



## **MEMORANDUM**

**TO:** Transportation Planning Board Technical Committee  
**FROM:** Andrew Meese, Eric Randall, Daivamani Sivasailam, Matthew Gaskin, Patrick Zilliacus, and James Li, TPB Staff  
**SUBJECT:** Transportation Impact Analysis of the Summer 2019 Blue and Yellow Line Shutdown – Revised and Updated  
**DATE:** October 25, 2019

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## **OVERVIEW**

This memorandum provides an overview, results, and the conclusions of a preliminary analysis of the transportation impacts of Washington Metropolitan Area Transit Authority's (WMATA) Blue and Yellow Line Station shutdown program. This impact analysis is similar to the analysis undertaken by staff to study WMATA's SafeTrack program in 2016. The analysis is limited in scope to studying only the congestion impacts on selected roads within a defined sub-regional study area in the vicinity of the shutdown. Beyond this TPB analysis, separate analyses conducted by involved agencies are anticipated later this year, looking at issues such as ridership impacts, shuttle bus operations, and overall lessons learned.

Overall, the TPB staff preliminary analysis concludes that congestion impacts at the regional level were minimal. There were localized congestion impacts, but mostly within the range of typical traffic conditions. Likely reasons that impacts were limited included the summer timing of the shutdown, since peak hour traffic is generally lighter than in other months, and apparently significant numbers of Metrorail riders on the affected lines who remained on transit options rather than switching to driving.

This memorandum and the associated slide presentation have been revised and updated versus the versions provided for the October 4 TPB Technical Committee meeting, discussion of which was deferred due to time constraints. Changes include revised, corrected, and expanded data analysis. These versions supersede the earlier versions.

## **METHODOLOGY**

Staff defined a sub-regional study area (Figure 1) in the vicinity of the six stations closed as part of the work, all located in Virginia within Fairfax County, Arlington County, and the City of Alexandria. A set of highways and roads analyzed within the study area were selected by department staff, to be indicative of likely traffic impacts, and are shown in Figure 2 and Table 1. Vehicle probe data from the Regional Integrated Transportation Information System (RITIS)<sup>1</sup> and the RITIS-associated Probe Data Analytics Suite<sup>2</sup> were used to perform the analysis.

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<sup>1</sup> See <https://www.ritis.org/intro>.

<sup>2</sup> See <https://www.cattlab.umd.edu/?portfolio=vehicle-probe-project-suite>.

WMATA's Blue and Yellow Line shutdown began Saturday, May 25, 2019, and ended Sunday, September 8, 2019. Staff conducted traffic analysis for varying time periods, starting with three weeks before the shutdown (to establish a baseline); weekly from late May through the week of the July 4 holiday; multi-week periods during July and August; and weekly again from late August through September (until three weeks after the reopening). Analysis looked at weekdays only (including holidays). Changes to bottlenecks in the study area were examined, as were travel time impacts on corridors used by the shuttle buses such as the Huntington to Pentagon, Franconia-Springfield to Pentagon, and King Street to National Airport.

The overall goal of the traffic analysis was an attempt to gauge the travel time impacts at the sub-regional scale and on the routes studied.

## **TRAFFIC ANALYSIS RESULTS**

Median travel times were examined across selected routes within the study area to compare traffic conditions as the shutdown progressed. Figure 3 shows, as an example, the median travel time and, for a measurement of variability, the minimum and maximum travel time for the US 1 corridor (between VA 123 and I-395). Figure 4 expands this analysis to a number of major corridors in the study area for the entirety of the shutdown period. Results vary as per the size of the road (from the long, high-volume I-395 to a shorter, key segment of VA 611). Interstates showed the highest variability, as is typical. As Figures 3 and 4 indicate, travel time changes before, during, and after the shutdown showed few significant spikes, and were generally within the range of typical variations of traffic conditions for the area.

Bottleneck analysis is another tool from the Probe Data Analytics Suite to examine traffic impacts. Changes in bottleneck locations and severity indicate changes in congestion conditions, with variations over time due to factors such as construction zones or seasonal travel patterns. Did changes in bottlenecks in the study area show any predominating impacts of the shutdown? Figure 5 shows the top 10 bottlenecks in the study area one week prior to the shutdown, during the shutdown and one week after the shutdown respectively. Though variations did occur, it appears from Figure 5 that the shutdown did not cause predominant impacts to the bottleneck locations.

