GPD GROUP

August 10, 2020
2020050.29

Douglas G. Courtney, PE
Chardon City Engineer
The C.W. Courtney Company
700 Beta Drive, Suite 200
Mayfield Village, Ohio 44143

Starbucks Traffic Study Review

Dear Mr. Courtney,

GPD Group has reviewed the Starbucks Traffic Study dated April 20, 2020. The proposed development consists of a 2,280 square foot Starbucks with a drive-thru window. Access to the site is proposed with full access drives on both Cherry Avenue and Center Street. The study scope includes the existing intersections of 1) Center Street / Giant Eagle driveway, 2) Center Street / Cherry Avenue, 3) Center Street / Washington Street, and 4) Water Street / Cherry Avenue / Wilson Mills Road, as well as the proposed drives.

Due to the current state of vehicle traffic due to the COVID-19 pandemic, traffic count data was unable to be collected for this study. In place of performing traffic counts, the study uses volume data from Streetlight Data, a service that uses cell phone information to provide volumes for various uses, including traffic count data. Prior to the consultant performing the traffic study, they requested approval from the City to use this data. The data was provided to GPD and reviewed and compared to historical traffic counts at these intersections. It was determined that this data would be suitable for use in this study.

The study was found to follow standard practices for traffic impact studies. The study concludes that the development and associated drives can be constructed without a significant impact on the study intersections and that no off-site improvements are needed to accommodate the development's traffic. The existence of two-way left turn lanes past both drives makes this possible. Based on the analysis presented in the study, GPD generally agrees with the conclusions.

The only reservation to these recommendations is the proposed left turns out of the site. As previously noted, both site drives are proposed to allow all turning movements (left in, right in, left out, right out). Due to the proximity of the drives to the Center Street / Cherry Avenue intersection, left turns out of both site drives will be difficult when traffic is queued from the signal during peak hours. Ideally, left turns would be restricted from both drives but this would restrict the patrons' ability to reach the Water Street / Cherry Avenue / Wilson Mills Road intersection. However, restricting left turns out from one of the drives would still allow patrons to reach all destinations.

Therefore, it is recommended that left turns be limited to only one of the site drives. As traffic can queue past both proposed driveways from the Center Street / Cherry Avenue intersection, it is difficult to determine which may be less impactful to allow the left turns out of the site. During peak hours, the traffic counts are lower past the Cherry Avenue driveway and would likely be the better option for allowing left turns. Additionally, the study assigned no left turning traffic to the left turn from the Center Street drive, showing that all exiting left turns could be handled at the Cherry Avenue drive from a capacity standpoint.

If you have any further questions, please do not hesitate to contact me.

Sincerely,
GPD Group

Kevin P. Westbrooks, PE, PTOE
Traffic Engineer

Chardon Starbucks

Traffic Study

Chardon, Ohio

April 20, 2020

ms consultants, inc.
engineers, architects, planners

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EXECUTIVE SUMMARY

This document serves as a traffic study for a proposed Starbucks on the southeast corner of Center Street (SR 44) and Cherry Avenue in Chardon, Ohio. This report documents the impact of the proposed new land use on the surrounding roadway system and will identify any necessary mitigative improvements that the developer should be responsible for providing.

The proposed Starbucks store will be approximately 2,280 square feet. Two full-movement access points are proposed, one on Center Street and one on Cherry Avenue.

Traffic volumes with and without the proposed development were developed. These volumes were used to analyze the traffic operations of the study area intersections.

The proposed development would provide similar Design Year traffic operations as the No-Build condition. The study area intersections are predicted to operate acceptably (LOS D or better) through the Design Year, without any roadway improvements. Additionally, all movements at the study area intersection operate at LOS D or better.

In the Build condition, a westbound left turn lane is expected to be warranted based on the projected traffic volumes. There is already a two-way left turn lane at this location, therefore no improvements are recommended. The only turn lane that is calculated to be longer in the Build condition (400') than the No-Build condition (375') is the northbound left turn lane at Center Street (SR 44) and Cherry Avenue. However, a recently constructed two-way left turn lane exists south of the striped northbound left turn lane, allowing excess queues to use this pavement. Therefore, no improvements or modifications are recommended at this location.

Based on the findings of this document, no traffic or roadway improvements are recommended for the Build condition.

INTRODUCTION

This document serves as a traffic study for a proposed Starbucks on the southeast corner of Center Street (SR 44) and Cherry Avenue in Chardon, Ohio. A map of the site location is provided as **Figure 1**. This report will document the impact of the proposed new land use on the surrounding roadway system and will identify the mitigative improvements, if any, that the developer should be responsible for providing.

STUDY AREA

The study area for this traffic study includes the following signalized intersections:

- Center Street (SR 44) & Giant Eagle driveway
- Center Street (SR 44) & Cherry Avenue
- Center Street (SR 44) & Washington Street
- Water Street (US 6) & Cherry Avenue/Wilson Mills Road

A summary of the existing conditions is provided below:

Center Street (SR 44) is an east-west principal arterial roadway with one through lane in each direction and a two-way left turn lane. The posted speed limit is 35 miles per hour. Cherry Avenue/Wilson Mills Road is a three-lane, north-south major collector with a 25-mph speed limit. Water Street (US 6) is an three-lane, east-west minor arterial with a speed limit of 25 miles per hour.

All four study area intersections are signalized. The Center Street/Giant Eagle intersection has eastbound, westbound, and northbound left turn lanes. The fourth leg of the intersection provides access to a bank.

The Center Street/Cherry Avenue intersection has left turn lanes on all four legs and an eastbound right turn lane. The north leg of the Cherry Avenue intersection provides access to a grocery store, a gas station, and a pharmacy.

The Center Street/Washington Street intersection has eastbound and westbound left turn lanes. The Water Street/Cherry Avenue/Wilson Mills Road has left turn lanes on all four legs and a channelized eastbound right turn lane.

PROPOSED BUILD CONDITION

The proposed Starbucks store will be approximately 2,280 square feet. Two access points are proposed, one on Center Street and one on Cherry Avenue. A conceptual site layout is shown in **Figure 2**.


GIANT EAGLE
PROPOSED SITE
44 CENTER STREET
WASHINGTON STREET
CHERRY AVENUE
6 WATER STREET
WILSON MILLS ROAD
Signalized Intersection
N
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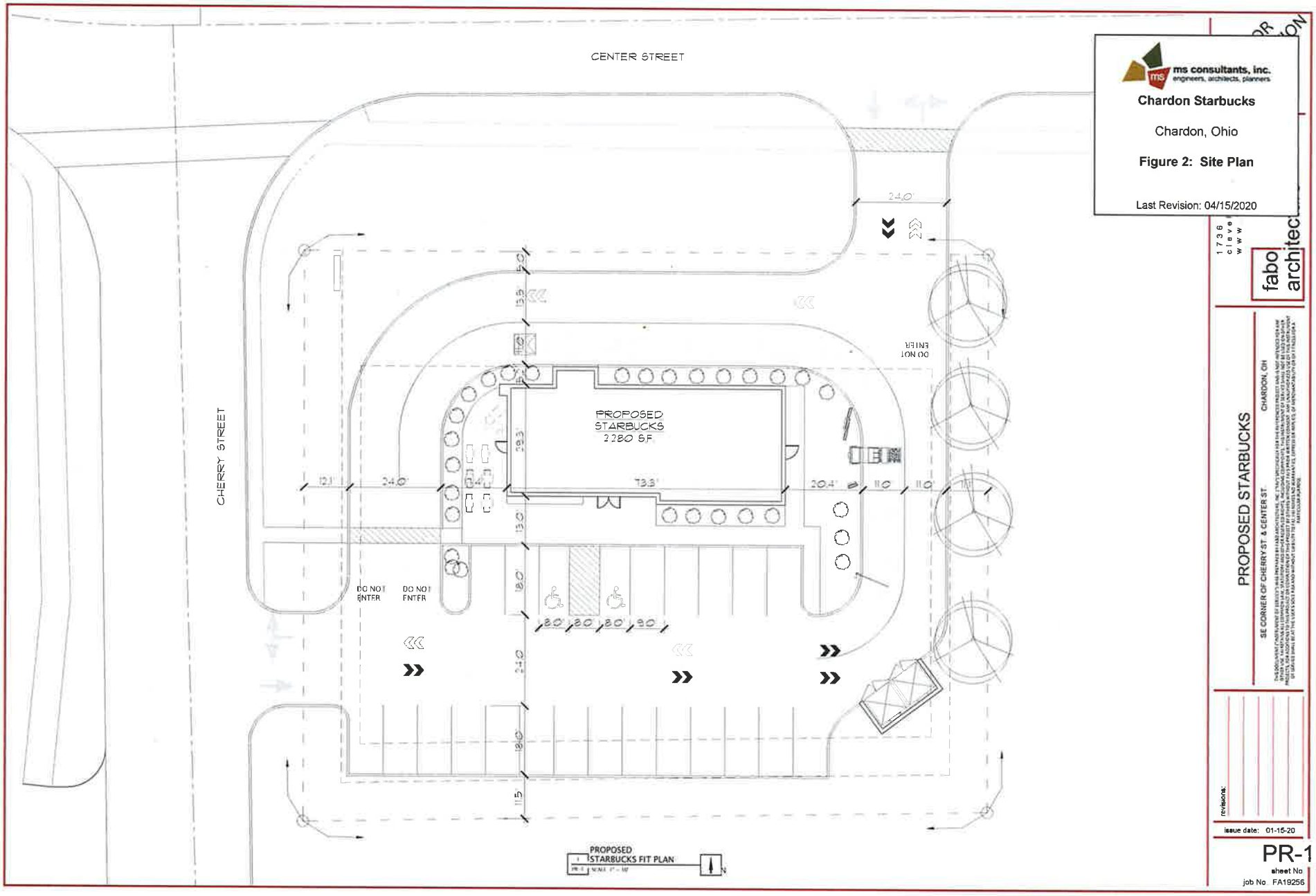
Chardon Starbucks
Chardon, Ohio
Figure 1: Study Area
Last Revision: 04/15/2020



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Chardon, Ohio

Figure 2: Site Plan

Last Revision: 04/15/2020

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www

PROPOSED STARBUCKS

SE CORNER OF CHERRY ST. & CENTER ST.

CHARDON, OH

revisions:

issue date: 01-15-20

PR-1

sheet No.

job No. FA19256

BACKGROUND TRAFFIC VOLUMES

With the disrupted traffic patterns due to the COVID-19 pandemic, accurate turning movement count data could not be collected. In this study, StreetLight Data was utilized to develop background traffic volumes. StreetLight Data was used to pull turning movement data for the peak hours. The data was aggregated from March 1, 2019 to April 30, 2019 and September 1, 2019 to October 31, 2019. The data was calibrated using available count data on the Ohio Department of Transportation (ODOT) Transportation Data Management System (TMMS) web application. Three 24-hour count locations were used to calibrate the data. The count locations used were:

- Center Street (SR 44) west of Giant Eagle driveway
- Center Street (SR 44) east of Washington Street
- Water Street (US 6) east of Washington Street

The peak hours from the ODOT 24-hour counts are 7:00-8:00AM and 5:00-6:00PM. These hours were used to generate the peak hours from the StreetLight data. The resulting 2019 traffic volumes are shown as **Figure 3**.

A growth rate for background traffic was developed using historic count data on the ODOT TMMS web application. Based on the counts over the past decade, traffic on this portion of Chardon has remained fairly stable. Thus, this study has conservatively assumed a 1.0% linear annual growth rate. Therefore, background volumes have been multiplied by 1.22 to obtain Design Year (2041) background (No-Build) volumes.

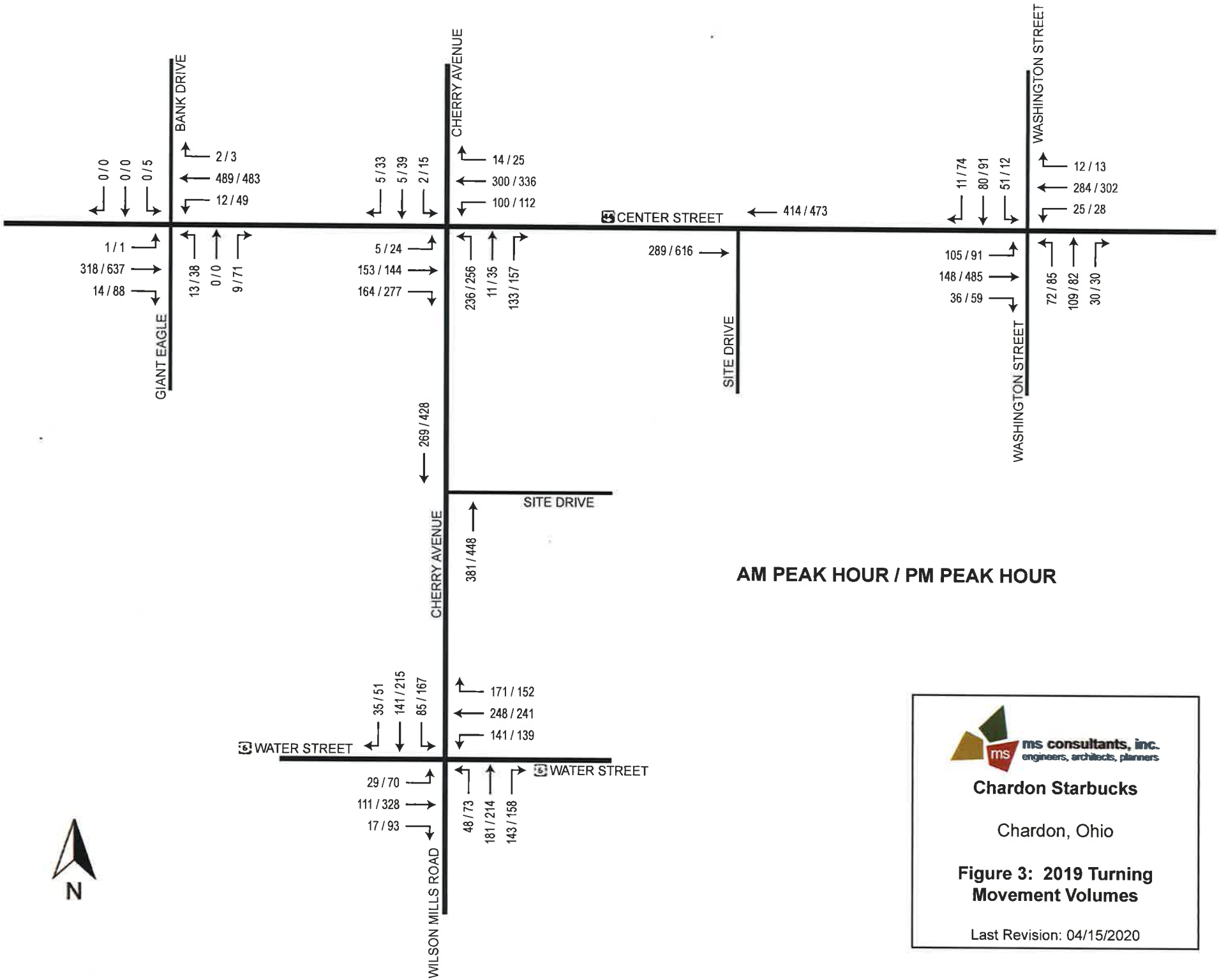
TRIP GENERATION/DISTRIBUTION

Trip generation has been performed using the ITE *Trip Generation Manual (10th Edition)*. The site trip generation information is shown on **Table 1**. Additional information is shown in **Appendix A**.

