

**EasyWay**



Annual Forum 2010



**Shortcut to the future.**

Lisbon • November 16<sup>th</sup>-18<sup>th</sup>



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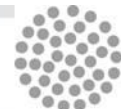
# Algorithm for Dynamic Speed Control

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  - Traffic behaviour
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# INTRODUCTION

- **Objectives:**

- Reduce congestion and get better traffic levels
- Homogeneous traffic
- Decrease sudden stops
- Cushion accordion effect
- Increase road safety

- **Procedure:**

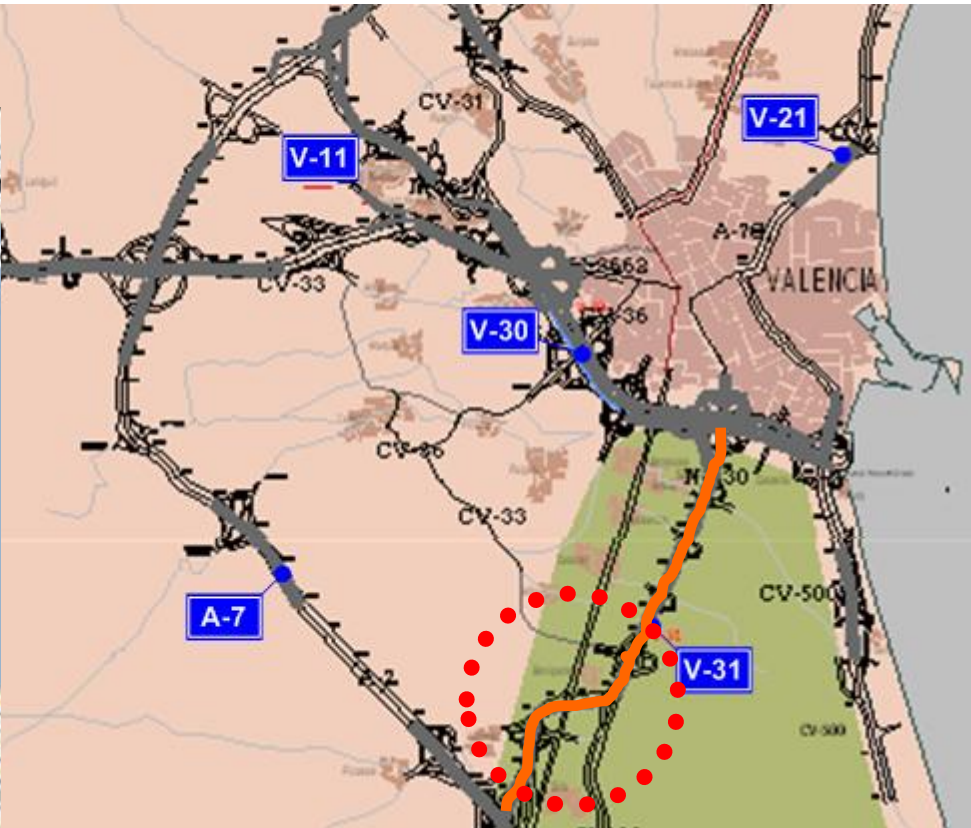
- Identification of conflicting traffic situations (place and time)
- Be prepared to congestion and holdup incidents in advance.
- Dynamic signaling speed
- Intervention in real time under real conditions





