OP•LANES™
MARYLAND

I-495 & I-270 Managed Lanes Study

APPENDIX C
FINAL COVID-19 TRAVEL ANALYSIS & MONITORING PLAN

June 2022

U.S. Department of Transportation
Federal Highway Administration

MDOT MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

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1 INTRODUCTION

The COVID-19 global pandemic had a profound impact on the daily routines of people across the world, affecting the way Maryland residents and commuters in the National Capital Region work, travel, and spend their free time. In the short-term, these changes have altered travel demand, transit use, and traffic volumes on all roadways in Maryland, the District of Columbia, and Virginia, including I-495 and I-270, during the years 2020 and 2021. In the long-term, there is uncertainty surrounding forecasts for post-pandemic traffic levels and transit use, and there is no definitive model to predict how or if changes to mobility patterns during the pandemic will affect long-term traffic trends.

While MDOT's number one priority is the health and safety of Marylanders, we are continuing with our efforts to ensure transportation improvements are being developed to meet our State's needs not only for today, but for the next 20-plus years. This Final COVID-19 Travel Analysis and Monitoring Plan has been prepared to support the FEIS and focuses on the potential long-term travel impacts associated with the pandemic, and the resulting impacts on future traffic forecasts. MDOT SHA committed to tracking trends in travel behavior and monitoring traffic volumes over time as businesses and schools reopened, and to evaluate and consider this information as part of the development of the FEIS. The Draft COVID-19 Travel Analysis and Monitoring Plan included steps to monitor travel patterns throughout the pandemic, to stay abreast of available information, research, and guidance within the larger transportation industry related to ongoing and long-term travel impacts associated with the COVID-19 pandemic, and to conduct sensitivity analyses and modeling to confirm that capacity improvements would still be required on I-495 and I-270 if future traffic demand is lower than pre-pandemic forecasts.

This Final COVID-19 Travel Analysis and Monitoring Plan builds upon the relevant resources identified in the draft plan and presents the results of the sensitivity analyses and modeling efforts. The plan includes three components, with additional details on each in the following sections:

- **Monitoring:** tracking changes in roadway and transit demand during the pandemic, including daily and hourly volume data, i.e., how does travel change in response to the number of cases, vaccine distribution, unemployment rates, school closings, and policy changes;
- **Research:** reviewing historical data and surveys/projections from the Transportation Research Board and the National Capital Region Transportation Planning Board;
- **Sensitivity Analyses:** evaluating "what if" scenarios, including potential changes in teleworking, eCommerce, and transit use on projected 2045 travel demand and operations.

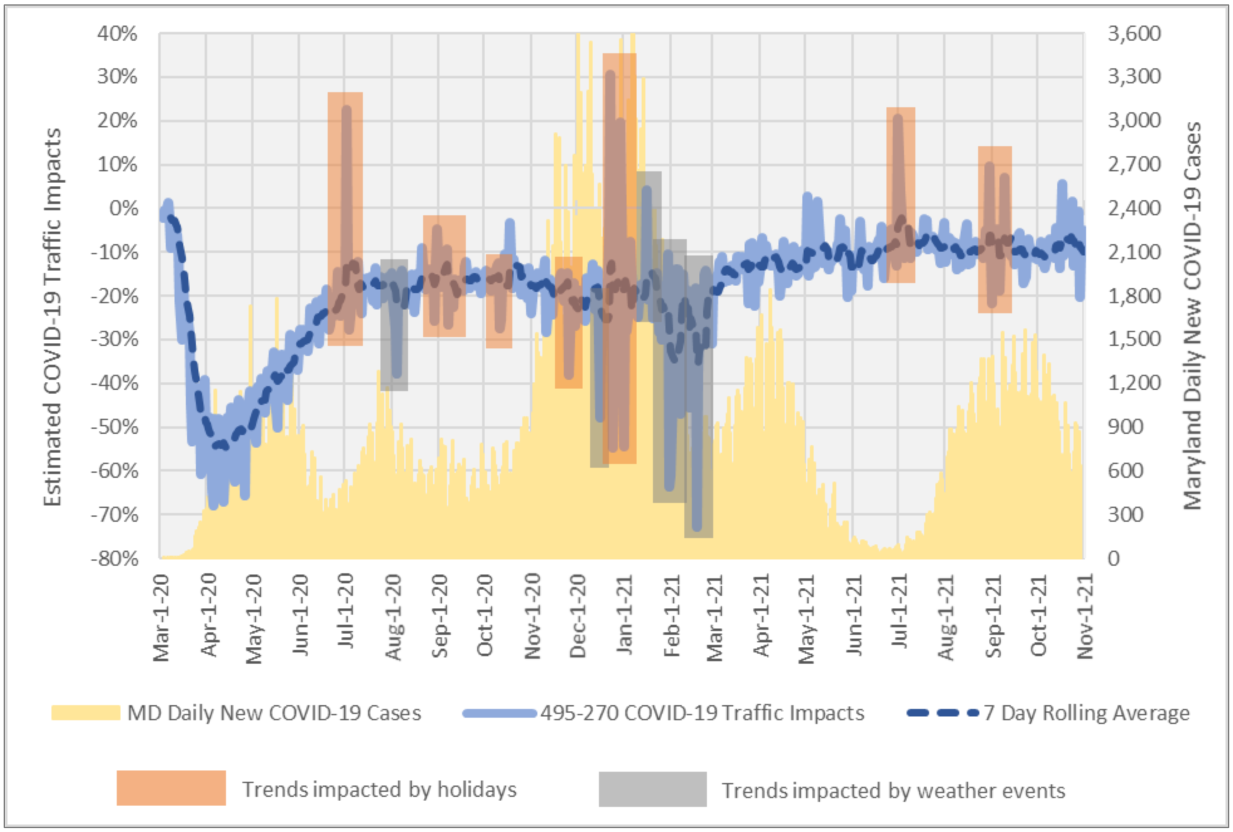
Relevant resources for each component have been compiled (attached) in **Attachments 1 through 3**.

1.1 Monitoring

As part of its ongoing mission, and in response to public comments on the DEIS, MDOT SHA has been closely monitoring the changes in traffic patterns throughout the pandemic. A memorandum was developed in August 2020 and updated on June 24, 2021 summarizing the analysis of COVID-19 related traffic impacts on the I-495 and I-270 corridors in Maryland during the first 15 months of the pandemic. This memorandum was included in the SDEIS for review by stakeholders and the public. The information and charts in the memorandum have been updated regularly throughout the project, and the most-recent available data from December 17, 2021, is included as **Attachment 1A**.

Figure 1 shows how traffic volumes within the study corridors have fluctuated during the pandemic compared to pre-pandemic levels. The data shows a severe drop in traffic volumes in April 2020 after stay-at-home orders were issued across Maryland, with daily traffic volumes on I-270 and I-495 reducing by more than 50 percent compared to April 2019. After the stay-at-home order was replaced with a "safer at home" advisory in May 2020, traffic volumes gradually increased throughout the summer, stabilizing at approximately 15 percent less than typical conditions during fall 2020. As cases began to surge in November/December 2020, traffic volumes dipped again through the winter. With the rollout of vaccines in early 2021, the corresponding drop in COVID-19 cases, and the gradual reopening of schools and businesses, daily traffic volumes have continued to recover. Volumes were back to over 90 percent of normal as of November 2021 compared to expected 2021 levels, even when considering two years of projected growth since 2019.

Figure 1: Daily Traffic Volume Changes on I-495 and I-270 During COVID-19 Pandemic vs. 2019



In addition to the project-specific information in **Attachment 1A**, MDOT posts frequent updates to statewide trends in the use of their services, including statewide weekly traffic volumes, statewide weekly truck volumes, MDTA customer traffic (toll roads), MTA services (transit), BWI passenger traffic (air travel), and Seagirt Monthly Container Counts (shipping) on the MDOT coronavirus tracking website: https://www.mdot.maryland.gov/tso/Pages/Index.aspx?PageId=141.

Statewide, weekly traffic volumes were within one percent of November 2019 values in November 2021, per MDOT's coronavirus tracking website, linked above. This is closer to pre-pandemic traffic volumes than similar measures in 2020, prior to the rollout of vaccines, when volumes were down between 15 and 25 percent. **Attachment 1B** includes graphs of the weekly changes at MDOT SHA permanent count stations throughout the state for both 2020 and 2021 compared to the 2019 pre-pandemic baseline. Hourly volumes at the permanent count stations on I-495 and I-270, shown in Figures 4 through 9 in **Attachment 1A**, indicate volumes during the afternoon peak hour have recovered closer to pre-pandemic levels compared to morning hours and daily volumes, with some permanent count stations on I-270 and I-495 recording higher volumes between 5PM and 6PM in October 2021 than October 2019. In contrast to the total traffic volumes, truck traffic rebounded more quickly after a smaller decline in the early weeks of the pandemic. Statewide, weekly truck volumes have been close to or above 2019 pre-pandemic levels since early June of 2020, as shown in the graphs in **Attachment 1B**. In November 2021, weekly truck volumes were 9 percent above the corresponding period in 2019, per MDOT's coronavirus tracking website.

Transit use has been slower to recover, with usage of Washington Metropolitan Area Transit Authority (WMATA) facilities down significantly in November 2021 compared to November 2019. WMATA rail ridership is down 73 percent on weekdays, while WMATA bus ridership is down 36 percent on weekdays, and parking at Metro facilities is down 88 percent, as shown in the WMATA Metro Ridership Snapshot from November 2021 included in **Attachment 1C**. Similarly, Maryland Transit Administration (MTA) services statewide are down over 40 percent compared to pre-pandemic levels as of November 2021, per data presented on MDOT's coronavirus tracking website.

The combined effect of changes in traffic volumes and changes in transit usage on speeds and congestion along I-495 and I-270 has also been monitored by MDOT SHA through our partnership with the Regional Integrated Transportation Information System (RITIS). RITIS compiles transportation-related data from a variety of sources, including speed and congestion data from INRIX, which MDOT SHA can obtain for any day and facility through the RITIS web portal. A review of this data indicated that congestion decreased significantly on I-495 and I-270 at the onset of the pandemic in Spring 2020, corresponding to the sharp decline in traffic volumes during that time. However, by November 2021, significant congestion had returned to the Study area, approaching pre-pandemic levels. For example, average speeds on the I-495 Inner Loop crossing the American Legion Bridge during the PM peak in early November (non-holiday) of 2021 were 20 mph, reflecting significant congestion, and matching the speeds during the similar period in November 2019 (also 20 mph). In the AM peak, average speeds on the I-495 Outer Loop between MD 650 and US 29 in early November 2021 were even lower - below 15 mph. While these speeds are slightly higher than those observed in that same area during the AM peak in November 2019 (10 mph), the findings indicate that there is still a lot of congestion along I-495 even though volumes have not fully rebounded to pre-pandemic levels along I-495 during the morning peak period. Along I-270, average speeds are generally 5 to 10 mph higher in November 2021 compared to November 2019 despite volumes exceeding 2019 levels at MDOT SHA's permanent count station located on I-270 South of MD 121. These improvements could be attributed to recent improvements completed by MDOT SHA along I-270, including the opening of the Watkins Mill interchange in 2020 and the implementation of ramp metering along southbound I-270 on-ramps in September 2021 as part of the Innovative Congestion Management (ICM) project. Even so, some congestion remains along I-270, with average speeds on I-270 southbound of approximately 30 mph during the AM peak period in November 2021 and average speeds on I-270 northbound below 40 mph during the PM peak period in November 2021. Speed data for early November 2021 and early November 2019 (non-holiday) is included in **Attachment 1D**.

MDOT SHA has also monitored an additional metric of congestion and reliability, Travel Time Index (TTI). TTI is defined as the ratio of the average (50th percentile) travel time during a particular hour to the travel time during free-flow or uncongested conditions. MDOT SHA defines "congestion" as any roadway segment with a TTI value greater than 1.15, while "severe congestion" is reached when TTI values reach 2.0. Baseline TTI data from 2017 and more recent October 2021 TTI data are included in **Attachment 1E**. In October 2021, the average TTI along I-495 (in both directions) exceeded 1.15 for 9 hours of the day (6:00 AM to 10:00 AM and 2:00 PM to 7:00 PM), while severe congestion (TTI > 2.0) was experienced in at least one segment of I-495 for 11 hours of the day (6:00 AM to 11:00 AM and 1:00 PM to 7:00 PM). These results are similar to the baseline (year 2017) data, in which the average TTI along I-495 exceeded 1.15 and severe congestion was experienced in at least one segment of I-495 for 10 hours of the day (6:00 AM to 10:00 AM and 2:00 PM to 8:00 PM). On I-270, the average TTI (in both directions) exceeded 1.15 for 5 hours of the day in October 2021 (6:00 AM to 9:00 AM and 4:00 PM to 6:00 PM), while severe congestion (TTI > 2.0) was experienced in at least one segment of I-495 for 8 hours of the day (6:00 AM to 10:00 AM and 3:00 PM to 7:00 PM). These results are slightly better than the baseline (year 2017) data, in which the average TTI along I-270 exceeded 1.15 and severe congestion was experienced in at least one segment of I-495 for 8 hours of the day (6:00 AM to 10:00 AM and 3:00 PM to 7:00 PM).

In addition to the detailed Fall 2021 data review described above, MDOT SHA continued to monitor volumes, transit ridership, and congestion patterns throughout early 2022. During this period, COVID-19 case counts surged due to the Omicron variant, schools and businesses adjusted operations, and volumes and transit ridership decreased as a result. However, by March 2022, COVID-19 case counts returned to below Fall 2021 levels, mask mandates were lifted through the region based on new CDC guidelines, and schools and businesses resumed more typical operations.

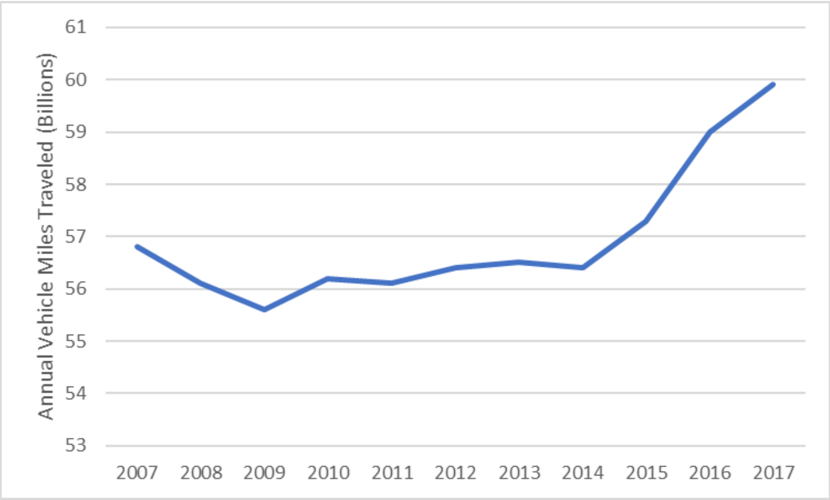
1.2 Research

Historically, vehicular travel has increased as the economy recovered following economic events and societal changes, such as the 1973 Arab oil embargo, 1979 energy crisis, and early 1990s recession. The most recent event was the Great Recession that occurred in 2007 and 2008. This recession had a prolonged effect on travel in Maryland, with impacts lasting for several years. The recession was compounded with a dramatic increase in fuel costs that further suppressed travel. However, a review of MDOT SHA Mobility Reports indicates that annual vehicle miles traveled (VMT) in Maryland returned to 2007 levels by 2015 and continued to increase significantly after that through 2017, as shown in **Figure 2**. Despite the dip in traffic volumes during and immediately following the recession, overall traffic growth in the 10 year period between 2007 and 2017 was more than 5 percent. In fact, traffic growth continued through 2019, and Maryland set a record for VMT in 2019 with 60.1 billion vehicle miles traveled. This pattern is similar to other historical events that have caused a temporary dip or plateau in travel, while the long-term trend line shown in **Figure 3** has continuously showed steady growth in VMT nationwide since 1970.

FHWA provides a monthly Traffic Volume Trends report based on hourly traffic count data collected at approximately 5,000 continuous traffic counting locations nationwide on the Office of Highway Policy

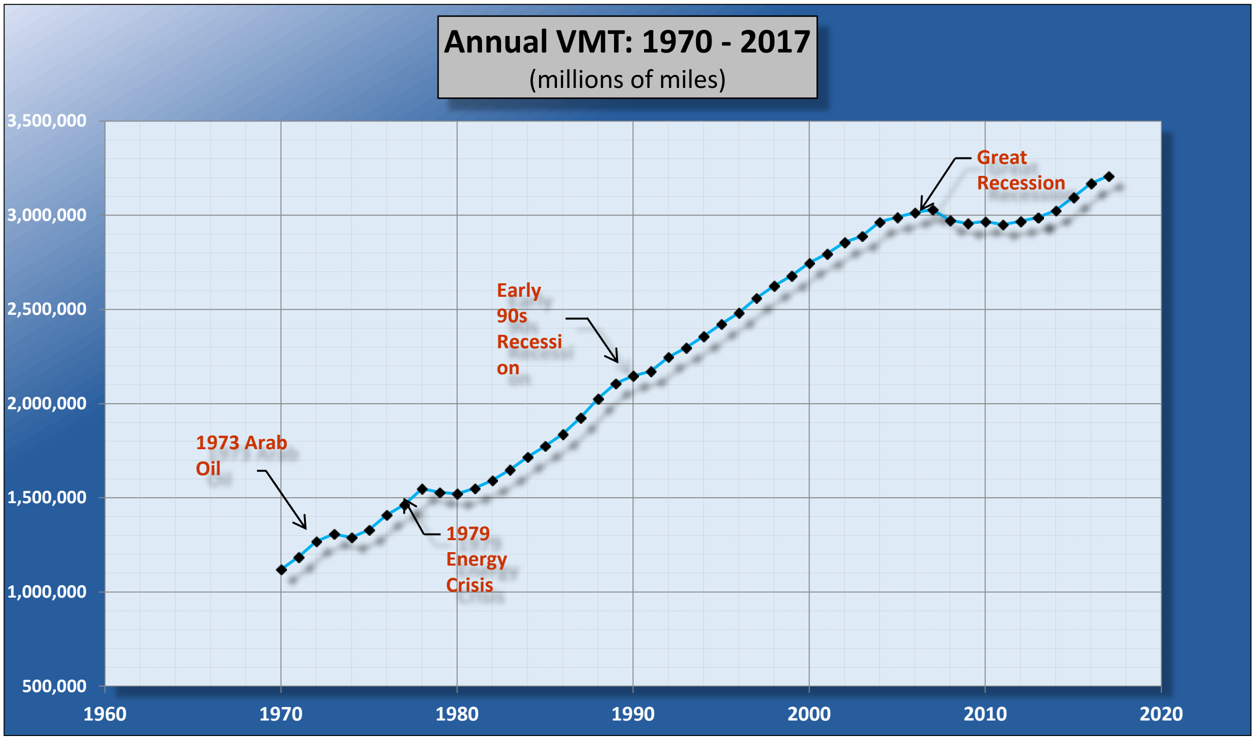
Information website: https://www.fhwa.dot.gov/policyinformation/travel_monitoring/tvt.cfm. The November 2021 report, included in **Attachment 2A**, shows that following large drops in March and April of 2020, the average daily vehicle miles traveled on both urban and rural highways, and the seasonally adjusted vehicle miles traveled by month, have rebounded, similar to the trends in Maryland described in **Section 1.1** above.

Figure 2: VMT Growth Trends in Maryland (2007 – 2017)



Source: *Maryland State Highway Mobility Reports*

Figure 3: VMT Growth Trends Nationwide (1970 – 2017)



Source: *Federal Highway Administration, Office of Highway Policy Information*

Throughout the Study, MDOT SHA has stayed abreast of available information, research studies, and guidance within the larger transportation industry related to the long-term effects of the COVID-19 pandemic on traffic volume forecasts, including the following reports and presentations, which are included in **Attachment 2B through 2H**:

- Presentation: How Much Will COVID-19 Affect Travel Behavior? by the National Academies of Sciences Engineering and Medicine Transportation Research Board, 6/1/2020 (see **Attachment 2B**)
- Presentation: COVID-19 Impacts on Managed Lanes by the National Academies of Sciences Engineering and Medicine Transportation Research Board, 6/25/2020 (see **Attachment 2C**)
- Memorandum: Transportation Impacts of the COVID-19 Pandemic in the National Capital Region by the National Capital Region Transportation Planning Board Technical Committee, 9/3/2020 (see **Attachment 2D**)
- Presentation: Commuter Connections 2020 Employer Telework Survey – Coronavirus Pandemic Survey Results by the National Capital Region Transportation Planning Board Technical Committee, 9/16/2020 (see **Attachment 2E**)
- Report: Capital COVID-19 Snapshot: Safe Return to Work by the Greater Washington Partnership, summarizing results from a survey conducted in August 2020. (see **Attachment 2F**)
- Presentation: Visualizing Effects of COVID-19 on Transportation: A One-Year Retrospective by the National Academies of Sciences Engineering and Medicine Transportation Research Board, 3/8/2021 (see **Attachment 2G**)
- Poster: Observed and Expected Impacts of COVID-19 on Travel Behavior in the United States. A Panel Study Analysis presented at the 2022 National Academies of Sciences Engineering and Medicine Transportation Research Board Annual Meeting, 1/11/2022 (see **Attachment 2H**)

Although there is no definitive conclusion on the long-term impacts for post-pandemic travel, common themes from these reports and presentations include a slower return to transit use and shared mobility with the potential for a corresponding increase in the use of private cars, an increase in online shopping that has occurred sooner than previously expected, and the potential for increases in teleworking and long-term land use changes as housing preferences change away from cities and with designated work-from-home space.

1.3 Sensitivity Analysis

The FEIS used 2045 forecasts and results based on models that were developed and calibrated prior to the onset of the COVID-19 pandemic. Based upon historic research of other similar dramatic societal effects on travel and the most recent data suggesting that traffic is rebounding close to pre-pandemic levels, the 2045 forecasts used in the FEIS have been determined to be reasonable for use in evaluating projected 2045 conditions. However, MDOT SHA acknowledges that residual effects of some of the near-term changes in travel behavior could be carried forward into the future. Therefore, a sensitivity analysis evaluating several "what if" scenarios related to future traffic demand due to potential long-term changes to teleworking, e-commerce, and transit use was also conducted as part of the Final COVID-19 Travel Analysis and Monitoring Plan. The results of the sensitivity analysis are summarized below.

The first part of the sensitivity analysis involved modifying input parameters in the MWCOG regional forecasting model based on observed changes in travel behavior during the pandemic to evaluate a range of potential long-term scenarios. Additional details of this scenario analysis step are provided in the *COVID-19 Scenario Analysis Report* included in **Attachment 3A**. Potential long-term travel impacts associated with the pandemic that could be captured within the travel demand model included changes in household travel due to increased work from home, remote learning possibilities, and increased discretionary travel, a reduction in non-home-based trips, and a decrease in long distance travel via airports, and changes in long-distance automobile travel.

Three potential scenarios were modeled using the MWCOG model. The "high impact" scenario replicated observed travel conditions in late 2020/early 2021 before the rollout of vaccines when the economy was functioning with continued work from home, and restrictions on long distance travel impacting visitor travel were still in place. During this period, there was approximately a 15% reduction in vehicle miles traveled (VMT) in the region compared to typical conditions, but this scenario would be unlikely in the long term. Two other more-likely scenarios were designed to capture potential levels between the high scenario and the original forecasts. These included a "low impact" scenario that assumed a part-time work from home schedule (1 to 2 days per week) for select industries along with limited remote learning opportunities (5 percent) and a "medium impact" scenario that assumed parameters between the low and high values. For each scenario, several model outputs were generated, including total trips, VMT, total delay, and LOS. While each scenario resulted in fewer trips, less VMT, and less overall delay than the original forecasts, a large portion of the project corridors would be projected to experience poor levels of service (LOS E or F) under No Build conditions in all scenarios. This evaluation confirmed that the project would still be needed, even if long-term effects of the pandemic were in the high impact range resulting in less traffic demand than originally projected.

Additionally, the project team consulted with MWCOG to determine how the National Capital Region Transportation Planning Board (TPB) is accounting for the potential long-term impacts of the COVID-19 pandemic in their *2022 Update to the Visualize 2045 Long-Range Transportation Plan*. MWCOG's approach is summarized in **Attachment 3B** and is consistent with the assumptions made by MDOT SHA for the Study.

The second part of the sensitivity analysis involved re-running the 2045 No Build and 2045 Build VISSIM models that were used to generate the operational results presented in the FEIS, but with reduced demand volumes to account for potential sustained impacts from the pandemic. Results from this VISSIM sensitivity analysis for the same operational metrics used in the FEIS are included in **Attachment 3C**.

For this analysis, MDOT SHA collected traffic count data in the second week of November 2021, when COVID-19 case counts were relatively low, vaccines and boosters were widely available, most schools were open for in-person learning, but many employers continued to offer flexible telework. This period avoids holidays, inclement weather, and other external factors that could impact travel, and therefore is representative of a potential long-term scenario. Data was collected at five permanent count stations located along I-270 and I-495 was compared to count data at the same locations during the same time period on the same week in November 2019. The results indicated that volumes during the AM peak period (6:00 AM to 10:00 AM) were approximately 5 percent less than normal, while volumes during the PM peak period (3:00 PM to 7:00 PM) were approximately 3 percent less than normal. Therefore, the VISSIM sensitivity analysis was conducted with AM peak period volumes 5 percent less and PM peak period volumes 3 percent less than projected in the original design year 2045 forecasts, and operational metrics were evaluated to determine the relative benefit of the Preferred Alternative under that hypothetical scenario.

The results indicate that the Preferred Alternative would be projected to provide meaningful operational benefits to the system under a reduced-demand scenario. As shown in **Table 1** below, the Preferred Alternative would be projected to reduce system-wide delay by 9 percent during the AM peak period and by 48 percent during the PM peak period compared to 2045 No Build conditions. In the AM peak period, the relative benefits of the Preferred Alternative are slightly less than for the original forecasts (9 percent versus 13 percent savings) because morning travel is impacted more significantly by factors related to the pandemic, such as increased telework. However, during the PM peak period, the relative benefits of the Preferred Alternative are higher under a reduced-demand scenario than in the original forecasts (48 percent versus 38 percent savings). This is because any long-term reduction in traffic volumes would help improve operations in the no action areas outside of the Phase 1 South limits that would otherwise constrain the overall benefits of the Preferred Alternative, particularly during the PM peak period. This trend is particularly evident when comparing the TTI results for the I-495 Inner Loop from Virginia 193 to I-270 during the PM peak, which shows a TTI of 1.2 (moderate congestion) under the reduced-demand scenario compared to a TTI of 4.0 (severe congestion) under the original forecast. VISSIM analysis results for additional metrics, including TTI, are provided in **Attachment 3C**.

Table 1: 2045 Sensitivity Analysis - System-Wide Delay for Entire Study Area

Alternative	Average Delay (min/vehicle)		Percent Improvement vs. No Build	
	AM Peak (6-10AM)	PM Peak (3-7PM)	AM Peak (6-10AM)	PM Peak (3-7PM)
No Build	8.0	8.4	N/A	N/A
Preferred Alternative	7.3	4.4	9%	48%

Note: Sensitivity analysis assumes 5% less volume during AM peak and 3% less volume during PM peak

The results of the MWCOG and VISSIM sensitivity analyses confirm that the capacity improvements proposed under the Preferred Alternative would be needed and effective even if future demand changes from the pre-pandemic forecasts based on potential long-term impacts to teleworking, e-commerce, and transit use that are not formally accounted for in the current regional forecasting models.

ATTACHMENT 1A:

COVID-19 Impacts on the I-495 and I-270 Corridors Report Update, December 17, 2021

75 State Street, Suite 701
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tel: 617 452-6000

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December 17, 2021

Dusty Holcombe
P3 Office Consultant Director
I-495 & I-270 P3 Office
601 N. Calvert St.
Baltimore MD 21202

Subject: COVID-19 Impacts on the I-495 and I-270 Corridors Report Update

Dear Mr. Holcombe:

This letter report provides an updated analysis of COVID-19 related traffic impacts on the Maryland I-495 and I-270 corridors using Maryland SHA permanent traffic count station data. An analysis of regional COVID-19 related travel data from other sources is also provided for context. This report updates the prior analysis which was presented in the "COVID-19 Impacts on the I-495 and I-270 Corridors Report Update" letter report, dated June 24th, 2020. In addition to providing more recent trends, this report includes a detailed analysis of the traffic impacts by time of day.

The COVID-19 Pandemic and Traffic

The COVID-19 pandemic continues to impact many aspects of society and the economy, including traffic levels, in a variety of ways. Beginning in March 2020, the pandemic caused significant reductions in traffic around the U.S. including in Maryland. Both direct impacts due to stay-at-home type orders and indirect impacts due to the economic recession were experienced. In the over-20 months since the beginning of the pandemic, traffic impacts have changed as the pandemic and societal responses to the pandemic have evolved. **Table 1** provides COVID-19 pandemic related traffic impact factors that were observed statistically or anecdotally during the first year of the pandemic and apply to Maryland. The factors are grouped into positive, negative, and varied travel impacts. **Table 2** shows a timeline of COVID-19 related mandates and events in Maryland.

Recent events in the timeline of COVID-19 mandates in Maryland reflect more stable conditions compared with prior iterations of this analysis. This coincides with improved vaccination rates achieved over the course of 2021 and more widespread trend of employees returning to the office in the second half of 2021. As the pandemic situation has evolved, certain factors shown in **Table 1** that were observed in the first year of the pandemic have changed. Some of these are driven by a quicker than expected increase in demand for travel and leisure activities and a return to the workplace. For example, fuel prices continued to increase in the past several months, driven by increasing demand and production stagnation. Also, longer-distance domestic vacation and leisure travel rebounded over the summer months , as shown in airline ticketing trends. Commercial

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shipping activity, which recovered to pre-pandemic levels in many sectors by fall 2020, continues to be strong. This is partially driven by growth in e-commerce during the pandemic.

Looking to the future, the medium and long-term impacts of several of the factors continue to be actively discussed and researched in the transportation industry, including those related to transit usage, e-commerce, telecommuting, and residential and employment patterns. Discussion and research related to these factors will continue to be monitored by the project team. For example, Q4 2021 trends will be monitored throughout the holiday season to observe impacts to holiday and leisure travel.

Table 1 – COVID-19 Traffic Impact Factors During the First Year of the Pandemic (March 2020 to February 2021)

Positive Traffic Impacts		Negative Traffic Impacts		Uncertain Traffic Impacts	
Passenger Cars	Commercial Vehicles	Passenger Cars	Commercial Vehicles	Passenger Cars	Commercial Vehicles
• Health concerns with transit causing shifts to vehicular travel in urban areas • Lower fuel prices	• Accelerated trends in e-commerce growth	• Reduced travel due to stay at home orders • Employment losses • Telecommuting • Ongoing avoidance of less-critical travel due to health concerns • Accelerated trends in e-commerce growth • Lower population growth due to lower immigration	• Less shipping activitiy and deliveries related to declines in economic activity	• Potential shift to relatively more local vacation and leisure activity • Potential shifts in residential and job location patterns	• Potential supply chain changes, for example related to international trade

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Table 2 (cont. on next page) – Timeline of COVID-19 Mandates and Events in Maryland

Calendar Year	Date	Description
2020	March 12	- Gatherings of more than 250 people banned - Schools closed until March 27th
2020	March 16	- Gatherings of more than 50 people banned - All bars and restaurants closed
2020	March 19	- Gatherings of more than 10 people banned - Transit for essential travel only
2020	March 23	- Non-essential businesses closed
2020	March 30	- Residents ordered to stay-at-home indefinitely, persons traveling into Maryland are required to self-quarantine for 14 days.
2020	April 17	- Schools closed through May 15th
2020	April 18	- Residents ordered to wear face masks in public settings
2020	May 6	- Schools closed through the end of the academic year
2020	May 15	- Statewide Stay at Home order replaced by Safer at Home advisory. Some jurisdictions began Stage One of "Maryland Strong: Roadmap to Recovery" program but most social distancing measures generally remain in place.
2020	June 5	- Maryland began moving to Stage Two of "Maryland Strong: Roadmap to Recovery" with the opening of businesses including manufacturing, construction, retail shops, specialty vendors, wholesalers, warehouses, and professional offices. Additionally, personal services(including salons, massage, and tattoo parlors) resumed operations at 50 percent capacity and the state government returned to more normal operations
2020	June 12	- Additional Stage Two openings occurred including indoor dining and pools at 50 percent capacity and outdoor amusements at full capacity
2020	June 19	- Additional Stage Two openings occurred including indoor fitness activities at 50 percent capacity and casinos, arcades, and malls at full capacity. Schools and child care centers also began partial reopening
2020	July 29	- An increase in COVID-19 hospitalizations in Maryland resulted in a pause in reopening plans. - Maryland residents were strongly advised to postpone or cancel travel to states with COVID-19 positivity testing rates of greater than or equal to 10 percent.
2020	July 31	- An expanded statewide face mask order went into effect.
2020	August 27	- All schools in Maryland authorized to reopen
2020	September 4	- Maryland began moving to Stage Three of the "Maryland Strong: Roadmap to Recovery" with additional safe and gradual openings. Effective September 4th at 5 PM, outdoor venues may open to general public at 50% capacity or 250 people, whichever is less. Capacity for retail establishments and religious facilities increased from 50 to 75 percent. Indoor theaters may open to the general public at 50% capacity, or 100 people per auditorium—whichever is less
2020	September 21	- Expanded capacity for indoor dining, from 50 to 75 percent, was put into place

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Table 2 (continued) – Timeline of COVID-19 Mandates and Events in Maryland

Calendar Year	Date	Description
2020	October 1	- Capacity limits on child care facilities lifted; indoor visitings allowed at nursing homes
2020	November 5	- Maryland enters red zone for coronavirus case rates; Travel advisory to avoid travel to and from states with positivity rates for 10% or higher renewed.
2020	November 20	- Hospital visitations restricted until further notice. Nursing home visitations limited to compassionate care visits. - Retail businesses and religious institutions back to Stage Two 50% capacity restrictions. Restaurants and Bars to close by 10 PM. - Fans restricted at any professional or collegiate stadiums and racetracks.
2020	December 14	- First COVID-19 vaccine administered in Maryland
2021	January 18	- Maryland moves to Phase 1B of the COVID-19 vaccine protocols to include all Marylanders 75 and older, as well as anyone of any age living in assisted living or independent living facilities and developmental disabilities and behavioral health group homes, K-12 teachers, education staff and child care providers.
2021	January 25	- Maryland moves to Phase 1C of the COVID-19 vaccine protocols to include adults 65 and older, U.S. Postal Service employees and essential workers in manufacturing and agriculture.
2021	March 12	- Capacity limits lifted on outdoor and indoor dining, retail businesses, religious facilities and personal services. - Large Outdoor and Indoor venues may operate at up to 50% capacity. - Quarantine requirements lifted on out of state travel.
2021	March 23	- Maryland moves to Phase 2A of the COVID-19 vaccine protocols to include all Marylanders, aged 60 and older.
2021	March 30	- Maryland moves to Phase 2B of the COVID-19 vaccine protocols to include all Marylanders, aged 16 and older with underlying health conditions.
2021	April 6	- COVID-19 vaccine eligibilty opens for all Marylanders, aged 16 and older at any of the state's mass vaccination sites.
2021	April 12	- COVID-19 vaccine eligibilty opens for all Marylanders, aged 16 and older at any vaccine provider in the state.
2021	April 28	- Maryland's statewide outdoor mask mandate lifted
2021	May 15	- All remaining capacity restrictions lifted on all indoor entertainment venues and conventions, and all outdoor entertainment, art, and sports venues, including all ticketed events. - All remaining capacity and distancing restrictions lifted on indoor and outdoor dining. - Maryland's indoor mask mandate lifted except for public transportation, health care settings and schools.
2021	May 31	- 70% of adults in Maryland have received at least one dose of the COVID-19 vaccine.
2021	June 15	- State of emergency in Maryland lifted with most pandemic-related orders ending as of July 1, 2021.
2021	August 5	- Maryland state employees who work in congregate settings must provide proof of COVID-19 vaccination effective September 1, 2021
2021	August 18	- All Maryland nursing home and hospital employees must get vaccinated against COVID-19 or be subject to regular testing
2021	September 3	- The COVID-19 case count in Maryland crosses 500,000.
2021	November 3	- COVID-19 vaccine rollout begins for 5- to 11-year old children.

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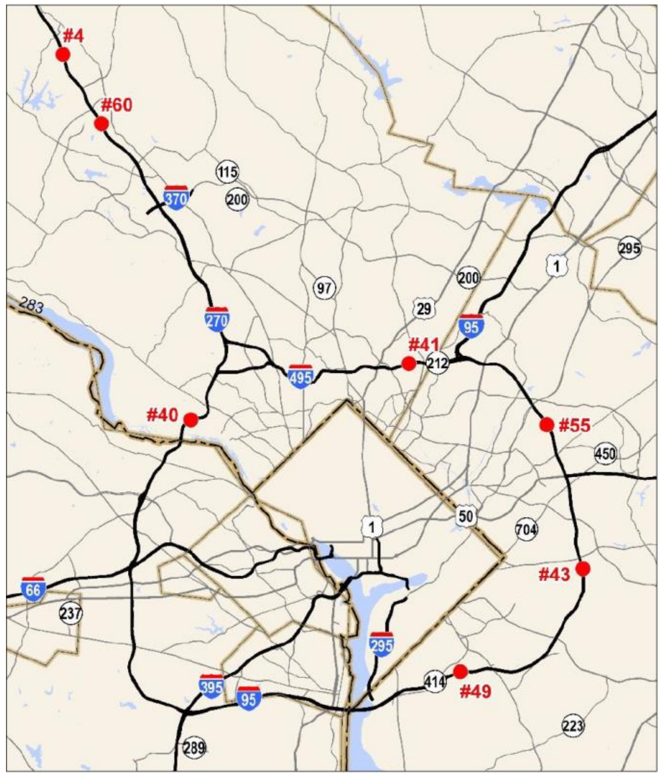
Traffic Analysis Methodology

Traffic trends on the I-495 and I-270 project corridor were analyzed using data from SHA permanent count stations (ATRs). The six ATR locations on these corridors used for the analysis are listed below and are shown in **Figure 1.**

- I-495 ATR #40: At Persimmon Tree Road
- I-495 ATR #41: West of MD 650
- I-495 ATR #55: At Good Luck Road
- I-495 ATR #43: South of MD 214
- I-270 ATR #4: South of MD 121
- I-270 ATR #60: South of Middlebrook Road

Figure 1 – Permanent Traffic Count Station (ATR) Locations on I-495 and I-270



Note: Location #49 was not used in this analysis

The hourly data for the ATR locations was downloaded from the MDOT SHA Internet Traffic Monitoring System website or obtained from SHA Traffic Monitoring System Team Data Services Division staff. Breakdowns of the data by vehicle classification, which were used from past years at some ATR locations, were no longer available at any of the I-495 and I-270 ATR locations for the years needed for the COVID-19 analysis. Therefore, the COVID-19 impact analysis was performed based on total traffic.

The daily COVID-19 impact data analysis methodology is described below:

1. Data for 2020 before the onset of COVID-19 impacts (from January 2020 to early March 2020) was compared to similar data by day for 2019 to estimate an annual 2019 to 2020 traffic change (growth) rate by ATR location. Note that the comparison was made by shifting the comparison dates to the same day of week rather than the same exact date. For example, Sunday March 1, 2020 was compared to Sunday March 3, 2019.
2. The pre-COVID-19 traffic change (growth) rates were applied to corresponding data by day from the year before the pandemic (March 2019 to February 2020). This resulted in an

estimate of traffic levels without the COVID-19 impact. Only one year of traffic change rates were applied to the estimated traffic without the COVID-19 impact.

3. The estimated traffic without the COVID-19 impact was compared with actual traffic since March 2020 to estimate an impact due to COVID-19. This analysis methodology accounts for seasonal impacts on traffic.

The analysis of hourly impacts was conducted by directly comparing hourly traffic on average weekdays before the pandemic with hourly traffic since the pandemic. No traffic change (growth) rates were applied to the hourly data from before the pandemic in this comparison. This was because some time periods at some ATR locations experienced severe congestion and queuing so traffic change (growth) rates would not be able to be applied consistently to all hours. Rather than attempting to apply varied traffic change (growth) rates by time of day, the hourly data post-pandemic was directly compared to pre-pandemic data.

Daily and Monthly Analysis Results

Figure 2 shows the seven-day rolling average COVID-19 traffic impacts by ATR location and **Figure 3** shows the impacts for all ATR locations combined (both daily and seven-day rolling average trends). **Table 3** also estimates the results by month by ATR location. The most recent month of October 2021 has an estimated COVID-19 impact of about -9 percent at all locations, which is among the lowest monthly impact since the beginning of the pandemic, and similar to impacts observed since June 2021. The percent impacts shown in these figures and table are the difference between actual transactions observed since March 2020 compared to estimates of traffic levels that would have occurred without COVID-19, including growth over 2019.

Based on **Table 3,** the variation of impacts between ATR locations has narrowed over time. From April to August 2020, the range of estimated COVID-19 traffic impacts by ATR location varied by 10 to 13 percentage points. ATRs #43 and #55 on the east I-495 beltway showed the least negative impacts early in the pandemic through September 2020. Over those same months, ATR #40 showed the most severe impacts. The variation in recent months was much lower, consistently around five percentage points. The lower variation over time, which may be due to some COVID-19 impact factors (see **Table 1**) evening out over time across the locations as the recovery continues.

From **Table 3**, the total estimated COVID-19 impacts for all ATR locations was the highest in April 2020 at -52 percent. There was a significant recovery in May 2020 through July 2020 to -17 percent, followed by a more gradual recovery through October 2020 to -16 percent. Impacts became gradually more severe in November 2020 and the winter months of 2020/2021, due to an elevated number of new COVID-19 cases, although February impacts were also severely impacted by weather events making the trend in that month misleading. Following this, traffic steadily increased until May 2021, after which COVID-19 impacts have stabilized close to -9 percent.

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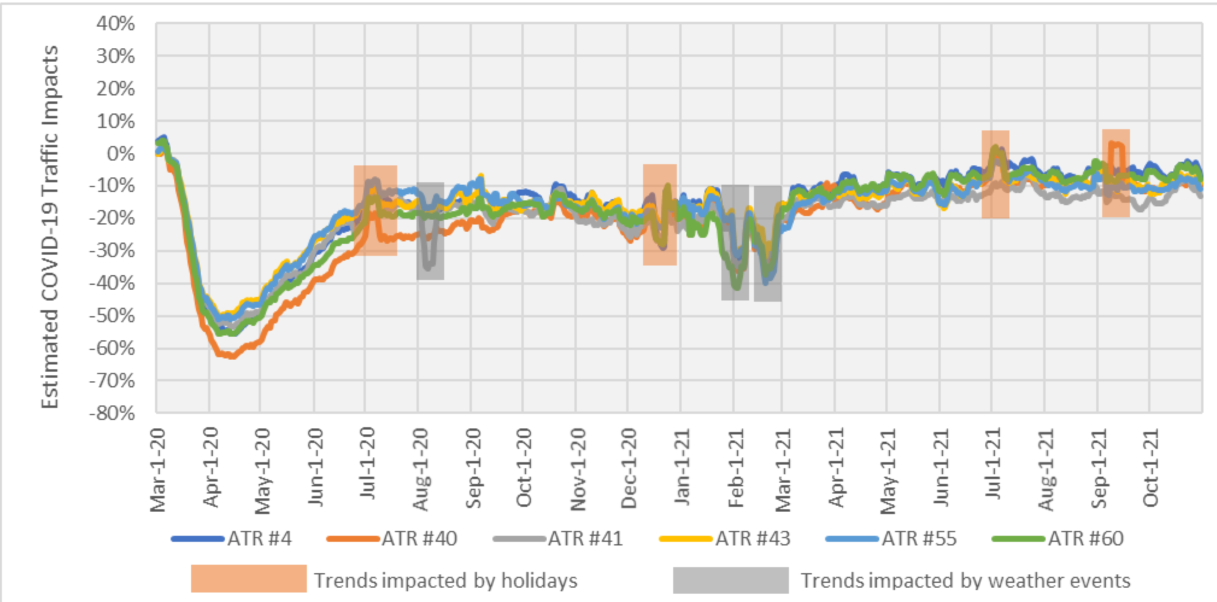
Figure 2 – Estimated Seven-Day Rolling Average COVID-19 Impacts by Day by Location



Note: Impacts represent the percent difference between observed transactions since March 2020 and estimates of traffic levels that would have occurred without COVID-19, including growth over 2019.

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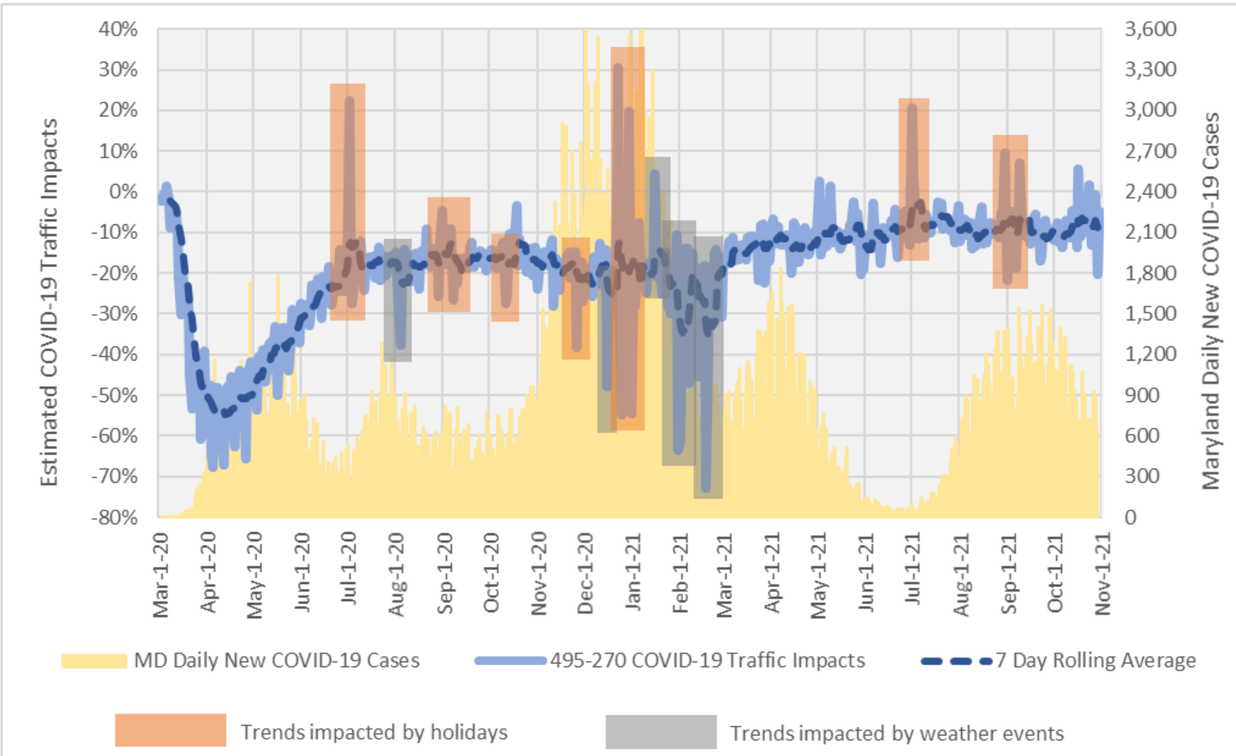
Figure 3 – Estimated COVID-19 Impacts by Day for all ATR Locations



Note: Impacts represent the percent difference between observed transactions since March 2020 and estimates of traffic levels that would have occurred without COVID-19, including growth over 2019.

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Table 3 – Estimated COVID-19 Impacts by Month by Location

Calendar Year	Month	ATR #4	ATR #40	ATR #41	ATR #43	ATR #55	ATR #60	Total All Locations
2020	March	-24%	-28%	-22%	-21%	-22%	-24%	-24%
2020	April	-52%	-60%	-50%	-47%	-48%	-53%	-52%
2020	May	-38%	-46%	-38%	-34%	-34%	-40%	-38%
2020	June	-23%	-32%	-23%	-20%	-19%	-27%	-24%
2020	July	-15%	-25%	-16%	-15%	-11%	-18%	-17%
2020	August	-16%	-23%	-20%	-15%	-13%	-18%	-18%
2020	September	-14%	-21%	-18%	-15%	-14%	-17%	-17%
2020	October	-13%	-18%	-16%	-15%	-15%	-16%	-16%
2020	November	-17%	-21%	-22%	-16%	-18%	-18%	-19%
2020	December	-19%	-22%	-22%	-17%	-18%	-21%	-20%
2021	January	-19%	-22%	-22%	-18%	-20%	-27%	-22%
2021	February[(1)]	-25%	-28%	-27%	-23%	-29%	-28%	-27%
2021	March	-11%	-16%	-15%	-13%	-15%	-12%	-14%
2021	April	-10%	-15%	-15%	-12%	-11%	-10%	-13%
2021	May	-8%	-10%	-14%	-11%	-11%	-9%	-11%
2021	June	-6%	-10%	-13%	-10%	-10%	-7%	-10%
2021	July	-3%	-8%	-10%	-6%	-6%	-5%	-7%
2021	August	-6%	-9%	-13%	-9%	-10%	-6%	-9%
2021	September	-5%	-7%	-15%	-10%	-11%	-7%	-10%
2021	October	-6%	-9%	-12%	-9%	-10%	-6%	-9%

[(1)] Traffic in February 2021 was severely impacted by weather events.

Note: Impacts represent the percent difference between observed transactions since March 2020 and estimates of traffic levels that would have occurred without COVID-19, including growth over 2019.

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In addition to the total trend at all ATR locations, **Figure 3** also graphs Maryland's daily new COVID-19 cases, as reported by the Maryland Department of Health[1]. Total ATR traffic declines were most severe in mid-April 2020 coinciding with the first wave of new cases. New cases peaked in mid-May then steadily declined through late June 2020. During this time a steady recovery in traffic occurred. The traffic impact trend improved only slightly through October during the time when the daily new cases fluctuated but remained relatively low. New COVID-19 cases started increasing significantly again starting late October and correspondingly the traffic levels dropped in November 2020. This trend continued through January 2021. With the decrease in new cases and improved access to COVID-19 vaccination, traffic levels started recovering in March 2021. The peak in new cases in late March through April 2021 did not appear to impact the traffic recovery trend. Towards the end of May 2021, the number of new COVID-19 cases in Maryland were the lowest since the beginning of the pandemic in March 2020. Another peak in cases occurred between August and November 2021, however traffic impacts remained stable.

Hourly Analysis Results

The daily COVID-19 impacts shown previously were found to vary when considering the results by time of day, especially for sections of I-495 and I-270 that experienced the most severe congestion and queuing before the pandemic. As described in more detail in this section, it was found that afternoon and evening hours have recovered to closer to pre-pandemic levels compared to morning hours.

Figure 4 through **Figure 9** show hourly traffic for both directions of travel at each of the six ATR locations. The figures include average Monday to Friday weekday traffic for April 2019 (wide pink line) and October 2019 (wide light blue line) which are pre-pandemic months, April 2020 (red line) with the largest pandemic-related traffic impacts of any month, and the most recent month, October 2021 (dark blue line). Callouts on each figure show the comparison of pre-pandemic versus post-pandemic traffic for the 7:00 to 7:59 AM hour and 5:00 to 5:59 PM hour for April 2019 versus April 2020 and October 2019 versus October 2021.

Traffic observed on I-270 (ATR locations #4 and #60) in October 2021 has recovered to near pre-pandemic levels for the majority of the day. Traffic at ATR location #60, south of Middlebrook Road, has recovered to the degree that congestion-related constraints are visible in the PM peak in the northbound direction, similar to pre-pandemic conditions. Morning peak period traffic in the southbound direction has not recovered to the same degree.

Similar trends can be seen at ATR locations on I-495. Evening peak hour traffic in October 2021 has recovered to levels within 11 percent of pre-pandemic levels at all four ATR locations on I-495 in

[1] https://coronavirus.maryland.gov/datasets/mdcovid19-totalcasesstatewide

both directions of travel. For example, PM peak traffic traveling in the eastbound direction at ATR location #40 (at Persimmon Tree Road) has recovered sufficiently to reflect congestion-related constraints approaching pre-pandemic conditions. Morning peak hour traffic through October remains below pre-pandemic levels in excess of 10 percent in both travel directions at all four locations. The most severe impacts remaining can be seen at ATR #40 where AM peak hour traffic in October 2021 was still 29 percent below pre-pandemic levels in both travel directions. This is likely due to remote work and flexible work hours options continuing to impact the early commute.

Figure 10 is similar to **Figures 4** through **Figure 9** but reflects traffic data from all six ATR locations in both directions added together. The overall differences in recovery by time of day can be seen in this graphic. The broad trend for all ATR locations indicates that the most recent traffic shows a significant return to pre-pandemic levels, with the exception of the morning peak, which has recovered significantly but still lags the pre-pandemic benchmark.

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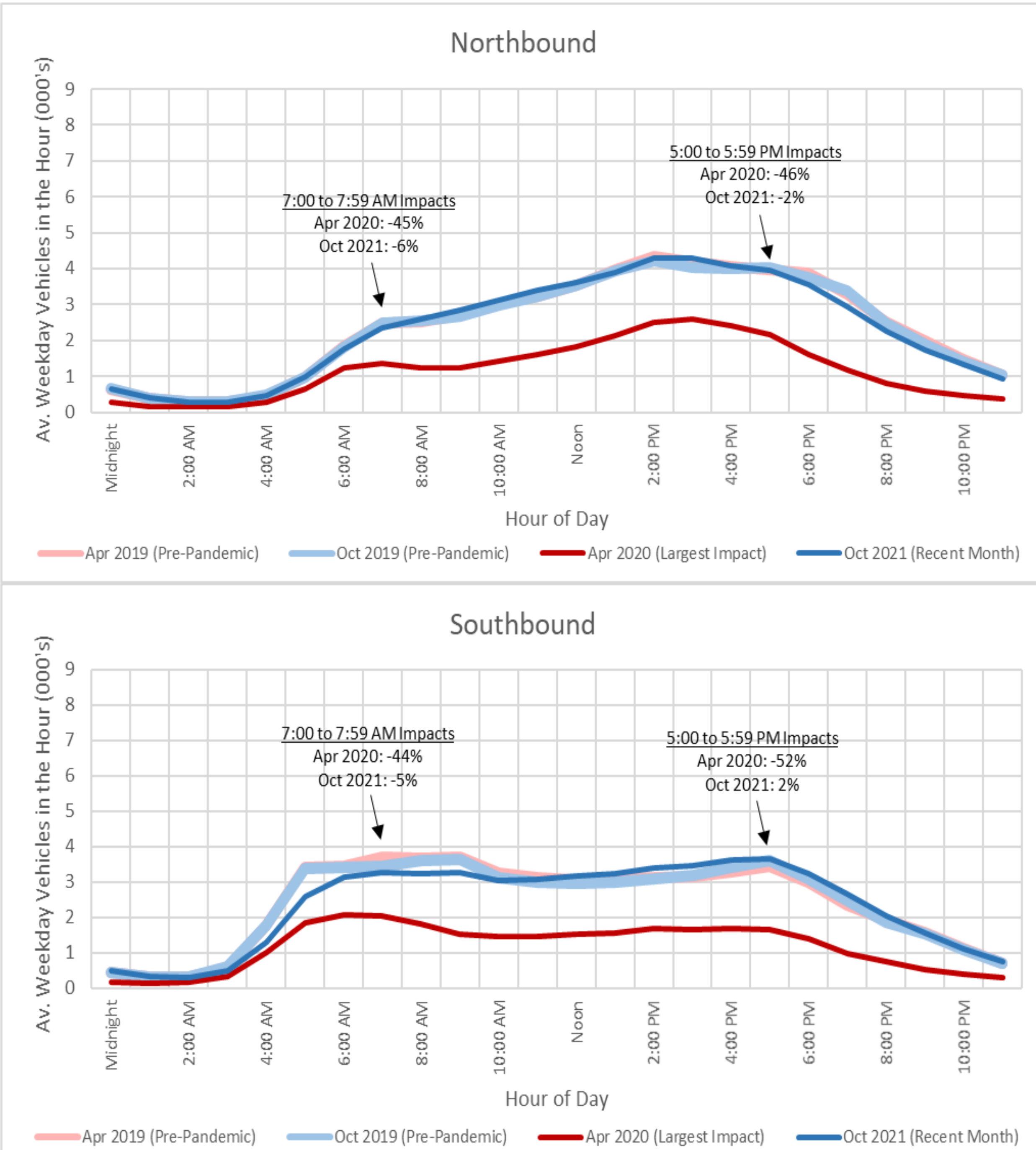
Figure 4 – Average Weekday Hourly Traffic at I-270 ATR Location #04



Note: Hourly traffic volumes represent unadjusted average non-holiday weekdays and have not been adjusted to account for traffic growth over 2019 had COVID-19 not occurred.

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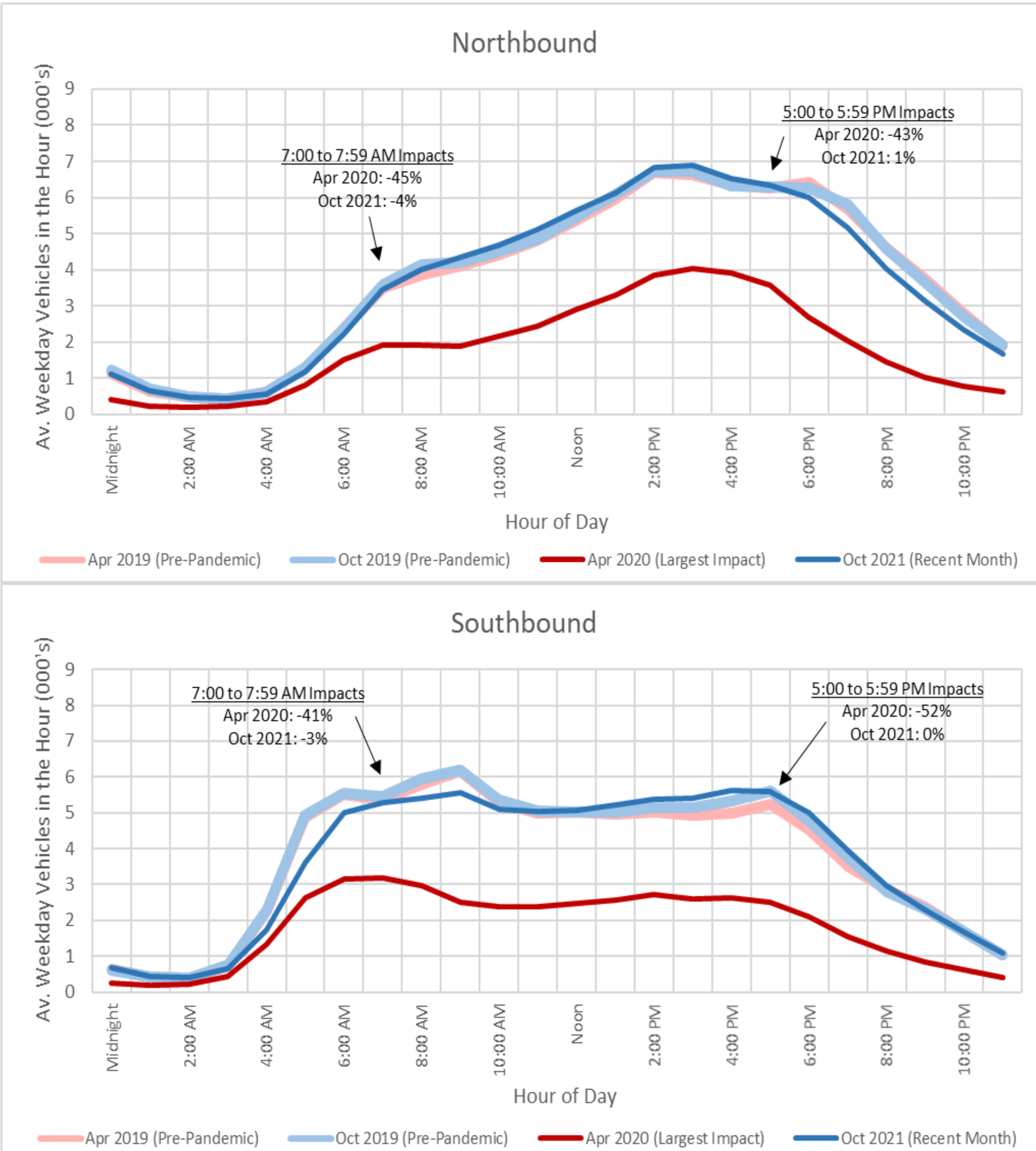
Figure 5 – Average Weekday Hourly Traffic at I-270 ATR Location #60



Note: Hourly traffic volumes represent unadjusted average non-holiday weekdays and have not been adjusted to account for traffic growth over 2019 had COVID-19 not occurred.

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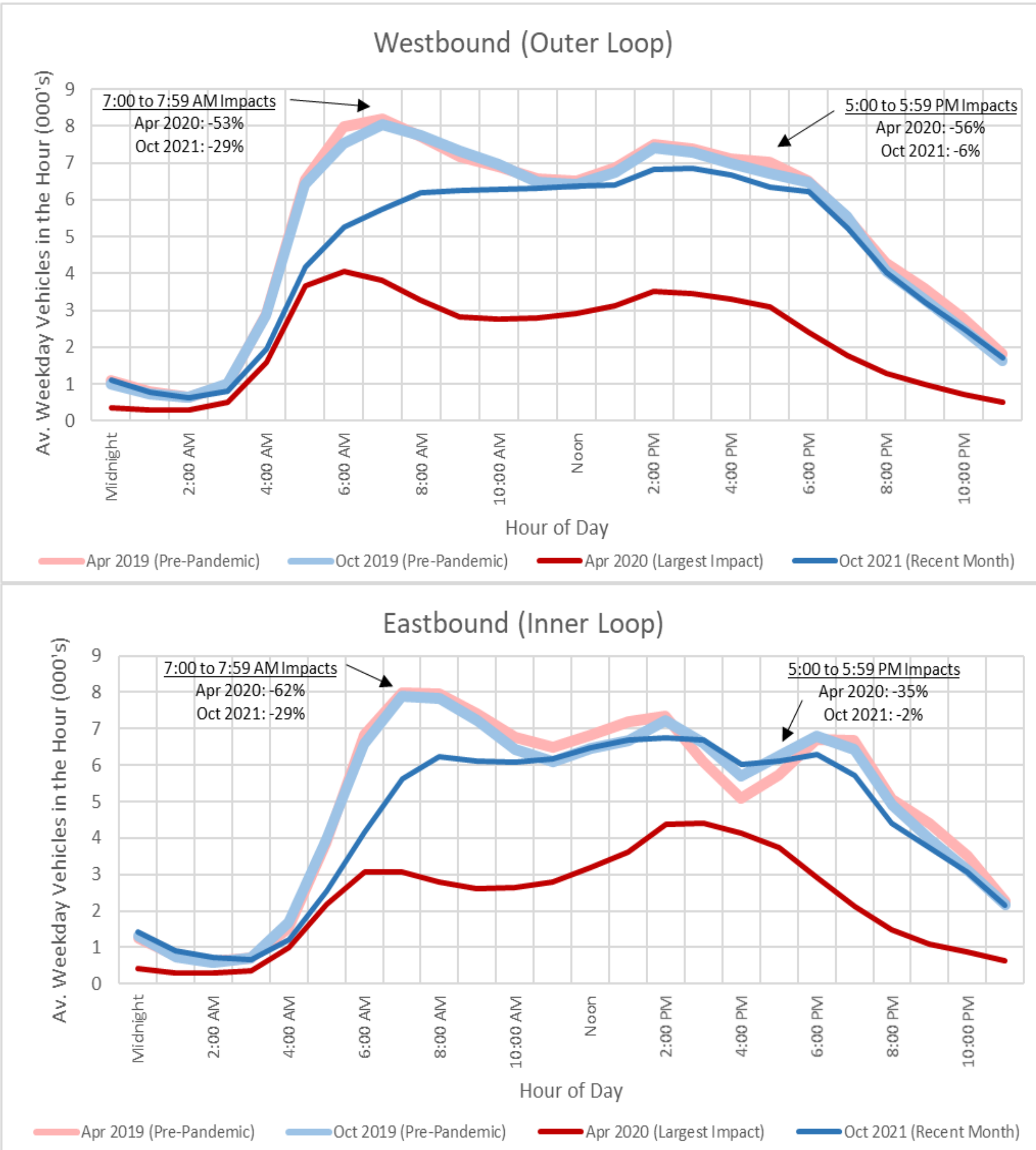
Figure 6 – Average Weekday Hourly Traffic at I-495 ATR Location #40



Note: Hourly traffic volumes represent unadjusted average non-holiday weekdays and have not been adjusted to account for traffic growth over 2019 had COVID-19 not occurred.

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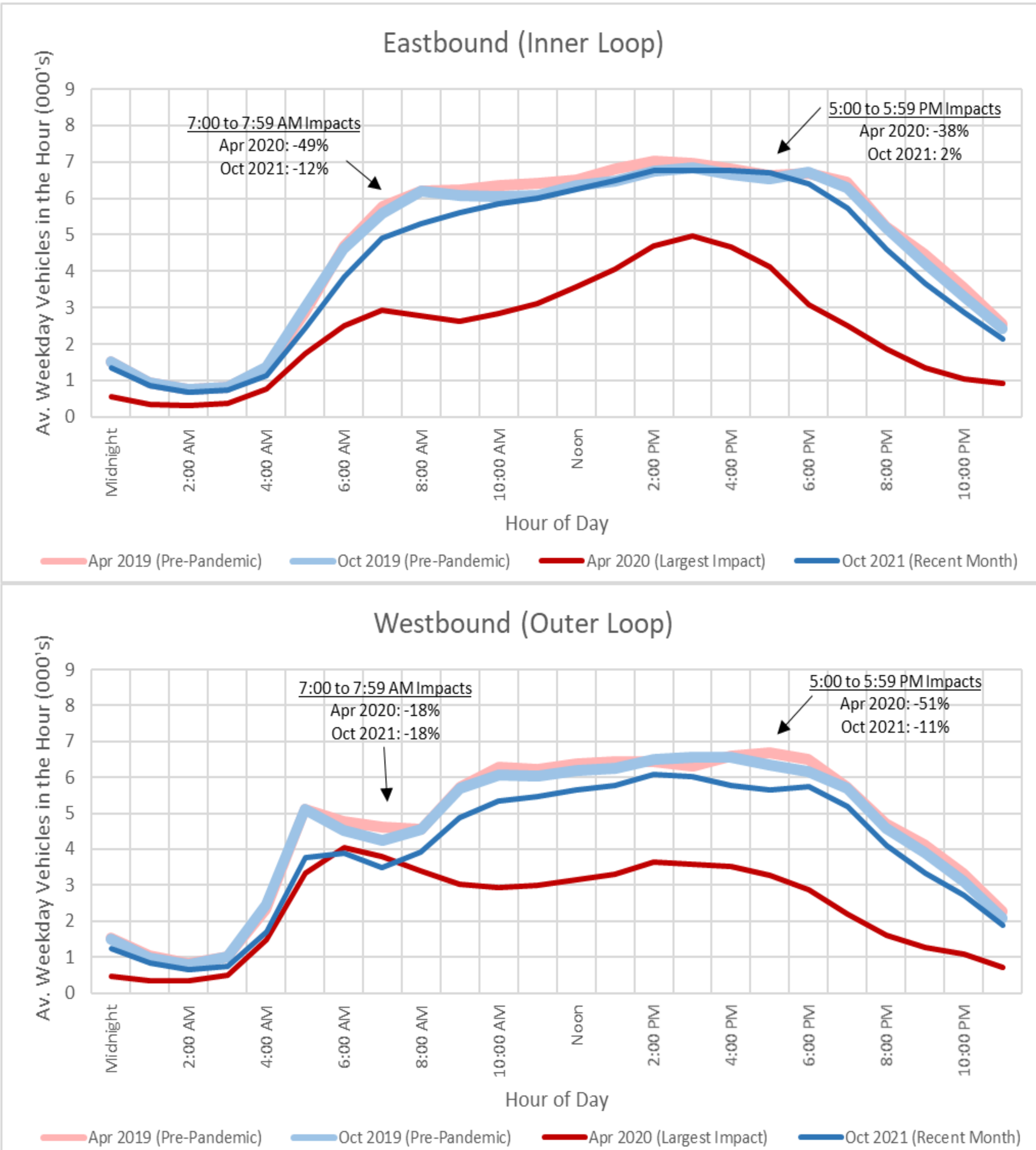
Figure 7 – Average Weekday Hourly Traffic at I-495 ATR Location #41



Note: Hourly traffic volumes represent unadjusted average non-holiday weekdays and have not been adjusted to account for traffic growth over 2019 had COVID-19 not occurred.

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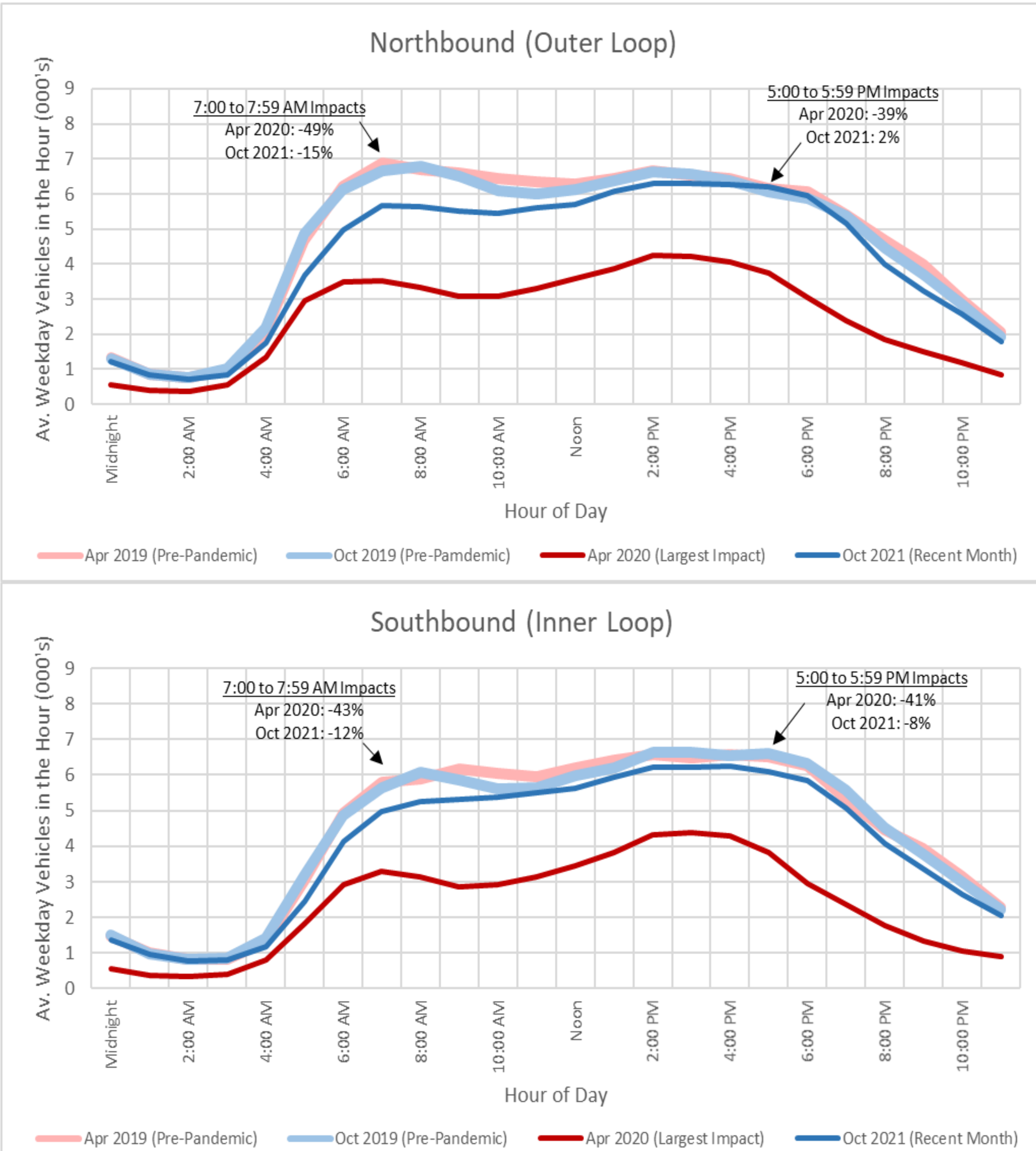
Figure 8 – Average Weekday Hourly Traffic at I-495 ATR Location #55



Note: Hourly traffic volumes represent unadjusted average non-holiday weekdays and have not been adjusted to account for traffic growth over 2019 had COVID-19 not occurred.

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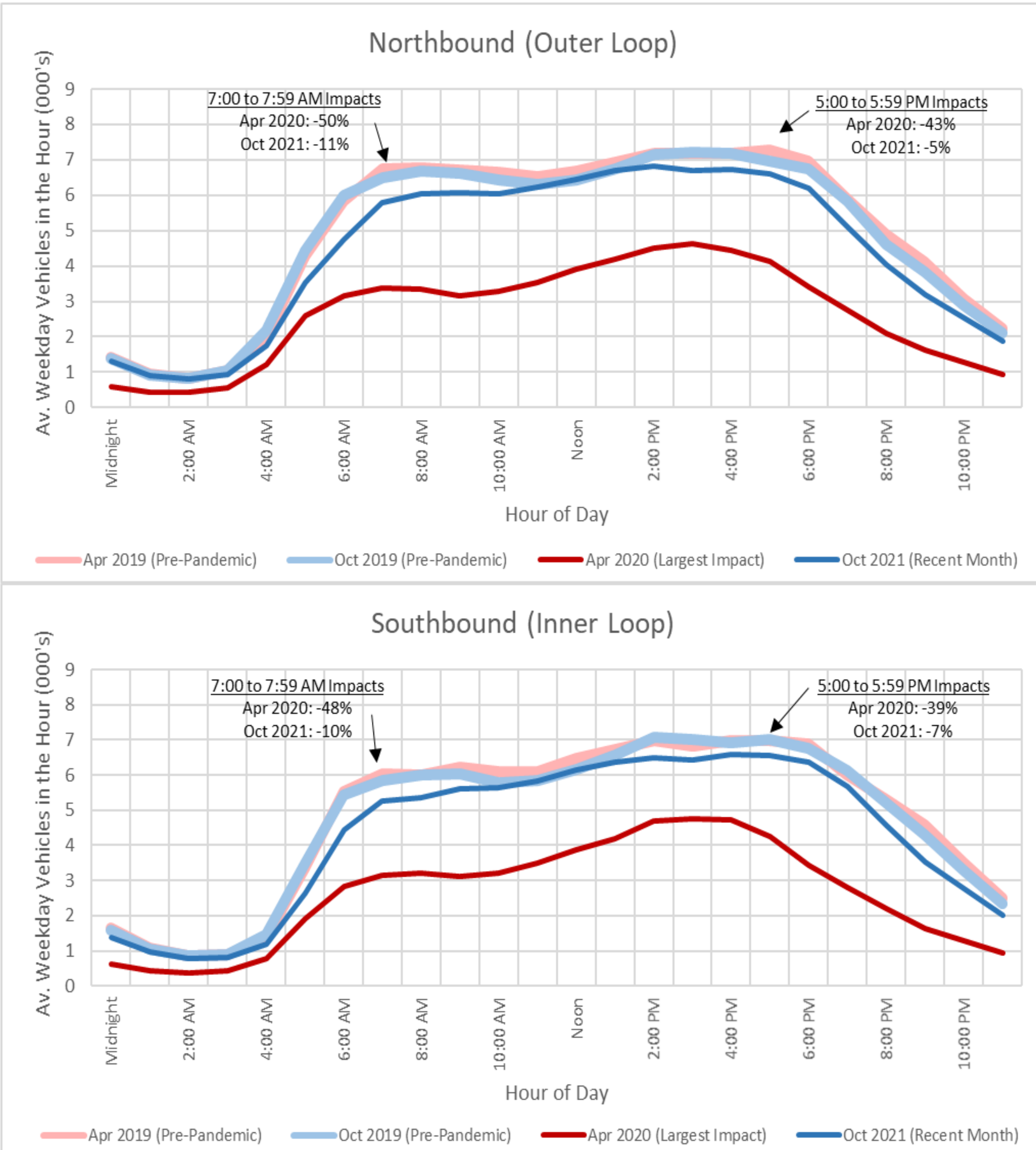
Figure 9 – Average Weekday Hourly Traffic at I-495 ATR Location #43



Note: Hourly traffic volumes represent unadjusted average non-holiday weekdays and have not been adjusted to account for traffic growth over 2019 had COVID-19 not occurred.

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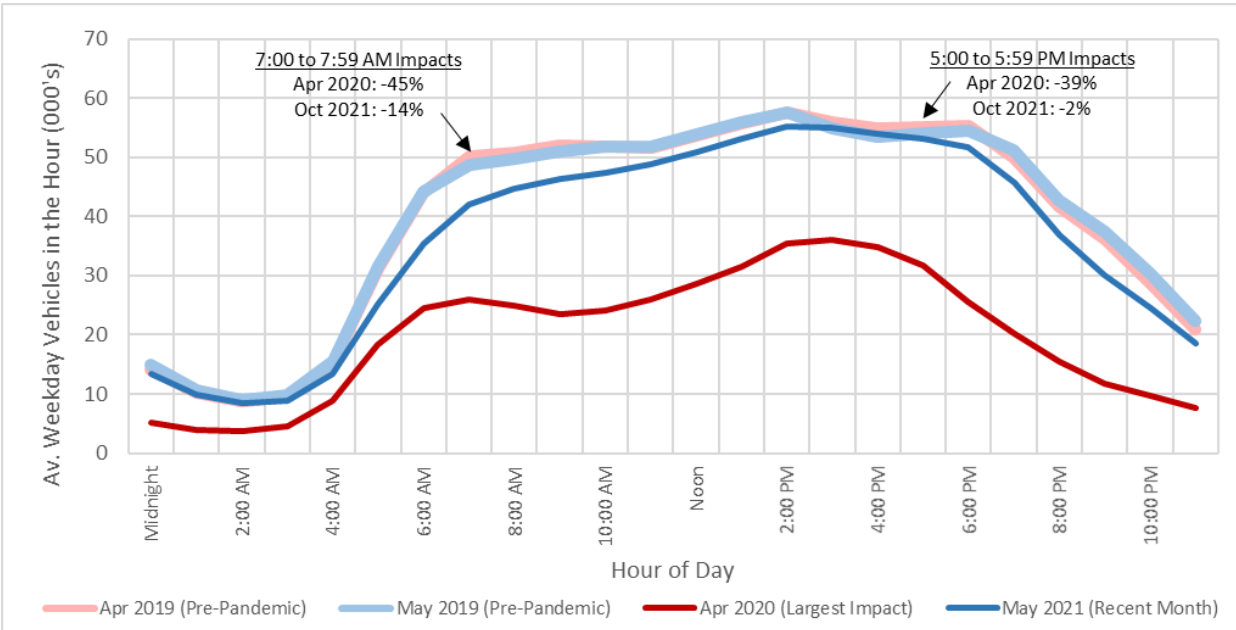
Figure 10 – Average Weekday Hourly Traffic at All ATR Locations in Both Directions



Note: Hourly traffic volumes represent unadjusted average non-holiday weekdays and have not been adjusted to account for traffic growth over 2019 had COVID-19 not occurred.

More detailed average weekday results by location and hour are included in **Appendix A**. Data are shown for key months corresponding to the trends discussed previously on page 6 in context of **Table 3.** The appendix tables represent a direct comparison of observed traffic and are not adjusted to show growth over 2019 levels had the COVID-19 pandemic not occurred. The data for months since the beginning of the pandemic is compared with the same month pre-pandemic. Both the absolute difference and percentage difference in traffic levels are shown. Note that overall trends listed in the "Total" row of these tables may be different than the results shown previously in **Table 3** due to the different data comparison approaches used as described previously in the Traffic Analysis Methodology section of this report and because the appendix tables include average weekday data and **Table 3** includes data from all days.

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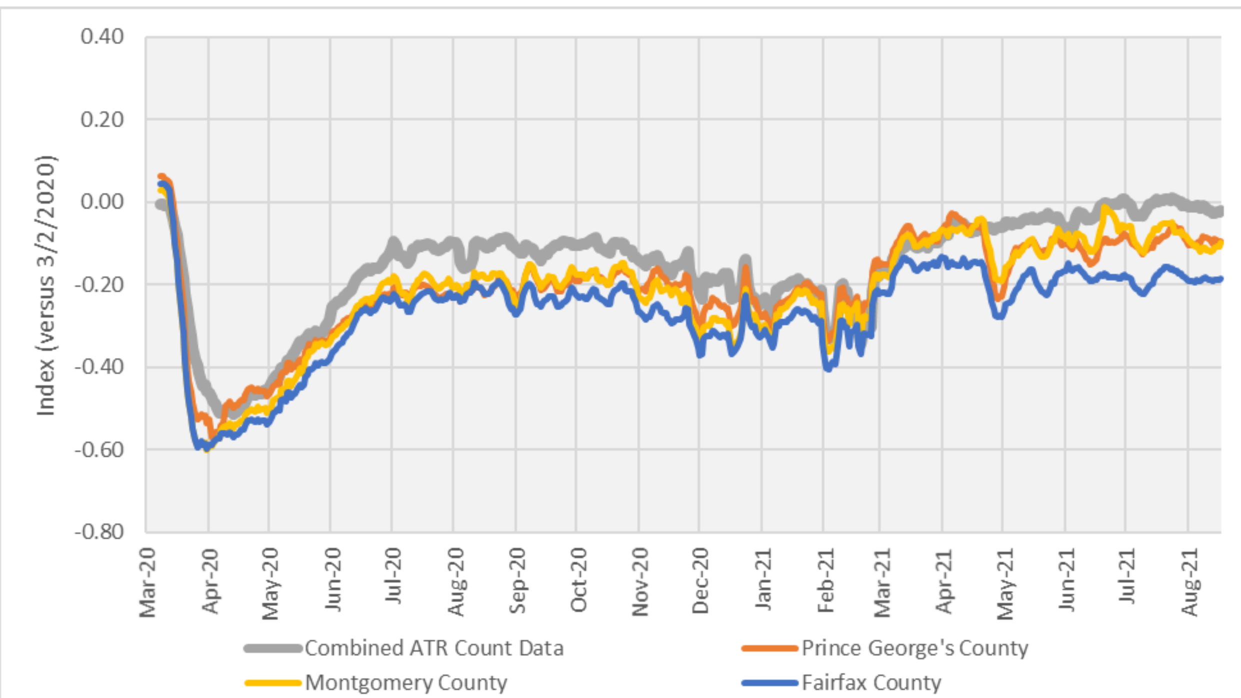
Sample Results from Other Sources

This section provides analysis based on other sources as context to the analysis of ATR data. Because a full year of pre-pandemic data is not available for many of these other sources, comparisons to the ATR data are made in this section based on indexing back to early March 2020.

Streetlight

Figure 11 provides COVID-19 impacts on vehicle-miles-travelled (VMT) indexed to March 2, 2020 from the transportation analytics provider Streetlight. Streetlight began releasing VMT by county estimates via a map interface for viewing on their website during the pandemic[2]. Data through October 17, 2021 is shown for Montgomery, Prince George's, and Fairfax Counties. Also, the total combined ATR data indexed to March 2, 2020 is shown for context. The ATR data follows similar pattern to county-level VMT data. Streetlight data was collected from the live website tool shown in the footnote on December 6th, 2021.

Figure 11 – Vehicle Miles Traveled Index by County based on Streetlight Data



Note: County-level VMT and ATR traffic volumes are indexed to March 2nd, 2020. No adjustments were made to account for traffic growth over 2019 had COVID-19 not occurred.

[2] https://www.streetlightdata.com/vmt-monitor-by-county/#emergency-map-response

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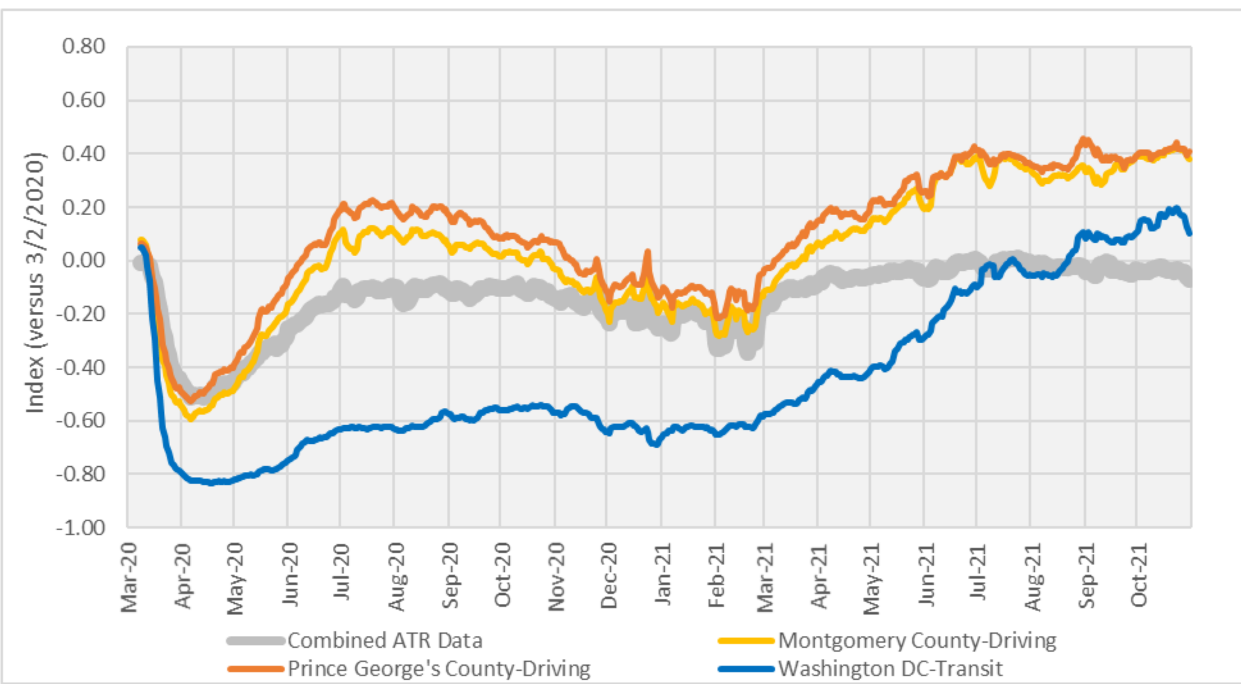
Apple

Figure 12 shows an index of the frequency of requests for directions in Apple Maps based on data made available by Apple[3]. An index of the combined ATR data is shown for comparison. The direction request trend lines for driving in Montgomery and Prince George's Counties showed a greater recovery than the ATR data starting mid-May 2020 and continued through mid-November, after which the recovery stayed similar to the ATR data through the end of February 2021. Starting March 2021, the trend lines for driving in Montgomery and Prince George's Counties showed a much stronger recovery compared to the ATR data. This likely indicates that requests for directions are an imperfect measure of overall travel trends. Requests for directions are likely more weighted toward recreational and leisure-type trips where travelers are more likely to need directions compared to more routine trips. However, it is helpful to see similar overall trends and parallels. The other trend line on the graphic, the Washington DC transit trend line, shows severe COVID-19 impacts from April 2020 through February 2021, followed by steady recovery through October 2021. It is notable that the steady increase in the Washington DC transit trend line beginning in March 2021 continued through October despite a spike in statewide COVID-19 cases from August to October 2021 (see **Figure 3**).

Figure 12 – Index of Frequency of Requests for Directions in Apple Maps



[3] https://www.apple.com/covid19/mobility

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Moody's Back-to-Normal Index

Figure 13 shows the Back-to-Normal Index (BNI) provided by Moody's analytics/CNN Business[4] for U.S., Maryland, Virginia, and Washington, D.C. The index ranges from zero, representing no economic activity and the most severe restrictions, to 100%, representing the economy returning to pre-pandemic level in 2020. This index is composed of a composite trend of 37 indicators. Some of the key indicators are Moody's GDP model, seated restaurant diners from OpenTable, the Google Workplace Mobility Index, airline traveler throughput from the Transportation Security Administration, small businesses hours worked from Homebase, new home listings from Zillow, petroleum products supplied from the Energy Information Administration, railroad traffic from the Association of American Railroads, unemployment insurance claims, the Purchase Activity Index from Mortgage Bankers Association the Moody's Business Confidence Index, and employment rates from the Bureau of Labor Statistics.

The composite trend is indexed to February 29, 2020 which represents an index value of one. For the purpose of this report, the composite trend was reindexed to March 2, 2020 to maintain consistency with indexing for the other data sources shown in this section. No adjustments were made to reflect economic growth that may have occurred in the absence of COVID-19. Combined ATR data is also shown in a similar index format for comparison. Both the BNI and ATR indices show steep declines through mid-April 2020. The BNI recovery was more gradual than the ATR recovery through November 2020, after which ATR data and BNI indices either decreased slightly or stayed flat, presumably due to the increase in COVID-19 cases in the winter months. The recovery again started towards the end of February 2021 and continued through the end of July 2021. Trends have somewhat stabilized from July 2021 through the end of the series in October. Most recently the BNI for Washington D.C. had less recovery compared to Maryland, while Maryland caught up with Virginia and the United States as a whole, which are both tracking closely together.

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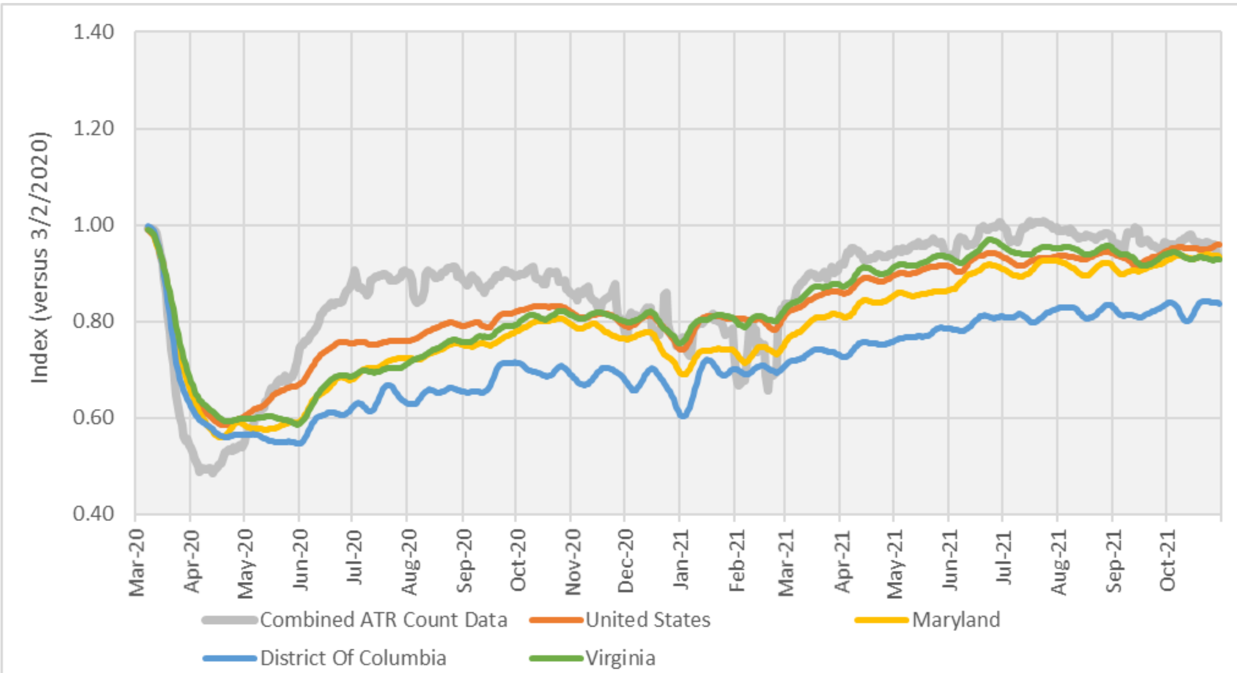
[4] Official Moody's Analytics Store: Purchase Research & Data Online (economy.com)

Figure 13 – Index of Moody's Back-to-Normal Index



Metropolitan Washington Council of Governments (MWCOG)

A MWCOG presentation titled "COVID-19 Impacts in Metropolitan Washington" [5], from September 27, 2021, includes several slides discussing COVID-19 impacts on transportation in Washington D.C. On slide 2: "Regional traffic volumes had recovered to over 80 percent of 2019 volumes by July 2020 and had remained fairly steady through December. In February 2021, traffic levels decreased as compared to their pre-pandemic levels but have since been steadily rebounding to over 95 percent of 2019 levels in July.". The graphic on the same slide shows a -14.6 percent average percent change from equivalent 2019 month in March 2021, decreasing -4.3 percent in the latest month of July 2021. Similar trends are shown in the average impacts for all ATR locations, as shown in **Table 3**.

[5] https://www.mwcog.org/documents/2021/09/27/covid-19-travel-monitoring-snapshot-traffic-monitoring/

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Maryland Transportation Authority (MDTA)

Materials for a November 18, 2021 Maryland Transportation Authority (MDTA) board meeting included graphics showing COVID-19 traffic impacts experienced on MDTA toll facilities[6]. The estimated COVID-19 impact for the MDTA Legacy system in July 2021 (most recent month in the graphic) was -2 percent for passenger cars and +8 percent for commercial vehicles. The Legacy system includes seven bridge and tunnel tolling locations, with the most traveled facilities in Baltimore or on I-95 north of Baltimore. A separate COVID-19 impact graphic includes the trend for the Intercounty Connector, a MDTA toll facility mostly in Montgomery County in the northern Washington D.C. suburbs and carries primarily commuter traffic, which exhibited a -13 percent impact in July 2021. The MDTA Legacy system COVID-19 impact is several percentage points better than that of the total ATR impact in July 2021, of -7 percent for I-495 and I-270, per **Table 3**. However, the ATR recovery trend is better than the MDTA Intercounty Connector recovery.

* * *

These trends will continue to be closely monitored by CDM Smith. Please reach out to us should you have any questions or concerns.

Sincerely,

Adam Aceto
Project Manager
CDM Smith Inc.

[6] See overall page 117 of the pdf link to the CDM Smith report "Maryland Transportation Authority FY2022 Traffic and Toll Revenue Update": https://mdta.maryland.gov/sites/default/files/Files/Meeting_Schedules/Meeting_Materials/2021_1118-%20REVISED%20Board%20Materials%20-%20Posting%20-%20Optimized.pdf

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Appendix Table 1 - Average Weekday Hourly Traffic at I-270 ATR #04 NB

Hour	Pre-Pandemic Hourly Traffic (thousands)					Post-Pandemic Hourly Traffic (thousands)					Absolute Difference (thousands)					Percentage Difference				
	Apr 2019	May 2019	Jun 2019	Oct 2019	Jan 2020	Apr 2020	Jun 2020	Oct 2020	Jan 2021	Oct 2021	Apr 2020 vs. Apr 2019	Jun 2020 vs. Jun 2019	Oct 2020 vs. Oct 2019	Jan 2021 vs. Jan 2020	Oct 2021 vs. Oct 2019	Apr 2020 vs. Apr 2019	Jun 2020 vs. Jun 2019	Oct 2020 vs. Oct 2019	Jan 2021 vs. Jan 2020	Oct 2021 vs. Oct 2019
Midnight	0.6	0.7	0.8	0.7	0.6	0.3	0.5	0.5	0.4	0.7	-0.4	-0.3	-0.2	-0.1	0.0	-58%	-38%	-25%	-25%	-3%
1:00 AM	0.4	0.4	0.4	0.4	0.4	0.2	0.3	0.3	0.3	0.4	-0.2	-0.1	-0.1	-0.1	0.0	-58%	-34%	-23%	-25%	1%
2:00 AM	0.3	0.3	0.3	0.3	0.3	0.1	0.2	0.2	0.2	0.3	-0.1	-0.1	-0.1	-0.1	0.0	-50%	-30%	-23%	-26%	-3%
3:00 AM	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.3	-0.1	-0.1	0.0	0.0	0.0	-44%	-23%	-14%	-18%	2%
4:00 AM	0.5	0.4	0.5	0.5	0.4	0.3	0.4	0.4	0.3	0.5	-0.2	-0.1	0.0	0.0	0.0	-42%	-11%	-10%	-12%	-3%
5:00 AM	1.0	1.0	1.0	1.0	0.8	0.6	1.0	0.9	0.8	1.0	-0.3	0.0	0.0	0.0	0.0	-34%	-5%	-5%	-5%	2%
6:00 AM	1.8	1.9	1.9	1.8	1.6	1.2	1.7	1.6	1.4	1.8	-0.6	-0.1	-0.2	-0.2	-0.1	-34%	-7%	-10%	-11%	-3%
7:00 AM	2.5	2.5	2.6	2.5	2.3	1.4	2.1	2.2	1.9	2.3	-1.1	-0.5	-0.3	-0.3	-0.1	-45%	-18%	-13%	-15%	-6%
8:00 AM	2.5	2.6	2.7	2.6	2.3	1.2	2.2	2.3	2.1	2.6	-1.3	-0.6	-0.2	-0.2	0.0	-50%	-20%	-8%	-9%	1%
9:00 AM	2.7	2.8	2.9	2.7	2.4	1.2	2.4	2.5	2.1	2.9	-1.5	-0.5	-0.1	-0.2	0.2	-54%	-18%	-5%	-9%	7%
10:00 AM	3.0	3.1	3.2	3.0	2.6	1.4	2.8	2.9	2.4	3.1	-1.6	-0.5	0.0	-0.2	0.1	-53%	-15%	-2%	-8%	5%
11:00 AM	3.2	3.4	3.5	3.2	2.9	1.6	3.0	3.2	2.7	3.4	-1.6	-0.5	0.0	-0.2	0.2	-51%	-13%	-1%	-8%	5%
Noon	3.5	3.6	3.7	3.5	3.3	1.8	3.2	3.5	3.0	3.6	-1.7	-0.5	0.0	-0.3	0.1	-48%	-14%	0%	-9%	2%
1:00 PM	4.0	3.9	3.9	3.9	3.8	2.1	3.5	3.8	3.3	3.9	-1.8	-0.4	-0.2	-0.5	-0.1	-46%	-10%	-4%	-13%	-1%
2:00 PM	4.3	4.3	4.3	4.2	4.2	2.5	3.9	4.2	3.7	4.3	-1.8	-0.4	0.0	-0.6	0.1	-42%	-9%	-1%	-13%	2%
3:00 PM	4.2	4.0	4.0	4.0	4.1	2.6	3.8	4.1	3.7	4.3	-1.6	-0.2	0.1	-0.4	0.3	-38%	-5%	2%	-9%	7%
4:00 PM	4.1	4.0	3.8	4.0	3.9	2.4	3.7	3.9	3.5	4.1	-1.7	-0.2	-0.1	-0.4	0.1	-41%	-5%	-2%	-9%	2%
5:00 PM	4.0	3.9	3.8	4.0	3.8	2.1	3.5	3.8	3.4	4.0	-1.8	-0.3	-0.3	-0.4	-0.1	-46%	-8%	-7%	-10%	-2%
6:00 PM	3.9	3.8	3.8	3.8	3.5	1.6	2.7	3.2	2.7	3.6	-2.3	-1.1	-0.6	-0.7	-0.2	-59%	-30%	-16%	-21%	-5%
7:00 PM	3.3	3.4	3.3	3.4	3.0	1.2	2.1	2.5	2.0	2.9	-2.1	-1.2	-0.9	-1.0	-0.4	-65%	-38%	-27%	-33%	-13%
8:00 PM	2.5	2.5	2.5	2.5	2.1	0.8	1.6	1.8	1.5	2.3	-1.7	-0.9	-0.7	-0.7	-0.2	-68%	-37%	-27%	-31%	-10%
9:00 PM	2.0	2.0	2.0	1.9	1.7	0.6	1.2	1.4	1.1	1.7	-1.4	-0.8	-0.6	-0.6	-0.2	-71%	-41%	-29%	-37%	-10%
10:00 PM	1.5	1.6	1.6	1.4	1.3	0.5	0.9	1.0	0.8	1.3	-1.0	-0.7	-0.4	-0.4	-0.1	-69%	-43%	-29%	-36%	-5%
11:00 PM	1.0	1.1	1.2	1.0	0.9	0.4	0.7	0.7	0.6	0.9	-0.7	-0.5	-0.3	-0.3	-0.1	-63%	-42%	-28%	-33%	-11%
Total	57.0	57.5	58.0	56.6	52.2	28.3	47.4	51.3	44.1	56.0	-28.6	-10.6	-5.3	-8.1	-0.6	-50%	-18%	-9%	-15%	-3%

Appendix Table 2 - Average Weekday Hourly Traffic at I-270 ATR #04 SB

Hour	Pre-Pandemic Hourly Traffic (thousands)					Post-Pandemic Hourly Traffic (thousands)					Absolute Difference (thousands)					Percentage Difference				
	Apr 2019	May 2019	Jun 2019	Oct 2019	Jan 2020	Apr 2020	Jun 2020	Oct 2020	Jan 2021	Oct 2021	Apr 2020 vs. Apr 2019	Jun 2020 vs. Jun 2019	Oct 2020 vs. Oct 2019	Jan 2021 vs. Jan 2020	Oct 2021 vs. Oct 2019	Apr 2020 vs. Apr 2019	Jun 2020 vs. Jun 2019	Oct 2020 vs. Oct 2019	Jan 2021 vs. Jan 2020	Oct 2021 vs. Oct 2019
Midnight	0.4	0.5	0.5	0.4	0.4	0.2	0.4	0.4	0.4	0.5	-0.3	-0.1	0.0	0.0	0.0	-57%	-26%	-6%	-5%	9%
1:00 AM	0.3	0.3	0.4	0.3	0.3	0.1	0.3	0.3	0.3	0.3	-0.2	-0.1	0.0	0.0	0.0	-54%	-23%	-6%	-8%	4%
2:00 AM	0.3	0.3	0.3	0.3	0.3	0.2	0.3	0.3	0.3	0.3	-0.1	-0.1	0.0	0.0	0.0	-47%	-21%	-11%	-12%	-7%
3:00 AM	0.6	0.5	0.6	0.6	0.5	0.3	0.5	0.5	0.4	0.5	-0.2	-0.1	-0.1	-0.1	-0.1	-41%	-19%	-21%	-21%	-18%
4:00 AM	1.8	1.7	1.7	1.8	1.7	1.0	1.3	1.3	1.1	1.3	-0.8	-0.3	-0.5	-0.6	-0.4	-44%	-20%	-27%	-35%	-25%
5:00 AM	3.4	3.2	3.2	3.4	3.2	1.9	2.5	2.4	2.2	2.6	-1.5	-0.7	-1.0	-1.0	-0.8	-45%	-23%	-28%	-33%	-24%
6:00 AM	3.4	3.4	3.4	3.4	3.2	2.1	2.8	2.9	2.5	3.1	-1.4	-0.6	-0.5	-0.7	-0.3	-40%	-17%	-16%	-22%	-8%
7:00 AM	3.7	3.6	3.6	3.5	3.4	2.1	3.0	3.2	2.8	3.3	-1.6	-0.6	-0.2	-0.6	-0.2	-44%	-16%	-7%	-18%	-5%
8:00 AM	3.7	3.6	3.6	3.6	3.4	1.8	2.8	3.2	2.8	3.2	-1.8	-0.8	-0.4	-0.7	-0.4	-50%	-22%	-12%	-19%	-11%
9:00 AM	3.7	3.6	3.7	3.7	3.4	1.5	2.5	2.9	2.3	3.3	-2.2	-1.2	-0.8	-1.1	-0.4	-59%	-31%	-21%	-33%	-10%
10:00 AM	3.3	3.2	3.3	3.1	3.0	1.5	2.5	2.7	2.3	3.0	-1.8	-0.9	-0.4	-0.7	-0.1	-55%	-26%	-14%	-23%	-3%
11:00 AM	3.1	3.1	3.2	3.0	2.8	1.5	2.5	2.7	2.3	3.1	-1.6	-0.6	-0.3	-0.5	0.1	-53%	-20%	-9%	-17%	3%
Noon	3.1	3.1	3.2	3.0	2.9	1.5	2.6	2.9	2.6	3.2	-1.5	-0.5	-0.1	-0.3	0.2	-50%	-17%	-2%	-11%	7%
1:00 PM	3.1	3.1	3.2	3.0	2.9	1.6	2.7	3.0	2.7	3.2	-1.5	-0.5	0.0	-0.2	0.3	-49%	-15%	1%	-7%	9%
2:00 PM	3.1	3.2	3.3	3.1	3.0	1.7	2.9	3.2	2.9	3.4	-1.4	-0.5	0.1	-0.1	0.3	-45%	-14%	4%	-2%	10%
3:00 PM	3.1	3.2	3.2	3.2	3.0	1.7	2.9	3.2	3.0	3.5	-1.5	-0.4	0.1	0.0	0.3	-47%	-11%	2%	-1%	9%
4:00 PM	3.3	3.3	3.4	3.4	3.2	1.7	2.9	3.4	3.0	3.6	-1.6	-0.5	0.0	-0.1	0.2	-48%	-13%	-1%	-4%	6%
5:00 PM	3.5	3.6	3.6	3.6	3.3	1.7	3.0	3.5	3.0	3.7	-1.8	-0.6	-0.1	-0.3	0.1	-52%	-17%	-4%	-8%	2%
6:00 PM	3.0	3.1	3.2	3.1	2.7	1.4	2.6	3.1	2.5	3.2	-1.6	-0.7	0.0	-0.2	0.1	-53%	-20%	0%	-7%	4%
7:00 PM	2.4	2.6	2.6	2.5	2.1	1.0	2.0	2.5	1.8	2.7	-1.4	-0.6	0.1	-0.3	0.2	-58%	-23%	2%	-15%	7%
8:00 PM	1.9	2.1	2.2	1.9	1.5	0.8	1.6	1.8	1.4	2.0	-1.2	-0.6	-0.1	-0.2	0.2	-60%	-26%	-4%	-12%	9%
9:00 PM	1.6	1.8	1.9	1.5	1.3	0.5	1.3	1.3	1.0	1.5	-1.0	-0.6	-0.2	-0.2	0.0	-66%	-30%	-14%	-17%	1%
10:00 PM	1.1	1.3	1.3	1.1	0.9	0.4	0.9	1.0	0.8	1.1	-0.7	-0.4	-0.1	-0.1	0.0	-64%	-33%	-10%	-11%	2%
11:00 PM	0.7	0.8	0.9	0.7	0.6	0.3	0.6	0.7	0.5	0.7	-0.4	-0.2	-0.1	-0.1	0.0	-57%	-28%	-7%	-14%	6%
Total	57.6	58.2	59.6	57.1	53.0	28.4	47.5	52.3	44.8	56.4	-29.2	-12.1	-4.8	-8.2	-0.7	-51%	-20%	-8%	-15%	-3%

Appendix Table 3 - Average Weekday Hourly Traffic at I-270 #60 NB

	Pre-Pandemic Hourly Traffic (thousands)					Post-Pandemic Hourly Traffic (thousands)					Absolute Difference (thousands)					Percentage Difference				
Hour	Apr 2019	May 2019	Jun 2019	Oct 2019	Jan 2020	Apr 2020	Jun 2020	Oct 2020	Jan 2021	Oct 2021	Apr 2020 vs. Apr 2019	Jun 2020 vs. Jun 2019	Oct 2020 vs. Oct 2019	Jan 2021 vs. Jan 2020	Oct 2021 vs. Oct 2019	Apr 2020 vs. Apr 2019	Jun 2020 vs. Jun 2019	Oct 2020 vs. Oct 2019	Jan 2021 vs. Jan 2020	Oct 2021 vs. Oct 2019
Midnight	1.1	1.2	1.3	1.2	1.0	0.4	0.7	0.9	0.7	1.1	-0.7	-0.6	-0.4	-0.3	-0.1	-63%	-44%	-31%	-33%	-9%
1:00 AM	0.7	0.7	0.8	0.7	0.6	0.2	0.4	0.5	0.4	0.7	-0.4	-0.3	-0.2	-0.2	0.0	-66%	-43%	-30%	-34%	-5%
2:00 AM	0.5	0.5	0.5	0.5	0.5	0.2	0.3	0.4	0.3	0.5	-0.3	-0.2	-0.1	-0.2	0.0	-57%	-37%	-27%	-35%	-3%
3:00 AM	0.4	0.4	0.5	0.4	0.4	0.2	0.3	0.4	0.3	0.4	-0.2	-0.2	-0.1	-0.1	0.0	-48%	-32%	-18%	-28%	4%
4:00 AM	0.6	0.6	0.6	0.6	0.5	0.3	0.5	0.5	0.4	0.6	-0.3	-0.1	-0.1	-0.1	0.0	-42%	-18%	-15%	-22%	-5%
5:00 AM	1.3	1.4	1.4	1.3	1.1	0.8	1.2	1.1	0.9	1.2	-0.5	-0.2	-0.2	-0.1	-0.1	-36%	-14%	-15%	-14%	-7%
6:00 AM	2.4	2.5	2.5	2.3	2.0	1.5	2.1	2.0	1.7	2.2	-0.8	-0.3	-0.4	-0.3	-0.1	-36%	-14%	-16%	-16%	-5%
7:00 AM	3.5	3.6	3.7	3.6	3.2	1.9	2.9	3.0	2.5	3.4	-1.6	-0.8	-0.6	-0.7	-0.1	-45%	-23%	-17%	-22%	-4%
8:00 AM	3.9	4.0	4.2	4.1	3.7	1.9	3.1	3.5	2.8	4.0	-2.0	-1.1	-0.7	-0.8	-0.1	-51%	-26%	-16%	-23%	-3%
9:00 AM	4.1	4.2	4.4	4.2	3.7	1.9	3.4	3.7	2.8	4.3	-2.2	-1.0	-0.5	-0.9	0.1	-54%	-23%	-12%	-24%	3%
10:00 AM	4.4	4.5	4.7	4.5	3.9	2.1	3.9	4.2	3.1	4.7	-2.3	-0.9	-0.3	-0.8	0.2	-51%	-19%	-6%	-19%	4%
11:00 AM	4.8	4.9	5.1	4.8	4.3	2.4	4.3	4.7	3.6	5.1	-2.4	-0.8	-0.1	-0.7	0.3	-49%	-16%	-3%	-17%	6%
Noon	5.4	5.5	5.6	5.5	5.0	2.9	4.8	5.3	4.2	5.6	-2.5	-0.8	-0.2	-0.9	0.2	-46%	-14%	-3%	-18%	4%
1:00 PM	6.0	6.0	6.1	6.1	5.8	3.3	5.2	5.7	4.7	6.1	-2.6	-0.9	-0.4	-1.1	0.0	-44%	-15%	-6%	-19%	0%
2:00 PM	6.7	6.7	6.7	6.7	6.6	3.8	5.8	6.4	5.3	6.8	-2.8	-0.9	-0.3	-1.3	0.1	-43%	-13%	-4%	-19%	1%
3:00 PM	6.6	6.5	6.6	6.7	6.7	4.0	5.9	6.6	5.5	6.9	-2.6	-0.7	-0.1	-1.2	0.2	-39%	-10%	-1%	-17%	2%
4:00 PM	6.4	6.2	6.1	6.3	6.2	3.9	5.9	6.5	5.0	6.5	-2.4	-0.3	0.2	-1.2	0.2	-38%	-5%	3%	-19%	3%
5:00 PM	6.3	6.2	6.1	6.3	6.0	3.6	5.7	6.3	4.7	6.3	-2.7	-0.4	0.0	-1.3	0.1	-43%	-7%	0%	-21%	1%
6:00 PM	6.4	6.3	6.3	6.3	5.9	2.7	4.4	5.4	3.4	6.0	-3.7	-1.9	-0.8	-2.5	-0.3	-58%	-30%	-13%	-42%	-4%
7:00 PM	5.7	5.8	5.6	5.8	5.3	2.0	3.5	4.5	2.8	5.2	-3.6	-2.1	-1.3	-2.4	-0.6	-64%	-37%	-23%	-46%	-10%
8:00 PM	4.6	4.5	4.5	4.6	4.0	1.5	2.7	3.3	2.1	4.0	-3.1	-1.7	-1.3	-1.9	-0.5	-68%	-38%	-28%	-48%	-12%
9:00 PM	3.8	3.7	3.9	3.6	3.2	1.0	2.1	2.5	1.5	3.1	-2.7	-1.8	-1.2	-1.8	-0.5	-72%	-47%	-33%	-54%	-14%
10:00 PM	2.8	3.0	3.1	2.7	2.4	0.8	1.5	1.8	1.2	2.4	-2.0	-1.5	-0.9	-1.3	-0.4	-73%	-50%	-35%	-52%	-13%
11:00 PM	1.9	2.0	2.2	1.9	1.7	0.6	1.1	1.3	1.0	1.7	-1.3	-1.0	-0.7	-0.7	-0.3	-67%	-47%	-33%	-41%	-14%
Total	90.1	90.9	92.6	90.9	83.7	44.3	71.9	80.3	61.0	89.0	-45.8	-20.7	-10.6	-22.7	-1.9	-51%	-22%	-12%	-27%	-2%

Appendix Table 4 - Average Weekday Hourly Traffic at I-270 #60 SB

Hour	Pre-Pandemic Hourly Traffic (thousands)					Post-Pandemic Hourly Traffic (thousands)					Absolute Difference (thousands)					Percentage Difference				
	Apr 2019	May 2019	Jun 2019	Oct 2019	Jan 2020	Apr 2020	Jun 2020	Oct 2020	Jan 2021	Oct 2021	Apr 2020 vs. Apr 2019	Jun 2020 vs. Jun 2019	Oct 2020 vs. Oct 2019	Jan 2021 vs. Jan 2020	Oct 2021 vs. Oct 2019	Apr 2020 vs. Apr 2019	Jun 2020 vs. Jun 2019	Oct 2020 vs. Oct 2019	Jan 2021 vs. Jan 2020	Oct 2021 vs. Oct 2019
Midnight	0.6	0.7	0.7	0.6	0.6	0.3	0.5	0.6	0.5	0.7	-0.4	-0.2	0.0	-0.1	0.1	-60%	-30%	-6%	-13%	9%
1:00 AM	0.4	0.4	0.5	0.4	0.4	0.2	0.4	0.4	0.4	0.4	-0.2	-0.1	0.0	0.0	0.0	-54%	-23%	-5%	-12%	7%
2:00 AM	0.4	0.4	0.4	0.4	0.4	0.2	0.4	0.4	0.3	0.4	-0.2	-0.1	0.0	-0.1	0.0	-45%	-19%	-9%	-13%	-1%
3:00 AM	0.7	0.7	0.8	0.8	0.7	0.4	0.6	0.6	0.6	0.6	-0.3	-0.2	-0.2	-0.1	-0.1	-39%	-22%	-21%	-19%	-17%
4:00 AM	2.3	2.3	2.3	2.3	2.2	1.3	1.7	1.7	1.5	1.7	-0.9	-0.5	-0.6	-0.7	-0.6	-42%	-23%	-28%	-34%	-25%
5:00 AM	4.9	4.7	4.7	4.9	4.6	2.6	3.5	3.4	3.0	3.6	-2.3	-1.2	-1.6	-1.6	-1.3	-46%	-26%	-32%	-34%	-27%
6:00 AM	5.5	5.4	5.4	5.6	5.2	3.1	4.4	4.4	3.9	5.0	-2.4	-1.1	-1.2	-1.3	-0.6	-43%	-19%	-21%	-25%	-10%
7:00 AM	5.4	5.1	5.4	5.4	5.2	3.2	4.6	5.1	4.5	5.3	-2.2	-0.8	-0.3	-0.7	-0.2	-41%	-15%	-6%	-13%	-3%
8:00 AM	5.8	5.6	5.7	5.9	5.6	3.0	4.5	5.3	4.6	5.4	-2.8	-1.2	-0.7	-0.9	-0.5	-49%	-21%	-11%	-17%	-9%
9:00 AM	6.2	6.0	6.1	6.2	5.6	2.5	4.1	4.7	3.9	5.6	-3.7	-1.9	-1.5	-1.7	-0.6	-60%	-32%	-24%	-30%	-10%
10:00 AM	5.3	5.3	5.5	5.4	5.0	2.4	4.0	4.4	3.8	5.1	-2.9	-1.5	-0.9	-1.2	-0.3	-55%	-27%	-18%	-24%	-5%
11:00 AM	5.0	4.9	5.2	5.0	4.7	2.4	4.0	4.4	3.8	5.0	-2.6	-1.2	-0.6	-0.9	0.0	-52%	-23%	-12%	-20%	0%
Noon	5.0	5.0	5.2	5.0	4.7	2.5	4.2	4.7	4.0	5.1	-2.5	-1.1	-0.4	-0.8	0.0	-51%	-20%	-7%	-16%	1%
1:00 PM	5.0	5.0	5.2	5.0	4.7	2.6	4.2	4.7	4.1	5.2	-2.4	-1.0	-0.3	-0.6	0.2	-48%	-19%	-6%	-12%	4%
2:00 PM	5.0	5.2	5.3	5.1	4.8	2.7	4.4	4.9	4.3	5.4	-2.3	-0.9	-0.2	-0.5	0.2	-46%	-17%	-4%	-10%	5%
3:00 PM	4.9	5.0	5.1	5.1	4.7	2.6	4.2	4.9	4.3	5.4	-2.3	-0.9	-0.2	-0.4	0.3	-47%	-17%	-4%	-9%	5%
4:00 PM	5.0	5.0	5.2	5.3	4.8	2.6	4.2	5.1	4.3	5.6	-2.4	-1.0	-0.2	-0.5	0.3	-48%	-19%	-4%	-11%	6%
5:00 PM	5.3	5.4	5.5	5.6	5.1	2.5	4.1	5.1	4.2	5.6	-2.8	-1.4	-0.5	-0.8	0.0	-52%	-25%	-9%	-17%	0%
6:00 PM	4.5	4.6	4.8	4.8	4.2	2.1	3.5	4.6	3.5	5.0	-2.4	-1.3	-0.2	-0.7	0.2	-53%	-28%	-4%	-17%	5%
7:00 PM	3.5	3.8	3.9	3.7	3.2	1.5	2.8	3.6	2.5	4.0	-2.0	-1.1	-0.2	-0.6	0.2	-56%	-29%	-5%	-20%	6%
8:00 PM	2.9	3.1	3.2	2.8	2.4	1.2	2.3	2.6	1.9	3.0	-1.7	-0.9	-0.2	-0.5	0.1	-60%	-29%	-8%	-20%	5%
9:00 PM	2.4	2.6	2.7	2.3	2.0	0.8	1.8	1.9	1.5	2.3	-1.5	-0.9	-0.4	-0.5	0.0	-65%	-34%	-17%	-25%	-1%
10:00 PM	1.7	1.9	2.0	1.7	1.4	0.6	1.2	1.5	1.2	1.7	-1.0	-0.7	-0.2	-0.3	0.0	-62%	-37%	-13%	-18%	0%
11:00 PM	1.0	1.2	1.2	1.0	1.0	0.4	0.8	0.9	0.8	1.1	-0.6	-0.4	-0.1	-0.2	0.1	-61%	-35%	-8%	-20%	6%
Total	88.5	89.2	92.0	90.6	83.1	43.8	70.3	79.9	67.4	88.1	-44.8	-21.7	-10.7	-15.7	-2.4	-51%	-24%	-12%	-19%	-1%

Appendix Table 5 - Average Weekday Hourly Traffic at I-495 #40 EB

Hour	Pre-Pandemic Hourly Traffic (thousands)					Post-Pandemic Hourly Traffic (thousands)					Absolute Difference (thousands)					Percentage Difference				
	Apr 2019	May 2019	Jun 2019	Oct 2019	Jan 2020	Apr 2020	Jun 2020	Oct 2020	Jan 2021	Oct 2021	Apr 2020 vs. Apr 2019	Jun 2020 vs. Jun 2019	Oct 2020 vs. Oct 2019	Jan 2021 vs. Jan 2020	Oct 2021 vs. Oct 2019	Apr 2020 vs. Apr 2019	Jun 2020 vs. Jun 2019	Oct 2020 vs. Oct 2019	Jan 2021 vs. Jan 2020	Oct 2021 vs. Oct 2019
Midnight	1.3	1.4	1.5	1.3	1.1	0.4	0.7	0.8	0.8	1.4	-0.8	-0.7	-0.5	-0.3	0.1	-68%	-50%	-36%	-29%	9%
1:00 AM	0.8	0.8	0.9	0.7	0.7	0.3	0.5	0.5	0.5	0.9	-0.5	-0.4	-0.2	-0.2	0.2	-64%	-46%	-25%	-33%	23%
2:00 AM	0.6	0.6	0.7	0.6	0.6	0.3	0.4	0.5	0.4	0.7	-0.3	-0.3	-0.1	-0.2	0.1	-52%	-38%	-18%	-29%	20%
3:00 AM	0.7	0.7	0.7	0.7	0.7	0.4	0.5	0.6	0.5	0.7	-0.3	-0.2	-0.1	-0.1	0.0	-48%	-30%	-14%	-21%	-6%
4:00 AM	1.5	1.6	1.7	1.7	1.5	1.0	1.2	1.3	1.2	1.2	-0.5	-0.5	-0.4	-0.3	-0.5	-35%	-31%	-22%	-19%	-29%
5:00 AM	3.9	3.9	4.0	4.0	3.6	2.2	2.9	3.0	2.7	2.5	-1.7	-1.1	-0.9	-0.9	-1.4	-44%	-27%	-23%	-24%	-36%
6:00 AM	6.8	6.6	6.9	6.6	6.1	3.1	4.2	4.4	4.1	4.2	-3.8	-2.7	-2.2	-1.9	-2.4	-55%	-39%	-33%	-32%	-37%
7:00 AM	8.0	7.3	7.9	7.9	7.4	3.1	4.5	5.5	5.0	5.6	-4.9	-3.4	-2.4	-2.3	-2.3	-62%	-43%	-31%	-32%	-29%
8:00 AM	8.0	7.2	7.8	7.8	7.3	2.8	4.5	5.7	5.3	6.2	-5.2	-3.3	-2.2	-2.0	-1.6	-65%	-43%	-28%	-28%	-20%
9:00 AM	7.4	7.3	7.3	7.2	6.8	2.6	4.4	5.2	4.7	6.1	-4.8	-2.8	-2.0	-2.1	-1.1	-65%	-39%	-28%	-31%	-15%
10:00 AM	6.8	6.9	6.9	6.4	6.0	2.6	4.6	5.0	4.5	6.1	-4.1	-2.3	-1.4	-1.5	-0.4	-61%	-34%	-22%	-25%	-6%
11:00 AM	6.5	6.5	6.5	6.1	5.8	2.8	4.8	5.2	4.6	6.2	-3.7	-1.7	-0.9	-1.1	0.1	-57%	-26%	-15%	-20%	1%
Noon	6.8	6.8	6.8	6.5	6.4	3.2	5.3	5.8	5.1	6.5	-3.6	-1.6	-0.7	-1.3	0.0	-53%	-23%	-11%	-20%	0%
1:00 PM	7.2	7.3	7.3	6.7	7.1	3.6	5.9	6.4	5.8	6.7	-3.6	-1.3	-0.3	-1.3	0.0	-50%	-18%	-4%	-19%	0%
2:00 PM	7.3	7.3	7.2	7.2	7.3	4.4	6.8	7.2	6.8	6.7	-3.0	-0.4	0.0	-0.5	-0.5	-40%	-6%	0%	-6%	-6%
3:00 PM	6.1	5.7	5.8	6.6	6.7	4.4	6.5	7.0	6.8	6.7	-1.7	0.7	0.4	0.1	0.1	-28%	12%	6%	2%	1%
4:00 PM	5.1	4.9	5.1	5.7	6.2	4.1	6.3	6.4	6.4	6.0	-1.0	1.2	0.7	0.2	0.3	-19%	23%	12%	4%	6%
5:00 PM	5.7	5.4	5.7	6.2	6.2	3.7	5.8	6.6	6.0	6.1	-2.0	0.1	0.4	-0.1	-0.1	-35%	2%	6%	-2%	-2%
6:00 PM	6.7	6.5	6.7	6.8	6.3	2.9	4.9	5.8	5.0	6.3	-3.8	-1.7	-1.0	-1.3	-0.5	-56%	-26%	-14%	-20%	-7%
7:00 PM	6.7	7.0	7.0	6.4	5.6	2.1	3.8	4.7	3.7	5.7	-4.5	-3.1	-1.7	-1.9	-0.7	-68%	-45%	-27%	-34%	-11%
8:00 PM	5.1	5.4	5.4	4.9	4.2	1.5	2.8	3.4	2.7	4.4	-3.6	-2.6	-1.5	-1.5	-0.5	-71%	-48%	-31%	-35%	-10%
9:00 PM	4.4	4.5	4.6	4.0	3.6	1.1	2.1	2.6	2.2	3.7	-3.3	-2.5	-1.3	-1.4	-0.2	-75%	-54%	-34%	-39%	-5%
10:00 PM	3.5	3.7	3.8	3.1	2.8	0.9	1.7	2.1	1.8	3.1	-2.6	-2.1	-1.1	-1.0	-0.1	-75%	-55%	-34%	-37%	-2%
11:00 PM	2.3	2.5	2.7	2.2	1.8	0.6	1.2	1.4	1.2	2.2	-1.6	-1.5	-0.7	-0.6	0.0	-72%	-56%	-34%	-31%	0%
Total	119.0	118.1	120.9	117.3	111.6	54.0	86.6	97.2	88.1	105.9	-65.0	-34.4	-20.1	-23.5	-11.4	-55%	-28%	-17%	-21%	-10%

Appendix Table 6 - Average Weekday Hourly Traffic at I-495 #40 WB

Hour	Pre-Pandemic Hourly Traffic (thousands)					Post-Pandemic Hourly Traffic (thousands)					Absolute Difference (thousands)					Percentage Difference				
	Apr 2019	May 2019	Jun 2019	Oct 2019	Jan 2020	Apr 2020	Jun 2020	Oct 2020	Jan 2021	Oct 2021	Apr 2020 vs. Apr 2019	Jun 2020 vs. Jun 2019	Oct 2020 vs. Oct 2019	Jan 2021 vs. Jan 2020	Oct 2021 vs. Oct 2019	Apr 2020 vs. Apr 2019	Jun 2020 vs. Jun 2019	Oct 2020 vs. Oct 2019	Jan 2021 vs. Jan 2020	Oct 2021 vs. Oct 2019
Midnight	1.1	1.1	1.2	1.0	0.9	0.3	0.6	0.7	0.6	1.1	-0.8	-0.6	-0.3	-0.3	0.1	-69%	-49%	-30%	-31%	13%
1:00 AM	0.8	0.8	0.8	0.7	0.7	0.3	0.4	0.5	0.5	0.8	-0.5	-0.4	-0.2	-0.2	0.1	-64%	-47%	-25%	-33%	9%
2:00 AM	0.7	0.7	0.7	0.6	0.6	0.3	0.4	0.5	0.4	0.6	-0.4	-0.3	-0.1	-0.2	0.0	-54%	-42%	-24%	-28%	-1%
3:00 AM	1.0	1.0	1.1	1.0	1.0	0.5	0.7	0.8	0.7	0.8	-0.5	-0.4	-0.2	-0.2	-0.2	-49%	-37%	-22%	-24%	-18%
4:00 AM	2.9	2.8	3.0	2.9	2.8	1.6	2.1	2.2	2.0	1.9	-1.3	-0.9	-0.7	-0.8	-0.9	-46%	-29%	-23%	-27%	-32%
5:00 AM	6.5	6.3	6.7	6.4	6.0	3.7	4.8	5.0	4.5	4.2	-2.9	-2.0	-1.4	-1.5	-2.3	-44%	-29%	-22%	-26%	-35%
6:00 AM	8.0	7.7	8.1	7.5	6.9	4.0	5.3	5.7	5.2	5.3	-3.9	-2.8	-1.8	-1.7	-2.3	-49%	-35%	-24%	-24%	-30%
7:00 AM	8.2	7.6	8.2	8.0	7.5	3.8	5.4	6.1	5.5	5.7	-4.4	-2.8	-1.9	-2.0	-2.3	-53%	-34%	-23%	-26%	-29%
8:00 AM	7.7	7.3	7.8	7.7	7.0	3.3	4.9	6.1	5.5	6.2	-4.4	-2.8	-1.7	-1.5	-1.5	-57%	-36%	-21%	-22%	-20%
9:00 AM	7.2	7.1	7.4	7.3	6.0	2.8	4.6	5.5	4.8	6.3	-4.4	-2.8	-1.8	-1.2	-1.1	-61%	-38%	-25%	-20%	-15%
10:00 AM	6.9	7.1	7.3	7.0	5.7	2.8	4.6	5.2	4.6	6.3	-4.1	-2.7	-1.7	-1.0	-0.7	-60%	-37%	-25%	-18%	-10%
11:00 AM	6.6	6.8	7.1	6.5	5.7	2.8	4.7	5.3	4.7	6.3	-3.8	-2.4	-1.2	-0.9	-0.2	-58%	-34%	-18%	-17%	-3%
Noon	6.5	6.8	6.9	6.4	5.8	2.9	4.9	5.5	5.1	6.4	-3.6	-2.1	-0.9	-0.7	-0.1	-55%	-30%	-14%	-12%	-1%
1:00 PM	6.9	7.0	7.1	6.8	6.0	3.1	5.1	5.8	5.3	6.4	-3.7	-2.0	-1.0	-0.6	-0.4	-55%	-28%	-14%	-11%	-5%
2:00 PM	7.5	7.4	7.2	7.4	6.8	3.5	5.7	6.5	5.9	6.8	-4.0	-1.5	-0.9	-0.8	-0.6	-53%	-21%	-13%	-13%	-8%
3:00 PM	7.4	7.1	7.1	7.3	7.0	3.4	5.7	6.9	6.3	6.9	-3.9	-1.4	-0.4	-0.6	-0.4	-53%	-20%	-6%	-9%	-6%
4:00 PM	7.1	6.9	7.0	7.0	6.5	3.3	5.5	6.6	6.0	6.7	-3.8	-1.5	-0.4	-0.4	-0.3	-54%	-21%	-5%	-7%	-5%
5:00 PM	7.0	7.1	7.2	6.7	6.6	3.1	5.3	6.5	5.9	6.3	-3.9	-1.9	-0.3	-0.7	-0.4	-56%	-26%	-4%	-11%	-6%
6:00 PM	6.5	6.6	6.8	6.5	6.1	2.4	4.1	5.6	4.7	6.2	-4.1	-2.7	-0.8	-1.4	-0.3	-63%	-40%	-13%	-23%	-4%
7:00 PM	5.5	5.8	5.9	5.5	5.0	1.8	3.1	4.3	3.4	5.2	-3.8	-2.7	-1.3	-1.6	-0.3	-68%	-47%	-23%	-32%	-6%
8:00 PM	4.3	4.4	4.5	4.1	3.6	1.3	2.4	3.1	2.4	4.0	-3.0	-2.0	-1.0	-1.2	0.0	-70%	-45%	-24%	-34%	-1%
9:00 PM	3.6	3.7	3.7	3.3	2.9	1.0	2.0	2.3	1.8	3.2	-2.6	-1.7	-0.9	-1.1	0.0	-72%	-47%	-29%	-39%	-2%
10:00 PM	2.8	2.9	2.9	2.5	2.2	0.7	1.4	1.7	1.4	2.5	-2.0	-1.5	-0.7	-0.8	0.0	-74%	-51%	-30%	-38%	0%
11:00 PM	1.8	1.9	2.0	1.6	1.4	0.5	1.0	1.2	0.9	1.7	-1.3	-1.0	-0.4	-0.5	0.1	-71%	-51%	-27%	-36%	6%
Total	124.3	123.9	127.9	121.7	110.5	53.3	84.9	99.7	88.3	107.8	-71.1	-43.0	-22.1	-22.3	-13.9	-57%	-34%	-18%	-20%	-13%

