18TH ROAD SAFETY CONFERENCE

9th March 2026, Chambéry

Evaluating the impact of road safety measures: Before and After studies in the Ascendi network

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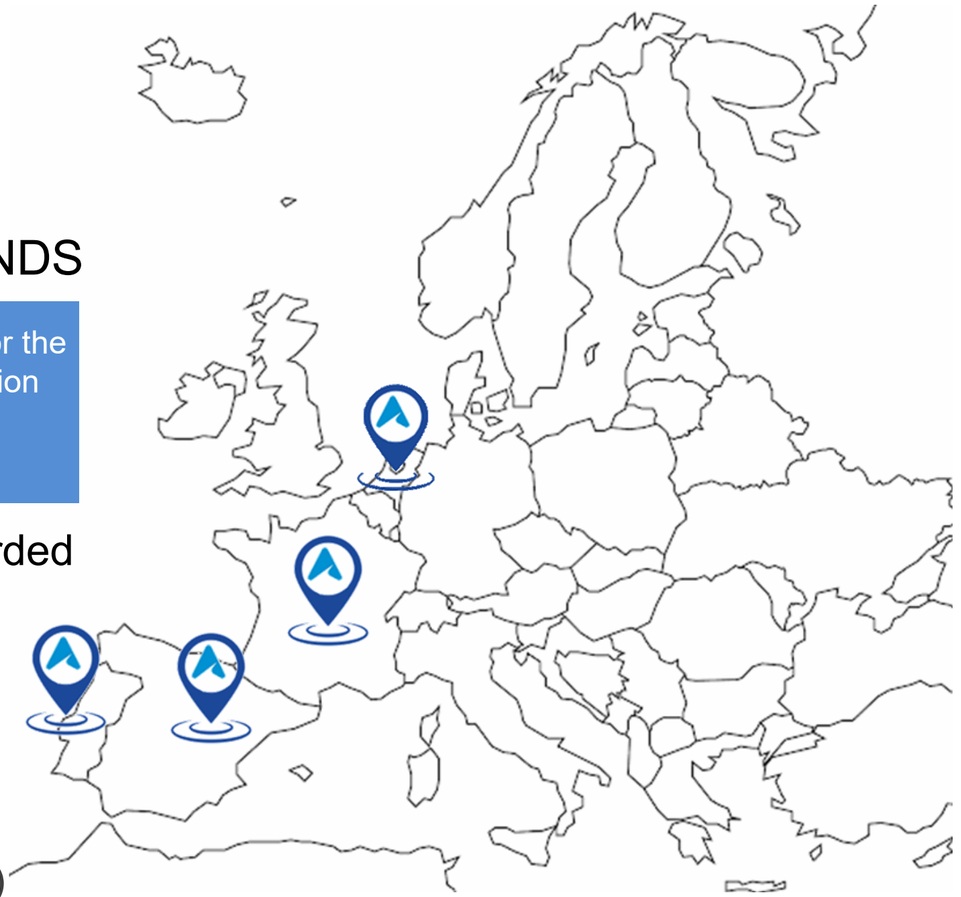
Hosted by ASFA AUTOROUTES & OUVRAGES CONCÉDÉS

Content

Overview

/ Ascendi is recognized for its expertise in **road infrastructure asset management operation & maintenance**, and **tolling services**, with more than 25 years of consolidated experience

PORTUGAL	FRANCE	SPAIN	NETHERLANDS
6 CONCESSIONS 627 km	1 CONCESSION 54 km	1 CONCESSION 161 km	Service provider for the national toll collection system for heavy vehicles goods
In operation	Under construction	In operation	Recently awarded



Provision of services in Portugal

/ **3** Provision of traditional toll collection services
/ **7** Provision of electronic toll collection services (Multi-Lane Free Flow)
/ **1** Provision of operation and maintenance services

Overview

Experience Road Safety

Ascendi conducts studies and implementations of crash risk mitigation measures in high-crash locations to improve road safety (~4 high-crash location studies per year).

Safety Measures Evaluation

It’s essential to evaluate whether the implemented measures effectively reduce crash frequency and enhance overall traffic safety.

“Before and After” Analysis

The Before–After methodology enables the comparison of crash occurrence in the pre- and post-intervention periods.

