



# *Improvement of the West road corridor for accessing to the new hospital of Lucca (Tuscany, Italy)*

**Francesco NICOLI, Antonio PRATELLI**

*Department of Civil Engineering & Industrial Engineering, University of Pisa (Italy)*

**Rahmi AKÇELIK**

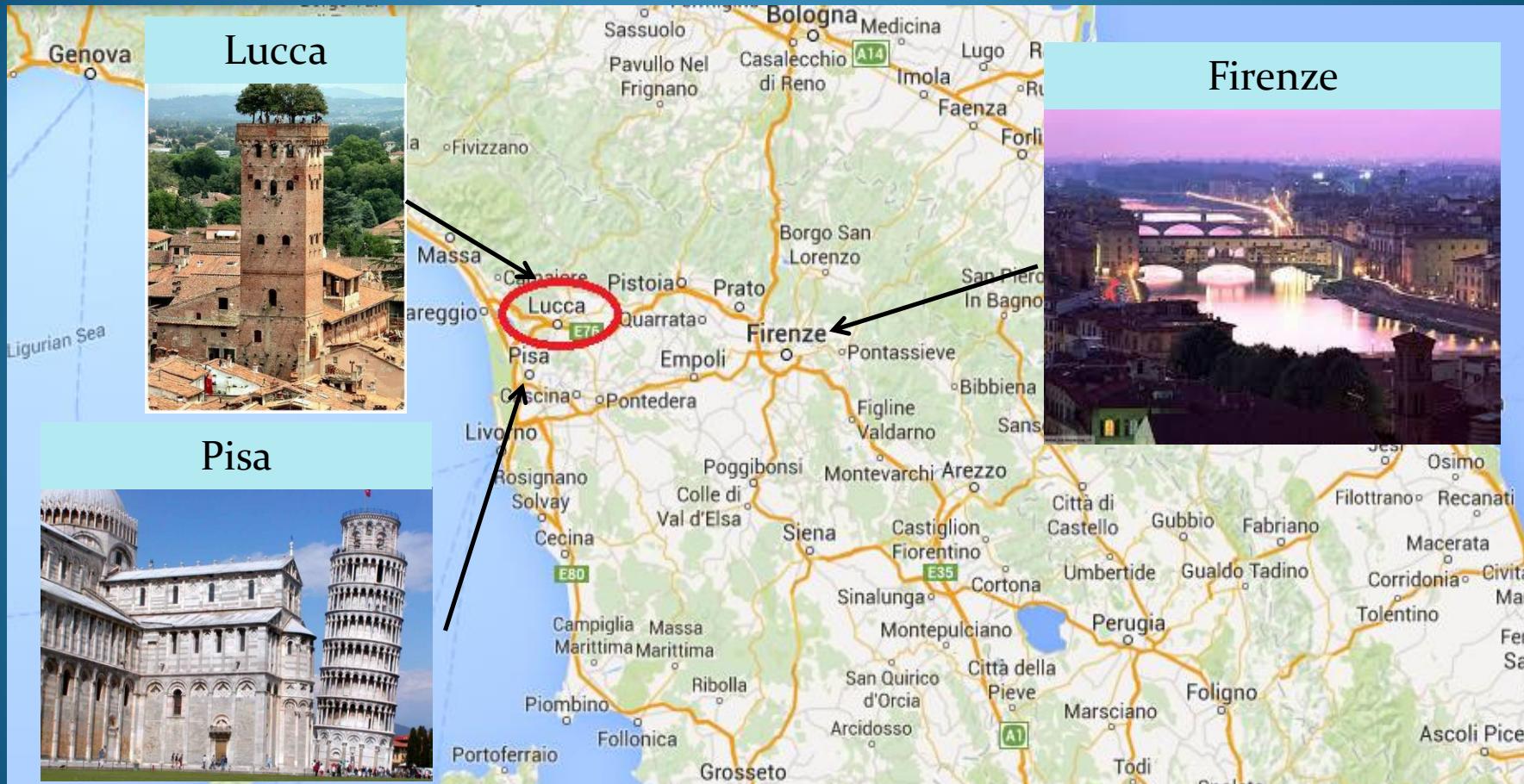
*SIDRA SOLUTIONS, Victoria (Australia)*

Full paper published in Urban Transport XXI, WIT Transactions on the Built Environment, Vol. 146, WIT Press, Southampton, UK, pp 449-460.

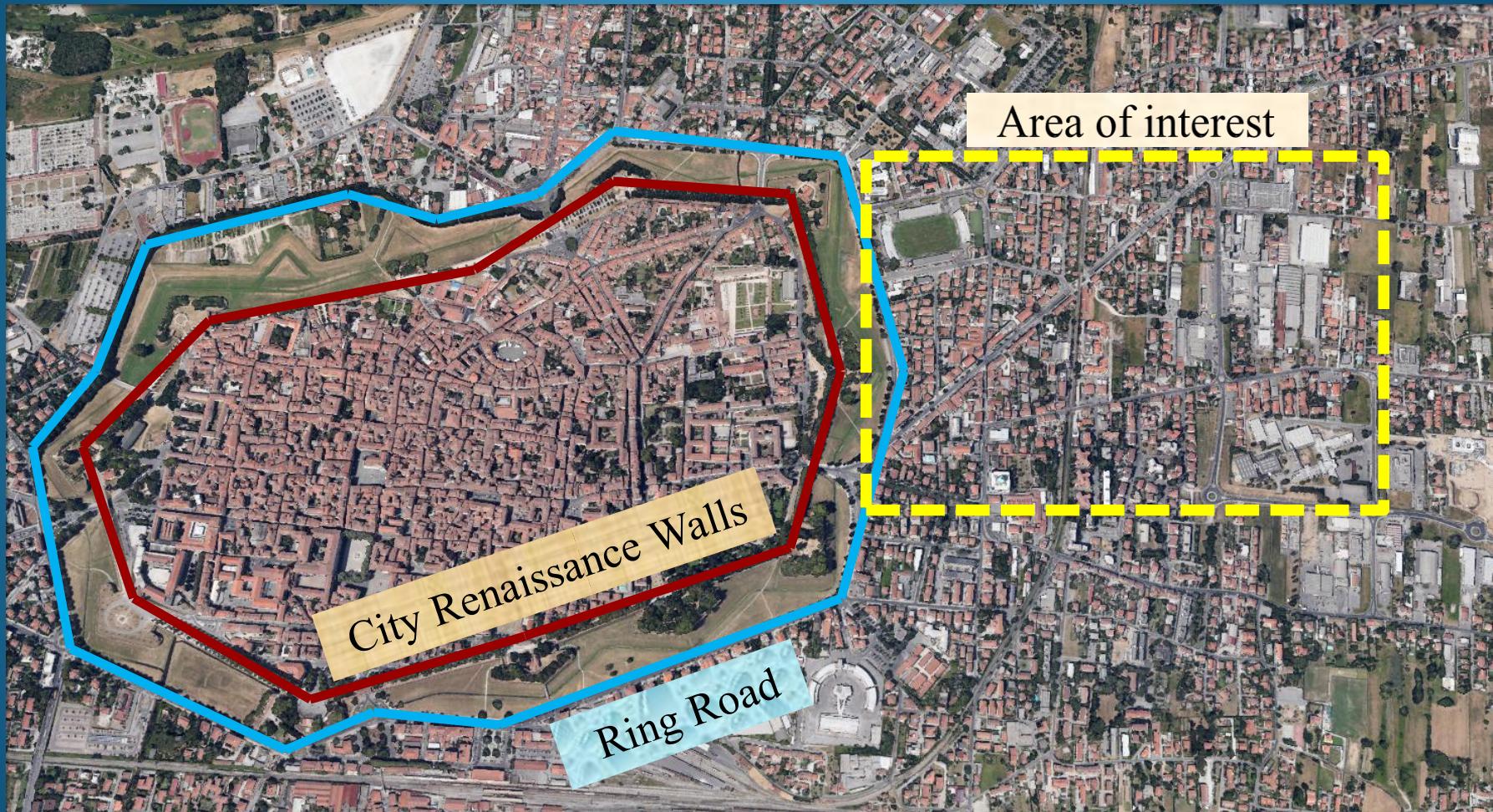
# Outline

- ✓ Location and design goals
- ✓ Present Situation
- ✓ Design Situation
- ✓ Results & Comparisons
- ✓ Conclusions

# Location and design goals



# Location and design goals



# Location and design goals



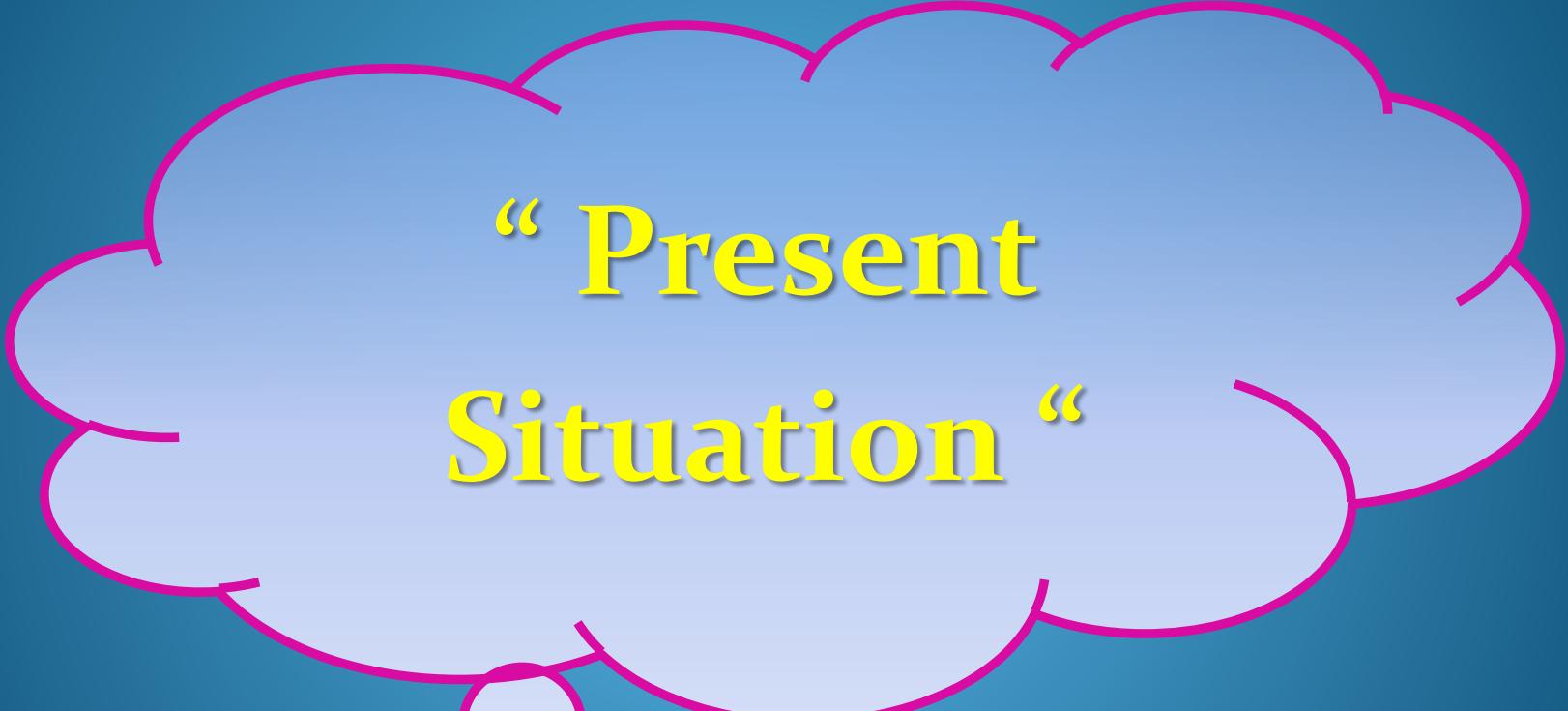
SIDRA INTERSECTION 6.0  
(NETWORK version) to study  
the “Present Situation”  
and  
the “Design Situation”



