

THE USE OF LiDAR TECHNOLOGY - MOBILE MAPPING IN URBAN ROAD INFRASTRUCTURE

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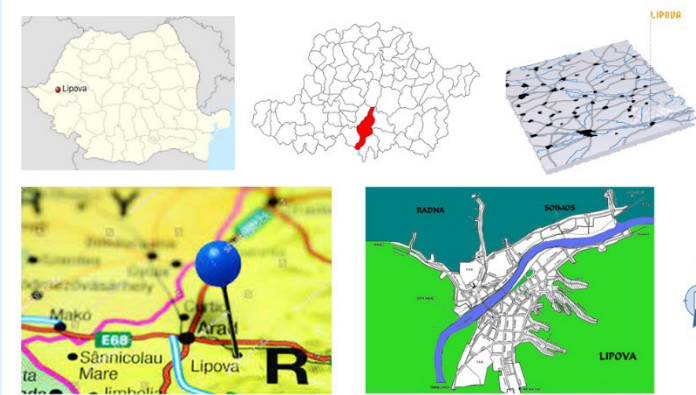
ABSTRACT

1

In what concerns detailed topographic measurements, typically performed with GNSS equipment and electronic total stations, the use of Mobile Mapping technology - LiDAR proves to be a significant advantage due to the reduction of working hours, the surveillance area coverage, and the complexity of acquired data. To provide proof and test the proposed model, a section of the town of Lipova in Arad County was selected for investigation using mobile scanning equipment, specifically the Leica Pegasus: Backpack, in conjunction with a Leica Viva GS14 GNSS device.

LOCATION OF THE EXPERIMENTAL SITE

2



The case study was conducted over 14 streets appertaining to the town of Lipova, Arad County. Lipova is a town located in the western part of the country, within the historical region of Crişana. Topographically, the town of Lipova mainly resides on gentle rolling terrain, hills and plains.

WORKFLOW

3



MATERIALS AND METHODS

4

Data acquisition was carried out using the Leica Pegasus: Backpack equipment, in conjunction with a Leica Viva GS14 GNSS device, which was used as the Master Base, recording Rinex data throughout the scanning process. In this case study, 14 individual scans were performed, one for each street. The entire scanning process lasted approximately 3 hours, during which all the elements of the investigated streets, with a coverage that captured of approximately 10 kilometers.

