



17TH ROAD SAFETY CONFERENCE



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CASCAIS, PORTUGAL

HOSTED BY:



TESTING TRAFFIC CALMING EQUIPMENT TO IMPROVE SAFETY IN HIGHWAY WORK ZONES



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01 Ascendi Overview

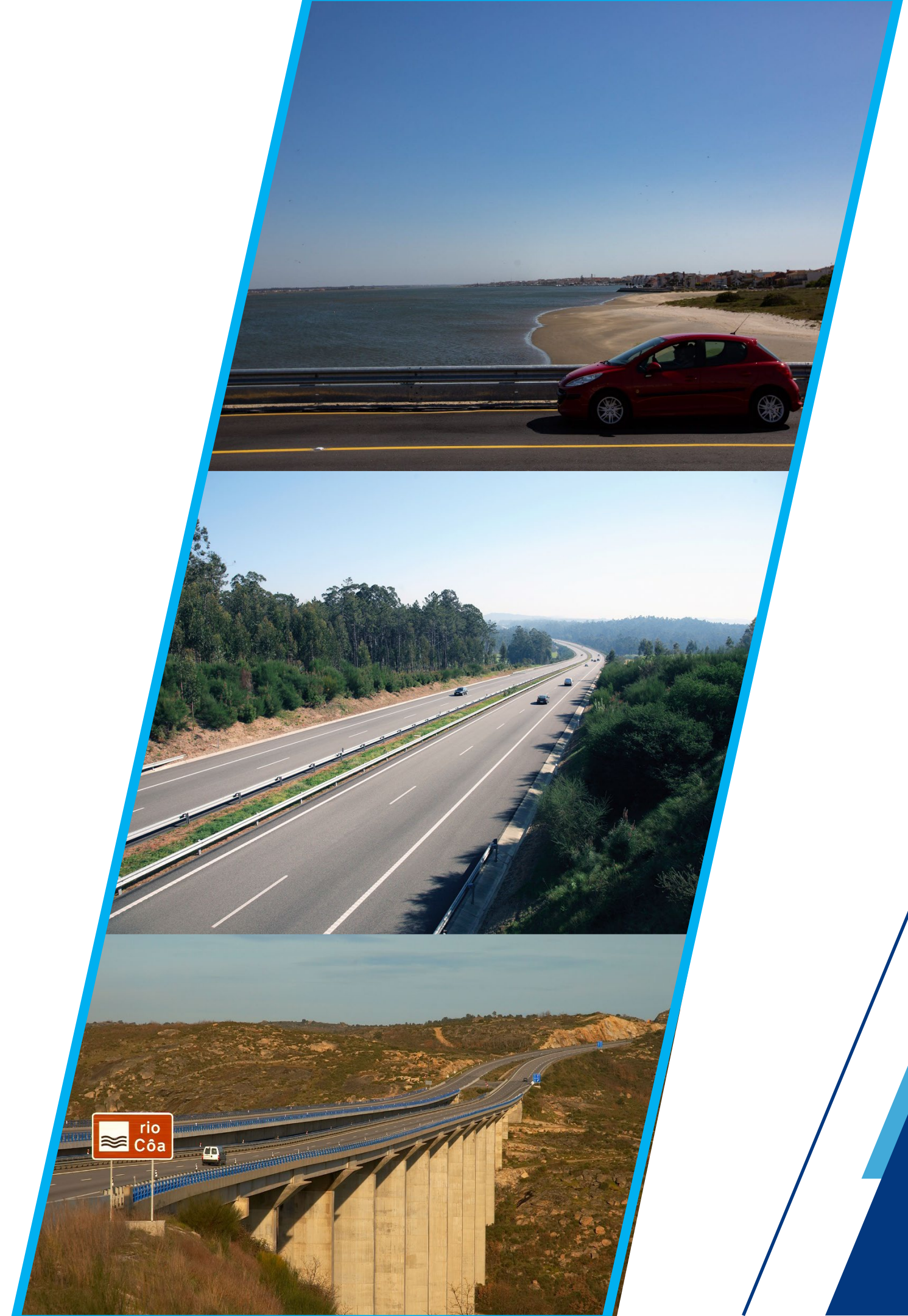
Ascendi Overview

Ascendi is a reference organization in the road infrastructure market that **manages infrastructure assets** and provides **toll collection** and **operation & maintenance** services.

