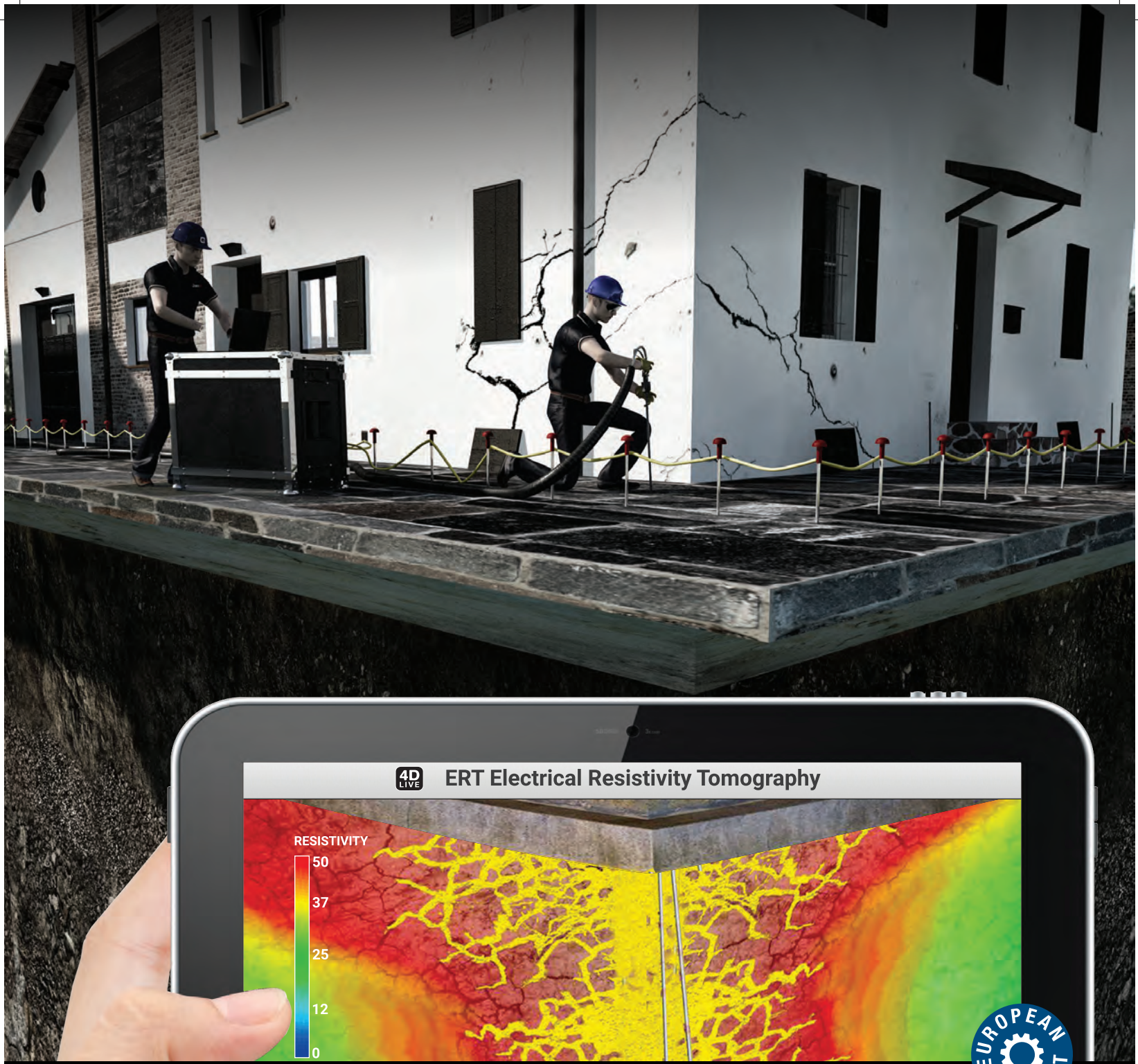




SEE&SHOOT[®]

RESTORATIONS OF **FOUNDATIONS**,
SOLID **FLOORS** AND **PAVEMENTS**
BY MEANS OF **INJECTION** OF **EXPANSIVE** RESIN

 **GEOSEC**
GROUND ENGINEERING

WALL CRACKS AND GROUND SETTLEMENT:

DECODING THE CAUSES

Understanding the Root Cause: The Starting Point for Every Intervention



Cracks in the walls and ground settlements are associated with actions of natural or human-induced origin, which upset the foundation's equilibrium conditions..



