TMS Engineers, Inc

AREA-WIDE PLANNING STUDY

Amherst, Ohio

July 6, 2020

Prepared for:

City of Amherst
206 South Main Street
Amherst, Ohio 44007

AREA-WIDE PLANNING STUDY

Oak Point Road/North Lake Street
&
Cooper Foster Park Road/State Route 2 Ramps

Amherst, Ohio

July 6, 2020

Prepared For:

City of Amherst
206 South Main Street
Amherst, Ohio 44001

Prepared By:

TMS Engineers, Inc.
2112 Case Parkway South
Unit #7
Twinsburg, Ohio 44087

REGISTERED ENGINEER NO. E56982
CERTIFICATION NO. 2234

"This document was prepared consistent with local agency requirements and/or applicable guidelines contained in this report."

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Executive Summary

This Area-Wide Planning Study has been prepared at the request of the City of Amherst. The study area is primarily located in the City of Amherst, Lorain County, Ohio. A portion of the City of Lorain will also be included in the study area. The study area will consist of the following intersections:

1. Oak Point Road & Buck Horn Boulevard
2. Oak Point Road/North Lake Street & Cooper Foster Park Road
3. North Lake Street & State Route 2 Westbound Ramps
4. North Lake Street & State Route 2 Eastbound Ramps
5. Cooper Foster Park Road & Hollstein Drive
6. North Main Street & Cooper Foster Park Road

The analysis of the study area included proposed and under construction developments that are located within the study area. The following developments were considered in forecast of future traffic volumes for the study area:

1. Medical Office Building (17,756 SF) - 2021
2. Reserve at Beaver Creek Subdivision (109 Units) - 2021
3. Eagle Ridge Subdivision (59 Units) - 2021
4. Preserve at Quarry Lakes Subdivision (100 Units) - 2020
5. Buckeye Square/Nova Medical Offices (11,325 SF) - 2020
6. Sandy Springs PUD (161 Units)

The year 2022 was analyzed for the opening year conditions. The future design year will be 2042 based on providing a twenty year design period for any recommended improvements in the study area.

The weekday AM peak hour of traffic was determined to be 7:15 AM to 8:15 AM. The weekday PM peak hour of traffic was found to be 4:30 PM to 5:30 PM. These periods were used to forecast expected and future traffic volumes since they reflect the period of the highest volume of vehicular traffic flow for the study area roadways.

The ODOT GIS Crash Analysis Tool (GCAT) was used to collect crash information at the study area intersections for the years 2017 - 2019. The study area experienced a total of 68 intersection related crashes between 2017 and 2019. Rear end crashes represented approximately 51% (35 crashes) of the total amount of crashes. Angle crashes represented approximately 19% of the crashes. Left and right turn crashes represented approximately 13% of the crashes. These four types of crashes represent the predominate crash types at the study area intersections.

Conditions at the study area intersections during the AM and PM peak hours were determined to operate with level-of-service D or better under the forecasted 2022 Build conditions.

Conditions at the study area intersections during the 2042 Build AM and PM peak hours were determined to operate with level-of-service D or better except at the following intersections under the PM peak hour:

- Oak Point Road & Cooper Foster Park Road
- North Lake Street & State Route 2 Westbound Ramps
- North Lake Street & State Route 2 Eastbound Ramps

The following turn lanes were determined to experience a queue length which exceeds the existing length of the turn lane based on the HCS analysis:

Oak Point Road & Cooper Foster Park Road
- Northbound Right Turn Lane (AM & PM Peak Hour)
- Northbound Left Turn Lane (PM Peak Hour)
- Eastbound Right Turn Lane (AM & PM Peak Hour)

North Lake Street & State Route 2 Westbound Ramps
- Westbound Left Turn Lane (PM Peak Hour)
- Southbound Right Turn Lane (PM Peak Hour)
- Northbound Left Turn Lane (PM Peak Hour)

North Lake Street & State Route 2 Eastbound Ramps
- Eastbound Left Turn Lane (AM & PM Peak Hour)
- Southbound Left Turn Lane (AM & PM Peak Hour)

Based on the available storage lengths along Oak Point Road/North Lake Street at Cooper Foster Park Road and the State Route 2 interchange there are multiple movements at each intersection that are expected to queue through the adjacent intersections and potentially block traffic from moving during a green indication in the signal phasing.

The report analyzed the following 8 alternatives in order to determine if the intersection levels-of-service can be improved and the impact of queued traffic can be reduced.

- Alternative #1 - Additional Turn Lanes
- Alternative #2 - Roundabouts
- Alternative #3 - NE Quadrant Roadway
- Alternative #4 - By-Pass Roadway
- Alternative #5 - Minor Street Bowtie
- Alternative #6 - Major Street Bowtie
- Alternative #7 - RCUT
- Alternative #8 - Additional Through Lanes

The eight scenarios were evaluated based on various criteria to consider a range of impacts. A matrix was prepared, which provides a comparative assessment of the eight scenarios. Information gathered for this report and the analysis contained within it were used to complete the matrix seen **Figure 5.1, Page 114.**

Upon detailed screening of capacity analysis results and qualitative impacts of 8 possible Preliminary Alternatives, 6 alternatives are presented for consideration:

- Alternative #1 - Additional Turn Lanes
- Alternative #2 - Roundabouts
- Alternative #3 - NE Quadrant Roadway
- Alternative #4 - By-Pass Roadway
- Alternative #5 - Minor Street Bowtie
- Alternative #8 - Additional Through Lanes

These alternatives are expected to address the intersection capacity issues at all locations. The queue length and turn lane lengths were determined to experience various levels of improvement however the impact of the queue lengths were not completely mitigated under any scenario and the available storage between intersections did not allow turn lane lengths that were able to fully accommodate the necessary length.

The improvements associated with Alternative #2 and Alternative #8 were determined to be the preferred alternatives based on the data analyzed for this report and shown in the matrix (**Figure 5.1, Page 114**). The alternatives were shown to improve the intersection capacity issues and to minimize queue blocking between the closely spaced intersections without relocating or closing access to any intersection.

The following interim improvements are also recommended for consideration in the study area:

- Review and update signal timing with optimized change and clearance intervals.
- Install signal backplate/retro-reflective back-plates to increase visibility of traffic control devices.
- Install "Left Turn Yield On Green Ball" signs (R10-12) on the traffic signal mast arms for approaches with protected and permissive left turn phases. The use of these signs would be in addition to the existing traffic control infrastructure.
- Upgrade traffic signal control to use the flashing yellow arrow for the left turn movements. The "Left Turn Yield On Green Ball" signs (R10-12) would not be used with this configuration of traffic control equipment.
- Provide surface treatment to increase friction of roadway surface.

Chapter 1
Introduction

1.1 Purpose of Report

This Area-Wide Planning Study has been prepared at the request of the City of Amherst. The study area is primarily located in the City of Amherst, Lorain County, Ohio. A portion of the City of Lorain will also be included in the study area. The study area will consist of the following intersections:

1. Oak Point Road & Buck Horn Boulevard
2. Oak Point Road/North Lake Street & Cooper Foster Park Road
3. North Lake Street & State Route 2 Westbound Ramps
4. North Lake Street & State Route 2 Eastbound Ramps
5. Cooper Foster Park Road & Hollstein Drive
6. North Main Street & Cooper Foster Park Road

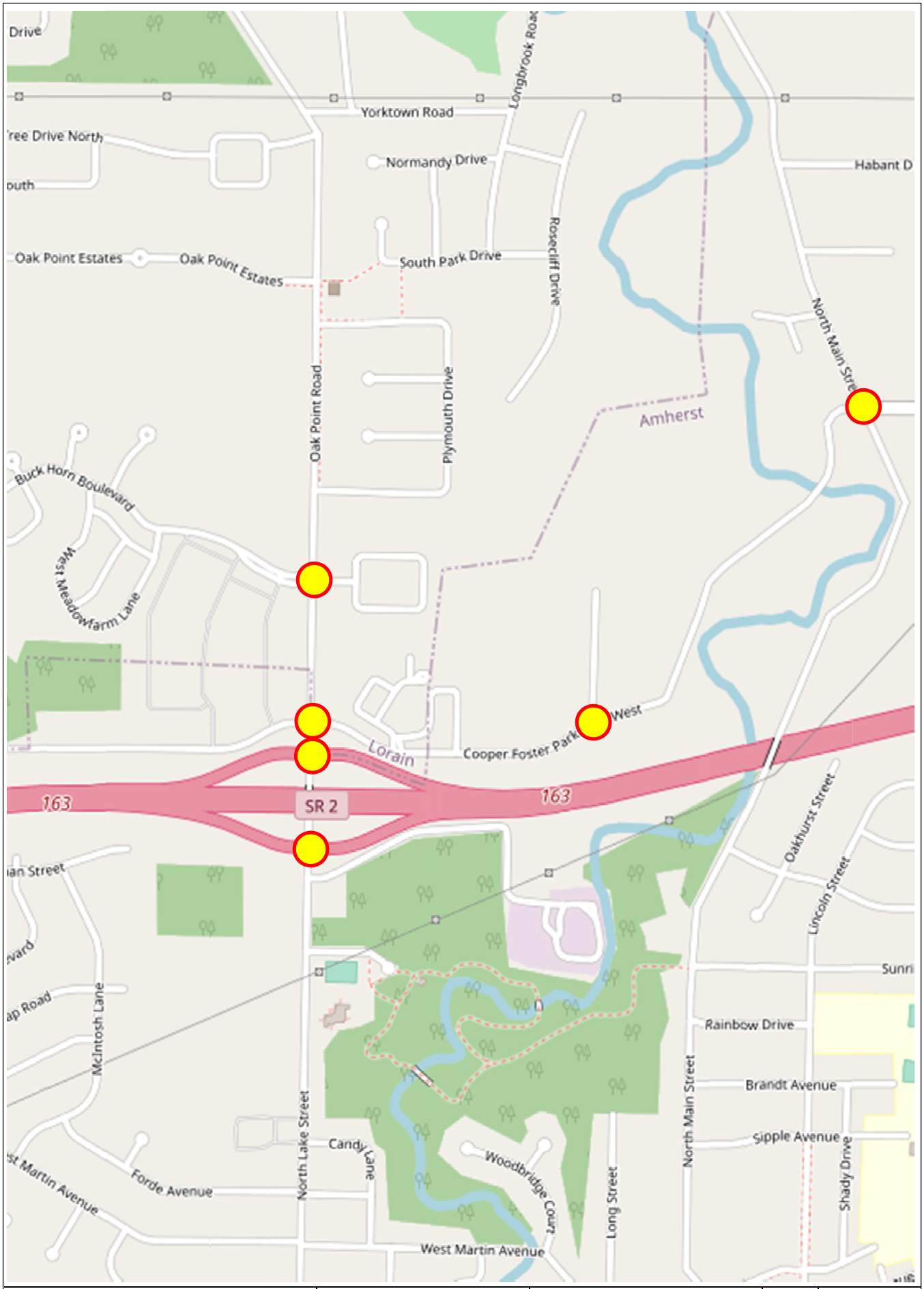
Figure 1.1, Page 2 shows the study area and intersections under study.

The analysis of the study area will also included proposed and under construction developments that are located within the study area. The following developments will be considered for the forecast of future traffic volumes for the study area:

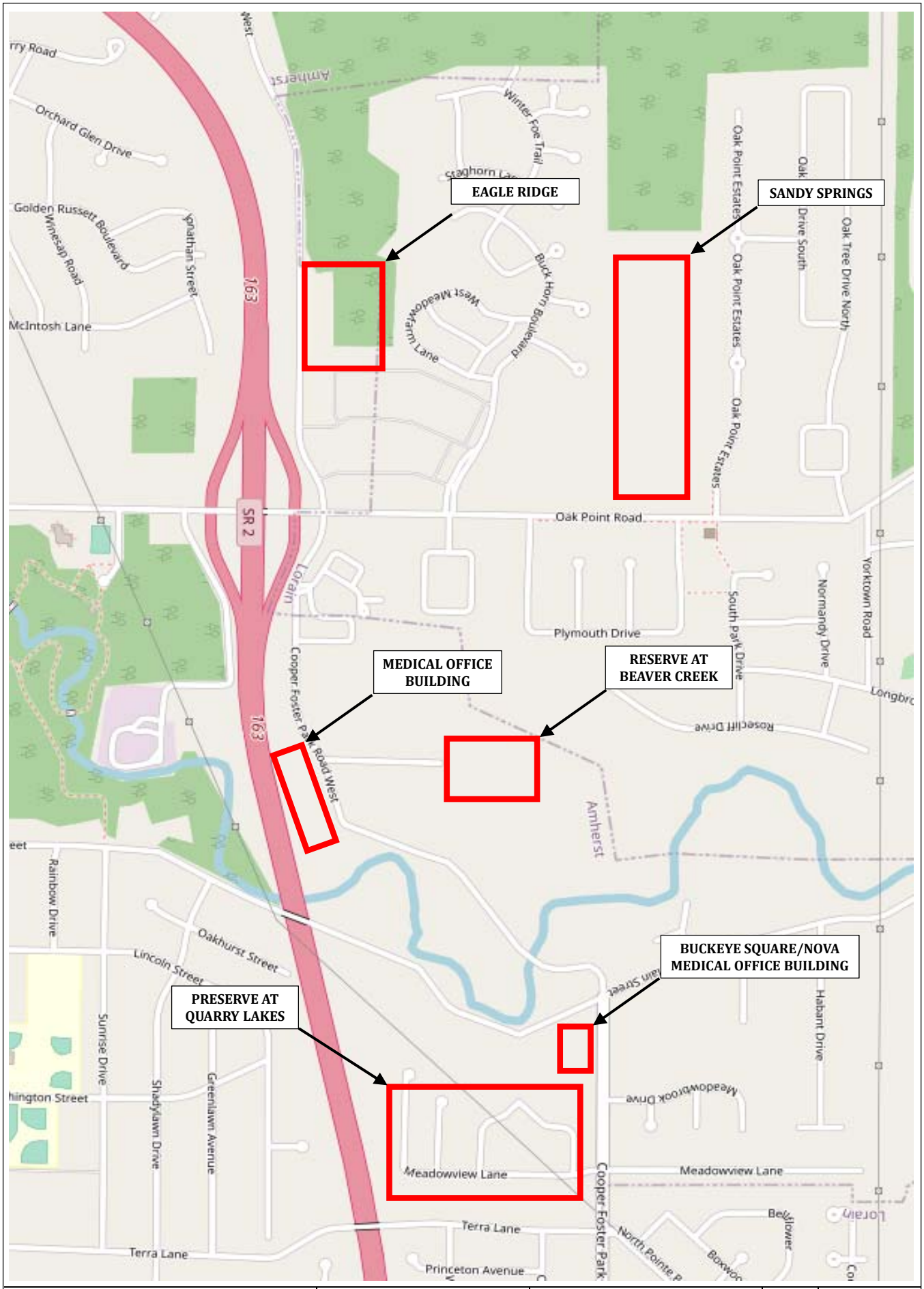
1. Medical Office Building (17,756 SF) - 2021
2. Reserve at Beaver Creek Subdivision (109 Units) - 2021
3. Eagle Ridge Subdivision (59 Units) - 2021
4. Preserve at Quarry Lakes Subdivision (100 Units) - 2020
5. Buckeye Square/Nova Medical Offices (11,325 SF) - 2020
6. Sandy Springs PUD (161 Units)

Figure 1.2, Page 3 details the development locations within the study area.

The year 2022 will be analyzed for the opening year conditions. The future design year will be 2042 based on providing a twenty year design period for any recommended improvements in the study area.



TMS Engineers, Inc. Transportation Management Services 2112 Case Parkway S., Unit 7, Twinsburg, Ohio 44087 www.TMSEngineers.com	**Areawide Planning Study** **Amherst, Ohio**	**Study Area** **Location Map**	⇧ **NORTH** NOT TO SCALE	**Figure: 1.1** **Page: 2**



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1.2 Study Objectives

This study is structured for the following purposes;

- to adequately identify and assess the existing and future study area traffic conditions,
- to adequately assess the traffic impacts associated with future development and identify the level of off-site access and traffic,
- to provide a comprehensive study which evaluates and documents the traffic impacts and off-site improvements, where warranted,
- and to provide a technically sound basis to identify mitigation requirements to off-site traffic impacts.

This study documents the methodologies, findings and conclusions of the analysis, including the basis for all assumptions, traffic parameters utilized and conclusions reached.

The development of future traffic volumes will be based on the forecasting guidelines and methodology found in the Ohio Department of Transportation's **Ohio Traffic Forecasting Manual**.

The traffic impacts will be determined by comparing the existing intersection levels-of-service before the construction of the proposed development to the anticipated levels-of-service after the development is completed. Levels-of-service for the study area and access roadway intersections will be calculated using the computerized version of the Transportation Research Board's **Highway Capacity Manual 6TH Edition (HCS7, Release 7.8.5)**.

The justification for any changes in the intersections will be determined by comparing data collected of the existing traffic conditions to the criteria established by the **Ohio Manual of Uniform Traffic Control Devices** and professional engineering judgment from an on-site field review.

Intersection geometric design guidelines will be based in the information and procedures found in the Ohio Department of Transportation's **Location & Design Manual, Volume 1**. The left and right turn lane warrants discussed in Section 401-6 will be used in addition to the capacity analyses to determine the need for deceleration and exclusive turn lanes at the unsignalized locations.

1.3 Intersection Capacity & Levels-of-Service

Intersection capacity analyses will be performed at the study area intersections using the procedures outlined in the computerized version of the Transportation Research Board's **Highway Capacity Manual 6TH Edition (HCS7, Release 7.8.5)**. The capacity analyses will be performed in order to estimate the maximum amount of traffic that can be accommodated by a roadway facility while maintaining recommended operational qualities. Peak hour traffic volumes will be analyzed to determine the level-of-service (LOS) at the study area intersections.

The capacity analysis procedures provide a calculated "average vehicle delay", which is based on traffic volumes, number of lanes, type of traffic control, channelization, grade, and percentage of large vehicles in the traffic stream at each intersection. The average delay calculated at an intersection is then assigned a "grade" or level of service (LOS) ranging from LOS A, the best, to LOS F, the worst based upon driver expectation. The intersection LOS "grades" as defined by the Transportation Research Board are as follows:

Table 1.1 Intersection LOS

LOS	UNSIGNALIZED AVERAGE DELAY PER VEHICLE (sec)	SIGNALIZED AVERAGE DELAY PER VEHICLE (sec)	ROUNDABOUT AVERAGE DELAY PER VEHICLE (sec)
A	≤ 10.0	≤ 10.0	≤ 10.0
B	10.1 to 15.0	10.1 to 20.0	10.1 to 20.0
C	15.1 to 25.0	20.1 to 35.0	20.1 to 35.0
D	25.1 to 35.0	35.1 to 55.0	35.1 to 50.0
E	35.1 to 50.0	55.1 to 80.0	50.1 to 70.0
F	> 50	> 80	> 70

The capacity analysis procedures and the resulting level-of-service grades and delays are a recognized traffic engineering standard for measuring the efficiency of intersection operations by such organizations as the Institute of Transportation Engineers, American Association of State Highway and Transportation Officials, and the Ohio Department of Transportation.

In most cases, a level-of-service D is considered the maximum delay threshold in an urbanized setting after which improvements should be investigated to determine if the delay can be reduced to a level of D or better. The capacity analyses will determine if there are any locations, approaches or movements in which the delay exceeds the level-of-service D.

The capacity analyses for signalized intersections will assume that the signal timing would be optimized to balance critical lane delays at the intersection.

It should be noted that any values shown in the HCS analysis summary sheets that are displayed in red indicate that the movement is expected to experience a queue length which exceeds the existing length of the turn lane.

1.4 Intersection Turn Lanes

Turn Lane Warrants

The ODOT **Location and Design Manual, Volume 1** and the **State Highway Access Management Manual** recommend that the need for auxiliary turn lanes at unsignalized intersections be determined by using the Auxiliary Lane Graphs found in Section 401-6 of the **Location and Design Manual, Volume 1**. This recommendation is made for the free-flow approaches at unsignalized intersections. Section 401.6.3 of the ODOT **Location and Design Manual** states that:

"To determine the number and use of left (right) turn lanes, intersection capacity analysis procedures of the current edition of the Highway Capacity Manual should be used. For unsignalized intersections, left (right) turn lanes may also be needed if they meet warrants provided in Figures 401-5(6)a, b, c and d. The warrants apply only to the free-flow approach of the unsignalized intersection."

It is the intent of this report to evaluate the need for exclusive deceleration and turn lanes at unsignalized intersections using the auxiliary lane graphs. The need for turn lanes at the signalized intersections will be based on the results of the capacity analyses.

Turn Lane Length

Turn lanes will be analyzed to determine the necessary turn lane storage length in accordance with the procedure recommended by the Ohio Department of Transportation in their **Location and Design Manual, Volume 1**, Section 401. The ODOT criteria and procedures are furnished in **Appendix A**.

It should be noted that the recommended maximum length is 800 feet for a right turn lane and 600 feet for a left turn lane, however if the calculated turn lane length is lower than these values, the maximum length will not be applicable.

Chapter 2
Area Conditions

2.1 Transportation Network Study Area

The Ohio Department of Transportation (ODOT) functionally classifies roadways to help define a roadway's characteristics as well as identify roadways that are eligible for federal funds. Functional classification is the grouping of roads, streets, and highways in a hierarchy based on the type of highway service they provide. Generally, streets and highways perform two types of service. They provide either traffic mobility or land access and can be ranked in terms of the proportion of service they provide.

The functional classification as determined by ODOT will be used in this report to apply growth and design hour factors to the study area roadways for use in forecasting the future traffic volumes in the study area. These factors are determined using data, guidelines, and methodology supplied by ODOT. These methods and the corresponding data are based on the roadways assigned functional classification. The ODOT methods for forecasting future traffic volumes are a recognized traffic engineering standard.

The ODOT functional classification of the roadways in the study area can currently be seen on ODOT's website at the following web address:

http://www.dot.state.oh.us/Divisions/Planning/ProgramManagement/MajorPrograms/Pages/RoadwayFunctionalClass.aspx

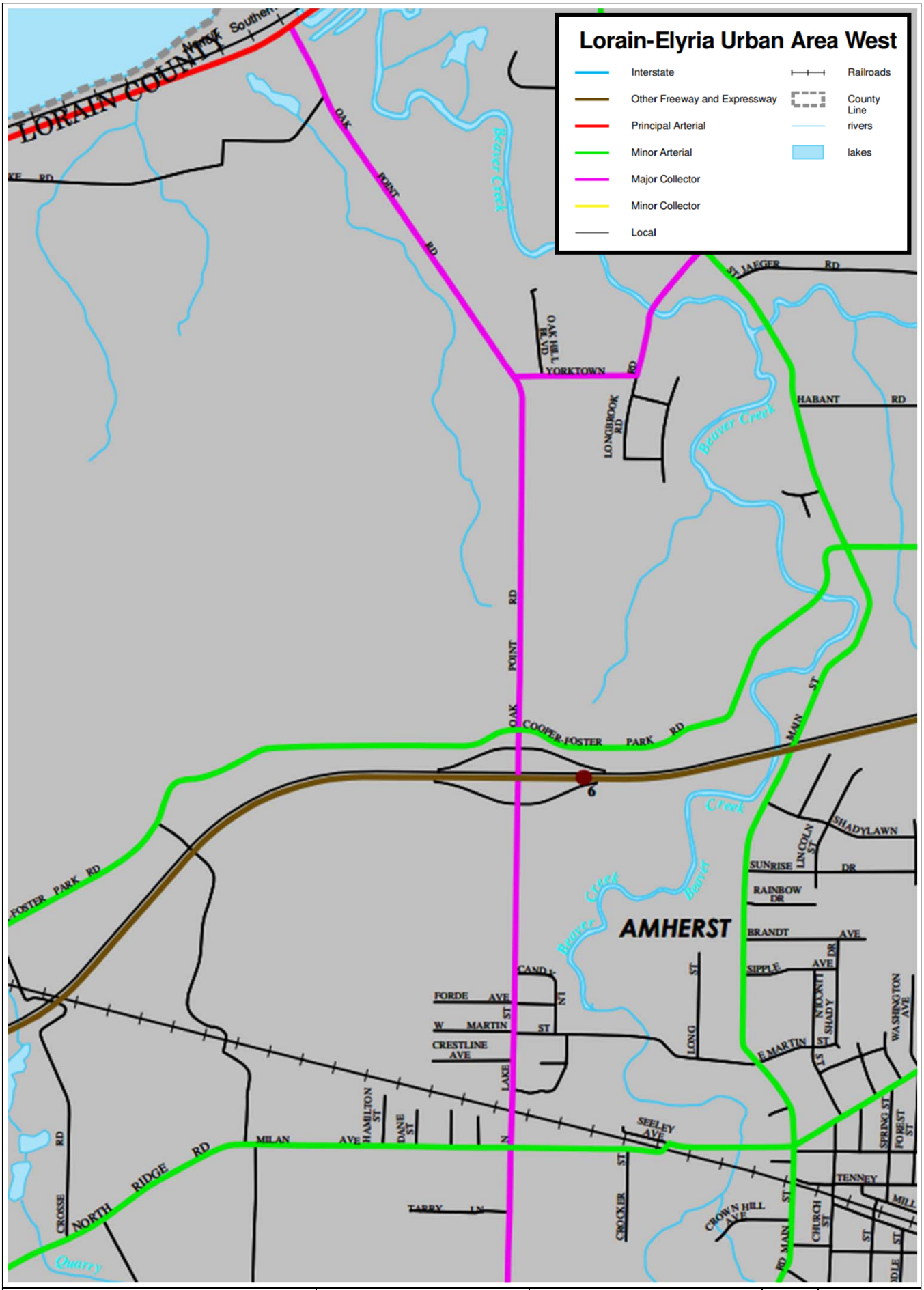
Roadways and driveways that are not listed as having a functional classification can be assigned into one of two categories. The first category is a local roadway and the second category is that of an access drive.

The following table lists the study area roadways that have an assigned functional classification as determined by ODOT and local government entities.

Table 2.1 Functional Classification

ROADWAY	AREA	FC #	CLASSIFICATION
SR 2 Ramps	Urban	2	Other Freeway/Expressway
Cooper Foster Park Road	Urban	4	Minor Arterial
North Main Street	Urban	4	Minor Arterial
Oak Point Road/North Lake Street	Urban	5	Major Collector
Buck Horn Boulevard	Urban	7	Local Roadway
Park Square Drive	Urban	7	Local Roadway
Hollstein Drive	Urban	7	Local Roadway

Figure 2.1, Page 10 illustrates the section of the functional classification map for the study area.



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The following table details the primary characteristics of the study area roadways:

Table 2.2 Roadway Characteristics

ROADWAY	# OF LANES	ORIENTATION	SPEED LIMIT (MPH)
SR 2 WB Exit Ramp	2	East-West	NOT POSTED
SR 2 WB Entrance Ramp	1	East-West	NOT POSTED
SR 2 EB Exit Ramp	2	East-West	NOT POSTED
SR 2 EB Entrance Ramp	1	East-West	NOT POSTED
Cooper Foster Park Road	2	East-West	35/25
North Main Street	2	North-South	35
Oak Point Rd/North Lake St	3	North-South	35
Buck Horn Boulevard	2	East-West	25
Park Square Drive	2	East-West	25
Hollstein Drive	2	North-South	25

Cooper Foster Park Road has a posted speed limit of 35 miles per hour west of Oak Point Road and 25 miles per hour east of Oak Point Road.

The following sections detail the existing lane use and traffic control at each location under study for this report.

OAK POINT ROAD & BUCK HORN BOULEVARD/PARK SQUARE DRIVE

Oak Point Road North Approach
- 1 Exclusive Left Turn Lane
- 1 Shared Through & Right Turn Lane

Oak Point Road South Approach
- 1 Exclusive Left Turn Lane
- 1 Shared Through & Right Turn Lane

Buck Horn Boulevard West Approach
- 1 Shared Left Turn & Through Lane
- 1 Exclusive Right Turn Lane

Park Square Drive East Approach
- 1 Shared Left/Through/Right Turn Lane

The intersection is controlled by a traffic signal. The traffic signal operation includes three phases. The first phase is the northbound and southbound left turn movements. The second phase is all northbound and southbound movements. The third phase is all east and westbound movements. Northbound and southbound left turn movements can be made during the green arrow indication (protected movement) and during a green ball indication when there is a gap in the opposing through traffic movements (permissive movement). The signal operation also includes a right turn overlap that allows the eastbound right turn movement during the protected northbound left turn phase.

OAK POINT ROAD & COOPER FOSTER PARK ROAD

Oak Point Road North Approach
- 1 Exclusive Left Turn Lane
- 1 Shared Through & Right Turn Lane

Oak Point Road South Approach
- 1 Exclusive Left Turn Lane
- 1 Through Lane
- 1 Exclusive Right Turn Lane

Cooper Foster Park Road West Approach
- 1 Shared Left Turn & Through Lane
- 1 Exclusive Right Turn Lane

Cooper Foster Park Road East Approach
- 1 Shared Left/Through/Right Turn Lane

The intersection is controlled by a traffic signal. The traffic signal operation includes three phases. The first phase is the northbound and southbound left turn movements. The second phase is all northbound and southbound movements. The third phase is all east and westbound movements. Northbound and southbound left turn movements can be made during the green arrow indication (protected movement) and during a green ball indication when there is a gap in the opposing through traffic movements (permissive movement). The signal operation also includes a right turn overlap that allows the eastbound right turn movement during the protected northbound left turn phase.

NORTH LAKE STREET & STATE ROUTE 2 WESTBOUND RAMPS

North Lake Street North Approach
- 1 Through Lane
- 1 Exclusive Right Turn Lane

North Lake Street South Approach
- 1 Exclusive Left Turn Lane
- 1 Through Lane

SR 2 WB Entrance Ramp West Approach
- 1 Receiving Lane

SR 2 WB Exit Ramp East Approach
- 1 Exclusive Left Turn Lane
- 1 Exclusive Right Turn Lane

The intersection is controlled by a traffic signal. The intersection operates with 2 signal phases. The first phase allows all northbound and southbound movements. The second phase allows the westbound movements from the exit ramp. The northbound left turn movement is made during the green ball indication when there is a gap in the opposing through traffic (permissive movement).

NORTH LAKE STREET & STATE ROUTE 2 EASTBOUND RAMPS

North Lake Street North Approach
- 1 Exclusive Left Turn Lane
- 1 Through Lane

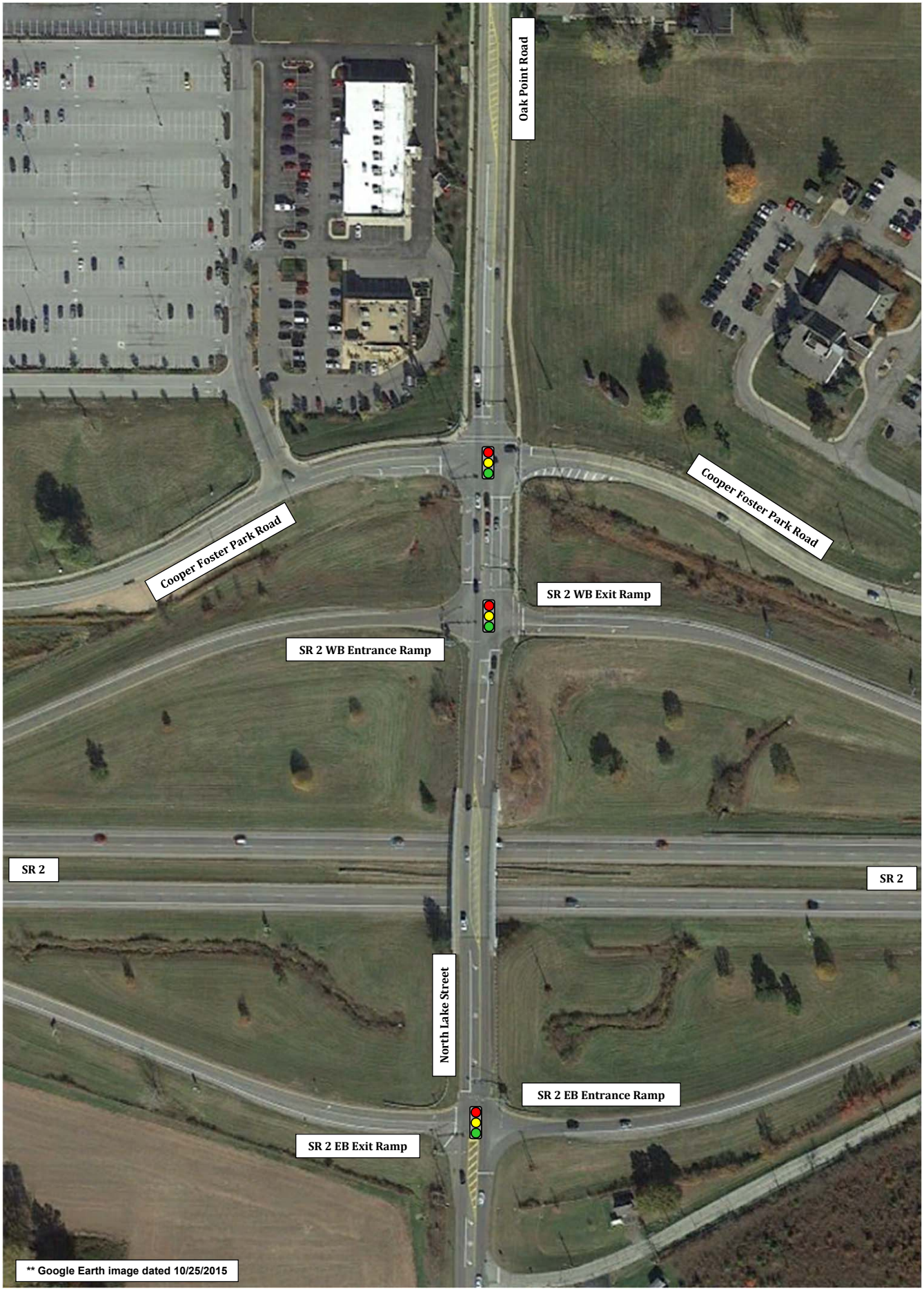
North Lake Street South Approach
- 1 Shared Through & Right Turn Lane

SR 2 EB Exit Ramp West Approach
- 1 Exclusive Left Turn Lane
- 1 Exclusive Right Turn Lane

SR 2 WB Entrance Ramp East Approach
- 1 Receiving Lane

The intersection is controlled by a traffic signal. The intersection operates with 3 signal phases. The first phase allows the southbound moments. The second phase allows all northbound and southbound movements. The third phase allows the eastbound movements from the exit ramp. The southbound left turn movement can be made during the green arrow indication (protected movement) and during a green ball indication when there is a gap in the opposing through traffic movement (permissive movement).

Figure 2.2, Page 14 shows an aerial view of the State Route 2 interchange area with Oak Point Road/North Lake Street and Cooper Foster Park Road.



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COOPER FOSTER PARK ROAD & HOLLSTEIN DRIVE

Cooper Foster Park Road West Approach
- 1 Shared Left Turn & Through Lane

Cooper Foster Park Road East Approach
- 1 Shared Through & Right Turn Lane

Hollstein Drive North Approach
- 1 Exclusive Left Turn Lane
- 1 Exclusive Right Turn Lane

The intersection is controlled by a stop sign on the Hollstein Drive approach. The Cooper Foster Park Road approaches operate under free-flow conditions eastbound left turn movement yielding to the westbound movements.

NORTH MAIN STREET & COOPER FOSTER PARK ROAD

North Main Street North Approach
- 1 Exclusive Left Turn Lane
- 1 Shared Through & Right Turn Lane

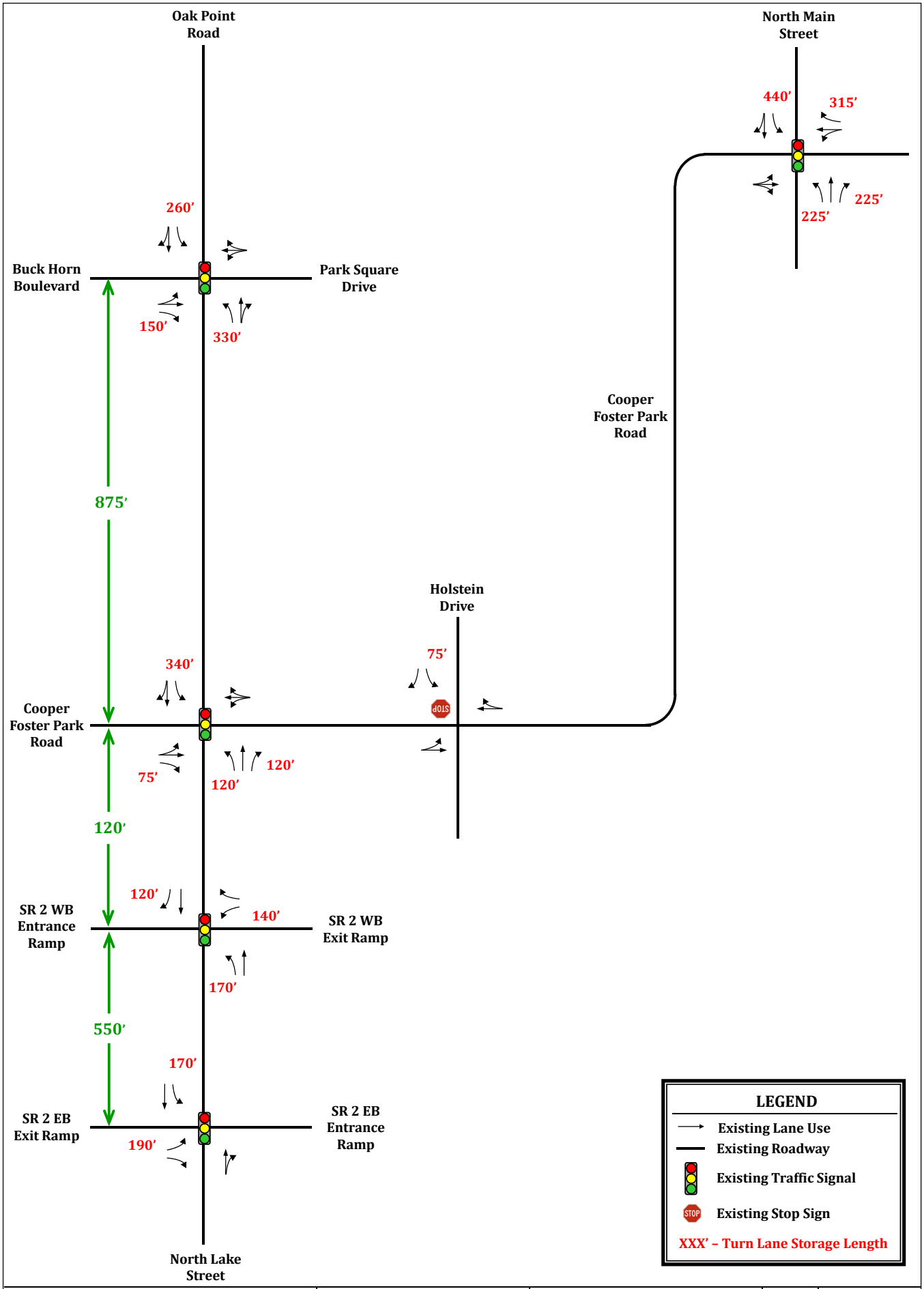
North Main Street South Approach
- 1 Exclusive Left Turn Lane
- 1 Through Lane
- 1 Exclusive Right Turn Lane

Cooper Foster Park Road West Approach
- 1 Shared Left/Through/Right Turn Lane

Cooper Foster Park Road East Approach
- 1 Shared Through & Right Turn Lane
- 1 Exclusive Right Turn Lane

The intersection is controlled by a traffic signal. The intersection operates with 3 signal phases. The first phase allows all southbound movements. The second phase allows all northbound and southbound movements. The third phase allows all eastbound and westbound movements. The southbound left turn movement can be made during the green arrow indication (protected movement) and during a green ball indication when there is a gap in the opposing through traffic movements (permissive movement). The remaining left turn movements can only be made during a green ball indication (permissive movement). The signal operation also includes a right turn overlap that allows the westbound right turn movement during the protected southbound left turn phase.

Figure 2.3, Page 16 shows the lane use and traffic control conditions based upon the existing conditions in the study area. The existing turn lane storage lengths and the available storage between intersections is also shown on **Figure 2.3**. These will be considered the existing base conditions for this report.



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Amherst, Ohio

Existing
Lane Use & Traffic Control

NORTH
NOT TO SCALE

Figure: 2.3

2.2 Traffic

The traffic count data that was collected for this report was conducted just prior to and on the opening day of the Ohio "Stay at Home Order" in response to the COVID-19 pandemic of 2020. The order restricts travel to essential activities primarily related to health and safety. These activities can include, but are not limited, to obtaining necessary supplies, travel for certain types of work, to take care of others, and for outdoor activity. A copy of the stay at home order can be seen in **Appendix B**. Prior to the order travel was beginning to the lessen due to closures of schools and certain businesses.

The collected traffic count data will be used to determine the directional distribution of the turn movements at the study area intersections and the peak hours of traffic flow. However, due to the COVID-19 pandemic and the "Stay at Home" order, these volumes are expected to be less than would typically be experienced at the intersections. The use of available recent and historical traffic data in the study area will be used in conjunction with the collected traffic data to forecast expected current and future traffic volumes in the study area under typical weekday conditions.

Traffic data collection at the study area intersections was performed on Thursday, March 19 and Tuesday, March 24, 2020. The intersection of North Main Street and Cooper Foster Park Road was counted on Tuesday, February 19, 2019. It should be noted that Tuesday, March 24, 2020 was the first day of Ohio's "Stay at Home Order" in response to the COVID-19 pandemic of 2020.

Weekday nine hour turning movement counts were performed on at the following locations:

1. **Oak Point Road & Buck Horn Boulevard**
2. **Oak Point Road/North Lake Street & Cooper Foster Park Road**
3. **North Lake Street & State Route 2 Westbound Ramps**
4. **North Lake Street & State Route 2 Eastbound Ramps**
5. **Cooper Foster Park Road & Hollstein Drive**
6. **North Main Street & Cooper Foster Park Road**

The weekday traffic counts were conducted in fifteen (15) minute intervals between the hours of 7 AM - 10 AM, 11 AM - 2 PM, and 3 PM - 6 PM, then hourly totals were calculated. Average daily traffic was calculated for the roadways using expansion factors to account for daily and seasonal variations according to the recommendations and latest data from the Ohio Department of Transportation. A copy of the intersection turn movement count is included in **Appendix C**.

The following tables detail a breakdown of the hourly volumes during the AM and PM hours that were determined to experience the highest traffic volumes. The data shown in the tables will be used in the determination of the AM and PM peak hours for the study area intersections.

Table 2.3 AM Peak Hour Traffic Volumes
(Total Entering Volume - Vehicles per Hour)

* INTERSECTION #	HOUR BEGINS								
	7:00	7:15	7:30	7:45	8:00	8:15	8:30	8:45	9:00
#1	323	337	326	297	263	259	268	280	297
#2	791	838	878	827	766	750	754	771	762
#3	692	768	802	749	706	670	673	685	664
#4	659	720	716	679	629	579	571	571	549
#5	139	135	143	150	141	158	155	142	149
#6	1047	994	901	825	805	777	775	763	758
TOTAL	3651	3792	3766	3527	3310	3193	3196	3212	3179

*** See Traffic Count Locations Detailed on Page 17**

Table 2.4 PM Peak Hour Traffic Volumes
(Total Entering Volume - Vehicles per Hour)

* INTERSECTION #	HOUR BEGINS @								
	3:00	3:15	3:30	3:45	4:00	4:15	4:30	4:45	5:00
#1	553	535	533	535	555	610	623	595	563
#2	1179	1272	1323	1375	1391	1379	1426	1340	1271
#3	1097	1214	1279	1338	1354	1343	1382	1311	1242
#4	862	889	945	1013	1044	1085	1117	1034	959
#5	229	227	202	218	242	240	252	221	205
#6	1153	1126	1089	1038	1068	1101	1110	1108	1039
TOTAL	5073	5263	5371	5517	5654	5758	5910	5609	5279

*** See Traffic Count Locations Detailed on Page 17**

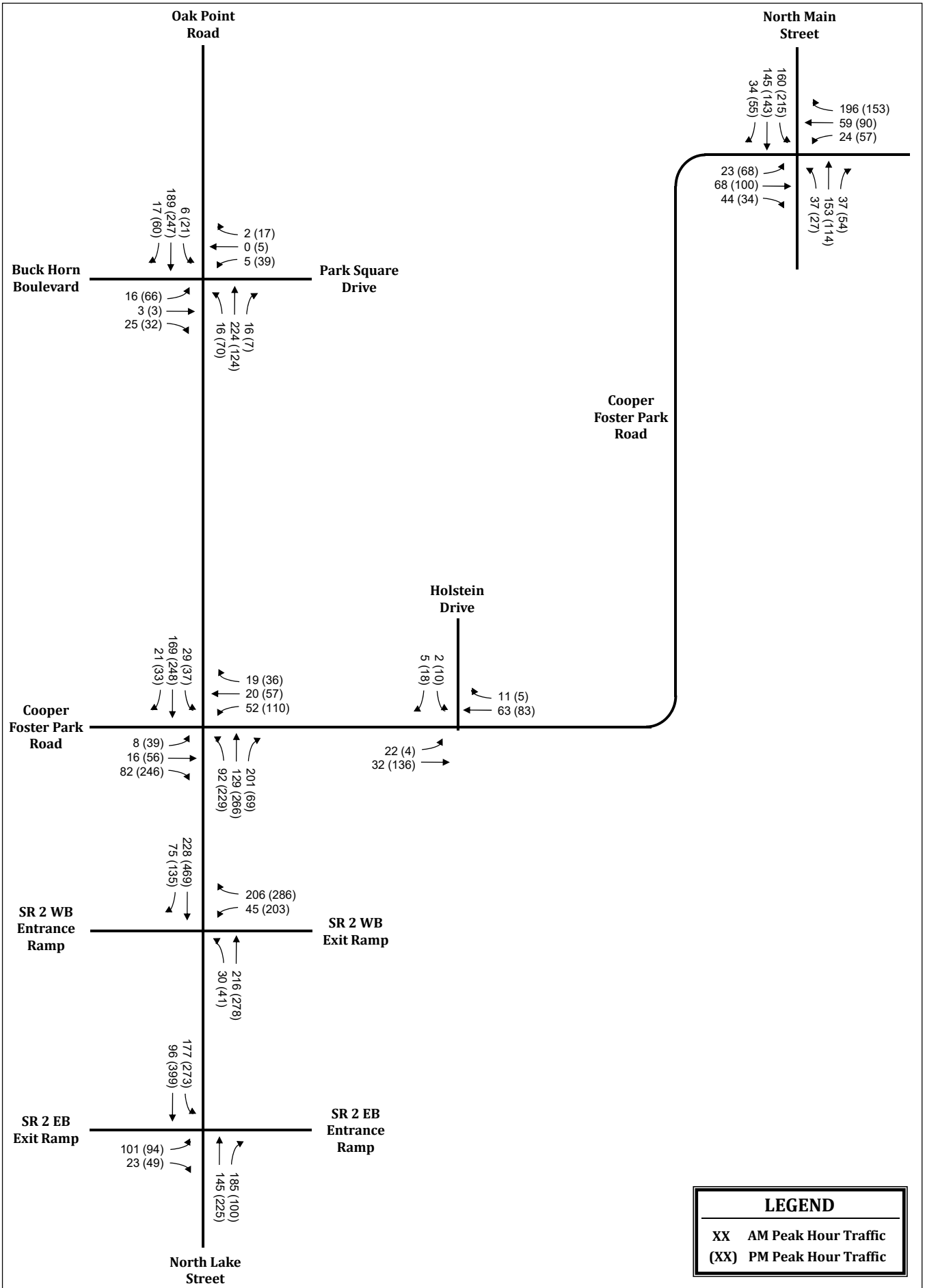
Based on the collected traffic data, the peak hours for the study area were determined based on the AM and PM hour experiencing the highest total volume indicated in red in the previous tables. The weekday AM peak hour of traffic was determined to be 7:15 AM to 8:15 AM. The weekday PM peak hour of traffic was found to be 4:30 PM to 5:30 PM. These periods will be used to forecast expected and future traffic volumes since they reflect the period of the highest volume of vehicular traffic flow for the study area roadways.

The peak hour traffic volumes detailed in **Appendix C** were determined to have minimal variations between the adjacent count locations. The volumes along Oak Point Road/North Lake Street should be equal between the adjacent intersections as there are no intersecting roadways or driveways between the minor streets to gain or lose vehicles.

Balancing traffic volumes is a process by which the differences between traffic volume data at adjacent traffic count locations is eliminated. The volumes along Oak Point Road/North Lake Street were balanced using a combination of the methods described in ODOT's **Ohio Traffic Forecasting Manual, Volume 2** in order to provide a conservative estimate of study area traffic volumes. The method used for the study area uses the volume from a single main intersection as the control volume and carries it through the adjacent intersections.

The volumes along Oak Point Road/North Lake Street were balanced using the volumes from the intersection at Oak Point Road and Cooper Foster Park Road. The volume at Oak Point Road and Cooper Foster Park Road was distributed north and south through the corridor by adding or subtracting the resulting difference to the north and south through movements at each intersection.

The existing *balanced* AM and PM peak hour traffic volumes are shown in **Figure 2.4, Page 21.** It should be noted that it will be necessary to adjust these volumes due to the effects of the COVID-19 pandemic and Ohio's "Stay at Home" order.



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2.3 Crash Data

The Ohio Department of Transportation provides a tool to retrieve crash data. The ODOT GIS Crash Analysis Tool (GCAT) was used to collect crash information at the study area intersections. The ODOT GIS Crash Analysis Tool can currently be found at the following web address:

https://gis.dot.state.oh.us/tims/

The years 2017 through 2019 at the six study area intersections were reviewed using the ODOT GCAT portal. Crash data summaries for each study area intersection with reported crash data can be found in **Appendix D**.

The study area experienced a total of 68 intersection related crashes between 2017 and 2019. Rear end crashes represented approximately 51% (35 crashes) of the total amount of crashes. Angle crashes represented approximately 19% of the crashes. Left and right turn crashes represented approximately 13% of the crashes. These four types of crashes represent the predominate crash types at the study area intersections.

Typical causes of rear end crashes at signalized intersections may include congestion, large turn volumes, slippery surfaces, excessive speed, lack of adequate gaps, and drivers unaware of the intersection. Rear end crashes can also be associated with roadways and intersections that are nearing or exceeding capacity. The cited contributing circumstance for all of the rear end crashes was Followed Too Closely/ACDA. Based on a review of the rear-end crash reports it is likely that driver inattention was also a factor in the crashes.

Typical causes of angle, left turn, and right turn crashes are congestion, large turn volumes, slippery surfaces, excessive speed, poor traffic signal coordination between intersections, inadequate clearance intervals, and poor visibility of traffic control devices. Left turn crashes can also be associated with roadways and intersections that are nearing or exceeding capacity.

The crashes were tabulated by intersection and crash type in order to address probable causes and corrective measures at each intersection based on the dominate crash type. The table detailing the intersection crash patterns and probable causes can be seen on the following page:

Table 2.6 - 2017 - 2019 Intersection Crash Patterns

INTERSECTION	TOTAL CRASHES (INJURY)	CRASH RATE*	MAJOR CRASH PATTERN	PROBABLE CAUSE
Oak Point Road & Buck Horn Blvd.	6 (0)	0.69	Rear End (5)	Roadway surface (weather) Traffic signal timing Congestion Driver inattention
Oak Point Road & Cooper Foster Park	16 (5)	0.76	Angle (4) Right Turn (4) Rear End (4) Left Turn (3)	Large turning volumes Poor device visibility Traffic signal timing Congestion Driver inattention
North Lake Street & SR 2 WB Ramps	23 (3)	1.19	Rear End (16) Angle (4)	Large turning volumes Poor device visibility Traffic signal timing Congestion Driver inattention
North Lake Street & SR 2 EB Ramps	9 (2)	0.58	Rear End (3) Angle (2)	Large turning volumes Poor device visibility Traffic signal timing
Cooper Foster Park & Hollstein	0	0.00		
North Main Street & Cooper Foster Park	14 (1)	0.98	Rear End (7) Angle (3) Left Turn (2)	Driver inattention Large turning volumes Traffic signal timing

*** Crash Rate - Crashes per Million Entering Vehicles**

Typical countermeasures in order to reduce the frequency of left turn, right turn, and angle crashes may include:

- Improve turn lane channelization with turn lanes.
- Update signal timing with optimized change and clearance intervals.
- Install signal backplate/retro-reflective back-plates to increase visibility of traffic control devices.
- Install "Left Turn Yield On Green Ball" signs (R10-12) on the traffic signal mast arms for approaches with protected and permissive left turn phases.
- Upgrade traffic signal control to use the flashing yellow arrow for the left turn movements.

Typical countermeasures in order to reduce the frequency of rear end crashes may include:

- Update signal timing with optimized change and clearance intervals.
- Install signal backplate/retro-reflective back-plates to increase visibility of traffic control devices.
- Provide surface treatment to increase friction of roadway surface.

Crash Diagram

An intersection crash diagram was prepared for the each intersection based on the results from the previous table and the summaries in **Appendix D**.

A crash diagram is a schematic drawing that has been compiled from a series of individual crash reports relative to a specific location (intersection). The diagram includes the vehicles direction of travel prior to contact, and the presence of any pedestrians or bicycles whose presence contributed to a collision or were involved directly in the crash. The crash diagrams can be used as a visual reference in analyzing possible crash patterns at an intersection.

The crash diagrams include the following information:

- Title block with project and study area description.
- Schematic of the location with the approaches labeled and directional arrow indicating north.
- A legend key to denote the symbols and abbreviations used in the diagram.
- Each crash includes the date in the following format: MM-DD-YR
- Each crash also includes the road conditions, light conditions, and the severity of the crash (Property Damage, Injury, or Fatality).

The crash data from the years 2017 through 2019 was used to create a crash diagram for each intersection under study. The intersection crash diagrams can be seen in **Appendix E**.

Chapter 3
Projected Traffic Conditions

3.1 Adjusted Traffic

The collected peak hour traffic volumes have been impacted due to the COVID-19 pandemic and the Ohio "Stay at Home Order". The traffic volumes as they were collected are not representative of a typical weekday under normal travel patterns and show less volume. The ODOT Modeling and Forecasting Section of the Office of Statewide Planning and Research has developed a process to calibrate counts that are artificially low due to the COVID-19 situation. An overview of the ODOT guidance and process can be seen in **Appendix F.** The development of calibration factors for the study area traffic volumes in order to determine the base line traffic conditions for future forecasting is described in the following paragraphs.

The ODOT Traffic Monitoring Management System (TMMS) was consulted to determine available Peak Hour Traffic along the study area roadways. Data from the following locations will be used to forecast the 2020 traffic volumes for the study area intersections on a typical weekday:

1. **State Route 2 Westbound Exit Ramp - Location ID 24547**
2. **State Route 2 Westbound Entrance Ramp - Location ID 24347**
3. **State Route 2 Eastbound Exit Ramp - Location ID 24247**
4. **State Route 2 Eastbound Entrance Ramp - Location ID 24447**

These locations were determined to provide recent peak hour traffic data. The peak hour data from these locations will be used in conjunction with the collected peak hour volumes to determine calibration factors for the AM and PM peak hours at the study area intersections.

The COVID factors are determined by dividing the historical peak hour volume by the collected peak hour volume for each ramp. The average of the four ramps was used to determine the COVID factor for the study area that will be applied to all intersections with the exception of North Main Street and Cooper Foster Park Road. The North Main Street and Cooper Foster Park Road intersection was counted in 2019 and was not impacted by the COVID-19 pandemic and the Ohio "Stay at Home Order"

The AM peak hour was determined to have a COVID factor of 1.358 and the PM peak hour had a factor of 1.293. Calculations to determine the COVID factors can be seen in **Appendix F**.

3.2 Site Traffic

Trip Generation

Calculating future total driveway trips requires an estimate of the traffic generated by proposed developments in the study area. The most widely accepted method of determining the amount of traffic that the proposed development will generate is to compare the proposed land use with existing facilities of the same use. The Institute of Transportation Engineers (ITE) has prepared a manual titled "**Trip Generation Manual**", which is a compilation of similar traffic generation studies to aide in making such a comparison. The most recent update of this manual is the 10TH edition and was utilized for this study.

The following developments were identified in the study area that are either under construction currently or will be in the near future:

- Medical Office Building (17,756 SF) - 2021
- Reserve at Beaver Creek Subdivision (109 Units) - 2021
- Eagle Ridge Subdivision (59 Units) - 2021
- Preserve at Quarry Lakes Subdivision (100 Units) - 2020
- Buckeye Square/Nova Medical Offices (11,325 SF) - 2020
- Sandy Springs PUD (161 Units)

The Preserve at Quarry Lakes is nearly built out. The remaining residential developments have recently started construction or about to begin construction. The Preserve at Quarry Lakes will not be included in the site generated trips for the future traffic forecasts due to the nearly built out status of the development. The remaining developments will be included in the future forecasts based on the total number of units regardless of the status of the development build out. It is our opinion that these assumptions will provide a conservative estimate of generated traffic from the proposed developments in the study area based on the status of each development.

The following table details the development land use and the corresponding ITE land use that will be used to forecast the site generated traffic volumes for future conditions:

Table 3.1 ITE Land Use Code

SITE PLAN DESCRIPTION	LAND USE	ITE CODE	ITE DESCRIPTION
Medical Office Building	Office	720	Medical-Dental Office Building
Reserve at Beaver Creek	Residential	210	Single Family Detached Housing
Eagle Ridge	Residential	210	Single Family Detached Housing
Buckeye Square/Nova	Office	720	Medical-Dental Office Building
Sandy Springs	Residential	210	Single Family Detached Housing

The following table details the development generated traffic volumes based on the previously described methods as outlined in the (ITE) **Trip Generation Handbook**. Copies of the trip generation worksheets can be seen in **Appendix G**.

Table 3.2 Site Generated Traffic

ITE TRIP GENERATION		SIZE (Units or SF)	TRIP ENDS			
ITE Code	Land Use Description		AM Peak Hour of Generator (Enter/Exit)		PM Peak Hour of Generator (Enter/Exit)	
720	Medical Office Building	17,756 SF	39	24	28	43
210	Reserve at Beaver Creek	109 Units	23	65	74	42
210	Eagle Ridge	59 Units	13	37	42	23
720	Buckeye Square/Nova	11,325 SF	26	16	17	27
210	Sandy Springs	161 Units	32	92	107	60
TOTAL NEW GENERATED TRIPS			**133**	**234**	**268**	**195**
			367		**463**	

Distribution of Generated Traffic

The directional distribution for the new generated traffic of each development is a function of the prevailing operating conditions on the existing roadways. The primary distribution patterns that were assumed for each development are based upon the existing traffic volumes entering and exiting the study area during the AM and PM peak hours shown in **Figure 2.4**.

The distribution pattern that was assumed at each development was based on the overall inbound (entering traffic) and outbound (exiting traffic) at each point of access for the proposed developments. The entering and exiting site generated traffic was then distributed through the study area roadway network based on the distribution of traffic at each intersection as the traffic volumes progress through the system.

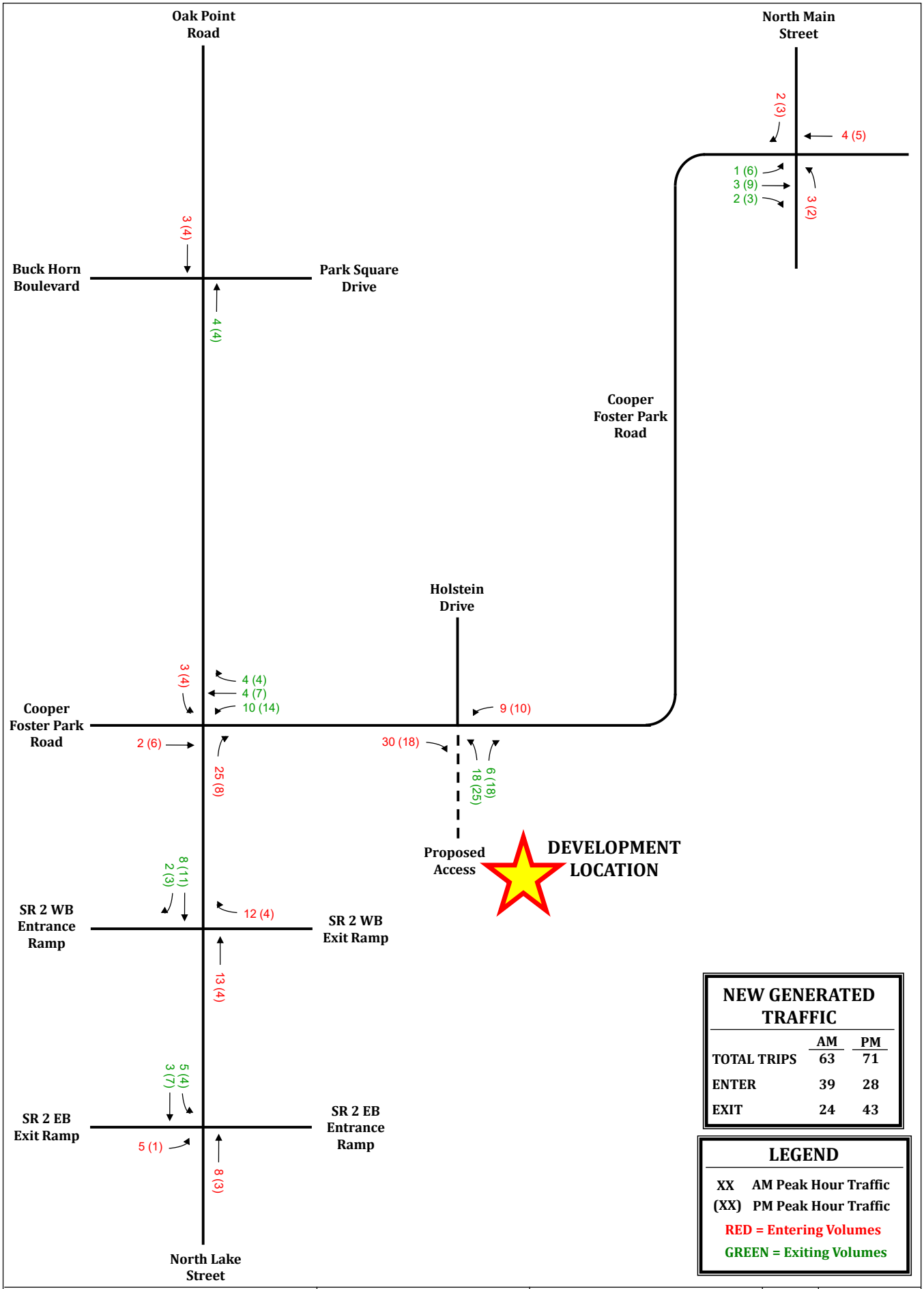
The directionally distributed site generated trips for the proposed Medical Office Building located along the south side of Cooper Foster Park Road at Hollstein Drive can be seen in **Figure 3.1, Page 30**

The directionally distributed site generated trips for the proposed Reserve at Beaver Creek subdivision located at the north end of Hollstein Drive can be seen **Figure 3.2, Page 31**.

The directionally distributed site generated trips for the proposed Eagle Ridge subdivision located along the north side of Cooper Foster Park Road to the west of Oak Point Road can be seen **Figure 3.3, Page 32**.

The directionally distributed site generated trips for the proposed Buckeye Square/Nova medical offices located at the southeast corner of the North Main Street and Cooper Foster Park Road intersection can be seen **Figure 3.4, Page 33**.

The directionally distributed site generated trips for the proposed Sandy Springs PUD located north of Buck Horn Boulevard along the west side of Oak Point Road can be seen **Figure 3.5, Page 34**.



