GEOSPECTRUM

Advanced geophysical technics

GROUND STUDIES

GEOPHYSICAL SURVEYS

Geophysical surveys are performed together with traditional geological surveys to identify the soil and rock structure. They allow to eliminate the limitations of point and invasive geological diagnosis. The advantages of such non-destructive engineering geophysical surveys are continuous, rapid and economical recognition of the geological medium.

These surveys are widely used in engineering issues related to ground recognition tasks for design purposes. They are also used to verification of the quality of investment implementation.

Georadar acquisition to identify the structure of the soil, geotechnical borders and cracks in the rock during construction.

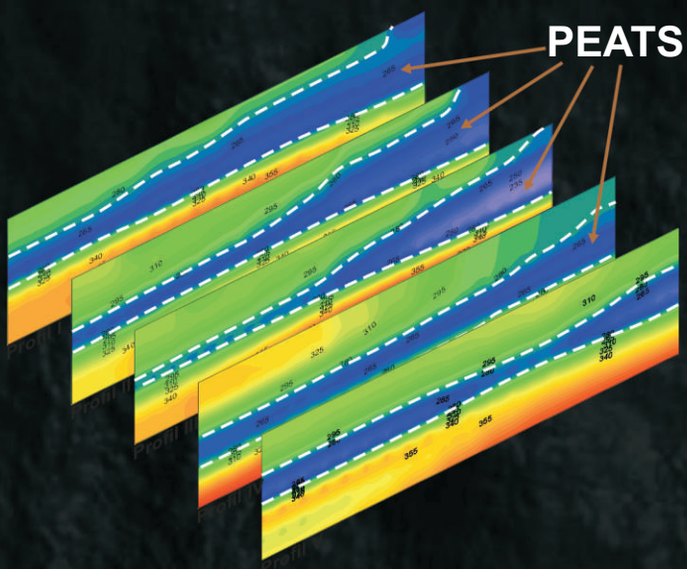
Studies of geoelectrical resistivity using ERT method.

The most common applied geophysical methods:

- georadar method (GPR)
- seismic method
- DC resistivity method.

Such studies are an important complement to geotechnical investigations in the field of precise recognition of the structure and geomechanical state.

Seismic studies for geotechnical recognition before the planned housing development.



Seismic MASW sections present changes in the thickness of the layers and allow to determine the volume of peat.

DC RESISTIVITY METHOD

Geophysical surveys with the electrical resistivity method are based on changes of real resistivity of the geological medium.

Commonly techniques used in this method:

- electrical resistivity tomography 2D (ERT)
- electrical resistivity soundings 1D (VES)
- electrical resistivity profiling 1D (EP).

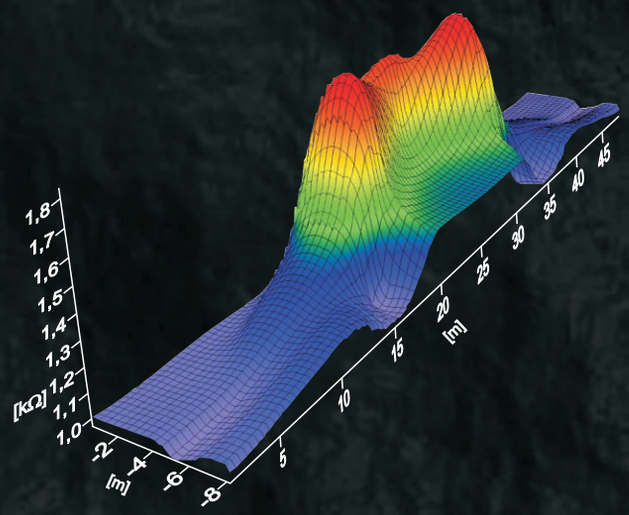
Results of these measurements are presented as vertical profiles, cross-sections and resistivity maps including geophysical or geological-engineering interpretation.