Table 1: Site Trip Generation – Total Traffic Volumes

		AM Peak			PM Peak		
Land Use	**Size**	**In**	**Out**	**Total**	**In**	**Out**	**Total**
Coffee/Donut Shop with Drive-Through Window (LU 937)	2,280 sf	103	100	203	49	50	99

The ITE *Trip Generation Handbook (3rd Edition)* was used to determine the number of pass-by trips this development would attract. The *Trip Generation Handbook* does not have pass-by data for the LU 937 site type. The closest site type is LU 938 (Coffee/Donut Shop with Drive-Through Window and No Indoor Seating). However, it has a daily pass-by rate of 89%, which seemed too high. The site type LU 934 (Fast Food Restaurant with Drive-Through Window) had a pass-by rate of 49% in the AM peak and 50% in the PM peak. This pass-by rate is more conservative and represents that half of the customers stop on their way to/from work/school, while the other half of customers are making a separate trip just to the store.



AM PEAK HOUR / PM PEAK HOUR

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Figure 3: 2019 Turning Movement Volumes

Last Revision: 04/15/2020

The proposed trip distribution is as follows:

- 20% to/from west on Center Street (SR 44)
- 40% to/from east on Center Street (SR 44)
- 10% to/from west on Water Street (US 6) (west of Cherry Avenue/Wilson Mills Road)
- 15% to/from south on Wilson Mills Road (south of Water Street)
- 15% to/from east on Water Street (US 6) (east of Cherry Avenue/Wilson Mills Road)

The site-generated trips were added to the background volumes to obtain the Build condition volumes. These total volumes can be found on **Figure 4** and **Figure 5**.

TURN LANE ANALYSIS

The unsignalized site driveways were evaluated to determine whether turn lanes are expected to be warranted as part of the proposed development. (The need for turn lanes at signalized intersections is determined from capacity analyses.) Turn lane warrants were evaluated using the warrant graphs and criteria from ODOT's *Location and Design Manual, Volume One* (L&D). Copies of the turn lane warrant analyses are located in **Appendix B**.

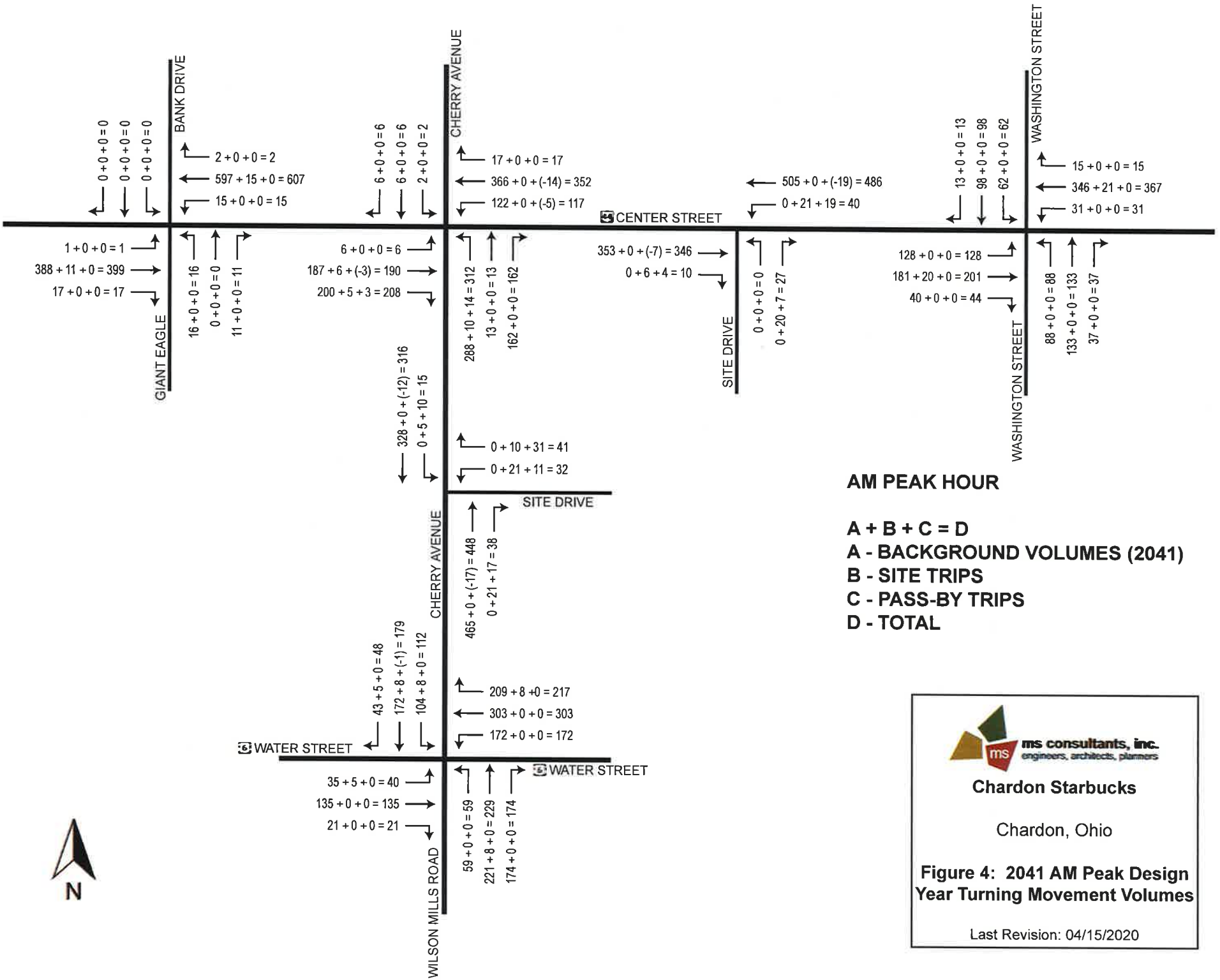
Table 2 indicates that a westbound left turn lane is expected to be warranted at the north site drive. There is currently a two-way left turn lane along Center Street (SR 44) at this location. Therefore, widening will not be required.

Table 2: Turn Lane Warrant Summary

Intersection	Movement	Build Condition
Center Street (SR 44) & North Site Drive	EBRT	Not Warranted
	WBLT	Warranted
Cherry Avenue & West Site Drive	NBRT	Not Warranted
	SBLT	Not Warranted

Turn lane sizing was calculated based on ODOT's L&D Manual methodology. All turn lanes (including those at the signalized intersections) were sized. A summary of the turn lane lengths can be found in **Table 3**.

The results show that all but one of the No-Build condition turn lane lengths matches the Build condition turn lane lengths. The only turn lane that is calculated to be longer in the Build condition (400') than the No-Build condition (375') is the northbound left turn lane at Center Street (SR 44) and Cherry Avenue. The current turn lane is striped approximately 200' long and was constructed as part of recently-completed widening of Cherry Avenue. A two-way left-turn lane exists south of the striped northbound left turn lane, allowing excess northbound queues to use this pavement. Therefore, no improvements or modifications are recommended at this location.



AM PEAK HOUR

A + B + C = D
A - BACKGROUND VOLUMES (2041)
B - SITE TRIPS
C - PASS-BY TRIPS
D - TOTAL

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Chardon, Ohio

Figure 4: 2041 AM Peak Design Year Turning Movement Volumes

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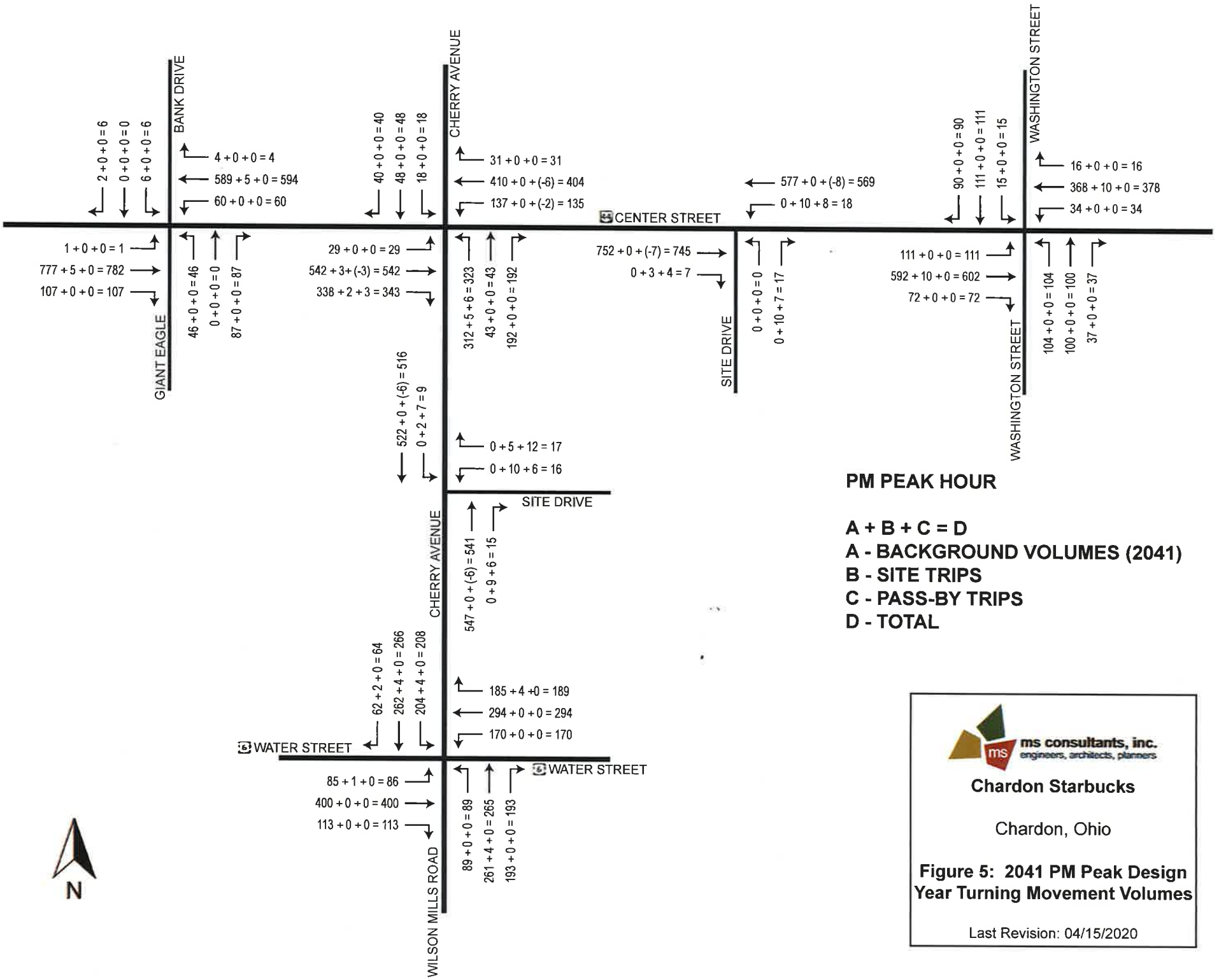

PM PEAK HOUR

A + B + C = D
A - BACKGROUND VOLUMES (2041)
B - SITE TRIPS
C - PASS-BY TRIPS
D - TOTAL

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Chardon, Ohio

Figure 5: 2041 PM Peak Design Year Turning Movement Volumes

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Table 3: ODOT L&D Turn Lane Sizing Calculations
All turn lane lengths include 50' taper

Intersection	Movement	Existing Length	No-Build Condition	Build Condition
Center Street (SR 44) & Giant Eagle	EBLT	100'	100'	100'
	WBLT	350'	150'	150'
	NBLT	175'	150'	150'
Center Street (SR 44) & Cherry Avenue	EBLT	100'	100'	100'
	EBRT	450'	400'	400'
	WBLT	225'	225'	225'
	NBLT	200'	375'	400'
	SBLT	175'	100'	100'
Center Street (SR 44) & North Site Drive	WBLT	--	--	100'
Center Street (SR 44) & Washington Street	EBLT	350'	225'	225'
	WBLT	125'	100'	100'
Water Street (US 6) & Cherry Avenue/ Wilson Mills Road	EBLT	225'	200'	200'
	EBRT	250'	200'	200'
	WBLT	150'	250'	250'
	NBLT	225'	200'	200'
	SBLT	250'	300'	300'

The Cherry Avenue/Water Street intersection has multiple turn lanes where L&D turn lane lengths exceed the existing length. However, the Build condition does not increase the L&D turn lane lengths. Thus, no improvements to these turn lanes are recommended due to the development.

TRAFFIC ANALYSIS

Capacity analyses were performed to determine whether the proposed development would degrade the traffic operations at the study area intersections. These intersections were analyzed using Synchro 11. For suburban/urban locations such as this, LOS D or better is typically considered acceptable traffic operations.

As **Table 4** shows, the study area intersections are anticipated to operate as LOS D or better through the Design Year. The level-of-service is not expected to degrade at either location. Average delays are predicted to increase by less than 1 second per vehicle. The Synchro analysis reports can be found in **Appendix C**.

Table 4: Level-of-Service (LOS) and Delays

	No-Build		Build	
	AM Peak	PM Peak	AM Peak	PM Peak
Center Street & Giant Eagle	A 6.2	B 16.1	A 6.2	B 16.2
Center Street & Cherry Avenue	B 14.3	C 22.5	B 14.9	C 23.0
Center Street & North Site Drive	--	--	B* 10.7	C* 15.0
Center Street & Washington Street	B 19.2	C 23.8	B 19.4	C 24.3
Cherry Avenue & West Site Drive	--	--	B* 14.9	C* 18.2
Water Street & Cherry Avenue/Wilson Mills Road	C 29.2	D 38.7	C 29.8	D 39.4

*unsignalized location – delays shown are for the stopped approach

CONCLUSIONS AND RECOMMENDATIONS

This document evaluated the impact of the Chardon Starbucks on the southeast corner of Center Street (SR 44) and Cherry Avenue in Chardon. The proposed site includes two full access driveways, one on Center Street (SR 44) and one on Cherry Avenue.

The proposed development would provide similar Design Year traffic operations as the No-Build condition. The study area intersections are predicted to operate acceptably (LOS D or better) through the Design Year, without any roadway improvements. Additionally, all movements at the study area intersection operate at LOS D or better.

In the Build condition, a westbound left turn lane is expected to be warranted based on the projected traffic volumes. There is already a two-way left turn lane at this location, therefore no improvements are recommended.

Turn lane lengths were calculated using ODOT L&D manual methodologies for both the No-Build and Build traffic volumes. The only turn lane that is calculated to be longer in the Build condition (400') than the No-Build condition (375') is the northbound left turn lane at Center Street (SR 44) and Cherry Avenue. However, a recently constructed two-way left turn lane exists south of the striped northbound left turn lane, allowing excess queues to use this pavement. Therefore, no improvements or modifications are recommended at this location.

Based on the above findings, no traffic or roadway improvements are recommended for the Build condition.