Appendix Table 7 - Average Weekday Hourly Traffic at I-495 #41 EB

	Pre-Pandemic Hourly Traffic (thousands)					Post-Pandemic Hourly Traffic (thousands)					Absolute Difference (thousands)					Percentage Difference				
Hour	Apr 2019	May 2019	Jun 2019	Oct 2019	Jan 2020	Apr 2020	Jun 2020	Oct 2020	Jan 2021	Oct 2021	Apr 2020 vs. Apr 2019	Jun 2020 vs. Jun 2019	Oct 2020 vs. Oct 2019	Jan 2021 vs. Jan 2020	Oct 2021 vs. Oct 2019	Apr 2020 vs. Apr 2019	Jun 2020 vs. Jun 2019	Oct 2020 vs. Oct 2019	Jan 2021 vs. Jan 2020	Oct 2021 vs. Oct 2019
Midnight	1.5	1.6	1.7	1.5	1.4	0.6	0.9	1.0	0.9	1.3	-1.0	-0.8	-0.5	-0.5	-0.2	-63%	-45%	-35%	-36%	-12%
1:00 AM	0.9	1.0	1.1	0.9	0.9	0.3	0.6	0.6	0.5	0.9	-0.6	-0.5	-0.3	-0.4	-0.1	-63%	-43%	-36%	-39%	-9%
2:00 AM	0.8	0.8	0.8	0.7	0.7	0.3	0.5	0.5	0.4	0.7	-0.4	-0.3	-0.3	-0.3	-0.1	-59%	-40%	-37%	-41%	-8%
3:00 AM	0.8	0.8	0.9	0.8	0.8	0.4	0.5	0.5	0.5	0.7	-0.4	-0.3	-0.3	-0.3	-0.1	-55%	-38%	-35%	-38%	-9%
4:00 AM	1.3	1.4	1.4	1.3	1.2	0.8	1.0	1.1	0.9	1.1	-0.6	-0.4	-0.3	-0.4	-0.2	-43%	-27%	-22%	-29%	-16%
5:00 AM	2.9	3.0	2.9	3.0	2.7	1.8	2.4	2.4	2.0	2.4	-1.1	-0.4	-0.6	-0.7	-0.6	-39%	-16%	-19%	-24%	-19%
6:00 AM	4.7	4.8	4.6	4.6	4.1	2.5	3.5	3.5	3.0	3.8	-2.2	-1.0	-1.1	-1.1	-0.8	-47%	-23%	-23%	-26%	-17%
7:00 AM	5.8	5.8	5.6	5.6	5.3	2.9	4.2	4.6	3.9	4.9	-2.8	-1.4	-1.0	-1.4	-0.7	-49%	-25%	-19%	-26%	-12%
8:00 AM	6.2	6.1	6.0	6.2	5.6	2.8	4.3	4.7	4.1	5.3	-3.4	-1.7	-1.5	-1.5	-0.9	-55%	-29%	-24%	-27%	-15%
9:00 AM	6.2	6.1	6.0	6.1	5.6	2.6	4.4	4.7	4.1	5.6	-3.6	-1.6	-1.4	-1.6	-0.5	-58%	-27%	-23%	-27%	-8%
10:00 AM	6.3	6.1	6.1	6.1	5.6	2.8	4.8	5.0	4.3	5.8	-3.5	-1.2	-1.0	-1.3	-0.2	-55%	-20%	-17%	-23%	-4%
11:00 AM	6.4	6.3	6.3	6.1	5.9	3.1	5.2	5.3	4.7	6.0	-3.3	-1.1	-0.8	-1.2	-0.1	-51%	-17%	-12%	-20%	-1%
Noon	6.5	6.6	6.5	6.4	6.4	3.6	5.7	6.0	5.3	6.3	-2.9	-0.8	-0.4	-1.1	-0.1	-45%	-12%	-6%	-17%	-2%
1:00 PM	6.8	6.8	6.7	6.5	6.9	4.0	6.3	6.5	5.9	6.5	-2.7	-0.4	0.0	-1.0	0.0	-40%	-6%	0%	-14%	0%
2:00 PM	7.0	6.9	6.8	6.8	7.0	4.7	6.9	6.9	6.4	6.8	-2.3	0.1	0.2	-0.6	0.0	-33%	1%	3%	-9%	0%
3:00 PM	7.0	6.8	6.9	6.9	7.1	5.0	6.8	7.0	6.6	6.8	-2.0	0.0	0.1	-0.4	-0.1	-29%	-1%	2%	-6%	-1%
4:00 PM	6.8	6.8	6.9	6.7	6.9	4.7	6.7	7.0	6.5	6.8	-2.1	-0.2	0.4	-0.4	0.1	-31%	-3%	6%	-6%	1%
5:00 PM	6.6	6.7	6.8	6.5	6.4	4.1	6.2	6.8	6.0	6.7	-2.5	-0.6	0.3	-0.4	0.2	-38%	-9%	4%	-7%	2%
6:00 PM	6.7	6.8	6.7	6.7	6.2	3.1	5.1	6.1	5.1	6.4	-3.6	-1.7	-0.6	-1.1	-0.3	-54%	-25%	-8%	-18%	-5%
7:00 PM	6.4	6.5	6.4	6.3	5.6	2.5	4.2	5.3	4.0	5.7	-3.9	-2.2	-1.0	-1.5	-0.6	-61%	-34%	-17%	-28%	-9%
8:00 PM	5.2	5.4	5.4	5.2	4.4	1.9	3.3	3.8	3.0	4.6	-3.4	-2.1	-1.3	-1.4	-0.6	-65%	-39%	-26%	-32%	-11%
9:00 PM	4.5	4.7	4.7	4.2	3.7	1.3	2.6	2.9	2.3	3.7	-3.1	-2.2	-1.3	-1.5	-0.6	-70%	-46%	-32%	-39%	-13%
10:00 PM	3.6	3.8	3.8	3.3	2.9	1.0	2.0	2.3	1.8	2.9	-2.5	-1.8	-1.0	-1.1	-0.5	-71%	-48%	-32%	-39%	-14%
11:00 PM	2.5	2.7	2.8	2.4	2.1	0.9	1.5	1.7	1.4	2.1	-1.6	-1.2	-0.7	-0.7	-0.3	-64%	-45%	-29%	-34%	-12%
Total	113.4	114.1	113.7	110.8	105.4	57.6	89.8	96.3	83.6	103.7	-55.8	-23.9	-14.5	-21.8	-7.0	-49%	-21%	-13%	-21%	-9%

Appendix Table 8 - Average Weekday Hourly Traffic at I-495 #41 WB

Hour	Pre-Pandemic Hourly Traffic (thousands)					Post-Pandemic Hourly Traffic (thousands)					Absolute Difference (thousands)					Percentage Difference				
	Apr 2019	May 2019	Jun 2019	Oct 2019	Jan 2020	Apr 2020	Jun 2020	Oct 2020	Jan 2021	Oct 2021	Apr 2020 vs. Apr 2019	Jun 2020 vs. Jun 2019	Oct 2020 vs. Oct 2019	Jan 2021 vs. Jan 2020	Oct 2021 vs. Oct 2019	Apr 2020 vs. Apr 2019	Jun 2020 vs. Jun 2019	Oct 2020 vs. Oct 2019	Jan 2021 vs. Jan 2020	Oct 2021 vs. Oct 2019
Midnight	1.5	1.5	1.7	1.5	1.3	0.5	0.9	0.9	0.8	1.2	-1.1	-0.8	-0.6	-0.4	-0.3	-70%	-46%	-38%	-33%	-17%
1:00 AM	1.0	1.0	1.1	1.0	0.9	0.3	0.6	0.6	0.6	0.8	-0.7	-0.5	-0.3	-0.3	-0.1	-66%	-44%	-35%	-36%	-15%
2:00 AM	0.8	0.8	0.9	0.8	0.7	0.3	0.5	0.5	0.5	0.6	-0.5	-0.4	-0.3	-0.3	-0.1	-59%	-41%	-33%	-35%	-19%
3:00 AM	1.0	1.0	1.0	1.0	1.0	0.5	0.7	0.7	0.6	0.7	-0.5	-0.4	-0.3	-0.3	-0.3	-49%	-34%	-31%	-35%	-26%
4:00 AM	2.3	2.3	2.3	2.5	2.3	1.5	1.9	1.9	1.5	1.7	-0.8	-0.4	-0.6	-0.7	-0.8	-36%	-19%	-24%	-32%	-31%
5:00 AM	5.1	5.1	4.9	5.1	4.9	3.3	4.0	4.1	3.5	3.8	-1.8	-0.8	-1.0	-1.4	-1.4	-35%	-17%	-20%	-29%	-27%
6:00 AM	4.8	4.8	4.7	4.5	4.5	4.0	5.1	4.8	4.4	3.9	-0.8	0.4	0.3	-0.1	-0.6	-16%	8%	7%	-1%	-14%
7:00 AM	4.6	4.3	4.2	4.3	4.3	3.8	5.1	4.9	4.5	3.5	-0.8	0.8	0.6	0.2	-0.8	-18%	20%	14%	5%	-18%
8:00 AM	4.6	4.3	4.3	4.6	4.4	3.4	4.8	5.1	4.7	3.9	-1.2	0.5	0.6	0.3	-0.6	-26%	12%	13%	6%	-14%
9:00 AM	5.7	5.3	5.4	5.7	5.5	3.0	4.6	5.1	4.4	4.9	-2.7	-0.8	-0.6	-1.1	-0.8	-47%	-15%	-11%	-20%	-14%
10:00 AM	6.3	6.1	6.1	6.1	5.6	2.9	4.7	5.1	4.5	5.3	-3.4	-1.5	-0.9	-1.1	-0.7	-53%	-24%	-16%	-20%	-12%
11:00 AM	6.2	6.2	6.3	6.0	5.8	3.0	4.9	5.2	4.7	5.5	-3.2	-1.4	-0.8	-1.1	-0.5	-52%	-22%	-13%	-19%	-9%
Noon	6.4	6.3	6.2	6.2	6.1	3.1	5.1	5.4	5.0	5.7	-3.2	-1.1	-0.8	-1.0	-0.5	-51%	-17%	-12%	-17%	-8%
1:00 PM	6.4	6.3	6.4	6.3	6.2	3.3	5.3	5.7	5.3	5.8	-3.1	-1.0	-0.6	-0.9	-0.5	-48%	-16%	-9%	-14%	-8%
2:00 PM	6.4	6.5	6.3	6.5	6.6	3.6	5.8	6.0	5.6	6.1	-2.8	-0.6	-0.5	-1.0	-0.4	-43%	-9%	-7%	-15%	-6%
3:00 PM	6.3	6.2	6.2	6.6	6.5	3.6	5.6	5.9	5.6	6.0	-2.7	-0.6	-0.6	-0.9	-0.5	-43%	-9%	-10%	-14%	-8%
4:00 PM	6.6	6.5	6.6	6.6	6.4	3.5	5.5	6.0	5.5	5.8	-3.1	-1.0	-0.6	-0.9	-0.8	-47%	-16%	-8%	-14%	-12%
5:00 PM	6.7	6.7	6.5	6.4	6.3	3.3	5.3	5.9	5.3	5.7	-3.4	-1.2	-0.5	-0.9	-0.7	-51%	-19%	-7%	-15%	-11%
6:00 PM	6.5	6.5	6.5	6.2	5.9	2.9	4.6	5.5	4.7	5.7	-3.6	-1.8	-0.7	-1.3	-0.4	-56%	-28%	-11%	-22%	-7%
7:00 PM	5.7	5.9	5.8	5.7	5.0	2.2	3.8	4.6	3.5	5.2	-3.5	-2.0	-1.1	-1.4	-0.5	-62%	-34%	-19%	-29%	-9%
8:00 PM	4.7	4.8	4.9	4.6	3.8	1.6	3.3	3.5	2.7	4.1	-3.1	-1.6	-1.1	-1.2	-0.5	-66%	-32%	-24%	-30%	-10%
9:00 PM	4.1	4.2	4.3	3.9	3.3	1.3	2.8	2.7	2.1	3.3	-2.9	-1.5	-1.2	-1.2	-0.6	-70%	-35%	-31%	-35%	-14%
10:00 PM	3.3	3.5	3.8	3.1	2.6	1.1	2.3	2.2	1.8	2.7	-2.2	-1.5	-0.9	-0.8	-0.4	-67%	-40%	-30%	-32%	-12%
11:00 PM	2.3	2.4	2.5	2.1	1.8	0.7	1.5	1.5	1.2	1.9	-1.6	-1.1	-0.6	-0.6	-0.2	-68%	-43%	-29%	-35%	-10%
Total	109.4	108.6	108.9	106.8	101.8	56.9	88.8	93.9	83.3	93.8	-52.6	-20.1	-13.0	-18.6	-13.0	-48%	-18%	-12%	-18%	-14%

Appendix Table 9 - Average Weekday Hourly Traffic at I-495 #55 NB

Hour	Pre-Pandemic Hourly Traffic (thousands)					Post-Pandemic Hourly Traffic (thousands)					Absolute Difference (thousands)					Percentage Difference				
	Apr 2019	May 2019	Jun 2019	Oct 2019	Jan 2020	Apr 2020	Jun 2020	Oct 2020	Jan 2021	Oct 2021	Apr 2020 vs. Apr 2019	Jun 2020 vs. Jun 2019	Oct 2020 vs. Oct 2019	Jan 2021 vs. Jan 2020	Oct 2021 vs. Oct 2019	Apr 2020 vs. Apr 2019	Jun 2020 vs. Jun 2019	Oct 2020 vs. Oct 2019	Jan 2021 vs. Jan 2020	Oct 2021 vs. Oct 2019
Midnight	1.3	1.5	1.6	1.3	1.2	0.5	1.1	1.1	0.9	1.2	-0.8	-0.5	-0.2	-0.2	-0.1	-60%	-31%	-14%	-20%	-6%
1:00 AM	0.9	0.9	1.0	0.9	0.8	0.4	0.8	0.7	0.7	0.8	-0.5	-0.3	-0.1	-0.2	0.0	-53%	-27%	-14%	-18%	-4%
2:00 AM	0.7	0.8	0.8	0.8	0.7	0.4	0.6	0.6	0.6	0.7	-0.4	-0.2	-0.1	-0.2	0.0	-49%	-25%	-16%	-22%	-6%
3:00 AM	1.0	1.0	1.0	1.0	1.0	0.5	0.8	0.8	0.7	0.8	-0.4	-0.3	-0.2	-0.2	-0.2	-45%	-25%	-22%	-24%	-17%
4:00 AM	2.0	2.0	2.1	2.2	2.0	1.3	1.7	1.7	1.5	1.8	-0.7	-0.4	-0.5	-0.5	-0.4	-35%	-19%	-24%	-25%	-19%
5:00 AM	4.7	4.5	4.5	4.9	4.4	3.0	3.6	3.5	3.1	3.7	-1.7	-1.0	-1.3	-1.2	-1.2	-37%	-21%	-28%	-28%	-24%
6:00 AM	6.2	6.1	6.0	6.1	5.5	3.5	4.5	4.4	4.0	5.0	-2.7	-1.5	-1.7	-1.5	-1.2	-44%	-25%	-28%	-28%	-19%
7:00 AM	6.9	6.6	6.5	6.7	6.0	3.5	4.8	5.0	4.5	5.7	-3.4	-1.7	-1.7	-1.6	-1.0	-49%	-26%	-25%	-26%	-15%
8:00 AM	6.7	6.6	6.5	6.8	6.0	3.3	4.9	5.2	4.6	5.6	-3.4	-1.6	-1.6	-1.5	-1.1	-50%	-24%	-24%	-25%	-17%
9:00 AM	6.6	6.5	6.5	6.5	6.0	3.1	4.8	4.9	4.2	5.5	-3.5	-1.7	-1.6	-1.8	-1.0	-53%	-26%	-25%	-30%	-15%
10:00 AM	6.5	6.5	6.3	6.1	5.6	3.1	4.9	5.0	4.4	5.5	-3.4	-1.3	-1.1	-1.2	-0.6	-52%	-21%	-18%	-21%	-10%
11:00 AM	6.3	6.5	6.3	6.0	5.6	3.3	5.3	5.3	4.8	5.6	-3.0	-1.0	-0.7	-0.8	-0.4	-48%	-16%	-12%	-15%	-7%
Noon	6.3	6.6	6.2	6.1	5.9	3.6	5.7	5.6	5.1	5.7	-2.7	-0.5	-0.5	-0.8	-0.4	-43%	-8%	-8%	-13%	-7%
1:00 PM	6.5	6.7	6.6	6.4	6.2	3.9	6.0	5.8	5.4	6.1	-2.6	-0.6	-0.6	-0.8	-0.3	-40%	-9%	-9%	-12%	-5%
2:00 PM	6.7	6.8	6.5	6.6	6.5	4.2	6.4	6.2	5.8	6.3	-2.4	-0.2	-0.4	-0.7	-0.4	-36%	-3%	-7%	-10%	-5%
3:00 PM	6.5	6.5	6.5	6.6	6.5	4.2	6.3	6.3	5.8	6.3	-2.3	-0.1	-0.2	-0.7	-0.3	-35%	-2%	-4%	-10%	-4%
4:00 PM	6.5	6.1	6.3	6.4	6.2	4.1	6.3	6.5	5.9	6.3	-2.4	0.0	0.1	-0.3	-0.1	-37%	1%	1%	-4%	-2%
5:00 PM	6.2	5.9	6.0	6.1	5.6	3.7	6.0	6.4	5.6	6.2	-2.4	0.1	0.3	0.0	0.1	-39%	1%	5%	-1%	2%
6:00 PM	6.1	5.9	6.1	5.9	5.3	3.1	5.2	5.7	4.7	5.9	-3.0	-0.8	-0.2	-0.5	0.1	-49%	-13%	-3%	-10%	1%
7:00 PM	5.4	5.6	5.5	5.4	4.5	2.4	4.3	4.7	3.6	5.2	-3.0	-1.2	-0.6	-0.9	-0.2	-55%	-21%	-12%	-20%	-3%
8:00 PM	4.7	4.8	4.9	4.4	3.6	1.8	3.7	3.7	2.9	4.0	-2.8	-1.2	-0.8	-0.7	-0.5	-61%	-24%	-17%	-21%	-10%
9:00 PM	4.0	4.1	4.2	3.7	3.1	1.5	3.2	3.0	2.4	3.2	-2.5	-1.0	-0.7	-0.7	-0.4	-63%	-24%	-19%	-23%	-12%
10:00 PM	3.0	3.2	3.4	2.8	2.4	1.2	2.6	2.4	2.0	2.6	-1.8	-0.8	-0.4	-0.4	-0.3	-60%	-24%	-14%	-18%	-9%
11:00 PM	2.1	2.3	2.3	1.9	1.7	0.8	1.7	1.7	1.4	1.8	-1.2	-0.6	-0.3	-0.3	-0.1	-60%	-27%	-14%	-19%	-8%
Total	113.6	114.0	113.5	111.5	102.2	60.5	95.1	96.3	84.5	101.5	-53.1	-18.4	-15.2	-17.7	-10.0	-47%	-16%	-14%	-17%	-11%

Appendix Table 10 - Average Weekday Hourly Traffic at I-495 #55 SB

Hour	Pre-Pandemic Hourly Traffic (thousands)					Post-Pandemic Hourly Traffic (thousands)					Absolute Difference (thousands)					Percentage Difference				
	Apr 2019	May 2019	Jun 2019	Oct 2019	Jan 2020	Apr 2020	Jun 2020	Oct 2020	Jan 2021	Oct 2021	Apr 2020 vs. Apr 2019	Jun 2020 vs. Jun 2019	Oct 2020 vs. Oct 2019	Jan 2021 vs. Jan 2020	Oct 2021 vs. Oct 2019	Apr 2020 vs. Apr 2019	Jun 2020 vs. Jun 2019	Oct 2020 vs. Oct 2019	Jan 2021 vs. Jan 2020	Oct 2021 vs. Oct 2019
Midnight	1.5	1.6	1.7	1.5	1.3	0.6	1.0	1.2	1.0	1.4	-0.9	-0.7	-0.3	-0.3	-0.1	-61%	-39%	-22%	-24%	-8%
1:00 AM	1.0	1.0	1.1	1.0	0.9	0.4	0.7	0.8	0.7	1.0	-0.6	-0.4	-0.2	-0.3	0.0	-61%	-40%	-22%	-27%	-1%
2:00 AM	0.8	0.8	0.9	0.8	0.8	0.3	0.5	0.6	0.6	0.8	-0.5	-0.3	-0.2	-0.2	0.0	-59%	-38%	-22%	-28%	-5%
3:00 AM	0.8	0.9	0.9	0.9	0.8	0.4	0.6	0.7	0.6	0.8	-0.4	-0.3	-0.2	-0.2	-0.1	-50%	-31%	-22%	-27%	-7%
4:00 AM	1.3	1.4	1.4	1.4	1.3	0.8	1.1	1.1	0.9	1.2	-0.5	-0.3	-0.3	-0.3	-0.2	-39%	-20%	-24%	-26%	-17%
5:00 AM	3.0	3.1	3.1	3.2	2.8	1.8	2.5	2.4	2.0	2.5	-1.2	-0.6	-0.8	-0.8	-0.7	-39%	-18%	-26%	-28%	-23%
6:00 AM	4.9	5.0	4.9	4.9	4.4	2.9	4.0	3.7	3.2	4.1	-2.0	-1.0	-1.2	-1.2	-0.7	-41%	-19%	-24%	-27%	-15%
7:00 AM	5.8	5.7	5.7	5.6	5.1	3.3	4.8	4.6	4.0	5.0	-2.5	-0.9	-1.0	-1.1	-0.7	-43%	-16%	-18%	-22%	-12%
8:00 AM	5.9	6.0	5.9	6.1	5.5	3.1	4.8	4.8	4.3	5.3	-2.8	-1.1	-1.3	-1.2	-0.8	-47%	-18%	-21%	-23%	-13%
9:00 AM	6.2	6.0	6.1	5.9	5.4	2.9	4.8	4.6	4.1	5.3	-3.3	-1.3	-1.3	-1.3	-0.6	-54%	-21%	-21%	-24%	-9%
10:00 AM	6.1	5.9	6.1	5.6	5.2	2.9	5.0	4.7	4.1	5.4	-3.1	-1.2	-0.9	-1.0	-0.3	-52%	-19%	-16%	-20%	-4%
11:00 AM	6.0	5.9	6.1	5.6	5.3	3.1	5.2	5.1	4.4	5.5	-2.8	-0.9	-0.5	-0.9	-0.1	-47%	-15%	-10%	-18%	-2%
Noon	6.2	6.1	6.3	6.0	5.7	3.5	5.6	5.5	4.9	5.6	-2.8	-0.7	-0.5	-0.9	-0.4	-44%	-11%	-8%	-15%	-6%
1:00 PM	6.4	6.4	6.4	6.2	6.1	3.8	5.9	5.8	5.3	5.9	-2.6	-0.5	-0.4	-0.8	-0.3	-41%	-7%	-7%	-13%	-4%
2:00 PM	6.6	6.4	6.3	6.7	6.6	4.3	6.3	6.2	5.9	6.2	-2.3	-0.1	-0.4	-0.7	-0.4	-34%	-1%	-7%	-10%	-6%
3:00 PM	6.5	6.4	6.4	6.6	6.5	4.4	6.3	6.3	6.0	6.2	-2.1	-0.1	-0.3	-0.5	-0.4	-32%	-1%	-5%	-8%	-7%
4:00 PM	6.6	6.3	6.4	6.5	6.4	4.3	6.2	6.4	5.8	6.2	-2.3	-0.2	-0.1	-0.6	-0.3	-35%	-3%	-2%	-9%	-5%
5:00 PM	6.5	6.5	6.3	6.6	6.2	3.8	5.8	6.3	5.5	6.1	-2.7	-0.5	-0.3	-0.6	-0.5	-41%	-8%	-4%	-10%	-8%
6:00 PM	6.3	6.3	6.3	6.3	5.6	3.0	4.7	5.5	4.7	5.8	-3.3	-1.5	-0.8	-0.9	-0.5	-53%	-24%	-13%	-16%	-8%
7:00 PM	5.3	5.4	5.5	5.6	4.7	2.4	3.9	4.8	3.7	5.1	-3.0	-1.6	-0.8	-1.0	-0.5	-56%	-29%	-14%	-21%	-9%
8:00 PM	4.5	4.6	4.6	4.5	3.7	1.8	3.2	3.6	2.8	4.1	-2.7	-1.4	-0.9	-0.9	-0.5	-60%	-30%	-20%	-23%	-10%
9:00 PM	3.9	4.1	4.1	3.8	3.3	1.3	2.7	2.9	2.2	3.4	-2.6	-1.4	-0.9	-1.0	-0.4	-66%	-35%	-24%	-31%	-11%
10:00 PM	3.1	3.3	3.4	3.0	2.6	1.1	2.1	2.3	1.8	2.6	-2.1	-1.3	-0.7	-0.7	-0.3	-66%	-39%	-22%	-28%	-11%
11:00 PM	2.3	2.4	2.5	2.2	1.9	0.9	1.6	1.8	1.5	2.1	-1.4	-0.9	-0.5	-0.4	-0.2	-60%	-36%	-21%	-23%	-8%
Total	107.5	107.3	108.3	106.5	98.2	57.0	89.2	91.6	80.2	97.5	-50.5	-19.1	-14.9	-18.0	-9.0	-47%	-18%	-14%	-18%	-9%

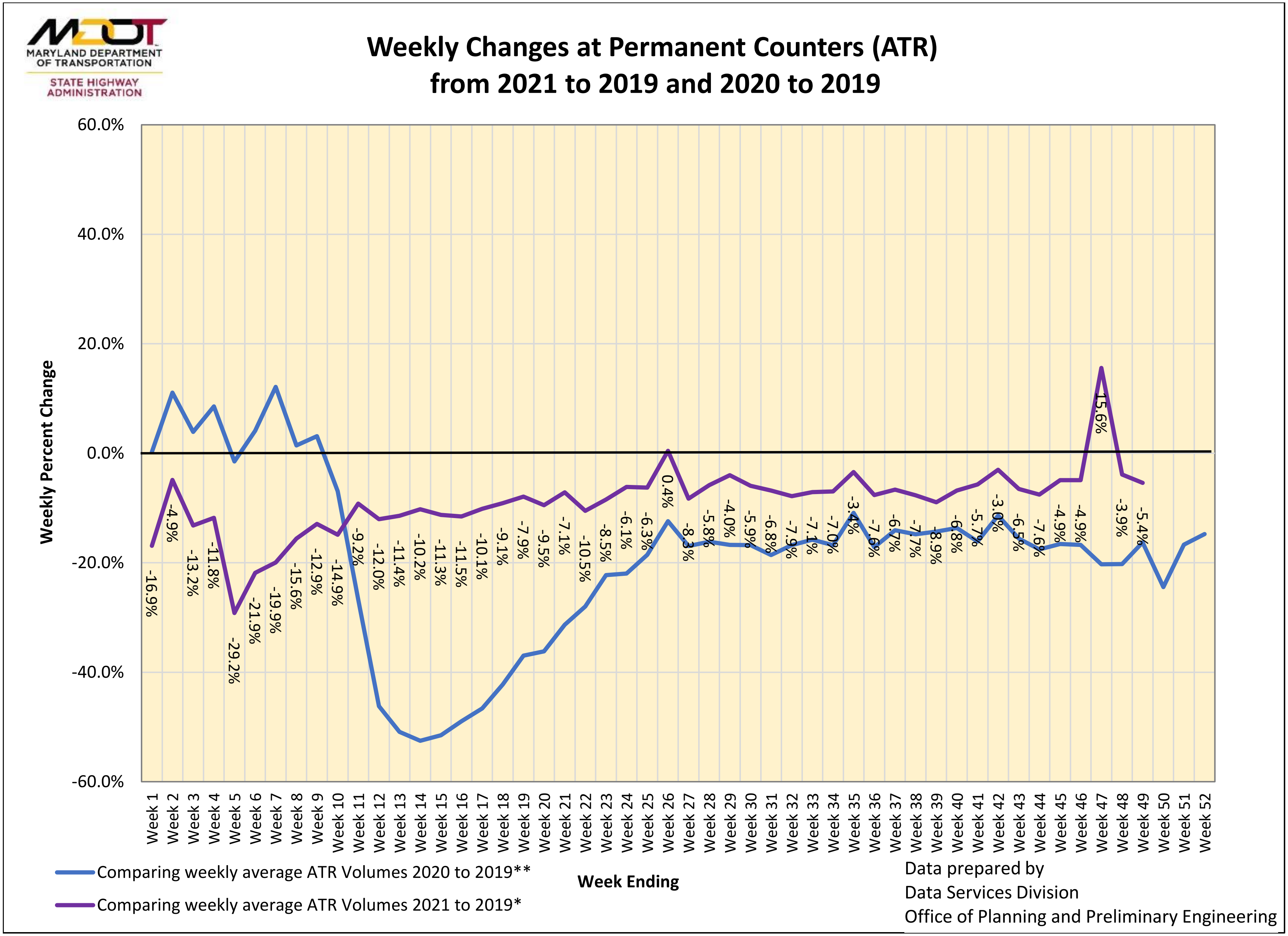
Appendix Table 11 - Average Weekday Hourly Traffic at I-495 #43 NB

Hour	Pre-Pandemic Hourly Traffic (thousands)					Post-Pandemic Hourly Traffic (thousands)					Absolute Difference (thousands)					Percentage Difference				
	Apr 2019	May 2019	Jun 2019	Oct 2019	Jan 2020	Apr 2020	Jun 2020	Oct 2020	Jan 2021	Oct 2021	Apr 2020 vs. Apr 2019	Jun 2020 vs. Jun 2019	Oct 2020 vs. Oct 2019	Jan 2021 vs. Jan 2020	Oct 2021 vs. Oct 2019	Apr 2020 vs. Apr 2019	Jun 2020 vs. Jun 2019	Oct 2020 vs. Oct 2019	Jan 2021 vs. Jan 2020	Oct 2021 vs. Oct 2019
Midnight	1.4	1.6	1.7	1.4	1.3	0.6	1.2	1.2	1.1	1.3	-0.8	-0.5	-0.2	-0.2	-0.1	-58%	-31%	-11%	-14%	-6%
1:00 AM	0.9	1.0	1.1	0.9	0.9	0.4	0.8	0.8	0.8	0.9	-0.5	-0.3	-0.1	-0.1	0.0	-53%	-27%	-8%	-16%	0%
2:00 AM	0.8	0.9	0.9	0.8	0.8	0.4	0.7	0.8	0.7	0.8	-0.4	-0.3	-0.1	-0.1	0.0	-49%	-28%	-8%	-15%	-1%
3:00 AM	1.0	1.0	1.1	1.0	1.0	0.6	0.8	0.9	0.8	0.9	-0.5	-0.3	-0.2	-0.2	-0.1	-47%	-28%	-17%	-21%	-10%
4:00 AM	2.0	2.0	2.0	2.2	2.0	1.2	1.6	1.6	1.5	1.7	-0.7	-0.4	-0.5	-0.5	-0.4	-38%	-22%	-24%	-24%	-19%
5:00 AM	4.3	4.2	4.2	4.4	4.0	2.6	3.3	3.3	2.9	3.5	-1.7	-0.9	-1.1	-1.1	-0.9	-39%	-21%	-26%	-27%	-20%
6:00 AM	5.8	5.8	5.8	6.0	5.3	3.2	4.2	4.1	3.8	4.8	-2.7	-1.6	-1.8	-1.5	-1.2	-46%	-27%	-31%	-29%	-21%
7:00 AM	6.8	6.5	6.5	6.5	6.0	3.4	4.7	4.9	4.4	5.8	-3.4	-1.8	-1.6	-1.6	-0.7	-50%	-27%	-24%	-27%	-11%
8:00 AM	6.8	6.5	6.6	6.7	6.1	3.3	4.9	5.3	4.7	6.1	-3.4	-1.7	-1.4	-1.4	-0.6	-51%	-26%	-20%	-23%	-9%
9:00 AM	6.7	6.6	6.7	6.6	6.0	3.2	5.0	5.1	4.6	6.1	-3.6	-1.8	-1.5	-1.4	-0.5	-53%	-26%	-23%	-23%	-8%
10:00 AM	6.7	6.6	6.6	6.4	5.8	3.3	5.2	5.3	4.8	6.0	-3.4	-1.5	-1.1	-1.0	-0.4	-50%	-22%	-18%	-17%	-7%
11:00 AM	6.5	6.5	6.5	6.3	5.7	3.5	5.5	5.5	5.1	6.2	-3.0	-1.0	-0.8	-0.6	-0.1	-46%	-16%	-13%	-10%	-1%
Noon	6.7	6.7	6.7	6.4	6.1	3.9	5.9	5.9	5.6	6.4	-2.8	-0.8	-0.5	-0.5	0.0	-42%	-12%	-7%	-8%	0%
1:00 PM	6.9	6.9	6.9	6.8	6.4	4.2	6.2	6.2	5.9	6.7	-2.7	-0.7	-0.5	-0.5	-0.1	-39%	-10%	-8%	-8%	-1%
2:00 PM	7.2	7.1	7.1	7.2	6.8	4.5	6.5	6.7	6.4	6.8	-2.7	-0.6	-0.5	-0.4	-0.3	-37%	-9%	-7%	-6%	-5%
3:00 PM	7.2	7.1	7.2	7.2	7.0	4.6	6.7	6.9	6.5	6.7	-2.6	-0.6	-0.3	-0.5	-0.5	-36%	-8%	-5%	-7%	-7%
4:00 PM	7.2	6.9	7.1	7.2	6.8	4.5	6.8	6.9	6.3	6.7	-2.7	-0.3	-0.3	-0.5	-0.4	-38%	-4%	-4%	-7%	-6%
5:00 PM	7.3	7.0	7.0	7.0	6.5	4.1	6.3	6.7	6.0	6.6	-3.1	-0.7	-0.2	-0.5	-0.4	-43%	-10%	-3%	-8%	-5%
6:00 PM	7.0	6.6	6.7	6.7	5.9	3.4	5.5	5.9	5.0	6.2	-3.6	-1.2	-0.8	-0.9	-0.5	-51%	-18%	-12%	-15%	-8%
7:00 PM	5.9	6.0	5.8	5.8	4.8	2.7	4.5	4.9	3.8	5.1	-3.2	-1.3	-0.9	-0.9	-0.7	-53%	-22%	-16%	-19%	-13%
8:00 PM	4.9	5.0	5.1	4.6	3.8	2.1	3.8	3.9	3.1	4.0	-2.8	-1.4	-0.8	-0.7	-0.6	-57%	-27%	-16%	-18%	-13%
9:00 PM	4.1	4.3	4.5	3.8	3.2	1.6	3.1	3.1	2.5	3.2	-2.5	-1.3	-0.8	-0.7	-0.6	-60%	-30%	-20%	-22%	-17%
10:00 PM	3.1	3.3	3.5	2.9	2.5	1.3	2.5	2.4	2.1	2.5	-1.8	-1.0	-0.5	-0.4	-0.4	-58%	-28%	-16%	-16%	-13%
11:00 PM	2.2	2.4	2.5	2.1	1.8	0.9	1.8	1.8	1.5	1.9	-1.3	-0.7	-0.3	-0.3	-0.2	-58%	-29%	-15%	-16%	-11%
Total	119.4	118.6	120.3	117.0	106.2	63.6	97.5	100.3	89.8	107.1	-55.8	-22.7	-16.7	-16.4	-9.9	-47%	-19%	-14%	-15%	-10%

Appendix Table 12 - Average Weekday Hourly Traffic at I-495 #43 SB

Hour	Pre-Pandemic Hourly Traffic (thousands)					Post-Pandemic Hourly Traffic (thousands)					Absolute Difference (thousands)					Percentage Difference				
	Apr 2019	May 2019	Jun 2019	Oct 2019	Jan 2020	Apr 2020	Jun 2020	Oct 2020	Jan 2021	Oct 2021	Apr 2020 vs. Apr 2019	Jun 2020 vs. Jun 2019	Oct 2020 vs. Oct 2019	Jan 2021 vs. Jan 2020	Oct 2021 vs. Oct 2019	Apr 2020 vs. Apr 2019	Jun 2020 vs. Jun 2019	Oct 2020 vs. Oct 2019	Jan 2021 vs. Jan 2020	Oct 2021 vs. Oct 2019
Midnight	1.7	1.7	1.9	1.6	1.4	0.6	1.2	1.2	1.1	1.4	-1.0	-0.7	-0.3	-0.3	-0.2	-62%	-37%	-21%	-24%	-12%
1:00 AM	1.1	1.1	1.2	1.0	1.0	0.4	0.8	0.8	0.7	1.0	-0.6	-0.4	-0.2	-0.3	-0.1	-60%	-34%	-18%	-26%	-5%
2:00 AM	0.9	0.9	0.9	0.9	0.8	0.4	0.6	0.7	0.6	0.8	-0.5	-0.3	-0.2	-0.2	-0.1	-58%	-37%	-23%	-27%	-7%
3:00 AM	0.9	0.9	1.0	0.9	0.8	0.4	0.6	0.7	0.6	0.8	-0.5	-0.3	-0.2	-0.2	-0.1	-52%	-33%	-22%	-25%	-10%
4:00 AM	1.4	1.4	1.4	1.5	1.3	0.8	1.1	1.1	0.9	1.2	-0.6	-0.3	-0.4	-0.4	-0.3	-42%	-23%	-26%	-29%	-20%
5:00 AM	3.4	3.4	3.4	3.5	3.1	1.9	2.6	2.5	2.1	2.6	-1.4	-0.8	-0.9	-0.9	-0.9	-43%	-24%	-27%	-30%	-24%
6:00 AM	5.5	5.6	5.3	5.4	4.7	2.8	3.8	3.9	3.2	4.4	-2.7	-1.5	-1.5	-1.5	-1.0	-49%	-28%	-28%	-31%	-18%
7:00 AM	6.0	5.9	5.7	5.8	5.4	3.1	4.5	4.8	3.9	5.2	-2.9	-1.3	-1.1	-1.5	-0.6	-48%	-22%	-18%	-28%	-10%
8:00 AM	6.0	5.9	5.9	6.0	5.5	3.2	4.6	5.0	4.2	5.4	-2.8	-1.3	-1.0	-1.3	-0.6	-46%	-22%	-16%	-24%	-11%
9:00 AM	6.2	6.1	6.1	6.0	5.7	3.1	4.8	5.0	4.2	5.6	-3.1	-1.3	-1.1	-1.5	-0.4	-50%	-21%	-18%	-26%	-7%
10:00 AM	6.1	6.1	6.0	5.8	5.5	3.2	4.9	5.1	4.4	5.6	-2.9	-1.1	-0.7	-1.1	-0.2	-47%	-18%	-12%	-21%	-3%
11:00 AM	6.1	6.1	6.1	5.8	5.6	3.5	5.3	5.5	4.7	5.8	-2.6	-0.8	-0.3	-0.9	0.0	-42%	-14%	-6%	-17%	0%
Noon	6.5	6.3	6.4	6.2	6.1	3.9	5.7	6.0	5.2	6.2	-2.6	-0.7	-0.1	-0.9	0.0	-40%	-11%	-2%	-14%	0%
1:00 PM	6.7	6.6	6.6	6.6	6.5	4.2	6.1	6.2	5.7	6.4	-2.5	-0.6	-0.4	-0.9	-0.2	-38%	-8%	-5%	-13%	-3%
2:00 PM	7.0	6.7	6.8	7.1	7.0	4.7	6.5	6.6	6.3	6.5	-2.3	-0.3	-0.4	-0.7	-0.6	-33%	-5%	-6%	-10%	-8%
3:00 PM	6.8	6.7	6.8	7.0	6.9	4.8	6.6	6.5	6.3	6.4	-2.1	-0.2	-0.5	-0.6	-0.6	-30%	-3%	-7%	-9%	-8%
4:00 PM	7.0	6.7	6.8	6.9	6.8	4.7	6.6	6.6	6.1	6.6	-2.2	-0.2	-0.3	-0.7	-0.3	-32%	-3%	-4%	-10%	-5%
5:00 PM	7.0	6.8	6.9	7.0	6.6	4.3	6.3	6.8	6.0	6.5	-2.7	-0.6	-0.2	-0.6	-0.5	-39%	-9%	-3%	-9%	-7%
6:00 PM	6.9	6.6	6.8	6.8	6.2	3.4	5.3	6.2	5.1	6.4	-3.5	-1.5	-0.6	-1.0	-0.4	-50%	-22%	-9%	-17%	-6%
7:00 PM	6.0	6.0	6.1	6.1	5.1	2.8	4.4	5.3	4.1	5.7	-3.2	-1.7	-0.9	-1.1	-0.5	-54%	-28%	-14%	-21%	-8%
8:00 PM	5.3	5.3	5.3	5.2	4.2	2.2	3.8	4.1	3.2	4.6	-3.1	-1.6	-1.1	-1.1	-0.6	-59%	-30%	-21%	-25%	-12%
9:00 PM	4.6	4.7	4.8	4.3	3.6	1.6	3.1	3.2	2.5	3.5	-2.9	-1.7	-1.0	-1.1	-0.8	-65%	-34%	-24%	-31%	-18%
10:00 PM	3.5	3.6	3.9	3.3	2.8	1.3	2.4	2.6	2.0	2.8	-2.2	-1.4	-0.7	-0.8	-0.5	-64%	-37%	-22%	-29%	-16%
11:00 PM	2.5	2.6	2.7	2.3	2.0	1.0	1.7	1.9	1.5	2.0	-1.5	-1.0	-0.5	-0.5	-0.3	-62%	-37%	-20%	-25%	-14%
Total	114.9	113.7	114.9	113.0	104.7	62.3	93.3	98.3	84.6	103.4	-52.6	-21.6	-14.7	-20.2	-9.6	-46%	-19%	-13%	-19%	-9%

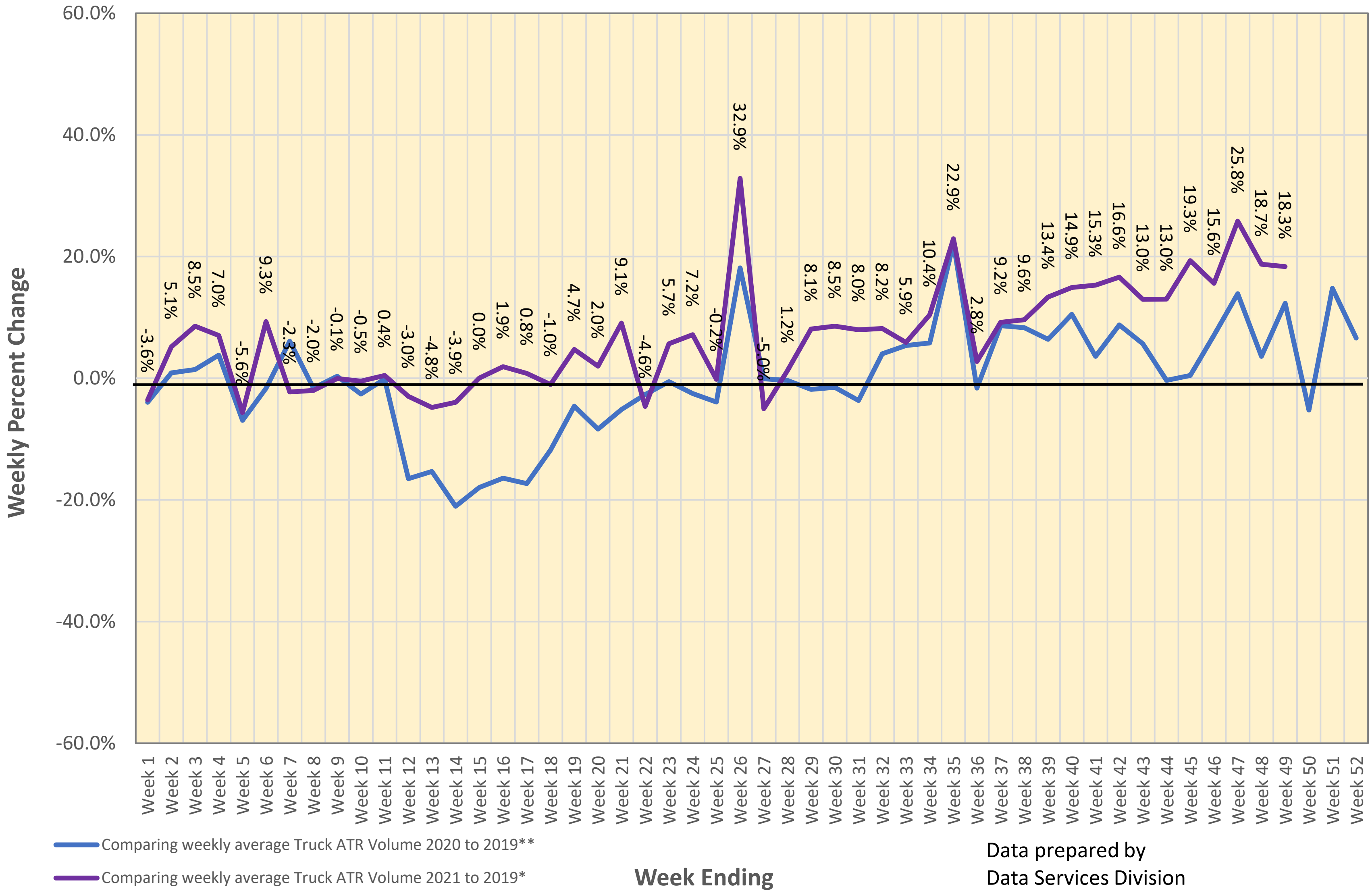
ATTACHMENT 1B:
Weekly Changes at Permanent Count Stations



MDOT
MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION
Weekly Changes at Permanent Counters (ATR)
from 2021 to 2019 and 2020 to 2019
60.0%
40.0%
20.0%
0.0%
-20.0%
-40.0%
-60.0%
Weekly Percent Change
-16.9%
-4.9%
-13.2%
-11.8%
-29.2%
-21.9%
-19.9%
-15.6%
-12.9%
-14.9%
-9.2%
-12.0%
-11.4%
-10.2%
-11.3%
-11.5%
-10.1%
-9.1%
-7.9%
-9.5%
-7.1%
-10.5%
-8.5%
-6.1%
-6.3%
0.4%
-8.3%
-5.8%
-4.0%
-5.9%
-6.8%
-7.9%
-7.1%
-7.0%
-3.4%
-7.6%
-6.7%
-7.7%
-8.9%
-6.8%
-5.7%
-3.0%
-6.5%
-7.6%
-4.9%
-4.9%
15.6%
-3.9%
-5.4%
Week 1 Week 2 Week 3 Week 4 Week 5 Week 6 Week 7 Week 8 Week 9 Week 10 Week 11 Week 12 Week 13 Week 14 Week 15 Week 16 Week 17 Week 18 Week 19 Week 20 Week 21 Week 22 Week 23 Week 24 Week 25 Week 26 Week 27 Week 28 Week 29 Week 30 Week 31 Week 32 Week 33 Week 34 Week 35 Week 36 Week 37 Week 38 Week 39 Week 40 Week 41 Week 42 Week 43 Week 44 Week 45 Week 46 Week 47 Week 48 Week 49 Week 50 Week 51 Week 52
Week Ending
Comparing weekly average ATR Volumes 2020 to 2019**
Comparing weekly average ATR Volumes 2021 to 2019*
Data prepared by
Data Services Division
Office of Planning and Preliminary Engineering

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

Weekly Changes in Truck Volumes at Permanent Counters (ATR) from 2021 to 2019 and 2020 to 2019



Trucks are FHWA Class 5-13

Data prepared by
Data Services Division
Office of Planning and Preliminary Engineering

ATTACHMENT 1C:
WMATA Metro Ridership Shapshot, November 2021

Metro Ridership Snapshot

November 2021

Washington Metropolitan Area Transit Authority

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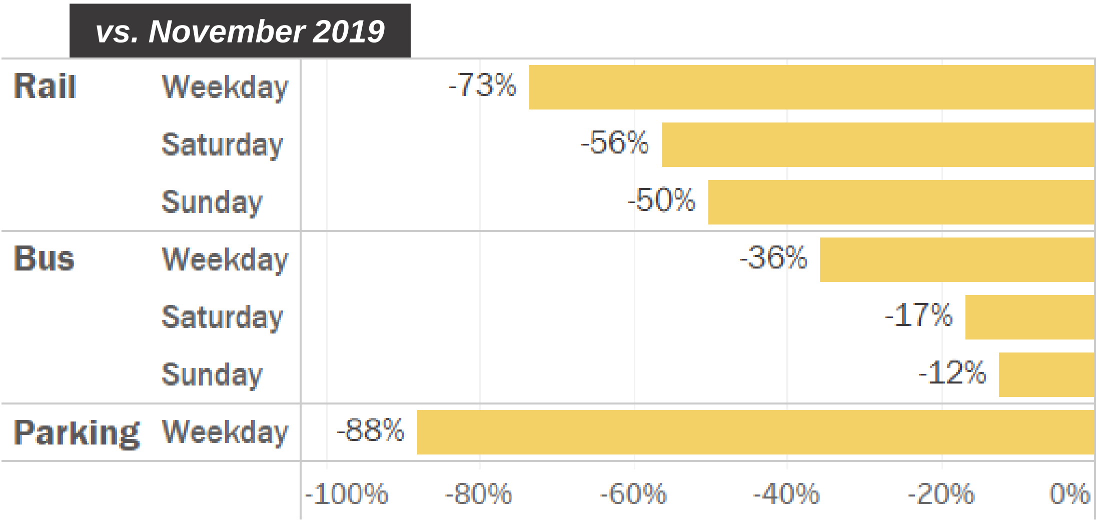
Note: All percentage changes in this document represent year-over-year changes in ridership, compared to the same time, location, and day type **two years ago** – to compare back to pre-pandemic ridership data. For more details, see How to Use and Interpret Metro Ridership Data

Bus ridership shown here is from Metro's automatic passenger counters, in both current and baseline months. Rail and parking ridership is from the farebox system.

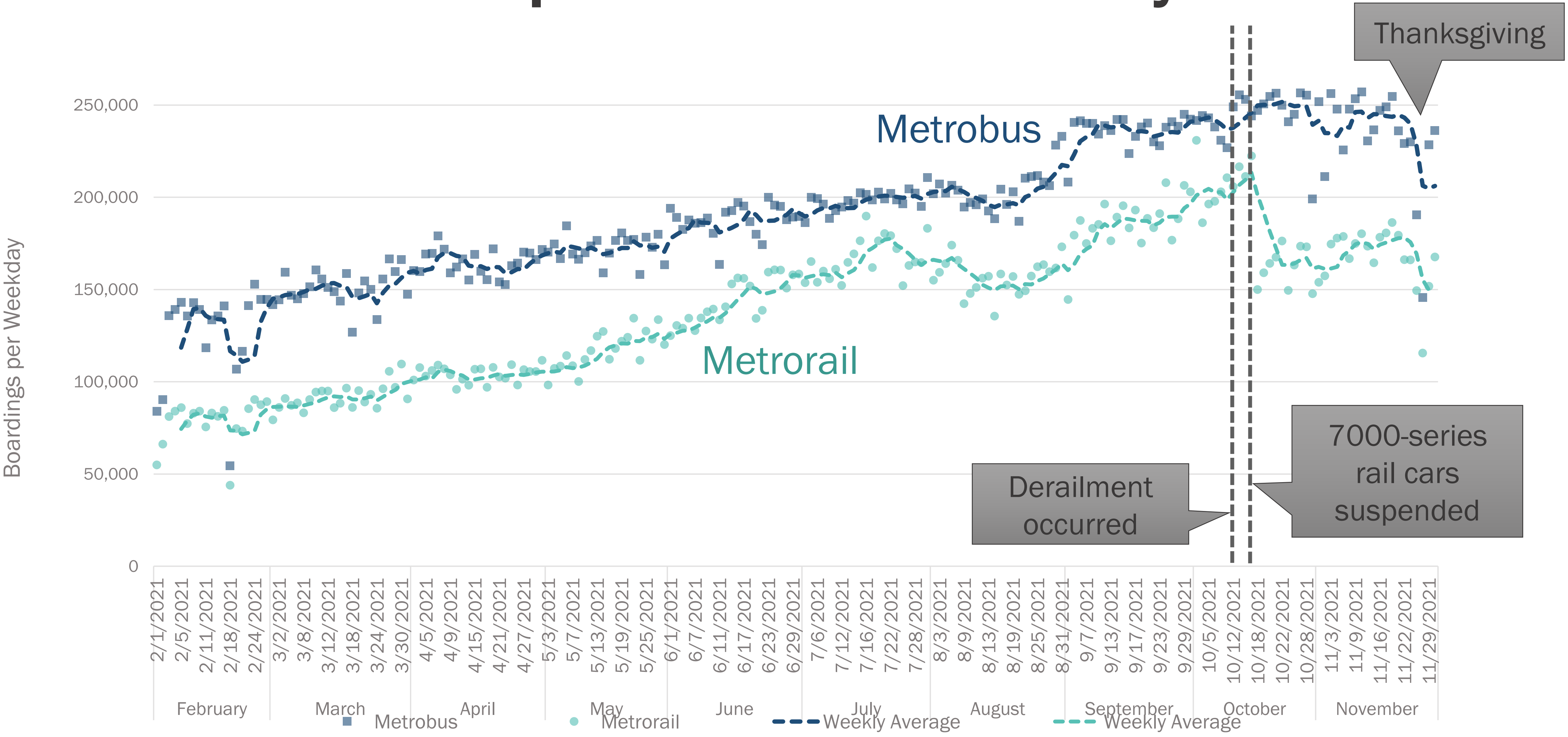
Overall Ridership in November

- **Rail**
  - At 27% of pre-pandemic levels on weekdays, about 50% on weekends
  - Ridership loss of 15-20% coinciding with the suspension of the 7000-series rail cars in mid-October, followed by relative stability in November
- **Bus**
  - At 64% of pre-pandemic levels on weekdays, with ridership closer to pre-pandemic levels on weekends
- **Parking**
  - Usage at 12% of pre-pandemic levels
- **Normal seasonal declines around Thanksgiving holiday**



November 2021 Averages	Weekday	Saturday	Sunday
Rail	167,000	128,000	80,000
Bus (APC)	233,000	140,000	107,000
Parking	5,000		

Ridership Trends Since February



Metrorail Ridership

- **Ridership at 27% of pre-pandemic levels on weekdays**
- **Ridership on weekends about 50% of pre-pandemic levels**
- **88% estimated retention of Shady Grove and Rockville ridership**
  - Based on shuttle bus ridership

- **Notes:**
  - Shady Grove and Rockville closed for repairs. Ridership at Twinbrook impacted by shuttle bus operations.
  - Rail service reduced by over 50% of normal levels through November 2021 due to the suspension of the 7000-series rail cars.

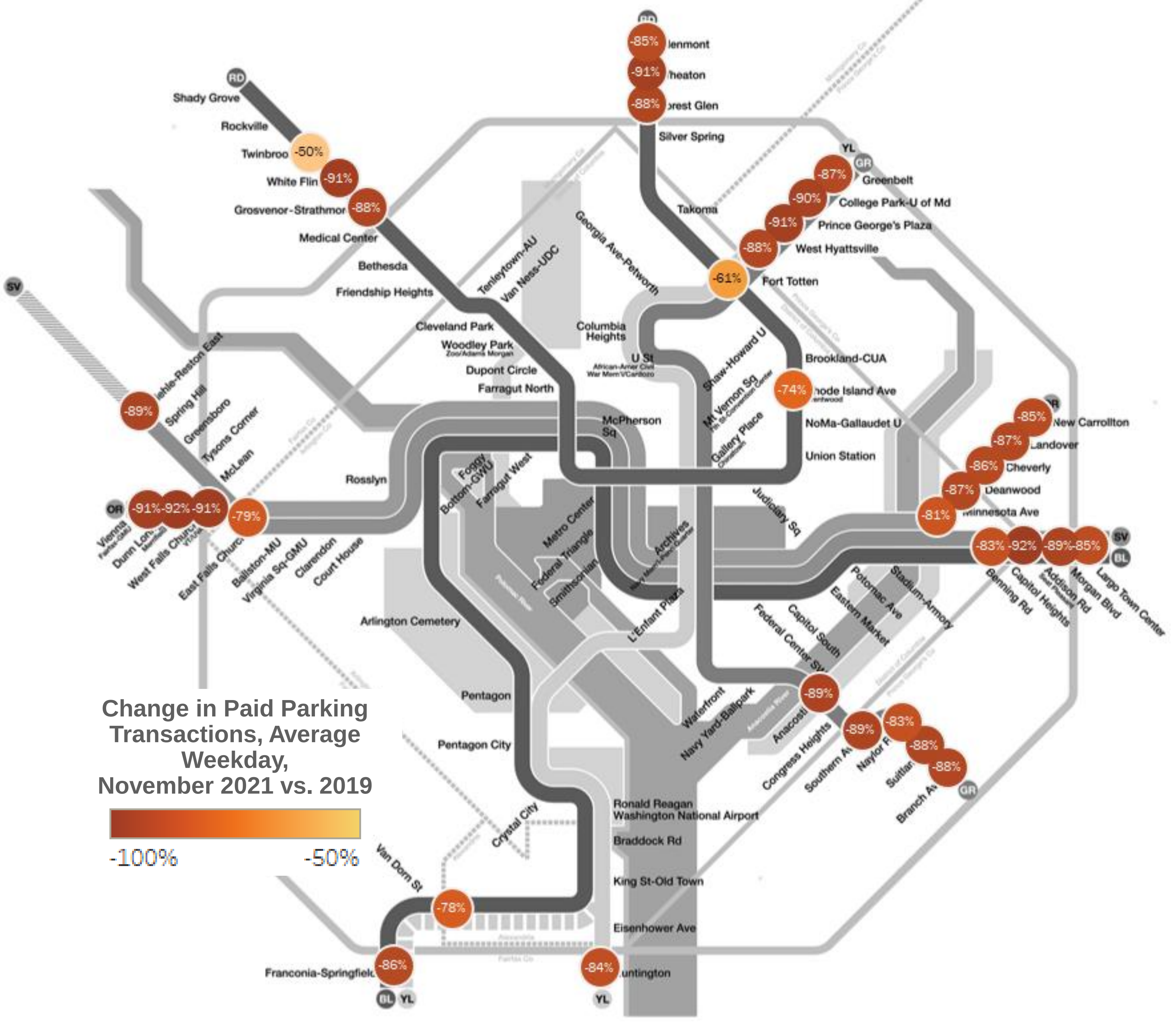
Metrobus Ridership

- **Ridership at 64% of pre-pandemic levels on weekdays**
- **Stronger retention on weekends - around 85% of pre-pandemic levels**
- **40% ridership increase on bus routes where service increased on Labor Day**
  - Higher than background average
  - October vs. July 2021
- **Notes:**
  - Cinder Bed Road division work stoppage impacted November 2019 ridership. Lines where there was no ridership in 2019 due to the work stoppage have been omitted from this chart
  - Line T2 excluded from this chart due to uncertain passenger count data
  - Bus <u>service</u> levels (scheduled revenue hours) remained around 93% of pre-pandemic levels on weekdays, 110-125% on weekends

Bus ridership based on Automatic Passenger Counter data

Metro Parking Transactions

- **Parking transactions significantly below pre-pandemic levels**
- **Most stations are at around 10-15% recovered**
- **Notes:**
    - Shady Grove and Rockville closed for repairs from mid-September 2021.



ATTACHMENT 1D:
INRIX Speed Data

INRIX Speed Data: November 2019 vs. November 2021

(Early November, non-holiday speeds to the nearest 5 mph)

AM Peak:

Segment	Direction	2019 Speed	2021 Speed	Difference
I-270 from MD-118 to Watkins Mill Rd	SB	25	30	+5
I-270 from MD-121 to MD-118	SB	20	25	+5
I-495 from US-29 to MD-650	CW	50	60	+10
I-495 from US-29 to MD-650	CCW	10	15	+5
I-495 from VA Line to MD-190	CW	55	60	+5
I-495 from VA Line to MD-190	CCW	30	40	+10
I-495 from MD-450 to MD-295	CW	50	50	0
I-495 from MD-450 to MD-295	CCW	40	45	+5
I-495 from Ritchie-Marlboro Road to MD-214	CW	40	50	+10
I-495 from Ritchie-Marlboro Road to MD-214	CCW	30	45	+15

PM Peak:

Segment	Direction	2019 Speed	2021 Speed	Difference
I-270 from MD-118 to Watkins Mill Rd	NB	35	40	+5
I-270 from MD-121 to MD-118	NB	30	50	+20
I-495 from US-29 to MD-650	CW	30	30	0
I-495 from US-29 to MD-650	CCW	55	50	-5
I-495 from VA Line to MD-190	CW	20	20	0
I-495 from VA Line to MD-190	CCW	20	30	+10
I-495 from MD-450 to MD-295	CW	30	40	+10
I-495 from MD-450 to MD-295	CCW	20	25	+5
I-495 from Ritchie-Marlboro Road to MD-214	CW	30	30	0
I-495 from Ritchie-Marlboro Road to MD-214	CCW	45	35	-10

ATTACHMENT 1E:
INRIX TTI Data

TTI Trends along I-495 and I-270 – Baseline 2017 to October 2021

Examining the TTI values along **I-495** revealed the following trends:

- Baseline 2017
  - The average TTI along I-495 (in both directions) exceeds 1.15 for **10 hours** of the day (6am to 10am and 2pm to 8pm)
  - Severe congestion (TTI > 2.00) is experienced in at least one segment of I-495 for **10 hours** of the day (6am to 10am and 2pm to 8pm)
  - Maximum observed TTI was **6.28** between 8am and 9am on the Outer Loop near MD 650
  - Daily average TTI along I-495 (in both directions) was **1.21**
- October 2021
  - The average TTI along I-495 (in both directions) exceeds 1.15 for **9 hours** of the day (6am to 10am and 2pm to 7pm)
  - Severe congestion (TTI > 2.00) is experienced in at least one segment of I-495 for **11 hours** of the day (6am to 11am and 1pm to 7pm)
  - Maximum observed TTI was **6.24** between 7am and 8am on the Outer Loop near MD 650
  - Daily average TTI along I-495 (in both directions) was **1.18**

Examining the TTI values along **I-270** revealed the following trends:

- Baseline 2017
  - The average TTI along I-270 (in both directions) exceeds 1.15 for **8 hours** of the day (6am to 10am and 3pm to 7pm)
  - Severe congestion (TTI > 2.00) is experienced in at least one segment of I-270 for **8 hours** of the day (6am to 10am and 3pm to 7pm)
  - Maximum observed TTI was **6.08** between 5pm and 6pm southbound near I-495
  - Daily average TTI along I-495 (in both directions) was **1.11**
- October 2021
  - The average TTI along I-495 (in both directions) exceeds 1.15 for **5 hours** of the day (6am to 9am and 4pm to 6pm)
  - Severe congestion (TTI > 2.00) is experienced in at least one segment of I-495 for **8 hours** of the day (6am to 10am and 3pm to 7pm)
  - Maximum observed TTI was **4.61** between 7am and 8am southbound near MD 80
  - Daily average TTI along I-495 (in both directions) was **1.05**

MDOT SHA defines various levels of congestion based on TTI. The TTI values in the following speed tables have been color-coded based on these levels as follows:

Uncongested (green)	TTI ≤ 1.15
Moderate Congestion (orange)	1.15 < TTI ≤ 1.3
Heavy Congestion (red)	1.3 < TTI < 2.0
Severe Congestion (black)	TTI ≥ 2.0

Travel time index for I-495 using INRIX data - Counterclockwise (Outer Loop)

2017 (Every Tuesday, Wednesday, and Thursday)

Road	Segment	Miles	12:00 AM	1:00 AM	2:00 AM	3:00 AM	4:00 AM	5:00 AM	6:00 AM	7:00 AM	8:00 AM	9:00 AM	10:00 AM	11:00 AM	12:00 PM	1:00 PM	2:00 PM	3:00 PM	4:00 PM	5:00 PM	6:00 PM	7:00 PM	8:00 PM	9:00 PM	10:00 PM	11:00 PM	Daily Avg
I-495	GREENBELT METRO DR/EXIT 24	0.49	1.00	0.96	0.97	0.96	0.94	0.92	0.99	1.02	1.08	0.99	1.04	1.10	1.09	1.00	1.06	1.21	1.44	1.74	1.82	1.30	0.97	0.96	1.02	1.14	
I-495	GREENBELT METRO DR/EXIT 24	0.28	1.05	0.97	0.97	0.96	0.94	0.93	0.99	1.02	1.06	0.99	1.00	1.05	1.04	0.98	1.03	1.11	1.22	1.36	1.43	1.21	0.98	0.98	1.01	1.15	
I-495	US-1/BALTIMORE AVE/EXIT 25	1.09	1.02	0.97	0.98	0.97	0.95	0.93	0.98	1.02	0.99	0.98	0.97	0.98	0.97	0.97	0.99	1.03	1.08	1.14	1.15	1.09	0.99	0.99	1.01	1.03	
I-495	US-1/BALTIMORE AVE/EXIT 25	0.22	0.96	0.97	0.97	0.96	0.93	0.92	0.96	1.04	0.99	0.95	0.95	0.95	0.96	0.96	0.98	1.02	1.05	1.09	1.06	1.02	0.97	0.97	0.96	0.96	
I-495	EXIT 27	0.65	0.95	0.95	0.96	0.95	0.93	0.90	0.98	1.15	1.03	0.93	0.92	0.93	0.93	0.94	0.95	0.98	1.02	1.09	1.01	0.98	0.95	0.95	0.94	0.94	
I-495	EXIT 27	0.93	0.97	0.97	0.98	0.96	0.92	0.90	2.16	4.38	3.45	1.48	1.03	0.95	0.93	0.93	0.97	0.95	0.95	0.97	1.02	0.97	0.95	0.95	0.94	0.95	
I-495	MD-650/NEW HAMPSHIRE AVE/EXIT 28	0.67	0.96	0.96	0.97	0.95	0.92	0.94	2.89	5.40	5.30	2.77	1.48	1.15	1.03	1.02	1.23	1.11	1.06	1.12	1.24	1.06	0.97	0.96	0.95	0.94	
I-495	MD-650/NEW HAMPSHIRE AVE/EXIT 28	0.55	0.96	0.96	0.97	0.95	0.92	0.95	3.20	5.68	6.28	3.58	1.87	1.43	1.29	1.34	1.46	1.34	1.18	1.18	1.21	1.05	0.96	0.95	0.95	0.96	
I-495	MD-193/UNIVERSITY BLVD/EXIT 29	1.16	0.94	0.94	0.95	0.94	0.90	0.97	3.18	5.06	6.07	3.66	1.82	1.36	1.30	1.31	1.37	1.56	1.31	1.21	1.17	1.04	0.94	0.93	0.92	0.92	
I-495	MD-193/UNIVERSITY BLVD/EXIT 29	0.21	0.94	0.95	0.95	0.94	0.90	1.00	2.54	4.03	4.91	2.90	1.41	1.06	1.05	1.09	1.23	1.45	1.23	1.13	1.11	1.03	0.94	0.94	0.93	0.93	
I-495	US-29/COLESVILLE RD/EXIT 30	0.58	0.94	0.95	0.95	0.94	0.91	1.01	2.51	3.78	4.55	2.93	1.49	1.10	1.09	1.15	1.32	1.60	1.33	1.16	1.15	1.05	0.95	0.94	0.93	0.93	
I-495	US-29/COLESVILLE RD/EXIT 30	0.24	0.94	0.95	0.95	0.94	0.91	1.04	2.50	3.62	4.31	3.00	1.61	1.15	1.16	1.23	1.43	1.77	1.45	1.22	1.20	1.08	0.96	0.94	0.93	0.93	
I-495	MD-97/GEORGIA AVE/EXIT 31	1.08	0.95	0.96	0.96	0.95	0.92	1.05	1.95	2.66	3.12	2.44	1.52	1.17	1.26	1.26	1.44	1.76	1.48	1.29	1.23	1.12	0.99	0.96	0.95	0.94	
I-495	MD-97/GEORGIA AVE/EXIT 31	0.35	0.96	0.96	0.96	0.95	0.92	1.04	1.53	2.18	2.53	1.99	1.38	1.18	1.37	1.28	1.44	1.66	1.43	1.32	1.18	1.10	1.00	0.98	1.02	0.95	
I-495	MD-185/CONNECTICUT AVE/EXIT 33	1.60	1.00	0.96	0.96	0.94	0.91	1.03	1.17	1.31	1.37	1.29	1.14	1.10	1.18	1.18	1.23	1.34	1.32	1.32	1.16	1.05	0.96	0.96	0.99	1.00	
I-495	MD-185/CONNECTICUT AVE/EXIT 33	0.69	0.97	0.98	0.97	0.97	0.93	0.98	1.04	1.13	1.18	1.16	1.10	1.14	1.21	1.20	1.17	1.20	1.30	1.40	1.19	1.05	0.98	0.97	1.06	0.97	
I-495	MD-355/WISCONSIN AVE/EXIT 34	1.13	0.96	0.96	0.96	0.96	0.93	0.95	0.99	1.03	1.09	1.09	1.05	1.07	1.10	1.08	1.06	1.10	1.36	1.53	1.25	1.04	0.97	0.97	1.10	0.96	
I-495	MD-355/WISCONSIN AVE/EXIT 34	0.18	0.97	0.98	0.98	0.97	0.95	0.94	0.96	1.00	1.04	1.04	1.00	1.00	1.00	1.01	1.01	1.06	1.36	1.54	1.26	1.02	0.99	0.99	1.04	0.98	
I-495	I-270/EXIT 35	0.14	0.98	0.99	1.00	0.98	0.96	0.96	0.97	1.00	1.04	1.05	1.01	1.01	1.00	1.00	1.01	1.07	1.30	1.39	1.20	1.03	1.00	0.99	1.05	1.00	
I-495	I-270/EXIT 35	0.40	1.01	1.01	1.02	0.99	0.99	1.01	0.97	1.03	1.04	1.05	0.98	0.99	0.98	0.99	1.02	1.13	1.27	1.15	1.04	1.01	1.02	1.00	1.15	1.05	
I-495	MD-187/OLD GEORGETOWN RD/EXIT 36	0.42	1.00	1.01	1.01	1.00	0.98	0.97	0.98	1.03	1.06	1.14	1.05	1.05	0.98	0.96	1.00	1.16	1.45	1.22	1.09	1.02	0.99	0.98	1.08	1.02	
I-495	MD-187/OLD GEORGETOWN RD/EXIT 36	0.40	1.00	1.01	1.00	0.99	0.97	0.95	1.00	1.06	1.14	1.35	1.17	1.11	0.99	0.95	1.02	1.35	2.19	1.83	1.37	1.10	0.97	0.98	1.06	1.02	
I-495	I-270 SPUR	1.41	0.99	1.00	1.00	0.99	0.95	0.96	1.02	1.14	1.30	1.52	1.25	1.10	0.99	0.98	1.06	1.60	3.07	2.96	1.94	1.13	0.96	0.98	1.01	0.99	
I-495	I-270 SPUR	0.37	1.01	1.01	1.02	1.00	0.97	1.01	1.11	1.34	1.65	1.81	1.35	1.11	1.03	1.05	1.17	2.01	3.85	3.99	2.62	1.24	1.00	0.99	1.00	1.00	
I-495	MD-190/RIVER RD/EXIT 39	1.26	0.97	0.98	0.98	0.96	0.92	0.94	1.04	1.19	1.59	1.81	1.34	1.08	1.00	1.01	1.13	1.99	3.46	3.60	2.61	1.28	0.96	0.95	0.95	0.95	
I-495	MD-190/RIVER RD/EXIT 39	0.01	0.98	0.98	0.98	0.96	0.93	0.92	1.00	1.11	1.64	2.01	1.38	1.07	0.99	1.02	1.16	2.08	3.40	3.57	2.77	1.34	0.96	0.95	0.95	0.95	
I-495	CABIN JOHN PKWY/EXIT 40	0.03	0.97	0.98	0.98	0.96	0.93	0.93	1.01	1.11	1.65	2.01	1.38	1.08	1.00	1.03	1.17	2.08	3.40	3.57	2.77	1.34	0.96	0.95	0.95	0.95	
I-495	CABIN JOHN PKWY/EXIT 40	0.55	0.98	0.98	0.98	0.97	0.93	0.93	1.01	1.14	1.78	2.19	1.46	1.10	1.02	1.06	1.21	2.13	3.34	3.51	2.79	1.37	0.98	0.96	0.96	0.95	
I-495	CLARA BARTON PKWY/EXIT 41	1.14	0.97	0.98	0.98	0.97	0.93	0.94	1.02	1.11	1.53	1.77	1.26	1.07	1.02	1.08	1.17	1.71	2.48	2.53	1.99	1.22	0.99	0.97	0.97	0.96	
I-495	CLARA BARTON PKWY/EXIT 41	0.33	0.96	0.96	0.96	0.95	0.93	0.95	1.04	1.11	1.45	1.64	1.18	1.06	1.03	1.09	1.16	1.69	2.44	2.44	1.85	1.17	0.99	0.96	0.96	0.97	
I-495	AMERICAN LEGION BRIDGE	0.05	0.95	0.95	0.95	0.94	0.92	0.94	1.04	1.10	1.38	1.52	1.14	1.05	1.03	1.07	1.12	1.55	2.11	2.06	1.61	1.14	0.98	0.96	0.95	0.95	
I-495	AMERICAN LEGION BRIDGE	0.26	0.96	0.96	0.96	0.95	0.92	0.95	1.05	1.13	1.30	1.34	1.06	1.05	1.05	1.06	1.15	1.70	2.18	1.89	1.46	1.10	0.99	0.98	0.97	0.96	
I-495	WOODROW WILSON MEMORIAL BRIDGE	0.77	0.98	0.98	0.98	0.97	0.95	0.95	0.97	1.04	1.00	0.99	0.98	0.98	0.99	0.98	1.01	1.13	1.18	1.21	1.20	1.13	1.01	1.04	1.00	0.99	
I-495	I-295	0.10	0.96	0.97	0.96	0.95	0.94	0.93	0.95	1.01	0.98	0.98	0.96	0.96	0.96	0.95	0.97	1.04	1.08	1.10	1.09	1.05	0.98	0.98	0.97	0.96	
I-495	I-295	0.94	0.97	0.98	0.98	0.98	0.97	0.94	0.95	0.98	0.98	0.96	0.96	0.96	0.95	0.95	0.97	1.03	1.09	1.08	1.08	1.04	0.98	0.98	0.97	0.98	
I-495	MD-210/EXIT 3	0.61	1.01	1.02	1.01	1.01	1.00	0.96	0.96	0.99	0.99	0.98	0.98	0.98	0.97	0.97	1.01	1.10	1.20	1.18	1.16	1.05	1.01	1.02	1.01	1.01	
I-495	MD-210/EXIT 3	0.40	1.02	1.01	1.01	1.03	1.02	0.96	0.97	0.99	0.98	0.98	0.98	0.97	0.98	0.97	1.01	1.13	1.23	1.20	1.16	1.04	0.99	1.01	1.02	1.07	
I-495	MD-414/ST BARNABAS RD/EXIT 4	0.75	0.99	0.99	0.99	0.99	0.97	0.94	0.95	0.96	0.98	0.97	0.97	0.96	0.97	0.97	1.01	1.11	1.17	1.17	1.12	1.03	0.98	0.98	1.00	1.03	
I-495	MD-414/ST BARNABAS RD/EXIT 4	0.65	0.98	0.99	0.99	0.98	0.97	0.94	0.97	0.96	1.00	0.97	0.98	0.96	0.95	0.96	1.02	1.16	1.30	1.28	1.13	1.02	0.97	0.97	0.97	0.98	
I-495	MD-5/BRANCH AVE/EXIT 7	2.39	0.97	0.98	0.98	0.98	0.97	0.95	1.00	0.98	1.02	0.99	0.99	0.97	0.96	0.96	1.02	1.34	1.58	1.49	1.25	1.09	0.98	0.99	0.97	0.97	
I-495	MD-5/BRANCH AVE/EXIT 7	0.64	1.00	1.00	1.00	1.00	0.99	0.96	0.97	1.06	1.09	1.07	1.04	1.01	0.98	1.00	1.14	1.59	2.09	1.87	1.39	1.15	1.07	1.17	1.05	0.99	
I-495	MD-337/ALLENTOWN RD/EXIT 9	1.10	1.00	1.00	1.01	1.00	0.98	0.97	1.04	1.14	1.19	1.19	1.12	1.06	1.04	1.11	1.24	1.70	2.17	1.91	1.39	1.11	1.06	1.23	1.17	1.03	
I-495	MD-337/ALLENTOWN RD/EXIT 9	0.37	1.01	1.01	1.02	1.01	0.98	0.97	1.04	1.07	1.21	1.18	1.14	1.09	1.07	1.14	1.25	1.69	2.18	1.90	1.39	1.10	1.03	1.07	1.07	1.03	
I-495	FORESTVILLE RD/EXIT 9	0.58	1.01	1.00	1.01	1.00	0.97	0.96	1.00	1.08	1.34	1.19	1.16	1.10	1.08	1.14	1.28	1.82	2.38	2.11	1.47	1.09	1.01	1.02	1.02	1.01	
I-495	FORESTVILLE RD/EXIT 9	0.20	0.99	0.99	0.99	0.98	0.96	0.95	0.98	1.09	1.39	1.19	1.15	1.08	1.06	1.12	1.25	1.84	2.37	2.11	1.47	1.08	0.99	0.99	0.99	1.00	
I-495	MD-4/PENNSYLVANIA AVE/EXIT 11	0.60	0.99	1.00	1.00	0.99	0.96	0.95	0.98	1.11	1.41	1.16	1.11	1.04	1.01	1.04	1.15	1.59	1.87	1.71	1.33	1.07	1.00	1.00	0.99	0.99	
I-495	MD-4/PENNSYLVANIA AVE/EXIT 11	0.61	0.99	0.99	1.00	0.99	0.96	0.95	0.97	1.15	1.49	1.16	1.12	1.04	0.99	1.01	1.09	1.50	1.70	1.54	1.26	1.06	1.00	0.99	0.98	0.99	
I-495	RITCHIE MARLBORO RD/EXIT 13	1.76																									
I-495	RITCHIE MARLBORO RD/EXIT 13	0.62																									
I-495	MD-214/CENTRAL AVE/EXIT 15	1.06	0.98	0.98	0.98	0.97	0.95	0.94	0.98	1.30	1.50	1.19	1.08	1.02	0.99	1.03	1.08	1.29	1.36	1.26	1.17	1.03	0.98	0.97	0.96	0.97	
I-495	MD-214/CENTRAL AVE/EXIT 15	0.54	0.99	0.98	0.98	0.98	0.95	0.94	1.00	1.37	1.48	1.17	1.03	1.00	1.00	1.03	1.11	1.27	1.31	1.22	1.13	1.02	0.98	0.97	0.97	0.97	
I-495	ARENA DR/EXIT 16	0.54	1.02	0.98	0.98	0.97	0.95	0.93	1.00	1.36	1.51	1.18	1.01	0.98	0.98	1.03	1.13	1.37	1.42	1.34	1.21	1.03	0.97	0.97	0.97	0.96	
I-495	ARENA DR/EXIT 16	0.41	0.98	0.98	0.98	0.97	0.95	0.94	1.00	1.48	1.71	1.29	1.04	0.99	0.99	1.05	1.20	1.56	1.70	1.62	1.39	1.08	0.99	0.98	0.98	0.97	
I-495	MD-202/LANDOVER RD/EXIT 17	0.29	0.98	0.98	0.99	0.98	0.96	0.95	1.02	1.85	2.24	1.51	1.10	1.01	1.03	1.13	1.36	1.96	2.27	2.17	1.75	1.15	1.01	0.98	1.00	0.98	
I-495	MD-202/LANDOVER RD/EXIT 17	0.27	0.98	0.99	0.99	0.98	0.96	0.95	1.05	2.26	2.68	1.78	1.17	1.06	1.09	1.23	1.57	2.30	2.68	2.68	2.09	1.23	1.03	0.99	1.02	0.99	
I-495	I-495/I-95 EXP	0.28	0.98	0.98	0.98	0.98	0.96	0.95	1.06	2.17	2.57	1.74	1.17	1.06	1.11	1.26	1.59	2.32	2.64	2.62	2.07	1.23	1.02	1.00	1.07	0.99	
I-495	I-495/I-95 EXP	0.11	0.97	0.98	0.98	0.97	0.95	0.94	1.08	2.50	2.99	2.01	1.25	1.09	1.17	1.35	1.80	2.64	2.98	3.07	2.39	1.31	1.03	1.00	1.12	0.99	
I-495	US-50/EXIT 19	1.33	0.96	0.97	0.97	0.96	0.94	0.93	1.06	1.78	1.91	1.51	1.14	1.05	1.10	1.18	1.38	1.73	1.82	2.02	1.82	1.20	1.02	1.01	1.02	0.97	
I-495	US-50/EXIT 19	0.73	0.97	0.97	0.97	0.97	0.95	0.93	1.12	1.71	1.68	1.18	1.01	0.97	1.01	1.02	1.02	1.04	1.15	1.98	1.88	1.08	1.02	1.01	0.97	0.97	
I-495	MD-450/ANNAPOLIS RD/EXIT 20	0.47	0.97	0.97	0.98	0.97	0.94	0.94	1.21	1.89	1.90	1.30	1.06	1.02	1.06	1.06	1.08	1.11	1.31	2.47	2.28	1.16	1.04	1.05	0.98	0.99	
I-495	MD-450/ANNAPOLIS RD/EXIT 20	0.38	0.97	0.97	0.97	0.97	0.94	0.94	1.22	1.73	1.71	1.28	1.07	1.03	1.05	1.04	1.09	1.14	1.38	2.49	2.25	1.19	1.03	1.10	0.98	0.97	
I-495	MD-295/MD-193/EXIT 22	2.00	0.97	0.97	0.97	0.96	0.93	0.94	1.10	1.25	1.25	1.12	1.05	1.03	1.03	1.00	1.07	1.15	1.42	2.24	2.05	1.19	1.00	1.04	0.99	0.96	
I-495	MD-295/MD-193/EXIT 22	0.53	0.97	1.00	0.97	0.97	0.93	0.93	1.00	1.08	1.12	1.03	1.02	1.07	1.07	1.00	1.11	1.29	1.77	2.60	2.27	1.21	1.02	0.98	0.98	0.97	
I-495	MD-201/KENILWORTH AVE/EXIT 23	0.34	0.97	0.98	0.98	0.96	0.94	0.93	0.99	1.05	1.09	1.03	1.05	1.11	1.11	1.02	1.12	1.33	1.84	2.59	2.32	1.30	1.02	0.98	1.00	0.99	
I-495	MD-201/KENILWORTH AVE/EXIT 23	0.59	0.97	0.97	0.97	0.96	0.93	0.92	0.98	1.02	1.08	1.01	1.07	1.13	1.13	1.01	1.10	1.32	1.78	2.38	2.27	1.36	0.98	0.96	1.02	1.02	
	Weighted TTI	39.39	0.98	0.98	0.98	0.97	0.94	0.95	1.24	1.64	1.79	1.45	1.15	1.06	1.05	1.06	1.14	1.41	1.70	1.78	1.51	1.11	0.99	0.99	1.00	0.98	
	Weighted Average TTI Both Directions	79.23	0.98	0.98	0.98	0.97	0.95	0.94	1.16	1.53	1.63	1.32	1.10	1.04	1.03	1.06	1.17	1.49	1.85	2.01	1.68	1.19	1.01	0.99	0.99	0.98	**1.21**
	Max Observed TTI Both Directions		1.05	1.02	1.02	1.03	1.02	1.05	3.20	6.20	6.28	3.66	1.87	1.43	1.37	1.51	2.30	3.64	5.06	5.54	4.04	2.64	1.47	1.23	1.17	1.15	

Travel time index for I-495 using INRIX data - Clockwise (Inner Loop)

2017 (Every Tuesday, Wednesday, and Thursday)

Road	Segment	Miles	12:00 AM	1:00 AM	2:00 AM	3:00 AM	4:00 AM	5:00 AM	6:00 AM	7:00 AM	8:00 AM	9:00 AM	10:00 AM	11:00 AM	12:00 PM	1:00 PM	2:00 PM	3:00 PM	4:00 PM	5:00 PM	6:00 PM	7:00 PM	8:00 PM	9:00 PM	10:00 PM	11:00 PM
I-495	MD-355/WISCONSIN AVE/EXIT 34	0.26	0.96	0.96	0.97	0.97	0.94	0.91	0.94	1.15	1.57	1.33	1.10	1.09	1.19	1.36	2.16	3.58	3.90	4.89	3.70	1.70	1.04	1.00	0.99	0.96
I-495	MD-355/WISCONSIN AVE/EXIT 34	0.11	0.95	0.96	0.96	0.96	0.92	0.89	0.93	1.17	1.63	1.40	1.14	1.12	1.22	1.44	2.30	3.64	4.04	4.86	3.74	1.83	1.04	0.98	0.96	0.95
I-495	MD-185/CONNECTICUT AVE/EXIT 33	1.16	0.94	0.95	0.95	0.95	0.91	0.88	0.92	1.23	1.64	1.48	1.22	1.16	1.22	1.46	2.18	3.15	3.70	4.02	3.35	1.93	1.07	1.00	0.99	0.93
I-495	MD-185/CONNECTICUT AVE/EXIT 33	0.41	0.94	0.95	0.95	0.95	0.91	0.88	0.91	1.06	1.25	1.16	1.12	1.12	1.16	1.38	1.92	2.83	3.70	4.00	3.51	2.06	1.11	1.04	1.10	0.94
I-495	MD-97/GEORGIA AVE/EXIT 31	1.82	0.99	0.97	0.96	0.95	0.92	0.89	0.91	1.06	1.24	1.20	1.18	1.11	1.13	1.29	1.53	1.85	2.39	2.60	2.38	1.70	1.10	1.00	1.03	0.98
I-495	MD-97/GEORGIA AVE/EXIT 31	0.29	0.95	0.96	0.96	0.96	0.93	0.90	0.90	1.00	1.04	1.03	1.04	1.02	1.04	1.11	1.23	1.52	2.20	2.43	2.22	1.48	1.04	0.98	0.96	0.94
I-495	US-29/COLESVILLE RD/EXIT 30	1.15	0.95	0.96	0.96	0.96	0.92	0.90	0.91	1.02	1.03	1.02	1.02	1.03	1.05	1.11	1.19	1.39	1.95	2.14	2.02	1.38	1.04	0.99	0.99	0.94
I-495	US-29/COLESVILLE RD/EXIT 30	0.38	0.95	0.95	0.96	0.95	0.92	0.90	0.90	1.04	1.04	1.02	1.03	1.04	1.05	1.10	1.16	1.31	1.85	2.10	1.89	1.27	1.00	0.98	0.95	0.94
I-495	MD-193/UNIVERSITY BLVD/EXIT 29	0.24	0.94	0.95	0.95	0.94	0.92	0.89	0.93	1.13	1.12	1.05	1.06	1.08	1.09	1.14	1.21	1.45	2.13	2.55	2.28	1.36	1.00	0.98	0.97	0.94
I-495	MD-193/UNIVERSITY BLVD/EXIT 29	0.42	0.94	0.95	0.95	0.94	0.92	0.89	0.94	1.16	1.12	1.05	1.08	1.09	1.08	1.13	1.21	1.53	2.21	2.57	2.45	1.48	1.01	0.98	0.99	0.95
I-495	MD-650/NEW HAMPSHIRE AVE/EXIT 28	1.10	0.96	0.96	0.96	0.95	0.93	0.90	0.96	1.18	1.09	1.03	0.97	0.99	0.98	1.03	1.09	1.34	1.71	1.92	1.93	1.35	1.01	0.96	0.97	0.95
I-495	MD-650/NEW HAMPSHIRE AVE/EXIT 28	0.59	0.98	0.98	0.98	0.97	0.95	0.92	0.98	1.13	1.06	1.01	0.98	1.00	0.98	1.03	1.09	1.24	1.45	1.65	1.62	1.27	1.05	0.99	0.98	0.96
I-495	EXIT 27	0.59	0.95	0.95	0.96	0.95	0.93	0.90	0.93	1.02	0.97	0.94	0.95	0.97	0.96	0.98	1.07	1.19	1.30	1.53	1.46	1.16	1.00	0.96	0.95	0.93
I-495	EXIT 27	1.04	0.97	0.97	0.97	0.97	0.94	0.92	0.94	1.01	1.18	1.05	0.94	0.93	0.93	0.94	0.96	1.11	1.44	1.89	1.46	1.04	0.97	0.96	0.95	0.96
I-495	US-1/BALTIMORE AVE/EXIT 25	0.54	0.98	0.97	0.97	0.97	0.95	0.93	0.97	1.51	2.32	1.72	1.09	0.98	0.97	1.06	1.09	1.93	3.29	3.79	2.43	1.16	0.99	0.96	0.97	0.96
I-495	US-1/BALTIMORE AVE/EXIT 25	0.24	1.00	0.99	0.99	0.98	0.96	0.95	0.99	1.60	2.31	1.90	1.19	1.03	1.01	1.10	1.15	2.18	3.33	3.65	2.48	1.24	1.02	0.99	1.00	0.98
I-495	GREENBELT METRO DR/EXIT 24	0.87	0.97	0.97	0.97	0.97	0.95	0.94	0.99	1.36	1.74	1.66	1.21	1.05	1.02	1.09	1.19	2.08	2.82	3.05	2.20	1.28	1.02	1.00	0.97	0.96
I-495	GREENBELT METRO DR/EXIT 24	0.50	0.96	0.96	0.97	0.98	0.94	0.93	0.98	1.12	1.24	1.31	1.14	1.03	1.01	1.06	1.19	1.83	2.32	2.49	1.83	1.24	1.03	1.00	0.96	0.95
I-495	MD-201/KENILWORTH AVE/EXIT 23	0.49	0.96	0.97	0.97	0.96	0.94	0.93	0.98	1.09	1.17	1.21	1.09	1.02	1.00	1.03	1.18	1.78	2.26	2.41	1.72	1.21	1.04	1.01	0.97	0.96
I-495	MD-201/KENILWORTH AVE/EXIT 23	0.57	0.96	0.97	0.97	0.96	0.94	0.94	0.98	1.09	1.16	1.20	1.10	1.01	1.01	1.03	1.21	1.83	2.33	2.44	1.73	1.24	1.05	0.98	0.96	0.96
I-495	MD-295/MD-193/EXIT 22	0.38	0.97	0.97	0.97	0.96	0.95	0.94	0.99	1.08	1.13	1.14	1.07	1.02	1.03	1.04	1.17	1.59	1.90	1.91	1.47	1.18	1.02	0.99	0.97	0.97
I-495	MD-295/MD-193/EXIT 22	0.50	0.97	0.97	0.97	0.96	0.95	0.94	0.96	1.04	1.09	1.08	1.02	0.99	1.01	1.02	1.14	1.54	1.85	1.86	1.43	1.18	1.01	0.97	0.96	0.97
I-495	MD-450/ANNAPOLIS RD/EXIT 20	2.01	1.00	0.96	0.96	0.95	0.94	0.93	0.95	1.01	1.08	1.05	1.01	0.99	0.99	1.01	1.13	1.50	1.76	1.84	1.44	1.09	0.97	0.95	0.96	1.05
I-495	MD-450/ANNAPOLIS RD/EXIT 20	0.23	0.96	0.97	0.97	0.96	0.95	0.95	0.96	1.01	1.10	1.07	1.04	1.00	0.99	1.01	1.18	1.54	1.78	1.90	1.51	1.11	0.97	0.97	0.96	0.97
I-495	US-50/EXIT 19	0.53	0.96	0.96	0.97	0.96	0.95	0.94	0.96	1.01	1.08	1.07	1.02	1.00	1.00	1.01	1.09	1.28	1.50	1.62	1.36	1.10	0.99	0.99	0.97	0.97
I-495	US-50/EXIT 19	0.84	0.96	0.97	0.97	0.96	0.94	0.94	0.96	1.00	1.16	1.13	1.00	0.96	0.95	0.98	1.05	1.46	2.03	2.35	1.79	1.18	0.98	1.01	0.96	0.96
I-495	I-495/I-95 EXP	1.16	0.96	0.97	0.97	0.96	0.95	0.93	0.98	1.04	1.24	1.21	1.04	0.98	0.98	1.04	1.12	1.47	1.87	2.04	1.65	1.15	0.99	0.98	0.96	0.96
I-495	I-495/I-95 EXP	0.24	0.98	0.98	0.98	0.98	0.97	0.94	0.97	1.03	1.07	1.07	1.01	0.98	0.98	1.02	1.07	1.42	1.95	2.18	1.53	1.10	1.00	0.98	0.97	0.97
I-495	MD-202/LANDOVER RD/EXIT 17	0.28	0.98	0.99	0.99	0.98	0.97	0.94	0.98	1.03	1.07	1.06	1.02	0.98	0.99	1.09	1.17	1.44	1.99	2.26	1.60	1.11	1.00	0.99	0.97	0.97
I-495	MD-202/LANDOVER RD/EXIT 17	0.26	0.98	0.99	0.98	0.98	0.96	0.94	0.98	1.06	1.11	1.09	1.03	0.99	0.99	1.04	1.13	1.65	2.38	2.67	1.82	1.16	1.00	0.98	0.97	0.97
I-495	ARENA DR/EXIT 16	0.29	0.97	0.98	0.98	0.97	0.96	0.93	0.99	1.10	1.15	1.12	1.05	1.01	0.99	1.08	1.18	1.89	2.75	3.00	2.01	1.25	1.00	0.97	0.96	0.96
I-495	ARENA DR/EXIT 16	0.32	0.99	0.98	0.98	0.97	0.96	0.93	1.01	1.13	1.19	1.14	1.09	1.06	1.01	1.06	1.21	1.97	2.74	2.96	2.14	1.33	1.02	0.98	0.97	0.97
I-495	MD-214/CENTRAL AVE/EXIT 15	0.64	0.98	0.98	0.98	0.97	0.96	0.93	1.00	1.15	1.22	1.15	1.09	1.05	1.01	1.04	1.20	1.84	2.42	2.57	2.05	1.35	1.04	0.99	0.97	0.96
I-495	MD-214/CENTRAL AVE/EXIT 15	0.52	0.96	0.97	0.97	0.96	0.95	0.93	1.01	1.21	1.32	1.18	1.10	1.07	1.01	1.05	1.23	1.82	2.31	2.38	1.98	1.39	1.05	0.99	0.96	0.96
I-495	RITCHIE MARLBORO RD/EXIT 13	1.01																								
I-495	RITCHIE MARLBORO RD/EXIT 13	0.73																								
I-495	MD-4/PENNSYLVANIA AVE/EXIT 11	1.76	0.96	0.97	0.97	0.96	0.95	0.93	1.07	1.18	1.26	1.14	1.11	1.02	1.00	1.03	1.14	1.32	1.49	1.53	1.44	1.23	1.05	1.01	0.97	0.96
I-495	MD-4/PENNSYLVANIA AVE/EXIT 11	0.50	0.98	0.99	0.99	0.99	0.97	0.96	1.03	1.13	1.17	1.11	1.11	1.05	1.03	1.05	1.16	1.21	1.33	1.45	1.34	1.08	1.02	1.01	1.04	1.00
I-495	FORESTVILLE RD/EXIT 9	0.77	1.00	1.00	1.00	0.99	0.98	0.96	1.09	1.09	1.15	1.09	1.09	1.09	1.05	1.05	1.20	1.20	1.33	1.51	1.37	1.11	1.05	1.04	1.08	1.04
I-495	FORESTVILLE RD/EXIT 9	0.05	1.03	1.01	1.01	1.00	0.99	0.97	1.04	1.04	1.08	1.08	1.05	1.08	1.03	1.03	1.15	1.13	1.19	1.35	1.28	1.11	1.07	1.07	1.07	1.04
I-495	MD-337/ALLENTOWN RD/EXIT 9	0.59	1.03	1.02	1.01	1.01	0.99	0.98	1.04	1.03	1.08	1.08	1.04	1.07	1.02	1.03	1.22	1.12	1.15	1.30	1.26	1.14	1.09	1.10	1.07	1.06
I-495	MD-337/ALLENTOWN RD/EXIT 9	0.31	1.01	1.01	1.00	1.00	0.98	0.96	1.04	1.02	1.09	1.06	1.01	1.02	0.99	1.02	1.21	1.10	1.12	1.25	1.25	1.13	1.09	1.11	1.05	1.09
I-495	MD-5/BRANCH AVE/EXIT 7	1.20	1.00	1.00	1.00	0.99	0.97	0.95	1.03	1.03	1.08	1.06	0.99	1.00	0.98	0.99	1.05	1.02	1.05	1.13	1.17	1.09	1.06	1.03	1.02	1.00
I-495	MD-5/BRANCH AVE/EXIT 7	0.55	0.99	0.99	1.00	0.99	0.97	0.96	1.11	1.49	1.50	1.20	0.99	0.98	0.98	0.98	1.00	0.99	1.00	1.09	1.09	1.01	1.00	1.00	0.98	0.98
I-495	MD-414/ST BARNABAS RD/EXIT 4	2.20	0.98	0.99	0.99	0.98	0.96	0.94	1.31	2.61	2.36	1.28	0.96	0.96	0.95	0.96	0.98	0.97	0.98	1.05	1.04	0.98	0.97	0.98	0.97	0.97
I-495	MD-414/ST BARNABAS RD/EXIT 4	0.73	0.99	1.00	1.00	0.99	0.96	0.95	1.72	3.77	3.33	1.43	0.99	0.97	0.97	0.96	0.97	0.97	1.02	1.08	1.08	1.00	1.02	1.00	0.99	0.99
I-495	MD-210/EXIT 3	1.01	0.99	0.99	1.00	0.97	0.96	0.96	1.67	3.07	2.81	1.39	1.01	0.97	0.97	0.97	0.97	0.98	1.04	1.14	1.10	1.01	1.03	1.01	0.99	0.98
I-495	MD-210/EXIT 3	0.47	0.99	1.00	0.98	0.98	0.98	0.96	2.59	6.20	4.70	1.80	1.03	0.97	0.98	0.97	0.97	1.00	1.25	1.97	1.59	1.06	0.99	0.99	0.99	0.98
I-495	I-295	0.59	0.99	0.99	0.98	0.97	0.95	0.97	2.37	5.21	4.49	1.85	1.09	1.00	1.04	0.99	1.00	1.08	1.59	2.69	1.93	1.17	1.00	1.01	1.02	1.03
I-495	I-295	0.63	0.99	0.97	0.97	0.96	0.94	0.96	1.57	2.60	2.64	1.42	1.05	1.00	1.04	0.98	0.99	1.07	1.51	2.24	1.77	1.15	1.01	1.03	1.06	1.04
I-495	WOODROW WILSON MEMORIAL BRIDGE	0.24	1.01	0.97	0.98	0.98	0.95	0.96	1.07	1.26	1.47	1.11	1.00	0.98	0.98	0.97	0.99	1.06	1.24	1.43	1.34	1.10	1.00	1.01	1.02	1.04
I-495	WOODROW WILSON MEMORIAL BRIDGE	0.75	1.02	0.97	0.97	0.96	0.94	0.96	1.05	1.21	1.37	1.12	1.04	0.99	0.98	0.98	0.99	1.03	1.17	1.32	1.23	1.06	1.00	1.01	1.00	1.03
I-495	AMERICAN LEGION BRIDGE	0.27	0.94	0.94	0.95	0.94	0.94	0.91	1.04	1.62	1.75	1.57	1.34	1.14	1.06	1.31	2.08	2.97	4.31	4.35	4.04	2.64	1.47	0.97	0.96	0.94
I-495	CLARA BARTON PKWY/EXIT 41	0.03	0.95	0.95	0.96	0.95	0.94	0.94	1.05	1.51	1.65	1.66	1.52	1.17	1.06	1.16	1.75	2.56	3.91	4.00	3.24	2.08	1.29	1.00	0.96	0.95
I-495	CLARA BARTON PKWY/EXIT 41	0.30	0.95	0.95	0.97	0.96	0.94	0.92	1.01	1.25	1.29	1.31	1.24	1.07	1.00	1.05	1.35	2.08	3.73	3.87	2.92	1.70	1.14	0.98	0.94	0.95
I-495	CABIN JOHN PKWY/EXIT 40	1.23	0.95	0.96	0.98	0.98	0.95	0.92	0.97	1.07	1.07	1.06	1.04	0.98	0.95	0.98	1.11	2.08	4.14	4.42	3.04	1.49	1.03	0.95	0.94	0.98
I-495	CABIN JOHN PKWY/EXIT 40	0.39	0.97	0.97	0.98	0.98	0.96	0.93	0.95	0.99	1.01	1.00	0.99	0.98	0.96	0.99	1.09	2.58	5.06	5.54	3.79	1.65	1.03	0.97	0.96	0.96
I-495	MD-190/RIVER RD/EXIT 39	0.15	0.97	0.98	0.99	0.99	0.97	0.94	0.95	0.98	1.00	1.00	0.98	0.98	0.96	1.00	1.09	2.48	4.54	5.16	3.65	1.67	1.04	0.98	0.98	0.97
I-495	MD-190/RIVER RD/EXIT 39	0.01	0.97	0.97	0.98	0.99	0.96	0.94	0.95	0.97	1.00	0.99	0.98	0.98	0.96	1.00	1.09	2.48	4.52	5.14	3.63	1.66	1.04	0.97	0.97	0.96
I-495	I-270 SPUR	1.13	0.96	0.97	0.98	0.98	0.96	0.93	0.93	0.95	0.99	0.99	0.97	0.96	0.95	0.98	1.06	2.03	3.18	3.52	2.72	1.49	1.01	0.96	1.00	0.97
I-495	I-270 SPUR	0.46	0.98	0.99	0.99	1.00	0.97	0.94	0.94	0.95	0.96	0.98	0.97	0.96	0.96	0.96	0.98	1.05	1.12	1.16	1.13	1.07	0.99	0.99	1.01	0.99
I-495	MD-187/OLD GEORGETOWN RD/EXIT 36	1.43	0.98	0.99	1.00	1.00	0.97	0.93	0.93	0.94	0.97	0.97	0.95	0.94	0.97	0.99	1.07	1.08	1.01	1.06	1.13	1.09	0.98	0.97	1.01	1.00
I-495	MD-187/OLD GEORGETOWN RD/EXIT 36	0.42	0.96	0.97	0.97	0.97	0.95	0.92	0.92	0.96	1.21	1.04	0.97	1.01	1.07	1.16	1.65	2.10	1.55	1.94	2.01	1.35	1.01	0.98	1.06	1.00
I-495	I-270/EXIT 35	0.41	0.96	0.97	0.97	0.97	0.95	0.92	0.94	1.07	1.47	1.22	1.04	1.08	1.18	1.32	2.11	3.42	2.93	3.86	3.18	1.66	1.06	1.03	1.06	0.99
I-495	I-270/EXIT 35	0.29	0.95	0.96	0.96	0.96	0.93	0.92	0.93	1.10	1.42	1.18	1.05	1.12	1.23	1.51	2.24	3.58	3.36	4.38	3.52	1.79	1.08	1.01	0.99	0.96
	Weighted TTI	39.84	0.97	0.97	0.98	0.97	0.95	0.93	1.07	1.43	1.47	1.18	1.05	1.01	1.01	1.06	1.20	1.57	2.01	2.24	1.86	1.27	1.02	0.99	0.99	0.98

Travel time index for I-495 using INRIX data - Counterclockwise (Outer Loop)

October 2021 (Every Tuesday, Wednesday, and Thursday)

Road	Segment	Miles	12:00 AM	1:00 AM	2:00 AM	3:00 AM	4:00 AM	5:00 AM	6:00 AM	7:00 AM	8:00 AM	9:00 AM	10:00 AM	11:00 AM	12:00 PM	1:00 PM	2:00 PM	3:00 PM	4:00 PM	5:00 PM	6:00 PM	7:00 PM	8:00 PM	9:00 PM	10:00 PM	11:00 PM	Daily Avg
I-495	GREENBELT METRO DR/EXIT 24	0.88	0.94	0.97	0.96	0.93	0.90	0.91	1.07	1.21	1.55	0.98	0.96	0.97	0.97	0.98	1.17	1.41	1.44	1.56	1.58	1.12	0.95	0.93	0.92	0.93	
I-495	US-1/BALTIMORE AVE/EXIT 25	0.78	0.94	0.96	0.95	0.92	0.89	0.91	1.03	1.09	1.44	0.97	0.95	0.96	0.96	0.97	1.02	1.06	1.09	1.13	1.14	1.05	0.97	0.93	0.93	0.93	
I-495	US-1/BALTIMORE AVE/EXIT 25	0.52	0.93	0.95	0.94	0.92	0.88	0.89	0.99	0.99	0.99	0.94	0.94	0.95	0.94	0.95	1.00	1.01	1.04	1.05	1.05	1.00	0.95	0.93	0.92	0.92	
I-495	EXIT 27	0.61	0.94	0.96	0.96	0.93	0.89	0.89	0.99	1.01	0.98	0.93	0.93	0.93	0.93	0.93	0.96	0.96	0.98	1.00	0.99	0.97	0.95	0.92	0.92	0.92	
I-495	EXIT 27	0.83	0.96	1.00	1.00	0.95	0.91	0.94	1.94	3.79	3.02	1.05	0.97	0.97	0.97	0.96	0.97	0.98	0.99	1.01	1.04	0.98	0.96	0.95	0.95	0.94	
I-495	MD-650/NEW HAMPSHIRE AVE/EXIT 28	0.76	0.93	0.96	0.94	0.93	0.89	0.91	2.95	5.74	5.20	1.88	0.98	0.96	0.96	0.96	0.99	1.03	1.13	1.26	1.26	1.14	0.96	0.94	0.93	0.92	
I-495	MD-650/NEW HAMPSHIRE AVE/EXIT 28	0.46	0.95	0.97	0.96	0.94	0.90	0.93	3.50	6.24	5.65	2.57	1.11	0.98	0.99	1.00	1.01	1.11	1.24	1.39	1.42	1.18	0.97	0.97	0.97	0.95	
I-495	MD-193/UNIVERSITY BLVD/EXIT 29	1.25	0.92	0.94	0.94	0.93	0.89	0.94	3.51	5.92	5.08	2.76	1.23	0.98	1.02	0.98	1.08	1.29	1.52	1.43	1.33	1.04	0.94	0.97	1.12	0.93	
I-495	MD-193/UNIVERSITY BLVD/EXIT 29	0.22	0.94	0.95	0.95	0.93	0.90	0.98	3.18	5.21	4.29	2.19	1.18	0.97	1.06	1.07	1.08	1.28	1.53	1.41	1.25	1.06	0.96	0.95	0.97	0.94	
I-495	US-29/COLESVILLE RD/EXIT 30	0.51	0.95	0.96	0.96	0.94	0.91	1.01	2.90	4.55	3.99	2.42	1.26	0.98	1.08	1.15	1.11	1.41	1.71	1.52	1.38	1.09	0.98	0.96	0.96	0.94	
I-495	US-29/COLESVILLE RD/EXIT 30	0.21	0.94	0.95	0.95	0.93	0.90	0.99	2.85	4.44	3.98	2.62	1.33	0.97	1.12	1.24	1.15	1.56	1.90	1.64	1.50	1.11	0.96	0.95	0.93	0.93	
I-495	MD-97/GEORGIA AVE/EXIT 31	1.15	0.99	0.98	0.97	0.99	0.90	0.99	2.19	3.07	2.93	2.13	1.26	0.99	1.04	1.32	1.19	1.54	1.85	1.79	1.61	1.23	0.95	0.94	0.96	1.00	
I-495	MD-97/GEORGIA AVE/EXIT 31	0.30	1.24	1.19	1.02	1.24	0.90	1.01	1.93	2.55	2.44	1.75	1.26	1.01	1.00	1.42	1.27	1.60	1.96	1.82	1.53	1.18	0.96	0.95	1.00	1.51	
I-495	MD-185/CONNECTICUT AVE/EXIT 33	1.65	0.99	1.00	0.96	0.99	0.89	0.96	1.43	1.41	1.31	1.28	1.07	0.97	0.97	1.29	1.09	1.35	1.69	1.67	1.40	1.12	0.93	0.92	0.92	1.00	
I-495	MD-185/CONNECTICUT AVE/EXIT 33	0.60	0.92	0.94	0.93	0.92	0.87	0.91	1.01	1.05	1.08	1.06	0.98	0.95	0.94	1.16	1.01	1.33	1.59	1.51	1.21	0.99	0.93	0.91	0.90	0.90	
I-495	MD-355/WISCONSIN AVE/EXIT 34	1.23	0.92	0.94	0.94	0.92	0.88	0.91	0.98	1.02	1.08	1.05	0.98	0.96	0.97	1.17	1.07	1.43	1.55	1.51	1.29	1.02	0.93	0.92	0.91	0.90	
I-495	MD-355/WISCONSIN AVE/EXIT 34	0.25	0.93	0.95	0.96	0.93	0.88	0.89	0.98	1.01	1.08	1.11	0.98	0.97	0.96	1.04	1.11	1.34	1.37	1.42	1.26	1.07	0.93	0.91	0.90	0.89	
I-495	I-270/EXIT 35	0.01	0.96	0.99	0.99	0.96	0.90	0.92	1.00	1.04	1.10	1.17	1.01	0.98	0.97	1.02	1.08	1.20	1.21	1.25	1.17	1.05	0.96	0.93	0.93	0.93	
I-495	I-270/EXIT 35	0.25	0.99	1.03	1.01	0.97	0.91	0.93	1.01	1.03	1.11	1.29	1.03	0.97	0.96	0.98	1.02	1.08	1.08	1.09	1.09	1.01	0.96	0.94	0.95	0.95	
I-495	MD-187/OLD GEORGETOWN RD/EXIT 36	0.58	0.96	0.99	0.99	0.95	0.89	0.89	0.97	0.99	1.16	1.45	1.14	0.95	0.91	0.93	1.02	0.98	1.05	1.10	1.02	0.95	0.92	0.91	0.92	0.92	
I-495	MD-187/OLD GEORGETOWN RD/EXIT 36	0.37	0.96	0.98	0.98	0.95	0.90	0.90	0.99	1.00	1.56	1.93	1.68	1.28	0.93	1.05	1.20	1.05	1.49	1.44	1.06	0.95	0.92	0.91	0.92	0.92	
I-495	I-270 SPUR	1.44	0.94	0.97	0.96	0.94	0.91	0.91	0.99	1.25	2.50	2.55	2.04	1.78	1.37	1.27	1.23	1.23	2.02	2.40	1.95	0.95	0.92	0.91	0.92	0.92	
I-495	I-270 SPUR	0.28	0.95	0.97	0.96	0.93	0.91	0.94	1.09	1.90	3.05	2.80	1.76	1.46	1.24	1.06	1.21	1.46	2.47	3.28	2.92	1.01	0.95	0.93	0.94	0.92	
I-495	MD-190/RIVER RD/EXIT 39	1.09	0.94	0.95	0.95	0.92	0.90	0.91	1.00	1.22	1.61	1.44	1.12	1.04	0.99	0.97	1.18	1.33	1.94	2.72	2.51	1.02	0.94	0.93	0.93	0.92	
I-495	MD-190/RIVER RD/EXIT 39	0.29	0.94	0.95	0.95	0.92	0.89	0.91	0.97	1.01	1.40	1.21	0.97	0.98	0.93	0.93	1.17	1.40	1.99	2.76	2.53	1.02	0.92	0.92	0.92	0.92	
I-495	CABIN JOHN PKWY/EXIT 40	0.04	0.92	0.94	0.94	0.91	0.88	0.90	0.96	0.98	1.42	1.22	0.95	0.98	0.92	0.93	1.18	1.41	1.98	2.76	2.50	1.01	0.91	0.91	0.91	0.91	
I-495	CABIN JOHN PKWY/EXIT 40	0.45	0.94	0.95	0.95	0.92	0.90	0.92	0.97	0.99	1.55	1.29	0.98	1.05	0.94	0.98	1.31	1.59	2.08	2.88	2.63	1.06	0.93	0.93	0.93	0.92	
I-495	CLARA BARTON PKWY/EXIT 41	1.20	0.94	0.96	0.95	0.92	0.89	0.92	1.01	1.01	1.54	1.17	1.01	1.11	0.96	1.03	1.22	1.39	1.53	1.87	1.58	1.03	0.94	0.93	0.94	0.93	
I-495	CLARA BARTON PKWY/EXIT 41	0.28	0.93	0.94	0.94	0.92	0.89	0.92	1.04	1.04	1.71	1.10	1.02	1.15	0.96	1.13	1.17	1.37	1.34	1.51	1.26	1.00	0.92	0.92	0.92	0.92	
I-495	AMERICAN LEGION BRIDGE	0.14	0.92	0.93	0.93	0.92	0.89	0.92	1.01	1.06	1.66	1.09	1.03	1.12	0.98	1.12	1.14	1.32	1.33	1.48	1.21	0.99	0.93	0.92	0.92	0.91	
I-495	AMERICAN LEGION BRIDGE	0.15	0.94	0.95	0.95	0.93	0.90	0.93	1.02	1.08	1.61	1.10	1.04	1.12	1.00	1.11	1.11	1.31	1.33	1.41	1.19	1.01	0.94	0.94	0.93	0.93	
I-495	WOODROW WILSON MEMORIAL BRIDGE	1.16	0.93	0.92	0.92	0.93	0.90	0.90	0.96	0.99	0.98	0.96	0.95	0.96	0.96	0.98	1.05	1.30	1.39	1.40	1.32	1.21	0.98	0.95	0.95	0.92	
I-495	I-295	0.12	0.95	0.93	0.92	0.92	0.91	0.90	0.93	0.94	0.94	0.94	0.93	0.93	0.93	0.94	0.97	1.06	1.09	1.10	1.08	1.07	0.95	0.93	0.92	0.91	
I-495	I-295	0.19	0.95	0.95	0.94	0.94	0.92	0.91	0.92	0.92	0.92	0.93	0.93	0.92	0.92	0.92	0.94	0.99	1.00	1.02	1.00	1.00	0.94	0.93	0.92	0.92	
I-495	MD-210/EXIT 3	0.07	0.94	0.95	0.94	0.95	0.93	0.91	0.92	0.91	0.92	0.92	0.92	0.92	0.91	0.91	0.93	0.97	0.97	0.99	0.97	0.97	0.92	0.92	0.91	0.92	
I-495	MD-210/EXIT 3	1.64	0.96	0.97	0.96	0.97	0.94	0.92	0.93	0.92	0.93	0.93	0.94	0.94	0.94	0.95	0.98	1.04	1.04	1.04	1.04	1.02	0.96	0.95	0.94	0.94	
I-495	MD-414/ST BARNABAS RD/EXIT 4	0.84	0.96	0.97	0.95	0.96	0.94	0.92	0.95	0.95	0.96	0.95	0.94	0.94	0.96	1.00	1.07	1.11	1.15	1.12	1.10	1.02	0.98	0.96	0.95	0.95	
I-495	MD-414/ST BARNABAS RD/EXIT 4	0.56	0.96	0.96	0.96	0.96	0.93	0.92	0.95	0.95	0.96	0.94	0.94	0.94	0.95	0.97	1.03	1.10	1.26	1.14	1.02	0.98	0.95	0.95	0.94	0.94	
I-495	MD-5/BRANCH AVE/EXIT 7	2.31	0.94	0.94	0.94	0.94	0.92	0.91	0.93	0.94	0.95	0.94	0.94	0.94	0.94	0.95	1.05	1.38	1.72	1.45	1.06	1.05	0.94	0.92	0.92	0.92	
I-495	MD-5/BRANCH AVE/EXIT 7	0.71	0.97	0.97	0.97	0.96	0.94	0.93	0.96	1.02	1.00	0.97	1.06	1.00	0.96	0.97	1.19	1.91	2.53	1.85	1.08	1.01	0.97	0.96	0.95	0.95	
I-495	MD-337/ALLENTOWN RD/EXIT 9	1.11	0.93	0.93	0.92	0.91	0.89	0.90	0.94	1.05	1.23	1.03	0.99	0.94	0.95	0.97	1.27	2.16	2.61	2.23	1.20	0.94	0.92	0.91	0.91	0.90	
I-495	MD-337/ALLENTOWN RD/EXIT 9	0.04	0.94	0.94	0.93	0.91	0.88	0.90	0.94	1.08	1.33	1.08	0.94	0.95	0.98	0.98	1.28	2.05	2.36	2.13	1.33	0.96	0.94	0.92	0.92	0.92	
I-495	FORESTVILLE RD/EXIT 9	0.93	0.98	0.98	0.96	0.93	0.89	0.92	0.98	1.24	1.69	1.20	0.98	0.99	1.01	1.03	1.55	2.57	2.90	2.61	1.68	1.00	0.98	0.96	0.96	0.96	
I-495	FORESTVILLE RD/EXIT 9	0.17	1.01	1.00	0.98	0.94	0.91	0.95	1.03	1.32	2.01	1.28	1.03	1.05	1.08	1.12	1.76	2.74	2.93	2.70	1.83	1.08	1.04	0.99	1.02	0.99	
I-495	MD-4/PENNSYLVANIA AVE/EXIT 11	0.60	1.00	1.00	0.96	0.93	0.91	0.95	1.03	1.20	1.88	1.22	1.02	1.03	1.04	1.09	1.38	1.93	2.01	1.91	1.32	1.10	1.05	1.00	1.00	0.98	
I-495	MD-4/PENNSYLVANIA AVE/EXIT 11	0.59	1.01	1.01	0.99	0.97	0.93	0.96	1.03	1.29	2.27	1.22	1.00	1.01	1.01	1.07	1.34	2.12	2.17	2.03	1.25	1.07	1.03	1.00	0.99	0.99	
I-495	RITCHIE MARLBORO RD/EXIT 13	1.87	0.96	0.96	0.96	0.94	0.91	0.93	0.98	1.34	1.97	1.13	0.96	0.97	0.97	1.00	1.29	1.58	1.59	1.52	1.18	0.99	0.96	0.95	0.94	0.95	
I-495	RITCHIE MARLBORO RD/EXIT 13	0.44	0.98	0.98	0.97	0.95	0.92	0.93	0.98	1.82	2.54	1.32	0.96	0.97	0.97	1.03	1.74	2.01	1.88	1.82	1.50	1.00	0.97	1.16	1.00	0.99	
I-495	MD-214/CENTRAL AVE/EXIT 15	1.20	1.43	1.06	1.03	0.99	0.94	0.97	1.10	1.45	1.76	1.22	1.01	1.01	1.01	1.08	1.46	1.55	1.52	1.48	1.34	1.09	1.05	1.78	1.27	1.37	
I-495	MD-214/CENTRAL AVE/EXIT 15	0.50	1.34	1.19	1.11	1.04	0.92	0.94	1.04	1.13	1.28	1.09	1.01	1.02	1.03	1.08	1.24	1.26	1.33	1.32	1.16	1.04	1.03	1.10	1.12	1.19	
I-495	ARENA DR/EXIT 16	0.53	1.05	1.06	1.01	0.97	0.90	0.91	0.98	1.10	1.24	1.06	0.95	0.96	0.96	0.98	1.21	1.34	1.44	1.52	1.16	1.01	0.96	0.98	1.00	1.00	
I-495	ARENA DR/EXIT 16	0.46	0.99	1.00	0.98	0.95	0.91	0.92	0.99	1.13	1.32	1.12	0.96	0.97	0.96	0.98	1.35	1.79	1.90	1.94	1.34	1.17	0.97	0.96	0.96	0.97	
I-495	MD-202/LANDOVER RD/EXIT 17	0.22	0.95	0.96	0.96	0.93	0.90	0.90	0.97	1.03	1.09	1.06	0.96	0.97	0.94	0.98	1.11	1.26	1.32	1.32	1.11	1.13	0.97	0.94	0.96	0.95	
I-495	MD-202/LANDOVER RD/EXIT 17	0.58	0.99	1.01	1.01	0.96	0.94	0.94	1.02	1.24	1.55	1.36	1.02	1.03	1.00	1.05	1.58	2.25	2.48	2.42	1.44	1.40	1.00	0.98	0.98	0.97	
I-495	I-495/I-95 EXP	0.17	0.98	1.01	1.03	0.97	0.93	0.94	1.07	1.61	2.09	1.70	1.09	1.18	1.04	1.19	2.49	3.86	4.17	4.02	2.30	1.89	1.02	0.97	0.95	0.97	
I-495	I-495/I-95 EXP	0.11	0.94	0.95	0.94	0.94	0.89	0.90	1.05	1.86	2.22	1.74	1.04	1.12	0.96	1.26	2.65	3.63	3.74	3.83	2.50	1.87	0.95	0.92	0.91	0.93	
I-495	US-50/EXIT 19	1.16	0.97	0.97	0.95	0.94	0.90	0.92	1.13	1.46	1.62	1.45	1.06	1.08	1.01	1.15	1.58	1.76	1.82	1.99	1.60	1.55	0.99	0.96	0.94	0.95	
I-495	US-50/EXIT 19	0.70	0.97	0.98	0.97	0.96	0.92	0.93	1.23	1.52	1.72	1.53	1.11	1.00	0.97	1.06	1.22	1.24	1.44	1.82	1.26	1.05	0.97	0.96	0.95	0.95	
I-495	MD-450/ANNAPOLIS RD/EXIT 20	0.49	0.95	0.96	0.95	0.92	0.90	0.94	1.36	1.76	1.99	1.64	1.20	0.99	0.98	1.06	1.28	1.59	1.98	2.19	1.57	1.04	0.97	0.96	0.95	0.94	
I-495	MD-450/ANNAPOLIS RD/EXIT 20	0.40	0.96	0.98	0.96	0.94	0.91	0.98	1.41	1.82	2.18	1.76	1.27	1.00	0.98	1.00	1.24	1.72	2.29	2.37	1.63	1.04	0.97	0.96	0.95	0.95	
I-495	MD-295/MD-193/EXIT 22	2.02	0.95	0.96	0.95	1.04	1.01	0.95	1.15	1.33	1.68	1.43	1.14	0.98	0.98	0.98	1.12	1.54	1.95	2.03	1.55	1.02	0.95	0.94	0.93	0.93	
I-495	MD-295/MD-193/EXIT 22	0.47	0.99	1.01	1.01	0.98	0.92	0.95	1.14	1.31	1.56	1.11	1.03	1.03	1.03	1.06	1.39	1.93	2.20	2.28	1.67	1.11	1.03	1.01	1.02	0.99	
I-495	MD-201/KENILWORTH AVE/EXIT 23	0.43	0.96	0.99	0.97	0.96	0.91	0.93	1.08	1.19	1.47	1.04	0.99	1.00	1.00	1.02	1.24	1.73	2.05	2.21	1.70	1.10	0.98	0.97	0.97	0.96	
I-495	MD-201/KENILWORTH AVE/EXIT 23	0.53	0.94	0.97	0.97	0.95	0.91	0.92	1.08	1.27	1.59	1.00	0.97	0.97	0.97	0.98	1.25	1.74	2.03	2.24	1.87	1.12	0.95	0.94	0.94	0.94	
	Weighted TTI	42.11	0.98	0.97	0.96	0.95	0.91	0.93	1.27	1.66	1.83	1.36	1.08	1.02	0.99	1.05	1.19	1.47	1.70	1.73	1.41	1.07	0.96	0.97	0.96	0.96	
	Weighted Average TTI Both Directions	84.02	0.97	0.98	0.96	0.95	0.91	0.92	1.16	1.57	1.70	1.27	1.05	1.01	1.00	1.08	1.24	1.53	1.79	1.82	1.50	1.12	0.97	0.97	0.96	0.97	1.18
	Max Observed TTI Both Directions		1.43	1.19	1.11	1.24	1.01	1.09	3.51	6.24	5.65	2.80	2.04	1.78	1.55	2.24	3.33	3.86	4.40	4.37	3.31	2.00	1.05	1.78	1.28	1.51	

Travel time index for I-495 using INRIX data - Clockwise (Inner Loop)

October 2021 (Every Tuesday, Wednesday, and Thursday)

