# GPR FOR OPTIMUM ROAD ECONOMY

**Ground Penetrating Radar (GPR) provides an image of ground conditions and characteristics. GPR is a continuous and non-invasive method to locate and categorize the road into sections with similar characteristics and conditions.**

### Purpose

The main purpose of the method is to determine layer structures for different materials as well as determining the position of various underground objects. GPR enables an informed choice of maintenance efforts for optimum road economy.

When surveying railway embankments, valuable knowledge is quickly gained as to variations in material conditions over long distances. Potentially problematic and weaker sections are efficiently identified for a more detailed testing.

The continuous information of data also makes it possible to identify and take care of shorter road sections where differing construction methods have been applied.
Knowledge about the road's construction enables resources to be focused on appropriate activities and road sections.
While investigating problem sections, information from a GPR study is a powerful instrument for analyzing and understanding what is causing a problem. Extensive production capacity combined with rational data handling results in cost efficient solutions for the customer.

### Efficient method

Surveys of roads are executed from a survey vehicle at normal traffic speed, and are thus performed in a manner safe to both the public and employees. For railway surveys, the equipment is loaded on a wagon drawn by a locomotive.
High production capacity in combination with rational data processing results in a good overall economy.

### Technology

GPR sends electromagnetic pulses down into the road. The pulses are reflected against layer interfaces and objects in the road structure. The results are presented in vertical sections – radargrams.
By combining antennas with different frequencies, the study can be limited to pavement and thin road constructions, or to reach deep into the road structure to map rock and ground water levels.
The measurement can be done with both 2D-GPR and 3D-GPR technology which Ramboll has expertise and equipment for both. The 2D-GPR measures along a single line and is suitable for classic road measurements. The 3D-GPR can cover big areas a measuring width close to 2 meters per passage. The passages can overlap and the result can for example be a continuous map of asphalt thickness over a wide airport runway.

Measurement data positioning is determined with great accuracy, using high-resolution length measurement, and GPS.

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