2023 Road Diet Assessments

FINAL REPORT - Metrotech Drive

December 17, 2024

Prepared for:

FCDOT
Serving Fairfax County for 25 Years and More

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Table of Contents

List of Figures

List of Tables

Executive Summary

The Virginia Department of Transportation (VDOT) will be repaving the Metrotech Drive corridor between Lee Jackson Memorial Highway (Route 50) and Centreville Road. As such, the Fairfax County Department of Transportation (FCDOT) initiated an assessment for a road diet to potentially reallocate pavement width for the purpose of accommodating bike lanes. The corridor contains two signalized intersections and four unsignalized intersections. This report summarizes the findings of a crash analysis, existing traffic conditions, a road diet assessment, and final recommendations and conclusions.

There were a total of 41 reported crashes along the entire corridor between January 1, 2020 and December 31, 2022, with the majority of crashes occurring at the intersection with Route 50. The results of the crash analysis suggest that these crashes were more likely a result of human error rather than existing road geometry or operations. Using turning movement count (TMC) data collected in March 2023 and Synchro software, weekday AM and PM peak hour traffic conditions were analyzed for existing conditions. The results of this analysis indicates that the intersection of Metrotech Drive and Route 50 operates at a level of service (LOS) C in the AM peak hour and LOS D in the PM peak hour. These results are somewhat skewed by the significant through volume on Route 50. Mainline left turns and side street approaches experience delays consistent with LOS F operations, primarily as a result of the high cycle lengths (200+ seconds). As for the intersection of Metrotech Drive and Centreville Road, the overall intersection operates at LOS C in the AM peak hour and LOS C in the PM peak hour.

The existing configuration of Metrotech Drive conforms to the typical road diet reconfiguration, transitioning from a four-lane undivided roadway to two travel lanes with a center left-turn lane. A Build traffic analysis was completed using the 2023 TMC data and the existing Synchro model, which was updated to reflect the road diet conditions. AM peak hour overall intersection operations maintain LOS C conditions at Route 50, while the PM peak hour operations degrade from LOS D to LOS E. At Centreville Road, overall intersection operations are maintained at LOS C during the AM and PM peak hours. While the overall operations at the two signalized intersections do not experience a significant degradation in LOS or increased delay, certain movements are more significantly impacted by geometric changes associated with the potential road diet. For example, the westbound approach at Centreville Road during the AM peak hour operates at failing conditions, operating at LOS F with a delay increase of 81.2 seconds. This indicates the removal of a vehicular travel lane would impact traffic operations further. At Route 50, while queues for mainline left turns are maintained within the existing storage, the southbound queue approaches the nearby intersection at the IHOP driveway, which could impact operations for that intersection.

Based on the outcome of the road diet assessment, the following are recommended for consideration in the future design of roadway modifications along Metrotech Drive:

- Northbound/Westbound Metrotech Drive
    - Start the northbound bike lane north of the intersection with Route 50; *thus, operating conditions would be identical between Existing and Build conditions at the intersection with Route 50*

  - Consider constructing a sidewalk or trail along the east side of Metrotech Drive to allow bicyclists to travel through the intersection
  - Install a center left-turn lane and buffered bike lane (minimum 2 feet) beginning at the IHOP Driveway
  - End the westbound bike lane at the intersection with Lightfoot Street
  - Maintain existing intersection geometry westbound at Centreville Road
- Eastbound/Southbound Metrotech Drive
  - Start the eastbound bike lane east of Centreville Road
  - End the southbound bike lane at the IHOP Driveway. Bicyclists could continue their trip on the existing asphalt path that begins south of the IHOP driveway.
  - Maintain the existing intersection geometry southbound at Route 50; *thus, operating conditions would be identical between Existing and Build conditions at the intersection with Route 50*

Introduction

As part of the 2023 Virginia Department of Transportation (VDOT) annual paving program, the Fairfax County Department of Transportation (FCDOT) requested that three separate corridors be evaluated to explore the feasibility of implementing a road diet to reallocate pavement space by removing a travel lane in each direction and to install a center left turn lane and buffered bicycle lanes. The Metrotech Drive corridor extents begin at the signalized intersection of Metrotech Drive and Lee Jackson Memorial Highway (Route 50) and ends at the signalized intersection of Metrotech Drive and Centreville Road. The corridor contains four unsignalized intersections:

- Metrotech Drive and IHOP Driveway,
- Metrotech Drive and Lowes Driveway,
- Metrotech Drive and At Home Driveway/Sully Shopping Center, and
- Metrotech Drive and Lightfoot Street.

Metrotech Drive is a four-lane undivided local roadway that connects Route 50, a principal arterial roadway, to Centreville Road, a minor arterial roadway. Metrotech Drive connects the residential community directly south of Route 50 to Centreville Road. The study corridor also provides access to several shopping centers and restaurants. **Figure 1** provides an overview of the study area and location relative to the surrounding area as well as intersection spacing between study intersections. Also noted in **Figure 1** is the typical cross-section of John Marr Drive. **Figure 1** is not to scale.

FCDOT has initiated this road diet study to evaluate the potential to improve the four-lane corridor regarding accessibility and improved mobility for all travel modes. The most recent Fairfax County Bicycle Network has not identified Metrotech Drive as a future bike lane facility; however, a shared use path exists along Centreville Road to the north and Route 50 to the south. Bike lanes along Metrotech Drive could allow for bicyclists to travel along the study corridor to shorten their trip between these two shared use paths.