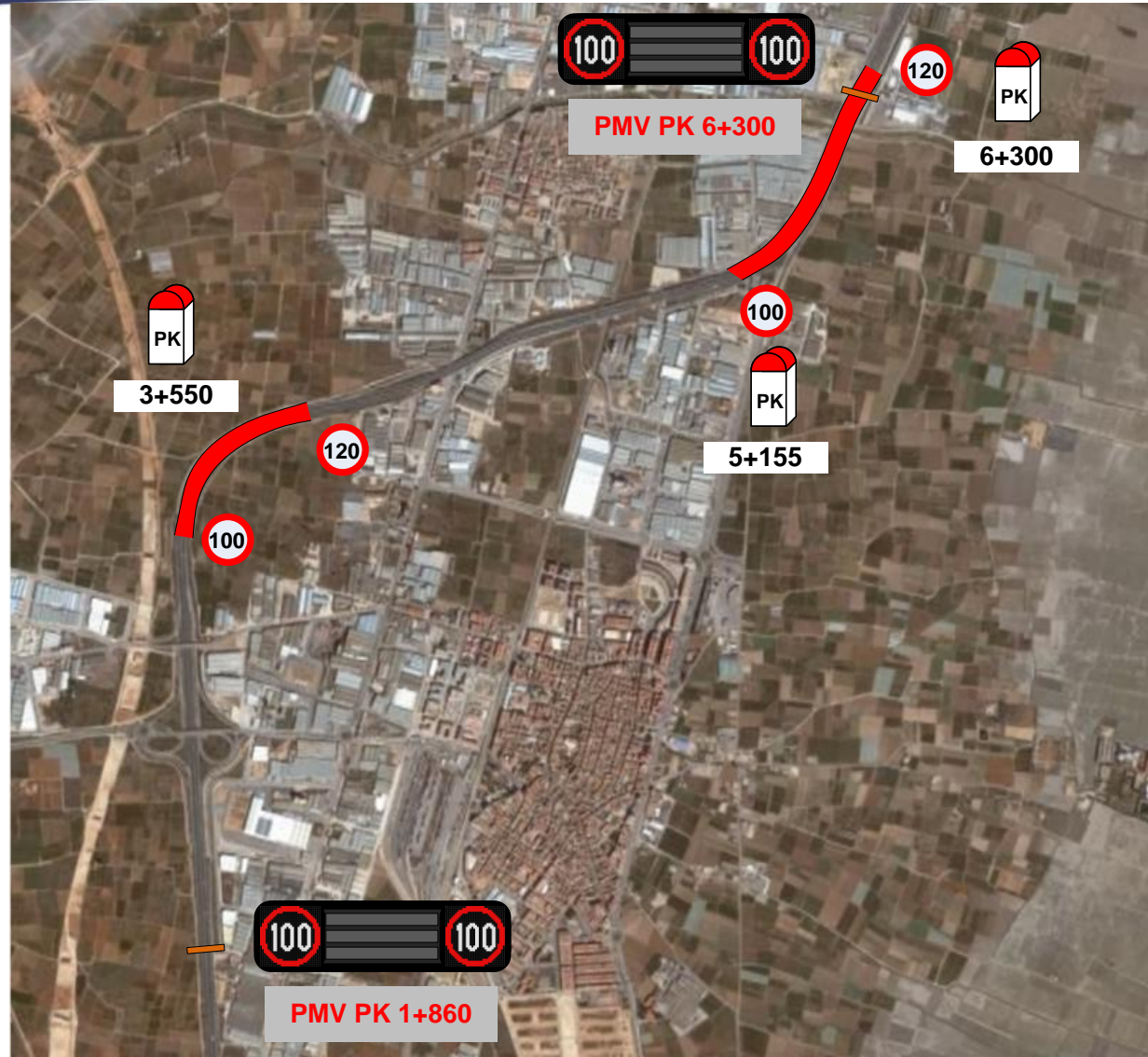
# PROJECT AREA

- V-31 Highway (Southern access to Valencia City)
- Length: 13 km
- Recurrent traffic





## PREVIOUS SITUATION



PMV PK 1+860

3+550

5+155

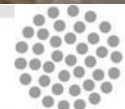
PMV PK 6+300

6+300



GOBIERNO DE ESPAÑA

MINISTERIO DEL INTERIOR



indra

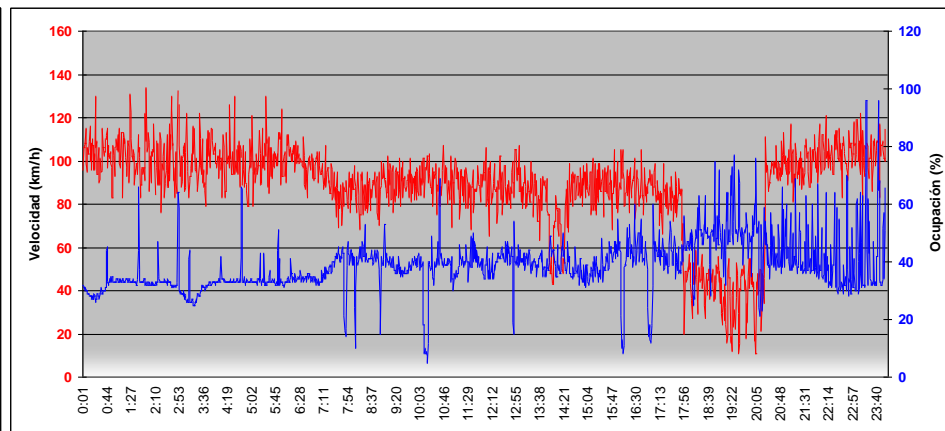
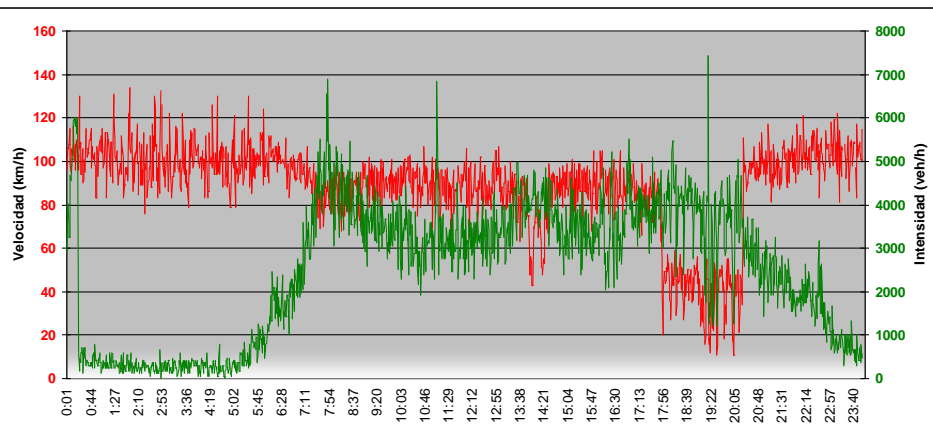


