



SILIANA TUNNEL

Tunisia, 1985

PROJECT CHARACTERISTICS

Works: rock cut for the portal of a twin tunnel. Formation of 28 m high exposed rock face above the portal.

Purpose: tunnels for river diversion, permanent bottom outlet and water intake at Siliana dam.

Dimensions:

- High of the rock face at the portal: 20 m
- Tunnel dimensions: each 9 x 8 m

Subsurface conditions:

- Steeply dipping marls and fine-grained sandstones in beds of 0.4 - 1.3 m thick.
- Clay inter-beddings 20 to 50 mm thick.

Construction method:

- High capacity (100 Mg) tendons 28 m long with 12 m long grouted bulb.



PROFESSIONAL SERVICES PERFORMED

Assessment of the rock structure. Geomechanical survey and geotechnical evaluation of the clay inter-beddings. General and local 3D stability analyses and design of stabilisation measures with selection of minimum acceptable safety factor. Assistance during implementation and early monitoring.

A large rockslide produced in the portal zone of the diversion/intake tunnels of Siliana dam. The collapse was triggered by improper portal geometry and by the undercutting of rock slabs separated by low strength inter-beddings. A collapse of over 15 000 m³ of rock produced shortly after a few rounds had been in the tunnel. Men and equipment were trapped at the front.

High capacity, pressure grouted, pre-tensioned anchors were installed over 700 m² of cut surface. The dislodged rock mass was hence removed. As excavation proceeded, a second series of anchors was installed.

The final geometry of the portal zone was modified and drain holes and gutters were added for a better control of surface and groundwaters.