its Engineering Company

ASSESSMENT DEPARTMENT

Brochure

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The Department

The Assessment Department provides services for the evaluation, restoration, and reinforcement of existing structures. Structures without periodic and proper maintenance are often affected by degradation due to human or environmental factors, which reduce their load-bearing capacity. Additionally, the increase in variable loads required by regulations and the update of safety standards may result in these structures being undersized according to current verification criteria.

The assessment approach differs fundamentally from new design processes and follows a structured knowledge path with progressive levels of investigation and verification. This method aims to optimize direct interaction with the structure regarding quantity, cost, and time. These activities include historical and critical analysis, review of the original design, surveys (geometric-structural, construction details, crack patterns, and structural damage), geological and technical site characterization, and investigations to assess construction details and materials.

Services

01 Static Safety Assessment

Assessment of structural safety and operability, including the verification of bridge and structure accessibility in compliance with the Guidelines for Risk Classification and Management, Safety Assessment, and Monitoring of Existing Bridges. This includes obtaining structural reliability indices, even on a probabilistic basis.

02 Seismic Vulnerability Assessment

In-depth structural analysis based on DM 17.01.2018 criteria determines the structure's capacity in relation to the seismic design loads.

03 Exceptional Transport Verification

Safety verification for load configurations exceeding mass limits,according to the Guidelines of 16.07.2022 on "Transport under Exceptional Conditions."

04 Multi-Risk Analysis

Advanced models for evaluating integrated risks, including hydrogeological risks (landslides, floods) and climate risks(cyclones, droughts), applicable to strategic lifelines and network infrastructures.

05 Large-Scale Risk Assessment and Analysis

Large-scale evaluations: analyzing and managing entire portfolio structures for public and private entities, using standardized or customized approaches based on specific needs.

06 Design and Engineering

Design of structural reinforcement, seismic retrofitting, and functional adaptation for existing structures and infrastructures.

These interventions consider the asset's cultural and historical value as well as environmental sustainability aspects.

Our Projects

Surveys and Investigations - Sardinia Region

Laser Scanning in the Survey of Civil Engineering Works on the Tourist Railway Lines in Sardinia

The survey activity proved crucial in the verification phase of the structures along the Sassari-Tempio-Palau tourist railway line, conducted by ITS Srl. Specifically, it played a key role for works with incomplete or, in some cases, entirely absent design documentation. The use of Laser Scanner technology enabled highly accurate results, allowing for detailed and precise modeling of bridges and viaducts along the line. This approach proved particularly advantageous for complex structures, providing reliable support throughout all stages of the analysis and safety assessment process.

Laser Scanning also proved fundamental during visual inspections, identifying and classifying defects on each structure, thus reducing the need for additional site visits in case of uncertainties or further inquiries. The entire activity aimed at gaining a thorough understanding of the structures, achieved through testing of the materials constituting the structures. These tests included micro-coring, endoscopies, concrete and reinforcement bar sampling, specific mortar tests, and the use of single and double flat jacks to determine the deformability and resistance properties of the masonry on-site, which is the predominant construction type along the line.

Location:	Sardinia, ITALY
Client:	RFI S.p.A.
Year:	2023 - ongoing
Work amount:	€3.858.022,22
Categories:	-
Service provided:	Surveying and investigation activities

Chienti Bridge

Safety Works on the Chienti River Bridge on SP 46 “Fermana” at 1+500 km

The safety works on the historical bridge on SP 46 over the Chienti River in the province of Macerata involved interventions within the riverbed that required a thorough evaluation of the existing bridge’s foundation system and an analysis of the river’s hydraulic regime. Based on previous hydraulic simulation results, already conducted by both public and private entities for the river section of interest to the project, the reference flow was obtained for the calibration of the HEC-RAS model and used for various hydraulic checks. The 1D river modelling also required preliminary topographic adjustments to the available Digital Terrain Model (DTM) based on the surveys provided by the client, using QGis software.

The study also thoroughly analyzed localized scour phenomena around the in-river structures, specifically the piers and abutments, for an event with a 200-year return period. The entire calculation process followed the HEC 18 methodology, allowing for the separation of the different contributions to localized scour from the various elements that make up the bridge’s piers and abutments, both in their existing and proposed configurations. In relation to the reconstructed HEC RAS model, hydraulic simulations and checks were carried out for the embankments protecting the construction site for in-river works.

The study concluded with the sizing and corresponding checks for the stormwater drainage systems related to the bridge.