SEISMIC METHOD

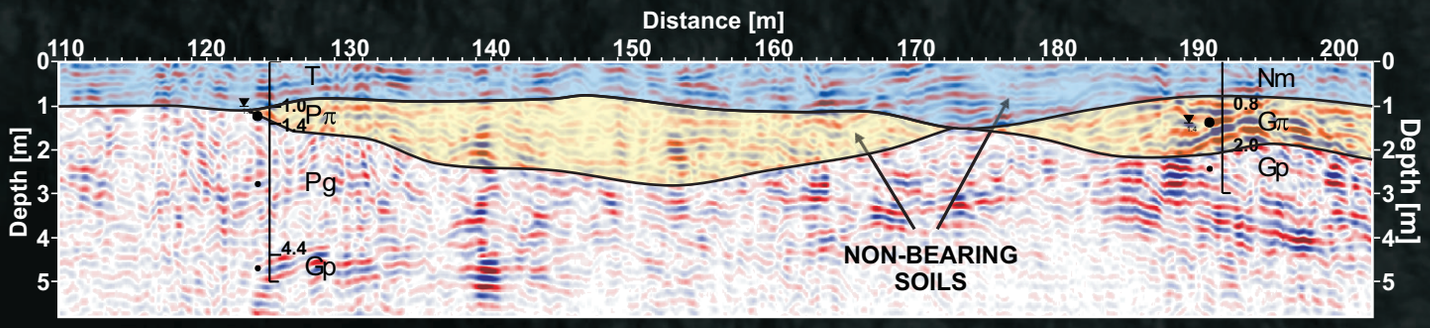
Geophysical surveys done by this method base on the changes of elastic parameters of the ground and are carried out with typical techniques:

- seismic refraction
- multichannel analysis of surface waves MASW 1D/2D/3D, MAM/ReMi 1D
- seismic refraction tomography
- crosshole, downhole, tomography

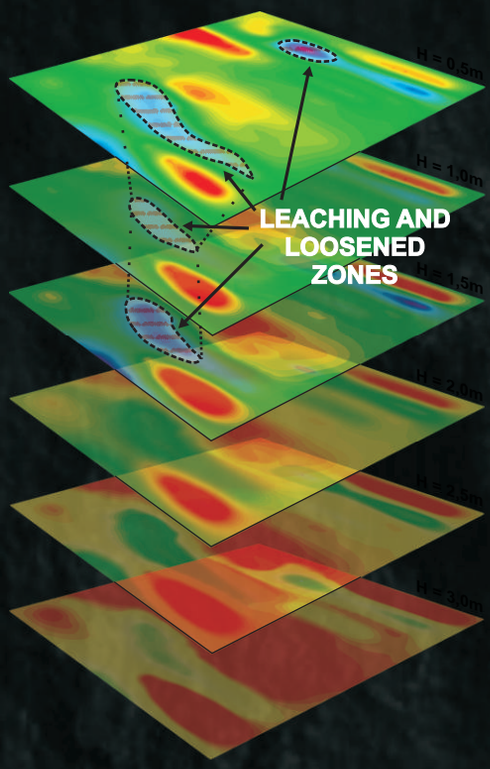
The result of the surveys are the determination of the structure and the calculation of seismic and geomechanical parameters. Results are presented in a form of cross-sections and seismic maps including interpretation.



3D distribution of resistivity changes in the soil in the presence of bedrock area for planned gas pipeline network.



GPR cross-section of the ground with geophysical interpretation which was correlated with geotechnical surveys. The measurement was performed in order to accurately display non-bearing soil borders in the place of planned production hall.



The results of seismic MASW studies imaging the migration routes of water, hydraulic filtration (blue zones) as a result of cracks, subsidence and leaching.

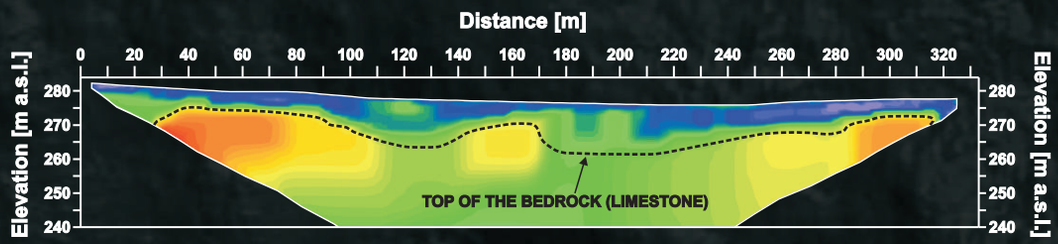
GEORADAR METHOD

The basis of geophysical surveys using georadar method (GPR) are changes of electric parameters of investigated ground. They reproduce the structure of the ground in detail up to a dozen or so meters depth. Surveys for ground identification are done by profiling technique. Results of the surveys are presented in a form of depth cross-sections including geophysical or geological interpretation.

