3 TRANSPORTATION AND TRAFFIC

The traffic analysis of the Build Alternatives was documented in the Draft Environmental Impact Statement (DEIS), **Chapter 3** and **DEIS, Appendix C**. It can be viewed through the following links on the project website:

https://495-270-p3.com/wp-content/uploads/2020/11/2020-06-02_DEIS_03_Traffic.pdf

https://495-270-p3.com/wp-content/uploads/2020/07/APP-C_MLS_Traffic-Tech-Report-Appendices.pdf

What is new in this Supplemental DEIS (SDEIS) Chapter:

- Traffic analysis results for the No Build Alternative with an updated design year 2045
- Traffic analysis results for the Preferred Alternative: Alternative 9 - Phase 1 South with design year 2045
- Discussion regarding the impact of COVID-19 on traffic demand and forecasts and the State's ongoing monitoring plan

3.1 Introduction

As noted in **Chapter 1**, any proposed action resulting from the Managed Lanes Study (Study) must accommodate existing congestion on I-495 and I-270 and long-term traffic growth. An understanding of current and projected traffic demands on the transportation network along the study corridors and the surrounding area is essential to properly evaluate how each of the Build Alternatives would address these traffic challenges. The DEIS and its appendices presented results from the traffic operational analyses conducted for the 2040 No Build Alternative and eight (8) Build Alternatives (Alternative 5, Alternative 8, Alternative 9, Alternative 9M, Alternative 10, Alternative 13B, Alternative 13C, and the MD 200 Diversion Alternative). This chapter presents the results from the traffic operational analyses conducted for the 2045 No Build condition and the Preferred Alternative: Alternative 9 - Phase 1 South. For additional details, refer to the *Traffic Evaluation Memorandum: Alternative 9 - Phase 1 South* in **SDEIS, Appendix A**.

3.1.1 Traffic Analysis Data Collection and Modeling Methodology

Baseline conditions for year 2017 and elements of the Study's Purpose and Need are unchanged from the DEIS. The DEIS assumed a design year of 2040. In this SDEIS, detailed traffic operational analyses were performed for the No Build Alternative and the Preferred Alternative for the updated design year of 2045. Refer to Paragraph 1 below and **Section 3.1.3** for additional details regarding why the design year was updated, as planned. Analysis was also completed for this SDEIS to evaluate the Preferred Alternative's ability to meet the Study's Purpose and Need based on year 2045 conditions. Similar to the DEIS, the evaluation methodology included a three-step process:

1. First, a regional forecasting model was developed for the No Build Alternative and Preferred Alternative using the Metropolitan Washington Council of Governments Travel Demand Model (MWCOG model), which is the model typically used by MDOT SHA and other transportation agencies to evaluate projects in the Washington, DC metro area. For the SDEIS, MDOT SHA used an updated version of the MWCOG model, Version 2.3.75, which was released in Fall 2018. The DEIS used an earlier version of the MWCOG model, Version 2.3.71. There are three primary differences between the model versions. First, land use data was

updated as part of MWCOG's regularly updated population, household, and employment cooperative forecasts from Round 9.0 to Round 9.1. Second, the transportation network was updated with new projects per the latest Constrained Long-Range Plan (CLRP), approved in 2018. Finally, forecasts were performed at five-year intervals out to the year 2045, which allowed MDOT SHA to extend the design year to 2045 for analysis in the SDEIS.

2. Next, the outputs from the MWCOG model were used to develop traffic volume projections for the design year of 2045 for each roadway segment and ramp movement within the study limits during the peak periods for the No Build Alternative and Preferred Alternative.
3. Finally, traffic simulation models were developed for the 2045 No Build Alternative and 2045 Preferred Alternative using VISSIM software to determine the projected operational performance in several key metrics during the AM peak period (6AM to 10AM) and the PM peak period (3PM to 7PM). The metrics were selected to evaluate the effectiveness of each of the Build Alternatives to efficiently move people through the region and to provide benefits to the transportation system. These same metrics used to evaluate in this SDEIS were the same used to evaluated for the other Build Alternatives in the DEIS: speed, delay, travel time, level of service, throughput, and local network impacts.

3.1.2 Traffic Analysis Area

The traffic analysis area for the DEIS extended beyond the Study limits to capture upstream and downstream effects. Evaluation of the Preferred Alternative in the SDEIS used the same limits for the VISSIM simulation models as in the DEIS, as shown in **Figure 3-1** and listed below:

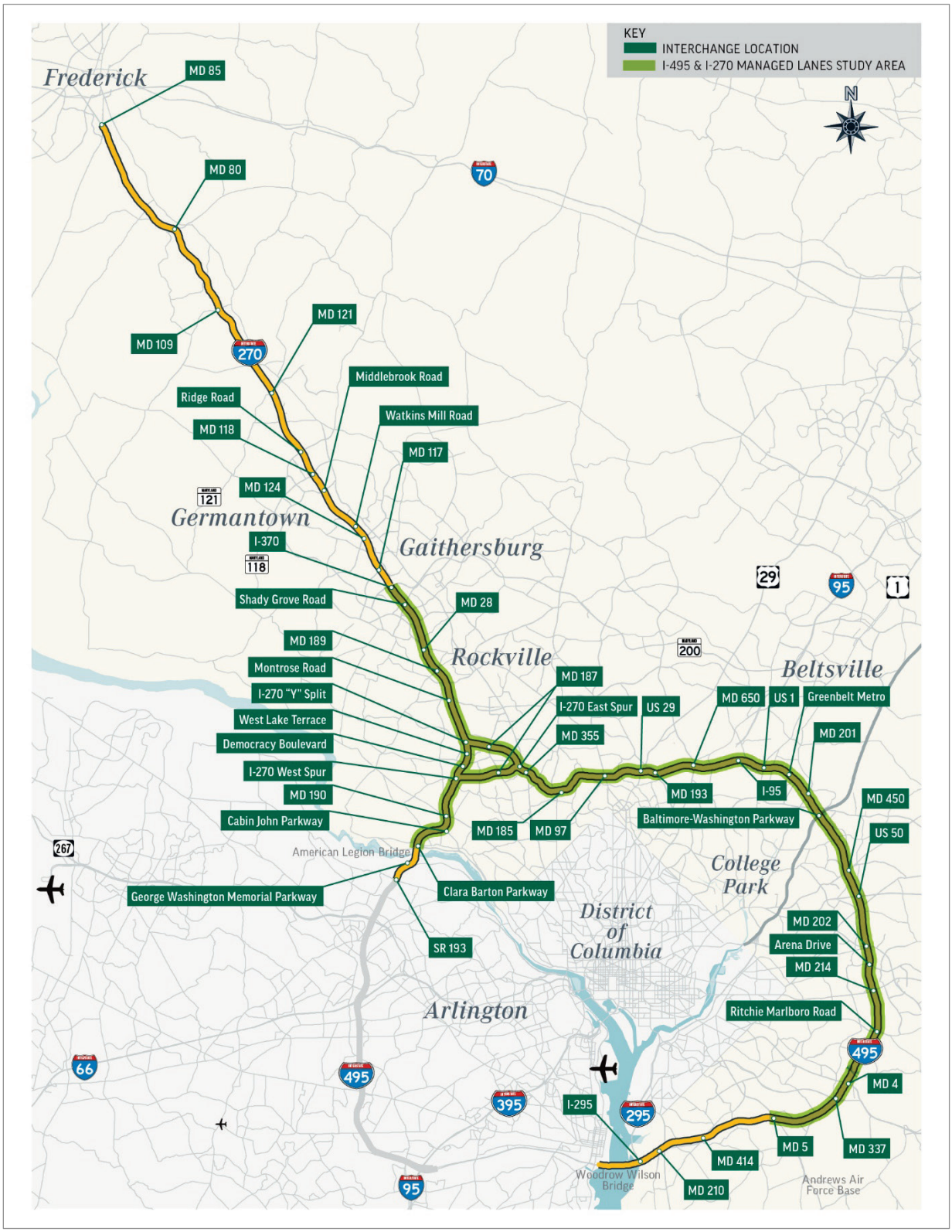
- I-495 from VA 193 in Virginia across the American Legion Bridge (ALB) and through the state of Maryland to the Woodrow Wilson Bridge
- I-270 from the I-70 ramp merges to I-495, including the East and West Spurs

Additionally, the updated version of the MWCOG model used to develop 2045 volume projections for this SDEIS covered the same area as the previous version for the DEIS: the entire National Capital Region of surrounding roadways in 22 jurisdictions, including Montgomery County, Prince George's County, and Frederick County in Maryland, as well as Arlington County and Fairfax County in Virginia, and the District of Columbia.

3.1.3 Traffic Modeling Assumptions

The DEIS used a 2040 design year to evaluate the Build Alternatives. MDOT SHA assumed the design year 2040 for all traffic analysis in the DEIS because at the time the Study began, that was the latest approved regional forecasting model from MWCOG. The 2040 forecasts were used to compare alternatives and determine which alternatives would be expected to provide the best operational benefit to meet the Study's Purpose and Need. A new version of the MWCOG model was approved and released in October 2018 that projected traffic demand out to the year 2045. The DEIS included a sensitivity analysis comparing the 2040 forecasts to the 2045 forecasts (refer to **Appendix J** of the **DEIS, Appendix C**, *Traffic Technical Report*) and a commitment to include updated 2045 operational analyses for the Preferred Alternative to evaluate how that Alternative would meet the Purpose and Need based on the latest MWCOG model. Therefore, this SDEIS assumes a design year 2045 for the No Build Alternative and Preferred Alternative.

Figure 3-1: Limits of VISSIM Model Network and Interchange Locations Included along I-495 and I-270



The analysis for the design year assumed completion of several background projects included in the region's CLRP. The impacts of these background projects were assumed as part of the baseline conditions for the design year 2045 No Build Alternative and for 2045 Preferred Alternative. The following roadway projects of regional significance within the Study limits were not in the baseline model, but were assumed to be in place in the year 2040 in the DEIS and are also assumed to be in place in the year 2045 for the purposes of this Study:

- I-270 Innovative Congestion Management (ICM) Improvements
- Virginia Department of Transportation I-495 Express Lanes Northern Extension (495 NEXT)
- I-270 at Watkins Mill Road Interchange (open to traffic in June 2020)
- Greenbelt Metro Station Access Improvements

Additionally, the benefits of the following proposed transit projects on the traffic demands for the roadway network within the study corridors were accounted for in the 2040 modeling and also included in the 2045 modeling:

- Purple Line Light Rail
- Corridor Cities Transitway (CCT)
- US 29 Bus Rapid Transit (BRT)
- Randolph Road BRT
- North Bethesda Transitway

The updated 2045 MWCOG model also includes the following additional transit projects that are part of Montgomery County's Rapid Transit System that were not included in the 2040 model:

- MD 355 BRT
- Veirs Mill Road BRT
- New Hampshire Avenue BRT

Potential roadway or transit improvements on I-270 from north of I-370 to I-70 were not included as part of this Study, as alternatives for that segment will be developed as part of a separate NEPA process (https://495-270-p3.com/i270-environmental/).

