



# Perceptual Measures to Influence Driving Behaviour and Reduce Crashes at Rural Intersections



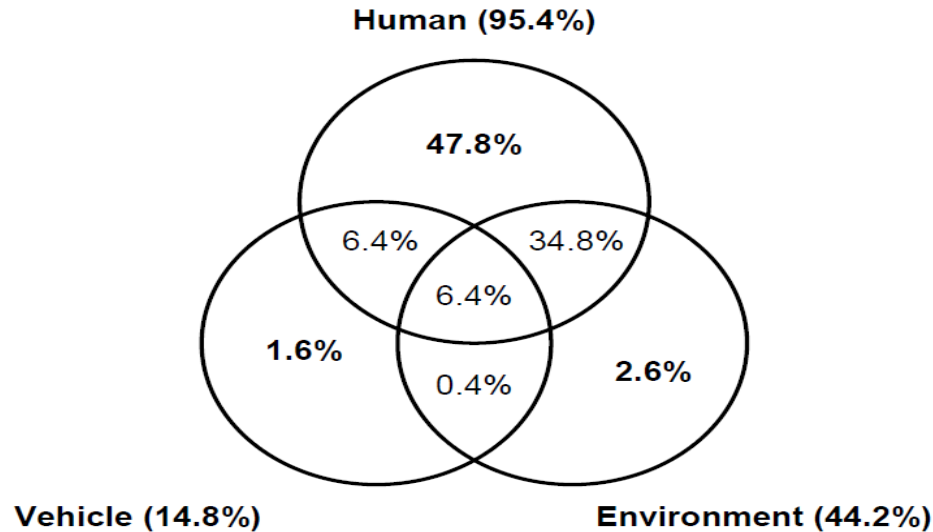
***Filomena Mauriello***

***filomena.mauriello@unina.it***

**University of Naples Federico II  
Department of Transportation Engineering**

**“Luigi Tocchetti”**

# Accident causation factors



- Errors due to physical, perceptual, and cognitive limitations of humans are in more than 90%
- Speeding inconsistently with the road environment is considered to be a major crash contributing factor
- Excessive speeds are involved in about 1/3 of fatal crashes

# Excessive speeds

- ▶ Speed limits not reflective of the roadway conditions
  - Most drivers feel that they are lower than what the roadway can accommodate
  - **Perceptual measure** may induce drivers to detect them earlier
    - To select appropriate speeds as a result of their perception of the roadway environment as a whole
    - Perceptual techniques can be reduction the potential error

# Intersections and Crash Risk

Intersections constitute only a small part of the overall highway system



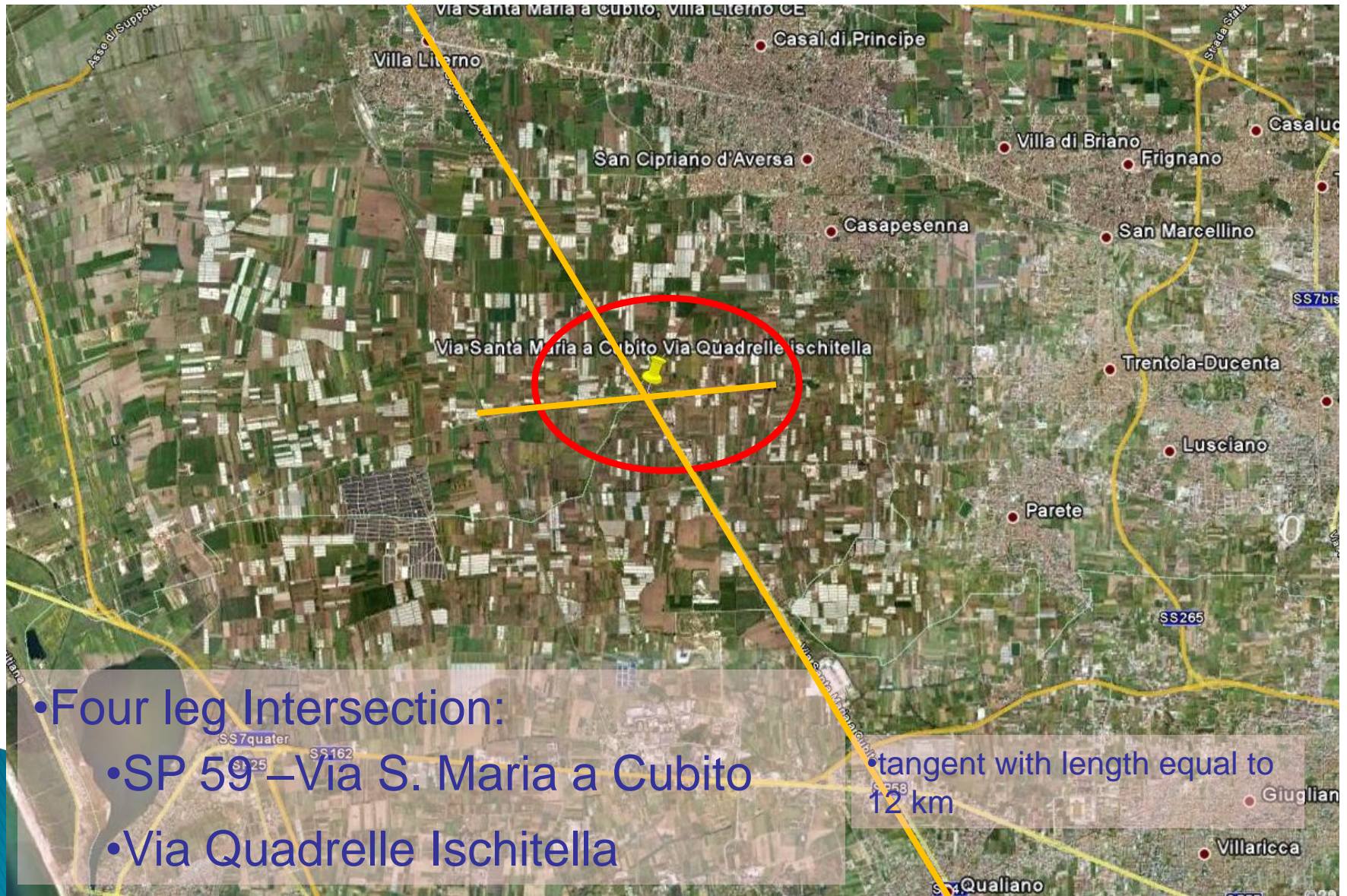
Intersections are recognized as the most hazardous location on roads, more than 4 possibilities of conflict are at intersection, which often result in high frequency of fatal crashes

# Study Site Description

- ▶ The study site is a located intersection in Giugliano in Campania, South of Italy in Province of Naples



# Study Site Description



•Four leg Intersection:

- SP 59 –Via S. Maria a Cubito
- Via Quadrelle Ischitella

•tangent with length equal to 12 km

# Study Site Description

- Two-lane rural highway
  - Lane width = 3.00 m (inadequate)
  - No auxiliary lanes
  - No shoulder lanes



# Study Site Description

- Traffic composition is constituted by:
  - Car
  - Heavy vehicles
  - Powered two-wheelers





