CONGESTION REPORT
1st Quarter 2018

A quarterly update of the National Capital Region's traffic congestion, travel time reliability, top-10 bottlenecks and featured spotlight

Feburary 11, 2019

National Capital Region
Transportation Planning Board

ABOUT TPB

Transportation planning at the regional level is coordinated in the Washington area by the National Capital Region Transportation Planning Board (TPB). Members of the TPB include representatives of the transportation agencies of the states of Maryland and Virginia, and the District of Columbia, local governments, the Washington Metropolitan Area Transit Authority, the Maryland and Virginia General Assemblies, and nonvoting members from the Metropolitan Washington Airports Authority and federal agencies. The TPB is staffed by the Department of Transportation Planning of the Metropolitan Washington Council of Governments.

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CONGESTION REPORT

1st Quarter 2018

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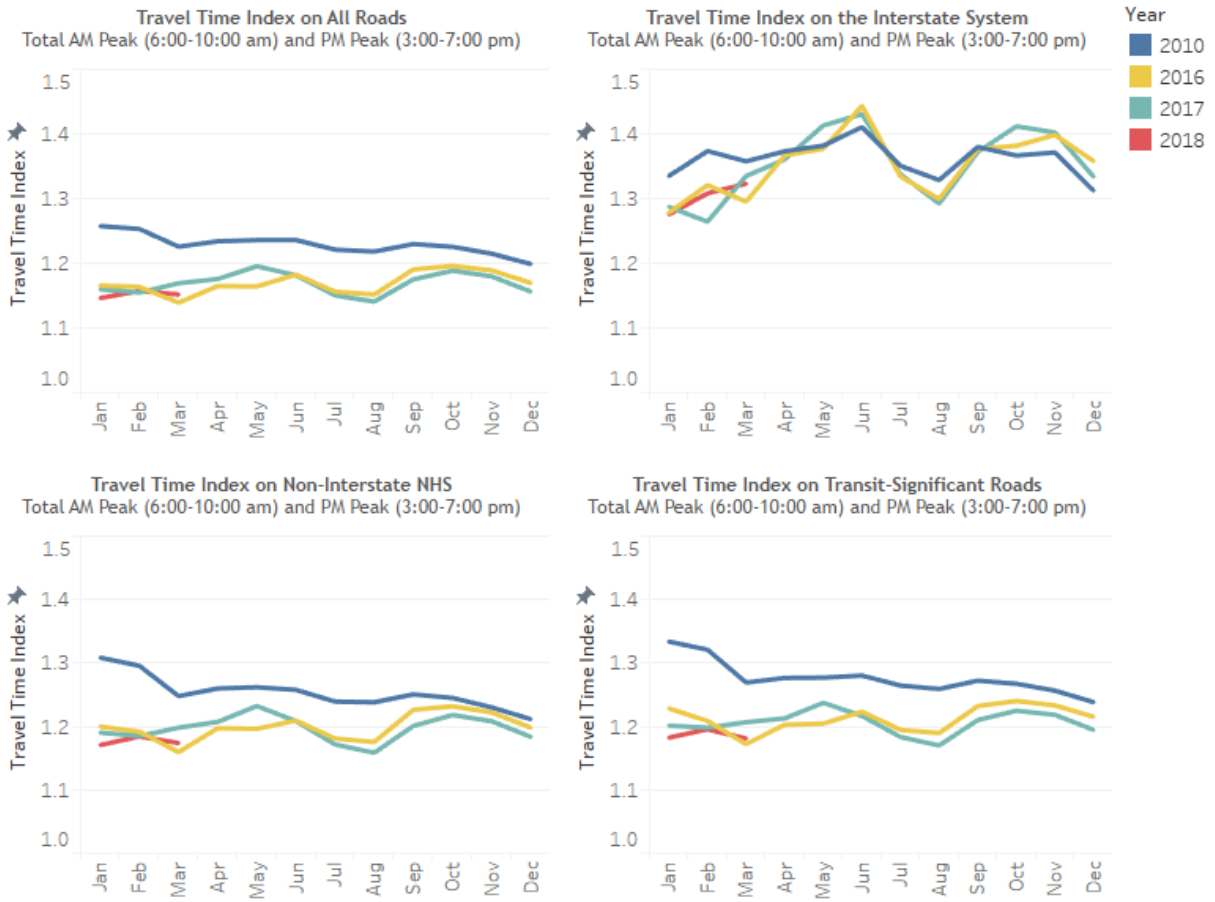
CONGESTION – TRAVEL TIME INDEX (TTI)

Interstate System		
TTI 1st Quarter 2018:	1.30	↑0.5% or 0.007[1]
TTI Trailing 4 Quarters:	1.36	↑0.2% or 0.003[2]
Transit-Significant[4]		
TTI 1st Quarter 2018:	1.19	↓1.3% or -0.016
TTI Trailing 4 Quarters:	1.20	↓0.8% or -0.01
Non-Interstate NHS[3]		
TTI 1st Quarter 2018:	1.18	↓1.2% or -0.015
TTI Trailing 4 Quarters:	1.19	↓0.6% or -0.008
All Roads		
TTI 1st Quarter 2018:	1.15	↓1.1% or -0.013
TTI Trailing 4 Quarters:	1.17	↓0.4% or -0.01

[1] Compared to 1st Quarter 2017; [2]Compared to one year earlier;[3] NHS: National Highway System; [4] See "Background" section.

Figure 1 Monthly Travel Time Index for Total AM peak (6:00-10:00 am) and PM peak (3:00-7:00 pm)



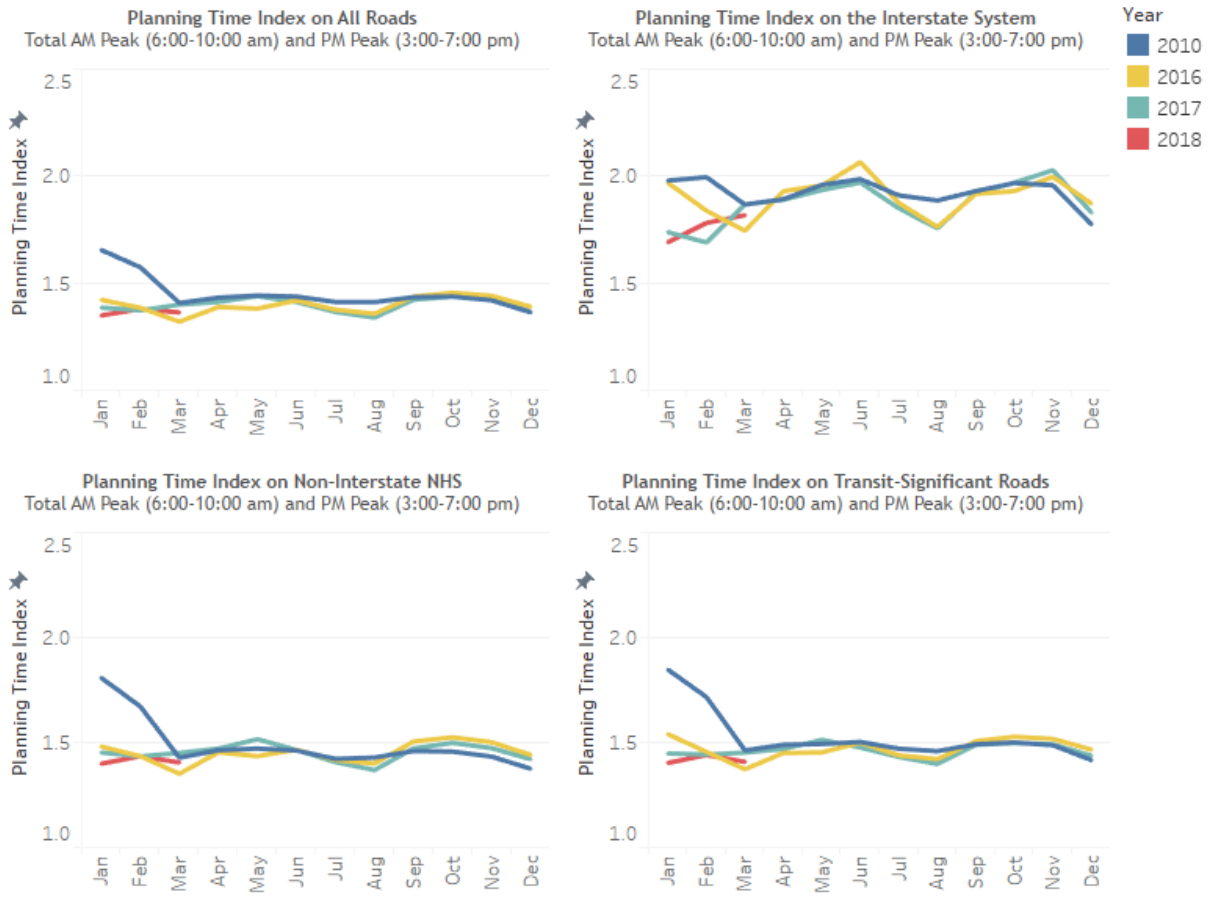
Travel Time Index *(TTI), defined as the ratio of actual travel time to free-flow travel time, measures the intensity of congestion. The higher the index, the more congested traffic conditions it represents, e.g., TTI = 1.00 means free flow conditions, while TTI = 1.30 indicates the actual travel time is 30% longer than the free-flow travel time.*

