GEOSPECTRUM

Advanced geophysical technics

SURFACE DIAGNOSTICS

GEORADAR SURVEYS

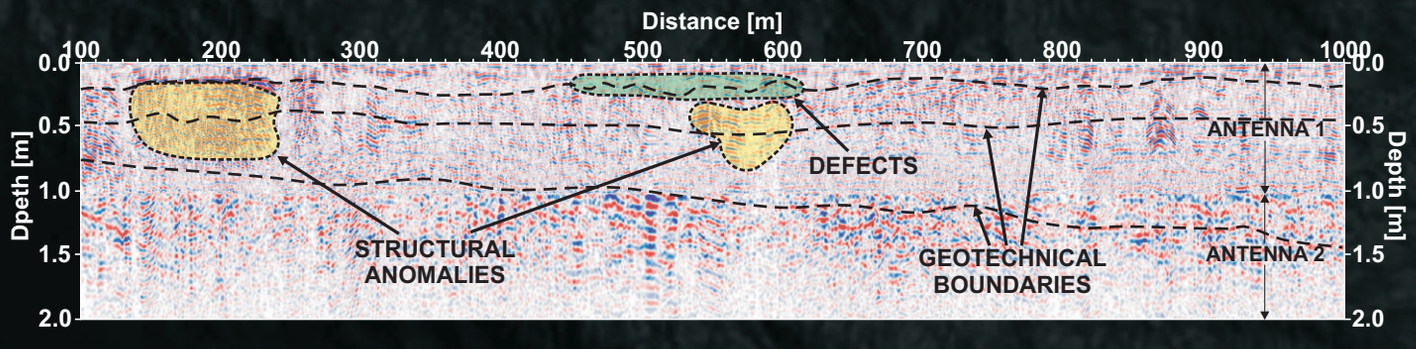
Dynamic technological development in recent years had crucial impact on the prevalence of the usage of the geophysical techniques. Problematic aspects of surface diagnostics commonly use non-invasive georadar surveys (GPR). They allow to carry out rapid and effective assessment of the technical surface as well as substructure state for runways, airport parking plates, highways, roads, bridges, rail-roads etc. Such surveys provide continuous and non-invasive detailed information about ground structure in order to describe continuity of geotechnical boundaries and occurrence of defects in constructing layers or steel elements.

Georadar survey of the pavement.

Georadar survey at airport runway.

ADVANTAGES OF GEORADAR

- non-destructing (non-invasive) surveys
- wide range of antennas with different parameters of the depth range and vertical resolution
- time efficiency
- continuous identification of the ground
- low cost of survey
- possibility of measurements in various terrain and weather conditions
- preliminary assessment in the field
- optimization of geotechnical investigations and repair works

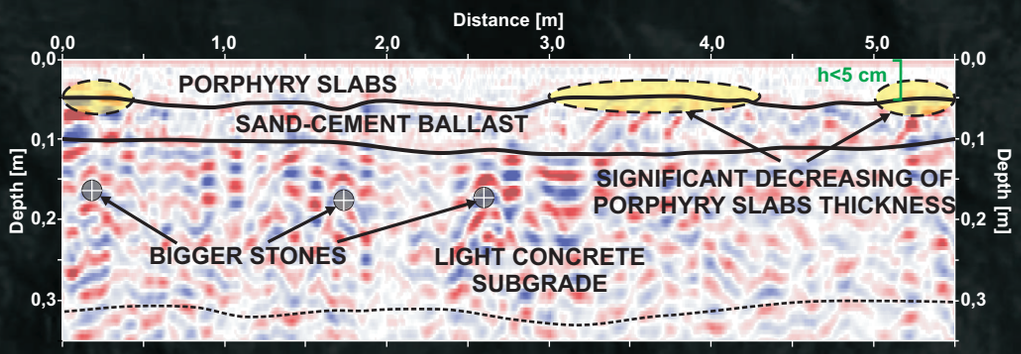


An example of georadar cross-section of the asphalt road surface along the lane with applied geophysical interpretation. The survey was done with two antennas which have different depth of penetration and vertical resolution.

