

Project: Demerara Bridge

Location: Georgetown, Guyana

Client: CRCC China Railway Construction Co.



Description: The new Demerara River Bridge is located in Georgetown, the capital of Guyana. This project aims to build a replacement for Demerara Harbour Bridge. The total length of the alignment is 3216 m, including the main bridge, the approach bridge, and the approach road.

Terratek carried out:

- Site investigation planning, supervision and data analysis;
- Seismic assessment;
- Pile bearing capacity analysis;
- Numerical modelling of the foundations;
- Consultancy for the approach embankments.

Project: Structural rehabilitation design, Papagaios Bridge

Location: Paraná, Brazil

Client: Rumo

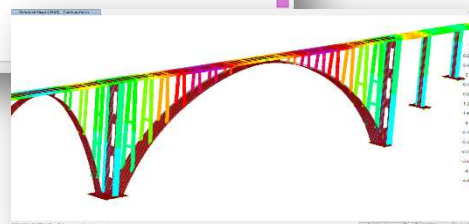
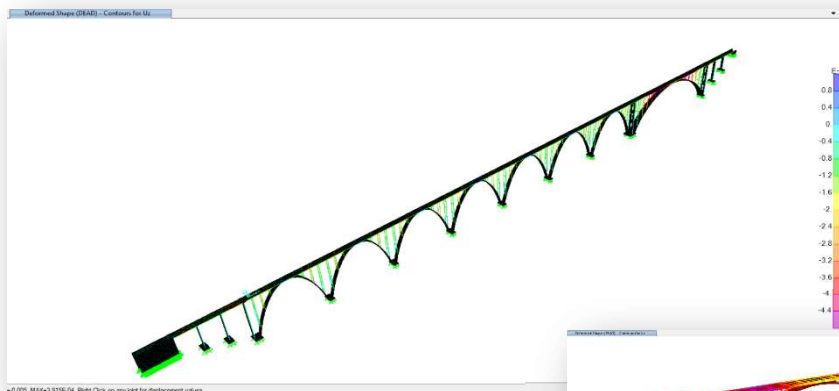
Description: Due to new loading conditions induced by increased traffic, an assessment of the structural integrity of the 60 year old Papagaios Railway Bridge became necessary. The bridge spanned 500 m and 90 m high over the Papagaios River in South Brazil.

In 2020 Terratek was hired for this project and a detailed assessment revealed the current design was inadequate for the new loading conditions. Terratek then designed a rehabilitation scheme which included reinforcing the pillars and the infrastructure.



Terratek carried out:

- Vibration monitoring with accelerometers;
- Data analyses and interpretation;
- Numerical modelling and calibration of the structural model in the frequency domain;
- Structural design and reinforcement of pillars and bridge slabs.



Project: Integrity assessment of bridges and abutments

Location: Amazon, Brazil

Client: Vale

Description: Buriticupu Bridge is part of Vale's Carajás Railway stretching over 1000 km from the Amazon iron ore mines to the São Luís Harbour. Vale built the first concrete bridge in the 80s. An additional line was constructed in 2016 and shortly after the new steel beam bridge showed signs of distress in one abutment. Vale awarded Terratek a contract to carry out a monitoring programme and geotechnical and structural integrity assessments of both bridges.



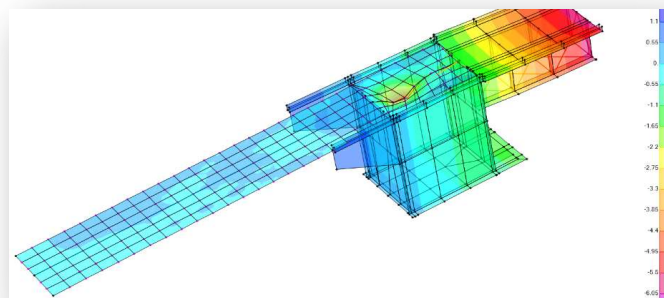
Terratek carried out:

- Site investigation programme and PMT tests;
- Geotechnical analyses using Plaxis 2D;
- Dynamic monitoring of both structures;
- Structural numerical modelling of both bridges;
- Data interpretation, analyses and recommendations.



Results

Both bridges presented normal and safe behaviour under severe loadings from trains. However, one abutment showed unacceptable displacements under loading. Terratek recommended replacing the railway pavement and the use of dampers to ease train impact when entering the bridge.