Appendix A

Trip Generation Information

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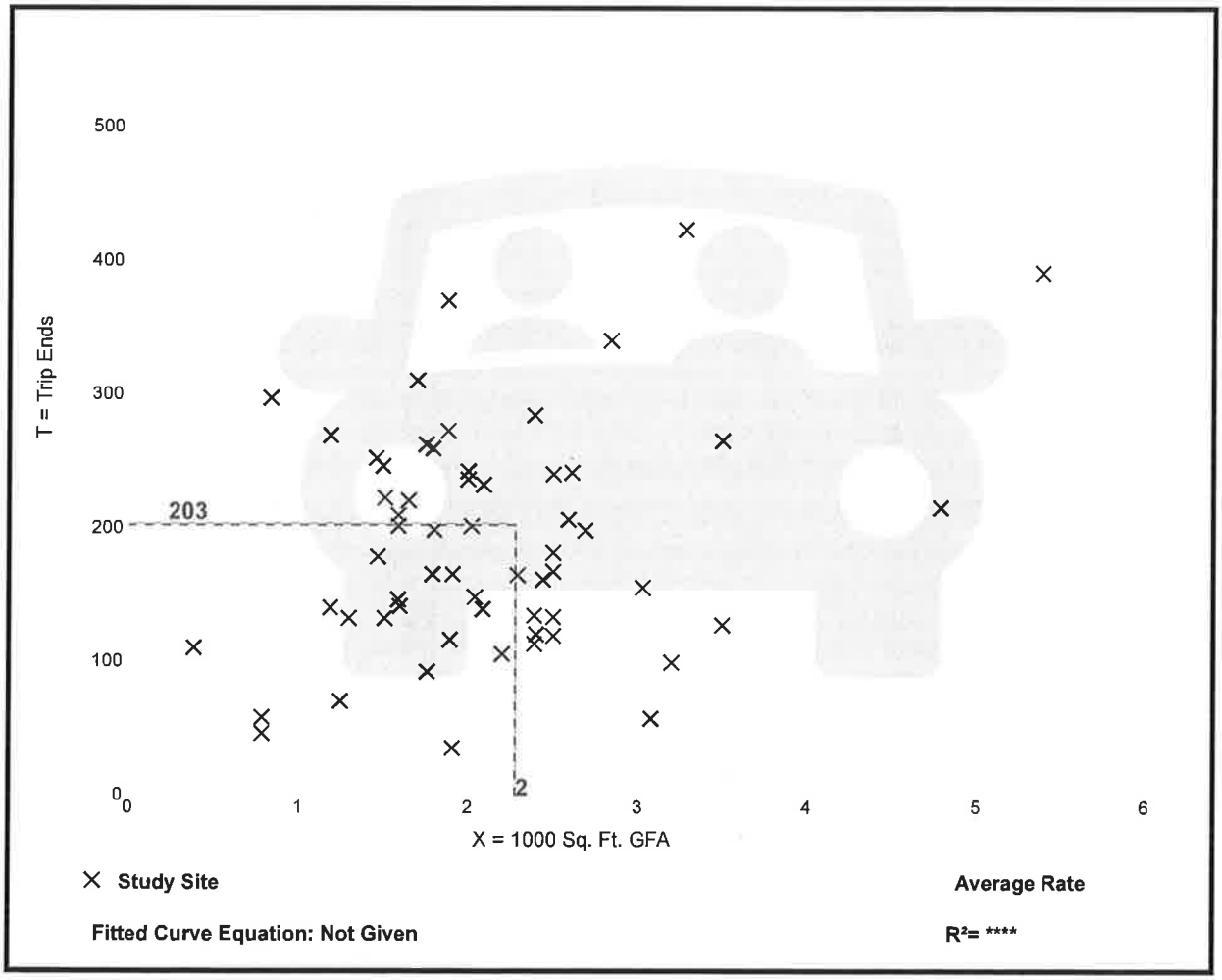
Coffee/Donut Shop with Drive-Through Window
(937)

Vehicle Trip Ends vs:	**1000 Sq. Ft. GFA**
On a:	**Weekday,**
	Peak Hour of Adjacent Street Traffic,
	One Hour Between 7 and 9 a.m.
Setting/Location:	**General Urban/Suburban**
Number of Studies:	61
Avg. 1000 Sq. Ft. GFA:	2
Directional Distribution:	51% entering, 49% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
88.99	18.32 - 353.57	48.19

Data Plot and Equation



Coffee/Donut Shop with Drive-Through Window
(937)

Vehicle Trip Ends vs:	**1000 Sq. Ft. GFA**
On a:	**Weekday,**
	Peak Hour of Adjacent Street Traffic,
	One Hour Between 4 and 6 p.m.
Setting/Location:	**General Urban/Suburban**
Number of Studies:	26
Avg. 1000 Sq. Ft. GFA:	2
Directional Distribution:	50% entering, 50% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
43.38	2.09 - 92.31	18.88

Data Plot and Equation

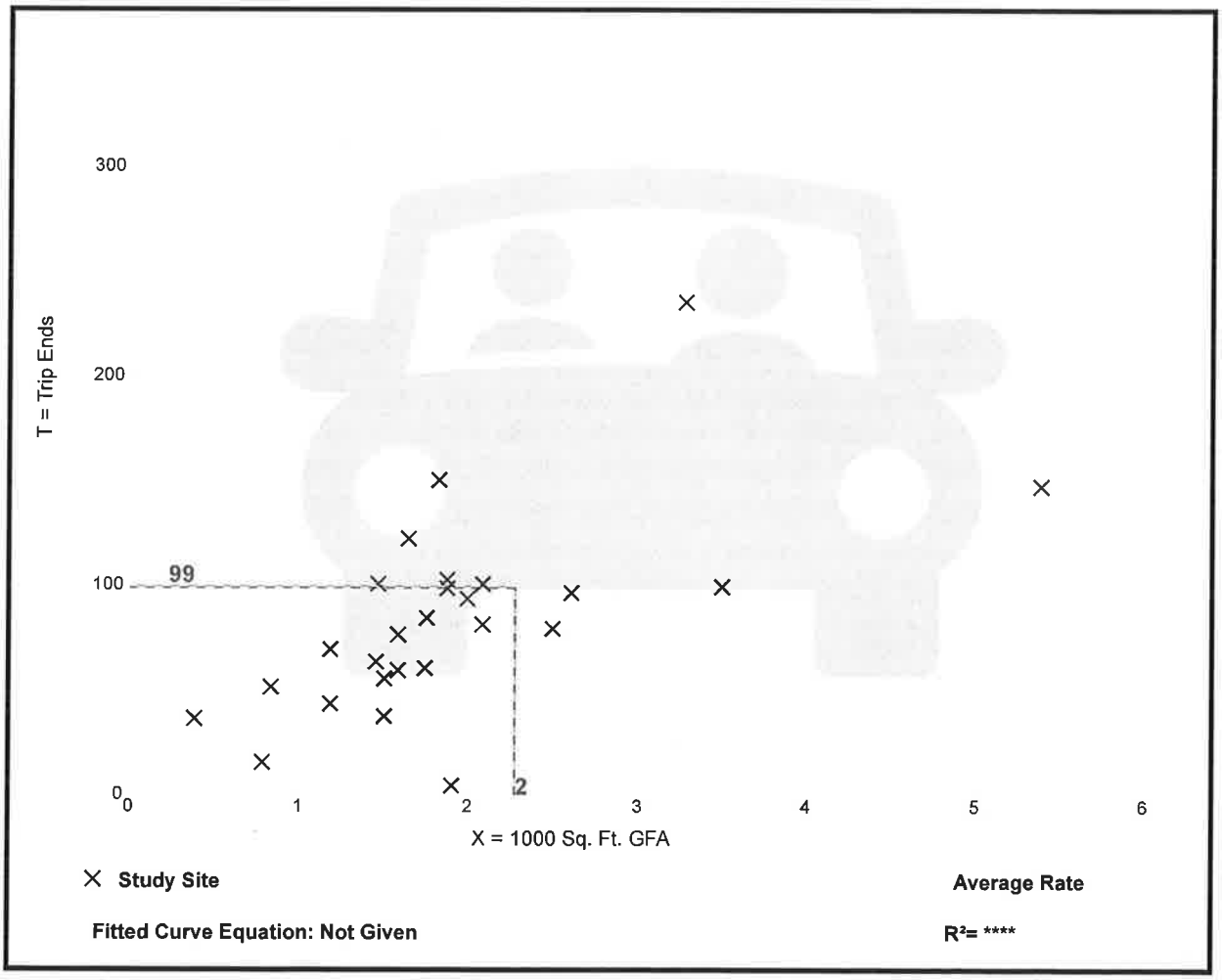


Table E.31 Pass-By and Non-Pass-By Trips Weekday, AM Peak Period Land Use Code 934—Fast-Food Restaurant with Drive-Through Window

SEATS	SIZE (1,000 SQ. FT. GFA)	LOCATION	WEEKDAY SURVEY DATE	NO. OF INTERVIEWS	TIME PERIOD	PASS-BY TRIP (%)	NON-PASS-BY TRIPS (%)			ADJ. STREET PEAK HOUR VOLUME	SOURCE
							PRIMARY	DIVERTED	TOTAL		
—	<5	Chicago suburbs, IL	1987	84	7:00–9:00 a.m.	44	—	—	56	—	Kenig, O'Hare, Humes, Fleck
88	1.4	Louisville area, KY	1993	—	7:00–9:00 a.m.	62	22	16	38	1,407	Barton-Aschman Assoc.
100	3.6	Louisville, KY	1993	—	7:00–9:00 a.m.	32	47	21	68	437	Barton-Aschman Assoc.
97	4.2	New Albany, IN	1993	—	7:00–9:00 a.m.	46	23	31	54	1,049	Barton-Aschman Assoc.
180	3.0	Louisville area, KY	1993	—	7:00–9:00 a.m.	43	14	43	57	2,903	Barton-Aschman Assoc.
—	3.3	varies	1988	—	6:00–9:00 a.m.	68	—	—	32	—	Oracle Engineering

Average Pass-By Trip Percentage: 49
"—" means no data were provided

Table E.32 Pass-By and Non-Pass-By Trips Weekday, PM Peak Period Land Use Code 934—Fast-Food Restaurant with Drive-Through Window

SEATS	SIZE (1,000 SQ. FT. GFA)	LOCATION	WEEKDAY SURVEY DATE	NO. OF INTERVIEWS	TIME PERIOD	PASS-BY TRIP (%)	NON-PASS-BY TRIPS (%)			ADJ. STREET PEAK HOUR VOLUME	SOURCE
							PRIMARY	DIVERTED	TOTAL		
—	~2.6	Minn-St. Paul, MN	1987	50	3:00–7:00 p.m.	25	27	48	75	—	—
—	<5.0	Chicago suburbs, IL	1987	80	3:00–6:00 p.m.	38	—	—	62	—	Kenig, O'Hare, Humes, Flock
—	<5.0	Chicago suburbs, IL	1987	100	3:00–6:00 p.m.	56	—	—	46	—	Kenig, O'Hare, Humes, Flock
—	<5.0	Chicago suburbs, IL	1987	159	3:00–6:00 p.m.	56	—	—	44	—	Kenig, O'Hare, Humes, Flock
—	<5.0	Chicago suburbs, IL	1987	225	3:00–6:00 p.m.	48	—	—	52	—	Kenig, O'Hare, Humes, Flock
—	<5.0	Chicago suburbs, IL	1987	88	3:00–6:00 p.m.	35	—	—	65	—	Kenig, O'Hare, Humes, Flock
—	<5.0	Chicago suburbs, IL	1987	84	3:00–6:00 p.m.	44	—	—	56	—	Kenig, O'Hare, Humes, Flock
88	1.3	Louisville area, KY	1993	—	4:00–6:00 p.m.	68	22	10	32	2,055	Barton-Aschman Assoc.
120	1.9	Louisville area, KY	1993	33	4:00–6:00 p.m.	67	24	9	33	2,447	Barton-Aschman Assoc.
87	4.2	New Albany, IN	1993	—	4:00–6:00 p.m.	56	25	19	44	1,832	Barton-Aschman Assoc.
150	3.0	Louisville area, KY	1993	—	4:00–6:00 p.m.	31	31	38	69	4,280	Barton-Aschman Assoc.
—	3.1	Kissimmee, FL	1995	28	2:00–6:00 p.m.	71	—	—	29	—	TPD Inc.
—	3.1	Apopka, FL	1995	29	2:00–6:00 p.m.	38	—	—	62	—	TPD Inc.
—	2.8	Winter Springs, FL	1995	47	2:00–6:00 p.m.	66	—	—	34	—	TPD Inc.
—	4.3	Longwood, FL	1994	304	2:00–6:00 p.m.	62	—	—	38	—	TPD Inc.
—	3.2	Altamonte Springs, FL	1995	202	2:00–6:00 p.m.	40	39	21	60	—	TPD Inc.
—	2.9	Winter Park, FL	1995	271	2:00–6:00 p.m.	41	41	18	59	—	TPD Inc.
—	3.3*	several	1995	varies	4:00–6:00 p.m.	62	—	—	38	—	Oracle Engineering

*Average of several combined studies.
Average Pass-By Trip Percentage: 50
"—" means no data were provided

Table E.33 Pass-By and Non-Pass-By Trips Weekday
Land Use Code 938—Coffee/Donut Shop with Drive-Through Window and No Indoor Seating (Coffee/Espresso Stand)

SIZE (1,000 SQ. FT. GFA)	LOCATION	WEEKDAY SURVEY DATE	NO. OF INTERVIEWS	TIME PERIOD	PASS-BY TRIP (%)	NON-PASS-BY TRIPS (%)			SOURCE
						PRIMARY	DIVERTED	TOTAL	
0.1	Vancouver, WA	Nov. 1997	89	6:00 a.m.–6:00 p.m.	83	—	—	17	Kittelson & Associates Inc.

"—" means no data were provided

Table E.34 Pass-By and Non-Pass-By Trips Weekday
Land Use Code 938—Coffee/Donut Shop with Drive-Through Window and No Indoor Seating (Coffee/Espresso Stand)

EMPLOYEES	LOCATION	WEEKDAY SURVEY DATE	NO. OF INTERVIEWS	TIME PERIOD	PASS-BY TRIP (%)	NON-PASS-BY TRIPS (%)			SOURCE
						PRIMARY	DIVERTED	TOTAL	
1	Vancouver, WA	Nov. 1997	70	6:00 a.m.–6:00 p.m.	83	—	—	17	Kittelson & Associates Inc.
1	Woodburn, OR	Feb. 1998	109	6:00 a.m.–6:00 p.m.	95	—	—	5	Kittelson & Associates Inc.
1	Vancouver, WA	Feb. 1998	83	6:00 a.m.–1:00 p.m.	89	—	—	11	Kittelson & Associates Inc.