6 Highway concessions

1 O&M Contract

707 Km in operation





ascendia

02

Project Framework

Project Framework

- **Ascendi's 24-27 RSAP** (Road Safety Action Plan)
- Safety in Work Zones
- **Objective:** Zero Work-Related Injuries
- Two main **risk factors**:
 - Speeding
 - Driver's Distraction



ZERO
ACIDENTES

ascendi

The problem: Speeding in Workzones

Measuring Point	Costa de Prata (A29)	Norte Concession (A11)	
	04/11/2022	Location 1 11/11/2022	Location 2 11/11/2022
Speed Limit	80 km/h	80 km/h	80 km/h
Average speed (Vd)	76 km/h	69 km/h	69 km/h
Maximum Speed (Vmax)	154 km/h	110 km/h	106 km/h
V85 (85th percentile)	87 km/h	85 km/h	86 km/h
Non-Compliance (%)	31%	23%	23%

- **Speed monitoring in 3 road closure locations** during road pavement works
- **Results displayed high values of Non-Compliance with the speed limit (%)**



03

Selected Equipment

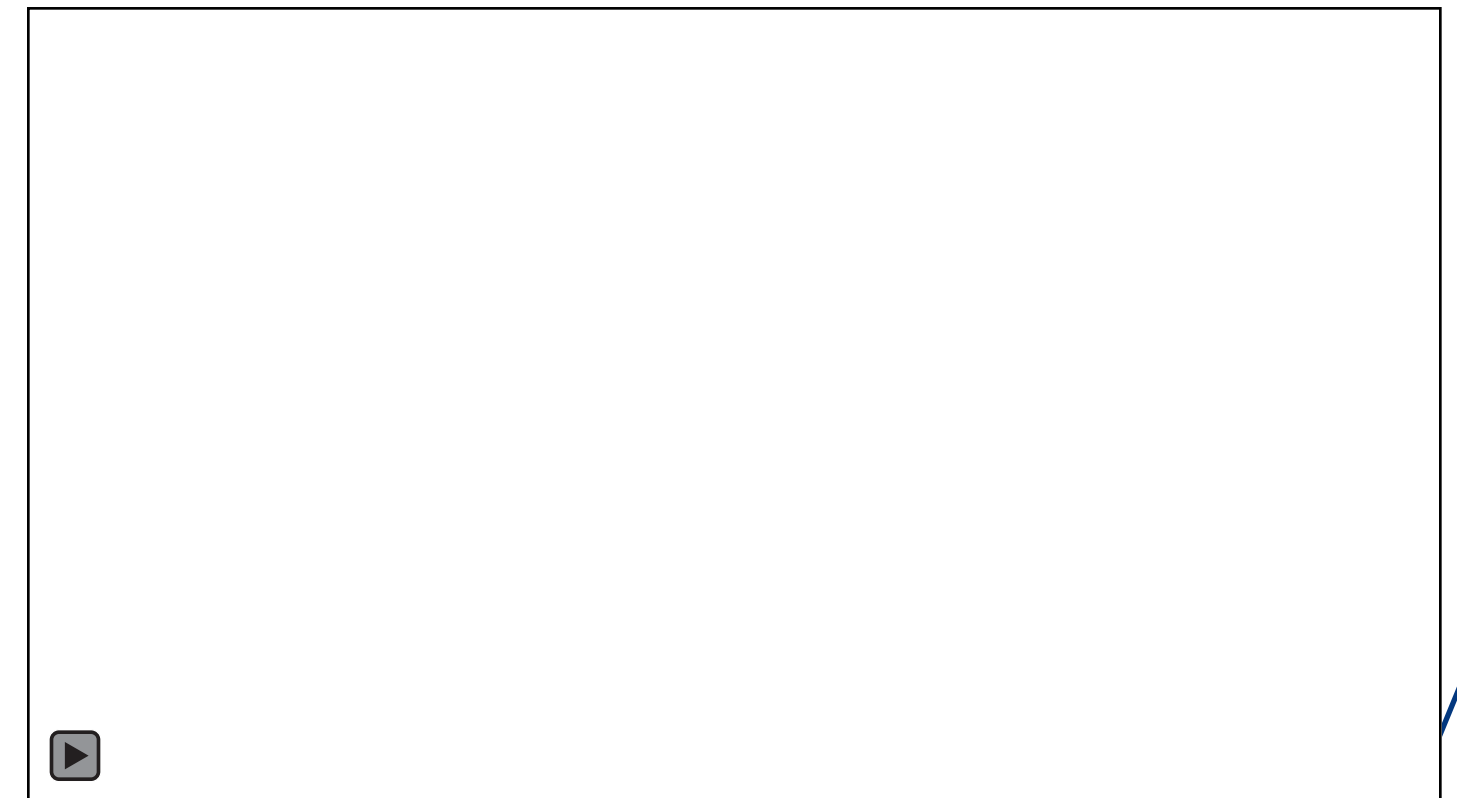
Dynamic Speed Sign (DSS)

