

# Road infrastructure

Diaphragm wall - Barrettes - Ground anchors - Drilling

## RIVIÈRE DES PLUIES VIADUCT

SAINT-DENIS - LA RÉUNION ISLAND



### Foundations of the viaduct and protection of the embankment works



*View of the completed structure*

**T**he Rivière des Pluies viaduct is located on the southern boulevard of Saint Denis.

The structure is a curved bridge, 190m long, supported by two abutments and three intermediate piers set in the river bed.

The bridge deck is made up of two transverse caissons for a total width of 31m, which provides passage for motor vehicles, bicycles, pedestrians and the future tram-train.

CLIENT :	RÉGION DE LA RÉUNION
ENGINEER :	DDE 974 - ILE DE LA RÉUNION
JOINT VENTURE :	GTOI (MAIN CONTRACTOR) - DEMATHIEU & BARD SOLÉTANCHE BACHY
PERIOD OF WORKS :	JANUARY 2006 - AUGUST 2007

#### MAIN QUANTITIES:

- 3,360m<sup>2</sup> of diaphragm wall (1.00m thick; 16m deep)
- 60 pre-stressed anchors, max. length 30m
- 9 barrettes 1000 x 2800 (average depth 20m)
- 24 barrettes 1500 x 2800 (variable depth from 11 to 27m)
- Prior exploration : 11 destructive boreholes and 1 cored borehole of 25m



View of the completed structure from the abutment on the right bank



Trepanning for excavation of barrettes on the P2 pier

Solétanche Bachy was awarded the contract to build 33 barrettes under the various supports and also a 210m long anchored diaphragm wall to protect the embankment near the right-hand abutment.

### Special features

Most of the work was carried out directly on the bed of a river with highly variable and unpredictable water behaviour. The water flow in dry weather ( $\ll 1\text{m}^3/\text{s}$ ) can suddenly increase a thousand-fold to reach a torrential flow rate of 500 to 1 000 $\text{m}^3/\text{s}$  in some conditions.

The surface water hydrology and the hydrogeology change completely after heavy rain and make it difficult to set

the platform levels for building the diaphragm wall and the barrettes.

### Geology

The Réunion Island is a relatively recent volcanic formation with a highly complex geology. The main difficulty faced was the highly heterogeneous, indurated and cemented nature of the ground, which also contained basalt blocks of up to 2m in height. Trepanning was used virtually systematically during excavation.

The presence of a large unweathered basalt slab and the need to embed the barrettes through the slab meant that the ground surrounding the 8 barrettes under the P1 pier had to be prefractured by blasting.

### Phasing

Phase 1: start of diaphragm wall works on the right bank.

Phase 2: simultaneously, construction of barrettes under the P3 pier.

Phase 3: construction of barrettes under the A4 abutment on the right bank and under the P2 pier.

Phase 4: continuation of the diaphragm wall in the A4 area and installation of the barrettes under the P1 pier.

Phase 5: completion of the diaphragm wall in the A4 area and installation of the barrettes under A0 on the left bank.



Diaphragm wall excavation, right bank



Presplitting and blasting for the P1 Pier barrettes, left bank