Analysis Period

1 January 2015 to 31 December 2025.

Objectives

“Before and After” Studies

- Present the results of “Before and After”studies carried out for each intervention local

Mesure the impact

- Measure the impact of the interventions carried out.

Pattern Identification

- Identify patterns that can be replicated in other locations

Metodology

Pre-Intervention Site Conditions

- Characterization of the site
- Characterization of historical crashes data

Post-Intervention Site Conditions

- Description of the mitigation measures implemented
- Date of completion of the intervention

Apllying the “Before and After” Methodologies

Method 1 – Simple “Before and After” Study

Expected crashes in the After period = “Before” Crashes x (After period duration /“Before” period duration)

Method 2 – “Before and After” Study (Time and Traffic Factor)

Expected crashes in the After period = “Before” Crashes x x Time factor x Traffic Factor

Global Indicators

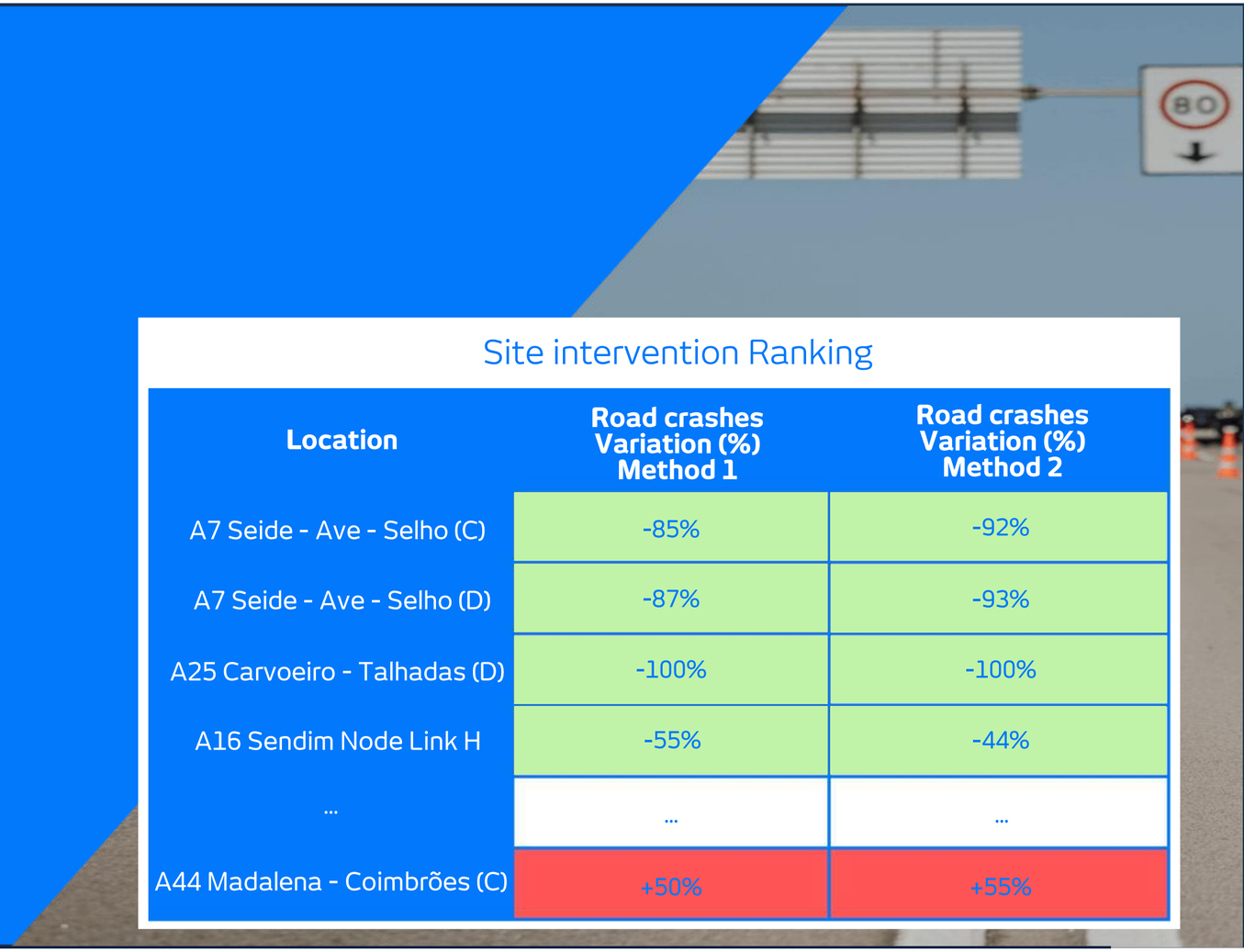
27
Interventions analyzed

21
Interventions with road crashed reductions

-3,0
Average of road crashes reduction per intervention

-86,6
Total road Crashes reductions

-49,9%
Average of road crashes reduction per intervention (%)



Site intervention Ranking

Location	Road crashes Variation (%) Method 1	Road crashes Variation (%) Method 2
A7 Seide - Ave - Selho (C)	-85%	-92%
A7 Seide - Ave - Selho (D)	-87%	-93%