Staff also examined routes traversed by the special shuttle bus services set up during the shutdown. (The most probable routings were used; exact routes used by individual shuttle bus runs may have varied from time to time.) This was to assess how conditions on these routes compared to the overall study area, and whether there were any particular phenomena associated with these routes. Note that the Probe Data Analytics Suite data source may not be fine-grained enough to detect very localized phenomena that might have occurred in certain locations. Figure 6 shows the minimum, median, and maximum travel time in minutes between the Franconia-Springfield and Pentagon Metrorail Stations. Figure 7 similarly shows the minimum, median, and maximum travel time in minutes between the King Street and National Airport Metrorail Stations. Again, it does not appear that there were any unusual phenomena along these shuttle bus routes.

## TRANSIT TRAVEL IMPACTS

On May 25<sup>th</sup>, six Blue and Yellow line Metrorail stations, south of Ronald Reagan National Airport (Franconia-Springfield, Van Dorn Street, Huntington, Eisenhower Avenue, King Street and Braddock Road), shutdown in order for full platform reconstruction and major station improvements. The stations remained closed through September 8. Approximately 17,000 persons typically board Metrorail at these stations each weekday, who had to make alternative travel arrangements.

During the shutdown, WMATA and the jurisdictions of Alexandria, Arlington, and Fairfax County provided substitute shuttle service and operated additional bus service on regular routes.

During the first four weeks of the shutdown, WMATA reported they had retained up to 60% of normal rail ridership from the closed stations on the shuttle bus operation. Shuttle buses had on average 26,000-34,000 boarding's per day, larger than any shuttle operation during SafeTrack. This range was for all shuttle routes during the first four weeks of the shutdown.

WMATA also provided supplemental service on regular bus routes: 10A, 11Y, 21A, 8Z, and Metroway. All of these bus lines showed increases in ridership. Below is a breakdown of the respected bus lines and their ridership increases:

- Metrobus 8Z – 23% increase in ridership, or an additional 140 passengers per day.
- Metrobus Metroway – 30% increase in ridership, or an additional 746 passengers per day.
- Metrobus 21A – 46% increase in ridership or an additional 205 passengers per day.
- Metrobus 11Y – 87% increase in ridership or an additional 461 passengers per day.
- Metrobus 10A – 10% increase in ridership with an average 24% increase during the AM.<sup>3</sup>

## OTHER AGENCY AFTER-ACTION REPORTS

NVTC will be providing an update to the Commission on general lessons learned and improvements on coordination for the next shutdown. The report will mostly focus on the planning, coordination process, not the ridership impacts nor evaluation of agencies' supplemental services— this briefing will most likely occur at the November or December Commission meeting. The organization is also potentially gathering some of the stakeholders in the Platform Improvement Project for an in-person debrief in October to review the effectiveness of the supplemental service and provide feedback on the planning/coordination process.

WMATA will not be preparing a formal report, but will provide an update on the project website page that includes construction wrap-up facts, before and after photos, and some ridership statistics.

The City of Alexandria is planning to prepare a final report on travel and traffic that would be released sometime in late 2019. During the shutdown, the City of Alexandria experienced the most significant impact from the shutdown. The City installed additional traffic sensors on major corridors to monitor travel times. These sensors relayed real time traffic data and provided historical data that can be used for monitoring and decision making. Travel times varied greatly with some commute periods with lower than average travel times and some substantially higher. On average, travel times

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<sup>3</sup> All ridership data referenced here are for the first four weeks of the shutdown only. General and shuttle bus ridership figures for the full shutdown period are anticipated in future reporting from WMATA.

