Route 7 Concept Study

Traffic Operations and Safety Report-Draft

February 10, 2021

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EXECUTIVE SUMMARY

This traffic operations and safety report examines existing and projected future conditions along Route 7 in Loudoun County, Virginia, between Dranesville Rd (Route 228) at the Fairfax County line to the Route 28 interchange, a distance of approximately 4.25 miles. This study includes an evaluation of the history of reported crashes occurring during recent years, an analysis of traffic operations along the corridor under existing conditions, travel demand forecasts for a 2040 No-Build alternative and (to-date) one 2040 Build alternative, and an analysis of the traffic operations expected under those alternatives.

Based on the data for the intersection-related crashes, it appears that rear-end collisions have been the predominant crash type. Research has shown that the presence of traffic signals can lead to an increase in the frequency of rear-end crashes, particularly in areas with heavier volumes, so these trends are consistent with Route 7 within the study area.

Traffic analyses for this study were performed using *VISSIM*. These *VISSIM* models were calibrated in accordance with the VDOT *VISSIM Users Guide* and the VDOT *Traffic Operations and Safety Analysis Manual, Version 2.0* (TOSAM), which recommend following the calibration process as described in the FHWA *Traffic Analysis Toolbox Volume III: Guidelines for Applying Traffic Microsimulation Modeling Software (FHWA-HRT-04-040)*. Traffic volume data for model calibration and analysis were collected in June 2019 and, therefore, were not impacted by the ongoing COVID-19 pandemic.

Traffic volume projections for 2040 were forecast by examining the Loudoun County Travel Demand Model output as well as historical VDOT traffic volume counts and estimates. Based on this evaluation, Loudoun County DTCI found it acceptable to use a +1% annual growth rate (applied exponentially) to adjust Existing traffic counts to Year 2040 levels for analysis in this study.

As part of the Route 7 Concept Study, several potential Build alternatives were developed at the sketch planning level and presented to Loudoun County DTCI staff and representatives from other government and institutional stakeholders during a brainstorming work session in August 2020. Of these potential improvement options, the Modified Superstreet Corridor was selected to be the first of several potential alternatives to be retained for more detailed analysis. This concept is referred to as Alternative 1. The primary feature of this alternative is the elimination of all through and left-turn movements from cross-streets along Route 7 and the diversion of those displaced volumes to U-turn movements at some existing intersections and some new signalized intersections to be built solely for this purpose. However, this alternative also assumes the existing cloverleaf interchange along Route 7 at Cascades Pkwy would be replaced with a tight diamond interchange to eliminate ramp junctions along Route 7, and the intersection of Route 7 and Dranesville Road (in Fairfax County) would be rebuilt as a “Green-T” to support a conservative analysis of Route 7 traffic operations downstream of this existing constraining location.

The analysis performed in this study shows that traffic operations would improve at some locations under Alternative 1 while they worsen at other locations under Alternative 1. However, during the PM peak hour, there would not be much change in LOS for Alternative 1 compared to the No-Build alternative.

In terms of density on the Route 7 roadway segments through the Cascades Parkway interchange, the analysis results show an improvement (i.e., reduction) in the density (vehicles per mile per lane) with the tight diamond interchange (TDI) configuration proposed under Alternative 1. This is likely due to the removal of an on- and off-ramp in each direction along Route 7 and the corresponding elimination of the weaving segment between those ramps.

Examining the corridor end-to-end travel times along Route 7 shows that Alternative 1 would result in a substantial improvement (i.e., reduction) in travel time in the peak direction (eastbound) during the AM

peak hour. The time required to travel the 4.25-mile study corridor eastbound would be reduced by more than 4 minutes – a 28% reduction in travel time. For reference, the red light (or red interval) duration of the traffic signals along Route 7 is about 80 seconds; therefore, the travel time savings are roughly equivalent to a driver not having to wait at three traffic signals. However, a comparison of the PM peak hour, peak direction (westbound) travel times shows that Alternative 1 would have no impact. The time required to travel the 4.25-mile study corridor westbound would remain at 11 minutes for Alternative 1 – the same as under the No-Build alternative.

The addition of 6 new traffic signals along Route 7 to accommodate the movements displaced by Alternative 1's modified superstreet configuration may offset the crash-reducing benefits of eliminating some conflict points at the existing intersections. These existing conflict points would be reduced by prohibiting through and left-turn movements from the cross-streets at the existing signalized intersections along Route 7.

Conclusion

There are several tangible benefits associated with Alternative 1 that are evident when comparing its performance to that of the No-Build alternative:

- Improved AM peak period travel times for eastbound traffic
- Reduced number of conflict points at existing intersections; potentially reducing the likelihood of crashes at those locations

However, there remain several areas where performance would decrease under Alternative 1, such as LOS for the cross-street approaches and for the proposed U-turn movements. Furthermore, the potential for crash reduction under Alternative 1 may be small.

Additional build alternatives may be developed in the future depending on the outcome of Loudoun County DTCI's review of the Alternative 1 benefits and challenges, including the traffic analysis results in this study.

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1. INTRODUCTION

The purpose of this report is to summarize the findings of the traffic operations analysis for Route 7 in Loudoun County, Virginia, extending from just west of Route 228 (Dranesville Road) at the Fairfax County/Loudoun County boundary to slightly west of the Route 28 (Sully Road) interchange, a distance of 4.25 miles. This document examines the safety and traffic operations for Existing Year 2020, plus travel forecasting and traffic operations for 2040 No-Build and Build alternatives. The traffic operations for all scenarios were evaluated using *VISSIM*. Using *VISSIM* allowed for the accurate simulation of driver behavior at the combination of signalized intersections, unsignalized driveways, and ramp merge and diverge areas along this study corridor. *VISSIM* also provides the level of control over the vehicle paths (i.e., lane changing behavior) between intersections that is required to simulate innovative intersection designs that could be considered along the corridor. The Existing conditions model development included the calibration process defined in the Virginia Department of Transportation (VDOT) Traffic Operations and Safety Analysis Manual (TOSAM) and VDOT *VISSIM* User Guide. Measures of effectiveness (MOEs) were reported for the 8 signalized intersections, 3 unsignalized intersections, 9 driveways, 11 ramp merge and diverge areas, 4 ramp weave sections, and 8 basic freeway segments. **Figure 1** illustrates the overall project study area and shows the locations of the signalized intersections along the corridor.

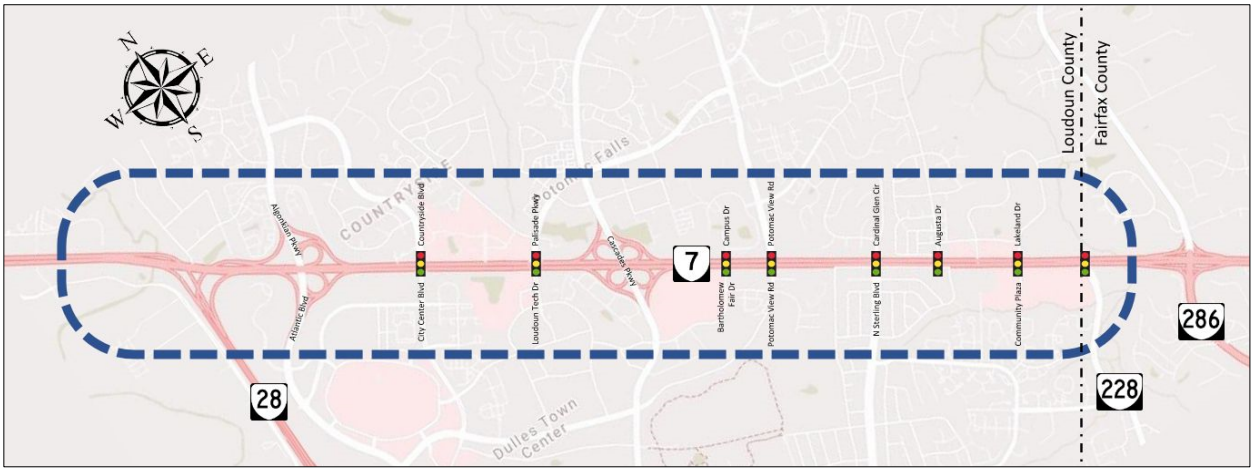


Figure 1: Map of the Study Area

2. SAFETY EVALUATION

As part of this study, a crash analysis was performed along the corridor, using a seven-year crash dataset for the period (2013-2019) obtained from VDOT's Traffic Engineering Tableau Crash Analysis Tool, available online. The study area extends along Route 7 between Dranesville Road and Waverly Road, slightly west of the on/off ramps to/from Sully Road/Darrell Green Boulevard (Route 28). The crash analysis was performed to review patterns across the study area including on type of injury, collision type, travel direction, surface condition, and lighting conditions. **Figure 2** and **Figure 3** illustrate "heat maps" of the crashes reported within the study area between 2013 and 2019.

A total of 1,514 crashes occurred within the study area between 2013 and 2019; including 4 (less than 0.5%) fatal injuries, 447 (approximately 30%) injury related (including nonvisible, visible, and severe injuries) and 1063 (70%) Property Damage Only (PDO) related crashes. During this 7-year study period, there was an average of 216 crashes per year, which amounts to an average of 18 crashes per month along the entire corridor. Considering only the intersection-related crashes, there was an average of 135 crashes per intersection.

Analysis of the crash data resulted in the following insights:

- Approximately 59% of the total crashes were rear end crashes, 20% were angle crashes, and 9% were sideswipe crashes.
    - 76% of the rear end collisions occurred along eastbound and westbound Route 7 approaching signalized intersections.
    - 42% of the length of Route 7 within the study corridor is located within signalized intersections.
    - Therefore, a disproportionate number of rear-end crashes occurred at signalized intersections, and there is a correlation between overall crash frequency and the prevalence of traffic signals along the corridor.
- Poor roadway conditions due to weather do not seem to be directly associated with the overall crash frequency; 82% of the total crashes were on dry roadway conditions, while only 16% of the crashes occurred on wet roadway conditions.
- 817 people were injured across the study area, including 8 pedestrians. 97 (12%) people sustained severe injuries, 589 (72%) people sustained visible injuries, and 127 (15%) sustained non-visible injuries.
- 462 crashes occurred during the Fall (October-December), 372 crashes occurred during the winter (January-March), 314 crashes occurred during the spring (April-June), and 366 crashes occurred during the summer (July-September).
- More crashes occurred during November and December than any other month. When analyzing crashes occurring during the month of November, the majority of crashes occurred during the first half of the month as opposed to during the Thanksgiving holiday period. When analyzing crashes occurring during the month of December, there is a considerable spike in crashes slightly before Christmas and a dramatic decrease in crashes between Christmas and New Year Eve. Additionally, the analysis shows crashes were not higher during other holidays (Memorial Day, 4th of July, Labor Day) when compared to the time periods surrounding the holidays.
- 104 (7%) crashes were related to alcohol or drug consumption.
- The majority of the crashes (64%) occurred under daylight conditions. For crashes occurring under nighttime conditions, 55% occurred were under lit conditions while 44% occurred were under not lit conditions.
- Crash frequency has decreased between 2013 and 2017. 2018 experienced the most crashes, followed by approximately a 25% reduction in crashes in 2019.
- Crash frequency was balanced between the eastbound and westbound directions, each of which adds up to 50% of the total crashes.

Crashes at the signalized intersections along the study area were further analyzed to attribute any localized safety issues related to the design context of each of the intersections. **Table 1** to **Table 8** summarize the crashes reported at each of the signalized intersections along the corridor between 2013 and 2019.

1. Route 7 at Dranesville Road:
    a. Out of the 150 crashes, 58% were rear end approximately 30% were angle crashes.
    b. 70% of the crashes are PDO crashes.
    c. 67% of the crashes occurred during daylight conditions.
    d. Intersection averages: 150 crashes, 21 crashes per year, 1.8 crashes per month

2. Route 7 at Lakeland Drive/Community Plaza:
    a. Out of the 93 crashes at this location, 60% were rear end crashes.
    b. 80% of the crashes are PDO crashes.
    c. 67% of the crashes occurred during daylight conditions.
    d. Intersection averages: 93 crashes, 12.3 crashes per year, 1.1 crashes per month
    e.
3. Route 7 at Augusta Drive:
    a. Out of the 107 crashes occurring at this location, approximately 70% were rear end crashes.
    b. 70% of the crashes were PDO crashes.
    c. One fatality occurred at this location, which was a pedestrian crash and was alcohol related.
    d. Approximately 70% of crashes occurred during daylight conditions.
    e. Intersection averages: 107 crashes, 15.3 crashes per year, 1.3 crashes per month

4. Route 7 at Cardinal Glen Circle/N Sterling Boulevard:
    a. Out of the 140 crashes occurring at this intersection, 75% were rear-end crashes.
    b. 75% of the crashes were also PDO crashes.
    c. 75% of the crashes occurred on dry roadway conditions.
    d. 55% of the crashes occurred during daylight conditions.
    e. Intersection averages: 140 crashes, 20 crashes per year, 1.7 crashes per month

5. Route 7 at Potomac View Road:
    a. Out of the 176 crashes occurring at this location, approximately 59% were rear end crashes and 25% were angle crashes.
    b. Two pedestrian crashes occurred at this location, resulting in severe injuries, one of which was alcohol related, while the other one involving a senior citizen.
    c. Intersection averages: 176 crashes, 25.1 crashes per year, 2 crashes per month

6. Route 7 at Campus Drive/Bartholomew Fair Drive:
    a. Out of the 112 crashes occurring at this location, 60% were rear end crashes
    b. Approximately 61% of the crashes were PDO crashes.
    c. 70% of the crashes occurred during daylight conditions.
    d. Approximately 87% of the crashes occurred under dry roadway surface conditions.
    e. There were 2 pedestrian crashes occurring at this location, one in 2014 while the other in 2019, one of which resulted in a fatality and was alcohol related, while the other resulted in a severe injury and involved a senior citizen.
    f. Intersection averages: 112 crashes, 16 crashes per year, 1.3 crashes per month

7. Route 7 at Palisade Parkway/Loudoun Tech Drive:
    a. Out of 117 crashes occurring at this location, 55% were rear-end crashes.
    b. Approximately 70% of the crashes were PDO crashes.
    c. 77% of the crashes occurred on dry roadway surface conditions.
    d. 60% of the crashes occurred during daylight conditions.
    e. Intersection averages: 117 crashes, 16.7 crashes per year, 1.4 crashes per month

8. Route 7 at Countryside Boulevard/City Center Boulevard:
    a. Out of 192 crashes occurring at this location, 63% were rear-end crashes.
    b. One pedestrian crash occurred at this location, resulting in a visible injury.
    c. Approximately 65% of the crashes were PDO crashes.
    d. 84% of the crashes occurred on dry roadway conditions.
    e. 60% of the crashes occurred during daylight conditions.
    f. Intersection averages: 192 crashes, 27.4 crashes per year, 2.3 crashes per month

Based on the data for the intersection-related crashes, it appears that rear-end collisions have been the predominant crash type. Several studies have shown that the presence of traffic signals can lead to an increase in the frequency of rear-end crashes, particularly in areas with heavier volumes, so these trends are consistent with Route 7 within the study area. A review of Crash Modification Factors (CMF) available in the FHWA Clearinghouse database shows that roadway geometry is primarily a factor in crashes at signalized intersections only if it impairs drivers' visibility of the signal indications. Route 7 is mostly in a tangent section, and generally level, so the existing geometry is not likely the root cause of the most commonly occurring crashes along the corridor. The number of lanes can affect travel speed (i.e., traffic may travel at higher speeds if more lane capacity is available), and several CMFs show a correlation between higher speeds and increasing crash frequency. According to the CMF Clearinghouse, factors such as signal phasing, signal timing, and clearance intervals have a greater effect on crash frequency than roadway geometry.

The frequency of pedestrian-involved crashes was relatively low compared to the other crash types, and 2 of the 4 pedestrian crashes reported involved alcohol impaired pedestrians. Several intersections had a nighttime crash percentage of 40% or more, which suggests that street lighting should be reviewed for appropriateness of location and adequacy of brightness.

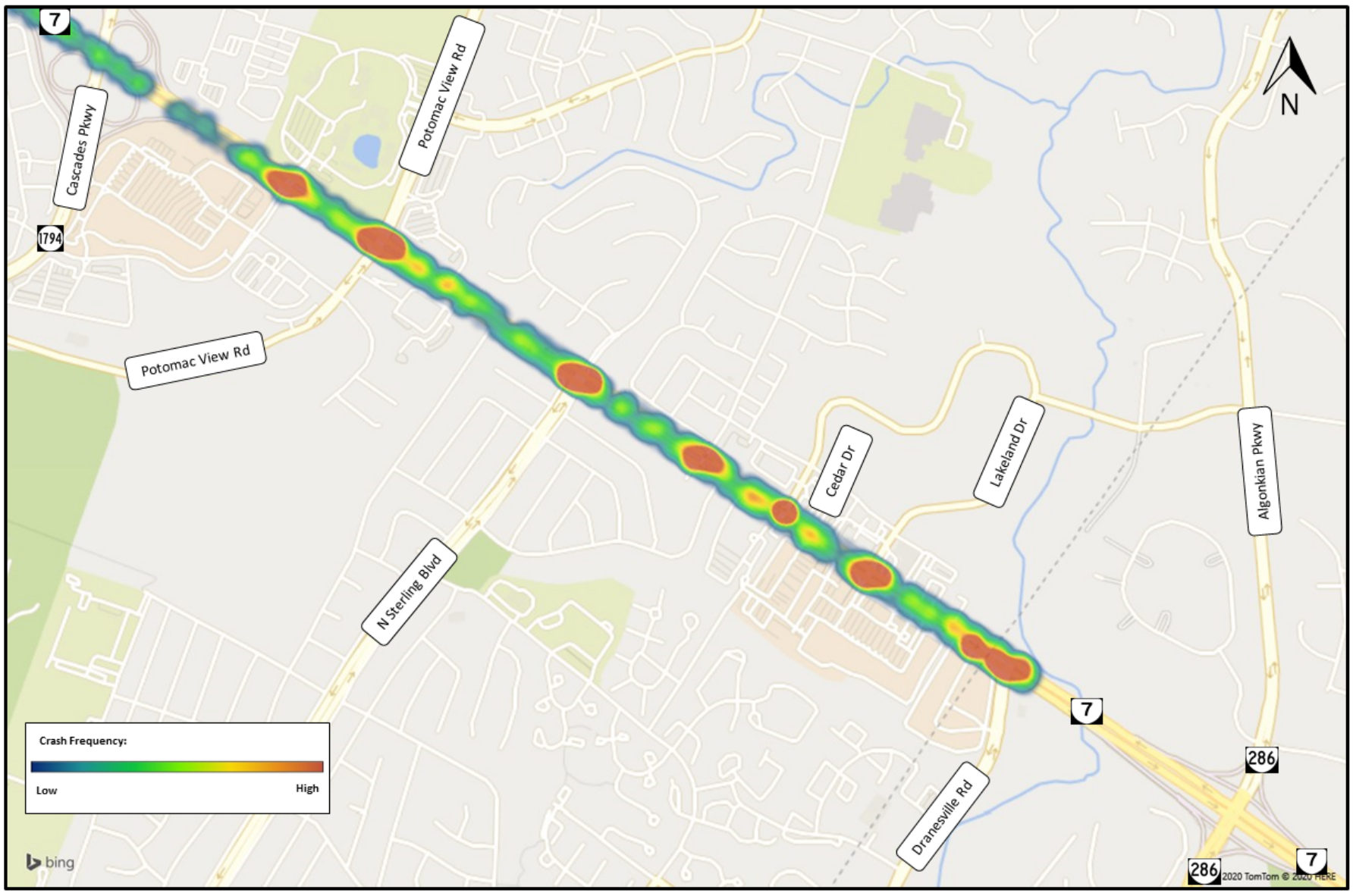


Figure 2: Crash Frequency Heat Map (2013-2019) along Route 7 East of Cascades Pkwy

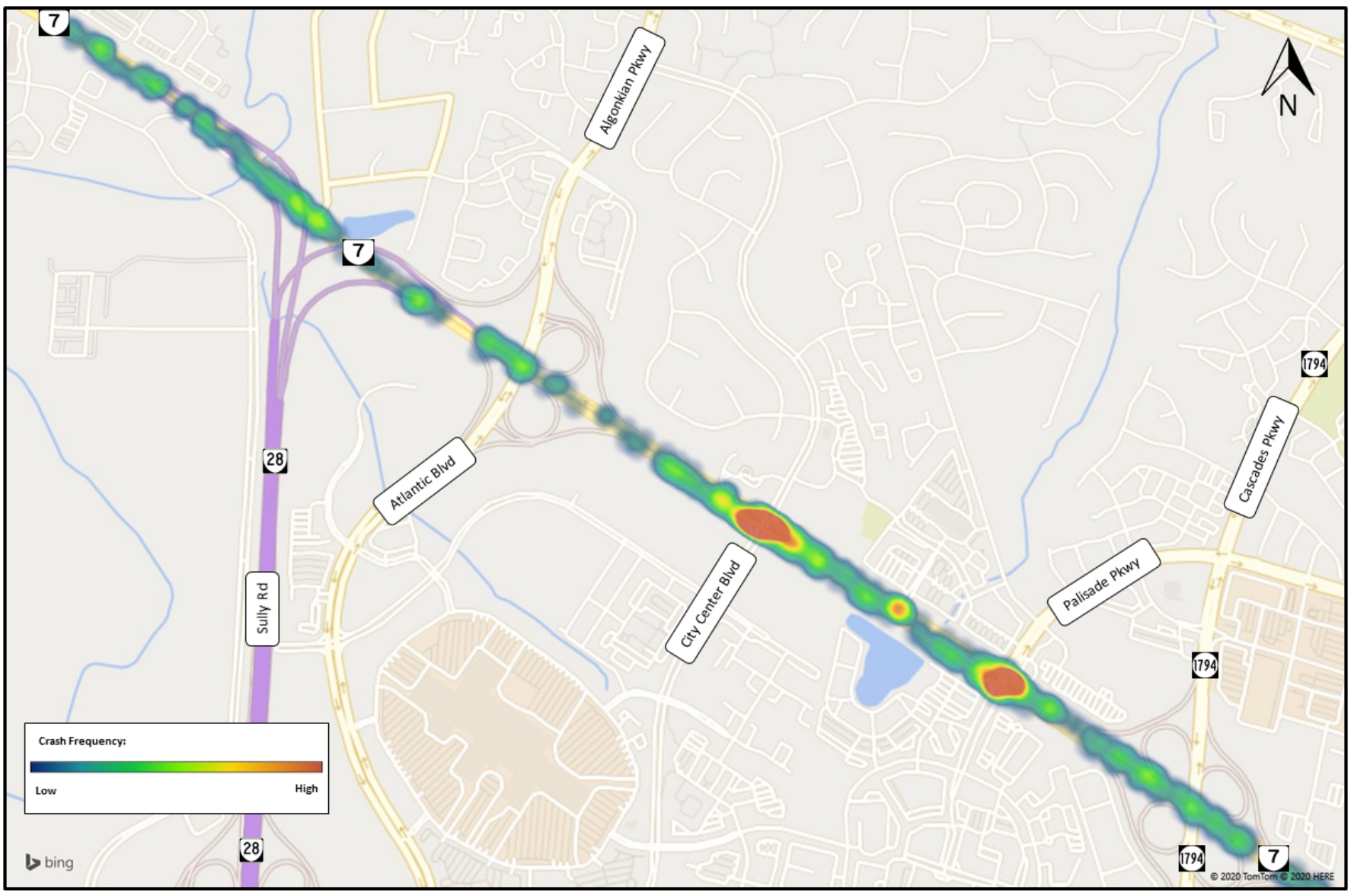


Figure 3: Crash Frequency Heat Map (2013-2019) along Route 7 West of Cascades Pkwy

Table 1: Route 7 and Route 228 (Dranesville Road) Crash Summary

Year	Type				Crash Severity			Surface Condition		Light Condition	
	Rear End	Angle	Other	Pedestrian	PDO	Injury	Fatality	Dry	Wet/Icy	Daylight	Dark
2013	12	6	3	0	13	8	0	18	3	14	7
2014	16	4	1	0	13	8	0	16	5	14	7
2015	18	8	4	0	19	11	0	23	7	21	9
2016	5	6	2	0	10	3	0	11	2	8	5
2017	13	3	5	0	14	7	0	16	5	13	8
2018	11	7	3	0	21	0	0	18	3	14	7
2019	12	10	1	0	15	8	0	21	2	16	7
Total	**87**	**44**	**19**	**0**	**105**	**45**	**0**	**123**	**27**	**100**	**50**

Table 2: Route 7 and Lakeland Drive/Community Plaza Crash Summary

Year	Type				Crash Severity			Surface Condition		Light Condition	
	Rear End	Angle	Other	Pedestrian	PDO	Injury	Fatality	Dry	Wet/Icy	Daylight	Dark
2013	9	2	2	0	11	2	0	12	1	9	4
2014	8	2	1	0	9	2	0	10	1	6	5
2015	2	2	4	0	6	2	0	7	1	2	6
2016	9	5	1	0	10	5	0	12	3	10	5
2017	10	1	3	0	10	4	0	12	2	13	1
2018	11	5	1	0	15	2	0	13	4	10	7
2019	7	5	3	0	13	2	0	12	3	13	2
Total	**56**	**22**	**15**	**0**	**74**	**19**	**0**	**78**	**15**	**63**	**30**

Table 3: Route 7 and Augusta Drive Crash Summary

Year	Type				Crash Severity			Surface Condition		Light Condition	
	Rear End	Angle	Other	Pedestrian	PDO	Injury	Fatality	Dry	Wet/Icy	Daylight	Dark
2013	18	4	0	0	16	6	0	21	1	14	8
2014	14	0	3	0	13	4	0	13	4	9	8
2015	6	2	0	1	4	4	1	6	3	6	3
2016	9	1	1	0	5	6	0	10	1	8	3
2017	9	3	3	0	10	5	0	13	2	13	2
2018	18	1	5	0	18	6	0	20	4	19	5
2019	3	5	1	0	8	9	0	7	2	7	2
Total	**77**	**16**	**13**	**1**	**74**	**40**	**1**	**90**	**17**	**76**	**31**

Table 4: Route 7 and Cardinal Glen Circle/N Sterling Boulevard Crash Summary

Year	Type				Crash Severity			Surface Condition		Light Condition	
	Rear End	Angle	Other	Pedestrian	PDO	Injury	Fatality	Dry	Wet/Icy	Daylight	Dark
2013	18	0	0	0	11	7	0	14	4	11	7
2014	8	5	2	0	10	5	0	13	2	8	7
2015	10	3	1	0	11	3	0	14	0	8	6
2016	19	2	1	0	13	9	0	16	6	9	13
2017	20	5	1	0	21	5	0	14	12	11	15
2018	17	8	3	0	24	4	0	21	7	19	9
2019	13	2	2	0	14	3	0	12	5	12	5
Total	**105**	**25**	**10**	**0**	**104**	**36**	**0**	**104**	**36**	**78**	**62**

Table 5: Route 7 and Potomac View Road Crash Summary

Year	Type				Crash Severity			Surface Condition		Light Condition	
	Rear End	Angle	Other	Pedestrian	PDO	Injury	Fatality	Dry	Wet/Icy	Daylight	Dark
2013	17	10	3	0	18	12	0	28	2	19	11
2014	14	4	4	0	17	5	0	18	4	12	10
2015	13	5	5	0	17	6	0	18	5	10	13
2016	10	7	7	0	18	6	0	21	3	15	9
2017	13	10	2	0	16	9	0	23	2	17	8
2018	21	5	2	2	17	13	0	25	5	23	7
2019	15	3	4	0	18	4	0	19	3	13	9
Total	**103**	**44**	**27**	**2**	**121**	**55**	**0**	**152**	**24**	**109**	**67**

Table 6: Route 7 and Campus Drive/Bartholomew Fair Drive Crash Summary

Year	Type				Crash Severity			Surface Condition		Light Condition	
	Rear End	Angle	Other	Pedestrian	PDO	Injury	Fatality	Dry	Wet/Icy	Daylight	Dark
2013	8	2	2	0	8	4	0	9	3	8	4
2014	12	2	4	1	14	4	1	17	2	10	9
2015	6	4	4	0	9	5	0	10	4	8	6
2016	12	5	4	0	12	9	0	14	7	17	4
2017	10	2	2	0	8	6	0	13	1	11	3
2018	15	2	2	0	11	8	0	18	1	17	2
2019	5	6	1	1	7	6	0	12	1	7	6
Total	**68**	**23**	**19**	**2**	**69**	**42**	**1**	**93**	**19**	**78**	**34**

Table 7: Route 7 and Palisade Parkway/Loudoun Tech Drive Crash Summary

Year	Type				Crash Severity			Surface Condition		Light Condition	
	Rear End	Angle	Other	Pedestrian	PDO	Injury	Fatality	Dry	Wet/Icy	Daylight	Dark
2013	14	8	2	0	18	6	0	17	7	12	12
2014	10	2	6	0	13	5	0	17	1	8	10
2015	6	1	3	0	8	2	0	4	6	8	2
2016	12	3	5	0	14	6	0	16	4	10	10
2017	9	1	3	0	8	5	0	12	1	11	2
2018	7	1	5	0	10	3	0	10	3	8	5
2019	7	7	5	0	12	7	0	14	5	13	6
Total	**65**	**23**	**29**	**0**	**83**	**34**	**0**	**90**	**27**	**70**	**47**

Table 8: Route 7 and Countryside Boulevard/City Center Boulevard Crash Summary

Year	Type				Crash Severity			Surface Condition		Light Condition	
	Rear End	Angle	Other	Pedestrian	PDO	Injury	Fatality	Dry	Wet/Icy	Daylight	Dark
2013	14	6	9	0	13	16	0	23	6	15	14
2014	14	3	8	1	14	12	0	22	4	15	11
2015	19	4	6	0	21	8	0	23	6	11	18
2016	15	3	5	0	17	6	0	19	4	15	8
2017	16	5	4	0	16	9	0	22	3	17	8
2018	22	4	5	0	20	11	0	24	7	22	9
2019	21	4	4	0	22	7	0	27	2	18	11
Total	**121**	**29**	**41**	**1**	**123**	**69**	**0**	**160**	**32**	**113**	**79**

3. *VISSIM* MODEL CALIBRATION

The goal of the calibration effort for this study is to replicate the existing field conditions in the simulation model with minimal acceptable differences. The existing intersection turning movement volumes used for calibration and analysis are summarized in **Appendix A.** These volumes include all signalized intersections, unsignalized intersections, ramp merges and diverges, and driveways along Route 7 between Route 286 (Fairfax County Parkway) and Route 28 (Sully Road/Darrell Green Boulevard).

The VDOT *VISSIM Users Guide* and the VDOT *Traffic Operations and Safety Analysis Manual, Version 2.0* (TOSAM) recommends following the calibration process as described in the FHWA *Traffic Analysis Toolbox Volume III: Guidelines for Applying Traffic Microsimulation Modeling Software (FHWA-HRT-04-040)*.

The complete calibration memorandum and results are summarized in **Appendix B.**

4. EXISTING CONDITIONS OPERATIONAL ANALYSIS

Traffic analyses were performed using *VISSIM* to evaluate the current intersection and roadway performance along Route 7 under existing conditions. The purposes of the existing conditions analyses are to calibrate the simulation model based on field-measured data and to establish a baseline to which the future year No-Build conditions can be compared. Furthermore, since the safety evaluation of crash history along the corridor is based on past and existing conditions, the existing conditions operational analyses makes it possible to identify potential correlations between traffic operations and the types and frequency of crashes. Existing traffic performance was measured in terms of delay (seconds per vehicle) and levels of service (LOS) at intersections by individual turning movement, directional approach, and whole intersection. The performance of interchange ramp merges, diverges, and weaves was measured in terms of LOS based on density (vehicles per mile per lane, or vpmpl).

Field-measured turning movement counts for all the intersections and ramps along Route 7 within the study area were collected in June 2019. The traffic count volumes at the signalized intersections along the study corridor are shown in **Figure 4**. Signal phasing and timing programs were obtained from VDOT in the form of Synchro software files (VDOT plans to implement new signal timing programs along this portion of Route 7 in the near future; the original 2020 implementation date was delayed due to the COVID-19 pandemic). The Existing Conditions AM and PM peak hour levels of service (LOS) for each individual turning movement, directional approach, and whole intersection at the signalized locations along Route 7 are summarized in **Figure 5**. Tables showing the *VISSIM* analysis results for the Existing Conditions are provided in **Appendix C**.