A25 Carvoeiro - Talhadas (D)	-100%	-100%
A16 Sendim Node Link H	-55%	-44%
...	...	...
A44 Madalena - Coimbrões (C)	+50%	+55%

“Before and After” studies on the intervention sites

Seide – Ave - Selho

Norte concession, A7 motorway, direction: decreasing from PK 33+500 to 33+000

Main Mitigation Measures

- Instantaneous speed camera at PK 33+250
- Milling and apllying a new wearing layer
- Improvement of horizontal and vertical signage

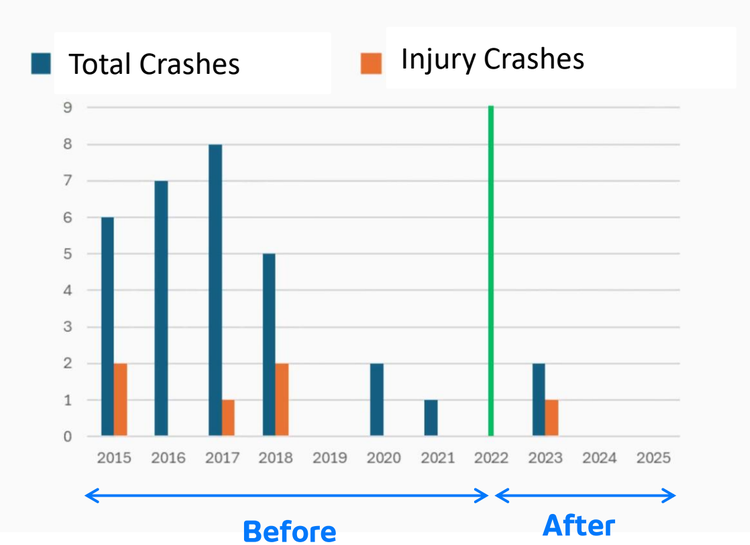
Implementation was completed on **01/03/2022**. The instantaneous speed camera was installed in **February 2023**.

Before

After

Seide – Ave - Selho

Crash History



Implementation date: 01/03/2022

"After" Period: 3 year and 10 months

Crash History in the "Before" Period

- 29 Total crashes
- 5 Injury crashes
- 72,5% of crashes were run-offs
- 85% of crashes occured on wet pavement

Before and After study (Simple method)

	Before	After	Expected After	Variation	Crash Variation (%)
Crashes	29	2	16	-14	-88%
Injury crashes	5	1	3	-2	-69%

Before and After study (Time and Traffic factor)

	Before	After	Weighted AADT Before*	Weighted AADT After	Expected After*	Variation	Variation(%)
Crashes	29	2	4996	9702	30	-28	-93%
Injury crashes	5	1	4996	9702	5	-4	-83%

*1 Weighted AADT Before = Average of annual AADT in the period Before

*2 Expected After Crashes = "Before" crashes × Time factor × Traffic factor. Example: $30 = 29 \times \frac{3,84}{7,17} \times \frac{9702}{4996}$

