0.45

Dense Sand
ϒ = 19.5kN/m3
Φ = 38 FC:16
Nspt= 38

-3.6

V. Dense Sand
ϒ = 20.0kN/m3
Φ = 43 FC:7
Nspt= 58

-5.3

Hard CH
ϒ = 20.0kN/m3
Cu= 240 kPa
Nspt= 60

-20.3

Note: Liquefaction Analysis is performed for this section.

# GTG Area 3

**Section for Calculation (SC) (Clay Base)**

| SC | Ground Level | N SPT | Nspt aver. |
|---|---|---|---|
| | 10.65 | Blows/30cm | Wll/Ip |

Clay CH
ϒ = 18.5kN/m3
Cu= 35 kPa
Nspt= 9

5.2

Med dns Sand
ϒ = 19.0kN/m3
Φ = 33
Nspt= 22

1.96

Dense Sand
ϒ = 19.5kN/m3
Φ = 38
Nspt= 40

-0.9

Hard CH
ϒ = 20.0kN/m3
Cu= 200 kPa
Nspt= 40

-3.9

V. Dense Sand
ϒ = 20.0kN/m3
Φ = 42
Nspt= 62

-9

Hard CH
ϒ = 20.0kN/m3
Cu= 240 kPa
Nspt= 65

-30

## GTG Area 2

**Section for Calculation (SC) (Clay Base)**

| SC | Ground Level | N SPT | Nspt aver. |
|---|---|---|---|
| | 9.95 | Blows/30cm | Wll/Ip |

Clay CH
ϒ = 18.5kN/m3
Cu= 35 kPa
Nspt= 10

5.00

Med dns Sand
ϒ = 19.0kN/m3
Φ = 33
Nspt= 22

1.00

Dense Sand

ϒ = 19.5kN/m3
Φ = 38
Nspt= 39

-2.5

V. Dense Sand

ϒ = 20.0kN/m3
Φ = 42
Nspt= 73

-6.5

Hard CH
ϒ = 20.0kN/m3
Cu= 240 kPa
Nspt= 65

-30

## GTG Area 1

**Section for Calculation (SC) (Clay Base)**

| SC | Ground Level | N SPT | Nspt aver. |
|---|---|---|---|
| | 9.91 | Blows/30cm | Wll/Ip |

Clay CH
ϒ = 18.5kN/m3
Cu= 35 kPa
Nspt= 7

5.2

Med dns Sand
ϒ = 19.0kN/m3
Φ = 33 FC:27
Nspt= 21

2.1

Dense Sand

ϒ = 19.5kN/m3
Φ = 38 FC:16
Nspt= 41

-4

V. Dense Sand

ϒ = 20.0kN/m3
Φ = 42 FC:14
Nspt= 79

-5.1

Hard CH
ϒ = 20.0kN/m3
Cu= 240 kPa
Nspt= 60

-30

**Section for Calculation (SC) (Sand Base)**

| SC | Ground Level | N SPT | Nspt aver. |
|---|---|---|---|
| | 9.91 | Blows/30cm | Wll/Ip |

Clay CH
ϒ = 18.5kN/m3
Cu= 35 kPa
Nspt= 9

6.87

Dense Sand

ϒ = 19.5kN/m3
Φ = 38
Nspt= 40

-2.37

V. Dense Sand

ϒ = 19.5kN/m3
Φ = 42
Nspt= 85

-23.13

Hard CH
ϒ = 20.0kN/m3
Cu= 240 kPa
Nspt= 96

-30

Note: Liquefaction Analysis is performed for this section.

## Transformers Area

**Section for Calculation (SC) (Clay Base)**

| SC | Ground Level | N SPT | Nspt aver. |
|---|---|---|---|
| | 9.815 | Blows/30cm | Wll/Ip |

Clay CH
ϒ = 18.5kN/m3
Cu= 35 kPa
Nspt= 9

4.5

Med dns Sand
ϒ = 19.0kN/m3
Φ = 33 FC:28
Nspt= 20

0.5

Dense Sand

ϒ = 19.5kN/m3
Φ = 38 FC:17
Nspt= 41

-3.17

V. Dense Sand

ϒ = 20.0kN/m3
Φ = 44 FC:16
Nspt= 62

-6.7

Hard CH
ϒ = 20.0kN/m3
Cu= 184 kPa
Nspt= 49

-10.2

V. Dense Sand

ϒ = 20.0kN/m3
Φ = 44
Nspt= 64

-13.1

Hard CH
ϒ = 20.0kN/m3
Cu= 244 kPa
Nspt= 65

-19.63

**Section for Calculation (SC) (Clay Base)**

| SC | Ground Level | N SPT | Nspt aver. |
|---|---|---|---|
| | 9.8 | Blows/30cm | Wll/Ip |

Clay CH
ϒ = 18.5kN/m3
Cu= 35 kPa
Nspt= 5

5.3

Med dns Sand
ϒ = 19.0kN/m3
Φ = 34
Nspt= 24

-0.7

V. Dense Sand

ϒ = 19.5kN/m3
Φ = 44
Nspt= 65

-2.2

Dense Sand

ϒ = 20.0kN/m3
Φ = 38
Nspt= 38

-3.7

Hard CH
ϒ = 20.0kN/m3
Cu= 214 kPa
Nspt= 57

-15.2

Note: Liquefaction Analysis is performed for this section.

## Electrical Building Area

**Section for Calculation (SC) (Clay Base)**

| SC | Ground Level | N SPT | Nspt aver. |
|---|---|---|---|
| | 10.25 | Blows/30cm | Wll/Ip |

Clay CH
ϒ = 18.5kN/m3
Cu= 35 kPa
Nspt= 6

5.46

Med dns Sand
ϒ = 19.0kN/m3
Φ = 34
Nspt= 23

0.96

Dense Sand

ϒ = 19.5kN/m3
Φ = 39
Nspt= 43

-6.04

Hard CH
ϒ = 20.0kN/m3
Cu= 240 kPa
Nspt= 64

-15.04

## LDO&CO Treatment Area

**Section for Calculation (SC) (Clay Base)**

| SC | Ground Level | N SPT | Nspt aver. |
|---|---|---|---|
| | 10.99 | Blows/30cm | Wll/Ip |

Clay CH
ϒ = 18.5kN/m3
Cu= 26 kPa
Nspt= 6

5.46

Med dns Sand
ϒ = 19.0kN/m3
Φ = 34
Nspt= 23

0.96

Dense Sand

ϒ = 19.5kN/m3
Φ = 39
Nspt= 43

-6.04

Hard CH
ϒ = 20.0kN/m3
Cu= 320 kPa
Nspt= 64

-15.04

## LDO CO Unloading Area

**Section for Calculation (SC) (Clay Base-1)**

| SC | Ground Level | N SPT | Nspt aver. |
|---|---|---|---|
| | 11.47 | Blows/30cm | Wll/Ip |

Clay CL
ϒ = 18.5kN/m3
Cu= 31 kPa
Nspt= 7

6.97

Med dns Sand
ϒ = 19.0kN/m3
Φ = 34
Nspt= 24

5.47

Dense Sand

ϒ = 19.5kN/m3
Φ = 40
Nspt= 48

-2.03

V. Dense Sand

ϒ = 20.0kN/m3
Φ = 44
Nspt= 63

-3.53

Hard CH
ϒ = 20.0kN/m3
Cu= 325 kPa
Nspt= 65

-12.53

V. Dense Sand

ϒ = 20.0kN/m3
Φ = 41
Nspt= 50

-13.53

## Switchyard Control Bld. Area

**Section for Calculation (SC) (Clay Base-1)**

| SC | Ground Level | N SPT | Nspt aver. |
|---|---|---|---|
| | 9.64 | Blows/30cm | Wll/Ip |

Clay CL
ϒ = 18.5kN/m3
Cu= 38 kPa
Nspt= 8

5.14

Med dns Sand
ϒ = 19.0kN/m3
Φ = 32 FC:38
Nspt= 16

2.22

Hard CH
ϒ = 20.0kN/m3
Cu= 195 kPa
Nspt= 39

1.47

Dense Sand

ϒ = 20.0kN/m3
Φ = 38 FC:26
Nspt= 41

-5.28

Hard CH
ϒ = 20.0kN/m3
Cu= 300 kPa
Nspt= 60

-15.28

Note: Liquefaction Analysis is performed for this section.

# Tank Area

**Section for Calculation (SC) (Clay Base-1)**

| SC | Ground Level | N SPT | Nspt aver. |
|---|---|---|---|
| | 11.47 | Blows/30cm | Wll/Ip |

Clay CH
ϒ = 18.5kN/m3
Cu= 35 kPa
Nspt= 9

5.6

Med dns Sand
ϒ = 19.0kN/m3
Φ = 34
Nspt= 25

1.6

Dense Sand

ϒ = 19.5kN/m3
Φ = 38
Nspt= 40

-2.9

Hard CH
ϒ = 20.0kN/m3
Cu= 240 kPa
Nspt= 68

-8.9

V. Dense Sand

ϒ = 20.0kN/m3
Φ = 42
Nspt= 64

-11.5

Hard CH
ϒ = 20.0kN/m3
Cu= 240 kPa
Nspt= 66

-30

**Section for Calculation (SC) (Sand Base)**

| SC | Ground Level | N SPT | Nspt aver. |
|---|---|---|---|
| | 11.7 | Blows/30cm | Wll/Ip |

Clay CH
ϒ = 18.5kN/m3
Cu= 35 kPa
Nspt= 15

5.69

Med dns Sand
ϒ = 19.0kN/m3
Φ = 35
Nspt= 29

2.69

V. Dense Sand

ϒ = 20.0kN/m3
Φ = 42
Nspt= 71

-3.31

Hard CH
ϒ = 20.0kN/m3
Cu= 240 kPa
Nspt= 93

-11.31

V. Dense Sand

ϒ = 20.0kN/m3
Φ = 42
Nspt= 100

-30

**Section for Calculation (SC) (Clay Base-2)**

| SC | Ground Level | N SPT | Nspt aver. |
|---|---|---|---|
| | 11.67 | Blows/30cm | Wll/Ip |

Clay CH
ϒ = 18.5kN/m3
Cu= 35 kPa
Nspt= 7

5.67

Med dns Sand
ϒ = 19.0kN/m3
Φ = 33
Nspt= 22

-2.33

Dense Sand

ϒ = 19.5kN/m3
Φ = 37
Nspt= 36

-6.33

Hard CH
ϒ = 20.0kN/m3
Cu= 240 kPa
Nspt= 50

-13.33

# Switchyard Area

**Section for Calculation (SC) (Clay Base)**

| SC | Ground Level | N SPT | Nspt aver. |
|---|---|---|---|
| | 9.78 | Blows/30cm | Wll/Ip |

Clay CH
ϒ = 18.5kN/m3
Cu= 35 kPa
Nspt= 10

4.42

Med dns Sand
ϒ = 19.0kN/m3
Φ = 33
Nspt= 20

1.25

Dense Sand

ϒ = 19.5kN/m3
Φ = 39
Nspt= 42

-3.25

V. Dense Sand

ϒ = 20.0kN/m3
Φ = 42
Nspt= 63

-7.1

Hard CH
ϒ = 20.0kN/m3
Cu= 240 kPa
Nspt= 64

-30

**Section for Calculation (SC) (Sand Base)**

| SC | Ground Level | N SPT | Nspt aver. |
|---|---|---|---|
| | 9.78 | Blows/30cm | Wll/Ip |

Clay CH
ϒ = 18.5kN/m3
Cu= 35 kPa
Nspt= 10

4.42

Med dns Sand
ϒ = 19.0kN/m3
Φ = 35
Nspt= 28

0.72

Dense Sand

ϒ = 19.5kN/m3
Φ = 40
Nspt= 45

-5.37

Hard CH
ϒ = 20.0kN/m3
Cu= 240 kPa
Nspt= 48

-9.1

V. Dense Sand

ϒ = 20.0kN/m3
Φ = 42
Nspt= 71

# Air Cooled Condenser Area

**Section for Calculation (SC) (Clay Base)**

| SC | Ground Level | N SPT | Nspt aver. |
|---|---|---|---|
| | 10.10 | Blows/30cm | Wll/Ip |

Clay CL
ϒ = 18.5kN/m3
Cu= 35 kPa
Nspt= 10

4.1

Med dns Sand
ϒ = 19.0kN/m3
Φ = 32
Nspt= 16

1.1

Dense Sand

ϒ = 20.0kN/m3
Φ = 38
Nspt= 39

-6.34

Hard CH
ϒ = 20.0kN/m3
Cu= 285 kPa
Nspt= 57

-9.53

## GIS Building Area

**Section for Calculation (SC) (Clay Base-1)**

| SC | Ground Level | N SPT | Nspt aver. |
|---|---|---|---|
| | 10.19 | Blows/30cm | Wll/Ip |

Clay CH
ϒ = 18.5kN/m3
Cu= 35 kPa
Nspt= 11

5.6

Med dns Sand
ϒ = 19.0kN/m3
Φ = 35
Nspt= 28

0.59

Dense Sand

ϒ = 19.5kN/m3
Φ = 38
Nspt= 41

-4.87

V. Dense Sand

ϒ = 20.0kN/m3
Φ = 42
Nspt= 74

-6.29

Hard CH
ϒ = 20.0kN/m3
Cu= 240 kPa
Nspt= 66

-30

**Section for Calculation (SC) (Sand Base)**

| SC | Ground Level | N SPT | Nspt aver. |
|---|---|---|---|
| | 11.7 | Blows/30cm | Wll/Ip |

Clay CH
ϒ = 18.5kN/m3
Cu= 35 kPa
Nspt= 11

5.6

Med dns Sand
ϒ = 19.0kN/m3
Φ = 35
Nspt= 28

0.59

Dense Sand

ϒ = 19.5kN/m3
Φ = 38
Nspt= 41

-4.87

V. Dense Sand

ϒ = 20.0kN/m3
Φ = 42
Nspt= 74

-12.51

Hard CH
ϒ = 20.0kN/m3
Cu= 240 kPa
Nspt= 72

-30

## Pipe Rack

**Section for Calculation (SC) (Clay Base)**

| SC | Ground Level | N SPT | Nspt aver. |
|---|---|---|---|
| | 10.19 | Blows/30cm | Wll/Ip |

Clay CL
ϒ = 18.5kN/m3
Cu= 35 kPa
Nspt= 10

5.69

M. Dense Sand
ϒ = 19.0kN/m3
Φ = 34
Nspt= 24

-1.65

Dense Sand
ϒ = 19.0kN/m3
Φ = 37
Nspt= 36

-5.65

Hard CH
ϒ = 20.0kN/m3
Cu= 430 kPa
Nspt= 86

-9.65

## STG Area

**Section for Calculation (SC) (Clay Base)**

| SC | Ground Level | N SPT | Nspt aver. |
|---|---|---|---|
| | 10.26 | Blows/30cm | Wll/Ip |

Clay CH
ϒ = 18.5kN/m3
Cu= 35 kPa
Nspt= 8

4.5

Med dns Sand
ϒ = 19.0kN/m3
Φ = 34
Nspt= 24

-1.50

Stiff CH
ϒ = 19.5kN/m3
Cu= 65 kPa
Nspt= 17

-3.0

V. Dense Sand
ϒ = 20.0kN/m3
Φ = 45
Nspt= 70

-8.8

Hard CH
ϒ = 20.0kN/m3
Cu= 240 kPa
Nspt= 61

-30

**Section for Calculation (SC) (Sand Base)**

| SC | Ground Level | N SPT | Nspt aver. |
|---|---|---|---|
| | 10.26 | Blows/30cm | Wll/Ip |

Med dns Sand
ϒ = 19.0kN/m3
Φ = 30
Nspt= 9

7.17

Soft CL
ϒ = 19.5kN/m3
Cu= 20 kPa
Nspt= 4

5.67

Med dns Sand
ϒ = 19.0kN/m3
Φ = 32
Nspt= 16

1.17

Dense Sand
ϒ = 19.5kN/m3
Φ = 39
Nspt= 42

-3.33

Very Stiff CH
ϒ = 20.0kN/m3
Cu= 230 kPa
Nspt= 26

-6.33

Med dns Sand
ϒ = 19.0kN/m3
Φ = 34
Nspt= 23

-7.83

Hard CH
ϒ = 20.0kN/m3
Cu= 240 kPa
Nspt= 72

-13.00

V. Dense Sand
ϒ = 20.0kN/m3
Φ = 41
Nspt= 50

-16.83

Hard CH
ϒ = 20.0kN/m3
Cu= 240 kPa
Nspt= 72

-30.00

## Fire Compressed Air Area

**Section for Calculation (SC) (Clay Base-1)**

| SC | Ground Level | N SPT | Nspt aver. |
|---|---|---|---|
| | 9.89 | Blows/30cm | Wll/Ip |

Clay CL
ϒ = 18.5kN/m3
Cu= 34 kPa
Nspt= 9

5.39

Dense Sand
ϒ = 19.0kN/m3
Φ = 35
Nspt= 29

0.89

Hard CH
ϒ = 20.0kN/m3
Cu= 150 kPa
Nspt= 30

-2.11

Dense Sand
ϒ = 20.0kN/m3
Φ = 40
Nspt= 47

-6.61

Hard CH
ϒ = 20.0kN/m3
Cu= 325 kPa
Nspt= 65

-27.61

Dense Sand
ϒ = 20.0kN/m3
Φ = 41
Nspt= 50

-30.11

# Water Treatment Plant Area

**Section for Calculation (SC) (Clay Base-1)**

| SC | Ground Level | N SPT | Nspt aver. |
|---|---|---|---|
| | 11.32 | Blows/30cm | Wll/Ip |

Clay CH
ϒ = 18.5kN/m3
Cu= 35 kPa
Nspt= 7

5.41

Med dns Sand
ϒ = 19.0kN/m3
Φ = 34
Nspt= 24

1.66

Dense Sand

ϒ = 19.5kN/m3
Φ = 39
Nspt= 44

-2.59

Hard CH
ϒ = 20.0kN/m3
Cu= 240 kPa
Nspt= 57

-4.59

V. Dense Sand

ϒ = 19.5kN/m3
Φ = 42
Nspt= 78

-8.59

Hard CH
ϒ = 20.0kN/m3
Cu= 240 kPa
Nspt= 81

-30

**Section for Calculation (SC) (Clay Base-2)**

| SC | Ground Level | N SPT | Nspt aver. |
|---|---|---|---|
| | 11.32 | Blows/30cm | Wll/Ip |

Clay CH
ϒ = 18.5kN/m3
Cu= 35 kPa
Nspt= 7

6.75

Med dns Sand
ϒ = 19.0kN/m3
Φ = 33
Nspt= 20

-0.75

Dense Sand

ϒ = 19.5kN/m3
Φ = 38
Nspt= 38

-3.75

Hard CH
ϒ = 20.0kN/m3
Cu= 240 kPa
Nspt= 49

# Non-Process Building Area

**Section for Calculation (SC) (Sand Base)**

| SC | Ground Level | N SPT | Nspt aver. |
|---|---|---|---|
| | 11.428 | Blows/30cm | Wll/Ip |

Clay CH
ϒ = 18.5kN/m3
Cu= 35 kPa
Nspt= 8
4.4

Med dns Sand
ϒ = 19.0kN/m3
Φ = 33
Nspt= 22
0.65

Dense Sand
ϒ = 20.0kN/m3
Φ = 38
Nspt= 39
-3.6

Hard CH
ϒ = 18.5kN/m3
Cu= 240 kPa
Nspt= 67
-7.6

Dense Sand
ϒ = 20.0kN/m3
Φ = 40
Nspt= 46
-10.1

Hard CH
ϒ = 20.0kN/m3
Cu= 235 kPa
Nspt= 47
-13.63

**Section for Calculation (SC) (Clay Base)**

| SC | Ground Level | N SPT | Nspt aver. |
|---|---|---|---|
| | 11.475 | Blows/30cm | Wll/Ip |

Clay CH
ϒ = 18.5kN/m3
Cu= 35 kPa
Nspt= 7
6.25

Med dns Sand
ϒ = 19.0kN/m3
Φ = 33
Nspt= 22
3.22

V. Stiff CH
ϒ = 18.5kN/m3
Cu= 35 kPa
Nspt= 21
2.4

Dense Sand
ϒ = 20.0kN/m3
Φ = 38
Nspt= 40
-2.6

Hard CH
ϒ = 20.0kN/m3
Cu= 215 kPa
Nspt= 43
-13.58

# Workshop & Stores Area

**Section for Calculation (SC) (Clay Base)**

| SC | Ground Level | N SPT | Nspt aver. |
|---|---|---|---|
| | 11.39 | Blows/30cm | Wll/Ip |

Clay CL
ϒ = 18.5kN/m3
Cu= 38 kPa
Nspt= 8
3.92

Medium Sand
ϒ = 19.0kN/m3
Φ = 34
Nspt= 24
2.42

V. Dense Sand
ϒ = 19.0kN/m3
Φ = 42
Nspt= 55
-3.58

Hard CH
ϒ = 20.0kN/m3
Cu= 240 kPa
Nspt= 54
-11.58

V. Dense Sand
ϒ = 19.0kN/m3
Φ = 44
Nspt= 64
-13.58

Hard CH
ϒ = 20.0kN/m3
Cu= 250 kPa
Nspt= 50
-13.58

# Annex 3 - Geotechnical Site Characterization

## POWER BLOCK SOIL STRATIFICATION

**HRSG 4 AREA**

| BH | Ground Level | N SPT | Nspt aver. | |
|---|---|---|---|---|
| 5 | 9.74 | | Wll/Ip | |
| **Depth(m)** | **Elev.(m)** | **Blows/30cm** | | |
| 0.5 | 9.25 | 7 | | |
| 1.5 | 8.25 | 8 | Stiff CH | |
| 3 | 6.75 | 13 | 10 | |
| 4.5 | 5.25 | 14 | 59/34 | |
| | | | 3.75 | |
| 6 | 3.75 | 17 | Med.dns Sand | |
| 7.5 | 2.25 | 30 | 23 | |
| 9 | 0.75 | 21 | 40/18 | FC: 32 |
| | | | 0.3 | |
| 10.5 | -0.75 | 43 | Dense Sand | |
| 12 | -2.25 | 40 | 41 | |
| | | | 43/22 | FC:47 |
| | | | -3.75 | |
| 13.5 | -3.75 | 46 | Hard CH | |
| 15 | -5.25 | 82 | 64 | |
| | | | 92/56 | |
| | | | -6 | |
| 16.5 | -6.75 | 72 | V. Dense Sand | |
| | | | 72 | FC:40 |
| | | | -7.5 | |
| 18 | -8.25 | 68 | | |
| 19.5 | -9.75 | 62 | Hard CH | |
| 21 | -11.25 | 60 | 66 | |
| 22.5 | -12.75 | 65 | 72/43 | |
| 24 | -14.25 | 73 | | |
| | | | -15.75 | |
| 25.5 | -15.75 | 57 | Dense Sand | |
| 27 | -17.25 | 37 | 47 | FC:45 |
| | | | 45/24 | |
| | | | -17.75 | |
| 28.5 | -18.75 | 100/27 | Hard CH | |
| 30 | -20.25 | 50/8 | 77/45 | |

| BH | Ground Level | | Nspt aver. | |
|---|---|---|---|---|
| 6 | 9.73 | | Wll/Ip | |
| **Depth(m)** | **Elev.(m)** | **Blows/30cm** | | |
| 0.5 | 9.22 | 8 | Stiff CH | |
| 1.5 | 8.22 | 6 | 8 | |
| 3 | 6.72 | 10 | 64/37 | |
| | | | 5.7 | |
| | | | Med.dns Sand | |
| 4.5 | 5.22 | 14 | | |
| 6 | 3.72 | 28 | 23 | FC:27 |
| 7.5 | 2.22 | 28 | 41/22 | |
| | | | 1.45 | |
| | | | Dense Sand | |
| 9 | 0.72 | 80 | 32 | NP FC:16 |
| 10.5 | -0.78 | 32 | 39/19 | |
| 12 | -2.28 | 30 | | |
| | | | -3 | |
| | | | Hard CH | |
| 13.5 | -3.78 | 53 | 56 | |
| 15 | -5.28 | 59 | 55/32 | |
| | | | -6 | |
| | | | V. Dense Sand | FC:39 |
| 16.5 | -6.78 | 69 | 69 | |
| | | | 43/21 | |
| | | | -7.5 | |
| 18 | -8.28 | 34 | Hard CH | |
| 19.5 | -9.78 | 83 | 71 | |
| 21 | -11.28 | 96 | 61/37 | |
| 22.5 | -12.78 | 50/13 | | |
| 24 | -14.28 | 50/12 | | |
| 25 | -15.28 | 50/14 | -15.3 | |

| CPT2 qc (MPa) | BH | Ground Level | | Nspt aver. | |
|---|---|---|---|---|---|
| | 7 | 10 | | Wll/Ip | |
| | **Depth(m)** | **Elev.(m)** | **Blows/30cm** | | |
| | 0.5 | 9.5 | 6 | Stiff CH | |
| | 1.5 | 8.5 | 6 | 11 | |
| 1 | 3 | 7 | 10 | 63/38 | |
| | 4.5 | 5.5 | 14 | | |
| | 6 | 4 | 21 | | |
| | | | | 2.5 | |
| 12 | | | | | |
| | 7.5 | 2.5 | 42 | Dense Sand. | |
| | | | | 42 | |
| | | | | 1 | |
| 21 | 9 | 1 | 60 | | |
| | | | | V. Dense Sand. | |
| | 10.5 | -0.5 | 55 | 62 | FC:29 |
| | | | | 44/23 | |
| | 12 | -2 | 71 | | |
| | | | | -3.5 | |
| | 13.5 | -3.5 | 74 | V. Dense Sand. | |
| | | | | 74 | |
| | | | | -4.25 | |
| | 15 | -5 | 100/25 | Hard CH | |
| | 16.5 | -6.5 | 100/28 | 43 | |
| | 18 | -8 | 43 | 83/52 | |
| | | | | -8.75 | |
| | 19.5 | -9.5 | 84 | V. Dense Sand | |
| | 21 | -11 | 67 | 82 | FC:47 |
| | 22.5 | -12.5 | 94 | 42/20 | |
| | | | | -14 | |
| | 24 | -14 | 78 | Hard CH | |
| | 25.5 | -15.5 | 82 | 83 | |
| | 27 | -17 | 77 | 84/50 | |
| | 28.5 | -18.5 | 95 | | |
| | 30 | -20 | 100/29 | | |

| **Cu** (kPa) |
|---|
| 25 |
| 33 |
| 44 |
| 53 |
| 29 |
| 33 |
| 43 |
| 31 |

| Depth (m) | Nspt Blows/30cm | Fi ° | Fc % |
|---|---|---|---|
| 9 | 36 | 29 | |
| 18 | 40 | 31 | 44 |
| 16.5 | 72 | 39 | 40 |
| 13.5 | 74 | 38 | NP |
| 12 | 33 | 31 | NP |

## POWER BLOCK SOIL STRATIFICATION

**CTG 4 AREA**

**Fin Fan Cooler 4**

| BH | Ground Level | N SPT | Nspt aver. | |
|---|---|---|---|---|
| 2 | 9.7 | | Wll/Ip | |
| **Depth (m)** | **Elev.** | **Blows/30cm** | | |
| 0.5 | 9.2 | 8 | Stiff CH | |
| 3 | 6.7 | 6 | 8 | |
| 4.5 | 5.2 | 11 | 59/35 | |
| | | | 3.7 | |
| 6 | 3.7 | 15 | Med.dns Sand | |
| 7.5 | 2.2 | 12 | 14 | FC: 28 |
| 9 | 0.7 | 14 | 46/22 | |
| | | | -0.8 | |
| 10.5 | -0.8 | 41 | Dense Sand | |
| | | | 38 | FC: 21 |
| 12 | -2.3 | 33 | | |
| 13.5 | -3.8 | 40 | NP:FC: 11 | |
| | | | -5.3 | |
| 15 | -5.3 | 64 | V. Dense Sand | |
| 16.5 | -6.8 | 50/8 | 64 | FC: 7 |
| | | | 89/58 | |
| 18 | -8.3 | 50/12 | -7.2 | |
| 19.5 | -9.8 | 55 | | |
| 21 | -11.3 | 50/11 | | |
| 22.5 | -12.8 | 50/13 | Hard CH | |
| 24 | -14.3 | 54 | 49 | |
| 25.5 | -15.8 | 57 | 78/47 | |
| 27 | -17.3 | 42 | | |
| 28.5 | -18.8 | 39 | | |
| 30 | -20.3 | 50/12 | | |

| CPT1 | BH | Ground Level | N SPT | Nspt aver. | |
|---|---|---|---|---|---|
| qc | 3 | 9.68 | | Wll/Ip | |
| (MPa) | **Depth (m)** | **Elev.** | **Blows/30cm** | | |
| | 0.75 | 8.93 | 5 | Medium CH | |
| 1.1 | 3 | 6.68 | 4 | 5 | |
| | 4.5 | 5.18 | 5 | 62/37 | |
| | | | | 4.68 | |
| 11 | 6 | 3.68 | 18 | Medium Sand | |
| | 7.5 | 2.18 | 13 | 16 | FC:43 |
| | | | | 0.68 | |
| 21 | 9 | 0.68 | 36 | Dense Sand | FC: 16 |
| | 10.5 | -0.82 | 49 | 42 | |
| | | | | -2.32 | |
| | 12 | -2.32 | 55 | | |
| | 13.5 | -3.82 | 60 | V. Dense Sand | FC: 17 |
| | | | | 58 | |
| | | | | -5.32 | |
| | 15 | -5.32 | 52 | Hard CH | |
| | 16.5 | -6.82 | 37 | 45 | |
| | | | | 55/32 | |
| | | | | -8.32 | |
| | 18 | -8.32 | 40 | Dense Sand | |
| | 20 | -10.32 | 49 | 44 | FC: 44 |
| | | | | -11.3 | |
| | | | | Hard CH | |
| | 22 | -12.32 | 43 | 46 | |
| | | | | -13.3 | |
| | 24 | -14.32 | 88 | V. Dense Sand. | |
| | 26 | -16.32 | 100/26 | 88 | FC: 36 |
| | | | | 65/37 | |
| | | | | -17.3 | |
| | 28 | -18.32 | 37 | Hard CH | |
| | 31 | -21.32 | 78 | 60 | |
| | 34 | -24.32 | 100/27 | 86/52 | |
| | 37 | -27.32 | 50/6 | | |
| | 40 | -30.32 | 66 | -30.32 | |

| BH | Ground Level | N SPT | Nspt aver. | |
|---|---|---|---|---|
| 4 | 9.67 | | Wll/Ip | |
| **Depth (m)** | **Elev.** | **Blows/30cm** | | |
| 0.5 | 9.17 | 6 | Stiff CH | |
| 3 | 6.67 | 11 | 11 | |
| | | | 53/30 | |
| | | | 5.17 | |
| 4.5 | 5.17 | 20 | Medium Sand | |
| 6 | 3.67 | 28 | 26 | FC: 49 |
| 7.5 | 2.17 | 29 | NP | |
| | | | 0.67 | |
| 9 | 0.67 | 80 | V. Dense Sand | |
| 10.5 | -0.83 | 100/27 | 74 | FC: 20 |
| 12 | -2.33 | 67 | NP | |
| 13.5 | -3.83 | 74 | | |
| | | | -5.33 | |
| 15 | -5.33 | 95 | | |
| | | | Hard CH | |
| | | | 95 | |
| | | | 95/56 | |
| | | | -6.83 | |
| 16.5 | -6.83 | 100/28 | V. Dense Sand | |
| | | | NP | FC: 18 |
| 18 | -8.33 | 91 | -8.33 | |
| 20 | -10.33 | 50/13 | V. Dense Sand | |
| | | | 91 | FC: 39 |
| | | | 37/18 | |
| 22 | -12.33 | 83 | -12.33 | |
| 24 | -14.33 | 82 | Hard CH | |
| 27 | -17.33 | 74 | 80 | |
| 30 | -20.33 | 50/6 | 72/42 | |

# POWER BLOCK SOIL STRATIFICATION

**HRSG 3 AREA**

| BH | Ground Level | N SPT | Nspt aver. | |
|---|---|---|---|---|
| 12 | 12 | | Wll/Ip | |
| **Depth(m)** | **Elev.(m)** | **Blows/30cm** | | |
| 0.5 | 11.5 | 7 | Stiff CH | |
| 3 | 9 | 12 | 10 | |
| | | | 60/32 | |
| | | | 7.5 | |
| 4.5 | 7.5 | 23 | Medium Sand | |
| 6 | 6 | 30 | 27 | FC: 22 |
| | | | NP | |
| | | | 4.5 | |
| 7.5 | 4.5 | 48 | Dense Sand | |
| | | | 46 | |
| 9 | 3 | 68 | NP | FC: 26 |
| 10.5 | 1.5 | 33 | | |
| 12 | 0 | 38 | 38/19 | |
| | | | 0 | |
| | | | Hard CH | |
| 13.5 | -1.5 | 50/11 | 50 | |
| | | | 65/41 | |
| | | | -3 | |
| 15 | -3 | 37 | Dense Sand | |
| 16.5 | -4.5 | 39 | 38 | FC: 40 |
| | | | 39/18 | |
| | | | -6 | |
| 18 | -6 | 54 | V. Dense Sand | |
| 19.5 | -7.5 | 59 | 63 | |
| 21 | -9 | 76 | NP | FC: 27 |
| | | | -10.5 | |
| 22.5 | -10.5 | 79 | Hard CH | |
| 24 | -12 | 88 | 84 | |
| 25.5 | -13.5 | 50/13 | 82/52 | |
| 27 | -15 | 50/13 | | |
| 28.5 | -16.5 | 50/8 | | |
| 30 | -18 | 50/4 | -18 | |

| CPT2 | BH | Ground Level | N SPT | Nspt aver. | |
|---|---|---|---|---|---|
| qc | 13 | 12 | | Wll/Ip | |
| (MPa) | **Depth(m)** | **Elev.(m)** | **Blows/30cm** | | |
| | 0.5 | 11.5 | 8 | Very Stiff CH | |
| 1.5 | 3 | 9 | 13 | 16 | |
| | 4.5 | 7.5 | 13 | 59/32 | |
| 8.6 | 6 | 6 | 28 | | |
| | | | | 5.5 | |
| | | | | Dense Sand | |
| 20 | 7.5 | 4.5 | 39 | 39 | FC:16 |
| | | | | NP | |
| | | | | 1.5 | |
| | 9 | 3 | 77 | | |
| | 10.5 | 1.5 | 77 | V. Dense Sand | |
| | 12 | 0 | 85 | 80 | |
| | 14 | -2 | 81 | | FC:13 |
| | | | | -3 | |
| | 16 | -4 | 93 | NP | |
| | 18 | -6 | R | V. Dense Sand | |
| | 20 | -8 | 96 | 96 | FC: 29 |
| | | | R | NP | |
| | | | | -8.5 | |
| | 22.5 | -10.5 | 98 | Hard CH | |
| | 25 | -13 | 50/11 | 98 | |
| | | | | 69/42 | |

| BH | Ground Level | N SPT | Nspt aver. | | Cu (kPa) |
|---|---|---|---|---|---|
| 14 | 10.07 | | Wll/Ip | | 35 |
| **Depth** | **Elev.** | Blows/30cm | | | 38 |
| | | | | | 38.5 |
| | | | | | 36 |
| | | | | | 42 |
| 0.5 | 9.56 | 7 | | | 48 |
| 1.5 | 8.56 | 10 | Stiff CL | | 28 |
| 3 | 7.06 | 9 | 10 | | 26 |
| 4.5 | 5.56 | 12 | 47/27 | | 38 |
| 6 | 4.06 | 11 | | | |
| | | | 2.56 | | |
| 7.5 | 2.56 | 87 | V. Dense Sand | | |
| 9 | 1.06 | 100/29 | 87 | FC: 16 | |
| | | | NP | | |
| | | | -0.44 | | |
| | | | Dense Sand | | |
| 10.5 | -0.44 | 43 | 43 | | |
| | | | NP | | |
| | | | -1.94 | | |
| 12 | -1.94 | 51 | V. Dense Sand | | |
| 13.5 | -3.44 | 70 | 61 | FC: 22 | |
| | | | NP | | |
| | | | -3.9 | | |
| 15 | -4.94 | 63 | | | |
| 16.5 | -6.44 | 76 | | | |
| 18 | -7.94 | 50/12 | Hard CH | | |
| 19.5 | -9.44 | 50/9 | 69 | | |
| 21 | -10.94 | 50/8 | 68/40 | | |
| 22.5 | -12.44 | 50/7 | | | |
| 24 | -13.94 | 50/14 | | | |
| 25.5 | -15.44 | 92 | -16.94 | | |
| | | | V dns Sand | | |
| 27 | -16.94 | 50/7 | 69 | | |
| | | | NP: FC: 39 | | |
| | | | -18.44 | | |
| 28.5 | -18.44 | 50/12 | Hard CH | | |
| 30 | -19.94 | 50/9 | 69/39 | | |

| Depth (m) | Nspt Blows/30cm | Fi ° | Fc % |
|---|---|---|---|
| 15 | 53 | 34 | 17 |
| 7.5 | 32 | 28 | 34 |
| 6 | 48 | 27 | 26 |
| 21 | 78 | 38 | 27 |
| 10.5 | 43 | 38 | 16 |
| 6.5 | 29 | 32 | 16 |
| 15.5 | 78 | 39 | 22 |
| 10.5 | 43 | 37 | 16 |

# POWER BLOCK SOIL STRATIFICATION

**STG3 AREA**

| BH | Ground Level | N SPT | Nspt aver. | |
|---|---|---|---|---|
| 9 | 9.93 | | Wll/Ip | |
| **Depth(m)** | **Elev.(m)** | **Blows/30cm** | | |
| 0.5 | 9.43 | 6 | Medium CL | |
| 1.5 | 8.43 | 6 | 7 | |
| 3 | 6.93 | 8 | 45/21 | |
| | | | 5.43 | |
| 4.5 | 5.43 | 18 | Med Dns Sand | |
| 6 | 3.93 | 24 | 21 | FC: 26 |
| 7.5 | 2.43 | 32 | 2.43 | |
| 9 | 0.93 | 31 | Dense Sand | |
| 10.5 | -0.57 | 34 | 39 | FC: 34 |
| 12 | -2.07 | 40 | 36/17 | |
| 13.5 | -3.57 | 58 | | |
| | | | -5.07 | |
| 15 | -5.07 | 60 | Hard CH | |
| | | | 60 | |
| | | | 66/39 | |
| | | | -6.57 | |
| 16.5 | -6.57 | 55 | V. Dense Sand | |
| 18 | -8.07 | 49 | 54 | FC: 17 |
| 20 | -10.07 | 57 | NP | |
| | | | -12.07 | |
| 22 | -12.07 | 57 | | |
| 24 | -14.07 | 83 | Hard CH | |
| 26 | -16.07 | 59 | 73 | |
| 28 | -18.07 | 79 | 85/52 | |
| 30 | -20.07 | 86 | | |

**FIN FAN COOLER 2**

| BH | Ground Level | N SPT | Nspt aver. | |
|---|---|---|---|---|
| 10 | 9.89 | | Wll/Ip | |
| **Depth(m)** | **Elev.(m)** | **Blows/30cm** | | |
| 0.5 | 9.39 | 8 | Stiff CH | |
| 3 | 6.89 | 10 | 9 | |
| | | | 68/43 | |
| | | | 5.39 | |
| 4.5 | 5.39 | 19 | Med. Dns. Sand | |
| | | | 19 | FC: 16 |
| | | | 3.89 | |
| 6 | 3.89 | 31 | Dense Sand | |
| 7.5 | 2.39 | 36 | 34 | NP: FC: 27 |
| | | | 0.89 | |
| 9 | 0.89 | 27 | Hard CH | |
| 10.5 | -0.61 | 33 | 30 | |
| | | | 65/39 | |
| 12 | -2.11 | 57 | -2.11 | |
| 13.5 | -3.61 | 36 | V. Dense Sand | |
| 15 | -5.11 | 53 | 49 | FC: 17 |
| 16.5 | -6.61 | 49 | NP | |
| 18 | -8.11 | 41 | -8.11 | |
| 20 | -10.11 | 32 | | |
| 22.5 | -12.61 | 57 | Hard CH | |
| 25 | -15.11 | 77 | 66 | |
| 27.5 | -17.61 | 65 | 72/43 | |
| 30 | -20.11 | 79 | | |
| 32.5 | -22.61 | 92 | | |
| 35 | -25.11 | 88 | | |
| | | | -27.61 | |
| 37.5 | -27.61 | 50/13 | V. Dense Sand | |
| 40 | -30.11 | 50/8 | 42/23 | FC: 37 |

| CPT3 | BH | Ground Level | N SPT | Nspt aver. | |
|---|---|---|---|---|---|
| qc | 11 | 9.96 | | Wll/Ip | |
| (MPa) | **Depth(m)** | **Elev.(m)** | **Blows/30cm** | | |
| | 0.5 | 9.46 | 7 | Stiff CH | |
| | 1.5 | 8.46 | 8 | 8 | |
| 1.1 | 3.5 | 6.46 | 9 | 54/30 | |
| 15.6 | 5 | 4.96 | 12 | 4.96 | |
| 19.7 | 6.5 | 3.46 | 29 | Med.Dns. Sand | |
| | | | | 21 | NP: FC: 16 |
| 17.9 | 8 | 1.96 | 78 | 1.96 | |
| 18 | 9.5 | 0.46 | 77 | V. Dense Sand | |
| | 11 | -1.04 | 77 | 78 | Sand FC: 19 |
| | 12.5 | -2.54 | 78 | NP | |
| | 14 | -4.04 | 84 | | |
| | 15.5 | -5.54 | 71 | | |
| | 17 | -7.04 | 64 | -7.04 | |
| | 18.5 | -8.54 | 50/10 | | |
| | 20 | -10.04 | 100/24 | | |
| | 21.5 | -11.54 | 50/14 | Hard CH | |
| | 23 | -13.04 | 98 | 81 | |
| | 24.5 | -14.54 | 50/11 | 80/50 | |
| | 26 | -16.04 | 50/9 | | |
| | 27.5 | -17.54 | 50/11 | | |
| | 29.5 | -19.54 | 50/14 | | |

## POWER BLOCK SOIL STRATIFICATION

**HRSG 2 AREA**

| BH | Ground Level | N SPT | Nspt aver. | |
|---|---|---|---|---|
| 19 | 9.9 | | Wll/Ip | |
| **Depth(m)** | **Elev.(m)** | **Blows/30cm** | | |
| 0.5 | 9.4 | 8 | Stiff CH | |
| 1.5 | 8.4 | 7 | 8 | |
| 3.5 | 6.4 | | 61/37 | |
| | | | 5.4 | |
| 4.5 | 5.4 | 20 | Dense Sand | |
| 6 | 3.9 | 42 | 35 | FC: 34 |
| 7.5 | 2.4 | 43 | 43/21 | |
| | | | 0.9 | |
| 9 | 0.9 | 59 | | |
| 10.5 | -0.6 | 72 | V. Dense Sand | |
| 12 | -2.1 | 89 | 69 | FC: 11 |
| 14 | -4.1 | 57 | NP | |
| | | | -6.6 | |
| 16.5 | -6.6 | 24 | Hard Clay CH | |
| 18 | -8.1 | 50/14 | 35 | |
| | | | 74/43 | |
| 20 | -10.1 | 45 | 40/18 | FC: 45 |
| | | | -12.6 | |
| 22.5 | -12.6 | 92 | Hard CH | |
| 25 | -15.1 | 50/12 | 92 | |
| 27.5 | -17.6 | 94 | 80/47 | |
| 30 | -20.1 | 90 | -20 | |

| BH | Ground Level | N SPT | Nspt aver. | |
|---|---|---|---|---|
| 20 | 10.08 | | Wll/Ip | |
| **Depth(m)** | **Elev.(m)** | **Blows/30cm** | | |
| 0.75 | 9.33 | 7 | Stiff CH | |
| 3 | 7.08 | 8 | 8 | |
| | | | 54/28 | |
| | | | 5.58 | |
| 4.5 | 5.58 | 12 | Med dns Sand | |
| | | | 12 | |
| | | | NP | |
| | | | 4.08 | |
| 6 | 4.08 | 29 | Medium Sand | |
| 7.5 | 2.58 | 28 | 28 | FC: 16 |
| 9 | 1.08 | 27 | NP | |
| | | | -0.42 | |
| 10.5 | -0.42 | 35 | Dense Sand | |
| 12 | -1.92 | 45 | 40 | FC: 17 |
| | | | NP | |
| | | | -4.92 | |
| 13.5 | -3.42 | 59 | V. Dense Sand | |
| 15 | -4.92 | 68 | 68 | |
| | | | NP | |
| | | | -6.42 | |
| 16.5 | -6.42 | 63 | | |
| 18 | -7.92 | 50/14 | Hard CH | |
| 19.5 | -9.42 | 50/13 | 63 | |
| 21 | -10.92 | 50/8 | 71/42 | |
| 23 | -12.92 | 50/10 | | |
| 25 | -14.92 | 50/12 | -14.92 | |

| CPT6 |
|---|
| qc |
| (MPa) |
| 1.5 |
| 4.7 |
| 9.8 |
| 15 |
| 18.5 |
| 21 |

| BH | Ground Level | N SPT | Nspt aver. | | Cu |
|---|---|---|---|---|---|
| 21 | 10.1 | | Wll/Ip | | |
| **Depth(m)** | **Elev.(m)** | **Blows/30cm** | | | **(kPa)** |
| | | | | | 37.5 |
| 0.5 | 9.6 | 8 | Stiff CL | | 59 |
| 3 | 7.1 | 12 | 13 | | 34 |
| 4.5 | 5.6 | 20 | 54/29 | | 45.5 |
| | | | | | 30.5 |
| | | | 4.1 | | 29 |
| | | | Dense Sand | | 44.5 |
| 6 | 4.1 | 39 | 39 | FC:17 | 42 |
| | | | 40/19 | | 33 |
| | | | | | 36 |
| | | | 2.6 | | |
| 7.5 | 2.6 | 70 | V. Dense Sand | | |
| | | | 70 | | |
| | | | NP | | |
| | | | 1.1 | | |
| 9 | 1.1 | 61 | V. Dense Sand | | |
| 10.5 | -0.4 | 94 | 64 | FC:12 | |
| 12 | -1.9 | 65 | 52/30 | | |
| 13.5 | -3.4 | 37 | -4.9 | | |
| 15 | -4.9 | 53 | Hard CH | | |
| | | | 60 | | |
| 16.5 | -6.4 | 58 | 73/47 | | |
| 18 | -7.9 | 69 | | | |
| | | | -9.9 | | |
| 20 | -9.9 | 83 | V. Dense Sand | | |
| | | | 83 | FC:35 | |
| | | | NP | | |
| | | | -11.9 | | |
| 22 | -11.9 | 99 | Hard CH | | |
| 24 | -13.9 | 100/29 | 99 | | |
| 26 | -15.9 | 50/13 | 89/54 | | |
| 28 | -17.9 | 50/12 | | | |
| 30 | -19.9 | 50/10 | -19.9 | | |

| Depth (m) | Nspt Blows/30cm | Fi ° | Fc % |
|---|---|---|---|
| 14 | 57 | 41 | 11 |
| 10.5 | 64 | 37 | 29 |
| 20 | 83 | 39 | 34 |
| 7.5 | 40 | 47 | 37 |
| 11 | 48 | 39 | 28 |
| 7.5 | 28 | 28 | 16 |
| 12.5 | 40 | 36 | 16 |

## POWER BLOCK SOIL STRATIFICATION

### STG 2 AREA

| BH | Ground Level | N SPT | Nspt aver. | |
|---|---|---|---|---|
| 16 | 9.84 | | Wll/Ip | |
| **Depth(m)** | **Elev.(m)** | **Blows/30cm** | | |
| 0.5 | 9.34 | 6 | Medium CH | |
| 3 | 6.84 | 5 | 5 | |
| | | | 51/29 | |
| | | | 5.34 | |
| 4.5 | 5.34 | 24 | Dense Sand | |
| 6 | 3.84 | 34 | 34 | FC:47 |
| 7.5 | 2.34 | 62 | 40/21 | |
| | | | 0.84 | |
| 9 | 0.84 | 32 | Dense Sand | |
| 10.5 | -0.66 | 48 | 40 | FC:25 |
| | | | NP | |
| | | | -2.16 | |
| 12 | -2.16 | 82 | V. Dense Sand | |
| | | | 82 | |
| | | | NP | |
| | | | -4.16 | |
| 14 | -4.16 | 47 | Hard CL | |
| 16 | -6.16 | 74 | 56 | |
| 18 | -8.16 | 46 | 47/22 | |
| | | | -10.16 | |
| 20 | -10.16 | 50/12 | NP | |
| | | | Sand FC:23 | |
| | | | -12.16 | |
| 22 | -12.16 | 97 | Hard CH | |
| 24 | -14.16 | 77 | 88 | |
| 26 | -16.16 | 89 | 73/43 | |
| 28 | -18.16 | 50/14 | | |
| 30 | -20.16 | 50/11 | | |

### FIN FAN COOLER 2

| BH | Ground Level | N SPT | Nspt aver. | |
|---|---|---|---|---|
| 17 | 9.83 | | Wll/Ip | |
| **Depth(m)** | **Elev.(m)** | **Blows/30cm** | | |
| 0.75 | 9.08 | 6 | Stiff CH | |
| 2 | 7.83 | 9 | 14 | |
| 3.5 | 6.33 | 14 | 65/41 | |
| 5 | 4.83 | 25 | | |
| | | | 3.33 | |
| 6.5 | 3.33 | 26 | Dense Sand | |
| 8 | 1.83 | 29 | 30 | |
| 9.5 | 0.33 | 88 | 42/23 | FC: 34 |
| | | | -1.17 | |
| 11 | -1.17 | 42 | Dense Sand | |
| 12.5 | -2.67 | 51 | 47 | FC:41 |
| | | | 59/34 | |
| | | | -4.17 | |
| 14 | -4.17 | 53 | V. Dense Sand | |
| 15.5 | -5.67 | 100/29 | 53 | FC: 42 |
| | | | 39/19 | |
| | | | -7.7 | |
| 17.5 | -7.67 | 100/29 | | |
| 19.5 | -9.67 | 70 | Hard CH | |
| 22 | -12.17 | 50/11 | 81 | |
| 24 | -14.17 | 50/8 | 79/50 | |
| 27 | -17.17 | 50/11 | | |
| 30 | -20.17 | 91 | | |
| | | | -23.17 | |
| 33 | -23.17 | 89 | NP | FC: 22 |
| | | | -26.2 | |
| 36 | -26.17 | 78 | Hard CH | |
| 39.5 | -29.67 | 87 | 83 | |
| | | | 68/39 | |

| CPT6 |
|---|
| qc |
| (MPa) |
| 1.5 |
| 1.7 |
| 11 |
| 25 |
| 22 |

| BH | Ground Level | N SPT | Nspt aver. | |
|---|---|---|---|---|
| 18 | 9.99 | | Wll/Ip | |
| **Depth(m)** | **Elev.(m)** | **Blows/30cm** | | |
| 0.5 | 9.49 | 7 | Stiff CH | |
| 1.5 | 8.49 | 9 | 8 | |
| | | | 56/31 | |
| | | | 6.49 | |
| 3.5 | 6.49 | 16 | Medium Sand | |
| | | | 16 | |
| | | | NP | |
| | | | 4.99 | |
| 5 | 4.99 | 35 | Dense Sand | |
| 6.5 | 3.49 | 32 | 48 | Sand FC:28 |
| 8 | 1.99 | 36 | 39/18 | |
| | | | 0.49 | |
| 9.5 | 0.49 | 88 | | |
| 11 | -1.01 | 100 | V. Dense Sand | |
| 12.5 | -2.51 | 94 | 100 | |
| 12.5 | -2.51 | 94 | NP | FC:15 |
| 14 | -4.01 | 100/26 | -4.01 | |
| 16 | -6.01 | 81 | | |
| 18 | -8.01 | 88 | Hard CH | |
| 20 | -10.01 | 50/11 | 85 | |
| | | | 78/46 | |
| 22 | -12.01 | 50/12 | | |
| 24 | -14.01 | 100/27 | | |
| 26 | -16.01 | 100/25 | | |
| 28 | -18.01 | 50/13 | | |
| 30 | -20.01 | 50/10 | | |

## POWER BLOCK SOIL STRATIFICATION

**HRSG 1 AREA**

| BH | Ground Level | N SPT | Nspt aver. | |
|---|---|---|---|---|
| 26 | 9.75 | | Wll/Ip | |
| **Depth(m)** | **Elev.(m)** | **Blows/30cm** | | |
| 0.5 | 9.25 | 8 | Stiff CL | |
| 3 | 6.75 | 12 | 10 | |
| | | | 45/25 | |
| | | | 5.25 | |
| 4.5 | 5.25 | 17 | Med dns Sand | |
| 6 | 3.75 | 16 | 17 | FC:27 |
| | | | 2.25 | |
| 7.5 | 2.25 | 52 | V. Dense Sand | |
| 9 | 0.75 | 57 | 50 | |
| 10.5 | -0.75 | 40 | 39/20 | FC:28 |
| | | | -2.25 | |
| 12 | -2.25 | 32 | Dense Sand | |
| | | | 32 | FC:29 |
| | | | -3.75 | |
| 13.5 | -3.75 | 38 | Hard CH | |
| 15 | -5.25 | 37 | 38 | |
| | | | 81/54 | |
| | | | -7.25 | |
| 17 | -7.25 | 39 | Dense Sand | |
| 19 | -9.25 | 53 | 46 | FC:42 |
| | | | NP | |
| 21 | -11.25 | 50/9 | -11.25 | |
| 23 | -13.25 | 47 | Hard CH | |
| 25 | -15.25 | 62 | 69 | |
| 27 | -17.25 | 90 | 74/45 | |
| 29.5 | -19.75 | 78 | | |

| BH | Ground Level | N SPT | Nspt aver. | |
|---|---|---|---|---|
| 27 | 9.98 | | Wll/Ip | |
| **Depth(m)** | **Elev.(m)** | **Blows/30cm** | | |
| 0.75 | 9.23 | 8 | Stiff CH | |
| 3 | 6.98 | 9 | 9 | |
| | | | 54/32 | |
| | | | 5.48 | |
| 4.5 | 5.48 | 11 | Med dns Sand | |
| 6 | 3.98 | 30 | 45 | FC:37 |
| | | | 2.48 | |
| | | | Dense Sand | |
| 7.5 | 2.48 | 47 | 47 | FC:32 |
| | | | 40/21 | |
| | | | 0.98 | |
| 9 | 0.98 | 93 | V. Dense Sand | |
| 10.5 | -0.52 | 66 | 47 | FC:22 |
| | | | 40/21 | |
| | | | -2.02 | |
| 12 | -2.02 | 60 | | |
| 14 | -4.02 | 62 | | |
| 16 | -6.02 | 63 | Hard CH | |
| 18 | -8.02 | 72 | 71 | |
| 20 | -10.02 | 93 | 80/51 | |
| 22 | -12.02 | 66 | | |
| 24.5 | -14.52 | 84 | | |

| CPT8 |
|---|
| qc |
| (MPa) |
| 1.3 |
| 4 |
| 7.8 |
| 14.3 |
| 12 |
| 9.5 |

| BH | Ground Level | N SPT | Nspt aver. | | Cu |
|---|---|---|---|---|---|
| 28 | 10.3 | | Wll/Ip | | (kPa) |
| **Depth(m)** | **Elev.(m)** | **Blows/30cm** | | | |
| | | | | | 44.5 |
| 0.5 | 9.7 | 6 | M.stiff CH | | 45 |
| | | | 5 | | 42 |
| 3 | 7.2 | 4 | 56/33 | | 26 |
| | | | 6.8 | | 24 |
| | | | | | 43 |
| 4.5 | 5.7 | 20 | | | 38 |
| 6 | 4.2 | 17 | Med dns Sand | | 27 |
| 7.5 | 2.7 | 23 | 22 | FC:28 | 52 |
| 9 | 1.2 | 26 | 36/17 | | 48 |
| | | | | | 63 |
| | | | -0.3 | | |
| 10.5 | -0.3 | 43 | Dense Sand | | |
| 12 | -1.8 | 46 | 46 | FC:16 | |
| | | | -3.8 | | |
| 14 | -3.8 | 52 | | | |
| 16 | -5.8 | 30 | | | |
| 18 | -7.8 | 27 | Hard CH | | |
| 20 | -9.8 | 35 | 51 | | |
| 22.5 | -12.3 | 54 | 85/55 | | |
| 25 | -14.8 | 62 | | | |
| 27.5 | -17.3 | 99 | | | |
| 30 | -19.8 | 50/14 | | | |

| Depth (m) | Nspt Blows/30cm | Fi ° | Fc % |
|---|---|---|---|
| 13.5 | 52 | 38 | 29 |
| 9 | 43 | 34 | 16 |
| 12 | 39 | 35 | 18 |
| 9 | 27 | 35 | 22 |
| 12 | 32 | 38 | 29 |
| 22.5 | 80 | 41 | 15 |

# POWER BLOCK SOIL STRATIFICATION

**GTG 1 AREA**

| BH | Ground Level | N SPT | Nspt aver. | |
|---|---|---|---|---|
| 23 | 9.88 | | Wll/Ip | |
| **Depth(m)** | **Elev.(m)** | **Blows/30cm** | | |
| | | | Stiff CH | |
| 0.5 | 9.37 | 8 | 8 | |
| | | | 61/35 | |
| | | | 6.87 | |
| 3 | 6.87 | 8 | Med dns Sand | |
| 4.5 | 5.37 | 26 | 17 | FC:27 |
| | | | NP | |
| | | | 3.87 | |
| 6 | 3.87 | 34 | Dense Sand | |
| | | | 35 | |
| | | | NP | |
| 7.5 | 2.37 | 35 | | |
| 9 | 0.87 | 35 | | FC:27 |
| | | | -0.63 | |
| 10.5 | -0.63 | 54 | V. Dense Sand | |
| | | | 54 | |
| | | | NP | |
| | | | | -2.13 |
| | | | Dense Sand | |
| 12 | -2.13 | 39 | 39 | NP: FC:18 |
| | | | | -3.63 |
| 13.5 | -3.63 | 50/13 | V. Dense Sand | |
| | | | NP | |
| | | | | -5.13 |
| 15 | -5.13 | 92 | Hard CH | |
| 16.5 | -6.63 | 50/9 | 72 | |
| 18 | -8.13 | 51 | 83/49 | |
| 20 | -10.13 | 100/29 | | |
| 22 | -12.13 | 50/12 | | |
| 24 | -14.13 | 50/10 | | |
| 26 | -16.13 | 50/12 | | |
| | | | | -18.13 |
| 28 | -18.13 | 50/13 | V. Dense Sand | FC:21 |
| 30 | -20.13 | 50/13 | R | |
| | | | NP | |

FIN FAN COOLER 1

| BH | Ground Level | N SPT | Nspt aver. | |
|---|---|---|---|---|
| 24 | 9.87 | | Wll/Ip | |
| **Depth(m)** | **Elev.(m)** | **Blows/30cm** | | |
| 0.5 | 9.37 | 8 | Stiff CH | |
| 3 | 6.87 | 11 | 8 | |
| | | | 6.87 | |
| | | | Dense Sand | |
| 4.5 | 5.37 | 35 | 39 | |
| 6 | 3.87 | 45 | 52/29 | FC:28 |
| | | | 2.37 | |
| 7.5 | 2.37 | 65 | V.dns Sand | |
| 9 | 0.87 | 100/27 | 80 | FC:36 |
| 10.5 | -0.63 | 100/26 | 37/18 | |
| 12 | -2.13 | 99 | | |
| 14 | -4.13 | 100/29 | | |
| 16 | -6.13 | 90 | | NP: FC:14 |
| 18 | -8.13 | 100/20 | | |
| 20 | -10.13 | 80 | | |
| 22.5 | -12.63 | 100/28 | | |
| 25 | -15.13 | 100/26 | | |
| 27.5 | -17.63 | 50/13 | | FC:33 |
| 30 | -20.13 | 92 | | |
| | | | -23.13 | |
| 33 | -23.13 | 92 | | |
| 36 | -26.13 | 100/27 | | |
| 39 | -29.13 | 50/10 | Hard CH | |
| 42 | -32.13 | 50/12 | 96 | |
| 45 | -35.13 | 100 | 69/41 | |
| 47.5 | -37.63 | 100/23 | | |
| 50 | -40.13 | 50/10 | | |

| CPT7 |
|---|
| qc |
| (MPa) |
| 1.5 |
| 4.7 |
| 9.8 |
| 15 |
| 18.5 |
| 21 |

| BH | Ground Level | N SPT | Nspt aver. | |
|---|---|---|---|---|
| 25 | 9.68 | | Wll/Ip | |
| **Depth(m)** | **Elev.(m)** | **Blows/30cm** | | |
| 0.5 | 9.18 | 5 | Med Stiff CL | |
| 1.5 | 8.18 | 3 | 4 | |
| 3 | 6.68 | 5 | 42/19 | |
| | | | 5.18 | |
| 4.5 | 5.18 | 24 | Med dns Sand | |
| | | | 24 | FC:33 |
| | | | 38/17 | |
| | | | 3.68 | |
| 6 | 3.68 | 29 | Medium Sand | |
| 7.5 | 2.18 | 29 | 29 | |
| | | | NP | |
| | | | 2.18 | |
| | | | Dense Sand | |
| 9 | 0.68 | 57 | 42 | FC:16 |
| | | | NP | |
| 10.5 | -0.82 | 34 | | |
| 12 | -2.32 | 32 | | |
| 13.5 | -3.82 | 39 | | FC:16 |
| 15 | -5.32 | 48 | 41/19 | |
| | | | -7.32 | |
| 17 | -7.32 | 88 | | |
| 19 | -9.32 | 57 | Hard CH | |
| 21 | -11.32 | 72 | 74 | |
| 23 | -13.32 | 79 | 74/46 | |
| 25 | -15.32 | 75 | | |
| | | | -17.32 | |
| 27 | -17.32 | 50/10 | V. Dense Sand | FC:42 |
| 29.5 | -19.82 | 50/13 | 41/20 | |

## TRANSFORMERS AREA

| BH | Ground Level | N SPT | Nspt aver. | | |
|---|---|---|---|---|---|
| 1 | 9.79 | blws/30cm | WIl/Ip | | |
| **Depth** | **Elev.** | | | | |
| 0.5 | 9.29 | 5 | Loose Sand | | 9.29 |
| 1.5 | 8.29 | 4 | 5 | FC:46 | |
| | | | 47/25 | | |
| | | | | | 6.79 |
| | | | Soft CH | | |
| 3 | 6.79 | 3 | 3 | | |
| | | | | | 5.29 |
| | | | M. Dense Sand | | |
| 4.5 | 5.29 | 14 | 14 | FC:29 | |
| | | | NP | | |
| | | | | | 3.79 |
| 6 | 3.79 | 17 | Very Stiff CH | | |
| 7.5 | 2.29 | 23 | 20 | | |
| | | | 50/26 | | 0.79 |
| 9 | 0.79 | 56 | V. Dense Sand | FC:42 | |
| 10.5 | -0.71 | 60 | 65 | | |
| 12 | -2.21 | 79 | NP | FC:16 | |
| 13.5 | -3.71 | 100/26 | | | |
| | | | | | -5.21 |
| 15 | -5.21 | 35 | | | |
| 16.5 | -6.71 | 42 | | | |
| 18 | -8.21 | 53 | | | |
| 19.5 | -9.71 | 75 | Hard CH | | |
| 21 | -11.21 | 33 | 47 | | |
| 22.5 | -12.71 | 37 | 72/41 | | |
| 24 | -14.21 | 47 | | | |
| 25.5 | -15.71 | 100/25 | | | |
| 27 | -17.21 | 38 | | | |
| 28.5 | -18.71 | 47 | | | |
| 30 | -20.21 | 61 | | | |

| BH | Ground Level | N SPT | Nspt aver. | | |
|---|---|---|---|---|---|
| 8 | 9.8 | blws/30cm | WIl/Ip | | |
| **Depth** | **Elev.** | | | | |
| 0.5 | 9.3 | 6 | Medium CH | | |
| 1.5 | 8.3 | 5 | 5 | | |
| 3 | 6.8 | 5 | 55/31 | | |
| | | | | | 5.3 |
| 4.5 | 5.3 | 20 | M. Dense Sand | | |
| 6 | 3.8 | 23 | 24 | FC:29 | |
| 7.5 | 2.3 | 29 | 38/19 | | |
| 9 | 0.8 | 23 | | | |
| | | | | | -0.7 |
| | | | V. Dense Sand | | |
| 10.5 | -0.7 | 65 | 65 | | |
| | | | NP | | -2.2 |
| | | | Dense Sand | | |
| 12 | -2.2 | 38 | 38 | FC:22 | |
| | | | NP | | |
| | | | | | -3.7 |
| 13.5 | -3.7 | 41 | | | |
| 15 | -5.2 | 42 | Hard CH | | |
| 16.5 | -6.7 | 60 | 57 | | |
| 18 | -8.2 | 67 | 84/53 | | |
| 19.5 | -9.7 | 41 | | | |
| 21 | -11.2 | 47 | | | |
| 23 | -13.2 | 100 | | | |
| 25 | -15.2 | 50/13 | | | |

| BH | Ground Level | N SPT | Nspt aver. | | |
|---|---|---|---|---|---|
| 15 | 9.87 | blws/30cm | WIl/Ip | | |
| **Depth** | **Elev.** | | | | |
| 0.5 | 9.37 | 5 | Medium CH | | |
| 3 | 6.87 | 4 | 6 | | |
| 4.5 | 5.37 | 10 | 60/35 | | |
| | | | | | 3.97 |
| 6 | 3.87 | 20 | M. Dense Sand | | |
| 7.5 | 2.37 | 25 | 22 | FC:27 | |
| | | | 41/29 | | -0.63 |
| 9 | 0.87 | 41 | Dense Sand | | |
| | | | | FC:17 | |
| 10.5 | -0.63 | 45 | 43 | | |
| | | | NP | | -2.13 |
| 12 | -2.13 | 14 | Stiff CL | | |
| 13.5 | -3.63 | 12 | 13 | | |
| | | | 39/22 | | |
| | | | | | -5.13 |
| | | | Dense Sand | | |
| 15 | -5.13 | 33 | 33 | FC:15 | |
| | | | NP | | |
| | | | | | -7.13 |
| 17 | -7.13 | 41 | Hard CH | | |
| 19 | -9.13 | 49 | 45 | | |
| | | | 84/55 | | |
| | | | | | -11.13 |
| | | | V. Dense Sand | | |
| 21 | -11.13 | 56 | 72 | FC:48 | |
| 23 | -13.13 | 87 | 43/23 | | |
| | | | | | -15.13 |
| 25 | -15.13 | 76 | Hard CH | | |
| 27 | -17.13 | 78 | 79 | | |
| 29.5 | -19.63 | 83 | 64/35 | | |

| BH | Ground Level | N SPT | Nspt aver. | | |
|---|---|---|---|---|---|
| 22 | 9.8 | blws/30cm | WIl/Ip | | |
| **Depth** | **Elev.** | | | | |
| 0.5 | 9.3 | 10 | Very Stif CL | | |
| 3 | 6.8 | 20 | 19 | | |
| 4.5 | 5.3 | 28 | 44/23 | | |
| | | | | | 3.8 |
| | | | Dense Sand | | |
| 6 | 3.8 | 34 | 36 | FC:46 | |
| | | | 40/19 | | |
| 7.5 | 2.3 | 36 | | | |
| 9 | 0.8 | 40 | NP | | |
| 10.5 | -0.7 | 35 | | | |
| | | | | | -2.2 |
| 12 | -2.2 | 62 | V. Dense Sand | FC:29 | |
| 13.5 | -3.7 | 70 | 66 | | |
| | | | 37/19 | | |
| 15 | -5.2 | 48 | NP | FC:17 | |
| | | | | | -6.7 |
| 16.5 | -6.7 | 61 | Hard CH | | |
| 18 | -8.2 | 47 | 54 | | |
| | | | 73/47 | | |
| | | | | | -9.7 |
| | | | V. Dense Sand | | |
| 19.5 | -9.7 | 51 | 51 | FC:34 | |
| | | | NP | | |
| | | | | | -11.2 |
| 21 | -11.2 | 50/11 | Hard CH | | |
| 23 | -13.2 | 50/12 | 86 | | |
| 25 | -15.2 | 86 | 76/45 | | |

| Cu (kPa) |
|---|
| 20.5 |
| 29.5 |
| 27 |
| 23.5 |
| 38 |
| 48 |
| 63 |

Cu mean= 36

| BH No | Depth(m) | fi | SPT |
|---|---|---|---|
| BH-1 | 13.5 | 36 | 38 |
| BH-8 | 7.5 | 30.5 | 25 |
| BH-15 | 9 | 34 | 41 |
| BH-22 | 13.5 | 38 | 70 |

## ELECTRICAL BUILDING AREA

| CPT 10 | BH | Ground Level | N SPT | Nspt aver. | |
|---|---|---|---|---|---|
| qc | 29 | 9.96 | blws/30cm | Wll/Ip | |
| Mpa | **Depth** | **Elev.** | | | |
| 3.6 | 0.5 | 9.46 | 8 | Stiff CH | |
| 1.38 | 3 | 6.96 | 18 | 13 | |
| 5.7 | | | | 62/38 | 5.46 |
| 12.16 | 4.5 | 5.46 | 19 | | |
| | | | | Medium Sand | |
| 16.98 | 6 | 3.96 | 30 | 25 | FC:25 |
| | | | | 41/19 | |
| | 7.5 | 2.46 | 25 | | |
| 14.64 | | | | | 0.96 |
| | 9 | 0.96 | 35 | | FC:25 |
| | 10.5 | -0.54 | 77 | Dense Sand | FC:36 |
| | | | | 46 | |
| | | | | NP | |
| | 12 | -2.04 | 39 | | |
| | 14 | -4.04 | 31 | | FC:28 |
| | | | | | -6.04 |
| | 16 | -6.04 | 28 | | |
| | 18 | -8.04 | 50/13 | Hard CH | |
| | 20 | -10.04 | 83 | 64 | |
| | | | | 83/51 | |
| | 22.5 | -12.54 | 82 | | |
| | 25 | -15.04 | 50/11 | | |

| CPT 9 | BH | Ground Level | N SPT | Nspt aver. | |
|---|---|---|---|---|---|
| qc | 30 | 10.54 | blws/30cm | Wll/Ip | |
| Mpa | **Depth** | **Elev.** | | | |
| 3.38 | 0.5 | 10.04 | 6 | Medium CH | |
| 1.29 | 1.5 | 9.04 | 6 | 5 | |
| 8.4 | 3 | 7.54 | 4 | 53/30 | |
| | | | | | 6.04 |
| | | | | Medium Sand | |
| 14.77 | 4.5 | 6.04 | 14 | 5 | FC:16 |
| | | | | NP | |
| | | | | | 4.54 |
| 16.35 | 6 | 4.54 | 40 | | |
| | 7.5 | 3.04 | 26 | | |
| | | | | Dense Sand | |
| | 9 | 1.54 | 38 | 41 | FC:14 |
| | 10.5 | 0.04 | 41 | NP | |
| | 12 | -1.46 | 44 | | |
| | 13.5 | -2.96 | 49 | | |
| | 15 | -4.46 | 52 | | |
| | | | | | -5.46 |
| | 17 | -6.46 | 62 | V. Dense Sand | |
| | 19 | -8.46 | 36 | 53 | FC:29 |
| | 21 | -10.46 | 62 | 38/19 | |
| | | | | | -12.46 |
| | 23 | -12.46 | 98 | Hard CH | |
| | 25 | -14.46 | 99 | 99 | |
| | | | | 71/42 | |

| | Cu (kPa) |
|---|---|
| | 27 |
| | 25 |
| | 24.5 |
| Cu mean= | 26 |

| BH No | Depth(m) | fi | SPT |
|---|---|---|---|
| BH-29 | 14 | 38 | 31 |
| BH-30 | 13.5 | 39 | 49 |

# TANK AREA-1

| BH | Ground Level | N SPT | Nspt aver. | |
|---|---|---|---|---|
| 31 | 11.31 | blws/30cm | WII/Ip | |
| **Depth** | **Elev.** | | | |
| 0.5 | 11 | 8 | Stiff CH | |
| 3 | 8.5 | 10 | 9 | |
| | | | 50/29 | 7 |
| 4.5 | 7 | 36 | Dense Sand | |
| 6 | 5.5 | 48 | 44 | FC:17 |
| 7.5 | 4 | 49 | NP | |
| | | | | 2.5 |
| 9 | 2.5 | 81 | V. Dense Sand | |
| 10.5 | 1 | 78 | 79 | FC:19 |
| 12 | -0.5 | 100/29 | NP | |
| 14 | -2.5 | 100/27 | | |
| 16 | -4.5 | 100/26 | | |
| | | | | -6.5 |
| 18 | -6.5 | 100/26 | | |
| 20 | -8.5 | 50/13 | | |
| 22.5 | -11 | 100 | Hard CH | |
| 25 | -13.5 | 86 | 95 | |
| 27.5 | -16 | 100 | 77/48 | |
| 30 | -18.5 | 100/28 | | |

| BH | Ground Level | N SPT | Nspt aver. | |
|---|---|---|---|---|
| 77 | 11.57 | blws/30cm | WII/Ip | |
| **Depth** | **Elev.** | | | |
| 0.5 | 11.07 | 8 | Stiff CH | |
| 1.5 | 10.07 | 11 | 13 | |
| 3 | 8.57 | 19 | 54/31 | |
| | | | | 7.07 |
| | | | M. Dense Sand | |
| 4.5 | 7.07 | 25 | 25 | |
| | | | NP | |
| | | | | 5.57 |
| 6 | 5.57 | 61 | | |
| 7.5 | 4.07 | 66 | V. Dense Sand | |
| 9 | 2.57 | 86 | 76 | FC:22 |
| 10.5 | 1.07 | 100/28 | NP | |
| 12 | -0.43 | 50/13 | | |
| 13.5 | -1.93 | 72 | | |
| 15 | -3.43 | 94 | | |
| | | | | -4.93 |
| 16.5 | -4.93 | 81 | Hard CH | |
| 18 | -6.43 | 100 | 91 | |
| 19.5 | -7.93 | 50/11 | 82/50 | |
| 21 | -9.43 | 100/26 | | |
| 23.5 | -11.93 | 50/10 | | |
| 24 | -12.43 | 100/29 | | |
| | | | | -13.93 |
| | | | V. Dense Sand | |
| 25.5 | -13.93 | 98 | 76 | FC:26 |
| 27 | -15.43 | 100/27 | NP | |
| | | | | -16.93 |
| 28.5 | -16.93 | 100/25 | Hard CH | |
| 30 | -18.43 | 50/12 | 68/39 | |

| BH | Ground Level | N SPT | Nspt aver. | |
|---|---|---|---|---|
| 32 | 12.09 | blws/30cm | WII/Ip | |
| **Depth** | **Elev.** | | | |
| 0.5 | 11.59 | 6 | Medium CH | |
| 1.5 | 10.59 | 8 | 7 | |
| | | | 57/32 | 9.09 |
| | | | Loose Sand | |
| 3 | 9.09 | 9 | 9 | |
| | | | 44/22 | 7.59 |
| 4.5 | 7.59 | 32 | Dense Sand | |
| 6 | 6.09 | 48 | 40 | FC:52 |
| | | | 44/22 | 4.59 |
| 7.5 | 4.59 | 57 | V. Dense Sand | |
| 9 | 3.09 | 67 | 78 | |
| | | | NP | |
| 10.5 | 1.59 | 99 | | |
| 12 | 0.09 | 100/28 | 37/18 | FC:27 |
| 14 | -1.91 | 91 | | |
| 16 | -3.91 | 100/25 | NP | |
| | | | | -5.91 |
| 18 | -5.91 | 50/10 | | |
| 20 | -7.91 | 65 | Hard CH | |
| 22.5 | -10.41 | 93 | 86 | |
| 25 | -12.91 | 50/12 | 79/49 | |
| 27.5 | -15.41 | 100 | | |
| 30 | -17.91 | 50/10 | | |

| CPT 14 | BH | Ground Level | N SPT | Nspt aver. | |
|---|---|---|---|---|---|
| qc | 78 | 10.55 | blws/30cm | WII/Ip | |
| Mpa | **Depth** | **Elev.** | | | |
| | 0.5 | 10.05 | 8 | Stiff CH | |
| 1.46 | 3 | 7.55 | 14 | 13 | |
| 8 | 4.5 | 6.05 | 16 | 54/30 | |
| | | | | | 4.55 |
| 14.7 | 6 | 4.55 | 25 | M. Dense Sand | |
| 15.7 | 7.5 | 3.05 | 22 | 25 | FC:26 |
| | 9 | 1.55 | 29 | NP | |
| | | | | | 1.00 |
| | 10.5 | 0.05 | 34 | Dense Sand | |
| | 12 | -1.45 | 36 | 36 | FC:12 |
| | 13.5 | -2.95 | 34 | NP | |
| | | | | | -3.70 |
| | | | | Hard CH | |
| | 15 | -4.45 | 34 | 34 | |
| | | | | 64/36 | |
| | | | | | -5.95 |
| | 16.5 | -5.95 | 32 | Dense Sand | |
| | 18 | -7.45 | 58 | 45 | FC:34 |
| | | | | 41/22 | |
| | | | | | -9.45 |
| | 20 | -9.45 | 70 | Hard CH | |
| | 22.5 | -11.95 | 80 | 75 | |
| | | | | 77/46 | |
| | | | | | -14.45 |
| | | | | V. Dense Sand | |
| | 25 | -14.45 | 78 | 78 | FC:42 |
| | | | | 43/23 | |

| BH | Ground Level | N SPT | Nspt aver. | |
|---|---|---|---|---|
| 33 | 10.96 | blws/30cm | WII/Ip | |
| **Depth** | **Elev.** | | | |
| 0.5 | 10.46 | 7 | Stiff CH | |
| 1.5 | 9.46 | 8 | 8 | |
| | | | 50/28 | 7.96 |
| 3 | 7.96 | 4 | Loose Sand | |
| | | | 4 | |
| | | | 54/31 | |
| 4.5 | 6.46 | 10 | NP | FC:19 |
| | | | | 4.96 |
| | | | M. Dense Sand | |
| 6 | 4.96 | 24 | 27 | FC:29 |
| 7.5 | 3.46 | 29 | NP | |
| | | | | 1.96 |
| 9 | 1.96 | 38 | Dense Sand | |
| 10.5 | 0.46 | 33 | 35 | FC:13 |
| 12 | -1.04 | 34 | NP | |
| | | | | -2.54 |
| 13.5 | -2.54 | 48 | Hard CH | |
| 15 | -4.04 | 72 | 53 | |
| 17 | -6.04 | 39 | 89/63 | |
| | | | | -8.04 |
| 19 | -8.04 | 54 | . Dense Sand | |
| | | | 54 | FC:46 |
| | | | 42/15 | -10.04 |
| 21 | -10.04 | 63 | Hard CH | |
| 23 | -12.04 | 52 | 58 | |
| 25 | -14.04 | 50/10 | 64/35 | |

| BH | Ground Level | N SPT | Nspt aver. | |
|---|---|---|---|---|
| 34 | 11.5 | blws/30cm | WII/Ip | |
| **Depth** | **Elev.** | | | |
| 0.75 | 10.75 | 8 | Stiff CH | |
| 3 | 8.5 | 13 | 11 | |
| | | | 67/43 | |
| | | | | 7 |
| 4.5 | 7 | 35 | M. Dense Sand | |
| 6 | 5.5 | 35 | 37 | FC:17 |
| 7.5 | 4 | 42 | | |
| | | | | 2.5 |
| 9 | 2.5 | 90 | | |
| 10.5 | 1 | 73 | | |
| 12 | -0.5 | 85 | V. Dense Sand | |
| 13.5 | -2 | 98 | 83 | FC:26 |
| 15 | -3.5 | 68 | 37/19 | |
| | | | | -5.5 |
| 17 | -5.5 | 75 | | |
| 19 | -7.5 | 100/26 | | |
| 21 | -9.5 | 50/12 | Hard CH | |
| 23 | -11.5 | 50/10 | 77 | |
| 25 | -13.5 | 78 | 71/42 | |
| 28 | -16.5 | 100/29 | | |
| 31 | -19.5 | 50/11 | | |
| 34 | -22.5 | 50/8 | | |
| 37 | -25.5 | 50/10 | | |
| 40 | -28.5 | 50/10 | | |

| BH | Ground Level | N SPT | Nspt aver. | |
|---|---|---|---|---|
| 79 | 11.67 | blws/30cm | WII/Ip | |
| **Depth** | **Elev.** | | | |
| 0.5 | 11.17 | 8 | Medium CH | |
| 3 | 8.67 | 4 | 7 | |
| 4.5 | 7.17 | 8 | 50/28 | |
| | | | | 5.67 |
| 6 | 5.67 | 17 | M. Dense Sand | |
| 7.5 | 4.17 | 24 | 22 | FC:33 |
| 9 | 2.67 | 22 | NP | |
| 10.5 | 1.17 | 24 | | FC:15 |
| 12 | -0.33 | 24 | 36/17 | FC:34 |
| | | | | -2.33 |
| 14 | -2.33 | 70 | Dense Sand | NP;FC:16 |
| | | | 36 | |
| 16 | -4.33 | 36 | 86/54 | |
| | | | | -6.33 |
| 18 | -6.33 | 34 | Hard CH | |
| 20 | -8.33 | 45 | 50 | |
| 22.5 | -10.83 | 100/27 | 60/35 | |
| 25 | -13.33 | 100/29 | | |

| BH | Ground Level | N SPT | Nspt aver. | |
|---|---|---|---|---|
| 35 | 11.36 | blws/30cm | WII/Ip | |
| **Depth** | **Elev.** | | | |
| 0.5 | 10.86 | 9 | Medium CH | |
| 3 | 8.36 | 6 | 7 | |
| 4.5 | 6.86 | 6 | 53/30 | |
| | | | | 5.36 |
| 6 | 5.36 | 17 | M. Dense Sand | |
| 7.5 | 3.86 | 17 | 21 | |
| 9 | 2.36 | 28 | NP | FC: 17 |
| | | | | 0.86 |
| | | | Dense Sand | |
| 10.5 | 0.86 | 38 | 38 | FC:35 |
| 12 | -0.64 | 41 | NP | |
| | | | | -2.64 |
| 14 | -2.64 | 21 | | |
| 16 | -4.64 | 31 | | |
| 18 | -6.64 | 38 | Hard CH | |
| 20 | -8.64 | 47 | 51 | |
| 22.5 | -11.14 | 55 | 77/47 | |
| 25 | -13.64 | 60 | | |
| 27.5 | -16.14 | 71 | | |
| 30 | -18.64 | 83 | | |

| BH No | Depth(m) | fi | SPT | Cu (kPa) |
|---|---|---|---|---|
| BH-31 | 12 | 40.5 | 100/29 | |
| BH-77 | 6 | 37 | 61 | 21.5 |
| BH-77 | 15 | 42 | 94 | 29 |
| BH-32 | 12 | 30 | 100/28 | 40.5 |
| BH-78 | 7.5 | 27.5 | 22 | 32 |
| BH-33 | 10.5 | 32.5 | 33 | 58.5 |
| BH-34 | 7.5 | 30.5 | 42 | 33 |
| BH-34 | 12 | 35 | 85 | 31 |
| BH-79 | 14 | 39 | 70 | 34 |
| BH-35 | 9 | 31 | 28 | 30.5 |
| BH-76 | 10.5 | 42 | 94 | 34 |
| BH-36 | 14 | 37.5 | 50/13 | 31 |
| BH-80 | 10.5 | 37 | 60 | 32 |
| BH-37 | 13.5 | 41 | 65 | 27 |
| BH-81 | 14 | 35.5 | 39 | 29 |
| BH-38 | 10.5 | 35 | 72 | 34.5 |
| BH-40 | 15 | 36.5 | 38 | 29.5 |
| BH-39 | 6 | 28 | 24 | 32 |
| | | | | 27 |
| | | | Cu mean= | 33 |

# TANK AREA-2

| BH | Ground Level | N SPT | Nspt aver. | |
|---|---|---|---|---|
| 76 | 11.7 | blws/30cm | WII/Ip | |
| **Depth** | **Elev.** | | | |
| 0.5 | 11.19 | 11 | Stiff CH | |
| 3 | 8.69 | 8 | 15 | |
| 4 | 7.69 | 25 | 50/27 | |
| | | | | 5.69 |
| | | | M. Dense Sand | |
| 6 | 5.69 | 28 | 29 | FC:17 |
| 7.5 | 4.19 | 30 | NP | |
| | | | | 2.69 |
| 9 | 2.69 | 67 | V. Dense Sand | |
| 10.5 | 1.19 | 94 | 71 | FC:13 |
| 12 | -0.31 | 59 | NP | |
| 13.5 | -1.81 | 63 | | |
| | | | | -3.31 |
| 15 | -3.31 | 93 | Hard CH | |
| 17 | -5.31 | 50/10 | 93 | |
| 19 | -7.31 | 50/11 | 78/51 | |
| 21 | -9.31 | 100/26 | | |
| | | | | -11.31 |
| 23 | -11.31 | 100 | V. Dense Sand | |
| 25 | -13.31 | 50/10 | 100 | FC:35 |
| | | | 40/18 | |

| BH | Ground Level | N SPT | Nspt aver. | |
|---|---|---|---|---|
| 36 | 11.56 | blws/30cm | WII/Ip | |
| **Depth** | **Elev.** | | | |
| 0.5 | 11.06 | 6 | Medium CH | |
| 3 | 8.56 | 8 | 7 | |
| | | | 53/31 | |
| | | | | 7.06 |
| | | | M. Dense Sand | |
| 4.5 | 7.06 | 25 | 25 | FC: 15 |
| | | | NP | |
| | | | | 5.56 |
| | | | Dense Sand | |
| 6 | 5.56 | 44 | 52 | FC:11 |
| 7.5 | 4.06 | 59 | NP | |
| | | | | 2.56 |
| 9 | 2.56 | 58 | | |
| 10.5 | 1.06 | 89 | V. Dense Sand | |
| 12 | -0.44 | 100/27 | 74 | FC:38 |
| 14 | -2.44 | 50/13 | 41/19 | |
| 16 | -4.44 | 100/29 | | |
| | | | | -6.44 |
| 18 | -6.44 | 88 | | |
| 20 | -8.44 | 92 | Hard CH | |
| 22.5 | -10.94 | 100/25 | 91 | |
| 25 | -13.44 | 93 | 85/52 | |
| 27.5 | -15.94 | 92 | | |
| 30 | -18.44 | 100/29 | | |

| BH | Ground Level | N SPT | Nspt aver. | |
|---|---|---|---|---|
| 80 | 11.65 | blws/30cm | WII/Ip | |
| **Depth** | **Elev.** | | | |
| 0.5 | 11.15 | 8 | Medium CH | |
| 3 | 8.65 | 6 | 7 | |
| | | | 50/28 | |
| | | | | 7.1 |
| 4.5 | 7.15 | 14 | M. Dense Sand | |
| 6 | 5.65 | 10 | 12 | FC:39 |
| | | | 37/19 | |
| | | | | 4.1 |
| | | | Dense Sand | |
| 7.5 | 4.15 | 48 | 48 | FC:28 |
| | | | NP | |
| | | | | 2.6 |
| 9 | 2.65 | 61 | V. Dense Sand | |
| 10.5 | 1.15 | 60 | 60 | FC:28 |
| 12 | -0.35 | 48 | 40/21 | |
| 13.5 | -1.85 | 73 | NP | FC:27 |
| 15 | -3.35 | 59 | | |
| | | | | -5.35 |
| 17 | -5.35 | 27 | Hard CH | |
| 19 | -7.35 | 54 | 46 | |
| 21 | -9.35 | 46 | 64/37 | |
| 23 | -11.35 | 57 | | |
| 24 | -12.35 | 50/10 | | |

| CPT 15 | BH | Ground Level | N SPT | Nspt aver. | |
|---|---|---|---|---|---|
| qc | 37 | 11.42 | blws/30cm | WII/Ip | |
| Mpa | **Depth** | **Elev.** | | | |
| 3.18 | 0.5 | 10.92 | 6 | | |
| 1.78 | 1.5 | 9.92 | 4 | Stiff CH | |
| | 3 | 8.42 | 7 | 11 | |
| 8.3 | 4.5 | 6.92 | 27 | 50/28 | |
| | | | | | 5.42 |
| | | | | | |
| 16.65 | 6 | 5.42 | 27 | Dense Sand | |
| 20.03 | 7.5 | 3.92 | 39 | 33 | FC : 20 |
| | | | | NP | |
| | | | | | 2.42 |
| | 9 | 2.42 | 71 | | |
| | 10.5 | 0.92 | 52 | V. Dense Sand | |
| | 12 | -0.58 | 65 | 63 | FC : 13 |
| | 13.5 | -2.08 | 65 | NP | |
| | 15 | -3.58 | 50/10 | | |
| | 16.5 | -5.08 | 100/28 | | |
| | | | | | -6.58 |
| | 18 | -6.58 | 29 | | |
| | 19.5 | -8.08 | 50/14 | | |
| | 21 | -9.58 | 50/12 | Hard CH | |
| | 23 | -11.58 | 100/24 | 63 | |
| | 25 | -13.58 | 100/27 | 81/51 | |
| | 27.5 | -16.08 | 96 | | |
| | 30 | -18.58 | 50/14 | | |

| BH | Ground Level | N SPT | Nspt aver. | |
|---|---|---|---|---|
| 81 | 11.59 | blws/30cm | WII/Ip | |
| **Depth** | **Elev.** | | | |
| 0.5 | 11.09 | 6 | Medium CH | |
| 3 | 8.59 | 9 | 8 | |
| | | | 59/33 | |
| | | | | 7.09 |
| | | | M. Dense Sand | |
| 4.5 | 7.09 | 15 | 15 | FC:20 |
| | | | | 5.59 |
| | | | Dense Sand | |
| 6 | 5.59 | 37 | 37 | |
| | | | NP | |
| 7.5 | 4.09 | 39 | | |
| 9 | 2.59 | 35 | 34/16 | FC:34 |
| 10.5 | 1.09 | 37 | NP | |
| | | | | -0.41 |
| 12 | -0.41 | 46 | V. Dense Sand | |
| 14 | -2.41 | 39 | 54 | FC:35 |
| 16 | -4.41 | 77 | 42/23 | |
| | | | | -6.41 |
| 18 | -6.41 | 61 | Hard CH | |
| 20 | -8.41 | 93 | 81 | |
| 22.5 | -10.91 | 50/14 | 89/55 | |
| 25 | -13.41 | 90 | | |

| BH | Ground Level | N SPT | Nspt aver. | |
|---|---|---|---|---|
| 38 | 11.52 | blws/30cm | WII/Ip | |
| **Depth** | **Elev.** | | | |
| 0.5 | 11.02 | 6 | Stiff CH | |
| 3 | 8.52 | 12 | 9 | |
| | | | 59/35 | |
| | | | | 7.02 |
| 4.5 | 7.02 | 27 | Dense Sand | |
| 6 | 5.52 | 32 | 36 | FC :40 |
| 7.5 | 4.02 | 42 | 46/24 | |
| 9 | 2.52 | 42 | | |
| | | | | 1.02 |
| 10.5 | 1.02 | 72 | | |
| 12 | -0.48 | 65 | V. Dense Sand | FC :40 |
| 13.5 | -1.98 | 62 | 57 | |
| | | | NP | |
| 15 | -3.48 | 55 | | |
| 17 | -5.48 | 50/12 | 41/21 | |
| 19 | -7.48 | 37 | | |
| 21 | -9.48 | 50 | | |
| | | | | -11.48 |
| 23 | -11.48 | 36 | Hard CH | |
| 25 | -13.48 | 50/14 | 36 | FC :31 |
| 27 | -15.48 | 50/8 | 81/53 | |
| 29.5 | -17.98 | 50/11 | | |

| BH | Ground Level | N SPT | Nspt aver. | |
|---|---|---|---|---|
| 40 | 11.6 | blws/30cm | WII/Ip | |
| **Depth** | **Elev.** | | | |
| 0.5 | 11.1 | 8 | Medium CH | |
| 1.5 | 10.1 | 6 | 7 | |
| 3 | 8.6 | 8 | 51/28 | |
| | | | | 7.1 |
| | | | Dense Sand | |
| 4.5 | 7.1 | 39 | 39 | FC:24 |
| | | | NP | |
| | | | | 5.6 |
| 6 | 5.6 | 35 | V. Dense Sand | |
| 7.5 | 4.1 | 50 | 50 | FC:27 |
| 9 | 2.6 | 60 | 37/17 | |
| 10.5 | 1.1 | 56 | | |
| 12 | -0.4 | 75 | | |
| 13.5 | -1.9 | 73 | NP | FC:29 |
| | | | | -2.6 |
| 15 | -3.4 | 58 | | |
| | | | Hard CH | |
| 17 | -5.4 | 50/9 | 60 | |
| 19 | -7.4 | 62 | 80/53 | |
| | | | | -9.4 |
| | | | V. Dense Sand | |
| 21 | -9.4 | 66 | 66 | |
| | | | NP | |
| | | | | -11.4 |
| 23 | -11.4 | 50/10 | | |
| 25 | -13.4 | 50/14 | Hard CH | |
| 27.5 | -15.9 | 50/10 | 72/49 | |
| 30 | -18.4 | 50/11 | | |

| CPT 16 | BH | Ground Level | N SPT | Nspt aver. | |
|---|---|---|---|---|---|
| qc | 39 | 11.42 | blws/30cm | WII/Ip | |
| Mpa | **Depth** | **Elev.** | | | |
| 2.59 | 0.5 | 10.92 | 7 | | |
| | 1.5 | 9.92 | 7 | 9 | |
| 1.16 | 3 | 8.42 | 12 | 56/33 | |
| | | | | | 6.92 |
| | | | | | |
| 19 | 4.5 | 6.92 | 29 | . Dense Sand | |
| | 6 | 5.42 | 24 | 34 | |
| 18.43 | 7.5 | 3.92 | 27 | NP | |
| | 9 | 2.42 | 55 | 40/19 | FC:35 |
| | | | | | 0.92 |
| | 10.5 | 0.92 | 39 | | FC:16 |
| | 12 | -0.58 | 50 | Dense Sand | |
| | 13.5 | -2.08 | 57 | 50 | FC:24 |
| | 15 | -3.58 | 53 | NP | |
| | | | | | -5.58 |
| | | | | Hard CH | |
| | 17 | -5.58 | 96 | 96 | |
| | | | | 76/45 | |
| | | | | | -7.58 |
| | 19 | -7.58 | 48 | . Dense Sand | |
| | 21 | -9.58 | 59 | 56 | FC:39 |
| | | | | 43/24 | |
| | | | | | -11.58 |
| | 23 | -11.58 | 50/13 | Hard CH | |
| | 25 | -13.58 | 50/14 | 94/63 | |

# LDO-CDO UNLOADING AREA

| CPT 17 | BH | Ground Level | N SPT | Nspt aver. | | CPT 8 |
|---|---|---|---|---|---|---|
| qc | 82 | 11.47 | blws/30cm | Wll/Ip | | qc |
| Mpa | **Depth** | **Elev.** | | | | Mpa |
| 2.4 | 0.5 | 10.97 | 8 | Medium CL | | 2.42 |
| 1.36 | 1.5 | 9.97 | 6 | 7 | | 1.27 |
| | 3 | 8.47 | 8 | 54/31 | | |
| 7.5 | | | | | 6.97 | |
| | | | | M. Dense Sand | | |
| 13.6 | 4.5 | 6.97 | 24 | 24 | FC:14 | 9.4 |
| | | | | NP | | |
| | | | | | 5.47 | 12.7 |
| | | | | Dense Sand | | |
| 24 | 6 | 5.47 | 41 | 48 | FC:13 | |
| 19.48 | 7.5 | 3.97 | 47 | NP | | 24.2 |
| | 9 | 2.47 | 56 | | FC:25 | |
| | 10.5 | 0.97 | 48 | | | |
| | 12 | -0.53 | 48 | | FC:12 | |
| | | | | | -2.03 | |
| | 13.5 | -2.03 | 63 | V. Dense Sand | | |
| | | | | 63 | FC:38 | |
| | | | | 44/22 | -3.53 | |
| | 15 | -3.53 | 50/10 | | | |
| | 17 | -5.53 | 50/8 | Hard CH | | |
| | 19 | -7.53 | 64 | 65 | | |
| | 21 | -9.53 | 65 | 82/51 | | |
| | 23 | -11.53 | 50/10 | | | |
| | | | | | -12.53 | |
| | 25 | -13.53 | 50/7 | V. Dense Sand | FC:41 | |
| | | | | 44/21 | | |

| | Cu (kPa) |
|---|---|
| | 31 |
| Cu mean= | 31 |

| BH No | Depth(m) | fi | SPT |
|---|---|---|---|
| BH-82 | 10.5 | 38.5 | 48 |

# SWICHYARD AREA

| CPT 20 qc Mpa | BH 84 Depth | Ground Level 9.84 Elev. | N SPT blws/30cm | Nspt aver. Wll/Ip | | |
|---|---|---|---|---|---|---|
| 1.19 | 0.5 | 9.34 | 7 | | | |
| | 3 | 6.84 | 10 | 9 | | |
| | | | | 51/29 | | 5.34 |
| 0.78 | 4.5 | 5.34 | 9 | Medium Sand | | |
| 18.73 | 6 | 3.84 | 14 | 17 | FC:45 | |
| | | | | 43/22 | | |
| 21.16 | 7.5 | 2.34 | 29 | NP | FC:21 | |
| | | | | | | 1.59 |
| | 9 | 0.84 | 88 | V. Dense Sand | | |
| | 10.5 | -0.66 | 76 | 73 | FC:17 | |
| | 12 | -2.16 | 58 | NP | | |
| | 13.5 | -3.66 | 68 | | | |
| | | | | | | -5.16 |
| | 15 | -5.16 | 41 | | | |
| | 16.5 | -6.66 | 53 | 50 | | |
| | 18 | -8.16 | 50/10 | 83/20 | | |
| | 20 | -10.16 | 57 | | | |

| CPT 22 qc Mpa | BH 85 Depth | Ground Level 9.87 Elev. | N SPT blws/30cm | Nspt aver. Wll/Ip | | |
|---|---|---|---|---|---|---|
| | 0.5 | 9.37 | 8 | Stiff CH | | |
| 1.24 | 3 | 6.87 | 11 | 14 | | |
| | 4.5 | 5.37 | 24 | 59/35 | | |
| | | | | | | 3.87 |
| | | | | Medium Sand | | |
| 12.29 | 6 | 3.87 | 28 | 28 | FC:21 | |
| | | | | NP | | |
| | | | | | | 2.37 |
| 16.09 | 7.5 | 2.37 | 35 | | | |
| 47.24 | 9 | 0.87 | 55 | NP | FC:16 | |
| | 10.5 | -0.63 | 52 | V. Dense Sand | | |
| | 12 | -2.13 | 56 | 58 | FC:25 | |
| | 13.5 | -3.63 | 62 | 36/19 | | |
| | 15 | -5.13 | 86 | | | |
| | | | | | | -6.63 |
| | 16.5 | -6.63 | 62 | Hard CH | | |
| | 18 | -8.13 | 100/28 | 62 | | |
| | 20 | -10.13 | 100/26 | 89/58 | | |

| CPT 21 qc Mpa | BH 42 Depth | Ground Level 9.72 Elev. | N SPT blws/30cm | Nspt aver. Wll/Ip | | | CPT 23 qc Mpa |
|---|---|---|---|---|---|---|---|
| 1.74 | 0.5 | 9.22 | 7 | Medium CH | | | 2.03 |
| 0.86 | 3 | 6.72 | 7 | 7 | | | 1.03 |
| | | | | 62/39 | | 5.22 | |
| 7.4 | 4.5 | 5.22 | 26 | Medium Sand | | | |
| 11.38 | 6 | 3.72 | 32 | 28 | FC:42 | | 13.4 |
| | | | | 44/24 | | | |
| | 7.5 | 2.22 | 27 | NP | FC:23 | | |
| | | | | | | 0.72 | |
| 17.94 | | | | | | | |
| | 9 | 0.72 | 41 | V. Dense Sand | | | 17.46 |
| | 10.5 | -0.78 | 58 | 62 | FC:18 | | |
| | 12 | -2.28 | 76 | NP | | | |
| | 13.5 | -3.78 | 71 | | | | |
| | | | | | | -5.28 | |
| | 15 | -5.28 | 42 | Hard CH | | | |
| | 16.5 | -6.78 | 37 | 44 | | | |
| | 18 | -8.28 | 53 | 94/62 | | | |
| | | | | | | -9.78 | |
| | | | | V. Dense Sand | | | |
| | 19.5 | -9.78 | 89 | 89 | FC:18 | | |
| | | | | NP | | | |

| | Cu (kPa) |
|---|---|
| | 37 |
| | 40 |
| | 62 |
| | 37.5 |
| | 31 |
| | 31.5 |
| | 29 |
| | 35.5 |
| | 35 |
| | 54 |
| | 40.5 |
| | 47 |
| | 66 |
| Cu mean= | 42 |

| BH No | Depth(m) | fi | SPT |
|---|---|---|---|
| BH-84 | 9 | 38 | 88 |
| BH-85 | 12 | 36 | 56 |
| BH-42 | 12 | 38 | 76 |
| BH-86 | 6 | 32 | 34 |
| BH-87 | 10.5 | 38.5 | 43 |
| BH-44 | 9 | 34.5 | 43 |
| BH-43 | 10.5 | 36 | 59 |

| BH 86 Depth | Ground Level 9.83 Elev. | N SPT blws/30cm | Nspt aver. Wll/Ip | | | CPT 24 qc Mpa |
|---|---|---|---|---|---|---|
| 0.5 | 9.33 | 8 | Stiff CH | | | |
| 3 | 6.83 | 11 | 11 | | | 1.14 |
| 4.5 | 5.33 | 13 | 52/29 | | | |
| | | | | | 3.83 | |
| 6 | 3.83 | 34 | Dense Sand | | | 10.33 |
| 7.5 | 2.33 | 35 | 35 | FC:18 | | 9.18 |
| | | | 61/37 | | | |
| | | | | | 0.83 | |
| 9 | 0.83 | 79 | V. Dense Sand | | | 46.25 |
| | | | 70 | FC:19 | | |
| | | | NP | | | |
| 10.5 | -0.67 | 46 | | | | |
| 12 | -2.17 | 59 | 38/18 | FC:28 | | |
| 13.5 | -3.67 | 100/29 | | | | |
| 15 | -5.17 | 73 | | | | |
| 16.5 | -6.67 | 92 | NP | | | |
| | | | | | -8.17 | |
| 18 | -8.17 | 91 | Hard CH | | | |
| 20 | -10.17 | 100/28 | 91 | | | |
| | | | 89/58 | | | |

| BH 87 Depth | Ground Level 9.63 Elev. | N SPT blws/30cm | Nspt aver. Wll/Ip | | |
|---|---|---|---|---|---|
| 0.5 | 9.13 | 8 | Stiff CH | | |
| 3 | 6.63 | 14 | 15 | | |
| 4.5 | 5.13 | 22 | 56/31 | | |
| | | | | | 3.63 |
| | | | Dense Sand | | |
| 6 | 3.63 | 17 | 45 | FC:15 | |
| | | | NP | | |
| 7.5 | 2.13 | 33 | | | |
| 9 | 0.63 | 90 | NP | FC:11 | |
| 10.5 | -0.87 | 43 | | | |
| 12 | -2.37 | 44 | | | |
| 13.5 | -3.87 | 45 | 64/37 | | |
| | | | | | -5.37 |
| 15 | -5.37 | 54 | Hard CL | | |
| 16.5 | -6.87 | 55 | 55 | | |
| | | | | | -8.37 |
| | | | V. Dense Sand | | |
| 18 | -8.37 | 54 | 63 | FC:20 | |
| | | | NP | | |
| 19.5 | -9.87 | 72 | 59/33 | | |

| BH 44 Depth | Ground Level 9.82 Elev. | N SPT blws/30cm | Nspt aver. Wll/Ip | | |
|---|---|---|---|---|---|
| 0.5 | 9.32 | 6 | Medium CH | | |
| 1.5 | 8.32 | 6 | 6 | | |
| 3 | 6.82 | 6 | 54/32 | | |
| 4.5 | 5.32 | 7 | | | |
| | | | | | 3.82 |
| 6 | 3.82 | 19 | Medium Sand | | |
| 7.5 | 2.32 | 25 | 29 | FC:31 | |
| | | | NP | | |
| | | | | | 0.82 |
| | | | Dense Sand | | |
| 9 | 0.82 | 43 | 43 | FC:31 | |
| | | | 37/17 | | |
| 10.5 | -0.68 | 46 | NP | | |
| 12 | -2.18 | 32 | | | |
| 13.5 | -3.68 | 55 | 43/22 | FC:42 | |
| | | | | | -4.43 |
| 15 | -5.18 | 27 | Hard CH | | |
| 16.5 | -6.68 | 33 | 30 | | |
| | | | 81/47 | | |
| | | | | | -8.18 |
| 18 | -8.18 | 61 | V. Dense Sand | | |
| 19.5 | -9.68 | 48 | 55 | FC:36 | |
| | | | 42/23 | | |
| | | | | | -10.43 |
| 21 | -11.18 | 39 | Hard CH | | |
| 22.5 | -12.68 | 100 | 71 | | |
| 24.5 | -14.68 | 75 | 79/46 | | |

| CPT 25 qc Mpa | BH 43 Depth | Ground Level 9.76 Elev. | N SPT blws/30cm | Nspt aver. Wll/Ip | | |
|---|---|---|---|---|---|---|
| | 0.5 | 9.26 | 7 | Stiff CH | | |
| 1.51 | 3 | 6.76 | 8 | 8 | | |
| | | | | 50/27 | | |
| | | | | | | 5.26 |
| 9.64 | 4.5 | 5.26 | 10 | Medium Sand | | |
| | 6 | 3.76 | 20 | 24 | FC:23 | |
| 11.23 | 7.5 | 2.26 | 28 | NP | | |
| | | | | | | 0.76 |
| 28.7 | 9 | 0.76 | 32 | Dense Sand | | |
| | | | | 32 | FC:17 | |
| | | | | NP | | |
| | | | | | | -0.74 |
| | | | | V. Dense Sand | | |
| | 10.5 | -0.74 | 59 | 57 | | |
| | | | | NP | | |
| | 12 | -2.24 | 32 | | | |
| | 13.5 | -3.74 | 81 | | FC:20 | |
| | | | | | | -5.24 |
| | 15 | -5.24 | 78 | Hard CH | | |
| | 16.5 | -6.74 | 94 | 87 | | |
| | 18 | -8.24 | 50/10 | 89/58 | | |
| | 19.5 | -9.74 | 88 | | | |

## SWITCHYARD CONTROL BUILDING AREA

| BH | Ground Level | N SPT | Nspt aver. | |
|---|---|---|---|---|
| 45 | 9.72 | blws/30cm | Wll/Ip | |
| **Depth** | **Elev.** | | | |
| 0.5 | 9.22 | 8 | Medium CH | |
| 1.5 | 8.22 | 7 | 7 | |
| 3 | 6.72 | 7 | 57/34 | |
| | | | | 5.22 |
| 4.5 | 5.22 | 15 | M. Dense Sand | |
| 6 | 3.72 | 18 | 16 | FC:38 |
| | | | 39/18 | |
| | | | | 2.22 |
| | | | Hard CH | |
| 7.5 | 2.22 | 39 | 39 | |
| | | | 53/29 | 1.47 |
| 9 | 0.72 | 46 | Dense Sand | |
| 10.5 | -0.78 | 48 | 41 | FC:27 |
| 12 | -2.28 | 30 | | |
| 13.5 | -3.78 | 39 | | FC:25 |
| | | | | -5.28 |
| 15 | -5.28 | 44 | | |
| 16.5 | -6.78 | 100/29 | | |
| 18 | -8.28 | 65 | Hard CH | |
| 19.5 | -9.78 | 40 | 60 | |
| 21 | -11.28 | 70 | 72/42 | |
| 23 | -13.28 | 81 | | |
| 25 | -15.28 | 100/28 | | |

| CPT 26 | BH | Ground Level | N SPT | Nspt aver. | |
|---|---|---|---|---|---|
| qc | 46 | 9.56 | blws/30cm | Wll/Ip | |
| Mpa | **Depth** | **Elev.** | | | |
| | 0.5 | 9.06 | 8 | | |
| 1.35 | 1.5 | 8.06 | 13 | 13 | |
| | 3 | 6.56 | 17 | 53/31 | |
| | | | | | 5.06 |
| 14.18 | 4.5 | 5.06 | 45 | Dense Sand | |
| 20.69 | 6 | 3.56 | 41 | 43 | FC:38 |
| | | | | 52/31 | |
| | | | | | 2.06 |
| 13.24 | 7.5 | 2.06 | 99 | V. Dense Sand | |
| 20.36 | 9 | 0.56 | 100/27 | 91 | FC: 21 |
| | 10.5 | -0.94 | 80 | NP | |
| | 12 | -2.44 | 84 | | FC:9 |
| | 13.5 | -3.94 | 99 | NP | |
| | | | | | -4.69 |
| | 15 | -5.44 | 93 | Hard CH | |
| | 16.5 | -6.94 | 50/8 | 94 | |
| | 18 | -8.44 | 94 | 99/65 | |
| | | | | | 19.5 |
| | | | | V. Dense Sand | |
| | 19.5 | -9.94 | 50/10 | NP | FC:23 |
| | | | | | -11.44 |
| | 21 | -11.44 | 50/9 | Hard CH | |
| | 22.5 | -12.94 | 100/26 | 97/66 | |
| | 24.5 | -14.94 | 50/13 | | |

| | Cu (kPa) |
|---|---|
| | 31 |
| | 47 |
| | 36 |
| | 39 |
| Cu mean= | 38 |

| BH No | Depth(m) | fi | SPT |
|---|---|---|---|
| BH-45 | 9 | 28 | 46 |
| BH-46 | 12 | 39 | 84 |