Road	Segment	Miles	12:00 AM	1:00 AM	2:00 AM	3:00 AM	4:00 AM	5:00 AM	6:00 AM	7:00 AM	8:00 AM	9:00 AM	10:00 AM	11:00 AM	12:00 PM	1:00 PM	2:00 PM	3:00 PM	4:00 PM	5:00 PM	6:00 PM	7:00 PM	8:00 PM	9:00 PM	10:00 PM	11:00 PM
I-495	MD-355/WISCONSIN AVE/EXIT 34	0.11	0.95	0.97	0.98	0.98	0.92	0.90	0.97	1.24	1.68	1.44	1.00	1.00	0.99	1.27	1.68	3.19	4.00	3.16	2.49	1.31	1.03	0.95	0.94	0.94
I-495	MD-355/WISCONSIN AVE/EXIT 34	0.23	0.95	0.97	0.98	0.97	0.91	0.88	0.95	1.26	1.63	1.56	1.00	0.98	0.98	1.28	1.69	3.24	3.90	3.37	2.56	1.33	1.02	0.94	0.93	0.93
I-495	MD-185/CONNECTICUT AVE/EXIT 33	1.21	0.93	0.96	0.97	0.96	0.89	0.88	0.95	1.49	1.73	1.81	1.09	0.99	0.99	1.43	1.99	3.44	4.33	4.00	3.24	1.85	1.04	0.94	0.93	0.92
I-495	MD-185/CONNECTICUT AVE/EXIT 33	0.36	0.95	0.97	0.96	0.96	0.89	0.87	0.94	1.04	1.07	1.07	0.98	0.97	0.97	1.44	1.97	3.43	4.29	4.08	3.09	2.00	1.05	0.95	1.07	1.03
I-495	MD-97/GEORGIA AVE/EXIT 31	1.87	1.06	1.11	0.96	0.95	0.88	0.86	0.93	1.03	1.01	1.02	0.98	1.01	1.01	1.28	1.45	2.21	2.53	2.65	2.11	1.65	1.02	0.96	1.10	1.09
I-495	MD-97/GEORGIA AVE/EXIT 31	0.28	0.94	0.96	0.96	0.96	0.89	0.88	0.94	1.01	1.00	0.99	0.98	0.99	1.01	1.12	1.11	2.00	2.26	2.50	1.87	1.20	0.99	0.94	0.93	0.93
I-495	US-29/COLESVILLE RD/EXIT 30	1.14	0.93	0.95	0.96	0.95	0.90	0.88	0.93	0.99	0.99	0.98	0.98	0.99	1.00	1.09	1.09	1.66	1.90	2.00	1.64	1.20	0.99	0.94	0.93	0.92
I-495	US-29/COLESVILLE RD/EXIT 30	0.31	0.95	0.97	0.98	0.96	0.92	0.90	0.95	1.03	1.03	1.00	0.99	1.04	1.00	1.08	1.10	1.53	2.02	2.07	1.56	1.16	1.02	0.97	0.95	0.95
I-495	MD-193/UNIVERSITY BLVD/EXIT 29	0.31	0.95	0.97	0.98	0.96	0.91	0.90	0.95	1.05	1.04	0.98	0.98	1.06	0.99	1.07	1.12	1.69	2.22	2.30	1.68	1.15	1.00	0.96	0.95	0.94
I-495	MD-193/UNIVERSITY BLVD/EXIT 29	0.40	0.95	0.97	0.98	0.97	0.92	0.91	0.95	1.06	1.06	0.99	0.99	1.13	1.00	1.08	1.22	1.95	2.48	2.51	1.85	1.17	1.00	0.97	0.95	0.94
I-495	MD-650/NEW HAMPSHIRE AVE/EXIT 28	1.14	0.93	0.95	0.96	0.95	0.91	0.89	0.93	1.12	1.03	0.97	0.99	1.08	0.98	1.01	1.10	1.48	1.55	1.52	1.40	1.12	0.97	0.94	0.93	0.92
I-495	MD-650/NEW HAMPSHIRE AVE/EXIT 28	0.57	0.93	0.95	0.96	0.94	0.92	0.90	0.97	1.17	1.05	0.99	1.04	1.06	1.00	1.03	1.09	1.33	1.37	1.29	1.24	1.15	1.01	0.96	0.94	0.93
I-495	EXIT 27	0.59	0.92	0.93	0.93	0.93	0.89	0.88	0.95	1.08	1.00	0.94	0.95	0.95	0.96	0.99	1.03	1.13	1.17	1.18	1.16	1.08	0.94	0.90	0.90	0.90
I-495	EXIT 27	1.01	1.00	0.99	1.01	0.99	0.94	0.93	0.96	1.24	1.22	1.15	0.98	0.96	0.95	0.96	1.02	1.08	1.29	1.42	1.13	1.00	0.96	0.94	0.94	1.09
I-495	US-1/BALTIMORE AVE/EXIT 25	0.49	0.95	0.97	0.97	0.96	0.92	0.92	1.01	2.18	2.80	1.56	1.15	0.94	0.94	0.93	1.08	1.96	3.21	3.55	1.95	1.00	0.95	0.93	0.93	0.93
I-495	US-1/BALTIMORE AVE/EXIT 25	0.54	0.94	0.97	0.96	0.95	0.92	0.92	1.04	2.34	2.88	1.73	1.26	0.95	0.95	0.97	1.23	2.31	3.34	3.53	2.28	1.06	0.96	0.94	0.93	0.93
I-495	GREENBELT METRO DR/EXIT 24	0.67	0.94	0.96	0.95	0.94	0.91	0.92	1.08	2.02	2.03	1.60	1.19	0.98	0.99	1.04	1.29	1.99	2.49	2.62	2.02	1.10	0.97	0.94	0.93	0.93
I-495	GREENBELT METRO DR/EXIT 24	0.11	0.93	0.95	0.94	0.93	0.91	0.91	1.11	1.88	1.68	1.45	1.17	0.97	1.00	1.05	1.34	1.94	2.36	2.51	2.00	1.12	0.95	0.93	0.92	0.92
I-495	MD-201/KENILWORTH AVE/EXIT 23	0.88	0.93	0.96	0.94	0.93	0.91	0.91	1.08	1.76	1.53	1.40	1.14	0.97	0.98	1.00	1.36	1.83	2.25	2.38	1.76	1.11	0.95	0.92	0.93	0.92
I-495	MD-201/KENILWORTH AVE/EXIT 23	0.54	0.96	0.99	0.97	0.96	0.94	0.96	1.21	1.73	1.65	1.53	1.18	1.02	1.05	1.07	1.58	2.07	2.33	2.50	1.84	1.25	0.99	0.96	0.96	0.96
I-495	MD-295/MD-193/EXIT 22	0.36	0.95	0.97	0.94	0.95	0.94	0.97	1.18	1.40	1.50	1.38	1.13	1.03	1.07	1.06	1.37	1.61	1.71	2.03	1.55	1.22	1.01	0.98	0.97	0.96
I-495	MD-295/MD-193/EXIT 22	0.52	0.98	1.00	0.98	0.97	0.94	0.95	1.04	1.22	1.45	1.23	1.01	1.00	1.04	1.01	1.19	1.42	1.47	1.93	1.28	1.08	1.00	0.98	0.98	0.98
I-495	MD-450/ANNAPOLIS RD/EXIT 20	2.02	0.93	0.94	0.94	0.94	0.92	0.91	1.00	1.25	1.53	1.28	0.97	0.96	1.01	0.96	1.17	1.49	1.48	1.62	1.22	1.01	0.94	0.92	0.92	0.92
I-495	MD-450/ANNAPOLIS RD/EXIT 20	0.23	0.94	0.96	0.95	0.94	0.92	0.92	1.14	1.55	1.83	1.54	1.07	1.02	1.09	1.07	1.43	1.85	1.79	1.73	1.36	1.10	0.97	0.95	0.93	0.94
I-495	US-50/EXIT 19	0.53	0.96	0.97	0.95	0.94	0.93	0.94	1.09	1.24	1.38	1.26	1.06	1.04	1.06	1.07	1.22	1.35	1.42	1.56	1.30	1.12	1.00	0.98	0.96	0.96
I-495	US-50/EXIT 19	0.81	0.94	0.97	0.96	0.95	0.94	0.92	0.97	1.16	1.77	1.41	1.05	0.95	0.95	0.95	1.14	1.50	1.95	2.32	1.70	1.15	0.94	0.93	0.93	0.94
I-495	I-495/I-95 EXP	1.04	0.95	0.96	0.96	0.96	0.94	0.93	1.03	1.39	2.12	1.62	1.21	1.01	1.02	1.06	1.44	1.97	2.14	2.25	1.85	1.32	1.00	0.97	0.95	0.95
I-495	I-495/I-95 EXP	0.10	0.93	0.95	0.94	0.94	0.91	0.90	0.96	1.04	1.24	1.08	1.03	0.96	0.94	0.95	1.08	1.18	1.45	1.33	1.21	1.02	0.95	0.98	0.93	0.93
I-495	MD-202/LANDOVER RD/EXIT 17	0.34	0.93	0.92	0.92	0.96	0.91	0.91	0.94	0.99	1.09	1.02	0.97	0.94	0.95	0.96	1.02	1.06	1.15	1.11	1.13	1.03	0.96	0.97	0.91	0.91
I-495	MD-202/LANDOVER RD/EXIT 17	0.47	0.98	0.97	0.97	0.98	0.97	0.97	0.96	1.03	1.06	1.04	1.02	1.01	1.01	1.00	1.05	1.11	1.13	1.12	1.08	1.05	1.01	1.04	0.97	0.97
I-495	ARENA DR/EXIT 16	0.26	1.01	1.03	1.02	1.01	1.00	0.94	1.00	1.12	1.21	1.07	1.01	1.02	1.01	1.03	1.19	1.29	1.62	1.65	1.26	1.05	0.99	1.06	1.04	1.04
I-495	ARENA DR/EXIT 16	0.36	1.04	1.04	1.05	1.02	1.00	0.94	1.02	1.28	1.70	1.16	1.00	1.00	1.00	1.04	1.51	2.01	2.79	2.76	1.83	1.12	0.99	1.20	1.19	1.38
I-495	MD-214/CENTRAL AVE/EXIT 15	0.66	1.07	1.07	1.03	0.99	0.94	0.94	1.08	1.46	1.79	1.26	1.03	1.02	1.03	1.07	1.58	1.98	2.28	2.28	1.83	1.19	1.03	1.25	1.28	1.51
I-495	MD-214/CENTRAL AVE/EXIT 15	0.49	1.06	1.05	1.02	0.96	0.92	0.91	1.03	1.67	2.08	1.27	1.02	1.00	1.01	1.06	1.62	2.19	2.39	2.41	1.95	1.18	1.00	1.07	1.12	1.25
I-495	RITCHIE MARLBORO RD/EXIT 13	1.12	0.97	0.97	0.96	0.94	0.91	0.90	0.99	1.36	1.66	1.12	1.01	0.98	0.99	1.02	1.25	1.52	1.62	1.66	1.45	1.10	0.98	0.96	0.97	0.98
I-495	RITCHIE MARLBORO RD/EXIT 13	0.58	0.95	0.97	0.96	0.95	0.92	0.91	0.99	1.16	1.45	1.05	1.04	0.97	0.96	0.99	1.11	1.19	1.38	1.46	1.26	1.08	0.97	0.94	0.94	0.95
I-495	MD-4/PENNSYLVANIA AVE/EXIT 11	1.84	0.95	0.96	0.96	0.93	0.91	0.91	1.03	1.23	1.30	1.12	1.07	0.97	0.98	1.04	1.12	1.20	1.30	1.37	1.31	1.17	1.00	0.96	0.95	0.94
I-495	MD-4/PENNSYLVANIA AVE/EXIT 11	0.50	0.97	0.98	0.97	0.93	0.93	0.95	1.04	1.11	1.12	1.08	1.04	1.00	1.03	1.18	1.06	1.09	1.10	1.11	1.13	1.09	1.01	0.99	0.97	0.97
I-495	FORESTVILLE RD/EXIT 9	0.63	0.96	0.96	0.95	0.92	0.89	0.92	0.99	1.06	1.07	1.03	1.00	1.01	1.05	1.10	1.01	1.06	1.07	1.07	1.11	1.06	0.99	0.96	0.94	0.94
I-495	FORESTVILLE RD/EXIT 9	0.18	0.97	0.96	0.95	0.92	0.89	0.92	0.99	1.05	1.05	1.02	0.99	0.98	0.99	1.01	1.00	1.04	1.07	1.07	1.11	1.06	1.01	0.97	0.95	0.95
I-495	MD-337/ALLENTOWN RD/EXIT 9	0.61	0.96	0.96	0.95	0.93	0.90	0.90	0.96	1.00	1.03	0.98	0.96	0.95	0.95	0.96	0.97	0.99	1.02	1.03	1.10	1.01	0.97	0.95	0.94	0.94
I-495	MD-337/ALLENTOWN RD/EXIT 9	0.31	0.94	0.95	0.94	0.91	0.89	0.88	0.93	0.96	1.03	0.97	0.94	0.94	0.93	0.94	0.95	0.97	1.02	1.05	1.11	1.02	0.95	0.93	0.92	0.93
I-495	MD-5/BRANCH AVE/EXIT 7	1.21	0.96	0.97	0.95	0.93	0.90	0.90	0.95	1.00	1.12	1.01	0.97	0.96	0.96	0.98	0.98	1.02	1.09	1.08	1.11	1.12	0.98	0.95	0.94	0.95
I-495	MD-5/BRANCH AVE/EXIT 7	0.52	0.99	0.99	0.98	0.96	0.94	0.96	1.01	1.51	1.78	1.11	0.98	0.98	0.98	0.98	0.99	1.00	1.03	1.03	1.05	1.03	1.00	0.98	0.97	0.99
I-495	MD-414/ST BARNABAS RD/EXIT 4	2.26	0.97	0.97	0.96	0.94	0.90	0.91	1.15	2.26	2.19	1.14	0.97	0.95	0.95	0.95	0.95	0.97	0.98	1.01	1.00	0.97	0.95	0.95	0.94	0.95
I-495	MD-414/ST BARNABAS RD/EXIT 4	0.66	0.97	0.97	0.96	0.93	0.89	0.92	1.60	3.82	2.88	1.18	1.11	0.96	1.03	0.96	0.97	0.99	1.00	1.02	1.04	1.01	0.97	0.97	0.95	0.96
I-495	MD-210/EXIT 3	0.47	0.97	0.97	0.97	0.95	0.91	0.94	1.51	3.95	3.18	1.24	1.18	1.01	1.03	0.97	0.97	0.99	1.00	1.03	1.05	1.02	0.98	0.98	0.96	0.97
I-495	MD-210/EXIT 3	1.07	1.00	1.02	1.00	0.98	0.93	1.02	1.77	4.32	3.73	1.30	1.03	1.08	0.99	0.99	0.98	0.99	1.01	1.11	1.08	1.04	1.00	0.98	0.98	0.99
I-495	I-295	0.56	0.98	1.00	0.98	0.95	0.92	1.09	1.90	4.62	4.17	1.41	0.98	0.98	0.98	1.00	0.99	0.99	1.06	1.51	1.51	1.12	0.98	0.96	0.97	0.97
I-495	I-295	0.63	1.01	1.03	0.97	0.94	0.91	1.04	1.56	2.35	2.33	1.24	0.97	0.98	0.99	1.04	1.01	1.03	1.11	1.59	1.49	1.11	1.01	0.99	0.98	0.99
I-495	WOODROW WILSON MEMORIAL BRIDGE	0.23	0.94	0.97	0.93	0.91	0.89	0.95	1.15	1.25	1.29	1.09	0.94	0.94	0.94	1.00	0.98	1.01	1.09	1.33	1.19	1.01	0.97	0.95	0.95	0.96
I-495	WOODROW WILSON MEMORIAL BRIDGE	1.14	0.94	0.96	0.92	0.91	0.89	0.92	1.05	1.10	1.16	1.04	0.95	0.95	0.95	0.99	0.98	1.00	1.08	1.21	1.13	1.02	0.97	0.95	0.96	0.96
I-495	AMERICAN LEGION BRIDGE	0.15	0.94	0.95	0.94	0.95	0.91	0.91	0.98	1.05	1.14	1.21	1.50	1.51	1.55	2.12	3.33	2.91	3.95	4.04	3.31	1.82	0.96	0.95	0.94	0.93
I-495	CLARA BARTON PKWY/EXIT 41	0.10	0.94	0.95	0.95	0.95	0.91	0.91	0.98	1.05	1.13	1.20	1.47	1.46	1.50	1.99	2.97	2.58	3.59	3.72	2.97	1.65	0.96	0.95	0.93	0.93
I-495	CLARA BARTON PKWY/EXIT 41	0.20	0.94	0.95	0.96	0.96	0.92	0.92	0.99	1.06	1.13	1.19	1.43	1.41	1.45	1.83	2.68	2.20	3.31	3.41	2.61	1.45	0.97	0.96	0.94	0.93
I-495	CABIN JOHN PKWY/EXIT 40	1.38	0.93	0.95	0.96	0.95	0.91	0.91	0.96	1.01	1.05	1.06	1.10	1.14	1.25	1.68	2.36	1.91	3.52	3.49	2.54	1.23	0.95	0.93	0.92	0.92
I-495	CABIN JOHN PKWY/EXIT 40	0.40	0.95	0.96	0.97	0.96	0.92	0.93	0.96	0.98	1.00	1.06	1.06	1.12	1.36	2.24	2.66	2.65	4.40	4.37	3.27	1.37	0.95	0.95	0.93	0.93
I-495	MD-190/RIVER RD/EXIT 39	0.05	0.96	0.97	0.98	0.97	0.94	0.93	0.97	0.98	0.99	1.04	1.07	1.09	1.39	2.16	2.50	2.45	3.73	3.78	2.91	1.39	0.97	0.96	0.95	0.95
I-495	MD-190/RIVER RD/EXIT 39	0.23	0.95	0.96	0.98	0.97	0.93	0.93	0.96	0.98	0.99	1.01	1.04	1.06	1.39	2.12	2.47	2.29	3.44	3.51	2.66	1.34	0.96	0.95	0.94	0.94
I-495	I-270 SPUR	1.23	0.95	0.96	0.97	0.96	0.93	0.92	0.95	0.96	0.97	1.03	1.01	1.02	1.25	1.70	1.70	1.64	2.17	2.17	1.77	1.20	0.95	0.94	0.93	0.93
I-495	I-270 SPUR	0.16	0.97	0.98	0.99	0.97	0.93	0.92	0.96	0.97	0.97	0.99	1.01	1.01	1.11	1.09	1.01	1.02	1.06	1.06	1.08	1.04	0.96	0.95	0.94	0.94
I-495	MD-187/OLD GEORGETOWN RD/EXIT 36	1.48	0.96	0.98	1.00	0.98	0.94	0.92	0.95	0.95	0.96	0.95	0.96	0.95	0.96	0.96	0.98	1.10	1.11	0.97	1.06	1.03	0.94	0.94	0.93	0.93
I-495	MD-187/OLD GEORGETOWN RD/EXIT 36	0.40	0.94	0.96	0.97	0.96	0.93	0.90	0.93	0.94	1.05	1.02	0.93	0.93	0.93	0.97	1.43	2.67	2.16	1.42	1.55	1.14	0.94	0.93	0.93	0.92
I-495	I-270/EXIT 35	0.43	0.96	0.97	0.98	0.99	0.99	0.93	0.96	1.00	1.32	1.16	0.98	0.98	0.98	1.14	1.63	3.29	3.57	2.02	2.11	1.31	1.00	0.96	0.96	0.96
I-495	I-270/EXIT 35	0.25	0.96	0.97	0.99	0.98	0.97	0.92	0.98	1.13	1.62	1.32	1.01	1.01	1.01	1.24	1.66	3.10	3.95	2.74	2.39	1.35	1.04	0.97	0.96	0.96
	Weighted TTI	41.91	0.96	0.98	0.97	0.95	0.92	0.92	1.06	1.49	1.56	1.18	1.03	1.00	1.02	1.11	1.29	1.59	1.88	1.91	1.59	1.17	0.98	0.96	0.96	0.97

Travel time index for I-270 and I-270 SPUR using INRIX data - Southbound

2017 (Every Tuesday, Wednesday, and Thursday)

Road	Segment	Miles	12:00 AM	1:00 AM	2:00 AM	3:00 AM	4:00 AM	5:00 AM	6:00 AM	7:00 AM	8:00 AM	9:00 AM	10:00 AM	11:00 AM	12:00 PM	1:00 PM	2:00 PM	3:00 PM	4:00 PM	5:00 PM	6:00 PM	7:00 PM	8:00 PM	9:00 PM	10:00 PM	11:00 PM	Daily Avg
I-270	I-70/US-40	0.69	1.00	1.05	1.03	0.98	0.97	1.16	1.02	1.02	1.11	1.00	0.99	0.96	0.97	1.00	1.02	0.99	0.97	0.97	0.98	0.97	0.97	0.99	1.00	0.98	
I-270	MD-85/EXIT 31	0.94	0.99	1.00	0.98	0.95	0.92	1.40	1.02	1.07	1.13	1.01	0.96	0.96	0.96	0.99	1.04	1.02	0.99	0.98	1.00	0.96	0.97	0.98	0.98	0.98	
I-270	MD-85/EXIT 31	0.48	1.00	0.99	0.98	0.95	0.92	1.40	1.05	1.05	1.02	1.01	0.99	0.98	0.98	1.01	1.04	1.07	1.03	1.02	1.06	0.98	0.99	0.99	1.00	0.99	
I-270	MD-80/EXIT 26	4.84	1.01	1.01	0.99	0.96	0.92	1.36	1.89	1.54	1.21	1.07	0.98	0.96	0.95	1.03	1.03	1.01	0.99	1.01	1.00	0.99	1.02	1.02	1.00	1.00	
I-270	MD-80/EXIT 26	0.16	1.03	1.02	1.00	0.97	0.95	1.67	2.89	2.22	1.66	1.21	1.07	1.03	1.02	1.00	1.01	1.01	1.02	1.01	1.05	1.05	1.06	1.04	1.02	1.01	
I-270	MD-109/EXIT 22	3.55	1.01	1.01	0.98	0.95	0.95	1.43	2.18	1.66	1.44	1.20	1.17	1.15	1.13	1.05	1.03	1.06	1.05	1.07	1.10	1.10	1.04	1.05	0.99	0.98	
I-270	MD-109/EXIT 22	0.17	1.02	1.04	0.99	0.96	0.99	1.51	2.28	1.82	1.66	1.31	1.19	1.10	1.05	1.03	1.03	1.03	1.01	1.03	1.07	1.03	0.99	1.06	1.02	0.98	
I-270	MD-121	3.47	0.99	0.99	0.98	0.95	0.93	1.07	1.25	1.21	1.18	1.11	1.03	0.98	0.98	0.97	0.96	0.96	0.95	0.96	0.96	0.96	0.97	1.06	1.04	0.98	
I-270	MD-121	0.45	1.02	1.05	1.04	0.98	0.93	0.96	1.02	1.22	1.36	1.12	0.98	0.95	0.95	0.95	0.95	0.96	0.95	0.95	0.96	0.97	0.98	1.01	1.01	1.00	
I-270	FATHER HURLEY BLVD/EXIT 16	2.01	1.01	1.01	1.00	0.97	0.93	0.94	1.20	1.64	1.85	1.34	1.00	0.95	0.95	0.95	0.95	0.95	0.94	0.95	0.95	0.97	0.98	0.99	0.99	0.99	
I-270	FATHER HURLEY BLVD/EXIT 16	0.72	1.01	1.01	1.01	0.98	0.93	0.96	1.87	2.97	3.14	1.86	1.10	0.95	0.95	0.96	0.96	0.95	0.95	0.95	0.96	0.97	0.98	0.99	0.99	1.01	
I-270	MD-118/EXIT 15	0.35	1.01	1.01	1.00	0.98	0.93	0.96	1.86	2.96	3.03	1.81	1.16	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.98	0.98	0.99	0.99	1.00	
I-270	MD-118/EXIT 15	0.62	1.00	1.00	1.00	0.97	0.93	0.97	1.86	2.92	2.97	1.86	1.24	0.96	0.96	0.96	0.98	0.96	0.95	0.98	0.98	0.99	0.98	0.99	0.99	1.00	
I-270	MIDDLEBROOK RD/EXIT 13	0.49	0.99	0.99	1.00	0.97	0.93	0.95	1.60	2.30	2.27	1.56	1.21	0.98	0.96	0.97	0.99	0.96	0.97	1.00	1.01	0.99	0.98	0.98	0.98	0.98	
I-270	MIDDLEBROOK RD/EXIT 13	0.28	1.00	0.99	0.99	0.97	0.93	0.95	1.47	2.05	2.00	1.38	1.17	0.98	0.96	0.96	0.99	0.95	0.95	0.98	1.00	0.98	0.98	0.98	0.98	0.99	
I-270	MD-124/QUINCE ORCHARD RD/EXIT 11	1.93	1.00	1.00	1.00	0.97	0.92	0.94	1.46	2.06	1.98	1.35	1.09	0.97	0.95	0.95	1.00	0.94	0.94	0.96	1.00	0.96	0.97	0.97	0.98	0.98	
I-270	MD-124/QUINCE ORCHARD RD/EXIT 11	0.31	1.00	1.00	1.00	0.98	0.92	0.95	1.58	2.25	2.18	1.44	1.00	0.95	0.95	0.95	1.04	0.95	0.95	0.96	0.98	0.96	0.97	0.98	0.98	0.99	
I-270	MD-117/EXIT 10	0.58	1.00	1.00	1.00	0.97	0.92	0.96	1.42	1.93	1.89	1.35	1.00	0.98	0.98	0.97	1.00	0.96	0.97	0.98	0.97	0.97	0.98	0.99	0.99	0.99	
I-270	MD-117/EXIT 10	0.28	0.99	0.99	0.99	0.97	0.91	0.94	1.26	1.67	1.62	1.22	0.97	0.96	0.96	0.95	0.95	0.95	0.95	0.97	0.96	0.96	0.97	0.98	0.98	0.98	
I-270	I-370/SAM EIG HWY/EXIT 9	0.71	0.99	0.99	0.99	0.97	0.91	0.93	1.16	1.54	1.46	1.15	0.96	0.95	0.95	0.95	0.95	0.95	0.96	0.99	0.97	0.96	0.97	0.97	0.98	0.98	
I-270	I-370/SAM EIG HWY/EXIT 9	0.60	1.00	1.00	1.00	0.98	0.92	0.92	1.08	1.87	1.78	1.20	0.97	0.95	0.95	0.95	0.95	0.95	0.95	0.96	0.95	0.96	0.98	0.98	0.99	0.99	
I-270	SHADY GROVE RD/EXIT 8	0.90	1.00	1.01	1.01	0.98	0.93	0.92	1.12	2.96	3.08	1.82	1.03	0.96	0.96	0.95	0.96	0.95	0.95	0.96	0.96	0.97	0.99	0.99	1.00	1.00	
I-270	SHADY GROVE RD/EXIT 8	0.01	1.01	1.01	1.01	0.99	0.95	0.93	1.16	2.76	2.94	1.92	1.08	0.97	0.97	0.96	0.96	0.96	0.96	0.97	0.97	0.98	0.99	1.00	1.00	1.00	
I-270	MD-28/MONTGOMERY AVE/EXIT 6	1.87	1.00	1.00	1.01	0.98	0.94	0.92	1.22	3.02	3.27	2.25	1.20	0.97	0.96	0.95	0.95	0.95	0.95	0.96	0.96	0.97	0.98	0.99	0.99	0.99	
I-270	MD-28/MONTGOMERY AVE/EXIT 6	0.01	0.99	1.00	1.00	0.97	0.93	0.92	1.22	2.19	2.27	1.83	1.16	0.97	0.97	0.96	0.96	0.95	0.95	0.96	0.96	0.96	0.98	0.98	0.98	0.99	
I-270	MD-189/FALLS RD/EXIT 5	0.78	1.01	1.01	1.01	0.99	0.94	0.93	1.20	2.07	2.19	1.68	1.15	0.97	0.96	0.96	0.96	0.96	0.96	0.97	0.97	0.97	0.99	1.00	1.00	1.00	
I-270	MD-189/FALLS RD/EXIT 5	0.58	1.00	1.00	1.01	0.98	0.94	0.93	1.27	2.30	2.46	1.85	1.24	1.00	0.96	0.95	0.95	0.95	0.94	0.95	0.96	0.96	0.98	0.99	1.00	0.99	
I-270	MONTROSE RD/EXIT 4	0.64	1.00	1.00	1.01	0.98	0.94	0.93	1.39	2.63	2.76	2.16	1.38	1.03	0.96	0.95	0.96	0.95	0.94	0.95	0.96	0.96	0.98	0.99	0.99	0.99	
I-270	MONTROSE RD/EXIT 4	0.91	0.99	0.99	1.00	0.97	0.93	0.92	1.34	2.10	2.14	1.73	1.26	1.03	0.96	0.95	0.95	0.95	0.94	0.95	0.95	0.95	0.97	0.98	0.98	0.98	
I-270	I-270 (SPUR)	1.17	0.99	1.00	1.00	0.98	0.94	0.92	1.22	1.49	1.55	1.32	1.11	0.99	0.96	0.95	0.96	0.96	0.94	0.96	0.95	0.95	0.96	0.97	0.98	0.97	
I-270	MD-187/OLD GEORGETOWN RD/EXIT 1	0.24	1.02	1.02	1.01	1.00	0.96	0.92	0.99	1.06	1.10	1.06	1.00	0.96	0.96	0.96	0.96	0.96	0.96	0.97	0.97	0.98	0.99	1.01	1.02	1.01	
I-270	MD-187/OLD GEORGETOWN RD/EXIT 1	0.81	1.02	1.01	1.01	1.00	0.96	0.92	0.97	1.03	1.13	1.11	1.01	0.95	0.94	0.94	0.94	0.95	0.96	1.05	1.04	0.98	0.99	1.01	1.01	1.00	
I-270	I-495/MD-355	1.17	0.99	0.99	1.00	0.97	0.94	0.90	0.95	1.04	1.27	1.08	0.96	0.94	0.94	0.94	0.96	1.02	1.12	1.90	1.42	0.97	0.96	0.99	0.98	0.97	
I-270	I-495/MD-355	0.26	0.99	0.98	1.01	0.96	0.92	0.90	0.95	1.09	1.35	1.20	1.02	1.01	1.04	1.08	1.33	1.88	2.34	3.52	2.57	1.21	1.02	1.05	1.03	0.98	
I-270-SPUR	I-270	0.22	0.99	1.00	1.00	0.97	0.94	0.95	1.75	2.35	2.59	2.15	1.47	1.07	1.00	0.99	1.01	1.05	1.06	1.08	1.06	0.98	0.99	0.99	0.99	1.01	
I-270-SPUR	DEMOCRACY BLVD	0.55	0.99	1.00	1.00	0.97	0.94	0.96	1.42	1.92	2.19	1.95	1.41	1.06	0.99	0.98	1.01	1.16	1.21	1.23	1.16	1.00	0.99	0.99	0.99	0.98	
I-270-SPUR	DEMOCRACY BLVD	0.52	0.99	0.99	1.00	0.96	0.93	0.95	1.17	1.69	2.04	2.38	1.73	1.17	0.97	0.96	1.05	1.88	3.30	4.21	2.50	1.11	0.97	0.98	0.98	0.97	
I-270-SPUR	I-495	0.79	0.99	0.99	0.99	0.97	0.93	0.96	1.21	1.78	2.16	2.65	1.85	1.26	1.01	1.00	1.17	2.49	5.39	6.08	3.70	1.36	0.99	0.99	1.00	0.98	
	Weighted TTI	35.05	1.00	1.00	1.00	0.97	0.93	1.09	1.46	1.78	1.78	1.41	1.11	1.00	0.98	0.98	0.99	1.04	1.12	1.20	1.10	1.00	0.99	1.01	1.00	0.99	
	Weighted Average TTI Both Directions	70.11	1.00	1.00	1.00	0.99	0.97	1.04	1.21	1.37	1.37	1.19	1.05	1.00	0.99	1.00	1.03	1.18	1.34	1.50	1.33	1.06	1.00	1.01	1.01	1.00	**1.11**
	Max Observed TTI Both Directions		1.10	1.06	1.12	1.16	1.20	1.67	2.89	3.02	3.27	2.65	1.85	1.26	1.13	1.14	1.41	2.77	5.39	6.08	3.70	1.79	1.06	1.19	1.18	1.14	

Travel time index for I-270 and I-270 SPUR using INRIX data - Northbound

2017 (Every Tuesday, Wednesday, and Thursday)

Road	Segment	Miles	12:00 AM	1:00 AM	2:00 AM	3:00 AM	4:00 AM	5:00 AM	6:00 AM	7:00 AM	8:00 AM	9:00 AM	10:00 AM	11:00 AM	12:00 PM	1:00 PM	2:00 PM	3:00 PM	4:00 PM	5:00 PM	6:00 PM	7:00 PM	8:00 PM	9:00 PM	10:00 PM	11:00 PM
I-270	I-495/MD-355	0.20	0.99	0.99	0.99	0.99	0.99	0.97	1.00	1.03	1.07	1.06	1.02	1.01	1.02	1.08	1.03	1.12	1.83	2.43	1.74	1.07	1.03	1.03	1.03	1.02
I-270	MD-187/OLD GEORGETOWN RD/EXIT 1	1.18	0.98	0.98	0.98	0.99	0.97	0.96	0.97	0.98	0.99	0.99	0.97	0.97	0.97	0.97	0.97	1.03	1.59	2.08	1.63	1.00	0.98	0.99	0.98	1.00
I-270	MD-187/OLD GEORGETOWN RD/EXIT 1	0.77	0.98	0.99	1.00	1.00	0.98	0.96	0.97	0.99	0.97	0.98	0.96	0.95	0.95	0.95	0.96	1.10	2.12	2.77	2.14	1.02	0.98	1.00	0.99	0.99
I-270	I-270 (SPUR)	0.06	0.98	0.98	0.99	0.99	0.97	0.95	0.97	0.98	0.97	0.98	0.96	0.96	0.96	0.96	0.97	1.24	2.57	3.28	2.56	1.06	0.98	0.99	0.99	0.98
I-270	MONTROSE RD/EXIT 4	1.34	0.99	0.99	0.99	1.00	0.98	0.97	0.96	0.96	0.97	0.98	0.98	0.99	0.98	0.98	1.00	1.21	1.83	2.11	1.85	1.11	1.00	0.99	0.98	0.98
I-270	MONTROSE RD/EXIT 4	0.96	1.00	1.00	1.01	1.01	1.00	0.98	0.96	0.95	0.95	0.96	0.96	0.97	0.96	0.96	0.99	1.10	1.32	1.47	1.35	1.04	0.98	0.98	0.98	0.98
I-270	MD-189/FALLS RD/EXIT 5	0.61	1.00	1.01	1.01	1.02	1.01	0.99	0.97	0.96	0.96	0.97	0.98	0.97	0.98	0.97	0.99	1.04	1.13	1.24	1.20	1.03	0.98	0.99	0.98	0.99
I-270	MD-189/FALLS RD/EXIT 5	0.58	1.01	1.00	1.01	1.02	1.00	0.99	0.96	0.95	0.96	0.97	0.97	0.97	0.97	0.96	0.98	1.02	1.10	1.25	1.21	1.02	0.98	0.98	0.98	0.98
I-270	MD-28/MONTGOMERY AVE/EXIT 6	0.77	0.99	0.99	1.00	1.00	0.99	0.98	0.96	0.96	0.96	0.97	0.97	0.96	0.96	0.97	0.97	1.03	1.13	1.40	1.28	1.02	0.97	0.97	0.97	0.98
I-270	MD-28/MONTGOMERY AVE/EXIT 6	0.01	0.97	0.97	0.98	0.98	0.97	0.96	0.95	0.95	0.95	0.96	0.95	0.95	0.94	0.96	0.95	1.01	1.09	1.34	1.24	1.00	0.96	0.96	0.96	0.96
I-270	SHADY GROVE RD/EXIT 8	1.90	1.10	1.06	1.12	1.16	1.20	1.11	1.10	1.06	0.97	0.97	0.97	1.04	1.03	1.09	1.00	1.01	1.14	1.64	1.57	1.06	1.03	1.04	1.06	1.14
I-270	SHADY GROVE RD/EXIT 8	0.01	1.00	1.00	1.01	1.01	1.00	0.99	0.97	0.96	0.95	0.97	0.97	0.96	0.96	0.99	0.97	0.99	1.11	1.54	1.65	1.06	0.98	0.98	0.98	0.99
I-270	I-370/SAM EIG HWY/EXIT 9	0.91	1.00	1.01	1.01	1.02	1.01	1.00	0.97	0.96	0.95	0.96	0.96	0.95	1.00	1.11	0.96	1.00	1.21	2.01	2.04	1.12	0.98	0.98	0.98	0.98
I-270	I-370/SAM EIG HWY/EXIT 9	0.03	1.00	1.00	1.02	1.01	1.00	0.99	0.97	0.96	0.95	0.96	0.96	0.95	1.08	1.12	0.96	1.00	1.31	2.36	2.29	1.17	0.97	0.98	0.97	0.98
I-270	MD-117/EXIT 10	1.50	1.00	1.00	1.01	1.01	1.01	0.99	0.97	0.96	0.95	0.96	0.96	1.02	1.08	1.09	0.98	1.07	1.55	2.45	2.26	1.20	0.98	0.98	0.98	0.99
I-270	MD-117/EXIT 10	0.01	0.98	1.00	1.00	1.00	0.99	0.98	0.97	0.96	0.95	0.96	0.97	0.97	0.97	0.95	0.99	1.21	1.88	2.43	2.22	1.23	0.97	0.97	0.97	0.97
I-270	MD-124/QUINCE ORCHARD RD/EXIT 11	0.62	0.99	0.99	1.00	1.00	1.00	0.99	0.97	0.95	0.95	0.95	0.98	0.98	0.96	0.95	0.99	1.33	2.12	2.58	2.37	1.30	0.97	0.97	0.97	0.98
I-270	MD-124/QUINCE ORCHARD RD/EXIT 11	0.01	0.99	0.99	1.01	1.01	1.00	0.99	0.97	0.95	0.95	0.95	0.99	0.99	0.95	0.95	0.98	1.44	2.29	2.66	2.44	1.36	0.98	0.98	0.97	0.98
I-270	MIDDLEBROOK RD/EXIT 13	2.28	0.98	0.99	1.00	1.00	1.00	0.98	0.96	0.94	0.95	0.95	0.98	0.97	0.95	0.95	0.97	1.29	1.75	1.95	1.74	1.21	0.99	0.97	0.97	0.97
I-270	MIDDLEBROOK RD/EXIT 13	0.23	0.98	0.99	1.00	1.00	1.00	0.98	0.96	0.94	0.95	0.95	0.96	0.95	0.95	0.94	0.97	1.09	1.31	1.40	1.18	1.03	0.98	0.98	0.97	0.97
I-270	MD-118/EXIT 15	0.46	0.99	0.99	1.00	1.00	1.00	0.99	0.96	0.95	0.95	0.96	0.96	0.96	0.95	0.95	0.97	1.12	1.35	1.47	1.19	1.02	0.98	0.98	0.97	0.97
I-270	MD-118/EXIT 15	0.65	0.99	1.00	1.01	1.01	1.02	0.99	0.96	0.95	0.95	0.96	0.97	0.96	0.96	0.95	0.99	1.16	1.39	1.53	1.18	1.02	0.99	0.99	0.98	0.98
I-270	FATHER HURLEY BLVD/EXIT 16	0.28	1.00	1.00	1.02	1.01	1.00	0.99	0.96	0.94	0.95	0.96	0.97	0.96	0.96	0.96	1.01	1.31	1.52	1.66	1.19	1.01	1.00	0.98	0.98	0.98
I-270	FATHER HURLEY BLVD/EXIT 16	0.64	0.99	1.00	1.00	1.00	1.00	0.99	0.96	0.95	0.94	0.96	0.97	0.99	0.99	1.00	1.08	1.66	1.87	2.02	1.32	1.03	1.02	0.99	0.99	0.98
I-270	MD-121	2.18	0.99	0.99	1.00	1.00	0.99	0.98	0.95	0.94	0.94	0.96	0.99	1.03	1.04	1.05	1.18	1.97	1.91	1.91	1.48	1.07	1.00	1.08	1.07	1.01
I-270	MD-121	0.18	1.01	1.00	1.01	1.02	1.03	0.99	0.96	0.94	0.95	1.05	1.08	1.10	1.08	1.14	1.41	2.77	2.92	3.06	2.22	1.24	1.02	1.16	1.12	1.02
I-270	MD-109/EXIT 22	3.87	0.98	0.98	0.98	0.98	0.97	0.96	0.96	0.97	0.97	1.03	1.04	1.05	1.05	1.07	1.16	1.50	1.61	1.69	1.47	1.14	1.05	1.19	1.18	1.06
I-270	MD-109/EXIT 22	0.17	1.00	1.00	1.00	1.00	1.00	0.98	0.97	0.94	0.95	0.96	0.96	1.00	0.98	0.98	1.04	1.14	1.22	1.23	1.16	1.06	1.02	1.02	1.02	1.01
I-270	MD-80/EXIT 26	3.54	1.01	1.01	1.01	1.01	1.00	0.99	0.97	0.94	0.95	0.95	0.96	1.00	0.97	1.03	1.13	1.31	1.40	1.33	1.25	1.12	1.02	1.02	1.00	1.00
I-270	MD-80/EXIT 26	0.18	1.00	1.01	1.00	1.00	1.00	0.99	0.97	0.95	0.96	0.96	0.97	1.02	0.98	1.04	1.10	1.22	1.31	1.35	1.26	1.10	0.99	0.99	0.99	1.01
I-270	MD-85/EXIT 31	4.71	1.02	1.01	1.00	1.00	0.99	0.98	0.96	0.95	0.99	0.99	1.00	1.02	0.98	1.01	1.10	1.18	1.17	1.25	1.14	1.04	0.99	0.98	1.03	1.02
I-270	MD-85/EXIT 31	0.47	1.00	1.01	1.00	1.01	1.01	0.99	0.97	0.97	0.99	1.00	1.00	1.00	1.00	0.99	1.00	1.04	1.15	1.33	1.09	1.03	1.01	1.00	1.00	0.99
I-270	I-70/US-40	0.50	0.99	1.01	1.01	1.01	0.99	0.99	0.96	0.94	0.95	0.96	0.97	0.97	0.97	0.97	0.97	1.03	1.21	1.37	1.05	0.98	0.98	0.98	0.98	0.97
I-270	I-70/US-40	0.94	1.00	1.00	0.99	1.00	0.99	0.98	0.97	1.00	1.21	1.08	0.98	1.02	1.05	0.99	1.06	1.57	2.46	2.99	1.40	0.99	0.99	1.02	0.99	0.97
I-270-SPUR	DEMOCRACY BLVD	0.94	0.99	0.98	0.99	0.99	0.98	0.95	0.94	0.94	0.96	0.97	0.98	0.96	0.97	1.01	1.13	1.91	2.42	2.89	2.49	1.68	1.01	0.97	0.97	0.97
I-270-SPUR	DEMOCRACY BLVD	0.50	0.99	0.99	1.00	1.00	1.00	0.97	0.94	0.93	0.94	0.96	0.97	0.97	0.97	1.00	1.17	2.01	2.48	3.02	2.71	1.79	1.06	1.01	0.98	0.97
I-270-SPUR	I-270	0.56	0.99	1.00	1.00	1.01	1.00	0.97	0.94	0.93	0.95	0.97	0.97	0.99	0.99	1.00	1.12	1.54	1.93	2.38	2.23	1.52	1.05	1.00	0.98	0.98
I-270-SPUR	I-270	0.31	0.99	0.99	1.00	1.01	0.99	0.97	0.94	0.93	0.95	0.96	0.97	0.98	0.98	0.98	1.05	1.30	1.67	2.01	1.91	1.33	1.03	0.99	0.97	0.97
	Weighted TTI	35.06	1.00	1.00	1.00	1.01	1.00	0.99	0.97	0.96	0.97	0.98	0.98	1.00	1.00	1.01	1.06	1.31	1.56	1.80	1.55	1.12	1.00	1.02	1.02	1.01

Travel time index for I-270 between I-495/MD-355 and I-70/US-40 and I-270-SPUR using INRIX data - Southbound

October 2021 (Every Tuesday, Wednesday, and Thursday)

Road	Segment	Miles	12:00 AM	1:00 AM	2:00 AM	3:00 AM	4:00 AM	5:00 AM	6:00 AM	7:00 AM	8:00 AM	9:00 AM	10:00 AM	11:00 AM	12:00 PM	1:00 PM	2:00 PM	3:00 PM	4:00 PM	5:00 PM	6:00 PM	7:00 PM	8:00 PM	9:00 PM	10:00 PM	11:00 PM	
I-270	I-70/US-40	0.60	0.97	1.04	1.01	0.91	0.87	0.88	1.38	0.97	0.94	0.92	1.04	1.00	0.92	0.91	0.91	0.91	0.92	0.92	0.92	0.92	0.91	0.93	0.93	0.95	
I-270	MD-85/EXIT 31	0.98	0.97	1.01	0.98	0.92	0.88	0.98	1.88	1.14	1.13	1.05	1.22	1.11	1.00	1.00	0.98	0.98	0.99	1.00	1.00	1.00	0.97	0.97	0.95	0.98	
I-270	MD-85/EXIT 31	0.43	0.98	1.02	0.97	0.91	0.88	0.99	1.80	1.06	1.02	1.01	1.04	1.05	1.02	1.02	1.01	1.01	1.02	1.03	1.02	1.02	0.99	0.98	0.97	0.99	
I-270	MD-80/EXIT 26	4.90	0.95	0.99	0.97	0.92	0.89	1.07	2.03	2.61	1.02	0.94	0.94	0.94	0.94	0.96	0.94	0.94	0.95	0.95	0.95	0.96	0.94	0.94	0.93	0.95	
I-270	MD-80/EXIT 26	0.09	0.99	1.02	0.99	0.95	0.93	1.25	3.09	4.61	1.37	0.97	0.97	1.00	0.98	0.98	0.97	0.98	0.98	0.99	0.99	1.00	0.99	0.99	0.97	0.98	
I-270	MD-109/EXIT 22	3.65	0.95	0.99	0.97	0.92	0.89	1.14	2.33	2.88	1.51	0.98	0.93	0.94	0.93	0.93	0.94	0.94	0.94	0.95	0.95	0.96	0.93	0.94	0.93	0.95	
I-270	MD-109/EXIT 22	0.12	0.96	0.99	0.97	0.93	0.91	1.24	2.67	3.09	2.10	1.14	0.99	0.98	0.96	0.96	0.97	0.96	0.97	0.98	0.97	0.97	0.95	0.95	0.94	0.96	
I-270	MD-121	3.48	0.96	1.00	0.97	0.92	0.89	1.06	1.36	1.44	1.32	1.05	0.99	0.98	0.99	0.96	0.96	0.96	0.97	0.98	0.98	0.97	0.94	0.95	0.93	0.95	
I-270	MD-121	0.14	0.97	1.01	0.97	0.94	0.91	0.92	0.99	1.22	1.28	0.94	0.93	0.94	0.94	0.93	0.94	0.94	0.93	0.94	0.94	0.96	0.95	0.96	0.95	0.96	
I-270	FATHER HURLEY BLVD/EXIT 16	2.34	0.97	1.00	0.98	0.95	0.92	0.92	0.98	2.04	2.53	1.09	0.94	0.94	0.95	0.94	0.95	0.94	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.96	
I-270	FATHER HURLEY BLVD/EXIT 16	0.63	0.96	0.99	0.96	0.94	0.90	0.91	0.99	3.33	3.91	1.39	0.94	0.94	0.94	0.94	0.95	0.94	0.95	0.95	0.95	0.95	0.94	0.94	0.94	0.95	
I-270	MD-118/EXIT 15	0.52	0.97	0.99	0.96	0.94	0.90	0.92	1.08	2.88	3.42	1.38	0.95	0.96	0.96	0.95	0.96	0.95	0.96	0.97	0.97	0.97	0.96	0.96	0.95	0.96	
I-270	MD-118/EXIT 15	0.46	0.97	0.99	0.96	0.94	0.90	0.93	1.12	2.81	3.33	1.43	0.96	0.95	0.96	0.96	0.96	0.96	0.96	0.98	0.97	0.98	0.96	0.96	0.94	0.95	
I-270	MIDDLEBROOK RD/EXIT 13	0.51	0.97	0.99	0.96	0.94	0.90	0.92	1.05	2.13	2.46	1.28	0.97	0.96	0.97	0.96	0.97	0.97	0.98	1.00	0.99	0.97	0.96	0.95	0.94	0.95	
I-270	MIDDLEBROOK RD/EXIT 13	0.27	0.96	0.99	0.96	0.94	0.91	0.91	1.02	1.69	1.96	1.16	0.96	0.96	0.97	0.96	0.97	0.97	0.97	0.99	0.98	0.96	0.95	0.94	0.94	0.94	
I-270	MD-124/QUINCE ORCHARD RD/EXIT 11	1.98	0.96	0.98	0.96	0.93	0.90	0.90	1.01	1.96	2.31	1.19	0.94	0.94	0.94	0.93	0.94	0.94	0.94	0.96	0.95	0.95	0.94	0.94	0.94	0.94	
I-270	MD-124/QUINCE ORCHARD RD/EXIT 11	0.29	0.98	1.00	0.98	0.94	0.90	0.93	1.13	2.27	2.50	1.34	0.97	0.97	0.97	0.97	0.97	0.97	0.98	1.00	0.99	0.98	0.97	0.96	0.96	0.96	
I-270	MD-117/EXIT 10	0.59	0.97	1.00	0.98	0.93	0.89	0.93	1.11	1.58	1.70	1.18	0.98	0.97	0.98	0.97	0.98	0.98	0.99	1.00	1.00	1.00	0.98	0.96	0.96	0.96	
I-270	MD-117/EXIT 10	0.26	0.97	1.00	0.98	0.93	0.89	0.92	1.06	1.40	1.49	1.11	0.96	0.96	0.97	0.96	0.97	0.97	0.99	1.00	0.99	1.00	0.98	0.96	0.96	0.95	
I-270	I-370/SAM EIG HWY/EXIT 9	0.82	0.96	0.99	0.97	0.92	0.89	0.90	1.02	1.21	1.25	1.04	0.95	0.95	0.95	0.95	0.96	0.96	0.98	1.00	0.97	0.97	0.96	0.95	0.94	0.94	
I-270	I-370/SAM EIG HWY/EXIT 9	0.88	0.98	1.00	0.99	0.95	0.90	0.91	0.99	1.19	1.33	1.02	0.95	0.94	0.95	0.94	0.94	0.94	0.94	0.94	0.95	0.95	0.95	0.94	0.95	0.96	
I-270	SHADY GROVE RD/EXIT 8	0.22	0.98	1.00	0.98	0.95	0.91	0.91	1.01	1.51	1.88	1.11	0.96	0.96	0.96	0.95	0.95	0.95	0.94	0.95	0.96	0.97	0.97	0.96	0.96	0.97	
I-270	SHADY GROVE RD/EXIT 8	0.50	1.00	1.01	0.99	0.97	0.92	0.93	1.04	1.58	2.08	1.22	0.97	0.97	0.97	0.97	0.98	0.96	0.96	0.97	0.97	0.99	0.98	0.97	0.97	0.98	
I-270	MD-28/MONTGOMERY AVE/EXIT 6	1.34	0.98	1.00	0.99	0.96	0.92	0.92	1.02	1.57	2.28	1.46	0.96	0.95	0.95	0.95	0.95	0.95	0.94	0.95	0.95	0.96	0.96	0.96	0.96	0.97	
I-270	MD-28/MONTGOMERY AVE/EXIT 6	0.61	0.96	0.99	0.97	0.94	0.90	0.90	1.03	1.43	1.79	1.58	0.98	0.95	0.95	0.94	0.95	0.94	0.93	0.95	0.94	0.95	0.95	0.94	0.95	0.95	
I-270	MD-189/FALLS RD/EXIT 5	0.52	0.98	1.01	1.00	0.96	0.91	0.92	1.04	1.14	1.34	1.42	1.09	1.00	0.98	0.97	0.98	0.96	0.95	0.96	0.95	0.97	0.96	0.96	0.96	0.96	
I-270	MD-189/FALLS RD/EXIT 5	0.56	0.98	1.00	0.99	0.96	0.91	0.92	1.06	1.10	1.39	1.18	1.03	0.98	0.97	0.97	0.98	0.95	0.94	0.95	0.94	0.96	0.96	0.95	0.96	0.96	
I-270	MONTROSE RD/EXIT 4	0.66	0.97	1.00	0.99	0.96	0.92	0.92	1.09	1.16	1.40	1.15	0.96	0.96	0.96	0.95	0.96	0.94	0.94	0.94	0.95	0.95	0.95	0.95	0.96	0.96	
I-270	MONTROSE RD/EXIT 4	0.92	0.98	1.01	1.00	0.97	0.93	0.93	1.10	1.17	1.23	1.06	0.97	0.97	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.95	0.96	0.96	
I-270	I-270 (SPUR)	0.89	0.97	0.99	0.98	0.95	0.91	0.91	0.98	1.07	1.30	1.04	0.97	0.97	0.96	0.96	0.96	0.95	0.95	0.96	0.95	0.95	0.95	0.95	0.95	0.95	
I-270	I-270-SPUR	0.53	1.01	1.04	1.03	1.02	0.92	0.92	0.99	1.08	1.20	1.05	0.98	0.98	0.98	0.98	0.98	0.97	0.97	0.98	0.98	0.99	0.98	0.97	0.97	0.98	
I-270	MD-187/OLD GEORGETOWN RD/EXIT 1	0.50	1.02	1.06	1.04	1.04	0.93	0.92	0.98	1.07	1.06	1.02	0.96	0.96	0.96	0.96	0.96	0.95	0.95	0.96	0.96	0.98	0.98	0.97	0.97	0.97	
I-270	MD-187/OLD GEORGETOWN RD/EXIT 1	0.27	1.02	1.05	1.03	1.04	0.94	0.92	0.99	1.07	1.07	1.03	0.97	0.98	0.97	0.98	0.97	0.97	0.97	0.97	0.97	1.00	1.00	0.98	0.99	0.99	
I-270	I-495/MD-355	1.18	0.98	1.03	1.01	1.01	0.91	0.90	0.96	1.04	1.17	1.08	0.95	0.95	0.95	0.96	0.96	0.97	0.97	0.98	0.97	0.96	0.95	0.93	0.94	0.94	
I-270	I-495/MD-355	0.28	1.02	1.05	1.04	1.02	0.93	0.92	1.03	1.27	1.60	1.29	1.03	1.03	1.02	1.09	1.22	1.69	1.86	1.81	1.52	1.12	1.03	0.99	0.99	0.99	
I-270-SPUI	I-270	0.57	0.98	1.00	0.99	0.95	0.91	0.92	0.98	1.23	2.22	1.47	0.98	0.98	0.98	0.98	0.99	0.98	0.98	0.99	0.98	0.98	0.97	0.96	0.96	0.96	
I-270-SPUI	DEMOCRACY BLVD	0.16	0.98	0.99	0.98	0.94	0.91	0.91	0.97	1.37	2.52	1.81	1.00	0.98	0.97	0.98	0.99	0.98	0.98	1.05	1.00	0.97	0.96	0.95	0.95	0.95	
I-270-SPUI	DEMOCRACY BLVD	0.44	0.97	0.99	1.00	0.95	0.92	0.92	0.96	1.75	3.07	2.58	1.25	0.96	0.95	0.96	0.97	0.97	1.00	1.65	1.35	0.95	0.95	0.95	0.95	0.95	
I-270-SPUI	I-495	0.26	0.97	0.98	0.98	0.95	0.91	0.93	1.06	1.72	2.34	2.22	1.54	1.19	1.01	1.00	1.11	1.23	2.03	2.98	2.82	1.00	0.98	0.97	0.96	0.96	
I-270-SPUI	I-495	0.53	0.97	0.98	0.99	0.95	0.91	0.92	1.01	1.98	2.94	2.69	1.69	1.06	0.97	0.97	0.99	1.05	1.42	2.82	2.49	0.98	0.96	0.96	0.96	0.96	
	Weighted TTI	34.88	0.97	1.00	0.98	0.94	0.90	0.98	1.38	1.86	1.69	1.16	0.99	0.97	0.96	0.96	0.96	0.96	0.98	1.02	1.01	0.97	0.95	0.95	0.94	0.96	Daily Avg
	Weighted Average TTI Both Directions	69.45	0.96	0.98	0.98	0.96	0.93	0.96	1.17	1.42	1.35	1.06	0.98	0.98	0.98	1.00	1.01	1.15	1.21	1.25	1.14	1.00	0.96	0.95	0.94	0.95	**1.05**
	Max Observed TTI Both Directions		1.02	1.06	1.04	1.04	1.04	1.25	3.09	4.61	3.91	2.69	1.69	1.35	1.49	1.75	1.58	2.57	2.63	3.26	3.05	1.23	1.03	1.00	1.00	1.03	

Travel time index for I-270 between I-495/MD-355 and I-70/US-40 and I-270-SPUR using INRIX data - Northbound

October 2021 (Every Tuesday, Wednesday, and Thursday)

Road	Segment	Miles	12:00 AM	1:00 AM	2:00 AM	3:00 AM	4:00 AM	5:00 AM	6:00 AM	7:00 AM	8:00 AM	9:00 AM	10:00 AM	11:00 AM	12:00 PM	1:00 PM	2:00 PM	3:00 PM	4:00 PM	5:00 PM	6:00 PM	7:00 PM	8:00 PM	9:00 PM	10:00 PM	11:00 PM
I-270	I-495/MD-355	0.19	0.97	1.00	1.02	0.98	0.93	0.94	1.02	1.06	1.11	1.12	1.06	1.07	1.05	1.09	1.15	1.30	1.40	1.58	1.36	1.15	1.03	0.99	0.98	0.97
I-270	MD-187/OLD GEORGETOWN RD/EXIT 1	1.21	0.95	0.99	1.02	1.00	0.94	0.92	0.96	0.97	0.98	0.98	0.96	0.96	0.95	0.96	0.96	1.01	1.07	1.28	1.13	1.00	0.95	0.95	0.94	0.95
I-270	MD-187/OLD GEORGETOWN RD/EXIT 1	0.26	0.98	1.00	1.04	1.03	0.99	0.95	0.98	0.98	0.98	0.99	0.97	0.97	0.96	0.97	0.98	1.01	1.10	1.34	1.27	1.01	0.96	0.97	0.96	0.96
I-270	I-270 (SPUR)	0.56	0.97	1.00	1.03	1.04	0.99	0.94	0.97	0.98	0.98	0.99	0.97	0.97	0.96	0.96	0.97	1.02	1.14	1.47	1.37	0.99	0.95	0.96	0.96	0.95
I-270	I-270-SPUR	0.56	0.97	0.99	1.01	1.03	0.96	0.92	0.96	0.98	1.00	0.99	0.98	0.98	0.98	0.98	1.01	1.21	1.36	1.77	1.69	1.05	0.99	0.98	0.96	0.95
I-270	MONTROSE RD/EXIT 4	0.83	0.95	0.96	0.98	0.97	0.95	0.93	0.96	0.97	0.98	0.97	0.97	0.97	0.97	0.97	0.99	1.11	1.16	1.38	1.36	1.02	0.96	0.96	0.94	0.94
I-270	MONTROSE RD/EXIT 4	0.82	0.95	0.96	0.97	0.96	0.94	0.92	0.93	0.93	0.94	0.94	0.94	0.94	0.93	0.93	0.94	1.06	1.16	1.48	1.32	0.96	0.93	0.92	0.92	0.93
I-270	MD-189/FALLS RD/EXIT 5	0.73	0.96	0.96	0.97	0.97	0.94	0.93	0.95	0.94	0.94	0.94	0.95	0.95	0.94	0.94	0.94	1.03	1.11	1.21	1.10	0.97	0.94	0.93	0.92	0.94
I-270	MD-189/FALLS RD/EXIT 5	0.55	0.95	0.96	0.97	0.97	0.94	0.92	0.94	0.93	0.94	0.94	0.95	0.94	0.94	0.94	0.95	1.01	1.06	1.13	1.05	0.97	0.93	0.93	0.92	0.93
I-270	MD-28/MONTGOMERY AVE/EXIT 6	0.53	0.96	0.97	0.98	0.98	0.95	0.93	0.95	0.94	0.95	0.95	0.96	0.96	0.95	0.96	0.99	1.03	1.10	1.14	1.08	0.97	0.94	0.94	0.93	0.94
I-270	MD-28/MONTGOMERY AVE/EXIT 6	0.60	0.97	0.97	0.98	0.97	0.97	0.95	0.95	0.95	0.95	0.96	0.96	0.96	0.96	0.97	0.98	1.02	1.11	1.12	1.07	0.98	0.96	0.95	0.94	0.96
I-270	SHADY GROVE RD/EXIT 8	1.41	1.01	1.01	1.00	1.01	1.01	1.00	0.98	0.98	0.97	0.98	0.99	0.99	0.99	0.97	0.96	0.99	1.09	1.25	1.15	1.01	0.98	0.99	0.98	1.00
I-270	SHADY GROVE RD/EXIT 8	0.39	1.01	1.05	1.03	1.01	1.03	1.02	0.98	0.96	0.95	0.97	0.96	0.95	0.95	0.93	0.92	0.96	1.10	1.38	1.29	0.96	0.94	0.97	0.95	1.02
I-270	I-370/SAM EIG HWY/EXIT 9	0.27	1.01	1.06	1.04	1.01	1.04	1.03	0.99	0.95	0.96	0.97	0.95	0.94	0.95	0.93	0.92	0.97	1.14	1.49	1.35	0.96	0.93	0.98	0.96	1.03
I-270	I-370/SAM EIG HWY/EXIT 9	1.10	1.00	1.03	1.03	1.02	1.03	1.00	0.98	0.96	0.95	0.95	0.95	0.95	0.93	0.93	0.93	0.98	1.26	1.66	1.46	0.98	0.92	0.95	0.95	0.99
I-270	MD-117/EXIT 10	0.56	0.95	0.96	0.96	0.97	0.96	0.94	0.96	0.96	0.97	0.96	0.96	0.96	0.94	0.95	0.95	1.10	1.47	2.00	1.62	1.01	0.96	0.95	0.93	0.94
I-270	MD-117/EXIT 10	0.28	0.96	0.98	0.98	0.98	0.98	0.95	0.96	0.95	0.96	0.96	0.96	0.95	0.95	0.95	0.95	1.18	1.57	2.29	1.81	1.00	0.95	0.95	0.94	0.95
I-270	MD-124/QUINCE ORCHARD RD/EXIT 11	0.43	0.95	0.98	0.98	0.98	0.98	0.94	0.95	0.95	0.95	0.95	0.95	0.94	0.94	0.94	0.94	1.31	1.87	2.69	2.28	1.01	0.95	0.95	0.94	0.94
I-270	MD-124/QUINCE ORCHARD RD/EXIT 11	0.81	0.95	0.97	0.98	0.97	0.97	0.94	0.95	0.94	0.94	0.95	0.95	0.95	0.94	0.94	0.94	1.72	2.55	3.26	3.05	1.12	0.94	0.94	0.93	0.94
I-270	MIDDLEBROOK RD/EXIT 13	1.70	0.93	0.96	0.97	0.95	0.95	0.93	0.94	0.94	0.94	0.95	0.95	0.95	0.95	0.94	0.97	1.46	1.69	1.84	1.99	1.23	0.95	0.94	0.92	0.92
I-270	MIDDLEBROOK RD/EXIT 13	0.21	0.93	0.96	0.98	0.95	0.96	0.92	0.94	0.95	0.93	0.95	0.95	0.95	0.95	0.94	0.96	1.13	1.15	1.16	1.19	1.04	0.96	0.95	0.93	0.93
I-270	MD-118/EXIT 15	0.46	0.94	0.96	0.97	0.95	0.95	0.93	0.94	0.95	0.94	0.95	0.95	0.95	0.95	0.95	0.98	1.15	1.20	1.18	1.16	1.02	0.96	0.95	0.93	0.93
I-270	MD-118/EXIT 15	0.54	0.94	0.96	0.96	0.95	0.95	0.93	0.94	0.95	0.93	0.95	0.95	0.95	0.95	0.96	0.98	1.16	1.14	1.17	1.13	1.02	0.96	0.95	0.93	0.93
I-270	FATHER HURLEY BLVD/EXIT 16	0.42	0.95	0.97	0.96	0.95	0.95	0.93	0.94	0.95	0.94	0.95	0.95	0.95	0.95	0.95	0.96	1.04	1.06	1.13	1.08	1.00	0.96	0.95	0.93	0.94
I-270	FATHER HURLEY BLVD/EXIT 16	0.57	0.95	0.96	0.96	0.95	0.95	0.93	0.94	0.94	0.93	0.94	0.94	0.96	0.94	0.94	0.93	0.98	1.12	1.18	1.04	0.95	0.93	0.93	0.93	0.93
I-270	MD-121	2.19	0.95	0.96	0.97	0.96	0.95	0.93	0.93	0.95	0.94	0.95	0.95	0.95	0.94	0.96	1.01	1.20	1.41	1.20	1.02	0.96	0.92	0.92	0.92	0.93
I-270	MD-121	0.18	0.96	0.97	0.98	0.98	0.97	0.94	0.95	0.97	0.95	0.95	0.96	0.96	0.95	1.17	1.30	1.88	2.12	1.52	1.07	0.99	0.94	0.94	0.94	0.94
I-270	MD-109/EXIT 22	3.91	0.96	0.96	0.97	0.97	0.97	0.94	0.95	0.98	0.96	0.96	0.97	1.09	1.25	1.53	1.37	1.99	2.20	1.75	1.24	1.03	0.94	0.94	0.94	0.94
I-270	MD-109/EXIT 22	0.15	0.95	0.95	0.96	0.97	0.96	0.93	0.96	0.97	0.97	1.03	0.97	1.35	1.46	1.45	1.09	1.56	1.58	1.18	1.06	1.07	0.95	0.94	0.94	0.93
I-270	MD-80/EXIT 26	3.57	0.95	0.95	0.96	0.96	0.95	0.93	0.95	0.96	1.23	0.98	0.96	1.02	1.05	1.08	1.02	1.28	1.27	1.19	1.02	1.05	1.01	0.94	0.93	0.93
I-270	MD-80/EXIT 26	0.10	0.97	0.97	0.98	0.97	0.97	0.96	0.98	1.03	1.42	1.03	0.97	0.98	0.98	0.99	1.07	1.36	1.24	1.23	1.05	1.08	1.00	0.98	0.96	0.95
I-270	MD-85/EXIT 31	4.82	0.96	0.96	0.96	0.96	0.95	0.94	0.96	1.06	1.02	0.97	0.96	0.97	0.97	0.98	1.13	1.42	1.35	1.28	1.05	1.04	0.99	0.98	0.96	0.96
I-270	MD-85/EXIT 31	0.37	0.99	0.99	0.97	0.96	0.94	0.92	0.97	1.01	1.01	1.01	1.01	1.05	1.05	1.05	1.12	1.29	1.39	1.37	1.11	1.10	1.01	1.00	1.00	0.98
I-270	I-70/US-40	0.53	0.95	0.94	0.95	0.94	0.94	0.90	0.93	0.96	0.96	0.95	0.95	0.97	0.97	0.96	0.97	1.23	1.21	1.28	1.01	0.99	0.94	0.93	0.93	0.92
I-270	I-70/US-40	0.74	0.96	1.00	1.01	0.98	0.99	0.96	0.97	1.10	1.24	0.94	0.94	1.00	0.97	0.94	1.04	2.57	2.63	2.71	1.24	0.97	0.94	0.93	0.93	0.93
I-270-SPUI	DEMOCRACY BLVD	0.53	0.95	0.97	0.98	0.97	0.94	0.93	0.95	0.96	0.98	1.03	1.04	1.02	1.12	1.18	1.19	1.14	1.29	1.27	1.24	1.04	0.96	0.95	0.94	0.95
I-270-SPUI	I-495	0.18	0.95	0.96	0.97	0.97	0.94	0.93	0.95	0.96	0.97	1.17	1.14	1.06	1.49	1.75	1.58	1.22	1.39	1.37	1.28	1.04	0.96	0.95	0.94	0.94
I-270-SPUI	DEMOCRACY BLVD	0.42	0.95	0.97	0.98	0.99	0.95	0.94	0.95	0.96	0.97	0.99	1.02	1.02	1.06	1.16	1.17	1.24	1.36	1.35	1.31	1.04	0.97	0.95	0.94	0.94
I-270-SPUI	I-270	0.16	0.94	0.97	0.98	0.98	0.95	0.93	0.94	0.96	0.97	0.98	1.02	1.02	1.05	1.10	1.11	1.25	1.31	1.34	1.32	1.05	0.97	0.95	0.94	0.94
I-270-SPUI	I-270	0.73	0.93	0.97	0.97	0.97	0.94	0.92	0.93	0.95	0.95	0.96	0.97	0.97	0.97	0.98	1.01	1.12	1.12	1.22	1.28	1.01	0.95	0.94	0.93	0.94
	Weighted TTI	34.57	0.96	0.97	0.98	0.97	0.96	0.94	0.95	0.98	1.00	0.97	0.96	0.99	1.01	1.05	1.06	1.33	1.45	1.48	1.27	1.03	0.96	0.95	0.94	0.95

ATTACHMENT 2A:

FHWA Traffic Volume Trends, November 2021

U. S. Department
of Transportation

Federal Highway Administration

Office of Highway
Policy Information

TRAFFIC VOLUME TRENDS

November 2021

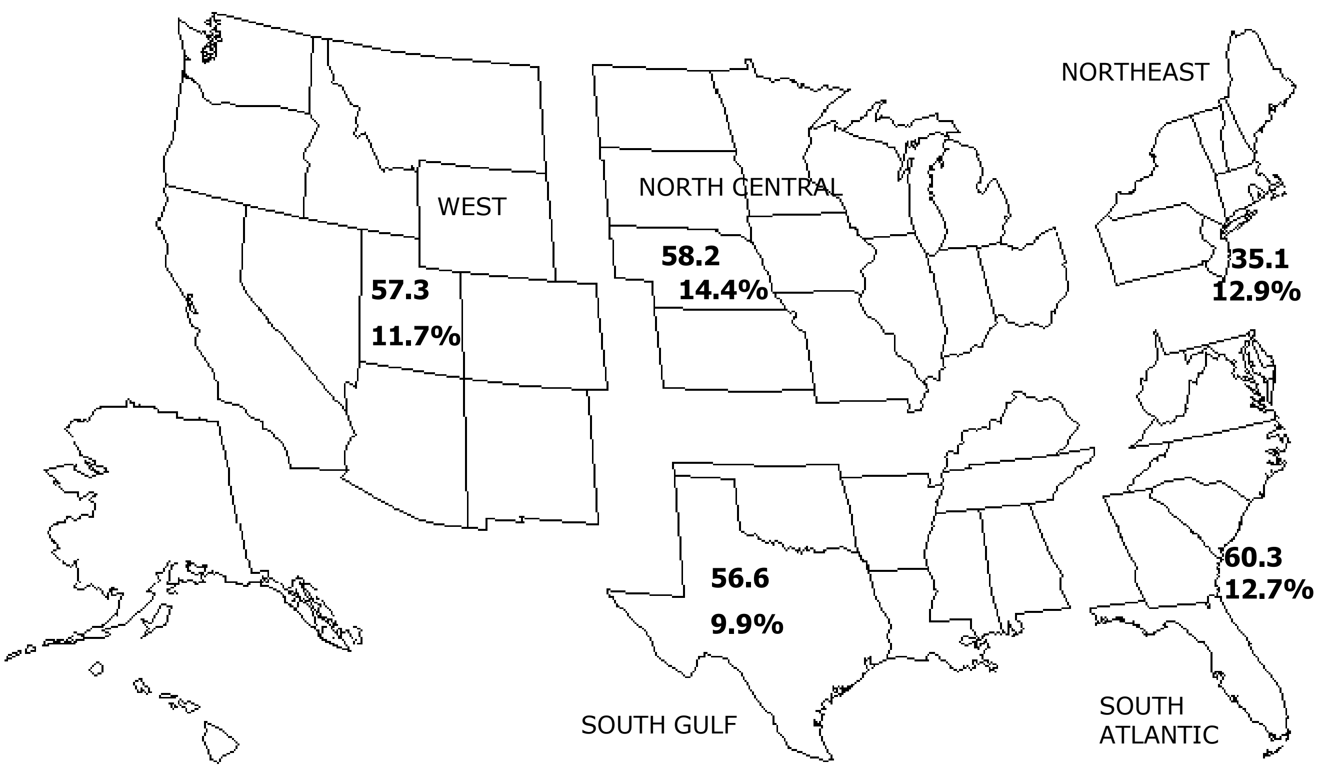
Travel on all roads and streets changed by **+12.3%** (+29.2 billion vehicle miles) for November 2021 as compared with November 2020. Travel for the month is estimated to be 267.5 billion vehicle miles.

The seasonally adjusted vehicle miles traveled for November 2021 is 279.4 billion miles, a **+11.3%** (+28.3 billion vehicle miles) increase over November 2020. It also represents a **+1.6%** increase (+4.4 billion vehicle miles) compared with October 2021

Cumulative Travel for 2021 changed by **+11.2%** (+298.1 billion vehicle miles). The Cumulative estimate for the year is 2,960.3 billion vehicle miles of travel.

Estimated Vehicle-Miles of Travel by Region - November 2021 - (in Billions)

Change in Traffic as compared to same month last year.



Note: All data for this month are preliminary. Revised values for the previous month are shown in Tables 1 and 2.

All vehicle-miles of travel computed with Highway Statistics 2020 Table VM-2 as a base.

Compiled with data on hand as of January 10, 2022.

Some historical data were revised based on HPMS and amended TVT data as of December 2020.
For information on total licensed drivers in the U.S. visit http://www.fhwa.dot.gov/policy/ohpi/hss/hsspubs.htm.
Select the year of interest then Section 6 (Driver Licensing).
For information on total registered motor vehicles in the U.S., visit http://www.fhwa.dot.gov/policy/ohpi/hss/hsspubs.htm
Select the year of interest and Section 7 (Motor Vehicles).

Traffic Volume Trends - November 2021

Based on preliminary reports from the State Highway Agencies, travel during November 2021 on all roads and streets in the nation changed by **+12.3%** (+29.2 billion vehicle miles) resulting in estimated travel for the month at **267.5**** billion vehicle-miles.

This total includes **83.3** billion vehicle-miles on rural roads and **184.2** billion vehicle-miles on urban roads and streets.

Cumulative Travel changed by **+11.2%** (+298.1 billion vehicle miles).

The larger changes to rural and urban travel are primarily because of the expansion in urban boundaries reflected in the 2010 census. Travel estimates for 2014 and beyond will also reflect this adjustment.

Travel for the current month, the cumulative yearly total, as well as the moving 12-month total on all roads and streets is shown below. Similar totals for each year since 1996 are also included.

Travel in Millions of Vehicle Miles

All Roads and Streets

Year	November	Year to Date	Moving 12-Month
1996	199,643	2,280,740	2,474,081
1997	202,422	2,353,051	2,554,513
1998	211,178	2,409,060	2,616,382
1999	221,856	2,457,994	2,674,296
2000	222,819	2,528,536	2,750,001
2001	230,511	2,566,027	2,784,417
2002	230,648	2,621,249	2,850,833
2003	233,698	2,651,684	2,885,944
2004	239,796	2,719,760	2,958,298
2005	243,056	2,743,643	2,988,672
2006	245,346	2,765,929	3,011,716
2007	245,787	2,789,541	3,037,728
2008	236,465	2,731,767	2,972,049
2009	237,264	2,717,170	2,958,912
2010	239,579	2,726,466	2,966,059
2011	238,535	2,705,592	2,946,392
2012	240,361	2,729,860	2,974,670
2013	240,055	2,747,043	2,985,753
2014	241,451	2,773,385	3,014,622
2015	248,843	2,835,949	3,088,219
2016	255,154	2,909,630	3,169,054
2017	258,159	2,944,389	3,209,167
2018	260,473	2,969,956	3,237,915
2019	260,326	3,000,015	3,270,385
2020	238,300	2,662,171	2,923,927
2021	267,512	2,960,303	3,201,754

Traffic Volume Trends is a monthly report based on hourly traffic count data. These data, collected at approximately 5,000 continuous traffic counting locations nationwide, are used to determine the percent change in traffic for the current month compared to the same month in the previous year. This percent change is applied to the travel for the same month of the previous year to obtain an estimate of travel for the current month.Because of the limited sample sizes, caution should be used with these estimates. The Highway Performance Monitoring System provides more accurate information on an annual basis.

** System entries may not add to give "All Systems" total due to rounding for Page 2 to 8.

Table - 1. Estimated Individual Monthly Motor Vehicle Travel in the United States**

System	Month											
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2020 Individual Monthly Vehicle-Miles of Travel in Billions												
Rural Interstate	19.6	18.3	18.0	12.2	17.4	20.5	22.3	22.1	20.9	21.6	19.6	19.5
Rural Other Arterial	29.8	27.8	27.0	20.6	27.6	31.4	33.4	33.2	31.9	32.6	28.7	28.7
Other Rural	26.4	24.4	23.9	19.5	25.6	28.6	30.7	30.1	29.0	29.5	25.9	25.4
Urban Interstate	46.8	43.4	39.3	27.3	36.0	41.7	44.5	44.2	43.6	45.5	41.3	41.8
Urban Other Arterial	93.9	87.5	79.9	58.9	76.6	86.2	90.8	91.9	89.0	92.8	83.2	84.8
Other Urban	44.3	41.3	38.5	29.2	37.8	42.0	43.9	43.6	43.1	44.5	39.7	41.2
All Systems	260.8	242.7	226.6	167.6	221.0	250.3	265.5	265.1	257.5	266.6	238.3	241.5
2021 Individual Monthly Vehicle-Miles of Travel in Billions												
Rural Interstate	18.3	16.4	21.9	20.9	24.0	24.7	26.5	24.5	22.9	23.7	22.7	
Rural Other Arterial	27.5	24.9	32.5	31.6	34.7	35.4	36.9	35.4	33.9	34.7	32.1	
Other Rural	24.4	22.1	28.6	28.4	31.4	31.6	33.4	31.8	30.5	31.0	28.4	
Urban Interstate	40.1	37.2	47.2	44.8	48.6	49.4	50.6	48.8	47.8	49.5	46.9	
Urban Other Arterial	81.7	76.3	94.2	90.4	98.1	98.2	100.7	99.7	96.3	99.3	92.8	
Other Urban	39.0	36.1	45.1	44.1	47.8	47.6	48.4	47.2	46.5	47.6	44.5	
All Systems	231.0	213.0	269.5	260.3	284.5	286.9	296.5	287.4	278.0	285.8	267.5	
* Percent Change In Individual Monthly Travel 2020 vs. 2021												
Rural Interstate	-6.8	-10.5	22.0	72.1	38.1	20.5	18.9	11.1	9.4	9.7	16.1	
Rural Other Arterial	-7.8	-10.5	20.2	53.5	25.5	12.9	10.5	6.5	6.4	6.5	11.8	
Other Rural	-7.3	-9.3	19.6	45.9	22.2	10.5	8.7	5.5	5.2	5.0	10.0	
Urban Interstate	-14.3	-14.4	19.9	64.1	34.9	18.6	13.8	10.4	9.5	8.8	13.7	
Urban Other Arterial	-13.0	-12.8	17.9	53.4	28.1	14.0	10.9	8.5	8.2	6.9	11.5	
Other Urban	-11.9	-12.5	17.3	51.2	26.5	13.2	10.1	8.3	8.1	6.9	12.2	
All Systems	-11.4	-12.2	18.9	55.3	28.7	14.6	11.6	8.4	7.9	7.2	12.3	

Table - 2. Estimated Cumulative Monthly Motor Vehicle Travel in the United States**

System	Month											
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2020 Cumulative Monthly Vehicle-Miles of Travel in Billions												
Rural Interstate	19.6	37.9	55.9	68.0	85.4	105.9	128.2	150.2	171.1	192.7	212.3	231.8
Rural Other Arterial	29.8	57.6	84.7	105.3	132.9	164.3	197.7	230.9	262.8	295.4	324.1	352.8
Other Rural	26.4	50.7	74.6	94.1	119.7	148.3	179.0	209.1	238.2	267.7	293.5	319.0
Urban Interstate	46.8	90.3	129.6	156.9	193.0	234.6	279.1	323.3	366.9	412.4	453.7	495.4
Urban Other Arterial	93.9	181.4	261.3	320.3	396.8	483.0	573.8	665.7	754.7	847.6	930.8	1015.6
Other Urban	44.3	85.6	124.0	153.2	191.0	233.0	276.9	320.5	363.6	408.1	447.8	489.1
All Systems	260.8	503.5	730.2	897.8	1118.8	1369.1	1634.7	1899.7	2157.3	2423.9	2662.2	2903.6
2021 Cumulative Monthly Vehicle-Miles of Travel in Billions												
Rural Interstate	18.3	34.7	56.6	77.5	101.5	126.2	152.7	177.2	200.1	223.7	246.5	
Rural Other Arterial	27.5	52.4	84.9	116.5	151.2	186.6	223.5	258.9	292.8	327.5	359.6	
Other Rural	24.4	46.5	75.1	103.5	134.9	166.4	199.8	231.6	262.1	293.1	321.5	
Urban Interstate	40.1	77.3	124.5	169.3	217.9	267.3	317.9	366.7	414.5	464.0	510.9	
Urban Other Arterial	81.7	158.0	252.2	342.6	440.7	538.9	639.7	739.4	835.7	935.0	1027.8	
Other Urban	39.0	75.1	120.2	164.3	212.1	259.8	308.1	355.4	401.9	449.5	494.0	
All Systems	231.0	444.0	713.5	973.8	1258.3	1545.2	1841.7	2129.1	2407.0	2692.8	2960.3	
* Percent Change In Cumulative Monthly Travel 2020 vs. 2021												
Rural Interstate	-6.8	-8.6	1.3	13.9	18.8	19.2	19.1	17.9	16.9	16.1	16.1	
Rural Other Arterial	-7.8	-9.1	0.2	10.7	13.7	13.6	13.1	12.1	11.4	10.9	11.0	
Other Rural	-7.3	-8.3	0.7	10.0	12.6	12.2	11.6	10.7	10.1	9.5	9.5	
Urban Interstate	-14.3	-14.3	-4.0	7.9	12.9	13.9	13.9	13.4	13.0	12.5	12.6	
Urban Other Arterial	-13.0	-12.9	-3.5	7.0	11.1	11.6	11.5	11.1	10.7	10.3	10.4	
Other Urban	-11.9	-12.2	-3.1	7.3	11.1	11.5	11.3	10.9	10.5	10.1	10.3	
All Systems	-11.4	-11.8	-2.3	8.5	12.5	12.9	12.7	12.1	11.6	11.1	11.2	

* Percent change is based on vehicle travel in millions of miles.

Table - 3. Changes on Rural Arterial Roads by Region and State**

Region and State	November				October			
	Number of Stations	Vehicle-Miles (Millions)		Percent Change	Number of Stations	Vehicle-Miles (Millions)		Percent Change
		2021 (Preliminary)	2020			2021 (Revised)	2020	
Northeast								
Connecticut	2	141	121	16.7	2	169	152	11.5
Maine	60	425	375	13.4	61	523	478	9.5
Massachusetts	15	133	110	20.2	15	156	139	12.4
New Hampshire	76	272	236	15.5	73	326	296	10.2
New Jersey	4	246	221	11.2	18	271	244	11.2
New York	49	1,006	893	12.7	47	1,169	1,079	8.3
Pennsylvania	44	1,924	1,670	15.2	43	2,115	1,955	8.2
Rhode Island	7	62	49	27.0	7	70	59	18.5
Vermont	25	211	180	17.3	26	257	232	11.1
Subtotal		**4,420**	**3,855**	**14.7**		**5,056**	**4,634**	**9.1**
South Atlantic								
Delaware	4	106	90	17.2	2	101	101	0.1
District of Columbia	-	0	0	0.0	-	0	0	0.0
Florida	104	2,454	2,141	14.6	101	2,423	2,191	10.6
Georgia	52	1,815	1,660	9.3	53	1,880	1,754	7.2
Maryland	6	576	449	28.2	4	558	524	6.5
North Carolina	35	1,887	1,691	11.6	34	1,980	1,833	8.0
South Carolina	48	1,562	1,392	12.2	52	1,621	1,503	7.8
Virginia	320	1,886	1,647	14.5	310	1,954	1,799	8.7
West Virginia	18	454	410	10.6	17	485	468	3.5
Subtotal		**10,740**	**9,480**	**13.3**		**11,002**	**10,173**	**8.1**
North Central								
Illinois	36	1,473	1,277	15.3	36	1,594	1,479	7.8
Indiana	24	1,445	1,267	14.1	23	1,577	1,469	7.3
Iowa	82	1,158	981	18.0	79	1,260	1,161	8.5
Kansas	68	905	807	12.1	69	968	915	5.8
Michigan	57	1,547	1,358	14.0	55	1,763	1,680	4.9
Minnesota	30	1,290	1,099	17.4	29	1,478	1,325	11.5
Missouri	86	1,717	1,501	14.4	82	1,779	1,639	8.5
Nebraska	38	725	631	14.9	38	803	747	7.5
North Dakota	54	334	290	15.2	53	375	340	10.3
Ohio	55	1,607	1,400	14.7	56	1,741	1,613	8.0
South Dakota	39	449	390	15.3	36	523	459	14.0
Wisconsin	106	1,424	1,209	17.8	87	1,628	1,473	10.5
Subtotal		**14,074**	**12,210**	**15.3**		**15,489**	**14,300**	**8.3**
South Gulf								
Alabama	71	1,461	1,349	8.3	67	1,545	1,444	7.0
Arkansas	18	956	882	8.4	21	968	937	3.4
Kentucky	25	1,534	1,342	14.2	30	1,601	1,512	5.9
Louisiana	17	1,099	1,003	9.5	16	1,100	1,019	7.9
Mississippi	48	1,254	1,161	8.0	49	1,315	1,232	6.7
Oklahoma	34	1,234	1,107	11.5	34	1,277	1,174	8.8
Tennessee	25	1,629	1,506	8.1	25	1,737	1,632	6.4
Texas	142	5,112	4,485	14.0	136	5,314	4,781	11.1
Subtotal		**14,279**	**12,835**	**11.3**		**14,857**	**13,731**	**8.2**
West								
Alaska	40	84	74	12.6	42	95	95	0.1
Arizona	74	1,220	1,081	12.8	66	1,206	1,157	4.2
California	69	3,954	3,517	12.4	57	3,998	3,828	4.4
Colorado	72	976	844	15.6	69	1,106	1,042	6.1
Hawaii	12	78	65	20.6	11	73	60	21.8
Idaho	124	564	486	16.1	112	628	598	5.0
Montana	67	502	431	16.6	68	587	524	12.1
Nevada	39	393	349	12.8	41	411	412	-0.3
New Mexico	19	896	729	23.0	15	946	822	15.1
Oregon	100	814	729	11.7	90	887	865	2.6
Utah	-	541	474	14.3	-	598	576	4.0
Washington	79	938	801	17.0	66	1,016	937	8.4
Wyoming	99	363	324	12.0	99	428	429	-0.2
Subtotal		**11,323**	**9,904**	**14.3**		**11,979**	**11,345**	**5.6**
TOTALS	**2,718**	**54,835**	**48,286**	**13.6**	**2,622**	**58,383**	**54,182**	**7.8**

Note: Where Number of Stations are shown as dashes, the values for the Vehicle-Miles and Percent Change are derived from the estimated VMT based on data from surrounding States or the nationwide average VMT.

Table - 4. Changes on Urban Arterial Roads by Region and State**

Region and State	November				October			
	Number of Stations	Vehicle-Miles (Millions)		Percent Change	Number of Stations	Vehicle-Miles (Millions)		Percent Change
		2021 (Preliminary)	2020			2021 (Revised)	2020	
Northeast								
Connecticut	15	2,165	1,842	17.5	16	2,367	2,106	12.4
Maine	20	235	206	13.9	20	265	244	8.4
Massachusetts	202	3,798	3,256	16.7	202	4,079	3,663	11.3
New Hampshire	69	485	425	14.0	69	558	512	8.9
New Jersey	57	4,560	3,956	15.3	102	4,978	4,450	11.9
New York	64	5,753	5,185	11.0	60	6,093	5,741	6.1
Pennsylvania	37	4,063	3,630	11.9	35	4,355	4,074	6.9
Rhode Island	26	514	437	17.8	29	528	457	15.3
Vermont	13	115	99	15.9	11	127	115	10.4
Subtotal		**21,688**	**19,036**	**13.9**		**23,350**	**21,362**	**9.3**
South Atlantic								
Delaware	7	458	398	15.1	12	438	432	1.4
District of Columbia	1	172	161	6.5	3	194	176	10.4
Florida	146	10,763	9,498	13.3	148	11,206	10,147	10.4
Georgia	122	5,543	5,055	9.6	121	5,848	5,453	7.2
Maryland	41	3,315	2,834	16.9	39	3,337	3,186	4.7
North Carolina	41	4,643	4,229	9.8	41	5,182	4,796	8.1
South Carolina	47	2,095	1,863	12.5	48	2,256	2,104	7.2
Virginia	366	3,771	3,361	12.2	371	3,998	3,680	8.6
West Virginia	12	561	501	11.9	14	589	556	6.0
Subtotal		**31,321**	**27,900**	**12.3**		**33,048**	**30,530**	**8.2**
North Central								
Illinois	54	4,862	4,168	16.7	53	5,027	4,707	6.8
Indiana	28	2,555	2,247	13.7	30	2,693	2,560	5.2
Iowa	30	824	721	14.2	31	887	833	6.5
Kansas	17	891	808	10.3	17	956	913	4.7
Michigan	49	4,453	3,826	16.4	49	4,812	4,499	7.0
Minnesota	13	2,029	1,672	21.3	11	2,245	2,010	11.7
Missouri	63	2,668	2,347	13.7	63	2,837	2,624	8.1
Nebraska	19	605	530	14.2	19	658	608	8.2
North Dakota	11	169	148	14.3	11	191	177	7.8
Ohio	99	4,560	4,133	10.3	98	4,945	4,723	4.7
South Dakota	5	226	192	17.7	4	241	219	10.0
Wisconsin	126	2,085	1,802	15.7	96	2,313	2,073	11.6
Subtotal		**25,927**	**22,594**	**14.8**		**27,805**	**25,946**	**7.2**
South Gulf								
Alabama	111	2,245	2,084	7.7	105	2,403	2,255	6.6
Arkansas	4	1,244	1,160	7.3	5	1,239	1,208	2.6
Kentucky	22	1,492	1,358	9.9	23	1,651	1,508	9.5
Louisiana	12	1,967	1,815	8.4	11	2,103	1,963	7.1
Mississippi	22	1,080	1,033	4.5	24	1,130	1,122	0.7
Oklahoma	22	1,491	1,444	3.3	21	1,643	1,550	6.0
Tennessee	26	3,480	3,267	6.5	28	3,514	3,433	2.4
Texas	78	14,103	12,342	14.3	73	14,754	13,338	10.6
Subtotal		**27,102**	**24,503**	**10.6**		**28,437**	**26,377**	**7.8**
West								
Alaska	57	161	140	15.4	57	186	174	6.8
Arizona	88	3,434	3,098	10.8	65	3,612	3,386	6.7
California	80	18,850	17,386	8.4	76	20,073	19,170	4.7
Colorado	36	2,463	2,176	13.2	36	2,729	2,560	6.6
Hawaii	48	474	389	22.0	51	477	387	23.4
Idaho	74	496	441	12.3	71	533	516	3.4
Montana	13	198	180	9.7	13	213	203	5.1
Nevada	39	1,267	1,070	18.4	38	1,337	1,221	9.5
New Mexico	16	722	590	22.4	15	801	701	14.3
Oregon	43	1,353	1,211	11.7	40	1,469	1,422	3.3
Utah	-	1,383	1,224	13.0	-	1,543	1,435	7.5
Washington	80	2,760	2,435	13.3	57	2,999	2,802	7.0
Wyoming	28	145	129	12.4	27	158	152	3.5
Subtotal		**33,706**	**30,469**	**10.6**		**36,130**	**34,129**	**5.9**
TOTALS	**2,699**	**139,746**	**124,503**	**12.2**	**2,659**	**148,771**	**138,348**	**7.5**

Note: Where Number of Stations are shown as dashes, the values for the Vehicle-Miles and Percent Change are derived from the estimated VMT based on data from surrounding States or the nationwide average VMT.

Table - 5. Changes on ALL* Estimated Roads by Region and State**

Region and State	November				October			
	Number of Stations	Vehicle-Miles (Millions) 2021 (Preliminary)	Vehicle-Miles (Millions) 2020	Percent Change	Number of Stations	Vehicle-Miles (Millions) 2021 (Revised)	Vehicle-Miles (Millions) 2020	Percent Change
Northeast								
Connecticut	17	2,908	2,474	17.5	18	3,247	2,889	12.4
Maine	107	1,150	1,037	10.9	108	1,361	1,255	8.5
Massachusetts	228	5,156	4,425	16.5	229	5,543	4,990	11.1
New Hampshire	157	1,043	914	14.1	154	1,206	1,107	8.9
New Jersey	65	6,319	5,524	14.4	126	6,919	6,218	11.3
New York	128	9,245	8,435	9.6	122	10,089	9,653	4.5
Pennsylvania	98	8,091	7,277	11.2	94	8,856	8,320	6.5
Rhode Island	33	669	563	18.7	36	707	611	15.7
Vermont	50	540	457	18.1	49	653	580	12.4
Subtotal		**35,121**	**31,106**	**12.9**		**38,581**	**35,623**	**8.3**
South Atlantic								
Delaware	11	840	726	15.7	14	810	801	1.1
District of Columbia	1	255	240	6.5	3	288	261	10.4
Florida	259	20,025	17,427	14.9	258	20,581	18,515	11.2
Georgia	203	10,787	9,832	9.7	203	11,395	10,632	7.2
Maryland	56	4,993	4,216	18.4	51	5,080	4,839	5.0
North Carolina	93	9,714	8,908	9.1	91	10,723	10,041	6.8
South Carolina	109	4,978	4,459	11.6	119	5,275	4,942	6.7
Virginia	699	7,276	6,421	13.3	693	7,657	7,032	8.9
West Virginia	34	1,415	1,282	10.4	35	1,508	1,447	4.2
Subtotal		**60,283**	**53,511**	**12.7**		**63,317**	**58,510**	**8.2**
North Central								
Illinois	97	8,738	7,507	16.4	95	9,190	8,586	7.0
Indiana	65	6,994	6,121	14.3	65	7,599	7,136	6.5
Iowa	139	2,674	2,327	14.9	136	2,912	2,744	6.1
Kansas	96	2,513	2,266	10.9	96	2,690	2,561	5.1
Michigan	106	7,933	6,853	15.8	104	8,741	8,214	6.4
Minnesota	48	4,692	3,952	18.7	44	5,216	4,720	10.5
Missouri	163	6,996	6,112	14.5	159	7,111	6,710	6.0
Nebraska	66	1,738	1,522	14.2	66	1,911	1,780	7.4
North Dakota	74	753	660	14.0	72	881	807	9.2
Ohio	169	9,188	8,321	10.4	168	10,067	9,572	5.2
South Dakota	47	897	771	16.2	43	1,004	901	11.5
Wisconsin	243	5,062	4,424	14.4	193	5,763	5,198	10.9
Subtotal		**58,178**	**50,836**	**14.4**		**63,085**	**58,929**	**7.1**
South Gulf								
Alabama	190	5,909	5,606	5.4	179	6,263	6,057	3.4
Arkansas	25	3,114	2,917	6.8	31	3,205	3,079	4.1
Kentucky	65	4,234	3,784	11.9	70	4,566	4,308	6.0
Louisiana	30	4,393	4,065	8.1	29	4,551	4,265	6.7
Mississippi	82	3,502	3,343	4.8	86	3,719	3,617	2.8
Oklahoma	66	3,751	3,495	7.3	65	4,016	3,741	7.3
Tennessee	59	7,031	6,591	6.7	60	7,220	7,035	2.6
Texas	253	24,657	21,693	13.7	243	25,670	23,266	10.3
Subtotal		**56,591**	**51,494**	**9.9**		**59,210**	**55,368**	**6.9**
West								
Alaska	111	407	375	8.5	112	486	475	2.3
Arizona	188	6,155	5,513	11.6	156	6,530	6,133	6.5
California	150	27,314	24,983	9.3	134	28,859	27,602	4.6
Colorado	110	4,332	3,816	13.5	107	4,835	4,545	6.4
Hawaii	68	907	743	22.0	70	897	731	22.7
Idaho	212	1,537	1,355	13.4	196	1,694	1,634	3.7
Montana	92	1,018	890	14.4	93	1,153	1,051	9.7
Nevada	90	2,378	2,035	16.9	90	2,520	2,360	6.8
New Mexico	40	2,280	1,879	21.4	35	2,469	2,165	14.1
Oregon	151	2,805	2,533	10.7	137	3,067	2,980	2.9
Utah	-	2,683	2,368	13.3	-	2,942	2,765	6.4
Washington	163	4,715	4,139	13.9	127	5,198	4,834	7.5
Wyoming	151	810	722	12.2	149	912	894	2.0
Subtotal		**57,341**	**51,351**	**11.7**		**61,562**	**58,169**	**5.8**
TOTALS	**5,957**	**267,512**	**238,300**	**12.3**	**5,813**	**285,760**	**266,596**	**7.2**

Note: Where Number of Stations are shown as dashes, the values for the Vehicle-Miles and Percent Change are derived from the estimated VMT based on data from surrounding States or the nationwide average VMT.
*** All Estimated roads include travel from Table 3 and 4 plus remaining roads.**

Table - 6. Estimated Rural Vehicle Miles (Millions) and Percent Change from Same Period Previous Year**

Year - 2020

	Rural Interstate	%		Rural Other Arter	%		Other Rural	%		Total Rural	%		All Systems	%
Jan	19,637	5.1	Jan	29,799	5.9	Jan	26,359	6.7	Jan	75,796	5.9	Jan	260,847	4.8
Feb	18,274	5.6	Feb	27,847	5.9	Feb	24,369	6.7	Feb	70,490	6.1	Feb	242,695	4.7
Mar	17,964	-17.9	Mar	27,044	-14.2	Mar	23,907	-12.1	Mar	68,915	-14.5	Mar	226,638	-16.8
Q1	*55,875*	*-3.5*	Q1	*84,690*	*-1.5*	Q1	*74,635*	*-0.1*	Q1	*215,201*	*-1.6*	Q1	*730,180*	*-3.0*
Apr	12,159	-43.3	Apr	20,591	-35.1	Apr	19,455	-30.9	Apr	52,204	-35.8	Apr	167,617	-38.7
May	17,370	-25.0	May	27,628	-19.3	May	25,648	-16.6	May	70,647	-19.9	May	221,006	-23.7
Jun	20,491	-13.2	Jun	31,369	-7.3	Jun	28,573	-4.8	Jun	80,433	-8.0	Jun	250,330	-11.0
Q2	*50,020*	*-26.7*	Q2	*79,589*	*-20.3*	Q2	*73,675*	*-17.1*	Q2	*203,284*	*-20.9*	Q2	*638,953*	*-24.3*
1st Half	105,895	-16.0	1st Half	164,279	-11.6	1st Half	148,311	-9.4	1st Half	418,484	-12.0	1st Half	1,369,133	-14.3
Jul	22,261	-10.6	Jul	33,417	-6.0	Jul	30,671	-2.6	Jul	86,349	-6.1	Jul	265,550	-8.9
Aug	22,055	-9.4	Aug	33,203	-6.6	Aug	30,150	-4.4	Aug	85,408	-6.6	Aug	265,060	-9.6
Sep	20,936	-2.9	Sep	31,856	-2.4	Sep	29,025	-0.6	Sep	81,817	-1.9	Sep	257,531	-5.8
Q3	*65,252*	*-7.8*	Q3	*98,475*	*-5.1*	Q3	*89,846*	*-2.6*	Q3	*253,574*	*-4.9*	Q3	*788,141*	*-8.2*
Oct	21,581	-3.4	Oct	32,601	-2.7	Oct	29,523	-0.7	Oct	83,705	-2.2	Oct	266,596	-6.1
Nov	19,572	-6.7	Nov	28,714	-5.7	Nov	25,850	-2.9	Nov	74,136	-5.0	Nov	238,300	-8.5
Dec	19,517	-9.0	Dec	28,683	-5.4	Dec	25,427	-2.8	Dec	73,627	-5.5	Dec	241,451	-7.8
Q4	*60,670*	*-6.3*	Q4	*89,998*	*-4.5*	Q4	*80,801*	*-2.1*	Q4	*231,469*	*-4.2*	Q4	*746,347*	*-7.4*
2nd Half	125,922	-7.1	2nd Half	188,473	-4.8	2nd Half	170,647	-2.4	2nd Half	485,042	-4.6	2nd Half	1,534,489	-7.8
Year	***231,818***	***-11.4***	***Year***	***352,752***	***-8.1***	***Year***	***318,957***	***-5.7***	***Year***	***903,527***	***-8.2***	***Year***	***2,903,622***	***-11.0***

Year - 2021

	Rural Interstate	%		Rural Other Arter	%		Other Rural	%		Total Rural	%		All Systems	%
Jan	18,311	-6.8	Jan	27,467	-7.8	Jan	24,441	-7.3	Jan	70,218	-7.4	Jan	231,016	-11.4
Feb	16,359	-10.5	Feb	24,934	-10.5	Feb	22,096	-9.3	Feb	63,389	-10.1	Feb	213,027	-12.2
Mar	21,924	22.0	Mar	32,494	20.2	Mar	28,591	19.6	Mar	83,009	20.5	Mar	269,486	18.9
Q1	*56,594*	*1.3*	Q1	*84,895*	*0.2*	Q1	*75,128*	*0.7*	Q1	*216,617*	*0.7*	Q1	*713,529*	*-2.3*
Apr	20,920	72.1	Apr	31,607	53.5	Apr	28,377	45.9	Apr	80,904	55.0	Apr	260,258	55.3
May	23,981	38.1	May	34,663	25.5	May	31,353	22.2	May	89,996	27.4	May	284,475	28.7
Jun	24,693	20.5	Jun	35,405	12.9	Jun	31,565	10.5	Jun	91,663	14.0	Jun	286,917	14.6
Q2	*69,594*	*39.1*	Q2	*101,675*	*27.8*	Q2	*91,295*	*23.9*	Q2	*262,564*	*29.2*	Q2	*831,651*	*30.2*
1st Half	126,187	19.2	1st Half	186,570	13.6	1st Half	166,423	12.2	1st Half	479,180	14.5	1st Half	1,545,180	12.9
Jul	26,477	18.9	Jul	36,938	10.5	Jul	33,354	8.7	Jul	96,770	12.1	Jul	296,475	11.6
Aug	24,500	11.1	Aug	35,371	6.5	Aug	31,798	5.5	Aug	91,669	7.3	Aug	287,397	8.4
Sep	22,907	9.4	Sep	33,905	6.4	Sep	30,529	5.2	Sep	87,341	6.8	Sep	277,979	7.9
Q3	*73,884*	*13.2*	Q3	*106,215*	*7.9*	Q3	*95,681*	*6.5*	Q3	*275,779*	*8.8*	Q3	*861,852*	*9.4*
Oct	23,665	9.7	Oct	34,718	6.5	Oct	31,003	5.0	Oct	89,386	6.8	Oct	285,760	7.2
Nov	22,721	16.1	Nov	32,113	11.8	Nov	28,431	10.0	Nov	83,265	12.3	Nov	267,512	12.3
Dec			Dec			Dec			Dec			Dec		
Q4	*46,386*	*12.7*	Q4	*66,831*	*9.0*	Q4	*59,434*	*7.3*	Q4	*172,651*	*9.4*	Q4	*553,272*	*9.6*
2nd Half	120,270	13.0	2nd Half	173,046	8.3	2nd Half	155,115	6.8	2nd Half	448,431	9.0	2nd Half	1,415,124	9.4
Year	***246,457***	***16.1***	***Year***	***359,616***	***11.0***	***Year***	***321,538***	***9.5***	***Year***	***927,611***	***11.8***	***Year***	***2,960,303***	***11.2***

Table - 7. Estimated Urban Vehicle Miles (Millions) and Percent Change from Same Period Previous Year**

Year - 2020

	Urban Interstate	%		Urban Other Arte	%		Other Urban	%		Total Urban	%		All Systems	%
Jan	46,835	4.7	Jan	93,908	3.9	Jan	44,308	4.8	Jan	185,051	4.3	Jan	260,847	4.8
Feb	43,438	4.6	Feb	87,508	3.8	Feb	41,259	4.3	Feb	172,205	4.1	Feb	242,695	4.7
Mar	39,341	-19.2	Mar	79,924	-18.0	Mar	38,458	-15.6	Mar	157,723	-17.7	Mar	226,638	-16.8
Q1	*129,614*	*-4.0*	Q1	*261,340*	*-3.9*	Q1	*124,025*	*-2.7*	Q1	*514,979*	*-3.7*	Q1	*730,180*	*-3.0*
Apr	27,331	-43.3	Apr	58,920	-39.6	Apr	29,162	-37.0	Apr	115,413	-39.9	Apr	167,617	-38.7
May	36,013	-28.7	May	76,564	-25.1	May	37,783	-22.7	May	150,360	-25.4	May	221,006	-23.7
Jun	41,674	-15.2	Jun	86,184	-12.2	Jun	42,039	-9.9	Jun	169,897	-12.4	Jun	250,330	-11.0
Q2	*105,017*	*-29.0*	Q2	*221,668*	*-25.6*	Q2	*108,984*	*-23.1*	Q2	*435,670*	*-25.9*	Q2	*638,953*	*-24.3*
1st Half	234,631	-17.0	1st Half	483,008	-15.3	1st Half	233,009	-13.5	1st Half	950,649	-15.3	1st Half	1,369,133	-14.3
Jul	44,467	-12.4	Jul	90,805	-10.1	Jul	43,929	-8.2	Jul	179,200	-10.2	Jul	265,550	-8.9
Aug	44,154	-13.8	Aug	91,896	-10.2	Aug	43,603	-9.6	Aug	179,653	-11.0	Aug	265,060	-9.6
Sep	43,618	-8.5	Sep	89,036	-7.6	Sep	43,061	-6.2	Sep	175,714	-7.5	Sep	257,531	-5.8
Q3	*132,239*	*-11.6*	Q3	*271,736*	*-9.3*	Q3	*130,593*	*-8.0*	Q3	*534,567*	*-9.6*	Q3	*788,141*	*-8.2*
Oct	45,500	-8.8	Oct	92,848	-8.0	Oct	44,543	-6.4	Oct	182,891	-7.8	Oct	266,596	-6.1
Nov	41,281	-11.0	Nov	83,222	-10.2	Nov	39,660	-8.3	Nov	164,164	-9.9	Nov	238,300	-8.5
Dec	41,774	-11.0	Dec	84,800	-9.2	Dec	41,249	-5.1	Dec	167,824	-8.7	Dec	241,451	-7.8
Q4	*128,555*	*-10.2*	Q4	*260,871*	*-9.1*	Q4	*125,453*	*-6.6*	Q4	*514,879*	*-8.8*	Q4	*746,347*	*-7.4*
2nd Half	260,794	-11.0	2nd Half	532,607	-9.2	2nd Half	256,046	-7.3	2nd Half	1,049,446	-9.2	2nd Half	1,534,489	-7.8
Year	***495,425***	***-14.0***	***Year***	***1,015,614***	***-12.2***	***Year***	***489,055***	***-10.4***	***Year***	***2,000,095***	***-12.2***	***Year***	***2,903,622***	***-11.0***

Year - 2021

	Urban Interstate	%		Urban Other Arte	%		Other Urban	%		Total Urban	%		All Systems	%
Jan	40,127	-14.3	Jan	81,653	-13.0	Jan	39,017	-11.9	Jan	160,797	-13.1	Jan	231,016	-11.4
Feb	37,201	-14.4	Feb	76,323	-12.8	Feb	36,114	-12.5	Feb	149,638	-13.1	Feb	213,027	-12.2
Mar	47,151	19.9	Mar	94,233	17.9	Mar	45,093	17.3	Mar	186,477	18.2	Mar	269,486	18.9
Q1	*124,479*	*-4.0*	Q1	*252,209*	*-3.5*	Q1	*120,224*	*-3.1*	Q1	*496,912*	*-3.5*	Q1	*713,529*	*-2.3*
Apr	44,850	64.1	Apr	90,398	53.4	Apr	44,107	51.2	Apr	179,354	55.4	Apr	260,258	55.3
May	48,578	34.9	May	98,086	28.1	May	47,814	26.6	May	194,479	29.3	May	284,475	28.7
Jun	49,424	18.6	Jun	98,225	14.0	Jun	47,604	13.2	Jun	195,254	14.9	Jun	286,917	14.6
Q2	*142,853*	*36.0*	Q2	*286,709*	*29.3*	Q2	*139,526*	*28.0*	Q2	*569,087*	*30.6*	Q2	*831,651*	*30.2*
1st Half	267,331	13.9	1st Half	538,918	11.6	1st Half	259,750	11.5	1st Half	1,065,999	12.1	1st Half	1,545,180	12.9
Jul	50,607	13.8	Jul	100,733	10.9	Jul	48,366	10.1	Jul	199,706	11.4	Jul	296,475	11.6
Aug	48,761	10.4	Aug	99,724	8.5	Aug	47,243	8.3	Aug	195,728	8.9	Aug	287,397	8.4
Sep	47,769	9.5	Sep	96,337	8.2	Sep	46,533	8.1	Sep	190,639	8.5	Sep	277,979	7.9
Q3	*147,136*	*11.3*	Q3	*296,794*	*9.2*	Q3	*142,142*	*8.8*	Q3	*586,072*	*9.6*	Q3	*861,852*	*9.4*
Oct	49,486	8.8	Oct	99,285	6.9	Oct	47,603	6.9	Oct	196,374	7.4	Oct	285,760	7.2
Nov	46,917	13.7	Nov	92,829	11.5	Nov	44,501	12.2	Nov	184,247	12.2	Nov	267,512	12.3
Dec			Dec			Dec			Dec			Dec		
Q4	*96,403*	*11.1*	Q4	*192,114*	*9.1*	Q4	*92,104*	*9.4*	Q4	*380,621*	*9.7*	Q4	*553,272*	*9.6*
2nd Half	243,539	11.2	2nd Half	488,909	9.2	2nd Half	234,245	9.1	2nd Half	966,693	9.6	2nd Half	1,415,124	9.4
Year	***510,870***	***12.6***	***Year***	***1,027,827***	***10.4***	***Year***	***493,995***	***10.3***	***Year***	***2,032,692***	***10.9***	***Year***	***2,960,303***	***11.2***

Figure - 1. Moving 12-Month Total on ALL Roads

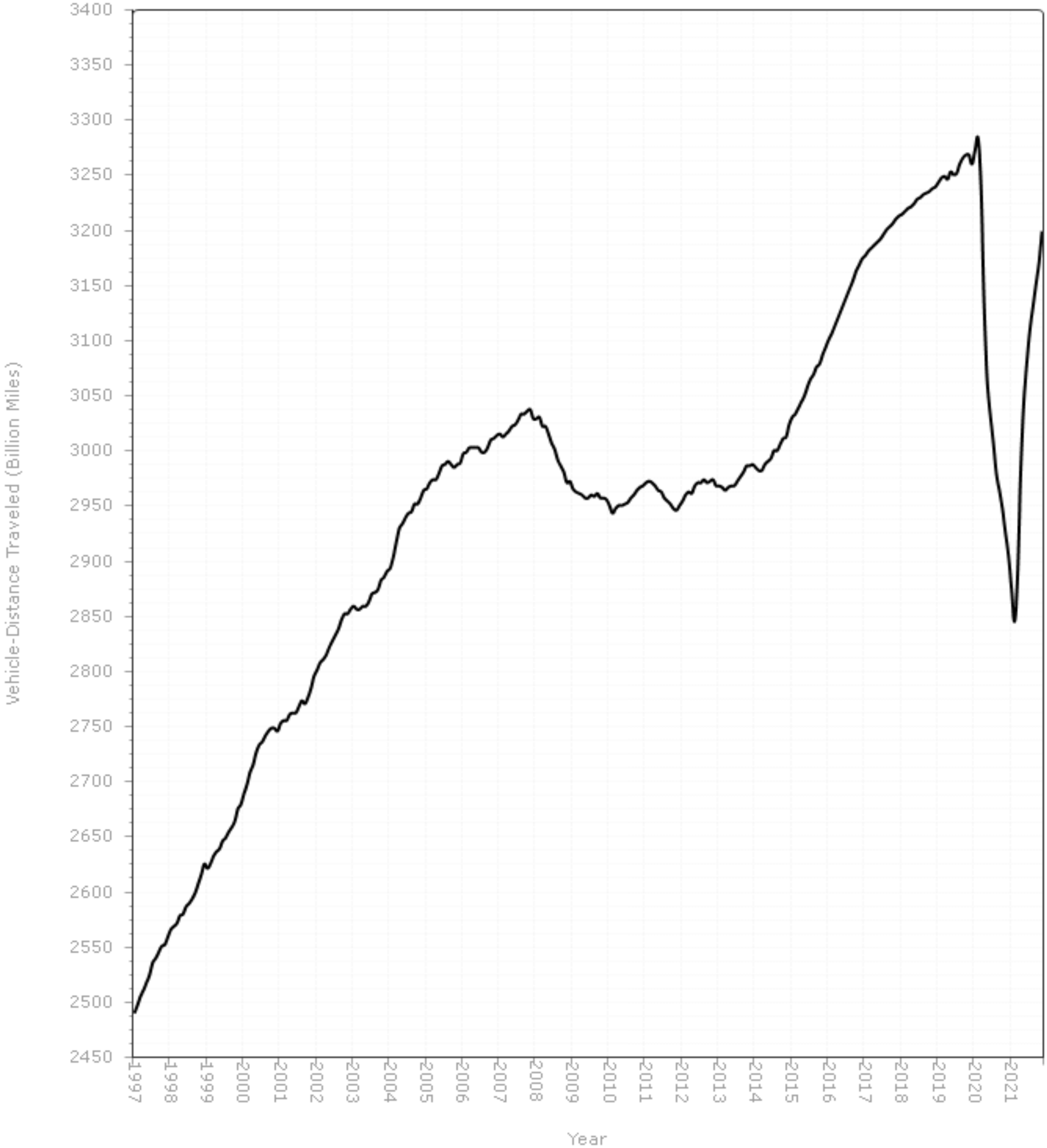


Figure - 2. Average Daily Travel on U.S. Highways by Month

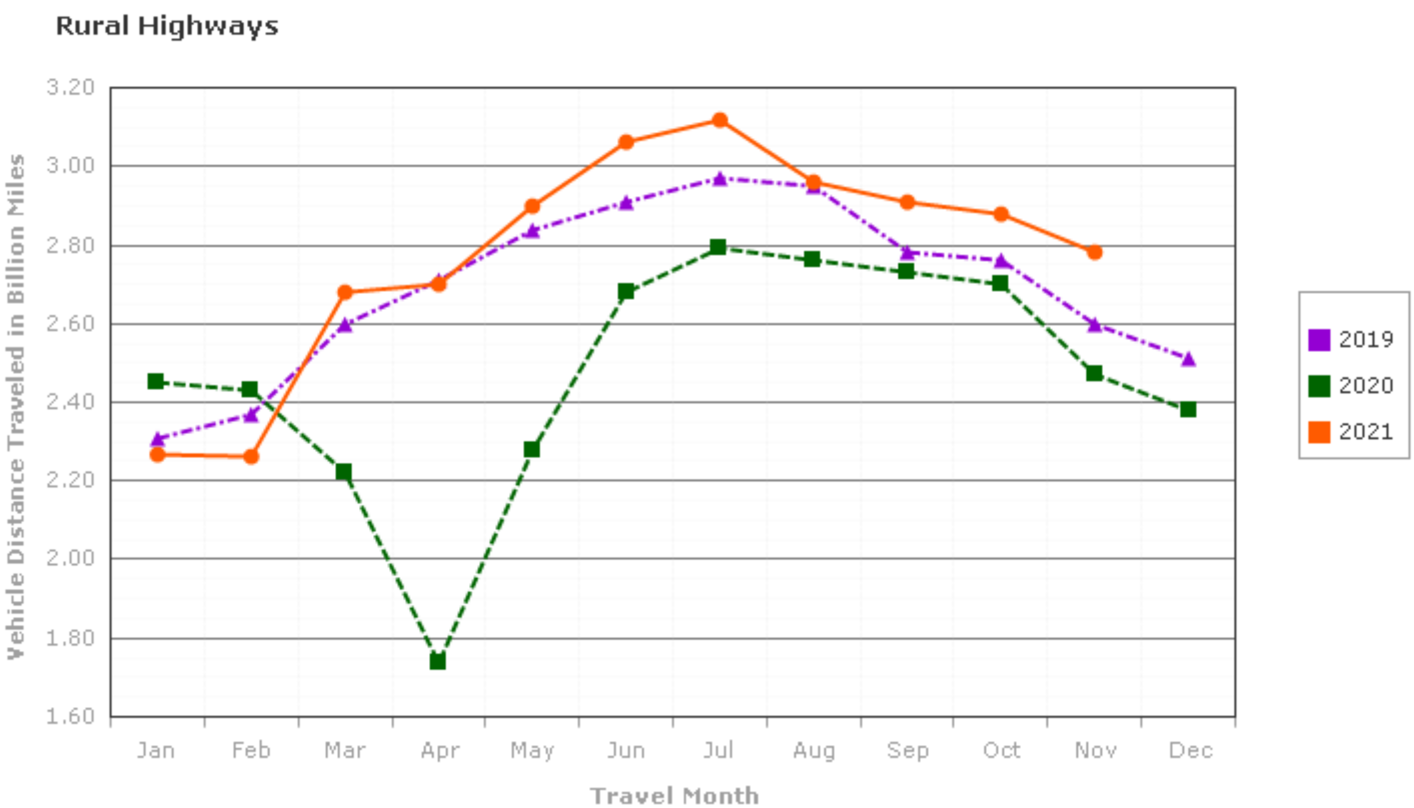
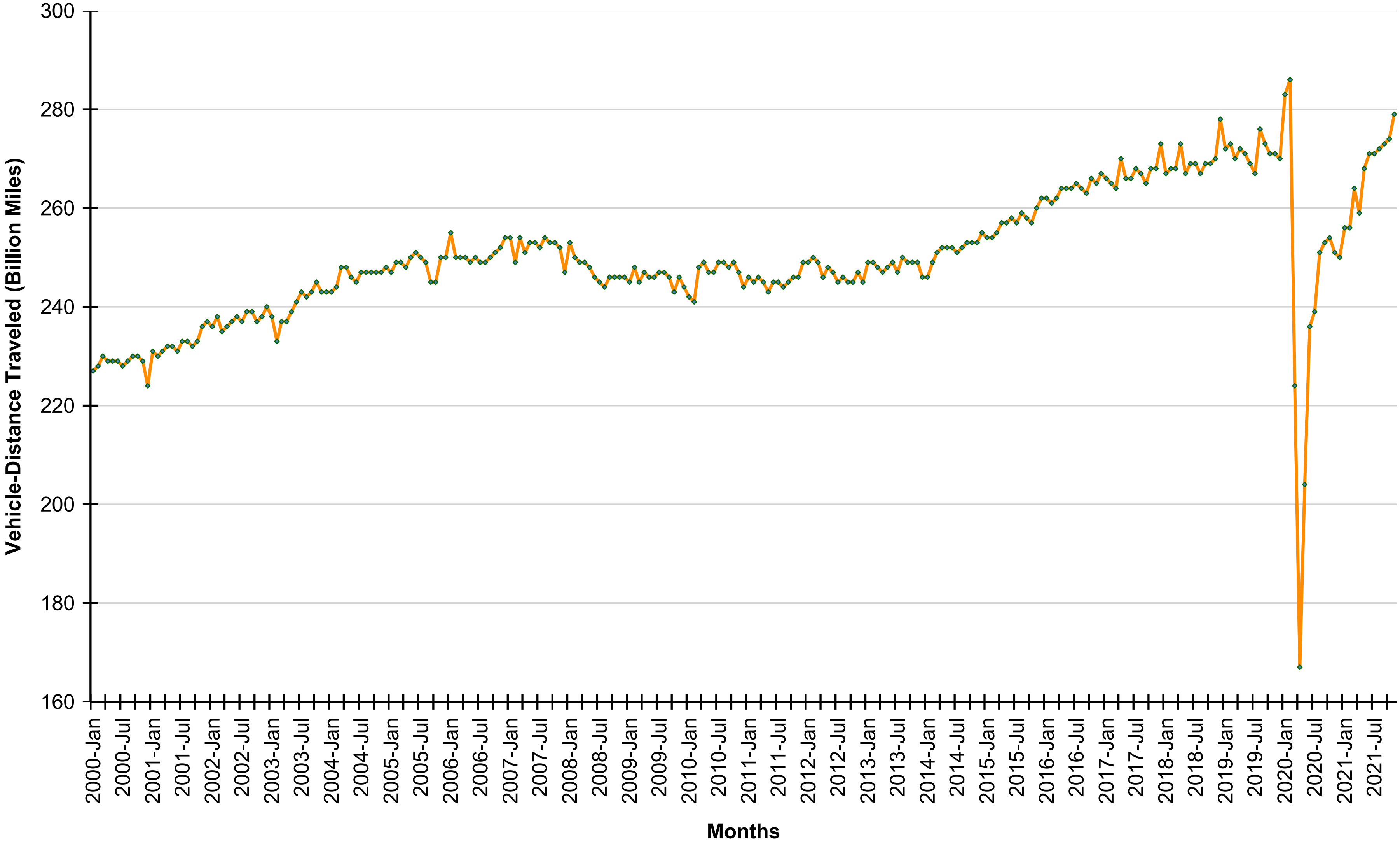


Figure - 3. Seasonally Adjusted Vehicle Miles Traveled by Month



ATTACHMENT 2B:

Presentation: How Much Will COVID-19 Affect Travel Behavior? by the National Academies of Sciences Engineering and Medicine Transportation Research Board, 6/1/2020


UIC ENGINEERING
How Much Will COVID-19 Affect Travel Behavior?
Monday, June 1
2:00 - 3:30 Eastern
The National Academies of
SCIENCES · ENGINEERING · MEDICINE
TRB
TRANSPORTATION RESEARCH BOARD
#TRBwebinar
#COVID19

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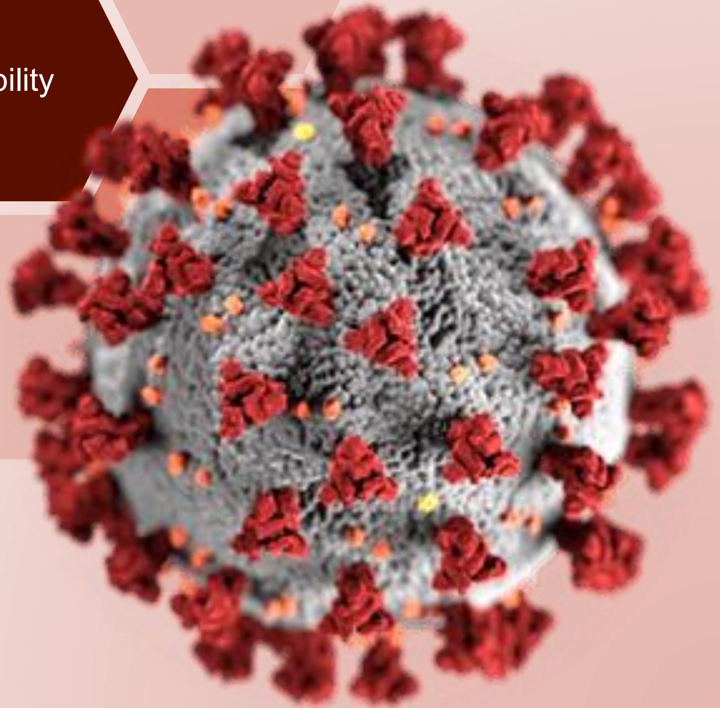
UIC ENGINEERING

Future Cities

- Livability
- ICT
- Public Health
- Mobility
- Safety
- Equity
- Environment
- Sustainability
- Resiliency



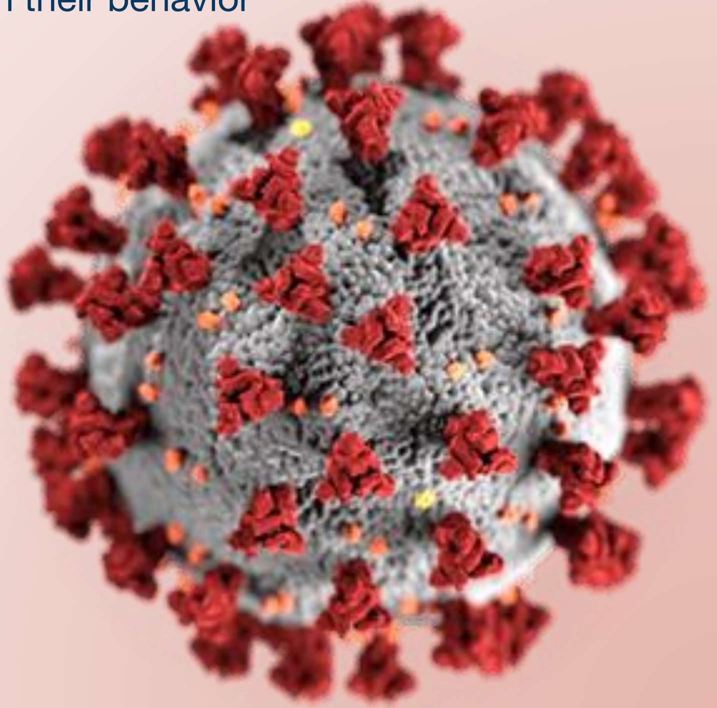
UIC ENGINEERING

COVID-19

- On March 11, 2020, the World Health Organization (WHO) recognised the COVID-19 outbreak as a pandemic calling for global attention

- The COVID-19 pandemic has forced rapid, large changes in U.S. households' social dynamics resulting in substantial changes in their behavior

- A sharp transition from a reality of long commutes, in-person classes and business meetings, and in-store shopping to telecommuting, online classes and business meetings, and online shopping even for groceries



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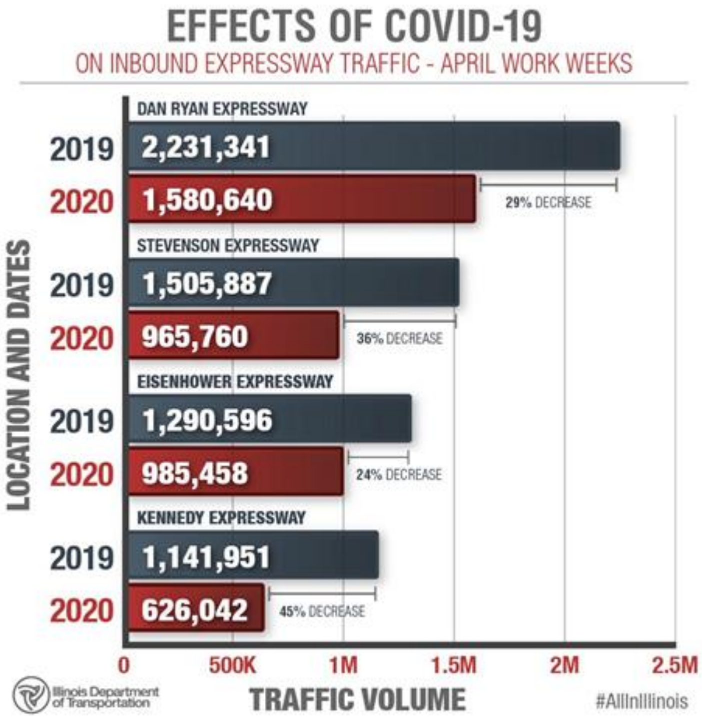

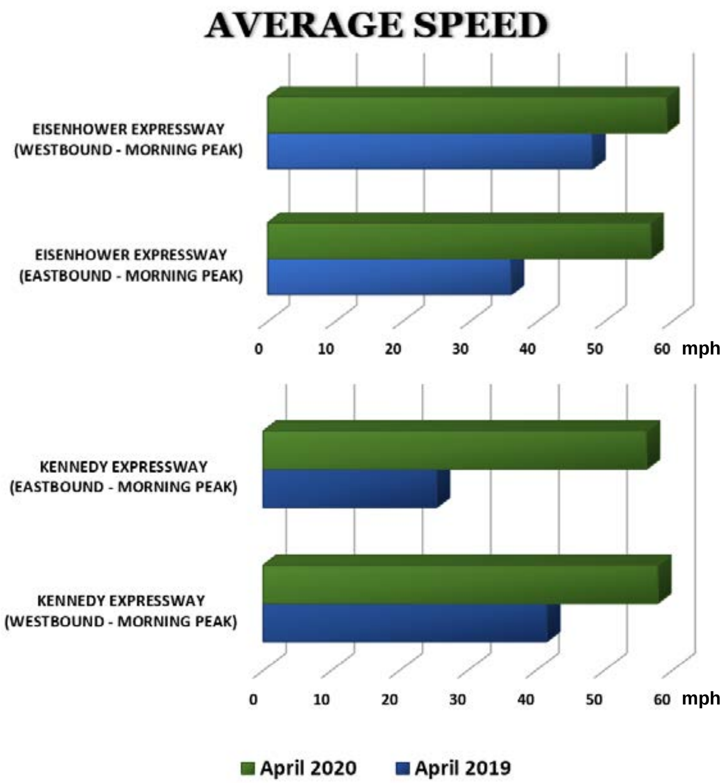

UIC ENGINEERING

OUTLINE

- INTRODUCTION
- ANALYSIS
  - Survey & Demographics
  - Health & Exposure Risk
  - Risk Perceptions
  - Air Travel
  - Shopping Habits & Attitudes
  - Economic Impacts
  - Working from Home
- FUTURE INSIGHTS
  - Planning Towards More Sustainable Future
  - Industries
  - Autonomous Vehicles
  - Digital Twin: ADAPTS Agent-based Model
- SUMMARY AND REMARKS

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Survey & Demographics

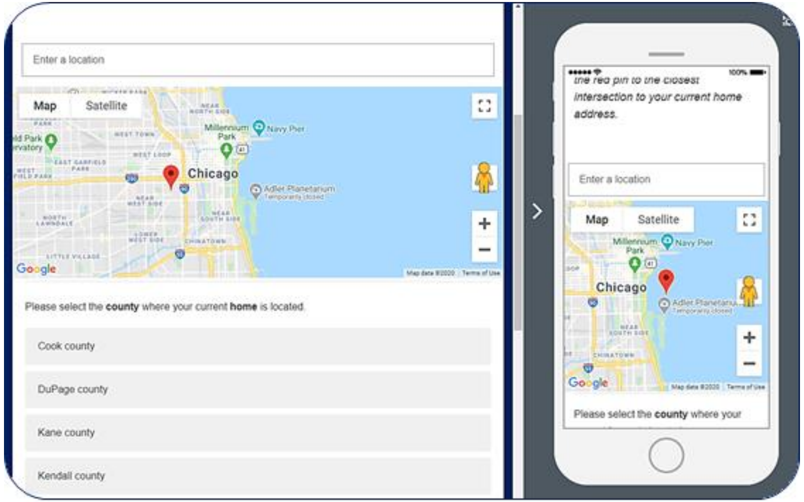
Online survey: *stated preference & revealed preference*

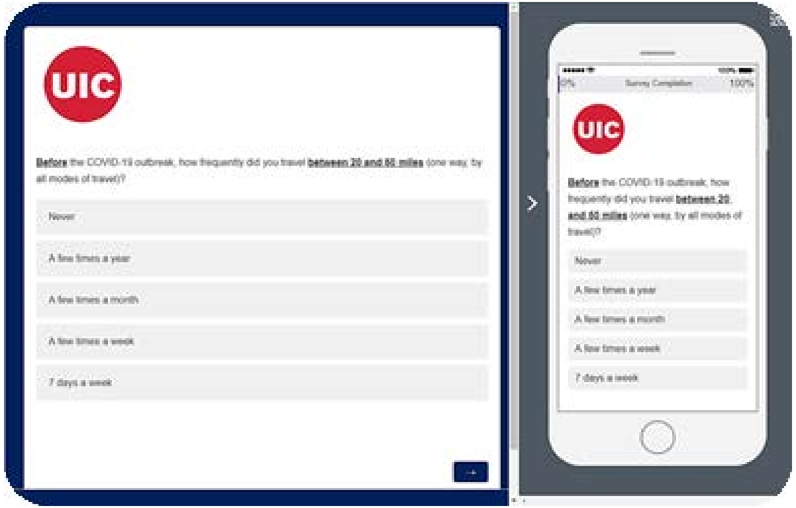
Study area: the Chicago Metropolitan Area

Survey duration: April 25 - May 20

Sample size: 906 valid responses

UIC IRB protocol: #2020-0395





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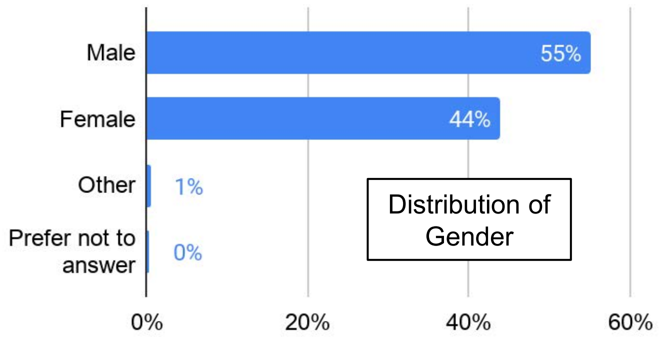
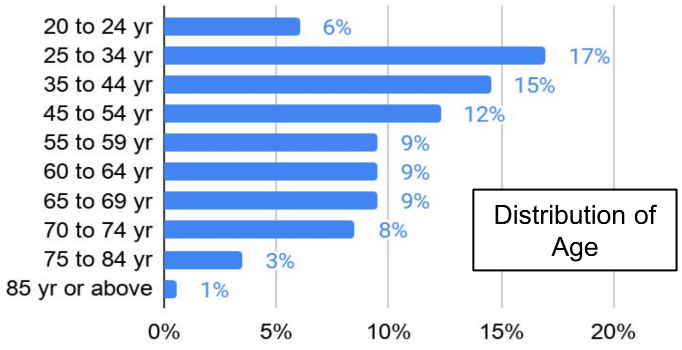
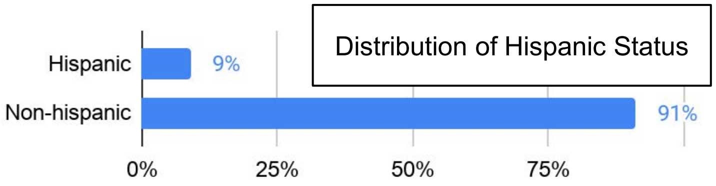
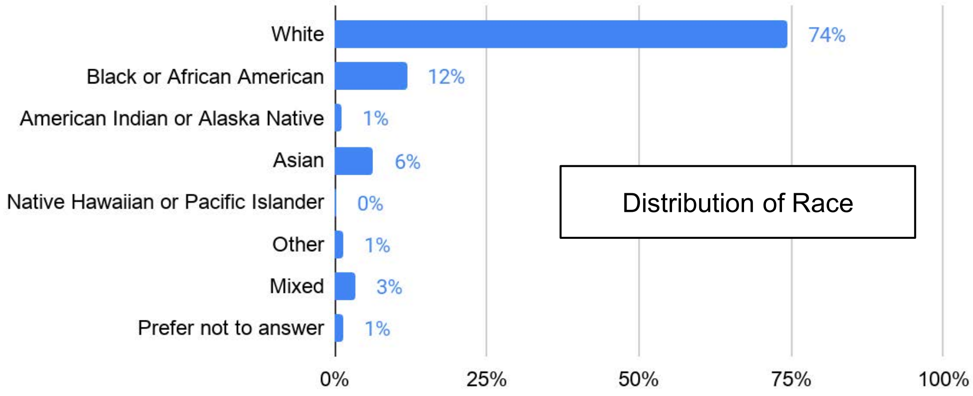
Survey & Demographics









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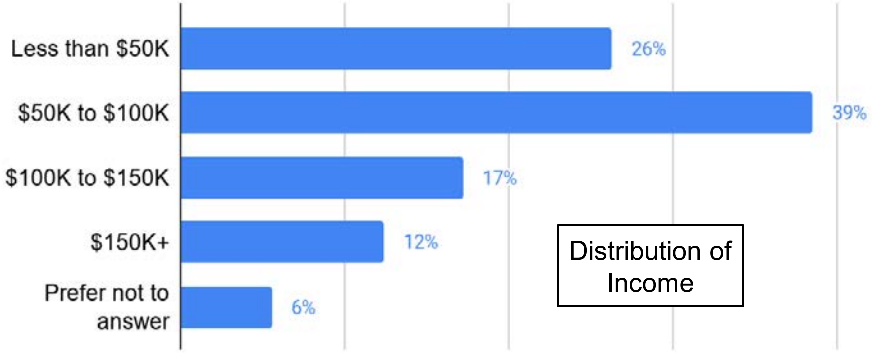
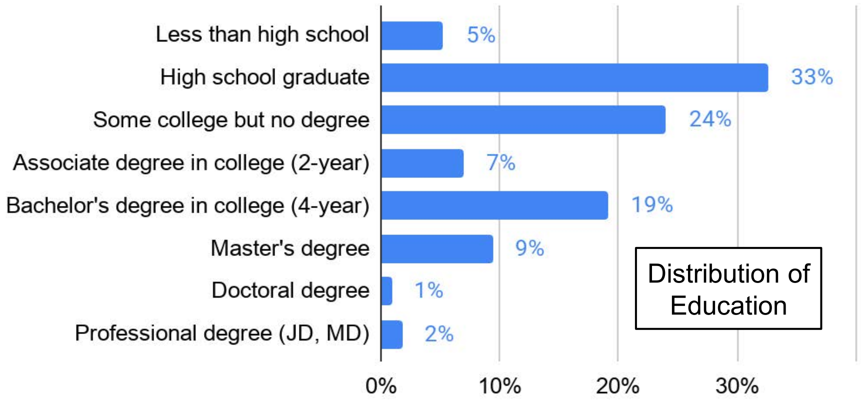
Survey & Demographics





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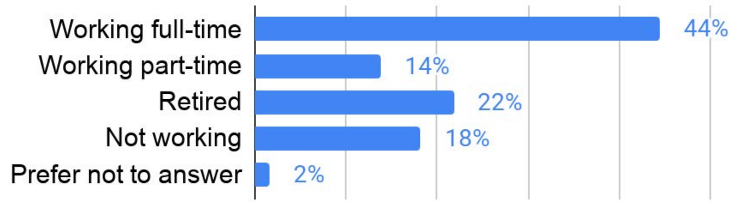
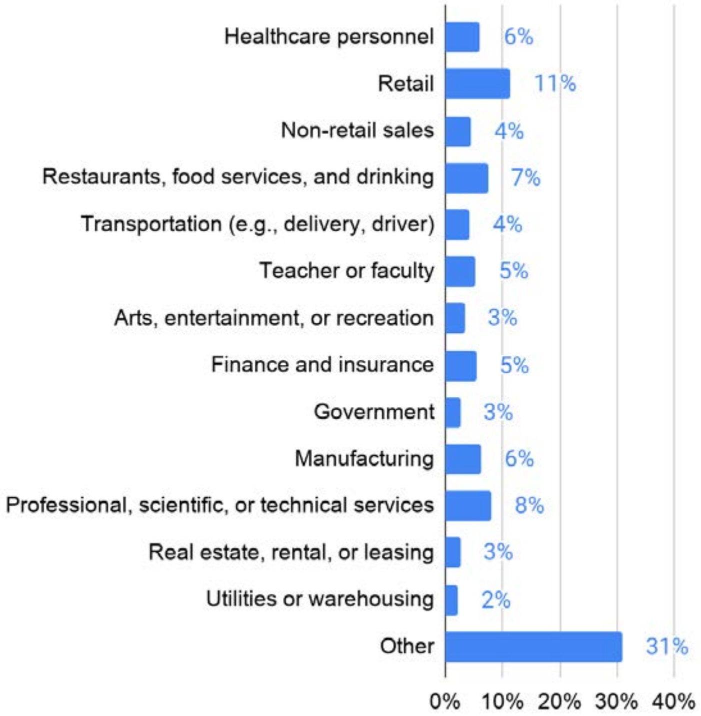
Survey & Demographics

Distribution of the work status
(before the pandemic)

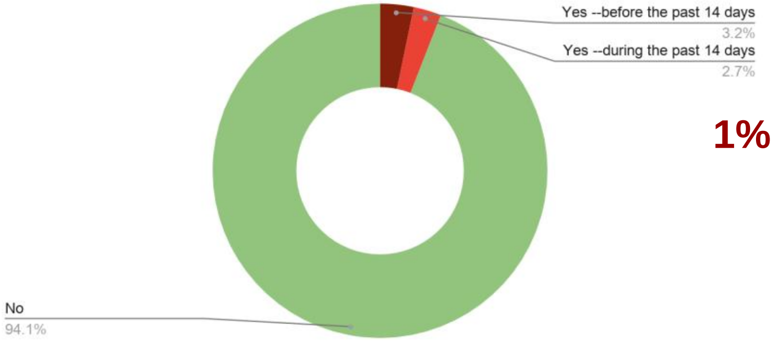


Distribution of job categories
(before the pandemic)

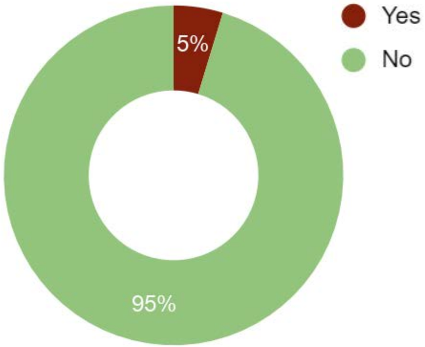


Health & Exposure Risk

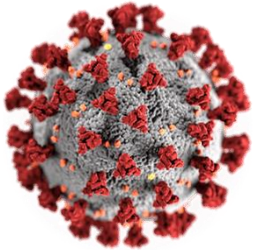
Had close contact with confirmed cases of COVID-19



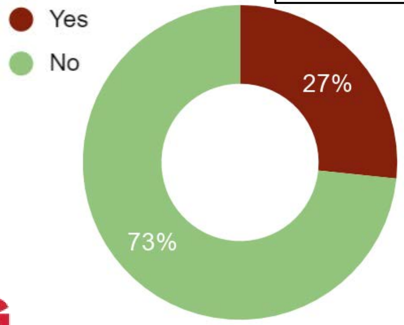
Had COVID-19 symptoms in the past 14 days



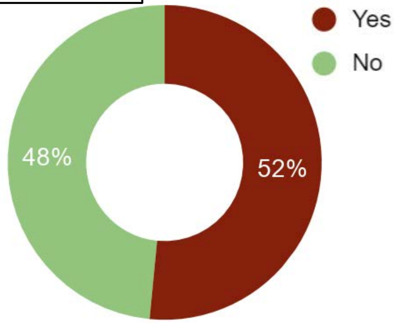
1% actually catched the virus!



