



Engineering Geology and Geotechnics - Presentation of Geokrak



www.geokrak.pl



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About the company

GEOKRAK sp. z o. o. began operating in 1992. Today, the company employs about 70 people and its wide range of operations includes:

- 🌐 Engineering geology and geotechnics
- 🌐 Geological mapping and GIS
- 🌐 Hydrogeology and environmental geology
- 🌐 Micropaleontology (microscopic studies)
- 🌐 Geological services for deep drilling operations
- 🌐 Desorption of coals and shales
- 🌐 Licenses
- 🌐 Geothermal energy



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About the company

Within the department of engineering geology, the company employs more than twenty qualified geologists, including persons with:

- 🌐 Licenses in the field of hydrogeology (category V)
- 🌐 Licenses in the field of engineering geology (category VI, VII)
- 🌐 Licenses of execution, supervision and management of geological works (categories: XI, XII)
- 🌐 Polish Geotechnical Committee Certificate.



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About the company

GEOKRAK performs front end work on the determination of ground substrate for such projects as:

- 🌐 Construction of buildings
- 🌐 Energy facilities
- 🌐 Linear facilities
- 🌐 Wind farms
- 🌐 Hydrotechnical objects
- 🌐 Landslide areas
- 🌐 Landfills
- 🌐 Communication investments



The company also works at the stage of investment, providing construction-related services.



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About the company

GEOKRAK offers a wide range of services, providing final developments of various types of design and documentation:

- 🌐 Geological work projects
- 🌐 Geotechnical and geological reports
- 🌐 Determining geotechnical foundation conditions of facilities
- 🌐 Acceptances of foundation trenches
- 🌐 Analysis of slope stability.



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Engineering Geology and Geotechnics - Fieldwork



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Fieldwork

GEOKRAK uses the following methods of fieldwork:

- ☛ Mechanical rotary drilling and percussion drilling
- ☛ Core boreholes descriptions
- ☛ Instalation of monitoring wells
- ☛ CPT(U) sounding
- ☛ Dynamic probing
- ☛ SLVT and FVT rotary probe tests
- ☛ Testing by VSS plate
- ☛ PLT dynamic plate load test
- ☛ Work in research pits



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Percussion drilling

Lightweight, portable equipment is best suited on the most demanding terrains. For this purpose, GEOKRAK uses two types of devices: Cobra MK-1 and Wacker BBH 65.

Special driving rods are used in order to introduce probes to a predetermined depth. A hydraulic or a manual with a terminal ball is used to pull the drill string out. Percussion drilling allows to determine non-rocky substrate and ceiling areas of rocky substrates, providing a complete and reliable sampling profile. This drilling allows accurate diagnosis of the soil structure, assessment of its homogeneity, depth of precipitates' limits and even determining very thin interbeddings.



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Rotary drilling

GEOKRAK also has a self-propelled (tracked) GTR 780 RHB rig manufactured by Geotool, a German company. With this device it is possible to perform both dry drilling with a spiral drill and drilling with fluid and a core.



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CPT(U) sounding



GEOKRAK has a hydraulic device manufactured by PAGANI, model TG 63 200, which allows CPT (U) sounding. It is based on the measurement of a continuous resistance on the cone and the sleeve, along the full length of the profile. This test allows to specify such parameters as: cone resistance and frictional resistance of the lateral surface. Characteristics of cone penetration is complemented by changes in the friction coefficient curve, the ratio of the resistance on the sleeve friction to the cone resistance.

Basing on the results of sounding strength parameters and ground deformation are calculated.



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Dynamic probing

In order to determine the status of non-cohesive soils, GEOKRAK uses four types of dynamic probes:

- 🌐 Dynamic Penetrometer Light (DPL)
- 🌐 Dynamic Penetrometer Medium (DPM)
- 🌐 Dynamic Penetrometer Heavy (DPH)
- 🌐 Dynamic Penetrometer Super-Heavy (DPSH)

Dynamic probing involves compaction with a specific probe tip while identifying resistance occurring at plunging.



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Testing by VSS plate

Testing by VSS plate are used to determine the modules of primary and secondary deformation and the deformation rate of land and embankments. The tests are primarily used to control the quality of the construction of embankments.



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Tests in research trenches

Are performed to:

- Thoroughly examine the course of layers
- Execute test load from the bottom of the trench
- Collect samples of intact structure
- Test the soil with a penetrometer and / or a rotary cutter, directly in the foundation substrate
- Inventories of the existing foundations



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Engineering Geology and Geotechnics

- Laboratory testing of soils



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Geotechnical Laboratory Testing

GEOKRAK has its own laboratory where it tests soils to determine their physico-mechanical properties. We also conduct testing for external companies.

