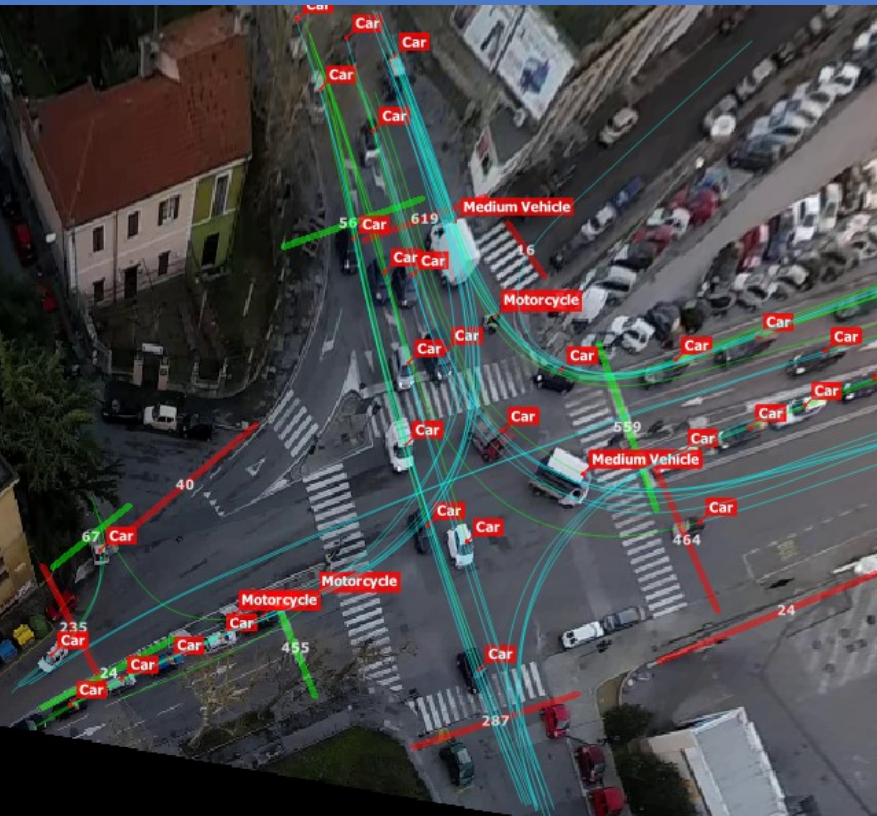


# The design of road intersection



- Master's Candidate: Erik Sferco
- University of Trieste
- Department of Engineering and Architecture
- Master Degree in Civil Engineering



## INTRODUCTION

The analysed crossroad is an urban traffic-light intersection, located in the suburbs of the Municipality of Trieste. The intersection presents a substantial traffic flow especially in the morning and the evening hours. Most of the inhabitants which live in the suburbs of Trieste cross this road intersection to go to work, to school and to university. Through the Software given me by DataFromSky it was possible to make an exhaustive study of the traffic.

## VIDEO

To begin I made a video from 13<sup>th</sup> floor of the skyscraper placed in Piazza dei Foraggi in Trieste.

Technical details of the shootings:

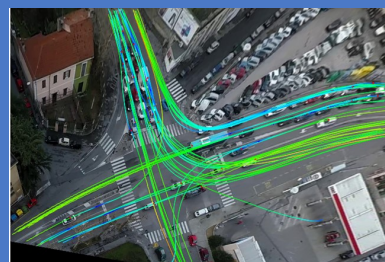
- Height: 45 m
- Duration: 30 minutes
- Time interval: 7:45-8:15 A.M.
- Video camera: GoPro Hero 3+ Black Edition
- Resolution: 1080p (1080x1920)
  - ◆ 60 fps
  - ◆ Ultra-wide angle
  - ◆ 16:9

## ANALYSIS

Thanks to DataFromSky Viewer it was possible to export the DXF file containing the vehicular trajectories identified in the road intersection.

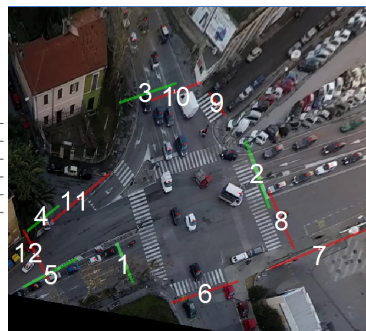
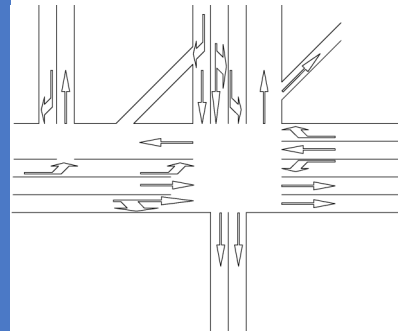
Through the association between the DXF file and the previously exported CSV file it was possible to create a Shapefile which can be used with any GIS software.