RELIABILITY – PLANNING TIME INDEX (PTI)

Interstate System			**Non-Interstate NHS[3]**		
PTI 1st Quarter 2018:	1.76	↓0.1% or -0.002[1]	PTI 1st Quarter 2018:	1.41	↓2.3% or -0.033
PTI Trailing 4 Quarters:	1.87	↓0.7% or -0.013[2]	PTI Trailing 4 Quarters:	1.44	↓0.9% or -0.013
Transit-Significant[4]			**All Roads**		
PTI 1st Quarter 2018:	1.42	↓2.1% or -0.031	PTI 1st Quarter 2018:	1.36	↓1.6% or -0.022
PTI Trailing 4 Quarters:	1.45	↓1.0% or -0.01	PTI Trailing 4 Quarters:	1.39	↓0.6% or -0.008

[1] Compared to 1st Quarter 2017;[2]Compared to one year earlier; [3] NHS: National Highway System; [4] See "Background" section.

Figure 2 Monthly Planning Time Index for Total AM peak (6:00-10:00 am) and PM peak (3:00-7:00 pm)

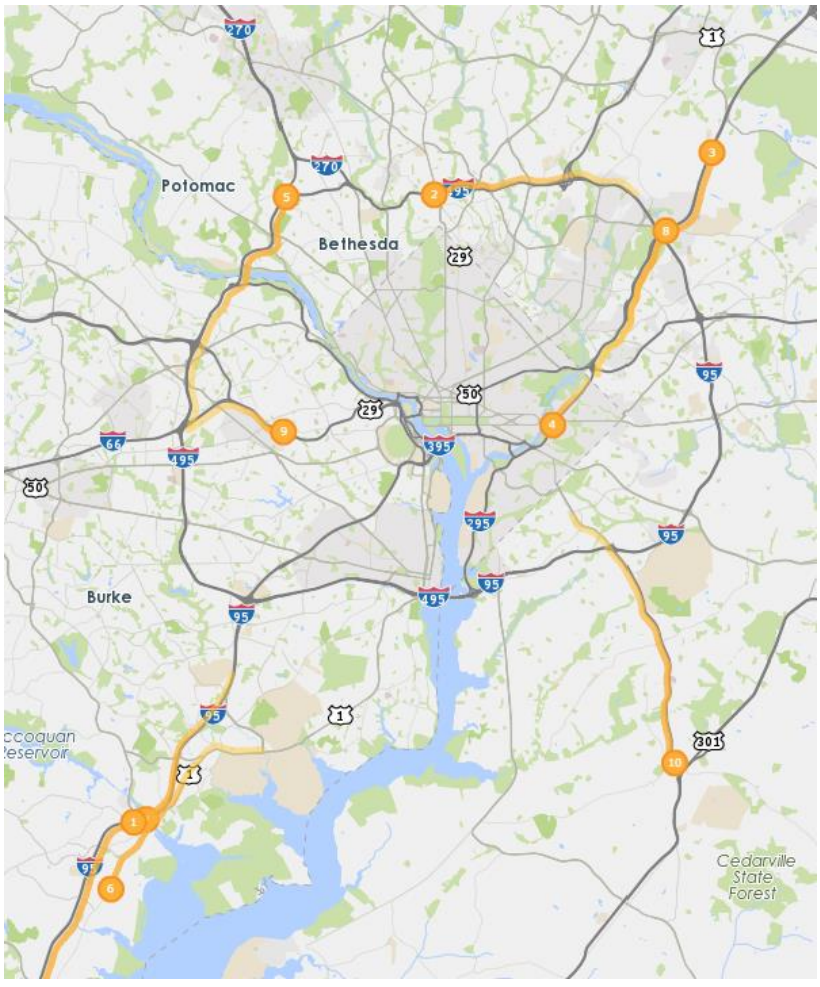


Planning Time Index *(PTI), defined as the ratio of 95th percentile travel time to free flow travel time, measures travel time reliability. The higher the index, the less reliable traffic conditions it represents, e.g., PTI = 1.30 means a traveler must budget 30% longer than the uncongested travel time to arrive on time 95% of the instances (i.e., 19 out of 20 trips).*

TOP 10 BOTTLENECKS

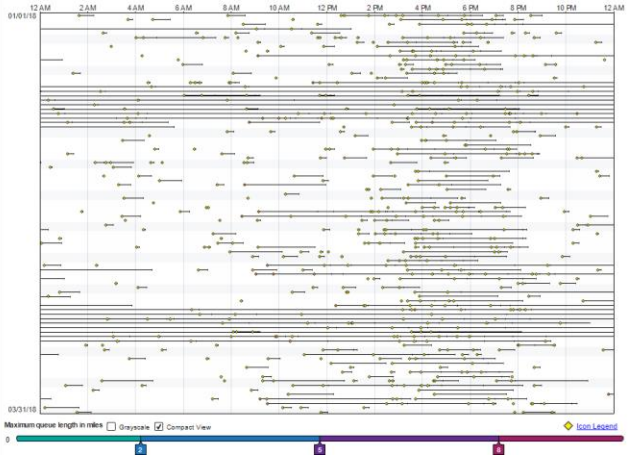
Rank (Last Quarter Rank)	Location	Average duration	Average max length (miles)	Total duration	Impact factor
1 (1) *	**I-95 S @ VA-123/EXIT 160**	6 h 35 m	3.65	24 d 17 h 34 m	122,631.68
2 (3)	**I-495 CCW @ MD-97/GEORGIA AVE/EXIT 31**	3 h 34 m	2.8	13 d 08 h 56 m	67,835.64
3 (4)	**BALTIMORE–WASHINGTON PARKWAY @ POWDER MILL RD**	5 h 13 m	2.79	19 d 13 h 27 m	66,242.78
4 (5)	**DC-295 S @ EAST CAPITOL ST**	8 h 50 m	1.19	33 d 03 h 48 m	64,737.05
5 (2)	**I-495 CW @ I-270 SPUR**	2 h 27 m	4.01	9 d 04 h 45 m	64,051.81
6 (9)	**US-1 S @ OPITZ BLVD**	5 h 41 m	2.3	21 d 08 h 43 m	60,765.46
7 (7)	**I-95 N @ VA-123/EXIT 160**	3 h 10 m	3.08	11 d 21 h 40 m	56,037.28
8 (8)	**BALTIMORE–WASHINGTON PARKWAY @ I-495/I-95**	3 h 22 m	3	12 d 15 h 45 m	51,728.65
9 (6)	**I-66 E @ SYCAMORE ST/EXIT 69**	4 h 50 m	1.75	18 d 03 h 39 m	49,269.14
10 (18)	**MD-5 S @ MD-381/BRANDYWINE RD**	9 h 38 m	0.62	36 d 04 h 00 m	46,883.59