Average Pass-By Trip Percentage: 89
"—" means no data were provided

Table E.35 Pass-By and Non-Pass-By Trips Weekday, AM Peak Period
Land Use Code 944—Gasoline/Service Station

SIZE (1,000 SQ. FT. GFA)	VEHICLE FUELING POSITIONS	LOCATION	WEEKDAY SURVEY DATE	NO. OF INTERVIEWS	TIME PERIOD	PASS-BY TRIP (%)	NON-PASS-BY TRIPS (%)			ADJ. STREET PEAK HOUR VOLUME	SOURCE
							PRIMARY	DIVERTED	TOTAL		
2.3	6	Gaithersburg, MD	1992	37	7:00–9:00 a.m.	32	41	27	68	2,080	RBA
2.1	6	Bethesda, MD	1992	26	7:00–9:00 a.m.	58	23	19	42	2,080	RBA
1.7	6	Wheaton, MD	1992	21	7:00–9:00 a.m.	67	14	19	33	900	RBA
2.0	8	Gaithersburg, MD	1992	46	7:00–9:00 a.m.	87	13	0	13	2,235	RBA
1.2	6	Damascus, MD	1992	21	7:00–9:00 a.m.	43	28	29	57	870	RBA
0.3	12	Wheaton, MD	1992	36	7:00–9:00 a.m.	61	8	31	39	3,480	RBA

Average Pass-By Trip Percentage: 58
"—" means no data were provided

Appendix B

Turn Lane Warrants & Sizing

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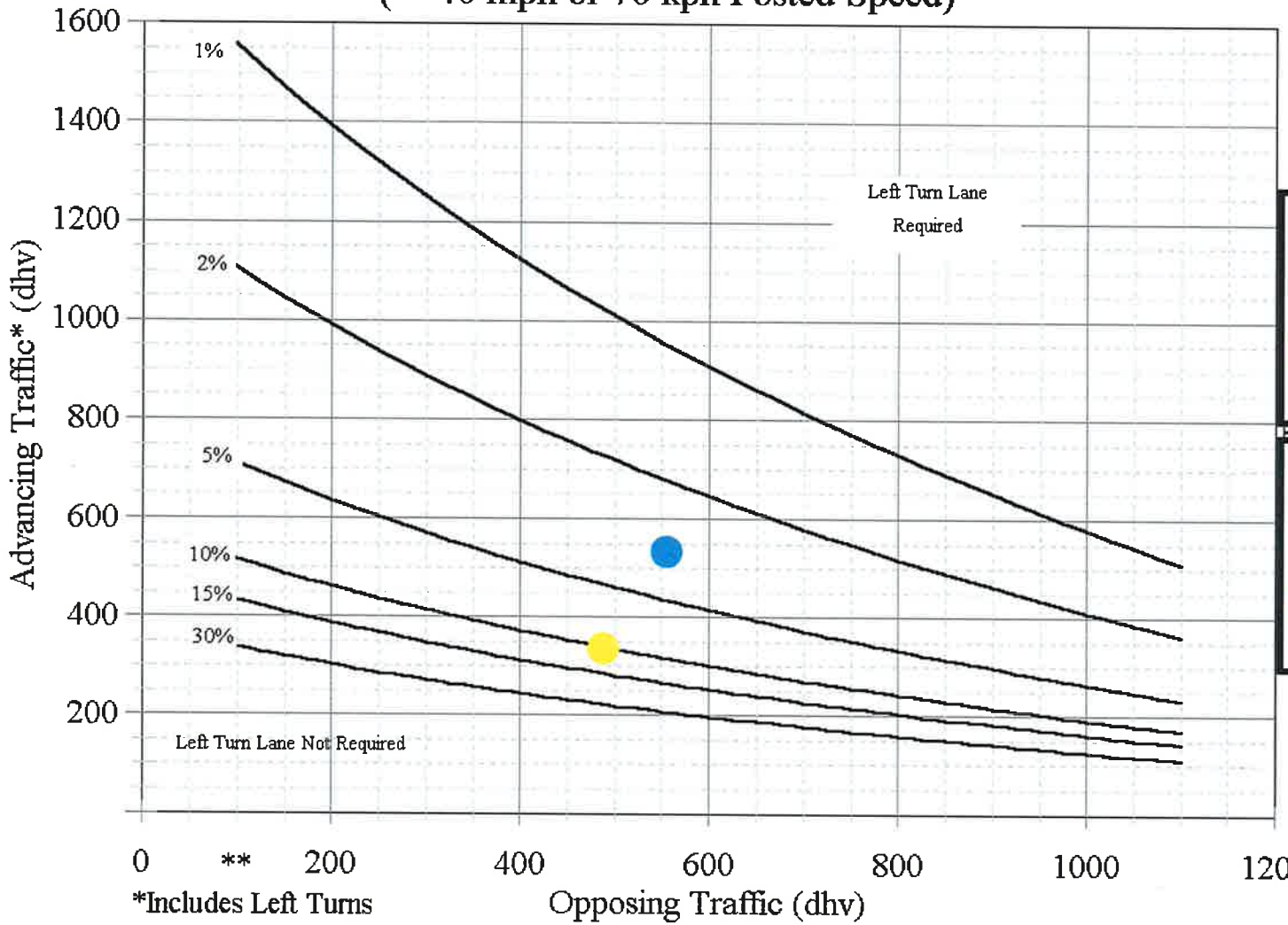
Cherry Street @ West Site Drive
Southbound Left Turn
2-Lane Highway Left Turn Lane Warrant
(=<40 mph or 70 kph Posted Speed)



AM Peak - Build
331 advancing
486 opposing
4.5% left turns
NOT WARRANTED

PM Peak - Build
525 advancing
556 opposing
1.7% left turns
NOT WARRANTED

** There is no minimum number of turns

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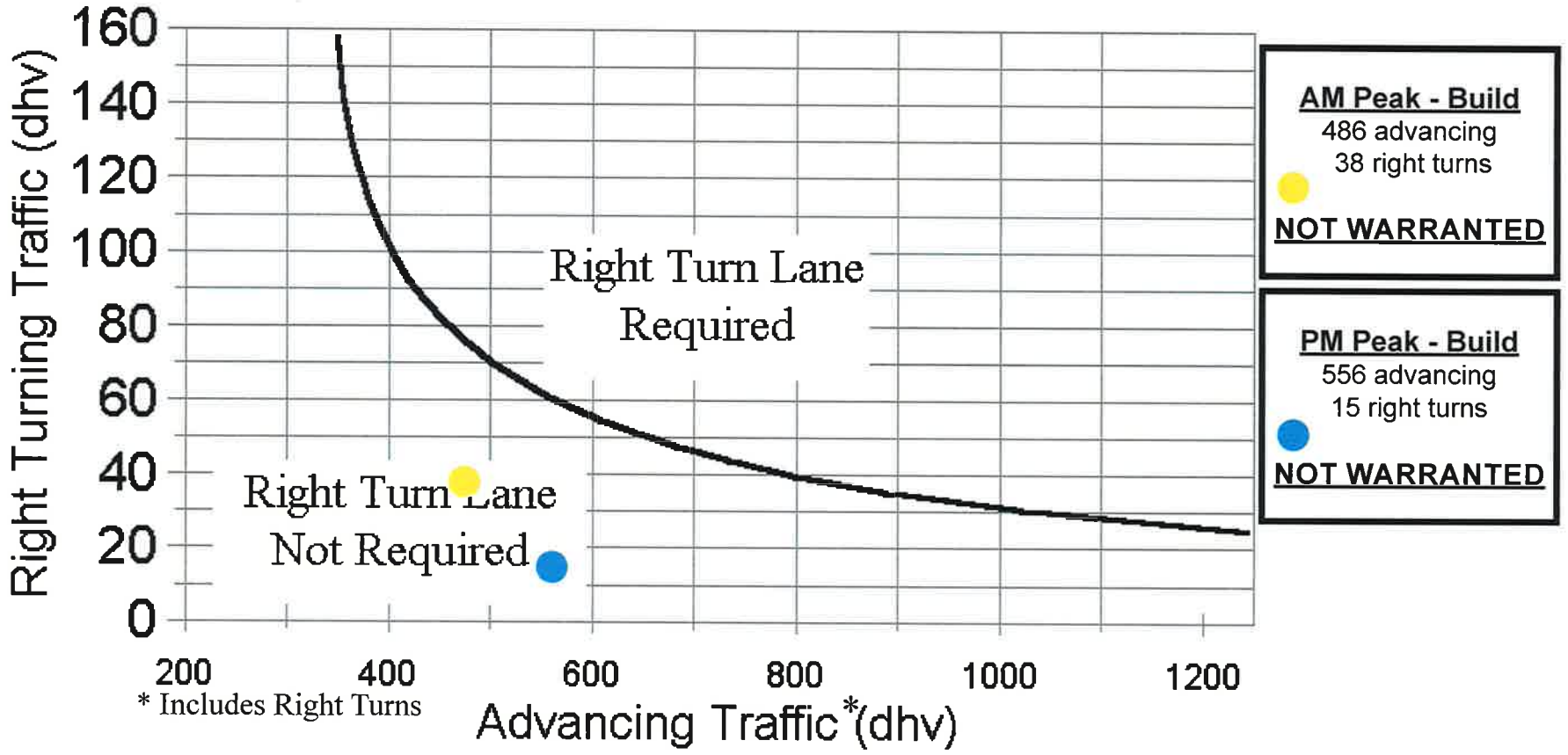
Cherry Street @ West Site Drive
Northbound Right Turn
2-Lane Highway Right Turn Lane Warrant
=< 40 mph or 70 kph Posted Speed



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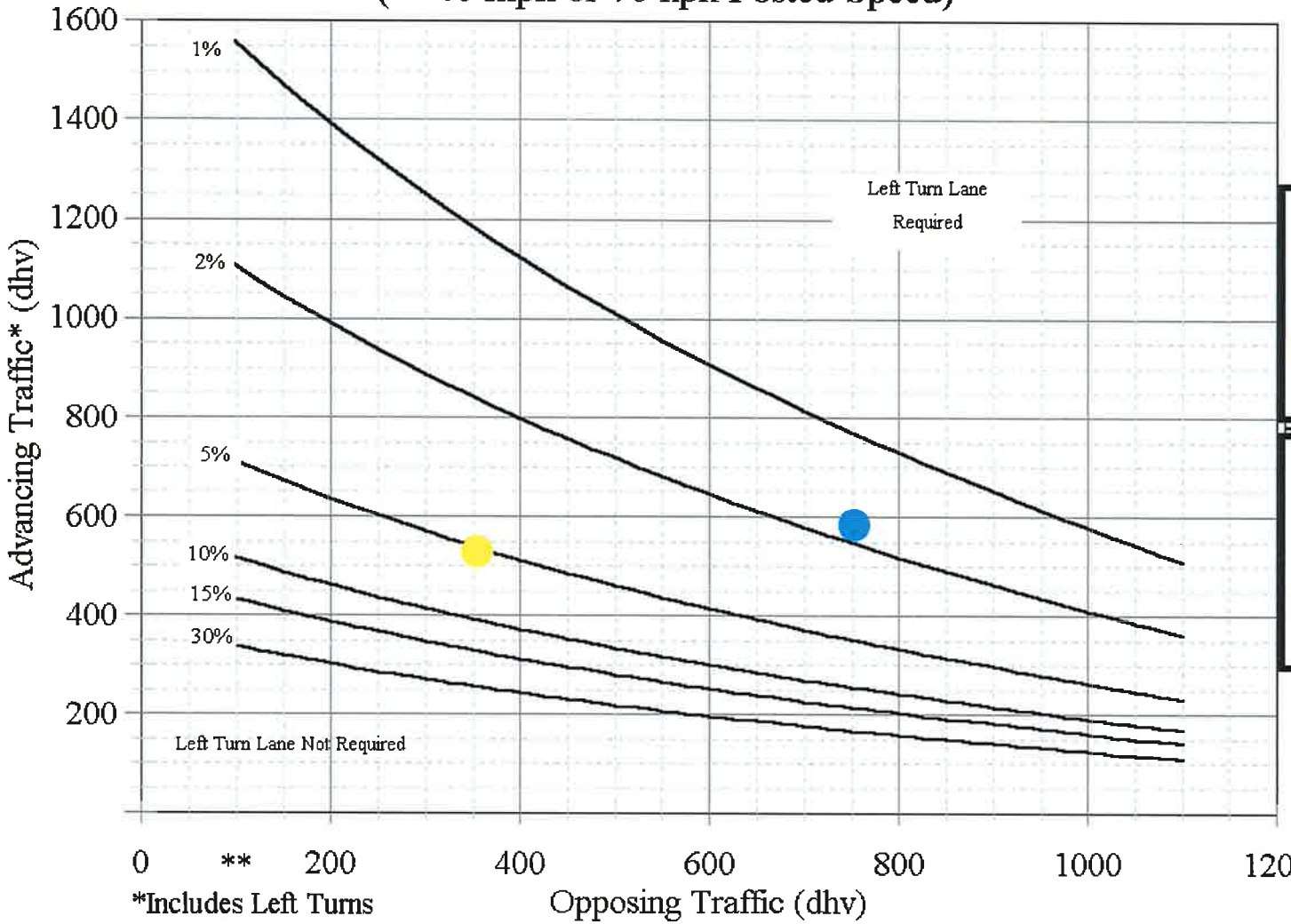
Center Street @ North Site Drive
Westbound Left Turn
2-Lane Highway Left Turn Lane Warrant
(=<40 mph or 70 kph Posted Speed)



AM Peak - Build
526 advancing
356 opposing
7.6% left turns
WARRANTED

PM Peak - Build
587 advancing
752 opposing
3.1% left turns
WARRANTED

** There is no minimum number of turns

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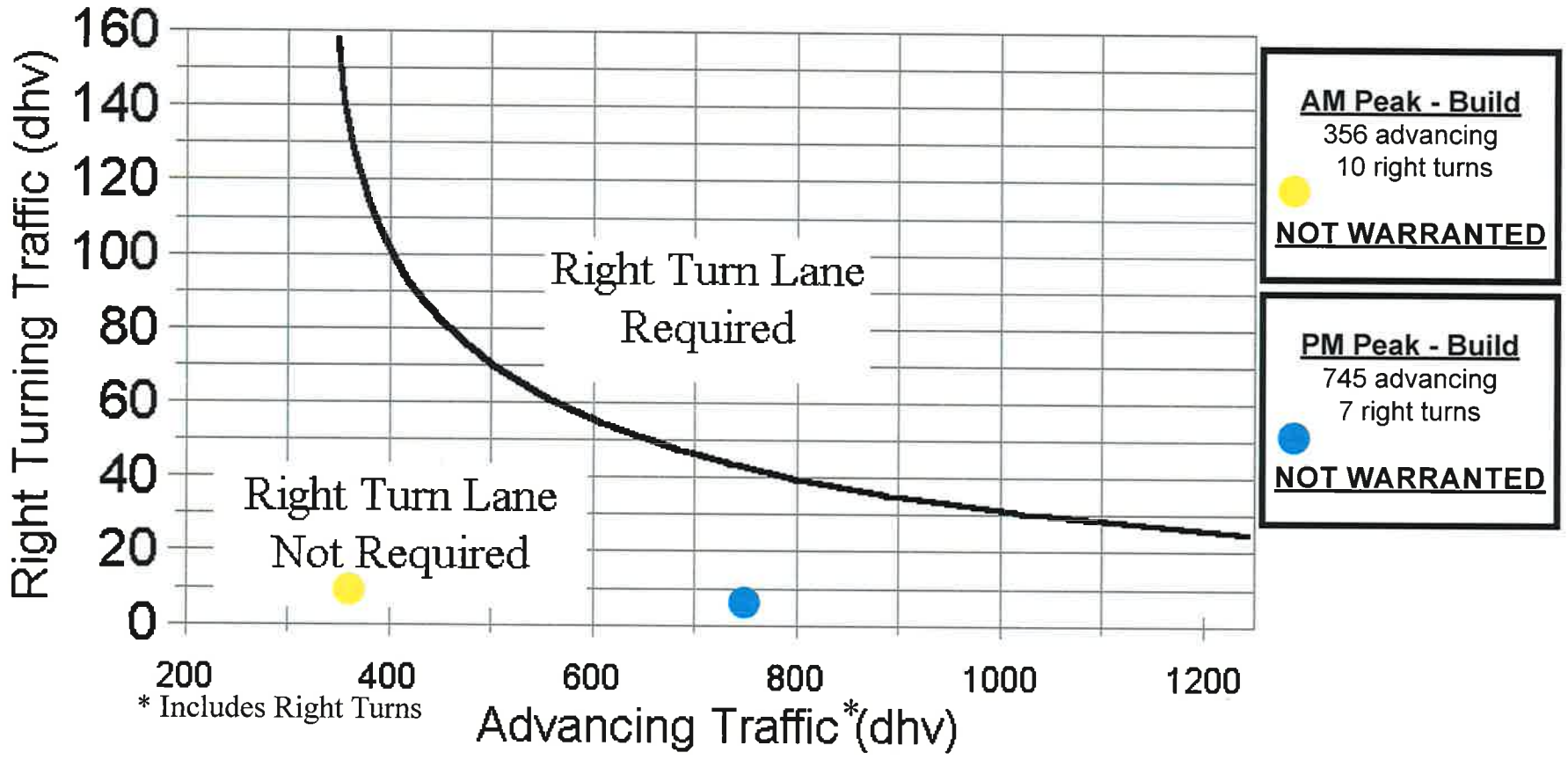
Center Street @ North Site Drive
Eastbound Right Turn
2-Lane Highway Right Turn Lane Warrant
=< 40 mph or 70 kph Posted Speed