Each of the Build Alternatives studied as part of the traffic analysis for the DEIS and SDEIS included managed lanes. The managed lanes were assumed to be buffer-separated with a physical delineation from the adjacent general purpose (GP) lanes, with access provided via direct connections at key locations. The direct access locations have evolved throughout the Study based on input from the stakeholders and design modifications to avoid or minimize impacts to sensitive resources, while still meeting the Purpose and Need.

The operational analysis results presented in this SDEIS assume direct access would be provided at the following locations, consistent with the latest design for the Preferred Alternative.

- Three (3) Interchanges on I-495:
  - George Washington Memorial Parkway
  - Cabin John Parkway / MD 190
  - I-270 west spur
- A Set of Exchange Ramps, including one (1) slip ramp per direction:

- Outer loop exchange ramp from Maryland high-occupancy toll (HOT) managed lanes to Virginia GP lanes south of the ALB
- Inner loop exchange ramp from Virginia GP lanes to Maryland HOT managed lanes north of Clara Barton Parkway

- Five (5) Interchanges on I-270:
  - I-495 and I-270 Y-split on the west spur
  - Westlake Terrace
  - Wooton Parkway
  - Gude Drive
  - I-370 (to/from the south)

Assumptions related to tolling and considerations for connected and automated vehicles (CAVs) are unchanged from the DEIS and can be found in **DEIS, Chapter 3** at the following link: (https://495-270-p3.com/wp-content/uploads/2020/11/2020-06-02_DEIS_03_Traffic.pdf)

3.1.4 Impact of COVID-19 Pandemic on Traffic Demand and Forecasts

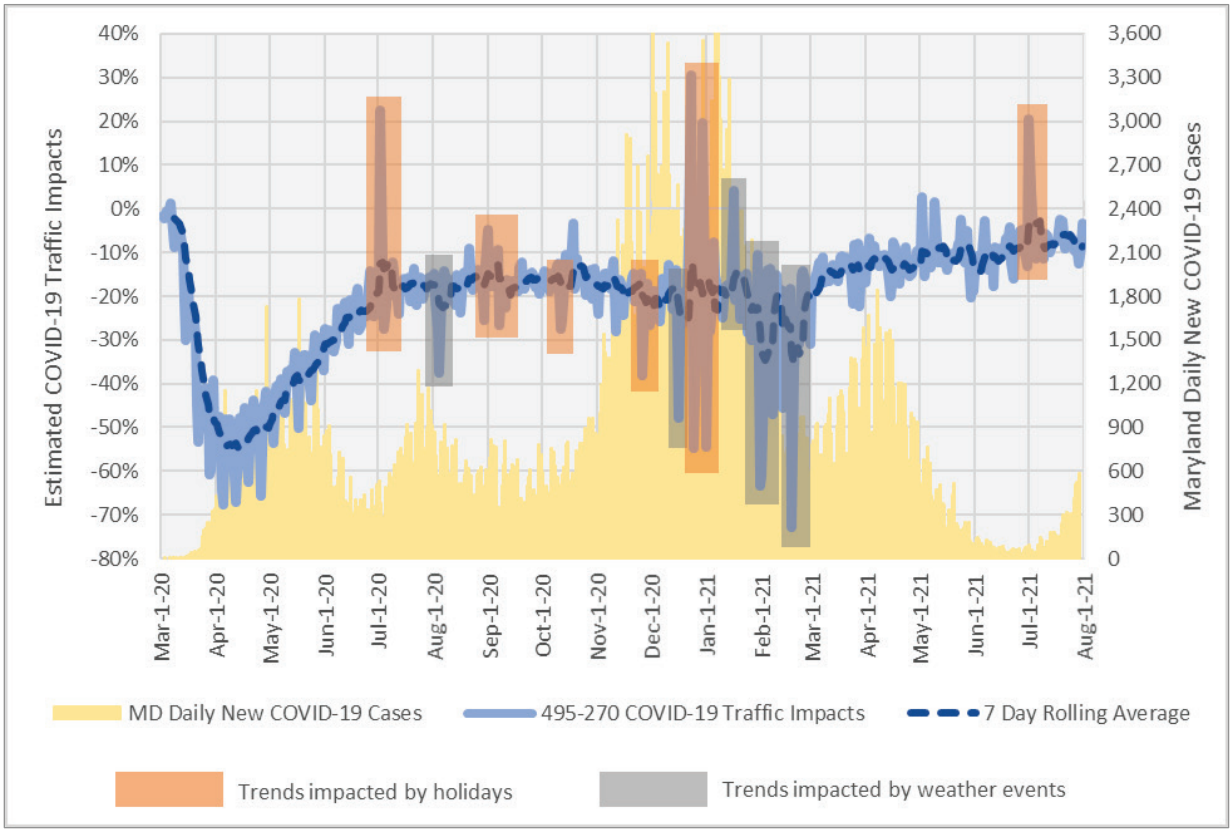
The COVID-19 global pandemic clearly impacted the daily routines of people across the world, affecting the way Maryland residents and regional commuters work, travel, and spend their free time. In the short-term, these changes have altered travel demand, transit use, and traffic volumes on all roadways in Maryland, including I-495 and I-270. 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. **Figure 3-2** 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 August 2021 compared to expected 2021 levels considering two years of growth since 2019. MDOT SHA will continue to monitor volumes into fall 2021 and winter 2021-2022.