# PROBLEMS OF THE ROAD

## TRAFFIC BEHAVIOUR

According to the data of general relationships among Speed, Density and Flow, and scatter diagram of Speed – Flow for each traffic data section: (increasing direction)

- Congestion is generated in 6+300 km
- Congestion grows from 6+300 to 5+155 and 3+550
- Congestion happens between 18:00 and 20:00



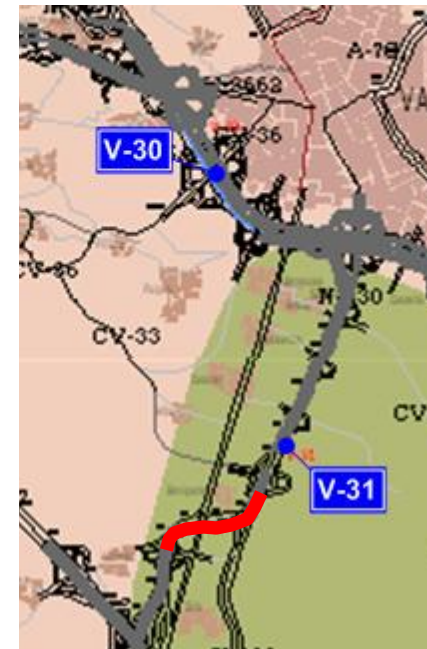
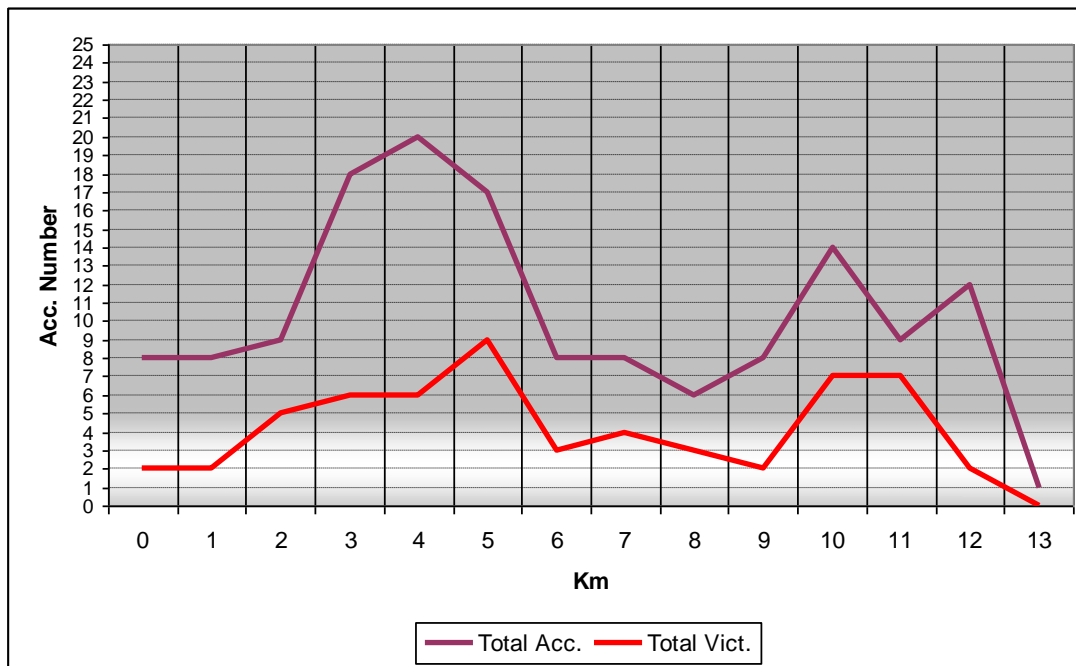


