

GUIDELINEGEO

ABEM | MALÅ

CASE STORY x 4

Utility locating
| MALÅ Ground Penetrating Radar (GPR) |

► Utility locating with MALÅ MIRA in Italy

CLIENT

The work was carried out by Esplora in Italy (www.esplorasrl.it) which is an academic spin-off from the University of Trieste, a company focusing on applied research and providing personalized service and non-standard applications. Esplora was founded in 2012 and offers consultancy and survey services in the field of topography, geognostics, geomorphology and geology, to support the design of civil and industrial work. The project was assigned to Esplora by an Energy Management Company.

PROJECTS

The MALÅ MIRA system from Guideline Geo has been used successfully at several different locations around Italy, to map different types of underground utilities and infrastructure. The MIRA system has been used both by hand and vehicle assisted and the investigations made cover small to larger areas. All surveys aimed to reveal subsurface conditions prior to other measures such as drilling or digging.

SOLUTION

Hardware

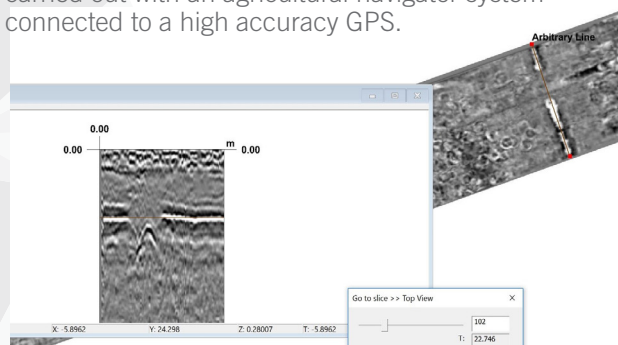
For all investigations presented, the work is done with the MiniMIRA (MIRA 8) system; a handy 8 channel GPR system with 400 MHz separate Tx and Rx antennas. This system gives a channel spacing of 8 cm and the measurements presented are collected with an 8 cm trace distance. Each trace was 452 samples and stacked 4 times.

Software

Data acquisition was undertaken with MIRASoft, providing a simple and straightforward data collection together with a precise positioning of the measurements. The data is processed and interpreted with rSlicer, a very easy-to-use software, developed to create detailed images with interpretation of the subsurface and objects in an efficient way. From rSlicer the interpreted results were exported to CAD and GIS tools to create complete underground maps.

Case I - Airport

The investigation was carried out on the runway of an airport where the MiniMIRA was towed by a quad and 2 km of profile were covered in less than 30 minutes. The main issue to consider during data acquisition was to maintain a good enough alignment between the long lines investigated, to avoid empty spots in the data coverage. The alignment of the MIRA survey swaths was carried out with an agricultural navigator system connected to a high accuracy GPS.



In the GPR data the utility is clearly seen both in the time slice as well as in the 2D view.

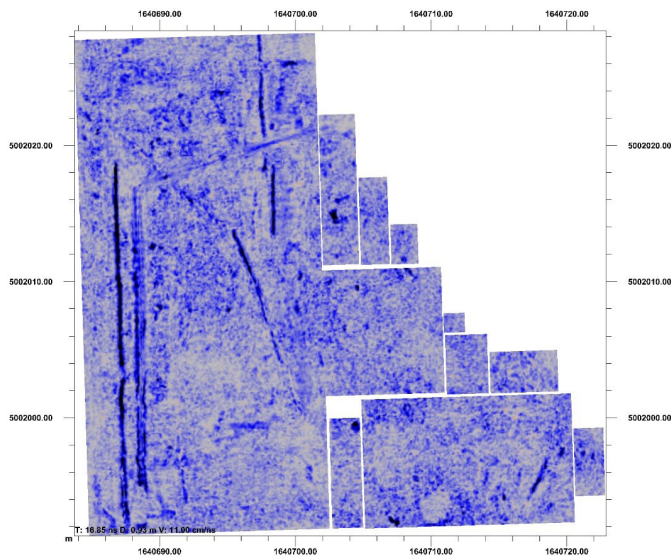


The measurement set-up with the MiniMIRA towed by quad and with a RTK-GPS attached on top of the antenna box.