NEW GENERATED TRAFFIC

	AM	PM
TOTAL TRIPS	63	71
ENTER	39	28
EXIT	24	43

LEGEND

XX AM Peak Hour Traffic
(XX) PM Peak Hour Traffic
RED = Entering Volumes
GREEN = Exiting Volumes

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Cooper Foster
Medical Building
New Generated Trips

NORTH
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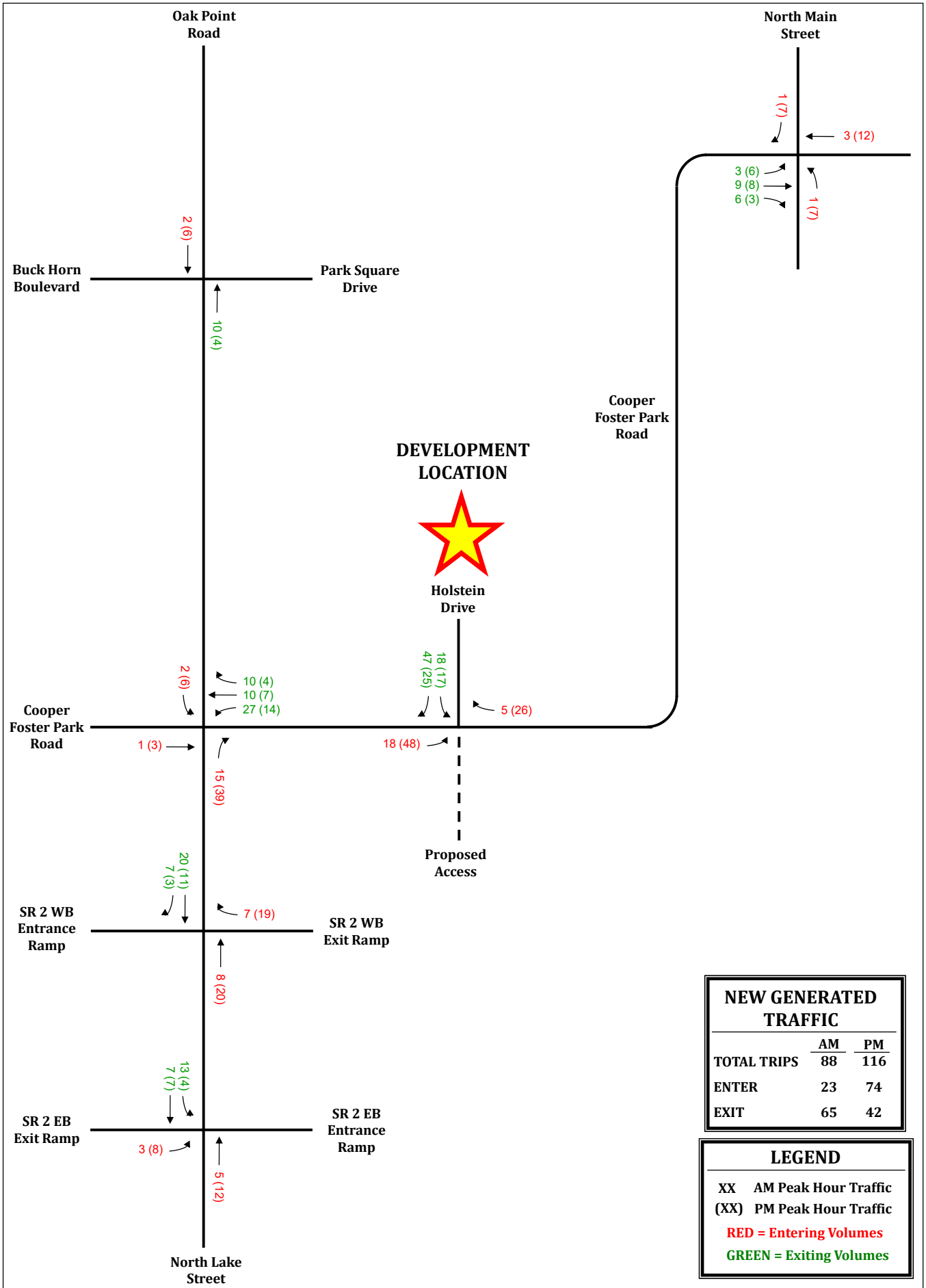
Figure: 3.1



NEW GENERATED TRAFFIC	AM	PM
TOTAL TRIPS	88	116
ENTER	23	74
EXIT	65	42

LEGEND

XX AM Peak Hour Traffic
(XX) PM Peak Hour Traffic
RED = Entering Volumes
GREEN = Exiting Volumes

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Reserve at Beaver Creek
Residential Development
New Generated Trips

NORTH
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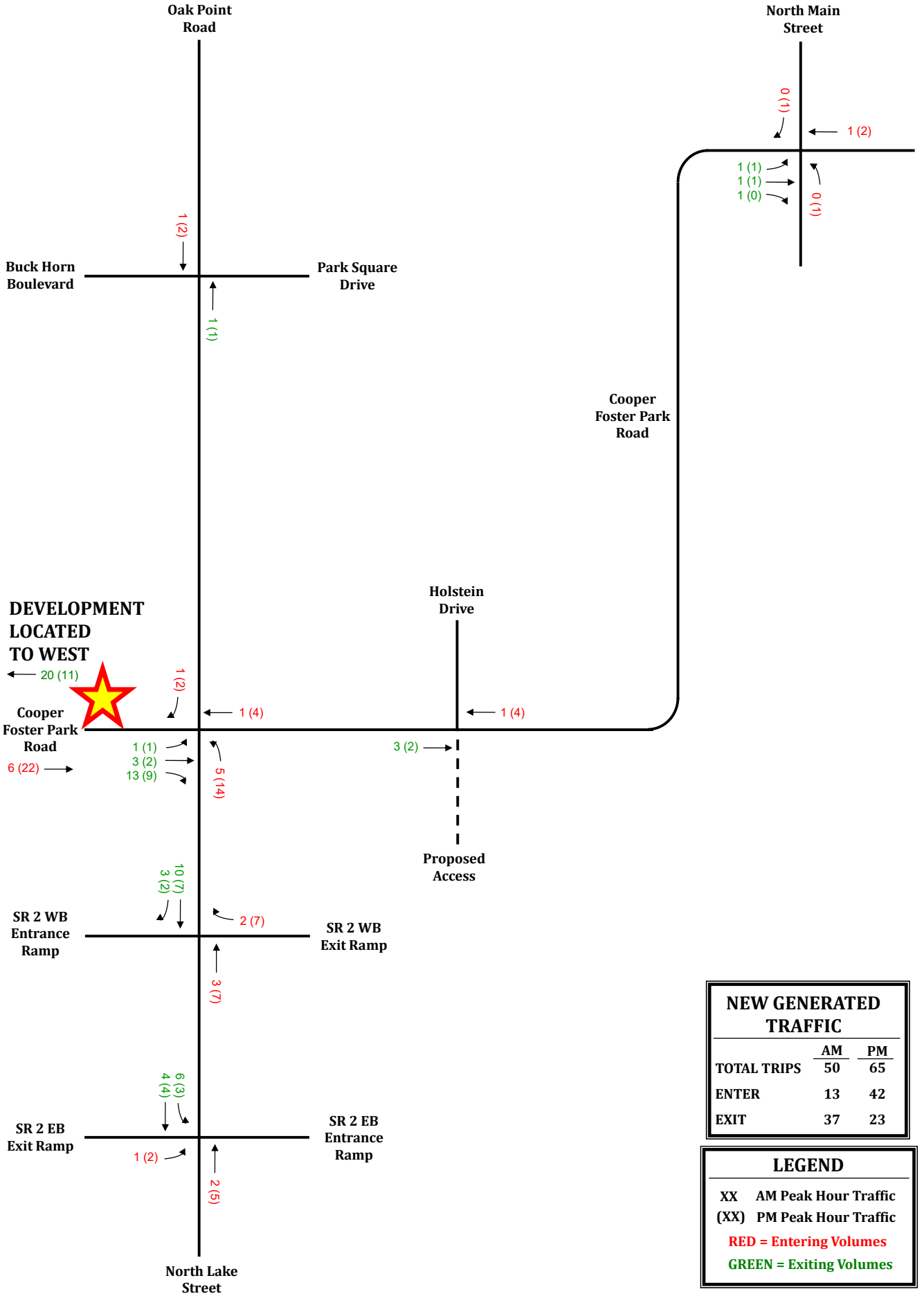
Figure: 3.2



NEW GENERATED TRAFFIC	AM	PM
TOTAL TRIPS	50	65
ENTER	13	42
EXIT	37	23

LEGEND

XX AM Peak Hour Traffic
(XX) PM Peak Hour Traffic
RED = Entering Volumes
GREEN = Exiting Volumes

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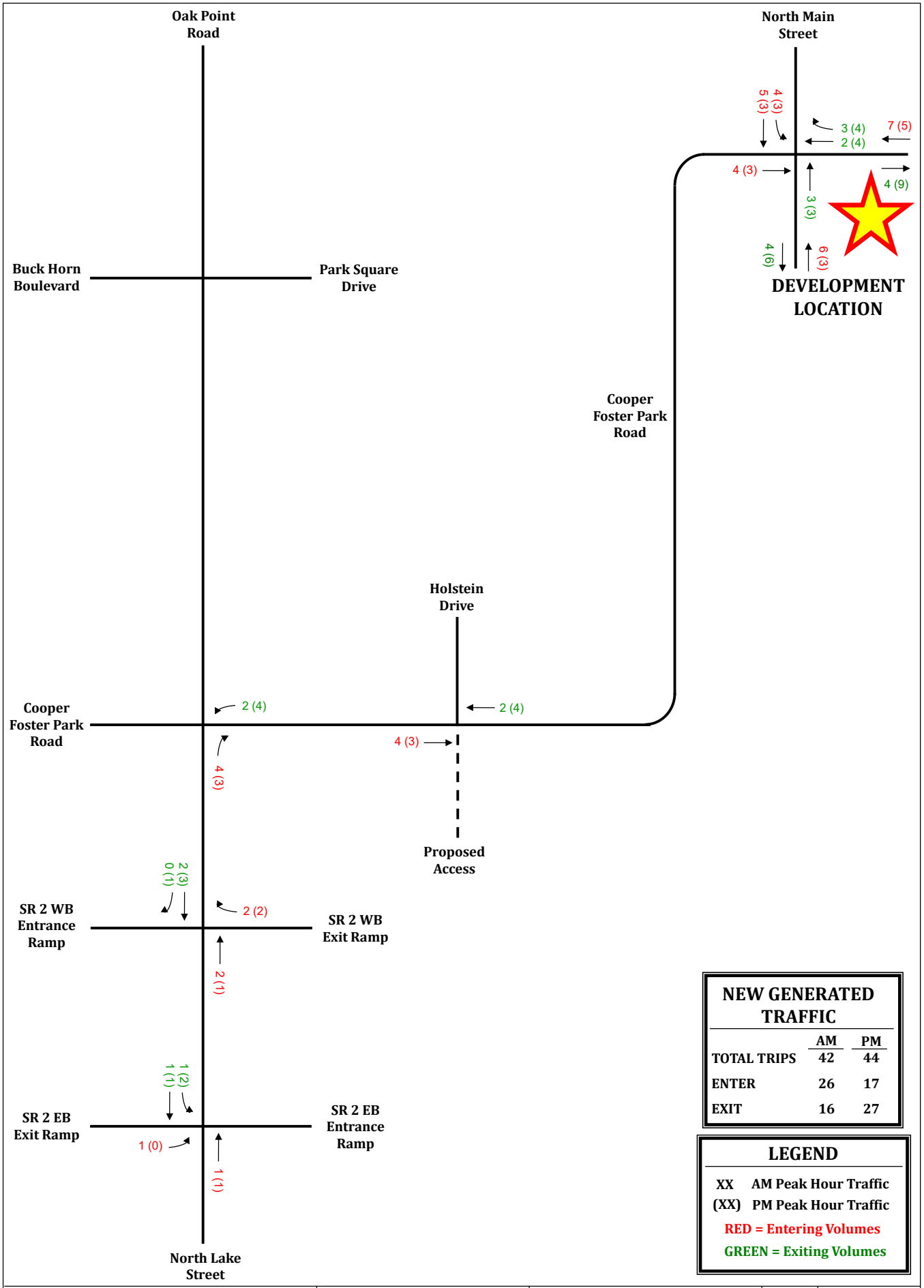
Eagle Ridge
Residential Development
New Generated Trips

NORTH
NOT TO SCALE

Figure: 3.3



NEW GENERATED TRAFFIC

	AM	PM
TOTAL TRIPS	42	44
ENTER	26	17
EXIT	16	27

LEGEND

XX AM Peak Hour Traffic
(XX) PM Peak Hour Traffic
RED = Entering Volumes
GREEN = Exiting Volumes

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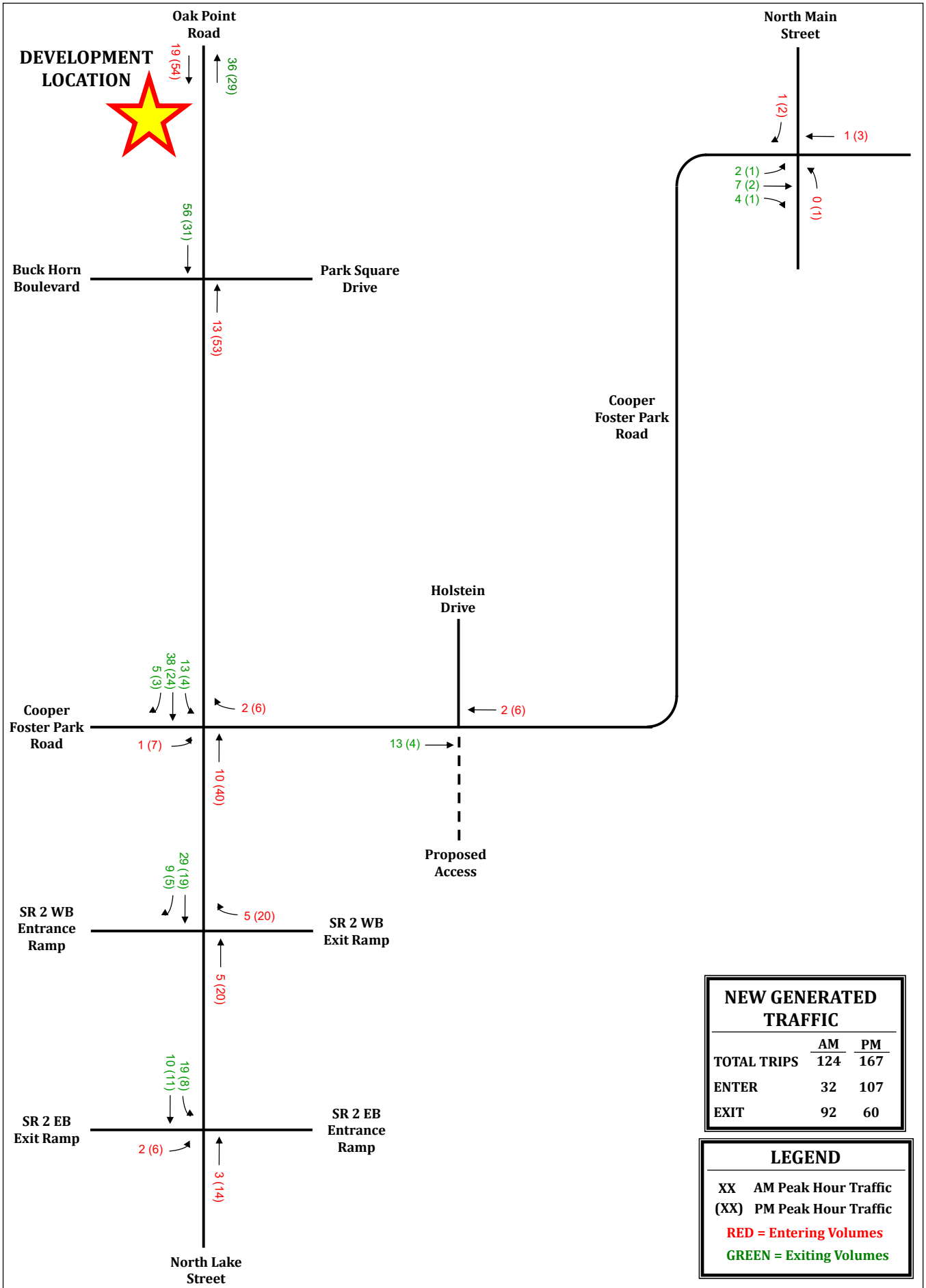
Buckeye Square/NOVA
Medical Office Building
New Generated Trips

NORTH
NOT TO SCALE

Figure: 3.4



NEW GENERATED TRAFFIC

	AM	PM
TOTAL TRIPS	124	167
ENTER	32	107
EXIT	92	60

LEGEND

XX AM Peak Hour Traffic
(XX) PM Peak Hour Traffic
RED = Entering Volumes
GREEN = Exiting Volumes

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Sandy Springs
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New Generated Trips

NORTH
NOT TO SCALE

Figure: 3.5

3.3 Non-Site Traffic

Background Traffic Growth

Design of new roadways or improvements to existing roadways should not usually be based on current traffic volumes alone, but should consider future traffic volumes expected to make use of the facilities. Roadways should be designed to accommodate the traffic volume that is likely to occur within the design life of the facility. In a practical sense, this design volume should be a value that can be estimated with reasonable accuracy. It is believed that the maximum design period is in the range of 15 to 24 years. Therefore, a period of twenty years is widely used as a basis for design for large projects. Traffic cannot usually be forecasted accurately beyond this period on a specific facility because of probable changes in the general regional economy, population, and land development along the roadway. The ODOT **Certified Traffic Manual** requires that twenty year design hour traffic volumes be analyzed.

Roadways, like those found in the study area, carry a significant amount of through traffic due to their functional characteristics. This through traffic component generally increases as regional growth occurs. Therefore, it is anticipated that existing traffic in the study area will increase in future years.

The years 2022 (Opening Year) and 2042 (Design Year) will be analyzed for the study area. Therefore, it is necessary to estimate historical growth rates in order to establish the future traffic on the study area roadways.

A growth rate for the study area was developed using data supplied by the Northeast Areawide Coordinating Agency (NOACA). NOACA provided 2020 and 2040 traffic data from the NOACA Travel Forecasting Model for the study area at the State Route 2 interchange. A copy of the NOACA supplied data can be found in **Appendix H**.

A linear growth rate of 0.7088% per year was utilized to estimate the AM peak hour traffic growth based on the growth from the 2020 data to the 2040 data that was supplied. A linear growth rate of 1.3831% per year was utilized to estimate the PM peak hour traffic growth based on the growth from the 2020 data to the 2040 data that was supplied. A copy of the growth rate calculations can be seen in **Appendix H**.

Design Hour Traffic

The traffic patterns on any roadway typically show considerable variation in the traffic volumes experienced during the various hours of the day and in the hourly volumes experienced throughout the year. A key decision in the design process involves determining which of these hourly traffic volumes should be used as the basis for the design.

It would be wasteful to predicate a design on the maximum peak hour traffic that occurs during the year and the use of the average hourly traffic would result in an inadequate design. The hourly traffic volumes used in a design should not be exceeded very often or by very much. However, the hourly traffic volumes should not be so high that traffic would rarely be sufficient to make full use of the designed facility.

Normal design policy in the State of Ohio is based upon a review of curves that depict the variation in hourly traffic volumes during the year. The Ohio Department of Transportation recommends using the 30^{TH} highest hour as a design control for urban streets. There is typically very little difference between the volumes in this range. The Ohio Department of Transportation provides factors that are applied to counted daily traffic volumes to determine appropriate design hour traffic volumes.

Following guidelines set forth in the **ODOT State Highway Access Management Manual**, all analyses are required to examine the design hour volume for the adjacent roadway and peak hour traffic volume of the proposed development. The **Ohio Traffic Forecasting Manual** will be used to determined peak hour factors for the study area roadways.

The design hour volumes are determined by multiplying the AM and PM peak hour volumes by the appropriate factors from the ODOT Peak Hour to Design Hour Factor Report based on the functional classification of the roadway, the day of the week and the month that the traffic data was collected. A copy of the ODOT's Peak Hour to Design Hour Factor Report can be seen in **Appendix I**.

Table 3.3 - Peak Hour to Design Hour Factors

LOCATION	AREA	FUNCTIONAL CLASSIFICATION	MONTH	DAY	DHV FACTOR
SR 2 Ramps	Urban	Freeway/Expressway	March	Thursday	1.105
Cooper Foster @ Oak Point	Urban	Minor Arterial	March	Thursday	1.135
Cooper Foster @ Hollstein	Urban	Minor Arterial	March	Tuesday	1.158
Cooper Foster @ N. Main	Urban	Minor Arterial	February	Tuesday	1.161
North Main Street	Urban	Minor Arterial	February	Tuesday	1.161
Oak Point @ Buck Horn	Urban	Major Collector	March	Tuesday	1.158
Oak Point @ Cooper Foster	Urban	Major Collector	March	Thursday	1.135
North Lake Street	Urban	Major Collector	March	Thursday	1.135
Buck Horn Boulevard	Urban	Local Roadway	March	Tuesday	1.158
Park Square Drive	Urban	Local Roadway	March	Tuesday	1.158
Hollstein Drive	Urban	Local Roadway	March	Tuesday	1.158

3.4 Future Traffic

No-Build Condition

The previously discussed calculation of COVID factors, design hour factors, and growth rates for each movement were applied to the existing 2020 traffic volumes shown in **Figure 2.4** in order to estimate the future traffic without the site specific developments discussed in Section 3.2.

A spreadsheet detailing the use of the COVID factors, the calculated growth rates, the design hour factors, and the resulting expected 2022 and 2042 No-Build traffic volumes can be found in **Appendix F**.

The estimated 2022 and 2042 No-Build traffic volumes for the study area are shown graphically in **Figures 3.6 and 3.7, Pages 39 and 40**. This traffic is the expected traffic if the proposed developments **are not** constructed, the **"No-Build"** condition.

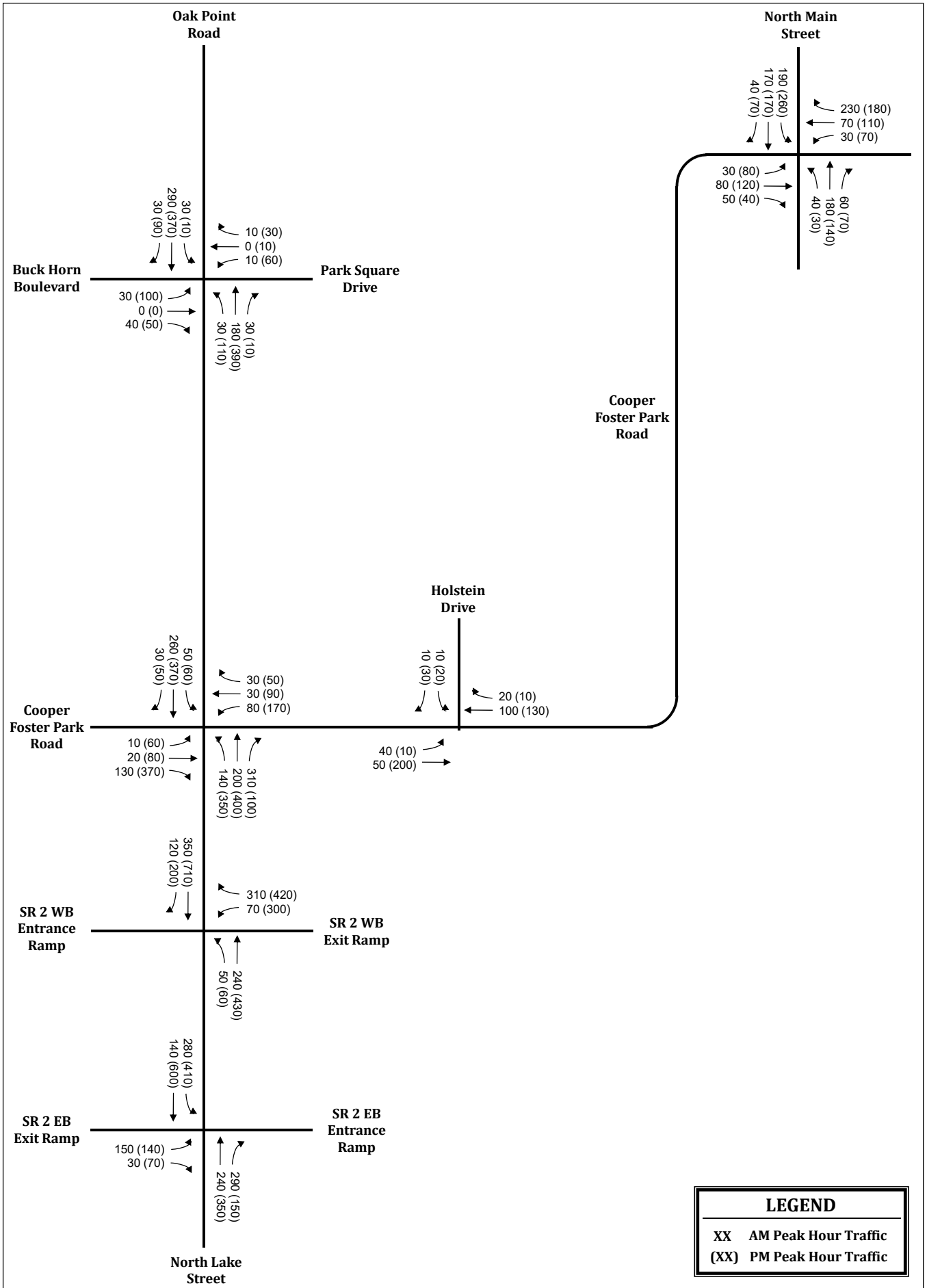
The No-Build traffic volumes have been rounded to the nearest 10 to adhere to preferred ODOT practices.

Build Condition

The sum of the 2022 and 2042 No-Build volumes, shown in **Figures 3.6 and 3.7**, were added to the new generated traffic (**Figures 3.1 - 3.5**) to equal the future Build peak hour volumes in order to estimate the future traffic considering the expected conditions.

The estimated 2022 Build traffic volumes for the study area are shown graphically in **Figure 3.8, Page 41**. These traffic volumes are the expected volumes if the proposed developments **are** constructed, or the **"Build"** condition.

The estimated 2042 Build traffic volumes for the study area under the full build conditions are shown graphically in **Figures 3.9, Pages 42**. These traffic volumes are the expected volumes if the proposed developments **are** constructed, or the **"Build"** condition.



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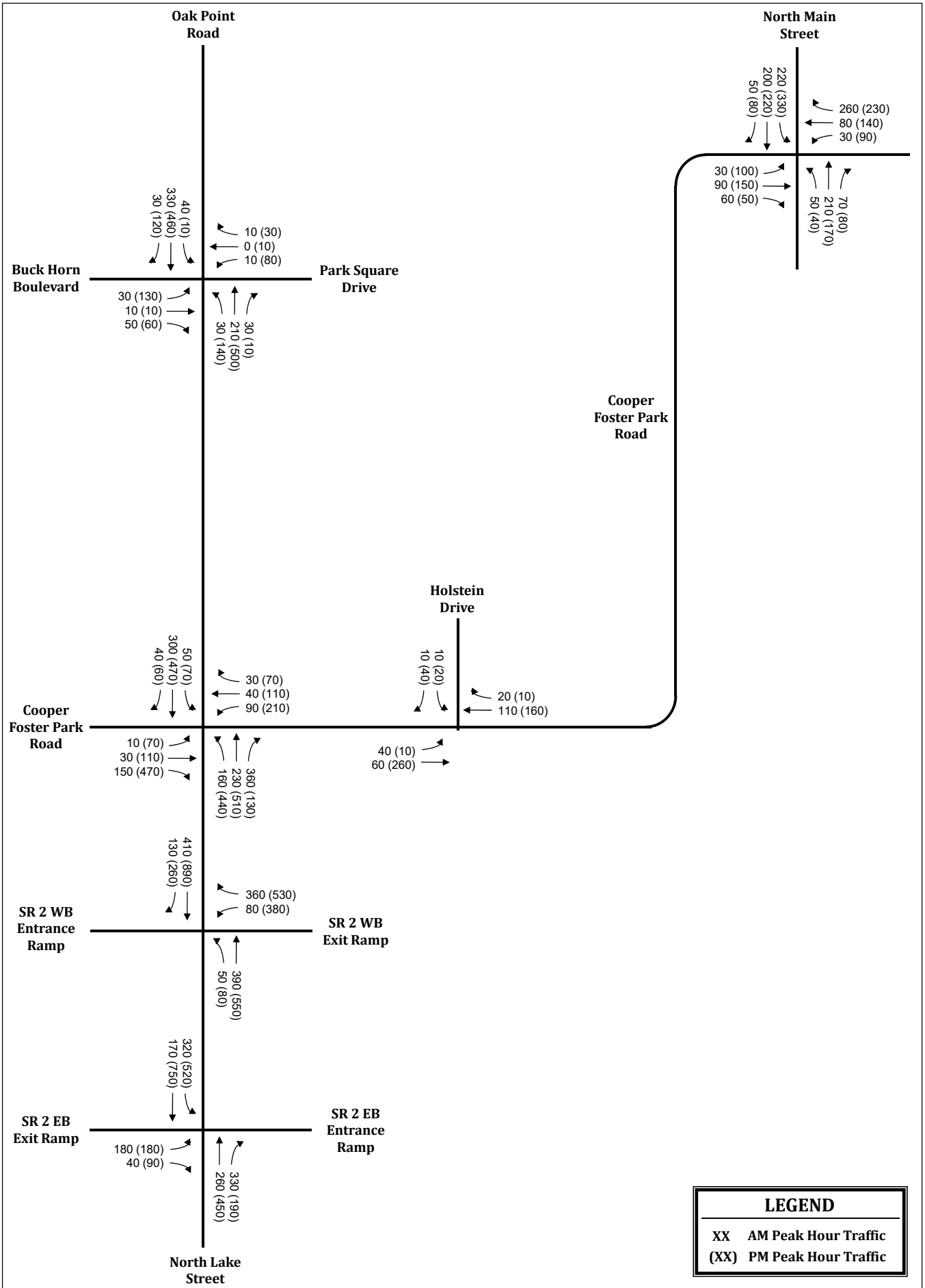

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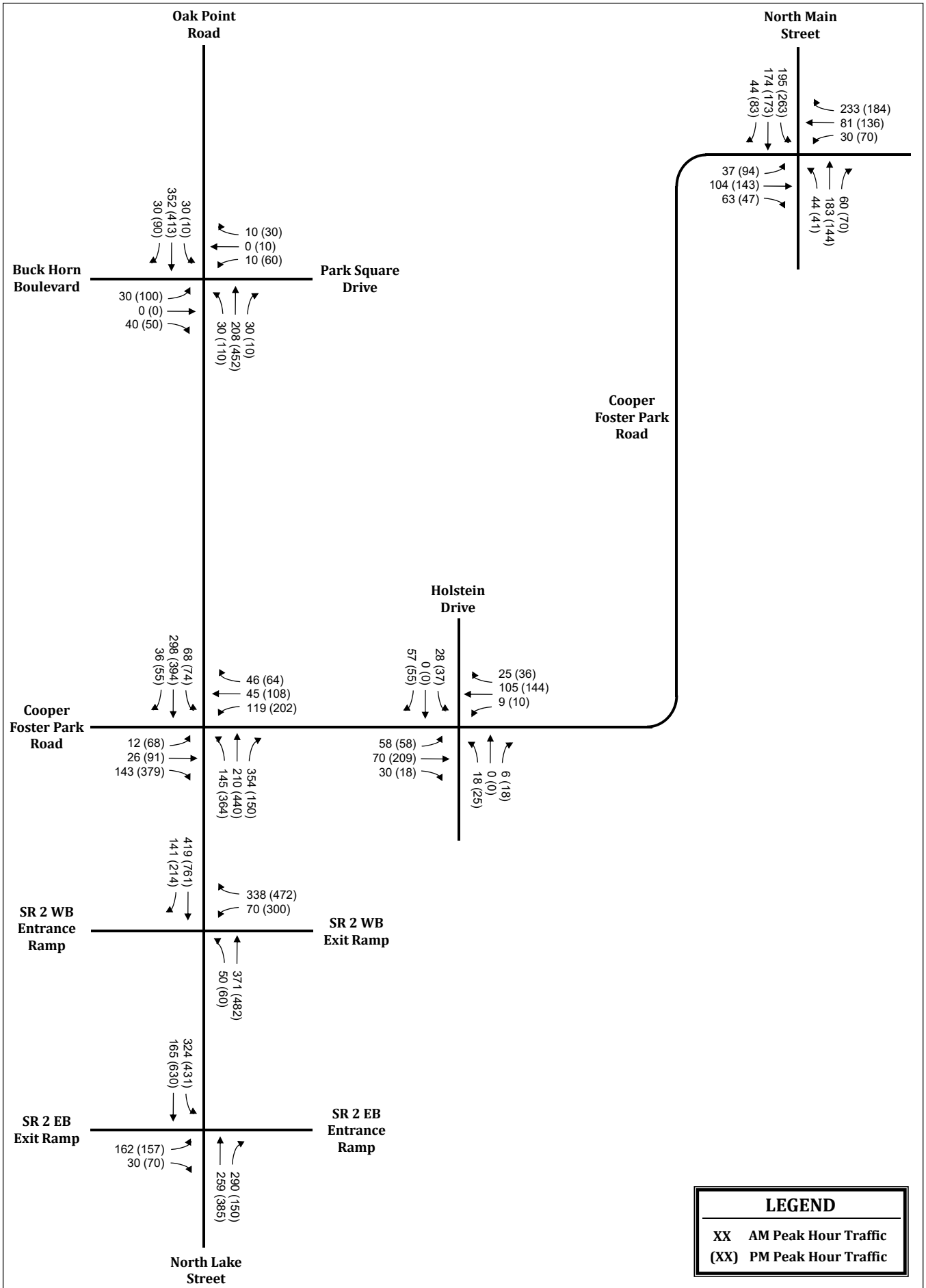
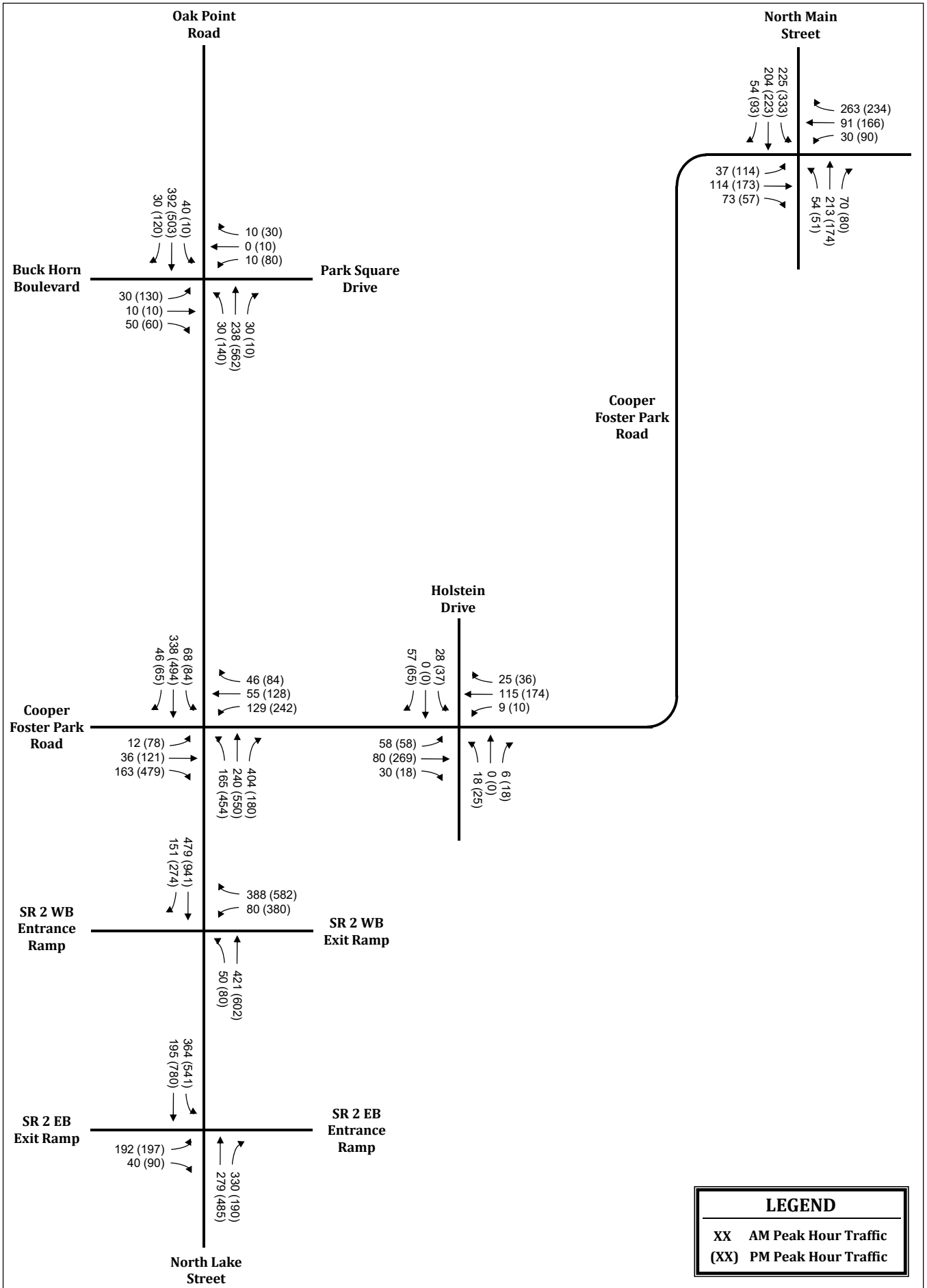


TMS Engineers, Inc. Transportation Management Services 2112 Case Parkway S., Unit 7, Twinsburg, Ohio 44087 www.TMSEngineers.com	Areawide Planning Study Amherst, Ohio	2022 Build Peak Hour Traffic Volumes	NORTH NOT TO SCALE	Figure: 3.8 Page: 41



TMS Engineers, Inc. Transportation Management Services 2112 Case Parkway S., Unit 7, Twinsburg, Ohio 44087 www.TMSEngineers.com	Areawide Planning Study Amherst, Ohio	2042 Build Peak Hour Traffic Volumes	NORTH NOT TO SCALE	Figure: 3.9 Page: 42

Chapter 4
Traffic Analysis

4.1 Future Conditions Analysis

Build Conditions - 2022 Capacity Analysis

Analyses were performed for the projected 2022 Build conditions. The traffic volumes used in the analyses can be seen in **Figure 3.8**. Copies of the capacity worksheets are included in **Appendix J.**

The results of the Year 2022 Build analyses with the existing roadway conditions are shown in the following table:

Table 4.1 - 2022 Levels-of-Service
(Build Volumes & Existing Roadway Conditions)

INTERSECTION	TRAFFIC CONTROL	MOVEMENT / APPROACH	AM PEAK LOS (DELAY)	PM PEAK LOS (DELAY)
Oak Point Road &	Traffic Signal	Intersection	B (19.7)	C (23.6)
Buck Horn Boulevard		Eastbound	B (18.7)	C (23.5)
		Westbound	C (21.1)	C (24.9)
		Northbound	B (18.3)	C (22.1)
		Southbound	C (20.7)	C (25.1)
Oak Point Road &	Traffic Signal	Intersection	C (20.6)	C (32.0)
Cooper Foster Park Road		Eastbound	B (18.2)	C (23.1)
		Westbound	C (23.6)	D (39.0)
		Northbound	C (20.7)	C (28.5)
		Southbound	B (19.9)	D (36.5)

(XX.X) = Average vehicle delay in seconds per vehicle

Table 4.1 - 2022 Levels-of-Service
(Build Volumes & Existing Roadway Conditions)

INTERSECTION	TRAFFIC CONTROL	MOVEMENT/ APPROACH	AM PEAK LOS (DELAY)	PM PEAK LOS (DELAY)
North Lake Street &	Traffic Signal	Intersection	B (17.9)	C (27.7)
SR 2 WB Ramps		Westbound	C (22.1)	D (35.8)
		Northbound	B (16.7)	B (19.7)
		Southbound	B (15.8)	C (25.7)
North Lake Street &		Intersection	C (26.4)	C (25.6)
SR 2 EB Ramps		Eastbound	C (29.1)	C (33.7)
		Northbound	C (29.5)	C (34.4)
		Southbound	C (21.8)	B (19.4)
Cooper Foster Park Road	One-Way Stop	Eastbound	A (7.6)	A (7.8)
Hollstein Drive		Westbound	A (7.5)	A (7.8)
		Northbound	B (11.6)	B (13.4)
		Southbound	B (10.1)	B (11.7)
North Main Street &	Traffic Signal	Intersection	B (14.7)	B (15.3)
Cooper Foster Park Road		Eastbound	B (17.9)	B (18.2)
		Westbound	B (14.6)	B (14.8)
		Northbound	B (17.4)	B (17.8)
		Southbound	B (11.4)	B (12.8)

(XX.X) = Average vehicle delay in seconds per vehicle

Conditions at the study area intersections during the AM and PM peak hour were determined to operate with level-of-service D or better.

The following turn lanes were determined to experience a queue length which exceeds the existing length of the turn lane based on the HCS analysis:

Oak Point Road & Cooper Foster Park Road

- Northbound Right Turn Lane (AM Peak Hour)
- Northbound Left Turn Lane (PM Peak Hour)
- Eastbound Right Turn Lane (AM Peak Hour)

North Lake Street & State Route 2 Westbound Ramps

- Westbound Left Turn Lane (PM Peak Hour)
- Southbound Right Turn Lane (PM Peak Hour)

North Lake Street & State Route 2 Eastbound Ramps

- Southbound Left Turn Lane (AM & PM Peak Hour)

The 2022 capacity analyses determined that multiple turn lanes in the Oak Point Road/North Lake Street corridor are not long enough to accommodate the expected traffic volumes.

Mitigation scenarios at these locations will be investigated in the following sections to determine if the impact of queued traffic can be reduced.

Build Conditions - 2042 Capacity Analysis

Analyses were performed for the projected 2042 design year conditions under the Build scenario. The traffic volumes used in this analysis can be seen in **Figure 3.9**. Copies of the capacity worksheets are included in **Appendix K.**

The results of the Year 2042 Build analyses with the existing roadway conditions are shown in the following table:

Table 4.2 - 2042 Levels-of-Service
(Build Volumes & Existing Roadway Conditions)

INTERSECTION	TRAFFIC CONTROL	MOVEMENT / APPROACH	AM PEAK LOS (DELAY)	PM PEAK LOS (DELAY)
Oak Point Road &	Traffic Signal	Intersection	C (21.4)	C (25.9)
Buck Horn Boulevard		Eastbound	B (17.9)	C (26.4)
		Westbound	C (20.1)	C (27.6)
		Northbound	B (19.8)	C (23.4)
		Southbound	C (23.2)	C (28.3)
Oak Point Road &	Traffic Signal	Intersection	C (20.4)	E (60.7)
Cooper Foster Park Road		Eastbound	C (20.4)	C (21.4)
		Westbound	C (26.4)	F (100.1)
		Northbound	B (19.6)	D (52.5)
		Southbound	B (18.8)	F (89.5)

(XX.X) = Average vehicle delay in seconds per vehicle

Table 4.2 - 2042 Levels-of-Service
(Build Volumes & Existing Roadway Conditions)

INTERSECTION	TRAFFIC CONTROL	MOVEMENT/ APPROACH	AM PEAK LOS (DELAY)	PM PEAK LOS (DELAY)
North Lake Street &	Traffic Signal	Intersection	B (19.3)	E (59.1)
SR 2 WB Ramps		Westbound	C (24.2)	F (106.1)
		Northbound	B (17.5)	C (31.8)
		Southbound	B (16.9)	D (37.2)
North Lake Street &		Intersection	C (32.2)	D (46.7)
SR 2 EB Ramps		Eastbound	D (35.7)	E (59.4)
		Northbound	D (36.7)	E (69.4)
		Southbound	C (25.8)	C (32.3)
Cooper Foster Park Road	One-Way Stop	Eastbound	A (7.6)	A (7.8)
Hollstein Drive		Westbound	A (7.5)	A (7.9)
		Northbound	B (11.8)	B (15.0)
		Southbound	B (10.2)	B (12.4)
North Main Street &	Traffic Signal	Intersection	B (15.0)	B (16.9)
Cooper Foster Park Road		Eastbound	B (18.2)	B (19.4)
		Westbound	B (14.9)	B (15.3)
		Northbound	B (17.6)	B (18.5)
		Southbound	B (11.8)	B (15.9)

(XX.X) = Average vehicle delay in seconds per vehicle

Conditions at the study area intersections during the AM and PM peak hours were determined to operate with level-of-service D or better except at the following intersections under the PM peak hour:

- Oak Point Road & Cooper Foster Park Road
- North Lake Street & State Route 2 Westbound Ramps
- North Lake Street & State Route 2 Eastbound Ramps

The following turn lanes were determined to experience a queue length which exceeds the existing length of the turn lane based on the HCS analysis:

Oak Point Road & Cooper Foster Park Road

- Northbound Right Turn Lane (AM & PM Peak Hour)
- Northbound Left Turn Lane (PM Peak Hour)
- Eastbound Right Turn Lane (AM & PM Peak Hour)

North Lake Street & State Route 2 Westbound Ramps

- Westbound Left Turn Lane (PM Peak Hour)
- Southbound Right Turn Lane (PM Peak Hour)
- Northbound Left Turn Lane (PM Peak Hour)

North Lake Street & State Route 2 Eastbound Ramps

- Eastbound Left Turn Lane (AM & PM Peak Hour)
- Southbound Left Turn Lane (AM & PM Peak Hour)

The 2022 and 2042 capacity analyses determined that Oak Point Road/Cooper Foster Park Road and the State Route 2 ramp intersections are expected to operate with poor levels-of-service. The analysis also determined that multiple turn lanes in the Oak Point Road/North Lake Street corridor are not long enough to accommodate the expected traffic volumes.

Mitigation scenarios at these locations will be investigated in the following sections to determine if the levels-of-service can be improved and the impact of queued traffic can be reduced. The analysis of additional scenarios will be based on the forecasted 2042 traffic volumes to ensure an adequate service life of any recommended improvements.

Queue Analysis

Queue analyses were performed to determine the impact of queued traffic along Oak Point Road between Cooper Foster Park Road to the north and the State Route 2 Eastbound ramps to the south. The analysis will be based on the previously detailed HCS results shown in Tables 4.1 & 4.2.

The purpose of the analysis will be to determine if the queued traffic from the signalized intersections at Cooper Foster Park Road and the State Route 2 ramps are extending through the adjacent intersections.

The section of roadway between Cooper Foster Park Road and the State Route 2 Westbound ramps has approximately 140 feet of storage for northbound traffic and 125 feet of storage for southbound traffic. The section of roadway between the State Route 2 Westbound and Eastbound ramps has approximately 600 feet of storage for northbound and southbound traffic in the through lanes. The back to back left turn lanes has approximately 550 storage available for the two turn lanes. The measurements were based on the location of the stop bar and the point where traffic would begin to block the adjacent intersection. The existing turn lane lengths and available storage between intersections can be seen detailed in **Figure 2.3, Page 16**.

The following table details the 95TH percentile queue lengths for the 2022 peak periods under study. Queue lengths shown to exceed the available storage length are highlighted on yellow. Copies of the HCS reports can be found in **Appendix J**.

Table 4.3 2022 Queue Length Analysis
(Oak Point Road/North Lake Street)

LOCATION	MOVEMENT	AVAILABLE STORAGE	AM PEAK 95TH Percentile	PM PEAK 95TH Percentile
Oak Point &	NB Left	140	83	310
Cooper Foster Park	NB Thru	140	146	338
	NB Right	140	269	110
North Lake &	SB Right	125	78	131
SR 2 Westbound	SB Thru	125	260	620
	NB Left	175 (350*)	38	70
	NB Thru	600	226	311
North Lake &	SB Left	175 (350*)	210	274
SR 2 Eastbound	SB Thru	600	58	280

XXX - Length in Feet

*** Additional storage space that could be gained through re-striping.**

Based on the available storage lengths along Oak Point Road/North Lake Street there are multiple movements at each intersection that are expected to queue through the adjacent intersections and potentially block traffic from moving during a green indication in the signal phasing.

The following table details the 95TH percentile queue lengths for the 2042 peak periods under study. Queue lengths shown to exceed the available storage length are highlighted on yellow. Copies of the HCS reports can be found in **Appendix K**.

Table 4.4 2042 Queue Length Analysis
(Oak Point Road/North Lake Street)

LOCATION	MOVEMENT	AVAILABLE STORAGE	AM PEAK 95TH Percentile	PM PEAK 95TH Percentile
Oak Point &	NB Left	140	88	563
Cooper Foster Park	NB Thru	140	159	429
	NB Right	140	297	129
North Lake &	SB Right	125	84	155
SR 2 Westbound	SB Thru	125	304	913
	NB Left	175 (350*)	40	203
	NB Thru	600	258	371
North Lake &	SB Left	175 (350*)	406	659
SR 2 Eastbound	SB Thru	600	56	270

XXX = Queue Length in Feet

*** Additional storage space that could be gained through re-striping.**

Based on the available storage lengths along Oak Point Road/North Lake Street there are multiple movements at each intersection that are expected to queue through the adjacent intersections and potentially block traffic from moving during a green indication in the signal phasing.

Mitigation scenarios at these locations will be investigated in the following sections to determine if the impact of queued traffic can be reduced.

The analysis of additional scenarios will be based on the forecasted 2042 traffic volumes to ensure an adequate service life of any recommended improvements.

Turn Lane Warrant Analysis

It is the intent of this section to evaluate the need for exclusive deceleration and turning lanes at the unsignalized intersection of Cooper Foster Park Road and Hollstein Drive based on the following conditions:

Cooper Foster Park

- Two-Lane Roadway
- Posted Speed Limit - 25 miles per hour

The following tables show the results of the analysis of the need for exclusive deceleration and turn lanes at the unsignalized intersection of Cooper Foster Park Road and Hollstein Drive. Copies of the ODOT turn lane warrant graphs can be seen in **Appendix L**.

Table 4.5 Turning Lane Warrants
(Cooper Foster Park Road @ Hollstein Drive)

TURN LANE & LOCATION	2042	
	AM PEAK	PM PEAK
Eastbound Left Turn Lane	NO	NO
Eastbound Right Turn Lane	NO	NO
Westbound Left Turn Lane	NO	NO
Westbound Right Turn Lane	NO	NO

The results of the turn lane warrant analyses indicate that an exclusive right and left turn lanes are not warranted on Cooper Foster Park Road at Hollstein Drive under the expected 2042 Build conditions.

Turn Lane Length Analysis

Analyses were performed to determine the necessary storage length for the turn lanes that were previously identified as having a queue length that exceeds the turn lane length. The analysis will be based on the Year 2042 peak hour Build conditions.

The turn lane calculations at will be based on the following conditions:

- Signalized Traffic Control
- Oak Point Road/North Lake Road - 40 MPH design speed
- Cooper Foster Park Road (West) - 40 MPH design speed
- Cooper Foster Park Road (East) - 30 MPH design speed
- State Route 2 Ramps - 40 mile per hour design speed

The following tables details the results of the turn lane length analyses based upon the highest anticipated turn volumes at the intersections under the expected 2030 Build conditions.

Table 4.6 - Turn Lane Length Analysis
(Oak Point Road & Cooper Foster Park Road)

Movement Direction	DHV	No. of Lanes	Cycles / Hour	Average Veh/ Cycle/ Lane	Design Speed (mph)	Fig. 401-10 Storage Length (ft)	Fig. 401-9 Condition		Backup Length (ft)	Turn Lane Length* (ft)
							B*	C*		
NB LT	454	1	36	12.6	40	475	125	590	--	590*
NB THRU	550	1	36	15.3	40	550	--	--	550	--
NB RT	404	1	36	11.2	40	450	125	565	--	565*
EB T/LT	199	1	36	5.5	40	250	--	--	250	--
EB RT	479	1	36	13.3	40	500	125	615	--	615*

*** Includes 50' taper**

There is not sufficient space between Cooper Foster Park Road and the State Route 2 westbound ramps to accommodate the recommended turn lane lengths for the northbound turn lanes.

Table 4.7 - Turn Lane Length Analysis
(North Lake Street & State Route 2 Westbound Ramps)

Movement Direction	DHV	No. of Lanes	Cycles / Hour	Average Veh/ Cycle/ Lane	Design Speed (mph)	Fig. 401-10 Storage Length (ft)	Fig. 401-9 Condition		Backup Length (ft)	Turn Lane Length* (ft)
							B*	C*		
NB LT	80	1	36	2.2	40	150	125	265	--	600*
NB THRU	602	1	36	16.7	40	600	--	--	600	--
SB RT	274	1	36	7.6	40	325	125	440	--	800*
SB THRU	941	1	36	26.1	40	875	--	--	875	--
WB LT	380	1	36	10.6	40	400	125	515	--	600*
WB RT	582	1	36	16.2	40	600	--	--	600	--

*** Includes 50' taper**

There is not sufficient space between Cooper Foster Park Road and the State Route 2 westbound ramps to accommodate the recommended turn lane length for the southbound right turn lane.

Table 4.8 - Turn Lane Length Analysis
(North Lake Street & State Route 2 Eastbound Ramps)

Movement Direction	DHV	No. of Lanes	Cycles / Hour	Average Veh/ Cycle/ Lane	Design Speed (mph)	Fig. 401-10 Storage Length (ft)	Fig. 401-9 Condition		Backup Length (ft)	Turn Lane Length* (ft)
							B*	C*		
SB LT	541	1	36	15.0	40	550	125	665	--	600*
SB THRU	780	1	36	21.7	40	750	--	--	750	--
EB LT	197	1	36	5.5	40	250	125	365	--	365*
EB RT	90	1	36	2.5	40	150	--	--	150	--

*** Includes 50' taper**

In order to accommodate the recommended length of the southbound left turn lane at the State Route 2 eastbound ramps and the northbound left turn lane at the State Route 2 westbound ramps it would be necessary to widen the roadway and the bridge over State Route 2 to construct side by side left turn lanes.

4.2 Alternative #1 - Additional Turn Lanes

The impact of adding additional turn lanes and modifying the signal timing was analyzed in order to determine if the 2042 levels-of-service can be improved and the impact of queued traffic can be reduced.

The following turn lane and signal improvements were determined to improve the intersection and approach levels-of-service to D or better:

Oak Point Road & Cooper Foster Park Road

- Eastbound Left Turn Lane
- Westbound Left Turn Lane
- Westbound Right Turn Lane
- Right turn overlap phase for westbound right turn during northbound left turn phase.

North Lake Street & State Route 2 Westbound Ramp

- 2ND Westbound Right Turn Lane

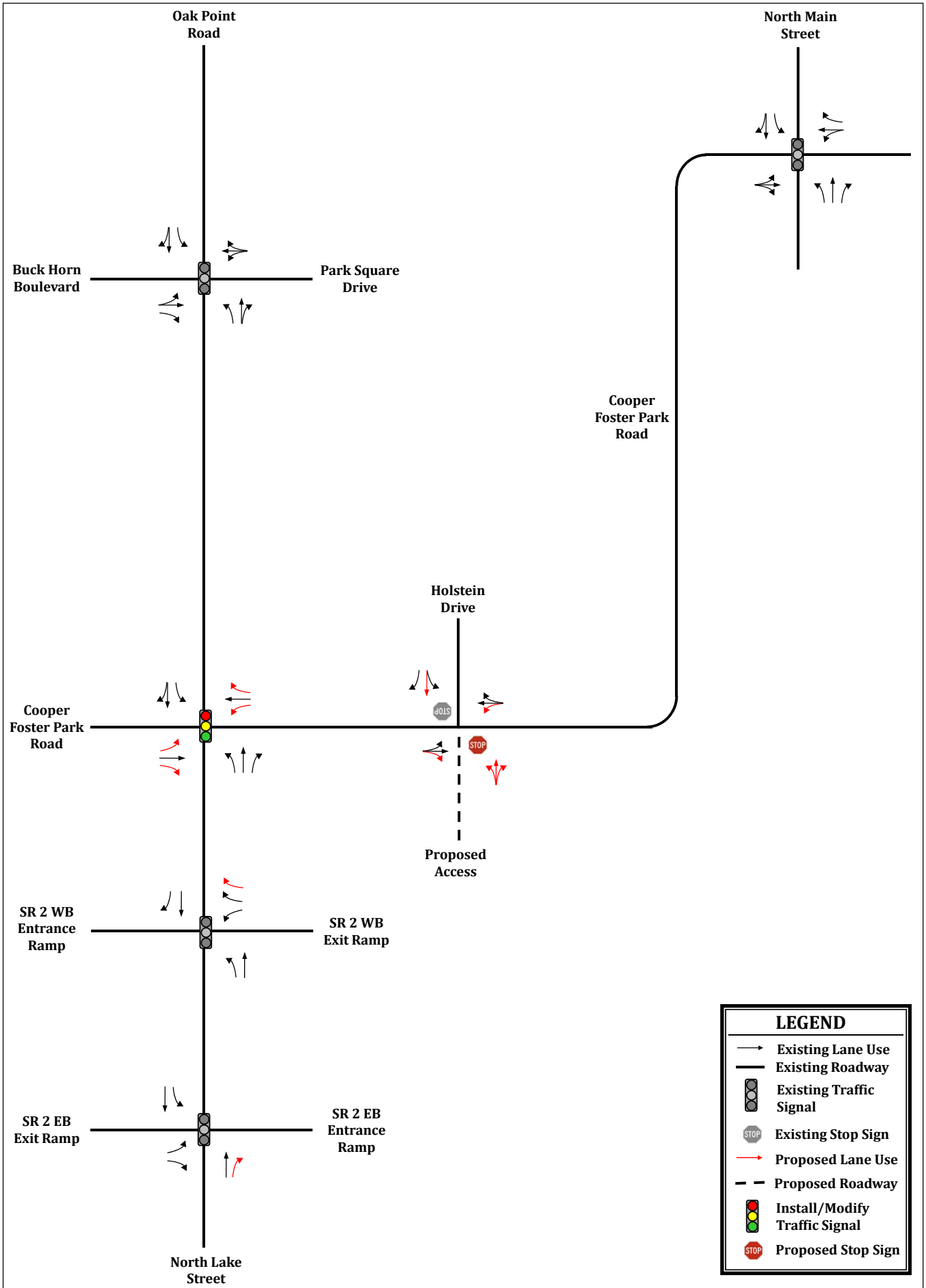
North Lake Street & State Route 2 Eastbound Ramp

- Northbound Right Turn Lane

It will be necessary to include lane destination signage on the westbound exit ramp with a second right turn lane so that motorists can be in the correct turn lane to access their preferred lane at Cooper Foster Park Road as the section between the westbound exit ramp and Cooper Foster Park Road does not provide enough room to weave.

The recommended turn lanes and improvements for Alternative #1 can be seen in **Figure 4.1, Page 57**.

The following table shows the capacity analysis results of implementing the previously mentioned turn lanes and modifications to the signal operation. Copies of the capacity worksheets for the intersection are included in **Appendix M**.



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Amherst, Ohio

Alternative #1
Additional Turn Lanes
Lane Use & Traffic Control

NORTH
NOT TO SCALE

Figure: 4.1

Table 4.9 - 2042 Levels-of-Service
(Alternative #1)

INTERSECTION	TRAFFIC CONTROL	MOVEMENT/ APPROACH	AM PEAK LOS (DELAY)	PM PEAK LOS (DELAY)
Oak Point Road &	Traffic Signal	Intersection	C (20.7)	D (38.6)
Cooper Foster Park Road		Eastbound	B (19.5)	C (25.4)
		Westbound	C (22.4)	D (46.3)
		Northbound	C (21.0)	C (34.4)
		Southbound	C (20.0)	D (54.8)
North Lake Street &	Traffic Signal	Intersection	B (16.9)	C (28.1)
SR 2 WB Ramps		Eastbound	C (21.7)	D (43.9)
		Northbound	B (15.2)	B (16.3)
		Southbound	B (14.5)	C (22.3)
North Lake Street &	Traffic Signal	Intersection	C (20.3)	C (27.4)
SR 2 EB Ramps		Eastbound	C (24.2)	D (36.8)
		Northbound	B (19.5)	C (34.6)
		Southbound	B (19.5)	C (21.7)

(XX.X) = Average vehicle delay in seconds per vehicle

Conditions at the intersections during the AM and PM peak hour were determined to operate with level-of-service D or better the previously discussed lane use and traffic signal improvements. It should be noted that while the intersection and approach levels-of-service are D or better at Oak Point Road and Cooper Foster Park Road there are individual movements that continue to operate with LOS E.

The following turn lanes were determined to experience a queue length which exceeds the existing length of the turn lane based on the HCS analysis:

Oak Point Road & Cooper Foster Park Road

- Northbound Left Turn Lane (AM & PM Peak Hour)
- Eastbound Right Turn Lane (AM & PM Peak Hour)

North Lake Street & State Route 2 Westbound Ramps

- Westbound Left Turn Lane (PM Peak Hour)
- Southbound Right Turn Lane (PM Peak Hour)

North Lake Street & State Route 2 Eastbound Ramps

- Southbound Left Turn Lane (AM & PM Peak Hour)
- Eastbound Left Turn Lane (PM Peak Hour)

Queue Analysis

The following table details the 95TH percentile queue lengths for the 2042 peak periods under the proposed Alternative #1 conditions. Queue lengths shown to exceed the available storage length between adjacent intersections are highlighted on yellow. Copies of the HCS reports can be found in **Appendix M**.

Table 4.10 2042 Queue Length Analysis
(Alternative #1)

LOCATION	MOVEMENT	AVAILABLE STORAGE	AM PEAK 95TH Percentile	PM PEAK 95TH Percentile
Oak Point &	NB Left	140	93	580
Cooper Foster Park	NB Thru	140	164	371
	NB Right	140	308	111
North Lake &	SB Right	125	76	130
SR 2 Westbound	SB Thru	125	280	705
	NB Left	175 (350*)	37	104
	NB Thru	600	240	320
North Lake &	SB Left	175 (350*)	200	589
SR 2 Eastbound	SB Thru	600	90	362

XXX = Queue Length in Feet

*** Additional storage space that could be gained through re-striping.**

Based on the available storage lengths along Oak Point Road/North Lake Street there are multiple movements at each intersection that are expected to queue through the adjacent intersections and potentially block traffic from moving during a green indication in the signal phasing.

Turn Lane Length Analysis

Analyses were performed to determine the necessary storage length for the turn lanes that were previously identified as having a queue length that exceeds the turn lane length. The analysis will be based on the Year 2042 peak hour Alternative #1 conditions.

The following tables details the results of the turn lane length analyses based upon the highest anticipated turn volumes at the intersections under the expected 2042 Build conditions with the recommended turn lanes for Alternative #1.

Table 4.11 - Alternative #1 Turn Lane Length Analysis
(Oak Point Road & Cooper Foster Park Road)

Movement Direction	DHV	No. of Lanes	Cycles / Hour	Average Veh/ Cycle/ Lane	Design Speed (mph)	Fig. 401-10 Storage Length (ft)	Fig. 401-9 Condition			Backup Length (ft)	Turn Lane Length * (ft)
							A*	B*	C*		
NB LT	454	1	36	12.6	40	475		125	590	--	590*
NB THRU	550	1	36	15.3	40	550		--	--	550	--
NB RT	404	1	36	11.2	40	450		125	565	--	565*
EB LT	78	1	36	2.2	40	150		125	265	--	265*
EB THRU	121	1	36	3.4	40	175		--	--	175	--
EB RT	479	1	36	13.3	40	500		125	615	--	615*
WB LT	242	1	36	6.7	30	275	325			--	325*
WB THRU	128	1	36	3.6	30	175	--			175	--
WB RT	84	1	36	2.3	30	150	200			--	200*

*** Includes 50' taper**

There is not sufficient space between Cooper Foster Park Road and the State Route 2 westbound ramps to accommodate the recommended turn lane lengths for the northbound turn lanes.

Table 4.12 - Alternative #1 Turn Lane Length Analysis
(North Lake Street & State Route 2 Westbound Ramps)

Movement Direction	DHV	No. of Lanes	Cycles / Hour	Average Veh/ Cycle/ Lane	Design Speed (mph)	Fig. 401-10 Storage Length (ft)	Fig. 401-9 Condition		Backup Length (ft)	Turn Lane Length* (ft)
							B*	C*		
SB RT	274	1	36	7.6	40	325	125	440	--	800*
SB THRU	941	1	36	26.1	40	875	--	--	875	--
WB LT	380	1	36	10.6	40	400	125	515	--	515*
WB RT	582	2	36	8.1	40	350	125	465	--	465*

*** Includes 50' taper**

There is not sufficient space between Cooper Foster Park Road and the State Route 2 westbound ramps to accommodate the recommended turn lane length for the southbound right turn lane.

Table 4.13 - Alternative #1 Turn Lane Length Analysis
(North Lake Street & State Route 2 Eastbound Ramps)

Movement Direction	DHV	No. of Lanes	Cycles / Hour	Average Veh/ Cycle/ Lane	Design Speed (mph)	Fig. 401-10 Storage Length (ft)	Fig. 401-9 Condition		Backup Length (ft)	Turn Lane Length* (ft)
							B*	C*		
SB LT	541	1	36	15.0	40	550	125	665	--	600*
SB THRU	780	1	36	21.7	40	750	--	--	750	--
NB RT	330	1	36	9.2	40	375	25	490	--	500*
NB THRU	485	1	36	13.5	40	500	--	--	500	--
EB LT	197	1	36	5.5	40	250	125	365	--	365*
EB RT	90	1	36	2.5	40	150	--	--	150	--

*** Includes 50' taper**

In order to accommodate the recommended length of the southbound left turn lane at the State Route 2 eastbound ramps and the northbound left turn lane at the State Route 2 westbound ramps it would be necessary to widen the roadway and the bridge over State Route 2 to construct side by side left turn lanes.

4.3 Alternative #2 - Roundabout Control

The impact of constructing roundabouts at each intersection was analyzed in order to determine if the 2042 levels-of-service can be improved and the impact of queued traffic can be reduced.

The following lane use was determined to improve the intersection and approach levels-of-service to D or better:

Oak Point Road & Cooper Foster Park Road

- Two -Lane Roundabout
- North Approach: 1 Left Turn Lane, 1 Through Lane, & Bypass Right Turn Lane
- South Approach: 1 Left Turn Lane & 1 Shared Through/Right Turn Lane
- West Approach: 1Shared Through/Left Turn Lane & 1 Bypass Right Turn Lane
- East Approach: 1 Left Turn Lane & 1 Shared Through/Right Turn Lane

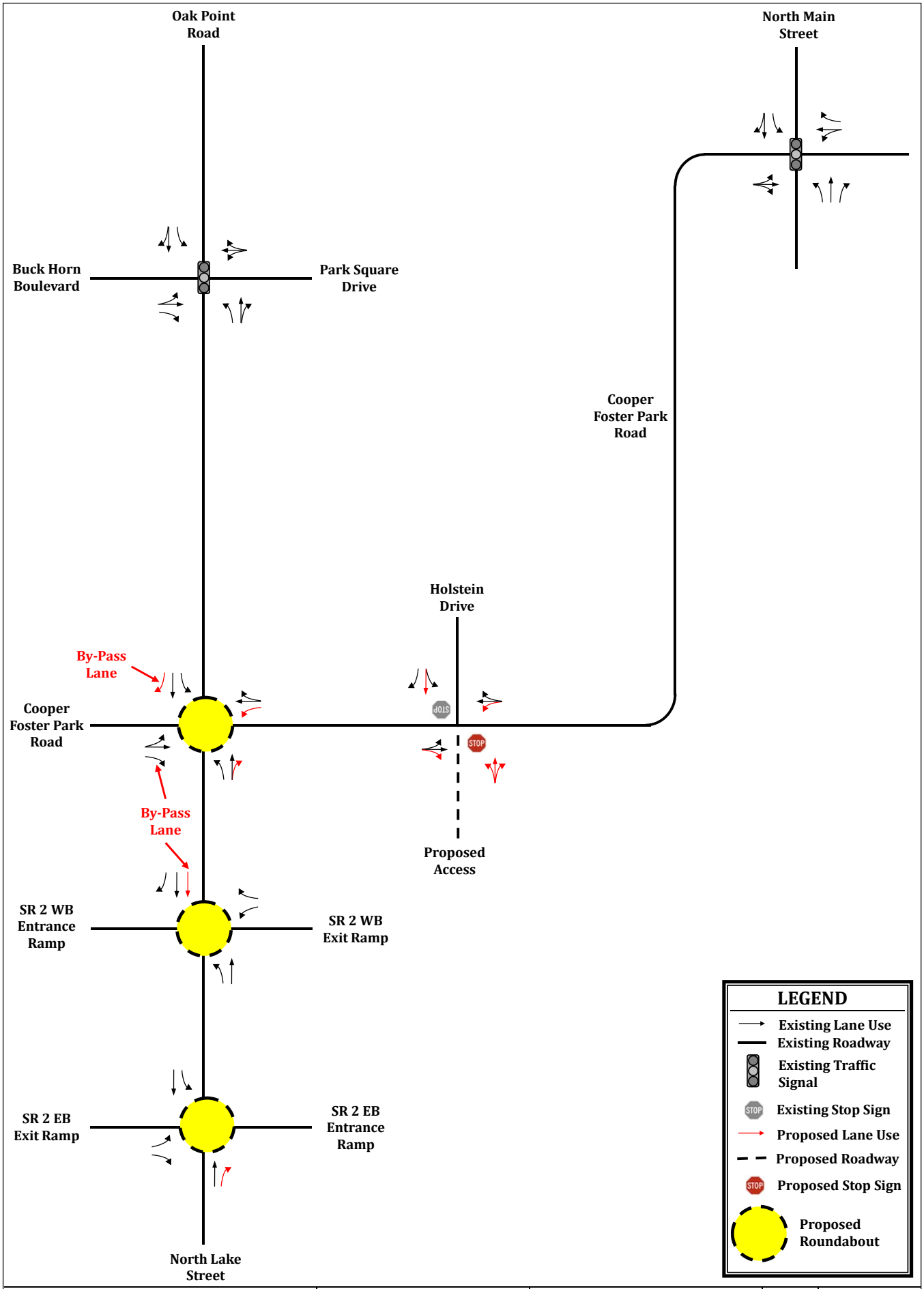
North Lake Street & State Route 2 Westbound Ramp

- Two -Lane Roundabout
- North Approach: 2 Through Lanes & 1 Bypass Right Turn Lane
- South Approach: 1 Left Turn Lane & 1 Through Lane
- East Approach: 1 Left Turn Lane & 1 Right Turn Lane

North Lake Street & State Route 2 Eastbound Ramp

- Two -Lane Roundabout
- North Approach: 1 Left Turn Lane & 1 Through Lane
- South Approach: 1 Through Lane & 1 Right Turn Lane
- West Approach: 1 Left Turn Lane & 1 Right Turn Lane

The recommended lane use for Alternative #2 can be seen in **Figure 4.2, Page 64**.



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Transportation Management Services
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Alternative #2
Roundabout Control
Lane Use & Traffic Control

NORTH
NOT TO SCALE

Figure: 4.2

The following table shows the capacity analysis results of implementing the previously mentioned turn lanes and roundabout control. Copies of the capacity worksheets for the intersection are included in **Appendix N**.

Table 4.14 - 2042 Levels-of-Service
(Alternative #2)

INTERSECTION	TRAFFIC CONTROL	MOVEMENT / APPROACH	AM PEAK LOS (DELAY)	PM PEAK LOS (DELAY)
Oak Point Road &	Traffic Signal	Intersection	A (7.3)	C (21.3)
Cooper Foster Park Road		Eastbound	A (6.6)	D (31.1)
		Westbound	A (5.4)	C (19.7)
		Northbound	A (8.4)	B (13.9)
		Southbound	A (6.7)	D (26.0)
North Lake Street &	Traffic Signal	Intersection	A (5.9)	C (15.9)
SR 2 WB Ramps		Eastbound	A (9.4)	D (28.6)
		Northbound	A (5.2)	A (6.7)
		Southbound	A (3.8)	B (11.1)
North Lake Street &	Traffic Signal	Intersection	A (7.6)	C (15.0)
SR 2 EB Ramps		Eastbound	A (7.8)	C (23.5)
		Northbound	A (9.8)	C (24.4)
		Southbound	A (5.0)	A (8.4)

(XX.X) = Average vehicle delay in seconds per vehicle

Conditions at the intersections during the AM and PM peak hour were determined to operate with level-of-service D or better under the proposed lane use and roundabout control.

Queue Analysis

The following table details the 95TH percentile queue lengths for the 2042 peak periods under study. Queue lengths shown to exceed the available storage length between adjacent intersections are highlighted on yellow. Copies of the HCS reports can be found in **Appendix N**.

Table 4.15 2042 Queue Length Analysis
(Alternative #2)

LOCATION	MOVEMENT	AVAILABLE STORAGE	AM PEAK 95TH Percentile	PM PEAK 95TH Percentile
Oak Point &	NB Left	140	20	60
Cooper Foster Park	NB Thru/Right	140	80	160
North Lake &	SB Left	125	20	100
SR 2 Westbound	SB Thru/Right	125	20	100
	NB Left	175 (350*)	20	20
	NB Thru/Right	600	40	60
North Lake &	SB Left	175 (350*)	40	60
SR 2 Eastbound	SB Thru/Right	600	20	100

XXX = Queue Length in Feet

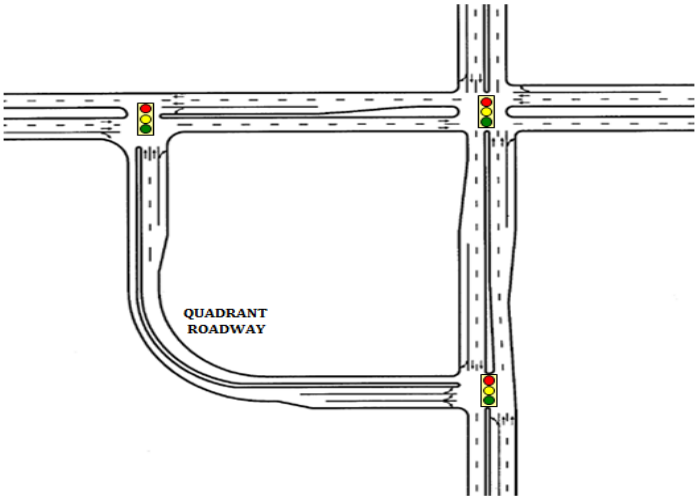
*** Additional storage space that could be gained through re-striping.**

Based on the available storage lengths along Oak Point Road/North Lake Street only the shared northbound through and right turn lane at Cooper Foster Park Road is expected to queue through the adjacent intersection and potentially block traffic from moving through the roundabout.

4.4 Alternative #3 - Quadrant Roadway-Intersection

A Quadrant Roadway (QR) intersection is an alternative design for an intersection of two high volume roadways. The intersection works by rerouting all four left–turn movements at a four–legged intersection onto a road that connects the two intersecting roads. This design prohibits all left turns at the main intersection and therefore allows a simple two–phase signal to process the remaining through and right–turn movements. Both junctions of the connector road are typically signalized. The location of the connector road depends on traffic flow and availability of right–of–way.

