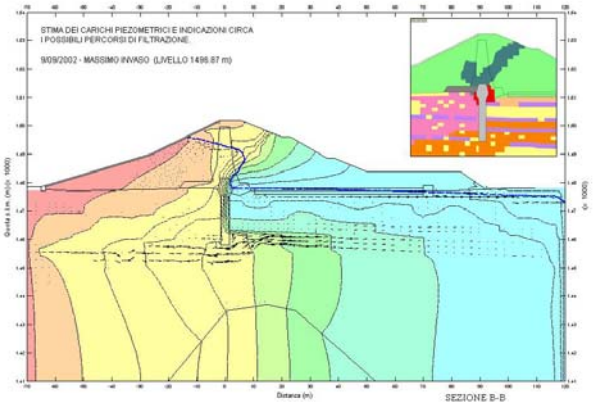
SEMBENELLI

C O N S U L T I N G

SAN VALENTINO DAM

Italy, 2005 - 2006

CARACTERISTICS OF THE PROJECT
Works: zoned earthfill dam built in 1942–1950, working since 1950
Purpose: hydropower production



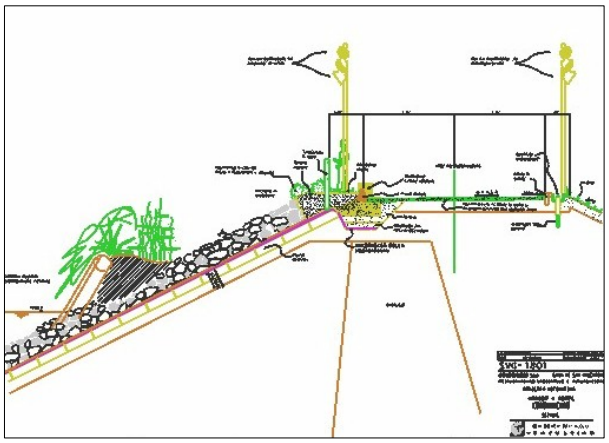
Dimensions:
- *height:* 32.8 m,
- *slope volume*: 556 000 m3
- *storage*: 127 000 000 m3
- *crest length*: 466.75 m

Watertightness: Central core and partly penetrating concrete diaphragm wall with inspection gallery at the top.

Materials:
- *fondations:* micaschists (right abutment), alluvial sands and gravels (core and left abutment);
- *embankment*: alluvial sand and gravel. Core enriched with bentonite

Monitoring:
- *Displacements:* 9+13 levelling and aligment bench marcks on the d/s berm, 32 benchmarks along the gallery, 36 points on the u/s slope;
- *Piezometers:* 36 open piezometer, 17 piezometric cells, 12 piezometers on the d/s slope + 6 downstream from the dam, 19 electric inserted in standpipes piezometers, 22 Casagrande piezometers, 44 standpipes in the diaphragm wall;
- *Seepage:* 21 relief wells, surface and deep seepage collectors.

PROFESSIONAL SERVICES PERFORMED
Preliminary and Construction Design of environmental rehabilitation and extraordinary maintenance. The project provided works to rehabilitate the upstream face, adapting the dam to the landscape. The present crest is naturalized the concrete elements and creating on the back of the blocks of the u/s face, a grass belt covered by grass and vegetated with mugho pines, alders, or others autochthonous bushes. The road is paved by slabs of porphyry and flangued by a wooden parquet. A rock blocks with log insertions replace the present concrete slabs slope. The downstream face is maintained except for planting part of the dam premises with forest trees.



Filtration process, tension-deformational conditions and stability of the dam were analysed using the data collected in 50 years of continuous monitoring more than 500 000 data were organized in a data bank.
These analyses have been made with bi/tridimensional finite elements (programs: SEEP/W, SLOPE/W, and SIGMA/W of GEOSLOPE) allowing an incremental analysis and the modelling of materials with no linear behaviour.
The analyses pointed out progressive modifications of the piezometric surface within the body of the dam which could lead to progressive loss of watertightness and possibly to hydrofracturing.

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