# Study Site Description

- ▶ Reduced sight distance:
  - Permanent obstacles

• Via Santa Maria a Cubito



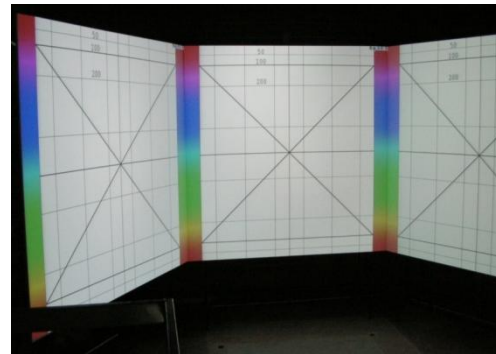
• Via Quadrelle Ischitella



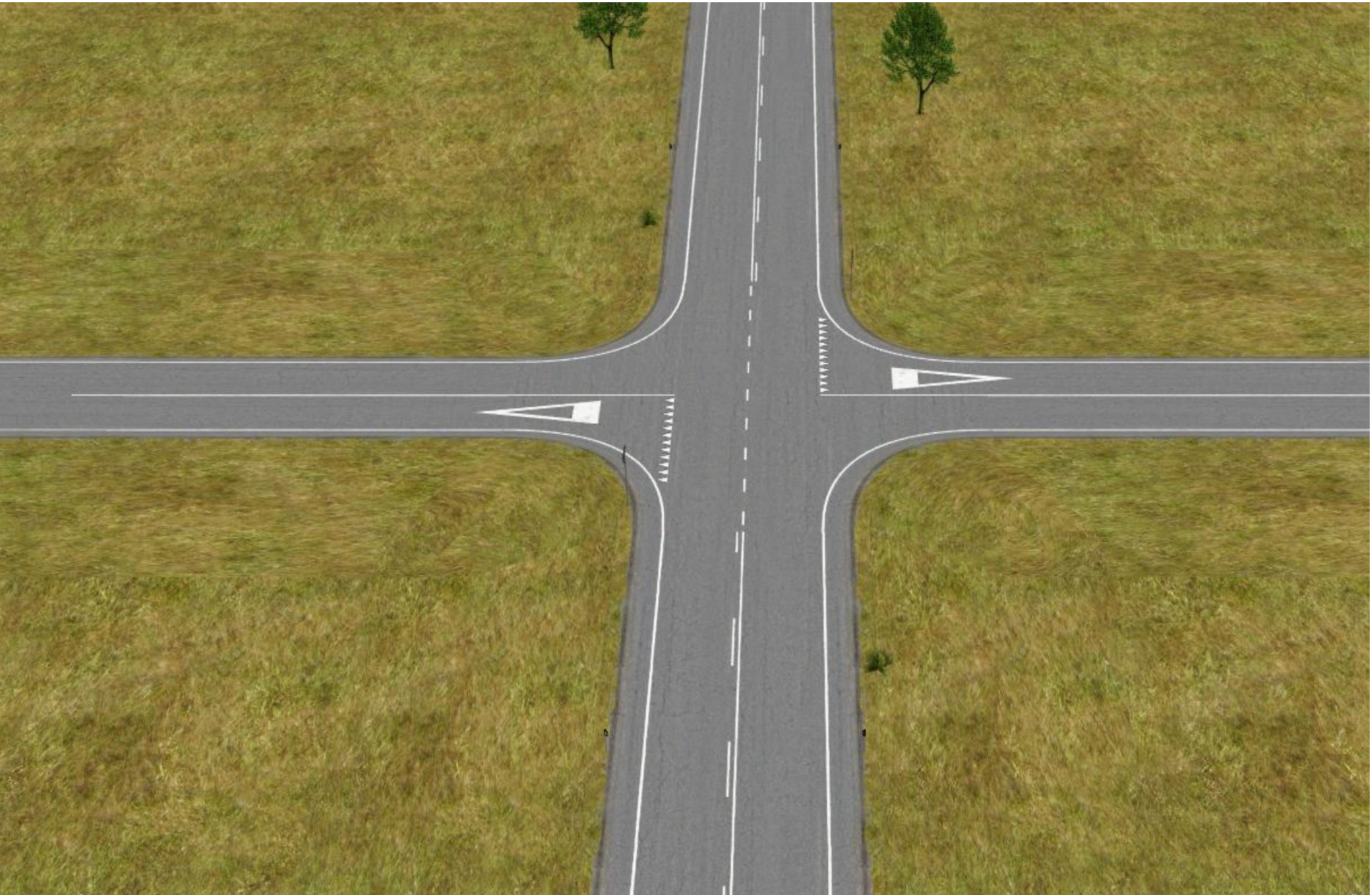
# Solution proposal: Background

## DYNAMIC-DRIVING SIMULATOR: VERA

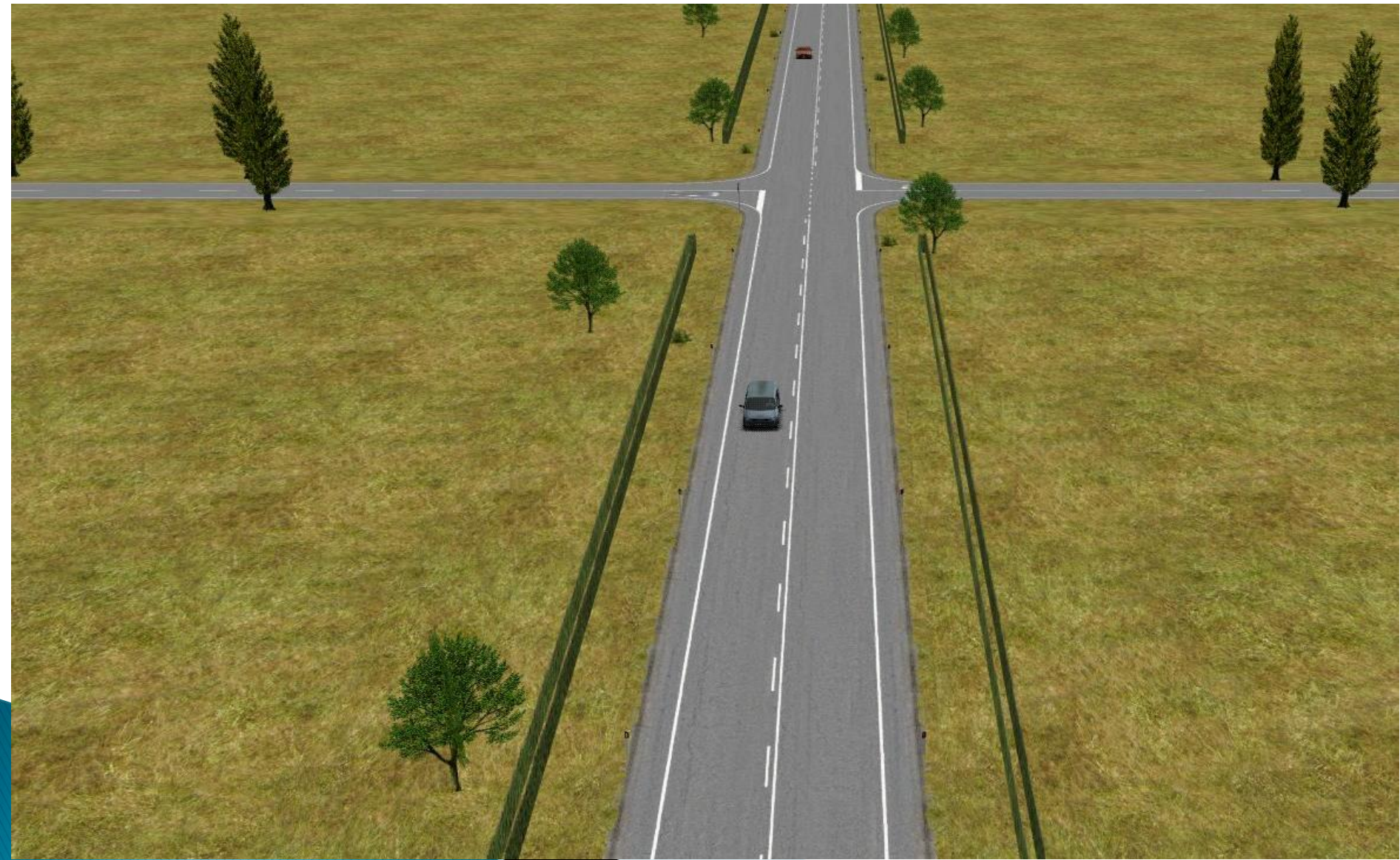
(Virtual Environment Road sAfety)