** See "Bottlenecks" section in the "Background" chapter for ranking variability from quarter to quarter.*

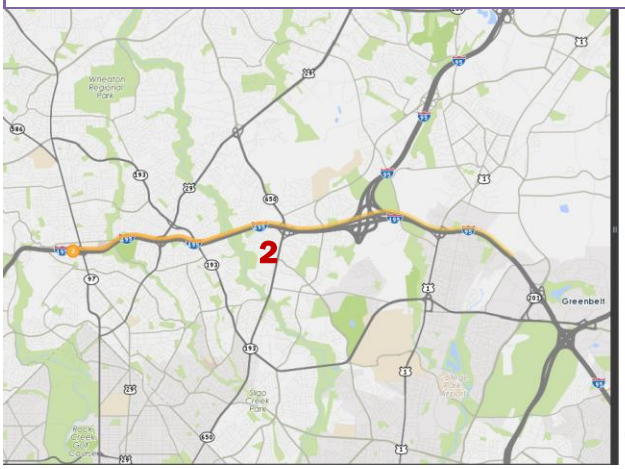


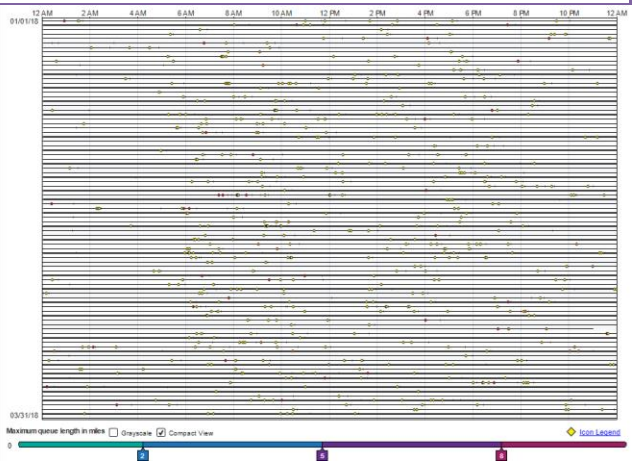
Rank	Location	Average duration	Average max length (miles)	Total duration	Impact factor*
1	I-95 S @ VA-123/EXIT 160	7 h 24 m	3.95	28 d 10 h 18 m	145,274.09

** The Impact Factor of a bottleneck is simply the product of the Average Duration (minutes), Average Max Length (miles) and the number of occurrences.*

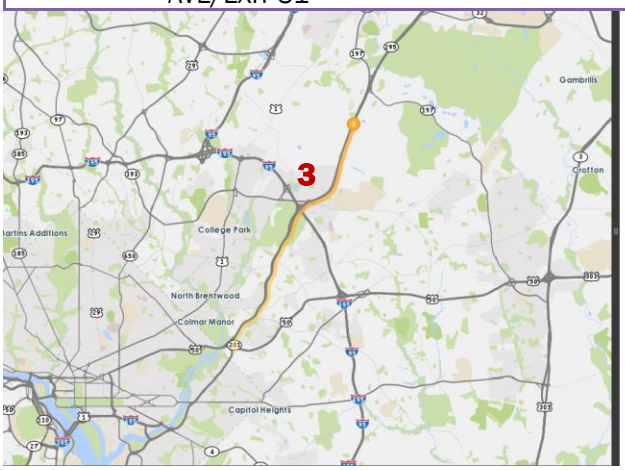


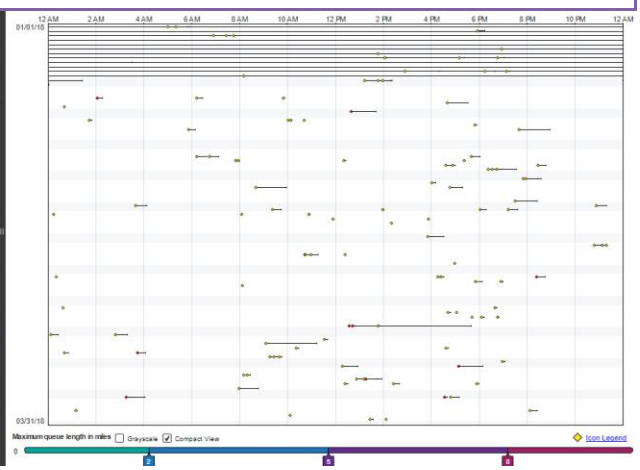
Rank	Location	Average duration	Average max length (miles)	Total duration	Impact factor
2	I-495 CW @ I-270 SPUR	2 h 34 m	4.46	9 d 20 h 26 m	88,898.23



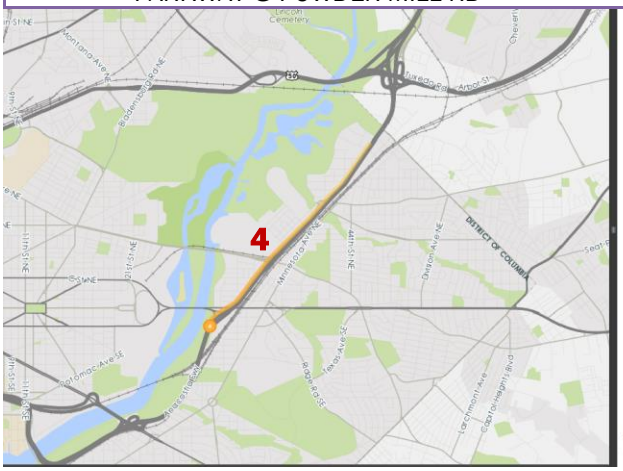


Rank	Location	Average duration	Average max length (miles)	Total duration	Impact factor
3	I-495 CCW @ MD-97/GEORGIA AVE/EXIT 31	4 h 22 m	2.67	16 d 18 h 04 m	82,678.58

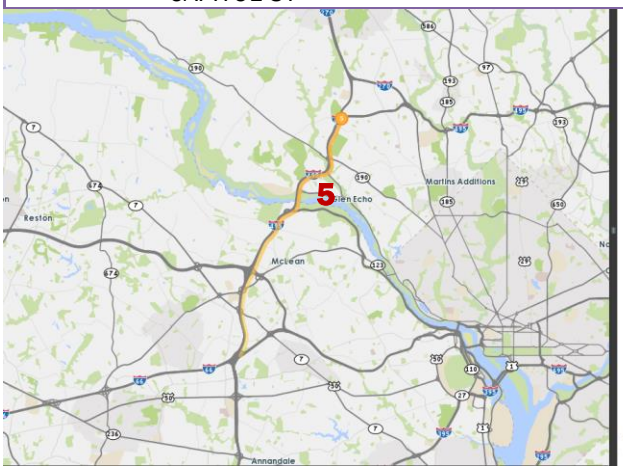


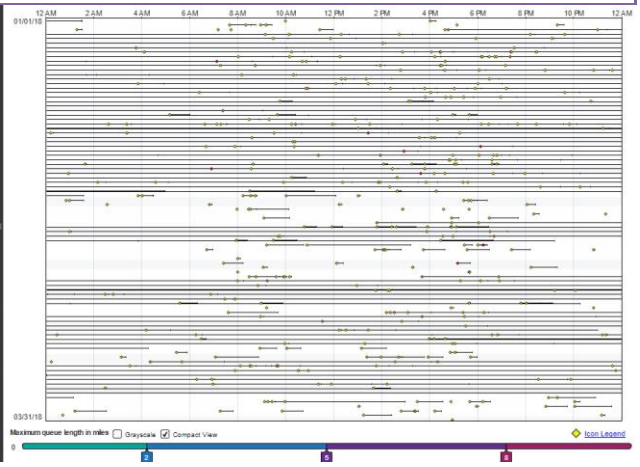


Rank	Location	Average duration	Average max length (miles)	Total duration	Impact factor
4	BALTIMORE–WASHINGTON PARKWAY @ POWDER MILL RD	5 h 58 m	2.81	22 d 22 h 13 m	73,249.20

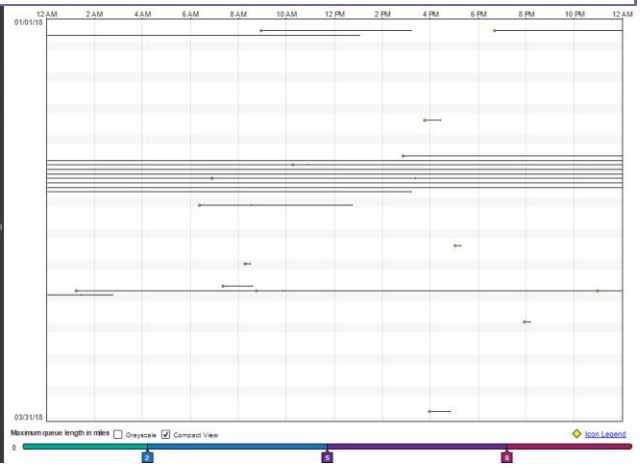


Rank	Location	Average duration	Average max length (miles)	Total duration	Impact factor
5	DC-295 S @ EAST CAPITOL ST	9 h 35 m	1.24	36 d 19 h 07 m	71,440.03