Statewide, weekly traffic volumes were only down seven (7) percent for the week of August 16, 2021 compared to the same week in 2019, per MDOT's coronavirus tracking website, linked below. 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 May 2021 than May 2019. Transit use has been slower to recover, with usage of Maryland Transit Administration (MTA) services still down approximately 50 percent compared to pre-pandemic levels as of August 2021 per data presented on MDOT's coronavirus tracking website: (https://www.mdot.maryland.gov/tso/Pages/Index.aspx?PageId=141)

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 projections. To adapt to the ongoing and potential long-term travel impacts associated with the pandemic, MDOT SHA developed a *COVID-19 Travel Analysis and Monitoring Plan* for the Study. A copy of the latest version of the plan is included in **SDEIS, Appendix B**. The plan includes three components:

- **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.

Figure 3-2: Daily Traffic Volume Changes on I-495 and I-270 During COVID-19 Pandemic vs. 2019



This plan will continue to evaluate transportation trends and confirm that the capacity improvements proposed under the Preferred Alternative would be needed and effective if future demand changes substantially from the pre-pandemic forecasts. MDOT SHA must ensure that transportation improvements are being developed to meet our State's needs not only for today, but for the next 25-plus years. Historically, vehicular travel has increased as the economy recovered following economic events and societal changes, such as the 2008 Great Recession. As noted above, traffic volumes within the Study area continue to increase as businesses and schools reopen with more openings expected by fall 2021. Because long-term travel trends are far from settled and because the most recent data suggests traffic is rebounding close to pre-pandemic levels, the SDEIS forecasts continue to apply models that were developed and calibrated prior to 2020 for use in evaluating projected 2045 conditions in this document. However, MDOT SHA will continue to review new data as it becomes available. The 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 as part of the *COVID-19 Travel Analysis and Monitoring Plan* (**SDEIS, Appendix B**) is ongoing. Results will be presented in the Final Environmental Impact Statement (FEIS).

3.2 Existing Conditions

The Study limits are the same as the DEIS and include many of the most heavily traveled, most congested, and most unreliable roadway segments in Maryland[1]. According to the *2019 Maryland State Highway Mobility Report*, the top four highest volume roadway sections in Maryland based on average daily traffic (ADT) are contained within the study limits. These locations include I-270 from the I-270 Split to MD 117, I-495 from the I-270 east spur to I-95, I-495 from the Virginia State Line to the I-270 west spur, and I-495 from MD 4 to I-95. **Table 3-1** shows the existing (year 2017) ADT for each segment within the study area, which reflects total traffic in both directions. Regional travel impacts of the COVID-19 pandemic were discussed above in Section 3.1.4.

Table 3-1: Existing Average Daily Traffic (ADT)

Corridor	Segment	Existing Volumes (2017)
I-270 (both directions)	I-370 to MD 28	226,000
	MD 28 to I-270 Spur	259,000
I-495 (both directions)	at American Legion Bridge	243,000
	MD 190 to I-270 Spur	253,000
	Between I-270 Spurs	119,000
	MD 355 to I-95	235,000
	I-95 to US 50	230,000
	US 50 to MD 214	235,000
	MD 214 to MD 4	221,000
	MD 4 to MD 5	198,000

3.3 Future Traffic Conditions and Alternatives Analysis

Traffic volumes throughout the study corridors are projected to continue to grow over the next 20 to 25 years due to expected increases in population and employment in the Washington, DC metropolitan region. **Table 3-2** shows the projected design year 2040 ADT for each segment along I-495 and I-270 within the study limits under the No Build condition that were presented in the DEIS, as well as the updated design year 2045 ADT values prepared for the SDEIS. Despite many segments already operating at or near capacity, daily traffic volumes on I-270 and I-495 are projected to continue to increase between now and the design year 2045 under the No Build condition.

Table 3-2: Existing and No Build Average Daily Traffic (ADT)

Corridor	Segment	Existing (2017)	No Build (2040)	No Build (2045)
I-270	I-370 to MD 28	226,000	265,000	274,000
	MD 28 to I-270 Spur	259,000	299,000	308,000
I-495	at American Legion Bridge	243,000	277,000	285,000
	MD 190 to I-270 Spur	253,000	282,000	289,000
	Between I-270 Spurs	119,000	127,000	129,000
	MD 355 to I-95	235,000	252,000	256,000
	I-95 to US 50	230,000	245,000	248,000
	US 50 to MD 214	235,000	252,000	256,000

[1] Segments as defined by *2019 Maryland State Highway Mobility Report*

Corridor	Segment	Existing (2017)	No Build (2040)	No Build (2045)
	MD 214 to MD 4	221,000	244,000	249,000
	MD 4 to MD 5	198,000	218,000	223,000

For future traffic conditions, the Preferred Alternative was evaluated and compared to the No Build condition using updated 2045 forecasts for several key operational metrics, including speed, delay, travel time, level of service, throughput, and the effect on the local network. These metrics are the same metrics used in the DEIS to evaluate and compare the alternatives. The results were obtained from the MWCOG model and the VISSIM traffic simulation models and are summarized in the following sections. For additional details, refer to **SDEIS, Appendix A,** *Traffic Evaluation Memorandum: Alternative 9 - Phase 1 South*.

Table 3-3 shows the projected design year 2045 ADT for each segment along I-495 and I-270 within the study limits for the No Build and Preferred Alternative. Locations that add capacity to I-270 and I-495 under the Preferred Alternative would be projected to see an increase in daily traffic volumes served compared to the No Build Alternative because the freeways would be able to accommodate latent demand that would otherwise use the local roadway network to avoid congestion.

