# All-in-one multifunctional pre-cast concrete element

## SESSION 1: Smart Construction

Edoardo Segù| TesiSystem

Final Event

Madrid, Friday, 31 January 2025

This Project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement Nº 955337.

TesiSystem Soluzioni prefabbricate

**TesiSystem** is Part of the **Grigolin Group**, a company specialising in the production and construction of precast Pre-stressed Concrete (C.A.P.) and Vibrated Concrete (C.A.V.) elements and roofing systems for the industrial, civil, commercial, logistics, agricultural and infrastructure sectors.

Turnover 120M€ and over 100 employees in a group of 900M€ turnover.

## PRODUCTION ORGANISATION AND LOGISTICS

TesiSystem operates from n.4 production (210,000 sqm, 50,000 covered)

- Casale sul Sile (TV)
- Nervesa della Battaglia (TV)
- Castelbelforte (MN)
- Martignacco (UD).

## OUR ROLE IN InfraROB.n.955337

**OB: Design, prototypes and testing a *smart prefabricated all-in-one component* that serves as both a roadside safety structure and a road design construction element bringing an important degree of modularization in the road interventions, with the intent to accelerate on site operations during construction, upgrade or large maintenance works, thus minimising road interruptions and traffic disruptions.**

# The concept: All-in-one element design

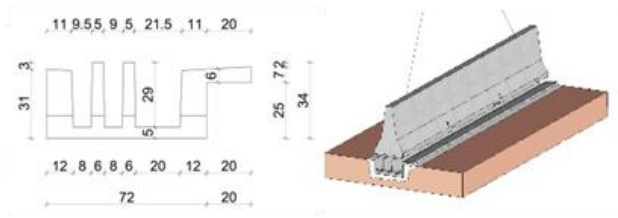
- Respondence to safety standards and structural integrity;
- Easy to install
- *Speed up* inspection and intervention in case of damage or maintenance
- Minimized road cuttings (e.g. lay down of facilities piping, optical fiber cables or power cables during subsequent road upgrades and works);
- Allow proper water flow towards the drain and good repartition to host service line and to facilitated installation at the pavement level;
- Lower environmental impact

# Mix design and laboratory tests

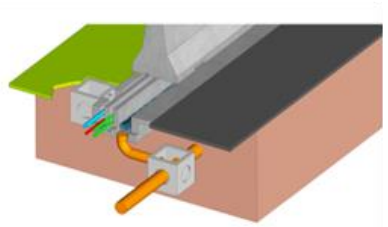
- Slump test UNE EN 12350-2 → 24,3 cm
- Air Content UNE EN 12350-7 → 4,5 %
- Compressive strength UNE EN 206-1 → 28d 69,75 Mpa 8450 gr
  68,36 Mpa 8552 gr
- Flexural strength UNE EN 12390-5 → 6,15 Mpa
- Testing hardened concrete - Part 6: UNE EN 12390-6:2010 → 4,74 Mpa
- Modulus of elasticity UNE EN 12390-13 → 39.450 Mpa
- Freeze/thaw resistance UNE NEB/TS 12390-9:2017 (<500 g/m²) → 285 g/m²)
- Resistance to chlorides UNE EN 206 < 0,1%

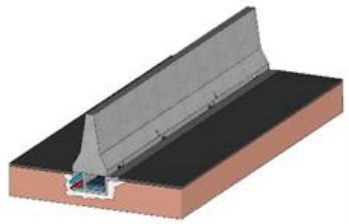
➢ w/c ≤ 0.45 with 4% of entrained air for horizontal surfaces exposed to freezing and direct spray of deicing salts (XF4).

