ETSH

Company Book
2022-2023

“You and I come by road or rail, but economists travel on infrastructure.”

Margaret Thatcher

RAILWAY INNOVATION CONTEST 2021 DITECFER WINNER 2021 LEADERS IN RAILWAY INNOVATION

SIG

iBIMi | buildingSMART Italy

AIS ASSOCIAZIONE INFRASTRUTTURE SOSTENIBILI

DILIGENTIA ETS Associazione Italici per la Responsabilita' d'Impresa e Sviluppo Sostenibile

ASSOCIATO oice CONFINDUSTRIA

AGI Associazione Geotecnica Italiana

ISI Ingegneria Sismica Italiana

we design

Infrastructure is a social value, maintenance a strategic need. At ETS we design for people. We think, design, develop quality, reliable, sustainable and resilient infrastructure, including regional and cross-border infrastructure, to support economic development and human well-being, with a focus on safety and equitable access for all. Since 2005, ETS has been operating in the civil engineering services sector, offering innovative solutions in the fields of railway and road design, structural, natural and environmental engineering, geotechnical and hydraulic geology, architecture, with a focus on the recovery and consolidation of works of art, convinced that the protection of infrastructural heritage is the key to sustainable development. ETS is certified at the highest levels in the qualification systems of the main Italian rail and road transport authorities. The company has its own code of ethics, a source of inspiration.

vision

We think big and plan big, to be recognised as an international player and contribute to building a better, sustainable world through know-how and shared values.

mission

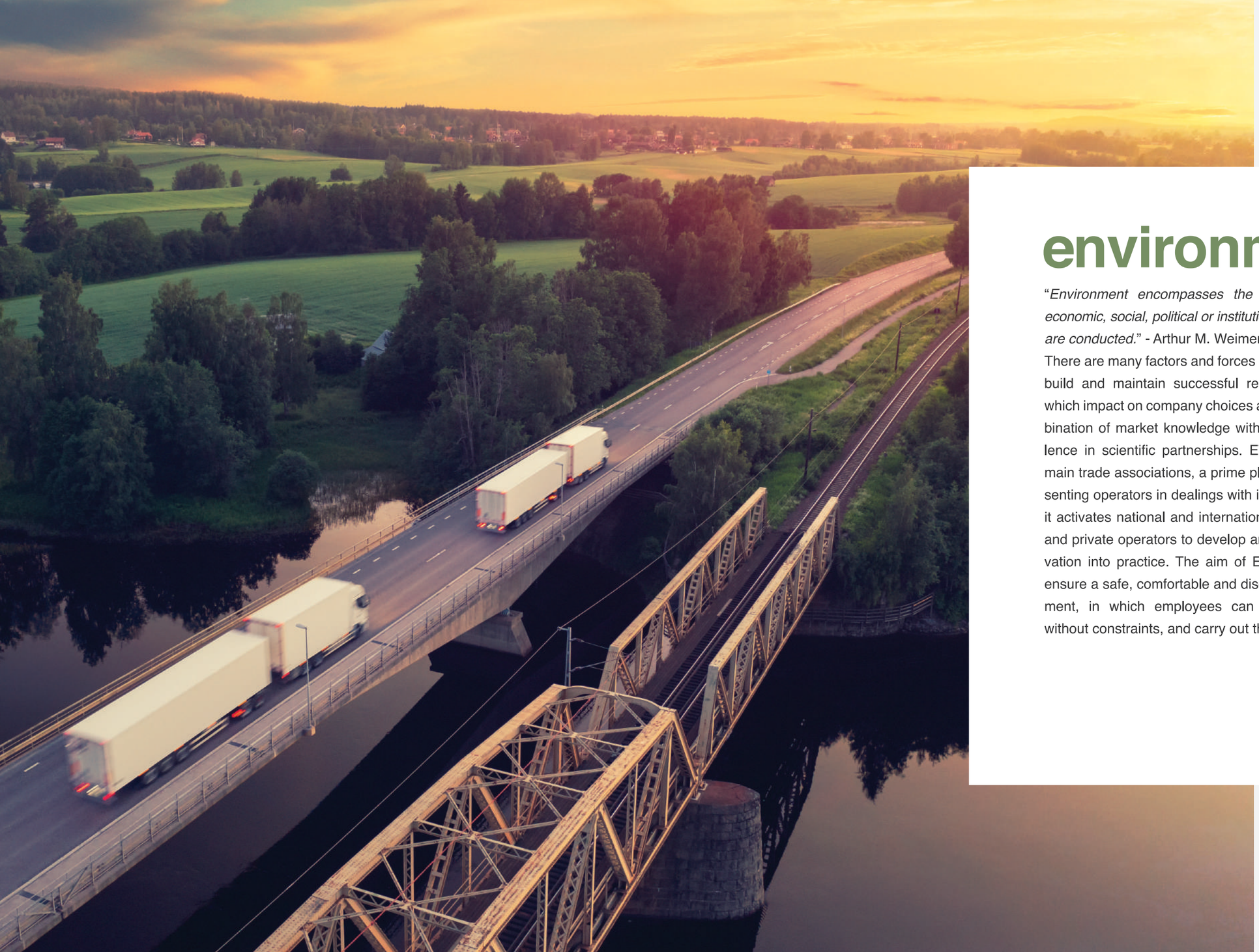
Providing innovative and sustainable services in engineering, geotechnical, architectural and infrastructure diagnostics to improve mobility and personal safety. Investing in Research and Development to produce new knowledge, new services and partnerships that can contribute to real sustainable development.

Railway Bridge
Sesto Calende

(Italy)

people

A company's success is determined by the people who shape it. People, not employees and not numbers, but co-workers each with their own way of thinking, with a distinctive career path, with a specific set of skills, but with the same desire to share the company's values and goals. We believe in a safe and prejudice-free working environment where people can creatively express themselves and where different points of view are respected. At ETS, we invest in training activities and various opportunities for personal and professional growth. Our conviction is that we can count on committed, responsible and motivated employees, on a multidisciplinary team with a common outlook, each maintaining their own specific characteristics and promoting themselves as ambassadors of the ETS values and brand.



environment

"*Environment encompasses the 'climate' or set of conditions, economic, social, political or institutional in which business operations are conducted.*" - Arthur M. Weimer.

There are many factors and forces influencing a company's ability to build and maintain successful relationships with customers and which impact on company choices and policies. This requires a combination of market knowledge with updated regulations and excellence in scientific partnerships. ETS operates within the sector's main trade associations, a prime place for discussion and for representing operators in dealings with institutions, and at the same time it activates national and international partnerships with universities and private operators to develop and put professionalism and innovation into practice. The aim of ETS's organisational model is to ensure a safe, comfortable and discrimination-free working environment, in which employees can creatively express themselves without constraints, and carry out their roles easily and sustainably.

Portella Bridge
Rome-Formia Railway Line

(Italy)

our story

18 years projects

2005
Company foundation

ETS was founded from the aspiration to do business believing in the centrality of people and new technologies. The core business is in transport infrastructure engineering.

2006
Inclusion in the RFI qualification system

The Company is included in RFI Rete Ferroviaria Italiana, the public company 100% owned by Ferrovie dello Stato Italiane, responsible for the maintenance and management of the national railway infrastructure.

2010
The Company grows

In these years the company has developed in the domestic market, with an increasing specialization in engineering services for the rail and road transport.

2015
New Headquarter and certificazions

ETS continues growing with the opening of its new headquarters and additional certifications: ETS gets ISO 9001, ISO 14001, OHSAS 18001, SA8000 quality certifications.

2016
BIM Design Implementation

ETS integrates BIM - Building Information Modeling methodology within the company processes to respond promptly and becoming the main channel of change.

2016/9
Associations

The Company decides to join the main associations in order to play in a proactive role and contribute directly to the debate on the key engineering topics. CIFI, OICE, iBIMi Building Smart Italy, AGI, SIG.

2018
Open to international markets

Thanks to the results achieved, ETS broadens its horizons by invests in the development of foreign markets, strategically involved in the main international trade fairs and taking part in important missions organized by OICE and supported by ITA, the Italian Trade Agency.

2018
Extension of RFI qualifications

In 2018 ETS consolidates its position in RFI, Rete Ferroviaria Italiana, significantly raising the level of qualification within the different categories represented.

2018
The INFRABIM design approach

ETS develops its own BIM workflow applied to infrastructure. INFRABIM by ETS certifies the company's role as an innovator in the search for solutions dedicated to infrastructure design.

2019
Growth in the number of employees and collaborators

ETS, thanks to the large number and relevance of projects acquired in recent years, increases the number of employees and collaborators with more than 40 resources. A new operational office is established in Milan.

2020
The company consolidates partnerships

The Company consolidates existing national partnerships, while pursuing the internationalization strategy. It integrates new methods such as smart-working into its corporate workflow, managing to meet commitments with customers and partners, while respecting the safety of its employees.

2021
Acquisition of EarthScience

The company gains an entire strategic asset: geological and geotechnical investigations, environmental and geognostic surveys, bathymetric surveys.

2021
Membership in the DITECFER Consortium

Participation in the Consortium is an important tool for opening up to new international markets, acquiring strategic know-how and business networking .

2022
Appointment of New CEO

2022
Institution of R&D Dept.

Certifies the innovative character of the Company and enables the organisation of resources and processes useful for the study of innovative solutions and services.

2022
GEA2021 EFCA2022

Important international awards confirm the right investment direction adopted by the Company.

New DT appointed

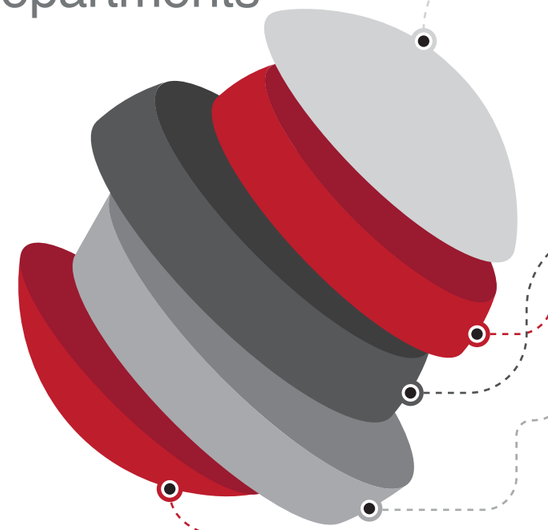
2022
Founding partner DILIGENTIA ets

Supporting and sharing the principles of corporate responsibility for sustainable development through ESG parameters, environmental objectives (European Taxonomy) and UN Sustainable Development Goals (SDGs).

