FEATURE OF TECHNICAL SERVICE

Subject	Executive Project of Castellanza pitting – Integrated contract works Lot 1 of the Saronno-Malpensa railway – M11. The operation was carried out on the T2 route from km 30+726 and km 32+635 to the municipality of Castellanza (Varese province), and consists of two double-oven tunnels with blind holes and eight inspection and ventilation shafts.	
Carried out by	SGAI Srl of E. Forlani & C.	
Client	ITINERA S.p.A. (already Grassetto Lavori S.p.A)	
Service length	2003	
Value of works	€ 30'351'783,82	
Categories value	S.05 E.17 V.02	€ 28'523'090,83 € 1'708'479,21 € 120'213,78

1 8000.00 1 10.04 1 0.05 5 80.40 5 0.0071 No 5000.00 Te 55.15 5- 5.26 5- 104.19 E- 0.0713 START LOT Start natural Underpass Via km 30+726.37 tunnel Italia By-pass By-pas **By-pass** Artificial tunnel (outside the Lot) Highway A8 Bridge on Olona river 2223

The service presented covers the section that has been removed from the Definite Project of the T2 section between km 30+726 and km 32+635 in the municipality of Castellanza (Varese), consisting of **TWO blind hole tunnels** and eight shafts, two of which are at the entrances of the tunnels under construction and will ultimately house the ventilation rooms, safety exits and firefighter entrance. The blind hole tunnels consist of twin tube with length of 1853m, each of which will house a single binary ("Pari" and "Dispari"). The cross section is of the circular type with external diameter of 8m.

In view of the evidence of the supplementary geognostic surveys foreseen in the executive project and the considerations outlined in the report *«Relazione sulla scelta della metodologia di scavo meccanizzato»* drawn up by SGAI, the NOT applicability of the EPB system has emerged as the main issue. This excavation system was provided for by the contractual documents and adopted in the first place by the company. This issue has been solved by combining the EPB excavation with technique of preconsolidations in the cover cap with injections of cement-based mixtures and a partial filling of the excavation chamber. The railway line has been checked to highlight all possible interference with the planned and pre-existing works. Therefore, studies, tests, modelling and monitoring were carried out in the attack zones and connections to the existing binary on both side Saronno and Malpensa, which required a careful study of the detailed surveys and interferences present along the track.









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Modeling, interference and checks

The analysis and study of the railway alignment was conducted by 3D modeling the morphology of the ground and project infrastructure with special software (*Rockware Quicksurf*), which it was also possible to verify the design deviations from detail survey and planning the ground works and study service access roads to ventilation shafts.