Have pre-existing conditions



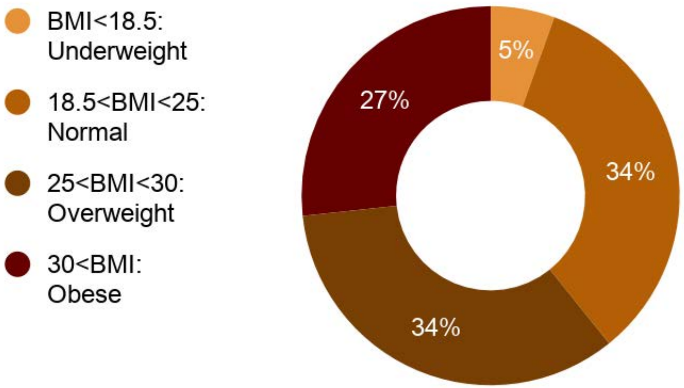
Younger than 65



Older than 65

Health & Exposure Risk

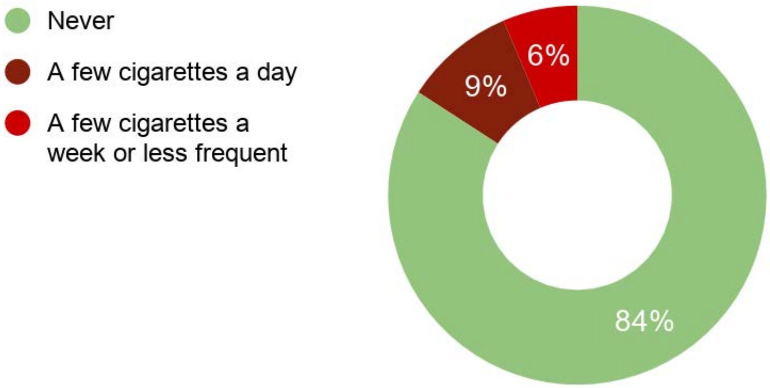
BMI Index



Adult Body Mass Index

(reference: Centers for Disease Control and Prevention)

Frequency of smoking cigarettes



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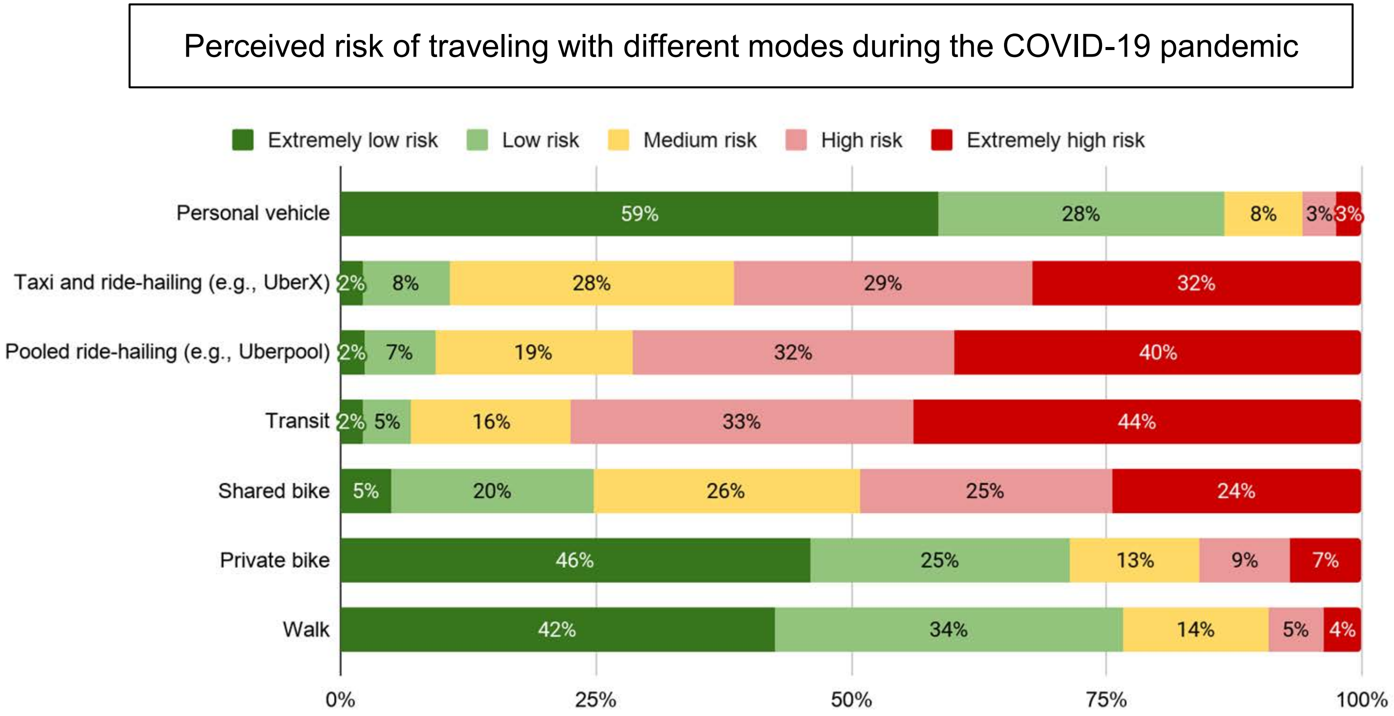
Risk Perceptions



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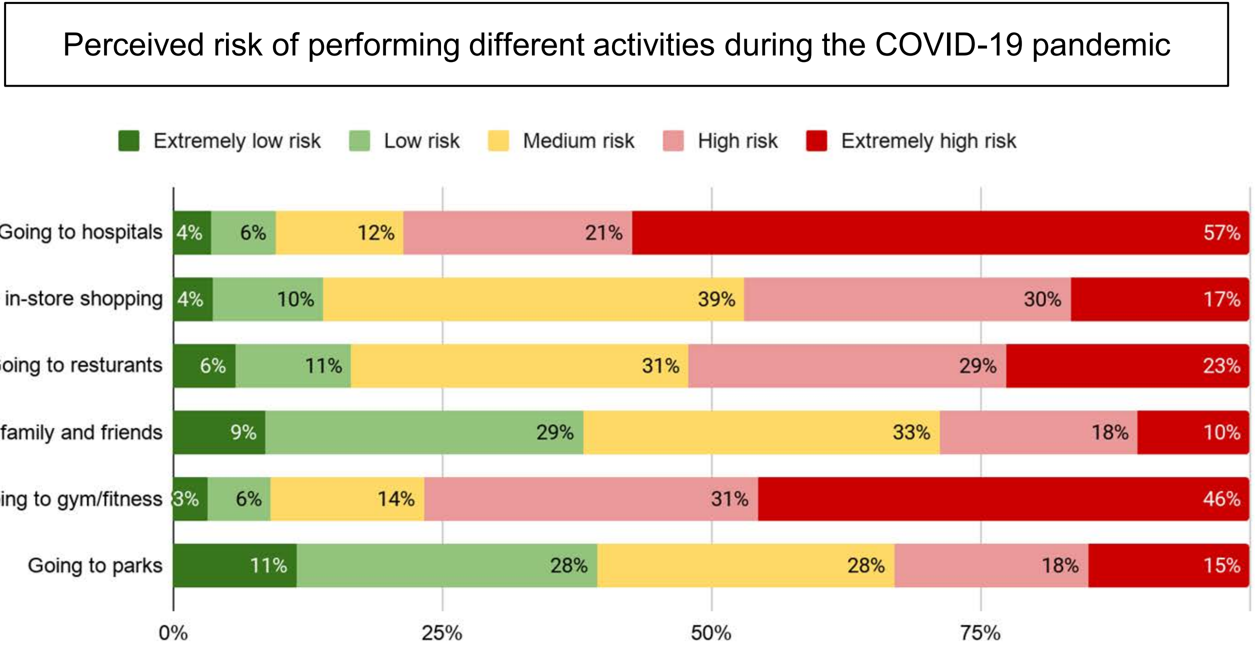
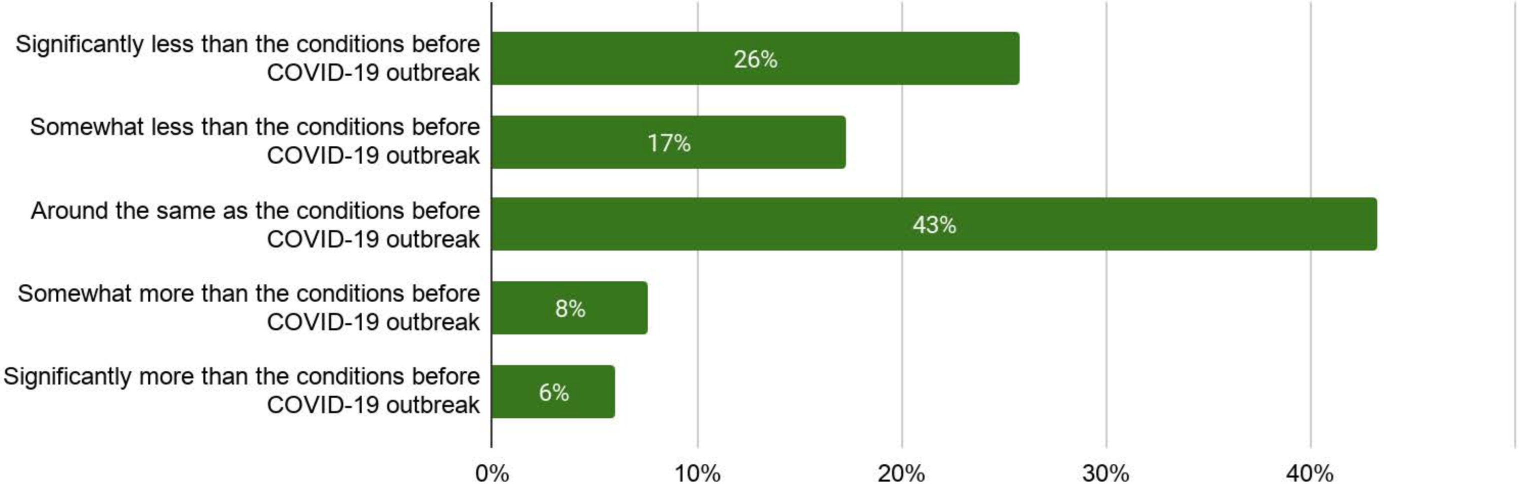
Risk Perceptions



UIC ENGINEERING

Air Travel

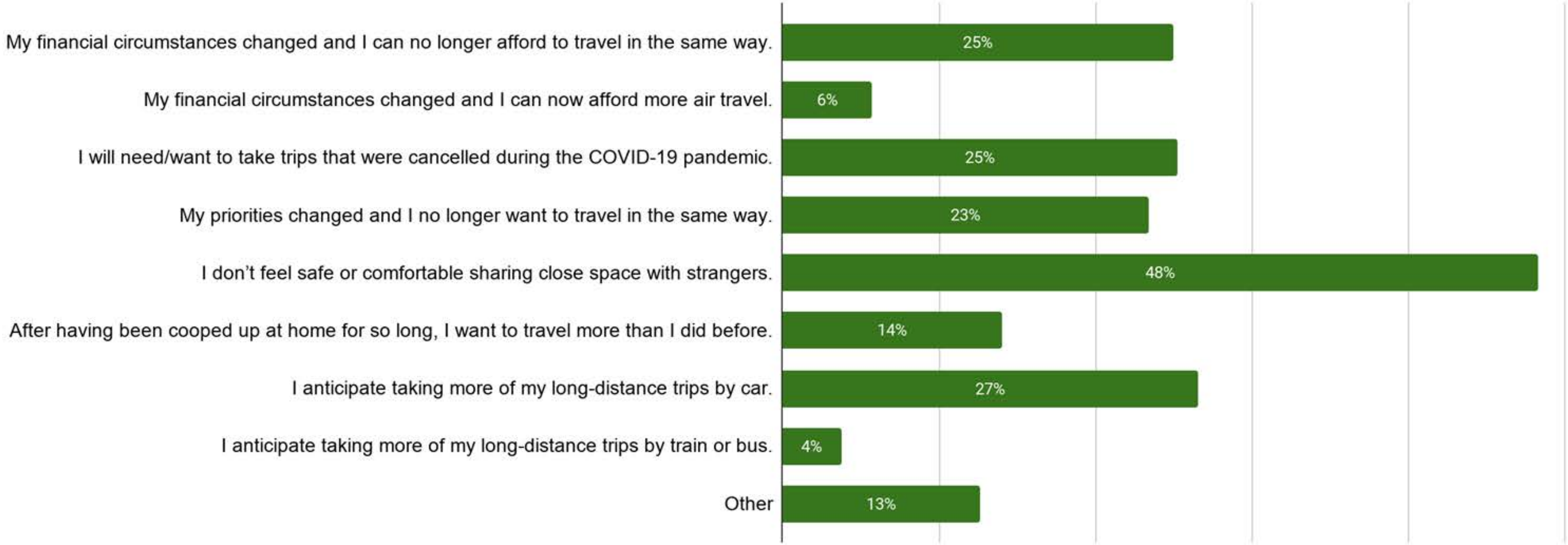
Expected change in airplane travels once the COVID-19 is no longer a threat as compared to the before-pandemic situations



UIC ENGINEERING

Air Travel

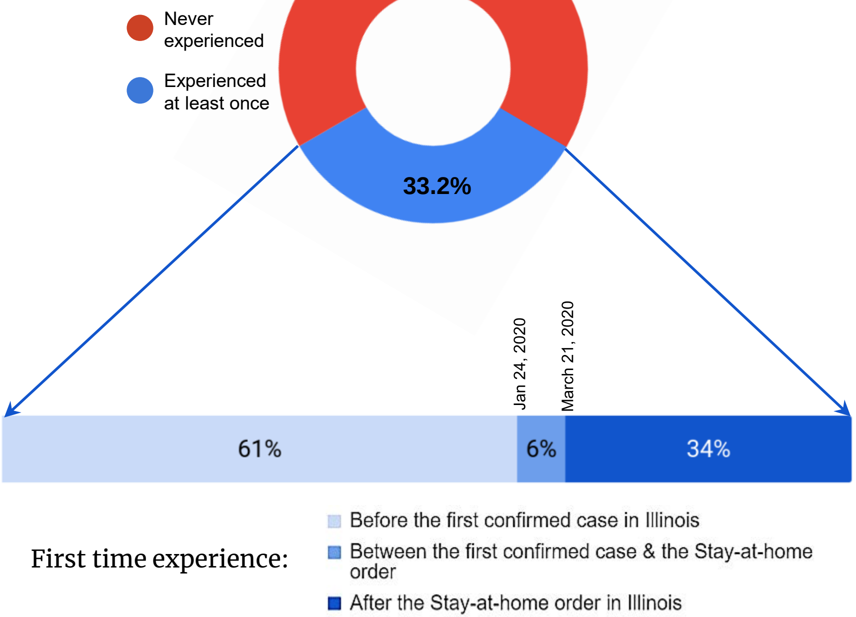
Reasons behind the expected change in airplane travels once the COVID-19 is no longer a threat as compared to the before-pandemic situations



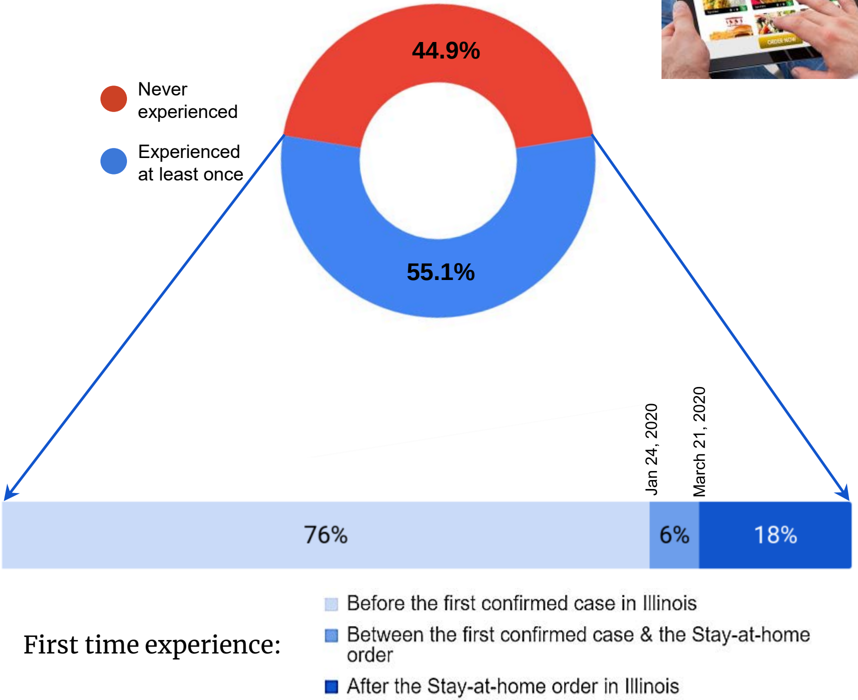
UIC ENGINEERING

Shopping Habits & Attitudes

Online grocery shopping



Order food online from restaurants



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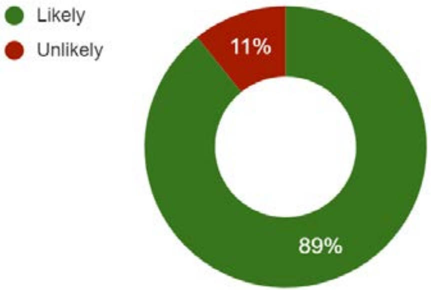
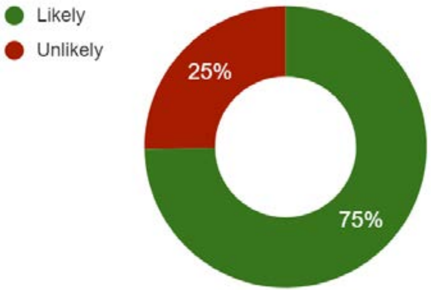
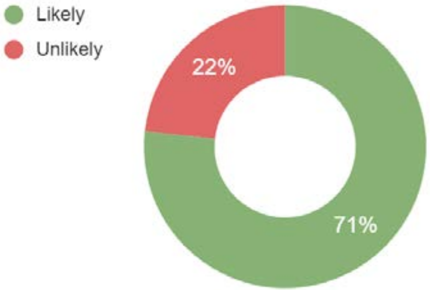
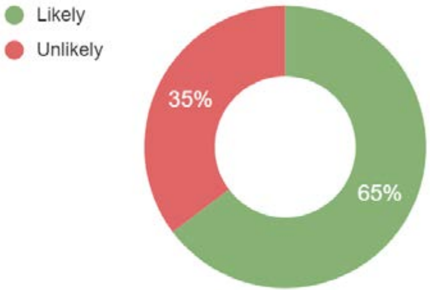
Shopping Habits & Attitudes

Online shopping more frequently in the future as compared to before-pandemic?

	Online grocery shopping	Order food online from restaurants
In the first few months after the pandemic is over		
Far after the pandemic is over		

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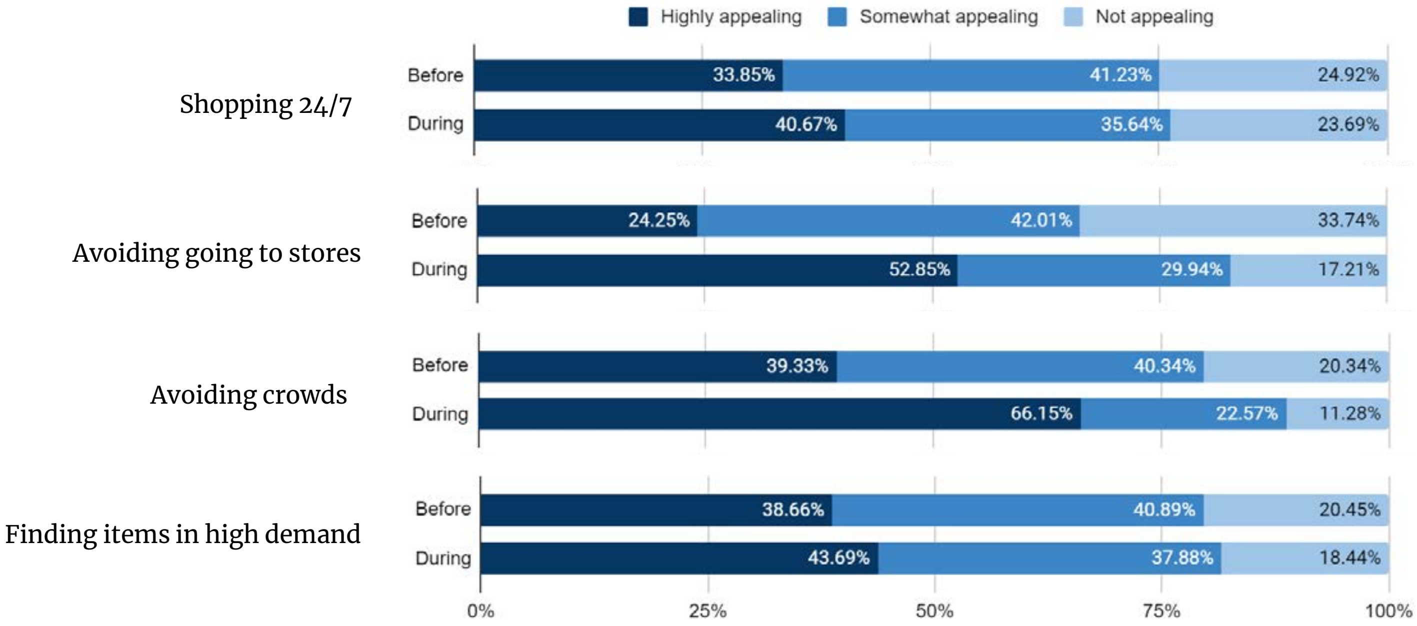
Shopping Habits & Attitudes

Motivations for online shopping before vs. during the COVID-19 outbreak



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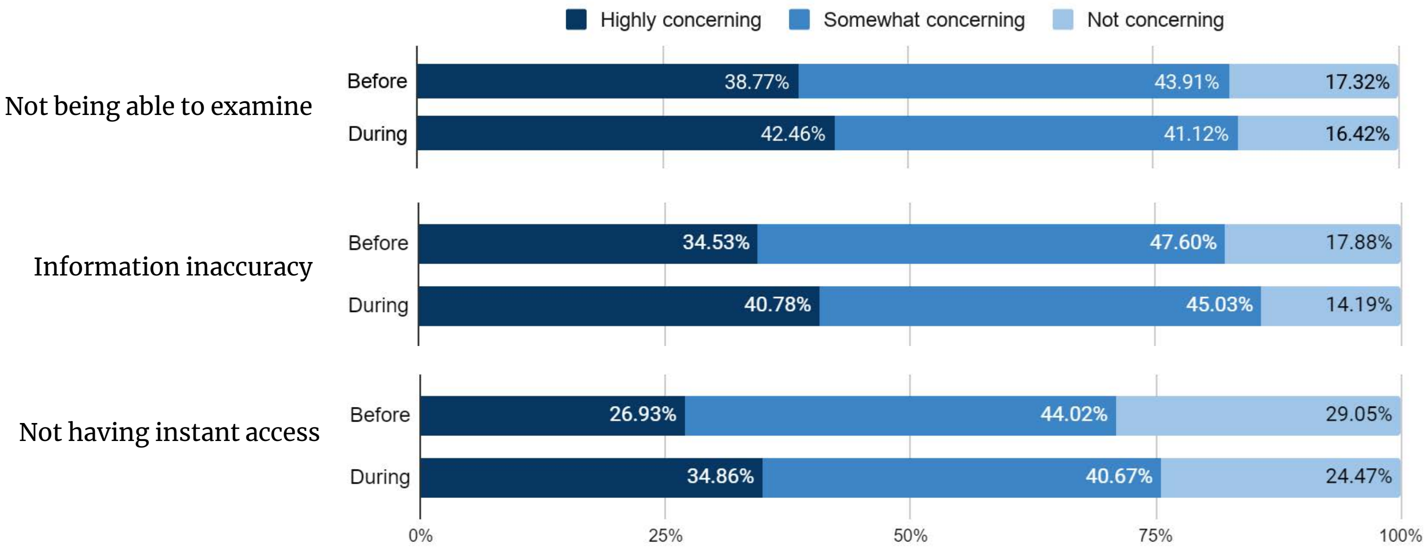
Shopping Habits & Attitudes

Concerns for online shopping before vs. during the COVID-19 outbreak



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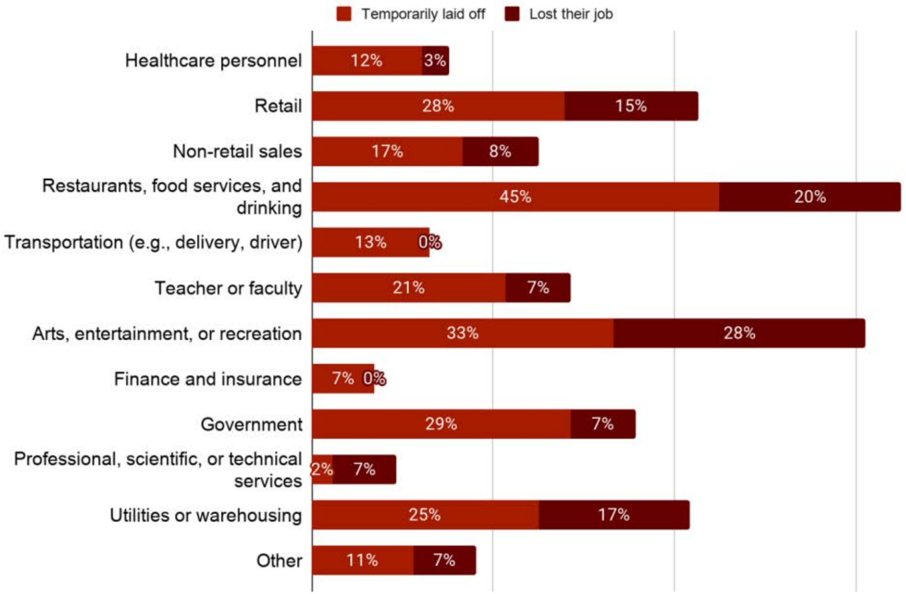
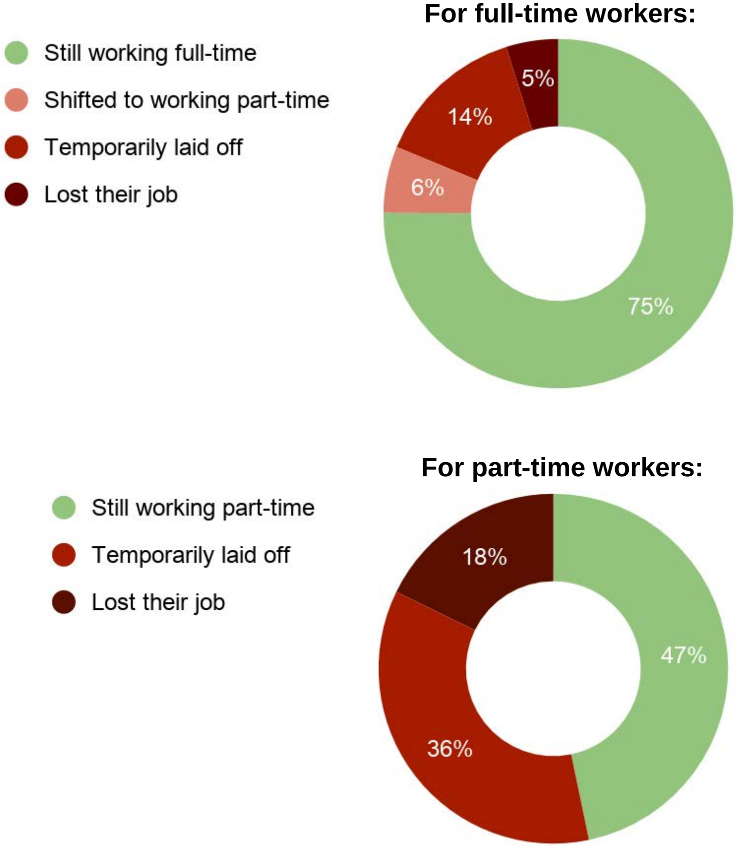
Economic Impacts

Lost job/Temporary laid off during the pandemic by job category



Change in employment status during the pandemic



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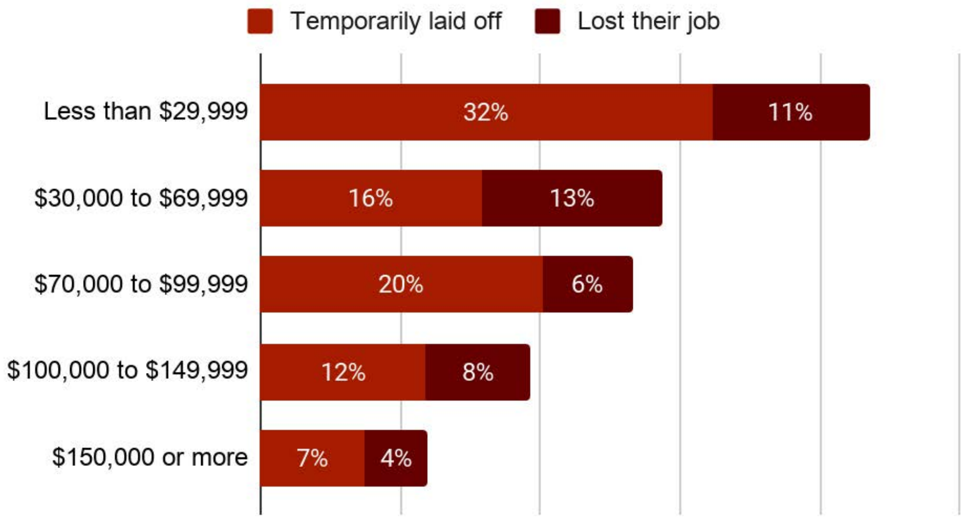
Economic Impacts

Lost job/Temporary laid off during the pandemic by income category



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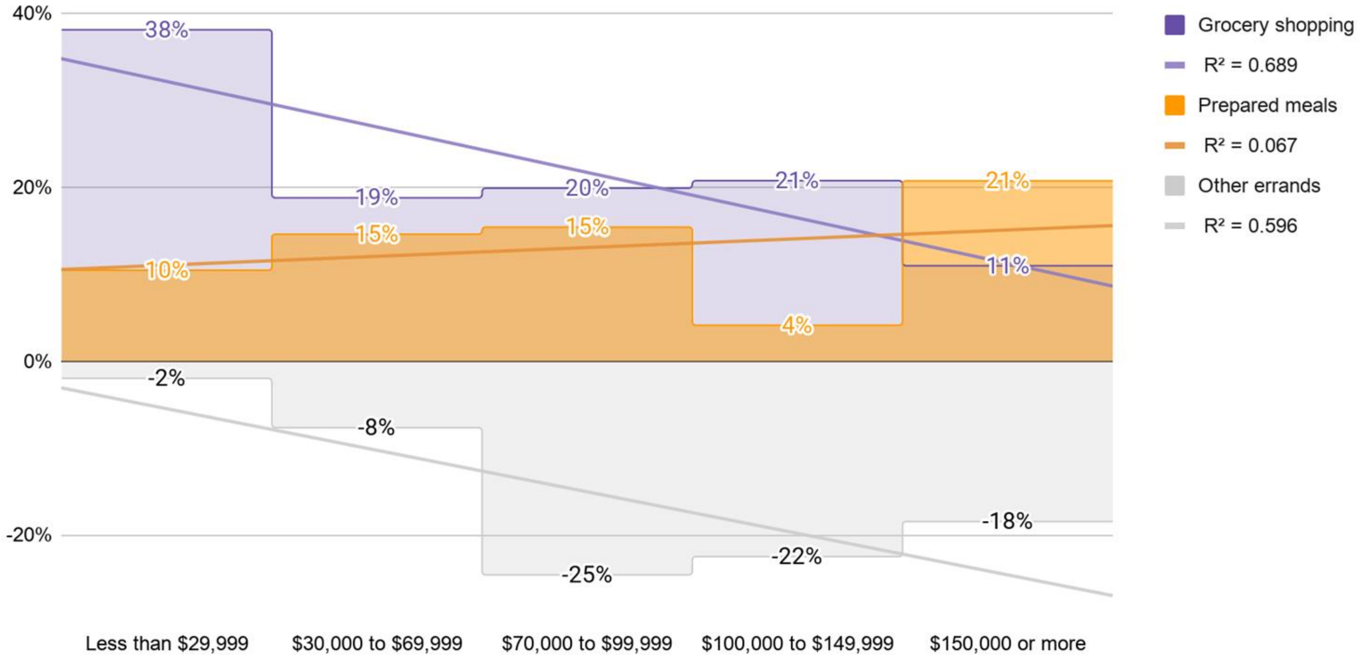
Economic Impacts

Change in shopping expenditure during the pandemic: Shopping for groceries, prepared meals, & errands



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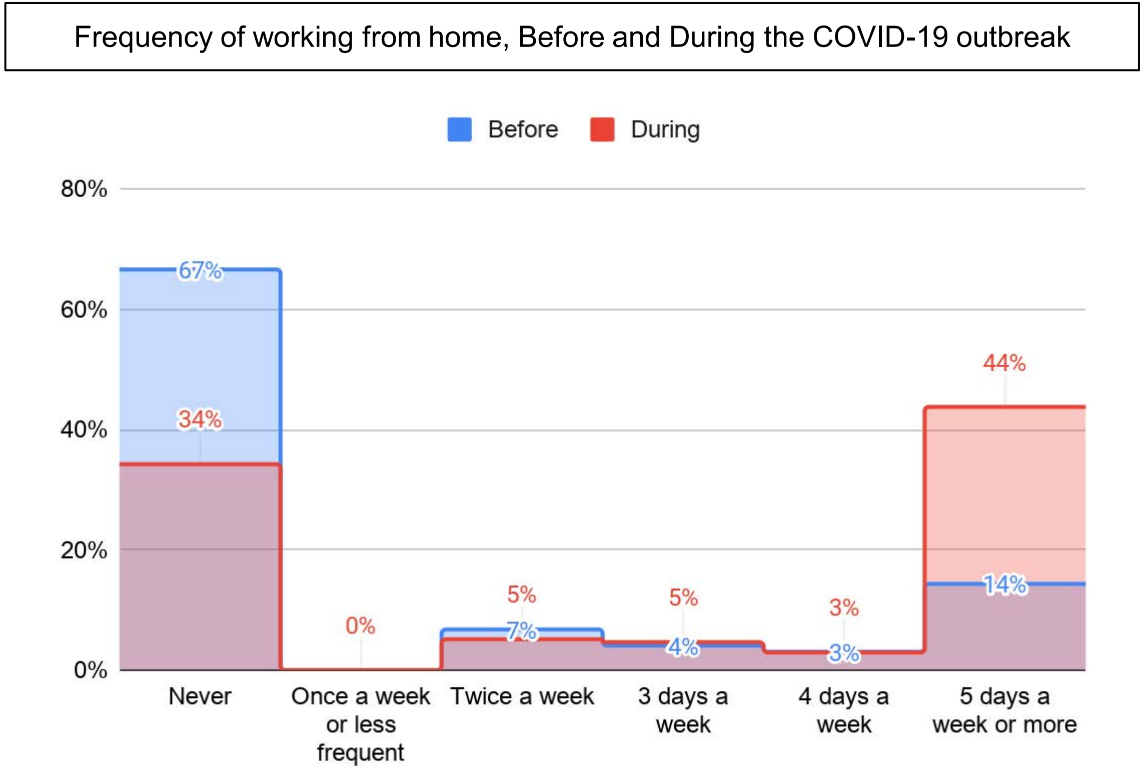
Working From Home



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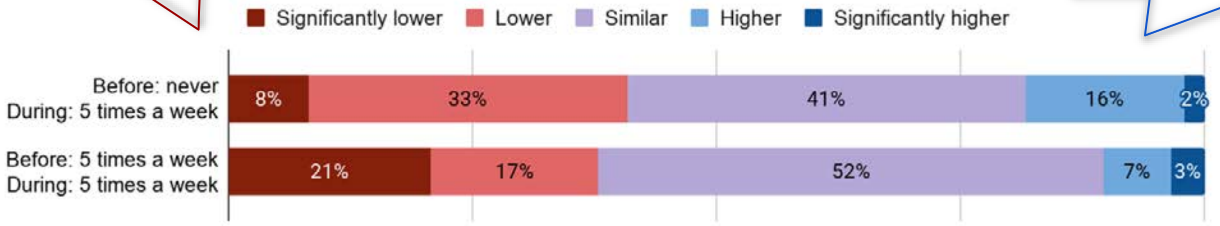
Working From Home

- More distractions at home
- Lack of comfortable work environment

- No commuting time to work
- More casual environment at home



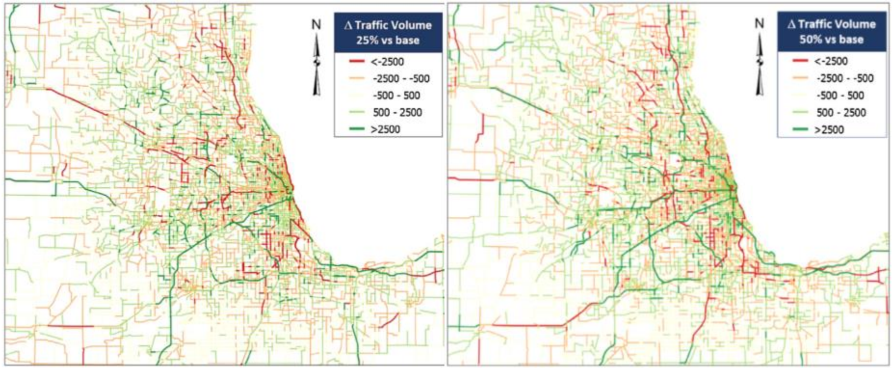
Workers' self-evaluation of the productivity of working from home during the COVID-19 pandemic

FUTURE INSIGHTS

FUTURE INSIGHTS

Planning Towards More Sustainable Future

- Teleworking carries much more potential than we thought before
    - A considerable portion of people fairly happy with their productivities at home, but not everyone:
        - Not having comfortable work environments at home
        - Distractions at home are important
    - Reducing the pollutants while keeping the individuals and firms productive.




Travel Behaviour and Society

Investigating the applicability of ADAPTS activity-based model in air quality analysis

Journal of Transport Geography

Incorporating in-home activities in ADAPTS activity-based framework: A sequential conditional probability

Transportation Research Part D

Analysis of telecommuting behavior and impacts on travel demand and the environment

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FUTURE INSIGHTS

Planning Towards More Sustainable Future

- Promoting micro-mobility
  - Bikes and scooters
  - Safe and accessible substitutes for transit in the pandemic situations

- Expectations on housing industry
  - Large Multi-story buildings in the suburban areas
  - People would be more interested in homes

FUTURE INSIGHTS

Industries

- Expectations on Air-travel & Urban Mobility Industries
    - Air-travel to road trips
    - Autonomous vehicles
    - Vehicle body sizes/types
    - TNC services to carry goods

https://news.abs-cbn.com/news/03/08/20/flight-attendants-fear-for-safety-as-coronavirus-cases-mount

https://www.flickr.com/photos/franklinheijnen/29761353154

FUTURE INSIGHTS

Industries

- Expectations on online shopping industry
  - Growth in the market of online shopping -- at least for groceries and from restaurants
    - Online shopping for groceries grew faster
    - Still online shopping from restaurants is more popular
  - The growth persists in the future, even far after the pandemic is over
    - ICT
    - Vehicle ownership

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FUTURE INSIGHTS

Autonomous Vehicles

More effective to promote AVs over non-AVs

- AVs make road trips easier
- AVs enable people to work in vehicles

More challenging to promote shared & pooled shared AVs over privately-owned AVs

- People have more concerns about shared-mobility

https://www.autonews.com/sponsored/autonomous-vehicles-automotive-and-transportation-disruption

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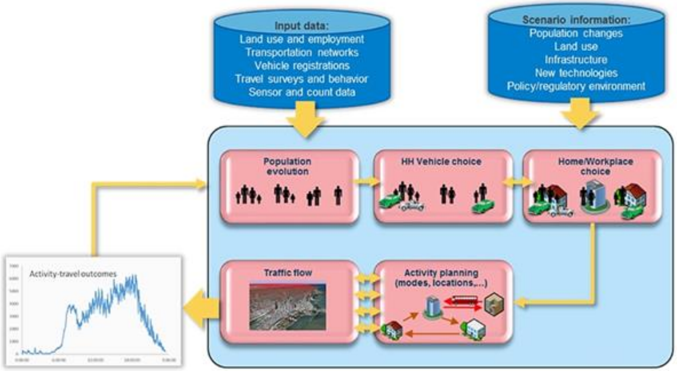
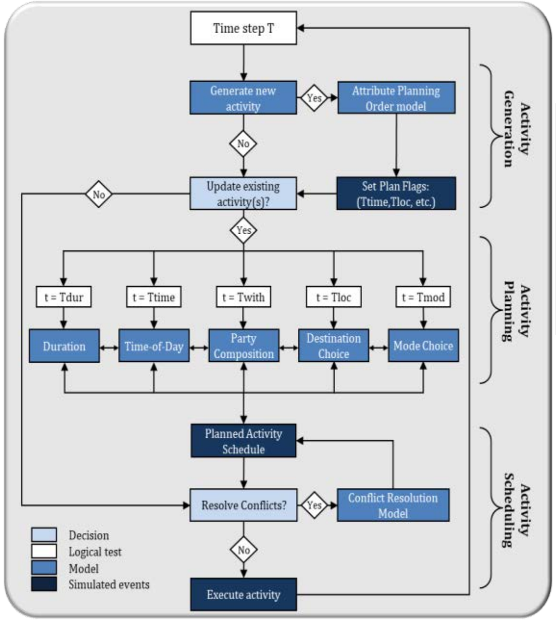
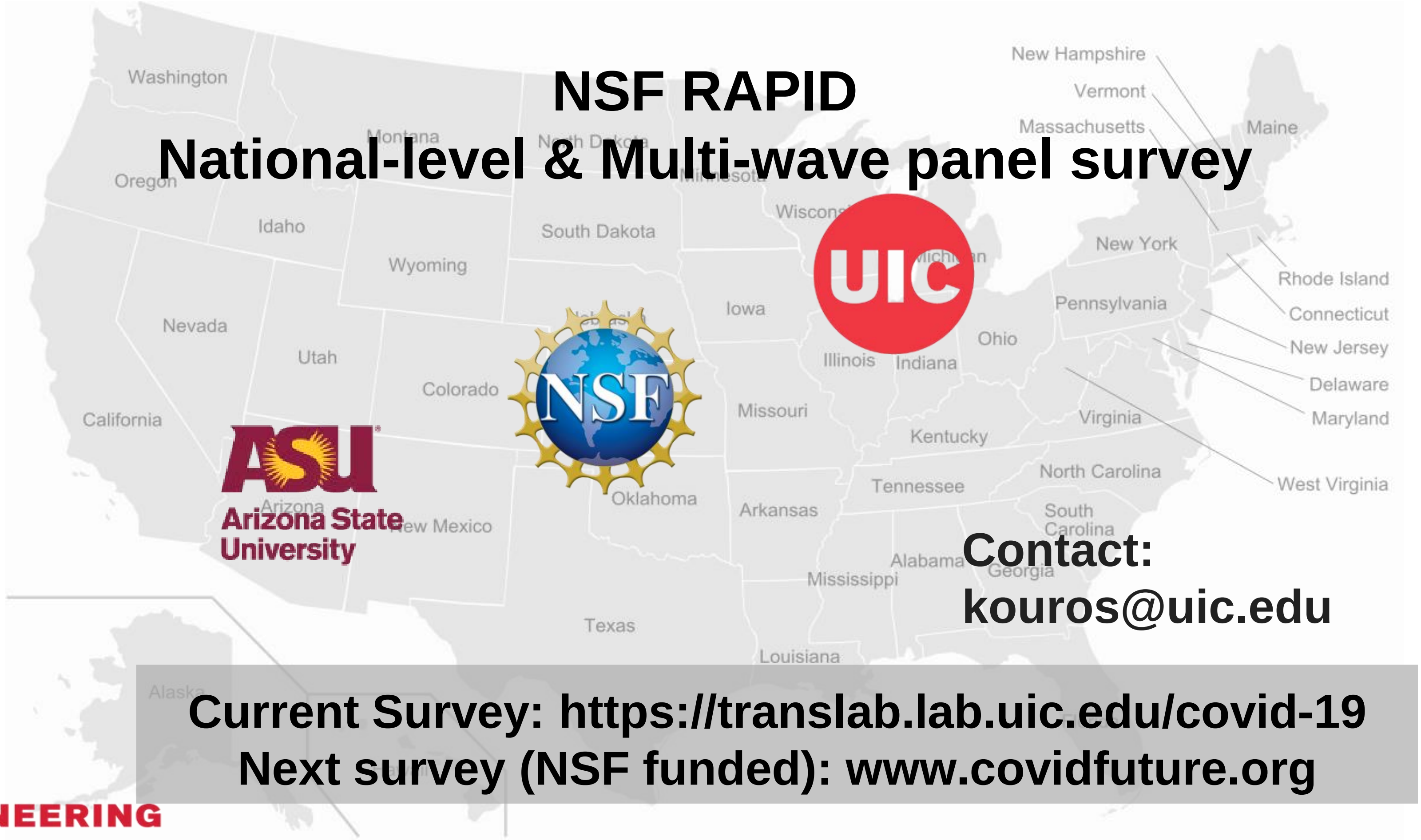
FUTURE INSIGHTS

Digital Twin: ADAPTS Agent-based Model





Next Phase of the Research ...



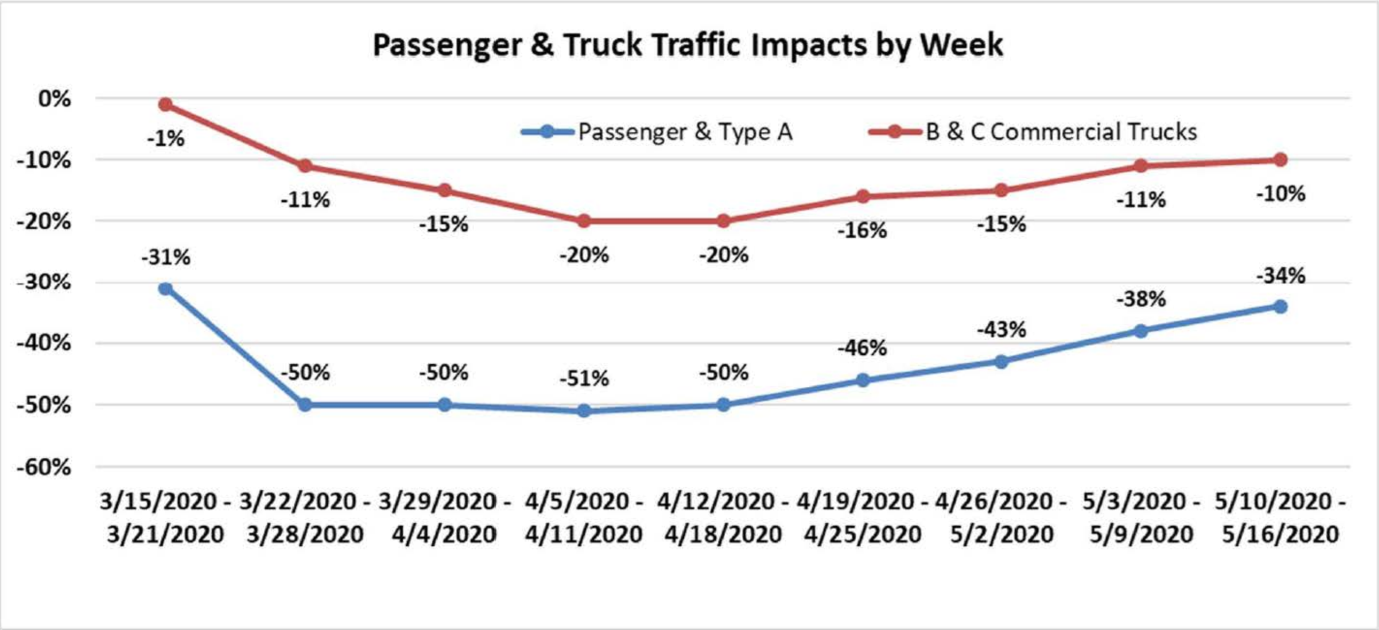
NSF RAPID
National-level & Multi-wave panel survey

Arizona State University

Contact:
kouros@uic.edu

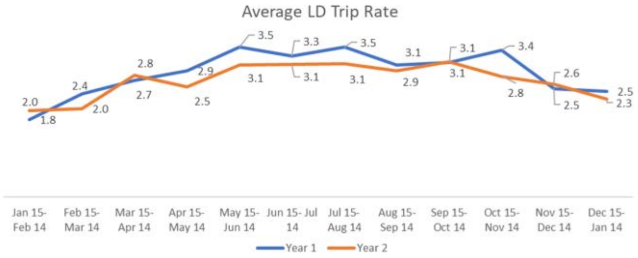
Current Survey: https://translab.lab.uic.edu/covid-19
Next survey (NSF funded): www.covidfuture.org

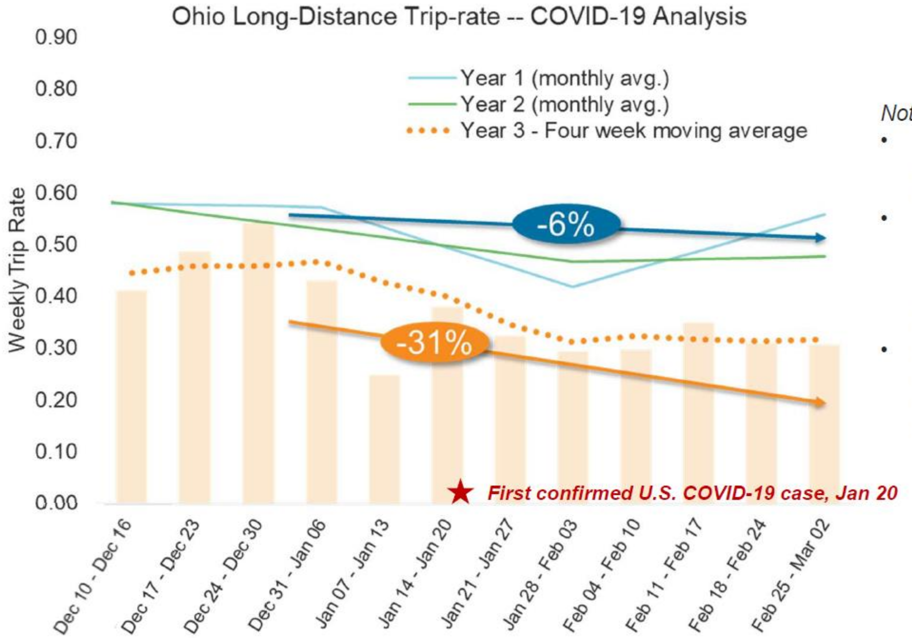
O Affected Everyone's Travel



Data Source: ODOT Technical Services, Traffic Monitoring, Permanent Count Stations, Average daily count by day of week March-May 2019 compared to actual count by specific day in 2020.

- Long-Distance trip rates were lower than expected starting mid-January.





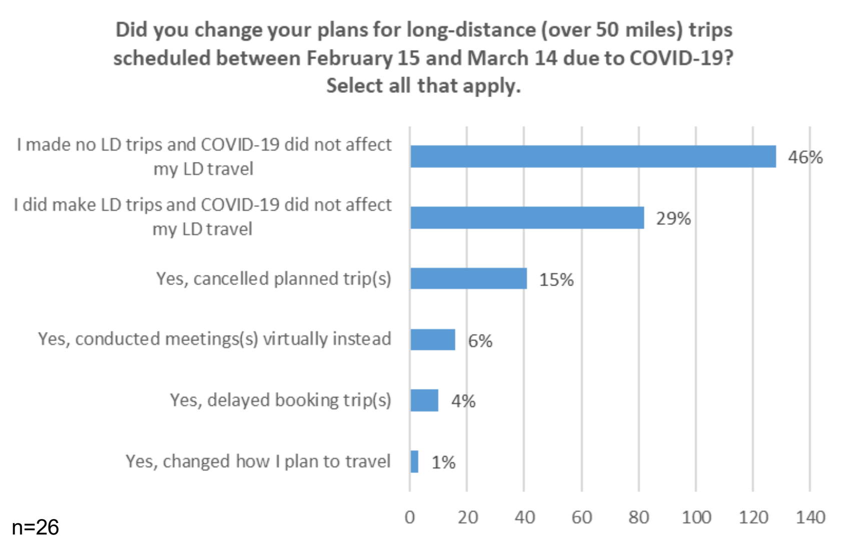
Notes:

- *Year 1,2 shown as average weekly trip rate by month*
- *Year 1,2 data wraps years (Y1 ran Jan-Jan; Y2 Feb-Feb) while Year 3 is sequential (Mar-Mar)*
- *Rate changes shown based on December and February monthly averages*

Data Source: Unweighted Ohio Long-Distance HTS

- 38% of those with LD trips planned February 15- March 14, 2020 were affected in due to COVID-19

- Personal travel was more affected than Business travel.
- Both were affected for 18% of respondents.



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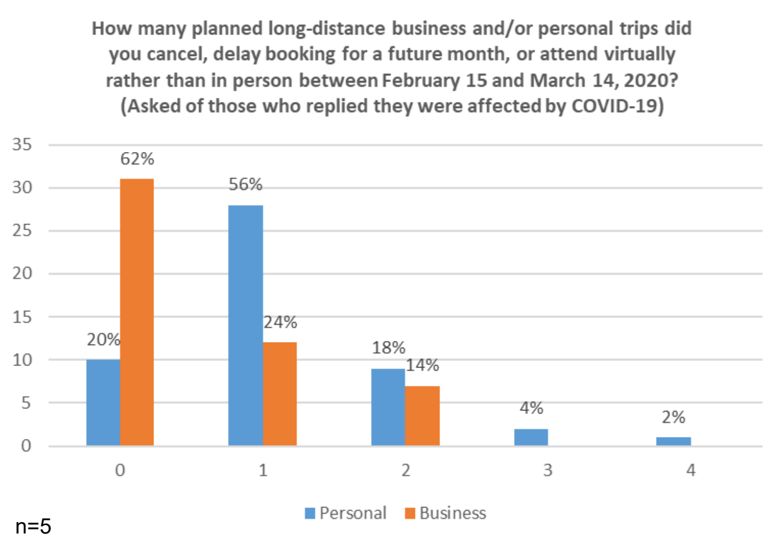
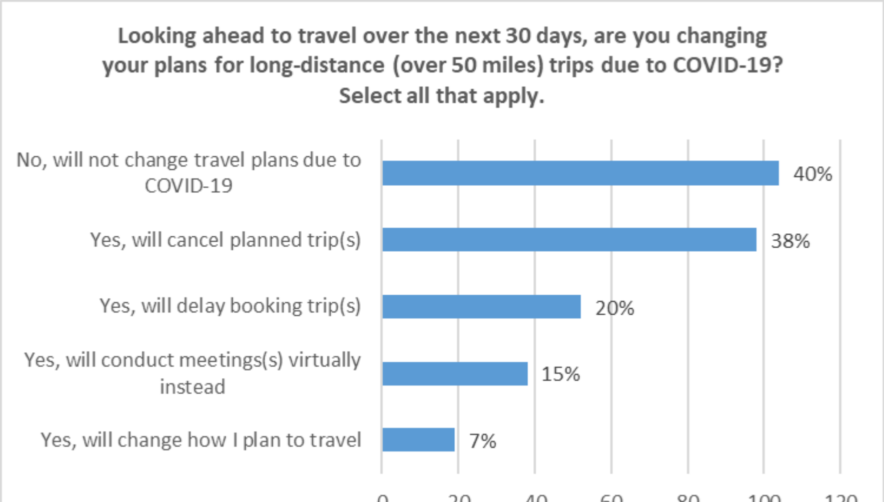


n=50

- Asked the week of March 15, 2020.
- Unfortunately, we neglected to ask if no LD trips were planned.
- Previous 2 years showed 73% of respondents made a LD trip from March 15-April 14



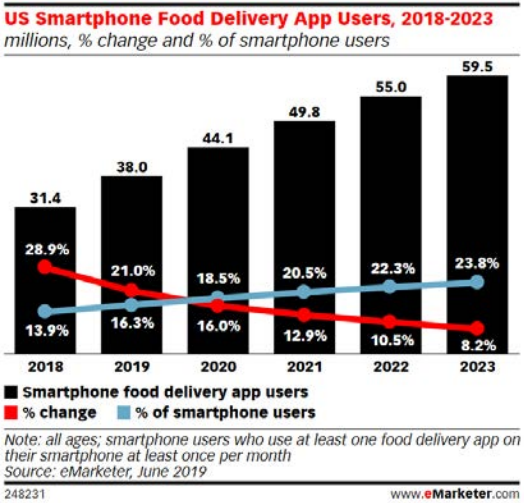
n=26
0

- Presumably, 13% of LD travelers did not think that their LD trips would be affected by COVID-19.
- This is potentially correct.
  - Many still made personal LD trips.
  - Some made unplanned LD trips.

Changes for Shopping

- Online grocery shopping and 3rd Party Food Delivery was already experiencing anticipated growth.
- Probably will level off to already expected levels by a Facility's Design Year (~2045)
- Hence, low-risk of affecting facility demand and design.

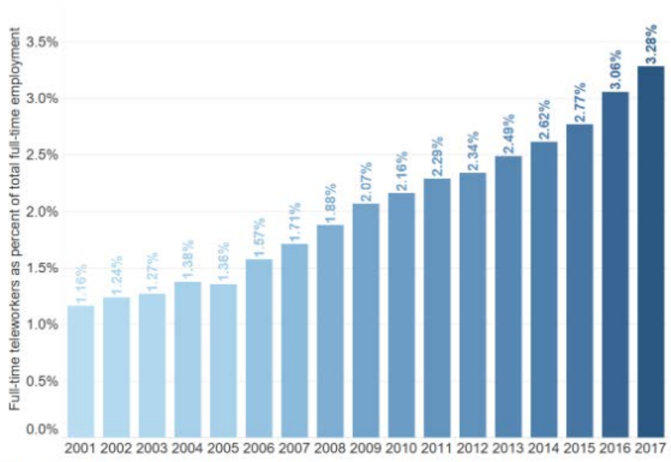
Source: https://www.statista.com/chart/14854/online-food-and-alcohol-sales-in-the-us/ July 2018



Source: https://www.emarketer.com/content/us-food-delivery-app-usage-will-approach-40-million-users-in-2019

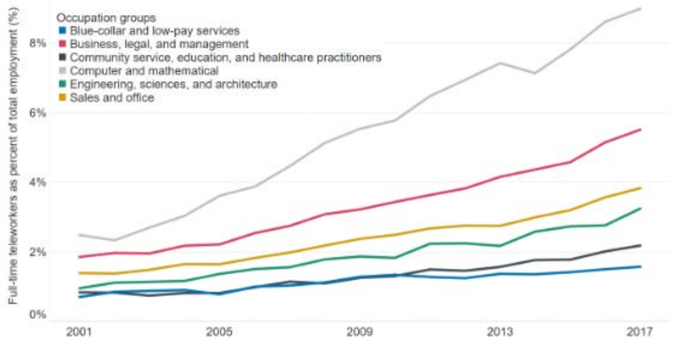
- While telecommuting was already expected to rise, the number of companies noting "just how well" telecommuting has worked for their business will probably increase this trend.
- Potential for decreased traffic to CBDs, leading to lower peak period congestion.
- Adds risk for overdesign of expensive downtown facilities

Chart 1: Full-time employees primarily working from home as a percent of total full-time employment, 2001 to 2017.



Source: American Community Survey; IPUMS-USA, University of Minnesota.

Chart 2: Full-time teleworkers as a percent of total full-time employment by occupation group, 2001 to 2017.



Source: American Community Survey; IPUMS-USA, University of Minnesota.

Source: https://www.conference-board.org/blog/labor-markets/Teleworking-Rapid-Expansion-Continues

- Prior research shows that mode use as a child persists over one's life
  - "Role of Childhood Context and Experience in Shaping Activity-Travel Choices in Adulthood" (Long, K. et al, TRR 2673, 2019)
  - "Mobility Biographies in Three Generations – Socialization Effects on Commute Mode Choice" (Doring, L. et al, Transportation Research Procedia 1, 2014)
  - "Travel Socialization: A Social Theory of Travel Mode Behavior" (Basington, H., International Journal of Sustainable Transportation, 2008)
  - "Childhood Influences on Adult Travel Mode Choice" (Johansson, M., International Conference of Traffic and Transport Psychology, 2005)

- "Bicycles are the new toilet paper" – Landis-Hanley, J. *The Guardian*, 21 Apr 2020
- Hard to quantify or even guess just what these effects might be
  - Will children or even adults continue to use active modes?
  - What trip purposes?
    - School, shopping, personal business, other errands?
  - Increase demand for non-motorized facilities?
- Perhaps increased importance for Routine Accommodation policies

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Rebekah Anderson
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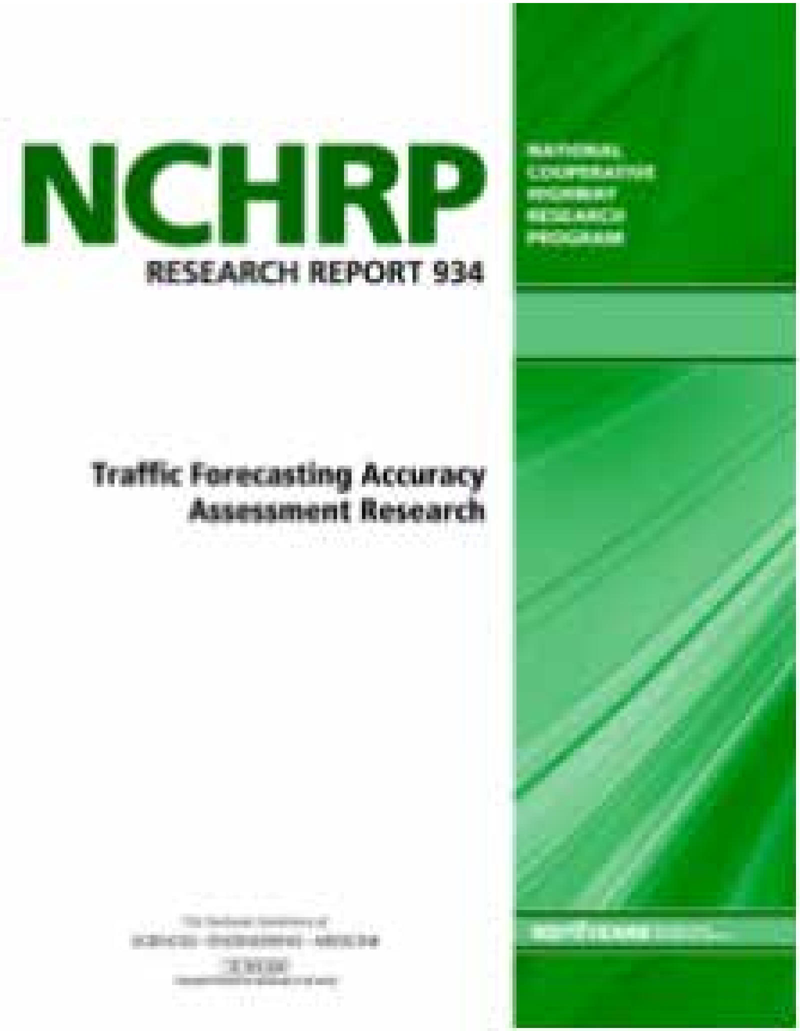
Ramin Shabanpour, PhD
University of Illinois at Chicago

Ali Shamshiripour
University of Illinois at Chicago

Monique Stinson
Argonne National Laboratory

TRB Resources

- Blog: **Telework transportation research in light of the COVID-19 pandemic**



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- Become a Friend of a Committee (http://bit.ly/TRBcommittees)
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  – May provide a path to become a Standing Committee member
- For more information: www.mytrb.org
  – Create your account
  – Update your profile

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Transportation Research Board

#TRBwebinar
#COVID19

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ATTACHMENT 2C:

Presentation: COVID-19 Impacts on Managed Lanes by the National Academies of Sciences Engineering and Medicine Transportation Research Board, 6/25/2020

The National Academies of
SCIENCES · ENGINEERING · MEDICINE

TRANSPORTATION RESEARCH BOARD

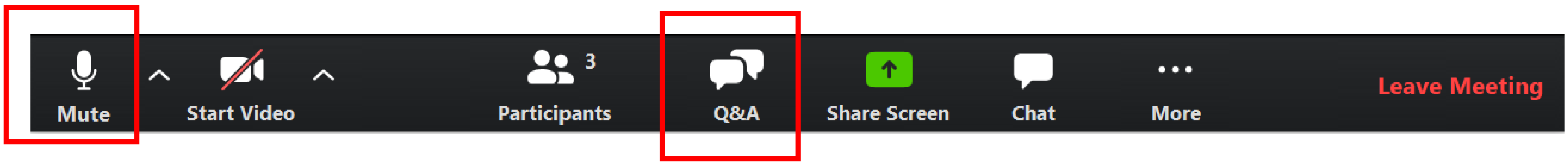
TRB Webinar: COVID-19 Impacts on Managed Lanes

June 25, 2020

@NASEMTRB
#TRBwebinar
#COVID19

Questions and Answers

Please type your questions into your webinar control panel



We will read your questions out loud, and answer as many as time allows

#TRBwebinar
#COVID19

COVID-19 Response
Bay Area Express Lanes

Lisa Klein
Director, Field Operations and Asset Management
Metropolitan Transportation Commission

TRB Webinar
June 25, 2020

BAY AREA **EXPRESS LANES**

COVID-19 Shelter-in-Place Regional Traffic Impacts

Traffic volumes decreased significantly:

- Bay Area Bridges: ⬇44% to 61%
- I-80 (Alameda County): ⬇40%
- US-101 (San Mateo County): ⬇60+%
- I-680 (Contra Costa County) Express Lanes Corridor: ⬇60+%

Traffic volumes reached their lowest point by late March / early April

Bay Bridge – Jan 2020

Bay Bridge – Mar 2020

Bay Area Express Lanes

About MTC's I-680 Express Lanes in Contra Cost County

- 12-mile corridor between Walnut Creek and Dublin, CA
- Heavily congested in the northern half of the corridor
- 31,000 Average Daily Express Lane Trips (pre COVID-19)

BAY AREA **EXPRESS LANES**

Regional Express Lane Tolling Ceased March 20 Restarted June 1

Express Lane Tolling Decisions

Bay Area Express Lane Operators Acted Jointly

Decision to Suspend Tolling

- Significant reduction in corridor traffic
- Free-up CHP enforcement for more critical tasks
- Relieve workload on back-office contractor

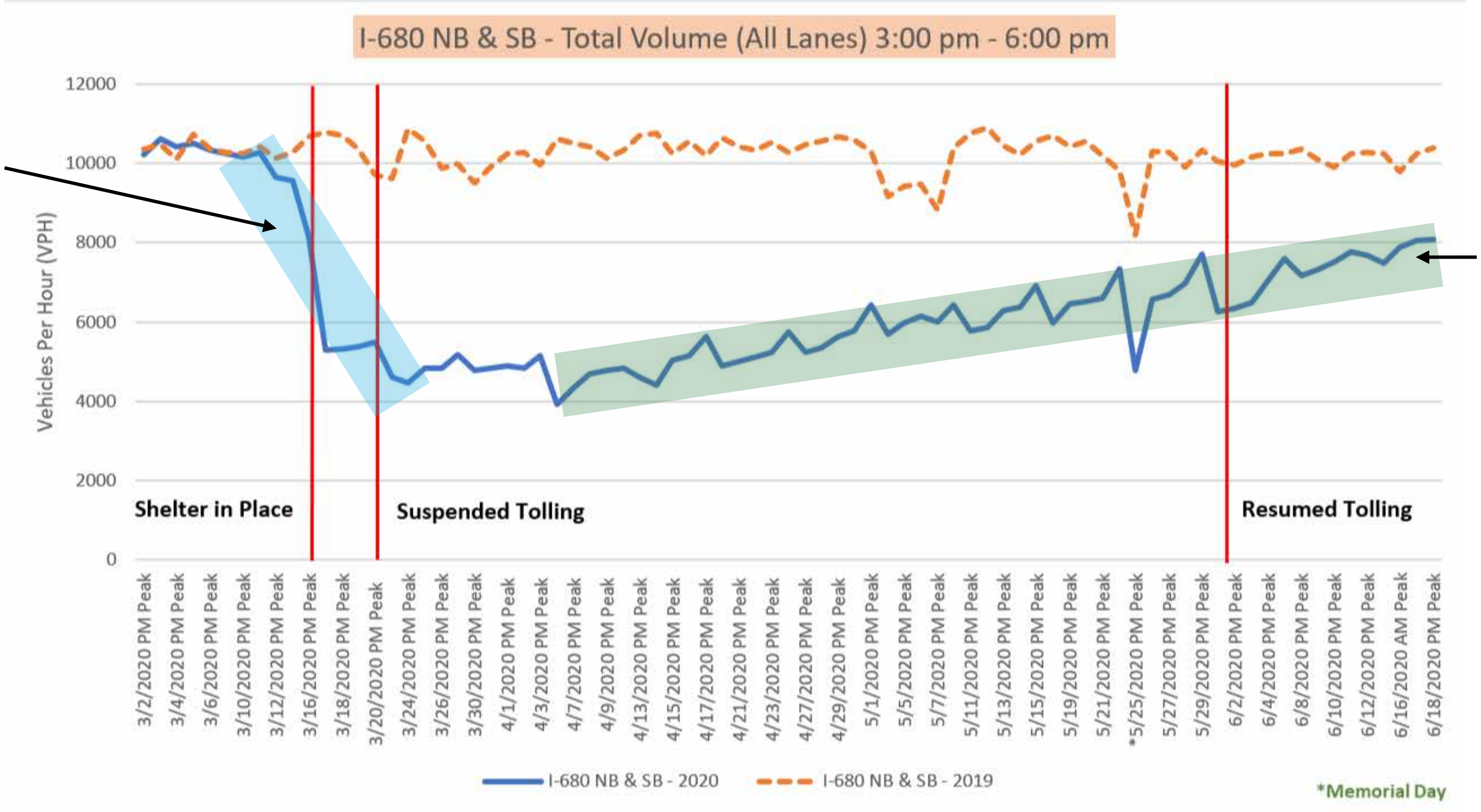
Decision to Resume Tolling

- Steady increase in corridor traffic
- Easing of public health orders
- 

Other CA EL Operators continued tolling

I-680 Traffic Trends During COVID-19

55% decline in traffic volumes in two-week period (3/10 – 3/24)



Steady rise in traffic volumes since 4/7. As of 6/18, corridor traffic volumes are down 22% compared to their pre COVID-19 levels.

I-680 Traffic Since Restart of Tolling

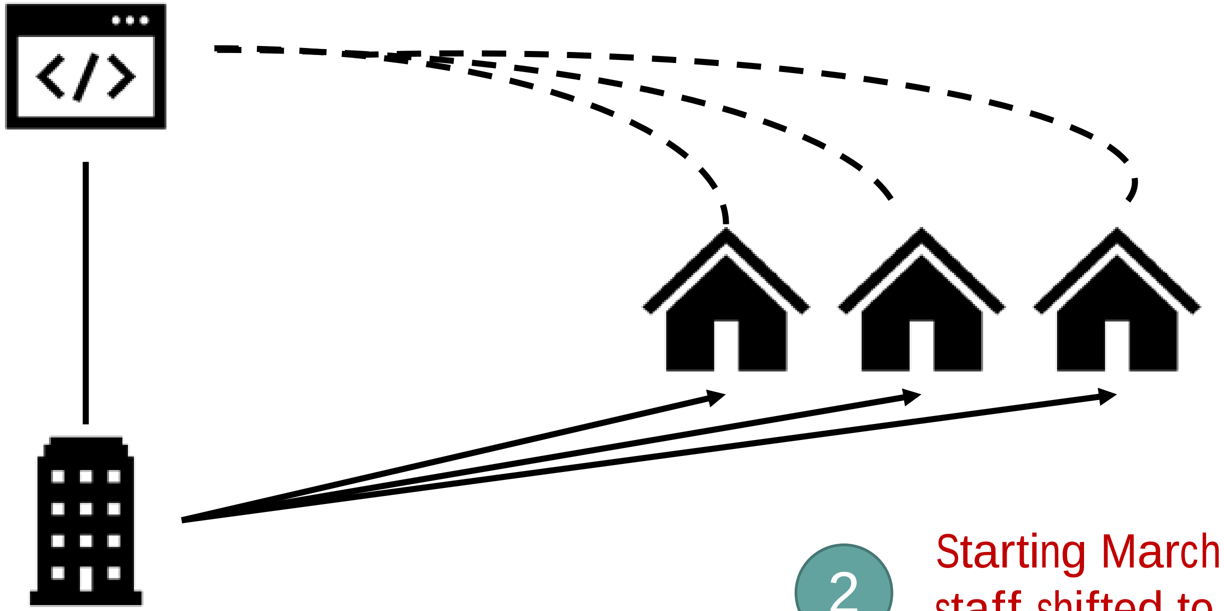
Peak Period (3:00 pm – 6:00 pm) Most Congested Tolling Zone

	Express Lane		
	Pre COVID-19 Pandemic	6/11/2020	% Difference
Average Toll	$8.00	$1.00	-88%
Average Speed	67 MPH	78 MPH	+16%
Average Volume	1,029 VPH	585 VPH	-43%

	General Purpose Lanes		
	Pre COVID-19 Pandemic	6/11/2020	% Difference
Average Toll	N/A	N/A	N/A
Average Speed	57 MPH	68 MPH	+19%
Average Volume	1,458 VPH	1,314 VPH	-10%

Remote Operation of Express Lanes

Express Lanes Network (ELN)



Regional Operations Center (ROC)

1

Pre COVID-19, EL Ops staff accessed the ELN directly through a closed network portal from the ROC.

2

Starting March 13th, EL Ops staff shifted to remote work to reduce risk of exposure to COVID-19 infection.

3

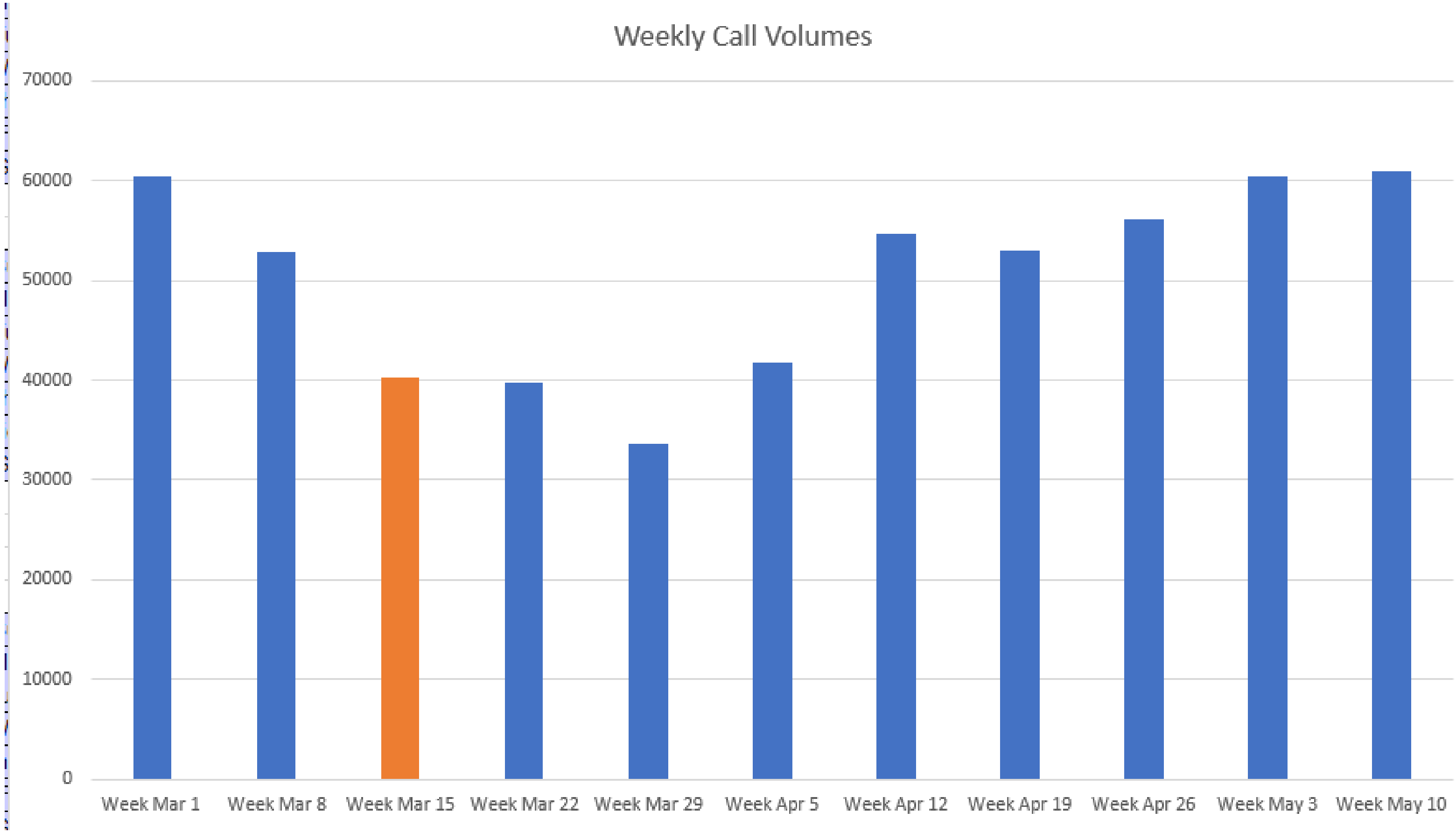
EL Ops staff continue operations remotely by connecting to the ELN via a secure Virtual Private Network (VPN).

Regional FasTrak Operations Significantly Affected

- Suspended cash collection on seven toll bridges
- Sent ~1.4 M invoices in each of April and May
- Suspended escalation for toll violations for all facilities

FasTrak Regional Customer Service Center Call Volumes

Call volumes declined by ~50% in the first weeks of shelter-in-place



Regional Customer Service Center COVID Impacts

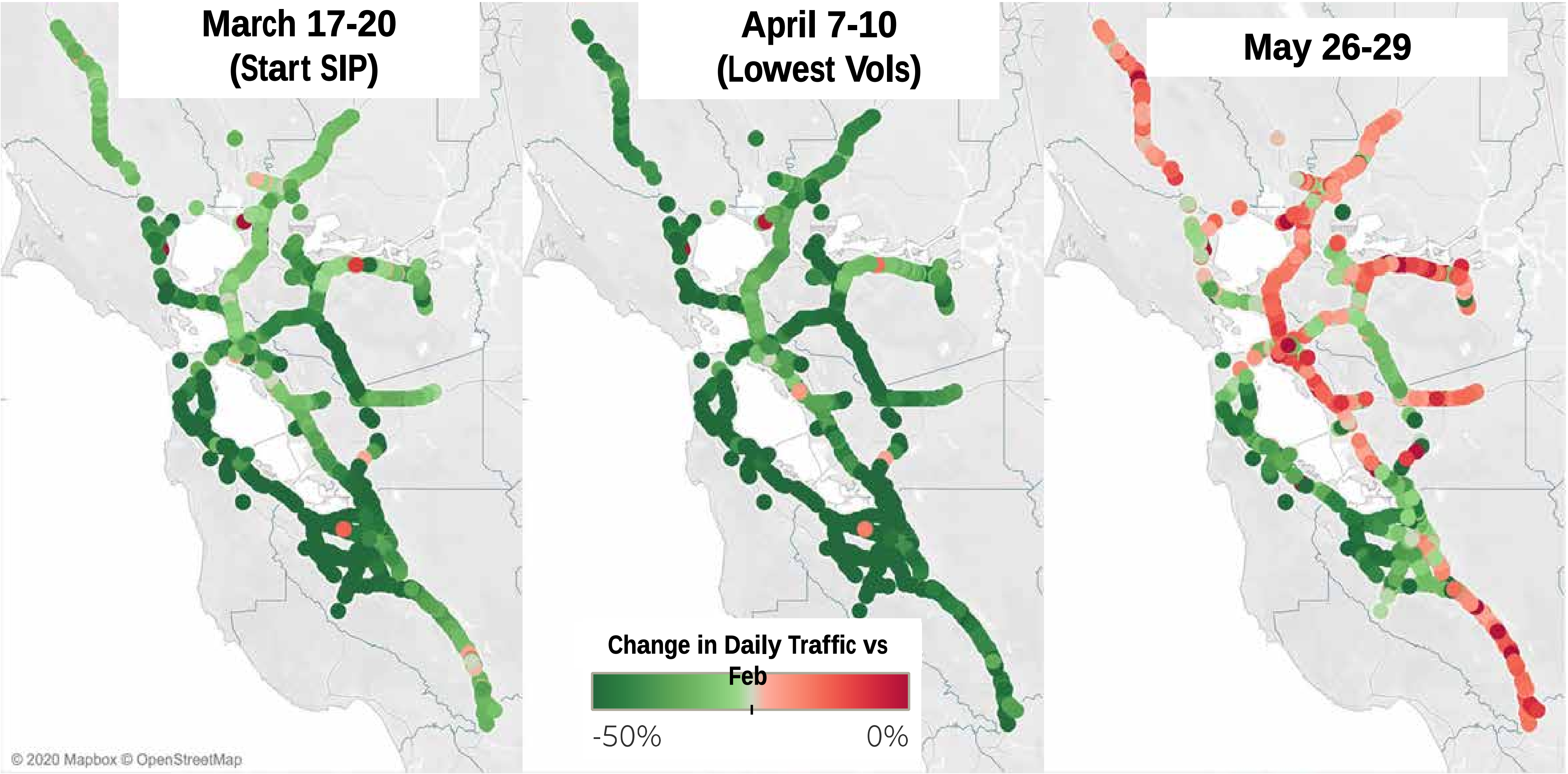
Operational Impacts

- Operations consistent with health ordinance for essential work
- Operational hours reduced; walk in center closed
- Sending toll notices with $0 penalty

Staffing Impacts

- Initial absenteeism between 40%-60%
- Recruiting to replace agents
- Work from home
  - Non-phone personnel in April
  - Phone agents in progress

Planning for the Future (3 – 12 months)
Uneven Return of Traffic



Source: Caltrans PeMS

More Unknowns than Knowns

Economic Recovery / Schools

Social/Business Practices (telecommuting, use of transit & carpooling)

Traffic

2nd Wave?

Managed lanes / technology provide operational flexibility

- Proceed as planned for new express lanes, opening later this year
- Formalize all electronic tolling on region's toll bridges

LA Metro ExpressLanes

COVID-19
Response

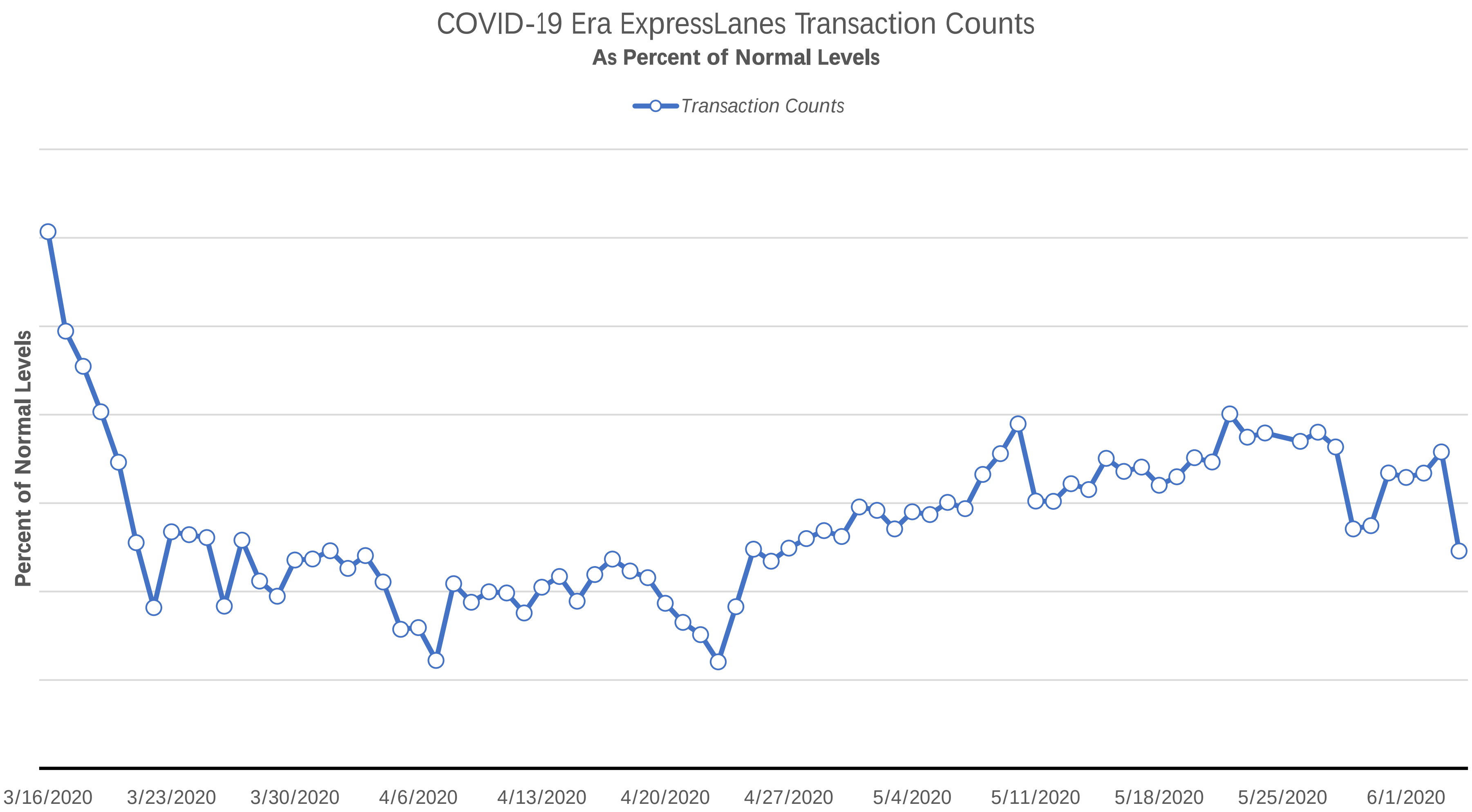
Metro

LA Metro COVID-19 Response

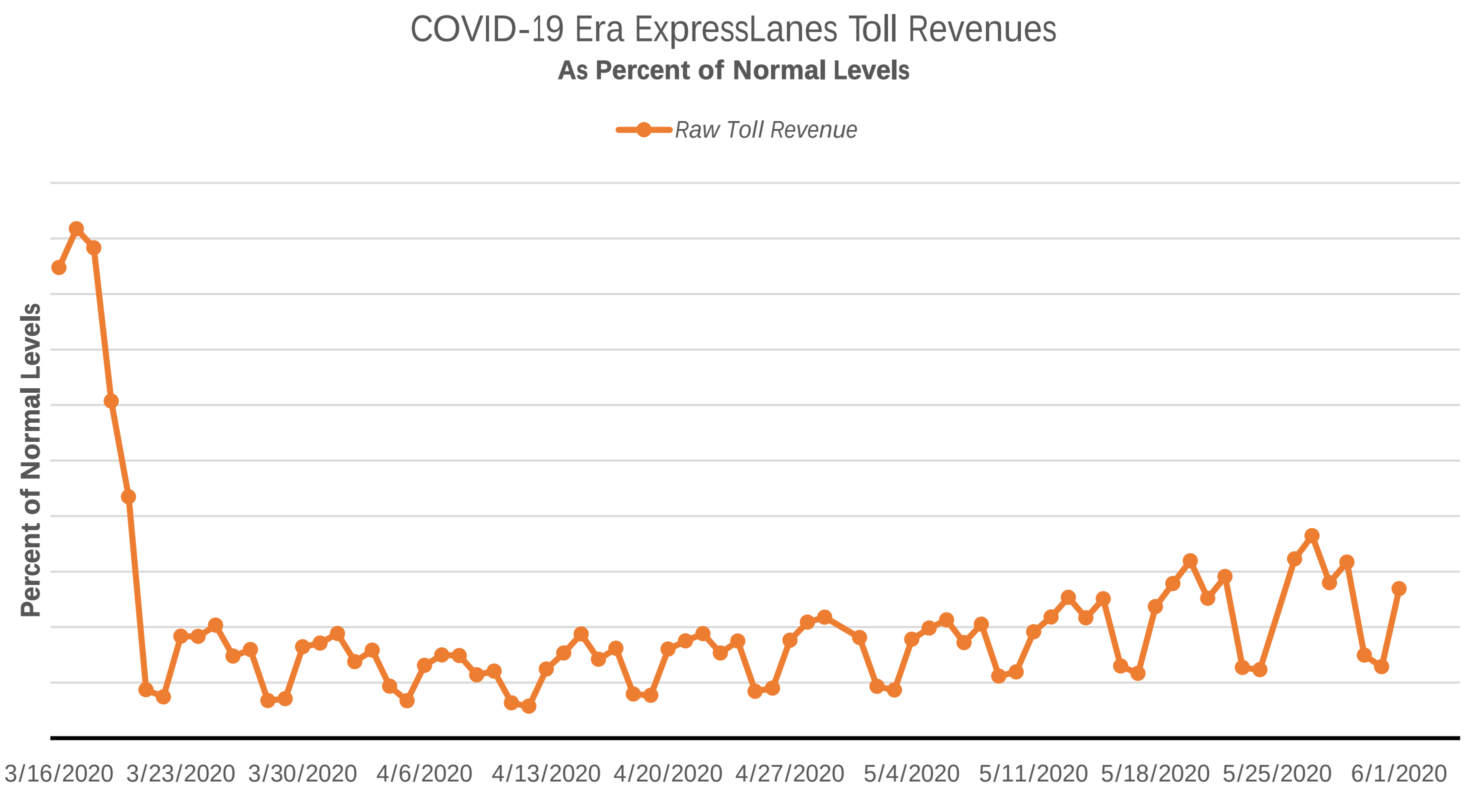
- March 19 – County of Los Angeles issues Safer at Home order (Ph 2:May 8)
  - Metro & ExpressLanes staff implement Work from Home (WFH) policy
  - Headquarters (Gateway Building) remains open
  - ExpressLanes closes Torrance Service Center
  - 20 Customer Service Representatives issued “Thin Clients” to receive calls remotely
  - Consultants, BOS, & RTCS remain engaged and in the field or work remotely
- End of March/early April Metro initiates minimum pricing on all corridors
- June 9 Metro re-establishes dynamic pricing on all corridors

Metro

Traffic Volumes

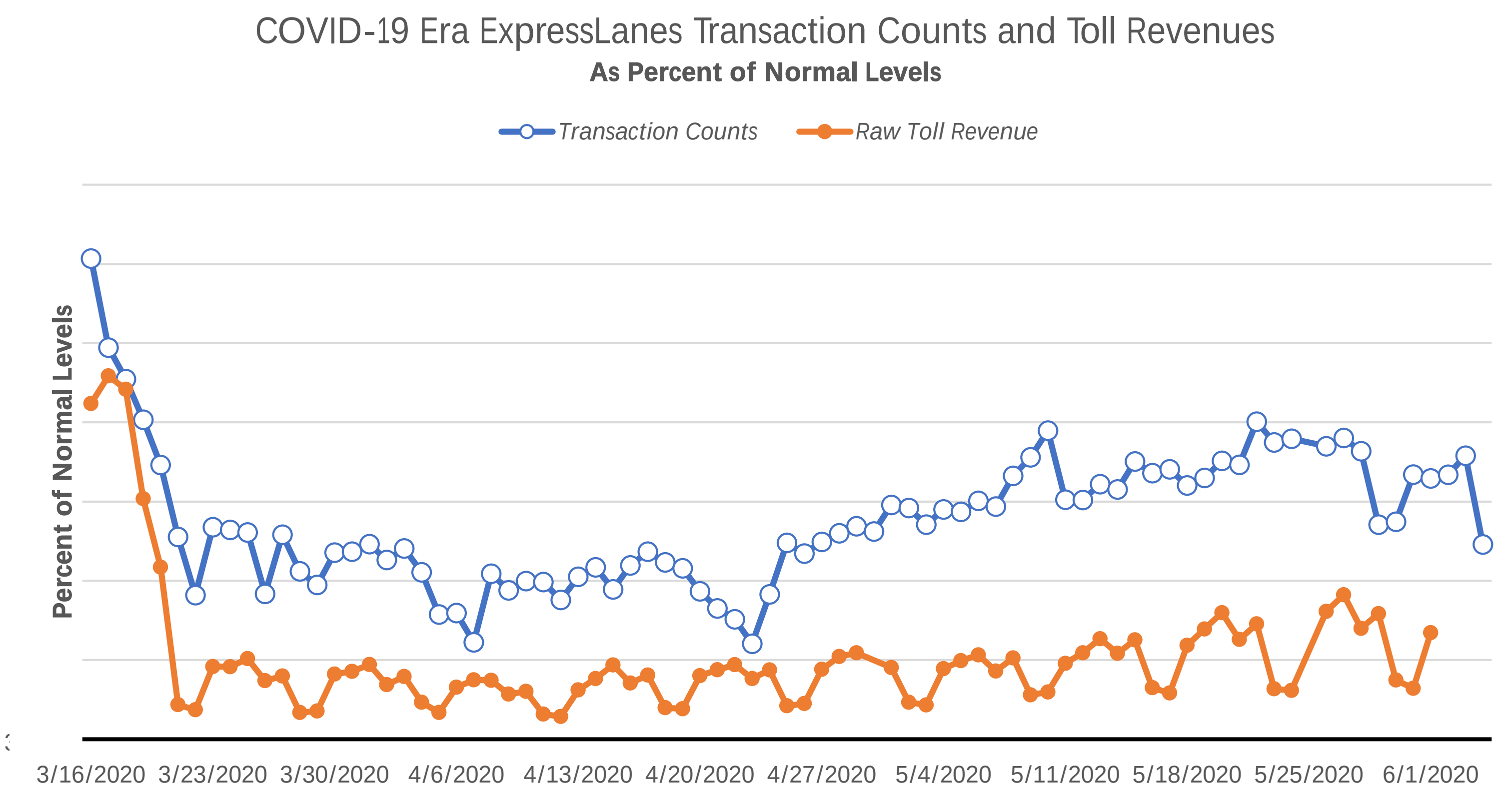


Revenue Volumes



Metro

Traffic and Revenue Volumes



LA Metro COVID-19

Next Steps:

- I-105 Environmental & Design (Ongoing)
- Dynamic Pricing (June 9)
- Open Service Center (July 6)
- Occupancy Detection System (August 1)
- Metro HQ (Gateway) Reopens (August – TBD)
- Normal Operations (October – December 2020)
- TIFIA LOI for 105 (2021, planned)

Metro

LA Metro COVID-19

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Congestion Reduction

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Metro

The Effects of COVID-19 on MnPASS Express Lanes

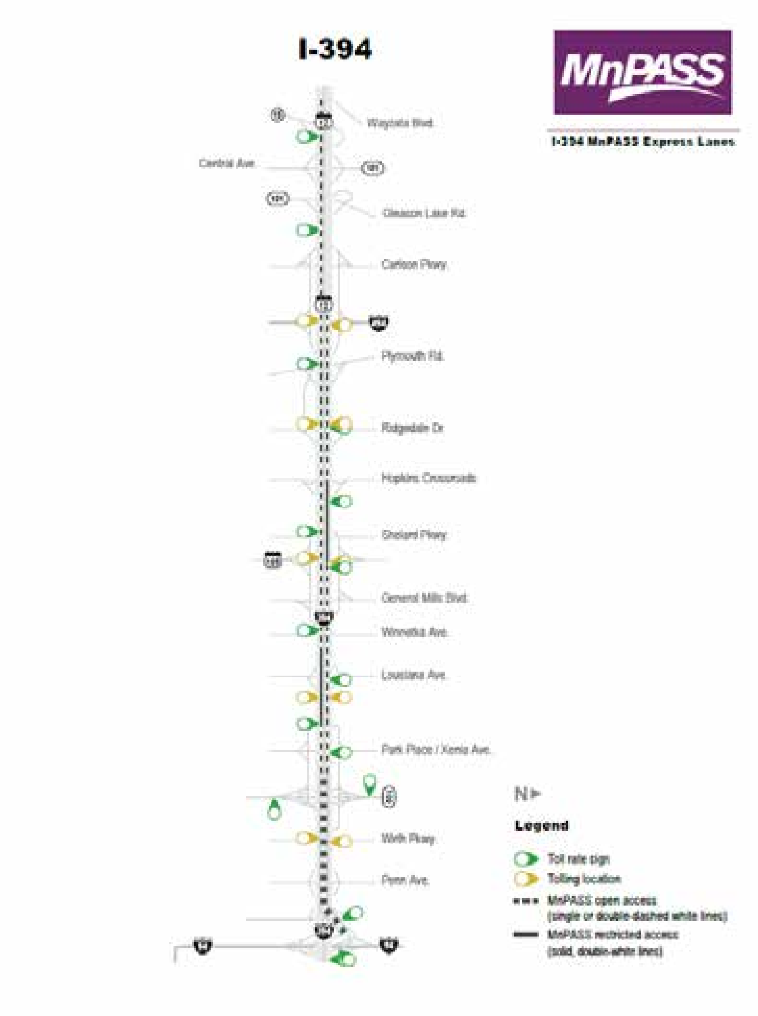
Kiet Ly, PE

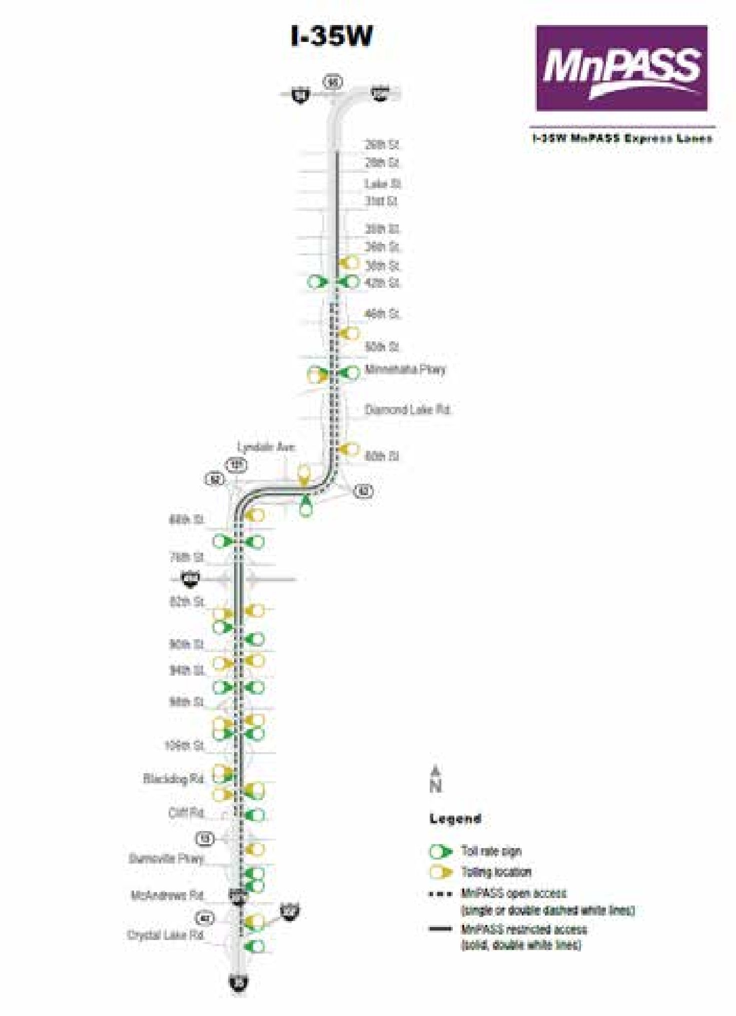
MnPASS Operations Engineer

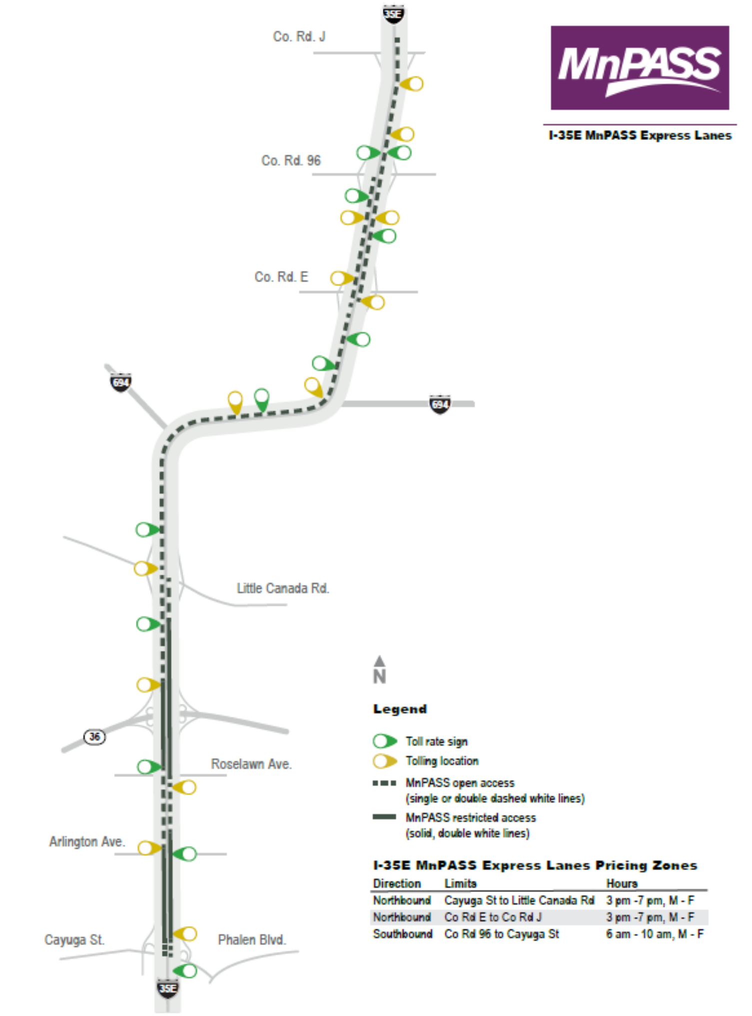
June 25, 2020

DEPARTMENT OF TRANSPORTATION

MnPASS Corridors Overview







MnPASS Express Lanes

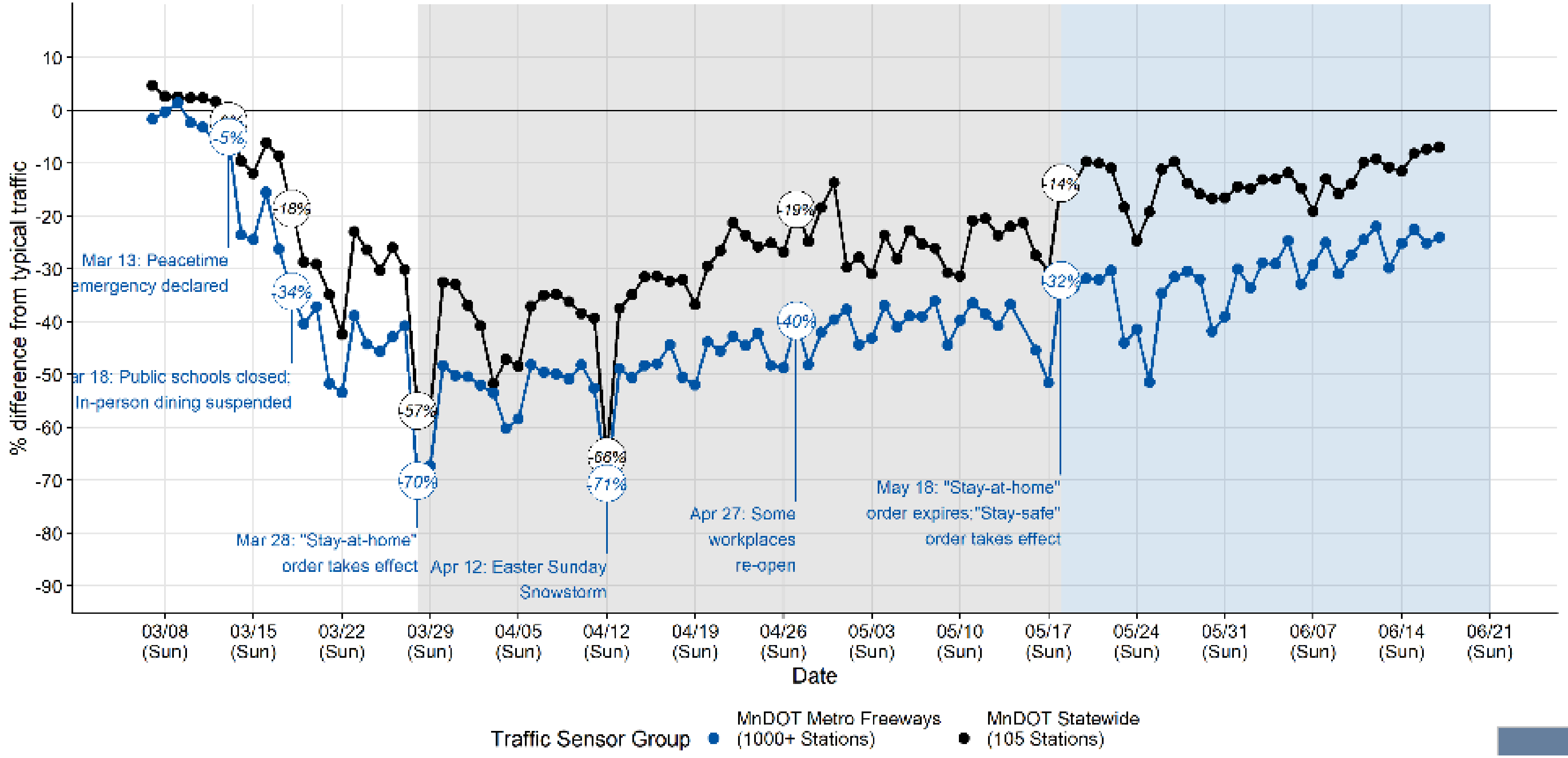
- MnPASS = MN's system of priced managed lanes (or High Occupancy Toll Lanes)

- MnPASS lanes currently in operation:
    - I-394 since 2005
    - I-35W since 2009
    - I-35E since 2015

- MnPASS is a key strategy for improving the efficiency of the region's highway and transit systems by providing a reliable, less congested option during peak travel times.

Traffic Travel Demand

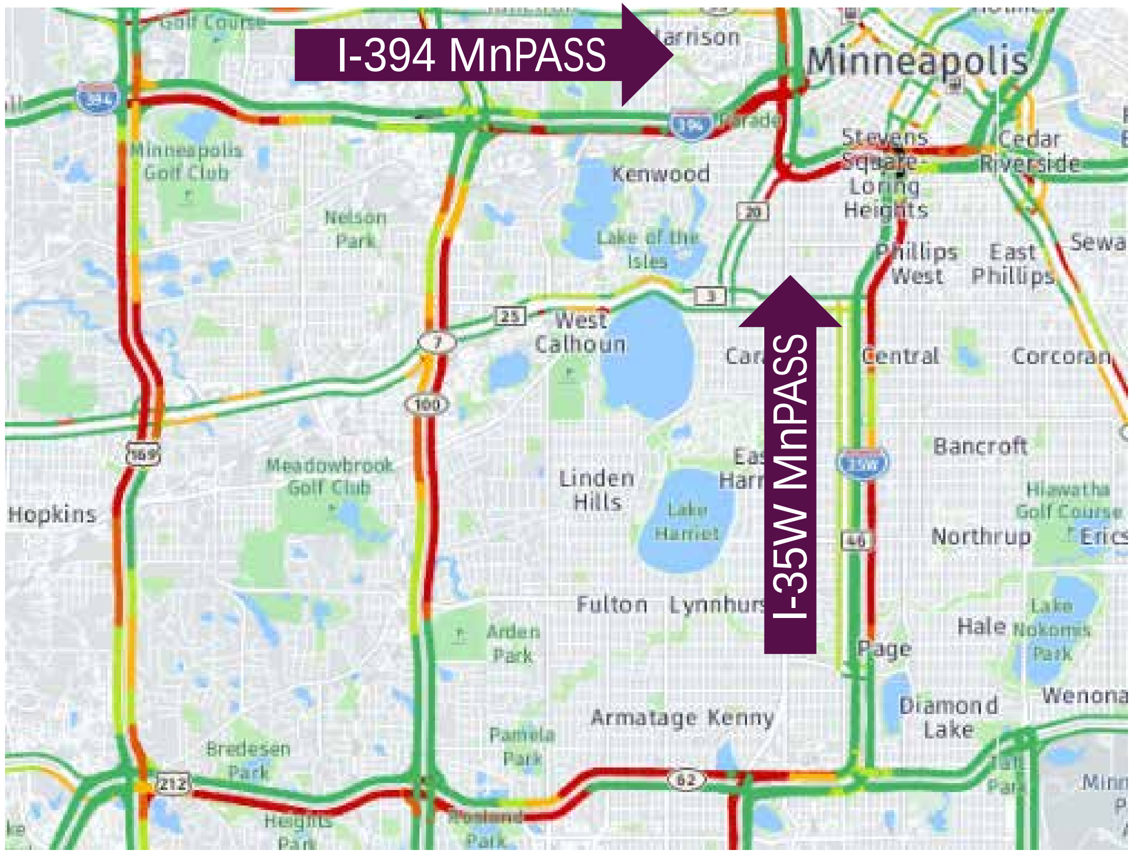
Travel decreased steadily in the days following the first COVID-19 case in Minnesota



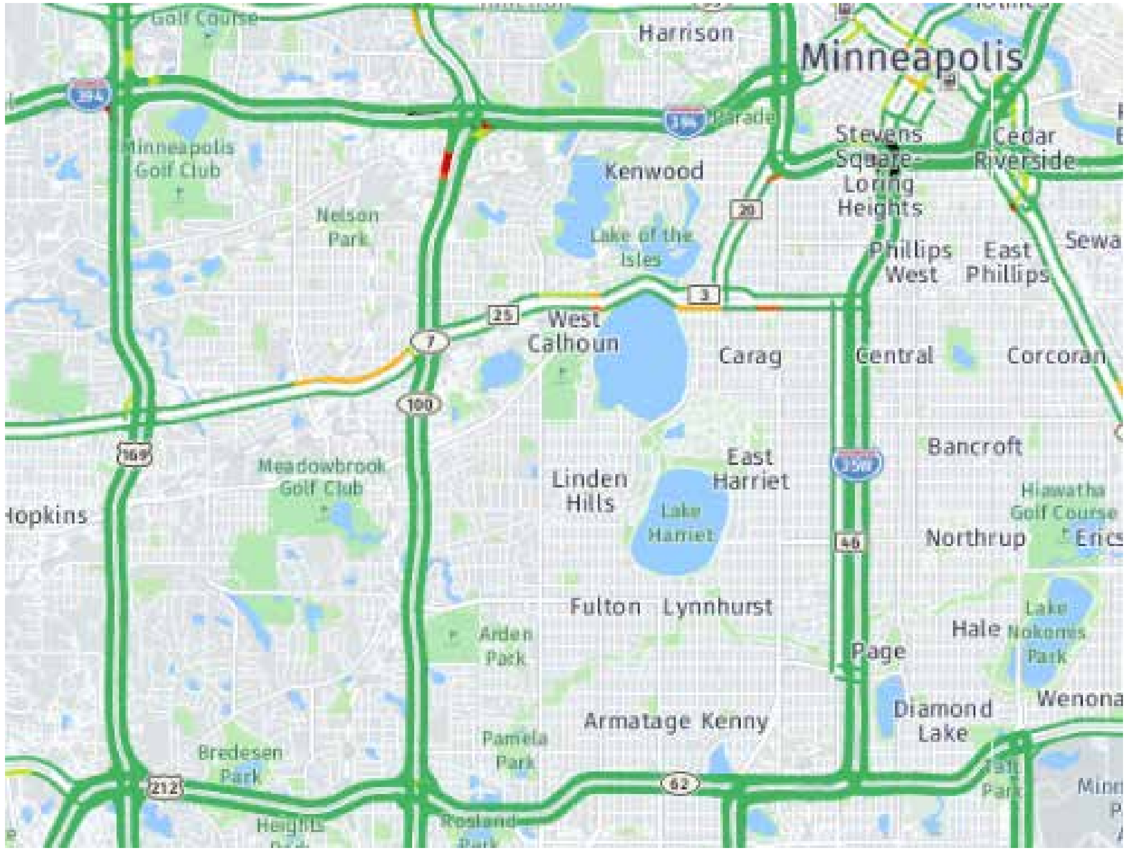
MnPASS.org

Congestion Levels

March 4th @ 8AM – before COVID-19 emergency



March 25th @ 8AM – after COVID-19 emergency



Operation Background

- MnPASS operations background
  - Customer Service Center at Golden Valley office
  - Approximately 50,000 accounts and over 67,000 transponders/tags
  - 3 CSRs; 1 CSR supervisor; 1 CSC manager and 1 project manager
- When Peace Time Emergency declared, our contract consultant established a new protocol to provide our services remotely
  - Discontinued walk-in service due to reduction of walk-in customers (a couple a day)
  - Set up CSRs to be able to access the back-office system remotely
  - Two staff report twice a week to handle mail and phone messages

COVID-19 Effects on MnPASS Operations

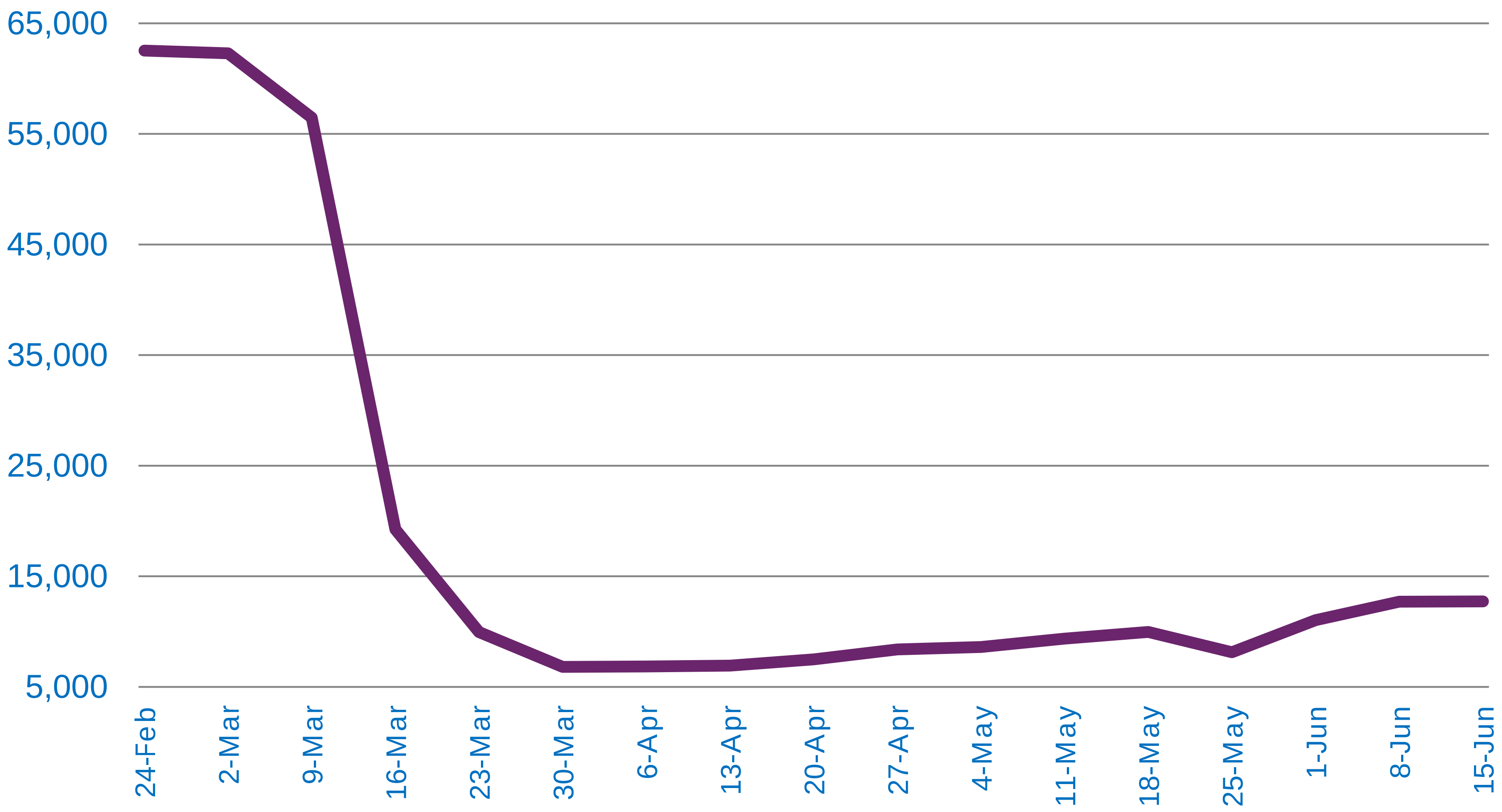
Average Monthly	Before COVID-19	After COVID-19	% Change
Inbound Calls	787	122	-84%
Outbound Calls	281	250	-11%
Emails	266	546	105%
Chats	145	155	7%
Walk-ins	76	0	-100%
Accounts Opened	486	42	-91%
Accounts Closed	92	86	-7%
Tags Requested	781	127	-84%

COVID-19 Effects on MnPASS Operations

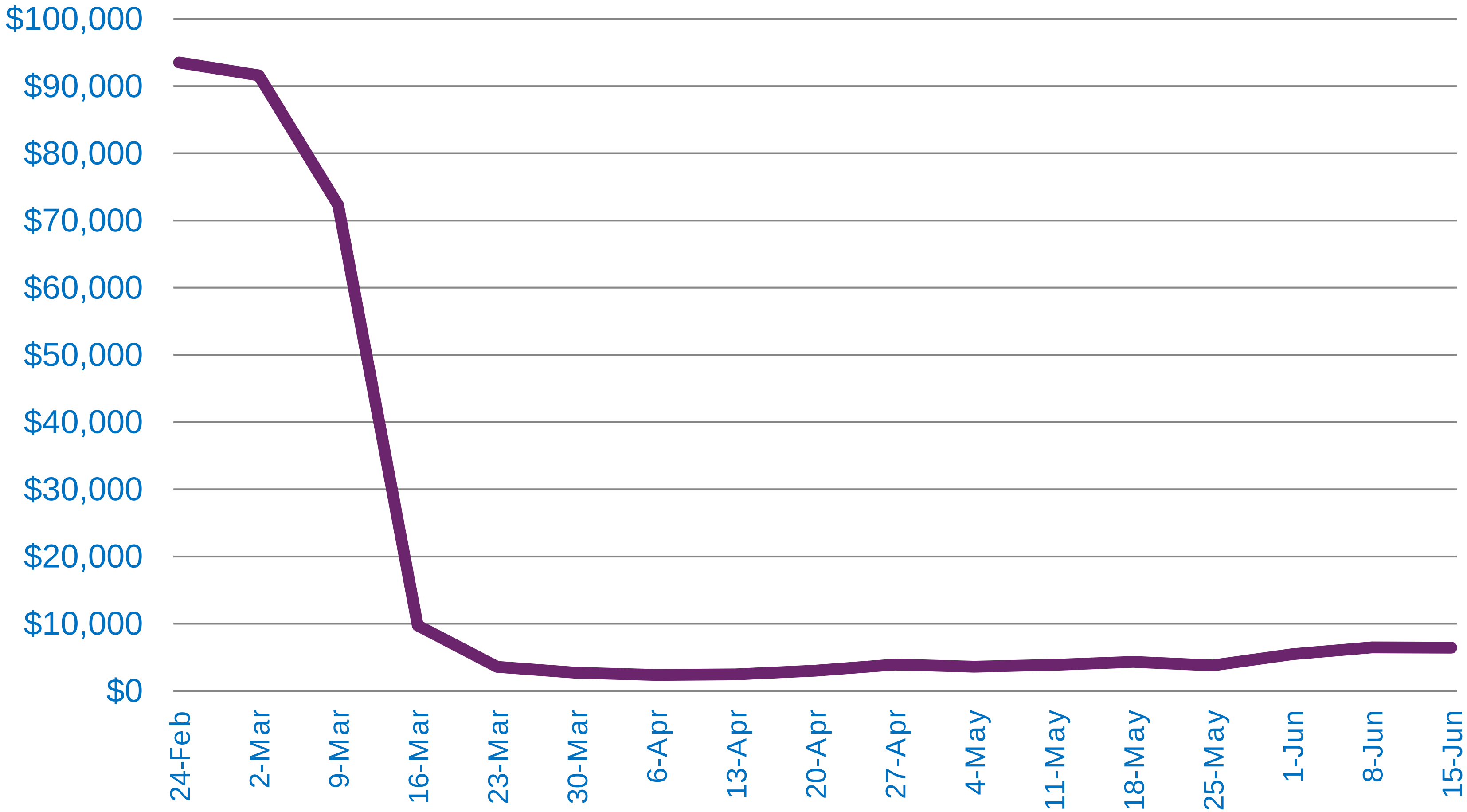
	Before COVID-19	After COVID-19	% Change
Average Monthly Toll Transactions (Trips)	258,103	36,169	-86%
Average Monthly Toll Revenue	$431,180.44	$14,788.75	-97%
Average Toll	$1.67	$0.41	-76%
Average Daily Toll Transactions (Trips)	12,340	1,722	-86%
Average Daily Toll Revenue	$20,614.20	$704.23	-97%

COVID-19 Effects on MnPASS Operations

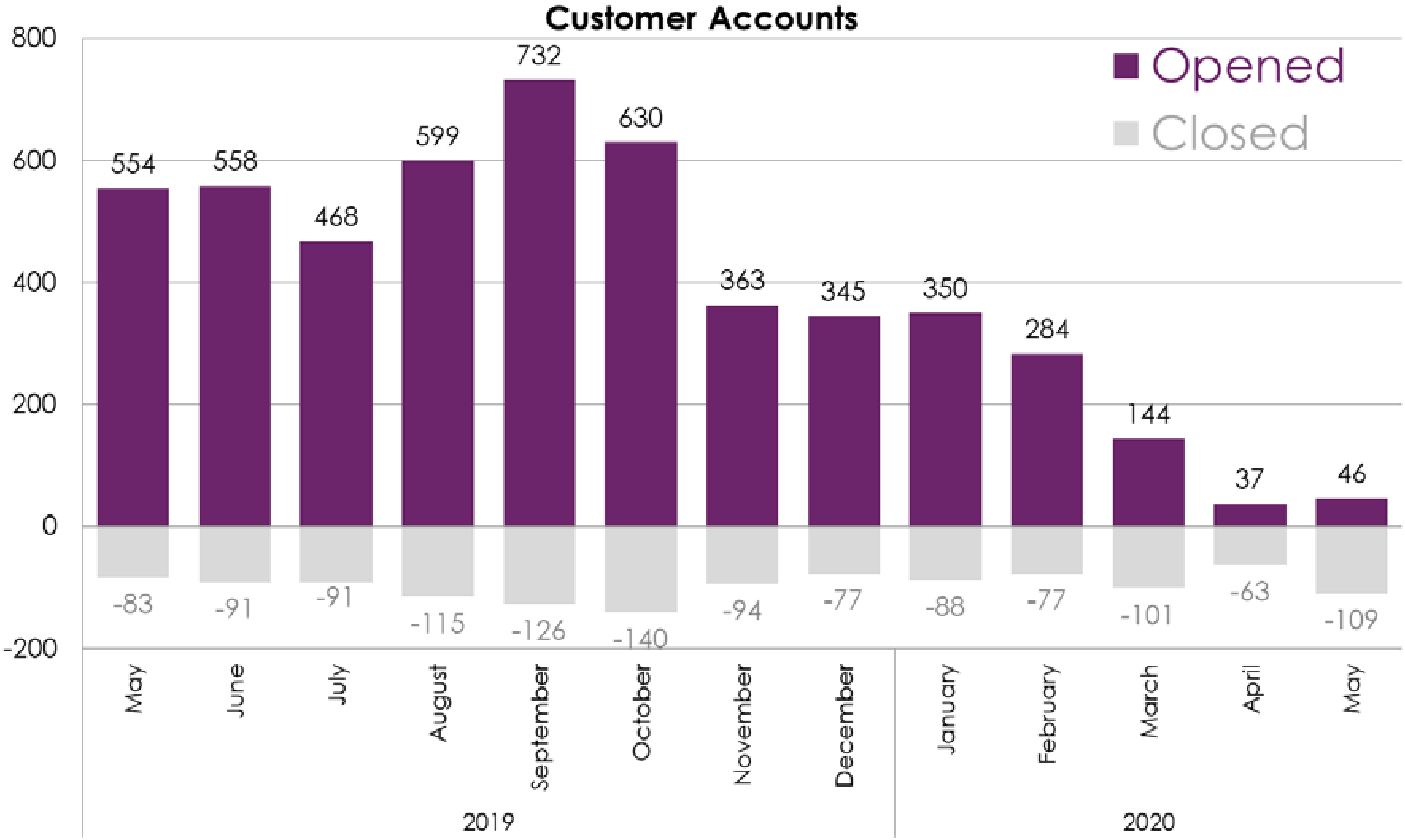
Weekly Trips



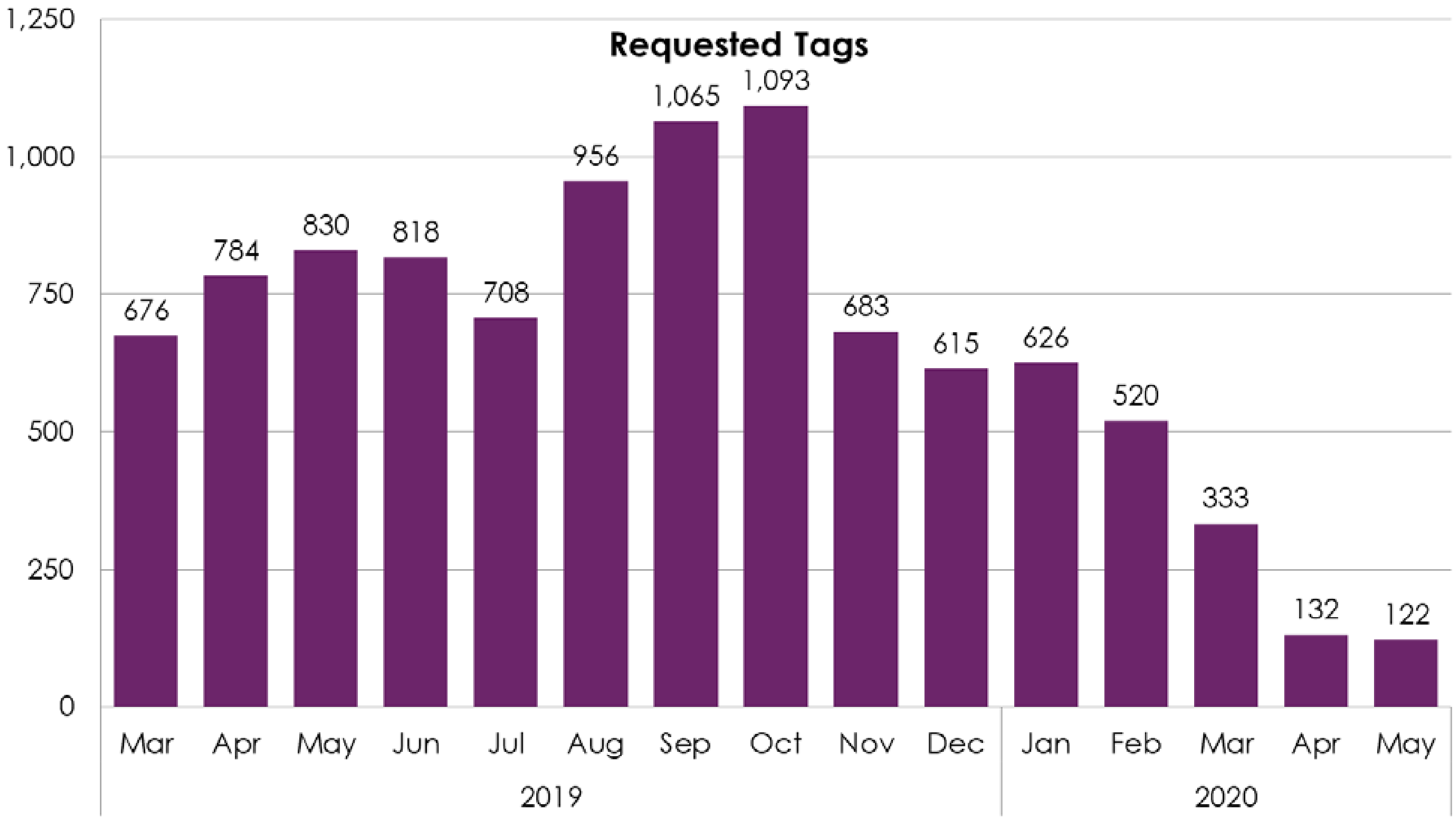
Weekly Toll Revenue



COVID-19 Effects on MnPASS Operations



COVID-19 Effects on MnPASS Operations



Conclusion

- Significant impacts on our operations.
- Continue to operate with our current protocol.
- We will operate normal when the economy and travel demands are recovered.