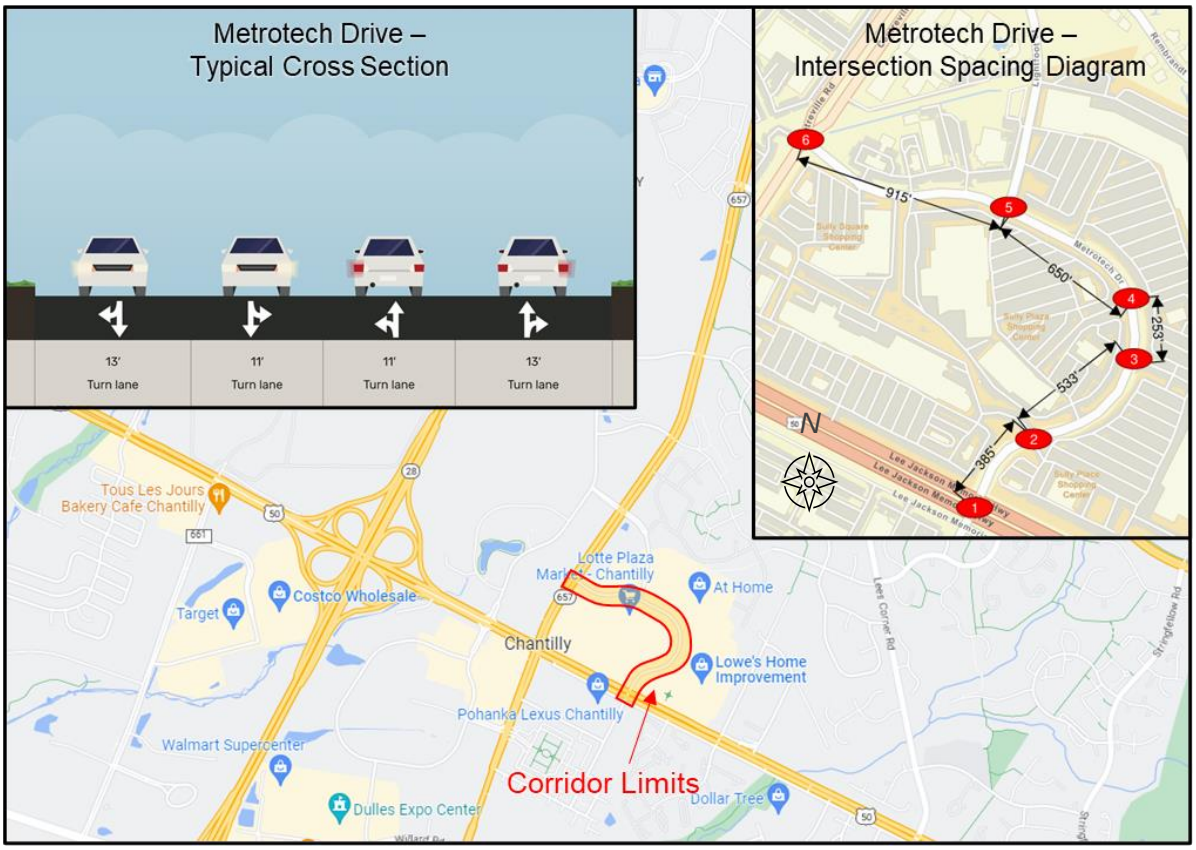

Figure 1: Study Corridor Map and Intersection Spacing Diagram

Data Collection

Turning-movement count (TMC) data was collected on Tuesday March 7th, 2023, from 6:00AM to 9:00 AM and from 4:00 PM to 7:00 PM (except as noted below) for the following intersections:

1. Metrotech Drive/Elmwood Street and Route 50
2. Metrotech Drive and IHOP Driveway/TD Bank Driveway
3. Metrotech Drive and Lowes Driveway
4. Metrotech Drive and At Home Driveway/Sully Place Shopping Center
5. Metrotech Drive and Lightfoot Street/Lotte Plaza (TMC data collected on March 14th, 2023)
6. Metrotech Drive and Centreville Road

Based upon a review of the collected TMC data, the network peak hour for the corridor was determined to be 7:30 AM to 8:30 AM and 4:30 PM to 5:30 PM. The network peak hours were used to evaluate the existing traffic conditions and build scenario conditions (with road diet). Peak hour turning movement count data is summarized in **Figure 2**. Based on a review of the network peak hour volumes in Synchro, adjustments were made to through volumes at Lightfoot Street to balance between adjacent intersections given the different date of data collection; however, no other volume adjustments were considered given the many access points along the corridor that were not counted.

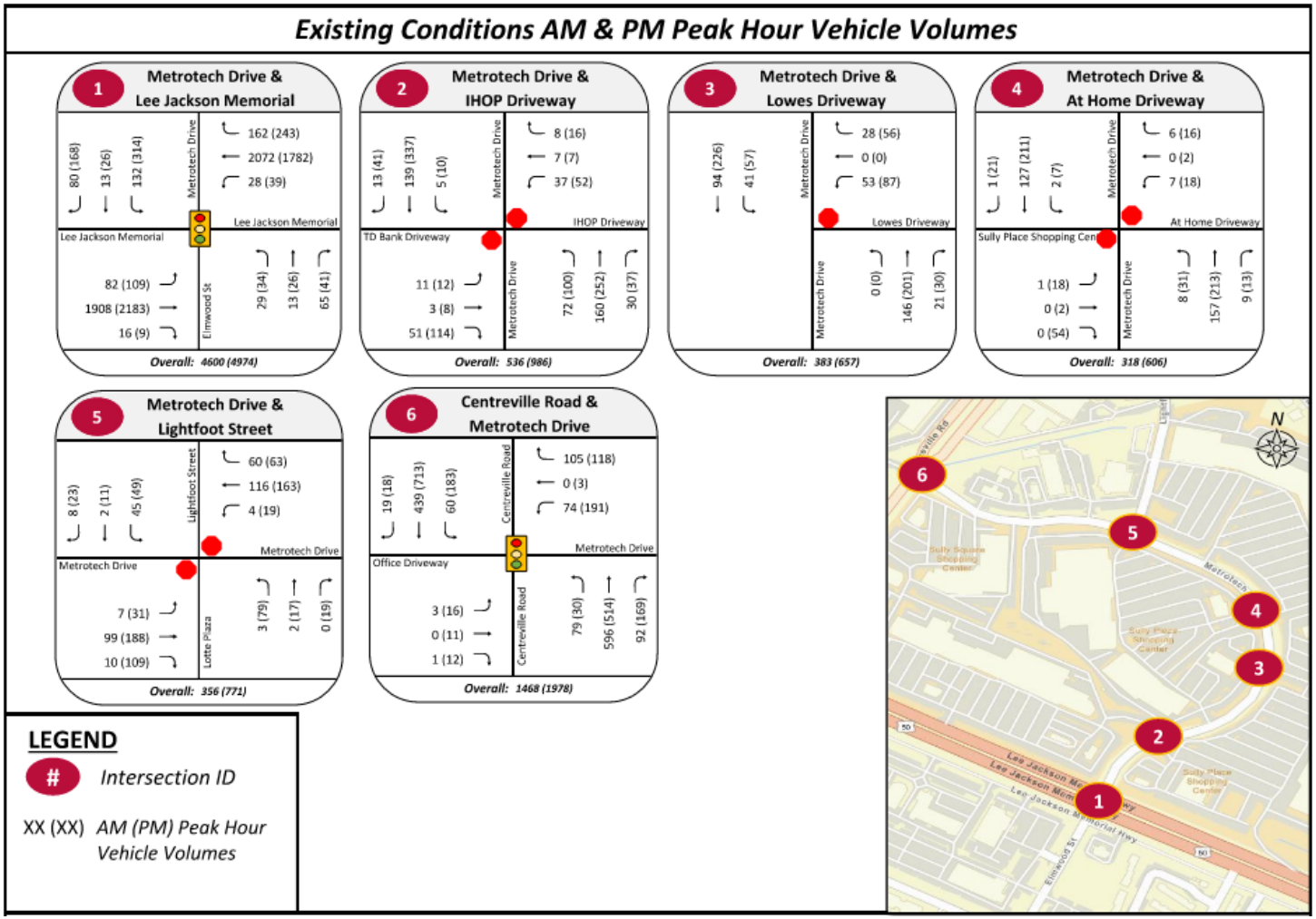

Figure 2: Metrotech Drive Peak Hour Traffic Volumes

Table 1 contains the historical annual average daily traffic (AADT) volumes along the segment from the most recent five years of traffic data provided by VDOT. The data below shows that between 2017 and 2021 the annual average daily traffic along Metrotech Drive between Route 50 and Centreville Road has not changed. Note that according to the VDOT traffic data, the count source reflects a raw count from May 20, 2009; thus, the historical AADT presented is not an accurate reflection of traffic volumes along the corridor and should not be referenced as a reliable data point given the age of the data.

Table 1: Historical AADT

Street	From	To	Year	AADT	%T	K	D
Metrotech Drive	Route 50	Centreville Road	2017	10,000	N/A	N/A	N/A
			2018	10,000	N/A	N/A	N/A
			2019	10,000	N/A	N/A	N/A
			2020	10,000	N/A	N/A	N/A
			2021	10,000	N/A	N/A	N/A

On March 8th, 2023, at approximately 1:00 PM, field observations were completed to evaluate the current traffic conditions and document existing roadway geometry. These observations were documented in a field data collection checklist and can be referenced in **Appendix A**. The corridor appeared to be very active during the time of observation, which may be attributed to midday trips associated with the number of restaurants and shopping centers in the vicinity. Only two pedestrians were observed walking along the corridor, and there was no bicycle or bus activity. Note that there are no bus stops present along the corridor.