2022
New Operation Headquarters in Rome

The Company confirms its growth trend through the opening of a new corporate headquarters.

corporate departments



Structures

Analysis, design and consulting in the structural field of public and private works of art with a focus on rail and road infrastructure.

Architecture, Safety, Constraints and Installations

Design of buildings for civil use in railway station infrastructure.

Geotechnical and Hydraulic Geology

Studies and design in the field of civil, geotechnical, hydraulic, environmental and geological engineering. Slope mapping, mitigation of hydrogeological instability.

R&D

Innovation and creation of new services, technologies, and procedures, with the aim of contributing to the general improvement of the sector.

Diagnostics

Monitoring, acquiring objective data useful for defining engineering, geotechnical, geological and architectural analyses. Owner instrumentation and procedures to investigate linear infrastructures in a new and efficient way.

Tenders

Qualification and tendering for rail and road infrastructure design.

Com & Mktg

Communication as a business development lever. Content marketing, brand positioning.

Trade Associations

Active participation in the main trade associations, to make our contribution where the decision making and guidelines for the future are made.

Last Year Milestone

- Participation in the DITECFER Consortium
- EarthScience acquisition
- Institution of New R&D Department
- New CEO
- Founding member Diligentia Association for ESG, SDGs
- International awards: GA2021 and EFCA 2022
- New Operation Headquarters in Rome

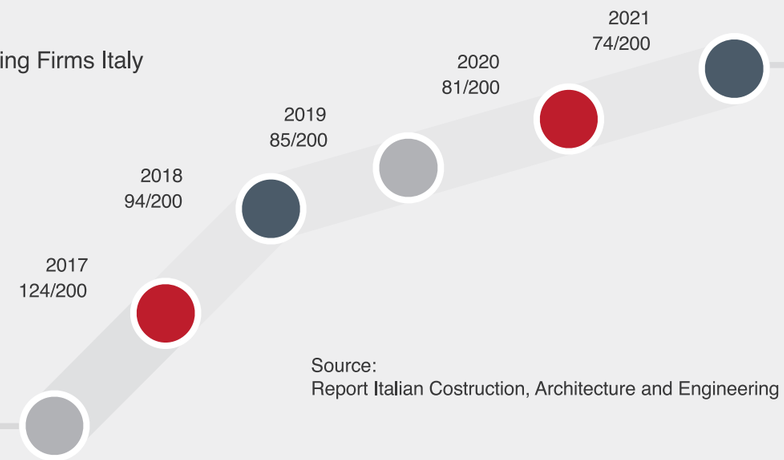
economic performances

ETS is featured in the prestigious Financial Times FT1000 2019-2020-2021 list as one of the one thousand European companies with the highest organic growth factor.

ETS is listed in the Report on the Italian Construction, Architecture and Engineering Industry 2019-2020-2021-2022 as one of one hundred Italian companies by total business volume.

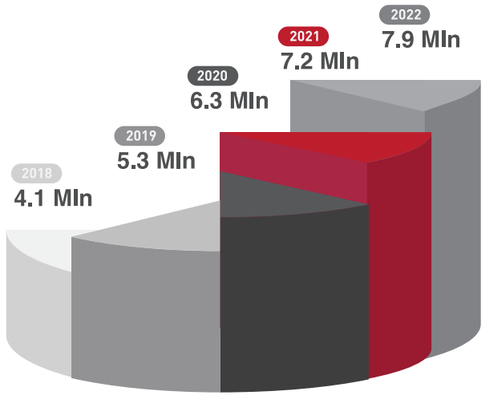
ETS is present in Plimsoll's prestigious sector study and financial analysis, where the largest Italian companies in the sector are ranked.

Top 200 Engineering Firms Italy



Source:
Report Italian Costruction, Architecture and Engineering Industry

Business Growth
2018/2022
+92,7%



structures

The Structures Department is the technical-operational point of reference for issues relating to the structural design of transport infrastructure and civic buildings on rail and road infrastructures. Its role is crucial for the development of complex and evolved infrastructure projects, where the multidisciplinary component becomes a fundamental element for the success of the project. The team of structural engineers is able to provide design solutions ranging from individual specific works, with their particular characteristics and technical features, to integrated solutions for complex projects relating to the entire linear infrastructure, with a focus on the sustainability of design choices, materials, and partners.
The issue of safety is a priority in any infrastructure project. Our team of structural engineers is on hand to provide both static and dynamic structural analysis services, as well as diagnostics and structural monitoring of works of art, inspections and seismic vulnerability analyses, a topic that is very much in the spotlight in Italy.
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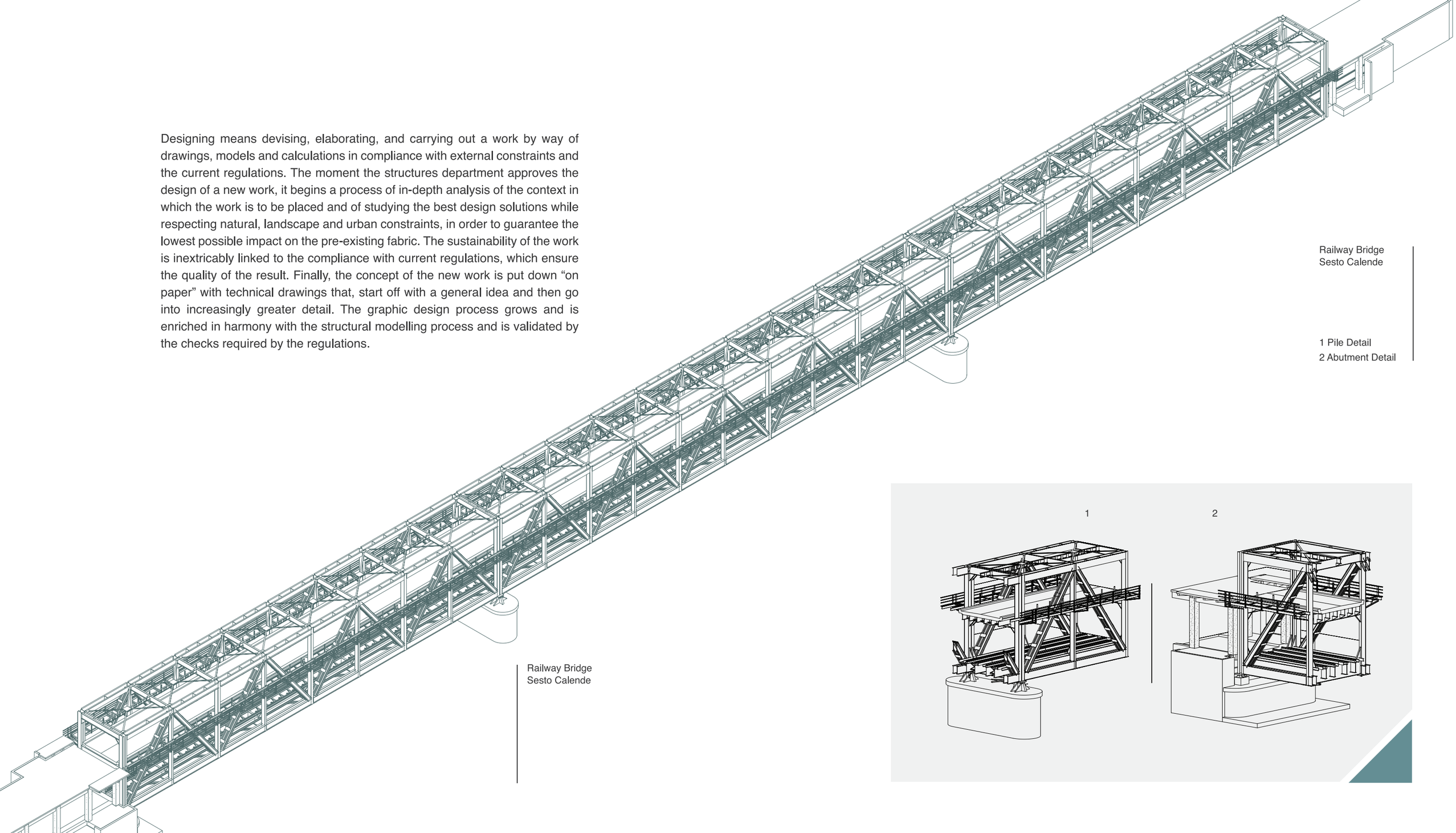
Designing means devising, elaborating, and carrying out a work by way of drawings, models and calculations in compliance with external constraints and the current regulations. The moment the structures department approves the design of a new work, it begins a process of in-depth analysis of the context in which the work is to be placed and of studying the best design solutions while respecting natural, landscape and urban constraints, in order to guarantee the lowest possible impact on the pre-existing fabric. The sustainability of the work is inextricably linked to the compliance with current regulations, which ensure the quality of the result. Finally, the concept of the new work is put down “on paper” with technical drawings that, start off with a general idea and then go into increasingly greater detail. The graphic design process grows and is enriched in harmony with the structural modelling process and is validated by the checks required by the regulations.