# GIS BUILDING AREA

| BH | Ground Level | N SPT | Nspt aver. | | |
|---|---|---|---|---|---|
| 49 | 10.77 | blws/30cm | Wll/Ip | | |
| **Depth** | **Elev.** | | | | |
| 0.5 | 10.27 | 7 | Stiff CH | | |
| 1.5 | 9.27 | 8 | 11 | | |
| 3 | 7.77 | 19 | 53/31 | | |
| | | | | | 6.27 |
| 4.5 | 6.27 | 22 | M. Dense Sand | | |
| | | | 24 | FC:35 | |
| | | | 41/22 | | |
| 6 | 4.77 | 22 | | | |
| 7.5 | 3.27 | 29 | NP | FC:16 | |
| | | | | | 1.77 |
| 9 | 1.77 | 38 | | | |
| 10.5 | 0.27 | 34 | Dense Sand | FC:18 | |
| 12 | -1.23 | 43 | 40 | | |
| 13.5 | -2.73 | 40 | NP | | |
| 15 | -4.23 | 46 | | | |
| | | | | | -5.73 |
| 16.5 | -5.73 | 62 | Hard CH | | |
| 18 | -7.23 | 50 | 56 | | |
| | | | 95/63 | | |
| | | | | | -8.73 |
| | | | V. Dense Sand | | |
| 19.5 | -8.73 | 51 | 49 | FC:30 | |
| | | | NP | | |
| 21 | -10.23 | 47 | | FC:37 | |
| | | | | | -11.73 |
| 22.5 | -11.73 | 67 | Hard CH | | |
| | | | 67 | | |
| | | | 64/36 | | -13.73 |
| | | | V. Dense Sand | | |
| 24.5 | -13.73 | 50/13 | NP | FC:12 | |

| CPT 27 | BH | Ground Level | N SPT | Nspt aver. | | |
|---|---|---|---|---|---|---|
| qc | 48 | 10.49 | blws/30cm | Wll/Ip | | |
| Mpa | **Depth** | **Elev.** | | | | |
| | 0.5 | 9.99 | 7 | | | |
| 1.02 | 1.5 | 8.99 | 6 | Stiff CH | | |
| | 3 | 7.49 | 5 | 9 | | |
| | | | | 62/39 | | |
| | 4.5 | 5.99 | 10 | | | |
| 11.82 | 6 | 4.49 | 18 | | | |
| | | | | | | 2.99 |
| 9.25 | 7.5 | 2.99 | 23 | M. Dense Sand | | |
| | 9 | 1.49 | 23 | 27 | FC:19 | |
| | 10.5 | -0.01 | 27 | NP | | |
| | 12 | -1.51 | 35 | | | |
| | | | | | | -3.01 |
| | | | | Dense Sand | | |
| | 13.5 | -3.01 | 41 | 45 | FC:9 | |
| | | | | NP | | |
| | 15 | -4.51 | 49 | | | |
| | 16.5 | -6.01 | 45 | 42/23 | FC:38 | |
| | | | | | | -7.51 |
| | 18 | -7.51 | 37 | Hard CH | | |
| | | | | 37 | | |
| | | | | 73/44 | | |
| | | | | | | -9.01 |
| | 19.5 | -9.01 | 50/13 | V. Dense Sand | | |
| | 21 | -10.51 | 61 | 61 | FC:37 | |
| | | | | 45/25 | | |
| | | | | | | -12.51 |
| | 23 | -12.51 | 82 | Hard CH | | |
| | 25 | -14.51 | 68 | 75 | | |
| | | | | 69/45 | | |

| BH | Ground Level | | Nspt aver. | | |
|---|---|---|---|---|---|
| 41 | 10.13 | | Wll/Ip | | |
| **Depth** | **Elev.** | **N SPT** | | | |
| 0.5 | 9.63 | 8 | Stiff CH | | |
| 3 | 7.13 | 8 | 8 | | |
| | | | 50/28 | | |
| | | | | | 5.63 |
| 4.5 | 5.63 | 28 | M. Dense Sand | | |
| 6 | 4.13 | 21 | 26 | FC:32 | |
| | | | 50/27 | | |
| 7.5 | 2.63 | 29 | | FC:21 | |
| | | | | | 1.13 |
| 9 | 1.13 | 83 | V. Dense Sand | | |
| 10.5 | -0.37 | 79 | 83 | FC:16 | |
| 12 | -1.87 | 75 | NP | | |
| 13.5 | -3.37 | 94 | | | |
| 15 | -4.87 | 50/14 | | | |
| | | | | | -5.62 |
| 16.5 | -6.37 | 37 | Hard CH | | |
| 18 | -7.87 | 52 | 48 | | |
| 19.5 | -9.37 | 56 | 61/38 | | |

| CPT 19 | BH | Ground Level | | Nspt aver. | | |
|---|---|---|---|---|---|---|
| qc | 83 | 10.62 | | Wll/Ip | | |
| Mpa | **Depth** | **Elev.** | **N SPT** | | | |
| 1.49 | 0.5 | 10.12 | 7 | Very Stiff CH | | |
| | 3 | 7.62 | 16 | 17 | | |
| | | | | 51/29 | | |
| 11.7 | 4.5 | 6.12 | 28 | | | |
| | | | | | | 5.37 |
| 16.9 | 6 | 4.62 | 48 | V. Dense Sand | | |
| 25.3 | 7.5 | 3.12 | 66 | 75 | FC:10 | |
| | 9 | 1.62 | 90 | NP | | |
| | 10.5 | 0.12 | 78 | | | |
| | 12 | -1.38 | 92 | NP | FC:21 | |
| | 14 | -3.38 | 50/11 | NP | FC:6 | |
| | | | | | | -4.38 |
| | 16 | -5.38 | 100 | Hard CH | | |
| | 18 | -7.38 | 100/25 | 100 | | |
| | 20 | -9.38 | 100/28 | 74/46 | | |

| BH | Ground Level | N SPT | Nspt aver. | | |
|---|---|---|---|---|---|
| 88 | 9.53 | blws/30cm | Wll/Ip | | |
| **Depth** | **Elev.** | | | | |
| 0.5 | 9.03 | 8 | Stiff CH | | |
| 1.5 | 8.03 | 12 | 14 | | |
| 3 | 6.53 | 21 | 63/38 | | |
| | | | | | 5.03 |
| 4.5 | 5.03 | 36 | Dense Sand | | |
| | | | 38 | FC:38 | |
| | | | 39/18 | | |
| 6 | 3.53 | 40 | NP | | 2.03 |
| 7.5 | 2.03 | 84 | V. Dense Sand | | |
| | | | 73 | FC:13 | |
| 9 | 0.53 | 49 | NP | | |
| | | | | FC:7 | |
| 10.5 | -0.97 | 64 | | | |
| 12 | -2.47 | 73 | | FC:22 | |
| 13.5 | -3.97 | 100/28 | | | |
| 15 | -5.47 | 95 | | | |
| 16.5 | -6.97 | 100/29 | 89/62 | FC:10 | |
| | | | | | -8.47 |
| 18 | -8.47 | 97 | Hard CH | | |
| 19.5 | -9.97 | 100/29 | 97 | | |
| 21 | -11.47 | 50/9 | 77/49 | | |
| 22.5 | -12.97 | 100/29 | | | |
| 24.5 | -14.97 | 100/26 | | | |

| BH | Ground Level | N SPT | Nspt aver. | | |
|---|---|---|---|---|---|
| 47 | 9.79 | blws/30cm | Wll/Ip | | |
| **Depth** | **Elev.** | | | | |
| 0.5 | 9.29 | 10 | Stiff CH | | |
| 1.5 | 8.29 | 13 | 12 | | |
| | | | 58/35 | | |
| | | | | | 6.79 |
| 3 | 6.79 | 40 | Dense Sand | | |
| 4.5 | 5.29 | 38 | 40 | FC:17 | |
| 6 | 3.79 | 42 | NP | | |
| | | | | | 2.29 |
| 7.5 | 2.29 | 51 | | | |
| 9 | 0.79 | 53 | | | |
| 10.5 | -0.71 | 90 | V. Dense Sand | | |
| 12 | -2.21 | 68 | 67 | FC:20 | |
| 13.5 | -3.71 | 76 | NP | | |
| 15 | -5.21 | 61 | | | |
| 16.5 | -6.71 | 50/8 | | | |
| 18 | -8.21 | 50/13 | 42/21 | FC:37 | |
| | | | | | -8.96 |
| 19.5 | -9.71 | 100 | Hard CH | | |
| 21 | -11.21 | 100/26 | 100 | | |
| 22.5 | -12.71 | 50/10 | 91/53 | | |
| | | | | | -14.71 |
| 24.5 | -14.71 | 50/8 | V. Dense Sand | | |
| | | | 46/25 | FC:40 | |

| CPT 28 | BH | Ground Level | N SPT | Nspt aver. | | |
|---|---|---|---|---|---|---|
| qc | 89 | 9.99 | blws/30cm | Wll/Ip | | |
| Mpa | **Depth** | **Elev.** | | | | |
| | 0.5 | 9.49 | 8 | Stiff CH | | |
| 3.2 | 1.5 | 8.49 | 13 | 11 | | |
| | | | | 56/33 | | |
| | | | | | | 6.99 |
| | 3 | 6.99 | 32 | M. Dense Sand | | |
| 10.79 | 4.5 | 5.49 | 43 | 32 | FC:16 | |
| | 6 | 3.99 | 31 | NP | | |
| | | | | | | 2.49 |
| 6.37 | 7.5 | 2.49 | 100 | V. Dense Sand | | |
| 24.89 | 9 | 0.99 | 65 | 83 | FC:25 | |
| | 10.5 | -0.51 | 81 | NP | | |
| | 12 | -2.01 | 100 | | | |
| | 13.5 | -3.51 | 97 | | | |
| | 15 | -5.01 | 94 | | FC:18 | |
| | | | | | | -5.76 |
| | 16.5 | -6.51 | 56 | Hard CH | | |
| | 18 | -8.01 | 79 | 68 | | |
| | 19.5 | -9.51 | 100/27 | 88/59 | | |

| | Cu (kPa) |
|---|---|
| | 36 |
| | 47 |
| | 44 |
| | 34 |
| | 39 |
| | 29 |
| | 31 |
| | 39.5 |
| | 66 |
| | 52 |
| | 47 |
| Cu mean= | 42 |

| BH No | Depth(m) | fi | SPT |
|---|---|---|---|
| BH-49 | 9 | 36 | 38 |
| BH-48 | 13.5 | 40.5 | 41 |
| BH-88 | 7.5 | 39.5 | 84 |
| BH-47 | 9 | 36 | 53 |
| BH-89 | 6 | 34 | 31 |
| BH-89 | 13.5 | 40.5 | 97 |
| BH-41 | 9 | 36.5 | 83 |
| BH-83 | 13.5 | 42 | 92 |

## AIR COOLED CONDERSER AREA

| CPT 30 qc Mpa | BH 50 Depth | Ground Leve 10.16 Elev. | N SPT blws/30cm | Nspt aver. Wll/Ip | | CPT 32 qc Mpa |
|---|---|---|---|---|---|---|
| 2.34 | 0.5 | 9.66 | 6 | Loose Sand | 9.66 | |
| | 1.5 | 8.66 | 7 | 7 | FC:48 | 2.95 |
| | | | | 47/26 | 7.16 | |
| 1.24 | 3 | 7.16 | 5 | Stiff CH | | 1.14 |
| 3.29 | 4.5 | 5.66 | 8 | 12 | | 9.48 |
| 11.75 | 6 | 4.16 | 24 | 61/34 | | 15.43 |
| | | | | | 2.66 | |
| 18.05 | 7.5 | 2.66 | 28 | M. Dense Sand | | 13.86 |
| | | | | 28 | | |
| | | | | NP | 1.16 | 21.9 |
| | 9 | 1.16 | 32 | Dense Sand | | |
| | | | | 32 | | |
| | | | | NP | -0.34 | |
| | 10.5 | -0.34 | 19 | Very Stiff CH | | |
| | | | | 19 | | |
| | | | | 68/38 | -1.84 | |
| | 12 | -1.84 | 34 | Dense Sand | | |
| | 13.5 | -3.34 | 30 | 39 | FC:30 | |
| | 15 | -4.84 | 53 | NP | FC:28 | |
| | | | | | -6.34 | |
| | 16.5 | -6.34 | 83 | Hard CH | | |
| | 18 | -7.84 | 81 | 69 | | |
| | 19.5 | -9.34 | 42 | 83/52 | | |

| CPT 29 qc Mpa | BH 67 Depth | Ground Leve 9.97 Elev. | N SPT blws/30cm | Nspt aver. Wll/Ip | |
|---|---|---|---|---|---|
| 2.58 | 0.5 | 9.47 | 8 | Stiff CH | |
| | 1.5 | 8.47 | 9 | 11 | |
| 1.33 | 3 | 6.97 | 12 | 54/29 | |
| | 4.5 | 5.47 | 16 | | |
| | | | | | 3.97 |
| | | | | M. Dense Sand | |
| 11.03 | 6 | 3.97 | 27 | 27 | FC: 17 |
| | | | | NP | |
| | | | | | 2.47 |
| 18.77 | 7.5 | 2.47 | 85 | V. Dense Sand | |
| 13.77 | 9 | 0.97 | 62 | 69 | FC:16 |
| | 10.5 | -0.53 | 73 | NP | |
| | 12 | -2.03 | 54 | | |
| | | | | | -3.53 |
| | 13.5 | -3.53 | 46 | | |
| | 15 | -5.03 | 50/13 | Hard CH | |
| | 16.5 | -6.53 | 50/11 | 46 | |
| | 18 | -8.03 | 50/14 | 61/37 | |
| | 19.5 | -9.53 | 50/9 | | |

| BH 68 Depth | Ground Leve 10.16 Elev. | N SPT blws/30cm | Nspt aver. Wll/Ip | | CPT 29 qc Mpa |
|---|---|---|---|---|---|
| 0.5 | 9.66 | 7 | Medium CH | | 2.5 |
| 1.5 | 8.66 | 7 | 7 | | 1.32 |
| 3 | 7.16 | 8 | 58/32 | | |
| | | | | 5.66 | |
| 4.5 | 5.66 | 18 | M. Dense Sand | | 6.23 |
| 6 | 4.16 | 14 | 17 | FC:19 | |
| 7.5 | 2.66 | 21 | NP | | 13.24 |
| | | | | 1.16 | |
| | | | | | 25.06 |
| 9 | 1.16 | 62 | V. Dense Sand | FC:18 | |
| 10.5 | -0.34 | 48 | 60 | | |
| 12 | -1.84 | 50 | NP | FC:17 | |
| 13.5 | -3.34 | 80 | | | |
| 15 | -4.84 | 50/14 | | FC:27 | |
| | | | | -6.34 | |
| 16.5 | -6.34 | 46 | Hard CH | | |
| 18 | -7.84 | 49 | 50 | | |
| 19.5 | -9.34 | 54 | 81/49 | | |

| Cu (kPa) |
|---|
| 34.5 |
| 42 |
| 31 |
| 27.5 |
| Cu mean= 34 |

| BH No | Depth(m) | fi | SPT |
|---|---|---|---|
| BH-50 | 4 | 42 | 8 |
| BH-69 | 14 | 32 | 46 |
| BH-68 | 7.5 | 27.5 | 21 |

# STG AREA

| CPT 34 | BH | Ground Level | N SPT | Nspt aver. | |
|---|---|---|---|---|---|
| qc | 53 | 10.17 | blws/30cm | Wll/Ip | |
| Mpa | Depth | Elev. | | | |
| 2.51 | 0.5 | 9.67 | 9 | 9 | FC:37 |
| | | | | | 7.17 |
| | | | | Soft CL | |
| 1.24 | 3 | 7.17 | 4 | 4 | |
| | | | | 46/24 | |
| | | | | | 5.67 |
| 9.16 | 4.5 | 5.67 | 7 | Medium Sand | |
| 13.35 | 6 | 4.17 | 17 | 16 | FC:29 |
| 12.25 | 7.5 | 2.67 | 25 | 41/22 | |
| | | | | | 1.17 |
| | | | | Dense Sand | |
| 11.28 | 9 | 1.17 | 37 | 42 | FC:29 |
| 22.74 | | | | 41/22 | |
| | 10.5 | -0.33 | 43 | NP | |
| | 12 | -1.83 | 47 | 38/18 | FC:44 |
| | | | | | -3.33 |
| | 13.5 | -3.33 | 24 | Very Stiff CH | |
| | 15 | -4.83 | 27 | 26 | |
| | | | | 59/34 | |
| | | | | | -6.33 |
| | | | | Medium Sand | |
| | 16.5 | -6.33 | 23 | 23 | FC:30 |
| | | | | NP | |
| | | | | | -7.83 |
| | 18 | -7.83 | 34 | Hard CH | |
| | 19.5 | -9.33 | 91 | 72 | |
| | 21 | -10.83 100/29 | | 81/50 | |
| | 23 | -12.83 | 92 | | |
| | | | | | -13.00 |
| | 25 | -14.83 50/12 | | V. Dense Sand | FC:43 |
| | | | | 40/22 | |
| | | | | | -16.83 |
| | 27 | -16.83 | 72 | Hard CH | |
| | 39.5 | -29.33 100/25 | | 72 | |
| | | | | 72/45 | |

| BH | Ground Level | N SPT | Nspt aver. | | |
|---|---|---|---|---|---|
| 54 | 10.13 | blws/30cm | Wll/Ip | | |
| Depth | Elev. | | | | |
| 0.5 | 9.63 | 7 | Medium CH | | |
| 3 | 7.13 | 6 | 7 | | |
| | | | 56/32 | | |
| | | | | | 5.63 |
| 4.5 | 5.63 | 22 | Medium Sand | | |
| | | | 25 | FC:35 | |
| 6 | 4.13 | 19 | 38/19 | | |
| 7.5 | 2.63 | 25 | NP | FC:21 | |
| 9 | 1.13 | 34 | | | |
| | | | | | -0.37 |
| | | | V. Dense Sand | | |
| 10.5 | -0.37 | 84 | 84 | FC:18 | |
| | | | | | -1.87 |
| 12 | -1.87 | 21 | Hard CH | | |
| 13.5 | -3.37 | 53 | 37 | | |
| | | | 71/43 | | |
| | | | | | -4.87 |
| 15 | -4.87 | 46 | Dense Sand | | |
| | | | 38 | FC:15 | |
| 16.5 | -6.37 | 31 | NP | | |
| 18 | -7.87 | 42 | | FC:34 | |
| 19.5 | -9.37 | 34 | 61/34 | | |
| | | | | | -10.87 |
| 21 | -10.87 100/29 | | | | |
| 23 | -12.87 | 84 | Hard CH | | |
| 25 | -14.87 | 59 | 62 | | |
| 27 | -16.87 | 53 | 83/50 | | |
| 29.5 | -19.37 | 52 | | | |

| BH | Ground Level | N SPT | Nspt aver. | | |
|---|---|---|---|---|---|
| 55 | 10.1 | blws/30cm | Wll/Ip | | |
| Depth | Elev. | | | | |
| 0.5 | 9.6 | 8 | | | |
| 3 | 7.1 | 4 | Stiff CH | | |
| 4.5 | 5.6 | 5 | 9 | | |
| 6 | 4.1 | 8 | 49/28 | | |
| 7.5 | 2.6 | 19 | | | |
| | | | | | 1.1 |
| 9 | 1.1 | 24 | Medium Sand | | |
| 10.5 | -0.4 | 26 | 24 | FC:24 | |
| 12 | -1.9 | 29 | NP | | |
| 13.5 | -3.4 | 15 | | | |
| | | | | | -4.9 |
| 15 | -4.9 | 17 | Stiff CH | | |
| | | | 17 | | |
| | | | 51/29 | | |
| | | | | | -6.4 |
| 16.5 | -6.4 | 81 | Medium Sand | | |
| 18 | -7.9 | 26 | 26 | FC:46 | |
| | | | 42/23 | | |
| | | | | | -9.4 |
| 19.5 | -9.4 | 56 | | | |
| 21 | -10.9 | 59 | | | |
| 22.5 | -12.4 | 77 | | | |
| 24 | -13.9 | 65 | Hard CH | | |
| 25.5 | -15.4 | 54 | 66 | | |
| 27 | -16.9 50/10 | | 88/57 | | |
| 28.5 | -18.4 | 42 | | | |
| 30 | -19.9 | 37 | | | |
| 33 | -22.9 | 75 | | | |
| 36 | -25.9 | 72 | | | |
| 39 | -28.9 | 64 | | | |
| 42 | -31.9 | 69 | | | |
| 45 | -34.9 | 100 | | | |
| 47.5 | -37.4 | 82 | | | |
| 50 | -39.9 | 77 | | | |

| BH | Ground Level | N SPT | Nspt aver. | | |
|---|---|---|---|---|---|
| 56 | 10.09 | blws/30cm | Wll/Ip | | |
| Depth | Elev. | | | | |
| 0.5 | 9.59 | 6 | Medium CH | | |
| 1.5 | 8.59 | 6 | 6 | | |
| 3 | 7.09 | 6 | 55/32 | | |
| | | | | | 5.59 |
| 4.5 | 5.59 | 17 | Medium Sand | | |
| 6 | 4.09 | 21 | 26 | FC:41 | |
| | | | 44/23 | | |
| 7.5 | 2.59 | 20 | NP | | |
| 9 | 1.09 | 25 | | | |
| 10.5 | -0.41 | 46 | 37/18 | FC:30 | |
| | | | | | -1.91 |
| 12 | -1.91 | 20 | Hard CH | | |
| 13.5 | -3.41 | 29 | 27 | | |
| 15 | -4.91 | 32 | 80/51 | | |
| | | | | | -6.41 |
| 16.5 | -6.41 | 50 | | | |
| 18 | -7.91 | 53 | | | |
| 19.5 | -9.41 | 57 | | | |
| 21 | -10.91 | 73 | | | |
| 22.5 | -12.41 | 87 | Hard CH | | |
| 24 | -13.91 | 100 | 60 | | |
| 25.5 | -15.41 | 67 | 80/51 | | |
| 27 | -16.91 | 68 | | | |
| 28.5 | -18.41 50/12 | | | | |
| 30 | -19.91 | 74 | | | |

| BH | Ground Leve | N SPT | Nspt aver. | | |
|---|---|---|---|---|---|
| 52 | 10.36 | blws/30cm | Wll/Ip | | |
| Depth | Elev. | | | | |
| 0.5 | 9.86 | 8 | Stiff CH | | |
| 3 | 7.36 | 10 | 9 | | |
| | | | 57/35 | | 5.86 |
| 4.5 | 5.86 | 35 | Dense Sand | | |
| 6 | 4.36 | 43 | 39 | FC:27 | |
| | | | NP | | |
| | | | | | 2.86 |
| | | | V. Dense Sand | | |
| 7.5 | 2.86 | 64 | 56 | FC:23 | |
| | | | NP | | |
| 9 | 1.36 | 63 | 35/16 | FC:31 | |
| 10.5 | -0.14 100/26 | | | | |
| 12 | -1.64 | 65 | NP | FC:19 | |
| 13.5 | -3.14 | 34 | | | |
| | | | | | -4.64 |
| 15 | -4.64 | 66 | | | |
| 16.5 | -6.14 | 96 | Hard CH | | |
| 18 | -7.64 50/10 | | 80 | | |
| 19.5 | -9.14 | 58 | 91/59 | | |
| 21 | -10.64 | 98 | | | |
| 23 | -12.64 50/12 | | | | |
| | | | | | -13.6 |
| | | | V. Dense Sand | | |
| 25 | -14.64 50/13 | | NP | FC:32 | |

| CPT 33 | BH | Ground Level | N SPT | Nspt aver. | |
|---|---|---|---|---|---|
| qc | 55 | 10.1 | blws/30cm | Wll/Ip | |
| Mpa | Depth | Elev. | | | |
| 3.33 | 0.5 | 9.6 | 8 | | |
| 1.32 | 3 | 7.1 | 4 | | |
| | | | | Stiff CH | |
| 14.37 | 4.5 | 5.6 | 5 | 9 | |
| | | | | 49/28 | |
| | 6 | 4.1 | 8 | | |
| 23.39 | 7.5 | 2.6 | 19 | | |
| | | | | | 1.1 |
| | 9 | 1.1 | 24 | | |
| | | | | Medium Sand | |
| | 10.5 | -0.4 | 26 | 24 | FC:24 |
| | 12 | -1.9 | 29 | NP | |
| | 13.5 | -3.4 | 15 | | |
| | | | | | -4.1 |
| | 15 | -4.9 | 17 | Stiff CH | |
| | | | | 17 | |
| | | | | 51/29 | |
| | | | | | -6.4 |
| | 16.5 | -6.4 | 81 | Medium Sand | |
| | 18 | -7.9 | 26 | 54 | FC:46 |
| | | | | 42/23 | |
| | | | | | -9.4 |
| | 19.5 | -9.4 | 56 | | |
| | 21 | -10.9 | 59 | | |
| | 22.5 | -12.4 | 77 | | |
| | 24 | -13.9 | 65 | Hard CH | |
| | 25.5 | -15.4 | 54 | 66 | |
| | 27 | -16.9 50/10 | | 88/57 | |
| | 28.5 | -18.4 | 42 | | |
| | 30 | -19.9 | 37 | | |
| | 33 | -22.9 | 75 | | |
| | 36 | -25.9 | 72 | | |
| | 39 | -28.9 | 64 | | |
| | 42 | -31.9 | 69 | | |
| | 45 | -34.9 | 100 | | |
| | 47.5 | -37.4 | 82 | | |
| | 50 | -39.9 | 77 | | |

| BH | Ground Level | N SPT | Nspt aver. | | |
|---|---|---|---|---|---|
| 58 | 10.87 | blws/30cm | Wll/Ip | | |
| Depth | Elev. | | | | |
| 0.5 | 10.37 | 9 | Stiff CH | | |
| 1.5 | 9.37 | 7 | 13 | | |
| 3 | 7.87 | 23 | 57/34 | | |
| | | | | | 6.37 |
| 4.5 | 6.37 | 29 | Medium Sand | | |
| 6 | 4.87 | 32 | 33 | FC:33 | |
| 7.5 | 3.37 | 39 | 44/23 | | |
| | | | | | 1.87 |
| 9 | 1.87 | 61 | V. Dense Sand | | |
| 10.5 | 0.37 | 53 | 64 | FC:20 | |
| 12 | -1.13 | 80 | NP | | |
| | | | | | -2.63 |
| 13.5 | -2.63 | 24 | Hard CH | | |
| 15 | -4.13 | 21 | 36 | | |
| 16.5 | -5.63 | 44 | 84/54 | | |
| 18 | -7.13 | 54 | | | |
| 19.5 | -8.63 50/10 | | | | |
| 21 | -10.13 100/28 | | | | |
| | | | | | -12.13 |
| 23 | -12.13 50/7 | | V. Dense Sand | | |
| 25 | -14.13 50/9 | | 41/19 | | |

| Cu (kPa) |
|---|
| 31.5 |
| 32 |
| 41 |
| 32.5 |
| 29 |
| 35.5 |
| 48 |
| 44 |
| 28.5 |
| 61 |

Cu mean= 38

| BH No | Depth(m) | fi | SPT |
|---|---|---|---|
| BH-53 | 15 | 28 | 27 |
| BH-54 | 9 | 33.5 | 34 |
| BH-55 | 9 | 28 | 24 |
| BH-56 | 9 | 27 | 25 |
| BH-52 | 10.5 | 36 | 100/26 |
| BH-58 | 12 | 38.5 | 80 |

# PIPE RACK

| BH | Ground Level | N SPT | Nspt aver. | | |
|---|---|---|---|---|---|
| 51 | 10.05 | blws/30cm | Wll/Ip | | |
| **Depth** | **Elev.** | | | | |
| 0.5 | 9.55 | 8 | Stiff CH | | |
| 1.5 | 8.55 | 10 | 10 | | |
| 3 | 7.05 | 13 | 58/33 | | |
| | | | | | 5.55 |
| 4.5 | 5.55 | 28 | M. Dense Sand | | |
| 6 | 4.05 | 24 | 26 | FC:25 | |
| | | | 52/28 | | |
| | | | | | 2.55 |
| 7.5 | 2.55 | 49 | V. Dense Sand | | |
| 9 | 1.05 | 76 | 63 | FC:16 | |
| | | | NP | | |
| | | | | | 0.3 |
| 10.5 | -0.45 | 35 | Hard CH | | |
| 12 | -1.95 | 39 | 48 | | |
| 13.5 | -3.45 | 50/13 | 68/42 | | |
| 15 | -4.95 | 50/10 | | | |
| 16.5 | -6.45 | 47 | | | |
| 18 | -7.95 | 34 | | | |
| 19.5 | -9.45 | 85 | | | |

| BH | Ground Level | N SPT | Nspt aver. | | |
|---|---|---|---|---|---|
| 57 | 10.17 | blws/30cm | Wll/Ip | | |
| **Depth** | **Elev.** | | | | |
| 0.5 | 9.67 | 8 | | | |
| 1.5 | 8.67 | 7 | Stiff CH | | |
| 3 | 7.17 | 14 | 12 | | |
| 4.5 | 5.67 | 18 | 52/19 | | |
| | | | | | 4.92 |
| 6 | 4.17 | 35 | Dense Sand | | |
| 7.5 | 2.67 | 47 | 41 | | |
| | | | | | 1.17 |
| 9 | 1.17 | 94 | V. Dense Sand | | |
| 10.5 | -0.33 | 72 | 79 | | |
| | | | 39/21 | | |
| 12 | -1.83 | 70 | NP | FC:27 | |
| | | | | | -2.58 |
| 13.5 | -3.33 | 73 | Hard CH | | |
| 15 | -4.83 | 61 | 67 | | |
| | | | 64/37 | | |
| | | | | | -5.58 |
| 16.5 | -6.33 | 50/11 | V. Dense Sand | FC:20 | |
| | | | NP | | |
| | | | | | -7.83 |
| | | | Hard CH | | |
| 18 | -7.83 | 71 | 71 | | |
| | | | 74/45 | | |
| | | | | | -9.83 |
| | | | V. Dense Sand | | |
| 20 | -9.83 | 76 | 76 | FC:16 | |
| | | | NP | | |
| | | | | | -11.33 |
| 21.5 | -11.33 | 89 | | | |
| 23 | -12.83 | 50/13 | Hard CH | | |
| 24.5 | -14.33 | 50/8 | 87 | | |
| 26 | -15.83 | 50/11 | 85/52 | | |
| 27.5 | -17.33 | 76 | | | |
| 29.5 | -19.33 | 96 | | | |

| BH | Ground Level | N SPT | Nspt aver. | | |
|---|---|---|---|---|---|
| 69 | 10.35 | blws/30cm | Wll/Ip | | |
| **Depth** | **Elev.** | | | | |
| 0.5 | 9.85 | 9 | Medium CH | | |
| 3 | 7.35 | 5 | 7 | | |
| | | | 54/31 | | 6.6 |
| | | | M. Dense Sand | | |
| 4.5 | 5.85 | 20 | 23 | FC:28 | |
| 6 | 4.35 | 15 | | | |
| 7.5 | 2.85 | 22 | NP | FC:16 | |
| 9 | 1.35 | 35 | | | |
| 10.5 | -0.15 | 25 | | | |
| | | | | | -1.65 |
| 12 | -1.65 | 32 | Dense Sand | | |
| | | | 31 | FC:18 | |
| 14 | -3.65 | 31 | NP | | |
| | | | | | -5.65 |
| 16 | -5.65 | 94 | Hard CH | | |
| 18 | -7.65 | 85 | 86 | | |
| 20 | -9.65 | 79 | 83/54 | | |

| **Cu (kPa)** |
|---|
| 45.5 |
| 41 |
| 34 |
| 60.5 |
| 27.5 |

Cu mean= 42

| BH No | Depth(m) | fi | SPT |
|---|---|---|---|
| BH-51 | 7.5 | 34.5 | 49 |
| BH-57 | 15 | 39 | 61 |
| BH-69 | 14 | 32 | 31 |

## FIRE & COMPRESSED AIR AREA

| CPT 36 qc | BH | Ground Level | N SPT | Nspt aver. | | CPT 35 qc |
|---|---|---|---|---|---|---|
| | 10 | 9.89 | blws/30cm | WIl/Ip | | |
| Mpa | **Depth** | **Elev.** | | | | Mpa |
| 3.45 | 0.5 | 9.39 | 8 | Stiff CH | | 2.56 |
| 1.43 | 3 | 6.89 | 10 | 9 | | 1.15 |
| | | | | 68/43 | | |
| | | | | | 5.39 | |
| | | | | Dense Sand | | |
| 10.48 | 4.5 | 5.39 | 19 | 29 | FC:16 | |
| | | | | NP | | |
| 20.34 | 6 | 3.89 | 31 | | FC:27 | 12.1 |
| 23.67 | 7.5 | 2.39 | 36 | | | |
| | | | | | 0.89 | |
| | 9 | 0.89 | 27 | Hard CH | | 14.84 |
| | 10.5 | -0.61 | 33 | 30 | | 36.6 |
| | | | | 65/39 | | |
| | | | | | -2.11 | |
| | 12 | -2.11 | 57 | Dense Sand | | |
| | 13.5 | -3.61 | 36 | 47 | FC:17 | |
| | 15 | -5.11 | 53 | NP | | |
| | | | | | -6.61 | |
| | 16.5 | -6.61 | 49 | | | |
| | 18 | -8.11 | 41 | | | |
| | 20 | -10.11 | 32 | Hard CH | | |
| | 22.5 | -12.61 | 57 | 65 | | |
| | 25 | -15.11 | 77 | 72/43 | | |
| | 27.5 | -17.61 | 65 | | | |
| | 30 | -20.11 | 79 | | | |
| | 32.5 | -22.61 | 92 | | | |
| | 35 | -25.11 | 88 | | | |
| | | | | | -27.61 | |
| | 37.5 | -27.61 | 50/13 | V. Dense Sand | | |
| | 40 | -30.11 | 50/8 | 42/23 | FC:37 | |

| | **Cu (kPa)** |
|---|---|
| | 35 |
| | 38 |
| Cu mean= | 37 |

| **BH No** | **Depth(m)** | **fi** | **SPT** |
|---|---|---|---|
| BH-10 | 15 | 34.5 | 53 |

# WATER TREATMENT PLANT AREA

| BH | Ground Level | N SPT | Nspt aver. | | |
|---|---|---|---|---|---|
| 59 | 11.56 | blws/30cm | Wll/Ip | | |
| **Depth** | **Elev.** | | | | |
| 0.5 | 11.06 | 8 | Medium CH | | |
| 3 | 8.56 | 6 | 7 | | |
| | | | 54/32 | | |
| | | | | | 7.06 |
| 4.5 | 7.06 | 14 | M. Dense Sand | | |
| 6 | 5.56 | 22 | 18 | FC:17 | |
| | | | NP | | |
| | | | | | 4.06 |
| 7.5 | 4.06 | 38 | Dense Sand | | |
| | | | 45 | FC:26 | |
| | | | NP | | |
| 9 | 2.56 | 45 | | | |
| 10.5 | 1.06 | 52 | 36/17 | FC:37 | |
| | | | | | 0.31 |
| 12 | -0.44 | 52 | V. Dense Sand | | |
| | | | 52 | | |
| | | | NP | | |
| 13.5 | -1.94 | 60 | | FC:26 | |
| | | | | | -3.44 |
| 15 | -3.44 | 50/13 | | | |
| 16.5 | -4.94 | 100/28 | Hard CH | | |
| 18 | -6.44 | 50/14 | 85/55 | | |
| 20 | -8.44 | 50/10 | | | |
| | | | | | -10.94 |
| 22.5 | -10.94 | 50/12 | V. Dense Sand | FC:43 | |
| | | | 40/19 | | |
| | | | | | -13.44 |
| 25 | -13.44 | 50/8 | Hard CH | | |
| 27.5 | -15.94 | 94 | 94 | | |
| 30 | -18.44 | 50/8 | 76/48 | | |

| BH | Ground Level | N SPT | Nspt aver. | | |
|---|---|---|---|---|---|
| 61 | 11.41 | blws/30cm | Wll/Ip | | |
| **Depth** | **Elev.** | | | | |
| 0.5 | 10.91 | 7 | Stiff CH | | |
| 3 | 8.41 | 8 | 10 | | |
| 4.5 | 6.91 | 14 | 50/28 | | |
| | | | | | 5.41 |
| 6 | 5.41 | 27 | | | |
| | | | M. Dense Sand | | |
| 7.5 | 3.91 | 35 | 28 | FC:37 | |
| | | | 42/22 | | |
| 9 | 2.41 | 22 | NP | FC:28 | |
| | | | | | 1.66 |
| 10.5 | 0.91 | 43 | Dense Sand | | |
| 12 | -0.59 | 44 | 44 | FC:36 | |
| | | | 38/20 | | |
| | | | | | -2.59 |
| 14 | -2.59 | 57 | Hard CH | | |
| | | | 57 | | |
| | | | 77/48 | | |
| | | | | | -4.59 |
| 16 | -4.59 | 50/14 | V. Dense Sand | | |
| 18 | -6.59 | 78 | 78 | FC:47 | |
| | | | 44/24 | | |
| | | | | | -8.59 |
| 20 | -8.59 | 69 | Hard CH | | |
| | | | 69 | | |
| | | | 81/53 | | |

| BH | Ground Level | N SPT | Nspt aver. | | |
|---|---|---|---|---|---|
| 71 | 11.44 | blws/30cm | Wll/Ip | | |
| **Depth** | **Elev.** | | | | |
| 0.5 | 10.94 | 7 | Medium CH | | |
| 3 | 8.44 | 5 | 6 | | |
| | | | 54/31 | | |
| | | | | | 6.94 |
| 4.5 | 6.94 | 26 | I. Dense Sand | | |
| 6 | 5.44 | 24 | 25 | FC:39 | |
| | | | 42/23 | | |
| | | | | | 3.94 |
| 7.5 | 3.94 | 40 | | | |
| 9 | 2.44 | 94 | | | |
| | | | V. Dense Sand | | |
| 10.5 | 0.94 | 49 | 62 | FC:10 | |
| | | | NP | | |
| 12 | -0.56 | 51 | | | |
| 13.5 | -2.06 | 48 | | FC:15 | |
| 15 | -3.56 | 74 | | | |
| 16.5 | -5.06 | 100/29 | | | |
| 18 | -6.56 | 77 | | | |
| | | | | | -8.06 |
| 19.5 | -8.06 | 58 | Hard CH | | |
| 21 | -9.56 | 68 | 71 | | |
| 22.5 | -11.06 | 80 | 83/54 | | |
| | | | | | -12.56 |
| 24 | -12.56 | 67 | . Dense Sand | | |
| | | | 67 | FC:34 | |
| | | | 39/19 | | |
| | | | | | -14.06 |
| 25.5 | -14.06 | 70 | Hard CH | | |
| 27 | -15.56 | 50/12 | 70 | | |
| 28.5 | -17.06 | 50/14 | 96/65 | | |
| 30 | -18.56 | 50/11 | | | |

| CPT 38 | BH | Ground Level | N SPT | Nspt aver. | | |
|---|---|---|---|---|---|---|
| qc | 72 | 11.39 | blws/30cm | Wll/Ip | | |
| Mpa | **Depth** | **Elev.** | | | | |
| | 0.5 | 10.89 | 8 | Medium CL | | |
| 1.46 | 1.5 | 9.89 | 6 | 7 | | |
| | 3 | 8.39 | 8 | 43/22 | | |
| | | | | | | 6.89 |
| | 4.5 | 6.89 | 18 | M. Dense Sand | | |
| | | | | 18 | FC:22 | |
| | | | | | | 5.39 |
| | | | | Dense Sand | | |
| 7.28 | 6 | 5.39 | 43 | 40 | FC:16 | |
| 2.13 | 7.5 | 3.89 | 37 | NP | | |
| | | | | | | 2.39 |
| 10.44 | 9 | 2.39 | 76 | V. Dense Sand | | |
| 26.72 | 10.5 | 0.89 | 66 | 67 | FC:21 | |
| | 12 | -0.61 | 60 | NP | | |
| | 13.5 | -2.11 | 66 | | | |
| | 15 | -3.61 | 66 | | | |
| | 16.5 | -5.11 | 70 | | FC:35 | |
| | | | | | | -6.61 |
| | 18 | -6.61 | 50/8 | Hard CH | | |
| | 19.5 | -8.11 | 91 | 91 | | |
| | 21 | -9.61 | 100/25 | 86/55 | | |
| | 23 | -11.61 | 50/10 | | | |
| | 25 | -13.61 | 50/12 | | | |

| BH | Ground Level | N SPT | Nspt aver. | | |
|---|---|---|---|---|---|
| 62 | 11.25 | blws/30cm | Wll/Ip | | |
| **Depth** | **Elev.** | | | | |
| 0.5 | 10.75 | 7 | Medium CH | | |
| 3 | 8.25 | 6 | 7 | | |
| | | | 60/35 | | |
| | | | | | 6.75 |
| 4.5 | 6.75 | 15 | M. Dense Sand | | |
| 6 | 5.25 | 17 | 20 | FC:42 | |
| | | | 45/24 | | |
| 7.5 | 3.75 | 22 | | | |
| 9 | 2.25 | 22 | NP | FC:24 | |
| 10.5 | 0.75 | 25 | | | |
| | | | | | -0.75 |
| | | | Dense Sand | | |
| 12 | -0.75 | 35 | 38 | FC:24 | |
| 13.5 | -2.25 | 40 | NP | | |
| | | | | | -3.75 |
| 15 | -3.75 | 49 | | | |
| 16.5 | -5.25 | 44 | Hard CH | | |
| 18 | -6.75 | 28 | 49 | | |
| 19.5 | -8.25 | 37 | 81/50 | | |
| 21 | -9.75 | 37 | | | |
| 23 | -11.75 | 87 | | | |
| 25 | -13.75 | 63 | | | |

| **Cu (kPa)** |
|---|
| 38.5 |
| 33 |
| 41.5 |
| 42 |
| 24.5 |
| 27 |
| 27 |
| 31 |
| 33 |
| 35.5 |

Cu mean= 33

| BH No | Depth(m) | fi | SPT |
|---|---|---|---|
| BH-59 | 13.5 | 37 | 60 |
| BH-61 | 9 | 26 | 22 |
| BH-71 | 12 | 36.5 | 51 |
| BH-71 | 24 | 39 | 67 |
| BH-60 | 12 | 34 | 45 |
| BH-72 | 7.5 | 31 | 37 |
| BH-72 | 11 | 38.5 | 60 |
| BH-62 | 13.5 | 33.5 | 40 |

# WORKSHOP & STORES AREA

| BH | Ground Level | N SPT | Nspt aver. | | |
|---|---|---|---|---|---|
| 64 | 11.36 | blws/30cm | Wll/Ip | | |
| **Depth** | **Elev.** | | | | |
| 0.5 | 10.86 | 9 | Stiff CL | | |
| | | | 9 | | |
| | | | 40/19 | | 8.86 |
| 3 | 8.36 | 11 | Stiff CH | | |
| | | | 11 | | |
| | | | 59/34 | | 6.86 |
| 4.5 | 6.86 | 9 | Medium Sand | | |
| 6 | 5.36 | 22 | 16 | FC:31 | |
| | | | 38/19 | | 3.86 |
| 7.5 | 3.86 | 55 | V. Dense Sand | | |
| 9 | 2.36 | 65 | 61 | FC:33 | |
| 10.5 | 0.86 | 56 | NP | | |
| 12 | -0.64 | 69 | | | |
| 13.5 | -2.14 | 66 | | FC:21 | |
| 15 | -3.64 | 53 | | | |
| | | | | | -4.64 |
| 17 | -5.64 | 68 | Hard CH | | |
| 19 | -7.64 | 36 | 52 | | |
| 21 | -9.64 | 50/12 | 85/55 | | |
| 23 | -11.64 | 50/14 | | | |
| | | | | | -13.64 |
| 25 | -13.64 | 50/10 | V. Dense Sand | FC:35 | |
| | | | 42/23 | | |

| CPT 38 | BH | Ground Level | N SPT | Nspt aver. | | |
|---|---|---|---|---|---|---|
| qc | 63 | 11.42 | blws/30cm | Wll/Ip | | |
| Mpa | **Depth** | **Elev.** | | | | |
| | 0.5 | 10.92 | 10 | | | |
| | 1.5 | 9.92 | 11 | Stiff CH | | |
| | 3 | 8.42 | 8 | 8 | | |
| 1.65 | 4.5 | 6.92 | 5 | 58/34 | | |
| 2.11 | 6 | 5.42 | 6 | | | |
| | | | | | | 3.92 |
| | | | | Medium Sand | | |
| | 7.5 | 3.92 | 24 | 24 | FC:31 | |
| 20.53 | | | | 39/18 | | |
| | | | | | | 2.42 |
| | 9 | 2.42 | 58 | V. Dense Sand | | |
| | 10.5 | 0.92 | 51 | 55 | FC:24 | |
| | 12 | -0.58 | 53 | NP | | |
| | 13.5 | -2.08 | 60 | | | |
| | | | | | | -3.58 |
| | 15 | -3.58 | 50/8 | Hard CH | | |
| | 17 | -5.58 | 69 | 54 | | |
| | 19 | -7.58 | 38 | 83/54 | | |
| | 21 | -9.58 | 50/7 | | | |
| | | | | | | -11.58 |
| | 23 | -11.58 | 64 | V. Dense Sand | | |
| | | | | 64 | FC:38 | |
| | | | | 41/19 | | -13.58 |
| | 25 | -13.58 | 50/10 | Hard CH | | |
| | | | | 74/47 | | |

| Cu (kPa) |
|---|
| 43 |
| 31 |
| 39.5 |

Cu mean= 38

| BH No | Depth(m) | fi | SPT |
|---|---|---|---|
| BH-64 | 7.5 | 37.5 | 55 |
| BH-63 | 10.5 | 38 | 51 |

# NON-PROCESS BUILDING

| CPT 40 qc Mpa | BH 65 | Ground Level 11.41 | N SPT blws/30cm | Nspt aver. Wll/Ip | | |
|---|---|---|---|---|---|---|
| | **Depth** | **Elev.** | | | | |
| | 0.5 | 10.91 | 6 | | | |
| | 1.5 | 9.91 | 5 | Medium CH | | |
| | 3 | 8.41 | 3 | 6 | | |
| 1.21 | 4.5 | 6.91 | 5 | 52/30 | | |
| | 6 | 5.41 | 10 | | | |
| | | | | | | 3.91 |
| | 7.5 | 3.91 | 26 | Dense Sand | | |
| 13.76 | 9 | 2.41 | 38 | 32 | FC:31 | |
| | | | | NP | | |
| | | | | | | 0.91 |
| 37.88 | 10.5 | 0.91 | 57 | V. Dense Sand | | |
| | 12 | -0.59 | 53 | 57 | | |
| | 13.5 | -2.09 | 62 | | FC:21 | |
| | | | | | | -3.59 |
| | 15 | -3.59 | 70 | Hard CH | | |
| | 17 | -5.59 | 50/13 | 60 | | |
| | 19 | -7.59 | 49 | 90/58 | | |
| | | | | | | -9.59 |
| | 21 | -9.59 | 50/10 | V. Dense Sand | | |
| | 23 | -11.59 | 50/14 | 43/24 | FC:38 | |
| | | | | | | -13.59 |
| | 25 | -13.59 | 50/9 | Hard CH | | |
| | | | | 64/36 | | |

| BH 75 | Ground Level 11.37 | N SPT blws/30cm | Nspt aver. Wll/Ip | | |
|---|---|---|---|---|---|
| **Depth** | **Elev.** | | | | |
| 0.5 | 10.87 | 8 | | | |
| 3 | 8.37 | 9 | Very Stiff CH | | |
| 4.5 | 6.87 | 14 | 21 | | |
| 6 | 5.37 | 24 | 49/27 | | |
| 7.5 | 3.87 | 37 | | | |
| 9 | 2.37 | 32 | | | |
| | | | | | 0.87 |
| | | | Dense Sand | | |
| 10.5 | 0.87 | 37 | 37 | | |
| | | | NP | | |
| 12 | -0.63 | 47 | | | |
| 14 | -2.63 | 47 | 38/18 | FC:33 | |
| | | | | | -3.63 |
| 16 | -4.63 | 58 | Hard CH | | |
| 18 | -6.63 | 62 | 60 | | |
| | | | 80/52 | | |
| | | | | | -8.63 |
| 20 | -8.63 | 46 | Dense Sand | | |
| | | | 46 | FC:15 | |
| | | | NP | | |
| | | | | | -11.13 |
| 22.5 | -11.13 | 54 | V. Dense Sand | | |
| | | | 54 | FC:21 | |
| | | | NP | | |
| | | | | | -13.63 |
| 25 | -13.63 | 67 | Hard CH | | |
| | | | 67 | | |
| | | | 71/45 | | |

| Cu (kPa) |
|---|
| 30.5 |
| 27 |
| 43.5 |
| 52 |
| 28 |
| 43 |
| 34 |
| 31 |
| 30.5 |
| 27 |

Cu mean= 35

| BH No | Depth(m) | fi | SPT |
|---|---|---|---|
| BH-65 | 12 | 40.5 | 53 |
| BH-75 | 12 | 37 | 47 |
| BH-73 | 10.5 | 41 | 54 |
| BH-74 | 9 | 39 | 91 |
| BH-66 | 10.5 | 37 | 56 |

| BH 73 | Ground Level 11.41 | N SPT blws/30cm | Nspt aver. Wll/Ip | | |
|---|---|---|---|---|---|
| **Depth** | **Elev.** | | | | |
| 0.5 | 10.91 | 6 | Stiff CH | | |
| 1.5 | 9.91 | 5 | 8 | | |
| 3 | 8.41 | 10 | 49/27 | | |
| 4.5 | 6.91 | 9 | | | |
| | | | | | 5.41 |
| 6 | 5.41 | 5 | M. Dense Sand | | |
| 7.5 | 3.91 | 14 | 16 | FC:32 | |
| 9 | 2.41 | 29 | 41/19 | | |
| | | | | | 1.66 |
| 10.5 | 0.91 | 54 | V. Dense Sand | | |
| 12 | -0.59 | 60 | 55 | FC:20 | |
| 13.5 | -2.09 | 59 | NP | | |
| 15 | -3.59 | 46 | | | |
| | | | | | -4.59 |
| 17 | -5.59 | 50/10 | Hard CH | | |
| 19 | -7.59 | 97 | 97 | | |
| | | | 84/58 | | |
| | | | | | -9.59 |
| 21 | -9.59 | 100/26 | V. Dense Sand | | |
| 23 | -11.59 | 72 | 72 | | |
| | | | 46/24 | | |
| | | | | | -13.59 |
| 25 | -13.59 | 50/10 | Hard CH | | |
| | | | 66/37 | | |

| CPT 41 qc Mpa | BH 74 | Ground Level 11.53 | N SPT blws/30cm | Nspt aver. Wll/Ip | | |
|---|---|---|---|---|---|---|
| | **Depth** | **Elev.** | | | | |
| | 0.5 | 11.03 | 8 | Medium CH | | |
| 2.04 | 1.5 | 10.03 | 7 | 7 | | |
| 0.88 | 3 | 8.53 | 7 | 54/31 | | |
| | | | | | | 7.03 |
| | 4.5 | 7.03 | 29 | M. Dense Sand | | |
| | 6 | 5.53 | 26 | 28 | FC:16 | |
| 20.97 | 7.5 | 4.03 | 28 | NP | | |
| | | | | | | 2.53 |
| 24.74 | 9 | 2.53 | 91 | V. Dense Sand | | |
| | 10.5 | 1.03 | 50 | 53 | FC:14 | |
| | 12 | -0.47 | 56 | NP | | |
| | | | | | | -2.47 |
| | 14 | -2.47 | 60 | Hard CH | | |
| | 16 | -4.47 | 50/10 | 60 | | |
| | 18 | -6.47 | 50/6 | 86/55 | | |
| | 20 | -8.47 | 50/13 | | | |

| BH 66 | Ground Level 11.42 | N SPT blws/30cm | Nspt aver. Wll/Ip | | | CPT 42 qc Mpa |
|---|---|---|---|---|---|---|
| **Depth** | **Elev.** | | | | | |
| 0.5 | 10.92 | 8 | Medium CL | | | |
| 3 | 8.42 | 5 | 7 | | | 1.24 |
| 4.5 | 6.92 | 8 | 43/23 | | | |
| | | | | | 5.42 | |
| | | | M. Dense Sand | | | |
| 6 | 5.42 | 27 | 27 | FC:33 | | |
| | | | NP | | | |
| | | | | | 3.92 | |
| | | | Very Stiff CH | | | |
| 7.5 | 3.92 | 21 | 21 | | | 4.2 |
| | | | 54/32 | | 2.42 | |
| | | | Dense Sand | | | |
| 9 | 2.42 | 29 | 40 | FC:40 | | |
| 10.5 | 0.92 | 56 | NP | FC:17 | | |
| 12 | -0.58 | 34 | 75/49 | | | |
| | | | | | -2.58 | |
| | | | | | | 19.28 |
| 14 | -2.58 | 46 | | | | |
| 16 | -4.58 | 42 | Hard CH | | | 33.49 |
| 18 | -6.58 | 39 | 43 | | | |
| 20 | -8.58 | 37 | 89/56 | | | |
| 22.5 | -11.08 | 37 | | | | |
| 25 | -13.58 | 54 | | | | |

# APPENDIX (K)

# VOID RATIO VS AXIAL PRESSURE CURVES

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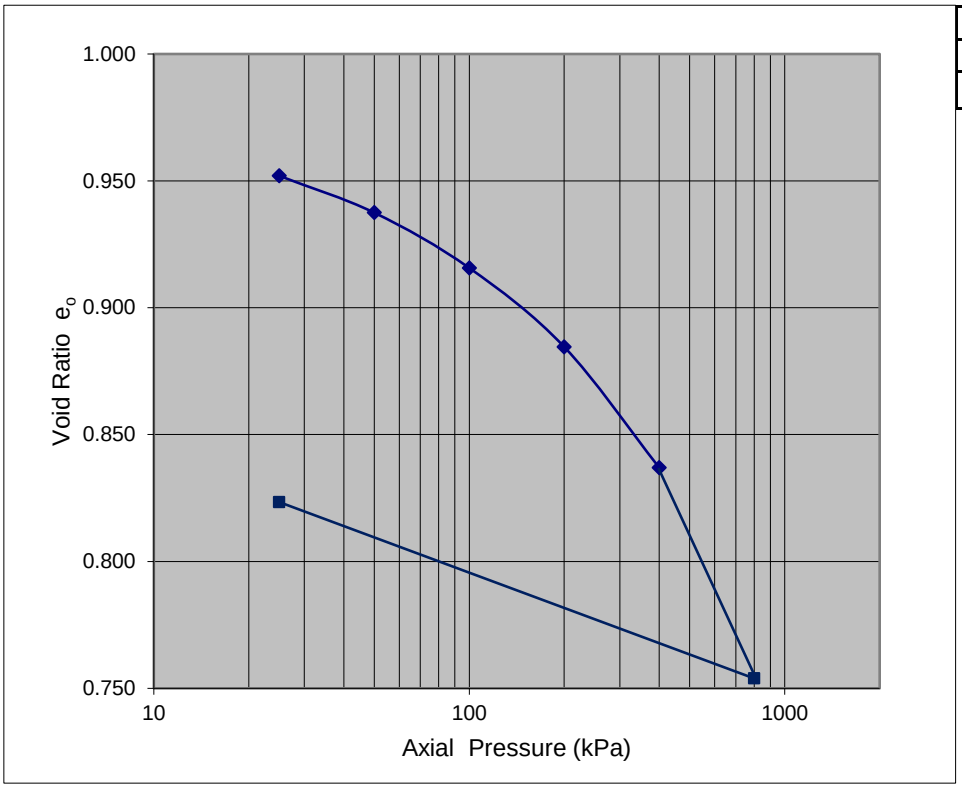
# Consolidation Test Results

**Project : Samawa Combined Cycle P.P**

**BH No. :** 1 **Sample:** 3 Depth: 2.0-2.5




| | |
|---|---|
| **Cc** | **0.28** |
| **Cr** | **0.046** |
| **$e_o$** | **0.957** |

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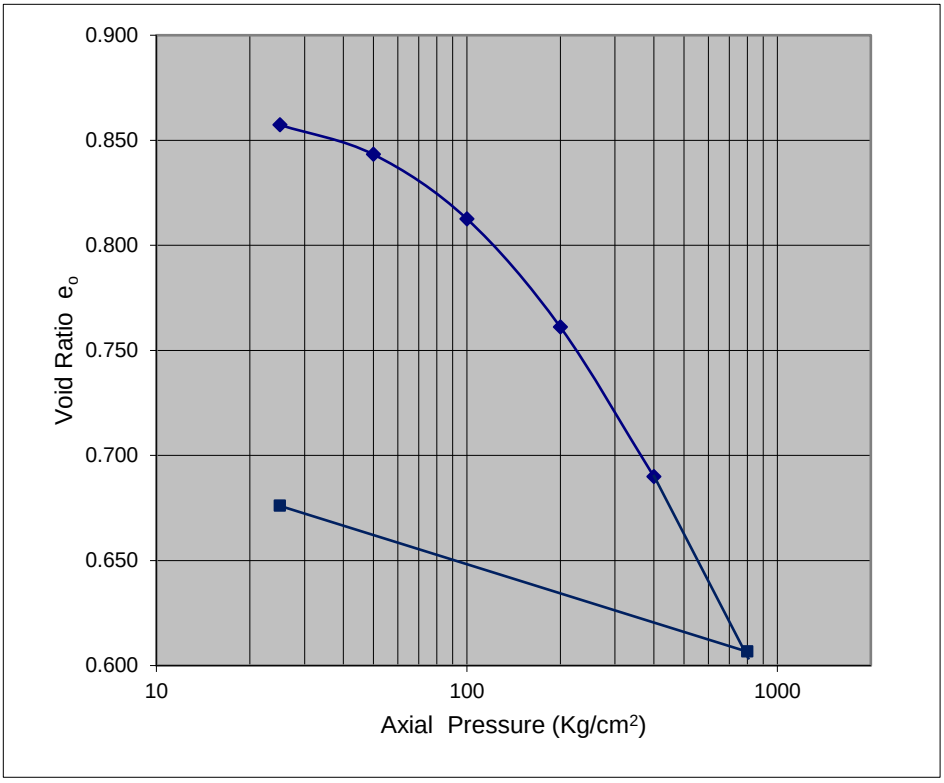
# Consolidation Test Results

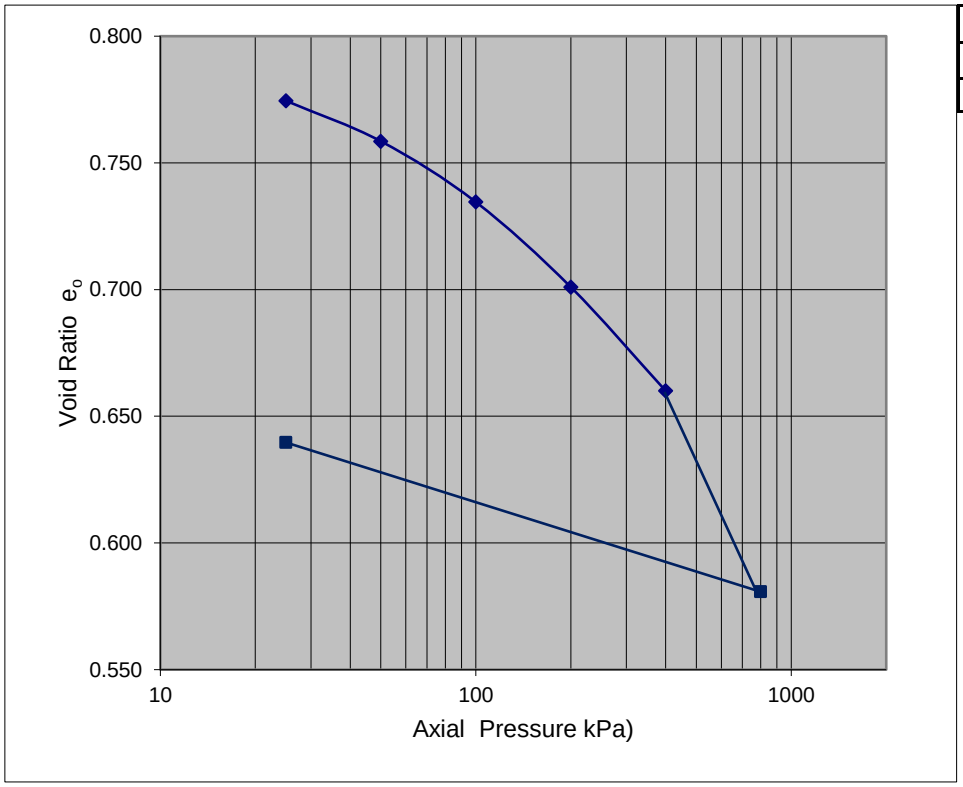
**Project : Samawa Combined Cycle P.P**

**BH No. :** 2 **Sample:** 2 Depth: 1.5-2.0




| | |
|---|---|
| **Cc** | **0.28** |
| **Cr** | **0.046** |
| **$e_o$** | **0.883** |

**BH No. :** 2 **Sample:** 4 Depth: 4.0-4.5




| | |
|---|---|
| **Cc** | **0.26** |
| **Cr** | **0.039** |
| **$e_o$** | **0.814** |

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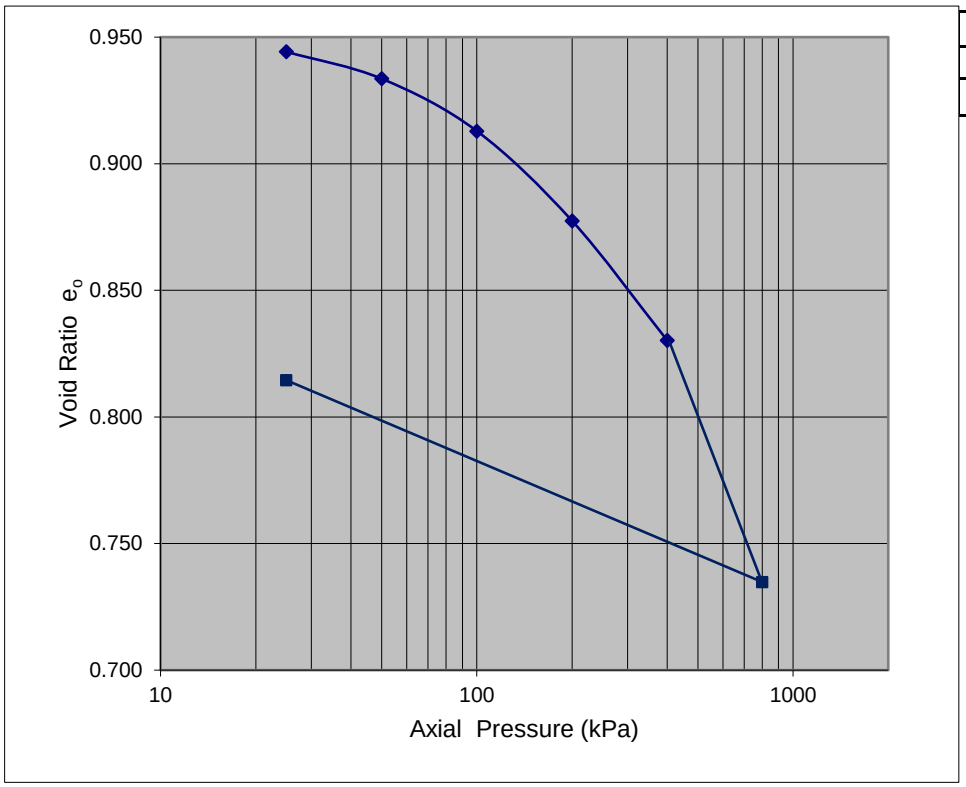
# Consolidation Test Results

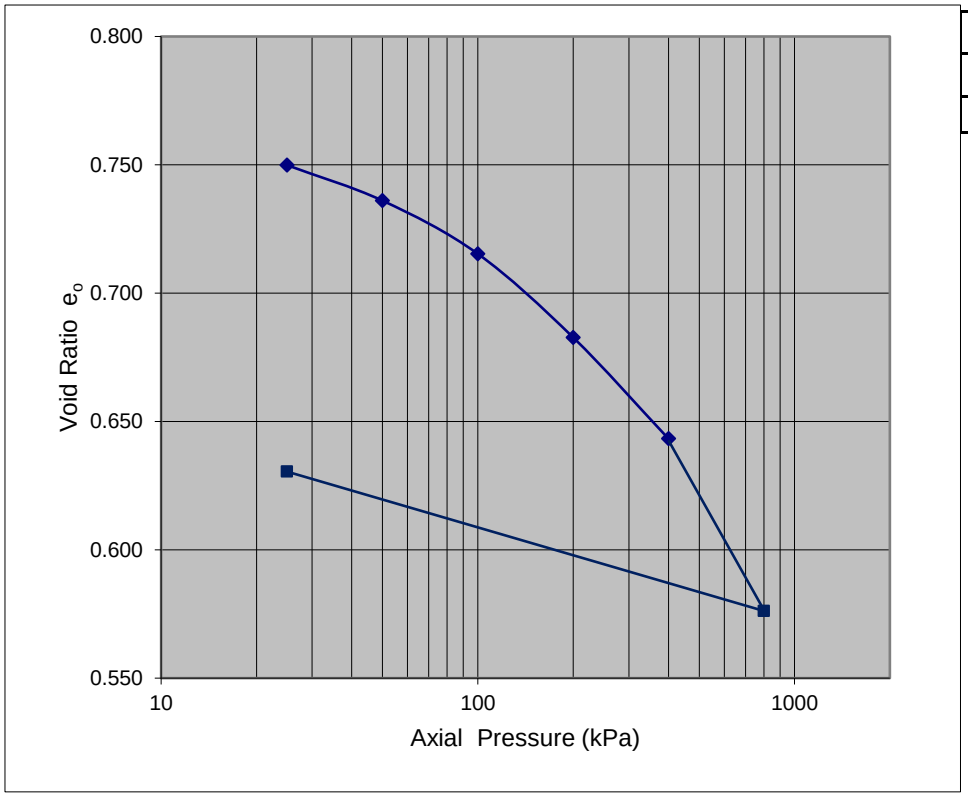
**Project : Samawa Combined Cycle P.P**

**BH No. :** 3 **Sample:** 2 Depth: 1.5-2.0




| | |
|---|---|
| **Cc** | **0.32** |
| **Cr** | **0.053** |
| **$e_o$** | **0.948** |

**BH No. :** 4 **Sample:** 2 Depth: 1.5-2.0




| | |
|---|---|
| **Cc** | **0.22** |
| **Cr** | **0.036** |
| **$e_o$** | **0.772** |

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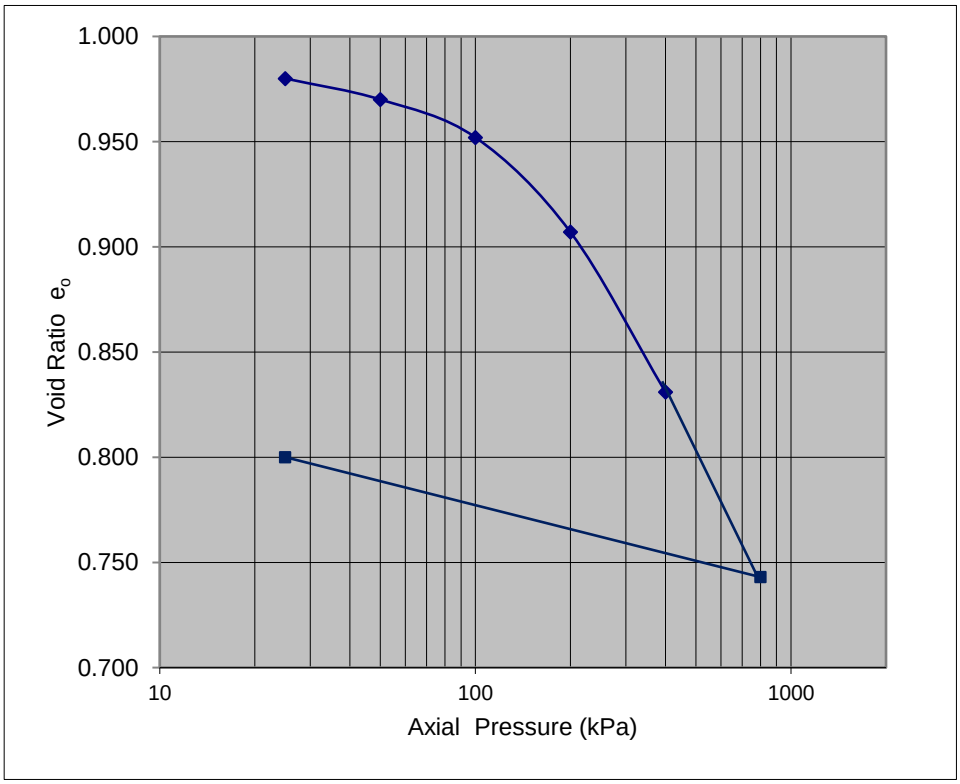
# Consolidation Test Results

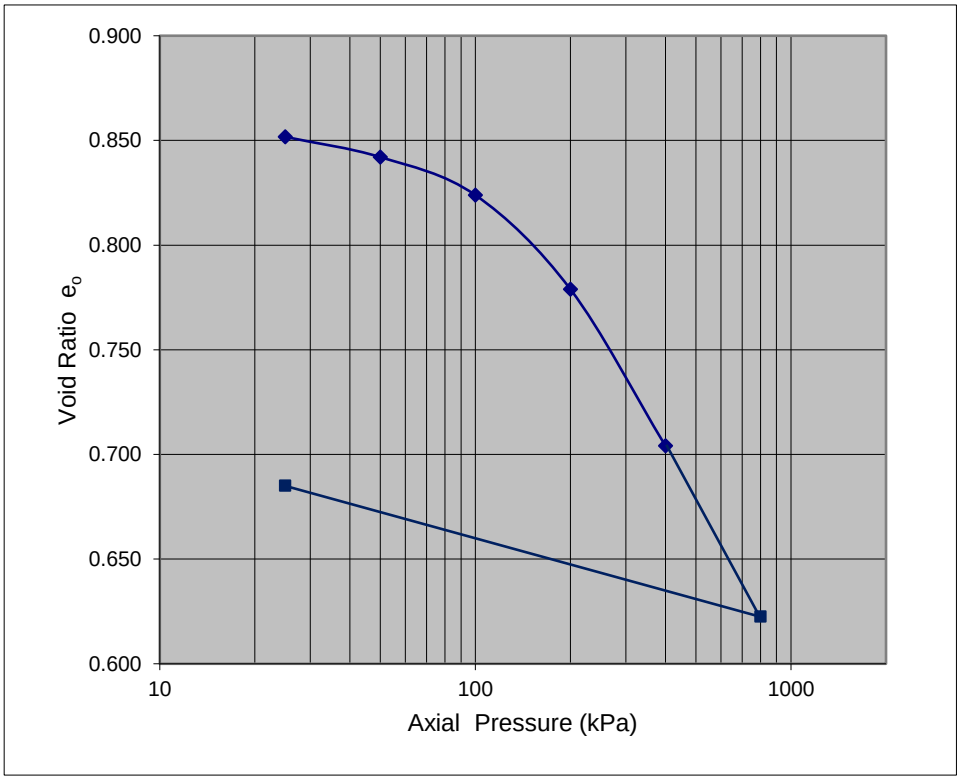
**Project : Samawa Combined Cycle P.P**

**BH No. :** 5 **Sample:** 2 Depth: 1.0-1.5




| | |
|---|---|
| **Cc** | **0.29** |
| **Cr** | **0.038** |
| **$e_o$** | **0.982** |

**BH No. :** 5 **Sample:** 5 Depth: 4.0-4.5




| | |
|---|---|
| **Cc** | **0.27** |
| **Cr** | **0.042** |
| **$e_o$** | **0.854** |

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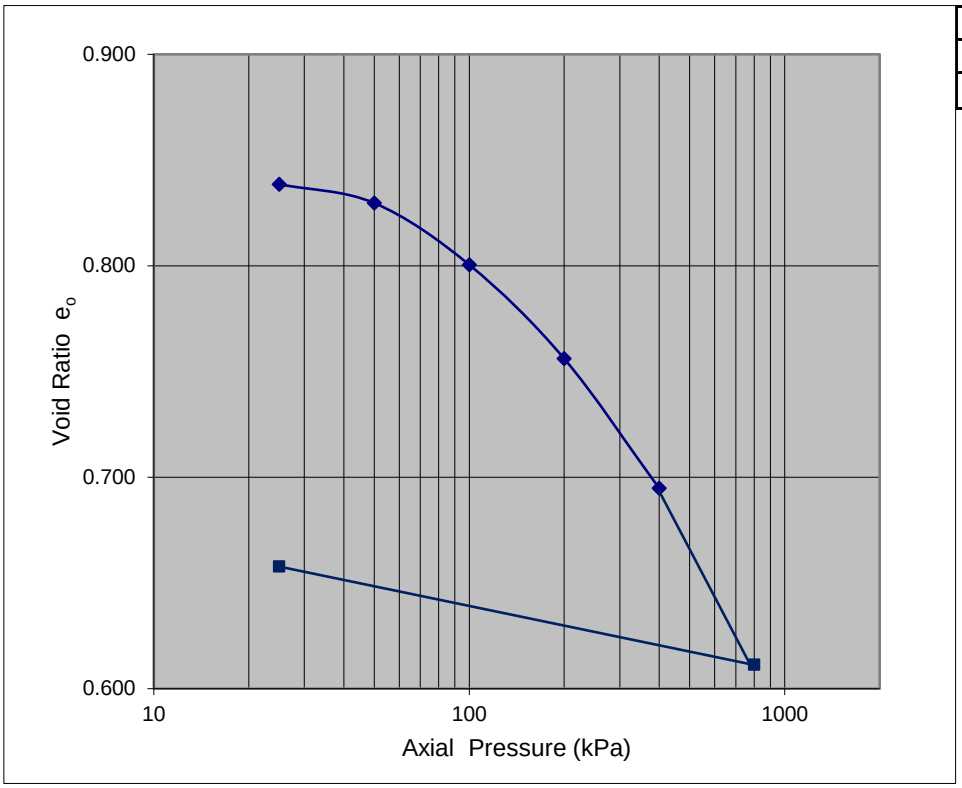
# Consolidation Test Results

**Project :** **Samawa Combined Cycle P.P**

**BH No. :** 6 **Sample:** 2 Depth: 1.0-1.5




| | |
|---|---|
| **Cc** | **0.28** |
| **Cr** | **0.031** |
| **$e_o$** | **0.868** |

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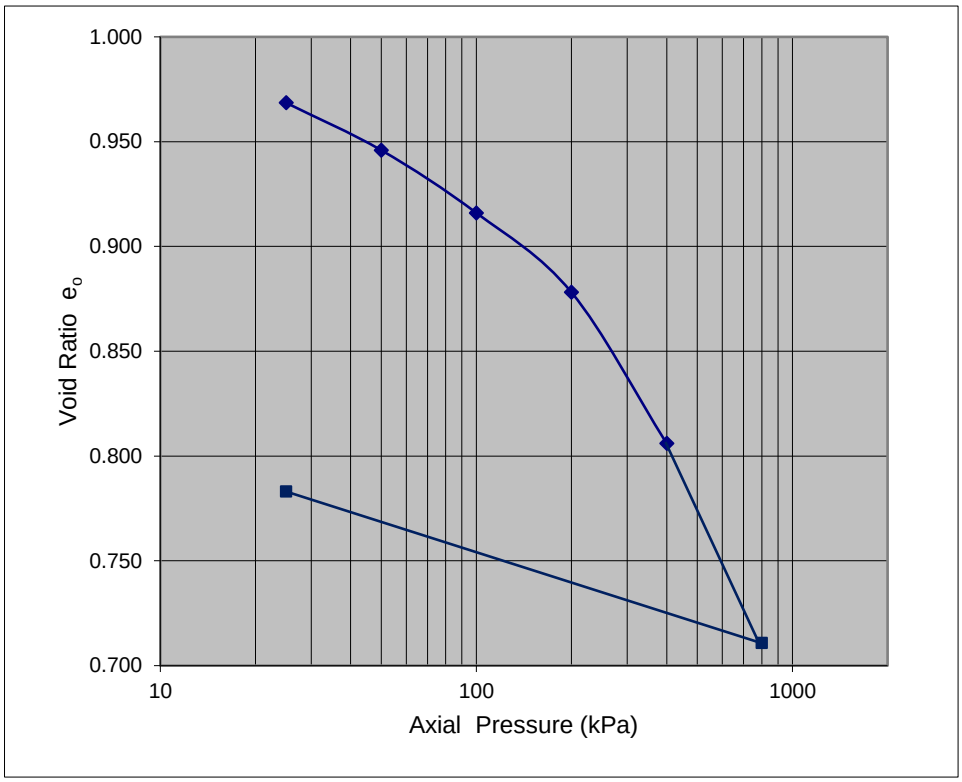
# Consolidation Test Results

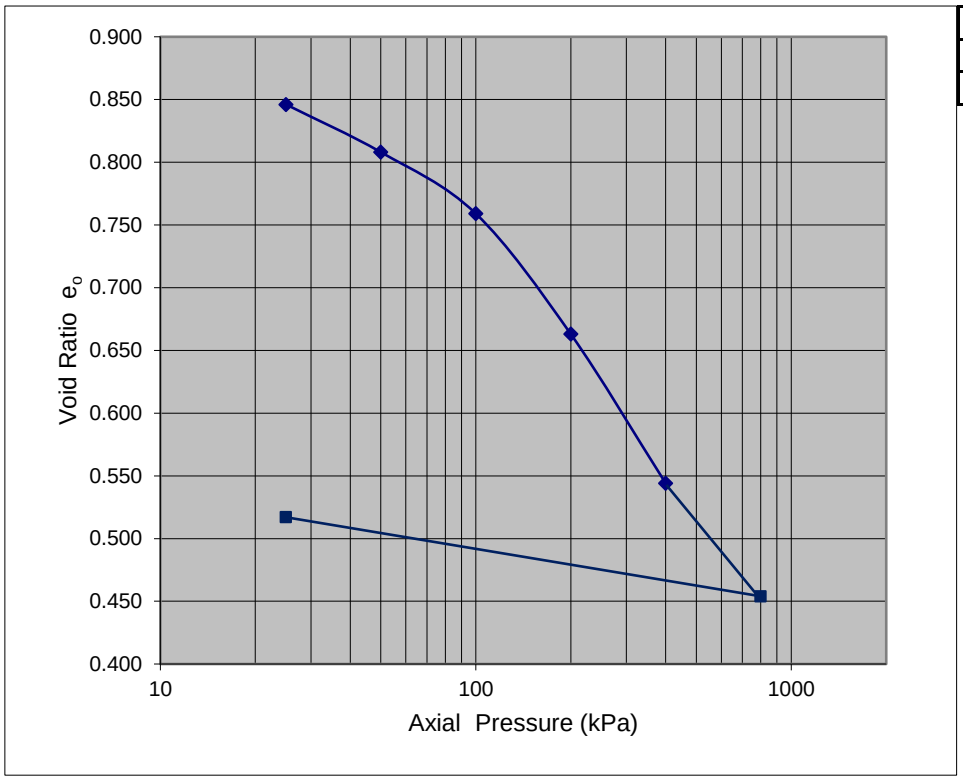
**Project :** **Samawa Combined Cycle P.P**

**BH No. :** 7 **Sample:** 3 Depth: 2.0-2.5




| | |
|---|---|
| **Cc** | **0.32** |
| **Cr** | **0.048** |
| **$e_o$** | **0.991** |

**BH No. :** 7 **Sample:** 5 Depth: 4.0-4.5




| | |
|---|---|
| **Cc** | **0.30** |
| **Cr** | **0.042** |
| **$e_o$** | **0.976** |

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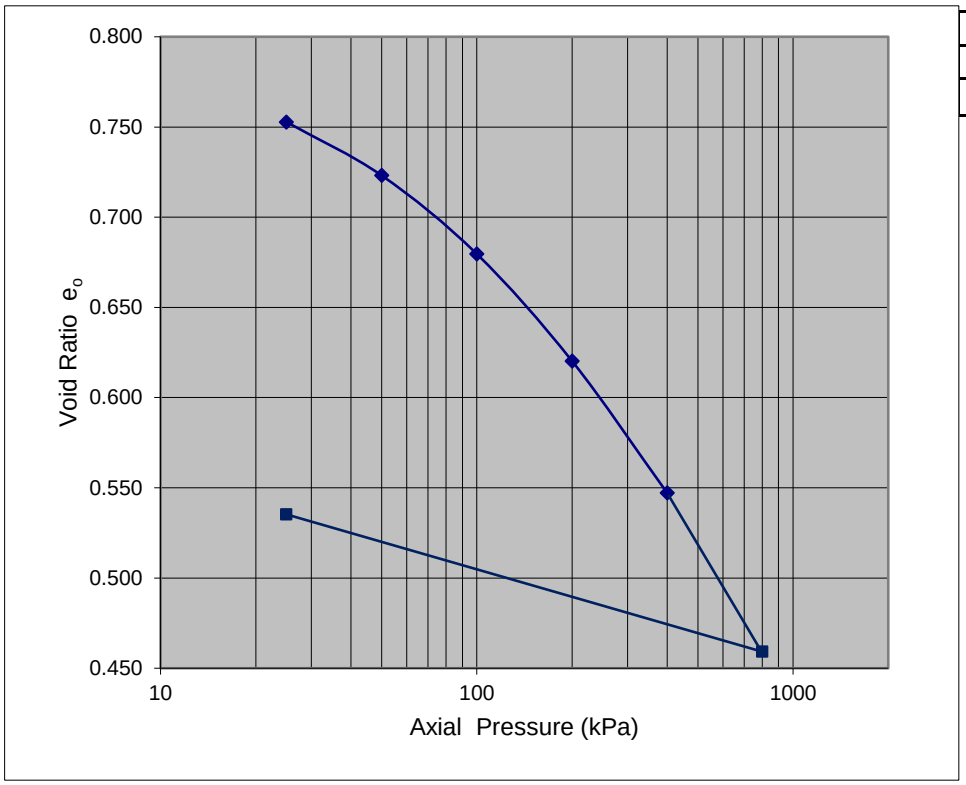
# Consolidation Test Results

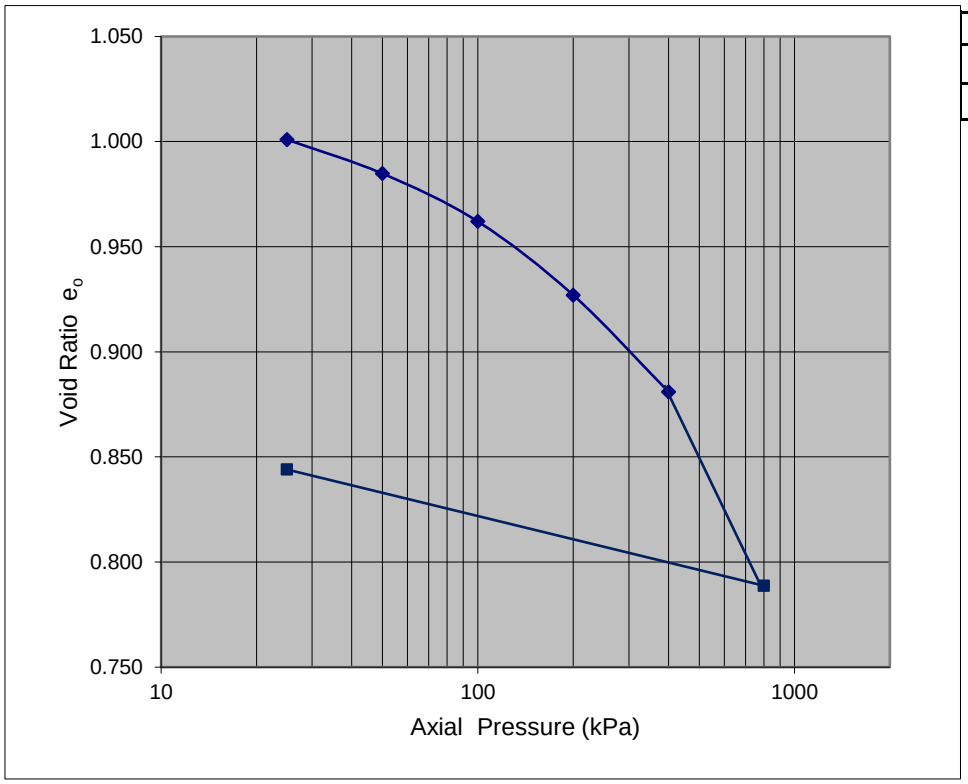
**Project :** **Samawa Combined Cycle P.P**

**BH No. :** 8 **Sample:** 2 Depth: 1.0-1.5




| | |
|---|---|
| **Cc** | **0.29** |
| **Cr** | **0.051** |
| **$e_o$** | **0.802** |

**BH No. :** 9 **Sample:** 3 Depth: 2.0-2.5




| | |
|---|---|
| **Cc** | **0.31** |
| **Cr** | **0.037** |
| **$e_o$** | **1.049** |

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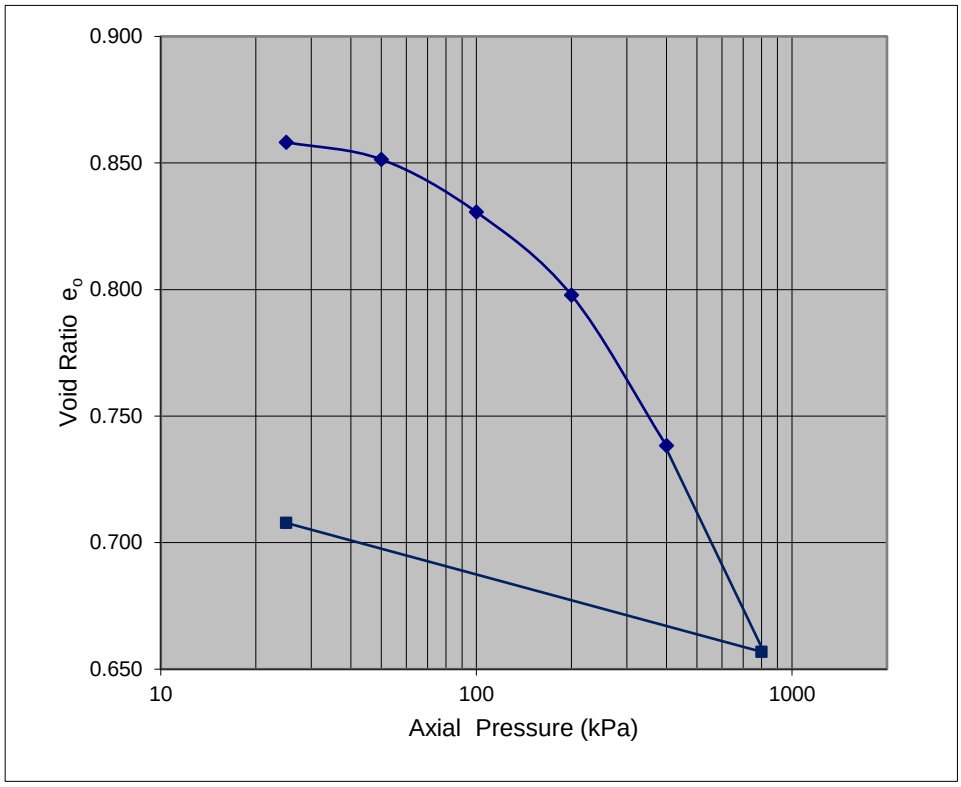
# Consolidation Test Results

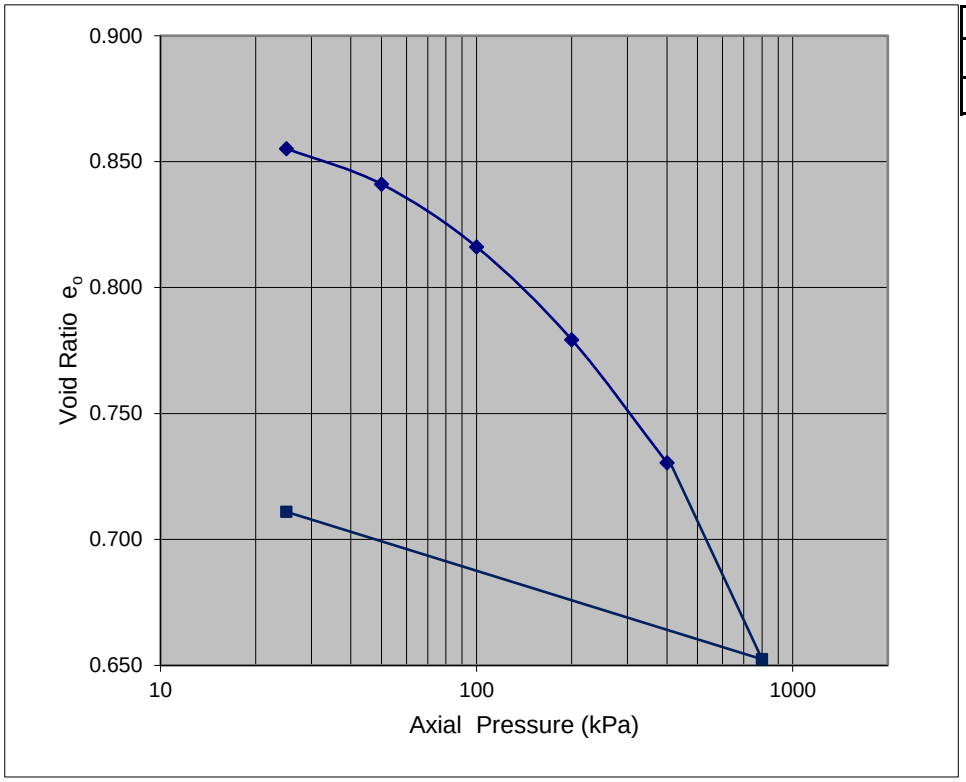
**Project :** **Samawa Combined Cycle P.P**

**BH No. :** 10 **Sample:** 2 Depth: 1.5-2.0




| | |
|---|---|
| **Cc** | **0.27** |
| **Cr** | **0.034** |
| **$e_o$** | **0.876** |

**BH No. :** 11 **Sample:** 3 Depth: 2.0-2.5




| | |
|---|---|
| **Cc** | **0.26** |
| **Cr** | **0.039** |
| **$e_o$** | **0.876** |

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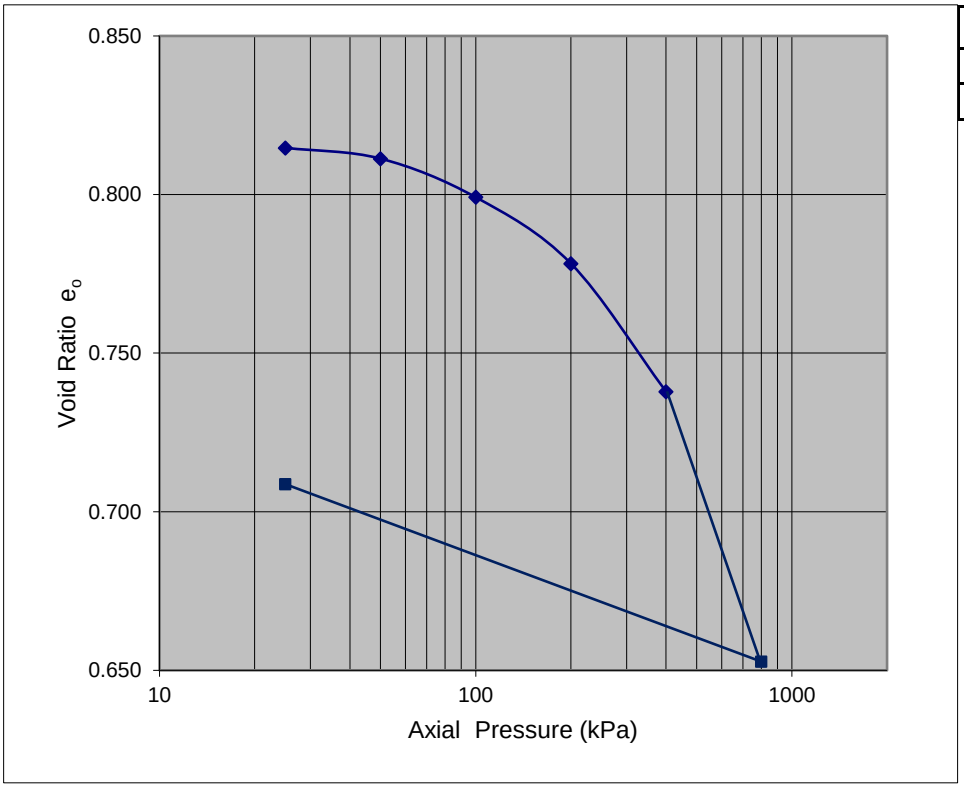
# Consolidation Test Results

**Project :** **Samawa Combined Cycle P.P**

**BH No. :** 12 **Sample:** 2 Depth: 1.5-2.0




| | |
|---|---|
| **Cc** | **0.28** |
| **Cr** | **0.037** |
| **$e_o$** | **0.828** |

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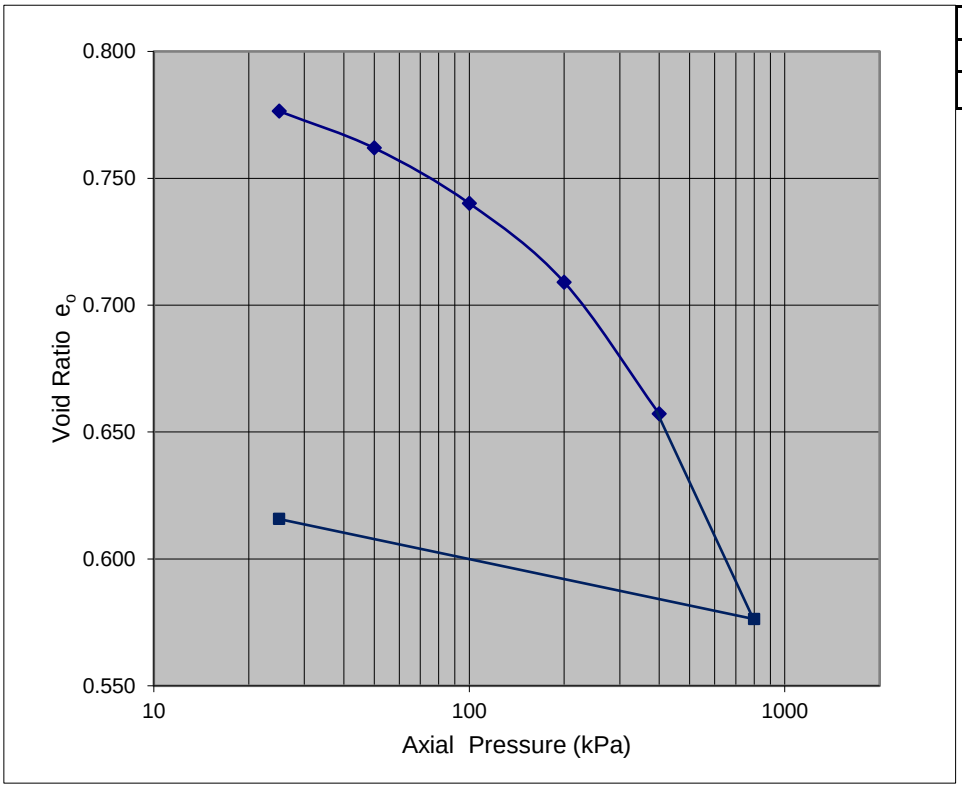
# Consolidation Test Results

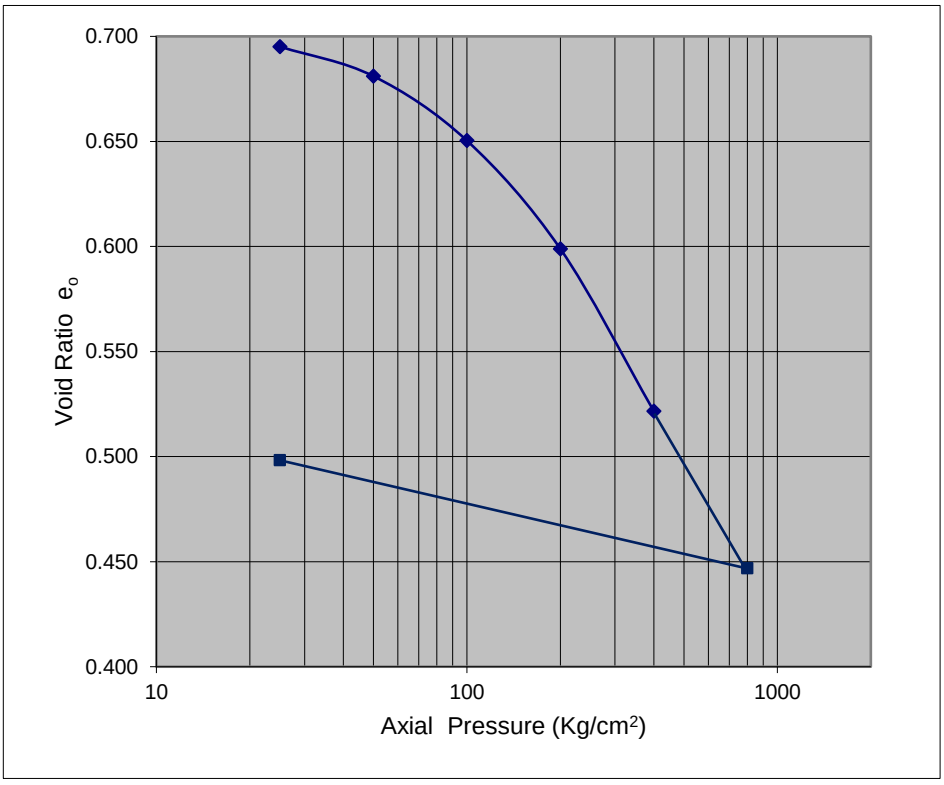
**Project : Samawa Combined Cycle P.P**

**BH No. :** 13 **Sample:** 2 Depth: 1.5-2.0




| | |
|---|---|
| **Cc** | **0.27** |
| **Cr** | **0.026** |
| **$e_o$** | **0.782** |

**BH No. :** 13 **Sample:** 4 Depth: 4.0-4.5




| | |
|---|---|
| **Cc** | **0.25** |
| **Cr** | **0.034** |
| **$e_o$** | **0.721** |

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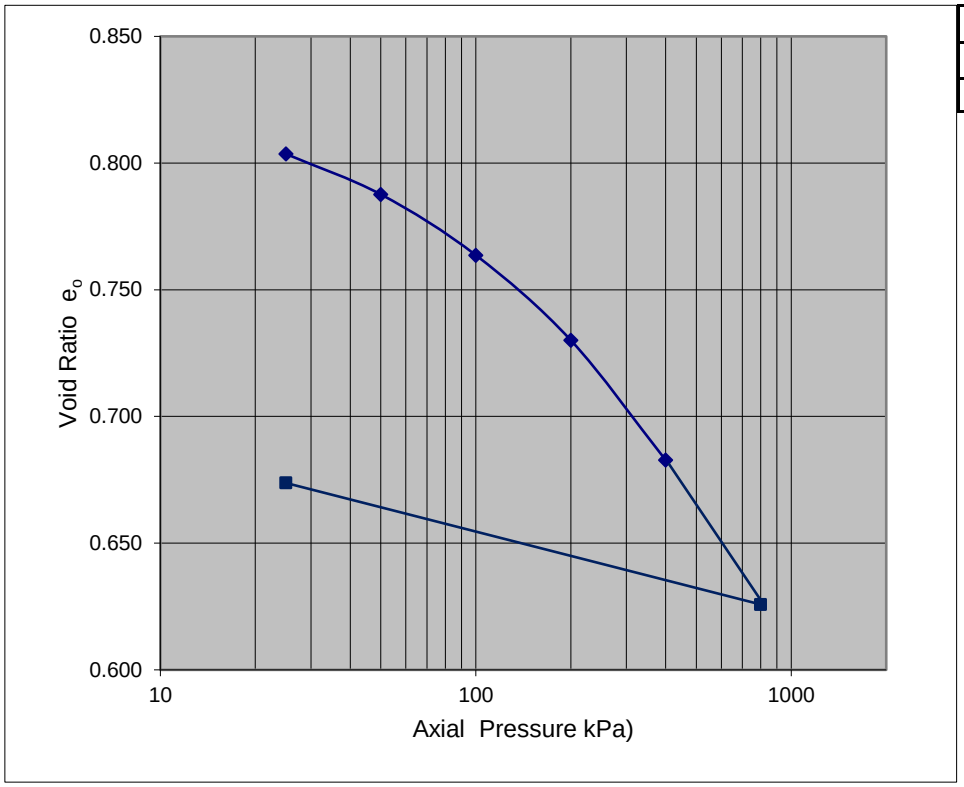
# Consolidation Test Results

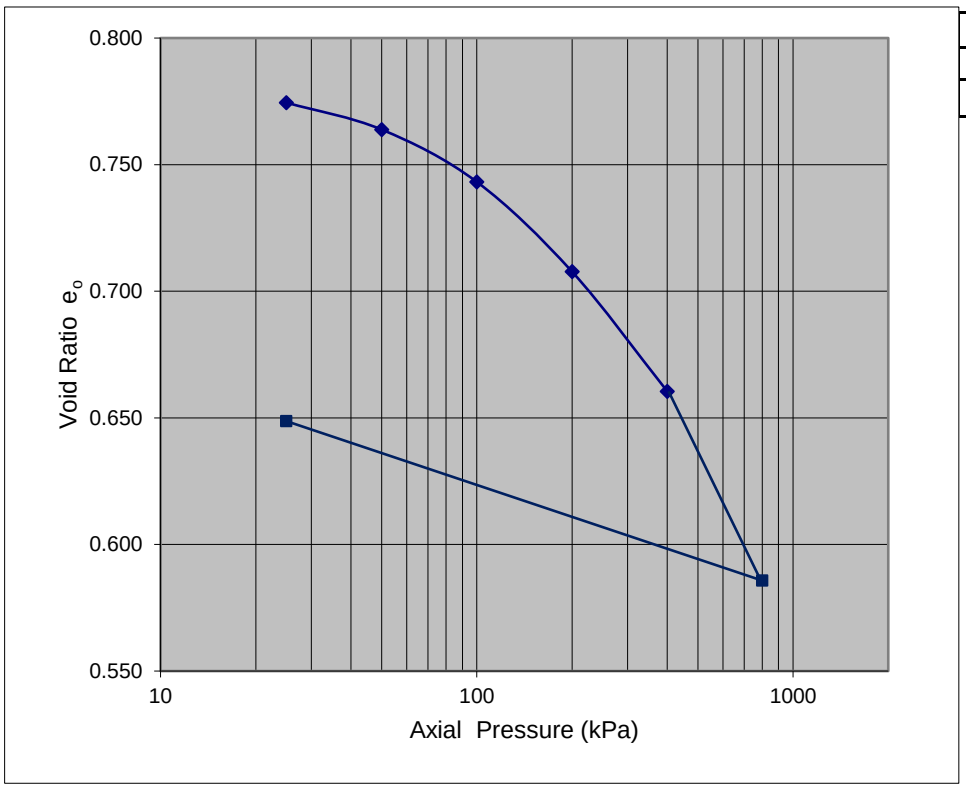
**Project : Samawa Combined Cycle P.P**

**BH No. :** 14 **Sample:** 3 Depth: 2.0-2.5




| | |
|---|---|
| **Cc** | **0.19** |
| **Cr** | **0.032** |
| **$e_o$** | **0.844** |

**BH No. :** 14 **Sample:** 5 Depth: 4.0-4.5




| | |
|---|---|
| **Cc** | **0.25** |
| **Cr** | **0.042** |
| **$e_o$** | **0.779** |

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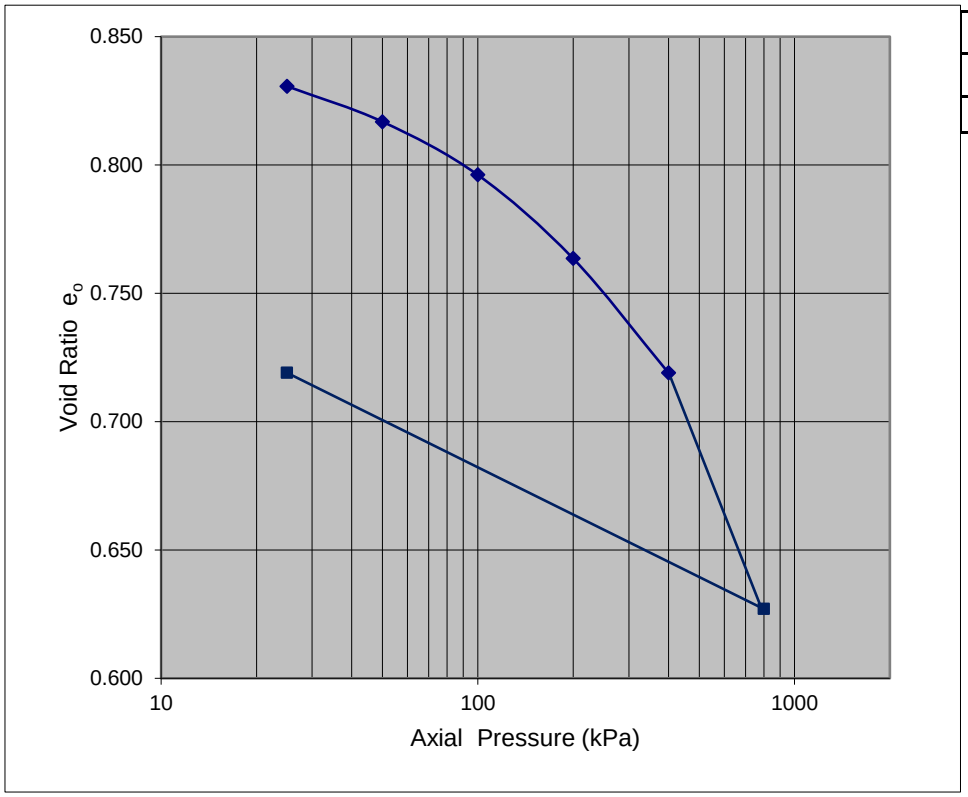
# Consolidation Test Results

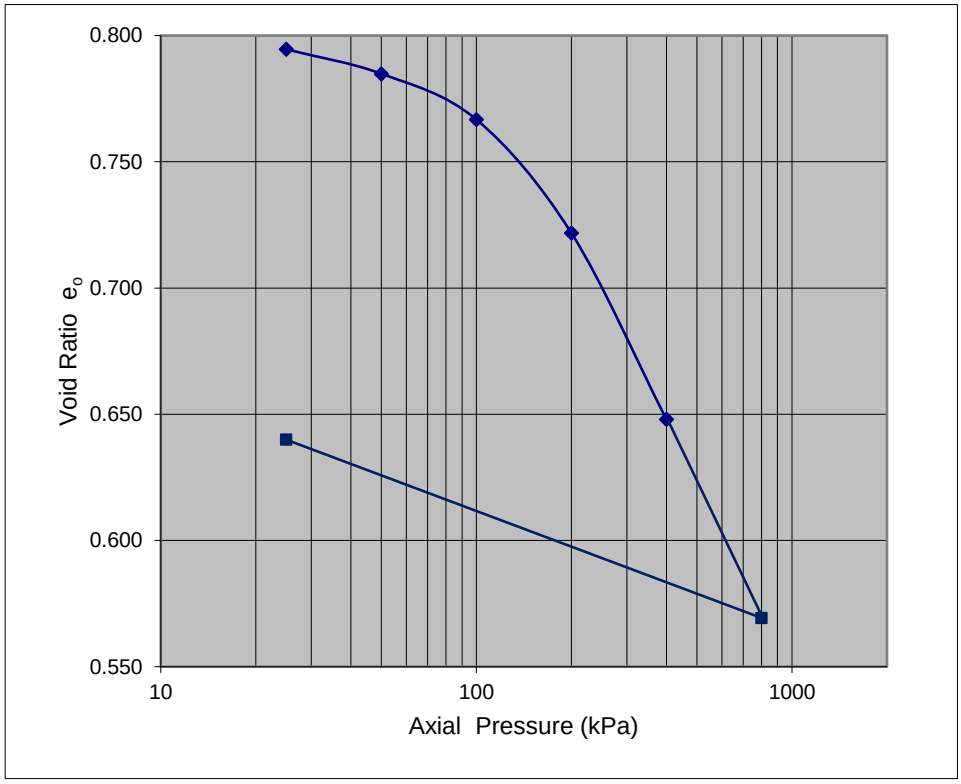
**Project : Samawa Combined Cycle P.P**

**BH No. :** 15 **Sample:** 2 Depth: 1.5-2.0




| | |
|---|---|
| **Cc** | **0.31** |
| **Cr** | **0.061** |
| **$e_o$** | **0.852** |