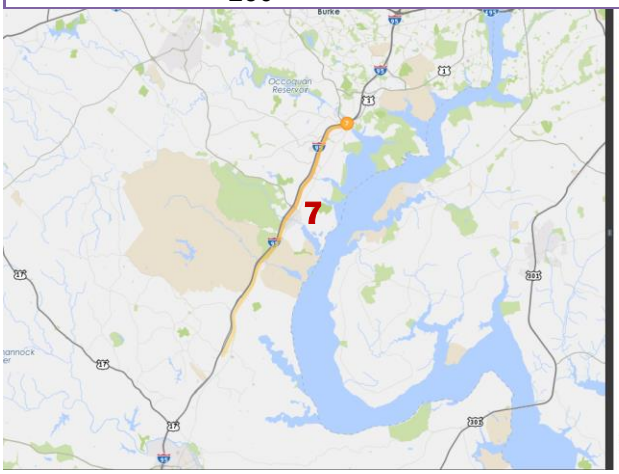


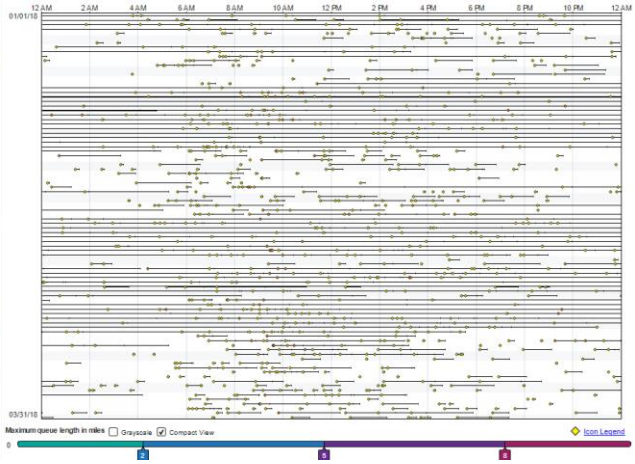


Rank	Location	Average duration	Average max length (miles)	Total duration	Impact factor
6	I-66 E @ SYCAMORE ST/EXIT 69	6 h 22 m	1.81	24 d 10 h 29 m	70,900.03

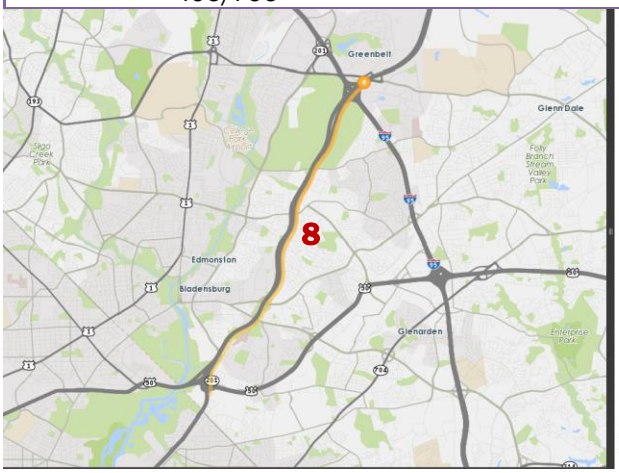


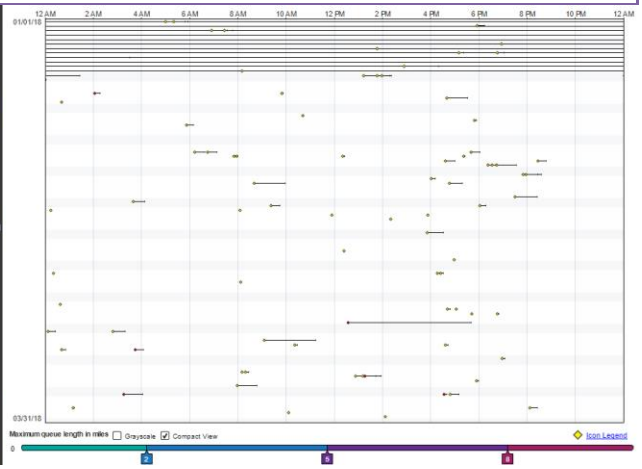
Rank	Location	Average duration	Average max length (miles)	Total duration	Impact factor
7	I-95 N @ VA-123/EXIT 160	3 h 25 m	3.32	13 d 02 h 42 m	68,786.91



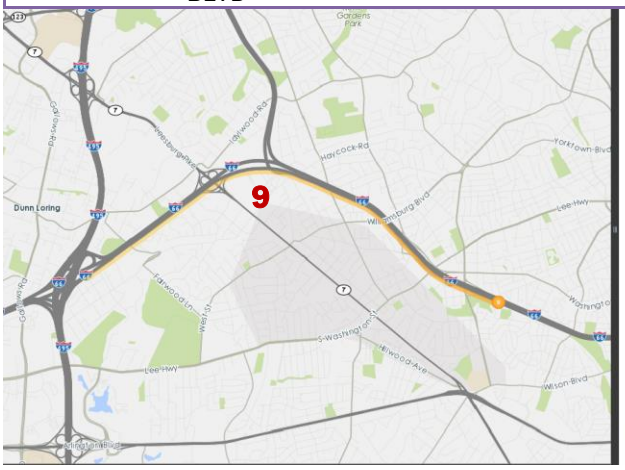


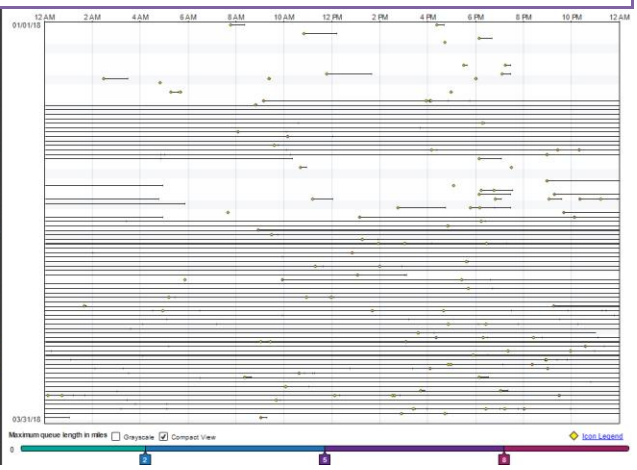
Rank	Location	Average duration	Average max length (miles)	Total duration	Impact factor
8	BALTIMORE–WASHINGTON PARKWAY @ I-495/I-95	4 h 07 m	3.14	15 d 20 h 21 m	66,618.89



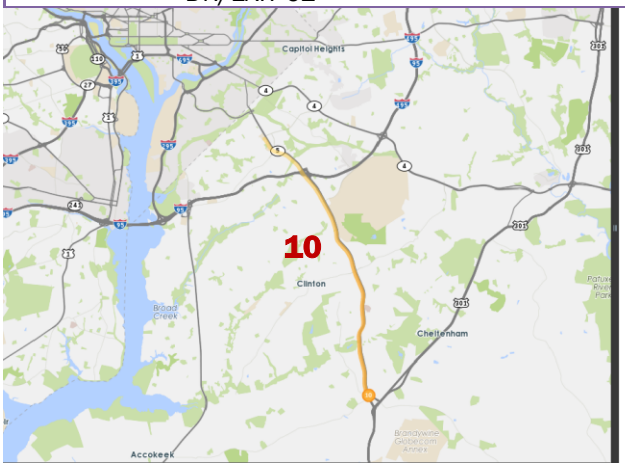


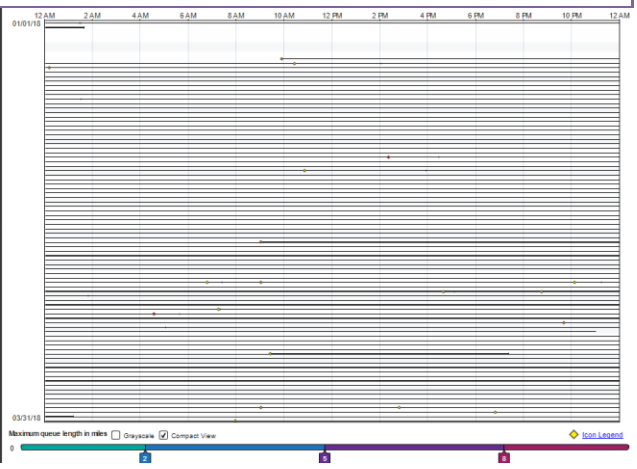
Rank	Location	Average duration	Average max length (miles)	Total duration	Impact factor
9	US-1 S @ OPITZ BLVD	5 h 45 m	2.36	22 d 01 h 59 m	64,835.54