## Main references:

This work has been developed taking into account of international references:

- NCHRP report 772: “Evaluating the Performance of Corridors with Roundabouts”.
- Akçelik, R. “Lane-Based Micro-Analytical Model of Roundabout Corridor”. Paper presented at the *CITE 2013 Annual Meeting*, Calgary, Alberta, Canada, 2013.
- Pratelli, A. “ Design of modern roundabouts in urban traffic systems”. In Brebbia & Dolezel (eds.) *Urban Transport XII*, WITPress, Ashurst Lodge 2006, pp. 83-93.



“ Present  
Situation “

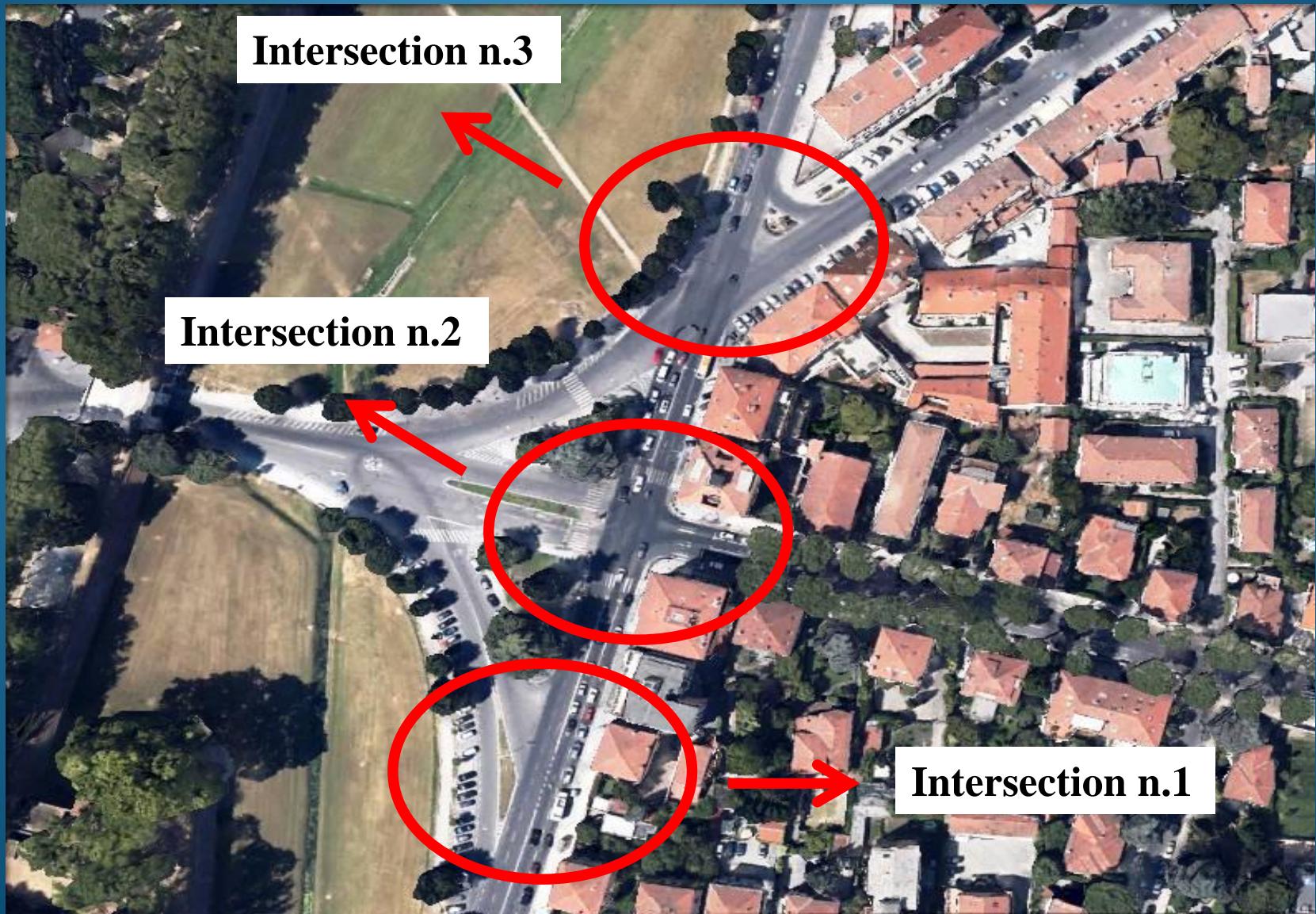
# Present Situation

## Road corridor & intersections



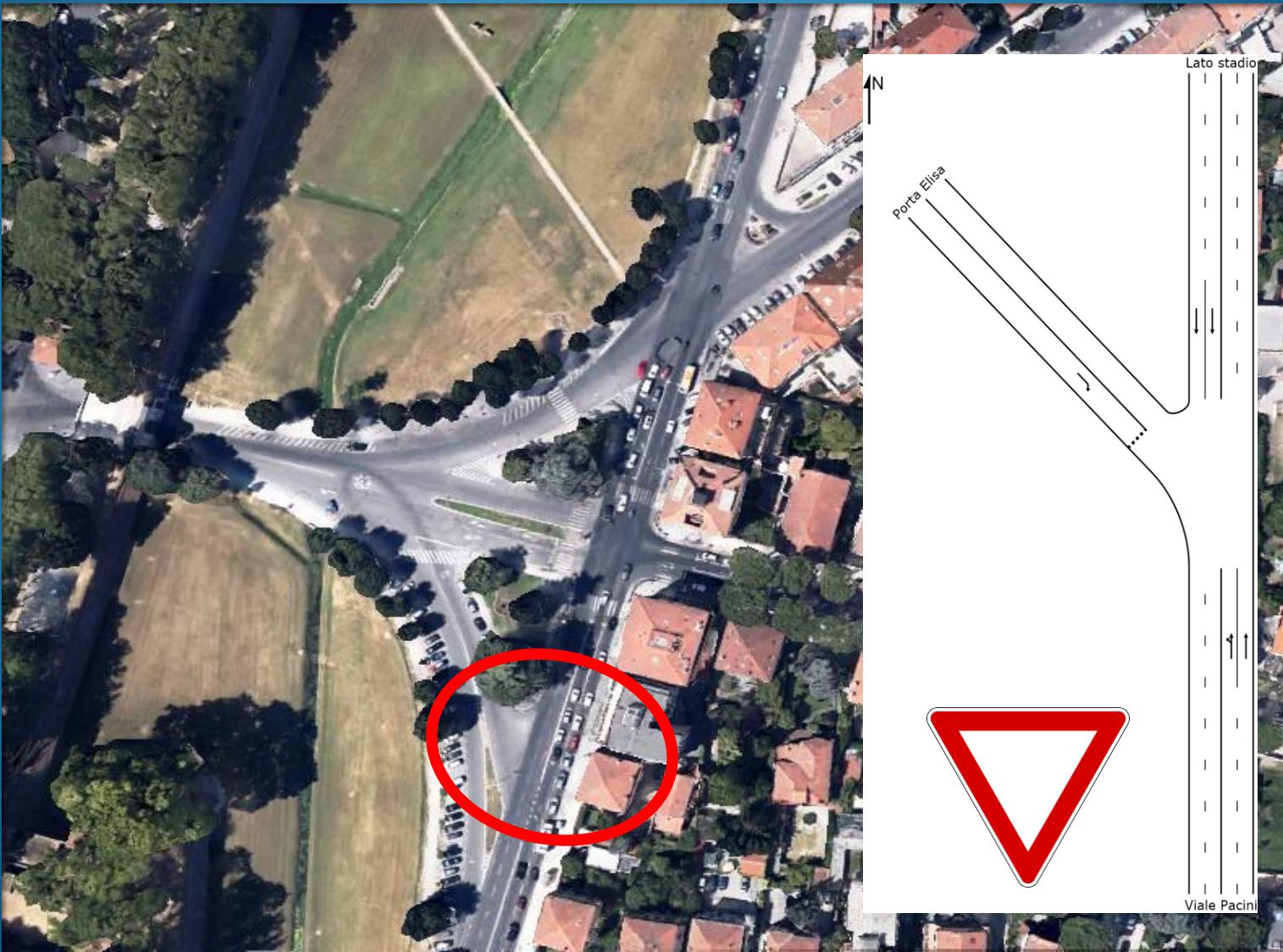
# Present Situation

- Piazzale Don Aldo Mei



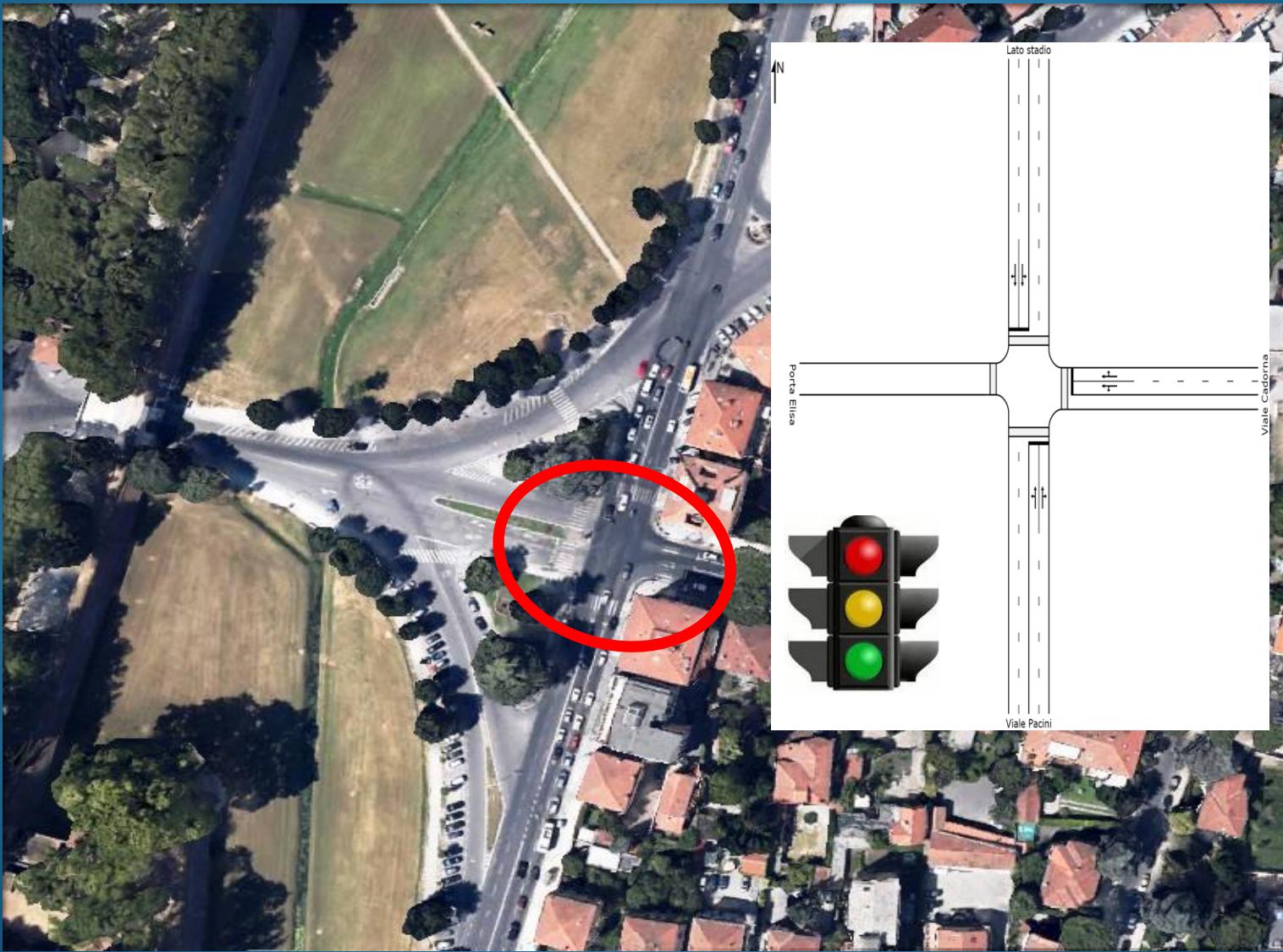