GEOTECHNICAL STUDIES

Geotechnical surveys allow to make (at points) an assessment of structure and ground state using:

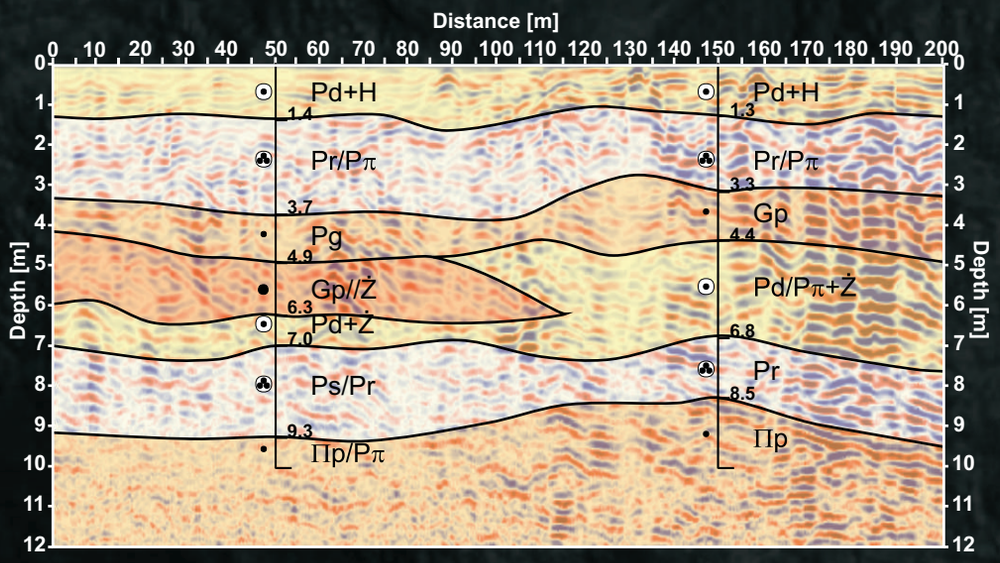
- calculation of stability
- test drillings and probing
- in situ and laboratory studies



Electrical resistivity tomography for designating the top of the bedrock.

ADVANTAGES OF GEOPHYSICS

- mobility
- non-destructive
- continuous recognition
- time&cost saving
- preeliminary assessment in the field
- optimization of the design and carrying out of geological works
- the possibility of geophysical monitoring in time
- ability to perform geophysical works at any season



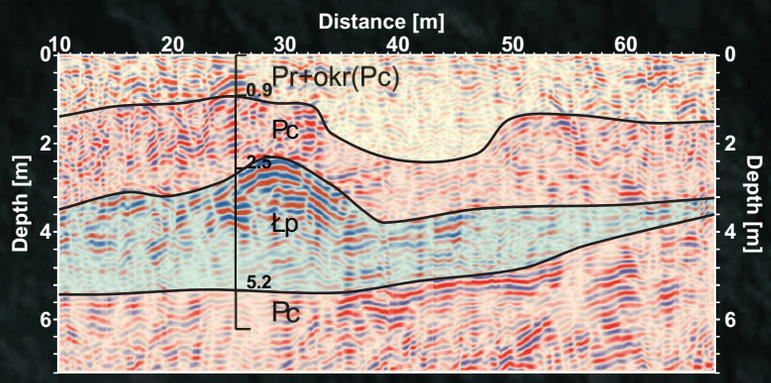
Geological and engineering cross-section on the GPR image.