While the posted speed limit along the corridor is 25 mph, some vehicles were observed to travel at an apparent high rate of speed around the curves and what appeared to be above the posted speed limit. Furthermore, the geometry of the road presents several stopping sight distance (SSD) challenges along the corridor. The photograph shown in **Figure 3** was taken at a distance of 155 feet east of the At Home Driveway, which is the SSD of a roadway with a design speed of 25 mph. Note that due to the curvature of the road, presence of tree branches and terrain, as well as roadside signs, southbound vehicles are not visible to a driver exiting the shopping center until 250 feet from the intersection. This is less than the minimum intersection sight distance of 280 feet required for a vehicle turning left from a stopped condition (AASHTO Green Book, Table 9-7). Given that vehicles appear to be traveling above the posted speed limit, intersection sight distance would be greater in order for a vehicle to safely make a left turn.

Figure 3: Stopping Sight Distance Southbound Traveling toward At Home Driveway/Sully Place Shopping Center

There were also significant westbound queues for the left-turn movement at the intersection of Metrotech Drive and Centreville Road, as seen in **Figure 4.** This is attributed to the westbound left/through lane operating with split phase signal operations and what appeared to be higher vehicle activity associated with midday activities within the commercial retail centers.

Figure 4: Westbound Left-Turn Queue Traveling Toward Centreville Road

Lastly, there is some vertical pavement inconsistency southbound before the intersection with Lightfoot Road, as shown in **Figure 5**. This could be a cause of concern for bicyclists if bike lanes are added, however, it should be noted that with mill and overlay this irregularity may be corrected.

Figure 5: Pavement Inconsistency Southbound before Lightfoot Road

Crash Analysis

A crash analysis for the Metrotech Drive corridor was conducted using the previous three years of crash data to identify crash patterns that may have an impact on the recommendations in the road diet assessment. Crash reports for the calendar years 2020 through 2022 were obtained from the Virginia Department of Transportation database. Each study intersection was isolated to a 150-foot radius around the center of the intersection and analyzed individually. The crash data along the corridor segments, which includes roadway outside of each 150-foot intersection radius, was also collected and analyzed.

There were a total of 41 reported crashes between January 1, 2020 and December 31, 2022 along the Guinea Road corridor. Of the 41 crashes, 23 were at the intersection with Route 50, four were at the intersection with IHOP Driveway, one at Lowes Driveway and At Home Driveway, four at Lightfoot Street, four at Centreville Road, and four that occurred outside the study intersections. The majority of the crashes were rear end crashes occurring in the off-peak hour. With the location of the corridor existing near commercial retail and restaurants and the occurrence of primarily off-peak, daylight crashes, suggests that crashes may be a result of both human factors and built conditions. The findings of the crash analysis are summarized in **Appendix B**.

Existing Conditions Traffic Analysis

The existing operating conditions for each intersection along the corridor were analyzed using Synchro software for the AM and PM peak hours. The key steps in preparing the network for existing AM and PM peak hour conditions were as follows:

- Modifying VDOT-provided Synchro files to include all study intersections and geometry
- Inputting AM and PM peak hour TMC data for all study intersections, including peak hour factors
- Inputting heavy truck percentages
- Volume balancing – where appropriate

The TMC data indicated that the study intersections had various AM and PM intersection-specific peak hours. For the volumes at each intersection to be properly balanced, the network peak hour was used, which represented the highest total network volume across all study intersections. The network peak hour the morning was found to be 7:30-8:30 AM and it was 4:30-5:30 PM for the evening. Several measures of effectiveness (MOE) generated by Synchro software were used to analyze the existing operations at the six intersections along the study corridor. Highway Capacity Manual (HCM) 6th Edition methodology was used to report MOEs from Synchro at unsignalized intersections. HCM 2000 methodology was used to report MOEs from Synchro at signalized intersections due to limitations of HCM6 methodology to analyze current signal operations.

Table 2 below summarizes the findings from the MOEs for all intersections along the study corridor, including average vehicular delay, level of service (LOS), available storage, and 95th percentile queue length. Overall intersection delay is not reported for unsignalized intersections since delay cannot be calculated for uncontrolled through movements along Metrotech Drive. Movements for which delay cannot be calculated are indicated with "(-)" in the table. The four unsignalized intersections did not have significant delay results, with the highest delay for any side street approach being 13.6 seconds in the AM peak hour and 22.1 seconds in the PM peak hour. In both peaks, this delay occurs on the westbound approach at the IHOP Driveway. This can be attributed to the fact that the westbound approach has one shared lane with left-turn, through, and right-turn movements. The presence of the through volume at the approach would require gaps in both directions of traffic for a vehicle to safely travel through the intersection. The eastbound approach at the TD Bank Driveway has the same lane movement configuration; however, there is a lower through volume at the eastbound approach than at the westbound approach, which explains why the delay is greater at the westbound approach. MOEs for AM and PM peak hour existing conditions for all six intersections can be found in **Appendix C**.

Table 2: AM and PM Peak Hour Results

			Existing AM		Existing PM	
Approach	**Movement**	**Storage Length**	**LOS+Delay**	**95th % Queue Length**	**LOS+Delay**	**95th % Queue Length**
Intersection 1: Metrotech Drive and Lee Jackson Memorial Hwy						
Overall Intersection		-	C (26.0)	-	**D (40.9)**	-
Eastbound (Lee Jackson Memorial)	EBL	340	**F (94.2)**	92	**F (110.2)**	134
	EBT	-	B (17.4)	707	C (33.7)	1165
	EBR	280	A (9.7)	0	B (16.2)	0
	EB Approach	-	C (20.5)	-	**D (37.3)**	-
Westbound (Lee Jackson Memorial)	WBL	375	**F (99.1)**	80	**F (109.1)**	116
	WBT	-	C (20.7)	826	C (26.0)	823
	WBR	-	A (7.1)	26	A (7.5)	33
	WB Approach	-	C (20.7)	-	C (25.4)	-
Northbound (Elmwood St)	NBL	-	**F (93.2)**	79	**F (108.8)**	101
	NBT	-	**F (90.8)**	44	**F (107.0)**	84
	NBR	310	**F (89.9)**	17	**F (103.8)**	0
	NB Approach	-	**F (90.9)**	-	**F (106.3)**	-
Southbound (Metrotech Drive)	SBL	-	**F (105.7)**	172	**F (122.9)**	**#407**
	SBT	-	**F (104.8)**	172	**F (121.9)**	404
	SBR	220	**F (86.9)**	51	**E (77.2)**	87
	SB Approach	-	**F (98.7)**	-	**F (107.4)**	-
Intersection 2: Metrotech Drive and IHOP Driveway						
Eastbound (TD Bank Driveway)	EBLTR	-	B (10.1)	8	B (12.7)	23
	EB Approach	-	B (10.1)	-	B (12.7)	-
Westbound (IHOP Driveway)	WBLTR	-	B (13.6)	10	C (22.1)	28
	WB Approach	-	B (13.6)	-	C (22.1)	-
Northbound (Metrotech Drive)	NBLT	-	A (7.8)	5	A (8.4)	8
	NBTR	-	A (0.1)	-	A (0.3)	-
	NB Approach	-	A (2.2)	-	A (2.4)	-
Southbound (Metrotech Drive)	SBLT	-	A (7.6)	0	A (7.9)	0
	SBTR	-	A (0.0)	-	A (0.0)	-
	SB Approach	-	A (0.2)	-	A (0.2)	-
Intersection 3: Metrotech Drive and Lowes Driveway						
Westbound (Lowes Driveway)	WBLR	-	B (10.9)	10	B (12.8)	23
	WB Approach	-	B (10.9)	-	B (12.8)	-
Northbound (Metrotech Drive)	NBT	-	(-)	-	(-)	-
	NBTR	-	(-)	-	(-)	-
	NB Approach	-	A (0.0)	-	A (0.0)	-
Southbound (Metrotech Drive)	SBLT	-	A (7.6)	3	A (7.8)	3
	SBT	-	A (0.1)	-	A (0.1)	-
	SB Approach	-	A (2.4)	-	A (1.7)	-
Intersection 4: Metrotech Drive and At Home Driveway						
Eastbound (Sully Place Shopping Center)	EBLTR	-	B (10.4)	0	B (10.4)	8
	EB Approach	-	B (10.4)	-	B (10.4)	-
Westbound (At Home Driveway)	WBLTR	-	A (10.0)	3	B (11.4)	5
	WB Approach	-	A (10.0)	-	B (11.4)	-
Northbound (Metrotech Drive)	NBLT	-	A (7.5)	0	A (7.8)	3
	NBTR	-	A (0.0)	-	A (0.1)	-
	NB Approach	-	A (0.3)	-	A (1.0)	-
Southbound (Metrotech Drive)	SBLT	-	A (7.6)	0	A (7.7)	0
	SBTR	-	A (0.0)	-	A (0.0)	-
	SB Approach	-	A (0.1)	-	A (0.2)	-