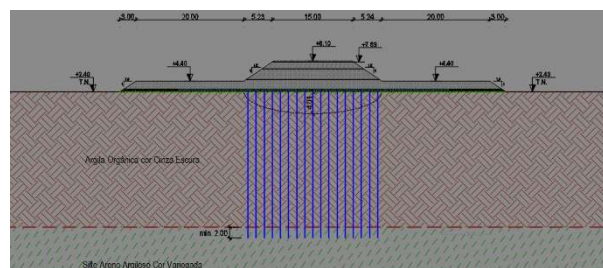
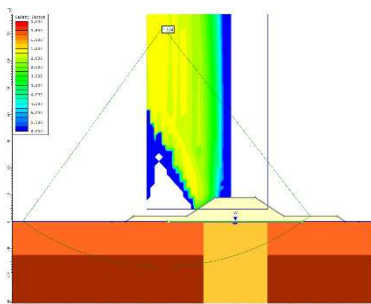


Project name: Pericumã Bridge**Location: Maranhão, Brazil****Client: Epeng Contractors**

Description: This is a 500 m long bridge over Pericumã River. Terratek was responsible in 2018 and 2019 for the onshore site investigation and detailed foundation design, as well as the bridge abutments embankments and the design of 7 km of access road embankments on soft soils.

Services provided by Terratek:

- Site investigation including in situ CPTU and VST and lab testing;
- Structural analysis and design
- Bridge foundation design;
- 5 km of access roads on soft soils
- Embankment design: geogrid reinforced embankments with temporary surcharge and soft soil improvement with 1.5 m spaced wickdrains;
- Instrumentation design.



Project name: Ayrton Senna
Stayed Bridge

Location: Rio de Janeiro, Brazil

Client: Andrade Gutierrez
Contractors



Description: As part of the Olympic Project in Rio de Janeiro, the Ayrton Senna Stayed Bridge was designed and built by 2013-14. Terratek was in charge of the site investigation, foundation design, quality control through integrity and pile loading tests. All foundations were piled with 2.5 to 3 m diameter bored piles socketed in rock.

Services provided by Terratek

- Site investigation: drilling, sampling, CPTU and VST
- Geotechnical consultancy and foundation design
- Site supervision during construction
- Crosshole integrity testing
- Pile loading tests with expansive hydraulic cells
- Instrumentation and monitoring



Project: Transoeste Highway Bridges

Location: Rio de Janeiro

Client: City of Rio de Janeiro

Description: The Transoeste Highway located in the South of Rio de Janeiro had a second line constructed in 2011. Terratek was the designer and provided not only bridge structural and foundation design but also geometry, earthworks, soft soils improvement utilizing weak drains, drainage and pavement design. Terratek designed two reinforced concrete highway bridges, one, 72 m long crossing Cabuçu River, the other crossing Valão das Cinzas River, 35 m long. Both had piled foundations using driven pre-cast concrete piles.



Project name: Mosquito Bridge

Location: Maranhão, Brazil

Client: Vale Railway

Description: Mosquito Bridge was built in the early '70s and by 2006 already presented structural damage.



Services provided by Terratek

- Bridge inspection;
- Concrete damage assessment
- Structural monitoring through high precision accelerometers
- Mode extraction and spectrum analysis
- Mathematical modelling
- Damage detection
- Integrity assessment
- Structural rehabilitation design



Bridges

Project name: Bridge 4B

Location: Sebiu – Bintulu Road,
Malaysia

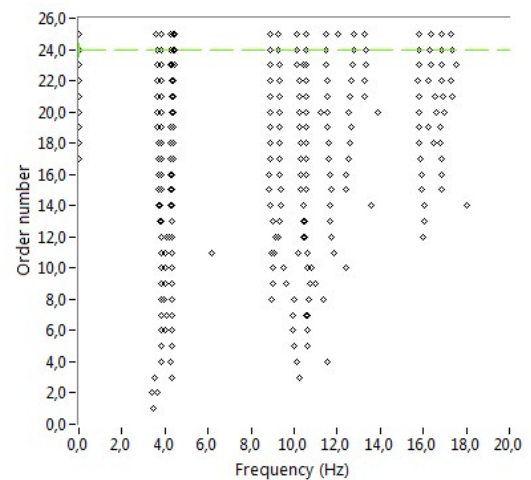
Client: JKR Works Department,
Malaysia



Description: The JKR was concerned about the design loading of this bridge, which was increased in recent structural standards. The JKR hired Terratek to carry out a dynamic loading testing and integrity assessment of the structure

Services provided by Terratek

- Bridge inspection;
- Concrete damage assessment
- Structural monitoring utilizing high precision accelerometers
- Modal and spectrum analyses, employing Stochastic Subspace Identification (SSI) technique;
- Mathematical modelling
- Damage detection
- Integrity assessment



Results

This bridge presented good behaviour and was safe.