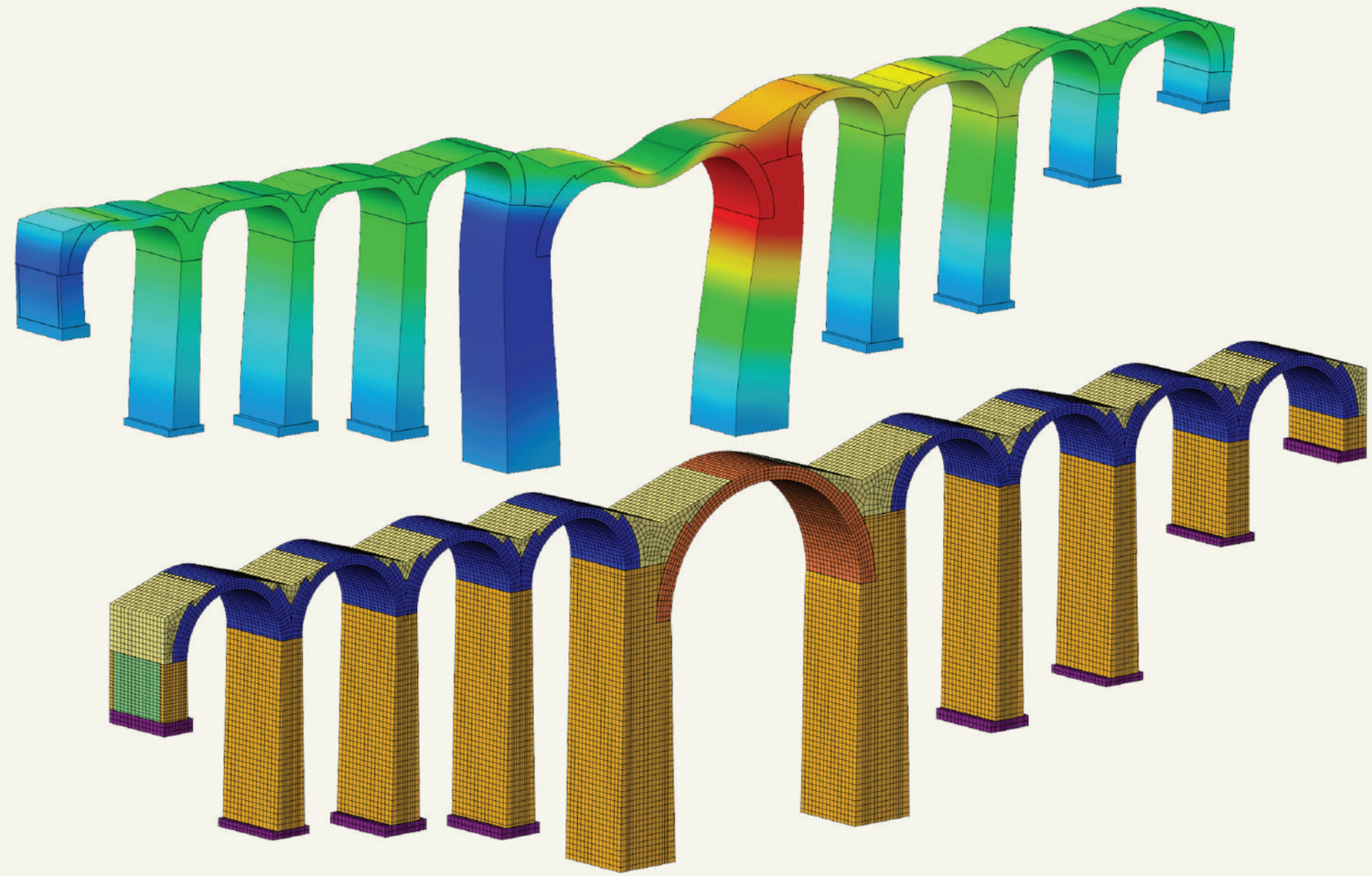
Railway Bridge
Sesto Calende

Railway Bridge
Sesto Calende

1 Pile Detail
2 Abutment Detail

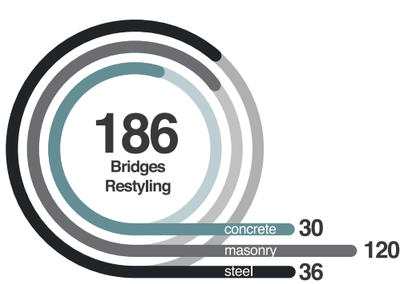
assets & services solutions

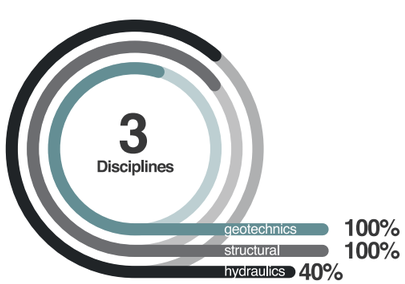
Existing structures are an asset to be preserved and protected, applying all the latest knowledge and technologies to extend their service life. Most of the existing structures on which the Structures Department intervenes fall into the category of historic structures, i.e. more than 70 years old. The first responsibility to these structures is to assess the risk of earthquakes and, when necessary, to provide for reinforcement works using sustainable solutions and materials that respect the aesthetic aspects of the structure. Intervening, therefore, on works of art of a historical nature is complex and entails evaluating technical solutions that take into account the use of new materials in combination with existing materials and technical solutions that are in harmony with the original concept of the work.

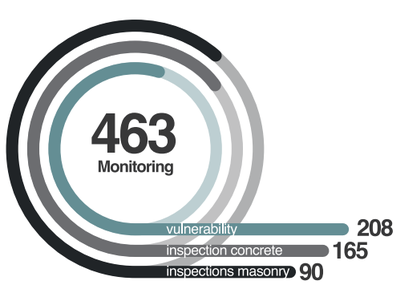


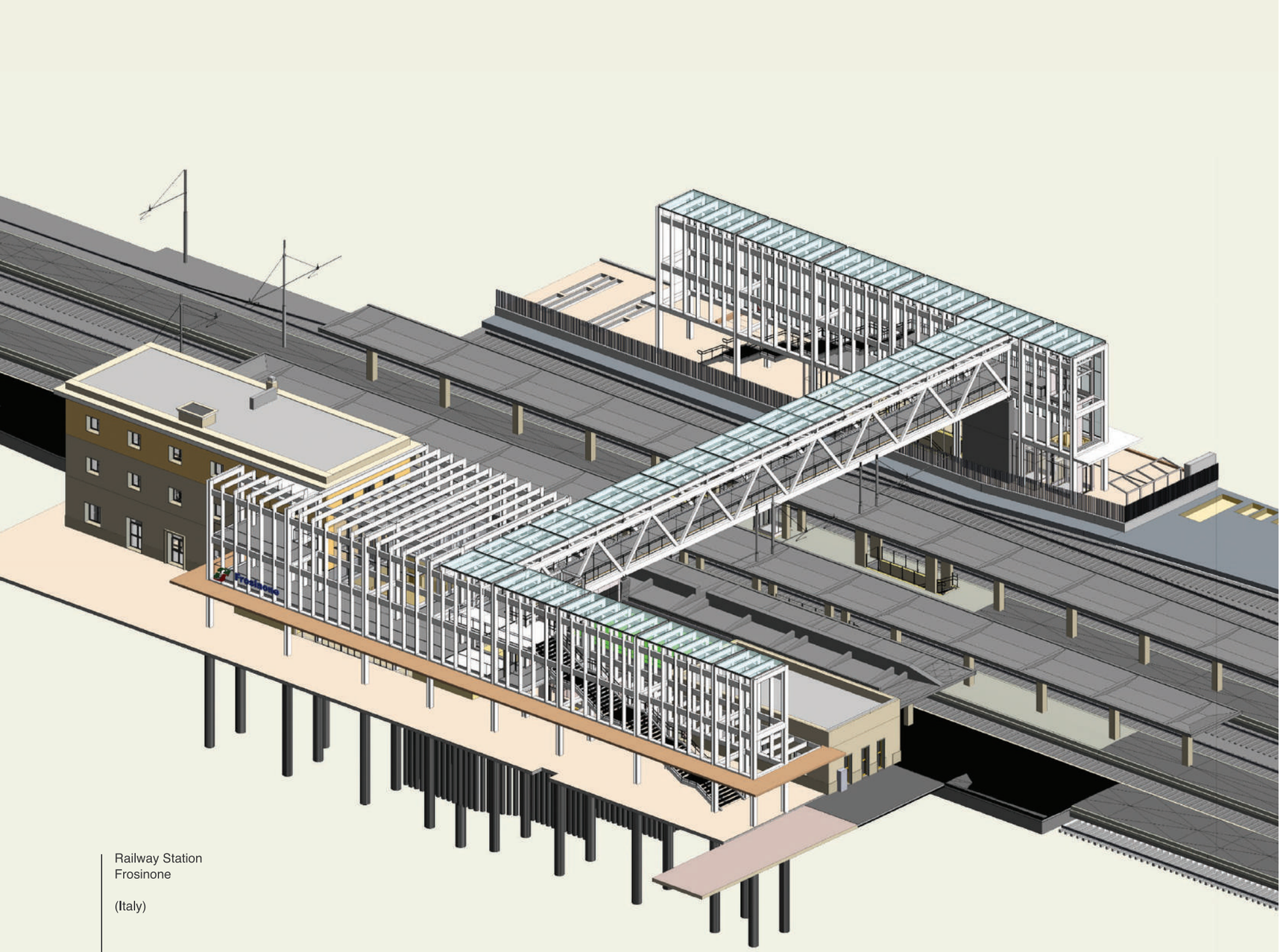
Railway Bridge
Cisano Bergamasco

(Italy)