**BH No. :** 15 **Sample:** 4 Depth: 4.0-4.5




| | |
|---|---|
| **Cc** | **0.26** |
| **Cr** | **0.047** |
| **$e_o$** | **0.797** |

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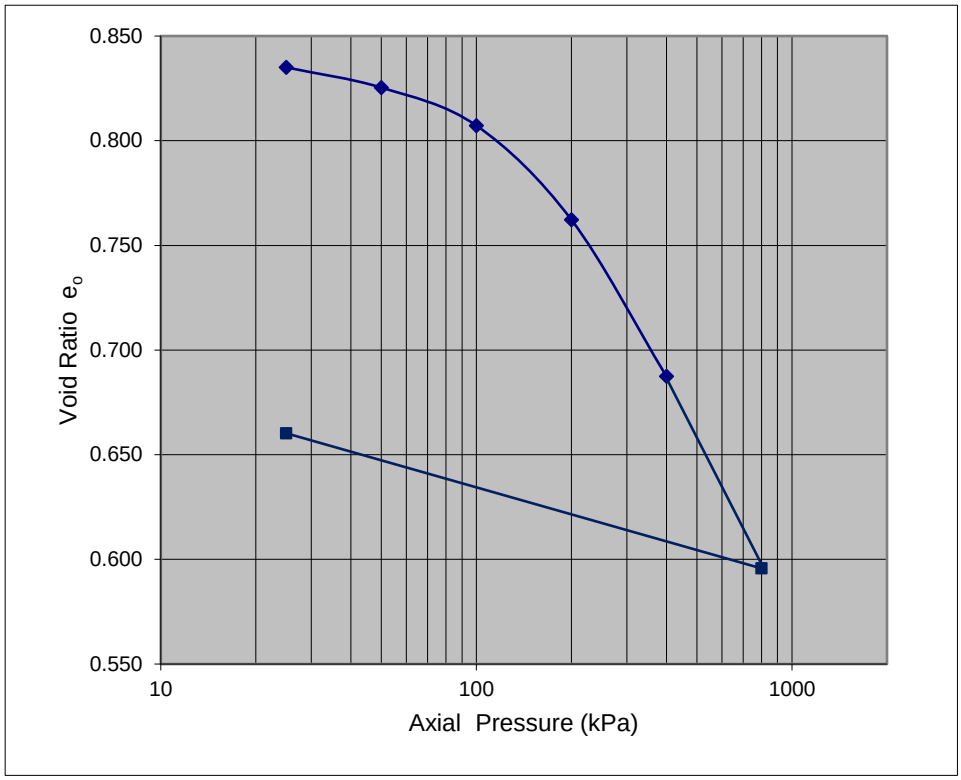
# Consolidation Test Results

**Project :** **Samawa Combined Cycle P.P**

**BH No. :** 16 **Sample:** 2 Depth: 1.5-2.0




| | |
|---|---|
| **Cc** | **0.30** |
| **Cr** | **0.043** |
| **$e_o$** | **0.838** |

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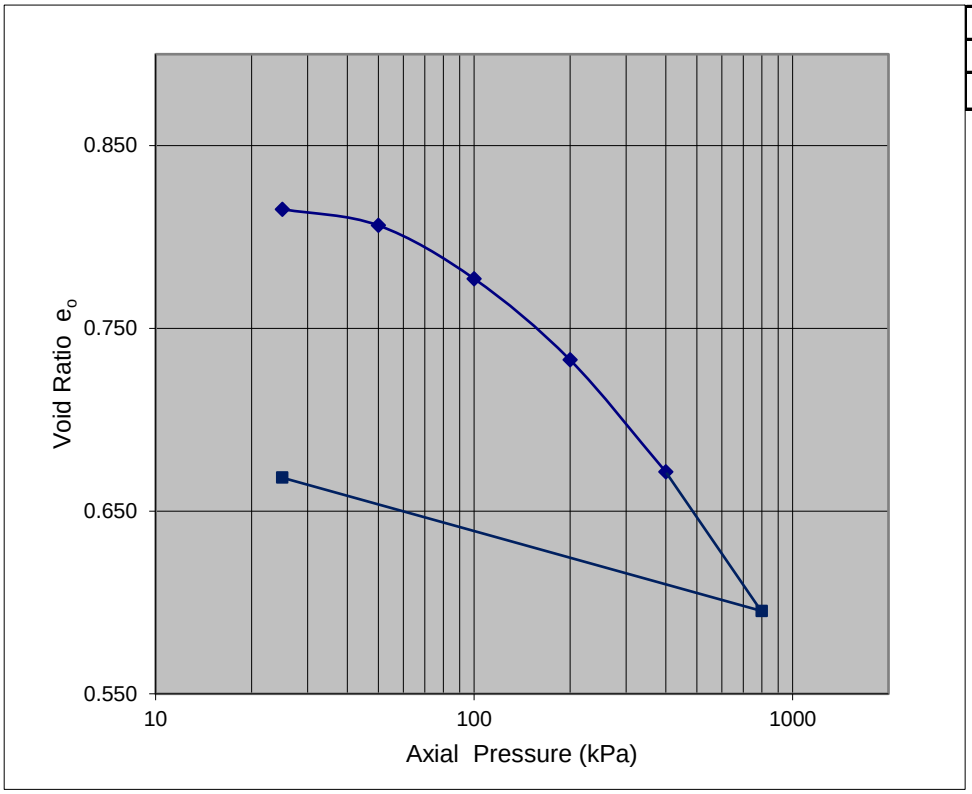
# Consolidation Test Results

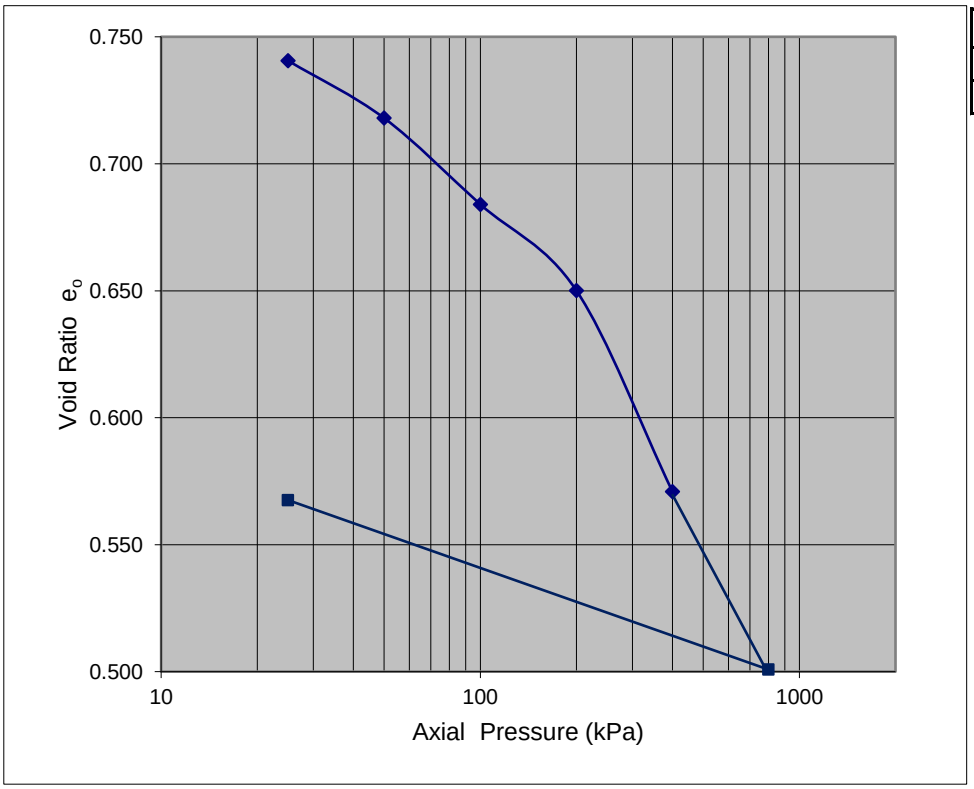
**Project :** **Samawa Combined Cycle P.P**

**BH No. :** 17 **Sample:** 2 Depth: 1.5-2.0




| | |
|---|---|
| **Cc** | **0.25** |
| **Cr** | **0.048** |
| **$e_o$** | **0.845** |

**BH No. :** 17 **Sample:** 5 Depth: 4.5-5.0




| | |
|---|---|
| **Cc** | **0.23** |
| **Cr** | **0.044** |
| **$e_o$** | **0.763** |

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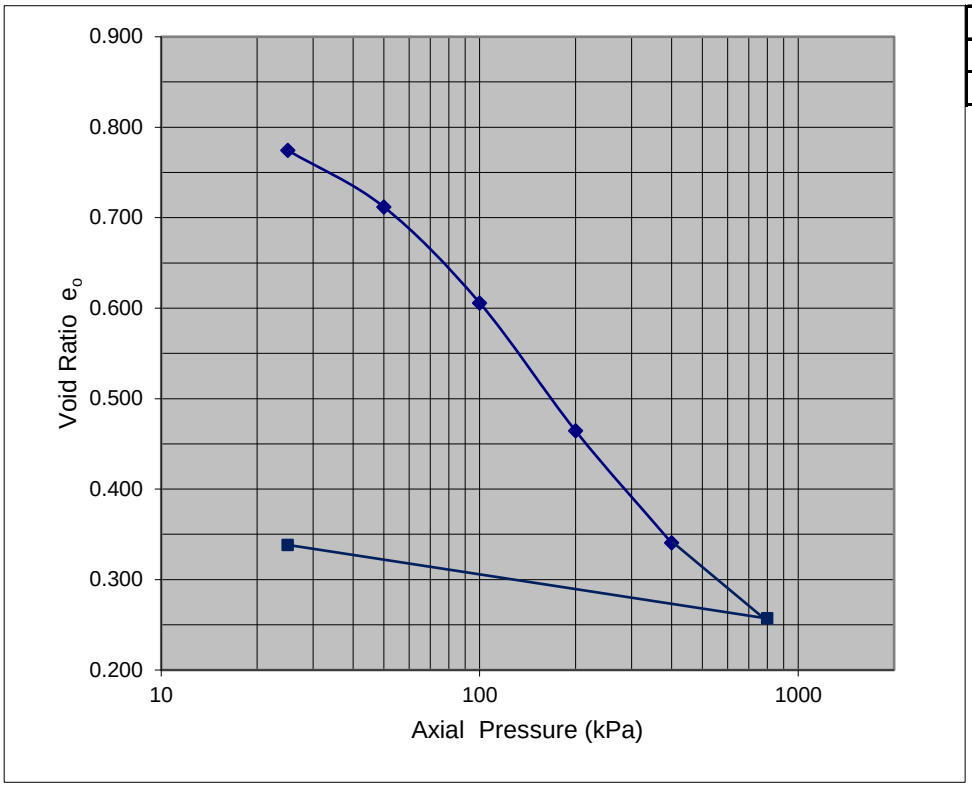
# Consolidation Test Results

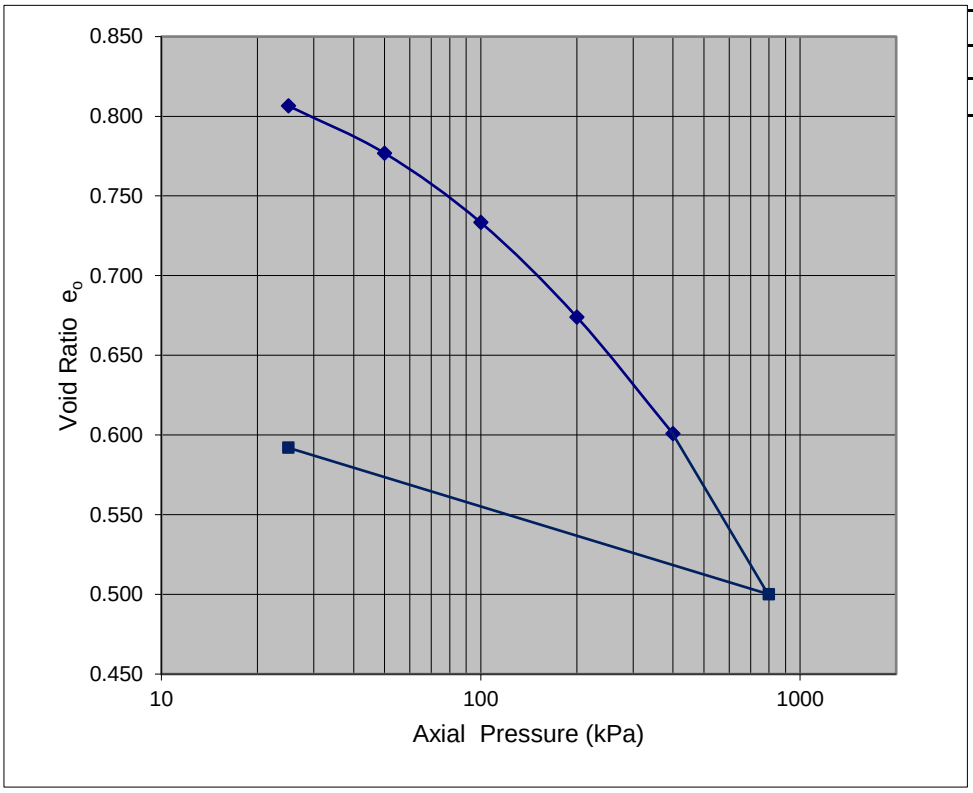
**Project :** **Samawa Combined Cycle P.P**

**BH No. :** 18 **Sample:** 3 Depth: 2.0-2.5




| | |
|---|---|
| **Cc** | **0.28** |
| **Cr** | **0.054** |
| **$e_o$** | **0.818** |

**BH No. :** 19 **Sample:** 3 Depth: 3.0-3.5




| | |
|---|---|
| **Cc** | **0.34** |
| **Cr** | **0.061** |
| **$e_o$** | **0.856** |

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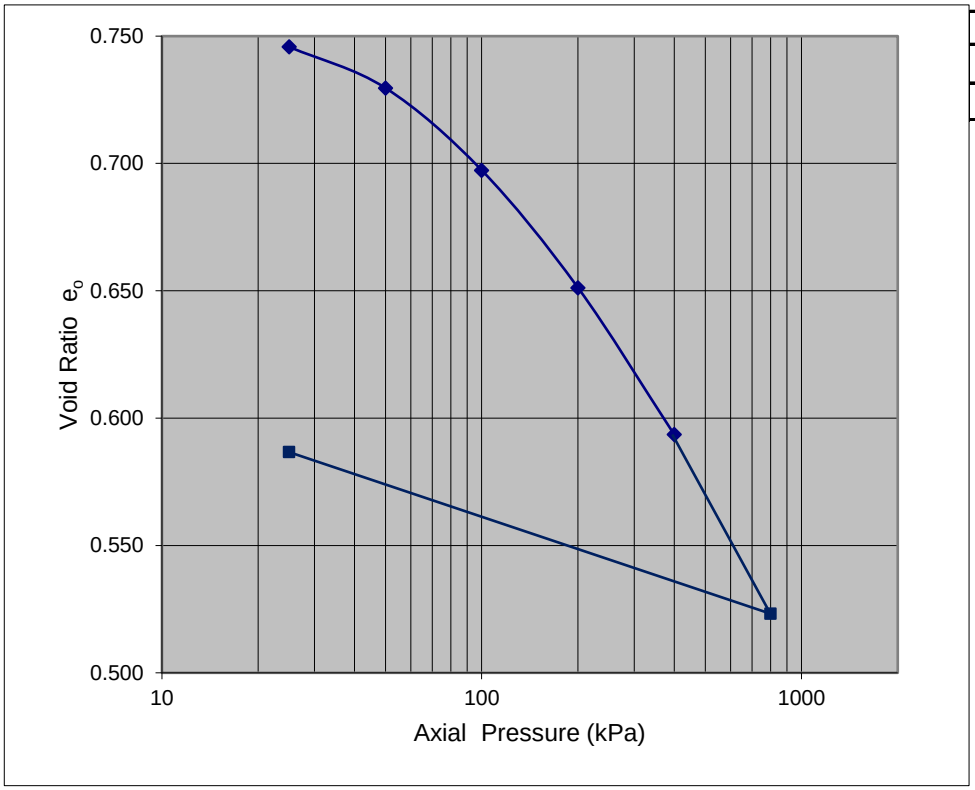
# Consolidation Test Results

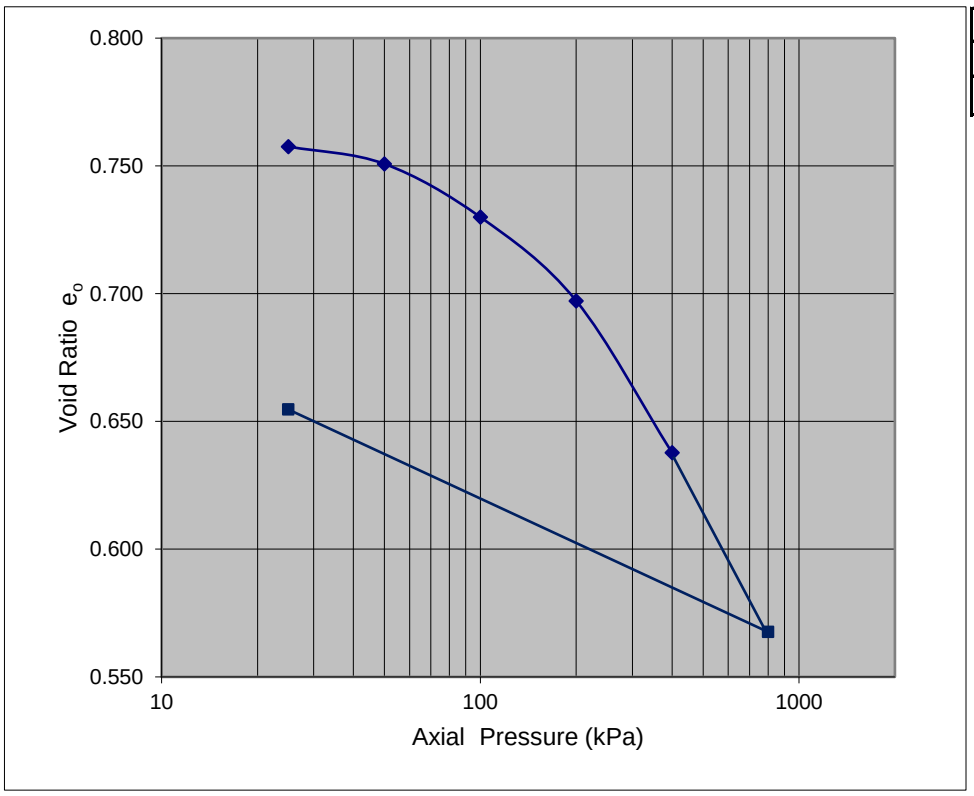
**Project :** **Samawa Combined Cycle P.P**

**BH No. :** 20 **Sample:** 2 Depth: 1.5-2.0




| | |
|---|---|
| **Cc** | **0.23** |
| **Cr** | **0.042** |
| **$e_o$** | **0.794** |

**BH No. :** 21 **Sample:** 2 Depth: 1.5-2.0




| | |
|---|---|
| **Cc** | **0.23** |
| **Cr** | **0.058** |
| **$e_o$** | **0.776** |

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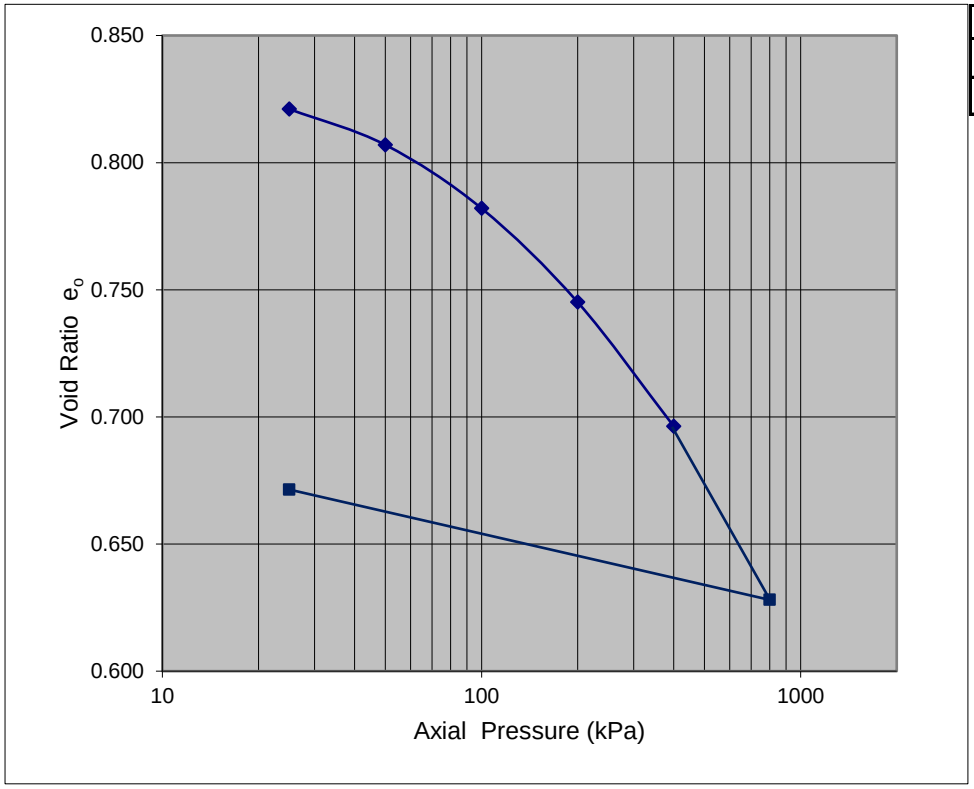
# Consolidation Test Results

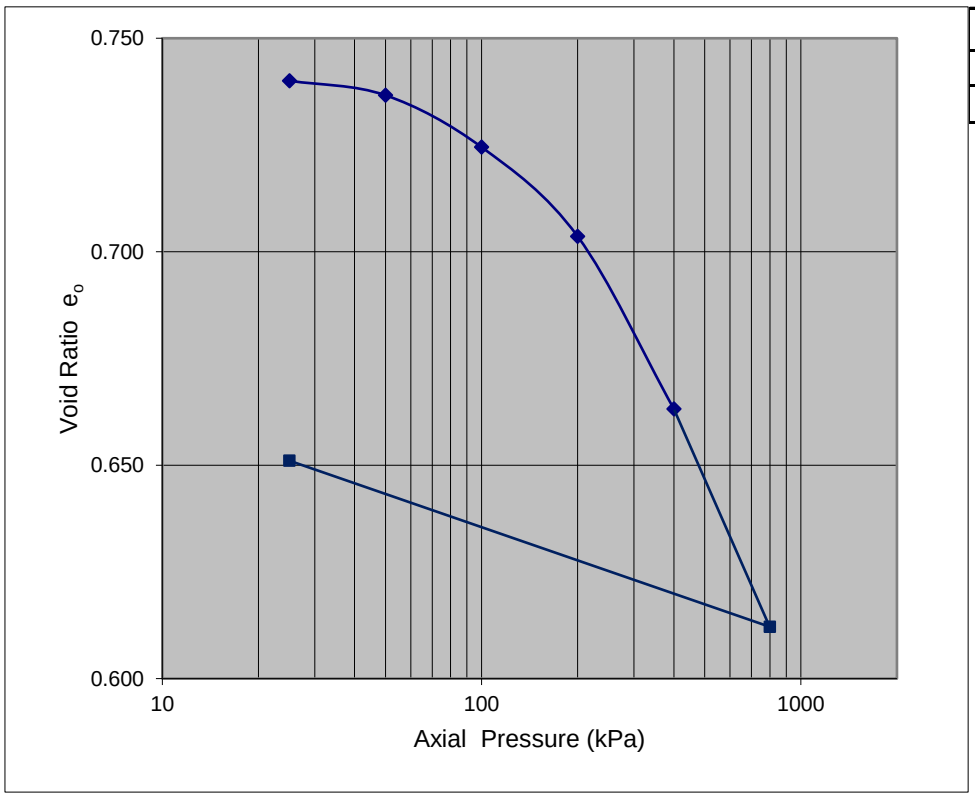
**Project :** **Samawa Combined Cycle P.P**

**BH No. :** 22 **Sample:** 2 Depth: 1.5-2.0




| | |
|---|---|
| **Cc** | **0.23** |
| **Cr** | **0.029** |
| **$e_o$** | **0.842** |

**BH No. :** 22 **Sample:** 4 Depth: 4.0-4.5




| | |
|---|---|
| **Cc** | **0.17** |
| **Cr** | **0.026** |
| **$e_o$** | **0.753** |

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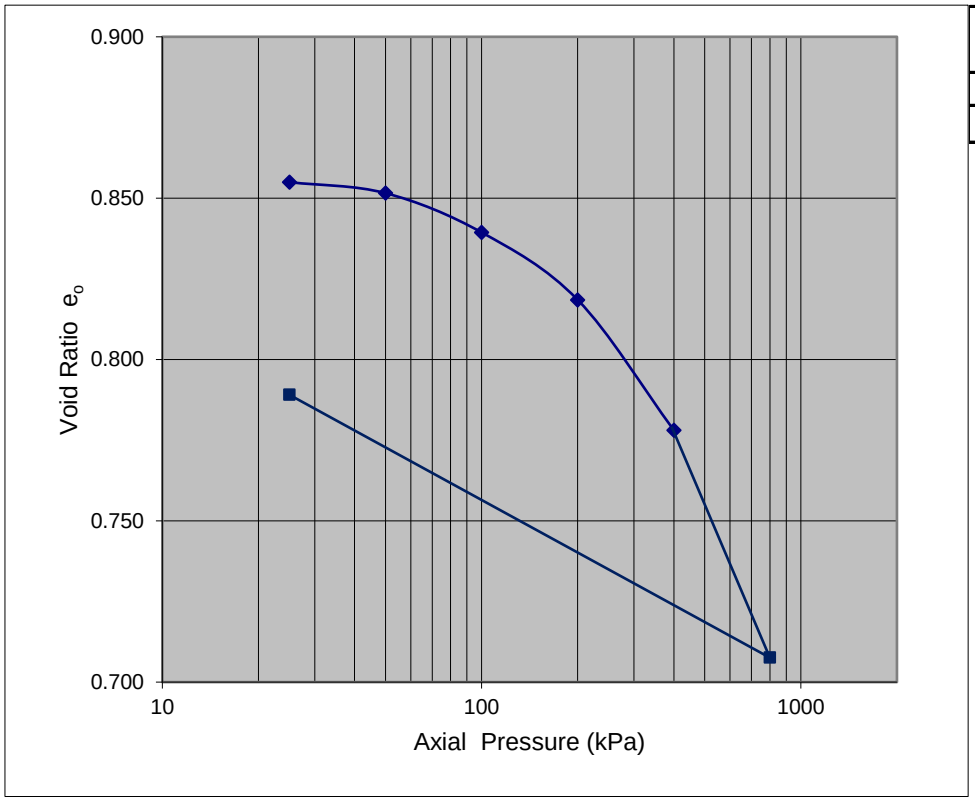
# Consolidation Test Results

**Project :** **Samawa Combined Cycle P.P**

**BH No. :** 23 **Sample:** 2 Depth: 1.5-2.0




| | |
|---|---|
| **Cc** | **0.23** |
| **Cr** | **0.054** |
| **$e_o$** | **0.868** |

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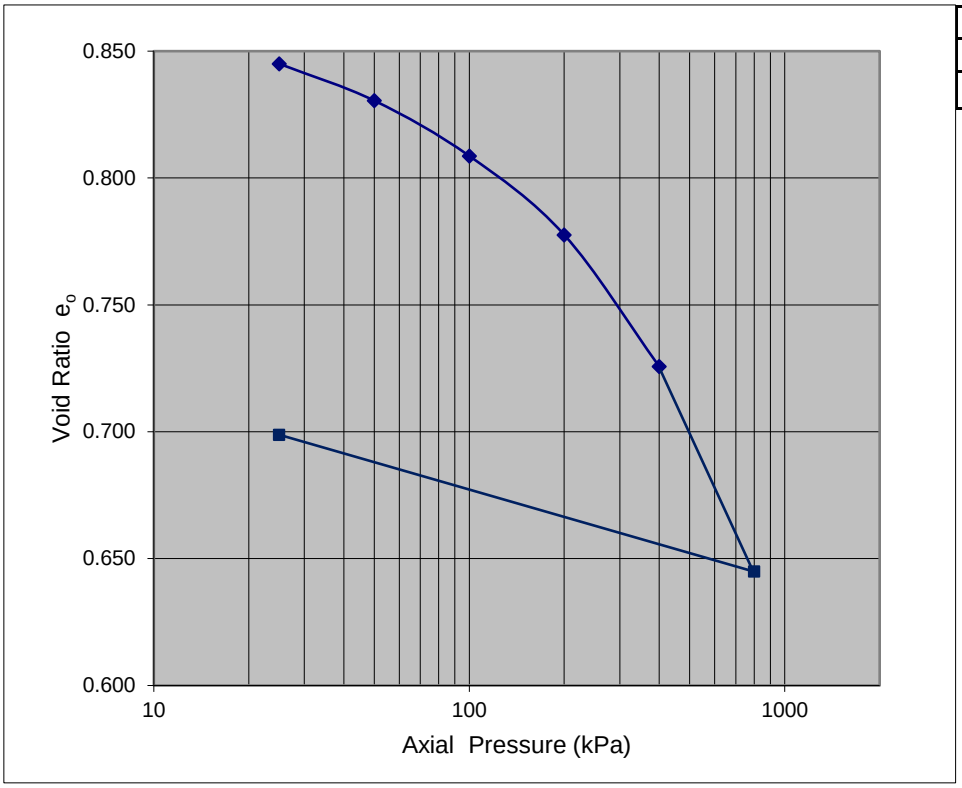
# Consolidation Test Results

**Project : Samawa Combined Cycle P.P**
**BH No. :** 24 **Sample:** 2 Depth: 1.5-2.0




| | |
|---|---|
| **Cc** | **0.27** |
| **Cr** | **0.036** |
| **$e_o$** | **0.850** |

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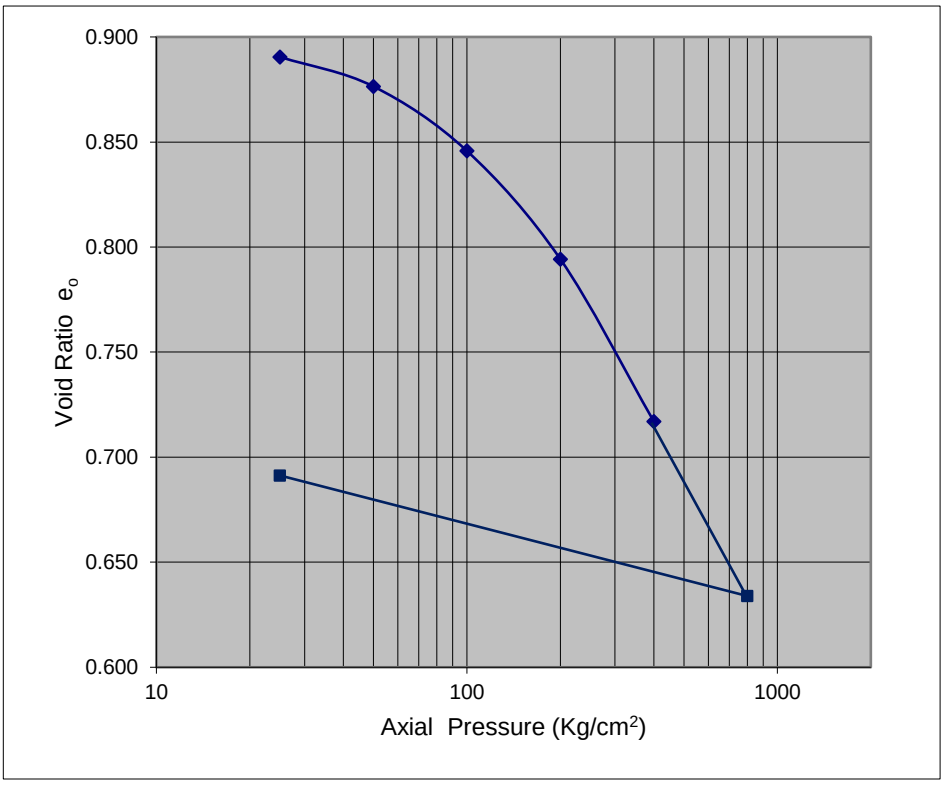
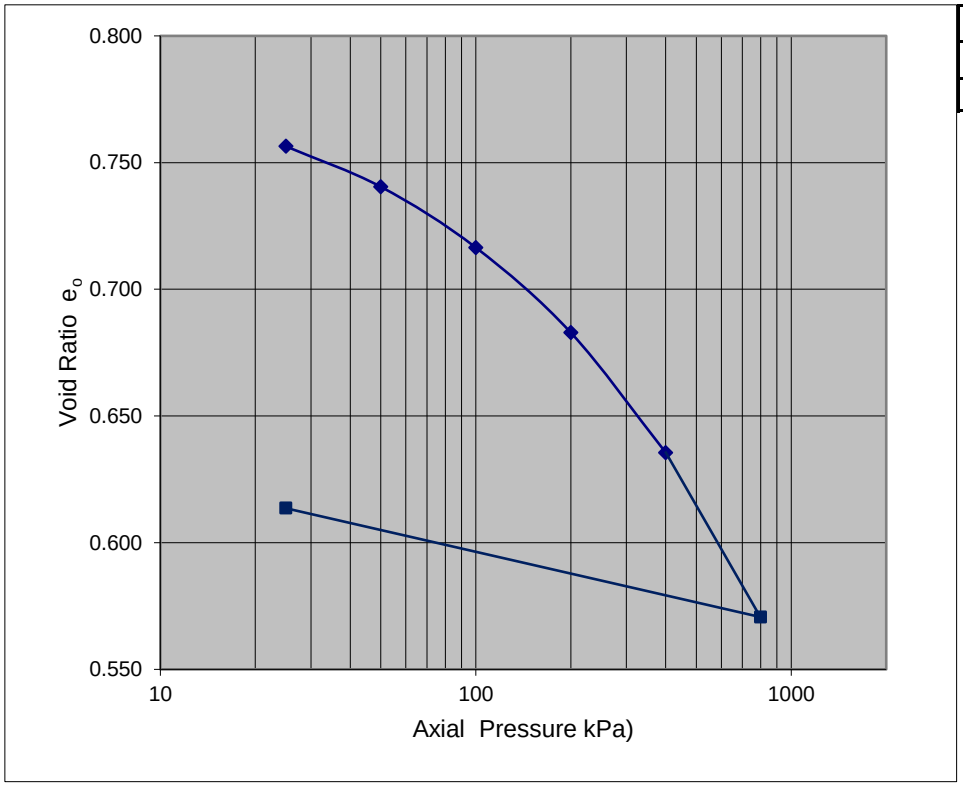
# Consolidation Test Results

**Project : Samawa Combined Cycle P.P**
**BH No. :** 25 **Sample:** 2 Depth: 1.0-1.5




| | |
|---|---|
| **Cc** | **0.28** |
| **Cr** | **0.038** |
| **$e_o$** | **0.916** |

**BH No. :** 25 **Sample:** 5 Depth: 4.0-4.5




| | |
|---|---|
| **Cc** | **0.22** |
| **Cr** | **0.029** |
| **$e_o$** | **0.796** |

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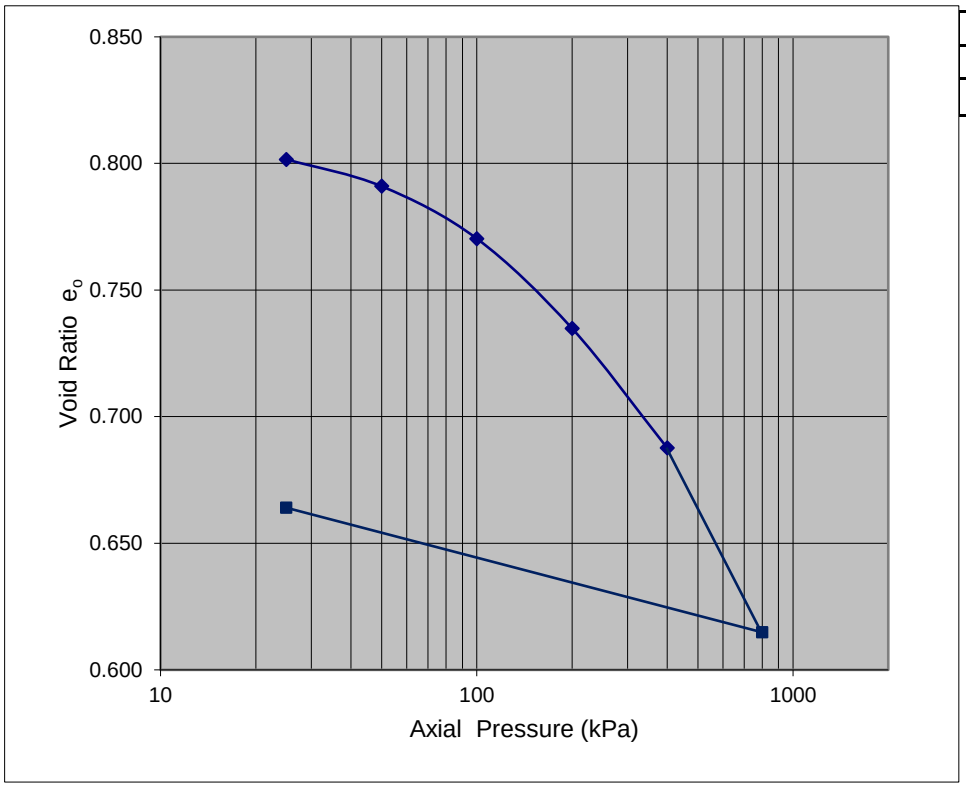
# Consolidation Test Results

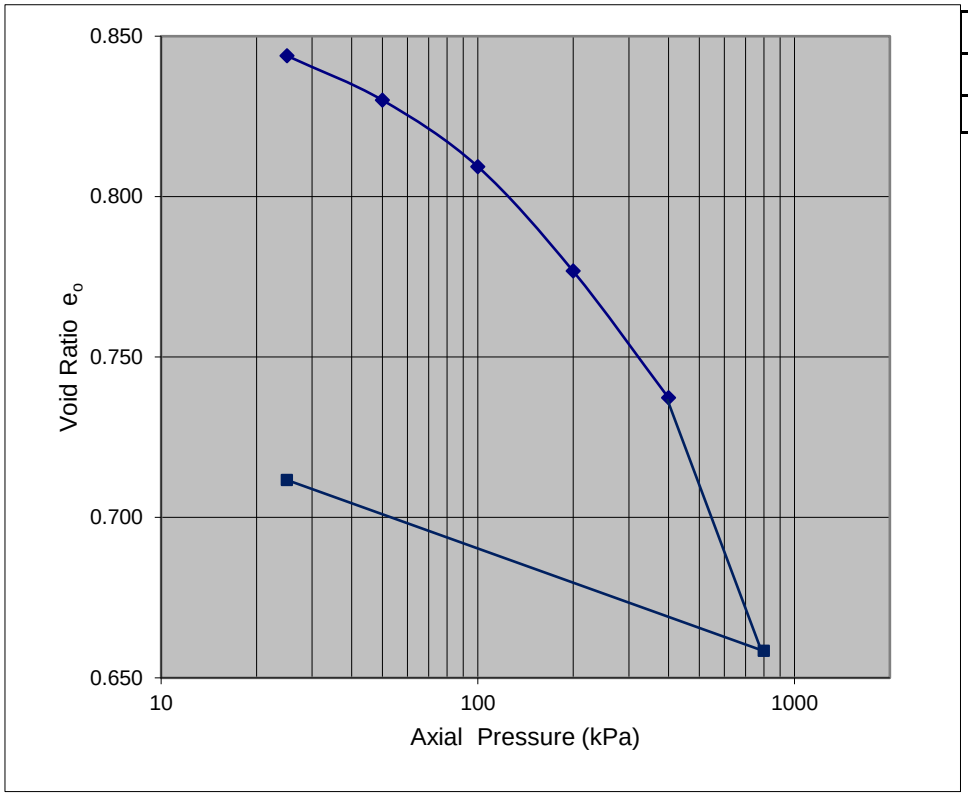
**Project : Samawa Combined Cycle P.P**

**BH No. :** 26 **Sample:** 2 Depth: 1.5-2.0




| | |
|---|---|
| **Cc** | **0.24** |
| **Cr** | **0.033** |
| **$e_o$** | **0.806** |

**BH No. :** 27 **Sample:** 2 Depth: 1.5-2.0




| | |
|---|---|
| **Cc** | **0.26** |
| **Cr** | **0.035** |
| **$e_o$** | **0.866** |

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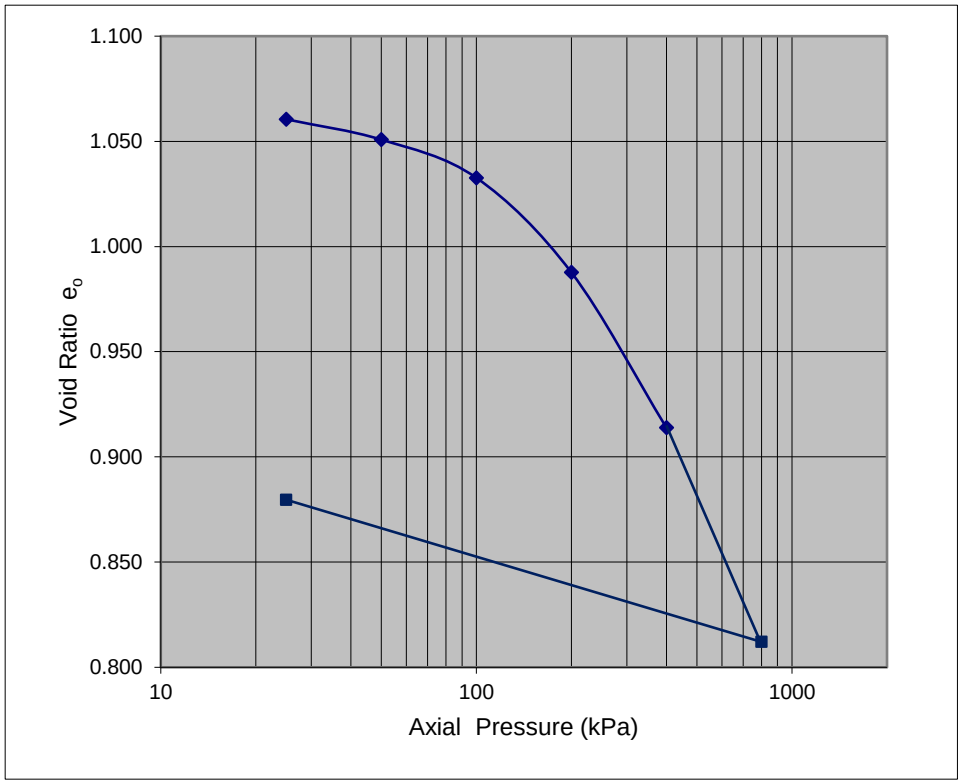
# Consolidation Test Results

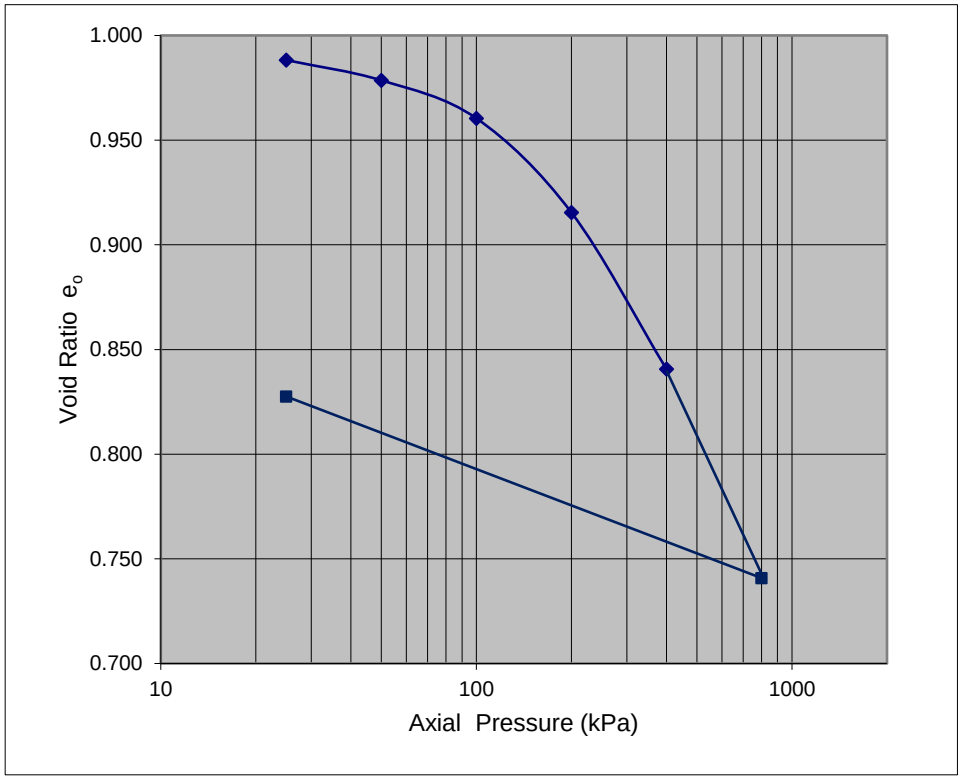
**Project : Samawa Combined Cycle P.P**

**BH No. :** 28 **Sample:** 2 Depth: 1.5-2.0




| | |
|---|---|
| **Cc** | **0.34** |
| **Cr** | **0.045** |
| **$e_o$** | **1.063** |

**BH No. :** 29 **Sample:** 2 Depth: 1.5-2.0




| | |
|---|---|
| **Cc** | **0.33** |
| **Cr** | **0.058** |
| **$e_o$** | **0.991** |

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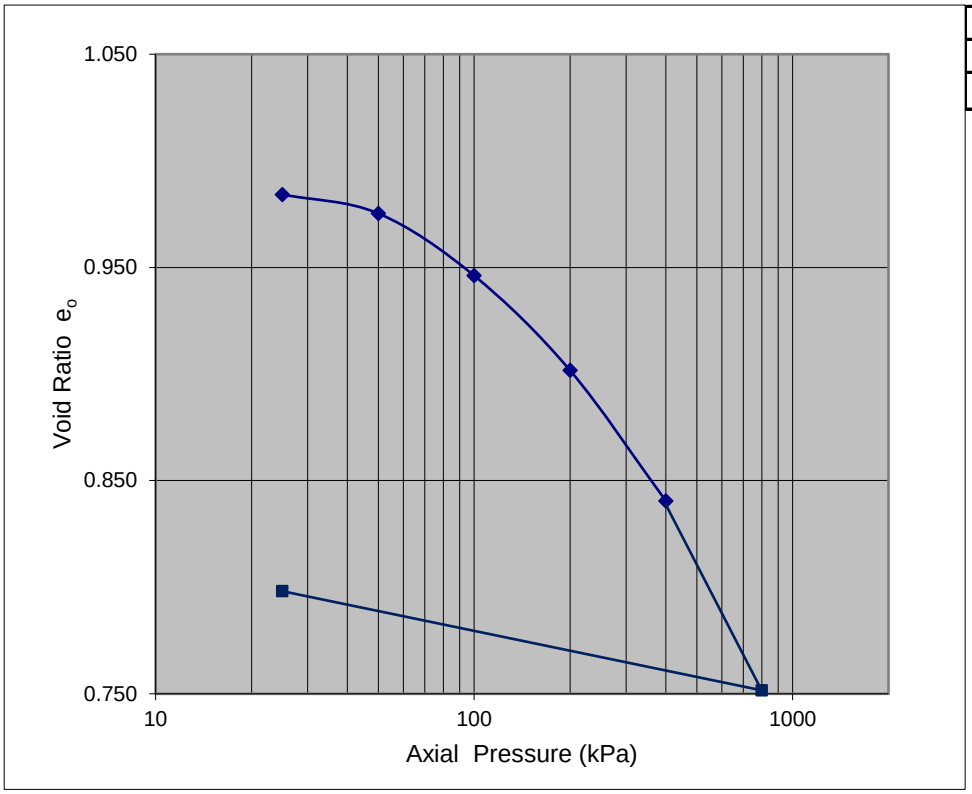
# Consolidation Test Results

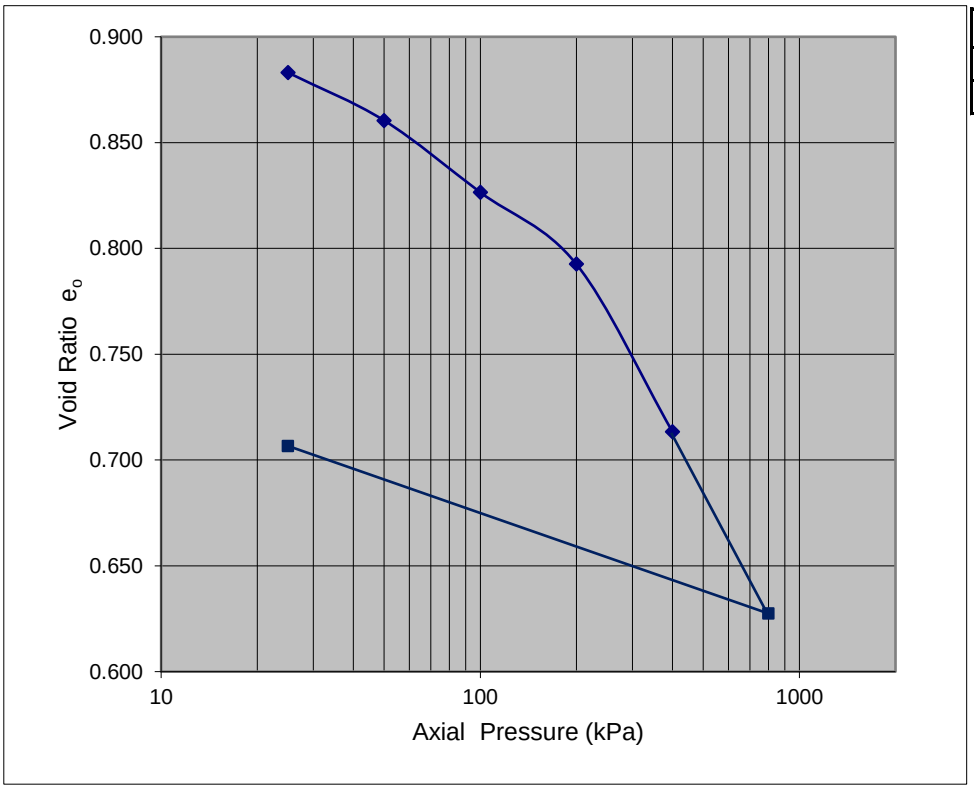
**Project :** **Samawa Combined Cycle P.P**

**BH No. :** 30 **Sample:** 2 Depth: 1.0-1.5




| | |
|---|---|
| Cc | 0.30 |
| Cr | 0.031 |
| $e_o$ | 1.014 |

**BH No. :** 32 **Sample:** 3 Depth: 2.0-2.5




| | |
|---|---|
| Cc | 0.29 |
| Cr | 0.053 |
| $e_o$ | 0.906 |

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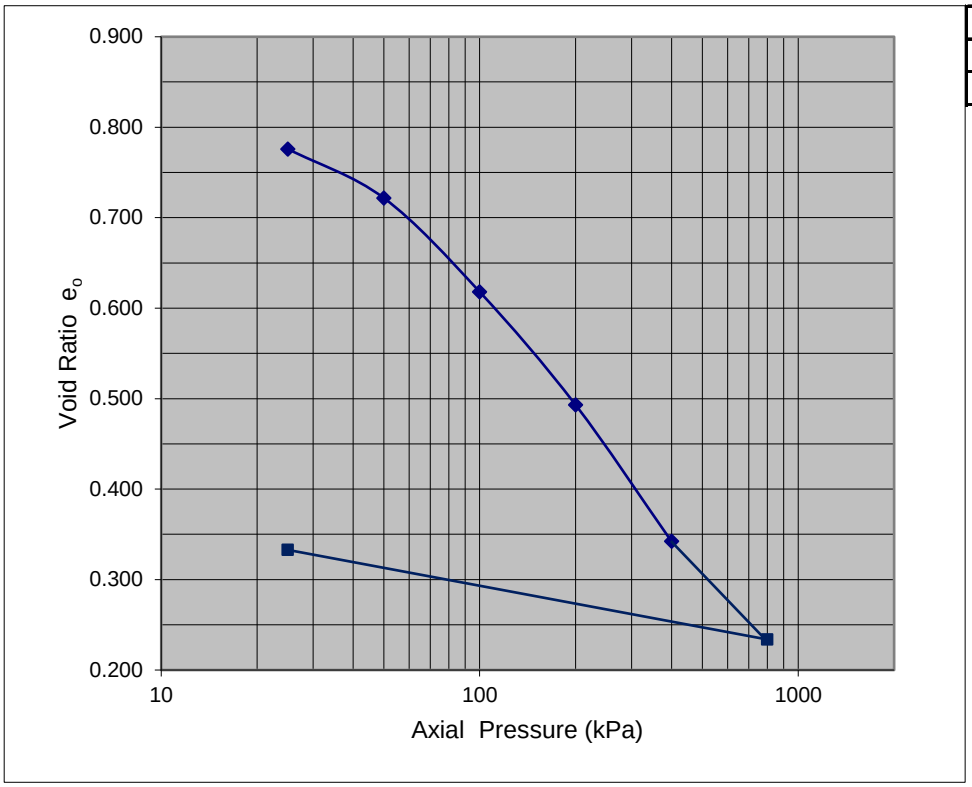
# Consolidation Test Results

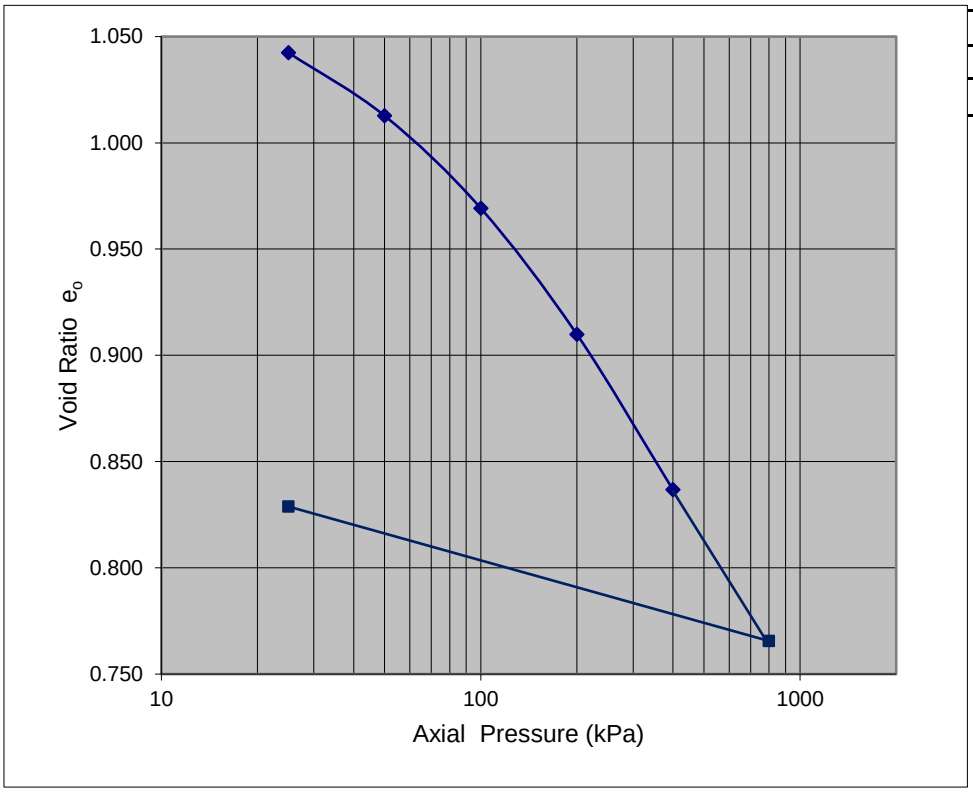
**Project :** **Samawa Combined Cycle P.P**

**BH No. :** 33 **Sample:** 2 Depth: 1.0-1.5




| | |
|---|---|
| **Cc** | **0.36** |
| **Cr** | **0.066** |
| **$e_o$** | **0.882** |

**BH No. :** 34 **Sample:** 2 Depth: 1.5-2.0




| | |
|---|---|
| **Cc** | **0.24** |
| **Cr** | **0.042** |
| **$e_o$** | **1.092** |

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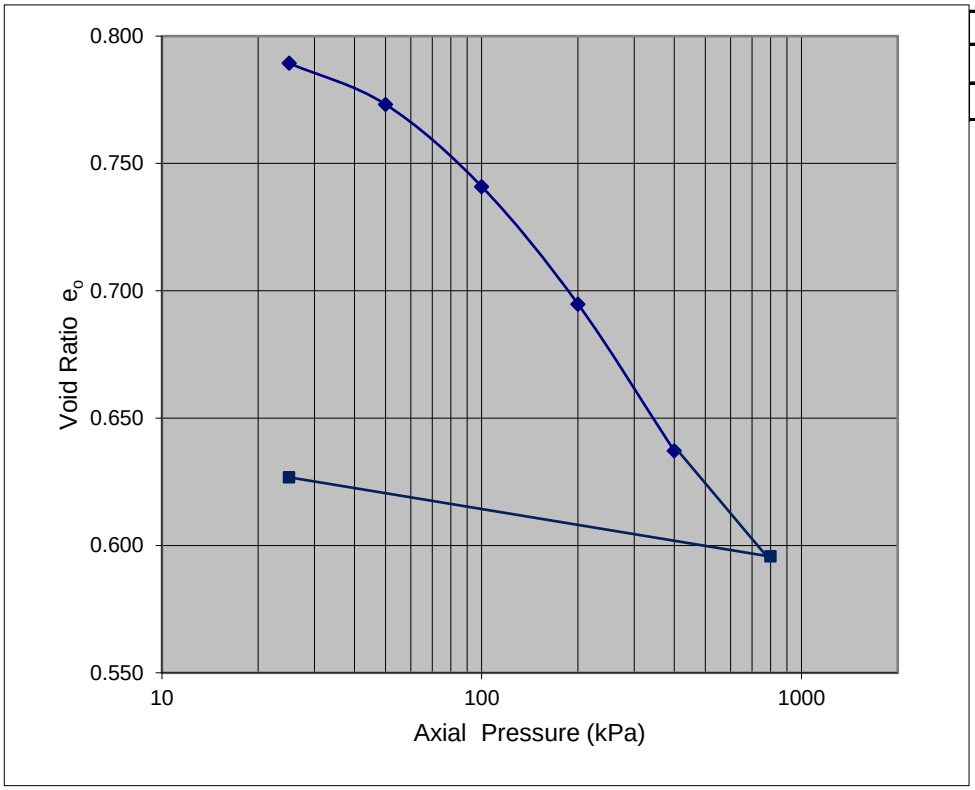
# Consolidation Test Results

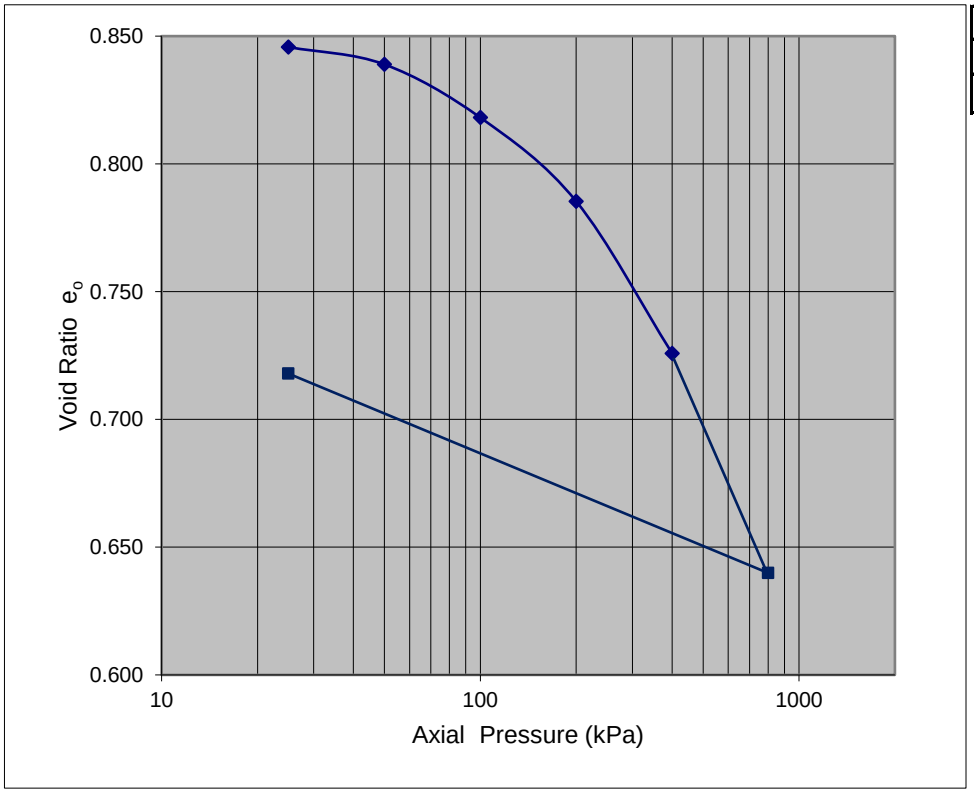
**Project :** **Samawa Combined Cycle P.P**

**BH No. :** 35 **Sample:** 2 Depth: 1.5-2.0




| | |
|---|---|
| **Cc** | **0.14** |
| **Cr** | **0.021** |
| **$e_o$** | **0.838** |

**BH No. :** 35 **Sample:** 4 Depth: 4.0-4.5




| | |
|---|---|
| **Cc** | **0.29** |
| **Cr** | **0.052** |
| **$e_o$** | **0.864** |

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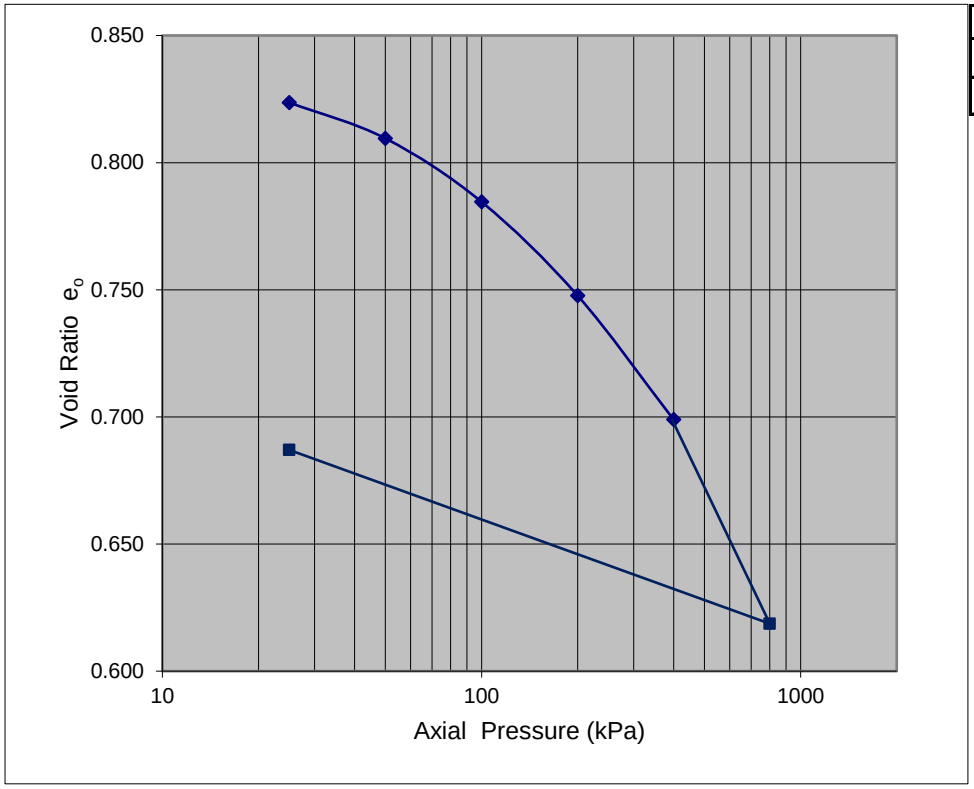
# Consolidation Test Results

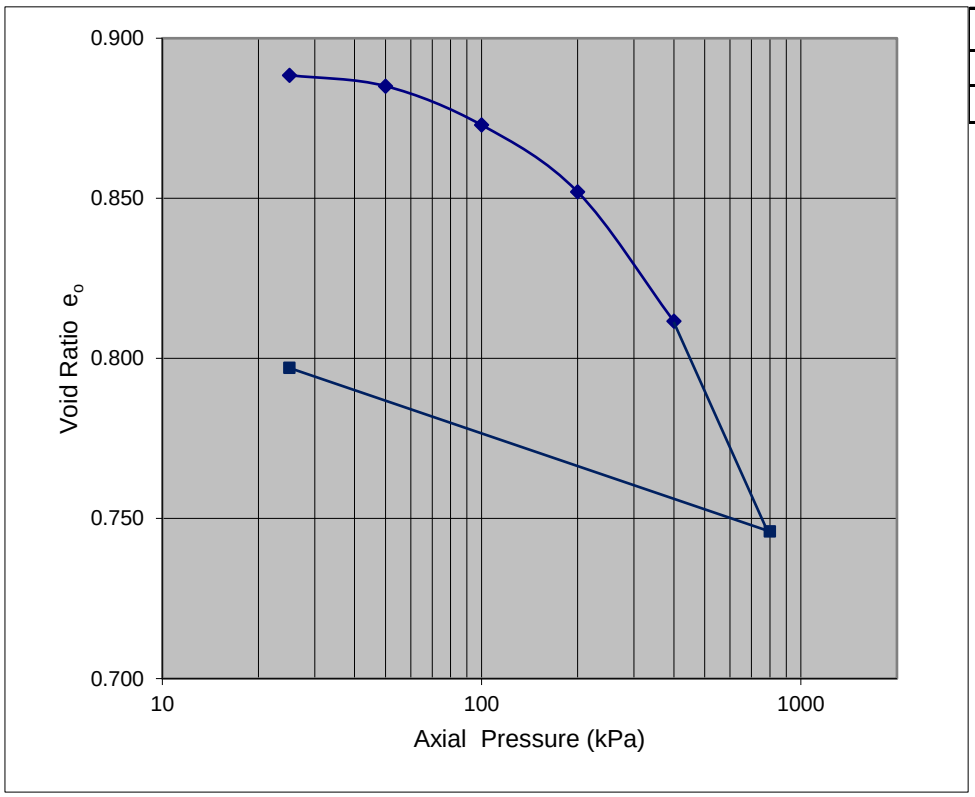
**Project :** **Samawa Combined Cycle P.P**

**BH No. :** 36 **Sample:** 2 Depth: 1.5-2.0




| | |
|---|---|
| **Cc** | **0.27** |
| **Cr** | **0.045** |
| **$e_o$** | **0.844** |

**BH No. :** 37 **Sample:** 3 Depth: 2.0-2.5




| | |
|---|---|
| **Cc** | **0.22** |
| **Cr** | **0.034** |
| **$e_o$** | **0.902** |

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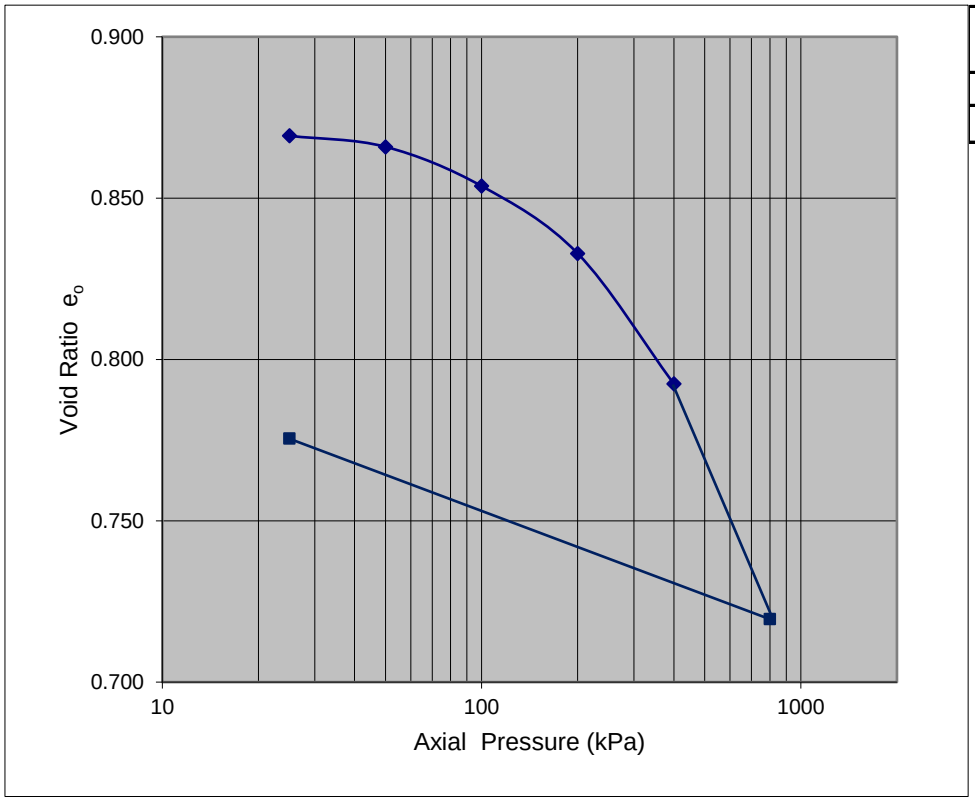
# Consolidation Test Results

**Project :** **Samawa Combined Cycle P.P**

**BH No. :** 38 **Sample:** 2 Depth: 1.5-2.0




| | |
|---|---|
| **Cc** | **0.24** |
| **Cr** | **0.037** |
| **$e_o$** | **0.882** |

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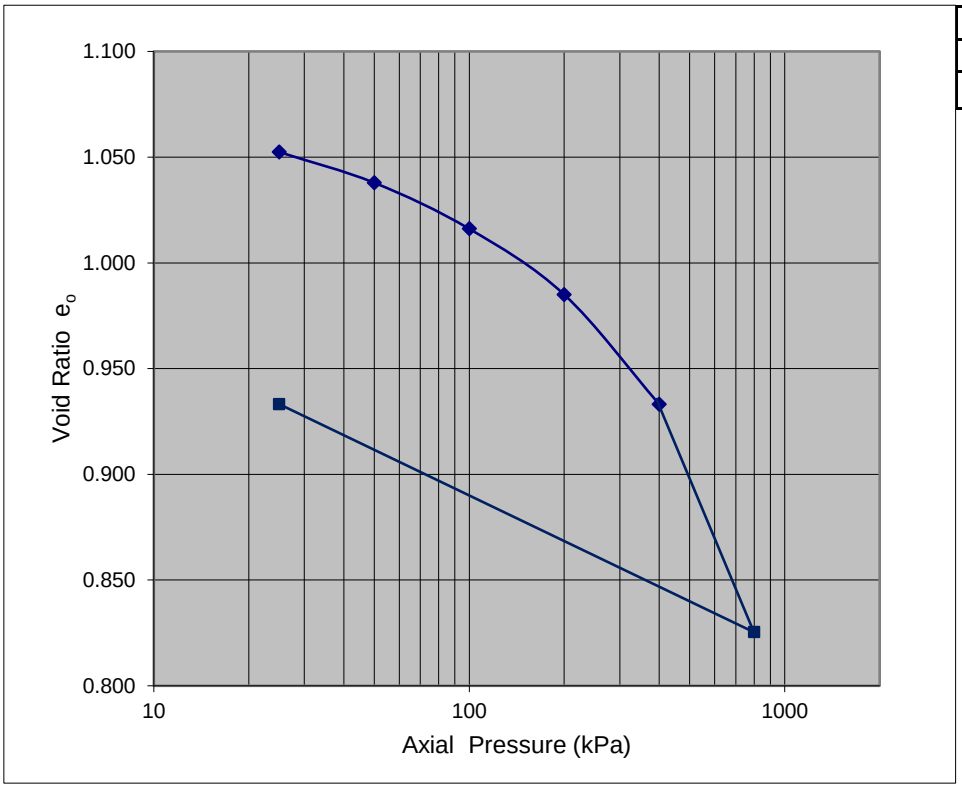
# Consolidation Test Results

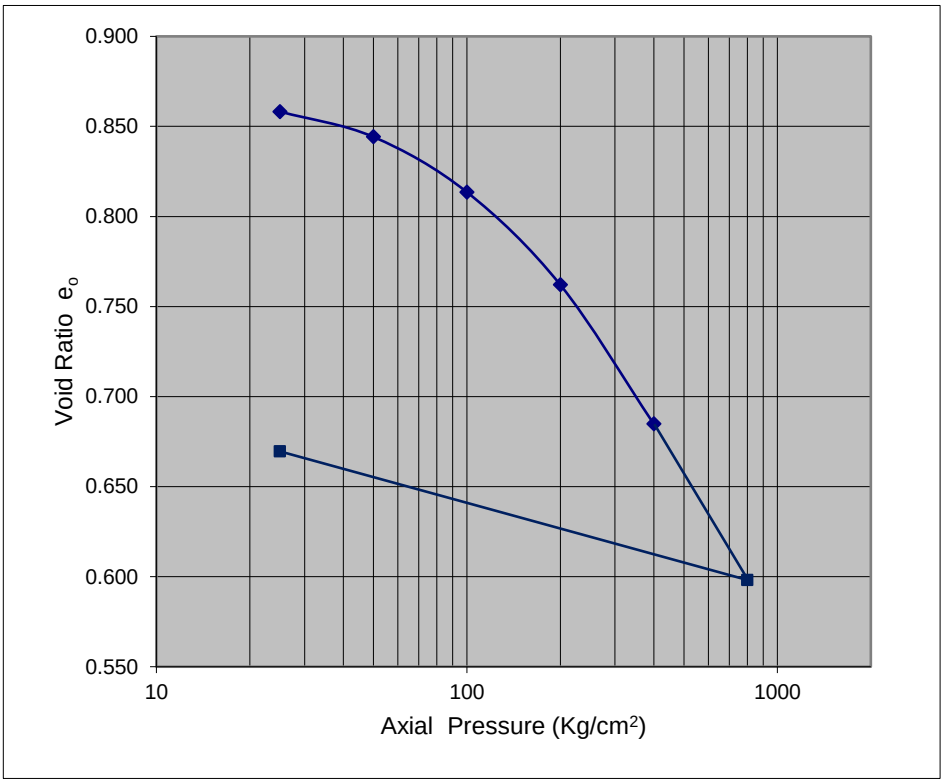
**Project : Samawa Combined Cycle P.P**

**BH No. :** 39 **Sample:** 2 Depth: 1.0-1.5




| | |
|---|---|
| **Cc** | **0.36** |
| **Cr** | **0.072** |
| **$e_o$** | **1.058** |

**BH No. :** 40 **Sample:** 2 Depth: 1.0-1.5




| | |
|---|---|
| **Cc** | **0.29** |
| **Cr** | **0.047** |
| **$e_o$** | **0.884** |

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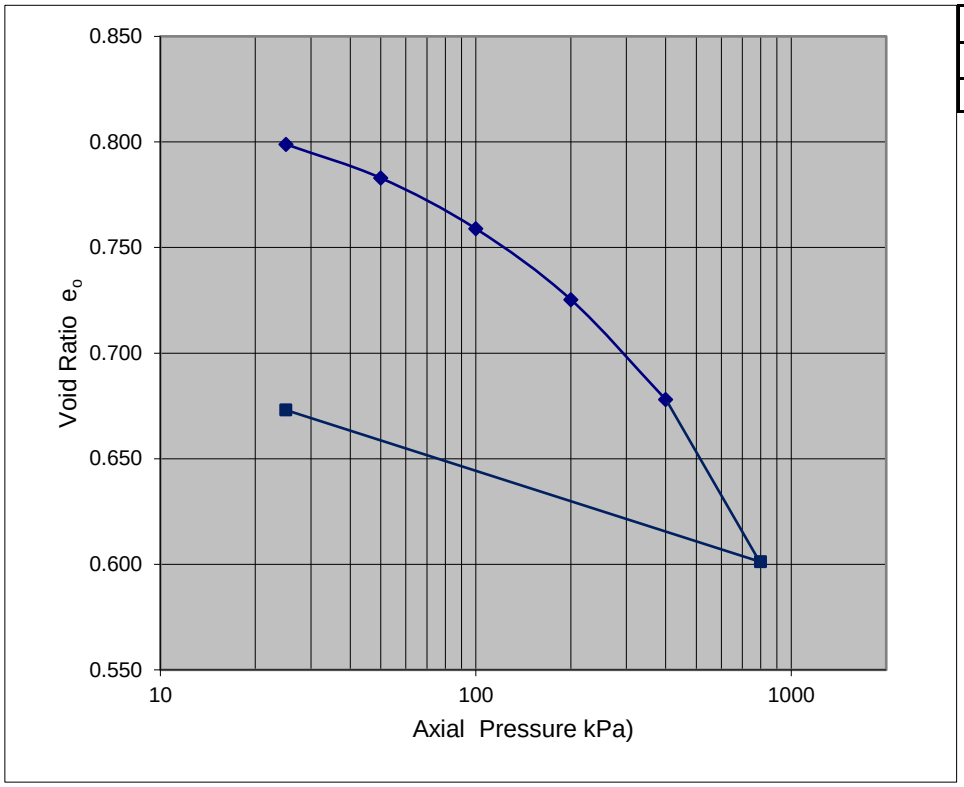
# Consolidation Test Results

**Project : Samawa Combined Cycle P.P**

**BH No. :** 41 **Sample:** 2 Depth: 1.5-2.0




| | |
|---|---|
| **Cc** | **0.26** |
| **Cr** | **0.048** |
| **$e_o$** | **0.839** |

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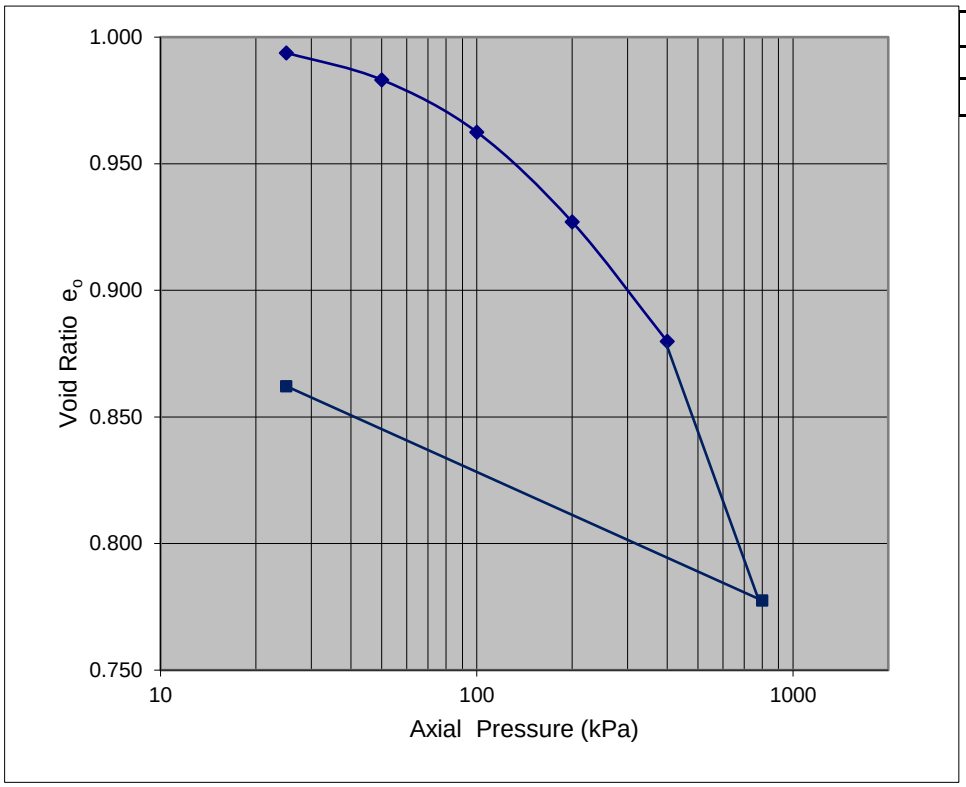
# Consolidation Test Results

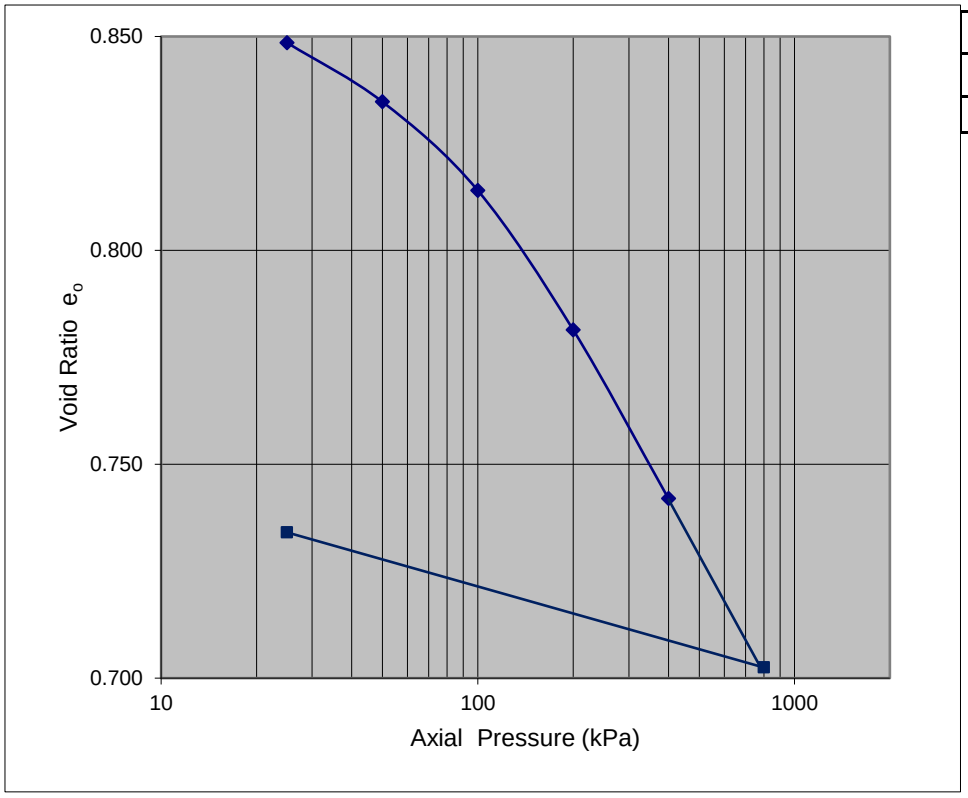
**Project : Samawa Combined Cycle P.P**

**BH No. :** 42 **Sample:** 2 Depth: 1.5-2.0




| | |
|---|---|
| **Cc** | **0.34** |
| **Cr** | **0.056** |
| **$e_o$** | **0.998** |

**BH No. :** 42 **Sample:** 4 Depth: 4.0-4.5




| | |
|---|---|
| **Cc** | **0.13** |
| **Cr** | **0.021** |
| **$e_o$** | **0.870** |

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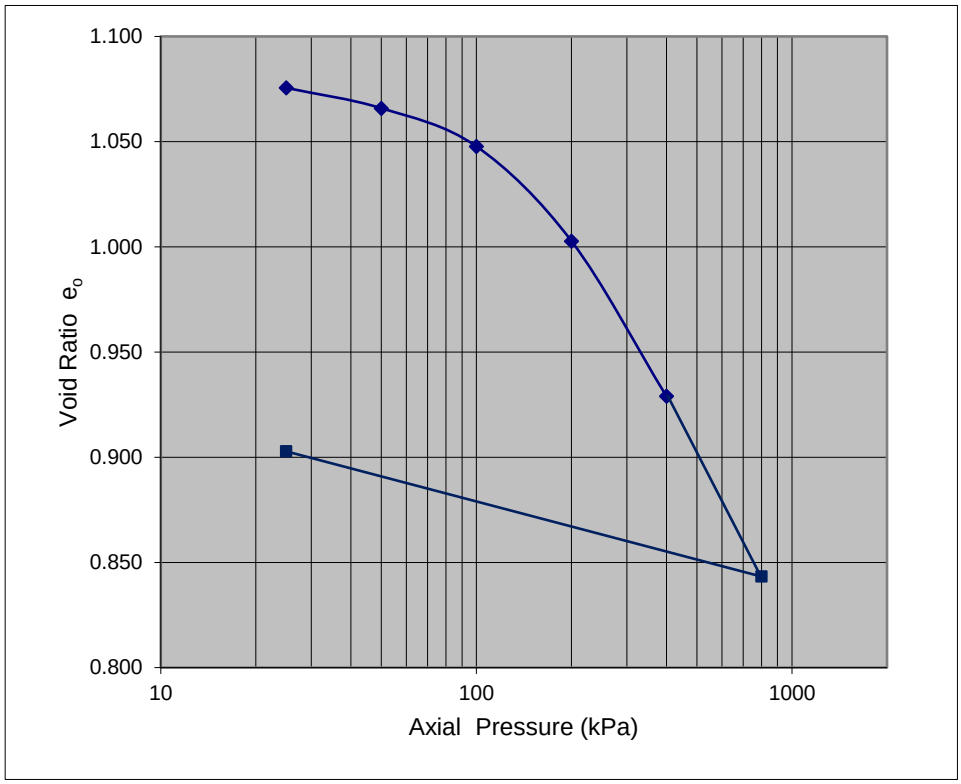
# Consolidation Test Results

**Project : Samawa Combined Cycle P.P**

**BH No. :** 43 **Sample:** 2 Depth: 1.5-2.0




| | |
|---|---|
| **Cc** | **0.28** |
| **Cr** | **0.040** |
| **$e_o$** | **1.078** |

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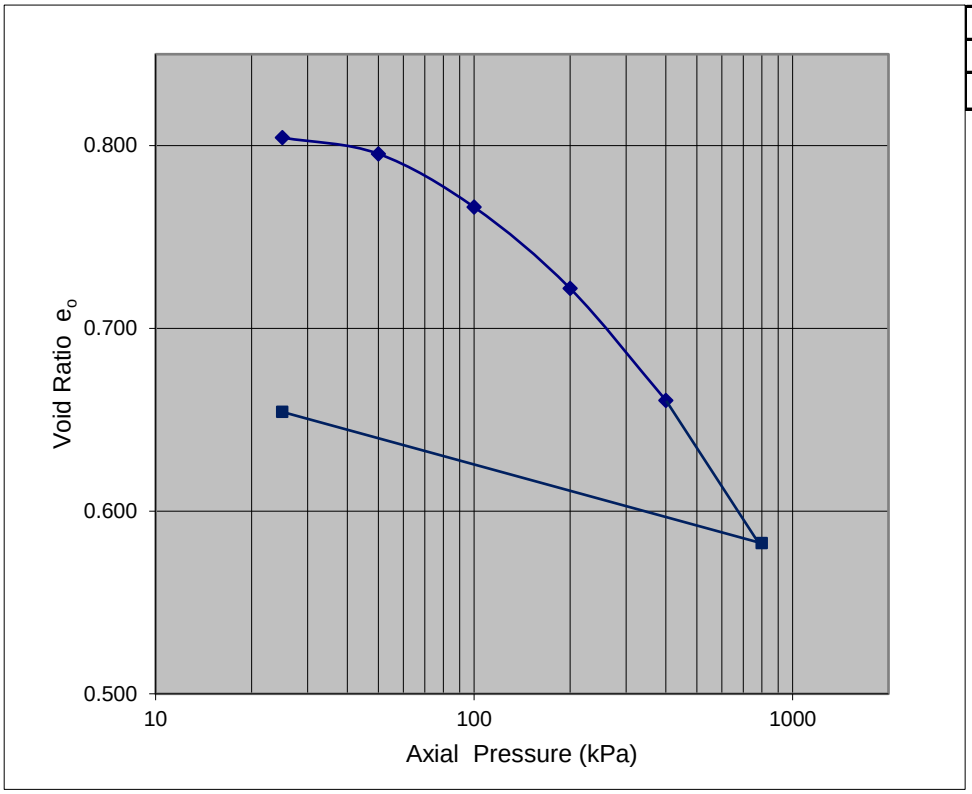
# Consolidation Test Results

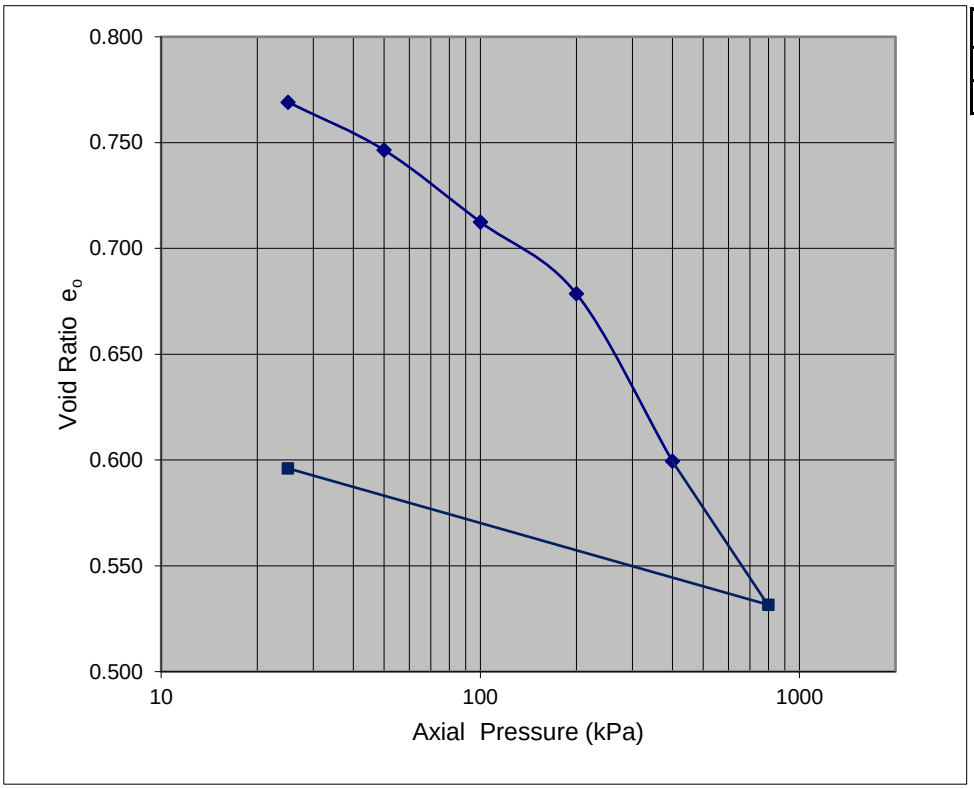
**Project :** **Samawa Combined Cycle P.P**

**BH No. :** 44 **Sample:** 2 Depth: 1.0-1.5




| | |
|---|---|
| Cc | 0.26 |
| Cr | 0.048 |
| $e_o$ | 0.834 |

**BH No. :** 44 **Sample:** 5 Depth: 4.0-4.5




| | |
|---|---|
| Cc | 0.23 |
| Cr | 0.043 |
| $e_o$ | 0.792 |

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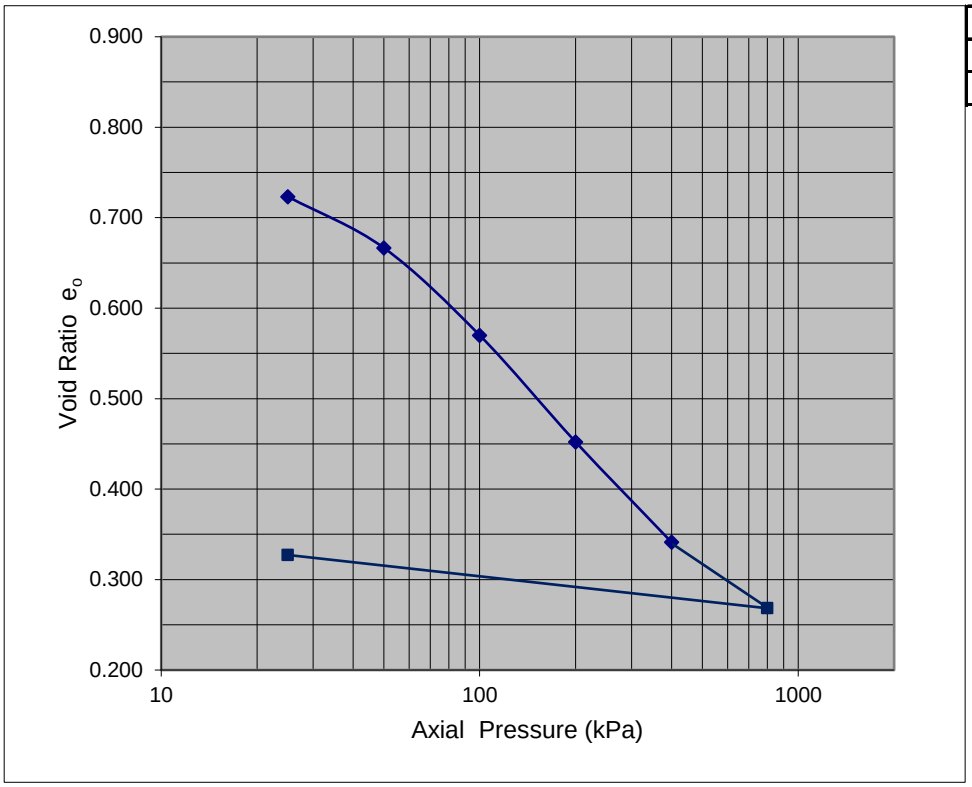
# Consolidation Test Results

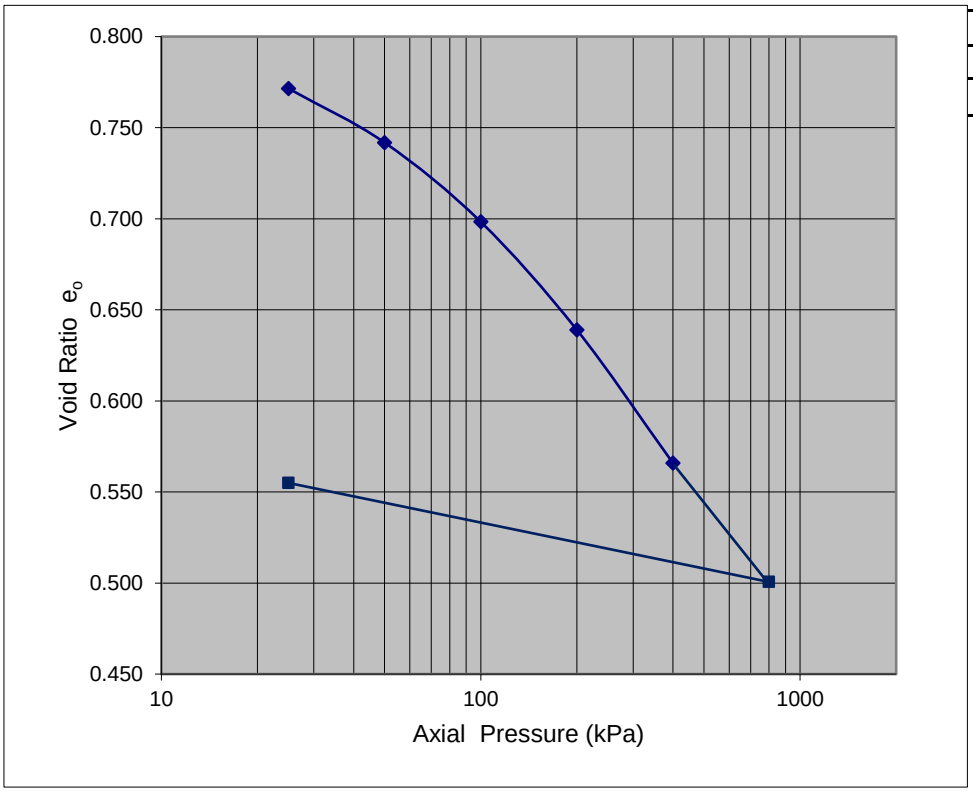
**Project :** **Samawa Combined Cycle P.P**

**BH No. :** 45 **Sample:** 2 Depth: 1.0-1.5




| | |
|---|---|
| **Cc** | **0.24** |
| **Cr** | **0.039** |
| **$e_o$** | **0.876** |

**BH No. :** 45 **Sample:** 5 Depth: 4.0-4.5




| | |
|---|---|
| **Cc** | **0.22** |
| **Cr** | **0.036** |
| **$e_o$** | **0.821** |

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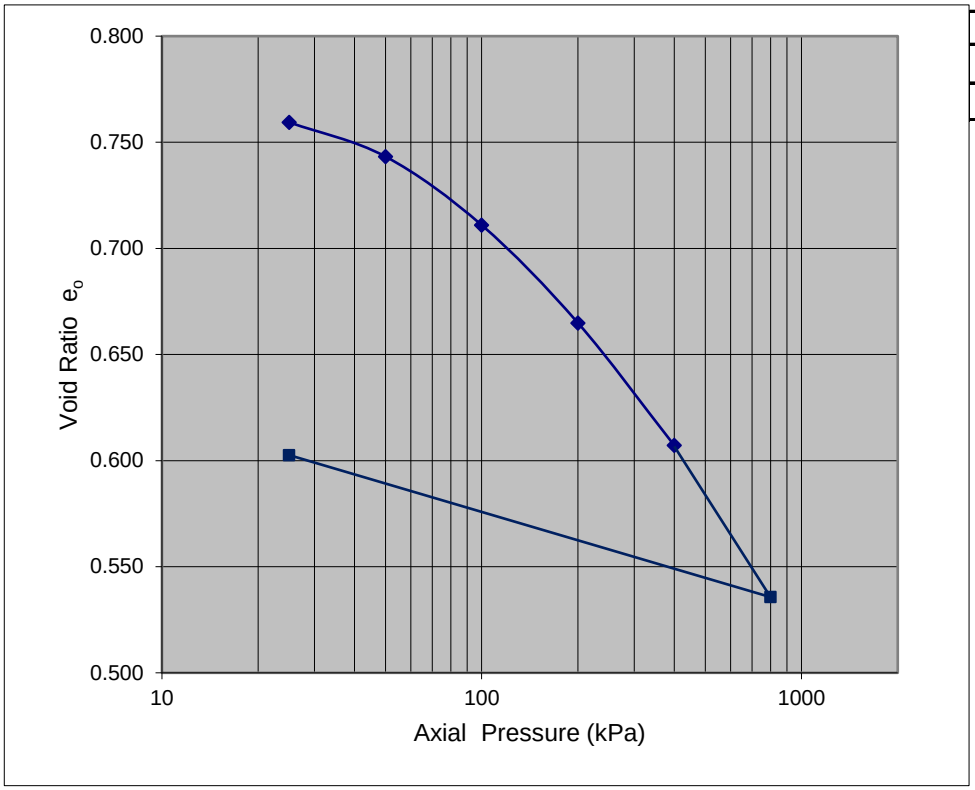
# Consolidation Test Results

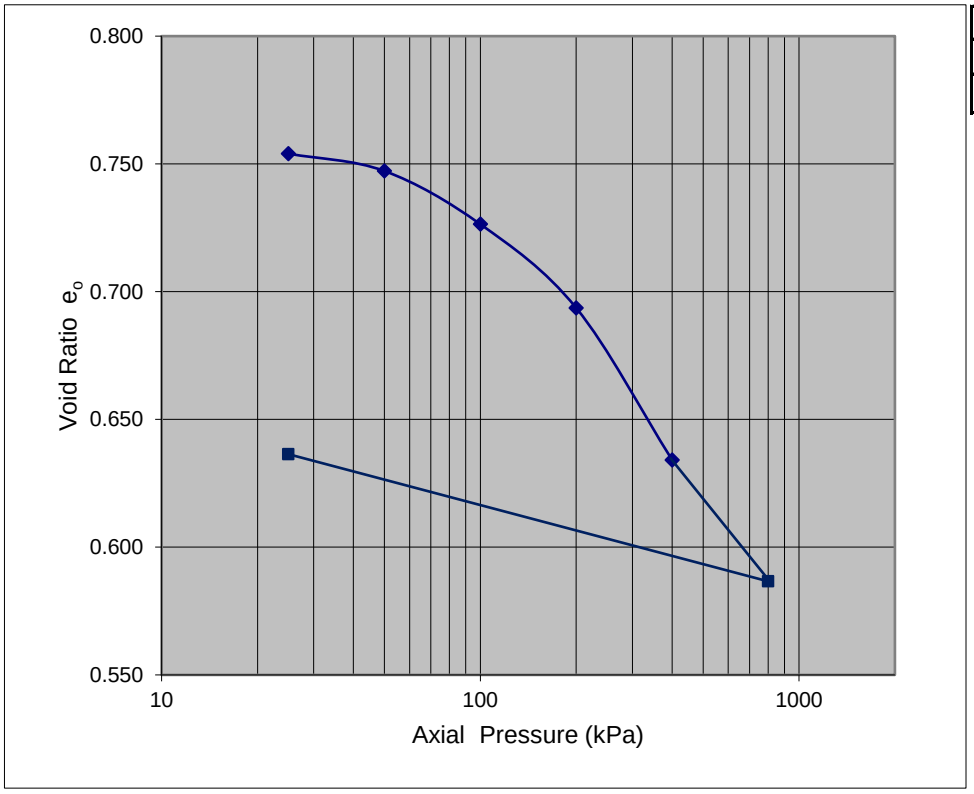
**Project :** **Samawa Combined Cycle P.P**

**BH No. :** 46 **Sample:** 2 Depth: 1.0-1.5




| | |
|---|---|
| **Cc** | **0.24** |
| **Cr** | **0.044** |
| **$e_o$** | **0.808** |

**BH No. :** 47 **Sample:** 2 Depth: 1.0-1.5




| | |
|---|---|
| **Cc** | **0.16** |
| **Cr** | **0.033** |
| **$e_o$** | **0.772** |

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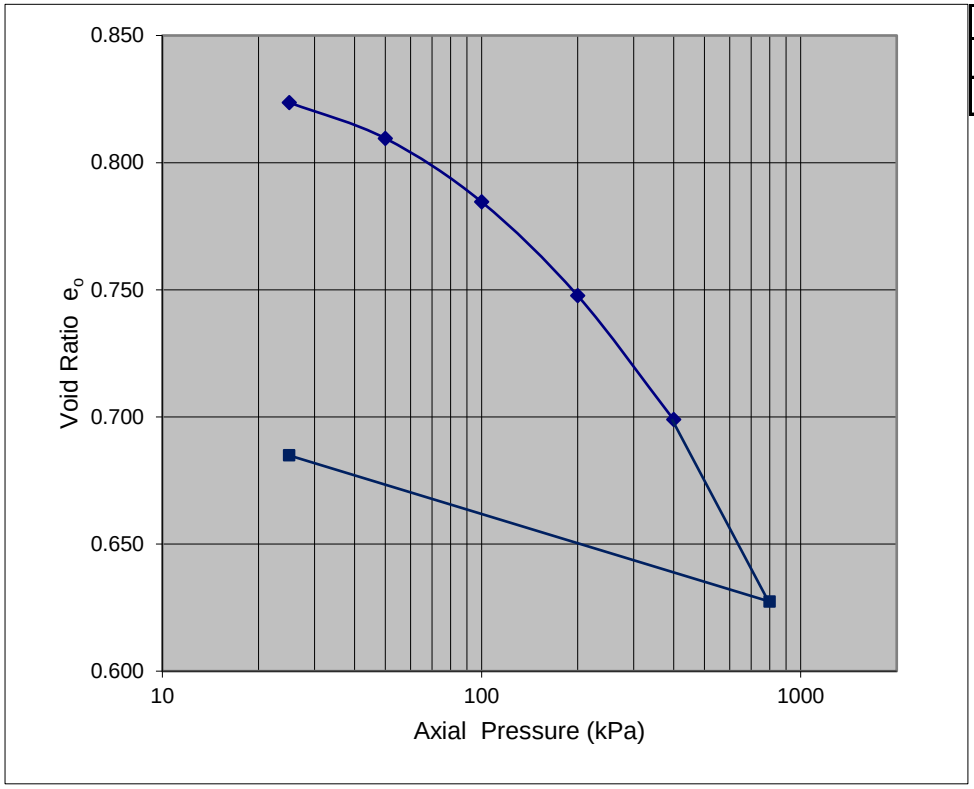
# Consolidation Test Results

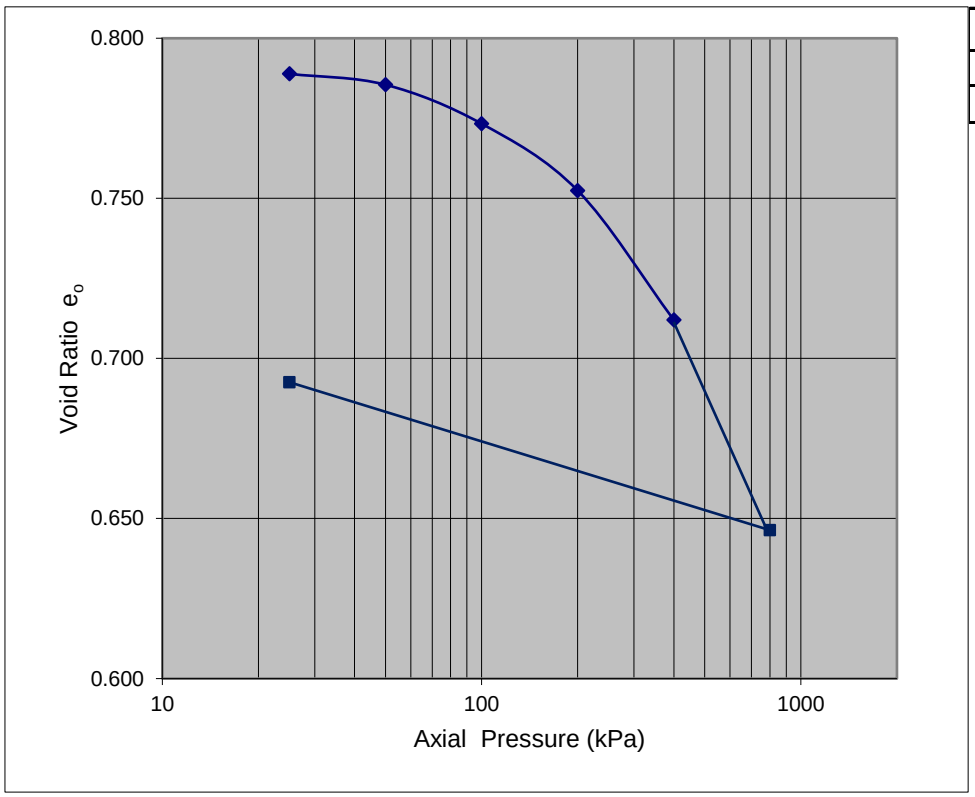
**Project :** **Samawa Combined Cycle P.P**

**BH No. :** 48 **Sample:** 2 Depth: 1.0-1.5




| | |
|---|---|
| **Cc** | **0.24** |
| **Cr** | **0.038** |
| **$e_o$** | **0.844** |

**BH No. :** 48 **Sample:** 5 Depth: 4.0-4.5




| | |
|---|---|
| **Cc** | **0.22** |
| **Cr** | **0.031** |
| **$e_o$** | **0.802** |