Carvoeiro - Talhadas

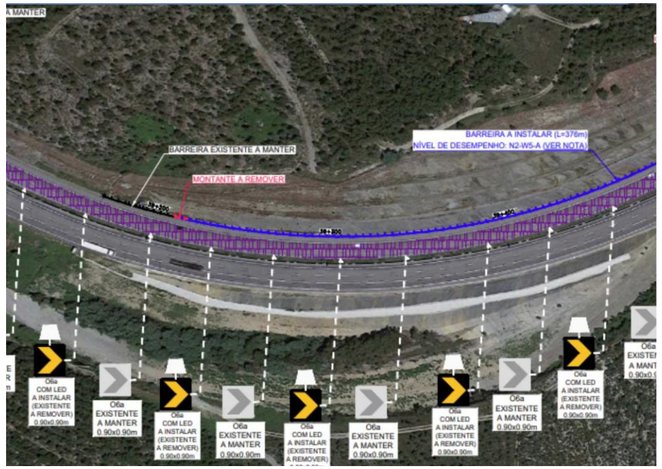
Beira Litoral e Alta concession, A25 motorway,
direction decreasing from PK 39+600 to 39+000

Main Mitigation Measures

- Average speed camera between PK 42+469 and PK 37+600
- Pavement shot blasting
- Instalation of safety barriers with MPD
- Instalation of Chevrons signs with alternating LED's

Before

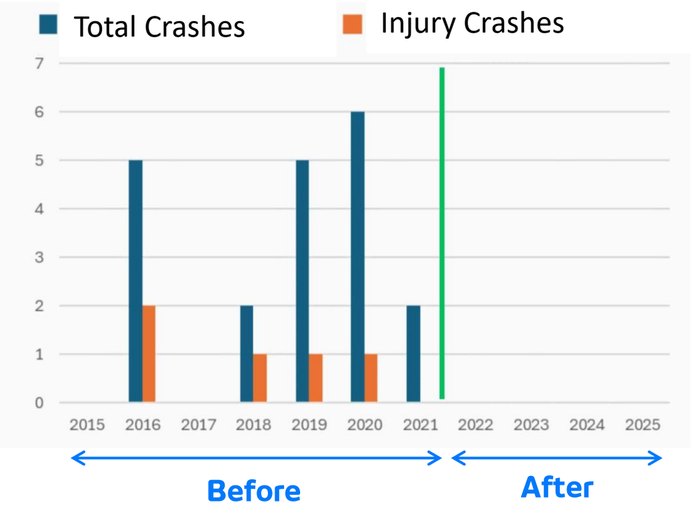
After



Implementation was completed on **20/12/2021**.
The average speed camera was installed in Agosto 2023.

Carvoeiro - Talhadas

Crash History



Implementation date: 20/12/2021

"After" period: 4 year and 11 months

Crash History in the "Before" Period

- 20 total crashes
- 5 injury crashes
- 100% of crashes are run-offs

Before and After study (Simple)

	Before	After	Expected After	Variation	Crash variation (%)
Crashes	20	0	12	-12	-100%
Injury crashes	5	0	3	-3	-100%

Before and After study (Time and Traffic factor)

	Before	After	Weighted AADT Before	Weighted AADT After	Expected After	Variation	Crash variation (%)
Crashes	20	0	6238	7631	14	-14	-100%
Injury crashes	5	0	6238	7631	3	-3	-100%

Sendim Node, link H

Grande Porto Concession, A4 Motorway, link H from Sendim Node

Main Mitigation Measures

- Reduction of Link H from 2 lanes to 1 lane
- Redution of the legal speed limit from 60 km/h to 40 km/h
- Improvements to horizontal and vertical signage
- Milling and replacement of the wearing layer

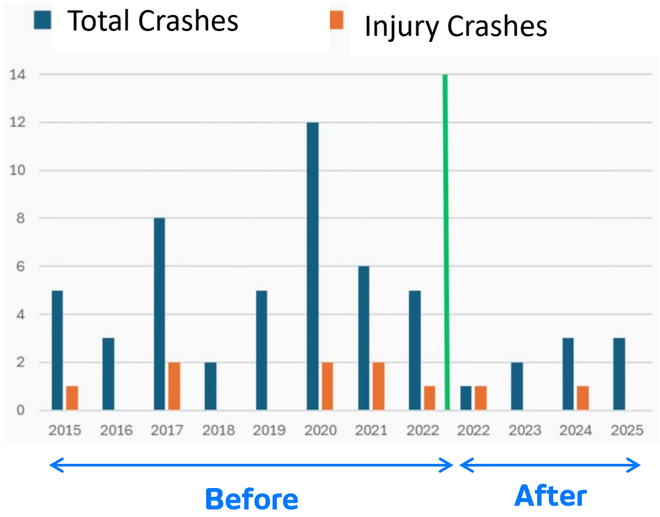
Before

After

Implementation was completed on 01/09/2022.