How it works:

- Registers and dynamically displays the speed of approaching vehicles.
- The displayed speed updates every 2-3 seconds as a vehicle approaches, allowing the driver to see the speed variation.
- The speed is shown in **green** when **below the speed limit** and in **red when above it**.

Objective: Reduction of practised speeds

Tested: May/June 2023 on Kilometre 1 of the A25



Temporary Rumble Strips (TRS)

How it works:

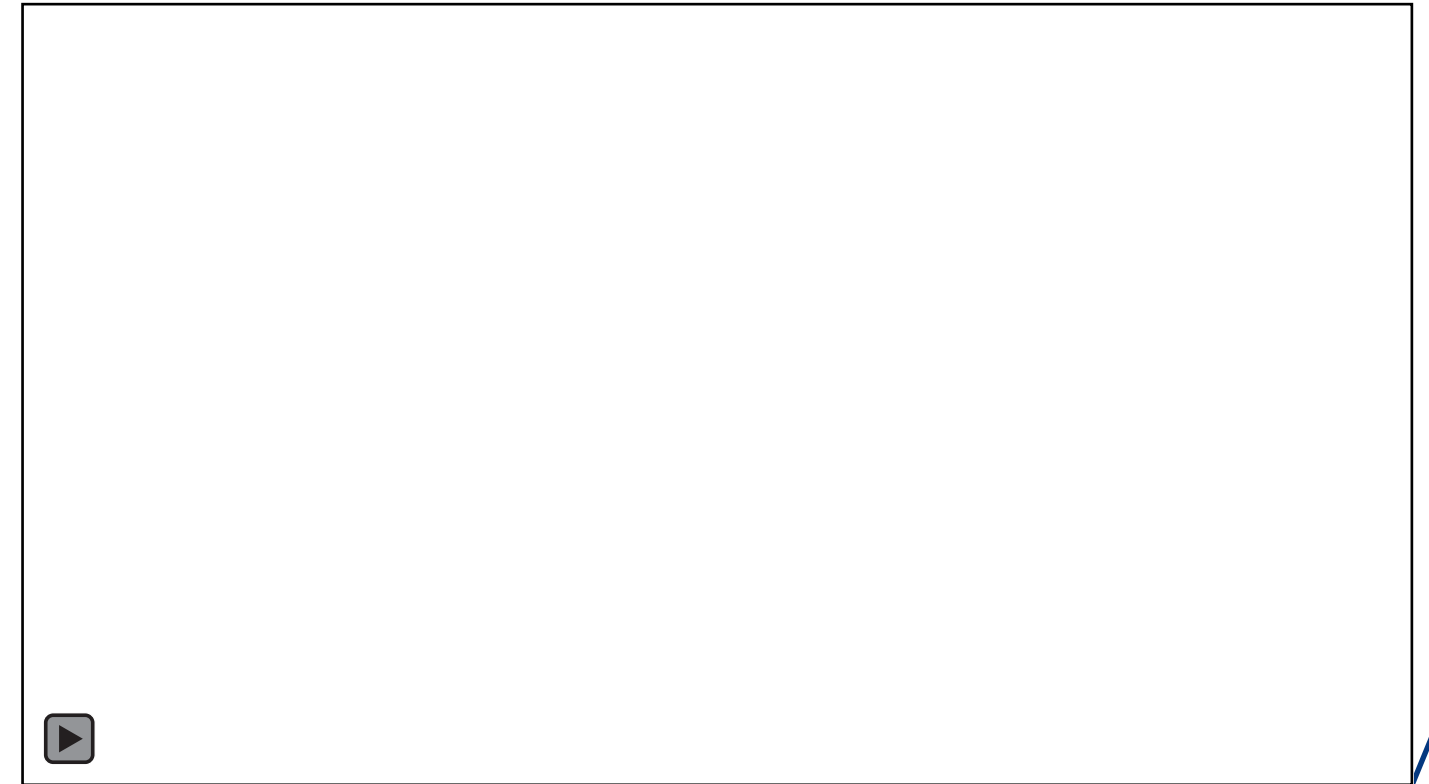
- Designed to alert drivers through **audible and vibratory feedback** when their vehicle approaches the closed lane due to the work zone.