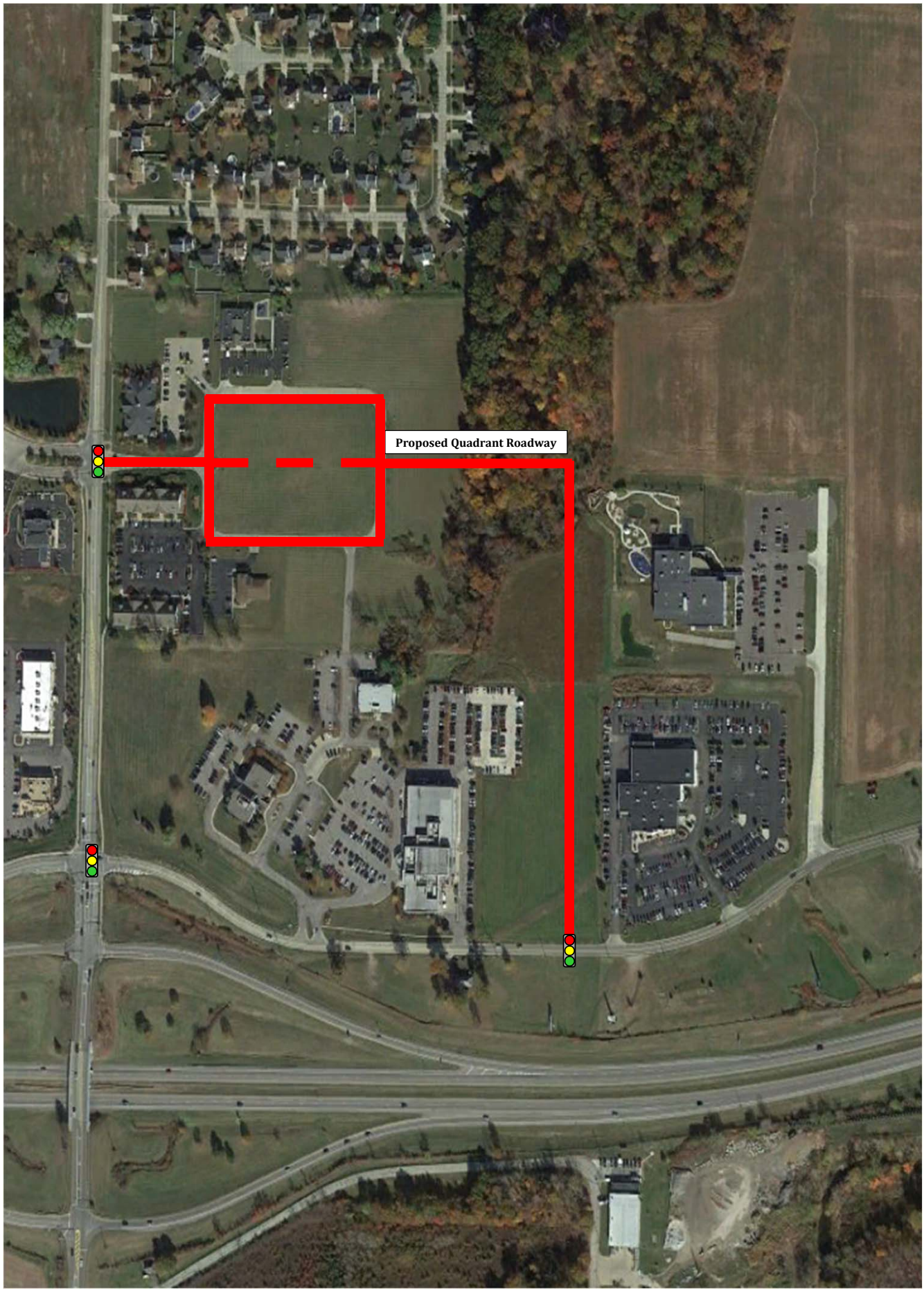
A QR intersection typically needs three sets of signal controlled intersections. The main intersection with two signal phases and two secondary intersections at the ends of the connecting roadway with three signal phases each typically comprise the QR intersection treatment. A typical intersection configuration with the quadrant roadway intersections can be seen below:



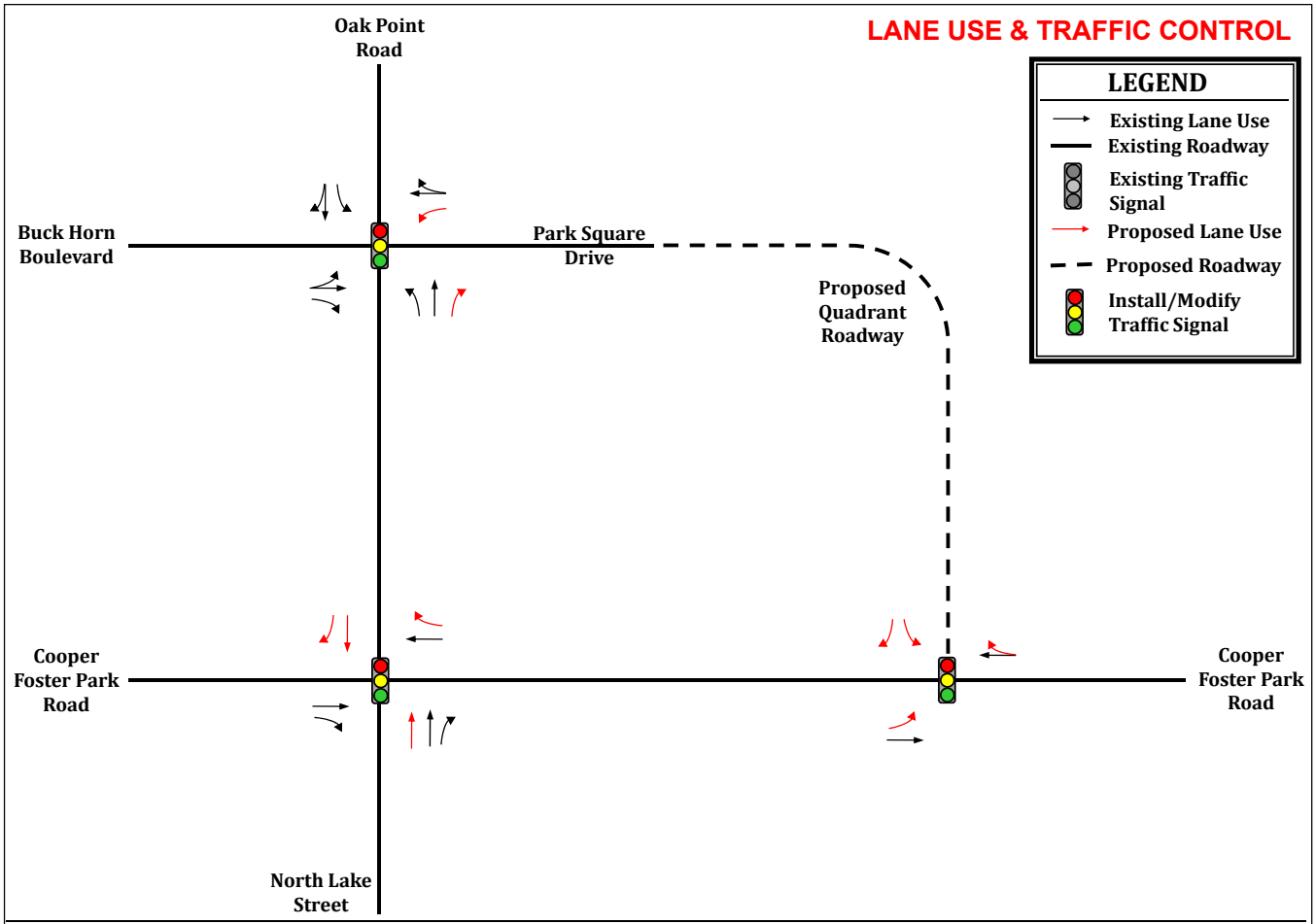
QUADRANT ROADWAY-INTERSECTION EXAMPLE

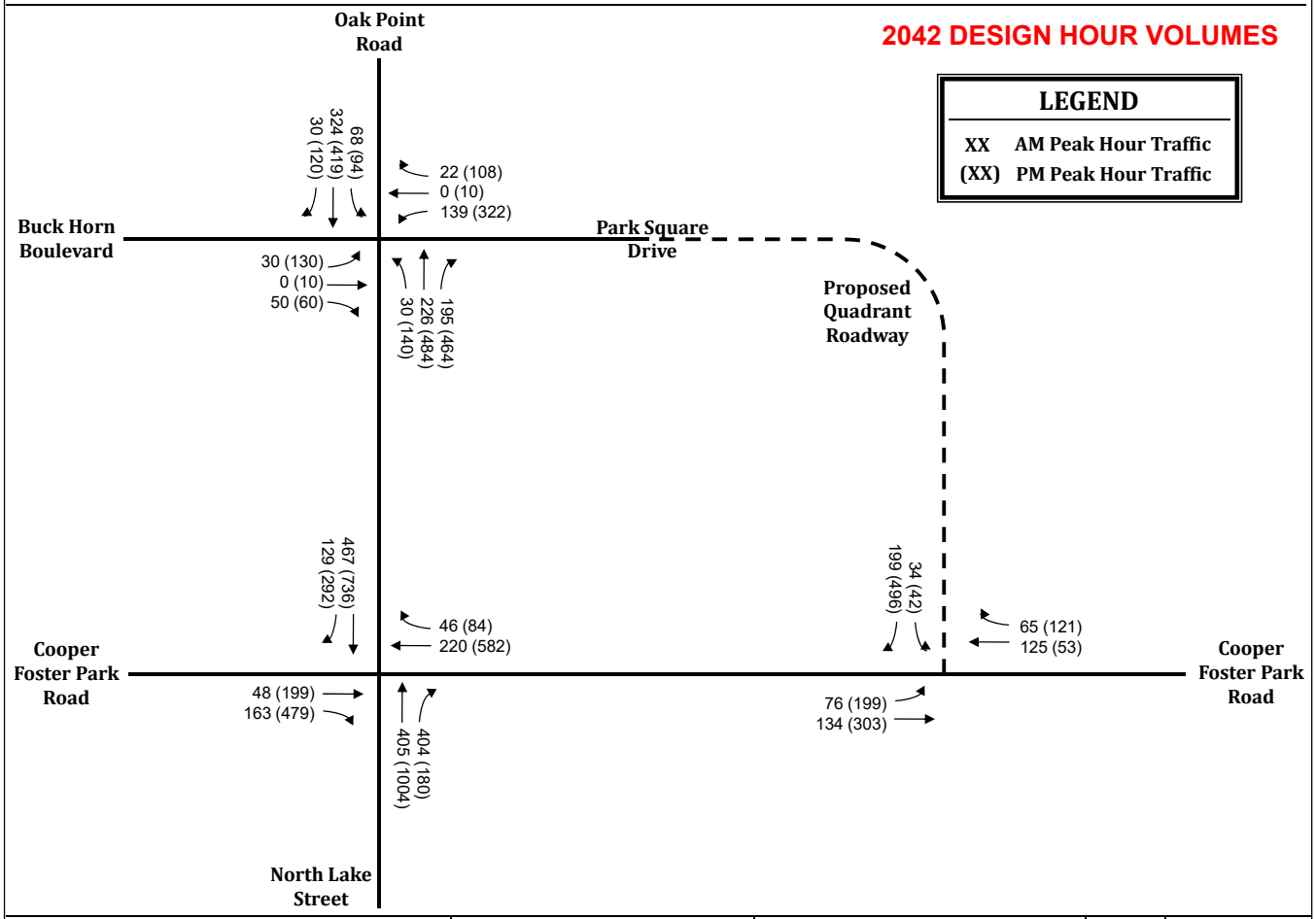
Northeast (NE) Quadrant Scenario

The NE Quadrant scenario would create a connecting roadway between Oak Point Road at the Buck Horn Boulevard/Park Square Drive intersection to Cooper Foster Park Road. An aerial view of the northeast quadrant at the intersection of Oak Point Road and Cooper Foster Park Road can be seen in **Figure 4.3, Page, 68.** The lane use, traffic control, and redistributed intersection volumes can be seen in **Figure 4.4, Page 69.**



TMS Engineers, Inc. Transportation Management Services 2112 Case Parkway S., Unit 7, Twinsburg, Ohio 44087 www.TMSEngineers.com	Areawide Planning Study Amherst, Ohio	Alternative #3 Northeast Quadrant Aerial View Roadway Alignment	NORTH NOT TO SCALE	Figure: 4.3 Page: 68





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Capacity analyses were performed for the estimated 2042 design hour conditions under the NE Quadrant scenario. The traffic volumes used in this analysis can be seen in **Figure 4.4**. Copies of the capacity worksheets are included in **Appendix O**. The results of the Year 2042 Design Hour Conditions analysis are shown in the following table:

Table 4.16 - 2042 Levels-of-Service
(Alternative #3)

INTERSECTION	TRAFFIC CONTROL	MOVEMENT/ APPROACH	AM PEAK LOS (DELAY)	PM PEAK LOS (DELAY)
Oak Point Road &	Traffic Signal	Intersection	C (23.7)	C (31.3)
Buck Horn Boulevard		Eastbound	C (24.8)	D (37.4)
		Westbound	C (22.0)	D (35.2)
		Northbound	C (21.9)	C (24.9)
		Southbound	C (26.0)	D (37.5)
Oak Point Road &	Traffic Signal	Intersection	B (17.1)	C (27.2)
Cooper Foster Park Road		Eastbound	B (18.0)	C (29.5)
		Westbound	B (18.4)	C (33.3)
		Northbound	B (16.6)	B (19.9)
		Southbound	B (16.8)	C (30.2)
Cooper Foster Park Road	Traffic Signal	Intersection	B (16.5)	C (21.4)
& Proposed Quadrant Roadway		Eastbound	B (12.0)	B (17.9)
		Northbound	B (19.9)	C (24.2)
		Southbound	B (17.9)	C (23.7)

(XX.X) = Average vehicle delay in seconds per vehicle

Conditions at the intersections during the AM and PM peak hour were determined to operate with level-of-service D or better under the proposed NE Quadrant Roadway scenario.

The following turn lanes were determined to experience a queue length which exceeds the existing length of the turn lane based on the HCS analysis:

Oak Point Road & Cooper Foster Park Road

- Eastbound Right Turn Lane (AM & PM Peak Hour)
- Northbound Right Turn Lane (AM & PM Peak Hour)

Queue Analysis

The following table details the 95TH percentile queue lengths for the 2042 peak periods under study. Queue lengths shown to exceed the available storage length between adjacent intersections are highlighted on yellow. Copies of the HCS reports can be found in **Appendix O**.

Table 4.17 2042 Queue Length Analysis
(Alternative #3)

LOCATION	MOVEMENT	AVAILABLE STORAGE	AM PEAK 95TH Percentile	PM PEAK 95TH Percentile
Oak Point &	NB Thru	140	118	361
Cooper Foster Park	NB Right	140	269	121

XXX = Queue Length in Feet

Based on the available storage lengths along Oak Point Road/North Lake Street between Cooper Foster Park Road and the State Route 2 westbound ramps the northbound queue at Cooper Foster Park Road is expected to block the State Route 2 westbound ramps.

Queue lengths between the State Route 2 ramps are expected to remained unchanged under Alternative #3 based on the previous scenarios.

Turn Lane Length Analysis

Analyses were performed to determine the necessary storage length for the recommended turn lanes and those that were previously identified as having a queue length that exceeds the turn lane length. The analysis will be based on the Year 2042 peak hour Build conditions.

The following tables details the results of the turn lane length analyses based upon the highest anticipated turn volumes at the intersections under the expected 2030 Build conditions.

Table 4.18 - Alternative #3 Turn Lane Length Analysis
(Oak Point Road & Buck Horn Boulevard)

Movement Direction	DHV	No. of Lanes	Cycles / Hour	Average Veh/ Cycle/ Lane	Design Speed (mph)	Fig. 401-10 Storage Length (ft)	Fig. 401-9 Condition			Backup Length (ft)	Turn Lane Length * (ft)
							A*	B*	C*		
NB LT	140	1	36	3.9	40	175		125	290	--	500
NB THRU	484	1	36	13.4	40	500		--	--	500	--
NB RT	464	1	36	12.9	40	475		125	590	--	590
WB LT	322	1	36	8.9	30	350	400			--	400*
WB T/RT	118	1	36	3.3	30	175	--			175	--

*** Includes 50' taper**

Table 4.19 - Alternative #3 Turn Lane Length Analysis
(Oak Point Road & Cooper Foster Park Road)

Movement Direction	DHV	No. of Lanes	Cycles / Hour	Average Veh/ Cycle/ Lane	Design Speed (mph)	Fig. 401-10 Storage Length (ft)	Fig. 401-9 Condition			Backup Length (ft)	Turn Lane Length * (ft)
							A*	B*	C *		
NB RT	404	1	36	11.2	40	450		125	56	--	565*
NB THRU	1004	2	36	13.9	40	500		--	--	500	--
SB RT	292	1	36	8.1	40	350		125	46	--	725*
SB THRU	736	1	36	20.4	40	725		--	--	725	--
EB RT	479	1	36	13.3	40	500		125	61	--	615*
EB THRU	199	1	36	5.5	40	250		--	--	250	--
WB RT	84	1	36	2.3	30	150	200			--	600*
WB THRU	582	1	36	16.2	30	600	--			600	--

*** Includes 50' taper**

There is not sufficient space between Cooper Foster Park Road and the State Route 2 westbound ramps to accommodate the recommended turn lane length for the northbound right turn lane.

Table 4.20 - Alternative #3 Turn Lane Length Analysis
(Cooper Foster Park Road & Quadrant Roadway)

Movement Direction	DHV	No. of Lanes	Cycles / Hour	Average Veh/ Cycle/ Lane	Design Speed (mph)	Fig. 401-10 Storage Length (ft)	Fig. 401-9 Condition	Backup Length (ft)	Turn Lane Length* (ft)
							A*		
EB LT	199	1	36	5.5	30	250	300	--	350*
EB THRU	303	1	36	8.4	30	350	--	350	--
SB LT	42	1	36	1.2	30	100	--	100	--
SB RT	496	1	36	13.8	30	500	550	--	550*

*** Includes 50' taper**

4.5 Alternative #4 - By-Pass Roadway

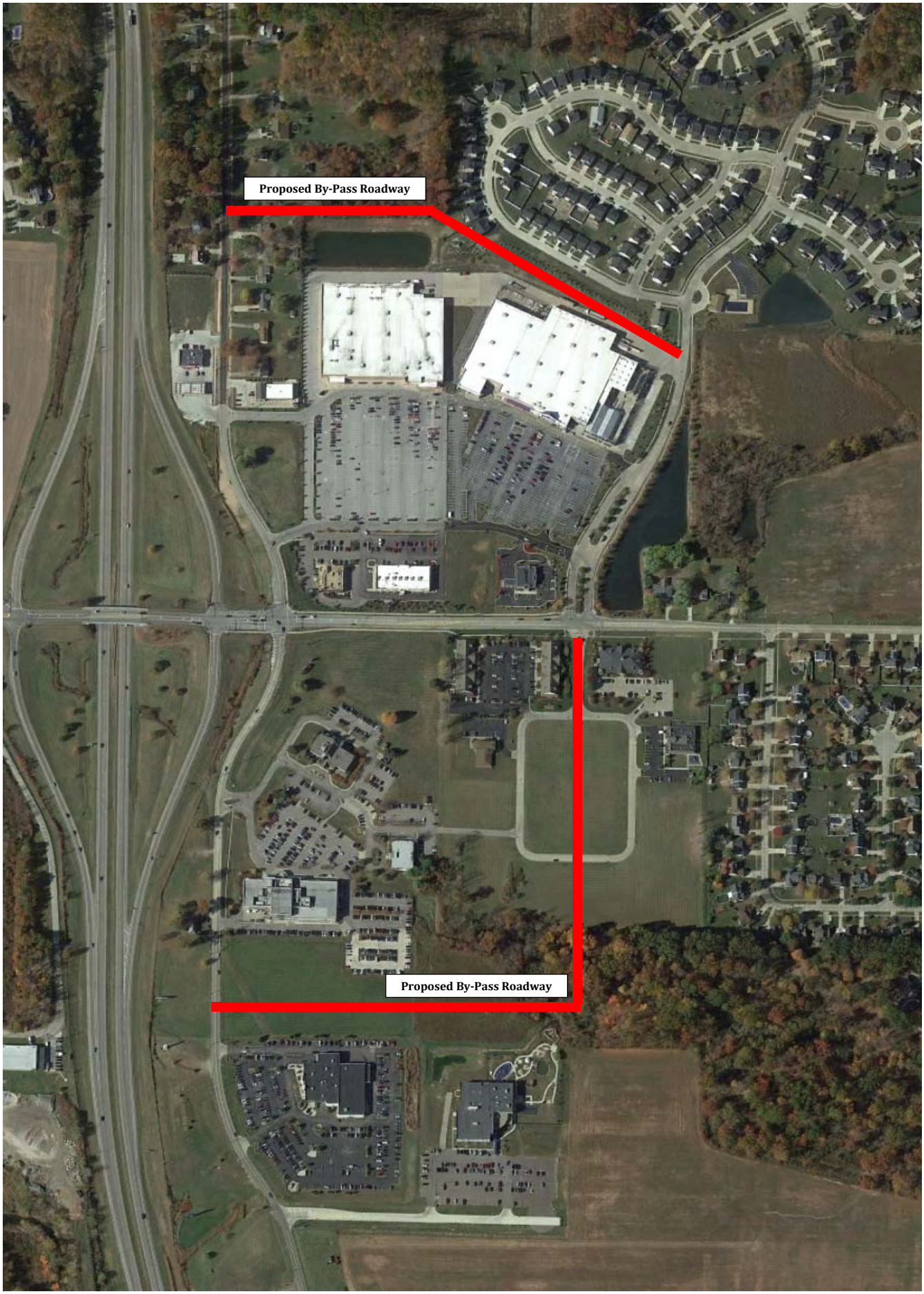
Alternative #4 would create a proposed Cooper Foster Park Road by-pass that diverts from a point along Cooper Foster Park Road to the west of the Deerfield retail plaza and intersects Buck Horn Boulevard where it would intersect with Oak Point Road at the existing traffic signal controlled intersection. From this intersection the proposed by-pass would continue to run east until curving south and intersecting Cooper Foster Park Road to the west of Hollstein Drive. The traffic flow on Cooper Foster Park Road would be restricted to right turns only at Oak Point Road. The southbound left turn movement from Oak Point Road to Cooper Foster Park Road would also be restricted.

An aerial view of the by-pass alternative can be seen in **Figure 4.5, Page, 75**

The elimination of the respective eastbound and westbound Cooper Foster Park Road traffic at Oak Point Road and the proposed by-pass would result in a re-distribution of traffic within the study area. The directional distribution for the rerouted traffic is a function of several variables including the prevailing operating conditions on the existing roadways, population distribution within the defined area of influence and current land uses.

The lane use, traffic control, and redistributed intersection volumes can be seen in **Figure 4.6, Page 76.**

Capacity analyses were performed for the estimated 2042 design hour conditions under Alternative #4. The traffic volumes used in this analysis can be seen in **Figure 4.6**. Copies of the capacity worksheets are included in **Appendix P**. The results of the Year 2042 Design Hour Conditions analysis are shown in the following table:



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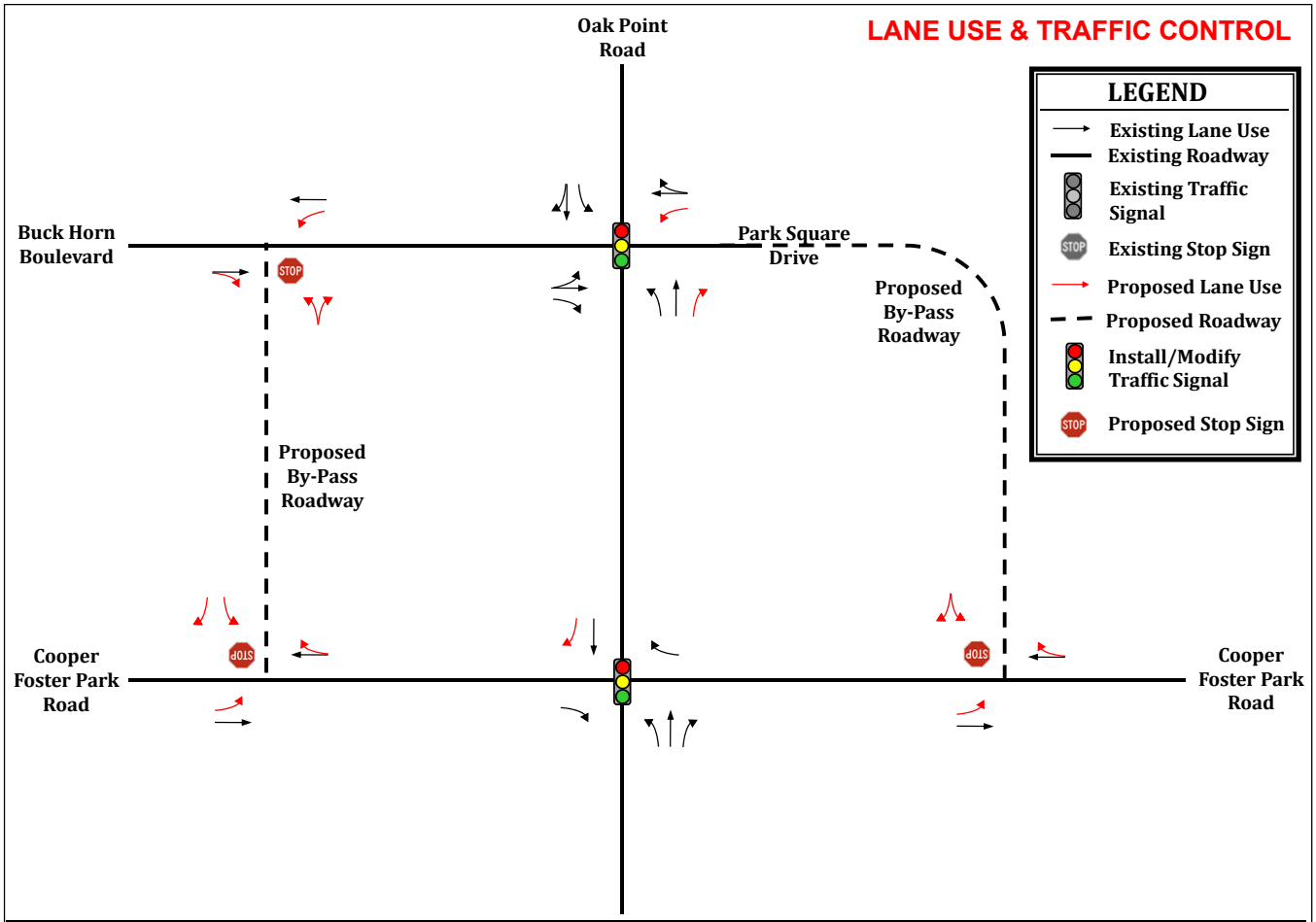

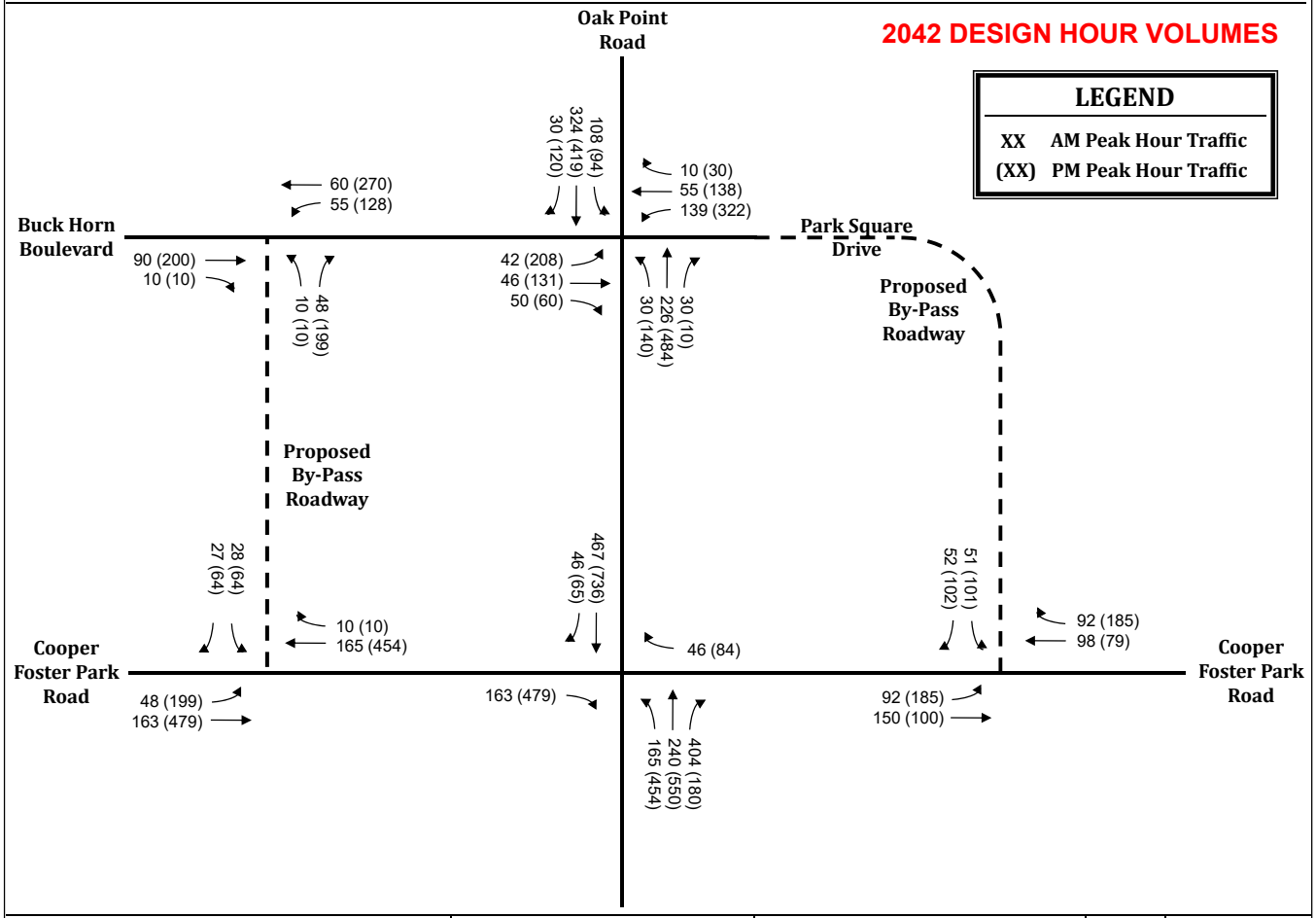

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Table 4.21 - 2042 Levels-of-Service
(Alternative #4)

INTERSECTION	TRAFFIC CONTROL	MOVEMENT/ APPROACH	AM PEAK LOS (DELAY)	PM PEAK LOS (DELAY)
Oak Point Road &	Traffic Signal	Intersection	C (25.2)	D (36.5)
Buck Horn Boulevard		Eastbound	C (26.3)	D (38.7)
		Westbound	C (25.0)	D (38.3)
		Northbound	C (23.4)	C (31.1)
		Southbound	C (26.0)	D (39.1)
Oak Point Road &	Traffic Signal	Intersection	B (16.5)	C (32.0)
Cooper Foster Park Road		Eastbound	B (19.5)	D (44.4)
		Westbound	C (22.5)	D (42.6)
		Northbound	B (12.2)	B (19.2)
		Southbound	C (21.9)	D (42.3)
Cooper Foster Park Road &	One-Way Stop	Eastbound	A (7.7)	A (9.3)
By-Pass Roadway West		Southbound	B (10.8)	E (44.2)
Buck Horn Boulevard &	One-Way Stop	Westbound	A (7.5)	A (8.0)
By-Pass Roadway West		Northbound	A (9.4)	B (11.8)
Cooper Foster Park Road &	One-Way Stop	Eastbound	A (7.8)	A (8.4)
By-Pass Roadway East		Southbound	B (12.1)	C (18.4)

(XX.X) = Average vehicle delay in seconds per vehicle

Conditions at the intersections during the AM and PM peak hour were determined to operate with level-of-service D or better under the proposed NE Quadrant Roadway scenario with the exception of the southbound approach at the proposed intersection of Cooper Foster Park Road and the By-Pass Roadway West during the PM peak hour.

The following turn lanes were determined to experience a queue length which exceeds the existing length of the turn lane based on the HCS analysis:

Oak Point Road & Cooper Foster Park Road

- Northbound Right Turn Lane (AM & PM Peak Hour)

Queue Analysis

The following table details the 95TH percentile queue lengths for the 2042 peak periods under study. Queue lengths shown to exceed the available storage length between adjacent intersections are highlighted on yellow. Copies of the HCS reports can be found in **Appendix P**.

Table 4.22 2042 Queue Length Analysis
(Alternative #4)

LOCATION	MOVEMENT	AVAILABLE STORAGE	AM PEAK 95TH Percentile	PM PEAK 95TH Percentile
Oak Point &	NB Left	140	20	112
Cooper Foster Park	NB Thru	140	194	428
	NB Right	140	20	6

XXX = Queue Length in Feet

Based on the available storage lengths along Oak Point Road/North Lake Street between Cooper Foster Park Road and the State Route 2 westbound ramps the northbound through lane queue at Cooper Foster Park Road is expected to block the State Route 2 westbound ramps.

Queue lengths between the State Route 2 ramps are expected to remained unchanged under Alternative #4 based on the previous scenarios.

Turn Lane Warrant Analysis

It is the intent of this section to evaluate the need for exclusive deceleration and turning lanes at the unsignalized intersections of Cooper Foster Park Road, Buck Horn Boulevard, and the by-pass roadways based on the following conditions:

Cooper Foster Park
- Two-Lane Roadway
- Posted Speed Limit - 25/35 miles per hour

Buck Horn Boulevard
- Two-Lane Roadway
- Posted Speed Limit - 25 miles per hour

The following tables show the results of the analysis of the need for exclusive deceleration and turn lanes at the unsignalized intersections of Cooper Foster Park Road at the east and west by-pass roadways. Copies of the ODOT turn lane warrant graphs can be seen in **Appendix L**.

Table 4.23 Alternative #4 Turning Lane Warrants
(Cooper Foster Park Road @ By-Pass Roadways)

TURN LANE & LOCATION	2042	
	AM PEAK	PM PEAK
Eastbound Left Turn Lane @ West By-Pass Roadway	NO	**YES**
Westbound Right Turn Lane @ West By-Pass Roadway	NO	NO
Eastbound Left Turn Lane @ East By-Pass Roadway	NO	**YES**
Westbound Right Turn Lane @ East By-Pass Roadway	NO	NO

The results of the turn lane warrant analyses indicate that exclusive right turn lanes are not warranted on Cooper Foster Park Road at the intersections with the west and east by-pass roadways under the expected 2042 Build conditions.

The results of the turn lane warrant analyses indicate that exclusive left turn lanes are warranted on Cooper Foster Park Road at the intersections with the west and east by-pass roadways under the expected 2042 Build conditions.

The following tables show the results of the analysis of the need for exclusive deceleration and turn lanes at the unsignalized intersection of Buck Horn Boulevard and the west by-pass roadway. Copies of the ODOT turn lane warrant graphs can be seen in **Appendix L**.

Table 4.24 Alternative #4 Turning Lane Warrants
(Buck Horn Boulevard @ West By-Pass Roadway)

TURN LANE & LOCATION	2042	
	AM PEAK	PM PEAK
Westbound Left Turn Lane @ West By-Pass Roadway	NO	**YES**
Eastbound Right Turn Lane @ West By-Pass Roadway	NO	NO

The results of the turn lane warrant analyses indicate that an exclusive right turn lane is not warranted on Buck Horn Boulevard at the intersection with the west by-pass roadway under the expected 2042 Build conditions.

The results of the turn lane warrant analyses indicate that an exclusive left turn lane is warranted on Buck Horn Road at the intersection with the west by-pass roadway under the expected 2042 Build conditions.

Turn Lane Length Analysis

Analyses were performed to determine the necessary storage length for the turn lanes that were previously identified as having a queue length that exceeds the turn lane length. The analysis will be based on the Year 2042 peak hour Build conditions.

The following tables details the results of the turn lane length analyses based upon the highest anticipated turn volumes at the intersections under the expected 2030 Build conditions.

Table 4.25 - Alternative #4 Turn Lane Length Analysis
(Oak Point Road & Buck Horn Boulevard)

Movement Direction	DHV	No. of Lanes	Cycles / Hour	Average Veh/ Cycle/ Lane	Design Speed (mph)	Fig. 401-10 Storage Length (ft)	Fig. 401-9 Condition			Backup Length (ft)	Turn Lane Length * (ft)
							A*	B*	C*		
NB LT	140	1	36	3.9	40	175		125	290	--	500
NB THRU	484	1	36	13.4	40	500		--	--	500	--
NB RT	30	1	36	0.8	40	50		125	165	--	500
WB LT	322	1	36	8.9	30	350	400			--	400*
WB T/RT	168	1	36	4.7	30	200	--			200	--
EB LT	208	1	36	5.8	30	250	300			--	300*
EB T/RT	191	1	36	5.3	30	250	--			250	--

*** Includes 50' taper**

Table 4.26 - Alternative #4 Turn Lane Length Analysis
(Oak Point Road & Cooper Foster Park Road)

Movement Direction	DHV	No. of Lanes	Cycles / Hour	Average Veh/ Cycle/ Lane	Design Speed (mph)	Fig. 401-10 Storage Length (ft)	Fig. 401-9 Condition		Backup Length (ft)	Turn Lane Length * (ft)
							B*	C*		
NB LT	454	1	36	12.6	40	475	125	590	--	590*
NB THRU	550	1	36	15.3	40	550	--	--	550	--
NB RT	404	1	36	11.2	40	450	125	565	--	565*
SB THRU	736	1	36	20.4	30	725	--	--	725	--
SB RT	65	1	36	1.8	30	100	125	215	--	725*

*** Includes 50' taper**

There is not sufficient space between Cooper Foster Park Road and the State Route 2 westbound ramps to accommodate the recommended turn lane length for the northbound right turn lane.

Table 4.27 - Alternative #4 Turn Lane Length Analysis
(Cooper Foster Park Road & West By-Pass Road)

Movement Direction	DHV	No. of Lanes	Cycles / Hour	Average Veh/ Cycle/ Lane	Design Speed (mph)	Fig. 401-10 Storage Length (ft)	Fig. 401-9 Condition		Backup Length (ft)	Turn Lane Length* (ft)
							B*	C*		
EB LT	199	1	60	3.3	40	175	125	290	--	290*

*** Includes 50' taper**

Table 4.28 - Alternative #4 Turn Lane Length Analysis
(Cooper Foster Park Road & East By-Pass Road)

Movement Direction	DHV	No. of Lanes	Cycles / Hour	Average Veh/ Cycle/ Lane	Design Speed (mph)	Fig. 401-10 Storage Length (ft)	Fig. 401-9 Condition	Backup Length (ft)	Turn Lane Length* (ft)
							A*		
EB LT	185	1	60	3.1	30	175	225	--	225*

*** Includes 50' taper**

Table 4.29 - Alternative #4 Turn Lane Length Analysis
(Buck Horn Boulevard & West By-Pass Road)

Movement Direction	DHV	No. of Lanes	Cycles / Hour	Average Veh/ Cycle/ Lane	Design Speed (mph)	Fig. 401-10 Storage Length (ft)	Fig. 401-9 Condition	Backup Length (ft)	Turn Lane Length* (ft)
							A*		
WB LT	128	1	60	2.1	30	150	200	--	200*

*** Includes 50' taper**

4.6 Alternative #5- Minor Street Bowtie

The minor street Bowtie treatment involves re-directing the left turns at the intersection of Oak Point Road and Cooper Foster Park Road to adjacent roundabouts along the Cooper Foster Park Road. The roundabouts will be evaluated based on the existing roadway conditions with single lanes entering from the east and west. The removal of the left turns at the main intersection allows for a simpler two phase operation where one phase is all north-south movements and the second phase is all east-west movements.

The following turn lane were determined to be necessary as part of Alternative #5:

Oak Point Road & Cooper Foster Park Road

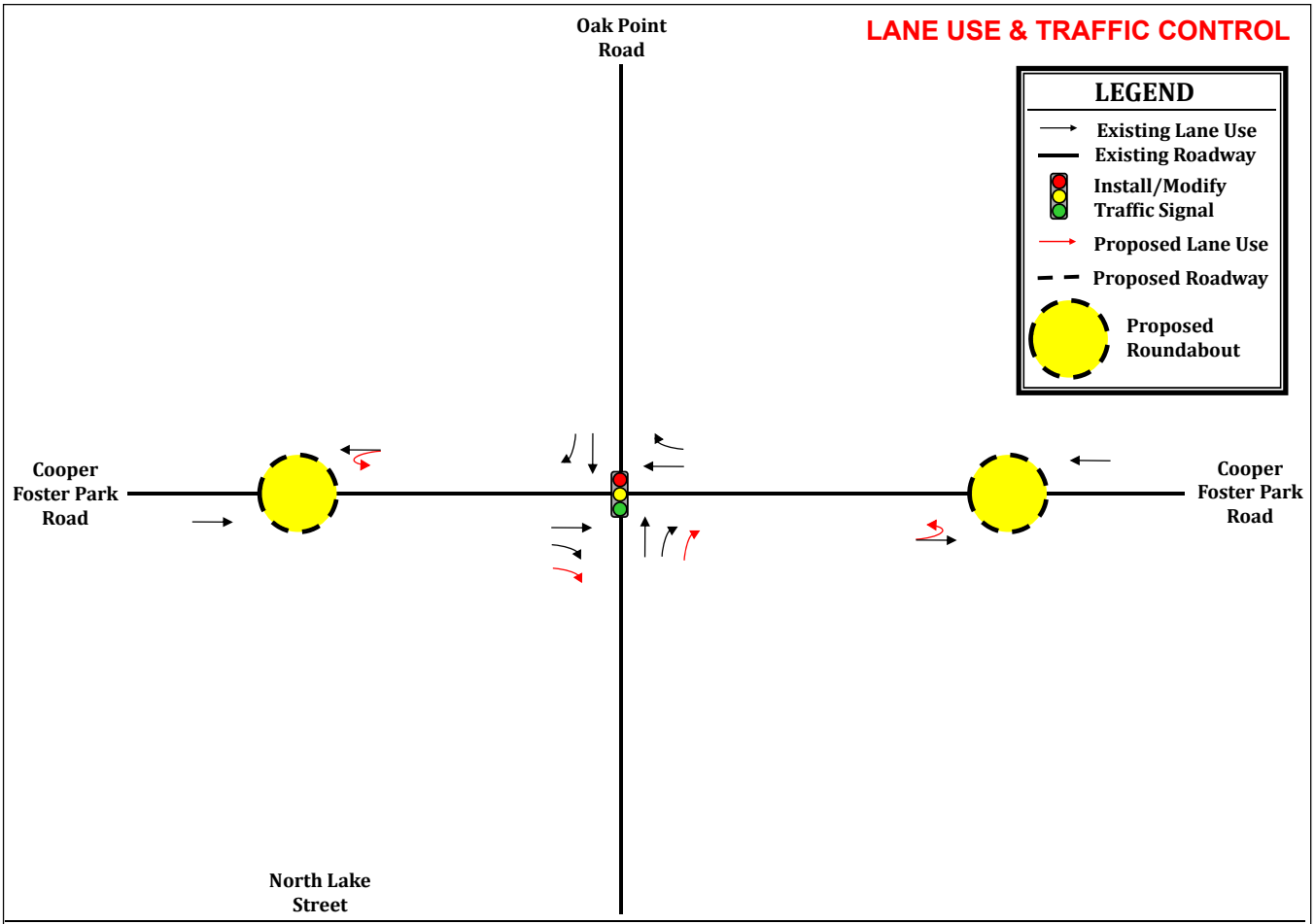
- 2ND Northbound Right Turn Lane
- 2ND Eastbound Right Turn Lane
- Westbound Right Turn Lane
- Southbound Right Turn Lane

The Bowtie scenario was determined to require single lane roundabouts along Cooper Foster Park Road.

The lane use, traffic control, and redistributed intersection volumes can be seen in **Figure 4.7, Page 84.**

Capacity analyses were performed for the estimated 2042 design hour conditions under the Bowtie alternative. The traffic volumes used in this analysis can be seen in **Figure 4.7**. Copies of the capacity worksheets are included in **Appendix Q**. The results of the Year 2042 Design Hour Conditions analysis are shown in the following table:

LANE USE & TRAFFIC CONTROL



2042 DESIGN HOUR VOLUMES

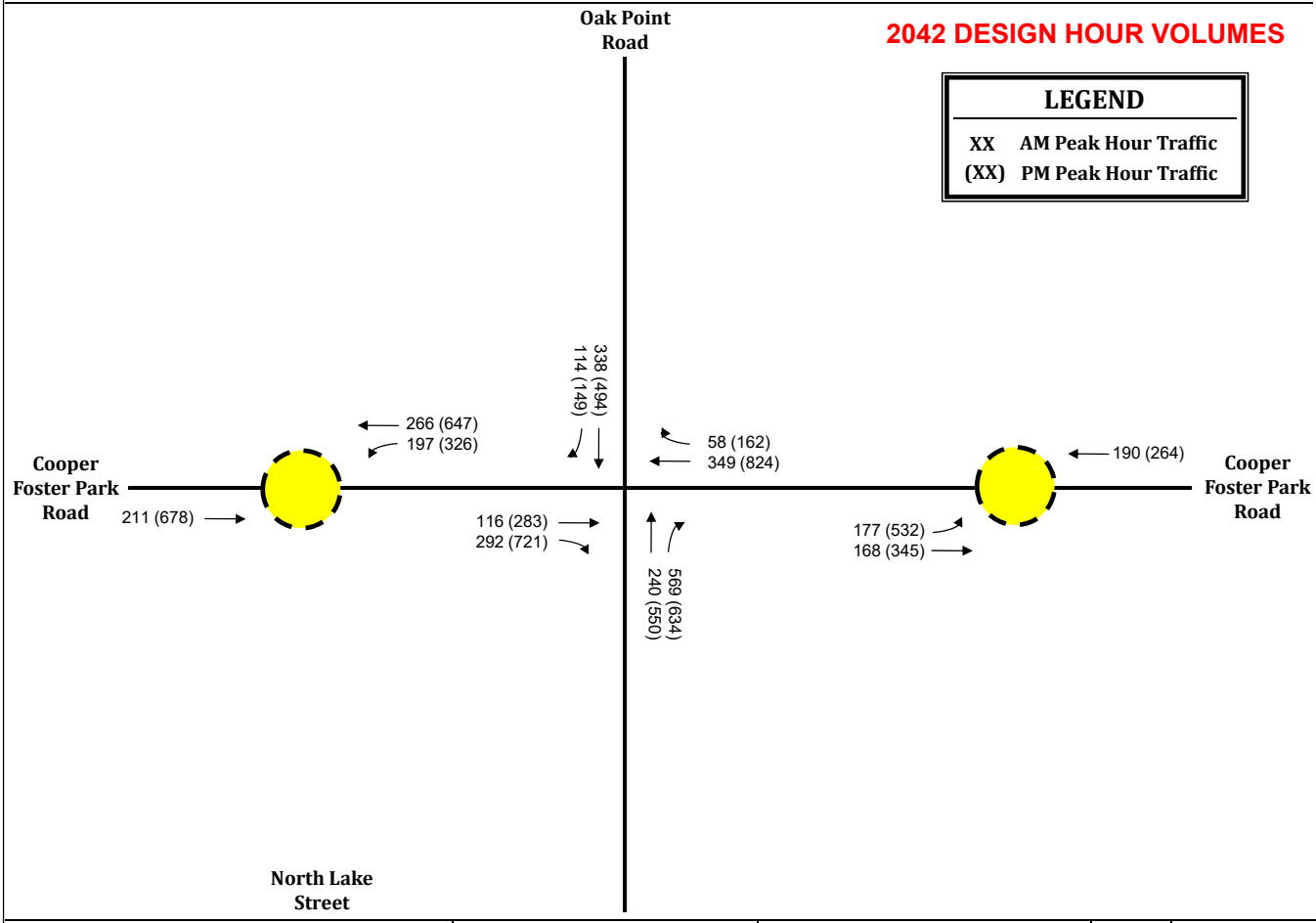


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Table 4.30 - 2042 Levels-of-Service
(Alternative #5)

INTERSECTION	TRAFFIC CONTROL	MOVEMENT/ APPROACH	AM PEAK LOS (DELAY)	PM PEAK LOS (DELAY)
Oak Point Road &	Traffic Signal	Intersection	B (17.5)	C (29.3)
Cooper Foster Park Road		Eastbound	B (16.3)	B (16.0)
		Westbound	B (18.0)	D (36.5)
		Northbound	B (18.0)	C (34.0)
		Southbound	B (17.4)	C (30.6)
Cooper Foster Park Road &	Roundabout	Intersection	A (5.8)	C (17.4)
West Bow Tie		Eastbound	A (5.3)	C (20.4)
		Westbound	A (6.1)	C (15.3)
Cooper Foster Park Road &	Roundabout	Intersection	A (5.0)	B (11.7)
East Bow Tie		Eastbound	A (5.1)	B (12.2)
		Westbound	A (4.9)	A (9.8)

(XX.X) = Average vehicle delay in seconds per vehicle

Conditions at the intersections during the AM and PM peak hour were determined to operate with level-of-service D or better under the proposed Bow Tie scenario during the AM and PM peak hours. The following turn lanes were determined to experience a queue length which exceeds the existing length of the turn lane based on the HCS analysis:

Oak Point Road & Cooper Foster Park Road

- Eastbound Right Turn Lane (AM & PM Peak Hour)
- Northbound Right Turn Lane (AM & PM Peak Hour)

Queue Analysis

The following table details the 95TH percentile queue lengths for the 2042 peak periods under study. Queue lengths shown to exceed the available storage length between adjacent intersections are highlighted on yellow. Copies of the HCS reports can be found in **Appendix Q**.

Table 4.18 2042 Queue Length Analysis
(Alternative #5)

LOCATION	MOVEMENT	AVAILABLE STORAGE	AM PEAK 95TH Percentile	PM PEAK 95TH Percentile
Oak Point &	NB Thru	140	154	539
Cooper Foster Park	NB Right (2 Lanes)	140	199	289

XXX = Queue Length in Feet

Based on the available storage lengths along Oak Point Road/North Lake Street northbound movements at Cooper Foster Park Road are expected to queue through the State Route 2 westbound exit ramp and potentially block traffic from moving during a green indication in the signal phasing.

Queue lengths between the State Route 2 ramps are expected to remained unchanged under Alternative #4 based on the previous scenarios.

Turn Lane Length Analysis

Analyses were performed to determine the necessary storage length for the turn lanes that were previously identified as having a queue length that exceeds the turn lane length. The analysis will be based on the Year 2042 peak hour Build conditions.

The following tables details the results of the turn lane length analyses based upon the highest anticipated turn volumes at the intersection under the expected 2042 Build conditions.

Table 4.32 - Alternative #5 Turn Lane Length Analysis
(Oak Point Road & Cooper Foster Park Road)

Movement Direction	DHV	No. of Lanes	Cycles / Hour	Average Veh/ Cycle/ Lane	Design Speed (mph)	Fig. 401-10 Storage Length (ft)	Fig. 401-9 Condition			Backup Length (ft)	Turn Lane Length * (ft)
							A*	B*	C*		
NB RT	550	2	36	7.6	40	325		125	440	--	625*
NB THRU	634	1	36	17.6	40	625		--	--	625	--
SB RT	149	1	36	4.1	40	200		125	315	--	500*
SB THRU	494	1	36	13.7	40	500		--	--	500	--
WB RT	162	1	36	4.5	40	200		125	315	--	775*
WB THRU	824	1	36	22.9	40	775		--	--	775	--
EB RT	721	2	36	10.0	30	400	450			--	450*
EB THRU	283	1	36	7.9	30	325	--			325	--

*** Includes 50' taper**

There is not sufficient space between Cooper Foster Park Road and the State Route 2 westbound ramps to accommodate the recommended turn lane length for the northbound right turn lanes.

4.7 Alternative #6 - Major Street Bowtie

The major street Bowtie treatment involves re-directing left turns and minor street through movements at the intersection of Oak Point Road and Cooper Foster Park Road to adjacent roundabouts along the Oak Point Road and North Lake Road. The removal of the conflicting minor street traffic and southbound left turns at the main intersection allows for a simpler three phase operation where one phase is all northbound movements, then all permitted north-south movements and the third phase is all east-west right turn movements. The intent of the movement restrictions is to provide as much time as possible in the cycle length for northbound traffic in order to reduce the impact of queued traffic between Cooper Foster Park Road and the State Route 2 westbound ramps.

The roundabouts would likely need to be located north of Buck Horn Boulevard and south of the State Route 2 interchange. The roundabouts will be evaluated based on the existing roadway conditions with single lanes entering from the north and south.

The following turn lane were determined to be necessary as part of Alternative #5:

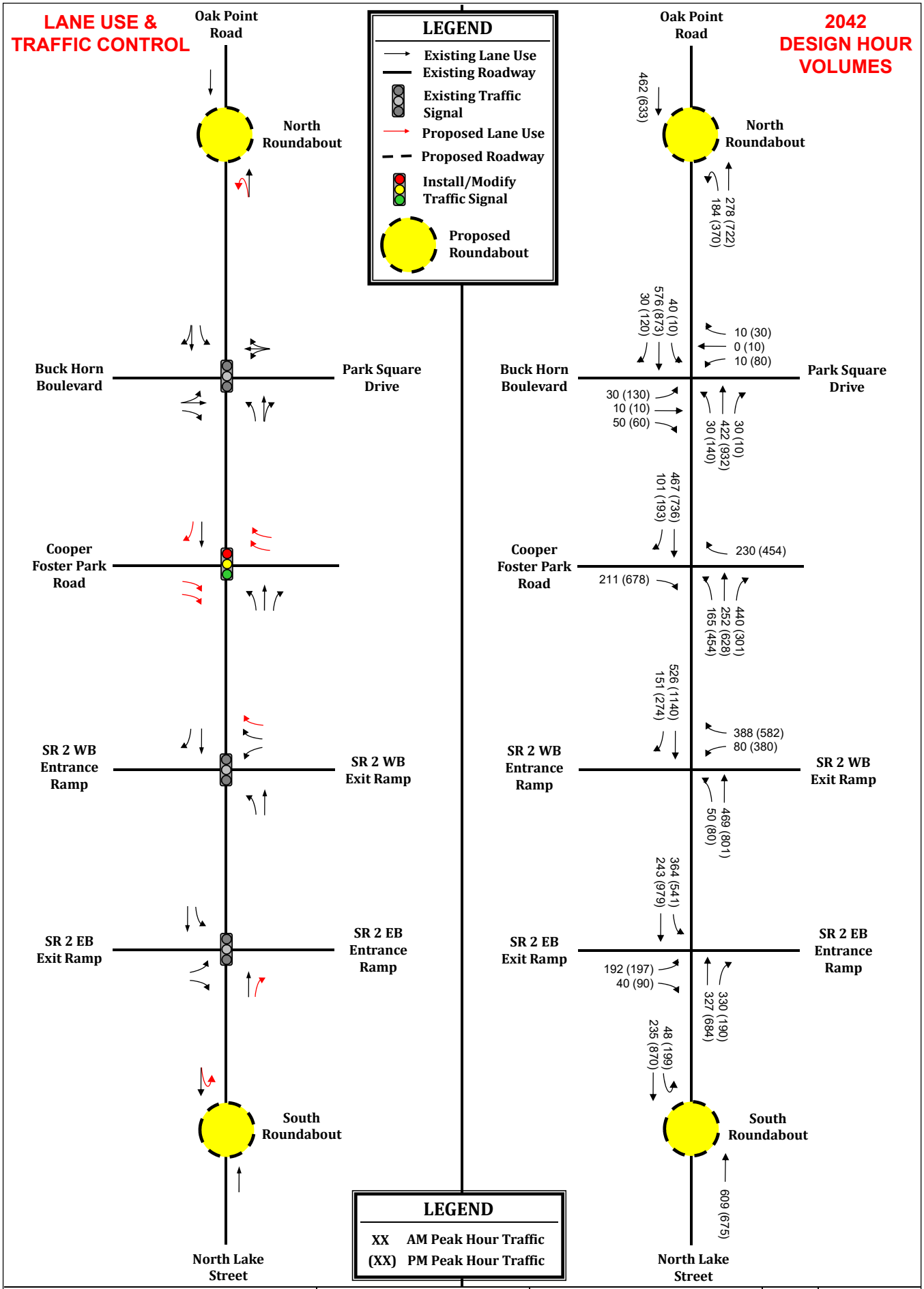
Oak Point Road & Cooper Foster Park Road

- 2ND Eastbound Right Turn Lane
- Dual Westbound Right Turn Lanes
- Southbound Right Turn Lane

The scenario also included the recommended turn lanes at the State Route 2 ramps from Alternative #1.

The lane use, traffic control, and redistributed intersection volumes based on the major street Bow Tie alternative can be seen in **Figure 4.8, Page 89.**

Capacity analyses were performed for the estimated 2042 design hour conditions under the major street Bowtie scenario. The traffic volumes used in this analysis can be seen in **Figure 4.8**. Copies of the capacity worksheets are included in **Appendix R**. The results of the Year 2042 Design Hour Conditions analysis are shown in the following table:


LANE USE & TRAFFIC CONTROL
2042 DESIGN HOUR VOLUMES
LEGEND
Existing Lane Use
Existing Roadway
Existing Traffic Signal
Proposed Lane Use
Proposed Roadway
Install/Modify Traffic Signal
Proposed Roundabout
Oak Point Road
North Roundabout
Buck Horn Boulevard
Park Square Drive
Cooper Foster Park Road
SR 2 WB Entrance Ramp
SR 2 WB Exit Ramp
SR 2 EB Exit Ramp
SR 2 EB Entrance Ramp
South Roundabout
North Lake Street
462 (633)
278 (722)
184 (370)
40 (10)
576 (873)
30 (120)
10 (30)
0 (10)
10 (80)
30 (130)
10 (10)
50 (60)
30 (10)
422 (932)
30 (140)
467 (736)
101 (193)
230 (454)
211 (678)
440 (301)
252 (628)
165 (454)
526 (1140)
151 (274)
388 (582)
80 (380)
469 (801)
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364 (541)
243 (979)
192 (197)
40 (90)
330 (190)
327 (684)
48 (199)
235 (870)
609 (675)
LEGEND
XX AM Peak Hour Traffic
(XX) PM Peak Hour Traffic

Table 4.33 - 2042 Levels-of-Service
(Alternative #6)

INTERSECTION	TRAFFIC CONTROL	MOVEMENT/ APPROACH	AM PEAK LOS (DELAY)	PM PEAK LOS (DELAY)
Oak Point & North Bow Tie	Roundabout	Intersection	A (7.2)	C (21.3)
		Northbound	A (6.1)	C (22.0)
		Southbound	A (8.3)	C (20.2)
Oak Point Road &	Traffic Signal	Intersection	C (21.7)	D (35.7)
Buck Horn Boulevard		Eastbound	C (22.2)	D (38.5)
		Westbound	C (24.5)	D (39.5)
		Northbound	B (18.5)	C (29.8)
		Southbound	C (23.9)	D (41.1)
Oak Point Road &	Traffic Signal	Intersection	B (17.6)	D (48.2)
Cooper Foster Park Road		Eastbound	B (18.3)	E (66.2)
		Westbound	C (23.3)	D (54.0)
		Northbound	B (12.9)	B (17.8)
		Southbound	C (22.2)	E (66.0)
North Lake Street &	Traffic Signal	Intersection	B (17.0)	D (53.2)
SR 2 WB Ramps		Westbound	C (22.5)	F (116.3)
		Northbound	B (15.2)	C (21.6)
		Southbound	B (14.6)	C (30.0)
North Lake Street &	Traffic Signal	Intersection	B (19.9)	D (41.0)
SR 2 EB Ramps		Eastbound	C (25.4)	E (56.7)
		Northbound	B (18.6)	E (55.6)
		Southbound	B (19.3)	C (29.5)
North Lake & South U-Turn	Roundabout	Intersection	A (7.2)	C (17.7)
		Northbound	A (8.3)	B (13.5)
		Southbound	A (4.6)	C (20.4)

(XX.X) = Average vehicle delay in seconds per vehicle

Conditions at the study area intersections during the AM and PM peak hours were determined to operate with level-of-service D or better except at the following intersections under the PM peak hour:

- Oak Point Road & Cooper Foster Park Road
- North Lake Street & State Route 2 Westbound Ramps
- North Lake Street & State Route 2 Eastbound Ramps

The following turn lanes were determined to experience a queue length which exceeds the existing length of the turn lane based on the HCS analysis:

Oak Point Road & Cooper Foster Park Road

- Northbound Right Turn Lane (AM Peak Hour)
- Northbound Left Turn Lane (PM Peak Hour)
- Eastbound Right Turn Lane (PM Peak Hour)

North Lake Street & State Route 2 Westbound Ramps

- Westbound Left Turn Lane (PM Peak Hour)
- Northbound Left Turn Lane (PM Peak Hour)

North Lake Street & State Route 2 Eastbound Ramps

- Eastbound Left Turn Lane (PM Peak Hour)
- Southbound Left Turn Lane (AM & PM Peak Hour)

Queue Analysis

The following table details the 95TH percentile queue lengths for the 2042 peak periods under study. Queue lengths shown to exceed the available storage length between adjacent intersections are highlighted on yellow. Copies of the HCS reports can be found in **Appendix R**.

Table 4.34 2042 Queue Length Analysis
(Alternative #6)

LOCATION	MOVEMENT	AVAILABLE STORAGE	AM PEAK 95TH Percentile	PM PEAK 95TH Percentile
Oak Point &	NB Left	140	87	131
Cooper Foster Park	NB Thru	140	119	503
	NB Right	140	242	3
North Lake &	SB Right	125	74	100
SR 2 Westbound	SB Thru	125	306	953
	NB Left	175 (350*)	38	185
	NB Thru	600	264	387
North Lake &	SB Left	175 (350*)	212	638
SR 2 Eastbound	SB Thru	600	110	415

XX/XX = Queue Length in Feet

*** Additional storage space that could be gained through re-striping.**

Based on the available storage lengths along Oak Point Road/North Lake Street there are multiple movements at each intersection that are expected to queue through the adjacent intersections and potentially block traffic from moving during a green indication in the signal phasing.

Turn Lane Length Analysis

Analyses were performed to determine the necessary storage length for the turn lanes that were previously identified as having a queue length that exceeds the turn lane length. The analysis will be based on the Year 2042 peak hour Build conditions.

Table 4.35 - Alternative #6 Turn Lane Length Analysis
(Oak Point Road & Cooper Foster Park Road)

Movement Direction	DHV	No. of Lanes	Cycles / Hour	Average Veh/ Cycle/ Lane	Design Speed (mph)	Fig. 401-10 Storage Length (ft)	Fig. 401-9 Condition			Backup Length (ft)	Turn Lane Length * (ft)
							A*	B*	C*		
NB LT	454	1	36	12.6	40	475		125	590	--	600*
NB THRU	628	1	36	17.4	40	625		--	--	625	--
NB RT	301	1	36	8.4	40	350		125	465	--	625*
SB RT	193	1	36	5.4	40	250		125	365	--	725*
SB THRU	736	1	36	20.4	40	725		--	--	725	--
EB RT	678	2	36	9.4	30	375		125	490	--	490*
WB RT	454	2	36	6.3	30	275	325			--	325*

*** Includes 50' taper**

There is not sufficient space between Cooper Foster Park Road and the State Route 2 westbound ramps to accommodate the recommended turn lane lengths for the northbound turn lanes.

Table 4.36 - Alternative #6 Turn Lane Length Analysis
(North Lake Street & State Route 2 Westbound Ramps)

Movement Direction	DHV	No. of Lanes	Cycles / Hour	Average Veh/ Cycle/ Lane	Design Speed (mph)	Fig. 401-10 Storage Length (ft)	Fig. 401-9 Condition		Backup Length (ft)	Turn Lane Length* (ft)
							B*	C*		
NB LT	80	1	36	2.2	40	100	125	215	--	600*
NB THRU	801	1	36	22.3	40	775	--	--	775	--
SB RT	274	1	36	7.6	40	325	125	440	--	800*
SB THRU	1140	1	36	31.7	40	1075	--	--	1075	--
WB LT	380	1	36	10.6	40	400	125	515	--	515*
WB RT	582	2	36	8.1	40	350	125	465	--	465*

*** Includes 50' taper**

There is not sufficient space between Cooper Foster Park Road and the State Route 2 westbound ramps to accommodate the recommended turn lane length for the southbound right turn lane.

Table 4.37 - Alternative #6 Turn Lane Length Analysis
(North Lake Street & State Route 2 Eastbound Ramps)

Movement Direction	DHV	No. of Lanes	Cycles / Hour	Average Veh/ Cycle/ Lane	Design Speed (mph)	Fig. 401-10 Storage Length (ft)	Fig. 401-9 Condition		Backup Length (ft)	Turn Lane Length* (ft)
							B*	C*		
SB LT	541	1	36	15.0	40	525	125	640	--	600*
SB THRU	979	1	36	27.2	40	900	--	--	900	--
EB LT	197	1	36	5.5	40	250	125	365	--	365*
EB RT	90	1	36	2.5	40	150	--	--	150	--

*** Includes 50' taper**

In order to accommodate the recommended length of the southbound left turn lane at the State Route 2 eastbound ramps and the northbound left turn lane at the State Route 2 westbound ramps it would be necessary to widen the roadway and the bridge over State Route 2 to construct side by side left turn lanes.

4.8 Alternative #7 - Restricted Crossing U-Turn (RCUT)

This alternative reconfigures the Oak Point Road and Cooper Foster Park Road intersection to prohibit left turn movements by adding median U-turn crossovers on Oak Point Road, and provides the additional lanes as described in Alternative #1 at the State Route 2 ramps. The removal of the conflicting minor street traffic and southbound left turns at the main intersection allows for a simpler three phase operation where one phase is all northbound movements, then all permitted north-south movements and the third phase is all east-west right turn movements. The intent of the movement restrictions is to provide as much time as possible in the cycle length for northbound traffic in order to reduce the impact of queued traffic between Cooper Foster Park Road and the State Route 2 westbound ramps.

The median u-turns would likely need to be located north of Buck Horn Boulevard and south of the State Route 2 interchange. Additional roadway widening will be needed at these locations to provide a lane for the u-turn traffic and as well as enough pavement to accommodate the turning radii of the u-turn vehicle. Traffic signal control would be necessary at each u-turn location in order to provide gaps in the opposing traffic stream for the u-turn movements.

The following turn lanes were determined to be necessary as part of Alternative #6:

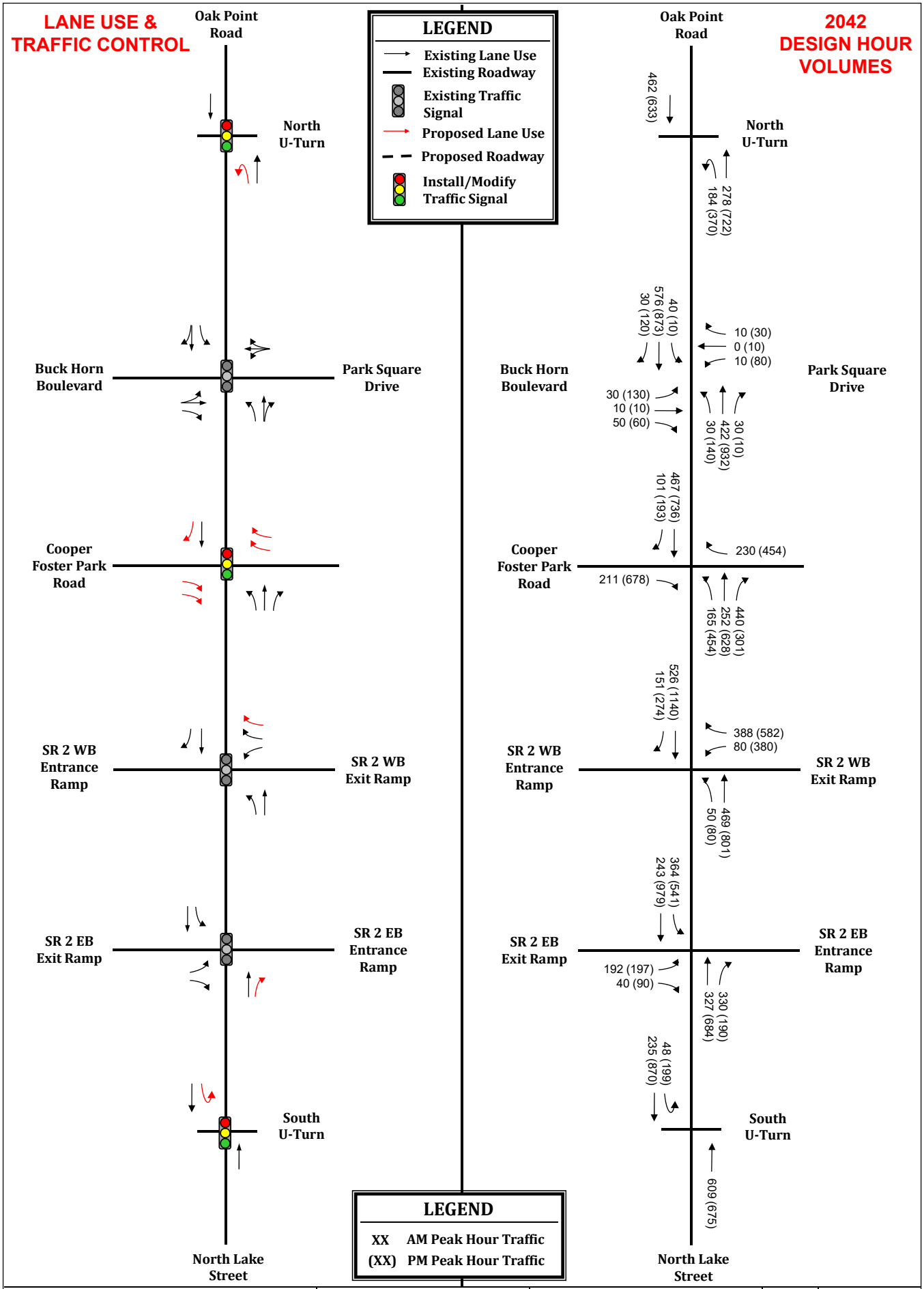
Oak Point Road & Cooper Foster Park Road

- 2ND Eastbound Right Turn Lane
- Dual Westbound Right Turn Lanes
- Southbound Right Turn Lane

The scenario also included the recommended turn lanes at the State Route 2 ramps from Alternative #1.

The lane use, traffic control, and redistributed intersection volumes based on the major street Bow Tie alternative can be seen in **Figure 4.9, Page 97.**

Capacity analyses were performed for the estimated 2042 design hour conditions under the Alternative #7. The traffic volumes used in this analysis can be seen in **Figure 4.9**. Copies of the capacity worksheets are included in **Appendix S**. The results of the Year 2042 Design Hour Conditions analysis are shown in the following table:



TMS Engineers, Inc.
Transportation Management Services
2112 Case Parkway S., Unit 7, Twinsburg, Ohio 44087
www.TMSEngineers.com

Areawide Planning Study
Amherst, Ohio

Alternative #7
RCUT
Lane Use, Traffic Control, & Traffic Volumes

NORTH
NOT TO SCALE

Figure: 4.9

Table 4.38 - 2042 Levels-of-Service
(Alternative #7)

INTERSECTION	TRAFFIC CONTROL	MOVEMENT/ APPROACH	AM PEAK LOS (DELAY)	PM PEAK LOS (DELAY)
Oak Point & North U-Turn	Traffic Signal	Intersection	A (3.5)	A (3.9)
		Northbound	A (1.3)	A (2.5)
		Southbound	A (5.6)	A (6.3)
Oak Point Road &	Traffic Signal	Intersection	C (21.7)	D (35.7)
Buck Horn Boulevard		Eastbound	C (22.2)	D (38.5)
		Westbound	C (24.5)	D (39.5)
		Northbound	B (18.5)	C (29.8)
		Southbound	C (23.9)	D (41.1)
Oak Point Road &	Traffic Signal	Intersection	B (17.6)	D (48.2)
Cooper Foster Park Road		Eastbound	B (18.3)	E (66.2)
		Westbound	C (23.3)	D (54.0)
		Northbound	B (12.9)	B (17.8)
		Southbound	C (22.2)	E (66.0)
North Lake Street &	Traffic Signal	Intersection	B (17.0)	D (53.2)
SR 2 WB Ramps		Westbound	C (22.5)	F (116.3)
		Northbound	B (15.2)	C (21.6)
		Southbound	B (14.6)	C (30.0)
North Lake Street &	Traffic Signal	Intersection	B (19.9)	D (41.0)
SR 2 EB Ramps		Eastbound	C (25.4)	E (56.7)
		Northbound	B (18.6)	E (55.6)
		Southbound	B (19.3)	C (29.5)
North Lake & South U-Turn	Traffic Signal	Intersection	A (1.8)	A (4.3)
		Northbound	A (4.7)	A (8.1)
		Southbound	A (0.7)	A (1.9)

(XX.X) = Average vehicle delay in seconds per vehicle

Conditions at the study area intersections during the AM and PM peak hours were determined to operate with level-of-service D or better except at the following intersections under the PM peak hour:

- Oak Point Road & Cooper Foster Park Road
- North Lake Street & State Route 2 Westbound Ramps
- North Lake Street & State Route 2 Eastbound Ramps

The following turn lanes were determined to experience a queue length which exceeds the existing length of the turn lane based on the HCS analysis:

Oak Point Road & Cooper Foster Park Road

- Northbound Right Turn Lane (AM Peak Hour)
- Northbound Left Turn Lane (PM Peak Hour)
- Eastbound Right Turn Lane (PM Peak Hour)

North Lake Street & State Route 2 Westbound Ramps

- Westbound Left Turn Lane (PM Peak Hour)
- Northbound Left Turn Lane (PM Peak Hour)

North Lake Street & State Route 2 Eastbound Ramps

- Eastbound Left Turn Lane (PM Peak Hour)
- Southbound Left Turn Lane (AM & PM Peak Hour)

Queue Analysis

The following table details the 95TH percentile queue lengths for the 2042 peak periods under study. Queue lengths shown to exceed the available storage length between adjacent intersections are highlighted on yellow. Copies of the HCS reports can be found in **Appendix S**.

Table 4.39 2042 Queue Length Analysis
(Alternative #7)

LOCATION	MOVEMENT	AVAILABLE STORAGE	AM PEAK 95TH Percentile	PM PEAK 95TH Percentile
Oak Point &	NB Left	140	87	131
Cooper Foster Park	NB Thru	140	119	503
	NB Right	140	242	3
North Lake &	SB Right	125	74	100
SR 2 Westbound	SB Thru	125	306	953
	NB Left	175 (350*)	38	185
	NB Thru	600	264	387
North Lake &	SB Left	175 (350*)	212	638
SR 2 Eastbound	SB Thru	600	110	415

XXX = Queue Length in Feet

*** Additional storage space that could be gained through re-striping.**

Based on the available storage lengths along Oak Point Road/North Lake Street there are multiple movements at each intersection that are expected to queue through the adjacent intersections and potentially block traffic from moving during a green indication in the signal phasing.

Table 4.40 - Alternative #7 Turn Lane Length Analysis
(Oak Point Road & Cooper Foster Park Road)

Movement Direction	DHV	No. of Lanes	Cycles / Hour	Average Veh/ Cycle/ Lane	Design Speed (mph)	Fig. 401-10 Storage Length (ft)	Fig. 401-9 Condition			Backup Length (ft)	Turn Lane Length * (ft)
							A*	B*	C*		
NB LT	454	1	36	12.6	40	475		125	590	--	600*
NB THRU	628	1	36	17.4	40	625		--	--	625	--
NB RT	301	1	36	8.4	40	350		125	465	--	625*
SB RT	193	1	36	5.4	40	250		125	365	--	725*
SB THRU	736	1	36	20.4	40	725		--	--	725	--
EB RT	678	2	36	9.4	30	375		125	490	--	490*
WB RT	454	2	36	6.3	30	275	325			--	325*

*** Includes 50' taper**

There is not sufficient space between Cooper Foster Park Road and the State Route 2 westbound ramps to accommodate the recommended turn lane lengths for the northbound turn lanes.

Table 4.41 - Alternative #7 Turn Lane Length Analysis
(North Lake Street & State Route 2 Westbound Ramps)

Movement Direction	DHV	No. of Lanes	Cycles / Hour	Average Veh/ Cycle/ Lane	Design Speed (mph)	Fig. 401-10 Storage Length (ft)	Fig. 401-9 Condition		Backup Length (ft)	Turn Lane Length* (ft)
							B*	C*		
NB LT	80	1	36	2.2	40	100	125	215	--	600*
NB THRU	801	1	36	22.3	40	775	--	--	775	--
SB RT	274	1	36	7.6	40	325	125	440	--	800*
SB THRU	1140	1	36	31.7	40	1075	--	--	1075	--
WB LT	380	1	36	10.6	40	400	125	515	--	515*
WB RT	582	2	36	8.1	40	350	125	465	--	465*

*** Includes 50' taper**

There is not sufficient space between Cooper Foster Park Road and the State Route 2 westbound ramps to accommodate the recommended turn lane length for the southbound right turn lane.

Table 4.42 - Alternative #7 Turn Lane Length Analysis
(North Lake Street & State Route 2 Eastbound Ramps)

Movement Direction	DHV	No. of Lanes	Cycles / Hour	Average Veh/ Cycle/ Lane	Design Speed (mph)	Fig. 401-10 Storage Length (ft)	Fig. 401-9 Condition		Backup Length (ft)	Turn Lane Length* (ft)
							B*	C*		
SB LT	541	1	36	15.0	40	525	125	640	--	600*
SB THRU	979	1	36	27.2	40	900	--	--	900	--
EB LT	197	1	36	5.5	40	250	125	365	--	365*
EB RT	90	1	36	2.5	40	150	--	--	150	--

*** Includes 50' taper**

In order to accommodate the recommended length of the southbound left turn lane at the State Route 2 eastbound ramps and the northbound left turn lane at the State Route 2 westbound ramps it would be necessary to widen the roadway and the bridge over State Route 2 to construct side by side left turn lanes.