# InfraROB project implementation

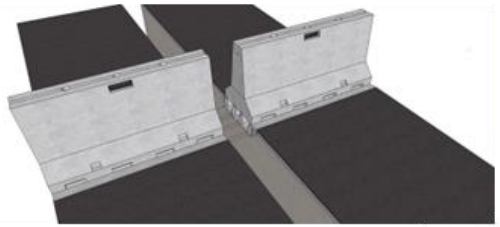




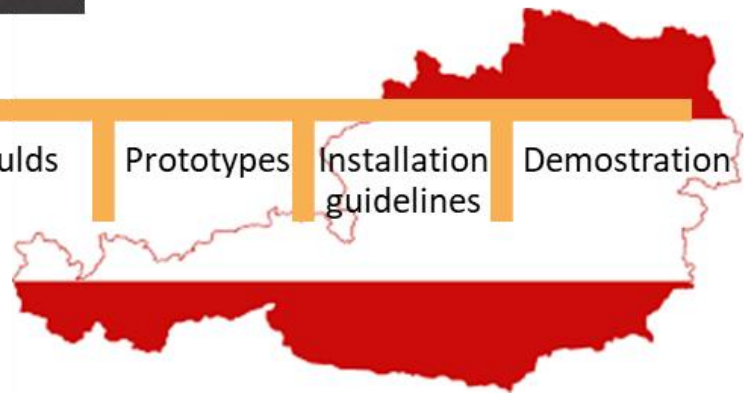





M1 — M48 design to installation



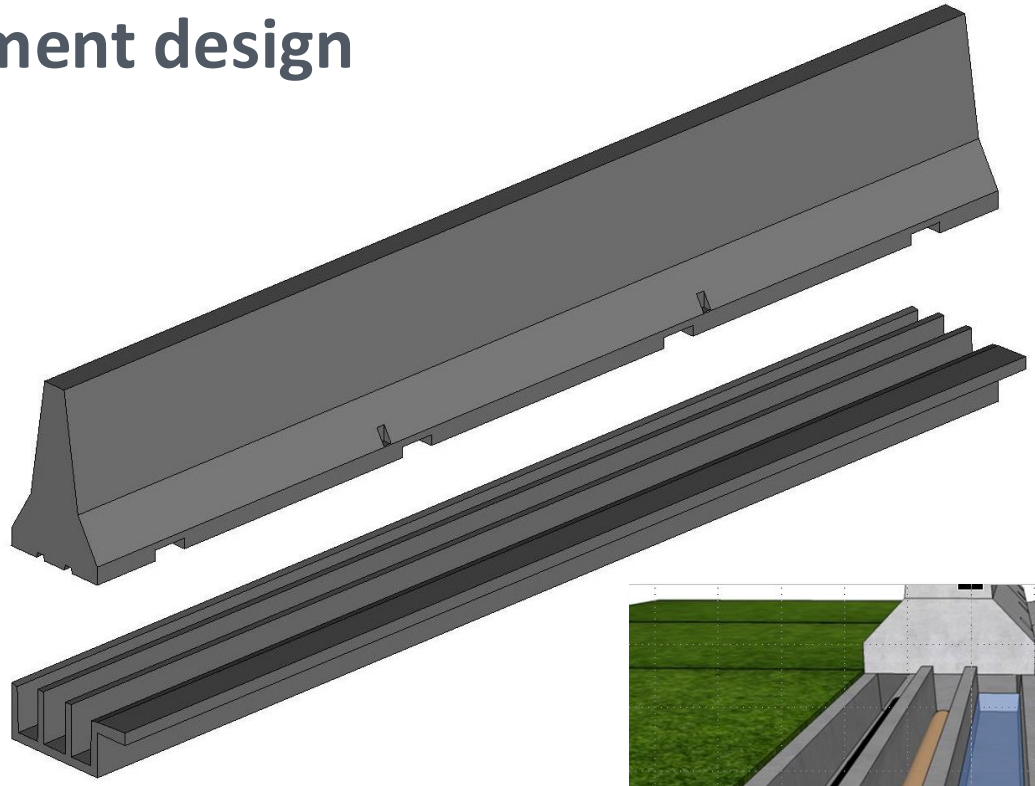
Concrete mix design | Concrete Testing | Validation | 2D/3D | BIM (Bentley) | Executive design | Moulds | Prototypes | Installation guidelines | Demostration

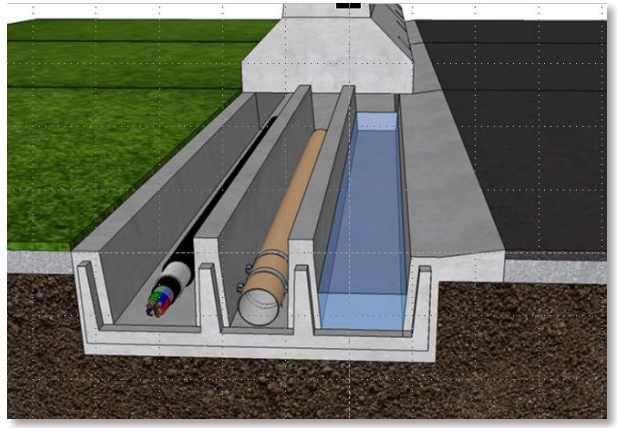


# The Design: All-in-one element design

New Jersey
- L: 630 cm
- H: 100 cm
- W: 62 cm

Bottom part:
- L: 630 cm
- H: 24 cm
- W: 82 cm





# Overall Benefit of the InfraROB experimental solution


- **-47%** installation time **(23,5h/12,5h)**
- **+57% recycled materials (gravel/sand)**
- Integrated design and easier installation process
- Ensure a low level of interlocking, lateral displacement and energy dissipation;
- Facilitation in maintenance intervention to services like fiber optics without disrupting the road surface;
- Water drainage and collection due to side inlets
- Production cost alligned with the reference

# Thank you for your attention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Infra ROB

*Maintaining integrity, performance and safety of the road infrastructure through autonomous robotized solutions and modularization*

## Project Partners

Universidade de Vigo · TinyMobileRobots · AIPSS · RINA · Technology Arts Sciences TH Köln · CECE Committee for European Construction Equipment · Universidade do Minho · FEHRL · ASFINAG · MOBA Mobile Automation · inSITU · TesiSystem prefabbricati in cls · TPA · Technische Universität Darmstadt