Figure 4: Existing Conditions AM (PM) Peak Hour Volumes at Signalized Intersections

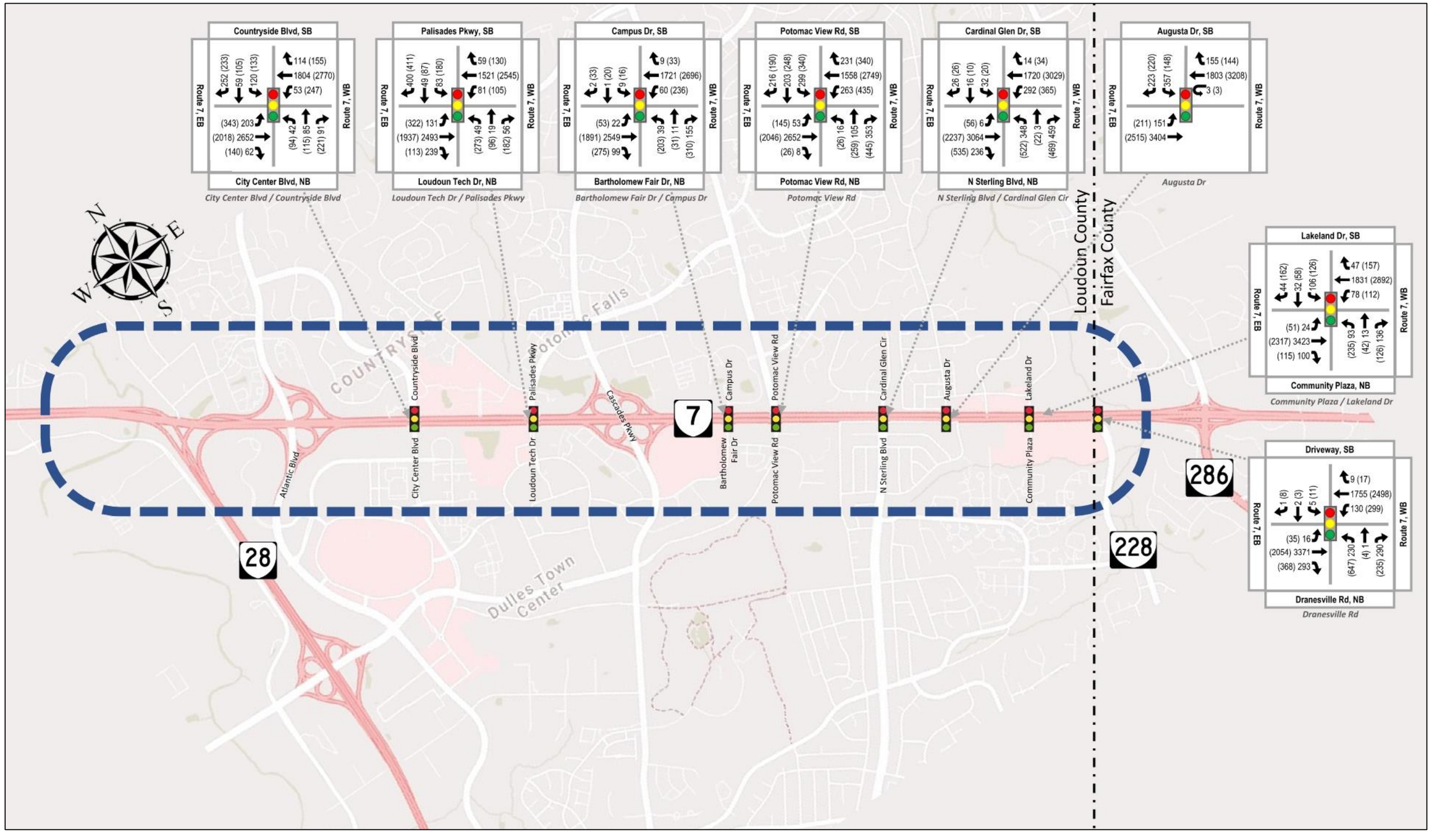
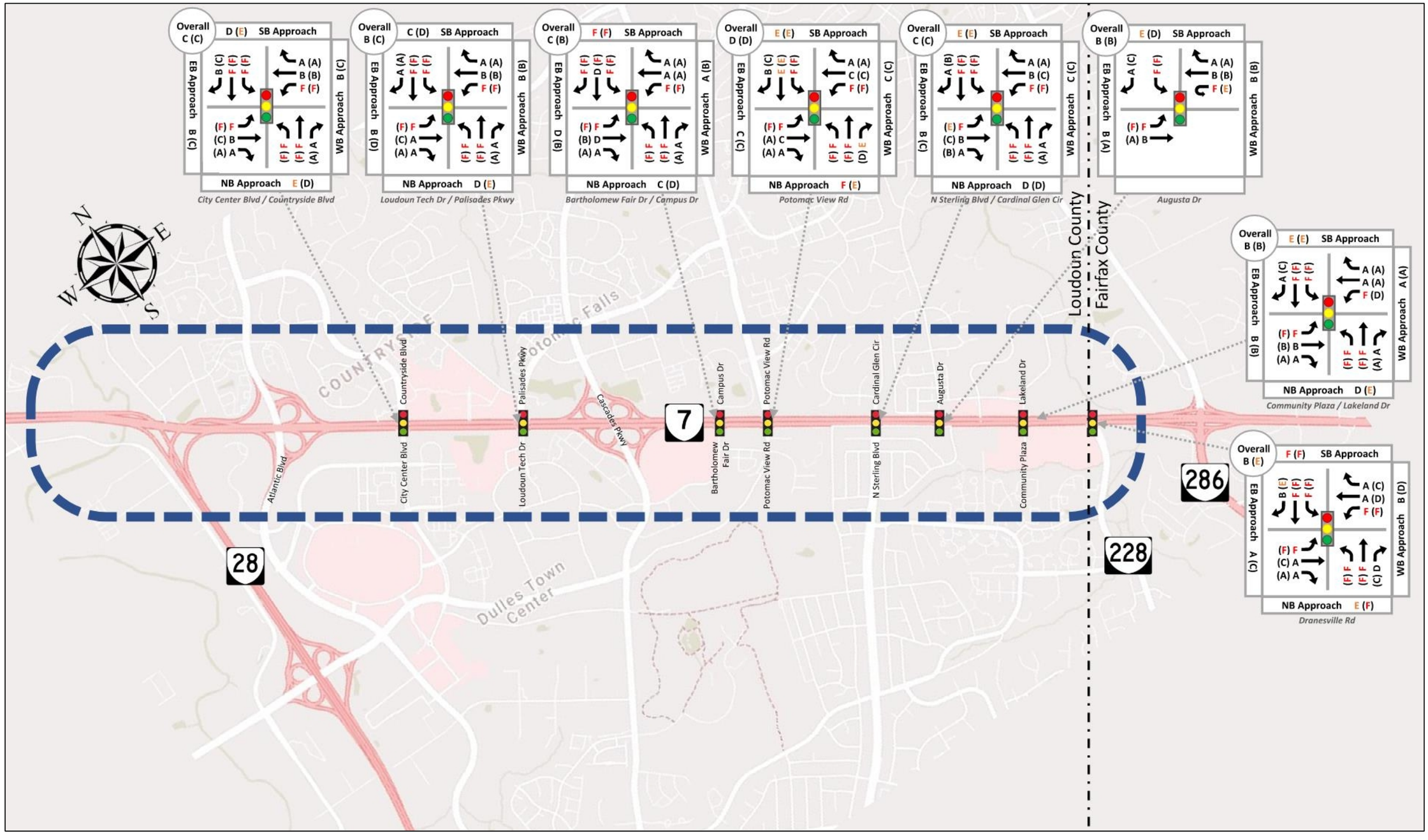


Figure 5: Existing Conditions AM (PM) Peak Hour Levels of Service (LOS)



Existing Conditions – Intersection Delays and HCM Levels of Service (LOS):

- Results were generated using *VISSIM* and measured for each overall signalized intersection, each directional approach at signalized and unsignalized intersections and driveways, and each individual turning movement.
- There are no overall intersections currently operating any worse than LOS D during either the AM or PM peak hours.
- There are no Route 7 directional approaches (i.e., eastbound or westbound approaches) at signalized intersections currently operating worse than LOS D during either the AM or PM peak hours.
- **Signalized** cross-street directional approaches that currently operate at LOS E or LOS F include:
    - City Center Blvd/Countryside Blvd: NB LOS E (AM); SB LOS E (PM)
    - Palisades Pkwy/Loudoun Tech Dr: NB LOS E (PM)
    - Campus Dr/Bartholomew Fair Dr: SB LOS F (AM & PM)
    - Potomac View Road: NB LOS F & SB LOS E (AM); NB LOS E & SB LOS E (PM)
    - N Sterling Blvd/Cardinal Glen Cir: SB LOS E (AM & PM)
    - Augusta Dr: SB LOS E (AM)
    - Lakeland Dr/Community Plaza: SB LOS E (AM); NB LOS E & SB LOS E (PM)
    - Route 228 (Dranesville Rd)/Popeyes: NB LOS E & SB LOS F (AM), NB LOS F & SB LOS F (PM)
- **Unsignalized (non-driveway)** cross-street directional approaches that currently operate at LOS E or F include:
    - Cedar Dr: NB LOS E & SB LOS F (AM)
- **Unsignalized driveway** approaches that currently operate at LOS E or F include:
    - Driveway from Mirror Ridge Shopping Center: SB LOS F (PM)
    - Driveway from Cascades Village and Rehabilitation Center: NB LOS F (AM)
    - Driveway to Christ the Redeemer Catholic Church: NB LOS F (AM)
    - Driveway from Chick-fil-A: NB LOS F (AM)

Existing Conditions – Intersection Queue Lengths:

- Maximum queue lengths were generated using *VISSIM* and measured in feet for each turning movement lane group (i.e., left turn, though, and right turn) at each signalized intersection, unsignalized intersection, and driveway.
- Queue lengths for left or right turn lane groups were compared to the available queue storage distance at each intersection.
- Queue lengths for the through lane groups were compared to the distance to the adjacent upstream intersection
- Intersections with maximum queues that currently exceed the available storage along Route 7 include:
    - AM Peak Hour
        - Potomac View Rd: EB Thru
        - Cedar Dr (unsignalized): EB Thru; EB Right
    - PM Peak Hour
        - Potomac View Rd: WB Left
        - N Sterling Blvd/Cardinal Glen Cir: EB Right; WB Thru
        - Cedar Dr (unsignalized): WB Right
        - Community Plaza/Lakeland Dr: WB Thru
        - Route 228 (Dranesville Rd): WB Left

Existing Conditions – Grade-Separated Interchange HCM Levels of Service (LOS):

Highway Capacity Manual (HCM) levels of service (LOS) for basic freeway segments, ramp merge/diverge areas, and weave sections are based on density measured as passenger cars per mile per lane (pcpmpl), whereas *VISSIM* generates density as vehicles per mile per lane (vpmpl), which may be lower than pcpmpl. Therefore, using *VISSIM* density with the HCM LOS thresholds can yield results that are slightly better than using HCM density, although for Route 7, little difference is expected due to trucks being a low percentage (2%) of the total traffic volume.

- Generated using *VISSIM* and measured for each on-ramp merge area, off-ramp diverge area, weaving area, and basic freeway segments between off- and on-ramps within each interchange.
- **Ramp merge, diverge, weave, and basic freeway segments** along Route 7 that currently operate at LOS E based on density (vehicles per mile per lane) include:
    - Cascades Pkwy
        - EB basic freeway segment (downstream) – AM
        - EB on-ramp merge – AM
        - WB on-ramp merge – PM
- No merge, diverge or weave, segments currently operate at LOS F.

Existing Conditions – Analysis Conclusions:

- All 8 signalized intersections along this corridor have at least one directional approach that operates at LOS E or F during the AM and/or PM peak hours.
- All 3 unsignalized intersections and all nine (9) driveways operate at LOS D or better during both the AM and PM peak hours.
- 3 of the 5 roadway segments along eastbound Route 7 through the Cascades Pkwy interchange operate at LOS C or better during the AM, and all 5 segments are LOS C or better during the PM.
- All 5 roadway segments along westbound Route 7 through the Cascades Pkwy interchange operate at LOS C or better during the AM, and 4 of 5 segments are LOS C or better during the PM.
- There are 4 overflowing left or right turn storage lane maximum queues that exceed the available storage lengths during the AM peak hour, and 8 during the PM peak hour.
- During the AM peak hour, 1 of the 4 overflowing turn lanes is along Route 7, and during the PM peak hour, 3 of the 8 overflowing turn lanes are along Route 7; the remaining overflowing turn lanes are on the cross street approaches.

5. TRAVEL FORECASTING

The Loudoun County Department of Transportation and Capital Infrastructure (DTCI) established 2040 to be the design year for the Route 7 Concept Study. A review of historical traffic counts performed along Route 7 by VDOT and the roadway link volumes estimated by the Loudoun County Travel Demand Model was used to determine a reasonable long-term traffic growth rate. The review process was as follows:

- Using historical VDOT volume counts and estimates:
    - Year 2014 bidirectional AADT = 58,000 vpd; Year 2019 bidirectional AADT = 59,000 vpd
    - Annual growth rate between 2014 and 2019 = +0.4% (or +0.004)
    - Examining the period from 2007 to 2018, the long-term historical trend shows a traffic reduction of about -2% per year
- Using the Loudoun County Travel Demand Model:
    - Year 2016 bidirectional ADT = 64,425 vpd; Year 2040 bidirectional ADT = 80,825 vpd
    - Annual growth rate between 2016 and 2040 (for exponential growth calculation) = +1%

- Conclusions:
  - Long-term historical trend was negative
  - Short-term historical trend is positive but almost flat
  - Long-term trend from the travel demand model is slightly positive
- **Recommendation:**
  - **Use +1% annual growth to adjust Existing traffic counts to Year 2040 levels for analysis**

The chart shown in **Figure 6** shows the growth projections associated with using long-term (2007 – 2019) historical VDOT volume data, recent short-term (2014 – 2019) historical VDOT volume data, base year (2016) and horizon year (2040) volume estimates from the Loudoun County Travel Demand Model, and a +1% annual growth rate applied to the most recent (2019) VDOT AADT volume estimate on Route 7 within the study limits. The projected 2040 AADT volume using the recommended +1% annual growth rate falls approximately midway between the trendline projections using the short-term recent historical VDOT volume data and the Loudoun County Model.

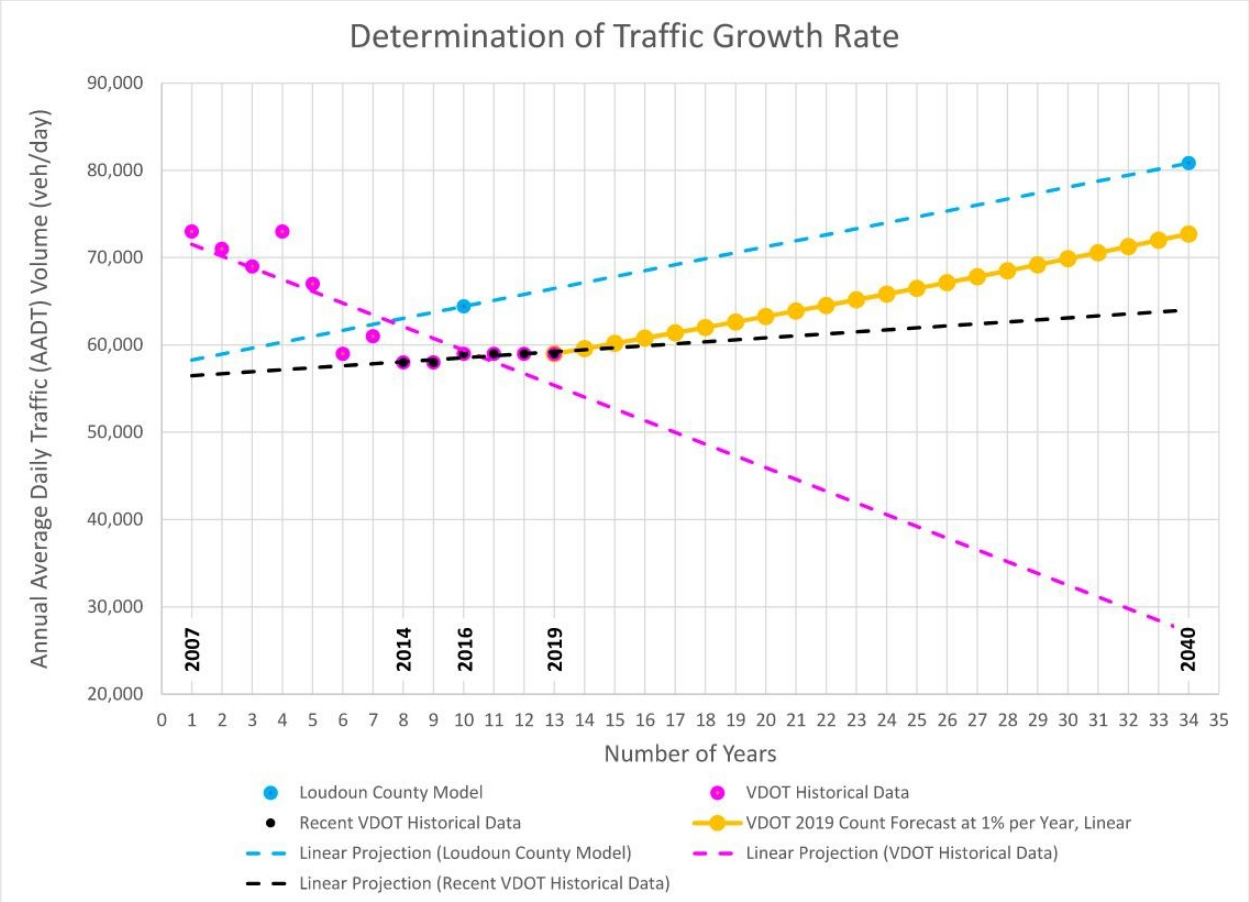


Figure 6: Comparison of Traffic Forecasting Methods

The projected 2040 intersection turning movement volumes and interchange volumes (including ramp junctions located immediately beyond the limits of any potential roadway improvements) are summarized in figures provided in **Appendix D**.

6. 2040 NO-BUILD CONDITIONS OPERATIONAL ANALYSIS

VISSIM was used to analyze the anticipated traffic operations along Route 7 in 2040 using the projected traffic volumes described in the previous section of this report (also shown in **Figure 7**). For these analyses, the traffic signal phasing and timing programs along Route 7 were maintained from the Existing Conditions analysis. No geometric roadway improvements were assumed to occur along Route 7 for this No-Build Conditions analysis. The purpose of this analysis is to establish the design year baseline operating conditions and support the concept development process for the Build Alternative by identifying specific locations along the corridor where capacity improvements may be needed. The 2040 No-Build Conditions AM and PM peak hour levels of service (LOS) for each individual turning movement, directional approach, and whole intersection at the signalized locations along Route 7 are summarized in **Figure 8**. Tables showing the *VISSIM* analysis results for the 2040 No-Build Conditions are provided in **Appendix E**.

2040 No-Build Conditions – Intersection Delays and HCM Levels of Service (LOS):

- Results were generated using *VISSIM* and measured for each overall signalized intersection, each directional approach at signalized and unsignalized intersections and driveways, and each individual turning movement.
- All intersections (8 signalized, 3 unsignalized, and 9 driveways) would operate at LOS D during the AM or PM peak hours with the exception of the signalized Dranesville Rd intersection which would operate at LOS E during the PM peak hour.
- All of the eastbound and westbound approaches along Route 7 at signalized intersections would operate at LOS D or better during the AM and PM peak hours, with the following exceptions:
    - Eastbound at Bartholomew Fair Dr/Campus Dr – LOS E during the AM peak hour
    - Eastbound at Loudoun Tech Dr/Palisades Pkwy – LOS E during the PM peak hour
- **Signalized** cross-street directional approaches that would operate at LOS E or LOS F include:
    - City Center Blvd/Countryside Blvd: NB LOS E (AM); SB LOS E (PM)
    - Palisades Pkwy/Loudoun Tech Dr: NB LOS E (AM & PM)
    - Campus Dr/Bartholomew Fair Dr: SB LOS F (AM & PM)
    - Potomac View Road: NB LOS F & SB LOS E (AM); NB LOS E & SB LOS F (PM)
    - N Sterling Blvd/Cardinal Glen Cir: SB LOS E (AM & PM)
    - Augusta Dr: SB LOS E (AM & PM)
    - Lakeland Dr/Community Plaza: SB LOS F (AM); NB LOS E & SB LOS E (PM)
    - Route 228 (Dranesville Rd)/Popeyes: NB LOS E & SB LOS F (AM), NB LOS F & SB LOS F (PM)
- **Unsignalized (non-driveway)** cross-street approaches that would operate at LOS E or F include:
    - Cedar Dr: NB LOS F & SB LOS F (AM); NB LOS F & SB LOS F (PM)

Figure 7: 2040 No-Build Conditions AM (PM) Peak Hour Volumes at Signalized Intersections

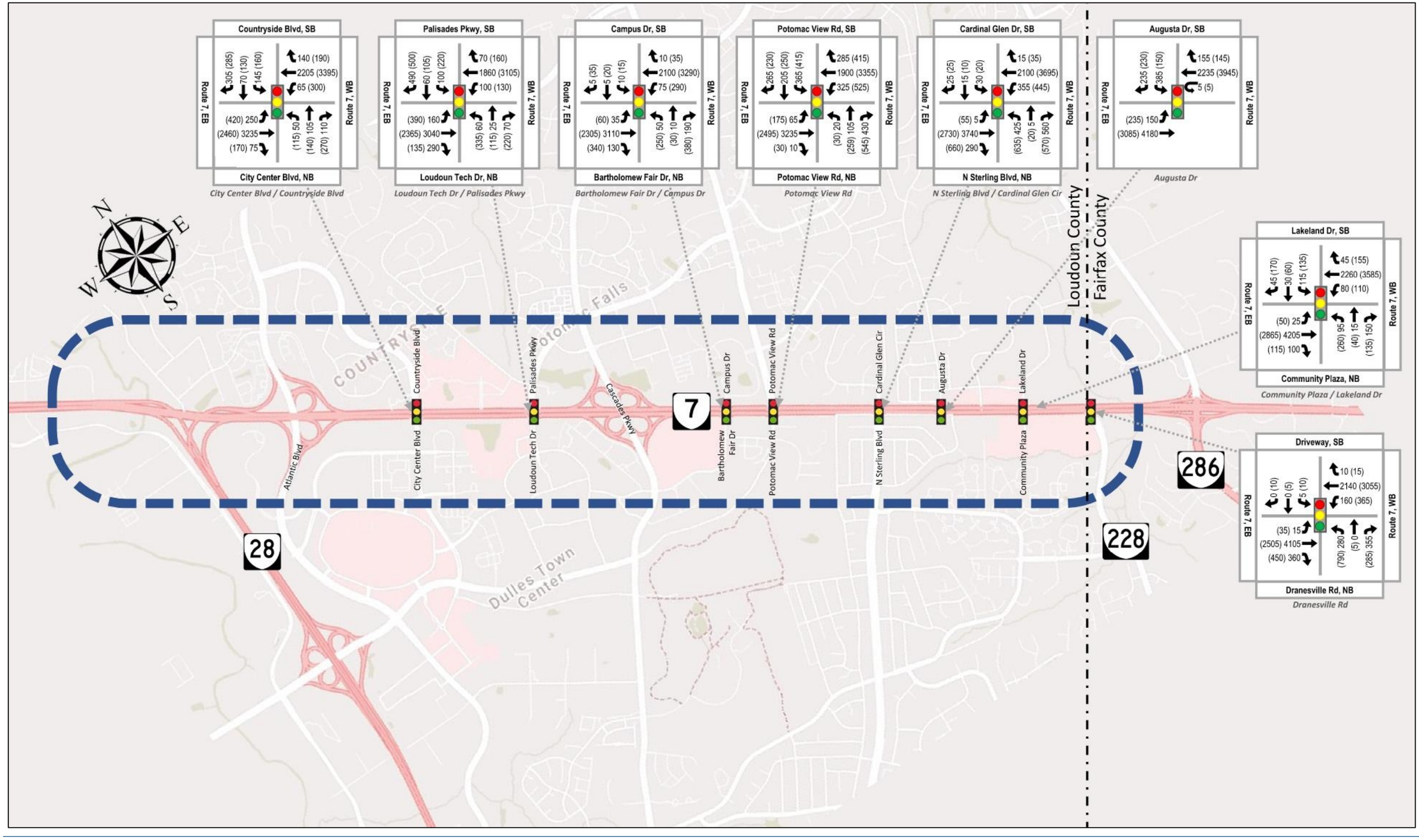
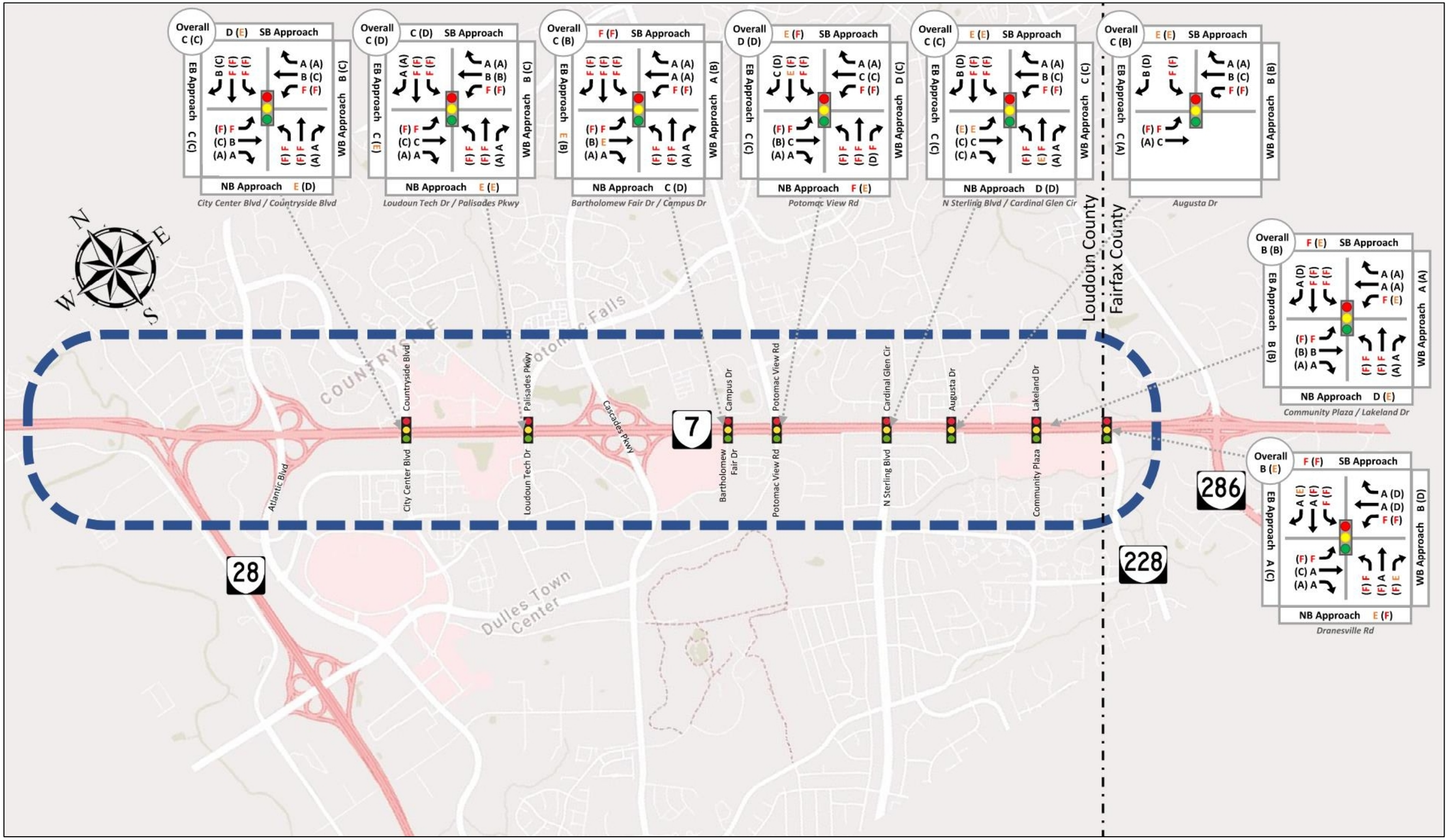


Figure 8: 2040 No-Build Conditions AM (PM) Peak Hour Levels of Service (LOS)



- **Unsignalized driveway** approaches that would operate at LOS E or F include:
    - Driveway from Mirror Ridge Shopping Center: SB LOS F (PM)
    - Driveway from Cascades Village and Rehabilitation Center: NB LOS F (AM)
    - Driveway to Christ the Redeemer Catholic Church: NB LOS F (AM)
    - Driveway from Chick-fil-A: NB LOS F (AM & PM)

2040 No-Build Conditions – Intersection Queue Lengths:

- Maximum queue lengths were generated using *VISSIM* and measured in feet for each turning movement lane group (i.e., left turn, though, and right turn) at each signalized intersection, unsignalized intersection, and driveway.
- Queue lengths for left or right turn lane groups were compared to the available queue storage distance at each intersection.
- Queue lengths for the through lane groups were compared to the distance to the adjacent upstream intersection
- Intersections with maximum queues that currently exceed the available storage along Route 7 include:
    - AM Peak Hour
        - Loudoun Tech Dr/Palisades Pkwy: EB Thru
        - Campus Dr/Bartholomew Fair Dr: EB Thru
        - Potomac View Rd: EB Thru; WB Left
        - N Sterling Blvd/Cardinal Glen Cir: EB thru
        - Augusta Dr: EB Thru
        - Cedar Dr (unsignalized): EB Thru; EB Right
    - PM Peak Hour
        - City Center Blvd/Countryside Blvd: WB Thru
        - Loudoun Tech Dr/Palisades Pkwy: EB Left
        - Potomac View Rd: EB Left; WB Left
        - N Sterling Blvd/Cardinal Glen Cir: EB Right; WB Thru
        - Augusta Dr: SB Right; WB Thru
        - Cedar Dr (unsignalized): EB Right; WB Thru
        - Community Plaza/Lakeland Dr: WB Thru
        - Route 228 (Dranesville Rd): WB Left

2040 No-Build Conditions – Grade-Separated Interchange HCM Levels of Service (LOS):

Highway Capacity Manual (HCM) levels of service (LOS) for basic freeway segments, ramp merge/diverge areas, and weave sections are based on density measured as passenger cars per mile per lane (pcpmpl), whereas *VISSIM* generates density as vehicles per mile per lane (vpmpl), which may be lower than pcpmpl. Therefore, using *VISSIM* density with the HCM LOS thresholds can yield results that are slightly better than using HCM density, although for Route 7, little difference is expected due to trucks being a low percentage (2%) of the total traffic volume.

- Results were generated using *VISSIM* and measured for each on-ramp merge area, off-ramp diverge area, weaving area, and basic freeway segments between off- and on-ramps within each interchange.
- **Ramp merge, diverge, weave, and basic freeway segments** along Route 7 that would operate at LOS E based on density (vehicles per mile per lane) include:
    - Cascades Pkwy

- EB off-ramp diverge - AM
- EB basic freeway segment (downstream) – AM
- EB weaving segment – AM
- EB basic freeway upstream (upstream) – AM
- EB on-ramp merge – AM
- WB on-ramp merge – PM

2040 No-Build Conditions – Analysis Conclusions:

- All 8 signalized intersections would continue to operate at a minimum LOS D, except for the intersection at Dranesville Road which would operate at LOS E during the PM peak hour.
- Like the Existing Conditions, every signalized intersection (8 total) along this corridor has at least one directional approach that would operate at LOS E or F during the AM and/or PM peak hours.
- All of the unsignalized intersections (3 total) and driveways (9 total) would operate at LOS D or better during the AM and PM peak hours.
- All 5 roadway segments along eastbound Route 7 through the Cascades Pkwy interchange would operate at LOS E or F during the AM, but all 5 segments would be LOS C or better during the PM.
- All 5 roadway segments along westbound Route 7 through the Cascades Pkwy interchange would operate at LOS C or better during the AM, and 3 of 5 segments are LOS C or better during the PM.
- Cedar Lane is the only unsignalized intersection (out of 3 along the corridor) that would have storage lanes with maximum queues that exceed the available storage length.

7. CONCEPT DEVELOPMENT FOR THE BUILD ALTERNATIVES

The existing and future No-Build conditions along Route 7 consist of conventional signalized and unsignalized at-grade intersections, as well as ramp merge, diverge, and weave sections within the Cascades Parkway and Atlantic Boulevard/Algonkian Parkway interchanges. Based on observations as well as the traffic operations analysis results presented in this study for the existing and future No-Build conditions, there are safety and performance deficiencies along this corridor that may require unconventional solutions. Therefore, an early step in the concept development process was to use the VDOT Junction Screening Tool (vJuST) to help identify innovative intersection and interchange configurations that might be appropriate and feasible along the Route 7 corridor. The results of this initial evaluation are summarized in **Appendix F**.

Alternative 1: Modified Superstreet Corridor

Based in part on the results of this initial screening, but also considering the projected capacity needs, estimated costs, and right of way limitations, the project team developed Alternative 1 as a corridor of several modified Restricted Center U-Turn (RCUT) intersections, also referred to as a modified Superstreet configuration. The primary purpose of this proposed configuration is to reduce delay and improve peak direction travel times for through traffic along Route 7, while improving safety through the reduction of the number of conflict points at the signalized cross-street intersections. Due to the intersection spacing limitations identified during the vJuST analysis, the traditional Superstreet configuration, which would typically accommodate all required U-turn movements at new signalized intersections located between the existing signalized cross-street intersections, was modified to accommodate some U-turns at the downstream existing signalized cross-street intersections. This was done where the distance between existing signalized cross-street intersections was insufficient for inserting a new U-turn-only intersection between them. Alternative 1 adds four new traffic signals along Route 7 where it was feasible based on the spacing between the existing signalized intersections, resulting in a total of 12 signalized intersections within the study corridor.

In addition to converting the Route 7 corridor to a modified Superstreet configuration within the study limits, Alternative 1 also assumes the existing cloverleaf interchange at Route 7 and Cascades Parkway would be replaced with a Tight Diamond Interchange (TDI), where the on- and off-ramps to and from Route 7 would be signalized at closely-spaced ramp terminal intersections along Cascades Parkway. The primary goals of this interchange reconfiguration are to reduce the number of ramp junctions along Route 7 and eliminate the weave sections along Route 7 within the interchange, thereby improving safety and reducing delay with fewer conflict points. **Figure 9** to **Figure 11** show the Alternative 1 concept. Additional build alternatives may be developed in the future depending on the outcome of Loudoun County DTCI's review of the Alternative 1 benefits and challenges, including the traffic analysis results.

8. 2040 BUILD ALTERNATIVE OPERATIONAL ANALYSIS

Traffic operations for the Build alternatives described in the previous section of this report were analyzed using *Synchro* and *VISSIM.* The redistributed traffic volumes corresponding to Alternative 1 are shown in **Figure 12.** *Synchro* was used solely to determine the phasing and splits for any proposed signals associated with the Build alternatives and to optimize all the signals (existing and proposed) to minimize delay and maintain progression along Route 7. These optimized signal timing plans were subsequently imported into *VISSIM*, since *VISSIM* does not have automatic signal timing optimization capabilities. *VISSIM* was used to perform microsimulation analysis of traffic operations, evaluating the following measures of effectiveness (MOEs): Average and maximum queue lengths, delays in second per vehicle by intersection, directional approach, and individual turning movement, and HCM-based levels of service (LOS) by intersection, directional approach, and individual turning movement. These analyses were performed based on the projected AM and PM peak hours on a typical weekday in 2040. The 2040 Alternative 1 AM and PM peak hour levels of service (LOS) for each individual turning movement, directional approach, and whole intersection at the signalized locations along Route 7 are summarized in **Figure 13**. Tables showing the *VISSIM* analysis results for the 2040 No-Build Conditions are provided in **Appendix G**.

Alternative 1: Modified Superstreet Corridor – Analysis Results

Alternative 1 Intersection Delays and HCM Levels of Service (LOS):

- 9 existing and proposed signalized intersections along Route 7 would operate at LOS D or better during the AM or PM peak hours. Exceptions are as follows:
    - Bartholomew Fair Dr / Campus Dr – LOS E during the AM peak hour
    - Community Plaza / Lakeland Dr – LOS E during the PM peak hour
    - Dranesville Rd – LOS F during the PM peak hour
- 20 of the 24 total eastbound and westbound Route 7 approaches at signalized intersections would operate at LOS D or better during the AM or PM peak hours, with the following exceptions:
    - Eastbound at Bartholomew Fair Dr/Campus Dr – LOS F during the AM peak hour
    - Westbound at the new U-turn crossover west of N Sterling Blvd – LOS F during the AM peak hour
    - Westbound at Lakeland Dr – LOS F during the PM peak hour
    - Westbound at Dranesville Rd – LOS F during the PM peak hour
- **Signalized** cross-street directional approaches that would operate at LOS E or LOS F include:
    - City Center Blvd/Countryside Blvd: NB LOS F & SB LOS E (AM); NB LOS E (PM)
    - Davenport Dr (new signal): SB LOS F (AM & PM)
    - Palisades Pkwy/Loudoun Tech Dr: NB LOS E & SB LOS E (AM)
    - Campus Dr/Bartholomew Fair Dr: NB LOS F (AM & PM)
    - Potomac View Road: SB LOS F (AM); SB LOS E (PM)
    - N Sterling Blvd/Cardinal Glen Cir: SB LOS F (AM)

Figure 9: Concept Drawing for Alternative 1 (Sheet 1 of 3)

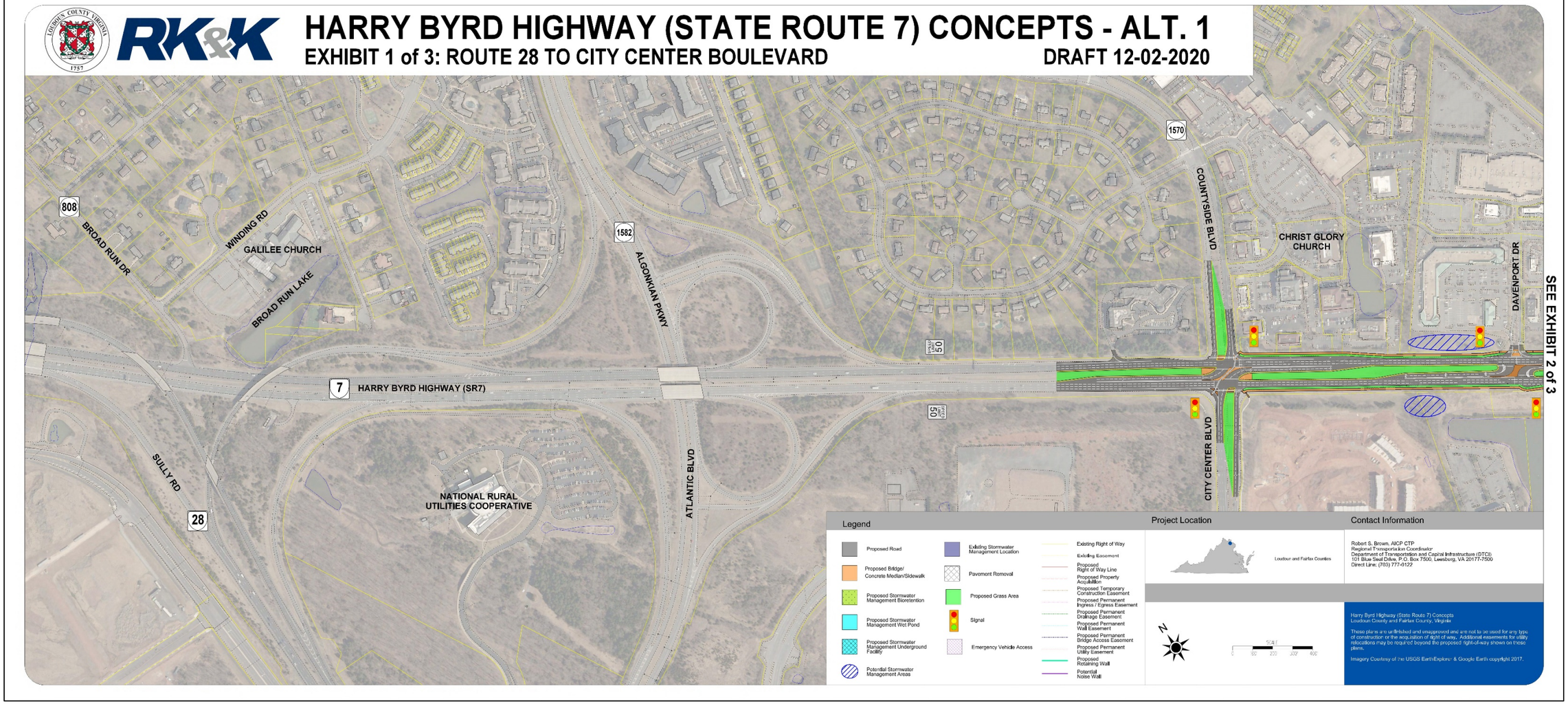


Figure 10: Concept Drawing for Alternative 1 (Sheet 2 of 3)