The Shapefile associated to the CSV spreadsheet was imported in the QGIS software in which is possible to visualize all the vehicular trajectories. Using specific filters it is possible to choose the trajectories of the vehicles that enter in a specific Gate and exit in another or there is the possibility to create a filter for the different typologies of vehicles, average speeds, follow-up time and exit time etc., there are many possibilities.



On the right are illustrated the trajectories of any single traffic light phase. Was created a filter that visualizes the trajectories of specific entry and exit Gates, for any image we can see the possible manoeuvres of any traffic light phase; obviously the manoeuvres were made in different times during the analysed interval (30 minutes, from 7:45 A.M. to 8:15 A.M.).

From the images we can notice that the highest speeds are those of the rectilinear trajectories of phase 2 and 3,  $45 < V < 58$  km/h, in certain cases the speeds are higher than the imposed limit of 50 km/h. In the turn manoeuvres the maximum average speed is between 24 and 35 km/h.



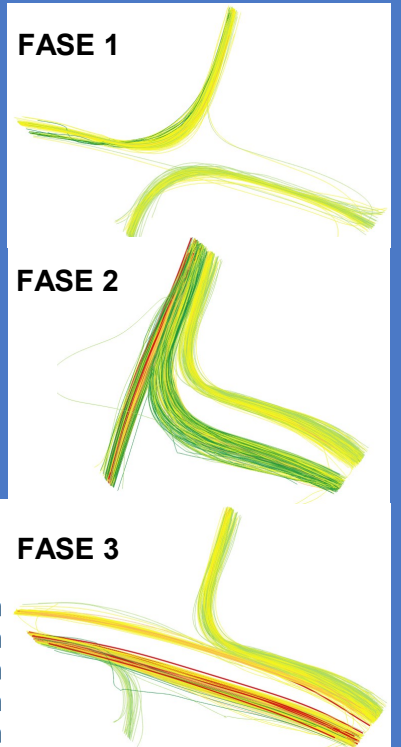
Legenda

- $2 < V < 13$  km/h
- $13 < V < 24$  km/h
- $24 < V < 35$  km/h
- $35 < V < 46$  km/h
- $46 < V < 58$  km/h

FASE 1

FASE 2

FASE 3



Thanks to DataFromSky Viewer it is possible to export the Source-Destination Traffic Matrix.

Origin-Destination Matrix - contains vehicle counts							
	Exit Gate 6	Exit Gate 9	Exit Gate 12	Exit Gate 11	Exit Gate 8	Exit Gate 10	Exit Gate 7
Entry Gate 1	20	5	0	0	158	271	6
Entry Gate 2	73	11	126	16	0	367	9
Entry Gate 3	221	0	58	4	301	0	9
Entry Gate 5	0	1	0	16	0	8	0
Entry Gate 4	2	1	66	0	3	1	1

In the analysed 30 minutes 1752 vehicles crossed the road intersection, most of which were cars (1326) and motpeds (287). In the next table is illustrated the composition of traffic flow and the average speed of any category of vehicle.

COUNT OF VEHICLES						
Car	Medium Vehicle	Heavy Vehicle	Bus	Motorcycle	Bicycle	Total
1326	88	20	31	287	2	1752

AVERAGE SPEED [km/h]						
Car	Medium Vehicle	Heavy Vehicle	Bus	Motorcycle	Bicycle	Average
24,83	21,80	19,52	20,29	20,64	11,93	19,84

## CONCLUSION

In the construction and redevelopment of road infrastructures the intersections are definitely the most complex items to analyze and design. The initial data concern the traffic, pedestrian and cycling flow. The acquisition of data often requires very expensive surveys distributed at various hours of the day and at different times of the year, as we have seen the recent use of aerial monitoring can overcome these problems. With the use of the system proposed by DataFromSky we can derive a multitude of necessary information to the design of the intersection, the advantages are both from the procedure and the economic point of view. Suffice it to say that after doing an aerial shot the DataFromSky software automatically returns all the necessary information; the traditional surveys require more staff, therefore hours of work to pay, or much more expensive stationary devices.