95th percentile volume exceeds capacity, queue may be longer

m Volume for 95th percentile queue is metered by upstream signal

Table 2 (continued): AM and PM Peak Hour Results

			Existing AM		Existing PM	
Approach	**Movement**	**Storage Length**	**LOS+Delay**	**95th % Queue Length**	**LOS+Delay**	**95th % Queue Length**
Intersection 5: Metrotech Drive and Lightfoot Street						
Eastbound (Metrotech Drive)	EBLT	-	A (7.6)	0	A (7.8)	3
	EBTR	-	A (0.0)	-	A (0.1)	-
	EB Approach	-	A (0.5)	-	A (0.8)	-
Westbound (Metrotech Drive)	WBLT	-	A (7.4)	0	A (7.9)	3
	WBTR	-	A (0.0)	-	A (0.1)	-
	WB Approach	-	A (0.2)	-	A (0.7)	-
Northbound (Lotte Plaza)	NBLTR	-	B (10.5)	0	C (15.6)	28
	NB Approach	-	B (10.5)	-	C (15.6)	-
Southbound (Lightfoot Street)	SBLTR	-	B (10.5)	8	B (13.6)	15
	SB Approach	-	B (10.5)	-	B (13.6)	-
Intersection 6: Metrotech Drive and Centreville Road						
Overall Intersection		-	B (17.7)	-	C (26.1)	-
Eastbound (Office Driveway)	EBLTR	-	D (47.8)	0	D (53.2)	56
	EB Approach	-	D (47.8)	-	D (53.2)	-
Westbound (Metrotech Drive)	WBLT	-	D (47.3)	79	E (55.9)	200
	WBR	-	D (40.5)	0	D (41.9)	2
	WB Approach	-	D (43.3)	-	D (50.6)	-
Northbound (Centreville Road)	NBL	120	A (9.3)	52	B (13.1)	26
	NBT	-	B (15.3)	271	C (24.2)	299
	NBTR	-	A (0.0)	0	A (0.0)	0
	NB Approach	-	B (14.7)	-	C (23.7)	-
Southbound (Centreville Road)	SBL	340	A (9.4)	42	B (15.2)	115
	SBT	-	B (13.6)	170	B (19.3)	296
	SBTR	-	A (0.0)	0	A (0.0)	0
	SB Approach	-	B (13.1)	-	B (18.5)	-

From the MOE results for the intersection of Metrotech Drive and Route 50, overall intersection results suggest acceptable operations in the AM and PM peak hours, with an overall intersection LOS C and LOS D, respectively. However, when considering movements separate from mainline Route 50, all other protected turns and through movements operate at LOS F. This is attributed to a combination of the fact that Elmwood Street and Metrotech Drive operate with split phase signal operations and the very high cycle length. AM peak hour signal operations run a cycle length of 200 seconds, and PM peak hour signal operations run a cycle length of 230 seconds. The cycle length can increase delay while certain movements, specifically the northbound and southbound approaches as well as mainline left-turn movements, experience a long dwell period waiting for the signal phase to be served. In addition to the cycle length, the northbound and southbound approaches accumulate high volumes with a limited number of lanes to process this volume. However, despite the poor operations of these non-mainline movements, none of the 95th percentile queue lengths exceed available storage.

The existing intersection operations of Metrotech Drive and Centreville Road are acceptable, with an overall intersection LOS B in the AM peak hour, and the worst intersection movements operating at LOS D, which are the eastbound and westbound approaches. This is primarily attributed to the movements operating with split phase signal operations. The same is true for the PM peak hour, during which the intersection operates with an overall intersection LOS C, and the worst side street movement (westbound through and left turn) operation at LOS E. Note that this movement operates just above the delay threshold of LOS E of 55 seconds by less than one second.

Road Diet Assessment

GEOMETRY

Using the information from the analysis of existing roadway geometry and traffic conditions, an assessment of the impact of the proposed road diet was completed. The modifications of the corridor include the removal of one northbound and one southbound through travel lane to install a center left-turn lane and a buffered bike lane along the east and west curb. **Figure 6** shows the existing cross section of the corridor, while **Figure 7** shows a typical cross section for the potential build conditions. Graphics were created using Streetmix. The cross-section graphics do not include existing gutter pans, which represents additional horizontal space to accommodate reconfiguration of the roadway width for bike lanes. Gutter pans along Metrotech Drive were measured to be 2 feet.