Sendim Node, Link H

Crash History



Implementation date: 01/09/2022

After Period: 3 year and 3 months

Crash History in the "Before" Period

- 47 total crashes and 8 injury crashes
- 11 Minor injuries
- 94% of crashes were run-offs
- 89,4% of crashes occurred on wet pavement

Before and After study (Simple)

	Before	After	Expected After	Variation	Crash Variation (%)
Crashes	47	9	20	-11	-57%
Injury Crashes	8	2	3	-1	-49%

Before and After study (Time and Traffic factor)

	Before	After	Weighted AADT Before	Weighted AADT After	Expected After	Variation	Crash Variation (%)
Crashes	47	9	14465	17742	25	-16	-65%
Injury Crashes	8	2	14465	17742	4	-2	-57%

Maia - Alfena

Grande Porto concession, A42 motorway, direction: increasing from PK 12+448 to 14+645

Main Mitigation Measures

- Reduction of the legal speed limit from 120km/h to 100Km/h
- Variable Message Sign (VMS) was instaled in March 2024
- Horizontal road markings with rumble strips and added lane-selection arrows

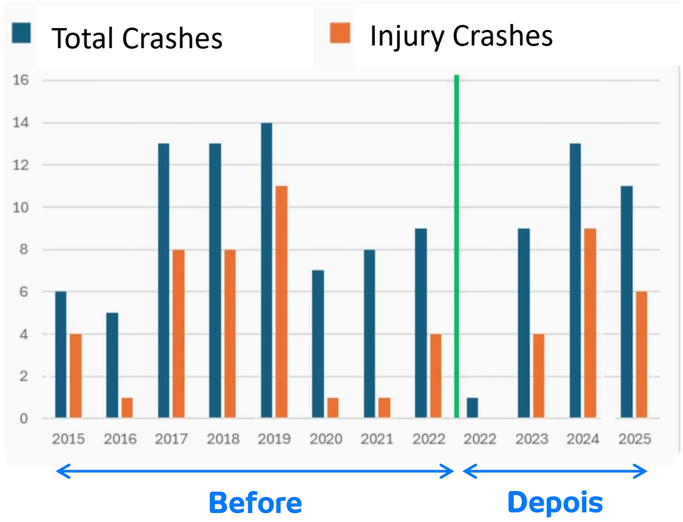
Implementations were completed on **28/11/2022**.
The VMS was installed in March 2024.

Before

After

Maia - Alfena

Crash History



Implementation date: 28/11/2022

After Period: 4 years, 1 month and 2 days

Crash History in the "Before" Period

- 76 total crashes
- 38 injury crashes
- 2 seriously injured and 62 slightly injured
- 86% of crashes are vehicle to vehicle collisions

Before and After studies (Simple)

	Before	After	Expected After	Variation	Crash Variation (%)
Crashes	76	34	30	+4	+13%
Injury Crashes	38	19	15	+4	+25%

Before and After studies (Time and Traffic Factor)

	Before	After	Weighted AADT Before	Weighted AADT After	Expected After *	Variation	Crash Variation (%)
Crashes	76	34	18614	25101	39	-6	-16%
Injury Crashes	38	19	18614	25101	20	-1	6%

Phase 2 measures: Installation of an instantaneous speed camera and widening of the Alfena Node exit, supported by a completed traffic study, if the implemented measures prove ineffective.