# Present Situation

## ✓ Intersection n. 1



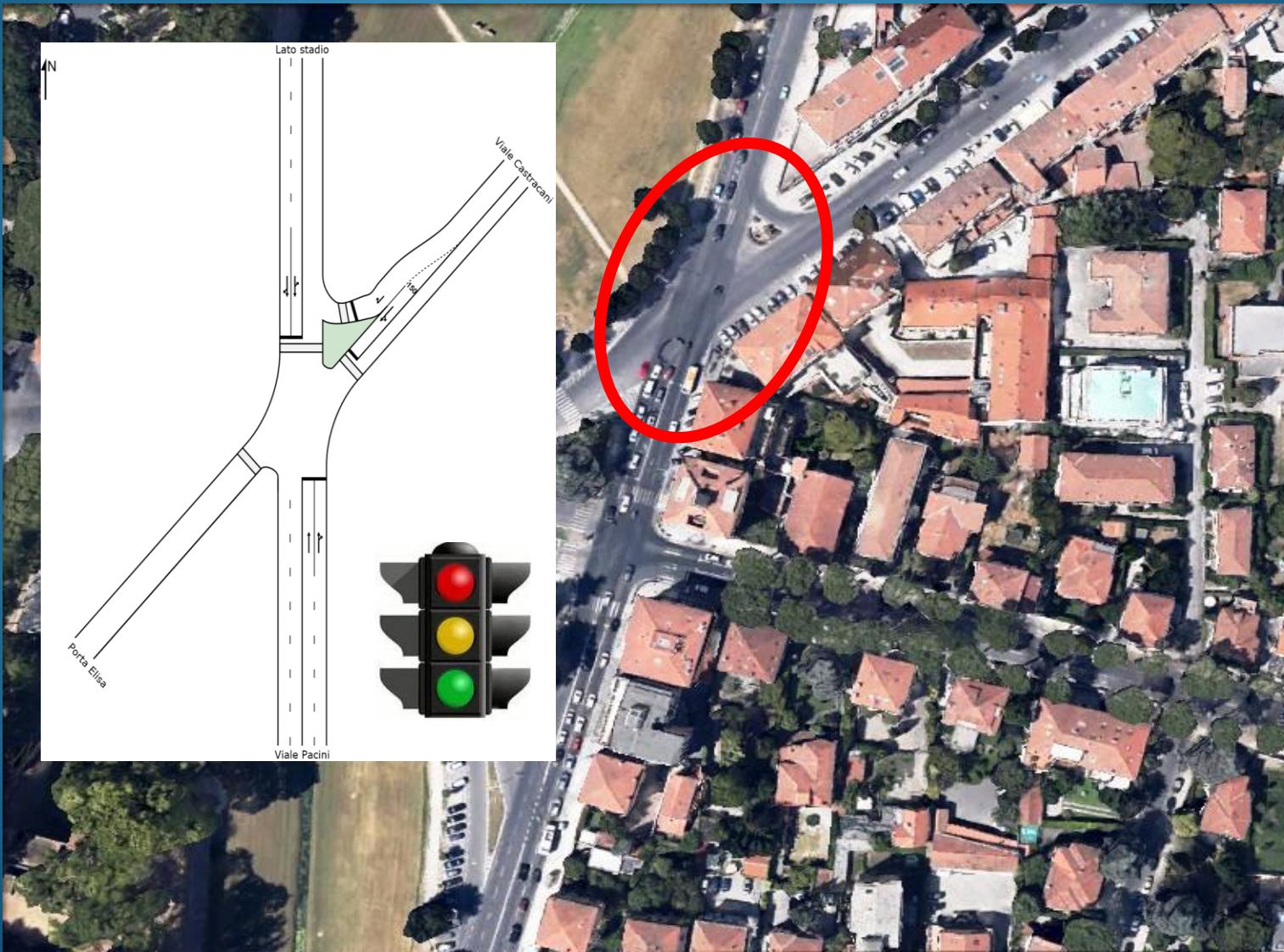
# Present Situation

## ✓ Intersection n.2



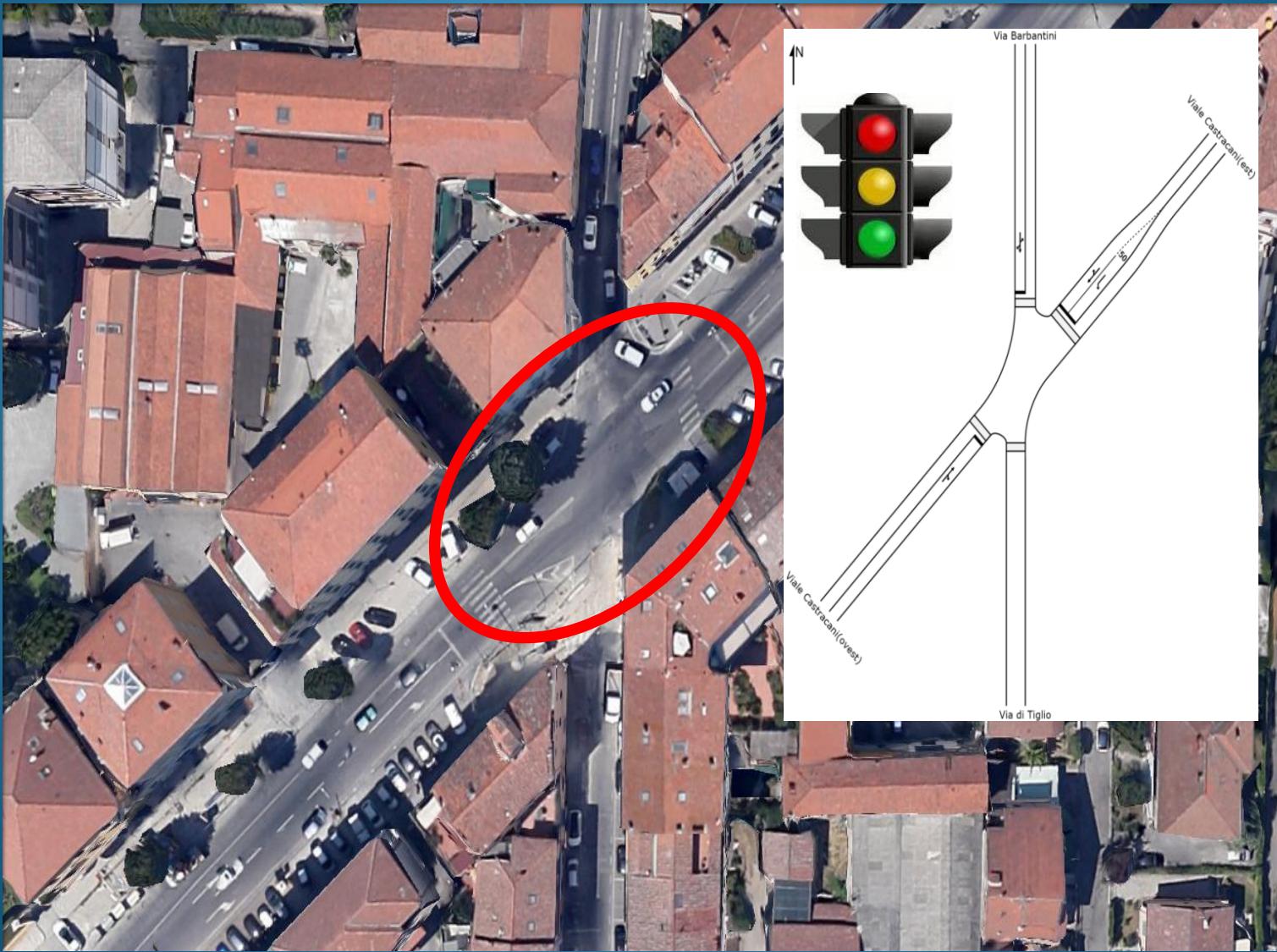
# Present Situation

## ✓ Intersection n.3



# Present Situation

## ✓ Intersection n. 4



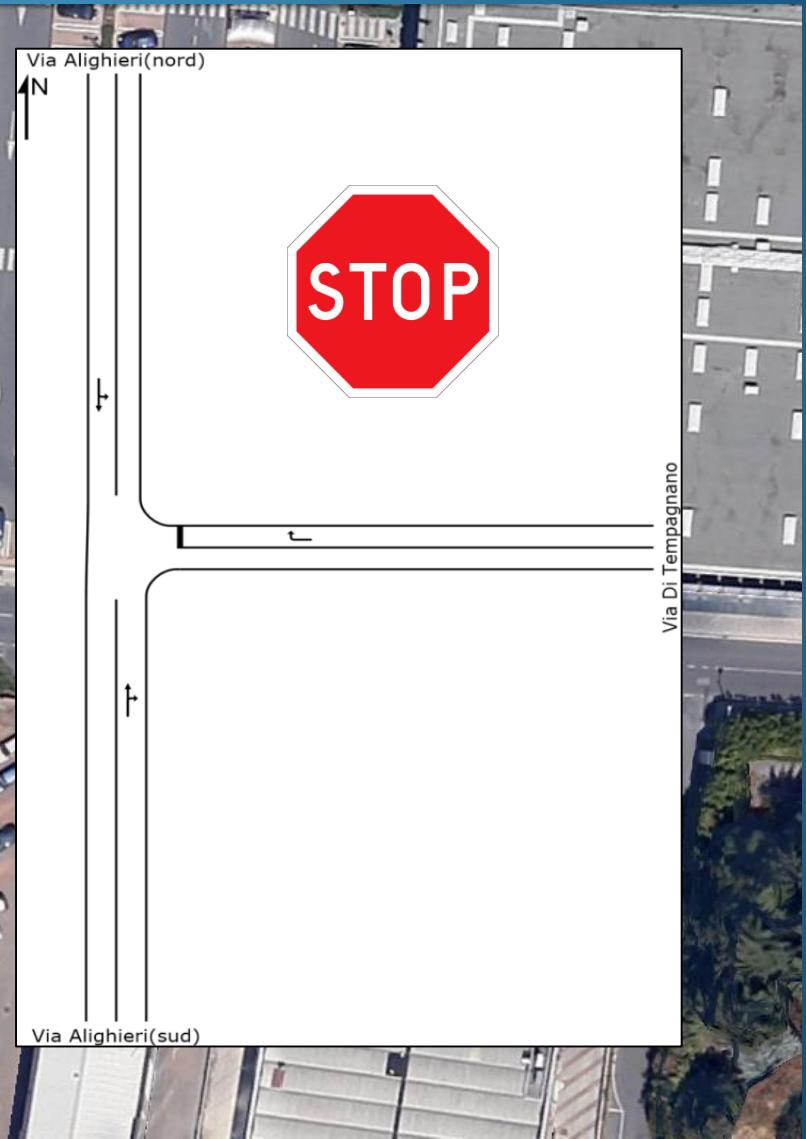
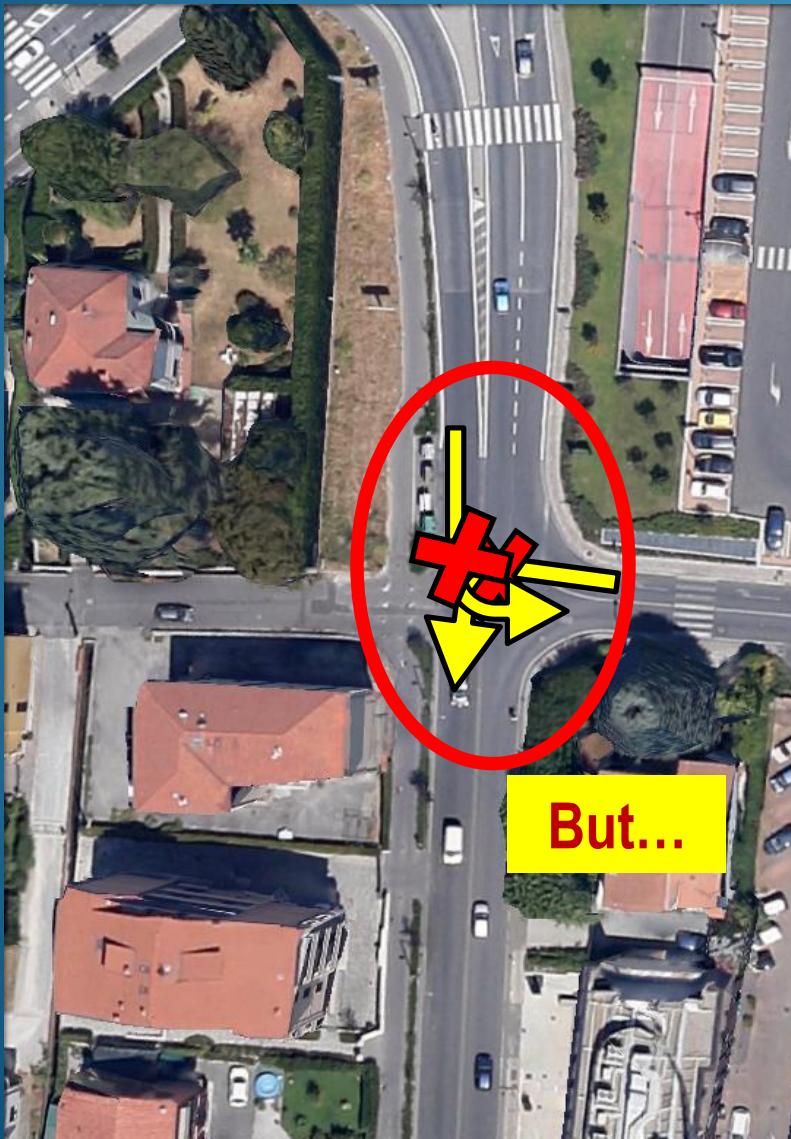
# Present Situation