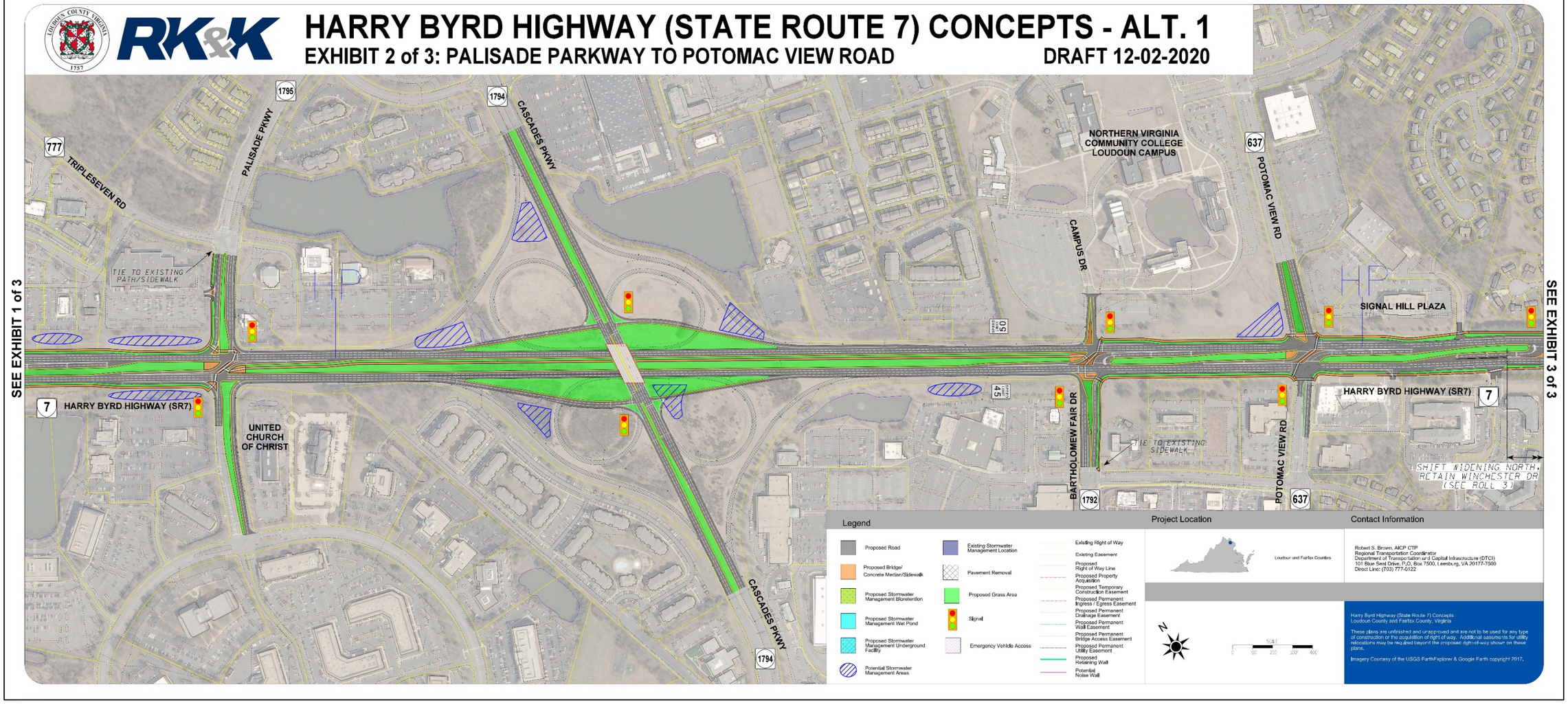


Figure 11: Concept Drawing for Alternative 1 (Sheet 3 of 3)

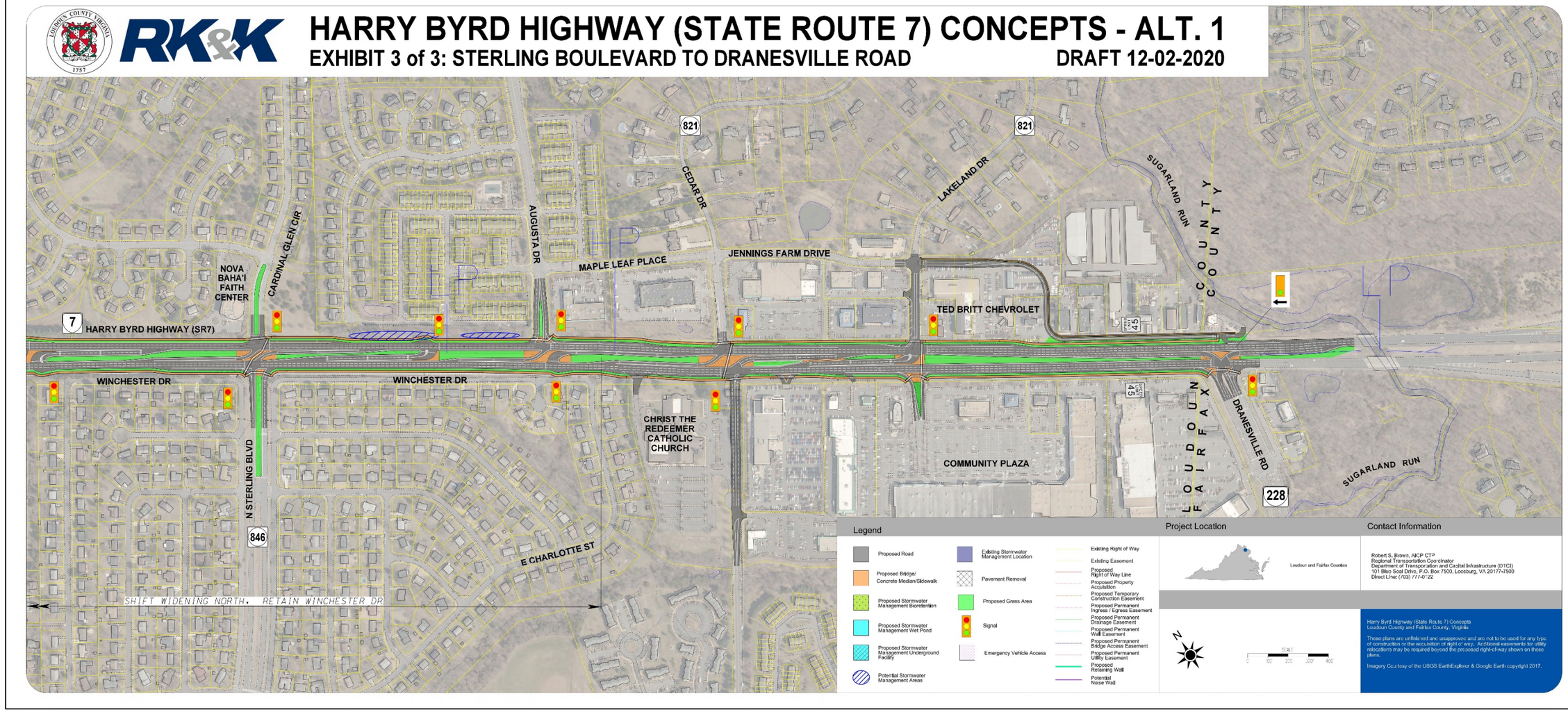


Figure 12: 2040 Build Alternative 1 AM (PM) Peak Hour Volumes at Signalized Intersections

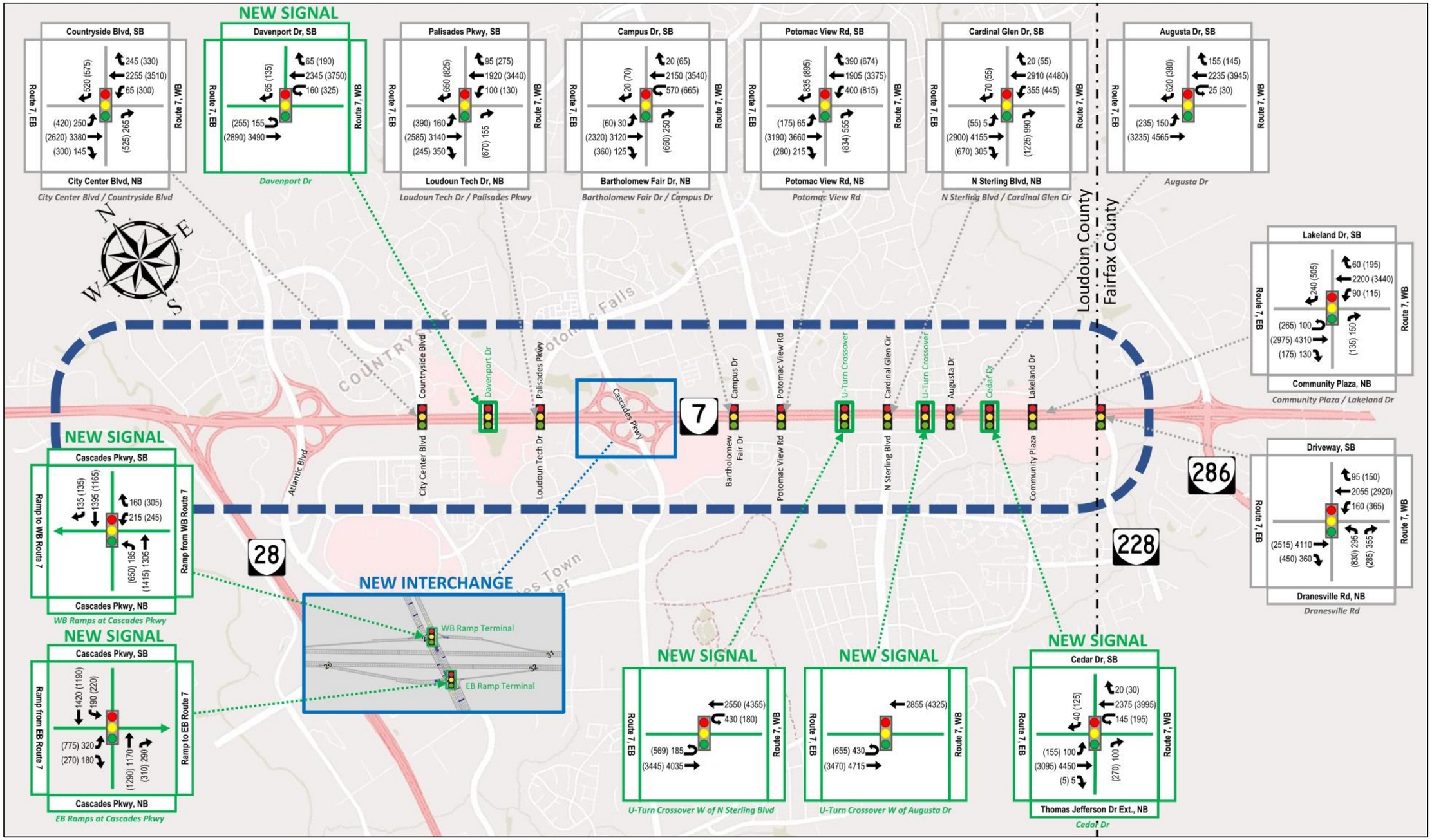
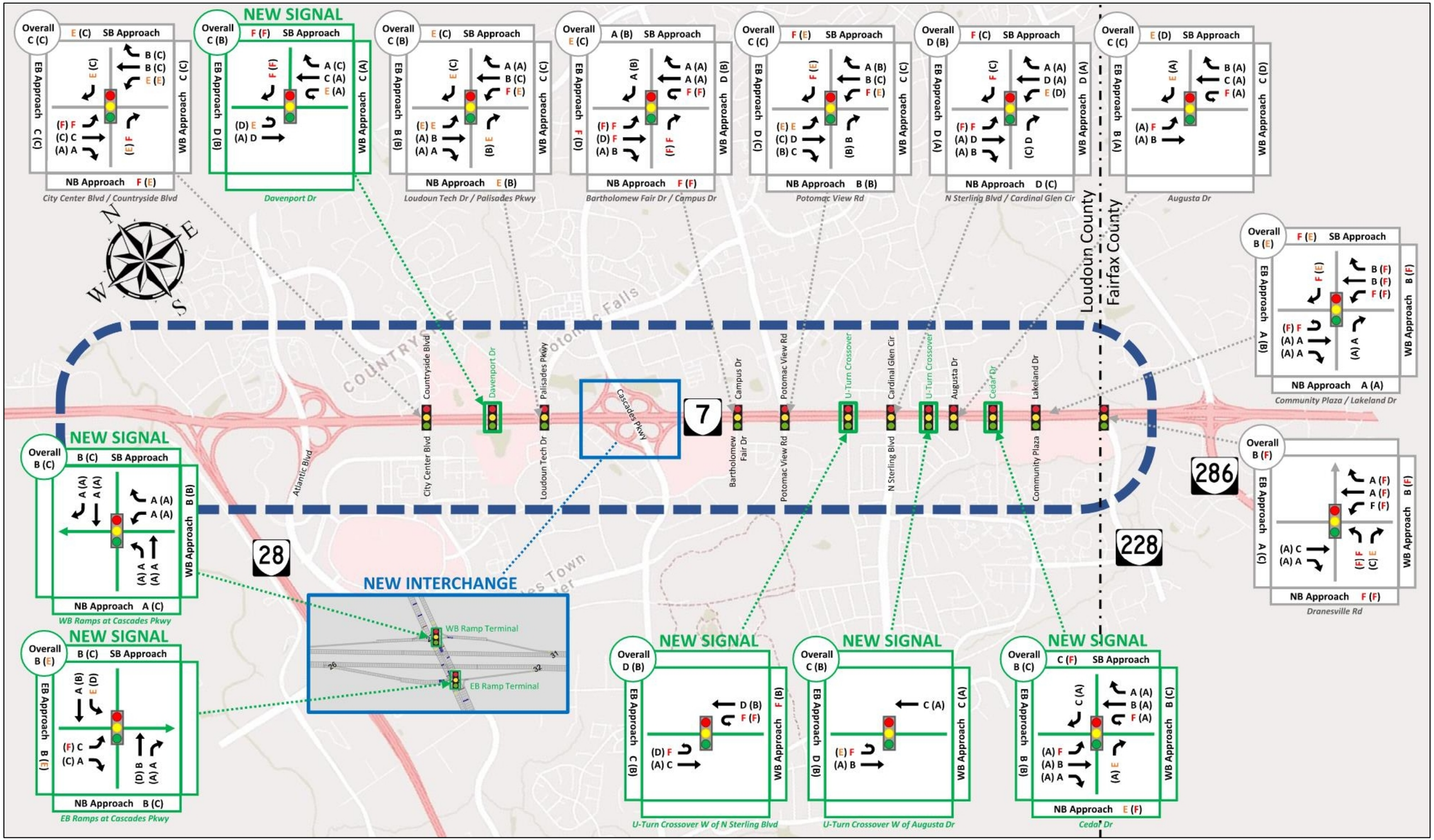


Figure 13: 2040 Build Alternative 1 AM (PM) Peak Hour Levels of Service (LOS)



  - Augusta Dr: SB LOS E (AM)
  - Cedar Dr (new signal): NB LOS E (AM); NB LOS F & SB LOS F (PM)
  - Lakeland Dr/Community Plaza: SB LOS F (AM); SB LOS E (PM)
  - Dranesville Rd: NB LOS F (AM & PM)
- **Unsignalized driveway** approaches that would operate at LOS E or F include:
  - Driveway from Mirror Ridge Shopping Center: LOS E (PM)
  - Driveway from Cascades Village and Rehabilitation Center: NB LOS F (AM); NB LOS E (PM)
  - Driveway east of Dranesville Rd: NB LOS F (PM)

Alternative 1 Intersection Queue Lengths:

Maximum queue lengths for Alternative 1 were generated using *VISSIM* and measured in feet for each turning movement lane group (i.e., left turn, though, and right turn) at each signalized intersection, unsignalized intersection, and driveway. Queue lengths for left or right turn lane groups were compared to the existing available queue storage distance at each existing intersection. At the proposed signalized locations added for the Alternative 1 concept, the available queue storage distances were maximized based on the available distance to the upstream intersection. Queue lengths for the through lane groups were compared to the distance to the adjacent upstream intersection. Results show that through lane queues at several signalized intersections would extend back through the upstream intersection. This is not due to the through lane volumes; it is caused by the left-turn or right-turn lane queues overflowing into the adjacent through lanes. Resolving the turn lane storage issues at the locations listed below would indirectly solve the through lane queuing issues. The Alternative 1 analyses performed for this study already assume optimized signal timing for the turning movements; therefore, the recommended storage lane lengths may need to be longer than what were assumed, if feasible based on intersection spacing.

- Signalized intersections with maximum turn lane queues along Route 7 that are projected to exceed the available storage include:
  - AM Peak Hour
    - City Center Blvd/Countryside Blvd: EB Left; WB Left
    - Davenport Dr (new signal): EB U-turn
    - Loudoun Tech Dr/Palisades Pkwy: EB Left; WB Left
    - Campus Dr/Bartholomew Fair Dr: EB Left; WB U-turn
    - Potomac View Rd: EB Left; WB Left
    - U-turn Crossover west of N Sterling Blvd (new signal): WB U-turn
    - N Sterling Blvd/Cardinal Glen Cir: EB Left; WB Left
    - U-turn Crossover west of Augusta Dr (new signal): WB U-turn
    - Augusta Dr: WB Thru; WB U-turns
    - Cedar Dr (new signal): EB Right; WB Left; WB Right
  - PM Peak Hour
    - City Center Blvd/Countryside Blvd: EB Left; WB Left
    - Davenport Dr (new signal): EB U-turn; WB U-turn
    - Loudoun Tech Dr/Palisades Pkwy: WB Left
    - Campus Dr/Bartholomew Fair Dr: EB Left; WB Right
    - Potomac View Rd: EB Left; WB Left; WB Right
    - U-turn Crossover west of Augusta Dr (new signal): WB Thru
    - Augusta Dr: WB U-turn
    - Cedar Dr (new signal): EB Right; WB Right
    - Community Plaza/Lakeland Dr: WB Left
    - Route 228 (Dranesville Rd): WB Left

Alternative 1 Grade-Separated Interchange HCM Levels of Service (LOS):

Highway Capacity Manual (HCM) levels of service (LOS) for basic freeway segments and ramp merge/diverge areas are based on density measured as passenger cars per mile per lane (pcpmpl), whereas *VISSIM* generates density as vehicles per mile per lane (vpmpl), which may be lower than pcpmpl. Therefore, using *VISSIM* density with the HCM LOS thresholds can yield results that are slightly better than using HCM density, although for Route 7, little difference is expected due to trucks being a low percentage (2%) of the total traffic volume.

Results were generated using *VISSIM* and measured for each on-ramp merge area, off-ramp diverge area, and basic freeway segments between off- and on-ramps within the Cascades Parkway interchange, reconfigured as a tight diamond interchange (TDI) under Alternative 1.

- **Ramp merge, diverge, and basic freeway segments** along Route 7 that would operate at LOS E or LOS F based on density (vehicles per mile per lane) include:
    - EB basic freeway segment (between the off- and on-ramps) – LOS E (AM)
    - EB on-ramp merge – LOS E (AM)
    - WB on-ramp merge – LOS E (PM)

Alternative 1 Safety Impacts

- The review of the recent crash history and trends along Route 7 between Dranesville Road and Route 28 showed that a disproportionate number of rear-end crashes have occurred at signalized intersections.
    - 42 percent of the length of Route 7 within the study corridor lies within the boundaries of the signalized intersections along the corridor.
    - 76 percent of the rear-end crashes within the study corridor occurred at signalized intersections.
    - 59 percent of all reported crashes within the study corridor were rear-end crashes; therefore, there is a correlation between crash frequency and the prevalence of signalized intersections along the corridor.
- Alternative 1 would reduce the number of conflict points at each of the existing signalized intersections by prohibiting crossing traffic and left-turns from the side streets.
- However, Alternative 1 would also add 6 new traffic signals to accommodate the movements displaced by restricting these cross-street movements.

Alternative 1 Analysis Conclusions:

- Even with the proposed conversion to a Green-T configuration, the Dranesville Road intersection would continue to be the worst-performing intersection along the Route 7 study corridor in terms of overall level of service, operating at LOS F during the PM peak hour.
- Looking at the performance of the individual turning movements at each signalized intersection, 22 of the 24 straight through movements along eastbound and westbound Route 7 would operate at LOS D or better. Exceptions include:
    - Eastbound through movement at Bartholomew Fair Dr/Campus Dr – LOS F during the AM
    - Westbound through movement at Dranesville Rd and at Community Plaza/Lakeland Dr – LOS F during the PM
- With through and left-turn traffic from the cross-streets diverted as right-turns to new downstream U-turn signals for this modified superstreet configuration, most of the excessive

delays and poor levels of service (i.e., LOS E or LOS F) would occur for the left, right, and U-turn movements along Route 7 and for the cross-streets approaching Route 7.

- All 22 left and U-turn movements at the signalized intersections along eastbound and westbound Route 7 would operate at LOS E or F during the AM and/or PM peak hours.
- 13 of the 17 total cross-street approaches at signalized intersections within the study corridor would operate at LOS E or F during the AM and/or PM peak hours.

Additional build alternatives may be developed in the future depending on the outcome of Loudoun County DTCI's review of the Alternative 1 benefits and challenges, including these traffic analysis results.

9. CONCLUSIONS

This traffic operations and safety report examines existing and projected future conditions along Route 7 in Loudoun County, Virginia, between Dranesville Rd (Route 228) at the Fairfax County line to the Route 28 interchange, a distance of approximately 4.25 miles. This study includes an evaluation of the history of reported crashes occurring during recent years, an analysis of traffic operations along the corridor under existing conditions, travel demand forecasts for a 2040 No-Build alternative and (to-date) one 2040 Build alternative, and an analysis of the traffic operations expected under those alternatives.

Comparison of Alternative 1 to the No-Build Alternative

As part of the Route 7 Concept Study, several potential Build alternatives were developed at the sketch planning level and presented to Loudoun County DTCI staff and representatives from other government and institutional stakeholders during a brainstorming work session in August 2020. Of these potential improvement options, the Modified Superstreet Corridor was selected to be the first of several potential alternatives to be retained for more detailed analysis. This concept is referred to as Alternative 1.

The analysis of traffic operations under the No-Build alternative identified individual turning movements, directional approaches, and overall intersections that would likely perform unsatisfactorily (i.e., at level of service (LOS) E or LOS F) during the AM and/or PM peak hours in 2040. **Table 9** and **Table 10** compare the number of directional approaches and overall intersections that would operate at each level of service under the No-Build alternative and Alternative 1. Full tables comparing the delays by approach and intersection, as well as comparing the roadway segment LOS within interchange areas and the corridor travel times, are provided in **Appendix H**.

Table 9: Comparison of the Number of Approaches and Intersections at Each LOS - AM Peak Hour

Level of Service	Directional Approaches				Overall Intersections			
	2040 No-Build		2040 Alternative 1		2040 No-Build		2040 Alternative 1	
	Number	% of Total	Number	% of Total	Number	% of Total	Number	% of Total
LOS F	9	16%	12	20%	0	0%	1	5%
LOS E	5	9%	5	8%	0	0%	1	5%
LOS D	7	13%	7	12%	2	10%	2	9%
LOS C	12	21%	8	13%	6	30%	6	27%
LOS B	7	13%	7	12%	4	20%	3	14%
LOS A	16	29%	21	35%	8	40%	9	41%

Table 10: Comparison of the Number of Approaches and Intersections at Each LOS - PM Peak Hour

Level of Service	Directional Approaches				Overall Intersections			
	2040 No-Build		2040 Alternative 1		2040 No-Build		2040 Alternative 1	
	Number	% of Total	Number	% of Total	Number	% of Total	Number	% of Total
LOS F	8	14%	8	13%	0	0%	1	5%
LOS E	8	14%	4	7%	1	5%	1	5%
LOS D	5	9%	3	5%	2	10%	0	0%
LOS C	11	20%	13	22%	3	15%	6	27%
LOS B	6	11%	12	20%	4	20%	5	23%
LOS A	18	32%	20	33%	10	50%	9	41%

The comparison of the LOS analysis results summarized in the AM peak hour table shows that traffic operations would improve at some locations under Alternative 1 while they would worsen at other locations under Alternative 1. However, during the PM peak hour, there would not be much change in LOS for Alternative 1 compared to the No-Build alternative.

In terms of density on the Route 7 roadway segments through the Cascades Parkway interchange, the analysis results show an improvement (i.e., reduction) in the density (vehicles per mile per lane) with the tight diamond interchange (TDI) configuration proposed under Alternative 1. This is likely due to the removal of an on- and off-ramp in each direction along Route 7 and the corresponding elimination of the weaving segment between those ramps.

Examining the corridor end-to-end travel times along Route 7 shows that Alternative 1 would result in a substantial improvement (i.e., reduction) in travel time in the peak direction (eastbound) during the AM peak hour. The time required to travel the 4.25-mile study corridor eastbound would be reduced by more than 4 minutes – a 28% reduction in travel time. However, a comparison of the PM peak hour, peak direction (westbound) travel times shows that Alternative 1 would have no impact. The time required to travel the 4.25-mile study corridor westbound would remain at 11 minutes for Alternative 1 – the same as under the No-Build alternative.

The addition of 6 new traffic signals along Route 7 to accommodate the movements displaced by Alternative 1's modified superstreet configuration may offset the crash-reducing benefits of eliminating some conflict points at the existing intersections. These existing conflict points would be reduced by prohibiting through and left-turn movements from the cross-streets at the existing signalized intersections along Route 7.

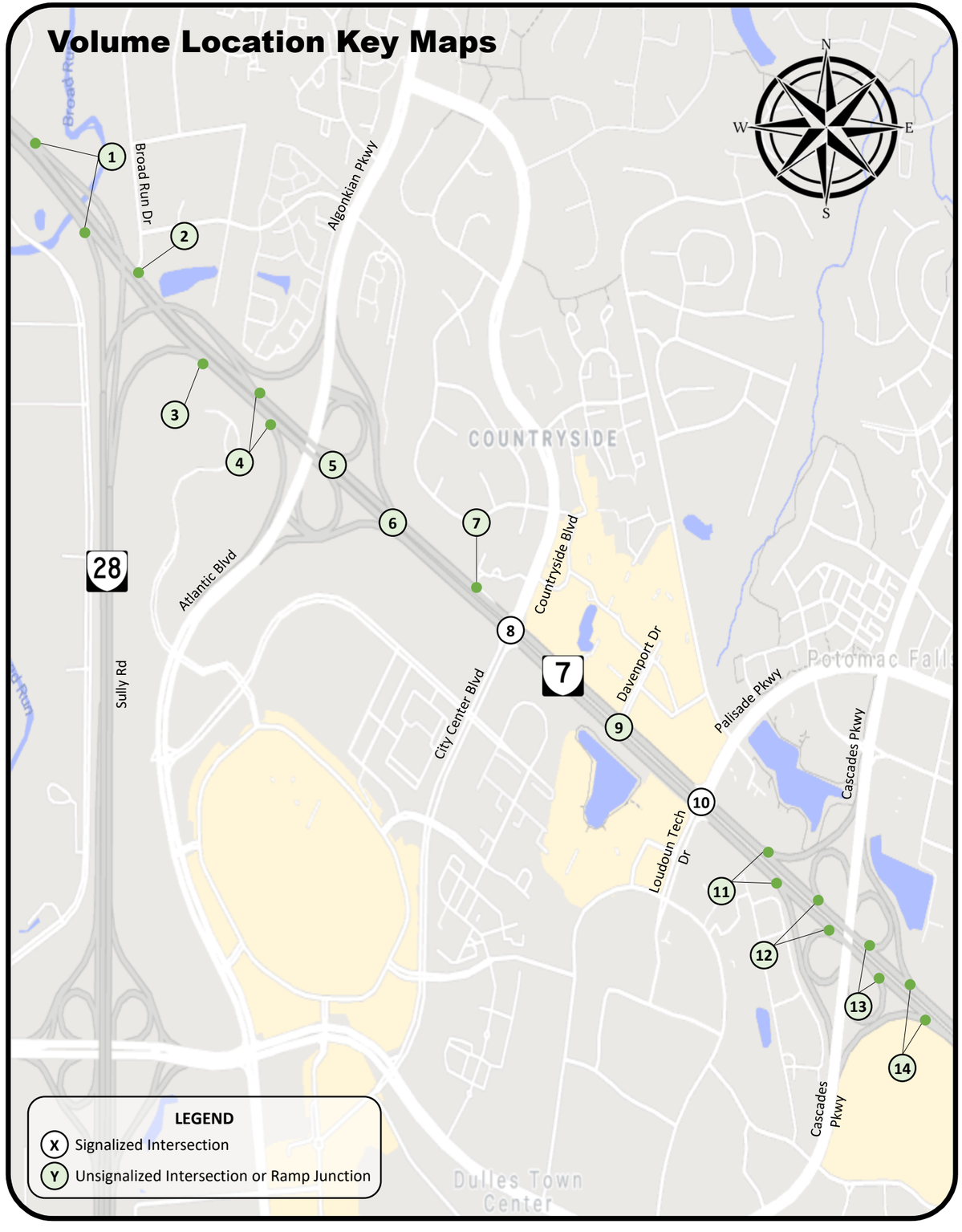
Summary

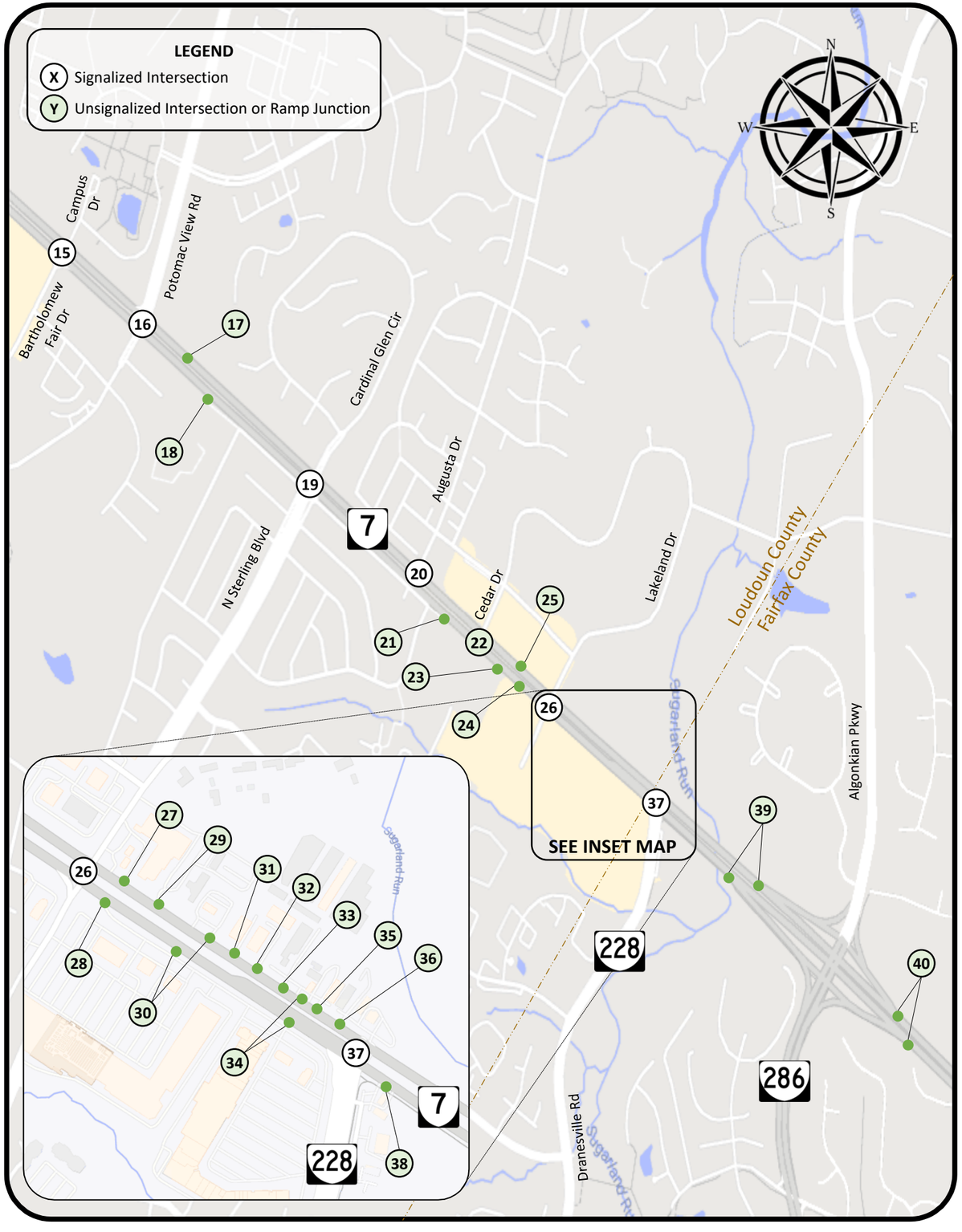
There are several tangible benefits associated with Alternative 1 that are evident when comparing its performance to that of the No-Build alternative. However, there remain several areas where performance would decrease under Alternative 1, such as LOS for the cross-street approaches and for the proposed U-turn movements. Furthermore, the potential for crash reduction under Alternative 1 may be small.

