

Project datasheet: Foundations

Project name: Delphina Wind Park

Location: Bahia, Brazil

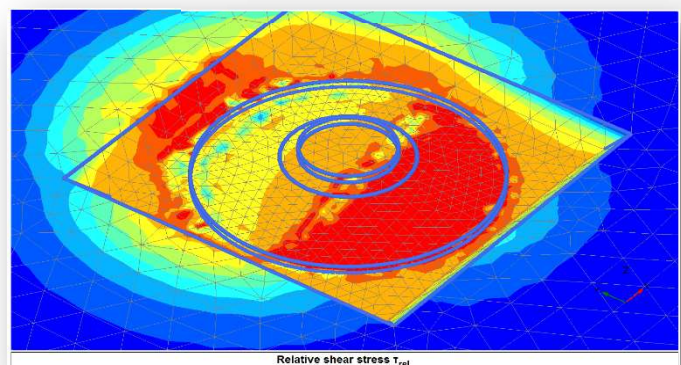
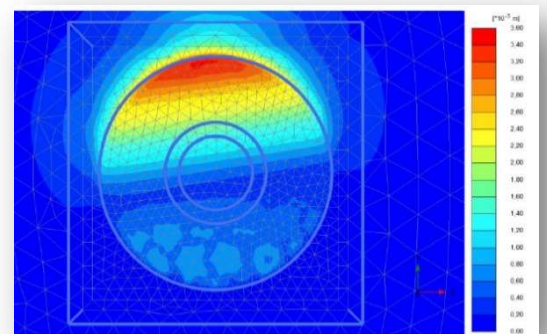
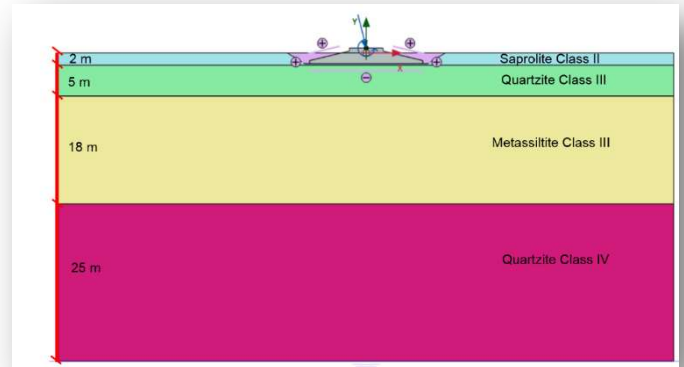
Client: Enel Green Power

Description: The Delphina wind farm has a total installed capacity of 29.4 MW with 80 m tall turbines, with 17.9 m diameter circular shallow foundations. The site investigation consisted of boreholes at the centre of each tower through soil and rocks and geophysical tests of electro-resistivity and MASW tests (Multichannel Analysis of Surface Waves). Detailed analyses of these data have led to a soil profile and engineering parameters for each turbine.

The analyses carried out for the foundation design consisted of a preliminary assessment and safety checks using standard plasticity theory methods followed by more sophisticated modelling through FEM (Finite Element Method) using the software Plaxis 3D.

Services provided by Terratek

- Site investigation data analysis;
- Foundation design;
- Structural design



Project datasheet: Foundations

Project name: Ayton Senna Stayed Bridge

Location: Rio de Janeiro, Brazil

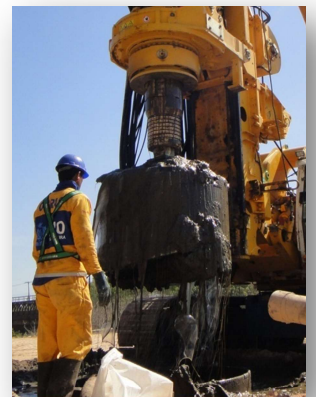
Client: Transcarioca JV



Description: The Ayton Senna Stayed Bridge is 200 m long and located in Barra da Tijuca borough of Rio de Janeiro. The foundations consisted of 2 m diameter bored piles excavated through soft clays and sands to the top of the bedrock. Then, they were pinned to the rock using root piles.

Services provided by Terratek

- Site investigation and CPTU;
- Foundation design;
- Crosshole tests on every pile;
- Vertical load static tests on selected piles using a hydraulic load cell embedded in the piles;
- Horizontal load test on one pile;
- Site supervision.