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ODOT L&D Manual Turn Lane Sizing Calculation Worksheet

4/17/2020

Center Street - Giant Eagle Drive No-Build

	EBLT AM Peak	WBLT AM Peak	NBLT AM Peak		EBLT PM Peak	WBLT PM Peak	NBLT PM Peak	
Intersection Control	Signal	Signal	Signal		Signal	Signal	Signal	
Design Speed (mph)	35	35	25		35	35	25	
Cycle Length (seconds)	90	90	90		90	90	90	
Number of Turn Lanes	1	1	1		1	1	1	
Turn Lane Volume (vph)	1	15	16		1	60	46	
Approach Volume (vph)	406	614	27		885	653	133	
Volume in Adjacent Thru Lane (vph)	405	599	11		884	593	87	
Turning Percentage	0%	2%	59%		0%	9%	35%	
Vehicles/Cycle	1	1	1		1	2	2	
Taper Length (feet)	50	50	50		50	50	50	
Deceleration Length (feet) (L1 if dual TLs)	0	0	0		0	0	0	
Total Storage Length (feet)	50	50	50		50	100	100	
Total Turn Lane Length (feet)	**100**	**100**	**100**		**100**	**150**	**150**	
No-Block Storage Length (feet)	**400**	**525**	**50**		**775**	**525**	**150**	

Center Street - Giant Eagle Drive Build

	EBLT AM Peak	WBLT AM Peak	NBLT AM Peak		EBLT PM Peak	WBLT PM Peak	NBLT PM Peak	
Intersection Control	Signal	Signal	Signal		Signal	Signal	Signal	
Design Speed (mph)	35	35	25		35	35	25	
Cycle Length (seconds)	90	90	90		90	90	90	
Number of Turn Lanes	1	1	1		1	1	1	
Turn Lane Volume (vph)	1	15	16		1	60	46	
Approach Volume (vph)	417	624	27		890	658	133	
Volume in Adjacent Thru Lane (vph)	405	599	11		884	593	87	
Turning Percentage	0%	2%	59%		0%	9%	35%	
Vehicles/Cycle	1	1	1		1	2	2	
Taper Length (feet)	50	50	50		50	50	50	
Deceleration Length (feet)	0	0	0		0	0	0	
Storage Length (feet)	50	50	50		50	100	100	
Total Turn Lane Length (feet)	**100**	**100**	**100**		**100**	**150**	**150**	
No-Block Storage Length (feet)	**400**	**525**	**50**		**775**	**525**	**150**	

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Center Street - Cherry Avenue No-Build

	EBLT AM Peak	EBRT AM Peak	WBLT AM Peak	NBLT AM Peak	SBLT AM Peak			
Intersection Control	Signal	Signal	Signal	Signal	Signal			
Design Speed (mph)	35	35	35	25	25			
Cycle Length (seconds)	90	90	90	90	90			
Number of Turn Lanes	1	1	1	1	1			
Turn Lane Volume (vph)	6	200	122	288	2			
Approach Volume (vph)	393	393	505	463	14			
Volume in Adjacent Thru Lane (vph)	187	187	383	175	12			
Turning Percentage	2%	51%	24%	62%	14%			
Vehicles/Cycle	1	5	4	8	1			
Taper Length (feet)	50	50	50	50	50			
Deceleration Length (feet) (L1 if dual TLs)	0	0	0	0	0			
Total Storage Length (feet)	50	200	175	325	50			
Total Turn Lane Length (feet)	**100**	**250**	**225**	**375**	**100**			
No-Block Storage Length (feet)	**200**	**200**	**375**	**200**	**50**			

Center Street - Cherry Avenue No-Build

	EBLT PM Peak	EBRT PM Peak	WBLT PM Peak	NBLT PM Peak	SBLT PM Peak			
Intersection Control	Signal	Signal	Signal	Signal	Signal			
Design Speed (mph)	35	35	35	25	25			
Cycle Length (seconds)	90	90	90	90	90			
Number of Turn Lanes	1	1	1	1	1			
Turn Lane Volume (vph)	29	338	137	312	18			
Approach Volume (vph)	909	909	578	547	106			
Volume in Adjacent Thru Lane (vph)	542	542	441	235	88			
Turning Percentage	3%	37%	24%	57%	17%			
Vehicles/Cycle	1	9	4	8	1			
Taper Length (feet)	50	50	50	50	50			
Deceleration Length (feet)	0	0	0	0	0			
Storage Length (feet)	50	350	175	325	50			
Total Turn Lane Length (feet)	**100**	**400**	**225**	**375**	**100**			
No-Block Storage Length (feet)	**500**	**500**	**450**	**250**	**150**			

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Center Street - Cherry Avenue Build

	EBLT AM Peak	EBRT AM Peak	WBLT AM Peak	NBLT AM Peak	SBLT AM Peak			
Intersection Control	Signal	Signal	Signal	Signal	Signal			
Design Speed (mph)	35	35	35	25	25			
Cycle Length (seconds)	90	90	90	90	90			
Number of Turn Lanes	1	1	1	1	1			
Turn Lane Volume (vph)	6	208	117	312	2			
Approach Volume (vph)	404	404	486	487	14			
Volume in Adjacent Thru Lane (vph)	190	190	369	175	12			
Turning Percentage	1%	51%	24%	64%	14%			
Vehicles/Cycle	1	6	3	8	1			
Taper Length (feet)	50	50	50	50	50			
Deceleration Length (feet) (L1 if dual TLs)	0	0	0	0	0			
Total Storage Length (feet)	50	250	150	325	50			
Total Turn Lane Length (feet)	**100**	**300**	**200**	**375**	**100**			
No-Block Storage Length (feet)	**200**	**200**	**375**	**200**	**50**			

Center Street - Cherry Avenue Build

	EBLT PM Peak	EBRT PM Peak	WBLT PM Peak	NBLT PM Peak	SBLT PM Peak			
Intersection Control	Signal	Signal	Signal	Signal	Signal			
Design Speed (mph)	35	35	35	25	25			
Cycle Length (seconds)	90	90	90	90	90			
Number of Turn Lanes	1	1	1	1	1			
Turn Lane Volume (vph)	29	343	135	323	18			
Approach Volume (vph)	914	914	570	558	106			
Volume in Adjacent Thru Lane (vph)	542	542	435	235	88			
Turning Percentage	3%	38%	24%	58%	17%			
Vehicles/Cycle	1	9	4	9	1			
Taper Length (feet)	50	50	50	50	50			
Deceleration Length (feet)	0	0	0	0	0			
Storage Length (feet)	50	350	175	350	50			
Total Turn Lane Length (feet)	**100**	**400**	**225**	**400**	**100**			
No-Block Storage Length (feet)	**500**	**500**	**400**	**250**	**150**			

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Center Street - North Site Drive - Build

	WBLT AM Peak		WBLT PM Peak					
Intersection Control	Stop		Stop					
Design Speed (mph)	35		35					
Cycle Length (seconds)	60		60					
Number of Turn Lanes	1		1					
Turn Lane Volume (vph)	40		18					
Approach Volume (vph)	526		587					
Volume in Adjacent Thru Lane (vph)	486		569					
Turning Percentage	8%		3%					
Vehicles/Cycle	1		1					
Taper Length (feet)	50		50					
Deceleration Length (feet) (L1 if dual TLs)	0		0					
Total Storage Length (feet)	50		50					
Total Turn Lane Length (feet)	**100**		**100**					
No-Block Storage Length (feet)	**N/A**		**N/A**					

Center Street - North Site Drive - Build

Intersection Control								
Design Speed (mph)								
Cycle Length (seconds)								
Number of Turn Lanes								
Turn Lane Volume (vph)								
Approach Volume (vph)								
Volume in Adjacent Thru Lane (vph)								
Turning Percentage								
Vehicles/Cycle								
Taper Length (feet)								
Deceleration Length (feet)								
Storage Length (feet)								
Total Turn Lane Length (feet)								
No-Block Storage Length (feet)								

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Center Street -Washington Avenue - No-Build

	EBLT AM Peak	WBLT AM Peak		EBLT PM Peak	WBLT PM Peak			
Intersection Control	Signal	Signal		Signal	Signal			
Design Speed (mph)	35	35		35	35			
Cycle Length (seconds)	90	90		90	90			
Number of Turn Lanes	1	1		1	1			
Turn Lane Volume (vph)	128	31		111	34			
Approach Volume (vph)	353	392		775	418			
Volume in Adjacent Thru Lane (vph)	225	361		664	384			
Turning Percentage	36%	8%		14%	8%			
Vehicles/Cycle	4	1		3	1			
Taper Length (feet)	50	50		50	50			
Deceleration Length (feet) (L1 if dual TLs)	0	0		0	0			
Total Storage Length (feet)	175	50		150	50			
Total Turn Lane Length (feet)	**225**	**100**		**200**	**100**			
No-Block Storage Length (feet)	**250**	**375**		**600**	**375**			

Center Street -Washington Avenue - Build

	EBLT AM Peak	WBLT AM Peak		EBLT PM Peak	WBLT PM Peak			
Intersection Control	Signal	Signal		Signal	Signal			
Design Speed (mph)	35	35		35	35			
Cycle Length (seconds)	90	90		90	90			
Number of Turn Lanes	1	1		1	1			
Turn Lane Volume (vph)	128	31		111	34			
Approach Volume (vph)	373	413		785	428			
Volume in Adjacent Thru Lane (vph)	245	382		674	394			
Turning Percentage	34%	8%		14%	8%			
Vehicles/Cycle	4	1		3	1			
Taper Length (feet)	50	50		50	50			
Deceleration Length (feet)	0	0		0	0			
Storage Length (feet)	175	50		150	50			
Total Turn Lane Length (feet)	**225**	**100**		**200**	**100**			
No-Block Storage Length (feet)	**275**	**375**		**600**	**375**			

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ODOT L&D Manual Turn Lane Sizing Calculation Worksheet

4/17/2020

Water Street - Cherry Avenue - No-Build

	EBLT AM Peak	EBRT AM Peak	WBLT AM Peak	NBLT AM Peak	SBLT AM Peak			
Intersection Control	Signal	Signal	Signal	Signal	Signal			
Design Speed (mph)	25	25	25	25	25			
Cycle Length (seconds)	90	90	90	90	90			
Number of Turn Lanes	1	1	1	1	1			
Turn Lane Volume (vph)	35	21	172	59	104			
Approach Volume (vph)	191	191	684	454	319			
Volume in Adjacent Thru Lane (vph)	135	135	512	395	215			
Turning Percentage	18%	11%	25%	13%	33%			
Vehicles/Cycle	1	1	5	2	3			
Taper Length (feet)	50	50	50	50	50			
Deceleration Length (feet) (L1 if dual TLs)	0	0	0	0	0			
Total Storage Length (feet)	50	50	200	100	150			
Total Turn Lane Length (feet)	**100**	**100**	**250**	**150**	**200**			
No-Block Storage Length (feet)	**175**	**175**	**475**	**375**	**250**			

Water Street - Cherry Avenue - No-Build

	EBLT PM Peak	EBRT PM Peak	WBLT PM Peak	NBLT PM Peak	SBLT PM Peak			
Intersection Control	Signal	Signal	Signal	Signal	Signal			
Design Speed (mph)	25	25	25	25	25			
Cycle Length (seconds)	90	90	90	90	90			
Number of Turn Lanes	1	1	1	1	1			
Turn Lane Volume (vph)	85	113	170	89	204			
Approach Volume (vph)	598	598	649	543	528			
Volume in Adjacent Thru Lane (vph)	400	400	479	454	324			
Turning Percentage	14%	19%	26%	16%	39%			
Vehicles/Cycle	3	3	5	3	6			
Taper Length (feet)	50	50	50	50	50			
Deceleration Length (feet)	0	0	0	0	0			
Storage Length (feet)	150	150	200	150	250			
Total Turn Lane Length (feet)	**200**	**200**	**250**	**200**	**300**			
No-Block Storage Length (feet)	**375**	**375**	**450**	**450**	**350**			

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ODOT L&D Manual Turn Lane Sizing Calculation Worksheet

4/17/2020

Water Street - Cherry Avenue - Build

	EBLT AM Peak	EBRT AM Peak	WBLT AM Peak	NBLT AM Peak	SBLT AM Peak			
Intersection Control	Signal	Signal	Signal	Signal	Signal			
Design Speed (mph)	25	25	25	25	25			
Cycle Length (seconds)	90	90	90	90	90			
Number of Turn Lanes	1	1	1	1	1			
Turn Lane Volume (vph)	40	21	172	59	112			
Approach Volume (vph)	196	196	692	462	339			
Volume in Adjacent Thru Lane (vph)	135	135	520	403	227			
Turning Percentage	20%	11%	25%	13%	33%			
Vehicles/Cycle	1	1	5	2	3			
Taper Length (feet)	50	50	50	50	50			
Deceleration Length (feet) (L1 if dual TLs)	0	0	0	0	0			
Total Storage Length (feet)	50	50	200	100	150			
Total Turn Lane Length (feet)	**100**	**100**	**250**	**150**	**200**			
No-Block Storage Length (feet)	**175**	**175**	**475**	**400**	**250**			