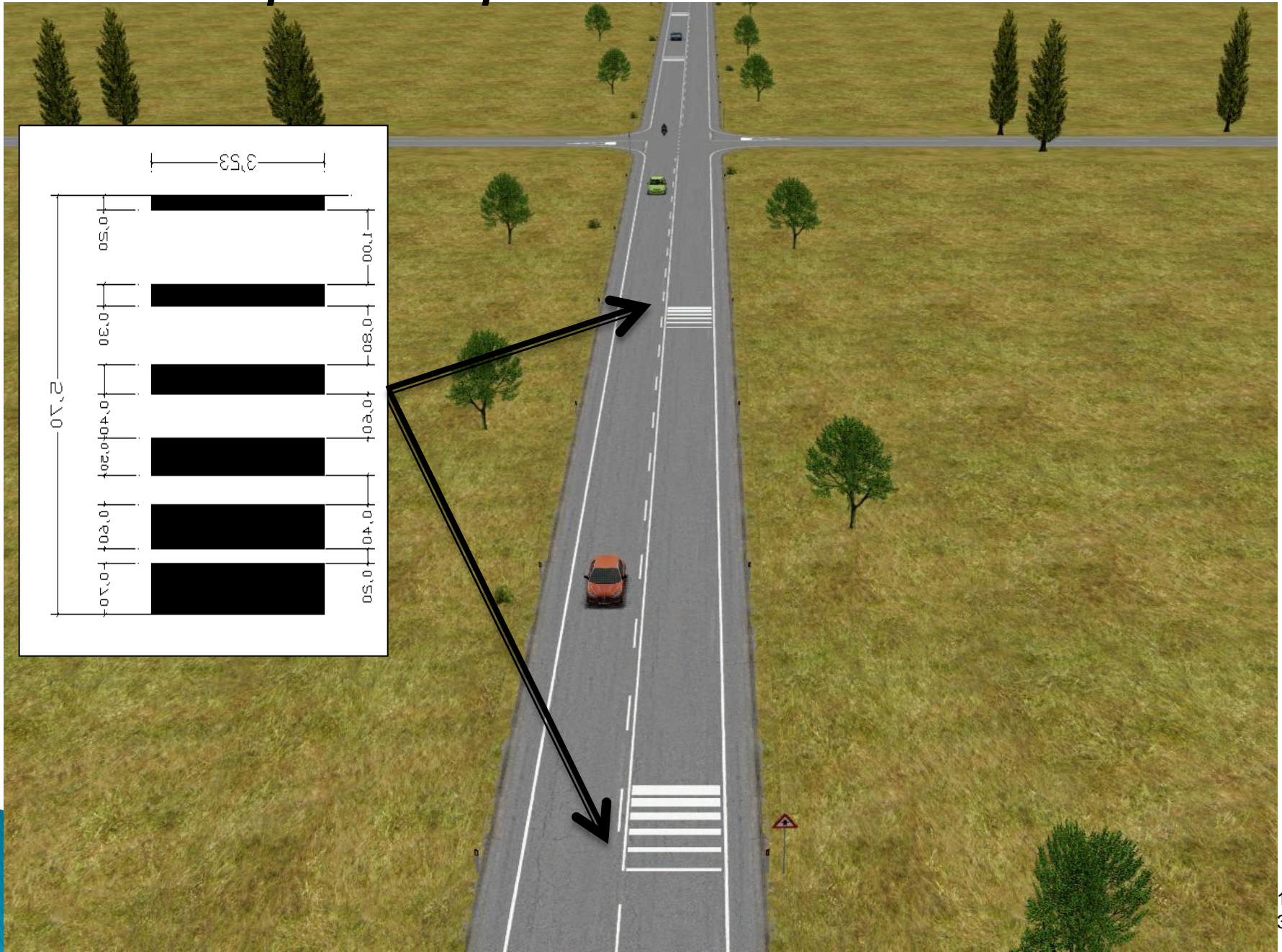
- ALT 2: *Base intersection*



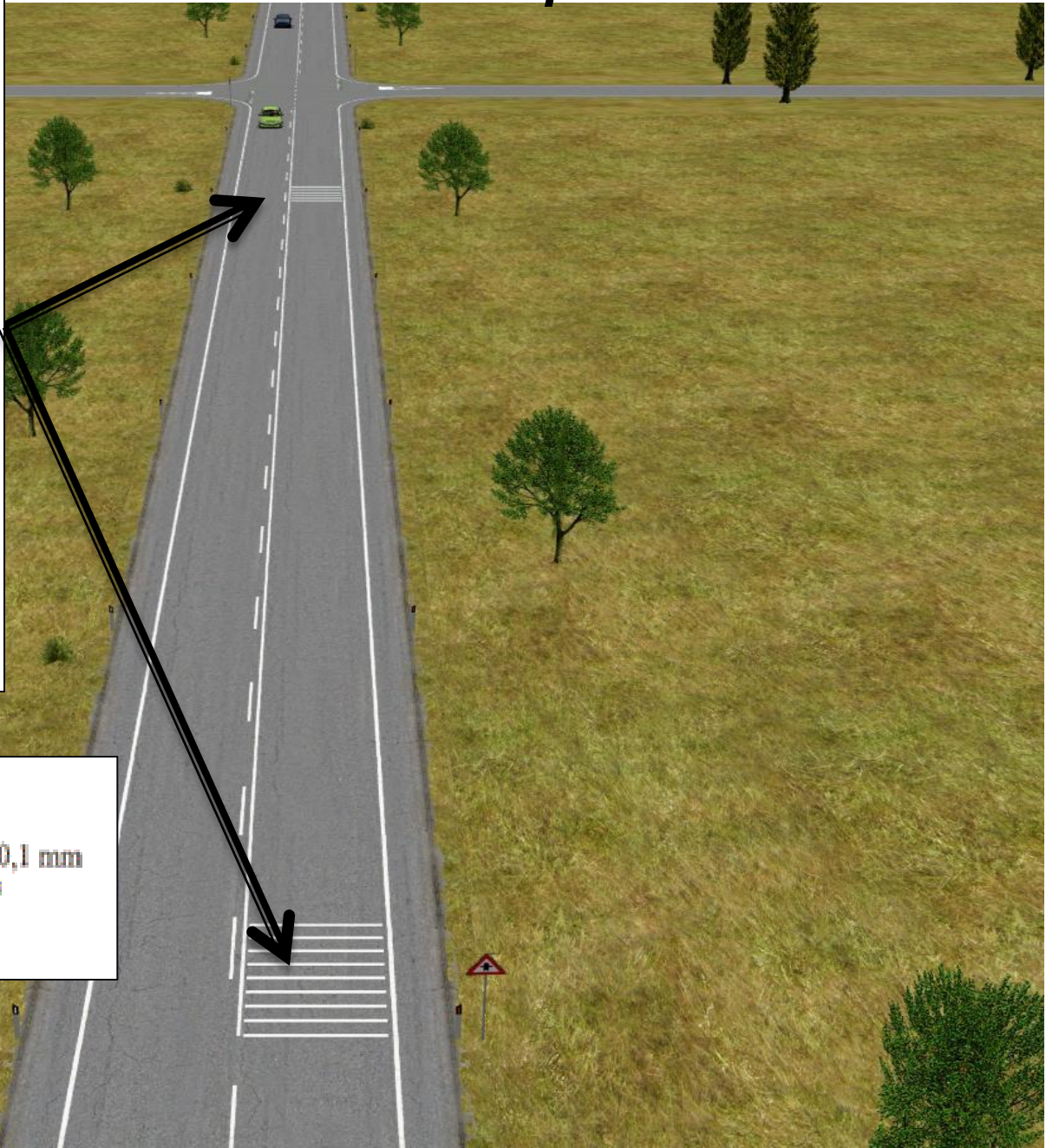
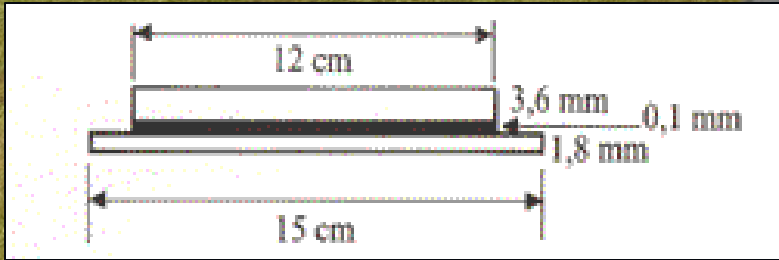
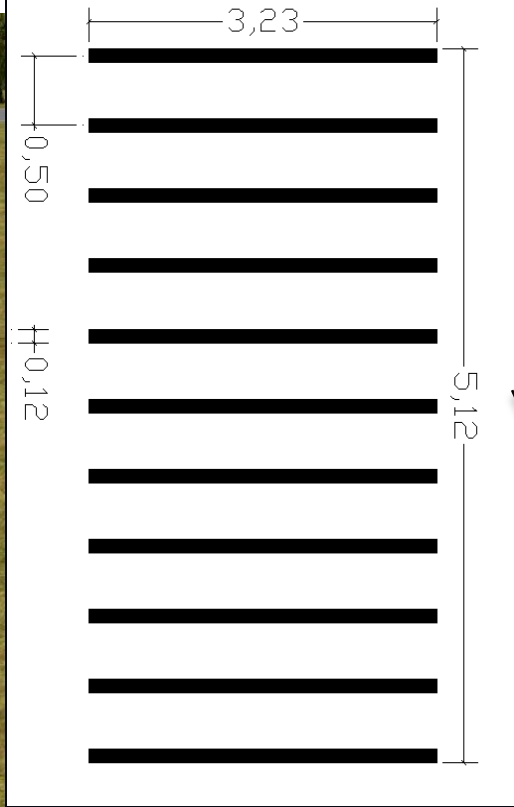
- Alt 3: *Reduced sight distance*