Location:	Marche, ITALY
Client:	Province of Macerata
Year:	2021 - 2023
Work amount:	€1,500,544.68
Categories:	S.04, V.02
Service provided:	Final and executive design, as well as safety coordination during the design phase

BS-VR-VI-PD Highway

Engineering Services for Safety Assessment and Level 3 Verification, and the Supply and Installation of Monitoring Systems for Selected Structures along the A4 and A31 Highways

The activities involved in this project focused on control, knowledge, and safety assessment, including detailed Level 3 verification by the Bridge Guidelines (LGP). The scope included the design, supply, and installation of monitoring systems for specific structures along the A4 and A31 highways. The process began with a geometric survey and the preparation of Level 0, Level 1, and Level 2 reports as per the LGP, along with preparing an investigation plan to achieve a Level of Knowledge up to LC3.

The second phase was the safety assessment of the structure at Level 3, as required by the LGP, and the executive design of the monitoring system. This was followed by the supply and installation of monitoring systems for the bridges, with some spans fully instrumented (full) and others partially instrumented for reduced data acquisition (light). The final phase involved the acquisition, processing, validation of the data, and maintenance of the monitoring systems.

Location:	ITALY
Client:	A4 Holding S.p.A.
Year:	2022
Work amount:	€840.339,41
Categories:	-
Service provided:	Monitoring and investigation activities

Sant'Ambrogio Bridge

Extraordinary Maintenance Works on Sant'Ambrogio Bridge in the Province of Modena

The current project involves the executive design of extraordinary maintenance works on the Sant'Ambrogio Bridge along S.S. 9 "Via Emilia" in the province of Modena. The original structure, designed by Architect Giuseppe Soli in 1790, consists of two volumes on each bank, from which two polycentric arches originate, connecting at the single central pier. The intervention aims to achieve static adjustment and seismic improvement of the structure while respecting the monument's historical constraints. In particular, the intervention includes:

- Foundation reinforcement through the construction of a micropile crown around the pier and cement injections under the foundation of the pier and abutments;
- Erosion protection of the riverbed using cylindrical geotextile bags and Reno mattresses;
- Conservation restoration of external degradations;
- Reconstruction of the road platform;
- Structural reinforcement of the deck through targeted internal interventions to the structure.

The execution of the works is divided into two phases. The first phase involves all interventions summarized above that do not require the closure of Via Emilia, achieving a seismic improvement of 48% of the seismic action as per the regulations. The second phase completes the intervention with structural reinforcement inside the arch deck, achieving the static adjustment of the structure and a seismic improvement of 80% of the seismic action as per the regulations.

Location:	Emilia-Romagna, ITALY
Client:	ANAS S.p.A.
Year:	2020 - 2022
Work amount:	€2,380,000.00
Categories:	S.04
Service provided:	Final and executive design, safety checks

Bridges and Highways Messina-Catania

Census, Primary Visual Inspections, and Determination of the Conservation State of Bridges and Viaducts on the A18 Messina-Catania Highway

