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GEOCONSTRUCT LTD.

telephone: 0899 822 691, fax: 02/416 53 02

Translation from Bulgarian

address: 19 Zholio Kyuri str., fl. 6, ap. 10

e-mail: [office@geoconstruct-bg.com](mailto:office@geoconstruct-bg.com)

## WORKING DESIGN

Amendment under Art. 154 according to the Spatial Development Act  
SITE: "INCREASING THE HYDRAULIC CONDUCTIVITY OF R. TSAPAREVSKA  
ON THE TERRITORY OF THE VILLAGE OF MIKREVO, TOTAL. FLOWED BY  
INNOVATIVE METHODS FOR WATER MANAGEMENT (GEOCELLS) "

ASSIGNOR: MUNICIPALITY OF STRUMYANI

CONTRACTOR: GEOCONSTRUKT LTD.

PART: GEOTECHNICAL REPORT

Manager:

Nikolay Mihaylov

Designers:

Eng. Geol. Mihail Markov

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## **1. INTRODUCTION**

The current engineering-geological survey was made in connection with the amendment of a working project for the correction of the Tsaparevska River - strengthening and cleaning in the village of Mikrevo. The river runs along the village in a southwest-northeast direction. The section, which will be strengthened and cleaned, starts from the bridge to the school and ends at the confluence of the river with the Struma River and is 1212 m long. Tsaparevska River descends from Maleshevska Mountain, has a large catchment area and has a constant inflow. That is why it is necessary to build its correction in order to protect the properties around it from seasonal floods.

The purpose of the survey was to clarify the geological structure of the earth layers and to specify their capacities. Also to determine the normative load of soils and their construction category. Specification of the groundwater level, the grain size distribution and the physical and mechanical parameters of the lithological varieties.

For this purpose, an inspection was made along the route of the river and the available natural discoveries around it.

Contracting authority of the site is: Strumyani Municipality.

## **2. GEOLOGICAL CONDITIONS**

The engineering-geological survey of the site shows that only Quaternary deposits are revealed, represented by an artificial embankment and boulder-gravel deposits (Fig. 1).





FIG. 1. Excerpt from a geological map (Kl. Strumica, Petrich, Gevrel and Sidirokastron)

**The artificial embankment** is ubiquitous and is 0.20 m ÷ 0.30 m thick. It is from construction and household waste.

The following are the **boulder-gravel deposits**, which are materials from the sediments of the old river terrace of the Tsaparevska River. The boulder pieces, which have a diameter of 0.20 m to 1.1 m, and the gravels are magmatic and metamorphic, with a large amount of sandy-clay aggregate. They are revealed in depth, and the bottom of the layer has not been established. The Contractor has the following calculated physical and mechanical parameters, which are evaluated on the basis of expert inspection and evaluation:

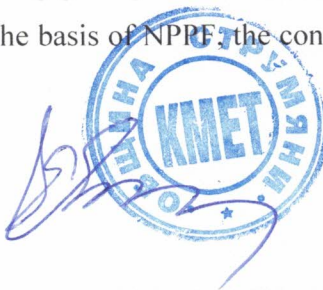
- bulk density -  $\rho_n = 1.90 \text{ gr / cm}^3$
- pore coefficient -  $e = 0.65$
- residual internal friction angle -  $\text{speed} = 22^\circ$
- modulus of total deformation -  $E_o = 10.00 \text{ MPa}$

### 3. HYDROLOGICAL CONDITIONS

Due to the constant inflow of water into the river, it is necessary to provide appropriate precautionary measures to protect the future facility from constantly flowing water.

### 4. ENGINEERING AND GEOLOGICAL CONDITIONS

Based on the results obtained from the engineering-geological survey and according to the regulations for design of buildings and facilities on the basis of NPPE, the conditional design





load for the boulder-gravel deposits of:

$$q_0 = 0,40 \text{ MPa}$$

## 5. CONCLUSION

Given the results obtained from the engineering-geological survey of the site, the following recommendations and conclusion can be made:

- To be funded according to the above proposed design load for boulder-gravel deposits;
- After making excavations (ditches) the presence of boulders and large gravels was established, which should be removed from the future route in order to form the profile.
- Direct foundation on the artificial embankment is not allowed;
- The groundwater of the site has a constant level and therefore it is necessary to provide appropriate precautionary measures to protect the future facility from constantly flowing water;
- The site is in an area with seismicity of IX degree;
- The construction category of the soils is 100% heavy earth;
- The natural slope of excavations with a depth of up to 3.00 m will be up to 1: 1.25;
- Excavation works to be accepted by a geologist and a designer.

Drafted:

Eng. Geol. Mihail Markov