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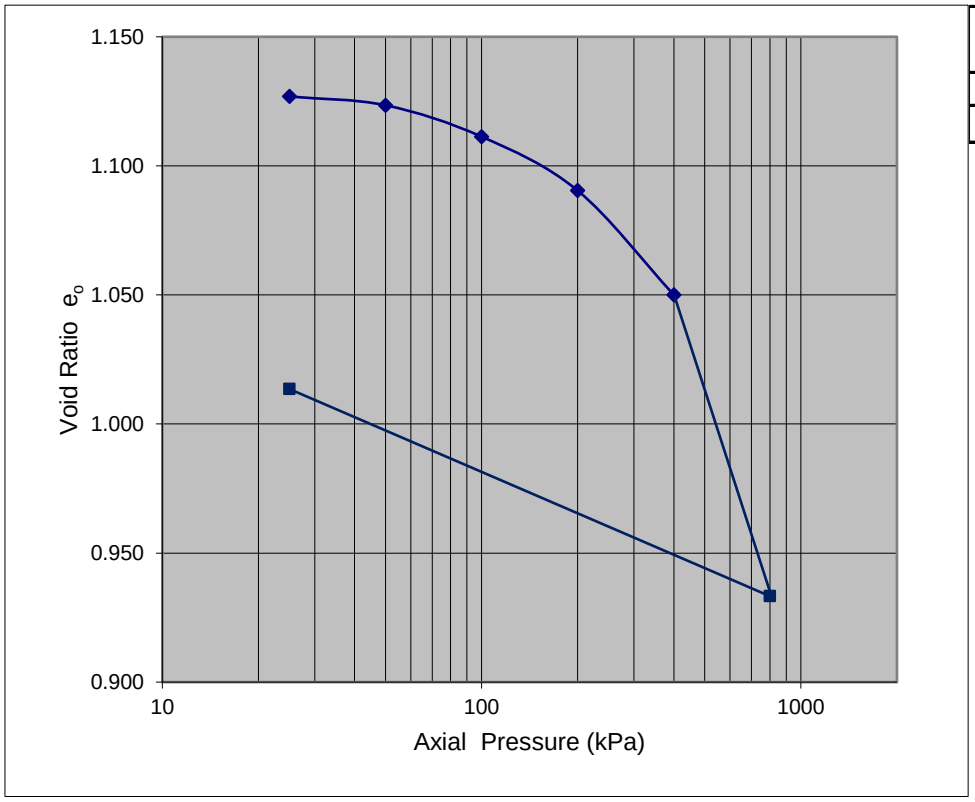
# Consolidation Test Results

**Project :** **Samawa Combined Cycle P.P**

**BH No. :** 49 **Sample:** 2 Depth: 1.0-1.5




| | |
|---|---|
| **Cc** | **0.39** |
| **Cr** | **0.053** |
| **$e_o$** | **1.140** |

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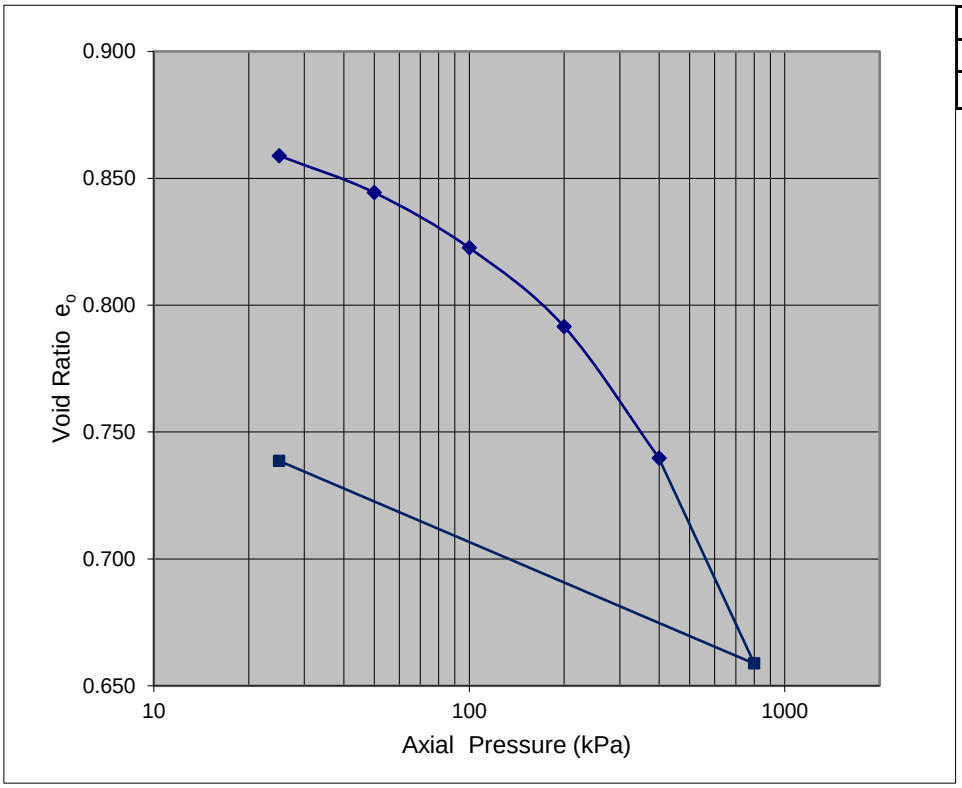
# Consolidation Test Results

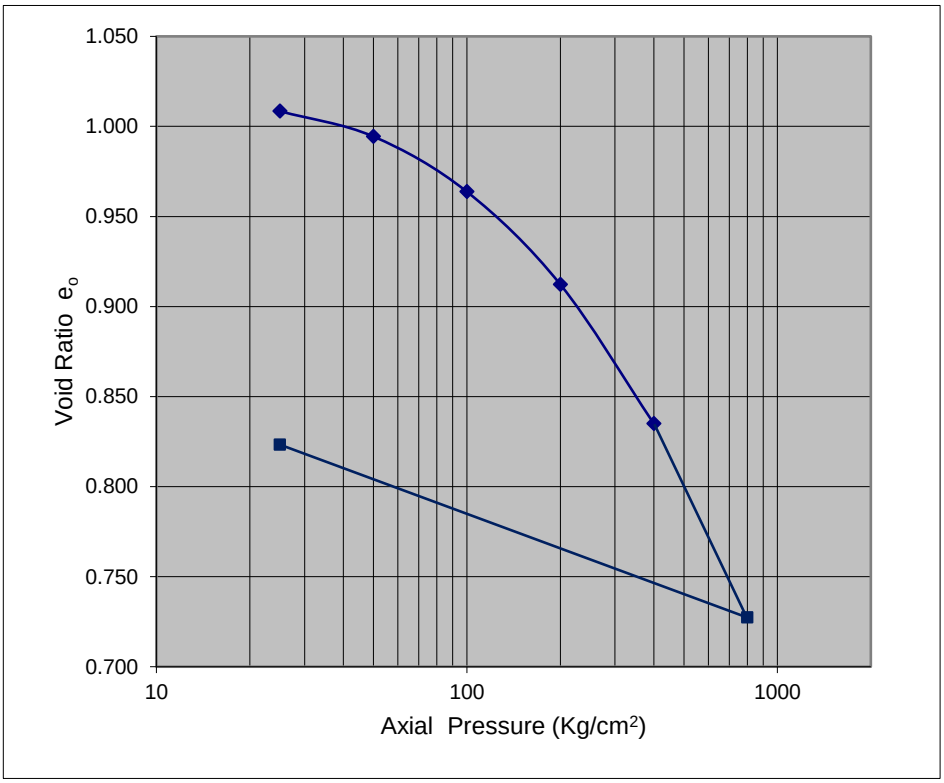
**Project : Samawa Combined Cycle P.P**

**BH No. :** 50 **Sample:** 2 Depth: 1.0-1.5




| | |
|---|---|
| **Cc** | **0.27** |
| **Cr** | **0.053** |
| **$e_o$** | **0.864** |

**BH No. :** 50 **Sample:** 4 Depth: 4.0-4.5




| | |
|---|---|
| **Cc** | **0.36** |
| **Cr** | **0.064** |
| **$e_o$** | **1.034** |

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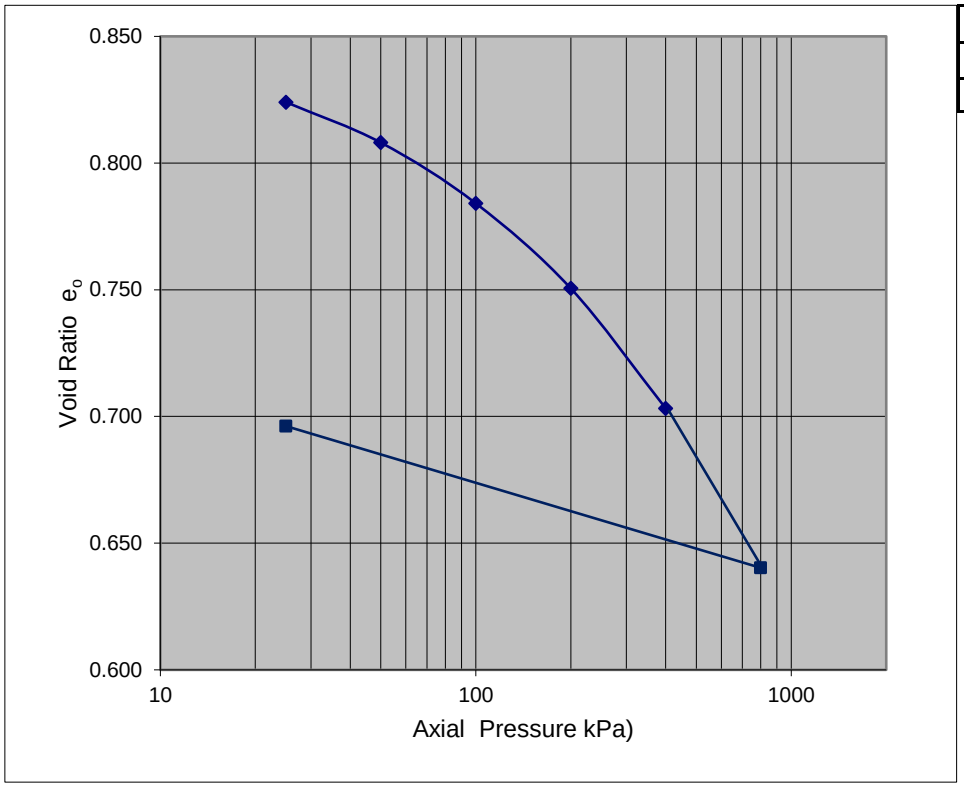
# Consolidation Test Results

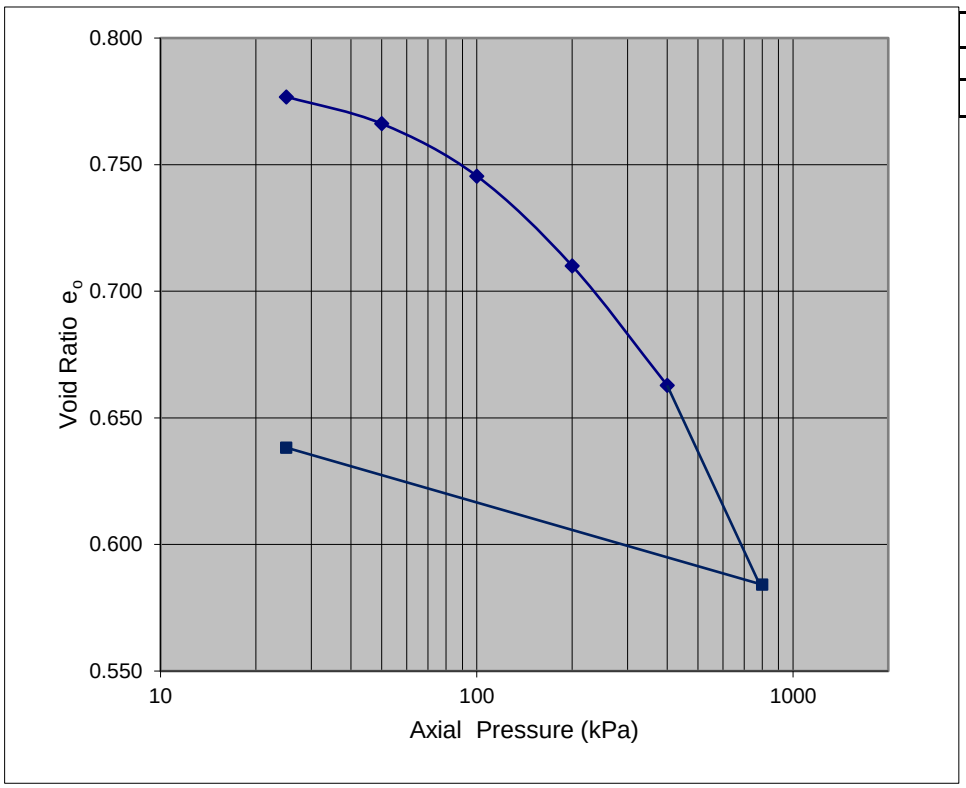
**Project : Samawa Combined Cycle P.P**

**BH No. :** 51 **Sample:** 2 Depth: 1.0-1.5




| | |
|---|---|
| **Cc** | **0.21** |
| **Cr** | **0.037** |
| **$e_o$** | **0.864** |

**BH No. :** 52 **Sample:** 2 Depth: 1.0-1.5




| | |
|---|---|
| **Cc** | **0.26** |
| **Cr** | **0.036** |
| **$e_o$** | **0.781** |

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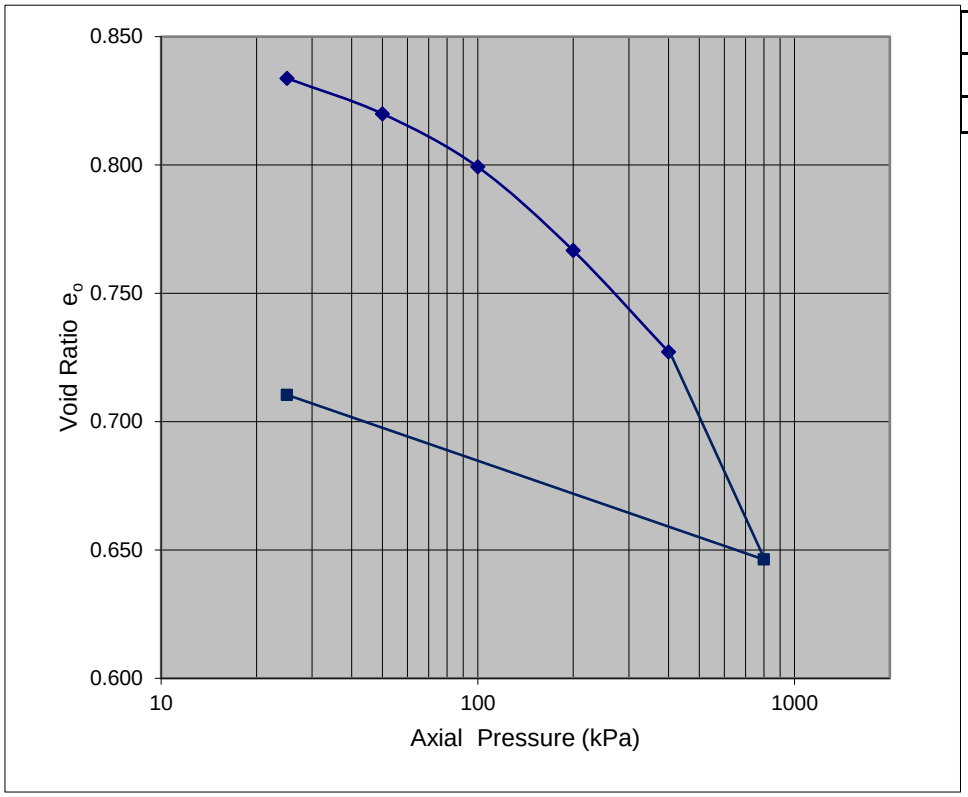
# Consolidation Test Results

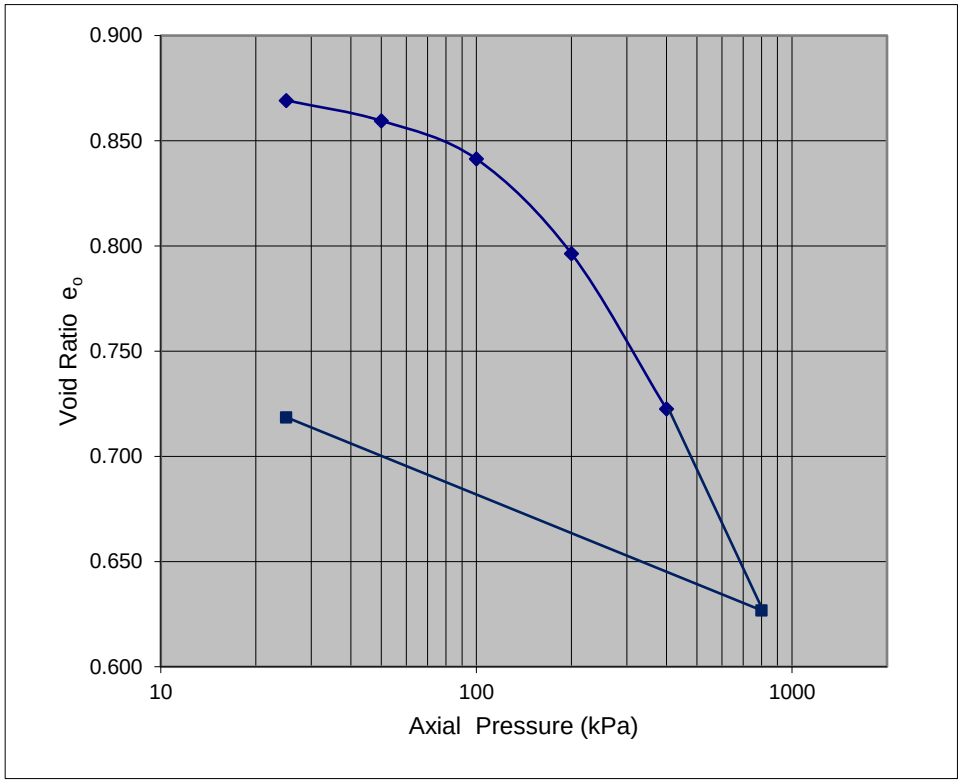
**Project : Samawa Combined Cycle P.P**

**BH No. :** 53 **Sample:** 4 Depth: 4.0-4.5




| | |
|---|---|
| **Cc** | **0.27** |
| **Cr** | **0.043** |
| **$e_o$** | **0.855** |

**BH No. :** 54 **Sample:** 2 Depth: 1.5-2.0




| | |
|---|---|
| **Cc** | **0.32** |
| **Cr** | **0.061** |
| **$e_o$** | **0.872** |

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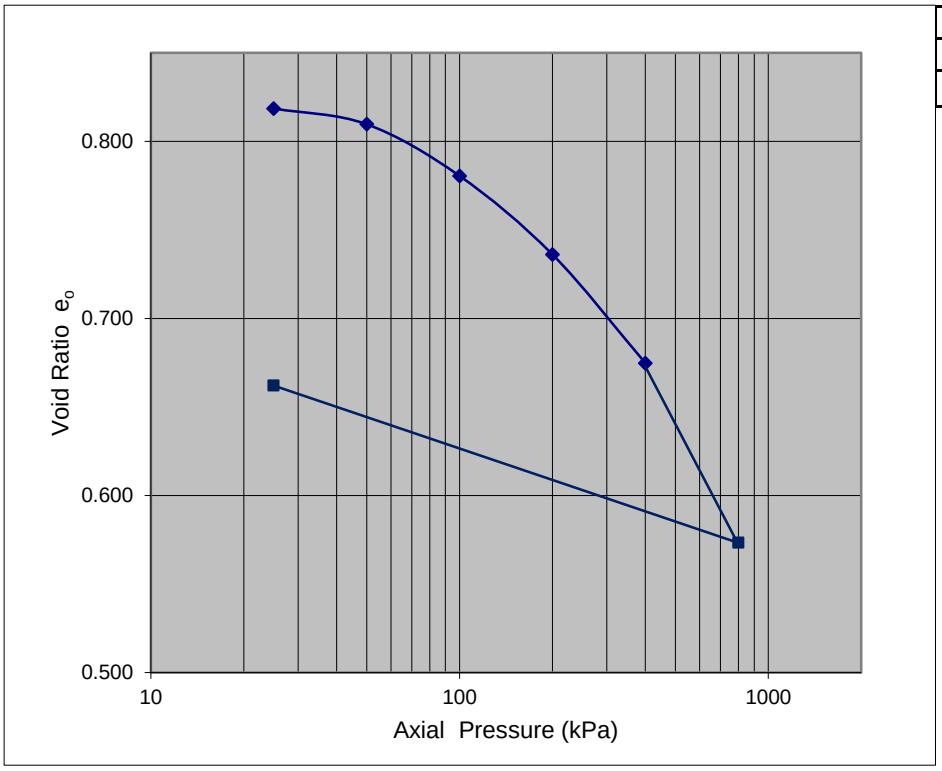
# Consolidation Test Results

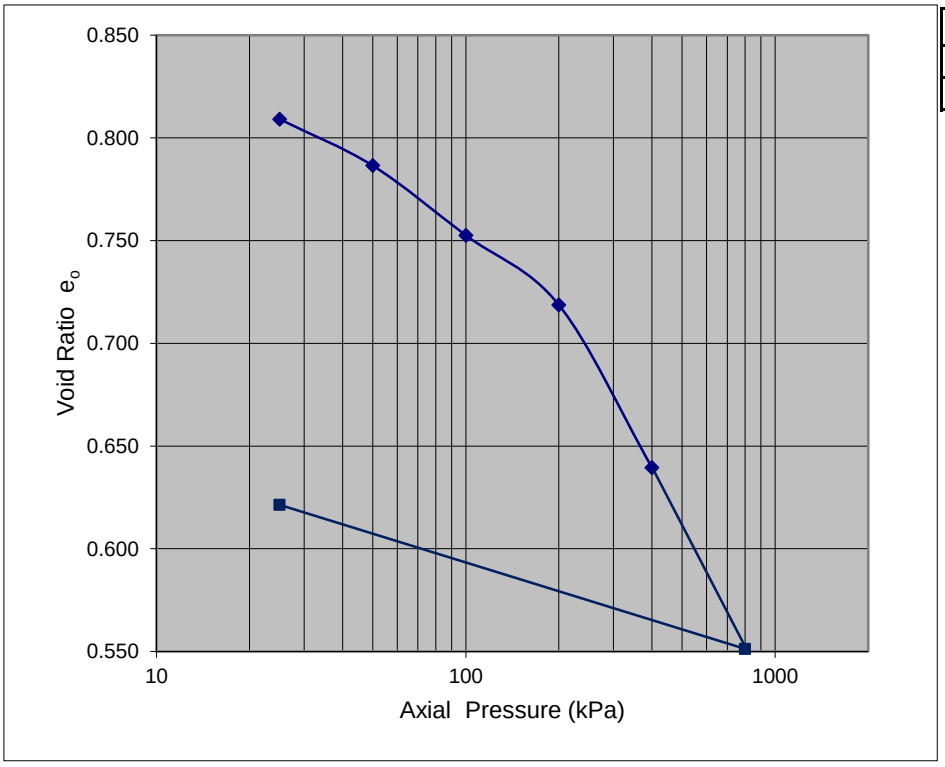
**Project :** **Samawa Combined Cycle P.P**

**BH No. :** 55 **Sample:** 2 Depth: 1.5-2.0




| | |
|---|---|
| **Cc** | **0.34** |
| **Cr** | **0.059** |
| **$e_o$** | **0.848** |

**BH No. :** 55 **Sample:** 4 Depth: 4.0-4.5




| | |
|---|---|
| **Cc** | **0.29** |
| **Cr** | **0.047** |
| **$e_o$** | **0.832** |

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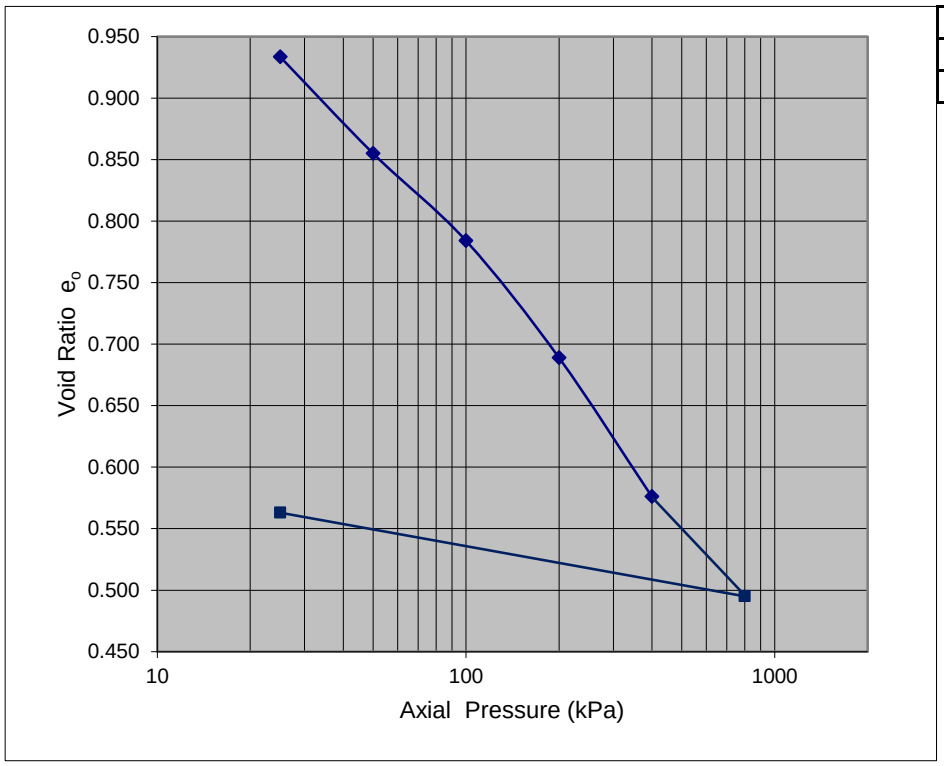
# Consolidation Test Results

**Project :** **Samawa Combined Cycle P.P**
**BH No. :** 56 **Sample:** 2 Depth: 1.0-1.5




| | |
|---|---|
| **Cc** | **0.27** |
| **Cr** | **0.045** |
| **$e_o$** | **0.962** |

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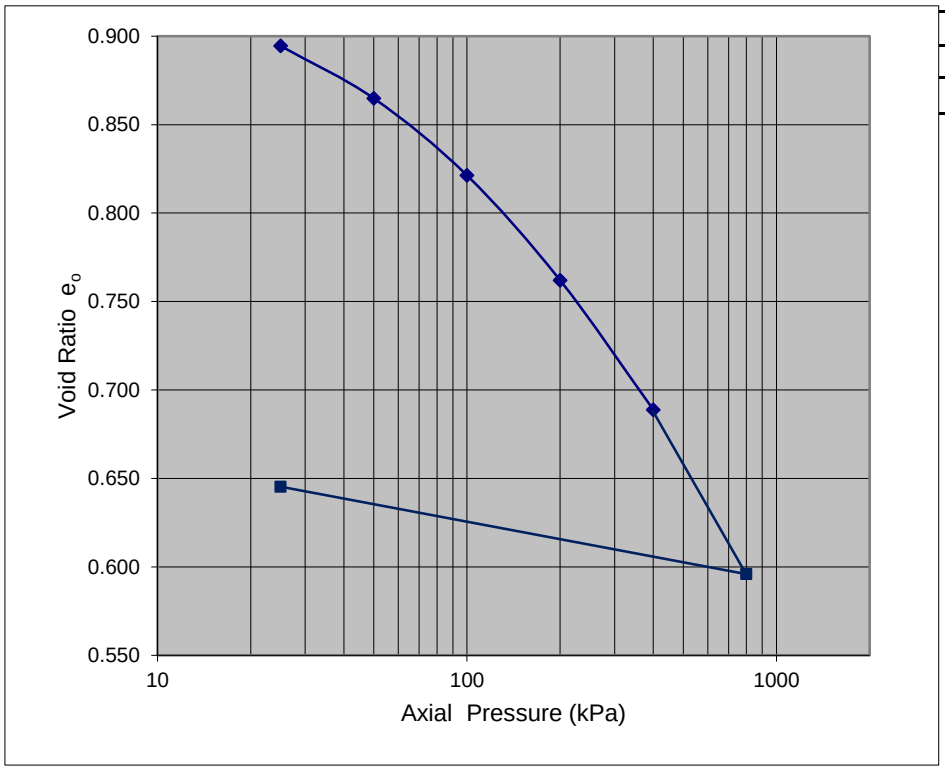
# Consolidation Test Results

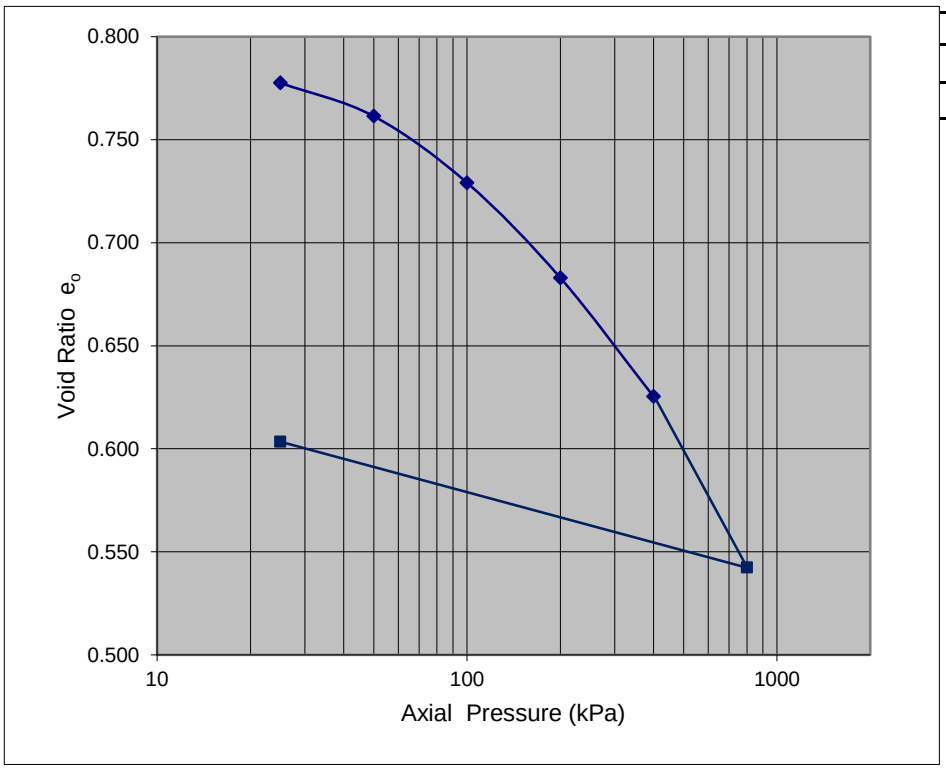
**Project :** **Samawa Combined Cycle P.P**

**BH No. :** 57 **Sample:** 2 Depth: 1.0-1.5




| | |
|---|---|
| **Cc** | **0.31** |
| **Cr** | **0.033** |
| **$e_o$** | **0.944** |

**BH No. :** 57 **Sample:** 4 Depth: 4.0-4.5




| | |
|---|---|
| **Cc** | **0.28** |
| **Cr** | **0.041** |
| **$e_o$** | **0.826** |

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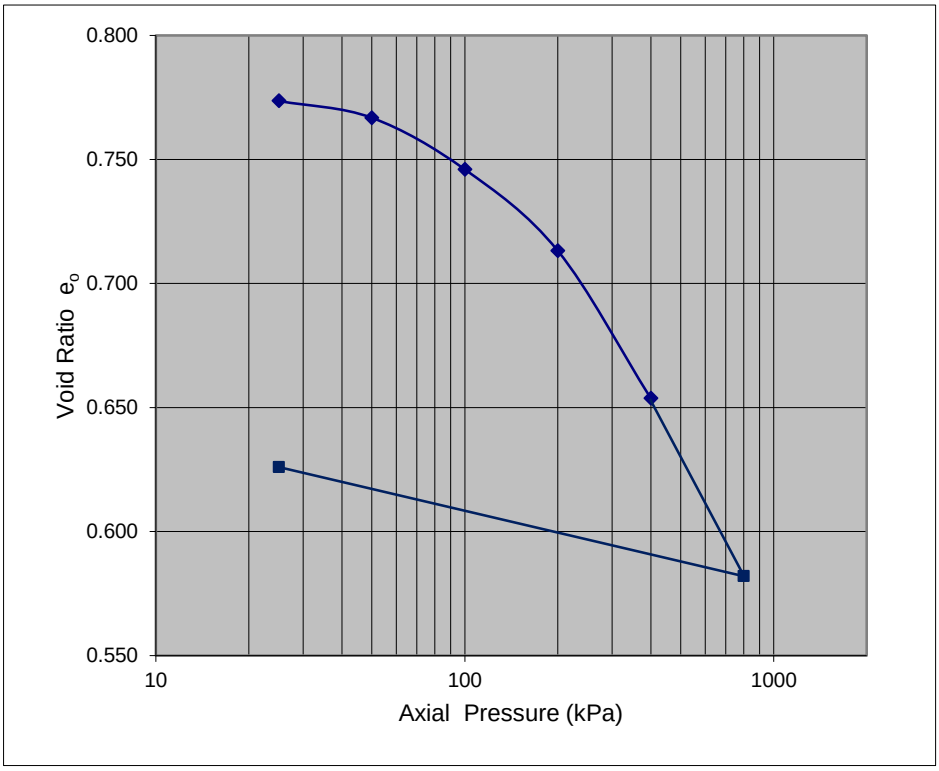
# Consolidation Test Results

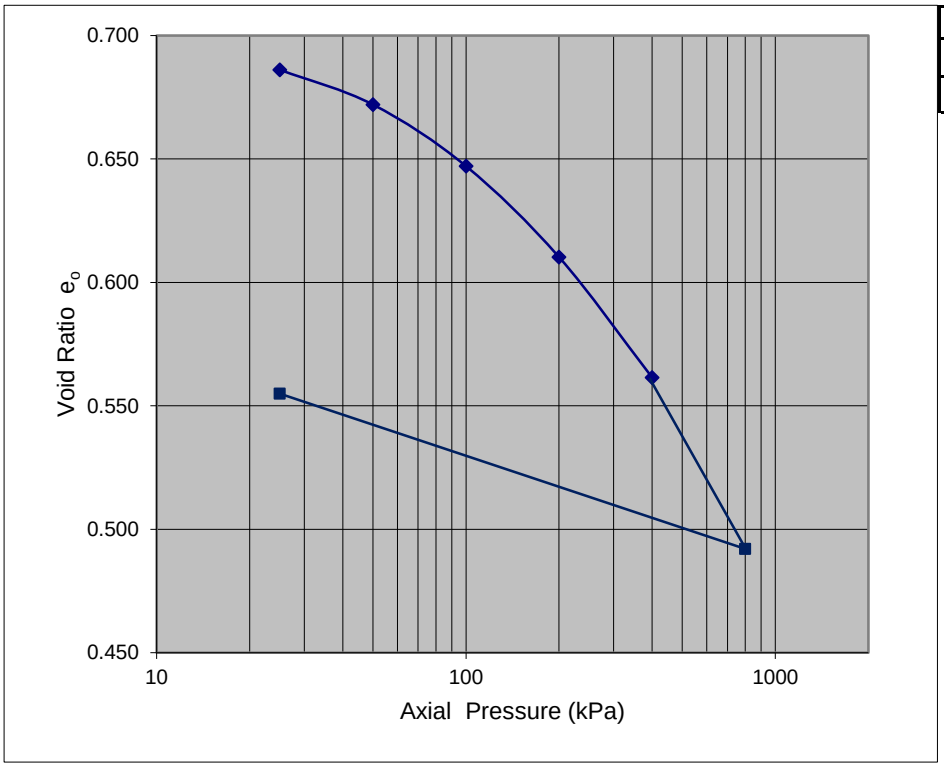
**Project :** **Samawa Combined Cycle P.P**

**BH No. :** 58 **Sample:** 2 Depth: 1.0-1.5




| | |
|---|---|
| Cc | 0.24 |
| Cr | 0.029 |
| $e_o$ | 0.798 |

**BH No. :** 58 **Sample:** 4 Depth: 4.0-4.5




| | |
|---|---|
| Cc | 0.23 |
| Cr | 0.042 |
| $e_o$ | 0.707 |

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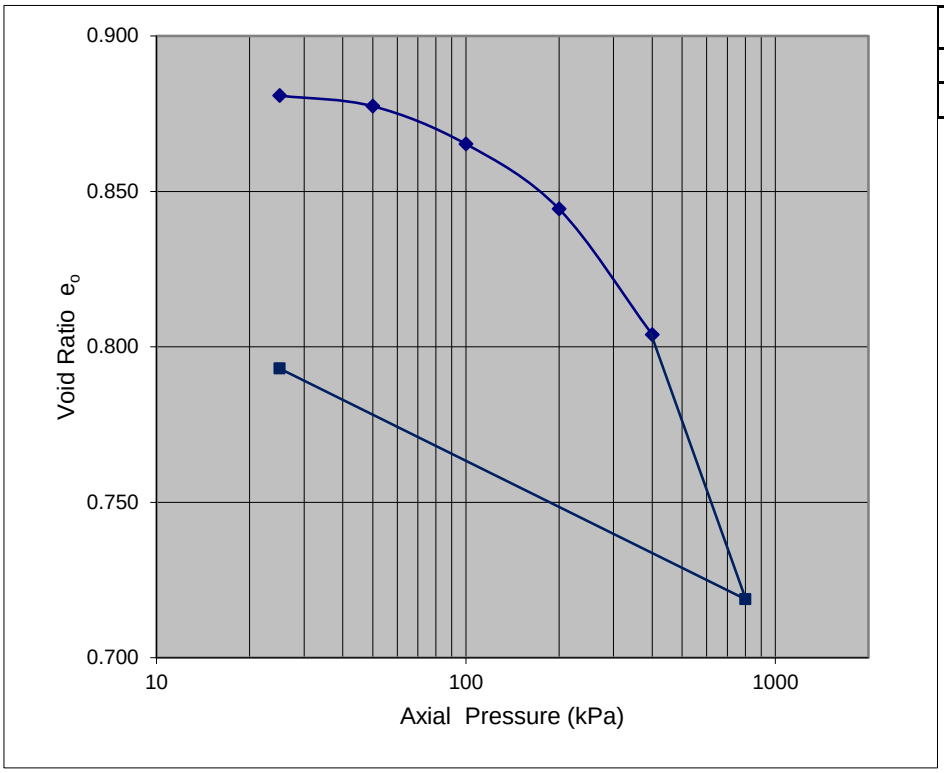
# Consolidation Test Results

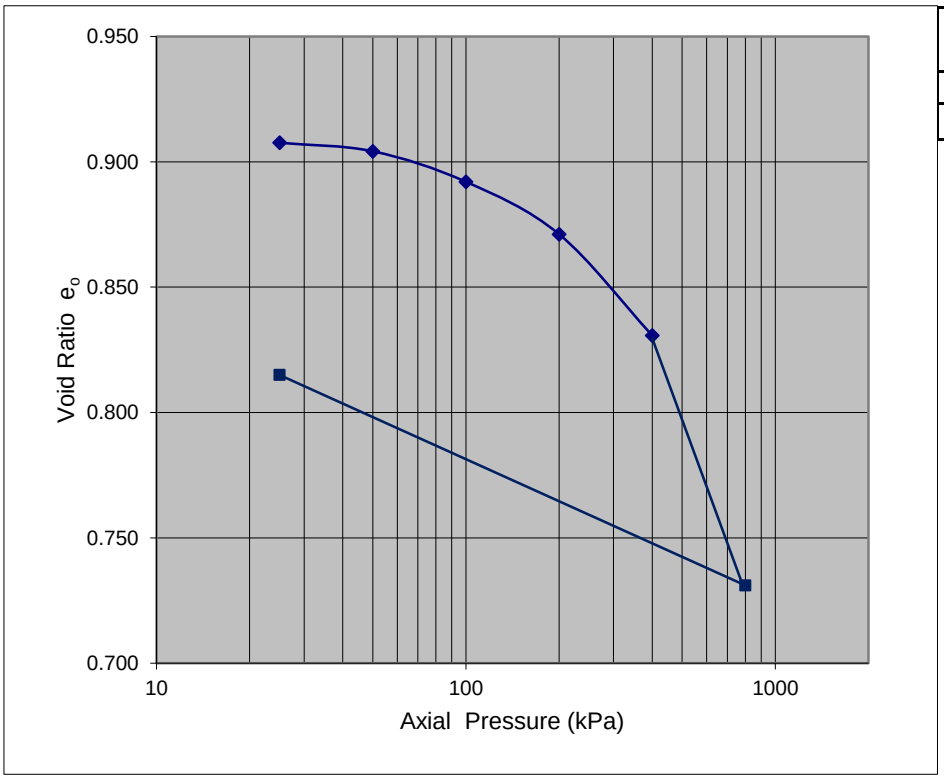
**Project :** **Samawa Combined Cycle P.P**

**BH No. :** 59 **Sample:** 2 Depth: 1.5-2.0




| | |
|---|---|
| **Cc** | **0.28** |
| **Cr** | **0.049** |
| **$e_o$** | **0.894** |

**BH No. :** 60 **Sample:** 4 Depth: 4.0-4.5




| | |
|---|---|
| **Cc** | **0.33** |
| **Cr** | **0.056** |
| **$e_o$** | **0.921** |

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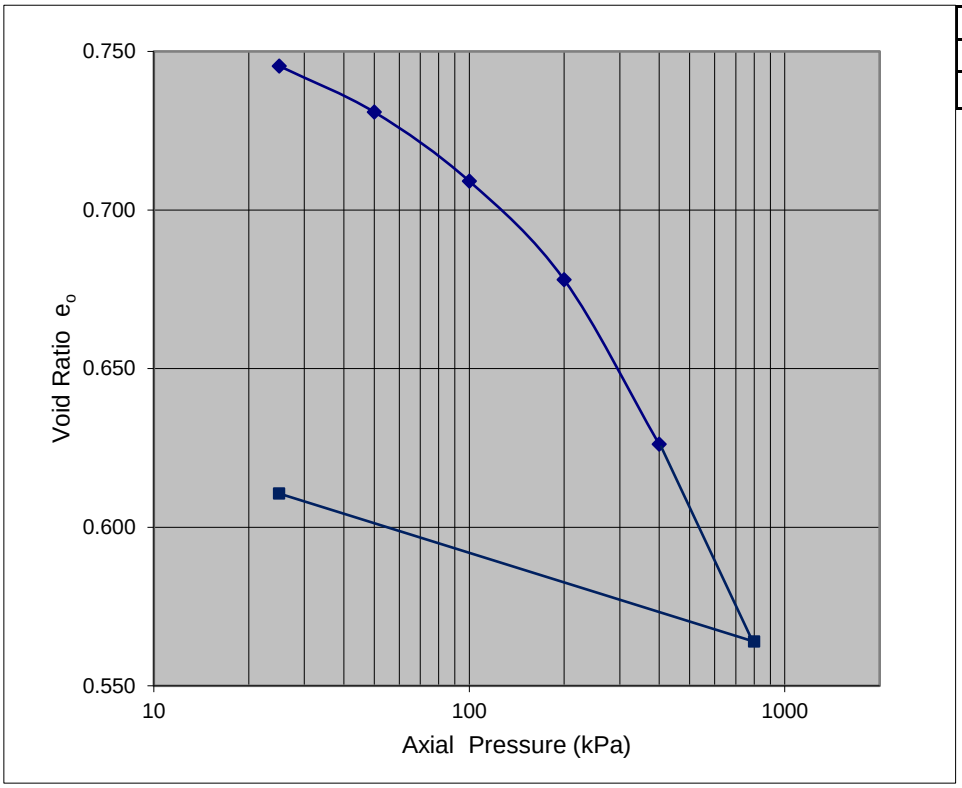
# Consolidation Test Results

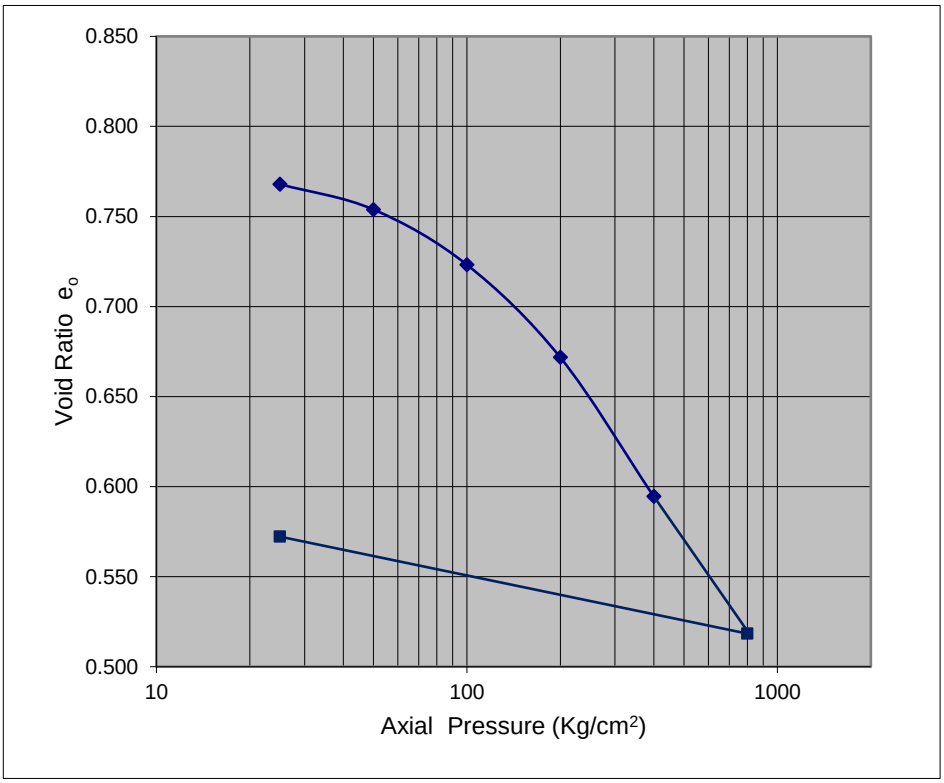
**Project : Samawa Combined Cycle P.P**

**BH No. :** 61 **Sample:** 2 Depth: 1.5-2.0




| | |
|---|---|
| **Cc** | **0.21** |
| **Cr** | **0.031** |
| **$e_o$** | **0.751** |

**BH No. :** 61 **Sample:** 4 Depth: 4.0-4.5




| | |
|---|---|
| **Cc** | **0.25** |
| **Cr** | **0.036** |
| **$e_o$** | **0.793** |

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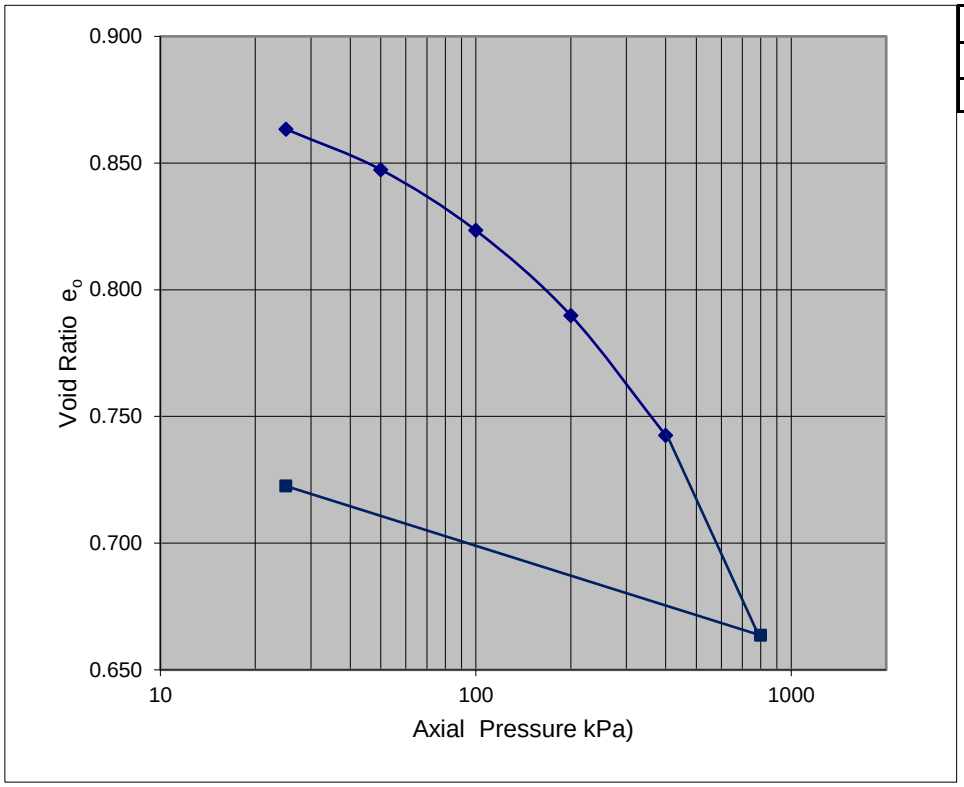
# Consolidation Test Results

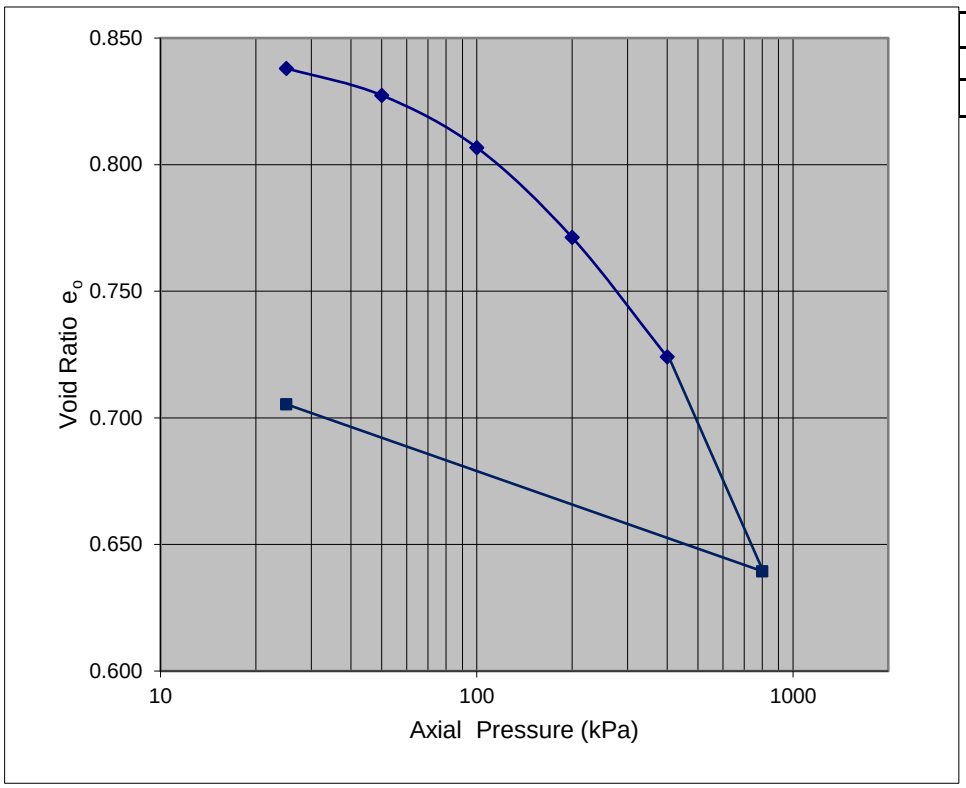
**Project : Samawa Combined Cycle P.P**

**BH No. :** 62 **Sample:** 2 Depth: 1.5-2.0




| | |
|---|---|
| **Cc** | **0.26** |
| **Cr** | **0.039** |
| **$e_o$** | **0.903** |

**BH No. :** 62 **Sample:** 4 Depth: 4.0-4.5




| | |
|---|---|
| **Cc** | **0.28** |
| **Cr** | **0.044** |
| **$e_o$** | **0.842** |

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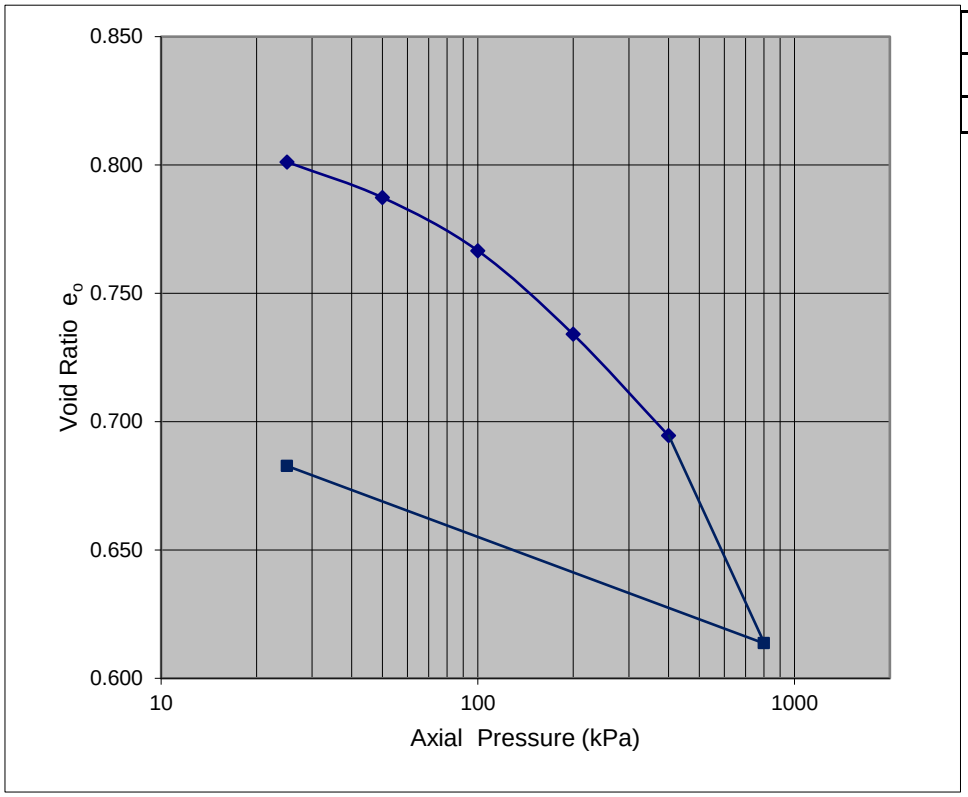
# Consolidation Test Results

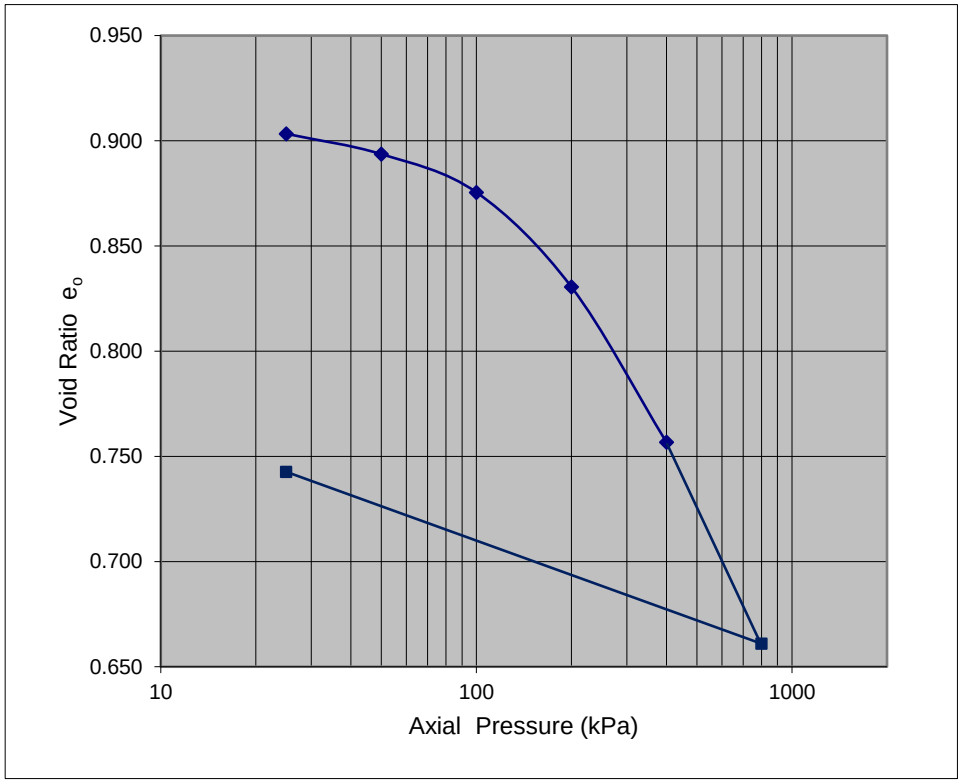
**Project : Samawa Combined Cycle P.P**

**BH No. :** 63 **Sample:** 2 Depth: 1.0-1.5




| | |
|---|---|
| **Cc** | **0.27** |
| **Cr** | **0.046** |
| **$e_o$** | **0.823** |

**BH No. :** 63 **Sample:** 5 Depth: 4.0-4.5




| | |
|---|---|
| **Cc** | **0.32** |
| **Cr** | **0.054** |
| **$e_o$** | **0.906** |

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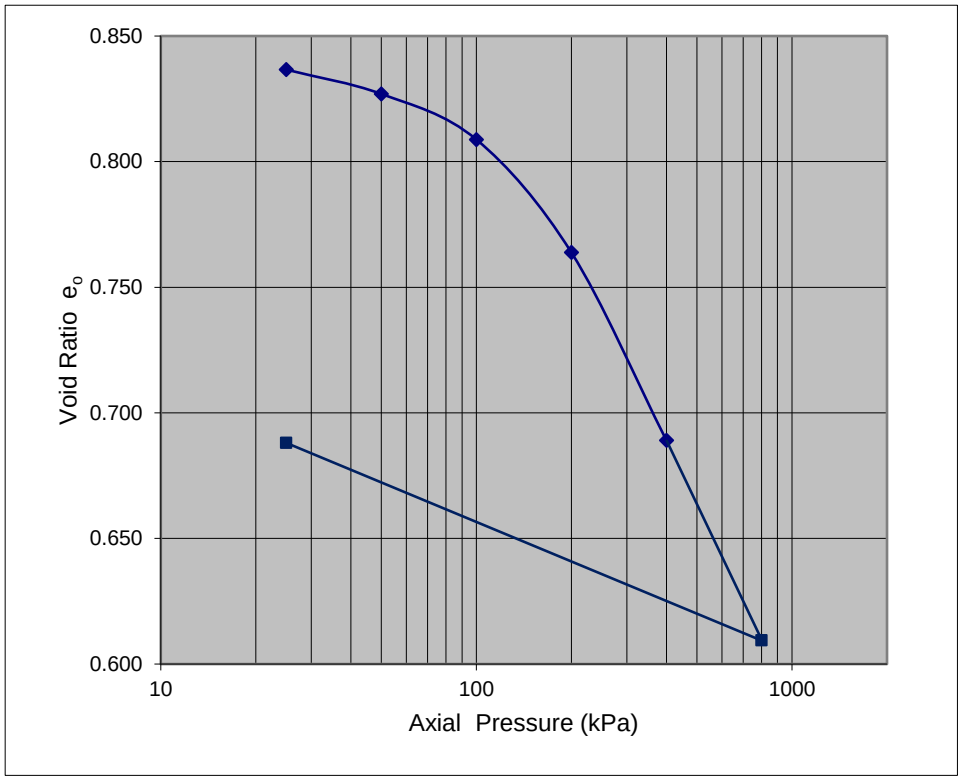
# Consolidation Test Results

**Project : Samawa Combined Cycle P.P**

**BH No. :** 64 **Sample:** 4 Depth: 4.0-4.5




| | |
|---|---|
| **Cc** | **0.26** |
| **Cr** | **0.052** |
| **$e_o$** | **0.839** |

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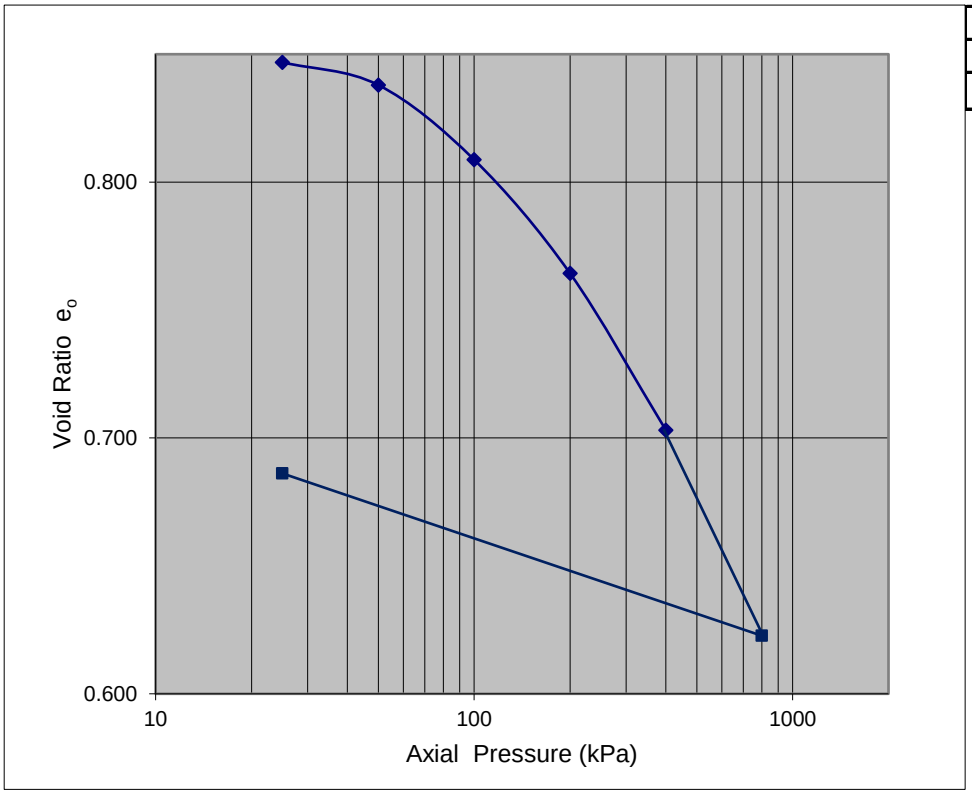
# Consolidation Test Results

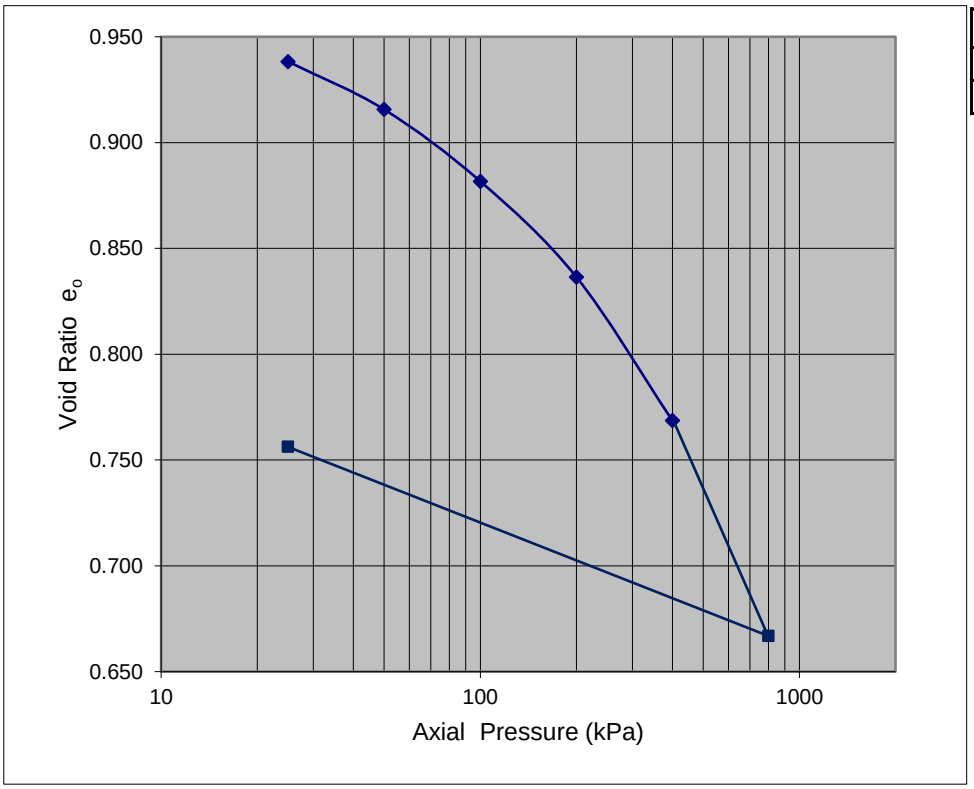
**Project :** **Samawa Combined Cycle P.P**

**BH No. :** 65 **Sample:** 2 Depth: 1.5-2.0




| | |
|---|---|
| **Cc** | **0.27** |
| **Cr** | **0.042** |
| **$e_o$** | **0.876** |

**BH No. :** 65 **Sample:** 5 Depth: 4.0-4.5




| | |
|---|---|
| **Cc** | **0.34** |
| **Cr** | **0.059** |
| **$e_o$** | **0.961** |

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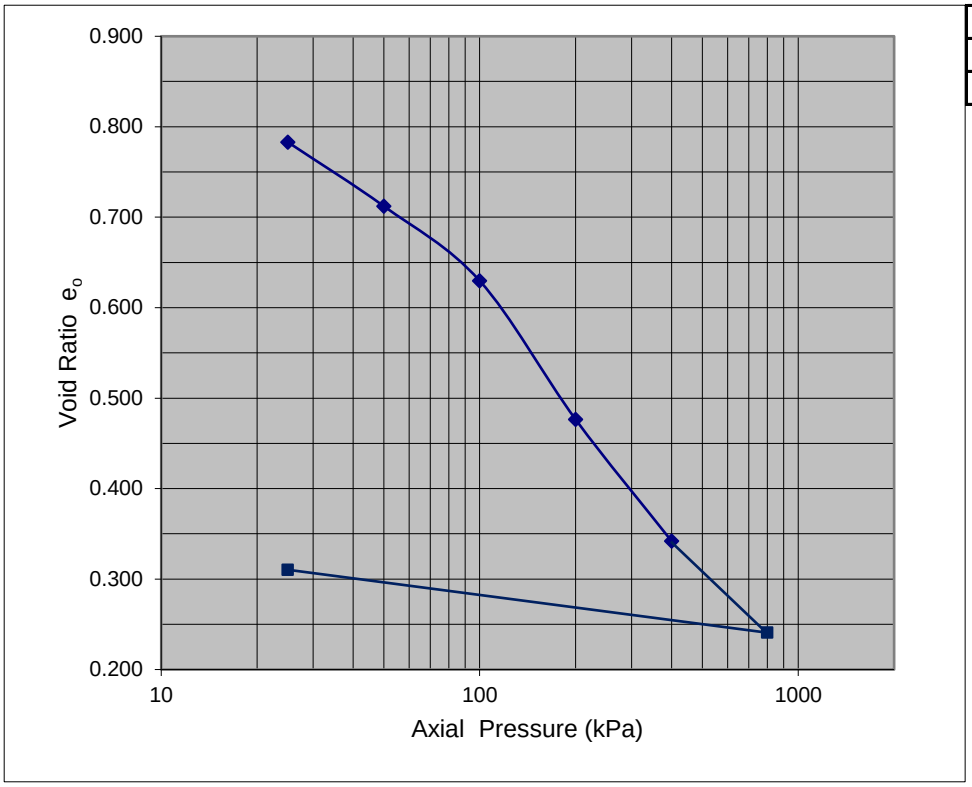
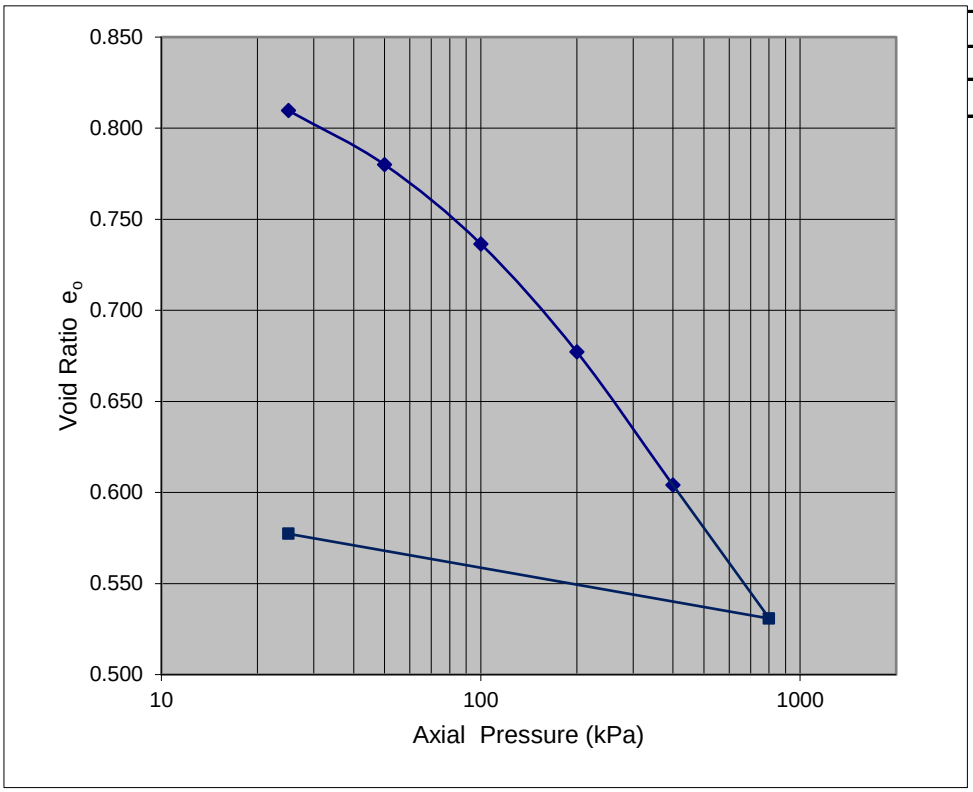
# Consolidation Test Results

**BH No. :** 66 **Sample:** 2 Depth: 1.5-2.0




| | |
|---|---|
| **Cc** | **0.34** |
| **Cr** | **0.046** |
| **$e_o$** | **1.066** |

**BH No. :** 66 **Sample:** 4 Depth: 4.0-4.5




| | |
|---|---|
| **Cc** | **0.24** |
| **Cr** | **0.031** |
| **$e_o$** | **0.859** |

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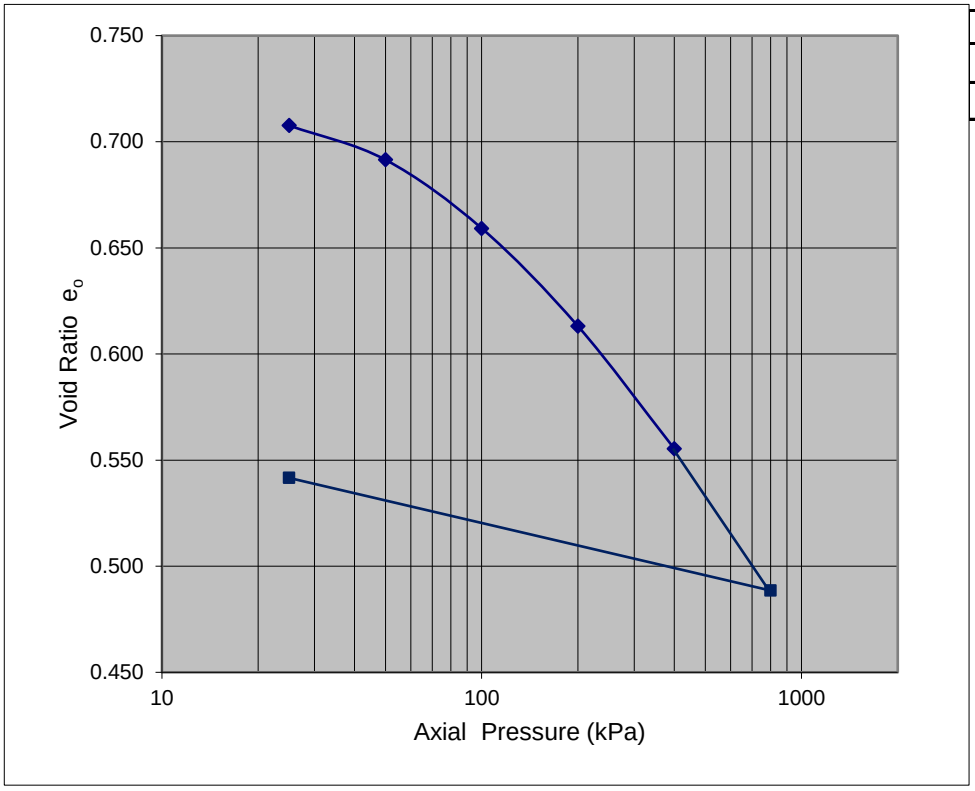
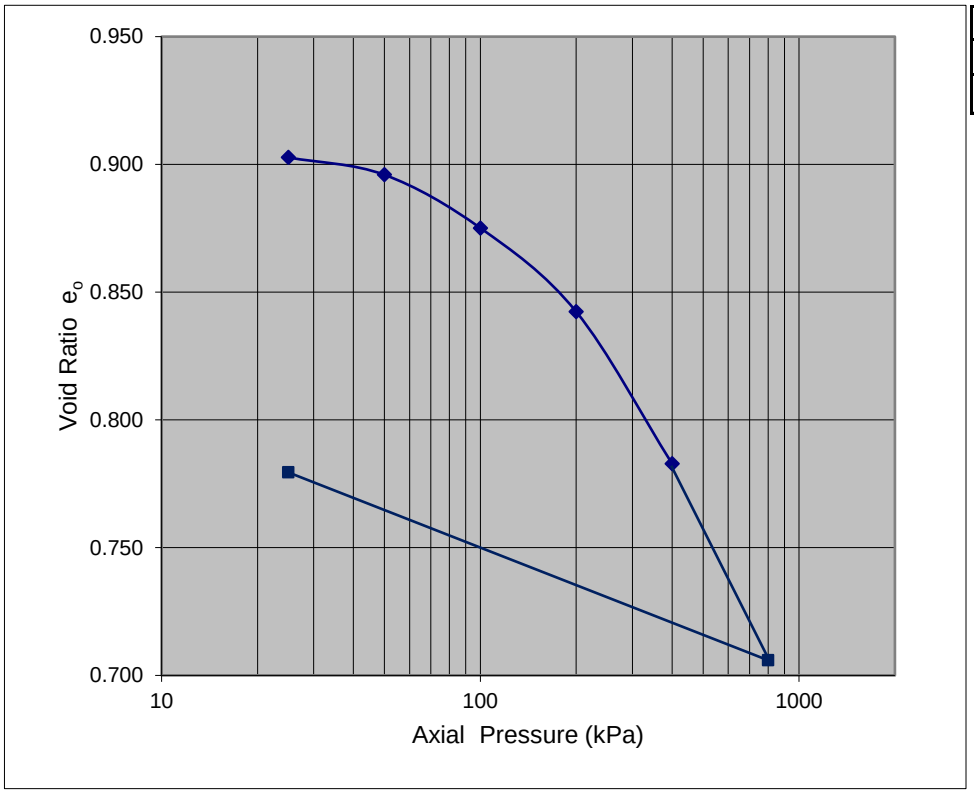
# Consolidation Test Results

**BH No. :** 67 **Sample:** 2 Depth: 1.0-1.5




| | |
|---|---|
| **Cc** | **0.22** |
| **Cr** | **0.035** |
| **$e_o$** | **0.756** |

**BH No. :** 67 **Sample:** 5 Depth: 4.0-4.5




| | |
|---|---|
| **Cc** | **0.26** |
| **Cr** | **0.049** |
| **$e_o$** | **0.921** |

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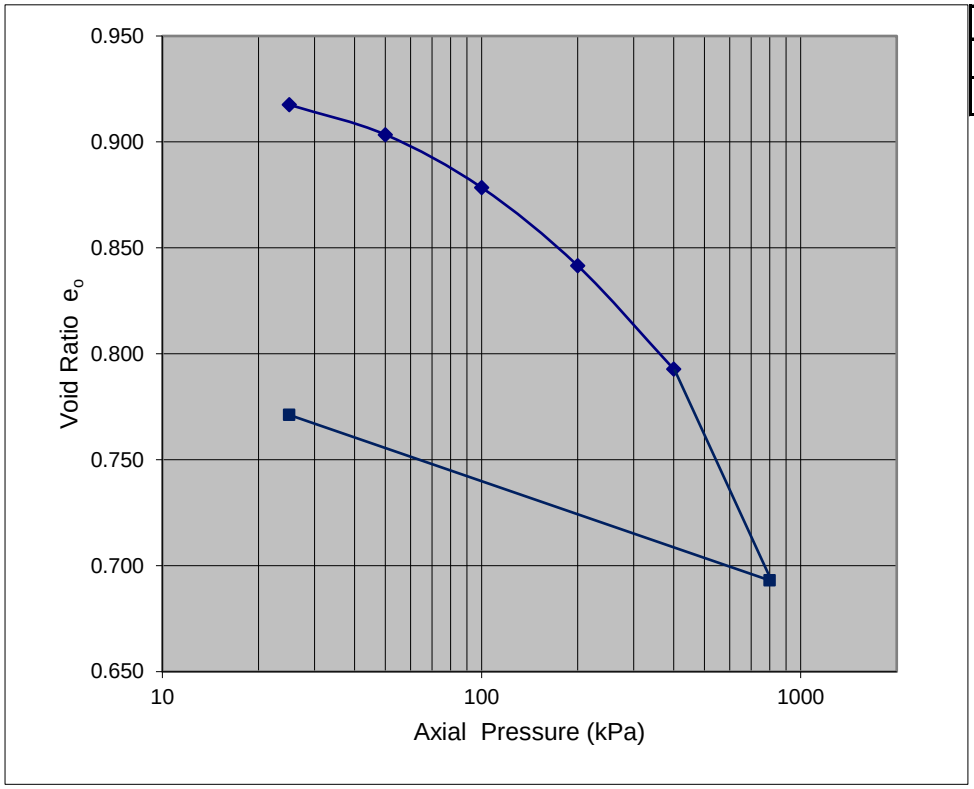
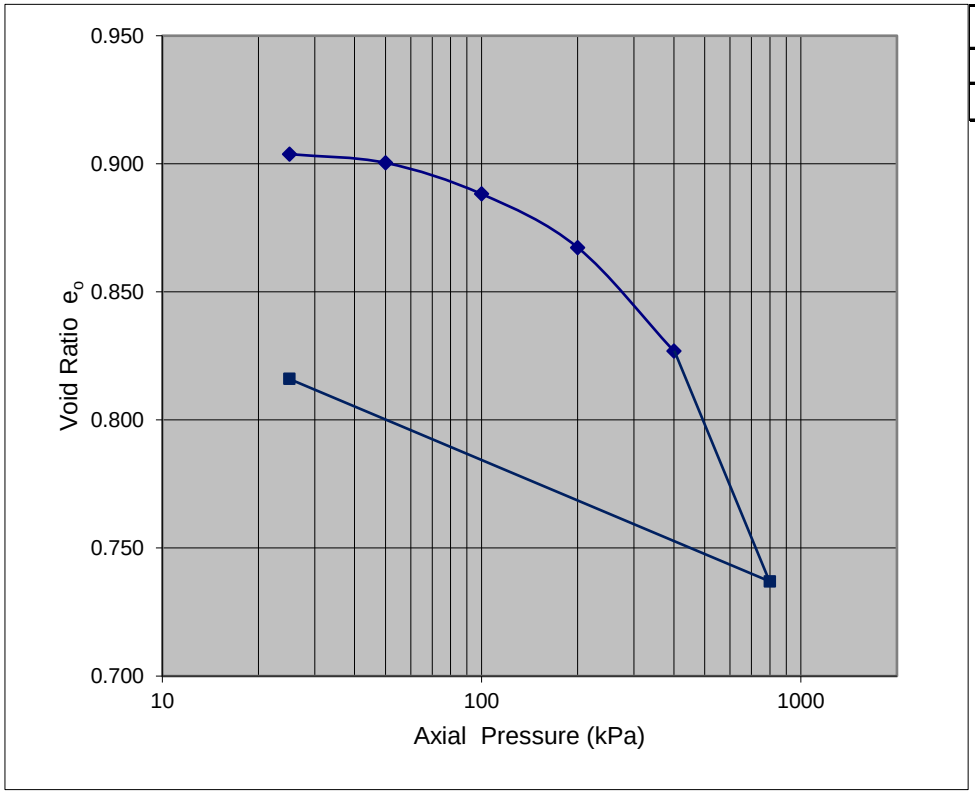
# Consolidation Test Results

**BH No. :** 68 **Sample:** 2 Depth: 1.0-1.5




| | |
|---|---|
| **Cc** | **0.33** |
| **Cr** | **0.052** |
| **$e_o$** | **0.938** |

**BH No. :** 69 **Sample:** 2 Depth: 1.5-2.0




| | |
|---|---|
| **Cc** | **0.30** |
| **Cr** | **0.053** |
| **$e_o$** | **0.917** |

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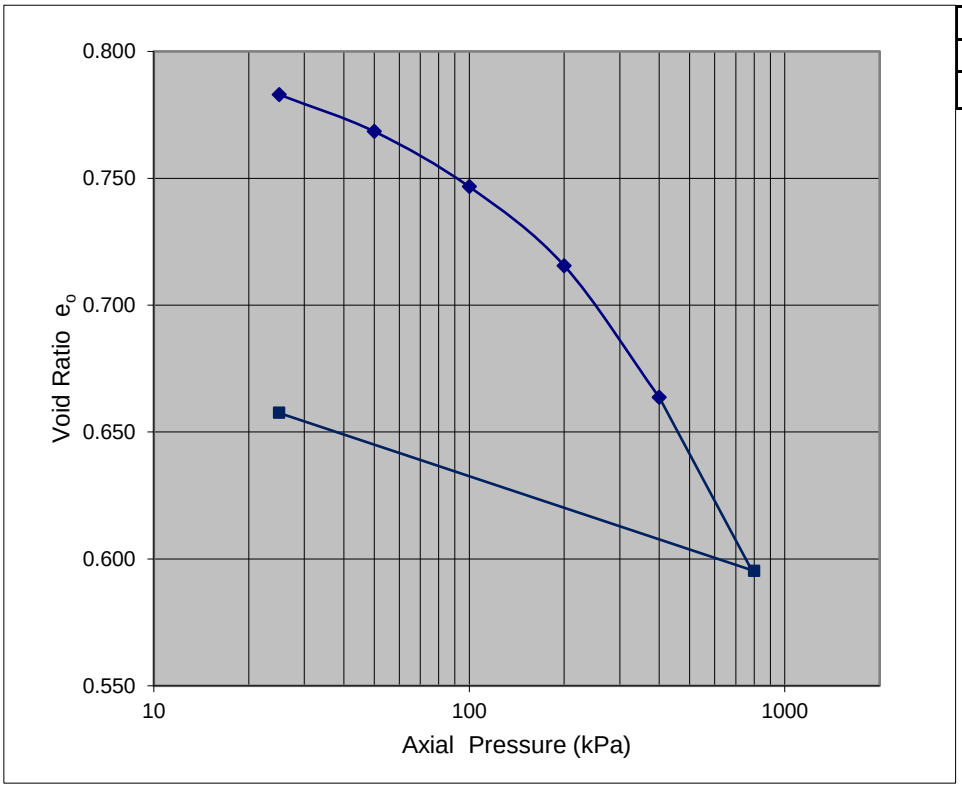
# Consolidation Test Results

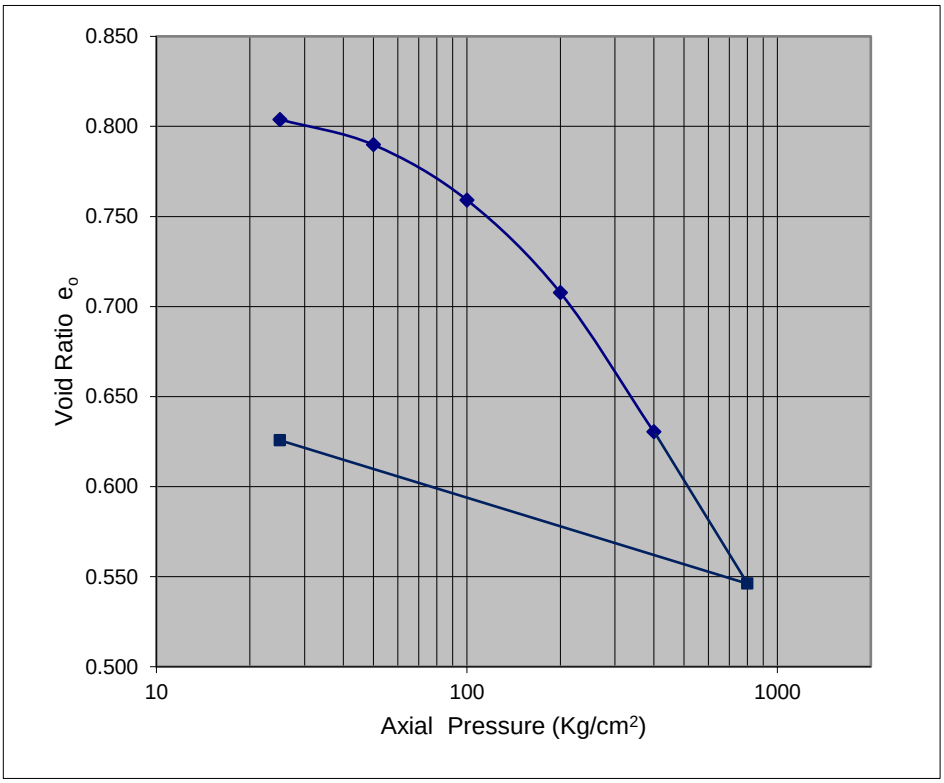
**Project : Samawa Combined Cycle P.P**

**BH No. :** 70 **Sample:** 2 Depth: 1.5-2.0




| | |
|---|---|
| **Cc** | **0.23** |
| **Cr** | **0.041** |
| **$e_o$** | **0.788** |

**BH No. :** 70 **Sample:** 4 Depth: 3.5-4.0




| | |
|---|---|
| **Cc** | **0.28** |
| **Cr** | **0.053** |
| **$e_o$** | **0.829** |

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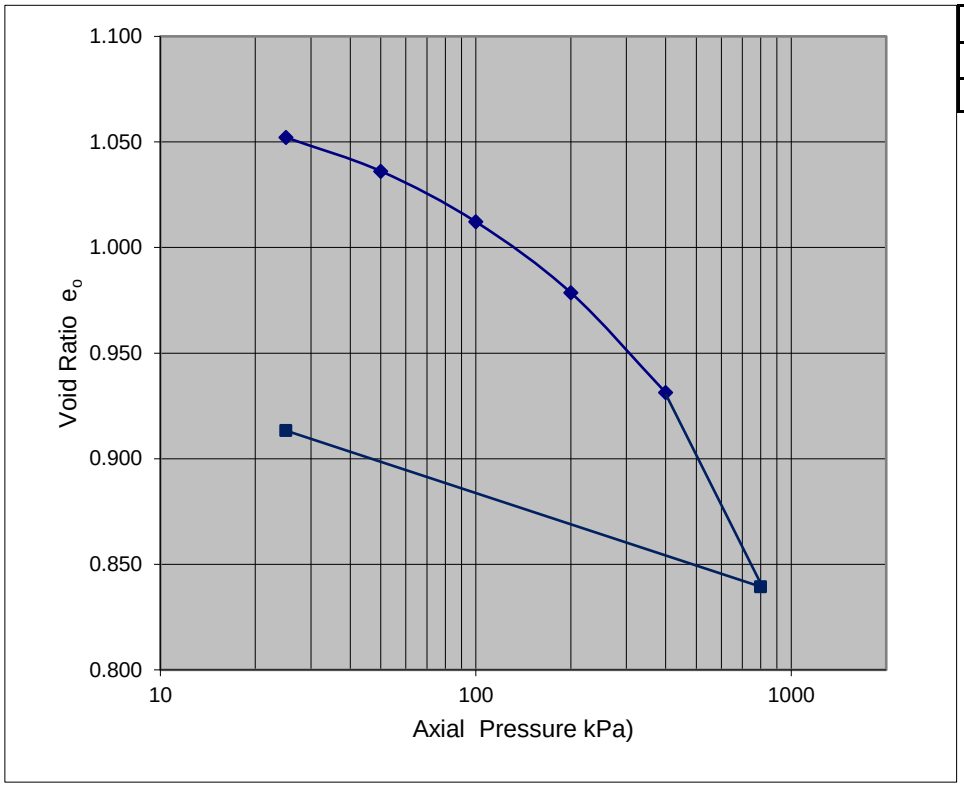
# Consolidation Test Results

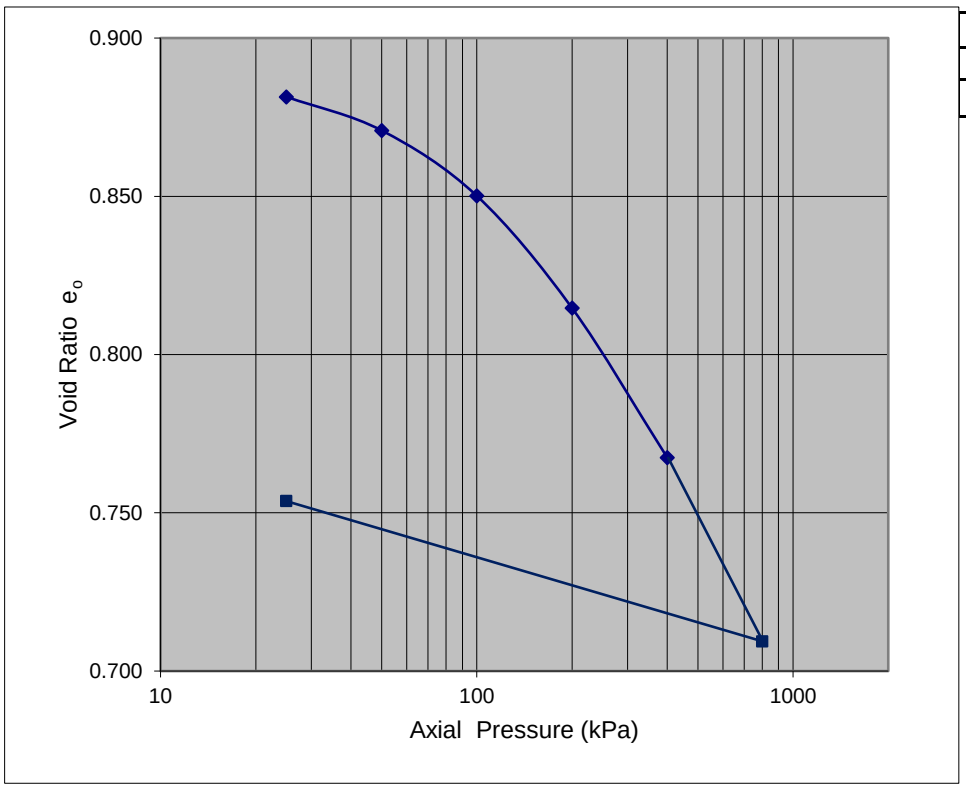
**Project : Samawa Combined Cycle P.P**

**BH No. :** 71 **Sample:** 2 Depth: 1.5-2.0




| | |
|---|---|
| **Cc** | **0.31** |
| **Cr** | **0.049** |
| **$e_o$** | **1.092** |

**BH No. :** 72 **Sample:** 2 Depth: 1.0-1.5




| | |
|---|---|
| **Cc** | **0.19** |
| **Cr** | **0.029** |
| **$e_o$** | **0.886** |

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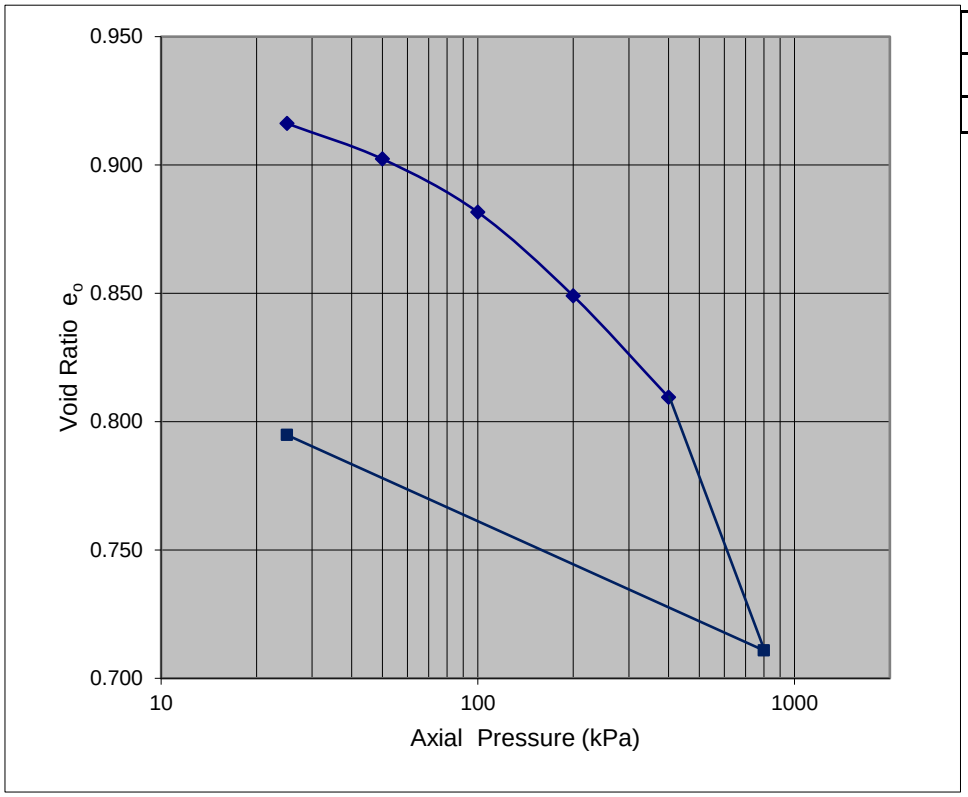
# Consolidation Test Results

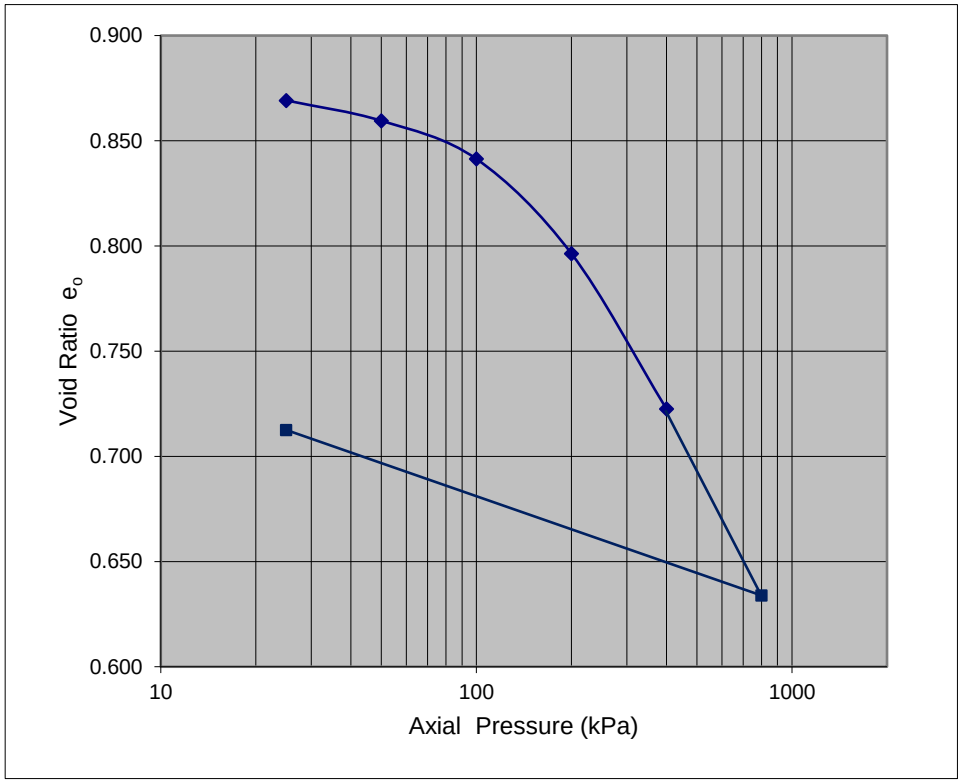
**Project : Samawa Combined Cycle P.P**

**BH No. :** 73 **Sample:** 2 Depth: 1.0-1.5




| | |
|---|---|
| **Cc** | **0.33** |
| **Cr** | **0.056** |
| **$e_o$** | **0.938** |

**BH No. :** 73 **Sample:** 5 Depth: 4.0-4.5




| | |
|---|---|
| **Cc** | **0.29** |
| **Cr** | **0.052** |
| **$e_o$** | **0.872** |

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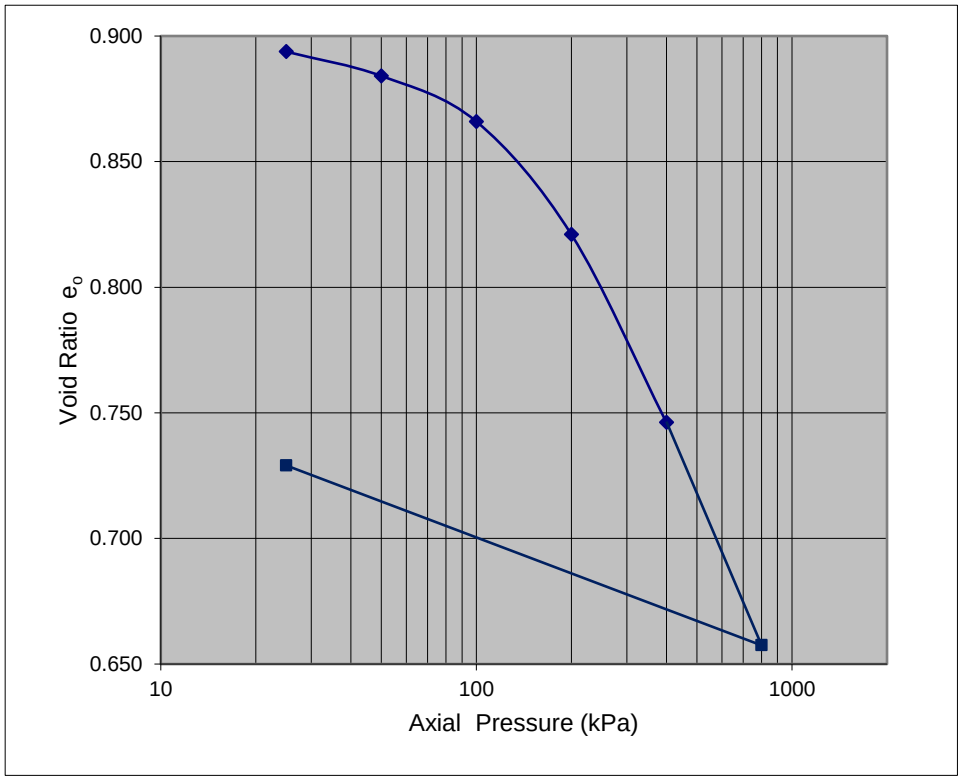
# Consolidation Test Results

**Project : Samawa Combined Cycle P.P**

**BH No. :** 74 **Sample:** 2 Depth: 1.0-1.5




| | |
|---|---|
| **Cc** | **0.29** |
| **Cr** | **0.048** |
| **$e_o$** | **0.896** |

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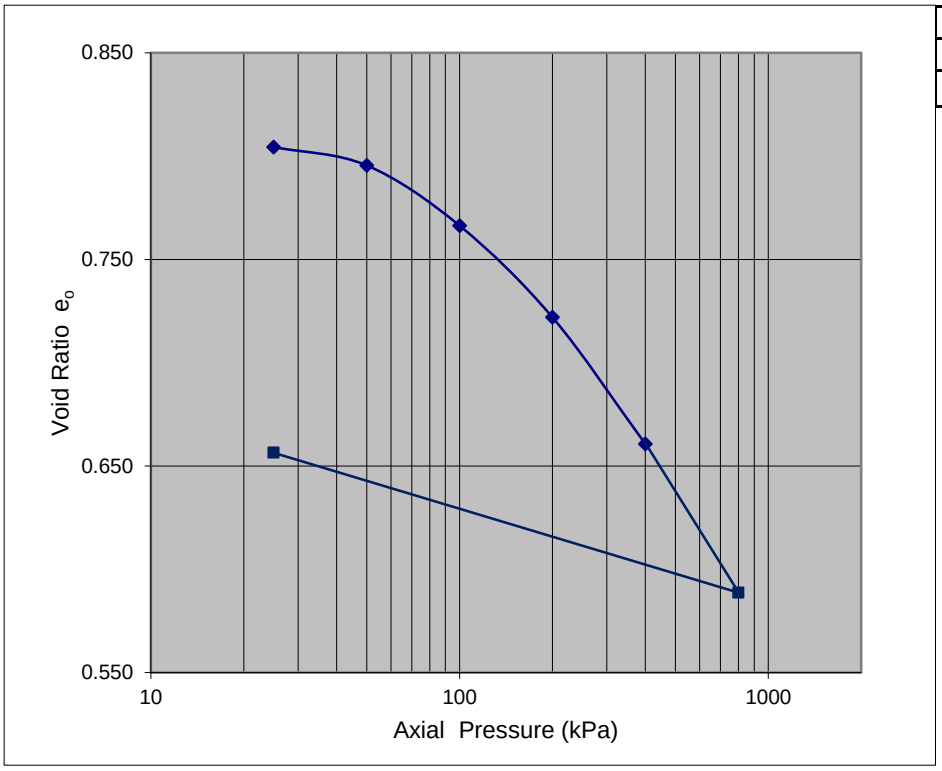
# Consolidation Test Results

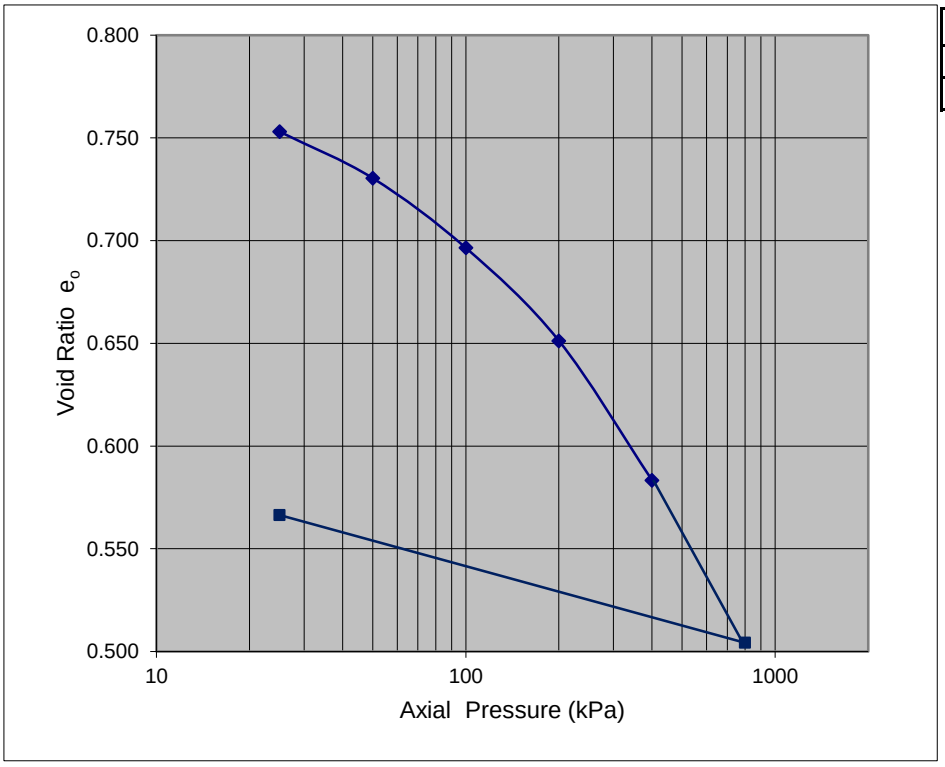
**Project :** **Samawa Combined Cycle P.P**

**BH No. :** 75 **Sample:** 2 Depth: 1.5-2.0




| | |
|---|---|
| **Cc** | **0.24** |
| **Cr** | **0.045** |
| **$e_o$** | **0.834** |

**BH No. :** 75 **Sample:** 4 Depth: 4.0-4.5




| | |
|---|---|
| **Cc** | **0.26** |
| **Cr** | **0.041** |
| **$e_o$** | **0.776** |

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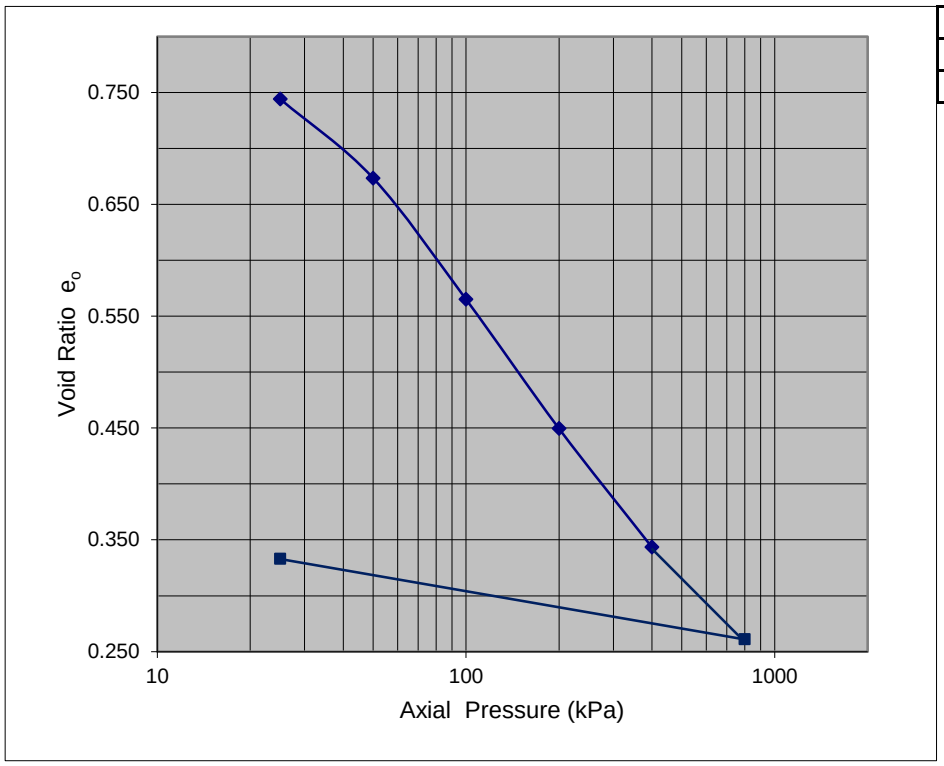
# Consolidation Test Results

**Project :** **Samawa Combined Cycle P.P**
**BH No. :** 77 **Sample:** 2 Depth: 1.0-1.5




| | |
|---|---|
| **Cc** | **0.27** |
| **Cr** | **0.048** |
| **$e_o$** | **0.803** |

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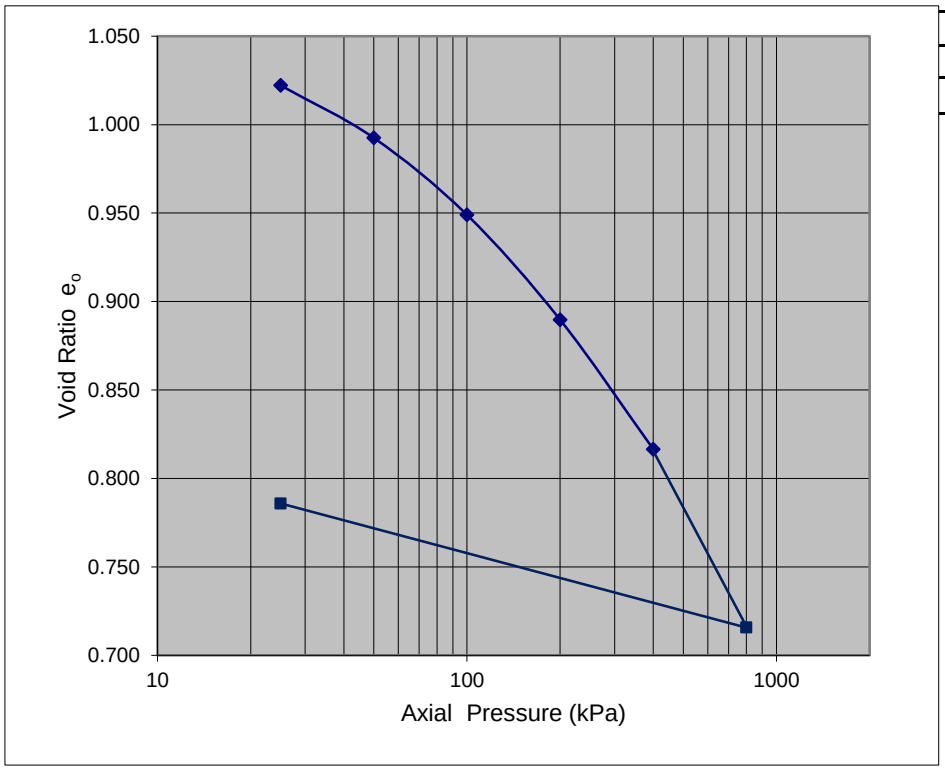
# Consolidation Test Results