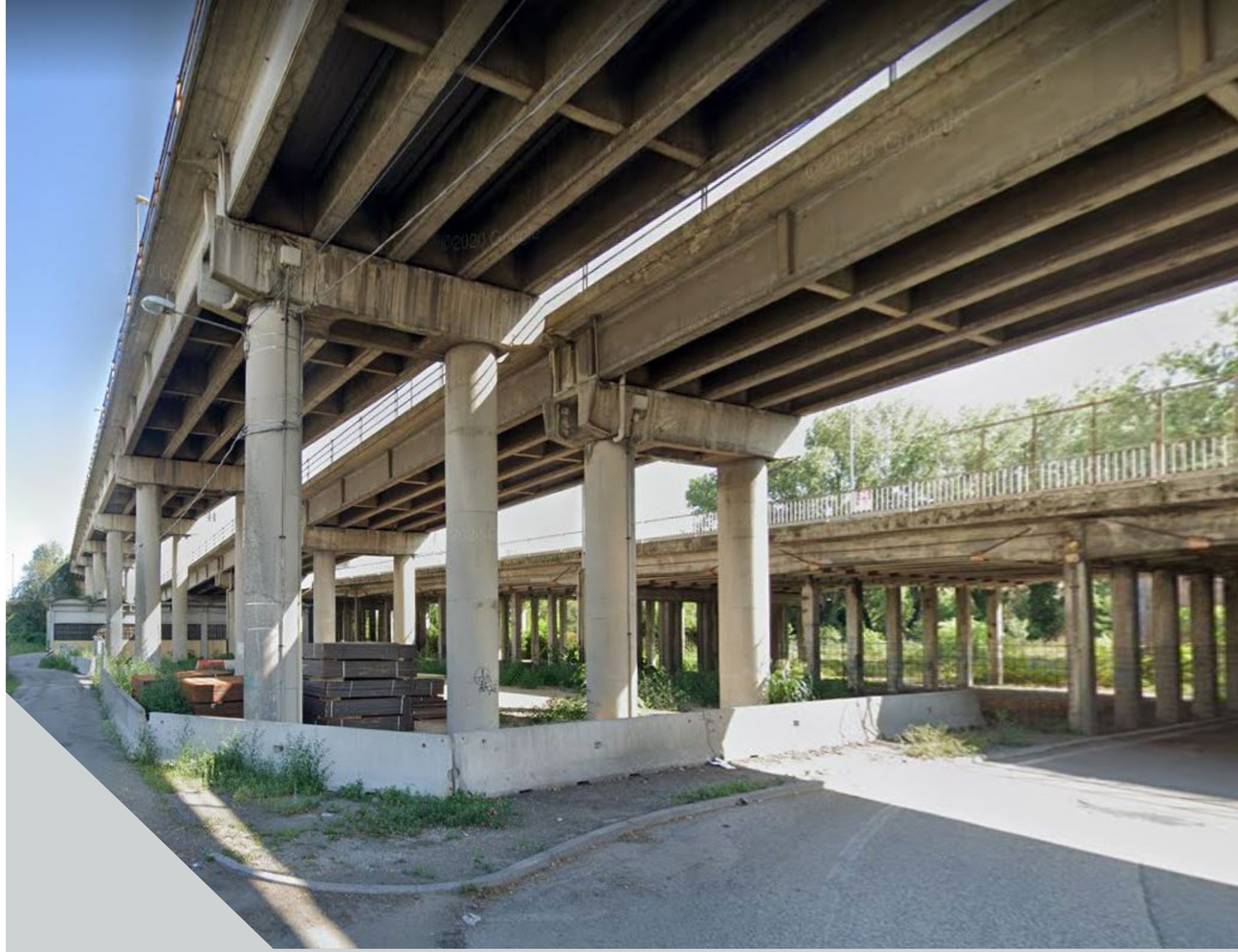
The intervention consisted of an initial fieldwork phase followed by a post-processing phase. A supplementary survey was conducted involving 40 structures along the A18, specifically on the Siracusa-Rosolini section. During the visual inspection of the deck, defect sheets were compiled using the "Guidelines for Classification and Risk Management, Safety Evaluation, and Monitoring of Existing Bridges" by the Ministry of Infrastructure and Transport. If the bridges and viaducts were in hard-to-reach positions from the ground level, the inspection methodology employed was rope access, with a team of experienced rope access technicians.

Location:	Sicily, ITALY
Client:	CAS – Consorzio Autostrade Siciliane
Year:	2021
Work amount:	€564,252.26
Categories:	-
Service provided:	Census, primary visual inspections, and determination of the conservation state

Mestre Overpass

Upgrading and Strengthening of the New Overpass in Marghera

ITS performed dynamic tests to characterize the frequencies of the main modes, thereby calibrating the dynamic model of the structure. In addition to dynamic tests, detensioning tests were carried out to determine the residual tension on the strands of the prestressing cables. Given the completeness of the original historical drawings and the opportunity to maximize the level of understanding and the mechanical properties of the materials, it was possible to enhance the mechanical and strength characteristics of the materials. The seismic vulnerability assessment was performed using modal analysis, from which the frequencies and stresses on the piers and foundations were derived. Based on the displacements obtained, the potential for bearing displacement was checked, and a restraining system using steel structures was designed. The piers were verified through push-over analysis to maximize the resistant behaviour of the structures. For the design of the seismic restraints in steel and the verification of the concrete slab of the deck, detailed FEM models were developed using Straus.