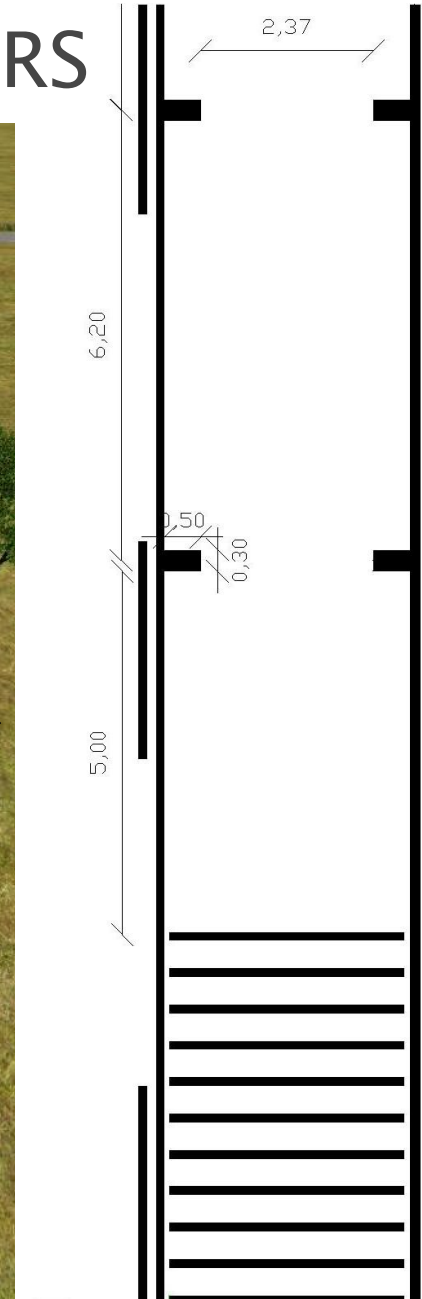
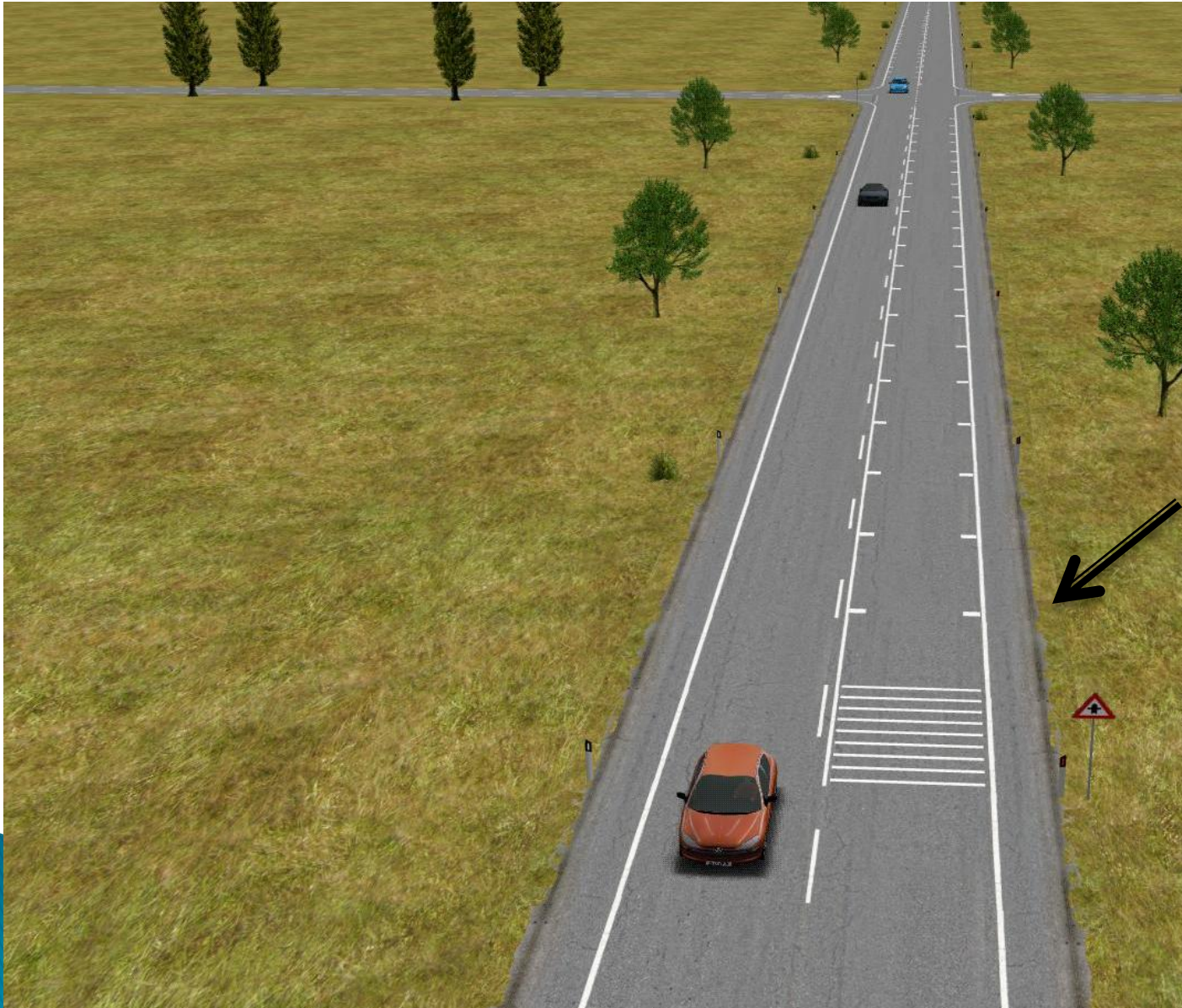
# • Alt 4: *Optical speed bars*