Appendix A:

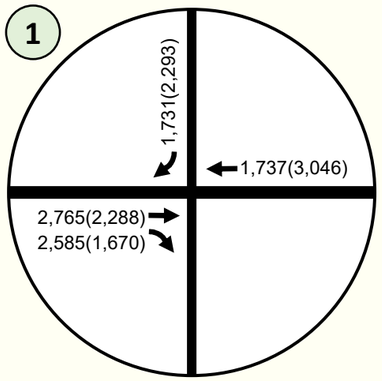
2019 Balanced Traffic Volumes

Volume Location Key Maps

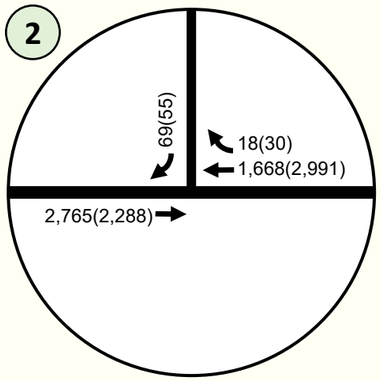




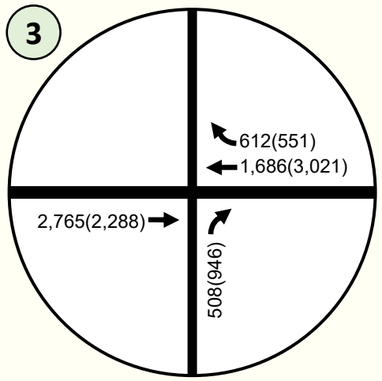
Existing 2019 Peak Hour Volumes



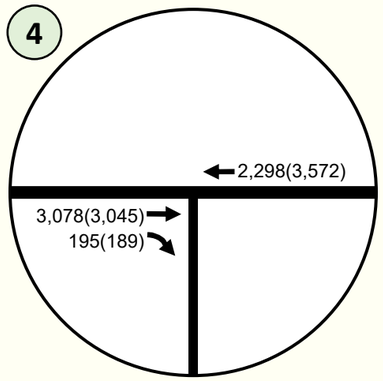
Route 7 at Route 28
EB Off-Ramp & WB On-Ramp



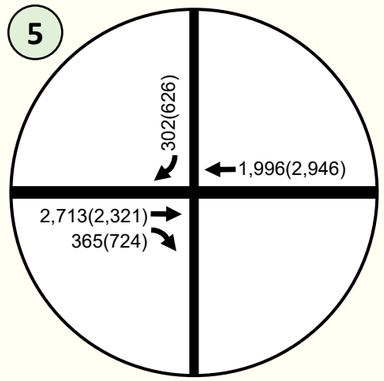
Route 7 at Broad Run Dr



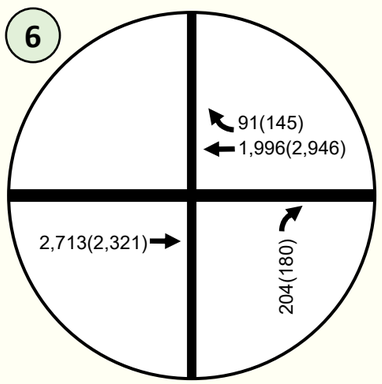
Route 7 at Route 28
EB On-Ramp & WB Off-Ramp



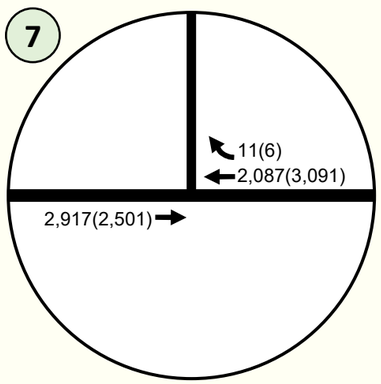
Route 7 at Atlantic Blvd
EB Off-Ramp



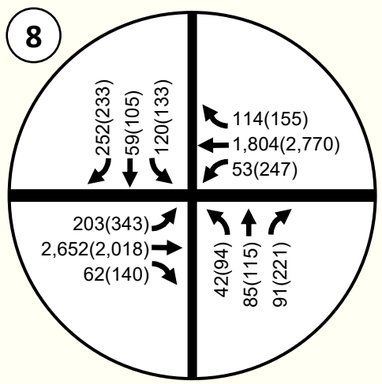
Route 7 at Atlantic Blvd
EB & WB Loop Ramps



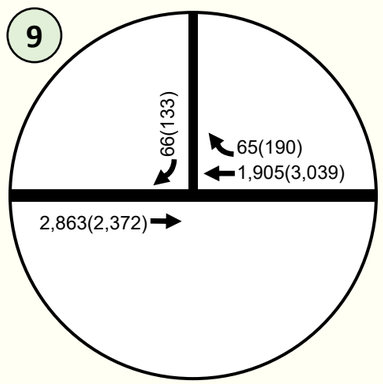
Route 7 at Atlantic Blvd
EB On-Ramp & WB Off-Ramp



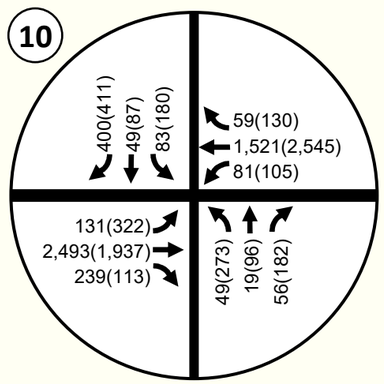
Route 7 at Jona Dr (Sunrise Senior Living)



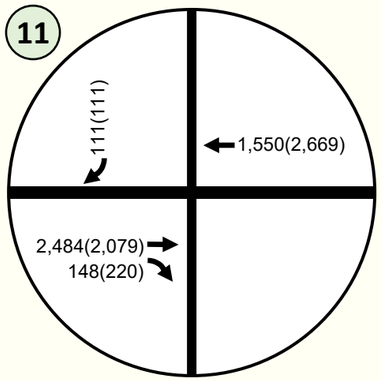
Route 7 at City Center Blvd & Countryside Blvd



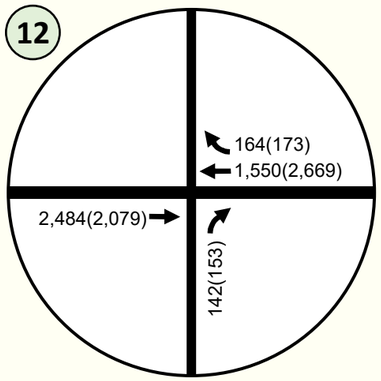
Route 7 at Davenport Dr



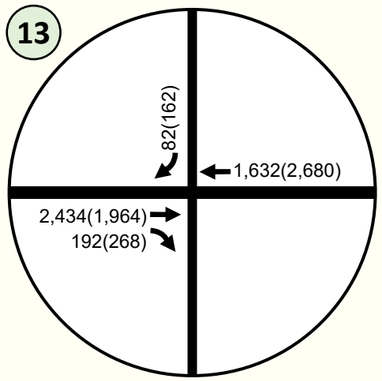
Route 7 at Palisade Pkwy & Loudoun Tech Dr



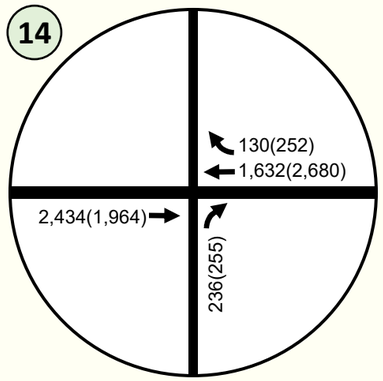
Route 7 at Cascades Pkwy
EB Off-Ramp & WB On-Ramp



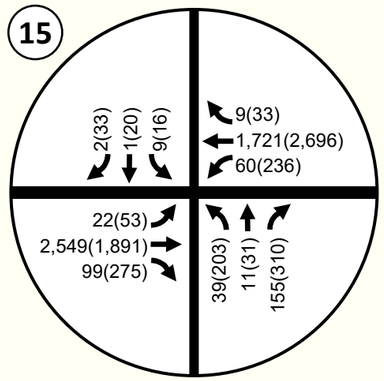
Route 7 at Cascades Pkwy
EB On & WB Off Loop Ramps



Route 7 at Cascades Pkwy
EB Off & WB On Loop Ramps



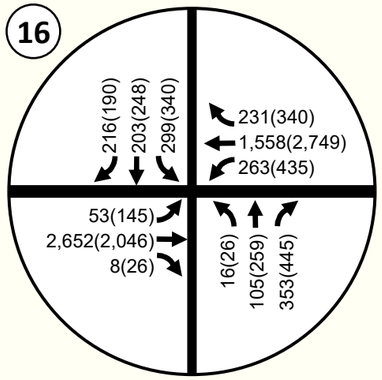
Route 7 at Cascades Pkwy
EB On-Ramp & WB Off-Ramp



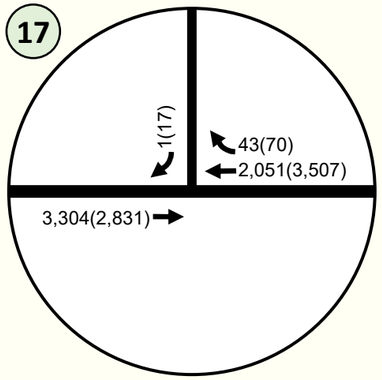
Route 7 at Campus Dr & Bartholomew Fair Dr

LEGEND: (X) Signalized Intersection (Y) Unsignalized Intersection or Ramp Junction ← AM(PM)

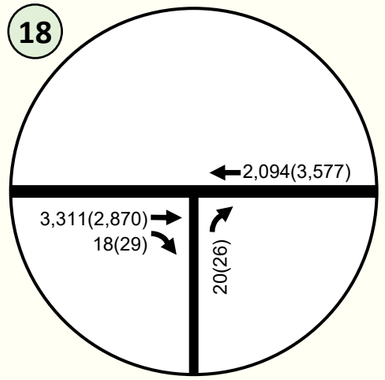
Existing 2019 Peak Hour Volumes



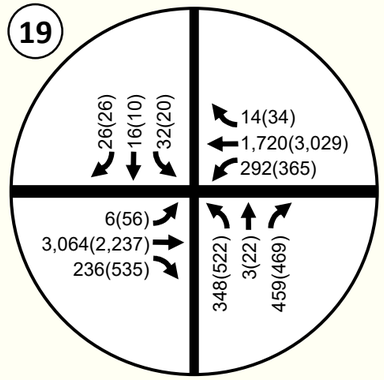
Route 7 at Potomac View Rd



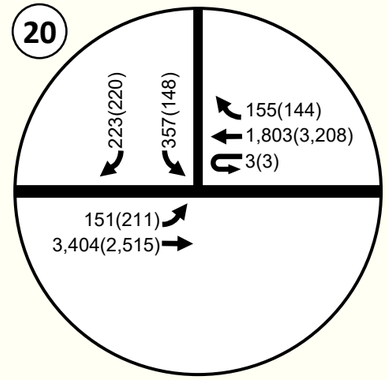
Route 7 at Mirror Ridge Shopping Center



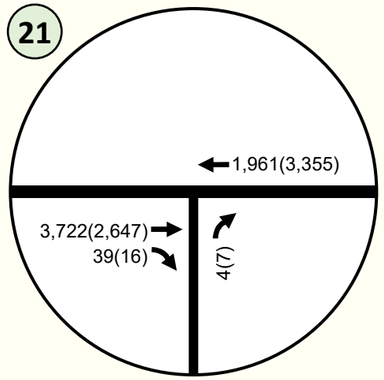
Route 7 at Cascades Village



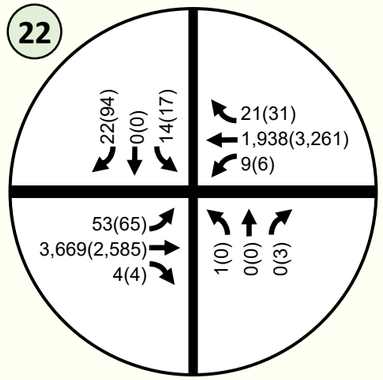
Route 7 at N Sterling Blvd & Cardinal Glen Dr



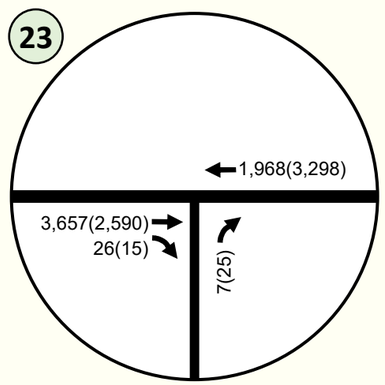
Route 7 at Augusta Dr



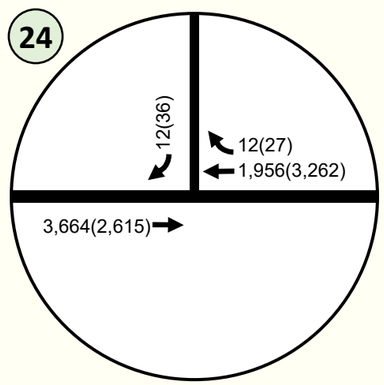
Route 7 at Catholic Church



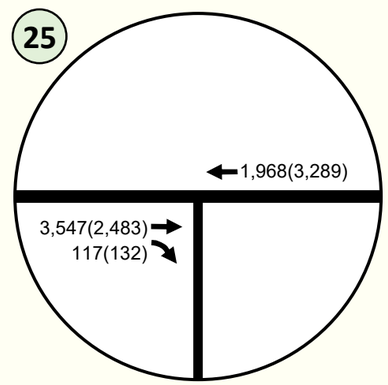
Route 7 at Cedar Dr



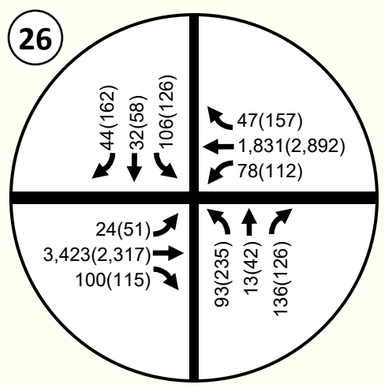
Route 7 at Koons Sterling Ford



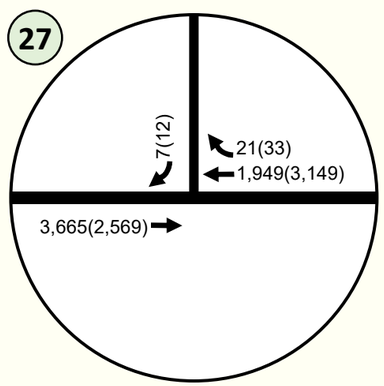
Route 7 at Cedar Lakes Plaza



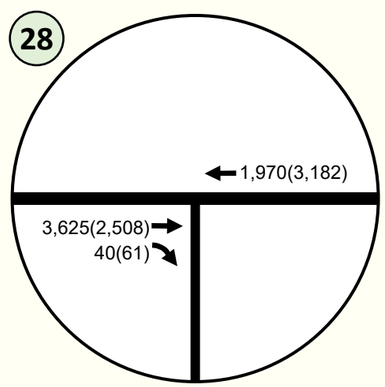
Route 7 at Community Plaza (West)



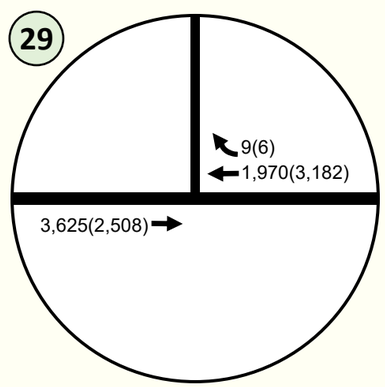
Route 7 at Lakeland Dr & Community Plaza



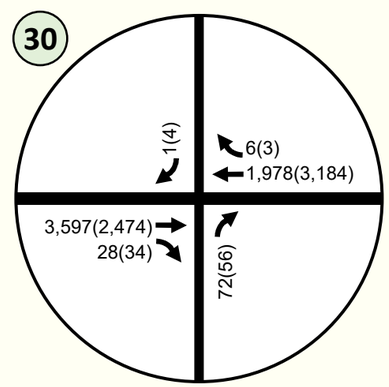
Route 7 at Shell Gas Station & DD BBQ



Route 7 at EB Service Road



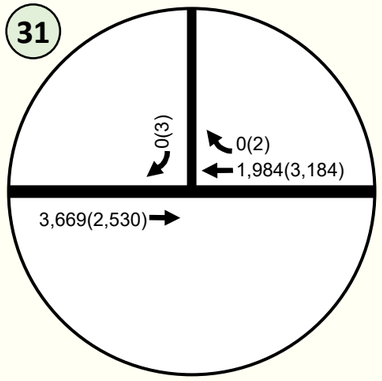
Route 7 at Ted Britt Chevrolet



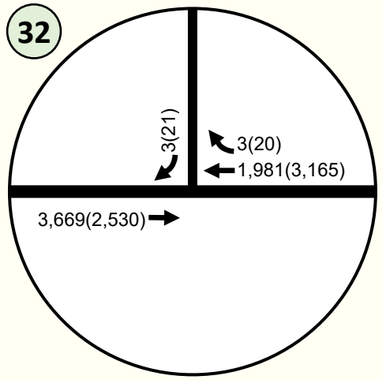
Route 7 at Ted Britt Used Cars & EB Service Rd Access

LEGEND: (X) Signalized Intersection (Y) Unsignalized Intersection or Ramp Junction ← AM(PM)

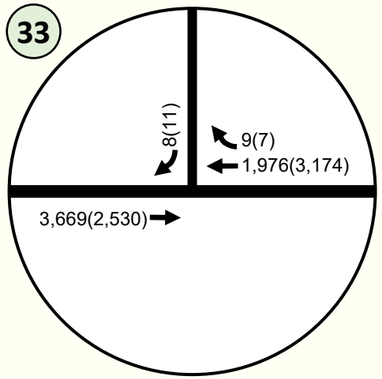
Existing 2019 Peak Hour Volumes



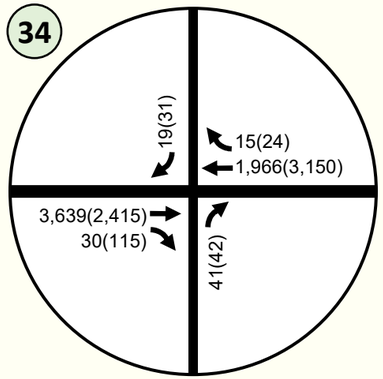
Route 7 at Mattress Warehouse



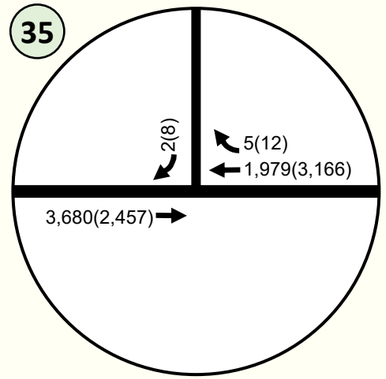
Route 7 at Advance Carpet and Rug



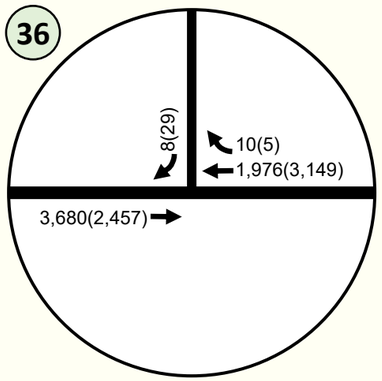
Route 7 at Public Storage



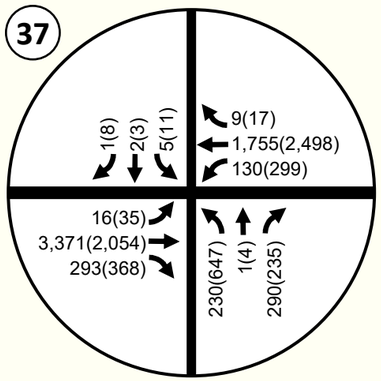
Route 7 at Mobil Gas Station & Town Center at Sterling



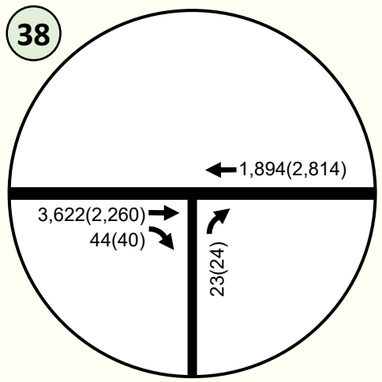
Route 7 at Napa Auto Parts



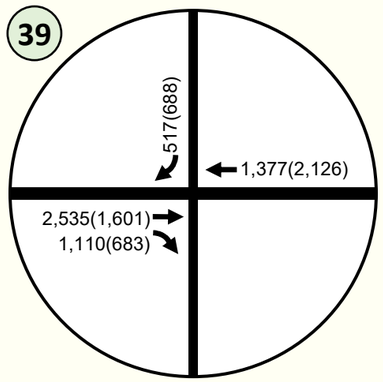
Route 7 at Great Falls Auto Service



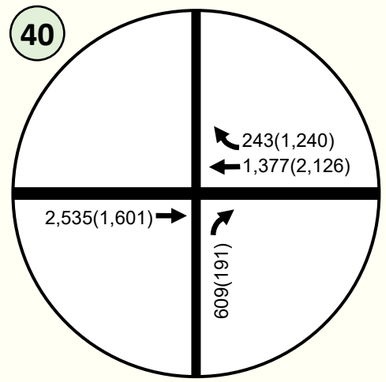
Route 7 at Route 228 & Popeyes



Route 7 at Shell Gas Station



Route 7 at Route 286
EB Off-Ramp & WB On-Ramp



Route 7 at Route 286
EB On-Ramp & WB Off-Ramp

LEGEND: (X) Signalized Intersection (Y) Unsignalized Intersection or Ramp Junction ← AM(PM)

Appendix B:

Calibration Memorandum and Results

VISSIM MODEL CALIBRATION

Purpose and Introduction

Microscopic simulation tool *VISSIM* version 11.0 was used to model the study area for the Route 7 Concept Study from Route 28 to the Loudoun/Fairfax County Line in Loudoun County, Virginia. The simulation models were developed for the AM and PM peak hours and were calibrated using field travel times and traffic volumes, in order to replicate field conditions within acceptable tolerances and to produce accurate Measures of Effectiveness (MOEs).

The purpose of this memorandum is to document the calibration procedures that were used and the parameters that were changed for the Route 7 Concept Study from Route 28 to the Loudoun/Fairfax County Line.

Calibration Setup

Calibration Targets

The goal of the calibration effort is to replicate the existing field condition in the simulation model with minimal acceptable differences. The VDOT *VISSIM Users Guide* and the VDOT *Traffic Operations and Safety Analysis Manual, Version 2.0* (TOSAM) recommends following the calibration process as described in the FHWA *Traffic Analysis Toolbox Volume III: Guidelines for Applying Traffic Microsimulation Modeling Software (FHWA-HRT-04-040)*. Below is a list of recommended thresholds that were used for the calibration of the *VISSIM* model for the Route 7 Concept Study from Route 28 to the Loudoun/Fairfax County Line.

1. Simulated Traffic Volumes (vph), Model Versus Observed
   GEH Statistic < 5.0

The GEH statistic formula used for comparing model flows versus field flows and is computed as follows:

$$GEH = \sqrt{\frac{2(m-c)^2}{(m+c)}}$$

where:

m = model output traffic volume (vph)

c = input traffic volume (vph)

2. Simulated Travel Times (seconds)
   Within ±30% for average observed travel times on arterials

As mentioned in the FHWA *Traffic Analysis Toolbox* guidelines, the target values will vary according to the purpose for which the microsimulation model is being developed and the resources available to the analyst. It is important to note that when calibrating to low travel times or volumes, small absolute differences represent significant percentage deviations.

VISSIM Global Parameters

The VDOT TOSAM describes specific *VISSIM* global parameters and inputs that must be coded into each model. These global parameters and their data sources are described below.

Vehicle Inputs & Seeding Time

The balanced traffic volumes for the peak hours are coded in the network. The peak hour (1-hour) duration is used for recording and processing the results. Additionally, a 15-minute seeding time is coded to produce queue or traffic demand buildup. The equivalent hourly traffic volume for the first 15-minute interval is used for the seeding period during the AM and PM peak hour.

Heavy Vehicle Percentages

The heavy vehicle percentage on Route 7 and Fairfax County Pkwy were determined based on field traffic counts (see **Table 1**). The heavy vehicle percentages for all the other minor roads are coded as 2%.

Table 1: Heavy Vehicle Percentages

Corridor	AM	PM
Route 7, EB	2.7%	0.7%
Route 7, WB	3.0%	2.2%
Fairfax County Pkwy, NB	1.4%	0.4%
Fairfax County Pkwy, SB	0.3%	2.7%

Arrival Distribution

The "exact volume" arrival distribution is used for all the vehicle inputs.

Link Speeds & Turning Speeds

A linear distribution ranging +/- 5 mph from the posted speed limit is used in the network. As recommended in the TOSAM, a linear distribution range of 7.5 - 15.5 mph is used for right turn speeds and 12.4 – 18.6 mph is used for the left-turns.

Origin-Destination (O-D)

The origin-destination routes were established based on the existing turning movement counts and later combined based on field observations to achieve realistic driver behavior.

Simulation Period and Resolution

A simulation period of 4,500 seconds including 900 seconds of seeding time is used during the AM and PM peak hour. As recommended in TOSAM, a simulation resolution of 10 time steps/simulation second is used.

VISSIM Default Driver Behavior Parameters

The *VISSIM* software models driver behavior based on the Wiedemann 74 and Wiedemann 99 car following models. The former model is recommended for modeling arterials or collector roadways and is used to model most of the roadways within the study area.

Data Sources

Volume and travel time data were used to calibrate the *VISSIM* models.

Field-measured turning movement counts for all the intersections and ramps along Route 7 within the study area were collected in June 2019. The turning movement counts were balanced manually. The balanced traffic volume network for the study area is shown in **Appendix A** of the main report.

Travel time runs were performed during peak hours on February 26, February 27, and March 5, 2020, along Route 7 from Route 28 to Fairfax County Pkwy. Additionally, the travel times along the study corridor were also collected from INRIX. All field travel time runs were performed prior to the widespread school closures and shutdowns resulting from the COVID-19 pandemic.

According to TOSAM, for routes that span a long distance, travel time should be calibrated at both the segment level and corridor level. For the corridor level travel time calibration, the average travel times along the entire study corridor were retrieved from the field travel time runs and were used for calibration. For the segment level travel time calibration, since there are multiple traffic signals along the study corridor, the segment level travel time can vary significantly depending on if the vehicle is stopped by a red light during field data collection. Therefore, INRIX data were used for the segment level travel time calibration instead of field data. Note that the INRIX travel time at each segment is the average travel time for all the vehicles that travel through the segment, including both the through traffic and turning traffic. Therefore, the sum total of these segment travel times is greater than the corridor end-to-end travel time measured in the field using a test vehicle making no turns. The traffic signals along the corridor are typically timed to optimize progression for through traffic, not turning traffic, resulting in greater delays and longer travel times reported for the individual segments, which include times for all traffic including turning vehicles. **Table 2** shows the processed travel time outputs.

Table 2: INRIX and Field-Measured Travel Times

Corridor		From	To	AM Travel Time (s)	PM Travel Time (s)
Rte. 7 EB	Segments	Rte. 28 off ramp	Rte. 28 on ramp	28	28
		Rte. 28 on ramp	City Center Blvd	69	71
		City Center Blvd	Cascades Pkwy off ramp	59	75
		Cascades Pkwy off ramp	Cascades Pkwy on ramp	54	40
		Cascades Pkwy on ramp	North Sterling Boulevard	250	141
		North Sterling Boulevard	Dranesville Road	154	132
		Dranesville Road	Fairfax County Pkwy	59	72
		Sum		**673**	**560**
	Corridor	Rte. 28 off ramp	Fairfax County Pkwy	561	451
Rte. 7 WB	Segments	Fairfax County Pkwy	Dranesville Road	49	278
		Dranesville Road	North Sterling Boulevard	111	216
		North Sterling Boulevard	Cascades Pkwy off ramp	123	120
		Cascades Pkwy off ramp	Cascades Pkwy on ramp	45	49
		Cascades Pkwy on ramp	City Center Blvd	69	85
		City Center Blvd	Rte. 28 off ramp	48	45
		Rte. 28 off ramp	Rte. 28 on ramp	48	77
		Sum		**495**	**869**
	Corridor	Fairfax County Pkwy	Rte. 28 on ramp	455	494

Notes:

- *Travel time for each **segment** is from INRIX data, and it is the average travel time for all the vehicles that travel through the segment, which include both the through traffic and turning traffic.*
- *Travel time for the entire **corridor** is from field data, and it is the average travel time for the field vehicle traveling through the entire corridor (i.e., end-to-end, making no turns)*

Video footage was recorded along the corridor during the field travel time runs using a dashboard-mounted camera. These videos were used to observe queue lengths along Route 7, and these observations aided the model calibration effort.

Number of Model Runs

Ten (10) *VISSIM* model runs were performed for both the AM and PM models. The number of simulation runs were determined by the VDOT sample size determination tool, version 1.1. The measures of effectiveness (MOE) used in the tool is the corridor level travel time. The results of the VDOT sample size determination tool are summarized in an attachment to this memo.

Calibration Process and Results

Initial simulation runs conducted using default driver behavior parameters showed that volume throughput calibration targets were generally met for all the study intersections. However, there are significant differences in travel time and queues along the study corridors, indicating that default driver behavior types do not replicate field conditions with sufficient accuracy. Hence, four (4) additional driving behavior types were created and applied to problematic segments/links. The driver behavior parameters for these four types of driving behavior types were adjusted through an iterative process to achieve results within the calibration targets. In particular, critical car following and lane changing parameters of the Wiedemann 74 model were adjusted for the calibration process. Additionally, the distribution for the desired speed limits were also adjusted.

The changes to the driver behavior model parameters and desired speed distribution yield model output that better matches the observed field conditions. All volume throughputs yield GEH statistic values within the recommended range (i.e., all GEH values are less than 5). Additionally, all travel times were calibrated to be within 30% of field collected travel times.

Modeled average and maximum queues were qualitatively assessed and were generally consistent with queues observed during field observations.

Table 3 summarizes the final calibrated model parameters that were used in the calibrated *VISSIM* models.

Table 3: Final Model Calibration Parameters

Wiedemann 74 Following Parameter	Default	AM Driving Behavior Types				PM Driving Behavior Types			
		AM1	AM2	AM3	AM4	PM1	PM2	PM3	PM4
Average Standstill Distance (ft)	6.56	6.56	7.2	8.0	8.6	6.56	7.7	8.0	8.7
Additive part of safety distance (ft)	2.0	2.0	2.2	3.0	3.6	2.0	2.7	3.0	3.7
Multiplicative part of safety distance (ft)	3.0	3.0	3.2	4.0	4.6	3.0	3.7	4.0	4.7
Wiedemann 74 Lane Change Parameter									
Safety Distance Reduction Factor	0.6	0.3	0.3	0.6	0.3	0.6	0.3	0.6	0.3

The results for the calibrated models are attached to this memo**.**

Attachments

Sample Size Determination Tool, Version 1.1

Virginia Department of Transportation

User Inputs	Sample Size (N) = Number of Model Runs
Constants	Sample Mean (X_s) = (1/N) (X_1 + X_2 + X_3 … + X_N)
Outputs	Sample Standard Deviation (S_s) = √[(Σ(X-X_s)^2)/(N-1)]
	Sampling Error = Z (S_s/√N)
	Confidence Level = X_s ± Z (S_s/√N)
	% of Sample Mean (E) = % Tolerance * X_s
	Sample Size Needed = [(Z)^2 * (S_s)^2] / (E)^2

Model Iterations

Measure of Effectiveness (MOE):	AM EB TT
Confidence Interval:	95%
Tolerance Error:	10%
Number of Model Runs:	10

Run Number	*AM EB TT*
1	497.47
2	548.57
3	509.57
4	559.04
5	538.08
6	551.64
7	553.84
8	635.97
9	470.75
10	561.67
11	
12	
13	
14	
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17	
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23	
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26	
27	
28	
29	
30	

Sample Size Outputs

N	=	10.0
X_s	=	542.7
S_s	=	44.6
E	=	54.3
Z	=	1.96

Sampling Error	=	27.65		
95% Confidence Interval	=	515.0	to	570.3
Percentage of Mean	=	5.1%		**Good**
Sample Size Needed	=	**10**		

Z is the number of standard deviations away from the mean corresponding to the required confidence level in a normal distribution.

Sample Size Determination Tool, Version 1.1

Virginia Department of Transportation

User Inputs	Sample Size (N) = Number of Model Runs
Constants	Sample Mean (X_s) = (1/N) (X_1 + X_2 + X_3 … + X_N)
Outputs	Sample Standard Deviation (S_s) = √[(Σ(X-X_s)^2)/(N-1)]
	Sampling Error = Z (S_s/√N)
	Confidence Level = X_s ± Z (S_s/√N)
	% of Sample Mean (E) = % Tolerance * X_s
	Sample Size Needed = [(Z)^2 * (S_s)^2] / (E)^2

Model Iterations

Measure of Effectiveness (MOE):	AM WB TT
Confidence Interval:	95%
Tolerance Error:	10%
Number of Model Runs:	10

Run Number	*AM WB TT*
1	406.83
2	418.16
3	400.98
4	399.92
5	396.29
6	406.31
7	407.23
8	408.38
9	398.20
10	407.52
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	
26	
27	
28	
29	
30	

Sample Size Outputs

N	=	10.0
X_s	=	405.0
S_s	=	6.4
E	=	40.5
Z	=	1.96

Sampling Error	=	3.95		
95% Confidence Interval	=	401.0	to	408.9
Percentage of Mean	=	1.0%		**Good**
Sample Size Needed	=	**10**		

Z is the number of standard deviations away from the mean corresponding to the required confidence level in a normal distribution.

Sample Size Determination Tool, Version 1.1

Virginia Department of Transportation

User Inputs	Sample Size (N) = Number of Model Runs
Constants	Sample Mean (X_s) = (1/N) (X_1 + X_2 + X_3 … + X_N)
Outputs	Sample Standard Deviation (S_s) = √[(Σ(X-X_s)^2)/(N-1)]
	Sampling Error = Z (S_s/√N)
	Confidence Level = X_s ± Z (S_s/√N)
	% of Sample Mean (E) = % Tolerance * X_s
	Sample Size Needed = [(Z)^2 * (S_s)^2] / (E)^2

Model Iterations

Measure of Effectiveness (MOE):	PM EB TT
Confidence Interval:	95%
Tolerance Error:	10%
Number of Model Runs:	10

Run Number	*PM EB TT*
1	450.92
2	465.36
3	474.93
4	464.69
5	468.24
6	482.32
7	471.44
8	473.31
9	491.32
10	460.50
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	
26	
27	
28	
29	
30	

Sample Size Outputs

N	=	10.0
X_s	=	470.3
S_s	=	11.3
E	=	47.0
Z	=	1.96

Sampling Error	=	7.01		
95% Confidence Interval	=	463.3	to	477.3
Percentage of Mean	=	1.5%		**Good**
Sample Size Needed	=	**10**		

Z is the number of standard deviations away from the mean corresponding to the required confidence level in a normal distribution.

Sample Size Determination Tool, Version 1.1

Virginia Department of Transportation

User Inputs	Sample Size (N) = Number of Model Runs
Constants	Sample Mean (X_s) = (1/N) (X_1 + X_2 + X_3 … + X_N)
Outputs	Sample Standard Deviation (S_s) = √[(Σ(X-X_s)^2)/(N-1)]
	Sampling Error = Z (S_s/√N)
	Confidence Level = X_s ± Z (S_s/√N)
	% of Sample Mean (E) = % Tolerance * X_s
	Sample Size Needed = [(Z)^2 * (S_s)^2] / (E)^2

Model Iterations

Measure of Effectiveness (MOE):	PM WB TT
Confidence Interval:	95%
Tolerance Error:	10%
Number of Model Runs:	10

Run Number	*PM WB TT*
1	554.31
2	522.48
3	514.56
4	520.07
5	561.05
6	513.50
7	572.40
8	515.40
9	516.90
10	593.14
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	
26	
27	
28	
29	
30	

Sample Size Outputs

N	=	10.0
X_s	=	538.4
S_s	=	29.2
E	=	53.8
Z	=	1.96

Sampling Error	=	18.11		
95% Confidence Interval	=	520.3	to	556.5
Percentage of Mean	=	3.4%		**Good**
Sample Size Needed	=	**10**		

Z is the number of standard deviations away from the mean corresponding to the required confidence level in a normal distribution.