Thank you!

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MnPASS Operations Engineer
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651-234-7028

Webinar Presenters

Lisa Klein

METROPOLITAN TRANSPORTATION COMMISSION

Mark Linsenmayer

Metro

Kiet Ly

DEPARTMENT OF TRANSPORTATION

Moderator: Darren Henderson

wsp

TRB Resources

- Consensus Study Report: *Renewing the National Commitment to the Interstate Highway System: A Foundation for the Future*
- *NCHRP Research Report 835: Guidelines for Implementing Managed Lanes*
- *NCHRP Research Report 860: Assessing the Environmental Justice Effects of Toll Implementation or Rate Changes: Guidebook and Toolbox*
- *NCHRP Synthesis Report 540: Leveraging Private Capital for Infrastructure Renewal*
- *NCFRP Research Report 39: Freight Transportation Resilience in Response to Supply Chain Disruptions*
- Traffic management webinars

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ATTACHMENT 2D:

Memorandum: Transportation Impacts of the COVID-19 Pandemic in the National Capital Region by the National Capital Region Transportation Planning Board Technical Committee, 9/3/2020

National Capital Region
Transportation Planning Board

MEMORANDUM

TO: TPB Technical Committee

FROM: Andrew Meese, TPB Systems Performance Planning Director

SUBJECT: Transportation Impacts of the COVID-19 Pandemic in the National Capital Region

DATE: September 3, 2020 (Revised)

INTRODUCTION

The COVID-19 pandemic and associated precautions since March 2020 have had profound impacts on travel and transportation systems in the National Capital Region. This memorandum compiles information from a variety of sources to provide snapshots of the magnitude and trends of these changes in the initial months of this disruptive pandemic period. Summary presentations are planned for the September 4, 2020 TPB Technical Committee meeting and at a future TPB meeting.

The purpose of this work activity is to examine the data availability on various aspects of travel, and to understand the fidelity and limitations of the data, to help assess the true nature/extent of change in travel and usage of the transportation service and infrastructure. At the present time, staff has not conducted any analysis to assess system performance and or draw conclusions to inform future planning and programming.

This work activity is the beginning of efforts towards better understanding the impacts with the intention of determining the aspects of transportation system that the region will need to address to be more resilient and more equitable in the future. A meaningful analysis of this unprecedented change in the supply and demand on transportation needs accurate, representative, comprehensive data on the demand and supply sides. For example, while the pandemic-related restrictions on movement have impacted travel demand, the personal and public health nature of the pandemic has affected the ability to provide transportation service – particularly public transportation. Regionally, fares contribute about 30% (ranging from 10% to 70% on different systems) of the operating costs of providing public transportation. Inability to collect these fares (on systems that have suspended fare collection due to pandemic social distancing precautions) and reduced travel (particularly on the rail systems) have impacted the financial viability of public transportation. At the same time, transit agencies have had to consider rider and employee health risks, and undertake both additional cleaning/disinfecting and equipment modification (e.g., driver shields) activities, while maintaining as much transit service as feasible. This comes at a time when these services have been most needed – especially the bus services.

Emergency orders in the District of Columbia, Maryland, and Virginia impacting travel were issued in the general time period of March 5 through 20, 2020. The COG website at www.mwcog.org/about-us/covid-19/ provides information about declarations as well as links to data sources about COVID-19 and its (non-transportation) impacts.

STRUCTURE OF THIS MEMORANDUM

TPB staff compiled data and information from a variety of sources to examine the COVID-19 pandemic's transportation impacts from several perspectives. These data differ in geography, time scales, and methodologies because of the variety of mostly non-COG/TPB sources, but individually and collectively provide insights (though not necessarily definitive conclusions) on regional impacts. Caveats include that the scope, timeliness, and consistent or continued availability of data from outside sources are beyond the control of TPB staff, potentially limiting further staff analysis. In some cases, anomalous information in data from external sources could not be explained, and for now, those sources have not been included in this memorandum. Additionally, a separate future effort is anticipated to examine transit impacts in more detail, especially for Metrobus and Metrorail.

Information is grouped into three main sections: Travel and Roadway Traffic Volumes Impacts; Transit and Walking; and Safety, Speeds, and Other Impacts. Each section contains multiple subsections with one or more information sources each, providing a variety of snapshots.

TRAVEL AND ROADWAY TRAFFIC VOLUME IMPACTS

1. ROADWAY TRAFFIC VOLUMES

Snapshot: Roadway traffic volumes in the National Capital Region, which in April 2020 had dipped below 50% of 2019 volumes, by July had recovered to over 80% of 2019 volumes. The magnitude of these trends varied among the core jurisdictions, inner suburbs, and outer suburbs.

Figure 1 shows traffic volumes at over 60 continuous count stations at locations around the TPB modeled region (larger than the TPB membership area itself). Volumes at these pinpoint locations were down generally almost 50% in the month of April 2020 compared to April 2019, but by July 2019, had risen to be just about 19% less than July 2019 levels. Visualizations of weekly average daily traffic and average hourly traffic by month are also shown.

Figures 2 through 4 show these traffic volumes summarized for three jurisdictional groupings in the modeled area: core, inner, and outer jurisdictions. Figure 2 shows that the central jurisdictions showed the largest decrease with a monthly average percent change in traffic of almost 60 percent from 2019 levels during April and still more than 30 percent off in July compared to the previous year. Figures 3 and 4 show that the inner jurisdictions and outer jurisdictions had changes in traffic volumes more consistent with regional levels, with the outer jurisdictions registering the smallest decrease in traffic volumes among the three jurisdictional groups.

Figure 1: Traffic Counts and Percentage Changes at Permanent County Stations in the TPB Modeled Region (Source: TPB)

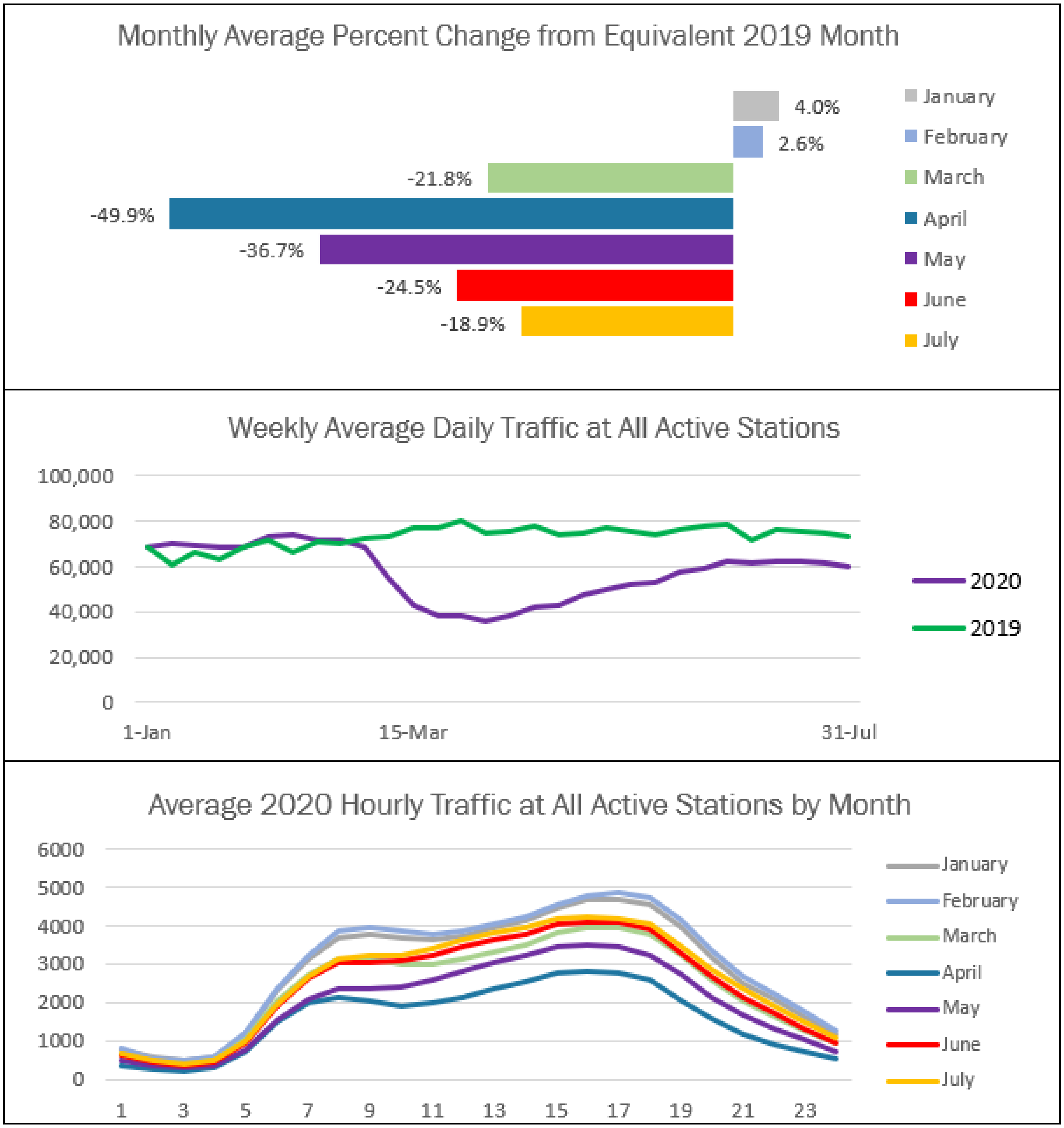
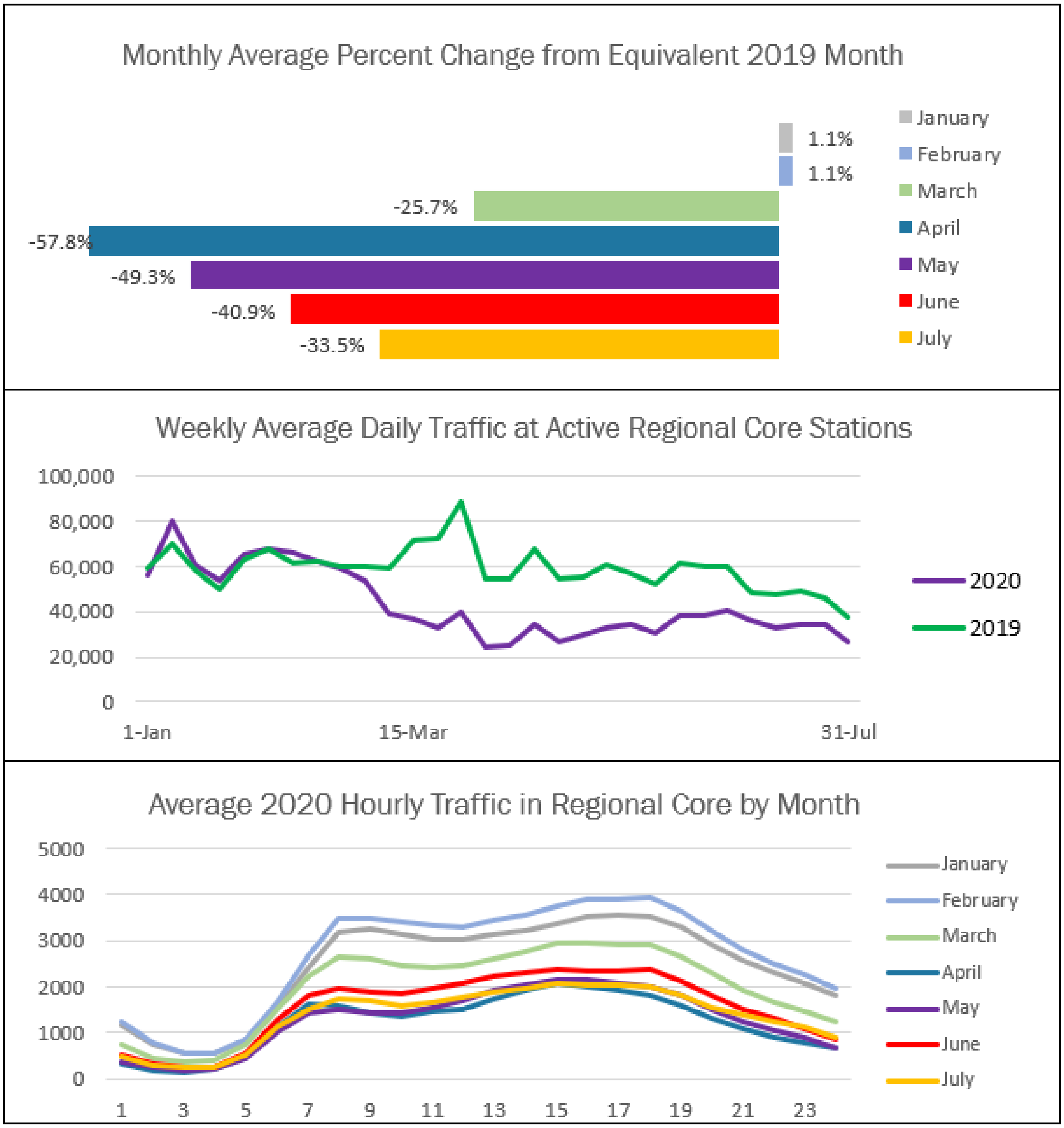
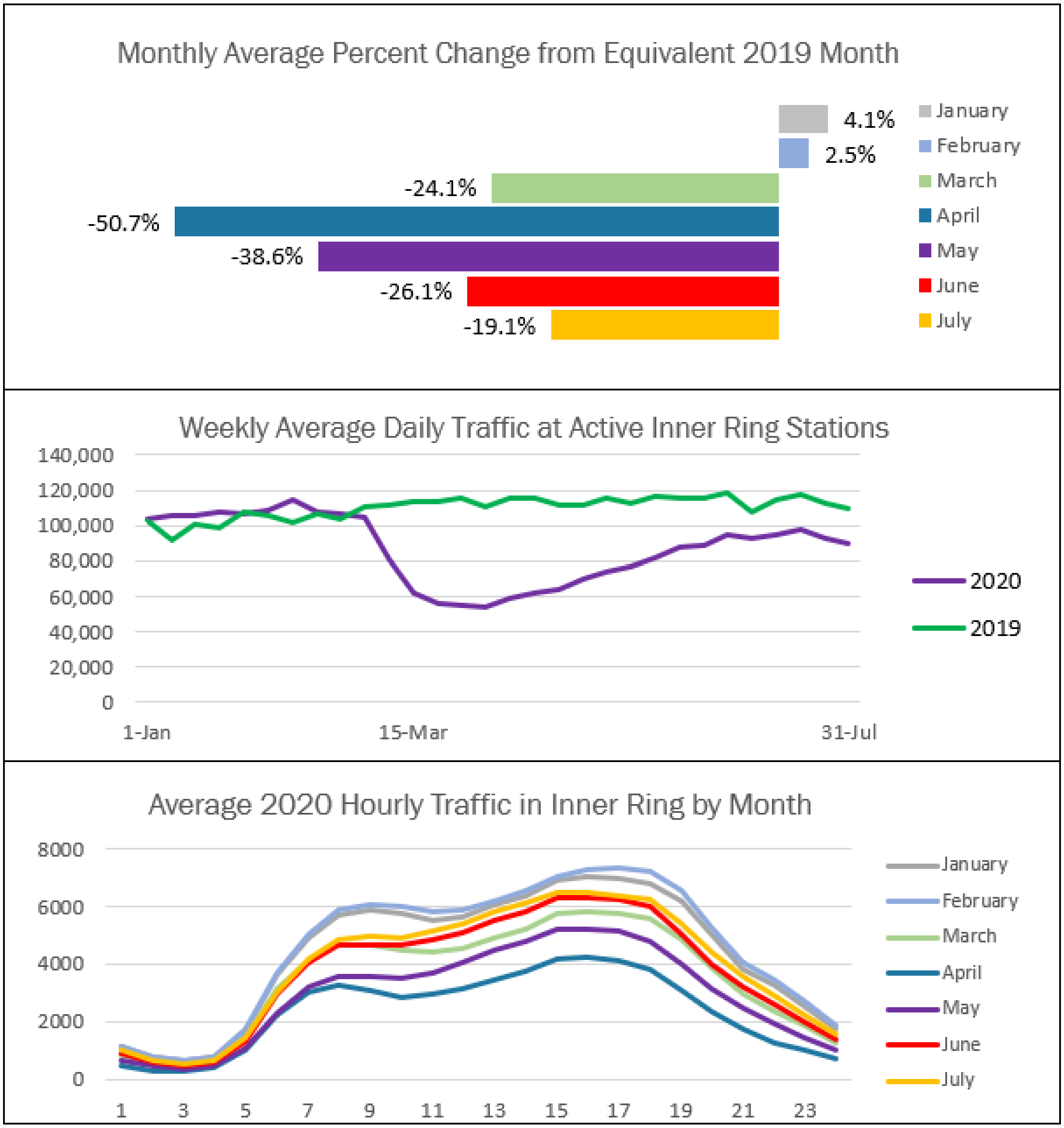


Figure 2: Traffic Counts and Percentage Changes at Permanent County Stations in the Core Jurisdictions (Source: TPB)



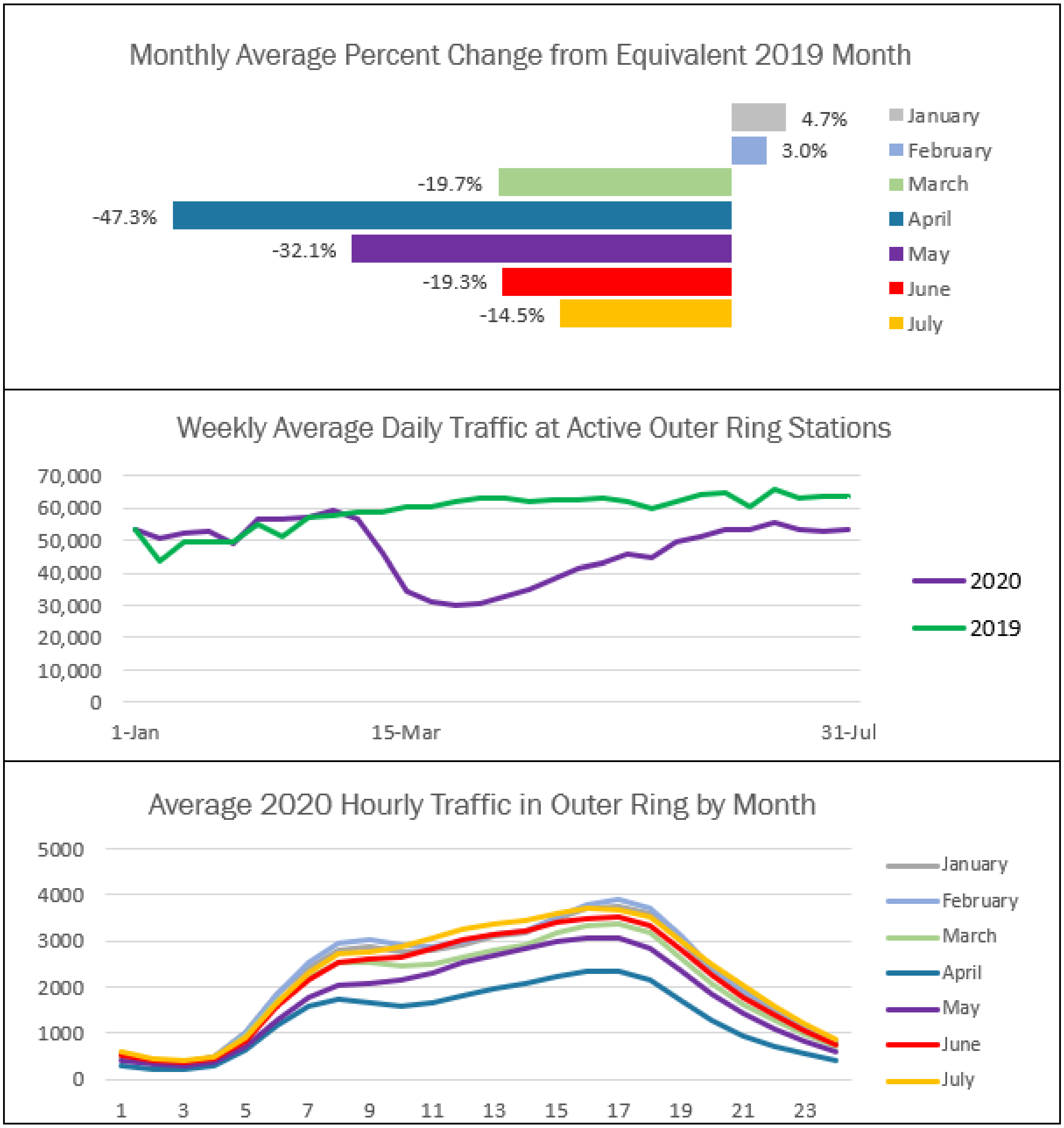
NOTE: Core jurisdictions include the District of Columbia and Arlington County and the City of Alexandria in Virginia.

Figure 3: Traffic Counts and Percentage Changes at Permanent County Stations in the Inner Jurisdictions (Source: TPB)



NOTE: Inner jurisdictions include Montgomery County, and Prince George's County in Maryland and Fairfax County (including independent cities of Falls Church and Fairfax) in Virginia.

Figure 4: Traffic Counts and Percentage Changes at Permanent County Stations in the Outer Jurisdictions (Source: TPB)



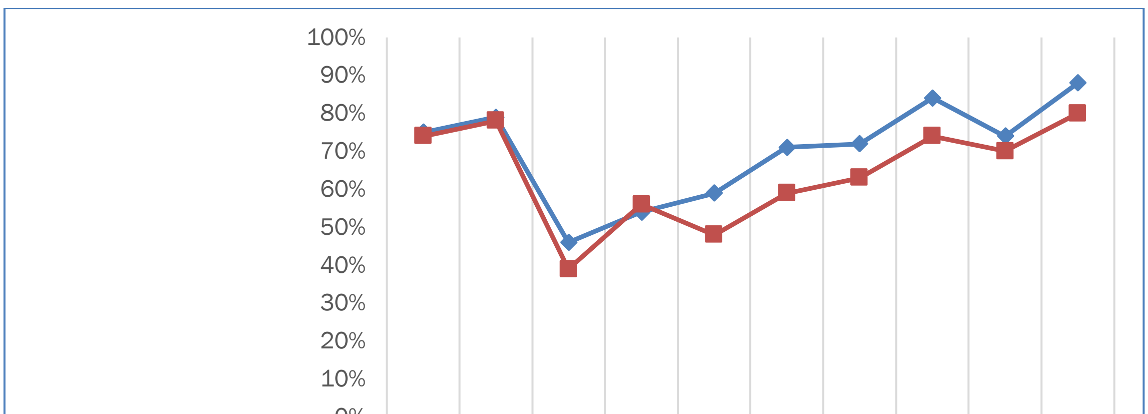
NOTE: Outer jurisdictions include Anne Arundel, Carroll, Charles, Frederick (including Frederick City), Howard, and St. Mary's counties in Maryland; Clarke, Fauquier, King George, Loudoun, Prince William (including Manassas and Manassas Park), Spotsylvania (portion), and Stafford counties in Virginia; and Jefferson County in West Virginia.

2. VEHICLE MILES OF TRAVEL

Snapshot: Regional vehicle miles of travel dipped most dramatically in April, but by July had recovered significantly, according to a post on the blog of big data provider INRIX[1].

Trends in vehicle miles of travel (VMT) in the region are informative, but not always readily available. Private sector big data provider INRIX[2], in an August 11, 2020 blog post, described morning and evening peak VMT trends for 26 major metropolitan areas[3] around the country, including metropolitan Washington[4]. Figure 5 shows reported VMT for metropolitan Washington versus the median values for the full 26 metropolitan areas described in the blog post[5]. Monthly VMT was lowest in April both regionally and nationally, and has recovered somewhat since then through July; metropolitan Washington's VMT has generally tracked a bit lower than the national median.

Figure 5: Vehicle Miles of Travel Trends (Percentage of Pre-pandemic VMT) Reported by INRIX, March through July 2020 (Source: INRIX https://inrix.com/blog/2020/08/vmt-commute-us/, August 11, 2020)



	March AM Peak	March PM Peak	April AM Peak	April PM Peak	May AM Peak	May PM Peak	June AM Peak	June PM Peak	July AM Peak	July PM Peak
Median of 26 Metro Areas	75%	79%	46%	54%	59%	71%	72%	84%	74%	88%
Metropolitan Washington	74%	78%	39%	56%	48%	59%	63%	74%	70%	80%

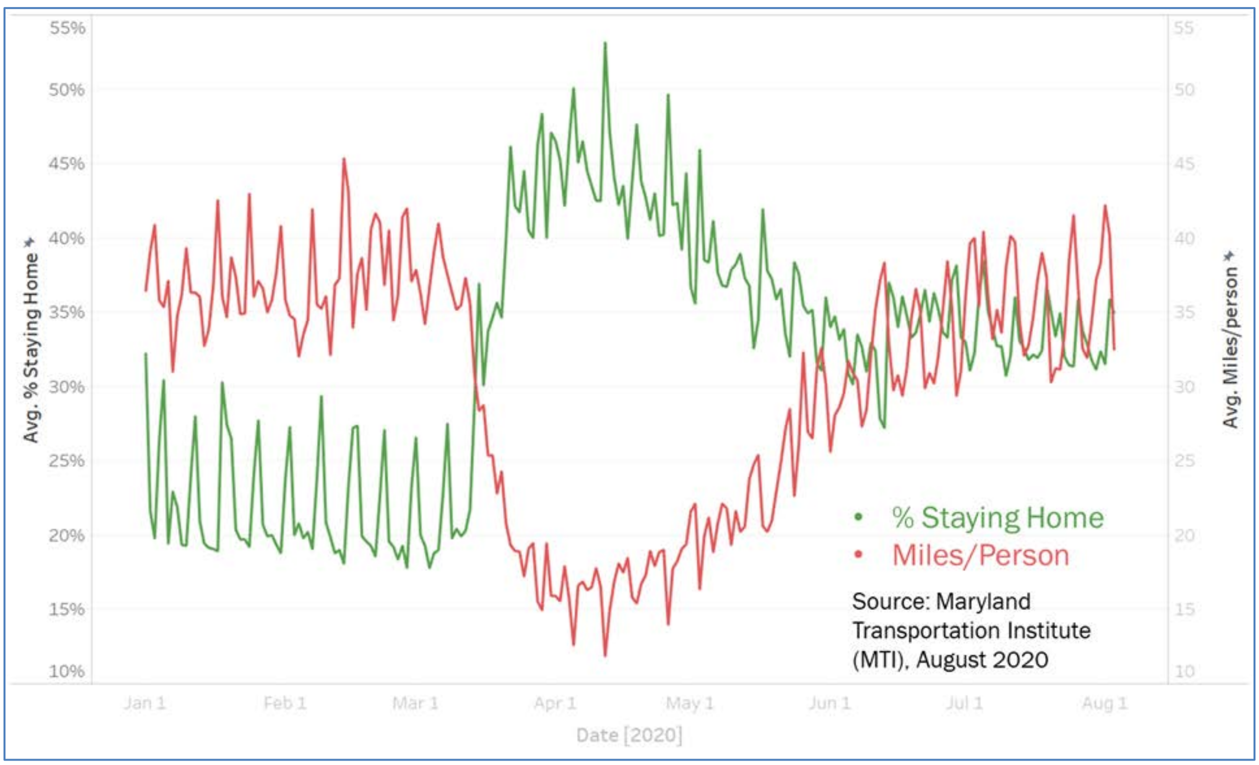
[1] https://inrix.com/blog/2020/08/vmt-commute-us/.
[2] At this time, TPB only has gratis access to some, not all, data sets vended by INRIX.
[3] The metropolitan areas reported (as listed by INRIX) were: Atlanta, Austin, Baltimore, Boston, Charlotte, Chicago, Dallas, Denver, Detroit, Houston, Los Angeles, Miami, Minneapolis, New York, Orlando, Philadelphia, Phoenix, Portland, Sacramento, San Antonio, San Diego, San Francisco, Seattle, St. Louis, Tampa, and Washington, D.C.
[4] Note that INRIX's geographical definition of metropolitan Washington, D.C. is understood to be somewhat different from (is more expansive than) the TPB membership area.
[5] Medians for the 26 metropolitan areas were calculated by TPB staff based on the blog post, and were not provided by INRIX; there may be rounding error. All values should be considered approximate.

3. PERSON TRAVEL

Snapshot: Though miles of travel per person have returned to near pre-pandemic levels, people are still much more likely to be staying at home than pre-pandemic.

The University of Maryland's COVID-19 Impact Analysis Platform[6] contains a wealth of information nationally about COVID-19 impacts and travel. Figure 6 illustrates the dramatic decline in person travel in the late March and early April time frame of the pandemic, and the recovery in person travel since then, by the metrics of percentage of persons staying home and miles of travel per person. People are still "staying home" at higher rates than before the pandemic, though miles of travel are close to pre-pandemic levels, perhaps reflecting a preponderance of non-work (non-commute) travel and considerable increases in delivery trips (food, grocery, online shopping).

Figure 6: National Capital Region Percentage Staying at Home and Miles of Travel Per Person (Source: TPB staff analysis of information from COVID-19 Impact Analysis Platform, Maryland Transportation Institute, University of Maryland, August 2020)



6 https://data.covid.umd.edu/. The site does not provide details on source data or methodology.

4. TRUCK TRAVEL

Snapshot: Truck travel never declined as much as passenger travel did.

According to big data provider INRIX, travel nationally has continued to recover from reductions in the April 2020 time frame. Notable in Figure 7 below is that truck travel, especially long-distance truck travel, never declined to the extent that passenger travel did. Figure 8 on the next page shows a National Capital Region example on an I-95 continuous count station at Dumfries, Virginia, where truck travel remained at similar levels or actually increased, as general volumes declined, during the March/April peak of COVID-19 impacts.

Figure 7: Nationwide Trends in Tripmaking and Confirmed COVID-19 Cases (Source: INRIX Blog https://inrix.com/covid-19-transportation-trends/, retrieved August 27, 2020)

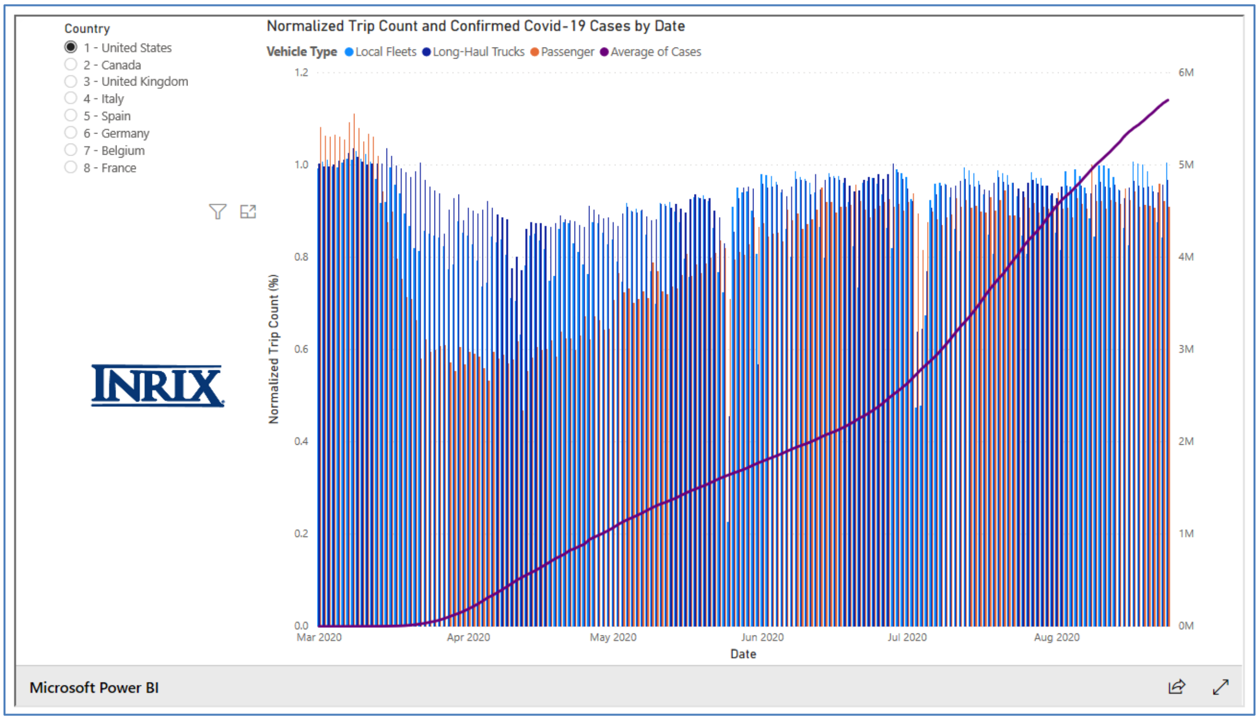
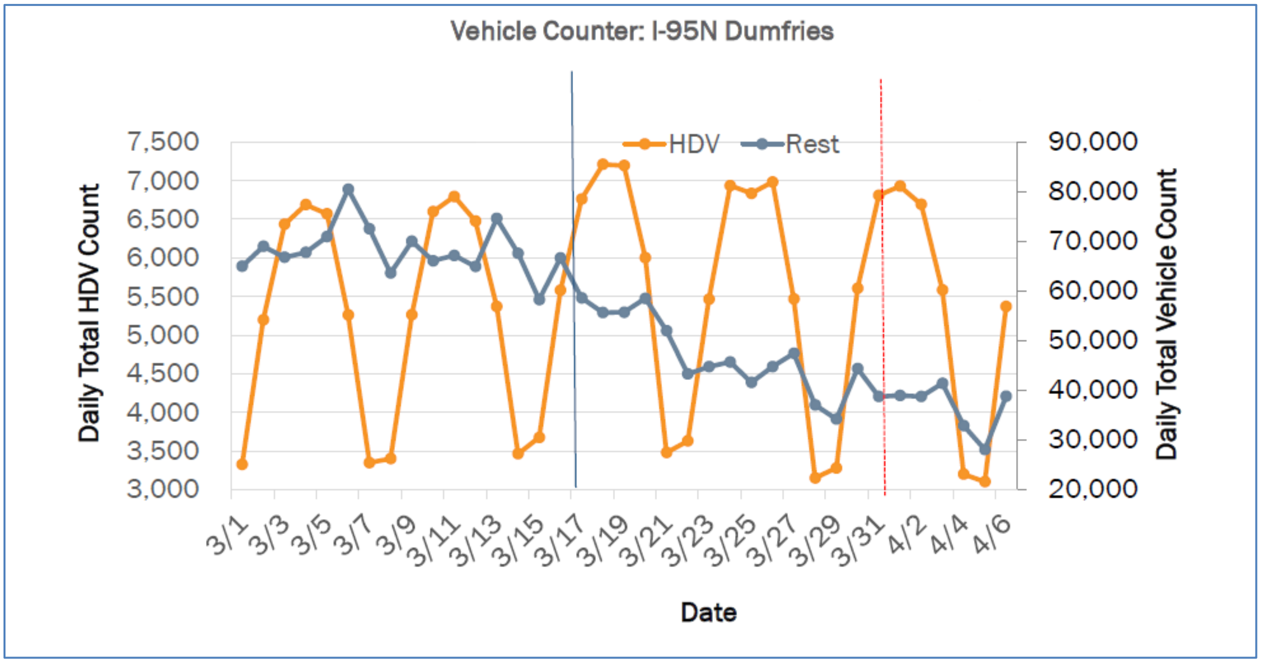


Figure 8: Heavy-Duty Vehicle (HDV) Volumes Compared to Non-HDV Volumes, I-95 Northbound at Dumfries, Virginia, March-April 2020 (Source: COG [Sunil Kumar] Analysis of Virginia Department of Transportation Data)



TRANSIT AND WALKING

5. TRANSIT RIDERSHIP: LOCAL TRANSIT AND COMMUTER SERVICES

Snapshot: Impacts to transit ridership have varied across the region, with longer-distance commuter services experiencing the biggest ridership declines, and local bus transit services experiencing declines of lesser magnitudes. While the ridership numbers reflect changes in usage, these reductions have to be viewed in relation to the reduction in service levels (capacity) due to pandemic-related challenges in operating transit. Preliminary data demonstrate that usage of available capacity has been significant, particularly on the bus system, which remains a lifeline for critical workers.

The region's local transit agencies and commuter services have experienced differing impacts to ridership. Figure 9 shows approximate ridership reductions for WMATA rail and bus[7], and Figure 10 for a selected group of the region's transit providers as reported by an August 5, 2020 questionnaire of these agencies by TPB. As may be observed from Figure 9, WMATA's Metrobus system continued to carry a substantial portion of riders through this period, even with considerable reductions in service and limits on passenger capacity within the buses due to social distancing. The regional nature of Metrobus routes, and the destinations and population served, highlight how critical bus service has been especially to the workers essential in many aspects of the economy. While longer distance services such as MARC and Loudoun Commuter Bus services had the largest reported declines in ridership (likely result of greater share of patrons being able to work from home), as did services popular with visitors and tourists such as DC Circulator, local and WMATA bus transit services generally reported ridership declines of lesser magnitudes (given the nature of destinations served and greater dependence of the patrons on public transportation).

TPB staff plans to work with transit agencies on further analysis of the supply and usage of public transportation in general and WMATA in particular given that about 84% of the region's public transportation trips are made on the WMATA system.

[7] Data obtained from WMATA Ridership Portal, https://wmata.com/initiatives/ridership-portal/.

Figure 9: Metrorail and Metrobus Year-to-Year Ridership Percentage Change, June/July/August 2020 Versus 2019 (Source: WMATA Data Portal)

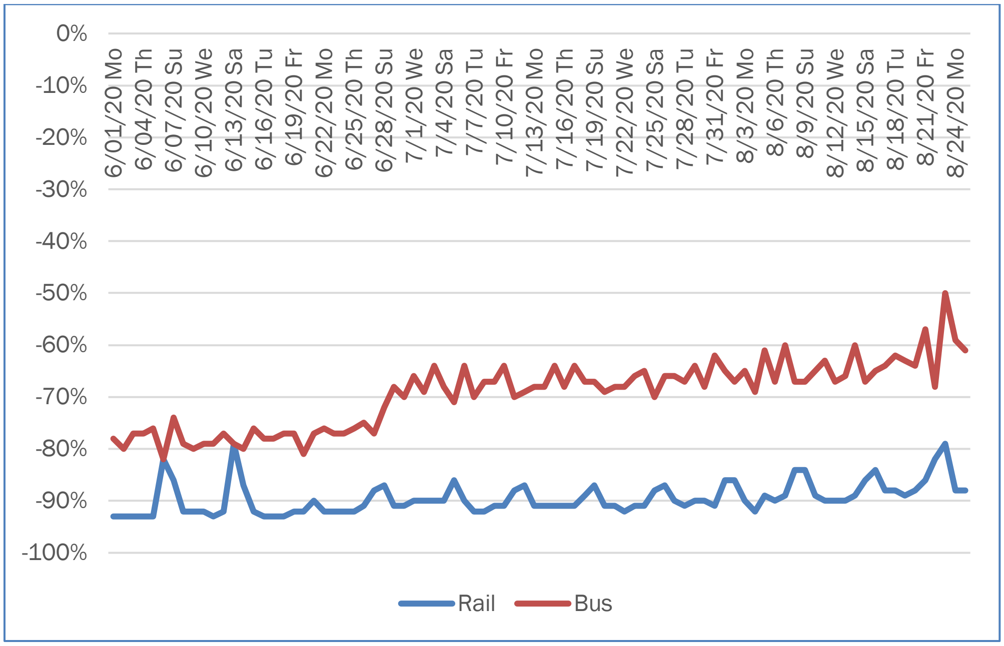
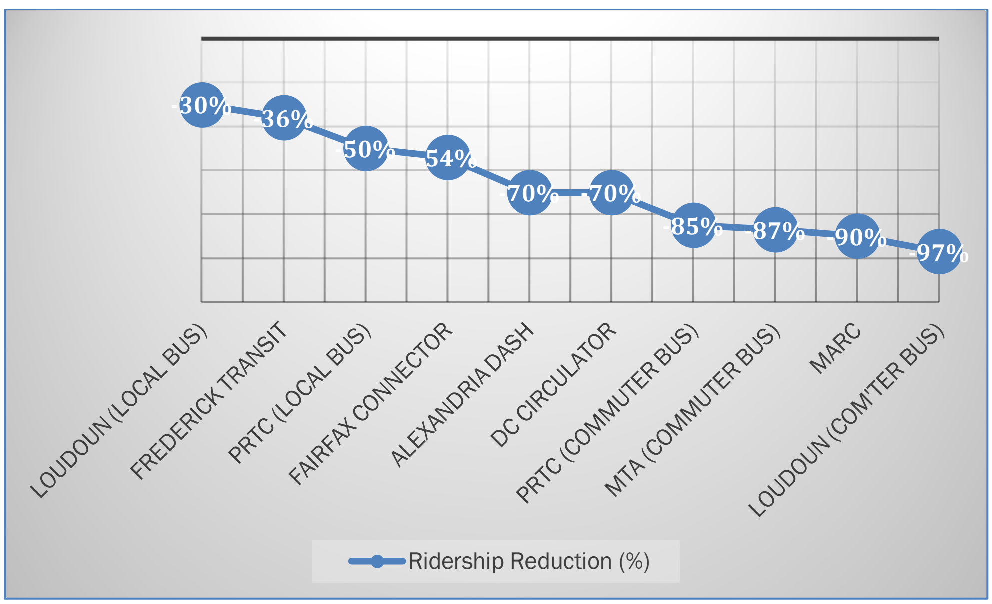


Figure 10: Transit Ridership Reductions on Selected Local Transit and Commuter Services (as reported in an August 5, 2020 TPB questionnaire to these agencies; all figures are approximate; Source: COG/TPB)

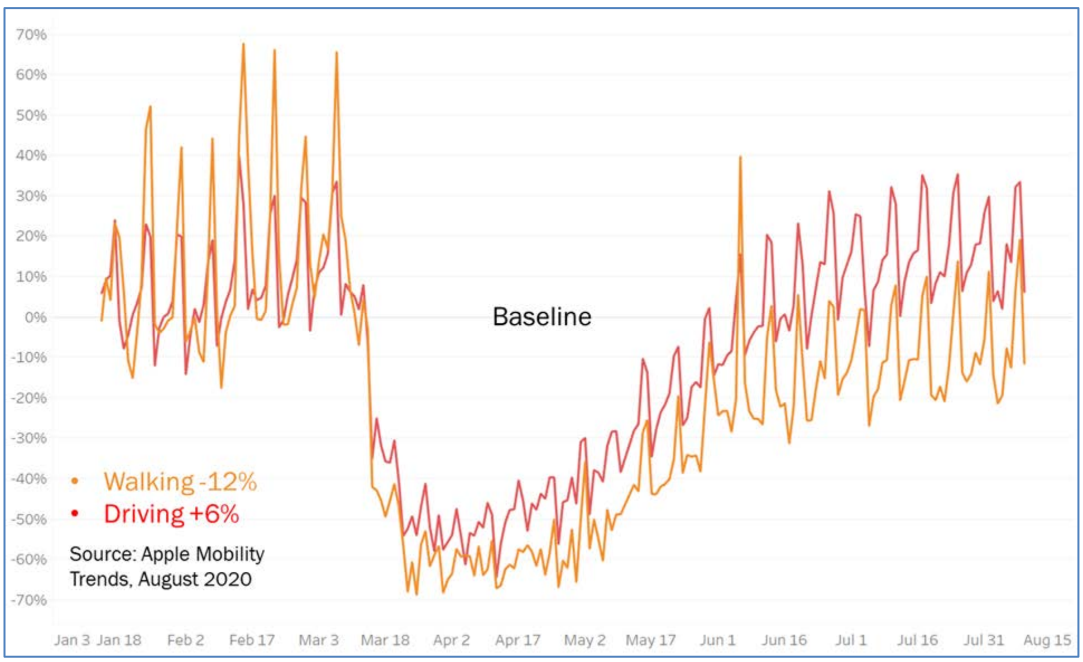


6. WALKING

Snapshot: App-based data provide an interesting but perhaps unproven insight into walking trends during the pandemic.

Data regarding walking in the region are of interest, but not always readily available. Apple Mobility made such data available for the District of Columbia[8]. These proprietary data compare mobile device usage associated with map direction requests on specific modes of travel[9], and may not be consistent with other data sources; their inclusion here is illustrative. Figure 11 shows trends over time comparing driving and walking to a January 13, 2020 baseline. Both modes showed significant declines in the late March and early April time frame, and have recovered since then. Driving is even being reported to exceed the January 13 baseline, with walking still down somewhat. It must be noted that this dataset comes from a limited segment of probe data (only Apple devices) and further from a smaller segment of such probe users (only those using the Apple Maps app on those Apple devices). The representativeness of these data is unclear compared to the overall population's walking, and may be biased toward trips to destinations unfamiliar to the user. Nevertheless, the comparative trend line is of interest.

Figure 11: Apple Mobility Data for Walking Versus Driving, District of Columbia Only (Compared to a January 13, 2020 Baseline) Source: Apple Mobility Trends, August 2020



8 Apple Mobility data sets do not appear to be made available or summarized at the level of the National Capital Region geography, thus data for the District of Columbia only were used as illustrative.

9 The information is generated by counting the number of requests made to Apple Maps for directions. The data sets are then compared to reflect a change in volume of people driving, walking or taking public transit around the world. Data availability in a particular city, country, or region is subject to a number of factors, including minimum thresholds for direction requests made per day. See https://www.apple.com/newsroom/2020/04/apple-makes-mobility-data-available-to-aid-covid-19-efforts/.

SAFETY, SPEEDS, AND OTHER IMPACTS

7. ROADWAY SPEEDS

Snapshot: Roadway speeds in the National Capital Region generally remain at or near free-flow speeds, with slight declines since May.

Reductions of peak period delays have been a noted impact of COVID-19, with free-flow conditions even at “rush hour” in most of the region in the April time frame. By July, peak period speeds have shown some slowing, but still much higher than pre-pandemic levels. Figure 12 provides an example showing the 5:00 P.M. to 6:00 P.M. time period on Interstate highways in the National Capital Region for the January to July 2020 time frame, separately for passenger vehicles and trucks.

As may be seen from the compiled data, speed increases have been of a greater magnitude than the magnitude of traffic volumes. While traffic volumes regionally recently have been about 20% below pre-pandemic levels, peak period speed data remain near free-flow. Traffic flow theory and longstanding empirical data have established that when demand exceeds capacity and traffic operations are in unstable or saturated conditions, a small reduction in demand results in a disproportionate improvement in speeds. As such, strategies to marginally reduce single occupant vehicle (SOV) demand during peak demand via flexible work schedules, pricing or ridesharing (including express bus service) are effective ways to address peak period congestion, conserve energy and reduce emissions.

Figure 12: Interstate System Car and Truck Mean Speeds by Week, Weekdays 5:00 P.M. to 6:00 P.M., National Capital Region (Source: TPB analysis of National Performance Management Research Data Set [NPMRDS])

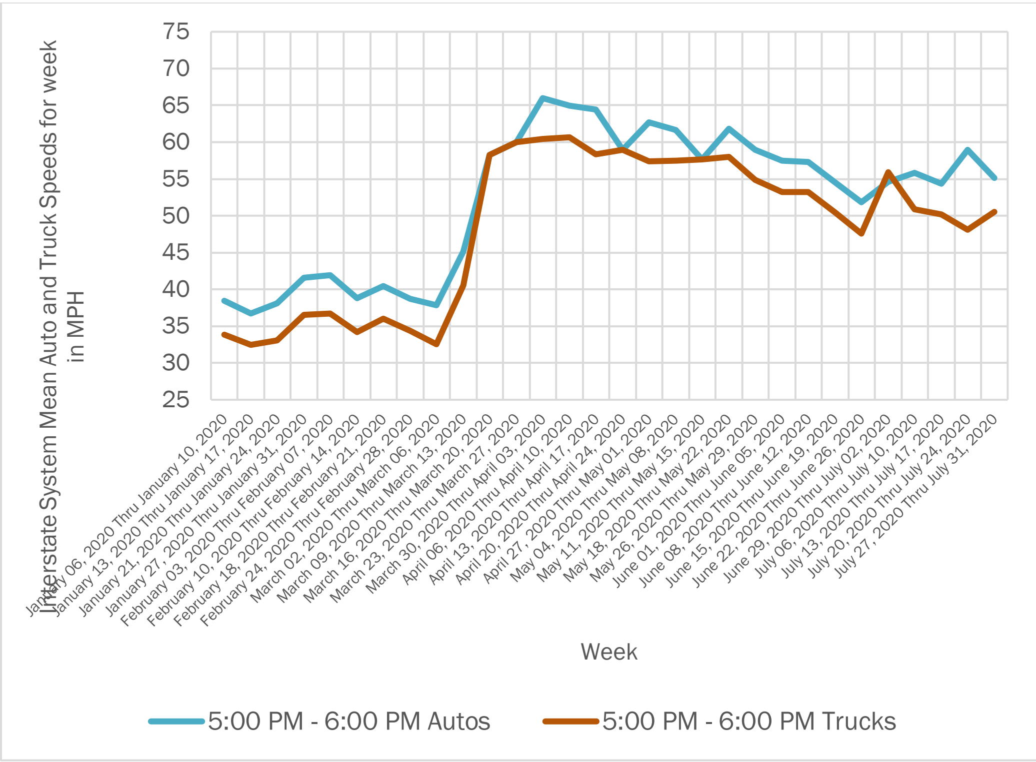
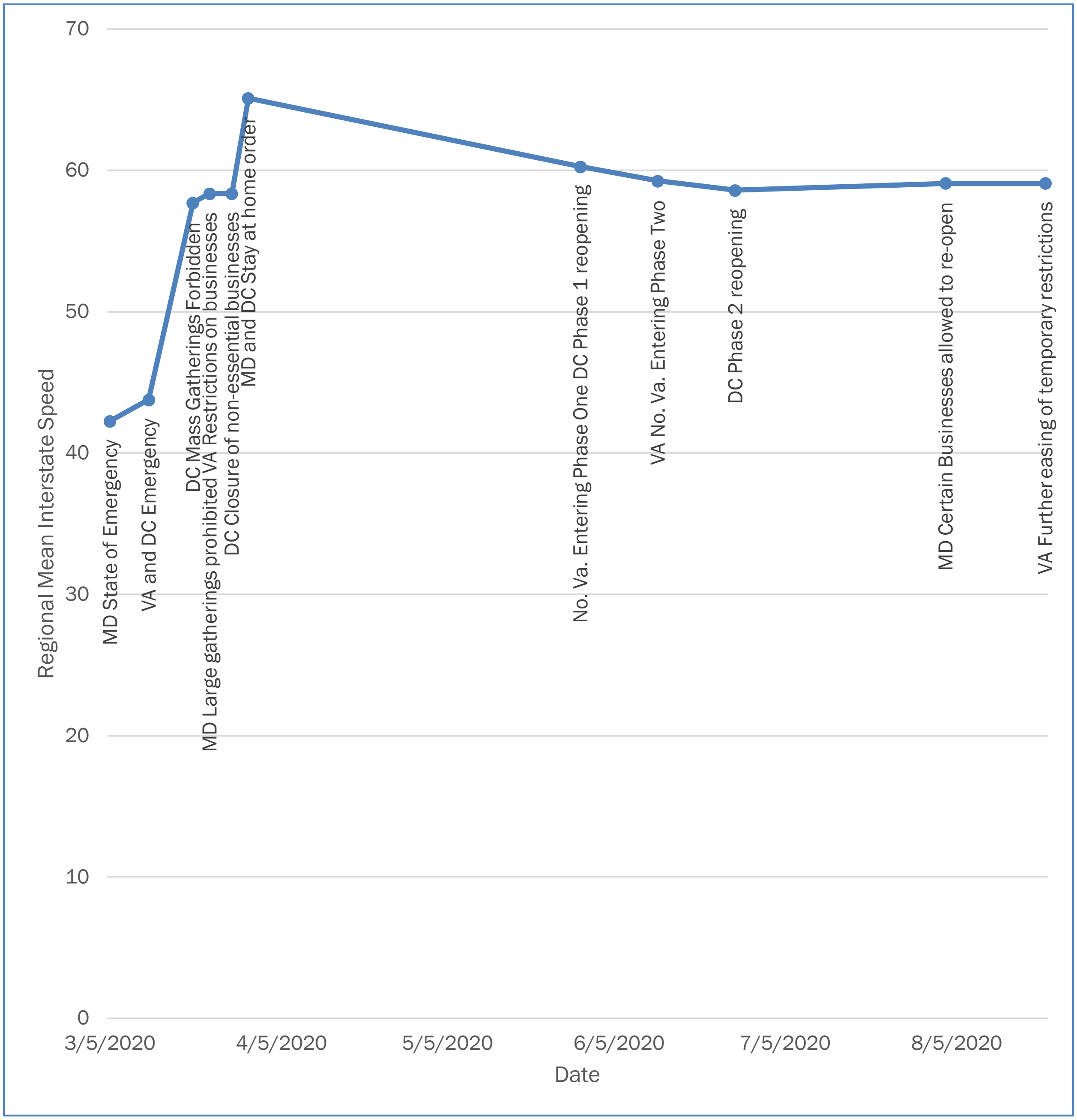


Figure 13 shows the chronology of COVID-related District of Columbia, Maryland, and Virginia emergency declarations since March, with the amalgamated mean speed trend of the region's Interstate highways shown in the same chronology. Regional Interstate Highway speed increases were dramatic in March, with modest reductions since then.

Figure 13: Chronology of Emergency Declarations and Regional Interstate Highways Mean Speed (Sources: COG regional COVID-19 resources web page (https://www.mwcog.org/about-us/covid-19/; National Performance Management Research Data Set)

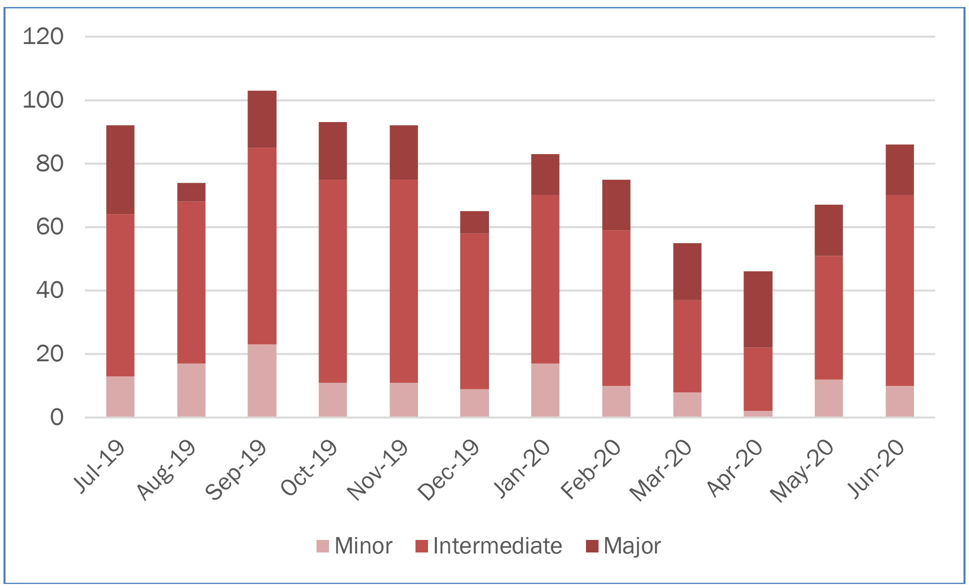


8. SAFETY

Snapshot: Though the overall number of crashes and incidents went down during the pandemic, the numbers of major incidents and fatal crashes have remained near pre-pandemic levels, despite reduced travel demand.

The Metropolitan Area Transportation Operations Coordination (MATOC) Program provides regional monitoring and situational awareness regarding incidents that have major impacts on traffic. MATOC's monthly records[10] provide an indication of overall incident trends, summarized in Figure 14. Notable in this data set was the relatively high number of incidents classified by MATOC as major during the month of April, even as the number of minor incidents had declined significantly, and intermediate incidents had declined somewhat. However, by June, incident patterns were already returning to historical norms.

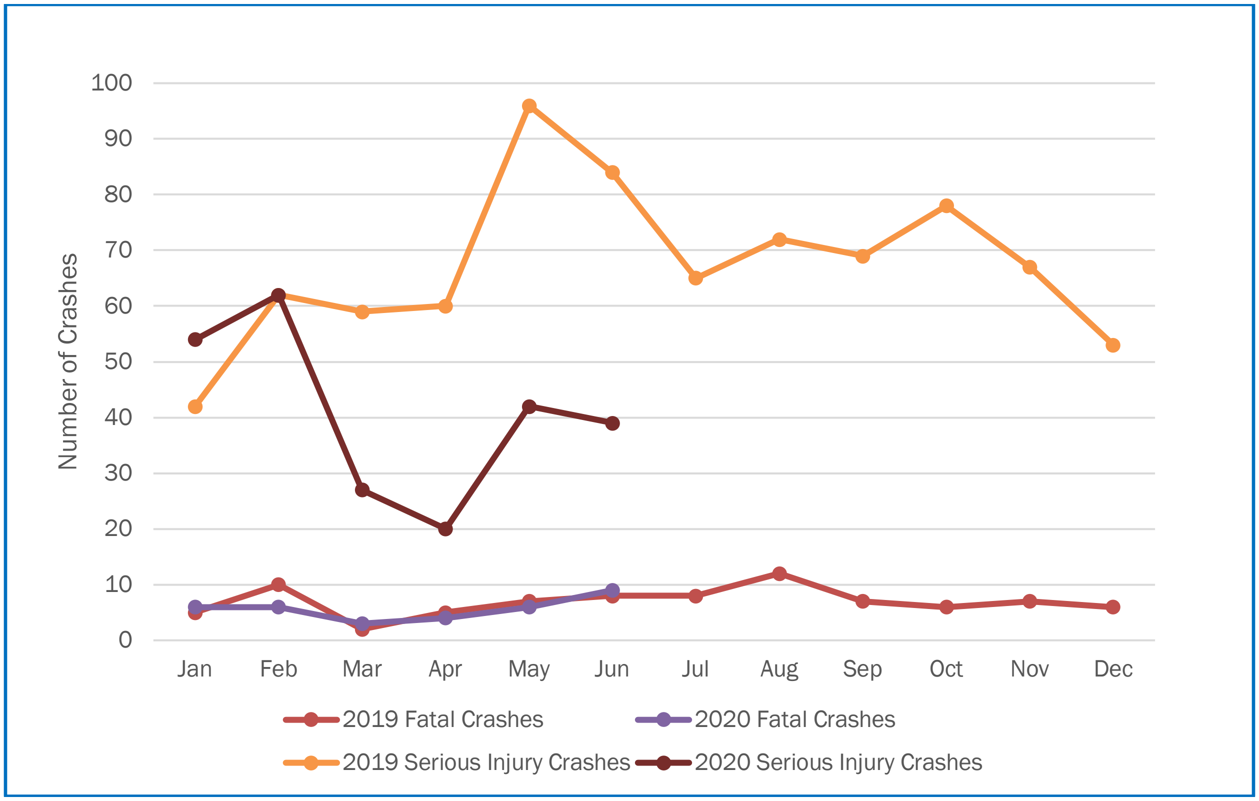
Figure 14: MATOC Roadway Incidents Summary, July 2019 to June 2020 (Source: MATOC)



[10] Summary provided to TPB staff by MATOC staff August 2020. Note that MATOC documents incidents only during its official operating hours, generally Mondays through Fridays from 4:30 A.M. to 8:00 P.M., and for a specific set of major roadways defined in MATOC's standard operating procedures (SOPs). Any incidents outside those hours and/or not on roadways designated in MATOC's SOPs are not included in these data.

Although comprehensive, regionwide fatal and serious injury crash data will not be available until later dates (published annually after thorough reviews), preliminary data have been made available for the Northern Virginia portion of the region[11]. Figure 15 shows fatal and serious injury crashes for all of 2019, and for 2020 through June. Post-COVID serious crash numbers have been significantly lower than their 2019 counterparts, but fatal crashes have remained at about the same level as 2019, even during months such as April with reduced traffic volumes.

Figure 15: Northern Virginia Fatal and Serious Injury Crashes: Preliminary 2019 and 2020 Data (Source: TPB staff analysis of Virginia Department of Motor Vehicles/Virginia Department of Transportation)



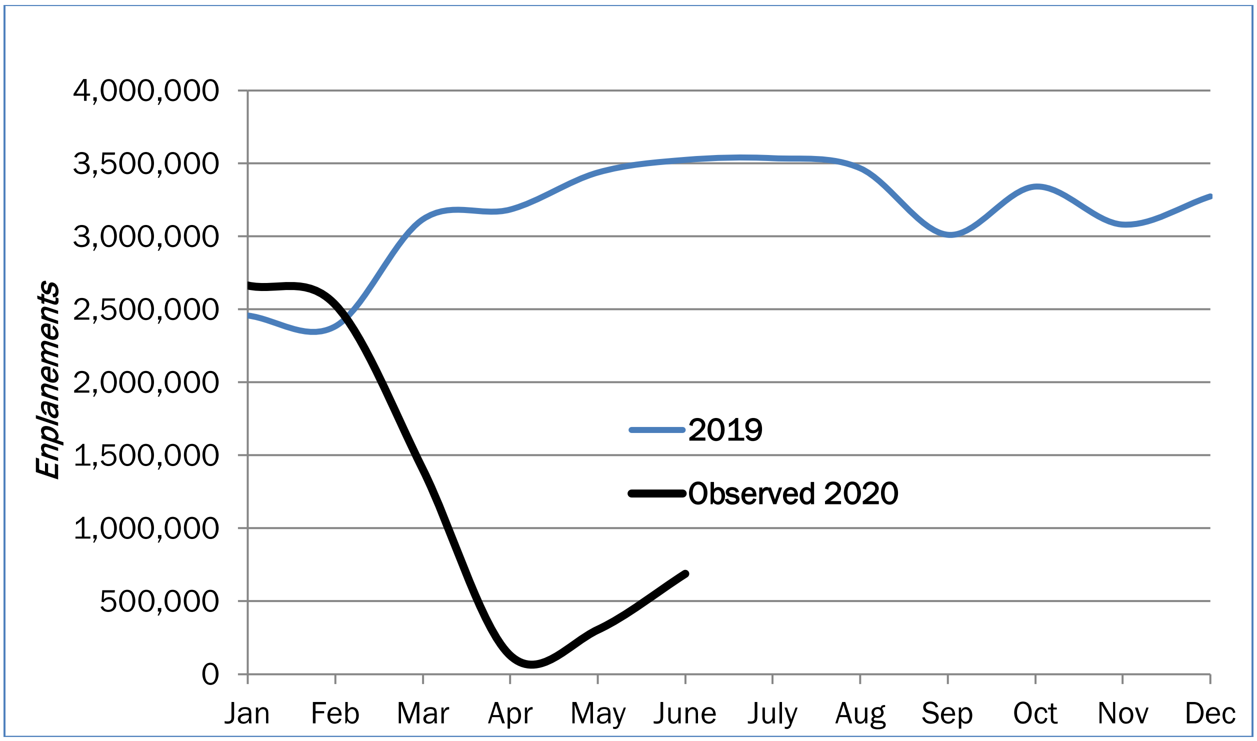
[11] Virginia Department of Motor Vehicles data accessed through the Virginia Department of Transportation Crash Analysis Tool website: https://app.powerbigov.us/view?r=eyJrIjoiMjhlZjFhZDAtNTljMC00MDA1LWEyOTMtYWYwM2NiMmRiMmRkIiwidCI6IjYyMGFlNWE5LTRlYzEtNGZhMC04NjQxLTVkOWYzODZjNzMwOSJ9.

9. AIR TRAVEL

Snapshot: Air travel has recovered somewhat at the region's three major airports since April, but remains much lower than 2019.

Figure 16 shows enplanements data for the area's three airports (Ronald Reagan Washington National Airport, Washington Dulles International Airport, and Baltimore-Washington Thurgood Marshall International Airport).

Figure 16: Washington/Baltimore Monthly Enplanements through June 2020 (Source: COG)



10. COVID-19 CASES

Figure 17, taken from the U.S. Centers for Disease Control, shows the number of newly reported COVID-19 cases nationally. Figure 18 shows cumulative cases of COVID-19 in the National Capital Region as reported by Johns Hopkins University.

Figure 17: Nationwide New Reported COVID-19 Cases By Day (Source: https://www.cdc.gov/coronavirus/2019-ncov/cases-updates/cases-in-us.html, retrieved August 25, 2020)

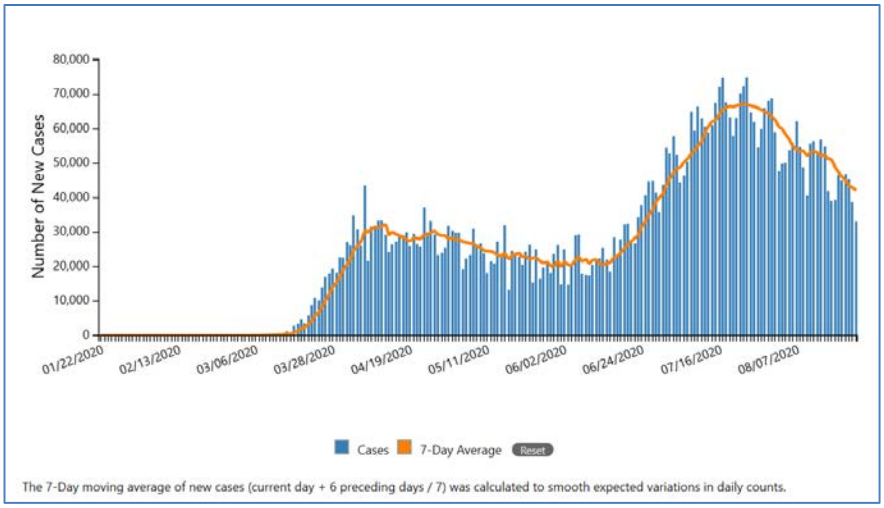
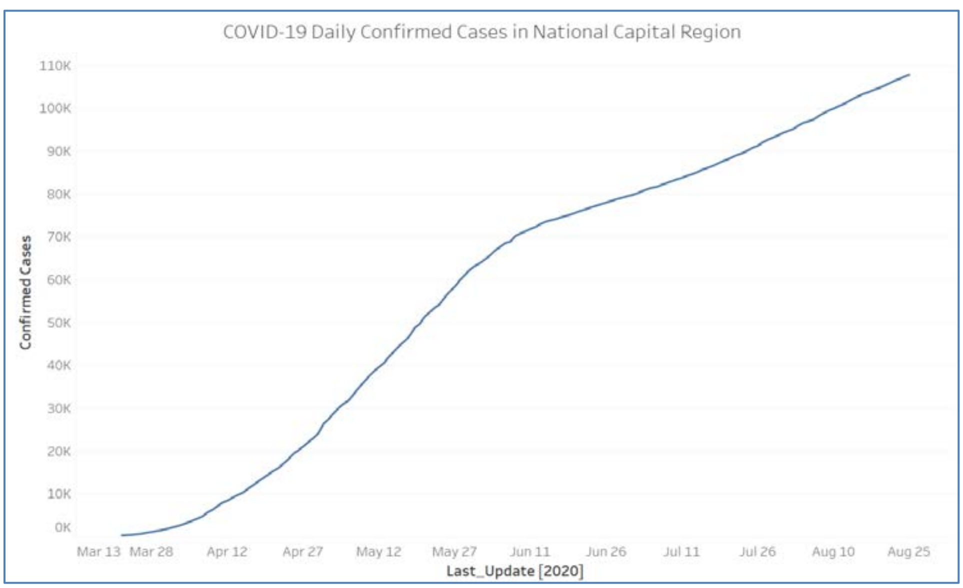


Figure 18: COVID-19 Cumulative Daily Confirmed Cases in the National Capital Region (Source: COVID-19 Data Repository by the Center for Systems Science and Engineering (CSSE) at Johns Hopkins University, https://coronavirus.jhu.edu/map.html)

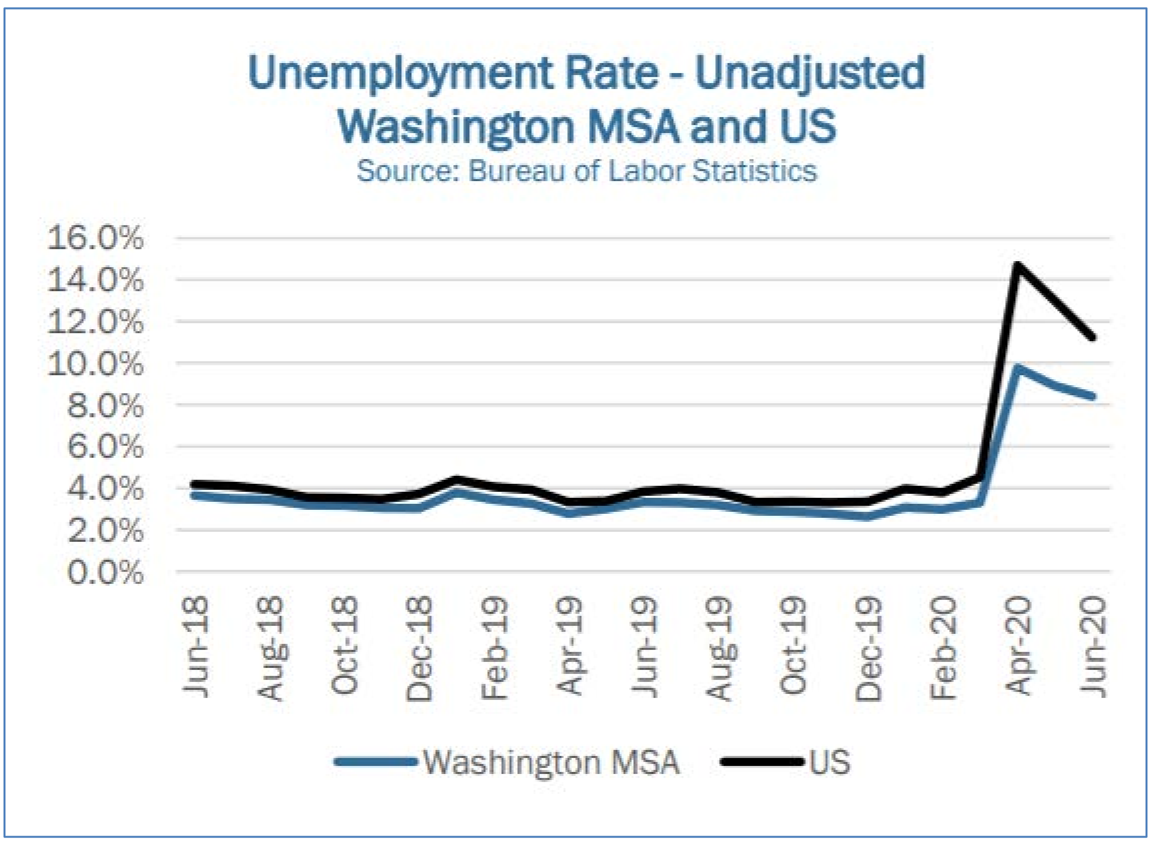


11. ECONOMIC IMPACTS

Figure 19, taken from COG's Regional Economic Monitoring System Report[12] for June 2020, shows the region's unemployment rate trend over time, compared to the national rate, as a comparator to travel demand.

Also according to the report, over-the-year employment decreased by 270,900 jobs or 8.0 percent in the Washington Metropolitan Statistical Area (MSA), while the national over-the-year employment decreased by about 13 million jobs or 8.7 percent. The Leisure & Hospitality Sector lost 131,700 jobs and the Trade Transportation, & Utilities Sector lost 35,400 jobs during the last year. (Most jobs were lost between March and April 2020) The number of unemployment insurance claims rose to a high of 96,406 for the week of April 4 and with a steady decline down to 20,679 for the week of June 27.The region's inflation decreased in May to -0.1 percent from a rate of 0.4 percent in March 2020. During June, the region's unemployment rate decreased to 8.4 percent, while the national rate decreased to 11.2 percent. The 2,432 new housing units authorized during June 2020 represent a 25.0 percent increase from June 2019, when 1,945 new units were started. For a list of jurisdictions in the MSA, visit www.mwcog.org/REMS.

Figure 19: Regional and National Unemployment Rate, June 2018 through June 2020 (Source: COG Regional Economic Monitoring System (REMS) Report, July 2020 REPORT – JULY 2020)



12 https://www.mwcog.org/documents/2020/07/01/regional-economic-monitoring-system-rems-report-economy/.

SUMMARY

The COVID-19 pandemic has had a significant, quickly-changing, and still-evolving impact on travel and transportation in the National Capital Region and nationally. Notable among the snapshots of data examined by TPB staff include:

- Traffic volumes in the National Capital Region, which in April 2020 had dipped below 50% of 2019 volumes, by July had recovered to over 80% of 2019 volumes.
- Regional vehicle miles of travel dipped most dramatically in April to approximately 40% of January 2020 levels, but by July had recovered significantly.
- Though miles of travel per person have returned to near pre-pandemic levels, people are still much more likely to be staying at home than pre-pandemic.
- Truck travel never declined as much as passenger travel did.
- Impacts to transit ridership have varied across the region, with longer-distance commuter services experiencing the biggest ridership declines, and local bus transit services experiencing declines of lesser magnitudes. While the ridership numbers reflect changes in usage, these reductions have to be viewed in relation to the reduction in service levels (capacity) due to pandemic-related challenges in operating transit. Preliminary data demonstrates that usage of available capacity has been significant, particularly on the bus system, which remains a lifeline for critical workers.
- Though the overall number of crashes and incidents went down during the pandemic, the numbers of major incidents and fatal crashes remained near pre-pandemic levels, even during periods of reduced travel demand.
- Air travel has recovered somewhat at the region's three major airport since April, but remains much lower than 2019.

ACKNOWLEDGEMENTS

Thanks to additional COG and TPB staff who contributed to this memorandum or analyses herein: Timothy Canan, Paul DesJardin, Martha Kile, Sunil Kumar, James Li, Abdul Mohammed, Eric Randall, Jon Schermann, Kanti Srikanth, and C. Patrick Zilliacus.

ATTACHMENT 2E:

Presentation: <u>Commuter Connections 2020 Employer Telework Survey – Coronavirus Pandemic Survey Results</u> by the National Capital Region Transportation Planning Board Technical Committee, 9/16/2020

COMMUTER CONNECTIONS 2020 EMPLOYER TELEWORK SURVEY

Coronavirus Pandemic Survey Results

Nicholas Ramfos
Director, Transportation Operations Programs

National Capital Region Transportation Planning Board
September 16, 2020

COMMUTER CONNECTIONS®
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Survey Objectives and Methodology

- Employer telework survey is conducted every three years by Commuter Connections to define the portion of teleworking influenced by assistance provided.
- For FY2020, the survey was expanded to include questions on the Coronavirus Pandemic's influence on Telework.

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Survey Objectives and Methodology (con't)

- Examined telework changes made by employers during coronavirus pandemic
- Interviewed employers that were in either the Employer Outreach database or federal Employee Transportation Coordinators/Telework coordinator database
- Sent email/postal mail invitations for an Internet-based survey and followed up by telephone.

Survey Objectives and Methodology (con't)

The questionnaire addressed the following broad topics:

- Change in worksite operation due to coronavirus pandemic
- Number of employees teleworking at the time of the survey and before the pandemic
- Changes in telework programs or policies in response to the pandemic
- Likelihood to continue telework after the pandemic ends
- Assistance received with telework planning or implementation
- Significant telework issues encountered during the pandemic
- Employee and manager benefits received by teleworking
- Employer characteristics (size, location, major industry)

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Survey Objectives and Methodology

- 4,539 Employers were contacted in May and June 2020 and 180 responded for a 4% response rate.
- Due to office closures, employee furloughs and other impediments to reaching employer representatives to respond to the survey, a survey confidence level was not calculated.
  - Essentially, the survey results can be categorized as a "very large focus group"
- Companion briefing report is also available with in-depth survey response details.

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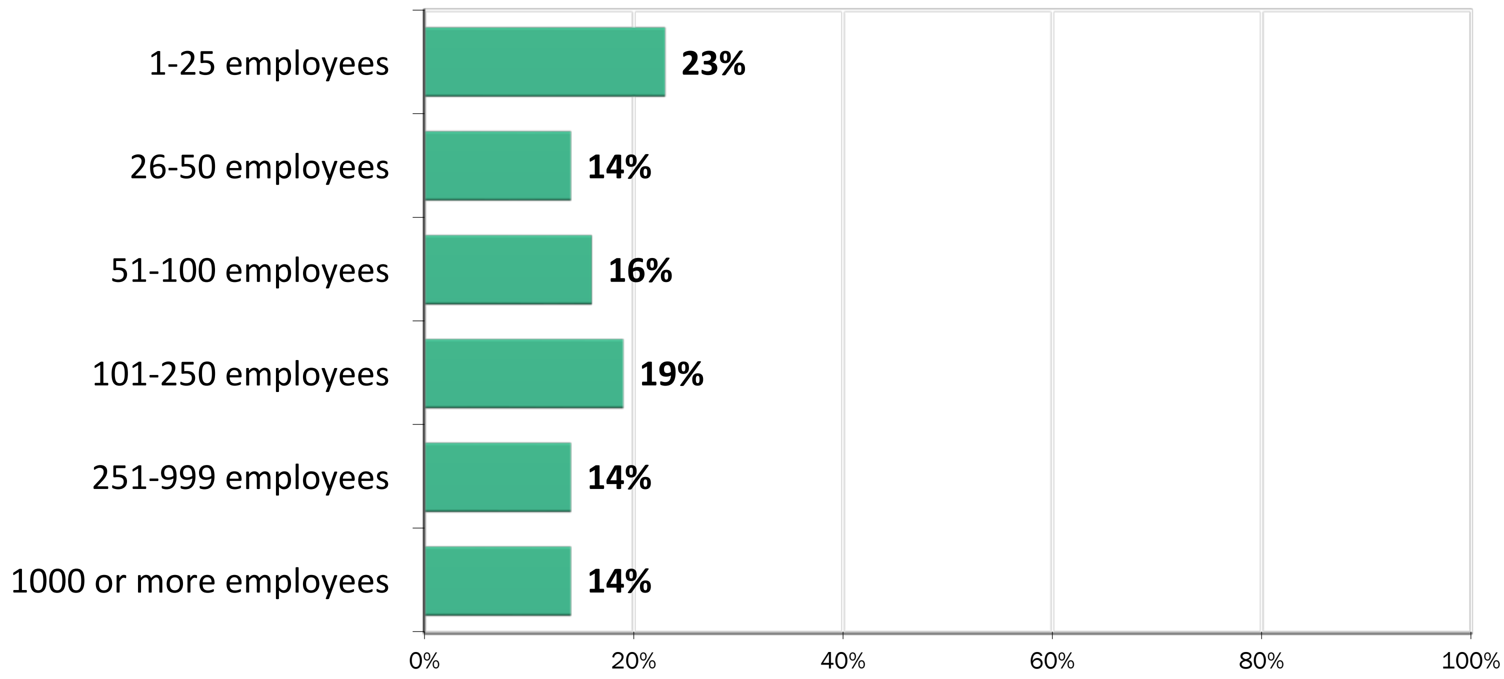
Employer Profile – Diverse Sample

- Worksite state: **12%** DC**, 43%** MD, **45%** VA
- Employer type: **49%** private, **33%** NFP, **13%** Federal, **5%** State/Local government
  - Industry: Government, medical, trade association, business support, education, real estate/property management, technology, hospitality, legal/professional, banking/finance
  - Size – number of employees in Washington metro region



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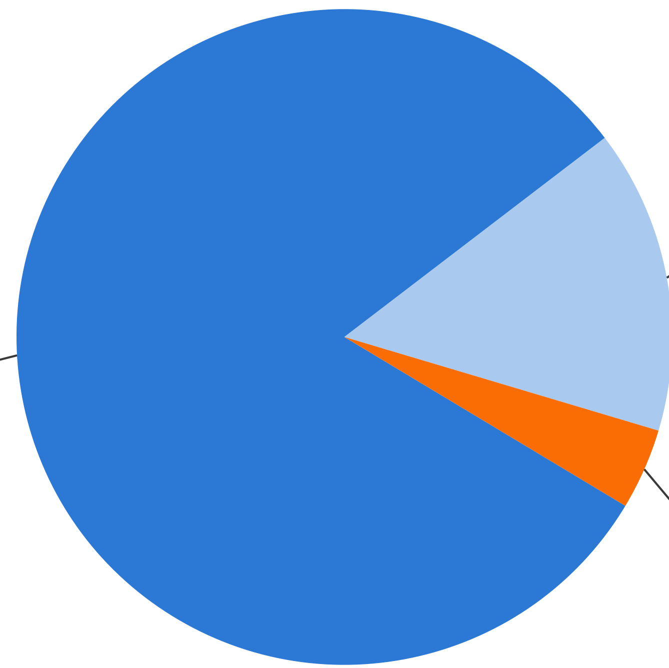
96% of Worksites Shut Down or Reduced On-site Operation Either Completely (81%) or Partially (15%) Since Coronavirus Pandemic Began

At the time of the survey, 95% of sites with reduced operation were still closed/limited on-site operation



COMMUTER CONNECTIONS
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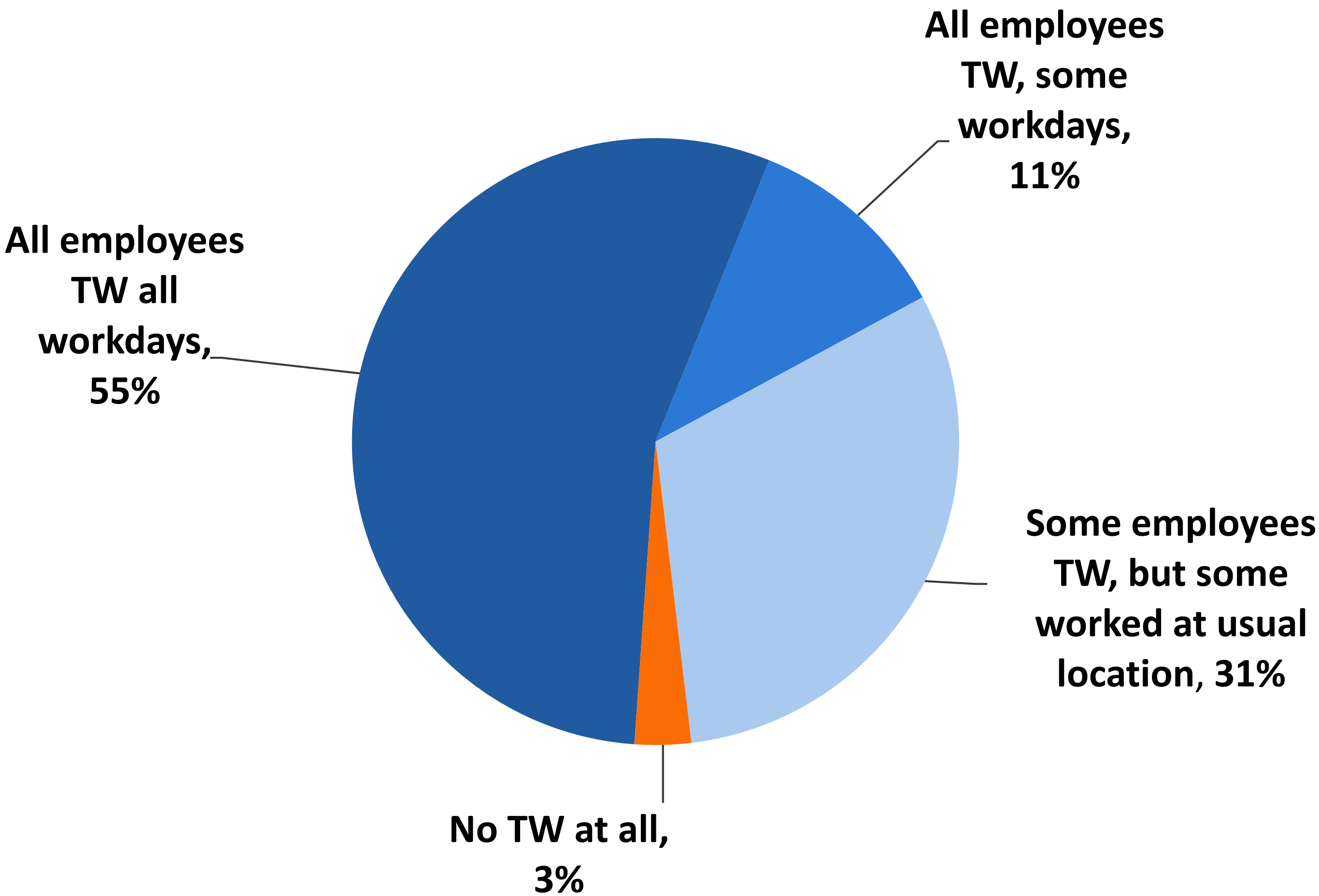
97% of Worksites Had At Least Some Telework Since Pandemic Began – For 55%, It was Full-time for All Employees



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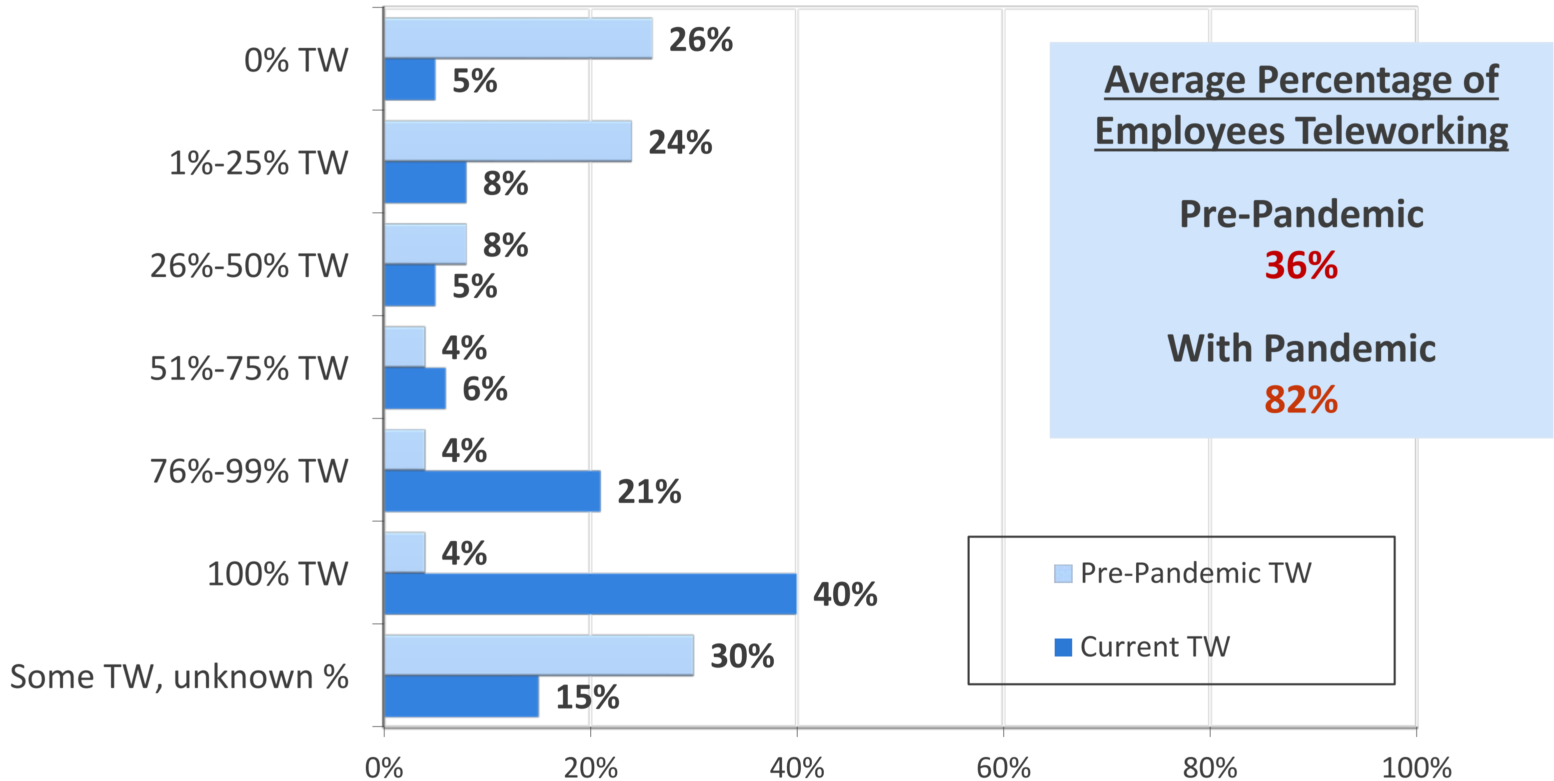
At the Time of the Survey, 95% of Worksites Had Telework; Telework Was Common Pre-Pandemic Also - 76% Had At Least Some Telework Before

But during the pandemic, the average share of employees who teleworked grew from 36% to 82% at sites with telework



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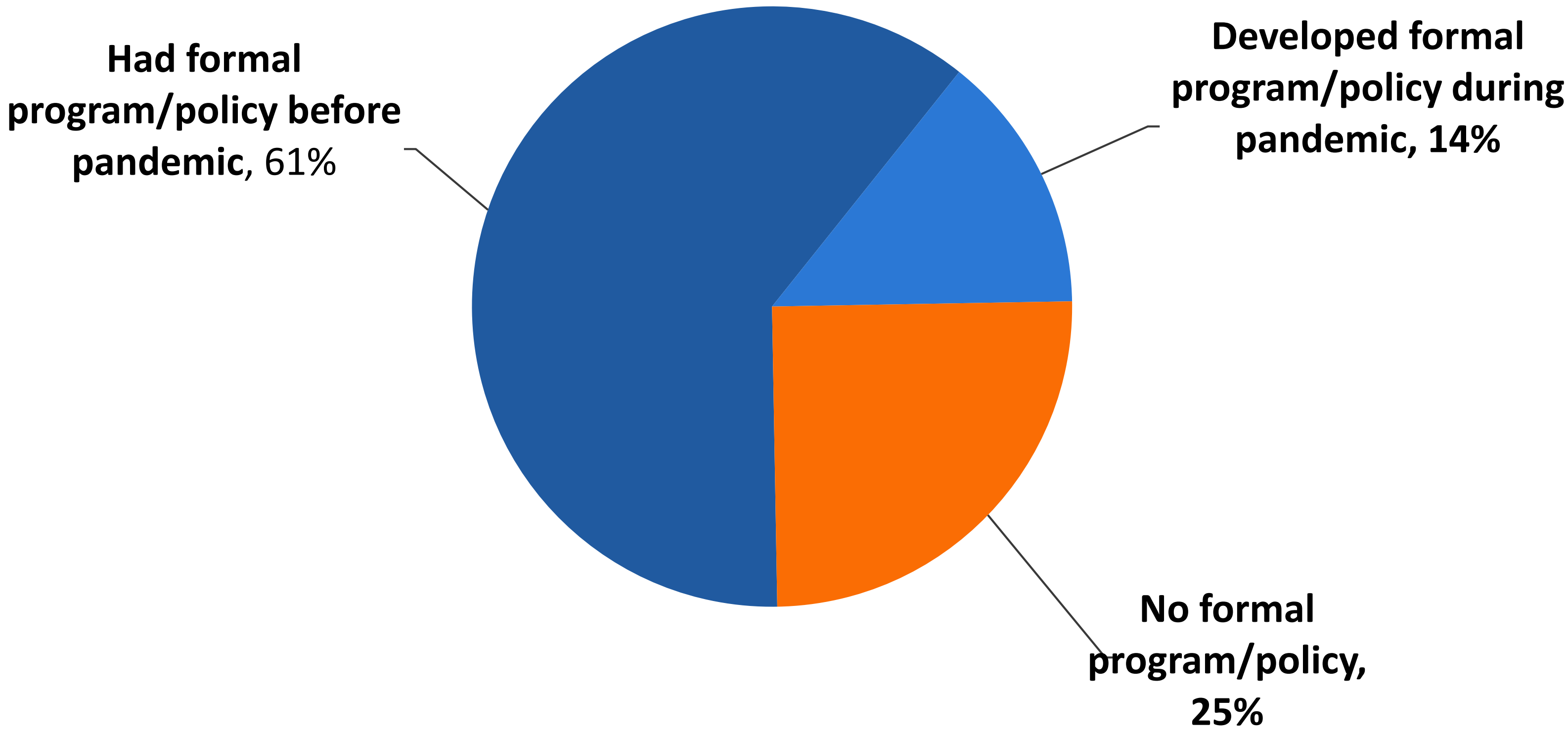
During the Pandemic, 14% of Worksites Developed a Formal Telework Program/Policy; 61% of Worksites Already Had a Formal Program/Policy before the Pandemic



COMMUTER CONNECTIONS
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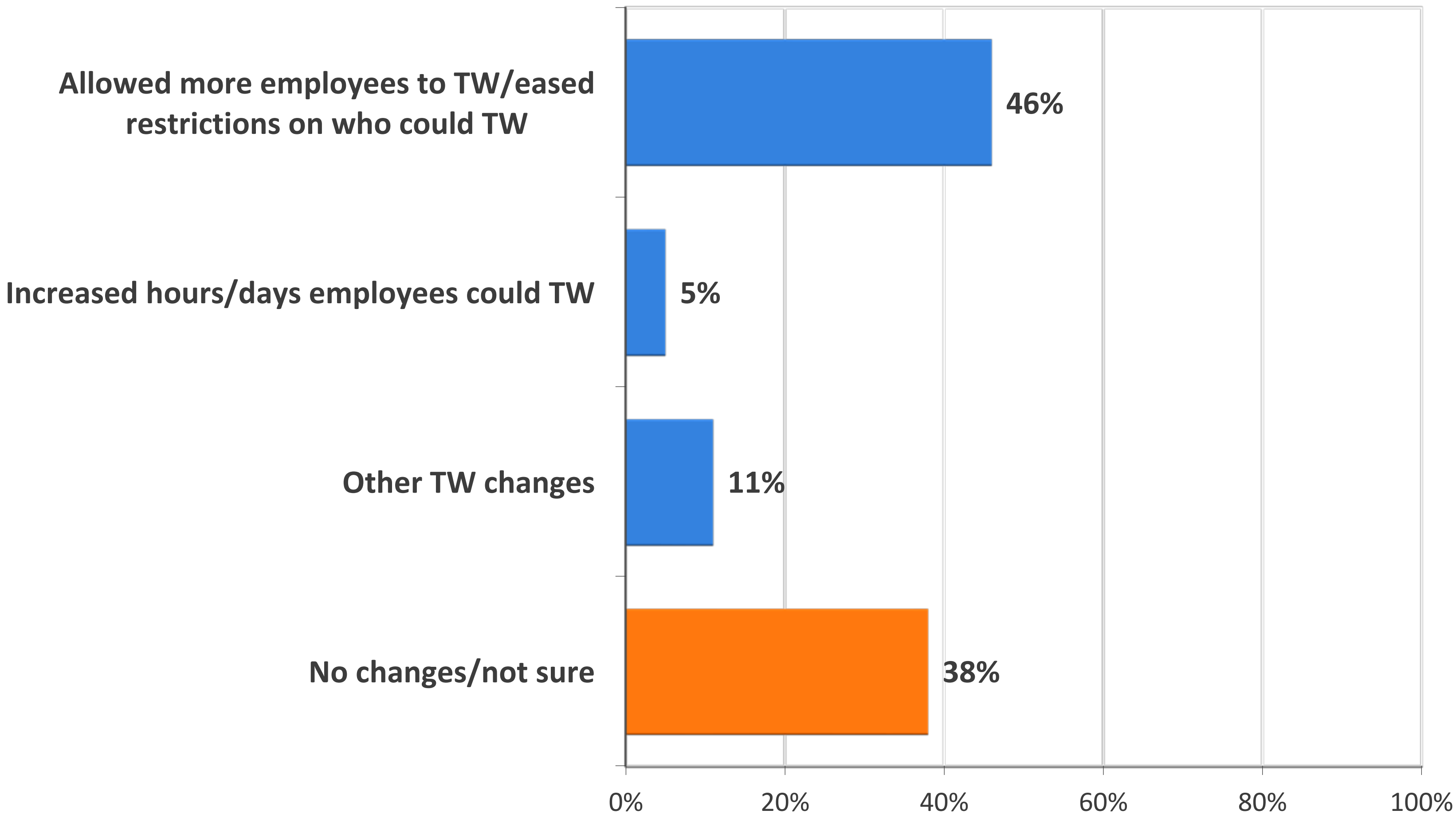
62% of Worksites With a Telework Program/Policy Made Changes to Accommodate the Pandemic – Most Made a Change to Expand Telework Eligibility



COMMUTER CONNECTIONS
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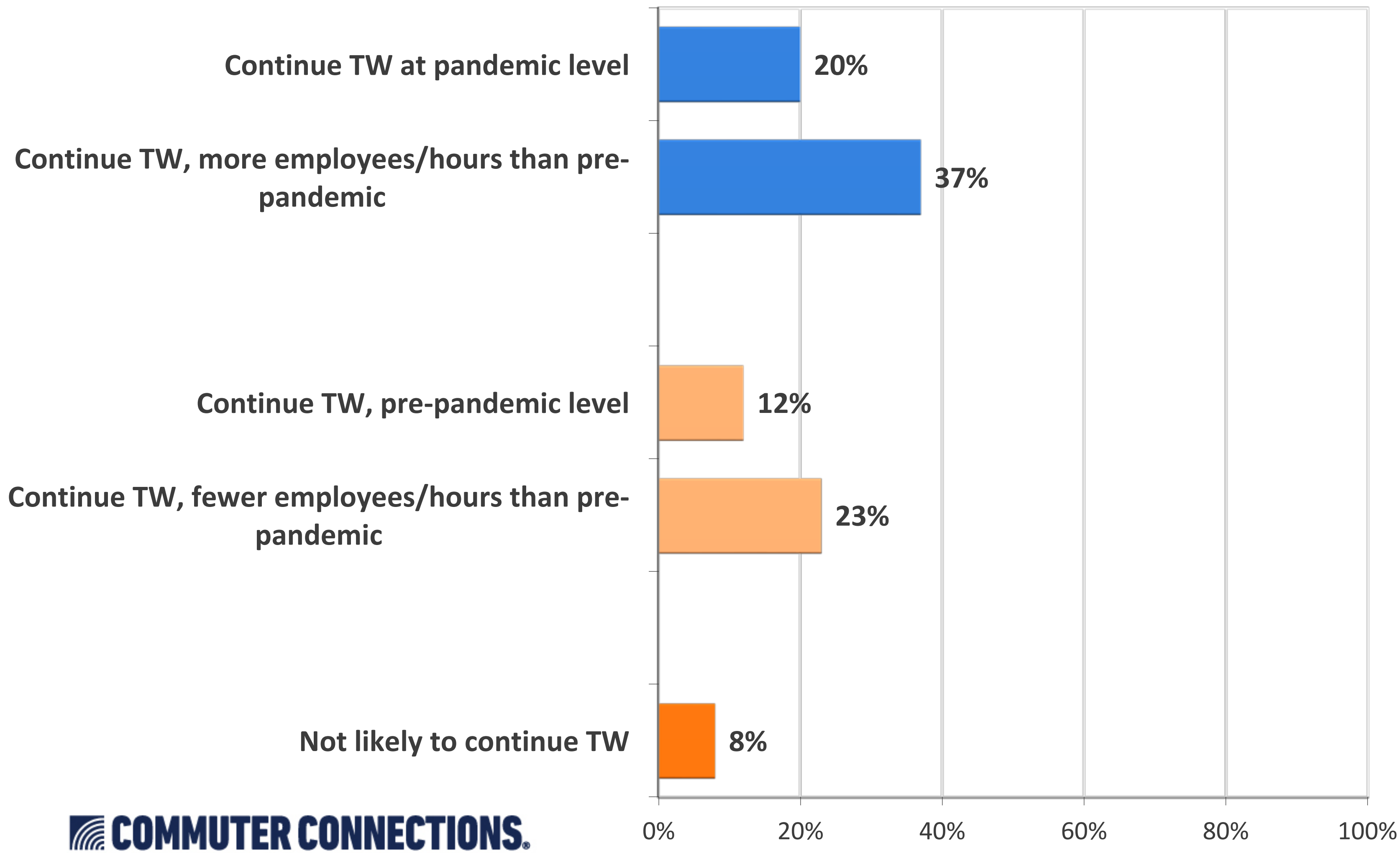
More than Half of Worksites Anticipate A Post-Pandemic Telework Level that is Higher Than the Pre-Pandemic Level



COMMUTER CONNECTIONS
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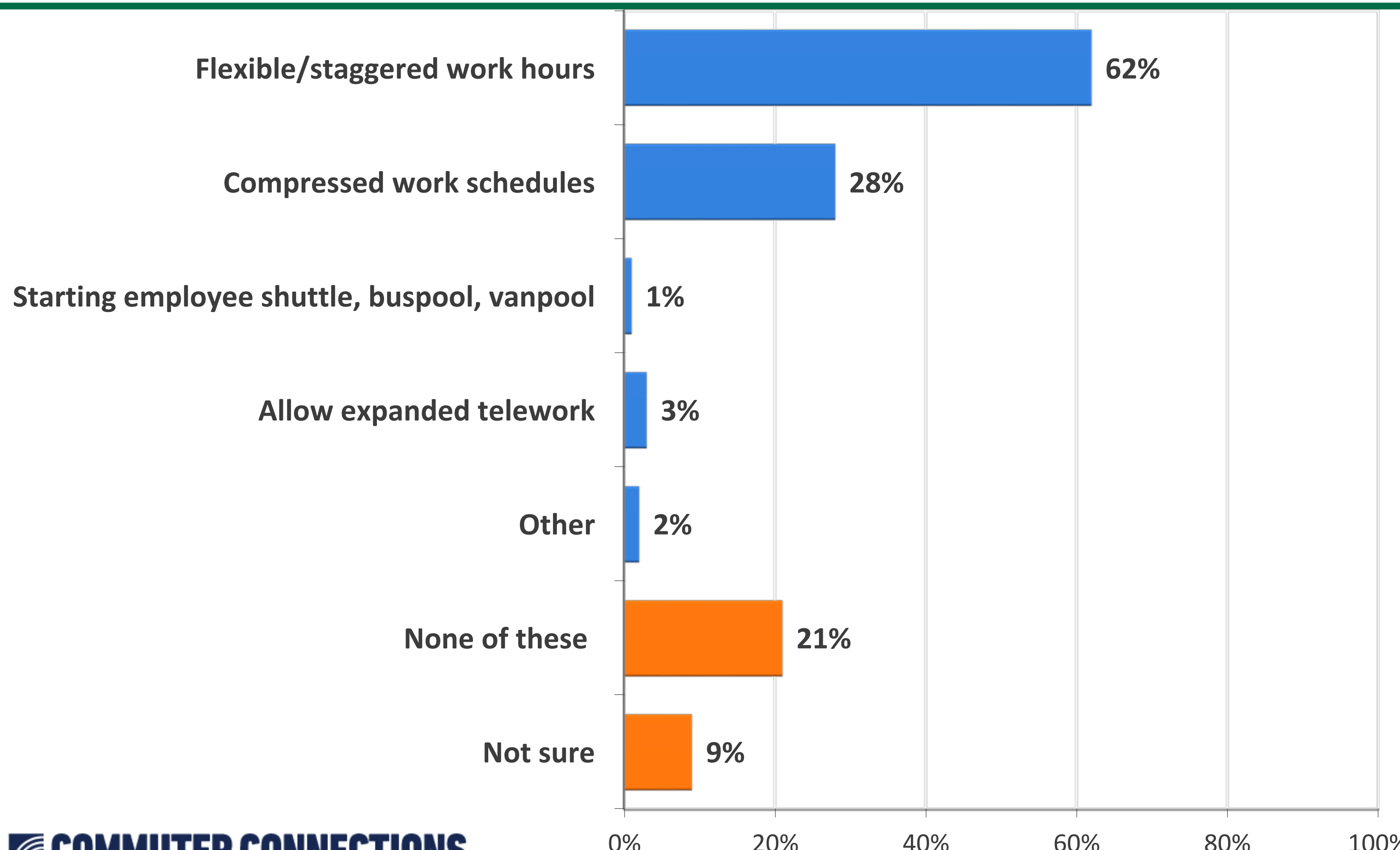
Seven in Ten Worksites Have Considered Implementing Work Hours or Commute Strategies After the Stay at Home Restrictions are Lifted to Reduce Future Virus Outbreaks



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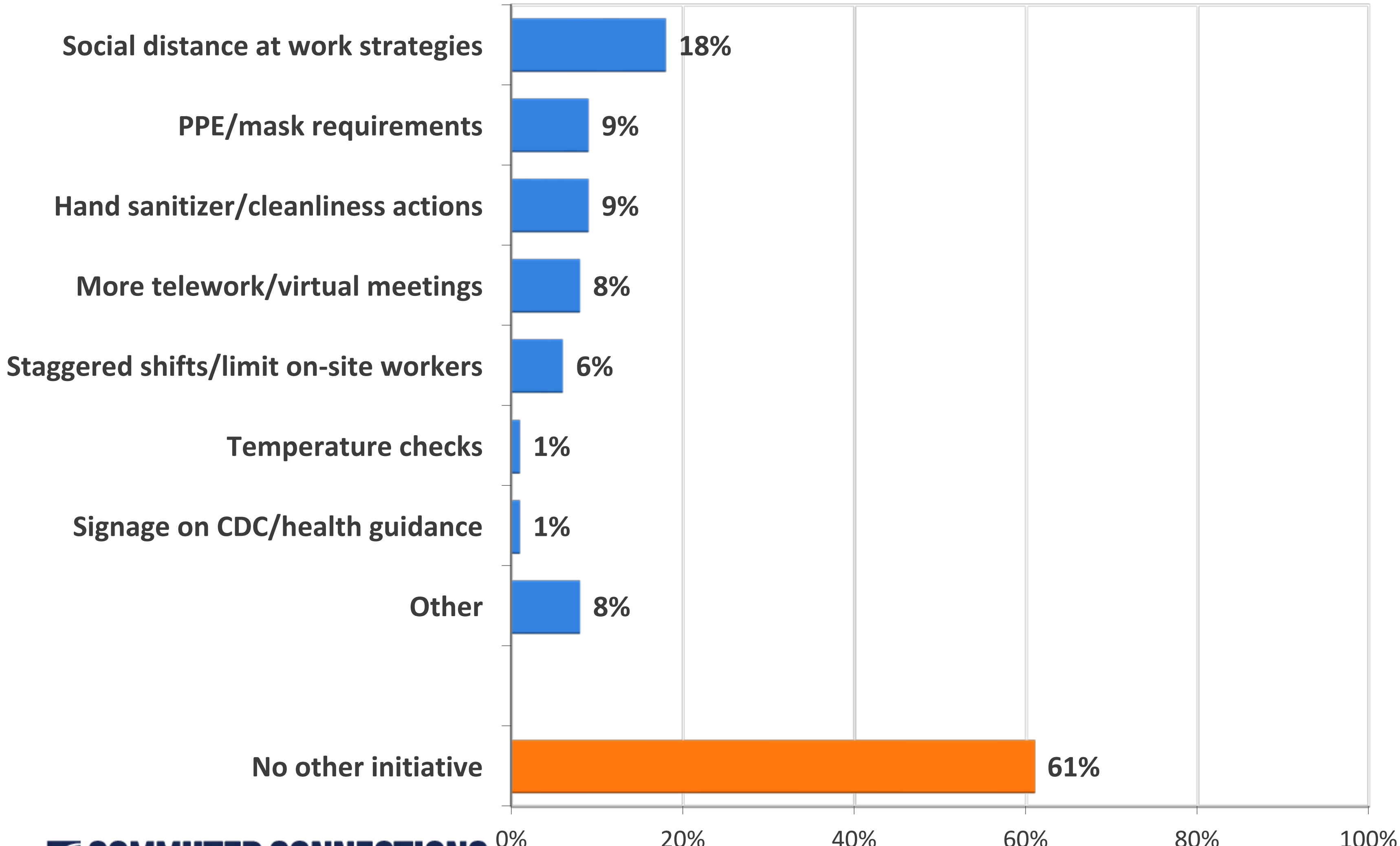
Employers Also Have Considered Implementing Other Virus-Prevention Strategies at the Worksite



COMMUTER CONNECTIONS
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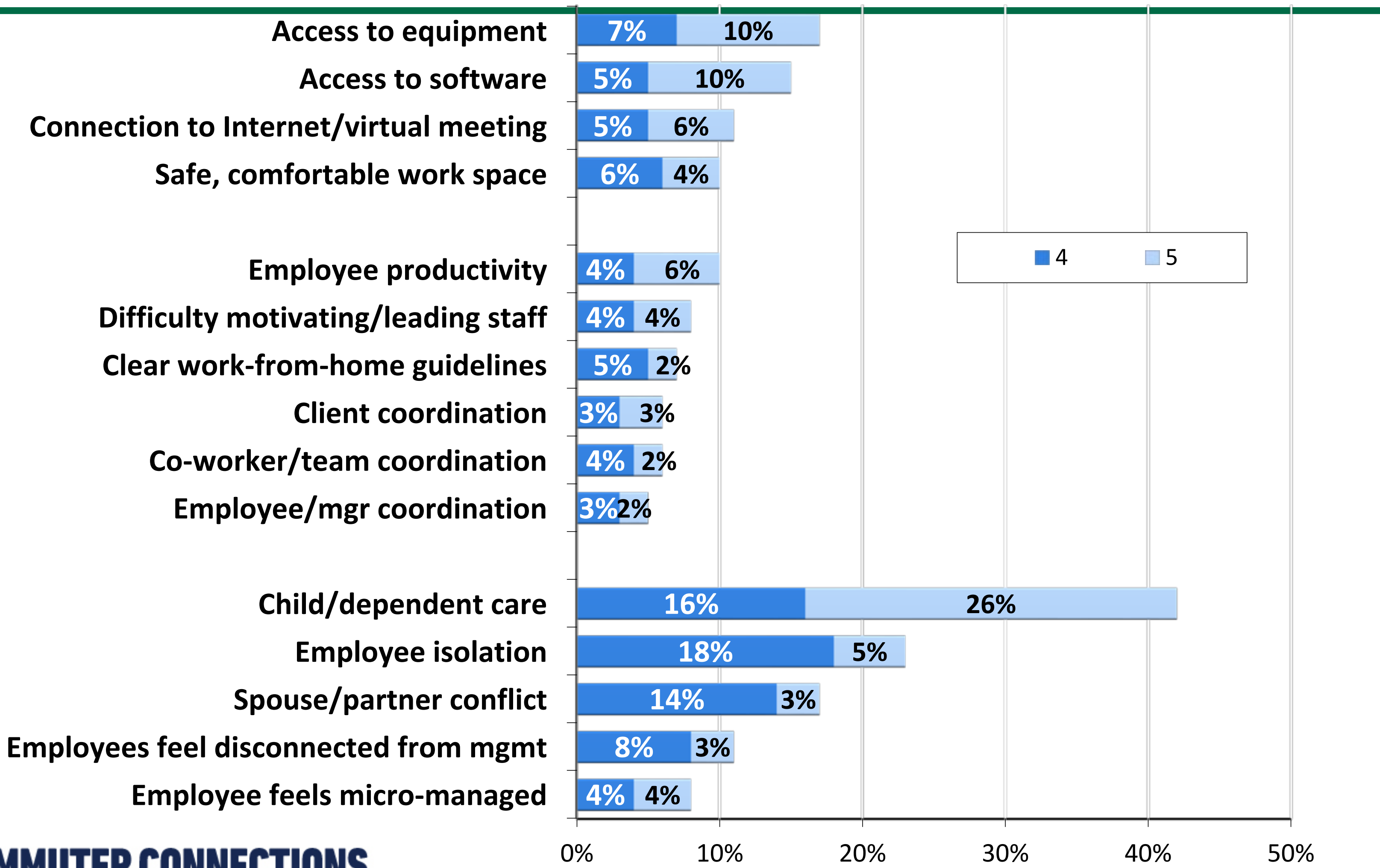
50% of Employers Noted A "Significant" TW Issue

Few Reported Technical and Coordination Issues; They Reported Greater Issues with Employees' Experience with Telework



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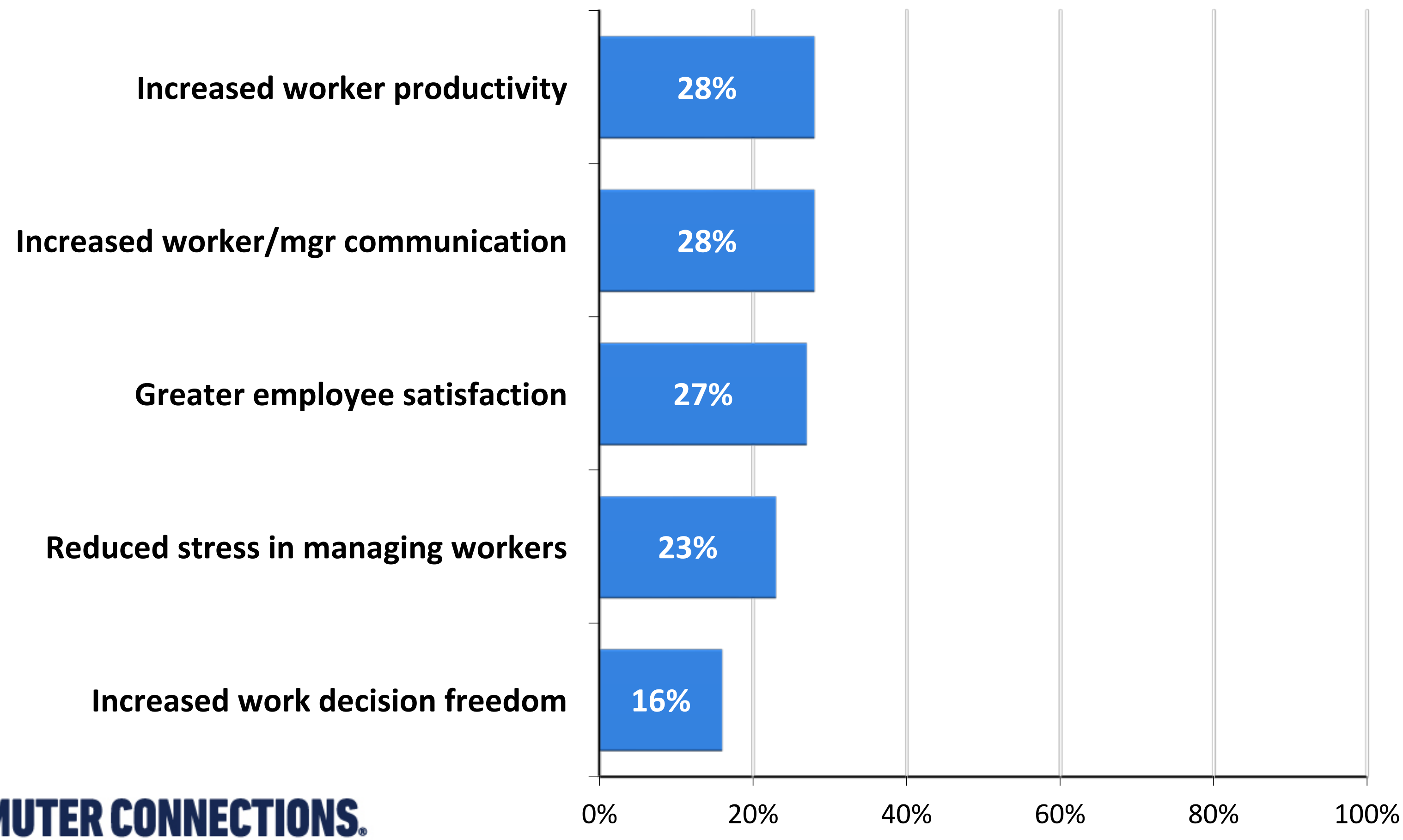
80% of Employers Said Managers Reported Benefits of Managing Remotely

Nearly three in ten said managers noted greater worker productivity and increased communication with workers



COMMUTER CONNECTIONS
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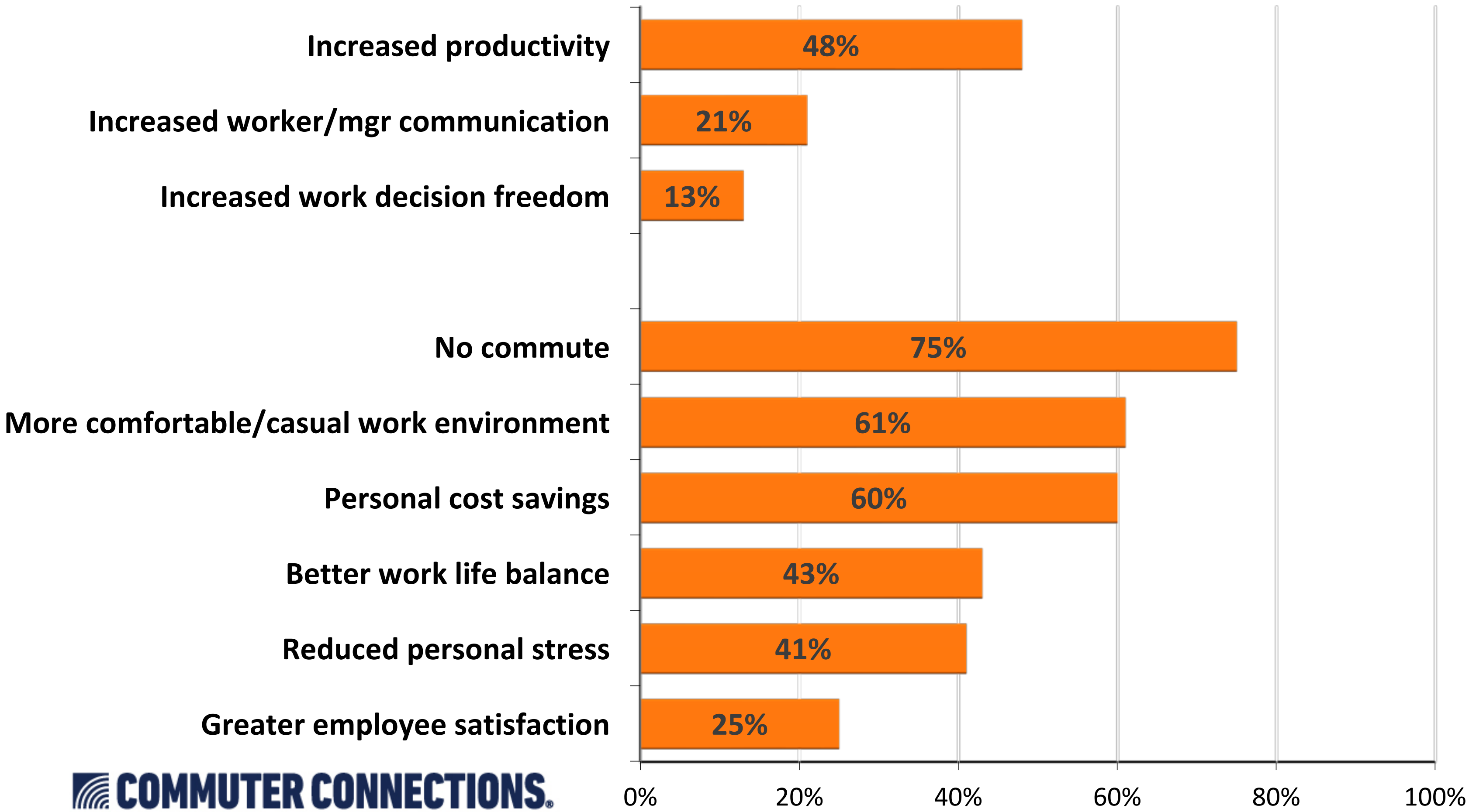
92% of Employers Said Employees Reported Benefits of Working From Home

The greatest employee benefits were on not commuting, comfortable work environment, and personal cost savings



COMMUTER CONNECTIONS.
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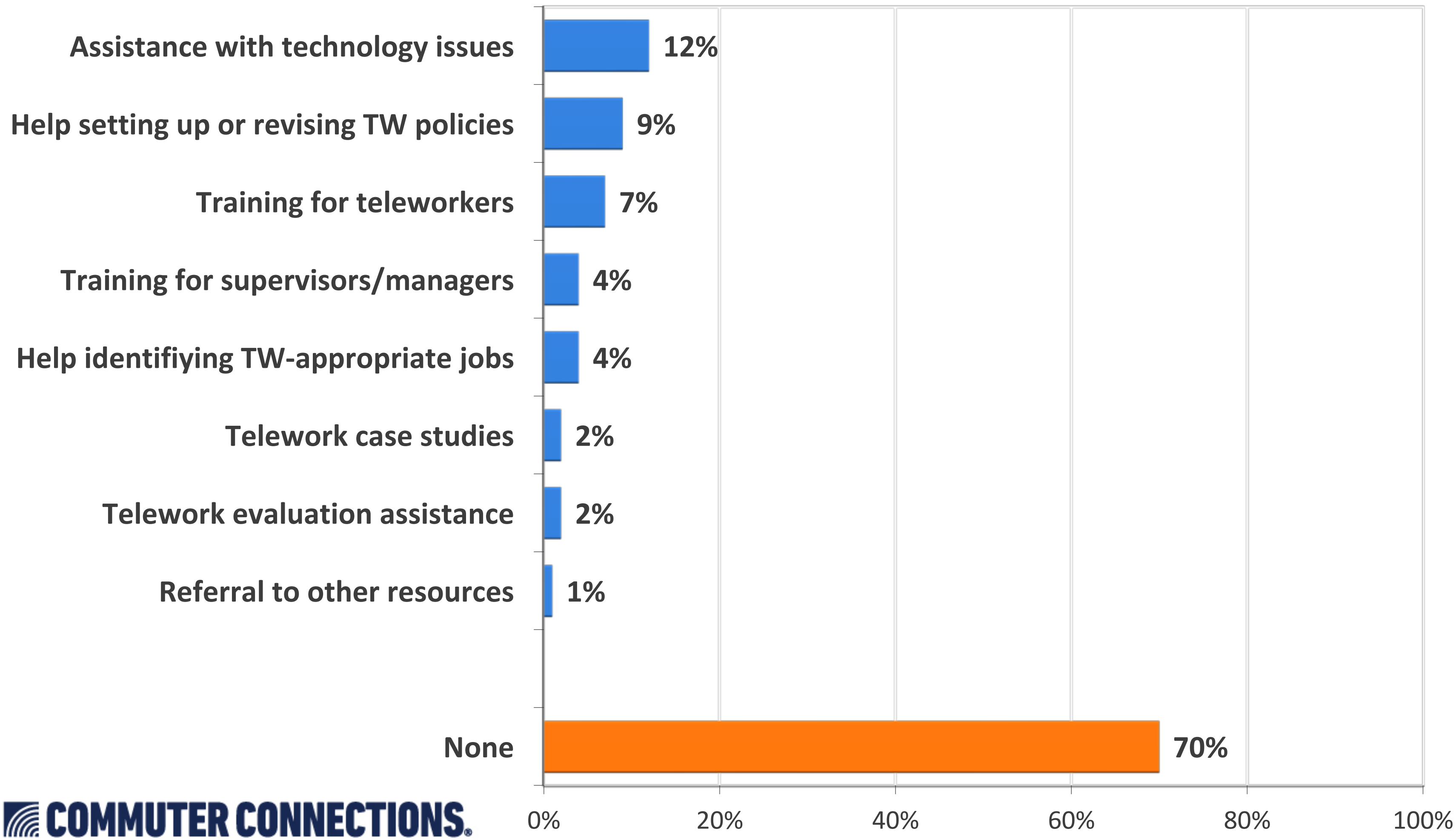
Three in Ten Organizations Had Received Some Telework Information or Assistance

Half Who Received Assistance Named an Internal or Corporate Source



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FY2020 Commuter Connections Regional Employer Telework Survey Key Highlights

- Good cross-section of employers that responded with regards to location, size and type of industry.
- During the pandemic, the average share of employees who teleworked grew from 36% to 82% at sites with telework already in place.
- Telework was a widely applied strategy to maintain business operations during the pandemic. Nearly all (97%) respondents said at least some employees were teleworking since the start of the pandemic. More than half (55%) said all employees teleworked all of their workdays.

FY2020 Commuter Connections Regional Employer Telework Survey Key Highlights (con't)

- More than six in ten (61%) respondents said their organizations had a formal telework policy or program in place before the pandemic began.
- 62% of Worksites With a Telework Program/Policy Made Changes to Accommodate the Pandemic – Most Made a Change to Expand Telework Eligibility.

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FY2020 Commuter Connections Regional Employer Telework Survey Key Highlights (con't)

- Ninety-two percent of respondents said their organizations anticipated continuing telework after the Stay-at-Home restrictions were lifted and employees could return to their usual work locations. Two in ten (20%) said they would most likely continue telework at the level during the pandemic.
- Seven in ten respondents said their organizations had considered at least one work hours or commute travel action. 64% considered actions for flexible or staggered work hours to minimize employee contact when arriving and leaving work. Three in ten (29%) considered compressed work schedules.

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FY2020 Commuter Connections Regional Employer Telework Survey Key Highlights (con't)

- More than four in ten (42%) said employees had encountered issues with child or dependent care, 23% said employees had experienced isolation and missed going to the workplace, and 17% had experienced conflict with a spouse or partner while teleworking during the pandemic.
- Nearly nine in ten (89%) respondents cited benefits they had heard employees express about their telework experience during the pandemic.
- About half (52%) of respondents noted benefits they heard managers express about their experience managing remotely during the pandemic.