Location:	Veneto, ITALY
Client:	Municipality of Venice
Year:	2020
Work amount:	€2.503.023,68
Categories:	S.03, V.02
Service provided:	Final and executive design, safety coordination during design and execution phases, work supervision

Dosolo-Guastalla Bridge

Emergency Works for the Safety of Provincial Road Infrastructure Connections over the Po River – Border between the Province of Reggio Emilia and the Province of Mantua

The bridge was built in the 1960s by the company Società Appalti Lavori Carpenterie (S.A.L.C.). It consists of a 680.30-meter-long section in the riverbed and a 421.80-meter-long section on the right bank of the Po River, for a total length of approximately 1,100 meters. ITS was commissioned for the Final and Executive Design, Safety Coordination during the Design Phase, diagnostic investigations, load and dynamic tests, and structural analysis for two intervention lots. These involved improving the static deck by applying additional prestressing through non-bonded external cables. The in-river structures consist of ten spans between the axes, each 62.00 meters, except for the first span (61.00 meters) and the tenth span (51.30 meters). The beams over the piers measure 30.00 meters, while the intermediate ones are 40.00 meters long (the first is 50.00 meters, and the tenth is 40.00 meters).

ITS performed extensive investigations to reach an LC3 knowledge level, including load and dynamic tests. It was also necessary to carry out detensioning tests on the cables to verify their actual tensioning and compare it with the results of the load tests. The FEM model was also calibrated based on the results of the dynamic test (see photo below) and a preliminary modal analysis.The first intervention lot carried out reinforcement works on the Garber saddles. In contrast, the second lot included the design of an external non-bonded prestressing cable intervention, which allowed for static improvement of the bridge to accommodate heavy vehicles weighing up to 44 tons.

Location:	Emilia-Romagna, ITALY
Client:	Province of Reggio Emilia
Year:	2018 - 2019
Work amount:	€2.6 million
Categories:	S.03, S.04
Service provided:	Final and executive design, safety coordination during the design phase

Borgoforte Bridge

Extraordinary Maintenance Works on Regional Roads – Extraordinary Maintenance of Borgoforte Bridge

This project involves a series of extraordinary maintenance interventions on Borgoforte Bridge, which is part of the periodic monitoring program for "bridge structures" promoted by the Province of Mantua. The main goal is to ensure the safety and durability of the infrastructure by addressing degradation issues affecting the entire structure.
The planned works include both widespread rehabilitation interventions to counteract the deterioration accumulated over time and localized reinforcement interventions on key structural elements such as the piers and Gerber joints. Special attention was given to the "Motteggiana" viaduct on the right bank, which underwent targeted structural reinforcement. In parallel, the reinforcement and upgrading of pier No. 30 were carried out, a crucial intervention to ensure the overall stability of the entire infrastructure.
These works are part of a broader strategy to preserve the region's strategic infrastructures, improve their performance, and extend their service life. Through advanced engineering approaches and innovative materials, the project seeks to minimize the impact on traffic while significantly enhancing safety for all road users.

Location:	Lombardy, ITALY
Client:	Province of Mantua
Year:	2018 - 2019
Work amount:	€2.6 million
Categories:	S.03, S.05
Service provided:	Technical and economic feasibility design, final and executive design, safety coordination during both design and execution phases, site supervision

Tubo Bridge

Investigations and Experimental Tests for Determining the Suitability of the Tubo Bridge Downstream of the Vajont Dam

The objective of the activities carried out was to verify the structural safety of the bridge in accordance with the Ministerial Decree of 14.01.2008. The safety assessment of the bridge aimed to determine whether the existing structure is still capable of resisting the design load combinations according to the performance levels set by the Italian Technical Standards (NTC). In case of a negative outcome, the maximum performance level that the structure can withstand was determined.

The main actions considered, based on the client's specifications, were as follows:

- Crowd load applied according to various load patterns for the lower walkway.
- Water load inside the tube, as although the pipeline is currently out of service, it may fill when the bypass gallery needs to be drained, for example, during maintenance or periodic inspections. Therefore, two different load levels were considered: one corresponding to a fully filled pipeline and the other with the pipeline half-filled. This load will never be simultaneous with the crowd load on the lower walkway.
- Classic actions as per regulations (wind, temperature, self-weight and imposed loads, distortions and/or settlement of supports, seismic actions, etc.).