Presence of Moisture

Due to leaks in the drainage network.



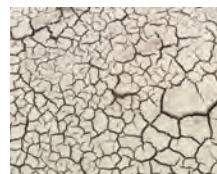
Increased loading

From adding floors to the property increases the stress to the property's foundations.



Heavy traffic of vehicles

Vibrations produced by heavy traffic of vehicles and heavy machinery.



Drought

Reduction in soil water content due to high ambient temperatures.



Deep excavations

Nearby the property can de-stabilise the bearing soils beneath the property.



Root induced subsidence

Reduction in moisture content due to the presence of nearby vegetation.

THE INNOVATIVE METHOD

THAT HAS REVOLUTIONISED
THE CONSOLIDATION
WITH INJECTIONS

GEOLOGIST/ENGINEER

INJECTION TUBES

PENETROMETER

ELECTRICAL
RESISTIVITY



ELECTRICAL RESISTIVITY
TOMOGRAPHY

LEVEL 1

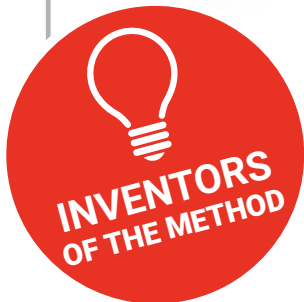
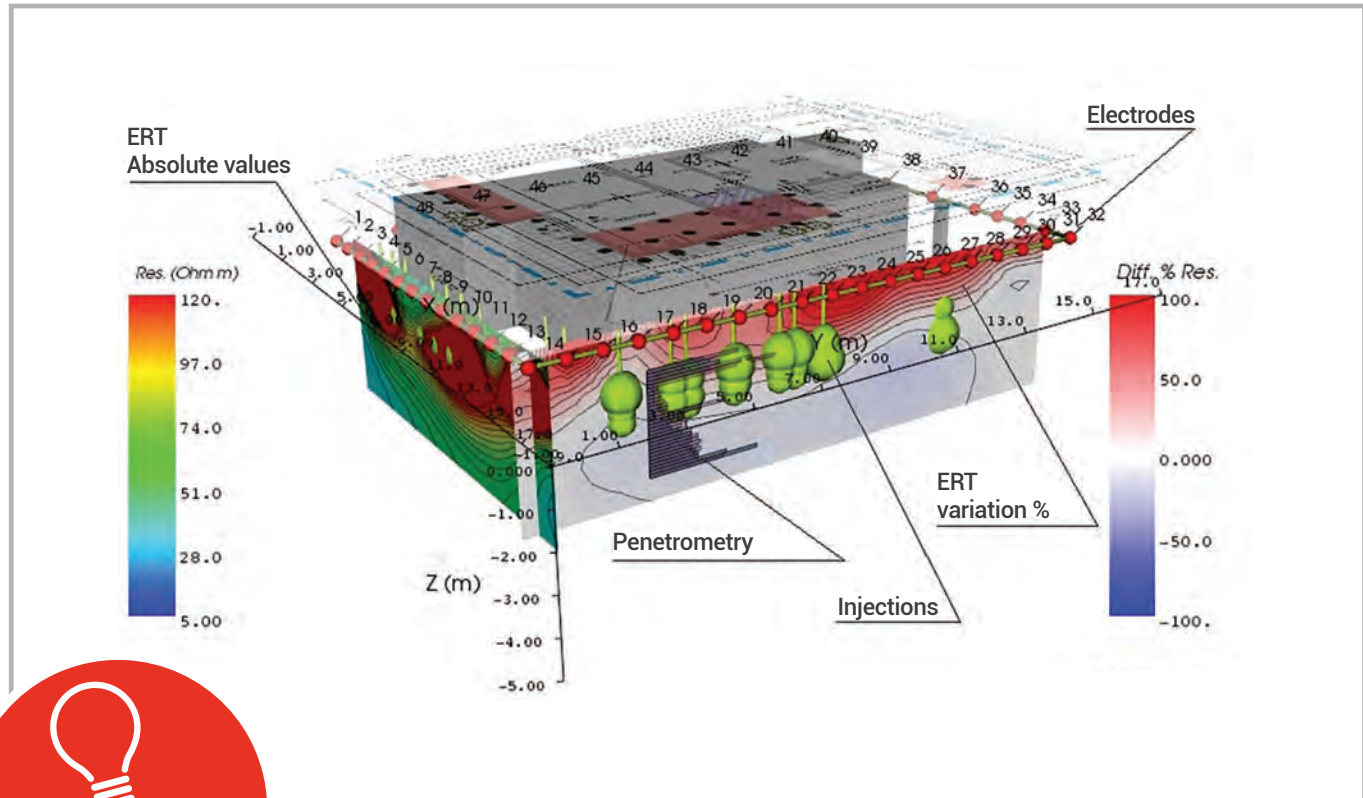
LEVEL 2