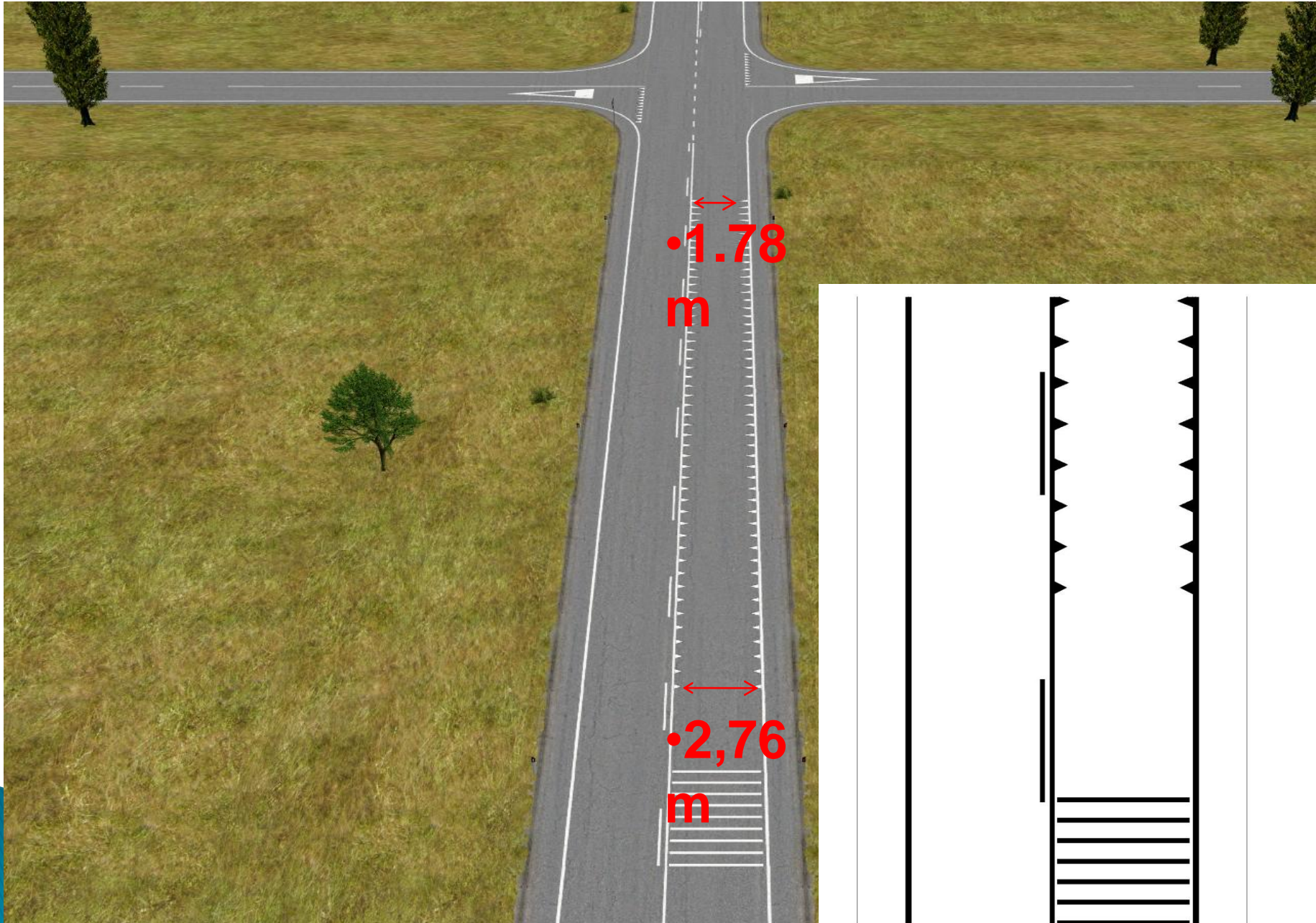
# • Alt 5: *Transverse rumble strips*



# • Alt 6: PERIPHERAL TRANSVERSE BARS

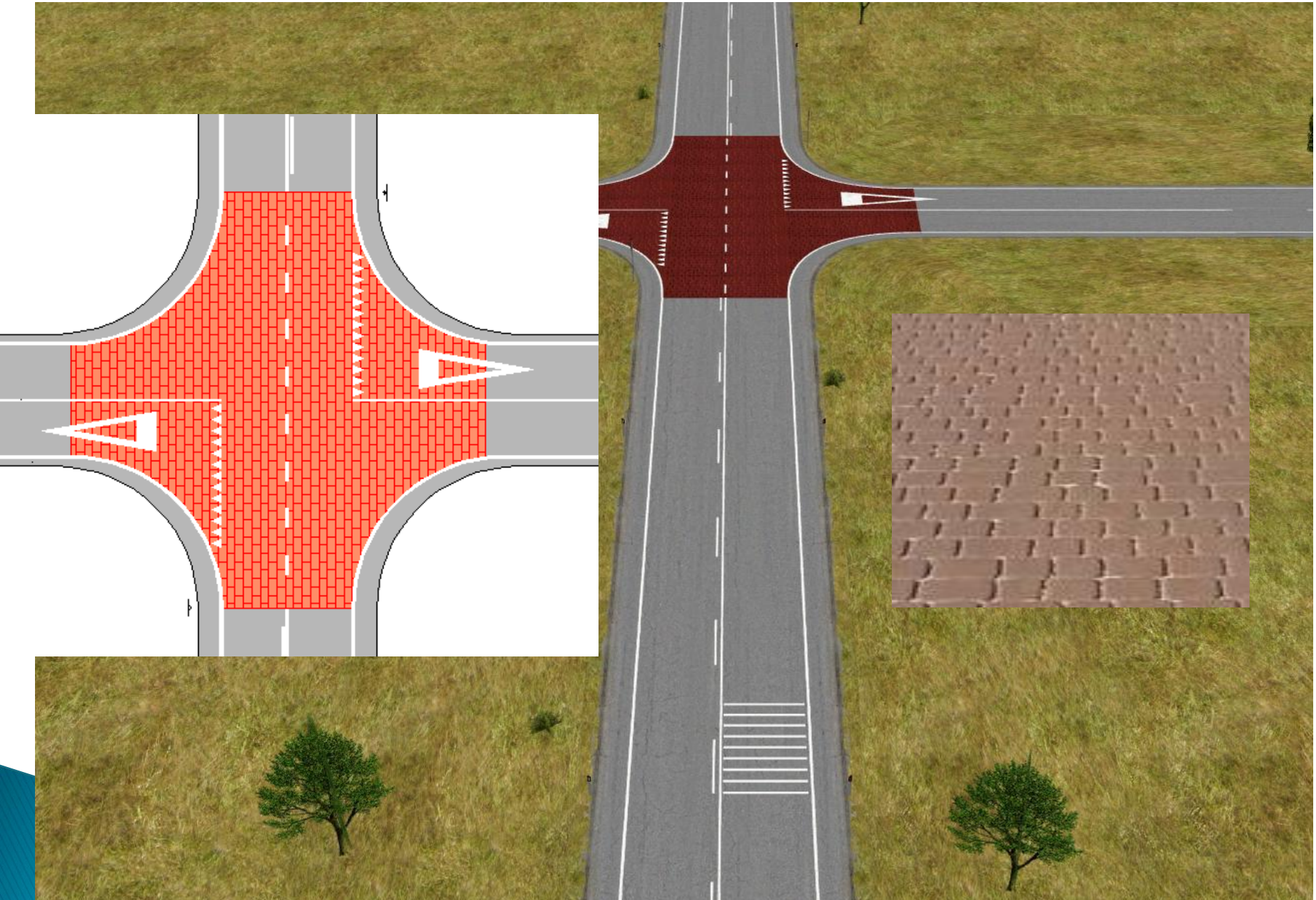


# • Alt 7: PERIPHERAL TRANSVERSE BARS

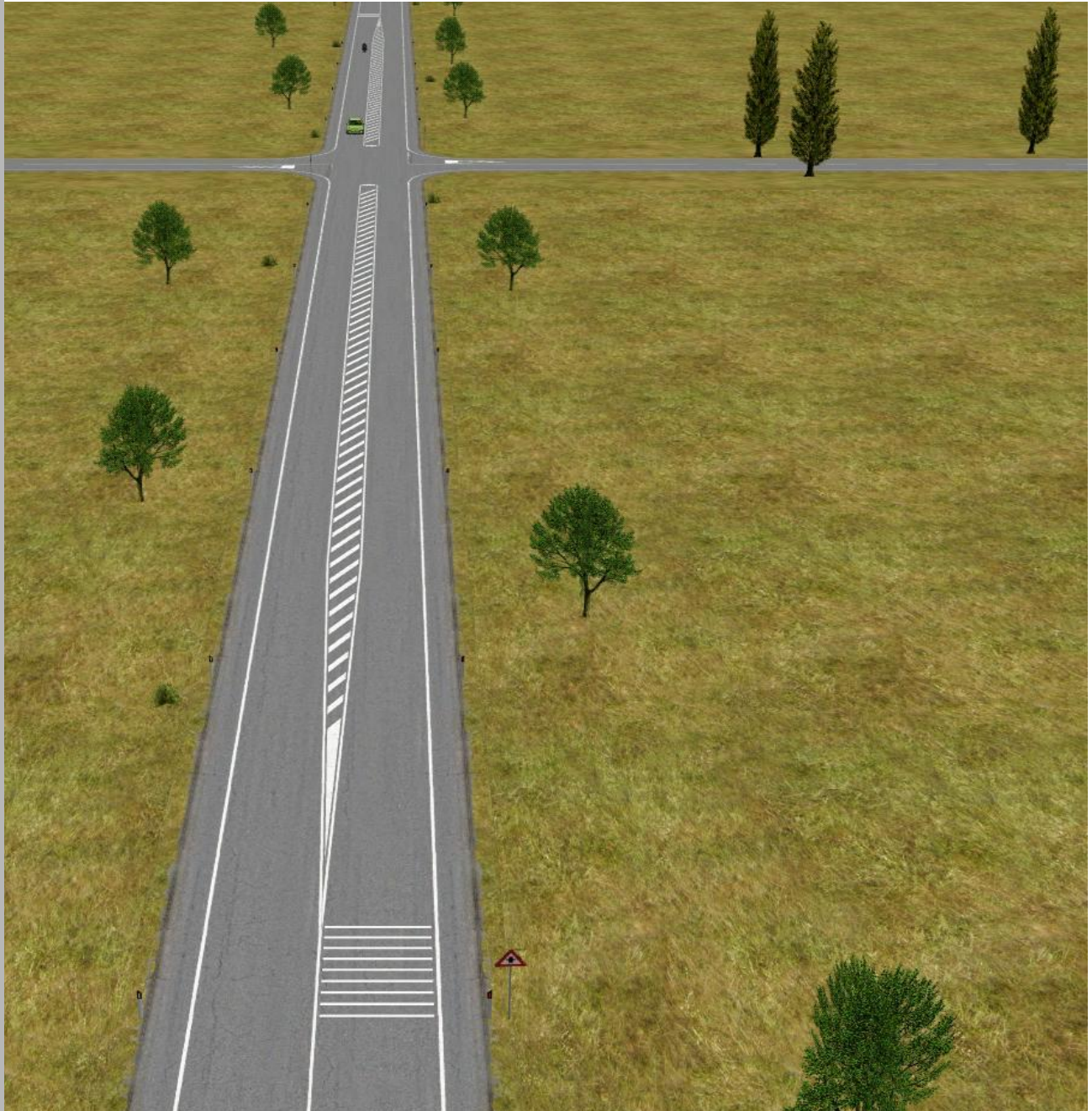
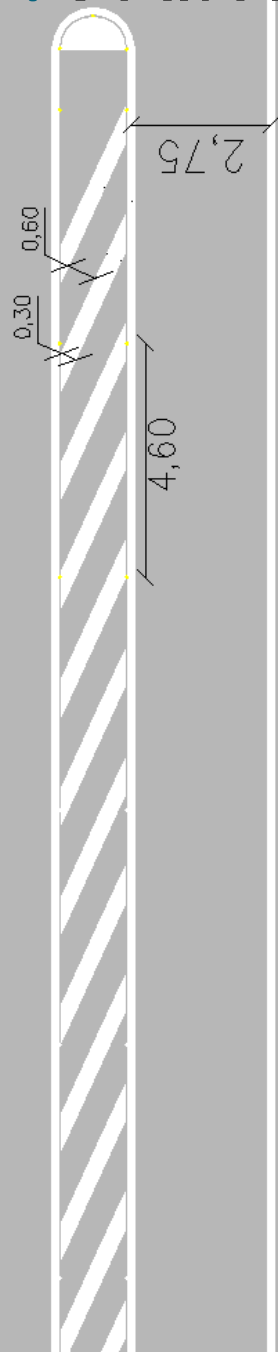