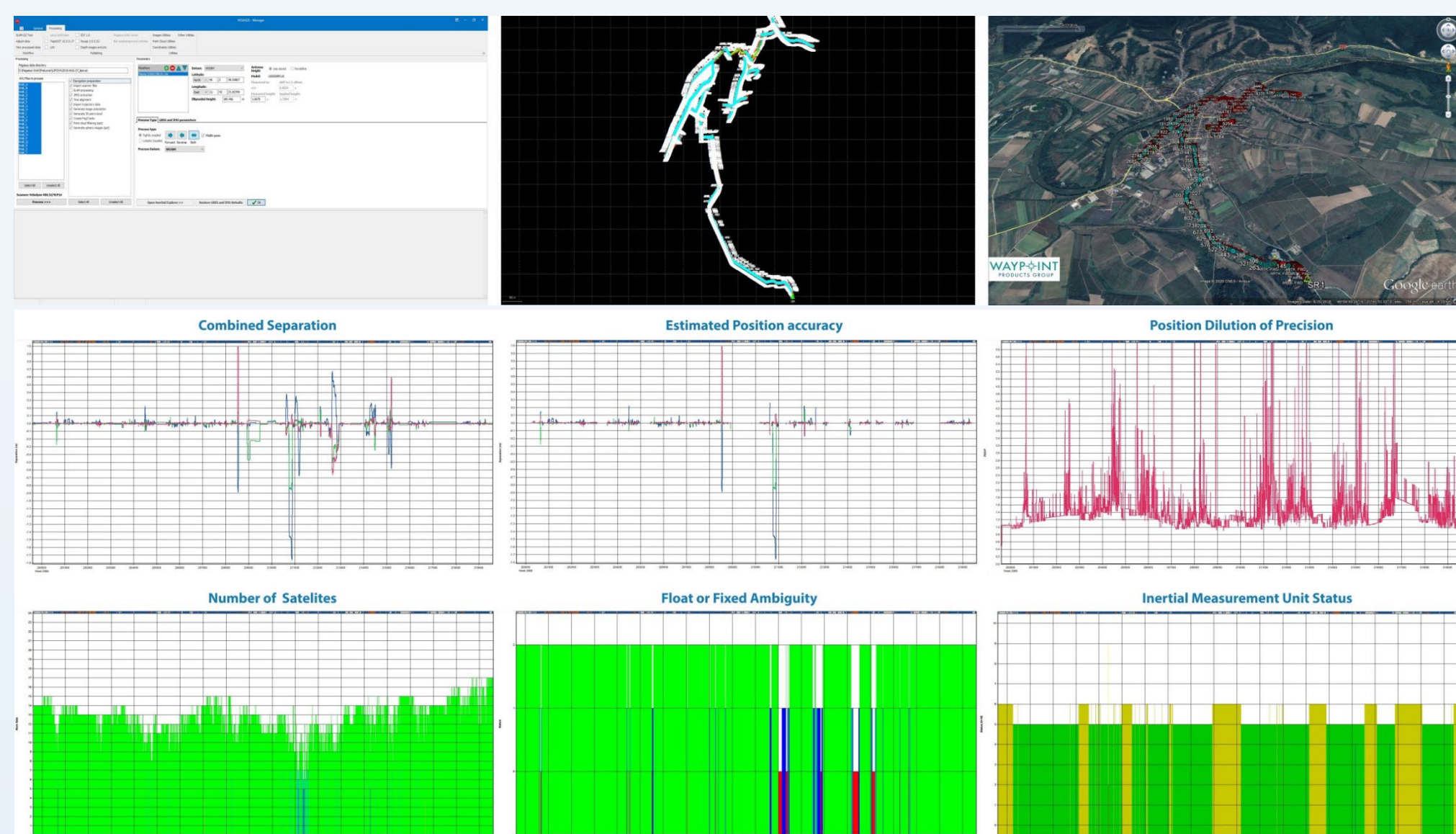


Replacing traditional topographic surveys with mobile mapping technologies, such as LiDAR scanning, and high-resolution imaging can offer significant advantages in modernization projects

RESULTS AND DISCUSSION

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Post-processing was performed using Pegasus Manager software, and accuracy checking was performed with Novatel Inertial Explorer software. Because the GNSS signal was very good throughout the period, it was not necessary to adjust the resulting trajectory using the SLAM algorithm, the average scan accuracy being 3 cm. For better control we also used ground control points determined by the RTK method.



NovAtel Inertial Explorer is a specialized software for correcting trajectories and analyzing inertial data obtained during mobile data collection, such as data from the Leica Pegasus Backpack equipment.

