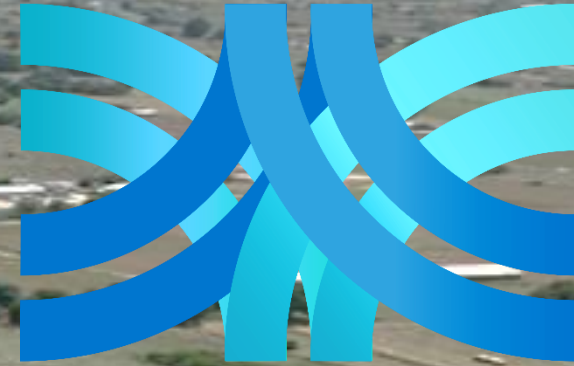


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# **Estimation of the Traffic Impact of Pavement Rehabilitation Roadworks on Attica Tollway ("Attiki Odos")**

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# Attica Tollway Athens, Greece



**OMC: Operation and Maintenance Center**  
**TB: Technical Base**

**Centerline: 70Kms**  
**Length: 140 Kms (bidirectional)**  
**39 Toll Stations**  
**195 Toll Gates (95 ETC capable)**  
**12,5 km of tunnels and cut and cover sections (9% of length)**  
**Daily Entries 2018: 226.035 veh/day**



# OPERATIONAL CHARACTERISTICS

- Urban tollway, tolls located at the entries
- High traffic volumes, nearly at capacity levels during peak hours
- High speeds, frequently above limits, risky driver behaviour
- A “rich project” regarding infrastructure & equipment. Heavy workload for preventive & corrective maintenance.
- Suburban railway in the median. Interface & co-ordination needed for both operation & maintenance activities.
- High traffic volumes leave limited time windows for maintenance.
- Strict contractual obligations regarding response times (on accidents or damages & equipment failures) – response in 10’ after accident detection

