

2 Geological conditions at the area of the embankment (Relevant paragraph of the paper: SITE LOCATION AND GEOLOGICAL CONDITIONS)

According to the Geological study, which has been elaborated for the current project (Megalomastora, 2012), the examined embankment is founded on alluvial deposits (AL) consisting of clayey and sandy-clayey soil materials. In places, fine pebbles of marble and gneiss of brown-red colour are also included in the mass of alluvial deposits.

In the broader area of Nestos' river bed the alluvial deposits consist mainly of sandy to sandy-gravelly materials of yellow-brownish colour. The porous layer of alluvial deposits is characterized by varying values of permeability coefficient, depending mainly on the grain size distribution of the formation, which is differentiated along the examined area. It is noted that greater values of permeability coefficient are expected in the coarse-grained layers of the alluvial deposits encountered into Nestos' river bed.

Due to the loose structure and the sandy to sandy gravelly composition of the deposits, water circulation is locally allowed through their mass, whereas the groundwater level is expected to be encountered at small depths from the ground surface at the level of Nestos' river. The rock formation of gneiss (gn) constitutes the bedrock at the area of interest.

In order to investigate the geotechnical conditions along the examined embankment, the results of geotechnical investigations from several phases are available. This is one of the reasons for which the examined case study is considered as particularly suitable for undergraduate instruction in the geotechnical engineering field. More specifically, the following geotechnical data are evaluated: a) four (4) sampling boreholes (M8, M12, M16, A2) executed in the framework of the current railway line project and b) seven (7) sampling boreholes (G48, G50, GN-1 to GN-4 and G103) executed in previous investigation phases for the adjacent project of Egnatia Highway.

Based on the above, the students have the opportunity to thoroughly evaluate the available data and get acquainted with the determination of the soil profile as well as the determination of the geotechnical parameters of the encountered formations. The above data will be used for the geotechnical design of the embankment.

Engineering geological evaluation of geotechnical investigation

Based on the findings of the Final Geological Study of the project and the borehole data of the pertinent geotechnical investigations (borehole logs, laboratory test results from representative soil samples), a preliminary separation of the individual geotechnical layers along the examined embankment is performed.

The engineering geological evaluation of the sampling boreholes located in the examined embankment is listed in Table 2-1.

Table 2-1: Engineering-geological evaluation of boreholes

No	Borehole	Depth (m)		Symbol	Formation
		From	To		
1	M8	0,00	48,00	AL	Alluvial deposits
		48,00	55,00	gn	Gneiss
2	M12	0,00	46,00	AL	Alluvial deposits
3	M16	0,00	50,00	AL	Alluvial deposits
4	A2	0,00	26,30	AL	Alluvial deposits
		26,30	33,00	gn	Gneiss
5	G48	0,00	25,30	AL	Alluvial deposits
		25,30	33,00	mr	Marble
		33,00	44,50	gn	Gneiss
		44,50	45,70	mr	Marble
		45,70	50,00	gn	Gneiss
6	G50	0,00	25,00	AL	Alluvial deposits
7	GN-1	0,00	18,70	AL	Alluvial deposits
		18,70	30,00	gn	Gneiss
8	GN-2	0,00	15,50	AL	Alluvial deposits
		15,50	30,00	gn	Gneiss
9	GN-3	0,00	16,00	AL	Alluvial deposits
		16,00	24,50	gn	Gneiss
10	GN-4	0,00	16,00	AL	Alluvial deposits
		16,00	25,00	gn	Gneiss
11	G103	0,00	1,70	AL	Alluvial deposits
		1,70	15,00	gn	Gneiss

Groundwater level measurements

In order to determine the groundwater level in the encountered geological formations along the examined alignment, the measurements taken from the piezometers installed in the boreholes are evaluated. In Table 2-2 the results of these measurements, taken after the completion of drilling process, are presented.

Table 2-2: Water level measurements at the piezometers of the boreholes at the area of the embankment from CH. 92+610 to CH. 93+870

Boreholes	Depth (m)	Geological formation of aquifer	Relative water level depth from ground surface (m)	
			26-11-01	10-6-02
M8	55,00	Alluvial deposits (AL)	4,90	-
M12	46,00		4,80	-
M16	50,00		5,20	-
A2	33,00		5,00	-
GN-1	30,00		-	1,80
GN-3	24,50		-	1,80

Accompanying files

2-1. The geological plan view with the boreholes' locations at the area of the embankment is presented in the following file:

2-1_GEOLOGICAL PLAN VIEW WITH BOREHOLES.jpg

2-2. The geological longitudinal section at the area of the embankment is presented in the following file:

2-2_GEOLOGICAL LONGITUDINAL SECTION.pdf

2-3. The borehole logs (boreholes listed in Table 1) are presented in the following file:

2-3_BOREHOLE LOGS.pdf

Relevant Reference

Megalomastora, P. (2012). "Final geological study – Studies regarding the design of the new railway alignment between the existing line and Kavala's commercial port – Phase B-Section B: Gravouna station-Connection with the existing railway line." EDAFOMICHANIKI S.A., April 2012 (in greek).