Project datasheet: Foundations

Project name: Metro Barra Bridge

Location: Rio de Janeiro, Brazil

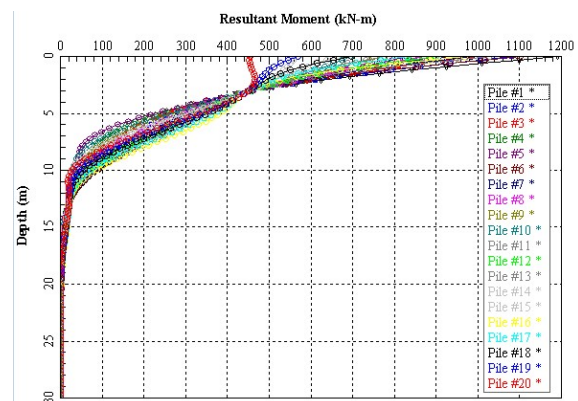
Client: Metro Barra JV Contractors



Description: The Line 4 Underground extension project in 2013 awarded Terratek a contract for the design of foundations of a 200 m long bridge designed by Calatrava Architects from Switzerland. The foundations consisted of 1.2 m diameter bored piles socketed into gneiss.

Services provided by Terratek

- Consultancy for foundation analysis and design;



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Project name: Rolls Royce
Turbine Factory

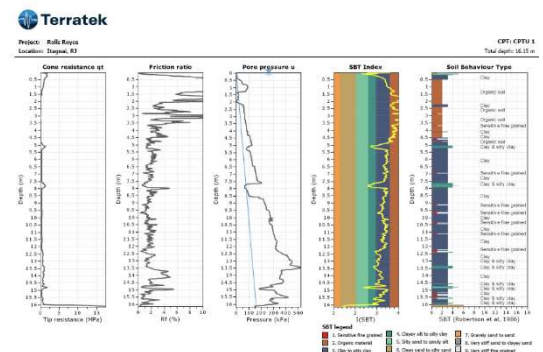
Location: Sepetiba, Brazil

Client: EBTE Contractors

Description: Rolls Royce factory lies in the Sepetiba Bay area and was built on 15 m deep soft clay overlying dense sands. Therefore, Terratek designed a ground improvement solution with 1.5 m spaced wick drains and a 1.5 m temporary surcharge. All buildings were piled with nearly 30 m long steel H piles.

Services provided by Terratek

- Site investigation: drilling and sampling and CPTU;
- Embankment design;
- Ground improvement through wick-drains;
- Instrumentation and monitoring;
- Pile design;
- QA & QC through static and dynamic pile testing.



Project datasheet: Foundations

Project name: SAG Mill Foundation

Location: Paracatu, MG,
Brazil

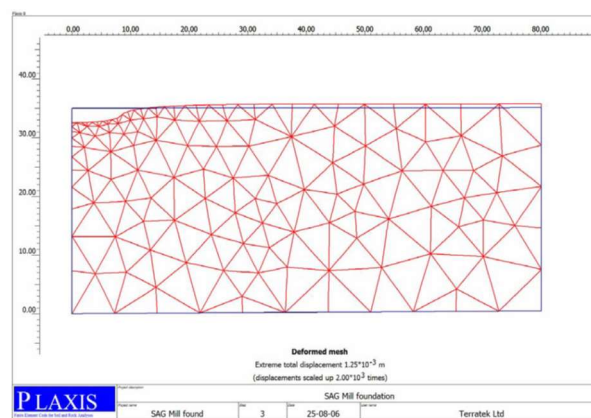
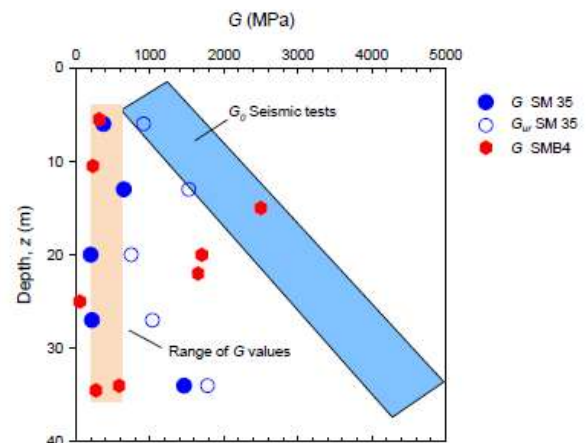
Client: Kinross Mining

Description: Back in 2007, RPM Mining, now Kinross Mining, carried out a large expansion project and the deployment of a new SAG Semi-Autogenous Grinding mill, 18 m in diameter



Services provided by Terratek

- Site investigation: drilling and sampling, PMT and seismic tests;
- Geotechnical analysis report;
- Dynamic numerical modelling of the foundation;
- Vibration monitoring for the commissioning of the structure.