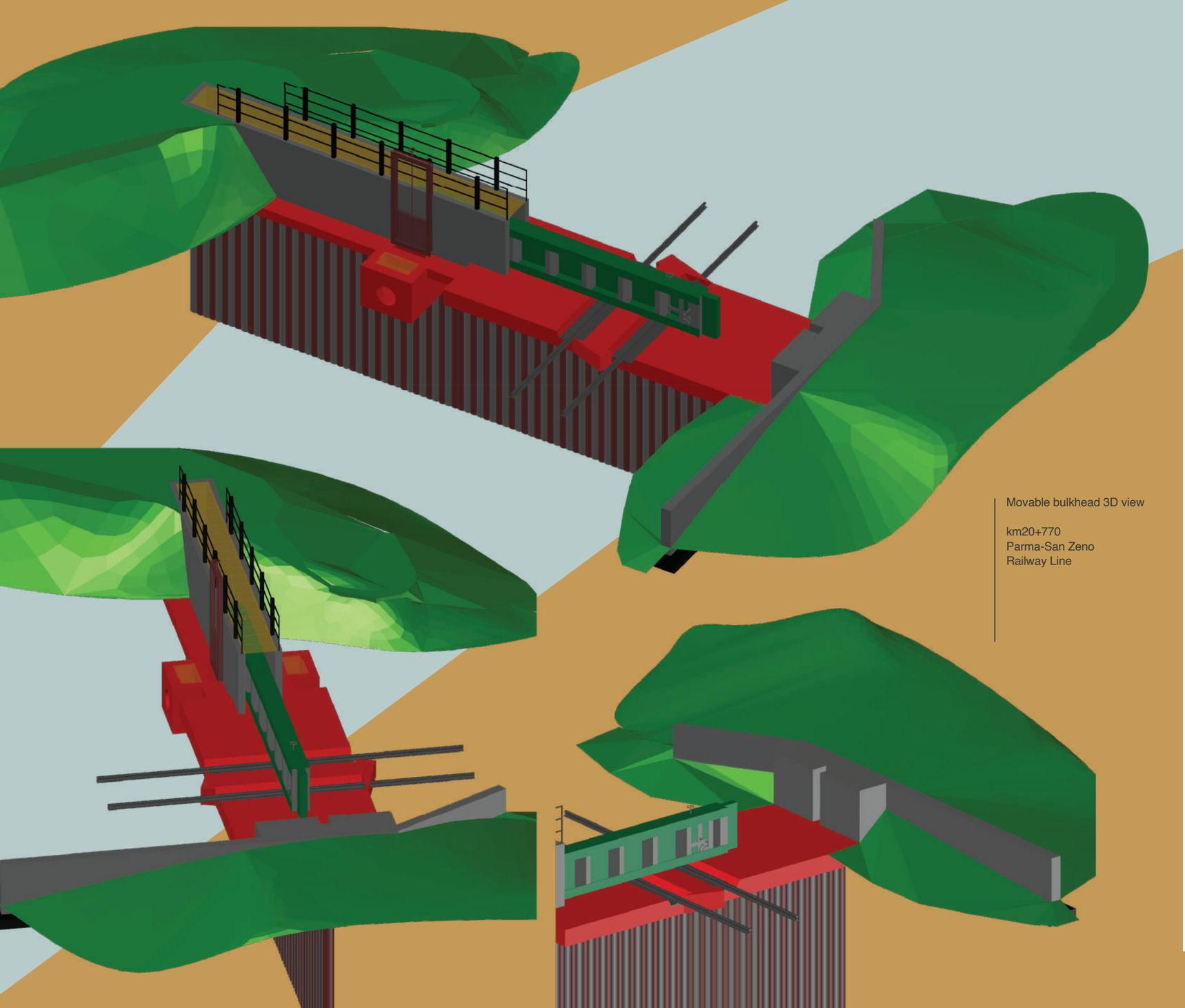
Railway Station
Frosinone

(Italy)

The observation of repeated behaviour of natural phenomena was the basis for the development of modern science. In the same way, observing the behaviour of a structure under the action of well-defined external forces is the basis for the new discipline of structural monitoring. Monitoring serves two purposes: in the short term, it must ensure the safety of the structure and its users; in the long term, it must increase its service life. Monitoring, the checking and recording of the static and dynamic phenomena to which a structure is subjected, is a necessary means of understanding how the structure responds to external inputs and therefore of understanding where and how to intervene with the measures, whether one-off or large-scale, necessary to extend the useful life of the work itself. Structural monitoring is therefore a new and important tool through which increasingly specific data sets can be obtained, which, when analysed and put together, become tools for designing increasingly precise and sustainable interventions.

geotechnics geology and hydraulics

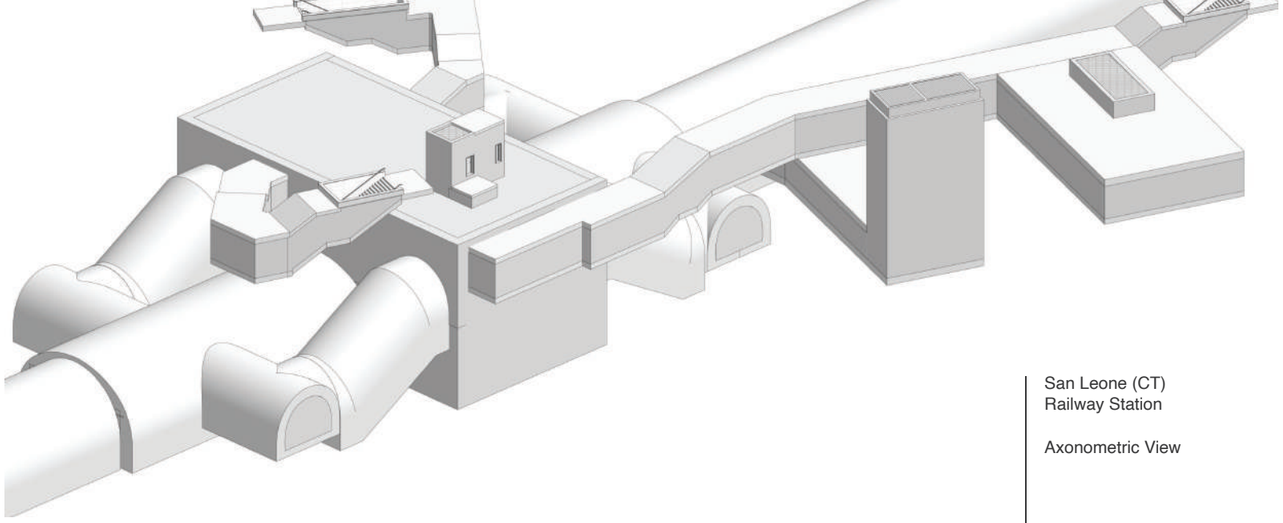
The Geotechnics, Geology and Hydraulics (GGH) Department is the point of reference for the design, diagnostics, management services of underground works, geotechnical structures and hydrogeological instability, as well as specialised and advanced studies in hydraulics, geology, geotechnics and risk analysis. The team is made up of specialists in various technical and scientific fields such as engineers, geologists, architects, surveyors, as well as a series of established and profitable collaborations with universities and private partners in Italy and around the world. Innovation, multi-disciplinary skills, expertise and sustainability are the key elements that guide the GGH team in its methodology and design choices, with the aim of finding the balance between People, Profit and Planet, the true driving force of our future.



Movable bulkhead 3D view

km20+770
Parma-San Zeno
Railway Line

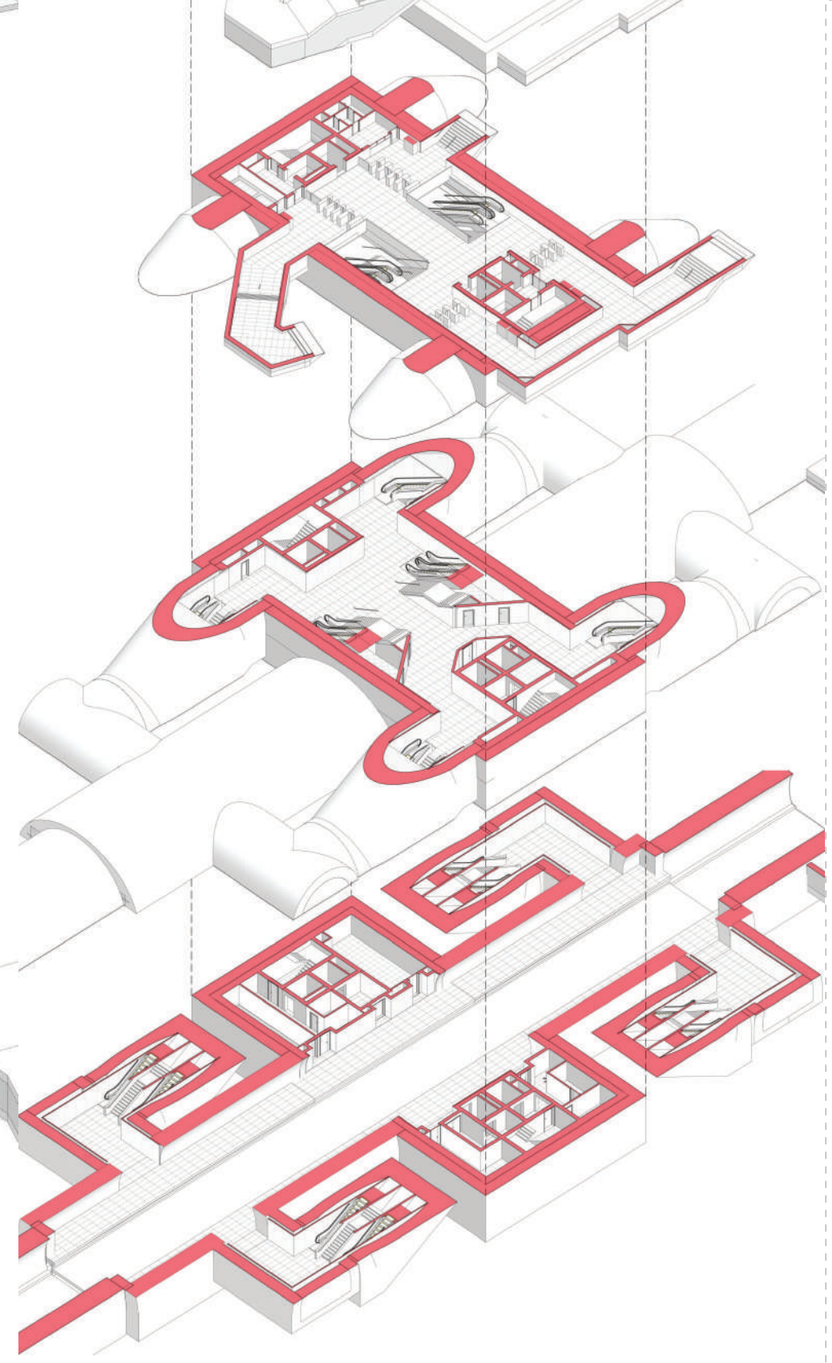
The GGH Department carries out hydrogeological and climatic risk analysis and management with state-of-the-art technologies and processes, complemented by the company's Research & Development Department. Innovative methodologies and techniques make it possible to design solutions and management tools to manage complex multi-disciplines over time and on different scales. In the field of river flood risk management in proximity to railway lines, interventions become particularly complex and involve numerous factors of different levels and kinds, up to previously unseen design interventions, such as the design of the first moveable horizontal railway retaining wall in Italy, designed in correspondence with the right main embankment of the River Po, and the design of pier protection structures in the riverbed.