Table 4.43 - Alternative #7 Turn Lane Length Analysis
(Oak Point Road & North U-Turn)

Movement Direction	DHV	No. of Lanes	Cycles / Hour	Average Veh/ Cycle/ Lane	Design Speed (mph)	Fig. 401-10 Storage Length (ft)	Fig. 401-9 Condition		Backup Length (ft)	Turn Lane Length* (ft)
							B*	C*		
NB UT	370	1	72	5.1	40	250	125	365	--	365*

*** Includes 50' taper**

Table 4.44 - Alternative #7 Turn Lane Length Analysis
(North Lake Street & South U-Turn)

Movement Direction	DHV	No. of Lanes	Cycles / Hour	Average Veh/ Cycle/ Lane	Design Speed (mph)	Fig. 401-10 Storage Length (ft)	Fig. 401-9 Condition		Backup Length (ft)	Turn Lane Length* (ft)
							B*	C*		
SB UT	199	1	72	2.8	40	150	125	265	--	265*

*** Includes 50' taper**

4.9 Alternative #8 - Additional Through Lanes

Alternative #8 analyzed the impact of widening Oak Point Road/North Lake Street to a four lane section with two through lanes in each direction. The 4-lane section would be recommended to being north of Buck Horn Boulevard and south of the State Route 2 eastbound ramps.

The scenario does not include the recommended turn lanes at the Cooper Foster Park Road and State Route 2 ramps from Alternative #1.

Capacity analyses were performed for the estimated 2042 design hour conditions under the 4-Lane scenario. The traffic volumes used in this analysis can be seen in **Figure 3.9**. Copies of the capacity worksheets are included in **Appendix T**. The results of the Year 2042 Design Hour Conditions analysis are shown in the following table:

Table 4.45 - 2042 Levels-of-Service
(Alternative #8)

INTERSECTION	TRAFFIC CONTROL	MOVEMENT/ APPROACH	AM PEAK LOS (DELAY)	PM PEAK LOS (DELAY)
Oak Point Road &	Traffic Signal	Intersection	B (18.9)	C (22.1)
Buck Horn Boulevard		Eastbound	B (17.6)	C (21.2)
		Westbound	B (19.7)	C (22.3)
		Northbound	B (18.4)	C (21.5)
		Southbound	B (19.4)	C (22.9)
Oak Point Road &	Traffic Signal	Intersection	C (20.1)	C (32.1)
Cooper Foster Park Road		Eastbound	B (19.2)	B (15.2)
		Westbound	C (25.0)	D (44.9)
		Northbound	C (20.5)	C (31.2)
		Southbound	B (17.4)	D (42.4)
North Lake Street &	Traffic Signal	Intersection	B (17.8)	C (25.2)
SR 2 WB Ramps		Westbound	C (20.1)	C (31.0)
		Northbound	B (17.0)	C (21.8)
		Southbound	B (16.7)	C (22.6)
North Lake Street &	Traffic Signal	Intersection	C (22.9)	C (25.5)
SR 2 EB Ramps		Eastbound	C (25.6)	C (34.3)
		Northbound	C (24.6)	C (34.8)
		Southbound	C (20.0)	B (18.9)

(XX.X) = Average vehicle delay in seconds per vehicle

Conditions at the intersections during the AM and PM peak hour were determined to operate with level-of-service D or better under the proposed alternative #7.

The following turn lanes were determined to experience a queue length which exceeds the existing length of the turn lane based on the HCS analysis:

Oak Point Road & Cooper Foster Park Road

- Northbound Left Turn Lane (AM & PM Peak Hour)
- Northbound Right Turn Lane (PM Peak Hour)
- Eastbound Right Turn Lane (PM Peak Hour)

North Lake Street & State Route 2 Westbound Ramps

- Westbound Left Turn Lane (PM Peak Hour)
- Southbound Right Turn Lane (PM Peak Hour)

North Lake Street & State Route 2 Eastbound Ramps

- Southbound Left Turn Lane (AM Peak Hour)
- Eastbound Left Turn Lane (PM Peak Hour)

Queue Analysis

The following table details the 95TH percentile queue lengths for the 2042 peak periods under study. Queue lengths shown to exceed the available storage length between adjacent intersections are highlighted on yellow. Copies of the HCS reports can be found in **Appendix T**.

Table 4.46 2042 Queue Length Analysis
(Alternative #8)

LOCATION	MOVEMENT	AVAILABLE STORAGE	AM PEAK 95TH Percentile	PM PEAK 95TH Percentile
Oak Point &	NB Left	140	93	430
Cooper Foster Park	NB Thru	140	77	225
	NB Right	140	310	149
North Lake &	SB Right	125	92	209
SR 2 Westbound	SB Thru	125	156	362
	NB Left	175 (350*)	36	90
	NB Thru	600	133	223
North Lake &	SB Left	175 (350*)	246	347
SR 2 Eastbound	SB Thru	600	40	162

XXX = Queue Length in Feet

*** Additional storage space that could be gained through re-striping.**

Based on the available storage lengths along Oak Point Road/North Lake Street there are movements at each intersection that are expected to queue through the adjacent intersections and potentially block traffic from moving during a green indication in the signal phasing.

Table 4.47 - Alternative #8 Turn Lane Length Analysis
(Oak Point Road & Cooper Foster Park Road)

Movement Direction	DHV	No. of Lanes	Cycles / Hour	Average Veh/ Cycle/ Lane	Design Speed (mph)	Fig. 401-10 Storage Length (ft)	Fig. 401-9 Condition			Backup Length (ft)	Turn Lane Length * (ft)
							A*	B*	C*		
NB LT	454	1	36	12.6	40	475		125	590	--	590*
NB THRU	550	2	36	7.6	40	325		--	--	325	--
NB RT	404	1	36	11.2	40	450		125	565	--	565*
EB LT/T	199	1	36	5.5	30	250		--	--	250	--
EB RT	479	1	36	13.3	30	500		125	615	615	615*

*** Includes 50' taper**

There is not sufficient space between Cooper Foster Park Road and the State Route 2 westbound ramps to accommodate the recommended turn lane lengths for the northbound turn lanes.

Table 4.48 - Alternative #8 Turn Lane Length Analysis
(North Lake Street & State Route 2 Westbound Ramps)

Movement Direction	DHV	No. of Lanes	Cycles / Hour	Average Veh/ Cycle/ Lane	Design Speed (mph)	Fig. 401-10 Storage Length (ft)	Fig. 401-9 Condition		Backup Length (ft)	Turn Lane Length* (ft)
							B*	C*		
SB RT	274	1	36	7.6	40	325	125	440	--	500*
SB THRU	941	2	36	13.1	40	500	--	--	500	
WB LT	380	1	36	10.6	40	400	125	515	--	515*
WB RT	582	1	36	16.2	40	600	--	--	600	--

*** Includes 50' taper**

There is not sufficient space between Cooper Foster Park Road and the State Route 2 westbound ramps to accommodate the recommended turn lane length for the southbound right turn lane.

Table 4.49 - Alternative #8 Turn Lane Length Analysis
(North Lake Street & State Route 2 Eastbound Ramps)

Movement Direction	DHV	No. of Lanes	Cycles / Hour	Average Veh/ Cycle/ Lane	Design Speed (mph)	Fig. 401-10 Storage Length (ft)	Fig. 401-9 Condition		Backup Length (ft)	Turn Lane Length* (ft)
							B*	C*		
SB LT	541	1	36	15.0	40	525	125	640	--	640*
SB THRU	780	2	36	10.8	40	400	--	--	400	--
EB LT	197	1	36	5.5	40	250	125	365	--	365*
EB RT	90	1	36	2.5	40	150	--	--	150	--

*** Includes 50' taper**

In order to accommodate the recommended length of the southbound left turn lane at the State Route 2 eastbound ramps and the northbound left turn lane at the State Route 2 westbound ramps it would be necessary to widen the roadway and the bridge over State Route 2 to construct side by side left turn lanes.

Chapter 5
Conclusions

Based on the results of the analyses, we offer the following conclusions and recommendations:

5.1 This Area-Wide Planning Study has been prepared at the request of the City of Amherst. The study area is primarily located in the City of Amherst, Lorain County, Ohio. A portion of the City of Lorain will also be included in the study area. The study area will consist of the following intersections:

1. Oak Point Road & Buck Horn Boulevard
2. Oak Point Road/North Lake Street & Cooper Foster Park Road
3. North Lake Street & State Route 2 Westbound Ramps
4. North Lake Street & State Route 2 Eastbound Ramps
5. Cooper Foster Park Road & Hollstein Drive
6. North Main Street & Cooper Foster Park Road

5.2 The analysis of the study area included proposed and under construction developments that are located within the study area. The following developments were considered in forecast of future traffic volumes for the study area:

1. Medical Office Building (17,756 SF) - 2021
2. Reserve at Beaver Creek Subdivision (109 Units) - 2021
3. Eagle Ridge Subdivision (59 Units) - 2021
4. Preserve at Quarry Lakes Subdivision (100 Units) - 2020
5. Buckeye Square/Nova Medical Offices (11,325 SF) - 2020
6. Sandy Springs PUD (161 Units)

5.3 The year 2022 was analyzed for the opening year conditions. The future design year will be 2042 based on providing a twenty year design period for any recommended improvements in the study area.

5.4 The weekday AM peak hour of traffic was determined to be 7:15 AM to 8:15 AM. The weekday PM peak hour of traffic was found to be 4:30 PM to 5:30 PM. These periods were used to forecast expected and future traffic volumes since they reflect the period of the highest volume of vehicular traffic flow for the study area roadways.

5.5 The ODOT GIS Crash Analysis Tool (GCAT) was used to collect crash information at the study area intersections for the years 2017 - 2019. The study area experienced a total of 68 intersection related crashes between 2017 and 2019. Rear end crashes represented approximately 51% (35 crashes) of the total amount of crashes. Angle crashes represented approximately 19% of the crashes. Left and right turn crashes represented approximately 13% of the crashes. These four types of crashes represent the predominate crash types at the study area intersections.

5.6 Conditions at the study area intersections during the AM and PM peak hours were determined to operate with level-of-service D or better under the forecasted 2022 Build conditions.

5.7 Conditions at the study area intersections during the 2042 Build AM and PM peak hours were determined to operate with level-of-service D or better except at the following intersections under the PM peak hour:

- Oak Point Road & Cooper Foster Park Road
- North Lake Street & State Route 2 Westbound Ramps
- North Lake Street & State Route 2 Eastbound Ramps

5.8 The following turn lanes were determined to experience a queue length which exceeds the existing length of the turn lane based on the HCS analysis:

Oak Point Road & Cooper Foster Park Road

- Northbound Right Turn Lane (AM & PM Peak Hour)
- Northbound Left Turn Lane (PM Peak Hour)
- Eastbound Right Turn Lane (AM & PM Peak Hour)

North Lake Street & State Route 2 Westbound Ramps

- Westbound Left Turn Lane (PM Peak Hour)
- Southbound Right Turn Lane (PM Peak Hour)
- Northbound Left Turn Lane (PM Peak Hour)

North Lake Street & State Route 2 Eastbound Ramps

- Eastbound Left Turn Lane (AM & PM Peak Hour)
- Southbound Left Turn Lane (AM & PM Peak Hour)

5.9 Based on the available storage lengths along Oak Point Road/North Lake Street at Cooper Foster Park Road and the State Route 2 interchange there are multiple movements at each intersection that are expected to queue through the adjacent intersections and potentially block traffic from moving during a green indication in the signal phasing.

5.10 The report analyzed the following 8 alternatives in order to determine if the intersection levels-of-service can be improved and the impact of queued traffic can be reduced.

- Alternative #1 - Additional Turn Lanes
- Alternative #2 - Roundabouts
- Alternative #3 - NE Quadrant Roadway
- Alternative #4 - By-Pass Roadway
- Alternative #5 - Minor Street Bowtie
- Alternative #6 - Major Street Bowtie
- Alternative #7 - RCUT
- Alternative #8 - Additional Through Lanes

5.11 The eight scenarios were evaluated based on various criteria to consider a range of impacts. A matrix was prepared, which provides a comparative assessment of the eight scenarios. Information gathered for this report and the analysis contained within it were used to complete the matrix seen **Figure 5.1, Page 114.**

5.12 Upon detailed screening of capacity analysis results and qualitative impacts of 8 possible Preliminary Alternatives, 6 alternatives are presented for consideration:

- Alternative #1 - Additional Turn Lanes
- Alternative #2 - Roundabouts
- Alternative #3 - NE Quadrant Roadway
- Alternative #4 - By-Pass Roadway
- Alternative #5 - Minor Street Bowtie
- Alternative #8 - Additional Through Lanes

These alternatives are expected to address the intersection capacity issues at all locations. The queue length and turn lane lengths were determined to experience various levels of improvement however the impact of the queue lengths were not completely mitigated under any scenario and the available storage between intersections did not allow turn lane lengths that were able to fully accommodate the necessary length.

AMHERST AREAWIDE PLANNING STUDY - COMPARISON OF ALTERNATIVES

Oak Point Road - North Lake Street - Cooper Foster Park Road - State Route 2 Interchange

	NO-BUILD	ALTERNATIVE #1 (Turn Lanes & Signal Modifications)	ALTERNATIVE #2 (Roundabout Control)	ALTERNATIVE #3 (NE Quadrant Roadway)	ALTERNATIVE #4 (By-Pass Roadway)	ALTERNATIVE #5 (Minor Street Bowtie)	ALTERNATIVE #6 (Major Steet Bowtie)	ALTERNATIVE #7 (RCUT)	ALTERNATIVE #8 (Additional Through Lanes)
Description	Forecasted 2042 traffic volumes w/ existing roadway conditions.	Construct additional turn lanes and modify traffic signal operation.	Install roundabout about control at Cooper Foster Park, SR 2 WB ramps, & SR 2 EB Ramps	Construct at Quandrant Roadway at the northeast quadrant of the Oak Point & Cooper Foster intersection.	Construction of a By-Pass Roadway to re-locate the minor street through and left turns at the Cooper Foster Park intersection.	Left Turn movements are relocated to roundabouts east and west of the intersection along Cooper Foster Park.	Left Turn movements are relocated to roundabouts north of Buck Horn and south of the SR 2 EB Ramps.	Create U-Turn intersections north of Buck Horn and south of the SR 2 EB Ramps in order to re-direct the minor street through and left turn movements.	Add an additional through lane in each direction beginning north of Buck Horn and through the SR 2 EB ramps.
Additional Intersections	NONE	NO	NO	1 New Traffic Signal Controlled Intersection	3 New Stop Sign Controlled Intesections	2 New Roundabouts	2 New Roundabouts	2 U-Turn Locations (Signalized)	NO
Additional Roadways	NONE	NO	NO	YES	YES	NO	NO	NO	NO
Additional Turn Lanes	NONE	@ Buck Horn: NONE @ Cooper Foster: EB Left Turn Lane WB Left Turn Lane WB Right Turn Lane @ SR 2 WB: 2nd WB Right Turn Lane @ SR 2 EB: NB Right Turn Lane	Each location would require a two lane roundabout with 2 lanes entering from the north and south. By-pass right turn lanes would also be necessary at Cooper Foster Park and the SR 2 WB Ramps	@ Buck Horn: WB Left Turn Lane NB Right Turn Lane @ Cooper Foster: WB Right Turn Lane NB Through Lane @ SR 2 WB: 2nd WB Right Turn Lane @ SR 2 EB: NB Right Turn Lane @ Quadrant: EB Left Turn Lane SB Left Turn Lane	@ Buck Horn: WB Left Turn Lane NB Right Turn Lane @ Cooper Foster: SB Right Turn Lane @ SR 2 WB: 2nd WB Right Turn Lane @ SR 2 EB: NB Right Turn Lane @ By-Pass West: EB Left Turn Lane @ Buck Horn By-Pass: WB Left Turn Lane @ By-Pass East EB Left Turn Lane	@ Buck Horn: NONE @ Cooper Foster: 2nd NB Right Turn Lane 2nd EB Right Turn Lane WB Right Turn Lane SB Right Turn Lane @ SR 2 WB: 2nd WB Right Turn Lane @ SR 2 EB: NB Right Turn Lane	@ Buck Horn: NONE @ Cooper Foster: 2nd EB Right Turn Lane 2nd WB Right Turn Lane SB Right Turn Lane @ SR 2 WB: 2nd WB Right Turn Lane @ SR 2 EB: NB Right Turn Lane	@ Buck Horn: NONE @ Cooper Foster: 2nd EB Right Turn Lane 2nd WB Right Turn Lane SB Right Turn Lane @ SR 2 WB: 2nd WB Right Turn Lane @ SR 2 EB: NB Right Turn Lane	@ Buck Horn: NONE @ Cooper Foster: NONE @ SR 2 WB: NONE @ SR 2 EB: NONE
Traffic Signal Modifications	NONE	Right Turn Overlap for WB RT at Cooper Foster	NONE	Modify Buck Horn Modify Cooper Foster Park	Modify Buck Horn Modify Cooper Foster Park	Modify Cooper Foster Park	Modify Cooper Foster Park	Modify Cooper Foster Park	NONE
PM Intersection LOS									
@ Buck Horn:	C (25.9)	C (25.9)	C (25.9)	C (31.3)	D (36.5)	C (25.9)	D (35.7)	D (35.7)	C (22.1)
@ Cooper Foster:	E (60.7)	D (38.6)	D (31.1)	C (27.2)	C (32.0)	C (29.3)	D (48.2) - EB & SB LOS E	D (48.2) - EB & SB LOS E	C (32.1)
@ SR 2 WB:	E (59.1)	C (28.1)	C (15.9)	C (28.1)	C (28.1)	C (28.1)	D (53.2) - WB LOS F	D (53.2) - WB LOS F	C (25.2)
@ SR 2 EB:	D (46.7)	C (27.4)	C (15.0)	C (27.4)	C (27.4)	C (27.4)	D (41.0) - EB & NB LOS E	D (41.0) - EB & NB LOS E	C (25.5)
Turn Lane Lengths	Multiple turn lane lengths are inadequate at the interchange and Cooper Foster Park intersections.	Insfficient space to accommodate NB turn lanes at Cooper Foster Park and SB right turn lane at SR2 WB. Brdige widening would be necessary for turn lanes at SR 2 ramps.	No turn lanes with roundabout control.	Insfficient space to accommodate NB turn lanes at Cooper Foster Park and SB right turn lane at SR2 WB. Brdige widening would be necessary for turn lanes at SR 2 ramps.	Insufficient space to accommodate NB turn lanes at Cooper Foster Park and SB right turn lane at SR2 WB. Brdige widening would be necessary for turn lanes at SR 2 ramps.	Insufficient space to accommodate NB right turn lane at Cooper Foster Park and SB right turn lane at SR2 WB. Bridge widening would be necessary for turn lanes at SR 2 ramps.	Insufficient space to accommodate NB turn lanes at Cooper Foster Park and SB right turn lane at SR2 WB. Brdige widening would be necessary for turn lanes at SR 2 ramps.	Insufficient space to accommodate NB turn lanes at Cooper Foster Park and SB right turn lane at SR2 WB. Brdige widening would be necessary for turn lanes at SR 2 ramps.	Insufficient space to accommodate NB turn lanes at Cooper Foster Park and SB right turn lane at SR2 WB. Brdige widening would be necessary for turn lanes at SR 2 ramps.
Queue Lengths	Queue lengths are expected to block adjacent intersections at the interchange and Cooper Foster Park.	Queue lengths are expected to block adjacent intersections at the interchange and Cooper Foster Park.	The PM peak northbound queue from Cooper Foster is expected to extend into the SR 2 WB ramps intersection	The AM & PM peak northbound queue from Cooper Foster is expected to extend into the SR 2 WB ramps intersection	The AM & PM peak northbound queue from Cooper Foster is expected to extend into the SR 2 WB ramps intersection	The AM & PM peak northbound queue from Cooper Foster is expected to extend into the SR 2 WB ramps intersection	Queue lengths are expected to block adjacent intersections at the interchange and Cooper Foster Park.	Queue lengths are expected to block adjacent intersections at the interchange and Cooper Foster Park.	Queue lengths are expected to block adjacent intersections at the interchange and Cooper Foster Park.
Bridge Impact		Widening necessary	Widening necessary	Widening necessary	Widening necessary	Widening necessary	Widening necessary	Widening necessary	Widening necessary
Location of Improvements		City of Amherst, Ohio	City of Amherst, Ohio City of Lorain, Ohio	City of Amherst, Ohio City of Lorain, Ohio	City of Amherst, Ohio City of Lorain, Ohio	City of Amherst, Ohio City of Lorain, Ohio	City of Amherst, Ohio City of Lorain, Ohio	City of Amherst, Ohio City of Lorain, Ohio	City of Amherst, Ohio City of Lorain, Ohio
Operational Benefits		Additional turn lanes increase intersection capacity.	Reduces number of conflict points. Reduces the # of stops. Reduces queue lenghts. Lower operating speeds.	Reduces the number of conflict points. Fewer signal phases increases efficiency.	Reduces the number of conflict points. Fewer signal phases increases efficiency.	Reduces the number of conflict points. Increased effieciency at Cooper Foster Park as the left turn movement is eliminated.	Reduce the number of conflict points.	Reduce the number of conflict points. Increase efficiency at intersection due to re-direct of minor street through and left turn movements	Increase capacity and shorten through traffic queue lengths.

Figure No.: 5.1
Page No.: 114

5.13 The improvements associated with Alternative #2 and Alternative #8 were determined to be the preferred alternatives based on the data analyzed for this report and shown in the matrix (**Figure 5.1, Page 114**). The alternatives were shown to improve the intersection capacity issues and to minimize queue blocking between the closely spaced intersections without relocating or closing access to any intersection.

5.14 The following interim improvements are also recommended for consideration in the study area:

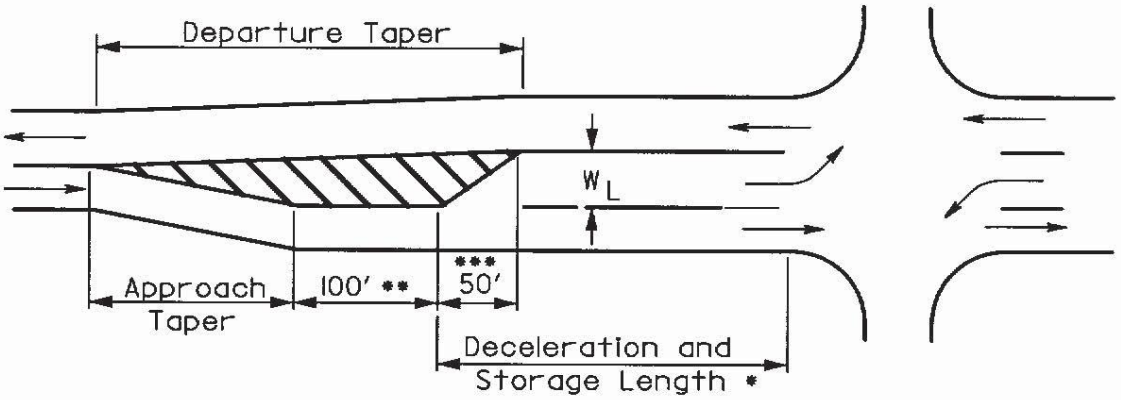
- Review and update signal timing with optimized change and clearance intervals.
- Install signal backplate/retro-reflective back-plates to increase visibility of traffic control devices.
- Install "Left Turn Yield On Green Ball" signs (R10-12) on the traffic signal mast arms for approaches with protected and permissive left turn phases. The use of these signs would be in addition to the existing traffic control infrastructure.
- Upgrade traffic signal control to use the flashing yellow arrow for the left turn movements. The "Left Turn Yield On Green Ball" signs (R10-12) would not be used with this configuration of traffic control equipment.
- Provide surface treatment to increase friction of roadway surface.

Appendix A
ODOT Turn Lane Design Criteria

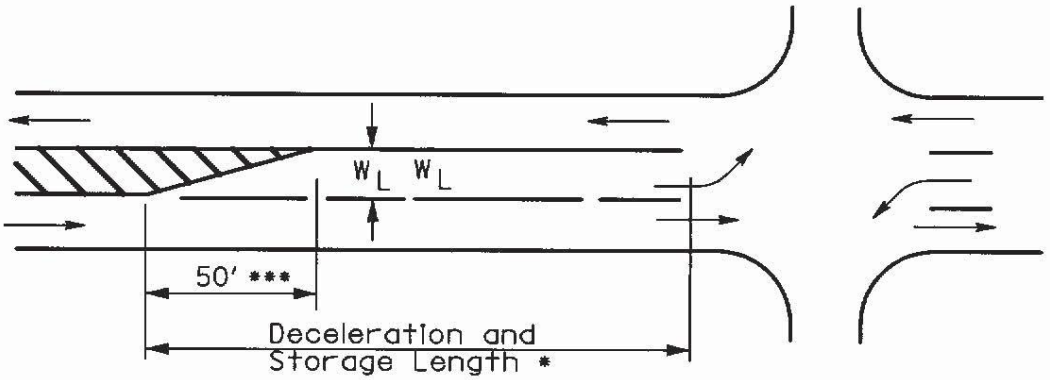
TURNING LANE DESIGN

401-7E

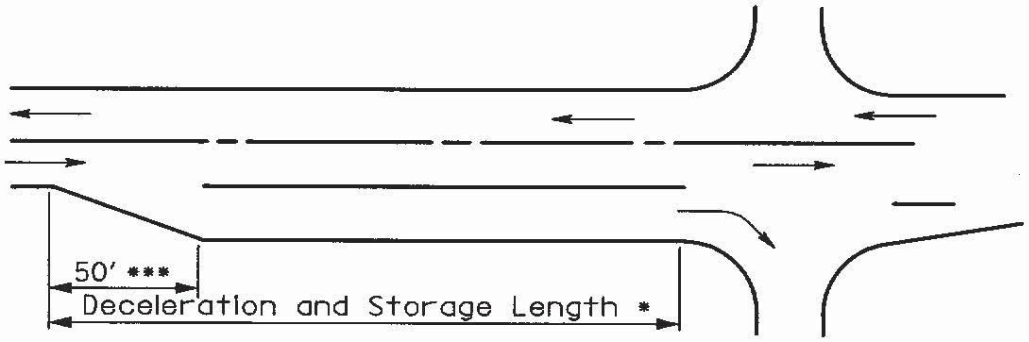
REFERENCE SECTIONS
401.6.1, 401.6.3



LEFT TURN LANE - NO MEDIAN OR MEDIAN WIDTH < W_L



LEFT TURN LANE - MEDIAN WIDTH >= W_L



RIGHT TURN LANE

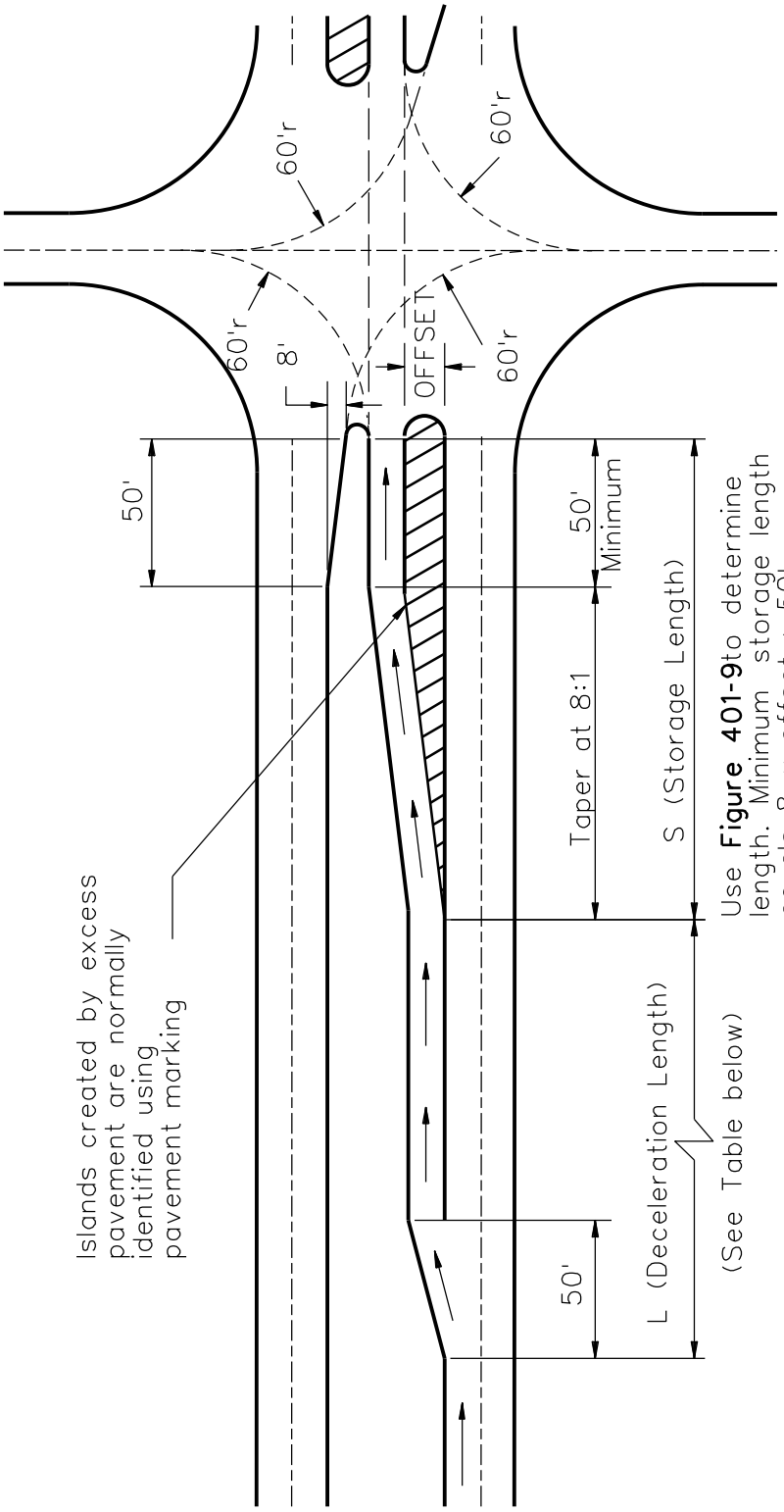
- * See **Figures 401-9 and 401-10** to copmpute length.
- ** May be reduced or eliminated in urban areas if intersection spacing or storage is constraining
- *** Diverging taper

W_L = Turn Lane Width

OFFSET LEFT TURN LANE

401-8E

REFERENCE SECTIONS
401.6.1, 401.6.3



Design Speed	L
40 mph	125'
45 mph	175'
50 mph	225'
55 mph	285'
60 mph	345'
65 mph	405'

BASIS FOR COMPUTING LENGTH OF TURN LANES

401-9E

REFERENCE SECTIONS
401.6.1, 401.6.3

Type of Traffic Control	Design Speed		
	30-35	40-65	
	Turn Demand Volume		
	All	Low*	High
Signalized	A	** B or C	** B or C
Unsignalized Stopped Crossroad	A	A	A
Unsignalized Through Road	A	B	** B or C

*Low is considered 10% or less of approach traffic volume
**Whichever is greater

CONDITION A	STORAGE ONLY
Length = 50' (diverging taper) + Storage Length (Figure 401-10)	

CONDITION B	HIGH SPEED DECELERATION ONLY
Design Speed	Length (including 50' Diverging Taper)
40	125
45	175
50	225
55	285
60	345
65	405

CONDITION C	MODERATE SPEED DECELERATION AND STORAGE
Design Speed	Length (including 50' Diverging Taper)
40	115 + Storage Length (Figure 401-10)
45	125 "
50	145 "
55	165 "
60	185 "
65	205 "

For explanation, see Turn Lane Design Example

STORAGE LENGTH AT INTERSECTIONS

401-10E

REFERENCE SECTIONS
401.6.1, 401.6.3

* AVERAGE NO. OF VEHICLES/CYCLE	REQUIRED LENGTH (FT.)	* AVERAGE NO. OF VEHICLES/CYCLE	REQUIRED LENGTH (FT.)
1	50	17	600
2	100	18	625
3	150	19	650
4	175	20	675
5	200	21	725
6	250	22	750
7	275	23	775
8	325	24	800
9	350	25	825
10	375	30	975
11	400	35	1125
12	450	40	1250
13	475	45	1400
14	500	50	1550
15	525	55	1700
16	550	60	1850

$$\text{* AVERAGE VEHICLES PER CYCLE} = \frac{\text{DHV (TURNING LANE)}}{\text{CYCLES/HOUR}}$$

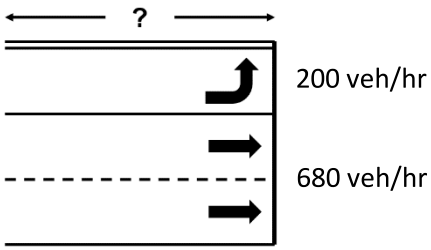
IF CYCLES ARE UNKNOWN ASSUME:

UNSIGNALIZED OR 2 PHASE = 60 CYCLES/HOUR
3 PHASE = 40 CYCLES/HOUR
4 PHASE = 30 CYCLES/HOUR

Example - Turn Lane Design Using Figures 401-9 and 401-10

Problem
Calculate the length of an exclusive left turn lane.

Traffic Control: **Signalized**
Design Speed: **55 mph**
Cycle Length: **90 sec**



Determine Storage and Turn Lane Lengths

Turn Lane Demand (High/Low) $= \frac{200 \text{ veh/hr}}{200 \text{ veh/hr} + 680 \text{ veh/hr}} = 23\% =$ **High Demand**

Refer to the matrix in **Figure 401-9**.

For Signalized, 55 mph, High Demand, use Method B or C, whichever is greater.

Method B – For 55 mph, a **285'** turn lane length is required (235' storage + 50' taper).

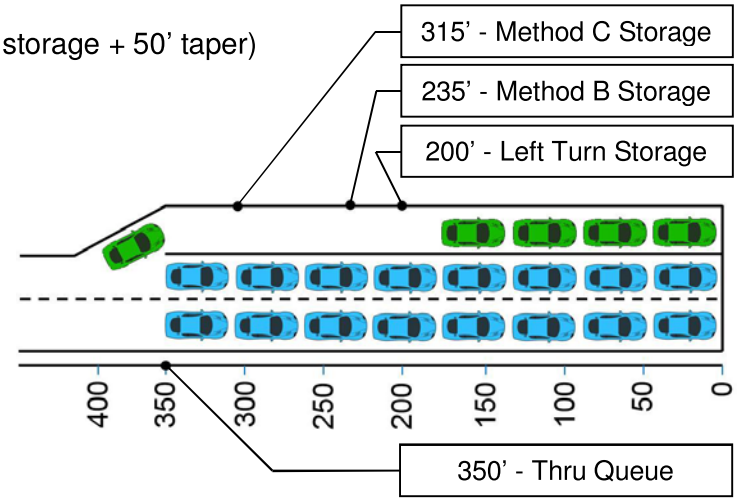
Method C – For 55 mph, 165' + calculated storage length in **Figure 401-10**.

Average Vehicles per Cycle $= \frac{(200 \text{ veh/hr}) * (90 \text{ sec/cyc})}{3600 \text{ sec/hr}} =$ 5 veh/cyc → 200'

Total Length = 165' + 200' = **365'** (315' storage + 50' taper)

Method C = **365'** > Method B = **285'**

Use Method C



Check Length for Thru-Block

Refer to **Figure 401-10** to calculate thru lane(s) queue distance.

680 veh/hr / 2 lanes = 340 veh/hr/ln

Average Vehicles per Cycle $= \frac{(340 \text{ veh/hr/ln}) * (90 \text{ sec/cyc})}{3600 \text{ sec/hr}} =$ 9 veh/cyc/ln → **350 ft/ln**

Thru Block = **350'** > Method C Storage = **315'** → **Turn Lane Blocked**

Use **350'** storage + **50'** taper = **400' Turn Lane Length**

Appendix B
Ohio Stay at Home Order

Ohio | Department of Health

Mike DeWine, Governor
Jon Husted, Lt. Governor

Amy Acton, M.D., MPH, Director

AMENDED DIRECTOR'S STAY AT HOME ORDER

Re: Amended Director's Order that All Persons Stay at Home Unless Engaged in Essential Work or Activity

I, Amy Acton, MD, MPH, Director of the Ohio Department of Health (ODH), pursuant to the authority granted to me in R.C. 3701.13 to "make special orders…for preventing the spread of contagious or infectious diseases" **Order** the following to prevent the spread of COVID-19 into the State of Ohio:

1. **Stay at home or place of residence**. With exceptions as outlined below, all individuals currently living within the State of Ohio are ordered to stay at home or at their place of residence except as allowed in this Order. To the extent individuals are using shared or outdoor spaces when outside their residence, they must at all times and as much as reasonably possible, maintain social distancing of at least six feet from any other person, with the exception of family or household members, consistent with the Social Distancing Requirements set forth in this Order. All persons may leave their homes or place of residence only for Essential Activities, Essential Governmental Functions, or to participate in Essential Businesses and Operations, all as defined below.

   Individuals experiencing homelessness are exempt from this Order, but are strongly urged to obtain shelter, and governmental and other entities are strongly urged to make such shelter available as soon as possible and to the maximum extent practicable (and to use in their operation COVID-19 risk mitigation practices recommended by the U.S. Centers for Disease Control and Prevention (CDC) and the Ohio Department of Health (ODH)). This order does not apply to incarcerated individuals, they are to follow the guidance of the facility in which they are confined. Individuals whose residences are unsafe or become unsafe, such as victims of domestic violence, are permitted and urged to leave their home and stay at a safe alternative location. For purposes of this Order, homes or residences include hotels, motels, shared rental units, shelters, and similar facilities.

2. **Non-essential business and operations must cease**. All businesses and operations in the State, except Essential Businesses and Operations as defined below, are required to cease all activities within the State except Minimum Basic Operations, as defined below. For clarity, businesses, including home-based businesses, may also continue operations consisting exclusively of employees or contractors performing activities at their own residences (i.e., working from home) or where the business consists of a single person, so long as all safe workplace safety standards are met.

   All Essential Businesses and Operations are encouraged to remain open. Essential Businesses and Operations shall comply with Social Distancing Requirements as defined in this Order, including by maintaining six-foot social distancing for both employees and members of the public at all times, including, but not limited to, when any customers are standing in line.

3. **Prohibited activities.** All public and private gatherings of any number of people occurring outside a single household or living unit are prohibited, except for the limited purposes permitted by this Order. Any gathering of more than ten people is prohibited unless exempted by this Order. This is in accordance with President Trump's coronavirus guidelines issued March 16, 2020. Nothing in this Order prohibits the gathering of members of a household or residence.

   All places of public amusement, whether indoors or outdoors, including, but not limited to, locations with amusement rides, carnivals, amusement parks, water parks, aquariums, zoos, museums, arcades, fairs, children's play centers, playgrounds, funplexes, theme parks, bowling alleys, movie and other theaters, concert and music halls, and country clubs or social clubs shall be closed. Recreational sports tournaments, organized recreational sports leagues, residential and day camps shall be prohibited. Swimming pools, whether public or private, shall be closed, unless it is a swimming pool for a single household. Campgrounds shall be closed, except that persons residing in recreational vehicles ("RVs") at campgrounds who genuinely have no other viable place of residence may remain in the campground. This campground closure also excludes cabins, mobile homes, or other fixed structure, meant for a single family in situations where no other viable place of residence exists. Such persons should comply with all applicable guidance from the U.S. Centers for Disease Control and Prevention and the Ohio Department of Health regarding social distancing.

4. **Prohibited and permitted travel.** Only Essential Travel and Essential Activities as defined herein, are permitted. People riding on public transit must comply with Social Distancing Requirements to the greatest extent feasible. This Order allows travel into or out of the State to maintain Essential Businesses and Operations and Minimum Basic Operations. However, persons entering the State with the intent to stay are asked to self-quarantine for fourteen days. For purposes of clarity this does not apply to persons who as part of their normal life live in one state and work or gain essential services in another state. Persons who have tested positive for COVID-19, are presumptively diagnosed with COVID-19 or are exhibiting the symptoms identified in the screening guidance available from the U.S. Centers for Disease Control and Prevention and the Ohio Department of Health shall not enter the State, unless they are doing so under medical orders for the purposes of medical care, are being transported by Emergency Medical Services (EMS), are driving or being driven directly to a medical provider for purposes of initial care, or are a permanent resident of the State.

5. **Leaving the home for Essential Activities is permitted.** For purposes of this Order, individuals may leave their residence only to perform any of the following Essential Activities:

   a. **For health and safety**. To engage in activities or perform tasks essential to their health and safety, or to the health and safety of their family or household members or persons who are unable or should not leave their home (including, but not limited to, pets), such as, by way of example only and without limitation, seeking emergency services, obtaining medical supplies or medication, or visiting a health care professional.

   b. **For necessary supplies and services.** To obtain necessary services or supplies for themselves and their family or household members or persons who are unable or should not leave their home, or to deliver those services or supplies to others, such as, by way of example only and without limitation, groceries and food, household consumer products, supplies they need to work from home, automobile and boat supplies (including showrooms, dealers, parts, supplies,

repair, delivery of boats and vehicles, shipping, and maintenance), accessing self-storage facilities, and products necessary to maintain the safety, sanitation, and essential operation of residences.

c. **For outdoor activity.** To engage in outdoor activity, provided the individuals comply with Social Distancing Requirements, as defined below, such as, by way of example and without limitation, walking, hiking, running, or biking. Individuals may go to public parks and open outdoor recreation areas. However, public access playgrounds may increase spread of COVID-19, and therefore shall be closed.

d. **For certain types of work** To perform work providing essential products and services at Essential Businesses or Operations (which, as defined below, includes Healthcare and Public Health Operations, Human Services Operations, Essential Governmental Functions, and Essential Infrastructure) or to otherwise carry out activities specifically permitted in this Order, including Minimum Basic Operations.

e. **To take care of others.** To care for a family member, friend, or pet in another household, and to transport family members, friends, or pets as allowed by this Order. This includes attending weddings and funerals.

6. **Elderly people and those who are vulnerable as a result of illness should take additional precautions.** People at high risk of severe illness from COVID-19, including elderly people and those who are sick, are urged to stay in their residence to the extent possible except as necessary to seek medical care. Nothing in this Order prevents the Department Health or local health departments from issuing and enforcing isolation and quarantine orders.

7. **Healthcare and Public Health Operations.** For purposes of this Order, individuals may leave their residence to work for or obtain services through Healthcare and Public Health Operations.

   Healthcare and Public Health Operations includes, but is not limited to: hospitals; clinics; dental offices; pharmacies; public health entities, including those that compile, model, analyze and communicate public health information; pharmaceutical, pharmacy, medical device and equipment, and biotechnology companies (including operations, research and development, manufacture, and supply chain); organizations collecting blood, platelets, plasma, and other necessary materials; licensed medical marijuana dispensaries and licensed medical marijuana cultivation centers; obstetricians and gynecologists; eye care centers, including those that sell glasses and contact lenses; home healthcare services providers; mental health and substance use providers; other healthcare facilities and suppliers and providers of any related and/or ancillary healthcare services; and entities that transport and dispose of medical materials and remains.

   Specifically included in Healthcare and Public Health Operations are manufacturers, technicians, logistics, and warehouse operators and distributors of medical equipment, personal protective equipment (PPE), medical gases, pharmaceuticals, blood and blood products, vaccines, testing materials, laboratory supplies, cleaning, sanitizing, disinfecting or sterilization supplies, and tissue and paper towel products.

   Healthcare and Public Health Operations also includes veterinary care and all healthcare services provided to animals.

Healthcare and Public Health Operations shall be construed broadly to avoid any impacts to the delivery of healthcare, broadly defined. Healthcare and Public Health Operations does not include fitness and exercise gyms, spas, salons, barber shops, tattoo parlors, and similar facilities.

8. **Human Services Operations.** For purposes of this Order, individuals may leave their residence to work for or obtain services at any Human Services Operations, including any provider funded by the Ohio Department of Aging, Department of Developmental Disabilities, Department of Health, Department of Job and Family Services, Department of Medicaid, Department of Mental Health and Addiction Services, Opportunities for Ohioans with Disabilities, Department of Veterans Services, and Department of Youth Services that is providing services to the public and including state-operated, institutional, or community-based settings providing human services to the public.

   Human Services Operations includes, but is not limited to: long-term care facilities; day care centers, day care homes, group day care homes; residential settings and shelters for adults, seniors, children, and/or people with developmental disabilities, intellectual disabilities, substance use disorders, and/or mental illness; transitional facilities; home-based settings to provide services to individuals with physical, intellectual, and/or developmental disabilities, seniors, adults, and children; field offices that provide and help to determine eligibility for basic needs including food, cash assistance, medical coverage, child care, vocational services, rehabilitation services; developmental centers; adoption agencies; businesses that provide food, shelter, and social services, and other necessities of life for economically disadvantaged individuals, individuals with physical, intellectual, and/or developmental disabilities, or otherwise needy individuals.

   Human Services Operations shall be construed broadly to avoid any impacts to the delivery of human services, broadly defined.

9. **Essential Infrastructure.** For purposes of this, individuals may leave their residence to provide any services or perform any work necessary to offer, provision, operate, maintain and repair Essential Infrastructure.

   Essential Infrastructure includes, but is not limited to: food production, distribution, fulfillment centers, storage facilities, marinas, and sale; construction (including, but not limited to, construction required in response to this public health emergency, hospital construction, construction of long-term care facilities, public works construction, school construction, essential business construction, and housing construction); building management and maintenance; airport operations; operation and maintenance of utilities, including water, sewer, and gas; electrical (including power generation, distribution, and production of raw materials); distribution centers; oil and biofuel refining; roads, highways, railroads, and public transportation; ports; cybersecurity operations; flood control; solid waste and recycling collection and removal; and internet, video, and telecommunications systems (including the provision of essential global, national, and local infrastructure for computing services, business infrastructure, communications, and web-based services).

   Essential Infrastructure shall be construed broadly to avoid any impacts to essential infrastructure, broadly defined.

10. **Essential Governmental Functions**. For purposes of this Order, all first responders, emergency management personnel, emergency dispatchers, legislators, judges, court personnel, jurors and grand jurors, law enforcement and corrections personnel, hazardous materials responders, child protection and child welfare personnel, housing and shelter personnel, military, and other governmental employees working for or to support Essential Businesses and Operations are categorically exempt from this Order.

    Essential Government Functions means all services provided by the State or any municipality, township, county, political subdivision, board, commission or agency of government and needed to ensure the continuing operation of the government agencies or to provide for or support the health, safety and welfare of the public, and including contractors performing Essential Government Functions. Each government body shall determine its Essential Governmental Functions and identify employees and/or contractors necessary to the performance of those functions.

    This Order does not apply to the United States government. Nothing in this Order shall prohibit any individual from performing or accessing Essential Governmental Functions.

11. **Businesses covered by this Order.** For the purposes of this Order, covered businesses include any for-profit, non-profit, or educational entities, regardless of the nature of the service, the function it performs, or its corporate or entity structure.

12. **Essential Businesses and Operations.** For the purposes of this Order, Essential Businesses and Operations means Healthcare and Public Health Operations, Human Services Operations, Essential Governmental Functions, and Essential Infrastructure, and the following:

    a. **CISA List**. On March 28, 2020, the U.S. Department of Homeland Security, Cybersecurity & Infrastructure Security Agency (CISA), issued an updated *Advisory Memorandum on Identification of Essential Critical Infrastructure Workers During COVID-19 Response.* The definition of Essential Businesses and Operations in this Order includes all the workers identified in that Memorandum or any updated versions of the Memorandum issued by CISA;

    b. **Stores that sell groceries and medicine.** Grocery stores, pharmacies, farmers' markets, farm and produce stands, supermarkets, convenience stores, and other establishments engaged in the retail sale of groceries, canned food, dry goods, frozen foods, fresh fruits and vegetables, pet supplies, fresh meats, fish, and poultry, prepared food, alcoholic and non-alcoholic beverages, any other household consumer products (such as cleaning and personal care products), and specifically includes their supply chain and administrative support operations. This includes stores that sell groceries, medicine, including medication not requiring a medical prescription, and also that sell other non-grocery products, and products necessary to maintaining the safety, sanitation, and essential operation of residences and Essential Businesses and Operations. Stores shall determine and enforce the maximum capacity of persons permitted in any store such that at all persons in a store at any one time may safely and comfortably maintain a six-foot distance from each other. Every store shall prominently display at every entrance the maximum capacity number. Every store shall ensure that baskets, shopping carts and the like are properly cleaned between customers. If a line is present either

inside or outside the store, a six-foot distance shall be maintained between those not residing in the same household;

c. **Food, beverage, and licensed marijuana production and agriculture**. Food and beverage manufacturing, production, processing, and cultivation, including farming, livestock, fishing, baking, and other production agriculture, including cultivation, marketing, production, and distribution of animals and goods for consumption; licensed medical marijuana use, medical marijuana dispensaries and licensed medical marijuana cultivation centers; and businesses that provide food, shelter, and other necessities of life for animals, including animal shelters, rescues, shelters, kennels, and adoption facilities;

d. **Organizations that provide charitable and social services.** Businesses and religious and secular nonprofit organizations, including food banks, when providing food, shelter, and social services, and other necessities of life for economically disadvantaged or otherwise needy individuals, individuals who need assistance as a result of this emergency, and people with disabilities;

e. **Religious entities.** Religious facilities, entities and groups and religious gatherings, including weddings and funerals. Wedding receptions are subject to the ten-person limitation in Section 3 of this Order. Weddings and funerals are not subject to the ten-person limitation in Section 3 of this Order;

f. **Media.** Newspapers, television, radio, and other media services;

g. **First amendment protected speech;**

h. **Gas stations and businesses needed for transportation.** Gas stations and auto supply, auto-repair, farm equipment, construction equipment, boat repair, and related facilities and bicycle shops and related facilities;

i. **Financial and insurance institutions.** Bank, currency exchanges, consumer lenders, including but not limited, to pawnbrokers, consumer installment lenders and sales finance lenders, credit unions, appraisers, title companies, financial markets, trading and futures exchanges, payday lenders, affiliates of financial institutions, entities that issue bonds, related financial institutions, and institutions selling financial products. Also insurance companies, underwriters, agents, brokers, and related insurance claims and agency services;

j. **Hardware and supply stores.** Hardware stores, garden centers, nurseries, and businesses that sell electrical, plumbing, and heating material;

k. **Critical trades.** Building and Construction Tradesmen and Tradeswomen, and other trades including but not limited to plumbers, electricians, exterminators, cleaning and janitorial staff for commercial and governmental properties, security staff, operating engineers, HVAC, painting, moving and relocation services, and other service providers who provide services that are necessary to maintaining the safety, sanitation, and essential operation of residences, Essential Activities, and Essential Businesses and Operations;

l. **Mail, post, shipping, logistics, delivery, and pick-up services.** Post offices and other businesses that provide shipping and delivery services, and businesses that ship or deliver groceries, food, alcoholic and non-alcoholic beverages, goods, vehicles or services to end users or through commercial channels;

m. **Educational institutions.** Educational institutions-including public and private pre-K-12 schools, colleges, and universities-for purposes of facilitating distance learning, performing critical research, or performing essential functions, provided that social distancing of six-feet per person is maintained to the greatest extent possible. This Order is consistent with and does not amend or supersede prior Orders regarding the closure of schools;

n. **Laundry services.** Laundromats, dry cleaners, industrial laundry services, and laundry service providers;

o. **Restaurants for consumption off-premises.** Restaurants and other facilities that prepare and serve food, but only for consumption off-premises, through such means as in-house delivery, third-party delivery, drive-through, curbside pick-up, and carry-out. Schools and other entities that typically provide food services to students or members of the public may continue to do so under this Order on the condition that the food is provided to students or members of the public on a pick-up and takeaway basis only. Schools and other entities that provide food services under this exemption shall not permit the food to be eaten at the site where it is provided, or at any other gathering site due to the virus's propensity to physically impact surfaces and personal property. This Order is consistent with and does not amend or supersede prior Orders regarding the closure of restaurants;

p. **Supplies to work from home.** Businesses that sell, manufacture, or supply products needed for people to work from home;

q. **Supplies for Essential Businesses and Operations.** Businesses that sell, manufacture, or supply other Essential Businesses and Operations with the support or materials necessary to operate, including computers, audio and video electronics, printing services, household appliances; IT and telecommunication equipment; hardware, paint, flat glass; electrical, plumbing and heating material; sanitary equipment; personal hygiene products; food, food additives, ingredients and components; medical and orthopedic equipment; optics and photography equipment; diagnostics, food and beverages, chemicals, soaps and detergent; and firearm and ammunition suppliers and retailers for purposes of safety and security;

r. **Transportation.** Airlines, taxis, transportation network providers (such as Uber and Lyft), vehicle rental services, paratransit, marinas, docks, boat storage, and other private, public, and commercial transportation and logistics providers necessary for Essential Activities and other purposes expressly authorized in this Order;

s. **Home-based care and services.** Home-based care for adults, seniors, children, and/or people with developmental disabilities, intellectual disabilities, substance use disorders, and/or mental illness, including caregivers such as nannies who may travel to the child's home to provide care, and other in-home services including meal delivery;

t. **Residential facilities and shelters.** Residential facilities and shelters for adults, seniors, children, pets, and/or people with developmental disabilities, intellectual disabilities, substance use disorders, and/or mental illness;

u. **Professional services.** Professional services, such as legal services, accounting services, insurance services, real estate services (including appraisal and title services);

v. **Manufacture, distribution, and supply chain for critical products and industries.** Manufacturing companies, distributors, and supply chain companies producing and supplying essential products and services in and for industries such as pharmaceutical, technology, biotechnology, healthcare, chemicals and sanitization, waste pickup and disposal, agriculture, food and beverage, transportation, energy, steel and steel products, petroleum and fuel, mining, construction, national defense, communications, as well as products used by other Essential Businesses and Operations;

w. **Critical labor union functions.** Labor Union essential activities including the administration of health and welfare funds and personnel checking on the well-being and safety of members providing services in Essential Businesses and Operations - provided that these checks should be done by telephone or remotely where possible;

x. **Hotels and motels.** Hotels and motels, to the extent used for lodging and delivery or carry-out food services;

y. **Funeral services.** Funeral, mortuary, cremation, burial, cemetery, and related services.

13. **Minimum Basic Operations.** For the purposes of this Order, Minimum Basic Operations include the following, provided that employees comply with Social Distancing Requirements, to the extent possible, while carrying out such operations:

    a. The minimum necessary activities to maintain the value of the business's inventory, preserve the condition of the business's physical plant and equipment, ensure security, process payroll and employee benefits, or for related functions.

    b. The minimum necessary activities to facilitate employees of the business being able to continue to work remotely from their residences.

14. **Essential Travel.** For the purposes of this Order, Essential Travel includes travel for any of the following purposes. Individuals engaged in any Essential Travel must comply with all Social Distancing Requirements as defined in this Section.

    a. Any travel related to the provision of or access to Essential Activities, Essential Governmental Functions, Essential Businesses and Operations, or Minimum Basic Operations.

    b. Travel to care for elderly, minors, dependents, persons with disabilities, or other vulnerable persons.

    c. Travel to or from educational institutions for purposes of receiving materials for distance learning, for receiving meals, and any other related services.

    d. Travel to return to a place of residence from outside the jurisdiction.

    e. Travel required by law enforcement or court order, including to transport children pursuant to a custody agreement.

    f. Travel required for non-residents to return to their place of residence outside the State. Individuals are strongly encouraged to verify that their transportation out of the State remains available and functional prior to commencing such travel.

15. **Social Distancing Requirements.** For purposes of this Order, Social Distancing Requirements includes maintaining at least six-foot social distancing from other individuals, washing hands with soap and water for at least twenty seconds as frequently as possible or using hand sanitizer, covering coughs or sneezes (into the sleeve or elbow, not hands), regularly cleaning high-touch surfaces, and not shaking hands.

    a. **Required measures.** Essential Businesses and Operations and businesses engaged in Minimum Basic Operations must take proactive measures to ensure compliance with Social Distancing Requirements, including where possible:

        i. **Designate six-foot distances.** Designating with signage, tape, or by other means six-foot spacing for employees and customers in line to maintain appropriate distance;

        ii. **Hand sanitizer and sanitizing products.** Having hand sanitizer and sanitizing products readily available for employees and customers;

        iii. **Separate operating hours for vulnerable populations.** Implementing separate operating hours for elderly and vulnerable customers; and

        iv. **Online and remote access.** Posting online whether a facility is open and how best to reach the facility and continue services by phone or remotely.

16. **Intent of this Order.** The intent of this Order is to ensure that the maximum number of people self-isolate in their places of residence to the maximum extent feasible, while enabling essential services to continue, to slow the spread of COVID-19 to the greatest extent possible. When people need to leave their places of residence, whether to perform Essential Activities, or to otherwise facilitate authorized activities necessary for continuity of social and commercial life, they should at all times and as much as reasonably possible comply with Social Distancing Requirements. All provisions of this Order should be interpreted to effectuate this intent.

17. **Enforcement.** This Order may be enforced by State and local law enforcement to the extent set forth in Ohio law. Specifically, pursuant to R.C 3701.352 "[n]o person shall violate any rule the director of health or department of health adopts or any order the director or department of health issues under this chapter to prevent a threat to the public caused by a pandemic, epidemic, or bioterrorism event." R.C. 3701.56 provides that "[b]oards of health of a general or city health district, health authorities and officials, officers of state institutions, police officers, sheriffs, constables, and other officers and employees of the state or any county, city, or township, shall enforce quarantine and isolation orders, and the rules the department of health adopts." To the extent any public official enforcing this Order has questions regarding what services are prohibited under this Order, the Director of Health hereby delegates to local health departments the authority to answer questions in writing and consistent with this Order, but does not require local health departments to provide advisory opinions to nongovernmental entities.

18. **Penalty.** A violation of R.C. 3701.352 is guilty of a misdemeanor of the second degree, which can include a fine of not more than $750 or not more than 90 days in jail, or both.

19. **COVID-19 Information and Checklist for Businesses/Employers.** Business and employers are to take the following actions:

    a. Allow as many employees as possible to work from home by implementing policies in areas such as teleworking and video conferencing.

b. Actively encourage sick employees to stay home until they are free of fever (without the use of medication) for at least 72 hours (three full days) AND symptoms have improved for at least 72 hours AND at least seven days have passed since symptoms first began. Do not require a healthcare provider's note to validate the illness or return to work of employees sick with acute respiratory illness; healthcare provider offices and medical facilities may be extremely busy and not able to provide such documentation in a timely way.

c. Ensure that your sick leave policies are up to date, flexible, and non-punitive to allow sick employees to stay home to care for themselves, children, or other family members. Consider encouraging employees to do a self-assessment each day to check if they have any COVID-19 symptoms (fever, cough, or shortness of breath).

d. Separate employees who appear to have acute respiratory illness symptoms from other employees and send them home immediately. Restrict their access to the business until they have recovered.

e. Reinforce key messages — stay home when sick, use cough and sneeze etiquette, and practice hand hygiene — to all employees, and place posters in areas where they are most likely to be seen. Provide protection supplies such as soap and water, hand sanitizer, tissues, and no-touch disposal receptacles for use by employees.

f. Frequently perform enhanced environmental cleaning of commonly touched surfaces, such as workstations, countertops, railings, door handles, and doorknobs. Use the cleaning agents that are usually used in these areas and follow the directions on the label. Provide disposable wipes so that commonly used surfaces can be wiped down by employees before each use.

g. Be prepared to change business practices if needed to maintain critical operations (e.g., identify alternative suppliers, prioritize customers, or temporarily suspend some of your operations).

20. **No limitation on authority.** Nothing in this Order shall, in any way, alter or modify any existing legal authority allowing the State or any local health department from ordering (1) any quarantine or isolation that may require an individual to remain inside a particular residential property or medical facility for a limited period of time, including the duration of this public health emergency, or (2) any closure of a specific location for a limited period of time, including the duration of this public health emergency.

21. **Savings clause.** If any provision of this Order or its application to any person or circumstance is held invalid by any court of competent jurisdiction, this invalidity does not affect any other provision or application of this Order, which can be given effect without the invalid provision or application. To achieve this purpose, the provisions of this Order are declared to be severable.

22. **Previous Orders superseded.** This Order supersedes, only to the extent that it conflicts, and amends any previous Order which conflicts with the provisions of this Order.

23. **Dispute Resolution.** If any local health department issues a determination under Section 17 of this Order that is in conflict with a determination issued by a different local health department, then the conflict may be submitted to the ODH by either of the local health departments or an entity or person subject to the determination. A Dispute Resolution Commission appointed by the Director of Health shall review the conflict and make a determination as to the application of this Order to the conflict. The decision of the Dispute Resolution Commission shall be final.

24. **Duration.** This Order shall be effective at 11:59 p.m. on April 6, 2020 and remains in full force and effect until 11:59 p.m. on May 1, 2020, unless the Director of the Ohio Department of Health rescinds or modifies this Order at a sooner time and date.

COVID-19 is a respiratory disease that can result in serious illness or death, is caused by the SARS-CoV-2 virus, which is a new strain of coronavirus that had not been previously identified in humans and can easily spread from person to person. The virus is spread between individuals who are in close contact with each other (within about six feet) through respiratory droplets produced when an infected person coughs or sneezes. It may be possible that individuals can get COVID-19 by touching a surface or object that has the virus on it and then touching their own mouth, nose or eyes.

On January 23, 2020, the Ohio Department of Health issued a Director's Journal Entry making COVID-19 a Class A reportable disease in Ohio.

On January 28, 2020, the Ohio Department of Health hosted the first statewide call with local health departments and healthcare providers regarding COVID-19.

On January 30, 2020, the International Health Regulations Emergency Committee of the World Health Organization declared the outbreak of COVID-19 a public health emergency of international concern.

On January 31, 2020, Health and Human Services Secretary, Alex M. Azar II, declared a public health emergency for the United States to aid the nation's healthcare community in responding to COVID-19.

On February 1, 2020, the Ohio Department of Health issued a statewide Health Alert Network to provide local health departments and healthcare providers with updated guidance for COVID-19 and revised Person Under Investigation (PUI) criteria.

On February 3, 2020, the Ohio Department of Health trained over 140 personnel to staff a call center for COVID-19, in the event it was needed.

On February 5, 2020, the Ohio Department of Health began updating and notifying the media of the number of PUIs in Ohio every Tuesday and Thursday.

On February 6, 2020, the Ohio Department of Health updated all agency assistant directors and chiefs of staff on COVID-19 preparedness and status during the Governor's cabinet meeting.

On February 7, 2020, the Ohio Department of Health and the Ohio Emergency Management Agency met to conduct advance planning for COVID-19.

On February 13, 2020, the Ohio Department of Health conducted a Pandemic Tabletop Exercise with State agencies to review responsive actions should there be a pandemic in Ohio.

On February 14, 2020, the Ohio Department of Health held a conference call with health professionals across the state. The purpose of the call was to inform and engage the healthcare community in Ohio. Presentations were provided by the Department of Health, Hamilton County Public Health, and the Ohio State University.

On February 27, 2020, the Ohio Department of Health and the Ohio Emergency Management Agency briefed the directors of State agencies during the Governor's cabinet meeting regarding preparedness and the potential activation of the Emergency Operations Center.

On February 28, 2020, the "Governor DeWine, Health Director Update COVID-19 Prevention and Preparedness Plan" was sent to a broad range of associations representing healthcare, dental, long-term care, K-12 schools, colleges and universities, business, public transit, faith-based organizations, non-profit organizations, and local governments.

On March 2, 2020, the Ohio Department of Health activated a Joint Information Center to coordinate COVID-19 communications.

On March 5, 2020, the Ohio Department of Health hosted the Governor's Summit on COVID-19 Preparedness, a meeting with the Governor, cabinet agency directors, local health department commissioners, and their staff.

On March 6, 2020, the Ohio Department of Health opened a call center to answer questions from the public regarding COVID-19.

On March 9, 2020, testing by the Department of Health confirmed that three (3) patients were positive for COVID-19 in the State of Ohio. This confirms the presence of a potentially dangerous condition which may affect the health, safety and welfare of citizens of Ohio.

On March 9, 2020, the Ohio Emergency Management Agency activated the Emergency Operations Center.

On March 9, 2020, the Governor Declared a State of Emergency in Executive Order 2020-01D.

On March 11, 2020, the head of the World Health Organization declared COVID-19 a pandemic.

On March 11, 2020, testing by the Ohio Department of Health confirmed that one (1) more patient was positive for COVID-19 in the State of Ohio.

On March 11, 2020, the Ohio Departments of Health and Veterans Services issued a Joint Directors' Order to limit access to Ohio nursing homes and similar facilities.

On March 15, 2020, the Ohio Department of Health issued a Director's Order to limit access to Ohio's jails and detention facilities.

On March 15, 2020, the Ohio Department of Health issued a Director's Order to limit the sale of food and beverages, liquor, beer and wine to carry-out and delivery only.

On March 15, 2020, the CDC issued Interim Guidance for mass gatherings or large community events, stating that such events that consist of 50 or more people should be cancelled or postponed.

On March 16, 2020 the Ohio Department of Health issued a Director's Order closing polling locations for the March 17, 2020 primary election.

On March 17, 2020 the Ohio Department of Health issued a Director's Order for the management of non-essential surgeries and procedures throughout Ohio.

On March 17, 2020 the Ohio Department of Health issued an Amended Director's Order to limit and/or prohibit mass gatherings and the closure of venues in the State of Ohio.

On March 19, 2020, the Ohio Department of Health issued a Director's Order closing hair salons, nail salons, barber shops, tattoo parlors, body piercing locations, and massage therapy locations.

Multiple areas of the United States are experiencing "community spread" of the virus that causes COVID-19. Community spread, defined as the transmission of an illness for which the source is unknown, means that isolation of known areas of infection is no longer enough to control spread.

The CDC reports that people are most contagious when they are most symptomatic (the sickest) however some spread might be possible before people show symptoms although that is not the main way the virus spreads.

Mass gatherings (10 or more persons) increase the risk of community transmission of the virus COVID-19.

Accordingly, to avoid an imminent threat with a high probability of widespread exposure to COVID-19 with a significant risk of substantial harm to a large number of people in the general population, including the elderly and people with weakened immune systems and chronic medical conditions, I hereby **ORDER** all persons are to continue to stay at home or their place of residence unless they are engaged in Essential Activities, Essential Governmental Functions, or to operate Essential Businesses and Operations as set forth in this Order. This Order shall remain in full force and effect until 11:59 p.m. on May 1, 2020, unless the Director of the Ohio Department of Health rescinds or modifies this Order at a sooner time and date. To the extent any public official enforcing this Order has questions regarding what services are prohibited under this Order, the Director of Health hereby delegates to local health departments the authority to answer questions in writing and consistent with this Order.

Amy Acton MD MPH

April 2, 2020

Amy Acton, MD, MPH
Director of Health

Appendix C
Traffic Count Data

VEHICULAR TRAFFIC COUNT SUMMARY

Municipality: Amherst **At Intersection of:** Oak Point Road **and** Buck Horn Boulevard

Date: 3/24/2020 **Day:** Tue. **Comments:** **Project:** 20-039

Weather: Clear **Recorder(s):** GFA **Data entry by:** JJO **Date entered:** Mar. 25, 2020 Oak Point Rd & Buck Horn Blvd 03242

TIME BEGINS	Oak Point Rd. FROM NORTH						Oak Point Rd. FROM SOUTH						TOTAL NORTH SOUTH	Buck Horn Blvd. FROM EAST						Buck Horn Blvd. FROM WEST						TOTAL EAST WEST	TOTAL ALL DIREC.	PEAK HOUR FACTOR			
	Left	Thru	Right	Total	Trk	Bus	Left	Thru	Right	Total	Trk	Bus		Left	Thru	Right	Total	Trk	Bus	Left	Thru	Right	Total	Trk	Bus			North	South	East	West
06:00																														
07:00	20	126	17	163	1	0	19	76	14	109	1	0	272	6	0	0	6	0	0	14	3	28	45	1	0	51	323	0.728	0.801	0.500	0.804
08:00	10	93	30	133	3	0	11	57	10	78	0	0	211	2	1	4	7	0	0	18	1	26	45	5	0	52	263	0.792	0.780	0.438	0.865
09:00	4	80	38	122	4	0	22	71	4	97	7	0	219	4	0	2	6	1	0	40	2	30	72	2	0	78	297	0.897	0.782	0.750	0.900
10:00																														
11:00	4	91	49	144	6	0	33	80	7	120	6	0	264	11	4	4	19	1	0	40	6	38	84	7	0	103	367	0.783	0.750	0.679	0.778
12:00	4	92	45	141	0	0	39	106	10	155	3	0	296	11	4	5	20	1	0	43	2	34	79	1	0	99	395	0.881	0.901	0.714	0.790
1:00	8	107	46	161	2	0	49	106	6	161	4	0	322	6	8	4	18	0	0	53	7	39	99	3	0	117	439	0.839	0.805	0.375	0.884
2:00																														
3:00	2	140	68	210	8	0	60	149	7	216	4	0	426	17	7	10	34	0	0	51	2	40	93	2	0	127	553	0.820	0.885	0.708	0.861
4:00	2	136	57	195	1	0	51	163	5	219	1	0	414	25	6	13	44	1	0	60	3	34	97	1	0	141	555	0.855	0.883	0.786	0.782
5:00	5	131	51	187	2	0	71	153	7	231	3	0	418	34	2	18	54	0	0	60	1	30	91	1	0	145	563	0.730	0.791	0.422	0.948
6:00																														
7:00																														
8:00																														
9:00																														
TOTALS	59	996	401	1456	27	0	355	961	70	1386	29	0	2842	116	32	60	208	4	0	379	27	299	705	23	0	913	3755				
ADT	93	1573	633	2299	1.9%		561	1518	111	2189	2.1%		4488	182	50	94	327	1.9%		596	42	470	1108	3.3%		1435	5923				

N Leg Hourly Factor:	1.65	E Leg Hourly Factor:	1.64
S Leg Hourly Factor:	1.65	W leg Hourly Factor:	1.64
N Leg Monthly Factor:	0.96	E Leg Monthly Factor:	0.96
S Leg Monthly Factor:	0.96	W Leg Monthly Factor:	0.96

N Leg Combined Factor:	1.58	E Leg Combined Factor:	1.57
S Leg Combined Factor:	1.58	W Leg Combined Factor:	1.57

TMS ENGINEERS, INC.

2112 Case Parkway South #7
Twinsburg, Ohio 44087
(330) 686-6402 FAX: (330) 686-6417

Figure #:

Page #:

TMS Engineers, Inc.