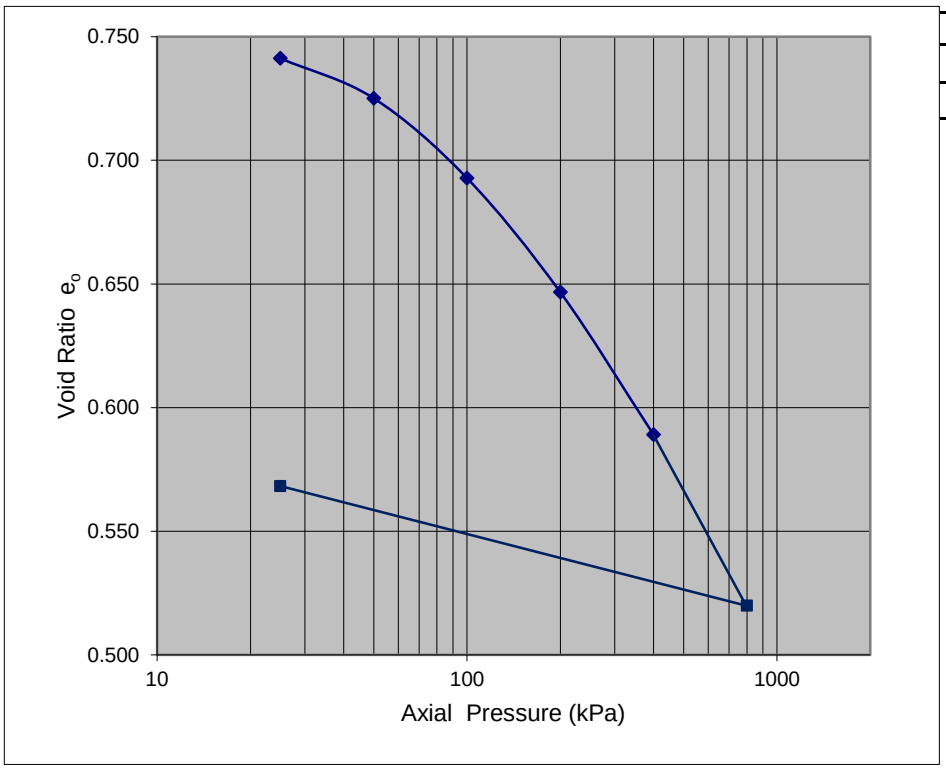
**Project :** **Samawa Combined Cycle P.P**

**BH No. :** 78 **Sample:** 2 Depth: 1.5-2.0




| | |
|---|---|
| **Cc** | **0.34** |
| **Cr** | **0.047** |
| **$e_o$** | **1.072** |

**BH No. :** 78 **Sample:** 4 Depth: 4.0-4.5




| | |
|---|---|
| **Cc** | **0.23** |
| **Cr** | **0.032** |
| **$e_o$** | **0.790** |

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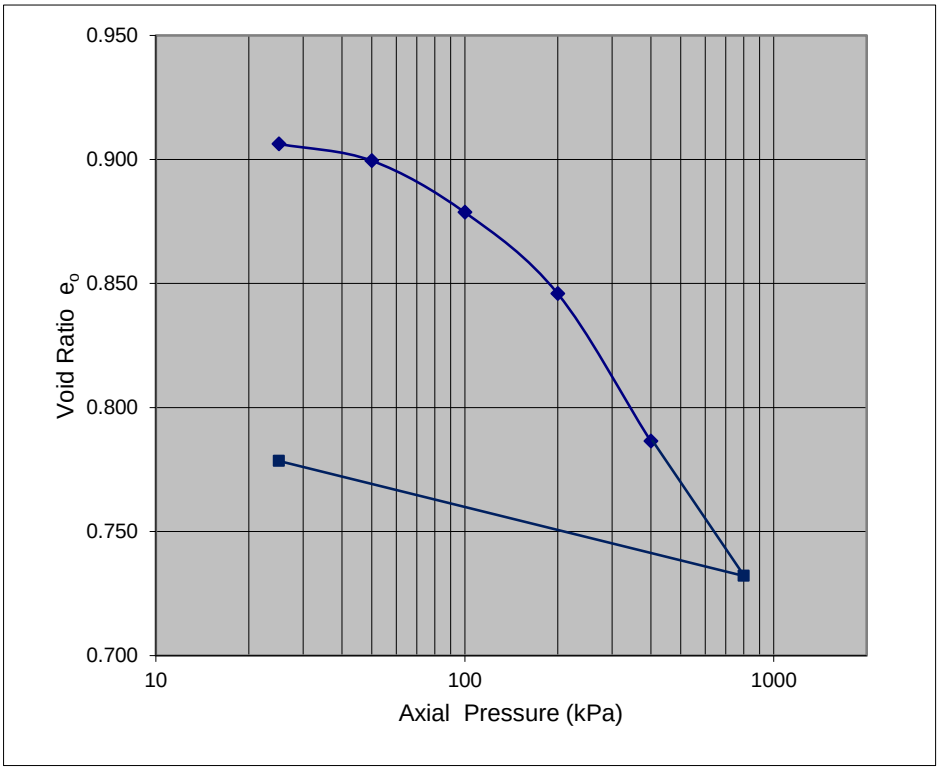
# Consolidation Test Results

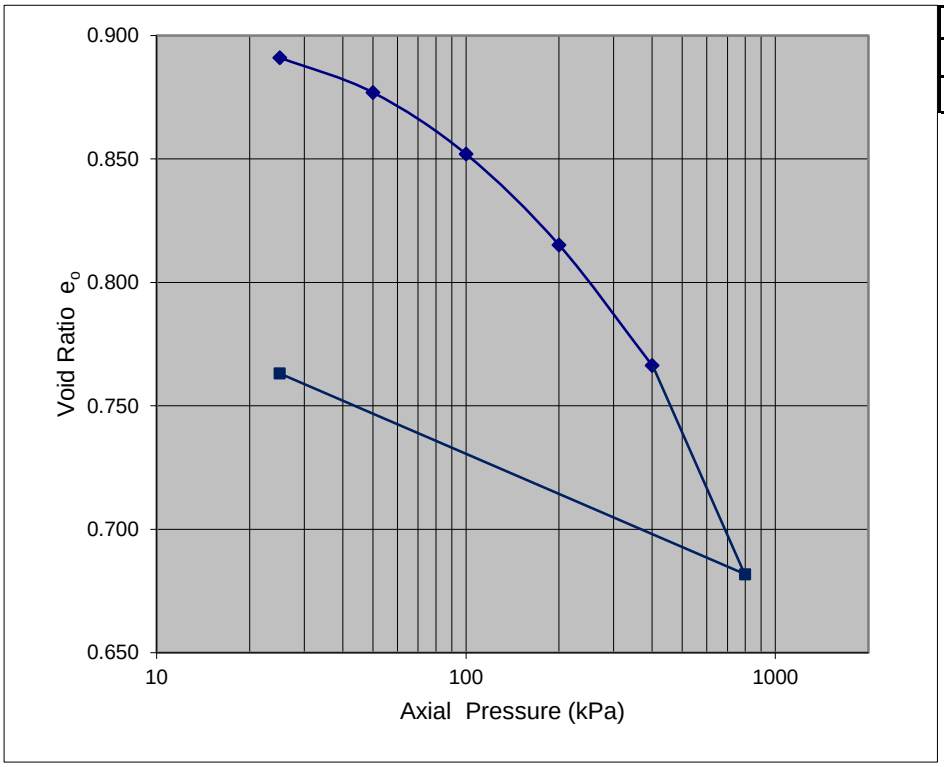
**Project :** **Samawa Combined Cycle P.P**

**BH No. :** 79 **Sample:** 2 Depth: 1.5-2.0




| | |
|---|---|
| **Cc** | **0.18** |
| **Cr** | **0.031** |
| **$e_o$** | **0.924** |

**BH No. :** 79 **Sample:** 4 Depth: 4.0-4.5




| | |
|---|---|
| **Cc** | **0.28** |
| **Cr** | **0.054** |
| **$e_o$** | **0.912** |

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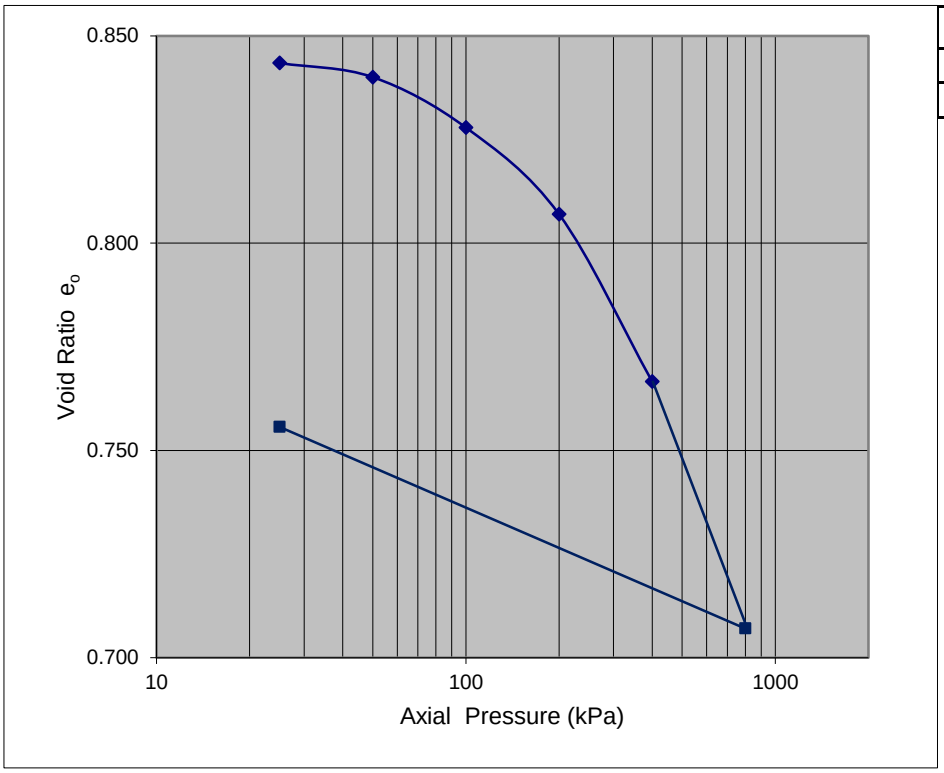
# Consolidation Test Results

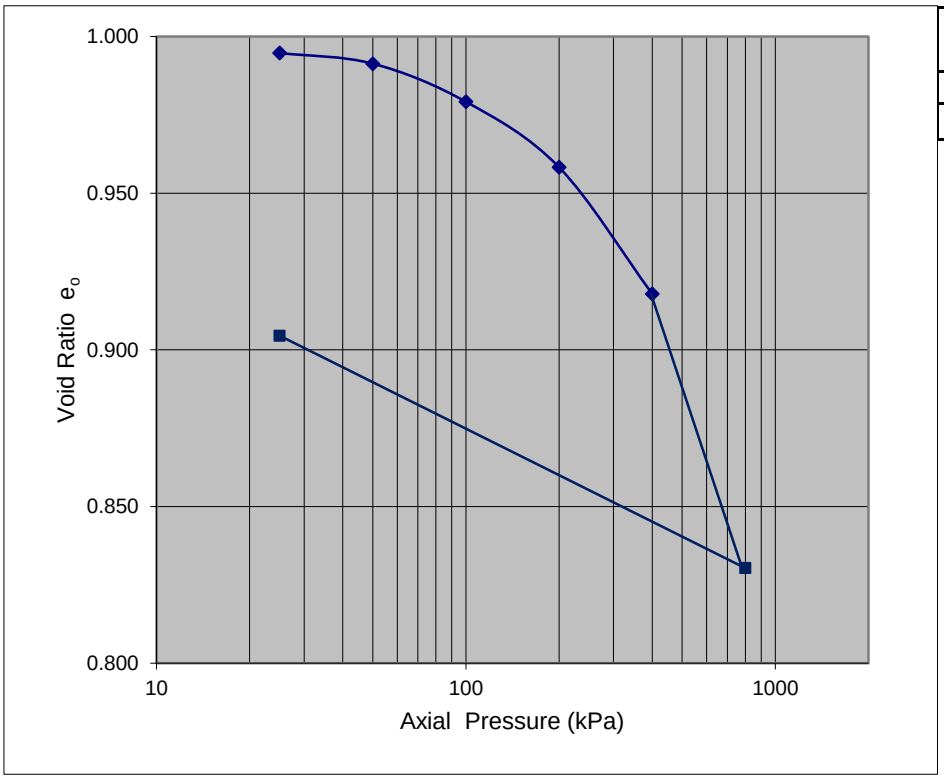
**Project :** **Samawa Combined Cycle P.P**

**BH No. :** 80 **Sample:** 2 Depth: 1.5-2.0




| | |
|---|---|
| **Cc** | **0.20** |
| **Cr** | **0.032** |
| **$e_o$** | **0.857** |

**BH No. :** 81 **Sample:** 2 Depth: 1.5-2.0




| | |
|---|---|
| **Cc** | **0.29** |
| **Cr** | **0.049** |
| **$e_o$** | **1.008** |

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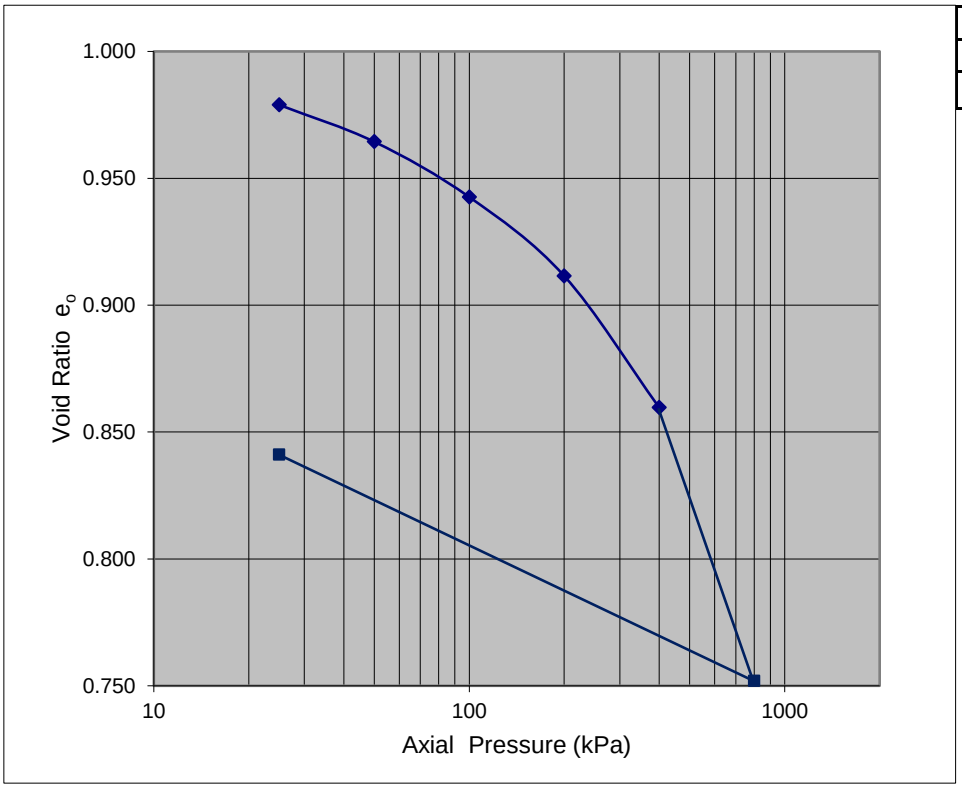
# Consolidation Test Results

**Project : Samawa Combined Cycle P.P**

**BH No. :** 82 **Sample:** 2 Depth: 1.0-1.5




| | |
|---|---|
| **Cc** | **0.36** |
| **Cr** | **0.059** |
| **$e_o$** | **0.984** |

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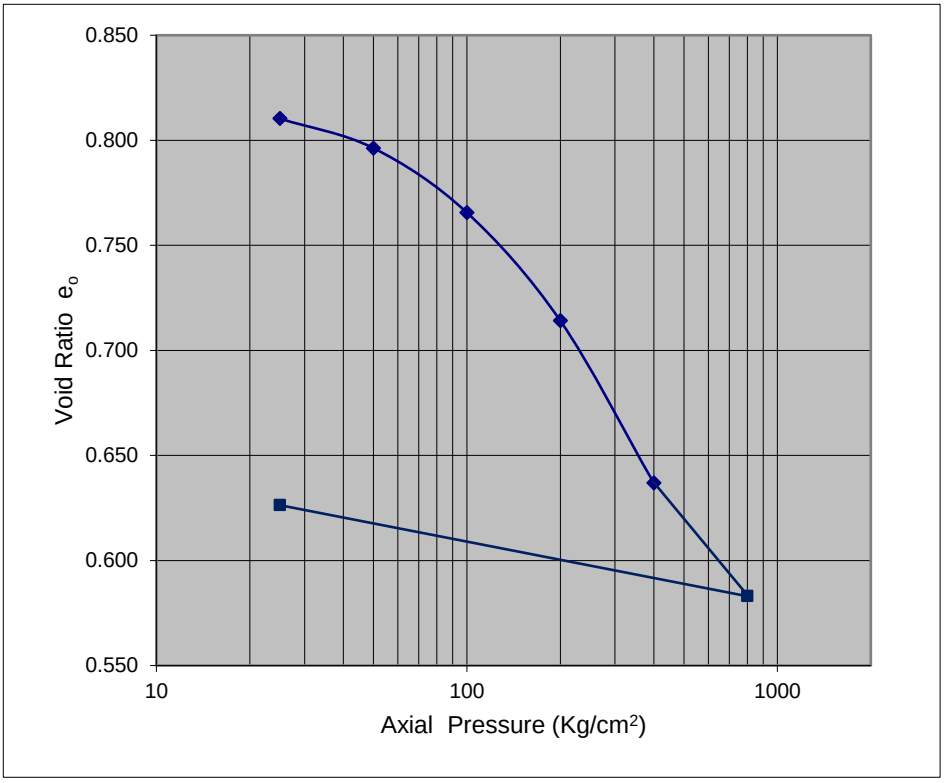
# Consolidation Test Results

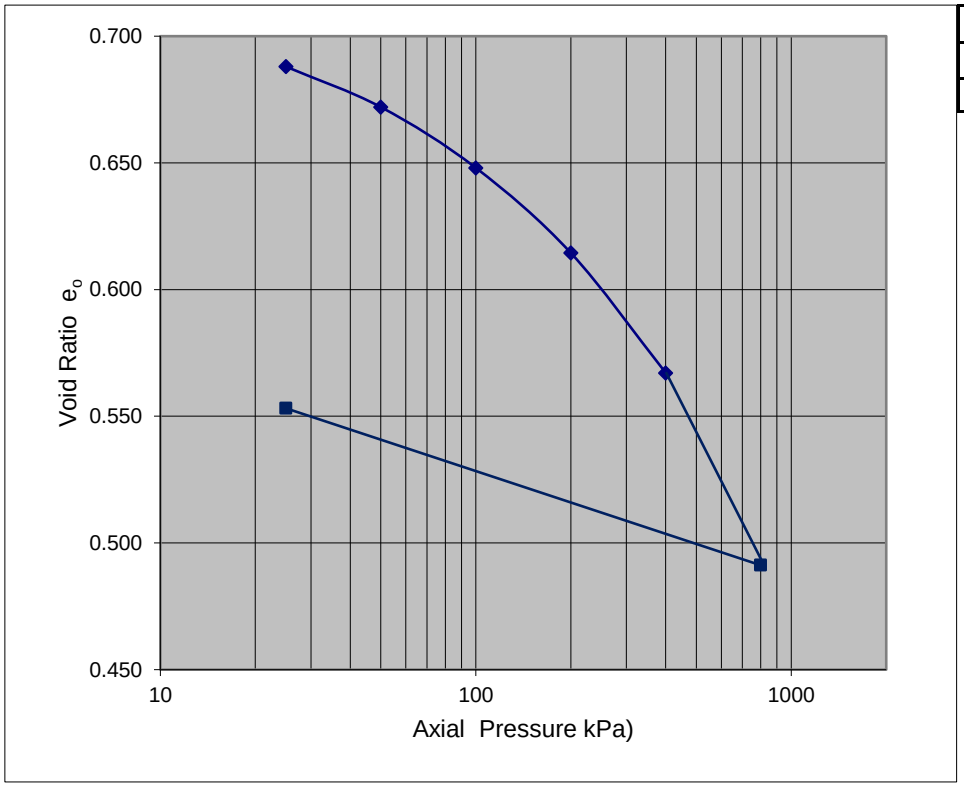
**Project : Samawa Combined Cycle P.P**

**BH No. :** 83 **Sample:** 2 Depth: 1.0-1.5




| | |
|---|---|
| **Cc** | **0.18** |
| **Cr** | **0.029** |
| **$e_o$** | **0.836** |

**BH No. :** 83 **Sample:** 4 Depth: 3.0-3.5




| | |
|---|---|
| **Cc** | **0.25** |
| **Cr** | **0.041** |
| **$e_o$** | **0.728** |

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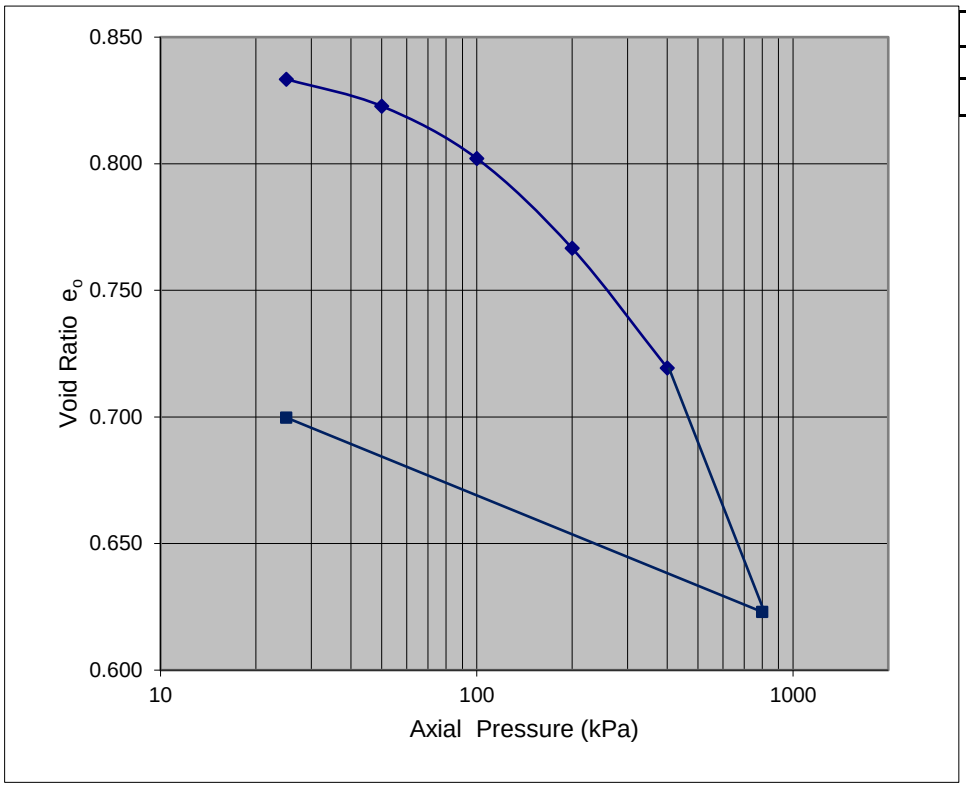
# Consolidation Test Results

**Project : Samawa Combined Cycle P.P**

**BH No. :** 84 **Sample:** 2 Depth: 1.0-1.5




| | |
|---|---|
| **Cc** | **0.32** |
| **Cr** | **0.051** |
| **$e_o$** | **0.838** |

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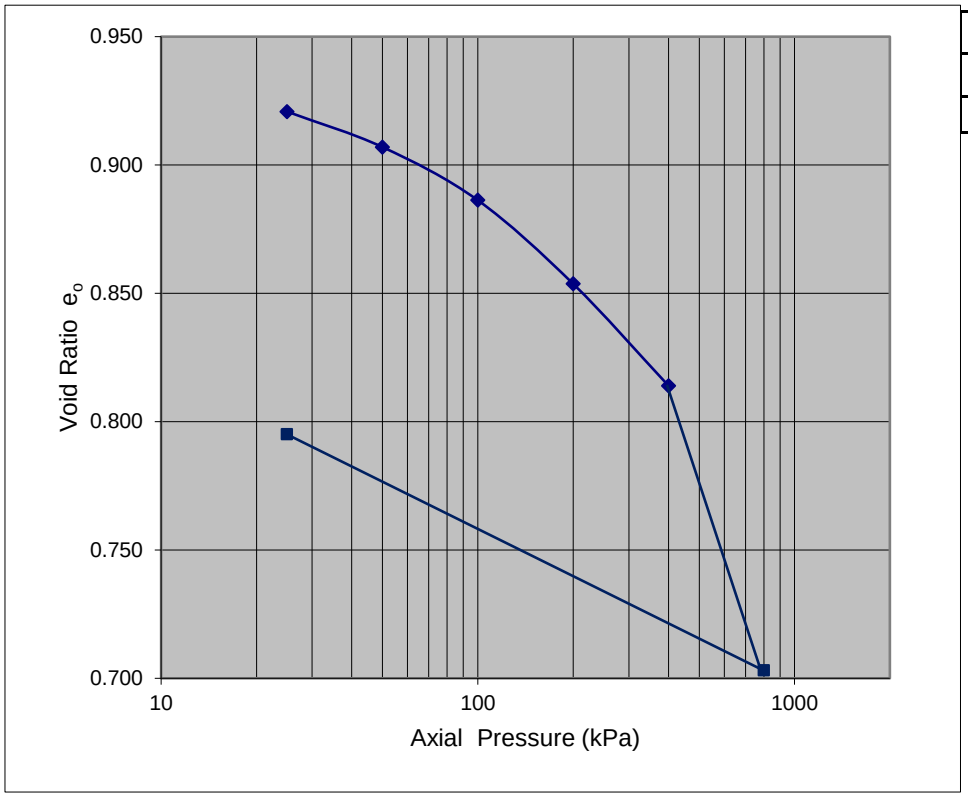
# Consolidation Test Results

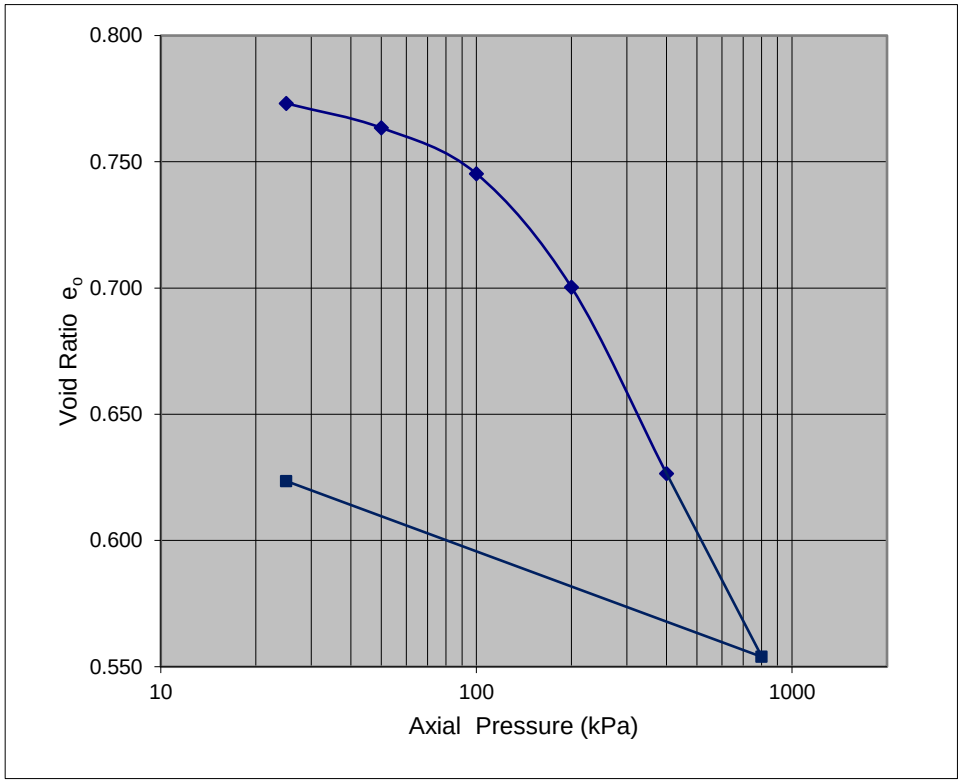
**Project : Samawa Combined Cycle P.P**

**BH No. :** 85 **Sample:** 2 Depth: 1.5-2.0




| | |
|---|---|
| **Cc** | **0.37** |
| **Cr** | **0.061** |
| **$e_o$** | **0.943** |

**BH No. :** 85 **Sample:** 4 Depth: 4.0-4.5




| | |
|---|---|
| **Cc** | **0.24** |
| **Cr** | **0.046** |
| **$e_o$** | **0.776** |

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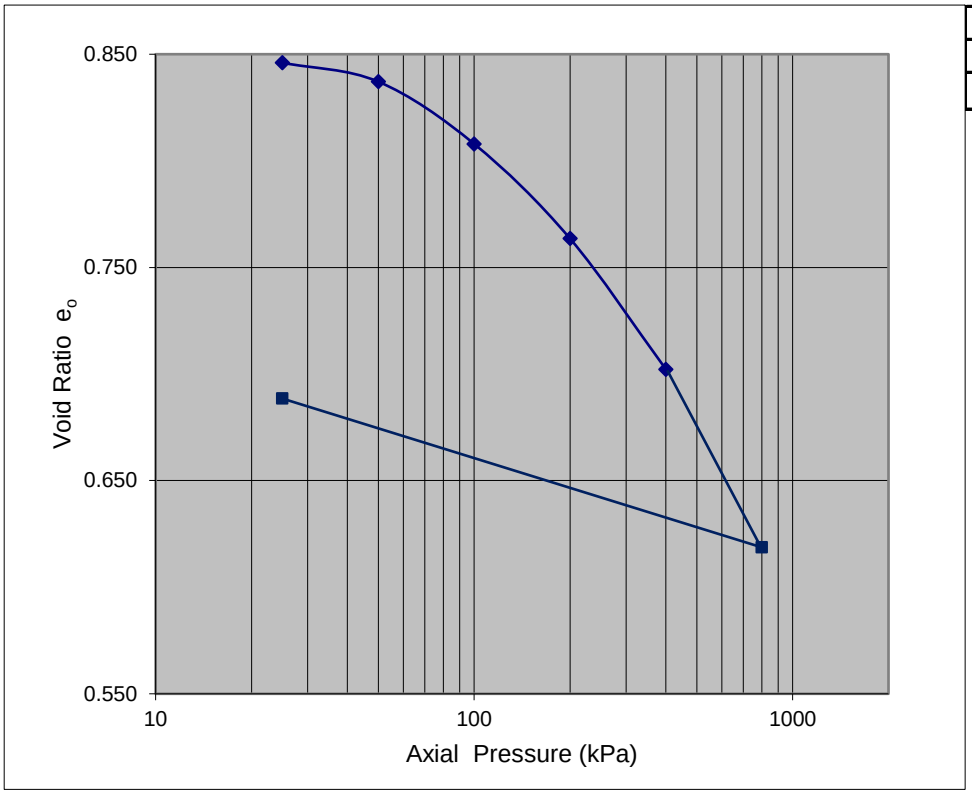
# Consolidation Test Results

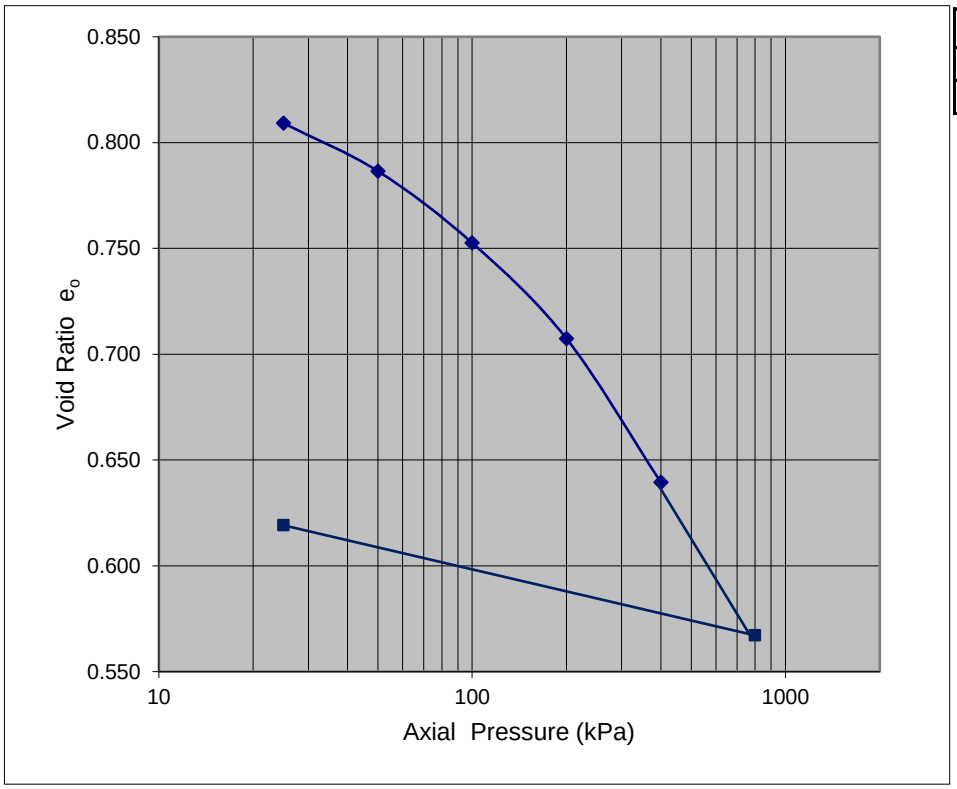
**Project :** **Samawa Combined Cycle P.P**

**BH No. :** 86 **Sample:** 2 Depth: 1.5-2.0




| | |
|---|---|
| Cc | 0.28 |
| Cr | 0.046 |
| $e_o$ | 0.876 |

**BH No. :** 86 **Sample:** 4 Depth: 4.0-4.5




| | |
|---|---|
| Cc | 0.24 |
| Cr | 0.035 |
| $e_o$ | 0.832 |

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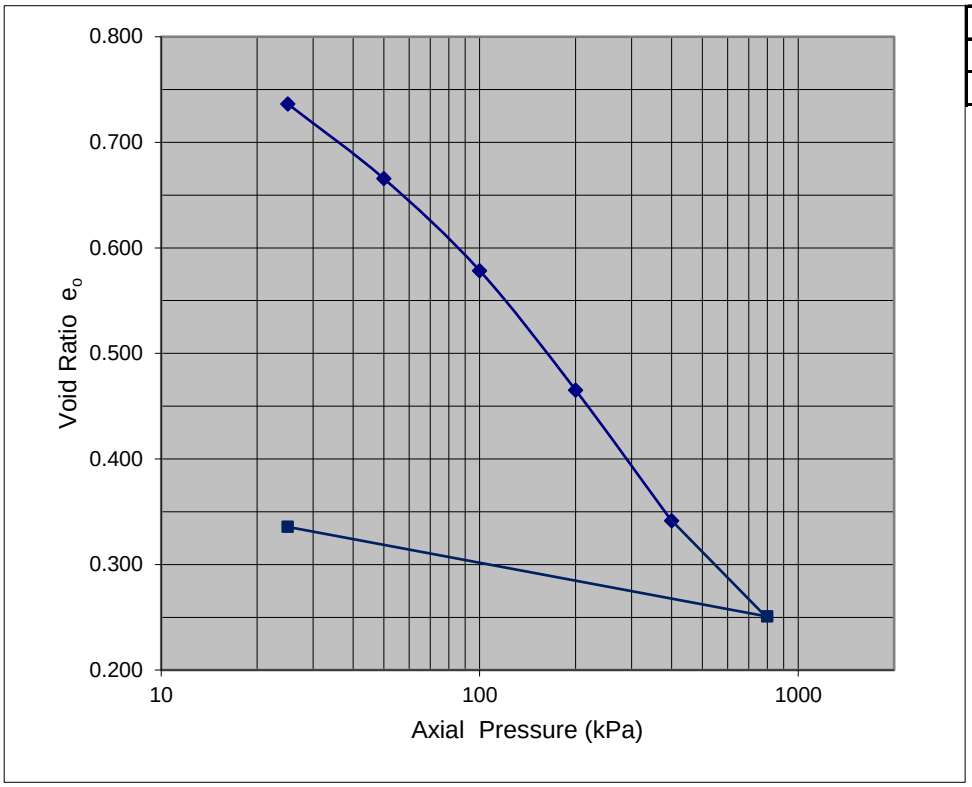
# Consolidation Test Results

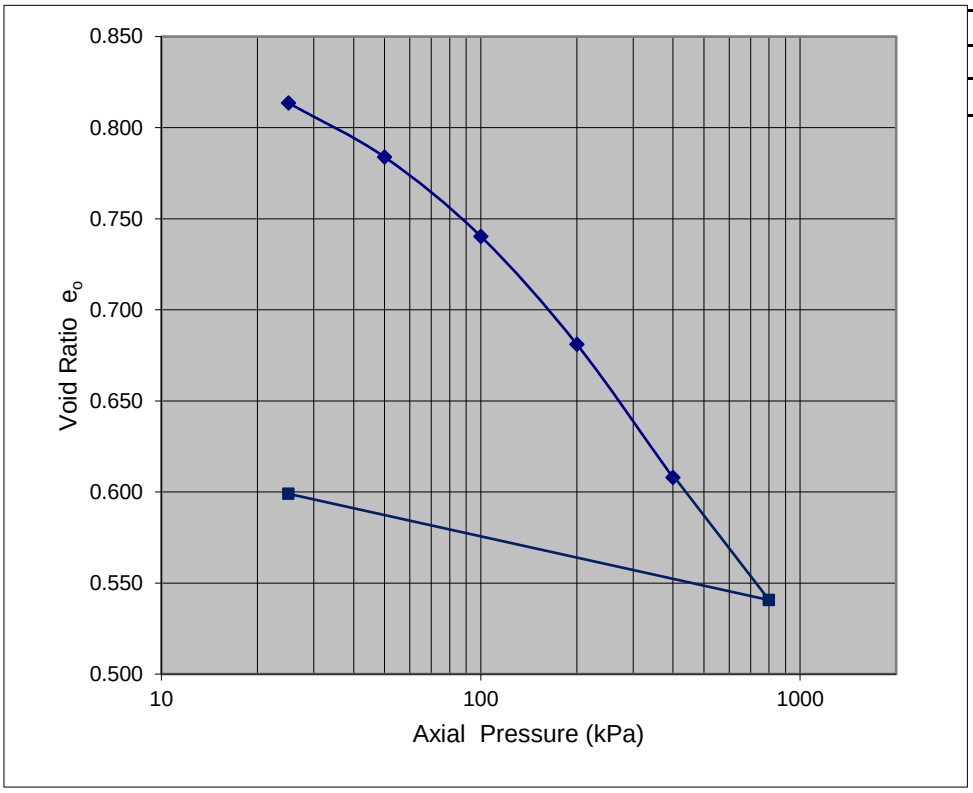
**Project :** **Samawa Combined Cycle P.P**

**BH No. :** 87 **Sample:** 2 Depth: 1.5-2.0




| | |
|---|---|
| **Cc** | **0.30** |
| **Cr** | **0.056** |
| **$e_o$** | **0.972** |

**BH No. :** 87 **Sample:** 4 Depth: 4.0-4.5




| | |
|---|---|
| **Cc** | **0.22** |
| **Cr** | **0.039** |
| **$e_o$** | **0.863** |

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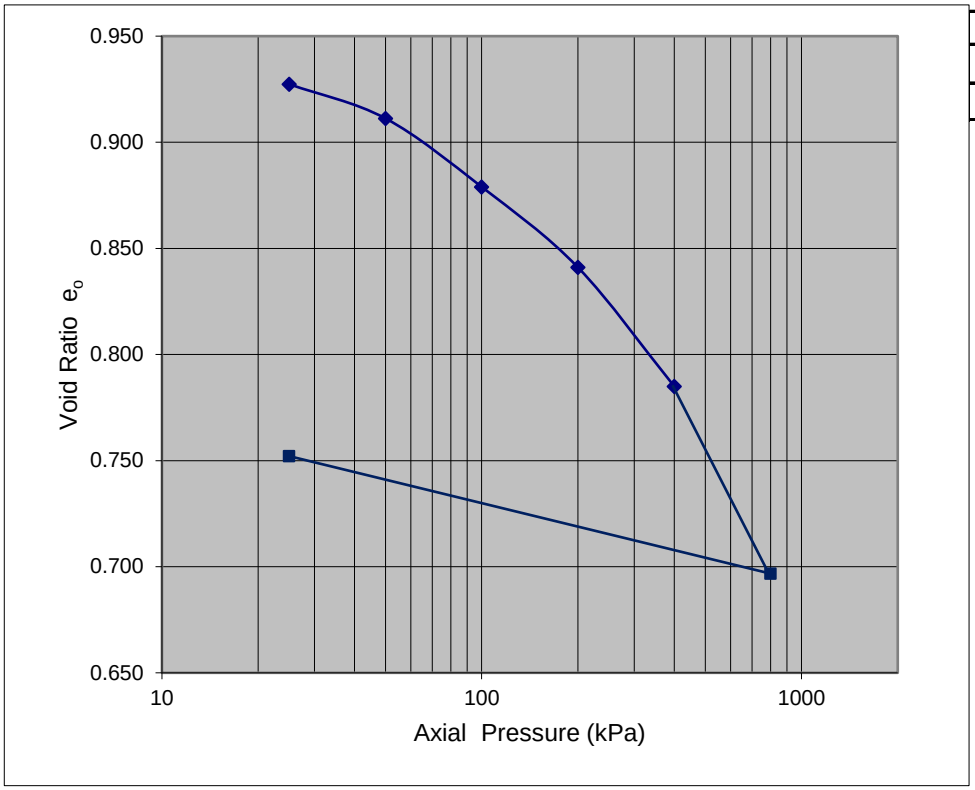
# Consolidation Test Results

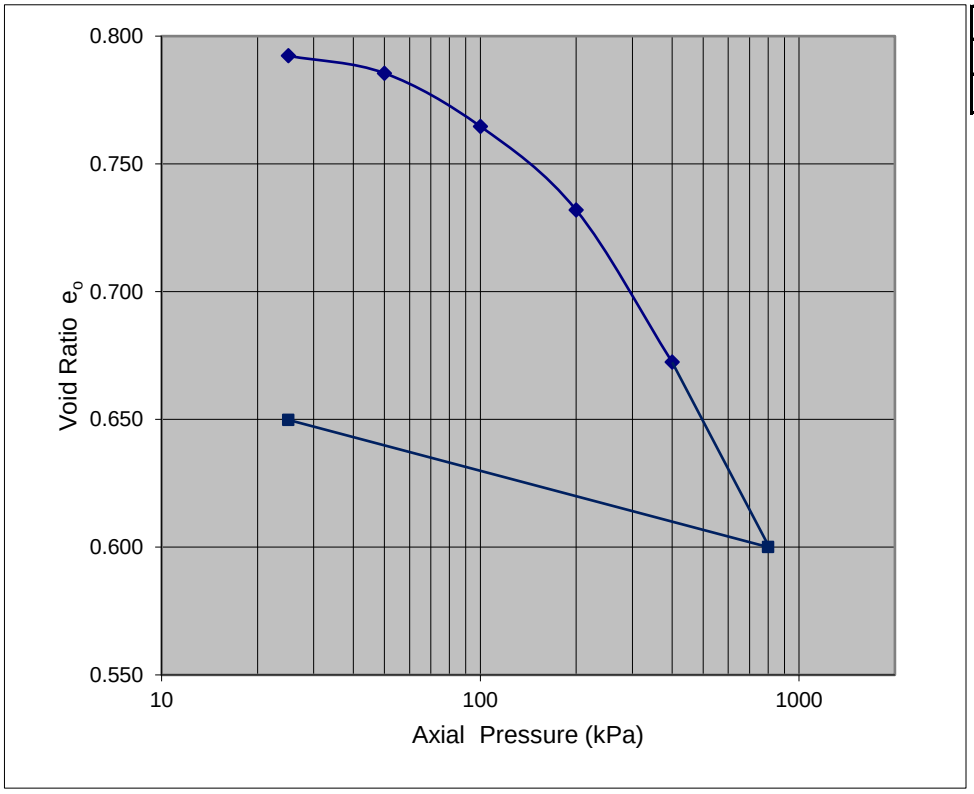
**Project :** **Samawa Combined Cycle P.P**

**BH No. :** 88 **Sample:** 2 Depth: 1.0-1.5




| | |
|---|---|
| **Cc** | **0.29** |
| **Cr** | **0.037** |
| **$e_o$** | **0.976** |

**BH No. :** 89 **Sample:** 2 Depth: 1.0-1.5




| | |
|---|---|
| **Cc** | **0.24** |
| **Cr** | **0.033** |
| **$e_o$** | **0.810** |

# APPENDIX (L)

# MOHR'S CIRCLE DIAGRAM

# &

# STRESS/ STRAIN CURVES

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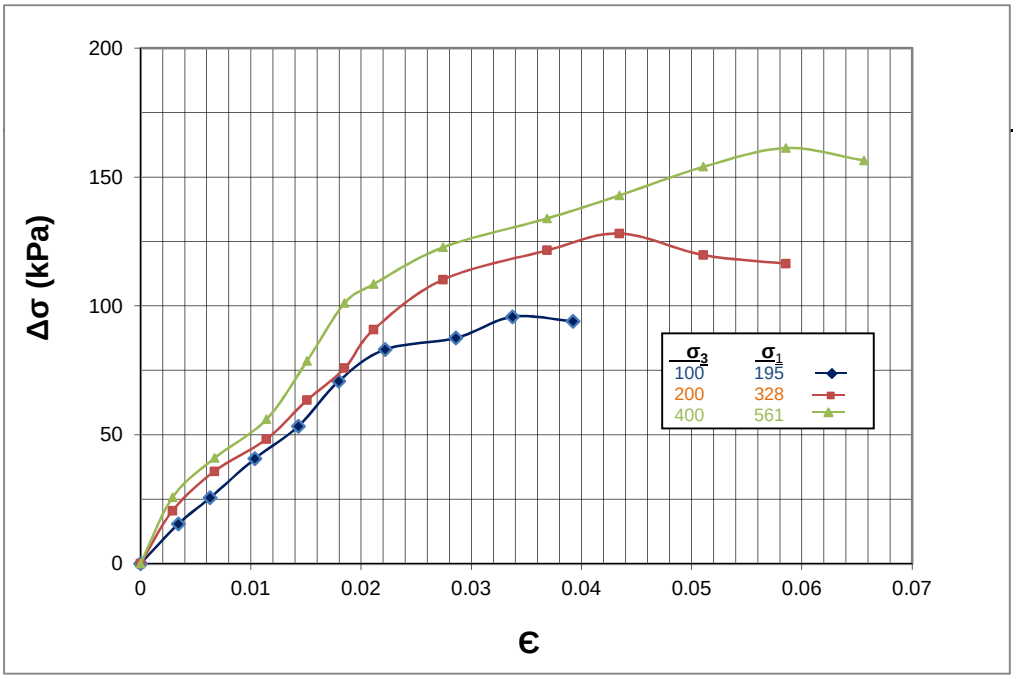
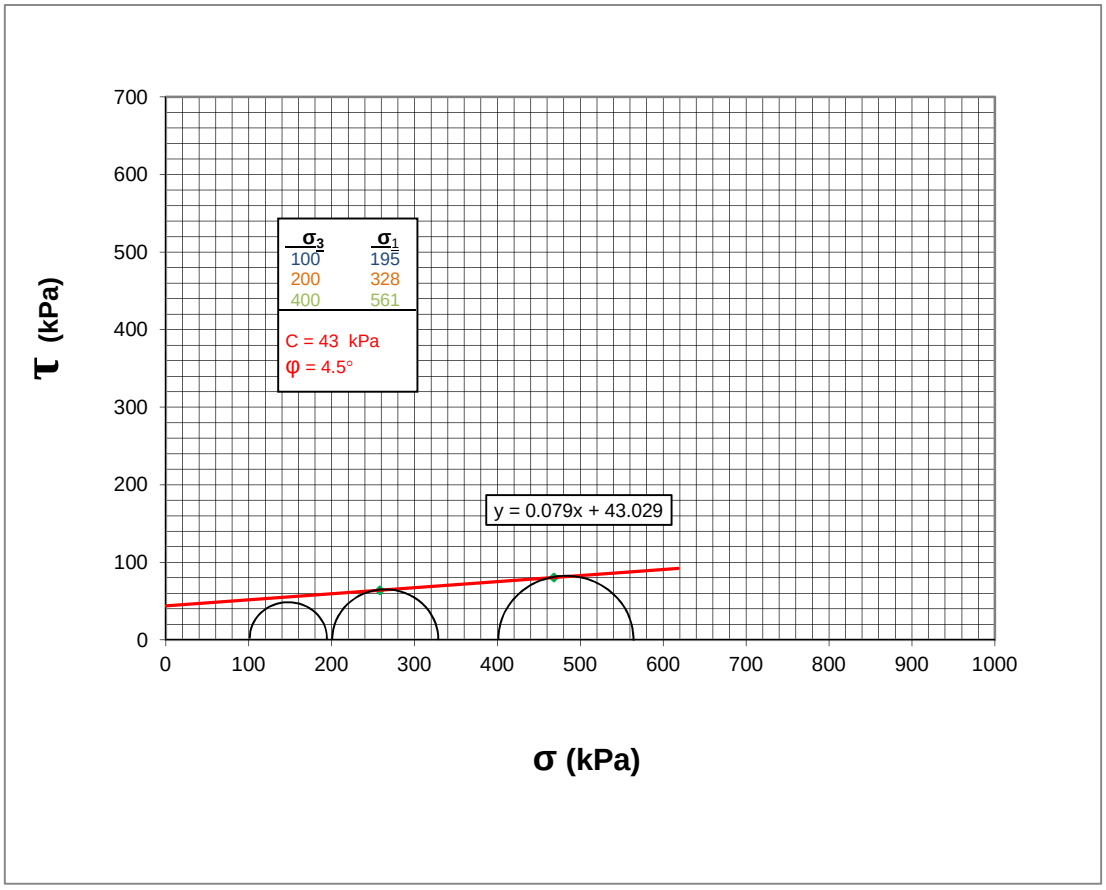
# TRIAXIAL COMPRESSION TEST

| | | | | | |
|---|---|---|---|---|---|
| **Project** | Samawa Combined Cycle PP | | | **Test Type** | |
| **BH No.** | 2 | **Sample No.** | 4 | **Depth (m)** | 4.0-4.5 |



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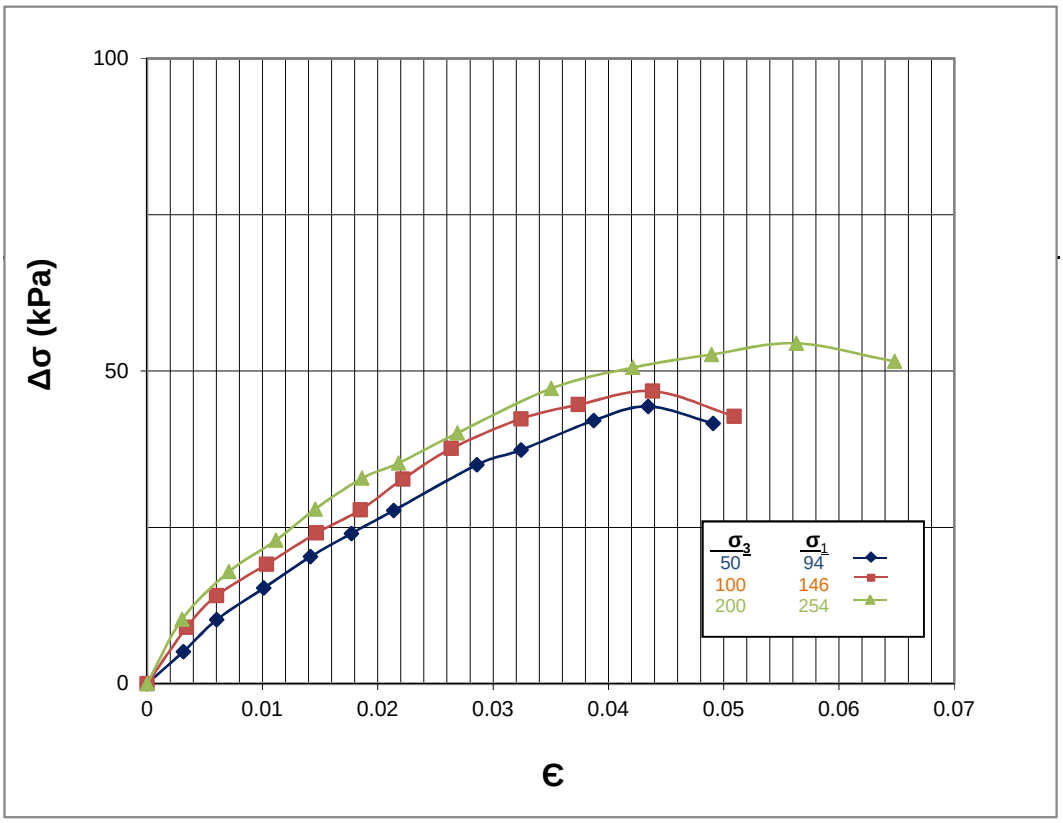
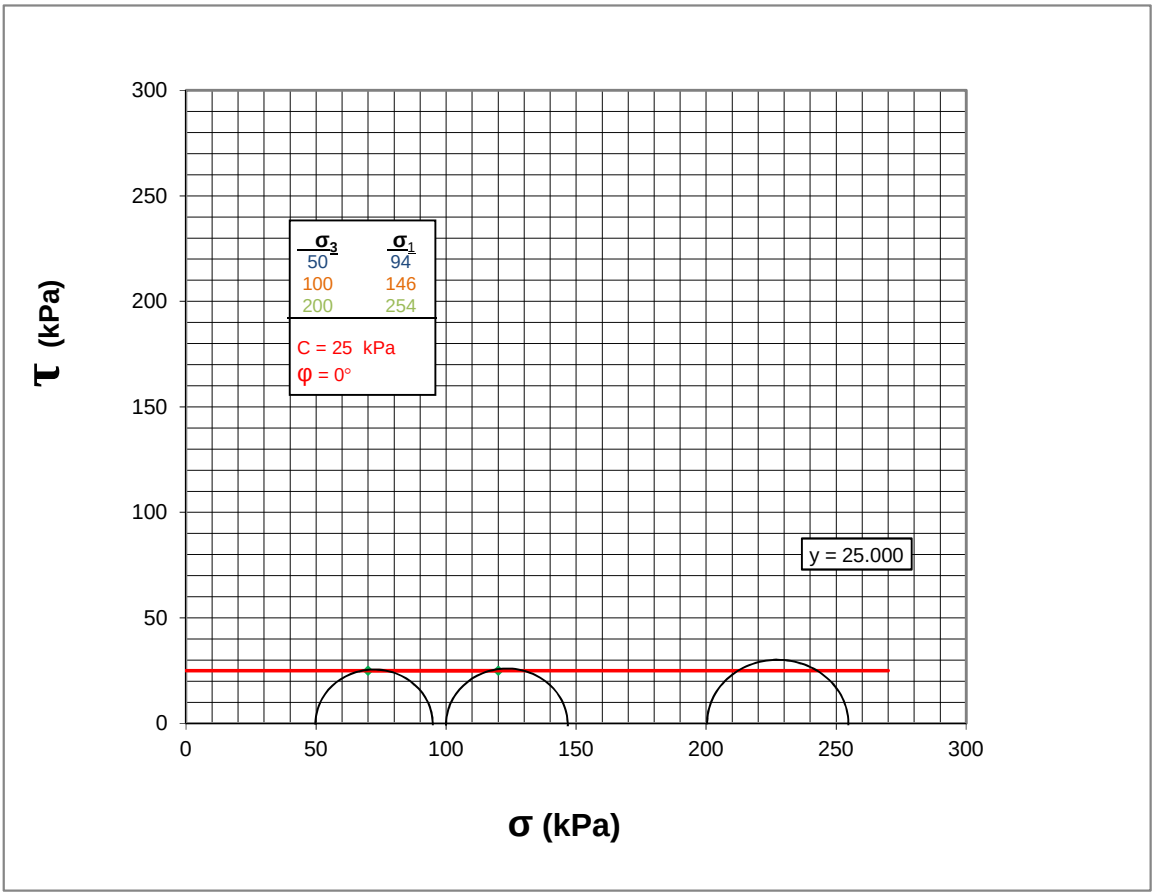
# TRIAXIAL COMPRESSION TEST

| | | | | | |
|---|---|---|---|---|---|
| **Project** | Samawa Combined Cycle P P | | | **Test Type** | |
| **BH No.** | 3 | **Sample No.** | 2 | **Depth (m)** | 1.5-2.0 |



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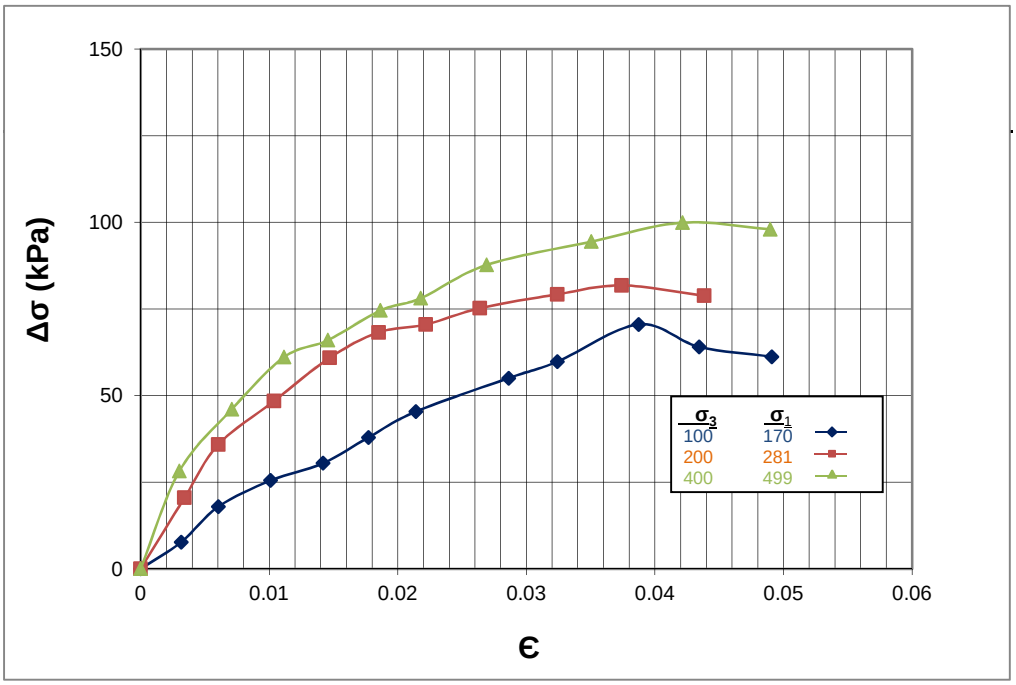
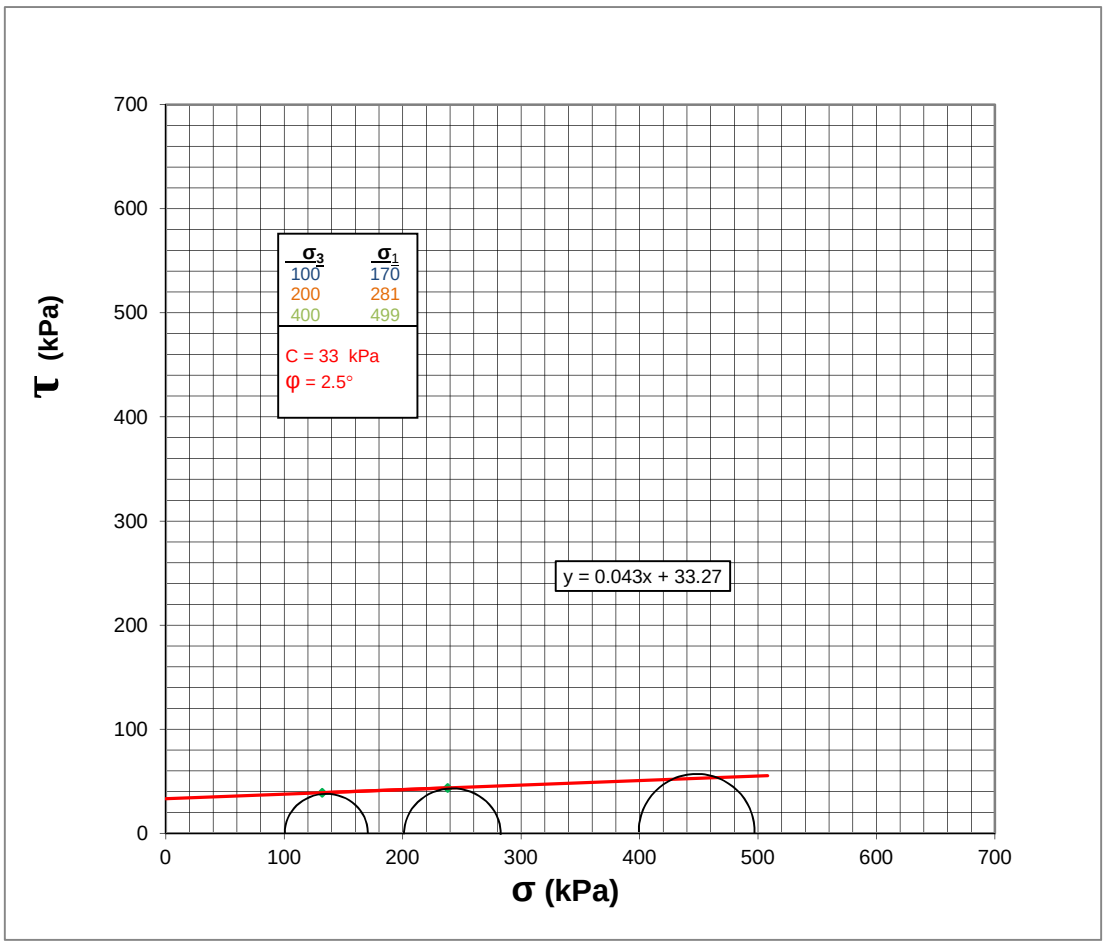
# TRIAXIAL COMPRESSION TEST

| | | | | | |
|---|---|---|---|---|---|
| **Project** | Samawa Combined Cycle PP | | | **Test Type** | |
| **BH No.** | 5 | **Sample No.** | 2 | **Depth (m)** | 1.0-1.5 |



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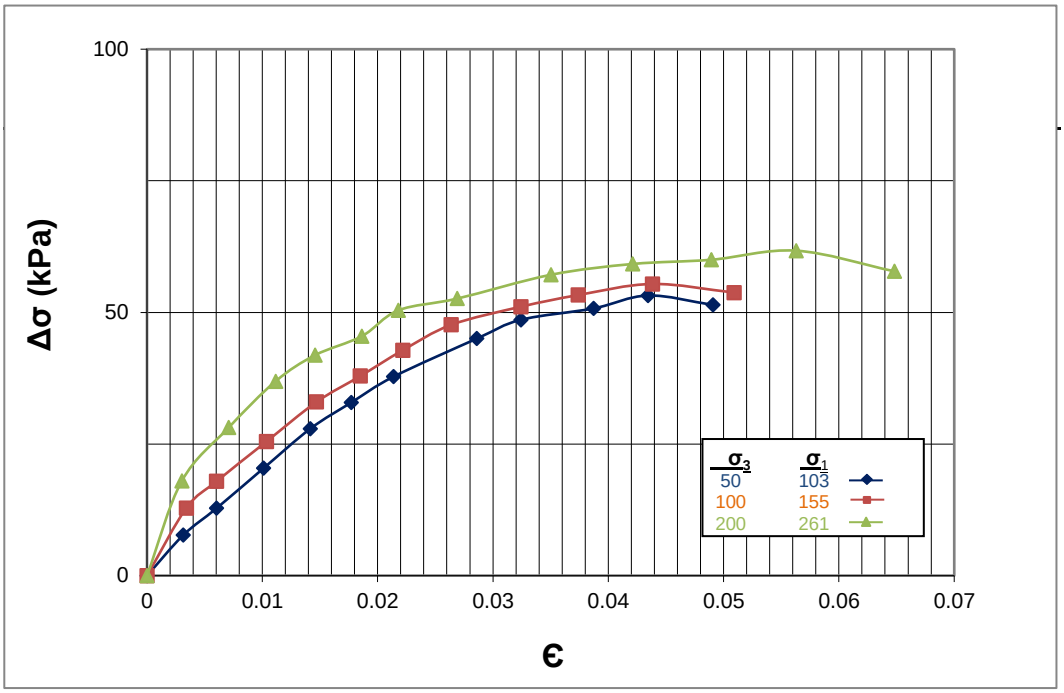
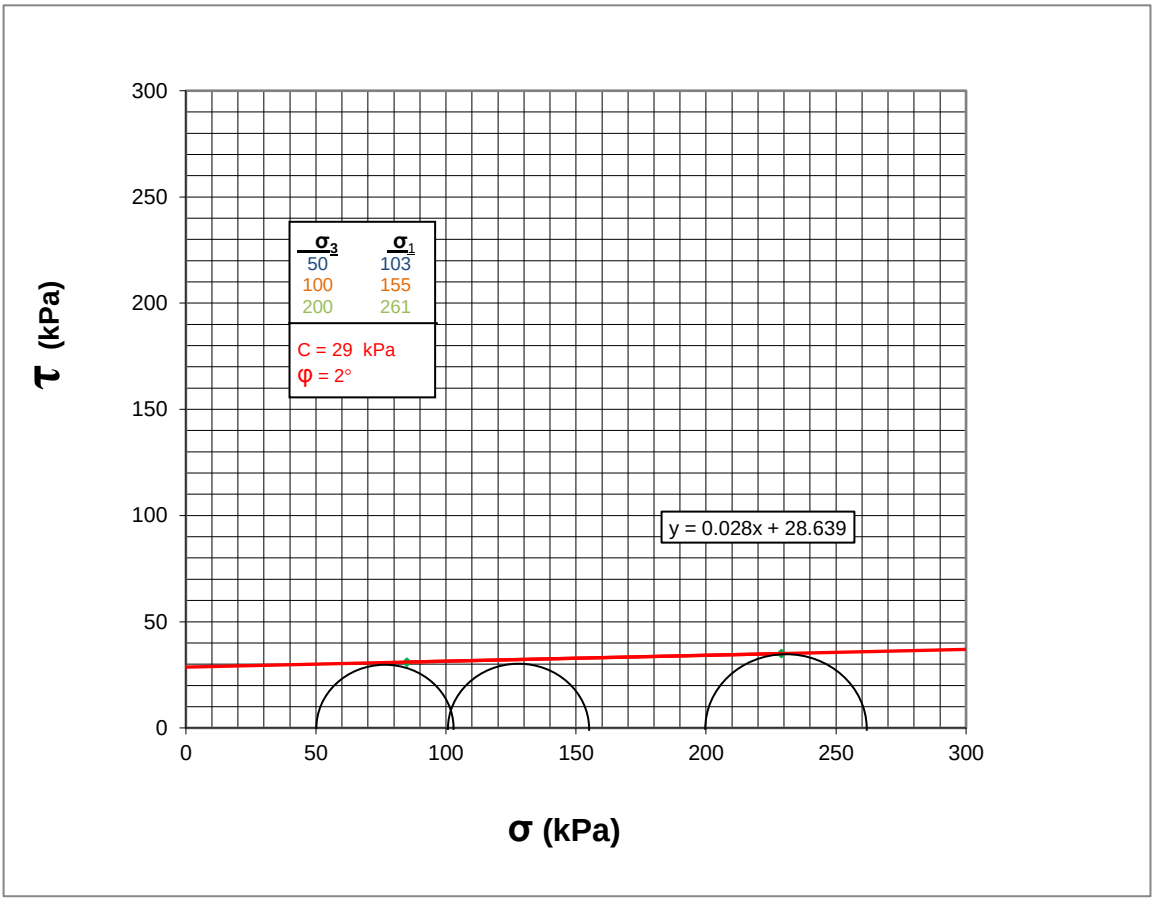
# TRIAXIAL COMPRESSION TEST

| | | | | | |
|---|---|---|---|---|---|
| **Project** | Samawa Combined Cycle P P | | | **Test Type** | |
| **BH No.** | 7 | **Sample No.** | 3 | **Depth (m)** | 2.0-2.5 |



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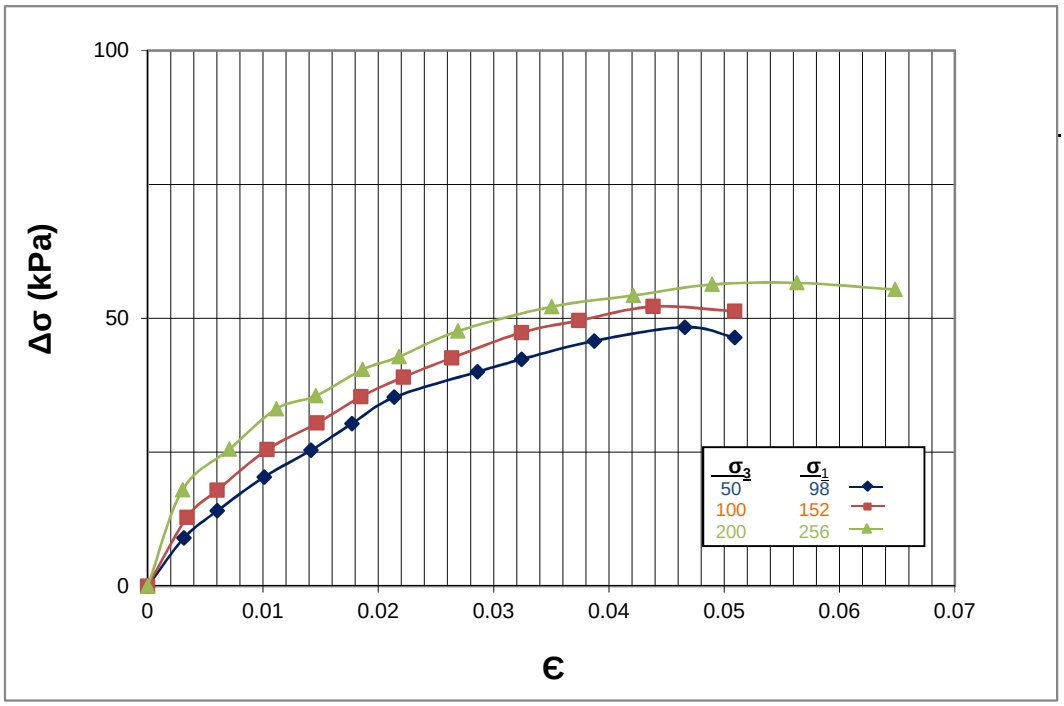
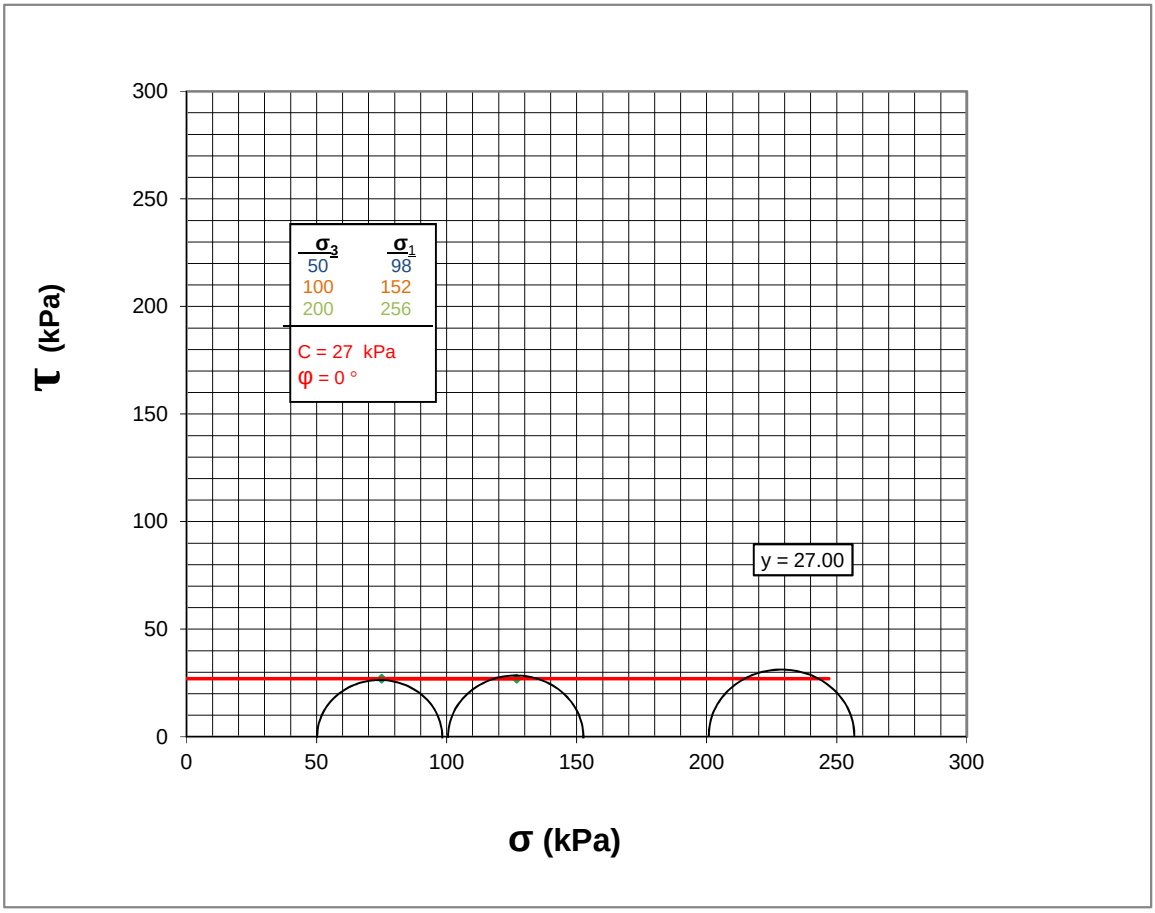
# TRIAXIAL COMPRESSION TEST

| | | | | | |
|---|---|---|---|---|---|
| **Project** | Samawa Combined Cycle P P | | | **Test Type** | |
| **BH No.** | 8 | **Sample No.** | 2 | **Depth (m)** | 1.0-1.5 |



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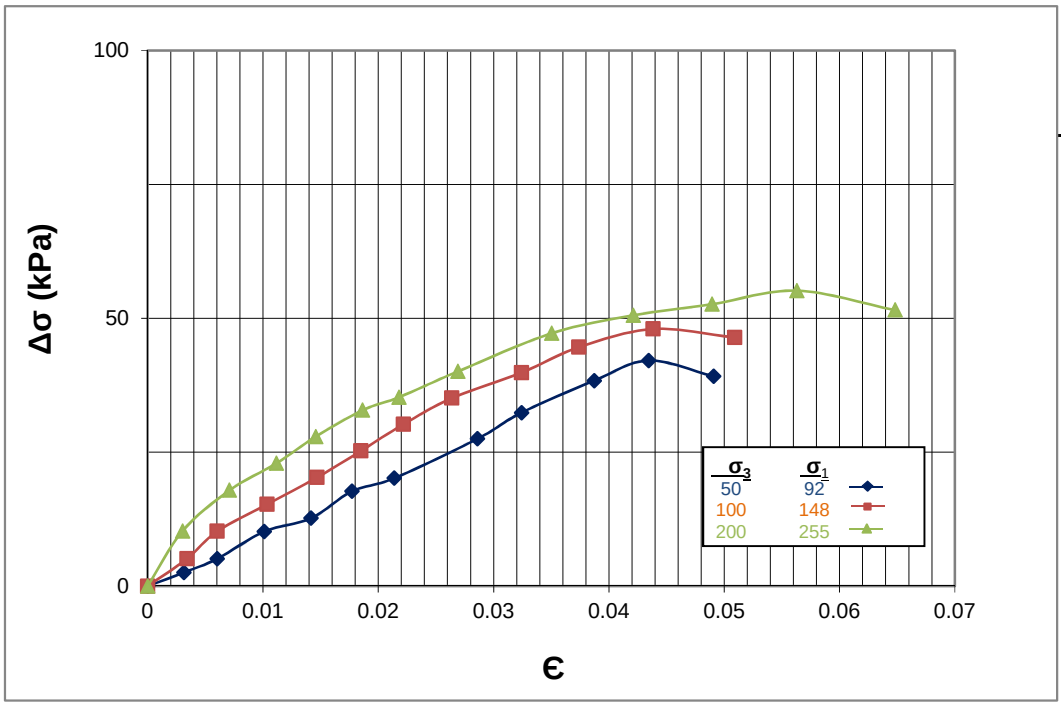
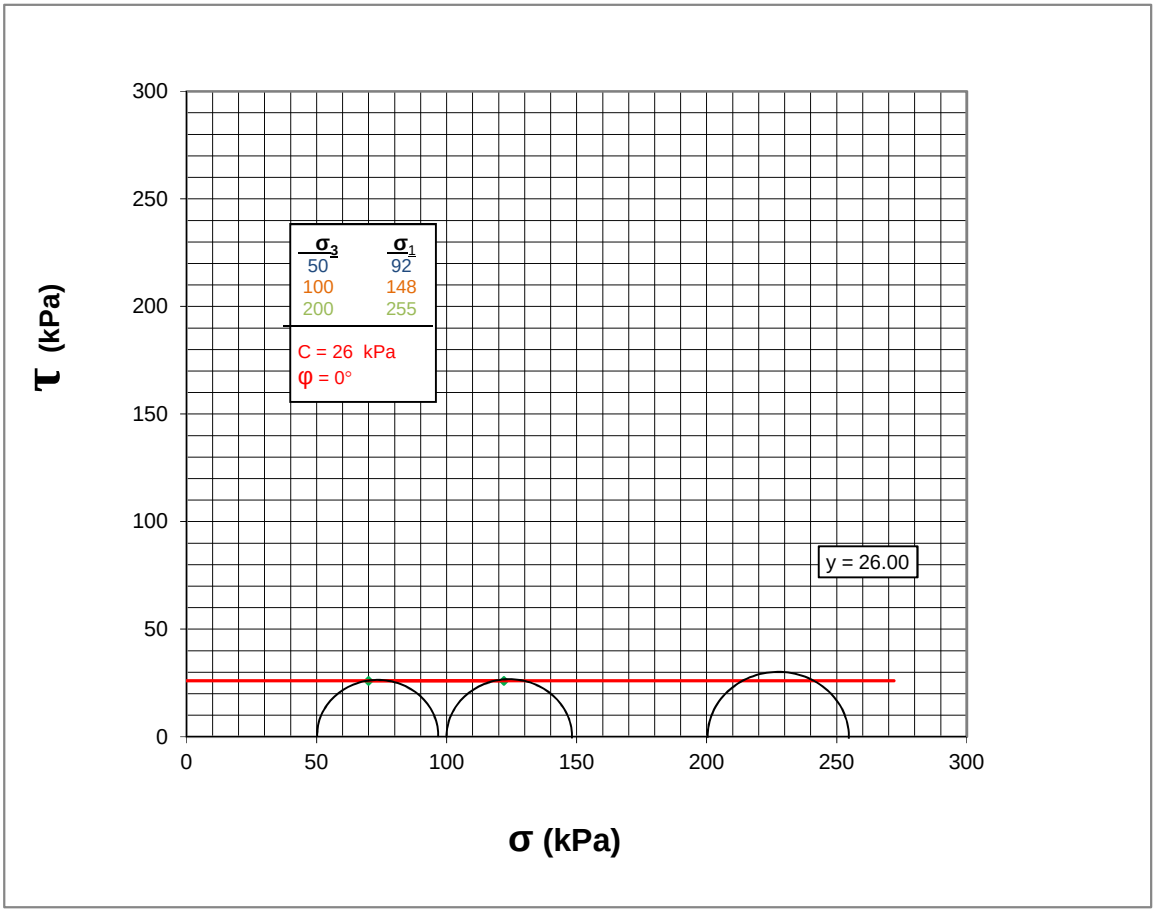
# TRIAXIAL COMPRESSION TEST

| | | | | | |
|---|---|---|---|---|---|
| **Project** | Samawa Combibed Cycle P P | | | **Test Type** | |
| **BH No.** | 9 | **Sample No.** | 3 | **Depth (m)** | 2.0-2.5 |



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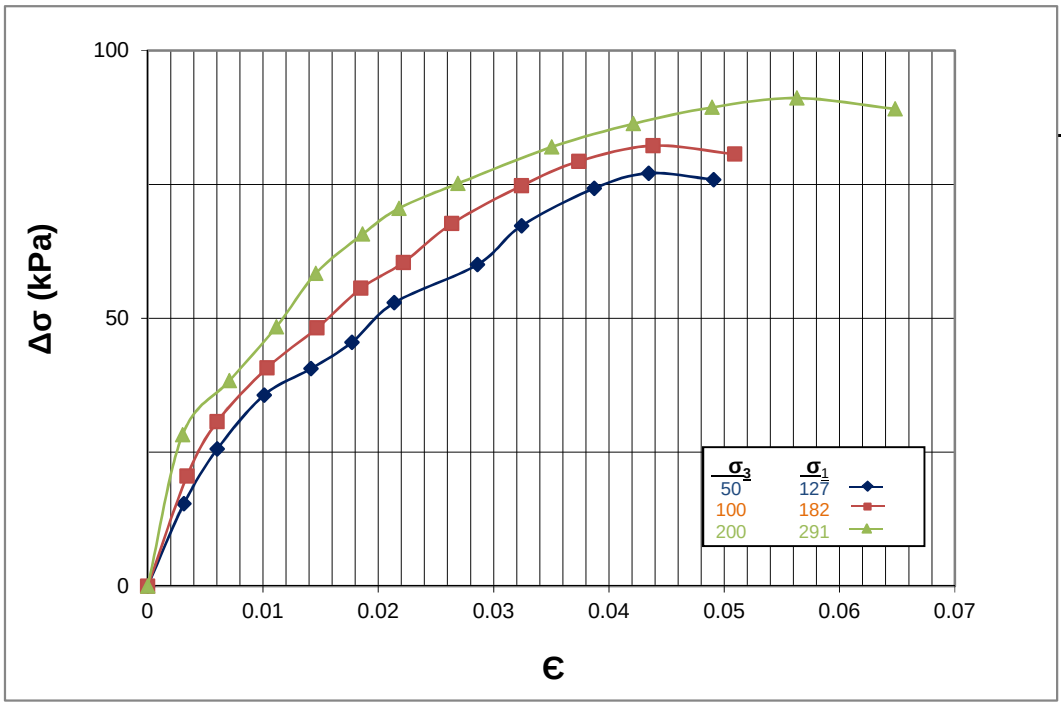
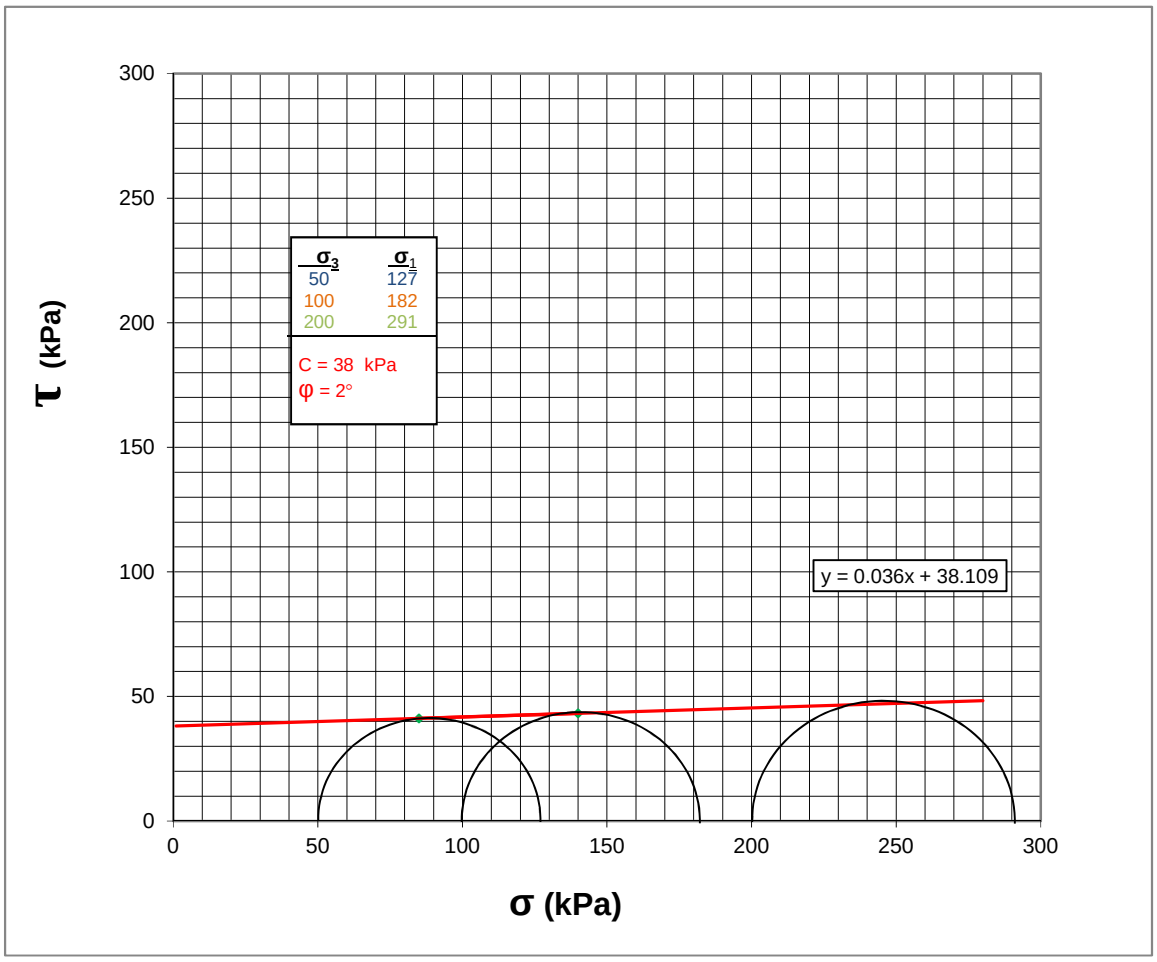
# TRIAXIAL COMPRESSION TEST

| | | | | | |
|---|---|---|---|---|---|
| **Project** | Samawa Combined Cycle P P | | | **Test Type** | |
| **BH No.** | 10 | **Sample No.** | 2 | **Depth (m)** | 1.5-2.0 |



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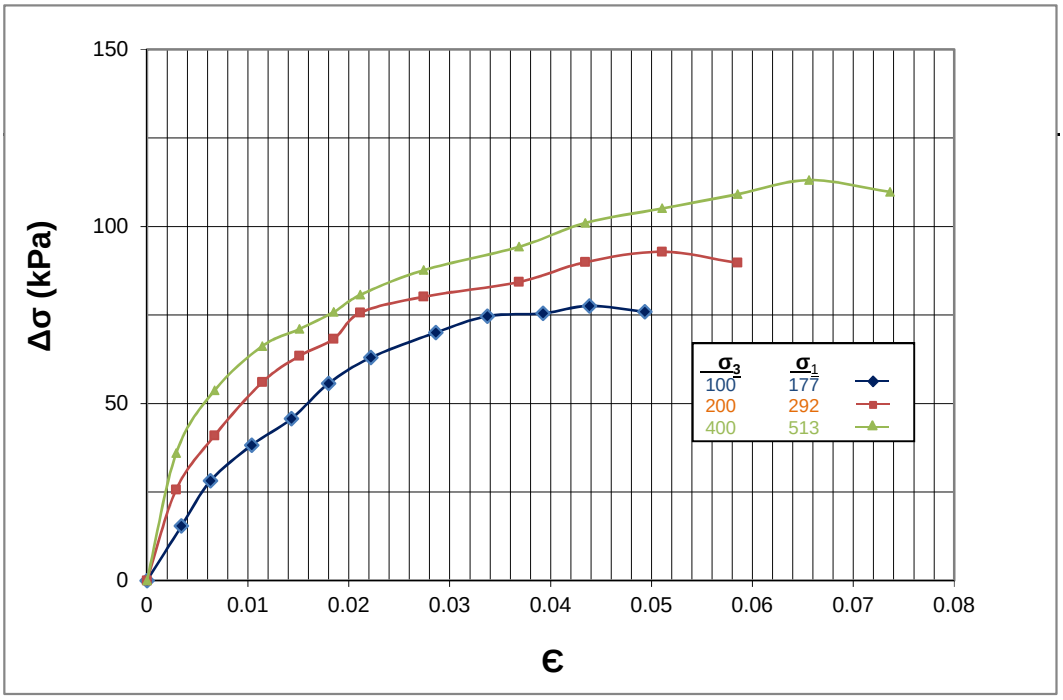
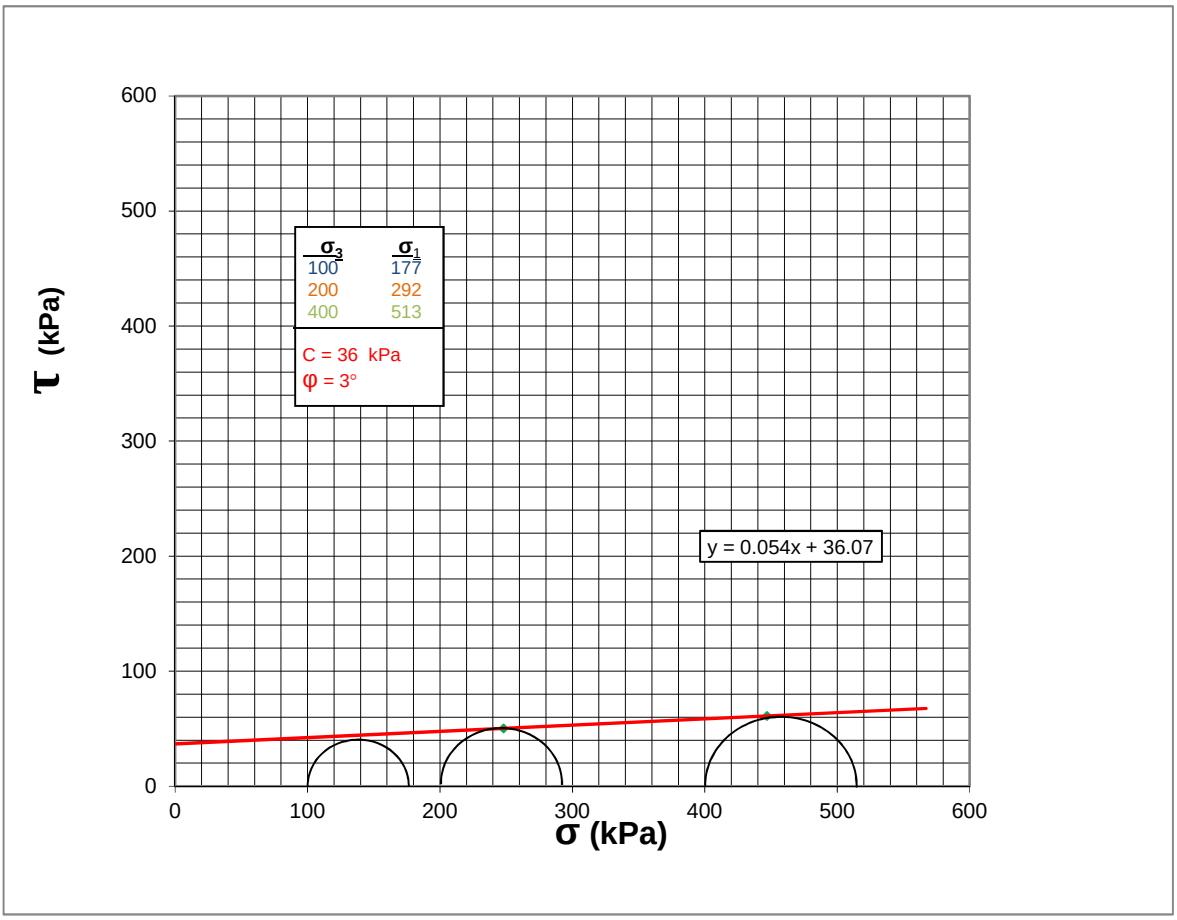
# TRIAXIAL COMPRESSION TEST

| | | | | | |
|---|---|---|---|---|---|
| **Project** | Samawa Combined Cycle PP | | | **Test Type** | |
| **BH No.** | 12 | **Sample No.** | 2 | **Depth (m)** | 1.5-2.0 |



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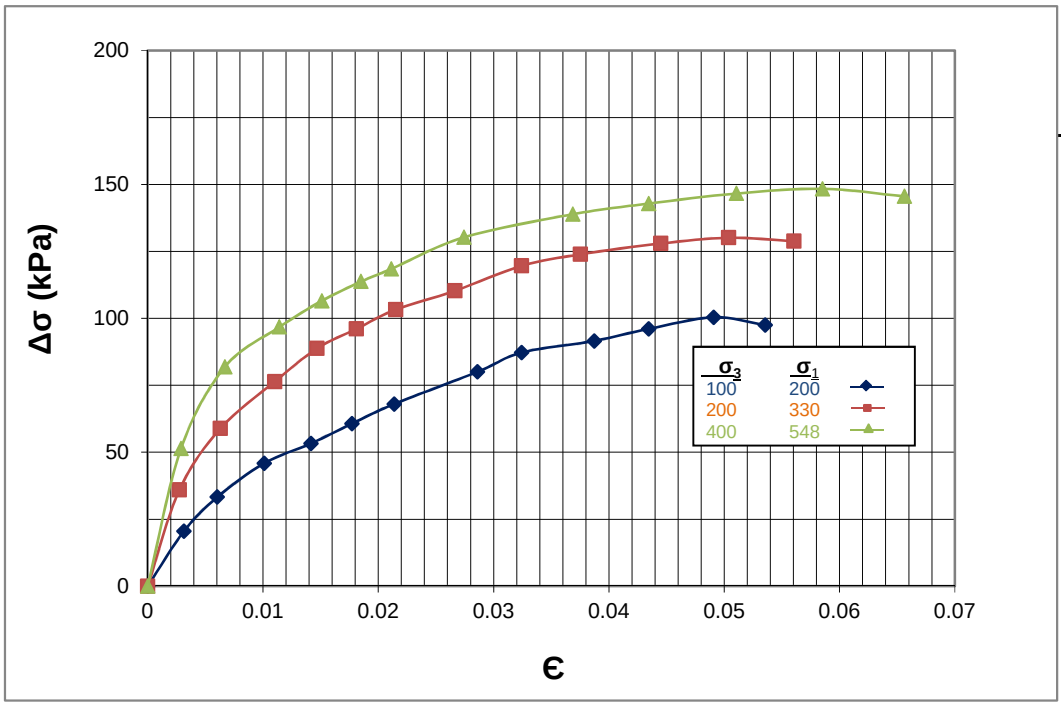
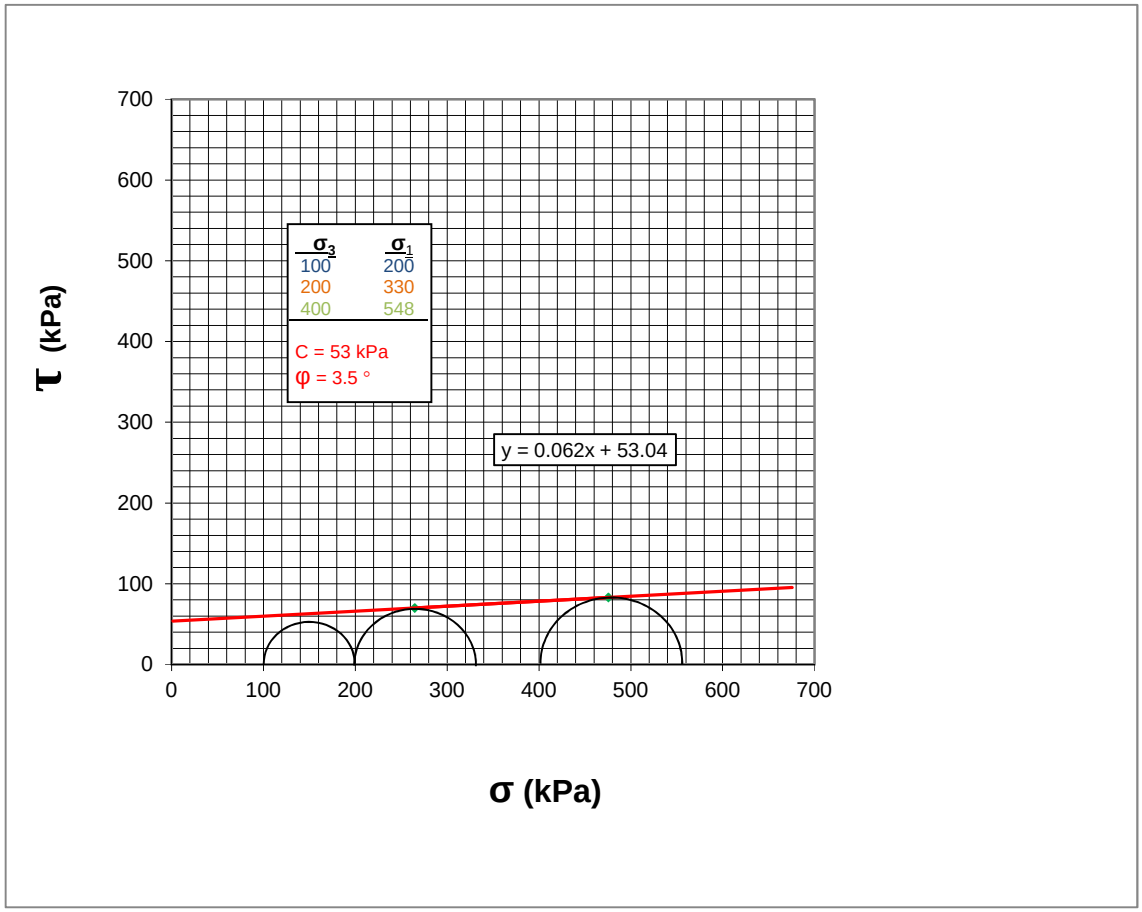
# TRIAXIAL COMPRESSION TEST

| | | | | | |
|---|---|---|---|---|---|
| **Project** | Samawa Combined Cycle PP | | | **Test Type** | |
| **BH No.** | 13 | **Sample No.** | 4 | **Depth (m)** | 4.0-4.5 |



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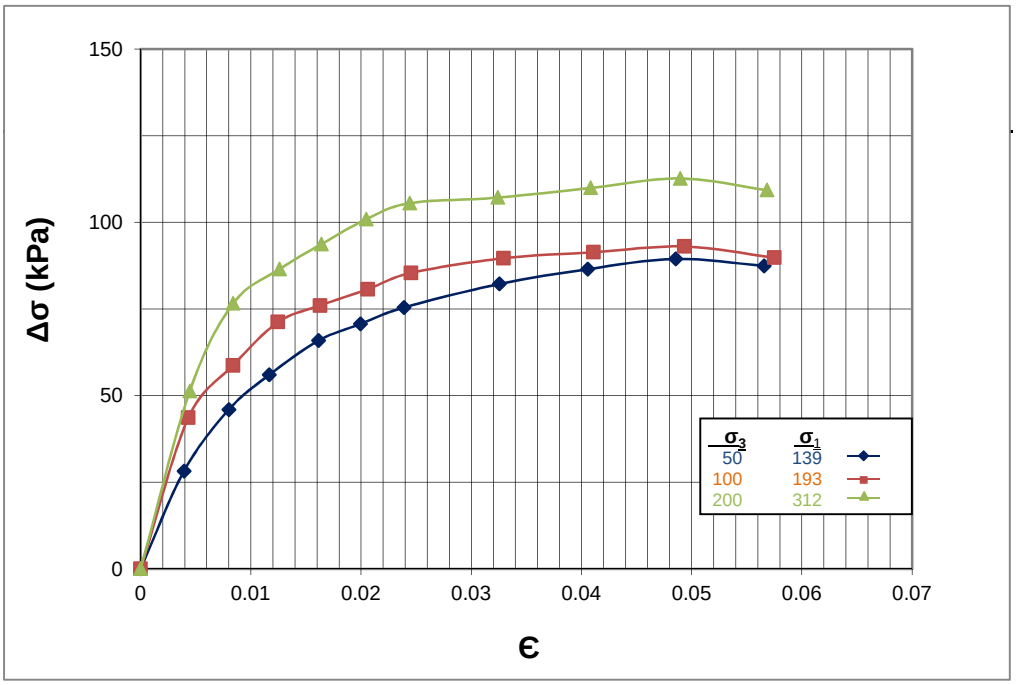
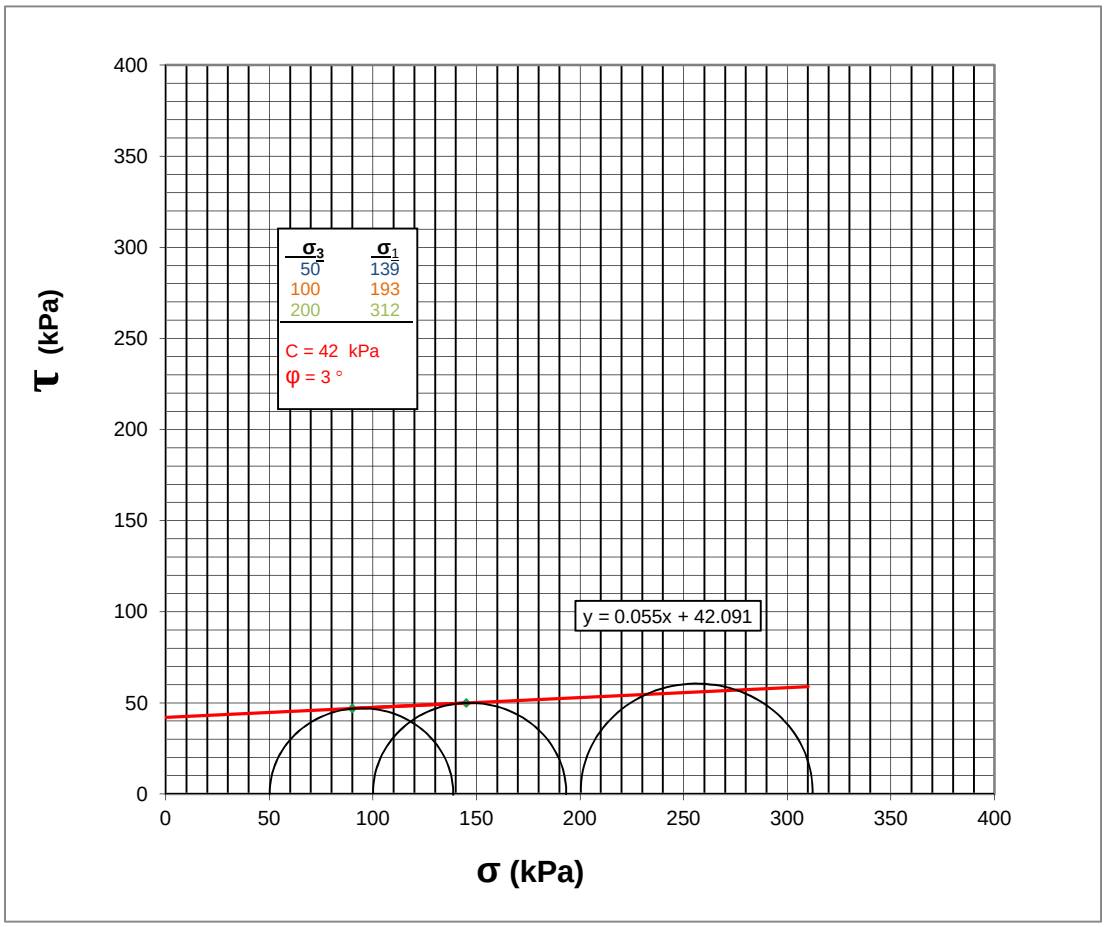
# TRIAXIAL COMPRESSION TEST

| | | | | | |
|---|---|---|---|---|---|
| **Project** | Samawa Combined Cycle Power Plant | | | **Test Type** | |
| **BH No.** | 14 | **Sample No.** | 3 | **Depth (m)** | 2.0-2.5 |



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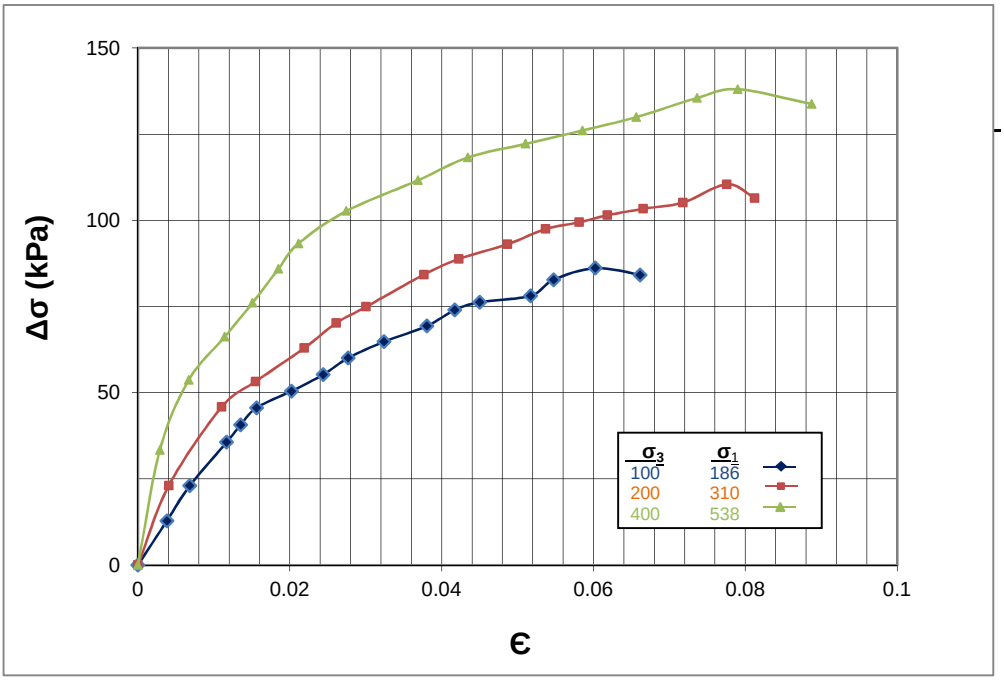
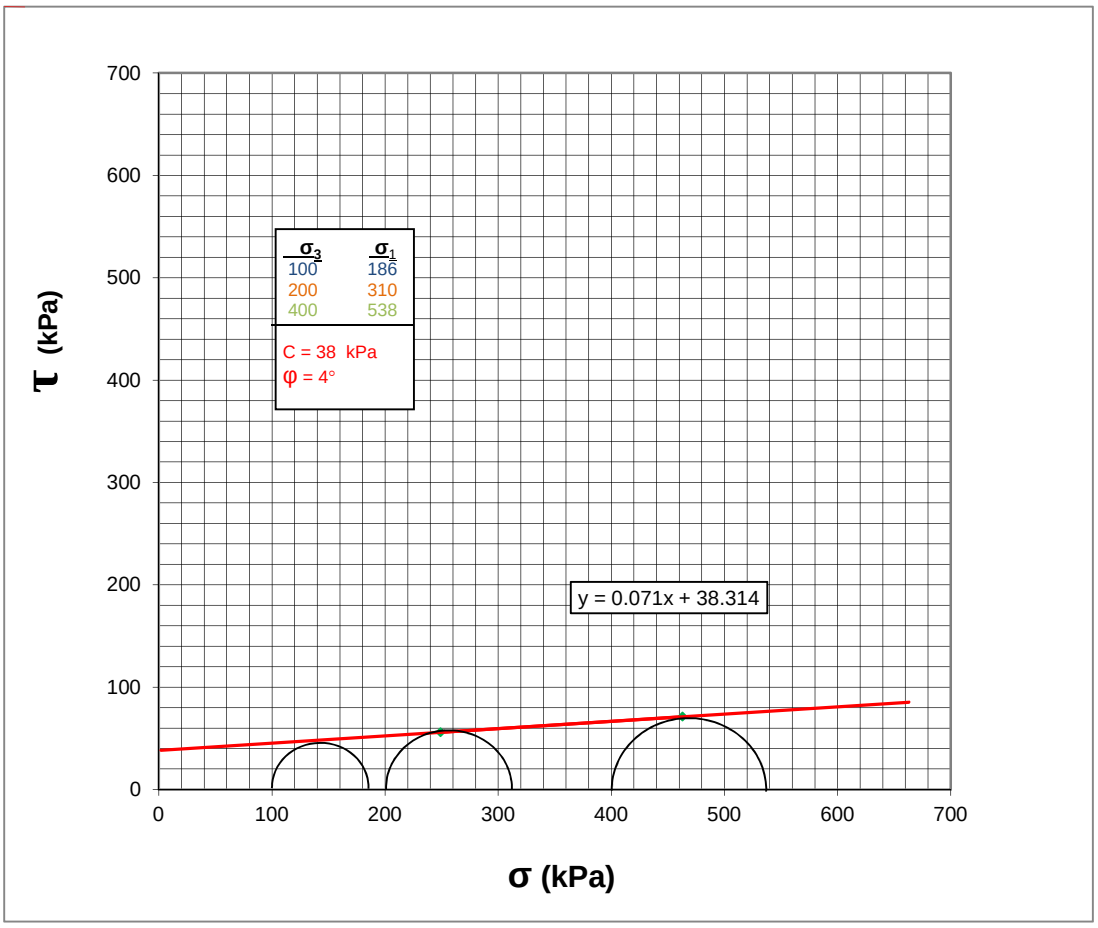
# TRIAXIAL COMPRESSION TEST