Rank	Location	Average duration	Average max length (miles)	Total duration	Impact factor
10	I-66 W @ VADEN DR/EXIT 62	4 h 22 m	1.67	16 d 18 h 05 m	60,747.47





CONGESTION MAPS

Figure 3. Travel Time Index during weekday 8: 00-9:00 A.M. in 1st Quarter of 2018

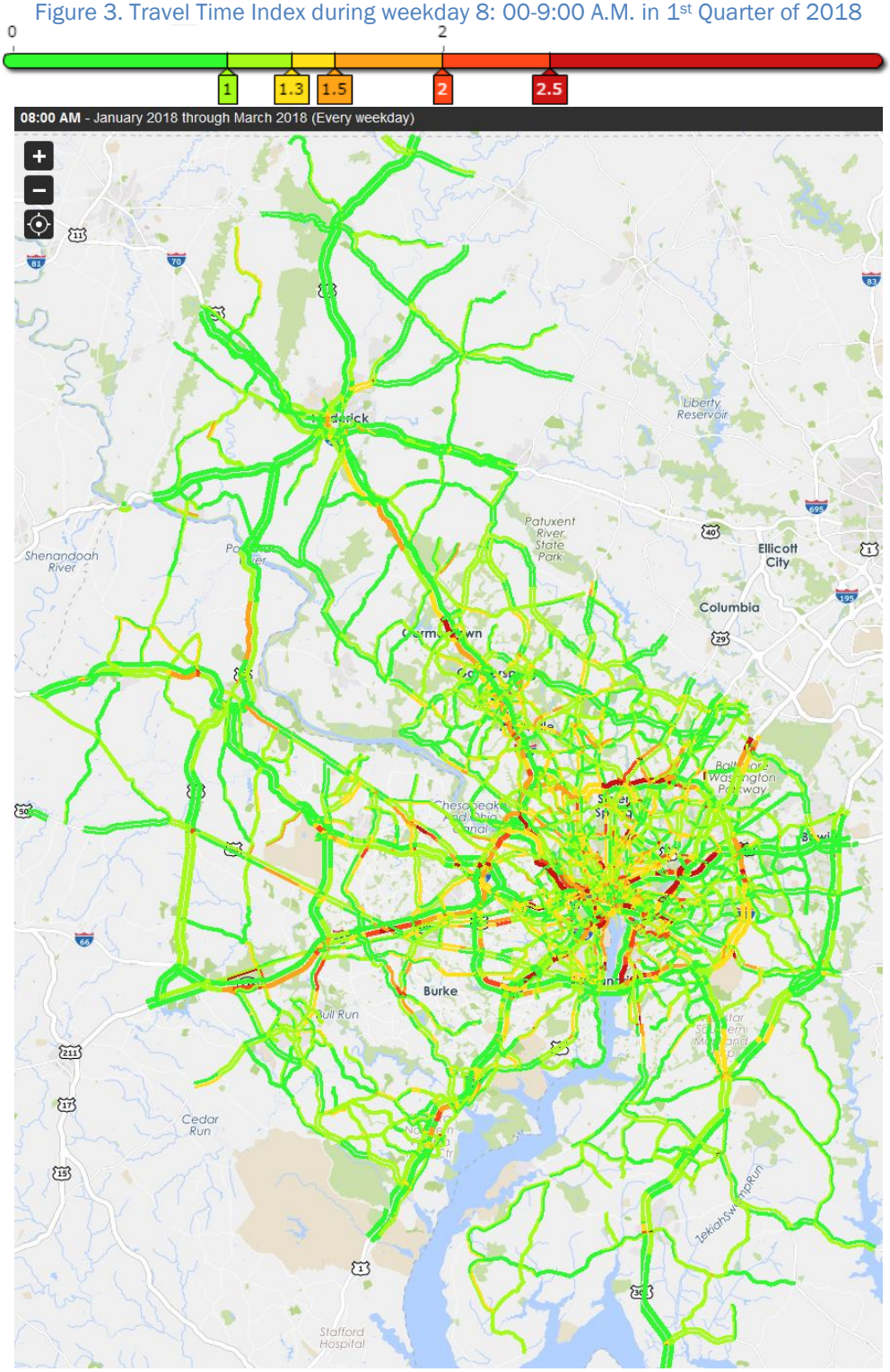
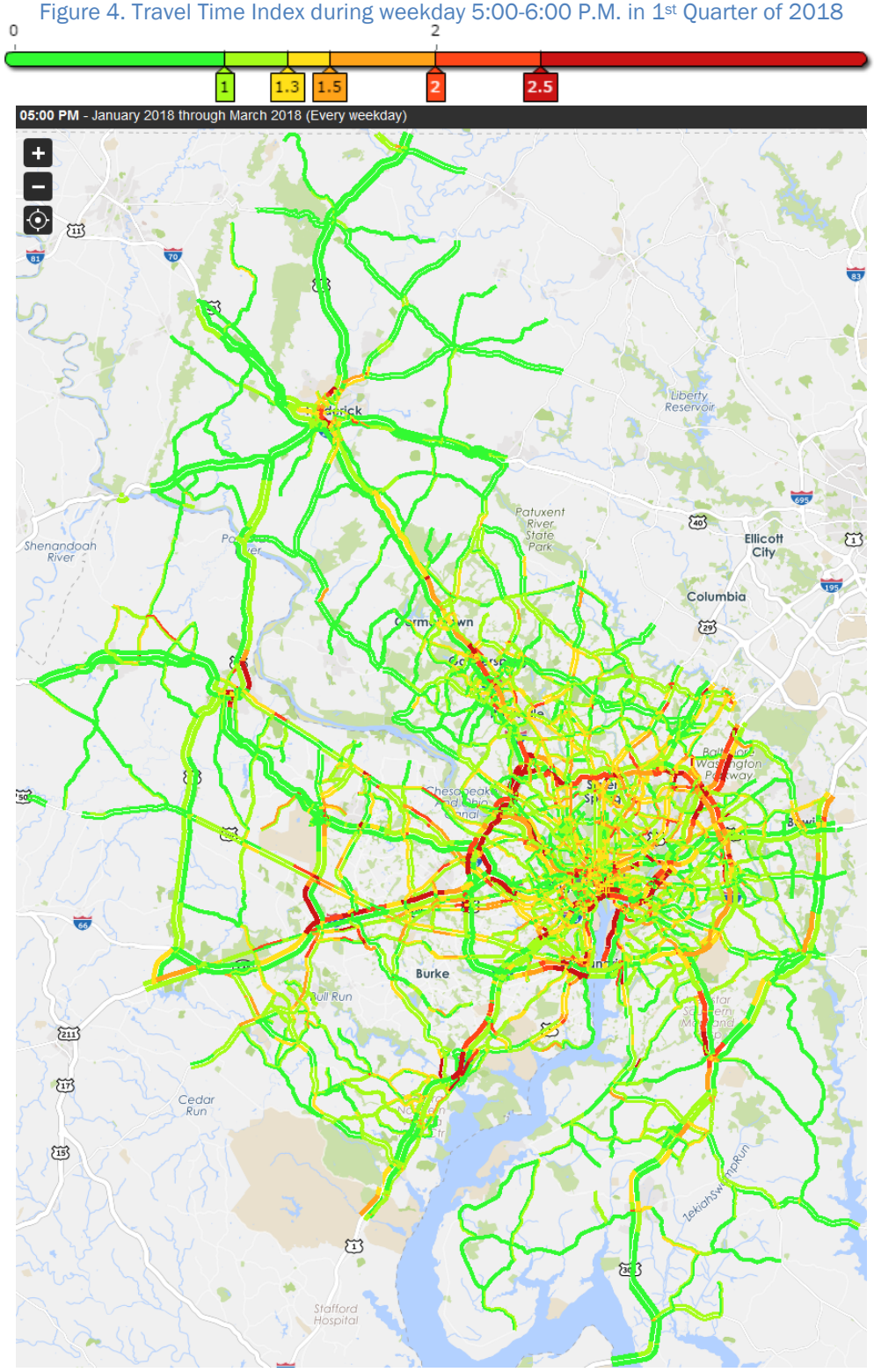