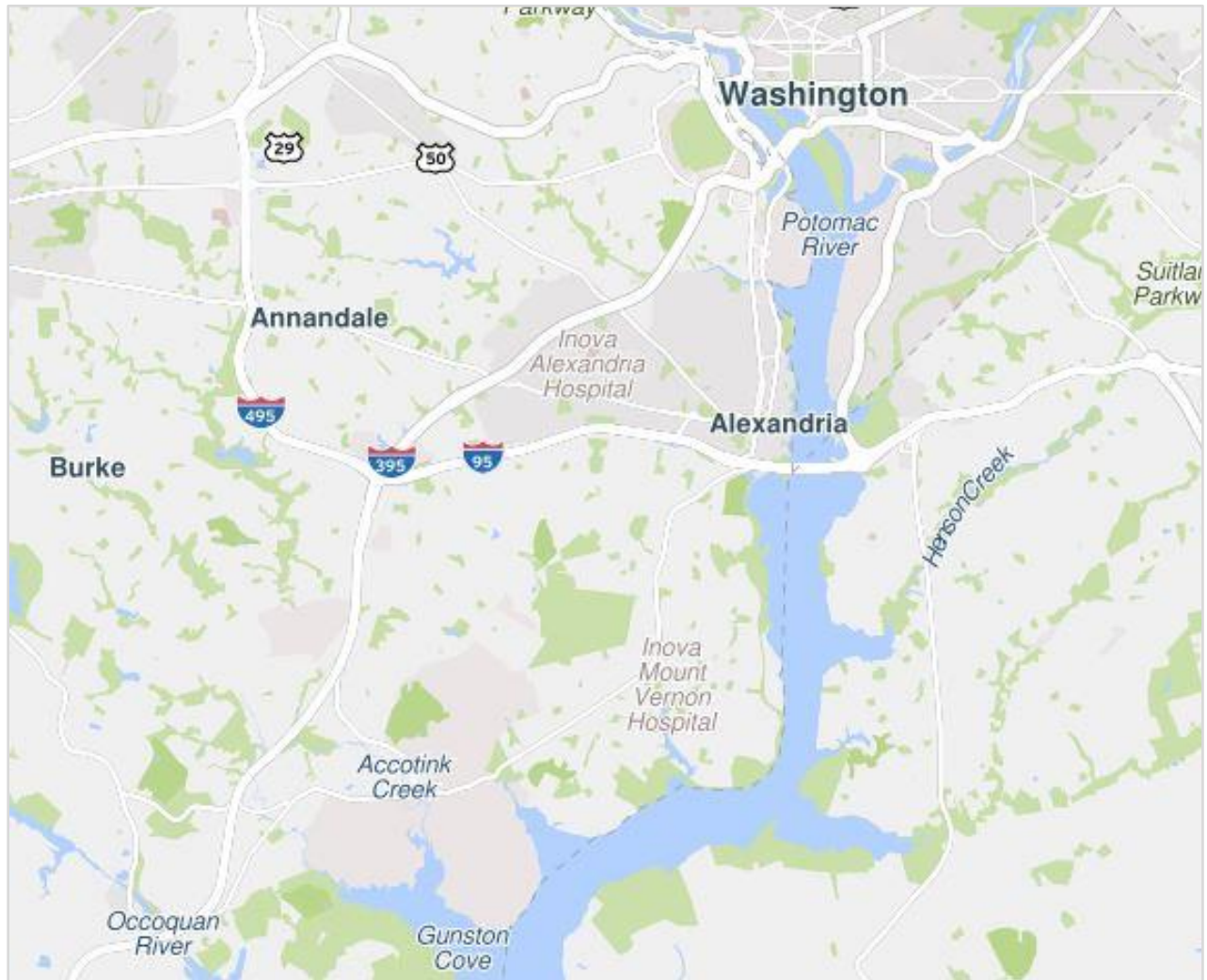
throughout the city only increased by about 4% when compared to the spring. However, travel times during the summer are typically lower due to decreased traffic during the summer months. The greatest increases were on the below corridors:

- Eastbound Duke Street (33%) during the evening commute period.
- Northbound Van Dorn Street (21%) during the morning commute period.