2112 Case Parkway S.
Unit #7
Twinsburg, Ohio, 44087
Ph: (330) 686-6402 Fax: (330) 686-6417

City: Amherst
Intersection: Oak Point Rd & Buck Horn Blvd
Counter: GFA
Day of the week: Tuesday

File Name : Gary Amherst Oak Point Road and Buck Horn Blvd 3 24 20
Site Code : 00000004
Start Date : 3/24/2020
Page No : 1

Groups Printed- cars - trucks - buses

	OAK POINT ROAD From North					BUCK HORN BOULEVARD From East					OAK POINT ROAD From South					BUCK HORN BOULEVARD From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
07:00 AM	4	22	1	0	27	0	0	1	0	1	3	12	3	0	18	9	0	2	0	11	57
07:15 AM	4	32	4	0	40	0	0	0	0	0	4	16	3	0	23	7	2	5	0	14	77
07:30 AM	4	32	4	0	40	0	0	3	0	3	4	24	6	0	34	8	0	0	0	8	85
07:45 AM	5	40	11	0	56	0	0	2	0	2	3	24	7	0	34	4	1	7	0	12	104
Total	17	126	20	0	163	0	0	6	0	6	14	76	19	0	109	28	3	14	0	45	323
08:00 AM	4	28	2	0	34	2	0	0	0	2	5	20	0	0	25	6	0	4	0	10	71
08:15 AM	4	21	5	0	30	2	1	1	0	4	4	11	4	0	19	8	1	4	0	13	66
08:30 AM	10	16	1	0	27	0	0	0	0	0	0	16	2	0	18	5	0	6	0	11	56
08:45 AM	12	28	2	0	42	0	0	1	1	2	1	10	5	0	16	7	0	4	0	11	71
Total	30	93	10	0	133	4	1	2	1	8	10	57	11	0	78	26	1	18	0	45	264
09:00 AM	10	16	2	0	28	0	0	2	0	2	0	14	5	0	19	9	0	9	0	18	67
09:15 AM	8	22	2	0	32	1	0	1	1	3	2	14	7	0	23	6	1	11	0	18	76
09:30 AM	11	17	0	0	28	0	0	0	0	0	1	17	6	0	24	5	0	11	0	16	68
09:45 AM	9	25	0	0	34	1	0	1	0	2	1	26	4	0	31	10	1	9	0	20	87
Total	38	80	4	0	122	2	0	4	1	7	4	71	22	0	97	30	2	40	0	72	298
10:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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File Name : Gary Amherst Oak Point Road and Buck Horn Blvd 3 24 20
Site Code : 00000004
Start Date : 3/24/2020

Groups Printed- cars - trucks - buses

	OAK POINT ROAD From North					BUCK HORN BOULEVARD From East					OAK POINT ROAD From South					BUCK HORN BOULEVARD From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
11:00 AM	11	17	1	0	29	1	0	2	0	3	1	17	7	0	25	12	3	12	0	27	84
11:15 AM	10	26	2	0	38	1	0	6	0	7	3	27	10	0	40	10	1	10	0	21	106
11:30 AM	14	32	0	0	46	0	2	2	0	4	1	14	6	0	21	8	0	10	0	18	89
11:45 AM	14	16	1	0	31	2	2	1	0	5	2	22	10	0	34	8	2	8	0	18	88
Total	49	91	4	0	144	4	4	11	0	19	7	80	33	0	120	38	6	40	0	84	367
12:00 PM	8	22	0	0	30	1	0	3	2	6	3	28	12	1	44	5	0	13	1	19	99
12:15 PM	12	24	0	0	36	2	1	1	5	9	5	27	8	1	41	11	1	13	0	25	111
12:30 PM	12	22	1	1	36	2	1	2	0	5	1	26	11	0	38	8	1	8	0	17	96
12:45 PM	13	24	3	0	40	0	2	5	1	8	1	25	8	5	39	10	0	9	0	19	106
Total	45	92	4	1	142	5	4	11	8	28	10	106	39	7	162	34	2	43	1	80	412
01:00 PM	9	24	2	0	35	3	4	5	0	12	0	17	12	0	29	7	1	12	0	20	96
01:15 PM	16	29	3	0	48	0	3	0	0	3	2	26	13	0	41	11	2	15	0	28	120
01:30 PM	11	24	1	0	36	1	1	0	0	2	1	36	13	0	50	11	2	11	0	24	112
01:45 PM	10	30	2	0	42	0	0	1	0	1	3	27	11	0	41	10	2	15	0	27	111
Total	46	107	8	0	161	4	8	6	0	18	6	106	49	0	161	39	7	53	0	99	439
02:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

TMS Engineers, Inc.

2112 Case Parkway S.
Unit #7
Twinsburg, Ohio, 44087
Ph: (330) 686-6402 Fax: (330) 686-6417

File Name : Gary Amherst Oak Point Road and Buck Horn Blvd 3 24 20
Site Code : 00000004
Start Date : 3/24/2020
Page No : 3

Groups Printed- cars - trucks - buses

	OAK POINT ROAD From North					BUCK HORN BOULEVARD From East					OAK POINT ROAD From South					BUCK HORN BOULEVARD From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
03:00 PM	22	34	1	0	57	3	2	5	0	10	3	36	12	0	51	8	0	12	0	20	138
03:15 PM	16	29	1	0	46	4	1	7	6	18	3	32	16	2	53	11	1	15	0	27	144
03:30 PM	16	48	0	0	64	2	2	3	0	7	0	43	18	0	61	8	1	16	0	25	157
03:45 PM	14	29	0	0	43	1	2	2	3	8	1	38	14	2	55	13	0	8	0	21	127
Total	68	140	2	0	210	10	7	17	9	43	7	149	60	4	220	40	2	51	0	93	566
04:00 PM	9	30	0	0	39	6	2	6	0	14	2	35	13	2	52	6	0	11	0	17	122
04:15 PM	15	32	0	0	47	3	1	7	6	17	1	43	9	0	53	11	0	12	0	23	140
04:30 PM	16	40	1	0	57	2	3	9	3	17	1	42	19	0	62	7	3	16	0	26	162
04:45 PM	17	34	1	0	52	2	0	3	0	5	1	43	10	0	54	10	0	21	0	31	142
Total	57	136	2	0	195	13	6	25	9	53	5	163	51	2	221	34	3	60	0	97	566
05:00 PM	14	48	2	0	64	12	0	20	0	32	1	40	16	2	59	9	0	13	0	22	177
05:15 PM	13	27	2	0	42	1	2	7	4	14	4	44	25	8	81	6	0	16	0	22	159
05:30 PM	12	32	1	0	45	4	0	3	0	7	0	39	17	2	58	10	1	12	0	23	133
05:45 PM	12	24	0	1	37	1	0	4	0	5	2	30	13	0	45	5	0	19	0	24	111
Total	51	131	5	1	188	18	2	34	4	58	7	153	71	12	243	30	1	60	0	91	580
Grand Total	401	996	59	2	1458	60	32	116	32	240	70	961	355	25	1411	299	27	379	1	706	3815
Apprch %	27.5	68.3	4	0.1		25	13.3	48.3	13.3		5	68.1	25.2	1.8		42.4	3.8	53.7	0.1		
Total %	10.5	26.1	1.5	0.1	38.2	1.6	0.8	3	0.8	6.3	1.8	25.2	9.3	0.7	37	7.8	0.7	9.9	0	18.5	
cars	393	978	58	2	1431	58	31	115	31	235	70	942	345	23	1380	285	25	372	0	682	3728
% cars	98	98.2	98.3	100	98.1	96.7	96.9	99.1	96.9	97.9	100	98	97.2	92	97.8	95.3	92.6	98.2	0	96.6	97.7
trucks	8	18	1	0	27	2	1	1	1	5	0	19	10	2	31	14	2	7	1	24	87
% trucks	2	1.8	1.7	0	1.9	3.3	3.1	0.9	3.1	2.1	0	2	2.8	8	2.2	4.7	7.4	1.8	100	3.4	2.3
buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

TMS Engineers, Inc.

2112 Case Parkway S.
Unit #7
Twinsburg, Ohio, 44087
Ph: (330) 686-6402 Fax: (330) 686-6417

	OAK POINT ROAD From North					BUCK HORN BOULEVARD From East					OAK POINT ROAD From South					BUCK HORN BOULEVARD From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 09:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:15 AM																					
07:15 AM	**4**	**32**	**4**	**0**	**40**	**0**	**0**	**0**	**0**	**0**	**4**	**16**	**3**	**0**	**23**	**7**	2	5	0	14	77
07:30 AM	4	32	4	0	40	0	0	3	0	3	4	**24**	6	0	**34**	**8**	0	0	0	8	85
07:45 AM	**5**	**40**	**11**	0	**56**	0	0	2	0	2	3	24	**7**	0	34	4	1	**7**	0	12	**104**
08:00 AM	4	28	2	0	34	**2**	0	0	0	2	**5**	20	0	0	25	6	0	4	0	10	71
Total Volume	17	132	21	0	170	2	0	5	0	7	16	84	16	0	116	25	3	16	0	44	337
% App. Total	10	77.6	12.4	0		28.6	0	71.4	0		13.8	72.4	13.8	0		56.8	6.8	36.4	0		
PHF	.850	.825	.477	.000	.759	.250	.000	.417	.000	.583	.800	.875	.571	.000	.853	.781	.375	.571	.000	.786	.810
cars	16	132	21	0	169	2	0	5	0	7	16	83	16	0	115	23	3	16	0	42	333
% cars	94.1	100	100	0	99.4	100	0	100	0	100	100	98.8	100	0	99.1	92.0	100	100	0	95.5	98.8
trucks	1	0	0	0	1	0	0	0	0	0	0	1	0	0	1	2	0	0	0	2	4
% trucks	5.9	0	0	0	0.6	0	0	0	0	0	0	1.2	0	0	0.9	8.0	0	0	0	4.5	1.2
buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Peak Hour Analysis From 02:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:30 PM																					
04:30 PM	16	40	1	0	57	2	**3**	9	3	17	1	42	19	0	62	7	**3**	16	0	26	162
04:45 PM	**17**	34	1	0	52	2	0	3	0	5	1	43	10	0	54	**10**	0	**21**	0	**31**	142
05:00 PM	14	**48**	**2**	0	**64**	**12**	0	**20**	0	**32**	1	40	16	2	59	9	0	13	0	22	**177**
05:15 PM	13	27	2	0	42	1	2	7	**4**	14	**4**	**44**	**25**	**8**	**81**	6	0	16	0	22	159
Total Volume	60	149	6	0	215	17	5	39	7	68	7	169	70	10	256	32	3	66	0	101	640
% App. Total	27.9	69.3	2.8	0		25	7.4	57.4	10.3		2.7	66	27.3	3.9		31.7	3	65.3	0		
PHF	.882	.776	.750	.000	.840	.354	.417	.488	.438	.531	.438	.960	.700	.313	.790	.800	.250	.786	.000	.815	.904
cars	60	147	6	0	213	17	5	38	7	67	7	168	68	10	253	32	2	66	0	100	633
% cars	100	98.7	100	0	99.1	100	100	97.4	100	98.5	100	99.4	97.1	100	98.8	100	66.7	100	0	99.0	98.9
trucks	0	2	0	0	2	0	0	1	0	1	0	1	2	0	3	0	1	0	0	1	7
% trucks	0	1.3	0	0	0.9	0	0	2.6	0	1.5	0	0.6	2.9	0	1.2	0	33.3	0	0	1.0	1.1
buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

VEHICULAR TRAFFIC COUNT SUMMARY

Municipality: Amherst **At Intersection of:** Oak Point Road **and** Cooper Foster Park Road

Date: 3/19/2020 **Day:** Thu. **Comments:** **Project:** 20-039

Weather: Clear **Recorder(s):** DJS **Data entry by:** JJO **Date entered:** Mar. 20, 2020 Point Rd & Cooper Foster Park Rd 031

TIME BEGINS	Oak Point Rd. FROM NORTH						Oak Point Rd. FROM SOUTH						TOTAL NORTH SOUTH	Cooper Foster Park Rd. FROM EAST						Cooper Foster Park Rd. FROM WEST						TOTAL EAST WEST	TOTAL ALL DIREC.	PEAK HOUR FACTOR			
	Left	Thru	Right	Total	Trk	Bus	Left	Thru	Right	Total	Trk	Bus		Left	Thru	Right	Total	Trk	Bus	Left	Thru	Right	Total	Trk	Bus			North	South	East	West
06:00																														
07:00	22	181	21	224	3	0	73	116	198	387	10	1	611	51	20	17	88	2	1	9	16	67	92	8	0	180	791	0.848	0.733	0.667	0.697
08:00	36	149	16	201	5	0	101	113	120	334	12	1	535	50	23	31	104	4	0	7	21	99	127	6	0	231	766	0.882	0.835	0.788	0.882
09:00	24	123	21	168	7	0	118	117	88	323	13	0	491	41	45	23	109	0	0	23	24	115	162	8	0	271	762	0.857	0.824	0.826	0.844
10:00																														
11:00	45	127	25	197	5	0	153	173	78	404	22	0	601	75	43	41	159	5	0	12	28	170	210	13	0	369	970	0.835	0.886	0.924	0.890
12:00	26	160	28	214	6	0	176	182	90	448	13	0	662	73	60	37	170	7	0	25	41	206	272	11	1	442	1104	0.863	0.889	0.944	0.773
1:00	32	182	41	255	5	0	187	179	78	444	10	0	699	61	65	36	162	2	0	16	56	215	287	7	0	449	1148	0.750	0.874	0.794	0.875
2:00																														
3:00	27	186	29	242	3	0	186	234	77	497	9	0	739	73	66	46	185	4	1	21	46	188	255	4	1	440	1179	0.960	0.914	0.873	0.839
4:00	36	233	25	294	3	0	218	267	86	571	13	0	865	111	58	38	207	4	0	27	42	250	319	4	0	526	1391	0.855	0.855	0.821	0.927
5:00	27	219	35	281	5	0	207	271	60	538	10	0	819	73	54	22	149	1	0	32	60	211	303	7	0	452	1271	0.732	0.873	0.866	0.743
6:00																														
7:00																														
8:00																														
9:00																														
TOTALS	275	1560	241	2076	42	0	1419	1652	875	3946	112	2	6022	608	434	291	1333	29	2	172	334	1521	2027	68	2	3360	9382				
ADT	422	2391	369	3183	2.0%		2175	2533	1341	6049	2.9%		9232	924	660	442	2027	2.3%		262	508	2313	3082	3.5%		5109	14340				

N Leg Hourly Factor:	1.65	E Leg Hourly Factor:	1.64
S Leg Hourly Factor:	1.65	W leg Hourly Factor:	1.64
N Leg Monthly Factor:	0.93	E Leg Monthly Factor:	0.93
S Leg Monthly Factor:	0.93	W Leg Monthly Factor:	0.93

N Leg Combined Factor:	1.53	E Leg Combined Factor:	1.52
S Leg Combined Factor:	1.53	W Leg Combined Factor:	1.52

TMS ENGINEERS, INC.

2112 Case Parkway South #7

Twinsburg, Ohio 44087

(330) 686-6402 FAX: (330) 686-6417

Figure #:

Page #:

TMS Engineers, Inc.

2112 Case Parkway S.
Unit #7
Twinsburg, Ohio, 44087
Ph: (330) 686-6402 Fax: (330) 686-6417

City: Amherst
Intersection: Oak Point Rd & Cooper Foster Park Rd
Counter: DJS
Day of the Week: Thursday

File Name : TC 1 Oakpoint Rd and Cooperfoster Park 031920 DJS
Site Code : 00000001
Start Date : 3/19/2020

Groups Printed- Cars - Trucks - Buses

	OAKPOINT ROAD From North					COOPER FOSTER PARK ROAD From East					OAKPOINT ROAD From South					COOPER FOSTER PARK ROAD From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
07:00 AM	4	41	2	0	47	5	3	11	0	19	35	18	12	0	65	12	1	2	0	15	146
07:15 AM	5	44	5	0	54	4	3	9	0	16	36	22	15	0	73	9	5	1	1	16	159
07:30 AM	6	48	3	0	57	2	1	17	0	20	53	42	22	0	117	24	6	3	0	33	227
07:45 AM	6	48	12	0	66	6	13	14	0	33	74	34	24	0	132	22	4	3	0	29	260
Total	21	181	22	0	224	17	20	51	0	88	198	116	73	0	387	67	16	9	1	93	792
08:00 AM	4	29	9	0	42	7	3	12	0	22	38	31	31	0	100	27	1	1	0	29	193
08:15 AM	5	41	10	0	56	5	6	6	0	17	25	36	29	0	90	26	8	1	0	35	198
08:30 AM	1	38	7	0	46	9	7	16	0	32	29	23	19	0	71	20	5	2	0	27	176
08:45 AM	6	41	10	0	57	10	7	16	0	33	28	23	22	0	73	26	7	3	0	36	199
Total	16	149	36	0	201	31	23	50	0	104	120	113	101	0	334	99	21	7	0	127	766
09:00 AM	7	34	8	0	49	7	4	12	0	23	20	30	19	0	69	23	2	11	0	36	177
09:15 AM	8	29	7	0	44	2	13	9	0	24	33	35	30	0	98	30	4	2	0	36	202
09:30 AM	3	26	3	0	32	10	12	11	0	33	14	27	39	0	80	31	13	4	0	48	193
09:45 AM	3	34	6	0	43	4	16	9	0	29	21	25	30	0	76	31	5	6	0	42	190
Total	21	123	24	0	168	23	45	41	0	109	88	117	118	0	323	115	24	23	0	162	762
10:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

TMS Engineers, Inc.

2112 Case Parkway S.
Unit #7
Twinsburg, Ohio, 44087
Ph: (330) 686-6402 Fax: (330) 686-6417

File Name : TC 1 Oakpoint Rd and Cooperfoster Park 031920 DJS
Site Code : 00000001
Start Date : 3/19/2020

Groups Printed- Cars - Trucks - Buses

	OAKPOINT ROAD From North					COOPER FOSTER PARK ROAD From East					OAKPOINT ROAD From South					COOPER FOSTER PARK ROAD From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
11:00 AM	6	39	11	0	56	11	8	20	1	40	26	34	34	0	94	32	5	4	0	41	231
11:15 AM	4	39	16	1	60	11	11	16	0	38	24	47	39	0	110	43	7	1	1	52	260
11:30 AM	7	25	12	0	44	12	14	17	0	43	11	37	38	0	86	52	5	2	0	59	232
11:45 AM	8	24	6	0	38	7	10	22	0	39	17	55	42	0	114	43	11	5	0	59	250
Total	25	127	45	1	198	41	43	75	1	160	78	173	153	0	404	170	28	12	1	211	973
12:00 PM	8	36	3	0	47	9	21	14	0	44	31	52	43	0	126	55	15	3	0	73	290
12:15 PM	10	37	6	0	53	7	15	18	1	41	12	39	53	0	104	45	9	4	0	58	256
12:30 PM	4	49	9	0	62	12	12	21	0	45	11	44	44	0	99	66	10	12	1	89	295
12:45 PM	6	38	8	0	52	9	12	20	0	41	36	47	36	0	119	40	7	6	0	53	265
Total	28	160	26	0	214	37	60	73	1	171	90	182	176	0	448	206	41	25	1	273	1106
01:00 PM	5	48	4	0	57	5	16	7	1	29	17	31	39	0	87	49	9	3	0	61	234
01:15 PM	11	43	11	2	67	13	15	12	0	40	18	47	54	0	119	46	15	2	0	63	289
01:30 PM	16	60	9	2	87	9	12	22	0	43	18	52	41	0	111	62	16	3	0	81	322
01:45 PM	9	31	8	0	48	9	22	20	0	51	25	49	53	0	127	58	16	8	0	82	308
Total	41	182	32	4	259	36	65	61	1	163	78	179	187	0	444	215	56	16	0	287	1153
02:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

TMS Engineers, Inc.

2112 Case Parkway S.
Unit #7
Twinsburg, Ohio, 44087
Ph: (330) 686-6402 Fax: (330) 686-6417

File Name : TC 1 Oakpoint Rd and Cooperfoster Park 031920 DJS
Site Code : 00000001
Start Date : 3/19/2020

Groups Printed- Cars - Trucks - Buses

	OAKPOINT ROAD From North					COOPER FOSTER PARK ROAD From East					OAKPOINT ROAD From South					COOPER FOSTER PARK ROAD From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
03:00 PM	2	47	9	0	58	16	15	22	0	53	22	52	39	0	113	43	14	5	0	62	286
03:15 PM	11	43	5	0	59	8	14	14	0	36	14	63	46	0	123	41	8	4	0	53	271
03:30 PM	8	48	7	0	63	10	19	21	0	50	13	57	55	0	125	49	9	6	1	65	303
03:45 PM	8	48	6	0	62	12	18	16	0	46	28	62	46	0	136	55	15	6	0	76	320
Total	29	186	27	0	242	46	66	73	0	185	77	234	186	0	497	188	46	21	1	256	1180
04:00 PM	13	64	9	0	86	5	12	30	0	47	28	82	57	0	167	64	11	4	0	79	379
04:15 PM	1	57	7	0	65	9	13	13	1	36	18	65	58	0	141	64	10	7	0	81	323
04:30 PM	5	63	8	0	76	9	16	37	0	62	26	60	57	0	143	60	11	2	0	73	354
04:45 PM	6	49	12	0	67	15	17	31	1	64	14	60	46	0	120	62	10	14	0	86	337
Total	25	233	36	0	294	38	58	111	2	209	86	267	218	0	571	250	42	27	0	319	1393
05:00 PM	11	76	9	0	96	5	12	20	0	37	13	72	69	0	154	51	15	14	0	80	367
05:15 PM	11	60	8	0	79	7	12	22	5	46	16	74	57	0	147	73	20	9	0	102	374
05:30 PM	5	37	8	0	50	4	12	12	0	28	17	62	49	0	128	44	14	4	0	62	268
05:45 PM	8	46	2	0	56	6	18	19	2	45	14	63	32	0	109	43	11	5	0	59	269
Total	35	219	27	0	281	22	54	73	7	156	60	271	207	0	538	211	60	32	0	303	1278
Grand Total	241	1560	275	5	2081	291	434	608	12	1345	875	1652	1419	0	3946	1521	334	172	4	2031	9403
Apprch %	11.6	75	13.2	0.2		21.6	32.3	45.2	0.9		22.2	41.9	36	0		74.9	16.4	8.5	0.2		
Total %	2.6	16.6	2.9	0.1	22.1	3.1	4.6	6.5	0.1	14.3	9.3	17.6	15.1	0	42	16.2	3.6	1.8	0	21.6	
Cars	236	1526	272	4	2038	289	422	591	4	1306	851	1612	1369	0	3832	1464	329	164	3	1960	9136
% Cars	97.9	97.8	98.9	80	97.9	99.3	97.2	97.2	33.3	97.1	97.3	97.6	96.5	0	97.1	96.3	98.5	95.3	75	96.5	97.2
Trucks	5	34	3	1	43	1	11	17	8	37	23	40	49	0	112	56	5	7	1	69	261
% Trucks	2.1	2.2	1.1	20	2.1	0.3	2.5	2.8	66.7	2.8	2.6	2.4	3.5	0	2.8	3.7	1.5	4.1	25	3.4	2.8
Buses	0	0	0	0	0	1	1	0	0	2	1	0	1	0	2	1	0	1	0	2	6
% Buses	0	0	0	0	0	0.3	0.2	0	0	0.1	0.1	0	0.1	0	0.1	0.1	0	0.6	0	0.1	0.1

TMS Engineers, Inc.

2112 Case Parkway S.
Unit #7
Twinsburg, Ohio, 44087
Ph: (330) 686-6402 Fax: (330) 686-6417

	OAKPOINT ROAD From North					COOPER FOSTER PARK ROAD From East					OAKPOINT ROAD From South					COOPER FOSTER PARK ROAD From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:15 AM to 08:00 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:15 AM																					
07:15 AM	**5**	**44**	**5**	**0**	**54**	**4**	**3**	**9**	**0**	**16**	**36**	**22**	**15**	**0**	**73**	**9**	**5**	**1**	1	16	159
07:30 AM	6	48	3	0	57	2	1	17	0	20	53	**42**	22	0	117	24	**6**	**3**	0	**33**	227
07:45 AM	6	48	**12**	0	**66**	6	**13**	14	0	**33**	**74**	34	24	0	**132**	22	4	3	0	29	**260**
08:00 AM	4	29	9	0	42	**7**	3	12	0	22	38	31	**31**	0	100	**27**	1	1	0	29	193
Total Volume	21	169	29	0	219	19	20	52	0	91	201	129	92	0	422	82	16	8	1	107	839
% App. Total	9.6	77.2	13.2	0		20.9	22	57.1	0		47.6	30.6	21.8	0		76.6	15	7.5	0.9		
PHF	.875	.880	.604	.000	.830	.679	.385	.765	.000	.689	.679	.768	.742	.000	.799	.759	.667	.667	.250	.811	.807
Cars	21	166	29	0	216	19	18	51	0	88	198	126	88	0	412	76	14	7	1	98	814
% Cars	100	98.2	100	0	98.6	100	90.0	98.1	0	96.7	98.5	97.7	95.7	0	97.6	92.7	87.5	87.5	100	91.6	97.0
Trucks	0	3	0	0	3	0	1	1	0	2	2	3	3	0	8	6	2	1	0	9	22
% Trucks	0	1.8	0	0	1.4	0	5.0	1.9	0	2.2	1.0	2.3	3.3	0	1.9	7.3	12.5	12.5	0	8.4	2.6
Buses	0	0	0	0	0	0	1	0	0	1	1	0	1	0	2	0	0	0	0	0	3
% Buses	0	0	0	0	0	0	5.0	0	0	1.1	0.5	0	1.1	0	0.5	0	0	0	0	0	0.4
Peak Hour Analysis From 02:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:30 PM																					
04:30 PM	5	63	8	0	76	9	16	**37**	0	62	**26**	60	57	0	143	60	11	2	0	73	354
04:45 PM	6	49	**12**	0	67	**15**	**17**	31	1	**64**	14	60	46	0	120	62	10	**14**	0	86	337
05:00 PM	**11**	**76**	9	0	**96**	5	12	20	0	37	13	72	**69**	0	**154**	51	15	14	0	80	367
05:15 PM	11	60	8	0	79	7	12	22	**5**	46	16	**74**	57	0	147	**73**	**20**	9	0	**102**	**374**
Total Volume	33	248	37	0	318	36	57	110	6	209	69	266	229	0	564	246	56	39	0	341	1432
% App. Total	10.4	78	11.6	0		17.2	27.3	52.6	2.9		12.2	47.2	40.6	0		72.1	16.4	11.4	0		
PHF	.750	.816	.771	.000	.828	.600	.838	.743	.300	.816	.663	.899	.830	.000	.916	.842	.700	.696	.000	.836	.957
Cars	33	245	36	0	314	36	56	107	2	201	66	261	223	0	550	241	56	38	0	335	1400
% Cars	100	98.8	97.3	0	98.7	100	98.2	97.3	33.3	96.2	95.7	98.1	97.4	0	97.5	98.0	100	97.4	0	98.2	97.8
Trucks	0	3	1	0	4	0	1	3	4	8	3	5	6	0	14	5	0	1	0	6	32
% Trucks	0	1.2	2.7	0	1.3	0	1.8	2.7	66.7	3.8	4.3	1.9	2.6	0	2.5	2.0	0	2.6	0	1.8	2.2
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

VEHICULAR TRAFFIC COUNT SUMMARY

Municipality: Amherst **At Intersection of:** Oak Point Road **and** SR 2 WB Ramps

Date: 3/19/2020 **Day:** Thu. **Comments:** **Project:** 20-039

Weather: Clear **Recorder(s):** GFA **Data entry by:** JJO **Date entered:** Mar. 20, 2020 Oak Point Rd & SR 2 WB Ramps 03192

TIME BEGINS	Oak Point Rd. FROM NORTH						Oak Point Rd. FROM SOUTH						TOTAL NORTH SOUTH	SR 2 WB Exit Ramp FROM EAST						FROM WEST						TOTAL EAST WEST	TOTAL ALL DIREC.	PEAK HOUR FACTOR			
	Left	Thru	Right	Total	Trk	Bus	Left	Thru	Right	Total	Trk	Bus		Left	Thru	Right	Total	Trk	Bus	Left	Thru	Right	Total	Trk	Bus			North	South	East	West
06:00																														
07:00	0	202	67	269	7	0	30	173	2	205	3	0	474	30	0	188	218	8	0							218	692	0.782	0.754	0.673	
08:00	0	240	65	305	11	0	33	147	0	180	3	0	485	52	0	169	221	10	0							221	706	0.965	0.776	0.921	
09:00	0	222	55	277	12	0	21	160	0	181	5	0	458	43	0	163	206	10	0							206	664	0.949	0.887	0.792	
10:00																														
11:00	0	272	89	361	13	0	28	192	1	221	9	0	582	74	0	183	257	18	0							257	839	0.921	0.921	0.880	
12:00	0	319	89	408	21	0	20	246	0	266	10	0	674	108	0	186	294	8	0							294	968	0.823	0.899	0.896	
1:00	0	360	78	438	12	0	29	247	0	276	6	0	714	92	0	194	286	7	0							286	1000	0.830	0.885	0.737	
2:00																														
3:00	0	353	99	452	8	0	30	247	0	277	4	0	729	127	0	241	368	8	0							368	1097	0.926	0.888	0.748	
4:00	0	456	137	593	5	0	46	263	0	309	4	0	902	169	0	283	452	4	0							452	1354	0.927	0.888	0.911	
5:00	0	376	114	490	8	0	32	251	0	283	3	0	773	175	0	294	469	7	0							469	1242	0.817	0.884	0.814	
6:00																														
7:00																														
8:00																														
9:00																														
TOTALS	0	2800	793	3593	97	0	269	1926	3	2198	47	0	5791	870	0	1901	2771	80	0							2771	8562				
ADT	0	4292	1216	5508	2.7%		412	2953	5	3370	2.1%		8878	1327	0	2900	4227	2.9%								4227	13105				

N Leg Hourly Factor:	1.65	E Leg Hourly Factor:	1.64
S Leg Hourly Factor:	1.65	W leg Hourly Factor:	0.00
N Leg Monthly Factor:	0.93	E Leg Monthly Factor:	0.93
S Leg Monthly Factor:	0.93	W Leg Monthly Factor:	0.00

N Leg Combined Factor:	1.53	E Leg Combined Factor:	1.53
S Leg Combined Factor:	1.53	W Leg Combined Factor:	

TMS ENGINEERS, INC.
2112 Case Parkway South #7
Twinsburg, Ohio 44087
(330) 686-6402 FAX: (330) 686-6417

Figure #:

Page #:

TMS Engineers, Inc.

2112 Case Parkway S.
Unit #7
Twinsburg, Ohio, 44087
Ph: (330) 686-6402 Fax: (330) 686-6417

City: Amherst
Intersection: Oakpoint Rd & SR 2 WB Ramps
Counter: GFA
Day of the week: Thursday

File Name : Gary Amherst Oak Point Rd and SR 2 WB Ramps 3 19 20
Site Code : 00000002
Start Date : 3/19/2020
Page No : 1

Groups Printed- cars - trucks - buses

	OAKPOINT ROAD From North					SR 2 WB EXIT RAMP From East					OAKPOINT ROAD From South					From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
07:00 AM	12	39	0	0	51	26	0	1	0	27	0	30	7	0	37	0	0	0	0	0	115
07:15 AM	17	41	0	0	58	30	0	8	0	38	0	36	8	0	44	0	0	0	0	0	140
07:30 AM	22	64	0	0	86	64	0	8	0	72	1	49	6	0	56	0	0	0	0	0	214
07:45 AM	16	58	0	0	74	68	0	13	0	81	1	58	9	0	68	0	0	0	0	0	223
Total	67	202	0	0	269	188	0	30	0	218	2	173	30	0	205	0	0	0	0	0	692
08:00 AM	20	53	0	0	73	44	0	16	0	60	0	51	7	0	58	0	0	0	0	0	191
08:15 AM	14	64	0	0	78	44	0	9	0	53	0	39	4	0	43	0	0	0	0	0	174
08:30 AM	15	60	0	0	75	44	0	9	0	53	0	25	8	0	33	0	0	0	0	0	161
08:45 AM	16	63	0	0	79	37	0	18	0	55	0	32	14	0	46	0	0	0	0	0	180
Total	65	240	0	0	305	169	0	52	0	221	0	147	33	0	180	0	0	0	0	0	706
09:00 AM	15	56	0	0	71	34	0	13	0	47	0	34	3	0	37	0	0	0	0	0	155
09:15 AM	9	57	0	0	66	55	0	10	0	65	0	39	7	0	46	0	0	0	0	0	177
09:30 AM	12	55	0	0	67	44	0	11	0	55	0	43	8	0	51	0	0	0	0	0	173
09:45 AM	19	54	0	0	73	30	0	9	0	39	0	44	3	0	47	0	0	0	0	0	159
Total	55	222	0	0	277	163	0	43	0	206	0	160	21	0	181	0	0	0	0	0	664
10:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

TMS Engineers, Inc.

2112 Case Parkway S.
Unit #7
Twinsburg, Ohio, 44087
Ph: (330) 686-6402 Fax: (330) 686-6417

File Name : Gary Amherst Oak Point Rd and SR 2 WB Ramps 3 19 20
Site Code : 00000002
Start Date : 3/19/2020

Groups Printed- cars - trucks - buses

	OAKPOINT ROAD From North					SR 2 WB EXIT RAMP From East					OAKPOINT ROAD From South					From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
11:00 AM	16	72	0	0	88	37	0	18	1	56	1	48	5	0	54	0	0	0	0	0	198
11:15 AM	30	68	0	0	98	47	0	15	0	62	0	51	8	1	60	0	0	0	0	0	220
11:30 AM	24	64	0	0	88	40	0	27	1	68	0	43	5	0	48	0	0	0	0	0	204
11:45 AM	19	68	0	0	87	59	0	14	0	73	0	50	10	0	60	0	0	0	0	0	220
Total	89	272	0	0	361	183	0	74	2	259	1	192	28	1	222	0	0	0	0	0	842
12:00 PM	28	76	0	0	104	53	0	16	0	69	0	65	9	0	74	0	0	0	0	0	247
12:15 PM	18	66	0	0	84	39	0	31	1	71	0	60	2	0	62	0	0	0	0	0	217
12:30 PM	22	102	0	0	124	42	0	31	1	74	0	59	3	0	62	0	0	0	0	0	260
12:45 PM	21	75	0	0	96	52	0	30	0	82	0	62	6	0	68	0	0	0	0	0	246
Total	89	319	0	0	408	186	0	108	2	296	0	246	20	0	266	0	0	0	0	0	970
01:00 PM	18	81	0	0	99	33	0	13	1	47	0	58	6	0	64	0	0	0	0	0	210
01:15 PM	18	80	0	0	98	45	0	31	0	76	0	65	13	0	78	0	0	0	0	0	252
01:30 PM	20	112	0	0	132	48	0	19	0	67	0	63	6	0	69	0	0	0	0	0	268
01:45 PM	22	87	0	0	109	68	0	29	0	97	0	61	4	0	65	0	0	0	0	0	271
Total	78	360	0	0	438	194	0	92	1	287	0	247	29	0	276	0	0	0	0	0	1001
02:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

TMS Engineers, Inc.

2112 Case Parkway S.
Unit #7
Twinsburg, Ohio, 44087
Ph: (330) 686-6402 Fax: (330) 686-6417

File Name : Gary Amherst Oak Point Rd and SR 2 WB Ramps 3 19 20
Site Code : 00000002
Start Date : 3/19/2020

Groups Printed- cars - trucks - buses

	OAKPOINT ROAD From North					SR 2 WB EXIT RAMP From East					OAKPOINT ROAD From South					From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
03:00 PM	26	84	0	0	110	54	0	25	0	79	0	48	12	0	60	0	0	0	0	0	249
03:15 PM	23	77	0	0	100	59	0	26	0	85	0	64	7	0	71	0	0	0	0	0	256
03:30 PM	25	95	0	0	120	59	0	22	0	81	0	71	7	0	78	0	0	0	1	1	280
03:45 PM	25	97	0	0	122	69	0	54	0	123	0	64	4	0	68	0	0	0	0	0	313
Total	99	353	0	0	452	241	0	127	0	368	0	247	30	0	277	0	0	0	1	1	1098
04:00 PM	42	118	0	0	160	84	0	35	1	120	0	77	10	0	87	0	0	0	0	0	367
04:15 PM	29	102	0	0	131	83	0	30	1	114	0	60	17	0	77	0	0	0	0	0	322
04:30 PM	39	121	0	0	160	48	0	48	0	96	0	71	11	0	82	0	0	0	0	0	338
04:45 PM	27	115	0	0	142	68	0	56	5	129	0	55	8	0	63	0	0	0	0	0	334
Total	137	456	0	0	593	283	0	169	7	459	0	263	46	0	309	0	0	0	0	0	1361
05:00 PM	34	116	0	0	150	80	0	45	0	125	0	67	13	0	80	0	0	0	0	0	355
05:15 PM	35	106	0	0	141	90	0	54	5	149	0	66	9	0	75	0	0	0	0	0	365
05:30 PM	26	72	0	0	98	70	0	37	0	107	0	55	7	0	62	0	0	0	0	0	267
05:45 PM	19	82	0	0	101	54	0	39	2	95	0	63	3	0	66	0	0	0	0	0	262
Total	114	376	0	0	490	294	0	175	7	476	0	251	32	0	283	0	0	0	0	0	1249
Grand Total	793	2800	0	0	3593	1901	0	870	19	2790	3	1926	269	1	2199	0	0	0	1	1	8583
Apprch %	22.1	77.9	0	0		68.1	0	31.2	0.7		0.1	87.6	12.2	0		0	0	0	100		
Total %	9.2	32.6	0	0	41.9	22.1	0	10.1	0.2	32.5	0	22.4	3.1	0	25.6	0	0	0	0	0	
cars	770	2726	0	0	3496	1849	0	842	6	2697	3	1883	265	0	2151	0	0	0	1	1	8345
% cars	97.1	97.4	0	0	97.3	97.3	0	96.8	31.6	96.7	100	97.8	98.5	0	97.8	0	0	0	100	100	97.2
trucks	23	74	0	0	97	52	0	28	13	93	0	43	4	1	48	0	0	0	0	0	238
% trucks	2.9	2.6	0	0	2.7	2.7	0	3.2	68.4	3.3	0	2.2	1.5	100	2.2	0	0	0	0	0	2.8
buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

TMS Engineers, Inc.

2112 Case Parkway S.
Unit #7
Twinsburg, Ohio, 44087
Ph: (330) 686-6402 Fax: (330) 686-6417

	OAKPOINT ROAD From North					SR 2 WB EXIT RAMP From East					OAKPOINT ROAD From South					From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:15 AM to 08:00 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:15 AM																					
07:15 AM	**17**	**41**	**0**	**0**	**58**	**30**	**0**	**8**	**0**	**38**	**0**	**36**	**8**	**0**	**44**	**0**	**0**	**0**	**0**	**0**	**140**
07:30 AM	22	64	0	0	86	64	0	8	0	72	1	49	6	0	56	0	0	0	0	0	214
07:45 AM	16	58	0	0	74	**68**	0	13	0	**81**	1	**58**	**9**	0	**68**	0	0	0	0	0	**223**
08:00 AM	20	53	0	0	73	44	0	**16**	0	60	0	51	7	0	58	0	0	0	0	0	191
Total Volume	75	216	0	0	291	206	0	45	0	251	2	194	30	0	226	0	0	0	0	0	768
% App. Total	25.8	74.2	0	0		82.1	0	17.9	0		0.9	85.8	13.3	0		0	0	0	0		
PHF	.852	.844	.000	.000	.846	.757	.000	.703	.000	.775	.500	.836	.833	.000	.831	.000	.000	.000	.000	.000	.861
cars	74	210	0	0	284	200	0	39	0	239	2	191	30	0	223	0	0	0	0	0	746
% cars	98.7	97.2	0	0	97.6	97.1	0	86.7	0	95.2	100	98.5	100	0	98.7	0	0	0	0	0	97.1
trucks	1	6	0	0	7	6	0	6	0	12	0	3	0	0	3	0	0	0	0	0	22
% trucks	1.3	2.8	0	0	2.4	2.9	0	13.3	0	4.8	0	1.5	0	0	1.3	0	0	0	0	0	2.9
buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Peak Hour Analysis From 02:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:30 PM																					
04:30 PM	**39**	**121**	0	0	**160**	48	0	48	0	96	0	**71**	11	0	**82**	0	0	0	0	0	338
04:45 PM	27	115	0	0	142	68	0	**56**	**5**	129	0	55	8	0	63	0	0	0	0	0	334
05:00 PM	34	116	0	0	150	80	0	45	0	125	0	67	**13**	0	80	0	0	0	0	0	355
05:15 PM	35	106	0	0	141	**90**	0	54	5	**149**	0	66	9	0	75	0	0	0	0	0	**365**
Total Volume	135	458	0	0	593	286	0	203	10	499	0	259	41	0	300	0	0	0	0	0	1392
% App. Total	22.8	77.2	0	0		57.3	0	40.7	2		0	86.3	13.7	0		0	0	0	0		
PHF	.865	.946	.000	.000	.927	.794	.000	.906	.500	.837	.000	.912	.788	.000	.915	.000	.000	.000	.000	.000	.953
cars	132	451	0	0	583	283	0	201	3	487	0	255	41	0	296	0	0	0	0	0	1366
% cars	97.8	98.5	0	0	98.3	99.0	0	99.0	30.0	97.6	0	98.5	100	0	98.7	0	0	0	0	0	98.1
trucks	3	7	0	0	10	3	0	2	7	12	0	4	0	0	4	0	0	0	0	0	26
% trucks	2.2	1.5	0	0	1.7	1.0	0	1.0	70.0	2.4	0	1.5	0	0	1.3	0	0	0	0	0	1.9
buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

VEHICULAR TRAFFIC COUNT SUMMARY

Municipality: Amherst **At Intersection of:** Oak Point Road **and** SR 2 EB Ramps

Date: 3/19/2020 **Day:** Thu. **Comments:** **Project:** 20-039

Weather: Clear **Recorder(s):** JMC **Data entry by:** JJO **Date entered:** Mar. 20, 2020 Oak Point Rd & SR 2 EB Ramps 03192(

TIME BEGINS	Oak Point Rd. FROM NORTH						Oak Point Rd. FROM SOUTH						TOTAL NORTH SOUTH	FROM EAST						SR 2 EB Exit Ramp FROM WEST						TOTAL EAST WEST	TOTAL ALL DIREC.	PEAK HOUR FACTOR			
	Left	Thru	Right	Total	Trk	Bus	Left	Thru	Right	Total	Trk	Bus		Left	Thru	Right	Total	Trk	Bus	Left	Thru	Right	Total	Trk	Bus			North	South	East	West
06:00																														
07:00	174	71	0	245	12	0	0	110	180	290	2	0	535							87	0	18	105	5	0	105	640	0.839	0.824		0.640
08:00	189	116	0	305	5	0	0	94	136	230	6	0	535							70	0	13	83	0	0	83	618	0.908	0.810		0.669
09:00	138	122	0	260	8	0	0	111	97	208	4	0	468							49	0	16	65	4	0	65	533	0.942	0.897		0.903
10:00																														
11:00	170	183	0	353	15	0	0	150	83	233	5	0	586							58	0	27	85	7	0	85	671	0.919	0.896		0.759
12:00	185	219	0	404	20	0	0	145	100	245	8	0	649							78	0	21	99	6	0	99	748	0.777	0.972		0.825
1:00	169	269	0	438	12	0	0	169	87	256	7	0	694							66	0	31	97	1	0	97	791	0.836	0.889		0.758
2:00																														
3:00	195	286	0	481	3	0	0	141	94	235	3	0	716							105	0	34	139	1	0	139	855	0.738	0.877		0.914
4:00	268	359	0	627	5	0	0	183	111	294	1	0	921							80	0	35	115	2	0	115	1036	0.901	0.942		0.821
5:00	211	351	0	562	7	0	0	160	87	247	0	0	809							95	0	43	138	5	0	138	947	0.822	0.858		0.908
6:00																														
7:00																														
8:00																														
9:00																														
TOTALS	1699	1976	0	3675	87	0	0	1263	975	2238	36	0	5913							688	0	238	926	31	0	926	6839				
ADT	2605	3029	0	5634	2.4%		0	1936	1495	3431	1.6%		9065							1050	0	363	1413	3.3%		1413	10477				

N Leg Hourly Factor:	1.65	E Leg Hourly Factor:	0.00
S Leg Hourly Factor:	1.65	W leg Hourly Factor:	1.64
N Leg Monthly Factor:	0.93	E Leg Monthly Factor:	0.00
S Leg Monthly Factor:	0.93	W Leg Monthly Factor:	0.93

N Leg Combined Factor:	1.53	E Leg Combined Factor:	
S Leg Combined Factor:	1.53	W Leg Combined Factor:	1.53

TMS ENGINEERS, INC.
2112 Case Parkway South #7
Twinsburg, Ohio 44087
(330) 686-6402 FAX: (330) 686-6417

Figure #:

Page #:

TMS Engineers, Inc.

2112 Case Parkway S.
Unit #7
Twinsburg, Ohio, 44087
Ph: (330) 686-6402 Fax: (330) 686-6417

City: Amherst
Intersection: Oakpoint Rd & SR 2 EB Ramps
Counter: JMC
Day of the Week: Thursday

File Name : rt 2 east exit and entrance oak point rd amherst 71920 jmc
Site Code : 00000003
Start Date : 3/19/2020
Page No : 1

Groups Printed- Cars - Trucks - Buses

	OAKPOINT ROAD From North					From East					OAKPOINT ROAD From South					SR 2 EB EXIT RAMP From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
07:00 AM	0	8	36	0	44	0	0	0	0	0	39	19	0	0	58	0	0	12	0	12	114
07:15 AM	0	16	40	0	56	0	0	0	0	0	48	20	0	0	68	5	0	23	0	28	152
07:30 AM	0	22	51	0	73	0	0	0	0	0	43	33	0	0	76	5	0	19	0	24	173
07:45 AM	0	25	47	0	72	0	0	0	0	0	50	38	0	0	88	8	0	33	0	41	201
Total	0	71	174	0	245	0	0	0	0	0	180	110	0	0	290	18	0	87	0	105	640
08:00 AM	0	34	39	0	73	0	0	0	0	0	44	27	0	0	71	5	0	26	0	31	175
08:15 AM	0	25	51	0	76	0	0	0	0	0	30	26	0	0	56	1	0	14	0	15	147
08:30 AM	0	23	49	0	72	0	0	0	0	0	35	21	0	0	56	4	0	9	0	13	141
08:45 AM	0	34	50	0	84	0	0	0	0	0	27	20	0	0	47	3	0	21	0	24	155
Total	0	116	189	0	305	0	0	0	0	0	136	94	0	0	230	13	0	70	0	83	618
09:00 AM	0	28	37	0	65	0	0	0	0	0	22	18	0	0	40	4	0	14	0	18	123
09:15 AM	0	33	36	0	69	0	0	0	0	0	22	30	0	0	52	4	0	12	0	16	137
09:30 AM	0	29	36	0	65	0	0	0	0	0	21	37	0	0	58	7	0	10	0	17	140
09:45 AM	0	32	29	0	61	0	0	0	0	0	32	26	0	0	58	1	0	13	0	14	133
Total	0	122	138	0	260	0	0	0	0	0	97	111	0	0	208	16	0	49	0	65	533
10:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

TMS Engineers, Inc.

2112 Case Parkway S.
Unit #7
Twinsburg, Ohio, 44087
Ph: (330) 686-6402 Fax: (330) 686-6417

File Name : rt 2 east exit and entrance oak point rd amherst 71920 jmc
Site Code : 00000003
Start Date : 3/19/2020

Groups Printed- Cars - Trucks - Buses

	OAKPOINT ROAD From North					From East					OAKPOINT ROAD From South					SR 2 EB EXIT RAMP From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
11:00 AM	0	48	48	0	96	0	0	0	1	1	22	42	0	0	64	10	0	13	0	23	184
11:15 AM	0	46	43	0	89	0	0	0	1	1	26	39	0	0	65	9	0	19	0	28	183
11:30 AM	0	45	46	0	91	0	0	0	1	1	18	28	0	0	46	3	0	15	0	18	156
11:45 AM	0	44	33	0	77	0	0	0	0	0	17	41	0	0	58	5	0	11	0	16	151
Total	0	183	170	0	353	0	0	0	3	3	83	150	0	0	233	27	0	58	0	85	674
12:00 PM	0	42	36	0	78	0	0	0	0	0	25	38	0	0	63	4	0	22	0	26	167
12:15 PM	0	53	44	0	97	0	0	0	1	1	22	37	0	0	59	8	0	14	0	22	179
12:30 PM	0	68	62	0	130	0	0	0	0	0	27	35	0	0	62	4	0	17	0	21	213
12:45 PM	0	56	43	0	99	0	0	0	1	1	26	35	0	0	61	5	0	25	0	30	191
Total	0	219	185	0	404	0	0	0	2	2	100	145	0	0	245	21	0	78	0	99	750
01:00 PM	0	55	33	0	88	0	0	0	0	0	19	40	0	0	59	6	0	10	0	16	163
01:15 PM	0	71	38	0	109	0	0	0	0	0	20	46	0	0	66	5	0	14	0	19	194
01:30 PM	0	78	53	0	131	0	0	0	0	0	26	46	0	0	72	14	0	16	0	30	233
01:45 PM	0	65	45	0	110	0	0	0	0	0	22	37	0	0	59	6	0	26	0	32	201
Total	0	269	169	0	438	0	0	0	0	0	87	169	0	0	256	31	0	66	0	97	791
02:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

TMS Engineers, Inc.

2112 Case Parkway S.
Unit #7
Twinsburg, Ohio, 44087
Ph: (330) 686-6402 Fax: (330) 686-6417

File Name : rt 2 east exit and entrance oak point rd amherst 71920 jmc
Site Code : 00000003
Start Date : 3/19/2020

Groups Printed- Cars - Trucks - Buses

	OAKPOINT ROAD From North					From East					OAKPOINT ROAD From South					SR 2 EB EXIT RAMP From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
03:00 PM	0	61	40	0	101	0	0	0	0	0	32	35	0	0	67	14	0	17	0	31	199
03:15 PM	0	64	41	0	105	0	0	0	0	0	20	30	0	0	50	3	0	30	0	33	188
03:30 PM	0	59	53	0	112	0	0	0	0	0	23	41	0	0	64	8	0	30	0	38	214
03:45 PM	0	102	61	0	163	0	0	0	0	0	19	35	0	0	54	9	0	28	0	37	254
Total	0	286	195	0	481	0	0	0	0	0	94	141	0	0	235	34	0	105	0	139	855
04:00 PM	0	79	63	0	142	0	0	0	0	0	26	38	0	0	64	3	0	17	0	20	226
04:15 PM	0	74	63	0	137	0	0	0	1	1	29	47	0	0	76	7	0	21	0	28	242
04:30 PM	0	100	74	0	174	0	0	0	0	0	22	56	0	0	78	14	0	18	0	32	284
04:45 PM	0	106	68	0	174	0	0	0	4	4	34	42	0	0	76	11	0	24	0	35	289
Total	0	359	268	0	627	0	0	0	5	5	111	183	0	0	294	35	0	80	0	115	1041
05:00 PM	0	91	67	0	158	0	0	0	0	0	26	46	0	0	72	11	0	27	0	38	268
05:15 PM	0	107	64	0	171	0	0	0	5	5	18	45	0	0	63	13	0	25	0	38	277
05:30 PM	0	68	34	0	102	0	0	0	0	0	25	38	0	0	63	11	0	23	0	34	199
05:45 PM	0	85	46	0	131	0	0	0	2	2	18	31	0	0	49	8	0	20	0	28	210
Total	0	351	211	0	562	0	0	0	7	7	87	160	0	0	247	43	0	95	0	138	954
Grand Total	0	1976	1699	0	3675	0	0	0	17	17	975	1263	0	0	2238	238	0	688	0	926	6856
Apprch %	0	53.8	46.2	0		0	0	0	100		43.6	56.4	0	0		25.7	0	74.3	0		
Total %	0	28.8	24.8	0	53.6	0	0	0	0.2	0.2	14.2	18.4	0	0	32.6	3.5	0	10	0	13.5	
Cars	0	1934	1654	0	3588	0	0	0	6	6	957	1245	0	0	2202	233	0	662	0	895	6691
% Cars	0	97.9	97.4	0	97.6	0	0	0	35.3	35.3	98.2	98.6	0	0	98.4	97.9	0	96.2	0	96.7	97.6
Trucks	0	42	45	0	87	0	0	0	0	0	18	18	0	0	36	5	0	26	0	31	154
% Trucks	0	2.1	2.6	0	2.4	0	0	0	0	0	1.8	1.4	0	0	1.6	2.1	0	3.8	0	3.3	2.2
Buses	0	0	0	0	0	0	0	0	11	11	0	0	0	0	0	0	0	0	0	0	11
% Buses	0	0	0	0	0	0	0	0	64.7	64.7	0	0	0	0	0	0	0	0	0	0	0.2

TMS Engineers, Inc.

2112 Case Parkway S.
Unit #7
Twinsburg, Ohio, 44087
Ph: (330) 686-6402 Fax: (330) 686-6417

	OAKPOINT ROAD From North					From East					OAKPOINT ROAD From South					SR 2 EB EXIT RAMP From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 09:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:15 AM																					
07:15 AM	**0**	**16**	**40**	**0**	**56**	**0**	**0**	**0**	**0**	**0**	**48**	**20**	**0**	**0**	**68**	**5**	**0**	**23**	**0**	**28**	**152**
07:30 AM	**0**	**22**	51	0	73	0	0	0	0	0	43	33	0	0	76	5	0	19	0	24	173
07:45 AM	0	25	47	0	72	0	0	0	0	0	50	38	0	0	**88**	**8**	0	**33**	0	**41**	**201**
08:00 AM	0	**34**	39	0	73	0	0	0	0	0	44	27	0	0	71	5	0	26	0	31	175
Total Volume	0	97	177	0	274	0	0	0	0	0	185	118	0	0	303	23	0	101	0	124	701
% App. Total	0	35.4	64.6	0		0	0	0	0		61.1	38.9	0	0		18.5	0	81.5	0		
PHF	.000	.713	.868	.000	.938	.000	.000	.000	.000	.000	.925	.776	.000	.000	.861	.719	.000	.765	.000	.756	.872
Cars	0	91	170	0	261	0	0	0	0	0	183	118	0	0	301	22	0	98	0	120	682
% Cars	0	93.8	96.0	0	95.3	0	0	0	0	0	98.9	100	0	0	99.3	95.7	0	97.0	0	96.8	97.3
Trucks	0	6	7	0	13	0	0	0	0	0	2	0	0	0	2	1	0	3	0	4	19
% Trucks	0	6.2	4.0	0	4.7	0	0	0	0	0	1.1	0	0	0	0.7	4.3	0	3.0	0	3.2	2.7
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Peak Hour Analysis From 02:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:30 PM																					
04:30 PM	0	100	**74**	0	**174**	0	0	0	0	0	22	**56**	0	0	**78**	**14**	0	18	0	32	284
04:45 PM	0	106	68	0	174	0	0	0	4	4	**34**	42	0	0	76	11	0	24	0	35	**289**
05:00 PM	0	91	67	0	158	0	0	0	0	0	26	46	0	0	72	11	0	**27**	0	**38**	268
05:15 PM	0	**107**	64	0	171	0	0	0	**5**	**5**	18	45	0	0	63	13	0	25	0	38	277
Total Volume	0	404	273	0	677	0	0	0	9	9	100	189	0	0	289	49	0	94	0	143	1118
% App. Total	0	59.7	40.3	0		0	0	0	100		34.6	65.4	0	0		34.3	0	65.7	0		
PHF	.000	.944	.922	.000	.973	.000	.000	.000	.450	.450	.735	.844	.000	.000	.926	.875	.000	.870	.000	.941	.967
Cars	0	400	271	0	671	0	0	0	3	3	100	189	0	0	289	49	0	92	0	141	1104
% Cars	0	99.0	99.3	0	99.1	0	0	0	33.3	33.3	100	100	0	0	100	100	0	97.9	0	98.6	98.7
Trucks	0	4	2	0	6	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	8
% Trucks	0	1.0	0.7	0	0.9	0	0	0	0	0	0	0	0	0	0	0	0	2.1	0	1.4	0.7
Buses	0	0	0	0	0	0	0	0	6	6	0	0	0	0	0	0	0	0	0	0	6
% Buses	0	0	0	0	0	0	0	0	66.7	66.7	0	0	0	0	0	0	0	0	0	0	0.5

VEHICULAR TRAFFIC COUNT SUMMARY

Municipality: Amherst **At Intersection of:** Hollstein Drive **and** Cooper Foster Park Road

Date: 3/24/2020 **Day:** Tue. **Comments:** **Project:** 20-039

Weather: Clear **Recorder(s):** DJS **Data entry by:** JJO **Date entered:** Mar. 25, 2020 lstein Dr & Cooper Foster Park Rd 032

TIME BEGINS	Hollstein Dr. FROM NORTH						FROM SOUTH						TOTAL NORTH SOUTH	Cooper Foster Park Rd. FROM EAST						Cooper Foster Park Rd. FROM WEST						TOTAL EAST WEST	TOTAL ALL DIREC.	PEAK HOUR FACTOR			
	Left	Thru	Right	Total	Trk	Bus	Left	Thru	Right	Total	Trk	Bus		Left	Thru	Right	Total	Trk	Bus	Left	Thru	Right	Total	Trk	Bus			North	South	East	West
06:00																														
07:00	1	0	4	5	2	0							5	1	65	12	78	1	0	25	31	0	56	1	0	134	139	0.625		0.848	0.737
08:00	6	0	10	16	1	0							16	0	55	9	64	2	0	17	44	0	61	1	0	125	141	0.800		0.762	0.763
09:00	7	0	13	20	1	0							20	0	55	8	63	2	0	9	57	0	66	4	0	129	149	0.714		0.926	0.868
10:00																														
11:00	7	0	9	16	3	0							16	0	63	8	71	2	0	15	68	0	83	0	0	154	170	0.667		0.845	0.798
12:00	11	0	14	25	1	0							25	0	84	10	94	5	0	17	86	0	103	4	0	197	222	0.568		0.810	0.954
1:00	6	0	7	13	1	0							13	0	92	9	101	1	0	6	83	0	89	2	0	190	203	0.464		0.765	0.824
2:00																														
3:00	6	0	16	22	1	0							22	0	87	8	95	2	0	10	102	0	112	2	0	207	229	0.786		0.880	0.636
4:00	12	0	17	29	0	0							29	0	77	6	83	1	0	6	124	0	130	0	0	213	242	0.659		0.669	0.774
5:00	7	0	13	20	1	0							20	0	78	0	78	1	0	1	106	0	107	0	0	185	205	0.556		0.813	0.811
6:00																														
7:00																														
8:00																														
9:00																														
TOTALS	63	0	103	166	11	0							166	1	656	70	727	17	0	106	701	0	807	14	0	1534	1700				
ADT	99	0	162	261	6.6%								261	2	1027	110	1139	2.3%		166	1098	0	1264	1.7%		2403	2664				

N Leg Hourly Factor:	1.64	E Leg Hourly Factor:	1.64
S Leg Hourly Factor:	0.00	W leg Hourly Factor:	1.64
N Leg Monthly Factor:	0.96	E Leg Monthly Factor:	0.96
S Leg Monthly Factor:	0.00	W Leg Monthly Factor:	0.96

N Leg Combined Factor:	1.57	E Leg Combined Factor:	1.57
S Leg Combined Factor:		W Leg Combined Factor:	1.57

TMS ENGINEERS, INC.

2112 Case Parkway South #7

Twinsburg, Ohio 44087

(330) 686-6402 FAX: (330) 686-6417

Figure #:

Page #:

TMS Engineers, Inc.

2112 Case Parkway S.
Unit #7
Twinsburg, Ohio, 44087
Ph: (330) 686-6402 Fax: (330) 686-6417

City: Amherst
Intersection: Cooper Foster Park Rd & Hollstein Dr
Counter: DJS
Day of the Week: Tuesday

File Name : TC 5 Hollstein Dr and Cooper Foster Park RD 032420 DJS
Site Code : 00000005
Start Date : 3/24/2020
Page No : 1

Groups Printed- Cars - Trucks - Buses

	HOLLSTEIN DRIVE From North					COOPER FOSTER PARK ROAD From East					From South					COOPER FOSTER PARK ROAD From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
07:00 AM	1	0	0	0	1	1	11	1	0	13	0	0	0	0	0	0	5	5	0	10	24
07:15 AM	1	0	0	0	1	4	17	0	0	21	0	0	0	0	0	0	11	3	0	14	36
07:30 AM	0	0	1	0	1	4	17	0	0	21	0	0	0	0	0	0	7	6	0	13	35
07:45 AM	2	0	0	0	2	3	20	0	0	23	0	0	0	0	0	0	8	11	0	19	44
Total	4	0	1	0	5	12	65	1	0	78	0	0	0	0	0	0	31	25	0	56	139
08:00 AM	2	0	1	0	3	0	9	0	0	9	0	0	0	0	0	0	6	2	0	8	20
08:15 AM	3	0	1	0	4	3	18	0	0	21	0	0	0	0	0	0	14	5	0	19	44
08:30 AM	3	0	2	0	5	2	15	0	0	17	0	0	0	0	0	0	17	3	0	20	42
08:45 AM	2	0	2	0	4	4	13	0	0	17	0	0	0	0	0	0	7	7	0	14	35
Total	10	0	6	0	16	9	55	0	0	64	0	0	0	0	0	0	44	17	0	61	141
09:00 AM	3	0	0	0	3	3	14	0	0	17	0	0	0	0	0	0	15	2	0	17	37
09:15 AM	4	0	1	0	5	1	16	0	0	17	0	0	0	0	0	0	17	2	0	19	41
09:30 AM	2	0	3	0	5	2	11	0	0	13	0	0	0	0	0	0	8	3	0	11	29
09:45 AM	4	0	3	0	7	2	14	0	0	16	0	0	0	0	0	0	17	2	0	19	42
Total	13	0	7	0	20	8	55	0	0	63	0	0	0	0	0	0	57	9	0	66	149
10:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

TMS Engineers, Inc.

2112 Case Parkway S.
Unit #7
Twinsburg, Ohio, 44087
Ph: (330) 686-6402 Fax: (330) 686-6417

File Name : TC 5 Hollstein Dr and Cooper Foster Park RD 032420 DJS
Site Code : 00000005
Start Date : 3/24/2020

Groups Printed- Cars - Trucks - Buses

	HOLLSTEIN DRIVE From North					COOPER FOSTER PARK ROAD From East					From South					COOPER FOSTER PARK ROAD From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
11:00 AM	4	0	2	0	6	0	14	0	0	14	0	0	0	0	0	0	15	9	0	24	44
11:15 AM	1	0	1	0	2	5	15	0	0	20	0	0	0	0	0	0	23	3	0	26	48
11:30 AM	1	0	3	0	4	2	19	0	0	21	0	0	0	0	0	0	17	2	0	19	44
11:45 AM	3	0	1	0	4	1	15	0	0	16	0	0	0	0	0	0	13	1	0	14	34
Total	9	0	7	0	16	8	63	0	0	71	0	0	0	0	0	0	68	15	0	83	170
12:00 PM	7	0	4	0	11	3	22	0	0	25	0	0	0	0	0	0	25	2	0	27	63
12:15 PM	4	0	1	0	5	4	18	0	0	22	0	0	0	0	0	0	20	7	0	27	54
12:30 PM	2	0	3	0	5	1	17	0	0	18	0	0	0	0	0	0	19	4	0	23	46
12:45 PM	1	0	3	0	4	2	27	0	0	29	0	0	0	0	0	0	22	4	0	26	59
Total	14	0	11	0	25	10	84	0	0	94	0	0	0	0	0	0	86	17	0	103	222
01:00 PM	5	0	2	1	8	3	21	0	0	24	0	0	0	0	0	0	19	1	0	20	52
01:15 PM	0	0	0	0	0	3	30	0	0	33	0	0	0	0	0	0	20	1	0	21	54
01:30 PM	1	0	3	0	4	1	21	0	0	22	0	0	0	0	0	0	24	3	0	27	53
01:45 PM	1	0	1	0	2	2	20	0	0	22	0	0	0	0	0	0	20	1	0	21	45
Total	7	0	6	1	14	9	92	0	0	101	0	0	0	0	0	0	83	6	0	89	204
02:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

TMS Engineers, Inc.

2112 Case Parkway S.
Unit #7
Twinsburg, Ohio, 44087
Ph: (330) 686-6402 Fax: (330) 686-6417

File Name : TC 5 Hollstein Dr and Cooper Foster Park RD 032420 DJS
Site Code : 00000005
Start Date : 3/24/2020

Groups Printed- Cars - Trucks - Buses

	HOLLSTEIN DRIVE From North					COOPER FOSTER PARK ROAD From East					From South					COOPER FOSTER PARK ROAD From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
03:00 PM	5	0	2	0	7	5	20	0	0	25	0	0	0	0	0	0	22	3	0	25	57
03:15 PM	4	0	1	0	5	3	17	0	0	20	0	0	0	0	0	0	41	3	0	44	69
03:30 PM	5	0	1	0	6	0	27	0	0	27	0	0	0	0	0	0	21	2	0	23	56
03:45 PM	2	0	2	0	4	0	23	0	0	23	0	0	0	0	0	0	18	2	0	20	47
Total	16	0	6	0	22	8	87	0	0	95	0	0	0	0	0	0	102	10	0	112	229
04:00 PM	3	0	4	0	7	1	17	0	0	18	0	0	0	0	0	0	29	1	0	30	55
04:15 PM	4	0	2	0	6	0	15	0	0	15	0	0	0	0	0	0	21	2	0	23	44
04:30 PM	6	0	5	0	11	2	17	0	0	19	0	0	0	0	0	0	40	2	0	42	72
04:45 PM	4	0	1	0	5	3	28	0	0	31	0	0	0	0	0	0	34	1	0	35	71
Total	17	0	12	0	29	6	77	0	0	83	0	0	0	0	0	0	124	6	0	130	242
05:00 PM	2	0	1	0	3	0	17	0	0	17	0	0	0	0	0	0	32	1	0	33	53
05:15 PM	6	0	3	0	9	0	21	0	0	21	0	0	0	0	0	0	26	0	0	26	56
05:30 PM	2	0	2	0	4	0	16	0	0	16	0	0	0	0	0	0	21	0	0	21	41
05:45 PM	3	0	1	0	4	0	24	0	0	24	0	0	0	0	0	0	27	0	0	27	55
Total	13	0	7	0	20	0	78	0	0	78	0	0	0	0	0	0	106	1	0	107	205
Grand Total	103	0	63	1	167	70	656	1	0	727	0	0	0	0	0	0	701	106	0	807	1701
Apprch %	61.7	0	37.7	0.6		9.6	90.2	0.1	0		0	0	0	0		0	86.9	13.1	0		
Total %	6.1	0	3.7	0.1	9.8	4.1	38.6	0.1	0	42.7	0	0	0	0	0	0	41.2	6.2	0	47.4	
Cars	95	0	60	0	155	64	645	1	0	710	0	0	0	0	0	0	691	102	0	793	1658
% Cars	92.2	0	95.2	0	92.8	91.4	98.3	100	0	97.7	0	0	0	0	0	0	98.6	96.2	0	98.3	97.5
Trucks	8	0	3	1	12	6	11	0	0	17	0	0	0	0	0	0	10	4	0	14	43
% Trucks	7.8	0	4.8	100	7.2	8.6	1.7	0	0	2.3	0	0	0	0	0	0	1.4	3.8	0	1.7	2.5
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

TMS Engineers, Inc.

2112 Case Parkway S.
Unit #7
Twinsburg, Ohio, 44087
Ph: (330) 686-6402 Fax: (330) 686-6417

	HOLLSTEIN DRIVE From North					COOPER FOSTER PARK ROAD From East					From South					COOPER FOSTER PARK ROAD From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:15 AM to 08:00 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:15 AM																					
07:15 AM	**1**	**0**	**0**	**0**	**1**	4	17	0	0	21	0	0	0	0	0	0	11	3	0	14	36
07:30 AM	0	0	1	0	1	4	17	0	0	21	0	0	0	0	0	0	7	6	0	13	35
07:45 AM	2	0	0	0	2	3	**20**	0	0	**23**	0	0	0	0	0	0	8	**11**	0	**19**	**44**
08:00 AM	2	0	1	0	**3**	0	9	0	0	9	0	0	0	0	0	0	6	2	0	8	20
Total Volume	5	0	2	0	7	11	63	0	0	74	0	0	0	0	0	0	32	22	0	54	135
% App. Total	71.4	0	28.6	0		14.9	85.1	0	0		0	0	0	0		0	59.3	40.7	0		
PHF	.625	.000	.500	.000	.583	.688	.788	.000	.000	.804	.000	.000	.000	.000	.000	.000	.727	.500	.000	.711	.767
Cars	5	0	1	0	6	10	63	0	0	73	0	0	0	0	0	0	31	22	0	53	132
% Cars	100	0	50.0	0	85.7	90.9	100	0	0	98.6	0	0	0	0	0	0	96.9	100	0	98.1	97.8
Trucks	0	0	1	0	1	1	0	0	0	1	0	0	0	0	0	0	1	0	0	1	3
% Trucks	0	0	50.0	0	14.3	9.1	0	0	0	1.4	0	0	0	0	0	0	3.1	0	0	1.9	2.2
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Peak Hour Analysis From 02:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:30 PM																					
04:30 PM	**6**	0	**5**	0	**11**	2	17	0	0	19	0	0	0	0	0	0	**40**	**2**	0	**42**	**72**
04:45 PM	4	0	1	0	5	**3**	**28**	0	0	**31**	0	0	0	0	0	0	34	1	0	35	71
05:00 PM	2	0	1	0	3	0	17	0	0	17	0	0	0	0	0	0	32	1	0	33	53
05:15 PM	6	0	3	0	9	0	21	0	0	21	0	0	0	0	0	0	26	0	0	26	56
Total Volume	18	0	10	0	28	5	83	0	0	88	0	0	0	0	0	0	132	4	0	136	252
% App. Total	64.3	0	35.7	0		5.7	94.3	0	0		0	0	0	0		0	97.1	2.9	0		
PHF	.750	.000	.500	.000	.636	.417	.741	.000	.000	.710	.000	.000	.000	.000	.000	.000	.825	.500	.000	.810	.875
Cars	18	0	10	0	28	5	82	0	0	87	0	0	0	0	0	0	132	4	0	136	251
% Cars	100	0	100	0	100	100	98.8	0	0	98.9	0	0	0	0	0	0	100	100	0	100	99.6
Trucks	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
% Trucks	0	0	0	0	0	0	1.2	0	0	1.1	0	0	0	0	0	0	0	0	0	0	0.4
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

VEHICULAR TRAFFIC COUNT SUMMARY

Municipality: Amherst **At Intersection of:** Cooper Foster Park **and** North Main Street

Date: 2/19/2019 **Day:** Tue. **Comments:** **Project:** 19-031

Weather: Rain **Recorder(s):** SLC **Data entry by:** JJO **Date entered:** Feb. 20, 2019 Cooper Foster Park & N.Main St 02191

TIME BEGINS	N.Main St. FROM NORTH						N.Main St. FROM SOUTH						TOTAL NORTH SOUTH	Cooper Foster Park FROM EAST						Cooper Foster Park FROM WEST						TOTAL EAST WEST	TOTAL ALL DIREC.	PEAK HOUR FACTOR			
	Left	Thru	Right	Total	Trk	Bus	Left	Thru	Right	Total	Trk	Bus		Left	Thru	Right	Total	Trk	Bus	Left	Thru	Right	Total	Trk	Bus			North	South	East	West
06:00																														
07:00	157	199	31	387	1	0	44	154	54	252	0	8	639	36	59	172	267	2	3	27	60	54	141	0	0	408	1047	0.800	0.759	0.845	0.750
08:00	124	100	43	267	7	4	28	112	41	181	4	1	448	15	71	162	248	2	5	21	56	32	109	1	3	357	805	0.914	0.754	0.939	0.908
09:00	138	66	50	254	0	6	12	67	29	108	2	1	362	24	92	153	269	3	2	37	82	8	127	1	2	396	758	0.948	0.771	0.830	0.722
10:00																														
11:00	148	93	31	272	4	1	20	55	29	104	2	1	376	28	74	124	226	5	0	42	115	19	176	0	0	402	778	0.872	0.788	0.974	0.846
12:00	154	73	51	278	4	0	21	95	40	156	4	0	434	22	74	152	248	3	3	28	103	12	143	1	1	391	825	0.858	0.975	0.849	0.851
1:00	162	102	44	308	5	4	24	84	36	144	3	0	452	56	75	147	278	2	1	41	98	17	156	1	0	434	886	0.963	0.837	0.818	0.907
2:00																														
3:00	240	133	48	421	3	6	49	153	49	251	2	11	672	30	96	143	269	3	6	55	122	35	212	0	4	481	1153	0.863	0.884	0.947	0.883
4:00	208	149	55	412	6	3	21	103	46	170	1	2	582	64	85	140	289	2	2	52	114	31	197	0	4	486	1068	0.896	0.924	0.850	0.821
5:00	187	128	37	352	2	1	31	127	50	208	1	0	560	58	75	156	289	1	1	58	109	23	190	0	0	479	1039	0.807	0.867	0.803	0.931
6:00																														
7:00																														
8:00																														
9:00																														
TOTALS	1518	1043	390	2951	32	25	250	950	374	1574	19	24	4525	333	701	1349	2383	23	23	361	859	231	1451	4	14	3834	8359				
ADT	2594	1782	666	5043	1.9%		427	1623	639	2690	2.7%		7732	527	1110	2137	3774	1.9%		572	1361	366	2298	1.2%		6072	13805				

N Leg Hourly Factor:	1.68	E Leg Hourly Factor:	1.64
S Leg Hourly Factor:	1.68	W leg Hourly Factor:	1.64
N Leg Monthly Factor:	1.02	E Leg Monthly Factor:	0.96
S Leg Monthly Factor:	1.02	W Leg Monthly Factor:	0.96

N Leg Combined Factor:	1.71	E Leg Combined Factor:	1.58
S Leg Combined Factor:	1.71	W Leg Combined Factor:	1.58

TMS ENGINEERS, INC.
2112 Case Parkway South #7
Twinsburg, Ohio 44087
(330) 686-6402 FAX: (330) 686-6417

Figure #:

Page #:

TMS Engineers, Inc.