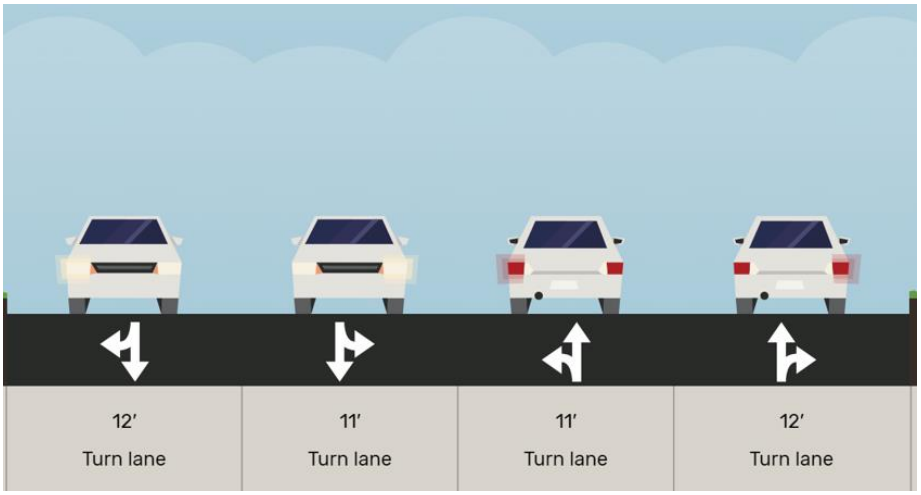

Figure 6: Metrotech Drive Existing Conditions Cross section

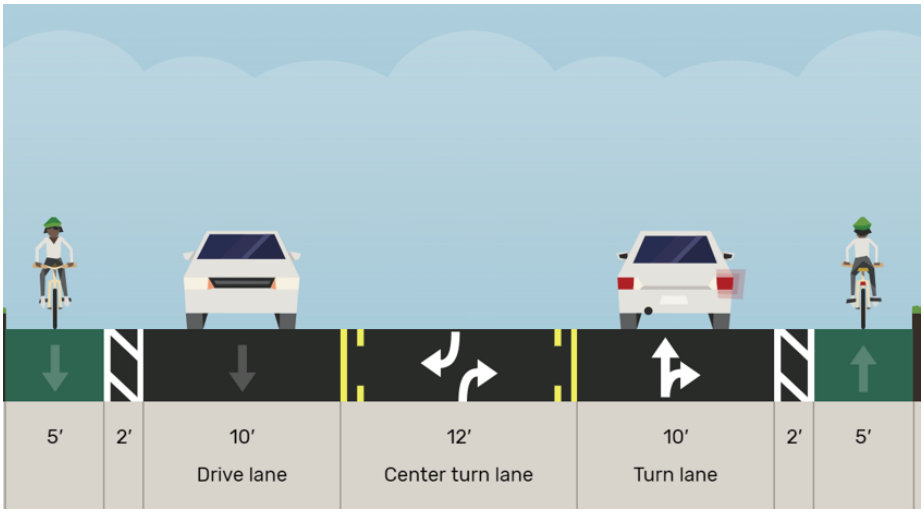

Figure 7: Metrotech Drive and Build Condition

Potential changes to the geometry at the intersection of Metrotech Drive and Route 50 (north of Route 50) are recommended as follows to accommodate bike lanes at the intersection:

- The two existing northbound shared through and left-turn/right-turn lanes become a shared through, left-turn, and right-turn lane
- Removal of an eastbound left-turn lane to account for the single receiving lane on Metrotech Drive
- Removal of a southbound left-turn lane to create space for the bike lane

Figure 8 illustrates the modifications proposed at this signalized intersection outlined above (cross section and plan view). In the plan schematic, red arrows represent vehicle travel lanes and green arrows represent bicycle travel lanes. The seven-foot bike lane (accounts for gutter pan) will begin on the north leg of the intersection and continue along the east curb of Metrotech Drive, with a seven-foot buffer. Given the presence of a single southbound right-turn lane, the bike lane would need to transition from the curb to be located in between the southbound right-turn only lane and shared through and left-turn lane to avoid potential conflicts with bicyclists and right turning vehicles.

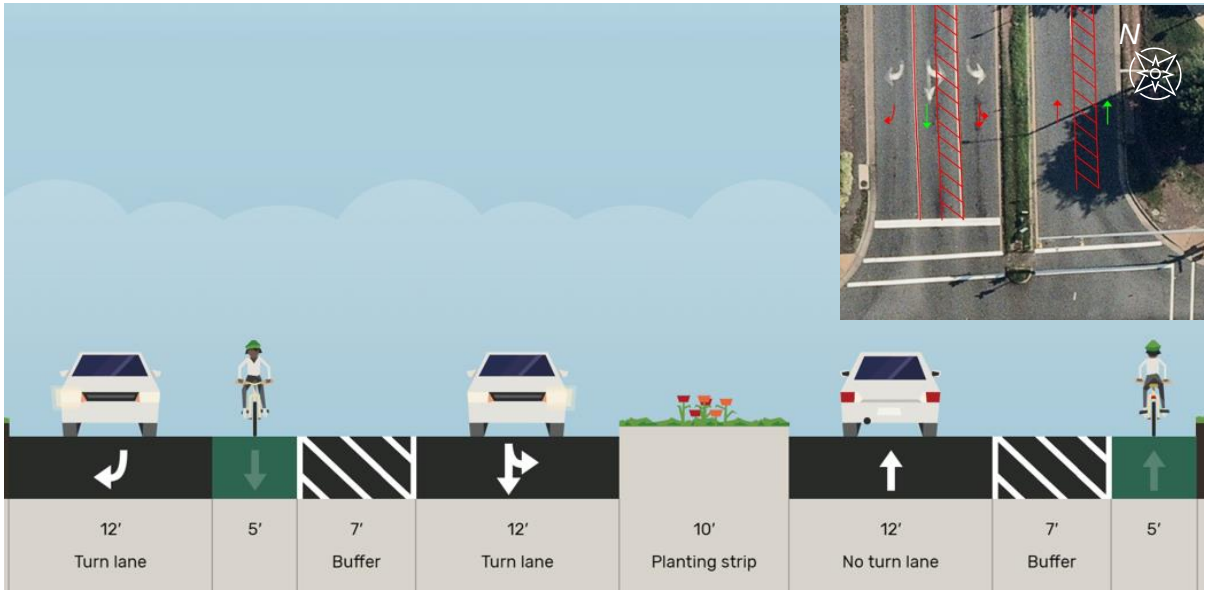

Figure 8: Intersection of Metrotech Drive and Route 50 Build Conditions Cross Section and Plan View

Potential changes to the geometry at the intersection of Metrotech Drive and Centreville Road for Build conditions are recommended as follows to accommodate bike lanes at the intersection:

- Removal of the westbound right-turn lane
- The existing westbound shared through and left-turn lane becomes a shared left-turn, through, and right-turn lane

Figure 9 illustrates the modifications proposed at this signalized intersection outlined above (cross section and plan view). The seven-foot bike lane (which accounts for the two-foot gutter pan) will begin on the east leg of the intersection and continue along the south curb of Metrotech Drive. The

removal of the single westbound right-turn lane allows for the westbound bike lane to be positioned along the north curb of Metrotech Drive. The bicyclist would then be able to access the shared used path along Centreville Road.

