

## THE ROLE OF GEOPHYSICAL METHODS AT THE ENGINEERING GEOLOGICAL SITE INVESTIGATIONS FOR CONSTRUCTION

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The development of technology's principles of integrated engineering geological site investigations to get reliable information for designing buildings and constructions at the optimal expenditures is one of the most important tasks at present.

In general true technology's basis of integrated site investigations with continuous technological working cycle includes the following aspects:

The analysis of the past investigations' results and (or) information on the adjacent sites, the preliminary working hypothesis of the category of engineering geological condition's complicity, including construction's classification;

Geophysical investigations to estimate and reveal the peculiarities of geological structure and hydrogeological conditions, the preliminary scheme of the investigation's sites location;

Penetration logging, static and (or) dynamic sounding on a relatively thin net, drilling and sampling of some boreholes, laboratory soil tests;

The analysis of the first results, the specification of the condition category's complicity and investigation's scheme in accordance with the designing organization;

Penetration logging completion, drilling with purposive sampling specimens of undisrupted and disrupted structure and choosing places of different field works on the basis of spatial variability estimating of soil property according to the penetration logging data, the use of penetration logging between the boreholes for detalization and specification;

The analysis of investigation's results, definition of engineering geological and soil calculated elements, the necessary calculated soil characteristics, conclusions, recommendations on conducting further investigations and monitoring.

It is enough to carry out shallow depth geophysical investigations when making a decision concerning a wide circle of engineering geological and geocological tasks. Resistivity prospecting is widely used in "Geoservice" for the decision of engineering problems, what is very important when investigating the soil of glacial formation marked with a high level of physical mechanical property's heterogeneities. The works on a new 2D electrical sounding technology (resistivity tomography) have been launched recently in many countries, in-

cluding Belarus (“Geoservice”). This method allows to perform the investigations in higher detail with optimal resolvability. In the complex with electrical sounding there have been widely used the georadar methods of investigations of subsurface horizons as the base and sphere for designed buildings and constructions. The modification of electrical sounding with non - contact electric field measurement is being introduced into the investigation work performance. A principally new approach to the use of electrical sounding in combination with georadar for engineering investigations allows to enlarge substantially scope of tasks under consideration, to increase productivity and quality of engineering geological investigations.

Penetration logging should be laid in the basis of integrated investigations. It allows to measure continuously along the cross-section six parameters of physical soil properties: soil resistivity under sonde head ( $q_c$ ), soil resistivity at side sonde surface ( $f_s$ ), soil density at penetration logging at GGL ( $\rho$ ), bulk moisture content at neutron- neutron logging ( $W_v$ ), natural soil gamma-activity at gamma-ray logging ( $I_\gamma$ ) and specific soil resistivity at electric logging ( $\rho_a$ ).

For recording, accumulation and adaptation of information the field geophysical stations are equipped with Notebook computers and modern software, allowing to perform digital recording of field information with corresponding graph displaying, to accumulate information on hard disk, to fulfil its automatic data processing and printing. It enables a specialist to make operative decisions, to put in corrections into the investigation technological process and, in the end, to carry out efficiently engineering geological investigations.

As it is proved by practice the most reliable studies of engineering geological conditions of construction sites with correct physical mechanical soil property's investigation are to be reached only with a use of integrated studies. It is specially important in studies of soil characterised with a significant spatial variability. The important role in engineering problems' decision belongs to geophysical methods as the basis of the complex: electrical sounding and georadar enable to discover the peculiarity of geological structure and hydrogeological site's conditions, to choose the rational working complex and the field technology. Penetration logging allows to divide in detail the geological cross-section and on the statistical links' basis to define the most important mechanical soil properties: specific cohesion, inner friction angle, deformation modulus and calculated resistivity for different genetic soil types, kinds and varieties and also to calculate the bearing pile capacity. Geophysical and engineering geological investigation results are used jointly for geocological estimation of the situation.

In our opinion the use of various geophysical methods for decision of engineering tasks allows to raise the technological process of engineering geological and geocological investigations to a higher level.