San Leone (CT)
Railway Station

Axonometric View

Expertise in design from feasibility studies to construction, up to site assistance and asset management with BIM tools and innovative methodologies. As part of the project for the extension of Catania underground railway line, in the Stesicoro-Aeroporto section, we provided support for the executive design of three underground stations with the relevant portions of tunnels in a traditional new construction. The complex geological and geotechnical structure of the sites under consideration required specific advice on construction methods, site organisation and the analysis of the infrastructure as a whole, which took full advantage of the Department's multidisciplinary capabilities.

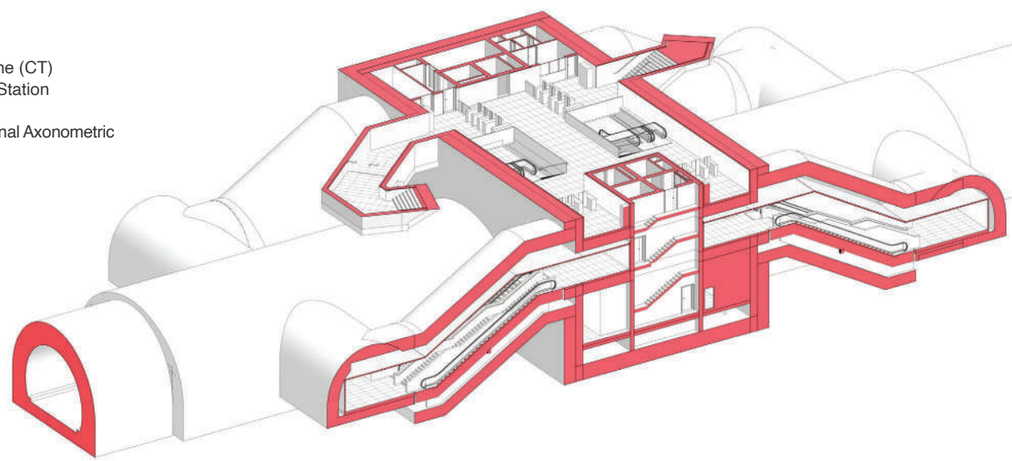


San Leone (CT)
Railway Station

Exploded Axonometric View

San Leone (CT)
Railway Station

Longitudinal Axonometric Section

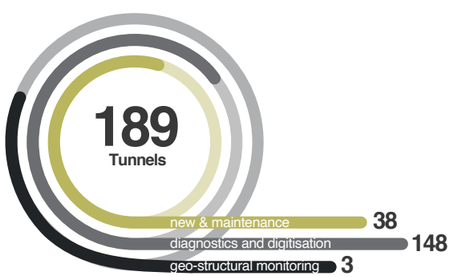


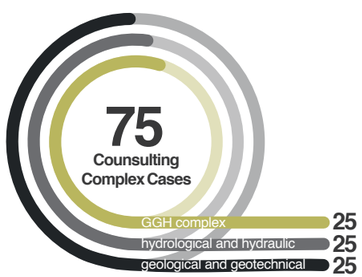
assets & services solutions

The GGH department is a centre of corporate excellence in innovation, making a major contribution to the promotion of state-of-the-art design solutions, with a focus on the sustainability of the proposed processes and solutions. Considerable effort is devoted to enhancing the know-how and tools for digitisation, risk analysis, works life cycle assessment and advanced numerical modelling. The main assets analysed are pre-existing and new tunnels, underground stations, major works of art and related hydrogeological risk mitigation, and works on infrastructure as a whole.

Section Railway Line

Liguria (Italy)





architecture
safety and permissions

Somewhere between art and science, architecture plays a vital role in the building process, in defining the spaces and functions associated with it. From the analysis of territorial, environmental and urban planning aspects, to the design and safety during construction, the aim is to design spaces and works conceived to improve life quality. The Architecture Department is responsible for the architectural, landscape and urban design of transport infrastructures and their inclusion in the territory. Infrastructures constitute the landscape and provide quality and shape to the territory. Architectural design makes a decisive contribution in this sense, favouring both interconnection and defence of the territory, supporting the design of new sustainable infrastructures, but also and most importantly favouring the maintenance, redevelopment and modernisation of the existing infrastructural heritage.

Railway stations will be the heart of the smart cities of the future, thanks to designs that promote accessibility and multi-function. They will be multi-service hubs, places of integrated and sustainable mobility, no longer conceived as merely places of transit, but as the pole of a MaaS (Mobility as a Service) system, expressing cultural, social and economic value with low environmental impact, an example of harmony between technology, sustainability and aesthetics. The Architecture Department is therefore responsible for the creation of people-centred design solutions. The railway stations are conceived as a central element of the urban mobility system, a point of convergence of the different LPT systems and environments that favour accessibility without discrimination, through new concepts of external and internal spaces, in compliance with current national and European regulations.

Santa Maria Novella
Railway Station

Florence (Italy)

Railway Station

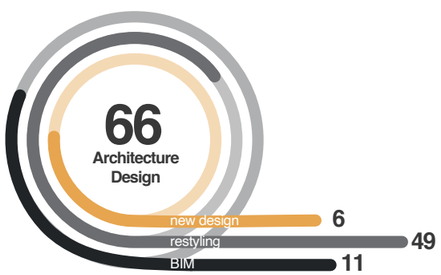
Lodi (Italy)

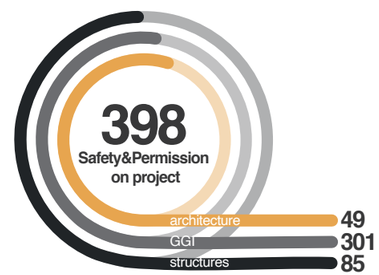
assets & services solutions

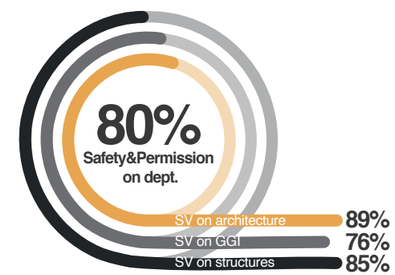
The Architecture Department is responsible for the architectural, landscape and urban design of transport infrastructures, both newly designed and redeveloped. In a national scenario where there is a strong presence of works of art of historical interest, design for the purpose of redevelopment is expressed in the ability to enhance the historical and cultural aspects of the works, in the research and selection of materials, respecting the landscape, environmental and urban constraints through design choices that are instrumental in preserving the value over time. At ETS we operate on the basis of a skilful mix of know-how, technical tools and innovative methodologies. “Designing” safety is crucial to guaranteeing the health and safety of the many professionals working on construction sites, and therefore safety coordination during the design phase (Health and Safety site officer) must be a collaborative element between the various stakeholders, from the designer to the client/site manager, and must interact with them so that the execution of the work and its subsequent maintenance are carried out in compliance with the regulations on workers’ health and safety.

Cassino
Railway Station

(Italy)





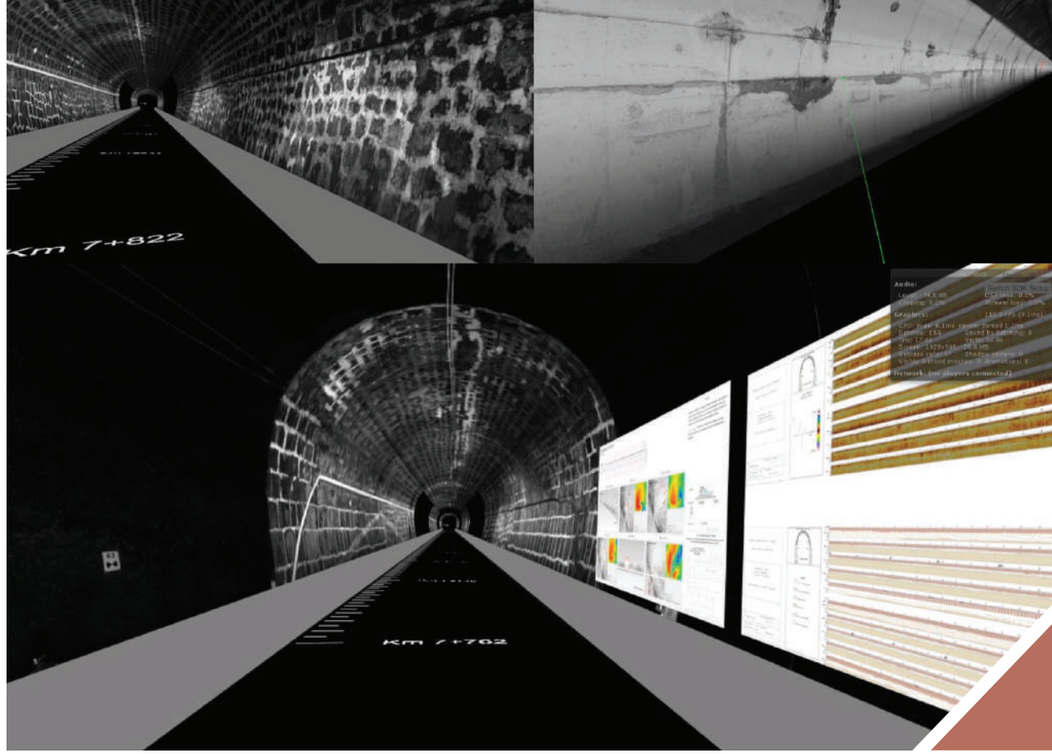


The infrastructure sector plays a strategic and vital role in economic development, but it is also one of the sectors that undoubtedly places the greatest pressure on environmental and natural resources and on the whole environmental and landscape context. Modern infrastructures must take these factors into account and be designed according to the most advanced safety and sustainability standards. The ASC Department is strongly committed to this approach. Designing the landscape as a means of preserving and redeveloping it for a reduction in the overall environmental impact between human activities and the landscape, and for the creation of harmony between open spaces and architecture. The landscape paradigm therefore requires the use of analysis and evaluation methodologies capable of overcoming the traditional sector perspective, in order to deal with the complexity of the systems in which we all live. “Good design” is based, primarily, on the best possible location of the infrastructure, then on the criteria for its integration in the landscape, in the choice of sustainable materials, and in its realisation by means of informed processes and actions.