**Project** Samawa Combined Cycle P P **Test Type**

**BH No.** 15 **Sample No.** 4 **Depth (m)** 4.0-4.5



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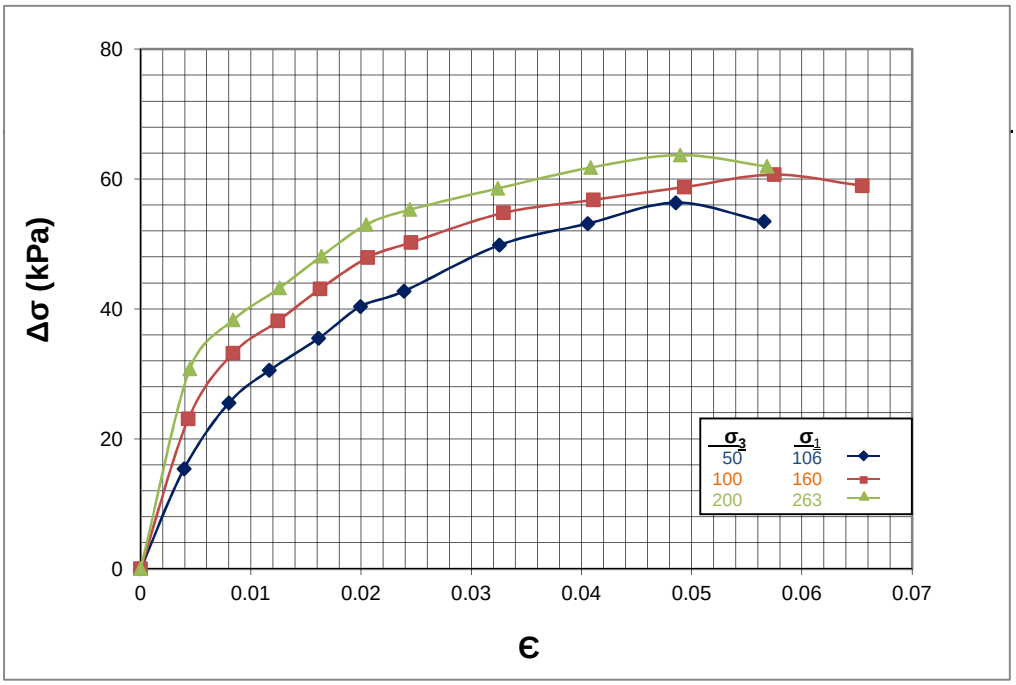
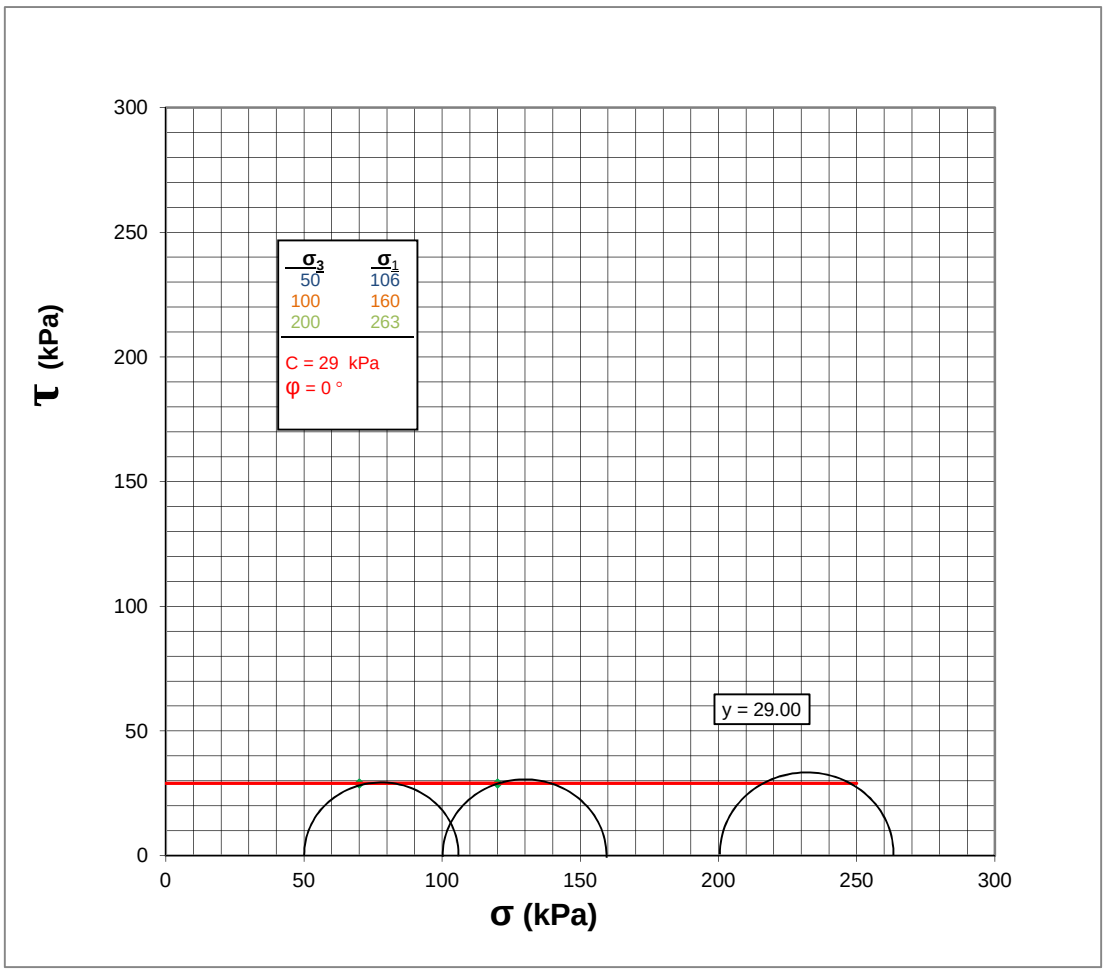
# TRIAXIAL COMPRESSION TEST

| | | | | | |
|---|---|---|---|---|---|
| **Project** | Samawa Combined Cycle Power Plant | | | **Test Type** | |
| **BH No.** | 16 | **Sample No.** | 2 | **Depth (m)** | 1.5-2.0 |



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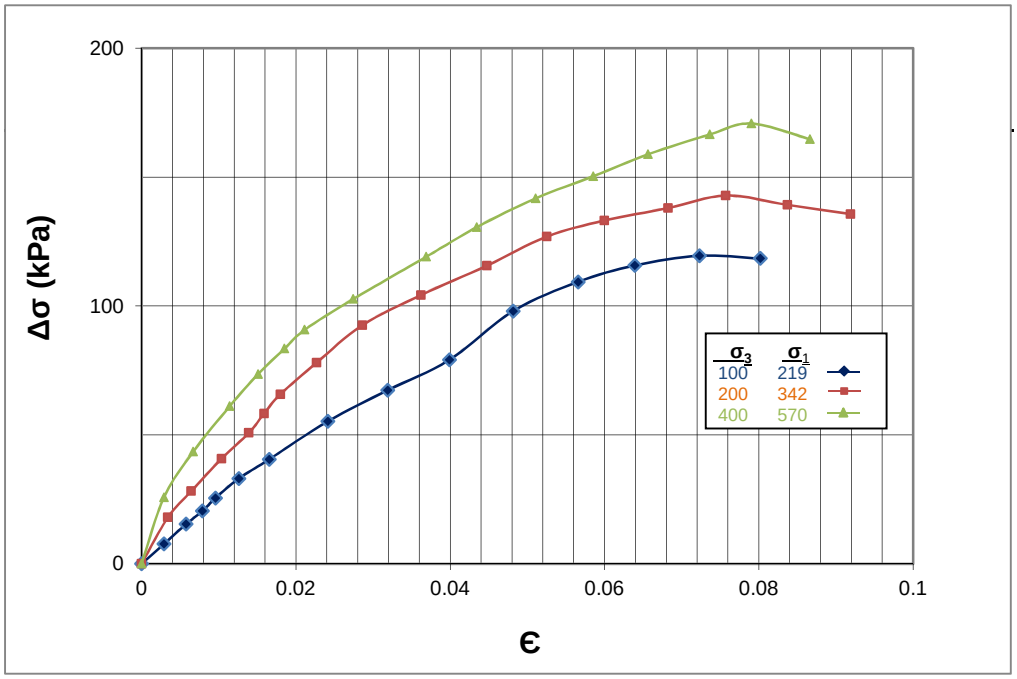
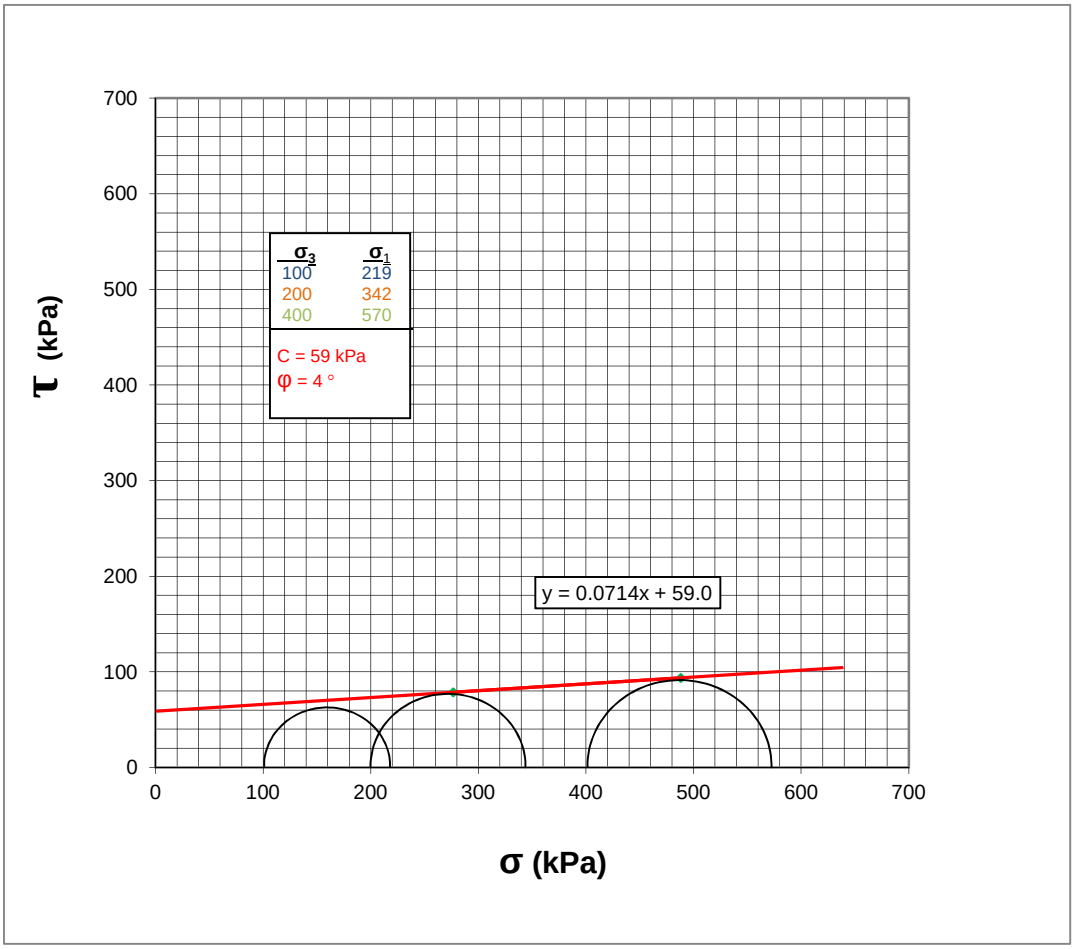
# TRIAXIAL COMPRESSION TEST

| | | | | | |
|---|---|---|---|---|---|
| **Project** | Samawa Combined Cycle P P | | | **Test Type** | |
| **BH No.** | 17 | **Sample No.** | 5 | **Depth (m)** | 4.5-5.0 |



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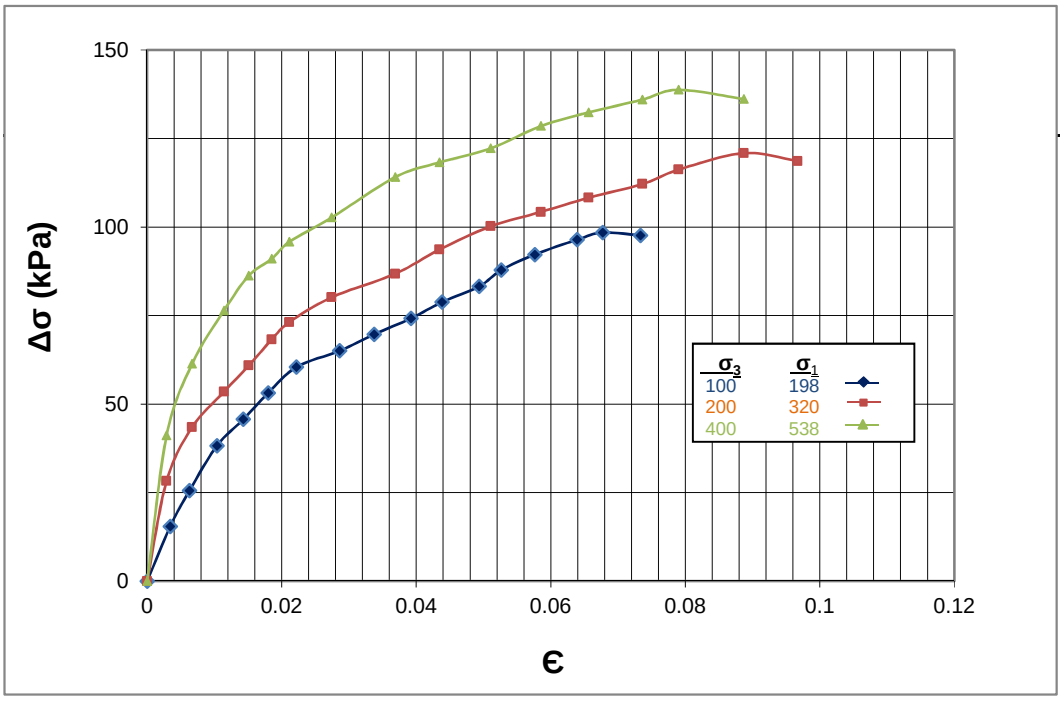
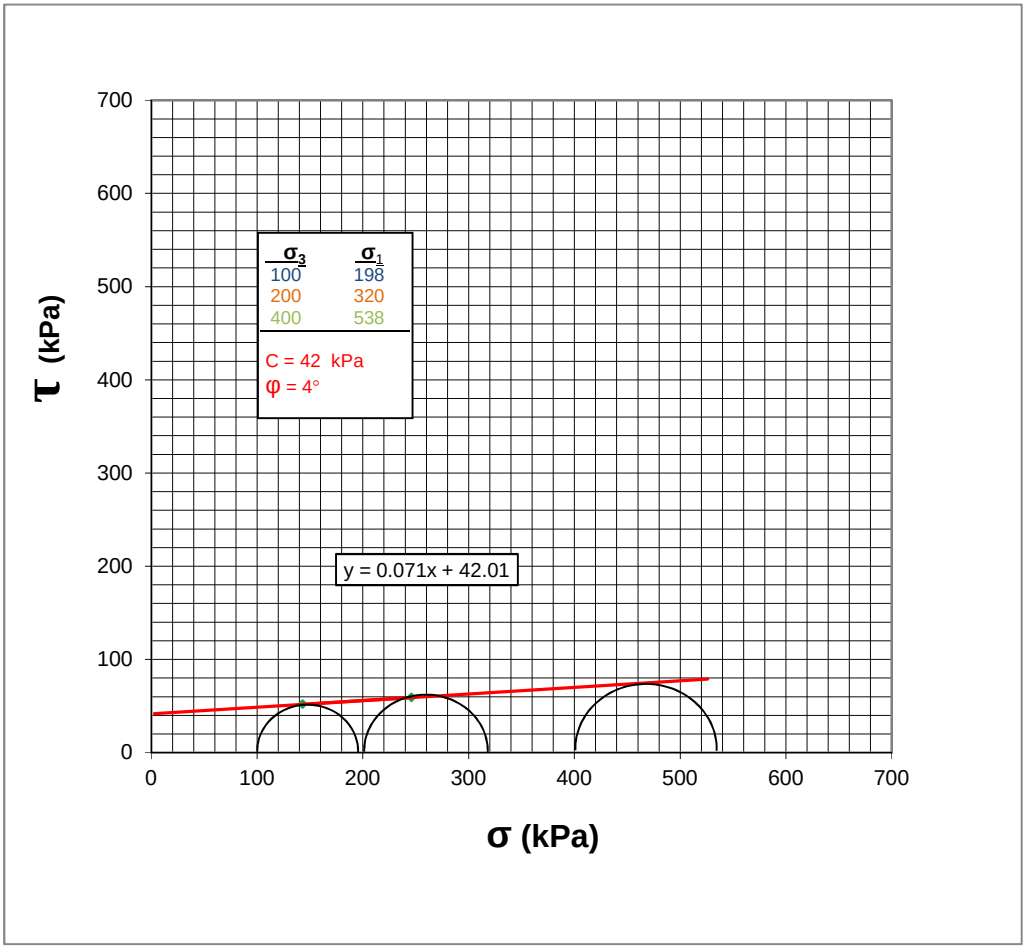
# TRIAXIAL COMPRESSION TEST

| | | | | | |
|---|---|---|---|---|---|
| **Project** | Samawa Combined Cycle P P | | | **Test Type** | |
| **BH No.** | 18 | **Sample No.** | 3 | **Depth (m)** | 2.0-2.5 |



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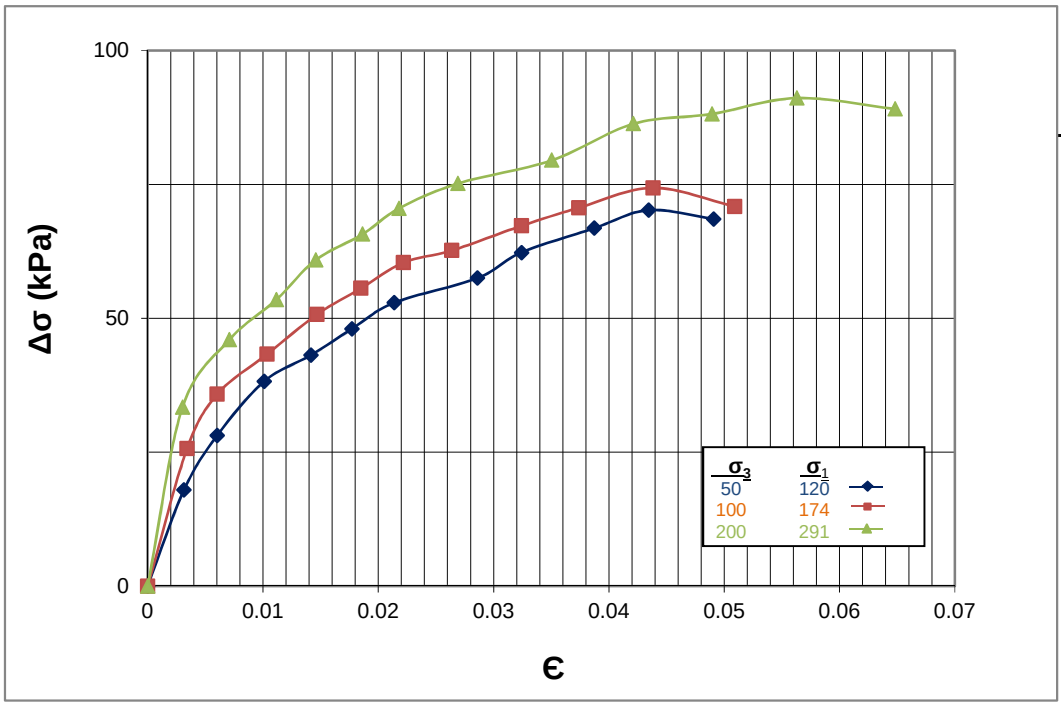
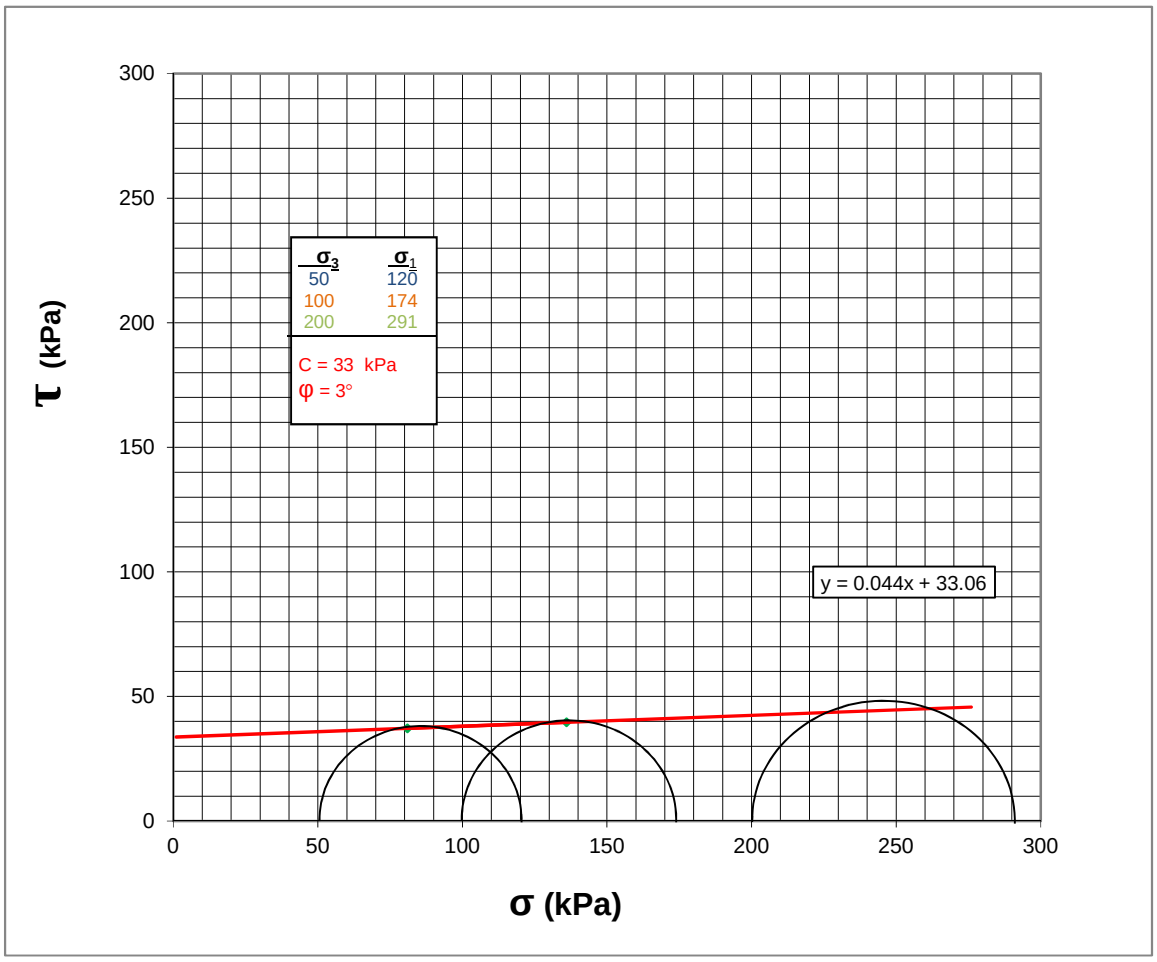
# TRIAXIAL COMPRESSION TEST

| | | | | | |
|---|---|---|---|---|---|
| **Project** | Samawa Combined Cycle P P | | | **Test Type** | |
| **BH No.** | 20 | **Sample No.** | 2 | **Depth (m)** | 1.5-2.0 |



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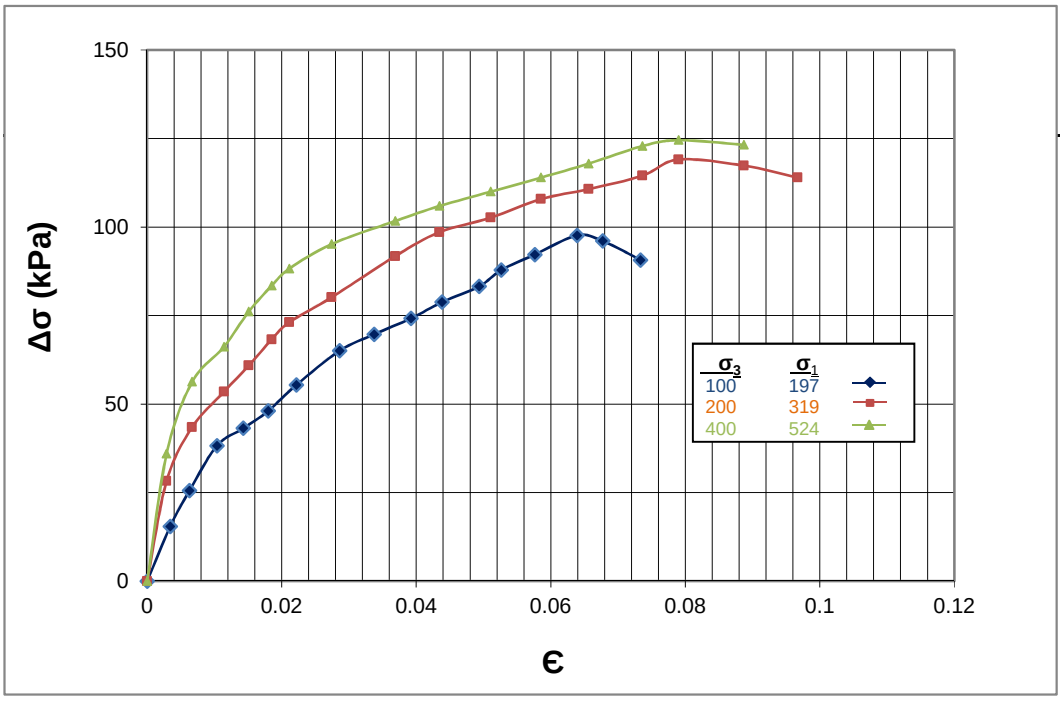
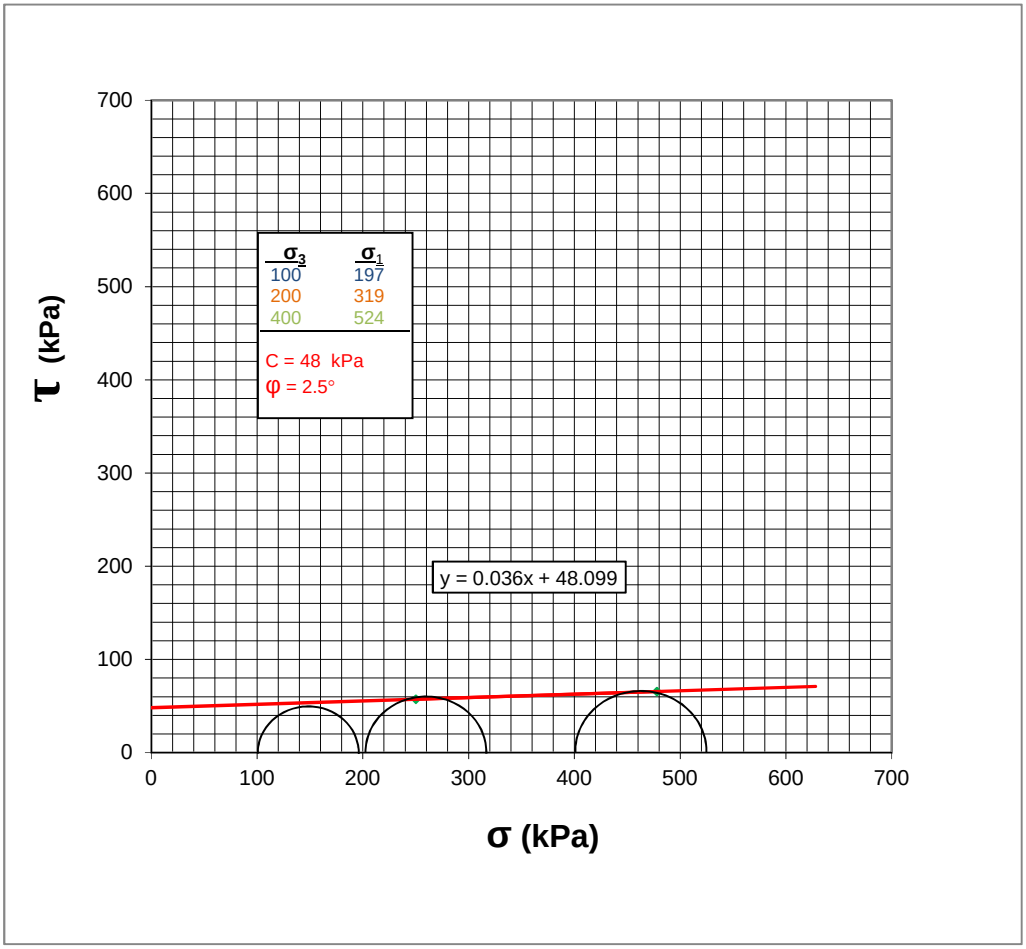
# TRIAXIAL COMPRESSION TEST

| | | | | | |
|---|---|---|---|---|---|
| **Project** | Samawa Combined Cycle P.P | | | **Test Type** | |
| **BH No.** | 22 | **Sample No.** | 2 | **Depth (m)** | 1.5-2.0 |



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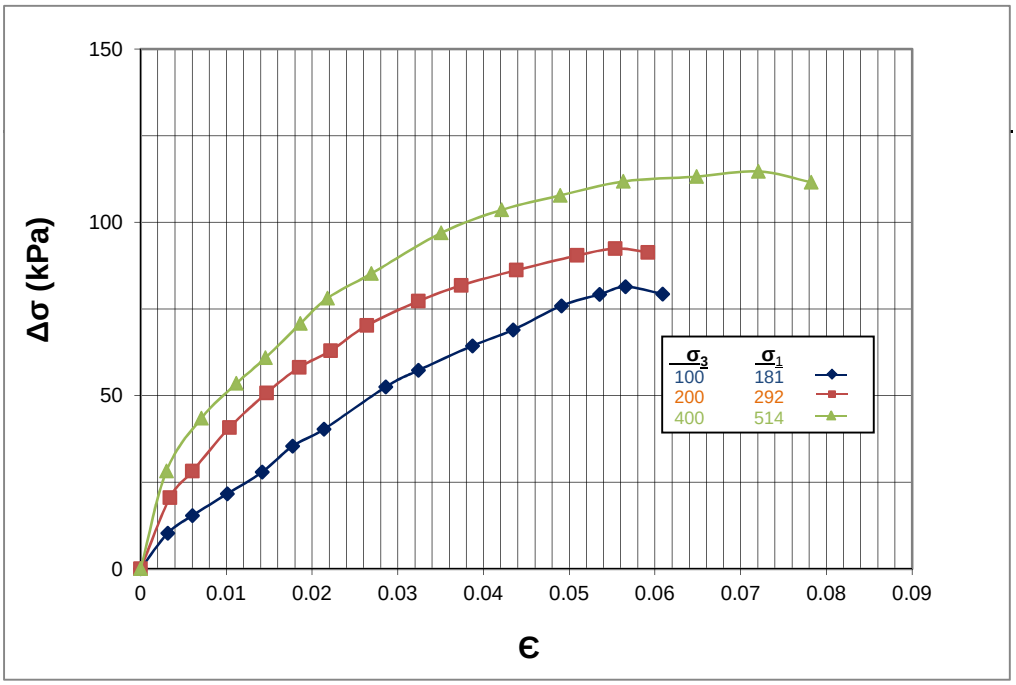
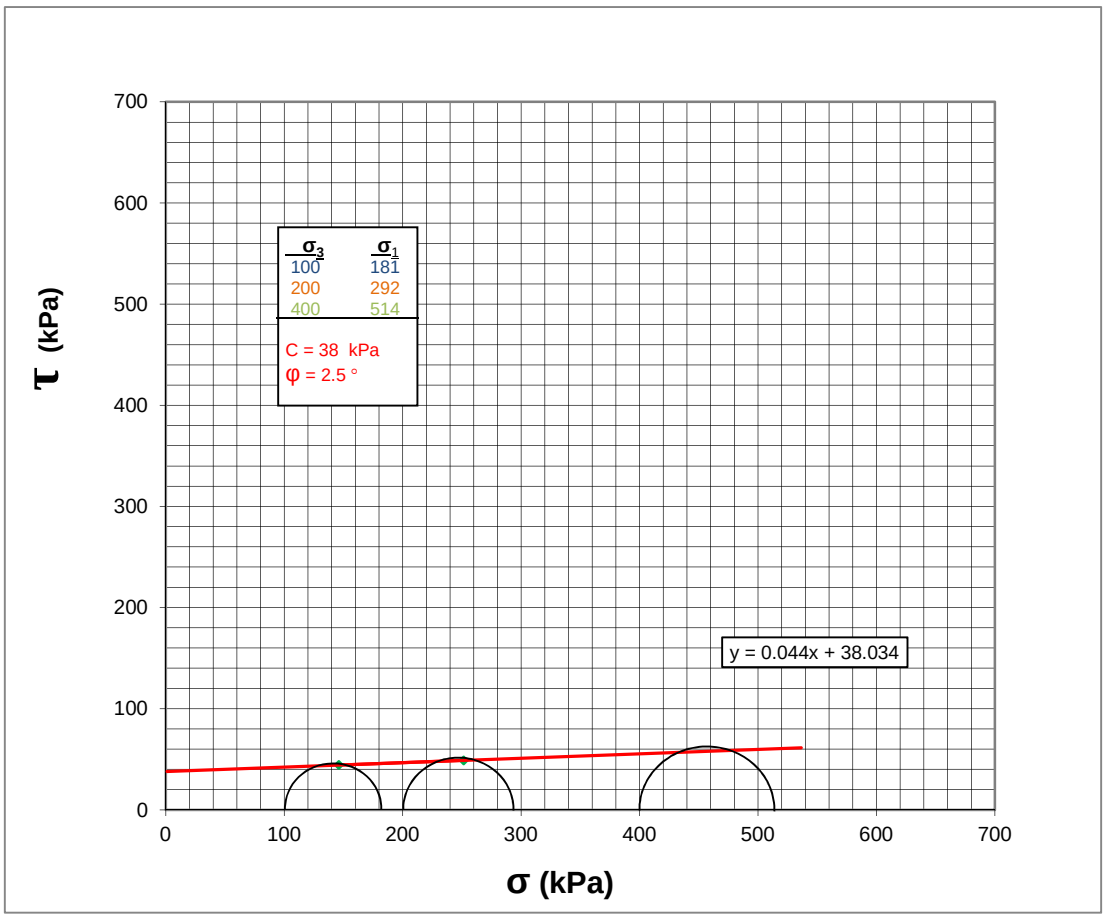
# TRIAXIAL COMPRESSION TEST

| | | | | | |
|---|---|---|---|---|---|
| **Project** | Samawa Combined Cycle P P | | | **Test Type** | |
| **BH No.** | 23 | **Sample No.** | 2 | **Depth (m)** | 1.5-2.0 |



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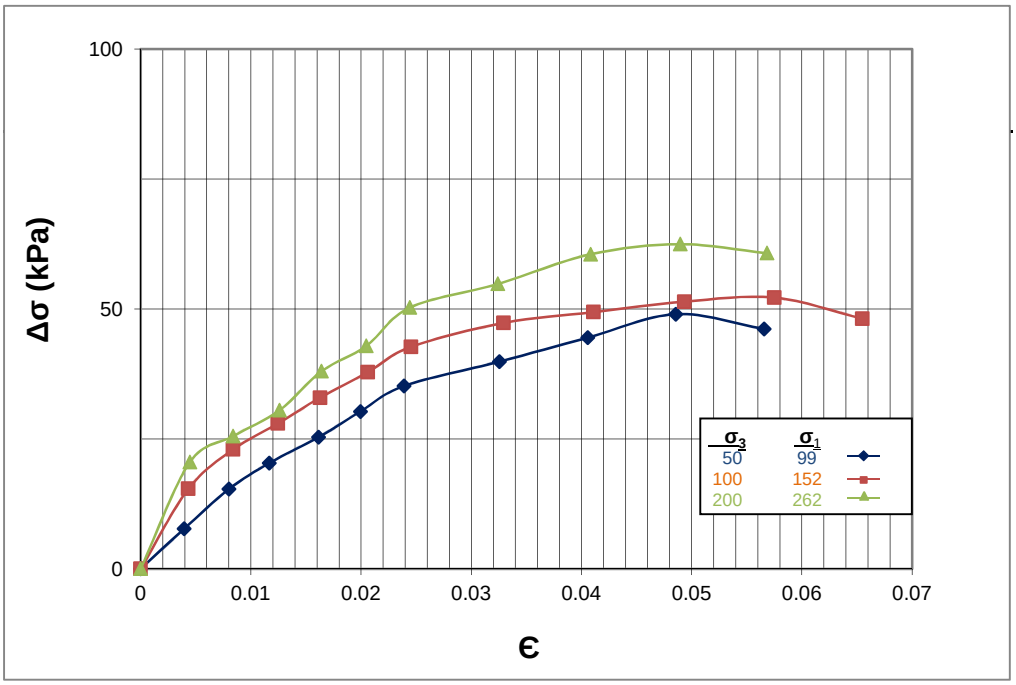
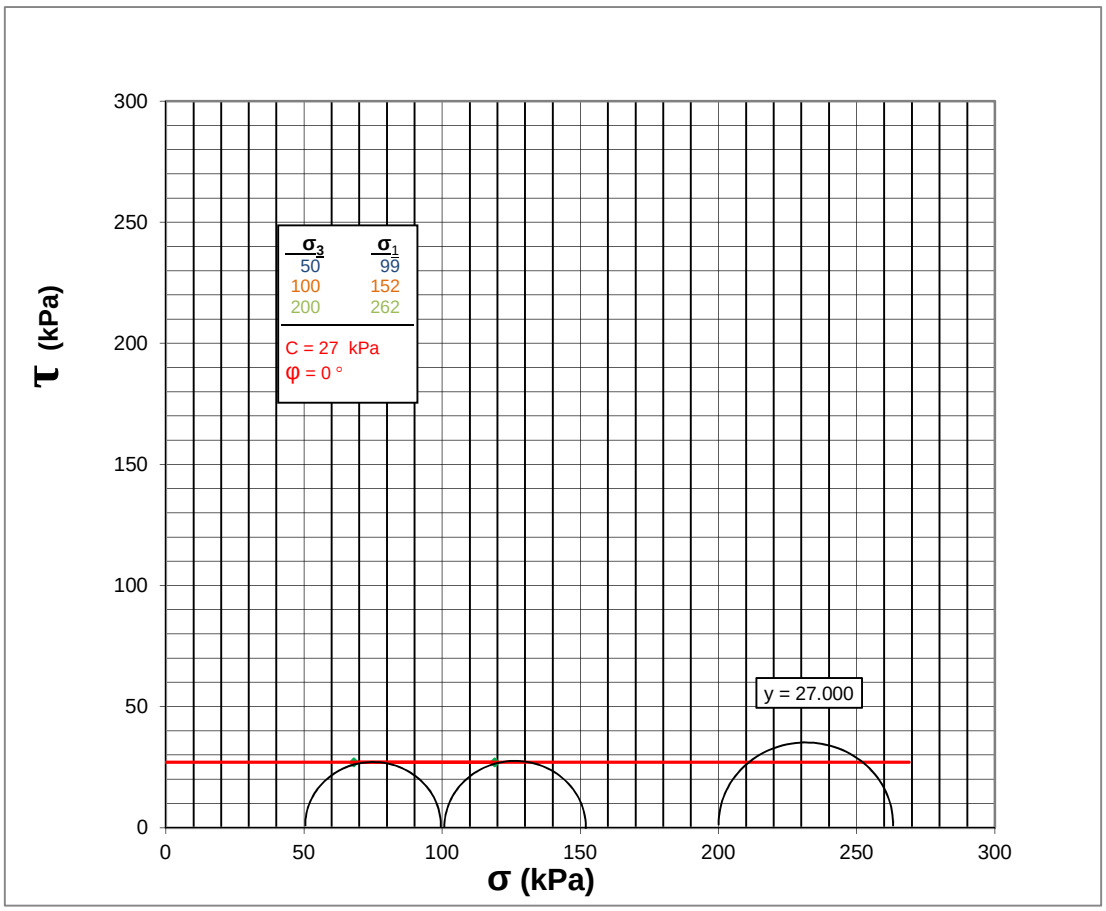
# TRIAXIAL COMPRESSION TEST

| | | | | | |
|---|---|---|---|---|---|
| **Project** | Samawa Combined Cycle Power Plant | | | **Test Type** | |
| **BH No.** | 25 | **Sample No.** | 2 | **Depth (m)** | 1.0-1.5 |



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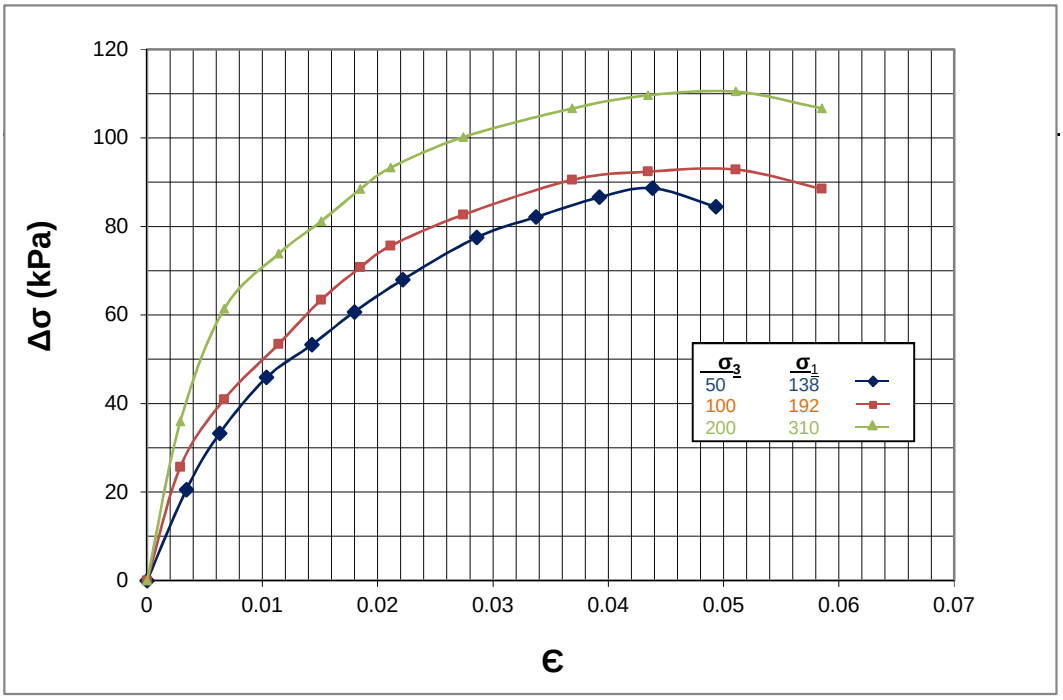
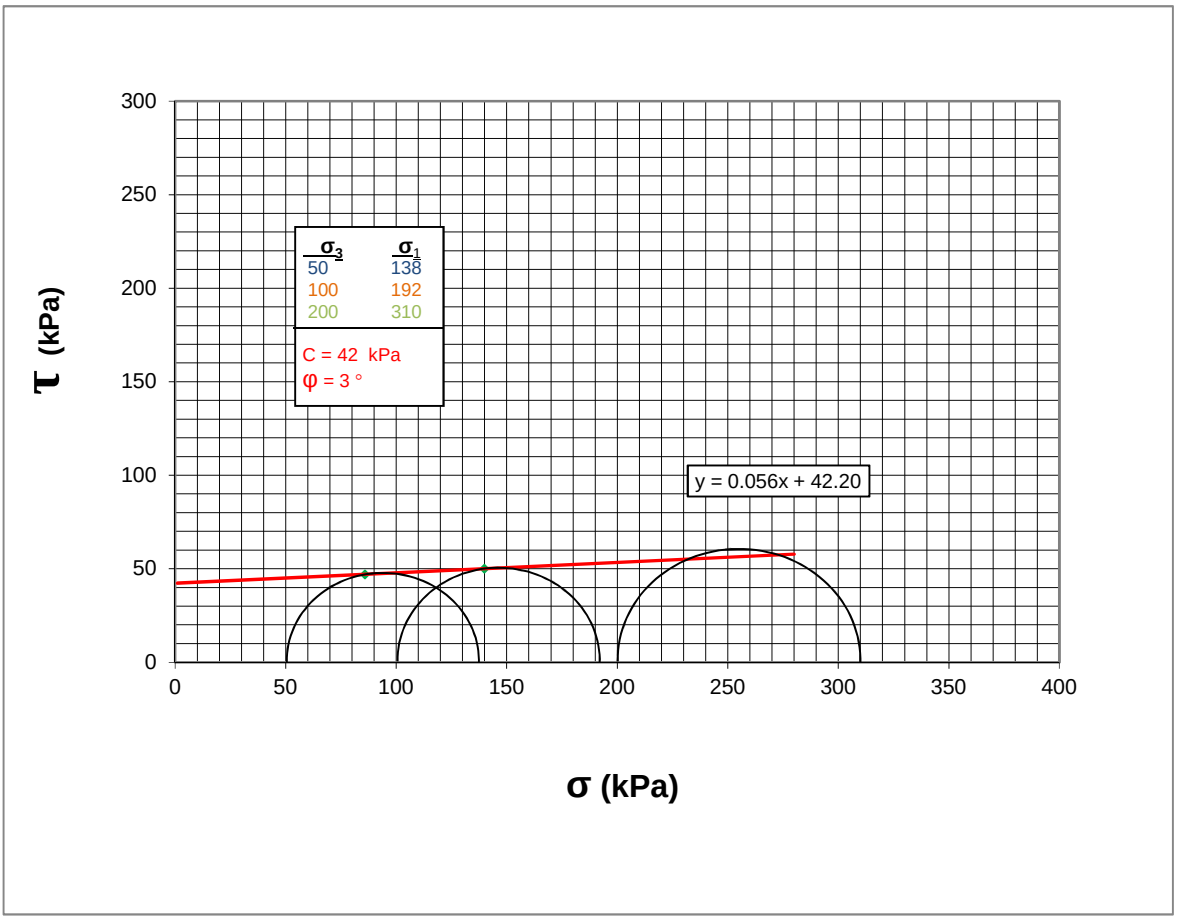
# TRIAXIAL COMPRESSION TEST

| | | | | | |
|---|---|---|---|---|---|
| **Project** | Samawa Combined Cycle Power Plant | | | **Test Type** | |
| **BH No.** | 26 | **Sample No.** | 2 | **Depth (m)** | 1.5-2.0 |



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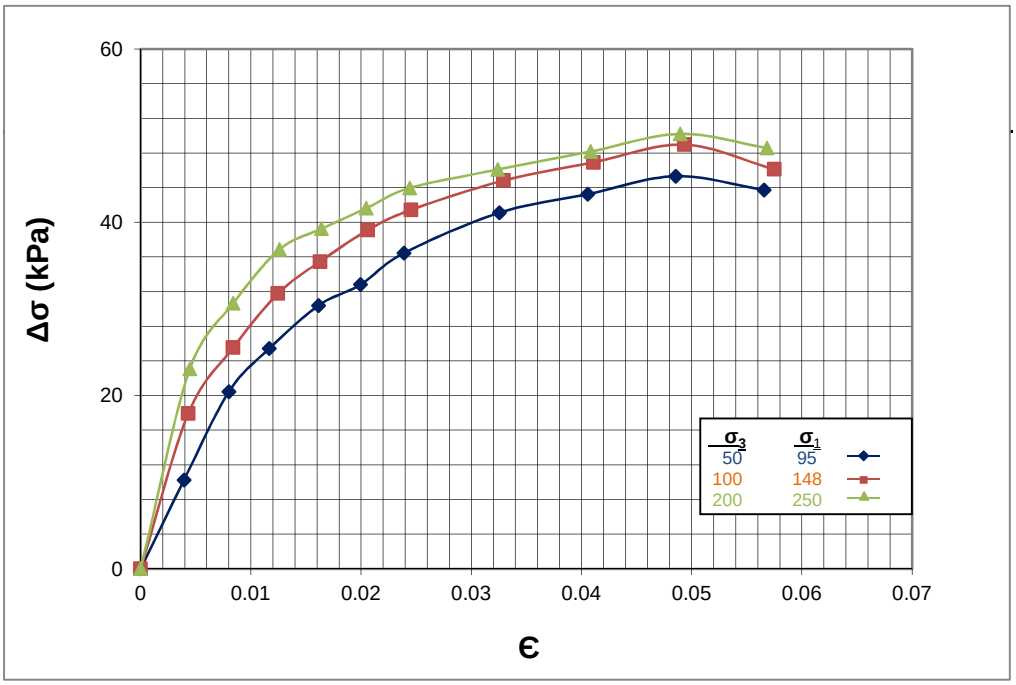
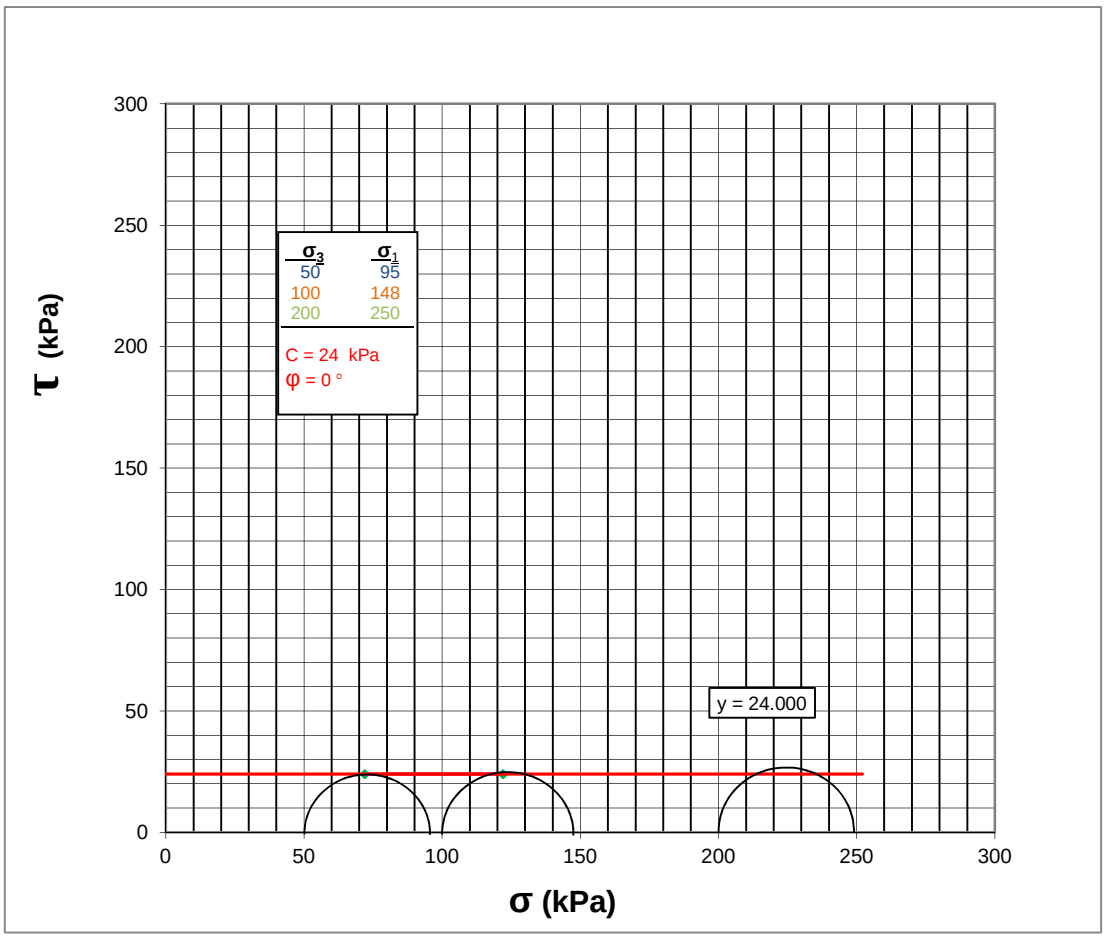
# TRIAXIAL COMPRESSION TEST

| | | | | | |
|---|---|---|---|---|---|
| **Project** | Samawa Combined Cycle Power Plant | | | **Test Type** | |
| **BH No.** | 28 | **Sample No.** | 2 | **Depth (m)** | 1.5-2.0 |



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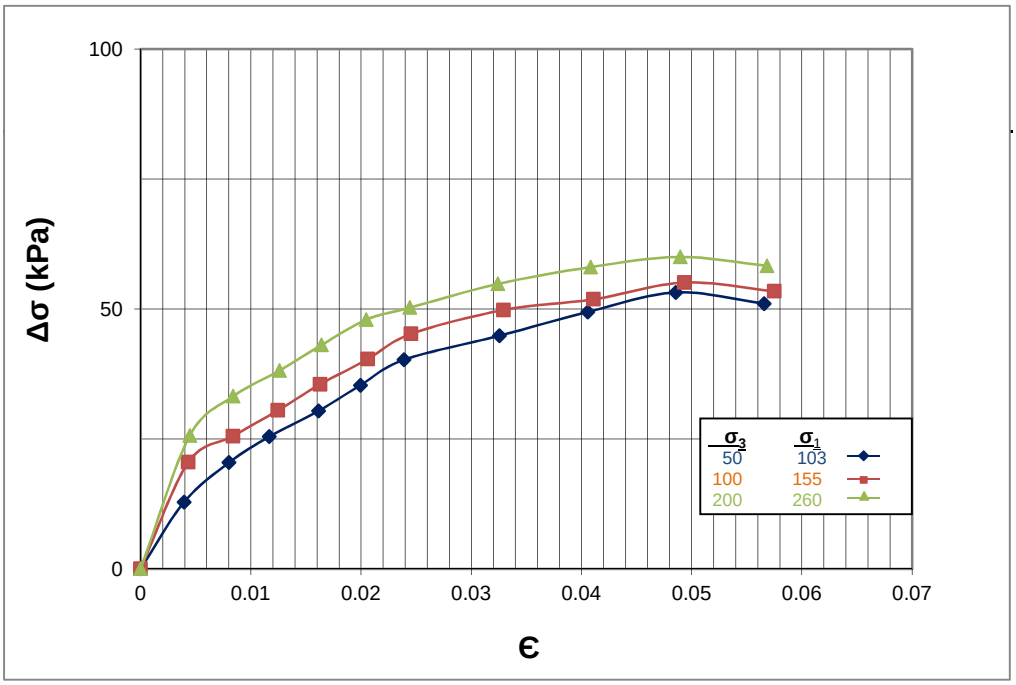
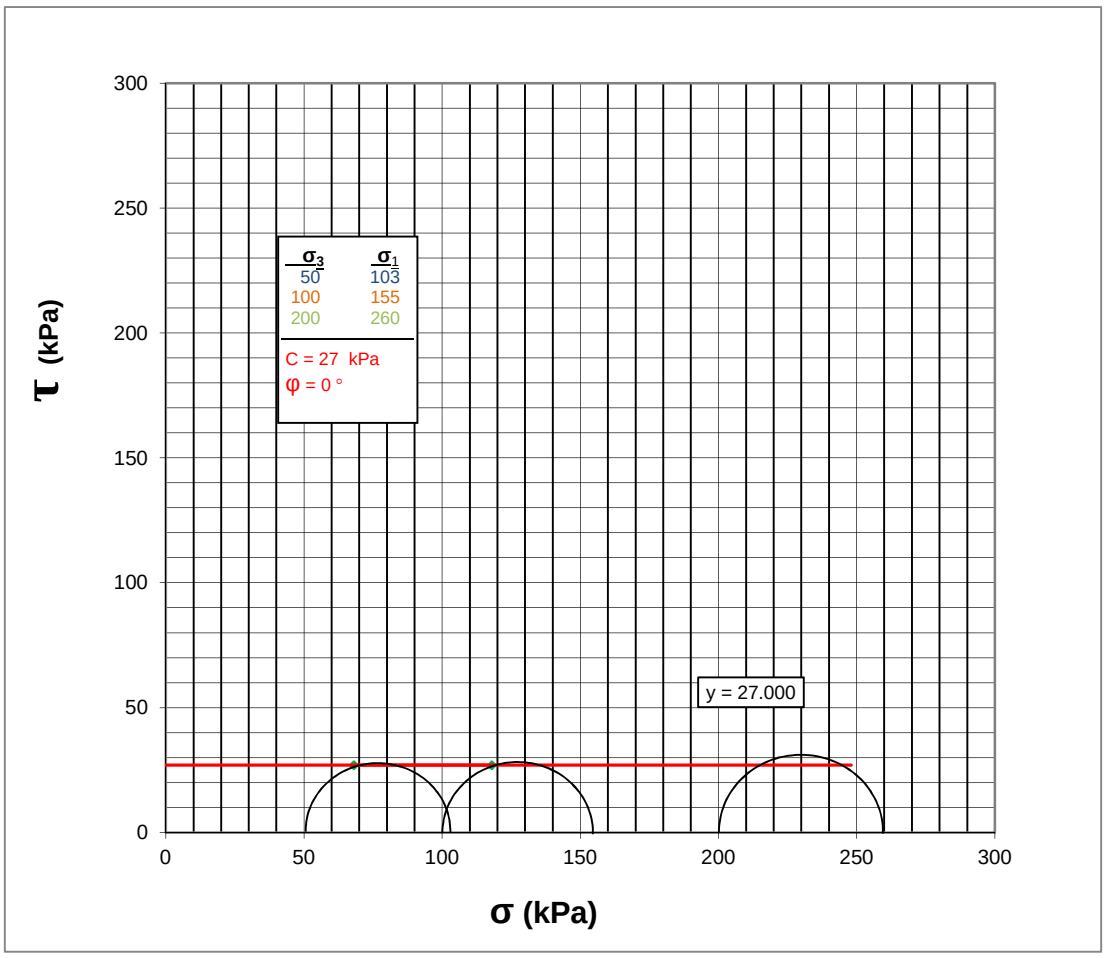
# TRIAXIAL COMPRESSION TEST

| | | | | | |
|---|---|---|---|---|---|
| **Project** | Samawa Combined Cycle Power Plant | | | **Test Type** | |
| **BH No.** | 29 | **Sample No.** | 2 | **Depth (m)** | 1.5-2.0 |



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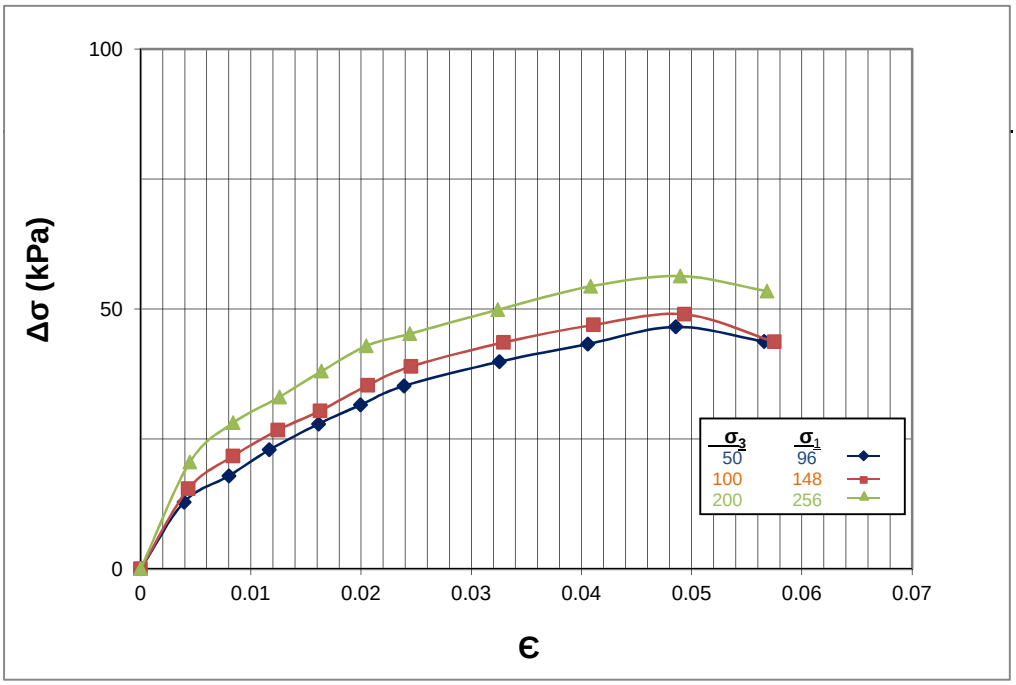
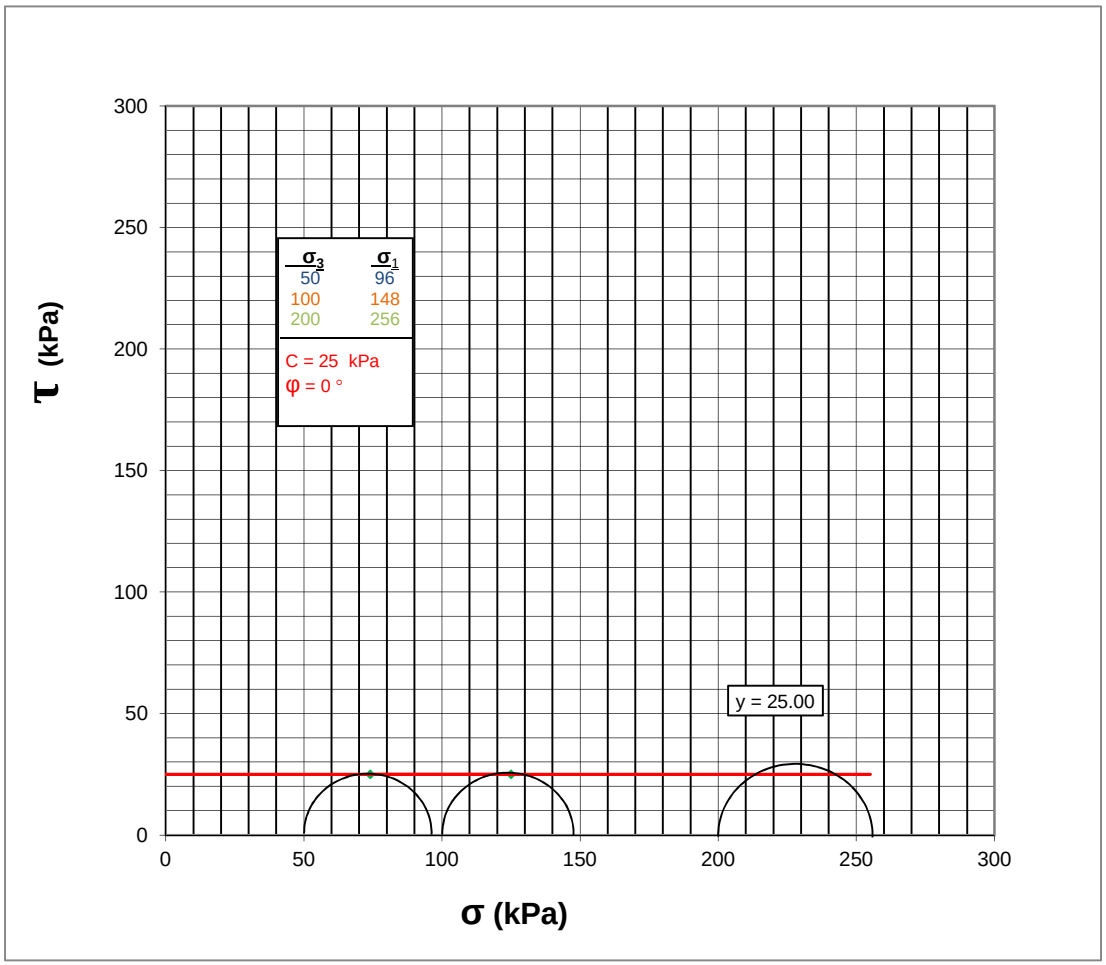
# TRIAXIAL COMPRESSION TEST

| | | | | | |
|---|---|---|---|---|---|
| **Project** | Samawa Combined Cycle Power Plant | | | **Test Type** | |
| **BH No.** | 30 | **Sample No.** | 2 | **Depth (m)** | 1.0-1.5 |



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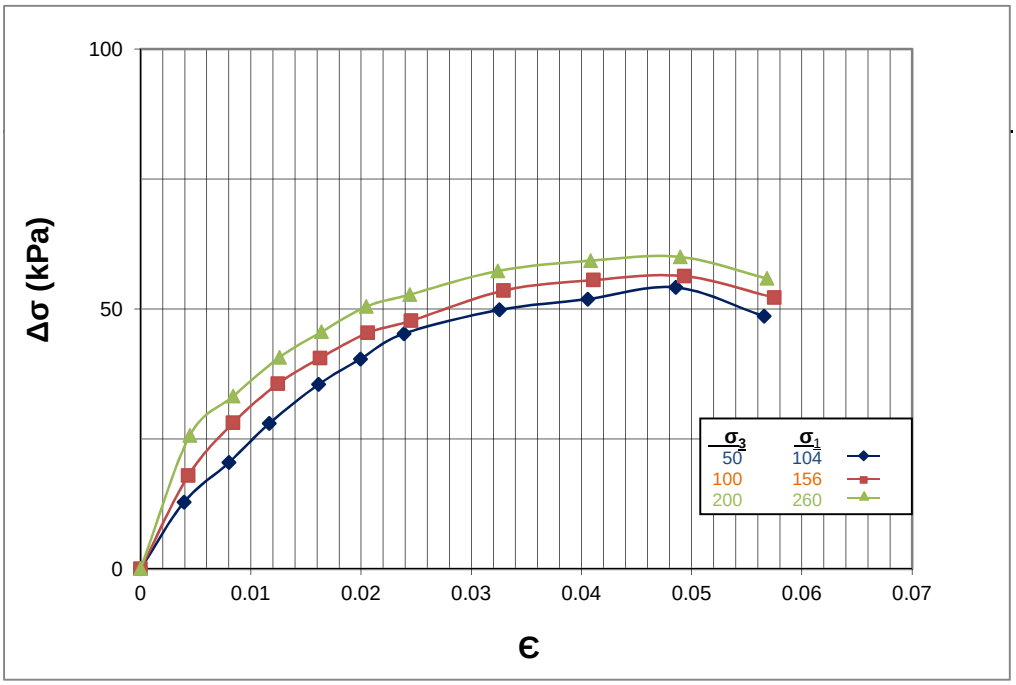
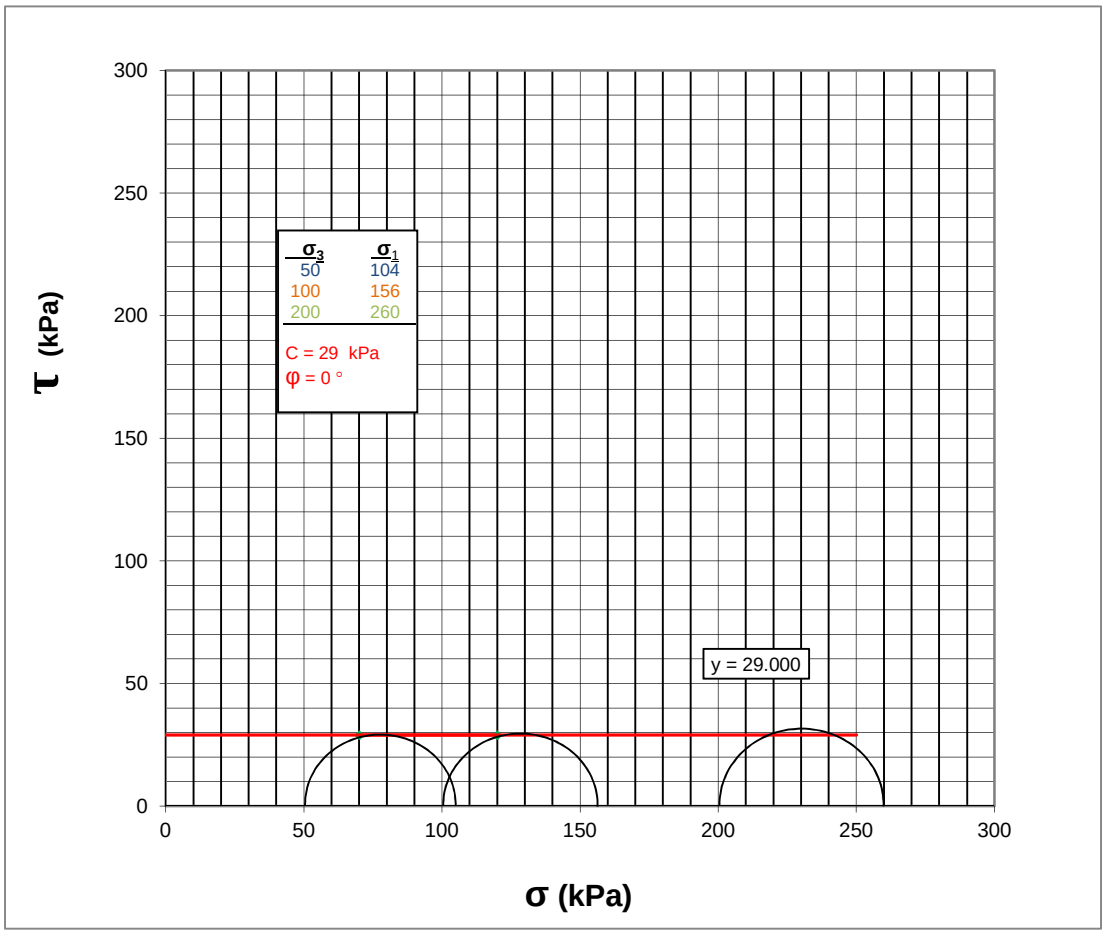
# TRIAXIAL COMPRESSION TEST

| | | | | | |
|---|---|---|---|---|---|
| **Project** | Samawa Combined Cycle Power Plant | | | **Test Type** | |
| **BH No.** | 32 | **Sample No.** | 3 | **Depth (m)** | 2.0-2.5 |



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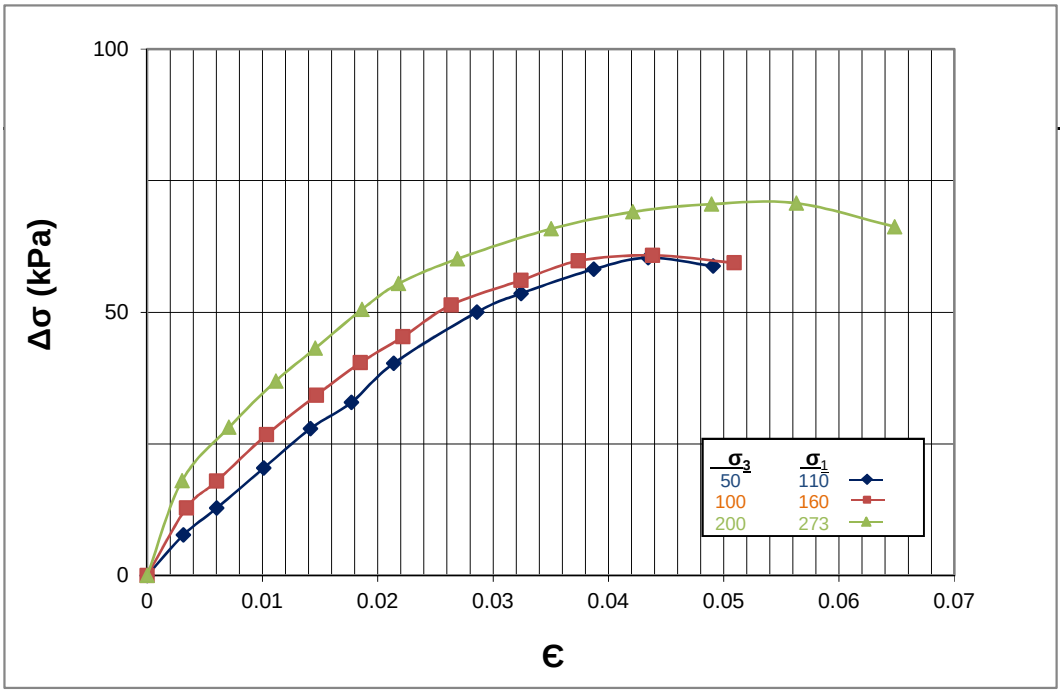
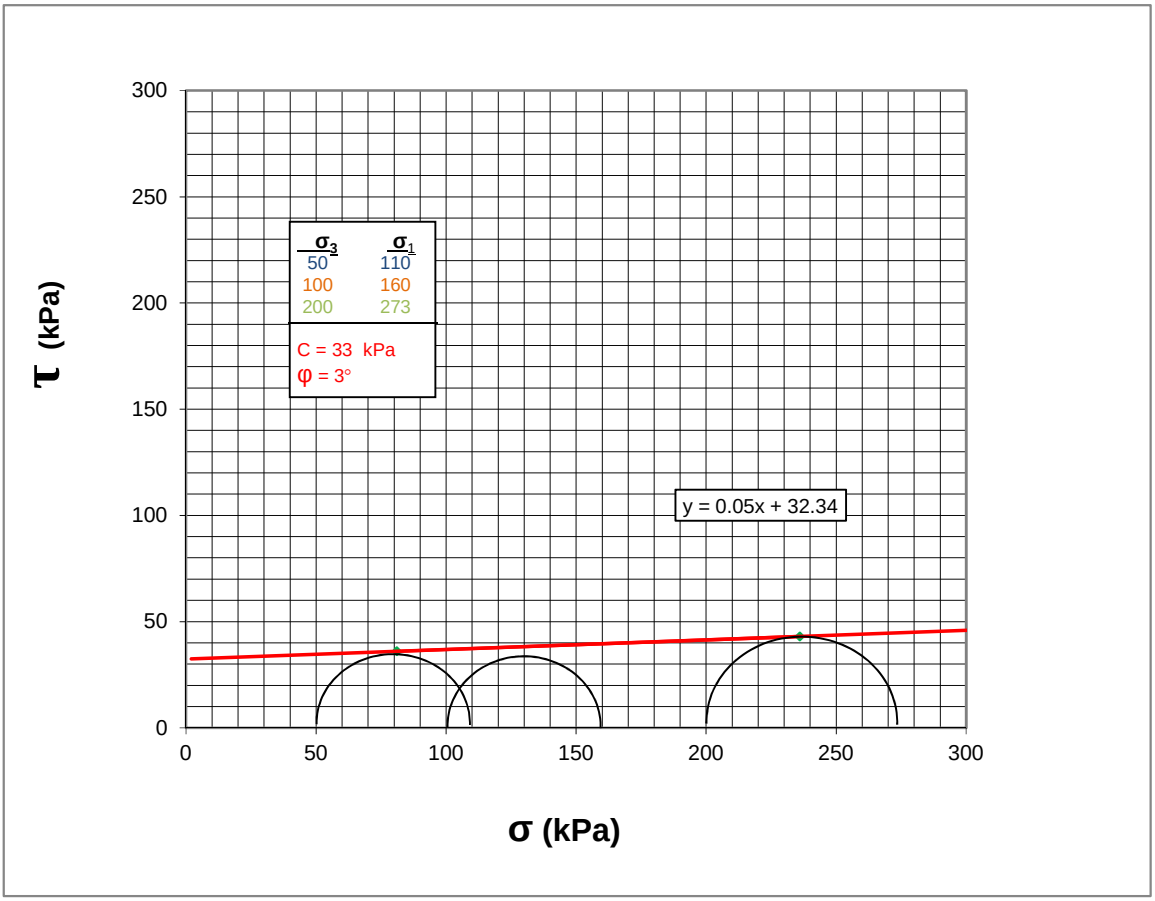
# TRIAXIAL COMPRESSION TEST

| | | | | | |
|---|---|---|---|---|---|
| **Project** | Samawa Combined Cycle PP | | | **Test Type** | |
| **BH No.** | 33 | **Sample No.** | 2 | **Depth (m)** | 1.0-1.5 |



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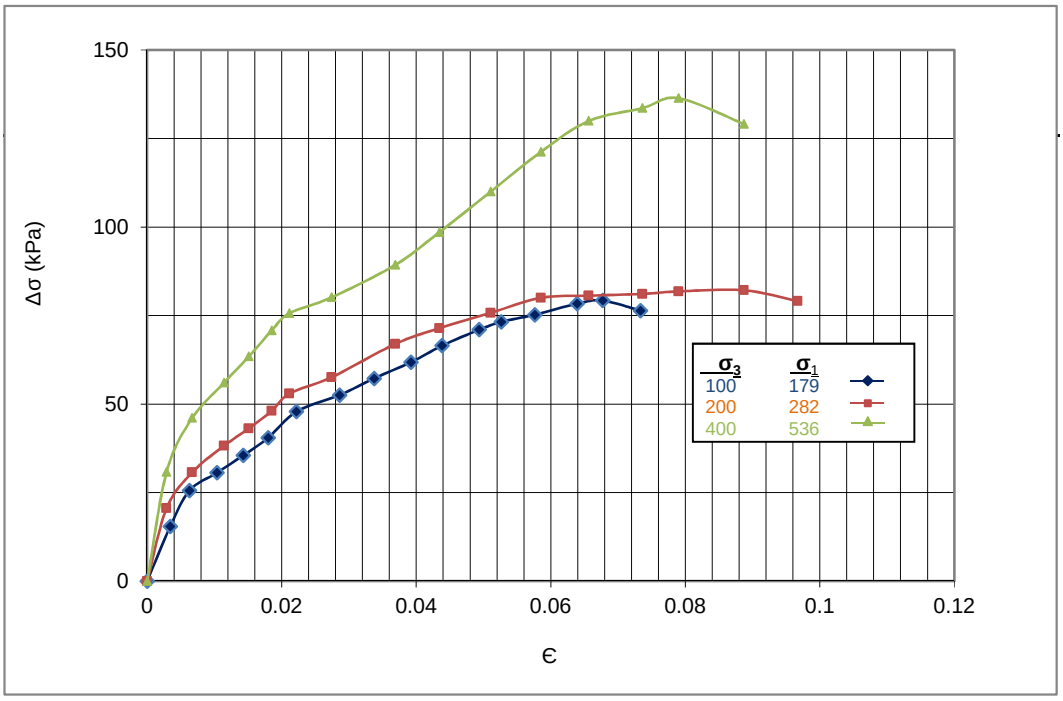
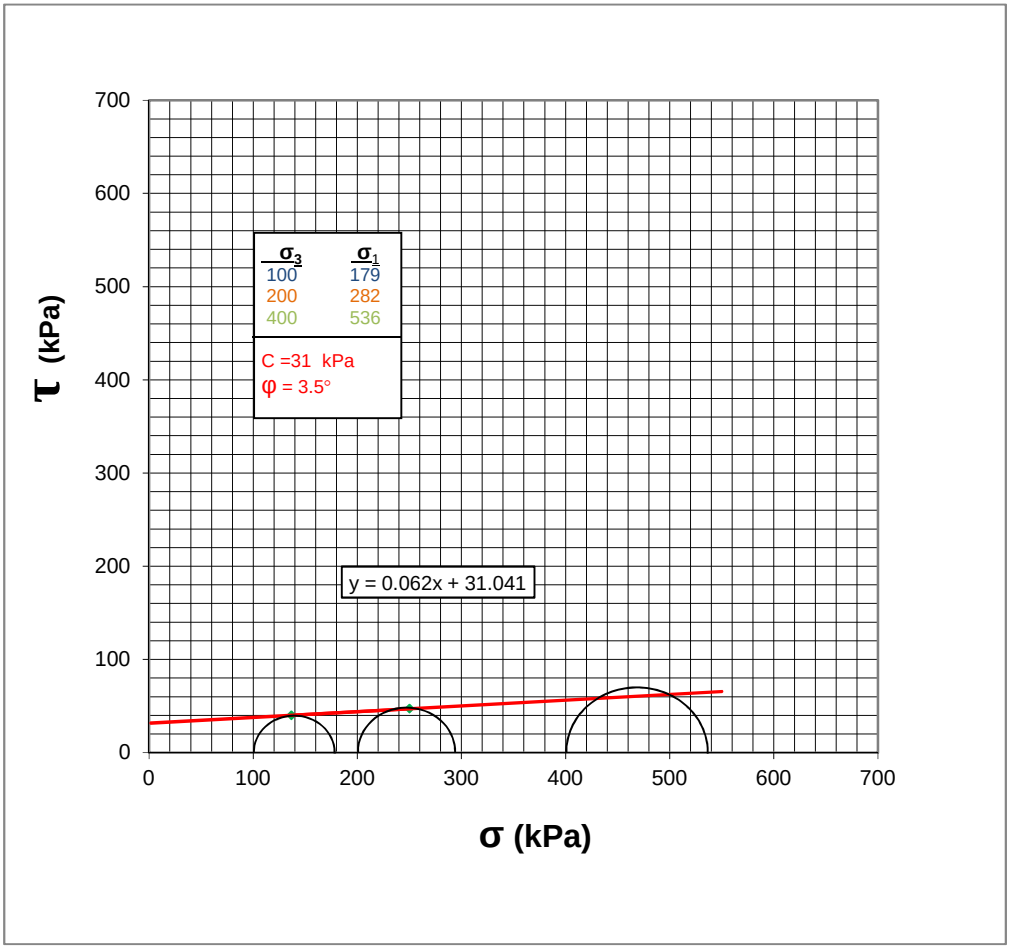
# TRIAXIAL COMPRESSION TEST

| | | | | | |
|---|---|---|---|---|---|
| **Project** | Samawa Combined Cycle PP | | | **Test Type** | |
| **BH No.** | 36 | **Sample No.** | 2 | **Depth (m)** | 1.5-2.0 |



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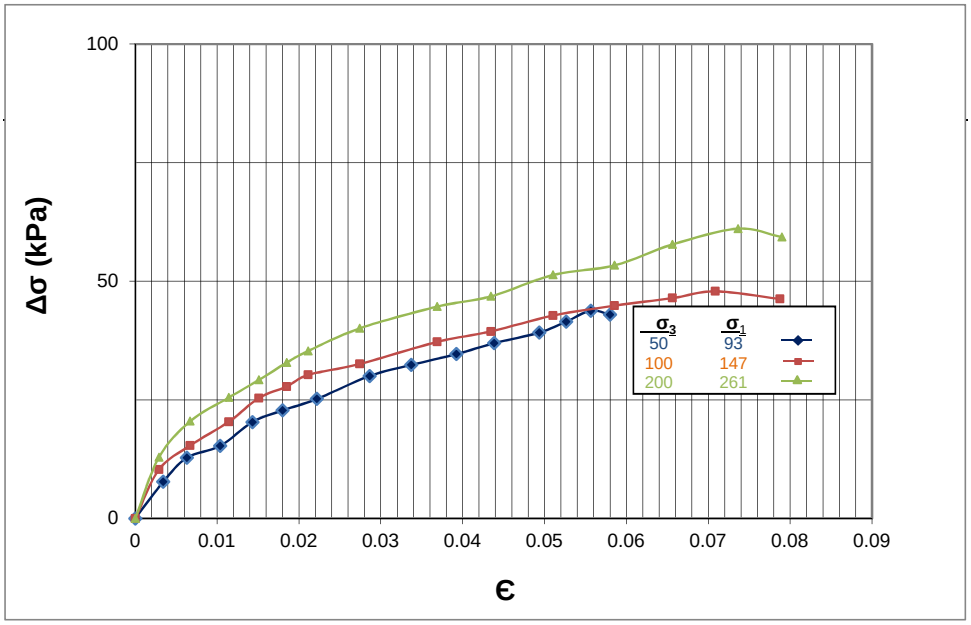
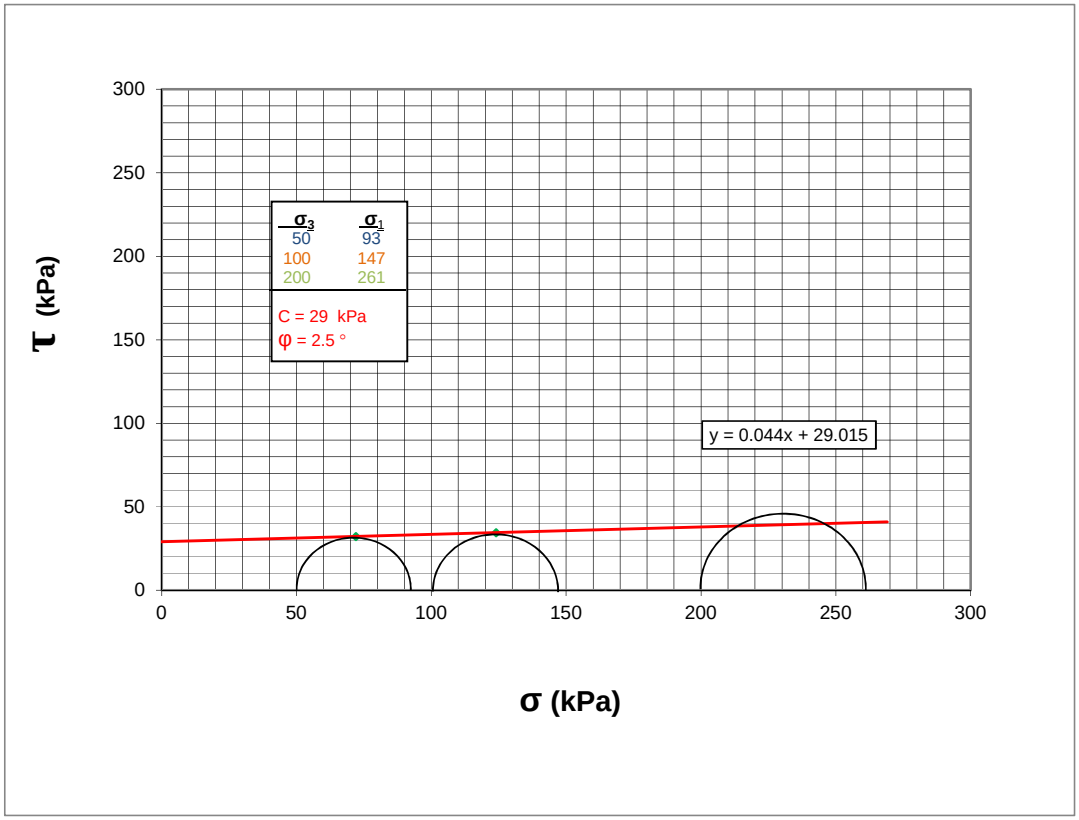
# TRIAXIAL COMPRESSION TEST

| | | | | | |
|---|---|---|---|---|---|
| **Project** | Samawa Combined Cycle P P | | | **Test Type** | |
| **BH No.** | 38 | **Sample No.** | 2 | **Depth (m)** | 1.5-2.0 |



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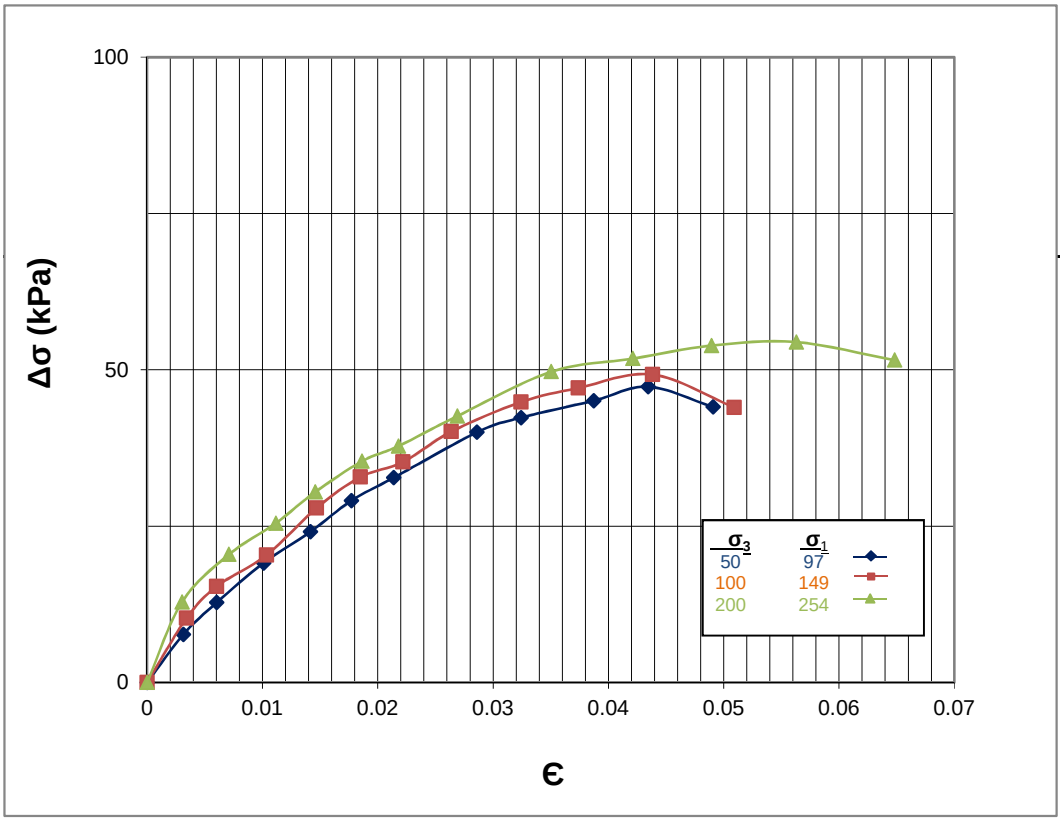
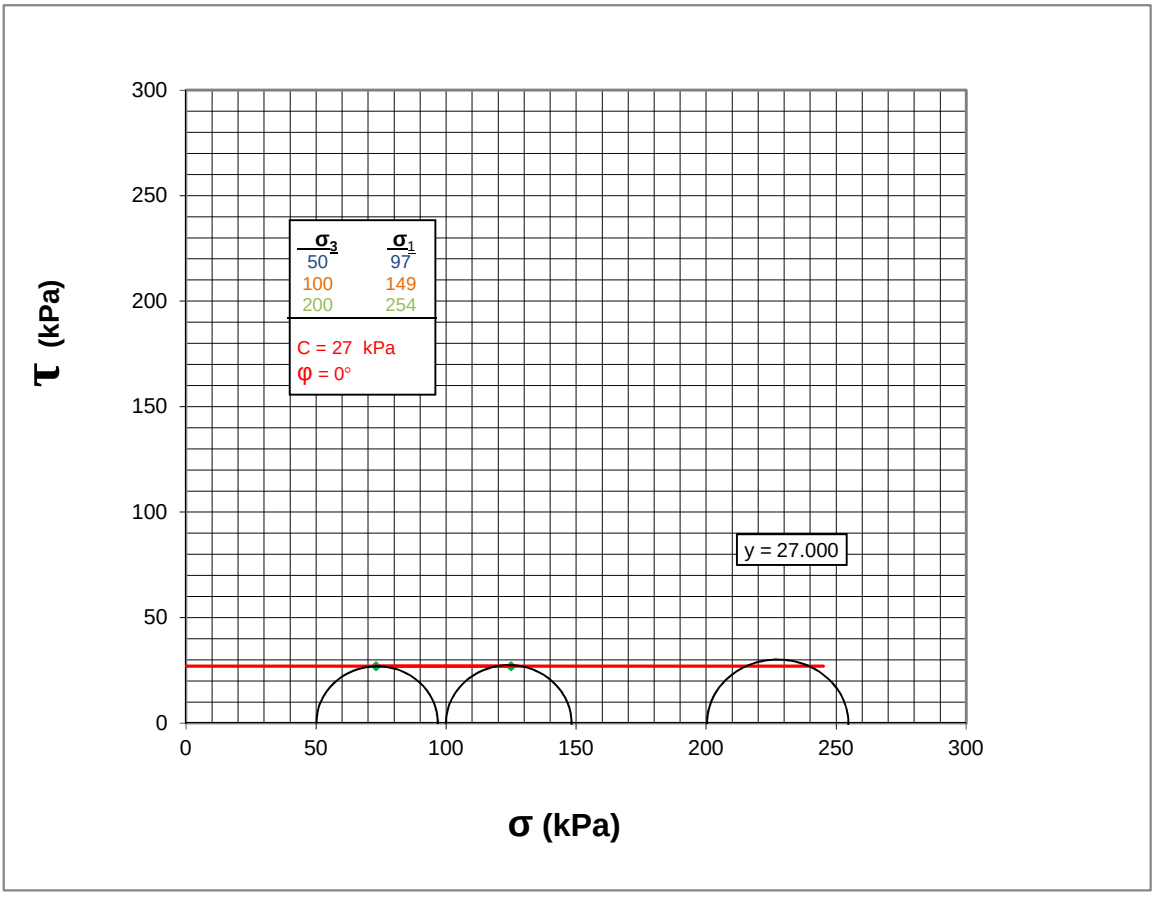
# TRIAXIAL COMPRESSION TEST

| | | | | | |
|---|---|---|---|---|---|
| **Project** | Samawa Combined Cycle PP | | | **Test Type** | |
| **BH No.** | 39 | **Sample No.** | 2 | **Depth (m)** | 1.0-1.5 |



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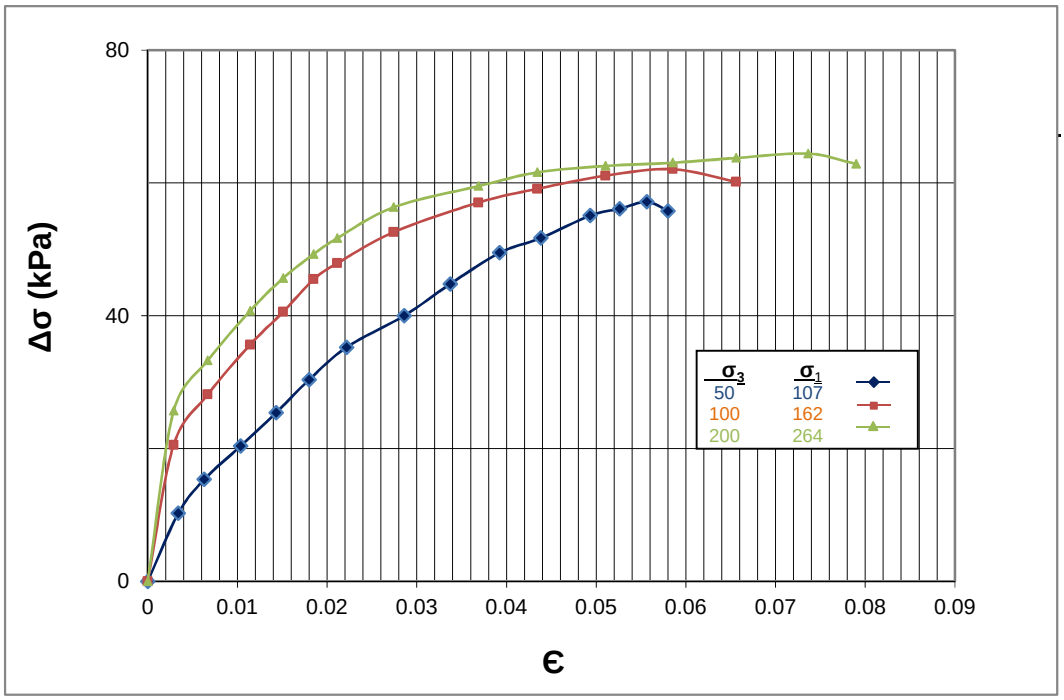
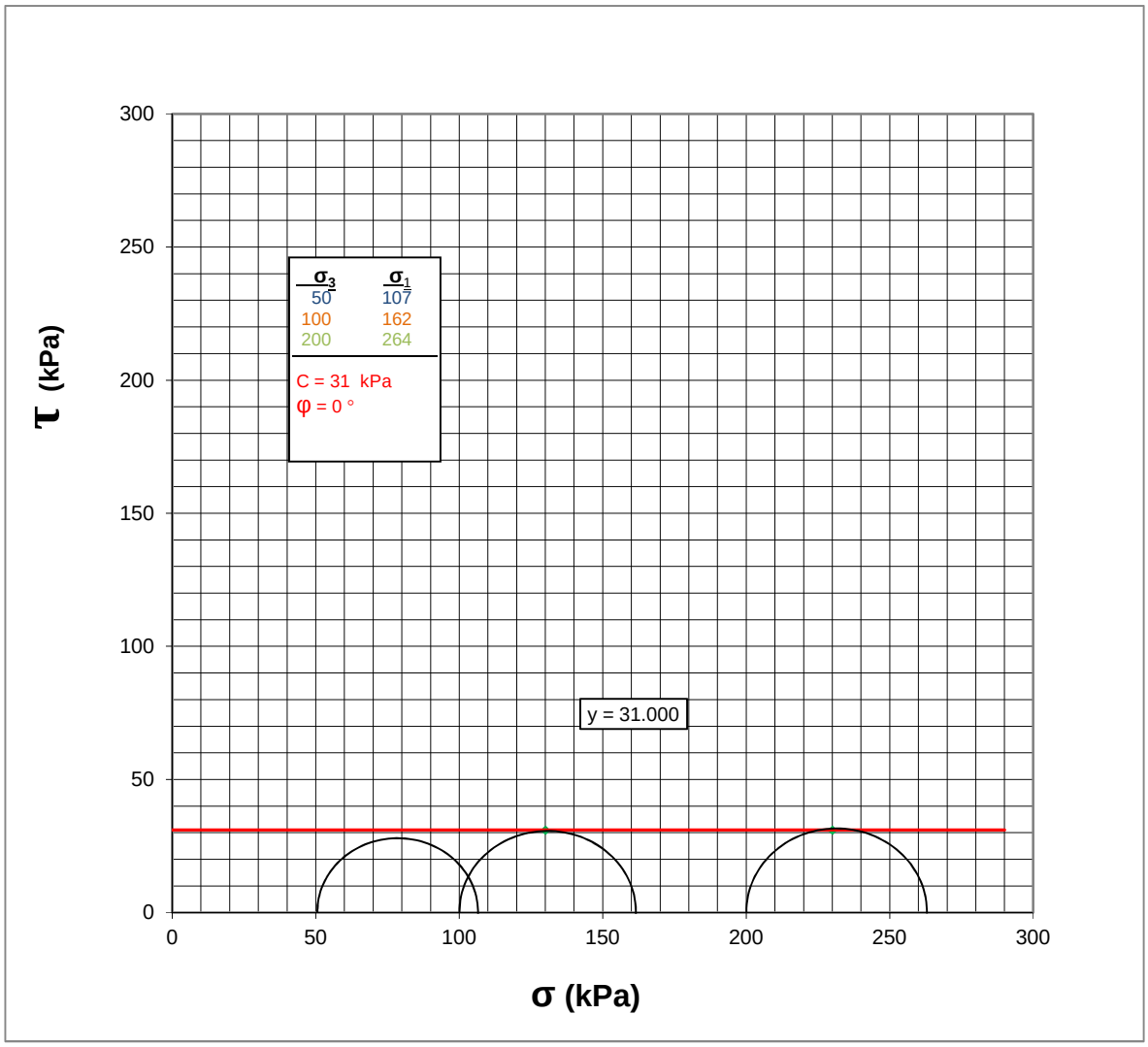
# TRIAXIAL COMPRESSION TEST

| | | | | | |
|---|---|---|---|---|---|
| **Project** | Samawa Combined Cycle PP | | | **Test Type** | |
| **BH No.** | 42 | **Sample No.** | 2 | **Depth (m)** | 1.5-2.0 |



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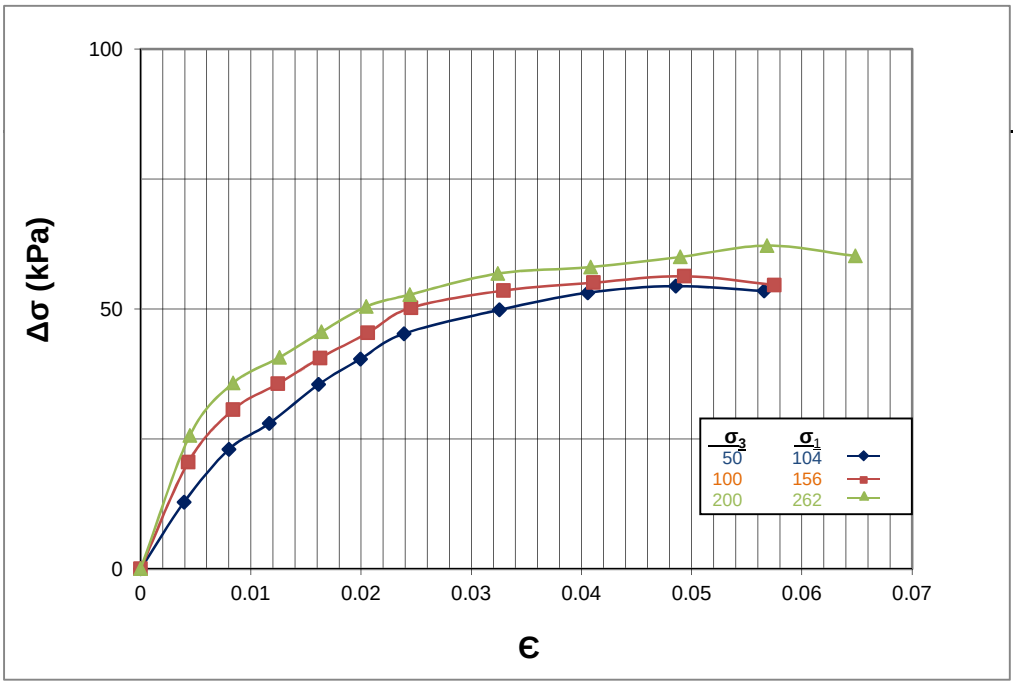
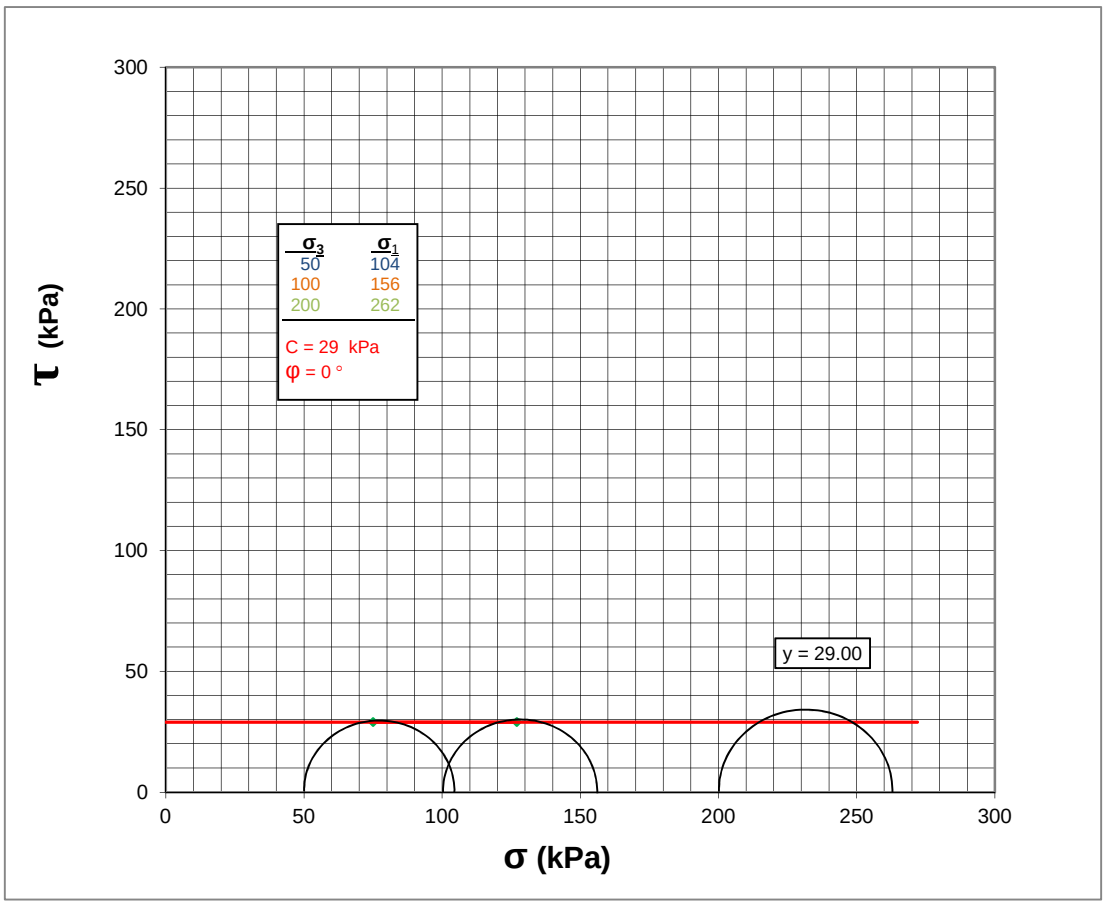
# TRIAXIAL COMPRESSION TEST

| | | | | | |
|---|---|---|---|---|---|
| **Project** | Samawa Combined Cycle P P | | | **Test Type** | |
| **BH No.** | 44 | **Sample No.** | 2 | **Depth (m)** | 1.0-1.5 |



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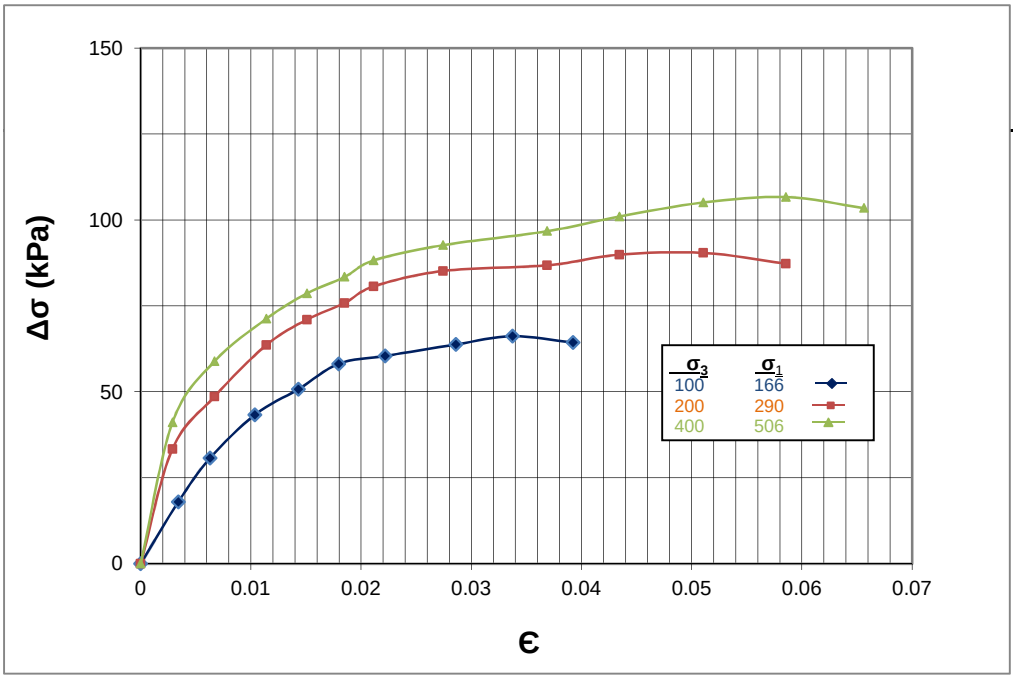
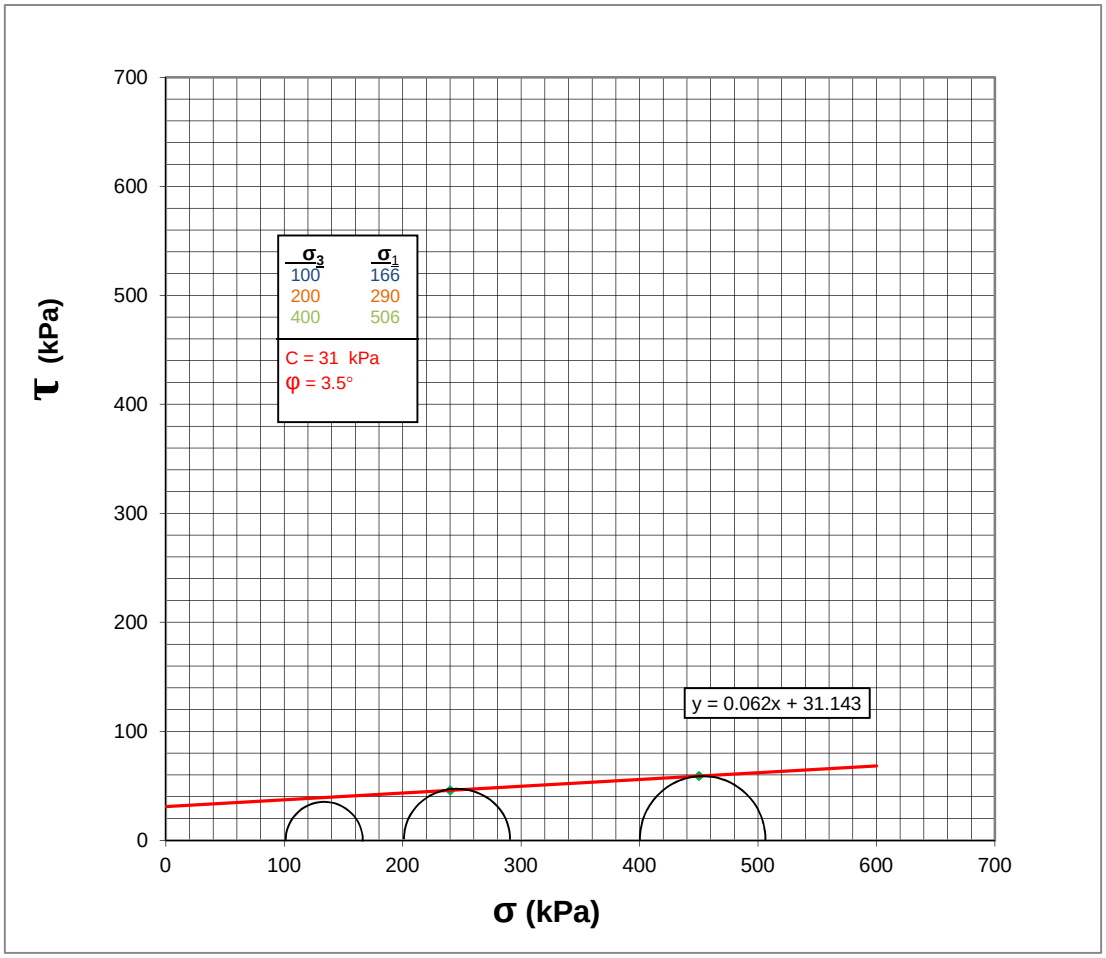
# TRIAXIAL COMPRESSION TEST

| | | | | | |
|---|---|---|---|---|---|
| **Project** | Samawa Combined Cycle PP | | | **Test Type** | |
| **BH No.** | 45 | **Sample No.** | 2 | **Depth (m)** | 1.0-1.5 |