Figure 4. Travel Time Index during weekday 5:00-6:00 P.M. in 1st Quarter of 2018



2018Q1 SPOTLIGHT – A PRATICE TO REDUCE COST OF CRASH

Introduction

Traffic congestion cost the nation $305 billion in 2017, according the transportation data firm INRIX. About half of congestion is estimated to be caused by temporary disruptions that take away part of the roadway from use – or "nonrecurring" congestion. Traffic incidents alone, the major cause of nonrecurring congestion, account for about a quarter of congestion. A nationwide estimate was about $76 billion in terms congestion costs in 2017.

This spotlight reviewed a crash in a major commute corridor of the National Capital Region and analyzed what it cost in terms of speed, travel time index, planning time index, and monetary estimations. With coordinated multi-disciplinary Traffic Incident Management (TIM) practices and MATOC playing a role, traffic flow was restored within two hours after the complicated crash.

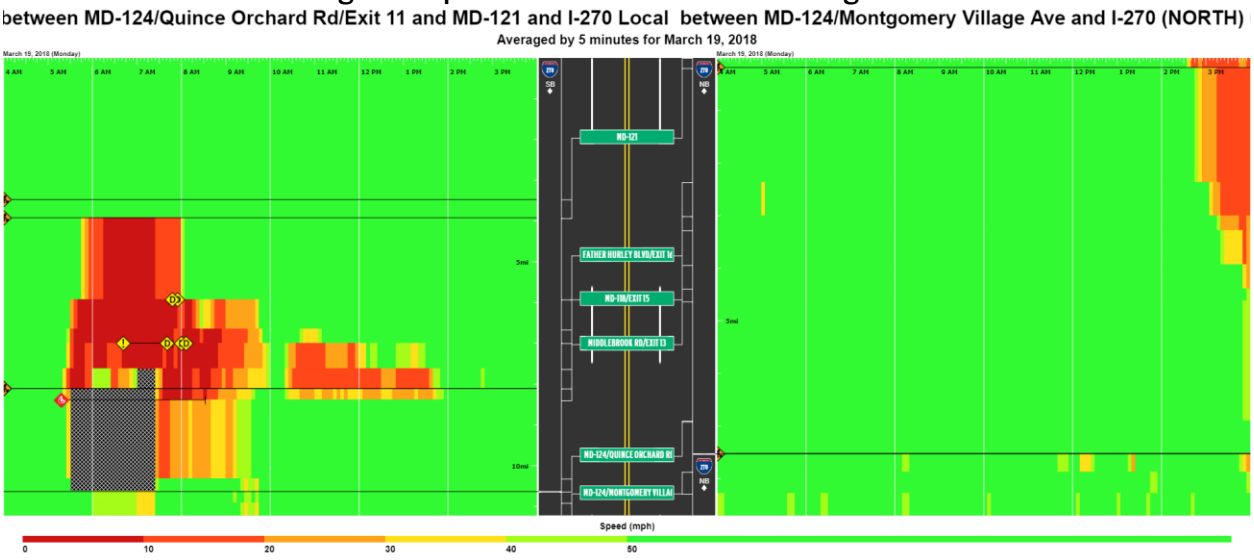
A crash on I-270

Around 5:18 a.m. on Monday March 19, 2018, an unidentified white tractor-trailer made an unsafe lane change that triggered a morning crash on southbound Interstate 270 in Germantown (Montgomery County), shutting it down and snarling the morning commute for hours. The crash involved 20 vehicles along with a tractor trailer that spilled its load of rock and gravel onto the roadway. All southbound lanes of Interstate 270 were closed due to the crash for about two hours.

Cost analysis on the I-270 crash

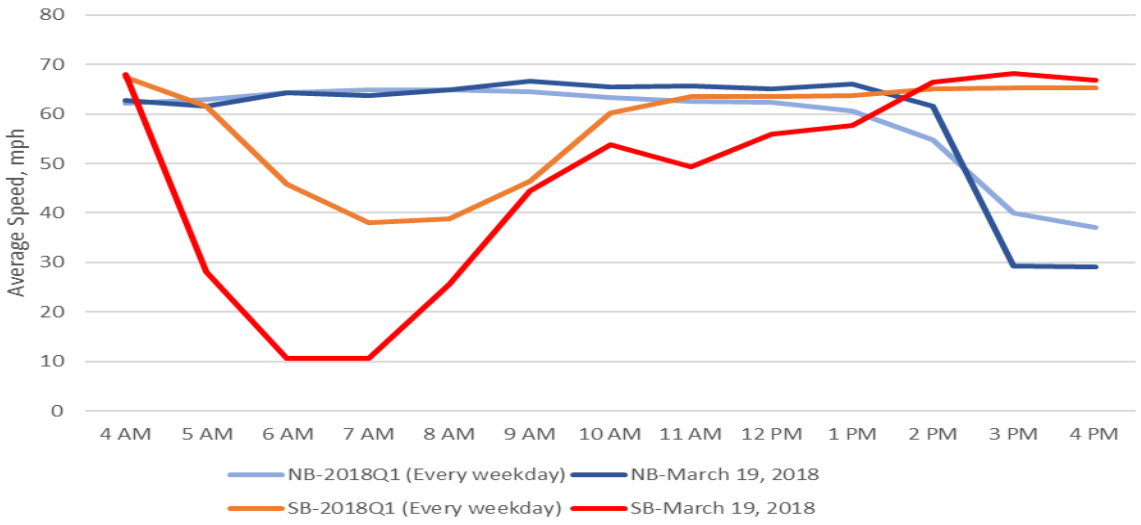
Vehicle speed, in terms of how much time was needed to travel a certain road segment, can be a straightforward measure to the cost analysis. Figure 5 shows average speed distribution at the studied segment, between MD-124/Quince Orchard Rd/Exit 11 and MD-121 of I-270, on March 19, 2018. Average speed distribution for southbound traffic is shown on the left of Figure 5 and on the right represented the distribution for northbound traffic. Perhaps because of the crash, there was no data reported in the black mesh area of Figure 5. The location and duration of the crash have been marked on Figure 5 with the red diamond and the associated black horizontal line. The dark red area on the map represents that average speed was less than 10 miles per hour; and the green indicates that average speed was greater than 50 miles per hour.