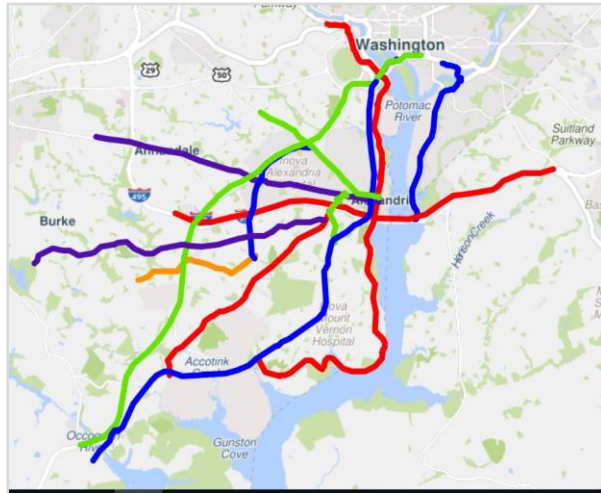
## **CONCLUSIONS**

Based on the shuttle and other transit ridership numbers, staff concluded about 2,000 to 3,000 of the typical Metrorail riders in the corridor changed travel to other than transit, possibly including driving alone, carpooling, bicycling and walking, telework, or other means. No data available at this time indicate how many may have switched to which alternative. But even under the unlikely event that a high proportion of the 2,000 to 3,000 corridor Metrorail riders switched to driving alone, those numbers spread across a number of facilities in the area and over many hours of the day did not result in traffic conditions outside normal variations. By comparison to the 2,000 to 3,000 riders, estimated average weekday daily traffic on northbound I-395 in the vicinity is about 125,000 vehicles. Even if a large portion of the transit riders switched to driving alone on I-395, and especially given relatively light summertime traffic, this caused few if any major issues. There were reports of issues during the first week, but those seems to subside quickly, and the traffic found a new equilibrium within normal variation in traffic. The transit alternatives provided, and riders' use of those alternatives, appear to have helped avoid significant regional traffic impacts during the shutdown.