Equipment: ROADQUAKE 2F by PSS

- Designed for speeds up to 130 km/h
- Approximate weight of 50 Kg

Objective: Improve driver awareness

Tested: October 2023 on Kilometre 20 of the A7

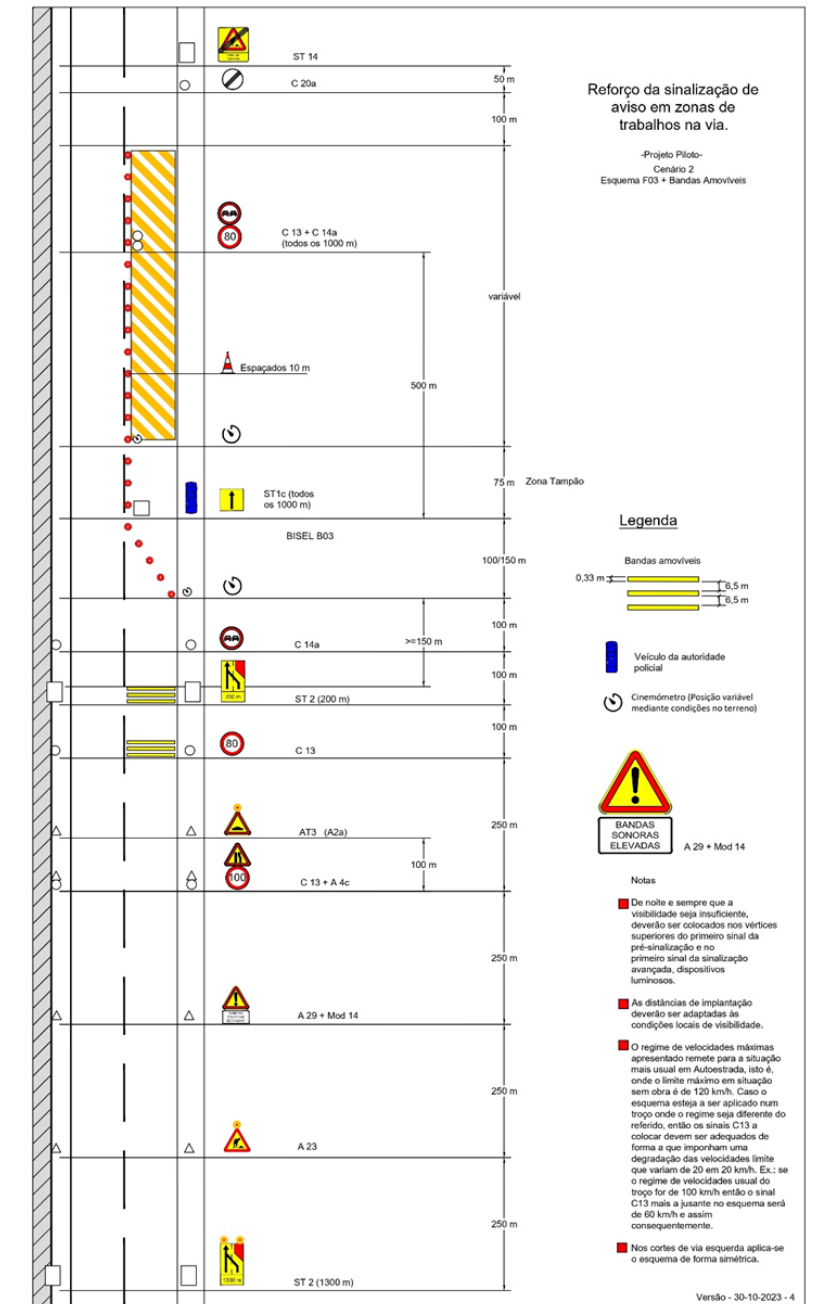
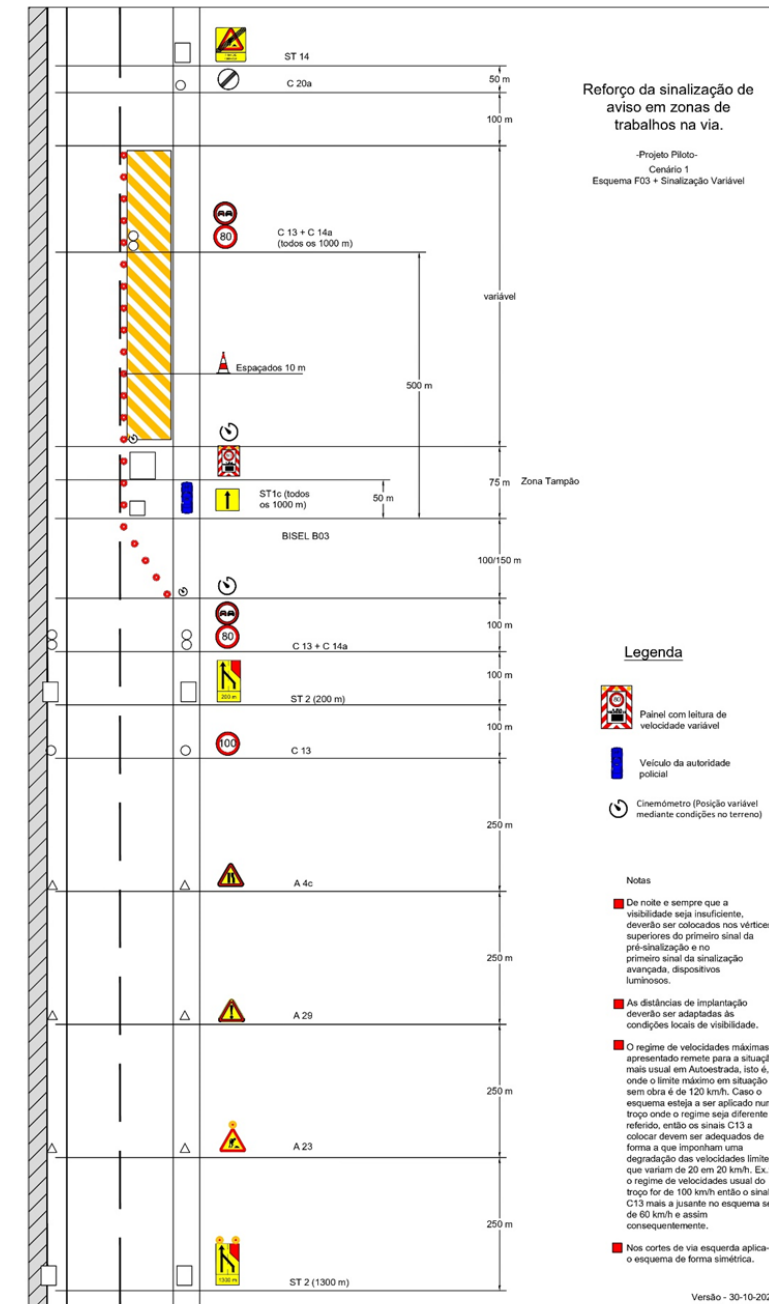