## ✓ Intersection n.5



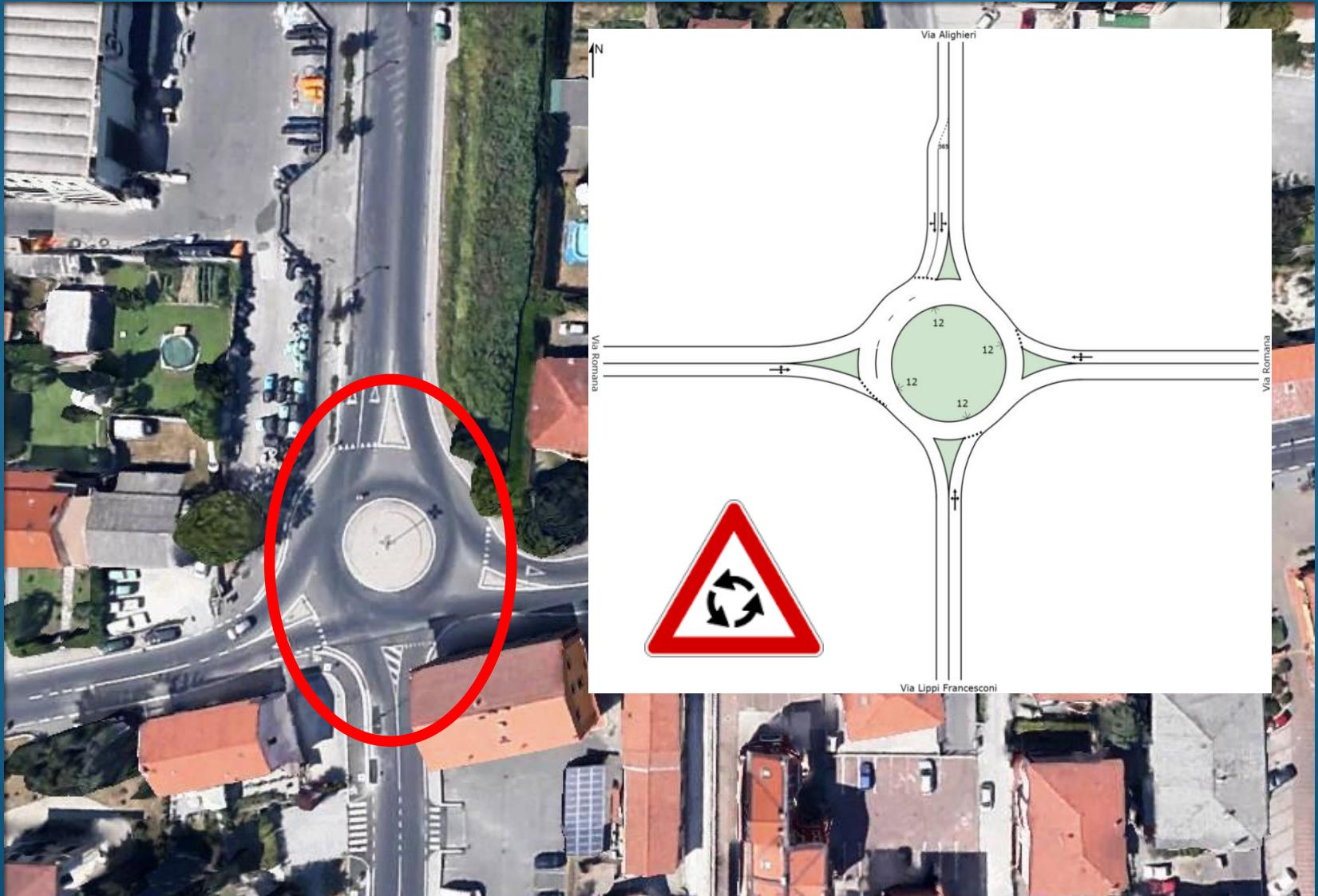
# Present Situation

## ✓ Intersection n.6



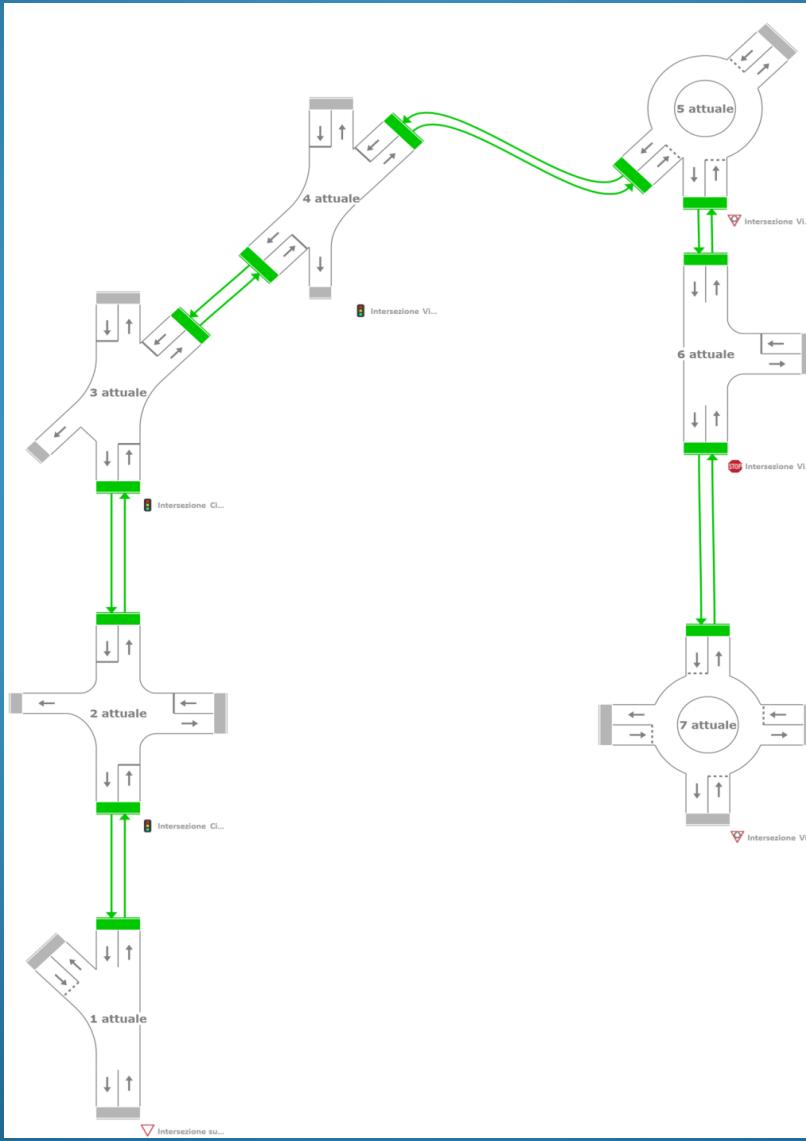
# Present Situation

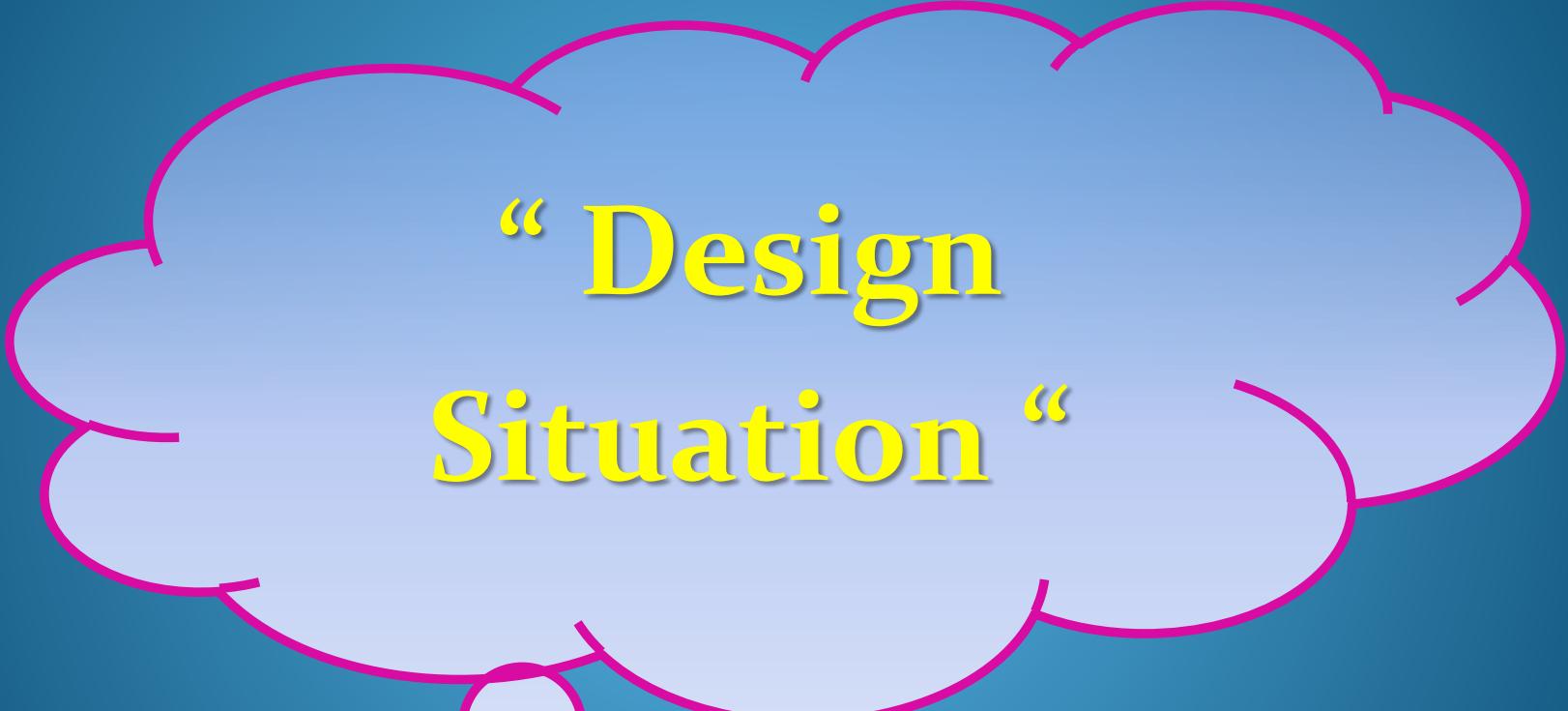
## ✓ Intersection n. 7



# Present Situation

## Road corridor layout (SIDRA)



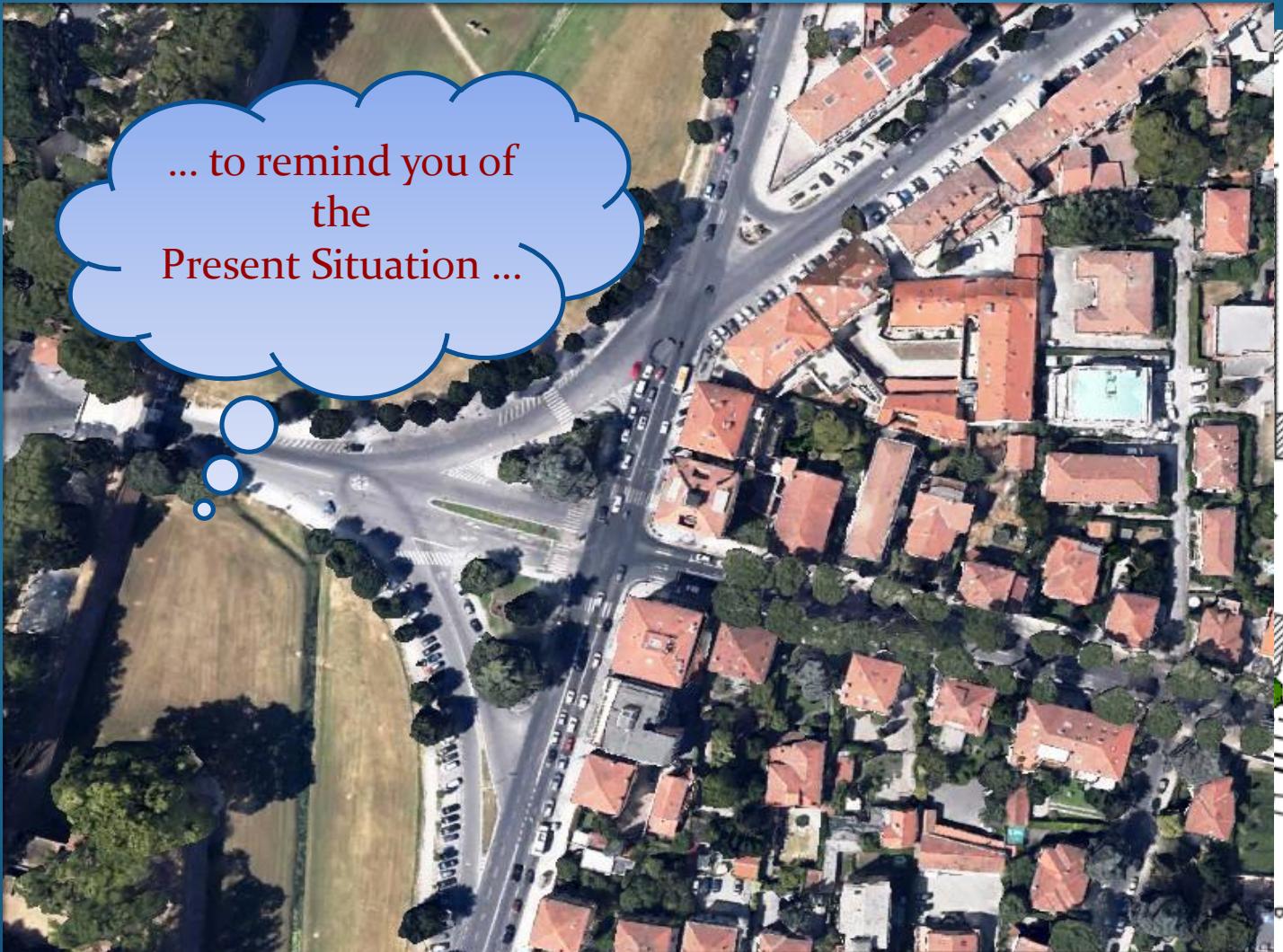


“Design  
Situation”