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Washington, DC 20002

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ATTACHMENT 2F:

Report: Capital COVID-19 Snapshot: Safe Return to Work by the Greater Washington Partnership, summarizing results from a survey conducted in August 2020

Capital COVID-19 Snapshot: Safe Return to Work

The Greater Washington Partnership is about solutions and unity.

GREATER WASHINGTON PARTNERSHIP
FROM BALTIMORE TO RICHMOND.
FOSTERING UNITY. ADVANCING GROWTH.

Contents

Introduction

The Greater Washington Partnership is about solutions and unity, bringing people, organizations, and jurisdictions together to make the Capital Region of Baltimore, Washington, and Richmond, the world's best place to live, work, raise a family, and build a business. **The Capital COVID Snapshot: Safe Return to Work,** conducted in partnership with public agencies and business organizations throughout the region, is designed to increase regional information and data sharing, so employers, both large and small, can make more informed decisions about reopening and public agencies can better understand when employees are expected to return to their offices and worksites.

In March 2020, the Capital Region issued stay-at-home orders due to the rapid spread of COVID-19. Employers quickly prepared to have a majority of their workforce work from home full-time if possible, while many in the region continued to serve on the front lines as healthcare workers, essential service providers, and researchers working on a vaccine. Six months later, many employers in our region are still unsure when and how to safely return their employees to worksites, limiting the public sector's ability to efficiently and confidently meet the demand for many services, including public transportation. Furthermore, it is clear that low-income and minority communities are bearing a disproportionate health and economic burden due to the pandemic. A successful recovery must go beyond reopening and seek ways to address the inequities in our systems and foster opportunity for all the Capital Region's residents.

The Capital COVID-19 Survey was conducted between August 10-28, 2020, with more than 430 unique employers participating from the Washington, Baltimore, and Richmond metro areas that employ 275,000 residents. Along with an analysis of employer reopening plans, this report includes public sector information, including a Transit Tracker that provides ridership trends and the social distancing carrying capacity of the region's public transportation systems. The findings contained in this report will help employers and public agencies collaboratively reopen the Capital Region's economy safely, gradually and sustainably in the months ahead. The Partnership intends to update this product regularly as the region continues to reopen, so that all public and private decision-makers and residents have access to regular, timely and actionable information. As we work together to reopen the region safely, the Partnership encourages all employers and residents to do their part to help slow the spread of COVID-19 by following public health officials' guidance, wearing masks and observing social distancing guidelines.

Capital COVID Snapshot

Regional Partners

The Greater Washington Partnership is a first-of-its-kind civic alliance of CEOs in the region, drawing from the leading employers and entrepreneurs committed to making the Capital Region— from Baltimore to Richmond—one of the world's best places to live, work and build a business. The Partnership is about unity and solutions and we are stronger and more successful when aligned with our many exceptional partners throughout the Capital Region. This is especially true for the Capital COVID Snapshot: Safe Return to Work report. Thank you to the following partners for collaborating on this effort to ensure the Capital Region has a strong, safe recovery.

Metropolitan Washington Council of Governments
metro
MDOT Maryland Department of Transportation
Northern Virginia Transportation Authority
Federal City Council — A Catalyst For Progress In The Nation's Capital
Northern Virginia Chamber of Commerce — The Voice of Business in Northern Virginia
Tysons
Greater Washington Board of Trade
Arlington Chamber of Commerce
Chamber of Commerce Montgomery County
Prince George's Chamber of Commerce — Est. 1924
Connected DMV
The Chamber ALX — Supporting Businesses & Cultivating Community
DCST — DC Sustainable Transportation
ULI Urban Land Institute Washington
NVTC — Northern Virginia Transportation Commission

Employer Comment #1

"Our COVID-19 Task Force is continuously monitoring and reviewing guidance from the CDC and local jurisdictions so that we can update our approach as needed."

Employer Survey

Key Findings

1. Employers are adopting a phased approach to reopening, but many remain uncertain. This fall, about one-third of the region's workforce are projected to physically return to worksites.

2. Of employers who had long-term reopening plans, on average, those employers expect to have 72% of their employees return to the office by Summer 2021. However, a third of responding employers are still unsure of their summer 2021 plans

3. Most employers want to test their employees for COVID-19 but will not if the test costs more than $50.

4. Nearly 50 percent of employers indicated a high level of concern about public transit safety and a low level of confidence that public agencies can control crowding and enforce the wearing of masks.

Reopening Worksites

The return to worksites will be gradual.

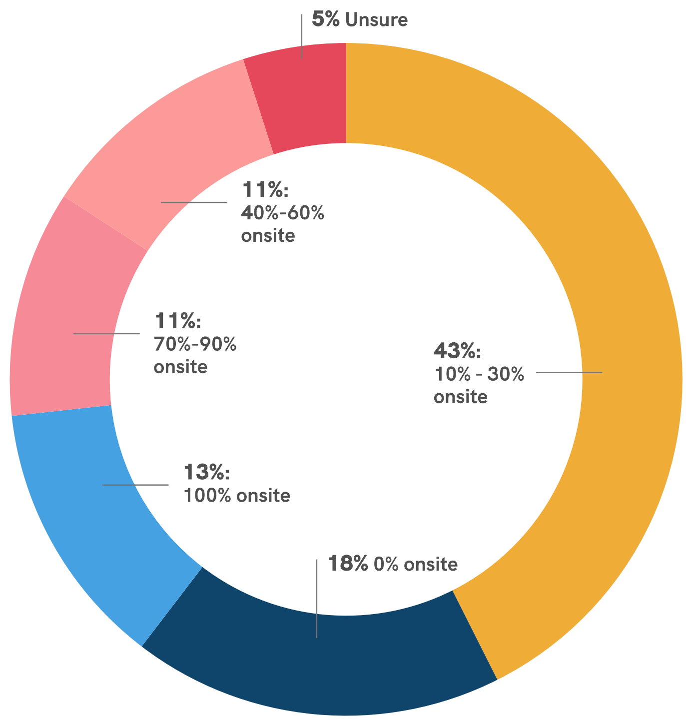
The health and safety of our regional workforce comes first.

Based on responses as of August 2020, employers with plans for next summer expect, on average, **72 percent of their employees to return to the office by summer 2021**. However, a third of responding employers are still unsure of their summer 2021 plans.

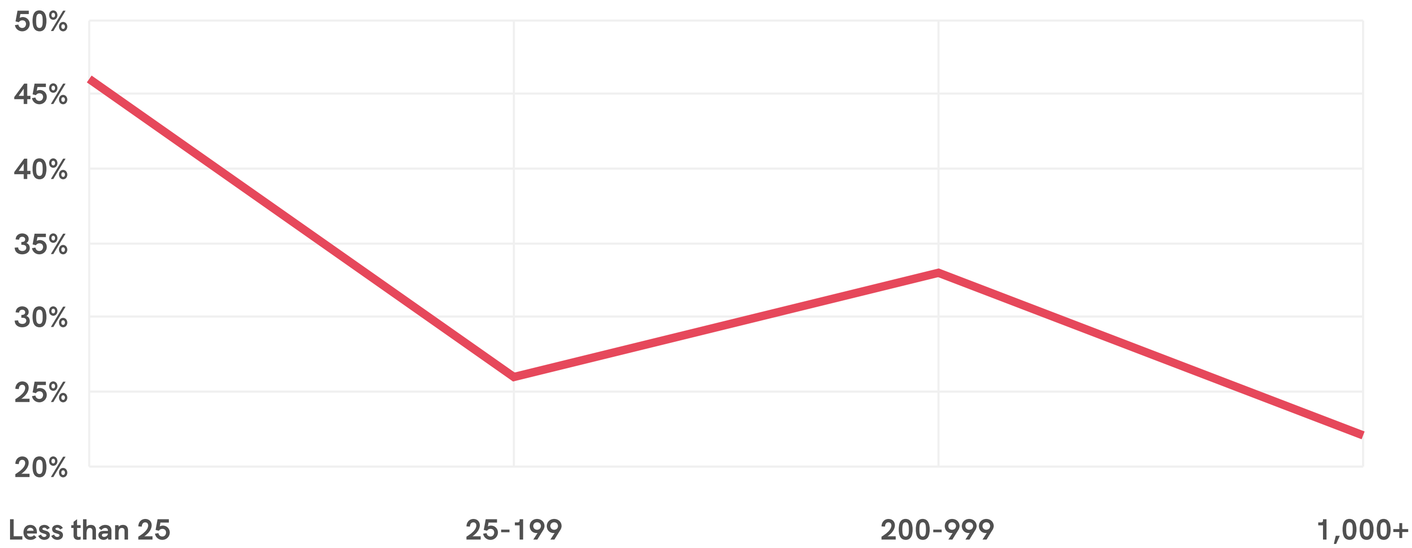
Decision-makers must continue to prioritize the health and safety of workers, and their families. By collecting and widely disseminating this information, leaders across organizations will be able to learn from each other and apply best practices to their operations.

According to responding employers, on average, less than a third of their workforce are expected to be physically at their worksites after Labor Day. Limiting the number of people in the office and teleworking will continue for most employers. Employers are adopting a phased approach to their return, with modified work schedules to limit the number of employees in the office.

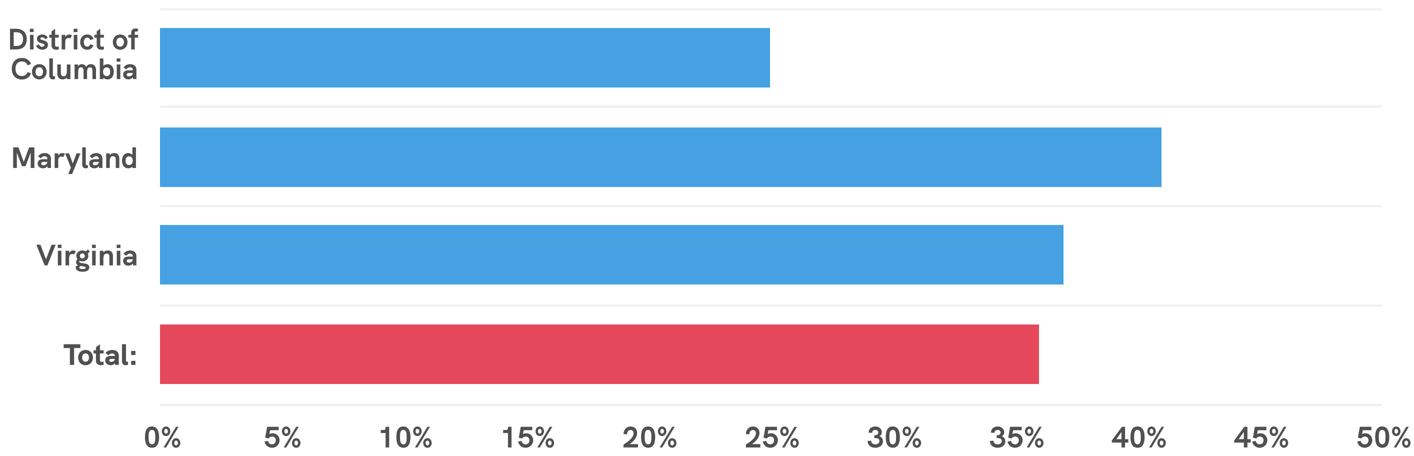
Share of Workforce Expected Onsite post Labor Day



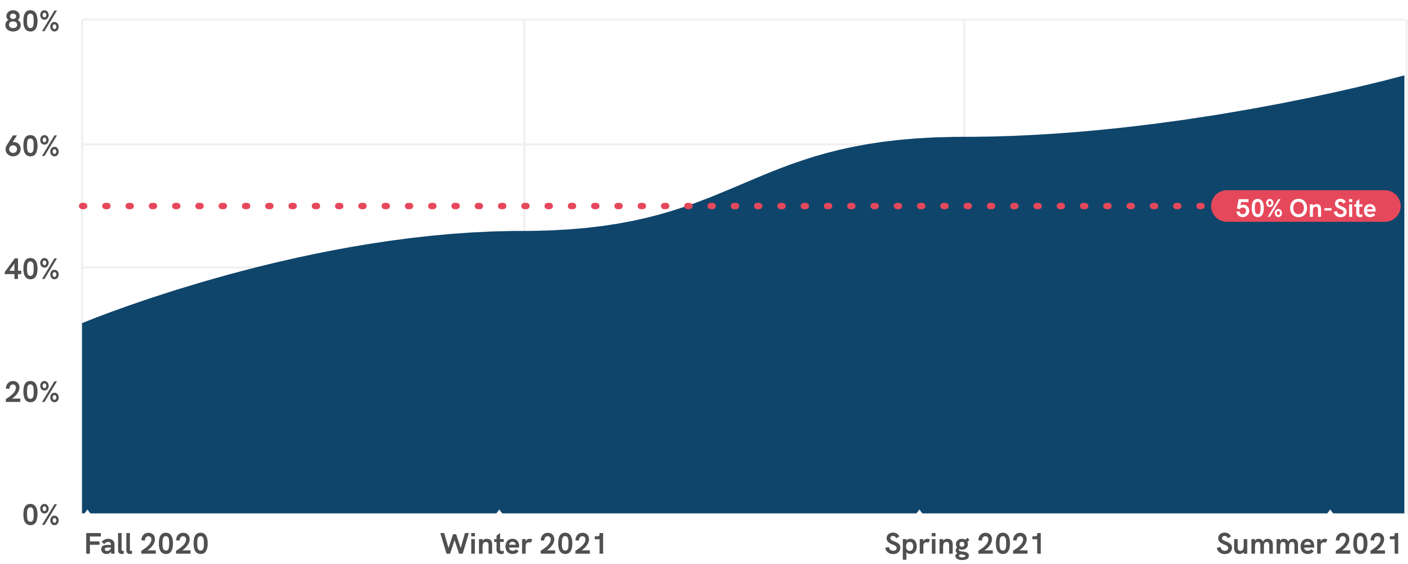
Share of Workforce Expected Onsite post Labor Day by Worksite Size



Share of Workforce Expected Onsite post Labor Day by State



Share of Workforce Expected Onsite Over the Next Year



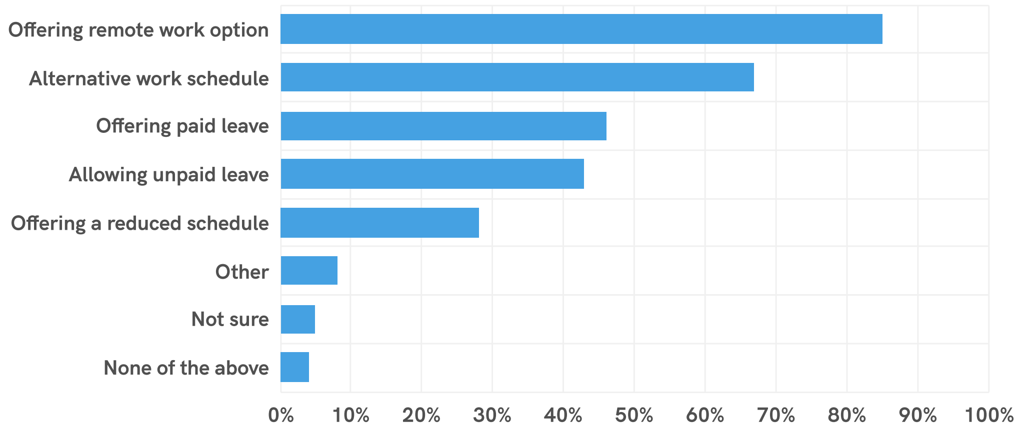
Some employers say they are benchmarking and monitoring the situation to adhere to the local/ state government mandates. Although the general theme in the comments provided by employers was continual "monitoring and re-evaluating,", those who were able to provide a long-term estimate on the return of their employees, believe a majority of their workforce will be back by spring 2021. Breaking down responses by larger employers are generally more cautious about bringing their workforce back.

Worksite Safety & Flexibility for Employees

Nearly 7 in 10 employers are currently offering alternate work schedules to support employees.

Employers are implementing revised policies and procedures to promote the safety and well-being of employees and their families during this pandemic, with more than two-thirds of respondents offering flexible and remote work options, and nearly 50 percent providing paid and/or unpaid leave. Comments from employers indicated the new accommodations are heavily influenced by employee childcare and education needs.

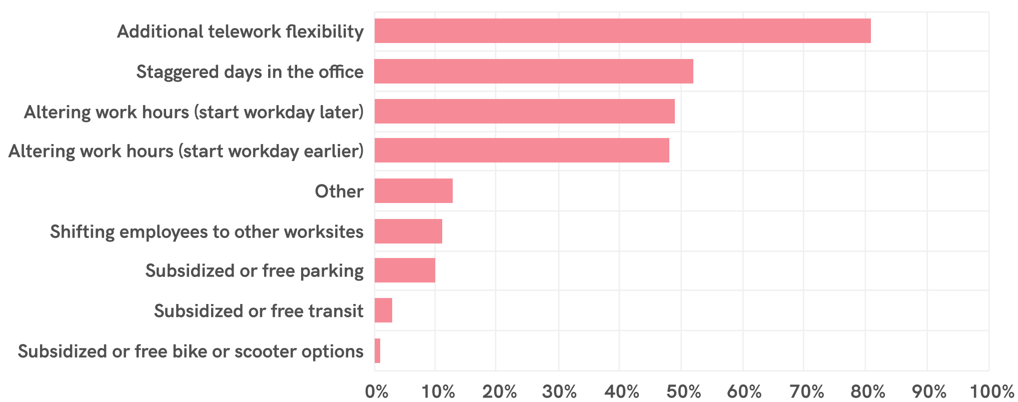
Accommodations for COVID-Related Personal Challenges (e.g. lack of childcare, caring for family member)



A majority of employers are providing new flexible options for employees.

In addition to allowing more telework, over half of employers responding to the survey are changing existing schedules to accommodate employee needs and ensure safety protocols. In addition to the listed options, employers noted that they are also providing expanded employee assistance programs, access to additional resources for working parents, and providing childcare at their worksites.

Post-COVID Flexible Work Policies



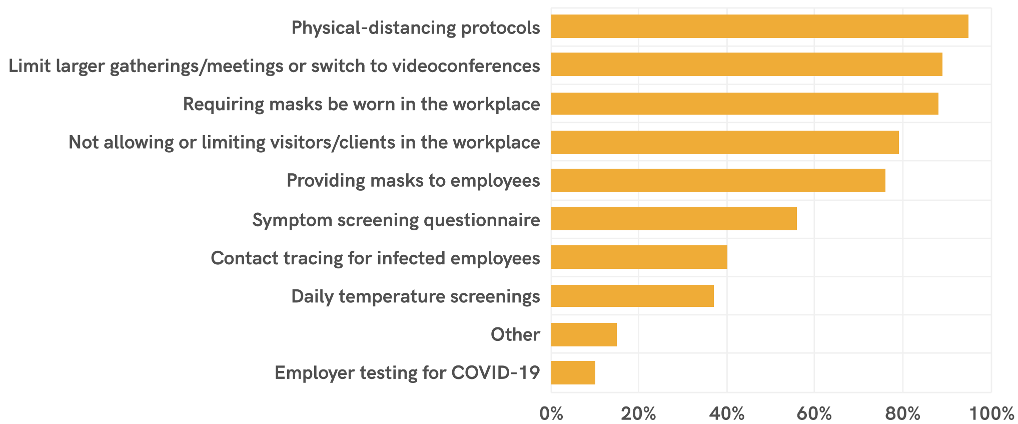
Employer Comment #2

"We are planning a 50% decrease in the density of our office as a maximum, based on a 9' planning module."

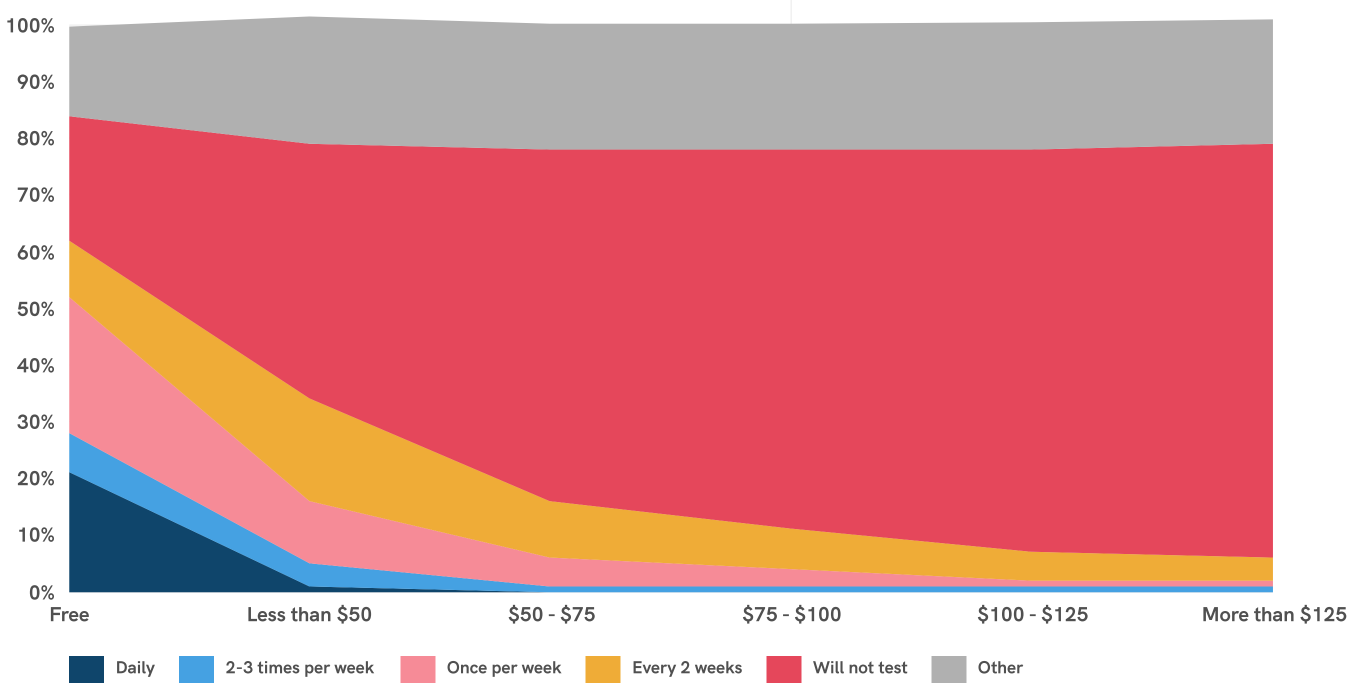
Most employers are working to ensure physical distancing, requiring masks and limiting the number of people in the workplace.

Employers are actively working to mitigate the risk of viral spread by adjusting their procedures for those employees that do return to worksites. Nearly 90 percent of employers are requiring employees to wear masks at the workplace, and four-in-ten employers plan to conduct contact tracing for infected employees.

Safety Measures at Worksites



Employer Attitudes on Frequency and Cost of Testing



Only 10-percent of respondents indicated that their organization plans to require testing to enter a worksite.

Most employers do not plan to regularly test employees.

A robust regionwide testing strategy that is timely, accessible, and affordable is needed to achieve our shared goal of reopening safely and sustainably. In addition to a robust testing strategy, there is a suite of actions employers are adopting to lower the transmission risk further. These include social distancing, contact tracing and requiring masks.

Half of employers will not test their employees if the cost per test were above $50.

While the Capital Region has been ramping up testing, there is no coordinated strategy or best practices for employers. **A robust regionwide testing strategy that is timely, accessible, and affordable is needed to achieve our shared goal of reopening safely and sustainably.** In addition to a robust testing strategy, there is a suite of actions employers are adopting to lower the transmission risk further. These include social distancing, contact tracing and requiring masks.

We asked respondents to indicate how often their organization would want to test employees for COVID, assuming rapid and accurate results, at varying price levels. When it comes to mandatory testing, employers' feelings are mixed with less than 10 percent indicating they are implementing mandatory testing. Larger organizations (500+) are more likely to require testing now or in the future (23 percent vs. 8 percent at smaller organizations). When asked about likelihood of testing if quick, accurate and free tests were available, less than quarter of the respondents (22 percent) said they would not test. However, 7 out 10 say they would not test if tests cost more than $75. Attitudes towards testing frequency vary greatly with few employers saying they would test daily (21 percent), once a week (24 percent), or every two weeks (10 percent) if tests were free. In their open-ended feedback, some employers shared that they plan to test as needed (i.e., testing required to return to work after exposure/infection). Regardless of frequency, some employers stressed the need for affordable and readily available testing with quick results in their comments.

Employer Comment #3

"People REALLY miss seeing each other and collaborating/interacting. The longer this continues, the more challenged our culture will be, let alone the economic challenges."

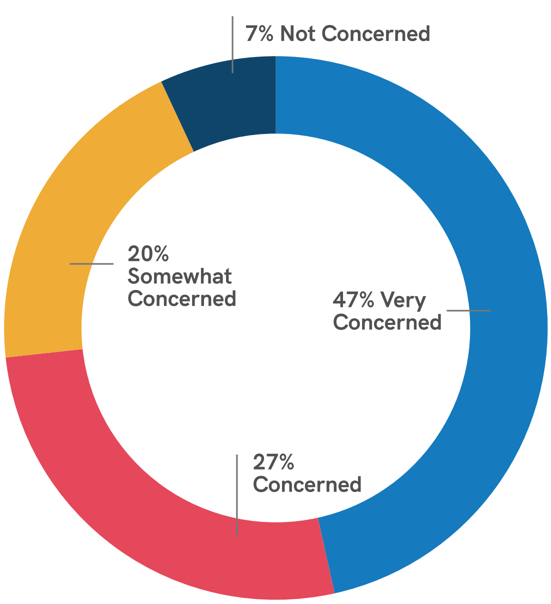
Commuting to Worksites

Employers do not expect many employees to use transit for commutes.

Today, most employees are teleworking or driving

We know that the **plan to reopen the Capital Region's economy safely must be phased and gradual**, including employee commutes. Prior to March 2020, more than 60 percent of employees at respondent worksites commuted by private vehicle, 25 percent by transit, and less than 10 percent teleworked daily. To maintain operations and safety during the pandemic, employee commutes have changed with teleworking growing by 7x since February and transit use shrinking by 4x.

Level of Concern About Employees Using Public Transit

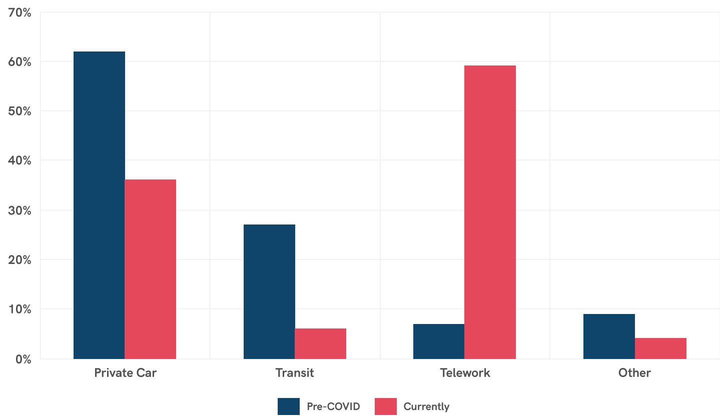


Now, more than ever, decision-makers need access to timely and relevant data to make crucial decisions and this includes real-time data on public transportation usage. The pandemic is likely to have long-lasting impacts on how employees commute to their worksites.

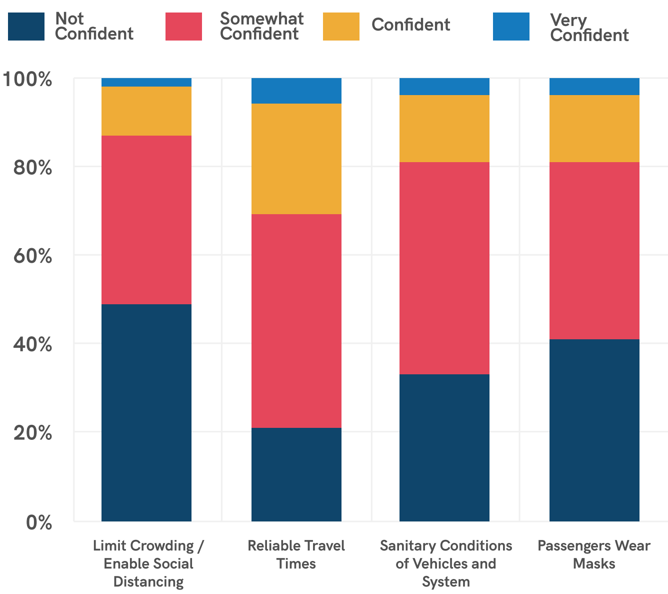
Employers lack confidence in the safety of public transportation.

Almost half of employers are very concerned about the safety of using public transit and generally do not feel confident about public agencies' ability to promote social distancing and enforce the use of masks. Employees' fears about using public transit also seems to be driving remote work policies – evidenced by some of the comments provided by employers.

COVID Impact on Commuting



Confidence in Public Transit Performance



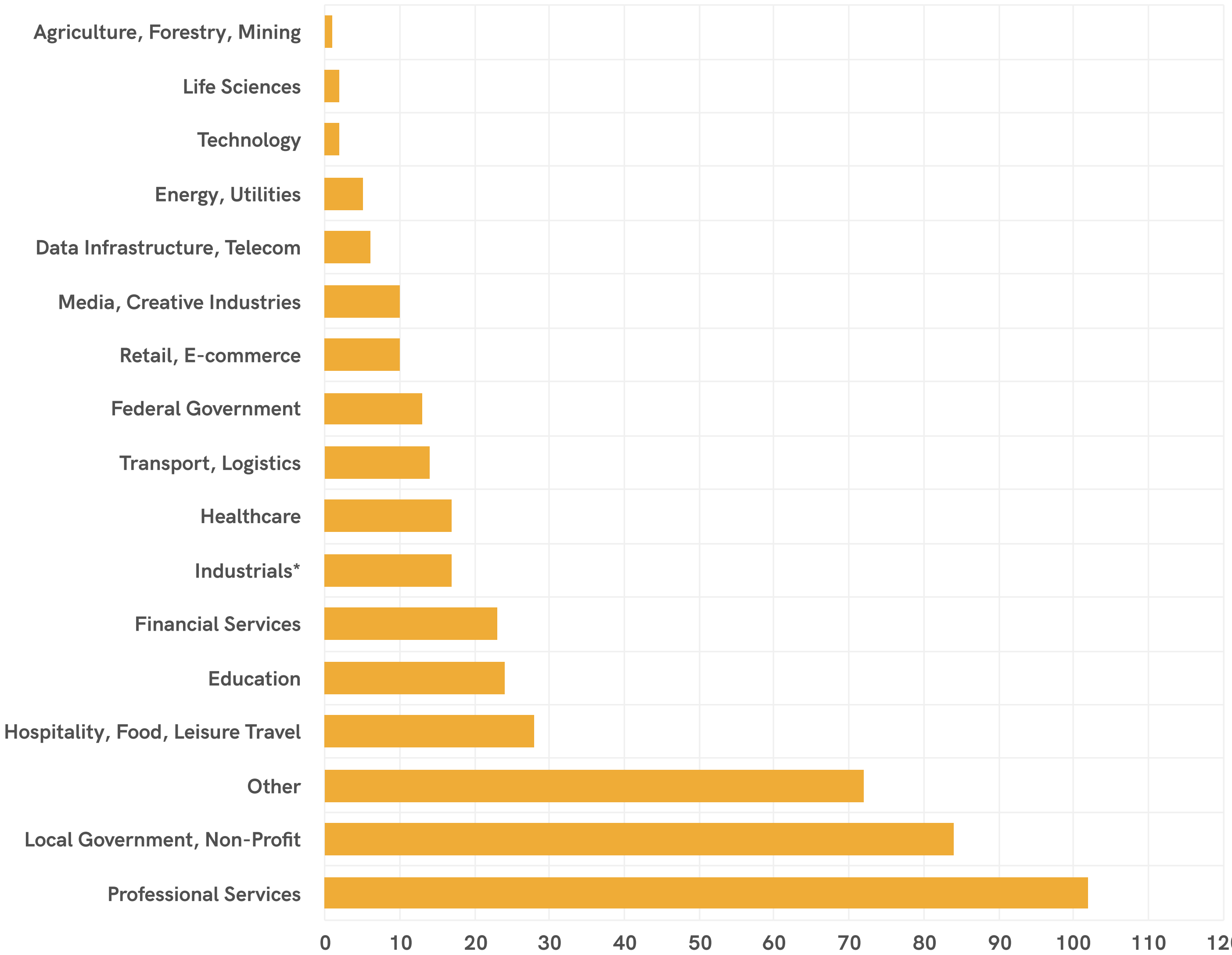
Employer Comment #4

"We are fundamentally re-assessing our workplace expectations. Our employees are very worried about public transportation. This is a big deal because our office location was secured to be very near metro and bus lines."

Capital COVID Survey Sample Information

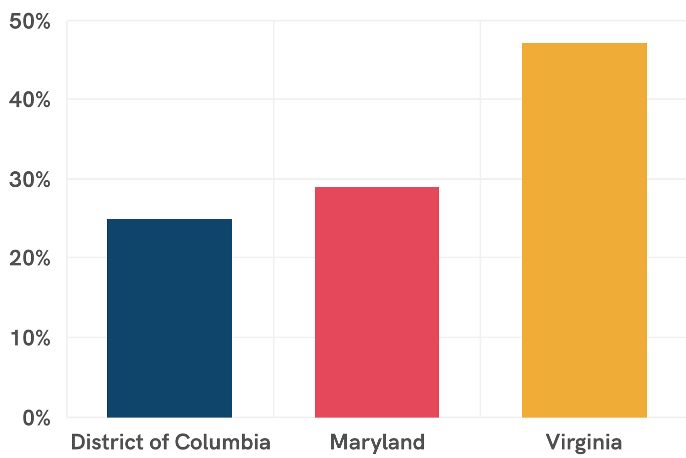
430 employers (562 worksites) from various industries are represented in the survey. Together these organizations employ around 275K people in the Capital Region (full time, part-time and contracted workforce). The results from the Employer Survey reflect the opinions and assumptions of employers who responded to the survey and should not be used to generalize to the entire Capital Region.

Organization/Industry Type

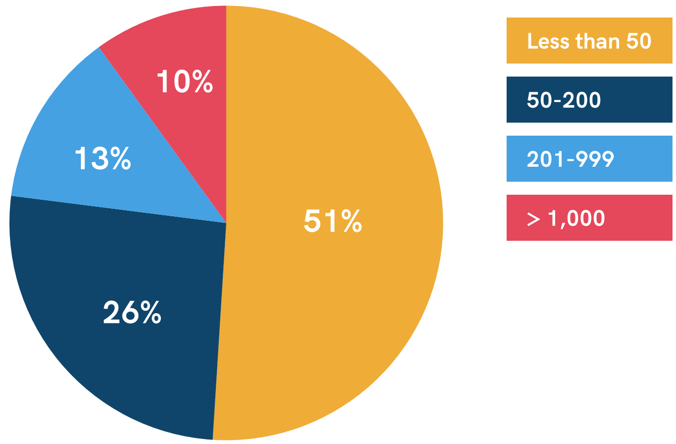


*Manufacturing, Construction, etc.

Location



Organization (Number of Employees)



Capital COVID-19 Transit Tracker

Key Findings from the Capital Transit Tracker

1. Metrorail ridership remains well below historic levels (85 percent below last year) while service, hours of operation, and frequencies are close to pre-pandemic levels. After service increased in August, on average there are no trains exceeding social distance standards, including during peak periods.

2. Local and WMATA bus transit services generally reported smaller ridership declines compared to commuter rail and bus, but no transit agencies have reported widespread crowding issues as of August.

3. Some historically high-ridership bus routes are experiencing crowding above social distancing capacity at certain times of day; a standard 40ft bus seats about 40 passengers, but the CDC guidance on social distancing capacity limits capacity to only 10 passengers per bus.

4. While crowding on the transit system is not common today, budget challenges resulting from COVID-19 will exacerbate crowding concerns should Congress be unable to provide additional aid to our region's transit network which is expected to lead to service reductions.

Working in partnership with the region's transit operators through the Metropolitan Washington Council of Governments (MWCOG), WMATA's public datasets and with expert guidance from Metro Hero, the Greater Washington Partnership and EY have created the Capital COVID-19 Transit Tracker. The tracker is intended to help employers and employees make decisions about whether and how to safely use transit. The tool allows the region to better understand the ridership and capacity limitations of the WMATA Metrorail System and provide summaries of service from commuter rail and bus transit providers around the region.

As of August 2020, nearly all transit agencies around the Capital Region are requiring masks to be worn on transit and are not reporting significant capacity issues that exceed social distancing capacity (except on limited bus routes and times outlined in the report). Data included in the report pertains to August 2020 and is subject to change based on the state of the health crisis and its impact on public budgets and transit agency service levels.

While snapshots from the Capital COVID Transit Tracker are included in this report,the interactive tool can be accessed online at: **greaterwashingtonpartnership.com/covid-transit-tracker**

Ridership remains 40-95% below normal depending on the system.

Transit service is close to pre-pandemic levels.

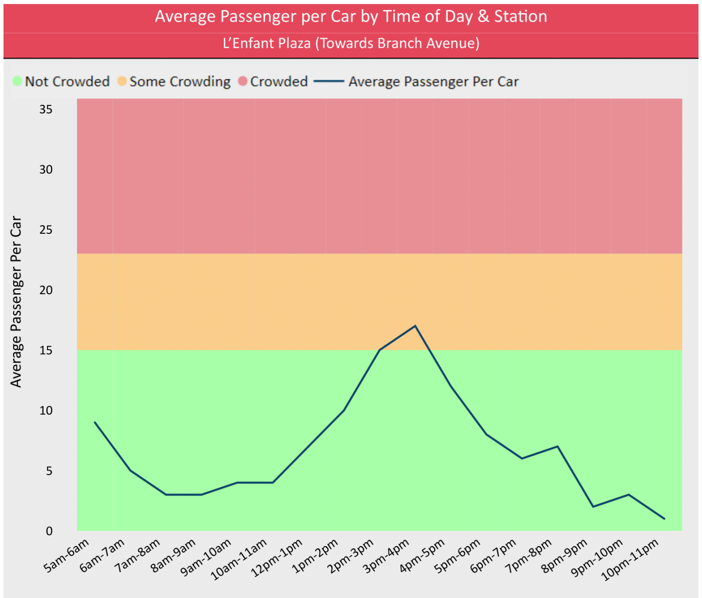
In March 2020, as COVID-related restrictions were implemented across the Capital Region and hundreds of thousands of workers transitioned to telework, transit ridership plummeted. Before the pandemic, WMATA Metrorail carried more than 600,000 trips each weekday. By the end of March, WMATA reported Metrorail ridership was around 30,000, a drop of 95%. Commuter rail systems experienced similar drops in ridership while buses, used heavily by essential workers, experienced smaller yet substantial declines in ridership between 40-80%. Daily Metrorail ridership at the end of August exceeded 70,000 riders for the first time since March, still 88% below pre-COVID levels.

WMATA Metrorail

The Metrorail system has not experienced significant capacity issues; however, some stations have approached the social distancing capacity during peak periods

Metrorail can only carry 23 passengers per car, on average, to allow six feet between passengers before they are considered crowded by social distance carrying capacity standards. During the coronavirus pandemic, the traditional peak periods have shifted. For example, the AM peak period has shifted earlier while the midday and early afternoon periods see higher relative levels of ridership.

The chart below shows the average passengers per car (PPC) by time of day on the Blue, Orange, and Silver lines passing through L'Enfant Plaza station between August 1 and August 31, 2020. L'Enfant Plaza is one of the busiest stations in the Metrorail system. During August, L'Enfant Plaza's average PPC did not exceed social distancing capacity, however it did approach the crowding threshold between 3-4pm heading towards Branch Avenue. *Use the Capital COVID Transit Tracker to observe ridership and crowding trends at any station on the Metrorail system.*



The chart below shows the average PPC for all WMATA Metrorail Red Line stations. During August, the Red line did not exceed social distancing capacity, however it did approach the crowding threshold between 1-6pm in the downtown core. *Use the Capital COVID Transit Tracker to observe ridership and crowding trends on any line on the Metrorail system.*

The maps below show the average crowding on the Metrorail system during the PM peak on the last Thursday in August in both 2019 and 2020. Pre-COVID, the Metrorail system experienced regular crowding on the system between 4-5pm, particularly downtown. Even with the current capacity restrictions to allow for social distancing, no station experienced crowding on August 27, 2020 between 4-5pm. *Use the Capital COVID Transit Tracker to observe ridership and crowding averages on the Metrorail system for any day and time period.*

Average Crowding Level by Station, Line & Time

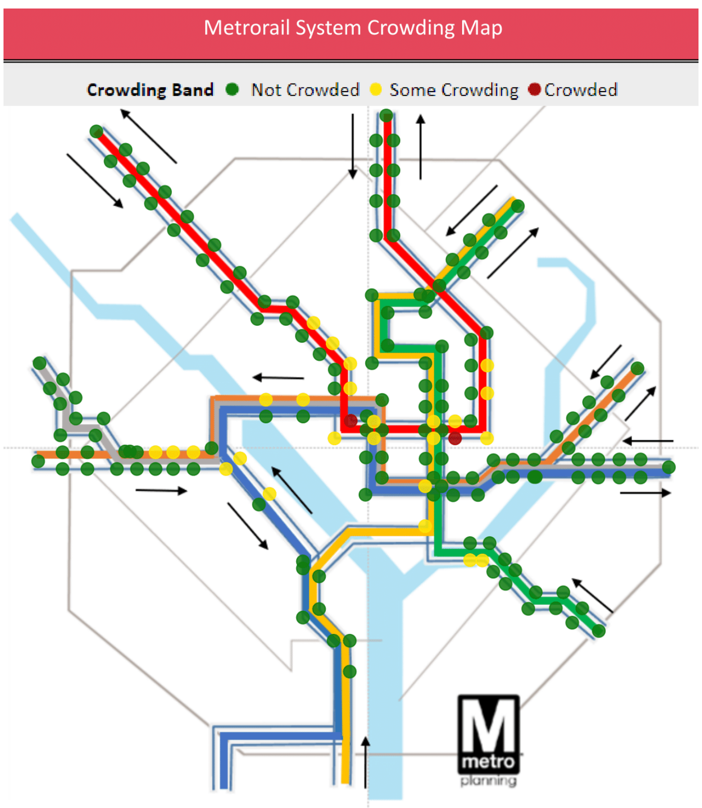
Station	Direction		5am-6am	6am-7am	7am-8am	8am-9am	9am-10am	10am-11am	11am-12pm	12pm-1pm	1pm-2pm	2pm-3pm	3pm-4pm	4pm-5pm	5pm-6pm	6pm-7pm	7pm-8pm	8pm-9pm	9pm-10pm	10pm-11pm
Bethesda	Towards Glenmont	RD	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded
Bethesda	Towards Shady Grove	RD	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded
Brookland–CUA	Towards Glenmont	RD	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded
Brookland–CUA	Towards Shady Grove	RD	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded
Cleveland Park	Towards Glenmont	RD	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Some Crowding	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded
Cleveland Park	Towards Shady Grove	RD	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Some Crowding	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded
Dupont Circle	Towards Glenmont	RD	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Some Crowding	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded
Dupont Circle	Towards Shady Grove	RD	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Some Crowding	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded
Farragut North	Towards Glenmont	RD	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Some Crowding	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded
Farragut North	Towards Shady Grove	RD	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Some Crowding	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded
Forest Glen	Towards Glenmont	RD	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded
Forest Glen	Towards Shady Grove	RD	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded
Fort Totten (upper level)	Towards Glenmont	RD	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded
Fort Totten (upper level)	Towards Shady Grove	RD	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded
Friendship Heights	Towards Glenmont	RD	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded
Friendship Heights	Towards Shady Grove	RD	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded
Gallery Place–Chinatown (upper level)	Towards Glenmont	RD	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Some Crowding	Some Crowding	Some Crowding	Some Crowding	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded
Gallery Place–Chinatown (upper level)	Towards Shady Grove	RD	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Some Crowding	Some Crowding	Some Crowding	Some Crowding	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded
Glenmont	Towards Shady Grove	RD	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded	Not Crowded

The crowding band definition is based on Avg. Passenger Per Car (PPC) and the range differs between Pre COVID Capacity and Social Distancing Capacity as explained below:
Pre COVID Capacity: Avg PPC < 60 "Not Crowded", 60 ≤ Avg PPC < 90 "Some Crowding" & Avg PPC ≥ 90 "Crowded"
Current Capacity (with social distancing): Avg PPC < 15 "Not Crowded", 15 ≤ Avg PPC < 23 "Some Crowding" & Avg PPC ≥ 23 "Crowded"

Not Crowded
Some Crowding
Crowded

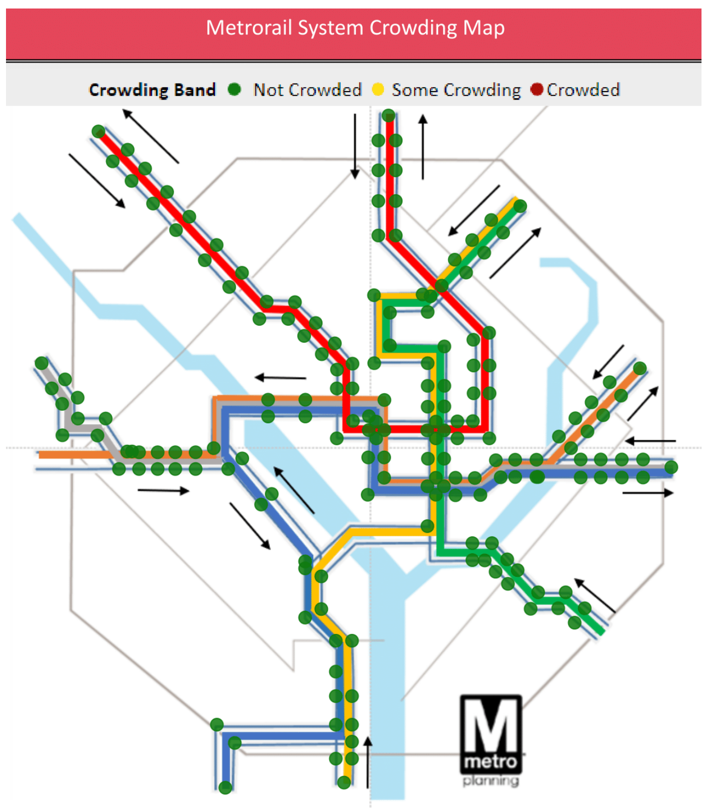
Metrorail System:

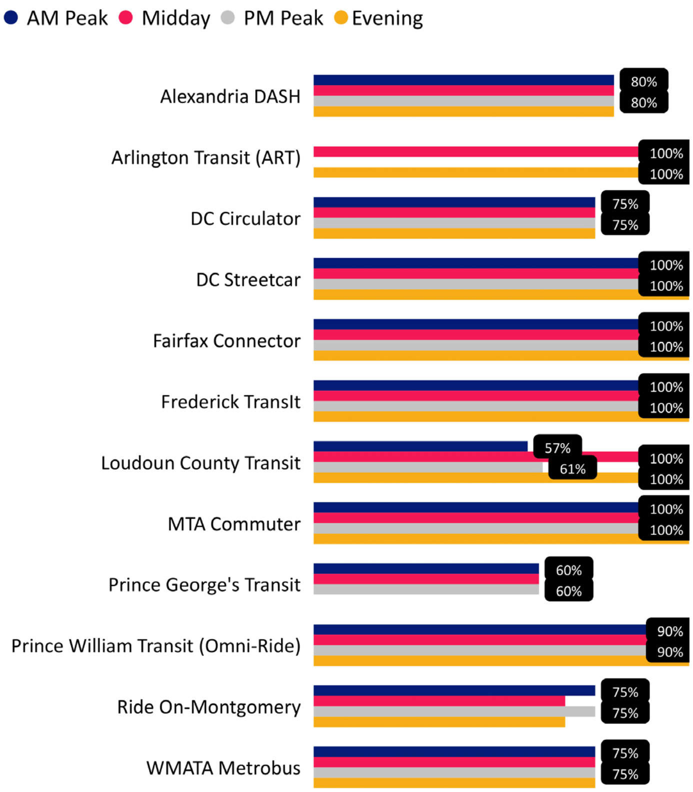
Pre-COVID Capacity
Thursday, August 29, **2019** between 4-5pm



Metrorail System:

Current Capacity (with social distancing)
Thursday, August 27, **2020** between 4-5pm





Bus Routes that were Estimated to Exceed Social Distancing Capacity in August*

WMATA Metrobus: A2, A6, A8, B2, C4, D8, F4, H8, J2, K6, P6, S2, S4, X2, Y2, Y8, Z8, 10B, 28A, 30N, 30S, 64, 70, 79, 80, 90, 92, 96, & REX

Prince George's Transit: AM Peak – Route 16, 18, 24, 33; PM Peak – Route 18, 24, 32

Montgomery Ride On: AM Peak – Route 55; PM Peak – Route 55

Alexandria DASH: AM Peak – AT8; PM Peak – AT8 & AT1 Plus

Arlington ART: AM Peak – Route 41 & 45; Late Evening – Route 41 & 45

*Estimates based on ridership and social distancing capacity. May only exceed social distance capacity along specific portions of the route at specific times of day. Subject to change as transit agencies adjust schedules and ridership levels vary.

Bus & Local Transit Service

Local bus and transit agencies are operating close to pre-pandemic levels of service.

To protect transit operators and conserve resources, transit service was significantly reduced at the outset of the pandemic. However, with new safety protocols, transit agencies began restoring service.

This chart captures service levels in September. After significant reductions during the early days of the pandemic, most local transit systems restored 75% or more of pre-COVID service. However, ridership is still historically low.

Real-time ridership and crowding data will help employers and employees feel more confident.

Most bus systems are not experiencing general crowding issues except on isolated routes at certain times of day.

A typical bus can only hold 10 passengers before exceeding CDC guidelines for social distancing capacity. However, most regional bus systems are not experiencing general crowding issues except on isolated routes at certain times of day. Route-level ridership data was not readily available for WMATA's Metrobus, but estimates indicate that approximately 20-30 of Metrobus routes in service may experience crowding conditions, especially historically heavily trafficked routes around midday.

Most local bus systems are reporting slow, steady ridership growth, while WMATA saw a nearly 20% increase from August 17 to August 24. Ridership varies among systems falling somewhere between 30%-70% of pre-COVID ridership. Commuter bus ridership remains significantly lower around 15% of pre-COVID ridership.

Every transit system in the Washington area requires masks onboard.

Every local bus and transit operation in the Washington area requires masks onboard and a majority are distributing masks upon request. Most bus systems have implemented rear door boarding and do not plan to collect fares until adequate protective barriers for drivers can be installed on buses.

Transit System Overview - Policies by Operator (August 31, 2020)

Bus Type	Masks Available Onboard Buses?	Masks Required Onboard Buses?	Fare Collection	Rear Door Boarding	Ridership Trend in mid-August
Alexandria DASH	✓	✓	✗	✓	↗
Arlington Transit (ART)	✓	✓	✗	✓	→
DC Circulator	✓	✓	✗	✓	↘
DC Streetcar	✗	✓	✗	✗	↘
Fairfax Connector	✓	✓	✗	✓	↗
Frederick Transit	✓	✓	✗	✓	↗
Loudoun County Transit	✓	✓	✗	✗	↗
MTA Commuter	✗	✓	✓	✗	↗
Prince George's Transit	✗	✓	✗	✓	↗
Prince William Transit (Omni-Ride)	✓	✓	✗	✓	↗
Ride On-Montgomery	✓	✓	✗	✓	→
WMATA Metrobus	✗	✓	✗	✓	↗

Real-time data sharing can help.

Transit agencies must instill confidence for riders and employers.

Employers are concerned of transit's ability to safely transport employees to worksites due to crowding and face mask concerns. Real-time ridership numbers, reporting on social distance carrying capacity, crowding data, and information on mask compliance may help employers and employees feel more confident in using the transit network during and after the COVID pandemic.

Limiting crowding and ensuring a safe and reliable ridership may become a challenge if large organizations in the Capital Region do not coordinate their efforts and use the latest data to ensure the safety of their employees.

Commuter Rail

Commuter rail has not reported any social distance capacity issues on rail cars.

Maryland's MARC ridership is holding steady at about 10% of pre-COVID ridership. Virginia's VRE ridership has been increasing by about 100 riders per week. However, as of August it remained well below social distancing capacity.

VRE created a Train Utilization Trends dashboard that shows the current daily ridership by train and the maximum capacity to fully support social distancing. A similar dashboard for MARC trains would help employees and employers make more informed transportation decisions.

The VRE dashboard can be accessed online at:
https://www.vre.org/service/rider/train-utilization-trends/

Find more COVID-related transit information:

- WMATA: COVID-19 Public Information
- Maryland Transit Administration: Coronavirus Updates
- Virginia Department of Rail & Public Transportation: Commuting Safely and Confidently
- Virginia Railway Express (VRE): Train Utilization Trends
- Metropolitan Washington Council of Governments: Commuter Connections Commute Guide

Conclusion

A key theme from the Capital COVID: Back to Work Report is continued uncertainty.

Many employers are uncertain when and how to reopen and whether transit is safe for their employees' commutes. While employers and transit agencies are taking unprecedented steps to make their worksites and transit trips safer, the full return to worksites is not expected until after summer 2021. The Greater Washington Partnership hopes the contents of this report, the cross-sector information sharing, and the Transit Tracker tool will help the region's leaders and public sector officials address some of the uncertainty so they can make the best plans for how to reopen their worksites and the Capital Region in a safe, gradual, and sustainable manner.

The Greater Washington Partnership would like to thank our public and private sector partners, especially the transit agencies, business organizations, and individual employers who helped to disseminate the survey and share their data. By working together, we can create the strategies, tools, and systems we need to reopen the Capital Region safely and create a stronger, more resilient and inclusive economy. We encourage everyone to do their part by wearing masks when outside of households, social distancing, and adhering to the guidance of public health officials. We look forward to continuing to work together to share more relevant and timely information so we can make the Capital Region one of the best places to live, work, and build a business during and after the COVID pandemic.

Survey & Transit Data Methodology

Survey Audience

Employers, public and private, of any size with worksites located in the Capital Region. Respondents included C-suite-level leaders and decision-makers involved in reopening plans and activities.

Survey Geography

Capital Region, which includes, Washington, Baltimore, and Richmond metro areas

Survey Data Collection

Online survey managed and hosted online by EY, under the supervision of the EY research team. Responses were collected between August 10, 2020 through August 28, 2020.

Survey Sample

Survey respondents were sought from email subscriber lists of The Greater Washington Partnership and more than 15 partner organizations, including MWCOG, WMATA, MDOT, NVTA and NVTC, and local Chambers of Commerce. Partner organizations supported this effort by promoting the survey through their network of employers and subscribers. The survey was also promoted through social media using both targeted ads and online posts on LinkedIn, Twitter, and Facebook Employer groups. Although survey results are only representative of the organizations which chose to participate in the survey, findings provide a valuable snapshot of employers' reopening plans and general sentiment related to commuting in the Capital Region. Please note, organizations in this study were not randomly sampled and so findings cannot be generalized to all employers in the region. Responses from the survey were also not statistically weighted by geography or business size. Instead, differences are highlighted based on these factors when significant.

430 employers (562 worksites) from various industries are represented in the survey. Together these organizations employ approximately 275,000 people in the Capital Region (full time, part-time and contracted workforce).

Transit Audience

Local transit agencies WMATA and Commuter Rail (Marc and VRE)

Transit Geography

Washington Metropolitan Area

Transit Data Collection

The MWCOG surveyed all transit agencies operating in the Washington metro area. EY analyzed available data from the MWCOG survey and data available from WMATA to produce the findings for this report. Data collection occurred during August 2020.

Transit Sample

Transit agencies were asked to provide data on current ridership, levels of service, projected demand, and safety precautions they are employing to limit the risk of COVID-19 transmission. MWCOG distributed a questionnaire to local transit agencies and EY worked directly with WMATA to access relevant data.

Findings provide a valuable snapshot of transit service levels and safety precautions related to commuting in the Capital Region. Data included in the report pertains to August 2020 and is subject to change as transit agencies adjust service plans and ridership levels respond to employer reopening plans and the state of the health crisis.

WMATA, MARC, VRE, ART, DASH, DC Circulator, DC Streetcar, Fairfax Connector, Frederick Transit, Loudoun County Transit, Montgomery Ride On, MTA Commuter, Prince George's Transit, and PRTC provided service level data during August 2020.

ATTACHMENT 2G:

Presentation: Visualizing Effects of COVID-19 on Transportation: A One-Year Retrospective by the National Academies of Sciences Engineering and Medicine Transportation Research Board, 3/8/2021

Visualizing Effects of COVID-19 on Transportation: A One-Year Retrospective

ORGANIZED BY:

TRB STANDING COMMITTEE ON VISUALIZATION IN TRANSPORTATION (AED80)

March 8, 2021 – 2:00 PM ET

TRB Standing Committee on Visualization in Transportation (AED80)

Our goal: to use visualization to identify and address critical transportation issues of today, and to develop innovative visualization approaches to meet society's transportation needs of the future.

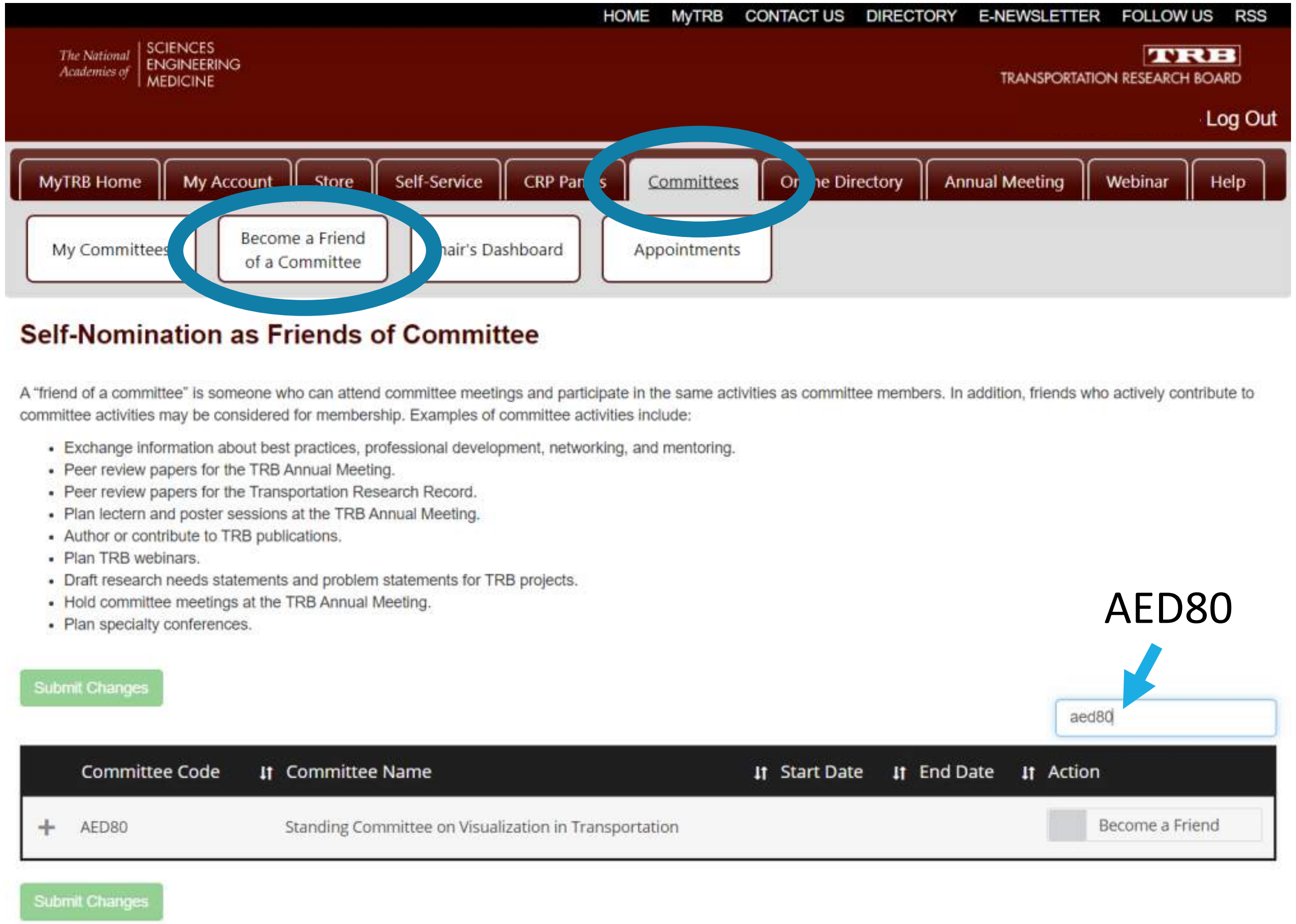
Subcommittees:

- Subcommittee on Building Information Modeling (BIM)
- Subcommittee on Performance Visualization
- Subcommittee Interactive Simulation

How to Get Involved

Become a friend of the Committee

Create an account at mytrb.org and search for AED80



Today's Webinar

Visualizing COVID-19 Impacts on Urban Mobility

Dr. Kaan Ozbay, New York University

Visualizing COVID-19 Impacts on State-Level Mobility

Michael L. Pack, University of Maryland

Visualizing COVID-19 Impacts on Air Travel

Mark Duell, FlightAware

Questions & Answers

Moderated by Charles Lattimer, University of Maryland

The National Academies of
SCIENCES · ENGINEERING · MEDICINE

TRANSPORTATION RESEARCH BOARD

Visualizing Effects of COVID-19 on Transportation: A One-Year Retrospective

March 8, 2021

@NASEMTRB
#TRBwebinar

PDH Certification Information:

- 1.5 Professional Development Hour (PDH) – see follow-up email for instructions
- You must attend the entire webinar to be eligible to receive PDH credits
- Questions? Contact Reggie Gillum at RGillum@nas.edu

The Transportation Research Board has met the standards and requirements of the Registered Continuing Education Providers Program. Credit earned on completion of this program will be reported to RCEP. A certificate of completion will be issued to participants that have registered and attended the entire session. As such, it does not include content that may be deemed or construed to be an approval or endorsement by RCEP.

RCEP

REGISTERED CONTINUING EDUCATION PROGRAM

#TRBwebinar

Learning Objectives

1. Identify COVID-19’s impacts on urban and state-level mobility
2. Identify COVID-19’s impacts on air travel

VISUALIZING COVID-19 IMPACTS ON URBAN MOBILITY AND SOCIABILITY

Kaan Ozbay, Ph.D.
Director & Professor
C2SMART University Transportation Center
New York University Tandon School of Engineering

Mar 8th, 2021

c2smart.engineering.nyu.edu

DATA VISUALIZATION vs COVID vs MOBILITY

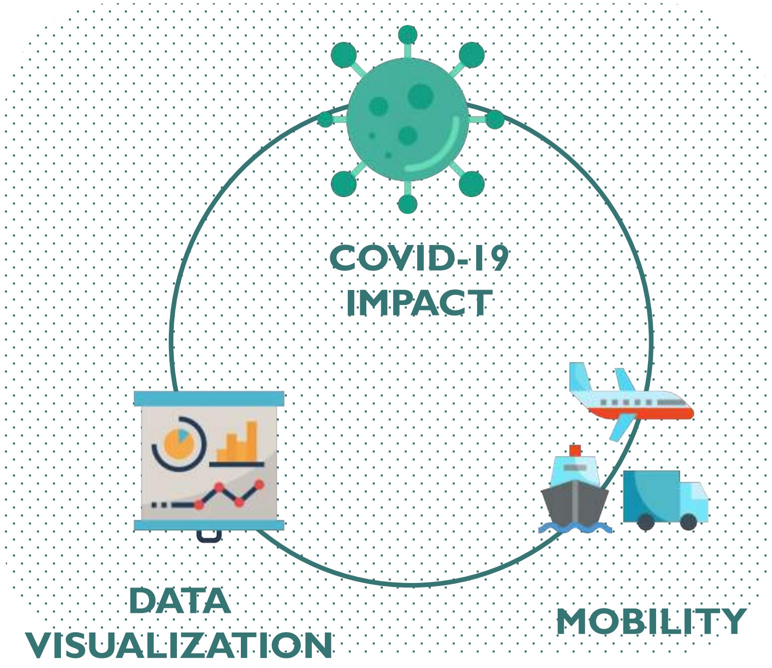
DATA is critical to understanding the impacts and needs in times of crisis. However, simply collecting data is not enough.

DATA VISUALIZATION is one of the best tools to understand the data and communicate findings in constructive ways. Data visualization during the COVID-19 pandemic helps us to fast track the changes and develop effective strategies immediately actionable in the current environment.

MOBILITY is one good indicator of the effectiveness of Nonpharmaceutical interventions (NPIs) such as social distancing policies during the outbreak and reveals the recovery of the cities.

OUR APPROACH:

Interactive Data Dashboard → Visualizing the Effect of Social Distancing → Infographics for Travel Survey



C2SMART COVID-19 INTERACTIVE DASHBOARD

Fan Zuo, Jingxing Wang, Jingqin Gao, Kaan Ozbay, Xuegang Jeff Ban, Yubin Shen, Hong Yang and Shri Iyer (2020), An Interactive Data Visualization and Analytics Tool to Evaluate Mobility and Sociability Trends During COVID-19, [UrbComp 2020]: The 9th SIGKDD International Workshop on Urban Computing.

We developed a comprehensive and publicly accessible data dashboard that integrates numerous sources of data to monitor transportation trends in the wake of COVID-19.

http://c2smart.engineering.nyu.edu/covid-19-dashboard/

Online dashboard pooling open data sources to observe trends

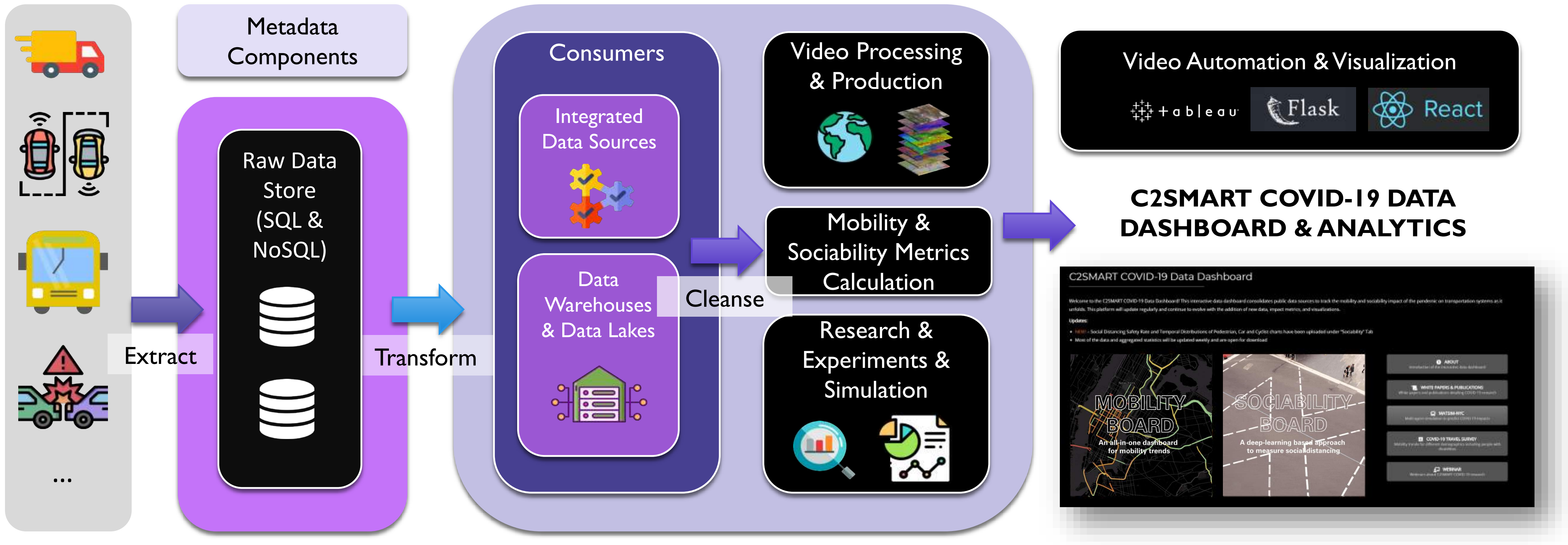
Travel trends and mode choice

The effect of social distancing

Multi-city: New York City, Chicago, Seattle, 6 cities in China

As far as we know it is the only deployed and open site that integrates all of these datasets in one place.

C2SMART COVID-19 DATA DASHBOARD ARCHITECTURE



Realtime/ Offline Data Acquisition

Digital Integration & Access Layer

Data Mining & Could Computing

- Cross domain multi-data view
- Perform scenario analysis

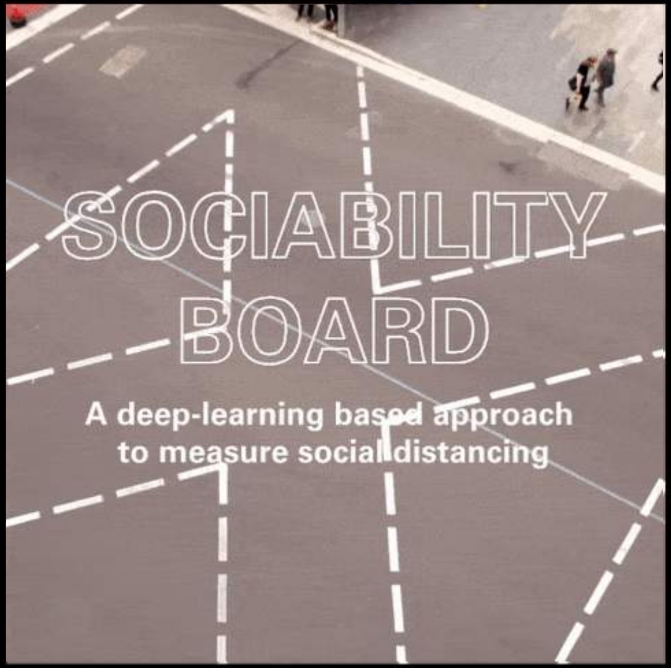
Newly Released Version of the Public Data Dashboard

C2SMART COVID-19 Data Dashboard

Welcome to the C2SMART COVID-19 Data Dashboard! This interactive data dashboard consolidates public data sources to track the mobility and sociability impact of the pandemic on transportation systems as it unfolds. This platform will update regularly and continue to evolve with the addition of new data, impact metrics, and visualizations.

Updates:

- NEW! – Social Distancing Safety Rate and Temporal Distributions of Pedestrian, Car and Cyclist charts have been uploaded under "Sociability" Tab
- Most of the data and aggregated statistics will be updated weekly and are open for download



ABOUT
Introduction of the interactive data dashboard

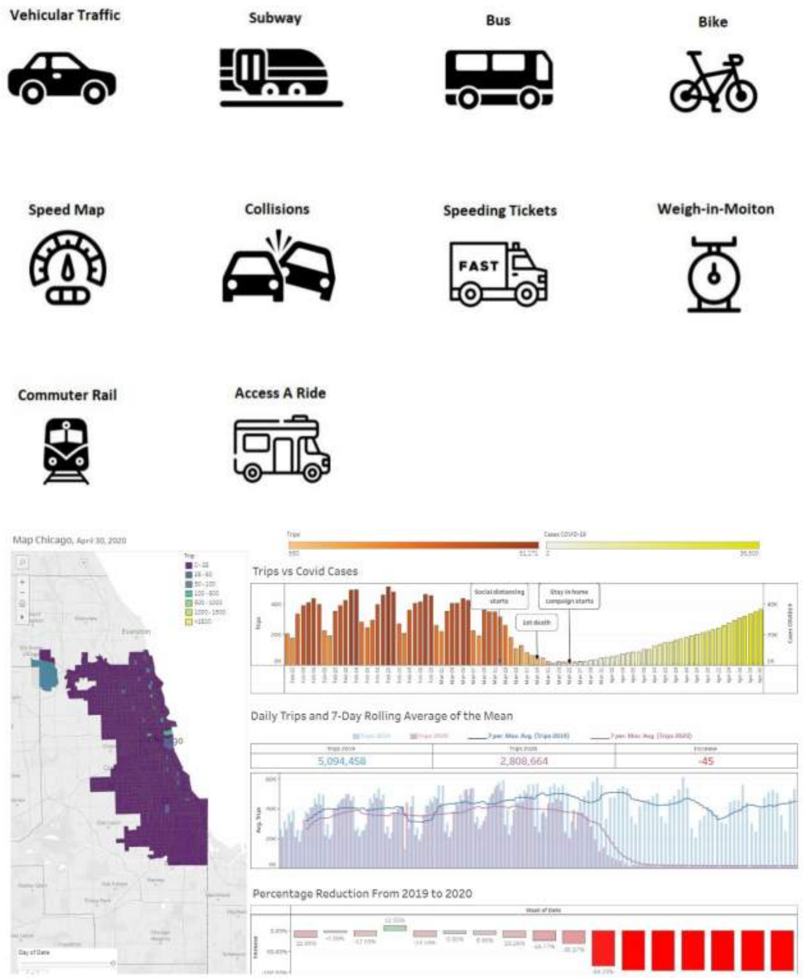
WHITE PAPERS & PUBLICATIONS
White papers and publications detailing COVID-19 research

MATSIM-NYC
Multi-agent simulation to predict COVID-19 impacts

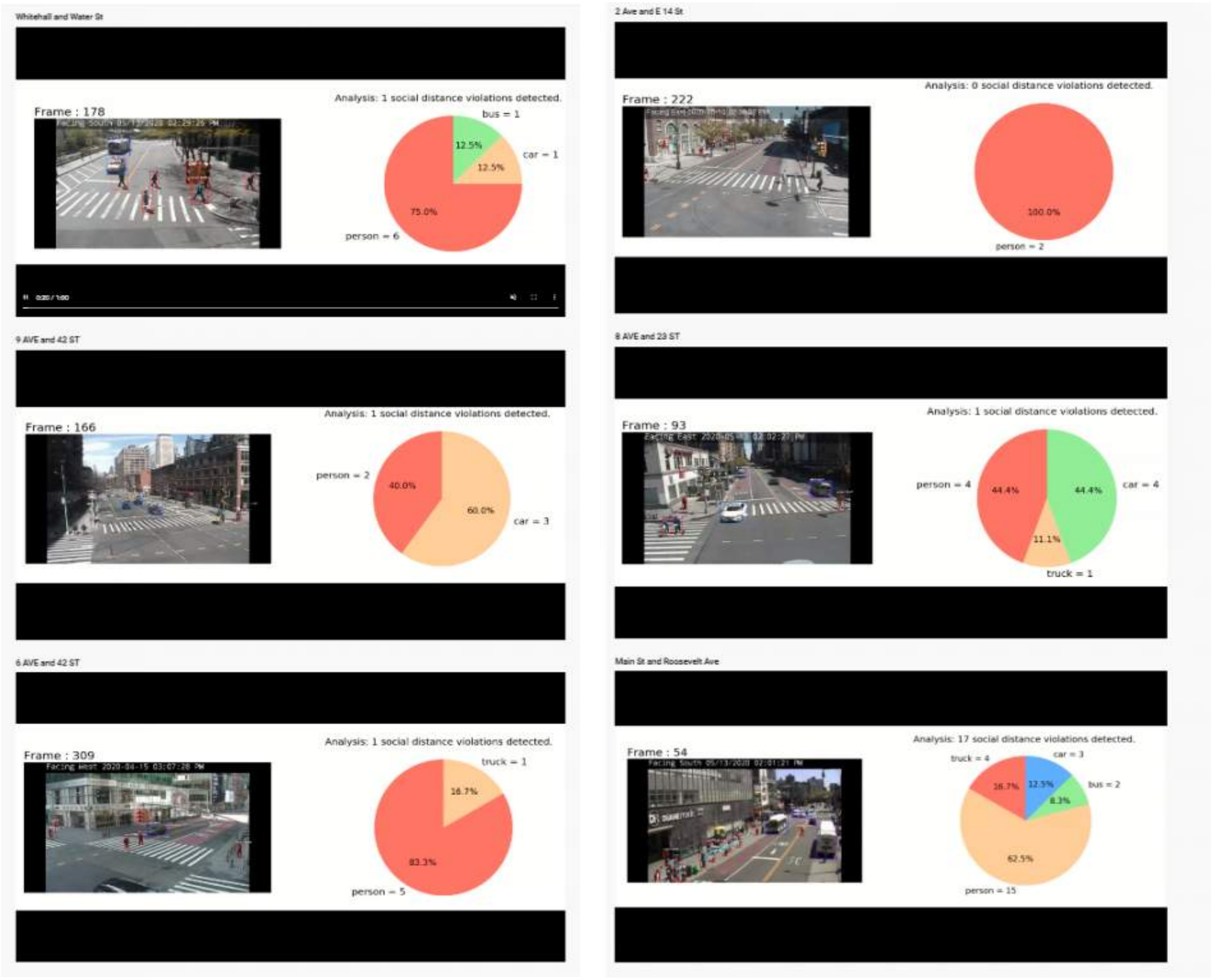
COVID-19 TRAVEL SURVEY
Mobility trends for different demographics including people with disabilities

WEBINAR
Webinars about C2SMART COVID-19 research

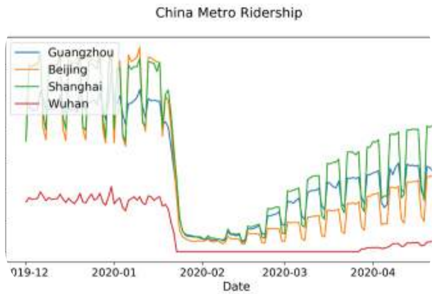
MOBILITY BOARD



SOCIABILITY BOARD



C2SMART COVID-19 Interactive Dashboard Data Collection



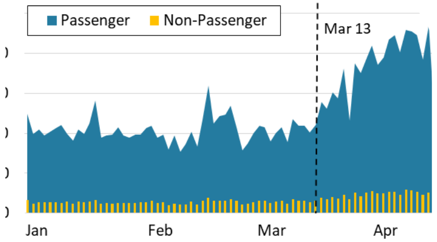
Transit Ridership

NYC/Seattle/Multiple cities in China

Speed & Travel Time

Traffic Speed Map

Corridor Travel Time

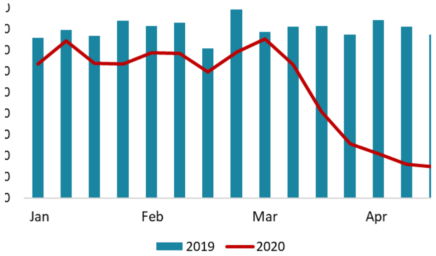


Camera Violations

Speeding /parking tickets

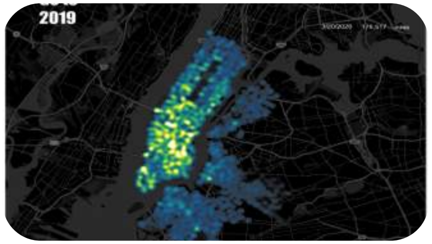
Vehicular Volume

NYC inter-city traffic volume



Crashes

NYPD reported crashes: peds/cyclist fatality rate



NYC CitiBike trips

Seattle Bike counts, Fremont Bridge

Social Distancing

Pedestrian density

Social distance safety rate

Weigh-in-Motion

Traffic Volume/speed

by gross vehicle weight classes

A Glance Back to April (April 2020 vs. 2019)

New York City

↓**92%** Subway

↓**68%** Vehicular Traffic via MTA bridges and tunnels

↑**108%** Avenue Speeds Midtown 8AM-6PM Apr vs. Feb

↑**14%** Average Bus Speeds

↑ **73%** School Zone Speeding Tickets

↓**30-44%** Trucks with GVW > 100kips at BQE WIM Stations

Changes in Freight Traffic

Yellow Taxi: **-96%**

Green Taxi: **-92%**

For-hire Vehicle: **-79%**

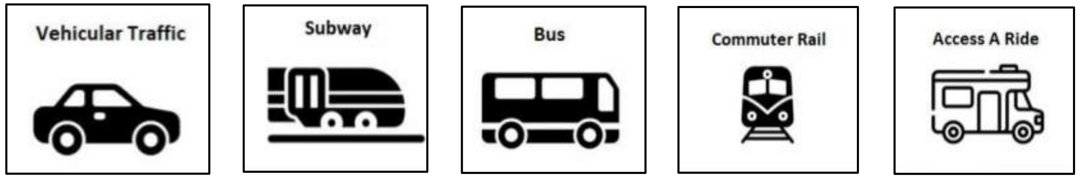
High volume for-hire services (Uber, Lyft, Via etc.): **-76%**

↓**15%** Friday & Saturday trips ↑**20%** Trip duration

Social Distancing Complaints

2nd most frequent of all 311 complaint types

WHERE WE ARE NOW

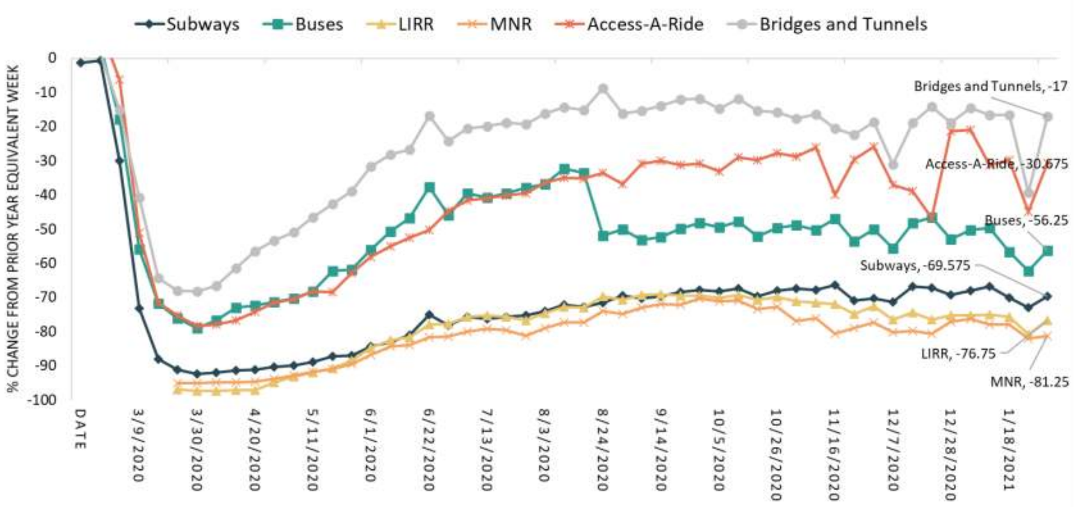


- Uneven recovery speeds - with a faster rebound of truck volume, and slower rebound of transit ridership
- Higher recovery demand for Access-a-ride

	Subway	Bus	Commuter Rail (LIRR)	Commuter Rail (MNR)	Access-a-ride
Worst week in 2020	-92%	-79%	-97%	-95%	-78%
Week of Jan 25, 2021	-70%	-56%	-76%	-78%	-30%

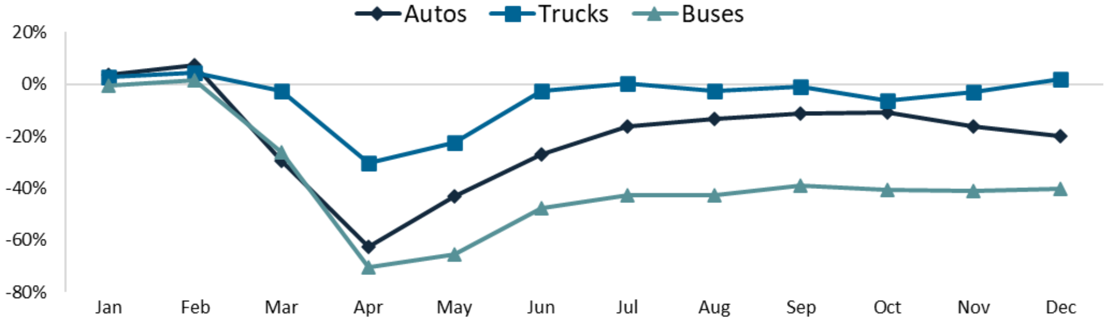
	Vehicular (MTA Bridge & Tunnel)	Vehicular (PANYNJ crossing - Monthly)	Vehicular (BQE WIM, Queensbound)
Worst week in 2020	-68%	-61% (-30% Truck)	-37% (-28% Truck)
Week of Jan 25, 2021	-17%	-19% (+2% Truck), Dec 2020	-4% (+1% Truck), Nov 2020

Source: MTA, PANYNJ, NYCDOT/C2SMART



Source: MTA

PANYNJ MONTHLY EASTBOUND VOLUMES



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Autos	4%	7%	-29%	-63%	-43%	-27%	-16%	-13%	-11%	-11%	-16%	-19.80%
Trucks	3%	4%	-2%	-30%	-23%	-3%	0%	-3%	-1%	-6%	-3%	1.90%
Buses	-1%	1%	-26%	-70%	-65%	-48%	-43%	-43%	-39%	-41%	-41%	-40.20%

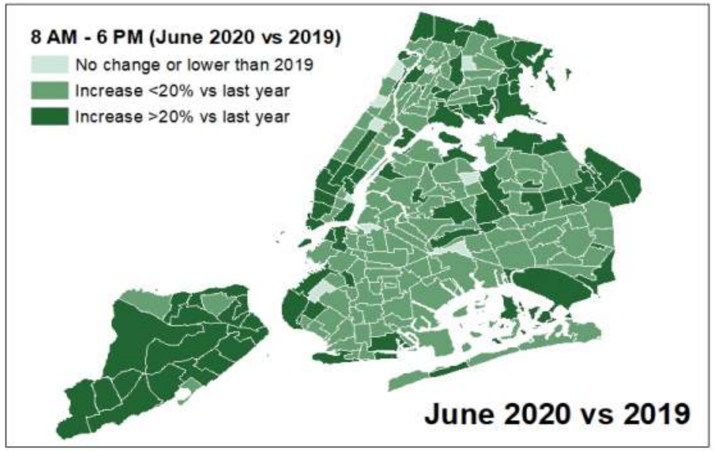
Source: PANYNJ

WHERE WE ARE NOW (Cont'd)

Bus Speed

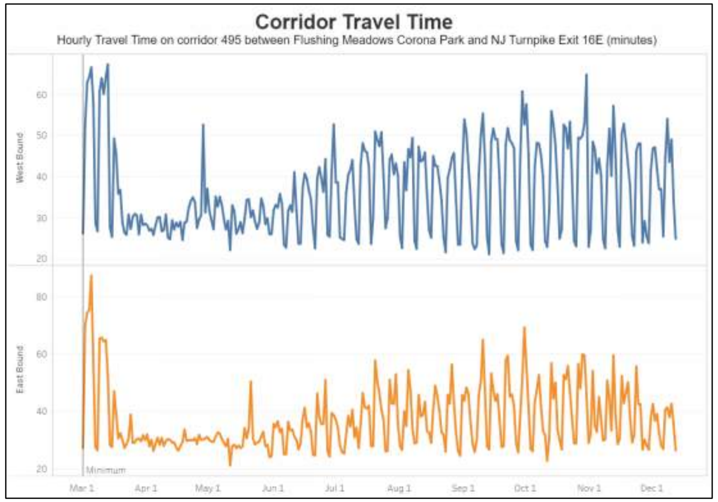
Borough	Monthly Bus Speed, mph (Feb 2020)	Monthly Bus Speed, mph (Dec 2020)	%change (Dec 2020 vs Feb 2020)	Highest %change in 2020 (Highest month vs Feb 2020)
Bronx	7.46	7.74	+4%	+10%
Brooklyn	7.17	7.55	+5%	+21%
Manhattan	5.97	6.44	+8%	+29%
Queens	8.94	9.42	+5%	+21%
Staten Island	14	14.25	+2%	+4%

Source: MTA



Vehicular Travel Time

- Travel times on the 495 Corridor in the first week of December 2020 are still about **17% lower (EB)** and **24% lower (WB)** compared to pre-pandemic levels (Feb 2020).
- Still see **30% more school zone speeding tickets** in Jan 2021, compared to Mar 2020.



Source: C2SMART Virtual Sensors

Micromobility

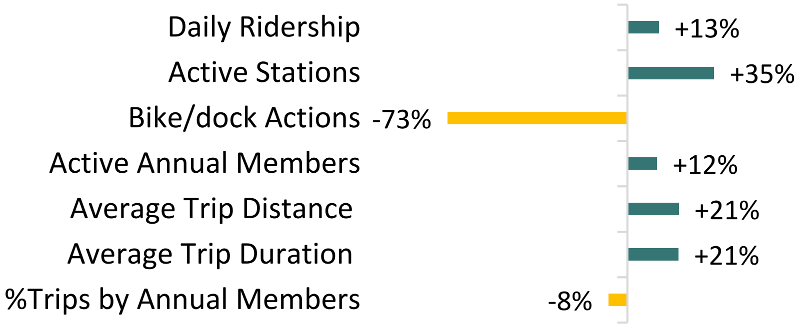
Micromobility is on the rise and have even surpasses pre-pandemic volumes in some cases. These modes are being increasingly counted on as an alternative to the subway, as economical, safer and less-crowded travel options.

Bike Share - Citi Bike

Source: Citi Bike

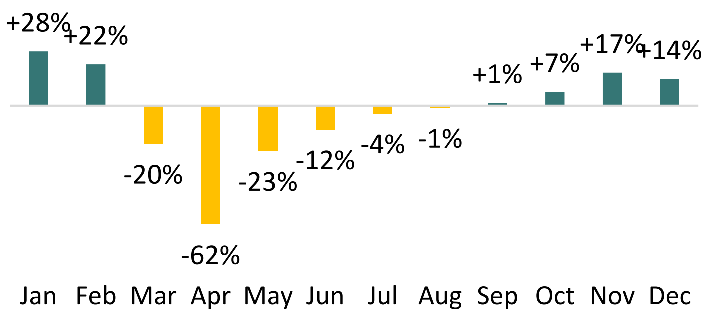
Overall Statistics

% Change (Citi Bike Dec 2020 vs Dec 2019)



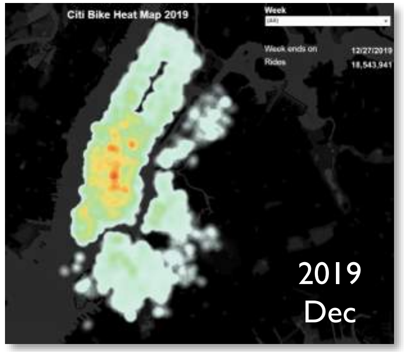
Ridership Trend

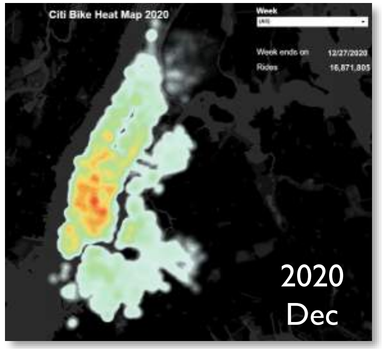
Citi Bike Monthly Ridership Change (2020 vs 2019, NYC only)



Spatial Distributions

Identify hotspots & new clusters

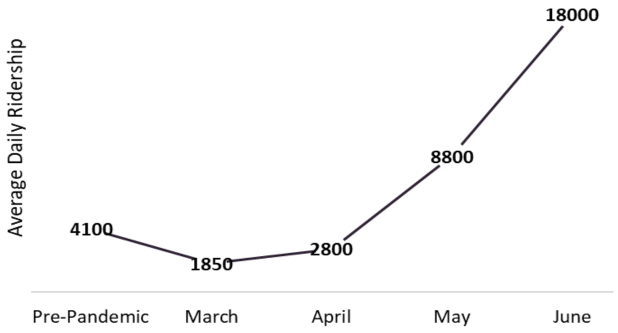




Ride-Sharing Moped - Revel

Source: Revel

Average daily ridership is 3 times higher in June 2020, compared with pre-pandemic data in 2020.



Sociability Indicators from Real-time Traffic Cameras

Pedestrian crowd at Main Street, Flushing (4/8/2020), (NYCDOT Traffic Camera)

Understanding the actual reduction in social contact and is important to measuring the effectiveness of the policy. Identifying the density of the crowd on the street can help provide informative insights.

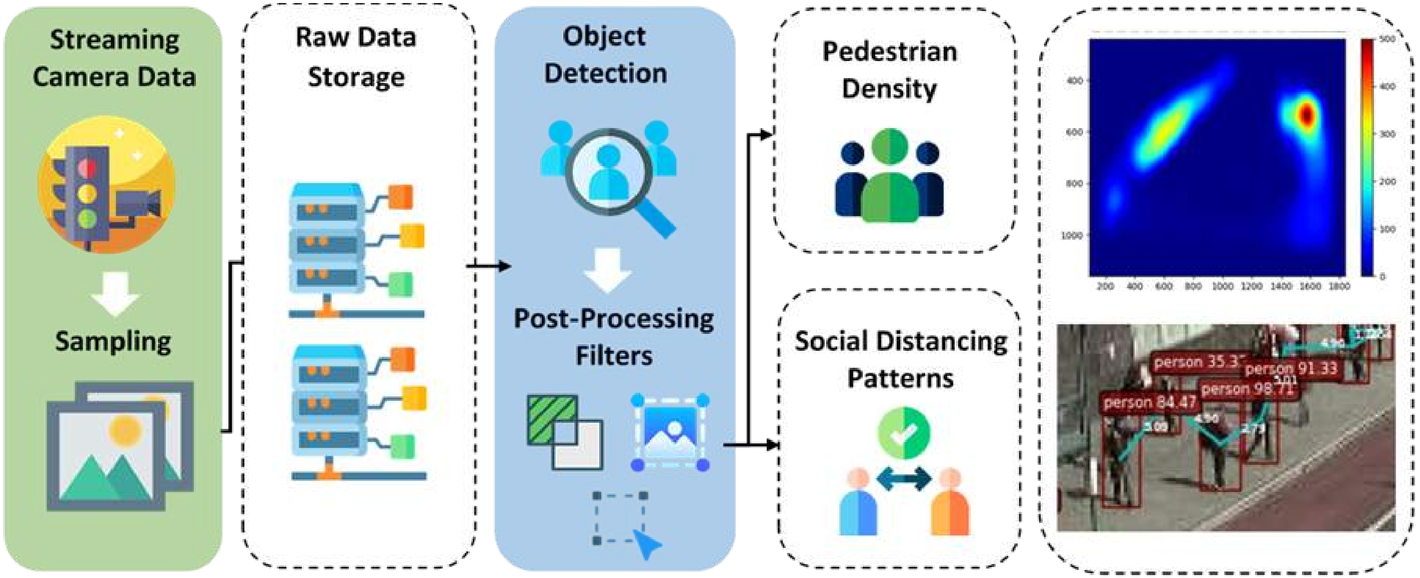
A **deep-learning based video-processing algorithm** was developed to monitor the evolution of social distancing patterns in urban areas.

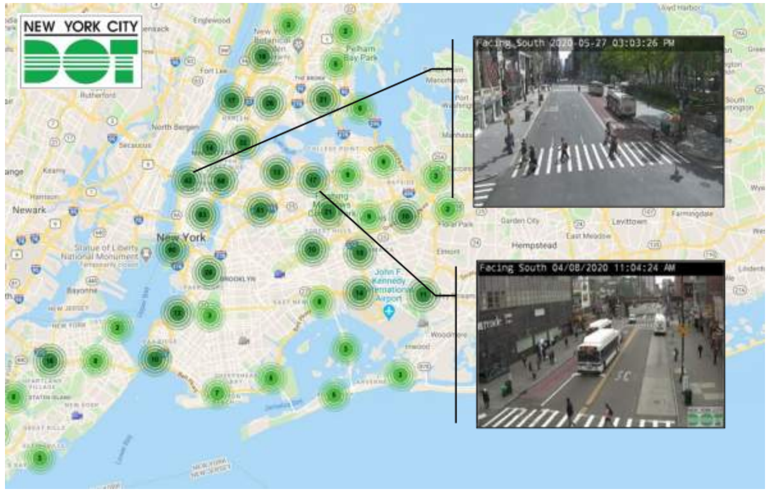
- ✓ Leverages existing public video data sources
- ✓ Real-time object detection for different classes (Pedestrians, Cars, Trucks and Cyclists)
- ✓ Distance projection and approximation
- ✓ Temporal and spatial density distribution

DATA-DRIVEN ANALYTICAL FRAMEWORK

Perishable data was collected for105 locations in NYC + 1 location in Seattle, including locations near hospitals, subway stations, and meal distribution centers.

- Reporting average and maximum pedestrian density from selected locations in NYC
- Computing social distancing safety sate (the ratio of people following social distancing guidelines)
- Currently applied in off-line mode, feasible for real-time application



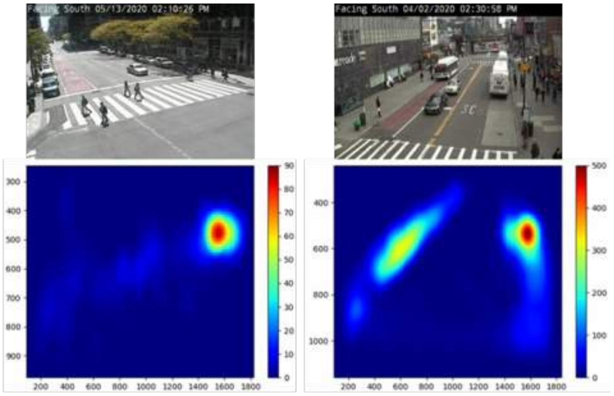


[Public Traffic Cameras: https://nyctmc.org/](https://nyctmc.org/)

This study (#IRB-FY2020-4638) is reviewed by the University Committee on Activities Involving Human Subjects (UCAIHS) at New York University and is determined that it does not involve human subjects as defined by 45 CFR part 46.102.

DETECTION OUTPUT

Blue lines between pedestrian pairs indicating a social distance less than 6 feet.

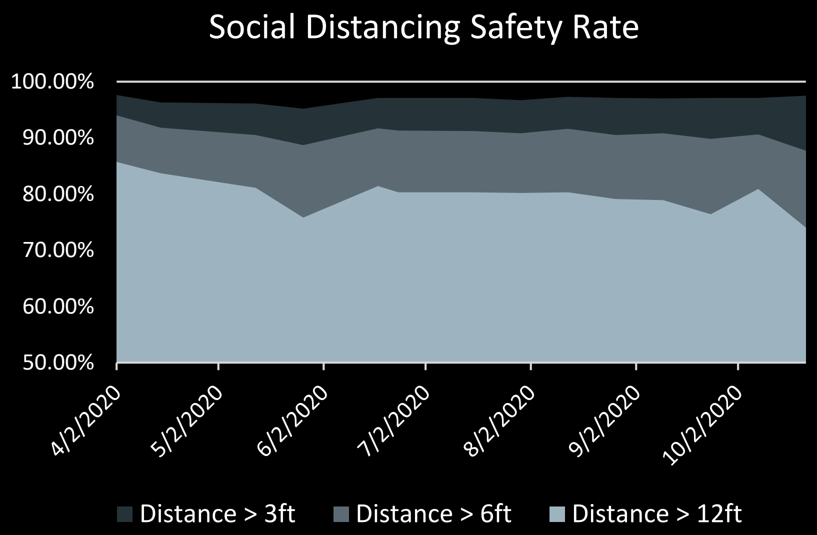


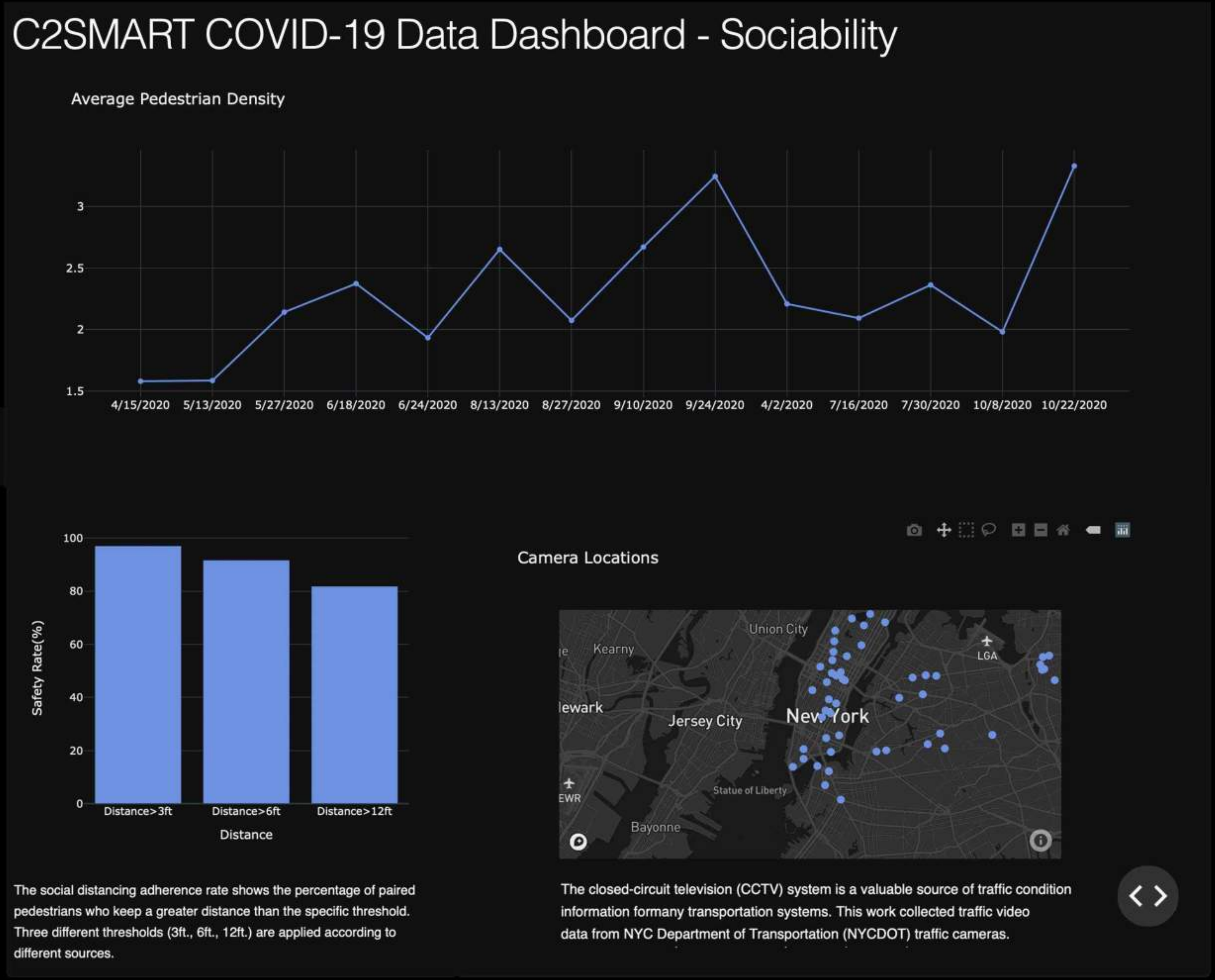
Heatmap example of clustered pedestrians who are not following social distancing guidelines during April 2020.

Zuo, F., Gao, J., Kurkcu, A., Yang, H., Ozbay, K., & Ma, Q. (2021) Reference-Free Video-to-Real Distance Approximation-Based Urban Social Distancing Analytics Amid COVID-19 Pandemic. Journal of Transport & Health.

SOCIABILITY TRENDS

Social distancing safety rate (the ratio of people following social distancing guidelines) and ***average pedestrian density*** (#peds/frame) are calculated from representative weekdays based on 60+ selected locations in NYC. The results are constantly updated with more locations.





C2SMART COVID-19 TRAVEL SURVEY

- Understand how people are adjusting their travel and essential needs as COVID19 presents new challenges and constraints
- Focus on NYC specific trends, looking at how different demographics of people were affected by the effect of COVID19
- Analyze how travel trends have changed for *people with disabilities, women, older people, low-income households*

What are the main concerns before and after the pandemic?

How the pandemic has changed travel trends?

Did people shift to other travel modes?

What is the impact on disadvantaged group's travel?

SURVEY STATISTICS

- Data collection time-frame: **July to October 2020**
- Total responses (partial and completed): **2022**
- Total completed responses: **1382**

July to September 2020

Phase I

Distributed **nation-wide** via **organic reach**

892

(partial and completed responses)

58% respondents for NYC (all five boroughs)

September to October 2020

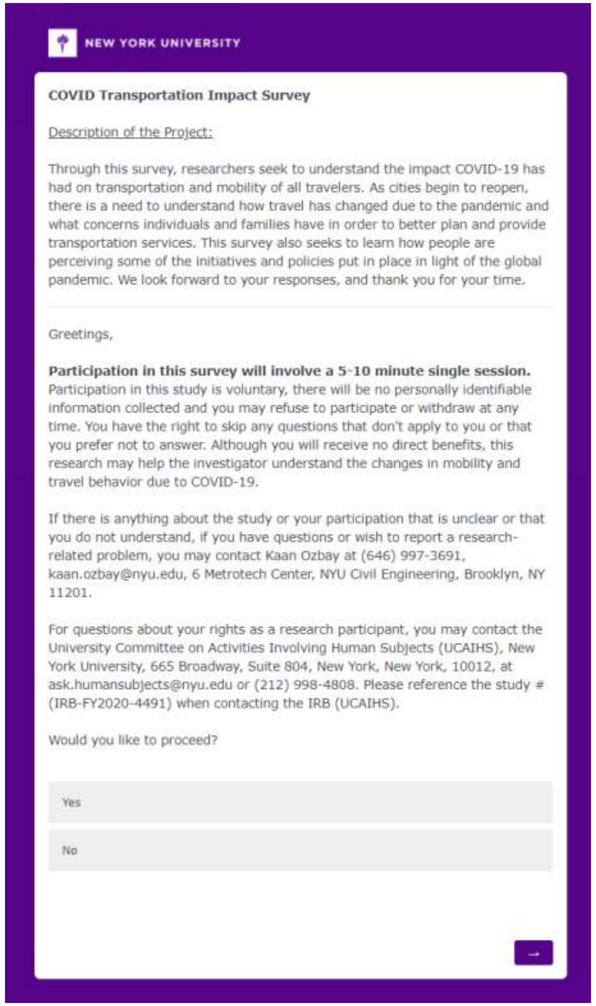
Phase II

Targeted at NYC residents who are **over 60 years old**, or identify as **having a disability**

1130

(partial and completed responses)

532 respondents identified as living with a disability


NEW YORK UNIVERSITY

COVID Transportation Impact Survey

Description of the Project:

Through this survey, researchers seek to understand the impact COVID-19 has had on transportation and mobility of all travelers. As cities begin to reopen, there is a need to understand how travel has changed due to the pandemic and what concerns individuals and families have in order to better plan and provide transportation services. This survey also seeks to learn how people are perceiving some of the initiatives and policies put in place in light of the global pandemic. We look forward to your responses, and thank you for your time.

Greetings,

Participation in this survey will involve a 5-10 minute single session. Participation in this study is voluntary, there will be no personally identifiable information collected and you may refuse to participate or withdraw at any time. You have the right to skip any questions that don't apply to you or that you prefer not to answer. Although you will receive no direct benefits, this research may help the investigator understand the changes in mobility and travel behavior due to COVID-19.

If there is anything about the study or your participation that is unclear or that you do not understand, if you have questions or wish to report a research-related problem, you may contact Kaan Ozbay at (646) 997-3691, kaan.ozbay@nyu.edu, 6 Metrotech Center, NYU Civil Engineering, Brooklyn, NY 11201.

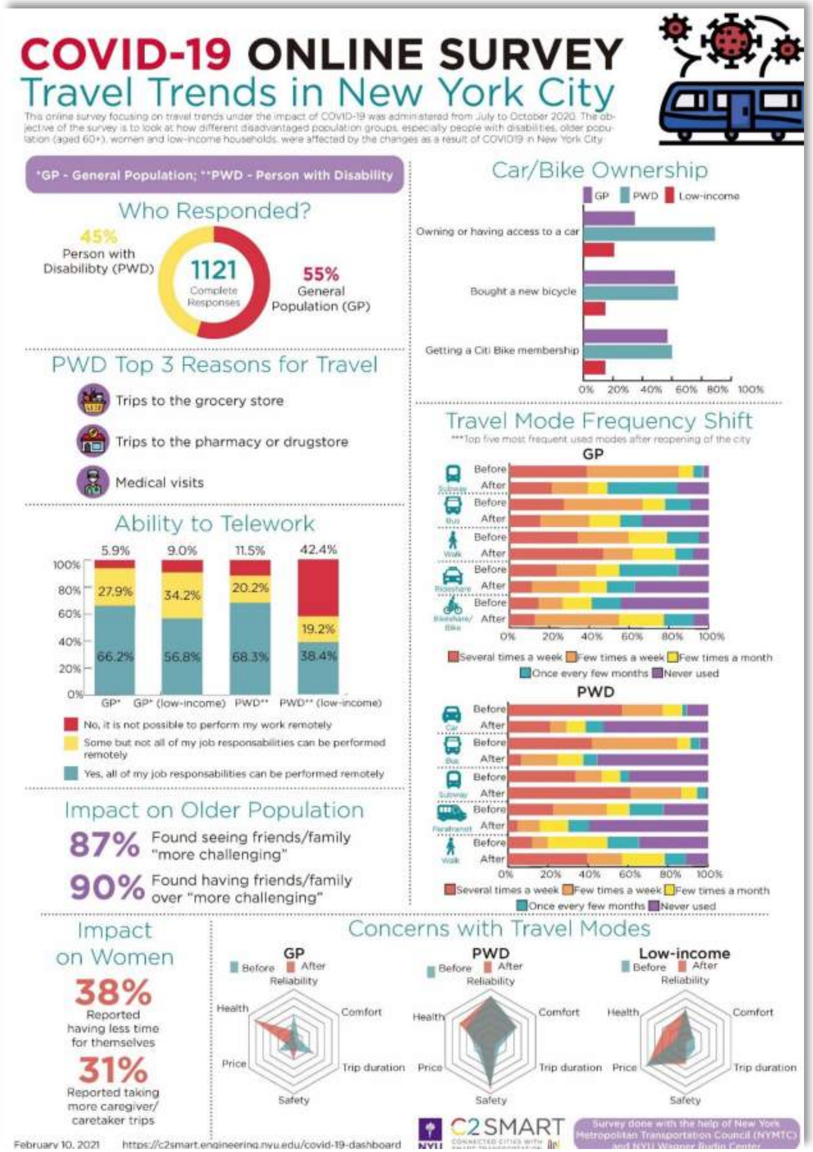
For questions about your rights as a research participant, you may contact the University Committee on Activities Involving Human Subjects (UCAIHS), New York University, 665 Broadway, Suite 804, New York, New York, 10012, at ask.humansubjects@nyu.edu or (212) 998-4808. Please reference the study # (IRB-FY2020-4491) when contacting the IRB (UCAIHS).

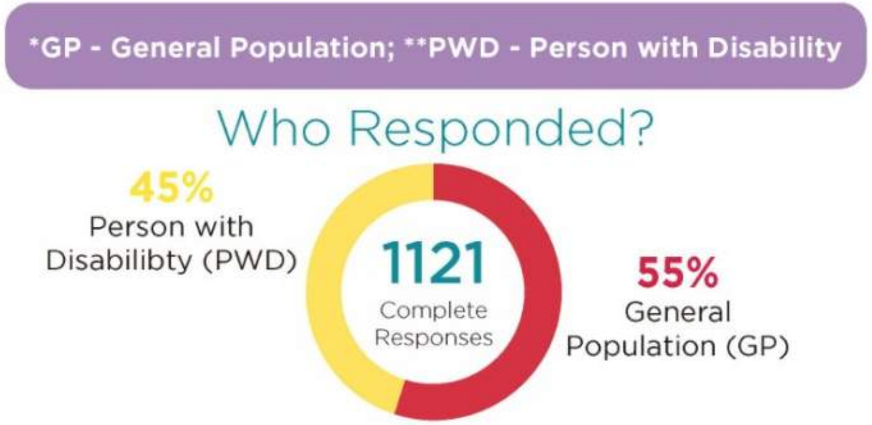
Would you like to proceed?

Yes

No

SURVEY RESULTS AT A GALANCE

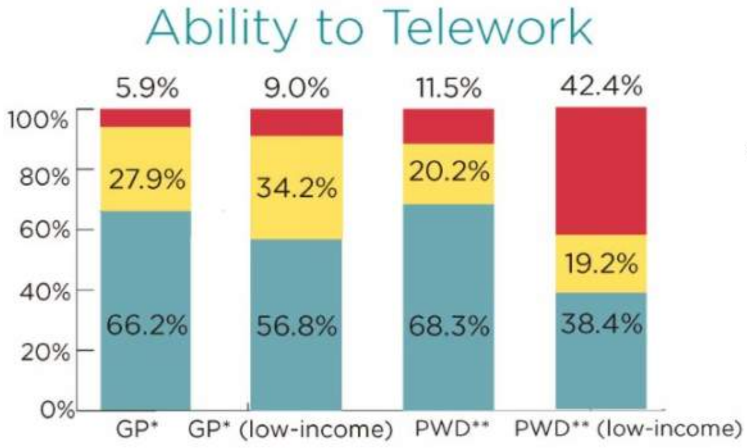


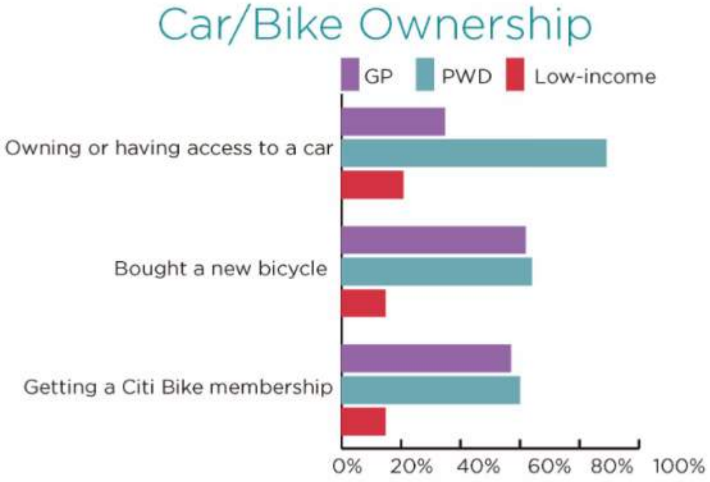


Impact on Women

38% Reported having less time for themselves

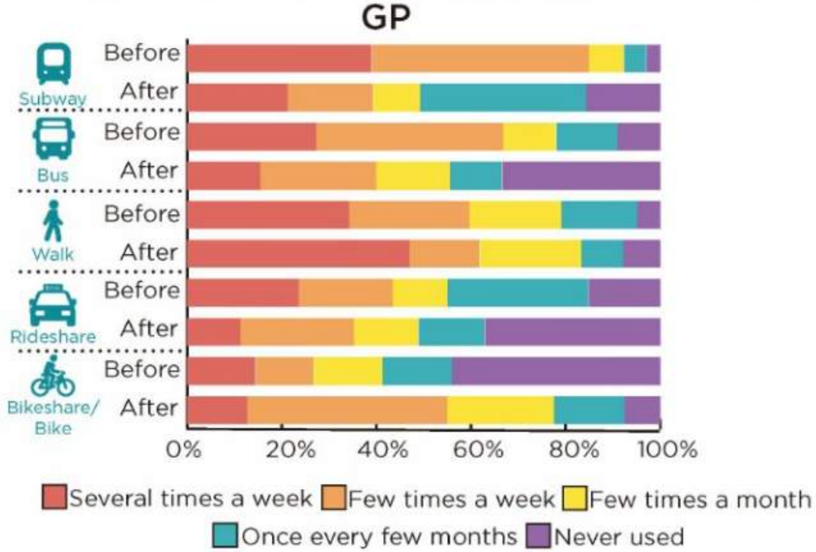
31% Reported taking more caregiver/ caretaker trips

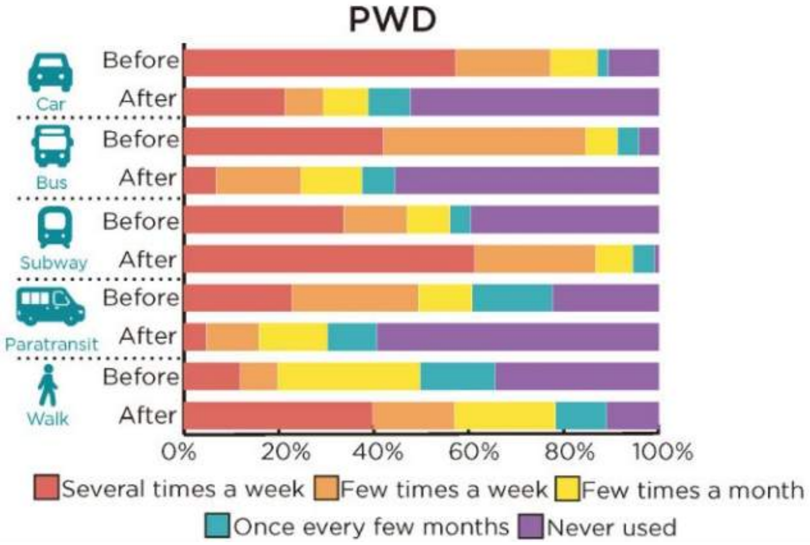




Travel Mode Frequency Shift

***Top five most frequent used modes after reopening of the city





Impact on Older Population

87% Found seeing friends/family "more challenging"

90% Found having friends/family over "more challenging"

PWD Top 3 Reasons for Travel

- Trips to the grocery store
- Trips to the pharmacy or drugstore
- Medical visits

Concerns with Travel Modes

https://c2smart.engineering.nyu.edu/covid-19-dashboard-covid-19-travel-survey

MATSim-nyc - A Multi-agent Simulation to Evaluate the Impact of COVID-19 on Mass Transit Ridership

The findings imply that a transit capacity restriction policy during reopening needs to be accompanied by (1) support for micromobility modes, particularly in non-Manhattan boroughs, and (2) congestion alleviation policies that focus on reducing traffic in Manhattan, such as cordon-based pricing.

Pre-COVID-19

Post-COVID-19

Wang, D., He, B. Y., Gao, J., Chow, J. Y., Ozbay, K., & Iyer, S. (2021). Impact of COVID-19 Behavioral Inertia on Reopening Strategies for New York City Transit. International Journal of Transportation Science and Technology.

C2SMART Project Team

Lead: Kaan Ozbay, Joseph Y.J. Chow, Shri Iyer

NYU Team: Jingqin Gao, Yubin Shen, Zilin Bian, Suzana Duran Bernardes,

Fan Zuo, Yubin Shen, Abhinav Bhattacharyya, Yueshuai He,

Ding Wang, Siva Soorya Muruga Thambiran, Nick Hudanich, John Petinos

UW Team: Jingxing Wang, Yanyan Chen,

Sai Sarath Chandra Pavuluri Venkata

Lead: Xuegang Jeff Ban

Rutgers Team: Chaekuk Na

Lead: Hani Nassif

New York University

Tandon School of Engineering

6 MetroTech Center

Brooklyn, NY 11201

c2smart.engineering.nyu.edu

kaan.ozbay@nyu.edu

THANK YOU

Visualizing the COVID-19 Impacts Platform

Michael Pack, Director of CATT Laboratory

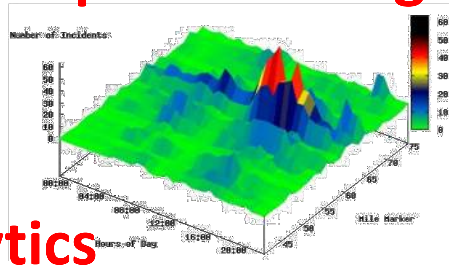
Enabling agencies through better communication, data-based decision making, advanced insights discovery, and enhanced operations and planning capabilities.