INRIX data and Field data

Finalized AM

Finalized PM

Corridor		From	To	INRIX &Field Data		Model Data			
				Travel Time (TT)		AM		PM	
						Iteration-15		Iteration-11	
				AM	PM	TT	% Diff	TT	% Diff
Eastbound									
Rte 7	Segments	Rte. 28 off ramp	Rte. 28 on ramp	28	28	28	1%	28	1%
		Rte. 28 on ramp	City Center Blvd	69	71	74	7%	76	7%
		City Center Blvd	Cascades Pkwy off ramp	59	75	60	2%	77	3%
		Cascades Pkwy off ramp	Cascades Pkwy on ramp	54	40	48	-12%	36	-10%
		Cascades Pkwy on ramp	North Sterling Boulevard	250	141	221	-12%	153	8%
		North Sterling Boulevard	Dranesville Road	154	132	150	-3%	143	8%
		Dranesville Road	Fairfax County Pkwy	59	72	55	-8%	65	-10%
		Sum		673	560	635	-6%	578	3%
	Corridor	Rte. 28 off ramp	Fairfax County Pkwy	561	451	543	-3%	470	4%
Westbound									
Rte 7	Segments	Fairfax County Pkwy	Dranesville Road	49	278	52	6%	296	6%
		Dranesville Road	North Sterling Boulevard	111	216	117	5%	226	5%
		North Sterling Boulevard	Cascades Pkwy off ramp	123	120	115	-7%	122	2%
		Cascades Pkwy off ramp	Cascades Pkwy on ramp	45	49	41	-10%	48	-1%
		Cascades Pkwy on ramp	City Center Blvd	69	85	72	3%	87	2%
		City Center Blvd	Rte. 28 off ramp	48	45	46	-3%	47	5%
		Rte. 28 off ramp	Rte. 28 on ramp	48	77	50	5%	73	-5%
		Sum		495	869	493	0%	899	3%
	Corridor	Fairfax County Pkwy	Rte. 28 on ramp	455	494	405	-11%	538	9%

Note:

- *Travel time at each segment is from INRIX data, and it is the average travel time for all the vehicles that travel through the segment, which include both the through traffic and turning traffic.*
- *Travel time for the entire corridor is from field data, and it is the average travel time that the field vehicle travel through the entire corridor*

Field data
Finalized AM
Finalized PM

Intersection	Movement	Field Data		Model Throughput			
		Traffic Volume		Iteration 15		Iteration 11	
				Traffic Volume	GEH	Traffic Volume	GEH
		AM	PM	AM		PM	
Rte 7 at Rte 28 Interchange	Rte 7 EB to Rte 28	2585	1670	2571	0.28	1653	0.42
	Rte 28 to Rte 7 EB	508	946	506	0.09	945	0.03
	Rte 7 WB to Rte 28	612	551	617	0.20	531	0.86
	Rte 28 to Rte 7 WB	1731	2293	1733	0.05	2208	1.79
	Rte 7 EB Through	2765	2288	2793	0.5	2308	0.4
	Rte 7 WB Through	1737	3046	1708	0.7	2944	1.9
Rte 7 at Broad Run Drive	WBRT	18	30	18	0.0	31	0.2
	WBT	1668	2991	1651	0.4	2890	1.9
	SBRT	69	55	69	0.0	54	0.1
Rte 7 at Atlantic Blvd Interchange	Rte 7 EB to Atlantic Blvd NB	365	724	375	0.5	722	0.1
	Rte 7 EB to Atlantic Blvd SB	195	189	199	0.3	189	0.0
	Atlantic Blvd NB to Rte 7 EB	43	78	44	0.2	82	0.4
	Atlantic Blvd SB to Rte 7 EB	161	102	161	0.0	100	0.2
	Rte 7 WB to Atlantic Blvd NB	53	119	53	0.0	116	0.3
	Rte 7 WB to Atlantic Blvd SB	38	26	37	0.2	24	0.4
	Atlantic Blvd NB to Rte 7 WB	52	288	51	0.1	286	0.1
	Atlantic Blvd SB to Rte 7 WB	250	338	247	0.2	329	0.5
	Rte 7 EB Through	2713	2321	2729	0.3	2339	0.4
	Rte 7 WB Through	1996	2946	1978	0.4	2838	2.0
Jona Drive	WBRT	11	6	9	0.6	6	0.0
	WBT	2087	3091	2077	0.2	2975	2.1
Rte 7 at City Center Blvd/Countryside Blvd	SBLT	120	133	123	0.3	137	0.3
	SBT	59	105	54	0.7	100	0.5
	SBRT	252	233	254	0.1	236	0.2
	EBLT	203	343	205	0.1	343	0.0
	EBT	2652	2018	2668	0.3	2035	0.4
	EBRT	62	140	61	0.1	144	0.3
	NBLT	42	94	40	0.3	89	0.5
	NBT	85	115	83	0.2	115	0.0
	NBRT	91	221	92	0.1	224	0.2
	WBLT	53	247	52	0.1	238	0.6
	WBT	1804	2770	1801	0.1	2655	2.2
	WBRT	114	155	113	0.1	146	0.7
Rte 7 at Davenport Drive	WBRT	65	190	71	0.7	186	0.3
	WBT	1905	3039	1911	0.1	2913	2.3
	SBRT	66	133	65	0.1	132	0.1
Rte 7 at Loudoun Tech Dr/Palisade Pkwy	SBLT	83	180	83	0.0	180	0.0
	SBT	49	87	50	0.1	86	0.1
	SBRT	400	411	398	0.1	412	0.0
	EBLT	131	322	131	0.0	325	0.2
	EBT	2493	1937	2514	0.4	1957	0.5
	EBRT	239	113	251	0.8	118	0.5
	NBLT	49	273	50	0.1	280	0.4
	NBT	19	96	17	0.5	95	0.1
	NBRT	56	182	58	0.3	180	0.1
	WBLT	81	105	78	0.3	98	0.7
	WBT	1521	2545	1511	0.3	2409	2.7
	WBRT	59	130	60	0.1	129	0.1
Rte 7 at Cascades Pkwy Interchange	Rte 7 EB to Cascades Pkwy NB	148	220	153	0.4	228	0.5
	Rte 7 EB to Cascades Pkwy SB	192	268	195	0.2	273	0.3
	Cascades Pkwy NB to Rte 7 EB	236	255	237	0.1	254	0.1
	Cascades Pkwy SB to Rte 7 EB	142	153	146	0.3	158	0.4
	Rte 7 WB to Cascades Pkwy NB	130	252	124	0.5	224	1.8
	Rte 7 WB to Cascades Pkwy SB	164	173	151	1.0	153	1.6

	Cascades Pkwy NB to Rte 7 WB	82	162	81	0.1	163	0.1
	Cascades Pkwy SB to Rte 7 WB	111	111	106	0.5	107	0.4
	Rte 7 EB Through	2434	1964	2359	1.5	1967	0.1
	Rte 7 WB Through	1550	2669	1540	0.3	2530	2.7
Rte 7 at Bartholomew Fair Dr/Campus Dr	SBLT	9	16	10	0.3	17	0.2
	SBT	1	20	1	0.0	21	0.2
	SBRT	2	33	2	0.0	30	0.5
	EBLT	99	53	96	0.3	54	0.1
	EBT	2549	1891	2405	2.9	1899	0.2
	EBRT	22	275	21	0.2	268	0.4
	NBLT	39	203	37	0.3	200	0.2
	NBT	11	31	11	0.0	30	0.2
	NBRT	155	310	155	0.0	313	0.2
	WBLT	60	236	62	0.3	217	1.3
	WBT	1721	2696	1678	1.0	2519	3.5
	WBRT	9	33	10	0.3	30	0.5
Rte 7 at Potomac View Road	SBLT	299	340	319	1.1	342	0.1
	SBT	203	248	205	0.1	251	0.2
	SBRT	216	190	214	0.1	187	0.2
	EBLT	53	145	50	0.4	141	0.3
	EBT	2652	2046	2498	3.0	2059	0.3
	EBRT	8	26	7	0.4	27	0.2
	NBLT	16	26	16	0.0	25	0.2
	NBT	105	259	107	0.2	259	0.0
	NBRT	353	445	337	0.9	440	0.2
	WBLT	263	435	261	0.1	418	0.8
	WBT	1558	2749	1521	0.9	2554	3.8
	WBRT	231	340	231	0.0	316	1.3
Rte 7 at Driveway to Mirror Ridge Shopping Center	WBRT	43	70	41	0.3	67	0.4
	WBT	2051	3507	2031	0.4	3285	3.8
	SBRT	1	17	1	0.0	17	0.0
Rte 7 at Driveway to Cascades Village Residential Development and Rehabilitation Center	EBRT	18	29	17	0.2	31	0.4
	EBT	3286	2802	3118	3.0	2810	0.2
	NBRT	20	26	19	0.2	25	0.2
Rte 7 at N Sterling blvd/Cardinal Glen Circle	SBLT	32	20	29	0.5	21	0.2
	SBT	16	10	17	0.2	8	0.7
	SBRT	26	26	26	0.0	26	0.0
	EBLT	6	56	4	0.9	54	0.3
	EBT	3064	2237	2932	2.4	2252	0.3
	EBRT	236	535	222	0.9	544	0.4
	NBLT	348	522	351	0.2	521	0.0
	NBT	3	22	3	0.0	18	0.9
	NBRT	459	469	447	0.6	463	0.3
	WBLT	292	365	284	0.5	338	1.4
	WBT	1720	3029	1702	0.4	2810	4.1
	WBRT	14	34	14	0.0	32	0.3
Rte 7 at August Dr	SBLT	357	148	362	0.3	151	0.2
	SBRT	223	220	218	0.3	216	0.3
	EBLT	151	211	149	0.2	213	0.1
	EBT	3404	2515	3253	2.6	2522	0.1
	WBUT	3	3	4	0.5	3	0.0
	WBT	1803	3208	1791	0.3	2975	4.2
	WBRT	155	144	161	0.5	137	0.6
Rte 7 at Driveway to Christ the Redeemer Catholic Church	EBRT	39	16	42	0.5	21	1.2
	EBT	3722	2647	3545	2.9	2653	0.1
	NBRT	4	7	4	0.0	7	0.0
Rte 7 at Business Dr/Cedar Dr	SBLT	14	17	10	1.2	15	0.5
	SBT	0	0	0	0.0	0	0.0
	SBRT	22	94	24	0.4	94	0.0
	EBLT	53	65	51	0.3	63	0.3
	EBT	3669	2585	3465	3.4	2591	0.1
	EBRT	4	4	4	0.0	4	0.0
	NBLT	1	0	1	0.00	0	0.00

	NBT	0	0	0	0.00	0	0.00
	NBRT	0	3	0	0.00	3	0.00
	WBLT	9	6	9	0.00	5	0.43
	WBT	1938	3261	1928	0.23	3031	4.10
	WBRT	21	31	23	0.43	30	0.18
Rte 7 at Driveway to Chick-fil-A	EBRT1	26	15	23	0.61	13	0.53
	EBRT2	117	132	113	0.37	135	0.26
	EBT	3657	2590	3462	3.27	2594	0.08
	NBRT	7	25	6	0.39	25	0.00
Rte 7 at Driveway to Cedar laks Plaza	WBRT	12	27	13	0.28	25	0.39
	WBT	1956	3262	1954	0.05	3035	4.05
	SBRT	12	36	10	0.60	33	0.51
Rte 7 at Community Plaza/Lakeland Drive	SBLT	106	126	106	0.00	122	0.36
	SBT	32	58	30	0.36	58	0.00
	SBRT	44	162	44	0.00	166	0.31
	EBLT	24	51	24	0.00	50	0.14
	EBT	3423	2317	3245	3.08	2319	0.04
	EBRT	100	115	95	0.51	112	0.28
	NBLT	93	235	91	0.21	239	0.26
	NBT	13	42	12	0.28	42	0.00
	NBRT	136	126	135	0.09	122	0.36
	WBLT	78	112	75	0.34	104	0.77
	WBT	1831	2892	1831	0.00	2653	4.54
	WBRT	47	157	48	0.15	142	1.23
Rte 7 at Driveways right between Community Plaza and Dranesville Road	EBRT1	40	61	36	0.65	60	0.13
	EBRT2	28	34	25	0.58	34	0.00
	EBRT3	30	115	28	0.37	119	0.37
	EBT	3625	2508	3441	3.10	2487	0.42
	NBRT1	72	56	74	0.23	58	0.26
	NBRT2	41	42	40	0.16	41	0.16
Rte 7 at Driveways left between Community Plaza and Dranesville Road	WBRT1	10	5	10	0.00	4	0.47
	WBRT2	5	12	4	0.47	9	0.93
	WBRT3	15	24	17	0.50	22	0.42
	WBRT4	9	7	8	0.34	5	0.82
	WBRT5	3	20	4	0.53	18	0.46
	WBRT6	0	2	0	0.00	3	0.63
	WBRT7	6	3	6	0.00	3	0.00
	WBRT8	9	6	9	0.00	5	0.43
	WBRT9	21	33	21	0.00	30	0.53
	WBT	1976	3149	1974	0.05	2906	4.42
	SBRT1	8	29	8	0.00	28	0.19
	SBRT2	2	8	2	0.00	8	0.00
	SBRT3	19	31	18	0.23	30	0.18
	SBRT4	8	11	8	0.00	11	0.00
	SBRT5	3	21	2	0.63	21	0.00
	SBRT6	0	3	0	0.00	3	0.00
	SBRT7	1	4	1	0.00	4	0.00
	SBRT8	7	12	6	0.39	12	0.00
Rte 7 at Dranesville Rd	SBLT	5	11	5	0.00	11	0.00
	SBT	2	3	3	0.63	3	0.00
	SBRT	1	8	1	0.00	8	0.00
	EBLT	16	35	15	0.25	35	0.00
	EBT	3371	2054	3241	2.26	2068	0.31
	EBRT	293	368	270	1.37	352	0.84
	NBLT	230	647	227	0.20	623	0.95
	NBT	1	4	1	0.00	3	0.53
	NBRT	290	235	294	0.23	236	0.07
	WBLT	130	299	129	0.09	264	2.09
	WBT	1755	2498	1754	0.02	2259	4.90
	WBRT	9	17	9	0.00	16	0.25
Rte 7 at Driveways right east of Dranesville Rd	EBRT	44	40	41	0.46	40	0.00
	EBT	3622	2260	3499	2.06	2275	0.32
	NBRT	23	24	23	0.00	25	0.20

Rte 7 at Fairfax County Pkwy Interchange	Rte 7 EB to Fairfax County Pkwy NB	70	177	69	0.12	172	0.38
	Rte 7 EB to Fairfax County Pkwy SB	1040	506	992	1.51	509	0.13
	Fairfax County Pkwy NB to Rte 7 EB	50	83	48	0.29	80	0.33
	Fairfax County Pkwy SB to Rte 7 EB	609	191	614	0.20	189	0.15
	Rte 7 WB to Fairfax County Pkwy NB	114	1076	112	0.19	1072	0.12
	Rte 7 WB to Fairfax County Pkwy SB	129	164	127	0.18	164	0.00
	Fairfax County Pkwy NB to Rte 7 WB	357	625	356	0.05	631	0.24
	Fairfax County Pkwy SB to Rte 7 WB	160	63	158	0.16	66	0.37
	Rte 7 EB Through	2535	1601	2424	2.23	1609	0.20
	Rte 7 WB Through	1377	2126	1371	0.16	1916	4.67

Appendix C:

VISSIM Results for Existing Conditions

LC_Rte 7_VISSIM Results: Existing 2019 Conditions, AM Peak Hour

5/28/2020

Travel Time: Rte 7 Between Rte 28 and Dranesville Rd

	Model Travel Time (min)	Field Travel Time (min)	Difference (%)
Eastbound	9.6	9.4	3%
Westbound	6.7	7.6	-11%

Intersection

Intersection	Movement		Output volume (vph)	Avg Queue (ft)	Max Queue (ft)	Storage Length (ft)	Delay (sec/veh)	LOS	Approach Delay (sec/veh)	Approach LOS	Intersection Delay (sec/veh)	Intersection LOS
Rte 7 at Broad Run Drive (Unsignalized)	WB	RT	18	0	0	300	0	A	0	A	0	A
		T	1,650	0	0	5,080	0	A				
	SB	RT	69	3	66	300	8	A	8	A		
Jona Driveway (Unsignalized)	WB	RT	9	0	3	260	0	A	0	A	0	A
		T	2,076	0	3	435	0	A				
Rte 7 at City Center Blvd/Countryside Blvd	SB	LT	123	48	152	320	97	F	47	D	20	C
		T	54	48	152	945	92	F				
		RT	254	19	156	400	13	B				
	EB	LT	205	73	211	700	98	F	19	B		
		T	2,668	171	889	14,995	14	B				
		RT	61	0	0	1,445	1	A				
	NB	LT	40	33	109	405	100	F	56	E		
		T	83	33	109	700	97	F				
		RT	92	0	9	455	1	A				
	WB	LT	52	25	107	480	88	F	12	B		
		T	1,798	48	338	1,310	11	B				
		RT	113	0	14	545	2	A				
Rte 7 at Davenport Drive (Unsignalized)	WB	RT	71	0	63	965	1	A	1	A	1	A
		T	1,910	0	63	985	1	A				
	SB	RT	66	4	74	320	12	B	12	B		
Rte 7 at Loudoun Tech Dr/Palisades Pkwy	SB	LT	83	39	117	345	101	F	28	C	17	B
		T	50	39	117	490	102	F				
		RT	398	0	45	455	4	A				
	EB	LT	131	60	167	440	124	F	13	B		
		T	2,519	93	1,275	2,460	8	A				
		RT	251	0	57	350	2	A				
	NB	LT	50	24	81	330	99	F	54	D		
		T	17	24	81	740	106	F				
		RT	58	0	0	700	1	A				
	WB	LT	78	67	194	445	130	F	16	B		
		T	1,511	57	634	4,190	11	B				
		RT	60	0	0	690	1	A				
Rte 7 at Bartholomew Fair Dr/Campus Dr	SB	LT	10	5	47	235	104	F	105	F	27	C
		T	1	5	47	230	54	D				
		RT	2	1	25	230	130	F				
	EB	LT	96	67	224	330	118	F	40	D		
		T	2,427	503	1,122	4,180	38	D				
		RT	21	0	38	1,070	1	A				
	NB	LT	37	19	72	200	100	F	24	C		
		T	11	19	72	470	97	F				
		RT	155	0	7	225	1	A				
	WB	LT	62	26	108	400	86	F	8	A		
		T	1,678	29	286	950	5	A				
		RT	10	1	34	215	7	A				
Rte 7 at Potomac View Road	SB	LT	320	111	402	590	93	F	66	E	39	D
		T	205	111	402	1,260	78	E				
		RT	214	19	150	270	15	B				
	EB	LT	50	30	174	405	92	F	23	C		
		T	2,517	1,385	2,198	910	22	C				
		RT	7	1	63	840	6	A				
	NB	LT	16	217	675	175	99	F	98	F		
		T	107	217	675	455	90	F				
		RT	342	260	735	455	100	F				
	WB	LT	261	135	322	420	110	F	34	C		
		T	1,521	204	647	2,200	25	C				
		RT	231	3	96	330	5	A				
Rte 7 at Driveway to Mirror Ridge Shopping Center (Unsignalized)	WB	RT	41	0	0		1	A	1	A	1	A
		T	2,031	1	65		1	A				
	SB	RT	1	0	4		2	A	2	A		
Rte 7 at Driveway to Cascades Village Residential Development and Rehabilitation Center (Unsignalized)	EB	RT	17	40	251		2	A	5	A	6	A
		T	3,147	40	251		5	A				
	NB	RT	20	8	60		71	F	71	F		
Rte 7 at N Sterling Blvd/Cardinal Glen Circle	SB	LT	29	28	128	410	107	F	73	E	23	C
		T	17	28	128	410	116	F				
		RT	26	1	59	405	8	A				
	EB	LT	4	4	44	390	103	F	15	B		
		T	2,950	621	1,657	2,180	15	B				
		RT	224	5	117	395	4	A				
	NB	LT	351	78	224	300	95	F	43	D		
		T	3	78	224	550	82	F				
		RT	447	0	73	510	2	A				
	WB	LT	284	101	294	410	91	F	25	C		
		T	1,700	120	389	1,285	14	B				
		RT	14	0	0	305	2	A				
Rte 7 at Augusta Dr	SB	LT	362	78	223	330	91	F	60	E	19	B
		RT	218	15	130	205	10	A				
	EB	LT	150	97	296	620	106	F	17	B		
		T	3,263	178	1,039	1,300	13	B				
	WB	UT	4	3	43	125	89	F	11	B		
		T	1,788	47	310	790	11	B				
		RT	160	0	46	400	2	A				
Rte 7 at Driveway to Christ the Redeemer Catholic Church (Unsignalized)	EB	RT	42	67	416		6	A	12	B	12	B
		T	3,563	67	416		12	B				
	NB	RT	4	2	32		72	F	72	F		
Rte 7 at Cedar Dr (Unsignalized)	SB	LT	11	6	60	220	206	F	71	F	10	A
		T	0	6	71	220	0	A				
		RT	24	2	65	220	9	A				
	EB	LT	51	5	99	415	9	A	14	B		
		T	3,486	261	923	800	14	B				
		RT	4	241	936	335	13	B				
	NB	LT	1	0	16	100	46	E	46	E		
		T	0	0	0	100	0	A				
		RT	0	0	0	100	0	A				
	WB	LT	9	8	86	175	64	F	1	A		
		T	1,924	0	107	880	0	A				
		RT	23	0	42	450	1	A				
Rte 7 at Driveway to Chick-fil-A (Unsignalized)	EB	RT1	23	95	279		12	B	12	B	12	B
		RT2	114	0	0		5	A				
		T	3,484	95	279		12	B				
	NB	RT	6	5	38		137	F	137	F		
Rte 7 at Driveway to Cedar Lake Plaza (Unsignalized)	WB	RT	13	0	0		1	A	0	A	0	A
		T	1,951	0	0		0	A				
	SB	RT	10	0	0		0	A	0	A		

Intersection

Intersection	Movement		Output volume (vph)	Avg Queue (ft)	Max Queue (ft)	Storage Length (ft)	Delay (sec/veh)	LOS	Approach Delay (sec/veh)	Approach LOS	Intersection Delay (sec/veh)	Intersection LOS
Rte 7 at Community Plaza/Lakeland Drive	SB	LT	106	50	175	370	99	F	77	E	13	B
		T	30	50	175	370	104	F				
		RT	44	2	61	200	8	A				
	EB	LT	24	15	88	380	95	F	12	B		
		T	3,264	100	369	875	11	B				
		RT	95	1	64	335	2	A				
	NB	LT	91	36	127	80	95	F	44	D		
		T	12	36	127	215	94	F				
		RT	135	10	87	210	5	A				
	WB	LT	75	38	108	390	89	F	6	A		
		T	1,830	36	322	1,410	3	A				
		RT	48	1	91	1,410	0	A				
Rte 7 at NB Driveways between Community Plaza and Dranesville Road (Unsignalized)	EB	RT1	37	1	107		0	A	0	A	1	A
		RT2	25	1	132		1	A	1	A		
		RT3	28	16	600		1	A	1	A		
		T	3,458	1	120		1	A	1	A		
	NB	RT1	74	0	41		1	A	1	A		
		RT2	40	0	29		2	A	2	A		
Rte 7 at SB Driveways left between Community Plaza and Dranesville Road (Unsignalized)	WB	RT1	10	0	0		0	A	0	A	0	A
		RT2	4	0	4		0	A	0	A		
		RT3	17	0	8		0	A	0	A		
		RT4	8	0	31		0	A	0	A		
		RT5	4	0	0		0	A	0	A		
		RT6	0	0	0		0	A	0	A		
		RT7	6	0	0		0	A	0	A		
		RT8	9	0	6		0	A	0	A		
		RT9	21	10	208		0	A	0	A		
		T	1,974	0	6		0	A	0	A		
	SB	RT1	8	0	0		0	A	0	A		
		RT2	2	0	2		0	A	0	A		
		RT3	18	0	9		0	A	0	A		
		RT4	8	0	6		0	A	0	A		
		RT5	2	0	2		0	A	0	A		
		RT6	0	0	0		0	A	0	A		
		RT7	1	0	0		0	A	0	A		
		RT8	6	0	2		2	A	2	A		
Rte 7 at Dranesville Rd	SB	LT	5	4	42	95	110	F	110	F	13	B
		T	3	4	42	95	142	F				
		RT	1	7	66	95	11	B				
	EB	LT	15	9	60	590	115	F	6	A		
		T	3,256	43	366	1,390	6	A				
		RT	271	0	80	1,325	1	A				
	NB	LT	226	73	213	340	93	F	69	E		
		T	1	73	213	420	109	F				
		RT	294	38	176	415	51	D				
	WB	LT	129	55	140	420	119	F	11	B		
		T	1,754	60	295	4,350	3	A				
		RT	9	0	13	4,350	4	A				
Rte 7 at Driveways east of Dranesville Rd (Unsignalized)	EB	RT	41	13	264		0	A	1	A	1	A
		T	3,512	13	264		1	A				
	NB	RT	23	1	41		13	B	13	B		

Interchange

Intersection /Interchange	Movement	Speed	Volume (vph)	Density (vpmpl)	LOS
Rte 7 at Atlantic Blvd Interchange	Rte 7 at Atlantic Blvd WB Off-ramp Junction	47	2,064	11	B
	Rte 7 at Atlantic Blvd WB Basic Freeway Segment	47	1,977	14	B
	Rte 7 at Atlantic Blvd WB Weaving Segment	46	2,286	12	B
	Rte 7 at Atlantic Blvd EB Weaving Segment	55	3,299	15	B
	Rte 7 at Atlantic Blvd EB Off-ramp Junction	54	3,102	14	B
	Rte 7 at Atlantic Blvd EB Basic Freeway Segment	48	2,729	19	B
	Rte 7 at Atlantic Blvd EB On-ramp Junction	35	2,936	21	C
Rte 7 at Cascades Pkwy Interchange	Rte 7 at Cascades Pkwy WB Off-ramp Junction	41	1,723	10	B
	Rte 7 at Cascades Pkwy WB Basic Freeway Segment 1	42	1,609	13	B
	Rte 7 at Cascades Pkwy WB Weaving Segment	42	1,694	10	B
	Rte 7 at Cascades Pkwy WB Basic Freeway Segment 2	42	1,542	12	B
	Rte 7 at Cascades Pkwy WB On-ramp Junction	31	1,647	13	B
	Rte 7 at Cascades Pkwy EB Off-ramp Junction	44	2,668	15	B
	Rte 7 at Cascades Pkwy EB Basic Freeway Segment 1	42	2,507	20	C
	Rte 7 at Cascades Pkwy EB Weaving Segment	32	2,646	21	C
	Rte 7 at Cascades Pkwy EB Basic Freeway Segment 2	22	2,401	37	E
	Rte 7 at Cascades Pkwy EB On-ramp Junction	11	2,562	57	E

LC_Rte 7_VISSIM Results: Existing 2019 Conditions, PM Peak Hour

5/28/2020

Travel Time: Rte 7 Between Rte 28 and Dranesville Rd

	Model Travel Time (min)	Field Travel Time (min)	Difference (%)
Eastbound	7.8	7.5	4%
Westbound	9.0	8.2	9%

Intersection

Intersection	Movement		Output volume (vph)	Avg Queue (ft)	Max Queue (ft)	Storage Length (ft)	Delay (sec/veh)	LOS	Approach Delay (sec/veh)	Approach LOS	Intersection Delay (sec/veh)	Intersection LOS
Rte 7 at Broad Run Drive (Unsignalized)	WB	RT	31	0	16	300	1	A	1	A	1	A
		T	2,890	0	16	5,080	1	A				
	SB	RT	54	4	72	300	15	B	15	B		
Jona Driveway (Unsignalized)	WB	RT	6	0	0	260	0	A	0	A	0	A
		T	2,979	0	0	435	0	A				
Rte 7 at City Center Blvd/Countryside Blvd	SB	LT	137	57	184	320	92	F	56	E	28	C
		T	100	57	184	945	88	F				
		RT	236	29	201	400	21	C				
	EB	LT	343	95	287	700	86	F	27	C		
		T	2,034	94	563	14,995	18	B				
		RT	144	0	0	1,445	1	A				
	NB	LT	89	45	119	405	93	F	45	D		
		T	115	45	119	700	92	F				
		RT	224	0	29	455	1	A				
	WB	LT	238	78	230	480	92	F	23	C		
		T	2,658	152	1,061	1,310	18	B				
		RT	145	0	35	545	2	A				
Rte 7 at Davenport Drive (Unsignalized)	WB	RT	187	2	259	965	2	A	1	A	2	A
		T	2,909	2	259	985	1	A				
	SB	RT	131	16	170	320	19	C	19	C		
Rte 7 at Loudoun Tech Dr/Palisades Pkwy	SB	LT	180	61	188	345	92	F	37	D	33	C
		T	86	61	188	490	90	F				
		RT	412	0	38	455	1	A				
	EB	LT	323	150	334	440	147	F	40	D		
		T	1,954	184	1,115	2,460	25	C				
		RT	118	0	24	350	1	A				
	NB	LT	280	86	259	330	89	F	59	E		
		T	95	86	259	740	83	F				
		RT	180	0	0	700	1	A				
	WB	LT	98	98	291	445	148	F	20	B		
		T	2,411	200	770	4,190	15	B				
		RT	130	0	23	690	1	A				
Rte 7 at Bartholomew Fair Dr/Campus Dr	SB	LT	17	27	147	235	94	F	93	F	17	B
		T	21	27	147	230	89	F				
		RT	30	27	149	230	96	F				
	EB	LT	54	38	151	330	110	F	16	B		
		T	1,901	128	802	4,180	16	B				
		RT	268	0	74	1,070	2	A				
	NB	LT	200	64	193	200	96	F	41	D		
		T	30	64	193	470	84	F				
		RT	313	7	104	225	1	A				
	WB	LT	216	89	250	400	116	F	12	B		
		T	2,520	27	173	950	3	A				
		RT	30	1	31	215	3	A				
Rte 7 at Potomac View Road	SB	LT	342	136	476	590	95	F	74	E	39	D
		T	251	136	476	1,260	79	E				
		RT	187	33	200	270	29	C				
	EB	LT	141	185	397	405	195	F	21	C		
		T	2,060	47	313	910	10	A				
		RT	27	0	36	840	2	A				
	NB	LT	25	18	85	175	117	F	79	E		
		T	259	221	626	455	114	F				
		RT	439	185	606	455	56	E				
	WB	LT	415	233	498	420	132	F	34	C		
		T	2,552	379	759	2,200	21	C				
		RT	316	5	140	330	5	A				
Rte 7 at Driveway to Mirror Ridge Shopping Center (Unsignalized)	WB	RT	67	0	4		1	A	9	A	9	A
		T	3,286	283	1,293		9	A				
	SB	RT	17	10	54		108	F	108	F		
Rte 7 at Driveway to Cascades Village Residential Development and Rehabilitation Center (Unsignalized)	EB	RT	31	1	112		2	A	1	A	1	A
		T	2,810	1	112		1	A				
	NB	RT	25	1	29		10	B	10	B		
Rte 7 at N Sterling Blvd/Cardinal Glen Circle	SB	LT	21	15	88	410	99	F	62	E	32	C
		T	8	15	88	410	103	F				
		RT	26	3	61	405	20	B				
	EB	LT	54	28	141	390	79	E	29	C		
		T	2,252	264	899	2,180	30	C				
		RT	544	68	456	395	18	B				
	NB	LT	521	99	292	300	83	F	45	D		
		T	18	99	292	550	81	F				
		RT	463	52	232	510	2	A				
	WB	LT	340	138	372	410	100	F	29	C		
		T	2,815	327	1,398	1,285	21	C				
		RT	32	0	0	305	3	A				
Rte 7 at Augusta Dr	SB	LT	151	46	209	330	86	F	54	D	14	B
		RT	216	41	255	205	31	C				
	EB	LT	213	158	434	620	114	F	10	A		
		T	2,520	5	101	1,300	1	A				
	WB	UT	3	2	41	125	79	E	13	B		
		T	2,982	136	715	790	13	B				
		RT	138	0	29	400	2	A				
Rte 7 at Driveway to Christ the Redeemer Catholic Church (Unsignalized)	EB	RT	21	0	5		1	A	0	A	0	A
		T	2,651	0	5		0	A				
	NB	RT	7	0	18		4	A	4	A		
Rte 7 at Cedar Dr (Unsignalized)	SB	LT	15	1	53	220	14	B	28	D	3	A
		T	0	1	64	220	0	A				
		RT	95	18	117	220	30	D				
	EB	LT	64	34	179	415	50	E	2	A		
		T	2,589	1	99	800	1	A				
		RT	4	1	105	335	1	A				
	NB	LT	0	0	0	100	0	A	8	A		
		T	0	0	0	100	0	A				
		RT	3	0	16	100	8	A				
	WB	LT	5	1	73	175	24	C	2	A		
		T	3,035	24	474	880	2	A				
		RT	30	1	105	450	3	A				
Rte 7 at Driveway to Chick-fil-A (Unsignalized)	EB	RT1	13	3	213		3	A	2	A	2	A
		RT2	136	0	0		3	A				
		T	2,593	3	213		2	A				
	NB	RT	25	1	38		11	B	11	B		
Rte 7 at Driveway to Cedar Lake Plaza (Unsignalized)	WB	RT	25	3	122		1	A	1	A	1	A
		T	3,038	3	122		1	A				
	SB	RT	33	0	0		0	A	0	A		

Intersection

Intersection	Movement		Output volume (vph)	Avg Queue (ft)	Max Queue (ft)	Storage Length (ft)	Delay (sec/veh)	LOS	Approach Delay (sec/veh)	Approach LOS	Intersection Delay (sec/veh)	Intersection LOS
Rte 7 at Community Plaza/Lakeland Drive	SB	LT	122	57	207	370	83	F	56	E	18	B
		T	58	57	207	370	83	F				
		RT	167	27	186	200	28	C				
	EB	LT	50	29	142	380	90	F	20	B		
		T	2,319	117	367	875	19	B				
		RT	113	2	68	335	3	A				
	NB	LT	239	81	255	80	88	F	62	E		
		T	42	81	255	215	83	F				
		RT	122	0	50	210	4	A				
	WB	LT	105	36	138	390	54	D	5	A		
		T	2,657	1,414	2,303	1,410	4	A				
		RT	142	9	146	1,410	2	A				
Rte 7 at NB Driveways between Community Plaza and Dranesville Road (Unsignalized)	EB	RT1	60	0	113		0	A	0	A	1	A
		RT2	34	0	4		1	A	1	A		
		RT3	119	27	402		2	A	2	A		
		T	2,487	0	59		1	A	1	A		
	NB	RT1	58	0	39		2	A	2	A		
		RT2	41	0	26		3	A	3	A		
Rte 7 at SB Driveways between Community Plaza and Dranesville Road (Unsignalized)	WB	RT1	4	82	202		0	A	0	A	6	A
		RT2	9	25	118		0	A	0	A		
		RT3	21	37	145		0	A	0	A		
		RT4	5	32	123		0	A	0	A		
		RT5	18	48	169		0	A	0	A		
		RT6	3	41	149		0	A	0	A		
		RT7	3	60	204		0	A	0	A		
		RT8	6	3,073	4,861		0	A	0	A		
		RT9	30	87	245		0	A	0	A		
		T	2,911	46	159		6	A	6	A		
	SB	RT1	28	0	17		0	A	0	A		
		RT2	8	0	16		1	A	1	A		
		RT3	30	0	22		1	A	1	A		
		RT4	11	0	16		1	A	1	A		
		RT5	21	0	20		1	A	1	A		
		RT6	3	0	2		0	A	0	A		
		RT7	4	0	6		0	A	0	A		
		RT8	12	0	18		4	A	4	A		
Rte 7 at Dranesville Rd	SB	LT	11	9	76	95	107	F	89	F	46	D
		T	3	9	76	95	106	F				
		RT	8	15	100	95	58	E				
	EB	LT	35	17	106	590	91	F	25	C		
		T	2,068	154	374	1,390	28	C				
		RT	353	0	30	1,325	2	A				
	NB	LT	629	430	896	340	143	F	110	F		
		T	4	430	896	420	103	F				
		RT	237	61	345	415	22	C				
	WB	LT	263	1,052	1,405	420	85	F	43	D		
		T	2,258	1,052	1,405	4,350	38	D				
		RT	16	919	1,457	4,350	31	C				
Rte 7 at Driveways east of Dranesville Rd (Unsignalized)	EB	RT	40	2	167		0	A	1	A	1	A
		T	2,278	2	167		1	A				
	NB	RT	24	1	35		8	A	8	A		

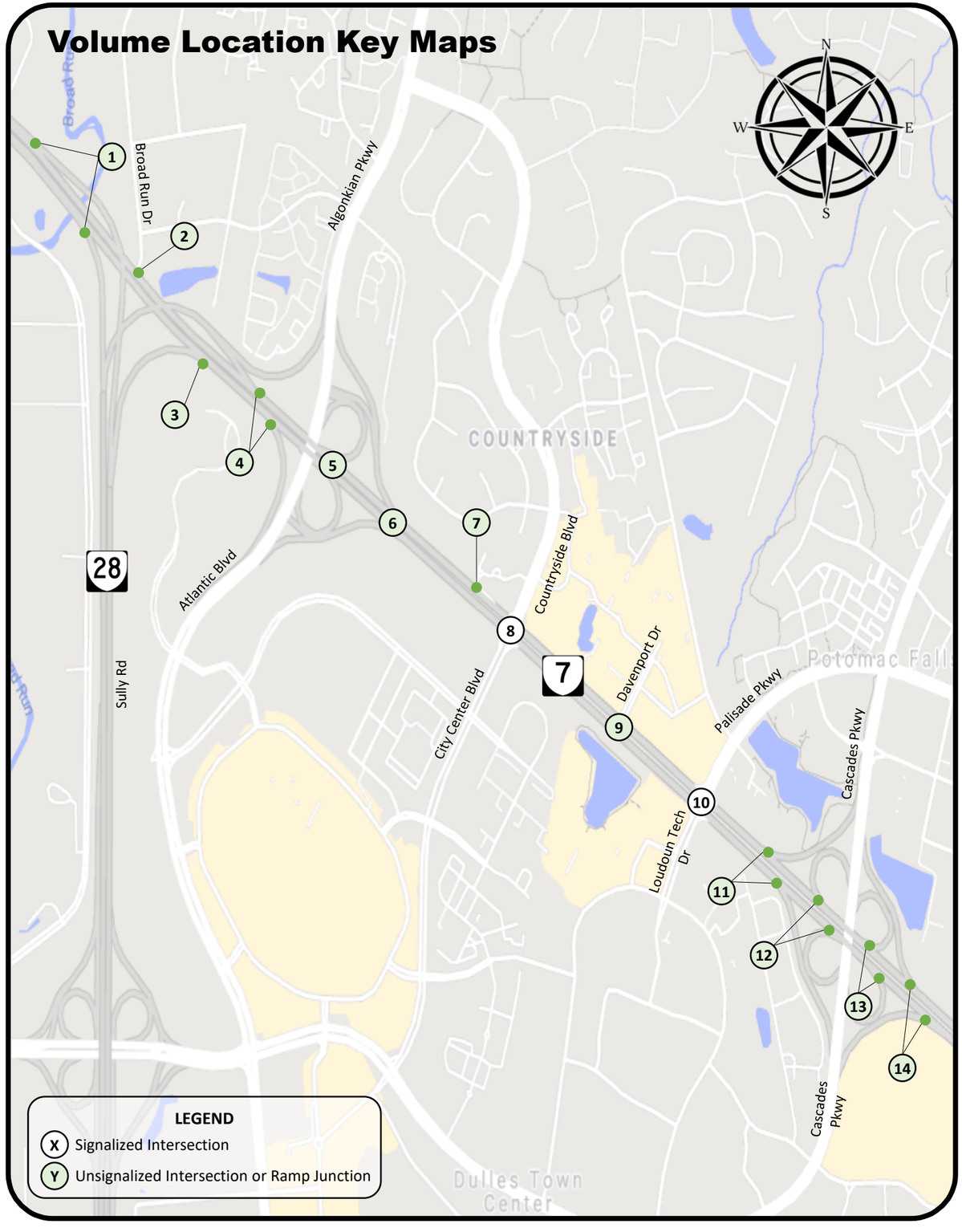
Interchange

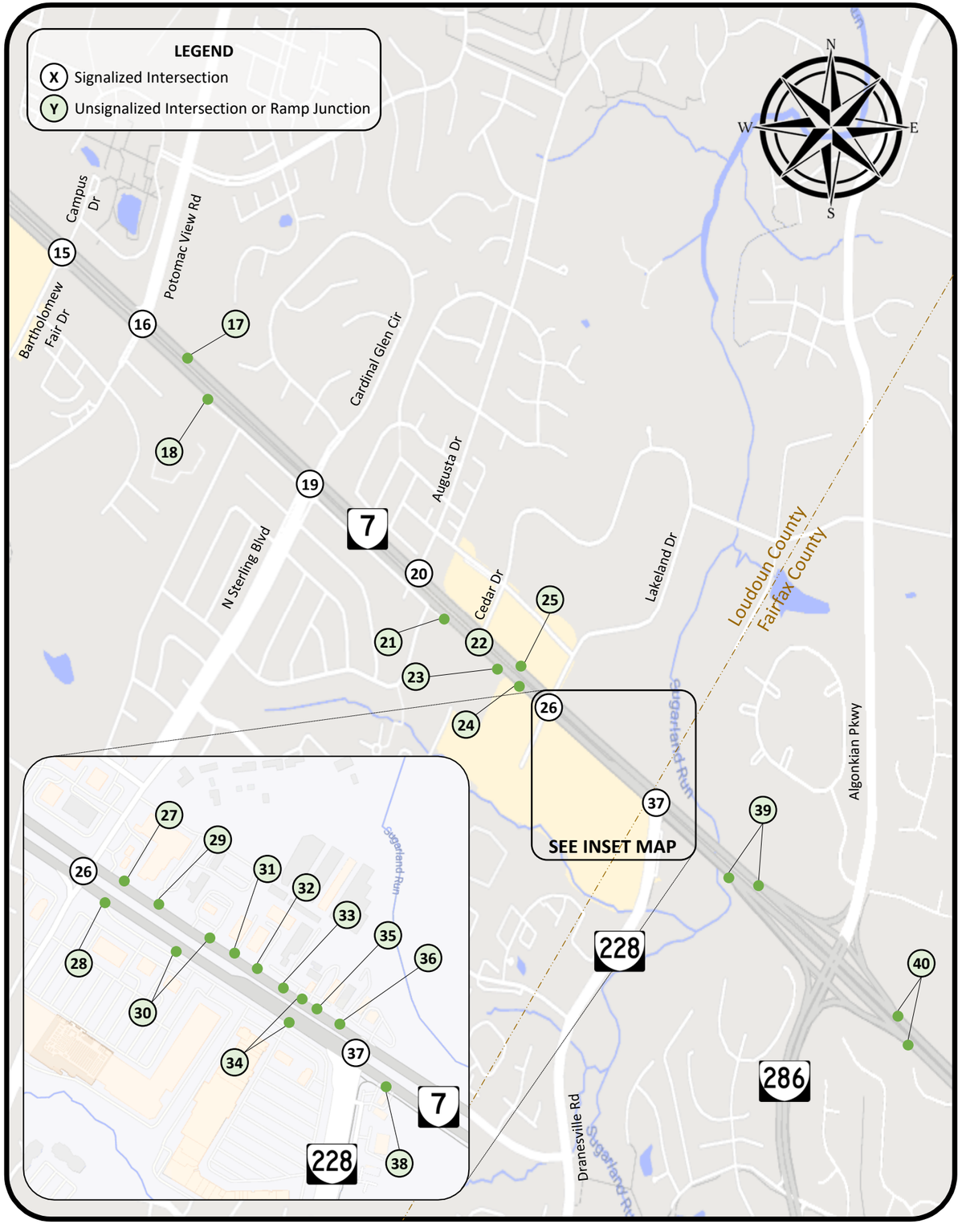
Intersection /Interchange	Movement	Speed	Volume (vph)	Density (vpmpl)	LOS
Rte 7 at Atlantic Blvd Interchange	Rte 7 at Atlantic Blvd WB Off-ramp Junction	46	2,977	16	B
	Rte 7 at Atlantic Blvd WB Basic Freeway Segment	47	2,838	20	C
	Rte 7 at Atlantic Blvd WB Weaving Segment	45	3,454	19	B
	Rte 7 at Atlantic Blvd EB Weaving Segment	53	3,251	15	B
	Rte 7 at Atlantic Blvd EB Off-ramp Junction	53	3,062	14	B
	Rte 7 at Atlantic Blvd EB Basic Freeway Segment	48	2,339	16	C
	Rte 7 at Atlantic Blvd EB On-ramp Junction	43	2,522	15	B
Rte 7 at Cascades Pkwy Interchange	Rte 7 at Cascades Pkwy WB Off-ramp Junction	41	2,749	17	B
	Rte 7 at Cascades Pkwy WB Basic Freeway Segment 1	43	2,525	20	C
	Rte 7 at Cascades Pkwy WB Weaving Segment	42	2,687	16	B
	Rte 7 at Cascades Pkwy WB Basic Freeway Segment 2	33	2,531	26	C
	Rte 7 at Cascades Pkwy WB On-ramp Junction	18	2,637	38	E
	Rte 7 at Cascades Pkwy EB Off-ramp Junction	45	2,316	13	B
	Rte 7 at Cascades Pkwy EB Basic Freeway Segment 1	46	2,086	15	B
	Rte 7 at Cascades Pkwy EB Weaving Segment	42	2,243	13	B
	Rte 7 at Cascades Pkwy EB Basic Freeway Segment 2	42	1,968	15	B
	Rte 7 at Cascades Pkwy EB On-ramp Junction	32	2,221	17	B