# PROBLEMS OF THE ROAD

## ROAD ACCIDENTS

Accidents per kilometer (increasing direction)

Most accidents between kilometers 3+000 and 5+000



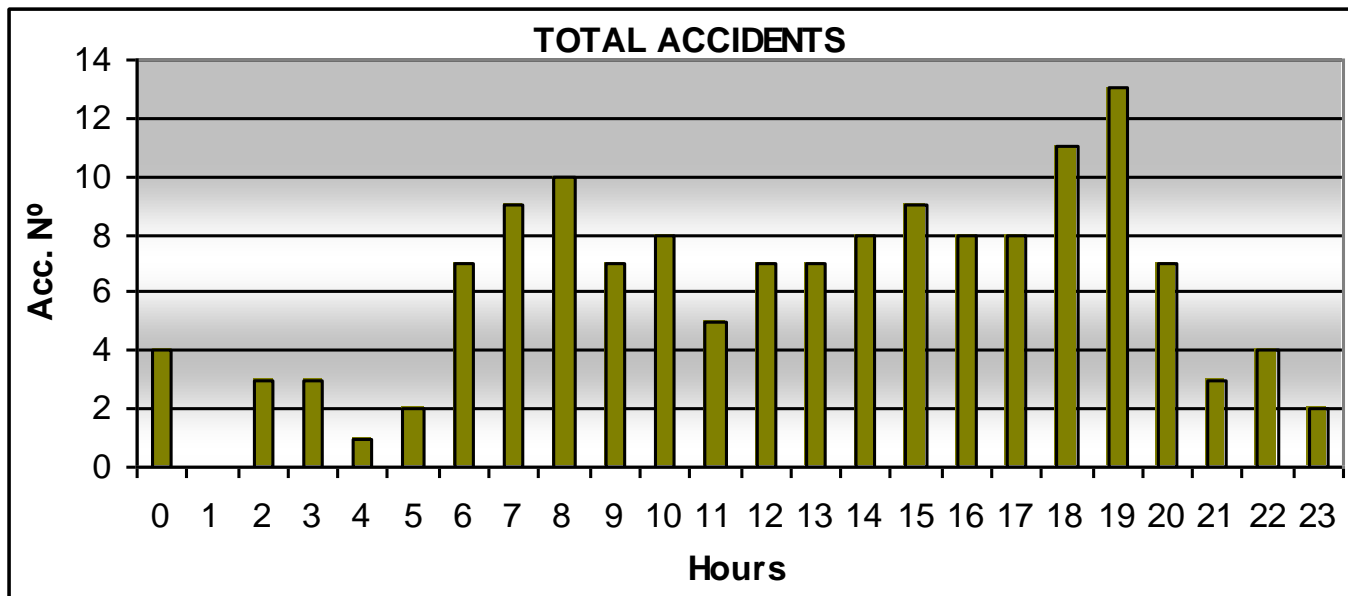


# PROBLEMS OF THE ROAD

## ROAD ACCIDENTS

Accidents per hour

Most accidents happen in the morning between 6:00 and 8:00 and in the afternoon between 18:00 and 19:00