Table 3-3: 2045 Average Daily Traffic (ADT)

Corridor	Segment	No Build (2045)	Preferred Alternative (2045)
I-270	I-370 to MD 28	274,000	277,000
	MD 28 to I-270 Spur	308,000	311,000
I-495	at American Legion Bridge	285,000	309,000
	MD 190 to I-270 Spur	289,000	317,000
	Between I-270 Spurs	129,000	135,000
	MD 355 to I-95	256,000	267,000
	I-95 to US 50	248,000	250,000
	US 50 to MD 214	256,000	258,000
	MD 214 to MD 4	249,000	251,000
	MD 4 to MD 5	223,000	224,000

3.3.1 Speed

The metric of average speed was calculated from the traffic simulation model output. Speed data was compiled for all links in the system. Similar to the DEIS, the speed data is summarized in two tables shown below. **Table 3-4** shows the average speed for the Preferred Alternative in the GP lanes for the entire study limits of I-495 and I-270 compared to the No Build Alternative during the peak periods in the design year of 2045 to determine if benefits would be achieved in the GP lanes. The results are shown for the entire study limits to be consistent with the results presented in the DEIS, even though the Build improvements for the Preferred Alternative are only proposed in the Phase 1 South limits.

Table 3-4: 2045 Average Speed

Alternative	Average Speed[1] (GP Lanes)
No Build	24 mph
Preferred Alternative	29 mph

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

The results indicated that the additional capacity proposed under the Preferred Alternative would improve average speed in the GP lanes by five (5) miles per hour (mph) on average throughout the study area during the peak periods compared to the No Build condition.

Detailed corridor travel speed results by peak hour and direction for the GP lanes and the managed lanes are provided in **Table 3-5**. During the 2045 AM peak, speeds in the I-495 GP lanes are projected to improve under the Preferred Alternative compared to No Build and all HOT lanes are projected to maintain speeds of at least 50 mph. On the I-495 outer loop, average speeds in the GP lanes are projected to improve from 33 mph to 52 mph between the I-270 west spur and the George Washington Memorial Parkway and improve slightly (from 26 mph to 27 mph) in the no action area between MD 5 and the I-270 West Spur. On the I-495 inner loop, average speeds in the GP lanes are projected to improve from 36 mph to 45 mph between the George Washington Memorial Parkway and the I-270 west spur and remain unchanged (at 31 mph) in the no action area between MD 5 and the I-270 west spur. On I-270 southbound, average speeds in the GP lanes are projected to improve from 46 mph to 50 mph between I-370 and I-495. On I-270 northbound, speeds are free flow during the AM peak period under both the No Build and the Preferred Alternative. The results show a slight decrease in average speed along I-270 northbound under the Preferred Alternative compared to No Build (from 63 mph to 61 mph) because the No Build data reflects speeds in the Express Lanes and therefore does not account for vehicles in the Local Lanes that are typically moving slower than vehicles in the Express Lanes while entering and exiting the facility.

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

Peak Period	Corridor	Travel Lanes	Alternative	
			No Build	Preferred
AM Peak	I-495 Outer Loop from MD 5 to I-270 West Spur[1]	GP Lanes	26	27
		HOT Lanes	-	-
	I-495 Outer Loop from I-270 West Spur to George Washington Memorial Parkway	GP Lanes	33	52
		HOT Lanes	-	56
	I-495 Inner Loop from George Washington Memorial Parkway to I-270 West Spur	GP Lanes	36	45
		HOT Lanes	-	51
	I-495 Inner Loop from I-270 West Spur to MD 5[1]	GP Lanes	31	31
		HOT Lanes	-	-
	I-270 Northbound from I-495 to I-370	GP Lanes	63[2]	61
		HOT Lanes	-	63
	I-270 Southbound from I-370 to I-495	GP Lanes	46[2]	50
		HOT Lanes	-	58
PM Peak	I-495 Outer Loop from MD 5 to I-270 West Spur[1]	GP Lanes	25	48
		HOT Lanes	-	-
	I-495 Outer Loop from I-270 West Spur to George Washington Memorial Parkway	GP Lanes	37	52
		HOT Lanes	-	59
	I-495 Inner Loop from George Washington Memorial Parkway to I-270 West Spur	GP Lanes	7	7
		HOT Lanes	-	23
	I-495 Inner Loop from I-270 West Spur to MD 5[1]	GP Lanes	23	27
		HOT Lanes	-	-
	I-270 Northbound from I-495 to I-370	GP Lanes	29[2]	28
		HOT Lanes	-	37
	I-270 Southbound from I-370 to I-495	GP Lanes	60[2]	56
		HOT Lanes	-	56

Notes: [1] Shaded rows reflect locations with no action proposed under the Preferred Alternative. [2] No Build results along I-270 are shown for the Express 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.

During the 2045 PM peak, the Preferred Alternative is projected to improve speeds significantly along the I-495 outer loop for both the GP lanes and the HOT lanes. On the I-495 outer loop, average speeds in the GP lanes are projected to improve from 37 mph to 52 mph between the I-270 west spur and the George Washington Memorial Parkway and also improve significantly (from 25 mph to 48 mph) in the no action area between MD 5 and the I-270 west spur due to the Preferred Alternative relieving the downstream bottleneck. The HOT lanes on the I-495 outer loop are projected to operate at free flow conditions (59 mph) during the PM peak. However, speeds along the I-495 inner loop and I-270 northbound are limited by downstream congestion outside the limits of Phase 1 South during the PM peak under the Preferred Alternative. On the I-495 inner loop, average speeds in the GP lanes are projected to remain unchanged (7 mph) between the George Washington Memorial Parkway and the I-270 west spur under the Preferred Alternative during the 2045 PM peak hour compared to the No Build Alternative because of severe congestion on the top side of I-495 in the proposed no action area. Average speeds in the HOT lanes would be better (23 mph) but would not be expected to achieve the desired 45 mph in 2045 without additional improvements along I-495 east of the I-270 west spur.