Madalena - Coimbrões

Costa de Prata concession, A44 motorway, direction increasing from PK 3+103 to 3+927

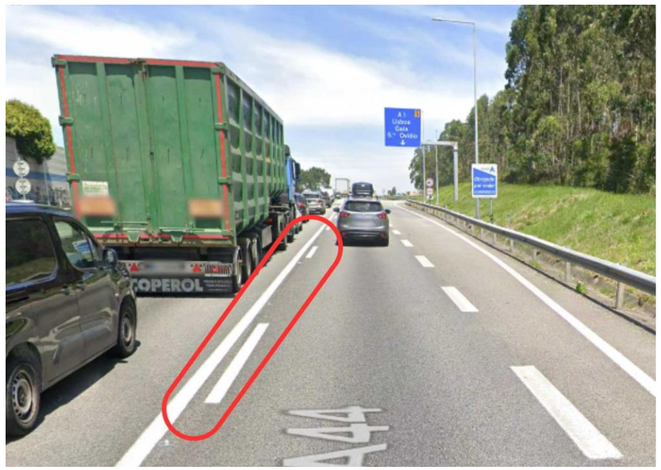
Main Mitigation Measures

- Pavement rehabilitation to improve skid resistance.
- Instalation of a Variable Message Sign (VMS) on PK 1+100.
- Instalation of an impact attenuator at the diverge point.
- CCTV Camera on Coimbrões Node (PK 3+650) and queue detection sensor for congestion warning.

Implementations were completed on 01/06/2024.
The CCTV camera was installed on 4 november 2025.

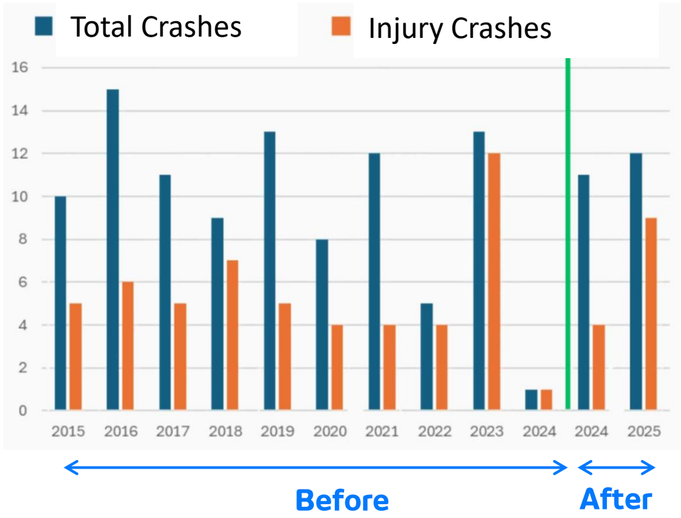
Before

After



Madalena - Coimbrões

Crash History



Implementation date: 01/06/2024

After Period: 1 year and 6 month

Crash History in the "Before" Period

- 97 total crashes and 53 injury Crashes
- 1 Mortal Victim
- 5 seriously injured and 85 slightly injured
- 97% of crashes were vehicle to vehicle collisions

Before and After Study (Simple)

	Before	After	Expected After	Variation	Crash Variation (%)
Crashes	98	24	16	+8	+54%
Injury Crashes	53	13	9	+4	+43%

Before and After Study (Time and Traffic Factor)

	Before	After	Weighted AADT Before	Weighted AADT After	Expected After*	Variation	Crash Variation (%)
Crashes	98	24	43627	40485	15	+9	+55%
Injury Crashes	53	13	43627	40485	8	+5	+54%

Conclusions

- The application of the “Before After” studies allowed an objective assessment of the interventions impact on road crash occurrence.
- The individual analysis of treated sites shows that, in most cases, the implemented measures were effective.
- An average reduction of **3 crashes per intervention** was observed.
- A total reduction **of 86 crashes** was recorded across all analyzed interventions.
- The most effective measures in reducing crashes were the installation of speed limit cameras, for both average speed (Carvoeiro–Talhadas) and instantaneous speed (Seide–Ave–Selho).
- Lane suppression and traffic channelization measures also proved highly effective, as demonstrated on link H from the Sendim Node.
- In locations where the primary issue is infrastructure-related, the implemented operational measures did not achieve the desired effects, as observed at Madalena–Coimbrões and Maia–Alfena.
- Interventions in high-crash concentration locations has a measurable impact on crash redution, altough the ideal is always to target the underlying risk factors contributing to crash occurrence.

Obrigado

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