research& development

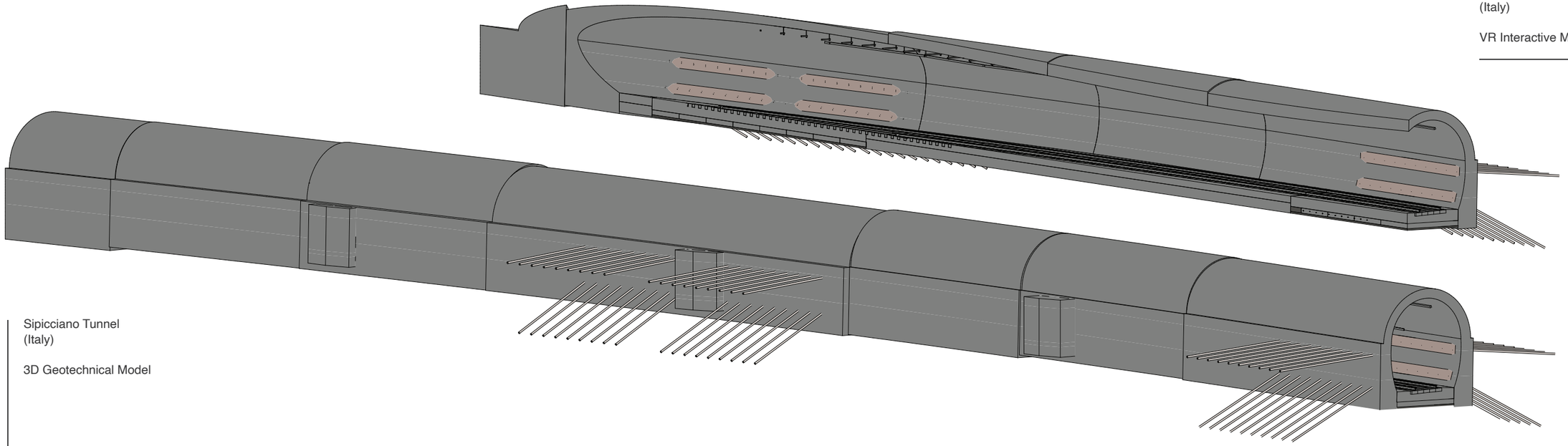
The Research & Development (R&D) Department defines the company's identity as a centre of innovation and has become a benchmark for the international technical-scientific community for digital transformation, sustainability and automation of analysis and management of existing infrastructures and territory. The team is made up of specialists from various social, technical and scientific fields, such as computer scientists, sociologists, mathematicians, engineers and geologists, as well as established collaborations with universities and partners in Italy and around the world. The strategic plan of the Research & Development Department's mission is to strike a balance between People, Profit and Planet, through the social benefit of infrastructure and territory. Innovation, multi-disciplines, computerisation and sustainability are the driving forces behind every internal and external process towards this goal.

Identification and management of infrastructure priorities and risk in a participatory, digital and automated environment. The mission consists of: Industrialisation of on-site activities and manual processes with state-of-the-art technology and artificial intelligence to automate technical and engineering expertise into algorithms, especially for diagnostics and the monitoring of bridges, tunnels and slopes. The digital transformation of inspection and asset management data with centralised computerisation, particularly for tunnels and hydrogeological instability mapping. Certified sustainability of technologies and processes developed in R&D with regard to the state of the art.



Sipicciano Tunnel
(Italy)

VR Interactive Model

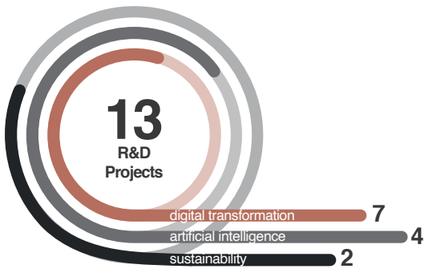


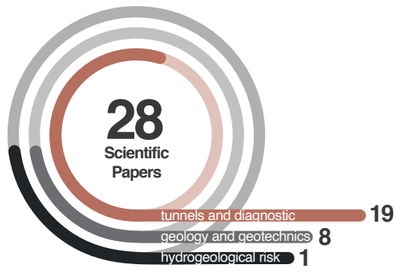
Sipicciano Tunnel
(Italy)

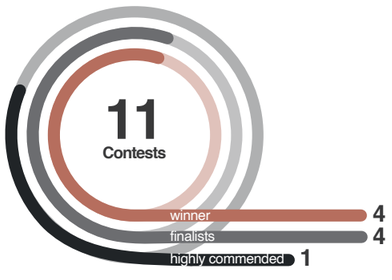
3D Geotechnical Model

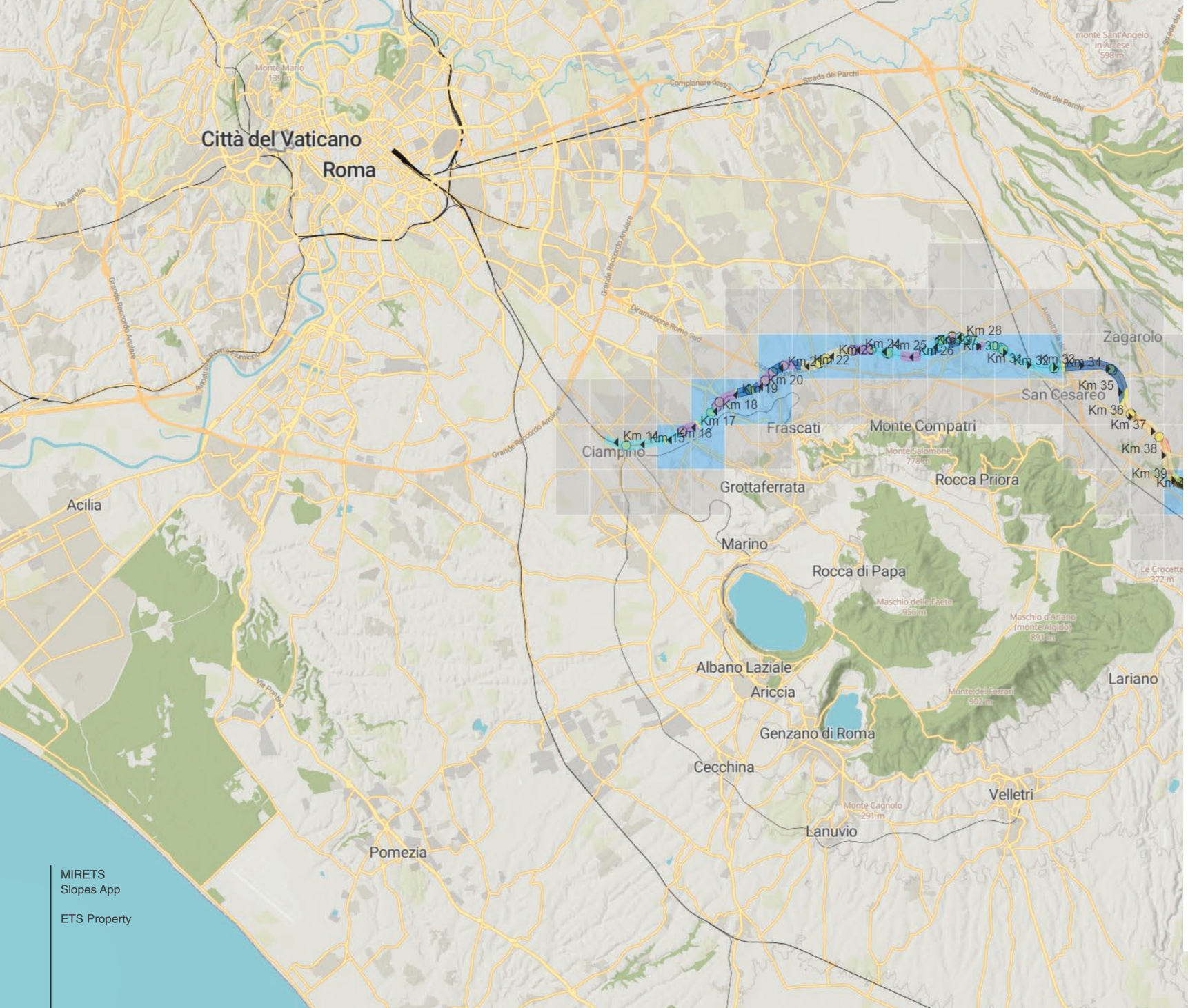
solutions for the planet, contribution to the public

The Research & Development (R&D) Department has become a benchmark for the international technical-scientific community on the topics of digital transformation, sustainability and automation of analysis and management of existing infrastructures and territory. This is made possible by a series of established collaborations with Universities and Partners in Italy and around the world that represent excellence in the topics covered; the strong link with industry and the direct application of services/products; their active presence in technical tables, commissions and working groups on technical, managerial, environmental and social subjects; the many publications in prestigious Journals and Conferences; national and international recognition in the main events for professional categories.