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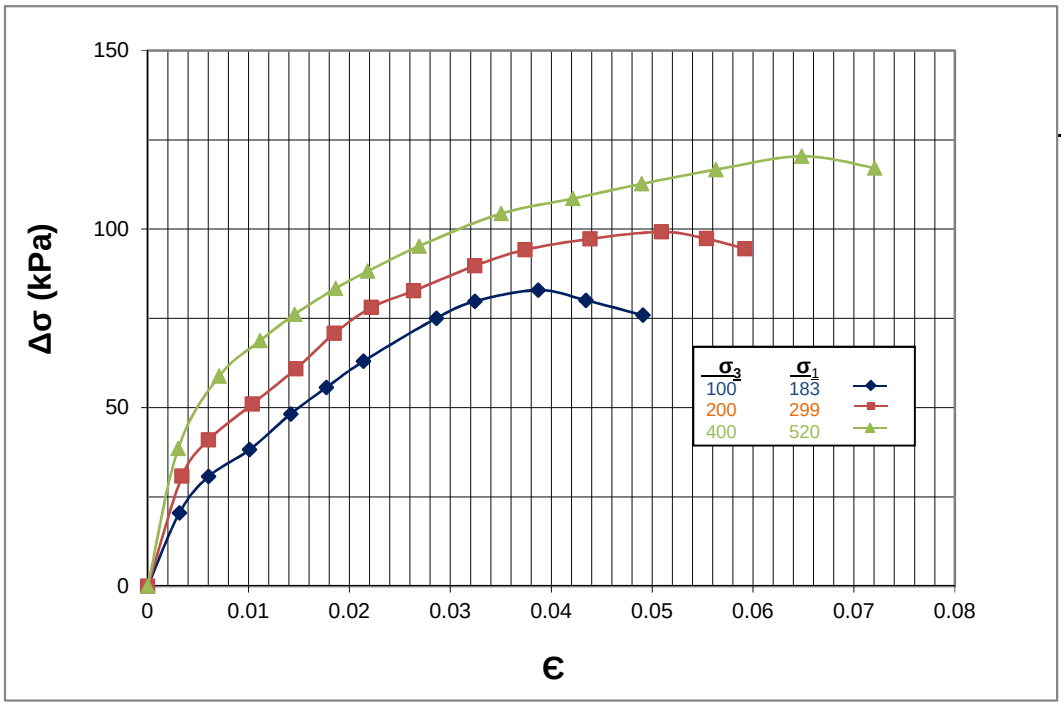
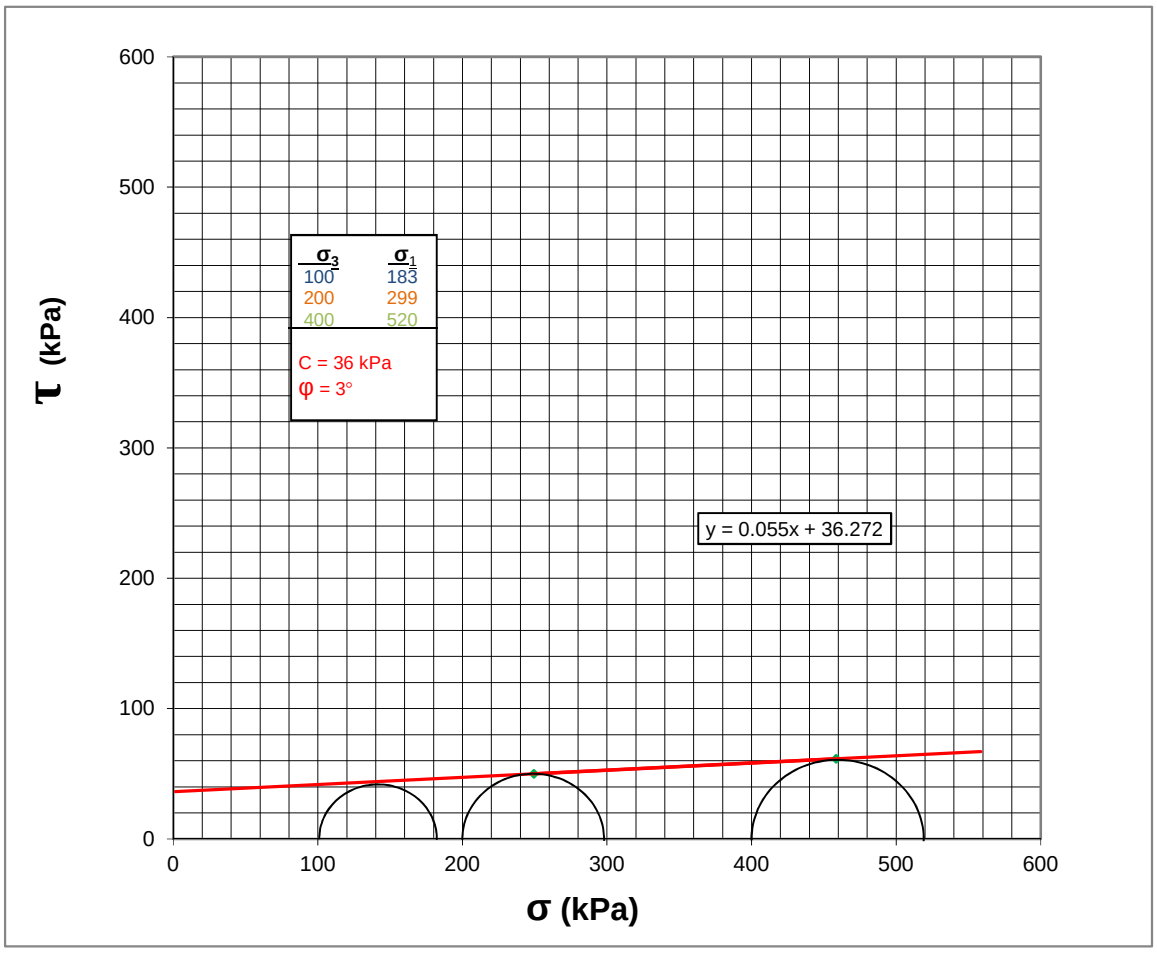
# TRIAXIAL COMPRESSION TEST

| | | | | | |
|---|---|---|---|---|---|
| **Project** | Samawa Combined Cycle PP | | | **Test Type** | |
| **BH No.** | 46 | **Sample No.** | 2 | **Depth (m)** | 1.0-1.5 |



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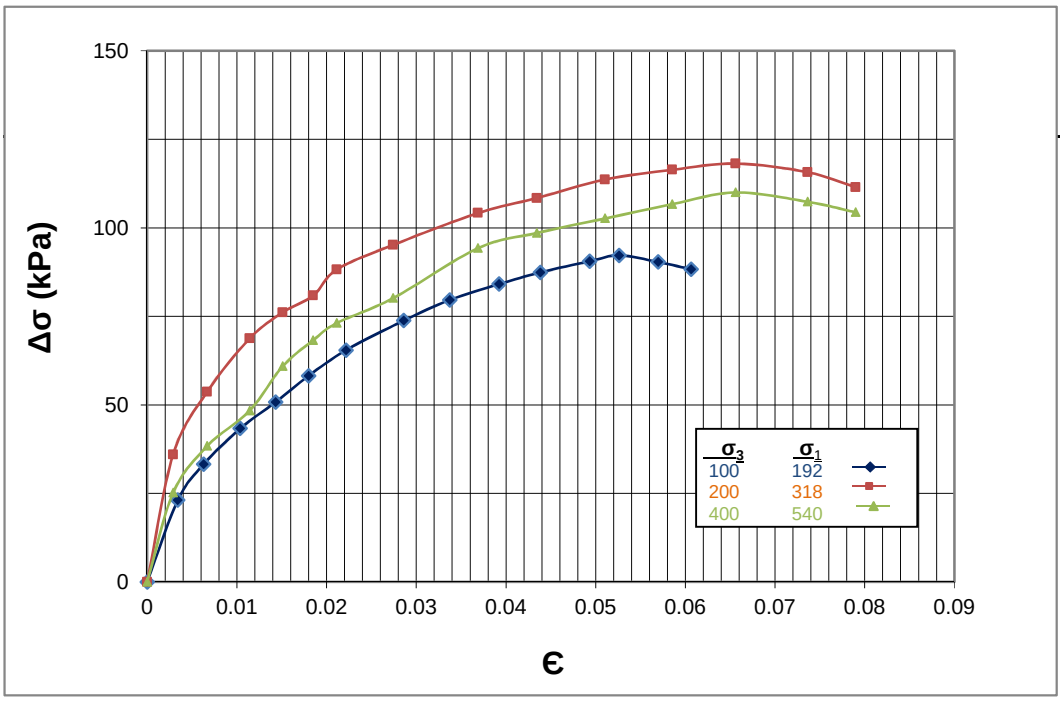
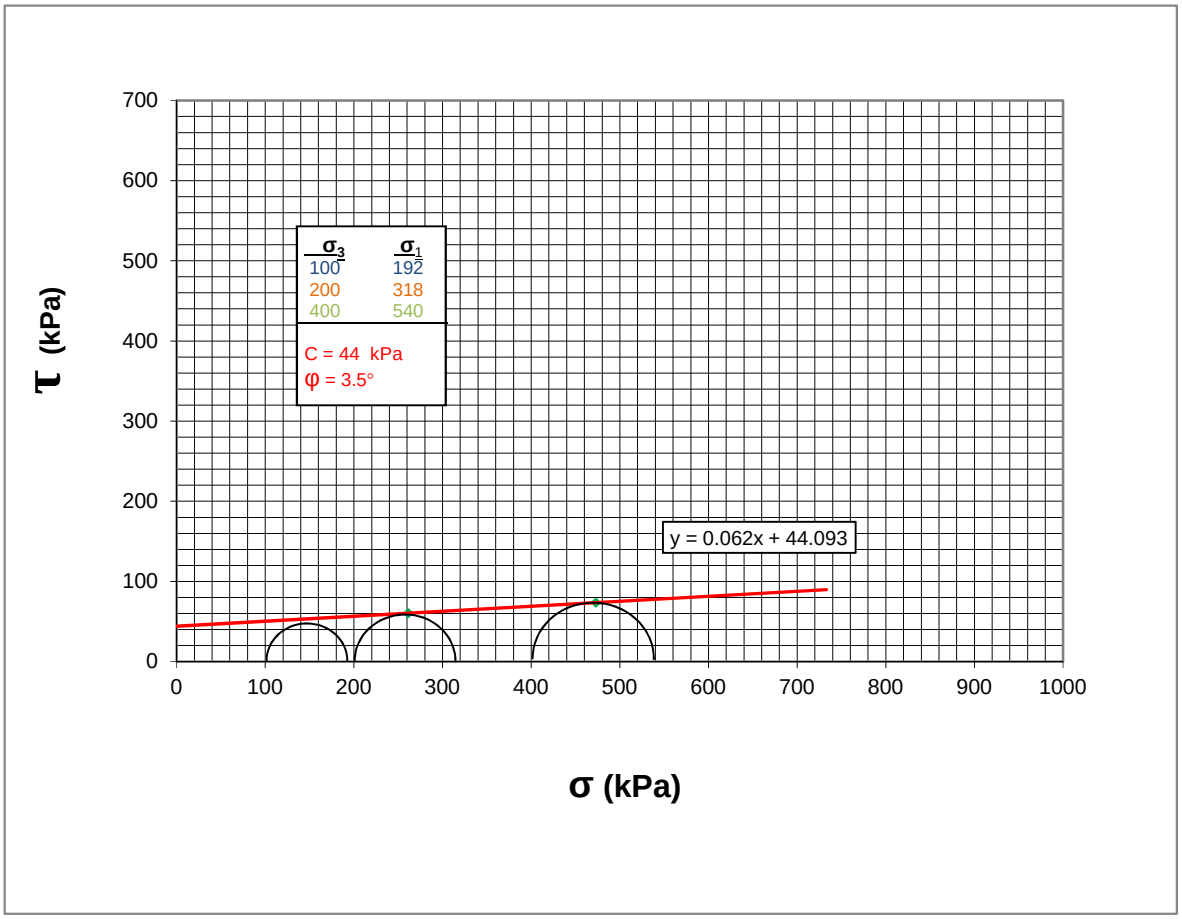
# TRIAXIAL COMPRESSION TEST

| | | | | | |
|---|---|---|---|---|---|
| **Project** | Samawa Combined Cycle P P | | | **Test Type** | |
| **BH No.** | 47 | **Sample No.** | 2 | **Depth (m)** | 1.0-1.5 |



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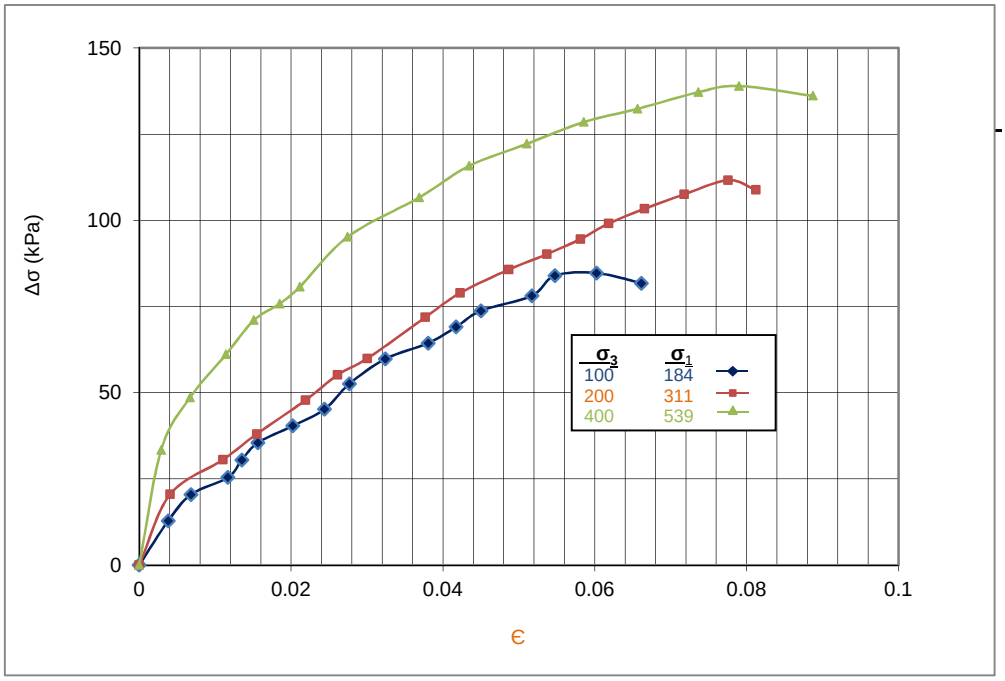
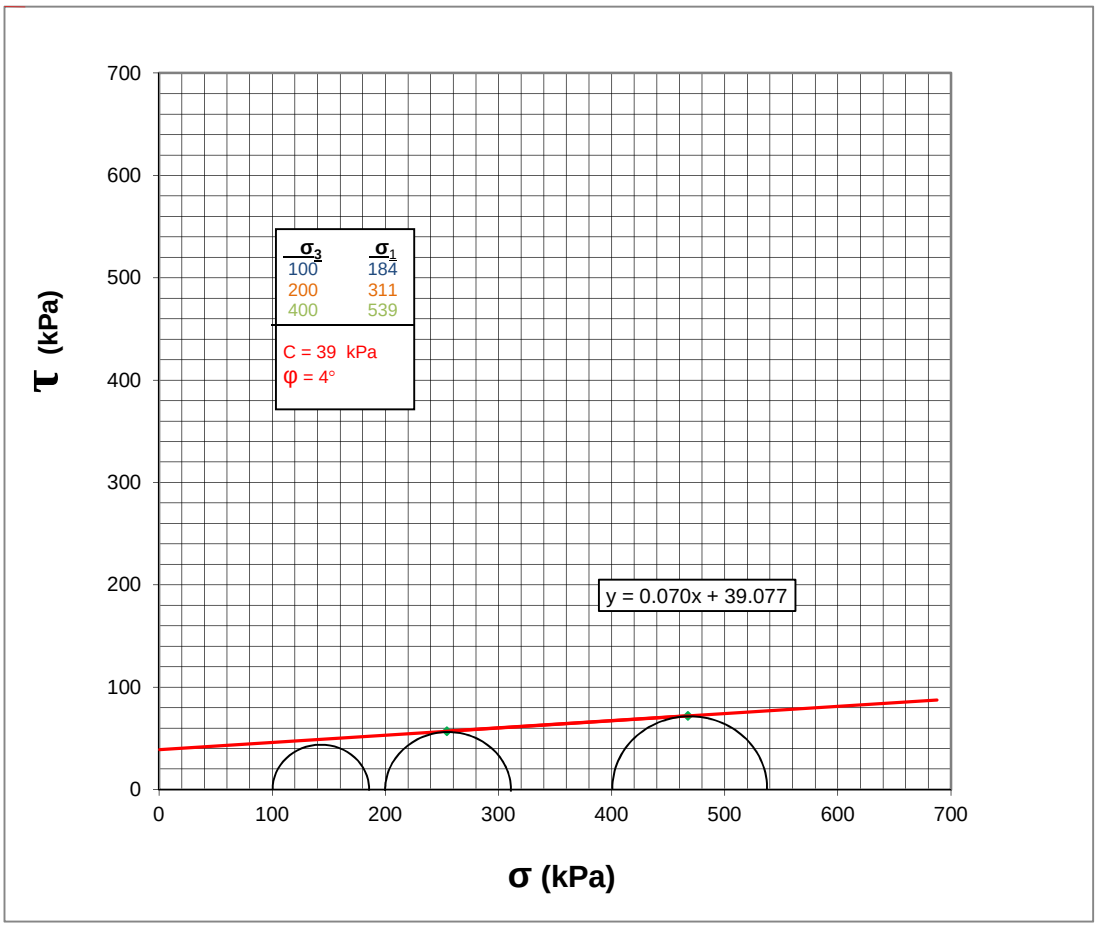
# TRIAXIAL COMPRESSION TEST

**Project** Samawa Combined Cycle PP **Test Type**

**BH No.** 48 **Sample No.** 5 **Depth (m)** 4.0-4.5



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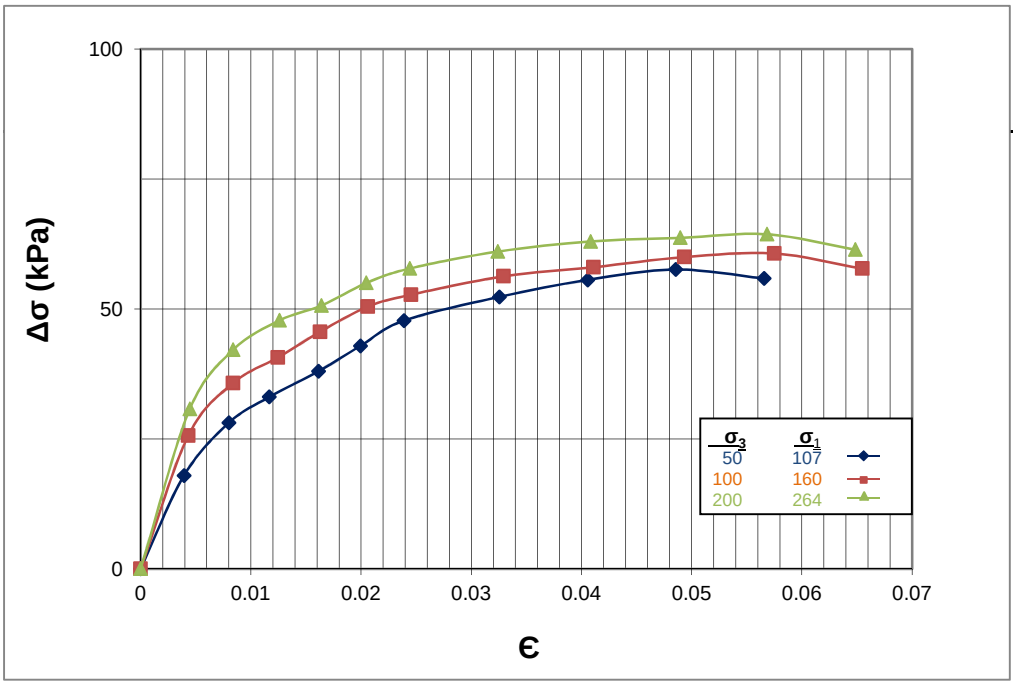
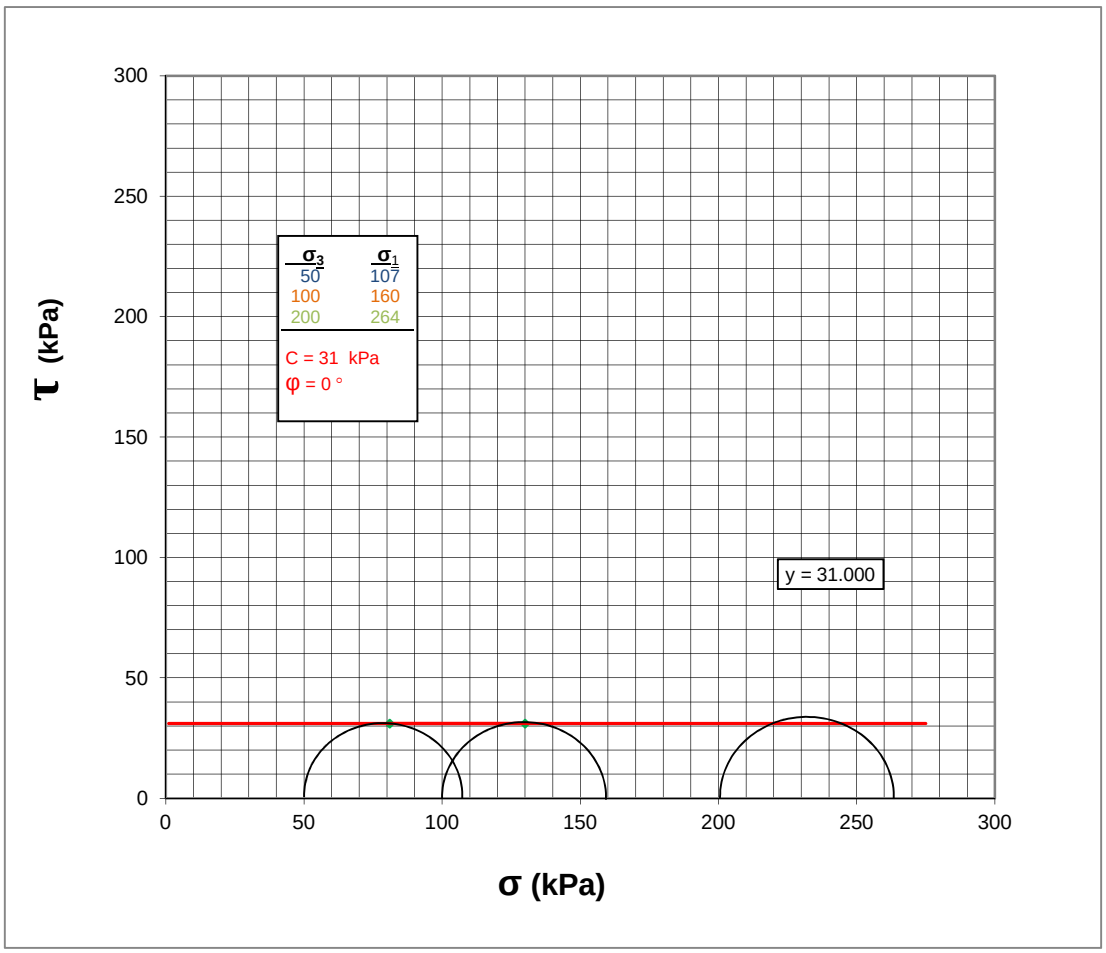
# TRIAXIAL COMPRESSION TEST

| | | | | | |
|---|---|---|---|---|---|
| **Project** | Samawa Combined Cycle PP | | | **Test Type** | |
| **BH No.** | 49 | **Sample No.** | 2 | **Depth (m)** | 1.0-1.5 |



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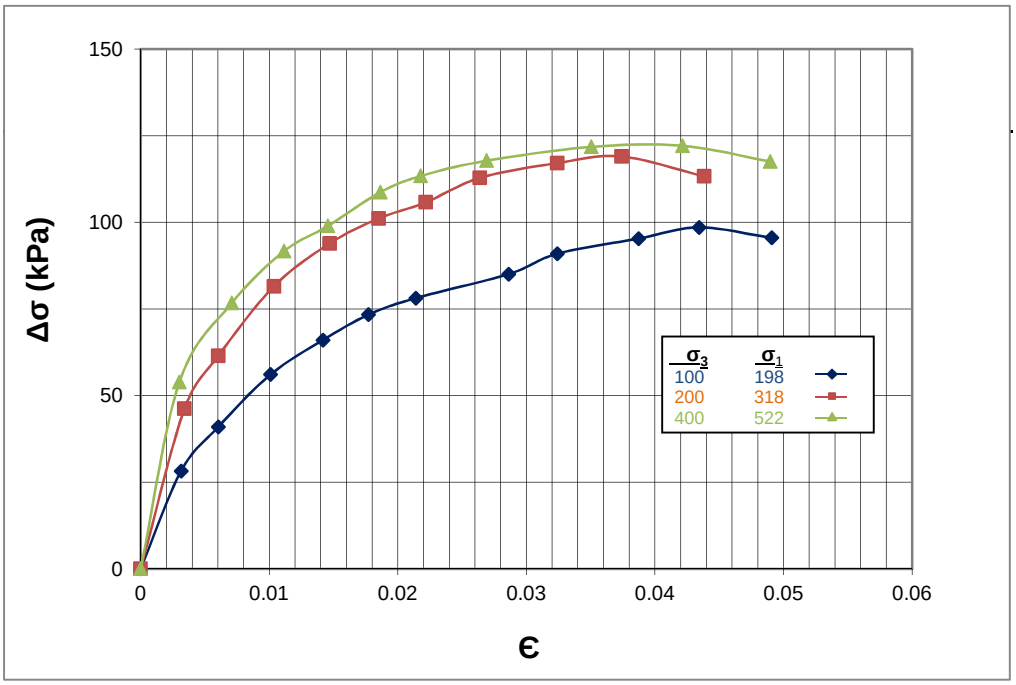
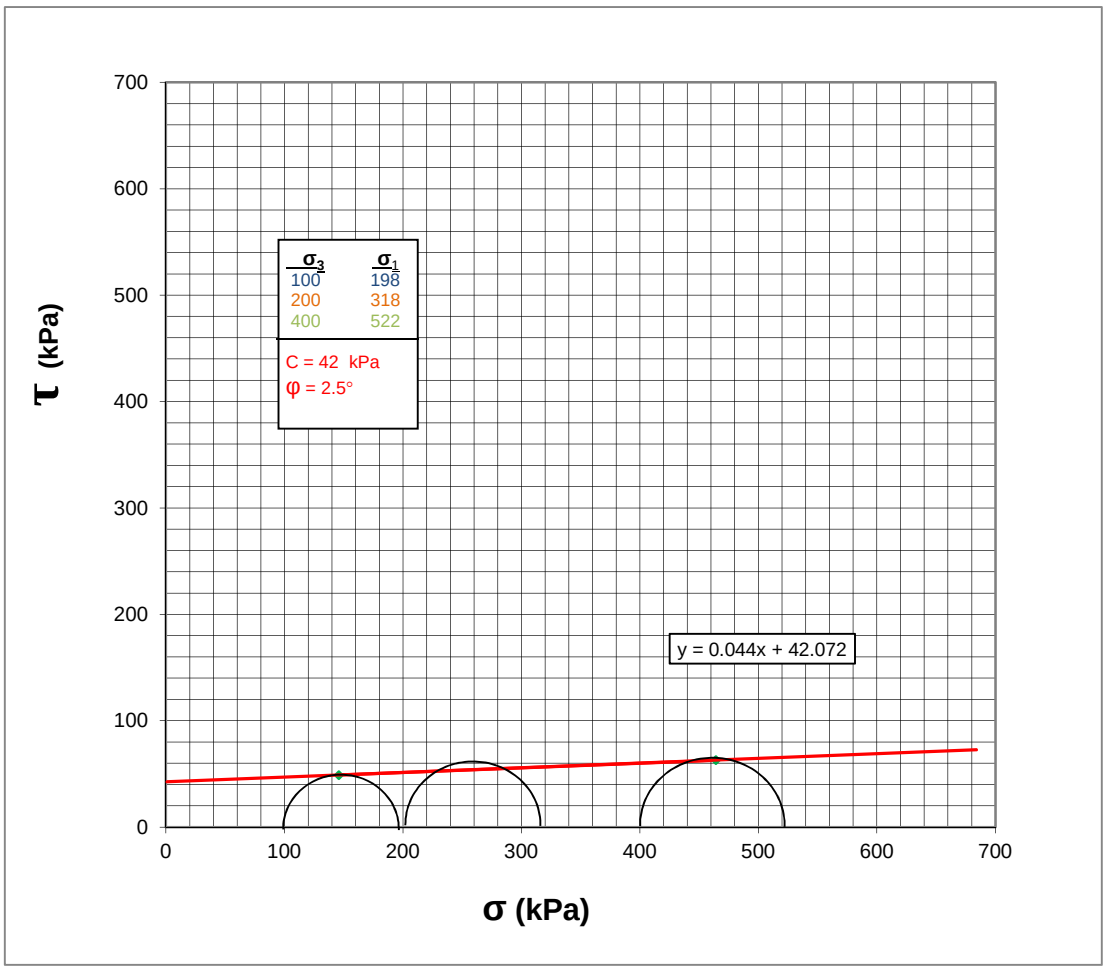
# TRIAXIAL COMPRESSION TEST

| | | | | | |
|---|---|---|---|---|---|
| **Project** | Samawa Combined Cycle PP | | | **Test Type** | |
| **BH No.** | 50 | **Sample No.** | 5 | **Depth (m)** | 4.0-4.5 |



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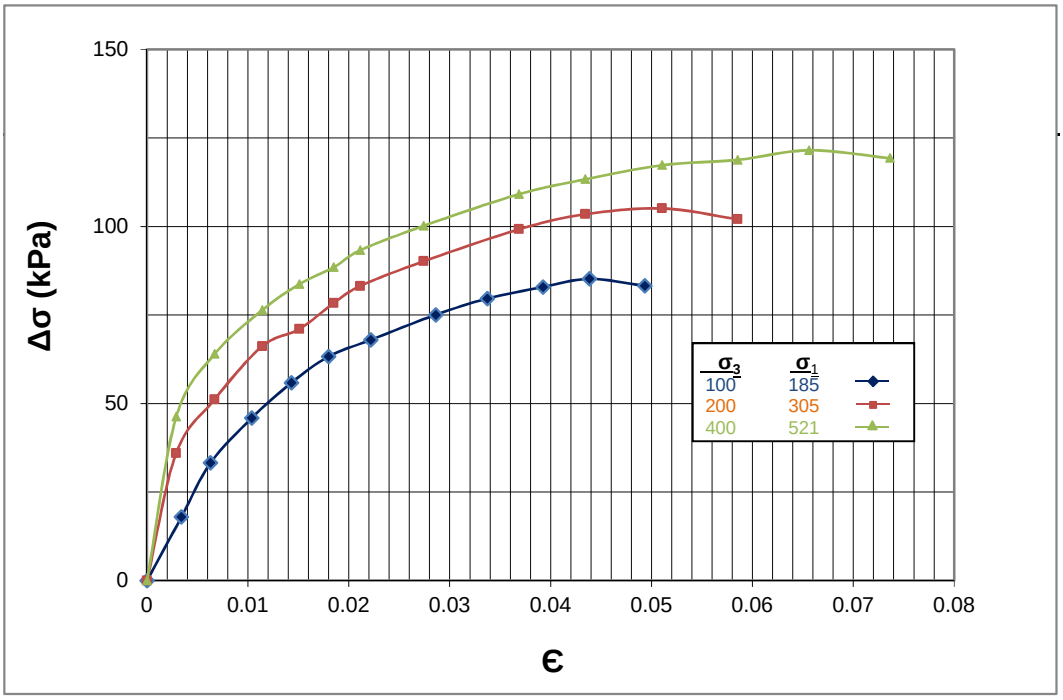
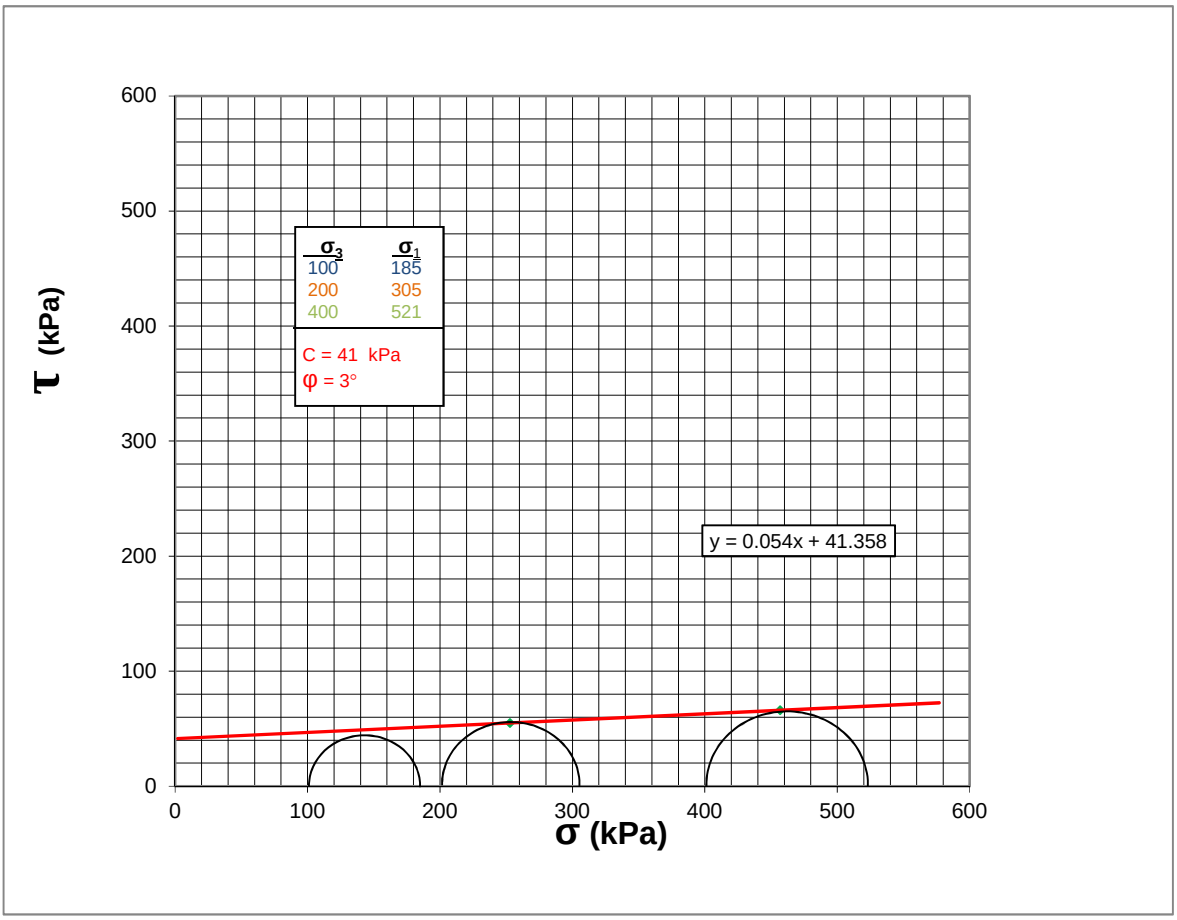
# TRIAXIAL COMPRESSION TEST

| | | | | | |
|---|---|---|---|---|---|
| **Project** | Samawa Combined Cycle PP | | | **Test Type** | |
| **BH No.** | 51 | **Sample No.** | 2 | **Depth (m)** | 1.0-1.5 |



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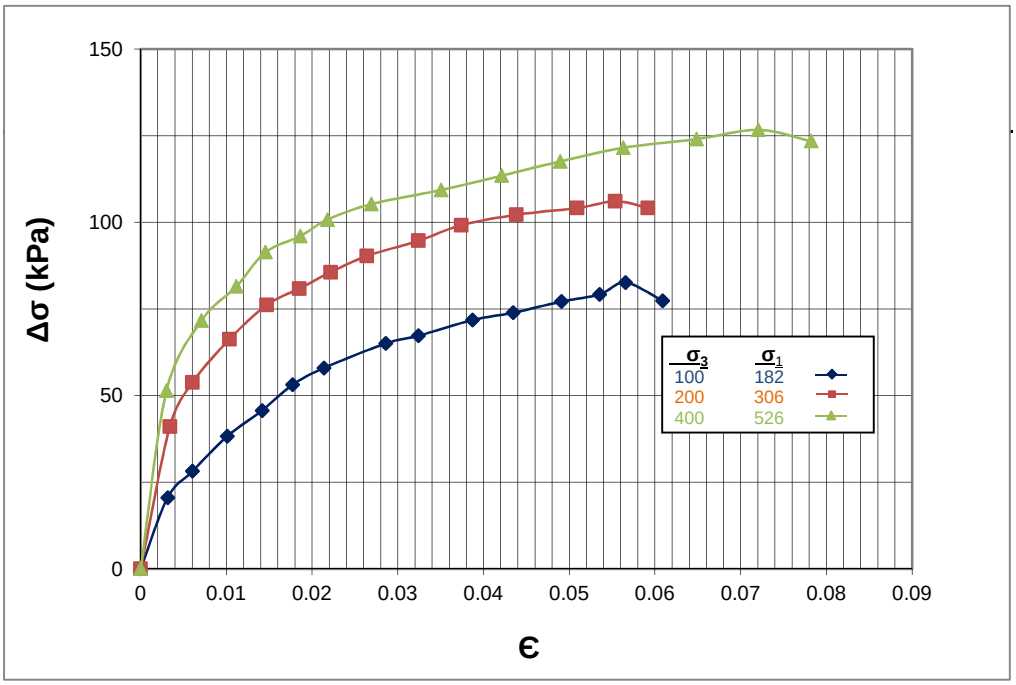
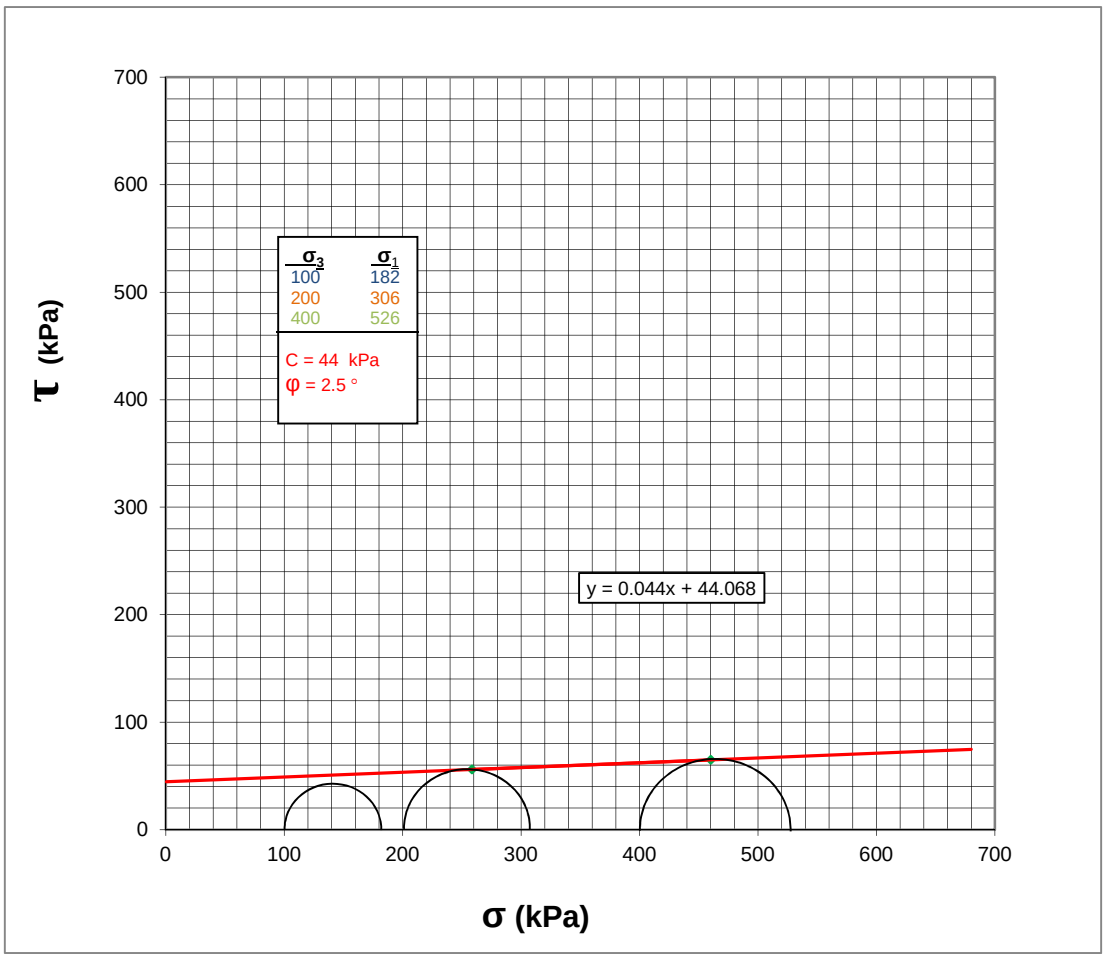
# TRIAXIAL COMPRESSION TEST

| | | | | | |
|---|---|---|---|---|---|
| **Project** | Samawa Combined Cycle PP | | | **Test Type** | |
| **BH No.** | 52 | **Sample No.** | 2 | **Depth (m)** | 1.0-1.5 |



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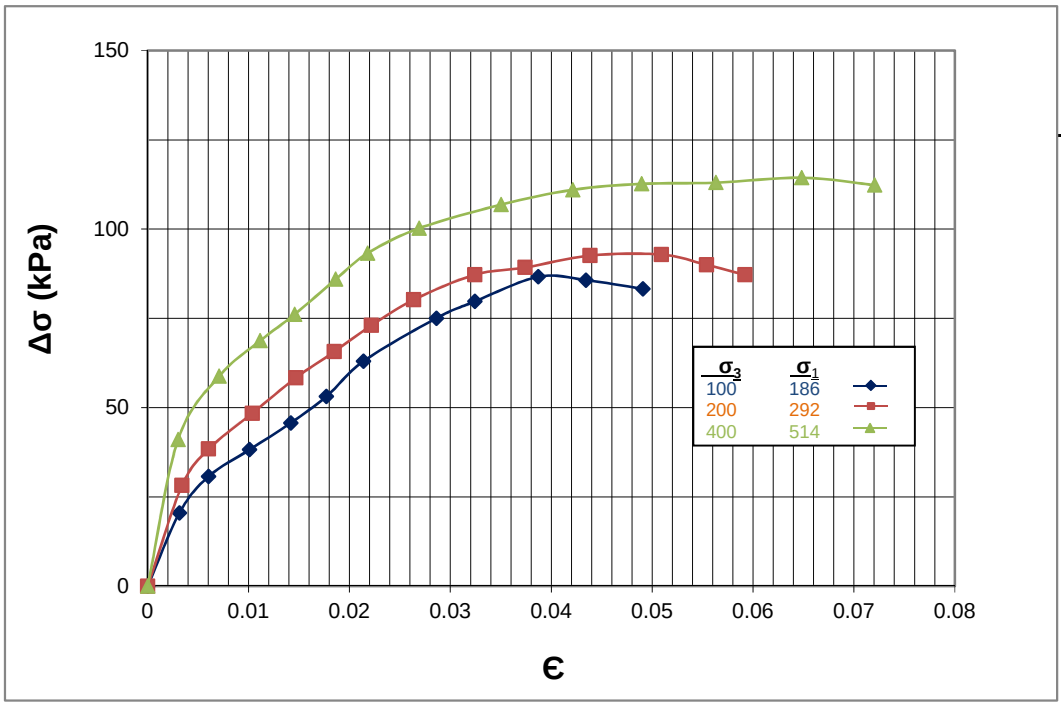
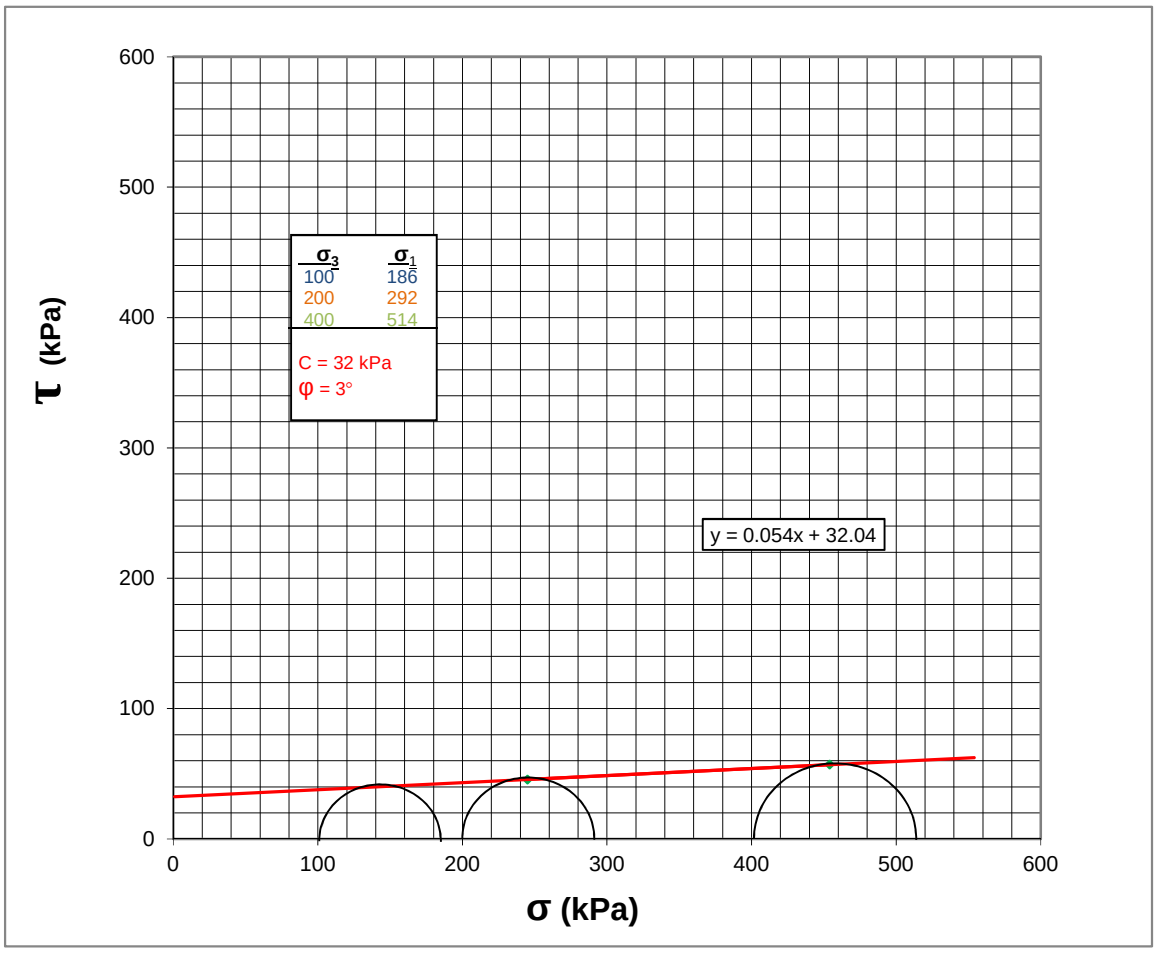
# TRIAXIAL COMPRESSION TEST

| | | | | | |
|---|---|---|---|---|---|
| **Project** | Samawa Combined Cycle PP | | | **Test Type** | |
| **BH No.** | 54 | **Sample No.** | 2 | **Depth (m)** | 1.5-2.0 |



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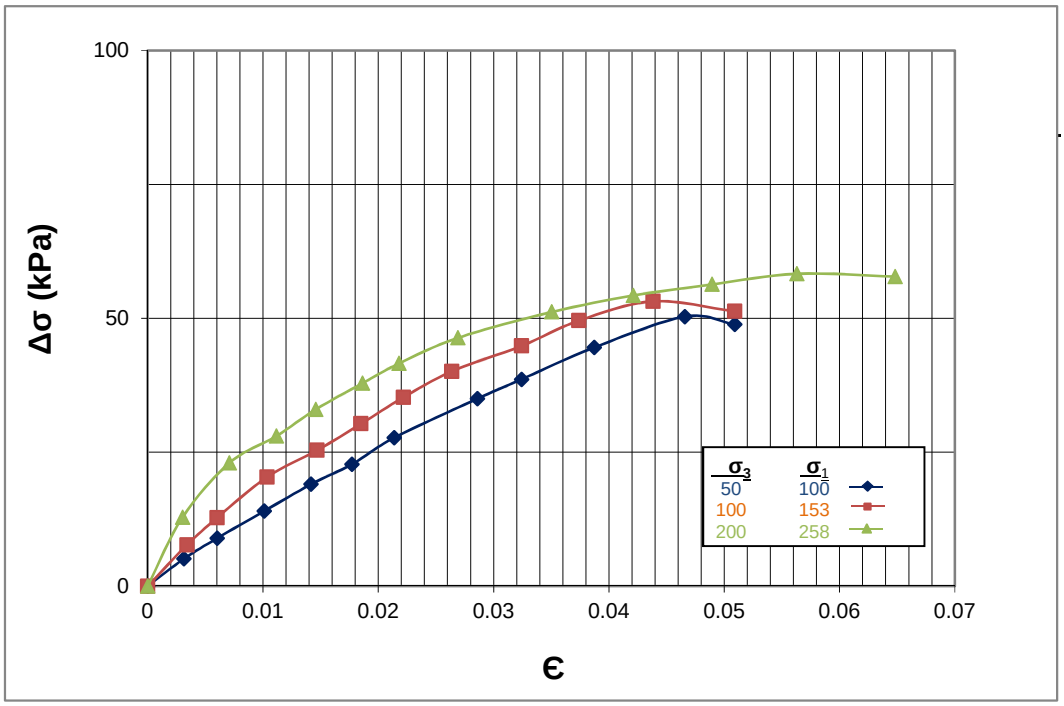
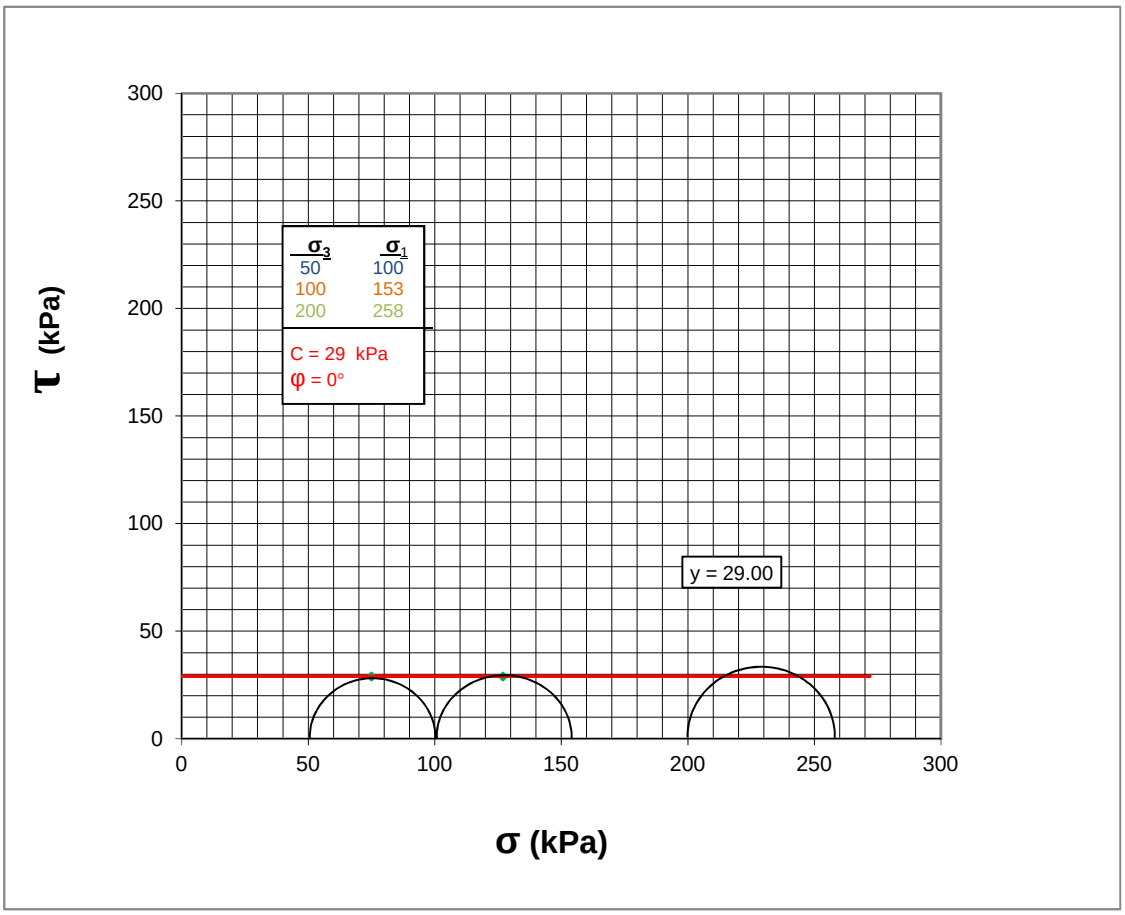
# TRIAXIAL COMPRESSION TEST

| | | | | | |
|---|---|---|---|---|---|
| **Project** | Samawa Combined Cycle P P | | | **Test Type** | |
| **BH No.** | 55 | **Sample No.** | 4 | **Depth (m)** | 4.0-4.5 |



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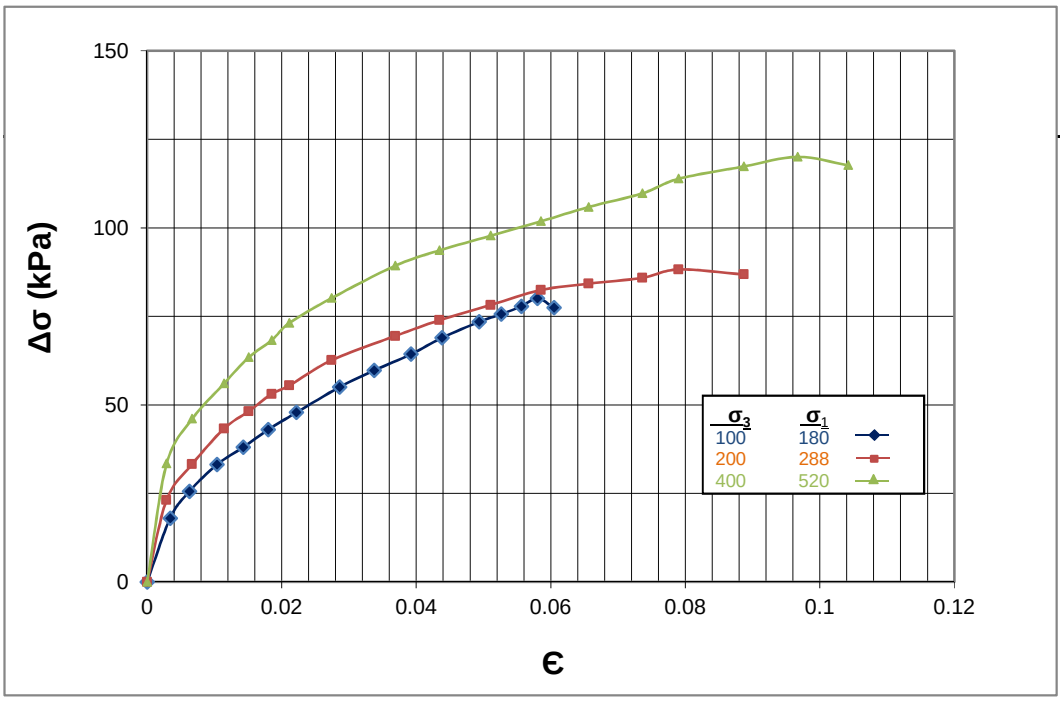
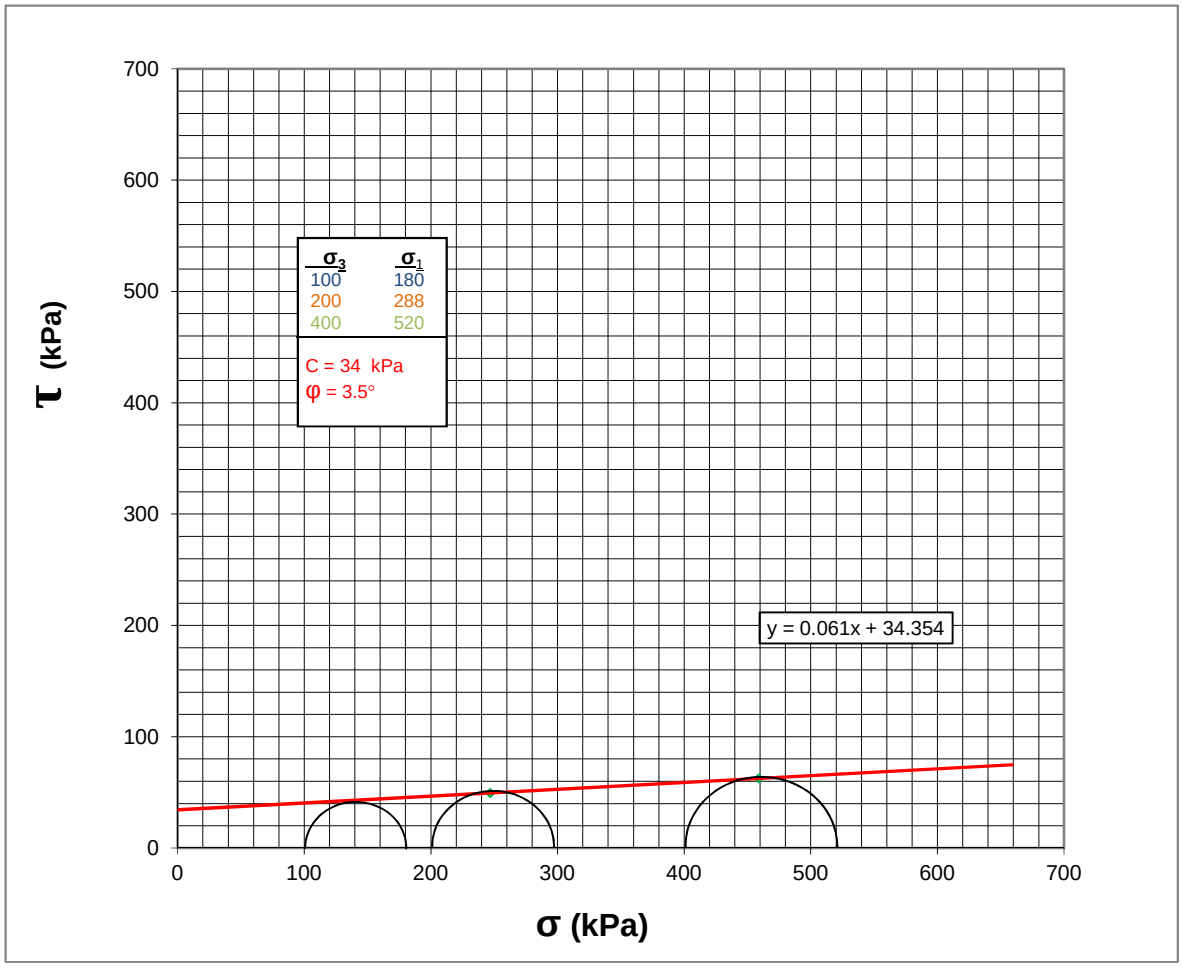
# TRIAXIAL COMPRESSION TEST

| | | | | | |
|---|---|---|---|---|---|
| **Project** | Samawa Combined Cycle PP | | | **Test Type** | |
| **BH No.** | 57 | **Sample No.** | 2 | **Depth (m)** | 1.0-1.5 |



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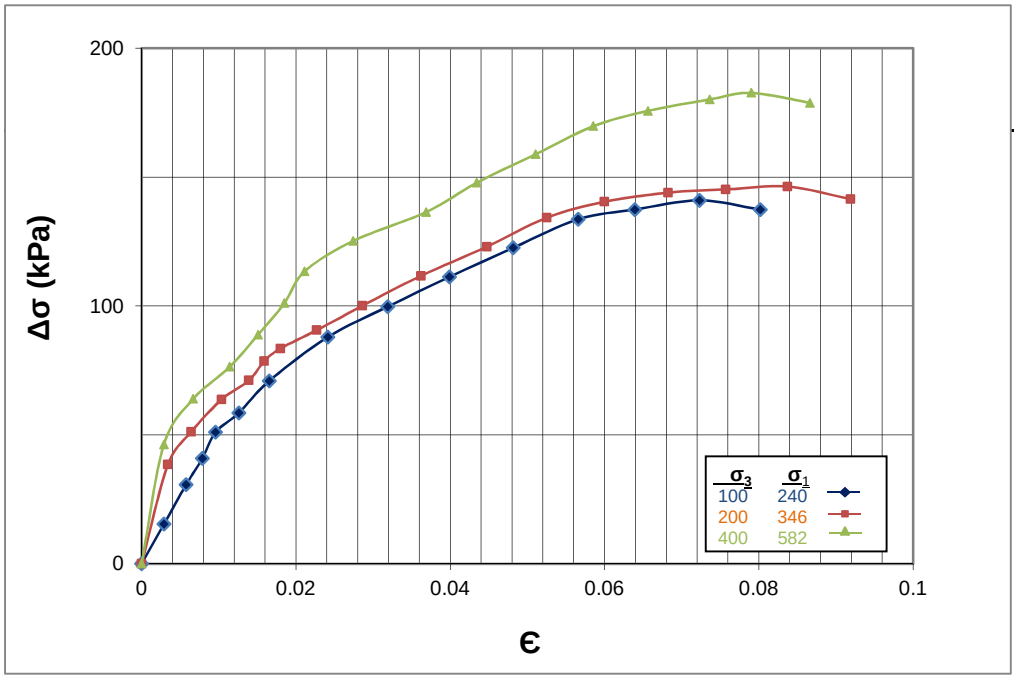
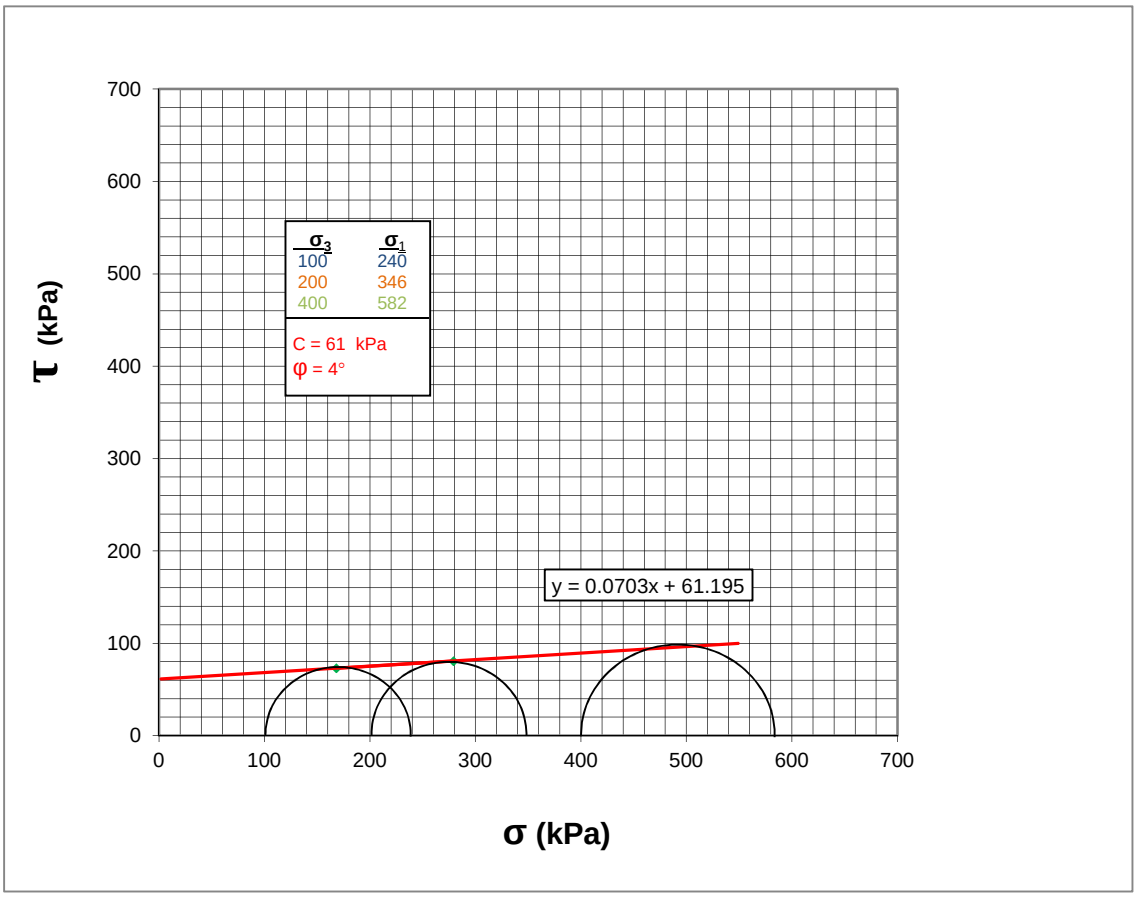
# TRIAXIAL COMPRESSION TEST

**Project** Samawa Combined Cycle PP **Test Type**

**BH No.** 58 **Sample No.** 5 **Depth (m)** 4.0-4.5



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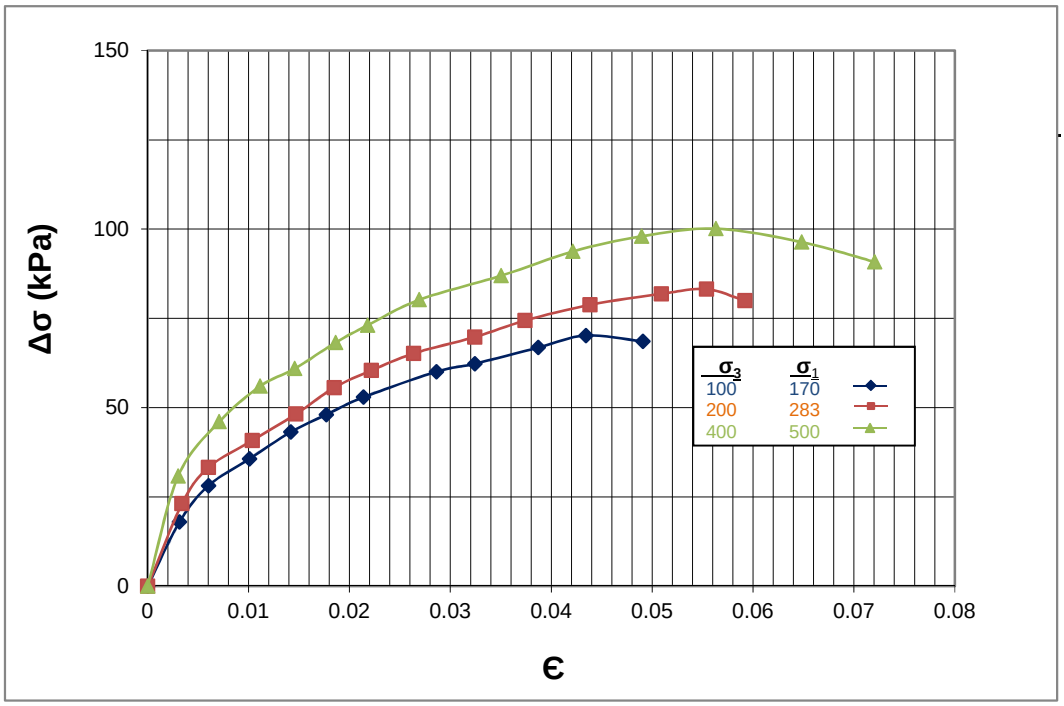
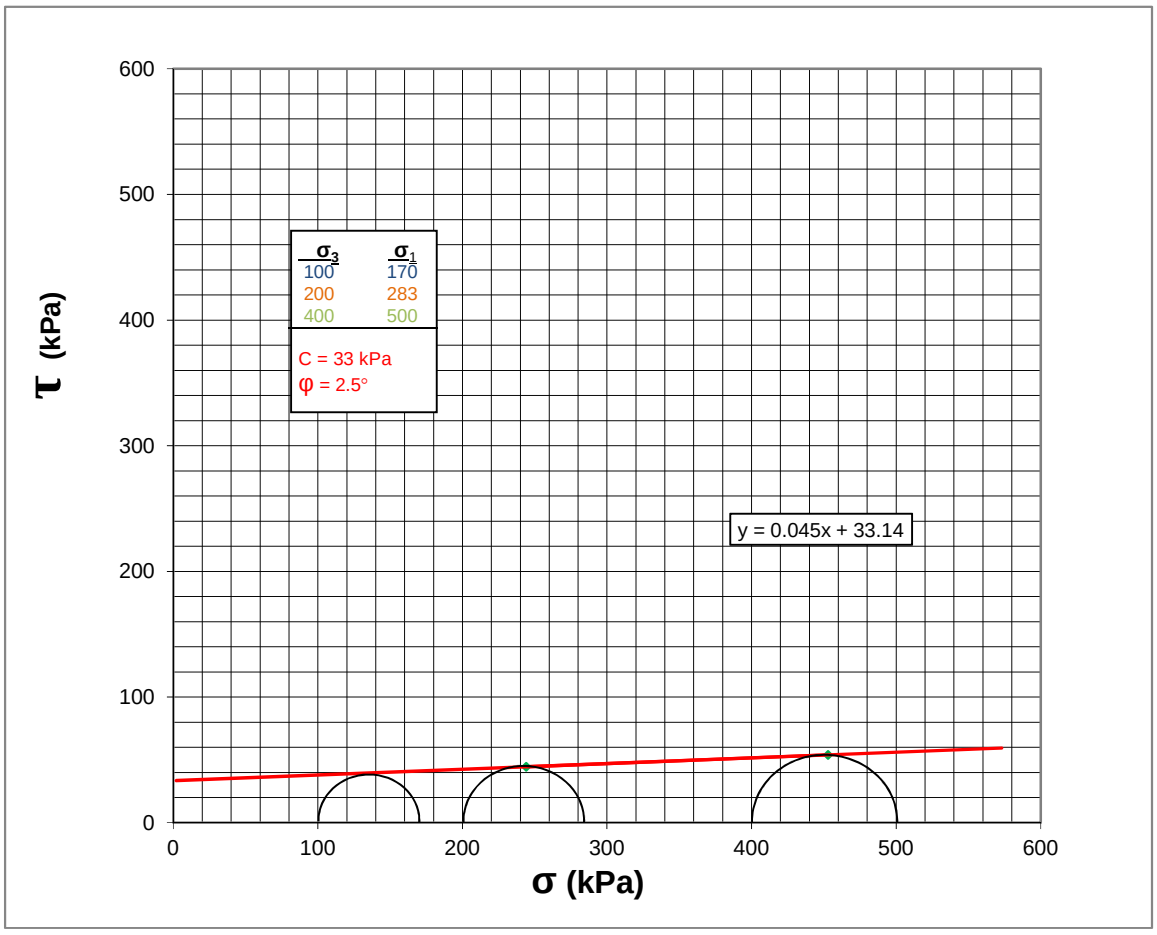
# TRIAXIAL COMPRESSION TEST

| | | | | | |
|---|---|---|---|---|---|
| **Project** | Samawa Combined Cycle P P | | | **Test Type** | |
| **BH No.** | 59 | **Sample No.** | 2 | **Depth (m)** | 1.5-2.0 |



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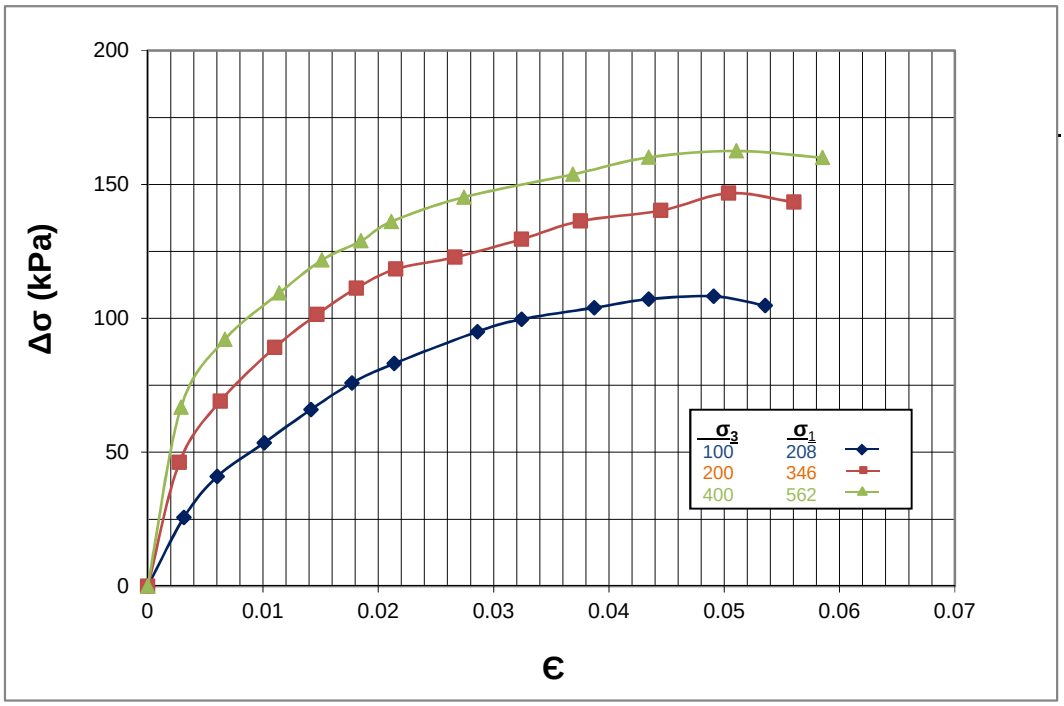
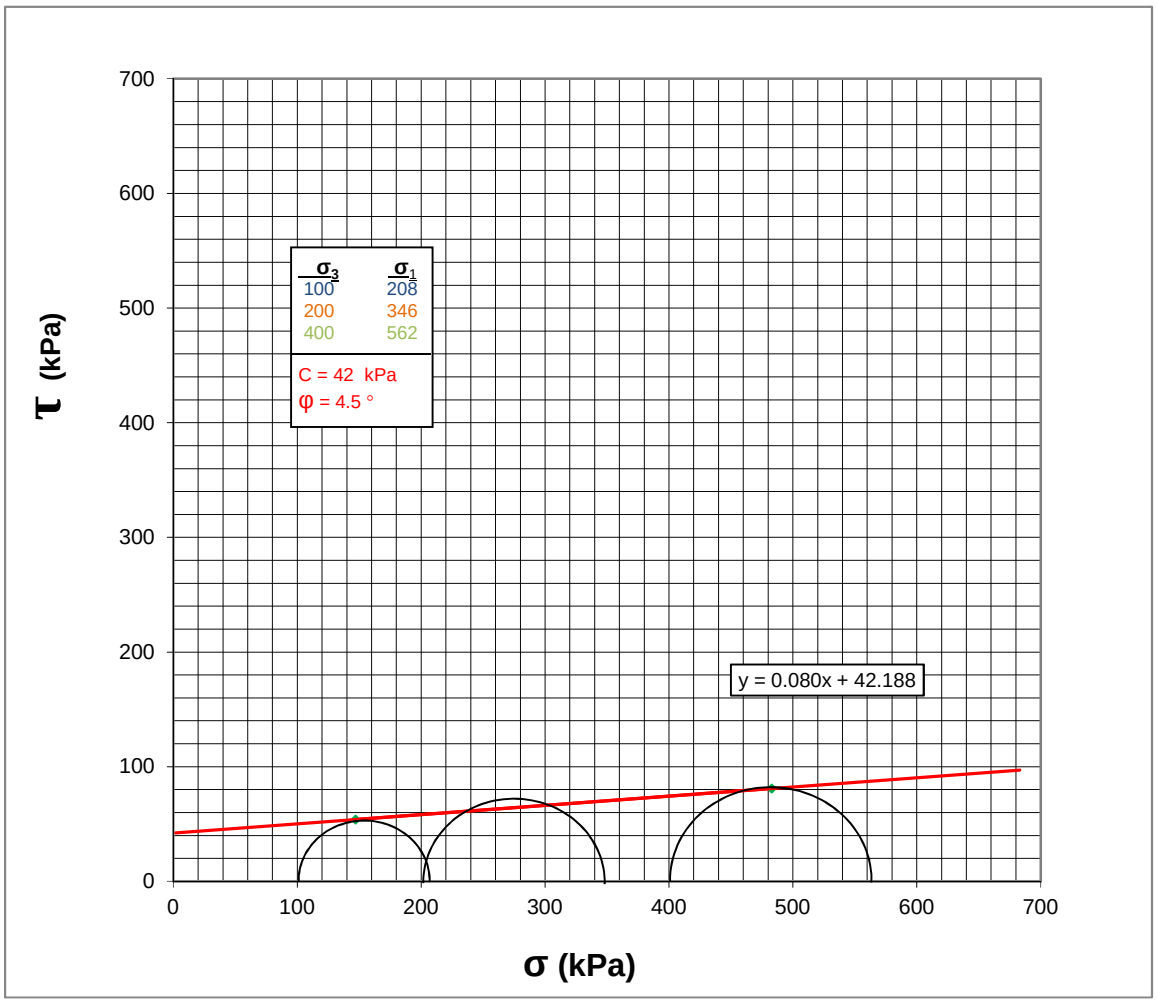
# TRIAXIAL COMPRESSION TEST

| | | | | | |
|---|---|---|---|---|---|
| **Project** | Samawa Combined Cycle P P | | | **Test Type** | |
| **BH No.** | 61 | **Sample No.** | 4 | **Depth (m)** | 4.0-4.5 |



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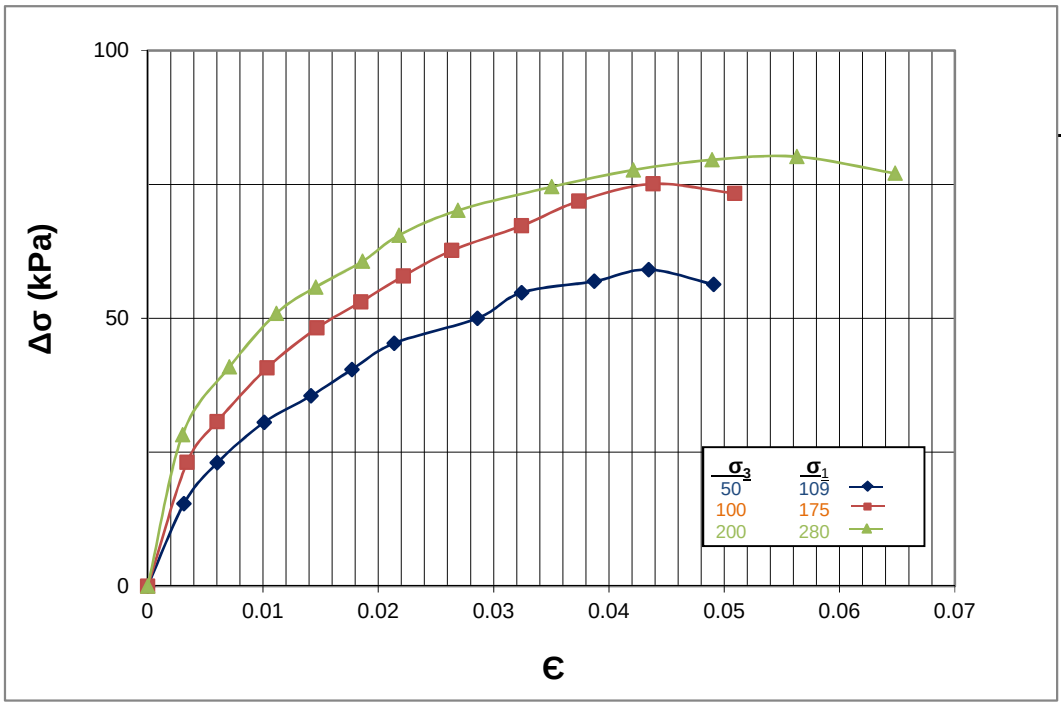
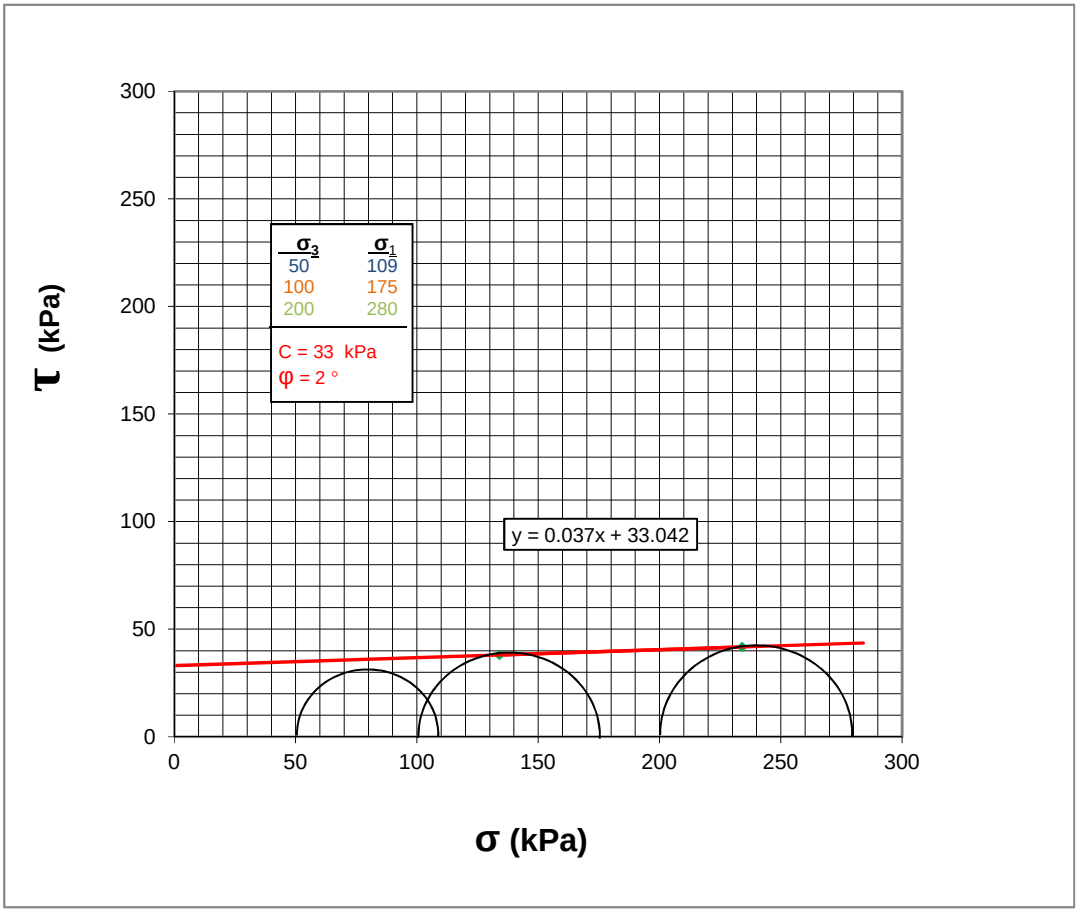
# TRIAXIAL COMPRESSION TEST

| | | | | | |
|---|---|---|---|---|---|
| **Project** | Samawa Combined Cycle PP | | | **Test Type** | |
| **BH No.** | 62 | **Sample No.** | 2 | **Depth (m)** | 1.5-2.0 |



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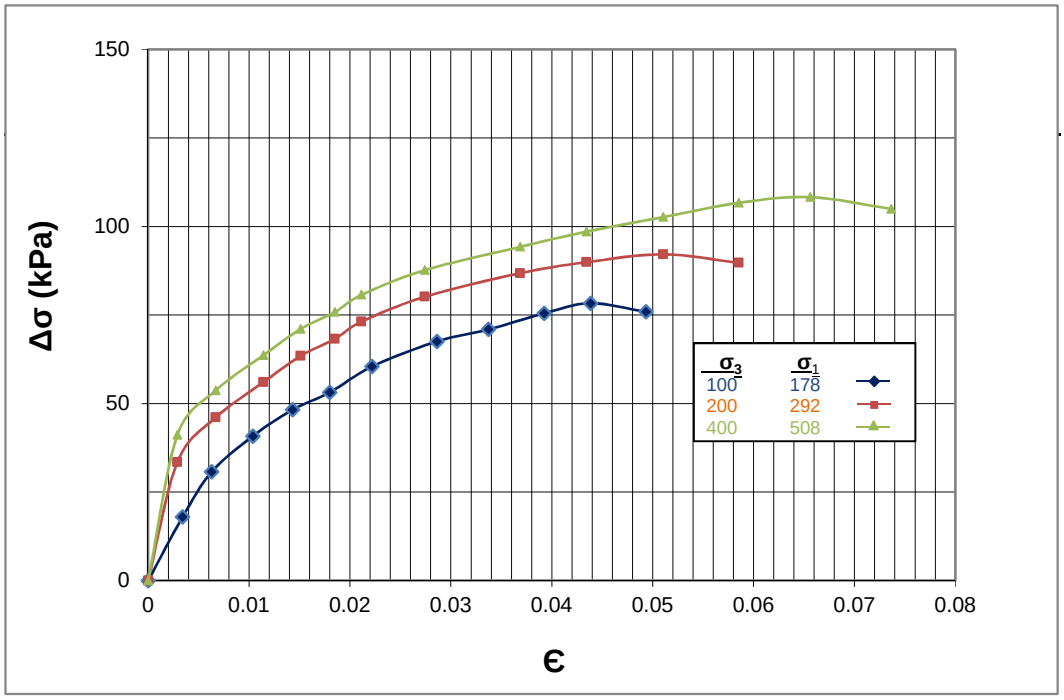
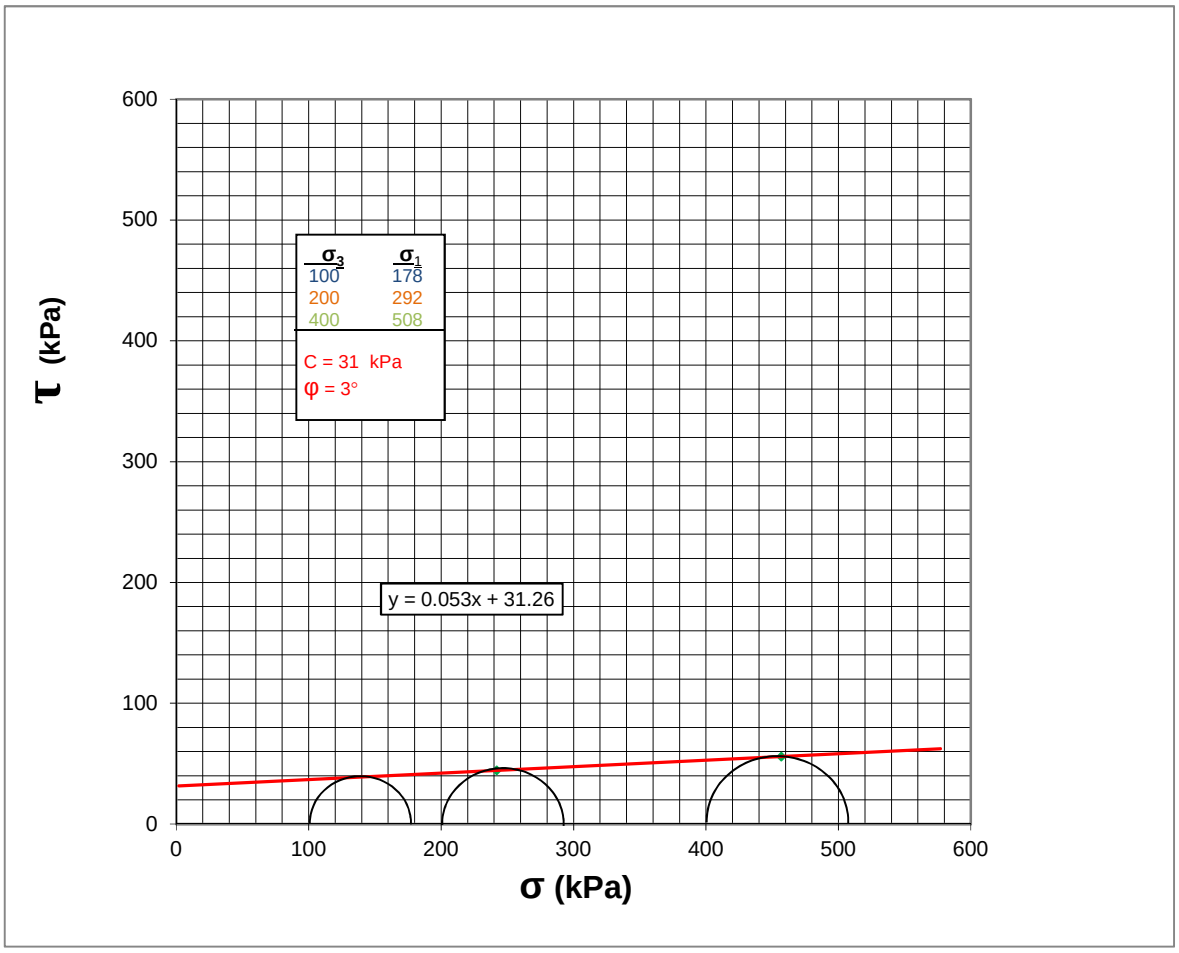
# TRIAXIAL COMPRESSION TEST

| | | | | | |
|---|---|---|---|---|---|
| **Project** | Samawa Combined Cycle P P | | | **Test Type** | |
| **BH No.** | 63 | **Sample No.** | 5 | **Depth (m)** | 4.0-4.5 |



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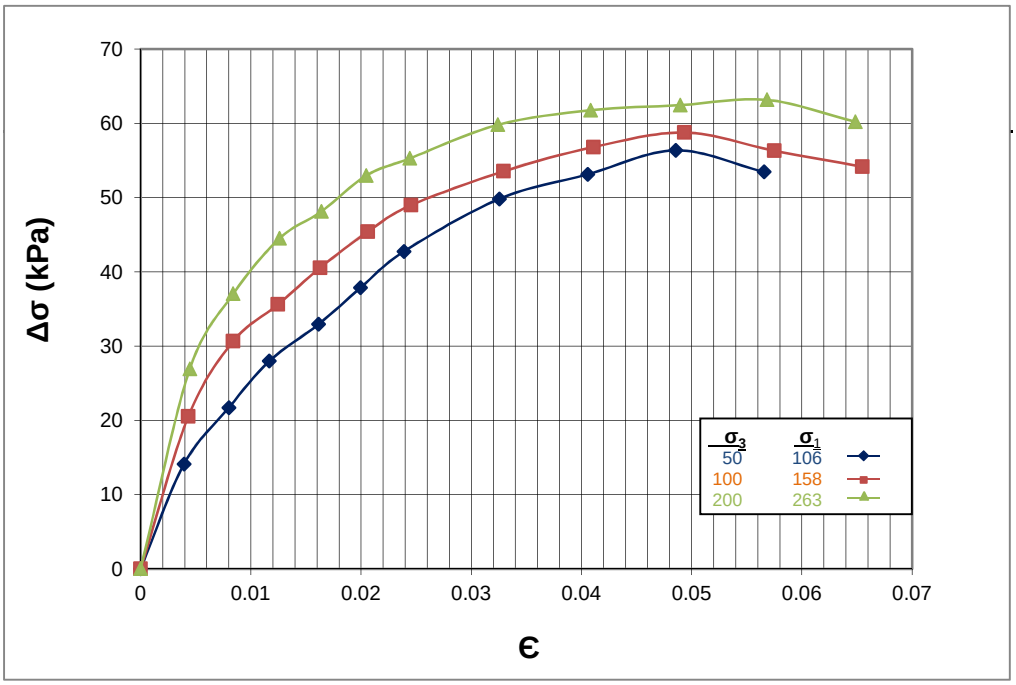
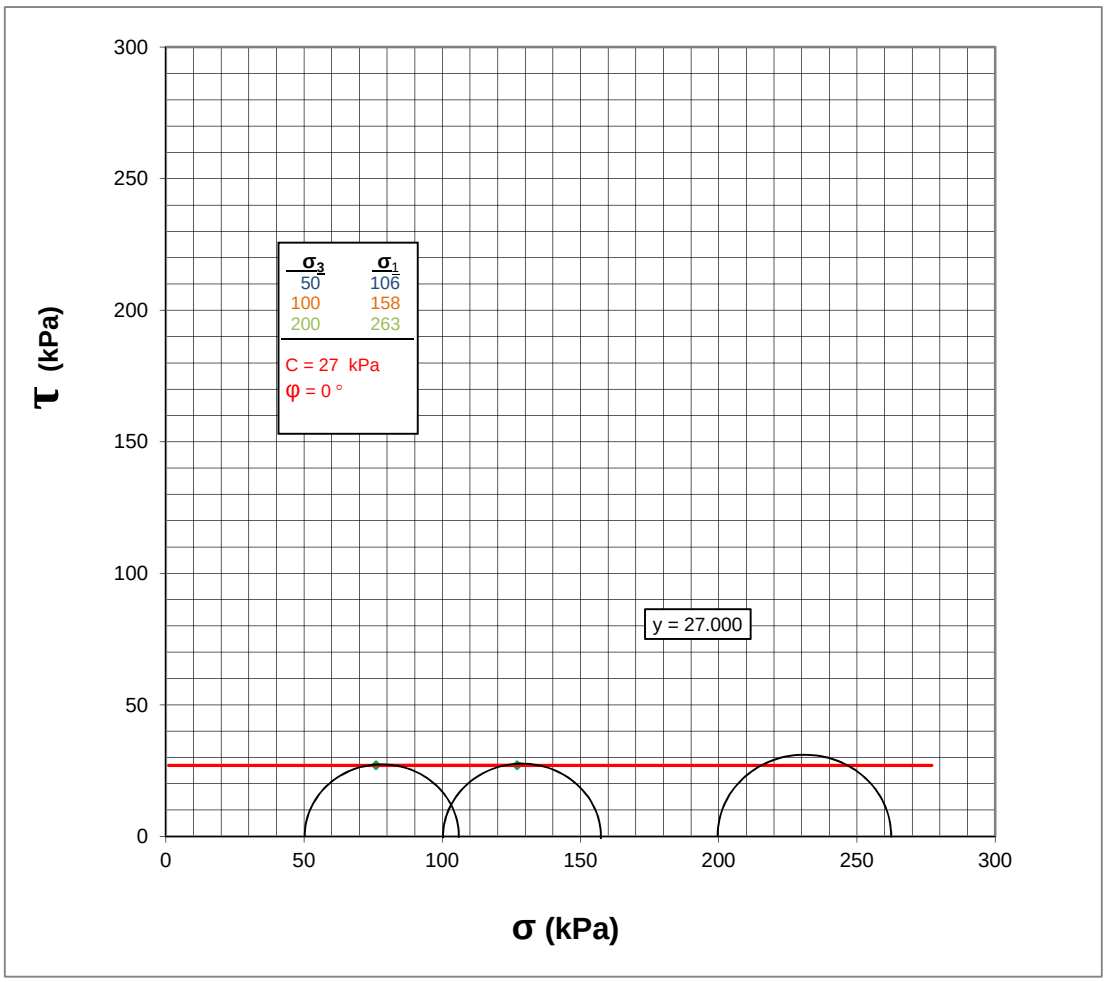
# TRIAXIAL COMPRESSION TEST

| | | | | | |
|---|---|---|---|---|---|
| **Project** | Samawa Combined Cycle P P | | | **Test Type** | |
| **BH No.** | 65 | **Sample No.** | 5 | **Depth (m)** | 4.0-4.5 |



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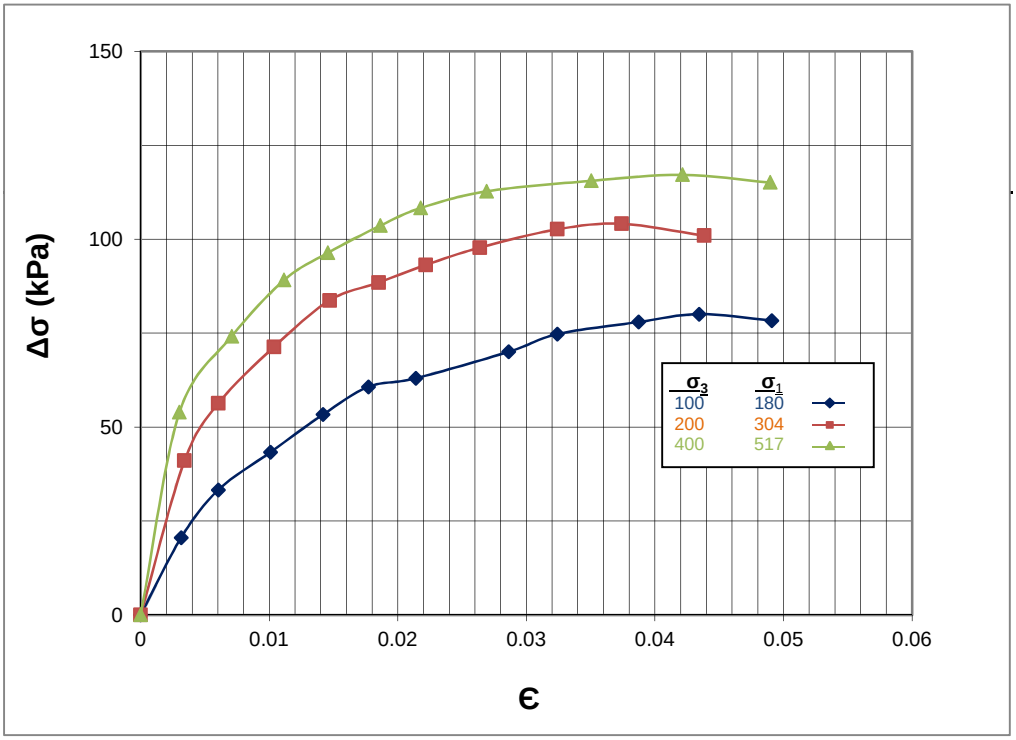
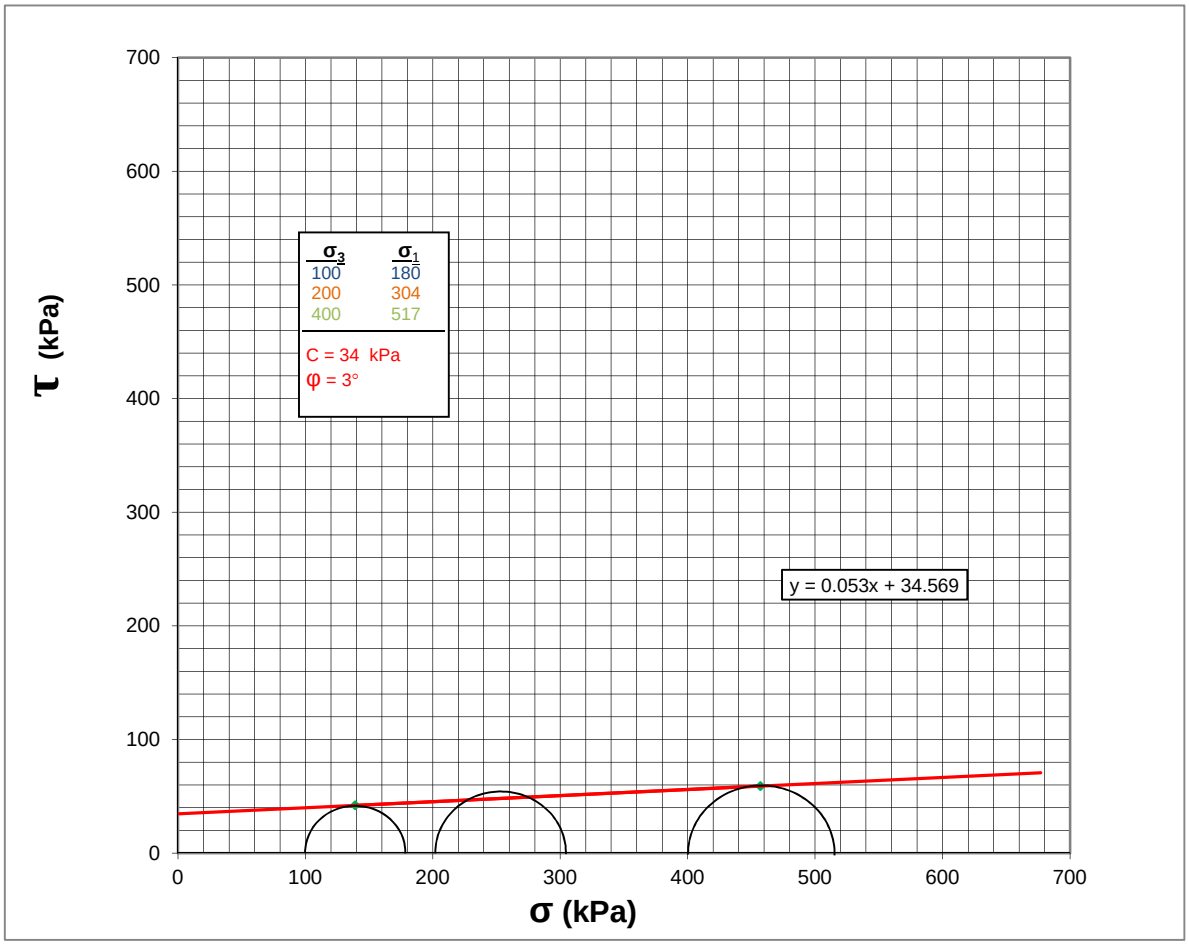
# TRIAXIAL COMPRESSION TEST

| | | | | | |
|---|---|---|---|---|---|
| **Project** | Samawa Combined Cycle P P | | | **Test Type** | |
| **BH No.** | 66 | **Sample No.** | 4 | **Depth (m)** | 4.0-4.5 |



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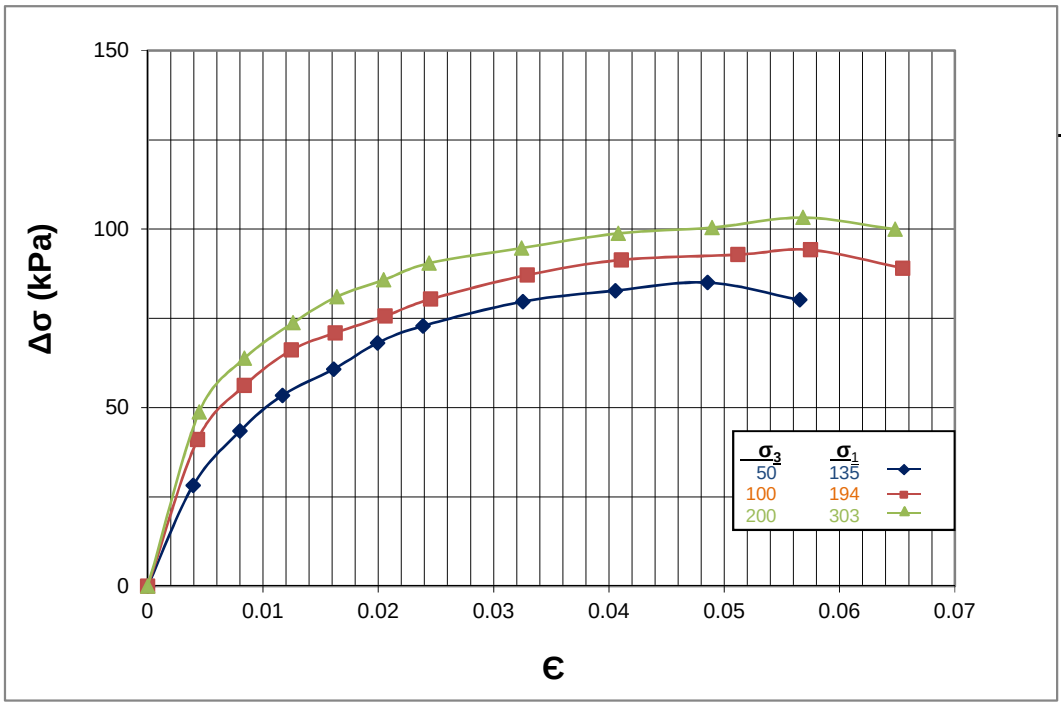
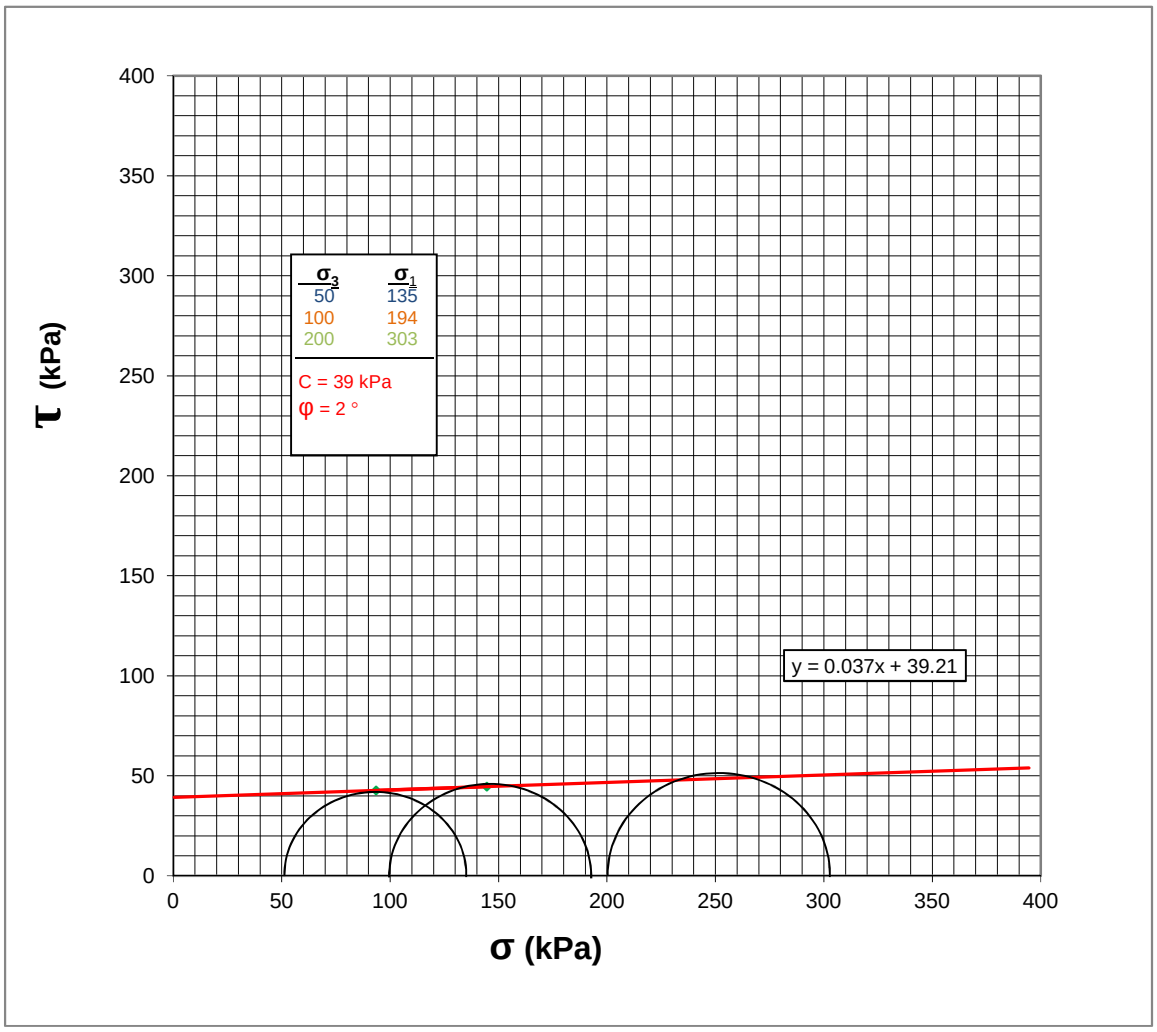
# TRIAXIAL COMPRESSION TEST

| | | | | | |
|---|---|---|---|---|---|
| **Project** | Samawa Combined Cycle PP | | | **Test Type** | |
| **BH No.** | 67 | **Sample No.** | 5 | **Depth (m)** | 4.5-5.0 |



