Traffic Impact Assessment – ABC Verdun

John Khoury, PhD, PE
Traffic Management Center
Principal Traffic Engineer

OUTLINE

- Project Description
- Traffic Counts
- Traffic Analysis Scenarios
- Intersection LOS Conditions
  - Without Project
  - With Project
- Network Microsimulation Results
- Queueing Analysis
- Traffic Recommendations
- Q/A

Project Description

1) A mega scale mall is planned to open this summer in Verdun area, between Verdun Street, Al Rachideen Street and Tamer Mallat Street.
2) The mall is the largest mall in the area and will be the main attractor for shopping.
3) Traffic into the mall and out will peak in the afternoon hours, which is assumed for the traffic analysis.
4) Around 1000 vehicles are assumed to enter and 900 vehicles to exit during one peak hour.

Traffic Counts

1) **Tuesday, July 11, 2017**
2) **Wednesday, July 12, 2017**
3) Counts were taken during good weather
4) Counts were taken for three hours, morning, midday and evening peaks over two weekdays
5) Counts were conducted at the intersections, including all movements

Traffic Analysis Scenarios

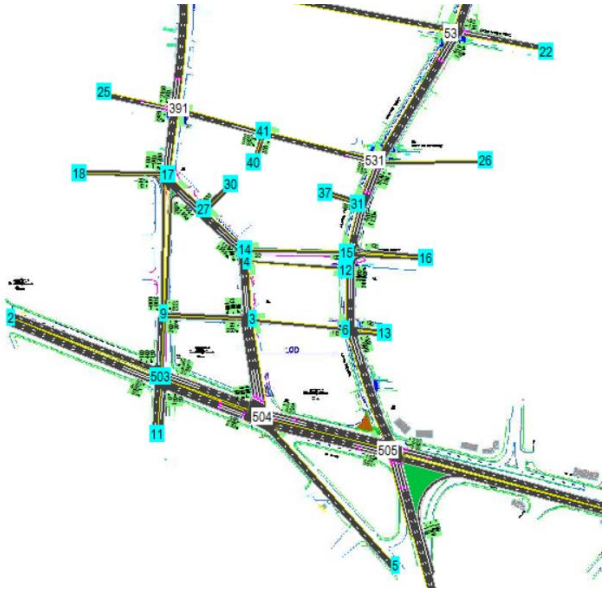
1) Existing Conditions – ABC still closed (without ABC traffic)
2) Existing Conditions – ABC open (with ABC traffic)
3) Modified timing / suggested improvements (with ABC traffic)

Intersection LOS Assessment

Intersection LOS Comparison for PM Peak Hour							
Street	Node	w/o ABC		with ABC		With ABC modified timing	
		delay/veh	LOS	delay/veh	LOS	delay/veh	LOS
Rachideen	505	31.2	C	95.7	F	40.2	D
	53a	7.4	A	16.1	B	11.6	B
	53	7.4	A	23.3	C	8.9	A
	53b	8.7	A	10.6	B	8.8	A
	55	30.6	C	36.9	D	46.8	D
Verdun	57	47.3	D	90.3	F	48.4	D
	39	18.4	B	90.2	F	37.8	D
	39a	16.6	B	31.1	C	26.1	C
	504	46.4	D	51.3	D	55.9	D

Network Analysis - simulation

System Wide Microsimulation Results				
Scenario	Total Delay (hr)	Average Delay/veh (sec)	Average Speed (kph)	Served (veh)
Current/Existing	222	89	19	8600
With ABC Traffic	446	154	13	9550
Percent Change	101%	73%	-32%	11%
With signal re-timing	309	103	17	10300
Percent Change	-31%	-33%	31%	8%



Queueing Analysis

Service Channels		1		2				3			
Arrival Flow	veh/hr	200	300	200	300	400	500	200	300	400	500
	veh/min	3.33	5.00	3.33	5.00	6.67	8.33	3.33	5.00	6.67	8.33
Service rate	veh/min	4.00	4.00	8.00	8.00	8.00	8.00	12.00	12.00	12.00	12.00
System Utilization		0.83	1.25	0.42	0.63	0.83	1.04	0.28	0.42	0.56	0.69
Queue	(veh)	4.17	∞	0.30	1.04	4.17	∞	0.11	0.30	0.69	1.58
Service Time	(min)	1.50	∞	0.21	0.33	0.75	∞	0.12	0.14	0.19	0.27

1) Arrival rates are random and variable
2) Service rates around 4 vehicles per minute, per ticket channel
3) Two ticketing channels per entrance to minimize queues and service time
4) Preferred 25 meters of storage if two ticketing channels are used

$$\overline{Q} = \frac{P_0 \rho^{N+1}}{N!N}\left[\frac{1}{(1-\rho/N)^2}\right]$$

$$\overline{w} = \frac{\rho + \overline{Q}}{\lambda} - \frac{1}{\mu}$$

$$\bar{t} = \frac{\rho + \overline{Q}}{\lambda}$$

Where, $\overline{Q}$ = average length of queue [veh],
$\overline{w}$ = average waiting time in the queue [unit time/veh], and
$\bar{t}$ = average time spent in the system [unit time/veh].

Traffic Recommendations

1) Re-optimizing of cycle timing/phasing at all intersections in vicinity
2) Reconfigure intersection 39 to allow dual left turn
3) Minimize street parking along Verdun street
4) Restrict access from NB Verdun free turn into ABC
5) Mall exit along Tamer Mallat, only right turn
6) Amine Takeyyeddine street, only right turn to Verdun street
7) Provide two ticketing channels at every entrance
8) Provide 25 meters of storage per lane entrance

Q & A

QUESTIONS