Location:	Veneto, ITALY
Client:	EMEL S.r.l.
Year:	2015
Work amount:	€37.640,00
Categories:	-
Service provided:	Investigations, experimental tests, and static suitability assessment

San Michele Bridge

Investigation Campaign, Inspection, and Characterization of the Structural Degradation State of the San Michele Bridge in Paderno d'Adda

The safety assessment of the bridge aims to determine whether the existing structure can withstand the load combinations as per the Italian Technical Standards (NTC), and in case of a negative outcome, identify the maximum sustainable performance level. The activities carried out include:

- Collection of available documentation (original project, restoration interventions, calculation and geological reports)
- Creation of a preliminary FEM model to plan investigations and identify potential criticalities
- Preparation of the operational plan for survey and investigation activities
- Detailed survey of the degradation state conducted using mountaineering techniques to ensure close-range inspection (<1.5 meters)
- Mechanical characterization of materials through sampling and restoration
- Geological and geotechnical investigations (MASW, H/V, seismic tomography, morphological and geomechanical surveys)
- Creation of a detailed FEM model with actual sections and reductions due to observed degradation
- Assessment of vulnerability and safety levels according to D.M. 2008 and RFI regulations with different load combinations
- The bridge is made of the original material, an agglomerated iron described in the Specifications as "laminated iron, soft, non-fragile, malleable hot and cold."

Location:	Lombardy, ITALY
Client:	RFI S.p.A.
Year:	2015
Work amount:	€20.000.000,00
Categories:	-
Service provided:	Inspections and investigations, static and seismic vulnerability assessment

Cadore Bridge

Structural Characterization, New Monitoring System, and Extraordinary Maintenance Works on Cadore Bridge

The preliminary phase of the intervention involved planning the diagnostic instrumental campaign, with detailed surveys of the entire structure. This was followed by dynamic identification of the bridge under environmental vibration conditions. Based on this phase, a second, more detailed bridge model was developed for conducting the Non-Linear Dynamic Analysis. Structural checks were carried out both under static and seismic conditions relative to the current state, adopting material priorities and the actual thicknesses of the metallic elements found on the structure.

Finally, a preliminary design was completed for the bridge's structural upgrade, an innovative road surface heating system, and reinforcement details for the Corten steel structures.

The third phase involved the design and installation of a new system for monitoring gravitational movements, consisting of sensors, including inclinometers, extensometers, and strain gauges.

Location:	ITALY
Client:	ANAS S.p.A.
Year:	2012
Work amount:	€6.764.500,00
Categories:	S.03, S.05
Service provided:	Structural investigation campaign, dynamic characterization, new monitoring system design, new monitoring system implementation

ANAS Framework Agreement

Engineering Services for Level 4 Assessments and Oversized Transport

As part of the ANAS Framework Agreement for the provision of engineering services, laboratory testing, and inspections related to infrastructure verification under exceptional transport conditions, the Assessment Department carried out Level 4 (VAL4) detailed safety assessments and structural evaluations for the transit of oversized vehicles in accordance with Ministerial Decree 204/2022 (Bridge Guidelines).
The activities focused on several strategic structures along the ANAS road network in Emilia-Romagna, located on routes subject to exceptional transport, with the aim of verifying the safety and structural adequacy of the infrastructure involved. The scope of work included:

- Development of Investigation Plans
- Execution of on-site inspections and tests
- Preparation of Level 4 technical reports according to Bridge Guidelines and Oversized Transport regulations
- Technical coordination and specialized support to the contracting authority

Following the results of these structural assessments, the Assessment Department was subsequently entrusted with the extraordinary maintenance design of one of the structures analyzed: the historic steel bridge over the Po River, a metal structure with over 150 years of service life.

Location:	Emilia-Romagna, ITALY
Client:	ANAS S.p.A.
Year:	2024 - ongoing
Work amount:	€2.000.000,00
Categories:	-
Service provided:	Level 4 detailed safety assessments (VAL4), structural verification for exceptional transport routes

Italian Highway Network - Framework Agreement

Safety Assessment of Bridges and Viaducts - Highway Network - Lot 3

The two Framework Agreements involve detailed safety verification activities (VAL4 according to LLGG22 for existing bridges in the Autostrade per l'Italia highway network). To execute these assessments, an Investigation Plan was prepared for material characterization and a thorough understanding of the construction details and any degradation, which is essential for the evaluations. Additionally, support was provided during the investigation phase to optimize the construction process, minimize the impact on traffic, and ensure the correct execution and placement of tests.

Location:	Veneto, ITALY
Client:	Autostrade per l'Italia S.p.A.
Year:	2022
Work amount:	€1.500.000,00
Categories:	-
Service provided:	Preliminary condition assessment of the structure, development of investigation plan, on-site investigation support, in-depth Level 4 assessment (VAL4), and safety evaluations

its
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