LEVEL 3

DYNAMIC PENETROMETER
PENETRATION TESTS

GEOSEC method:

SEE&SHOOT® is a procedure - aimed at consolidating the subsoil beneath the foundation, created to counteract differential vertical settlements in buildings - comprising several steps as better illustrated in the teachings of European Patents EP1914350 and EP2543769.



ERT 4D LIVE tomography throughout the intervention

4D electrical resistivity tomography (ERT) offers significant benefits in ground improvement projects by providing real-time, non-invasive subsurface imaging. This advanced technique enables accurate identification of soil heterogeneities, groundwater flow, and potential problem areas.

Maximum precision and reliability

Thanks to the **ERT 4D LIVE**, the **GEOSEC®** team can validate the correct consolidation of the ground by making real-time observations and adjustments.

A homogeneous and stable consolidation

The **ERT 4D LIVE** geophysical survey encompasses not only the treatment area but also regions with greater stability to serve as a reference. By including these more stable areas in the survey, it helps facilitate a more uniform consolidation of settled regions, aiming for conditions as homogeneous as possible with the non-settled areas.

Geotechnical tests

In addition to the geophysical studies with the **ERT 4D LIVE** tomography, penetration tests are performed to compare the variation in mechanical resistance once the consolidation injections in the soil have been carried out.

ERT 4D LIVE tomography: Revolutionising the injection industry

The **ERT 4D LIVE** geophysical survey encompasses not only the treatment area but also regions with greater stability to serve as a reference. By including these more stable areas in the survey, it helps facilitate a more uniform consolidation of settled regions, aiming for conditions as homogeneous as possible with the non-settled areas.

Why combine electrical tomography studies and injections in the field?

1.

Settlement it necessary to consolidate a understand “how” to an increase in strength with long-lasting effects. For this reason, it is an advantage to be able to see the effects and variations produced by the treatment and be sure that voids and cavities have been foundation and this leads to a physical-chemical change in these consolidated grounds.

2.

Most types of lithology found in surface soils (e.g., clays, silts, sands) can be distinguished with resistivity tomography and a sequential image can be obtained that helps to understand the state of the intervention area and to monitor the consolidation.

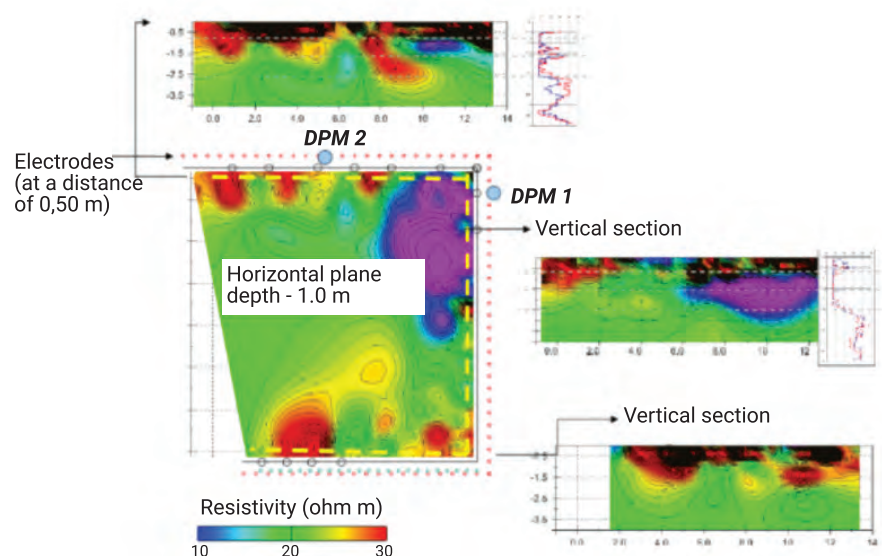
3.