***A busy tollway with a variety of incidents on a daily basis***

# Things happening on a motorway



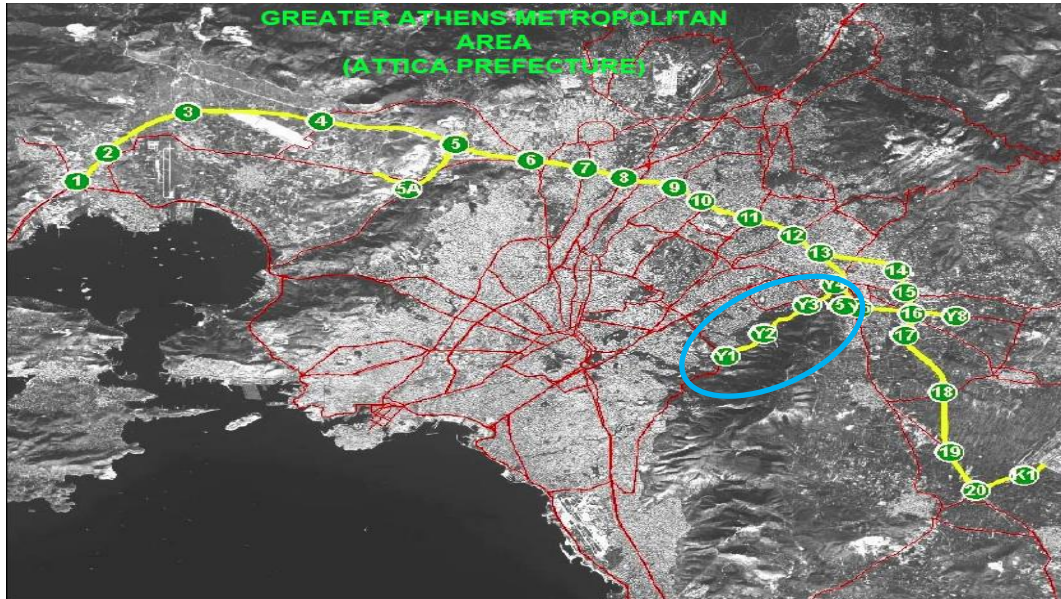
# Things happening on a motorway



22/5/2019 8:17:48 πμ  
GTB Daylight Time

# PAVEMENT REHABILITATION: THE TASK

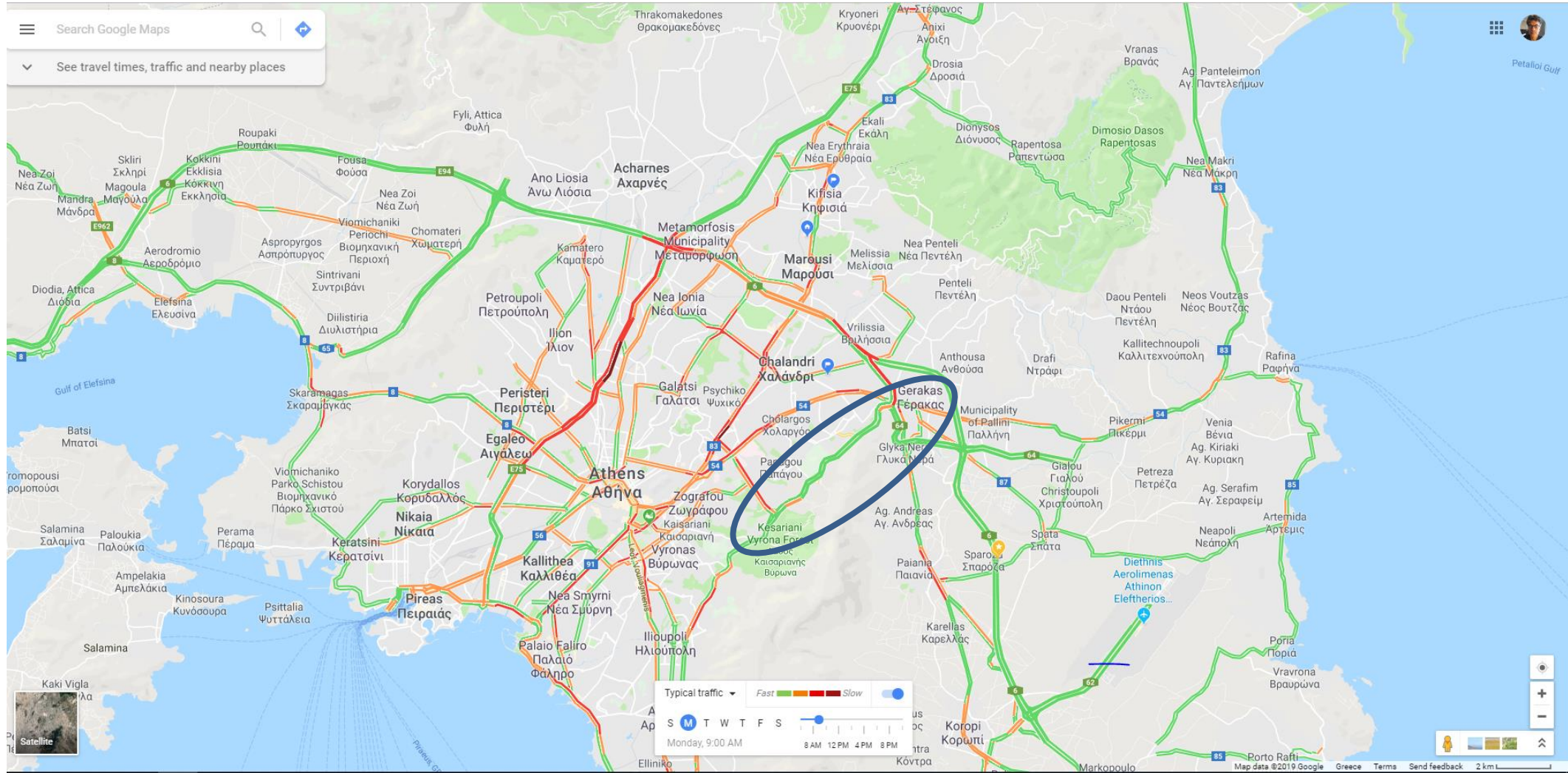
- In the coming years, Attiki Odos will proceed with pavement resurfacing works
- Need for initial estimation of the traffic impact of these road works
- First test: Examination of the impact of road works in a specific stretch of 5,4km length