Appendix D:

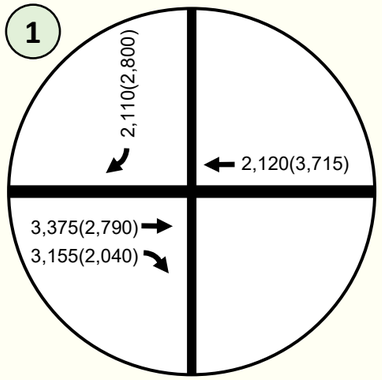
Projected 2040 Balanced Traffic Volumes

Volume Location Key Maps

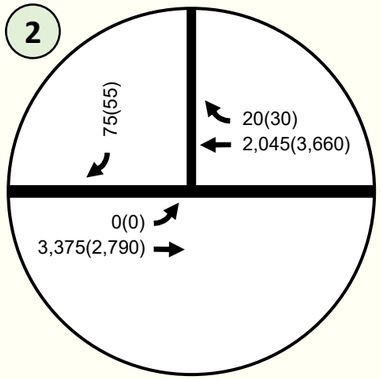




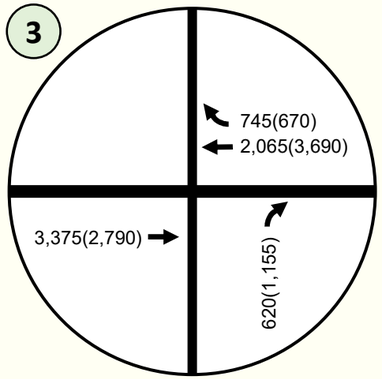
No-Build 2040 Peak Hour Volumes



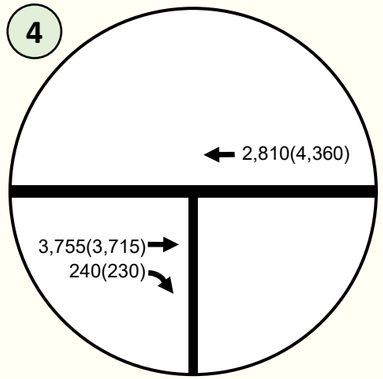
Route 7 at Route 28
EB Off-Ramp & WB On-Ramp



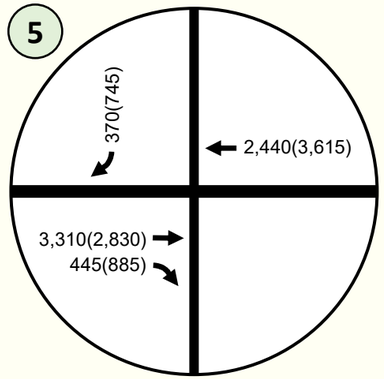
Route 7 at Broad Run Dr



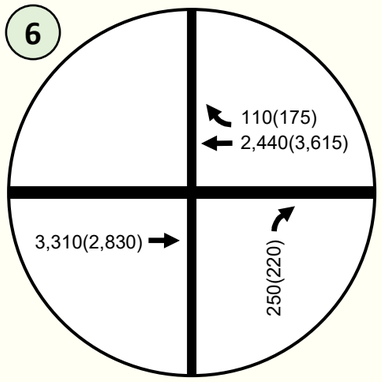
Route 7 at Route 28
EB On-Ramp & WB Off-Ramp



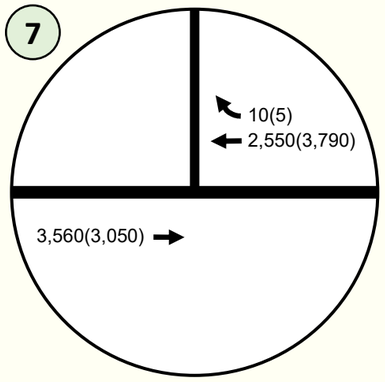
Route 7 at Atlantic Blvd
EB Off-Ramp



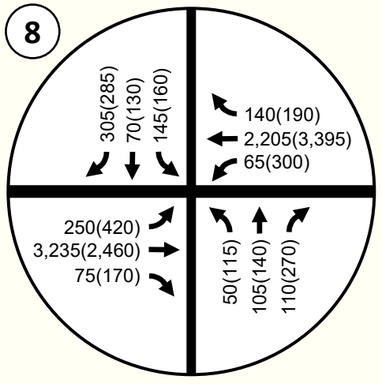
Route 7 at Atlantic Blvd
EB & WB Loop Ramps



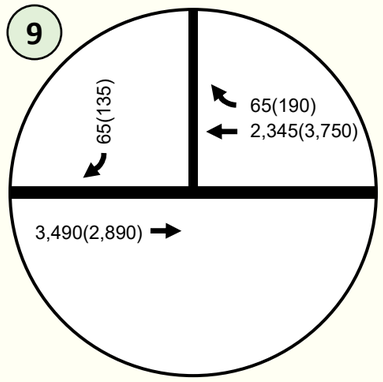
Route 7 at Atlantic Blvd
EB On-Ramp & WB Off-Ramp



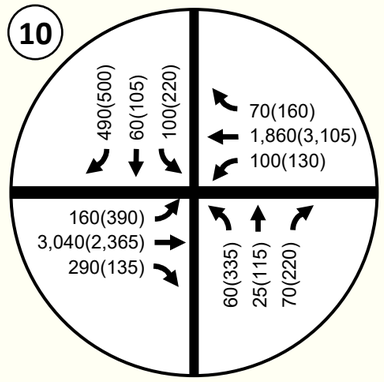
Route 7 at Jona Dr (Sunrise Senior Living)



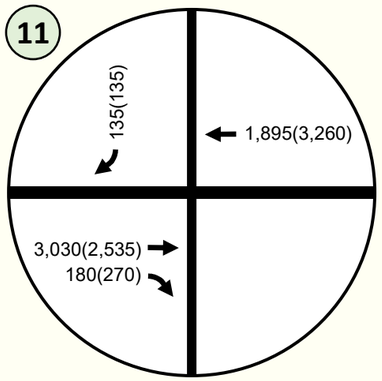
Route 7 at City Center Blvd & Countryside Blvd



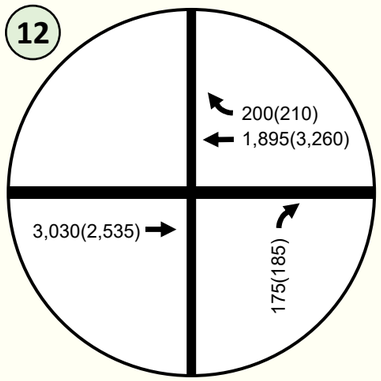
Route 7 at Davenport Dr



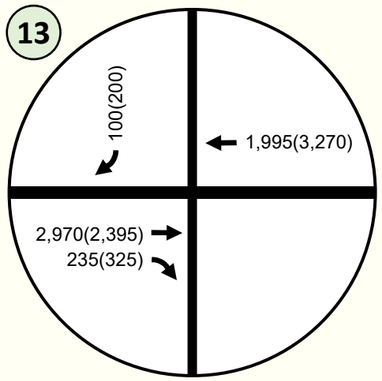
Route 7 at Palisade Pkwy & Loudoun Tech Dr



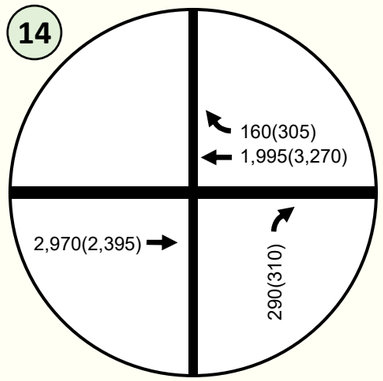
Route 7 at Cascades Pkwy
EB Off-Ramp & WB On-Ramp



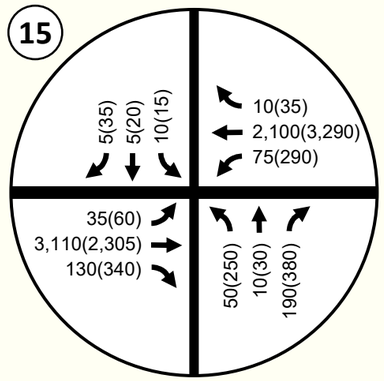
Route 7 at Cascades Pkwy
EB On & WB Off Loop Ramps



Route 7 at Cascades Pkwy
EB Off & WB On Loop Ramps



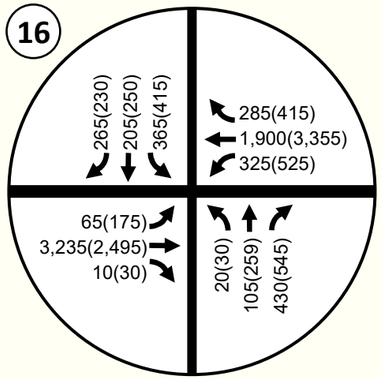
Route 7 at Cascades Pkwy
EB On-Ramp & WB Off-Ramp



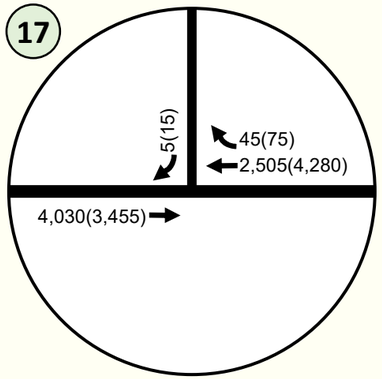
Route 7 at Campus Dr & Bartholomew Fair Dr

LEGEND: (X) Signalized Intersection (Y) Unsignalized Intersection or Ramp Junction ←AM(PM)

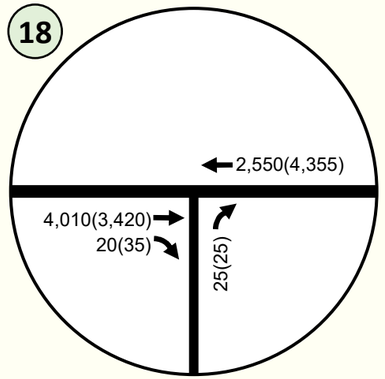
No-Build 2040 Peak Hour Volumes



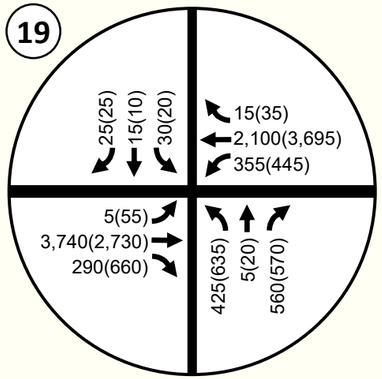
Route 7 at Potomac View Rd



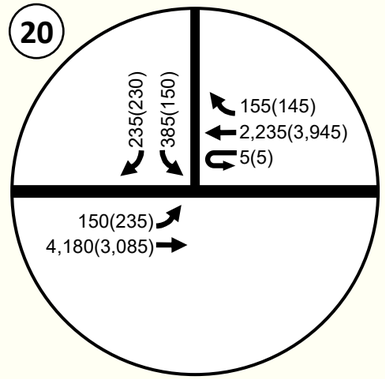
Route 7 at Mirror Ridge Shopping Center



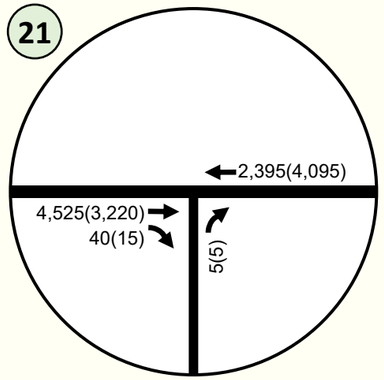
Route 7 at Cascades Village



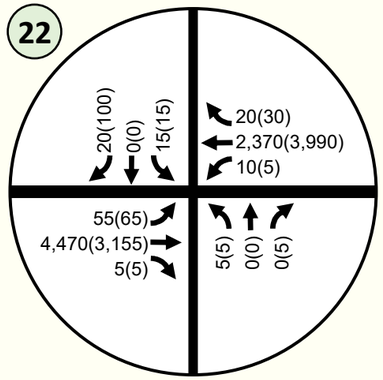
Route 7 at N Sterling Blvd & Cardinal Glen Dr



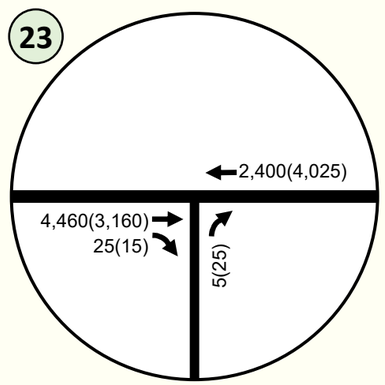
Route 7 at Augusta Dr



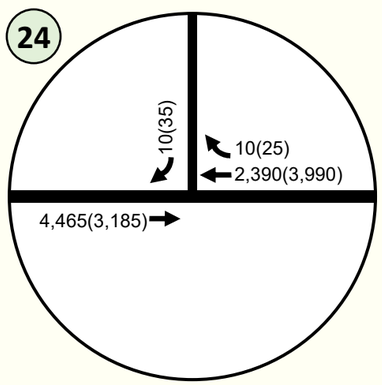
Route 7 at Catholic Church



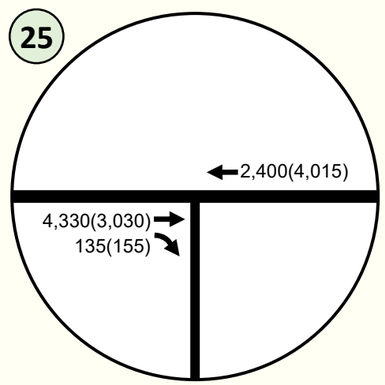
Route 7 at Cedar Dr



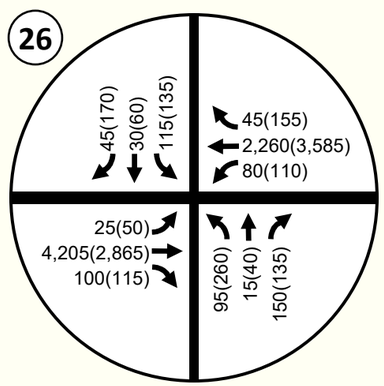
Route 7 at Koons Sterling Ford



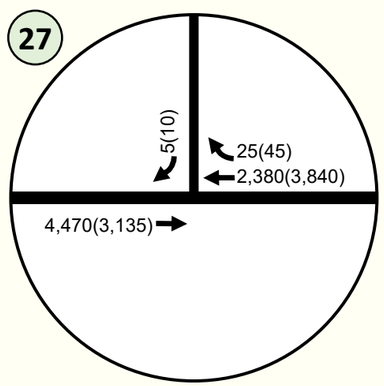
Route 7 at Cedar Lakes Plaza



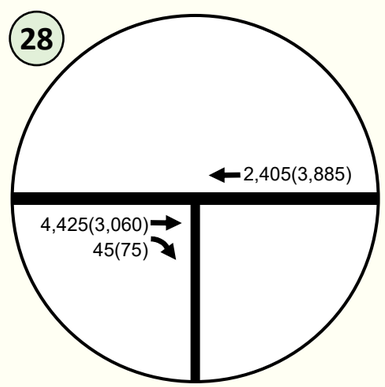
Route 7 at Community Plaza (West)



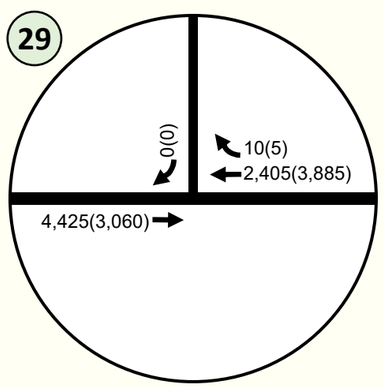
Route 7 at Lakeland Dr & Community Plaza



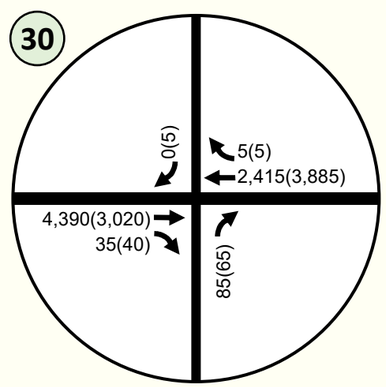
Route 7 at Shell Gas Station & DD BBQ



Route 7 at EB Service Road



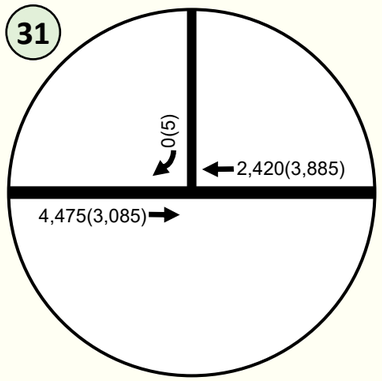
Route 7 at Ted Britt Chevrolet



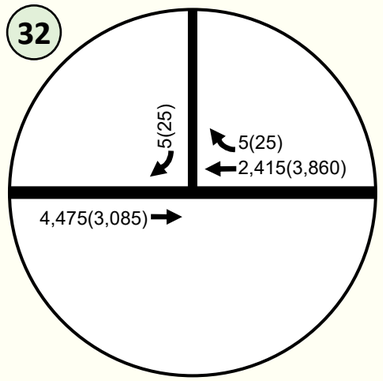
Route 7 at Ted Britt Used Cars & EB Service Rd Access

LEGEND: (X) Signalized Intersection (Y) Unsignalized Intersection or Ramp Junction ← AM(PM)

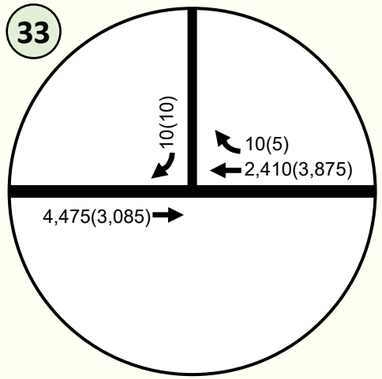
No-Build 2040 Peak Hour Volumes



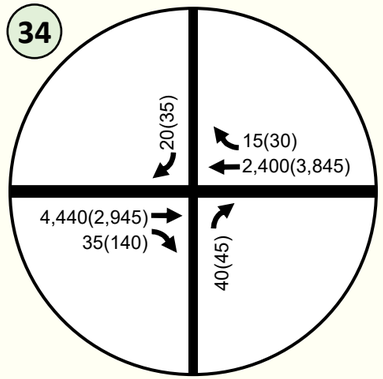
Route 7 at Mattress Warehouse



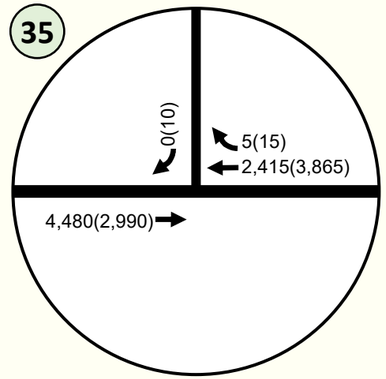
Route 7 at Advance Carpet and Rug



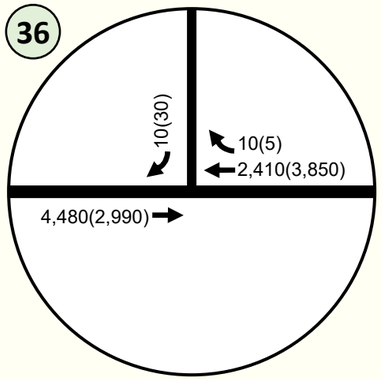
Route 7 at Public Storage



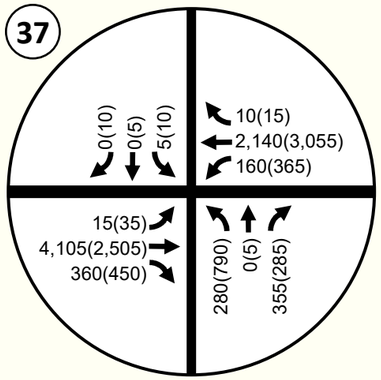
Route 7 at Mobil Gas Station & Town Center at Sterling



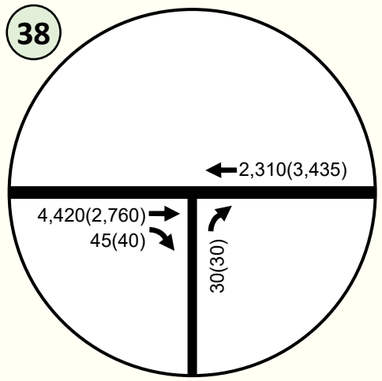
Route 7 at Napa Auto Parts



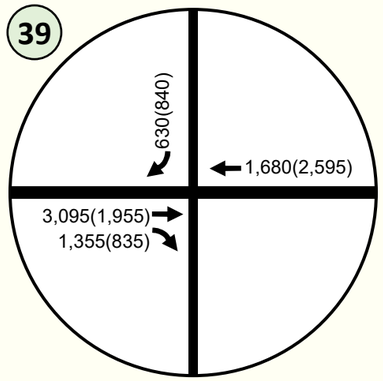
Route 7 at Great Falls Auto Service



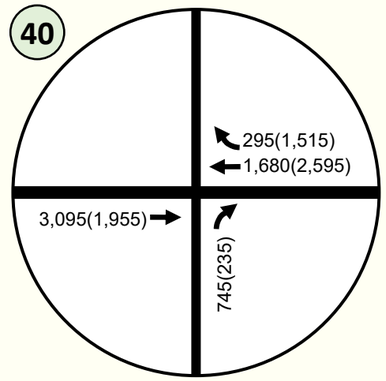
Route 7 at Route 228 & Popeyes



Route 7 at Shell Gas Station



Route 7 at Route 286
EB Off-Ramp & WB On-Ramp



Route 7 at Route 286
EB On-Ramp & WB Off-Ramp

LEGEND: (X) Signalized Intersection (Y) Unsignalized Intersection or Ramp Junction ← AM(PM)

Appendix E:

VISSIM Results for 2040 No-Build Conditions

LC_Rte 7_VISSIM Results: 2040 No-build Conditions, AM Peak Hour

6/8/2020

Travel Time: Rte 7 Between Rte 28 and Dranesville Rd

	Model Travel Time (min)
Eastbound	15.6
Westbound	7.2

Intersection

Intersection	Movement		Output volume (vph)	Avg Queue (ft)	Max Queue (ft)	Storage Length (ft)	Delay (sec/veh)	LOS	Approach Delay (sec/veh)	Approach LOS	Intersection Delay (sec/veh)	Intersection LOS
Rte 7 at Broad Run Drive (Unsignalized)	WB	RT	19	0	0	300	0	A	0	A	0	A
		T	1,982	0	0	5,080	0	A				
	SB	RT	75	4	67	300	9	A	9	A		
Jona Driveway (Unsignalized)	WB	RT	10	0	0	260	0	A	0	A	0	A
		T	2,465	0	0	435	0	A				
Rte 7 at City Center Blvd/Countryside Blvd	SB	LT	148	59	220	320	100	F	50	D	23	C
		T	68	59	220	945	88	F				
		RT	305	32	235	400	17	B				
	EB	LT	234	77	230	700	93	F	22	C		
		T	2,962	276	1,315	14,995	17	B				
		RT	67	0	0	1,445	1	A				
	NB	LT	46	40	127	405	103	F	58	E		
		T	104	40	127	700	97	F				
		RT	110	0	0	455	1	A				
	WB	LT	61	30	110	480	89	F	15	B		
		T	2,132	78	513	1,310	14	B				
		RT	131	0	7	545	2	A				
Rte 7 at Davenport Drive (Unsignalized)	WB	RT	69	1	81	965	2	A	1	A	2	A
		T	2,275	1	81	985	1	A				
	SB	RT	65	5	77	320	14	B	14	B		
Rte 7 at Loudoun Tech Dr/Palisades Pkwy	SB	LT	99	43	136	345	97	F	27	C	23	C
		T	59	43	136	490	98	F				
		RT	489	0	80	455	4	A				
	EB	LT	139	57	169	440	114	F	24	C		
		T	2,647	614	3,190	2,460	22	C				
		RT	264	0	59	350	2	A				
	NB	LT	62	29	103	330	98	F	55	E		
		T	24	29	103	740	104	F				
		RT	71	0	0	700	1	A				
	WB	LT	91	72	218	445	121	F	16	B		
		T	1,783	80	759	4,190	12	B				
		RT	70	0	10	690	1	A				
Rte 7 at Bartholomew Fair Dr/Campus Dr	SB	LT	9	7	61	235	100	F	103	F	34	C
		T	5	7	61	230	109	F				
		RT	7	6	60	230	101	F				
	EB	LT	28	19	92	330	105	F	55	E		
		T	2,328	3,326	7,396	4,180	57	E				
		RT	100	1	149	1,070	5	A				
	NB	LT	47	22	78	200	99	F	24	C		
		T	12	22	78	470	97	F				
		RT	190	0	14	225	1	A				
	WB	LT	72	29	120	400	90	F	10	A		
		T	2,047	41	380	950	7	A				
		RT	10	0	31	215	6	A				
Rte 7 at Potomac View Road	SB	LT	378	124	446	590	102	F	74	E	51	D
		T	216	124	446	1,260	77	E				
		RT	262	47	246	270	29	C				
	EB	LT	49	28	145	405	85	F	27	C		
		T	2,458	2,043	2,288	910	26	C				
		RT	9	1	79	840	6	A				
	NB	LT	17	616	1,781	175	115	F	171	F		
		T	98	616	1,781	455	94	F				
		RT	314	648	1,828	455	198	F				
	WB	LT	305	301	525	420	209	F	47	D		
		T	1,847	387	752	2,200	27	C				
		RT	281	4	130	330	5	A				
Rte 7 at Driveway to Mirror Ridge Shopping Center (Unsignalized)	WB	RT	43	0	0		1	A	6	A	6	A
		T	2,475	55	789		6	A				
	SB	RT	5	0	21		19	C	19	C		
Rte 7 at Driveway to Cascades Village Residential Development and Rehabilitation Center (Unsignalized)	EB	RT	15	381	1,009		4	A	27	D	29	D
		T	3,041	381	1,009		28	D				
	NB	RT	13	81	249		358	F	358	F		
Rte 7 at N Sterling Blvd/Cardinal Glen Circle	SB	LT	28	25	128	410	105	F	70	E	29	C
		T	16	25	128	410	106	F				
		RT	26	2	53	405	11	B				
	EB	LT	3	1	36	390	59	E	23	C		
		T	2,845	1,579	2,433	2,180	25	C				
		RT	218	11	154	395	7	A				
	NB	LT	425	100	265	300	102	F	46	D		
		T	4	100	265	550	131	F				
		RT	548	0	89	510	3	A				
	WB	LT	343	127	331	410	99	F	29	C		
		T	2,087	175	685	1,285	17	B				
		RT	15	0	0	305	2	A				
Rte 7 at Augusta Dr	SB	LT	390	83	235	330	91	F	62	E	23	C
		RT	230	21	163	205	13	B				
	EB	LT	124	77	271	620	97	F	24	C		
		T	3,270	400	1,442	1,300	21	C				
	WB	UT	4	3	47	125	87	F	11	B		
		T	2,222	60	396	790	12	B				
		RT	160	0	52	400	2	A				
Rte 7 at Driveway to Christ the Redeemer Catholic Church (Unsignalized)	EB	RT	37	127	448		8	A	19	C	19	C
		T	3,582	127	448		19	C				
	NB	RT	5	3	34		118	F	118	F		
Rte 7 at Cedar Dr (Unsignalized)	SB	LT	9	21	87	220	241	F	81	F	13	B
		T	0	21	98	220	0	A				
		RT	21	2	68	220	13	B				
	EB	LT	45	7	106	415	13	B	19	C		
		T	3,510	408	955	800	20	C				
		RT	4	372	948	335	11	B				
	NB	LT	5	1	22	100	52	F	52	F		
		T	0	0	0	100	0	A				
		RT	0	0	0	100	0	A				
	WB	LT	11	11	86	175	87	F	1	A		
		T	2,357	7	314	880	1	A				
		RT	22	0	46	450	2	A				
Rte 7 at Driveway to Chick-fil-A (Unsignalized)	EB	RT1	20	143	281		13	B	15	B	15	B
		RT2	106	0	0		6	A				
		T	3,520	143	281		15	B				
	NB	RT	5	7	42		271	F	271	F		
Rte 7 at Driveway to Cedar Lake Plaza (Unsignalized)	WB	RT	10	1	53		1	A	0	A	0	A
		T	2,383	1	53		0	A				
	SB	RT	8	0	0		0	A	0	A		

Intersection

Intersection	Movement		Output volume (vph)	Avg Queue (ft)	Max Queue (ft)	Storage Length (ft)	Delay (sec/veh)	LOS	Approach Delay (sec/veh)	Approach LOS	Intersection Delay (sec/veh)	Intersection LOS
Rte 7 at Community Plaza/Lakeland Drive	SB	LT	115	55	172	370	102	F	81	F	13	B
		T	28	55	172	370	108	F				
		RT	45	3	62	200	10	A				
	EB	LT	20	11	86	380	84	F	12	B		
		T	3,328	106	369	875	11	B				
		RT	78	1	55	335	2	A				
	NB	LT	93	38	126	80	96	F	44	D		
		T	15	38	126	215	97	F				
		RT	147	11	85	210	5	A				
	WB	LT	76	40	117	390	87	F	5	A		
		T	2,256	45	392	1,410	3	A				
		RT	46	1	84	1,410	0	A				
Rte 7 at Driveways right between Community Plaza and Dranesville Road (Unsignalized)	EB	RT1	36	1	115		0	A	0	A	1	A
		RT2	24	1	223		1	A	1	A		
		RT3	29	17	637		1	A	1	A		
		T	3,544	1	169		1	A	1	A		
	NB	RT1	86	0	38		1	A	1	A		
		RT2	40	0	25		2	A	2	A		
Rte 7 at Driveways between Community Plaza and Dranesville Road (Unsignalized)	WB	RT1	10	0	0		0	A	0	A	0	A
		RT2	5	0	0		0	A	0	A		
		RT3	15	0	0		0	A	0	A		
		RT4	10	0	52		0	A	0	A		
		RT5	4	0	0		0	A	0	A		
		RT6	0	0	0		0	A	0	A		
		RT7	5	0	5		0	A	0	A		
		RT8	11	0	80		0	A	0	A		
		RT9	25	16	229		0	A	0	A		
		T	2,403	0	8		0	A	0	A		
	SB	RT1	9	0	0		0	A	0	A		
		RT2	0	0	0		0	A	0	A		
		RT3	20	0	18		0	A	0	A		
		RT4	10	0	6		0	A	0	A		
		RT5	5	0	2		0	A	0	A		
		RT6	0	0	0		0	A	0	A		
		RT7	0	0	0		0	A	0	A		
		RT8	5	0	6		2	A	2	A		
Rte 7 at Dranesville Rd	SB	LT	5	3	28	95	105	F	105	F	15	B
		T	0	3	28	95	0	A				
		RT	0	5	52	95	0	A				
	EB	LT	14	8	60	590	107	F	6	A		
		T	3,341	45	366	1,390	6	A				
		RT	281	0	64	1,325	1	A				
	NB	LT	275	94	279	340	96	F	75	E		
		T	0	94	279	420	0	A				
		RT	356	56	243	415	59	E				
	WB	LT	155	61	152	420	118	F	11	B		
		T	2,132	70	388	4,350	4	A				
		RT	10	0	72	4,350	3	A				
Rte 7 at Driveways east of Dranesville Rd (Unsignalized)	EB	RT	36	12	243		0	A	1	A	1	A
		T	3,668	12	243		1	A				
	NB	RT	30	2	52		17	C	17	C		

Interchange

Intersection /Interchange	Movement	Speed	Volume (vph)	Density (vpmpl)	LOS
Rte 7 at Atlantic Blvd Interchange	Rte 7 at Atlantic Blvd WB Off-ramp Junction	47	2,456	13	B
	Rte 7 at Atlantic Blvd WB Basic Freeway Segment	47	2,353	17	B
	Rte 7 at Atlantic Blvd WB Weaving Segment	46	2,730	15	B
	Rte 7 at Atlantic Blvd EB Weaving Segment	54	3,692	17	B
	Rte 7 at Atlantic Blvd EB Off-ramp Junction	54	3,470	16	B
	Rte 7 at Atlantic Blvd EB Basic Freeway Segment	48	3,059	21	B
	Rte 7 at Atlantic Blvd EB On-ramp Junction	27	3,283	30	D
Rte 7 at Cascades Pkwy Interchange	Rte 7 at Cascades Pkwy WB Off-ramp Junction	41	2,101	13	B
	Rte 7 at Cascades Pkwy WB Basic Freeway Segment 1	42	1,959	15	B
	Rte 7 at Cascades Pkwy WB Weaving Segment	42	2,065	12	B
	Rte 7 at Cascades Pkwy WB Basic Freeway Segment 2	41	1,880	15	B
	Rte 7 at Cascades Pkwy WB On-ramp Junction	28	1,943	17	B
	Rte 7 at Cascades Pkwy EB Off-ramp Junction	8	2,693	82	E
	Rte 7 at Cascades Pkwy EB Basic Freeway Segment 1	8	2,489	101	F
	Rte 7 at Cascades Pkwy EB Weaving Segment	7	2,542	97	F
	Rte 7 at Cascades Pkwy EB Basic Freeway Segment 2	5	2,245	137	F
	Rte 7 at Cascades Pkwy EB On-ramp Junction	5	2,457	113	E

