



DSI References



Reference Details

Owner Panama Canal Authority (ACP - Autoridad Canal de Panama), Panama +++ **General Contractor** Constructora Urbana S.A. (CUSA), Panama City, Panama +++
Contractor Atlantic Tractor S.A. +++
Subcontractor Rodio Swissboring Panama, Panama City, Panama +++
Engineers

DSI Unit DSI USA, BU Geotechnics, New Jersey, USA

DSI Scope Supply of 368 double corrosion protected DCP Rock Anchors, Ø26 and 36 mm, grade 150: S 830/1035 N/mm²



DYWIDAG Rock Anchors Protect Panama Canal against Landslides

Stabilization of a Slope at "Gaillard Cut", Panama Canal, Panama

"Gaillard Cut" is the name of the part of the Panama Canal leading through the Continental Divide of the American continent. This cut through 64m high hills started in 1882 and was one of the biggest technical challenges during the construction of the Canal. The 12.6km long cut used to be called Culebra Cut (Culebra = snake in Spanish) because of its many bends. However, it was later renamed after the American engineer Col. David DuBose Gaillard, who was the main person responsible for the construction of the cut. Due to the continuous increase in transit traffic, there had already been two enlarging projects from the original width of 91.5m to 222m today. As a result, the capacity of this bottleneck was increased to two Panamax ships into each direction and the safety of the passage could be ameliorated.

Ever since its construction, there have been massive landslides in this area because the substance of the soil is extremely unstable. The floor mainly consists of tertiary volcanic tuff, schistous clay and mudstone. At the time, the first massive landslide in 1907 led to fears that the construction of the channel would not be possible. However, the slopes were stabilized in such a way as to allow the opening of the Canal in 1914. Despite this, up to today, there continue to be mudslides into the canal, making continuous dredging necessary.

These geological surroundings are extremely sensitive to vibrations caused by construction works. Both of the widenings of "Gaillard Cut" caused further landslides that continued even after the completion of the construction work.

A comprehensive landslide control program was undertaken to minimize these risks. Extensive stabilization was carried out at a slope that was especially critical in mid 2007. For the additional stabilization and support, DSI USA supplied a total of 368 double corrosion protected DCP Rock Anchors consisting of 1" (26mm) and 1 3/8" (36mm) grade 150: S 830/1035 N/mm² post-tensioning bars from their factory in Bolingbrook, IL USA. The 7.5-15m long DCP Rock Anchors were installed and grouted by Rodio Swissboring Panama and the stabilization of the anchors was complemented by massive concrete blocks.

Consequently, the last of the extension works at "Gaillard Cut" were brought to an end and the minimum requirements for the visibility range were fulfilled. This project was the last one before the start of the widening of the complete Panama Canal in 2007.



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