# ATHENS TRAFFIC AT 9AM



# METHODOLOGY

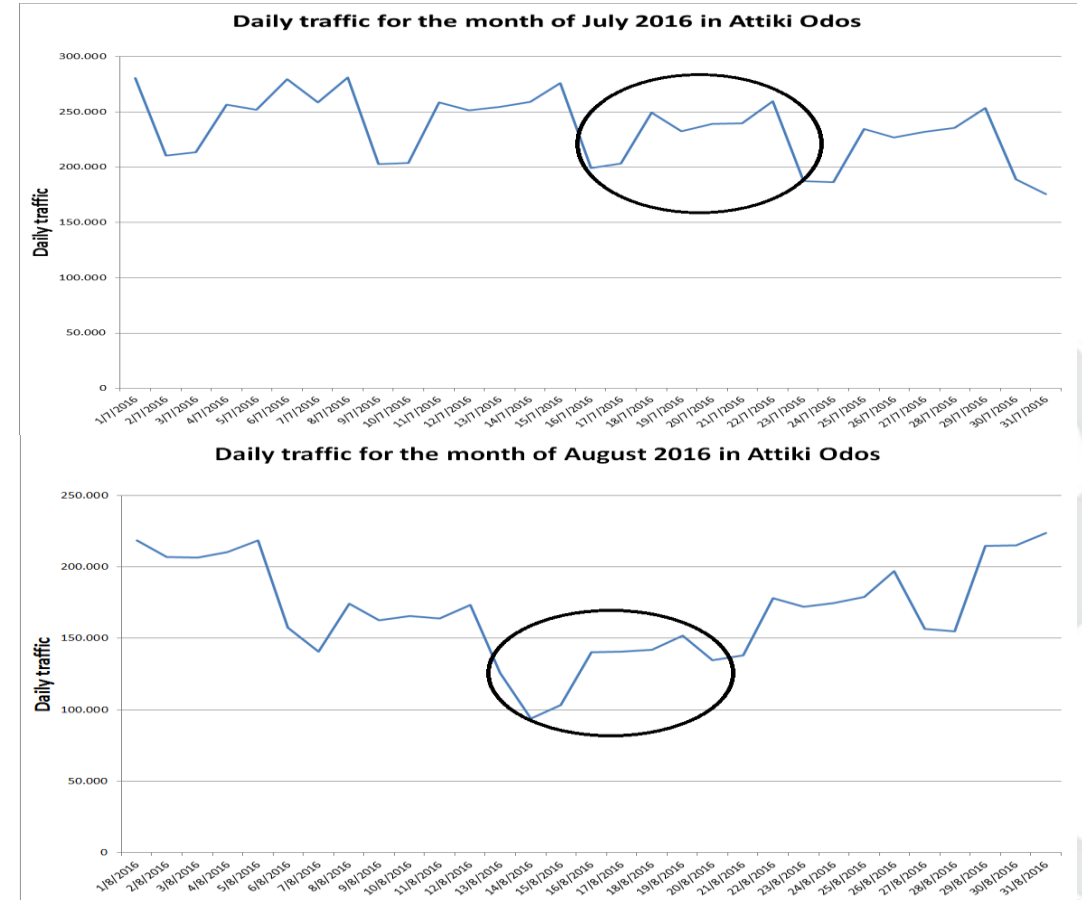
**2 stages to be analysed (Construction & traffic impact), different software for each stage**