In certain cases the expansive resins to inject contrast with the underlying soil below the foundation and this leads to a physical-chemical change in these consolidated grounds.

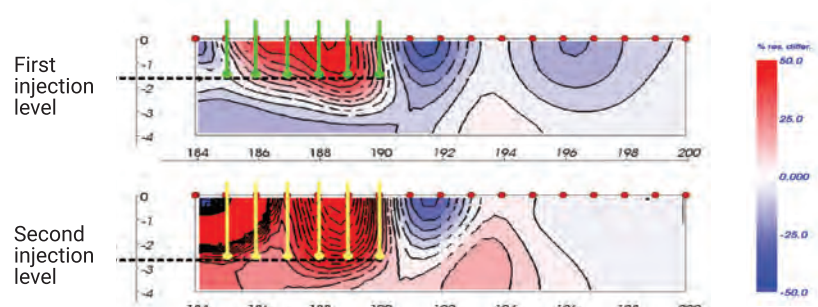
Using the **GEOSEC®** method, the **4D-ERT** study, taken prior to intervention, revealed subsurface weaknesses responsible for the settlement. In the accompanying image, the purple area represents a water main leak.

Our on-site geologist reviewed the data on the day of the work and amended the design to match the data from the pre-start ERT study.

On the right, details of an ERT sequence during the work can be seen. The variation in soil resistivity indicates an improvement accomplished thanks to the resin injections carried out directly and at varying depths.



Variation in electrical soil resistivity following the injections (3D volume section)



WE KNOW WHAT LIES BENEATH

AN ELECTRONIC EYE WHICH
CAN OBSERVE BENEATH
THE BUILDING WHILST
CARRYING OUT
THE INTERVENTION

 **GEOSEC**
GROUND ENGINEERING

PHASES OF OPERATION

SPECIALISED TECHNICIANS
AND DIAGNOSTIC TOOLS
ALWAYS ON SITE

1 Non-invasive, fast and safe work



The injection truck

The laboratory-truck contains all the necessary tools for consolidation works and can be parked at a maximum distance of 80-100m from the intervention area. A hose will connect the injection system located on the truck to the different injection points.



Prevention and safety

Before the intervention, **GEOSEC®** recommends conducting a search for buried utilities to prevent any interference with injections.

This service is available to the client thanks to our cooperation with specialised providers.

2

Studies prior to the intervention



Tests provided prior to installation for a more precise intervention

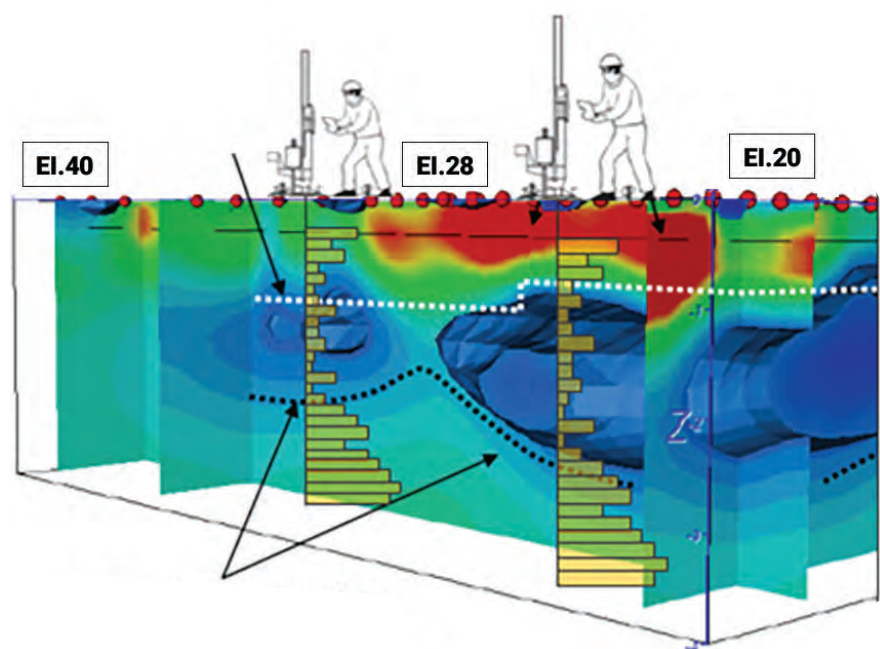
The results obtained and the data on the building's construction and utilities help to define a work model that represents the state of the area to be treated and is a highly useful reference for the next consolidation phase.