Water Street - Cherry Avenue - Build

	EBLT PM Peak	EBRT PM Peak	WBLT PM Peak	NBLT PM Peak	SBLT PM Peak			
Intersection Control	Signal	Signal	Signal	Signal	Signal			
Design Speed (mph)	25	25	25	25	25			
Cycle Length (seconds)	90	90	90	90	90			
Number of Turn Lanes	1	1	1	1	1			
Turn Lane Volume (vph)	86	113	170	89	208			
Approach Volume (vph)	599	599	653	547	538			
Volume in Adjacent Thru Lane (vph)	400	400	483	458	330			
Turning Percentage	14%	19%	26%	16%	39%			
Vehicles/Cycle	3	3	5	3	6			
Taper Length (feet)	50	50	50	50	50			
Deceleration Length (feet)	0	0	0	0	0			
Storage Length (feet)	150	150	200	150	250			
Total Turn Lane Length (feet)	**200**	**200**	**250**	**200**	**300**			
No-Block Storage Length (feet)	**375**	**375**	**475**	**450**	**350**			

Appendix C

Synchro Reports

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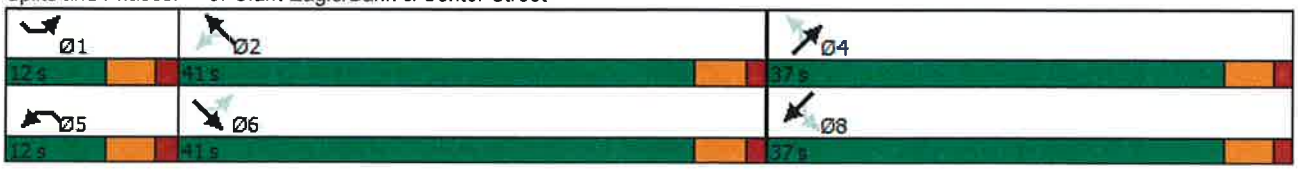
Lane Group	SEL	SET	NWL	NWT	NEL	NET	SWL	SWT
Lane Configurations								
Traffic Volume (vph)	1	388	15	597	16	1	1	1
Future Volume (vph)	1	388	15	597	16	1	1	1
Turn Type	pm+pt	NA	pm+pt	NA	Perm	NA	Perm	NA
Protected Phases	1	6	5	2		4		8
Permitted Phases	6		2		4		8	
Detector Phase	1	6	5	2	4	4	8	8
Switch Phase								
Minimum Initial (s)	7.0	10.0	7.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	12.0	23.0	12.0	23.0	23.0	23.0	23.0	23.0
Total Split (s)	12.0	41.0	12.0	41.0	37.0	37.0	37.0	37.0
Total Split (%)	13.3%	45.6%	13.3%	45.6%	41.1%	41.1%	41.1%	41.1%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0		0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0		5.0
Lead/Lag	Lead	Lag	Lead	Lag				
Lead-Lag Optimize?								
Recall Mode	None	Min	None	Min	None	None	None	None
Act Effct Green (s)	33.4	36.6	33.4	36.6	11.1	11.1		11.1
Actuated g/C Ratio	0.76	0.83	0.76	0.83	0.25	0.25		0.25
v/c Ratio	0.00	0.28	0.02	0.42	0.04	0.03		0.01
Control Delay	3.0	5.1	2.9	6.3	20.8	13.7		20.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0		0.0
Total Delay	3.0	5.1	2.9	6.3	20.8	13.7		20.0
LOS	A	A	A	A	C	B		B
Approach Delay		5.1		6.3		17.7		20.0
Approach LOS		A		A		B		B

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 43.9
Natural Cycle: 65
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.42
Intersection Signal Delay: 6.2 — Intersection LOS: A
Intersection Capacity Utilization 48.2% — ICU Level of Service A
Analysis Period (min) 15

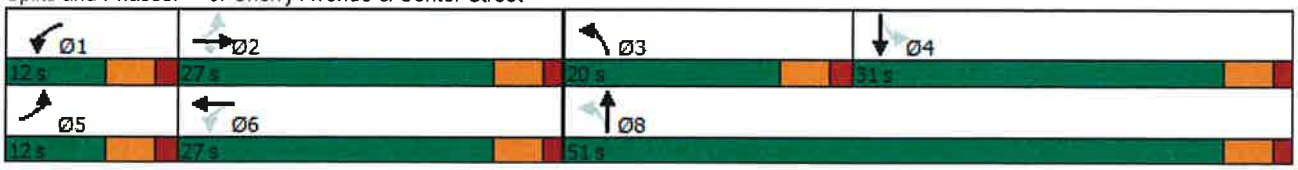
Splits and Phases: 3: Giant Eagle/Bank & Center Street



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	6	187	200	122	366	288	13	2	6
Future Volume (vph)	6	187	200	122	366	288	13	2	6
Turn Type	pm+pt	NA	Perm	pm+pt	NA	pm+pt	NA	Perm	NA
Protected Phases	5	2		1	6	3	8		4
Permitted Phases	2		2	6		8		4	
Detector Phase	5	2	2	1	6	3	8	4	4
Switch Phase									
Minimum Initial (s)	7.0	10.0	10.0	7.0	10.0	7.0	10.0	10.0	10.0
Minimum Split (s)	12.0	23.0	23.0	12.0	23.0	12.0	23.0	23.0	23.0
Total Split (s)	12.0	27.0	27.0	12.0	27.0	20.0	51.0	31.0	31.0
Total Split (%)	13.3%	30.0%	30.0%	13.3%	30.0%	22.2%	56.7%	34.4%	34.4%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lead		Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes
Recall Mode	None	Max	Max	None	Max	None	None	None	None
Act Effct Green (s)	28.0	22.7	22.7	31.0	29.9	16.0	16.0	10.3	10.3
Actuated g/C Ratio	0.48	0.39	0.39	0.53	0.51	0.28	0.28	0.18	0.18
v/c Ratio	0.01	0.28	0.29	0.21	0.44	0.68	0.33	0.01	0.05
Control Delay	8.7	16.7	4.2	9.0	14.4	26.9	5.4	25.0	19.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	8.7	16.7	4.2	9.0	14.4	26.9	5.4	25.0	19.5
LOS	A	B	A	A	B	C	A	C	B
Approach Delay		10.2			13.1		18.8		20.2
Approach LOS		B			B		B		C

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 58.1	
Natural Cycle: 70	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.68	
Intersection Signal Delay: 14.3	Intersection LOS: B
Intersection Capacity Utilization 61.2%	ICU Level of Service B
Analysis Period (min) 15	

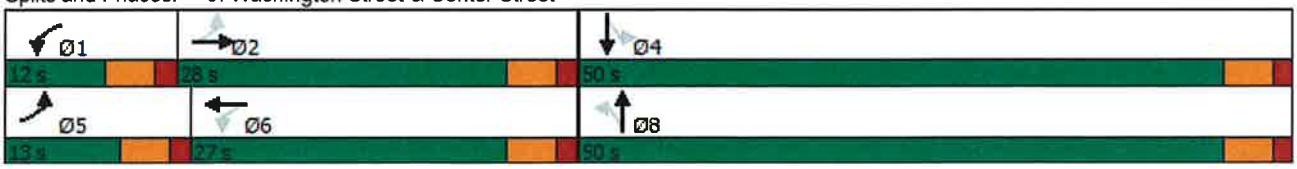
Splits and Phases: 6: Cherry Avenue & Center Street



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	128	181	31	346	88	133	62	98
Future Volume (vph)	128	181	31	346	88	133	62	98
Turn Type	pm+pt	NA	pm+pt	NA	Perm	NA	Perm	NA
Protected Phases	5	2	1	6		8		4
Permitted Phases	2		6		8		4	
Detector Phase	5	2	1	6	8	8	4	4
Switch Phase								
Minimum Initial (s)	7.0	10.0	7.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	12.0	23.0	12.0	23.0	23.0	23.0	23.0	23.0
Total Split (s)	13.0	28.0	12.0	27.0	50.0	50.0	50.0	50.0
Total Split (%)	14.4%	31.1%	13.3%	30.0%	55.6%	55.6%	55.6%	55.6%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0		0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0		5.0		5.0
Lead/Lag	Lead	Lag	Lead	Lag				
Lead-Lag Optimize?	Yes	Yes	Yes	Yes				
Recall Mode	None	Max	None	Max	None	None	None	None
Act Effct Green (s)	31.1	28.2	28.1	22.8		15.7		15.7
Actuated g/C Ratio	0.53	0.48	0.48	0.39		0.27		0.27
v/c Ratio	0.27	0.28	0.05	0.54		0.68		0.49
Control Delay	8.8	12.7	7.6	19.9		28.1		22.6
Queue Delay	0.0	0.0	0.0	0.0		0.0		0.0
Total Delay	8.8	12.7	7.6	19.9		28.1		22.6
LOS	A	B	A	B		C		C
Approach Delay		11.3		18.9		28.1		22.6
Approach LOS		B		B		C		C

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 58.5	
Natural Cycle: 60	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.68	
Intersection Signal Delay: 19.2	Intersection LOS: B
Intersection Capacity Utilization 56.8%	ICU Level of Service B
Analysis Period (min) 15	

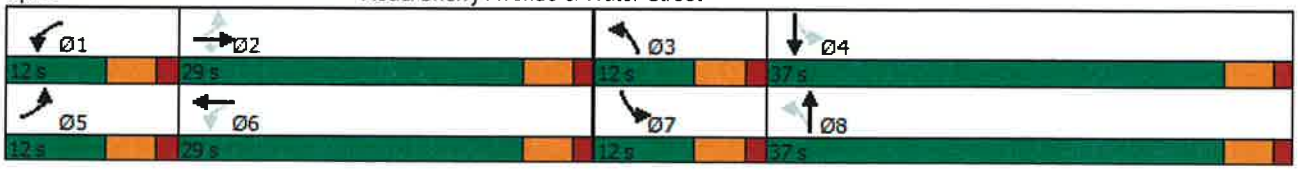
Splits and Phases: 9: Washington Street & Center Street



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	35	135	21	172	303	59	221	104	172
Future Volume (vph)	35	135	21	172	303	59	221	104	172
Turn Type	pm+pt	NA	Perm	pm+pt	NA	pm+pt	NA	pm+pt	NA
Protected Phases	5	2		1	6	3	8	7	4
Permitted Phases	2		2	6		8		4	
Detector Phase	5	2	2	1	6	3 8	8	4 7	4
Switch Phase									
Minimum Initial (s)	7.0	10.0	10.0	7.0	10.0	7.0	10.0	7.0	10.0
Minimum Split (s)	12.0	23.0	23.0	12.0	23.0	12.0	23.0	12.0	23.0
Total Split (s)	12.0	29.0	29.0	12.0	29.0	12.0	37.0	12.0	37.0
Total Split (%)	13.3%	32.2%	32.2%	13.3%	32.2%	13.3%	41.1%	13.3%	41.1%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	Max	Max	None	Max	None	None	None	None
Act Effct Green (s)	31.7	24.6	24.6	34.1	30.3	27.7	22.4	27.7	22.4
Actuated g/C Ratio	0.40	0.31	0.31	0.43	0.39	0.35	0.28	0.35	0.28
v/c Ratio	0.14	0.25	0.04	0.35	0.80	0.16	0.81	0.44	0.44
Control Delay	16.4	25.0	0.1	18.3	36.9	14.0	35.7	19.1	24.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	16.4	25.0	0.1	18.3	36.9	14.0	35.7	19.1	24.1
LOS	B	C	A	B	D	B	D	B	C
Approach Delay		20.7			32.2		32.9		22.5
Approach LOS		C			C		C		C

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 78.6	
Natural Cycle: 80	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.81	
Intersection Signal Delay: 29.2	Intersection LOS: C
Intersection Capacity Utilization 79.3%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 12: Wilson Mills Road/Cherry Avenue & Water Street



Lane Group	SEL	SET	NWL	NWT	NEL	NET	SWL	SWT
Lane Configurations								
Traffic Volume (vph)	1	777	60	589	46	1	6	1
Future Volume (vph)	1	777	60	589	46	1	6	1
Turn Type	pm+pt	NA	pm+pt	NA	Perm	NA	Perm	NA
Protected Phases	1	6	5	2		4		8
Permitted Phases	6		2		4		8	
Detector Phase	1	6	5	2	4	4	8	8
Switch Phase								
Minimum Initial (s)	7.0	10.0	7.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	12.0	23.0	12.0	23.0	23.0	23.0	23.0	23.0
Total Split (s)	12.0	40.0	12.0	40.0	38.0	38.0	38.0	38.0
Total Split (%)	13.3%	44.4%	13.3%	44.4%	42.2%	42.2%	42.2%	42.2%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0		0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0		5.0
Lead/Lag	Lead	Lag	Lead	Lag				
Lead-Lag Optimize?								
Recall Mode	None	Min	None	Min	None	None	None	None
Act Effct Green (s)	43.5	40.7	45.4	45.2	10.1	10.1		10.1
Actuated g/C Ratio	0.69	0.65	0.72	0.72	0.16	0.16		0.16
v/c Ratio	0.00	0.81	0.20	0.48	0.22	0.29		0.04
Control Delay	3.0	22.1	4.9	8.2	27.7	9.3		23.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0		0.0
Total Delay	3.0	22.1	4.9	8.2	27.7	9.3		23.0
LOS	A	C	A	A	C	A		C
Approach Delay		22.0		7.9		15.6		23.0
Approach LOS		C		A		B		C

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 63.1	
Natural Cycle: 90	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.81	
Intersection Signal Delay: 16.1	Intersection LOS: B
Intersection Capacity Utilization 66.5%	ICU Level of Service C
Analysis Period (min) 15	

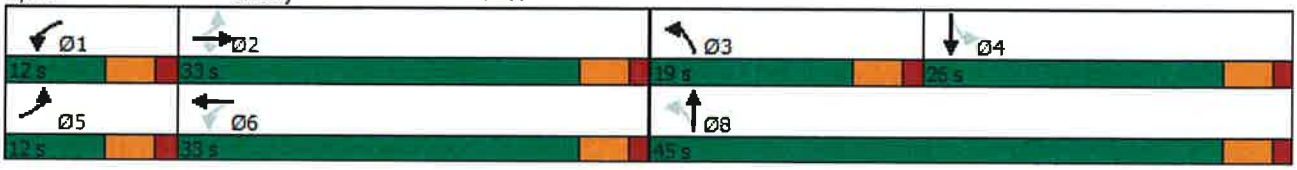
Splits and Phases: 3: Giant Eagle/Bank & Center Street

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	29	542	338	137	410	312	43	18	48
Future Volume (vph)	29	542	338	137	410	312	43	18	48
Turn Type	pm+pt	NA	Perm	pm+pt	NA	pm+pt	NA	Perm	NA
Protected Phases	5	2		1	6	3	8		4
Permitted Phases	2		2	6		8		4	
Detector Phase	5	2	2	1	6	3	8	4	4
Switch Phase									
Minimum Initial (s)	7.0	10.0	10.0	7.0	10.0	7.0	10.0	10.0	10.0
Minimum Split (s)	12.0	23.0	23.0	12.0	23.0	12.0	23.0	23.0	23.0
Total Split (s)	12.0	33.0	33.0	12.0	33.0	19.0	45.0	26.0	26.0
Total Split (%)	13.3%	36.7%	36.7%	13.3%	36.7%	21.1%	50.0%	28.9%	28.9%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lead		Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes
Recall Mode	None	Max	Max	None	Max	None	None	None	None
Act Effct Green (s)	35.4	28.3	28.3	38.5	35.9	25.3	25.3	10.4	10.4
Actuated g/C Ratio	0.47	0.37	0.37	0.51	0.47	0.33	0.33	0.14	0.14
v/c Ratio	0.07	0.85	0.45	0.52	0.55	0.77	0.37	0.13	0.35
Control Delay	10.7	37.3	4.2	17.8	20.8	33.7	6.2	32.8	23.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.7	37.3	4.2	17.8	20.8	33.7	6.2	32.8	23.4
LOS	B	D	A	B	C	C	A	C	C
Approach Delay		24.1			20.1		21.9		25.0
Approach LOS		C			C		C		C