LC_Rte 7_VISSIM Results: 2040 No-build Conditions, PM Peak Hour

6/8/2020

Travel Time: Rte 7 Between Rte 28 and Dranesville Rd

	Model Travel Time (min)
Eastbound	9.4
Westbound	10.7

Intersection

Intersection	Movement		Output volume (vph)	Avg Queue (ft)	Max Queue (ft)	Storage Length (ft)	Delay (sec/veh)	LOS	Approach Delay (sec/veh)	Approach LOS	Intersection Delay (sec/veh)	Intersection LOS
Rte 7 at Broad Run Drive (Unsignalized)	WB	RT	29	0	36	300	1	A	2	A	2	A
		T	3,269	0	36	5,080	2	A				
	SB	RT	54	7	77	300	24	C	24	C		
Jona Driveway (Unsignalized)	WB	RT	3	0	6	260	1	A	0	A	0	A
		T	3,277	0	6	435	0	A				
Rte 7 at City Center Blvd/Countryside Blvd	SB	LT	164	75	255	320	91	F	61	E	31	C
		T	126	75	255	945	91	F				
		RT	287	53	273	400	30	C				
	EB	LT	380	104	311	700	86	F	29	C		
		T	2,226	141	808	14,995	21	C				
		RT	153	0	0	1,445	1	A				
	NB	LT	113	54	149	405	95	F	45	D		
		T	141	54	149	700	90	F				
		RT	271	0	5	455	1	A				
	WB	LT	256	81	245	480	88	F	25	C		
		T	2,879	257	1,631	1,310	20	C				
		RT	160	0	37	545	2	A				
Rte 7 at Davenport Drive (Unsignalized)	WB	RT	166	11	424	965	2	A	2	A	3	A
		T	3,162	11	424	985	2	A				
	SB	RT	134	19	162	320	23	C	23	C		
Rte 7 at Loudoun Tech Dr/Palisades Pkwy	SB	LT	218	74	217	345	93	F	37	D	41	D
		T	105	74	217	490	86	F				
		RT	499	0	64	455	2	A				
	EB	LT	349	270	462	440	231	F	57	E		
		T	2,151	514	1,934	2,460	32	C				
		RT	128	0	16	350	1	A				
	NB	LT	343	104	300	330	90	F	60	E		
		T	112	104	300	740	83	F				
		RT	221	0	0	700	1	A				
	WB	LT	104	103	315	445	144	F	21	C		
		T	2,494	242	771	4,190	17	B				
		RT	135	0	8	690	1	A				
Rte 7 at Bartholomew Fair Dr/Campus Dr	SB	LT	16	28	149	235	97	F	94	F	19	B
		T	21	28	149	230	97	F				
		RT	32	28	151	230	91	F				
	EB	LT	55	40	173	330	114	F	18	B		
		T	2,070	173	955	4,180	18	B				
		RT	298	0	78	1,070	2	A				
	NB	LT	251	79	235	200	98	F	42	D		
		T	28	79	235	470	87	F				
		RT	379	16	146	225	1	A				
	WB	LT	227	95	248	400	117	F	13	B		
		T	2,596	34	206	950	4	A				
		RT	27	1	28	215	4	A				
Rte 7 at Potomac View Road	SB	LT	415	156	524	590	106	F	82	F	41	D
		T	256	156	524	1,260	82	F				
		RT	226	49	248	270	36	D				
	EB	LT	148	384	936	405	254	F	27	C		
		T	2,272	137	808	910	13	B				
		RT	27	0	41	840	2	A				
	NB	LT	28	20	93	175	112	F	65	E		
		T	260	224	602	455	116	F				
		RT	542	67	311	455	38	D				
	WB	LT	420	228	517	420	125	F	35	C		
		T	2,596	425	765	2,200	24	C				
		RT	321	7	157	330	6	A				
Rte 7 at Driveway to Mirror Ridge Shopping Center (Unsignalized)	WB	RT	59	0	0		1	A	14	B	15	C
		T	3,360	731	1,891		15	B				
	SB	RT	14	12	69		159	F	159	F		
Rte 7 at Driveway to Cascades Village Residential Development and Rehabilitation Center (Unsignalized)	EB	RT	34	23	583		3	A	2	A	2	A
		T	3,194	23	583		2	A				
	NB	RT	25	2	37		17	C	17	C		
Rte 7 at N Sterling Blvd/Cardinal Glen Circle	SB	LT	21	15	92	410	93	F	71	E	33	C
		T	8	15	92	410	98	F				
		RT	25	5	70	405	44	D				
	EB	LT	50	25	145	390	77	E	27	C		
		T	2,564	491	1,863	2,180	28	C				
		RT	629	95	530	395	21	C				
	NB	LT	637	118	366	300	88	F	48	D		
		T	16	118	366	550	79	E				
		RT	566	71	306	510	2	A				
	WB	LT	336	128	354	410	92	F	32	C		
		T	2,769	552	1,454	1,285	25	C				
		RT	28	0	0	305	2	A				
Rte 7 at Augusta Dr	SB	LT	153	54	264	330	80	F	61	E	18	B
		RT	228	63	310	205	47	D				
	EB	LT	227	178	471	620	117	F	10	A		
		T	2,918	10	177	1,300	2	A				
	WB	UT	5	3	44	125	83	F	20	B		
		T	2,919	375	880	790	21	C				
		RT	110	0	40	400	2	A				
Rte 7 at Driveway to Christ the Redeemer Catholic Church (Unsignalized)	EB	RT	19	2	176		1	A	1	A	1	A
		T	3,054	2	176		1	A				
	NB	RT	5	0	23		9	A	9	A		
Rte 7 at Cedar Dr (Unsignalized)	SB	LT	13	21	149	220	40	E	166	F	11	B
		T	0	22	160	220	0	A				
		RT	74	162	494	220	188	F				
	EB	LT	63	39	178	415	58	F	3	A		
		T	2,991	17	610	800	2	A				
		RT	5	16	616	335	3	A				
	NB	LT	4	2	26	100	119	F	60	F		
		T	0	0	0	100	0	A				
		RT	5	0	20	100	13	B				
	WB	LT	3	1	72	175	32	D	15	B		
		T	3,008	227	910	880	15	B				
		RT	25	33	407	450	10	B				
Rte 7 at Driveway to Chick-fil-A (Unsignalized)	EB	RT1	16	10	270		3	A	4	A	5	A
		RT2	148	0	0		6	A				
		T	2,988	10	270		4	A				
	NB	RT	25	9	83		62	F	62	F		
Rte 7 at Driveway to Cedar Lake Plaza (Unsignalized)	WB	RT	18	59	408		1	A	8	A	8	A
		T	3,028	59	408		8	A				
	SB	RT	32	0	0		1	A	1	A		

Intersection

Intersection	Movement		Output volume (vph)	Avg Queue (ft)	Max Queue (ft)	Storage Length (ft)	Delay (sec/veh)	LOS	Approach Delay (sec/veh)	Approach LOS	Intersection Delay (sec/veh)	Intersection LOS
Rte 7 at Community Plaza/Lakeland Drive	SB	LT	131	70	222	370	84	F	65	E	20	B
		T	60	70	222	370	85	F				
		RT	174	46	217	200	44	D				
	EB	LT	48	27	140	380	89	F	20	B		
		T	2,703	142	373	875	19	B				
		RT	107	2	73	335	3	A				
	NB	LT	262	85	262	80	86	F	62	E		
		T	40	85	262	215	91	F				
		RT	133	1	54	210	4	A				
	WB	LT	78	27	118	390	62	E	7	A		
		T	2,611	1,924	2,669	1,410	6	A				
		RT	111	6	131	1,410	1	A				
Rte 7 at Driveways right between Community Plaza and Dranesville Road (Unsignalized)	EB	RT1	74	1	137		0	A	0	A	1	A
		RT2	41	3	156		2	A	2	A		
		RT3	135	71	606		2	A	2	A		
		T	2,873	2	146		1	A	1	A		
	NB	RT1	66	0	36		2	A	2	A		
		RT2	45	0	33		3	A	3	A		
Rte 7 at Driveways between Community Plaza and Dranesville Road (Unsignalized)	WB	RT1	4	93	208		0	A	0	A	7	A
		RT2	9	30	113		0	A	0	A		
		RT3	20	43	146		0	A	0	A		
		RT4	4	36	127		0	A	0	A		
		RT5	15	53	169		0	A	0	A		
		RT6	0	45	143		0	A	0	A		
		RT7	3	69	206		0	A	0	A		
		RT8	5	6,345	7,494		0	A	0	A		
		RT9	31	95	247		0	A	0	A		
		T	2,793	53	159		7	A	7	A		
	SB	RT1	29	0	13		0	A	0	A		
		RT2	10	0	18		1	A	1	A		
		RT3	34	0	27		1	A	1	A		
		RT4	10	0	10		1	A	1	A		
		RT5	25	0	22		1	A	1	A		
		RT6	5	0	14		1	A	1	A		
		RT7	5	0	11		1	A	1	A		
		RT8	10	0	21		5	A	5	A		
Rte 7 at Dranesville Rd	SB	LT	10	9	88	95	95	F	85	F	59	E
		T	5	9	88	95	101	F				
		RT	11	15	112	95	68	E				
	EB	LT	34	15	94	590	84	F	23	C		
		T	2,405	165	372	1,390	26	C				
		RT	408	1	68	1,325	3	A				
	NB	LT	626	1,010	1,217	340	230	F	201	F		
		T	4	1,010	1,217	420	300	F				
		RT	239	796	1,209	415	124	F				
	WB	LT	247	1,179	1,404	420	87	F	49	D		
		T	2,134	1,179	1,404	4,350	44	D				
		RT	11	1,071	1,455	4,350	38	D				
Rte 7 at Driveways east of Dranesville Rd (Unsignalized)	EB	RT	40	4	240		0	A	1	A	1	A
		T	2,617	4	240		1	A				
	NB	RT	30	1	48		9	A	9	A		

Interchange

Intersection /Interchange	Movement	Speed	Volume (vph)	Density (vpmpl)	LOS
Rte 7 at Atlantic Blvd Interchange	Rte 7 at Atlantic Blvd WB Off-ramp Junction	46	3,279	18	B
	Rte 7 at Atlantic Blvd WB Basic Freeway Segment	47	3,124	22	C
	Rte 7 at Atlantic Blvd WB Weaving Segment	44	3,868	22	C
	Rte 7 at Atlantic Blvd EB Weaving Segment	54	3,648	17	B
	Rte 7 at Atlantic Blvd EB Off-ramp Junction	53	3,420	16	B
	Rte 7 at Atlantic Blvd EB Basic Freeway Segment	48	2,535	18	C
	Rte 7 at Atlantic Blvd EB On-ramp Junction	37	2,759	19	B
Rte 7 at Cascades Pkwy Interchange	Rte 7 at Cascades Pkwy WB Off-ramp Junction	41	2,880	18	B
	Rte 7 at Cascades Pkwy WB Basic Freeway Segment 1	43	2,648	21	C
	Rte 7 at Cascades Pkwy WB Weaving Segment	41	2,847	17	B
	Rte 7 at Cascades Pkwy WB Basic Freeway Segment 2	30	2,682	30	D
	Rte 7 at Cascades Pkwy WB On-ramp Junction	16	2,737	44	E
	Rte 7 at Cascades Pkwy EB Off-ramp Junction	45	2,596	15	B
	Rte 7 at Cascades Pkwy EB Basic Freeway Segment 1	46	2,343	17	B
	Rte 7 at Cascades Pkwy EB Weaving Segment	42	2,423	15	B
	Rte 7 at Cascades Pkwy EB Basic Freeway Segment 2	42	2,121	17	B
	Rte 7 at Cascades Pkwy EB On-ramp Junction	27	2,428	23	C

Appendix F:

VDOT Junction Screening Tool (vJuST) Evaluation Summary

Route 7 Concept Study
vJuST Analysis of Potential Intersection Configuration Options

Intersection Type	Comments							
	Route 7 @ City Center / Countryside Blvd	Route 7 @ Loudoun Tech Dr	Route 7 @ Campus Dr	Route 7 @ Potomac View Rd	Route 7 @ Cardinal Glen Cir	Route 7 @ Cedar Dr	Route 7 @ Dranesville Rd	Route 7 @ Lakeland Dr
Conventional								
Bowtie	Not enough Space	Not enough Space	Not enough Space	Not enough Space	Not enough Space	Not enough Space	Not enough Space	Not enough Space
Center Turn Overpass								
Continuous Green T	Design for 3-leg Int	Design for 3-leg Int	Design for 3-leg Int	Design for 3-leg Int	Design for 3-leg Int	Design for 3-leg Int	Design for 3-leg Int	Design for 3-leg Int
Echelon								
Full Displaced Left Turn	Not enough Space	Not enough Space	Not enough Space	Not enough Space	Not enough Space	Not enough Space	Not enough Space	Not enough Space
Median U Turn	Not enough Space	Not enough Space	Not enough Space	Not enough Space	Not enough Space	Not enough Space	Not enough Space	Not enough Space
Partial Displaced Left Turn	Not enough Space							
Partial Median U Turn	Not enough Space	Not enough Space	Not enough Space	Not enough Space	Not enough Space	Not enough Space	Not enough Space	Not enough Space
Quadrant Roadway	Analyzed only for S-W Quad due to space	Not enough Space	Not enough Space	Analyzed only for N-W Quad due to space	Analyzed only for N-E Quad due to space	Not enough Space	Not enough Space	Not enough Space
Restricted Crossing U-Turn (RCUT) / Superstreet	Not enough Space	Not enough Space	Not enough Space	Not enough Space	Not enough Space	Not enough Space	Not enough Space	Not enough Space
Single Loop	Analyzed only for S-W Quad due to space	Not enough Space	Not enough Space	Analyzed only for N-W Quad due to space	Analyzed only for N-E Quad due to space	Not enough Space	Not enough Space	Not enough Space
Split Intersection	Not enough Space	Not enough Space	Not enough Space	Not enough Space	Not enough Space	Not enough Space	Not enough Space	Not enough Space
Roundabout	Too high of Volume	Too high of Volume	Too high of Volume	Too high of Volume	Too high of Volume	Too high of Volume	Too high of Volume	Too high of Volume
Two Way Stop Control	Too high of Volume	Too high of Volume	Too high of Volume	Too high of Volume	Too high of Volume	Too high of Volume	Too high of Volume	Too high of Volume
Traditional Diamond	Not enough Space	Not enough Space	Not enough Space	Not enough Space	Not enough Space	Not enough Space	Not enough Space	Not enough Space
Contraflow Left	Not enough Space	Not enough Space	Not enough Space	Not enough Space	Not enough Space	Not enough Space	Not enough Space	Not enough Space
Displaced Left Turn	Not enough Space	Not enough Space	Not enough Space	Not enough Space	Not enough Space	Not enough Space	Not enough Space	Not enough Space
Diverging Diamond	Not enough Space	Not enough Space	Not enough Space	Not enough Space	Not enough Space	Not enough Space	Not enough Space	Not enough Space
Double Roundabout	Not enough Space	Not enough Space	Not enough Space	Not enough Space	Not enough Space	Not enough Space	Not enough Space	Not enough Space
Michigan Urban Diamond								
Partial Cloverleaf	Not enough Space	Not enough Space	Not enough Space	Not enough Space	Not enough Space	Not enough Space	Not enough Space	Not enough Space
Single Point								
Single Roundabout	Too high of Volume	Too high of Volume	Too high of Volume	Too high of Volume	Too high of Volume	Too high of Volume	Too high of Volume	Too high of Volume

Route 7 at City Center Blvd / Countryside Blvd

1	Conventional	-	Y	
2	Bowtie	Link	N	Insufficient intersection spacing
3	Center Turn Overpass	Link	Y	
4	Continuous Green-T	Link	N	Not feasible for roadway facility type
5	Echelon	Link	Y	
6	Full Displaced Left Turn	Link	N	Right-of-way restrictions identified
7	Median U-Turn	Link	N	Insufficient intersection spacing
8	Partial Displaced Left Turn	Link	N	Right-of-way restrictions identified
9	Partial Median U-Turn	Link	N	Insufficient intersection spacing
10	Quadrant Roadway N-E	Link	N	Right-of-way restrictions identified
11	Quadrant Roadway N-W	Link	N	Right-of-way restrictions identified
12	Quadrant Roadway S-E	Link	N	Right-of-way restrictions identified
13	Quadrant Roadway S-W	Link	Y	
14	Restricted Crossing U-Turn	Link	N	Insufficient intersection spacing
15	Single Loop	Link	Y	
16	Split Intersection	Link	N	Insufficient intersection spacing
	Unsignalized Intersections			
17	50 Mini Roundabout	Link	N	Unable to accommodate magnitude of traffic volumes
18	75 Mini Roundabout	Link	N	Unable to accommodate magnitude of traffic volumes
19	Roundabout	Link	N	Unable to accommodate magnitude of traffic volumes
20	Two-Way Stop Control	-	N	Unable to accommodate magnitude of traffic volumes
#	**Interchanges**	**Information**	**Consider?**	**Justification**
21	Traditional Diamond	Link	N	Right-of-way restrictions identified
22	Contraflow Left	Link	N	Right-of-way restrictions identified
23	Displaced Left Turn	Link	N	Right-of-way restrictions identified
24	Diverging Diamond	Link	N	Right-of-way restrictions identified
25	Double Roundabout	Link	N	Right-of-way restrictions identified
26	Michigan Urban Diamond	Link	Y	
27	Partial Cloverleaf	Link	N	Right-of-way restrictions identified
28	Single Point	Link	Y	
29	Single Roundabout	Link	N	Unable to accommodate magnitude of traffic volumes

The results of the vJuST analysis for the AM and PM peak scenarios are shown below. Overall the interchange options provide the greatest improvement from the current conventional intersection. The Center Turn Overpass and the Echelon provide the best improvements for non-interchange options.

AM Peak Hour

Intersection Results					
		Congestion	Pedestrian	Safety	Notes
Type	Dir	Maximum V/C	Accommodation Compared to Conventional	Weighted Total Conflict Points	
Conventional	-	0.87		48	
Center Turn Overpass	-	0.72	+	32	
Echelon	-	0.74	+	28	NB shares approach with WB
Partial Displaced Left Turn	-	0.77	-	44	
Quadrant Roadway	S-W	0.83		40	
Single Loop	-	0.83	-	28	
Contraflow Left	-	0.35		32	Freeway direction is EB-WB
Displaced Left Turn	-	0.25	-	28	Freeway direction is EB-WB
Double Roundabout	-	0.32	+	16	Freeway direction is EB-WB
Michigan Urban Diamond	-	0.31	+	24	Freeway direction is EB-WB
Single Point	-	0.22	-	32	Freeway direction is EB-WB

PM Peak Hour

Intersection Results					
		Congestion	Pedestrian	Safety	Notes
Type	**Dir**	**Maximum V/C**	**Accommodation Compared to Conventional**	**Weighted Total Conflict Points**	
Conventional	-	0.96		48	
Center Turn Overpass	-	0.76	+	32	
Echelon	-	0.79	+	28	NB shares approach with WB
Partial Displaced Left Turn	-	0.88	-	44	
Quadrant Roadway	S-W	0.95		40	
Single Loop	-	0.85	-	28	
Contraflow Left	-	0.39		32	Freeway direction is EB-WB
Displaced Left Turn	-	0.34	-	28	Freeway direction is EB-WB
Double Roundabout	-	0.79	+	16	Freeway direction is EB-WB
Michigan Urban Diamond	-	0.39	+	24	Freeway direction is EB-WB
Single Point	-	0.32	-	32	Freeway direction is EB-WB

Route 7 at Loudoun Tech Dr

1	Conventional	-	Y	
2	Bowtie	Link	N	Insufficient intersection spacing
3	Center Turn Overpass	Link	Y	
4	Continuous Green-T	Link	N	Not feasible for roadway facility type
5	Echelon	Link	Y	
6	Full Displaced Left Turn	Link	N	Right-of-way restrictions identified
7	Median U-Turn	Link	N	Insufficient intersection spacing
8	Partial Displaced Left Turn	Link	Y	
9	Partial Median U-Turn	Link	N	Insufficient intersection spacing
10	Quadrant Roadway N-E	Link	N	Right-of-way restrictions identified
11	Quadrant Roadway N-W	Link	N	Right-of-way restrictions identified
12	Quadrant Roadway S-E	Link	N	Right-of-way restrictions identified
13	Quadrant Roadway S-W	Link	N	Right-of-way restrictions identified
14	Restricted Crossing U-Turn	Link	N	Insufficient intersection spacing
15	Single Loop	Link	N	Right-of-way restrictions identified
16	Split Intersection	Link	N	Insufficient intersection spacing
	Unsignalized Intersections			
17	50 Mini Roundabout	Link	N	Unable to accommodate magnitude of traffic volumes
18	75 Mini Roundabout	Link	N	Unable to accommodate magnitude of traffic volumes
19	Roundabout	Link	N	Unable to accommodate magnitude of traffic volumes
20	Two-Way Stop Control	-	N	Unable to accommodate magnitude of traffic volumes
#	**Interchanges**	**Information**	**Consider?**	**Justification**
21	Traditional Diamond	Link	N	Right-of-way restrictions identified
22	Contraflow Left	Link	N	Right-of-way restrictions identified
23	Displaced Left Turn	Link	N	Right-of-way restrictions identified
24	Diverging Diamond	Link	N	Right-of-way restrictions identified
25	Double Roundabout	Link	N	Right-of-way restrictions identified
26	Michigan Urban Diamond	Link	Y	
27	Partial Cloverleaf	Link	N	Right-of-way restrictions identified
28	Single Point	Link	Y	
29	Single Roundabout	Link	N	Unable to accommodate magnitude of traffic volumes

The results of the vJuST analysis for the AM and PM peak scenarios are shown below. Overall the interchange options provide the greatest improvement from the current conventional intersection. The Center Turn Overpass and the Echelon provide the best improvements for non-interchange options.

AM Peak Hour

Intersection Results					
		Congestion	Pedestrian	Safety	Notes
Type	Dir	Maximum V/C	Accommodation Compared to Conventional	Weighted Total Conflict Points	
Conventional	-	0.76		48	
Center Turn Overpass	-	0.66	+	32	
Echelon	-	0.71	+	28	NB shares approach with WB
Partial Displaced Left Turn	-	0.73	-	44	
Michigan Urban Diamond	-	0.28	+	24	Freeway direction is EB-WB
Single Point	-	0.32	-	32	Freeway direction is EB-WB

PM Peak Hour

Intersection Results					
		Congestion	Pedestrian	Safety	Notes
Type	**Dir**	**Maximum V/C**	**Accommodation Compared to Conventional**	**Weighted Total Conflict Points**	
Conventional	-	0.97		48	
Center Turn Overpass	-	0.73	+	32	
Echelon	-	0.76	+	28	NB shares approach with WB
Partial Displaced Left Turn	-	0.85	-	44	
Michigan Urban Diamond	-	0.57	+	24	Freeway direction is EB-WB
Single Point	-	0.44	-	32	Freeway direction is EB-WB

Route 7 at Potomac View Rd

1	Conventional	-	Y	
2	Bowtie	Link	N	Insufficient intersection spacing
3	Center Turn Overpass	Link	Y	
4	Continuous Green-T	Link	N	Not feasible for roadway facility type
5	Echelon	Link	Y	
6	Full Displaced Left Turn	Link	N	Right-of-way restrictions identified
7	Median U-Turn	Link	N	Insufficient intersection spacing
8	Partial Displaced Left Turn	Link	Y	
9	Partial Median U-Turn	Link	N	Insufficient intersection spacing
10	Quadrant Roadway N-E	Link	N	Right-of-way restrictions identified
11	Quadrant Roadway N-W	Link	N	Right-of-way restrictions identified
12	Quadrant Roadway S-E	Link	N	Right-of-way restrictions identified
13	Quadrant Roadway S-W	Link	N	Right-of-way restrictions identified
14	Restricted Crossing U-Turn	Link	N	Insufficient intersection spacing
15	Single Loop	Link	N	Right-of-way restrictions identified
16	Split Intersection	Link	N	Insufficient intersection spacing
	Unsignalized Intersections			
17	50 Mini Roundabout	Link	N	Unable to accommodate magnitude of traffic volumes
18	75 Mini Roundabout	Link	N	Unable to accommodate magnitude of traffic volumes
19	Roundabout	Link	N	Unable to accommodate magnitude of traffic volumes
20	Two-Way Stop Control	-	N	Unable to accommodate magnitude of traffic volumes
#	**Interchanges**	**Information**	**Consider?**	**Justification**
21	Traditional Diamond	Link	N	Right-of-way restrictions identified
22	Contraflow Left	Link	N	Right-of-way restrictions identified
23	Displaced Left Turn	Link	N	Right-of-way restrictions identified
24	Diverging Diamond	Link	N	Right-of-way restrictions identified
25	Double Roundabout	Link	N	Right-of-way restrictions identified
26	Michigan Urban Diamond	Link	Y	
27	Partial Cloverleaf	Link	N	Right-of-way restrictions identified
28	Single Point	Link	Y	
29	Single Roundabout	Link	N	Unable to accommodate magnitude of traffic volumes

The results of the vJuST analysis for the AM and PM peak scenarios are shown below. Overall the interchange options provide the greatest improvement from the current conventional intersection. The Center Turn Overpass and the Echelon provide the best improvements for non-interchange options.

AM Peak Hour

Intersection Results					
		Congestion	Pedestrian	Safety	Notes
Type	**Dir**	**Maximum V/C**	**Accommodation Compared to Conventional**	**Weighted Total Conflict Points**	
Conventional	-	1.17		48	
Center Turn Overpass	-	0.76	+	32	
Echelon	-	0.82	+	28	NB shares approach with WB
Partial Displaced Left Turn	-	0.88	-	44	
Michigan Urban Diamond	-	0.49	+	24	Freeway direction is EB-WB
Single Point	-	0.48	-	32	Freeway direction is EB-WB

PM Peak Hour

Intersection Results					
		Congestion	Pedestrian	Safety	Notes
Type	**Dir**	**Maximum V/C**	**Accommodation Compared to Conventional**	**Weighted Total Conflict Points**	
Conventional	-	1.18		48	
Center Turn Overpass	-	0.79	+	32	
Echelon	-	0.87	+	28	NB shares approach with WB
Partial Displaced Left Turn	-	0.91	-	44	
Michigan Urban Diamond	-	0.65	+	24	Freeway direction is EB-WB
Single Point	-	0.58	-	32	Freeway direction is EB-WB

Route 7 at Cardinal Glen Circle

1	Conventional	-	Y	
2	Bowtie	Link	N	Insufficient intersection spacing
3	Center Turn Overpass	Link	Y	
4	Continuous Green-T	Link	N	Not feasible for roadway facility type
5	Echelon	Link	Y	
6	Full Displaced Left Turn	Link	N	Right-of-way restrictions identified
7	Median U-Turn	Link	N	Insufficient intersection spacing
8	Partial Displaced Left Turn	Link	Y	
9	Partial Median U-Turn	Link	N	Insufficient intersection spacing
10	Quadrant Roadway N-E	Link	Y	
11	Quadrant Roadway N-W	Link	N	Right-of-way restrictions identified
12	Quadrant Roadway S-E	Link	N	Right-of-way restrictions identified
13	Quadrant Roadway S-W	Link	N	Right-of-way restrictions identified
14	Restricted Crossing U-Turn	Link	N	Insufficient intersection spacing
15	Single Loop	Link	Y	
16	Split Intersection	Link	N	Insufficient intersection spacing
	Unsignalized Intersections			
17	50 Mini Roundabout	Link	N	Unable to accommodate magnitude of traffic volumes
18	75 Mini Roundabout	Link	N	Unable to accommodate magnitude of traffic volumes
19	Roundabout	Link	N	Unable to accommodate magnitude of traffic volumes
20	Two-Way Stop Control	-	N	Unable to accommodate magnitude of traffic volumes
#	**Interchanges**	**Information**	**Consider?**	**Justification**
21	Traditional Diamond	Link	N	Right-of-way restrictions identified
22	Contraflow Left	Link	N	Right-of-way restrictions identified
23	Displaced Left Turn	Link	N	Right-of-way restrictions identified
24	Diverging Diamond	Link	N	Right-of-way restrictions identified
25	Double Roundabout	Link	N	Right-of-way restrictions identified
26	Michigan Urban Diamond	Link	Y	
27	Partial Cloverleaf	Link	N	Right-of-way restrictions identified
28	Single Point	Link	Y	
29	Single Roundabout	Link	N	Unable to accommodate magnitude of traffic volumes

The results of the vJuST analysis for the AM and PM peak scenarios are shown below. Overall the interchange options provide the greatest improvement from the current conventional intersection. The Center Turn Overpass and the Echelon provide the best improvements for non-interchange options.

AM Peak Hour

Intersection Results					
			Congestion	Pedestrian	Safety
Type	Dir	Maximum V/C	Accommodation Compared to Conventional	Weighted Total Conflict Points	Notes
Conventional	-	0.97		48	
Center Turn Overpass	-	0.72	+	32	
Echelon	-	0.73	+	28	NB shares approach with WB
Partial Displaced Left Turn	-	0.73	-	44	
Michigan Urban Diamond	-	0.05	+	24	Freeway direction is EB-WB
Single Point	-	0.05	-	32	Freeway direction is EB-WB

PM Peak Hour

Intersection Results					
		Congestion	Pedestrian	Safety	Notes
Type	**Dir**	**Maximum V/C**	**Accommodation Compared to Conventional**	**Weighted Total Conflict Points**	
Conventional	-	0.97		48	
Center Turn Overpass	-	0.78	+	32	
Echelon	-	0.92	+	28	NB shares approach with WB
Partial Displaced Left Turn	-	0.95	-	44	
Michigan Urban Diamond	-	0.61	+	24	Freeway direction is EB-WB
Single Point	-	0.78	-	32	Freeway direction is EB-WB

Route 7 at Cedar Drive

1	Conventional	-	Y	
2	Bowtie	Link	N	Insufficient intersection spacing
3	Center Turn Overpass	Link	Y	
4	Continuous Green-T	Link	N	Not feasible for roadway facility type
5	Echelon	Link	Y	
6	Full Displaced Left Turn	Link	N	Right-of-way restrictions identified
7	Median U-Turn	Link	N	Insufficient intersection spacing
8	Partial Displaced Left Turn	Link	Y	
9	Partial Median U-Turn	Link	N	Insufficient intersection spacing
10	Quadrant Roadway N-E	Link	Y	
11	Quadrant Roadway N-W	Link	N	Right-of-way restrictions identified
12	Quadrant Roadway S-E	Link	N	Right-of-way restrictions identified
13	Quadrant Roadway S-W	Link	N	Right-of-way restrictions identified
14	Restricted Crossing U-Turn	Link	N	Insufficient intersection spacing
15	Single Loop	Link	Y	
16	Split Intersection	Link	N	Insufficient intersection spacing
	Unsignalized Intersections			
17	50 Mini Roundabout	Link	N	Unable to accommodate magnitude of traffic volumes
18	75 Mini Roundabout	Link	N	Unable to accommodate magnitude of traffic volumes
19	Roundabout	Link	N	Unable to accommodate magnitude of traffic volumes
20	Two-Way Stop Control	-	N	Unable to accommodate magnitude of traffic volumes
#	**Interchanges**	**Information**	**Consider?**	**Justification**
21	Traditional Diamond	Link	N	Right-of-way restrictions identified
22	Contraflow Left	Link	N	Right-of-way restrictions identified
23	Displaced Left Turn	Link	N	Right-of-way restrictions identified
24	Diverging Diamond	Link	N	Right-of-way restrictions identified
25	Double Roundabout	Link	N	Right-of-way restrictions identified
26	Michigan Urban Diamond	Link	Y	
27	Partial Cloverleaf	Link	N	Right-of-way restrictions identified
28	Single Point	Link	Y	
29	Single Roundabout	Link	N	Unable to accommodate magnitude of traffic volumes

The results of the vJuST analysis for the AM and PM peak scenarios are shown below. Overall the interchange options provide the greatest improvement from the current conventional intersection. The Center Turn Overpass and the Echelon provide the best improvements for non-interchange options.

AM Peak Hour

Intersection Results					
		Congestion	Pedestrian	Safety	Notes
Type	Dir	Maximum V/C	Accommodation Compared to Conventional	Weighted Total Conflict Points	
Conventional	-	0.97		48	
Center Turn Overpass	-	0.72	+	32	
Echelon	-	0.73	+	28	NB shares approach with WB
Partial Displaced Left Turn	-	0.73	-	44	
Quadrant Roadway	N-E	0.99		40	
Single Loop	-	0.97	-	28	
Michigan Urban Diamond	-	0.05	+	24	Freeway direction is EB-WB
Single Point	-	0.05	-	32	Freeway direction is EB-WB

PM Peak Hour

Intersection Results					
		Congestion	Pedestrian	Safety	Notes
Type	Dir	Maximum V/C	Accommodation Compared to Conventional	Weighted Total Conflict Points	
Conventional	-	0.71		48	
Center Turn Overpass	-	0.64	+	32	
Echelon	-	0.64	+	28	NB shares approach with WB
Partial Displaced Left Turn	-	0.68	-	44	
Quadrant Roadway	N-E	0.92		40	
Single Loop	-	0.88	-	28	
Michigan Urban Diamond	-	0.06	+	24	Freeway direction is EB-WB
Single Point	-	0.06	-	32	Freeway direction is EB-WB

Route 7 at Dranesville Rd

1	Conventional	-	Y	
2	Bowtie	Link	N	Insufficient intersection spacing
3	Center Turn Overpass	Link	Y	
4	Continuous Green-T	Link	N	Not feasible for roadway facility type
5	Echelon	Link	Y	
6	Full Displaced Left Turn	Link	N	Right-of-way restrictions identified
7	Median U-Turn	Link	N	Insufficient intersection spacing
8	Partial Displaced Left Turn	Link	Y	
9	Partial Median U-Turn	Link	N	Insufficient intersection spacing
10	Quadrant Roadway N-E	Link	N	Right-of-way restrictions identified
11	Quadrant Roadway N-W	Link	N	Right-of-way restrictions identified
12	Quadrant Roadway S-E	Link	N	Right-of-way restrictions identified
13	Quadrant Roadway S-W	Link	N	Right-of-way restrictions identified
14	Restricted Crossing U-Turn	Link	N	Insufficient intersection spacing
15	Single Loop	Link	N	Right-of-way restrictions identified
16	Split Intersection	Link	N	Insufficient intersection spacing
	Unsignalized Intersections			
17	50 Mini Roundabout	Link	N	Unable to accommodate magnitude of traffic volumes
18	75 Mini Roundabout	Link	N	Unable to accommodate magnitude of traffic volumes
19	Roundabout	Link	N	Unable to accommodate magnitude of traffic volumes
20	Two-Way Stop Control	-	N	Unable to accommodate magnitude of traffic volumes
#	**Interchanges**	**Information**	**Consider?**	**Justification**
21	Traditional Diamond	Link	N	Right-of-way restrictions identified
22	Contraflow Left	Link	N	Right-of-way restrictions identified
23	Displaced Left Turn	Link	N	Right-of-way restrictions identified
24	Diverging Diamond	Link	N	Right-of-way restrictions identified
25	Double Roundabout	Link	N	Right-of-way restrictions identified
26	Michigan Urban Diamond	Link	Y	
27	Partial Cloverleaf	Link	N	Right-of-way restrictions identified
28	Single Point	Link	Y	
29	Single Roundabout	Link	N	Unable to accommodate magnitude of traffic volumes

The results of the vJuST analysis for the AM and PM peak scenarios are shown below. Overall the interchange options provide the greatest improvement from the current conventional intersection. The Center Turn Overpass and the Echelon provide the best improvements for non-interchange options.

AM Peak Hour

Intersection Results					
		Congestion	Pedestrian	Safety	Notes
Type	Dir	Maximum V/C	Accommodation Compared to Conventional	Weighted Total Conflict Points	
Conventional	-	1.07		48	
Center Turn Overpass	-	0.66	+	32	
Echelon	-	0.66	+	28	NB shares approach with WB
Partial Displaced Left Turn	-	0.72	-	44	
Michigan Urban Diamond	-	0.30	+	24	Freeway direction is EB-WB
Single Point	-	0.39	-	32	Freeway direction is EB-WB

PM Peak Hour

Intersection Results					
		Congestion	Pedestrian	Safety	Notes
Type	**Dir**	**Maximum V/C**	**Accommodation Compared to Conventional**	**Weighted Total Conflict Points**	
Conventional	-	1.01		48	
Center Turn Overpass	-	0.82	+	32	
Echelon	-	0.84	+	28	NB shares approach with WB
Partial Displaced Left Turn	-	0.75	-	44	
Michigan Urban Diamond	-	0.78	+	24	Freeway direction is EB-WB
Single Point	-	0.82	-	32	Freeway direction is EB-WB

Route 7 at Lakeland Drive

1	Conventional	-	Y	
2	Bowtie	Link	N	Insufficient intersection spacing
3	Center Turn Overpass	Link	Y	
4	Continuous Green-T	Link	N	Not feasible for roadway facility type
5	Echelon	Link	Y	
6	Full Displaced Left Turn	Link	N	Right-of-way restrictions identified
7	Median U-Turn	Link	N	Insufficient intersection spacing
8	Partial Displaced Left Turn	Link	Y	
9	Partial Median U-Turn	Link	N	Insufficient intersection spacing
10	Quadrant Roadway N-E	Link	N	Right-of-way restrictions identified
11	Quadrant Roadway N-W	Link	N	Right-of-way restrictions identified
12	Quadrant Roadway S-E	Link	N	Right-of-way restrictions identified
13	Quadrant Roadway S-W	Link	N	Right-of-way restrictions identified
14	Restricted Crossing U-Turn	Link	N	Insufficient intersection spacing
15	Single Loop	Link	N	Right-of-way restrictions identified
16	Split Intersection	Link	N	Insufficient intersection spacing
	Unsignalized Intersections			
17	50 Mini Roundabout	Link	N	Unable to accommodate magnitude of traffic volumes
18	75 Mini Roundabout	Link	N	Unable to accommodate magnitude of traffic volumes
19	Roundabout	Link	N	Unable to accommodate magnitude of traffic volumes
20	Two-Way Stop Control	-	N	Unable to accommodate magnitude of traffic volumes
#	**Interchanges**	**Information**	**Consider?**	**Justification**
21	Traditional Diamond	Link	N	Right-of-way restrictions identified
22	Contraflow Left	Link	N	Right-of-way restrictions identified
23	Displaced Left Turn	Link	N	Right-of-way restrictions identified
24	Diverging Diamond	Link	N	Right-of-way restrictions identified
25	Double Roundabout	Link	N	Right-of-way restrictions identified
26	Michigan Urban Diamond	Link	Y	
27	Partial Cloverleaf	Link	N	Right-of-way restrictions identified
28	Single Point	Link	Y	
29	Single Roundabout	Link	N	Unable to accommodate magnitude of traffic volumes

The results of the vJuST analysis for the AM and PM peak scenarios are shown below. Overall the interchange options provide the greatest improvement from the current conventional intersection. The Center Turn Overpass and the Echelon provide the best improvements for non-interchange options.