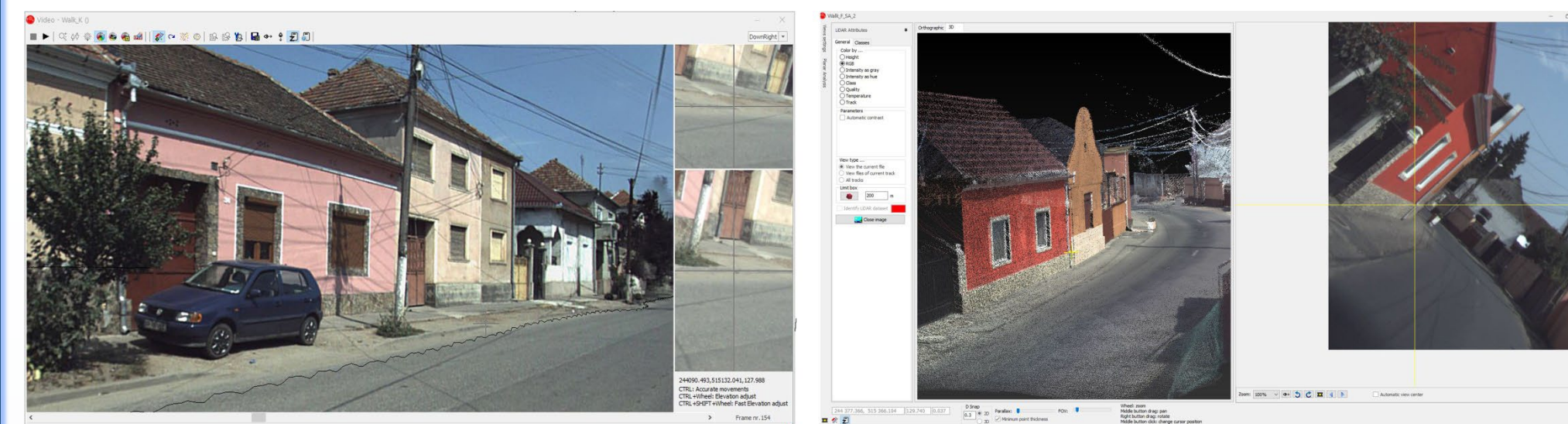
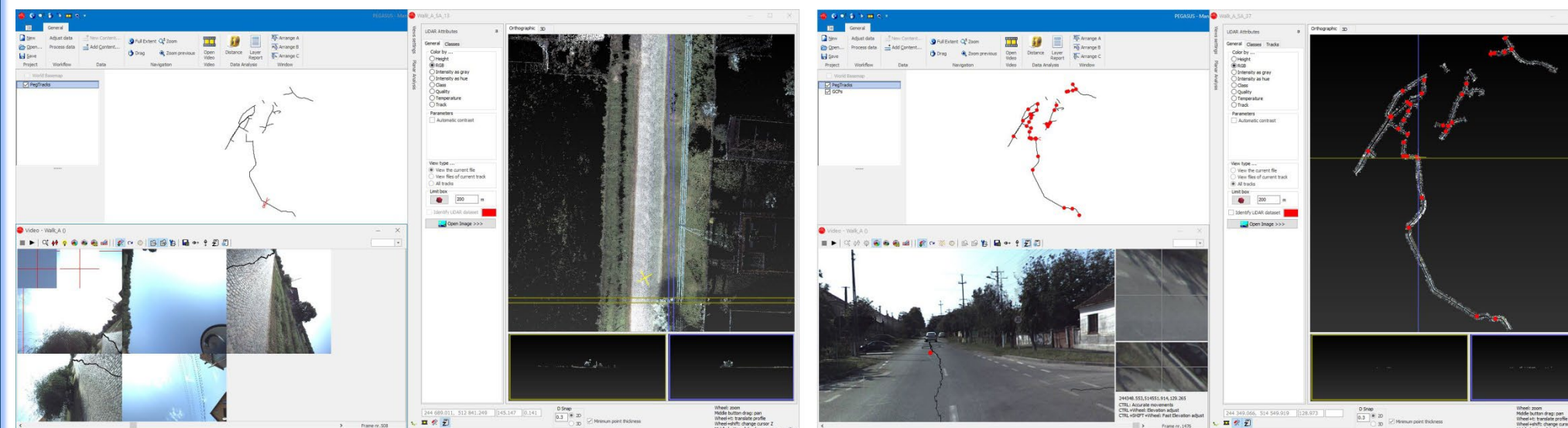
CONCLUSIONS

1. The speed of the measurements (for topographic detail surveys or other types of projects);
2. Obtaining point clouds, therefore a detailed image, in coordinates of the area of interest;
3. Accuracy of the data obtained;
4. The high degree of detail, gives the possibility to use the images obtained in projects such as construction, design, road infrastructure, architecture, cartography, etc.
5. LiDAR - Mobile Mapping equipment can also be used in locations where the GNSS positioning signal is missing (underground, inside buildings, etc.);
6. The possibility of using the data obtained in the GIS environment which allows "combining" with other geospatial data or creating non-graphical databases;

DATA VISUALIZATION

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Leica Pegasus allows you to quickly check the quality and accuracy of your acquired data from the Pegasus mobile mapping system. It displays the captured mission, and allows the user to seamlessly navigate through the images and point clouds. Pegasus Manager is specialized in managing and processing data obtained during mobile mapping data collection, such as LiDAR scans and photo images. Processing often requires specialized knowledge in cartography and mobile mapping technologies.