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 75.8
Natural Cycle: 80
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.85
Intersection Signal Delay: 22.5 — Intersection LOS: C
Intersection Capacity Utilization 72.6% — ICU Level of Service C
Analysis Period (min) 15

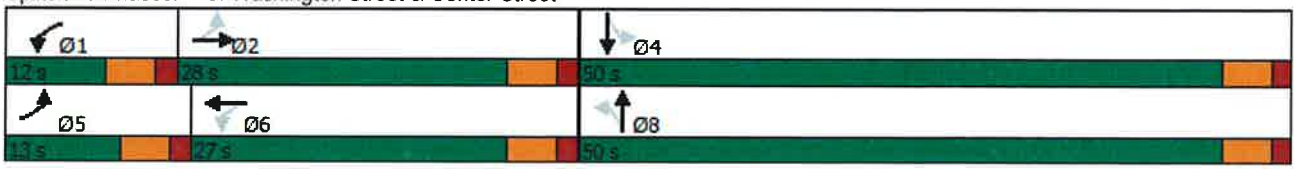
Splits and Phases: 6: Cherry Avenue & Center Street



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	111	592	34	368	104	100	15	111
Future Volume (vph)	111	592	34	368	104	100	15	111
Turn Type	pm+pt	NA	pm+pt	NA	Perm	NA	Perm	NA
Protected Phases	5	2	1	6		8		4
Permitted Phases	2		6		8		4	
Detector Phase	5	2	1	6	8	8	4	4
Switch Phase								
Minimum Initial (s)	7.0	10.0	7.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	12.0	23.0	12.0	23.0	23.0	23.0	23.0	23.0
Total Split (s)	13.0	28.0	12.0	27.0	50.0	50.0	50.0	50.0
Total Split (%)	14.4%	31.1%	13.3%	30.0%	55.6%	55.6%	55.6%	55.6%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0		0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0		5.0		5.0
Lead/Lag	Lead	Lag	Lead	Lag				
Lead-Lag Optimize?	Yes	Yes	Yes	Yes				
Recall Mode	None	Max	None	Max	None	None	None	None
Act Effct Green (s)	31.0	28.2	28.1	22.8		15.7		15.7
Actuated g/C Ratio	0.53	0.48	0.48	0.39		0.27		0.27
v/c Ratio	0.25	0.81	0.11	0.58		0.74		0.47
Control Delay	8.6	27.9	8.1	20.6		32.7		17.1
Queue Delay	0.0	0.0	0.0	0.0		0.0		0.0
Total Delay	8.6	27.9	8.1	20.6		32.7		17.1
LOS	A	C	A	C		C		B
Approach Delay		25.2		19.6		32.7		17.1
Approach LOS		C		B		C		B

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 58.4	
Natural Cycle: 70	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.81	
Intersection Signal Delay: 23.8	Intersection LOS: C
Intersection Capacity Utilization 83.5%	ICU Level of Service E
Analysis Period (min) 15	

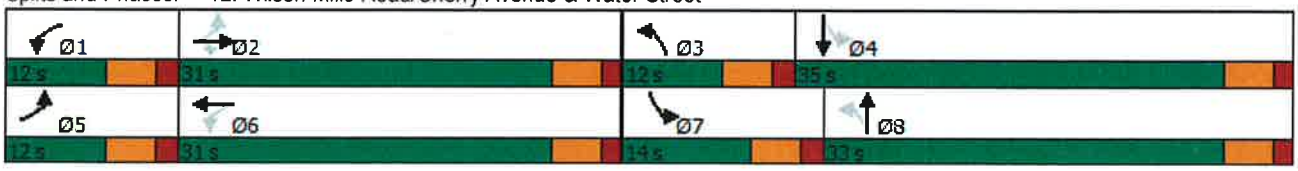
Splits and Phases: 9: Washington Street & Center Street



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	85	400	113	170	294	89	261	204	262
Future Volume (vph)	85	400	113	170	294	89	261	204	262
Turn Type	pm+pt	NA	Perm	pm+pt	NA	pm+pt	NA	pm+pt	NA
Protected Phases	5	2		1	6	3	8	7	4
Permitted Phases	2		2	6		8		4	
Detector Phase	5	2	2	1	6	3 8	8	4 7	4
Switch Phase									
Minimum Initial (s)	7.0	10.0	10.0	7.0	10.0	7.0	10.0	7.0	10.0
Minimum Split (s)	12.0	23.0	23.0	12.0	23.0	12.0	23.0	12.0	23.0
Total Split (s)	12.0	31.0	31.0	12.0	31.0	12.0	33.0	14.0	35.0
Total Split (%)	13.3%	34.4%	34.4%	13.3%	34.4%	13.3%	36.7%	15.6%	38.9%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	Max	Max	None	Max	None	None	None	None
Act Effct Green (s)	33.0	26.0	26.0	34.1	28.6	33.1	26.1	37.8	30.7
Actuated g/C Ratio	0.37	0.29	0.29	0.39	0.32	0.38	0.30	0.43	0.35
v/c Ratio	0.41	0.79	0.22	0.71	0.88	0.26	0.90	0.85	0.55
Control Delay	22.0	41.5	4.1	34.5	46.8	15.8	49.1	49.2	27.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	22.0	41.5	4.1	34.5	46.8	15.8	49.1	49.2	27.0
LOS	C	D	A	C	D	B	D	D	C
Approach Delay		31.6			43.6		43.6		35.6
Approach LOS		C			D		D		D

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 88.2	
Natural Cycle: 90	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.90	
Intersection Signal Delay: 38.7	Intersection LOS: D
Intersection Capacity Utilization 86.1%	ICU Level of Service E
Analysis Period (min) 15	

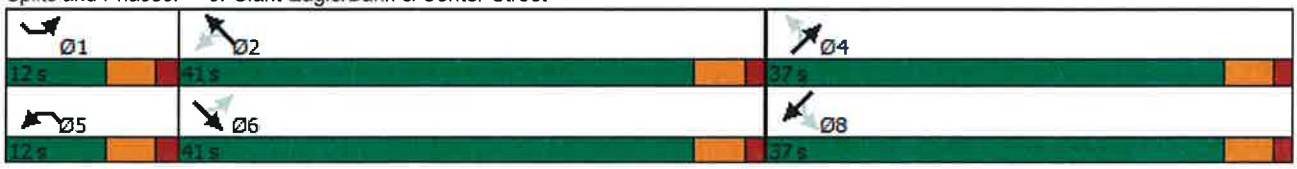
Splits and Phases: 12: Wilson Mills Road/Cherry Avenue & Water Street



Lane Group	SEL	SET	NWL	NWT	NEL	NET	SWL	SWT
Lane Configurations								
Traffic Volume (vph)	1	399	15	607	16	1	1	1
Future Volume (vph)	1	399	15	607	16	1	1	1
Turn Type	pm+pt	NA	pm+pt	NA	Perm	NA	Perm	NA
Protected Phases	1	6	5	2		4		8
Permitted Phases	6		2		4		8	
Detector Phase	1	6	5	2	4	4	8	8
Switch Phase								
Minimum Initial (s)	7.0	10.0	7.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	12.0	23.0	12.0	23.0	23.0	23.0	23.0	23.0
Total Split (s)	12.0	41.0	12.0	41.0	37.0	37.0	37.0	37.0
Total Split (%)	13.3%	45.6%	13.3%	45.6%	41.1%	41.1%	41.1%	41.1%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0		0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0		5.0
Lead/Lag	Lead	Lag	Lead	Lag				
Lead-Lag Optimize?								
Recall Mode	None	Min	None	Min	None	None	None	None
Act Effct Green (s)	34.0	37.1	34.0	37.1	11.1	11.1		11.1
Actuated g/C Ratio	0.76	0.83	0.76	0.83	0.25	0.25		0.25
v/c Ratio	0.00	0.29	0.02	0.43	0.04	0.03		0.01
Control Delay	3.0	5.2	2.9	6.4	20.9	13.8		20.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0		0.0
Total Delay	3.0	5.2	2.9	6.4	20.9	13.8		20.0
LOS	A	A	A	A	C	B		B
Approach Delay		5.2		6.3		17.8		20.0
Approach LOS		A		A		B		B

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 44.5	
Natural Cycle: 65	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.43	
Intersection Signal Delay: 6.2	Intersection LOS: A
Intersection Capacity Utilization 48.7%	ICU Level of Service A
Analysis Period (min) 15	

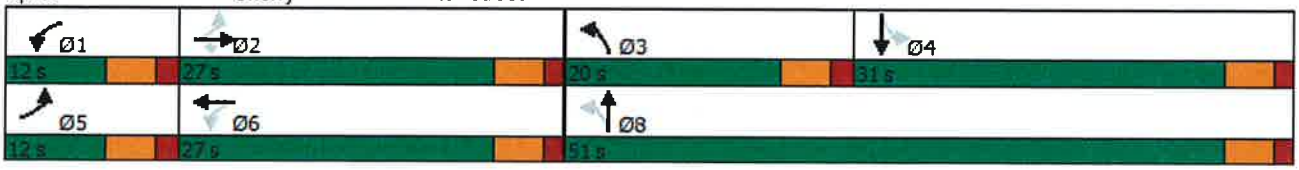
Splits and Phases: 3: Giant Eagle/Bank & Center Street



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	6	190	208	117	352	312	13	2	6
Future Volume (vph)	6	190	208	117	352	312	13	2	6
Turn Type	pm+pt	NA	Perm	pm+pt	NA	pm+pt	NA	Perm	NA
Protected Phases	5	2		1	6	3	8		4
Permitted Phases	2		2	6		8		4	
Detector Phase	5	2	2	1	6	3	8	4	4
Switch Phase									
Minimum Initial (s)	7.0	10.0	10.0	7.0	10.0	7.0	10.0	10.0	10.0
Minimum Split (s)	12.0	23.0	23.0	12.0	23.0	12.0	23.0	23.0	23.0
Total Split (s)	12.0	27.0	27.0	12.0	27.0	20.0	51.0	31.0	31.0
Total Split (%)	13.3%	30.0%	30.0%	13.3%	30.0%	22.2%	56.7%	34.4%	34.4%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lead		Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes
Recall Mode	None	Max	Max	None	Max	None	None	None	None
Act Effct Green (s)	28.0	22.7	22.7	31.0	29.9	16.2	16.2	10.3	10.3
Actuated g/C Ratio	0.48	0.39	0.39	0.53	0.51	0.28	0.28	0.18	0.18
v/c Ratio	0.01	0.29	0.30	0.20	0.42	0.73	0.33	0.01	0.05
Control Delay	8.7	16.8	4.2	9.0	14.1	29.0	5.3	25.0	19.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	8.7	16.8	4.2	9.0	14.1	29.0	5.3	25.0	19.5
LOS	A	B	A	A	B	C	A	C	B
Approach Delay		10.2			12.9		20.5		20.2
Approach LOS		B			B		C		C

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 58.3	
Natural Cycle: 70	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.73	
Intersection Signal Delay: 14.9	Intersection LOS: B
Intersection Capacity Utilization 61.8%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 6: Cherry Avenue & Center Street

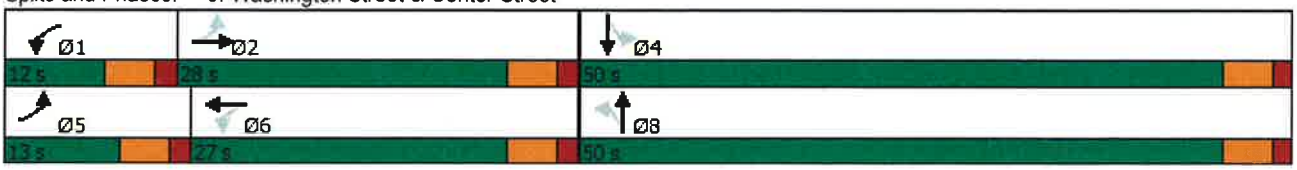


Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	128	201	31	367	88	133	62	98
Future Volume (vph)	128	201	31	367	88	133	62	98
Turn Type	pm+pt	NA	pm+pt	NA	Perm	NA	Perm	NA
Protected Phases	5	2	1	6		8		4
Permitted Phases	2		6		8		4	
Detector Phase	5	2	1	6	8	8	4	4
Switch Phase								
Minimum Initial (s)	7.0	10.0	7.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	12.0	23.0	12.0	23.0	23.0	23.0	23.0	23.0
Total Split (s)	13.0	28.0	12.0	27.0	50.0	50.0	50.0	50.0
Total Split (%)	14.4%	31.1%	13.3%	30.0%	55.6%	55.6%	55.6%	55.6%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0		0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0		5.0		5.0
Lead/Lag	Lead	Lag	Lead	Lag				
Lead-Lag Optimize?	Yes	Yes	Yes	Yes				
Recall Mode	None	Max	None	Max	None	None	None	None
Act Effct Green (s)	31.1	28.2	28.1	22.8		15.7		15.7
Actuated g/C Ratio	0.53	0.48	0.48	0.39		0.27		0.27
v/c Ratio	0.28	0.30	0.06	0.57		0.68		0.49
Control Delay	8.9	13.0	7.6	20.5		28.1		22.6
Queue Delay	0.0	0.0	0.0	0.0		0.0		0.0
Total Delay	8.9	13.0	7.6	20.5		28.1		22.6
LOS	A	B	A	C		C		C
Approach Delay		11.6		19.6		28.1		22.6
Approach LOS		B		B		C		C

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 58.5
Natural Cycle: 60
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.68
Intersection Signal Delay: 19.4 — Intersection LOS: B
Intersection Capacity Utilization 57.9% — ICU Level of Service B
Analysis Period (min) 15

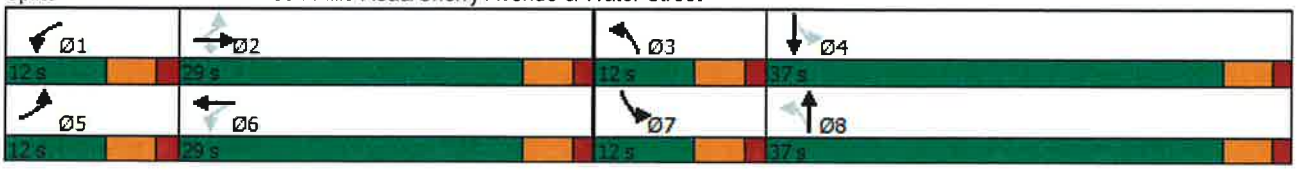
Splits and Phases: 9: Washington Street & Center Street