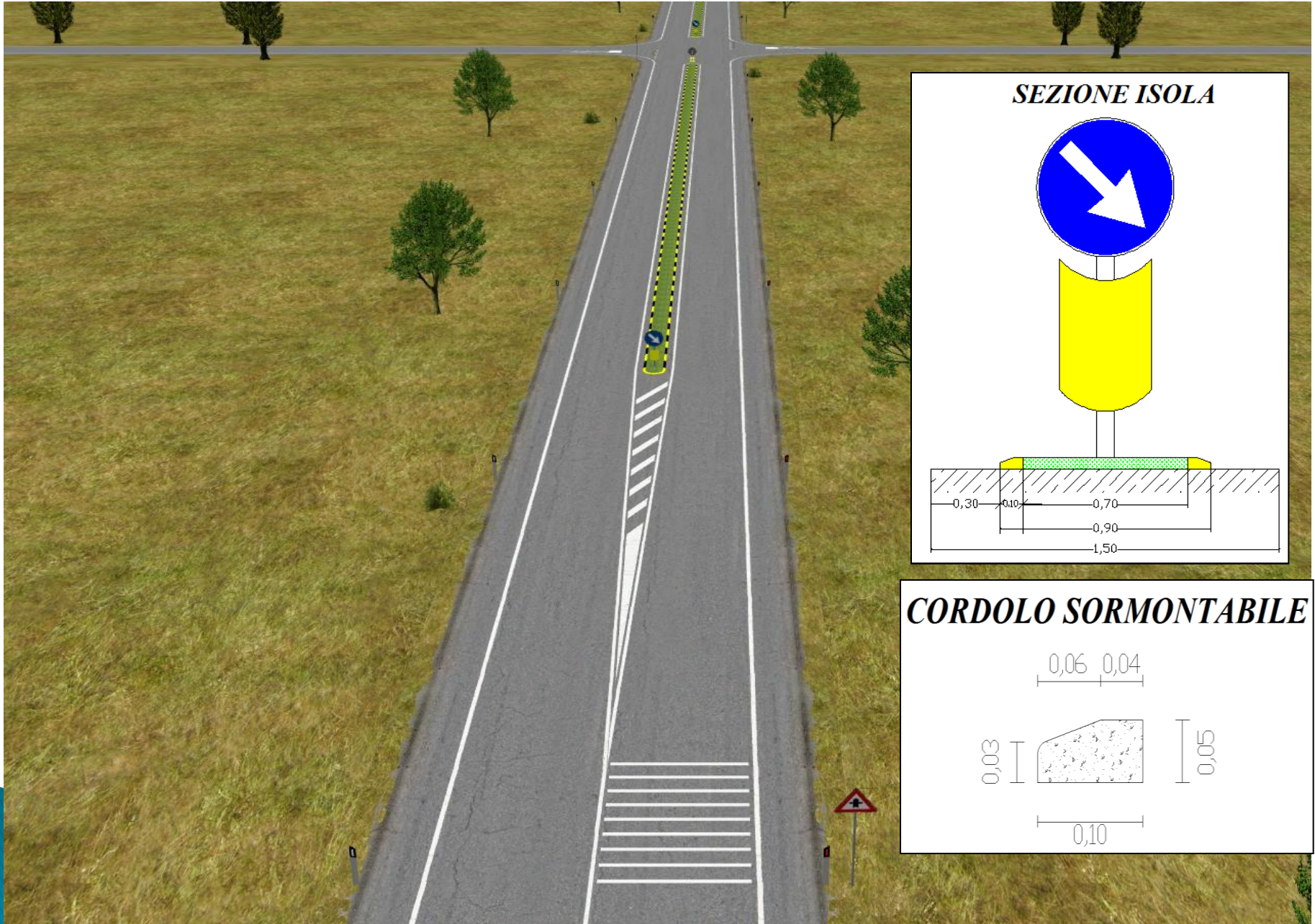
# Alt 8: COLORED INTERSECTION AREA



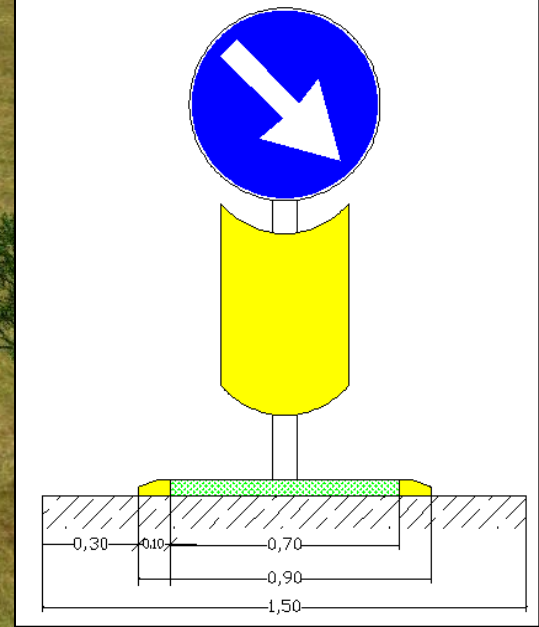
# • Alt 9: PAINTED MEDIAN ISLAND



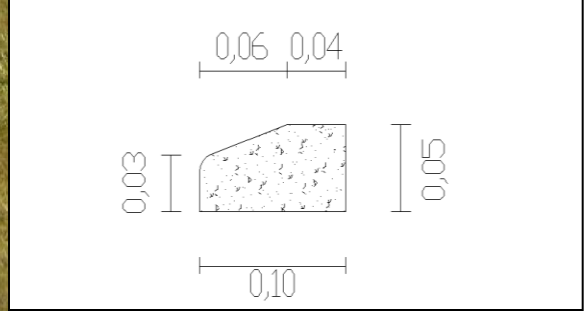
# Alt 10: RAISED MEDIAN ISLAND



**SEZIONE ISOLA**

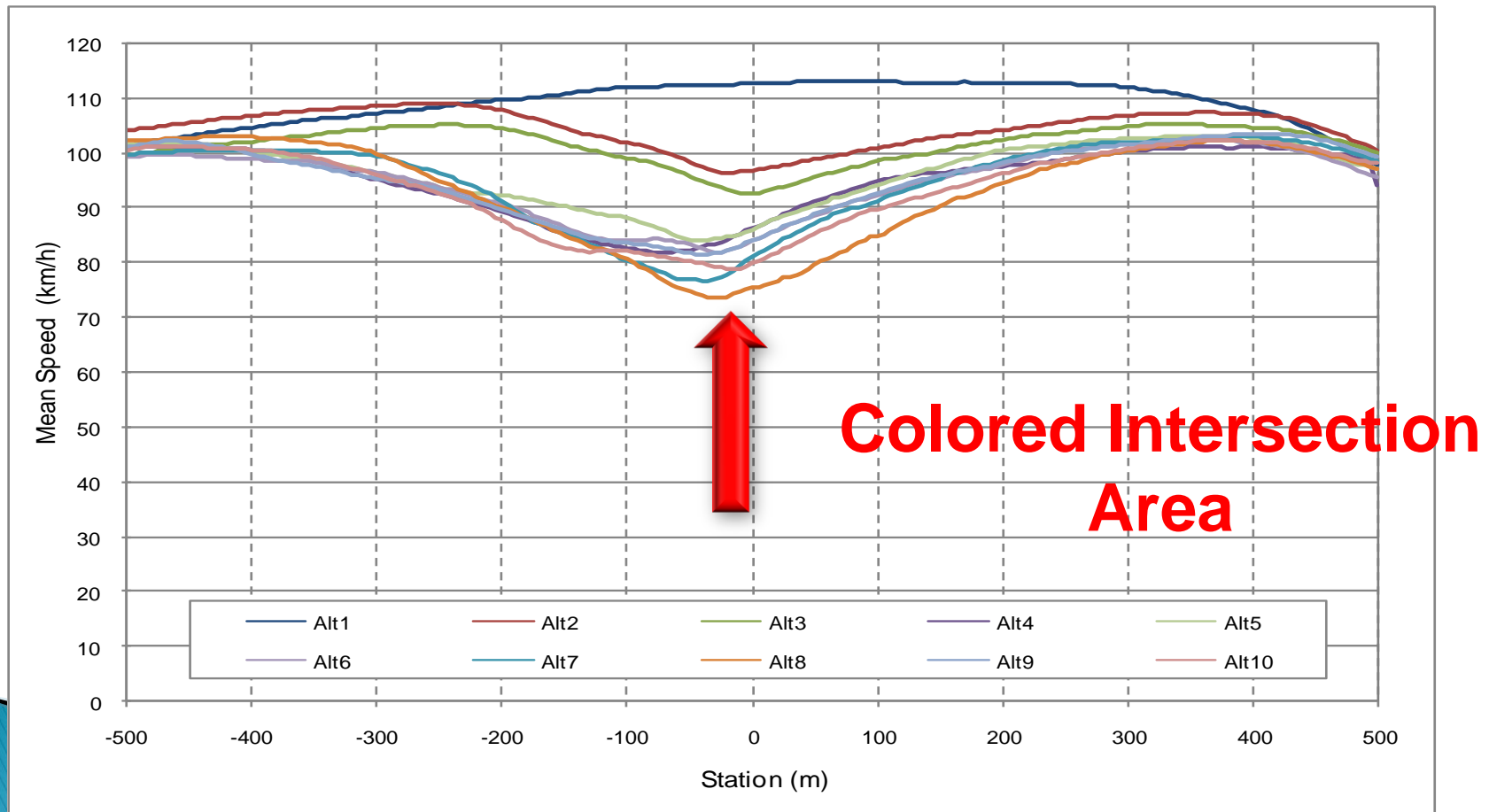