Our offer includes:

- ☒ Detemination of liquidity index
- ☒ Grain size analysis
- ☒ Soil swelling testing
- ☒ Determination of the content of organic matter by weight loss on ignition
- ☒ Oedometer tests for soils (compressibility)
- ☒ Optimum moisture content of soils and the maximum bulk density of soil skeleton testing
- ☒ Determination of bulk density of soils



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Determination of liquidity index

Determination of liquidity index which requires analyses of:

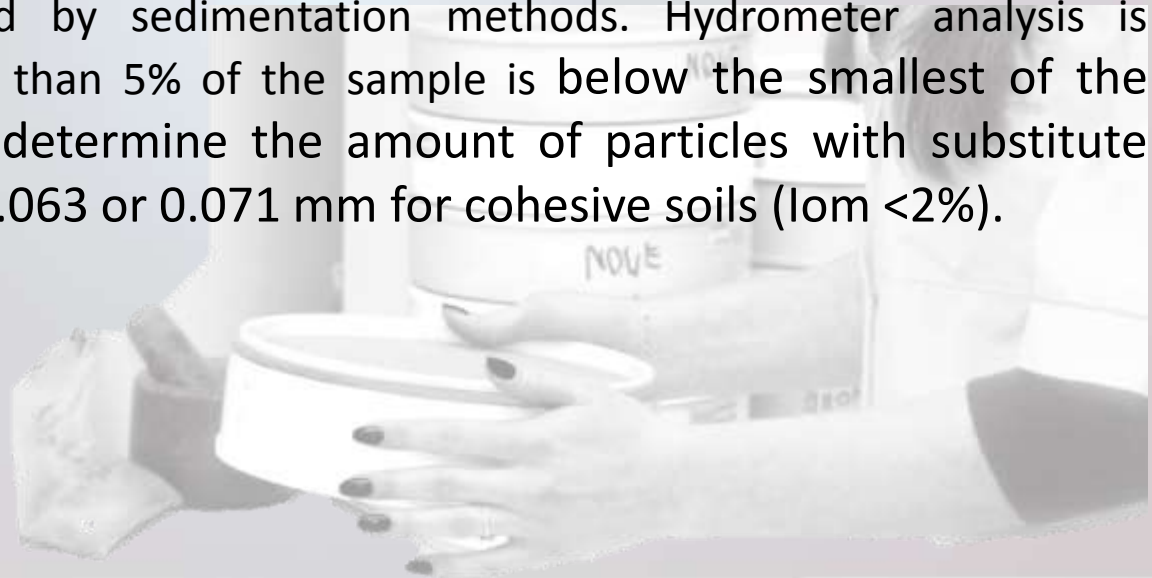


- ❏ Natural moisture content of soil testing – a natural soil sample is placed in a crucible and dried at a temp. of 110°C in a laboratory oven
- ❏ Soil plasticity testing - the tested soil is rolled using a bare hand until a suitable cracking, then the sample is dried at a temp. of 110°C in a laboratory oven
- ❏ Liquid limit testing - the tested soil is triturated with distilled water to a proper consistency and, using the Casagrande apparatus, the Vasiliev cone or a cone penetrometer, the soil fluidity is tested, and then the sample is dried to a temp. of 110°C in a laboratory oven.



Grain size analysis

- ❏ Sieve analysis - is to determine the grain size composition of soil, by separating various fractions of the soil. The soil is sieved by a set of sieves. The result is a graph of the grain size curve, we determine the type and name of the tested soil. Knowledge of the type of the soil tested allow for the prediction of its properties and determination of the scope of further research.
- ❏ Hydrometer analysis - consists in determining the composition of the soil particle size, as based on the rate of descent of mineral particles in aqueous suspension. The test is performed by sedimentation methods. Hydrometer analysis is performed when more than 5% of the sample is below the smallest of the sieves. It is used to determine the amount of particles with substitute diameters less than 0.063 or 0.071 mm for cohesive soils ($I_{om} < 2\%$).



Soil swelling testing

Soil swelling testing is a percentage determination of the maximum value of soil samples' swelling under the action of water. The tested sample is placed in the Vasiliev apparatus, it swells and starts acting the mandrel of the sensor. The test duration is 24 or 48 hours. The test is performed using the AW Vasiliev apparatus, according to PN-B-02841.