Figure 5 Speed distribution in the I-270 segments



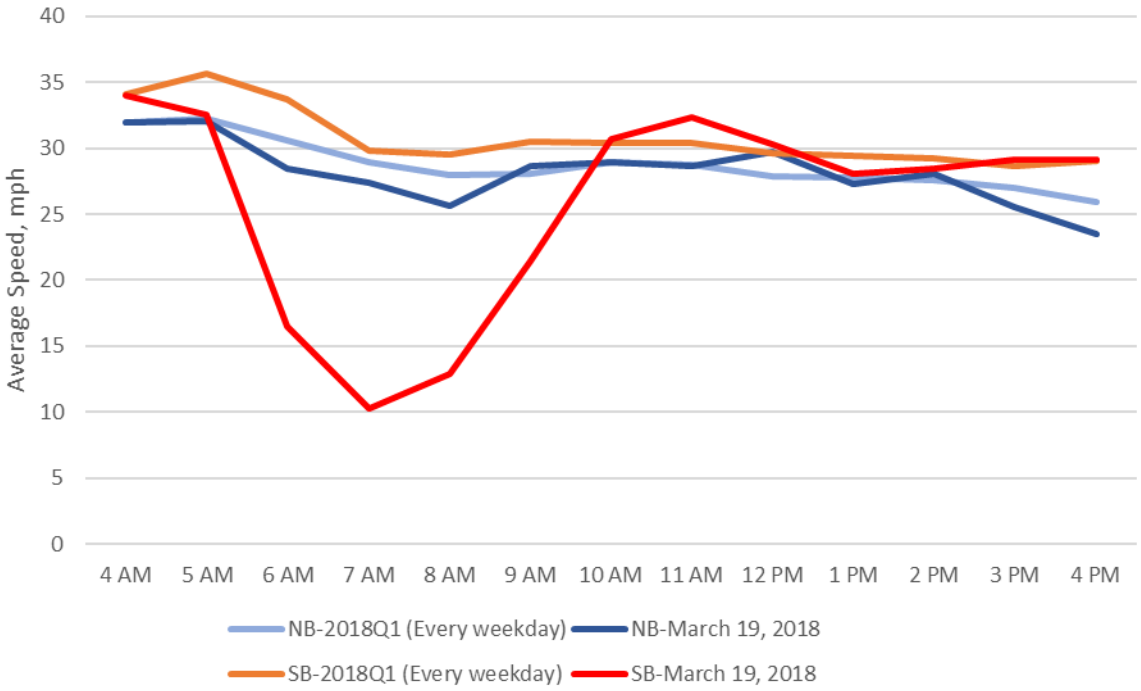
SB I-270 is typically congested during the AM peak period and the incident exasperated the congestion. Figure 6 shows a comparison of hourly average speed (HAS) on March 19, 2018 (southbound in Red and northbound in dark blue) versus all weekdays in the 1st quarter of 2018 (southbound in Orange and northbound in light blue). The most congested time, i.e. with the lowest HAS, in the studied segment happened around 7 a.m. The HAS at 7 a.m. on March 19, 2018 (red line in Figure 6) was 24.28 mile per hour that is about 36 percent slower than the average over all weekdays in the 1st quarter of 2018 (orange line in Figure 6) at the same time. However, traffic was almost back to normal in terms of HAS after 8 a.m. on March 19, 2018.

Figure 6 Hourly average speed at the I-270 segments on March 19 and average weekdays in the 1st quarter of 2018



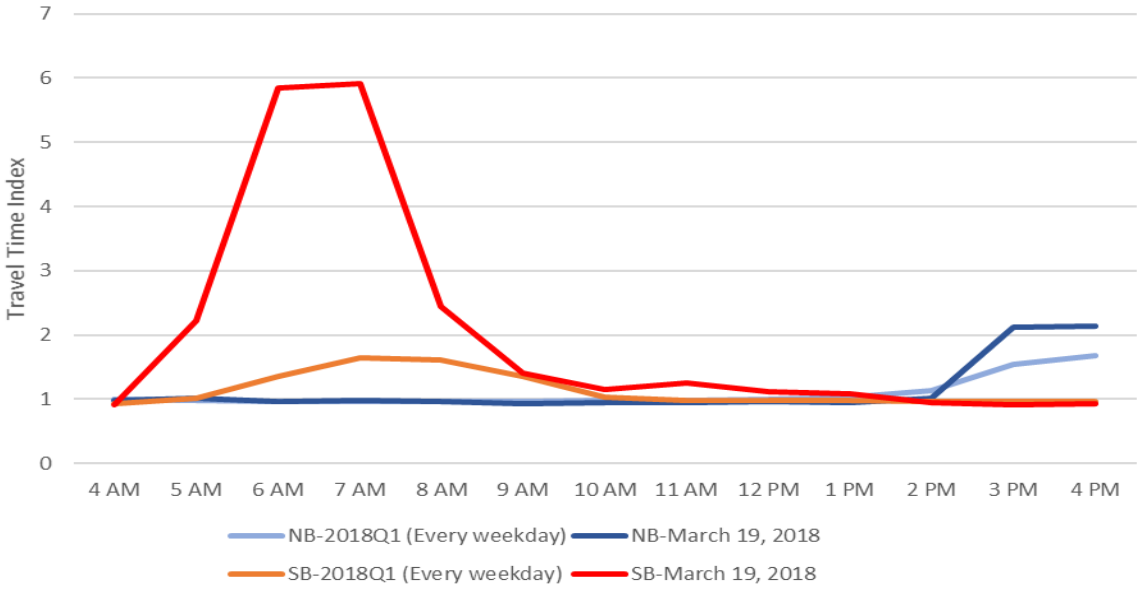
Since southbound I-270 was completely shut down due to the crash, impacts on the parallel surface street, MD-355 in this case, were significant. Figure 7 shows a comparison of HAS on March 19, 2018 (southbound in red and northbound in dark blue) versus all weekdays in the 1st quarter of 2018 (southbound in orange and northbound in light blue). During a regular weekday in the first quarter of 2018, variation of the HAS in the MD-355 southbound segment was insignificant, especially after 7 a.m. However, the shut-down in I-270 southbound resulted a 66% decrease of HAS in the southbound of MD-355 at 7 a.m., from 30 miles per hour to 10 miles per hour. The HAS in MD-355 southbound went back to normal around 10 a.m., suggesting that the shut-down brought longer-lasting impact on the surface street than on the interstate.

Figure 7 Hourly average speed at the MD-355 segments on March 19 and average weekdays in the 1st quarter of 2018



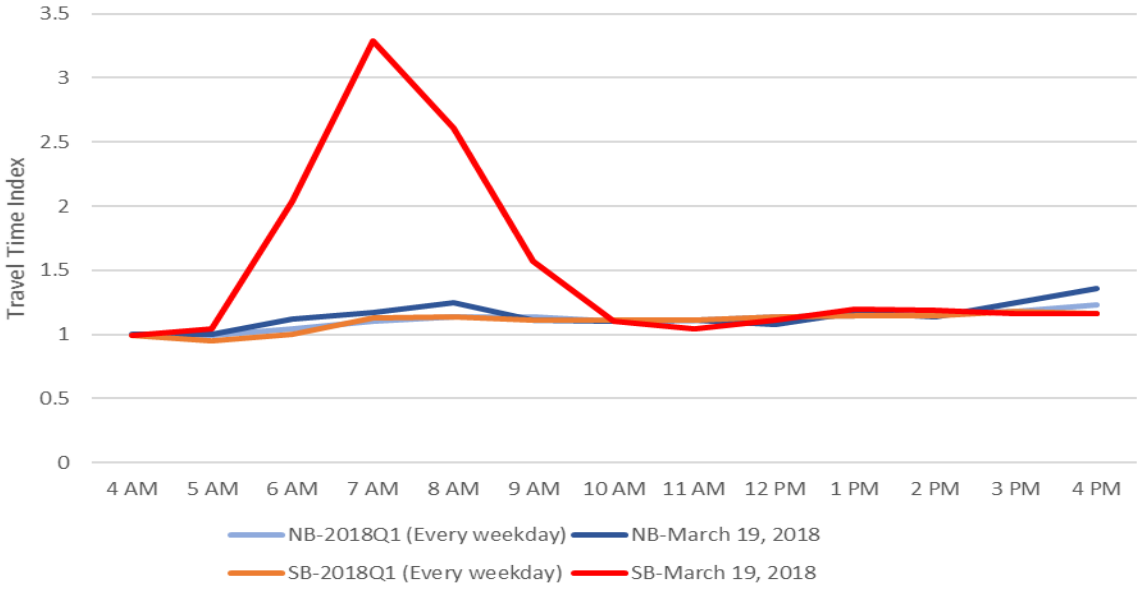
Travel Time Index (TTI) can be used to measure how intense a congestion situation was. The higher the TTI, the more congested traffic condition it represents, e.g., TTI = 1.00 means free flow conditions, while TTI = 1.30 indicates the actual travel time is 30% longer than the free-flow travel time. The TTI of I-270 southbound around 7 a.m. on March 19, 2018 shown in Figure 8 (red line) suggested that the crash resulted almost five times (491%) longer of travel time than what it took under free-flow conditions. In comparison to regular weekday traffic in the 1st quarter of 2018, expected travel time would be about 60% longer than what it took under free-flow conditions on the same segment.