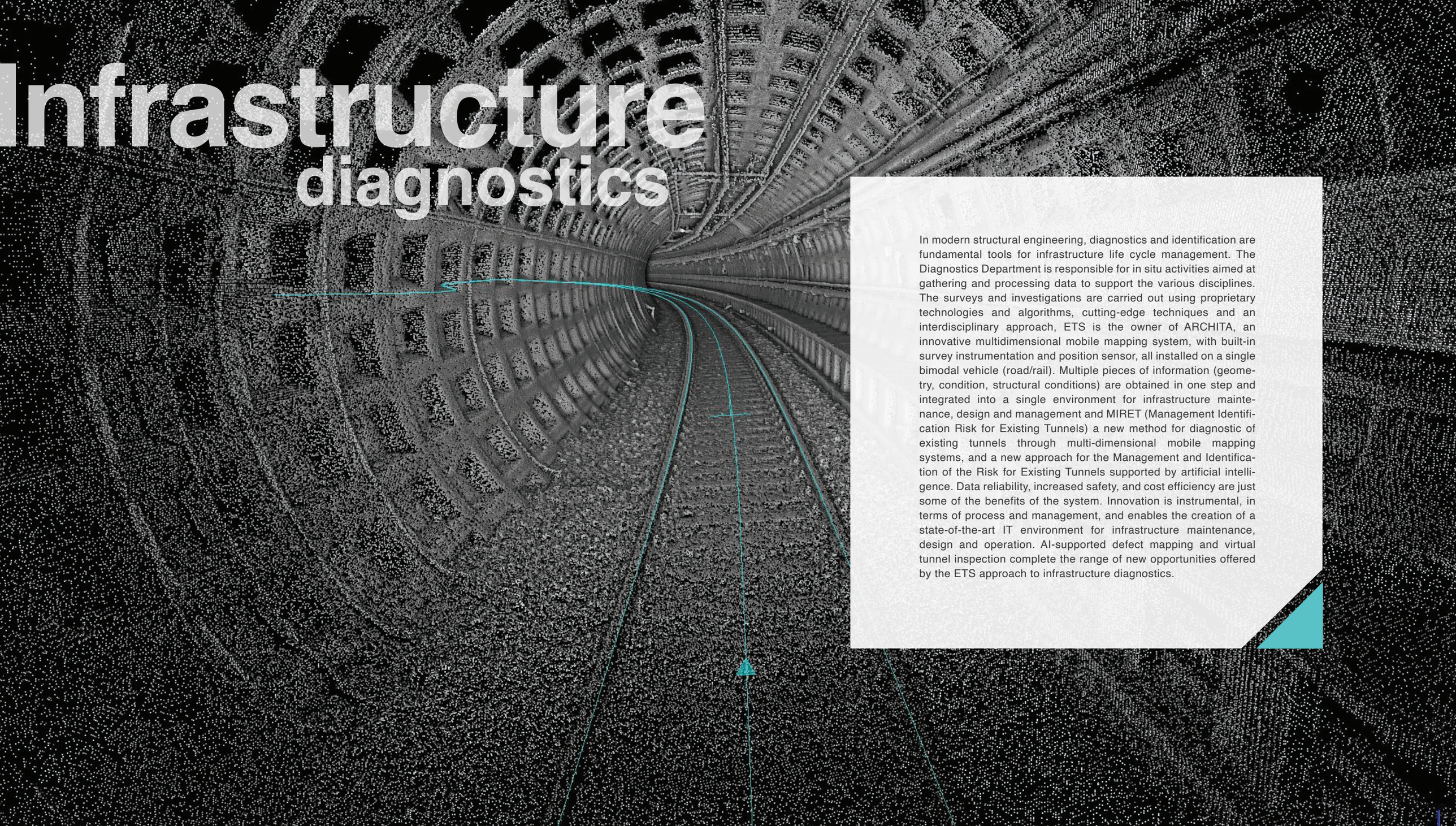






We aim to be sustainability leaders in our Research & Development by anticipating, supporting and implementing global trends in analysis and certification. R&D services and products, as well as the entire supply chain involved, undergo continuous analysis and verification of ESG parameters, environmental goals (European Taxonomy) and UN Sustainable Development Goals (SDGs). We have reduced the impact of emissions, pollutants and resource use in the inspection, operation and maintenance of existing infrastructure between 5 and 10 times. We developed the first methodology for quantitative climate change risk analysis for infrastructure assets.

Infrastructure diagnostics



In modern structural engineering, diagnostics and identification are fundamental tools for infrastructure life cycle management. The Diagnostics Department is responsible for in situ activities aimed at gathering and processing data to support the various disciplines. The surveys and investigations are carried out using proprietary technologies and algorithms, cutting-edge techniques and an interdisciplinary approach, ETS is the owner of ARCHITA, an innovative multidimensional mobile mapping system, with built-in survey instrumentation and position sensor, all installed on a single bimodal vehicle (road/rail). Multiple pieces of information (geometry, condition, structural conditions) are obtained in one step and integrated into a single environment for infrastructure maintenance, design and management and MIRET (Management Identification Risk for Existing Tunnels) a new method for diagnostic of existing tunnels through multi-dimensional mobile mapping systems, and a new approach for the Management and Identification of the Risk for Existing Tunnels supported by artificial intelligence. Data reliability, increased safety, and cost efficiency are just some of the benefits of the system. Innovation is instrumental, in terms of process and management, and enables the creation of a state-of-the-art IT environment for infrastructure maintenance, design and operation. AI-supported defect mapping and virtual tunnel inspection complete the range of new opportunities offered by the ETS approach to infrastructure diagnostics.

MIRET infrastructure digitalization

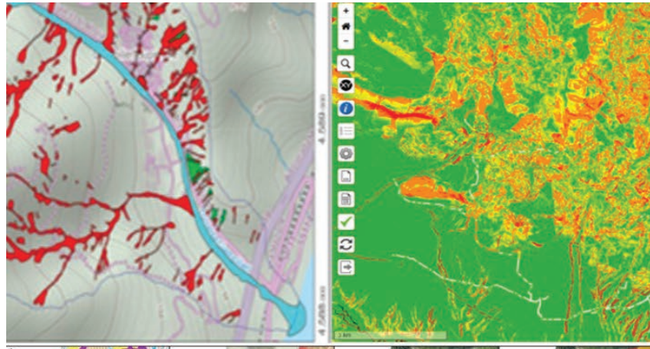
The knowledge, the preservation and the maintenance of heritage infrastructures is one of the most challenging matters facing modern civilization. It involves, in inextricable patterns, factors belonging to different fields (cultural, humanistic, social, technical, economical, ad-ministrative) coupled with the requirements of safety that can be in conflict with the integrity of part of the infrastructure. For these reasons, it is fundamental to carry out investigations and new planning strategies to know and predict the conditions of very old structures. ETS introduced MIRET (Management Identification Risk for Existing Tunnels) a new method for diagnostic of existing tunnels through multi-dimensional mobile mapping systems, and a new approach for the Management and Identification of the Risk for Existing Tunnels. The approach belongs to the digital strategies for infrastructure maintenance that are very fast and minimally invasive.

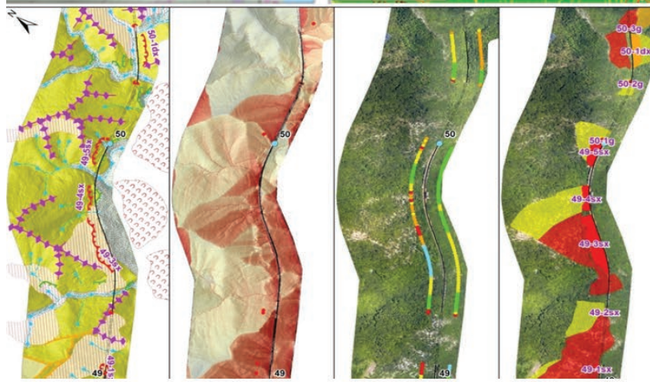
The integrated instrumentation allows to have almost all the information necessary for the diagnostics of a structure with non-destructive tests, preserving the integrity of very old structures in a phase of preliminary assessment. In such a way, the process of visual inspection is automatized and back-officed. The results, in terms of defects on the structures, are digitalized and manipulated in different IT environments. The results can be incorporated in the information modelling and virtual reality inspections. The use of artificial intelligence will be necessary to speed-up the back-office phase and introduce the technologies as a new inspection standard.

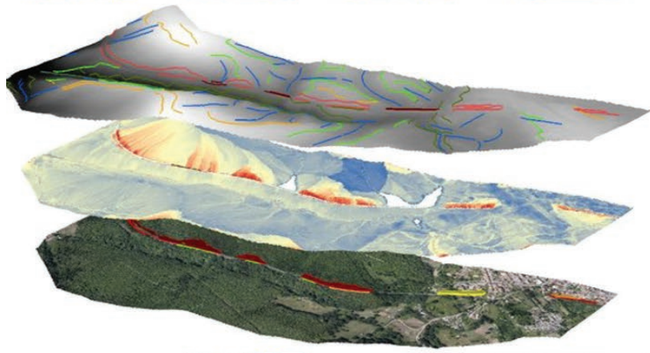
Assets and service solutions

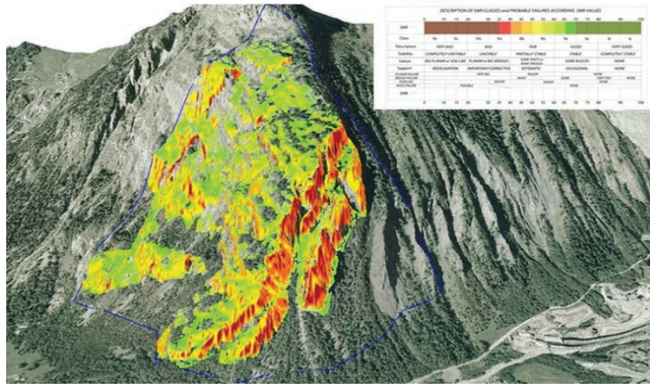
The planning and the management of existing tunnels is already a central challenge for industrialized countries. Infrastructure inspection and diagnostic are a crucial task in providing reliable predictive maintenance at cost with time consuming and error-prone process if based on human operations only. Therefore, the diagnostic inspection process and the relevant analytical procedures are suitable to automation. ETS and its partners have carried out the diagnostic and the maintenance of existing infrastructure through an innovative instruments and services. **ARCHITA**: To complement the innovative multi-dimensional mapping of ARCHITA and its integration by non-destructive diagnosis techniques. ETS with her partner developed a two fold techno-logical solution: Tunnel Scan (an instrumental apparatus) and Tunnel Review (dedicate software). The mapping of the defects is carried out combining the high-resolution photos, taken by three high-definition cameras and the point cloud.