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Content of organic matter

Determination of the content of organic matter by weight loss on ignition consists of drying samples in an oven at a temp. of 110°C, and its subsequent ignition at a temperature of approx. 600°C. As a result of weight loss on ignition, organic matter content in the tested soil is determined. The organic content is subjected to ignition in a high-temperature SNOL furnace, according to PN-88/B-04481.



Oedometer tests for soils

Oedometer tests for soils (compressibility) - progressive loading of soil samples under conditions which prevent its lateral expansion. The soil is deformed only in the direction of the force, which is in line with the actual conditions of the soil in the foundation substrate. The tests, as carried out according to the PN-88/B-04481, use a laboratory EL-1B oedometer in the range from 12.5 to 400 kPa.



Optimal soil moisture testing

Optimum moisture content tests for soils and determination of the maximum bulk density of the soil skeleton – compaction of several soil layers with a given energy within a cylinder of the Proctor apparatus.

The Proctor apparatus compaction conditions must comply with the density of the given embankment in the natural scale. The test is carried out with a manual Proctor light rammer, according to PN-88/B-04481.



Determination of the bulk density of soils

Is expressed as the ratio of the mass of the soil sample to its volume. Bulk density is one of the three parameters by which we can determine the ratio of the three phases in the soil: solid, liquid and gas. The test is carried out by a cutting ring, according to PN-88/B-0448.

Quality and safety

Laboratory work is carried out in accordance with Polish and Eurocode 7 standards. The tested soil samples are stored in a warehouse until documentation approval and then are disposed of by a specialized company.



Engineering Geology and Geotechnics

– Site-specific works



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Modern software:

GEOKRAK uses modern software that supports graphic development, including:

- 🌐 Borehole cards (Geostar platform)
- 🌐 Engineering-geological cross-sections (Geostar platform)
- 🌐 Dynamic CPT (U) sounding cards (Geostar platform)
- 🌐 Thematic isoline maps (Surfer 11)
- 🌐 Allows to quickly perform engineering calculations, such as: calculations of slope stability (Flac 6.0).

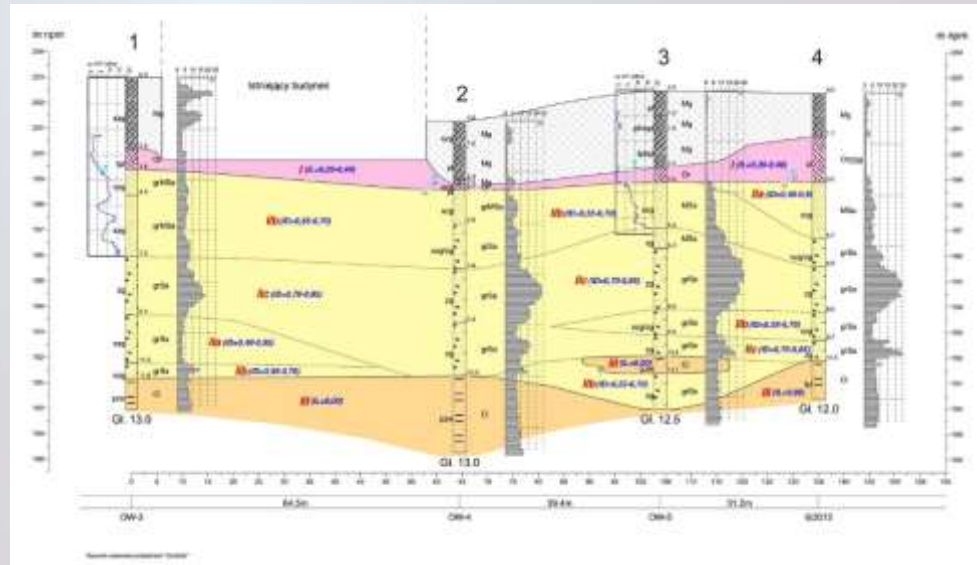
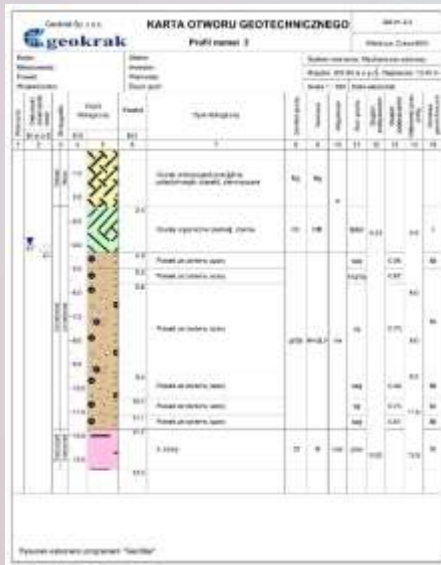
When mapping, the company uses the GIS/CAD tools.