Figure 8 TTI at the I-270 segments on March 19 and average weekdays in the 1st quarter of 2018



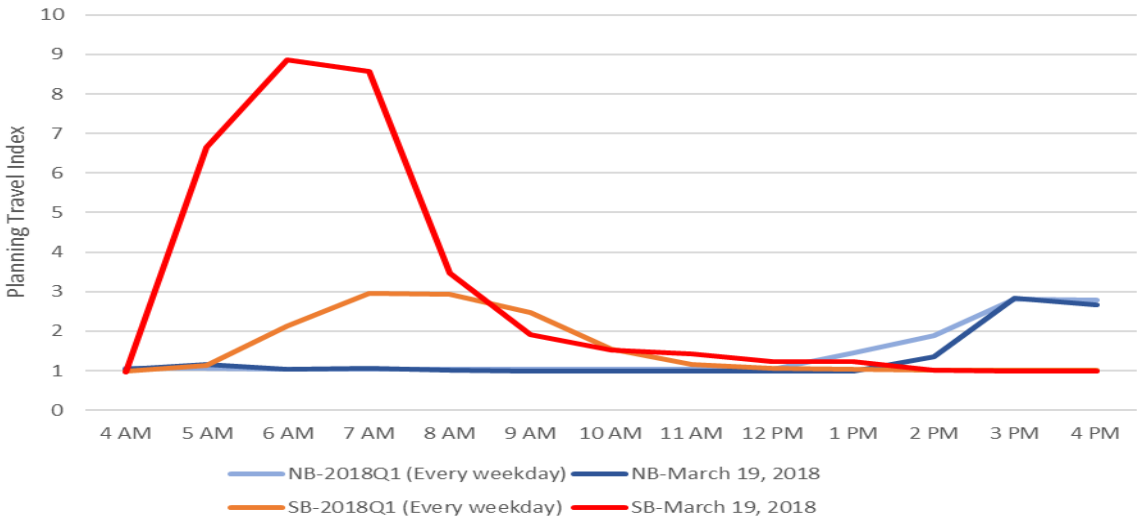
The TTI on the parallel surface street MD-355 also increased, but by less magnitude than on I-270. The TTI (orange line in Figure 9) was 1.13 at 7 a.m. for an average weekday of 2018 1st quarter in the southbound of MD-355. The shut-down raised travel time in the southbound MD-355 (red line in Figure 9) to two times (191%) longer than its regular congested condition.

Figure 9 TTI at the MD-355 segments on March 19 and average weekdays in the 1st quarter of 2018



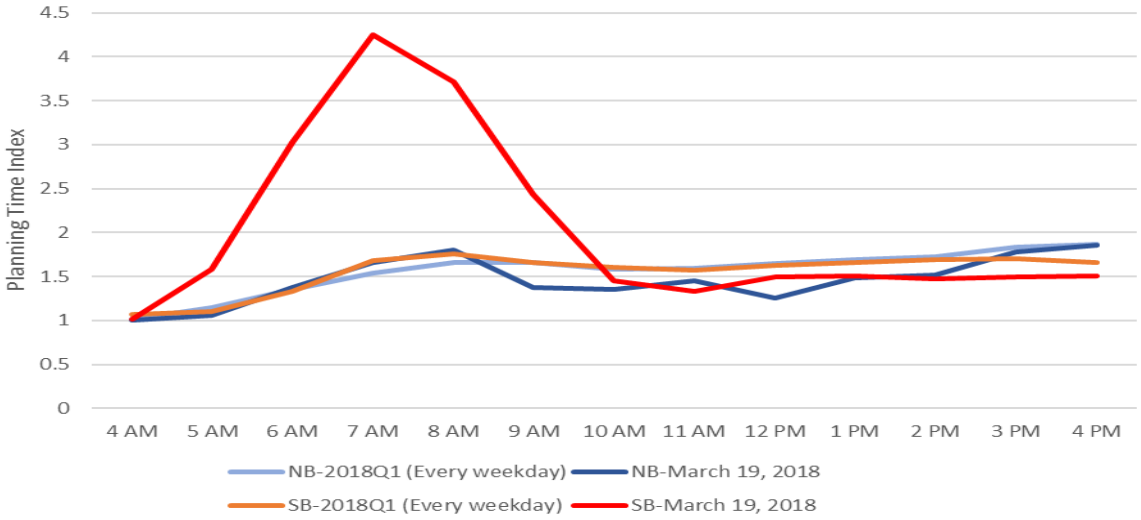
Planning Time Index (PTI) can be used to estimate reliability of expected travel time. The higher the PTI, the less reliable traffic conditions it represents, e.g., PTI = 1.30 means a traveler must budget 30% more time than the uncongested travel time to arrive on time 95% of the instances (i.e., 19 out of 20 trips). On the day of the crash commuters would not have reached their destination unless they allowed a cushion of 3 times (314%) above their normal congested travel time.

Figure 10 PTI at the I-270 segments on March 19 and average weekdays in the 1st quarter of 2018



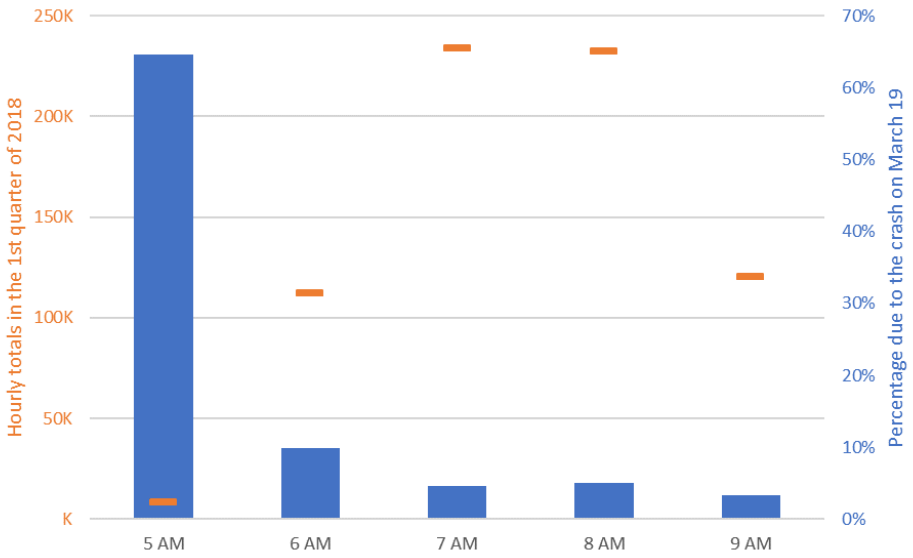
In comparison to I-270, PTI in the southbound MD-355 at 7 a.m. increased to 4.25 (red line in Figure 11 representing the crash day) from 1.68 (orange line in Figure 11 representing average weekday of 2018 1st quarter), a 153% increase.

Figure 11 PTI at the MD-355 segments on March 19 and average weekdays in 2018 1st quarter



In terms of monetary user delay cost (MUDC), hourly totals in the 1st quarter of 2018 are shown in Figure 9 with orange bars. The blue columns in the figure represent the percentage of hourly totals in the 1st quarter that resulted from the crash. It suggested that the crash contributed 65% of hourly totals ($8.4K) in the 1st quarter of 2018 at five o'clock in the morning. The percentage is high because between 5 and 6 a.m. at the studied segment was not usually congested. Within the recurring congested periods, i.e. from 6 a.m. to 10 a.m., impacts of the crash on the quarter's hourly MUDC reduced to 10% ($112.1K), 5%($234.1K), 5%($232.3K), and 3%($120.4K) respectively. Please be advised that the MUDC takes only user delay into consideration, no injury, property damage, or emergency operations were counted into the estimation.

Figure 12 Hourly Monetary User Delay Cost in the 1st quarter of 2018 and the percentage costed by the crash on March 19, 2018



Summary

Any major incident will cause delay and cost to the travelling public, but programs in place such as MATOC, TIM training for the first responders, better communication among responders, and better information to the travelling public to avoid the area helps in reducing the impact. The region convened a task force to study ways to improve TIM response, with recommendations delivered to the COG board, and shared with other stakeholders, in late 2018.

National Capital Region
Transportation Planning Board

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