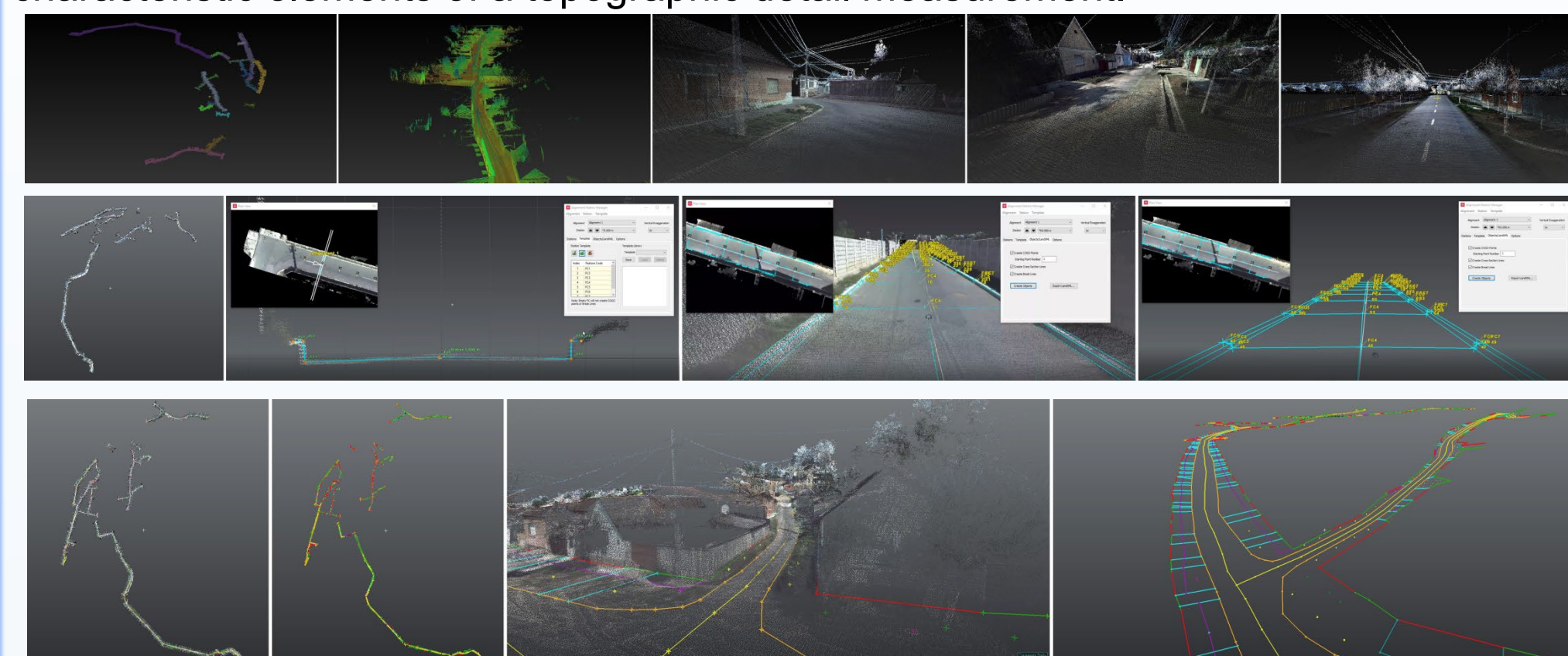


The application enables us to take measurements from images and LiDAR data and create reports by combining GIS information with images and LiDAR data.

EXTRACTION OF TOPOGRAPHIC DATA

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After obtaining the 3D point cloud following the post-processing explained above, the project was loaded into the Leica Cyclone Model software where all the tracked items were extracted. We created cross-sectional profiles for the road and extracted all the characteristic elements of a topographic detail measurement.