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Geostar software package

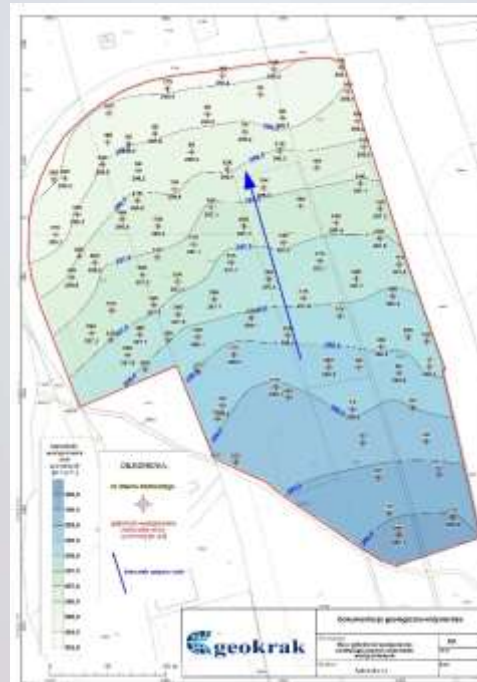
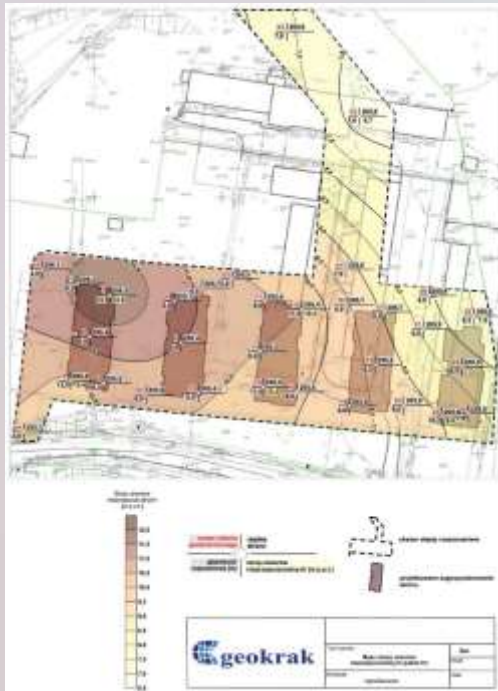
GEOKRAK uses the Geostar software package to perform documentation cards of borehole profiles, dynamic and static CPT (U) probing with the interpretation of the results. The program also enables the creation of advanced geological cross-sections through the selected holes together with the illustration of other data in the database.



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XYZ data visualizations

GEOKRAK uses the Surfer program that provides flexible XYZ data visualization, making it possible to create maps in the form of digital images of the given terrain and maps of the selected lithological layers of the surface of the floor / footwall.