HIGH-RESOLUTION ANALYSIS OF SURFACE STRUCTURE

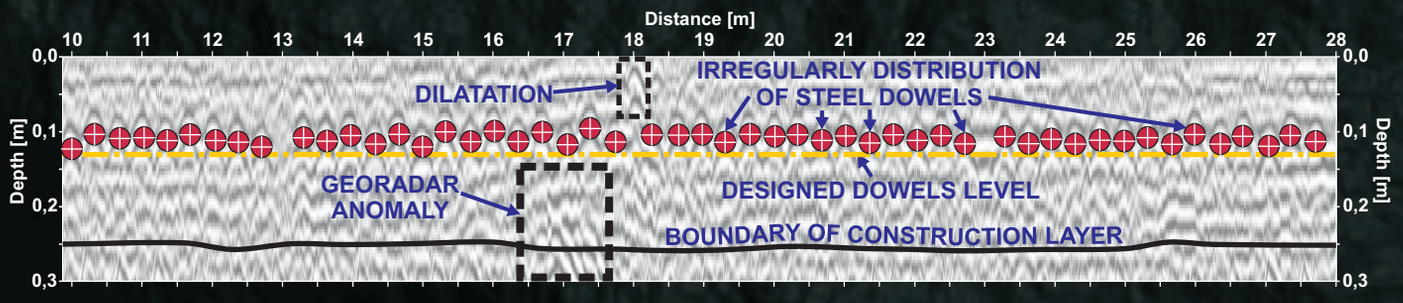
In many engineering tasks, it is very often important to proper determine the structure of surface in a very precise way. In such cases it is necessary to recognize thickness of structural layers (asphalt, concrete, stone, paving, etc.). Precise verification of occurrence and proper location of connecting or reinforcing elements such bolts and anchors is also expected. Such studies are increasingly demanded by investors at the verification stage of compliance with the designed scope of construction works. GPR surveys are predestined for these tasks. The requirements that are then placed can only be met by using high-resolution (HR) GPR antennas.

Georadar acquisition using high resolution bipolar antenna on the road surface made of porphyry slabs.



A sample of georadar cross-section on the road surface covered with porphyry slabs, with interpretation. Very high resolution GPR antenna was applied.

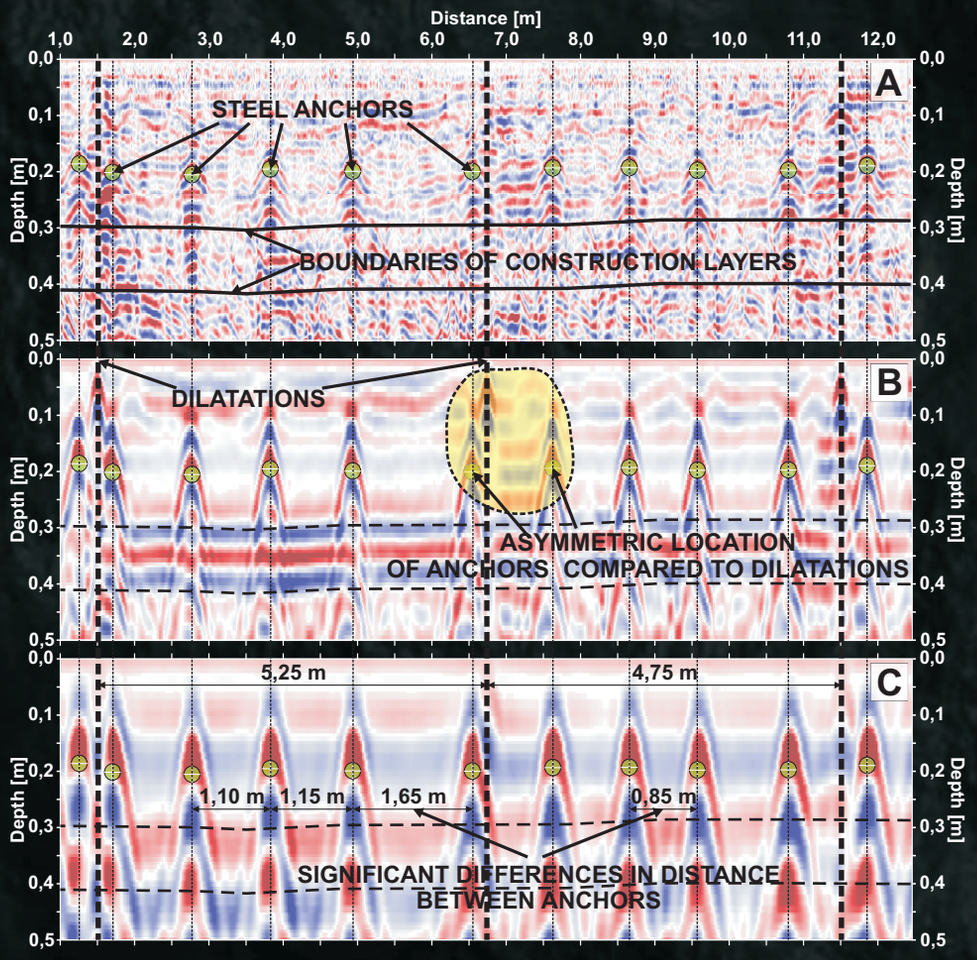
Specialized, high-resolution antennas with operating frequencies of at least 2 GHz are characterized by a vertical **accuracy of about 1 cm**, allowing for a very detailed analysis. Often are also used so-called **bipolar sets**.