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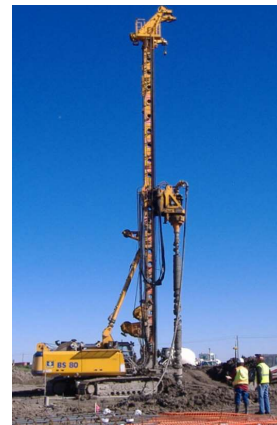
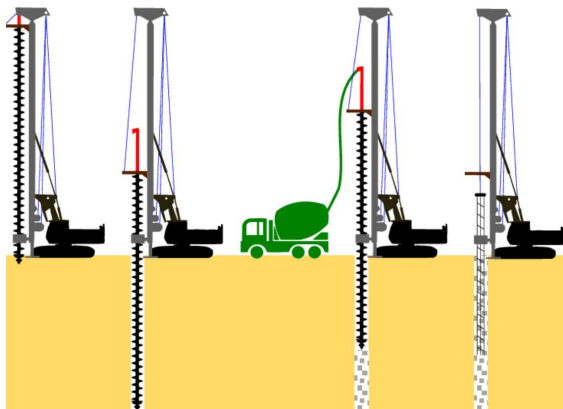
Project name: Shopping Lagos

Location: Cabo Frio, RJ, Brazil

Client: João Fortes Engenharia



Description: Shopping Lagos is a shopping centre built-in 2010. It is a two-story structure covering a large area. Soils conditions are 5 m deep loose sands overlying medium dense sand. Pillar loads are not large. Internal pillars apply only 190 kN on each foundation, but pillar along the perimeter apply a larger value of 530 kN. Terratek designed the foundations using CFA (concrete flight auger piles). Despite the small loading on each pillar, the foundations were isolated, therefore Terratek used a minimum of three piles per pillar, to avoid rotation and cracks to the structure.



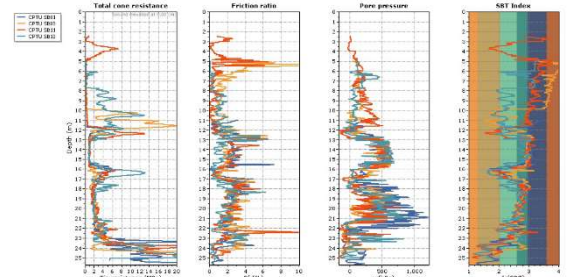
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Project name: Açú Harbour
Geotechnical Design Review

Location: Açú Harbour, RJ, Brazil

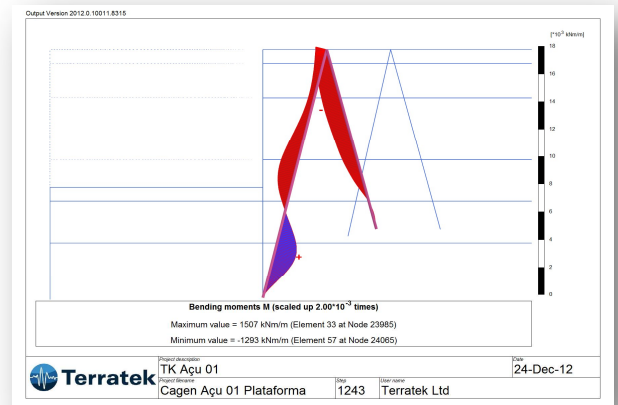
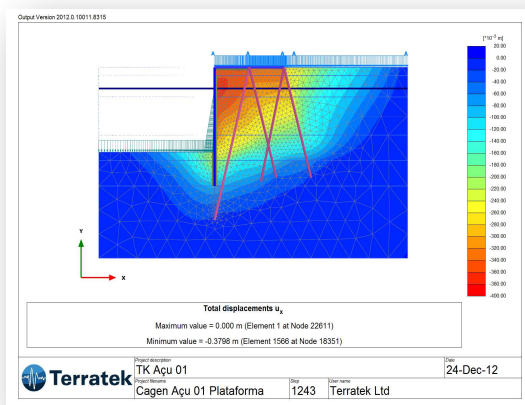
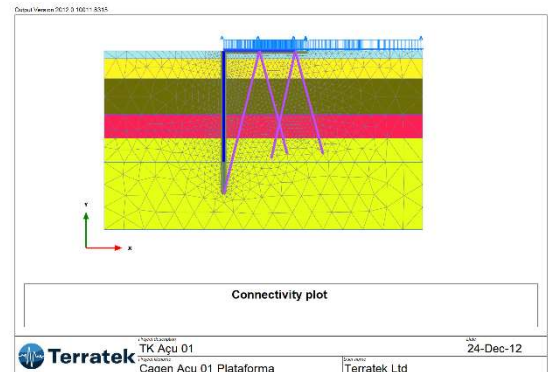
Client: Carioca Engineering Contractors