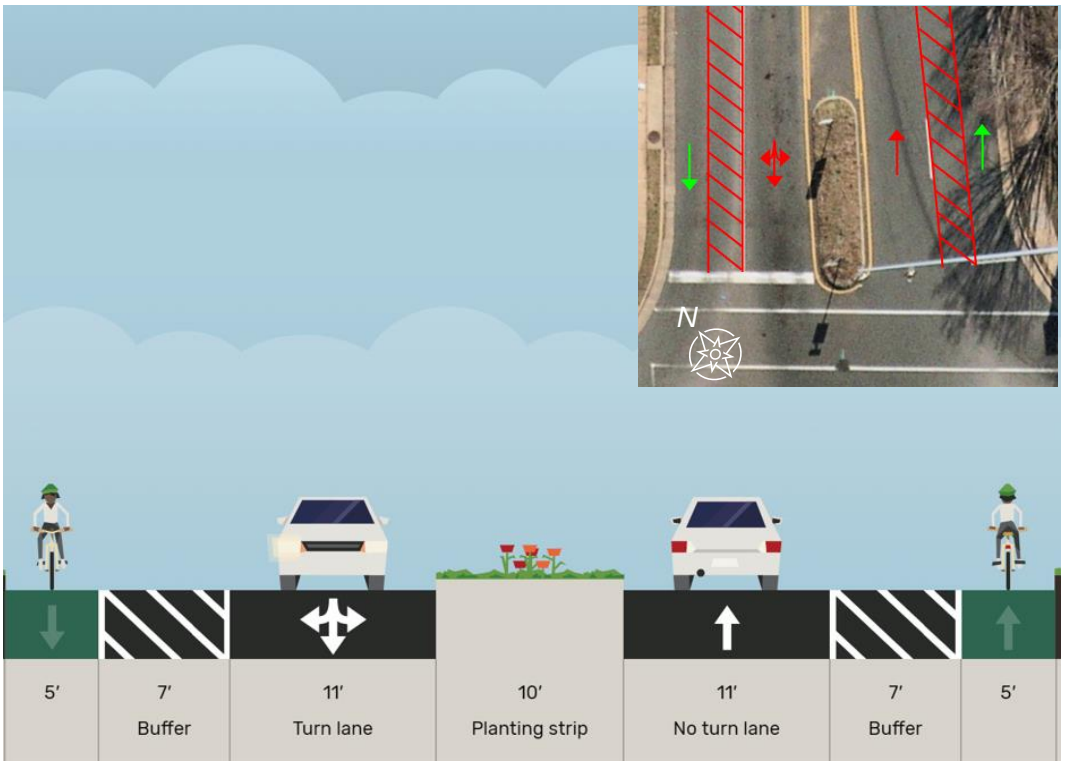

Figure 9: Intersection of Metrotech Drive and Centreville Road

POTENTIAL CRASH MITIGATION

The Virginia state preferred crash modification factors (CMF) li list[1] was referenced to identify appropriate modification factors and the potential impact on crash likelihood along the corridor. There were no bicycle or pedestrian-related crashes along the study corridor; therefore, no crash modification factors are needed for crash likelihood. Related to vehicle countermeasures, there is a CMF for roadway segments with the countermeasure of a road diet. A road diet is also another fundamental component of this study as a means of creating space for bicyclists within the roadway. The road diet countermeasure is specific to the conversion of a four-lane undivided roadway to two travel lanes with a center turn lane. The relevant CMF is described as follows:

- **Road Diet (4U to 3T),** CMF = 0.71 this factor applies to all crashes and has a service life of 20 years.

[1] *https://www.virginiadot.org/business/resources/vhsip/VA-State-Preferred-CMF-List_acc050222.pdf*

Metrotech Drive is a four-lane undivided roadway, with the exception of the medians present at the signalized intersections. Within the section of Metrotech Drive where the undivided, four-lane section exists, there were a total of 14 crashes over a three-year period. Applying this CMF will reduce the number of crashes from nearly 5 crashes per year to approximately 3.5 crashes per year (3.31 crashes).

FUTURE GROWTH ASSESSMENT (PREPARED BY FCDOT)

Located in the Dulles Suburban Center part of the Fairfax County Compressive Plan, specifically Land Unit E-2, Metrotech Drive is surrounded by auto-oriented strip malls and suburban shopping centers. Despite that, the Plan specifically discourages free-standing, auto-oriented retail, commercial and financial uses. Given the lack of space for new auto-oriented businesses, it is highly unlikely that ones will be added along Metrotech Drive. Development should facilitate on and off-site pedestrian access and circulation and enhance the pedestrian environment, thereby reducing dependence on the automobile. While the Plan has a goal of level of service D operating conditions, it has a caveat "if feasible", which is achievable in this project except for the intersection at Route 50 during the PM peak hour. The Plan recommends an internal grid of streets. As a result, traffic growth on Metrotech Drive is unlikely. FCDOT does not anticipate traffic volume growth over the next decade and did not include it in this analysis.

BUILD TRAFFIC ANALYSIS

The Build traffic conditions were analyzed using the same process as done with the existing conditions. This includes updating the lane geometry in Synchro and evaluating the operations at the study intersections. The Synchro results can be referenced in **Appendix D**. As with the existing conditions, MOEs were evaluated to understand the impact to operations of each intersection under the Build conditions.

The four unsignalized intersections did not have significant delay results, with the highest delay for any side street approach being 14.6 seconds in the AM peak hour and 31.5 seconds in the PM peak hour. During both peaks, this delay occurs on the westbound approach at the IHOP Driveway. The westbound approach changes to LOS D operating conditions under Build conditions.

The removal of a northbound and southbound through lane along Metrotech Drive has significant impacts on delay for the two signalized intersections, as seen in the results in **Table 3** and **Table 4**. The removal of one of the eastbound left-turn lane at the intersection of Metrotech Drive and Route 50 increases eastbound left-turn movement delays from 94.2 seconds in the existing AM peak hour condition to 113.4 seconds in the Build AM peak hour condition. Despite the increase in delay, the 95th percentile queue is still accommodated within the existing storage. Note that green time was reallocated from Route 50 to the southbound approach to manage delays given the reduction in the number of left-turn lanes. At Metrotech Drive and Centreville Road, the westbound approach degrades from operating at LOS D to LOS F with delays increasing from 43.3 seconds to 124.5 seconds. This can be attributed to the removal of the single westbound right-turn lane, which will increase the volume in the proposed shared westbound left, through, and right-turn lane.

As with the AM peak hour, the PM peak hour operations experience significant delay and queuing for several movements both signalized intersections. The PM peak hour operations at the intersection of

Metrotech Drive and Route 50 are worse than the operations in the AM peak hour. The overall intersection level of service for the PM peak hour degrades from LOS D to LOS E, with overall delay increasing 16.2 seconds. The highest delay is expected for the westbound left-turn with an average delay of 175.7 seconds. At the intersection of Metrotech Drive and Centreville Road, the overall intersection maintains LOS C operations with a minor increase in overall delay for the westbound approach given the reduction in travel lanes, pushing the approach from LOS D operations to just above the threshold for LOS E. Queues are generally longer than existing conditions, but spillback does not occur for any movements with storage at the intersection of Metrotech Drive and Centreville Road. As with the AM peak hour, side street delays are generally low, operating at LOS C or better with the exception of the westbound approach at the IHOP driveway. This is due in part to the queue extending from Route 50 as well as fewer gaps in mainline traffic for vehicles to turn out of the driveway.