A sample GPR cross-section for the surface of the motorway made of concrete slabs densely joined by steel dowels. Derogations in depth and placement of dowels are clearly indicated. Additionally showed georadar anomalies and boundary between layers were determined.

Mechanical drilling in concrete layers on highway, located in place of observed and marked cracks on surface (top) and a core of two outer layers of concrete separated by a geotextile, with a visible long vertical crack in top layer (right).

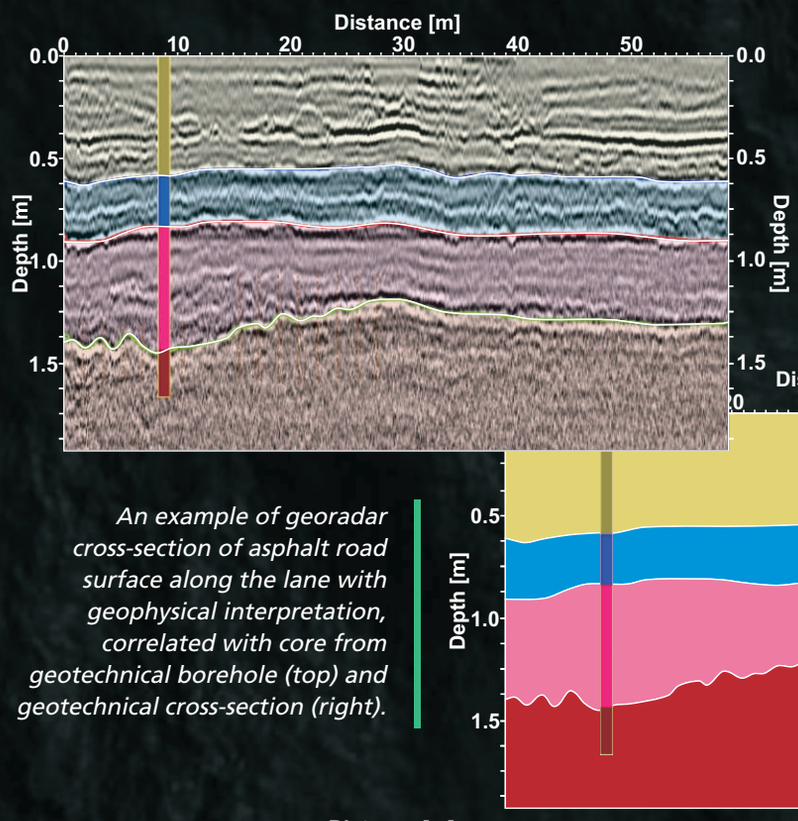
GPR investigation results should be verified by **mechanical geotechnical boreholes**, which clearly find the cause of the detected georadar anomalies. Drillings will specify the scale of unfavorable processes. Proper and early diagnosis allows for quick application of **appropriate repair works**.



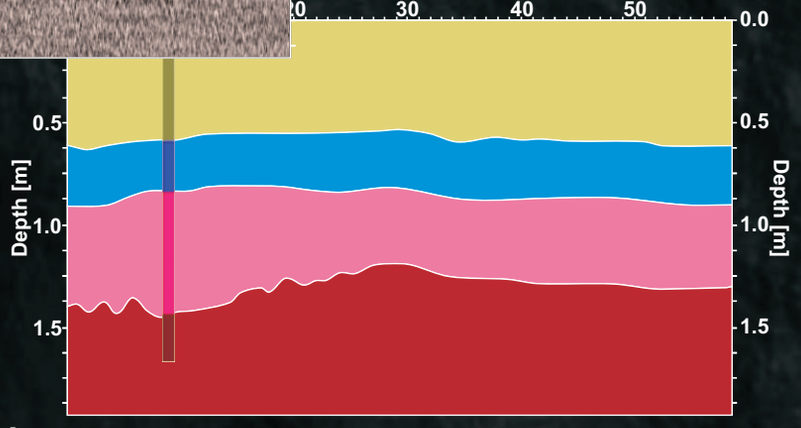
Prior to implementation of GPR studies, very important is the **selection of appropriate antennas.** Applying antennas with inappropriate frequencies leads to unacceptable mistakes in precision of identifying of location, depth, thickness or even inclination of structural objects such as steel reinforcement meshes anchors, dowels.