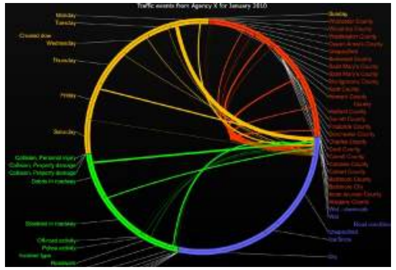
CATT Lab Visualization Team

- 75+ Professional Staff of
  - Software Developers
  - Data Scientists
  - UI/UX Designers
  - Program Managers
  - IT & Network Engineers
- 30-60 Students
  - Computer Science
  - Human Computer Interaction
  - Engineering
- 50+ affiliated researchers

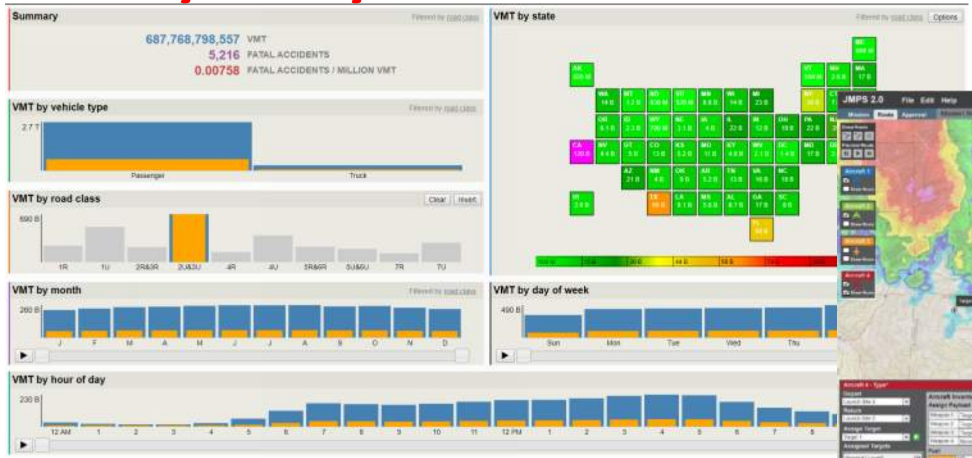
Analytics of All Flavors

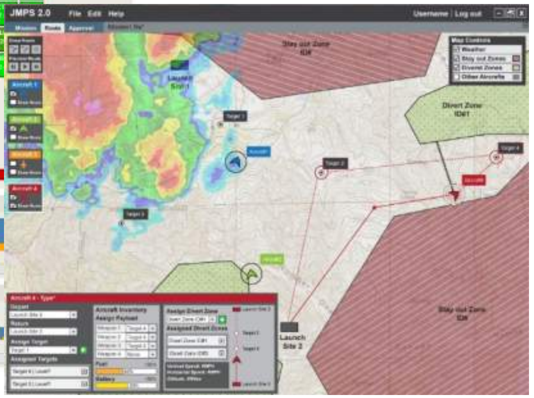
Speed & Congestion



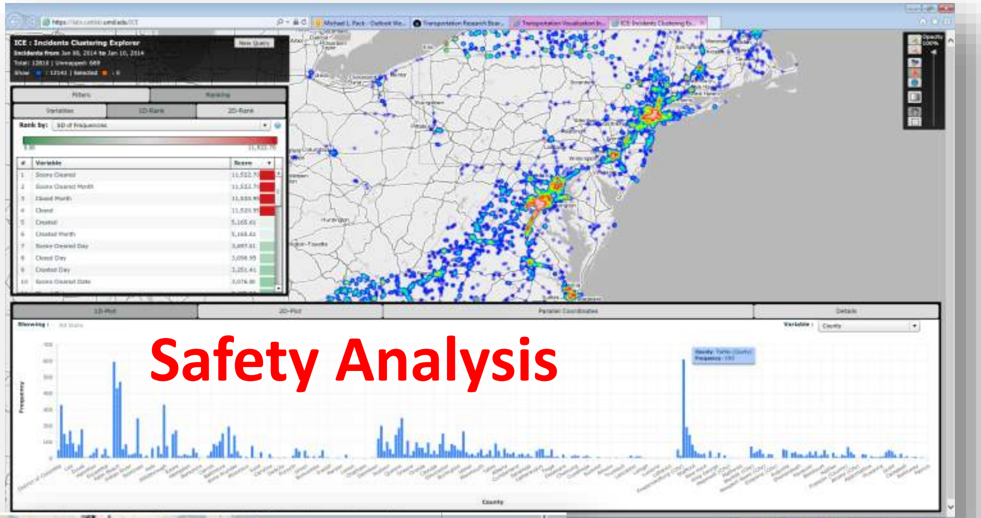


Mobility Analytics

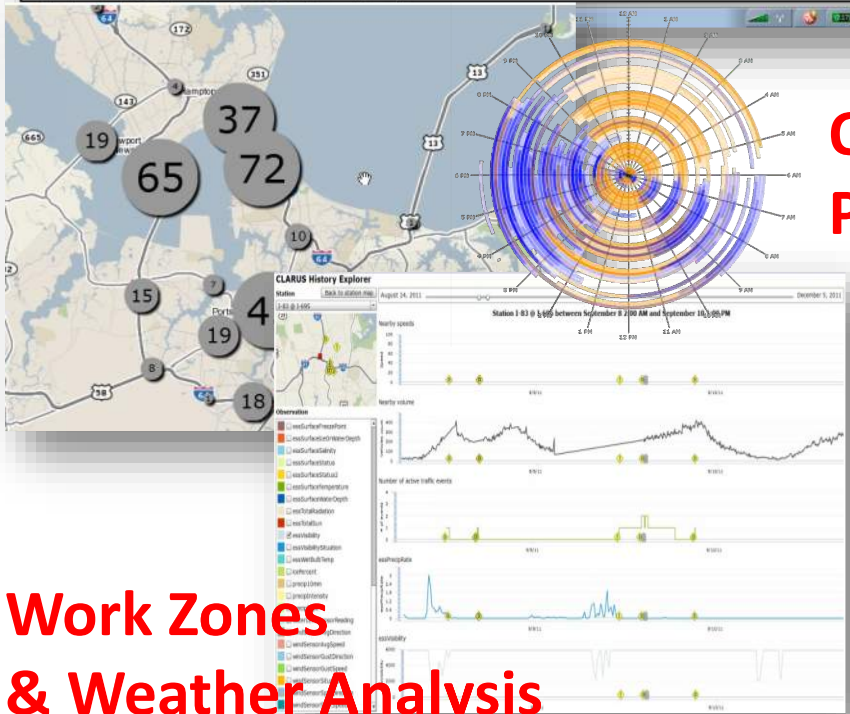


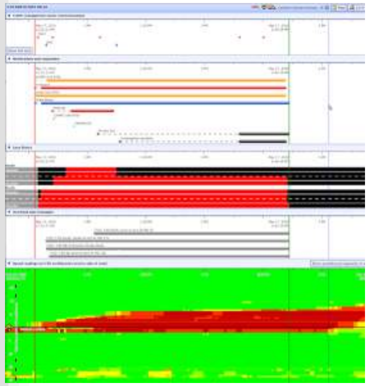


Safety Analysis

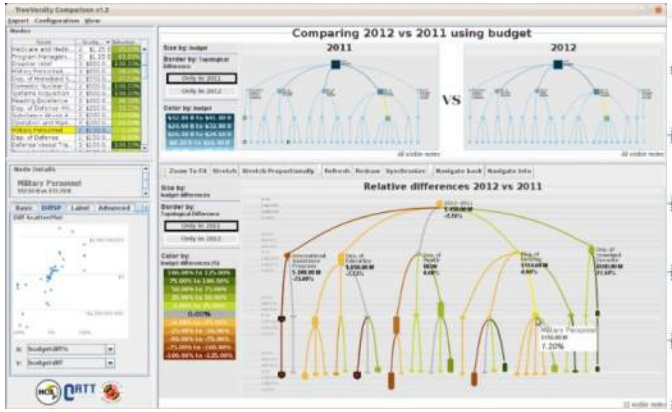


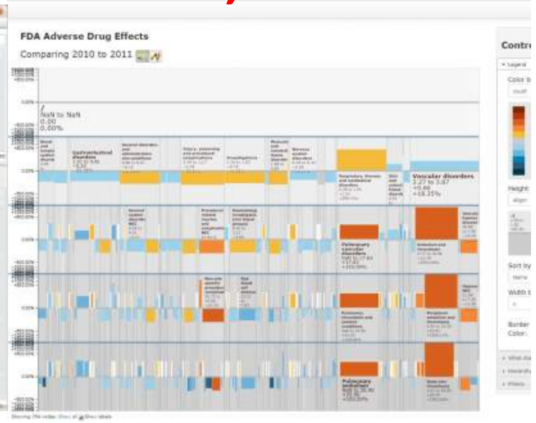
Operations and Planning Analytics





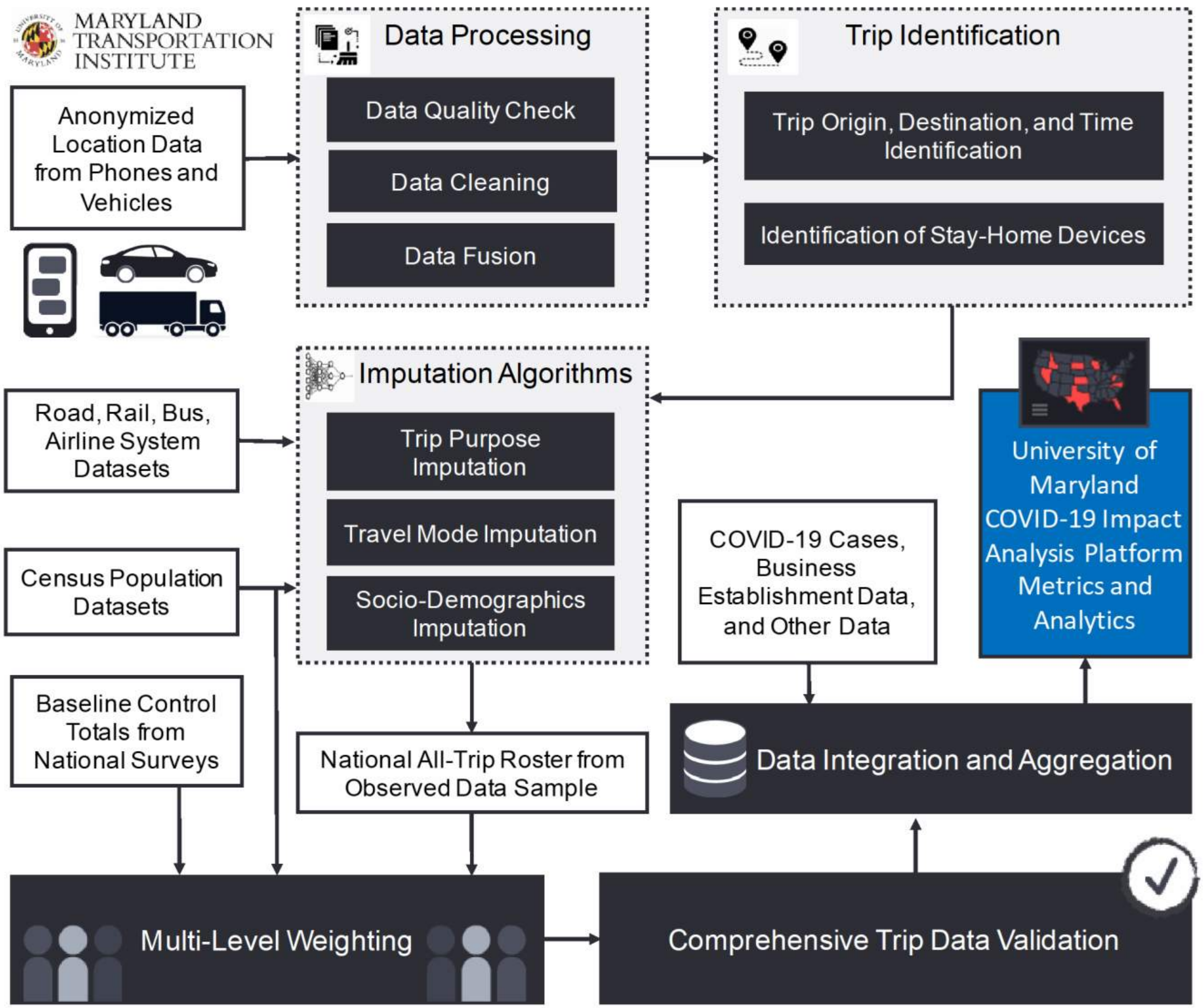
Project Prioritization, Before & After Studies, and AARs



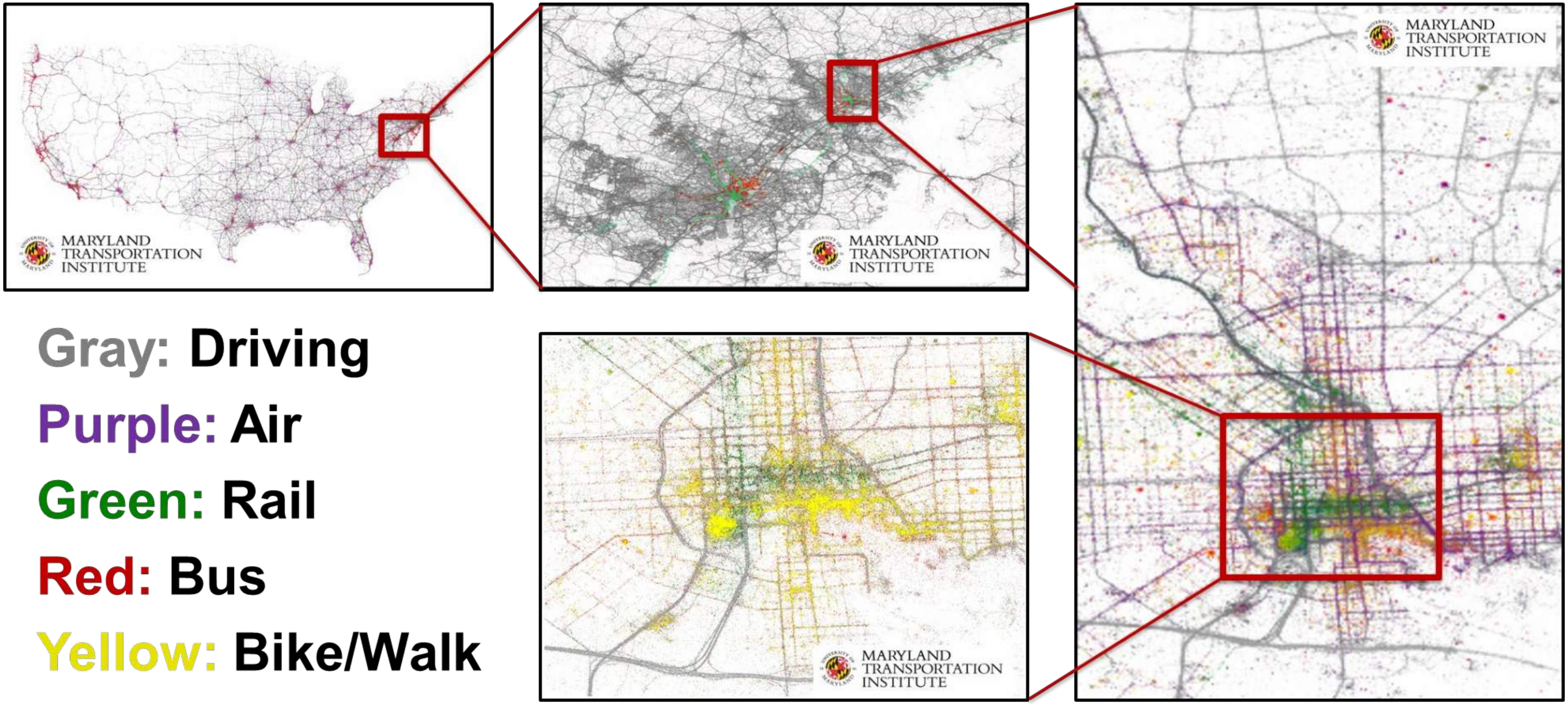


Work Zones & Weather Analysis

COVID-19 Travel Impacts Analysis


MARYLAND TRANSPORTATION INSTITUTE
Anonymized Location Data from Phones and Vehicles
Data Processing
Data Quality Check
Data Cleaning
Data Fusion
Trip Identification
Trip Origin, Destination, and Time Identification
Identification of Stay-Home Devices
Road, Rail, Bus, Airline System Datasets
Imputation Algorithms
Trip Purpose Imputation
Travel Mode Imputation
Socio-Demographics Imputation
Census Population Datasets
COVID-19 Cases, Business Establishment Data, and Other Data
University of Maryland COVID-19 Impact Analysis Platform Metrics and Analytics
Baseline Control Totals from National Surveys
National All-Trip Roster from Observed Data Sample
Data Integration and Aggregation
Multi-Level Weighting
Comprehensive Trip Data Validation

U.S. Nation-Wide Daily Multimodal Travel Data for All Travel Modes



Gray: Driving

Purple: Air

Green: Rail

Red: Bus

Yellow: Bike/Walk

39 Metrics are Computed and Aggregated

- Mobility & Social Distancing (9 metrics)
  - Social distancing index
  - % Staying at hoe
  - Trips/Person
  - % out-of-county trips
  - % out-of-state trips
  - Miles/person
  - Work trips/ person
  - Non-work trips / person
  - Transit mode share
- COVID & Health (15 metrics)
- Economic Impact (5 metrics)
- Vulnerable Populations (10 metrics)


UNIVERSITY OF MARYLAND
COVID-19 Impact Analysis Platform
About | Tutorial | Methods | Findings | Press | Contact
MARYLAND TRANSPORTATION INSTITUTE
States
Counties
From August 27, 2020 to August 27, 2020
Select metrics:
Mobility and Social Distancing
COVID and Health
Economic Impact
Vulnerable Population
Search for a county
County ▲
Social distancing index
% staying home
Imported COVID cases
% change in consumption
COVID death rate
Abbeville County, South Carolina 15 18% 173 13.7% 1.68% SERA
Acadia Parish, Louisiana 44 32% 401 -20.7% 2.49% SERA
Social distancing index over time
% staying home over time
Imported COVID cases over time
% change in consumption over time
COVID death rate over time
Zoom to All states
Show Social distancing index
Show National Statistics
Showing data for August 27, 2020
Social distancing index
0
18
21
24
29+
© 2020 University of Maryland

COVID-19 **Key Insights**

UMD COVID-19 Impact Analysis Platform: data.covid.umd.edu

https://data.covid.umd.edu/

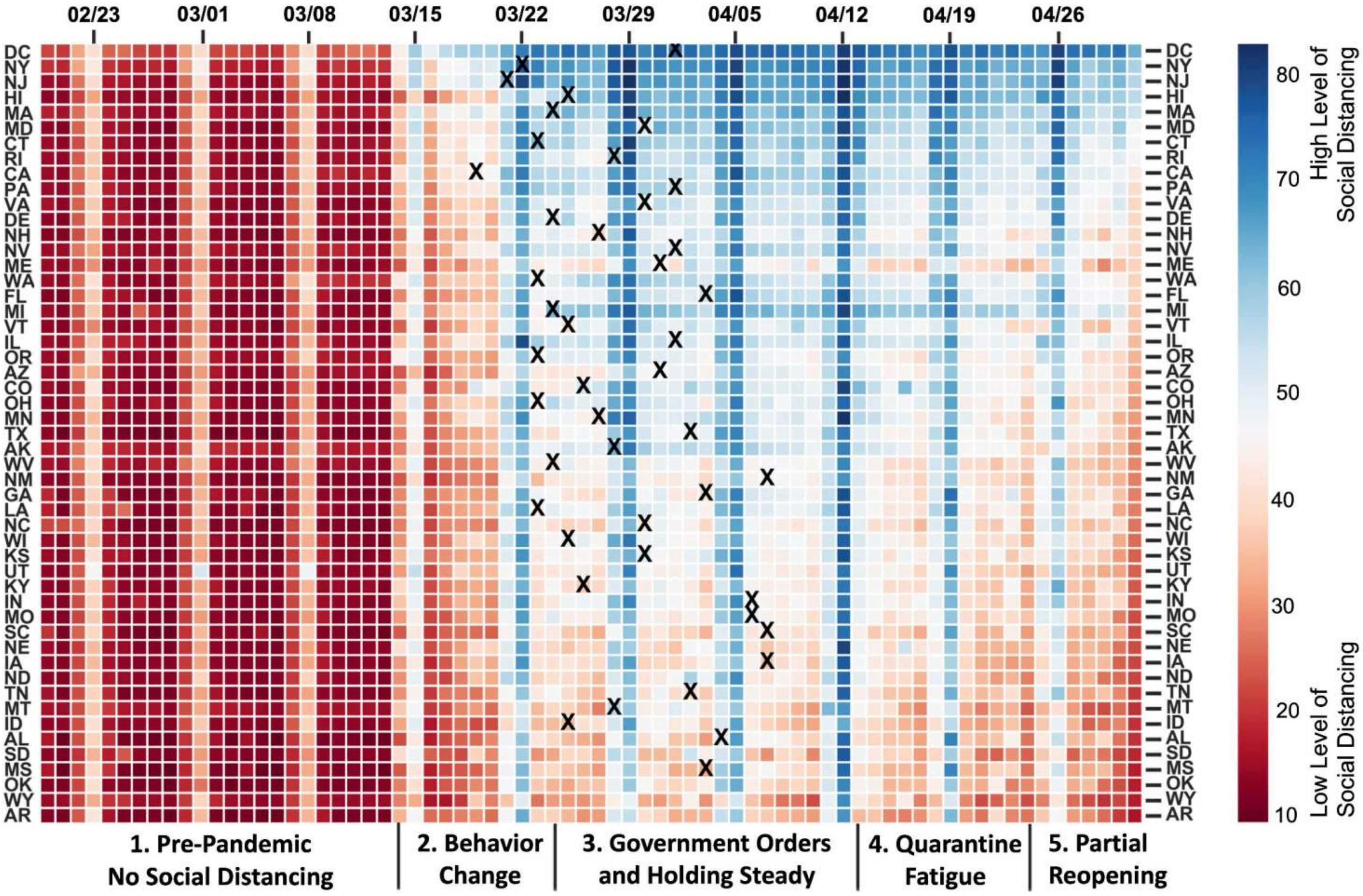
Live Demo
data.covid.umd.edu

MARYLAND TRANSPORTATION INSTITUTE

Social Distancing Index by State

February 20~May 1 data from: data.covid.umd.edu

"X" indicates statewide stay-at-home order date.

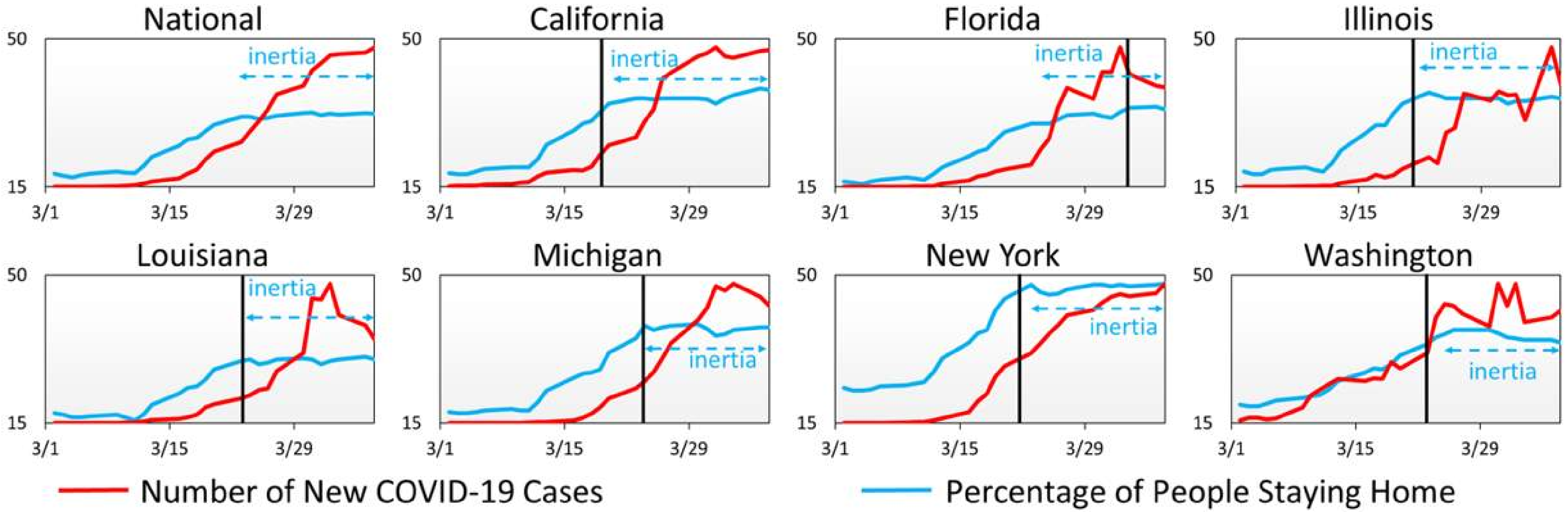


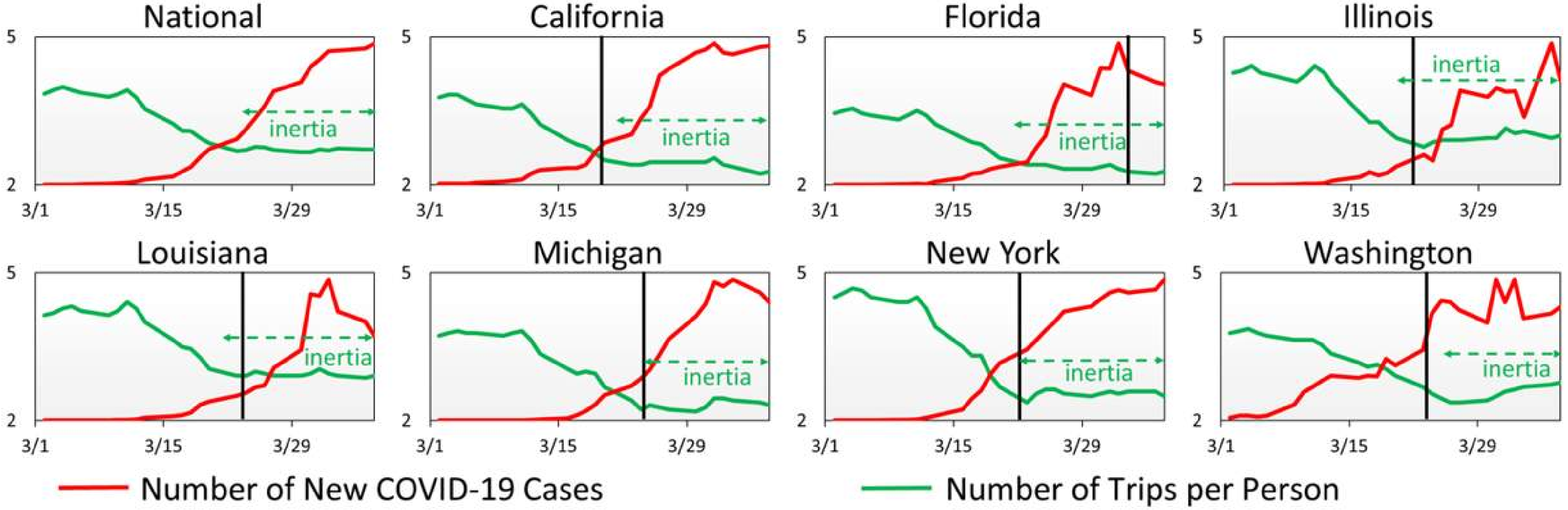
MARYLAND TRANSPORTATION INSTITUTE

Impact of Stay-at-Home Orders on Mobility Behavior

March 1~April 9 data from: data.covid.umd.edu

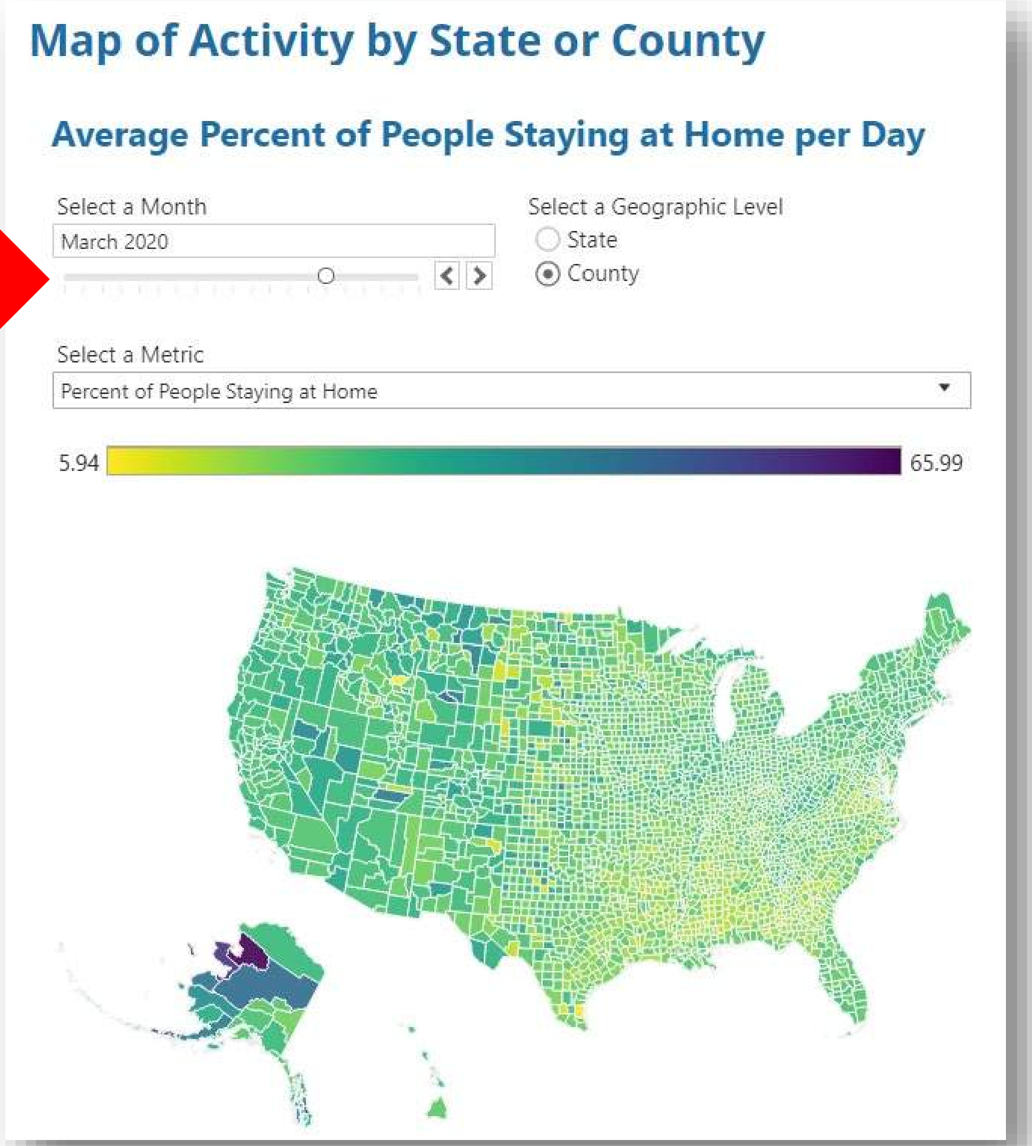
Black lines indicate dates of statewide stay-at-home orders. Vertical axes on the left show ranges of %staying home (15~50) and #trips/person (2~5). #COVID-19 cases across states have different ranges.

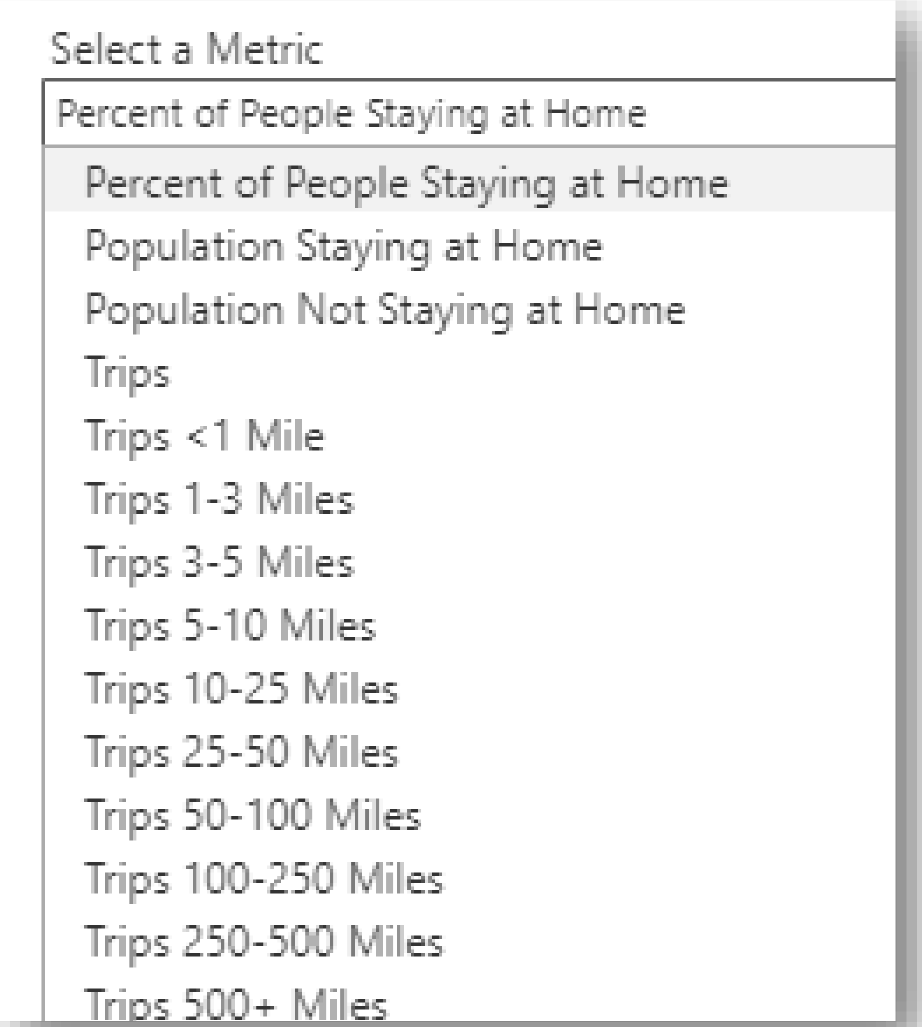




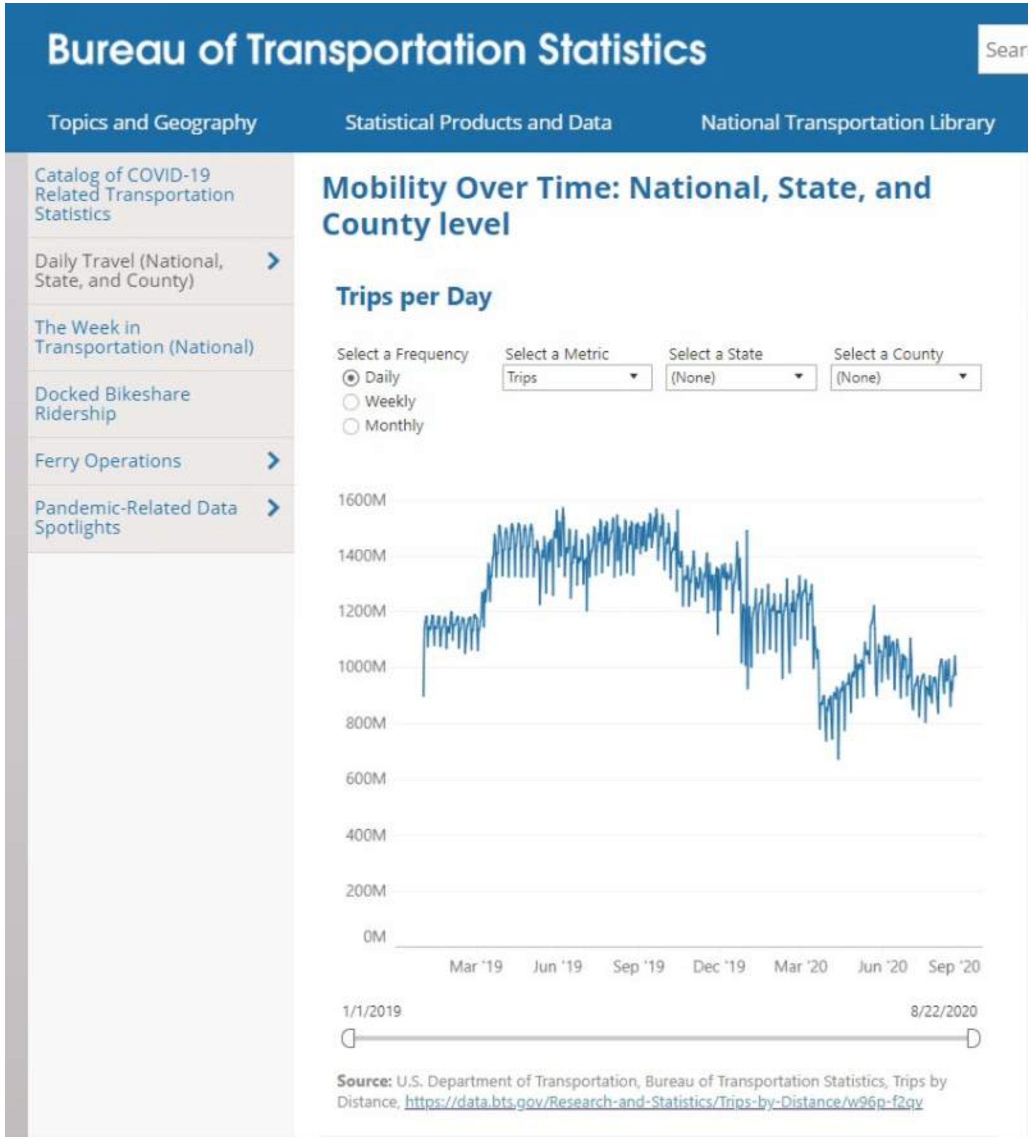
USDOT Bureau of Transportation Statistics

USDOT Bureau of Transportation Statistics





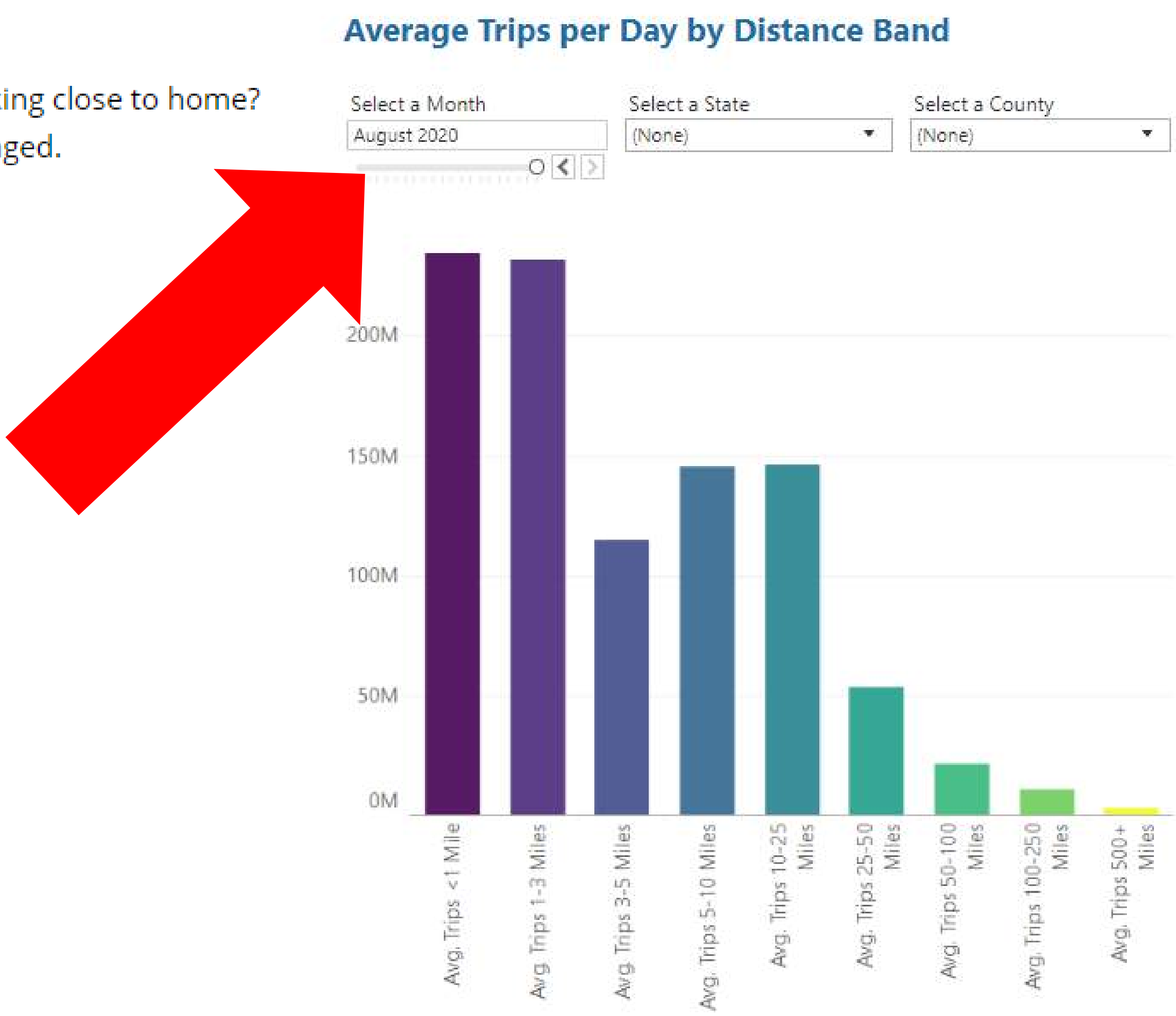
USDOT Bureau of Transportation Statistics



When they leave the home, how far are people traveling?

Are people going farther on each trip, or are they sticking close to home? Use the date selector to learn how patterns have changed.

Distribution of Trips by Distance: National, State, and County level



Catalog of COVID-19 Related Transportation Statistics

Daily Travel (National, State, and County)

The Week in Transportation (National)

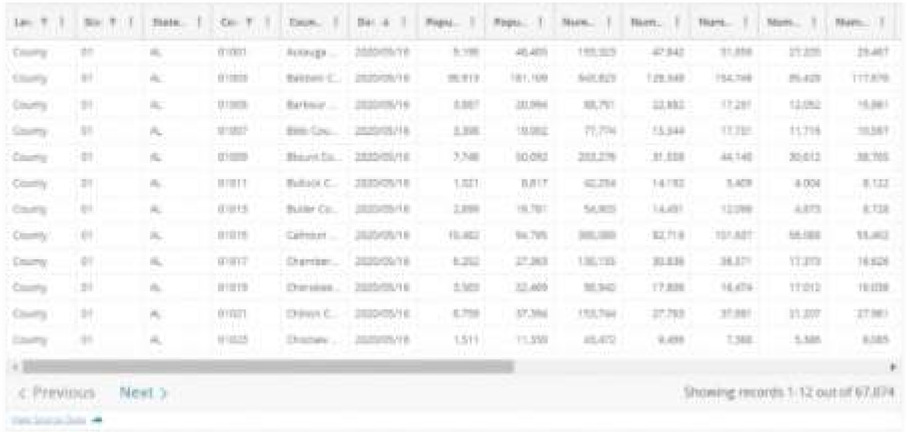
Docked Bikeshare Ridership

Ferry Operations

Pandemic-Related Data Spotlights

Explore the Trips By Distance Data on Your Own

Click on the image below to see the metadata for the Daily Travel data in our Data Inventory. There, you can download the data or use the inventory platform to create your own visualizations and share them with others.



Source

The Daily Travel data and number of people staying home and not staying home are estimated for the Bureau of Transportation Statistics by the Maryland Transportation Institute and Center for Advanced Transportation Technology Laboratory at the University of Maryland.

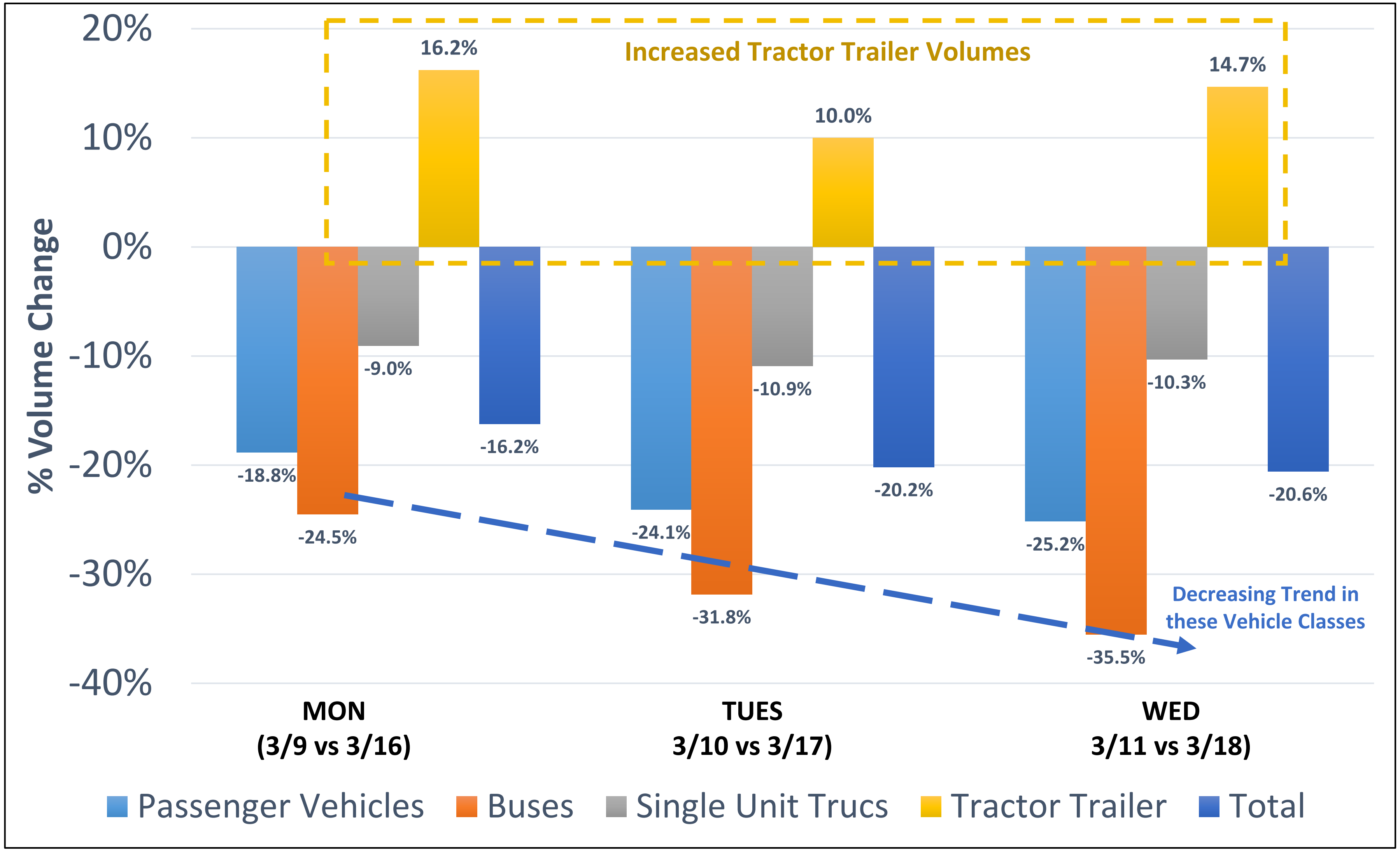
Additional Analysis & Tools from the RITIS Platform

COVID-19 **Key Insights**

Traffic Volumes Decreased Significantly due to COVID-19

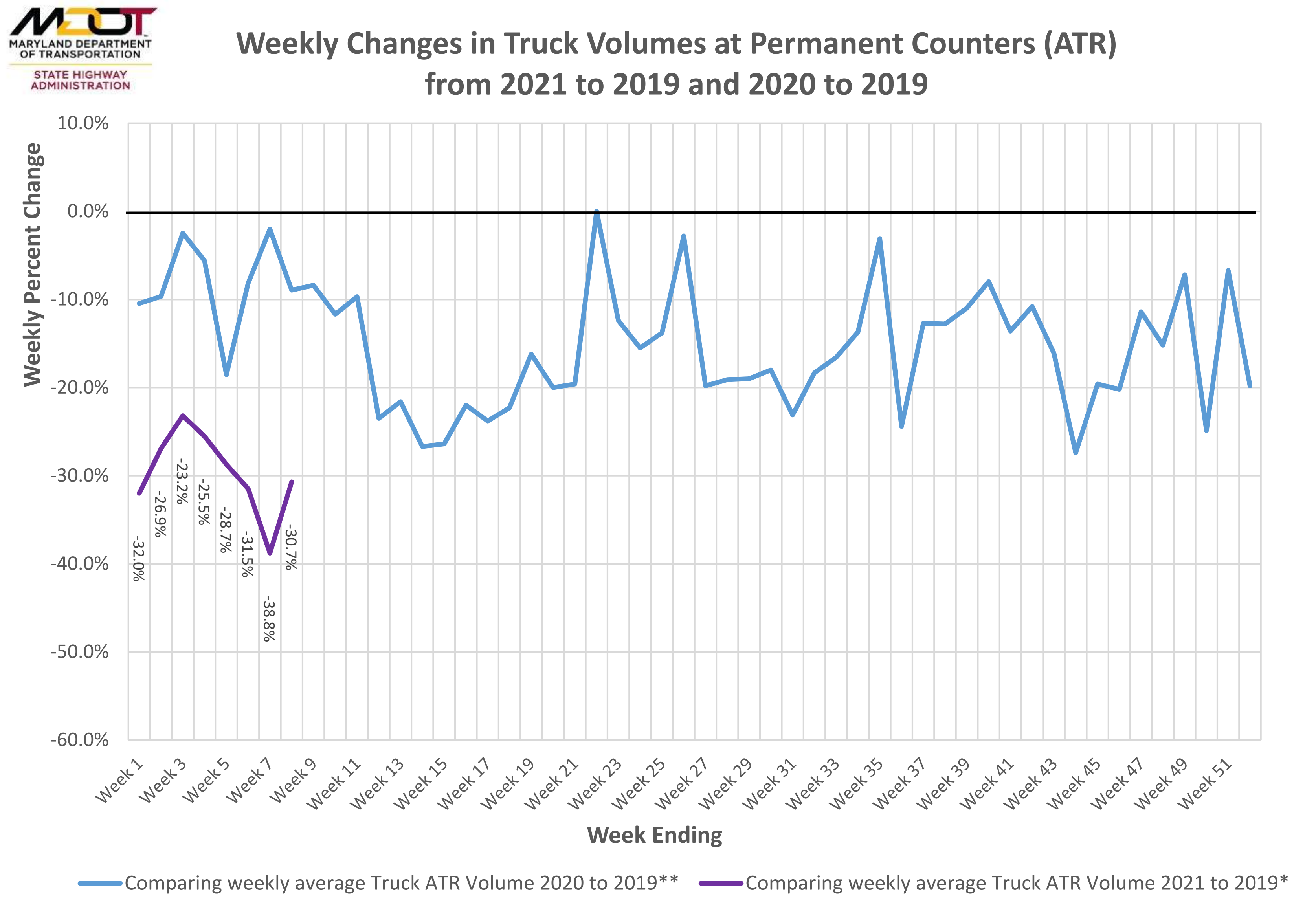
- Passenger vehicles, buses, and single unit trucks ***decreased by 9-35%***

- Tractor trailer volumes ***increased by 10-16%*** in select freight corridors



COVID-19 **Key Insights**

Traffic Volumes Decreased Significantly due to COVID-19



Trucks are FHWA Class 5-13

Probe Data Analytics Suite

Welcome, Michael | My History | Help | Tutorials | Logout

What's New 07/17/20

REGION EXPLORER
Explore the relationships between bottlenecks and traffic events in real-time and in the past.

Tutorial Help

MASSIVE DATA DOWNLOADER
Download raw probe data from our archive for offline analysis.

Tutorial Help History

CONGESTION SCAN
Analyze the rise and fall of congested conditions on a stretch of road.

Tutorial Help History

TREND MAP
Create animated maps of roadway conditions.

Tutorial Help History

PERFORMANCE CHARTS
Chart performance metrics over time.

Tutorial Help History

PERFORMANCE SUMMARIES
Report on Buffer Time Index, Planning Time Index, and other performance metrics.

Tutorial Help History

BOTTLENECK RANKING
Rank bottlenecks and discover which ones have the greatest impact.

Tutorial Help History

SPEED THRESHOLD BREAKDOWN
Determine how well or how poorly a road performed between two dates.

Help History

USER DELAY COST ANALYSIS
Put a dollar amount on how much a road's performance impacts its users.

Tutorial Help History

DASHBOARD
Create your own personal dashboards to monitor corridor performance in regions of interest.

Tutorial Help

NPMRDS COVERAGE MAP
Explore the coverage completeness of the NPMRDS on a month-by-month basis.

Tutorial Help

TRAVEL TIME DELTA RANKING
Rank roads based on their change in travel time performance between two time periods.

Tutorial Help History

TRAVEL TIME COMPARISON
Chart travel times to compare performance for different time periods.

Tutorial Help History

TUTORIALS
Learn how to use each of the tools in the suite.

Need to reach out to us? Feedback | Support

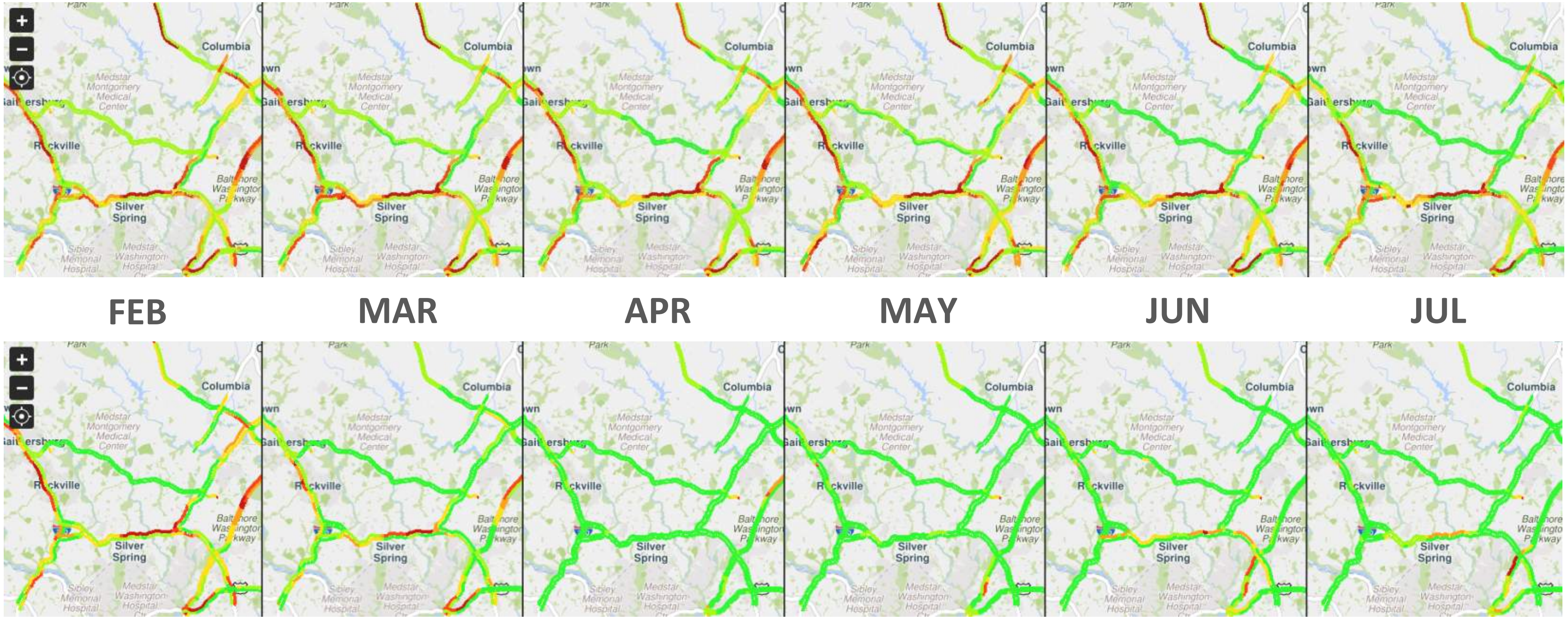
With Decreased Travel Demand, Traffic Congestion was also Mitigated

Average travel speeds by month at 8:00 a.m.

2019

2020

- 20 mph
- 30 mph
- 40 mph
- 50 mph
- 60 mph



Source: RITIS / Trend Map

FEB 2020 — **AUG 2020**

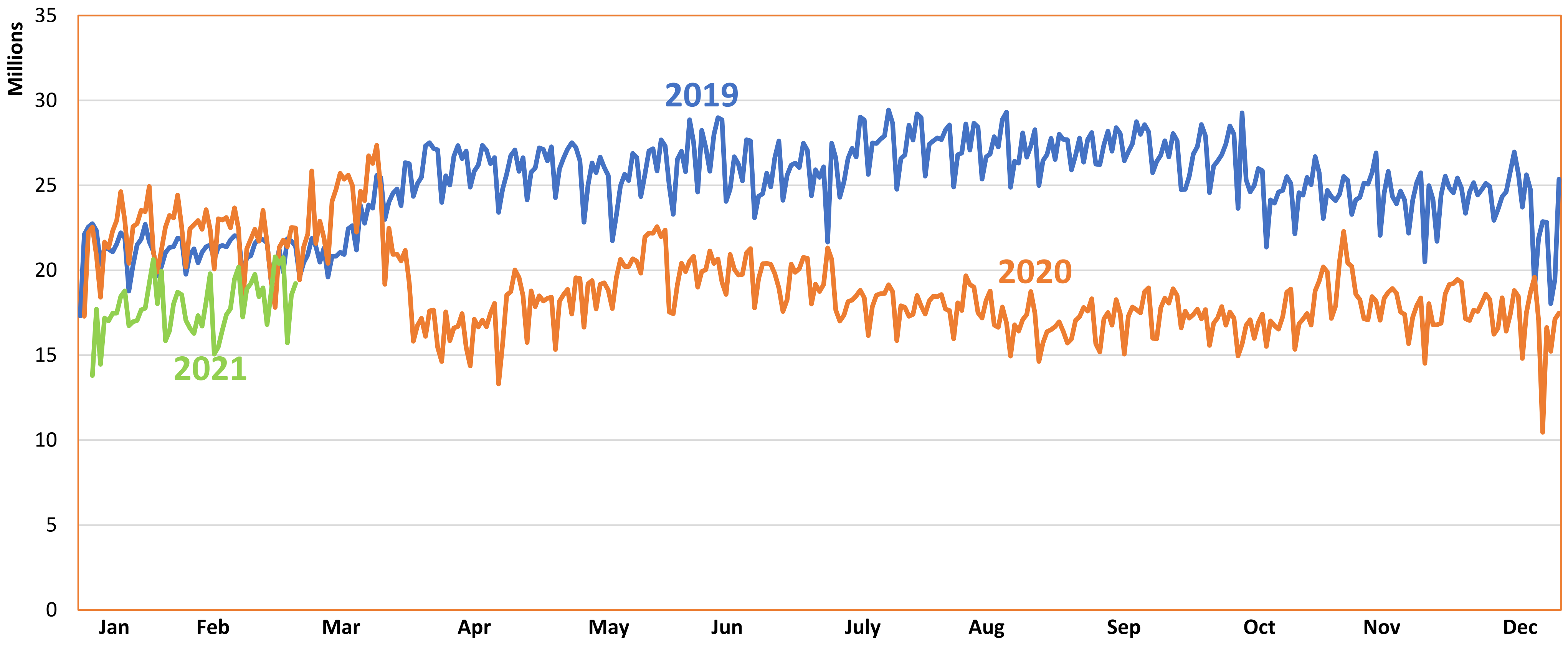
03.05.20
Catastrophic Health Emergency declared

03.30.20
Stay at Home Order issued

04.15.20
Use of Face Coverings & Physical Distancing Order issued

05.15.20
Stay at Home Order replaced by Safer at Home Order

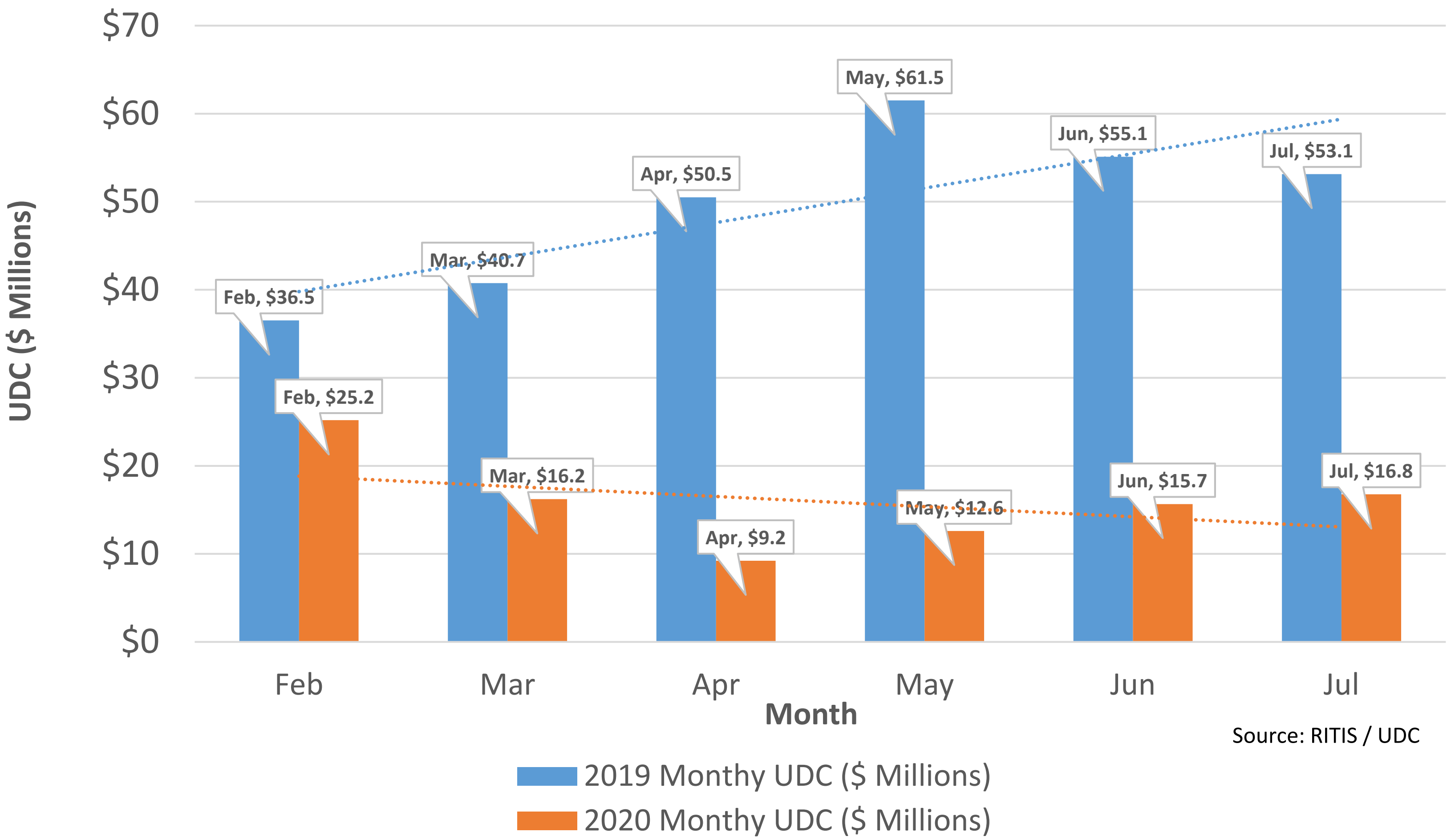
Maryland Daily Trips (Jan 1, 2019 - Feb 20, 2021)



Using the UMD RITIS **User Delay Cost (UDC)** tool, comparisons were made for a six-month period between 2019 (pre-pandemic) and 2020.

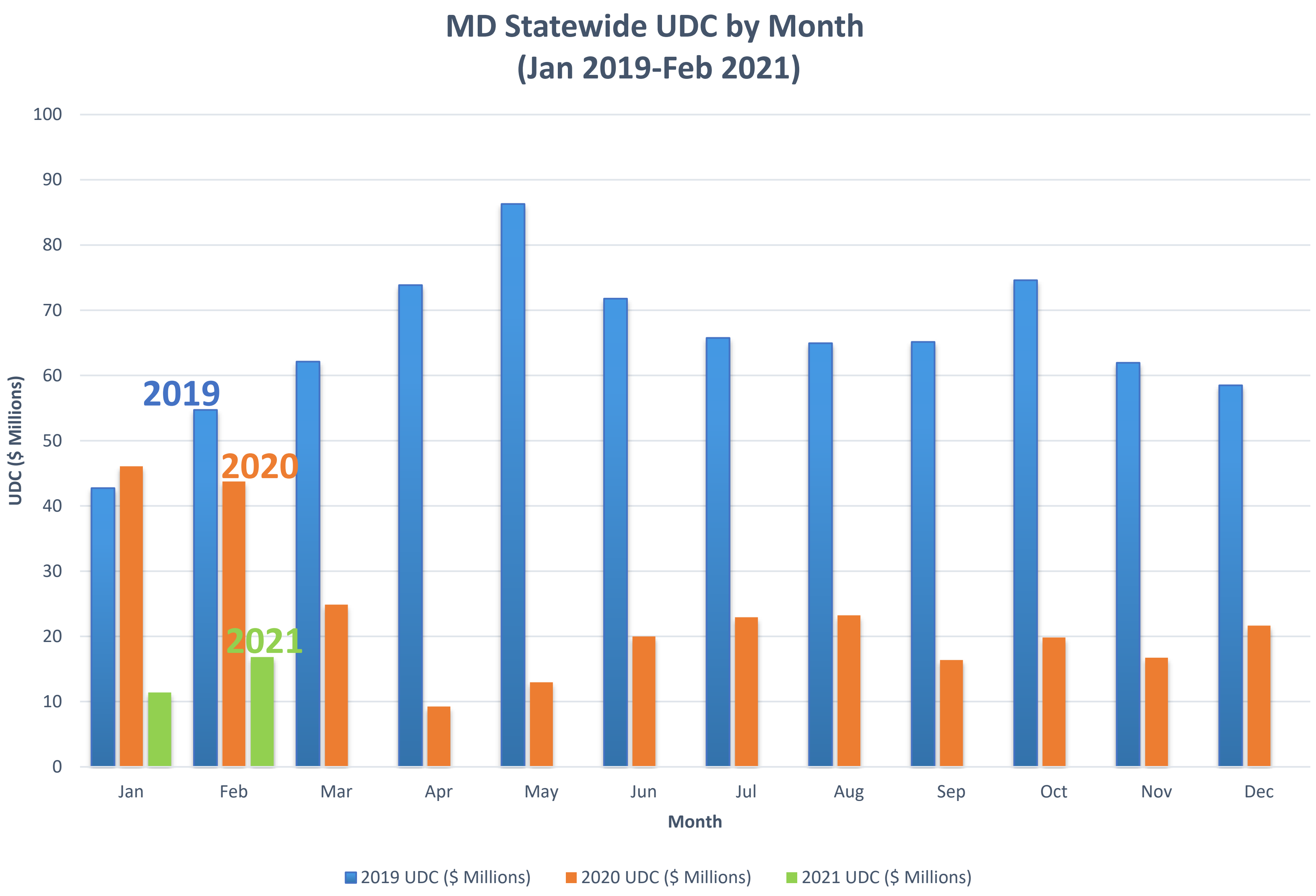
Comparing month-by-month UDC results for the entire state of Maryland shows ***dramatic drops* in user delay cost – between 31% and 82%** – with an overall decrease in delay cost of **$202M** for the six-month period.

Statewide UDC by Month | 2019 vs 2020 (Feb to Jul)



Source: RITIS / UDC

COVID-19 **Key Insights** User Delay Cost (UDC) Comparisons: Pre-pandemic vs. Pandemic



Thanks! Comments and Feedback are Welcome.

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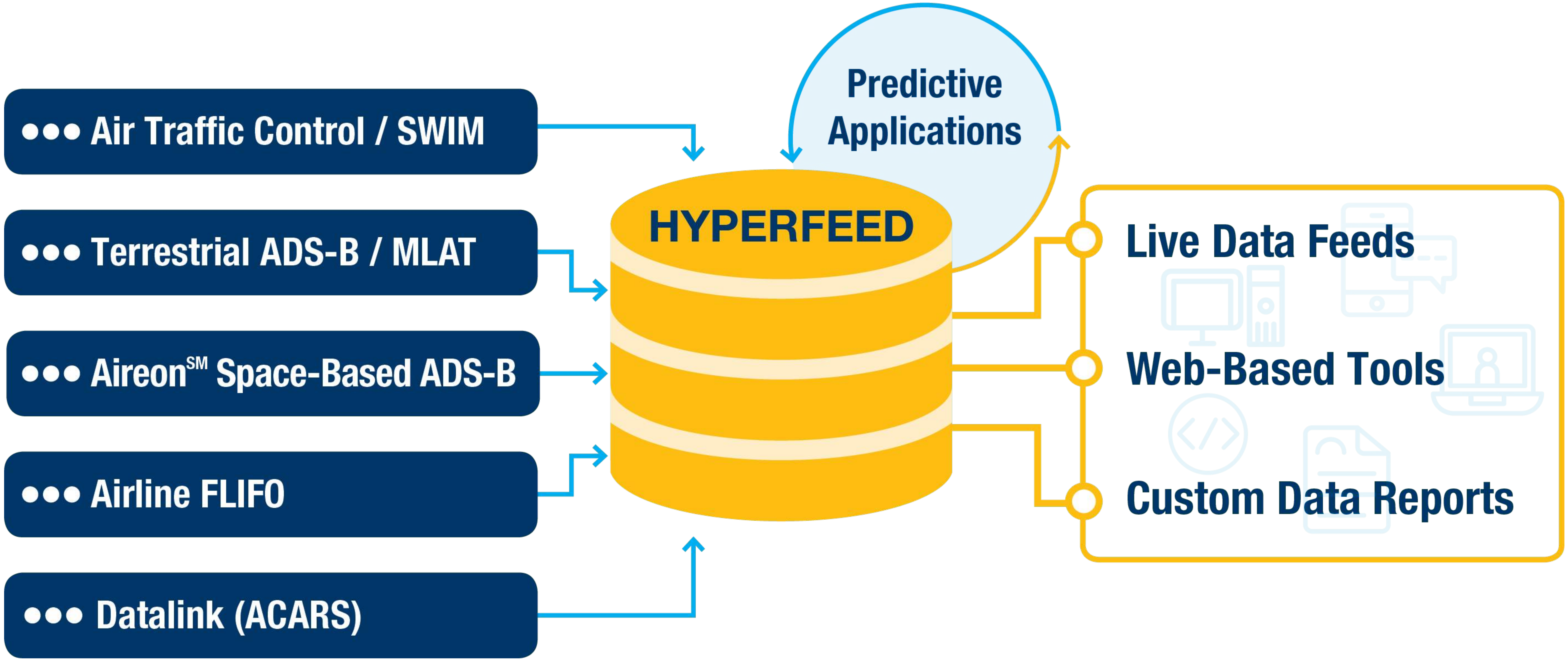
Online Training Videos available at:
https://www.ritis.org/help/tutorials/

Visualizing the Impact of COVID-19 on the Aviation Industry

Hyperfeed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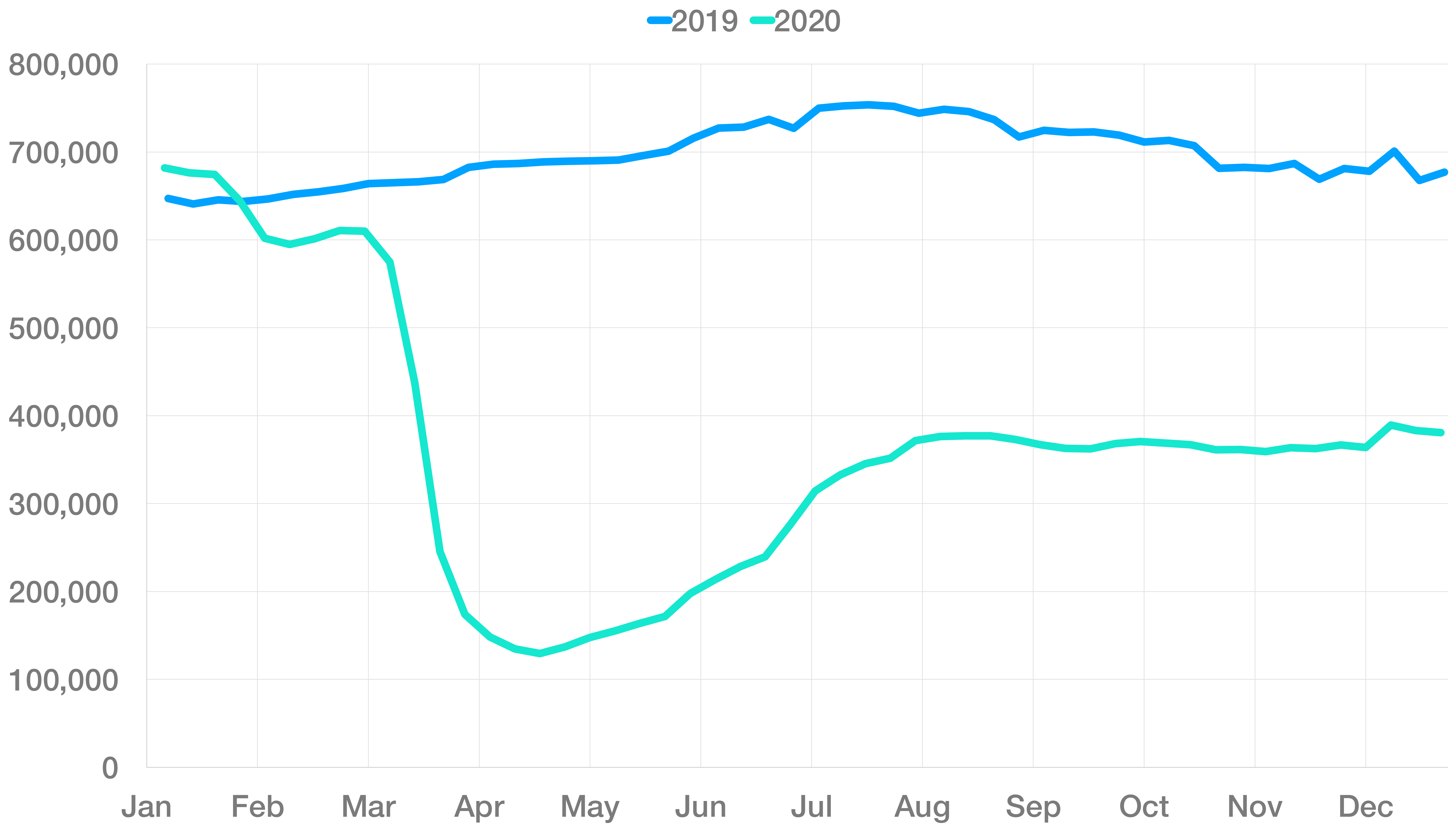
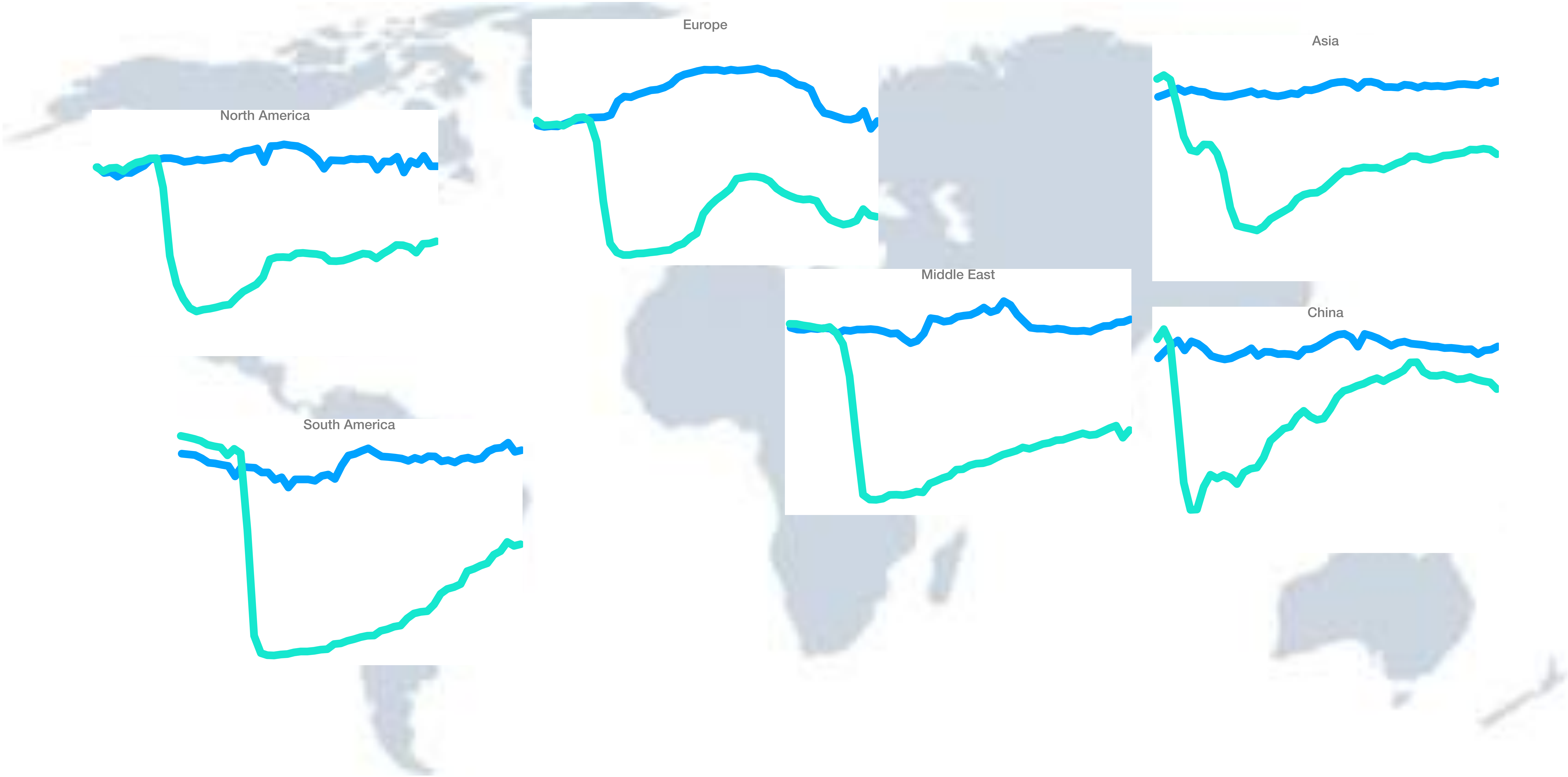
Terrestrial ADS-B / MLAT
Aireon℠ Space-Based ADS-B
Airline FLIFO
Datalink (ACARS)
Predictive Applications
HYPERFEED
Live Data Feeds
Web-Based Tools
Custom Data Reports

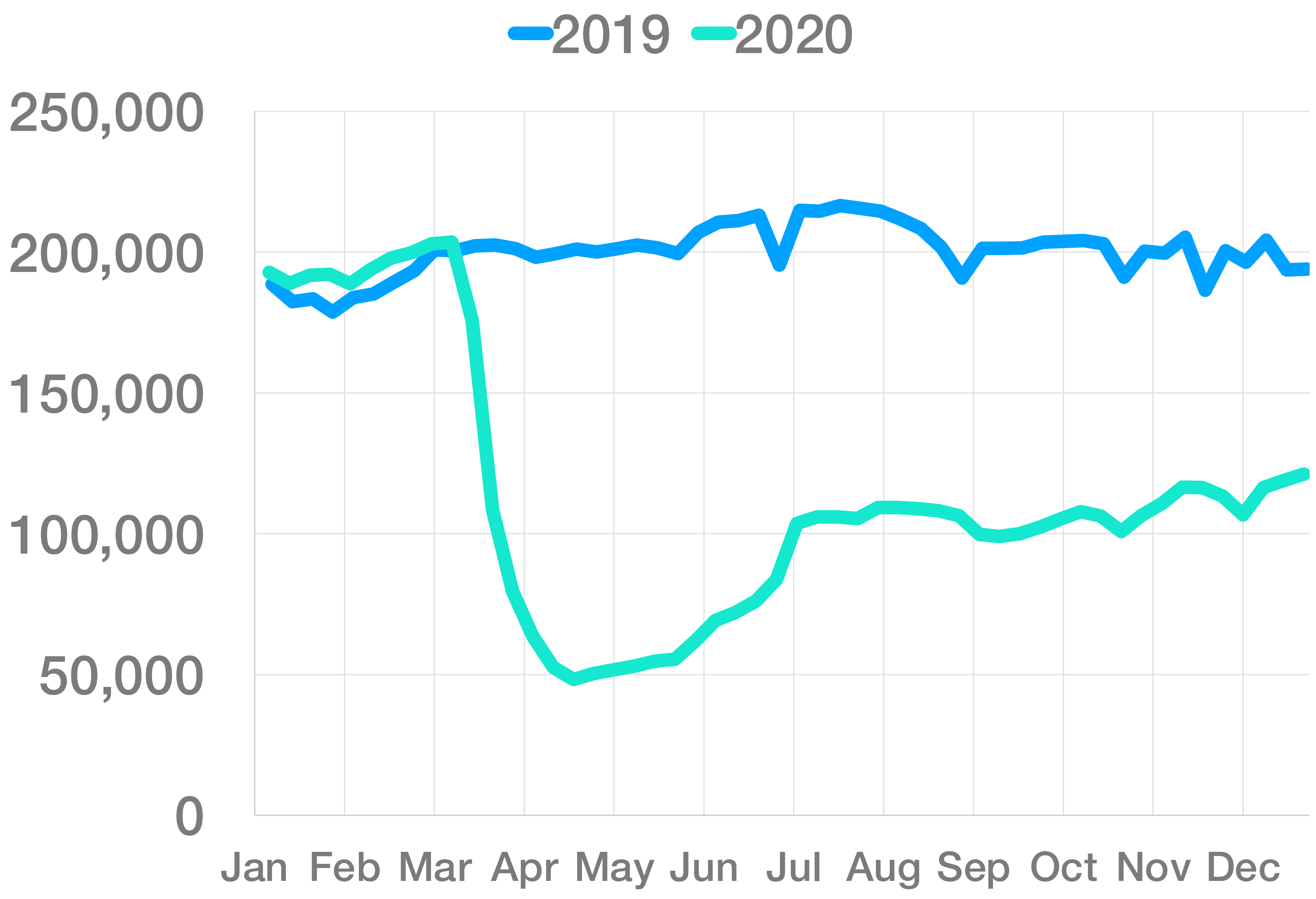
Commercial Passenger Airlines Overall



Geographic Variation

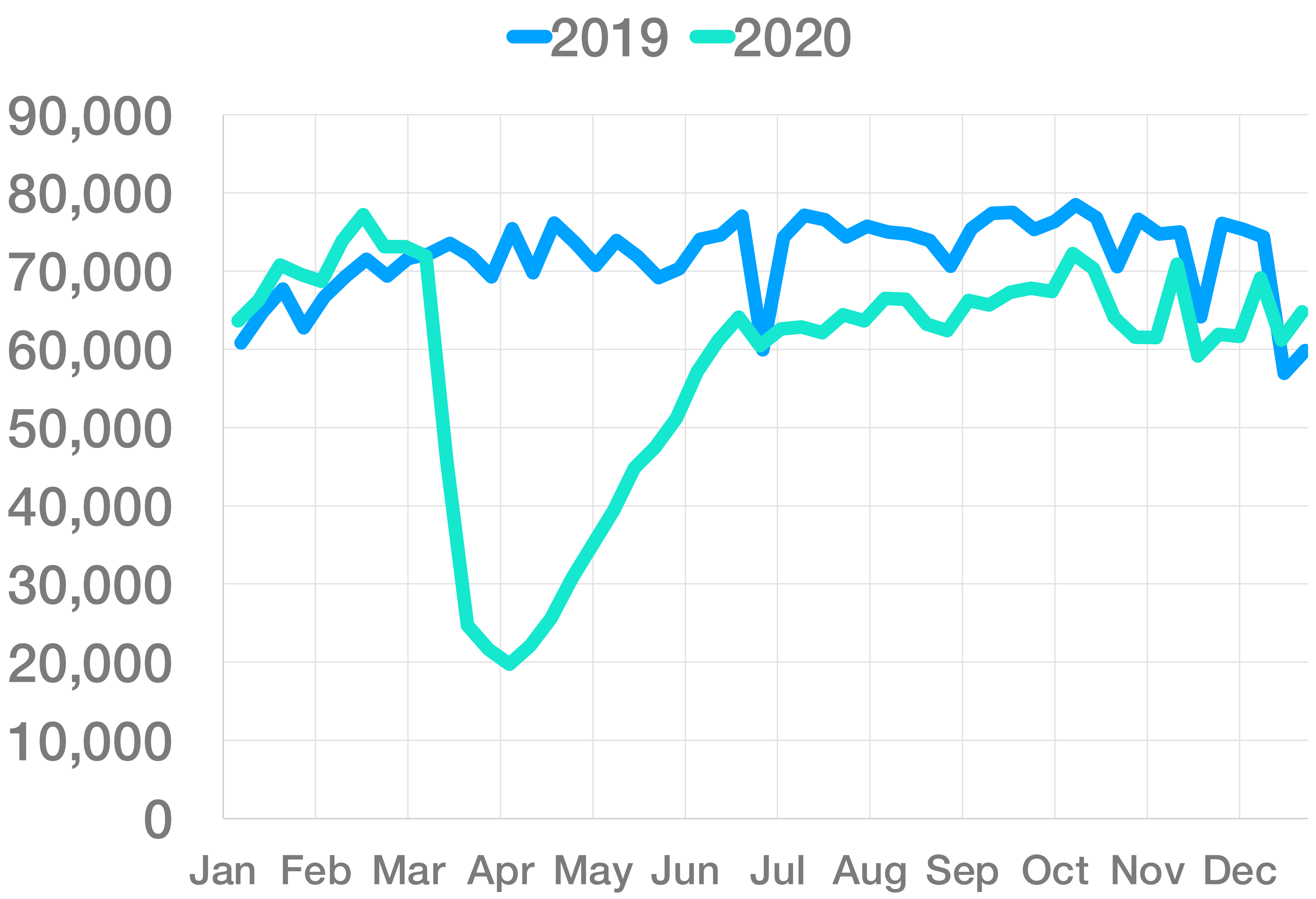


Operation Type Impact



Passenger Airlines

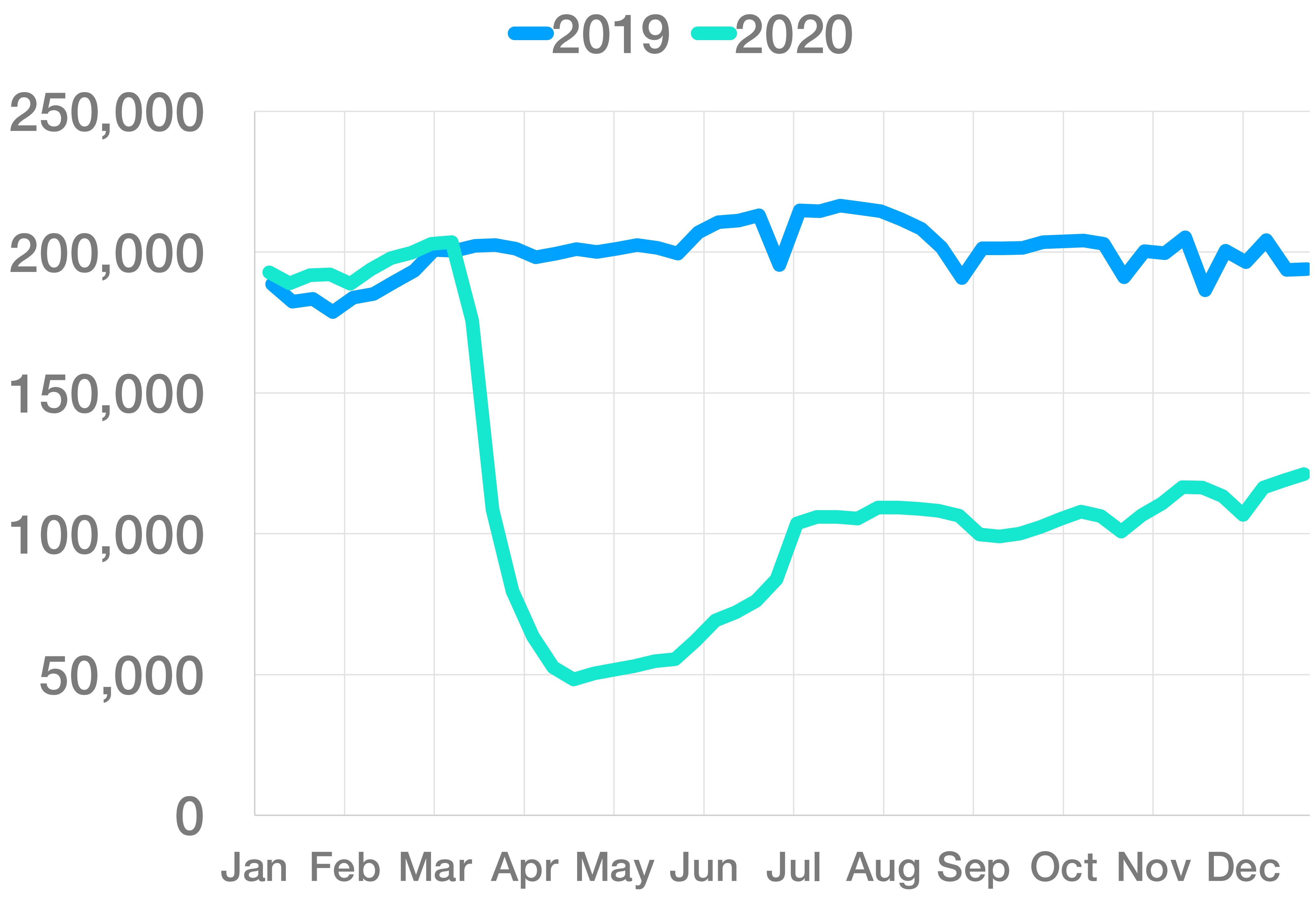
(to/from/within United States)



Business Aviation

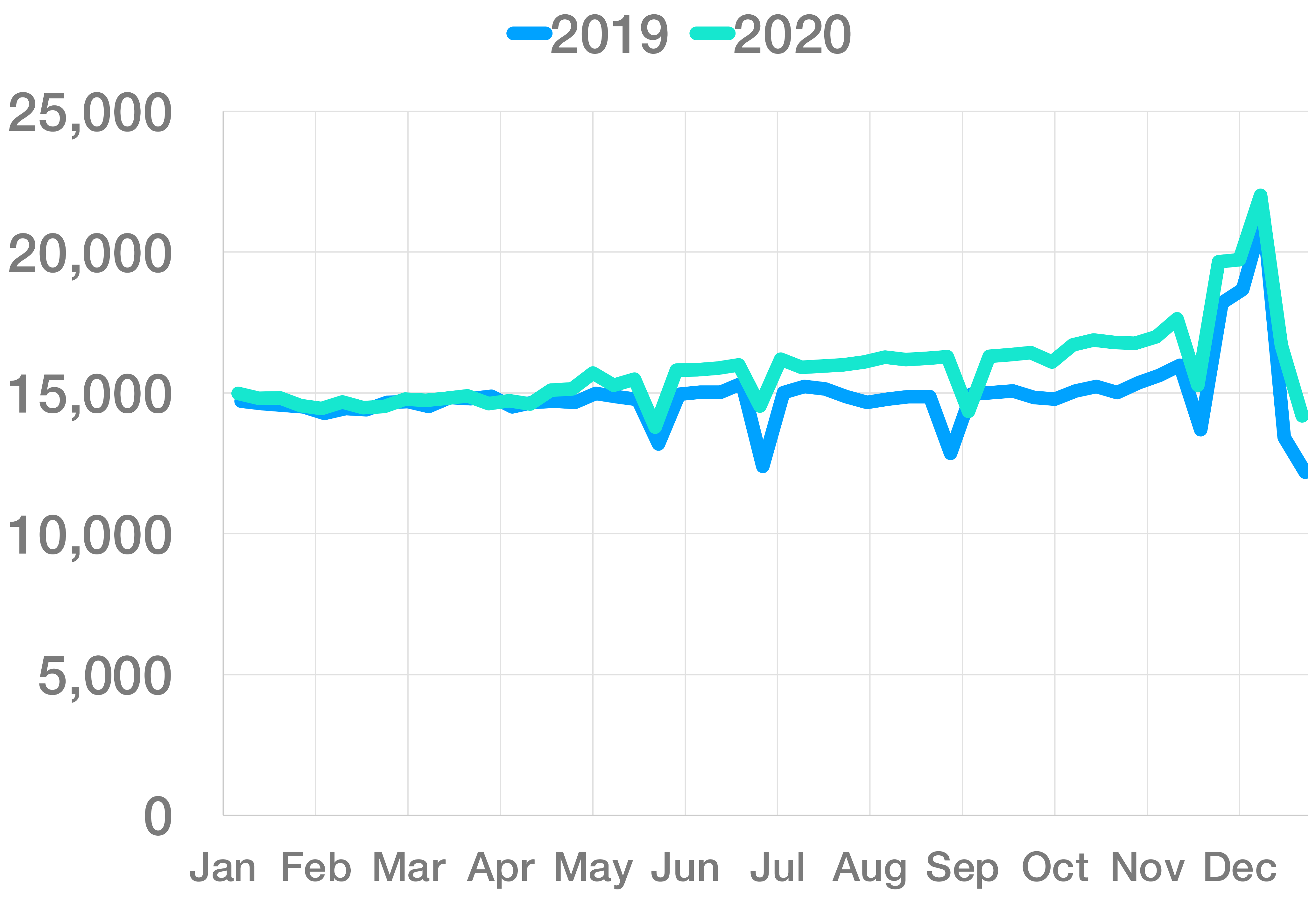
(to/from/within United States)

Operation Type Impact



Passenger Airlines

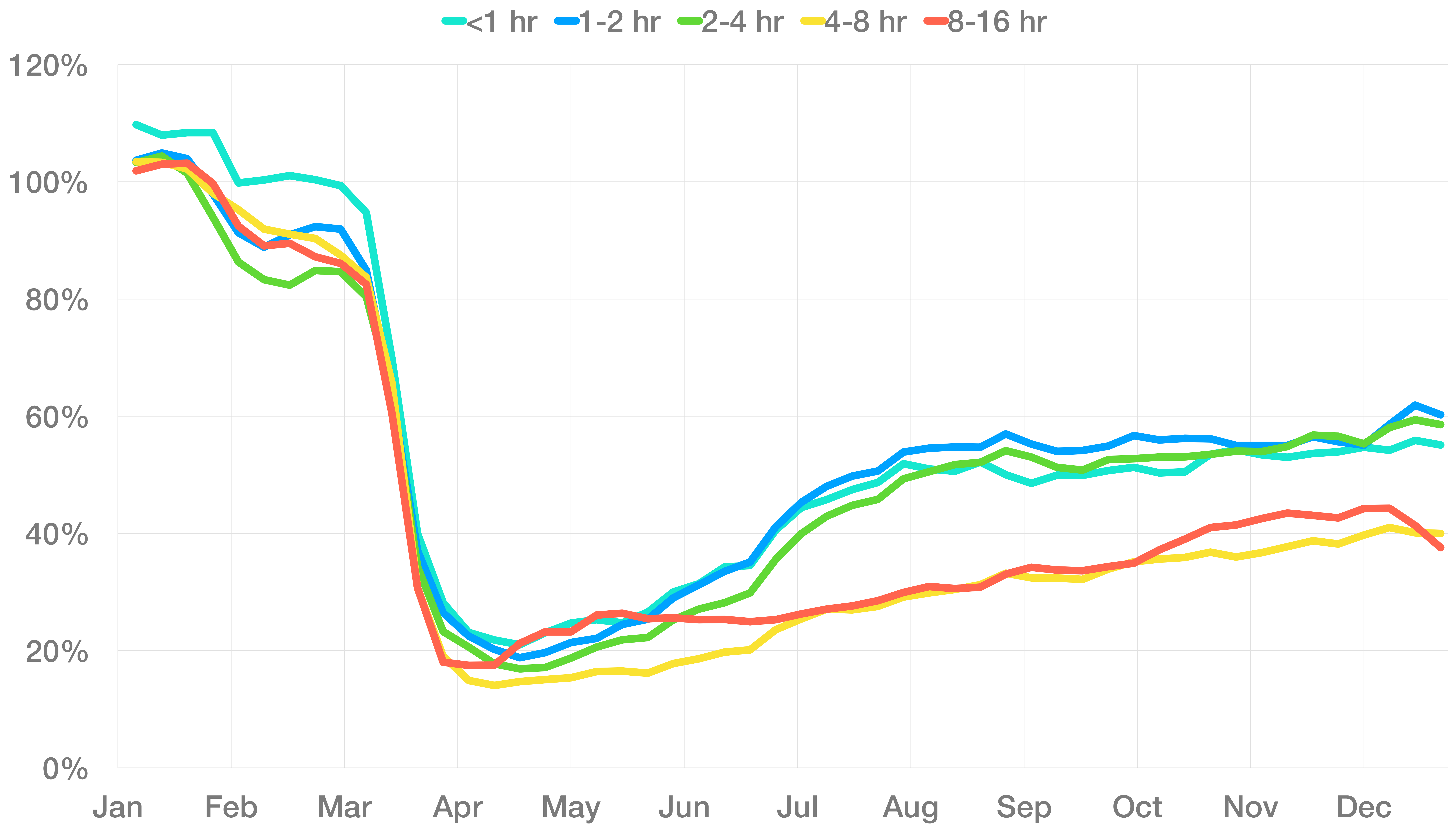
(to/from/within United States)



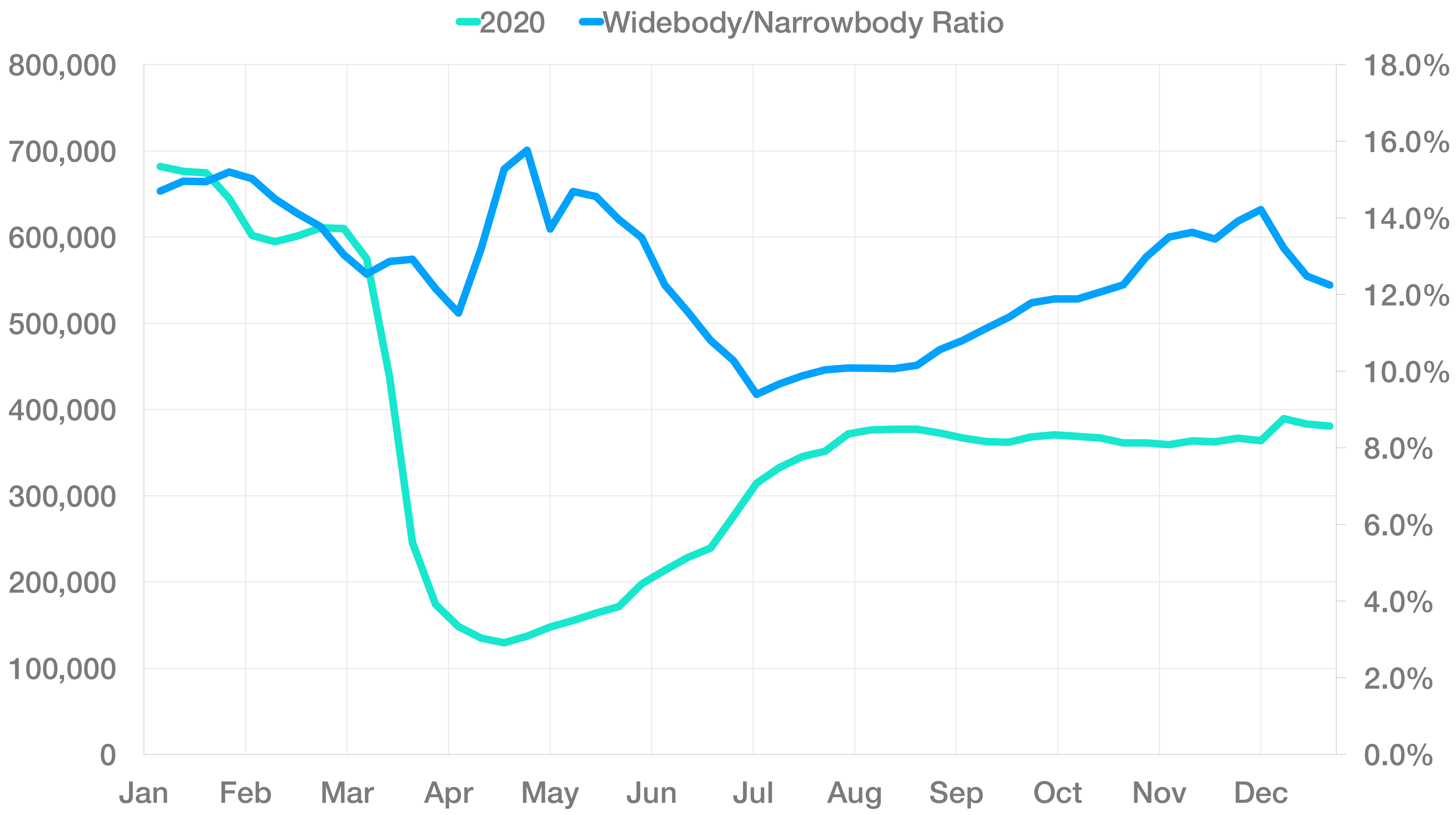
Cargo Airlines

(to/from/within United States)

Stage length impact



Airliner Size Mix



Summary

- Commercial passenger airlines have levelled off at a modest recovery of traffic levels during COVID19
    - Geographically diverse recovery profile
- Other operation types have seen more substantial recovery and even growth through COVID19
- Different recovery profiles for flights above and below 4 hours
- Multiple changes in mix of aircraft size

Today’s Panelists

#TRBWebinar

Moderator:
Charles Lattimer

Michael Pack

CATT LABORATORY

Kaan Ozbay, ***New York University/ C2SMART Center***

Mark Duell

FlightAware

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ATTACHMENT 2H:

Poster: Observed and Expected Impacts of COVID-19 on Travel Behavior in the United States. A Panel Study Analysis presented at the 2022 National Academies of Sciences Engineering and Medicine Transportation Research Board Annual Meeting, 1/11/2022

Observed and Expected Impacts of COVID-19 on Travel Behavior in the United States. A Panel Study Analysis

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1. University of Illinois at Chicago, IL, USA.
2. Arizona State University, Tempe, AZ, USA.
3. University of North Carolina at Chapel Hill, Chapel Hill, North Carolina.

Introduction

- A collaboration between the University of Illinois at Chicago (UIC) and the Arizona State University (ASU).
- Drastic impacts of Covid-19 on the rhythm of daily life by forcing billions of people to stay at their homes.
- Exploring people's activity and travel behavior before, during, and after the Covid-19 pandemic.
- Focusing on three major areas of **work-from-home (WFH), online shopping,** and **commute mode choice**.
- Research questions:
  1. How was the evolution of observed changes, from the pre-pandemic through different waves during the pandemic?
  2. What are the expected behavioral preferences and choices regarding the 3 mentioned categories in the post-covid world?
  3. What are the underlying reasons that motivate individuals to make such decisions?
- Conducting a two-wave panel survey with nearly 3000 valid responses in the United States.

Introduction

- Conducting a longitudinal two-wave panel survey, from April 2020 to October 2020 (wave 1) and from November 2020 to May 2021(wave 2), in the U.S. encompassing the information of nearly 3,000 respondents across different states.
- Employing census divisions and developing sample weights to control for demographic discrepancies and provide more representative results. (Fig. 1).
- Using descriptive and inferential statistic measures, to investigate the revealed changes in travel behavior from the pre-pandemic to wave 1, revealed transitions from wave 1 to wave 2, and expected changes after the pandemic.

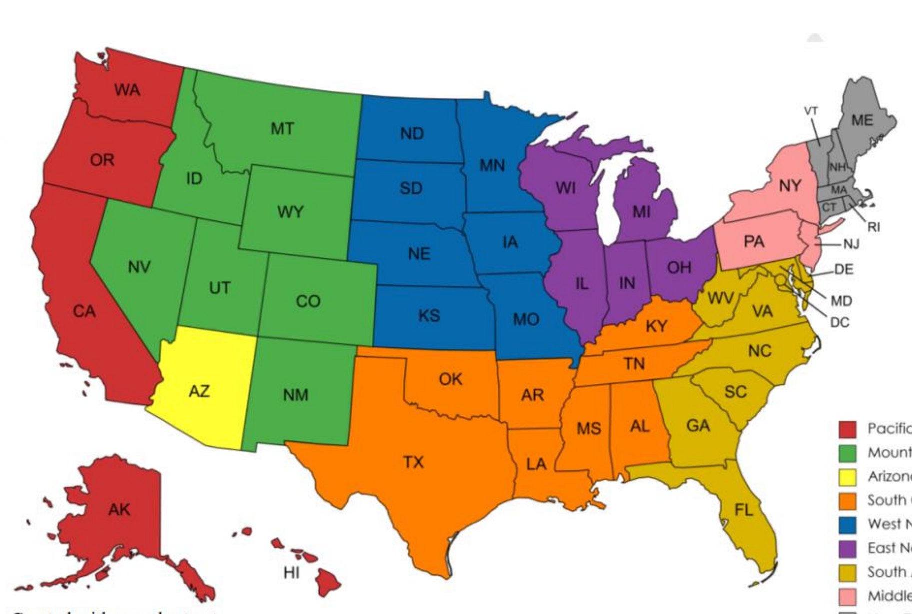


Fig. 1. Used census divisions for weighting the panel sample

Results and Discussion

❑Work from Home (WFH)

- The proportion of frequent WFH workers (i.e., WFH more than once/week) has substantially expanded from 16% (pre-pandemic) to 46% (i.e., 191% rise) in wave 1 which is also sustained through wave 2. (Fig. 2)
- Another observation is that through the transition from pre-pandemic to wave 1, 13% of the formerly employed respondents have been laid off. The unemployment rate then started to recover by reaching 9% in wave 2.
- In the post-covid situation, 52% of the respondents expect not to have the opportunity to WFH.
- Frequent WFH employees are expected to increase from 16% in pre-pandemic to 34% in post-pandemic (i.e., 113% growth).

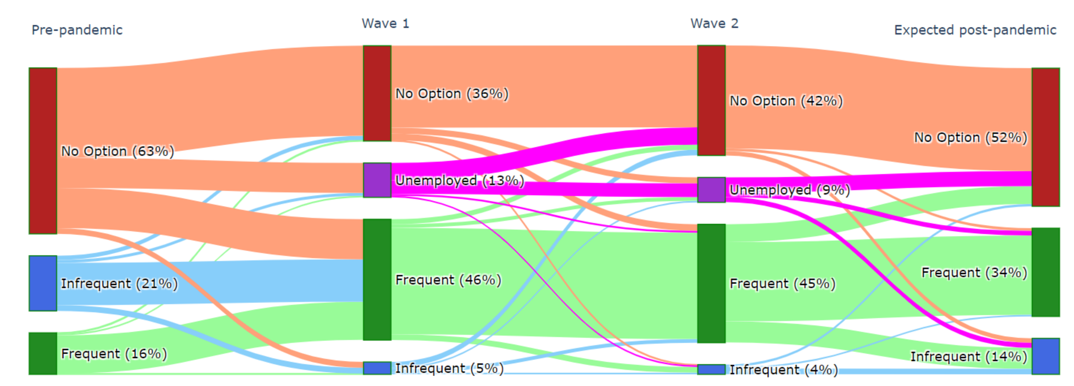


Fig. 2. Proportions and transitions of different levels of work from home from pre-pandemic to post-pandemic. Please note that "Frequent" refers to WFH more than once/week, and "Infrequent" refers to WFH once/week or less.

- Workers' intention to WFH after the pandemic can be highly correlated with their perceived productivity.
- Fig. 3 shows the reasons that positively affects the perceived productivity of WFH in wave 1 and 2 of the survey.
- The first selected positive factor associated with being more productive in both waves is "no commute" (selected by 69% and 45% of workers in waves 1 and 2, respectively) followed by "more comfortable workspace at home" (selected by 48%) in wave 1 and "flexible hours" (selected by 35%) in wave 2

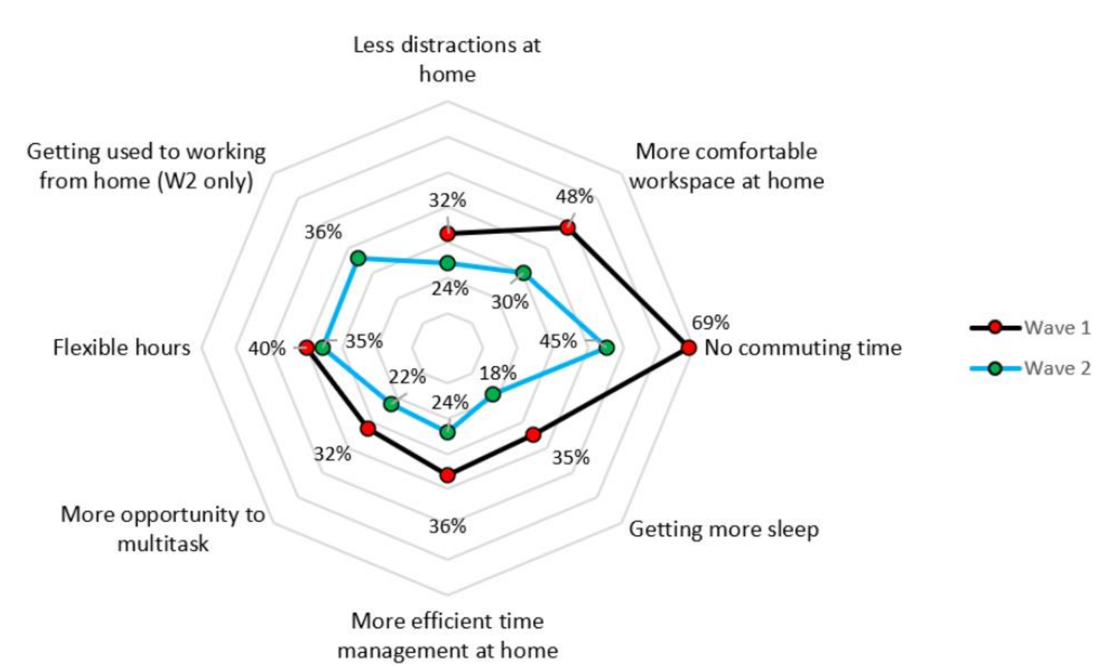


Fig. 3. Factors positively affecting WFH productivity, reported in wave 1 and wave 2 of data collection.

❑Online Shopping

- The increased consumers' willingness to shop online to avoid coronavirus in tandem with enforced social distancing regulations has accelerated the expansion of the already growing e-commerce industry to an unprecedented pace.

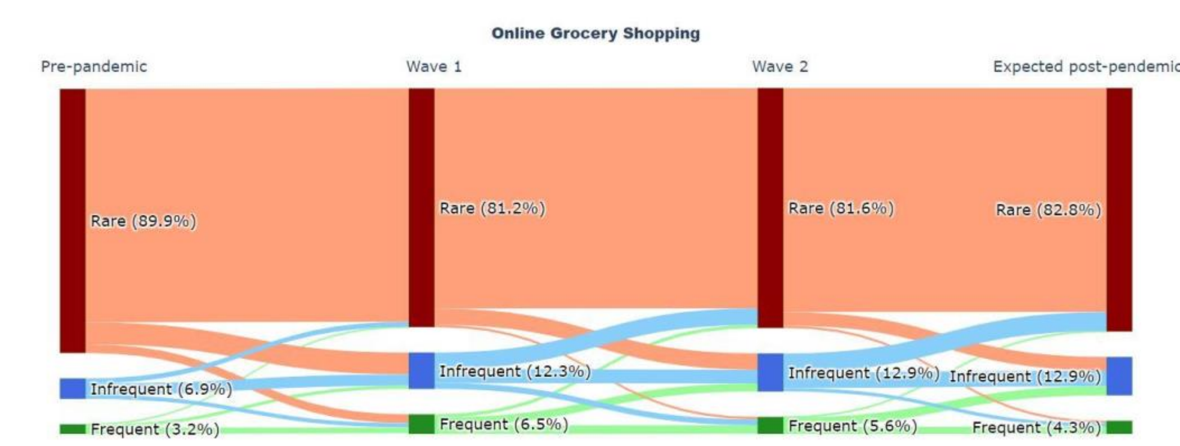


Fig. 4. Proportions and transitions of different categories of online grocery shoppers from pre-pandemic to post-pandemic. Please note that "Frequent" refers to doing online shopping more than once/week, "Infrequent" refers to between once/week and once/month, and "Rare" refers to less than once/month or never.

- The frequent online grocery shoppers (i.e., doing online shopping more than once/week) have almost doubled in wave 1 of the survey. (Fig. 4)
- 78% growth in "infrequent" online grocery shoppers (i.e., doing online shopping between once/week and once/month) from pre-pandemic to wave 1.
- The growth in the post-pandemic (compared to the pre-pandemic) is expected to occur in infrequent grocery buyers (i.e., 87%) and frequent grocery buyers (i.e., 34%).
- These results indicate that consumers' adaptations to online shopping are likely to persist after the COVID-19 passes.

❑Commute Trips and Mode Choice

- As shown in Fig. 5, before the pandemic, around 81% of the commuters relied on private vehicles to get to their destination. The following most frequently used modes were transit and walk, accounting for transporting 12% and 3.5% of the commuters, respectively.

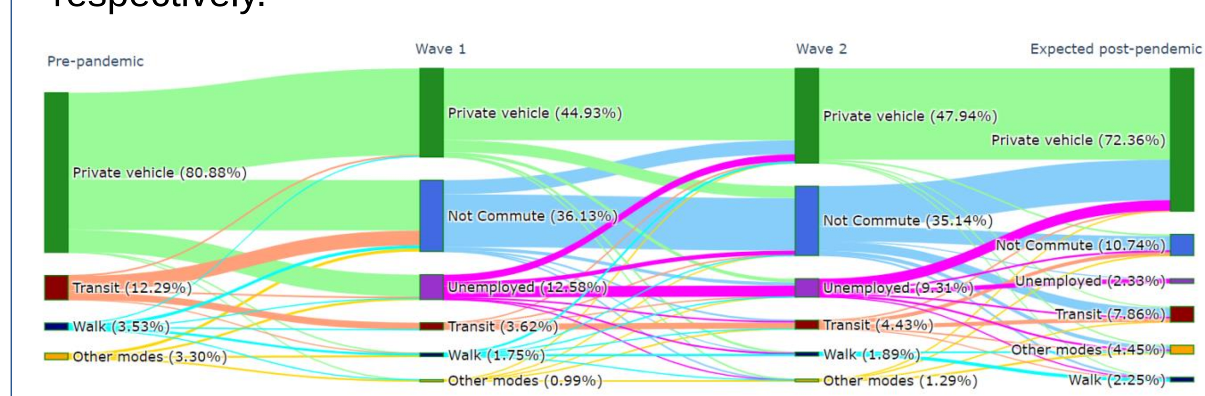
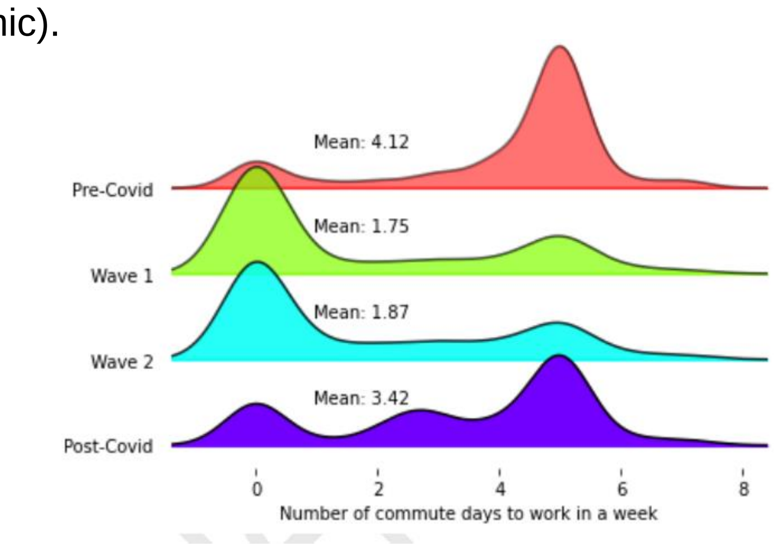


Fig. 5. Proportions and transitions of different categories of commuters based on main travel mode to work from pre-pandemic to post-pandemic.

- In wave 1, the share of private vehicle commuters plummeted to around 45% (i.e., 44.45% reduction) primarily for shifting to telecommuting and partly for becoming unemployed.
- Regarding the post-covid perceptions, 72% of the respondents expected to use a private vehicle for commuting, indicating a 10.5% reduction compared to the pre-pandemic era.
- With a 70.5% reduction, transit commuters experienced the most massive drop among all modes from pre-pandemic to wave 1.
- The share of transit commute increased by 22% from waves 1 to 2.
- In the post-pandemic, the percentage of transit commuters would still be 36% less than before the COVID-19 outbreak.
- The percentage of walking commuters sharply declined by 50% from pre-pandemic to wave 1. The share of this category then grew by 8% from wave 1 to wave 2; however, this change is not significant.
- Concerning the post-covid period, our data indicate that 36% fewer commuters are expected to use walking mode to commute to work compared to the pre-pandemic period.
- The share of commute modes should be considered in tandem with the frequency of commuting to account for future changes.
- As shown in fig. 6, before the pandemic, the average number of commute days was 4.1 days per week, which then plummet to 1.75 and 1.87 days per week in wave 1 and wave 2, respectively.
- After-pandemic, it is expected that, on average, people commute 3.42 days/week (i.e., 17% decline compared to the pre-pandemic).



- Fig. 6. The number of commute days to work in pre-pandemic, wave 1, wave 2, and post-pandemic periods.

Conclusion

- This study presents descriptive/inferential analyses to investigate activity-travel behaviors and attitudes before, during, and after the Covid-19 pandemic.
- Relying on concrete evidence from nationwide-representative panel data, our results confirm substantially observed and expected changes during and after the pandemic in telecommuting, commute mode choice, and online shopping.
- Around half of the employees expect to have the option to WFH and among which 71% anticipate being frequent telecommuters (i.e., work from home more than once a week) after the pandemic.
- Despite the gradual rebound of transit ridership, it is still expected that after the pandemic, transit commuters will be 36% less, compared to the pre-pandemic situation.
- The remarkable shift to WFH will significantly alter the commute travel patterns.
- Altogether, these findings indicate that the future of urban mobility includes a lower number of commute trips, higher car dependency, significant transit ridership lost, new and additional generated trips, and different traffic patterns rather than just the conventional morning/afternoon peak.
- More reliance on private vehicles and increased time flexibility of telecommuters can create different peak hours throughout the day or even exacerbate congestions in unexpected hours.

ATTACHMENT 3A:
COVID-19 Scenario Analysis Report

OP·LANES™
MARYLAND

Options & Opportunities for All

COVID-19 Scenario Analysis
January 2022

U.S. Department of Transportation

Federal Highway Administration

MDOT MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

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1. INTRODUCTION

The Maryland Department of Transportation State Highway Administration (MDOT SHA) is currently conducting the I-495 & I-270 Managed Lanes Study (MLS). The Study is evaluating potential transportation improvements to portions of the I-495 and I-270 corridors in Montgomery and Prince George's Counties, Maryland, and Fairfax County, Virginia.

I-495 and I-270 in Maryland are the two most heavily traveled freeways in the National Capital Region, each with Average Annual Daily Traffic (AADT) volume up to 260,000 vehicles per day in 2018 (MDOT SHA, 2019). I-495 is the only circumferential route in the region that provides interregional connections to many radial routes in the region, such as I-270, US 29 (Colesville Road), I-95, US 1, the Baltimore-Washington Parkway, US 50 (John Hanson Highway), and MD 5 (Branch Avenue). I-270 is the only freeway link between I-495 and the fast-growing northwest suburbs in northern Montgomery County and the suburban areas in Frederick County. In addition to heavy commuter traffic demand, I-495 provides connectivity along the East Coast, as it merges and runs concurrent with I-95 in Maryland for 25 miles around the east side of Washington DC. Figure 1 shows the limits of the MLS along I-495 and I-270 along with the Preferred Alternative.

The traffic forecast for the MLS is based upon the outputs of the MWCOG Regional Travel Demand Model, Version 2.3.75. More information on the traffic forecasting can be found within the FEIS - Chapter 4 and Appendix A, Final Traffic Analysis Technical Report. The MWCOG model, which is the model typically used by MDOT SHA and other transportation agencies to evaluate projects in the Washington, DC metro area, relies upon a set of model parameters to estimate travel that were based upon household travel survey data collected in the MWCOG region. The model is validated to observed traffic counts throughout the region and then applied to future scenarios that rely upon different network assumptions. These network assumptions include the regional long-range transportation plan and inputs from the Cooperative Demographic Forecast program. For the MLS, the model was updated to reflect the latest network assumptions (Alternative 9 - Phase 1) and applied using 2045 demographic inputs consistent with the Vision 2045 model effort completed by MWCOG.

There is understanding that the forecasts developed by the model are only predictions that are based on the best assumptions available at the time. The accuracy of those predictions can be impacted through multiple factors, including variations in land use patterns, changing demographic patterns or growth trends, emergence of new technologies, and/or unanticipated travel behavioral shifts. The TRB National Cooperative Highway Research Program (NCHRP) developed *Research Report 934: Traffic Forecasting Accuracy Assessment Research* (2020) that studied the accuracy of forecasts and analyzed some of the reasons why the predictions were not realized. The COVID-19 pandemic is an example of a factor that can dramatically impact the accuracy of the forecasts given the uncertainty of the long-term impacts.

Sensitivity analysis is a process of understanding the impacts of changing assumptions on the results of a set of mathematical models and is well-suited to the study of understanding the long-term impacts of COVID-19 on the resulting MWCOG forecasts.

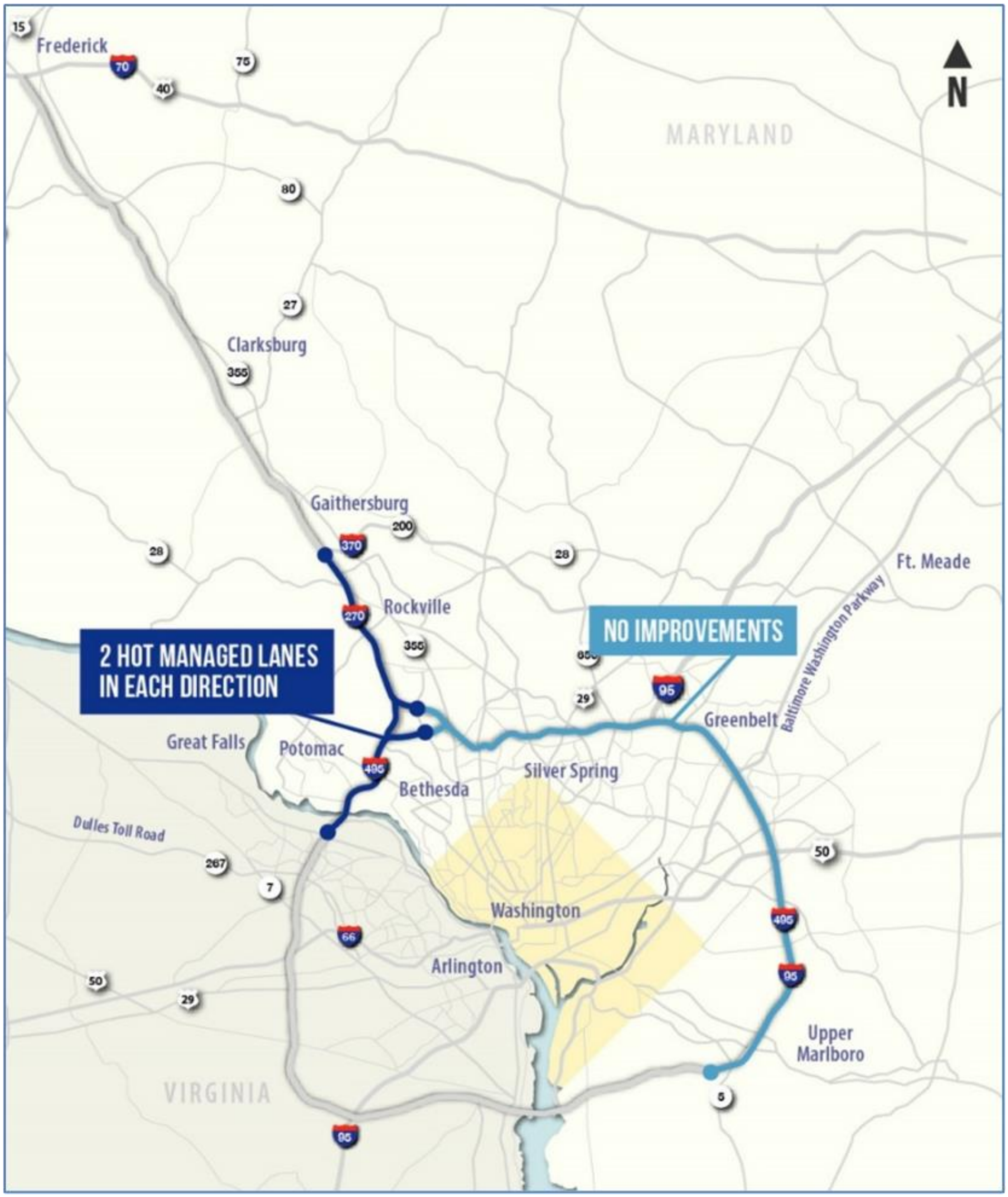


Figure 1: I-495 and I-270 Corridors

1.1 STUDY DESIGN

The purpose of this report is to provide the results of a sensitivity analysis that considered the potential long-term impacts of the COVID-19 pandemic on travel patterns within the study area of the I-495/I-270 MLS. For this analysis, the MWCOG Regional Travel Demand Model was used as the basis for the sensitivity modeling. A series of parameters were developed that captured potential long-term impacts based on various scenarios. Because of the uncertainty surrounding the long-term impacts, parameter values were varied to account for a range of potential long-term impacts.

To understand the impacts these changes may have to regional travel in the future, and more specifically to the I-495 and I-270 corridors, a series of model scenarios for various levels of travel demand changes were developed to evaluate low, mid and high-level impacts. The intent of this analysis is to understand the sensitivities of the forecasts under various future growth scenarios, since it is unknown how the pandemic will impact travel in the long term. The future high-impact scenario assumes consideration of personal safety in decision-making relating to travel, similar to what was experienced in late 2020/early 2021 in terms of increased levels of work-from-home, modified mode-choice, and significant levels of distance-learning prior to the availability of vaccines. The high-impact scenario is defined to capture this period of the pandemic but is not expected as a possible future scenario. Conversely, the low-impact scenario for the future assumes minimal impacts directly related to COVID-19 but assumes some behavioral shift over time. The mid-impact scenario assumes a midpoint for long-term behavioral shifts.

The resulting demand impacts were applied to the 2045 model using two network scenarios as a base:

- 2045 No Build (MWCOG Constrained Long-Range Plan (CLRP) Network without MLS Preferred Alternative)
- 2045 Build (MWCOG Constrained Long-Range Plan (CLRP) Network with MLS Preferred Alternative)

The purpose of the sensitivity analysis was not to develop a predictive tool to estimate the utilization of the highway network under different long-term impacts, but instead to provide a quantitative framework to provide decisionmakers an understanding of the potential range of impacts to the system, given the unknown long-term changes that may result from the pandemic.

There are several potential long-term travel impacts associated with the COVID-19 pandemic that could be captured within a travel demand model. These types of potential impacts include:

- Household Travel: Changes in work from home, remote learning opportunities, and increased time for discretionary activities due to reduced commute times.
- Visitor Travel: Changes in air passenger demand and external visitors to the region.
- Modal Preference: Shifts in mode choice away from transit to personal vehicle or from high occupancy to lower occupancy modes.
- E-Commerce: Potential accelerated adoption of E-Commerce, including home delivery or curbside pickup.
- Freight: Changes in truck demand for freight.

The sensitivity analysis for this study focused on understanding the long-term impacts related to personal travel made by households within the model area, as well as external auto demand that passes through the model area (i.e., visitor travel). The decision to focus on these factors was based on available data collected during the period from January 2020 through Spring 2021 that captured changes in household travel behavior prior to the pandemic and early stages of stay-at-home orders.

The following factors were not included because data indicated the impact was short term or inconclusive:

- Modal Preference: There was a significant drop in transit use, with a greater than a 50% decrease in usage of Maryland Transit Administration (MTA) services and with an approximately 70% drop in Baltimore-Washington International (BWI) Airport passenger traffic compared to 2019. Similar trends were observed in the WMATA rail and bus data. Data collected by WMATA through late 2021 is starting to show a rebound in both rail and bus ridership that is still below pre-pandemic levels but is trending upward. Based on the available data, it appears that changes to mode-choice were driven by reductions in service and restrictions to travel and may not reflect long term shifts in behavior. Further, data from MTA (Maryland Transit Authority) was not publicly available.
- E-Commerce: During the early stages of the pandemic, there was a dramatic increase in the use of E-commerce for retail activity. However, available data was unable to distinguish what proportion of that increase was direct delivery versus curbside fulfillment. Because curbside fulfillment still requires a home-based shopping trip and delivery of retail goods to a brick-and-mortar store, the potential for significant decreases in traffic is minimal.
- Freight: In the early phases of the pandemic, truck traffic was dramatically up, as a percentage of total traffic, with fewer total vehicles on the road. Data from the Bureau of Transportation Statistics (BTS) shows that through 2021, the freight activity begins to normalize as compared to pre-2020 based upon the Freight Index.

The implementation of the identified impacts was able to be implemented via adjusting existing model parameters or direct inputs. Scripts were not modified in the provided model.

2. DATA SOURCES

Data sources were identified to address two fundamental questions related to the analysis:

1) What are the travel behavior changes experienced during the pandemic recovery phase observed in the fall of 2020 through early spring of 2021, and how did they impact the level of traffic?

2) What information is available that can be used to help predict long-term changes in travel behavior post pandemic?

The following sections of this chapter provide a brief overview of the data sources utilized. Further discussion of how the data was used to establish the parameter values for input to the MWCOG models is discussed in Chapters 3 and 4 of this report.

2.1 UNIVERSITY OF MARYLAND COVID-19 IMPACT ANALYSIS PLATFORM

The Maryland Transportation Institute (MTI), in collaboration with the Center for Advanced Transportation Technology Laboratory (CATT Lab), has developed the University of Maryland COVID-19 Impact Analysis Platform. This platform allows users to view county and statewide data related to COVID-19's impact on mobility, health, economy, and society. Up until April 20, 2021, data was reported daily and can be searched by user-defined date ranges and by one of four specific metric areas: Mobility and Social Distancing, COVID and Health, Economic Impact, and Vulnerable Populations, as shown in Table 1.

Access to the dashboard is public and can be found at https://data.covid.umd.edu/. For purposes of this study, UMD provided the study team raw data for the counties within the MWCOG model area for the period from January 1, 2020 through February 2021.

The dashboard allows users to view data elements from each category and compare how they change over time. An example for Montgomery County, MD for January 1, 2020 through April 20, 2021 is shown in Figure 2.

Table 1: UMD COVID-19 Impact Analysis Platform Metrics

Mobility and Social Distancing (M)		COVID and Health (H)		Economic Impact (E)		Vulnerable Populations (P)	
1	Social distance index	1	# days: decreasing COVID cases	1	Unemployment claims/1000 people	1	% people older than 60
2	% staying at home	2	# days: decreasing Influenza-like illness (ILI) cases	2	Unemployment rate	2	Median income
3	Trips/person	3	Testing capacity gap	3	% working from home	3	% African Americans
4	% out of county trips	4	# contact tracing workers/1000 people	4	Cumulative inflation rate	4	% Hispanic Americans
5	% out of state trips	5	% hospital bed utilization	5	% change in consumption	5	% male
6	Miles/person	6	% ICU utilization			6	Population density
7	Work trips/person	7	New COVID cases			7	Employment density
8	Non-work trips/person	8	New cases/1000 people			8	# hot spots/1000 people
9	Transit mode share	9	Active cases/1000 people			9	COVID death rate
		10	Imported COVID cases			10	Population
		11	COVID exposure/1000 people				
		12	Tests done/1000 people				
		13	Hospital beds/1000 people				
		14	ICUS/1000 people				
		15	Ventilator needs				

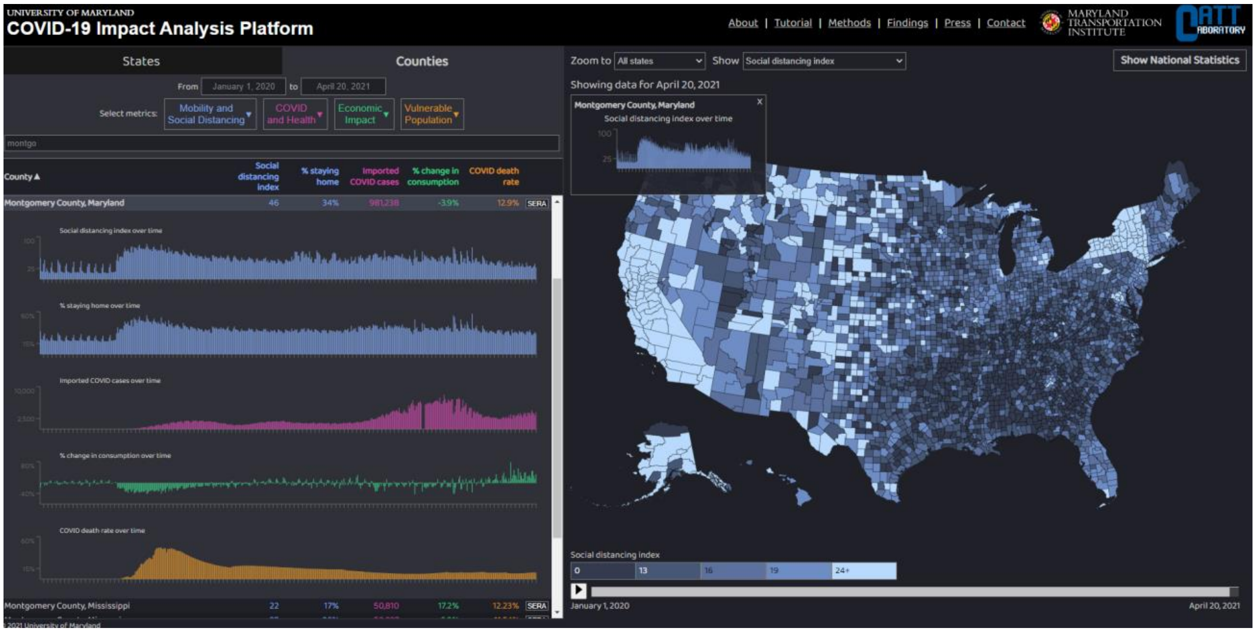


Figure 2: UMD COVID-19 Impact Analysis Platform Metric Visualization

2.2 BURBIO SCHOOL OPENING TRACKER

Data related to the status of in-person versus remote learning at schools within the MLS study area was obtained from Burbio. Burbio collects data from 80,000 elementary, middle, and high school calendars from across the United States. Throughout the 2020 to 2021 school year, Burbio has provided data related to various levels of virtual, traditional in-person, and hybrid learning across all 50 states, school openings and closures, and other information related to the pandemic's impact on learning for Kindergarten through Grade 12. Figure 3 shows the national trends of in-person learning by grade level. Burbio has not posted data for the 2021 to 2022 school year.

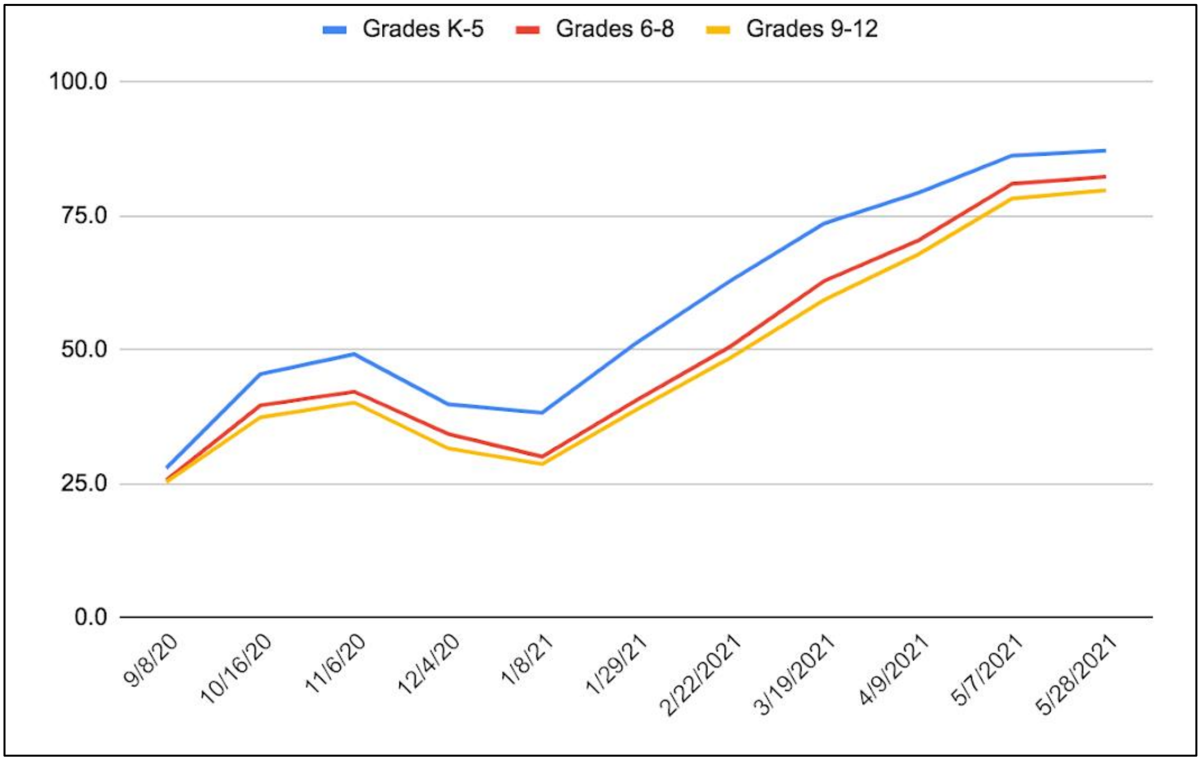
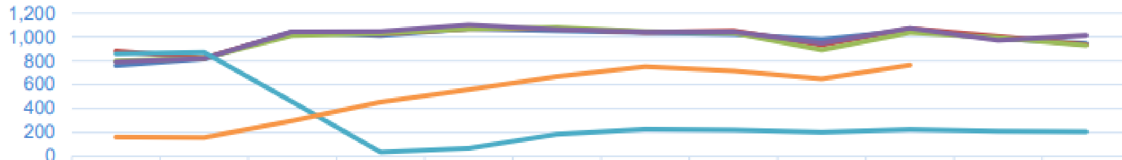


Figure 3: In-Person Index by Grade Level (Source: Burbio)

2.3 AIR TRAFFIC STATISTICS

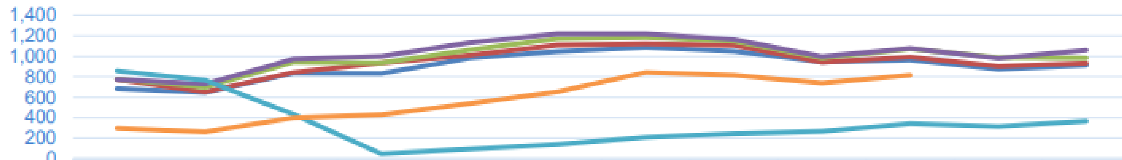
The Metropolitan Washington Airport Authority (MWAA) manages both Washington Dulles International and Washington National Airports. Available to the public, the MWAA reports monthly passenger traffic by airport for each month and compares the data to previous years' information. Data from the most recently available report for October 2021 shows significant reduction in passenger service through 2020, but a steady increase in 2021, as shown in Figure 4.

Reagan National



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2016	760	815	1,042	1,012	1,068	1,051	1,035	1,023	979	1,053	986	945
2017	881	823	1,038	1,026	1,067	1,067	1,037	1,051	932	1,070	1,005	936
2018	798	822	1,012	1,030	1,065	1,081	1,044	1,033	891	1,037	993	928
2019	790	821	1,042	1,044	1,103	1,062	1,040	1,043	948	1,072	971	1,013
2020	858	872	456	35	67	185	228	222	202	226	211	206
2021	162	157	299	454	560	668	751	715	649	765		

Dulles International



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2016	684	647	836	834	984	1,048	1,088	1,051	946	964	875	913
2017	773	652	842	936	1,011	1,111	1,121	1,108	944	992	903	932
2018	777	698	942	936	1,064	1,171	1,185	1,148	983	1,073	987	984
2019	774	728	972	1,000	1,133	1,221	1,219	1,165	998	1,078	980	1,060
2020	857	766	434	48	95	138	210	244	268	342	314	367
2021	298	261	399	429	538	654	843	816	738	817		

Figure 4: Total Commercial Passenger Enplanements Trends (2016-2021), Source: MWAA October 2021 Report

2.4 MDOT SHA TRAFFIC MONITORING

Maryland Department of Transportation State Highway Administration (MDOT SHA) has been providing data from permanent count stations throughout the state, known as Automatic Traffic Recorders (ATR). There are six (6) ATR stations located along I-270 and I-495 in Montgomery and Prince George's Counties that collect data continuously. MDOT SHA has been using the data from these ATR stations to track how volumes have fluctuated throughout the pandemic.