Table 3: AM Peak Hour Build Condition Results

			Existing AM		Build	Build AM	
Approach	**Movement**	**Storage Length**	**LOS+Delay**	**95th % Queue Length**	**Movement**	**LOS+Delay**	**95th % Queue Length**
Intersection 1: Metrotech Drive and Lee Jackson Memorial Hwy							
Overall Intersection		-	C (26.0)	-	-	C (32.2)	-
Eastbound (Lee Jackson Memorial)	EBL	340	**F (94.2)**	92	EBL	**F (113.4)**	#197
	EBT	-	B (17.4)	707	EBT	C (21.7)	741
	EBR	280	A (9.7)	0	EBR	B (12.1)	0
	EB Approach	-	C (20.5)	-	EB Approach	C (25.4)	-
Westbound (Lee Jackson Memorial)	WBL	375	**F (99.1)**	80	WBL	**F (120.9)**	#85
	WBT	-	C (20.7)	826	WBT	C (29.6)	946
	WBR	-	A (7.1)	26	WBR	A (8.0)	20
	WB Approach	-	C (20.7)	-	WB Approach	C (29.2)	-
Northbound (Elmwood St)	NBL	-	**F (93.2)**	79			
	NBT	-	**F (90.8)**	44	NBTL	**F (95.5)**	108
	NBR	310	**F (89.9)**	17	NBR	**F (90.0)**	0
	NB Approach	-	**F (90.9)**	-	NB Approach	**F (92.2)**	-
Southbound (Metrotech Drive)	SBL	-	**F (105.7)**	172			
	SBT	-	**F (104.8)**	172	SBLT	**F (102.3)**	275
	SBR	220	**F (86.9)**	51	SBR	**F (83.7)**	162
	SB Approach	-	**F (98.7)**	-	SB Approach	**F (95.7)**	-
Intersection 2: Metrotech Drive and IHOP Driveway							
Eastbound (TD Bank Driveway)	EBLTR	-	B (10.1)	8	EBLTR	B (10.6)	8
	EB Approach	-	B (10.1)	-	EB Approach	B (10.6)	-
Westbound (IHOP Driveway)	WBLTR	-	B (13.6)	10	WBLTR	B (14.6)	10
	WB Approach	-	B (13.6)	-	WB Approach	B (14.6)	-
Northbound (Metrotech Drive)	NBLT	-	A (7.8)	5	NBL	A (7.7)	5
	NBTR	-	A (0.1)	-	NBTR	(-)	-
	NB Approach	-	A (2.2)	-	NB Approach	A (2.1)	-
Southbound (Metrotech Drive)	SBLT	-	A (7.6)	0	SBL	A (7.6)	0
	SBTR	-	A (0.0)	-	SBTR	(-)	-
	SB Approach	-	A (0.2)	-	SB Approach	A (0.2)	-
Intersection 3: Metrotech Drive and Lowes Driveway							
Westbound (Lowes Driveway)	WBLR	-	B (10.9)	10	WBLR	B (10.8)	10
	WB Approach	-	B (10.9)	-	WB Approach	B (10.8)	-
Northbound (Metrotech Drive)	NBT	-	(-)	-	NBTR	(-)	-
	NBTR	-	(-)	-			
	NB Approach	-	A (0.0)	-	NB Approach	A (0.0)	-
Southbound (Metrotech Drive)	SBLT	-	A (7.6)	3	SBL	A (7.6)	3
	SBT	-	A (0.1)	-	SBT	(-)	-
	SB Approach	-	A (2.4)	-	SB Approach	A (2.3)	-
Intersection 4: Metrotech Drive and At Home Driveway							
Eastbound (Sully Place Shopping Center)	EBLTR	-	B (10.4)	0	EBLTR	B (11.1)	0
	EB Approach	-	B (10.4)	-	EB Approach	B (11.1)	-
Westbound (At Home Driveway)	WBLTR	-	A (10.0)	3	WBLTR	B (10.4)	3
	WB Approach	-	A (10.0)	-	WB Approach	B (10.4)	-
Northbound (Metrotech Drive)	NBLT	-	A (7.5)	0	NBL	A (7.5)	0
	NBTR	-	A (0.0)	-	NBTR	(-)	-
	NB Approach	-	A (0.3)	-	NB Approach	A (0.3)	-
Southbound (Metrotech Drive)	SBLT	-	A (7.6)	0	SBL	A (7.6)	0
	SBTR	-	A (0.0)	-	SBTR	(-)	-
	SB Approach	-	A (0.1)	-	SB Approach	A (0.1)	-

95th percentile volume exceeds capacity, queue may be longer

Table 3 (continued): AM Peak Hour Build Condition Results

			Existing AM		Build	Build AM	
Approach	**Movement**	**Storage Length**	**LOS+Delay**	**95th % Queue Length**	**Movement**	**LOS+Delay**	**95th % Queue Length**
Intersection 5: Metrotech Drive and Lightfoot Street							
Eastbound (Metrotech Drive)	EBLT	-	A (7.6)	0	EBL	A (7.6)	0
	EBTR	-	A (0.0)	-	EBTR	(-)	-
	EB Approach	-	A (0.5)	-	EB Approach	A (0.5)	-
Westbound (Metrotech Drive)	WBLT	-	A (7.4)	0	WBL	A (7.4)	0
	WBTR	-	A (0.0)	-	WBTR	(-)	-
	WB Approach	-	A (0.2)	-	WB Approach	A (0.2)	-
Northbound (Lotte Plaza)	NBLTR	-	B (10.5)	0	NBLTR	B (10.9)	0
	NB Approach	-	B (10.5)	-	NB Approach	B (10.9)	-
Southbound (Lightfoot Street)	SBLTR	-	B (10.5)	8	SBLTR	B (10.9)	8
	SB Approach	-	B (10.5)	-	SB Approach	B (10.9)	-
Intersection 6: Metrotech Drive and Centreville Road							
Overall Intersection		-	B (17.7)	-	-	C (26.8)	-
Eastbound (Office Driveway)	EBLTR	-	D (47.8)	0	EBLTR	D (47.8)	0
	EB Approach	-	D (47.8)	-	EB Approach	D (47.8)	-
Westbound (Metrotech Drive)	WBLT	-	D (47.3)	79	WBLTR	F (124.5)	53
	WBR	-	D (40.5)	0			
	WB Approach	-	D (43.3)	-	WB Approach	F (124.5)	-
Northbound (Centreville Road)	NBL	120	A (9.3)	52	NBL	A (8.7)	52
	NBT	-	B (15.3)	271	NBT	B (14.3)	271
	NBTR	-	A (0.0)	0	NBTR	A (0.0)	0
	NB Approach	-	B (14.7)	-	NB Approach	B (13.7)	-
Southbound (Centreville Road)	SBL	340	A (9.4)	42	SBL	A (8.8)	42
	SBT	-	B (13.6)	170	SBT	B (12.7)	170
	SBTR	-	A (0.0)	0	SBTR	A (0.0)	0
	SB Approach	-	B (13.1)	-	SB Approach	B (12.3)	-