On I-270 northbound, average speeds in the GP lanes would be similar for the Preferred Alternative compared to the No Build Alternative in the 2045 PM peak without additional improvements on I-270 north of I-370 (speeds would reduce slightly from 29 mph to 28 mph) because of severe congestion where I-270 reduces to two lanes north of the Phase 1 South limits. Average speeds in the HOT lanes would be better (37 mph) but would not be expected to achieve the desired 45 mph without additional improvements along I-270 north of I-370 by 2045. As noted earlier in **Section 3.1.3**, potential improvements in this section of I-270 are being evaluated under a separate pre-NEPA study. On I-270 southbound, speeds in the GP lanes and HOT lanes are free flow during the PM peak period under both the No Build and the Preferred Alternative. The results show a slight decrease in average speed along I-270 southbound under the Preferred Alternative compared to No Build (from 60 mph to 56 mph) because the No Build data reflects speeds in the Express Lanes and therefore does not account for vehicles in the Local Lanes that are typically moving slower than vehicles in the Express Lanes while entering and exiting the facility. Additional details are provided in the *Traffic Evaluation Memorandum: Alternative 9 - Phase 1 South* (**SDEIS, Appendix A**).

3.3.2 Delay

System-wide delay was calculated to determine the average amount of time each vehicle in the traffic simulation model was delayed while trying to reach its destination. Delay can be caused by slow travel due to congestion or vehicles yielding the right-of-way at stop-controlled or signalized intersections. **Table 3-6** shows the projected average delay per vehicle in the entire network under the No Build Alternative and the Preferred Alternative during the 2045 AM peak period and the 2045 PM peak period.

Table 3-6: 2045 System-Wide Delay

Alternative	Average Delay (min/vehicle)		Percent Improvement vs. No Build	
	AM Peak	PM Peak	AM Peak	PM Peak
No Build	12.9	13.6	N/A	N/A
Preferred Alternative	10.6	9.2	18%	32%

The results indicated that the Preferred Alternative would be projected to reduce system-wide delay by 18 percent during the AM peak period and by 32 percent during the PM peak period compared to 2045 No Build conditions. These results reflect all vehicles in the model, including those traveling on I-495 and I-270 for the entire length of the study area (including the no action areas) and those traveling through and within the cross-street interchanges.

3.3.3 Travel Time

Travel time index (TTI) was calculated for each segment of I-495 and I-270 based on the outputs from the traffic simulation model. TTI quantifies the average travel time and congestion levels during the peak periods and 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. TTI also serves as a proxy for the Planning Time Index (PTI), which is used to estimate reliability, because there is a strong correlation between PTI and TTI. Roadways with a lower TTI have some reserve capacity to absorb the disruption caused by non-recurring congestion (and generally have a lower PTI), while roadways with high TTI values are more likely to be impacted by minor incidents (and generally have a higher PTI). **Table 3-7** shows the weighted average TTI values for the entire study area (including the no action areas) in the GP lanes for the Preferred Alternative and the No Build Alternative in the design year 2045.

Table 3-7: 2045 Travel Time Index (TTI)

Alternative	Weighted Average TTI[1] (GP Lanes)
No Build	2.36
Preferred Alternative	2.01

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

MDOT SHA defines "congestion" as any roadway segment with a TTI value greater than 1.15, while "severe congestion" is reached when TTI values exceed 2.0. Under the 2045 No Build Alternative, the weighted average TTI along I-270 and I-495 during the peak hours is 2.36, which reflects severe congestion. The results indicated that the GP lanes under the Preferred Alternative would improve compared to No Build but would remain in the severe congestion category in the design year of 2045. TTI values broken down by segment are provided in **Table 3-8** and have been color coded based on MDOT SHA's definition of uncongested conditions, moderate congestion, heavy congestion, and severe congestion.

The results indicated that the Preferred Alternative would be projected to improve five segments from congested levels under the No Build Alternative (TTI over 1.15) to uncongested (TTI under 1.15) and improve two segments from severe congestion (TTI over 2.0) to heavy congestion (TTI under 2.0). However, the I-495 inner loop from I-270 to I-95 would be projected to degrade during the 2045 AM peak hour from moderate congestion (TTI of 1.3) to severe congestion (TTI over 2.0) due to congestion on the top side of I-495 in the proposed no action area. Additionally, the segment of the I-495 inner loop from Virginia 193 to I-270 would also degrade slightly during the 2045 PM peak hour due to residual effects of congestion in the proposed no action area on the top side of I-495. Additional details are provided in the *Traffic Evaluation Memorandum: Alternative 9 - Phase 1 South* (**SDEIS**, **Appendix A**).