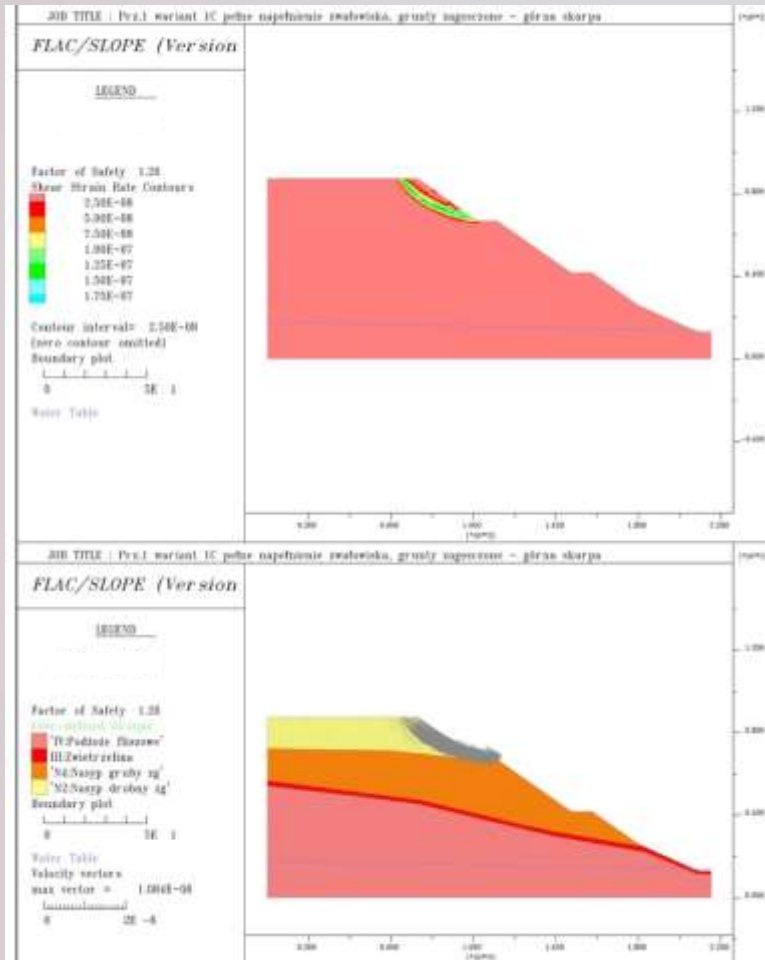


The program, through extensive gridding procedures and many algorithms implemented, creates a regular grid of values for irregularly spaced XYZ points.



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Stability of scarps and slopes



In order to assess the condition of scarps and slopes and to analyze the impact of various factors on stability, GEOKRAK uses the FLAC program that determines stability using the method of reducing shear strength.

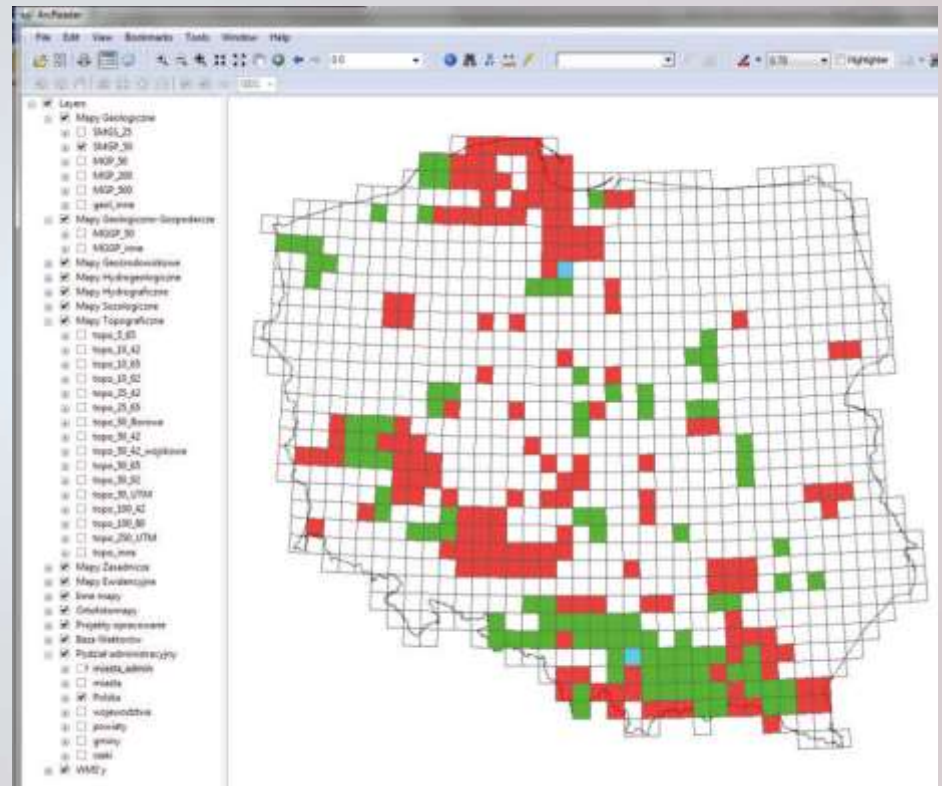
These analyzes are used to assess slope stability for landslide areas, landfills, walls or dumps of quarries, flood walls and walls of excavations.



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Cooperation with GIS

When mapping, the company uses the Geographic Information System (GIS) system for introducing, collecting, processing and visualization of geographic data. GEOKRAK has a team of specialists on GIS, owns GIS/CAD software: ArcGIS, Global Mapper, GeoGraphix, AutoCAD, and manages an extensive database, storing various types of maps for years.





Quality and safety of work

Our work is carried out in accordance with health and safety regulations and with full attention to the environment. They are carried out under the supervision of persons trained in first aid.



In order to achieve the highest possible standard and effectiveness of services, GEOKRAK successfully completed to implement the Integrated Management System based on ISO 9001, ISO 14001 and OHSAS 18001 in 2014.

GEOKRAK employees strive for continuous development, participating in numerous workshops and courses.



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