ERT 4D LIVE tomography

In the accompanying photo you can see an example of electrical resistivity tomography combined with penetration tests, which allows us to build a ground model prior to injections.

Tailored design

Based on the preliminary data obtained, it is possible to define the injection design precisely to carry out the treatment in the areas where it is necessary.



Weaknesses in the ground

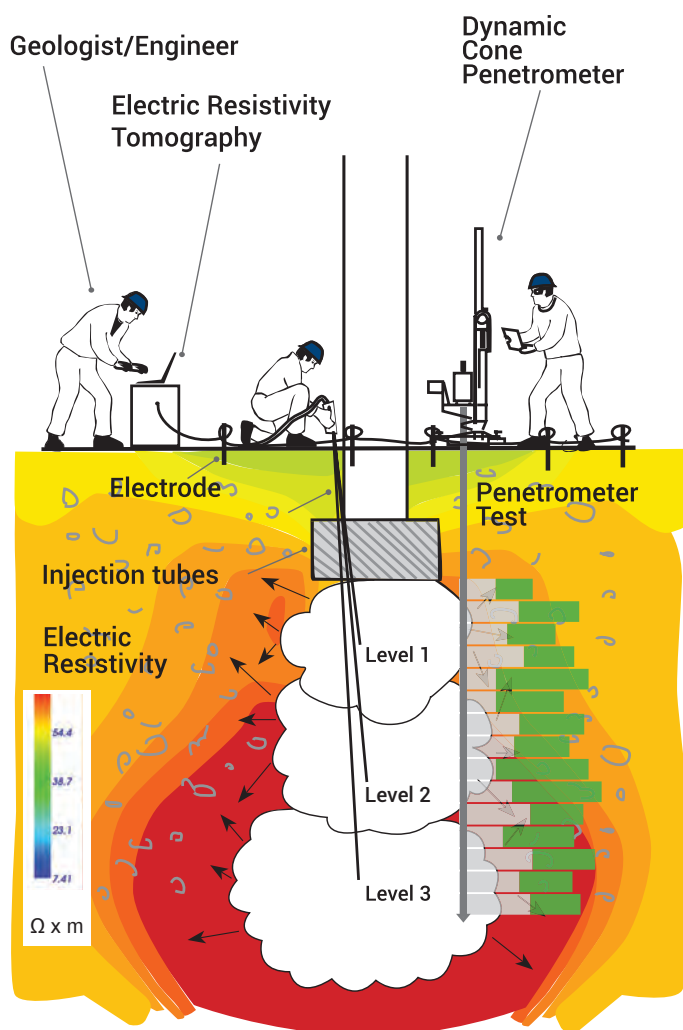
3 Small boreholes penetrating the foundation

Drilling and placement of injection tubes

Once the work area is secured and cleared of any interfering furniture or objects, small holes will be drilled into the slab using handheld drills. Once the desired depth is reached, injection tubes will be installed for the subsequent consolidation process.

Achieving at-depth consolidation

Over the course of the interventions, several levels of injections, even superimposed, are planned for, utilizing the same borehole to reach different depths.



4

Resin injections always under control



ERT 4D LIVE Tomography carried out before, during and after treatment.