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	40	135	21	172	303	59	229	112	179
Future Volume (vph)	40	135	21	172	303	59	229	112	179
Turn Type	pm+pt	NA	Perm	pm+pt	NA	pm+pt	NA	pm+pt	NA
Protected Phases	5	2		1	6	3	8	7	4
Permitted Phases	2		2	6		8		4	
Detector Phase	5	2	2	1	6	3 8	8	4 7	4
Switch Phase									
Minimum Initial (s)	7.0	10.0	10.0	7.0	10.0	7.0	10.0	7.0	10.0
Minimum Split (s)	12.0	23.0	23.0	12.0	23.0	12.0	23.0	12.0	23.0
Total Split (s)	12.0	29.0	29.0	12.0	29.0	12.0	37.0	12.0	37.0
Total Split (%)	13.3%	32.2%	32.2%	13.3%	32.2%	13.3%	41.1%	13.3%	41.1%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	Max	Max	None	Max	None	None	None	None
Act Effct Green (s)	31.6	24.5	24.5	33.9	30.1	28.6	23.3	28.6	23.3
Actuated g/C Ratio	0.40	0.31	0.31	0.43	0.38	0.36	0.29	0.36	0.29
v/c Ratio	0.16	0.26	0.04	0.35	0.82	0.16	0.80	0.47	0.46
Control Delay	16.8	25.2	0.1	18.5	39.0	14.0	35.3	19.9	24.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	16.8	25.2	0.1	18.5	39.0	14.0	35.3	19.9	24.2
LOS	B	C	A	B	D	B	D	B	C
Approach Delay		20.8			33.9		32.6		22.8
Approach LOS		C			C		C		C

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 79.3	
Natural Cycle: 90	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.82	
Intersection Signal Delay: 29.8	Intersection LOS: C
Intersection Capacity Utilization 80.6%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 12: Wilson Mills Road/Cherry Avenue & Water Street



Intersection	
Int Delay, s/veh	0.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑			↑↑	Y	
Traffic Vol, veh/h	346	10	40	489	0	27
Future Vol, veh/h	346	10	40	489	0	27
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	50	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	376	11	43	532	0	29

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	387	0	734	382
Stage 1	-	-	-	-	382	-
Stage 2	-	-	-	-	352	-
Critical Hdwy	-	-	4.13	-	6.63	6.23
Critical Hdwy Stg 1	-	-	-	-	5.43	-
Critical Hdwy Stg 2	-	-	-	-	5.83	-
Follow-up Hdwy	-	-	2.219	-	3.519	3.319
Pot Cap-1 Maneuver	-	-	1170	-	371	664
Stage 1	-	-	-	-	689	-
Stage 2	-	-	-	-	684	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1170	-	352	664
Mov Cap-2 Maneuver	-	-	-	-	352	-
Stage 1	-	-	-	-	689	-
Stage 2	-	-	-	-	648	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.8	10.7
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	664	-	-	1170	-
HCM Lane V/C Ratio	0.044	-	-	0.037	-
HCM Control Delay (s)	10.7	-	-	8.2	0.2
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0.1	-

Intersection	
Int Delay, s/veh	1.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	32	41	448	38	15	316
Future Vol, veh/h	32	41	448	38	15	316
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	35	45	487	41	16	343

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	883	264	0	0	528	0
Stage 1	508	-	-	-	-	-
Stage 2	375	-	-	-	-	-
Critical Hdwy	6.63	6.93	-	-	4.13	-
Critical Hdwy Stg 1	5.83	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.519	3.319	-	-	2.219	-
Pot Cap-1 Maneuver	300	735	-	-	1037	-
Stage 1	570	-	-	-	-	-
Stage 2	694	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	294	735	-	-	1037	-
Mov Cap-2 Maneuver	294	-	-	-	-	-
Stage 1	570	-	-	-	-	-
Stage 2	681	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	14.9	0	0.4
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	443	1037	-
HCM Lane V/C Ratio	-	-	0.179	0.016	-
HCM Control Delay (s)	-	-	14.9	8.5	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.6	0	-

Lane Group	SEL	SET	NWL	NWT	NEL	NET	SWL	SWT
Lane Configurations								
Traffic Volume (vph)	1	782	60	594	46	1	6	1
Future Volume (vph)	1	782	60	594	46	1	6	1
Turn Type	pm+pt	NA	pm+pt	NA	Perm	NA	Perm	NA
Protected Phases	1	6	5	2		4		8
Permitted Phases	6		2		4		8	
Detector Phase	1	6	5	2	4	4	8	8
Switch Phase								
Minimum Initial (s)	7.0	10.0	7.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	12.0	23.0	12.0	23.0	23.0	23.0	23.0	23.0
Total Split (s)	12.0	40.0	12.0	40.0	38.0	38.0	38.0	38.0
Total Split (%)	13.3%	44.4%	13.3%	44.4%	42.2%	42.2%	42.2%	42.2%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0		0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0		5.0
Lead/Lag	Lead	Lag	Lead	Lag				
Lead-Lag Optimize?								
Recall Mode	None	Min	None	Min	None	None	None	None
Act Effct Green (s)	43.5	40.7	45.4	45.2	10.1	10.1		10.1
Actuated g/C Ratio	0.69	0.65	0.72	0.72	0.16	0.16		0.16
v/c Ratio	0.00	0.82	0.20	0.49	0.22	0.29		0.04
Control Delay	3.0	22.4	5.0	8.3	27.7	9.3		23.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0		0.0
Total Delay	3.0	22.4	5.0	8.3	27.7	9.3		23.0
LOS	A	C	A	A	C	A		C
Approach Delay		22.3		8.0		15.6		23.0
Approach LOS		C		A		B		C

Intersection Summary

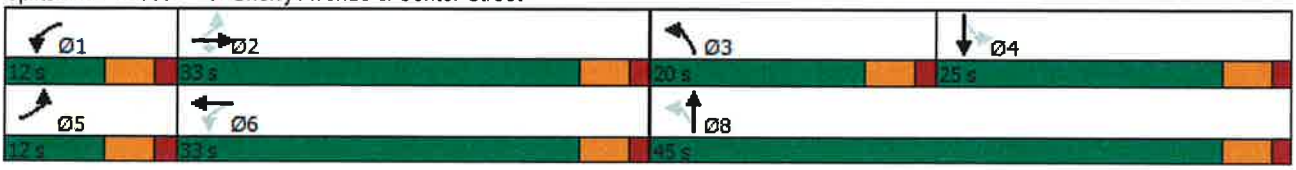
Cycle Length: 90
Actuated Cycle Length: 63.1
Natural Cycle: 90
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.82
Intersection Signal Delay: 16.2 — Intersection LOS: B
Intersection Capacity Utilization 66.5% — ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 3: Giant Eagle/Bank & Center Street

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	29	542	343	135	404	323	43	18	48
Future Volume (vph)	29	542	343	135	404	323	43	18	48
Turn Type	pm+pt	NA	Perm	pm+pt	NA	pm+pt	NA	Perm	NA
Protected Phases	5	2		1	6	3	8		4
Permitted Phases	2		2	6		8		4	
Detector Phase	5	2	2	1	6	3	8	4	4
Switch Phase									
Minimum Initial (s)	7.0	10.0	10.0	7.0	10.0	7.0	10.0	10.0	10.0
Minimum Split (s)	12.0	23.0	23.0	12.0	23.0	12.0	23.0	23.0	23.0
Total Split (s)	12.0	33.0	33.0	12.0	33.0	20.0	45.0	25.0	25.0
Total Split (%)	13.3%	36.7%	36.7%	13.3%	36.7%	22.2%	50.0%	27.8%	27.8%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lead		Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes
Recall Mode	None	Max	Max	None	Max	None	None	None	None
Act Effct Green (s)	35.4	28.3	28.3	38.6	35.9	26.1	26.1	10.4	10.4
Actuated g/C Ratio	0.46	0.37	0.37	0.50	0.47	0.34	0.34	0.14	0.14
v/c Ratio	0.07	0.86	0.46	0.52	0.55	0.77	0.37	0.13	0.35
Control Delay	11.1	38.7	4.3	18.7	21.2	33.4	6.0	33.3	23.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	11.1	38.7	4.3	18.7	21.2	33.4	6.0	33.3	23.8
LOS	B	D	A	B	C	C	A	C	C
Approach Delay		24.9			20.6		21.8		25.4
Approach LOS		C			C		C		C

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 76.7	
Natural Cycle: 80	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.86	
Intersection Signal Delay: 23.0	Intersection LOS: C
Intersection Capacity Utilization 73.1%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 6: Cherry Avenue & Center Street



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	111	602	34	378	104	100	15	111
Future Volume (vph)	111	602	34	378	104	100	15	111
Turn Type	pm+pt	NA	pm+pt	NA	Perm	NA	Perm	NA
Protected Phases	5	2	1	6		8		4
Permitted Phases	2		6		8		4	
Detector Phase	5	2	1	6	8	8	4	4
Switch Phase								
Minimum Initial (s)	7.0	10.0	7.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	12.0	23.0	12.0	23.0	23.0	23.0	23.0	23.0
Total Split (s)	13.0	28.0	12.0	27.0	50.0	50.0	50.0	50.0
Total Split (%)	14.4%	31.1%	13.3%	30.0%	55.6%	55.6%	55.6%	55.6%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0		0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0		5.0		5.0
Lead/Lag	Lead	Lag	Lead	Lag				
Lead-Lag Optimize?	Yes	Yes	Yes	Yes				
Recall Mode	None	Max	None	Max	None	None	None	None
Act Effct Green (s)	31.0	28.2	28.1	22.8		15.7		15.7
Actuated g/C Ratio	0.53	0.48	0.48	0.39		0.27		0.27
v/c Ratio	0.25	0.83	0.11	0.59		0.74		0.47
Control Delay	8.6	28.8	8.2	21.1		32.7		17.1
Queue Delay	0.0	0.0	0.0	0.0		0.0		0.0
Total Delay	8.6	28.8	8.2	21.1		32.7		17.1
LOS	A	C	A	C		C		B
Approach Delay		25.9		20.1		32.7		17.1
Approach LOS		C		C		C		B

Intersection Summary

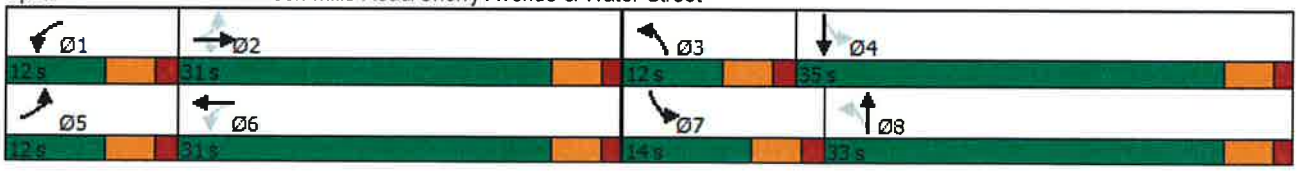
Cycle Length: 90
Actuated Cycle Length: 58.4
Natural Cycle: 70
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.83
Intersection Signal Delay: 24.3 — Intersection LOS: C
Intersection Capacity Utilization 84.0% — ICU Level of Service E
Analysis Period (min) 15

Splits and Phases: 9: Washington Street & Center Street

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	86	400	113	170	294	89	265	208	266
Future Volume (vph)	86	400	113	170	294	89	265	208	266
Turn Type	pm+pt	NA	Perm	pm+pt	NA	pm+pt	NA	pm+pt	NA
Protected Phases	5	2		1	6	3	8	7	4
Permitted Phases	2		2	6		8		4	
Detector Phase	5	2	2	1	6	3 8	8	4 7	4
Switch Phase									
Minimum Initial (s)	7.0	10.0	10.0	7.0	10.0	7.0	10.0	7.0	10.0
Minimum Split (s)	12.0	23.0	23.0	12.0	23.0	12.0	23.0	12.0	23.0
Total Split (s)	12.0	31.0	31.0	12.0	31.0	12.0	33.0	14.0	35.0
Total Split (%)	13.3%	34.4%	34.4%	13.3%	34.4%	13.3%	36.7%	15.6%	38.9%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	Max	Max	None	Max	None	None	None	None
Act Effct Green (s)	33.0	26.0	26.0	34.1	28.6	33.4	26.3	38.0	30.9
Actuated g/C Ratio	0.37	0.29	0.29	0.39	0.32	0.38	0.30	0.43	0.35
v/c Ratio	0.42	0.79	0.22	0.71	0.89	0.26	0.91	0.87	0.56
Control Delay	22.1	41.7	4.1	35.0	47.9	15.9	49.7	52.5	27.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	22.1	41.7	4.1	35.0	47.9	15.9	49.7	52.5	27.2
LOS	C	D	A	D	D	B	D	D	C
Approach Delay		31.8			44.5		44.2		36.9
Approach LOS		C			D		D		D

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 88.4	
Natural Cycle: 90	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.91	
Intersection Signal Delay: 39.4	Intersection LOS: D
Intersection Capacity Utilization 86.8%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 12: Wilson Mills Road/Cherry Avenue & Water Street



Intersection	
Int Delay, s/veh	0.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	745	7	18	569	0	17
Future Vol, veh/h	745	7	18	569	0	17
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	50	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	810	8	20	618	0	18

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	818	0	1163	814
Stage 1	-	-	-	-	814	-
Stage 2	-	-	-	-	349	-
Critical Hdwy	-	-	4.13	-	6.63	6.23
Critical Hdwy Stg 1	-	-	-	-	5.43	-
Critical Hdwy Stg 2	-	-	-	-	5.83	-
Follow-up Hdwy	-	-	2.219	-	3.519	3.319
Pot Cap-1 Maneuver	-	-	808	-	201	377
Stage 1	-	-	-	-	435	-
Stage 2	-	-	-	-	686	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	808	-	193	377
Mov Cap-2 Maneuver	-	-	-	-	193	-
Stage 1	-	-	-	-	435	-
Stage 2	-	-	-	-	660	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.5	15
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	377	-	-	808	-
HCM Lane V/C Ratio	0.049	-	-	0.024	-
HCM Control Delay (s)	15	-	-	9.6	0.2
HCM Lane LOS	C	-	-	A	A
HCM 95th %tile Q(veh)	0.2	-	-	0.1	-

Intersection	
Int Delay, s/veh	0.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	16	17	541	15	9	516
Future Vol, veh/h	16	17	541	15	9	516
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	17	18	588	16	10	561

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1177	302	0	0	604	0
Stage 1	596	-	-	-	-	-
Stage 2	581	-	-	-	-	-
Critical Hdwy	6.63	6.93	-	-	4.13	-
Critical Hdwy Stg 1	5.83	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.519	3.319	-	-	2.219	-
Pot Cap-1 Maneuver	197	695	-	-	972	-
Stage 1	514	-	-	-	-	-
Stage 2	558	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	194	695	-	-	972	-
Mov Cap-2 Maneuver	194	-	-	-	-	-
Stage 1	514	-	-	-	-	-
Stage 2	550	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	18.2	0	0.1
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	309	972	-
HCM Lane V/C Ratio	-	-	0.116	0.01	-
HCM Control Delay (s)	-	-	18.2	8.7	0
HCM Lane LOS	-	-	C	A	A
HCM 95th %tile Q(veh)	-	-	0.4	0	-