The combination of the two technologies made the images measurable, with the possibility of positioning, measuring and quantifying the defects identified on the tunnel lining **B-SHAPE**: ETS has also implemented and deployed a marine Unmanned Surface Vehicle (USV) for the bathymetric survey. The processed data are integrated with the topographic survey to obtain a 3D reconstruction of both the above-sea and undersea surface. The aforementioned data are used for the study, the characterization of the materials and the design of the solution to reinforce the existing structures and mitigate the erosion effect near the line. All data acquired, engineering and geology analisys are integrated into our innovative B-SHAPE software. **SLOPE and LANDSCAPE** ETS has been developing a methodology called MIRETS (Management and Identification of the Risk - ETS). The approach can be applied in a wide field of civil engineering works, where a common application is for slopes and landslides that interest infrastructures. **MIRET - MIRETS** approach the analysis of the elements focusing on an integrated workflow to connect survey-inspection data for geology, digitalization, diagnostics and design. This approach can be defined through the following milestones: Survey and Inspection (SI), Infrastructure/Slope Digitalization (DI), Priorities Analysis (PA), Planning and Design (PD), Works and Maintenance (WM), Monitoring (MO).





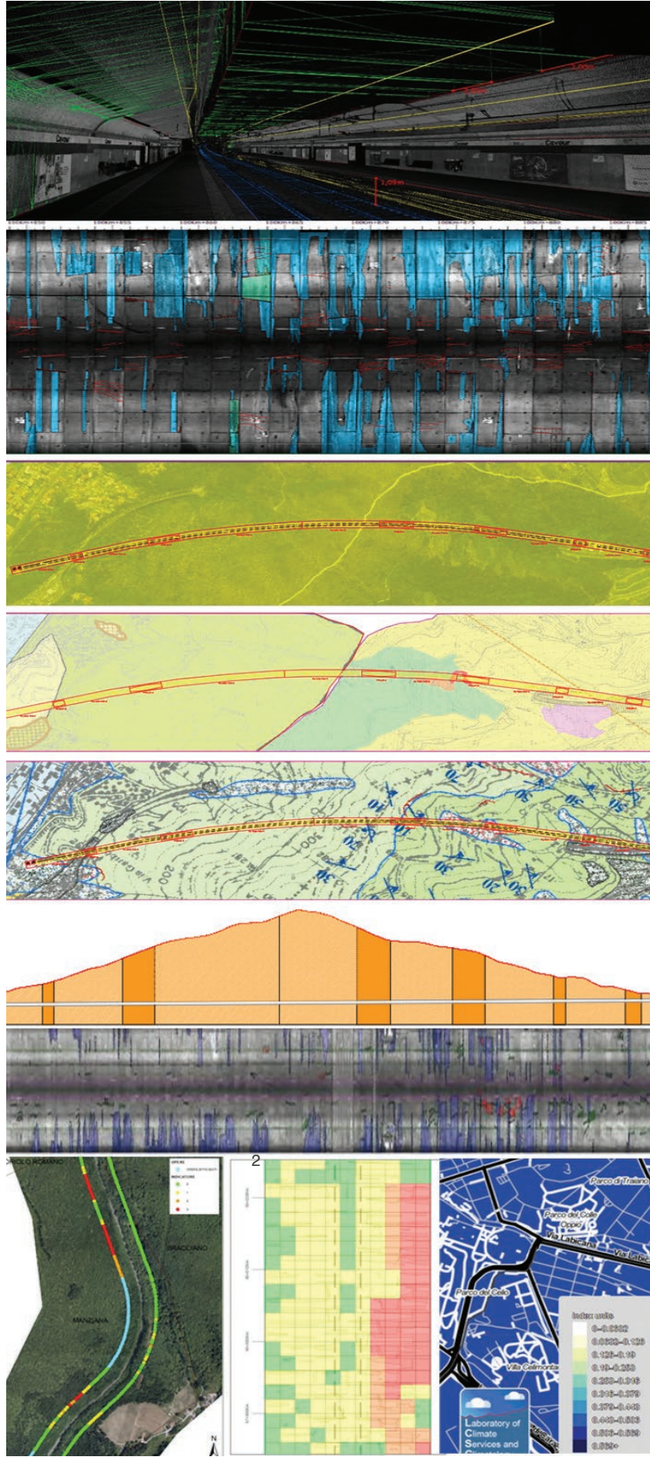




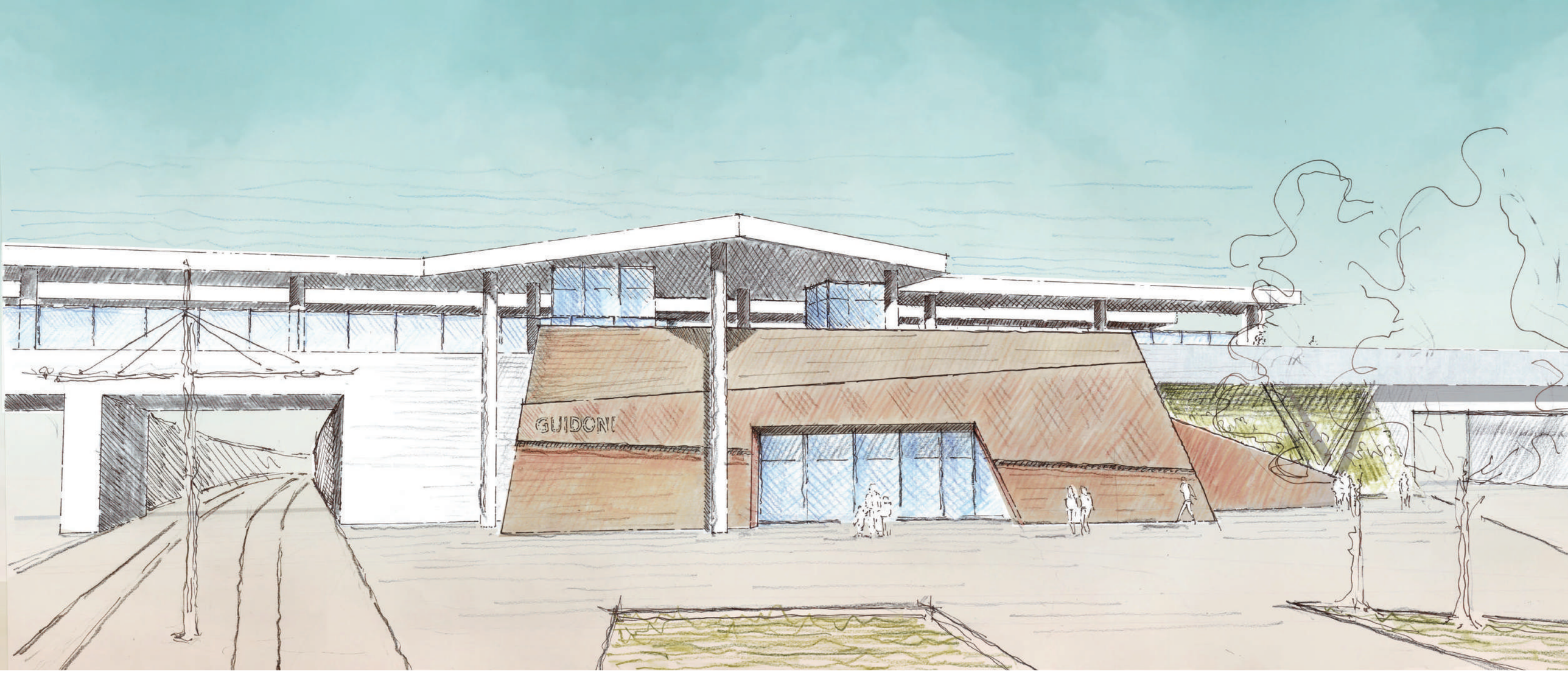
Diagnostic Slope Mapping

Catastrophic events like landslides and floods can cause significant social, economic and infrastructure damage. Damage can be avoided and made more manageable by a proper system of warning and planning of ordinary or extraordinary maintenance. The system must also work with respect for the environment and the historical and social value that infrastructure represents. To respond to these issues, ETS has tools, technologies and processes that can enable appropriate management and prioritization according to their potential manifestation. The infrastructure elements are digitized and the approach is based on logical and coordinated decisions in a digital and multidisciplinary environment for the management of risk scenarios, primarily for tunnels and hydro-geological instability.

Bibliographic analysis for reconstruction of the database of the events of the hazards and vulnerabilities from the bibliographic point of view. Airbone LIDAR survey: a LIDAR flight is taken along the railway line to obtain a high-resolution DTM and DSM of the area and detailed orthoimage. Mobile Mapping survey (ARCHITA): this multi-dimensional mobile mapping system is equipped with a laser scanner, thermal cameras, multi-channel GPR, high-resolution cameras and ground penetration Radar. In-Line Inspections: is the field geological survey along the line by specialized technician like geologist and engineer. Data processing and Priorities Analysis: data are georeferenced, they are processed in a GIS environment to extract all the input parameters needed for the SMCA analysis. Materials characterization: The characterization of the elements, such soil or rocks is a fundamental information which is integrated to perform advanced analyses. Data processing and stability evaluation to evaluate the stability index of each trench, both geomorphometric data and geological tests (on-site and lab tests) are generally used. Geomorphometric analyses: Thanks to the availability of a high-resolution DEM detailed geomorphometric analyses can be carried out, providing valuable data to evaluate the possible impact of landslides, both rock and earth fall, onto the railway. SMCA: Each input parameter is described by a georeferenced vector or raster layer, thus forming the geo-database needed to perform the Spatial Multi-Criteria Analysis.



MIRET - Process Workflow



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