FIGURE 1 - MAP OF THE GENERAL STUDY AREA



**FIGURE 2 – MAP SHOWING STUDY AREA ROUTES EXAMINED**

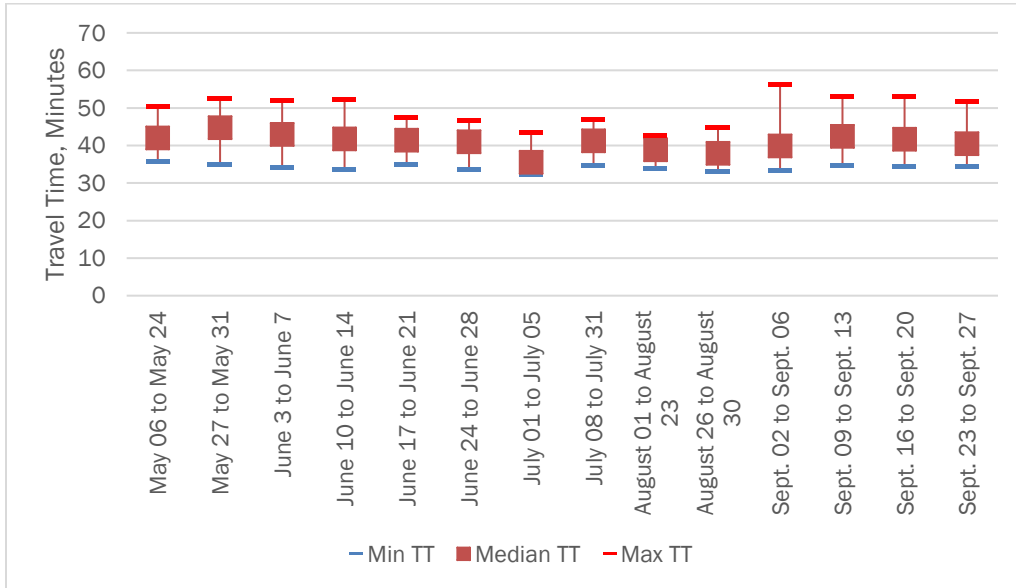


**TABLE 1 - STUDY AREA ROUTES EXAMINED IN DETAIL<sup>4</sup>**

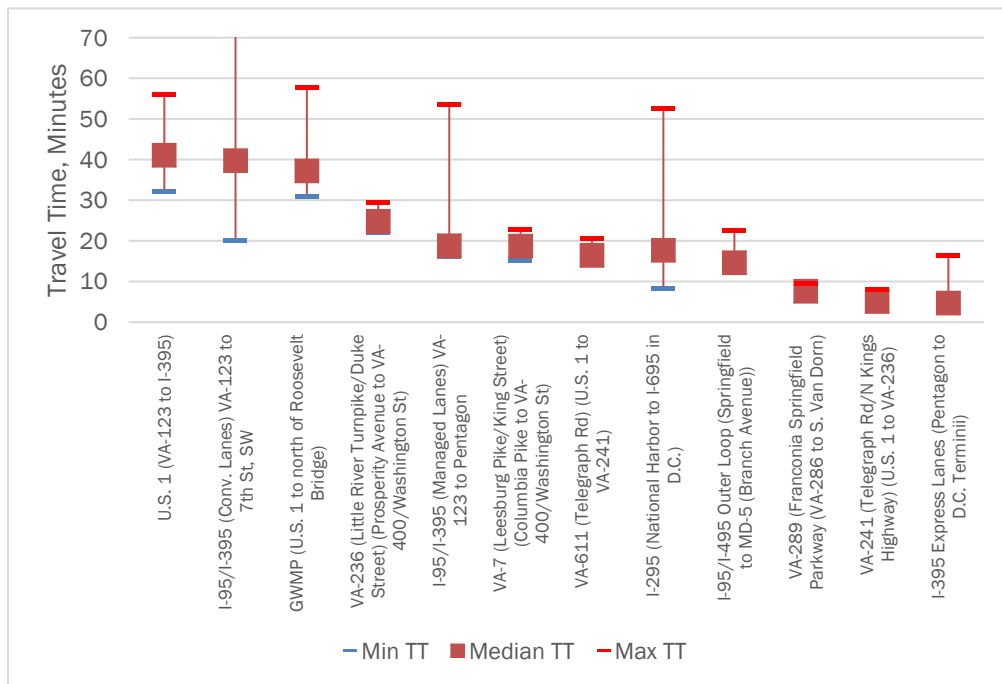
1	I-395 from I-95 (Springfield Interchange) to 7th Street, S.W. (Conventional Lanes)
2	I-95 and I-395 HOV/toll and HOV rdwy from VA-123 (Gordon Blvd) to Pentagon
3	I-395 Express Lanes from Pentagon to north terminus in District of Columbia
4	I-95 from VA-123 (Gordon Boulevard) to I-395 (Springfield Interchange)
5	I-95/I-495 from Springfield Interchange to MD-5 (Branch Avenue)
6	I-295 from I-95/I-495 to I-695
7	George Washington Memorial Pkwy from U.S. 1 to Spout Run Pkwy (includes VA-235 from U.S. 1 to Mount Vernon and VA-400 (Washington St) from Capital Beltway to Slaters Ln)
8	U.S. 1 from VA-123 (Gordon Blvd) to I-395 (north of Crystal City)
9	VA-241 (North Kings Hwy and Telegraph Rd) between U.S. 1 and VA-236
10	VA-611 (Telegraph Rd) from U.S. 1 to VA-241
11	VA-613 (South Van Dorn St) and VA-401 (North Van Dorn St) from Kingstown Blvd to VA-7 (King St)
12	VA-289 (Franconia Springfield Pkwy, Manchester Blvd and Kingstown Blvd) from VA-286 (Fairfax County Prkwy) to South Van Dorn St
13	VA-644 (Old Keene Mill Rd and Franconia Rd) from VA-286 to VA-611 (Telegraph Rd)
14	VA-236 (Duke St and Little River Turnpike) from VA-699 (Prosperity Av) to VA-400 (Washington St)
15	VA-7 (Leesburg Pike and King St) from VA-244 (Columbia Pike) to VA-400 (Washington St)

<sup>4</sup> Some routes were omitted from graphics for brevity.