Description: Carioca Engineering Contractors awarded to Terratek back in 2012 a consultancy contract to carry out site investigation and geotechnical design review of the harbour structure. The existing design consisted of a steel sheet pile wall and a piled concrete structure to support cargo loading up to 200 kPa applied on the concrete slab. The navigation canal was designed to be dredged after the structure was ready. The Plaxis 2D numerical model demonstrated that dredging would lead to severe horizontal displacements and thus very high bending moments to the piles, leading to piling collapse.



Services provided by Terratek

- Site investigation: CPTU and seismic CPT
- Geotechnical analysis report;
- Numerical modelling of the harbour structure



Project datasheet: Foundations

Project Name: Hotel Atlântico Prime

Location: Rio de Janeiro, Brazil

Client: Duo Contractors



Description: Terratek was the foundation designer for a new hotel in the historical city centre of Rio de Janeiro. Ground conditions involved are 5 to 7 m deep soft soils, followed by hard layers. At the site there was a 100-year old historical low-rise building with shallow foundations, which had to be preserved, surrounded by the new high-rise building which was piled. The project consisted of $\phi 800$ mm, 15 m long CFA piles.

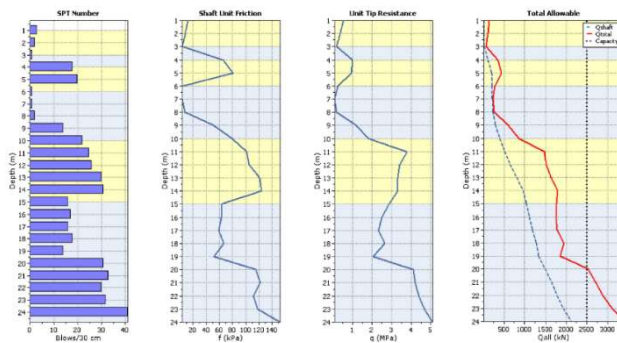
The construction site had several underground structures, including old piles. For this reason, the piles had to be frequently relocated whenever hit an obstacle during construction.

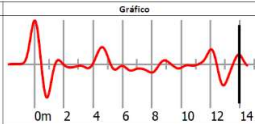
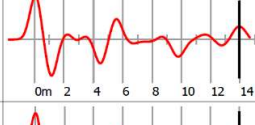
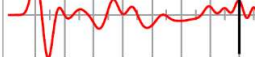
Later, Terratek was awarded a contract for the foundation design of an adjacent building, founded on $\phi 400$ mm minipiles.

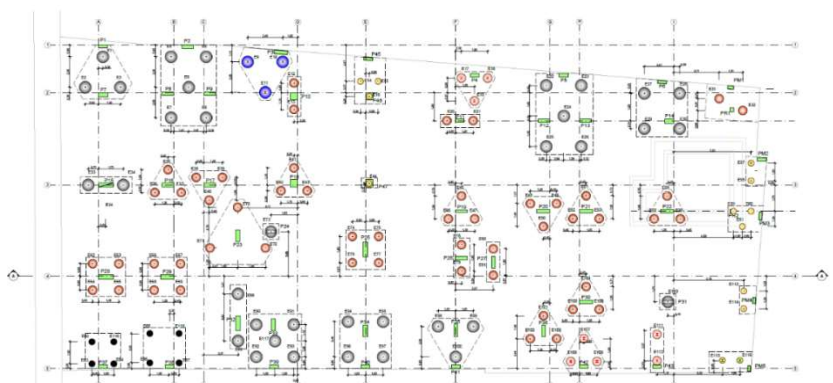
Terratek used a pile bearing capacity software *Spile*, jointly developed by Geologismiki and Terratek, and carried out the structural design of pile caps.