AM Peak Hour

Intersection Results					
		Congestion	Pedestrian	Safety	Notes
Type	**Dir**	**Maximum V/C**	**Accommodation Compared to Conventional**	**Weighted Total Conflict Points**	
Conventional	-	1.01		48	
Center Turn Overpass	-	0.70	+	32	
Echelon	-	0.72	+	28	NB shares approach with WB
Partial Displaced Left Turn	-	0.77	-	44	
Michigan Urban Diamond	-	0.17	+	24	Freeway direction is EB-WB
Single Point	-	0.15	-	32	Freeway direction is EB-WB

PM Peak Hour

Intersection Results					
		Congestion	Pedestrian	Safety	Notes
Type	**Dir**	**Maximum V/C**	**Accommodation Compared to Conventional**	**Weighted Total Conflict Points**	
Conventional	-	0.95		48	
Center Turn Overpass	-	0.61	+	32	
Echelon	-	0.70	+	28	NB shares approach with WB
Partial Displaced Left Turn	-	0.74	-	44	
Michigan Urban Diamond	-	0.25	+	24	Freeway direction is EB-WB
Single Point	-	0.24	-	32	Freeway direction is EB-WB

Appendix G:

VISSIM Results for 2040 Build Alternative 1 Conditions

LC_Rte 7_VISSIM Results: 2040 Alt1, AM Peak Hour

12/23/2020

Travel Time: Rte 7 Between Rte 28 and Dranesville Rd

	Model Travel Time (min)
Eastbound	11.3
Westbound	8.6

Intersection

Intersection	Movement		Output volume (vph)	Avg Queue (ft)	Max Queue (ft)	Storage Length (ft)	Delay (sec/veh)	LOS	Approach Delay (sec/veh)	Approach LOS	Intersection Delay (sec/veh)	Intersection LOS
Rte 7 at Broad Run Drive (Unsignalized)	WB	RT	19	0	0	300	0	A	1	A	1	A
		T	1,981	0	0	5,080	1	A				
	SB	RT	75	4	66	300	10	A	10	A		
Jona Driveway (Unsignalized)	WB	RT	10	0	8	260	1	A	1	A	1	A
		T	2,678	0	8	435	1	A				
Rte 7 at City Center Blvd/Countryside Blvd	SB	RT	218	81	385	400	64	E	64	E	27	C
	EB	LT	235	217	1,005	700	91	F	25	C		
		T	3,126	217	1,005	14,995	21	C				
		RT	134	0	14	1,445	5	A				
	NB	RT	259	48	211	455	87	F	87	F		
	WB	LT	61	106	686	480	72	E	20	C		
		T	2,164	106	686	1,310	19	B				
		RT	236	12	182	545	19	B				
Rte 7 at Davenport Drive	WB	RT	67	186	892	965	8	A	21	C	33	C
		T	2,241	186	892	985	21	C				
		UT	160	186	892	900	58	E				
	SB	RT	65	41	170	320	111	F	111	F		
	EB	T	3,238	465	1,440	1,300	38	D	39	D		
		UT	150	465	1,440	800	67	E				
Rte 7 at Loudoun Tech Dr/Palisades Pkwy	SB	RT	159	41	168	530	69	E	69	E	22	C
	EB	LT	148	121	516	440	71	E	18	B		
		T	2,908	121	516	2,460	16	B				
		RT	337	0	91	350	5	A				
	NB	RT	70	18	86	700	68	E	68	E		
	WB	LT	93	149	700	530	140	F	24	C		
		T	1,813	149	700	4,190	19	B				
		RT	93	1	115	690	4	A				
Cascades Pkwy at EB Ramps to/from Route 7	SB	T	1,389	88	252	400	8	A	16	B	16	B
		LT	193	88	252	275	69	E				
	EB	LT	307	24	161	900	21	C	14	B		
		RT	165	24	161	350	1	A				
	NB	T	1,180	54	263	1,000	19	B	16	B		
		RT	279	54	263	1,000	3	A				
Cascades Pkwy at WB Ramps to/from Route 7	SB	RT	133	69	378	1,000	1	A	19	B	15	B
		T	1,382	69	378	1,000	21	C				
	WB	LT	196	31	233	800	25	C	15	B		
		RT	145	31	233	320	0	A				
	NB	T	1,304	34	191	400	7	A	10	A		
		LT	186	34	191	400	28	C				
Rte 7 at Bartholomew Fair Dr/Campus Dr	SB	RT	20	1	38	230	10	A	10	A	80	E
	EB	LT	31	742	1,569	425	136	F	85	F		
		T	2,630	742	1,569	4,180	88	F				
		RT	124	0	0	1,070	14	B				
	NB	RT	198	317	607	500	393	F	393	F		
	WB	T	2,008	479	1,012	950	7	A	50	D		
		RT	19	479	1,012	215	3	A				
		UT	539	479	1,012	850	214	F				
Rte 7 at Potomac View Road	SB	RT	563	194	759	1,300	99	F	99	F	31	C
	EB	LT	54	353	1,099	480	69	E	36	D		
		T	3,054	353	1,099	910	36	D				
		RT	204	1	152	840	26	C				
	NB	RT	549	33	140	455	20	B	20	B		
	WB	LT	347	189	691	420	114	F	27	C		
		T	1,772	189	691	2,200	15	B				
		RT	371	3	149	330	6	A				
Rte 7 at Driveway to Mirror Ridge Shopping Center (Unsignalized)	WB	RT	40	7	196		1	A	2	A	2	A
		T	2,463	7	196		2	A				
	SB	RT	5	0	22		7	A	7	A		
Rte 7 at Driveway to Cascades Village Residential Development and Rehabilitation Center (Unsignalized)	EB	RT	16	466	976		33	D	54	F	56	F
		T	3,501	466	976		54	F				
	NB	RT	13	92	257		452	F	452	F		
U-Turn - West of Sterling Blvd/Cardinal Glen Circle	EB	UT	178	258	464	1,250	96	F	30	C	52	D
		T	3,312	258	464	1,100	26	C				
	WB	UT	362	581	1,007	725	335	F	82	F		
		T	2,323	581	1,007	1,000	42	D				
Rte 7 at N Sterling Blvd/Cardinal Glen Circle	SB	RT	65	48	216	405	109	F	109	F	42	D
	EB	LT	3	462	974	580	86	F	40	D		
		T	3,408	462	974	2,180	42	D				
		RT	247	5	130	395	17	B				
	NB	RT	957	186	606	510	53	D	53	D		
	WB	LT	339	313	857	650	63	E	39	D		
		T	2,709	313	857	1,285	36	D				
		RT	18	0	0	305	8	A				
U-Turn - West of Augusta Dr	EB	UT	382	335	914	700	134	F	26	D	24	C
		T	3,937	335	914	800	16	B				
	WB	T	2,741	204	597	400	21	C	21	C		
Rte 7 at Augusta Dr	SB	RT	621	131	496	205	80	E	80	E	26	C
	EB	LT	131	165	562	620	97	F	14	B		
		T	3,803	165	562	1,300	11	B				
	WB	UT	18	188	723	500	110	F	32	C		
		T	2,153	188	723	790	33	C				
		RT	157	3	101	400	13	B				
Rte 7 at Driveway to Christ the Redeemer Catholic Church (Unsignalized)	EB	RT	40	66	465		4	A	9	A	9	A
		T	3,770	66	465		9	A				
	NB	RT	5	0	0		0	A	0	A		
Rte 7 at Cedar Dr	SB	RT	33	6	63	220	35	C	35	C	18	B
	EB	LT	69	158	457	550	102	F	16	B		
		T	3,697	158	457	800	14	B				
		RT	5	158	457	335	1	A				
	NB	RT	104	23	121	100	56	E	56	E		
	WB	T	2,334	116	445	880	12	B	19	B		
		RT	22	116	445	450	1	A				
		UT	142	116	445	800	136	F				
Rte 7 at Driveway to Chick-fil-A (Unsignalized)	EB	RT1	19	60	326		9	A	9	A	9	A
		RT2	111	0	0		4	A				
		T	3,927	60	326		9	A				
	NB	RT	0	0	0		0	A	0	A		
Rte 7 at Driveway to Cedar Lake Plaza (Unsignalized)	WB	RT	10	21	178		1	A	4	A	4	A
		T	2,508	21	178		4	A				
	SB	RT	8	0	0		0	A	0	A		

LC_Rte 7_VISSIM Results: 2040 Alt1, AM Peak Hour

12/23/2020

Travel Time: Rte 7 Between Rte 28 and Dranesville Rd

	Model Travel Time (min)
Eastbound	11.3
Westbound	8.6

Intersection

Intersection	Movement		Output volume (vph)	Avg Queue (ft)	Max Queue (ft)	Storage Length (ft)	Delay (sec/veh)	LOS	Approach Delay (sec/veh)	Approach LOS	Intersection Delay (sec/veh)	Intersection LOS
Rte 7 at Community Plaza/Lakeland Drive	SB	RT	240	65	185	200	92	F	92	F	16	B
	EB	UT	102	94	332	380	91	F	9	A		
		T	3,595	94	332	875	7	A				
		RT	110	1	56	335	1	A				
	NB	RT	147	0	0	210	2	A	2	A		
	WB	LT	87	121	769	1,300	89	F	19	B		
		T	2,180	121	769	1,410	17	B				
		RT	2,180	121	769	1,410	17	B				
Rte 7 at Driveways between Community Plaza and Dranesville Road (Unsignalized)	EB	RT1	35	11	175		0	A	0	A	3	A
		RT2	30	45	390		2	A	2	A		
		RT3	25	138	625		3	A	3	A		
		T	3,683	28	282		3	A	3	A		
	NB	RT1	86	0	39		2	A	2	A		
		RT2	39	0	27		2	A	2	A		
Rte 7 at Dranesville Rd	EB	T	3,446	91	365	1,390	10	A	9	A	17	B
		RT	296	0	91	1,325	3	A				
	NB	LT	291	96	280	340	95	F	81	F		
		RT	359	96	280	415	69	E				
	WB	LT	158	68	174	420	137	F	10	B		
		T	2,044	41	169	4,350	1	A				
		RT	93	41	169	470	1	A				
Rte 7 at Driveways east of Dranesville Rd (Unsignalized)	EB	RT	38	37	217		0	A	2	A	2	A
		T	3,764	37	217		2	A				
	NB	RT	28	10	81		55	F	55	F		

Interchange

Intersection /Interchange	Movement	Speed	Volume (vph)	Density (vpmpl)	LOS
Rte 7 at Atlantic Blvd Interchange	Rte 7 at Atlantic Blvd WB Off-ramp Junction	46	2,677	14	B
	Rte 7 at Atlantic Blvd WB Basic Freeway Segment	47	2,349	17	B
	Rte 7 at Atlantic Blvd WB Weaving Segment	45	2,718	15	B
	Rte 7 at Atlantic Blvd EB Weaving Segment	54	3,702	17	B
	Rte 7 at Atlantic Blvd EB Off-ramp Junction	52	3,476	17	B
	Rte 7 at Atlantic Blvd EB Basic Freeway Segment	44	3,052	23	B
	Rte 7 at Atlantic Blvd EB On-ramp Junction	31	3,497	28	D
Rte 7 at Cascades Pkwy Interchange	Rte 7 at Cascades Pkwy WB Off-ramp Junction	42	2,026	12	B
	Rte 7 at Cascades Pkwy WB Basic Freeway Segment	43	1,683	13	B
	Rte 7 at Cascades Pkwy WB On-ramp Junction	24	2,001	21	C
	Rte 7 at Cascades Pkwy EB Off-ramp Junction	25	3,031	30	D
	Rte 7 at Cascades Pkwy EB Basic Freeway Segment	19	2,503	43	E
	Rte 7 at Cascades Pkwy EB On-ramp Junction	10	2,793	73	E

LC_Rte 7_VISSIM Results: 2040 Alt1, PM Peak Hour

12/23/2020

Travel Time: Rte 7 Between Rte 28 and Dranesville Rd

	Model Travel Time (min)
Eastbound	7.8
Westbound	11.0

Intersection

Intersection	Movement		Output volume (vph)	Avg Queue (ft)	Max Queue (ft)	Storage Length (ft)	Delay (sec/veh)	LOS	Approach Delay (sec/veh)	Approach LOS	Intersection Delay (sec/veh)	Intersection LOS
Rte 7 at Broad Run Drive (Unsignalized)	WB	RT	28	1	56	300	2	A	3	A	3	A
		T	3,280	1	56	5,080	3	A				
	SB	RT	54	7	80	300	24	C	24	C		
Jona Driveway (Unsignalized)	WB	RT	3	0	0	260	0	A	0	A	0	A
		T	3,632	0	0	435	0	A				
Rte 7 at City Center Blvd/Countryside Blvd	SB	RT	574	48	263	400	34	C	34	C	33	C
	EB	LT	379	183	711	700	83	F	28	C		
		T	2,388	183	711	14,995	23	C				
		RT	277	0	101	1,445	2	A				
	NB	RT	518	109	276	455	70	E	70	E		
	WB	LT	258	272	1,331	480	63	E	32	C		
		T	3,062	272	1,331	1,310	30	C				
		RT	307	21	217	545	24	C				
Rte 7 at Davenport Drive	WB	RT	169	45	398	965	2	A	6	A	19	B
		T	3,243	45	398	985	5	A				
		UT	321	45	398	350	26	C				
	SB	RT	131	82	279	320	110	F	110	F		
	EB	T	2,682	76	768	1,300	10	A	13	B		
		UT	252	76	768	250	44	D				
Rte 7 at Loudoun Tech Dr/Palisades Pkwy	SB	RT	820	65	244	530	21	C	21	C	20	B
	EB	LT	364	96	292	440	69	E	16	B		
		T	2,410	96	292	2,460	9	A				
		RT	235	1	117	350	3	A				
	NB	RT	673	39	165	700	18	B	18	B		
	WB	LT	108	186	683	530	69	E	23	C		
		T	2,918	186	683	4,190	23	C				
		RT	249	17	456	690	8	A				
Cascades Pkwy at EB Ramps to/from Route 7	SB	T	1,139	76	255	400	14	B	20	C	66	E
		LT	240	76	255	275	48	D				
	EB	LT	744	299	709	900	95	F	78	E		
		RT	248	299	709	350	25	C				
	NB	T	1,301	148	577	1,000	41	D	34	C		
		RT	300	2	108	1,000	3	A				
Cascades Pkwy at WB Ramps to/from Route 7	SB	RT	136	0	61	1,000	2	A	34	C	30	C
		T	1,156	115	415	1,000	38	D				
	WB	LT	226	30	251	800	24	C	12	B		
		RT	246	30	251	320	1	A				
	NB	T	1,409	204	347	400	11	B	32	C		
		LT	636	204	347	400	79	E				
Rte 7 at Bartholomew Fair Dr/Campus Dr	SB	RT	69	6	85	230	16	B	16	B	32	C
	EB	LT	59	254	881	425	99	F	38	D		
		T	2,165	254	881	4,180	42	D				
		RT	353	0	110	1,070	3	A				
	NB	RT	670	136	454	500	86	F	86	F		
	WB	UT	658	255	799	850	90	F	17	B		
		T	2,892	255	799	950	1	A				
		RT	56	255	799	215	1	A				
Rte 7 at Potomac View Road	SB	RT	895	114	814	1,300	63	E	63	E	31	C
	EB	LT	162	290	1,096	480	71	E	28	C		
		T	3,063	290	1,096	910	27	C				
		RT	279	22	332	840	18	B				
	NB	RT	834	35	174	455	15	B	15	B		
	WB	LT	651	328	771	420	76	E	31	C		
		T	2,717	328	771	2,200	23	C				
		RT	588	44	359	330	17	B				
Rte 7 at Driveway to Mirror Ridge Shopping Center (Unsignalized)	WB	RT	63	92	617	-	1	A	5	A	5	A
		T	3,959	92	617	-	5	A				
	SB	RT	15	5	52	-	70	F	70	E		
Rte 7 at Driveway to Cascades Village Residential Development and Rehabilitation Center (Unsignalized)	EB	RT	35	89	778	-	3	A	9	A	9	A
		T	3,890	89	778	-	9	A				
	NB	RT	25	4	54	-	39	E	39	E		
U-Turn - West of Sterling Blvd/Cardinal Glen Circle	EB	UT	563	133	449	1,250	50	D	11	B	14	B
		T	3,355	133	449	1,100	5	A				
	WB	UT	181	171	699	725	114	F	18	B		
		T	3,449	171	699	1,000	13	B				
Rte 7 at N Sterling Blvd/Cardinal Glen Circle	SB	RT	54	6	67	405	21	C	21	C	11	B
	EB	LT	51	57	391	580	90	F	8	A		
		T	2,832	57	391	2,180	6	A				
		RT	657	23	321	395	9	A				
	NB	RT	1,212	48	403	510	27	C	27	C		
	WB	LT	330	87	510	650	47	D	9	A		
		T	3,565	87	510	1,285	5	A				
		RT	44	0	14	305	3	A				
U-Turn - West of Augusta Dr	EB	UT	657	136	578	700	63	E	12	B	11	B
		T	3,401	136	578	800	2	A				
	WB	T	3,291	116	578	400	10	A	10	A		
Rte 7 at Augusta Dr	SB	RT	377	51	282	205	50	D	50	D	28	C
	EB	LT	232	146	457	620	107	F	10	A		
		T	3,164	146	457	1,300	3	A				
	WB	UT	17	555	906	500	134	F	47	D		
		T	2,909	555	906	790	47	D				
		RT	106	555	906	400	15	B				
Rte 7 at Driveway to Christ the Redeemer Catholic Church (Unsignalized)	EB	RT	19	0	20	-	1	A	1	A	1	A
		T	3,160	0	20	-	1	A				
	NB	RT	5	0	0	-	0	A	0	A		
Rte 7 at Cedar Dr	SB	RT	113	51	204	220	81	F	81	F	35	C
	EB	LT	150	119	403	550	89	F	14	B		
		T	3,000	119	403	800	11	B				
		RT	5	119	403	335	0	A				
	NB	RT	265	476	596	100	314	F	314	F		
	WB	UT	192	297	537	800	34	C	29	C		
		T	2,908	297	537	880	29	C				
		RT	24	297	537	450	6	A				

LC_Rte 7_VISSIM Results: 2040 Alt1, PM Peak Hour

12/23/2020

Travel Time: Rte 7 Between Rte 28 and Dranesville Rd

	Model Travel Time (min)
Eastbound	7.8
Westbound	11.0

Intersection

Intersection	Movement		Output volume (vph)	Avg Queue (ft)	Max Queue (ft)	Storage Length (ft)	Delay (sec/veh)	LOS	Approach Delay (sec/veh)	Approach LOS	Intersection Delay (sec/veh)	Intersection LOS
Rte 7 at Driveway to Chick-fil-A (Unsignalized)	EB	RT1	15	2	220	-	3	A	2	A	2	A
		RT2	152	0	0	-	3	A				
		T	3,434	2	220	-	2	A				
	NB	RT	25	1	39	-	10	B	10	B		
Rte 7 at Driveway to Cedar Lake Plaza (Unsignalized)	WB	RT	16	127	478	-	2	A	18	C	18	C
		T	3,114	127	478	-	18	C				
	SB	RT	32	0	0	-	0	A	0	A		
Rte 7 at Community Plaza/Lakeland Drive	SB	RT	504	98	299	200	75	E	75	E	69	E
	EB	UT	257	116	308	380	141	F	13	B		
		T	2,870	116	308	875	2	A				
		RT	170	0	50	335	2	A				
	NB	RT	132	0	0	210	2	A	2	A		
	WB	LT	76	1,336	1,569	1,300	130	F	143	F		
		T	2,345	1,336	1,569	1,410	147	F				
		RT	146	0	48	1,410	95	F				
Rte 7 at Driveways between Community Plaza and Dranesville Road (Unsignalized)	EB	RT1	77	1	118	-	0	A	0	A	1	A
		RT2	41	0	72	-	1	A	1	A		
		RT3	128	75	562	-	2	A	2	A		
		T	2,907	0	95	-	1	A	1	A		
	NB	RT1	66	0	36	-	2	A	2	A		
		RT2	45	0	35	-	3	A	3	A		
Rte 7 at Dranesville Rd	EB	T	2,482	155	369	1,390	24	C	21	C	99	F
		RT	428	0	117	1,325	3	A				
	NB	LT	815	457	927	340	126	F	100	F		
		RT	289	16	209	415	26	C				
	WB	LT	220	1,263	1,400	420	229	F	209	F		
		T	1,747	1,263	1,400	4,350	211	F				
		RT	90	1,263	1,400	470	127	F				
Rte 7 at Driveways east of Dranesville Rd (Unsignalized)	EB	RT	37	1	85	-	0	A	0	A	1	A
		T	2,735	1	85	-	0	A				
	NB	RT	30	2	50	-	11	B	11	B		

Interchange

Intersection /Interchange	Movement	Speed	Volume (vph)	Density (vpmpl)	LOS
Rte 7 at Atlantic Blvd Interchange	Rte 7 at Atlantic Blvd WB Off-ramp Junction	45	3,631	20	C
	Rte 7 at Atlantic Blvd WB Basic Freeway Segment	46	3,189	23	C
	Rte 7 at Atlantic Blvd WB Weaving Segment	44	3,916	22	C
	Rte 7 at Atlantic Blvd EB Weaving Segment	54	3,637	17	B
	Rte 7 at Atlantic Blvd EB Off-ramp Junction	53	3,410	16	B
	Rte 7 at Atlantic Blvd EB Basic Freeway Segment	48	2,527	18	C
	Rte 7 at Atlantic Blvd EB On-ramp Junction	39	3,042	20	B
Rte 7 at Cascades Pkwy Interchange	Rte 7 at Cascades Pkwy WB Off-ramp Junction	39	2,964	19	B
	Rte 7 at Cascades Pkwy WB Basic Freeway Segment	43	2,495	19	C
	Rte 7 at Cascades Pkwy WB On-ramp Junction	21	3,275	40	E
	Rte 7 at Cascades Pkwy EB Off-ramp Junction	33	3,057	23	C
	Rte 7 at Cascades Pkwy EB Basic Freeway Segment	47	2,047	15	B
	Rte 7 at Cascades Pkwy EB On-ramp Junction	21	2,591	30	D

Appendix H:

Comparison of *VISSIM* Results –

2040 Build Alternative 1 Conditions vs.

2040 No-Build Conditions

LC_Rte 7_VISSIM Results: Comparison of 2040 Alternative 1 vs. 2040 No-Build Intersecton Delay and LOS, AM Peak Hour

Intersection	2040 No-Build					2040 Alternative 1			
	Approach Direction	Approach Delay (sec/veh)	Approach LOS	Intersection Delay (sec/veh)	Intersection LOS	Approach Delay (sec/veh)	Approach LOS	Intersection Delay (sec/veh)	Intersection LOS
Rte 7 at Broad Run Drive (Unsignalized)	WB	0	A	0	A	1	A	1	A
	SB	9	A			10	A		
Jona Driveway (Unsignalized)	WB	0	A	0	A	1	A	1	A
Rte 7 at City Center Blvd/Countryside Blvd	SB	50	D	23	C	64	E	27	C
	EB	22	C			25	C		
	NB	58	E			87	F		
	WB	15	B			20	B		
Rte 7 at Davenport Drive (Unsignalized under No-Build; Signalized under Alternative 1)	WB	1	A	2	A	21	C	33	C
	SB	14	B			111	F		
	EB	N/A	N/A			39	D		
Rte 7 at Loudoun Tech Dr/Palisades Pkwy	SB	27	C	23	C	69	E	22	C
	EB	24	C			18	B		
	NB	55	D			68	E		
	WB	16	B			24	C		
Rte 7 at Bartholomew Fair Dr/Campus Dr	SB	103	F	34	C	10	A	80	E
	EB	55	D			85	F		
	NB	24	C			393	F		
	WB	10	A			50	D		
Rte 7 at Potomac View Road	SB	74	E	51	D	99	F	31	C
	EB	27	C			36	D		
	NB	171	F			20	B		
	WB	47	D			27	C		
Rte 7 at Driveway to Mirror Ridge Shopping Center (Unsignalized)	WB	6	A	6	A	2	A	2	A
	SB	19	C			7	A		
Rte 7 at Driveway to Cascades Village Residential Development and Rehabilitation Center (Unsignalized)	EB	27	D	29	D	54	F	56	F
	NB	358	F			452	F		
U-Turn - West of Sterling Blvd/Cardinal Glen Circle (Does not exist for No-Build)	EB	N/A	N/A	N/A	N/A	30	C	52	D
	WB	N/A	N/A			82	F		

LC_Rte 7_VISSIM Results: Comparison of 2040 Alternative 1 vs. 2040 No-Build Intersecton Delay and LOS, AM Peak Hour

Intersection	2040 No-Build					2040 Alternative 1			
	Approach Direction	Approach Delay (sec/veh)	Approach LOS	Intersection Delay (sec/veh)	Intersection LOS	Approach Delay (sec/veh)	Approach LOS	Intersection Delay (sec/veh)	Intersection LOS
Rte 7 at N Sterling Blvd/Cardinal Glen Circle	SB	70	E	29	C	109	F	42	D
	EB	23	C			40	D		
	NB	46	D			53	D		
	WB	29	C			39	D		
U-Turn - West of August Dr (Does not exist for No-Build)	EB	N/A	N/A	N/A	N/A	26	D	24	C
	WB					21	C		
Rte 7 at Augusta Dr	SB	62	E	23	C	80	E	26	C
	EB	24	C			14	B		
	WB	11	B			32	C		
Rte 7 at Driveway to Christ the Redeemer Catholic Church (Unsignalized)	EB	19	C	19	C	9	A	9	A
	NB	118	F			0	A		
Rte 7 at Cedar Dr (Unsignalized for No-Build; Signalized for Alternative 1)	SB	81	F	13	B	35	C	18	B
	EB	19	C			16	B		
	NB	52	F			56	E		
	WB	1	A			19	B		
Rte 7 at Driveway to Chick-fil-A (Unsignalized)	EB	15	B	15	B	9	A	9	A
	NB	271	F			0	A		
Rte 7 at Driveway to Cedar Lake Plaza (Unsignalized)	WB	0	A	0	A	4	A	4	A
	SB	0	A			0	A		
Rte 7 at Community Plaza/Lakeland Drive	SB	81	F	13	B	92	F	16	B
	EB	12	B			9	A		
	NB	44	D			2	A		
	WB	5	A			19	B		
Rte 7 at NB Driveways between Community Plaza and Dranesville Road (Unsignalized)	EB	1	A	1	A	3	A	3	A
	NB	1	A			2	A		

LC_Rte 7_VISSIM Results: Comparison of 2040 Alternative 1 vs. 2040 No-Build Intersecton Delay and LOS, AM Peak Hour

Intersection	2040 No-Build					2040 Alternative 1			
	Approach Direction	Approach Delay (sec/veh)	Approach LOS	Intersection Delay (sec/veh)	Intersection LOS	Approach Delay (sec/veh)	Approach LOS	Intersection Delay (sec/veh)	Intersection LOS
Rte 7 at SB Driveways between Community Plaza and Dranesville Road (Unsignalized)	EB/WB	0	A	0	A	3	A	3	A
	NB/SB	2	A			2	A		
Rte 7 at Dranesville Rd (Converted to "Green-T" for Alternative 1)	SB	105	F	15	B	N/A	N/A	17	B
	EB	6	A			9	A		
	NB	75	E			81	F		
	WB	11	B			10	A		
Rte 7 at Driveways east of Dranesville Rd (Unsignalized)	EB	1	A	1	A	2	A	2	A
	NB	17	C			55	F		

LC_Rte 7_VISSIM Results: Comparison of 2040 Alternative 1 vs. 2040 No-Build Intesection Delay and LOS, PM Peak Hour

Intersection	2040 No-Build					2040 Alternative 1			
	Approach Direction	Approach Delay (sec/veh)	Approach LOS	Intersection Delay (sec/veh)	Intersection LOS	Approach Delay (sec/veh)	Approach LOS	Intersection Delay (sec/veh)	Intersection LOS
Rte 7 at Broad Run Drive (Unsignalized)	WB	2	A	2	A	3	A	3	A
	SB	24	C			24	C		
Jona Driveway (Unsignalized)	WB	0	A	0	A	0	A	0	A
Rte 7 at City Center Blvd/Countryside Blvd	SB	61	E	31	C	34	C	33	C
	EB	29	C			28	C		
	NB	45	D			70	E		
	WB	25	C			32	C		
Rte 7 at Davenport Drive	WB	2	A	3	A	6	A	19	B
(Unsignalized under No-Build; Signalized under Alternative 1)	SB	23	C			110	F		
	EB	N/A	N/A			13	B		
Rte 7 at Loudoun Tech Dr/Palisades Pkwy	SB	37	D	41	D	21	C	20	B
	EB	57	E			16	B		
	NB	60	E			18	B		
	WB	21	C			23	C		
Rte 7 at Bartholomew Fair Dr/Campus Dr	SB	94	F	19	B	16	B	32	C
	EB	18	B			38	D		
	NB	42	D			86	F		
	WB	13	B			17	B		
Rte 7 at Potomac View Road	SB	82	F	41	D	63	E	31	C
	EB	27	C			28	C		
	NB	65	E			15	B		
	WB	35	C			31	C		
Rte 7 at Driveway to Mirror Ridge Shopping Center (Unsignalized)	WB	14	B	15	C	5	A	5	A
	SB	159	F			70	F		
Rte 7 at Driveway to Cascades Village Residential Development and Rehabilitation Center (Unsignalized)	EB	2	A	2	A	9	A	9	A
	NB	17	C			39	E		
U-Turn - West of Sterling Blvd/Cardinal Glen Circle	EB	N/A	N/A	N/A	N/A	11	B	14	B
(Does not exist for No-Build)	WB	N/A	N/A			18	B		

LC_Rte 7_VISSIM Results: Comparison of 2040 Alternative 1 vs. 2040 No-Build Intesection Delay and LOS, PM Peak Hour

Intersection	2040 No-Build					2040 Alternative 1			
	Approach Direction	Approach Delay (sec/veh)	Approach LOS	Intersection Delay (sec/veh)	Intersection LOS	Approach Delay (sec/veh)	Approach LOS	Intersection Delay (sec/veh)	Intersection LOS
Rte 7 at N Sterling Blvd/Cardinal Glen Circle	SB	71	E	33	C	21	C	11	B
	EB	27	C			8	A		
	NB	48	D			27	C		
	WB	32	C			9	A		
U-Turn - West of August Dr (Does not exist for No-Build)	EB	N/A	N/A	N/A	N/A	12	B	11	B
	WB					10	A		
Rte 7 at Augusta Dr	SB	61	E	18	B	50	D	28	C
	EB	10	A			10	A		
	WB	20	B			47	D		
Rte 7 at Driveway to Christ the Redeemer Catholic Church (Unsignalized)	EB	1	A	1	A	1	A	1	A
	NB	9	A			0	A		
Rte 7 at Cedar Dr (Unsignalized for No-Build; Signalized for Alternative 1)	SB	166	F	11	B	81	F	35	C
	EB	3	A			14	B		
	NB	60	F			314	F		
	WB	15	B			29	C		
Rte 7 at Driveway to Chick-fil-A (Unsignalized)	EB	4	A	5	A	2	A	2	A
	NB	62	F			10	A		
Rte 7 at Driveway to Cedar Lake Plaza (Unsignalized)	WB	8	A	8	A	18	C	18	C
	SB	1	A			0	A		
Rte 7 at Community Plaza/Lakeland Drive	SB	65	E	20	B	75	E	69	E
	EB	20	B			13	B		
	NB	62	E			2	A		
	WB	7	A			143	F		
Rte 7 at NB Driveways between Community Plaza and Dranesville Road (Unsignalized)	EB	1	A	1	A	1	A	1	A
	NB	3	A			2	A		

LC_Rte 7_VISSIM Results: Comparison of 2040 Alternative 1 vs. 2040 No-Build Intesection Delay and LOS, PM Peak Hour

Intersection	2040 No-Build					2040 Alternative 1			
	Approach Direction	Approach Delay (sec/veh)	Approach LOS	Intersection Delay (sec/veh)	Intersection LOS	Approach Delay (sec/veh)	Approach LOS	Intersection Delay (sec/veh)	Intersection LOS
Rte 7 at SB Driveways between Community Plaza and Dranesville Road (Unsignalized)	EB/WB	7	A	7	A	1	A	1	A
	NB/SB	5	A			2	A		
Rte 7 at Dranesville Rd (Converted to "Green-T" for Alternative 1)	SB	85	F	59	E	N/A	N/A	99	F
	EB	23	C			21	C		
	NB	201	F			100	F		
	WB	49	D			209	F		
Rte 7 at Driveways east of Dranesville Rd (Unsignalized)	EB	1	A	1	A	0	A	1	A
	NB	9	A			11	B		

LC_Rte 7_VISSIM Results: Comparison of 2040 Alternative 1 vs. 2040 No-Build Interchange Density and LOS, AM Peak Hour

Interchange	Location	2040 No-Build		2040 Alternative 1	
		Density (vpmpl)	LOS	Density (vpmpl)	LOS
Rte 7 at Atlantic Blvd Interchange	Rte 7 at Atlantic Blvd WB Off-ramp Diverge	13	B	14	B
	Rte 7 at Atlantic Blvd WB Basic Freeway Segment	17	B	17	B
	Rte 7 at Atlantic Blvd WB Weaving Segment	15	B	15	B
	Rte 7 at Atlantic Blvd EB Weaving Segment	17	B	17	B
	Rte 7 at Atlantic Blvd EB Off-ramp Diverge	16	B	17	B
	Rte 7 at Atlantic Blvd EB Basic Freeway Segment	21	B	23	B
	Rte 7 at Atlantic Blvd EB On-ramp Merge	30	D	28	D
Rte 7 at Cascades Pkwy Interchange	Rte 7 at Cascades Pkwy WB Off-ramp Diverge	13	B	12	B
	Rte 7 at Cascades Pkwy WB Basic Freeway Segment (Weaving segment for No-Build)	12	B	13	B
	Rte 7 at Cascades Pkwy WB On-ramp Merge	17	B	21	C
	Rte 7 at Cascades Pkwy EB Off-ramp Diverge	82	E	30	D
	Rte 7 at Cascades Pkwy EB Basic Freeway Segment (Wevaing segment for No-Build)	97	F	43	E
	Rte 7 at Cascades Pkwy EB On-ramp Merge	113	E	73	E

LC_Rte 7_VISSIM Results: Comparison of 2040 Alternative 1 vs. 2040 No-Build Interchange Density and LOS, PM Peak Hour

Interchange	Location	2040 No-Build		2040 Alternative 1	
		Density (vpmpl)	LOS	Density (vpmpl)	LOS
Rte 7 at Atlantic Blvd Interchange	Rte 7 at Atlantic Blvd WB Off-ramp Diverge	18	B	20	C
	Rte 7 at Atlantic Blvd WB Basic Freeway Segment	22	C	23	C
	Rte 7 at Atlantic Blvd WB Weaving Segment	22	C	22	C
	Rte 7 at Atlantic Blvd EB Weaving Segment	17	B	17	B
	Rte 7 at Atlantic Blvd EB Off-ramp Diverge	16	B	16	B
	Rte 7 at Atlantic Blvd EB Basic Freeway Segment	18	C	18	C
	Rte 7 at Atlantic Blvd EB On-ramp Merge	19	B	20	B
Rte 7 at Cascades Pkwy Interchange	Rte 7 at Cascades Pkwy WB Off-ramp Diverge	18	B	19	B
	Rte 7 at Cascades Pkwy WB Basic Freeway Segment (Weaving segment for No-Build)	21	C	19	C
	Rte 7 at Cascades Pkwy WB On-ramp Merge	44	E	40	E
	Rte 7 at Cascades Pkwy EB Off-ramp Diverge	15	B	23	C
	Rte 7 at Cascades Pkwy EB Basic Freeway Segment (Wevaing segment for No-Build)	17	B	15	B
	Rte 7 at Cascades Pkwy EB On-ramp Merge	17	B	30	D

LC_Rte 7_VISSIM Results: Comparison of 2040 Alternative 1 vs. 2040 No-Build Average Travel Times

Route 7 Between Route 28 and Dranesville Rd

Direction	AM Peak Hour Modeled Travel Time (minutes)		PM Peak Hour Modeled Travel Time (minutes)	
	2040 No-Build	2040 Alternative 1	2040 No-Build	2040 Alternative 1
Eastbound	15.6	11.3	9.4	7.8
Westbound	7.2	8.6	10.7	11.0