Table 3-8: 2045 Travel Time Index (TTI) Results for General Purpose Lanes from VISSIM Model

Peak Period	Corridor	Alternative	
		No Build	Preferred
AM Peak	I-495 Inner Loop from Virginia 193 to I-270	1.7	1.0
	I-495 Outer Loop from I-270 to Virginia 193	1.3	1.1
	I-495 Inner Loop from I-270 to I-95	1.3	2.7
	I-495 Outer Loop from I-95 to I-270	2.9	2.6
	I-495 Inner Loop from I-95 to MD 5	2.5	1.9
	I-495 Outer Loop from MD 5 to I-95	2.5	2.5
	I-270 Northbound from I-495 to I-370	1.0	1.0
	I-270 Southbound from I-370 to I-495	1.2	1.1
PM Peak	I-495 Inner Loop from Virginia 193 to I-270	6.6	6.9
	I-495 Outer Loop from I-270 to Virginia 193	1.6	1.1
	I-495 Inner Loop from I-270 to I-95	4.8	3.0
	I-495 Outer Loop from I-95 to I-270	3.5	1.1
	I-495 Inner Loop from I-95 to MD 5	1.5	1.8
	I-495 Outer Loop from MD 5 to I-95	2.4	1.5
	I-270 Northbound from I-495 to I-370	1.9	1.9
	I-270 Southbound from I-370 to I-495	1.0	1.0

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. [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).

3.3.4 Level of Service

Level of Service (LOS) is a letter grade assigned to a section of roadway that measures the quality of traffic flow, ranging from LOS A to LOS F. LOS A represents optimal, free-flow conditions, while LOS F represents failing conditions where demand exceeds capacity. For freeway segments, the *Highway Capacity Manual* assigns LOS grades based on density. Urban freeway segments reach failing (LOS F) conditions when the density exceeds 45 passenger cars per mile per lane. The percentage of lane-miles projected to operate at LOS F during the peak periods in the design year of 2045 was calculated from the traffic simulation model output for the Preferred Alternative and the No Build Alternative. The results include the entire study areas (including the no action areas) and are shown in **Table 3-9.**

Table 3-9: 2045 Percent of Lane-Miles Operating at LOS F

Alternative	Percent of Lane-Miles Operating at LOS F		
	AM Peak	PM Peak	Average
No Build	33%	50%	41%
Preferred Alternative	29%	29%	29%

The results indicated that the Preferred Alternative would be effective at reducing the number of failing segments within the study corridors. However, it is projected that 29 percent of the lane miles would continue to operate at LOS F in the design year of 2045 under the Preferred Alternative, primarily in areas along I-495 east of the I-270 east spur that would have no action.

3.3.5 Throughput

The metric of vehicle throughput was calculated from the traffic simulation model output to quantify how efficiently goods, services, and people could be moved through the study corridors under each alternative. Throughput represents the number of vehicles that pass by a given point in the roadway network in a set amount of time. Four key locations were chosen for evaluating throughput during the peak periods: I-495 crossing the American Legion Bridge, I-495 west of I-95, I-495 at MD 5, and I-270 at Montrose Road. These locations cover the four main segments of the study area, separated by major freeway junctions (I-495 at I-95 and I-495 at I-270) and are considered representative of the entire study area. **Table 3-10** summarizes the average vehicle-throughput at the four key locations for the No Build Alternative and the Preferred Alternative in terms of vehicles per hour. The values include traffic traveling in both directions and account for vehicles traveling in both the GP lanes and the managed lanes. For consistency, the same four key locations used in the DEIS are reported in this SDEIS even though the Preferred Alternative includes no action in two of the four locations. Under No Build conditions, the number of vehicles (and people) that can travel through the system during the peak period is constrained by congestion. The Preferred Alternative would result in increased throughput compared to the No Build Alternative. This translates into increased efficiency of the roadway network in getting people, goods, and services to their destinations. Additional benefits of increased throughput on the highway include reduced peak spreading (i.e., less congestion in the off-peak hours) and reduced burden on the surrounding roadway network.

Table 3-10: 2045 Vehicle Throughput

Alternative	Average Vehicle Throughput at Four Key Locations[1] (veh/hr)
No Build	15,600
Preferred Alternative	17,600

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 3-11 provides additional detail by showing the vehicle throughput results generated from the VISSIM outputs at each key location. Results are reported in terms of vehicles per hour and percent increase in vehicle-throughput for the Preferred Alternative compared to the No Build Alternative, rounded to the nearest five (5) percent. As expected, the most significant increases under the Preferred Alternative occur at the locations where HOT lanes are proposed (I-495 at the American Legion Bridge and I-270 at Montrose Road). For additional information, refer to the *Traffic Evaluation Memorandum: Alternative 9 - Phase 1 South* (**SDEIS, Appendix A**).

Table 3-11: 2045 Vehicle Throughput Results from VISSIM Model

Metric	Peak Period	Location	Alternative	
			No Build	Preferred
Vehicle-Throughput (veh/hr)	AM Peak	I-495 at American Legion Bridge	17,869	22,930
		I-495 west of I-95	15,393	14,523
		I-495 at MD 5	10,661	12,197
		I-270 at Montrose Rd	17,765	20,774

Metric	Peak Period	Location	Alternative	
			No Build	Preferred
	PM Peak	I-495 at American Legion Bridge	15,999	19,635
		I-495 west of I-95	14,896	15,965
		I-495 at MD 5	14,591	14,086
		I-270 at Montrose Rd	17,403	20,563
Percent Change in Vehicle-Throughput vs. 2045 No Build	AM Peak	I-495 at American Legion Bridge	N/A	30%
		I-495 west of I-95	N/A	< 0%
		I-495 at MD 5	N/A	15%
		I-270 at Montrose Rd	N/A	15%
	PM Peak	I-495 at American Legion Bridge	N/A	25%
		I-495 west of I-95	N/A	5%
		I-495 at MD 5	N/A	< 0%
		I-270 at Montrose Rd	N/A	20%

3.3.6 Local Network

While the focus of the Study is to provide benefits to travelers using I-495 and I-270, the proposed action would also have impacts on the surrounding local roadway network[2]. This impact was quantified by using the results of the MWCOG regional model output for the No Build Alternative and the Preferred Alternative to calculate the total vehicle hours of delay on all arterials in Montgomery County, Maryland, Prince George's County, Maryland, and the District of Columbia. Other regions in Maryland and Virginia showed negligible changes in local delay as a result of the project. **Table 3-12** shows the relative change in total delay on the local network for the Preferred Alternative compared to the No Build Alternative. The results indicated that the Preferred Alternative would be projected to result in a net reduction in daily delay on the surrounding arterials of 3.5 percent by drawing traffic off the local network, despite some localized increases in arterial traffic near the managed lane access interchanges.