GROUND STUDIES

CAPABILITIES

Geophysical studies are applied to detection and determining:

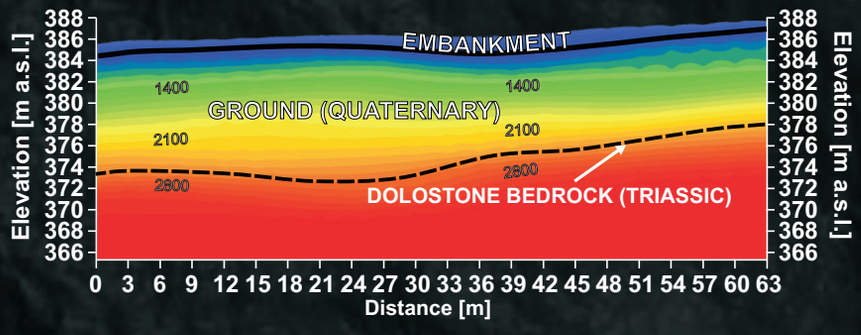
- geological boundaries, weathering zones and depth to bedrock
- sinkholes, voids, karst, caverns
- faults, fractures and weak zones
- groundwater levels
- analysis of changes in compaction, subsidence, slip surfaces
- underground objects
- geomechanical parameters



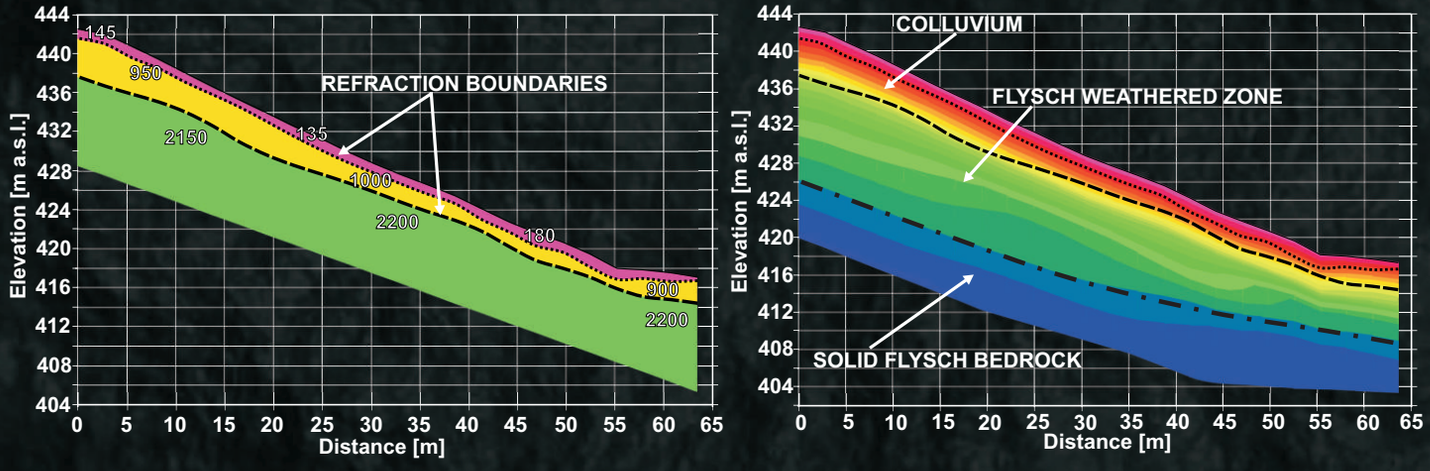
Geotechnical cross-section on the GPR image.

SELECTED APPLICATIONS OF GEOPHYSICAL STUDIES

- design of transport infrastructure and its monitoring
- pipeline planning, HDD and DD drilling
- foundation of large buildings and hydrotechnical constructions
- design and verification of the location of underground infrastructure
- stability assessment of landslides, slopes, levees and embankments



Seismic refraction tomography cross-section for the office building foundation project in the postmining area. Surveys indicate thickness variability of nearsurface layers and identify bedrock.



Seismic cross-sections: refraction (left), imaging the a three-layer construction of landslide and refraction tomography (right) with marked refraction boundaries. Visible additional boundary of the solid flysch bedrock and variability of the structure in rock massif.

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