2112 Case Parkway S.
Unit #7
Twinsburg, Ohio, 44087
Ph: (330) 686-6402 Fax: (330) 686-6417

City: Amherst
Intersection: Cooper Foster Park & N. Main St
Counter: SLC
Day of the Week: Tuesday

File Name : Amherst Traffic Count #1 N Main St & Cooper Foster Park Rd 021919 Sue
Site Code : 00000000
Start Date : 2/19/2019
Page No : 1

Groups Printed- Cars - Trucks - Buses

	NORTH MAIN STREET From North					COOPER FOSTER PARK From East					NORTH MAIN STREET From South					COOPER FOSTER PARK From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
07:00 AM	6	83	32	0	121	26	12	15	0	53	10	26	10	0	46	24	6	6	0	36	256
07:15 AM	7	66	34	0	107	37	21	7	0	65	16	53	14	0	83	20	20	7	0	47	302
07:30 AM	8	38	52	0	98	47	15	8	0	70	19	41	11	0	71	6	19	5	0	30	269
07:45 AM	10	12	39	0	61	62	11	6	0	79	9	34	9	0	52	4	15	9	0	28	220
Total	31	199	157	0	387	172	59	36	0	267	54	154	44	0	252	54	60	27	0	141	1047
08:00 AM	9	29	35	0	73	50	12	3	0	65	7	25	3	0	35	14	14	2	0	30	203
08:15 AM	11	23	22	0	56	42	20	4	0	66	15	37	8	0	60	7	16	4	0	27	209
08:30 AM	15	22	32	0	69	41	12	5	0	58	9	22	11	0	42	4	14	6	0	24	193
08:45 AM	8	26	35	0	69	29	27	3	0	59	10	28	6	0	44	7	12	9	0	28	200
Total	43	100	124	0	267	162	71	15	0	248	41	112	28	0	181	32	56	21	0	109	805
09:00 AM	6	13	36	0	55	32	13	11	0	56	8	23	3	0	34	0	23	7	0	30	175
09:15 AM	12	18	37	0	67	40	35	6	0	81	5	7	3	0	15	4	27	13	0	44	207
09:30 AM	16	15	35	0	66	48	15	1	0	64	8	15	1	0	24	3	17	7	0	27	181
09:45 AM	16	20	30	0	66	33	29	6	0	68	8	22	5	0	35	1	15	10	0	26	195
Total	50	66	138	0	254	153	92	24	0	269	29	67	12	0	108	8	82	37	0	127	758
10:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

TMS Engineers, Inc.

2112 Case Parkway S.
Unit #7
Twinsburg, Ohio, 44087
Ph: (330) 686-6402 Fax: (330) 686-6417

City: Amherst
Intersection: Cooper Foster Park & N. Main St
Counter: SLC
Day of the Week: Tuesday

File Name : Amherst Traffic Count #1 N Main St & Cooper Foster Park Rd 021919 Sue
Site Code : 00000000
Start Date : 2/19/2019

Groups Printed- Cars - Trucks - Buses

	NORTH MAIN STREET From North					COOPER FOSTER PARK From East					NORTH MAIN STREET From South					COOPER FOSTER PARK From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
11:00 AM	8	21	34	0	63	28	22	8	0	58	6	16	3	0	25	6	32	9	0	47	193
11:15 AM	10	25	43	0	78	30	19	6	0	55	12	14	7	0	33	6	28	12	0	46	212
11:30 AM	4	28	43	0	75	29	20	7	0	56	5	16	6	0	27	4	33	15	0	52	210
11:45 AM	9	19	28	0	56	37	13	7	0	57	6	9	4	0	19	3	22	6	0	31	163
Total	31	93	148	0	272	124	74	28	0	226	29	55	20	0	104	19	115	42	0	176	778
12:00 PM	10	20	43	0	73	30	18	5	0	53	7	27	6	0	40	2	32	8	0	42	208
12:15 PM	15	15	31	0	61	34	19	3	0	56	9	25	5	0	39	5	30	7	0	42	198
12:30 PM	16	9	38	0	63	44	20	9	0	73	9	20	8	0	37	4	19	9	0	32	205
12:45 PM	10	29	42	0	81	44	17	5	0	66	15	23	2	0	40	1	22	4	0	27	214
Total	51	73	154	0	278	152	74	22	0	248	40	95	21	0	156	12	103	28	0	143	825
01:00 PM	16	24	35	0	75	36	23	11	0	70	8	30	5	0	43	5	17	10	0	32	220
01:15 PM	10	25	45	0	80	30	15	14	0	59	11	18	6	0	35	4	26	11	0	41	215
01:30 PM	8	29	41	0	78	30	21	13	0	64	11	17	6	0	34	5	26	12	0	43	219
01:45 PM	10	24	41	0	75	51	16	18	0	85	6	19	7	0	32	3	29	8	0	40	232
Total	44	102	162	0	308	147	75	56	0	278	36	84	24	0	144	17	98	41	0	156	886
02:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

TMS Engineers, Inc.

2112 Case Parkway S.
Unit #7
Twinsburg, Ohio, 44087
Ph: (330) 686-6402 Fax: (330) 686-6417

City: Amherst
Intersection: Cooper Foster Park & N. Main St
Counter: SLC
Day of the Week: Tuesday

File Name : Amherst Traffic Count #1 N Main St & Cooper Foster Park Rd 021919 Sue
Site Code : 00000000
Start Date : 2/19/2019

Groups Printed- Cars - Trucks - Buses

	NORTH MAIN STREET From North					COOPER FOSTER PARK From East					NORTH MAIN STREET From South					COOPER FOSTER PARK From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
03:00 PM	10	41	71	0	122	35	28	5	0	68	15	47	9	0	71	8	24	10	0	42	303
03:15 PM	13	23	62	0	98	35	22	10	0	67	12	34	10	0	56	10	35	15	0	60	281
03:30 PM	10	29	66	0	105	40	23	8	0	71	15	40	15	0	70	11	27	14	0	52	298
03:45 PM	15	40	41	0	96	33	23	7	0	63	7	32	15	0	54	6	36	16	0	58	271
Total	48	133	240	0	421	143	96	30	0	269	49	153	49	0	251	35	122	55	0	212	1153
04:00 PM	8	37	48	0	93	42	20	23	0	85	12	31	2	0	45	6	35	12	0	53	276
04:15 PM	11	29	51	0	91	37	16	16	0	69	10	26	5	0	41	4	29	10	0	43	244
04:30 PM	13	38	64	0	115	20	22	11	0	53	7	21	10	0	38	10	22	9	0	41	247
04:45 PM	23	45	45	0	113	41	27	14	0	82	17	25	4	0	46	11	28	21	0	60	301
Total	55	149	208	0	412	140	85	64	0	289	46	103	21	0	170	31	114	52	0	197	1068
05:00 PM	11	31	67	0	109	50	23	17	0	90	15	35	10	0	60	5	23	22	0	50	309
05:15 PM	8	29	39	0	76	42	18	15	0	75	15	33	3	0	51	8	27	16	0	51	253
05:30 PM	12	30	43	0	85	36	19	13	0	68	11	29	10	0	50	4	27	11	0	42	245
05:45 PM	6	38	38	0	82	28	15	13	0	56	9	30	8	0	47	6	32	9	0	47	232
Total	37	128	187	0	352	156	75	58	0	289	50	127	31	0	208	23	109	58	0	190	1039
Grand Total	390	1043	1518	0	2951	1349	701	333	0	2383	374	950	250	0	1574	231	859	361	0	1451	8359
Apprch %	13.2	35.3	51.4	0		56.6	29.4	14	0		23.8	60.4	15.9	0		15.9	59.2	24.9	0		
Total %	4.7	12.5	18.2	0	35.3	16.1	8.4	4	0	28.5	4.5	11.4	3	0	18.8	2.8	10.3	4.3	0	17.4	
Cars	385	1023	1486	0	2894	1317	694	326	0	2337	370	924	237	0	1531	222	852	359	0	1433	8195
% Cars	98.7	98.1	97.9	0	98.1	97.6	99	97.9	0	98.1	98.9	97.3	94.8	0	97.3	96.1	99.2	99.4	0	98.8	98
Trucks	3	8	21	0	32	18	4	1	0	23	3	12	4	0	19	2	1	1	0	4	78
% Trucks	0.8	0.8	1.4	0	1.1	1.3	0.6	0.3	0	1	0.8	1.3	1.6	0	1.2	0.9	0.1	0.3	0	0.3	0.9
Buses	2	12	11	0	25	14	3	6	0	23	1	14	9	0	24	7	6	1	0	14	86
% Buses	0.5	1.2	0.7	0	0.8	1	0.4	1.8	0	1	0.3	1.5	3.6	0	1.5	3	0.7	0.3	0	1	1

TMS Engineers, Inc.

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	NORTH MAIN STREET From North					COOPER FOSTER PARK From East					NORTH MAIN STREET From South					COOPER FOSTER PARK From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:15 AM to 08:00 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:15 AM																					
07:15 AM	7	**66**	34	0	**107**	37	**21**	7	0	65	16	**53**	**14**	0	**83**	**20**	**20**	7	0	**47**	**302**
07:30 AM	8	38	**52**	0	98	47	15	**8**	0	70	**19**	41	11	0	71	6	19	5	0	30	269
07:45 AM	**10**	12	39	0	61	**62**	11	6	0	**79**	9	34	9	0	52	4	15	**9**	0	28	220
08:00 AM	9	29	35	0	73	50	12	3	0	65	7	25	3	0	35	14	14	2	0	30	203
Total Volume	34	145	160	0	339	196	59	24	0	279	51	153	37	0	241	44	68	23	0	135	994
% App. Total	10	42.8	47.2	0		70.3	21.1	8.6	0		21.2	63.5	15.4	0		32.6	50.4	17	0		
PHF	.850	.549	.769	.000	.792	.790	.702	.750	.000	.883	.671	.722	.661	.000	.726	.550	.850	.639	.000	.718	.823
Cars	33	142	158	0	333	194	59	23	0	276	51	148	33	0	232	41	68	23	0	132	973
% Cars	97.1	97.9	98.8	0	98.2	99.0	100	95.8	0	98.9	100	96.7	89.2	0	96.3	93.2	100	100	0	97.8	97.9
Trucks	1	1	1	0	3	1	0	0	0	1	0	1	0	0	1	0	0	0	0	0	5
% Trucks	2.9	0.7	0.6	0	0.9	0.5	0	0	0	0.4	0	0.7	0	0	0.4	0	0	0	0	0	0.5
Buses	0	2	1	0	3	1	0	1	0	2	0	4	4	0	8	3	0	0	0	3	16
% Buses	0	1.4	0.6	0	0.9	0.5	0	4.2	0	0.7	0	2.6	10.8	0	3.3	6.8	0	0	0	2.2	1.6
Peak Hour Analysis From 04:30 PM to 05:15 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:30 PM																					
04:30 PM	13	38	64	0	**115**	20	22	11	0	53	7	21	**10**	0	38	10	22	9	0	41	247
04:45 PM	**23**	**45**	45	0	113	41	**27**	14	0	82	**17**	25	4	0	46	**11**	**28**	21	0	**60**	301
05:00 PM	11	31	**67**	0	109	**50**	23	**17**	0	**90**	15	**35**	10	0	**60**	5	23	**22**	0	50	**309**
05:15 PM	8	29	39	0	76	42	18	15	0	75	15	33	3	0	51	8	27	16	0	51	253
Total Volume	55	143	215	0	413	153	90	57	0	300	54	114	27	0	195	34	100	68	0	202	1110
% App. Total	13.3	34.6	52.1	0		51	30	19	0		27.7	58.5	13.8	0		16.8	49.5	33.7	0		
PHF	.598	.794	.802	.000	.898	.765	.833	.838	.000	.833	.794	.814	.675	.000	.813	.773	.893	.773	.000	.842	.898
Cars	55	142	214	0	411	152	90	57	0	299	54	113	27	0	194	34	100	68	0	202	1106
% Cars	100	99.3	99.5	0	99.5	99.3	100	100	0	99.7	100	99.1	100	0	99.5	100	100	100	0	100	99.6
Trucks	0	1	0	0	1	1	0	0	0	1	0	1	0	0	1	0	0	0	0	0	3
% Trucks	0	0.7	0	0	0.2	0.7	0	0	0	0.3	0	0.9	0	0	0.5	0	0	0	0	0	0.3
Buses	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
% Buses	0	0	0.5	0	0.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1

Appendix D
Crash Data Summaries

Oak Point Road & Buck Horn Boulevard

Crash Summary Sheet

Year	Total Crashes	Fatalities	Serious Injuries
2017	1	0	0
2018	4	0	0
2019	1	0	0
Grand Total	6	0	0

Total Crashes	Injury Level	
Crash Type	PDO/No Injury	Grand Total
Rear End	5	5
Angle	1	1
Grand Total	6	6

Oak Point Road & Buck Horn Boulevard

Crash Summary Sheet

Road Condition	Total Crashes	Fatalities	Serious Injuries
Dry	3	0	0
Ice	2	0	0
Snow	1	0	0
Grand Total	6	0	0

Hour of Day	Total Crashes
7	1
8	1
10	1
14	1
18	1
19	1
Grand Total	6

Month	Total Crashes
January	2
March	1
June	1
October	1
December	1
Grand Total	6

Weather	Total Crashes	Fatalities	Serious Injuries
Data Not Valid or Not Provided	6	0	0
Grand Total	6	0	0

Day in Week	Total Crashes
Sunday	1
Monday	2
Tuesday	1
Wednesday	1
Thursday	1
Grand Total	6

Crash Location	Total Crashes	Fatalities	Serious Injuries
Four-Way Intersection	5	0	0
Not An Intersection	1	0	0
Grand Total	6	0	0

Roadway Contour	Total Crashes	Fatalities	Serious Injuries
Straight Level	6	0	0
Grand Total	6	0	0

Oak Point Road & Cooper Foster Park Road

Crash Summary Sheet

Year	Total Crashes	Fatalities	Serious Injuries
2017	2	0	0
2018	4	0	0
2019	10	0	0
Grand Total	16	0	0

Total Crashes	Injury Level			
Crash Type	PDO/No Injury	Injury Possible	Minor Injury Su	Grand Total
Angle	2	1	1	4
Right Turn	4	0	0	4
Rear End	3	1	0	4
Left Turn	2	1	0	3
Sideswipe - Passing	0	1	0	1
Grand Total	11	4	1	16

Oak Point Road & Cooper Foster Park Road

Crash Summary Sheet

Road Condition	Total Crashes	Fatalities	Serious Injuries
Dry	13	0	0
Snow	2	0	0
Wet	1	0	0
Grand Total	16	0	0

Hour of Day	Total Crashes
7	1
8	1
9	1
11	1
12	1
13	1
14	1
15	3
16	1
17	1
18	1
20	1
22	2
Grand Total	16

Month	Total Crashes
February	1
April	2
May	1
June	3
July	4
September	1
October	1
November	2
December	1
Grand Total	16

Weather	Total Crashes	Fatalities	Serious Injuries
Data Not Valid or Not Provided	16	0	0
Grand Total	16	0	0

Day in Week	Total Crashes
Sunday	2
Monday	1
Tuesday	5
Wednesday	3
Thursday	2
Friday	1
Saturday	2
Grand Total	16

Crash Location	Total Crashes	Fatalities	Serious Injuries
Four-Way Intersection	11	0	0
Not An Intersection	5	0	0
Grand Total	16	0	0

Roadway Contour	Total Crashes	Fatalities	Serious Injuries
Curve Grade	1	0	0
Straight Grade	5	0	0
Straight Level	10	0	0
Grand Total	16	0	0

North Lake Street & State Route 2 Westbound Ramps

Crash Summary Sheet

Year	Total Crashes	Fatalities	Serious Injuries
2017	6	0	0
2018	10	0	0
2019	7	0	0
Grand Total	23	0	0

Total Crashes	Injury Level			
Crash Type	PDO/No Injury	Minor Injury Su	Injury Possible	Grand Total
Rear End	13	1	2	16
Angle	4	0	0	4
Right Turn	1	0	0	1
Left Turn	1	0	0	1
Pedalcycles	1	0	0	1
Grand Total	20	1	2	23

North Lake Street & State Route 2 Westbound Ramps

Crash Summary Sheet

Road Condition	Total Crashes	Fatalities	Serious Injuries
Dry	19	0	0
Snow	1	0	0
Wet	3	0	0
Grand Total	23	0	0

Hour of Day	Total Crashes
7	1
9	2
11	1
12	2
13	3
14	3
15	2
16	2
17	4
18	1
19	2
Grand Total	23

Month	Total Crashes
January	1
February	2
March	3
April	1
May	3
June	1
July	4
August	1
September	3
November	3
December	1
Grand Total	23

Weather	Total Crashes	Fatalities	Serious Injuries
Data Not Valid or Not Provided	23	0	0
Grand Total	23	0	0

Day in Week	Total Crashes
Sunday	2
Monday	3
Tuesday	4
Wednesday	2
Thursday	9
Friday	3
Grand Total	23

Crash Location	Total Crashes	Fatalities	Serious Injuries
Four-Way Intersection	5	0	0
Not An Intersection	8	0	0
T-Intersection	4	0	0
On Ramp	1	0	0
Off Ramp	5	0	0
Grand Total	23	0	0

Roadway Contour	Total Crashes	Fatalities	Serious Injuries
Straight Grade	8	0	0
Straight Level	15	0	0
Grand Total	23	0	0

North Lake Street & SR 2 Eastbound Ramps

Crash Summary Sheet

Year	Total Crashes	Fatalities	Serious Injuries
2017	3	0	0
2018	4	0	0
2019	2	0	1
Grand Total	9	0	1

Total Crashes	Injury Level			
Crash Type	PDO/No Injury	Minor Injury Su	Serious Injury S	Grand Total
Rear End	3	0	0	3
Angle	2	0	0	2
Sideswipe - Passing	0	1	0	1
Fixed Object	1	0	0	1
Other Non-Collision	0	0	1	1
Left Turn	1	0	0	1
Grand Total	7	1	1	9

North Lake Street & SR 2 Eastbound Ramps

Crash Summary Sheet

Road Condition	Total Crashes	Fatalities	Serious Injuries
Dry	7	0	1
Snow	1	0	0
Wet	1	0	0
Grand Total	9	0	1

Hour of Day	Total Crashes
1	1
2	1
7	2
10	1
11	1
13	1
16	2
Grand Total	9

Month	Total Crashes
January	2
February	3
April	1
May	1
September	1
December	1
Grand Total	9

Weather	Total Crashes	Fatalities	Serious Injuries
Data Not Valid or Not Provided	9	0	1
Grand Total	9	0	1

Day in Week	Total Crashes
Sunday	2
Wednesday	3
Thursday	1
Friday	2
Saturday	1
Grand Total	9

Crash Location	Total Crashes	Fatalities	Serious Injuries
Four-Way Intersection	2	0	0
Not An Intersection	4	0	0
T-Intersection	2	0	1
Off Ramp	1	0	0
Grand Total	9	0	1

Roadway Contour	Total Crashes	Fatalities	Serious Injuries
Straight Grade	6	0	1
Straight Level	3	0	0
Grand Total	9	0	1

Cooper Foster Park Road & North Main Street

Crash Summary Sheet

Year	Total Crashes	Fatalities	Serious Injuries
2017	6	0	0
2018	4	0	0
2019	4	0	0
Grand Total	14	0	0

Total Crashes	Injury Level		
Crash Type	PDO/No Injury	Injury Possible	Grand Total
Rear End	6	1	7
Angle	3	0	3
Left Turn	2	0	2
Right Turn	1	0	1
Head On	1	0	1
Grand Total	13	1	14

Cooper Foster Park Road & North Main Street

Crash Summary Sheet

Road Condition	Total Crashes	Fatalities	Serious Injuries
Dry	11	0	0
Snow	1	0	0
Wet	2	0	0
Grand Total	14	0	0

Hour of Day	Total Crashes
7	2
9	3
11	1
12	1
15	3
16	2
19	1
20	1
Grand Total	14

Month	Total Crashes
February	1
March	1
April	1
May	1
June	2
July	1
August	1
September	1
November	2
December	3
Grand Total	14

Weather	Total Crashes	Fatalities	Serious Injuries
Data Not Valid or Not Provided	14	0	0
Grand Total	14	0	0

Day in Week	Total Crashes
Sunday	2
Monday	2
Tuesday	3
Wednesday	1
Thursday	3
Friday	3
Grand Total	14

Crash Location	Total Crashes	Fatalities	Serious Injuries
Four-Way Intersection	9	0	0
Not An Intersection	5	0	0
Grand Total	14	0	0

Roadway Contour	Total Crashes	Fatalities	Serious Injuries
Curve Grade	1	0	0
Straight Grade	1	0	0
Straight Level	12	0	0
Grand Total	14	0	0

Appendix E
Crash Diagrams

OAK POINT DRIVE

10-28-19/D/Dry

01-29-17/O/Snow

01-09-18/D/Ice

PARK SQUARE DRIVE

03-08-18/D/Ice

BUCK HORN BOULEVARD

Legend:

Symbols	Types of Collisions
Other	Rear End
Backing Vehicle	Head On
Pedestrian	Side-Swipe Passing
Parked Vehicle	Side-Swipe Meeting
Fixed Object	Out-of-Control
Fatal Crash	Angle
Injury Crash	Angle
Signal	Left Turn
Street — Street Name	Right Turn
STOP — Stop Sign	Right Turn
Animal	

12-12-18/D/Dry

06-11-18/D/Dry

OAK POINT DRIVE

CRASH DIAGRAM

Oak Point Drive
&
Buck Horn Boulevard/Park Square Drive

Crashes By Year
2019: 1
2018: 4

OAK POINT ROAD

COOPER FOSTER PARK ROAD

COOPER FOSTER PARK ROAD

04-27-19/D/Dry

06-10-18/D/Dry

05-15-19/D/Dry

02-13-19/O/Dry

07-02-19/D/Dry

07-02-18/D/Dry

04-06-17/D/Wet

10-15-19/O/Dry

09-10-19/D/Dry

06-17-18/O/Dry

06-12-19/D/Dry

07-27-18/D/Dry

11-12-19/D/Snow

07-20-19/D/Dry

11-12-19/D/Snow

12-07-17/D/Dry

NORTH LAKE STREET

Legend:

Symbols	Types of Collisions
Other	Rear End
Backing Vehicle	Head On
Pedestrian	Side-Swipe Passing
Parked Vehicle	Side-Swipe Meeting
Fixed Object	Out-of-Control
Fatal Crash	Angle
Injury Crash	Angle
Signal	Left Turn
Street Name	Right Turn
Stop Sign	Right Turn
Animal	

CRASH DIAGRAM

Oak Point Drive/North Lake Street & Cooper Foster Park Road

Crashes By Year
2019: 10
2018: 4

NORTH LAKE STREET

SR 2 WB ENTRANCE RAMP

SR 2 WB EXIT RAMP

11-01-19/D/Dry

02-16-18/D/Dry

07-25-18/D/Dry

03-19-18/D/Dry

05-10-18/D/Dry

12-06-17/D/Dry

03-08-18/D/Wet

04-29-19/D/Wet

07-26-18/D/Dry

11-07-17/D/Dry

09-22-19/D/Dry

03-30-17/D/Wet

01-03-19/D/Dry

07-30-18/D/Dry

06-18-17/D/Dry

08-17-17/D/Dry

05-17-18/D/Dry

09-10-19/D/Dry

09-27-19/D/Dry

07-12-18/D/Dry

05-15-18/D/Dry

11-12-19/D/Snow

02-02-17/D/Dry

Legend:

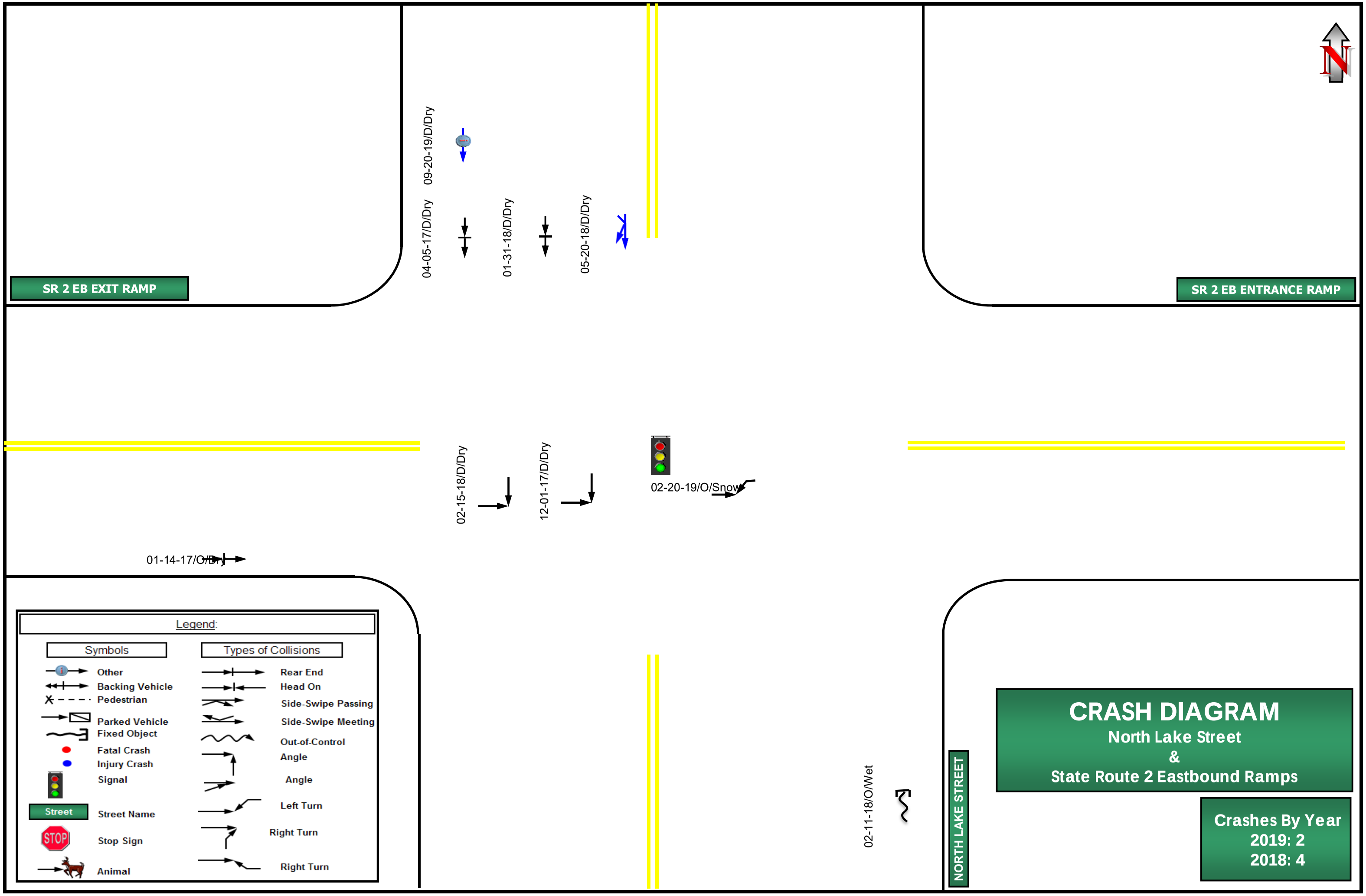
Symbols	Types of Collisions
Other	Rear End
Backing Vehicle	Head On
Pedestrian	Side-Swipe Passing
Parked Vehicle	Side-Swipe Meeting
Fixed Object	Out-of-Control
Fatal Crash	Angle
Injury Crash	Angle
Signal	Left Turn
Street Name	Right Turn
Stop Sign	Right Turn
Animal	

NORTH LAKE STREET

CRASH DIAGRAM

North Lake Street
&
State Route 2 Westbound Ramps

Crashes By Year
2019: 7
2018: 10


SR 2 EB EXIT RAMP
SR 2 EB ENTRANCE RAMP
09-20-19/D/Dry
04-05-17/D/Dry
01-31-18/D/Dry
05-20-18/D/Dry
02-15-18/D/Dry
12-01-17/D/Dry
02-20-19/O/Snow
01-14-17/O/Dry
02-11-18/O/Wet
Legend:
Symbols
Other
Backing Vehicle
Pedestrian
Parked Vehicle
Fixed Object
Fatal Crash
Injury Crash
Signal
Street
Street Name
STOP
Stop Sign
Animal
Types of Collisions
Rear End
Head On
Side-Swipe Passing
Side-Swipe Meeting
Out-of-Control
Angle
Angle
Left Turn
Right Turn
Right Turn
NORTH LAKE STREET
CRASH DIAGRAM
North Lake Street
&
State Route 2 Eastbound Ramps
Crashes By Year
2019: 2
2018: 4

NORTH MAIN STREET

COOPER FOSTER PARK ROAD

COOPER FOSTER PARK ROAD

11-21-19/D/Dry

12-21-18/O/Wet

06-30-17/D/Dry

08-28-19/O/Dry

04-02-19/D/Dry

12-24-17/O/Snow

12-20-18/D/Wet

03-12-17/D/Dry

06-14-18/D/Dry

11-27-17/D/Dry

02-20-17/D/Dry

09-27-19/D/Dry

05-09-17/D/Dry

07-03-18/D/Dry

Legend:

Symbols	Types of Collisions
Other	Rear End
Backing Vehicle	Head On
Pedestrian	Side-Swipe Passing
Parked Vehicle	Side-Swipe Meeting
Fixed Object	Out-of-Control
Fatal Crash	Angle
Injury Crash	Angle
Signal	Left Turn
Street Name	Right Turn
Stop Sign	Right Turn
Animal	

CRASH DIAGRAM

Oak Point Drive/North Lake Street & Cooper Foster Park Road

Crashes By Year
2019: 4
2018: 4

NORTH MAIN STREET

Appendix F
ODOT COVID-19 Calibration Guidelines & Calculations

Decreased traffic as a result of the COV19 pandemic requires additional consideration in the collection and processing of traffic counts for design traffic forecasts. The Office of Technical Services is continuously reporting the statewide decrease in traffic as registered by our permanent traffic recorders at:

http://www.dot.state.oh.us/Divisions/Planning/TechServ/Documents/Regional-Traffic-Analysis.pdf

Currently about a 45% decrease in traffic is occurring which has been relatively stable since March 24, 2020. However, the values reported here are averages based solely on the location of the permanent traffic recorders which are heavily biased towards freeways and therefore may not represent local conditions.

For establishing base line traffic conditions for forecasting projects the following procedure is therefore recommended. However, **this method is an expedient to keep projects moving, the preferred methodology would be to defer collecting new traffic counts for projects until traffic conditions return to normal**. Any forecast submitted for certification using this methodology must:

A. Contain count plates showing the prior existing counts, original raw counts and the factored values with factor stations and the new counts to which they applied clearly indicated.
B. Forecast plates must contain the following additional uncertainty note: "Counts collected during COVID19 Pandemic and factored per ODOT Modeling and Forecasting guidance". When traffic returns to normal any such project resubmitted for certification for whatever reason is likely to require all new traffic counts.

Step 1 Get Existing Counts

Utilize the ODOT Traffic Monitoring Management System at:

https://odot.ms2soft.com/tcds/tsearch.asp?loc=odot

to obtain as many prior existing counts as possible. ODOT coverage counts are conducted every 3 years, the latest count that is no more than 3 years old should be used, however, only counts conducted prior to March 15, 2020 should be included. Efforts should be made to include counts on the primary project routes even if those counts are outside of the project study area.

Step 2 Conduct New Counts

Conduct new counts as normal, both machine and turning movement. New machine counts must also be conducted at the locations obtained in step 1 to establish "factor stations". Counts should be conducted following all previously published guidance:

http://www.dot.state.oh.us/Divisions/Planning/SPR/ModelForecastingUnit/Documents/Traffic%20counts%20for%20traffic%20forecasts.pdf

Step 3 Create Project Specific Factors

In lieu of the normal seasonal adjustment factor process to develop AADT, the counts collected at the factor stations will be compared to the counts from step 1 to develop factors. Both daily (AADT) and peak hour factors will be calculated separately as it is anticipated that time of day patterns have been changed drastically (and thus the peak hour selected for analysis should be determined by the existing counts from step 1). Note, at the

daily level the raw new count is compared to the seasonally adjusted prior count, thus the factor developed is a replacement for the seasonal adjustment factoring process. If other project counts are conducted on different days from the factor stations, additional seasonal factors could be applied to reconcile to the factor day, however, so long as all project counts are conducted on Monday-Thursday within a month of one another this should be unnecessary. This does not replace or change other processes such as the application of design hour volume factors.

Step 4 Apply Factors

The factors from Step 3 will be applied to the other counts collected in Step 2. The analyst needs to determine which factors to apply to each count. Generally, factors should be selected from the same road as close to the subject count as possible. If this isn't possible, a factor station with similar characteristics (functional class, development density, lanes, speed limit, access type etc.) and geographic proximity should be chosen. Average factors from multiple locations might also be used.

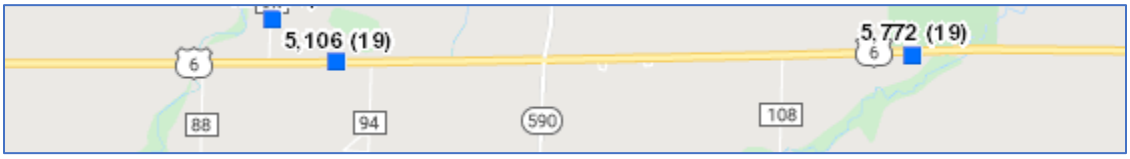
Step 5 Additional Turn Movement Count Considerations

As ODOT's Traffic Monitoring Management System does not contain extensive turning movement counts and turning movement counts aren't conducted for an entire day there are additional considerations. If a count does exist in TMC (the turning movement portion of TMMS) and it is within 3 years old it can be used in lieu of a new count. A new count could also be conducted for the purpose of creating factors from this count in Step 2, however, since TM counts are not done for the full day, this would only result in peak hour factors which would thus require alternate factor station locations for developing the AADT factors. Therefore, in general, factor station locations are recommended for machine count locations only.

In addition, it is possible that the turning movement proportions have been skewed as a result of the traffic decrease. Therefore, for important intersections, it is recommended that StreetLight Data be queried at the intersection using average week day for one full month of weekdays. Both a pre and post COVID19 month should be queried. The pre-C month should either be February 2020 or April 2019. The former should be used if the analyst believes changing development patterns are most important while the latter is used if the analyst believes seasonal effects are most important. The post-C month will be April 2020 once this is available from StreetLight. As additional months of StreetLight data become available in 2020, the latest available will be used in place of April (while February 2020 will remain the same for the option 1 pre-C month). Until April 2020 StreetLight data is available, the pre-C StreetLight data can be compared directly to the turning movement counts (this will involve a high degree of judgement since differences could be due to the different data sources, COV19 changes or changes in development patterns). The comparisons should be made in terms of the turning movement percentages, not absolute volume. If the StreetLight comparisons indicate the turn movement percentages have changed by more than 10 percentage points, the turn movement count percentages can be adjusted to reflect this. Any such adjustment must be clearly indicated with the submitted count information.

Note: Check back to the web site for any updates.

Simple Corridor Project Factor Example *(Blue Dots are TMMS- MS2 Count Locations)*



Step 1: Get the most recent hourly, 24-hour count.

Use TMMS (https://odot.ms2soft.com/tcds/tsearch.asp?loc=Odot&mod=) to obtain "Old" pre-COVID date count.

Use the most recent 24 hour-hourly count for AADT, AM.PM

AADT

Year	AADT	DHV-30	K %	D %	PA	BC	Src
2019	5,106[3]		8	53	3,842 (75%)	1,264 (25%)	Grown from 2018
2018	5,050	407	8	53	3,800 (75%)	1,250 (25%)	
2017	6,234[3]		9	52	4,706 (75%)	1,530 (25%)	Grown from 2016
2016	6,029[3]		9	52	4,551 (75%)	1,477 (24%)	Grown from 2015

Note:
We cannot use 2019 AADT because it is estimated from 2018. There is no hourly data.

Most Recent Hourly Count Summary from MS2-TMMS

21:00-22:00	24	26	29	21	100
22:00-23:00	19	20	20	19	78
23:00-24:00	15	14	20	9	58
Total					5,216
AADT					5,050
AM Peak					07:00-08:00 407
PM Peak					15:15-16:15 416

Note:
This example assumed the entire corridor peaks at 3:15-4:15 PM. This may not be the case. Look at all the counts in the corridor to establish the peak that will be used.

Step 2: Get the new count

Note: The new count is taken at the same location as Location ID: 472 as a 24-hour count. (probably tube count)

NEW Raw Count 4/15/2020 (COVID Best)			
	EB	WB	Tot
7-8 AM	101	91	192
3:15-4 :15 PM	106	144	250
24 Hrs			2190

Step 3: Calculate factors: (Pre-COVID count) / (new count)

5050 / 2190 =	2.306	AADT COVID FACTOR
407 / 192 =	2.120	AM COVID FACTOR
416 / 250 =	1.664	PM COVID FACTOR

Repeat this calculation for as many MS2 counts are in the project area within the same year and average them. In this example, the two on US 6 shown may be enough.

COVID FACTOR CALIBRATIONS
STATE ROUTE 2 INTERCHANGE

	2017 DATA	2020 DATA	COVID FACTOR
WB EXIT			
ADT	5239	4227	1.2394
7AM	**266**	**218**	**1.2202**
4PM	599	452	1.3252
430 PM	**584**	**489**	**1.1933**
5PM	568	469	1.2111
WB ENTRANCE			
ADT	2173	1628	1.3348
7AM	**139**	**97**	**1.4330**
4PM	226	183	1.2350
430 PM	**224**	**176**	**1.2727**
5PM	222	146	1.5205
EB EXIT			
ADT	2110	1413	1.4933
7AM	**132**	**105**	**1.2571**
4PM	212	115	1.8435
430 PM	**216**	**143**	**1.5070**
5PM	219	139	1.5755
EB ENTRANCE			
ADT	5357	4100	1.3066
7AM	**538**	**354**	**1.5198**
4PM	433	379	1.1425
430 PM	**448**	**373**	**1.1997**
5PM	462	298	1.5503
		AM AVG	**1.2932**
		PM AVG	**1.3485**

WORKSHEET FOR NO BUILD VEHICULAR TRAFFIC COUNT CALCULATIONS

Oak Point & Buck Horn 032420

			Oak Point Road FROM NORTH						Oak Point Road FROM SOUTH						TOTAL NORTH SOUTH	Park Square Drive FROM EAST						Buck Horn Boulevard FROM WEST						TOTAL EAST WEST	TOTAL ALL DIREC.
			Left	Thru	Right	Total	Trk	Bus	Left	Thru	Right	Total	Trk	Bus		Left	Thru	Right	Total	Trk	Bus	Left	Thru	Right	Total	Trk	Bus		
AM PEAK	2020	Raw	21	189	17	227			16	124	16	156			383	5	0	2	7			16	3	25	44			51	434
	COVID	Factor	1.358	1.358	1.358				1.358	1.358	1.358					1.358	1.358	1.358				1.358	1.358	1.358					
	DHV	Factor	1.158	1.158	1.158				1.158	1.158	1.158					1.158	1.158	1.158				1.158	1.158	1.158					
	2020	No Build	33	297	27	357			25	195	25	245			602	8	0	3	11			25	5	39	69			80	682
	Growth	Factor	0.007	0.007	0.007				0.007	0.007	0.007					0.007	0.007	0.007				0.007	0.007	0.007					
	2022	Raw +Growth+DHV	33	301	27	362			26	198	26	249			610	8	0	3	11			26	5	40	70			81	692
	Opening Year	Round	30	300	30	360			30	200	30	260			620	10	0	0	10			30	0	40	70			80	700
	2042	Raw +Growth+DHV	38	343	31	412			29	225	29	283			696	9	0	4	13			29	5	45	80			93	788
	Design Year	Round	40	340	30	410			30	230	30	290			700	10	0	0	10			30	10	50	90			100	800
PM PEAK	2020	Raw	6	247	60	313			70	224	7	301			614	39	5	17	61			66	3	32	101			162	776
	COVID	Factor	1.293	1.293	1.293				1.293	1.293	1.293					1.293	1.293	1.293				1.293	1.293	1.293					
	DHV	Factor	1.158	1.158	1.158				1.158	1.158	1.158					1.158	1.158	1.158				1.158	1.158	1.158					
	2020	No Build	9	370	90	469			105	335	10	451			919	58	7	25	91			99	4	48	151			243	1162
	Growth	Factor	0.014	0.014	0.014				0.014	0.014	0.014					0.014	0.014	0.014				0.014	0.014	0.014					
	2022	Raw +Growth+DHV	9	380	92	482			108	345	11	463			945	60	8	26	94			102	5	49	155			249	1194
	Opening Year	Round	10	380	90	480			110	340	10	460			940	60	10	30	100			100	0	50	150			250	1190
	2042	Raw +Growth+DHV	12	482	117	611			137	437	14	588			1199	76	10	33	119			129	6	62	197			316	1515
	Design Year	Round	10	480	120	610			140	440	10	590			1200	80	10	30	120			130	10	60	200			320	1520

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2112 Case Parkway S.
Unit #7
Twinsburg, Ohio 44087

WORKSHEET FOR NO BUILD VEHICULAR TRAFFIC COUNT CALCULATIONS

Oak Point & Cooper Foster 031920

			Oak Point Road FROM NORTH						Oak Point Road FROM SOUTH						TOTAL NORTH SOUTH	Cooper Foster Park Road FROM EAST						Cooper Foster Park Road FROM WEST						TOTAL EAST WEST	TOTAL ALL DIREC.
			Left	Thru	Right	Total	Trk	Bus	Left	Thru	Right	Total	Trk	Bus		Left	Thru	Right	Total	Trk	Bus	Left	Thru	Right	Total	Trk	Bus		
AM PEAK	2020	Raw	29	169	21	219			92	129	201	422			641	52	20	19	91			8	16	82	106			197	838
	COVID	Factor	1.358	1.358	1.358				1.358	1.358	1.358					1.358	1.358	1.358				1.358	1.358	1.358					
	DHV	Factor	1.135	1.135	1.135				1.135	1.135	1.135					1.135	1.135	1.135				1.135	1.135	1.135					
	2020	No Build	45	260	32	337			142	199	310	650			988	80	31	29	140			12	25	126	163			304	1291
	Growth	Factor	0.007	0.007	0.007				0.007	0.007	0.007					0.007	0.007	0.007				0.007	0.007	0.007					
	2022	Raw +Growth+DHV	45	264	33	342			144	202	314	659			1002	81	31	30	142			12	25	128	166			308	1309
	Opening Year	Round	50	260	30	340			140	200	310	650			990	80	30	30	140			10	20	130	160			300	1290
	2042	Raw +Growth+DHV	52	301	37	390			164	230	358	752			1142	93	36	34	162			14	28	146	189			351	1492
	Design Year	Round	50	300	40	390			160	230	360	750			1140	90	40	30	160			10	30	150	190			350	1490
PM PEAK	2020	Raw	37	248	33	318			229	266	69	564			882	110	57	36	203			39	56	246	341			544	1426
	COVID	Factor	1.293	1.293	1.293				1.293	1.293	1.293					1.293	1.293	1.293				1.293	1.293	1.293					
	DHV	Factor	1.135	1.135	1.135				1.135	1.135	1.135					1.135	1.135	1.135				1.135	1.135	1.135					
	2020	No Build	54	364	48	467			336	390	101	828			1294	161	84	53	298			57	82	361	500			798	2093
	Growth	Factor	0.014	0.014	0.014				0.014	0.014	0.014					0.014	0.014	0.014				0.014	0.014	0.014					
	2022	Raw +Growth+DHV	56	374	50	480			345	401	104	851			1330	166	86	54	306			59	84	371	514			820	2151
	Opening Year	Round	60	370	50	480			350	400	100	850			1330	170	90	50	310			60	80	370	510			820	2150
	2042	Raw +Growth+DHV	71	475	63	609			438	509	132	1080			1688	211	109	69	389			75	107	471	653			1041	2730
	Design Year	Round	70	470	60	600			440	510	130	1080			1680	210	110	70	390			70	110	470	650			1040	2720

TMS Engineers, Inc.
2112 Case Parkway S.
Unit #7
Twinsburg, Ohio 44087

WORKSHEET FOR NO BUILD VEHICULAR TRAFFIC COUNT CALCULATIONS

Oak Point & SR2WB 031920

			North Lake Street FROM NORTH						North Lake Street FROM SOUTH						TOTAL NORTH SOUTH	SR 2 WB Exit Ramp FROM EAST						SR 2 WB Entrance Ramp FROM WEST						TOTAL EAST WEST	TOTAL ALL DIREC.
			Left	Thru	Right	Total	Trk	Bus	Left	Thru	Right	Total	Trk	Bus		Left	Thru	Right	Total	Trk	Bus	Left	Thru	Right	Total	Trk	Bus		
AM PEAK	2020	Raw	0	228	75	303			30	216	0	246			549	45	0	206	251			0	0	0	0			251	800
	COVID	Factor	1.358	1.358	1.358				1.358	1.358	1.358					1.358	1.358	1.358				1.358	1.358	1.358					
	DHV	Factor	1.135	1.135	1.135				1.135	1.135	1.135					1.105	1.105	1.105				1.105	1.105	1.105					
	2020	No Build	0	351	116	467			46	333	0	379			846	67	0	309	376			0	0	0	0			376	1222
	Growth	Factor	0.007	0.007	0.007				0.007	0.007	0.007					0.007	0.007	0.007				0.007	0.007	0.007					
	2022	Raw +Growth+DHV	0	356	117	473			47	337	0	384			858	68	0	313	382			0	0	0	0			382	1240
	Opening Year	Round	0	360	120	480			50	340	0	390			870	70	0	310	380			0	0	0	0			380	1250
	2042	Raw +Growth+DHV	0	406	134	540			53	385	0	438			978	78	0	357	435			0	0	0	0			435	1413
	Design Year	Round	0	410	130	540			50	380	0	430			970	80	0	360	440			0	0	0	0			440	1410
PM PEAK	2020	Raw	0	469	135	604			41	278	0	319			923	203	0	286	489			0	0	0	0			489	1412
	COVID	Factor	1.293	1.293	1.293				1.293	1.293	1.293					1.293	1.293	1.293				1.293	1.293	1.293					
	DHV	Factor	1.135	1.135	1.135				1.135	1.135	1.135					1.105	1.105	1.105				1.105	1.105	1.105					
	2020	No Build	0	688	198	886			60	408	0	468			1355	290	0	409	698			0	0	0	0			698	2053
	Growth	Factor	0.014	0.014	0.014				0.014	0.014	0.014					0.014	0.014	0.014				0.014	0.014	0.014					
	2022	Raw +Growth+DHV	0	707	204	911			62	419	0	481			1392	298	0	420	718			0	0	0	0			718	2110
	Opening Year	Round	0	710	200	910			60	420	0	480			1390	300	0	420	720			0	0	0	0			720	2110
	2042	Raw +Growth+DHV	0	898	258	1156			78	532	0	611			1767	378	0	533	911			0	0	0	0			911	2678
	Design Year	Round	0	900	260	1160			80	530	0	610			1770	380	0	530	910			0	0	0	0			910	2680

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2112 Case Parkway S.
Unit #7
Twinsburg, Ohio 44087

WORKSHEET FOR NO BUILD VEHICULAR TRAFFIC COUNT CALCULATIONS

Oak Point & SR2EB 031920

			North Lake Street FROM NORTH						North Lake Street FROM SOUTH						TOTAL NORTH SOUTH	SR 2 EB Entrance Ramp FROM EAST						SR 2 EB Exit Ramp FROM WEST						TOTAL EAST WEST	TOTAL ALL DIREC.
			Left	Thru	Right	Total	Trk	Bus	Left	Thru	Right	Total	Trk	Bus		Left	Thru	Right	Total	Trk	Bus	Left	Thru	Right	Total	Trk	Bus		
AM PEAK	2020	Raw	177	96	0	273			0	145	185	330			603	0	0	0	0			101	0	23	124			124	727
	COVID	Factor	1.358	1.358	1.358				1.358	1.358	1.358					1.358	1.358	1.358				1.358	1.358	1.358					
	DHV	Factor	1.135	1.135	1.135				1.135	1.135	1.135					1.105	1.105	1.105				1.105	1.105	1.105					
	2020	No Build	273	148	0	421			0	223	285	508			929	0	0	0	0			151	0	34	186			186	1115
	Growth	Factor	0.007	0.007	0.007				0.007	0.007	0.007					0.007	0.007	0.007				0.007	0.007	0.007					
	2022	Raw +Growth+DHV	277	150	0	427			0	227	289	516			942	0	0	0	0			154	0	35	189			189	1131
	Opening Year	Round	280	150	0	430			0	230	290	520			950	0	0	0	0			150	0	30	180			180	1130
	2042	Raw +Growth+DHV	315	171	0	486			0	258	329	588			1074	0	0	0	0			175	0	40	215			215	1289
	Design Year	Round	320	170	0	490			0	260	330	590			1080	0	0	0	0			180	0	40	220			220	1300
PM PEAK	2020	Raw	273	399	0	672			0	225	100	325			997	0	0	0	0			94	0	49	143			143	1140
	COVID	Factor	1.293	1.293	1.293				1.293	1.293	1.293					1.293	1.293	1.293				1.293	1.293	1.293					
	DHV	Factor	1.135	1.135	1.135				1.135	1.135	1.135					1.105	1.105	1.105				1.105	1.105	1.105					
	2020	No Build	401	586	0	986			0	330	147	477			1463	0	0	0	0			134	0	70	204			204	1667
	Growth	Factor	0.014	0.014	0.014				0.014	0.014	0.014					0.014	0.014	0.014				0.014	0.014	0.014					
	2022	Raw +Growth+DHV	412	602	0	1014			0	339	151	490			1504	0	0	0	0			138	0	72	210			210	1714
	Opening Year	Round	410	600	0	1010			0	340	150	490			1500	0	0	0	0			140	0	70	210			210	1710
	2042	Raw +Growth+DHV	523	764	0	1286			0	431	191	622			1908	0	0	0	0			175	0	91	266			266	2175
	Design Year	Round	520	760	0	1280			0	430	190	620			1900	0	0	0	0			180	0	90	270			270	2170

TMS Engineers, Inc.
2112 Case Parkway S.
Unit #7
Twinsburg, Ohio 44087

WORKSHEET FOR NO BUILD VEHICULAR TRAFFIC COUNT CALCULATIONS

Cooper Foster & Hollstein 032420

			Hollstein Drive FROM NORTH						FROM SOUTH						TOTAL NORTH SOUTH	Cooper Foster Park Road FROM EAST						Cooper Foster Park Road FROM WEST						TOTAL EAST WEST	TOTAL ALL DIREC.
			Left	Thru	Right	Total	Trk	Bus	Left	Thru	Right	Total	Trk	Bus		Left	Thru	Right	Total	Trk	Bus	Left	Thru	Right	Total	Trk	Bus		
AM PEAK	2020	Raw	2	0	5	7			0	0	0	0			7	0	63	11	74			22	32	0	54			128	135
	COVID	Factor	1.358	1.358	1.358				1.358	1.358	1.358					1.358	1.358	1.358				1.358	1.358	1.358					
	DHV	Factor	1.158	1.158	1.158				1.158	1.158	1.158					1.158	1.158	1.158				1.158	1.158	1.158					
	2020	No Build	3	0	8	11			0	0	0	0			11	0	99	17	116			35	50	0	85			201	212
	Growth	Factor	0.007	0.007	0.007				0.007	0.007	0.007					0.007	0.007	0.007				0.007	0.007	0.007					
	2022	Raw +Growth+DHV	3	0	8	11			0	0	0	0			11	0	100	18	118			35	51	0	86			204	215
	Opening Year	Round	0	0	10	10			0	0	0	0			10	0	100	20	120			40	50	0	90			210	220
	2042	Raw +Growth+DHV	4	0	9	13			0	0	0	0			13	0	114	20	134			40	58	0	98			233	245
	Design Year	Round	0	0	10	10			0	0	0	0			10	0	110	20	130			40	60	0	100			230	240
PM PEAK	2020	Raw	10	0	18	28			0	0	0	0			28	0	83	5	88			4	132	0	136			224	252
	COVID	Factor	1.293	1.293	1.293				1.293	1.293	1.293					1.293	1.293	1.293				1.293	1.293	1.293					
	DHV	Factor	1.158	1.158	1.158				1.158	1.158	1.158					1.158	1.158	1.158				1.158	1.158	1.158					
	2020	No Build	15	0	27	42			0	0	0	0			42	0	124	7	132			6	198	0	204			335	377
	Growth	Factor	0.014	0.014	0.014				0.014	0.014	0.014					0.014	0.014	0.014				0.014	0.014	0.014					
	2022	Raw +Growth+DHV	15	0	28	43			0	0	0	0			43	0	128	8	135			6	203	0	209			345	388
	Opening Year	Round	20	0	30	50			0	0	0	0			50	0	130	10	140			10	200	0	210			350	400
	2042	Raw +Growth+DHV	20	0	35	55			0	0	0	0			55	0	162	10	172			8	258	0	266			437	492
	Design Year	Round	20	0	40	60			0	0	0	0			60	0	160	10	170			10	260	0	270			440	500

TMS Engineers, Inc.
2112 Case Parkway S.
Unit #7
Twinsburg, Ohio 44087

WORKSHEET FOR NO BUILD VEHICULAR TRAFFIC COUNT CALCULATIONS

Cooper Foster & Main 021919

			North Main Street FROM NORTH						North Main Street FROM SOUTH						TOTAL NORTH SOUTH	Cooper Foster Park Road FROM EAST						Cooper Foster Park Road FROM WEST						TOTAL EAST WEST	TOTAL ALL DIREC.
			Left	Thru	Right	Total	Trk	Bus	Left	Thru	Right	Total	Trk	Bus		Left	Thru	Right	Total	Trk	Bus	Left	Thru	Right	Total	Trk	Bus		
AM PEAK	2019	Raw	160	145	34	339			37	153	51	241			580	24	59	196	279			23	68	44	135			414	994
	DHV	Factor	1.161	1.161	1.161				1.161	1.161	1.161					1.161	1.161	1.161				1.161	1.161	1.161				
	2019	No Build	186	168	39	393			43	178	59	280			673	28	68	227	324			27	79	51	157			481	1154
	Growth	Factor	0.007	0.007	0.007				0.007	0.007	0.007					0.007	0.007	0.007				0.007	0.007	0.007				
	2022	Raw +Growth+DHV	190	172	40	402			44	181	60	286			687	28	70	232	331			27	81	52	160			491	1178
	Opening Year	Round	190	170	40	400			40	180	60	280			680	30	70	230	330			30	80	50	160			490	1170
	2042	Raw +Growth+DHV	216	196	46	458			50	207	69	325			783	32	80	265	377			31	92	59	182			559	1342
	Design Year	Round	220	200	50	470			50	210	70	330			800	30	80	260	370			30	90	60	180			550	1350
PM PEAK	2019	Raw	215	143	55	413			27	114	54	195			608	57	90	153	300			68	100	34	202			502	1110
	DHV	Factor	1.161	1.161	1.161				1.161	1.161	1.161					1.161	1.161	1.161				1.161	1.161	1.161				
	2019	No Build	250	166	64	479			31	132	63	226			706	66	104	178	348			79	116	39	234			583	1288
	Growth	Factor	0.014	0.014	0.014				0.014	0.014	0.014					0.014	0.014	0.014				0.014	0.014	0.014				
	2022	Raw +Growth+DHV	260	173	66	499			33	138	65	236			735	69	109	185	363			82	121	41	244			607	1342
	Opening Year	Round	260	170	70	500			30	140	70	240			740	70	110	180	360			80	120	40	240			600	1340
	2042	Raw +Growth+DHV	329	219	84	632			41	174	83	298			930	87	138	234	459			104	153	52	309			768	1698
	Design Year	Round	330	220	80	630			40	170	80	290			920	90	140	230	460			100	150	50	300			760	1680

TMS Engineers, Inc.
2112 Case Parkway S.
Unit #7
Twinsburg, Ohio 44087

Appendix G
Trip Generation Worksheets

Single Family Detached Housing

ITE Code = 210

RESERVE AT BEAVER CREEK Date: **5/4/2020**

Trip Generation based on: Size of Analysis Area: **109** **Units**

Dwelling Units	Average Rate	Standard Deviation	Adjustment Factor	Driveway Volume
WEEKDAY				
Average Weekday 2-way Volume	10.33	3.70	1.00	1126
Weekday Peak Hour of Adjacent Street Traffic				
7-9 AM Peak Hour Enter	0.19	0.00	1.00	21
7-9 AM Peak Hour Exit	0.57	0.00	1.00	62
7-9 AM Peak Hour Total	0.75	0.90	1.00	82
4-6 PM Peak Hour Enter	0.64	0.00	1.00	70
4-6 PM Peak Hour Exit	0.37	0.00	1.00	41
4-6 PM Peak Hour Total	1.01	1.05	1.00	110
Weekday Peak Hour of Generator				
AM Peak Hour Enter	0.21	0.00	1.00	23
AM Peak Hour Exit	0.59	0.00	1.00	65
AM Peak Hour Total	0.80	0.91	1.00	87
PM Peak Hour Enter	0.68	0.00	1.00	74
PM Peak Hour Exit	0.38	0.00	1.00	42
PM Peak Hour Total	1.06	1.05	1.00	116
SATURDAY				
Average Saturday 2-way Volume	9.76	3.72	1.00	1064
Saturday Peak Hour of Generator				
Saturday Peak Hour Enter	0.54	0.00	1.00	59
Saturday Peak Hour Exit	0.46	0.00	1.00	50
Saturday Peak Hour Total	1.01	0.99	1.00	110
SUNDAY				
Average Sunday 2-way Volume	8.27	3.36	1.00	902
Sunday Peak Hour of Generator				
Sunday Peak Hour Enter	0.47	0.00	1.00	51
Sunday Peak Hour Exit	0.42	0.00	1.00	46
Sunday Peak Hour Total	0.89	0.95	1.00	97

Single Family Detached Housing

ITE Code = 210

The above rates were calculated from the equations shown below:

		% ENTER	% EXIT
WEEKDAY			
Average Weekday 2-way Volume	$\ln(T) = 0.92 \ln(X) + 2.71$	50%	50%
Weekday Peak Hour of Adjacent Street Traffic			
7-9 AM Peak Hour Total	$T = 0.71 (X) + 4.80$	25%	75%
4-6 PM Peak Hour Total	$\ln(T) = 0.96 \ln(X) + 0.20$	63%	37%
Weekday Peak Hour of Generator			
AM Peak Hour Total	$\ln(T) = 0.91 \ln(X) + 0.20$	26%	74%
PM Peak Hour Total	$\ln(T) = 0.94 \ln(X) + 0.34$	64%	36%
SATURDAY			
Average Saturday 2-way Volume	$\ln(T) = 0.94 \ln(X) + 2.56$	50%	50%
Saturday Peak Hour of Generator			
Saturday Peak Hour Volume	$T = 0.84 (X) + 17.99$	54%	46%
SUNDAY			
Average Sunday 2-way Volume	$T = 8.87 (X) - 65.12$	50%	50%
Sunday Peak Hour of Generator			
Sunday Peak Hour Volume	$T = 0.79 (X) + 11.02$	53%	47%

Source: **Institute of Transportation Engineers**
Trip Generation Manual, 10TH Edition, September 2017

Single Family Detached Housing

ITE Code = 210

EAGLE RIDGE SUBDIVISION Date: **5/4/2020**

Trip Generation based on: Size of Analysis Area: **59** **Units**

Dwelling Units	Average Rate	Standard Deviation	Adjustment Factor	Driveway Volume
WEEKDAY				
Average Weekday 2-way Volume	10.85	3.70	1.00	640
Weekday Peak Hour of Adjacent Street Traffic				
7-9 AM Peak Hour Enter	0.20	0.00	1.00	12
7-9 AM Peak Hour Exit	0.59	0.00	1.00	35
7-9 AM Peak Hour Total	0.79	0.90	1.00	47
4-6 PM Peak Hour Enter	0.65	0.00	1.00	39
4-6 PM Peak Hour Exit	0.38	0.00	1.00	23
4-6 PM Peak Hour Total	1.04	1.05	1.00	61
Weekday Peak Hour of Generator				
AM Peak Hour Enter	0.22	0.00	1.00	13
AM Peak Hour Exit	0.63	0.00	1.00	37
AM Peak Hour Total	0.85	0.91	1.00	50
PM Peak Hour Enter	0.70	0.00	1.00	42
PM Peak Hour Exit	0.40	0.00	1.00	23
PM Peak Hour Total	1.10	1.05	1.00	65
SATURDAY				
Average Saturday 2-way Volume	10.13	3.72	1.00	598
Saturday Peak Hour of Generator				
Saturday Peak Hour Enter	0.62	0.00	1.00	36
Saturday Peak Hour Exit	0.53	0.00	1.00	31
Saturday Peak Hour Total	1.14	0.99	1.00	68
SUNDAY				
Average Sunday 2-way Volume	7.77	3.36	1.00	458
Sunday Peak Hour of Generator				
Sunday Peak Hour Enter	0.52	0.00	1.00	31
Sunday Peak Hour Exit	0.46	0.00	1.00	27
Sunday Peak Hour Total	0.98	0.95	1.00	58

Single Family Detached Housing

ITE Code = 210

The above rates were calculated from the equations shown below:

		% ENTER	% EXIT
WEEKDAY			
Average Weekday 2-way Volume	$\ln(T) = 0.92 \ln(X) + 2.71$	50%	50%
Weekday Peak Hour of Adjacent Street Traffic			
7-9 AM Peak Hour Total	$T = 0.71 (X) + 4.80$	25%	75%
4-6 PM Peak Hour Total	$\ln(T) = 0.96 \ln(X) + 0.20$	63%	37%
Weekday Peak Hour of Generator			
AM Peak Hour Total	$\ln(T) = 0.91 \ln(X) + 0.20$	26%	74%
PM Peak Hour Total	$\ln(T) = 0.94 \ln(X) + 0.34$	64%	36%
SATURDAY			
Average Saturday 2-way Volume	$\ln(T) = 0.94 \ln(X) + 2.56$	50%	50%
Saturday Peak Hour of Generator			
Saturday Peak Hour Volume	$T = 0.84 (X) + 17.99$	54%	46%
SUNDAY			
Average Sunday 2-way Volume	$T = 8.87 (X) - 65.12$	50%	50%
Sunday Peak Hour of Generator			
Sunday Peak Hour Volume	$T = 0.79 (X) + 11.02$	53%	47%

Source: **Institute of Transportation Engineers**
Trip Generation Manual, 10TH Edition, September 2017

Single Family Detached Housing

ITE Code = 210

PRESERVE AT QUARRY LAKES Date: **5/4/2020**

Trip Generation based on: Size of Analysis Area: **100** **Units**

Dwelling Units	Average Rate	Standard Deviation	Adjustment Factor	Driveway Volume
WEEKDAY				
Average Weekday 2-way Volume	10.40	3.70	1.00	1040
Weekday Peak Hour of Adjacent Street Traffic				
7-9 AM Peak Hour Enter	0.19	0.00	1.00	19
7-9 AM Peak Hour Exit	0.57	0.00	1.00	57
7-9 AM Peak Hour Total	0.76	0.90	1.00	76
4-6 PM Peak Hour Enter	0.64	0.00	1.00	64
4-6 PM Peak Hour Exit	0.38	0.00	1.00	38
4-6 PM Peak Hour Total	1.02	1.05	1.00	102
Weekday Peak Hour of Generator				
AM Peak Hour Enter	0.21	0.00	1.00	21
AM Peak Hour Exit	0.60	0.00	1.00	60
AM Peak Hour Total	0.81	0.91	1.00	81
PM Peak Hour Enter	0.68	0.00	1.00	68
PM Peak Hour Exit	0.38	0.00	1.00	38
PM Peak Hour Total	1.07	1.05	1.00	107
SATURDAY				
Average Saturday 2-way Volume	9.81	3.72	1.00	981
Saturday Peak Hour of Generator				
Saturday Peak Hour Enter	0.55	0.00	1.00	55
Saturday Peak Hour Exit	0.47	0.00	1.00	47
Saturday Peak Hour Total	1.02	0.99	1.00	102
SUNDAY				
Average Sunday 2-way Volume	8.22	3.36	1.00	822
Sunday Peak Hour of Generator				
Sunday Peak Hour Enter	0.48	0.00	1.00	48
Sunday Peak Hour Exit	0.42	0.00	1.00	42
Sunday Peak Hour Total	0.90	0.95	1.00	90

Single Family Detached Housing

ITE Code = 210

The above rates were calculated from the equations shown below:

		% ENTER	% EXIT
WEEKDAY			
Average Weekday 2-way Volume	$\ln(T) = 0.92 \ln(X) + 2.71$	50%	50%
Weekday Peak Hour of Adjacent Street Traffic			
7-9 AM Peak Hour Total	$T = 0.71 (X) + 4.80$	25%	75%
4-6 PM Peak Hour Total	$\ln(T) = 0.96 \ln(X) + 0.20$	63%	37%
Weekday Peak Hour of Generator			
AM Peak Hour Total	$\ln(T) = 0.91 \ln(X) + 0.20$	26%	74%
PM Peak Hour Total	$\ln(T) = 0.94 \ln(X) + 0.34$	64%	36%
SATURDAY			
Average Saturday 2-way Volume	$\ln(T) = 0.94 \ln(X) + 2.56$	50%	50%
Saturday Peak Hour of Generator			
Saturday Peak Hour Volume	$T = 0.84 (X) + 17.99$	54%	46%
SUNDAY			
Average Sunday 2-way Volume	$T = 8.87 (X) - 65.12$	50%	50%
Sunday Peak Hour of Generator			
Sunday Peak Hour Volume	$T = 0.79 (X) + 11.02$	53%	47%

Source: **Institute of Transportation Engineers**
Trip Generation Manual, 10TH Edition, September 2017

Medical-Dental Office Building

ITE Code = 720

COOPER FOSTER MEDICAL BUILDING Date: **5/4/2020**

Trip Generation based on: Size of Analysis Area: **17.756** **1,000 SF**

1,000 Square Feet Gross Floor Area	Average Rate	Standard Deviation	Adjustment Factor	Driveway Volume
WEEKDAY				
Average Weekday 2-way Volume	33.49	0.00	1.00	595
Weekday Peak Hour of Adjacent Street Traffic				
7-9 AM Peak Hour Enter	2.11	0.00	1.00	37
7-9 AM Peak Hour Exit	0.59	0.00	1.00	11
7-9 AM Peak Hour Total	2.70	0.00	1.00	48
4-6 PM Peak Hour Enter	0.98	0.00	1.00	17
4-6 PM Peak Hour Exit	2.52	0.00	1.00	45
4-6 PM Peak Hour Total	3.50	0.00	1.00	62
Weekday Peak Hour of Generator				
AM Peak Hour Enter	2.22	0.00	1.00	39
AM Peak Hour Exit	1.36	0.00	1.00	24
AM Peak Hour Total	3.57	0.00	1.00	63
PM Peak Hour Enter	1.56	0.00	1.00	28
PM Peak Hour Exit	2.45	0.00	1.00	43
PM Peak Hour Total	4.01	0.00	1.00	71
SATURDAY				
Average Saturday 2-way Volume	8.57	9.07	1.00	152
Saturday Peak Hour of Generator				
SAT Peak Hour Enter	1.19	0.00	1.00	21
SAT Peak Hour Exit	0.89	0.00	1.00	16
SAT Peak Hour Total	2.08	0.00	1.00	37
SUNDAY				
Average Sunday 2-way Volume	1.42	1.44	1.00	25
Sunday Peak Hour of Generator				
SUN Peak Hour Enter	0.17	0.00	1.00	3
SUN Peak Hour Exit	0.15	0.00	1.00	3
SUN Peak Hour Total	0.32	0.49	1.00	6

Medical-Dental Office Building

ITE Code = 720

The above rates were calculated from the equations shown below:

		% ENTER	% EXIT
WEEKDAY			
Average Weekday 2-way Volume	$T = 38.42(X) - 87.62$	50%	50%
Weekday Peak Hour of Adjacent Street Traffic			
7-9 AM Peak Hour Total	$\text{Ln}(T) = 0.89\ \text{Ln}(X) + 1.31$	78%	22%
4-6 PM Peak Hour Total	$T = 3.39(X) + 2.02$	28%	72%
Weekday Peak Hour of Generator			
AM Peak Hour Total	$T = 3.43(X) + 2.57$	62%	38%
PM Peak Hour Total	$T = 4.27(X) - 4.63$	39%	61%
SATURDAY			
Average Saturday 2-way Volume	$Not\ Given\ -Use\ ITE\ Rates$	50%	50%
Saturday Peak Hour of Generator			
Peak Hour of Generator	$T = 4.94(X) - 50.78$	57%	43%
SUNDAY			
Average Sunday 2-way Volume	$Not\ Given\ -Use\ ITE\ Rates$	50%	50%
Sunday Peak Hour of Generator			
Peak Hour of Generator	$Not\ Given\ -Use\ ITE\ Rates$	52%	48%

Source: **Institute of Transportation Engineers**
Trip Generation Manual, 10TH Edition, September 2017

Medical-Dental Office Building

ITE Code = 720

BUCKEYE SQUARE/NOVA MEDICAL BUILDING Date: **5/4/2020**

Trip Generation based on: Size of Analysis Area: **11.325** **1,000 SF**

1,000 Square Feet Gross Floor Area	Average Rate	Standard Deviation	Adjustment Factor	Driveway Volume
WEEKDAY				
Average Weekday 2-way Volume	30.68	0.00	1.00	347
Weekday Peak Hour of Adjacent Street Traffic				
7-9 AM Peak Hour Enter	2.21	0.00	1.00	25
7-9 AM Peak Hour Exit	0.62	0.00	1.00	7
7-9 AM Peak Hour Total	2.84	0.00	1.00	32
4-6 PM Peak Hour Enter	1.00	0.00	1.00	11
4-6 PM Peak Hour Exit	2.57	0.00	1.00	29
4-6 PM Peak Hour Total	3.57	0.00	1.00	40
Weekday Peak Hour of Generator				
AM Peak Hour Enter	2.27	0.00	1.00	26
AM Peak Hour Exit	1.39	0.00	1.00	16
AM Peak Hour Total	3.66	0.00	1.00	41
PM Peak Hour Enter	1.51	0.00	1.00	17
PM Peak Hour Exit	2.36	0.00	1.00	27
PM Peak Hour Total	3.86	0.00	1.00	44
SATURDAY				
Average Saturday 2-way Volume	8.57	9.07	1.00	97
Saturday Peak Hour of Generator				
SAT Peak Hour Enter	0.26	0.00	1.00	3
SAT Peak Hour Exit	0.20	0.00	1.00	2
SAT Peak Hour Total	0.46	0.00	1.00	5
SUNDAY				
Average Sunday 2-way Volume	1.42	1.44	1.00	16
Sunday Peak Hour of Generator				
SUN Peak Hour Enter	0.17	0.00	1.00	2
SUN Peak Hour Exit	0.15	0.00	1.00	2
SUN Peak Hour Total	0.32	0.49	1.00	4

Medical-Dental Office Building

ITE Code = 720

The above rates were calculated from the equations shown below:

		% ENTER	% EXIT
WEEKDAY			
Average Weekday 2-way Volume	$T = 38.42(X) - 87.62$	50%	50%
Weekday Peak Hour of Adjacent Street Traffic			
7-9 AM Peak Hour Total	$\text{Ln}(T) = 0.89\ \text{Ln}(X) + 1.31$	78%	22%
4-6 PM Peak Hour Total	$T = 3.39(X) + 2.02$	28%	72%
Weekday Peak Hour of Generator			
AM Peak Hour Total	$T = 3.43(X) + 2.57$	62%	38%
PM Peak Hour Total	$T = 4.27(X) - 4.63$	39%	61%
SATURDAY			
Average Saturday 2-way Volume	$Not\ Given\ -Use\ ITE\ Rates$	50%	50%
Saturday Peak Hour of Generator			
Peak Hour of Generator	$T = 4.94(X) - 50.78$	57%	43%
SUNDAY			
Average Sunday 2-way Volume	$Not\ Given\ -Use\ ITE\ Rates$	50%	50%
Sunday Peak Hour of Generator			
Peak Hour of Generator	$Not\ Given\ -Use\ ITE\ Rates$	52%	48%