MALÅ

Case II - Town square

When investigating a small town square, the MiniMIRA was hand-pushed without GPS support, due to poor GPS reception. The town square is approximately 40 x 25 meters and the investigation took around 4 hours to carry out. When working without any positioning system the need of a distinct measurement layout is essential. The positioning data can be created afterwards, to get the correct layout in the post-processing software rSlicer.



Processed MIRA data revealing several underground utilities



The measurement set-up with a hand towed solution. Note that the GPS could not be used in this urban area, crowded with high buildings.

Case III - Port dock

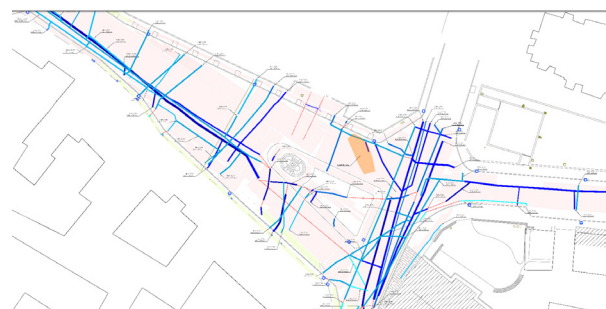
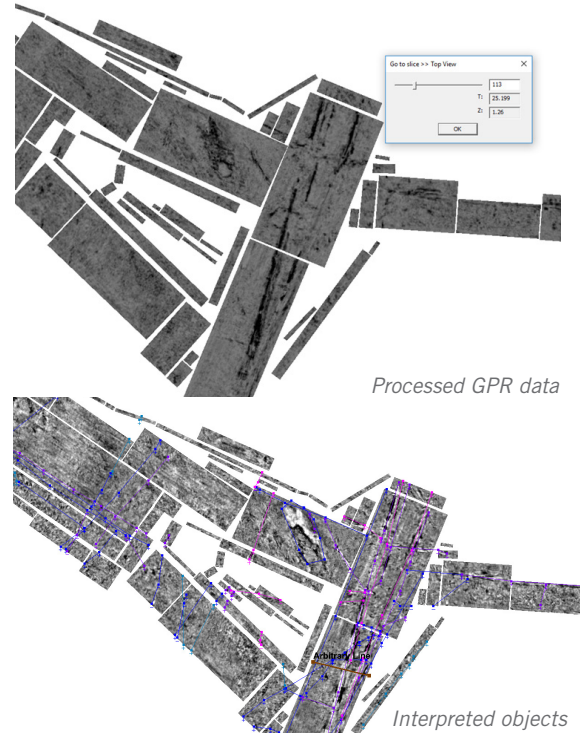
The port dock was investigated with a hand-pushed MiniMIRA, while positioning was logged by a RTK-GPS. The area, 40x3 meters, took less than 30 minutes to cover. The challenge during field work was to avoid the heavy traffic and run smoothly over obstacles in the port area.



Results of the MiniMIRA investigation clearly show hidden railway tracks together with utilities.

Case IV - Urban streets and squares

The investigation was carried out with a hand towed MiniMIRA without any aid of positioning system in a rather complicated street environment consisting of numerous areas. The investigation area was covered within one field day, with carefully laid out measurement grids and a challenging working environment with heavy city traffic.



Final product

Results (all projects)

The main achievement was that utilities and other underground constructions could be mapped, both efficiently and in high detail, with the MiniMIRA system.

PROJECTS x 4

- ▷ **Method:** Ground Penetrating Radar (GPR)
- ▷ **Configuration/Solution:** MALÅ MIRA 8. GPR system with 400 MHz separate Tx and Rx antennas. 8 cm channel spacing and measurements presented with an 8 cm, trace distance. Each trace was 452 samples and stacked 4 times
- Acquisition and visualisation SW:** MIRA Soft (data acquisition), rSlicer (interpretation), CAD & GIS

Acknowledgement

We would like to thank Esplora Srl (www.esplorasrl.it) for sharing these cases



UNIVERSITÀ
DEGLI STUDI DI TRIESTE