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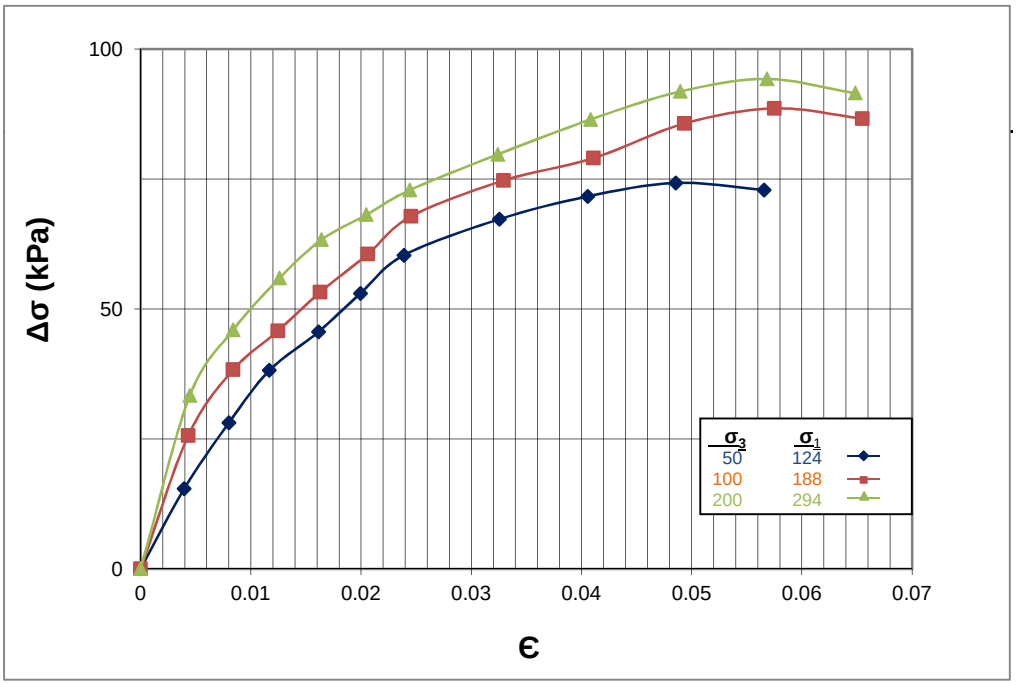
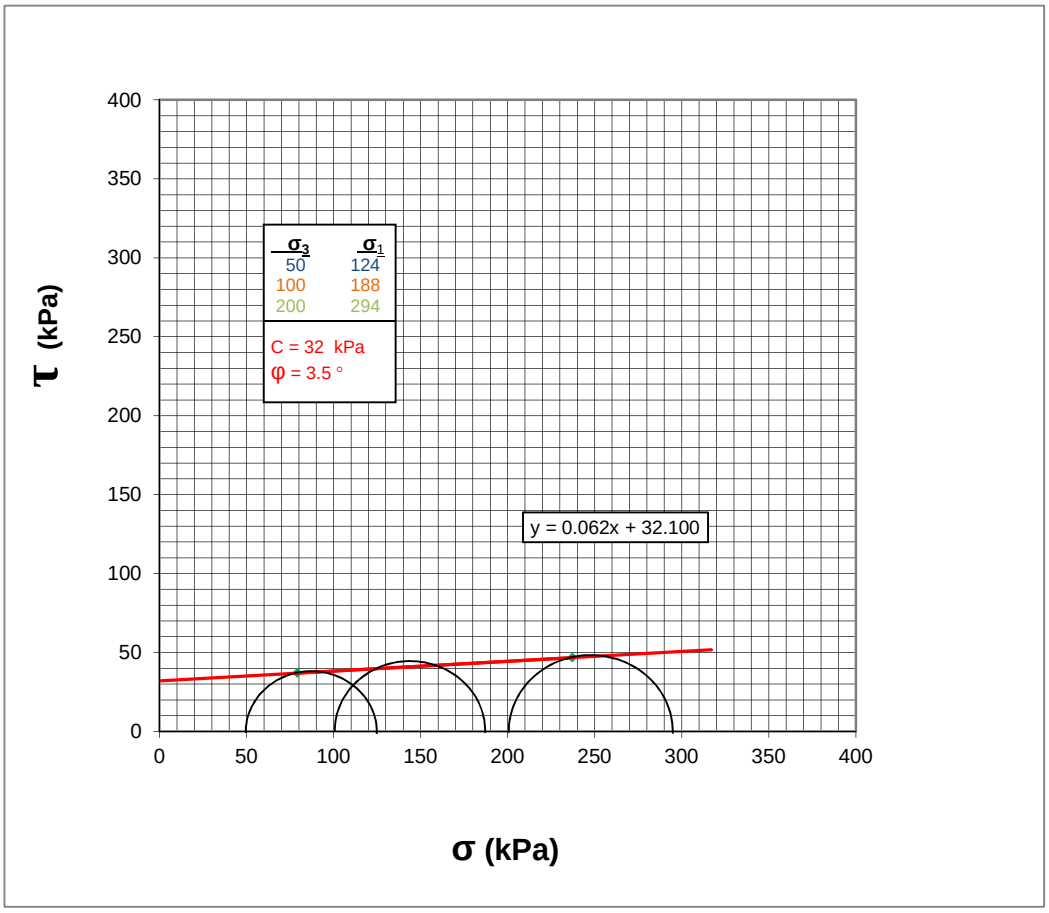
# TRIAXIAL COMPRESSION TEST

| | | | | | |
|---|---|---|---|---|---|
| **Project** | Samawa Combined Cycle P P | | | **Test Type** | |
| **BH No.** | 70 | **Sample No.** | 2 | **Depth (m)** | 1.5-2.0 |



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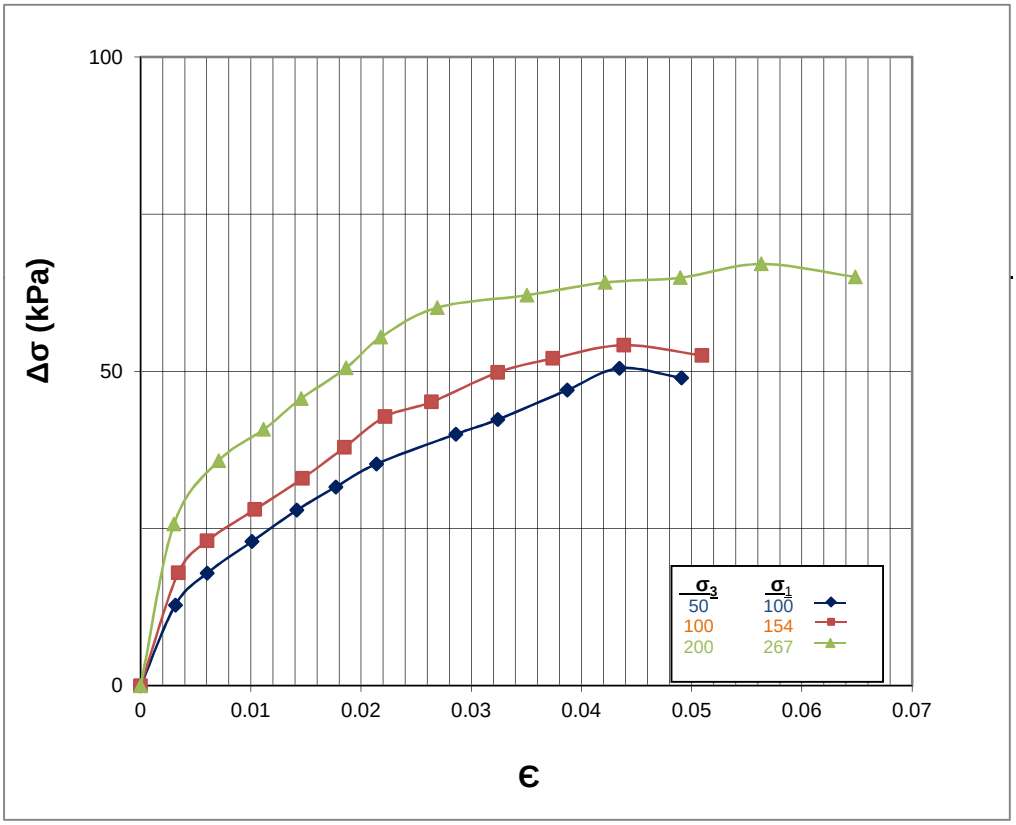
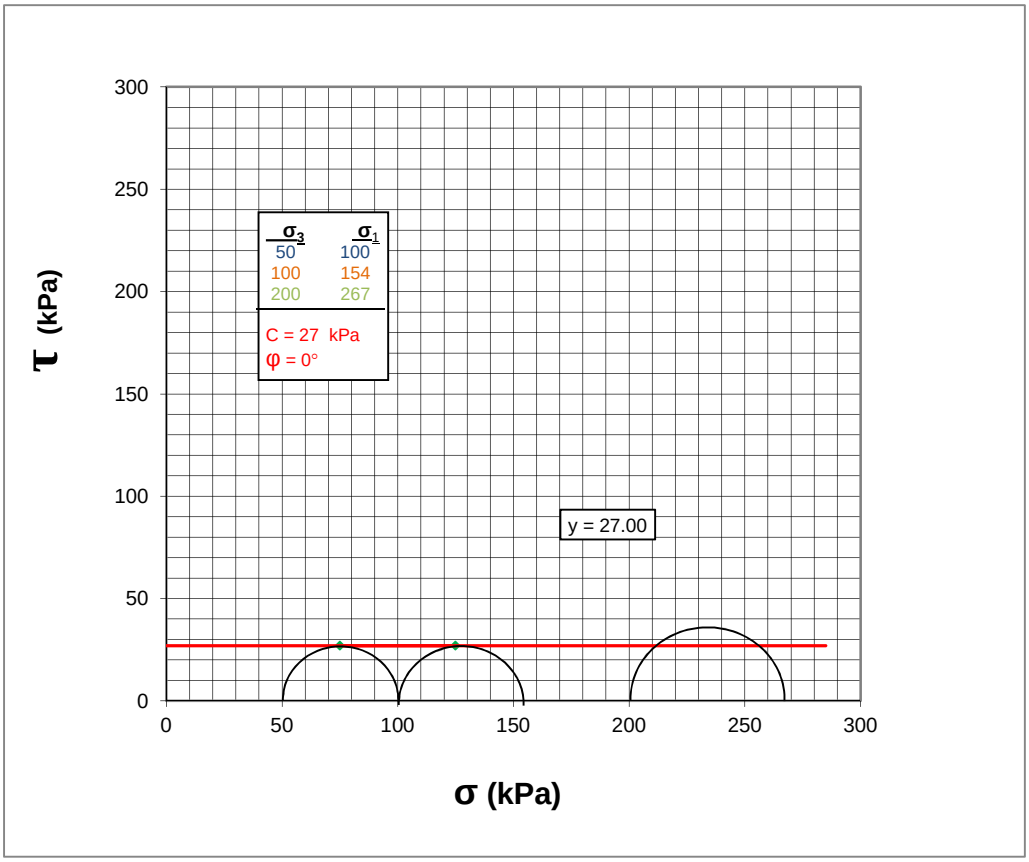
# TRIAXIAL COMPRESSION TEST

| | | | | | |
|---|---|---|---|---|---|
| **Project** | Samawa Combined Cycle P P | | | **Test Type** | |
| **BH No.** | 71 | **Sample No.** | 2 | **Depth (m)** | 1.5-2.0 |



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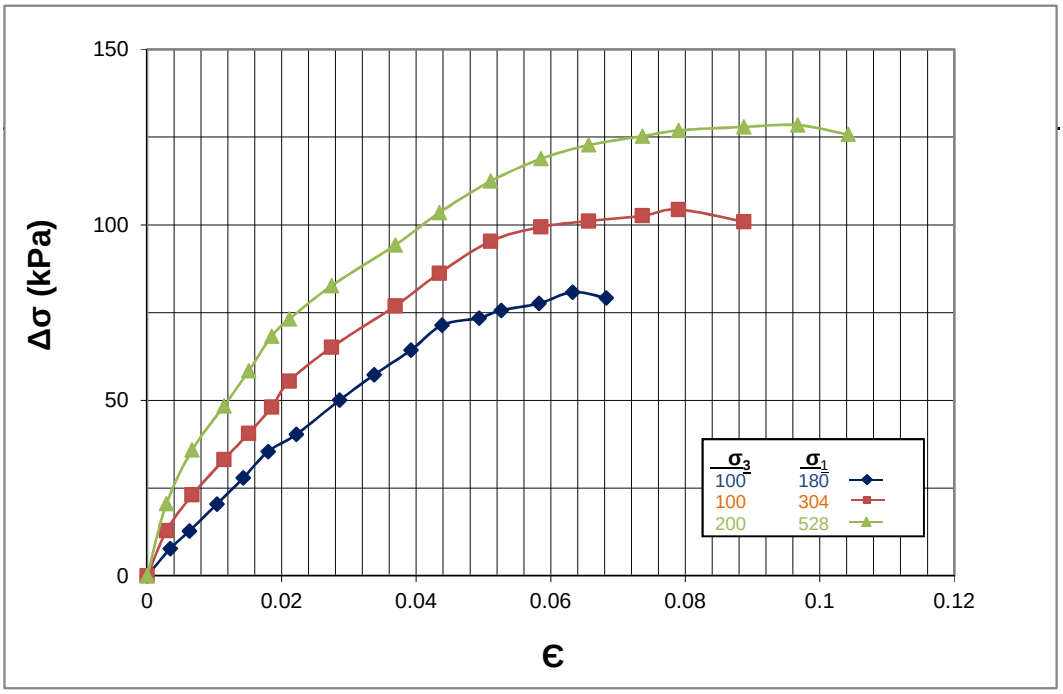
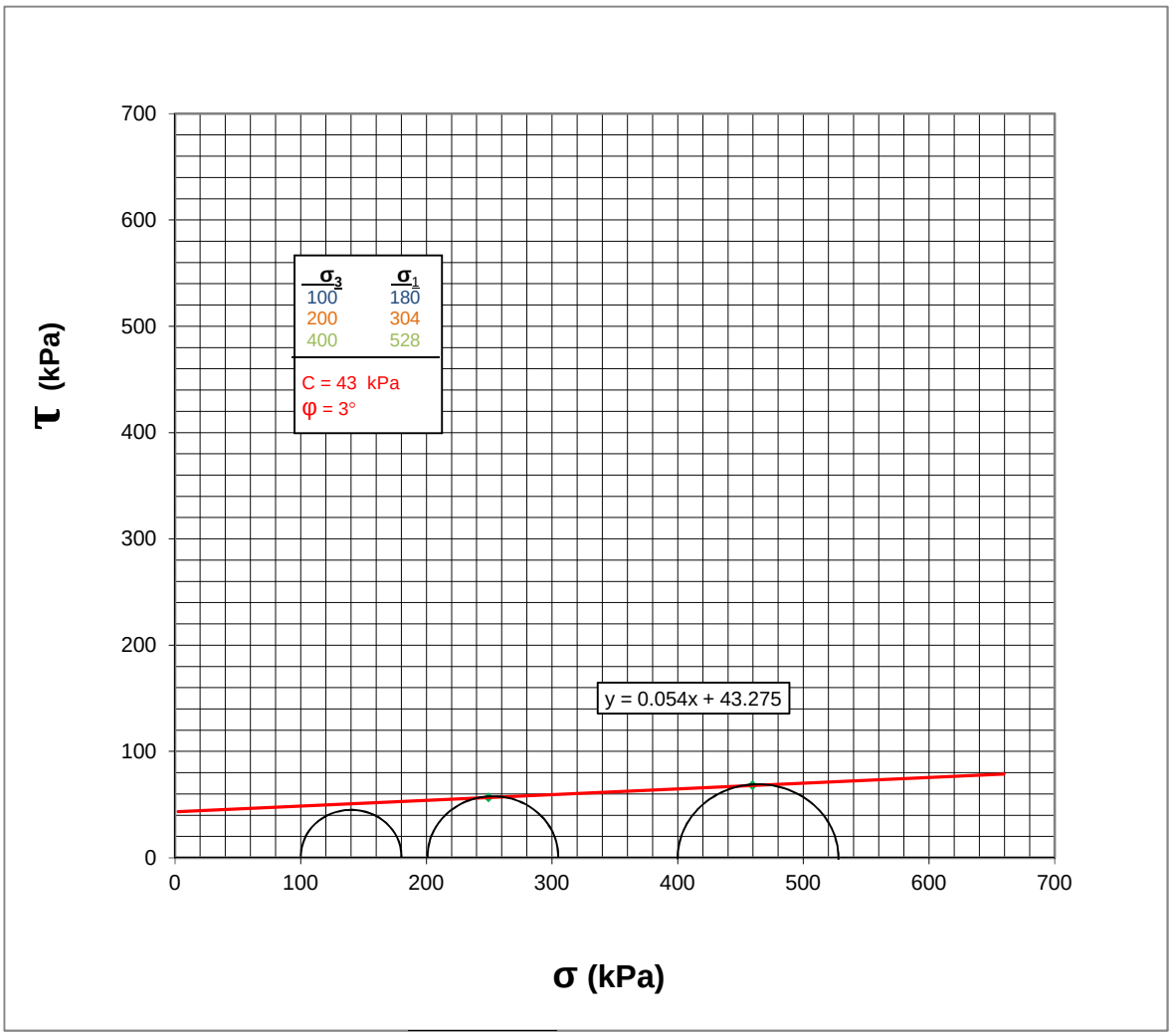
# TRIAXIAL COMPRESSION TEST

| | | | | | |
|---|---|---|---|---|---|
| **Project** | Samawa Combined Cycle PP | | | **Test Type** | |
| **BH No.** | 73 | **Sample No.** | 5 | **Depth (m)** | 4.0-4.5 |



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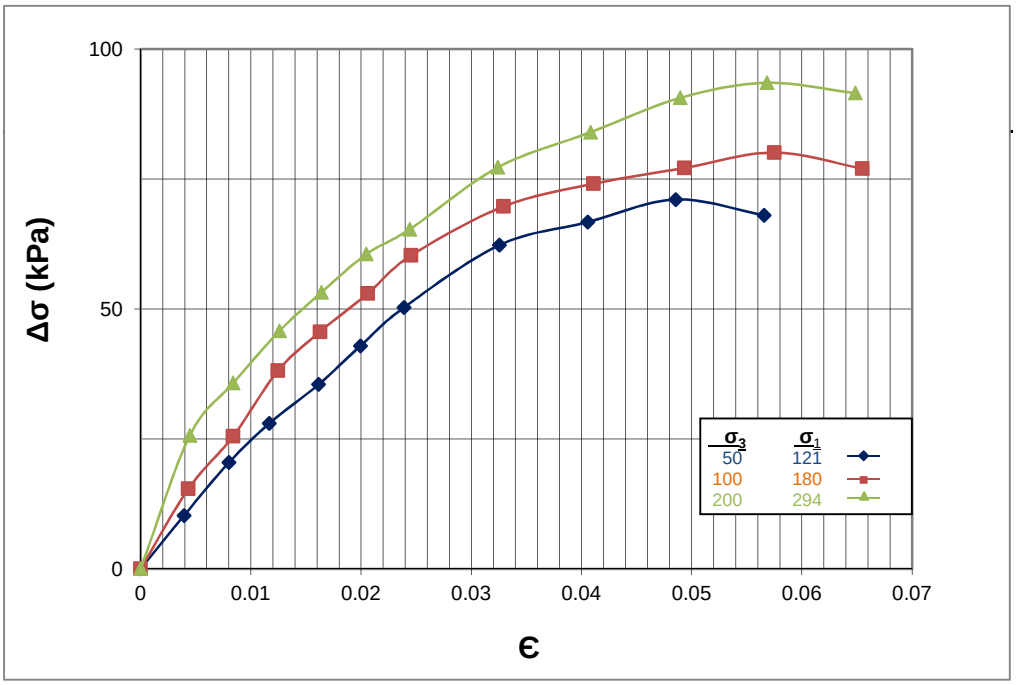
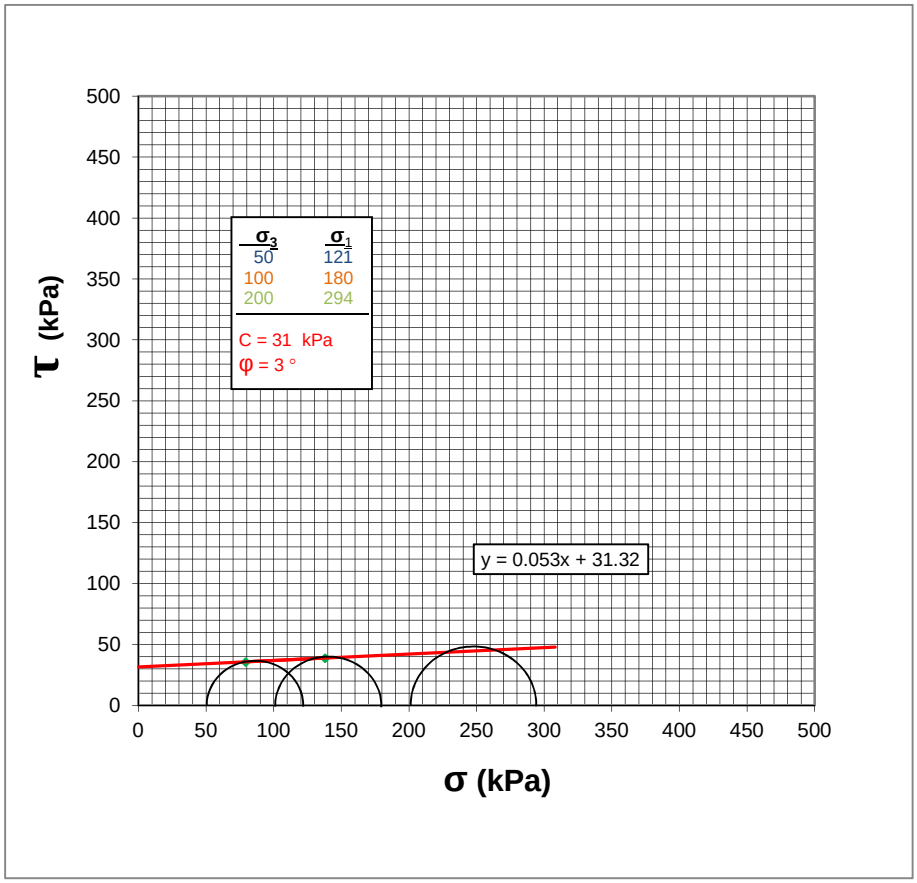
# TRIAXIAL COMPRESSION TEST

| | | | | | |
|---|---|---|---|---|---|
| **Project** | Samawa Combined Cycle P P | | | **Test Type** | |
| **BH No.** | 74 | **Sample No.** | 2 | **Depth (m)** | 1.0-1.5 |



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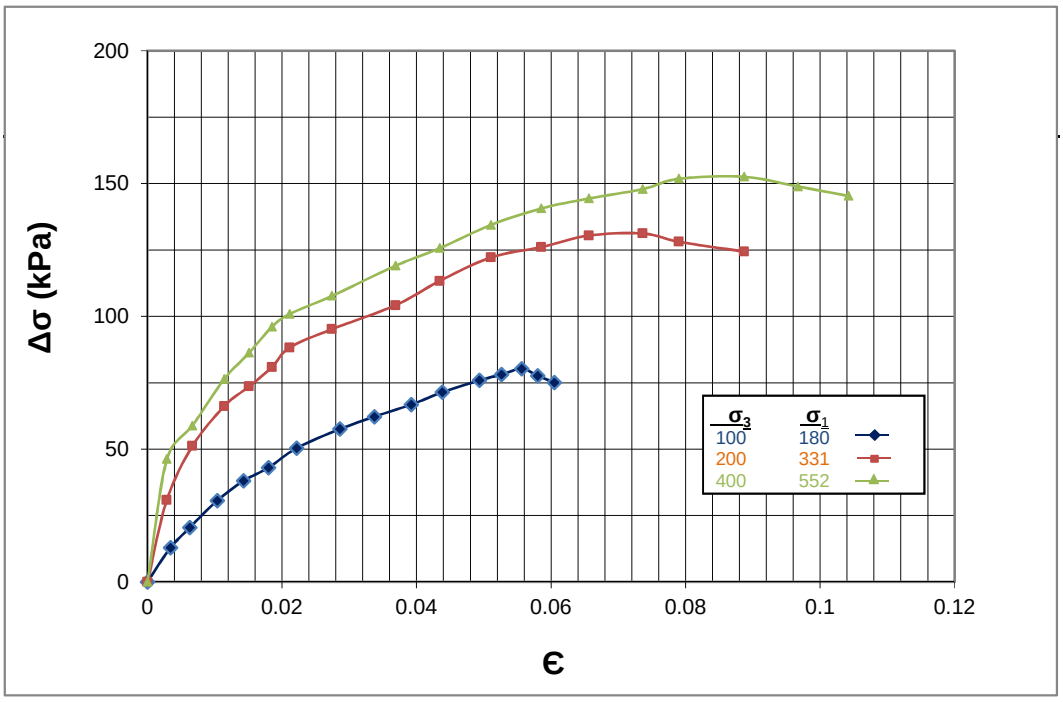
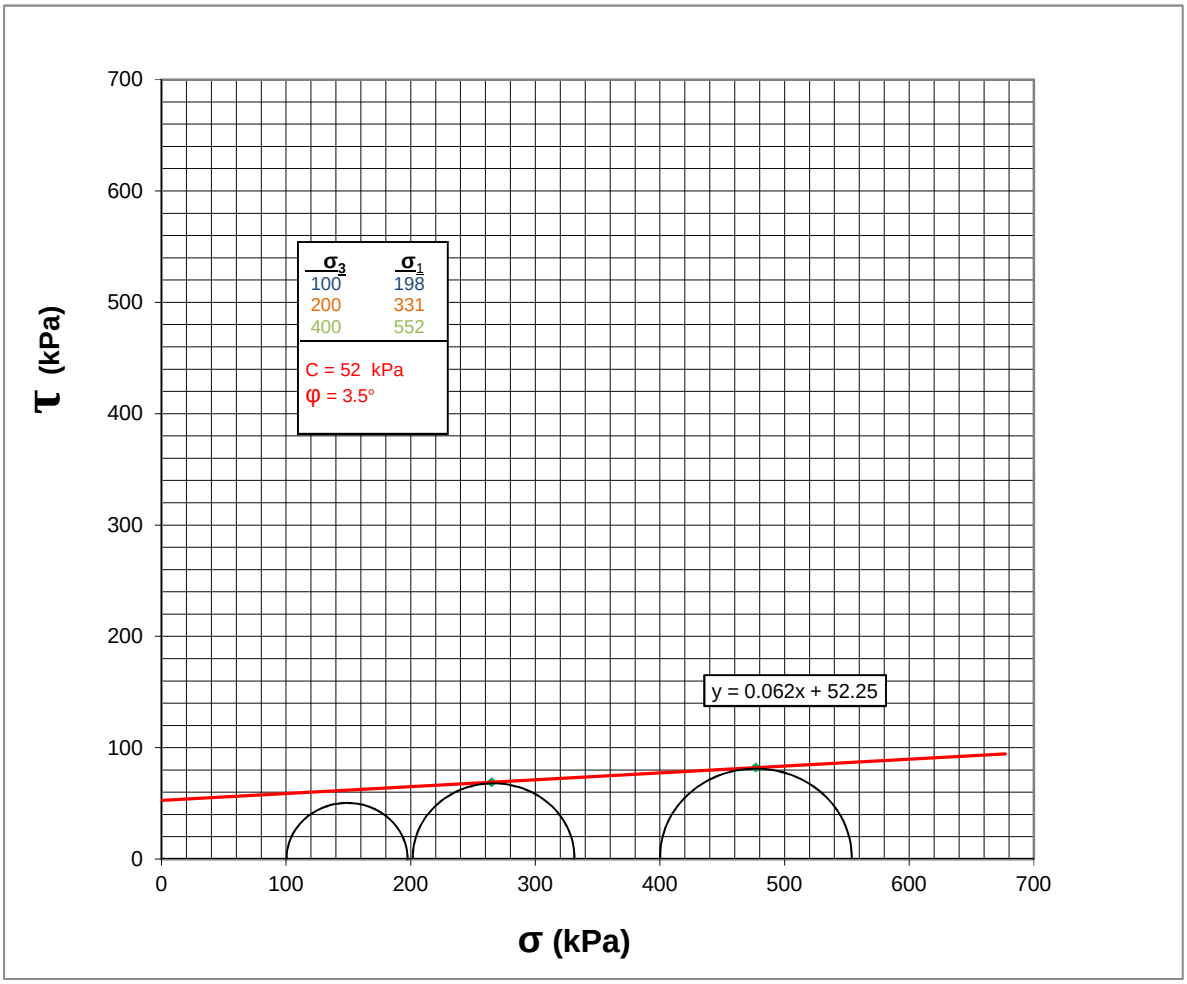
# TRIAXIAL COMPRESSION TEST

| | | | | | |
|---|---|---|---|---|---|
| **Project** | Samawa Combined Cycle P P | | | **Test Type** | |
| **BH No.** | 75 | **Sample No.** | 4 | **Depth (m)** | 4.0-4.5 |



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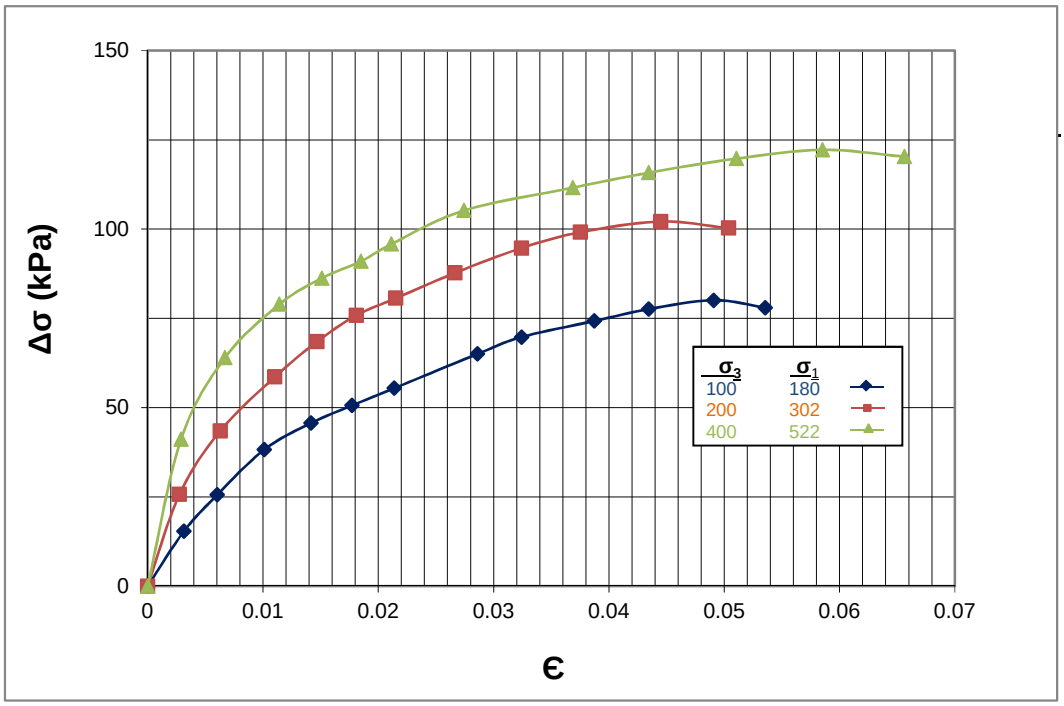
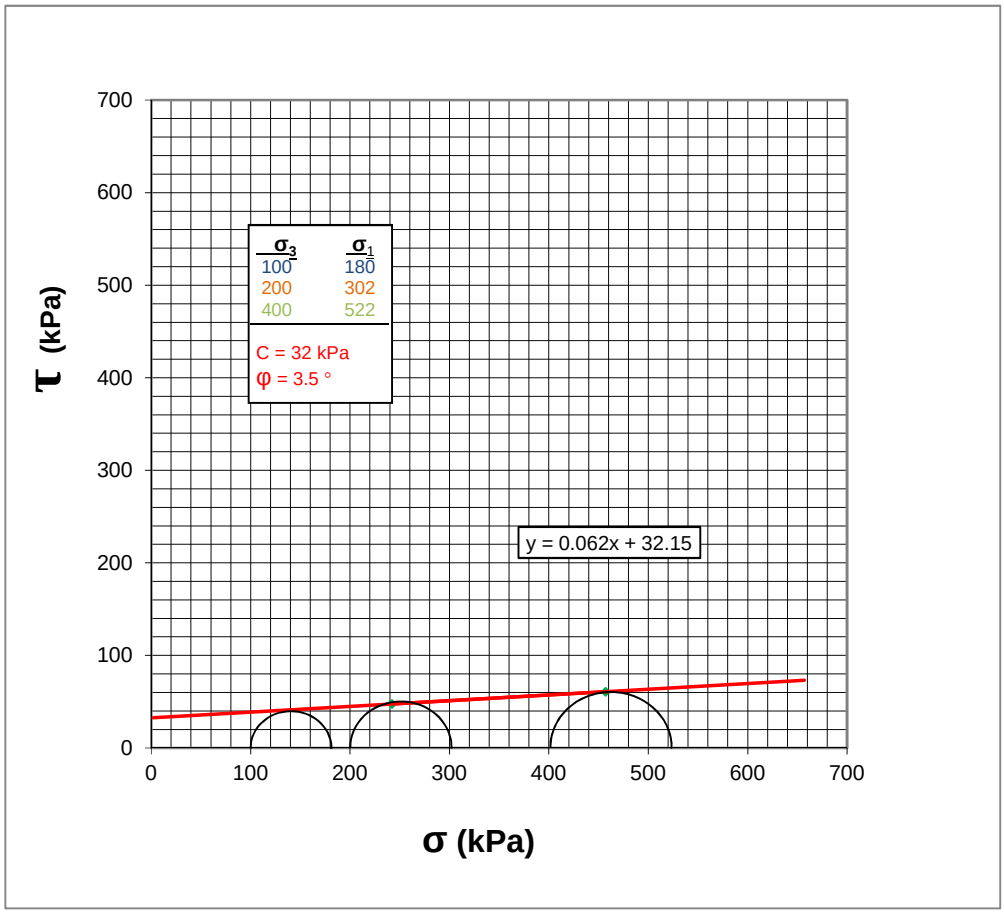
# TRIAXIAL COMPRESSION TEST

| | | | | | |
|---|---|---|---|---|---|
| **Project** | Samawa Combined Cycle P P | | | **Test Type** | |
| **BH No.** | 78 | **Sample No.** | 2 | **Depth (m)** | 1.5-2.0 |



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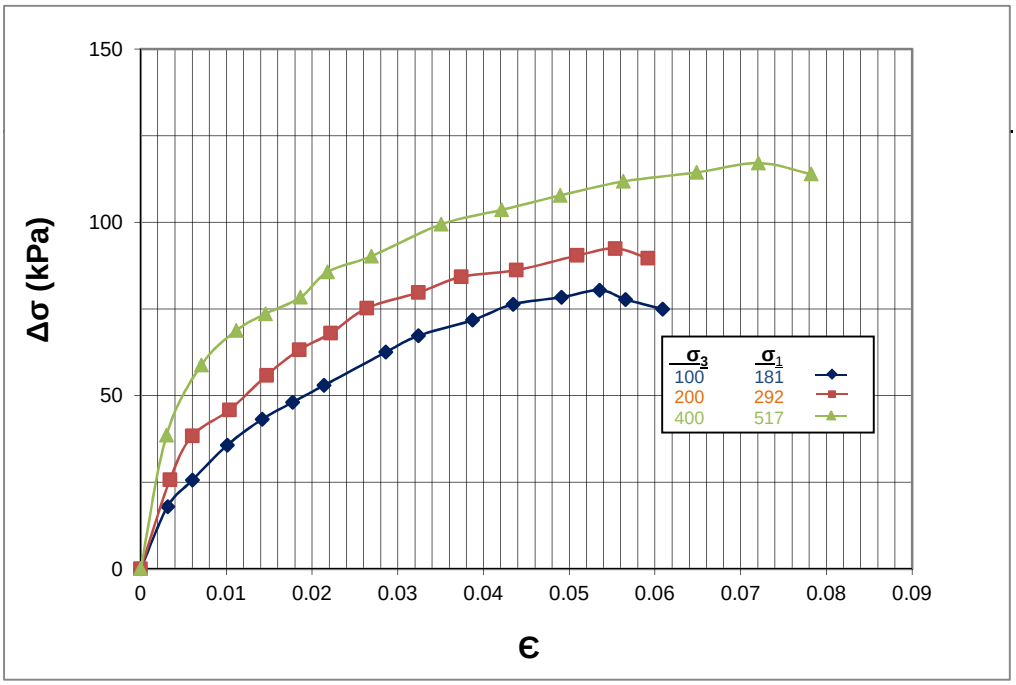
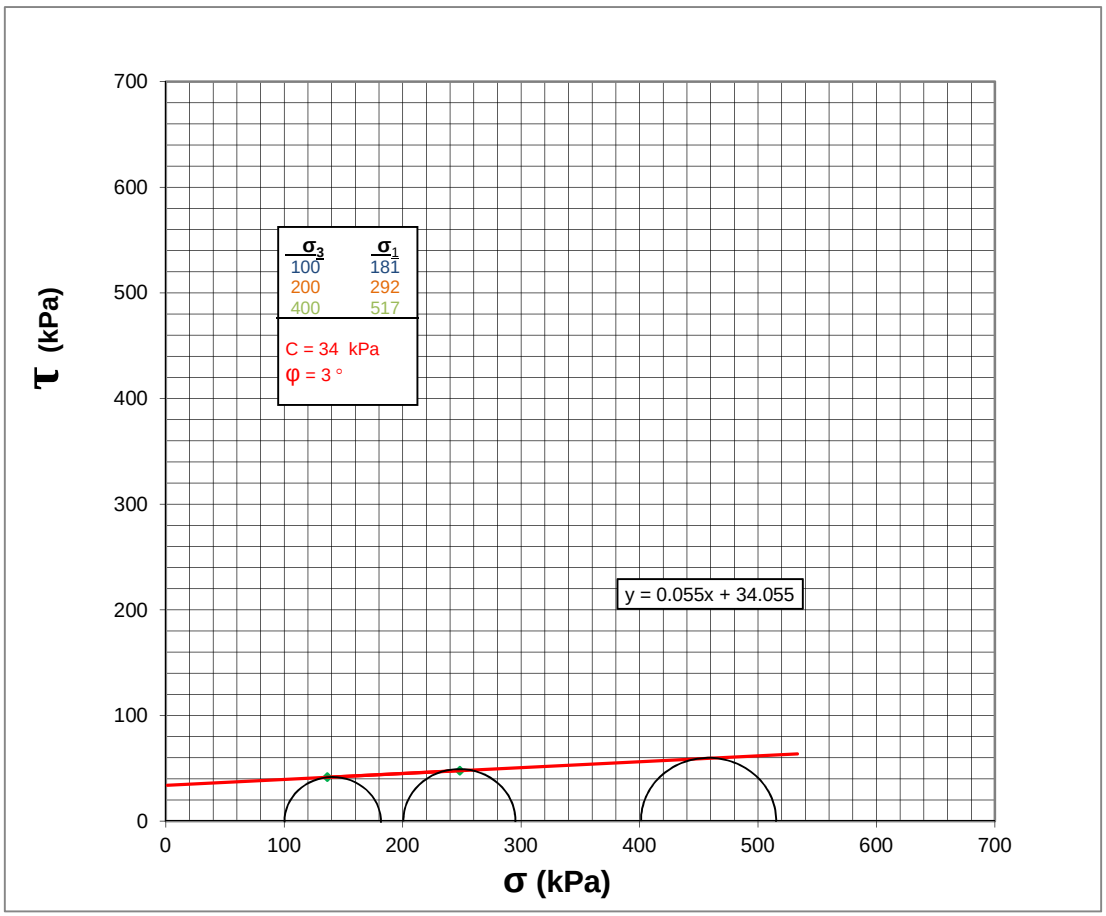
# TRIAXIAL COMPRESSION TEST

| | | | | | |
|---|---|---|---|---|---|
| **Project** | Samawa Combined Cycle P P | | | **Test Type** | |
| **BH No.** | 79 | **Sample No.** | 4 | **Depth (m)** | 4.0-4.5 |



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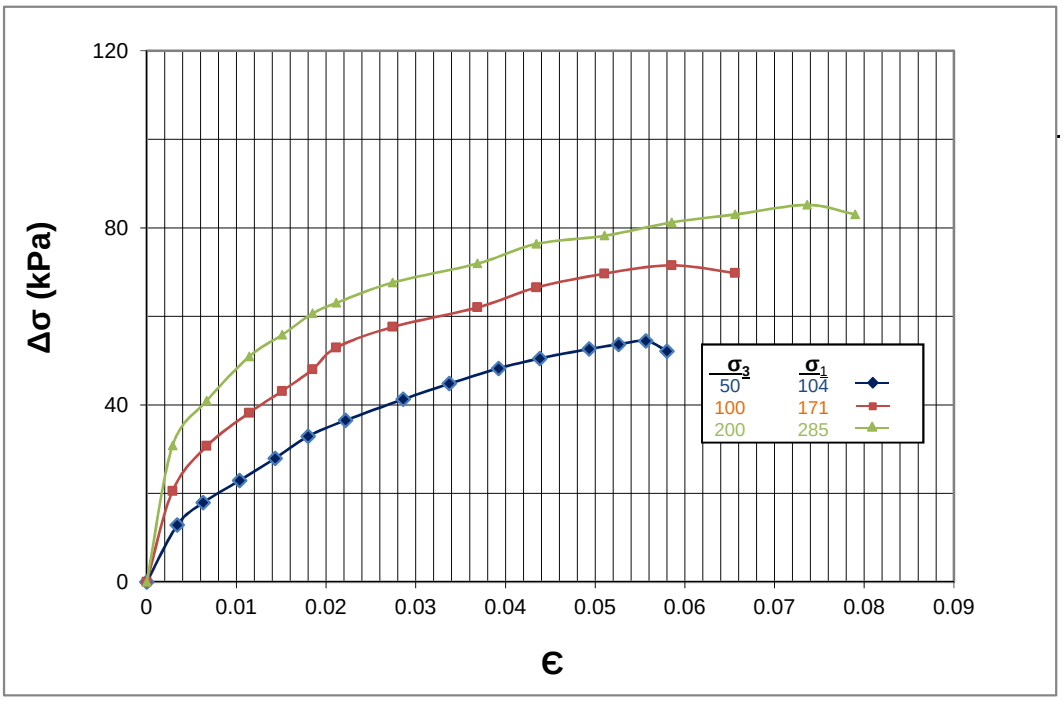
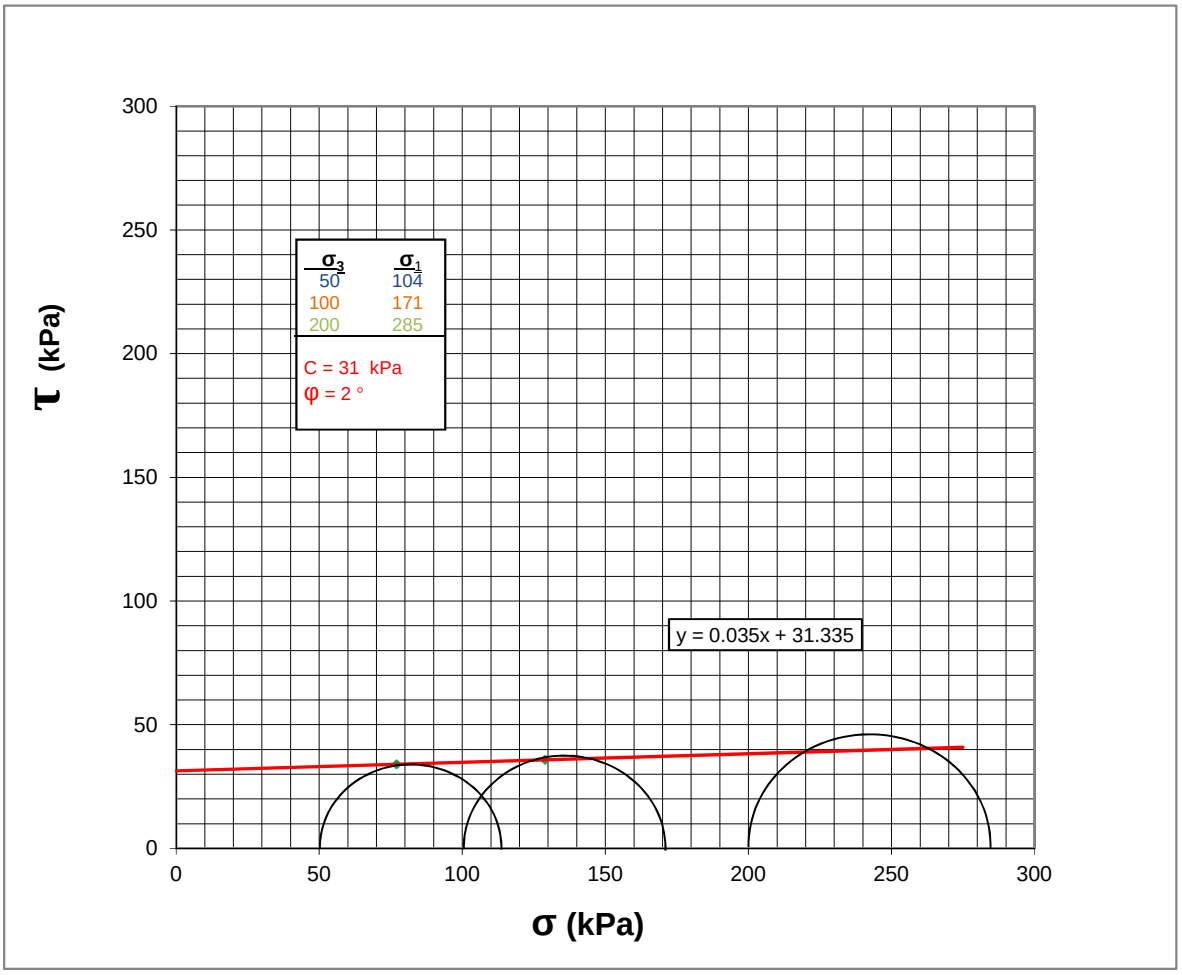
# TRIAXIAL COMPRESSION TEST

| | | | | | |
|---|---|---|---|---|---|
| **Project** | Samawa Combined Cycle PP | | | **Test Type** | |
| **BH No.** | 82 | **Sample No.** | 2 | **Depth (m)** | 1.0-1.5 |



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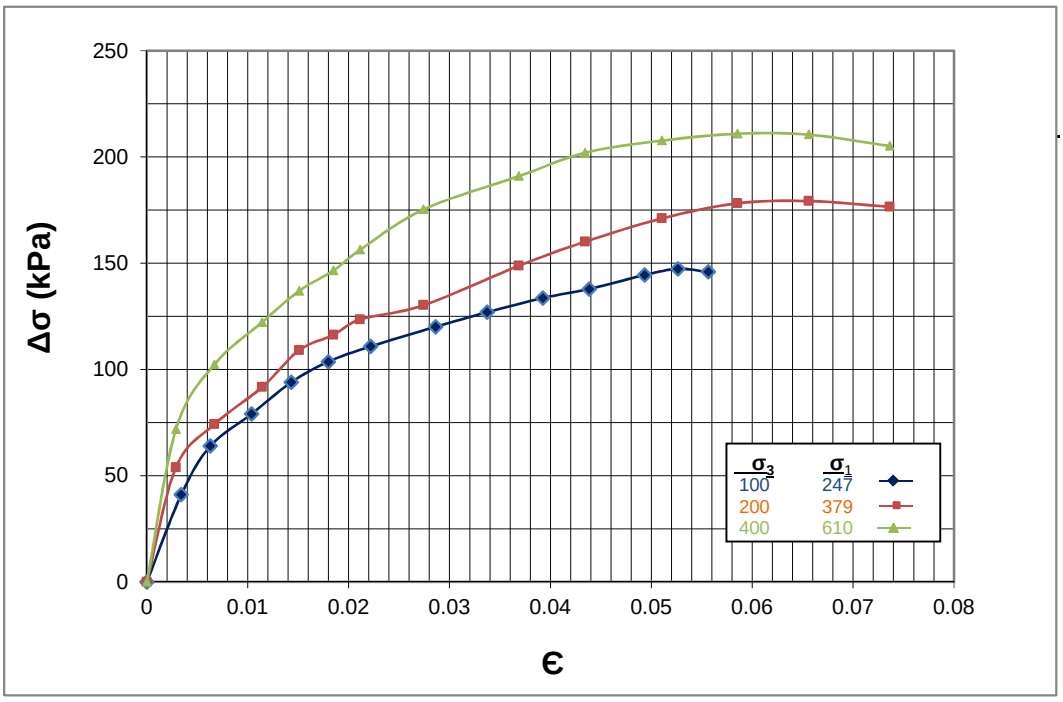
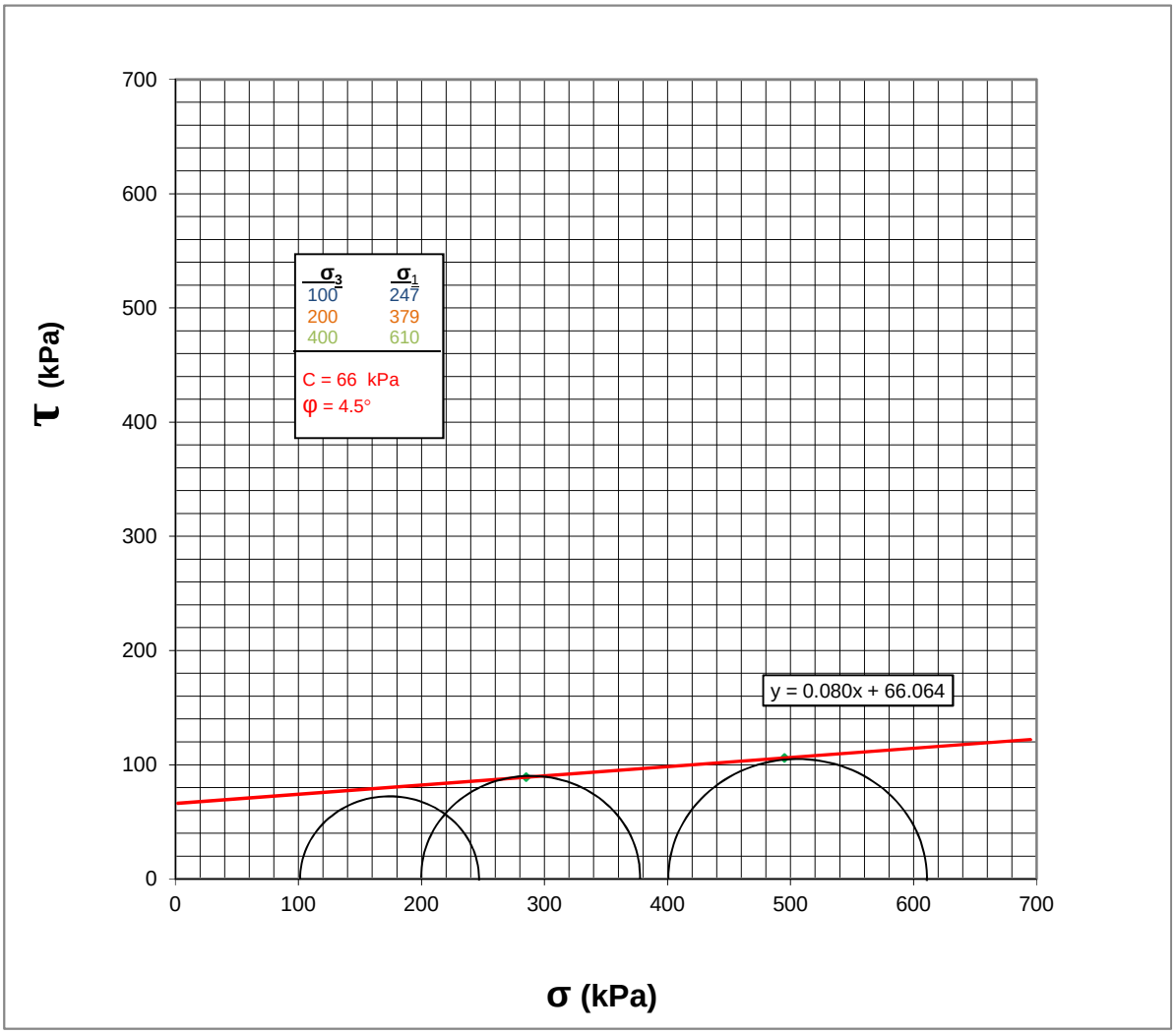
# TRIAXIAL COMPRESSION TEST

| | | | | | |
|---|---|---|---|---|---|
| **Project** | Samawa Combined Cycle P P | | | **Test Type** | |
| **BH No.** | 83 | **Sample No.** | 4 | **Depth (m)** | 3.0-3.5 |



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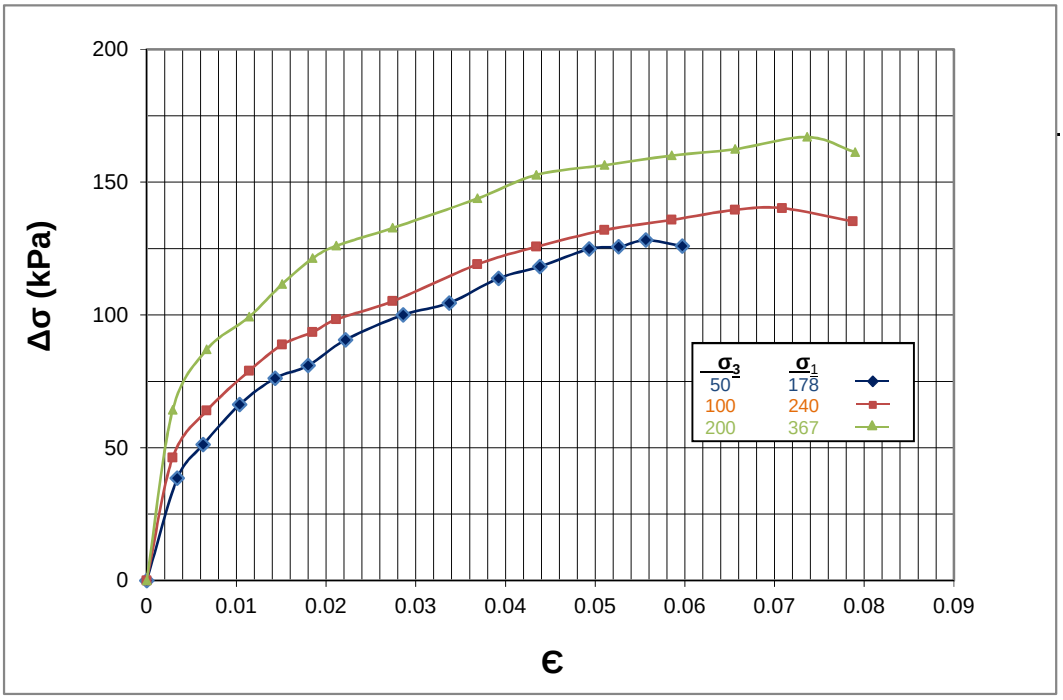
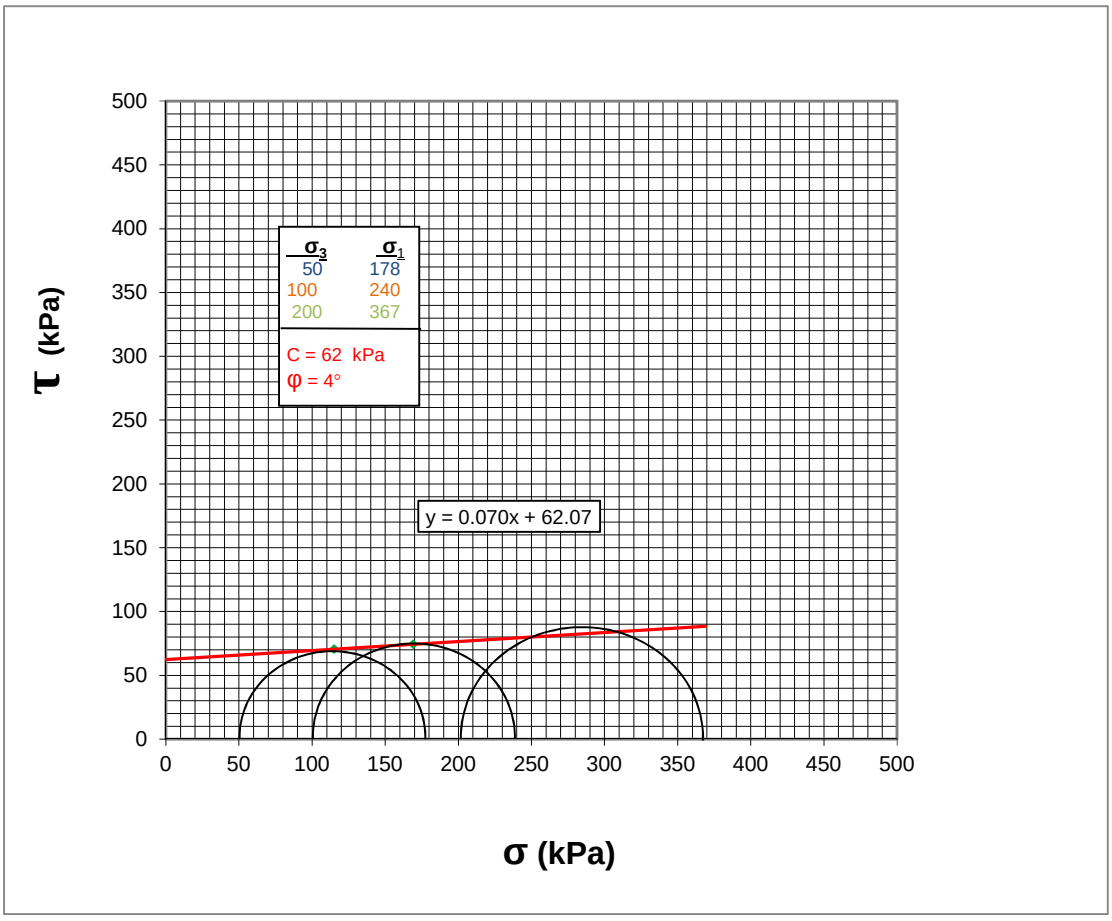
# TRIAXIAL COMPRESSION TEST

| | | | | | |
|---|---|---|---|---|---|
| **Project** | Samawa Combined Cycle P P | | | **Test Type** | |
| **BH No.** | 85 | **Sample No.** | 4 | **Depth (m)** | 4.0-4.5 |



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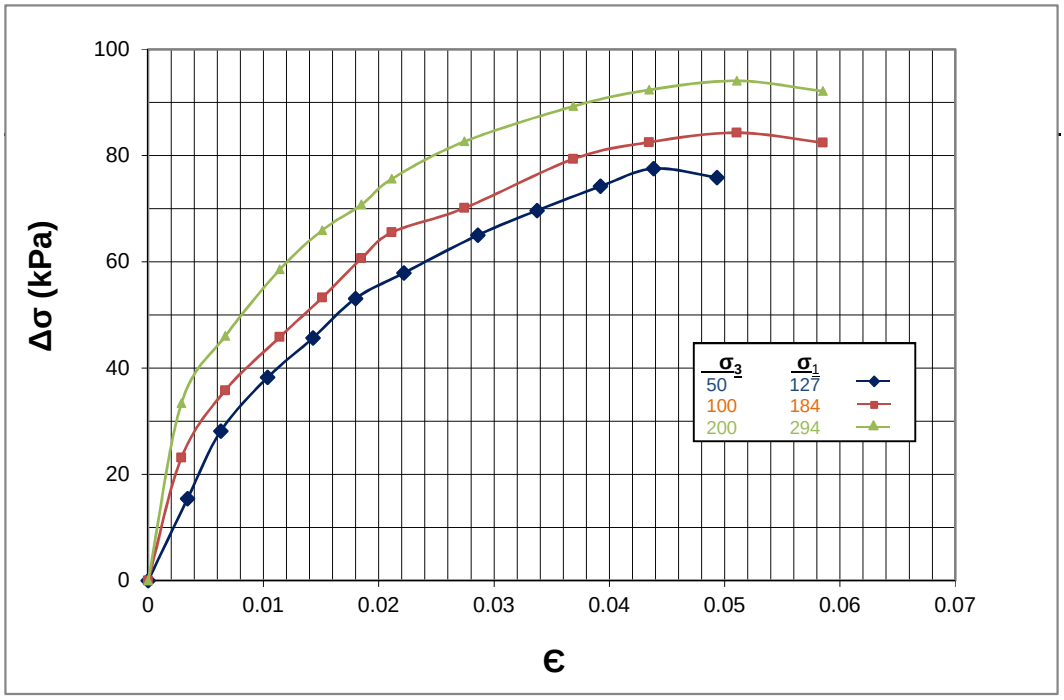
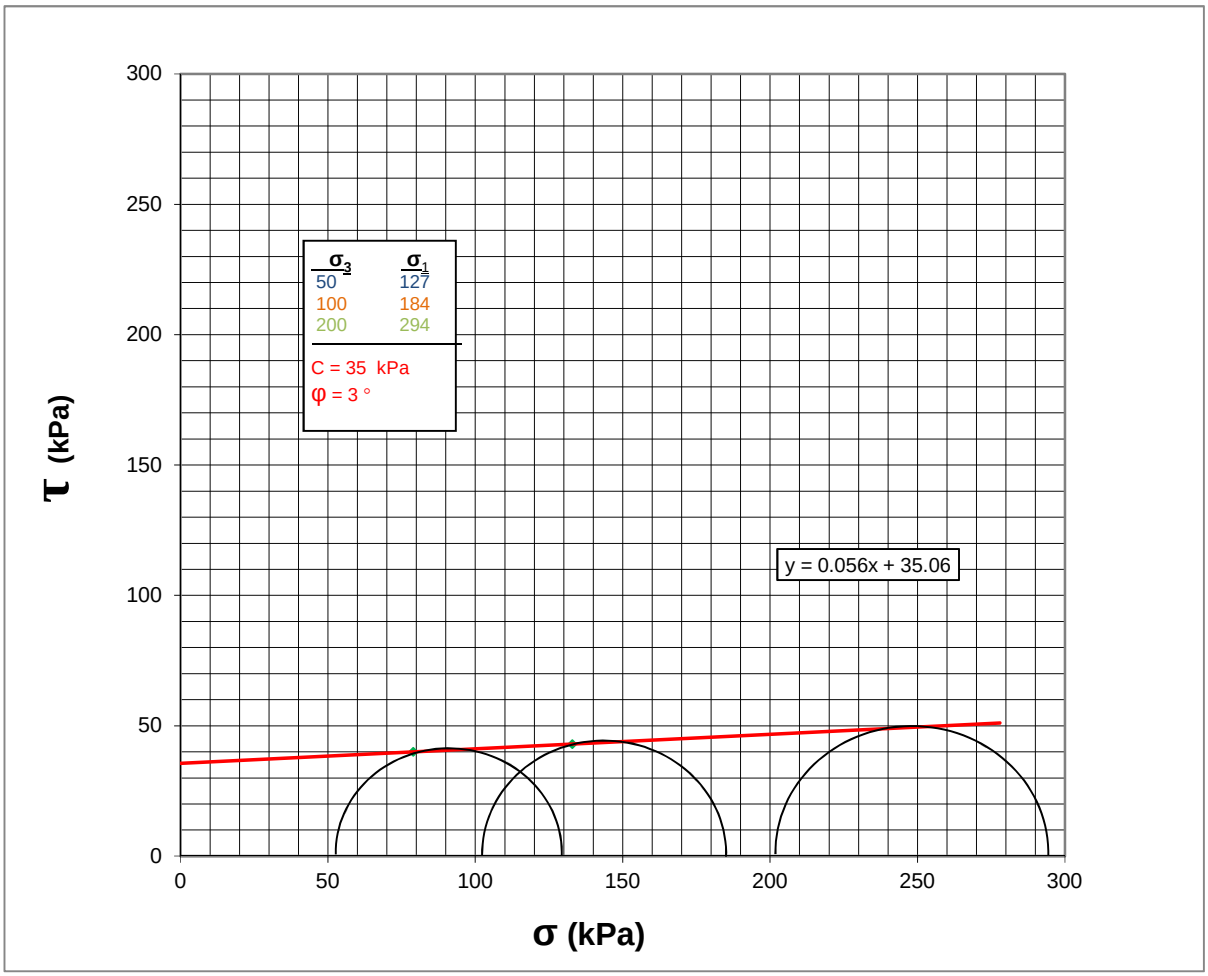
# TRIAXIAL COMPRESSION TEST

| | | | | | |
|---|---|---|---|---|---|
| **Project** | Samawa Combined Cycle PP | | | **Test Type** | |
| **BH No.** | 86 | **Sample No.** | 2 | **Depth (m)** | 1.5-2.0 |



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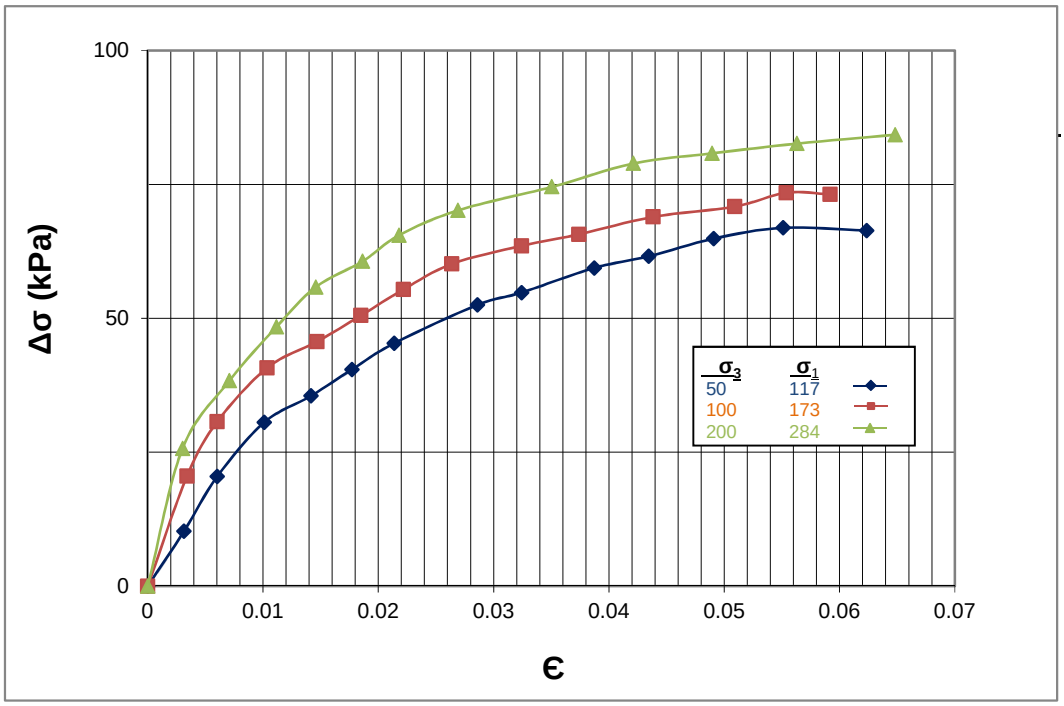
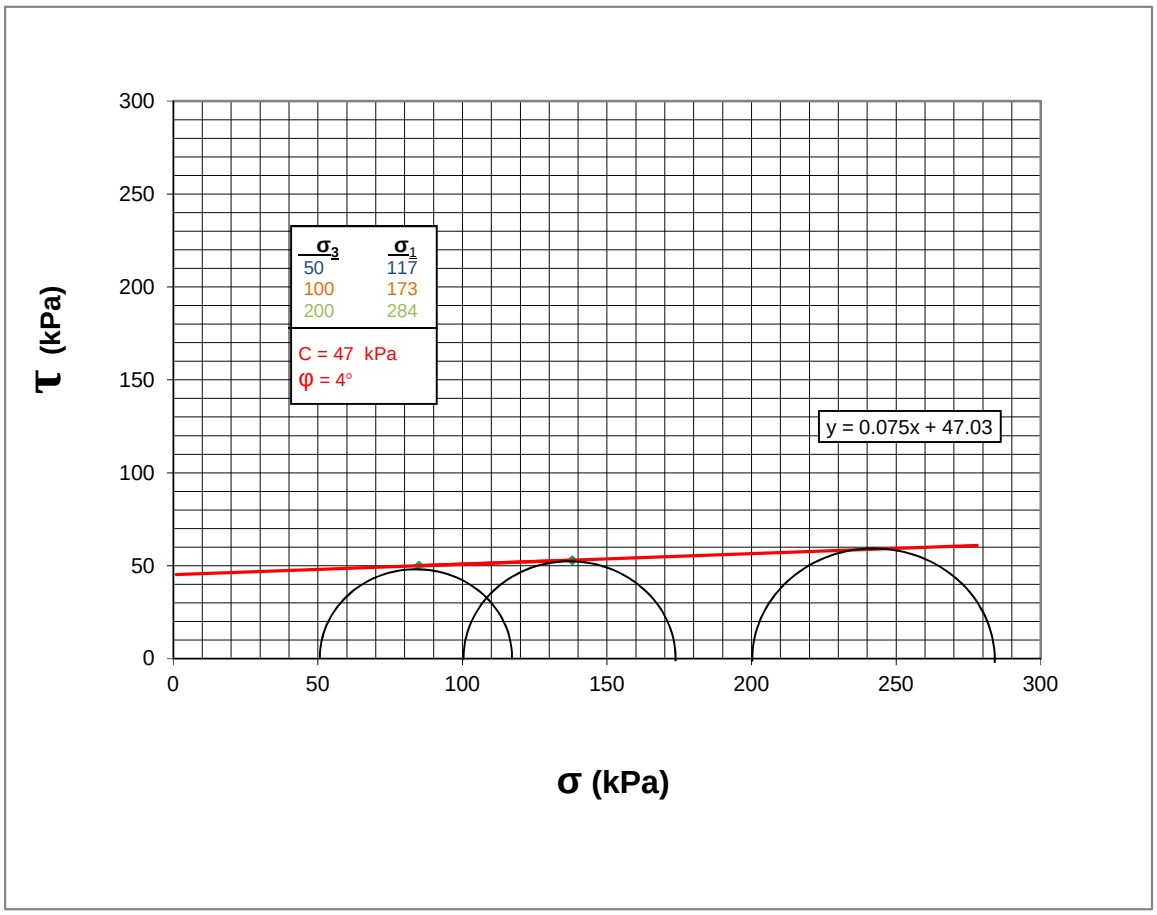
# TRIAXIAL COMPRESSION TEST

| | | | | | |
|---|---|---|---|---|---|
| **Project** | Samawa Combined Cycle PP | | | **Test Type** | |
| **BH No.** | 87 | **Sample No.** | 4 | **Depth (m)** | 4.0-4.5 |



# APPENDIX (M)

# SETTLEMENT CALCULATIONS

## Settlement Analysis

Building:Samawa- Watch Tower

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Found. B= | 5.8 | m | | Finished Grade= | 10.3m msl |
| Mean ground elev.(Z1) | | 10.6 | m | Found.L= | 5.8 | m | | |
| Finished grade | | 10.3 | m | σzg0=Δfill+( (Z 1)-(Z2))*γexis.soil | | | F.B.El(Z2) | 9.4m msl |
| Found. Bottom elev.(Z2) | | 9.4 | m | σ zp= | 56 | kPa | GW Elev | 7.6m msl |
| Additional fill thick. | | 0 | m | σzg0= | 22.20 | kPa | | |
| Mean GWE= | | 7.6 | m | σ zp0= | σ zp-σzg0= | 33.80kPa | Z(m) | |
| γ fill str. | | 20 | kN/m3 | | L/B | 1.00 | | |
| Yexis. Soil | | 18.5 | kN/m3 | Δfill= | 0.0 | KPa | | |

Clay Area

| Soil Types | Def Mod. (E)Mpa | Top/Bottom Elev. (m) | Thick. H(m) | Z(m) m | σ' zg kPa | ξ=2z/B | αi | Δσ zp,i= αixσ zp0 kPa | Settlement due to σzp0 Sσzp,i= σ zp,ix(Hi/Ei) (m) |
|---|---|---|---|---|---|---|---|---|---|
| | | 10.3 | 0.9 | | | | | | |
| F.B.Elev. | | 9.4 | | 0 | 22.20 | | | | |
| | | | 0.5 | 0.25 | | 0.09 | 0.991 | 33.50 | 0.0004 |
| Strac.fill | 40 | 8.9 | | 0.5 | 32.20 | | | | |
| Clay | 6.9 | 8.9 | 4.65 | 0.5 | | | | | 0.016 |
| GW Elev | | 7.6 | | | | | | | |
| | | 6.575 | | 2.825 | 58.4625 | 0.97 | 0.718 | 24.27 | |
| | | 4.25 | | 5.15 | 84.73 | | | | |
| M. Dense Sand | 20.0 | 4.25 | 5.05 | 5.15 | | | | | 0.002 |
| | | 1.725 | | 7.675 | 107.45 | 2.65 | 0.222 | 7.50 | |
| | | -0.8 | | 10.2 | 130.18 | 3.52 | 0.137 | 4.63 | |
| Dense Sand | 40 | -0.8 | 2.8 | 10.2 | | | | | 0.000 |
| | | -2.2 | | 11.6 | 143.475 | 4.00 | 0.108 | 3.65 | |
| | | -3.6 | | 13 | 156.78 | 4.48 | 0.088 | 2.97 | |
| V. Dense Sand | 58 | -3.6 | 1.7 | | | | | | |
| | | -5.3 | | | | | | | |
| | | | | | | | | ΣSσzp,i= | 0.019m |
| | | | | | | | | Stotal=0.8(Sσzp,i)= | 0.015m |

### Consolidation Test

| | Depth ) (m) | $e_o$ | $P_c$ (kPa) | $C_c$ | $C_r$ | σ v' (kPa) | OCR=Pc/σv' |
|---|---|---|---|---|---|---|---|
| Min | 0 | 0.751 | 90 | 0.14 | 0.021 | | |
| Max | 2 | 1.14 | 125 | 0.39 | 0.072 | | |
| Average | 1 | 0.89 | 110 | 0.27 | 0.044 | 18.5 | 5.95 |
| Min | 2 | 0.707 | 105 | 0.13 | 0.021 | | |
| Max | 5 | 1.049 | 140 | 0.36 | 0.064 | | |
| Average | 3.5 | 0.85 | 125 | 0.26 | 0.043 | 59.75 | 2.09 |

$mv=(1/1+e_0)x\ Cr\ x\ (1/\Delta\sigma v')x(\log \sigma'v_f-\log \sigma'v_i)$

depth 0.50m to 5.15m

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| At elev=6.575 m msl: | | Pc/σ'vg= | 2.09 | σ' zg+Δσzp,i= | 82.73 | <P'c= | 122.3065 | kPa |
| | | | | σ'vf=σ' zg+Δσzp,i= | 82.73 | kPa | | |
| | | | | σ'vi=σ' zg= | 58.4625 | kPa | | |
| $1/1+e_0$= | 0.540248514 | | | | | | | |
| Cr | 0.043 | | | | | | | |
| 1/Δσv'= | 0.0412 | (1/kPa) | | | | | | |
| log(σ'vi)= | 1.7669 | | | | | | | |
| log(σ'vf)= | 1.9177 | | | | | | | |
| mv= | 0.00014 | 1/kPa | | | | | | |
| E=1/mv= | 6.9 | MPa | | | | | | |

Sand E(MPa)= 1*SPT N (CIRIA Report no143)
1*20=20MPa (For M. Dense Sand)
1*40=40MPa (For Dense Sand)
1*58=58MPa (For V. Dense Sand)

## Settlement Analysis

Building:Samawa- Workshop(Alt1)

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Found. B= | 19 | m | | Finished Grade= | 10.3m msl |
| Mean ground elev.(Z1) | 10.6 | m | Found.L= | 23.5 | m | | | |
| Finished grade | 10.3 | m | σzg0=Δfill+( (Z 1)-(Z2))*γexis.soil | | | | F.B.El(Z2) | 10.0m msl |
| Found. Bottom elev.(Z2) | 10 | m | σ zp= | 35 | kPa | | GW Elev | 7.6m msl |
| Additional fill thick. | 0 | m | σzg0= | 11.10 | kPa | | | |
| Mean GWE= | 7.6 | m | σ zp0= | σ zp-σzg0= | 23.90kPa | | Z(m) | |
| γ fill str. | 20 | kN/m3 | | L/B | 1.24 | | | |
| Yexis. Soil | 18.5 | kN/m3 | Δfill= | 0.0 | KPa | | | |

Settlement due to σzp0

| Clay Area | | | | Z(m) | σ' zg | ξ=2z/B | αi | Δσ zp,i= αixσ zp0 | Sσzp,i= σ zp,ix(Hi/Ei) |
|---|---|---|---|---|---|---|---|---|---|
| Soil Types | Def Mod. (E)Mpa | Top/Bottom Elev. (m) | Thick. H(m) | m | kPa | | | kPa | (m) |
| | | 10.6 | 0.6 | | | | | | |
| F.B.Elev. | | 10 | | 0 | 11.10 | | | | |
| | | | | | | | | | |
| | | | 0.5 | 0.25 | | 0.03 | 0.998 | 23.85 | 0.0003 |
| | | | | | | | | | |
| Strac.fill | 40 | 9.5 | | 0.5 | 21.10 | | | | |
| Stiff Clay | 5.8 | 9.5 | | 0.5 | | | | | |
| GW Elev | | 7.6 | | | | | | | |
| | | 7.45 | 4.1 | 2.55 | 48.025 | 0.27 | 0.978 | 23.37 | 0.016 |
| | | | | | | | | | |
| | | 5.4 | | 4.6 | 74.95 | | | | |
| Medium Sand | 20.0 | 5.4 | | 4.6 | | | | | |
| | | | | | | | | | |
| | | 3.91 | 2.98 | 6.09 | 88.36 | 0.64 | 0.88 | 21.13 | 0.003 |
| | | | | | | | | | |
| | | 2.42 | | 7.58 | 101.77 | 0.80 | 0.829 | 19.81 | |
| V. Dense Sand | 55.0 | 2.42 | | 7.58 | | | | | |
| | | | | | | | | | |
| | | -0.58 | 6 | 10.58 | 131.77 | 1.11 | 0.691 | 16.51 | 0.002 |
| | | | | | | | | | |
| | | -3.58 | | 13.58 | 161.77 | 1.43 | 0.564 | 13.48 | |
| V stiff clay | 58.3 | -3.58 | | | | | | | |
| | | | | | | | | | |
| | | -11.58 | 8 | | | | | | |
| | | | | | | | | ΣSσzp,i= | 0.020m |
| | | | | | | | | Stotal=0.8(Sσzp,i)= | 0.016m |

## Consolidation Test

| | Depth ) (m) | $e_o$ | $P_c$ (kPa) | $C_c$ | $C_r$ | σ v' (kPa) | OCR=Pc/σv' |
|---|---|---|---|---|---|---|---|
| Min | 0 | 0.751 | 90 | 0.14 | 0.021 | | |
| Max | 2 | 1.14 | 125 | 0.39 | 0.072 | | |
| Average | 1 | 0.89 | 110 | 0.27 | 0.044 | 18.5 | 5.95 |
| Min | 2 | 0.707 | 105 | 0.13 | 0.021 | | |
| Max | 5 | 1.049 | 140 | 0.36 | 0.064 | | |
| Average | 3.5 | 0.85 | 125 | 0.26 | 0.043 | 59.75 | 2.09 |

$mv=(1/1+e_0)x\ Cr\ x\ (1/\Delta\sigma v')x(\log \sigma'v_f-\log \sigma'v_i)$

depth 0.50m to 4.6m

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| At elev=7.45m msl: | | Pc/σ'vg= | 2.09 | σ' zg+Δσzp,i= | 71.40 | <P'c= | 100.4707 | kPa |
| | | | | σ'vf=σ' zg+Δσzp,i= | 71.40 | kPa | | |
| | | | | σ'vi=σ' zg= | 48.025 | kPa | | |
| $1/1+e_0$= | 0.540248514 | | | | | | | |
| Cr | 0.043 | | | | | | | |
| 1/Δσv'= | 0.0428 | (1/kPa) | | | | | | |
| log(σ'vi)= | 1.6815 | | | | | | | |
| log(σ'vf)= | 1.8537 | | | | | | | |
| mv= | 0.0002 | 1/kPa | | | | | | |
| E=1/mv= | 5.8 | MPa | | | | | | |

Stiff Clay *E= 220*Cu=220*265=58300kPa CIRIA Report no143
Sand E(MPa)= 1*SPT N (CIRIA Report no143)
1*20=20MPa (For M. Dense Sand)
1*55=55MPa (For V. Dense Sand)

## Settlement Analysis

Building:Samawa- Workshop(Alt2)

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Found. B= | 3.5 | m | | Finished Grade= | 10.3m msl |
| Mean ground elev.(Z1) | | 10.6 | m | Found.L= | 4 | m | | |
| Finished grade | | 10.3 | m | σzg0=Δfill+( (Z 1)-(Z2))*γexis.soil | | | F.B.El(Z2) | 8.8m msl |
| Found. Bottom elev.(Z2) | | 8.8 | m | σ zp= | 70 | kPa | GW Elev | 7.6m msl |
| Additional fill thick. | | 0 | m | σzg0= | 33.30 | kPa | | |
| Mean GWE= | | 7.6 | m | σ zp0= | σ zp-σzg0= | 36.70kPa | Z(m) | |
| γ fill str. | | 20 | kN/m3 | | L/B | 1.14 | | |
| Yexis. Soil | | 18.5 | kN/m3 | Δfill= | 0.0 | KPa | | |

Clay Area

| Soil Types | Def Mod. (E)Mpa | Top/Bottom Elev. (m) | Thick. H(m) | Z(m) m | σ' zg kPa | ξ=2z/B | αi | Δσ zp,i= αixσ zp0 kPa | Settlement due to σzp0 SσZp,i= σ zp,ix(Hi/Ei) (m) |
|---|---|---|---|---|---|---|---|---|---|
| | | 10.6 | 1.8 | | | | | | |
| F.B.Elev. | | 8.8 | | 0 | 33.30 | | | | |
| | | | | | | | | | |
| | | | 0.5 | 0.25 | | 0.14 | 0.987 | 36.22 | 0.0005 |
| | | | | | | | | | |
| Strac.fill | 40 | 8.3 | | 0.5 | 43.30 | | | | |
| Stiff Clay | 7.0 | 8.3 | | 0.5 | | | | | |
| GW Elev | | 7.6 | | | | | | | |
| | | 6.85 | 2.9 | 1.95 | 59.125 | 1.11 | 0.674 | 24.74 | 0.010 |
| | | | | | | | | | |
| | | 5.4 | | 3.4 | 74.95 | | | | |
| Medium Sand | 20.0 | 5.4 | | 3.4 | | | | | |
| | | | | | | | | | |
| | | 3.91 | 2.98 | 4.89 | 88.36 | 2.79 | 0.22 | 8.18 | 0.001 |
| | | | | | | | | | |
| | | 2.42 | | 6.38 | 101.77 | 3.65 | 0.142 | 5.21 | |
| V. Dense Sand | 55.0 | 2.42 | | 6.38 | | | | | |
| | | | | | | | | | |
| | | -0.58 | 6 | 9.38 | 131.77 | 5.36 | 0.071 | 2.61 | 0.000 |
| | | | | | | | | | |
| | | -3.58 | | 12.38 | 161.77 | 7.07 | 0.042 | 1.54 | |
| V stiff clay | 58.3 | -3.58 | | | | | | | |
| | | | | | | | | | |
| | | -11.58 | 8 | | | | | | |
| | | | | | | | | ΣSσzp,i= | 0.012m |
| | | | | | | | | Stotal=0.8(Sσzp,i)= | 0.010m |

## Consolidation Test

| | Depth ) (m) | $e_o$ | $P_c$ (kPa) | $C_c$ | $C_r$ | σ v' (kPa) | OCR=Pc/σv' |
|---|---|---|---|---|---|---|---|
| Min | 0 | 0.751 | 90 | 0.14 | 0.021 | | |
| Max | 2 | 1.14 | 125 | 0.39 | 0.072 | | |
| Average | 1 | 0.89 | 110 | 0.27 | 0.044 | 18.5 | 5.95 |
| Min | 2 | 0.707 | 105 | 0.13 | 0.021 | | |
| Max | 5 | 1.049 | 140 | 0.36 | 0.064 | | |
| Average | 3.5 | 0.85 | 125 | 0.26 | 0.043 | 59.75 | 2.09 |

$mv=(1/1+e_0)x\ Cr\ x\ (1/\Delta\sigma v')x(\log \sigma'v_f-\log \sigma'v_i)$

depth 0.50m to 4.6m

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| At elev=6.85m msl: | | Pc/σ'vg= | 2.09 | σ' zg+Δσzp,i= | 83.86 | <P'c= | 123.6925 | kPa |
| | | | | σ'vf=σ' zg+Δσzp,i= | 83.86 | kPa | | |
| | | | | σ'vi=σ' zg= | 59.125 | kPa | | |
| $1/1+e_0$= | 0.540248514 | | | | | | | |
| Cr | 0.043 | | | | | | | |
| 1/Δσv'= | 0.0404 | (1/kPa) | | | | | | |
| log(σ'vi)= | 1.7718 | | | | | | | |
| log(σ'vf)= | 1.9236 | | | | | | | |
| mv= | 0.0001 | 1/kPa | | | | | | |
| E=1/mv= | 7.0 | MPa | | | | | | |

Stiff Clay *E= 220*Cu=220*265=58300kPa CIRIA Report no143
Sand E(MPa)= 1*SPT N (CIRIA Report no143)
1*20=20MPa (For M. Dense Sand)
1*55=55MPa (For V. Dense Sand)

## Settlement Analysis

Building:Samawa- Canteen Building

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Found. B= | 23 | m | | Finished Grade= | 10.3m msl |
| Mean ground elev.(Z1) | 10.6 | m | Found.L= | 35 | m | | | |
| Finished grade | 10.3 | m | σzg0=Δfill+( (Z 1)-(Z2))*γexis.soil | | | | F.B.El(Z2) | 9.6m msl |
| Found. Bottom elev.(Z2) | 9.6 | m | σ zp= | 55 | kPa | | GW Elev | 7.6m msl |
| Additional fill thick. | 0 | m | σzg0= | 18.50 | kPa | | | |
| Mean GWE= | 7.6 | m | σ zp0= | σ zp-σzg0= | 36.50kPa | | Z(m) | |
| γ fill str. | 20 | kN/m3 | | L/B | 1.52 | | | |
| Yexis. Soil | 18.5 | kN/m3 | Δfill= | 0.0 | KPa | | | |

Clay Area

| Soil Types | Def Mod. (E)Mpa | Top/Bottom Elev. (m) | Thick. H(m) | Z(m) m | σ' zg kPa | ξ=2z/B | αi | Settlement due to σzp0: Δσ zp,i= αixσ zp0 kPa | Sσzp,i= σ zp,ix(Hi/Ei) (m) |
|---|---|---|---|---|---|---|---|---|---|
| | | 10.6 | 1 | | | | | | |
| F.B.Elev. | | 9.6 | | 0 | 18.50 | | | | |
| | | | 0.5 | 0.25 | | 0.02 | 0.999 | 36.46 | 0.0005 |
| Strac.fill | 40 | 9.1 | | 0.5 | 28.50 | | | | |
| Medium Clay | 6.4 | 9.1 | | 0.5 | | | | | |
| GW Elev | | 7.6 | | | | | | | |
| | | 7.65 | 2.9 | 1.95 | 48.325 | 0.17 | 0.988 | 36.06 | 0.016 |
| | | 6.2 | | 3.4 | 68.15 | | | | |
| M. Dense Sand | 27.0 | 6.2 | | 3.4 | | | | | |
| | | 5.06 | 2.28 | 4.54 | 78.41 | 0.39 | 0.974 | 35.55 | 0.003 |
| | | 3.92 | | 5.68 | 88.67 | 0.49 | 0.946 | 34.53 | |
| V. Stiff Clay | 23.1 | 3.92 | | 5.68 | | | | | |
| | | 3.17 | 1.5 | 6.43 | 95.795 | 0.56 | 0.925 | 33.76 | 0.002 |
| | | 2.42 | | 7.18 | 102.92 | 0.62 | 0.907 | 33.11 | |
| Dense Sand | 40 | 2.42 | | 7.18 | | | | | |
| | | -0.08 | 5 | 9.68 | 126.67 | 0.84 | 0.837 | 30.55 | 0.004 |
| | | -2.58 | | 12.18 | 150.42 | 1.06 | 0.749 | 27.34 | |
| Hard Clay | 50 | -2.58 | 11 | | | | | | |
| | | -13.58 | | | | | | | |
| | | | | | | | | ΣSσzp,i= | 0.026m |
| | | | | | | | | Stotal=0.8(Sσzp,i)= | 0.021m |

## Consolidation Test

| | Depth ) (m) | $e_o$ | $P_c$ (kPa) | $C_c$ | $C_r$ | σ v' (kPa) | OCR=Pc/σv' |
|---|---|---|---|---|---|---|---|
| Min | 0 | 0.751 | 90 | 0.14 | 0.021 | | |
| Max | 2 | 1.14 | 125 | 0.39 | 0.072 | | |
| Average | 1 | 0.89 | 110 | 0.27 | 0.044 | 18.5 | 5.95 |
| Min | 2 | 0.707 | 105 | 0.13 | 0.021 | | |
| Max | 5 | 1.049 | 140 | 0.36 | 0.064 | | |
| Average | 3.5 | 0.85 | 125 | 0.26 | 0.043 | 59.75 | 2.09 |

$mv=(1/1+e_0)x\ Cr\ x\ (1/\Delta\sigma v')x(\log \sigma'v_f-\log \sigma'v_i)$

depth 0.5m to 3.4m

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| At elev=7.65 m msl: | | Pc/σ'vg= | 2.09 | σ' zg+Δσzp,i= | 84.39 | <P'c= | 12.43922 | kPa |
| | | | | σ'vf=σ' zg+Δσzp,i= | 84.39 | kPa | | |
| | | | | σ'vi=σ' zg= | 48.325 | kPa | | |
| $1/1+e_0$= | 0.540248514 | | | | | | | |
| Cr | 0.043 | | | | | | | |
| 1/Δσv'= | 0.0277 | (1/kPa) | | | | | | |
| log(σ'vi)= | 1.6842 | | | | | | | |
| log(σ'vf)= | 1.9263 | | | | | | | |
| mv= | 0.0002 | 1/kPa | | | | | | |
| E=1/mv= | 6.4 | MPa | | | | | | |

Stiff Clay *E= 220*Cu=220*105=23100kPa CIRIA Report no143
Sand E(MPa)= 1*SPT N (CIRIA Report no143)
1*27=27MPa (For M. Dense Sand)
1*40=40MPa (For Dense Sand)

## Settlement Analysis

Building:Samawa- Transformers

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Found. B= | 3 | m | | Finished Grade= | 10.3m msl |
| Mean ground elev.(Z1) | 10.6 | m | Found.L= | 8 | m | | | |
| Finished grade | 10.3 | m | σzg0=Δfill+( (Z 1)-(Z2))*γexis.soil | | | | F.B.El(Z2) | 8.5m msl |
| Found. Bottom elev.(Z2) | 8.5 | m | σ zp= | 42 | kPa | | GW Elev | 7.6m msl |
| Additional fill thick. | 0 | m | σzg0= | 38.85 | kPa | | | |
| Mean GWE= | 7.6 | m | σ zp0= | σ zp-σzg0= | 3.15kPa | | Z(m) | |
| γ fill str. | 20 | kN/m3 | | L/B | 2.67 | | | |
| Yexis. Soil | 18.5 | kN/m3 | Δfill= | 0.0 | KPa | | | |

Clay Area

| Soil Types | Def Mod. (E)Mpa | Top/Bottom Elev. (m) | Thick. H(m) | Z(m) m | σ' zg kPa | ξ=2z/B | αi | Δσ zp,i= αixσ zp0 kPa | Settlement due to σzp0 Sσzp,i= σ zp,ix(Hi/Ei) (m) |
|---|---|---|---|---|---|---|---|---|---|
| | | 10.3 | 1.8 | | | | | | |
| F.B.Elev. | | 8.5 | | 0 | 38.85 | | | | |
| | | | 0.5 | 0.25 | | 0.17 | 0.990 | 3.12 | 0.0000 |
| Strac.fill | 40 | 8 | | 0.5 | 48.85 | | | | |
| Clay | 6.7 | 8 | 3.75 | 0.5 | | | | | |
| GW Elev | | 7.6 | | | | | | | |
| | | 6.125 | | 2.375 | 66.7875 | 1.58 | 0.277 | 0.87 | 0.000 |
| | | 4.25 | | 4.25 | 84.73 | | | | |
| M. Dense Sand | 20.0 | 4.25 | 5.05 | 4.25 | | | | | |
| | | 1.725 | | 6.775 | 107.45 | 4.52 | 0.189 | 0.60 | 0.000 |
| | | -0.8 | | 9.3 | 130.18 | 6.20 | 0.113 | 0.36 | |
| Dense Sand | 40* | -0.8 | 2.8 | 9.3 | | | | | |
| | | -2.2 | | 10.7 | 143.475 | 7.13 | 0.088 | 0.28 | 0.000 |
| | | -3.6 | | 12.1 | 156.78 | 8.07 | 0.067 | 0.21 | |
| V. Dense Sand | 58 | -3.6 | | | | | | | |
| | | -5.3 | 1.7 | | | | | | |
| | | | | | | | | ΣSσzp,i= | 0.001m |
| | | | | | | | | Stotal=0.8(Sσzp,i)= | 0.001m |

Consolidation Test

| | Depth ) (m) | $e_o$ | $P_c$ (kPa) | $C_c$ | $C_r$ | σ v' (kPa) | OCR=Pc/σv' |
|---|---|---|---|---|---|---|---|
| Min | 0 | 0.751 | 90 | 0.14 | 0.021 | | |
| Max | 2 | 1.14 | 125 | 0.39 | 0.072 | | |
| Average | 1 | 0.89 | 110 | 0.27 | 0.044 | 18.5 | 5.95 |
| Min | 2 | 0.707 | 105 | 0.13 | 0.021 | | |
| Max | 5 | 1.049 | 140 | 0.36 | 0.064 | | |
| Average | 3.5 | 0.85 | 125 | 0.26 | 0.043 | 59.75 | 2.09 |

$mv=(1/1+e_0)x\ Cr\ x\ (1/\Delta\sigma v')x(\log \sigma'v_f-\log \sigma'v_i)$

depth 0.50m to 4.25m

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| At elev=6.125 m msl: | | Pc/σ'vg= | 2.09 | σ' zg+Δσzp,i= | 67.66 | <P'c= | 139.7228 | kPa |
| | | | | σ'vf=σ' zg+Δσzp,i= | 67.66 | kPa | | |
| | | | | σ'vi=σ' zg= | 66.7875 | kPa | | |
| $1/1+e_0$= | 0.540248514 | | | | | | | |
| Cr | 0.043 | | | | | | | |
| 1/Δσv'= | 1.1461 | (1/kPa) | | | | | | |
| log(σ'vi)= | 1.8247 | | | | | | | |
| log(σ'vf)= | 1.8303 | | | | | | | |
| mv= | 0.0002 | 1/kPa | | | | | | |
| E=1/mv= | 6.7 | MPa | | | | | | |

## Settlement Analysis

Building:Samawa- Gate House

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Found. B= | 9.8 | m | | Finished Grade= | 10.3m msl |
| Mean ground elev.(Z1) | | 10.6 | m | Found.L= | 13.2 | m | | |
| Finished grade | | 10.3 | m | σzg0=Δfill+( (Z 1)-(Z2))*γexis.soil | | | F.B.El(Z2) | 9.4m msl |
| Found. Bottom elev.(Z2) | | 9.4 | m | σ zp= | 59 | kPa | GW Elev | 7.6m msl |
| Additional fill thick. | | 0 | m | σzg0= | 22.20 | kPa | | |
| Mean GWE= | | 7.6 | m | σ zp0= | σ zp-σzg0= | 36.80kPa | Z(m) | |
| γ fill str. | | 20 | kN/m3 | | L/B | 1.35 | | |
| Yexis. Soil | | 18.5 | kN/m3 | Δfill= | 0.0 | KPa | | |

Clay Area

| Soil Types | Def Mod. (E)Mpa | Top/Bottom Elev. (m) | Thick. H(m) | Z(m) m | σ' zg kPa | ξ=2z/B | αi | Δσ zp,i= αixσ zp0 kPa | Settlement due to σzp0: Sσzp,i= σ zp,ix(Hi/Ei) (m) |
|---|---|---|---|---|---|---|---|---|---|
| | | 10.6 | 1.2 | | | | | | |
| F.B.Elev. | | 9.4 | | 0 | 22.20 | | | | |
| | | | 0.5 | 0.25 | | 0.05 | 0.996 | 36.65 | 0.0005 |
| Strac.fill | 40 | 8.9 | | 0.5 | 32.20 | | | | |
| Medium Clay | 6.3 | 8.9 | | 0.5 | | | | | |
| GW Elev | | 7.6 | | | | | | | |
| | | 7.935 | 1.93 | 1.465 | 46.9025 | 0.30 | 0.978 | 35.99 | 0.011 |
| | | 6.97 | | 2.43 | 61.61 | | | | |
| M. Dense Sand | 24.0 | 6.97 | | 2.43 | | | | | |
| | | 1.01 | 11.92 | 8.39 | 115.245 | 1.71 | 0.489 | 18.00 | 0.009 |
| | | -4.95 | | 14.35 | 168.89 | 2.93 | 0.237 | 8.72 | |
| Dense Sand | 48* | -4.95 | | 14.35 | | | | | |
| | | -7.575 | 5.25 | 16.975 | 193.8225 | 3.46 | 0.179 | 6.59 | 0.001 |
| | | -10.2 | | 19.6 | 218.76 | 4.00 | 0.14 | 5.15 | |
| V. Dense Sand | 63 | -10.2 | | | | | | | |
| | | -25.7 | 15.5 | | | | | | |
| | | | | | | | | ΣSσzp,i= | 0.020m |
| | | | | | | | | Stotal=0.8(Sσzp,i)= | 0.016m |

## Consolidation Test

| | Depth ) (m) | $e_o$ | $P_c$ (kPa) | $C_c$ | $C_r$ | σ v' (kPa) | OCR=Pc/σv' |
|---|---|---|---|---|---|---|---|
| Min | 0 | 0.751 | 90 | 0.14 | 0.021 | | |
| Max | 2 | 1.14 | 125 | 0.39 | 0.072 | | |
| Average | 1 | 0.89 | 110 | 0.27 | 0.044 | 18.5 | 5.95 |
| Min | 2 | 0.707 | 105 | 0.13 | 0.021 | | |
| Max | 5 | 1.049 | 140 | 0.36 | 0.064 | | |
| Average | 3.5 | 0.85 | 125 | 0.26 | 0.043 | 59.75 | 2.09 |

$mv=(1/1+e_0)x\ Cr\ x\ (1/\Delta\sigma v')x(\log \sigma'v_f-\log \sigma'v_i)$

depth 0.5m to 2.43m

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| At elev=7.935 m msl: | | Pc/σ'vg= | 2.09 | σ' zg+Δσzp,i= | 82.89 | <P'c= | 98.12238 | kPa |
| | | | | σ'vf=σ' zg+Δσzp,i= | 82.89 | kPa | | |
| | | | | σ'vi=σ' zg= | 46.9025 | kPa | | |
| $1/1+e_0$= | 0.540248514 | | | | | | | |
| Cr | 0.043 | | | | | | | |
| 1/Δσv'= | 0.0278 | (1/kPa) | | | | | | |
| log(σ'vi)= | 1.6712 | | | | | | | |
| log(σ'vf)= | 1.9185 | | | | | | | |
| mv= | 0.0002 | 1/kPa | | | | | | |
| E=1/mv= | 6.3 | MPa | | | | | | |

Sand E(MPa)= 1*SPT N (CIRIA Report no143)
1*24=24MPa (For M. Dense Sand)
1*48=48MPa (For Dense Sand)
1*63=63MPa (For V. Dense Sand)

# APPENDIX (N)

# LIQUEFACTION ANALYSES

# Liquefaction Analysis for GTG-1 Area

| | | | | | |
|---|---|---|---|---|---|
| Section No: | GTG-1 | | | PGA(g): | 0.2 |
| | | Top Elv(m): | 0 | Gw depth(m): | 2.70 |
| Mw: | 7 | | | Ground Level(m): | 10.3 |
| MSF: | 1.193 | | | | |

| Number | Depth | $\gamma_n$ kN/m³ | $\gamma_{sat}$ kN/m³ | FC (%) | σv (kPa) | σv' (kPa) | Nspt Blows/30 | Cn | Cr | $N_{60}$ | $N_{1,60}$ | $\alpha_{fc}$ | $\beta_{fc}$ | $N_{1,60,FC}$ | $CRR_{7.5}$ | $CRR_{Mw}$ | σv/σv' | rd | CSR | FS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 6.65 | 19 | 19 | 27 | 126.35 | 87.60 | 16 | 1.06 | 0.95 | 15.20 | 16.11 | 4.48 | 1.13 | 22.69 | 0.252 | 0.301 | 1.442 | 0.952 | 0.178 | 1.685 |
| 2 | 11.25 | 19.5 | 19.5 | 16 | 367.58 | 283.70 | 41 | 0.54 | 1.00 | 41.00 | 22.34 | 2.77 | 1.05 | 26.32 | 0.321 | 0.382 | 1.296 | 0.877 | 0.148 | 2.590 |
| 3 | 14.85 | 20 | 20 | 14 | 243.00 | 123.81 | 79 | 0.90 | 1.00 | 79.00 | 71.29 | 2.20 | 1.04 | 76.51 | 0.538 | 0.642 | 1.963 | 0.766 | 0.195 | SPT N160 > 30 , No Liquefaction |

# Liquefaction Analysis for GTG-4 Area

| | | | | | |
|---|---|---|---|---|---|
| Section No: | GTG-4 | | | PGA(g): | 0.2 |
| | | Top Elv(m): | 0 | Gw depth(m): | 2.70 |
| Mw: | 7 | | | Ground Level(m): | 10.3 |
| MSF: | 1.193 | | | | |

| Number | Depth | $\gamma_n$ kN/m³ | $\gamma_{sat}$ kN/m³ | FC (%) | σv (kPa) | σv' (kPa) | Nspt Blows/30 | Cn | Cr | $N_{60}$ | $N_{1,60}$ | $\alpha_{fc}$ | $\beta_{fc}$ | $N_{1,60,FC}$ | $CRR_{7.5}$ | $CRR_{Mw}$ | σv/σv' | rd | CSR | FS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 7.8 | 19 | 19 | 27 | 148.20 | 98.17 | 20 | 1.01 | 0.95 | 19.00 | 19.16 | 4.48 | 1.13 | 26.13 | 0.316 | 0.377 | 1.510 | 0.940 | 0.184 | 2.045 |
| 2 | 12.5 | 19.5 | 19.5 | 16 | 391.95 | 295.81 | 40 | 0.53 | 1.00 | 40.00 | 21.16 | 2.77 | 1.05 | 25.07 | 0.293 | 0.350 | 1.325 | 0.842 | 0.145 | 2.412 |
| 3 | 14.75 | 20 | 20 | 7 | 241.00 | 122.79 | 58 | 0.91 | 1.00 | 58.00 | 52.56 | 0.12 | 1.01 | 53.12 | 0.336 | 0.401 | 1.963 | 0.769 | 0.196 | SPT N160 > 30 , No Liquefaction |

# Liquefaction Analysis for Transformers Area

| | | | | | |
|---|---|---|---|---|---|
| Section No: | Trnsfrmrs | | | PGA(g): | 0.2 |
| | | Top Elv(m): | 0 | Gw depth(m): | 2.70 |
| Mw: | 7 | | | Ground Level(m): | 10.3 |
| MSF: | 1.193 | | | | |

| Number | Depth | $\gamma_n$ kN/m³ | $\gamma_{sat}$ kN/m³ | FC (%) | σv (kPa) | σv' (kPa) | Nspt Blows/30 | Cn | Cr | $N_{60}$ | $N_{1,60}$ | $\alpha_{fc}$ | $\beta_{fc}$ | $N_{1,60,FC}$ | $CRR_{7.5}$ | $CRR_{Mw}$ | σv/σv' | rd | CSR | FS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 7.8 | 19 | 19 | 28 | 148.20 | 98.17 | 20 | 1.01 | 0.95 | 19.00 | 19.16 | 4.56 | 1.14 | 26.37 | 0.322 | 0.384 | 1.510 | 0.940 | 0.184 | 2.082 |
| 2 | 12.13 | 19.5 | 19.5 | 17 | 384.74 | 292.23 | 41 | 0.53 | 1.00 | 41.00 | 21.88 | 3.01 | 1.06 | 26.21 | 0.318 | 0.379 | 1.317 | 0.853 | 0.146 | 2.599 |
| 3 | 15.23 | 20 | 20 | 6 | 250.60 | 127.68 | 62 | 0.89 | 1.00 | 62.00 | 55.07 | 0.03 | 1.00 | 55.36 | 0.358 | 0.427 | 1.963 | 0.753 | 0.192 | SPT N160 > 30 , No Liquefaction |

# Liquefaction Analysis for Switchyard Control Building

| | | | | | |
|---|---|---|---|---|---|
| Section No: | Switch. Ctr. | | | PGA(g): | 0.2 |
| | | Top Elv(m): | 0 | Gw depth(m): | 2.70 |
| Mw: | 7 | | | Ground Level(m): | 10.3 |
| MSF: | 1.193 | | | | |

| Number | Depth | $\gamma_n$ kN/m³ | $\gamma_{sat}$ kN/m³ | FC (%) | σv (kPa) | σv' (kPa) | Nspt Blows/30 | Cn | Cr | $N_{60}$ | $N_{1,60}$ | $\alpha_{fc}$ | $\beta_{fc}$ | $N_{1,60,FC}$ | $CRR_{7.5}$ | $CRR_{Mw}$ | σv/σv' | rd | CSR | FS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 6.62 | 19 | 19 | 38 | 125.78 | 87.32 | 16 | 1.06 | 0.95 | 15.20 | 16.13 | 5.00 | 1.20 | 24.36 | 0.280 | 0.334 | 1.440 | 0.952 | 0.178 | 1.871 |
| 2 | 12.2 | 19.5 | 19.5 | 26 | 386.10 | 292.91 | 41 | 0.53 | 1.00 | 41.00 | 21.85 | 4.39 | 1.12 | 28.91 | 0.406 | 0.484 | 1.318 | 0.851 | 0.146 | 3.322 |