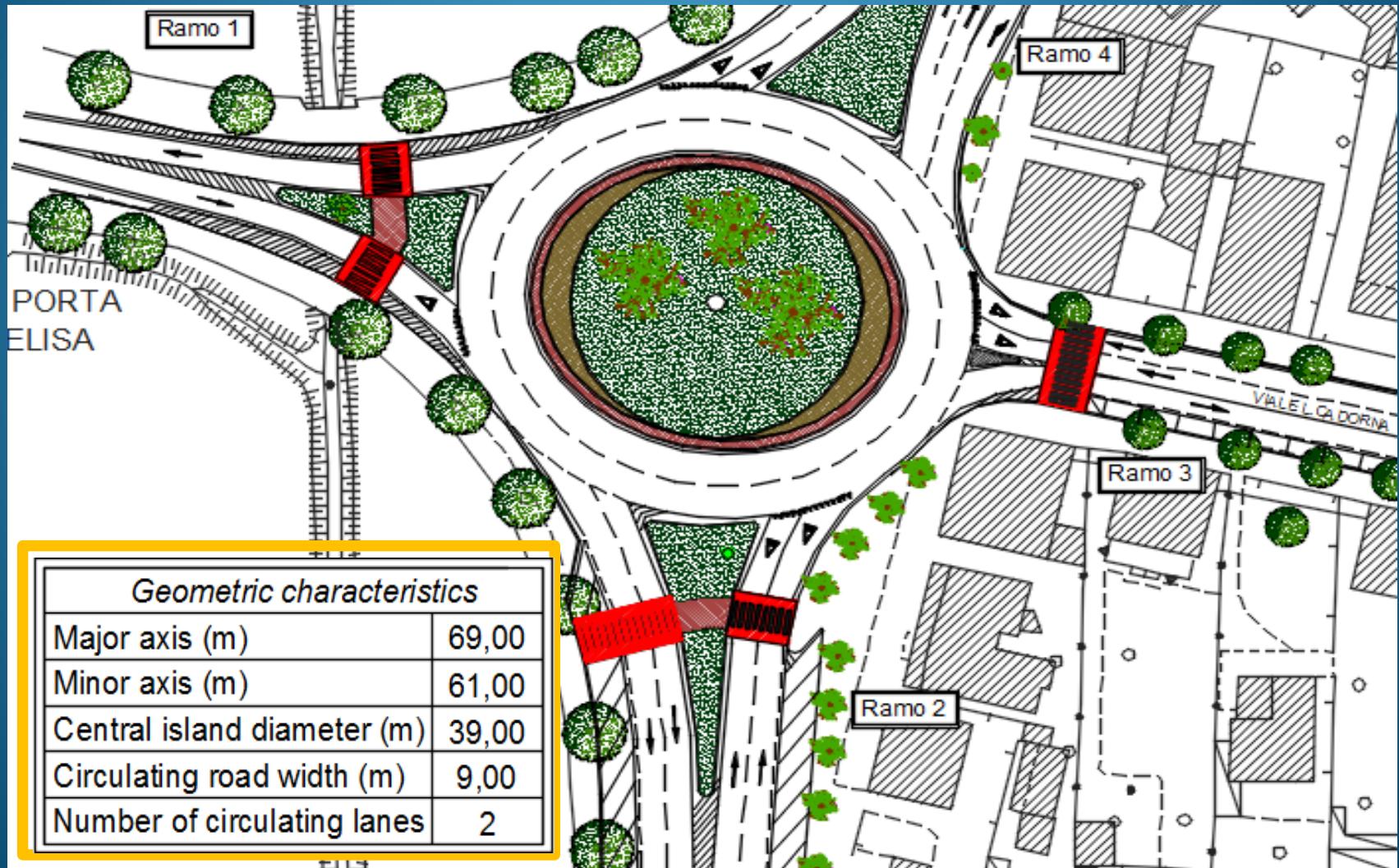
# Design Situation

- Piazzale Don Aldo Mei



# Design Situation

Main geometric characteristics of Porta Elisa's roundabout:



# Design Situation

- Tra<sup>ffic</sup> Intersection n.<sup>4</sup> the Intersection n.4:



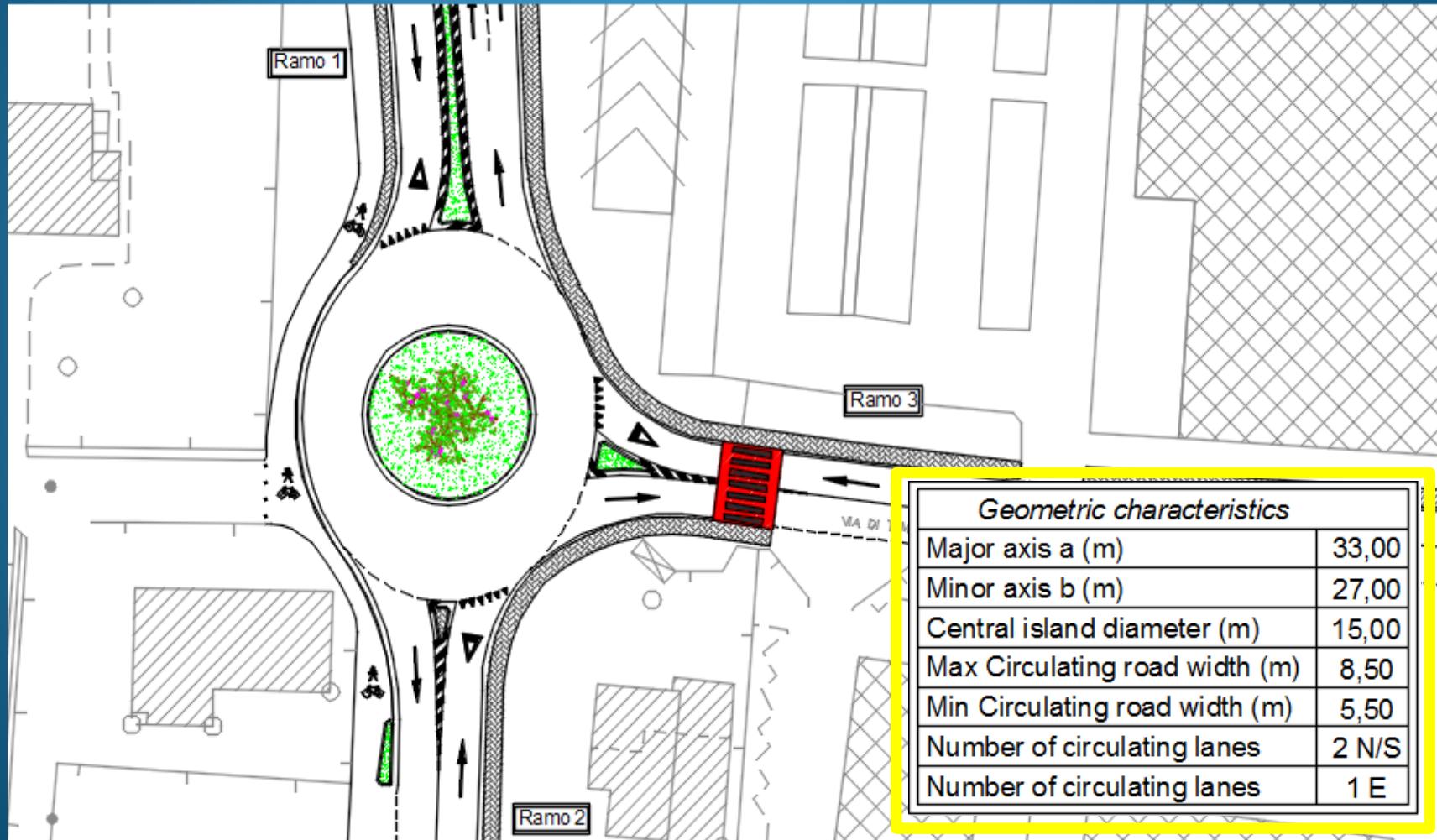
# Design Situation

- Intersection n.6 about at the Intersection n.6:



# Design Situation

Main geometric characteristics of the roundabout:



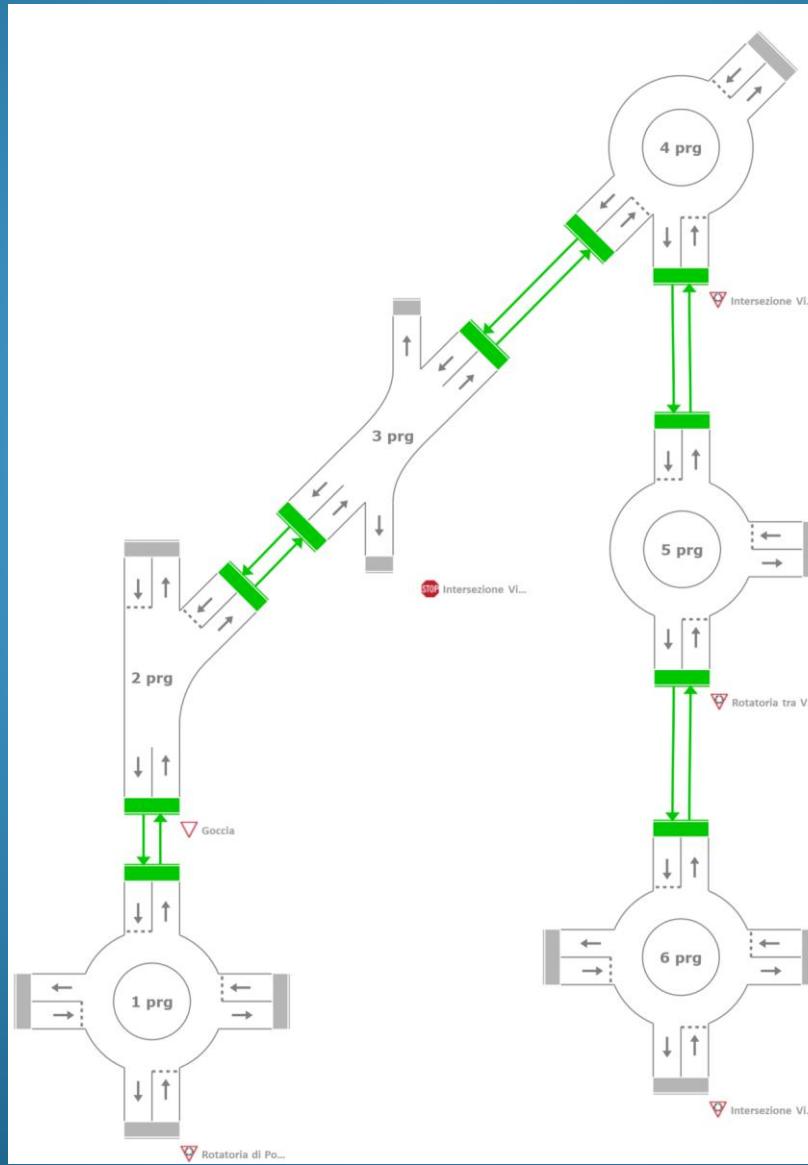
# Design Situation

- Roundabout at the Intersection n.7:

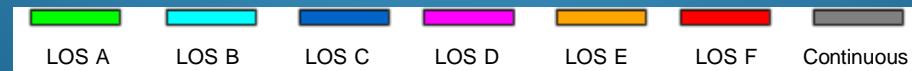
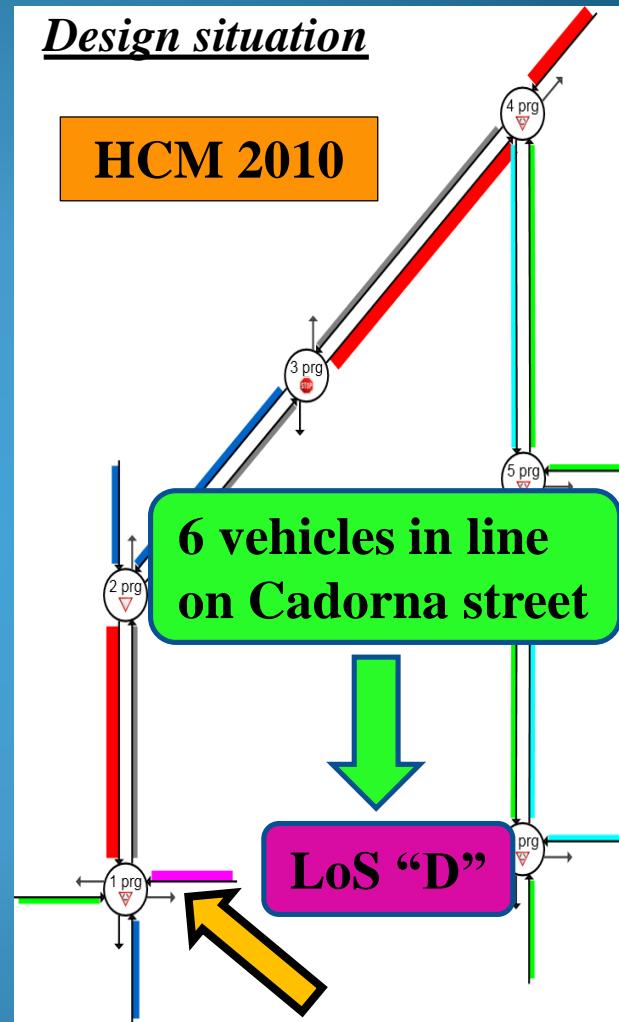
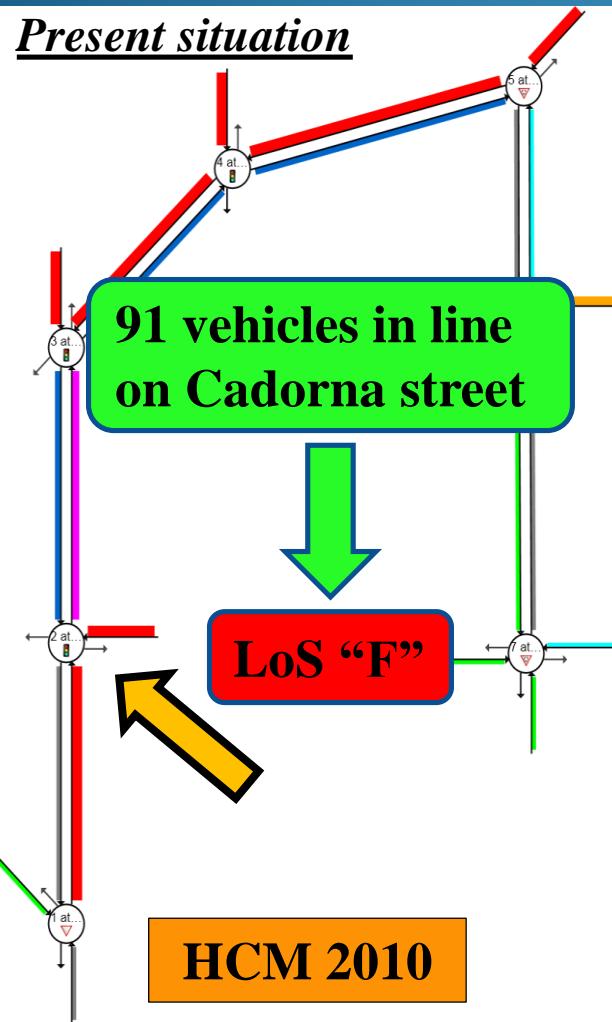


# Design Situation

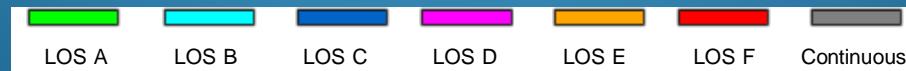
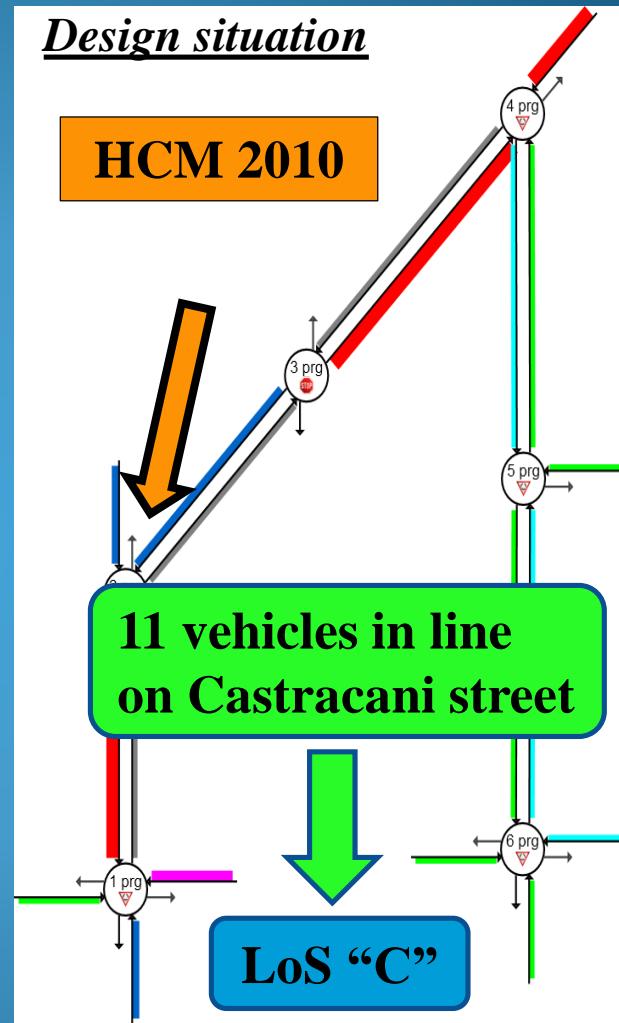
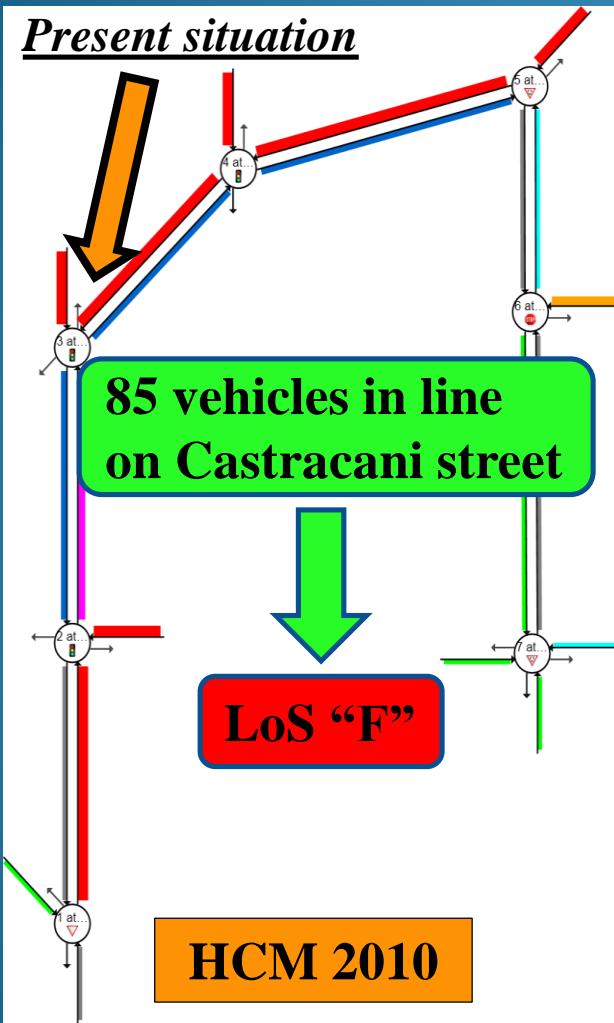
## Road corridor layout (SIDRA)



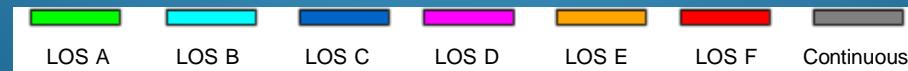
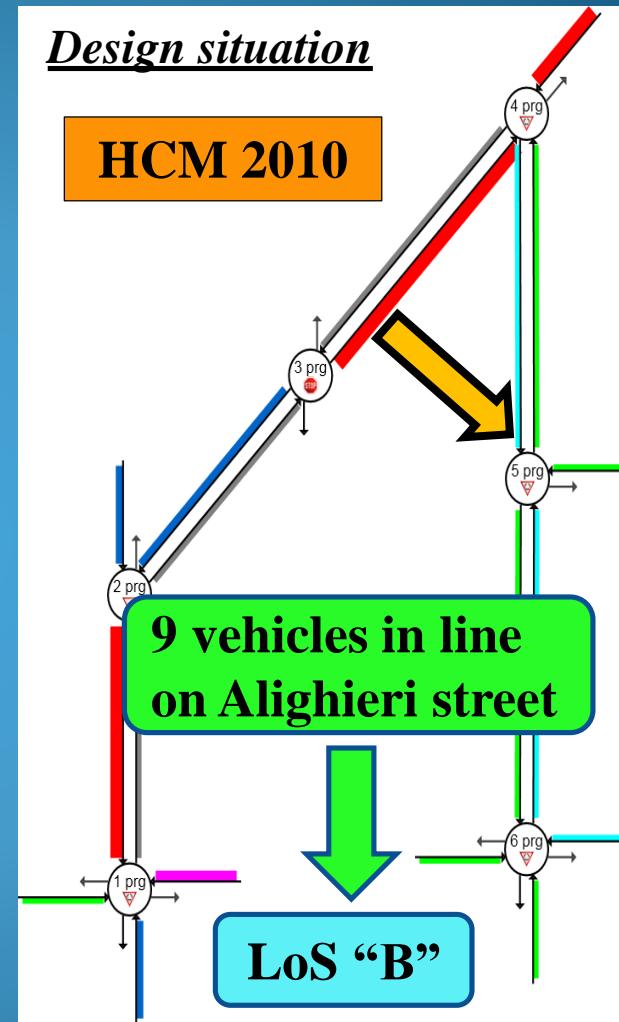
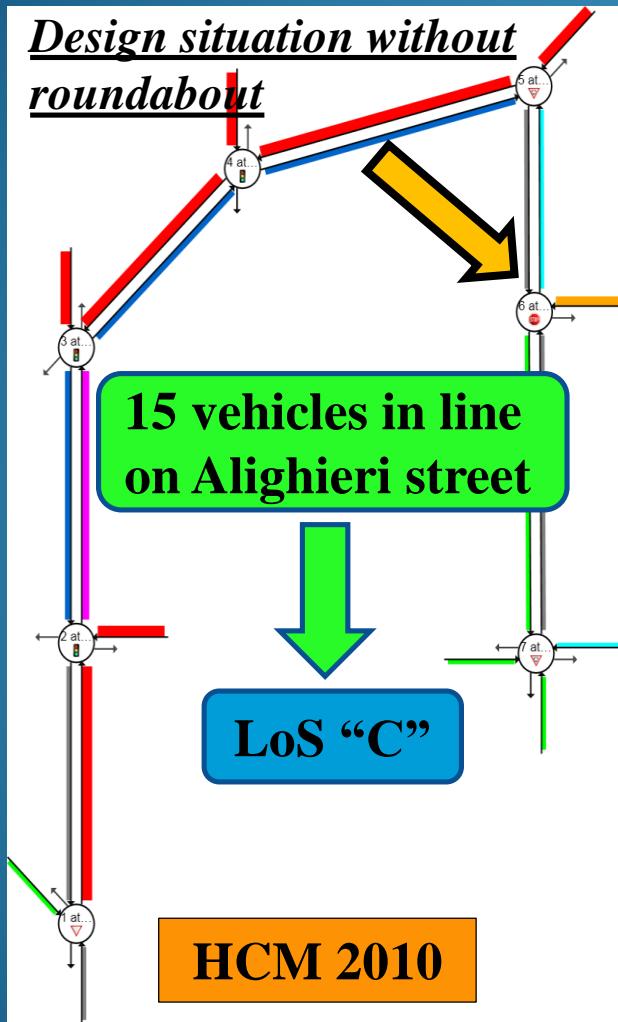
# Results & Comparisons