**FIGURE 3 - MEDIAN, MINIMUM, AND MAXIMUM TRAVEL TIMES FOR THE US 1 CORRIDOR**

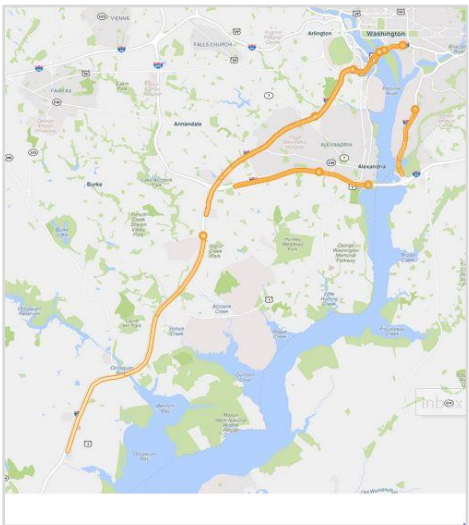
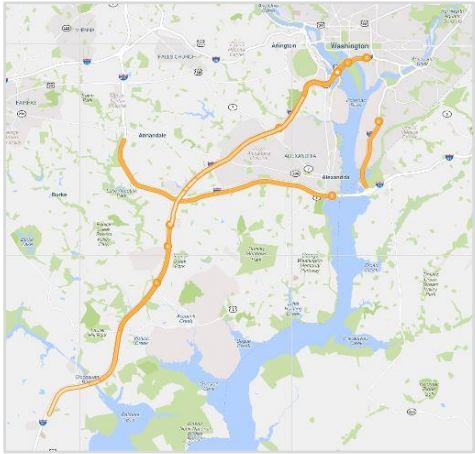
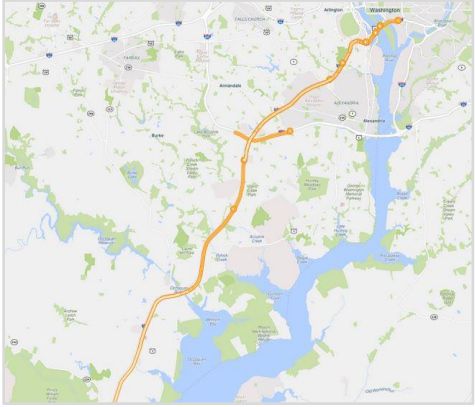


**FIGURE 4 - MAJOR CORRIDORS TRAVEL TIMES DURING FULL SHUTDOWN PERIOD<sup>5</sup>**



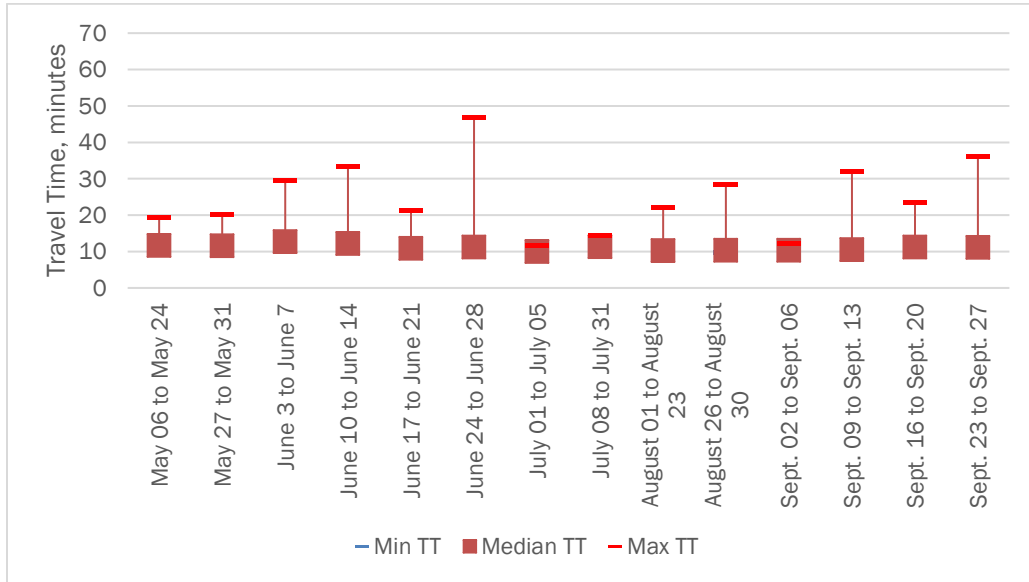
<sup>5</sup> Maximum travel time for I-95/I-395 (second column) is 71.1 minutes.

**FIGURE 5 - APPROXIMATE BOTTLENECK LOCATIONS BEFORE, DURING, AND AFTER SHUTDOWN PERIOD**





**FIGURE 6 - MINIMUM, MEDIAN, AND MAXIMUM TRAVEL TIMES FOR THE GENERAL ROUTE USED BY SHUTTLE BUSES BETWEEN FRANCONIA/SPRINGFIELD AND PENTAGON STATIONS**



**FIGURE 7 - MINIMUM, MEDIAN, AND MAXIMUM TRAVEL TIMES FOR THE GENERAL ROUTE USED BY SHUTTLE BUSES BETWEEN KING STREET AND NATIONAL AIRPORT STATIONS**