To cover both settled and more stable, non-settled areas taken as reference during consolidation. Once the injection system is connected to the tubes in the ground, our special, expansive resin is injected.

The treatment is continuously monitored by the 4D resistivity tomography, thanks to sequential and repetitive images of what happens in the ground beneath the foundation.

Specialized **GEOSEC®** technicians can accurately validate the procedure in real-time and make the necessary adjustments to achieve the best consolidation results.

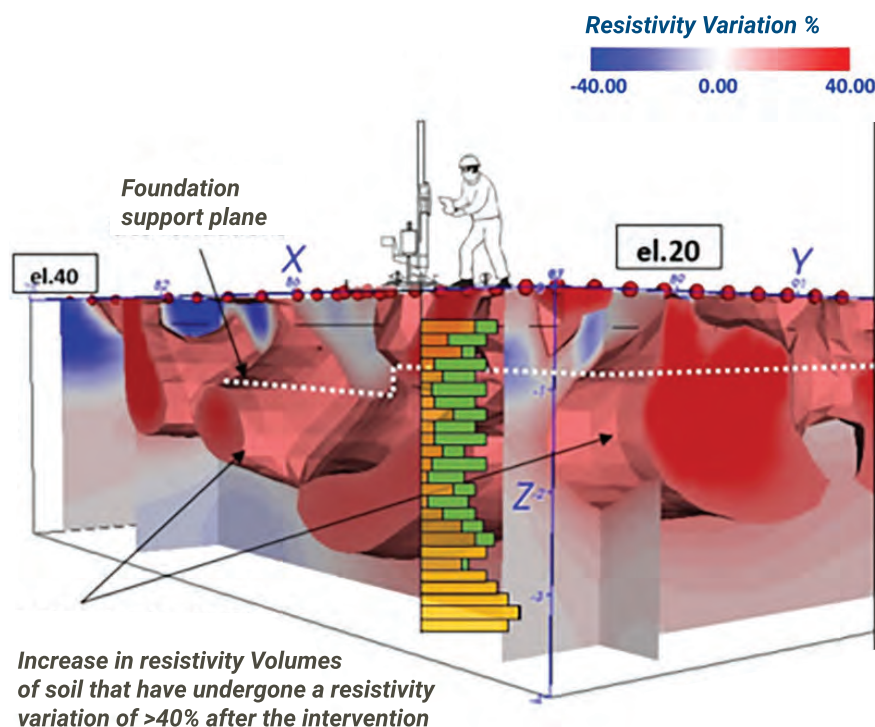
**ERT
4D
LIVE**

5

Final validation of the intervention

For a homogeneous and balanced treatment

Specifically designed calculation software for **GEOSEC®** interventions enables us to obtain the variation of resistivity of the treated soil, throughout the entire project.



WHY CHOOSE GEOSEC?

OUR STRENGTHS

CHOOSE THE ORIGINAL



CERTIFIED GEOSEC SOLUTIONS

GEOSEC® has invented the method of ground consolidation and stabilisation, and for over 20 years, it has ensured a high level of expertise in the industry thanks to hundreds of successful interventions.

With **GEOSEC®**, you can be confident in relying on the know-how, technologies, and competencies that are unique to the inventor of the method.



"ERT 4D LIVE" TOMOGRAPHY IN TIME LAPSE

Unique technology of its kind for its reliability and intervention precision.

Thanks to the patented **GEOSEC®** system, injections are monitored during the intervention in the ground to know what is happening beneath the building during consolidation.



ANTI-SEISMIC SAFETY

Consolidation of the ground with injections is part of the seismic improvement project of buildings, starting with the underpinning and reinforcement of the ground.