Source: **Institute of Transportation Engineers**
Trip Generation Manual, 10TH Edition, September 2017

Single Family Detached Housing

ITE Code = 210

SANDY SPRINGS (LORAIN) Date: **5/4/2020**

Trip Generation based on: Size of Analysis Area: **161** **Units**

Dwelling Units	Average Rate	Standard Deviation	Adjustment Factor	Driveway Volume
WEEKDAY				
Average Weekday 2-way Volume	10.01	3.70	1.00	1611
Weekday Peak Hour of Adjacent Street Traffic				
7-9 AM Peak Hour Enter	0.18	0.00	1.00	30
7-9 AM Peak Hour Exit	0.55	0.00	1.00	89
7-9 AM Peak Hour Total	0.74	0.90	1.00	119
4-6 PM Peak Hour Enter	0.63	0.00	1.00	101
4-6 PM Peak Hour Exit	0.37	0.00	1.00	59
4-6 PM Peak Hour Total	1.00	1.05	1.00	160
Weekday Peak Hour of Generator				
AM Peak Hour Enter	0.20	0.00	1.00	32
AM Peak Hour Exit	0.57	0.00	1.00	92
AM Peak Hour Total	0.77	0.91	1.00	124
PM Peak Hour Enter	0.66	0.00	1.00	107
PM Peak Hour Exit	0.37	0.00	1.00	60
PM Peak Hour Total	1.04	1.05	1.00	167
SATURDAY				
Average Saturday 2-way Volume	9.54	3.72	1.00	1535
Saturday Peak Hour of Generator				
Saturday Peak Hour Enter	0.51	0.00	1.00	83
Saturday Peak Hour Exit	0.44	0.00	1.00	70
Saturday Peak Hour Total	0.95	0.99	1.00	153
SUNDAY				
Average Sunday 2-way Volume	8.47	3.36	1.00	1363
Sunday Peak Hour of Generator				
Sunday Peak Hour Enter	0.45	0.00	1.00	73
Sunday Peak Hour Exit	0.40	0.00	1.00	65
Sunday Peak Hour Total	0.86	0.95	1.00	138

Single Family Detached Housing

ITE Code = 210

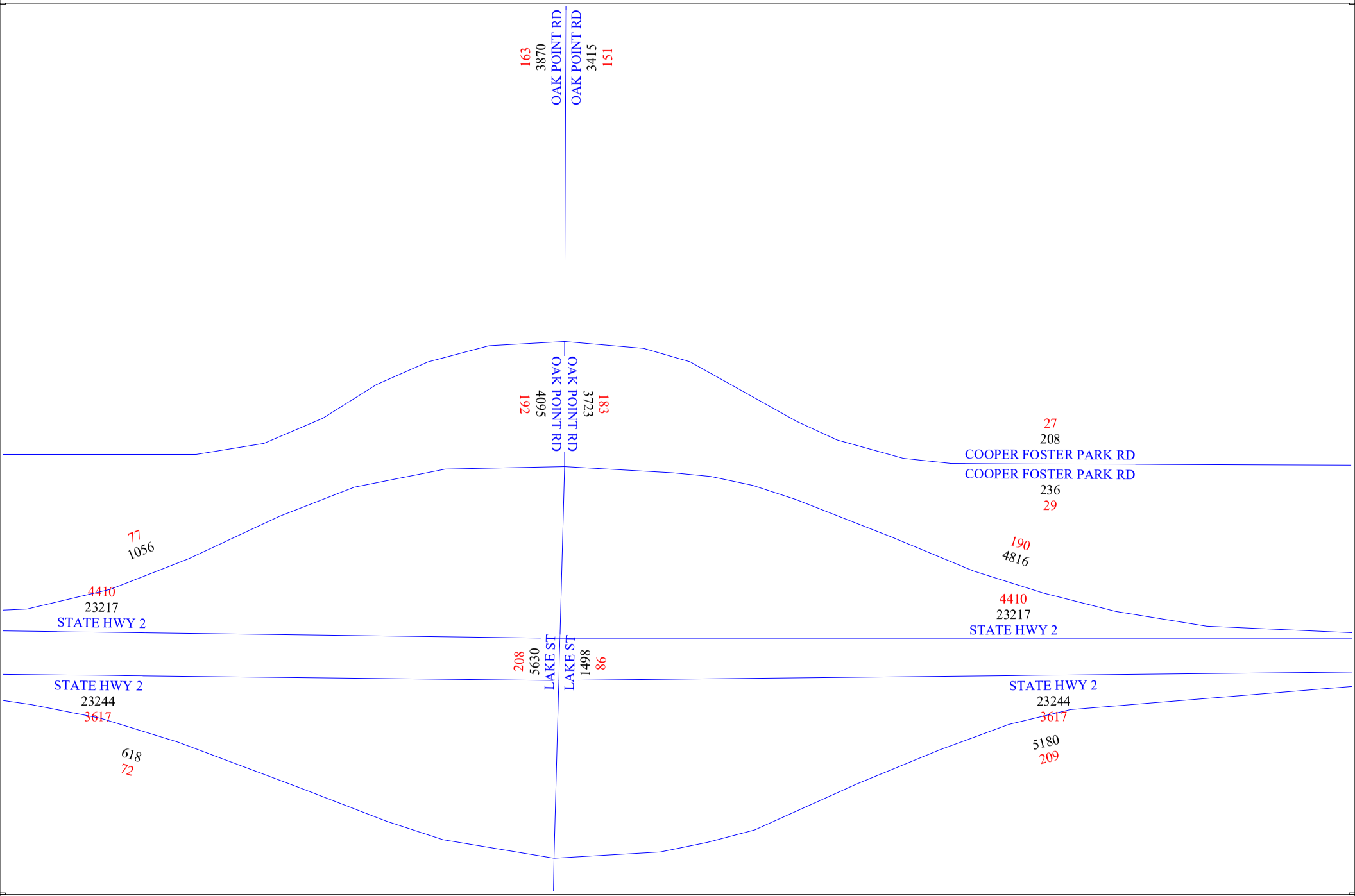
The above rates were calculated from the equations shown below:

		% ENTER	% EXIT
WEEKDAY			
Average Weekday 2-way Volume	$\ln(T) = 0.92 \ln(X) + 2.71$	50%	50%
Weekday Peak Hour of Adjacent Street Traffic			
7-9 AM Peak Hour Total	$T = 0.71 (X) + 4.80$	25%	75%
4-6 PM Peak Hour Total	$\ln(T) = 0.96 \ln(X) + 0.20$	63%	37%
Weekday Peak Hour of Generator			
AM Peak Hour Total	$\ln(T) = 0.91 \ln(X) + 0.20$	26%	74%
PM Peak Hour Total	$\ln(T) = 0.94 \ln(X) + 0.34$	64%	36%
SATURDAY			
Average Saturday 2-way Volume	$\ln(T) = 0.94 \ln(X) + 2.56$	50%	50%
Saturday Peak Hour of Generator			
Saturday Peak Hour Volume	$T = 0.84 (X) + 17.99$	54%	46%
SUNDAY			
Average Sunday 2-way Volume	$T = 8.87 (X) - 65.12$	50%	50%
Sunday Peak Hour of Generator			
Sunday Peak Hour Volume	$T = 0.79 (X) + 11.02$	53%	47%

Source: **Institute of Transportation Engineers**
Trip Generation Manual, 10TH Edition, September 2017

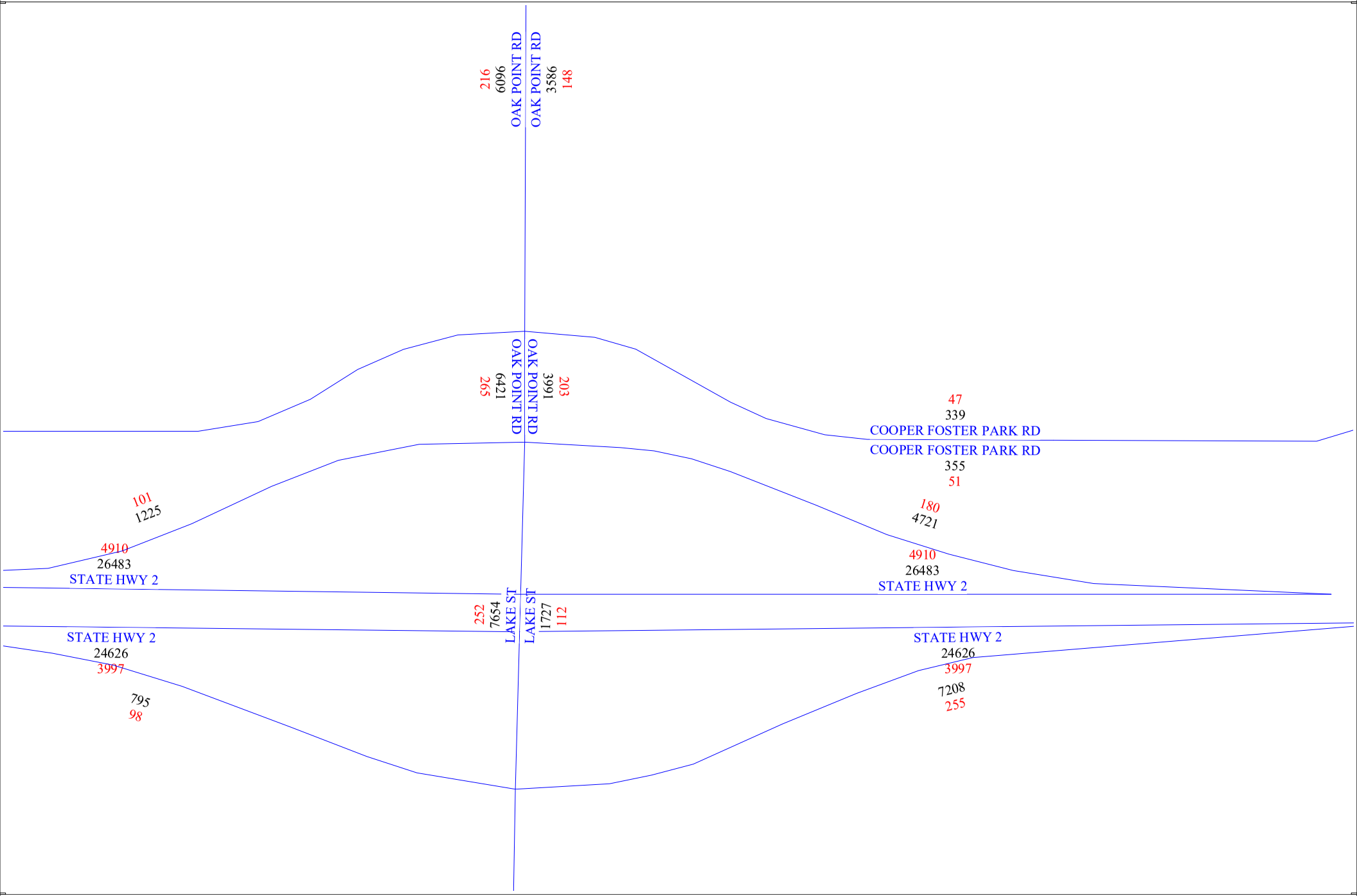
Appendix H
NOACA Traffic Data

NOACA 2020 Base Year
NOACA Travel Forecasting Model
Directional 24-HR Auto & Truck Volumes



NOACA

NOACA 2040 Forecast Year
NOACA Travel Forecasting Model
Directional 24-HR Auto & Truck Volumes



NOACA

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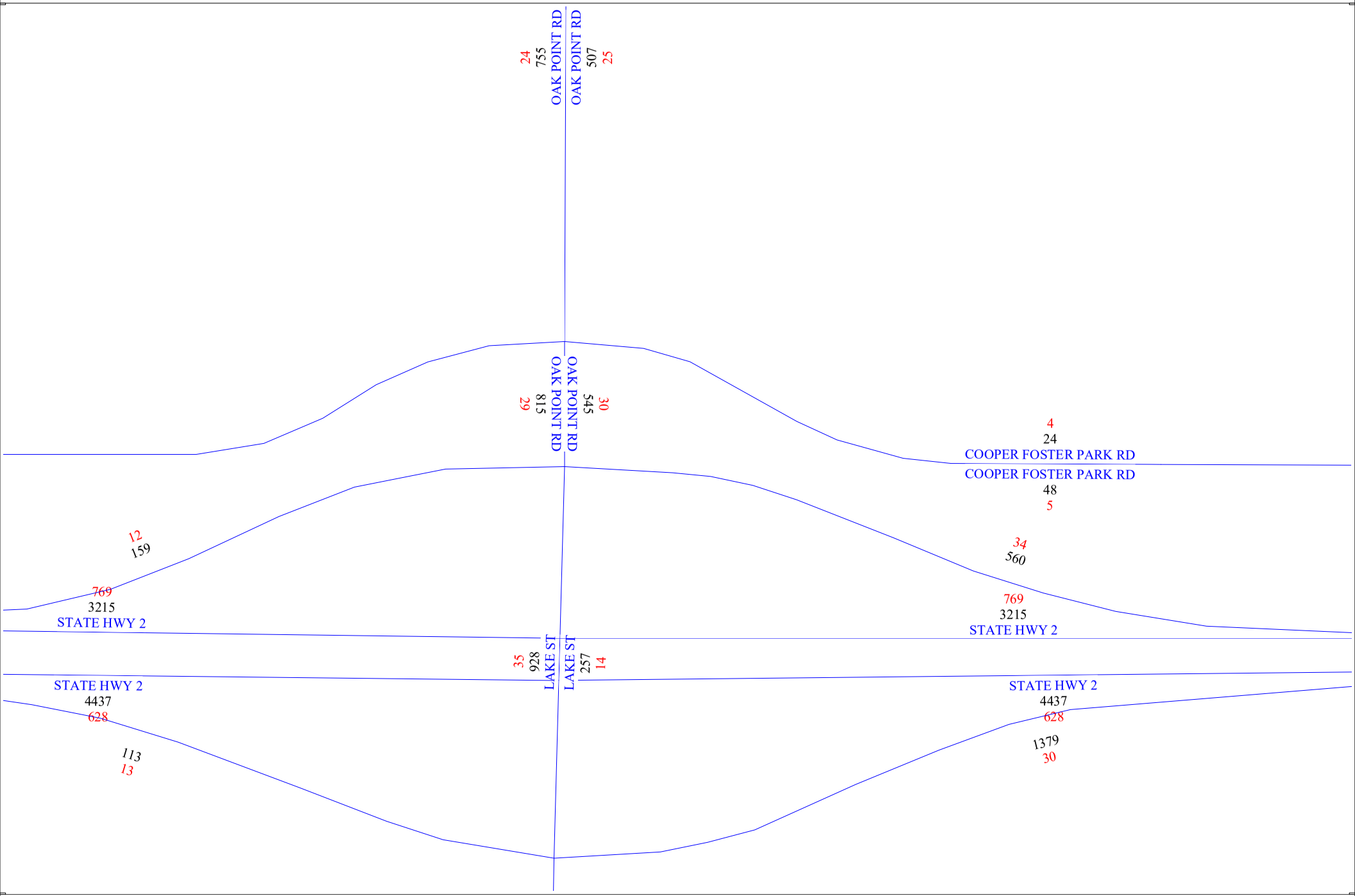
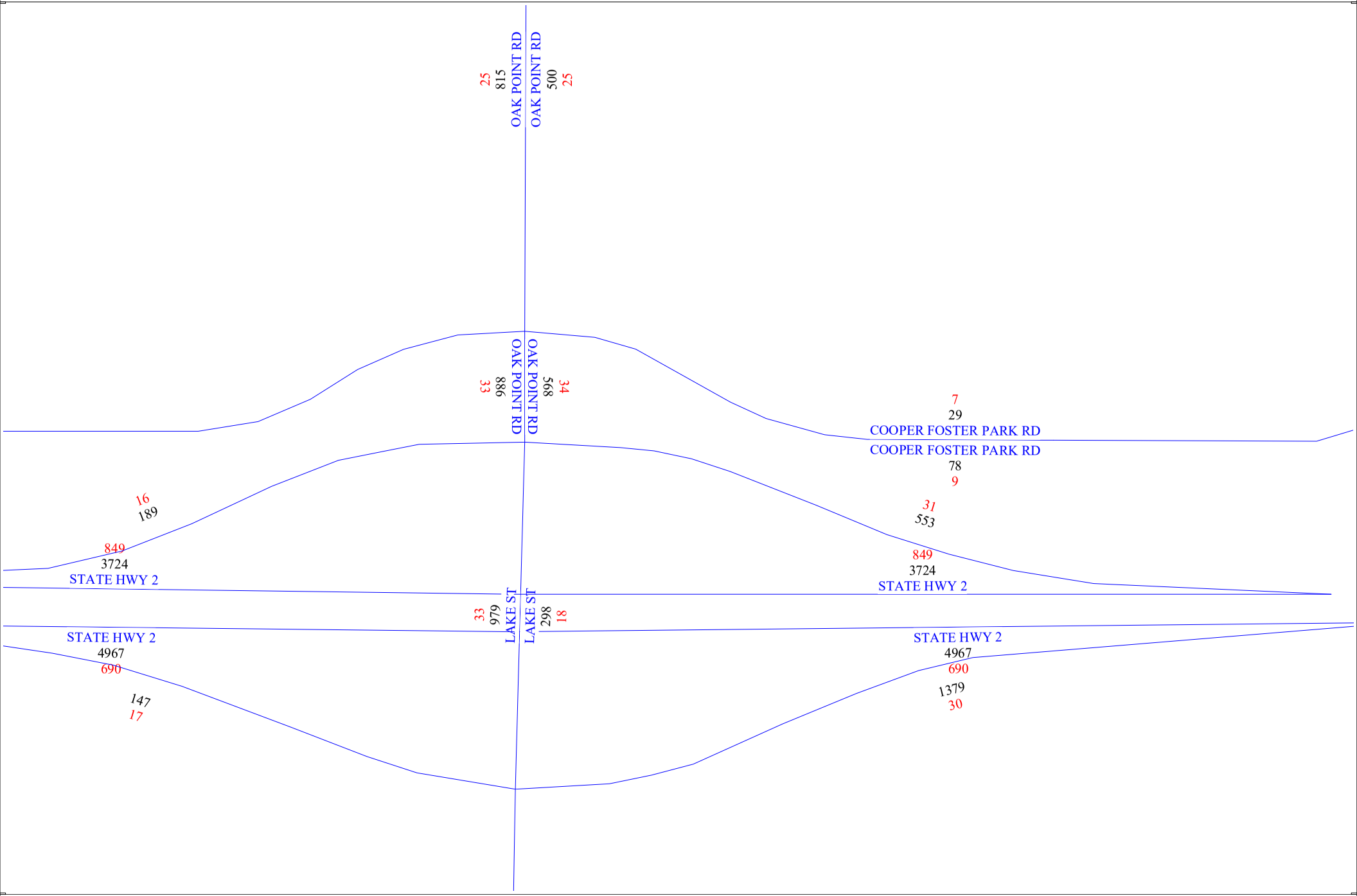
NOACA 2020 Base Year
NOACA Travel Forecasting Model
Directional AM Peak Period Auto & Truck Volumes



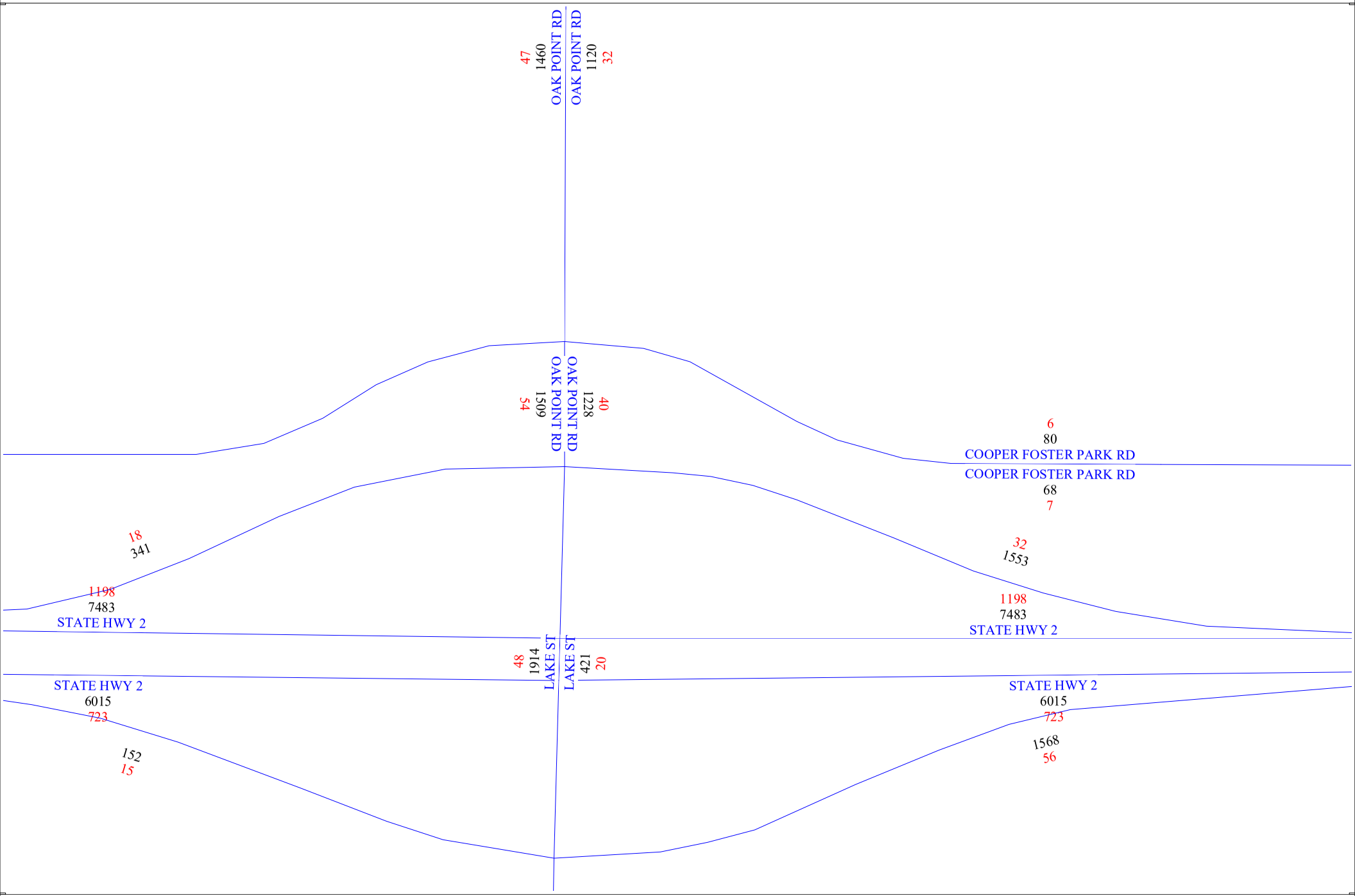
NOACA

NOACA 2040 Forecast Year
NOACA Travel Forecasting Model
Directional AM Peak Period Auto & Truck Volumes



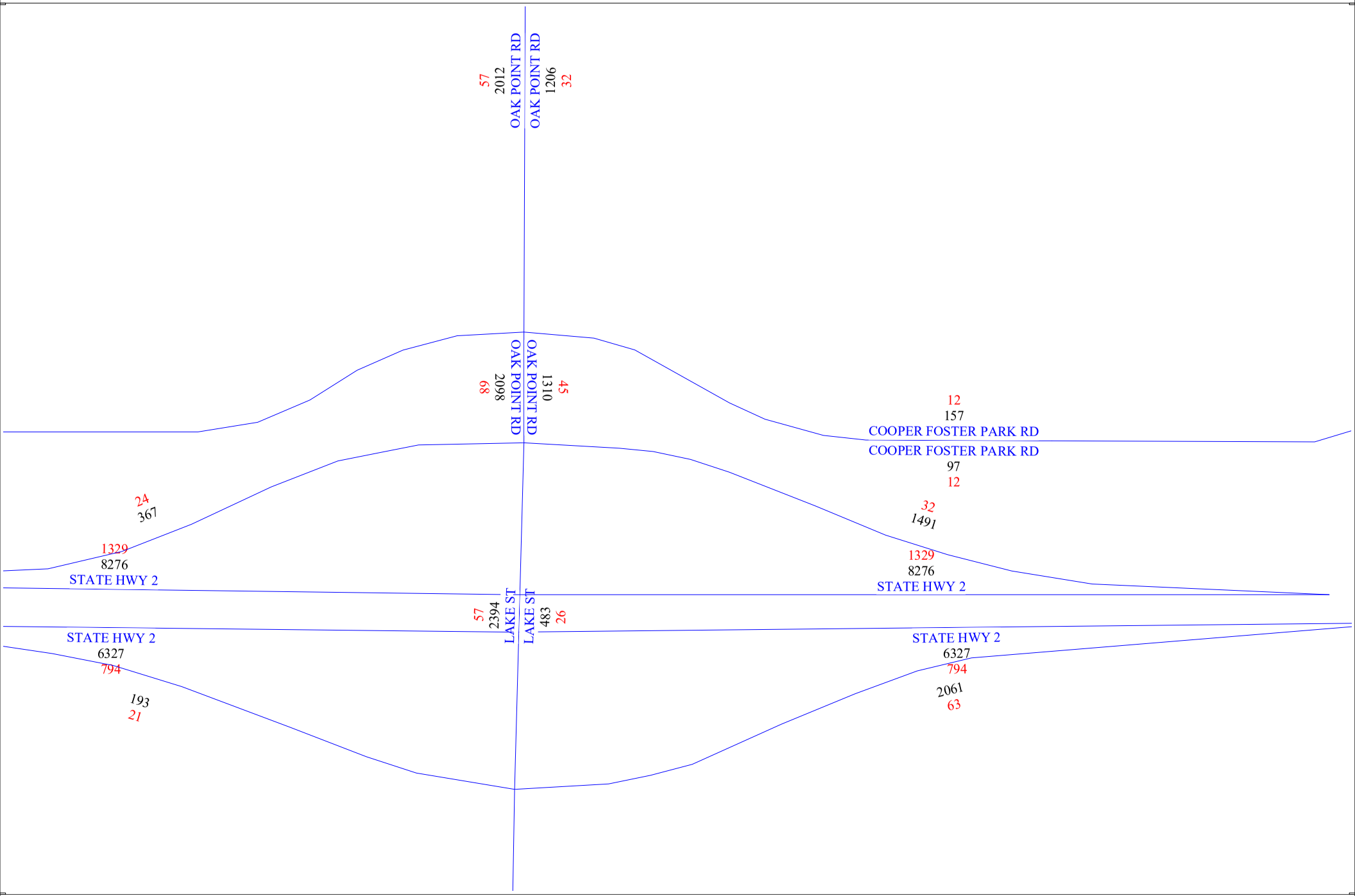
NOACA

NOACA 2020 Base Year
NOACA Travel Forecasting Model
Directional PM Peak Period Auto & Truck Volumes



NOACA

NOACA 2040 Forecast Year
NOACA Travel Forecasting Model
Directional PM Peak Period Auto & Truck Volumes



NOACA

GROWTH RATE CALCULATIONS

			24-HOUR ADT						AM PEAK						PM PEAK					
LOCATION		DIRECTION	2020	2040	%	AVG		DIRECTION	2020	2040	%	AVG		2020	2040	%	AVG	
OAK POINT	North of CFP	SOUTHBOUND	3870	6096	2.8760%	1.5632%		SOUTHBOUND	755	815	0.3974%	0.1642%		1460	2012	1.8904%	1.1372%	
		NORTHBOUND	3415	3586	0.2504%			NORTHBOUND	507	500	-0.0690%			1120	1206	0.3839%		
OAK POINT	Between CFP & SR 2 WB	SOUTHBOUND	4095	6421	2.8400%	1.6000%	1.4814%	SOUTHBOUND	815	886	0.4356%	0.3233%	0.3412%	1509	2098	1.9516%	1.1427%	1.0917%
		NORTHBOUND	3723	3991	0.3599%			NORTHBOUND	545	568	0.2110%			1228	1310	0.3339%		
OAK POINT	Between SR 2 Ramps	SOUTHBOUND	5630	7654	1.7975%	1.2809%		SOUTHBOUND	928	979	0.2748%	0.5362%		1914	2394	1.2539%	0.9951%	
		NORTHBOUND	1498	1727	0.7644%			NORTHBOUND	257	298	0.7977%			421	483	0.7363%		
COOPER FOSTER	East of Oak Point	EASTBOUND	236	355	2.5212%	2.8351%		EASTBOUND	48	78	3.1250%	2.0833%		68	97	2.1324%	3.4724%	
		WESTBOUND	208	339	3.1490%			WESTBOUND	24	29	1.0417%			80	157	4.8125%		
SR 2	WB Exit	WESTBOUND	4816	4721	-0.0986%	0.3508%		WESTBOUND	560	553	-0.0625%	0.3933%		1553	1491	-0.1996%	0.0908%	
SR 2	WB Entrance	WESTBOUND	1056	1225	0.8002%			WESTBOUND	159	186	0.8491%			341	367	0.3812%		
SR 2	EB Exit	EASTBOUND	618	795	1.4320%	1.6948%		EASTBOUND	113	147	1.5044%	0.7522%		152	193	1.3487%	1.4604%	
SR 2	EB Entrance	EASTBOUND	5180	7208	1.9575%			EASTBOUND	1379	1379	0.0000%			1568	2061	1.5721%		
						1.5541%						**0.7088%**					**1.3831%**	

Appendix I
ODOT Peak Hour to Design Hour Factors

PEAK HOUR to DESIGN HOUR FACTORS

FUNCTIONAL CLASSIFICATION = 02u

(Urban Freeways / Expressways)

Day / Month	Monthly Average by Day-of-Week							
	WEEKDAY MON-THUR	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
January	1.15	2.00	1.18	1.17	1.14	1.13	1.12	1.73
February	1.13	1.89	1.14	1.12	1.13	1.12	1.08	1.64
March	1.11	1.80	1.13	1.11	1.11	1.10	1.10	1.63
April	1.08	1.75	1.11	1.09	1.06	1.07	1.06	1.59
May	1.07	1.69	1.09	1.07	1.07	1.06	1.06	1.56
June	1.08	1.68	1.10	1.08	1.08	1.07	1.07	1.55
July	1.10	1.70	1.13	1.09	1.08	1.09	1.09	1.57
August	1.08	1.67	1.10	1.08	1.07	1.06	1.05	1.54
September	1.07	1.69	1.10	1.07	1.06	1.05	1.03	1.54
October	1.06	1.69	1.09	1.06	1.06	1.04	1.03	1.54
November	1.08	1.76	1.10	1.07	1.07	1.07	1.03	1.60
December	1.09	1.83	1.10	1.10	1.08	1.09	1.08	1.58

peak hour volume * factor = design hour volume

source: year 2016, 2017, & 2018 Automatic Traffic Recorders (ATR) Data

ATR Stations:
2018: 105, 136, 502, 504, 546, 547, 554, 555, 556, 557, 564, 586, 590, 591, 622, 628, 709, 727, 756, 761, N81, N82, N99
2017: 105, 502, 546, 547, 555, 557, 564, 586, 590, 591, 593, 618, 628, 709, 727, 761

Ohio Department of Transportation
Modeling & Forecasting Section
June 2019

NOTE: These are NOT seasonal adjustment factors!!!

PEAK HOUR to DESIGN HOUR FACTORS

FUNCTIONAL CLASSIFICATION = 03, 04, 05u

(Urban Principal Arterial, Urban Minor Arterial, & Urban Minor Collector)

Day / Month	Monthly Average by Day-of-Week							
	WEEKDAY MON-THUR	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
January	1.20	1.72	1.22	1.21	1.20	1.17	1.15	1.56
February	1.17	1.63	1.19	1.16	1.17	1.16	1.11	1.48
March	1.15	1.57	1.16	1.16	1.16	1.13	1.11	1.45
April	1.11	1.52	1.13	1.12	1.09	1.09	1.06	1.41
May	1.08	1.44	1.10	1.09	1.08	1.06	1.04	1.35
June	1.14	1.51	1.16	1.15	1.14	1.11	1.09	1.39
July	1.16	1.54	1.19	1.17	1.15	1.15	1.13	1.44
August	1.13	1.51	1.15	1.14	1.13	1.11	1.08	1.40
September	1.12	1.53	1.15	1.11	1.12	1.09	1.04	1.40
October	1.10	1.53	1.13	1.10	1.10	1.08	1.05	1.40
November	1.13	1.56	1.16	1.12	1.13	1.11	1.06	1.48
December	1.13	1.58	1.14	1.13	1.12	1.12	1.09	1.44

peak hour volume * factor = design hour volume

source: year 2016, 2017, & 2018 Automatic Traffic Recorders (ATR) Data

ATR Stations:
2018: 21, 28, 123, 131, 134, 166, 169, 517, 523, 543, 544, 550, 565, 605, 765
2017: 21, 123, 523, 538, 543, 544, 550, 565, 605, 725, 765, 28, 134, 169, 517, 131, 166

Ohio Department of Transportation
Modeling & Forecasting Section
June 2019

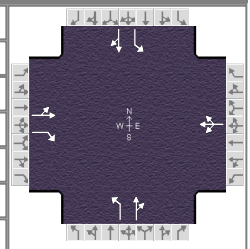
NOTE: These are NOT seasonal adjustment factors!!!

Note: Insufficient data exists to produce factors for functional classes 06 and 07 Urban.

Appendix J
Build Capacity Analysis Worksheets - 2022

HCS7 Signalized Intersection Results Summary

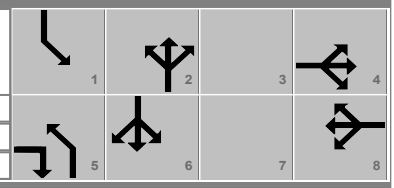
General Information				Intersection Information	
Agency	TMS Engineers, Inc.			Duration, h	0.250
Analyst	ABC	Analysis Date	Jun 2, 2020	Area Type	Other
Jurisdiction	Lorain, OH	Time Period	AM Peak	PHF	0.92
Urban Street	Oak Point Road	Analysis Year	2022	Analysis Period	1> 7:00
Intersection	@ Buck Horn/Park Square	File Name	AM 22 BuckHorn.xus		
Project Description	Existing Conditions				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	30	0	40	10	0	10	30	208	30	30	352	30

Signal Information			
Cycle, s	90.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	7.0	36.2	28.8	0.0	0.0	0.0						
Yellow	4.0	4.0	4.0	0.0	0.0	0.0						
Red	2.0	2.0	2.0	0.0	0.0	0.0						



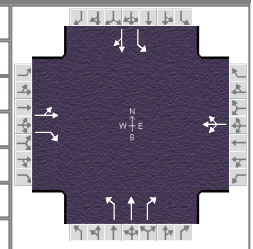
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2	1	6
Case Number		7.0		8.0	1.1	4.0	1.1	4.0
Phase Duration, s		34.8		34.8	13.0	42.2	13.0	42.2
Change Period, ($Y+R_c$), s		6.0		6.0	6.0	6.0	6.0	6.0
Max Allow Headway (*MAH*), s		3.2		3.2	3.1	3.1	3.1	3.1
Queue Clearance Time (g_s), s		3.6		2.8	2.9	10.8	2.9	17.5
Green Extension Time (g_e), s		0.2		0.0	0.0	0.0	0.0	1.2
Phase Call Probability		1.00		1.00	1.00	1.00	1.00	1.00
Max Out Probability		0.00		0.27	0.15	1.00	0.15	0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h		33	43		22		33	259		33	415	
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1426	1510		1536		1810	1843		1810	1859	
Queue Service Time (g_s), s		0.7	1.6		0.0		0.9	8.8		0.9	15.5	
Cycle Queue Clearance Time (g_c), s		1.4	1.6		0.8		0.9	8.8		0.9	15.5	
Green Ratio (*g/C*)		0.32	0.40		0.32		0.48	0.40		0.48	0.40	
Capacity (*c*), veh/h		536	601		551		426	741		542	748	
Volume-to-Capacity Ratio (*X*)		0.061	0.072		0.039		0.077	0.349		0.060	0.555	
Back of Queue (*Q*), ft/ln (95 th percentile)		20.9	25.7		13.9		14.9	162.6		14.8	267.3	
Back of Queue (*Q*), veh/ln (95 th percentile)		0.8	1.0		0.6		0.6	6.5		0.6	10.6	
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00	0.17		0.00		0.05	0.00		0.06	0.00	
Uniform Delay (d_1), s/veh		21.3	16.8		21.1		14.1	18.7		13.1	20.7	
Incremental Delay (d_2), s/veh		0.0	0.0		0.0		0.0	0.1		0.0	0.5	
Initial Queue Delay (d_3), s/veh		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Control Delay (*d*), s/veh		21.3	16.8		21.1		14.2	18.8		13.1	21.3	
Level of Service (LOS)		C	B		C		B	B		B	C	
Approach Delay, s/veh / LOS	18.7	B		21.1	C		18.3	B		20.7	C	
Intersection Delay, s/veh / LOS	19.7						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS								
Bicycle LOS Score / LOS								

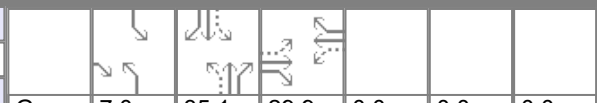
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	TMS Engineers, Inc.			Duration, h	0.250
Analyst	ABC	Analysis Date	Jun 2, 2020	Area Type	Other
Jurisdiction	Amherst, OH	Time Period	AM Peak	PHF	0.92
Urban Street	Oak Point Road	Analysis Year	2022	Analysis Period	1> 7:00
Intersection	@ Cooper Foster Park…	File Name	AM 22 CooperFoster.xus		
Project Description	Existing Conditions				

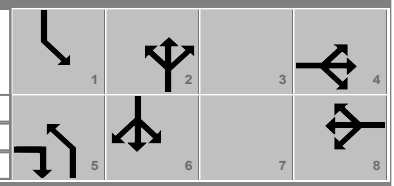


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	12	26	143	119	45	46	145	210	354	68	298	36

Signal Information			
Cycle, s	90.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	7.0	35.1	29.9	0.0	0.0	0.0
Yellow	4.0	4.0	4.0	0.0	0.0	0.0
Red	2.0	2.0	2.0	0.0	0.0	0.0



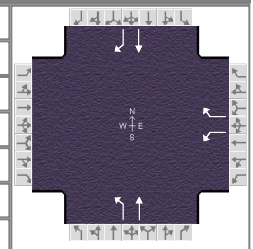
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2	1	6
Case Number		7.0		8.0	1.1	3.0	1.1	4.0
Phase Duration, s		35.9		35.9	13.0	41.1	13.0	41.1
Change Period, ($Y+R_c$), s		6.0		6.0	6.0	6.0	6.0	6.0
Max Allow Headway (*MAH*), s		3.2		3.2	3.1	3.2	3.1	3.2
Queue Clearance Time (g_s), s		8.0		12.5	6.7	19.6	4.0	15.5
Green Extension Time (g_e), s		0.8		0.0	0.0	0.0	0.0	2.0
Phase Call Probability		1.00		1.00	1.00	1.00	1.00	1.00
Max Out Probability		0.00		1.00	1.00	1.00	1.00	0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h		41	155		228		158	228	385	74	363	
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1581	1522		1511		1753	1870	1585	1810	1835	
Queue Service Time (g_s), s		0.0	6.0		8.9		4.7	7.6	17.6	2.0	13.5	
Cycle Queue Clearance Time (g_c), s		1.4	6.0		10.5		4.7	7.6	17.6	2.0	13.5	
Green Ratio (*g/C*)		0.33	0.41		0.33		0.47	0.39	0.39	0.47	0.39	
Capacity (*c*), veh/h		578	624		565		434	729	618	552	716	
Volume-to-Capacity Ratio (*X*)		0.071	0.249		0.404		0.363	0.313	0.622	0.134	0.507	
Back of Queue (*Q*), ft/ln (95 th percentile)		27.9	96.2		168.7		82.8	145.2	268.9	35.5	238.6	
Back of Queue (*Q*), veh/ln (95 th percentile)		1.0	3.6		6.6		3.2	5.7	10.6	1.4	9.4	
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00	1.28		0.00		0.69	0.00	2.24	0.10	0.00	
Uniform Delay (d_1), s/veh		20.5	17.4		23.5		15.6	19.1	22.1	13.8	20.9	
Incremental Delay (d_2), s/veh		0.0	0.1		0.2		0.2	0.1	1.5	0.0	0.2	
Initial Queue Delay (d_3), s/veh		0.0	0.0		0.0		0.0	0.0	0.0	0.0	0.0	
Control Delay (*d*), s/veh		20.6	17.5		23.6		15.8	19.2	23.6	13.9	21.1	
Level of Service (LOS)		C	B		C		B	B	C	B	C	
Approach Delay, s/veh / LOS	18.2	B		23.6	C		20.7	C		19.9	B	
Intersection Delay, s/veh / LOS	20.6						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS								
Bicycle LOS Score / LOS								

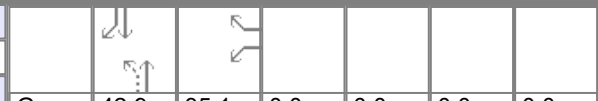
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	TMS Engineers, Inc.			Duration, h	0.250
Analyst	ABC	Analysis Date	Jun 2, 2020	Area Type	Other
Jurisdiction	Amherst, OH	Time Period	AM Peak	PHF	0.92
Urban Street	North Lake Street	Analysis Year	2022	Analysis Period	1> 7:00
Intersection	@ SR 2 WB Ramps	File Name	AM 22 Westbound2.xus		
Project Description	Existing Conditions				

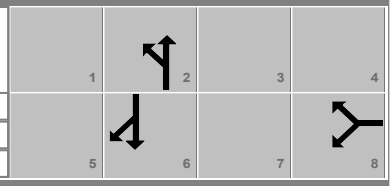


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h				70		338	50	371			419	141

Signal Information			
Cycle, s	90.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	42.9	35.1	0.0	0.0	0.0	0.0	
Yellow	4.0	4.0	0.0	0.0	0.0	0.0	
Red	2.0	2.0	0.0	0.0	0.0	0.0	



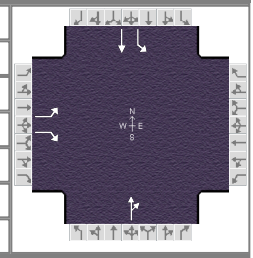
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase				8		2		6
Case Number				9.0		6.0		7.0
Phase Duration, s				41.1		48.9		48.9
Change Period, ($Y+R_c$), s				6.0		6.0		6.0
Max Allow Headway (*MAH*), s				3.3		3.1		3.1
Queue Clearance Time (g_s), s				18.7		21.1		17.3
Green Extension Time (g_e), s				0.9		0.0		2.2
Phase Call Probability				1.00		1.00		1.00
Max Out Probability				0.00		1.00		0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement				3		18	5	2			6	16
Adjusted Flow Rate (*v*), veh/h				76		367	54	403			455	153
Adjusted Saturation Flow Rate (*s*), veh/h/ln				1626		1572	951	1870			1856	1598
Queue Service Time (g_s), s				2.7		16.7	3.8	12.9			15.3	5.0
Cycle Queue Clearance Time (g_c), s				2.7		16.7	19.1	12.9			15.3	5.0
Green Ratio (*g/C*)				0.39		0.39	0.48	0.48			0.48	0.48
Capacity (*c*), veh/h				634		613	371	891			884	762
Volume-to-Capacity Ratio (*X*)				0.120		0.599	0.146	0.452			0.515	0.201
Back of Queue (*Q*), ft/ln (95 th percentile)				48.4		256.8	37.3	225.8			259.6	77.3
Back of Queue (*Q*), veh/ln (95 th percentile)				1.8		10.0	1.5	8.9			10.1	3.1
Queue Storage Ratio (*RQ*) (95 th percentile)				0.35		0.00	0.22	0.00			0.00	0.64
Uniform Delay (d_1), s/veh				17.6		21.8	23.0	15.7			16.3	13.6
Incremental Delay (d_2), s/veh				0.0		1.1	0.1	0.1			0.2	0.0
Initial Queue Delay (d_3), s/veh				0.0		0.0	0.0	0.0			0.0	0.0
Control Delay (*d*), s/veh				17.6		23.0	23.0	15.8			16.6	13.7
Level of Service (LOS)				B		C	C	B			B	B
Approach Delay, s/veh / LOS	0.0			22.1		C	16.7		B	15.8		B
Intersection Delay, s/veh / LOS	17.9						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS								
Bicycle LOS Score / LOS								

HCS7 Signalized Intersection Results Summary

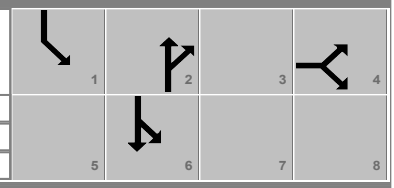
General Information				Intersection Information	
Agency	TMS Engineers, Inc.			Duration, h	0.250
Analyst	ABC	Analysis Date	Jun 2, 2020	Area Type	Other
Jurisdiction	Amherst, OH	Time Period	AM Peak	PHF	0.92
Urban Street	North Lake Street	Analysis Year	2022	Analysis Period	1> 7:00
Intersection	@ SR 2 EB Ramps	File Name	AM 22 Eastbound2.xus		
Project Description	Existing Conditions				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	162		30					259	290	324	165	

Signal Information			
Cycle, s	90.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	12.7	38.2	21.1	0.0	0.0	0.0
Yellow	4.0	4.0	4.0	0.0	0.0	0.0
Red	2.0	2.0	2.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4				2	1	6
Case Number		9.0				8.3	1.0	4.0
Phase Duration, s		27.1				44.2	18.7	62.9
Change Period, ($Y+R_c$), s		6.0				6.0	6.0	6.0
Max Allow Headway (*MAH*), s		3.2				3.2	3.1	3.2
Queue Clearance Time (g_s), s		9.6				29.5	11.3	5.6
Green Extension Time (g_e), s		0.3				0.0	0.1	1.7
Phase Call Probability		1.00				1.00	1.00	1.00
Max Out Probability		0.00				1.00	1.00	0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7		14					2	12	1	6	
Adjusted Flow Rate (*v*), veh/h	176		33					597		352	179	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1767		1560					1721		1753	1811	
Queue Service Time (g_s), s	7.6		1.5					27.5		9.3	3.6	
Cycle Queue Clearance Time (g_c), s	7.6		1.5					27.5		9.3	3.6	
Green Ratio (*g/C*)	0.23		0.23					0.42		0.59	0.63	
Capacity (*c*), veh/h	414		366					731		424	1145	
Volume-to-Capacity Ratio (*X*)	0.425		0.089					0.817		0.832	0.157	
Back of Queue (*Q*), ft/ln (95 th percentile)	145.6		25					435.4		209.5	57.7	
Back of Queue (*Q*), veh/ln (95 th percentile)	5.7		1.0					17.3		8.1	2.2	
Queue Storage Ratio (*RQ*) (95 th percentile)	0.77		0.00					0.00		1.23	0.00	
Uniform Delay (d_1), s/veh	29.3		26.9					22.8		17.1	6.8	
Incremental Delay (d_2), s/veh	0.3		0.0					6.7		12.4	0.0	
Initial Queue Delay (d_3), s/veh	0.0		0.0					0.0		0.0	0.0	
Control Delay (*d*), s/veh	29.5		27.0					29.5		29.5	6.8	
Level of Service (LOS)	C		C					C		C	A	
Approach Delay, s/veh / LOS	29.1	C		0.0			29.5	C		21.8	C	
Intersection Delay, s/veh / LOS	26.4						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS								
Bicycle LOS Score / LOS								

HCS7 Two-Way Stop-Control Report

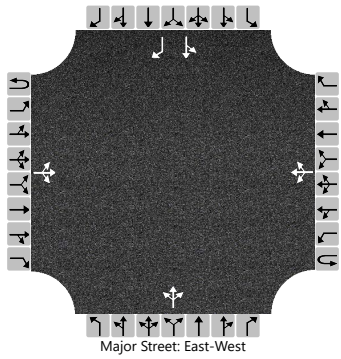
General Information

Analyst	ABC
Agency/Co.	TMS Engineers, Inc.
Date Performed	6/2/2020
Analysis Year	2022
Time Analyzed	AM Peak
Intersection Orientation	East-West
Project Description	Existing Conditions

Site Information

Intersection	Cooper Foster & Hollstein
Jurisdiction	Amherst, OH
East/West Street	Cooper Foster Park Road
North/South Street	Hollstein Drive
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	1	1
Configuration			LTR				LTR				LTR			LT		R
Volume (veh/h)		58	70	30		9	105	25		18	0	6		28	0	57
Percent Heavy Vehicles (%)		3				3				3	0	3		3	0	3
Proportion Time Blocked																
Percent Grade (%)										0				0		
Right Turn Channelized														No		
Median Type | Storage			Undivided													

Critical and Follow-up Headways

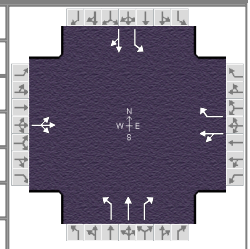
Base Critical Headway (sec)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2
Critical Headway (sec)		4.13				4.13				7.13	6.50	6.23		7.13	6.50	6.23
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.23				2.23				3.53	4.00	3.33		3.53	4.00	3.33

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		63				10					26			30		62
Capacity, c (veh/h)		1436				1476					570			558		920
v/c Ratio		0.04				0.01					0.05			0.05		0.07
95% Queue Length, Q_{95} (veh)		0.1				0.0					0.1			0.2		0.2
Control Delay (s/veh)		7.6				7.5					11.6			11.8		9.2
Level of Service (LOS)		A				A					B			B		A
Approach Delay (s/veh)	3.0				0.5				11.6				10.1			
Approach LOS									B				B			

HCS7 Signalized Intersection Results Summary

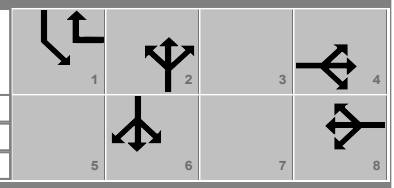
General Information				Intersection Information	
Agency	TMS Engineers, Inc.			Duration, h	0.250
Analyst	ABC	Analysis Date	Jun 2, 2020	Area Type	Other
Jurisdiction	Amherst, OH	Time Period	AM Peak	PHF	0.92
Urban Street	North Main Street	Analysis Year	2022	Analysis Period	1> 7:00
Intersection	@ Cooper Foster Park…	File Name	AM 22 Main.xus		
Project Description	Existing Conditions				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	37	104	63	30	81	233	44	183	60	195	174	44

Signal Information			
Cycle, s	75.0	Reference Phase	2
Offset, s	0	Reference Point	Begin
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	7.0	26.3	26.7	0.0	0.0	0.0
Yellow	4.0	4.0	4.0	0.0	0.0	0.0
Red	1.0	1.0	1.0	0.0	0.0	0.0



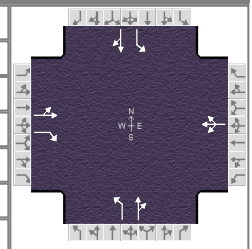
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8		2	1	6
Case Number		8.0		7.0		5.3	1.0	4.0
Phase Duration, s		31.7		31.7		31.3	12.0	43.3
Change Period, ($Y+R_c$), s		5.0		5.0		5.0	5.0	5.0
Max Allow Headway (*MAH*), s		3.2		3.2		3.1	3.0	3.1
Queue Clearance Time (g_s), s		8.9		9.8		7.8	7.3	7.5
Green Extension Time (g_e), s		1.1		0.0		0.0	0.0	1.0
Phase Call Probability		1.00		1.00		1.00	1.00	1.00
Max Out Probability		0.00		1.00		1.00	1.00	0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h		222			121	253	48	199	65	212	237	
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1689			1688	1598	1062	1856	1610	1795	1805	
Queue Service Time (g_s), s		0.0			0.0	7.8	2.3	5.8	2.1	5.3	5.5	
Cycle Queue Clearance Time (g_c), s		6.9			3.3	7.8	2.3	5.8	2.1	5.3	5.5	
Green Ratio (*g/C*)		0.36			0.36	0.45	0.35	0.35	0.35	0.47	0.51	
Capacity (*c*), veh/h		658			662	718	468	651	565	589	922	
Volume-to-Capacity Ratio (*X*)		0.337			0.182	0.353	0.102	0.306	0.116	0.360	0.257	
Back of Queue (*Q*), ft/ln (95 th percentile)		120.6			60.8	1	25.8	108	32.1	86.5	88.8	
Back of Queue (*Q*), veh/ln (95 th percentile)		4.7			2.4	0.0	0.9	4.2	1.3	3.4	3.5	
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00			0.00	0.00	0.09	0.00	0.12	0.18	0.00	
Uniform Delay (d_1), s/veh		17.8			16.6	13.5	16.6	17.7	16.5	12.4	10.3	
Incremental Delay (d_2), s/veh		0.1			0.0	0.1	0.0	0.1	0.0	0.1	0.1	
Initial Queue Delay (d_3), s/veh		0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Control Delay (*d*), s/veh		17.9			16.7	13.6	16.6	17.8	16.5	12.6	10.4	
Level of Service (LOS)		B			B	B	B	B	B	B	B	
Approach Delay, s/veh / LOS	17.9	B		14.6	B		17.4	B		11.4	B	
Intersection Delay, s/veh / LOS	14.7						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS								
Bicycle LOS Score / LOS								

HCS7 Signalized Intersection Results Summary

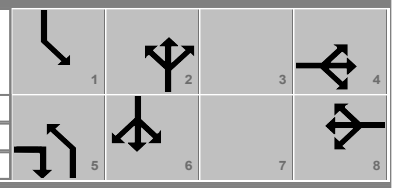
General Information				Intersection Information	
Agency	TMS Engineers, Inc.			Duration, h	0.250
Analyst	ABC	Analysis Date	Jun 2, 2020	Area Type	Other
Jurisdiction	Lorain, OH	Time Period	PM Peak	PHF	0.92
Urban Street	Oak Point Road	Analysis Year	2022	Analysis Period	1> 7:00
Intersection	@ Buck Horn/Park Square	File Name	PM 22 BuckHorn.xus		
Project Description	Existing Conditions				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	100	10	50	60	10	30	110	452	10	10	413	90

Signal Information			
Cycle, s	100.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	7.0	43.1	31.9	0.0	0.0	0.0
Yellow	4.0	4.0	4.0	0.0	0.0	0.0
Red	2.0	2.0	2.0	0.0	0.0	0.0



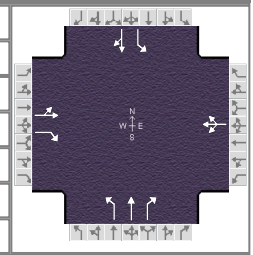
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2	1	6
Case Number		7.0		8.0	1.1	4.0	1.1	4.0
Phase Duration, s		37.9		37.9	13.0	49.1	13.0	49.1
Change Period, ($Y+R_c$), s		6.0		6.0	6.0	6.0	6.0	6.0
Max Allow Headway (*MAH*), s		3.2		3.2	3.1	3.1	3.1	3.1
Queue Clearance Time (g_s), s		8.2		6.9	5.6	22.8	2.3	26.3
Green Extension Time (g_e), s		0.5		0.0	0.0	0.0	0.0	2.1
Phase Call Probability		1.00		1.00	1.00	1.00	1.00	1.00
Max Out Probability		0.00		1.00	1.00	1.00	0.02	0.01

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h		120	54		109		120	502		11	547	
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1411	1610		1514		1767	1878		1810	1826	
Queue Service Time (g_s), s		1.3	2.1		0.0		3.6	20.8		0.3	24.3	
Cycle Queue Clearance Time (g_c), s		6.2	2.1		4.9		3.6	20.8		0.3	24.3	
Green Ratio (*g/C*)		0.32	0.39		0.32		0.50	0.43		0.50	0.43	
Capacity (*c*), veh/h		519	626		541		339	809		384	787	
Volume-to-Capacity Ratio (*X*)		0.230	0.087		0.201		0.353	0.620		0.028	0.695	
Back of Queue (*Q*), ft/ln (95 th percentile)		94.3	35.2		84.7		64.4	349.6		5.3	395.1	
Back of Queue (*Q*), veh/ln (95 th percentile)		3.7	1.4		3.3		2.5	13.9		0.2	15.7	
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00	0.23		0.00		0.20	0.00		0.02	0.00	
Uniform Delay (d_1), s/veh		25.3	19.3		24.8		17.4	22.1		15.2	23.1	
Incremental Delay (d_2), s/veh		0.1	0.0		0.1		0.2	1.1		0.0	2.2	
Initial Queue Delay (d_3), s/veh		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Control Delay (*d*), s/veh		25.4	19.3		24.9		17.6	23.2		15.2	25.3	
Level of Service (LOS)		C	B		C		B	C		B	C	
Approach Delay, s/veh / LOS	23.5	C		24.9	C		22.1	C		25.1	C	
Intersection Delay, s/veh / LOS	23.6						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS								
Bicycle LOS Score / LOS								

HCS7 Signalized Intersection Results Summary

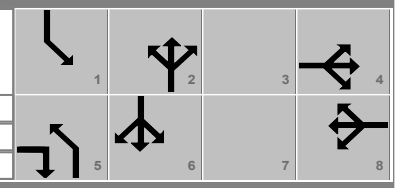
General Information				Intersection Information	
Agency	TMS Engineers, Inc.			Duration, h	0.250
Analyst	ABC	Analysis Date	Jun 2, 2020	Area Type	Other
Jurisdiction	Amherst, OH	Time Period	PM Peak	PHF	0.92
Urban Street	Oak Point Road	Analysis Year	2022	Analysis Period	1> 7:00
Intersection	@ Cooper Foster Park…	File Name	PM 22 CooperFoster.xus		
Project Description	Existing Conditions				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	68	91	37	202	108	64	364	440	150	74	394	55

Signal Information			
Cycle, s	100.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	7.0	4.0	32.4	32.6	0.0	0.0
Yellow	4.0	4.0	4.0	4.0	0.0	0.0
Red	2.0	2.0	2.0	2.0	0.0	0.0



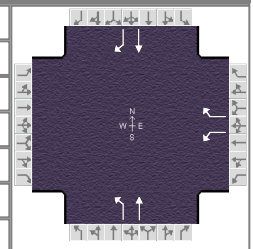
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2	1	6
Case Number		7.0		8.0	1.1	3.0	1.1	4.0
Phase Duration, s		38.6		38.6	23.0	48.4	13.0	38.4
Change Period, ($Y+R_c$), s		6.0		6.0	6.0	6.0	6.0	6.0
Max Allow Headway (*MAH*), s		3.2		3.2	3.1	3.1	3.1	3.1
Queue Clearance Time (g_s), s		10.5		29.1	16.0	21.8	4.9	26.3
Green Extension Time (g_e), s		1.3		0.0	0.1	0.0	0.0	1.5
Phase Call Probability		1.00		1.00	1.00	1.00	1.00	1.00
Max Out Probability		0.00		1.00	1.00	1.00	1.00	0.41

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h		173	40		407		396	478	163	80	488	
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1450	1585		1424		1767	1870	1560	1767	1845	
Queue Service Time (g_s), s		0.0	1.3		18.6		14.0	19.8	6.7	2.9	24.3	
Cycle Queue Clearance Time (g_c), s		8.5	1.3		27.1		14.0	19.8	6.7	2.9	24.3	
Green Ratio (*g/C*)		0.33	0.50		0.33		0.51	0.42	0.42	0.39	0.32	
Capacity (*c*), veh/h		524	786		520		445	793	661	383	598	
Volume-to-Capacity Ratio (*X*)		0.330	0.051		0.782		0.889	0.603	0.247	0.210	0.817	
Back of Queue (*Q*), ft/ln (95 th percentile)		138.1	20.6		387.9		309.9	337.1	109.8	53.6	437.9	
Back of Queue (*Q*), veh/ln (95 th percentile)		5.5	0.8		15.0		12.1	13.3	4.3	2.1	17.4	
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00	0.27		0.00		2.58	0.00	0.91	0.16	0.00	
Uniform Delay (d_1), s/veh		25.4	13.0		32.0		20.4	22.3	18.5	20.0	31.1	
Incremental Delay (d_2), s/veh		0.1	0.0		7.0		18.7	0.9	0.1	0.1	8.1	
Initial Queue Delay (d_3), s/veh		0.0	0.0		0.0		0.0	0.0	0.0	0.0	0.0	
Control Delay (*d*), s/veh		25.5	13.0		39.0		39.1	23.2	18.6	20.1	39.2	
Level of Service (LOS)		C	B		D		D	C	B	C	D	
Approach Delay, s/veh / LOS	23.1	C		39.0	D		28.5	C		36.5	D	
Intersection Delay, s/veh / LOS	32.0						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS								
Bicycle LOS Score / LOS								

HCS7 Signalized Intersection Results Summary

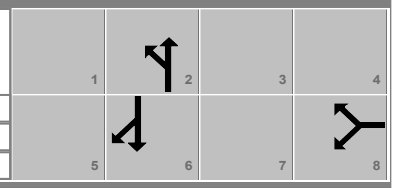
General Information				Intersection Information	
Agency	TMS Engineers, Inc.			Duration, h	0.250
Analyst	ABC	Analysis Date	Jun 2, 2020	Area Type	Other
Jurisdiction	Amherst, OH	Time Period	PM Peak	PHF	0.92
Urban Street	North Lake Street	Analysis Year	2022	Analysis Period	1> 7:00
Intersection	@ SR 2 WB Ramps	File Name	PM 22 Westbound2.xus		
Project Description	Existing Conditions				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h				300		472	60	482			761	214

Signal Information			
Cycle, s	100.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	51.3	36.7	0.0	0.0	0.0	0.0	
Yellow	4.0	4.0	0.0	0.0	0.0	0.0	
Red	2.0	2.0	0.0	0.0	0.0	0.0	



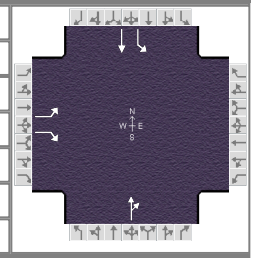
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase				8		2		6
Case Number				9.0		6.0		7.0
Phase Duration, s				42.7		57.3		57.3
Change Period, ($Y+R_c$), s				6.0		6.0		6.0
Max Allow Headway (*MAH*), s				3.3		3.2		3.2
Queue Clearance Time (g_s), s				31.9		50.0		40.6
Green Extension Time (g_e), s				1.1		0.0		3.4
Phase Call Probability				1.00		1.00		1.00
Max Out Probability				0.59		1.00		0.28

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement				3		18	5	2			6	16
Adjusted Flow Rate (*v*), veh/h				326		513	65	524			827	233
Adjusted Saturation Flow Rate (*s*), veh/h/ln				1795		1598	673	1870			1870	1585
Queue Service Time (g_s), s				14.0		29.9	9.4	19.0			38.6	8.4
Cycle Queue Clearance Time (g_c), s				14.0		29.9	48.0	19.0			38.6	8.4
Green Ratio (*g/C*)				0.37		0.37	0.51	0.51			0.51	0.51
Capacity (*c*), veh/h				659		586	157	959			959	813
Volume-to-Capacity Ratio (*X*)				0.495		0.875	0.415	0.546			0.862	0.286
Back of Queue (*Q*), ft/ln (95 th percentile)				246		480.4	70	311			619.2	130.4
Back of Queue (*Q*), veh/ln (95 th percentile)				9.8		19.1	2.8	12.2			24.4	5.1
Queue Storage Ratio (*RQ*) (95 th percentile)				1.76		0.00	0.41	0.00			0.00	1.09
Uniform Delay (d_1), s/veh				24.5		29.5	42.2	16.5			21.3	13.9
Incremental Delay (d_2), s/veh				0.2		13.4	0.6	0.4			7.8	0.1
Initial Queue Delay (d_3), s/veh				0.0		0.0	0.0	0.0			0.0	0.0
Control Delay (*d*), s/veh				24.7		42.9	42.9	16.8			29.0	14.0
Level of Service (LOS)				C		D	D	B			C	B
Approach Delay, s/veh / LOS	0.0			35.8	D		19.7	B		25.7	C	
Intersection Delay, s/veh / LOS	27.7						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS								
Bicycle LOS Score / LOS								

HCS7 Signalized Intersection Results Summary

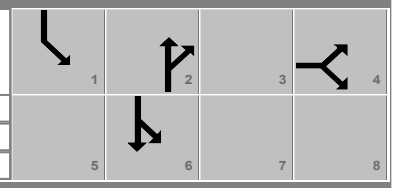
General Information				Intersection Information	
Agency	TMS Engineers, Inc.			Duration, h	0.250
Analyst	ABC	Analysis Date	Jun 2, 2020	Area Type	Other
Jurisdiction	Amherst, OH	Time Period	PM Peak	PHF	0.92
Urban Street	North Lake Street	Analysis Year	2022	Analysis Period	1> 7:00
Intersection	@ SR 2 EB Ramps	File Name	PM 22 Eastbound2.xus		
Project Description	Existing Conditions				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	157		70					385	150	431	630	

Signal Information			
Cycle, s	100.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	21.2	39.2	21.6	0.0	0.0	0.0
Yellow	4.0	4.0	4.0	0.0	0.0	0.0
Red	2.0	2.0	2.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4				2	1	6
Case Number		9.0				8.3	1.0	4.0
Phase Duration, s		27.6				45.2	27.2	72.4
Change Period, ($Y+R_c$), s		6.0				6.0	6.0	6.0
Max Allow Headway (*MAH*), s		3.2				3.1	3.1	3.1
Queue Clearance Time (g_s), s		10.3				30.8	17.8	21.2
Green Extension Time (g_e), s		0.4				0.0	0.4	2.8
Phase Call Probability		1.00				1.00	1.00	1.00
Max Out Probability		0.00				1.00	0.86	0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7		14					2	12	1	6	
Adjusted Flow Rate (*v*), veh/h	171		76					582		468	685	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1781		1610					1809		1795	1885	
Queue Service Time (g_s), s	8.3		3.9					28.8		15.8	19.2	
Cycle Queue Clearance Time (g_c), s	8.3		3.9					28.8		15.8	19.2	
Green Ratio (*g/C*)	0.22		0.22					0.39		0.62	0.66	
Capacity (*c*), veh/h	385		348					709		540	1252	
Volume-to-Capacity Ratio (*X*)	0.444		0.219					0.820		0.868	0.547	
Back of Queue (*Q*), ft/ln (95 th percentile)	162.5		67.6					479.8		273.6	279.6	
Back of Queue (*Q*), veh/ln (95 th percentile)	6.4		2.7					19.2		10.9	11.1	
Queue Storage Ratio (*RQ*) (95 th percentile)	0.86		0.00					0.00		1.61	0.00	
Uniform Delay (d_1), s/veh	34.0		32.3					27.2		20.9	8.9	
Incremental Delay (d_2), s/veh	0.3		0.1					7.1		13.5	0.3	
Initial Queue Delay (d_3), s/veh	0.0		0.0					0.0		0.0	0.0	
Control Delay (*d*), s/veh	34.3		32.4					34.4		34.4	9.2	
Level of Service (LOS)	C		C					C		C	A	
Approach Delay, s/veh / LOS	33.7	C		0.0			34.4	C		19.4	B	
Intersection Delay, s/veh / LOS	25.6						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS								
Bicycle LOS Score / LOS								

HCS7 Two-Way Stop-Control Report

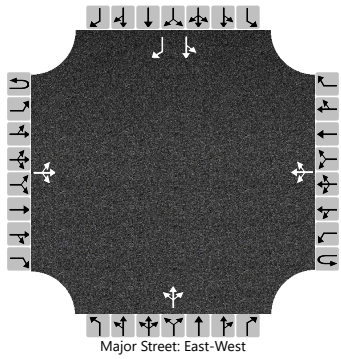
General Information

Analyst	ABC
Agency/Co.	TMS Engineers, Inc.
Date Performed	6/2/2020
Analysis Year	2022
Time Analyzed	PM Peak
Intersection Orientation	East-West
Project Description	Existing Conditions

Site Information

Intersection	Cooper Foster & Hollstein
Jurisdiction	Amherst, OH
East/West Street	Cooper Foster Park Road
North/South Street	Hollstein Drive
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	1	1
Configuration			LTR				LTR				LTR			LT		R
Volume (veh/h)		58	209	18		10	144	36		25	0	18		37	0	55
Percent Heavy Vehicles (%)		3				3				3	0	3		3	0	3
Proportion Time Blocked																
Percent Grade (%)										0				0		
Right Turn Channelized														No		
Median Type | Storage			Undivided													

Critical and Follow-up Headways

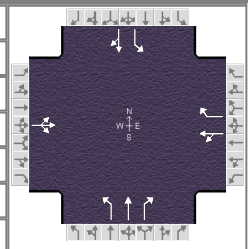
Base Critical Headway (sec)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2
Critical Headway (sec)		4.13				4.13				7.13	6.50	6.23		7.13	6.50	6.23
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.23				2.23				3.53	4.00	3.33		3.53	4.00	3.33

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		63				11					47			40		60
Capacity, c (veh/h)		1371				1313					477			400		865
v/c Ratio		0.05				0.01					0.10			0.10		0.07
95% Queue Length, Q_{95} (veh)		0.1				0.0					0.3			0.3		0.2
Control Delay (s/veh)		7.8				7.8					13.4			15.0		9.5
Level of Service (LOS)		A				A					B			C		A
Approach Delay (s/veh)		1.9				0.5				13.4				11.7		
Approach LOS										B				B		

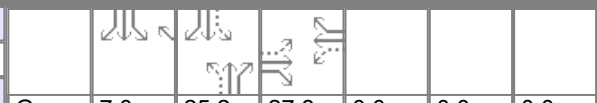
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	TMS Engineers, Inc.			Duration, h	0.250
Analyst	ABC	Analysis Date	Jun 2, 2020	Area Type	Other
Jurisdiction	Amherst, OH	Time Period	PM Peak	PHF	0.92
Urban Street	North Main Street	Analysis Year	2022	Analysis Period	1> 7:00
Intersection	@ Cooper Foster Park…	File Name	PM 22 Main.xus		
Project Description	Existing Conditions				

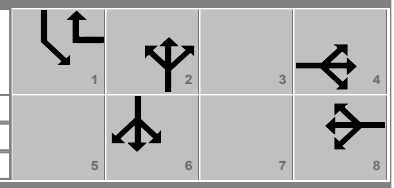


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	94	143	47	70	136	184	41	144	70	263	173	83

Signal Information			
Cycle, s	75.0	Reference Phase	2
Offset, s	0	Reference Point	Begin
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	7.0	25.2	27.8	0.0	0.0	0.0
Yellow	4.0	4.0	4.0	0.0	0.0	0.0
Red	1.0	1.0	1.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8		2	1	6
Case Number		8.0		7.0		5.3	1.0	4.0
Phase Duration, s		32.8		32.8		30.2	12.0	42.2
Change Period, ($Y+R_c$), s		5.0		5.0		5.0	5.0	5.0
Max Allow Headway (*MAH*), s		3.2		3.2		3.1	3.0	3.1
Queue Clearance Time (g_s), s		12.5		8.9		6.5	9.0	9.0
Green Extension Time (g_e), s		1.4		0.0		0.1	0.0	1.0
Phase Call Probability		1.00		1.00		1.00	1.00	1.00
Max Out Probability		0.00		1.00		1.00	1.00	0.00

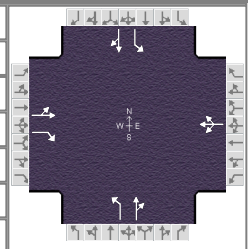
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h		309			224	200	45	157	76	286	278	
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1628			1626	1598	1118	1885	1610	1795	1781	
Queue Service Time (g_s), s		3.6			0.0	5.8	2.1	4.5	2.5	7.0	7.0	
Cycle Queue Clearance Time (g_c), s		10.5			6.9	5.8	2.1	4.5	2.5	7.0	7.0	
Green Ratio (*g/C*)		0.37			0.37	0.46	0.34	0.34	0.34	0.46	0.50	
Capacity (*c*), veh/h		667			667	741	472	633	541	606	884	
Volume-to-Capacity Ratio (*X*)		0.463			0.336	0.270	0.094	0.247	0.141	0.472	0.315	
Back of Queue (*Q*), ft/ln (95 th percentile)		170.2			115.9	84.1	22.6	83.8	38.9	127.3	111.6	
Back of Queue (*Q*), veh/ln (95 th percentile)		6.8			4.6	3.3	0.9	3.3	1.6	5.1	4.4	
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00			0.00	0.23	0.08	0.00	0.14	0.26	0.00	
Uniform Delay (d_1), s/veh		18.0			16.9	12.3	17.2	18.0	17.4	14.0	11.3	
Incremental Delay (d_2), s/veh		0.2			0.1	0.1	0.0	0.1	0.0	0.2	0.1	
Initial Queue Delay (d_3), s/veh		0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Control Delay (*d*), s/veh		18.2			17.0	12.4	17.3	18.1	17.4	14.2	11.4	
Level of Service (LOS)		B			B	B	B	B	B	B	B	
Approach Delay, s/veh / LOS	18.2	B		14.8	B		17.8	B		12.8	B	
Intersection Delay, s/veh / LOS	15.3						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS								
Bicycle LOS Score / LOS								