Figure 5 shows how traffic volumes within the study corridors have fluctuated during the pandemic compared to pre-pandemic levels. The data shows a severe drop in traffic volumes in April 2020 after stay-at-home orders were issued across Maryland, with daily traffic volumes on I-270 and I-495 reducing by more than 50 percent compared to April 2019. After the stay-at-home order was replaced with a "safer at home" advisory in May 2020, traffic volumes gradually increased throughout the summer, stabilizing at approximately 15 percent less than typical conditions during fall 2020. As cases began to surge in November/December 2020, traffic volumes dipped again through the winter. With the rollout of vaccines in early 2021, the corresponding drop in COVID-19 cases, and the gradual reopening of schools and businesses, daily traffic volumes have continued to recover. Volumes were back to over 90 percent of normal as of October 2021 compared to expected 2021 levels, even when considering two years of projected growth since 2019. MDOT SHA will continue to monitor volumes into winter 2021-2022.

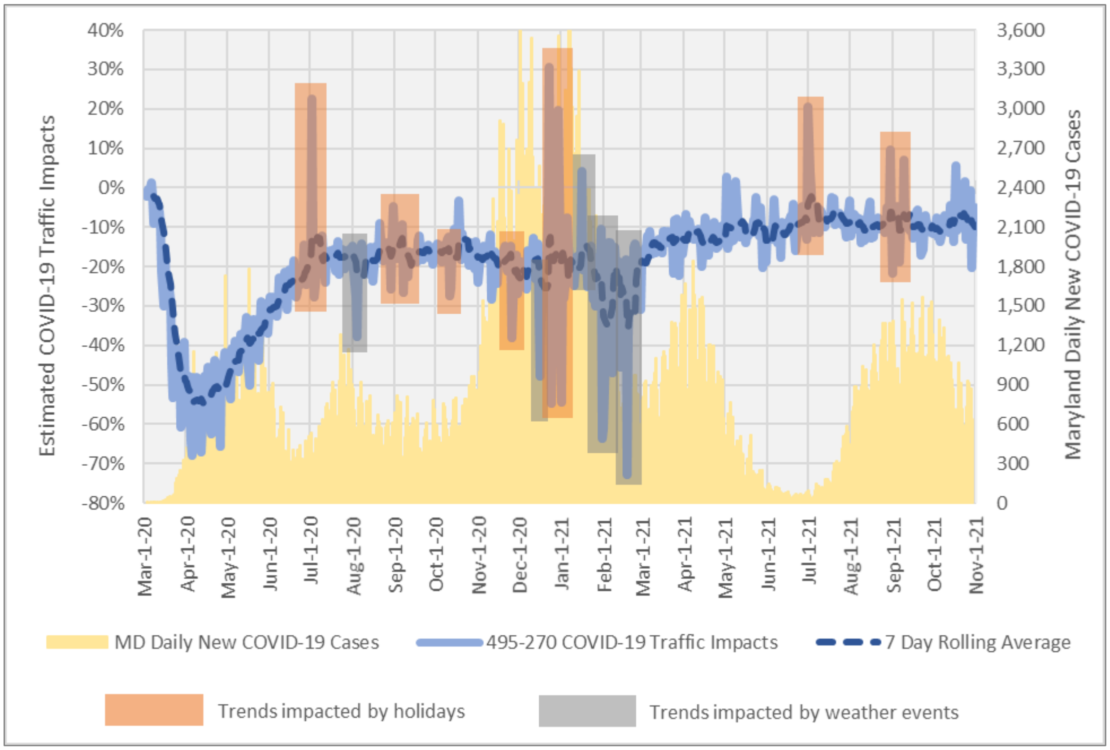


Figure 5: Daily Traffic Volume Changes on I-495 and I-270 During COVID-19 Pandemic vs. 2019

Figure 6 shows into the levels of traffic observed along one of the ATR stations, I-495 east of Persimmon Tree Road, which is located close to the American Legion Bridge. Shaded bars show the percent change in volume from 2019 to 2020, and solid bars show the percent change volume from 2019 to 2021.

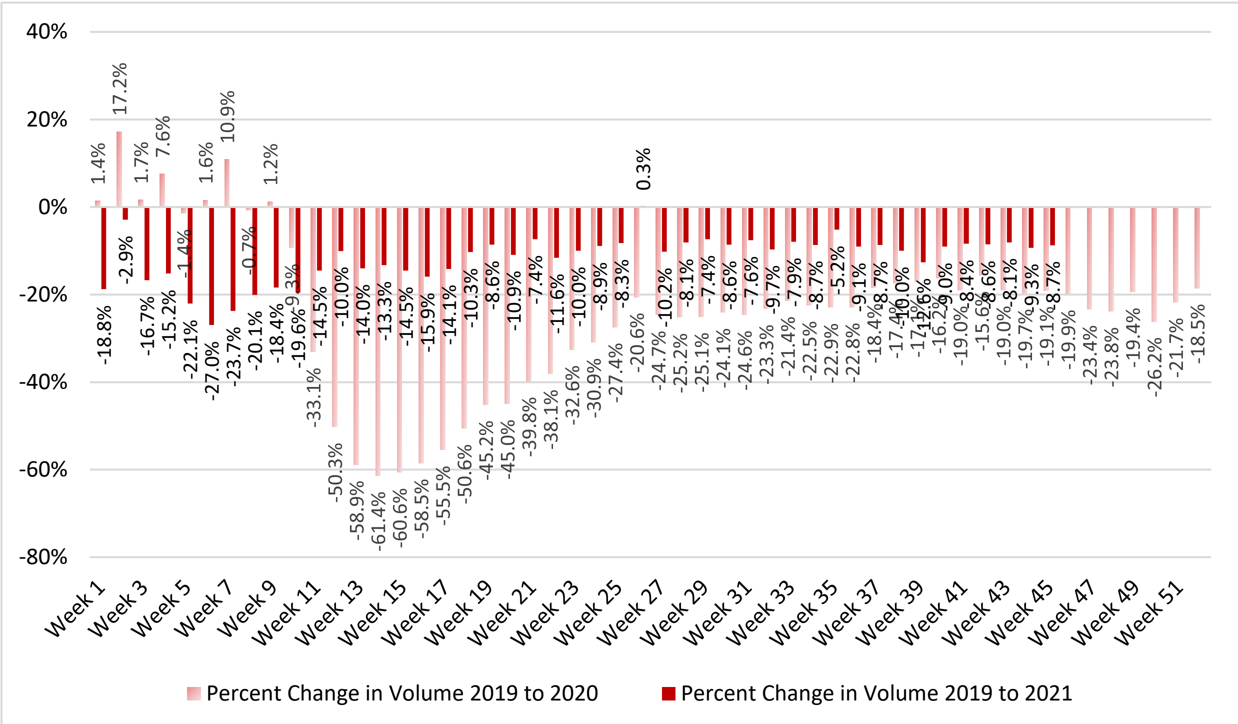


Figure 6: Volume Trends along I-495 East of Persimmon Tree Road (Near the American Legion Bridge)

3. LONG-TERM IMPACTS

Since the beginning of the pandemic, there is has been a significant shift in travel behavior that can be associated with two primary factors:

1) Response to restrictive measures imposed by the Government, and
2) Perception of own safety and/or commitment to slow the spread.

Predicting the impact on travel from restrictive measures is relatively straightforward. More difficult is understanding the long-term behavioral shifts that may not be directly related to safety or restrictions because of the pandemic. Much of the research and analysis that has been done since March 2020 has focused on understanding the changes in travel behavior and highway system utilization during the initial rounds of closures. This study differs in that it is not attempting to model the period during the most active and restrictive phase of the pandemic, but instead the intent is to consider the long-term impacts in travel behavior that may be experienced in 2045.

Using the available data described in the previous section, specific behavioral impacts related to travel have been identified for consideration of long-term impacts associated with the pandemic. These include changes in work from home, increased remote learning and changes in discretionary travel. These factors are shown in Table 2 and how they can be reflected within the MWCOG model is also described.

Table 2: Potential Long-Term Travel Impacts

Impact	Description of Impact	Representation in MWCOG
Work from Home (WFH) – Production	Increased participation in work from home on a regular or semi-regular basis will continue.	Reduction in HBW production rates for higher income households that are more likely to be industries that can function remotely.
Changes in Non-Home-Based (NHB) Travel	Because many NHB trips are associated with work locations, reduction of NHB work related travel.	Lower NHB work travel based on reduction in WFH activities.
Distance Learning	Increased use of hybrid education models that include remote or distance learning in place of in-person.	Reduction of home-based school trip purpose; only includes K-12 school trips.
Changes in Discretionary Travel	With reduced time spent commuting because of WFH on a semi-regular or regular basis, household may increase discretionary travel.	Increase to the non-work-related Home-Based trip purpose production rates.
Long Distance Travel (External Demand)	Restrictive policies have reduced non-essential long-distance travel for recreational and work-related purposes.	Reduction in external travel entering region.

4. PARAMETER DEVELOPMENT

For each of the potential impacts described above, data sources were reviewed to help define parameter values for the MWCOG sensitivity modeling. As mentioned previously, the range of scenarios evaluated were to capture a spectrum of impacts that used observed conditions from late 2020/early 2021 before vaccines were available as the high-impact scenario and then moving towards a low and mid scenario that captures a range of the long-term potential impacts.

The basis for the scenario analysis is the MWCOG Regional Travel Demand Model, Version 2.3.75. This is the same model platform used for the modeling of the MLS alternatives to support the forecast development. A review of the MWCOG model revealed a series of parameters, either specific values or input files, that are accessible to adjust for the purposes of the scenario analysis. Table 3 identifies the parameters and relationship with the long-term impacts identified in Chapter 3.

Table 3: MWCOG Model Parameters and Long Term Impact

MWCOG Model Parameter/Input	Long Term Impact				
	Work from Home	Changes in Non Home Based Travel	Distance Learning	Changes in Discretionary Travel	Long Distance Travel
Airport Trip Table					X
School Trip Table			X		
Taxi Trip Table		X			X
Visitor Trip Table				X	X
External Through Auto Trips					X
Trip Generation (Production End)	X	X		X	

A discussion of each of the long-term impacts and how the available data covering the period in late 2020/early 2021 can be used to establish the base parameter values.

4.1 WORK FROM HOME

Perhaps the most significant impact of the pandemic has been the sudden shift to work from home. Traditionally work from home has been focused on specific industries or job types. The onset of the pandemic saw an increase in work from home for these traditional candidate industries as well as expansion to new industries and workers. In the long term, work from home is expected to continue in some form on a more regular basis. The impact of work from home is related to both the production and attraction end of the trip purpose.

4.1.1 Work from Home – Production End

Based on data from the University of Maryland COVID-19 Impact Analysis Platform, the average work trips per person dropped significantly from March 2020 onward. The rate reported is based on trips made outside the home for work purposes and thus captures the increase in WFH activities. By fall of 2020, the number of work trips was approaching 50% of pre-pandemic levels (Figure 7).

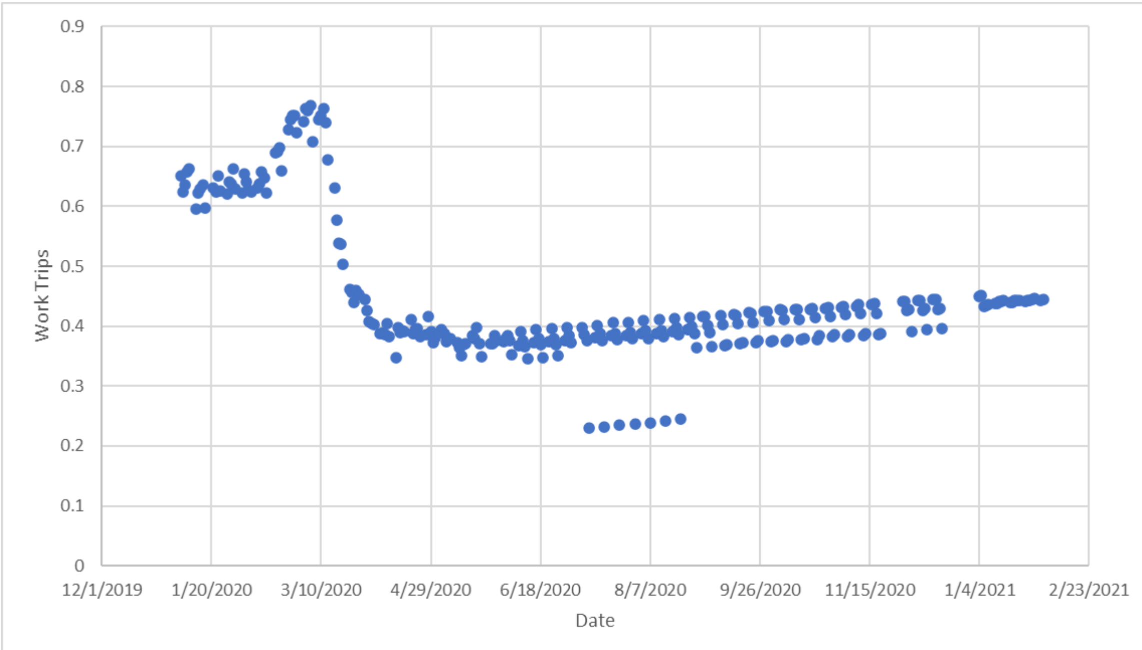


Figure 7: Work Trip Rates (Source: UMD COVID-19 Impact Portal – MWCOG Model Area)

Data from the Bureau of Transportation Statistics (BTS) collected during September of 2020 found that 47.3% of households in the state of Maryland had at least one person substituting work trips by working from home. Further review of the data shows that this percentage increases significantly as household income increases. For household making less than $25,000, the percentage that had at least one person substituting work trips by working from home was 11.9% (compared to over 70% for households making more than $200,000). This information from BTS is shown in Figure 8.

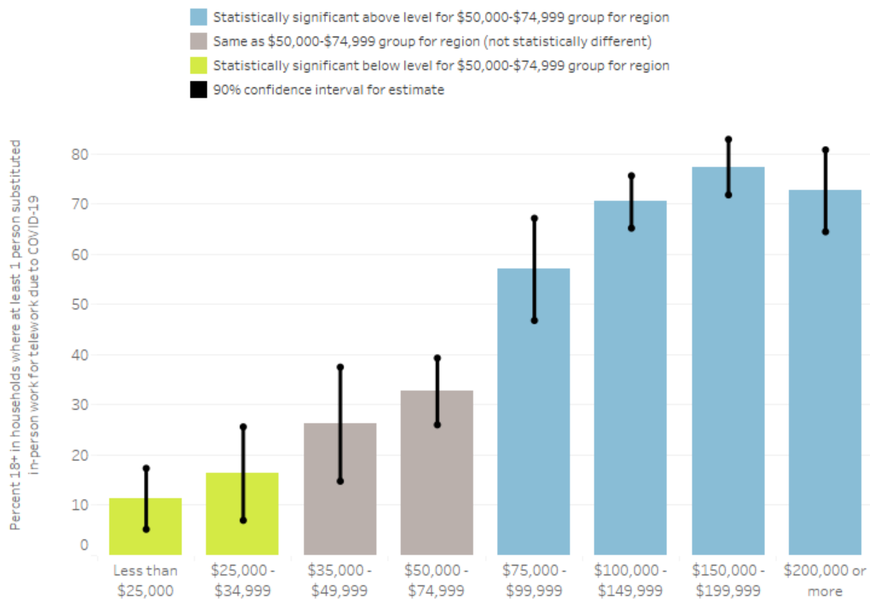
Effects of COVID-19 on Travel Behavior by Income Group

Travel Behavior Metric:
An adult in the household substituted some or all of their typical in-person work for telework because of the coronavirus ..

Collection Period:
Week 15 (Sep 16 to Sep 28)

Region:
Maryland

For this collection period, in Maryland, **47.3%** of persons 18 and over are in a household where at least 1 person substituted in-person work for telework due to COVID-19



Persons 18+ in households where at least 1 person substituted in-person work for telework due to COVID-19, for Maryland

Income Level	Total 18+ Reporting	Total Reporting Behavior Change	Percent Reporting Behavior Change	Percent Margin of Error
Less than $25,000	355,300	40,165	11.3	6.1
$25,000 - $34,999	303,753	49,593	16.3	9.3
$35,000 - $49,999	435,233	113,934	26.2	11.4
$50,000 - $74,999	519,351	169,801	32.7	6.6
$75,000 - $99,999	440,686	251,260	57.0	10.2
$100,000 - $149,999	603,180	424,973	70.5	5.2
$150,000 - $199,999	414,723	320,965	77.4	5.5
$200,000 or more	379,871	276,072	72.7	8.2
Total	4,383,233	2,074,954	47.3	2.7

Source: U.S. Census Bureau Household Pulse Survey, Transportation Tables 1, 2, and 3, and Spending Table 2.
https://www.census.gov/programs-surveys/household-pulse-survey/data.html Total population 18 years and older.

Figure 8: Effects of COVID-19 on Travel Behavior by Income Group (Source: BTS)

4.2 DISTANCE LEARNING

Remote learning has been prevalent across the country starting in the spring of 2020 and continuing through late 2020/early 2021 throughout the country. Each school district has implemented different policies ranging from solely virtual learning to some mix of in-person and virtual learning. Figure 9 shows the level of in-person and virtual learning on March 1, 2021.

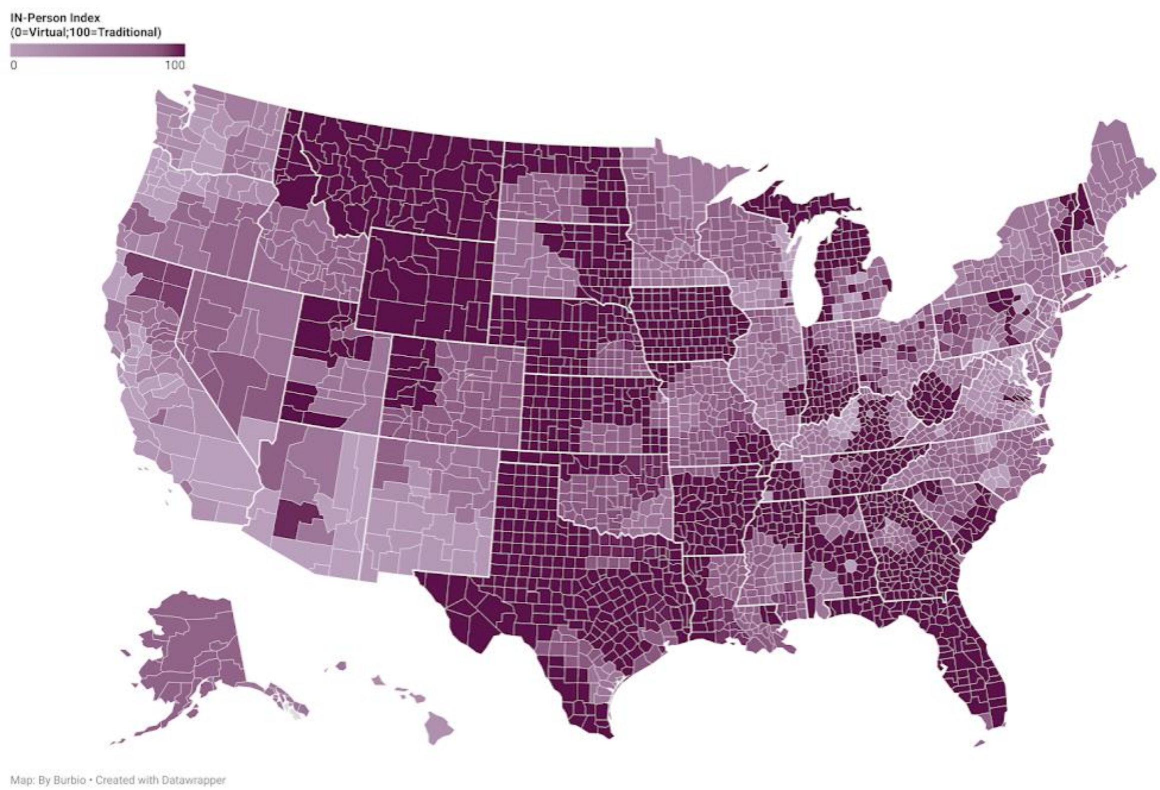


Figure 9: School Opening Tracker as of 3/1/2021 (Source: Burbio School Opening Tracker)

Based on Maryland State Department of Education's Local School System (LSS) Reopening Plans, as of August 2020, the majority of school districts within the MWCOG model area were providing remote learning only in place of in-person. (Source: http://marylandpublicschools.org/newsroom/Pages/COVID-19/ReopeningPlans.aspx). At this time, Maryland was at a level of 16 (Source: Burbio School Opening Index) on a scale of 0 to 100, with 0 representing no in-school instruction and 100 representing 5 days a week in-school instruction.

By fall of 2021, most schools had returned to in-person instruction, including Montgomery and Prince George's County public schools. Prince George's County Public Schools returned to full-time virtual learning from December 20, 2021 to January 14, 2022 however because of recent changes in cases, but returned to in-person learning on January 18, 2022. It is expected that in the future remote learning may be offered to both traditional and non-traditional students.

4.3 DISCRETIONARY AND NON-HOME-BASED TRAVEL

Under restrictive policies present in late 2020/early 2021, it would be expected to see overall decreases in work and non-work-related travel. Data from the University of Maryland COVID-19 Impact Analysis Platform shows that following an initial decrease in both total trips per person (Figure 10) and non-work (Figure 11) related travel in March and April, levels approach pre-pandemic values by varying greatly day-by-day during the non-holiday weekdays. Because of the underlying reduction in work-related travel for higher income households, for travel levels to be as high as those pre-pandemic households are making higher levels of non-work-related travel.

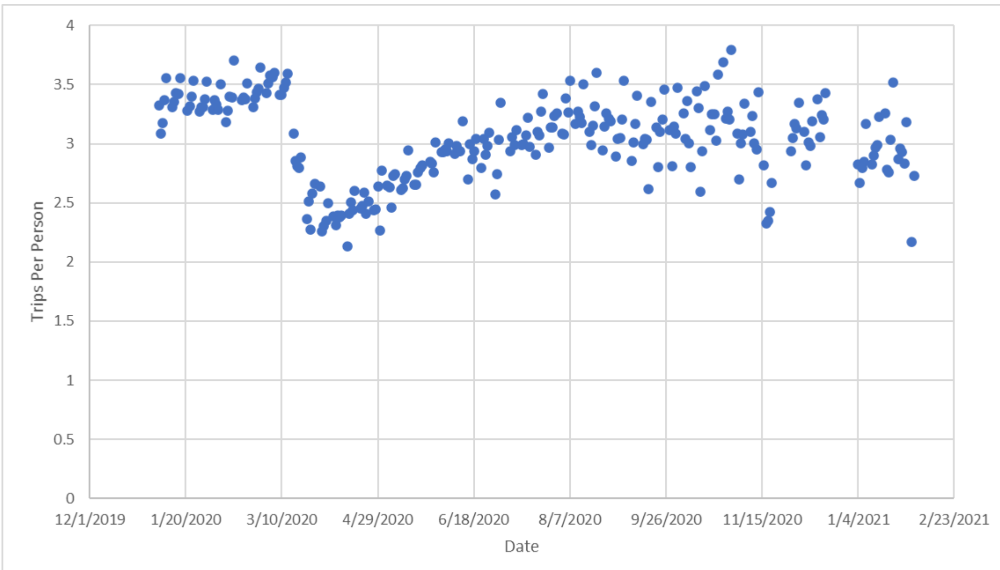


Figure 10: Daily Trips Per Person (Source: UMD COVID-19 Impact Portal – MWCOG Model Area)

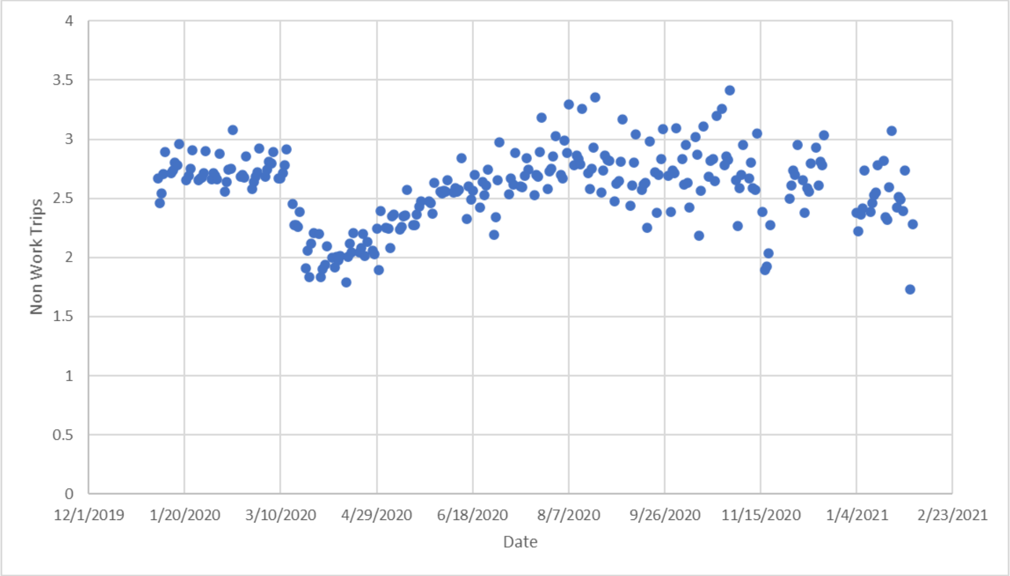


Figure 11: Daily Non Work Trips Per Person
(Source: UMD COVID-19 Impract Portal – MWCOG Model Area)

4.4 LONG DISTANCE TRAVEL

Without data directly associated with trips by distance, two measures from the UMD COVID-19 Impact Portal can be used to look at changes in long distance travel because of COVID-19. The first, daily % of trips made outside the county is approximately 5% lower in late 2020/early 2021 as compared to pre-pandemic levels (Figure 12). The second metric, daily % of trips made out of state shows a similar reduction as compared to pre-pandemic levels (Figure 12).

A second measure of long-distance travel is change in passengers arriving to Washington DC area airports. Combined passenger volumes for National and Dulles airport were down 73% in December 2020 from 2019 and 67% for the last 12 months ending in December 2020 (Figure 13).

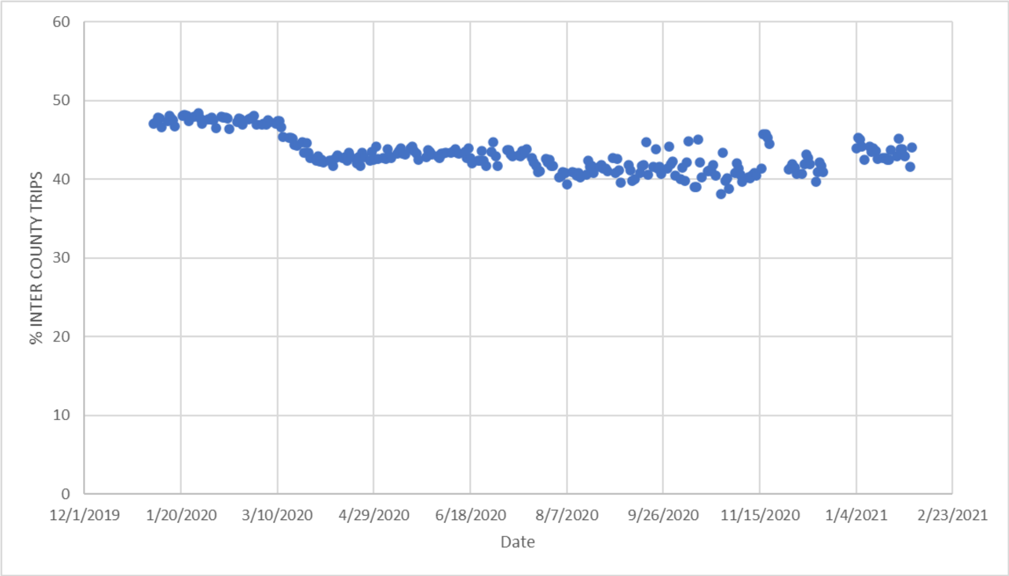


Figure 12: Daily % Trips Out of County (Source: UMD COVID-19 Impact Portal – MWCOG Model Area)

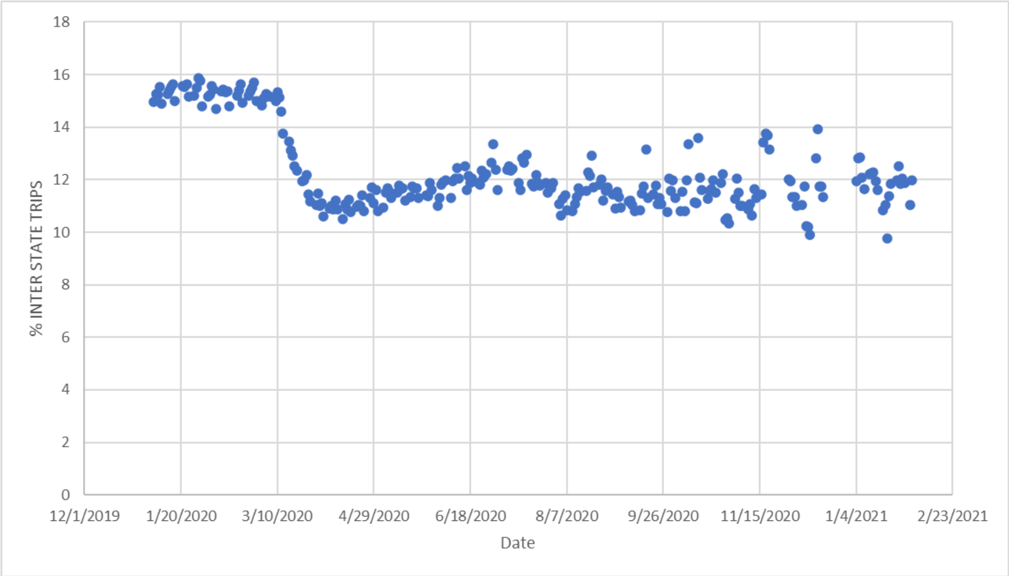
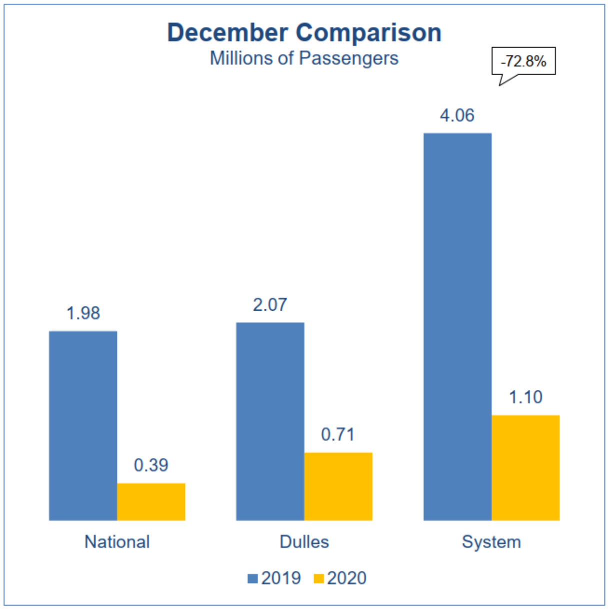


Figure 13: Daily % Inter State Trips (Source: UMD COVID-19 Impact Portal – MWCOG Model Area)



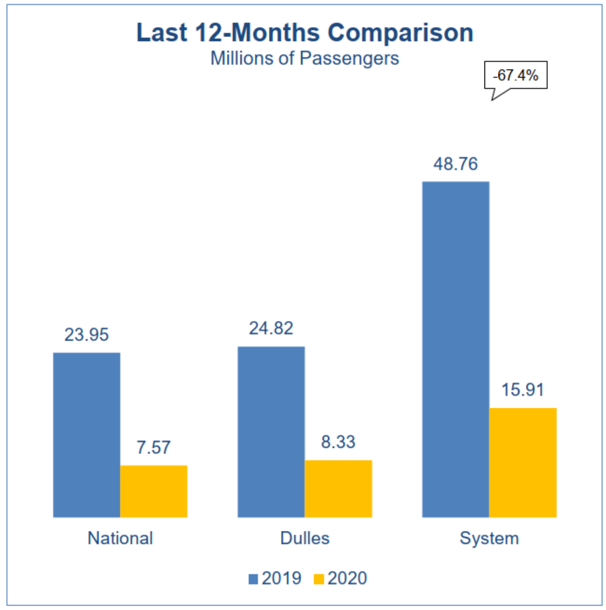


Figure 14: Change in Passenger Travel through December 2020 (Source: Air Traffic Statistics, Metropolitan Washington Airports Authority, January 2021)

5. MODEL PARAMETERS – BASELINE SCENARIO (HIGH)

Several data sources including information from the UMD COVID-19 Impact Portal and MDOT SHA traffic counts show that in late 2020/early 2021 there was an observed 15 to 20% reduction in both miles traveled per person per day (Figure 15) and daily traffic levels across the study area (Figure 16). Some variation occurs during weeks that include holidays.

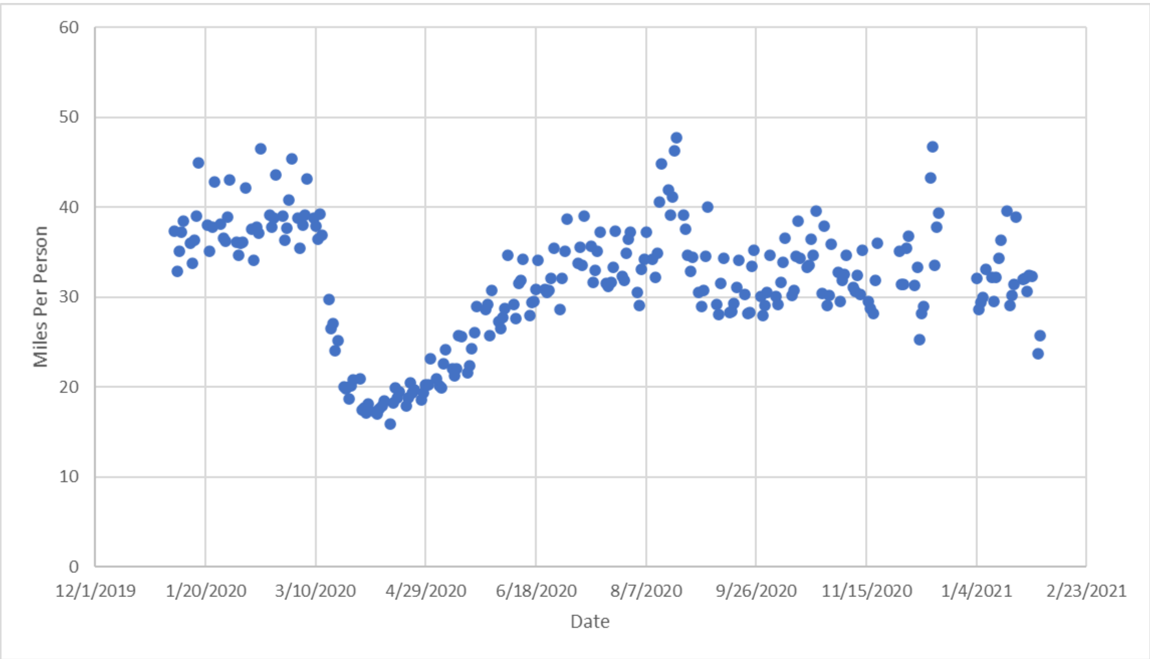


Figure 15: Miles Per Person (Source: UMD COVID-19 Impact Portal – MWCOG Model Area)

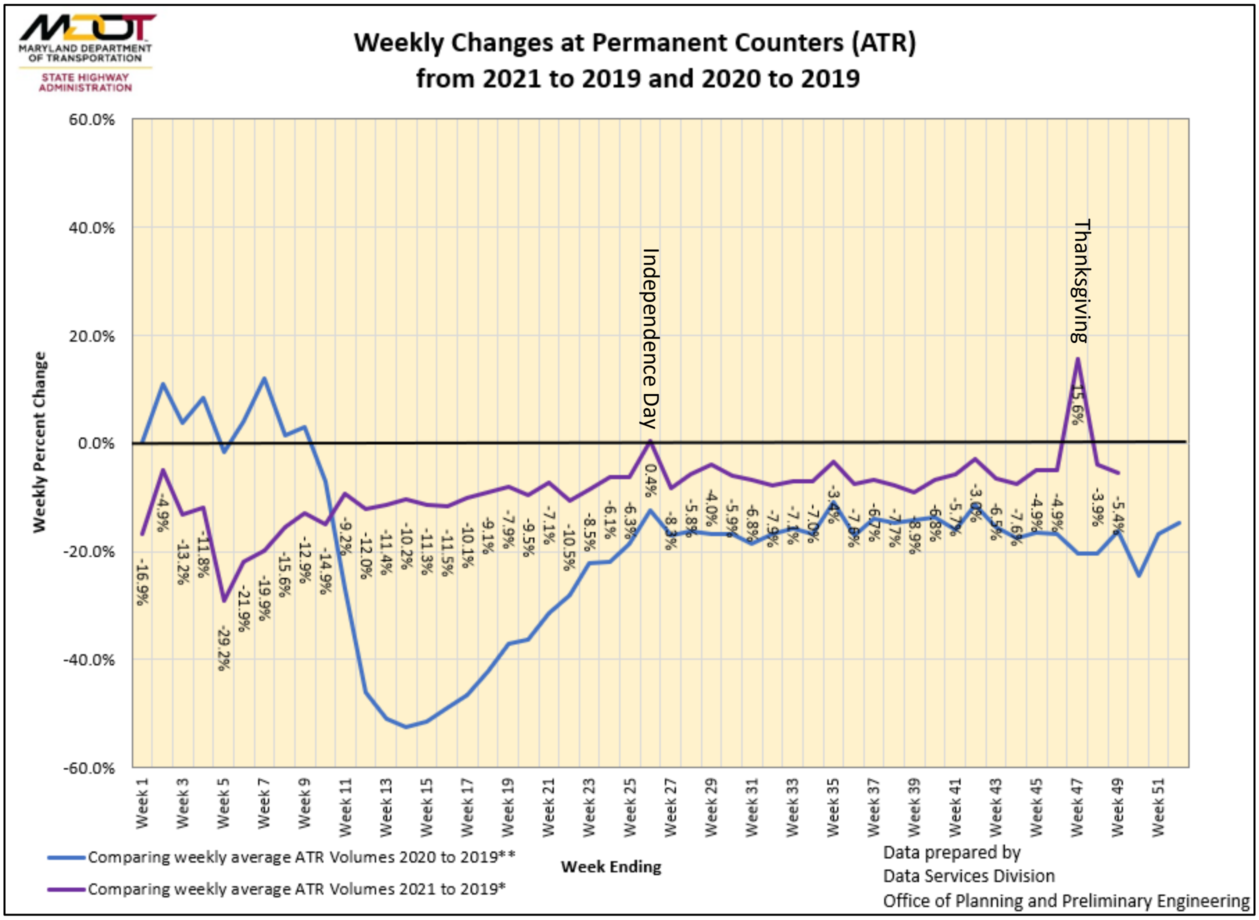


Figure 16: Weekly Traffic Change – Statewide (Source: MDOT SHA)

Table 4 provides an overview of the parameter values used for establishing the high scenario results. The goal for this scenario when the parameters are combined is to provide a base of travel reduction consistent with that observed in the above figures representing the fall of 2020.

Table 4: High Scenario Model Parameters

Impact	Parameter	Value	Source
WFH	Production Rates – Reduce HBW Productions by Income	Income Level 1 (0 to $50k): -18% Inc2 ($50 to $100k): -45% Inc3 ($100 to $150k): -70% Inc4 (>$150k):-75%	BTS
Change in NHB Travel	Reduction of Non-Home-Based Work (NHBW) Production Rates by Income	Inc1 (0 to $50k): -18% Inc2 ($50 to $100k): -45% Inc3 ($100 to $150k): -70% Inc4 (>$150k):-75%	BTS
Distance Learning	Reduction of Home-Based School Trips by 75% to account for hybrid learning	Home Based School Trip Table * 0.25	Burbio School Opening Index
Discretionary Travel (Other HB Travel)	Changes to discretionary non home-based travel.	5% increase in HBO Travel for all income groups No change to home-based shopping to account for increase in curb-side fulfilment	UMD COVID-19 Impact Portal
Long Distance Travel	External Auto Air Travel Visitor Travel	5% reduction in external auto trips *75% decrease in trips associated with airports consistent with passenger volume* *75% decrease in visitor trips consistent with airport passenger travel.*	UMD COVID-19 Impact Portal *Washington Airports Authority*

5.1 RESULTS OF HIGH SCENARIO IN 2019

The goal for the high scenario is to replicate the observed travel seen during late 2020/early 2021 when the economy was functioning with continued work from home and restrictions on long distance travel impacting visitors still in place. The high-impact scenario is defined to capture this period of the pandemic but is not expected as a possible future scenario. From the observed data from the UMD COVID-19 Portal and SHA, this period saw an approximate 15% reduction in Vehicle Miles Traveled (VMT) and daily trip making. From the MWCOG model, the number of daily household trips reduced 16% as compared to the calibrated model parameters. Table 5 shows a decrease in the home-based work and non-home-based work purposes consistent with higher levels of WFH.

Table 5: Change in Household Trip Making

Trip Purpose	Baseline	High Scenario	% Change
Home Based Work	3,507,999	1,727,433	-51%
Home Based Shop	2,199,435	2,196,887	0%
Home Based Other	5,057,367	5,297,795	5%
Non-Home Based – Work	1,420,675	624,967	-56%
Non-Home Based – Other	2,402,671	2,390,395	-1%

The number of visitor related trips, airport passenger related travel and school trips are reduced by 75% from the baseline condition with a 5% reduction in auto external travel (Table 6).

Table 6: Changes in MISC Trip Making

Trip Purpose	Baseline	High Scenario	% Change
Auto Through Trips	46,516	44,335	-5%
Visitor Trips	280,434	70,234	-75%
School Trips	322,953	80,808	-75%
Airport Trips	73,580	18,415	-75%

Consistent with observed data, the change in the AM period is most dramatic with a 28% decrease in home-based travel with 19% reduction in the PM and less than 12% in the mid-day and night. As expected, home based work trips decrease from nearly 24% of all household travel to 14% while the importance of discretionary travel goes up.

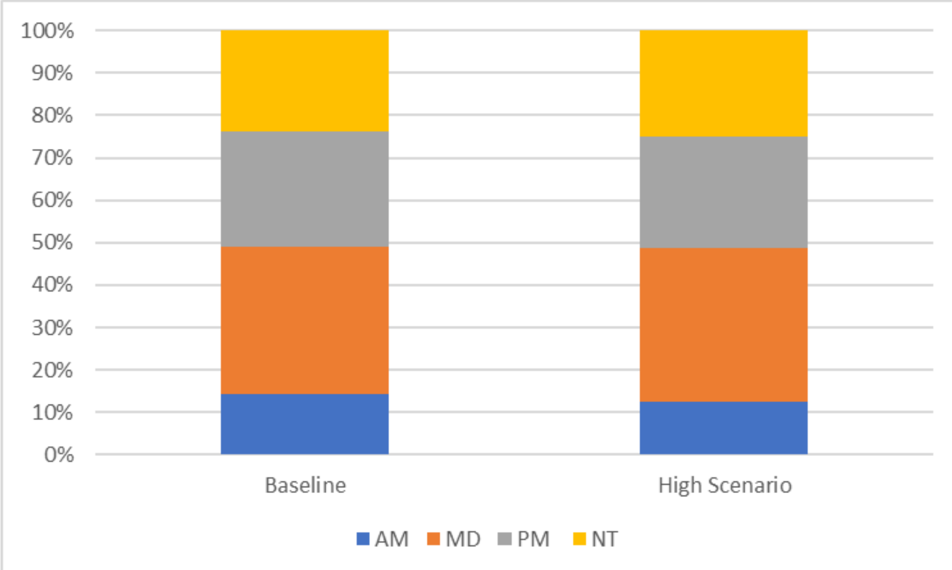


Figure 17: Distribution of Household Trips by Period

Traffic assignment results from the MWCOG model can be summarized by roadway type (freeway vs arterial) and by period of the day (AM Period, Midday Period, PM Period and Overnight). The resulting Vehicle Miles Traveled (VMT) decreases by 17% from the baseline when aggregating the four period volumes together for a daily value. The reduction is 14% on freeways and 19% on arterials between the two scenarios. Congested VHT decreased by 31% with 29% reduction on freeways and 33% on arterials. Consistent with the change in trips by period, the AM VMT decreases as a proportion of the daily traffic from 19% to 17.3% for the baseline and high scenario respectively.

Table 7: 2019 Baseline Regional Systemwide Metrics

Metric		AM Period	Midday Period	PM Period	Overnight	Daily
Vehicle Miles Traveled (VMT)	Freeway	14,868,116	25,247,639	21,921,054	18,989,412	81,026,222
	Arterial	18,203,521	27,362,877	27,069,716	19,565,261	92,201,375
	Total	33,071,637	52,610,517	48,990,770	38,554,673	173,227,597
Vehicle Hours Traveled – Free Flow	Freeway	257,433	438,998	380,321	330,462	1,407,214
	Arterial	444,743	665,182	662,535	471,868	2,244,328
	Total	702,176	1,104,180	1,042,856	802,330	3,651,543
Vehicle Hours Traveled – Congested	Freeway	542,625	512,909	778,787	346,134	2,180,456
	Arterial	813,795	780,872	1,161,087	506,640	3,262,394
	Total	1,356,420	1,293,782	1,939,875	852,774	5,442,850
Daily Hours of Delay	Freeway	285,192	73,912	398,466	15,673	773,242
	Arterial	369,051	115,690	498,553	34,771	1,018,065
	Total	654,243	189,602	897,019	50,444	1,791,308

Table 8: 2019 High Scenario Regional Systemwide Metrics

		AM Period	Midday Period	PM Period	Overnight	Daily
Vehicle Miles Traveled (VMT)	Freeway	11,984,091	22,611,646	18,374,437	16,343,682	69,313,856
	Arterial	12,978,939	23,965,126	20,979,012	16,612,850	74,535,927
	Total	24,963,030	46,576,772	39,353,449	32,956,532	143,849,783
Vehicle Hours Traveled – Free Flow	Freeway	207,131	392,341	318,336	283,469	1,201,277
	Arterial	312,912	580,706	508,906	399,946	1,802,470
	Total	520,044	973,047	827,242	683,415	3,003,747
Vehicle Hours Traveled – Congested	Freeway	309,984	443,563	500,598	294,252	1,548,398
	Arterial	416,370	658,541	700,555	423,185	2,198,651
	Total	726,354	1,102,105	1,201,154	717,437	3,747,049
Daily Hours of Delay	Freeway	102,853	51,222	182,262	10,783	347,121
	Arterial	103,457	77,836	191,650	23,239	396,181
	Total	206,311	129,058	373,912	34,022	743,302

The results presented above comparing the baseline to the high scenario for 2019 show that the parameters used to capture the level of activity towards the end of 2020/early 2021 replicate the approximate 15% reduction in VMT and change in period trips.

6. SCENARIO FRAMEWORK

As described above the scenario framework includes the testing of three different levels of long-term impacts from COVID-19 on travel behavior using the No Build and Phase 1 Build 2045 networks. In addition to the three scenarios, the calibrated model parameters from the MWCOG model will serve as the baseline. The scenarios test different levels of work from home, remote learning, and impact to airport and visitor-related travel.

The scenarios were designed to capture potential levels of the different impacts between the high and baseline levels:

- WFH: with respect to work from home, the mid and low-level scenarios assume roughly 50% and 30% work from home for higher income households, respectively. The low scenario is consistent with a 1 to 2-day work from home schedule being used in several industries.

- Remote Learning: incremental levels were selected between the high scenario of 95% remote to a 5% level under the low scenario.

- Airport and Visitor Travel: based upon maintaining past trends working from a potential lower forecast point of air traffic not returning to pre-pandemic levels.

Table 9: Scenario Framework

Impact	Parameter	High Impact	Medium Impact	Low Impact
WFH	Production Rates – Reduce HBW Productions by Income	Inc1 (0 to $50k): -18%	Inc1 (0 to $50k): -9%	Inc1 (0 to $50k): -0%
		Inc2 ($50 to $100k): -45%	Inc2 ($50 to $100k): -35%	Inc2 ($50 to $100k): -20%
		Inc3 ($100 to $150k): -70%	Inc3 ($100 to $150k): -50%	Inc3 ($100 to $150k): -30%
		Inc4 (>$150k):-75%	Inc4 (>$150k):-50%	Inc4 (>$150k):-30%
	Attraction Rates – Reduce Office Employment in HBW Attraction Model by Income	Inc1 (0 to $50k): -18%	Inc1 (0 to $50k): -9%	Inc1 (0 to $50k): -0%
		Inc2 ($50 to $100k): -45%	Inc2 ($50 to $100k): -35%	Inc2 ($50 to $100k): -20%
		Inc3 ($100 to $150k): -70%	Inc3 ($100 to $150k): -50%	Inc3 ($100 to $150k): -30%
		Inc4 (>$150k):-75%	Inc4 (>$150k):-50%	Inc4 (>$150k):-30%
Change in NHB Travel	Reduction of NHBW Production Rates by Income	Inc1 (0 to $50k): -18%	Inc1 (0 to $50k): -9%	Inc1 (0 to $50k): -0%
		Inc2 ($50 to $100k): -45%	Inc2 ($50 to $100k): -35%	Inc2 ($50 to $100k): -20%
		Inc3 ($100 to $150k): -70%	Inc3 ($100 to $150k): -50%	Inc3 ($100 to $150k): -30%
		Inc4 (>$150k):-75%	Inc4 (>$150k):-50%	Inc4 (>$150k):-30%
Distance Learning	Reduction of HBSC Trips by 75% to account for hybrid learning	SCHL Trip Table * 0.25	SCHL Trip Table * 0.65	SCHL Trip Table * 0.95
Other HB Travel	Changes to discretionary and home-based shopping	5% increase in HBO Travel for all income groups		
		No change to HB-Shopping to account for increase in curb-side fulfilment		
Long Distance Travel	External Auto	5% reduction in external auto trips	5% reduction in external auto trips	No change in external auto trips
	Air Travel	75% decrease in trips associated with airports consistent with passenger volume	40% decrease in trips associated with airports consistent with passenger volume	5% decrease in trips associated with airports consistent with passenger volume
	Visitor Travel	75% decrease in visitor trips consistent with airport passenger travel.	40% decrease in visitor trips consistent with airport passenger travel.	5% decrease in visitor trips consistent with airport passenger travel.

7. RESULTS

Using the 2045 MWCOG model, the baseline scenario applies the calibrated model parameters. The Low, Mid, and High scenarios were tested using the No Build and Phase 1 Build network. A series of metrics were extracted from the model runs for each of the three demand scenarios under the two network scenarios for 2045 and compared against the baseline scenario. Trends in growth are evaluated using the 2019 baseline and 2019 using the high-impact scenario, consistent with the pandemic in late 2020/early 2021 before the rollout of vaccines.

7.1 MEASURES USED

The MWCOG Regional Travel Demand Model generates statistics related to the demand for travel as well how travel is assigned to the system and resulting levels of congestion. Table 10 provides an overview of the metrics extracted from the model and whether they relate to travel demand, network utilization, and/or congestion levels.

Table 10: MWCOG Model Results

Data Attribute	Demand	Network	Congestion
Trips by Purpose	X		
Trips by Mode	X		
Vehicle Miles Traveled (Freeway vs Arterial)	X	X	
Vehicle Hours Traveled (Freeway vs Arterial)	X	X	
Total Hours of Delay (Freeway vs Arterial)		X	X
Lane Miles by Level of Service (LOS)			X
Vehicle Miles Traveled by LOS			X

The trips being compared are those considered in the scenario framework – which include home-based purposes and impacted external demands from visitors, airport-related travel, and external auto trips. Level of service (LOS) is measured by calculating the volume-to-capacity ratio on each link with an associated LOS. LOS is reported by lane miles as well as distribution of VMT experiencing the conditions.

Table 11: Level of Service by V/C Range

V/C Ratio	Level of Service
0.0 to 0.49	A
0.49 to 0.74	B
0.75 to 0.79	C
0.80 to 0.89	D
0.9 to 1.0	E
>1.0	F

7.2 GEOGRAPHIC SCALE

The measures reported in Table 10 above will be reported for each of the demand and network scenarios at three levels of geography: regionally (Figure 18), Montgomery and Prince George's Counties (Figure 19), and specific to the corridor using a buffer around the entire MLS corridor (Figure 20).

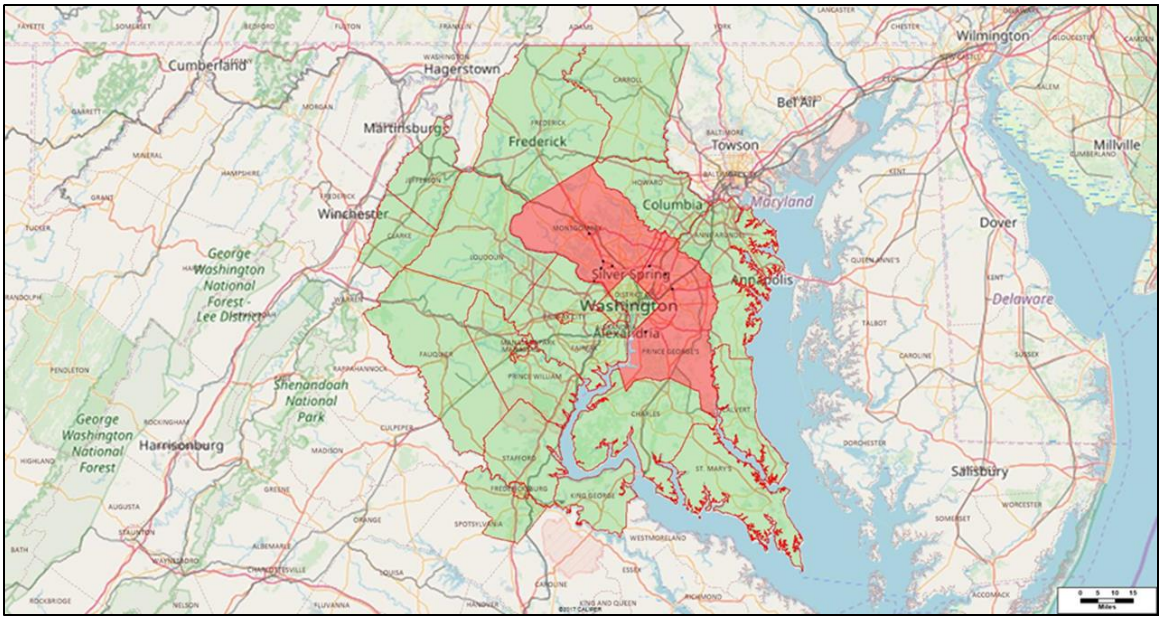


Figure 18: Regional Extent

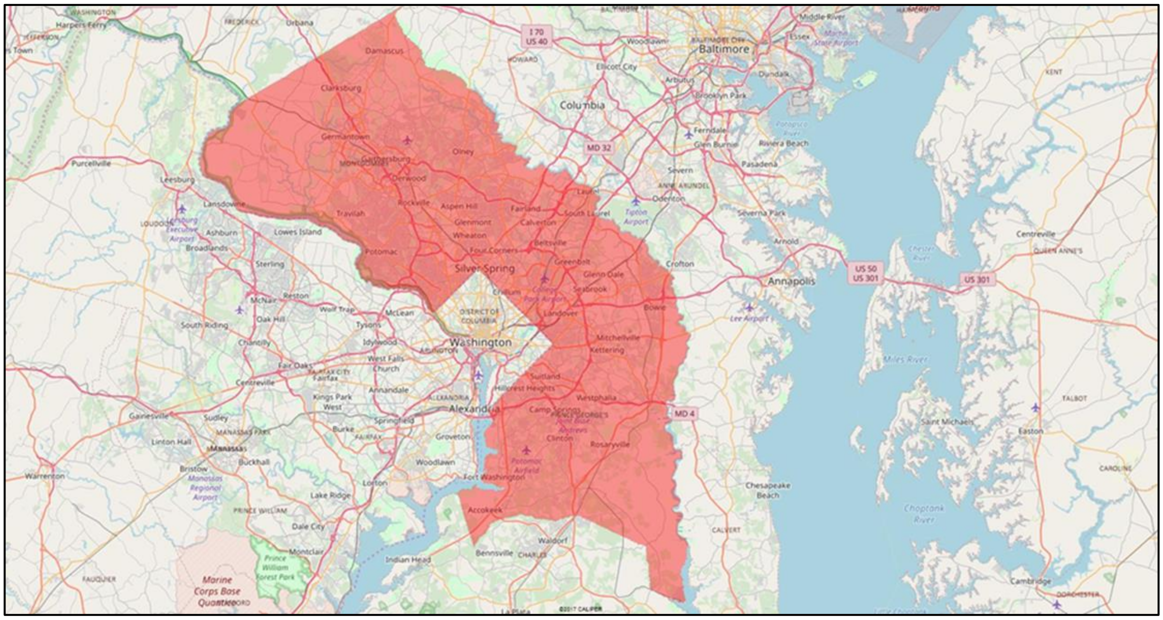


Figure 19: Montgomery and Prince George's Counties

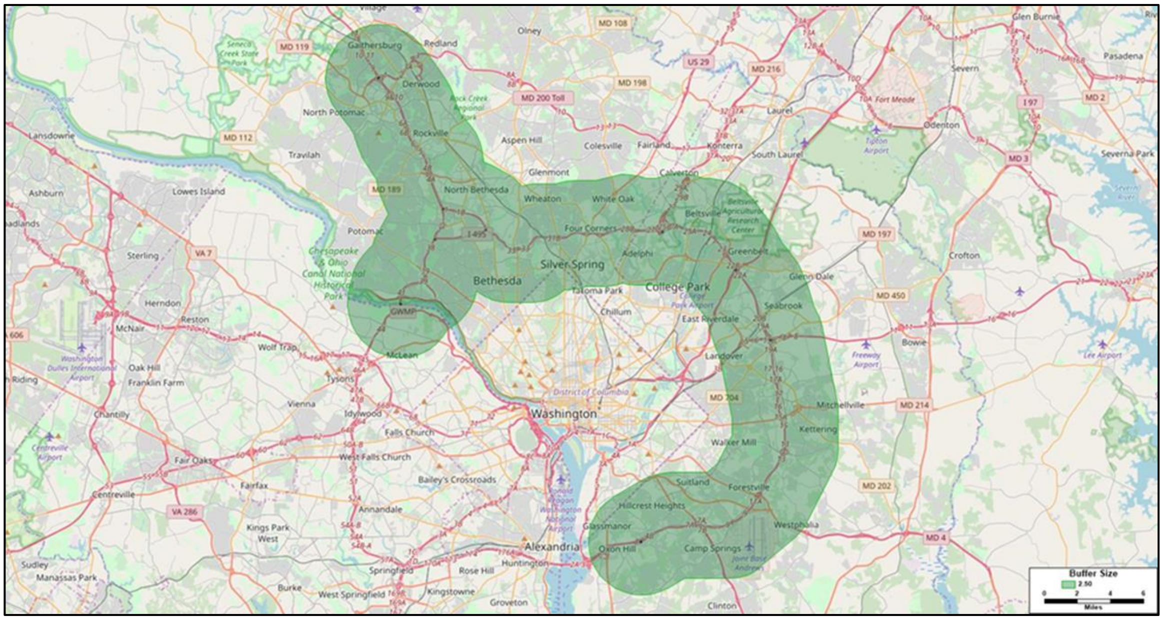


Figure 20: MLS Study Area

7.3 CHANGES IN TRIP MAKING

In 2045, the baseline scenario estimates nearly 17.5 million daily household trips with a time-of-day distribution of: 14% (AM), 35% (MD), 27% (PM) and 24% (NT). The High Scenario reduces the number of trips by 16% to 14.7 million daily household trips with a reduction in the AM period to 12% and PM to 26%. Figure 21 provides a comparison of the baseline to the HIGH, MID and LOW scenarios for total trips and distribution by period.

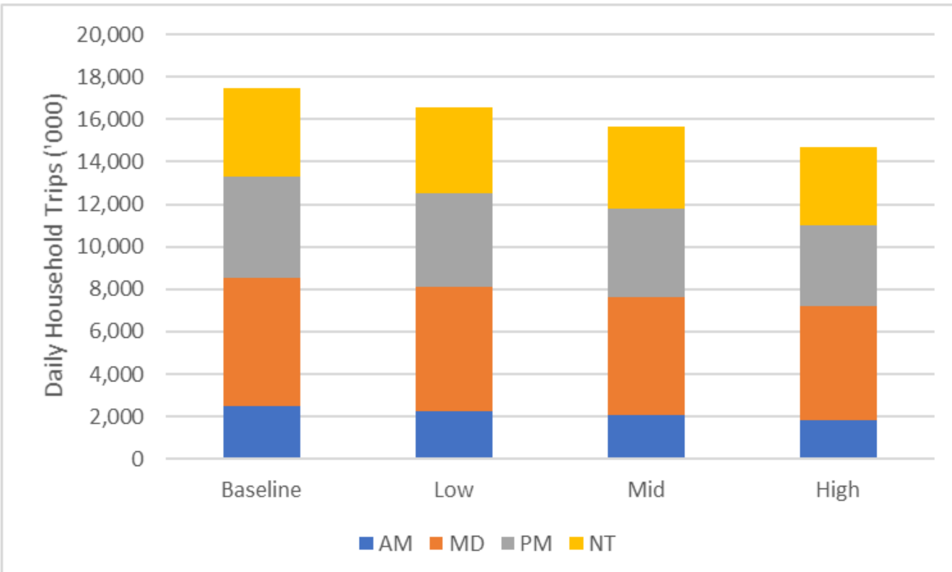


Figure 21: 2045 Daily Household Trips by Period by Scenario

Consistent with the parameters for each scenario, the home-based-work and non-home-based-work related purposes see the most significant decrease between the baseline and HIGH scenario as shown in Figure 22. Home-based-work trips are cut by nearly ½ because of the high levels of work from home activity in all income ranges. The LOW and MID scenarios estimate a 19% and 33% reduction, respectively. With the reduction in home-based-work trips, AM and PM travel sees a greater decrease as compared to the mid-day and night which have proportion of discretionary travel.

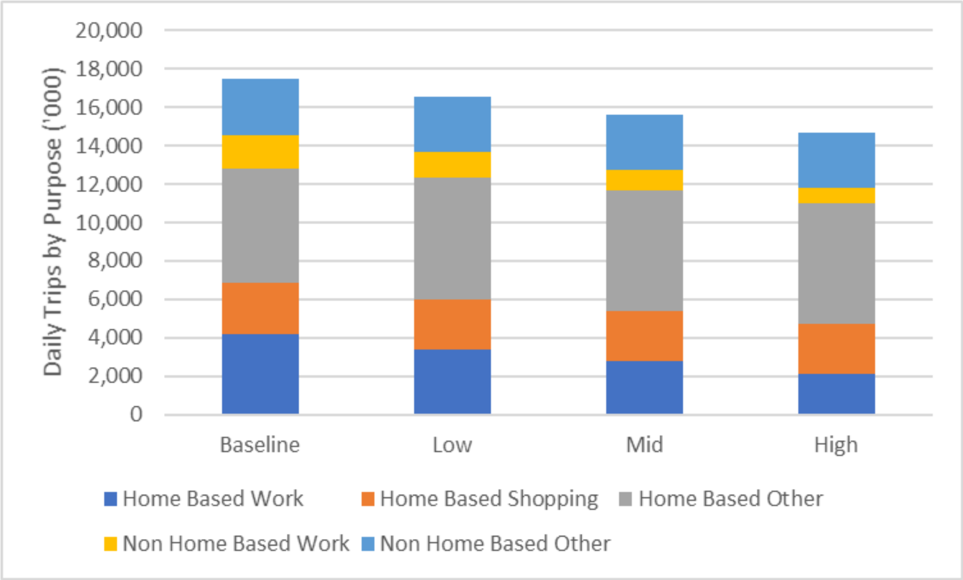


Figure 22: 2045 Daily Household Trips by Purpose by Scenario

7.4 REGIONAL NETWORK CHANGES

The baseline scenario was compared against the HIGH, MID and LOW scenarios across the entire MWCOG model network. Scenarios were compared using the vehicle miles traveled (VMT), hours of delay, and lane miles by level of service during the AM period for freeways and arterials. The regional network statistics are shown for the No Build and Phase 1 Build network scenarios.

7.4.1 Vehicle Miles of Travel

Vehicle Miles of Travel (VMT) is a common measure used to represent the total travel in the system across the entire region. Under the baseline scenario, the entire MWCOG region is expected to see a 21% increase in VMT between 2045 and 2019 reaching nearly 210 million miles traveled per day. Under the HIGH scenario, the pandemic level VMT is estimated at 143 million which is a 17% decrease from the baseline scenario. In 2045, the estimated VMT under the HIGH scenario is 177 million, showing a similar rate of growth as the baseline scenario. Figure 23 and Figure 24 show the VMT for 2019 and 2045 under the baseline and three scenarios for the No Build and Phase 1 Build network scenario. These figures show that at the regional level, VMT growth is similar in both the No Build and Phase 1 Build conditions under the baseline and each of the three scenarios. The three scenarios for 2045 are shown to pivot from the 2019 estimate of pandemic level VMT observed in the 2020/2021 timeframe. The figures show that under the LOW and MID scenarios, the level of VMT expected in 2045 is approaching the baseline scenario with a 5% reduction and 10% reduction respectively.

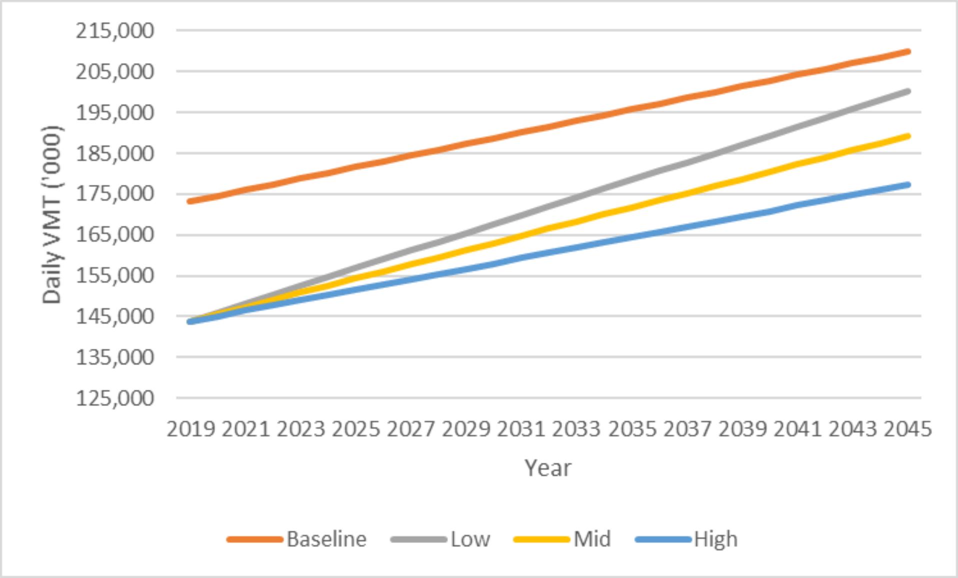


Figure 23: Daily VMT – No Build Network

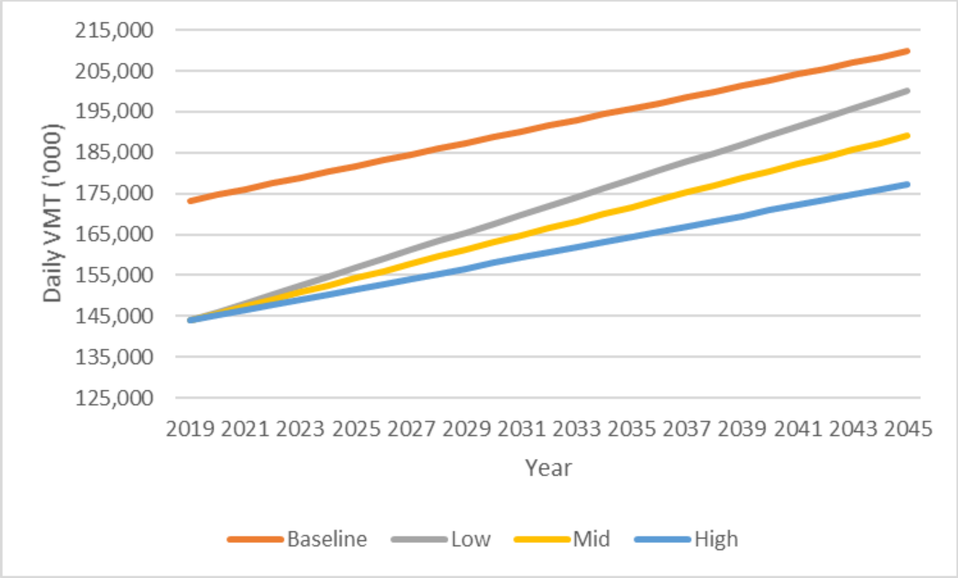


Figure 24: Daily VMT – Phase 1 Build Network

7.4.2 Daily Vehicle Hours of Delay

Vehicle Hours of Delay is calculated as the differences between the vehicle hours of travel on each link in the network under congested and free flow speeds aggregated across the four periods of the model. Under the baseline scenario, the region experiences 1.79 million hours of delay per day in 2019 and is expected to increase to almost 2.97 million hours by 2045. With the introduction of the project, regional delay decreases by 50,000 hours. Figure 25 and Figure 26 show the estimated hours of delay under the LOW, MID and HIGH scenarios as compared to the baseline under the no build and build network conditions. The reduction in hours of delay is not a linear relationship to Vehicle Miles Traveled (VMT) reduction because of the non-linear shape of the volume delay functions in the travel demand model. Additionally, background improvements within the model increase the number of lane miles in the system and reduce delay in the 2045 No Build condition compared to 2019 conditions. Similar to the Vehicle Miles Traveled (VMT) growth, Vehicle Hours of Delay (VHD) growth at the regional level is similar in both the No Build and Phase 1 Build conditions under the baseline and each of the three scenarios.

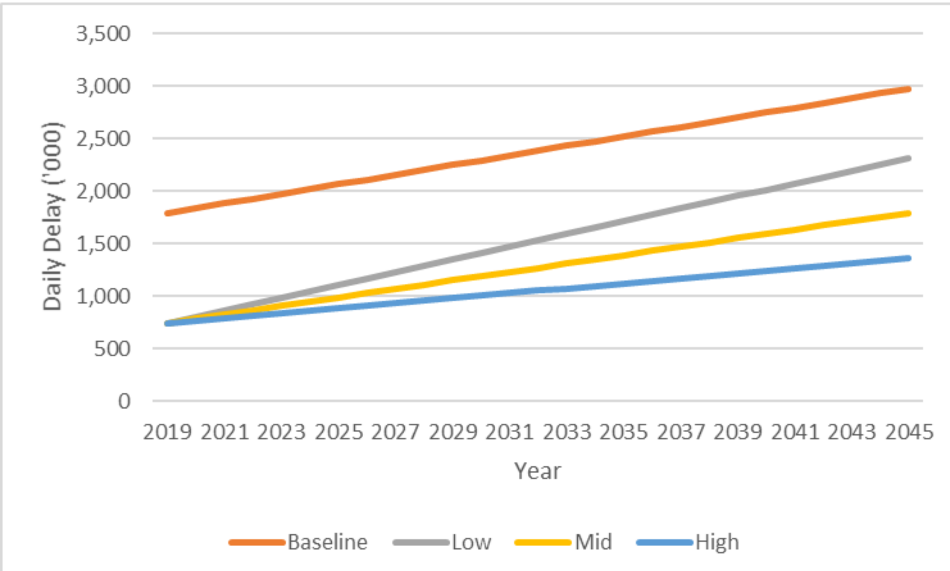


Figure 25: Daily VHT – No Build Network

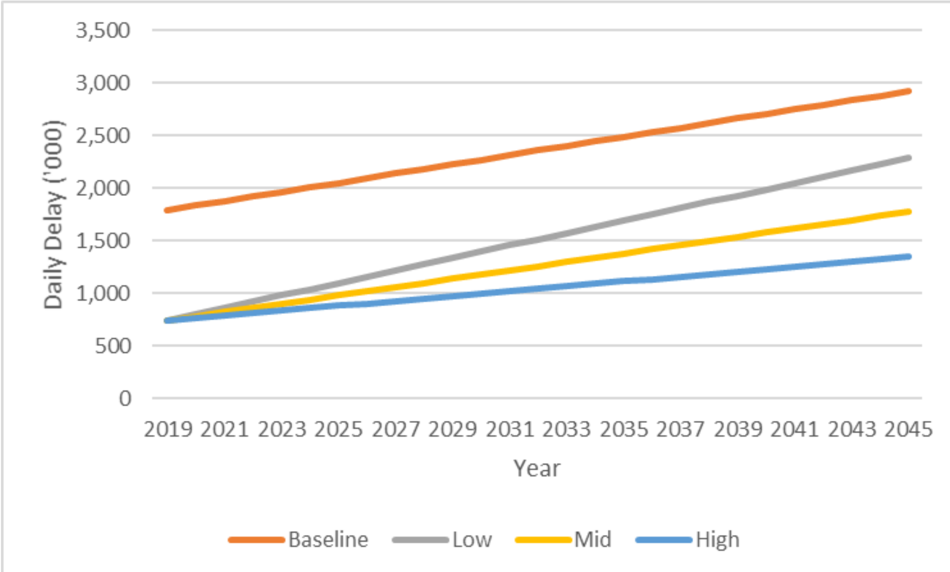


Figure 26: Daily VHT – Phase 1 Build Network

7.4.3 Lane Miles by Level of Service

When evaluating Level of Service, the results were compared using the AM Peak Period. The AM was selected because it includes the highest proportion of home-based work activity and would be the most sensitive to the long-term travel impacts. In 2019 under the baseline scenario, 29% of the arterial lane miles and 39% of the freeway lane miles are at LOS F across the region (Figure 27). Under the HIGH scenario for 2019 which is a representation of the late 2020/early 2021 phase of the pandemic, the LOS F lane miles decreased to 9% on arterials and 6% on freeways in the AM period (Figure 28).

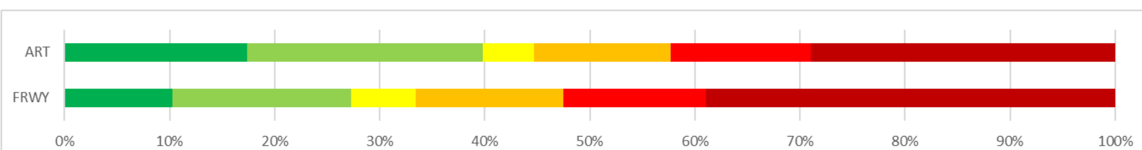


Figure 27: 2019 Baseline AM Lane Miles by LOS

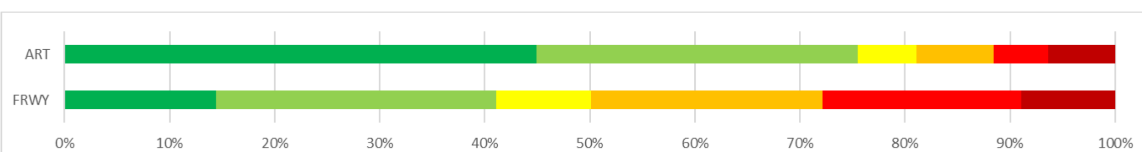


Figure 28: 2019 HIGH AM Lane Miles by LOS

Under the baseline scenario, the % of lane miles by LOS shows some reduction in LOS F lane miles between the No Build (Figure 29) and Phase 1 (Figure 30) network scenario in 2045 for freeways with a higher percentage of arterials with LOS below D in the build condition.

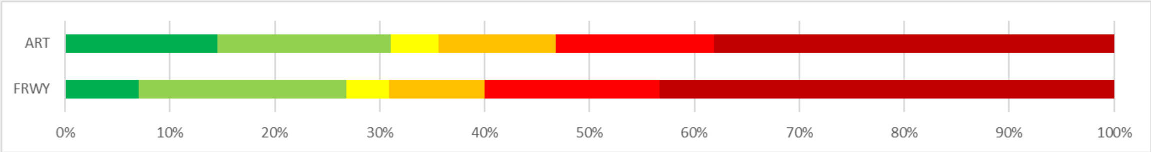


Figure 29: 2045 No Build Baseline Scenario AM Lane Miles by LOS

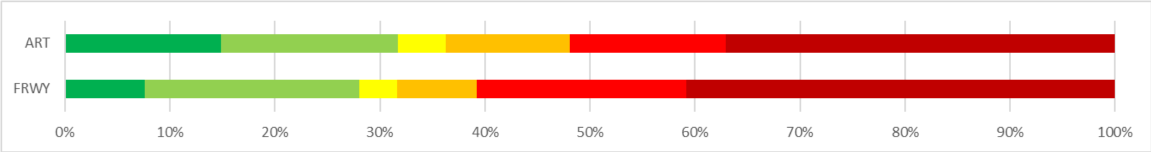


Figure 30: 2045 Phase 1 Build Baseline Scenario AM Lane Miles by LOS

Figure 31, Figure 32, and Figure 33show the change in the distribution of lane miles by LOS under the AM no build conditions for the LOW, MID and HIGH scenarios respectively for the entire MWCOG model network. As anticipated, the percentage of the network operating at LOS E and F decreases on both the arterial and freeway systems.

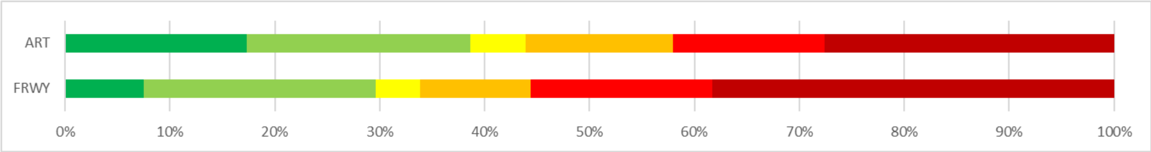


Figure 31: 2045 No Build LOW Scenario AM Lane Miles by LOS

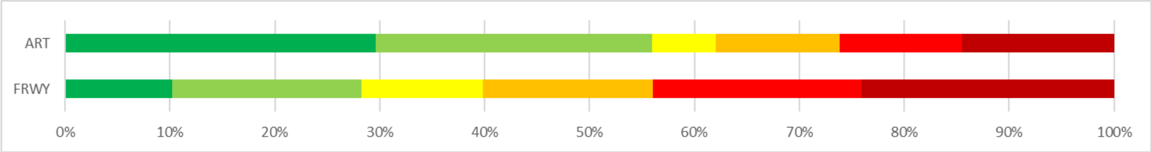


Figure 32: 2045 No Build MID Scenario AM Lane Miles by LOS

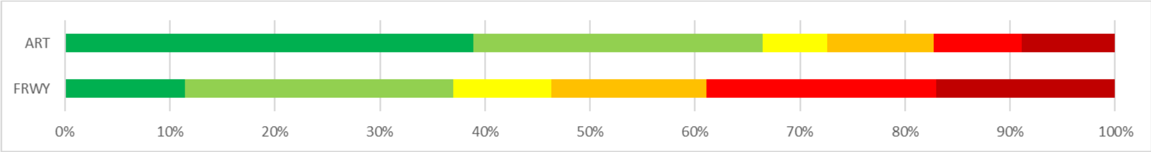


Figure 33: 2045 No Build HIGH Scenario AM Lane Miles by LOS

7.5 STUDY AREA

More specific to the I-270 and I-495 corridors, the metrics below are summarized for Prince George's and Montgomery Counties that were shown in Figure 34. The total VMT for the two-county area in 2045 under the three scenarios is less than the baseline by 5%, 11% and 16% for the LOW, MID and HIGH scenarios, respectively.

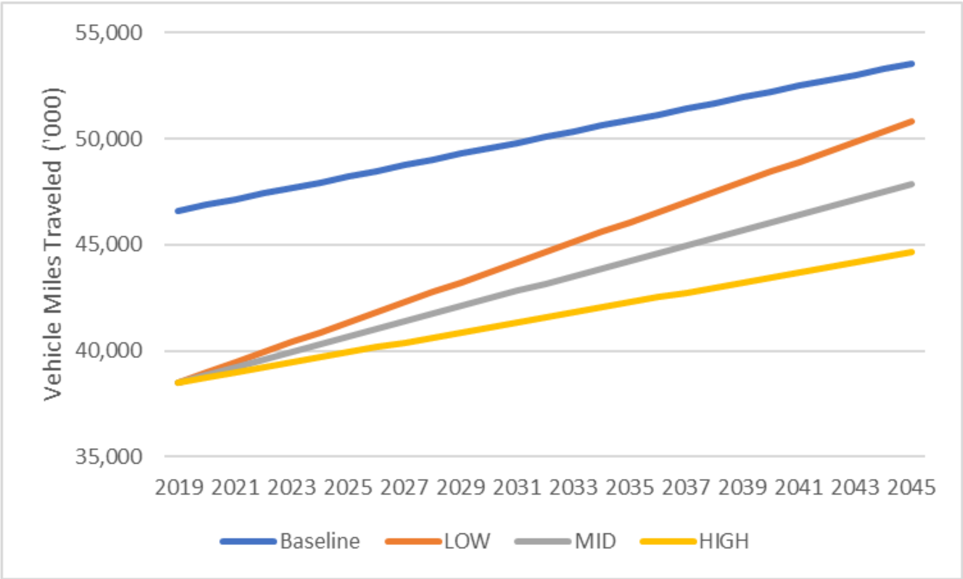


Figure 34: Daily No Build VMT for Prince George's and Montgomery Counties

Tables 12 and 13 provide a comparison of the percent of AM VMT by LOS on arterials and freeways in Montgomery and Prince George's County, respectively, under the baseline and three scenarios (LOW, MID and HIGH). As anticipated and consistent with the decrease in VMT, the percent of the network that has LOS of D or below increases significantly.

Table 12: AM % of VMT by LOS No Build – Montgomery County

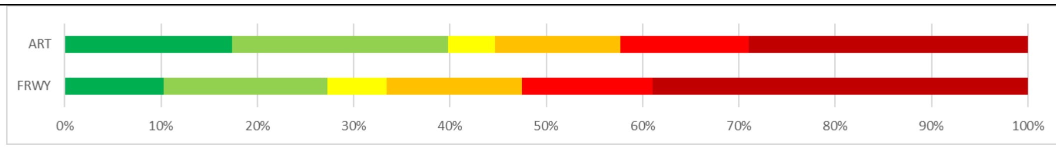
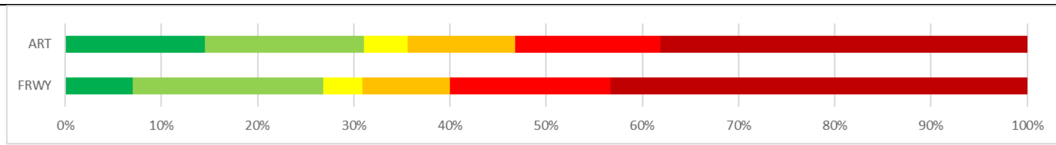
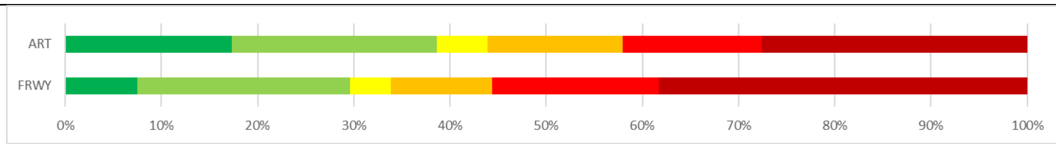
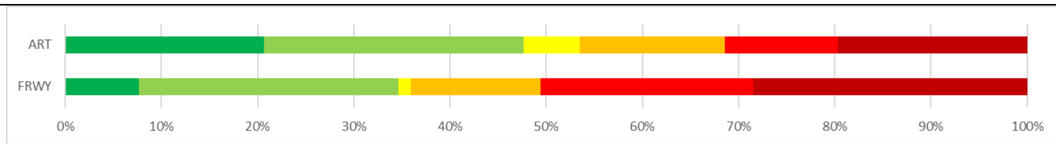
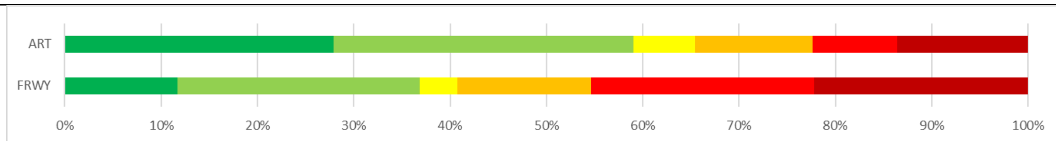
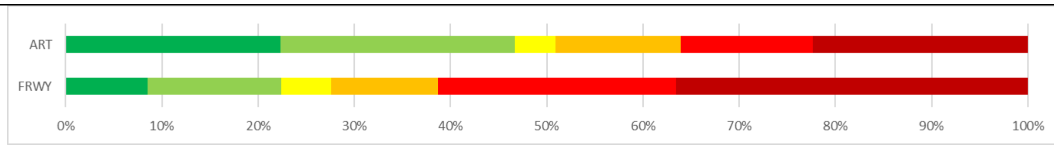
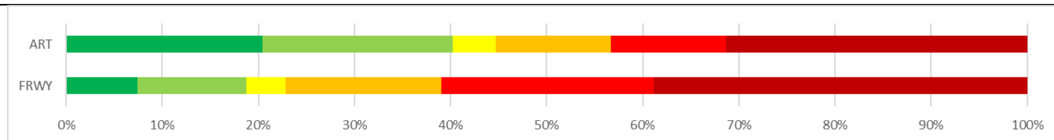
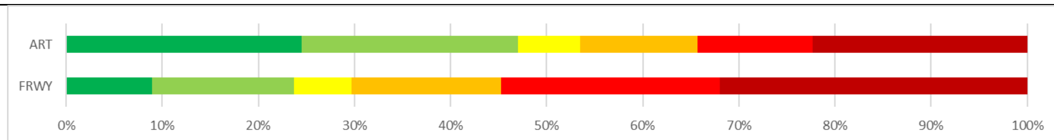
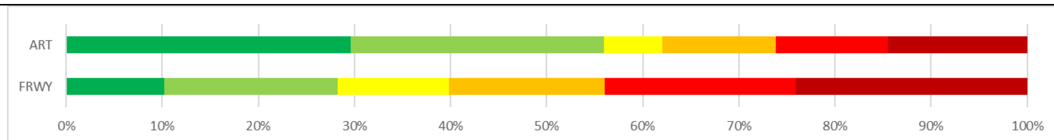
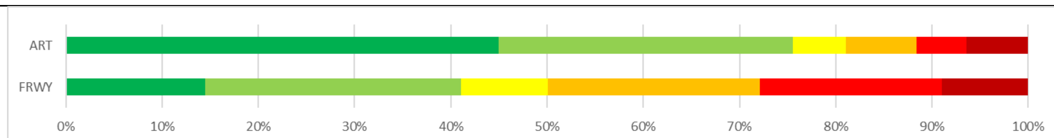
2019	
2045 Baseline	
2045 LOW	
2045 MID	
2045 HIGH	

Table 13: AM % of VMT by LOS No Build – Prince George's County

2019	
2045 Baseline	
2045 LOW	
2045 MID	
2045 HIGH	

7.6 PROJECT CORRIDOR

The buffer analysis around the I-270 and I-495 corridors as shown in Figure 20 accounts for 16% of the VMT across the entire MWCOG model area and approximately 60% of the VMT in Montgomery and Prince George's Counties combined. Table 14 and Table 15 show the distribution of VMT by LOS under the AM conditions for Montgomery and Prince George's Counties respectively. The tables further provide the information for the No Build and Phase 1 Build network under the baseline, LOW, MID and HIGH scenarios. As expected, the difference between the No Build and Phase 1 Build networks is more significant in Montgomery County given its proximity to the I-270 corridor where Phase 1 is to be built.

Under No Build conditions, in Montgomery County, nearly 50% of the freeway VMT in the AM conditions still experiences LOS E and F conditions in the HIGH scenario as compared to over 65% in the baseline scenario. Under the Phase 1 Build scenario, the % of VMT experiencing LOS E and F conditions decreases from nearly 60% to less than 50% in the HIGH scenario.

There is less difference between the No Build and Phase 1 Build scenarios in Prince George's County, but comparing the baseline to HIGH scenario shows a decrease in the % of VMT experiencing LOS E and F conditions on both arterials and freeways.

Table 14: Project Corridor – Montgomery County AM % VMT by LOS

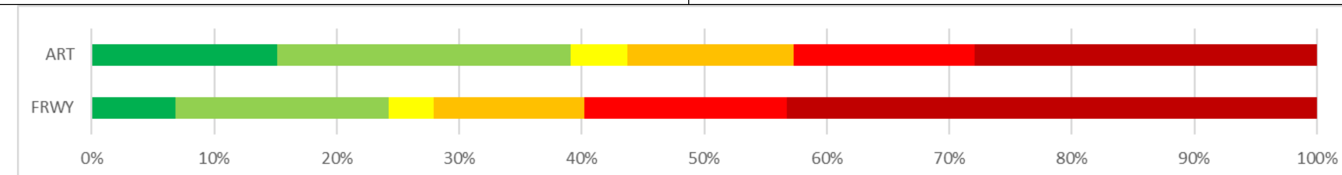
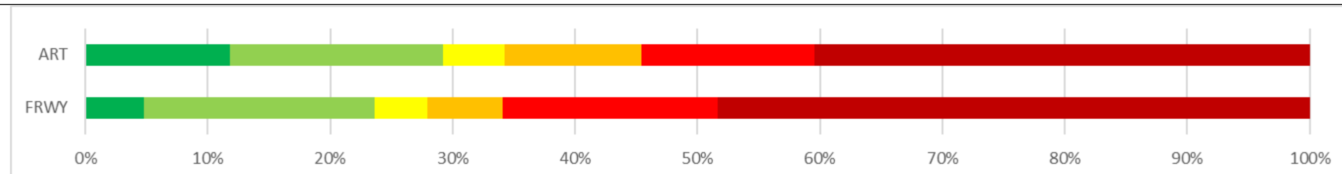
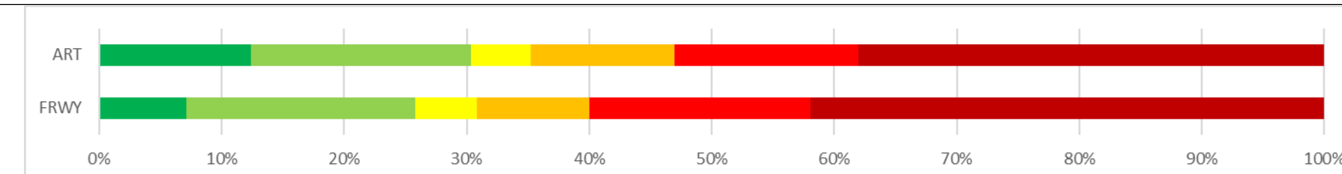
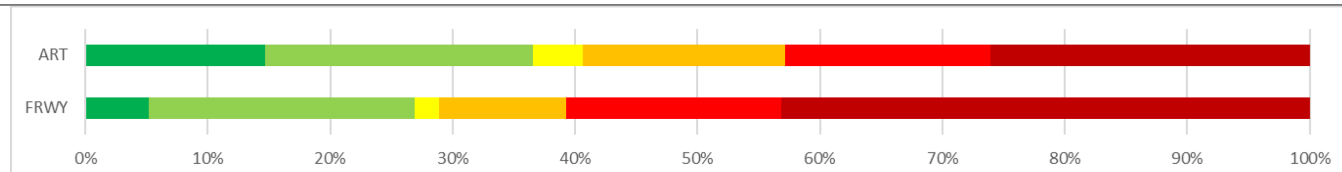
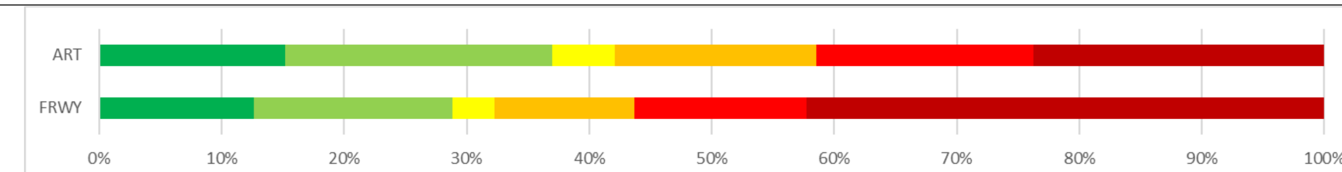
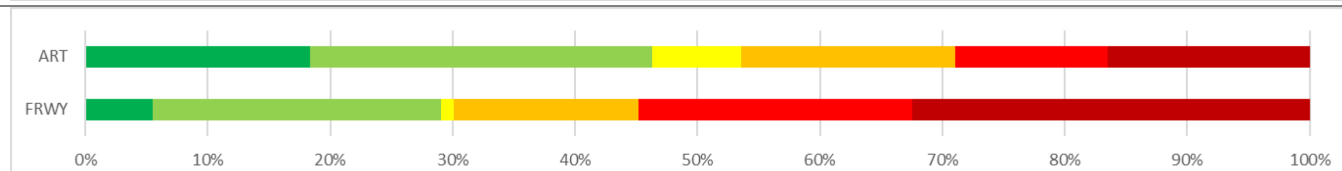
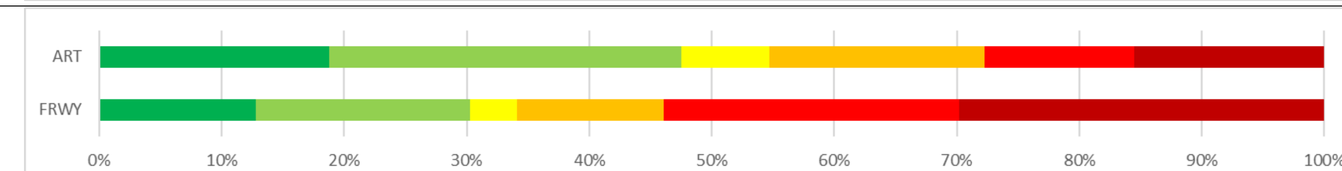
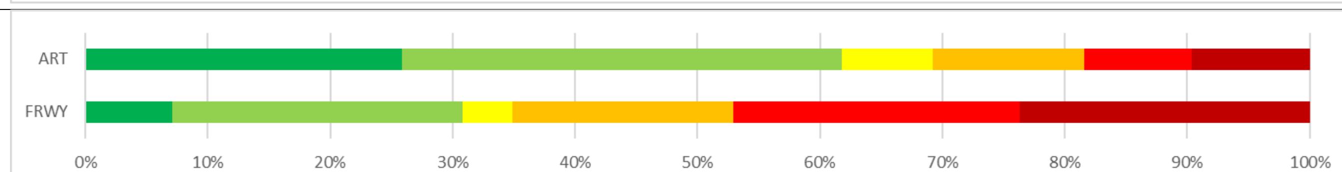
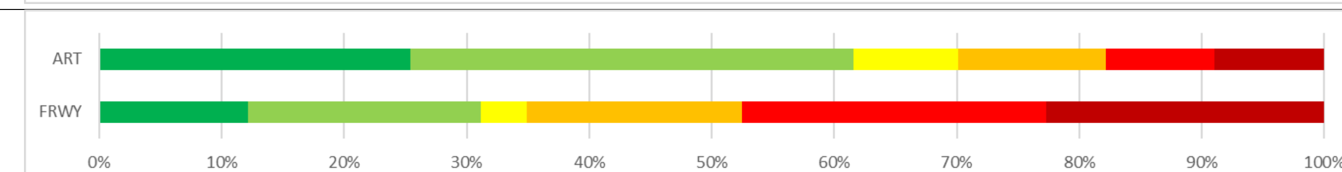
<table>
<tr><th>Scenario</th><th>No Build</th><th>Phase 1 Build</th></tr>
<tr><td>2019</td><td colspan="2"></td></tr>
<tr><td>2045 Baseline</td><td></td><td></td></tr>
<tr><td>2045 LOW</td><td></td><td></td></tr>
<tr><td>2045 MID</td><td></td><td></td></tr>
<tr><td>2045 HIGH</td><td></td><td></td></tr>
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Table 15: Project Corridor – Prince George's County AM % VMT by LOS

<table>
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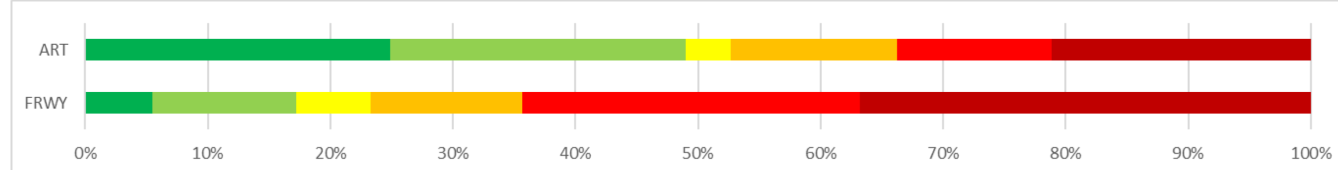
<tr><td>2019</td><td colspan="2">
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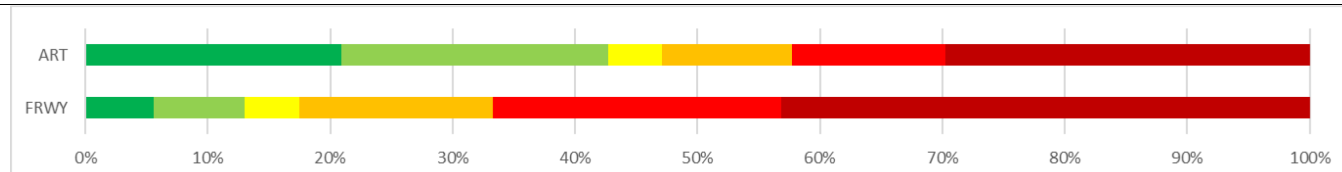
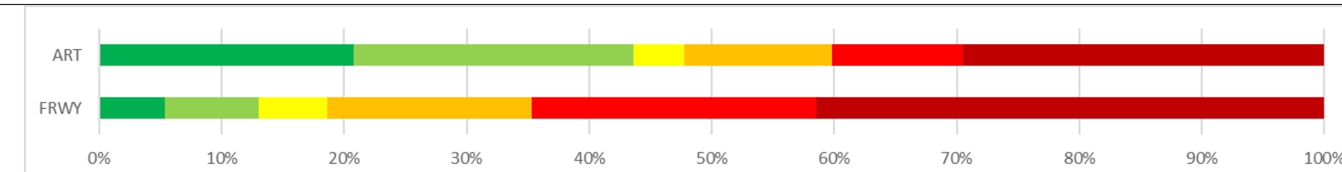
<tr><td>2045 Baseline</td><td>
</td><td>
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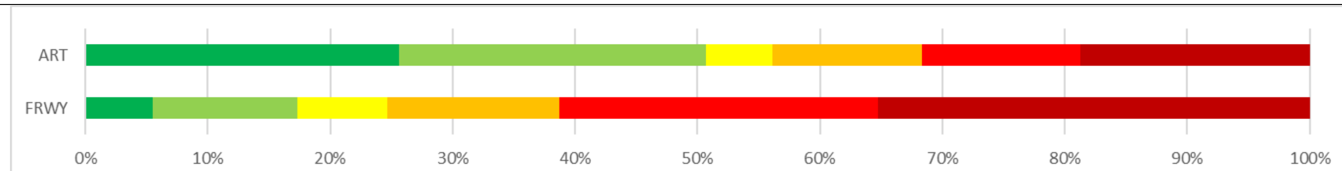
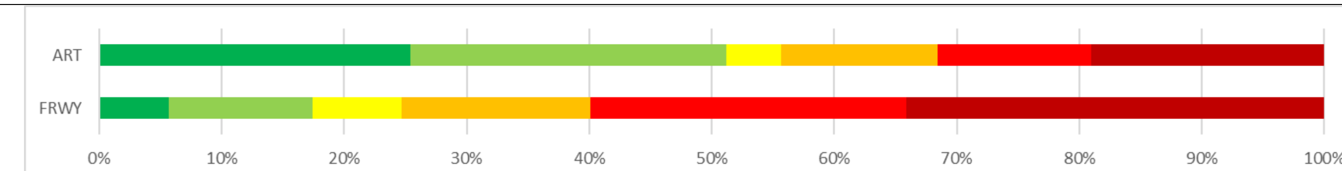
<tr><td>2045 LOW</td><td>
</td><td>
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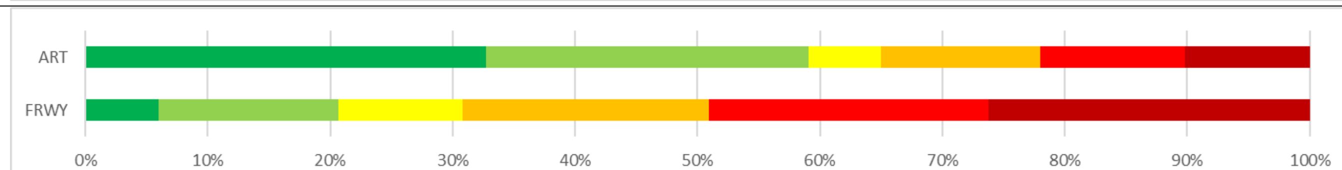
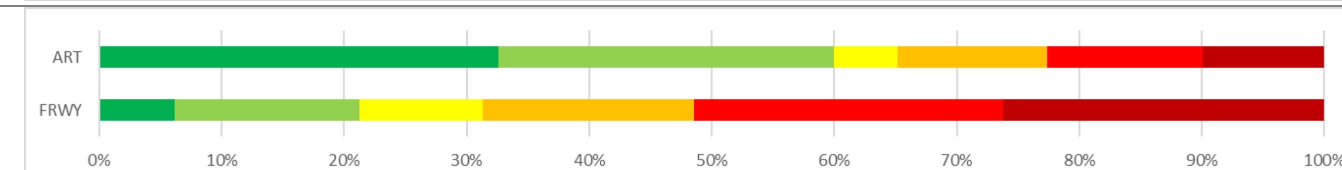
<tr><td>2045 MID</td><td>
</td><td>
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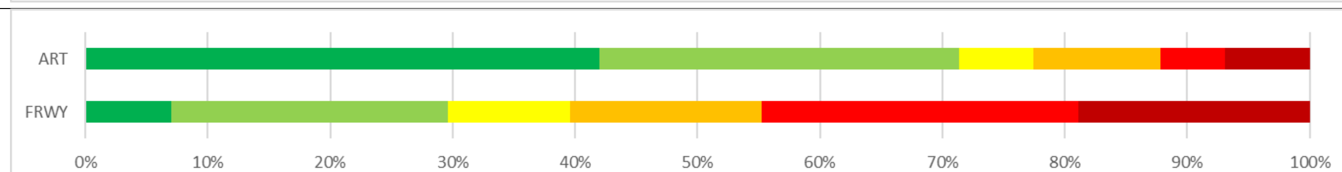
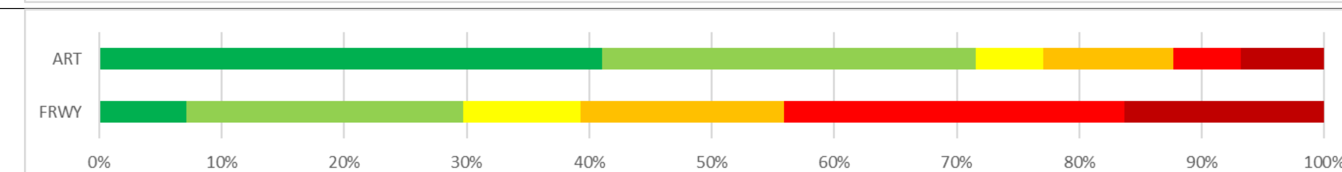
<tr><td>2045 HIGH</td><td>
</td><td>
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8. CONCLUSION

8.1 METHODOLOGY

The purpose of this analysis was to evaluate the potential long term behavioral changes related to travel that have come from COVID-19. This includes changes in work from home, work related non-home based trips, increased time for discretionary travel as well as changes in visitor, airport related and external travel demand. Model parameters were developed under three scenarios including a baseline to measure different levels of impact. The HIGH scenario was developed to represent a level of activity consistent with the period during the pandemic in late 2020/early 2021 before the rollout of vaccines that saw increases in activity because of loosening restrictions but still high levels of work from home and remote learning. This scenario is seen as unlikely in the long term. The LOW and MID scenarios are more likely outcomes that will include some level of work from home continuing into the future for higher income industries, a low level of remote learning and potential long term declines in visitor and air passenger related travel.

The MWCOG model was run for the 2019, 2045 No Build and 2045 Build (Phase 1) for the baseline, LOW, MID and HIGH scenarios. The results of the scenarios were evaluated at three levels of geography: the entire MWCOG model area, project area (Montgomery and Prince George's Counties) and finally in a buffer area focused on the I-270 and I-495 corridor through the two counties.

The parameters defined for this analysis did not include several potential long-term impacts including shifts in mode choice (SOV vs HOV or transit vs non-transit options) nor impacts related to freight trends. Both areas were considered in the initial scenario development but because of lack of data or inconsistencies in the trends observed during 2020 and early 2021 they were not included. The scenarios were focused on impacts to household trip making and direct external related travel from visitors, air passengers and through demand.

8.2 RESULTS

The analysis conducted to explore the long-term impacts of behavioral changes created by COVID-19 indicates a continued need for the improvements to the I-270 and I-495 corridor:

- There was significant traffic congestion in 2019 prior to the pandemic.
- 2045 No Build VMT will exceed 2019 VMT even in the highly unlikely HIGH scenario.
- In the more likely LOW scenario, projected VMT and congestion is near the 2045 baseline.
- There will still be significant congestion in the study area under a No Build condition evidenced by the high percentage of LOS E/F segments in the region under all scenarios.

The resulting decrease in VMT between the LOW, MID and HIGH scenarios was 5%, 10% and 15% respectively across the entire MWCOG model region. shows that starting from a 2019 HIGH scenario reflecting the period in the pandemic, the VMT under the LOW and MID scenarios exceeds 2019 levels between 2030 and 2035 and begins to approach that of the baseline scenario by 2045.

The results confirm that the capacity improvements proposed under the Preferred Alternative would be needed and effective even if future demand changes from the pre-pandemic forecasts based on potential long-term impacts to teleworking, e-commerce, and transit use that are not formally accounted for in the current regional forecasting models. For example, in Montgomery County under the HIGH scenario, the % of VMT experiencing LOS E and F conditions decreases from nearly 60% in the No Build scenario to less than 50% in the Phase 1 Build scenario, with greater improvements in the LOW and MID scenarios.

When focusing on the project corridor buffer, specifically in Montgomery County where Phase 1 is located, the impact of the scenarios between the no build and build network shows significant VMT still subjected to poor levels of service (Table 17).

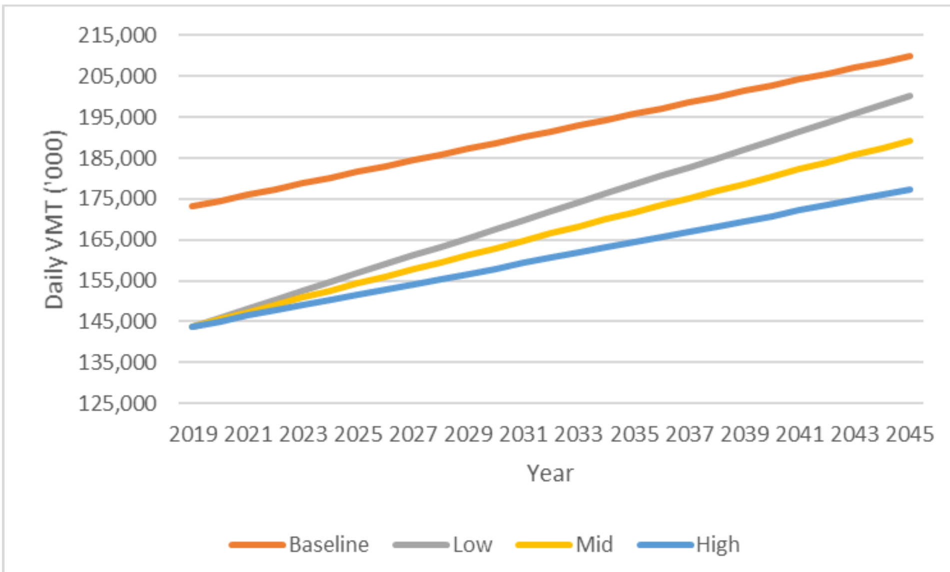


Figure 35: Daily VMT (No Build Network)

The decrease in VMT does reduce the hours of delay and improves the % of the network operating under poor Level of Service across the entire region (Table 16).

Table 16: AM % of Lane Miles by LOS No Build – MWCOG Model Region

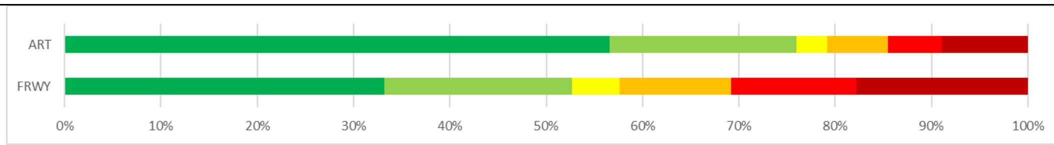
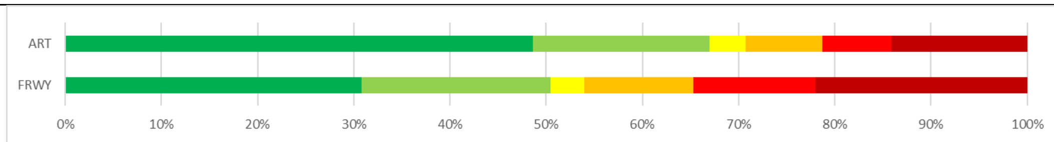
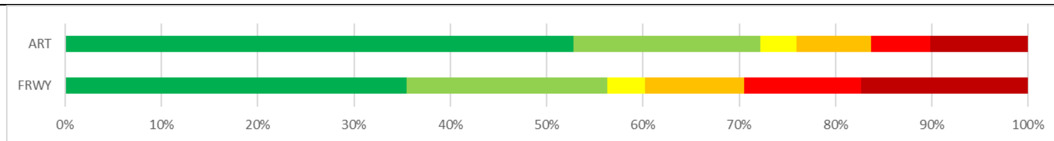
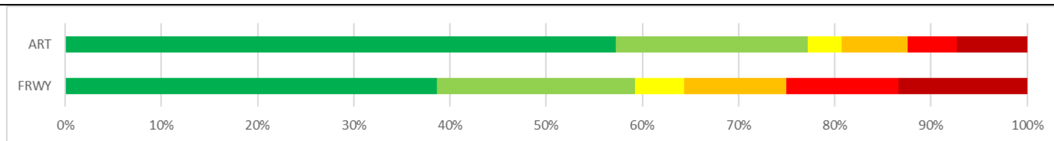
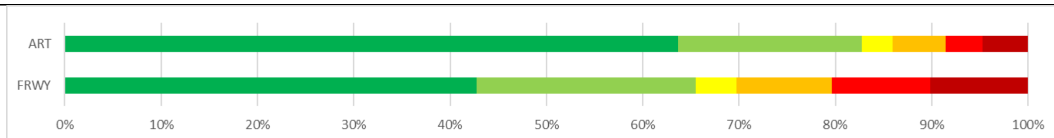
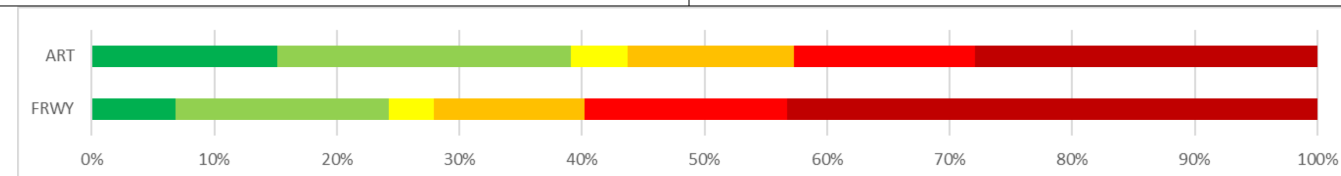
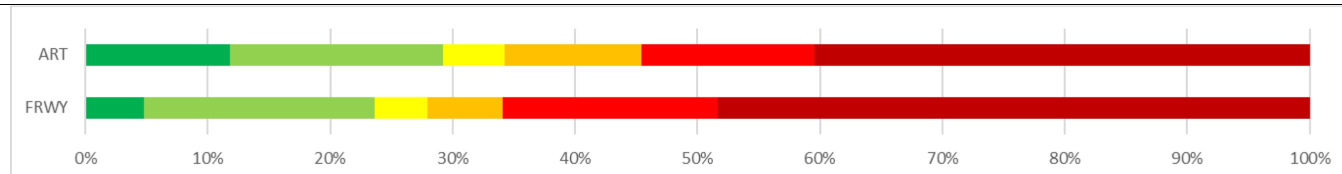
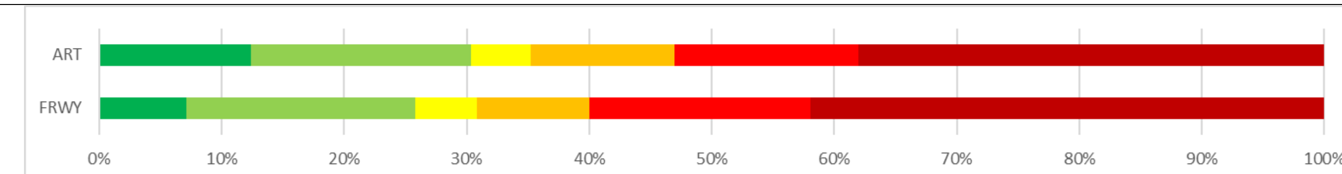
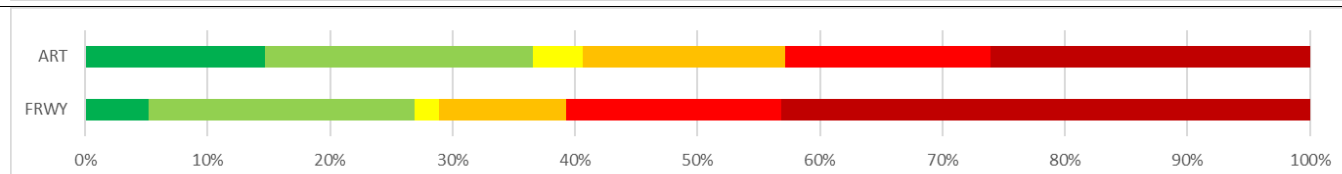
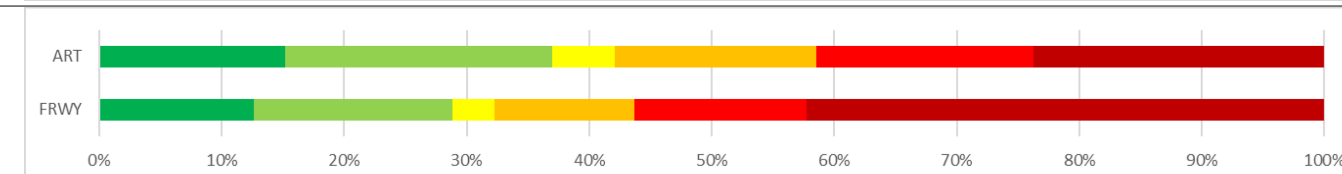
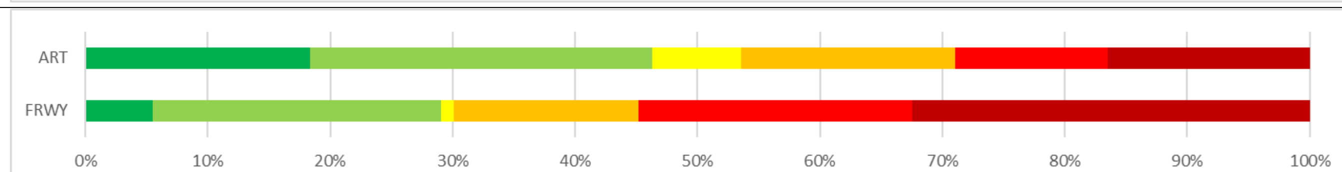
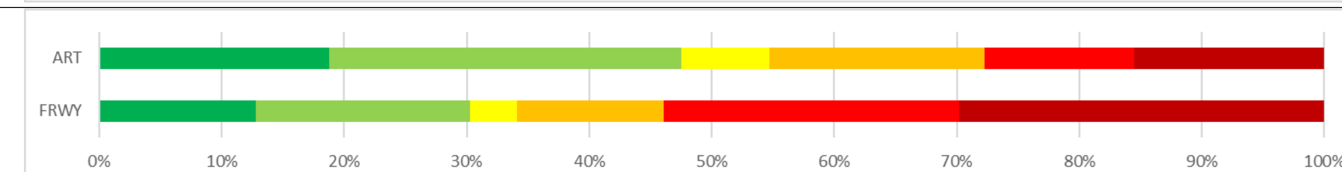
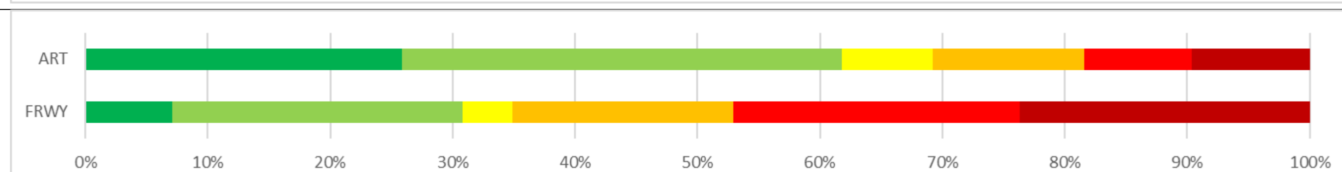
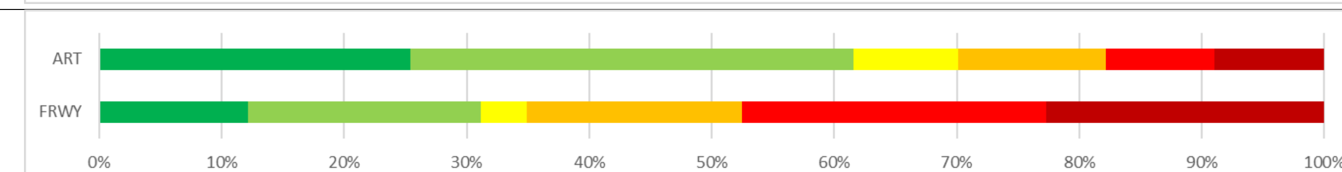
2019	
2045 Baseline	
2045 LOW	
2045 MID	
2045 HIGH	

Table 17: Project Corridor – Montgomery County AM % VMT by LOS

Scenario	No Build	Phase 1 Build
2019		
2045 Baseline		
2045 LOW		
2045 MID		
2045 HIGH		

ATTACHMENT 3B:

MWCOG COVID-19 Assumptions for Visualize 2045 Update

MDOT SHA Correspondence with MWCOG via email 3/22/2022

Question from Project Team:

Is MWCOG in its update to Visualize 2045 considering long term effect of COVID-19 on regional analysis?

Response from MWCOG:

For the air quality conformity analysis of the constrained element of the 2022 Update to the Visualize 2045 Long-Range Transportation Plan, TPB staff did not adjust the travel demand model inputs or outputs to account for potential long-term impacts of the COVID-19 pandemic. The TPB staff believe that the pandemic-related travel disruptions are still evolving and are yet to settle into an established pattern that could be used as the basis for more reliable forecasts. An examination of the traffic and travel data in the region by the TPB staff indicate that current roadway traffic volumes and peak period conditions are approaching the pre-pandemic levels, while transit ridership is currently low for a variety of reasons including some that staff believe to be short term. The plan is currently in development, with TPB action scheduled for June 2022.

TPB staff acknowledge that there are uncertainties associated with various elements of every long-range transportation plan given the 20-plus-year planning horizon of the plan, which necessitate forecasting a range of items (e.g., population, employment, land use, and transit service levels). The current COVID-19-pandemic-related disruptions to people's travel behavior, choices, and patterns, while unique, present one additional uncertainty. Given the unprecedent nature of the pandemic-related disruptions to travel, the TPB staff have been examining a set of travel metrics during the pandemic and intend to continue to do this into the near future. The TPB's process of updating its long-range transportation plan provides for updates to the inputs and assumptions to reflect changes in demand and supply. As such, based on observed data and research findings documenting the "new normal," including travel surveys and other sources, appropriate adjustments to modeling tools and assumptions will be reflected in future updates of the long-range transportation plan. The TPB recognizes the value of scenario planning to gauge impacts of uncertainties and has used it in the past and could do so again.

The planning assumptions for the constrained element of the 2022 Update to Visualize 2045 were presented by staff to the TPB Technical Committee (Cook, Stacy. "Visualize 2045 Update: Planning Assumptions Review." National Capital Region Transportation Planning Board Technical Committee, Metropolitan Washington Council of Governments, January 8, 2021. https://www.mwcog.org/file.aspx?&A=ZT42EzEXvqejO2LNpFaf084ytgIXJN%2bZn1y1iyGTLsY%3d.)

ATTACHMENT 3C:
2045 VISSIM Sensitivity Analysis Results

Table 3C-1: 2045 Sensitivity Analysis - System-Wide Delay

Alternative	Original 2045 Forecasts				With Reduced Volumes (AM - 5% & PM - 3%)			
	Average Delay (min/vehicle)		Percent Improvement vs. No Build		Average Delay (min/vehicle)		Percent Improvement vs. No Build	
	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak
No Build	12.2	11.3	N/A	N/A	8	8.4	N/A	N/A
Preferred Alternative	10.6	7	13%	38%	7.3	4.4	9%	48%

Table 3C-2: 2045 Sensitivity Analysis Travel Time Index (TTI)

Alternative	Original 2045 Forecasts	With Reduced Volumes (AM - 5% & PM - 3%)
	Weighted Average TTI[1] (GP Lanes)	Weighted Average TTI[1] (GP Lanes)
No Build	2	1.6
Preferred Alternative	1.8	1.4

Note: [1] Reflects weighted average TTI on I-270 and I-495 during peak hours

Table 3C-3: 2045 Sensitivity AnalysisTravel Time Index (TTI) Results for General Purpose Lanes from VISSIM Model

Peak Period	Corridor	Alternative			
		Original 2045 Forecasts		With Reduced Volumes (AM-5% & PM-3%)	
		No Build	Preferred	No Build	Preferred
AM Peak Hour (7-8AM)	I-270 Northbound from I-495 to I-370	1.1	1	1	1
	I-270 Southbound from I-370 to I-495	1.3	1.2	1.1	1.2
	I-495 Inner Loop from Virginia 193 to I-270	1.4	1	1.2	1
	I-495 Outer Loop from I-270 to Virginia 193	1.5	1.1	1.5	1.1
	I-495 Inner Loop from I-270 to I-95[3]	1	1.1	1	1
	I-495 Outer Loop from I-95 to I-270[3]	2.9	2.7	2.6	2.6
	I-495 Inner Loop from I-95 to MD 5[3]	2.7	2.6	1.8	1.6
	I-495 Outer Loop from MD 5 to I-95[3]	2.5	2.5	2.1	2.2
PM Peak Hour (4-5PM)	I-270 Northbound from I-495 to I-370	2.2	1.7	1.4	1.3
	I-270 Southbound from I-370 to I-495	1	1	1	1
	I-495 Inner Loop from Virginia 193 to I-270	3.8	4	2.9	1.2
	I-495 Outer Loop from I-270 to Virginia 193	2.4	1	1.3	1
	I-495 Inner Loop from I-270 to I-95[3]	2.8	2.4	2.8	2.3
	I-495 Outer Loop from I-95 to I-270[3]	1.8	1.1	1.2	1.1
	I-495 Inner Loop from I-95 to MD 5[3]	1.4	1.5	1.4	1.3
	I-495 Outer Loop from MD 5 to I-95[3]	2.7	1.9	2.1	1.6

Notes: [1] MDOT SHA defines various levels of congestion based on TTI: Uncongested (green) – TTI ≤ 1.15; Moderate Congestion (yellow) – 1.15 < TTI ≤ 1.3; Heavy Congestion (orange) – 1.3 < TTI < 2.0; Severe Congestion (red) – TTI ≥ 2.0 [2] This table summarizes TTI in the GP lanes. All HOT/Express Toll Lanes would have TTI values in the uncongested range (TTI less than 1.15). [3] Gray shaded rows reflect segments outside Phase 1 South limits

Table 3C-4: 2045 Sensitivity Analysis Average Speed – Entire Study Area

Alternative	Average Speed[1] (GP Lanes)	
	Original 2045 Forecasts	With Reduced Volumes (AM-5% & PM-3%)
No Build	24 mph	31 mph
Preferred Alternative	28 mph	36 mph

Note: [1] Reflects weighted average speed on I-270 and I-495 during peak hours (7-8AM and 4-5PM)

Table 3C-5: 2045 Sensitivity Analysis Corridor Travel Speed (mph) Results from VISSIM Model

Peak Period	Corridor	Travel Lanes	Alternative			
			Original 2045 Forecasts		With Reduced Volumes (AM-5% & PM-3%)	
			No Build	Preferred	No Build	Preferred
AM Peak Hour (7-8AM)	I-270 Northbound from I-495 to I-370	GP Lanes	55 [2]	61	55	61
		HOT Lanes	-	63	-	63
	I-270 Southbound from I-370 to I-495	GP Lanes	44 [2]	45	46	49
		HOT Lanes	-	62	-	62
	I-495 Outer Loop from I-270 West Spur to George Washington Memorial Parkway	GP Lanes	35	50	35	51
		HOT Lanes	-	62	-	62
	I-495 Inner Loop from George Washington Memorial Parkway to I-270 West Spur	GP Lanes	38	55	47	56
		HOT Lanes	-	63	-	63
	I-495 Outer Loop from MD 5 to I-270 West Spur[1]	GP Lanes	20	22	25	25
		HOT Lanes	-	-	-	-
	I-495 Inner Loop from I-270 West Spur to MD 5[1]	GP Lanes	26	26	36	40
		HOT Lanes	-	-	-	-
PM Peak Hour (4-5PM)	I-270 Northbound from I-495 to I-370	GP Lanes	27 [2]	27	36	42
		HOT Lanes	-	45	-	59
	I-270 Southbound from I-370 to I-495	GP Lanes	57 [2]	58	57	58
		HOT Lanes	-	63	-	63
	I-495 Outer Loop from I-270 West Spur to George Washington Memorial Parkway	GP Lanes	22	52	44	52
		HOT Lanes	-	63	-	62
	I-495 Inner Loop from George Washington Memorial Parkway to I-270 West Spur	GP Lanes	14	15	19	47
		HOT Lanes	-	62	-	62
	I-495 Outer Loop from MD 5 to I-270 West Spur[1]	GP Lanes	19	32	31	38
		HOT Lanes	-	-	-	-
	I-495 Inner Loop from I-270 West Spur to MD 5[1]	GP Lanes	25	24	29	30
		HOT Lanes	-	-	-	-

Notes: [1] Shaded rows reflect locations outside the Phase 1 South limits with no action proposed under the Preferred Alternative. [2] No Build results along I-270 are shown as an average of the Express Lanes and the adjacent Local Lanes. Under No Build conditions, vehicles enter and exit I-270 via a separated Local Lanes system, which will be eliminated under the Build alternatives to reduce the roadway footprint and minimize impacts

Table 3C-6: 2045 Sensitivity Analysis Percent of Lane-Miles Operating at LOS F

Alternative	Percent of Lane-Miles Operating at LOS F					
	Original 2045 Forecasts			With Reduced Volumes (AM-5% & PM-3%)		
	AM Peak	PM Peak	Average	AM Peak	PM Peak	Average
No Build	32%	47%	39%	24%	31%	27%
Preferred Alternative	26%	30%	28%	18%	19%	19%

Table 3C-7: 2045 Sensitivity Analysis Vehicle Throughput

Alternative	Average Vehicle Throughput at Four Key Locations[1] (veh/hr)	
	Original 2045 Forecasts	With Reduced Volumes (AM-5% & PM-3%)
No Build	15,700	16,200
Preferred Alternative	17,700	17,900

Note: [1] Evaluation locations include I-495 at American Legion Bridge, I-495 west of I-95, I-495 at MD 5, I-270 at Montrose Road

Table 3C-8: 2045 Sensitivity Analysis Vehicle Throughput Results from VISSIM Model

Metric	Peak Period	Location	Alternative			
			Original 2045 Forecasts		With Reduced Volumes (AM-5% & PM-3%)	
			No Build	Preferred	No Build	Preferred
Vehicle-Throughput (veh/hr)	AM Peak	I-270 at Montrose Rd	18,182	19,855	17,808	19,256
		I-495 at American Legion Bridge	18,204	22,346	18,332	21,346
		I-495 west of I-95	14,381	14,525	14,557	14,447
		I-495 at MD 5	8,847	8,990	11,935	12,579
	PM Peak	I-270 at Montrose Rd	19,246	22,182	19,517	22,291
		I-495 at American Legion Bridge	17,002	22,472	17,761	22,612
		I-495 west of I-95	15,881	16,639	16,120	16,525
		I-495 at MD 5	13,804	14,325	13,792	14,078
Percent Change in Vehicle-Throughput vs. 2045 No Build	AM Peak	I-270 at Montrose Rd	N/A	10%	N/A	10%
		I-495 at American Legion Bridge	N/A	25%	N/A	15%
		I-495 west of I-95	N/A	0%	N/A	0%
		I-495 at MD 5	N/A	0%	N/A	5%
	PM Peak	I-270 at Montrose Rd	N/A	15%	N/A	15%
		I-495 at American Legion Bridge	N/A	30%	N/A	25%
		I-495 west of I-95	N/A	5%	N/A	0%
		I-495 at MD 5	N/A	5%	N/A	0%

Note: Gray shaded rows indicate locations outside Phase 1 South limits.