# Results & Comparisons



# Results & Comparisons

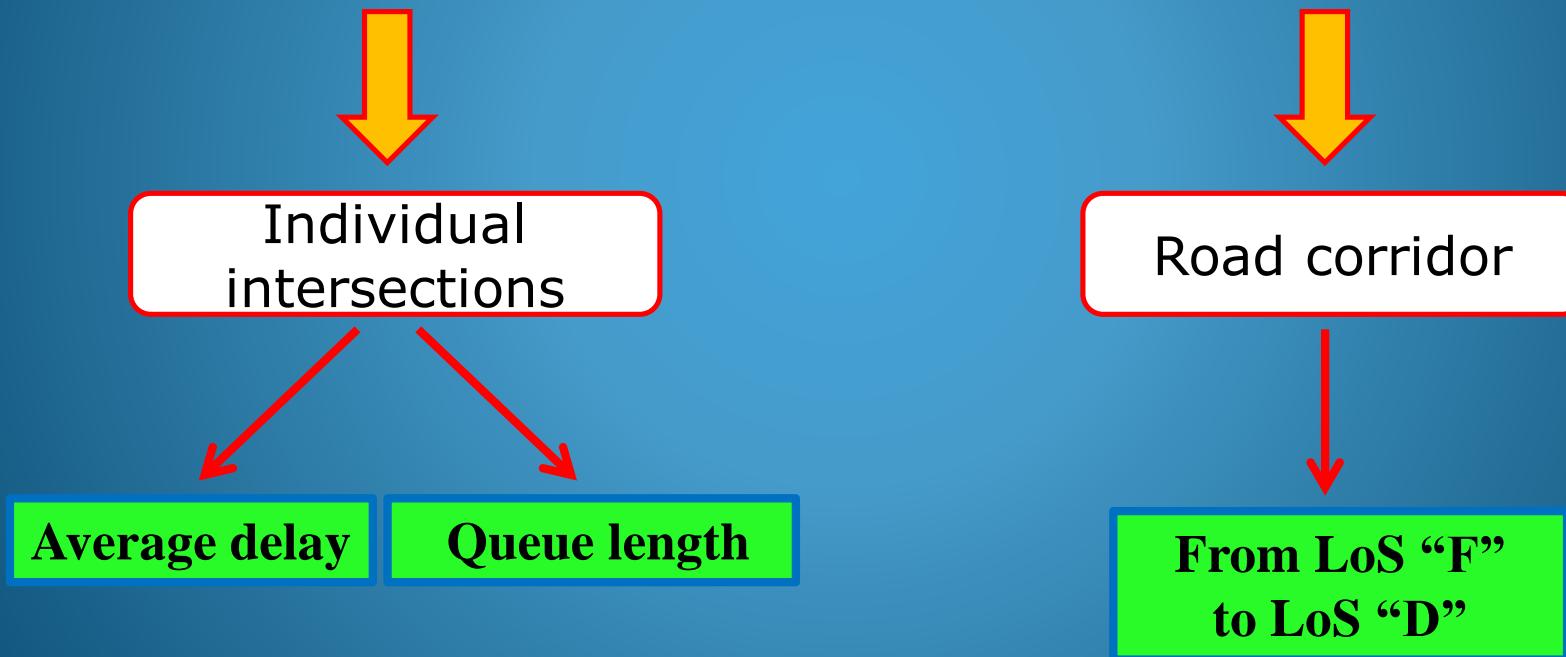


# Results & Comparisons

Performance Measure	Units	Network A PRESENT SITUATION	Network B DESIGN SITUATION	Difference Network B -Network A	% Difference Diff / Network A
<u>Network Level of Service (LOS)</u>		LOS F	LOS D	NA	NA
Travel Time Index		0,07	3,99	3,92	5868,0
Speed Efficiency		0,11	0,46	0,35	333,0
Congestion Coefficient		9,43	2,18	-7,25	-76,9
<u>Travel Speed (Average)</u>	km/h	5,3	22,9	17,6	333,0
<u>Degree of Saturation</u>		3,383	1,178	-2,205	-65,2
Cost (Total)	\$/h	12804,54	4506,74	-8297,80	-64,8
Fuel Consumption (Total)	L/h	1505,0	824,9	-680,1	-45,2
Carbon Dioxide (Total)	kg/h	3536,8	1938,6	-1598,1	-45,2

## Conclusions (1)

We obtained some very interesting results analysing the two networks as well as analysing individual intersections (especially in terms of reducing queue length and average delay).



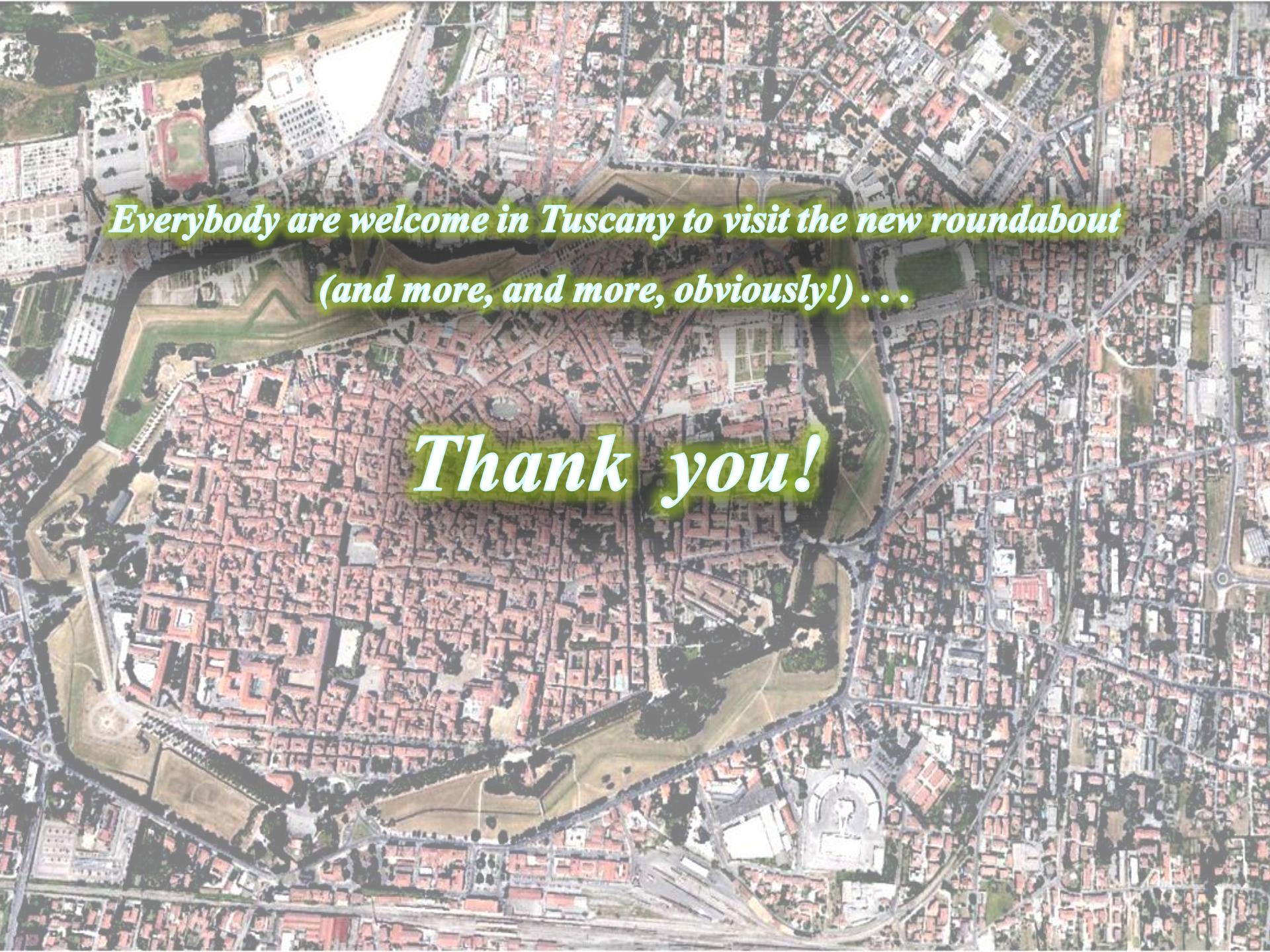
## Conclusions (2)

- Substantial improvements are indicated in all performance measures.
- The results of the modelling effort strongly support the design proposal of improving the West road corridor for accessing the new hospital of Lucca. This finding is emphasized considering that ambulances are the most crucial users of the road corridor.
- Our analyses also showed that improved traffic conditions in the corridor could be obtained only considering the proposed road corridor improvements as a whole.

## Latest developments

Today, the works for building the large roundabout of Porta Elisa are in progress. We are pleased to think that such a practical result is also due to our detailed modelling effort.



An aerial photograph of a Tuscan town, likely Pistoia, showing a dense cluster of buildings with red-tiled roofs. The town is surrounded by green fields and some industrial or institutional buildings. A large, modern roundabout is visible in the lower right foreground.

*Everybody are welcome in Tuscany to visit the new roundabout  
(and more, and more, and obviously!) . . .*

*Thank you!*