**CORDOLO SORMONTABILE**

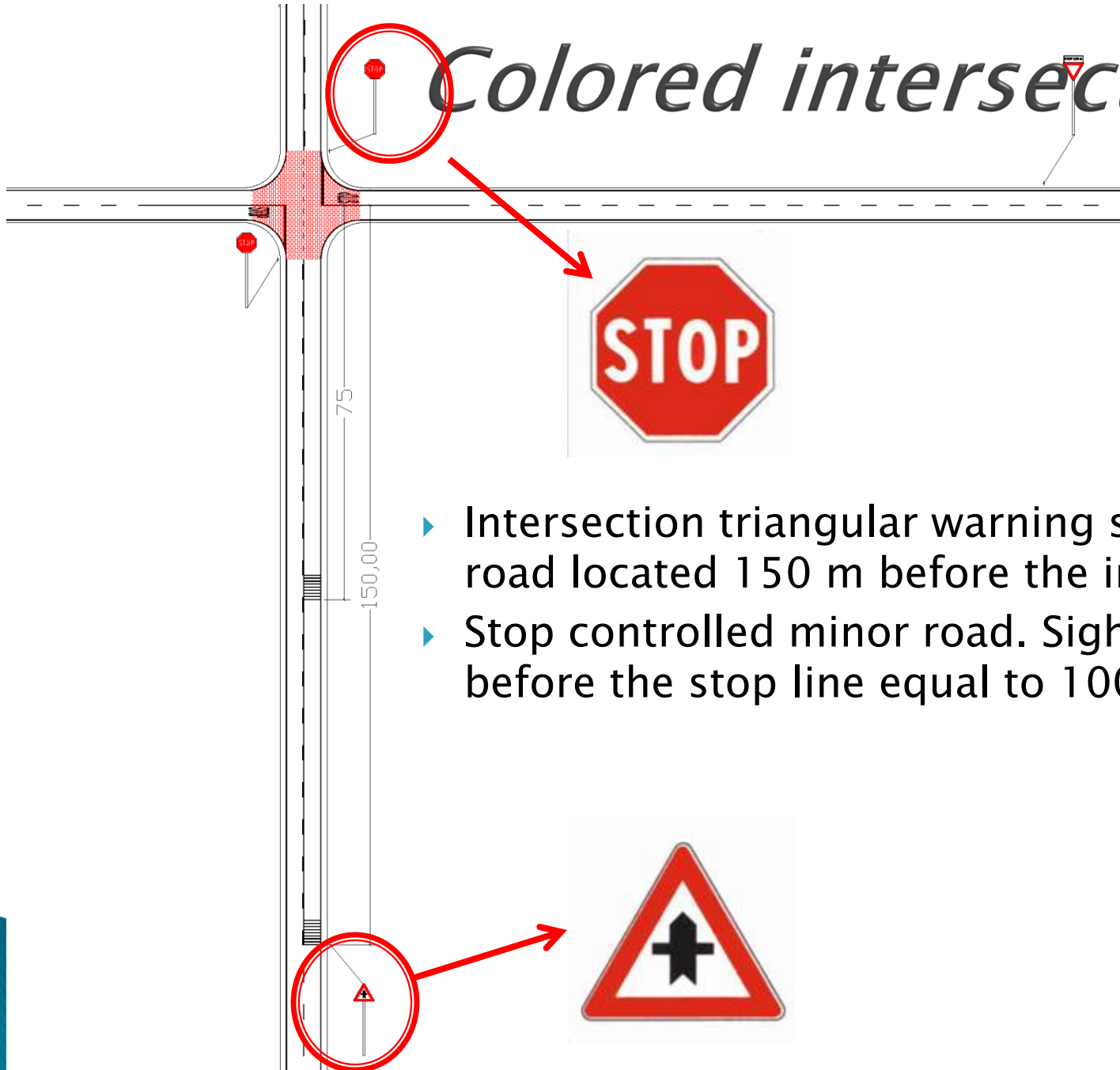


# Solution proposal: Background

- Mean speeds were significantly lower for all the perceptual measures
  - *with speed reductions ranging between 10 km/h and 23 km/h*