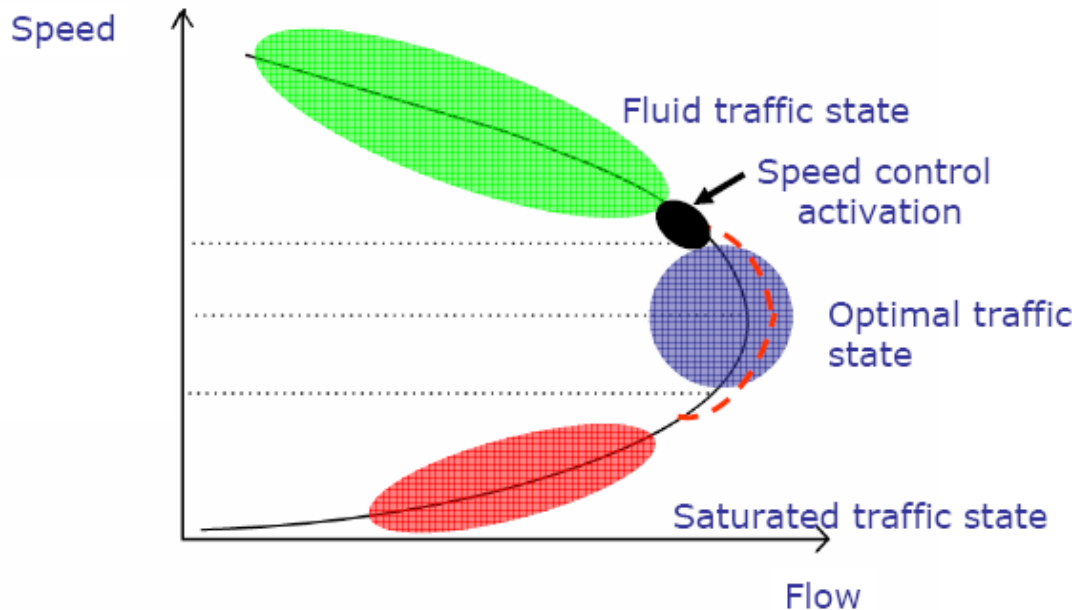




# DYNAMIC SPEED CONTROL

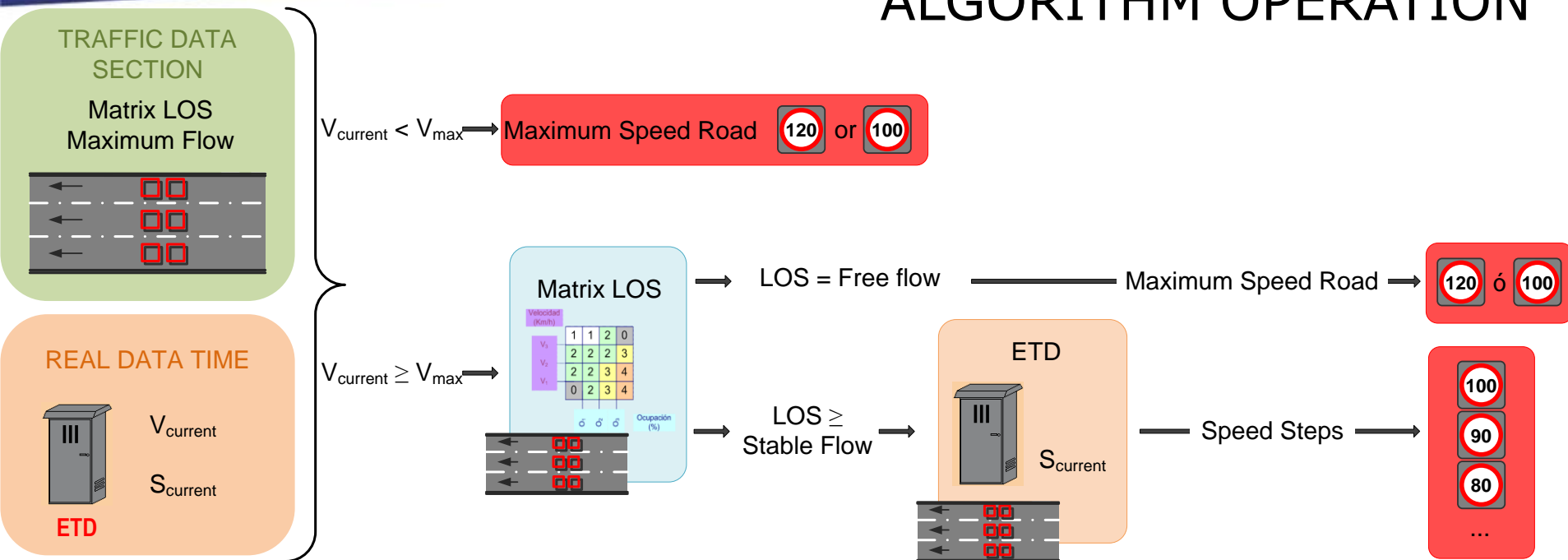
## PREVIOUS CONSIDERATIONS

The speed limit to be shown on the variable-message signs keeps the vehicular traffic in the optimal state. This point represents the highest capacity at an acceptable speed



The algorithm will be activated in slow traffic situations, before reaching congestion situations

## ALGORITHM OPERATION



For an integration period of time well defined  $t_{(i)}$ , an  $V_{(i)}$  of each section will be obtained. (From Real Time Information)

If any  $V_{(i)}$  exceeds the  $V_{MAX}$  defined previously, the LOS will be calculated.

If the LOS is Stable Flow, the  $S_{(i)}$  will be calculated, and the first step down limit will be shown.

Signaling in several sections will be coordinated to disallow sharp speed reductions, and however allow sudden speed growths.