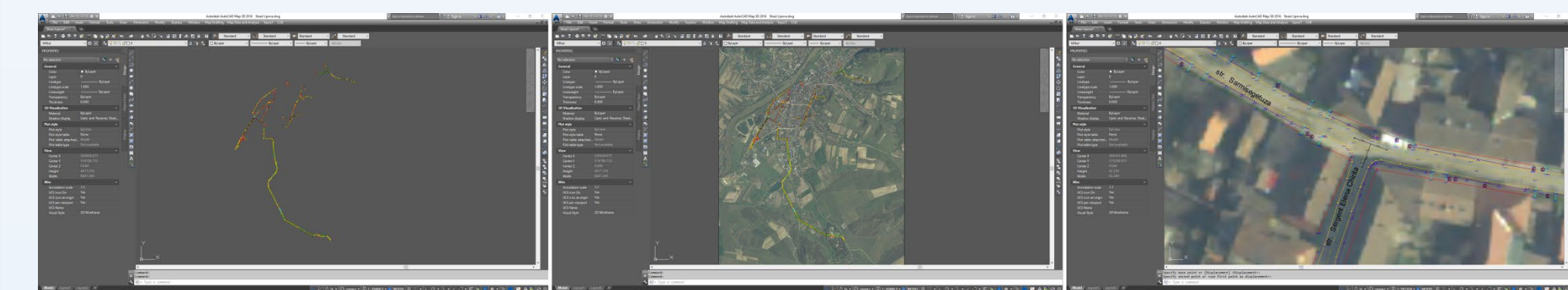
The software allows us to segment the data based on specific objectives or areas of interest. This can include identifying and separating terrain, buildings, trees or other objects.

THE FINAL RESULT

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Mobile mapping technology does not only allow for accurate and detailed data capture, but also for analysis and evaluation of the data for planning purposes, risk assessment/management, and scenario modelling, transforming the way in which public safety authorities keep their citizens safe.

The final result was processed using the Autodesk AutoCAD Map 3D software, and the report was generated using the Leica Infinity software.

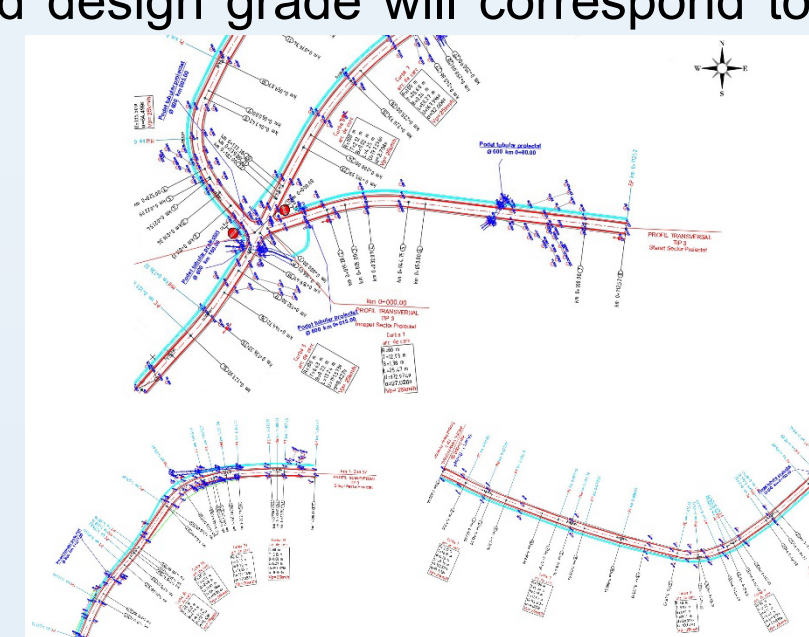


Longitudinal Profile:

In the longitudinal profile, the slopes range from 0.01% to 14.71%, as the roads are located in a hilly area. The vertical alignments and design grade will correspond to a design speed of 25 km/h.

Transversal Profile:

Road platform: 5.0 m
Roadway:.....4.0 m
Shoulders: 2 x 0.50 m
Width of protected/unprotected ditches: 0.40 m



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