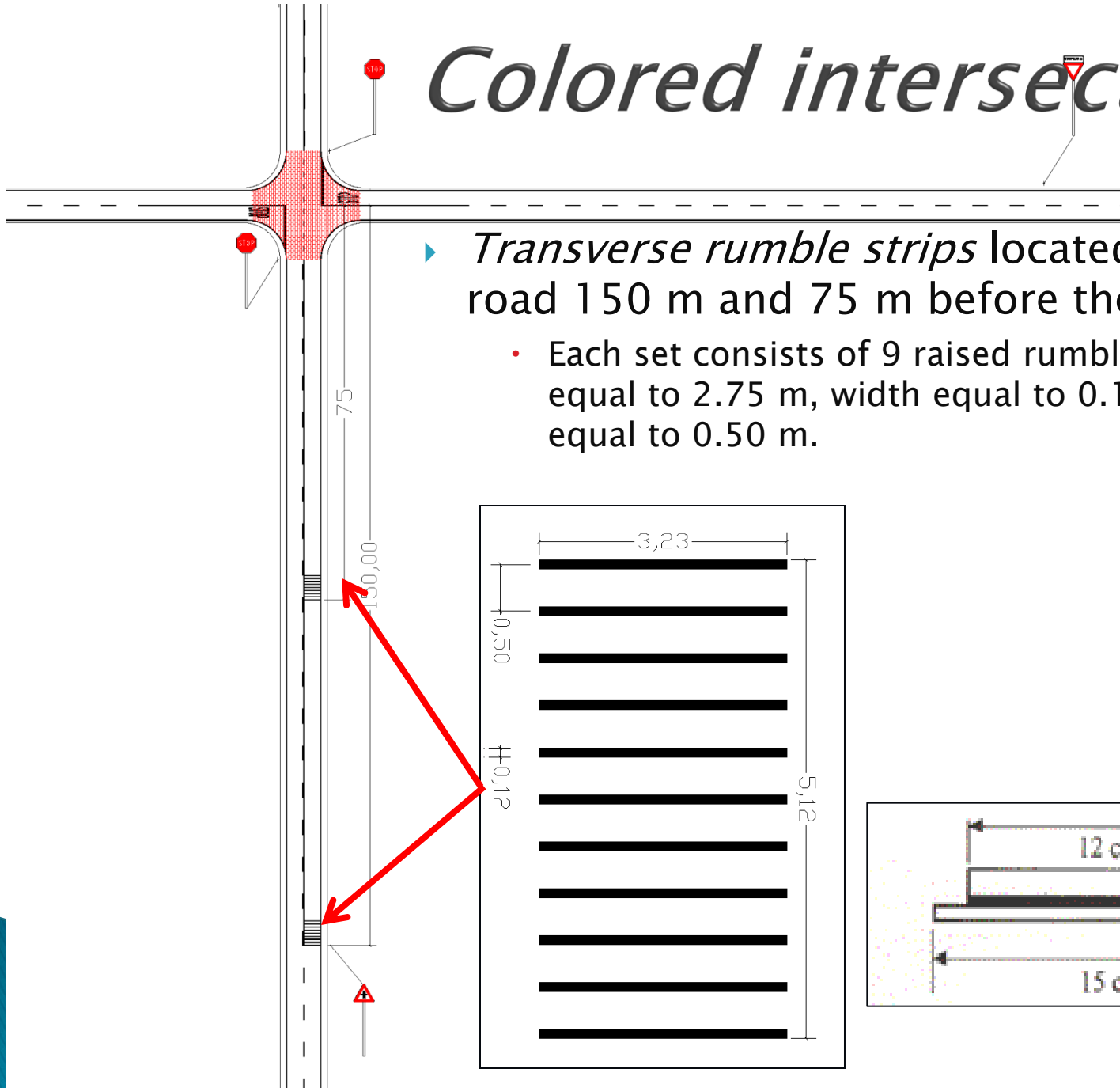


# Colored intersection area



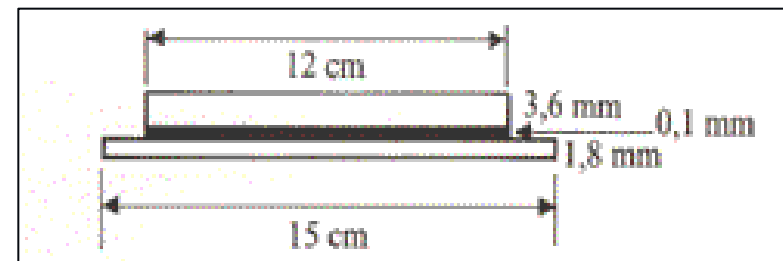
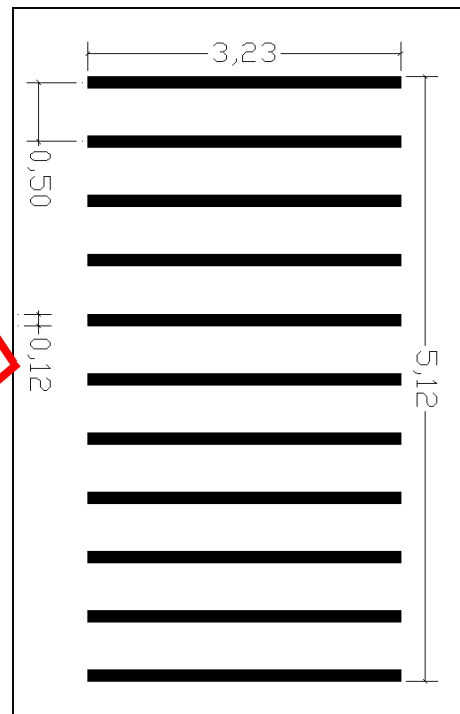
- ▶ Intersection triangular warning sign on the major road located 150 m before the intersection.
- ▶ Stop controlled minor road. Sight distance 3 m before the stop line equal to 100 m.

# Colored intersection area

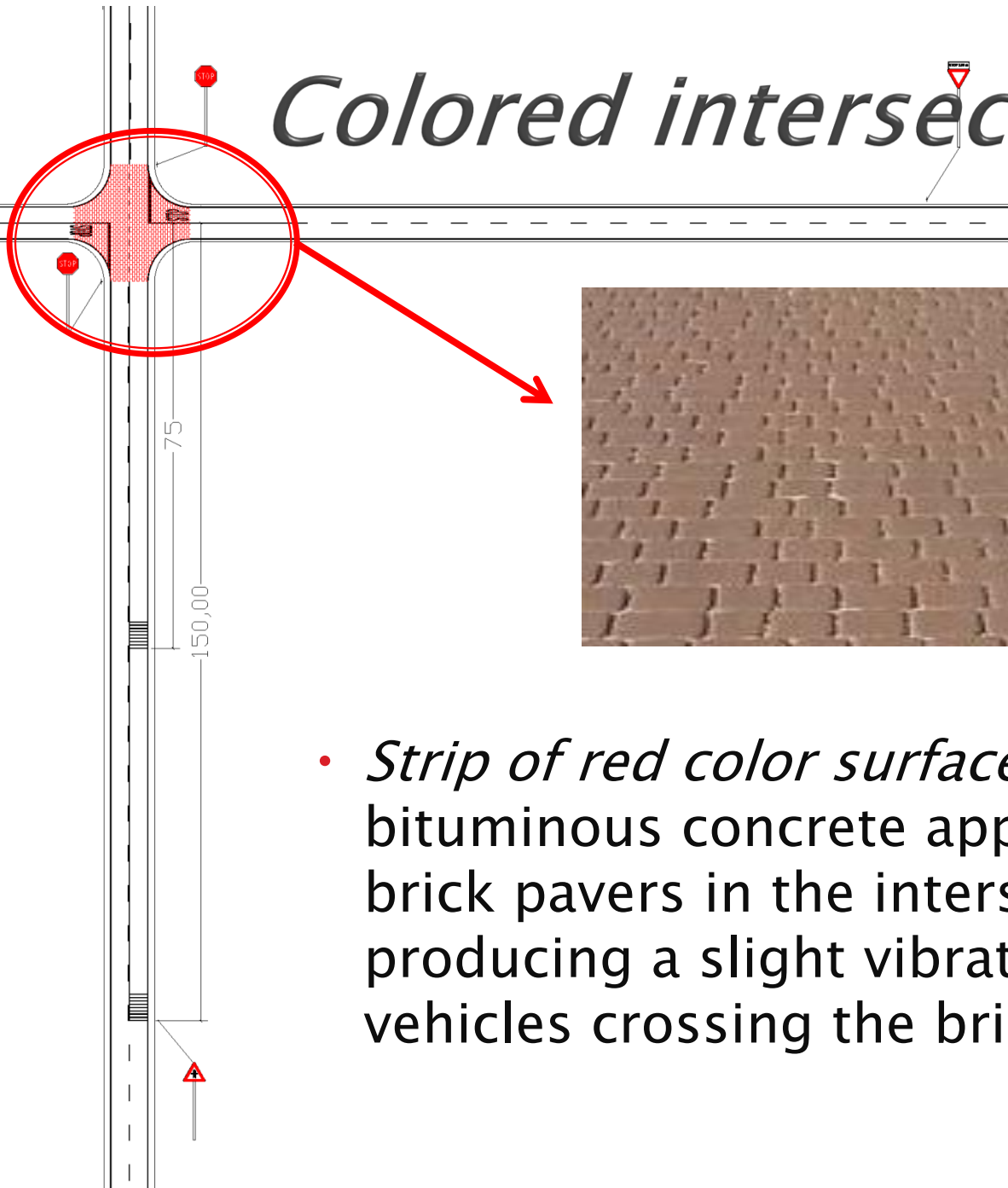


▶ *Transverse rumble strips* located on the maior road 150 m and 75 m before the intersection.

- Each set consists of 9 raised rumble strips, with length equal to 2.75 m, width equal to 0.12 m, and spacing equal to 0.50 m.



# Colored intersection area



- *Strip of red color surface* with printed bituminous concrete appearing as brick pavers in the intersection area, producing a slight vibration to the vehicles crossing the brick area.

# Campaign and Achievements

- ▶ I 'm Lucky
- ▶ I showed at engineers of the Province:
  - ▶ The work with dynamic-driving simulator
  - ▶ The published results in Transportation Research Record
- ▶ They understood the importance and effective of the devices and They gave me the consent to implement my solution





• THANKS FOR  
THE  
ATTENTION



***filomena.mauriello@unina.it***