# DYNAMIC SPEED CONTROL

## SIMULATION RESULTS

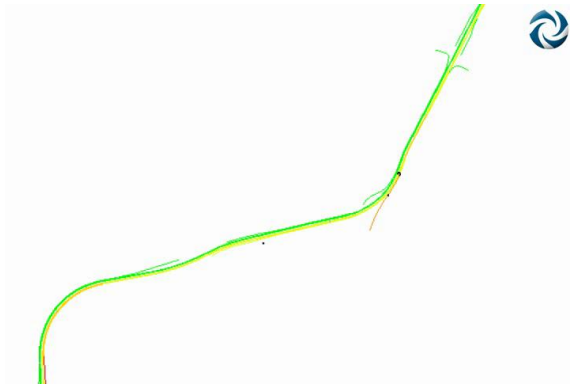
Traffic behaviour in V-31 has been studied using AIMSUN™ simulation model. Previous data has been taken from the road on a weekday type, and two different scenarios have been established:

- Previous behaviour of the road
- New behaviour by applying the algorithm defined

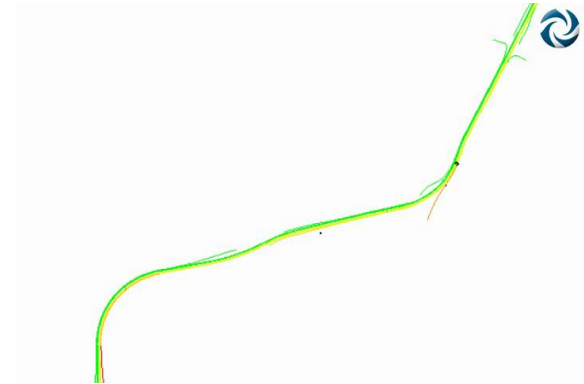




## SIMULATION RESULTS



Previous behaviour of the road  
Increasing direction  
Km 6+000

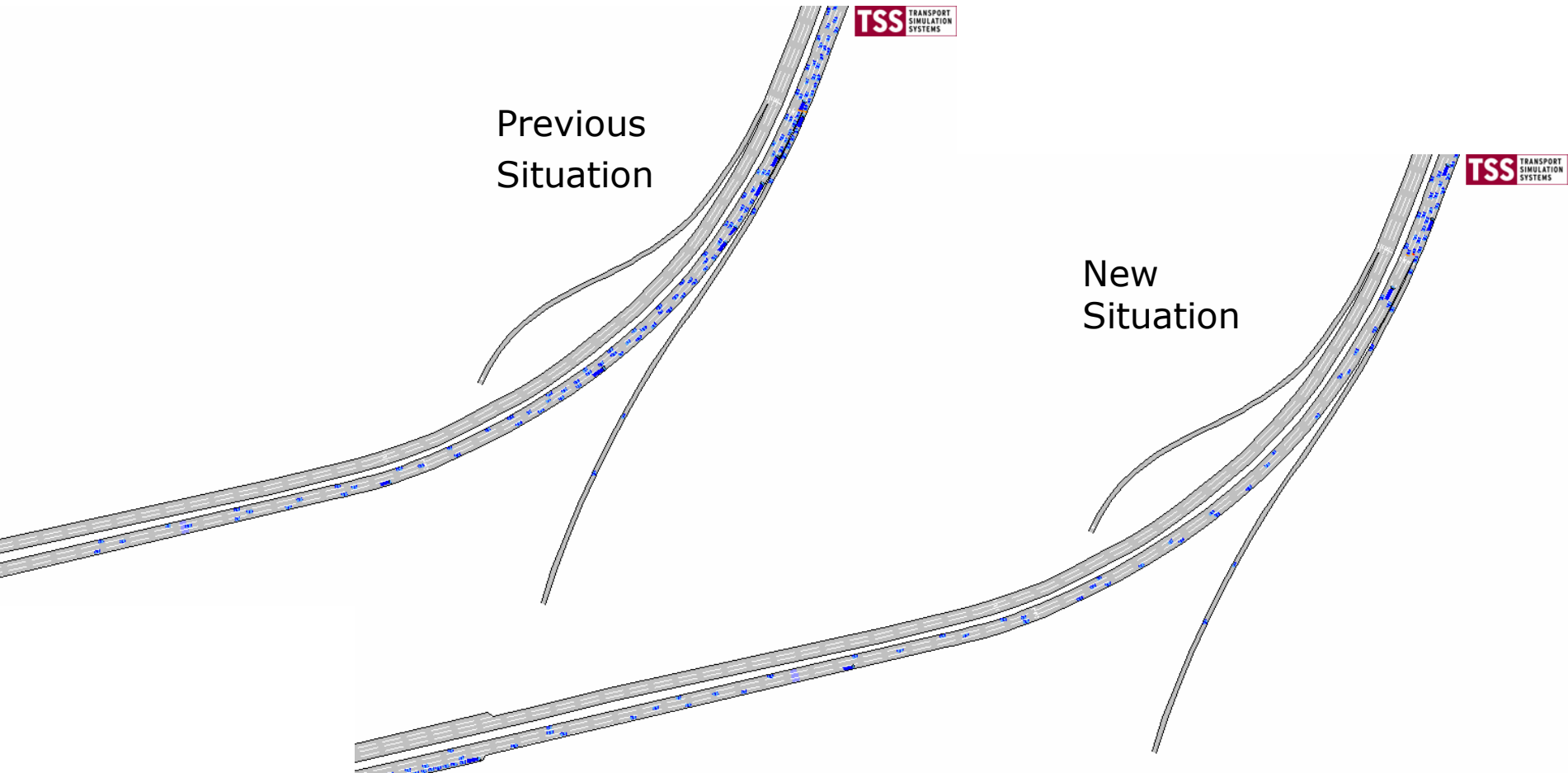


New behaviour by applying the  
algorithm defined  
Increasing direction  
Km 6+000



## SIMULATION RESULTS

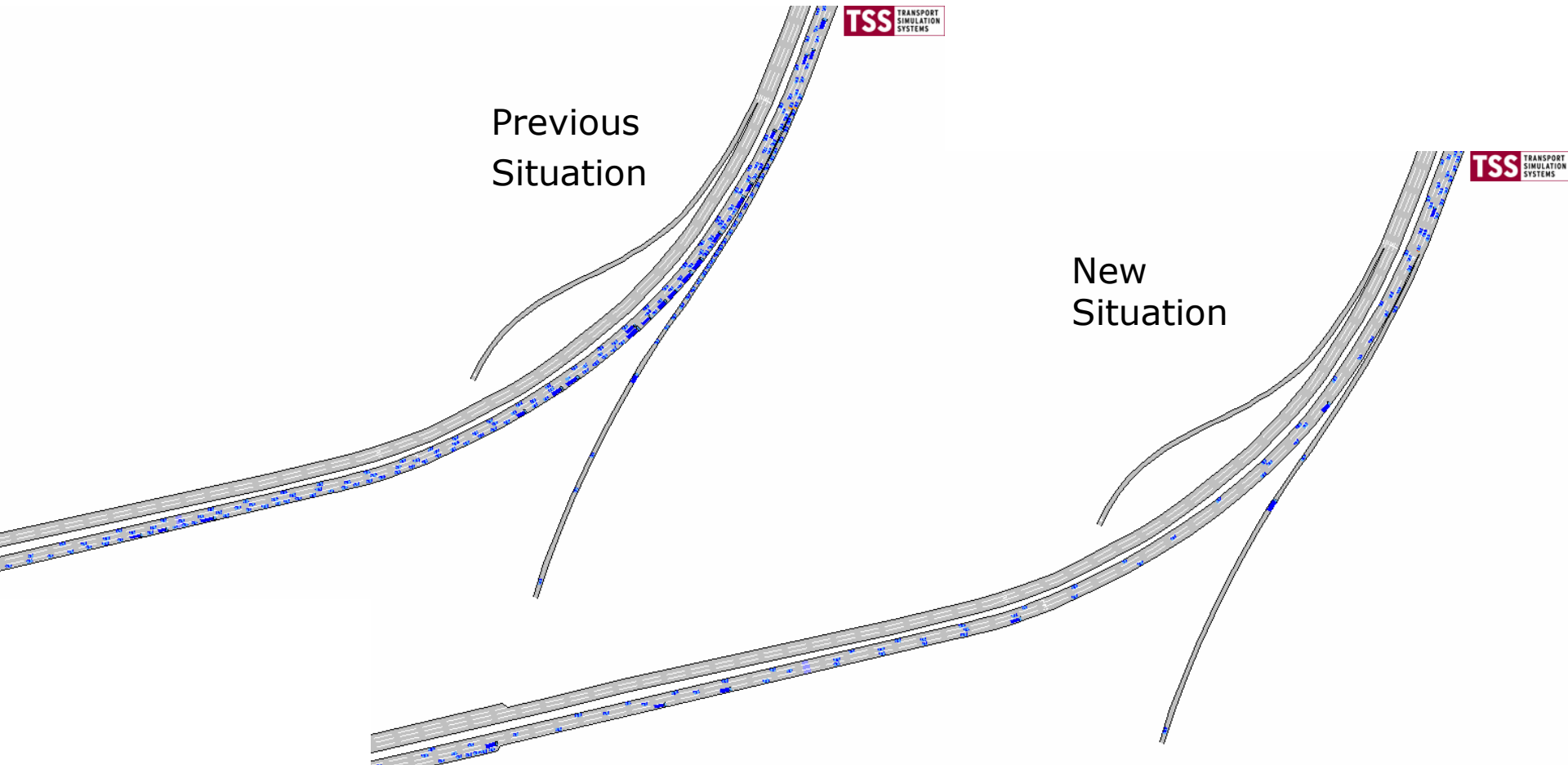
18:15 hours – Increasing direction – Km 6+000





