

Real-time mapping of the network of waterways and sewers on Italian

Leonardo FRANCHI

Key words: Engineering survey;GNSS/GPS;Land management

SUMMARY

The technological networks can be water, sewage, gas, electric, telephone, electronic, industrial plants, and fire protection. An essential aspect for the management and maintenance programming and intervention development is an in-depth knowledge of their technological networks. This can be achieved through the proper cataloging and survey of the works present and distributed in the territory and by digitally mapping these networks. These services are the main business of Leonardo Franchi

The goal of Leonardo Franchi. is to provide administrations, planners, information and territorial managers, an appropriate support for the collection of these information, through the georeferenced mapping services of technological networks, the territorial knowledge of works and plants, the direct topographic and GPS survey, and the reproduction of the territorial data acquired on a GIS platform that can be checked and updated in the future and in real time, through the use of dedicated apps and tablets directly on-site.

1. Introduction

LEONARDO FRANCHI creates mappings using a webGIS based on ESRI's Arcgis, in order to provide the contracting authority with an integrated mapping system that can be updated in real time at any time, using arcgis and the support collector on tablets.

The mapping activity does not consist only in detecting the positioning of the network, but also in the direct survey of the various connections present on it, the sizing of the pipes and the state of maintenance of the same as well as the housing elements, in order to provide a unique and complete tool for managing the entire system, with the possibility of exporting information on hydraulic design software.

In addition, the company assists the contracting authority, through an assistance system with leak detection, this type of intervention includes systematic and preventive leak detection on all water supply networks (private - public or industrial), sanitary systems, heating and district heating, industrial distribution networks and fire prevention systems and has the purpose of identifying the points of loss of the systems.

This verification leads to an exact identification of the loss points, with a limitation of the dismantling and demolition interventions, in rapid times. It is also possible to carry out repairs using sealing products without interrupting the operation of the system. To achieve accurate localization, different instruments are used, which can be considered individually or together, depending on the case, such as the acoustic system, the cross-correlation system, the tracer gas system and thermography.

The whole process leads to a significant decrease in losses and increases the efficiency of the distribution systems, with consequent reduction in management costs. Furthermore, pressure and flow meters can also be inserted to monitor the quantity of fluid over time. in order to understand if there are any leaks on the line, and promptly repair them.

The further usefulness of having a computerized and georeferenced graphic support on the GIS platform, also allows you to overlay all the maps held by the administrations, and have an excellent tool for the future design of new networks and / or new areas to be urbanized.

2. SUBTITLE

1.1 What we do in the office

Water network survey and census and return on gis basis.

In recent years, due to the increasingly significant problems due to drought and consequent decrease in the available water resource, an increasing sensitivity has been created by managers, who govern the integrated water cycle, towards a more accurate and punctual optimization of aqueduct networks. Hence the idea of creating a cutting-edge company specializing in the survey and mapping of the water network, with the simultaneous return of geometric, dimensional and all other characteristics of the network, in order to create a unique and

complete database to provide at the contracting station.



1.2 Methodologies for conducting surveys

The gis chosen for the return of the final data is ESRI Arcgis, which offers numerous advanced features, such as simultaneous multi-operator detection, real-time monitoring and updating of the progress of the detection operations and subsequent updating, hydraulic modeling of the plug-in for processing flow rate controls and possible network expansion, as well as identification of critical problems.



The relevant operations are carried out through the use of the latest generation pipe finders, for the identification of the pipe in real time, and gps instrumentation with RTK correction for geographic positioning also in real time.



1.3 Problems encountered

In our work experience we found difficulties in positioning and tracing the polyethylene lines, given the high use of this material for excellent wear resistance, we went in search of a tracing method that had to be reliable, economical and quick, as classic detection and monitoring techniques, such as georadar or even excavation probing, were expensive, destructive and time consuming.

1.4 Solutions After numerous field tests and researches, we have come to a solution, our "innovation", which have proven to be highly reliable in the positioning of pvc pipes in the field, otherwise impossible to detect, for the use of this technique requires a lot of practicality and experience, the operator's skills are of fundamental importance, as well as the harmony of the team (composed of two professionals) since the operator who has the task of detecting must be able to understand the signs made by the locator in order to have the correct positioning result.

With this detection technique it is also possible to detect curves and branches of the line, as well as the final connections of the users.

During the mapping of course monographs of the bedrooms are made with the population of all the information acquired, also communicating promptly to the contracting authority all the anomalies found in the survey phase, such as leaks or malfunctions on the water line.



The final map consists of the materialization of the water network containing all the data collected inside, which is delivered to the contracting station with the possibility of being overlaid with any other cartography available to the client, also it has the possibility of updating it in time real through any tablet, or even by the operator himself who performs extraordinary maintenance or new lines.

REFERENCES CONTACTS

LEONARDO
FRANCHI
VIA TORRITO,19
MONTORIO AL VOMANO
ITALY
Tel. + 393482307196
Email: leonardofranchi07@gmail.com

Real-Time Mapping of the Network of Waterways and Sewers on Italian Territory (12502)
Leonardo Franchi, Enrico Davoli, Sara Gepponi and Daniele Camele (Italy)

FIG Working Week 2024
Your World, Our World: Resilient Environment and Sustainable Resource Management for all
Accra, Ghana, 19–24 May 2024