Table 3-12: 2045 Effect on the Local Network

Alternative	Percent Reduction Local Network Delay vs. No Build[1]
No Build	N/A
Preferred Alternative	3.5%

Note: [1] Based on total daily vehicle-hours of delay from 2045 MWCOG model for arterials in Montgomery County, Prince George's County, and the District of Columbia

[2] For the purposes of this Study, the local roadway network includes minor and principal arterials, but not roadways that are classified as expressways, freeways, or interstate.

Table 3-13 provides additional detail by showing the total vehicle hours of delay and percent reduction compared to the 2045 No Build Alternative for arterials in Montgomery County, Prince George's County, and the District of Columbia individually. Montgomery County would be projected to experience the largest local network savings under the Preferred Alternative as a result of the proposed physical roadway widening along portions of I-495 and I-270 in Montgomery County to provide HOT lanes under this Alternative. Prince George's County and the District of Columbia would also expect to experience some benefits to the local network despite no physical roadway improvements within these jurisdictions under the Preferred Alternative.

Table 3-13: 2045 Local Network Results from MWCOG Model

Metric	Alternative	
	No Build	**Preferred**
Daily Delay (vehicle-hours) for All Arterials in Montgomery County	242,408	230,882
Percent Reduction vs. No Build (Montgomery County)	*N/A*	*4.8%*
Daily Delay (vehicle-hours) for All Arterials in Prince George's County	160,143	157,832
Percent Reduction vs. No Build (Prince George's County)	*N/A*	*1.4%*
Daily Delay (vehicle-hours) for All Arterials in District of Columbia (DC)	176,612	169,859
Percent Reduction vs. No Build (District of Columbia)	*N/A*	*3.8%*
Total Daily Delay (vehicle-hours) for All Arterials in Montgomery County, Prince George's County, and the District of Columbia (DC)	579,163	558,573
Percent Reduction vs. No Build (Total)	**N/A**	**3.5%**

3.3.7 Summary

The following summarizes the results of the design year 2045 traffic operational evaluation for the No Build Alternative and the Preferred Alternative presented in this chapter of the SDEIS.

1. The **No Build Alternative** would not address any of the significant operational issues experienced under existing conditions, and it would not be able to accommodate long-term traffic growth, resulting in slow travel speeds, significant delays, long travel times, and an unreliable network. Compared to the 2040 No Build results presented in the DEIS, the 2045 No Build results show higher delays and travel times on I-495 and I-270 due to additional projected traffic growth between 2040 and 2045. This traffic growth is anticipated despite additional transit projects included in the 2045 forecast that help to slightly reduce projected delays on the surrounding local roadway network.

2. The **Preferred Alternative** is projected to provide meaningful operational benefits to the system even though it includes no action or no improvements for a large portion of the study area to avoid and minimize impacts. This alternative would significantly increase throughput across the American Legion Bridge and on the southern section of I-270 while reducing congestion. It would also increase speeds, improve reliability, and reduce travel times and delays along the majority of I-495, I-270, and the surrounding roadway network compared to the No Build Alternative. Although the Preferred Alternative provides less improvement to traffic operations when compared to the Build Alternatives that included the full 48-mile study limits evaluated in the DEIS

(such as Alternatives 9 and 10), it was chosen based in part on feedback from the public and stakeholders who indicated a strong preference for eliminating property and environmental impacts on the top and east side of I-495. Congestion would be present during the PM peak period on I-270 northbound and the I-495 inner loop in the design year of 2045 due to downstream bottlenecks outside of the Preferred Alternative limits. .

3.4 Next Steps

As the Study progresses, traffic models for the Preferred Alternative will continue to be refined and updated to reflect ongoing design enhancements resulting from stakeholder coordination. In addition, MDOT SHA will continue to monitor traffic trends and changes in travel behavior related to the COVID-19 pandemic and will complete a sensitivity analysis of potential long-term impacts to the forecasts per the *COVID-19 Travel Analysis and Monitoring Plan* (**SDEIS, Appendix B**). These updated traffic results will be documented in the FEIS.

MDOT SHA will also continue to work with FHWA to evaluate operations and safety at the project termini and at all interchanges within the limits of the proposed build improvements as part of the Interstate Access Point Approval (IAPA) process. This requires an evaluation of the operations and safety of each interchange including the nearby intersections by analyzing any localized increase in demand on cross streets near the interchange. The IAPA will evaluate potential ways to mitigate increases in traffic volumes to ensure safe and efficient operations on these roads. Potential mitigation strategies include signal timing adjustments, adding or extending turn lanes, changing lane assignments, pedestrian and bicycle improvements, modification to intersections such as new traffic signals, and TDM strategies such as dynamic signage to encourage traffic to use I-270 and MD 200 when practical to avoid congested segments in the no action areas. These mitigation strategies will continue to be refined as the IAPA is completed and will be included in the FEIS. Any mitigation proposed will avoid environmental impacts along I-495 outside of the Phase 1 South limits. The IAPA will be included as an appendix to the FEIS.