Table 4: PM Peak Hour Build Condition Results

			Existing PM		Build	Build PM	
Approach	**Movement**	**Storage Length**	**LOS+Delay**	**95th % Queue Length**	**Movement**	**LOS+Delay**	**95th % Queue Length**
Intersection 1: Metrotech Drive and Lee Jackson Memorial Hwy							
Overall Intersection		-	D (40.9)	-	-	E (57.1)	-
Eastbound (Lee Jackson Memorial)	EBL	340	**F (110.2)**	134	EBL	**F (152.7)**	#324
	EBT	-	C (33.7)	1165	EBT	D (51.3)	#1511
	EBR	280	B (16.2)	0	EBR	C (23.7)	0
	EB Approach	-	D (37.3)	-	EB Approach	E (56.0)	-
Westbound (Lee Jackson Memorial)	WBL	375	**F (109.1)**	116	WBL	**F (175.7)**	#152
	WBT	-	C (26.0)	823	WBT	D (49.7)	1115
	WBR	-	A (7.5)	33	WBR	A (9.4)	32
	WB Approach	-	C (25.4)	-	WB Approach	D (47.3)	-
Northbound (Elmwood St)	NBL	-	**F (108.8)**	101			
	NBT	-	**F (107.0)**	84	NBTL	**F (111.4)**	159
	NBR	310	**F (103.8)**	0	NBR	**F (101.1)**	0
	NB Approach	-	**F (106.3)**	-	NB Approach	**F (107.2)**	-
Southbound (Metrotech Drive)	SBL	-	**F (122.9)**	#407			
	SBT	-	**F (121.9)**	404	SBLT	**F (104.3)**	676
	SBR	220	E (77.2)	87	SBR	E (66.6)	149
	SB Approach	-	**F (107.4)**	-	SB Approach	**F (91.8)**	-
Intersection 2: Metrotech Drive and IHOP Driveway							
Eastbound (TD Bank Driveway)	EBLTR	-	B (12.7)	23	EBLTR	B (14.4)	28
	EB Approach	-	B (12.7)	-	EB Approach	B (14.4)	-
Westbound (IHOP Driveway)	WBLTR	-	C (22.1)	28	WBLTR	D (31.5)	40
	WB Approach	-	C (22.1)	-	WB Approach	D (31.5)	-
Northbound (Metrotech Drive)	NBLT	-	A (8.4)	8	NBL	A (8.4)	8
	NBTR	-	A (0.3)	-	NBTR	(-)	-
	NB Approach	-	A (2.4)	-	NB Approach	A (2.2)	-
Southbound (Metrotech Drive)	SBLT	-	A (7.9)	0	SBL	A (7.9)	0
	SBTR	-	A (0.0)	-	SBTR	(-)	-
	SB Approach	-	A (0.2)	-	SB Approach	A (0.2)	-
Intersection 3: Metrotech Drive and Lowes Driveway							
Westbound (Lowes Driveway)	WBLR	-	B (12.8)	23	WBLR	B (12.5)	23
	WB Approach	-	B (12.8)	-	WB Approach	B (12.5)	-
Northbound (Metrotech Drive)	NBT	-	(-)	-	NBTR	(-)	-
	NBTR	-	(-)	-			
Southbound (Metrotech Drive)	SBLT	-	A (7.8)	3	SBL	A (7.8)	3
	SBT	-	A (0.1)	-	SBT	(-)	-
	SB Approach	-	A (1.7)	-	SB Approach	A (1.6)	-
Intersection 4: Metrotech Drive and At Home Driveway							
Eastbound (Sully Place Shopping Center)	EBLTR	-	B (10.4)	8	EBLTR	B (11.2)	10
	EB Approach	-	B (10.4)	-	EB Approach	B (11.2)	-
Westbound (At Home Driveway)	WBLTR	-	B (11.4)	5	WBLTR	B (12.5)	5
	WB Approach	-	B (11.4)	-	WB Approach	B (12.5)	-
Northbound (Metrotech Drive)	NBLT	-	A (7.8)	3	NBL	A (7.8)	3
	NBTR	-	A (0.1)	-	NBTR	(-)	-
	NB Approach	-	A (1.0)	-	NB Approach	A (0.9)	-
Southbound (Metrotech Drive)	SBLT	-	A (7.7)	0	SBL	A (7.7)	0
	SBTR	-	A (0.0)	-	SBTR	(-)	-
	SB Approach	-	A (0.2)	-	SB Approach	A (0.2)	-

95th percentile volume exceeds capacity, queue may be longer

Table 4 (continued): PM Peak Hour Build Condition Results

			Existing PM		Build	Build PM	
Approach	**Movement**	**Storage Length**	**LOS+Delay**	**95th % Queue Length**	**Movement**	**LOS+Delay**	**95th % Queue Length**
Intersection 5: Metrotech Drive and Lightfoot Street							
Eastbound (Metrotech Drive)	EBLT	-	A (7.8)	3	EBL	A (7.8)	3
	EBTR	-	A (0.1)	-	EBTR	(-)	-
	EB Approach	-	A (0.8)	-	EB Approach	A (0.7)	-
Westbound (Metrotech Drive)	WBLT	-	A (7.9)	3	WBL	A (7.9)	3
	WBTR	-	A (0.1)	-	WBTR	(-)	-
	WB Approach	-	A (0.7)	-	WB Approach	A (0.6)	-
Northbound (Lotte Plaza)	NBLTR	-	C (15.6)	28	NBLTR	C (17.6)	33
	NB Approach	-	C (15.6)	-	NB Approach	C (17.6)	-
Southbound (Lightfoot Street)	SBLTR	-	B (13.6)	15	SBLTR	C (15.4)	20
	SB Approach	-	B (13.6)	-	SB Approach	C (15.4)	-
Intersection 6: Metrotech Drive and Centreville Road							
Overall Intersection		-	C (26.1)	-	-	C (31.9)	-
Eastbound (Office Driveway)	EBLTR	-	D (53.2)	56	EBLTR	D (51.4)	52
	EB Approach	-	D (53.2)	-	EB Approach	D (51.4)	-
Westbound (Metrotech Drive)	WBLT	-	E (55.9)	200	WBLTR	E (57.6)	m289
	WBR	-	D (41.9)	2			
	WB Approach	-	D (50.6)	-	WB Approach	E (57.6)	-
Northbound (Centreville Road)	NBL	120	B (13.1)	26	NBL	B (18.4)	37
	NBT	-	C (24.2)	299	NBT	C (27.4)	#368
	NBTR	-	A (0.0)	0	NBTR	A (0.0)	0
	NB Approach	-	C (23.7)	-	NB Approach	C (27.0)	-
Southbound (Centreville Road)	SBL	340	B (15.2)	115	SBL	C (26.8)	#228
	SBT	-	B (19.3)	296	SBT	C (26.0)	#420
	SBTR	-	A (0.0)	0	SBTR	A (0.0)	0
	SB Approach	-	B (18.5)	-	SB Approach	C (26.2)	-

95th percentile volume exceeds capacity, queue may be longer

m Volume for 95th percentile queue is metered by upstream signal

Conclusions and Recommendations

The results of the Build condition analysis suggest that the removal of one travel lane in each direction of Metrotech Drive does not negatively impact unsignalized intersections along Metrotech Drive, but it will cause significant delay and congestion at the two signalized intersections. The primary factor contributing to increased delay is associated with removing an approach lane at Route 50 and Centreville Road to accommodate the bike lane. This creates significant delay during the AM peak hour for the westbound approach at Centreville Road, and while delay is managed on the southbound approach at Route 50, it is at the detriment of other movements at the intersection. Removing an eastbound left-turn lane in addition to the southbound left-turn lane at Route 50 would cause significant delay at this intersection, and several movements in the PM peak hour would be expected to operate with significantly higher delay. There is also concern with changing the geometry at the intersection of Metrotech Drive and Centreville Road. The single shared through, left-turn, and right-turn lane on the westbound approach greatly increases delay in the AM peak hour.

Based on the outcome of the road diet assessment, it is recommended that the following be considered as part of the implementation of buffered bike lanes on Metrotech Drive between Route 50 and Centreville Road:

- Northbound/Westbound Metrotech Drive
    - Start the northbound bike lane north of the intersection with Route 50; *thus, operating conditions would be identical between Existing and Build conditions at the intersection with Route 50*
    - Consider constructing a sidewalk or trail along the east side of Metrotech Drive to allow bicyclists to travel through the intersection
    - Install a center left-turn lane and buffered bike lane (minimum 2 feet) beginning at the IHOP Driveway
    - End the westbound bike lane at the intersection with Lightfoot Street
    - Maintain existing intersection geometry westbound at Centreville Road
- Eastbound/Southbound Metrotech Drive
    - Start the eastbound bike lane east of Centreville Road
    - End the southbound bike lane at the IHOP Driveway. Bicyclists could continue their trip on the existing asphalt path that begins south of the IHOP driveway.
    - Maintain the existing intersection geometry southbound at Route 50; *thus, operating conditions would be identical between Existing and Build conditions at the intersection with Route 50*