04 Case Studies

Project Scope

- Project Partners:
 - IMT** (Institute for Mobility and Transport)
 - GNR** (Republican National Guard)
 - ANSR** (Road Safety National Authority)
- The tested equipment was included in the Lane Closure
- Need to **Adapt the Temporary Signalling Scheme** of the work zone to consider the equipment



Case Study 1

Location: Highway A25, Kilometre 100

Date: January 2024

Road Work: Reinforcement of an excavation slope

Road Constraints: Right Lane Closure

Equipment Used: DSS + TRS

Objective: Speed Monitoring With and Without the DSS/TRS

Test Approved by the Concession authority in September 2023.



Scenarios:

- **Scenario 1** – No additional equipment used
- **Scenario 2** – DSS
- **Scenario 3** – TRS

Case Study 1

Results:

1st Case Study	Scenario 1	Scenario 2 (S2)	Scenario 3 (S3)
	NO ADDITIONAL EQUIPMENT	WITH THE DYNAMIC PANEL	WITH THE TEMPORARY RUMBLE STRIPS
Measuring Period	29/01/2024 10:40h - 30/01/2024 10:50h	30/01/2024 10:50h - 31/01/2024 11:00h	31/01/2024 11:00h - 01/02/2024 11:00h
Speed Limit (km/h)	80	80	80
Measured Vehicles	9974	8038	7983
Average Speed (Vd)	89	80 (-10%)	82 (-8%)
V85 (85th percentile) (km/h)	101	94 (-7%)	95 (-6%)
Non-Compliance (%)	77	50 (-27pp)	56 (-21pp)

- With the installation of the DSS (Scenario 2) and the TRS (Scenario 3):
 - The **percentage of non-compliances fell significantly**;
 - **Both the V85 speed and average speed**, presented satisfactory reductions on both scenarios;
 - A gradual small **displacement of the TRS was verified** during the measurement period

Case Study 2

Date: October 2023, Night Period

Location: Highway A7, Kilometre 20

Road Work: Major Pavement Repairs

Road Constraints: Left Lane Closure

Equipment Used: Dynamic Speed Panel and/or Rumble Strips

Objective: Speed Monitoring With and Without the Panel/Rumble Strips



Scenarios:

- **Scenario 1** – No additional equipment used
- **Scenario 2** – DSS
- **Scenario 3** – TRS
- **Scenario 4** – TRS + DSS

Case Study 2

Results:

2nd Case Study	Scenario 1	Scenario 2	Scenario 3	Scenario 4
	NO ADDITIONAL EQUIPMENT	WITH THE DYNAMIC PANEL	WITH THE TEMPORARY RUMBLE STRIPS	WITH THE TEMPORARY RUMBLE STRIPS AND THE DYNAMIC PANEL
Measuring Period	13/10/2023 02:00h - 03:00h	13/10/2023 01:00h - 02:00h	13/10/2023 00:00h - 01:00h	12/10/2023 23:00h - 00:00h
Speed Limit (km/h)	80	80	80	80
Measured Vehicles	46	47	73	155
Average Speed (Vd)	75	67 (-11%)	69 (-8%)	69 (-8%)
V85 (85th percentile) (km/h)	85	80 (-6%)	82 (-4%)	80 (-6%)
Non-Compliance (%)	41	19 (-22pp)	21 (-20pp)	15 (-26pp)

In the 3 scenarios where an equipment was used:

- The **percentage of non-compliances fell significantly;**
- **Satisfactory reduction in the average speed;**
- The **results** were very **similar** to the tests conducted in the **daytime** period.
- Despite the reduced sample size, it was possible to notice an **earlier vehicle transition to the available lane** during the lane closure.



05 Findings



Findings

- **Both Case Studies** showed significant and constant **speed reduction improvements** that are likely to be related with the use of DSS and TRS:
 - **V85: -6% Average**
 - **Average Speed: -9% Average**
- It was possible to **identify an increase to the number of vehicles that transitioned to the available lane at a distance of 300m to the constraint (+ 4%)**, when the Temporary Rumble Strips were used.
- The **project** has showed **promising results**, justifying an extension of its **end date to June 2026**.