- ✓ **1. CA4PRS (Construction Analysis for Pavement Rehabilitation Strategies)**
  - developed by the University of California Pavement Research Center (UCPRC)
  - software for the pavement rehabilitation roadworks design
  - examines different lane closure scenarios
  - estimates the road works duration and generalised cost incurred
  - provides choice of optimized combination of roadworks duration, lane closures and generalized cost
  
- ✓ **2. VISSIM**
  - micro-simulation traffic movement software
  - use of average vehicle delay as operational performance measure

# ROADWORKS SCENARIOS



- Length of 5400 meters
- 3 lanes with 3,5m width each
- 3 entries (Tolls) and 1 exit
- Capacity of 1800 PCUs/hour/lane
- 2 periods tested (July & August)
- 2 scenarios (total & half closure)
- Traffic impact assessment for the half closure scenario presented here





# ROADWORKS SCENARIOS

## *Parameters of Roadworks Closures*

Parameters	Total closure	Half closure
Roadworks Length (km)	5,4	5,4
Objective (lane-km)	16,2	16,2
Mobilization (hours)	6	6
Demobilization (hours)	4	4
Lag time between Milling and Paving (hours)	10	10
Traffic Switch Time (hours)	0	6
Number of teams	4	2
Hauling Truck Capacity (tonnes)	20	20
Hauling Trucks per hour per team	5	5
Batch Plant Capacity (tonnes/hour)	150	150
Number of Batch Plants	1	1
HMA Delivery Truck Capacity (tonnes)	24	24
HMA Delivery Trucks per hour	8	8



# RESULTS

- Estimation of closure scenarios based on CA4PRS:

Total closure duration: 6 days

Half-closure duration: 9 days

- VISSIM: Traffic impact for August Scenario

Low average vehicle delay - Level of Service A

The users will not use alternative routes

- VISSIM: Traffic impact for July Scenario

Low average vehicle delay - Level of Service A to C

The users will not use alternative routes

In both scenarios, the 2 lanes which will remain open during the half closure have the necessary reserve capacity

*August scenario – Half Closure*

Time Period	Average delay (sec/vehicle)			LOS		
	Katechaki Tolls -> end of the roadworks	Cholargos Tolls -> end of the roadworks	Dimokritos Tolls -> end of the roadworks	Katechaki Tolls -> end of the roadworks	Cholargos Tolls -> end of the roadworks	Dimokritos Tolls -> end of the roadworks
09:00-10:00	6,9	5,6	0,8	A	A	A
10:00-11:00	8,2	6,4	0,8	A	A	A
11:00-12:00	8,5	6,1	0,8	A	A	A
12:00-13:00	8,2	5,5	0,9	A	A	A

*July scenario – Half Closure*

Time Period	Average delay (sec/vehicle)			LOS		
	Katechaki Tolls -> end of the roadworks	Cholargos Tolls -> end of the roadworks	Dimokritos Tolls -> end of the roadworks	Katechaki Tolls -> end of the roadworks	Cholargos Tolls -> end of the roadworks	Dimokritos Tolls -> end of the roadworks
09:00-10:00	10,2	8,6	1,3	B	A	A
10:00-11:00	18,5	20,4	2,9	C	C	A
11:00-12:00	17,7	22,2	3,5	C	C	A
12:00-13:00	12,7	10	1,5	B	A	A

# **FUTURE STEPS**

- **Analysis tools need to be validated**
- **Selection of Strategy will be based on several different parameters**
  - Traffic Impact – user acceptance
  - Comparison of direct road works costs for each scenario
  - Income loss for each scenario, especially for total closures
  - Difficulties in pavement roadworks during the month of August
  - Road worker safety for each scenario

**Final choice should be based on the Generalized Cost of all above parameters combined**



# Thank you !

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