GPR cross-sections using different antennas frequencies (resolutions) on concrete surface reinforced by steel anchors. Fig. A - antenna with the highest resolution. Fig. C - antenna with the lowest resolution. Visible numerous derogations in the positioning of the anchors and the differences in the location's precision of structural objects.

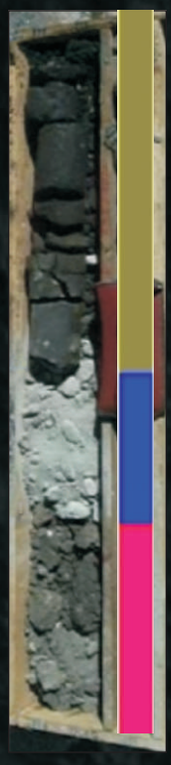
SURFACE DIAGNOSTICS

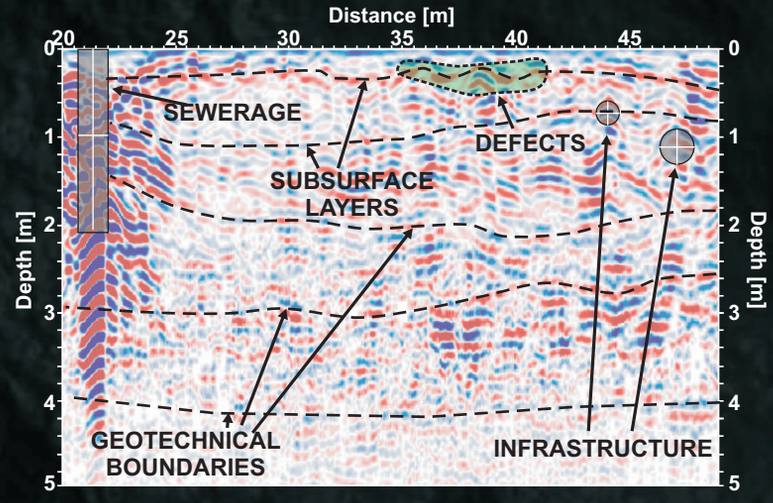


An example of georadar cross-section of asphalt road surface along the lane with geophysical interpretation, correlated with core from geotechnical borehole (top) and geotechnical cross-section (right).



Core sample from geotechnical investigation done in a road



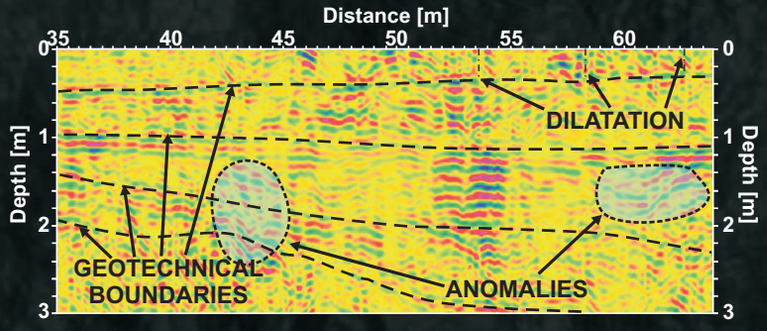


Georadar cross-section across the runway with applied geophysical interpretation.

APPLICATION

- identification of the continuity of the concrete slabs and bituminous layers
- assessment of layer thickness
- identification of voids, stand out zones, cracks and crevices
- localization of flux, washouts and suffosion under the surface
- compaction and subsidence mapping
- identification of reinforced slabs and pipes, ducts, conduits, drains etc.

- analysis of the lithological system
- elaboration of geotechnical investigations to recognize the geomechanical state and structure
- monitoring of structural changes in the pavement and subgrade layers during operation
- determination of foundation layers mixing



Georadar cross-section across the taxiway with applied geophysical interpretation.

We invite you to familiarize with full offer on our website and FB

GEOSPECTRUM
Advanced geophysical technics

biuro@geospectrum.pl
www.geospectrum.pl
GEOSPECTRUMSPZOO

+48 502-208-177
+48 726-030-326