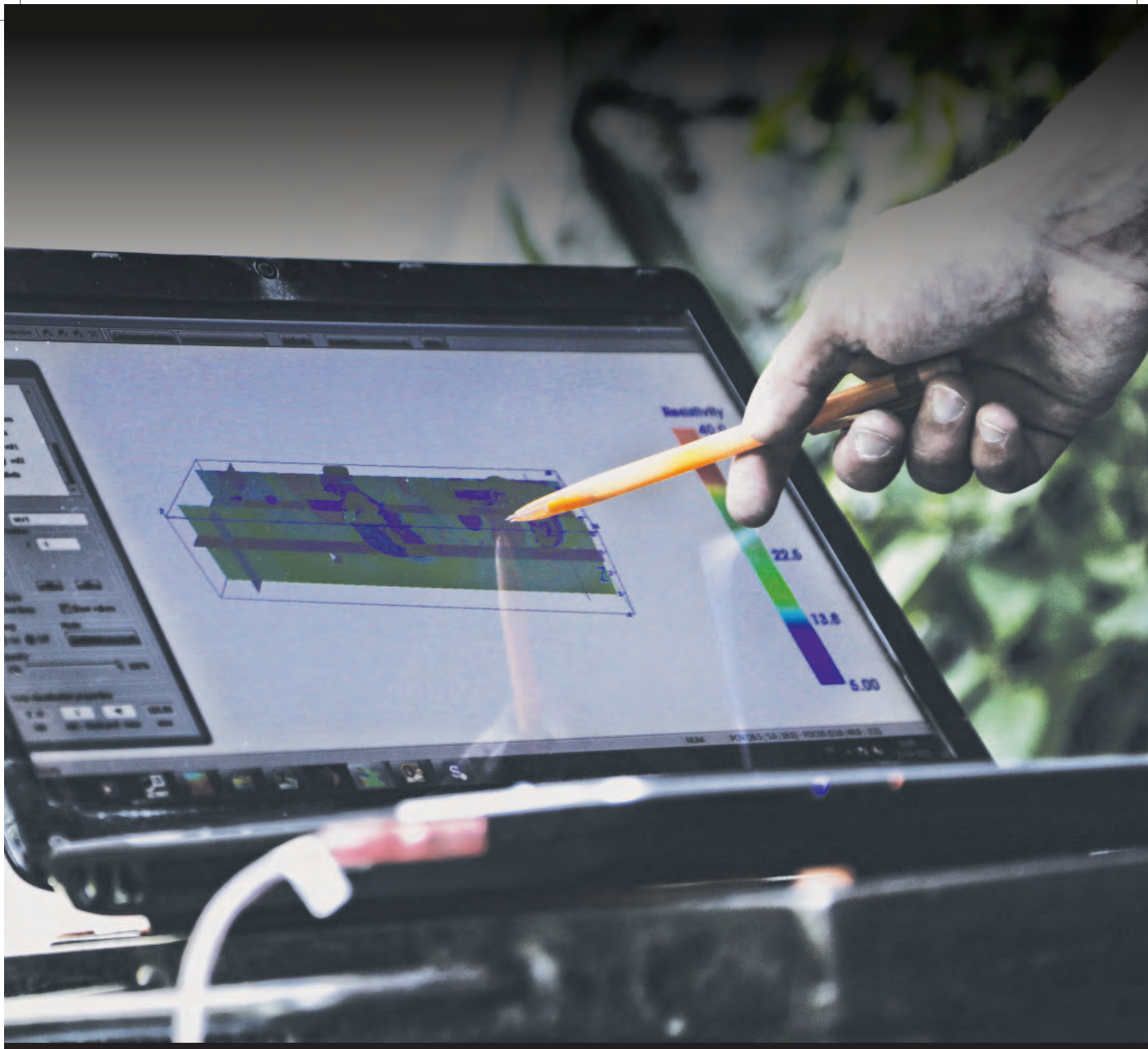
CONSOLIDATING WITHOUT CONTAMINATING

GEOSEC® cares for the environment and once the intervention has been carried out, the ground will not be contaminated. **MAXIMA®** is the resin produced exclusively for **GEOSEC®** by qualified multinationals in the sector.

INTERVENTION WARRANTY



GEOSEC® 's solution is unique and holds prestigious international technical certificates. It offers a ten year company guarantee with the possibility of upgrading it to a ten year insurance backed guarantee, thanks to its cooperation with major international insurance companies.



WANT TO **KNOW** MORE?

FOR MORE INFORMATION, CONTACT US FOR A NO OBLIGATION CONSULTATION.
OUR ENGINEERS ARE AT YOUR SERVICE THROUGHOUT THE UK.

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Get a FREE Quote

www.geosec.co.uk

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GROUND ENGINEERING