## SIMULATION RESULTS

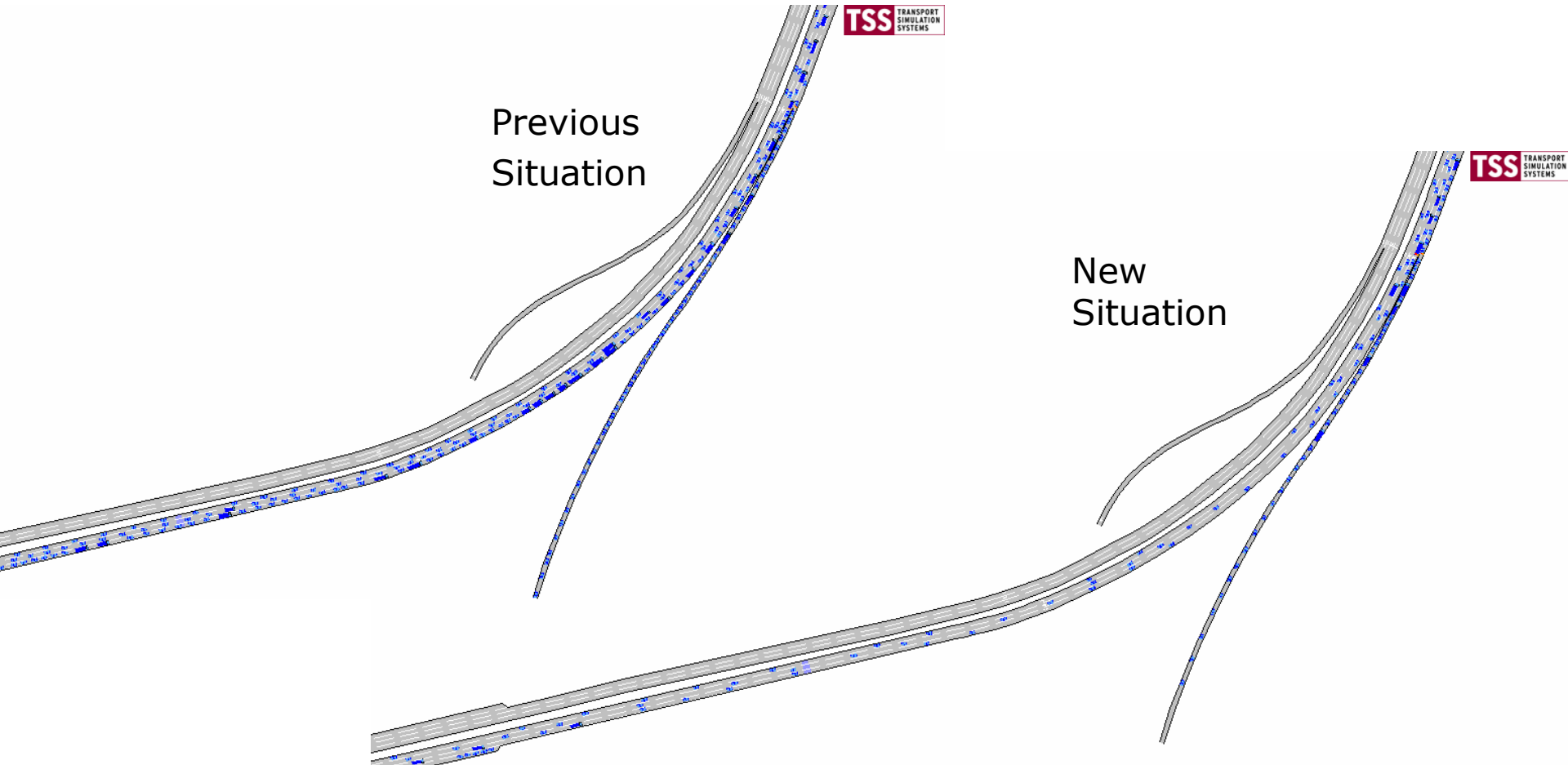
18:25 hours – Increasing direction – Km 6+000





## SIMULATION RESULTS

18:45 hours – Increasing direction – Km 6+000



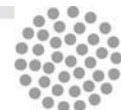


## CONCLUSIONS

As seen in previous images, the implementation of the algorithm, **delays the formation of traffic jams** and minimize the length of them.

It is able to **reduce the episodes of sudden stops** of vehicles. These episodes are an important part in generating congestion.

The speed **adapts to traffic demand in real time.**



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