Services provided by Terratek

- Foundation design using CFA and minipiles;
- QA & QC through static and dynamic pile testing.



Estaca	L	Info	Gráfico
E54	14.0m	16/10/2014 Vel:3650m/s MA:22 Avg:15	
E55	14.0m	16/10/2014 Vel:3650m/s MA:19 Avg:17	
E56	14.0m	16/10/2014 Vel:3800m/s MA:95 Avg:9	



Project datasheet: Foundations

Project name: Steel Plant

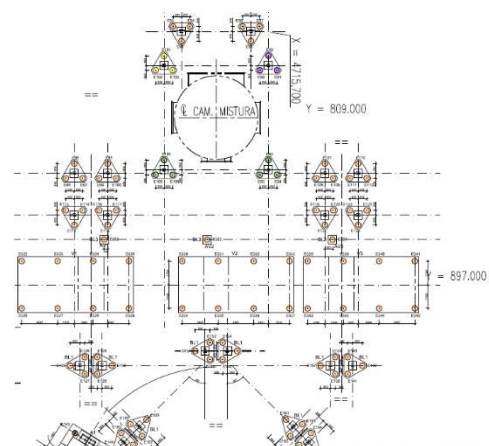
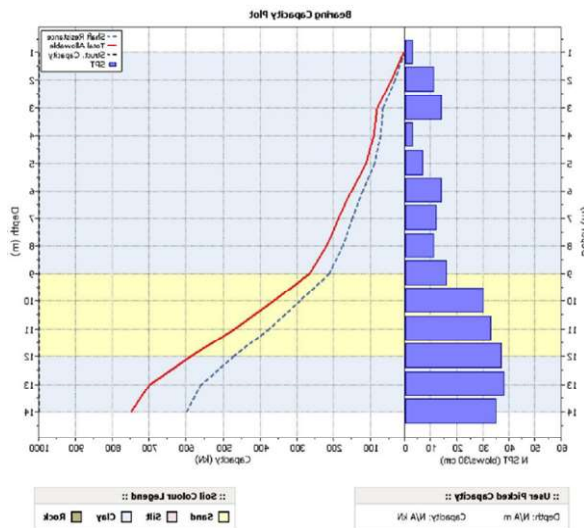
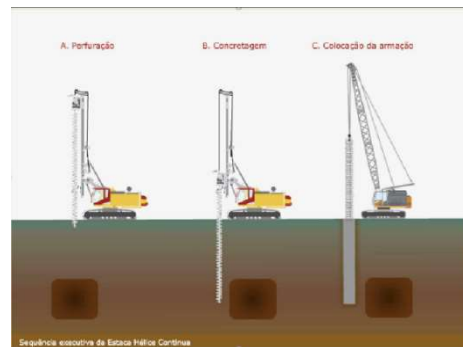
Location: São Paulo, Brazil

Client: Gerdau Steel Co.

Description: Terratek was the foundation designer for the Gerdau steel plant expansion project of the Gerdau unit in São Paulo. Ground conditions included 4 to 7 m deep low bearing capacity soils, whereby piling was necessary. However, the site was located on an old dump area, where leftovers from steel were dumped. Therefore, no driven piles. Terratek selected 400 mm diameter CFA piles, with an average length of 15 m.

Services provided by Terratek

- Foundation design with CFA piles.



* PILE TOP REACTIONS *

PILE GROUP	FOR. X, KN	FOR. Y, KN	FOR. Z, KN	MOM X, KN- M	MOM Y, KN- M
1	280.00	-0.6667	-24.000	0.0000	0.0000
0.0000	2228.2	-0.6667	-24.000	0.0000	0.0000
2	280.00	-0.6667	-24.000	0.0000	0.0000
0.0000	2228.2	-0.6667	-24.000	0.0000	0.0000
3	280.00	-0.6667	-24.000	0.0000	0.0000
0.0000	2228.2	-0.6667	-24.000	0.0000	0.0000
MINIMUM	280.00	-0.6667	-24.000	0.0000	0.0000
0.0000	2228.2	-0.6667	-24.000	0.0000	0.0000
1	1	1	1	1	1
MAXIMUM	280.00	-0.6667	-24.000	0.0000	0.0000
0.0000	2228.2	-0.6667	-24.000	0.0000	0.0000
1	1	1	1	1	1