WB24-SRB-TRA-02 Reconstruction and Modernization of Railway Kraljevo–Rudnica

BOQ - PRICE BID

Geotechnical Investigation							
Art.	**Item Description**	Unit	Quantity for bridges & open line&retaining walls	Tunnel' GI Quantity	Total Quantity	*Unit Rate (Euro) without VAT*	*Cost (Euro) without VAT*
1	**PREPARATORY WORKS AND TRANSPORTATION COSTS**						
1.1	Mobilization and Demobilization, including coordinations and obtaining permits from Serbian Railways Infrastructure (SRI) and eventual H&S training	LS			1		
1.	**TOTAL 1 (Euro) without VAT**						
2	**SITE INVESTIGATION WORKS**						
2.1	Setting up and dismantling of the drilling rig,	LS			1		
2.2	Engineering - Geological mapping along the railway axis up to 50 m alongside it (i.e. 100 m zone). Mapping shall cover the following *at minimum* : a) Identification of different lithological units or/and soil formations b) Tectonic diagrams (where possible) at the areas of the bridges, tunnels and retaining structures c) Geological map at 1:2000 for the alignment and 1:500 for the portals of the tunnels d) Geological section along the alignment e) Cross sections at the locations of the tunnels, bridges and retaining structures f) Classification of rockmass g) Identification of unstable zones along the alignment. See Article 4.2	Km2			7,7		
2.3	Rotary core drilling of boreholes including water provision and casing (were necessary). (Vertical drilling)	ml	551		551		
2.4	Rotary core drilling of boreholes including water provision and casing (were necessary). (Vertical drilling)-Existing/New Tunnels	ml		578	578		
2.5	Rotary core drilling of boreholes including water provision and casing (were necessary). Inclined - horizontal drilling-Existing Tunnels where the access is not possible	ml		70	70		
2.6	Non sampling Borehole (m) in case of rock/or soil	ml	130		130		
2.7	Standard Penetration Test ASTM D 1586. Performing the Standard Penetration Tests (SPT) – shall be carried out at 3 m interval in each borehole, exclusively in soil materials.	LS			50		
2.8	Engineering-geological mapping the core of the boreholes, together with photographing the core. The geologist on site shall provide the following: a. Field description of the core sample per AUSCS or/and BS5930, b. Wrapping and storing of samples in wooden core boxes, c. Photographing and labeling of core samples, d. Supervision of the flawless progression of the driling process.	ml			1129		
2.9	Excavation of trial pits with depth 2.5 - 4.0 m, incl. mapping and sampling (Engineering-geological mapping trial pits)	Nb	98	0	98		
	Geophysical measurement						
2.10	Geo Electrical measurement. Geo-electrical investigations in addition to boreholes will be conducted. Vertical Electrical Sounding (VES) geo-electrical investigations in the location of the new tunnels	Nb	-	4	4		
	In situ Permeability test						
2.11	Lefranc test	Nb	10	0	10		
2.12	Lugeon Test	Nb	0	90	90		
	Piezometer installation						
2.13	Piezometer installation included PVC tube, for water table monitoring	ml	180	60	240,00		
2	**TOTAL 2 (Euro) without VAT**						
3	**LABORATORY TESTS**						
3.1	Particle size analysis – by sieving and / or hydrometer methods.	Nb	10	-	10		
3.2	Atterberg limits ASTM D 4318 (plastic and liquid limits, plasticity index).	Nb	10	-	10		
3.3	Determination of natural water content.	Nb	10	-	10		
3.4	Determination of unit weight of soil – bulk and dry density.	Nb	0	-	0		
3.5	Determination of soil strength parameters (direct shear test).	Nb	30	-	30		

3.6	Unconsolidated-undrained / Consolidated-undrained triaxial test.	Nb	15	-	15		
3.7	Unconfined compression test on soil.	Nb	10	-	10		
3.8	Oedometer test.	Nb	5	-	5		
3.9	Proctor test (dry density/moisture content relationship).	Nb	49	0	49		
3.10	California Bearing Ratio (CBR) test.	Nb	49	0	49		
3.11	Water Chemical analysis (SO4, pH, CO2, NH4+, Mg2+, Cl-)	Nb	20	0	20		
3.12	Chemical analysis of ground (SO4, (mg/kg), CaCO3, Cl-, Acidity degree according to method Baumann Gully (ml/kg),	Nb	20	0	20		
	Rock test						
3.13	Uniaxial Compressive Strength (UCS) of intact rock core.	Nb	40	40	80		
3.14	Point Load Test (PLT) on rock samples.	Nb	40	40	80		
3.15	Direct shear on the discontinuity planes	Nb	40	20	60		

3	**TOTAL 3 (Euro) without VAT**						

4	**REPORTS**						
4.1	Factual report for bridges, tunnels, open line and material construction including external control, Documentation of site and laboratory tests. The following should be included *at minimum* a) Cummulative tables and graphs of laboratory testing results, b) Presentation of field test results in tables and graphs, c) GWL monitoring during drilling and subsequently (if available), d) Plan view with the points of investigation, e) Borehole logs with the description of the encountered formations, the SPT results, the laboratory testing results, the permeability testing results, the TCR, SCR and RQD (if applicable) of the drilling process and any other informations relevant to the current borehole each time, f) The laboratory sheets for every test conducted, g) Photo documentation of the boreholes, h) Classification (GSI, RMR) of the rockmass samples	LS			**1**		
4.2	Geological Report. Preparation of a Final Geological Report, including *at minimum* the data obtained through the engineering and geological mapping (refer to Article 2.1), evaluated towards the direction of deriving a conceptual geological model for the whole area of investigation with conclusions and recommendations regarding any geological risks / hazards that could arise. waste deposits and borrow pits report.	LS			**1**		
4	**TOTAL 4 (Euro) without VAT**						

5	**GENERAL TOTAL (Euro) without VAT**						