Appendix K
Build Capacity Analysis Worksheets - 2042

HCS7 Signalized Intersection Results Summary

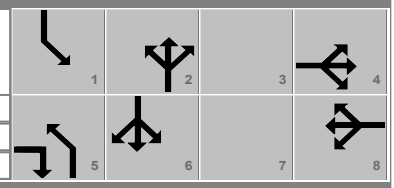
General Information				Intersection Information	
Agency	TMS Engineers, Inc.			Duration, h	0.250
Analyst	ABC	Analysis Date	Jun 2, 2020	Area Type	Other
Jurisdiction	Lorain, OH	Time Period	AM Peak	PHF	0.92
Urban Street	Oak Point Road	Analysis Year	2042	Analysis Period	1> 7:00
Intersection	@ Buck Horn/Park Square	File Name	AM 42 BuckHorn.xus		
Project Description	Existing Conditions				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	30	10	50	10	0	10	30	238	30	40	392	30

Signal Information			
Cycle, s	90.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	7.0	34.7	30.3	0.0	0.0	0.0
Yellow	4.0	4.0	4.0	0.0	0.0	0.0
Red	2.0	2.0	2.0	0.0	0.0	0.0



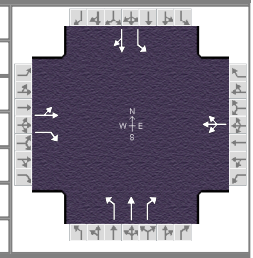
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2	1	6
Case Number		7.0		8.0	1.1	4.0	1.1	4.0
Phase Duration, s		36.3		36.3	13.0	40.7	13.0	40.7
Change Period, ($Y+R_c$), s		6.0		6.0	6.0	6.0	6.0	6.0
Max Allow Headway (*MAH*), s		3.2		3.2	3.1	3.1	3.1	3.1
Queue Clearance Time (g_s), s		4.0		2.8	2.9	12.3	3.2	20.1
Green Extension Time (g_e), s		0.2		0.1	0.0	0.0	0.0	1.3
Phase Call Probability		1.00		1.00	1.00	1.00	1.00	1.00
Max Out Probability		0.00		0.29	0.16	1.00	0.30	0.01

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h		43	54		22		33	291		43	459	
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1529	1510		1528		1810	1848		1810	1861	
Queue Service Time (g_s), s		0.8	2.0		0.0		0.9	10.3		1.2	18.1	
Cycle Queue Clearance Time (g_c), s		1.6	2.0		0.8		0.9	10.3		1.2	18.1	
Green Ratio (*g/C*)		0.34	0.41		0.34		0.46	0.39		0.46	0.39	
Capacity (*c*), veh/h		585	626		574		375	712		495	718	
Volume-to-Capacity Ratio (*X*)		0.074	0.087		0.038		0.087	0.409		0.088	0.639	
Back of Queue (*Q*), ft/ln (95 th percentile)		27.2	31.2		13.4		15.5	192.9		20.7	310.7	
Back of Queue (*Q*), veh/ln (95 th percentile)		1.1	1.2		0.5		0.6	7.7		0.8	12.3	
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00	0.21		0.00		0.05	0.00		0.08	0.00	
Uniform Delay (d_1), s/veh		20.3	16.0		20.1		15.5	20.2		14.2	22.5	
Incremental Delay (d_2), s/veh		0.0	0.0		0.0		0.0	0.1		0.0	1.5	
Initial Queue Delay (d_3), s/veh		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Control Delay (*d*), s/veh		20.3	16.0		20.1		15.6	20.3		14.2	24.0	
Level of Service (LOS)		C	B		C		B	C		B	C	
Approach Delay, s/veh / LOS	17.9	B		20.1	C		19.8	B		23.2	C	
Intersection Delay, s/veh / LOS	21.4						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS								
Bicycle LOS Score / LOS								

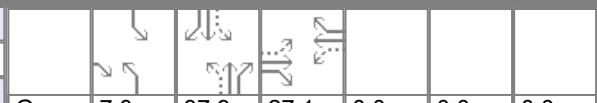
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	TMS Engineers, Inc.			Duration, h	0.250
Analyst	ABC	Analysis Date	Jun 2, 2020	Area Type	Other
Jurisdiction	Amherst, OH	Time Period	AM Peak	PHF	0.92
Urban Street	Oak Point Road	Analysis Year	2042	Analysis Period	1> 7:00
Intersection	@ Cooper Foster Park…	File Name	AM 42 CooperFoster.xus		
Project Description	Existing Conditions				

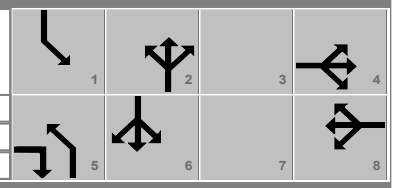


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	12	36	163	129	55	46	165	240	404	68	338	46

Signal Information			
Cycle, s	90.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	7.0	37.9	27.1	0.0	0.0	0.0
Yellow	4.0	4.0	4.0	0.0	0.0	0.0
Red	2.0	2.0	2.0	0.0	0.0	0.0



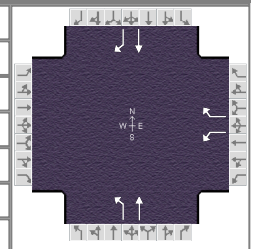
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2	1	6
Case Number		7.0		8.0	1.1	3.0	1.1	4.0
Phase Duration, s		33.1		33.1	13.0	43.9	13.0	43.9
Change Period, ($Y+R_c$), s		6.0		6.0	6.0	6.0	6.0	6.0
Max Allow Headway (*MAH*), s		3.2		3.2	3.1	3.2	3.1	3.2
Queue Clearance Time (g_s), s		9.4		14.3	7.1	22.0	3.9	17.4
Green Extension Time (g_e), s		0.9		0.0	0.0	0.0	0.0	2.4
Phase Call Probability		1.00		1.00	1.00	1.00	1.00	1.00
Max Out Probability		0.00		1.00	1.00	1.00	1.00	0.01

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h		52	177		250		179	261	439	74	417	
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1625	1522		1512		1753	1870	1585	1810	1831	
Queue Service Time (g_s), s		0.0	7.4		10.3		5.1	8.4	20.0	1.9	15.4	
Cycle Queue Clearance Time (g_c), s		1.9	7.4		12.3		5.1	8.4	20.0	1.9	15.4	
Green Ratio (*g/C*)		0.30	0.38		0.30		0.50	0.42	0.42	0.50	0.42	
Capacity (*c*), veh/h		539	577		518		434	788	667	567	771	
Volume-to-Capacity Ratio (*X*)		0.097	0.307		0.483		0.413	0.331	0.658	0.130	0.541	
Back of Queue (*Q*), ft/ln (95 th percentile)		37.4	118.9		197.7		88.3	158.6	296.9	32.8	262.8	
Back of Queue (*Q*), veh/ln (95 th percentile)		1.4	4.5		7.7		3.4	6.2	11.7	1.3	10.3	
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00	1.59		0.00		0.74	0.00	2.47	0.10	0.00	
Uniform Delay (d_1), s/veh		22.6	19.6		26.1		14.7	17.5	20.9	12.4	19.5	
Incremental Delay (d_2), s/veh		0.0	0.1		0.3		0.2	0.1	1.9	0.0	0.4	
Initial Queue Delay (d_3), s/veh		0.0	0.0		0.0		0.0	0.0	0.0	0.0	0.0	
Control Delay (*d*), s/veh		22.7	19.8		26.4		14.9	17.6	22.8	12.5	20.0	
Level of Service (LOS)		C	B		C		B	B	C	B	B	
Approach Delay, s/veh / LOS	20.4	C		26.4	C		19.6	B		18.8	B	
Intersection Delay, s/veh / LOS	20.4						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS								
Bicycle LOS Score / LOS								

HCS7 Signalized Intersection Results Summary

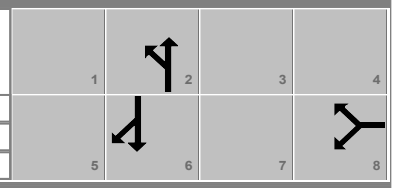
General Information				Intersection Information	
Agency	TMS Engineers, Inc.			Duration, h	0.250
Analyst	ABC	Analysis Date	Jun 2, 2020	Area Type	Other
Jurisdiction	Amherst, OH	Time Period	AM Peak	PHF	0.92
Urban Street	North Lake Street	Analysis Year	2042	Analysis Period	1> 7:00
Intersection	@ SR 2 WB Ramps	File Name	AM 42 Westbound2.xus		
Project Description	Existing Conditions				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h				80		388	50	421			479	151

Signal Information			
Cycle, s	90.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	42.9	35.1	0.0	0.0	0.0	0.0	
Yellow	4.0	4.0	0.0	0.0	0.0	0.0	
Red	2.0	2.0	0.0	0.0	0.0	0.0	



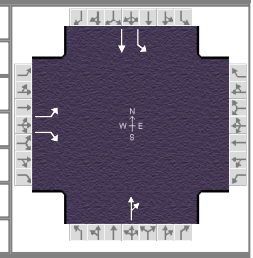
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase				8		2		6
Case Number				9.0		6.0		7.0
Phase Duration, s				41.1		48.9		48.9
Change Period, ($Y+R_c$), s				6.0		6.0		6.0
Max Allow Headway (*MAH*), s				3.3		3.1		3.1
Queue Clearance Time (g_s), s				22.1		24.6		20.4
Green Extension Time (g_e), s				1.0		0.0		2.5
Phase Call Probability				1.00		1.00		1.00
Max Out Probability				0.01		1.00		0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement				3		18	5	2			6	16
Adjusted Flow Rate (*v*), veh/h				87		422	54	458			521	164
Adjusted Saturation Flow Rate (*s*), veh/h/ln				1626		1572	895	1870			1856	1598
Queue Service Time (g_s), s				3.1		20.1	4.2	15.3			18.4	5.4
Cycle Queue Clearance Time (g_c), s				3.1		20.1	22.6	15.3			18.4	5.4
Green Ratio (*g/C*)				0.39		0.39	0.48	0.48			0.48	0.48
Capacity (*c*), veh/h				634		613	324	891			884	762
Volume-to-Capacity Ratio (*X*)				0.137		0.688	0.168	0.513			0.589	0.216
Back of Queue (*Q*), ft/ln (95 th percentile)				55.6		305.4	39.6	258			303.8	83.4
Back of Queue (*Q*), veh/ln (95 th percentile)				2.0		11.9	1.6	10.2			11.9	3.3
Queue Storage Ratio (*RQ*) (95 th percentile)				0.40		0.00	0.23	0.00			0.00	0.70
Uniform Delay (d_1), s/veh				17.7		22.9	25.4	16.3			17.1	13.7
Incremental Delay (d_2), s/veh				0.0		2.7	0.1	0.2			0.7	0.1
Initial Queue Delay (d_3), s/veh				0.0		0.0	0.0	0.0			0.0	0.0
Control Delay (*d*), s/veh				17.7		25.6	25.5	16.5			17.8	13.8
Level of Service (LOS)				B		C	C	B			B	B
Approach Delay, s/veh / LOS	0.0			24.2		C	17.5		B	16.9		B
Intersection Delay, s/veh / LOS	19.3						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS								
Bicycle LOS Score / LOS								

HCS7 Signalized Intersection Results Summary

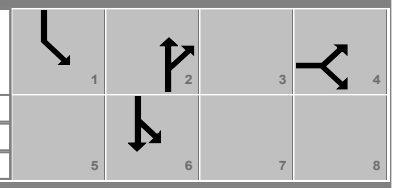
General Information				Intersection Information	
Agency	TMS Engineers, Inc.			Duration, h	0.250
Analyst	ABC	Analysis Date	Jun 2, 2020	Area Type	Other
Jurisdiction	Amherst, OH	Time Period	AM Peak	PHF	0.92
Urban Street	North Lake Street	Analysis Year	2042	Analysis Period	1> 7:00
Intersection	@ SR 2 EB Ramps	File Name	AM 42 Eastbound2.xus		
Project Description	Existing Conditions				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	192		40					279	330	364	195	

Signal Information			
Cycle, s	90.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	16.4	38.8	16.8	0.0	0.0	0.0
Yellow	4.0	4.0	4.0	0.0	0.0	0.0
Red	2.0	2.0	2.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4				2	1	6
Case Number		9.0				8.3	1.0	4.0
Phase Duration, s		22.8				44.8	22.4	67.2
Change Period, ($Y+R_c$), s		6.0				6.0	6.0	6.0
Max Allow Headway (*MAH*), s		3.2				3.2	3.1	3.2
Queue Clearance Time (g_s), s		11.8				34.1	14.4	5.8
Green Extension Time (g_e), s		0.2				0.0	0.2	2.0
Phase Call Probability		1.00				1.00	1.00	1.00
Max Out Probability		0.20				1.00	1.00	0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7		14					2	12	1	6	
Adjusted Flow Rate (*v*), veh/h	209		43					662		396	212	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1767		1560					1718		1753	1811	
Queue Service Time (g_s), s	9.8		2.1					32.1		12.4	3.8	
Cycle Queue Clearance Time (g_c), s	9.8		2.1					32.1		12.4	3.8	
Green Ratio (*g/C*)	0.19		0.19					0.43		0.64	0.68	
Capacity (*c*), veh/h	330		291					740		456	1232	
Volume-to-Capacity Ratio (*X*)	0.633		0.149					0.894		0.868	0.172	
Back of Queue (*Q*), ft/ln (95 th percentile)	199.1		36.1					527.6		405.4	55.9	
Back of Queue (*Q*), veh/ln (95 th percentile)	7.8		1.4					20.9		15.7	2.1	
Queue Storage Ratio (*RQ*) (95 th percentile)	1.05		0.00					0.00		2.38	0.00	
Uniform Delay (d_1), s/veh	33.8		30.6					23.7		21.2	5.2	
Incremental Delay (d_2), s/veh	3.0		0.1					13.0		15.5	0.0	
Initial Queue Delay (d_3), s/veh	0.0		0.0					0.0		0.0	0.0	
Control Delay (*d*), s/veh	36.7		30.7					36.7		36.8	5.2	
Level of Service (LOS)	D		C					D		D	A	
Approach Delay, s/veh / LOS	35.7	D		0.0			36.7	D		25.8	C	
Intersection Delay, s/veh / LOS	32.2						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS								
Bicycle LOS Score / LOS								

HCS7 Two-Way Stop-Control Report

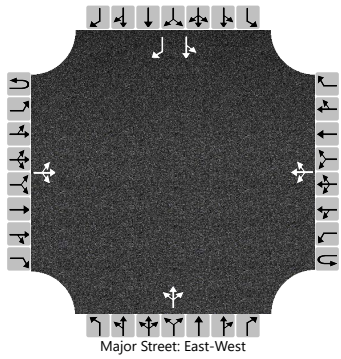
General Information

Analyst	ABC
Agency/Co.	TMS Engineers, Inc.
Date Performed	6/2/2020
Analysis Year	2042
Time Analyzed	AM Peak
Intersection Orientation	East-West
Project Description	Existing Conditions

Site Information

Intersection	Cooper Foster & Hollstein
Jurisdiction	Amherst, OH
East/West Street	Cooper Foster Park Road
North/South Street	Hollstein Drive
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	1	1
Configuration			LTR				LTR				LTR			LT		R
Volume (veh/h)		58	80	30		9	115	25		18	0	6		28	0	57
Percent Heavy Vehicles (%)		3				3				3	0	3		3	0	3
Proportion Time Blocked																
Percent Grade (%)										0				0		
Right Turn Channelized														No		
Median Type | Storage		Undivided														

Critical and Follow-up Headways

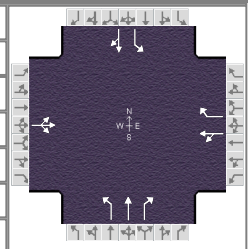
Base Critical Headway (sec)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2
Critical Headway (sec)		4.13				4.13				7.13	6.50	6.23		7.13	6.50	6.23
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.23				2.23				3.53	4.00	3.33		3.53	4.00	3.33

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		63				10					26			30		62
Capacity, c (veh/h)		1422				1462					552			539		907
v/c Ratio		0.04				0.01					0.05			0.06		0.07
95% Queue Length, Q_{95} (veh)		0.1				0.0					0.1			0.2		0.2
Control Delay (s/veh)		7.6				7.5					11.8			12.1		9.3
Level of Service (LOS)		A				A					B			B		A
Approach Delay (s/veh)	2.9				0.5				11.8				10.2			
Approach LOS									B				B			

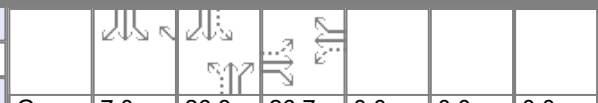
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	TMS Engineers, Inc.			Duration, h	0.250
Analyst	ABC	Analysis Date	Jun 2, 2020	Area Type	Other
Jurisdiction	Amherst, OH	Time Period	AM Peak	PHF	0.92
Urban Street	North Main Street	Analysis Year	2042	Analysis Period	1> 7:00
Intersection	@ Cooper Foster Park…	File Name	AM 42 Main.xus		
Project Description	Existing Conditions				

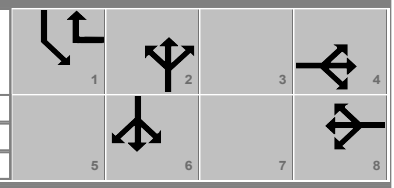


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	37	114	73	30	91	263	54	213	70	225	204	54

Signal Information			
Cycle, s	75.0	Reference Phase	2
Offset, s	0	Reference Point	Begin
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	7.0	26.3	26.7	0.0	0.0	0.0
Yellow	4.0	4.0	4.0	0.0	0.0	0.0
Red	1.0	1.0	1.0	0.0	0.0	0.0



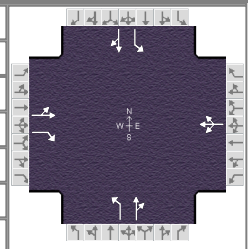
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8		2	1	6
Case Number		8.0		7.0		5.3	1.0	4.0
Phase Duration, s		31.7		31.7		31.3	12.0	43.3
Change Period, ($Y+R_c$), s		5.0		5.0		5.0	5.0	5.0
Max Allow Headway (*MAH*), s		3.2		3.2		3.1	3.0	3.1
Queue Clearance Time (g_s), s		9.7		11.0		8.9	8.3	8.8
Green Extension Time (g_e), s		1.2		0.0		0.0	0.0	1.2
Phase Call Probability		1.00		1.00		1.00	1.00	1.00
Max Out Probability		0.00		1.00		1.00	1.00	0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h		243			132	286	59	232	76	245	280	
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1692			1699	1598	1020	1856	1610	1795	1802	
Queue Service Time (g_s), s		0.0			0.0	9.0	3.0	6.9	2.4	6.3	6.8	
Cycle Queue Clearance Time (g_c), s		7.7			3.6	9.0	3.0	6.9	2.4	6.3	6.8	
Green Ratio (*g/C*)		0.36			0.36	0.45	0.35	0.35	0.35	0.47	0.51	
Capacity (*c*), veh/h		658			665	718	454	651	565	562	920	
Volume-to-Capacity Ratio (*X*)		0.370			0.198	0.398	0.129	0.356	0.135	0.435	0.305	
Back of Queue (*Q*), ft/ln (95 th percentile)		134.3			66.6	133	32.1	128.2	37.8	102.2	108	
Back of Queue (*Q*), veh/ln (95 th percentile)		5.3			2.6	5.3	1.2	5.0	1.5	4.1	4.3	
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00			0.00	0.36	0.12	0.00	0.14	0.21	0.00	
Uniform Delay (d_1), s/veh		18.0			16.7	13.9	16.8	18.1	16.6	12.8	10.6	
Incremental Delay (d_2), s/veh		0.1			0.1	0.1	0.0	0.1	0.0	0.2	0.1	
Initial Queue Delay (d_3), s/veh		0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Control Delay (*d*), s/veh		18.2			16.8	14.0	16.8	18.2	16.6	13.0	10.7	
Level of Service (LOS)		B			B	B	B	B	B	B	B	
Approach Delay, s/veh / LOS	18.2		B	14.9		B	17.6		B	11.8		B
Intersection Delay, s/veh / LOS	15.0						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS								
Bicycle LOS Score / LOS								

HCS7 Signalized Intersection Results Summary

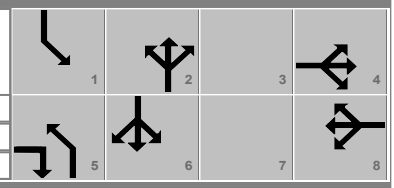
General Information				Intersection Information	
Agency	TMS Engineers, Inc.			Duration, h	0.250
Analyst	ABC	Analysis Date	Jun 2, 2020	Area Type	Other
Jurisdiction	Lorain, OH	Time Period	PM Peak	PHF	0.92
Urban Street	Oak Point Road	Analysis Year	2042	Analysis Period	1> 7:00
Intersection	@ Buck Horn/Park Square	File Name	PM 42 BuckHorn.xus		
Project Description	Existing Conditions				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	130	10	60	80	10	30	140	562	10	10	503	120

Signal Information			
Cycle, s	100.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	7.0	46.1	28.9	0.0	0.0	0.0
Yellow	4.0	4.0	4.0	0.0	0.0	0.0
Red	2.0	2.0	2.0	0.0	0.0	0.0



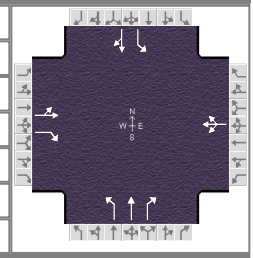
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2	1	6
Case Number		7.0		8.0	1.1	4.0	1.1	4.0
Phase Duration, s		34.9		34.9	13.0	52.1	13.0	52.1
Change Period, ($Y+R_c$), s		6.0		6.0	6.0	6.0	6.0	6.0
Max Allow Headway (*MAH*), s		3.2		3.2	3.1	3.1	3.1	3.1
Queue Clearance Time (g_s), s		10.6		8.4	6.4	28.7	2.3	33.9
Green Extension Time (g_e), s		0.6		0.0	0.0	0.0	0.0	2.5
Phase Call Probability		1.00		1.00	1.00	1.00	1.00	1.00
Max Out Probability		0.00		1.00	1.00	1.00	0.02	0.10

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h		152	65		130		152	622		11	677	
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1403	1610		1502		1767	1879		1810	1822	
Queue Service Time (g_s), s		2.2	2.7		0.0		4.4	26.7		0.3	31.9	
Cycle Queue Clearance Time (g_c), s		8.6	2.7		6.4		4.4	26.7		0.3	31.9	
Green Ratio (*g/C*)		0.29	0.36		0.29		0.53	0.46		0.53	0.46	
Capacity (*c*), veh/h		475	578		494		288	866		341	840	
Volume-to-Capacity Ratio (*X*)		0.320	0.113		0.264		0.528	0.718		0.032	0.806	
Back of Queue (*Q*), ft/ln (95 th percentile)		129.7	45.1		109		79.2	434.2		4.9	508.4	
Back of Queue (*Q*), veh/ln (95 th percentile)		5.1	1.8		4.3		3.1	17.2		0.2	20.2	
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00	0.30		0.00		0.24	0.00		0.02	0.00	
Uniform Delay (d_1), s/veh		28.3	21.4		27.5		19.2	21.7		15.2	23.1	
Incremental Delay (d_2), s/veh		0.1	0.0		0.1		0.9	2.5		0.0	5.4	
Initial Queue Delay (d_3), s/veh		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Control Delay (*d*), s/veh		28.5	21.4		27.6		20.1	24.2		15.2	28.5	
Level of Service (LOS)		C	C		C		C	C		B	C	
Approach Delay, s/veh / LOS	26.4	C		27.6	C		23.4	C		28.3	C	
Intersection Delay, s/veh / LOS	25.9						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS								
Bicycle LOS Score / LOS								

HCS7 Signalized Intersection Results Summary

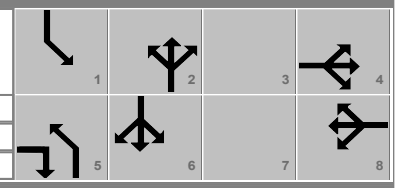
General Information				Intersection Information	
Agency	TMS Engineers, Inc.			Duration, h	0.250
Analyst	ABC	Analysis Date	Jun 2, 2020	Area Type	Other
Jurisdiction	Amherst, OH	Time Period	PM Peak	PHF	0.92
Urban Street	Oak Point Road	Analysis Year	2042	Analysis Period	1> 7:00
Intersection	@ Cooper Foster Park…	File Name	PM 42 CooperFoster.xus		
Project Description	Existing Conditions				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	78	121	479	242	128	84	454	550	180	84	494	65

Signal Information			
Cycle, s	100.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	7.0	8.5	30.2	30.3	0.0	0.0
Yellow	4.0	4.0	4.0	4.0	0.0	0.0
Red	2.0	2.0	2.0	2.0	0.0	0.0



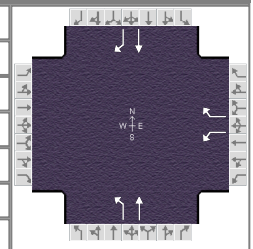
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2	1	6
Case Number		7.0		8.0	1.1	3.0	1.1	4.0
Phase Duration, s		36.3		36.3	27.5	50.7	13.0	36.2
Change Period, ($Y+R_c$), s		6.0		6.0	6.0	6.0	6.0	6.0
Max Allow Headway (*MAH*), s		3.3		3.3	3.1	3.1	3.1	3.1
Queue Clearance Time (g_s), s		25.6		32.3	23.5	28.0	5.4	32.2
Green Extension Time (g_e), s		1.6		0.0	0.0	0.0	0.0	0.0
Phase Call Probability		1.00		1.00	1.00	1.00	1.00	1.00
Max Out Probability		0.71		1.00	1.00	1.00	1.00	1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h		216	521		493		493	598	196	91	608	
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1455	1585		1336		1767	1870	1560	1767	1847	
Queue Service Time (g_s), s		0.0	23.6		18.9		21.5	26.0	7.9	3.4	30.2	
Cycle Queue Clearance Time (g_c), s		11.4	23.6		30.3		21.5	26.0	7.9	3.4	30.2	
Green Ratio (*g/C*)		0.30	0.52		0.30		0.54	0.45	0.45	0.37	0.30	
Capacity (*c*), veh/h		491	821		460		452	836	697	332	558	
Volume-to-Capacity Ratio (*X*)		0.441	0.634		1.073		1.092	0.715	0.281	0.275	1.090	
Back of Queue (*Q*), ft/ln (95 th percentile)		186.8	328.7		716.9		562.6	429	128.2	64	821.9	
Back of Queue (*Q*), veh/ln (95 th percentile)		7.4	12.9		27.8		22.0	16.9	5.0	2.5	32.6	
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00	4.38		0.00		4.69	0.00	1.07	0.19	0.00	
Uniform Delay (d_1), s/veh		28.0	17.3		37.2		30.2	22.5	17.5	21.8	34.9	
Incremental Delay (d_2), s/veh		0.2	1.2		62.9		69.5	2.5	0.1	0.2	64.7	
Initial Queue Delay (d_3), s/veh		0.0	0.0		0.0		0.0	0.0	0.0	0.0	0.0	
Control Delay (*d*), s/veh		28.2	18.5		100.1		99.7	25.0	17.6	22.0	99.6	
Level of Service (LOS)		C	B		F		F	C	B	C	F	
Approach Delay, s/veh / LOS	21.4	C		100.1	F		52.5	D		89.5	F	
Intersection Delay, s/veh / LOS	60.7						E					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS								
Bicycle LOS Score / LOS								

HCS7 Signalized Intersection Results Summary

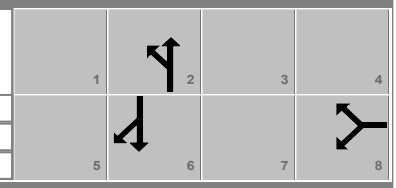
General Information				Intersection Information	
Agency	TMS Engineers, Inc.			Duration, h	0.250
Analyst	ABC	Analysis Date	Jun 2, 2020	Area Type	Other
Jurisdiction	Amherst, OH	Time Period	PM Peak	PHF	0.92
Urban Street	North Lake Street	Analysis Year	2042	Analysis Period	1> 7:00
Intersection	@ SR 2 WB Ramps	File Name	PM 42 Westbound2.xus		
Project Description	Existing Conditions				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h				380		582	80	602			941	274

Signal Information			
Cycle, s	100.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	55.8	32.2	0.0	0.0	0.0	0.0	
Yellow	4.0	4.0	0.0	0.0	0.0	0.0	
Red	2.0	2.0	0.0	0.0	0.0	0.0	



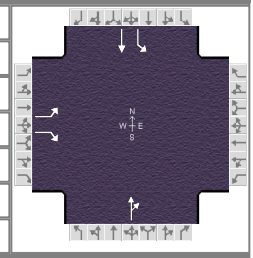
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase				8		2		6
Case Number				9.0		6.0		7.0
Phase Duration, s				38.2		61.8		61.8
Change Period, ($Y+R_c$), s				6.0		6.0		6.0
Max Allow Headway (*MAH*), s				3.3		3.2		3.2
Queue Clearance Time (g_s), s				34.2		57.8		55.3
Green Extension Time (g_e), s				0.0		0.0		0.3
Phase Call Probability				1.00		1.00		1.00
Max Out Probability				1.00		1.00		1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement				3		18	5	2			6	16
Adjusted Flow Rate (*v*), veh/h				413		633	87	654			1023	298
Adjusted Saturation Flow Rate (*s*), veh/h/ln				1795		1598	560	1870			1870	1585
Queue Service Time (g_s), s				20.3		32.2	2.4	23.8			53.3	10.2
Cycle Queue Clearance Time (g_c), s				20.3		32.2	55.8	23.8			53.3	10.2
Green Ratio (*g/C*)				0.32		0.32	0.56	0.56			0.56	0.56
Capacity (*c*), veh/h				578		514	86	1044			1044	884
Volume-to-Capacity Ratio (*X*)				0.714		1.230	1.015	0.627			0.980	0.337
Back of Queue (*Q*), ft/ln (95 th percentile)				351.1		1078.6	202.2	370.1			912.1	154.5
Back of Queue (*Q*), veh/ln (95 th percentile)				13.9		42.8	8.1	14.6			35.9	6.1
Queue Storage Ratio (*RQ*) (95 th percentile)				2.51		0.00	1.19	0.00			0.00	1.29
Uniform Delay (d_1), s/veh				29.9		33.9	49.8	15.0			21.6	12.0
Incremental Delay (d_2), s/veh				3.6		119.6	101.4	0.9			22.9	0.1
Initial Queue Delay (d_3), s/veh				0.0		0.0	0.0	0.0			0.0	0.0
Control Delay (*d*), s/veh				33.4		153.5	151.2	15.9			44.5	12.1
Level of Service (LOS)				C		F	F	B			D	B
Approach Delay, s/veh / LOS	0.0			106.1		F	31.8		C	37.2		D
Intersection Delay, s/veh / LOS	59.1						E					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS								
Bicycle LOS Score / LOS								

HCS7 Signalized Intersection Results Summary

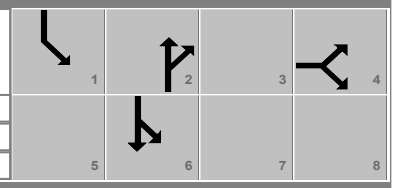
General Information				Intersection Information	
Agency	TMS Engineers, Inc.			Duration, h	0.250
Analyst	ABC	Analysis Date	Jun 2, 2020	Area Type	Other
Jurisdiction	Amherst, OH	Time Period	PM Peak	PHF	0.92
Urban Street	North Lake Street	Analysis Year	2042	Analysis Period	1> 7:00
Intersection	@ SR 2 EB Ramps	File Name	PM 42 Eastbound2.xus		
Project Description	Existing Conditions				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	197		90					485	190	541	780	

Signal Information			
Cycle, s	100.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	28.5	39.7	13.8	0.0	0.0	0.0
Yellow	4.0	4.0	4.0	0.0	0.0	0.0
Red	2.0	2.0	2.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4				2	1	6
Case Number		9.0				8.3	1.0	4.0
Phase Duration, s		19.8				45.7	34.5	80.2
Change Period, ($Y+R_c$), s		6.0				6.0	6.0	6.0
Max Allow Headway (*MAH*), s		3.2				3.1	3.1	3.1
Queue Clearance Time (g_s), s		13.8				41.7	30.5	23.1
Green Extension Time (g_e), s		0.0				0.0	0.0	4.0
Phase Call Probability		1.00				1.00	1.00	1.00
Max Out Probability		1.00				1.00	1.00	0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7		14					2	12	1	6	
Adjusted Flow Rate (*v*), veh/h	214		98					734		588	848	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1781		1610					1808		1795	1885	
Queue Service Time (g_s), s	11.8		5.6					39.7		28.5	21.1	
Cycle Queue Clearance Time (g_c), s	11.8		5.6					39.7		28.5	21.1	
Green Ratio (*g/C*)	0.14		0.14					0.40		0.70	0.74	
Capacity (*c*), veh/h	246		222					718		584	1399	
Volume-to-Capacity Ratio (*X*)	0.871		0.440					1.022		1.007	0.606	
Back of Queue (*Q*), ft/ln (95 th percentile)	283.1		99.1					816.2		658.4	269.1	
Back of Queue (*Q*), veh/ln (95 th percentile)	11.1		4.0					32.6		26.1	10.7	
Queue Storage Ratio (*RQ*) (95 th percentile)	1.49		0.00					0.00		3.87	0.00	
Uniform Delay (d_1), s/veh	42.2		39.6					30.2		30.3	6.0	
Incremental Delay (d_2), s/veh	26.0		0.5					39.3		39.0	0.5	
Initial Queue Delay (d_3), s/veh	0.0		0.0					0.0		0.0	0.0	
Control Delay (*d*), s/veh	68.3		40.1					69.4		69.3	6.6	
Level of Service (LOS)	E		D					F		F	A	
Approach Delay, s/veh / LOS	59.4	E		0.0			69.4	E		32.3	C	
Intersection Delay, s/veh / LOS	46.7						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS								
Bicycle LOS Score / LOS								

HCS7 Two-Way Stop-Control Report

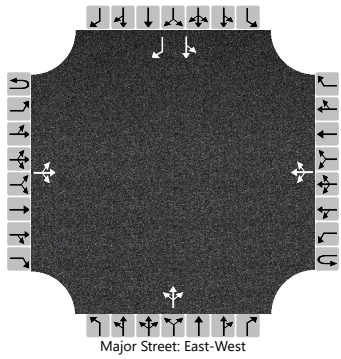
General Information

Analyst	ABC
Agency/Co.	TMS Engineers, Inc.
Date Performed	6/2/2020
Analysis Year	2042
Time Analyzed	PM Peak
Intersection Orientation	East-West
Project Description	Existing Conditions

Site Information

Intersection	Cooper Foster & Hollstein
Jurisdiction	Amherst, OH
East/West Street	Cooper Foster Park Road
North/South Street	Hollstein Drive
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	1	1
Configuration			LTR				LTR				LTR			LT		R
Volume (veh/h)		58	269	18		10	174	36		25	0	18		37	0	65
Percent Heavy Vehicles (%)		3				3				3	0	3		3	0	3
Proportion Time Blocked																
Percent Grade (%)										0				0		
Right Turn Channelized														No		
Median Type | Storage			Undivided													

Critical and Follow-up Headways

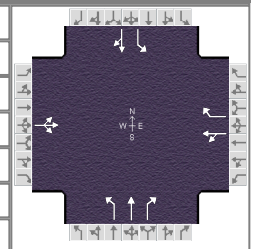
Base Critical Headway (sec)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2
Critical Headway (sec)		4.13				4.13				7.13	6.50	6.23		7.13	6.50	6.23
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.23				2.23				3.53	4.00	3.33		3.53	4.00	3.33

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		63				11					47			40		71
Capacity, c (veh/h)		1334				1243					408			342		829
v/c Ratio		0.05				0.01					0.11			0.12		0.09
95% Queue Length, Q_{95} (veh)		0.1				0.0					0.4			0.4		0.3
Control Delay (s/veh)		7.8				7.9					15.0			16.9		9.7
Level of Service (LOS)		A				A					B			C		A
Approach Delay (s/veh)	1.7				0.4				15.0				12.4			
Approach LOS									B				B			

HCS7 Signalized Intersection Results Summary

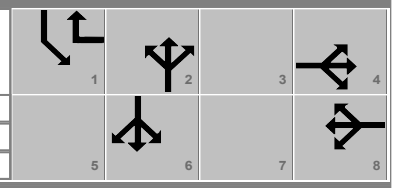
General Information				Intersection Information	
Agency	TMS Engineers, Inc.			Duration, h	0.250
Analyst	ABC	Analysis Date	Jun 2, 2020	Area Type	Other
Jurisdiction	Amherst, OH	Time Period	PM Peak	PHF	0.90
Urban Street	North Main Street	Analysis Year	2019	Analysis Period	1> 7:00
Intersection	@ Cooper Foster Park…	File Name	PM 42 Main.xus		
Project Description	Existing Conditions				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	114	173	57	90	166	234	51	174	80	333	223	93

Signal Information			
Cycle, s	75.0	Reference Phase	2
Offset, s	0	Reference Point	Begin
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	7.0	24.7	28.3	0.0	0.0	0.0
Yellow	4.0	4.0	4.0	0.0	0.0	0.0
Red	1.0	1.0	1.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8		2	1	6
Case Number		8.0		7.0		5.3	1.0	4.0
Phase Duration, s		33.3		33.3		29.7	12.0	41.7
Change Period, ($Y+R_c$), s		5.0		5.0		5.0	5.0	5.0
Max Allow Headway (*MAH*), s		3.2		3.2		3.1	3.0	3.1
Queue Clearance Time (g_s), s		16.0		12.4		7.7	9.0	11.3
Green Extension Time (g_e), s		1.7		0.0		0.0	0.0	1.3
Phase Call Probability		1.00		1.00		1.00	1.00	1.00
Max Out Probability		0.04		1.00		1.00	1.00	0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h		382			284	260	57	193	89	370	351	
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1611			1529	1598	1046	1885	1610	1795	1790	
Queue Service Time (g_s), s		3.6			0.0	7.7	2.9	5.7	2.9	7.0	9.3	
Cycle Queue Clearance Time (g_c), s		14.0			10.4	7.7	2.9	5.7	2.9	7.0	9.3	
Green Ratio (*g/C*)		0.38			0.38	0.47	0.33	0.33	0.33	0.45	0.49	
Capacity (*c*), veh/h		672			642	752	441	621	530	567	876	
Volume-to-Capacity Ratio (*X*)		0.569			0.443	0.346	0.129	0.311	0.168	0.653	0.401	
Back of Queue (*Q*), ft/ln (95 th percentile)		216.7			154.7	112.3	29.6	107	46.4	88.6	150.7	
Back of Queue (*Q*), veh/ln (95 th percentile)		8.7			6.2	4.5	1.2	4.2	1.9	3.5	6.0	
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00			0.00	0.31	0.11	0.00	0.17	0.18	0.00	
Uniform Delay (d_1), s/veh		18.7			17.5	12.6	17.8	18.8	17.9	17.3	12.2	
Incremental Delay (d_2), s/veh		0.7			0.2	0.1	0.0	0.1	0.1	2.1	0.1	
Initial Queue Delay (d_3), s/veh		0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Control Delay (*d*), s/veh		19.4			17.6	12.7	17.9	18.9	17.9	19.4	12.3	
Level of Service (LOS)		B			B	B	B	B	B	B	B	
Approach Delay, s/veh / LOS	19.4	B		15.3	B		18.5	B		15.9	B	
Intersection Delay, s/veh / LOS	16.9						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS								
Bicycle LOS Score / LOS								

Appendix L
ODOT Turn Lane Warrant Graphs

AUXILLIARY TURN LANE WARRANTS

PROJECT INFORMATION

1. Client	CITY OF AMHERST
2. Job Number	20-039
3. Jurisdiction	CITY OF AMHERST
4. Name of roadway where turn lanes are to be analyzed	COOPER FOSTER PARK ROAD @ HOLLSTEIN
5. Roadway speed limit	25
6. Number of Lanes	2
7. Analysis Condition (Year / Build)	2042 BUILD
8. Direction of Roadway	EB/WB
9. Direction of Side Street Approach	NB
10. Is the Roadway Divided or Undivided	Undivided

11. Enter Volume Data for Intersection

EASTBOUND

- Right Turn		Right	Thru	Advancing
	AM	30	138	168
	PM	18	327	345

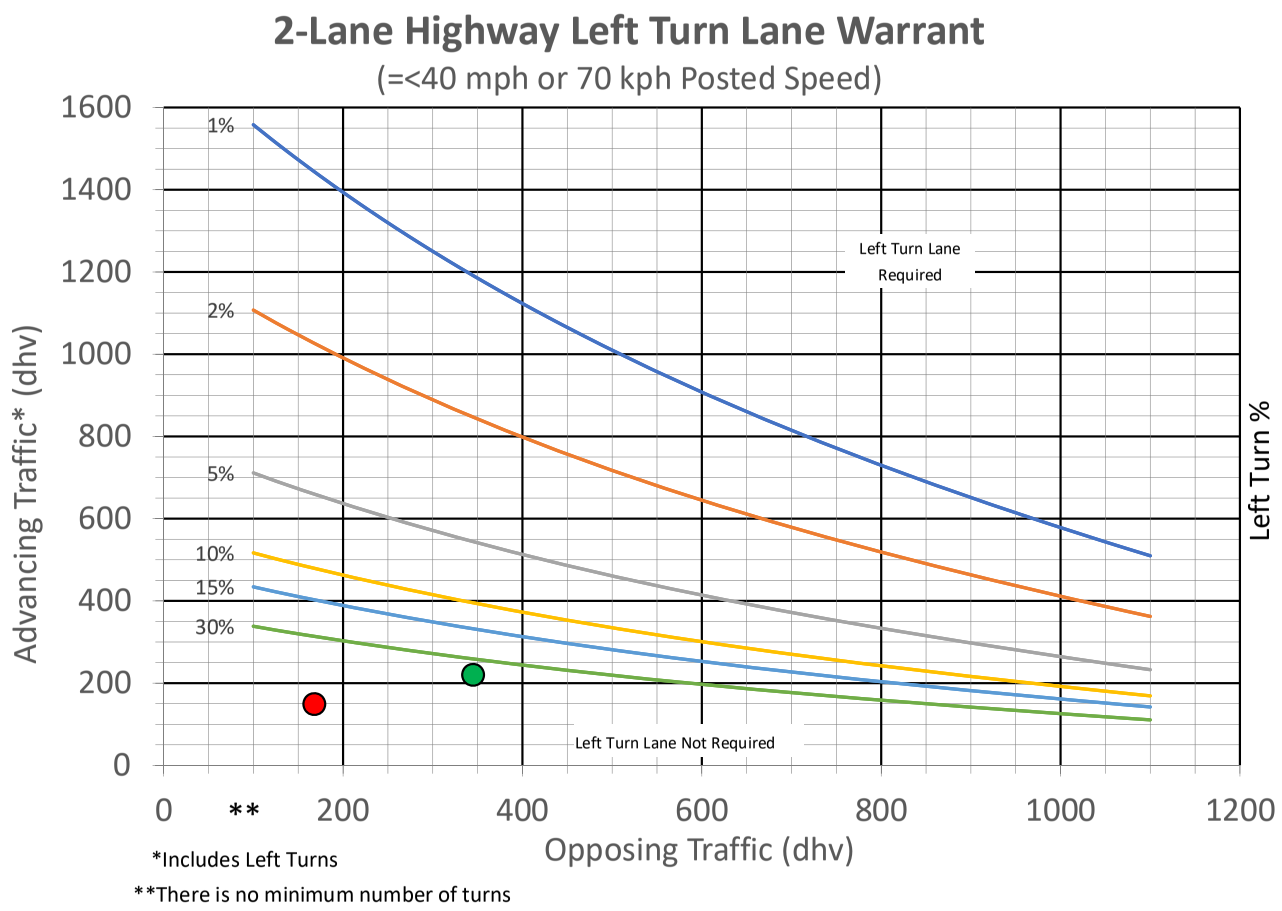
		WESTBOUND	EASTBOUND					
- Left Turn		Left	Thru	Thru	Right	Advancing	Opposing	LT%
	AM	9	140	138	30	149	168	6.0%
	PM	10	210	327	18	220	345	4.5%

Notes:

1. Analyst to fill in all blue areas.
2. Green areas are calculated for the analyst

COOPER FOSTER PARK ROAD @ HOLLSTEIN

2042 BUILD **WARRANT IS NOT MET**



*Includes Left Turns

**There is no minimum number of turns

TIME	WESTBOUND		EASTBOUND		ADVANCING	OPPOSING	LT%	WARRANT?
	LEFT	THRU	THRU	RIGHT				
AM	9	140	138	30	149	168	6.0%	NO
PM	10	210	327	18	220	345	4.5%	NO

2-LANE LEFT TURN LANE WARRANT (LOW SPEED)

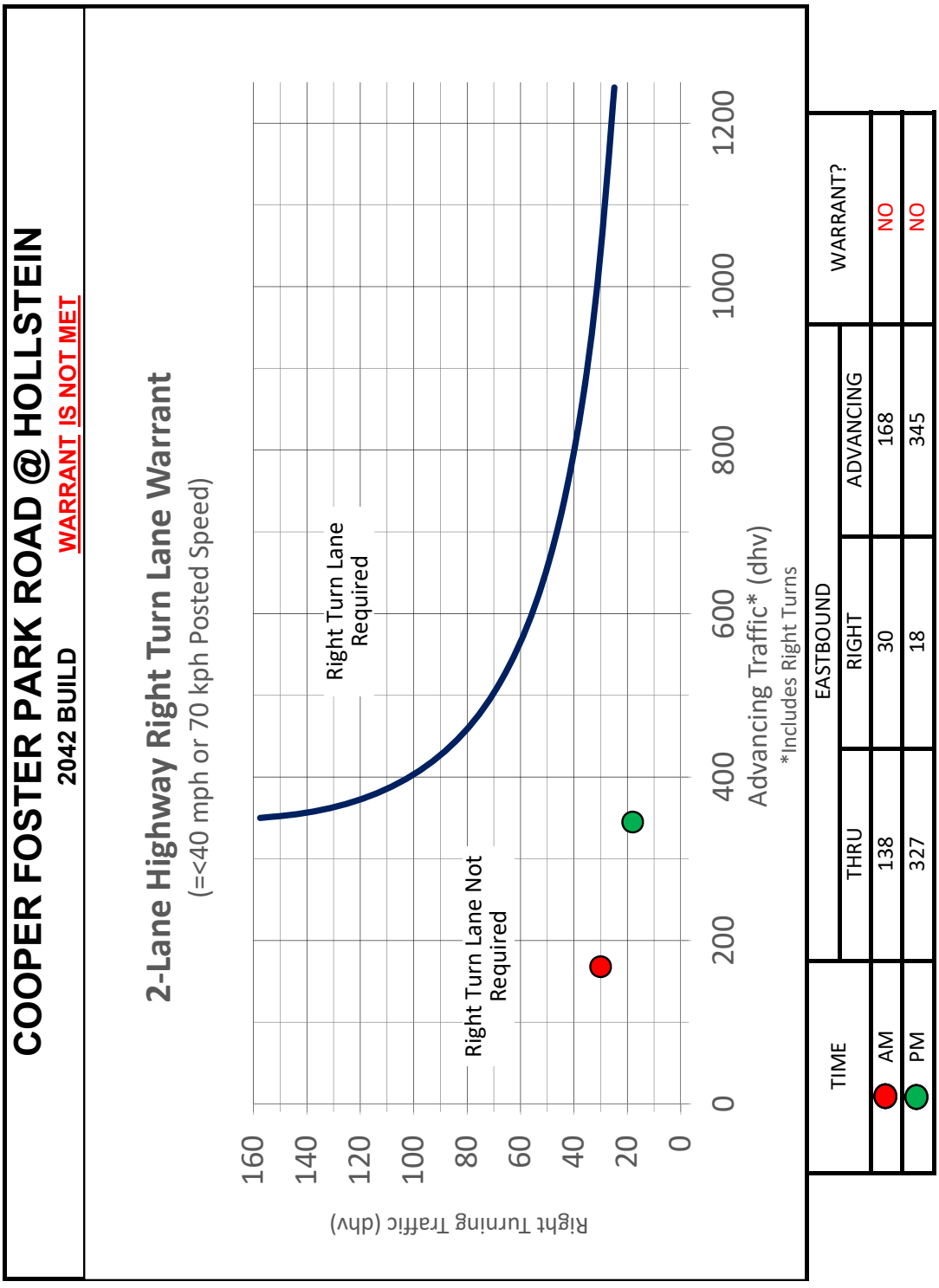
401-5aM

REFERENCE SECTION 401.6.1

2-LANE RIGHT TURN LANE WARRANT (LOW SPEED)

401-6aM

REFERENCE SECTION
401.6.3



AUXILLIARY TURN LANE WARRANTS

PROJECT INFORMATION

1. Client	CITY OF AMHERST
2. Job Number	20-039
3. Jurisdiction	CITY OF AMHERST
4. Name of roadway where turn lanes are to be analyzed	COOPER FOSTER PARK ROAD @ HOLLSTEIN
5. Roadway speed limit	25
6. Number of Lanes	2
7. Analysis Condition (Year / Build)	2042 BUILD
8. Direction of Roadway	EB/WB
9. Direction of Side Street Approach	SB
10. Is the Roadway Divided or Undivided	Undivided

11. Enter Volume Data for Intersection

WESTBOUND

- Right Turn		Right	Thru	Advancing
	AM	25	124	149
	PM	36	184	220

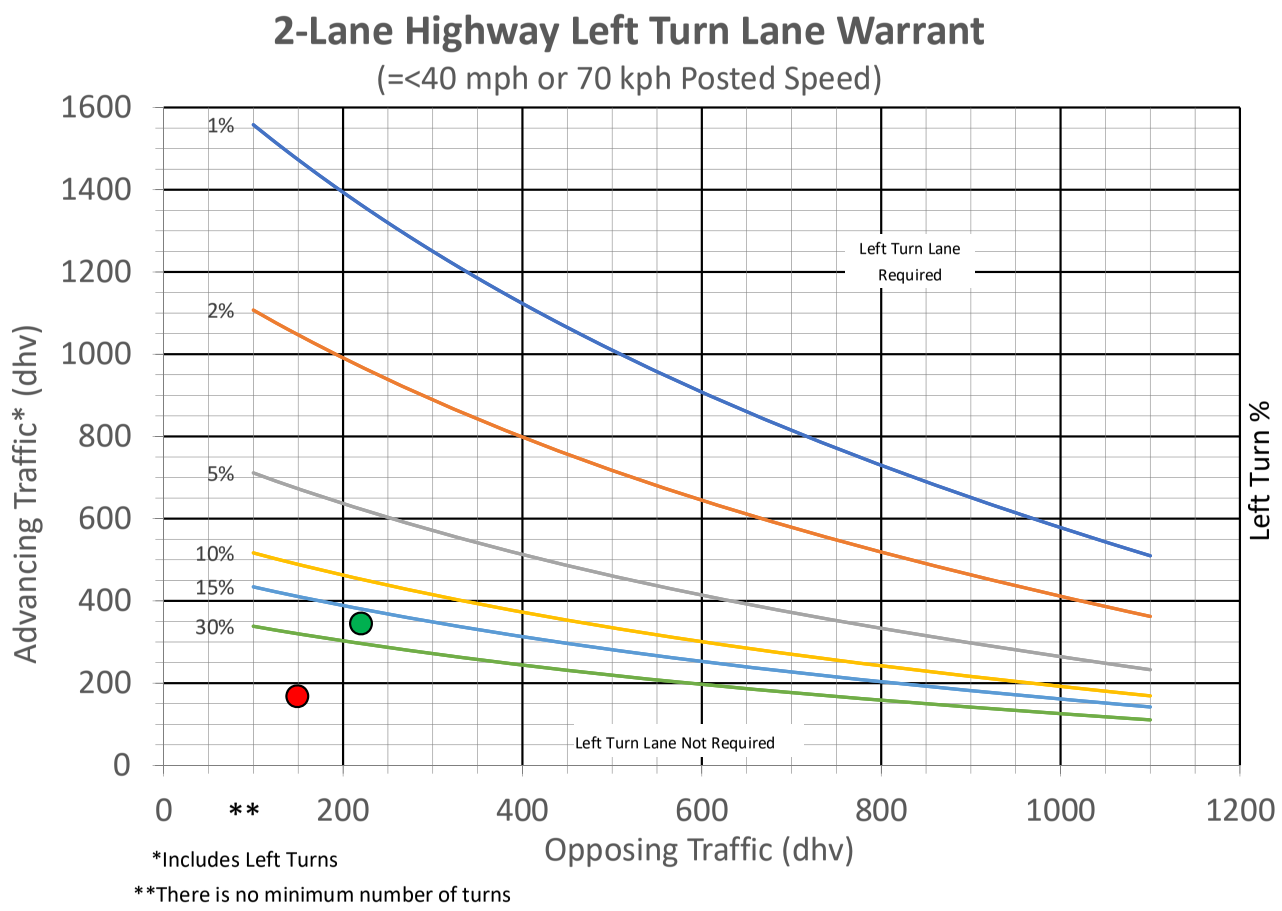
		EASTBOUND		WESTBOUND				
- Left Turn		Left	Thru	Thru	Right	Advancing	Opposing	LT%
	AM	58	110	124	25	168	149	34.5%
	PM	58	287	184	36	345	220	16.8%

Notes:

1. Analyst to fill in all blue areas.
2. Green areas are calculated for the analyst

COOPER FOSTER PARK ROAD @ HOLLSTEIN

2042 BUILD **WARRANT IS NOT MET**



*Includes Left Turns

**There is no minimum number of turns

TIME	EASTBOUND		WESTBOUND		ADVANCING	OPPOSING	LT%	WARRANT?
	LEFT	THRU	THRU	RIGHT				
AM	58	110	124	25	168	149	34.5%	NO
PM	58	287	184	36	345	220	16.8%	NO

2-LANE LEFT TURN LANE WARRANT (LOW SPEED)

401-5aM

REFERENCE SECTION 401.6.1

2-LANE RIGHT TURN LANE WARRANT (LOW SPEED)

401-6aM

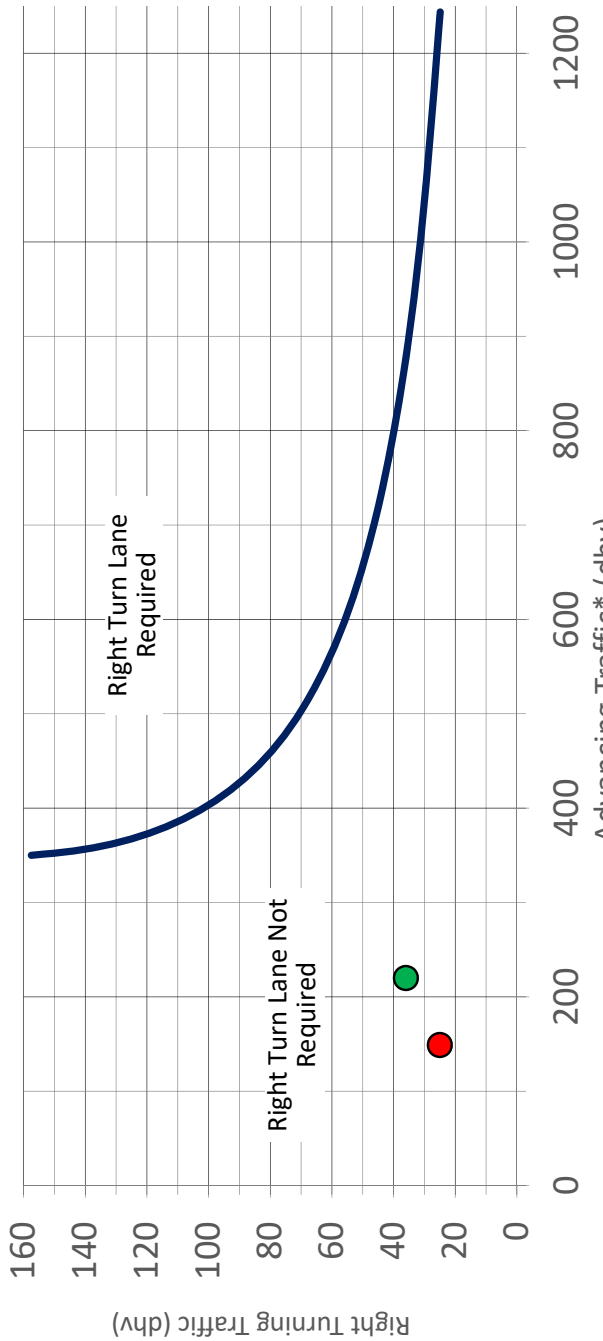
REFERENCE SECTION 401.6.3

COOPER FOSTER PARK ROAD @ HOLLSTEIN

2042 BUILD **WARRANT IS NOT MET**

2-Lane Highway Right Turn Lane Warrant

(=<40 mph or 70 kph Posted Speed)



*Includes Right Turns

TIME	WESTBOUND			WARRANT?
	THRU	RIGHT	ADVANCING	
AM	124	25	149	NO
PM	184	36	220	NO

AUXILLIARY TURN LANE WARRANTS

PROJECT INFORMATION

1. Client	CITY OF AMHERST
2. Job Number	20-039
3. Jurisdiction	CITY OF AMHERST
4. Name of roadway where turn lanes are to be analyzed	COOPER FOSTER PARK & WEST BY-PASS
5. Roadway speed limit	35
6. Number of Lanes	2
7. Analysis Condition (Year / Build)	2042 BUILD
8. Direction of Roadway	EB/WB
9. Direction of Side Street Approach	SB
10. Is the Roadway Divided or Undivided	Divided

11. Enter Volume Data for Intersection

- Right Turn		WESTBOUND		
		Right	Thru	Advancing
	AM	10	165	175
	PM	10	454	464

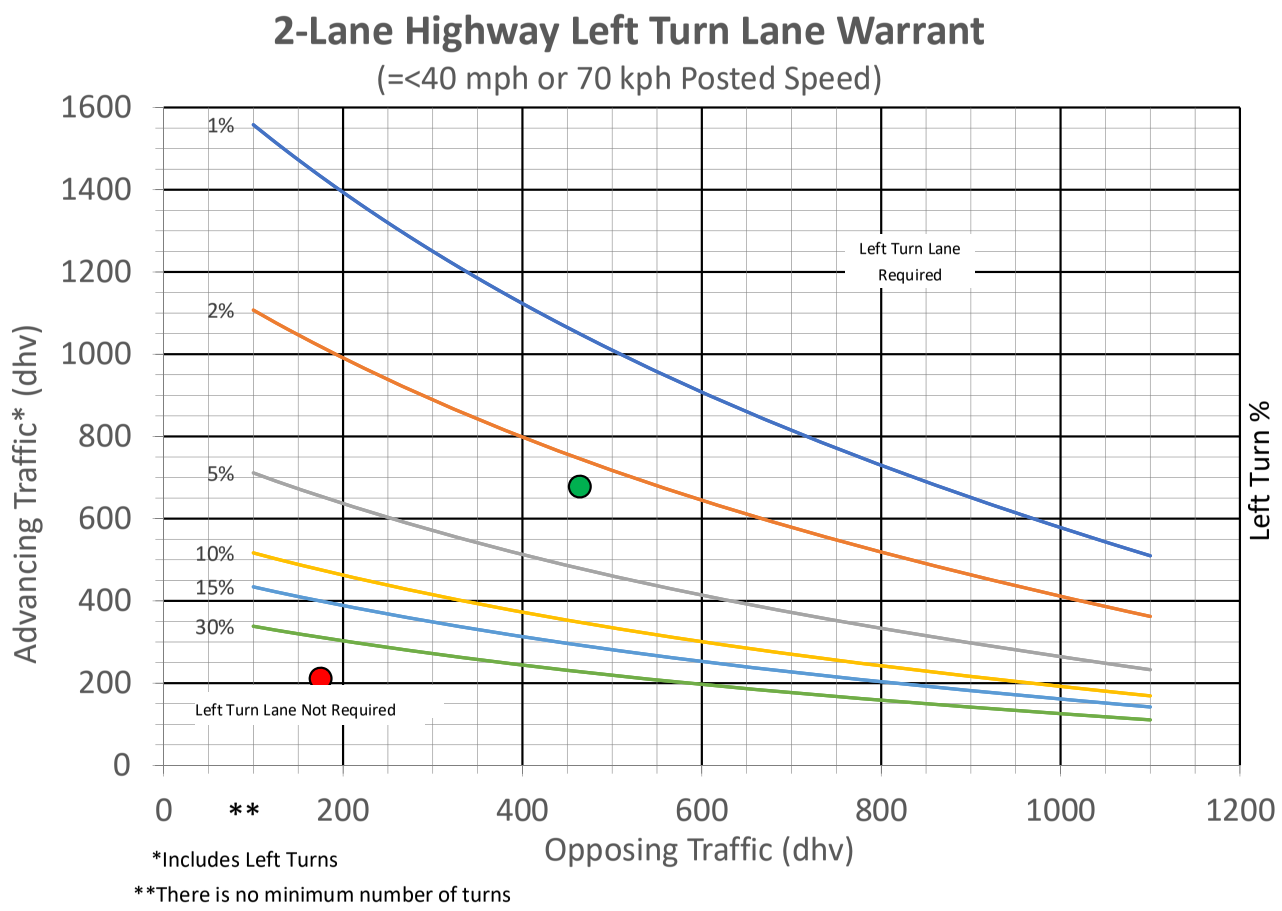
- Left Turn		EASTBOUND	WESTBOUND					
		Left	Thru	Thru	Right	Advancing	Opposing	LT%
	AM	48	163	165	10	211	175	22.7%
	PM	199	479	454	10	678	464	29.4%

Notes:

1. Analyst to fill in all blue areas.
2. Green areas are calculated for the analyst

COOPER FOSTER PARK & WEST BY-PASS

2042 BUILD **WARRANT IS MET**



*Includes Left Turns

**There is no minimum number of turns

TIME	EASTBOUND		WESTBOUND		ADVANCING	OPPOSING	LT%	WARRANT?
	LEFT	THRU	THRU	RIGHT				
AM	48	163	165	10	211	175	22.7%	NO
PM	199	479	454	10	678	464	29.4%	YES

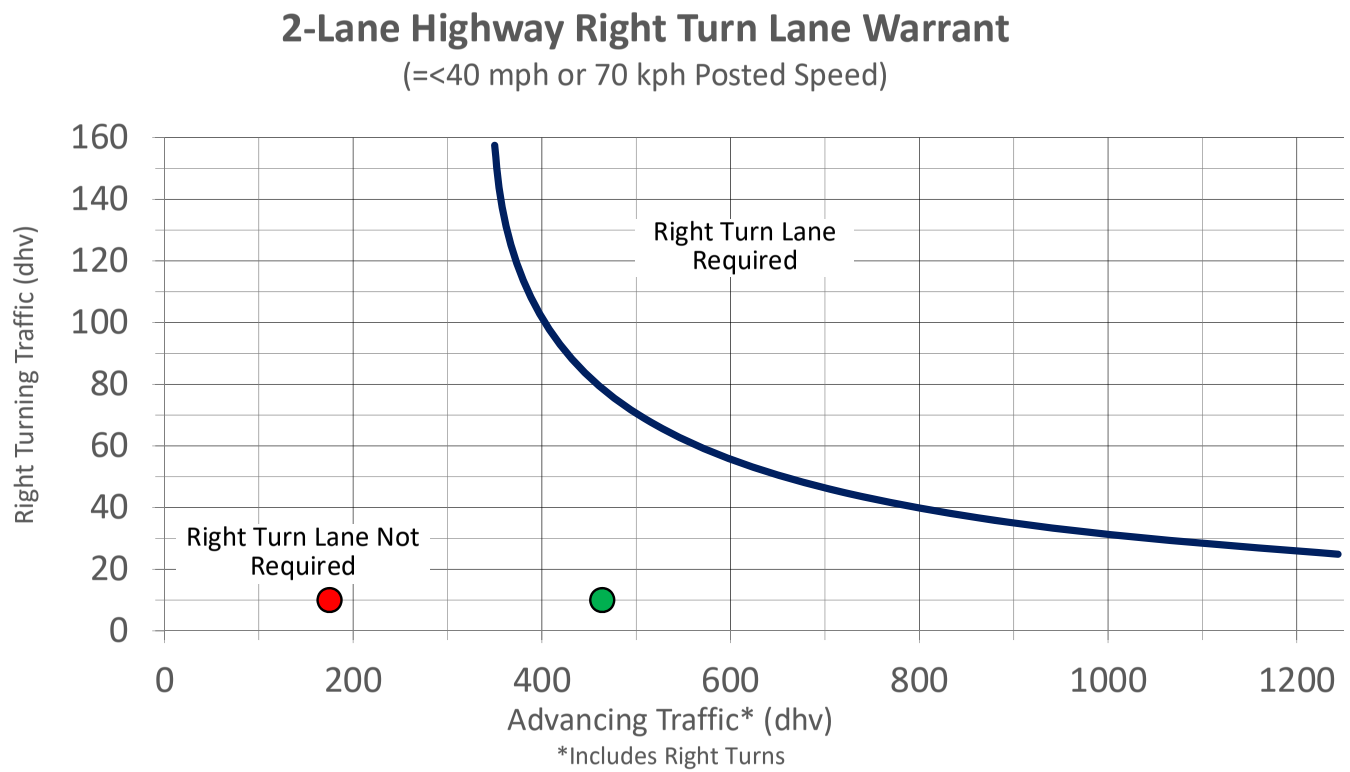
2-LANE LEFT TURN LANE WARRANT (LOW SPEED)

401-5aM

REFERENCE SECTION 401.6.1

COOPER FOSTER PARK & WEST BY-PASS

2042 BUILD **WARRANT IS NOT MET**



TIME	WESTBOUND			WARRANT?
	THRU	RIGHT	ADVANCING	
AM	165	10	175	NO
PM	454	10	464	NO

2-LANE RIGHT TURN LANE WARRANT (LOW SPEED)

401-6aM

REFERENCE SECTION 401.6.3

AUXILLIARY TURN LANE WARRANTS

PROJECT INFORMATION

1. Client	CITY OF AMHERST
2. Job Number	20-039
3. Jurisdiction	CITY OF AMHERST
4. Name of roadway where turn lanes are to be analyzed	COOPER FOSTER PARK & EAST BY-PASS
5. Roadway speed limit	25
6. Number of Lanes	2
7. Analysis Condition (Year / Build)	2042 BUILD
8. Direction of Roadway	EB/WB
9. Direction of Side Street Approach	SB
10. Is the Roadway Divided or Undivided	Divided

11. Enter Volume Data for Intersection

WESTBOUND

- Right Turn	Right	Thru	Advancing
AM	92	98	190
PM	160	104	264

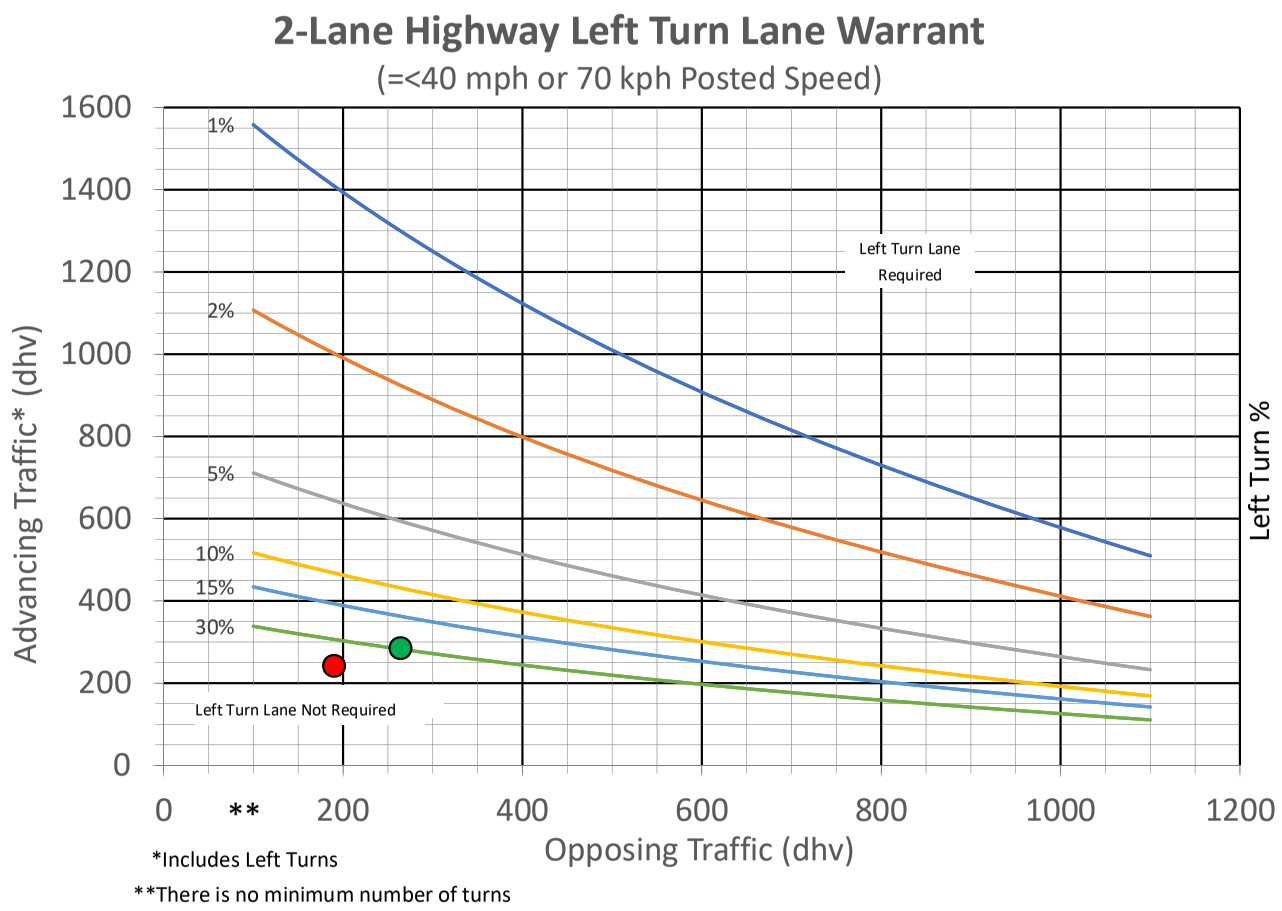
	EASTBOUND		WESTBOUND				
- Left Turn	Left	Thru	Thru	Right	Advancing	Opposing	LT%
AM	92	150	98	92	242	190	38.0%
PM	185	100	79	185	285	264	64.9%

Notes:

1. Analyst to fill in all blue areas.
2. Green areas are calculated for the analyst

COOPER FOSTER PARK & EAST BY-PASS

2042 BUILD **WARRANT IS MET**



*Includes Left Turns

**There is no minimum number of turns

TIME	EASTBOUND		WESTBOUND		ADVANCING	OPPOSING	LT%	WARRANT?
	LEFT	THRU	THRU	RIGHT				
AM	92	150	98	92	242	190	38.0%	NO
PM	185	100	79	185	285	264	64.9%	YES

2-LANE LEFT TURN LANE WARRANT (LOW SPEED)

401-5aM

REFERENCE SECTION 401.6.1

2-LANE RIGHT TURN LANE WARRANT (LOW SPEED)

401-6aM

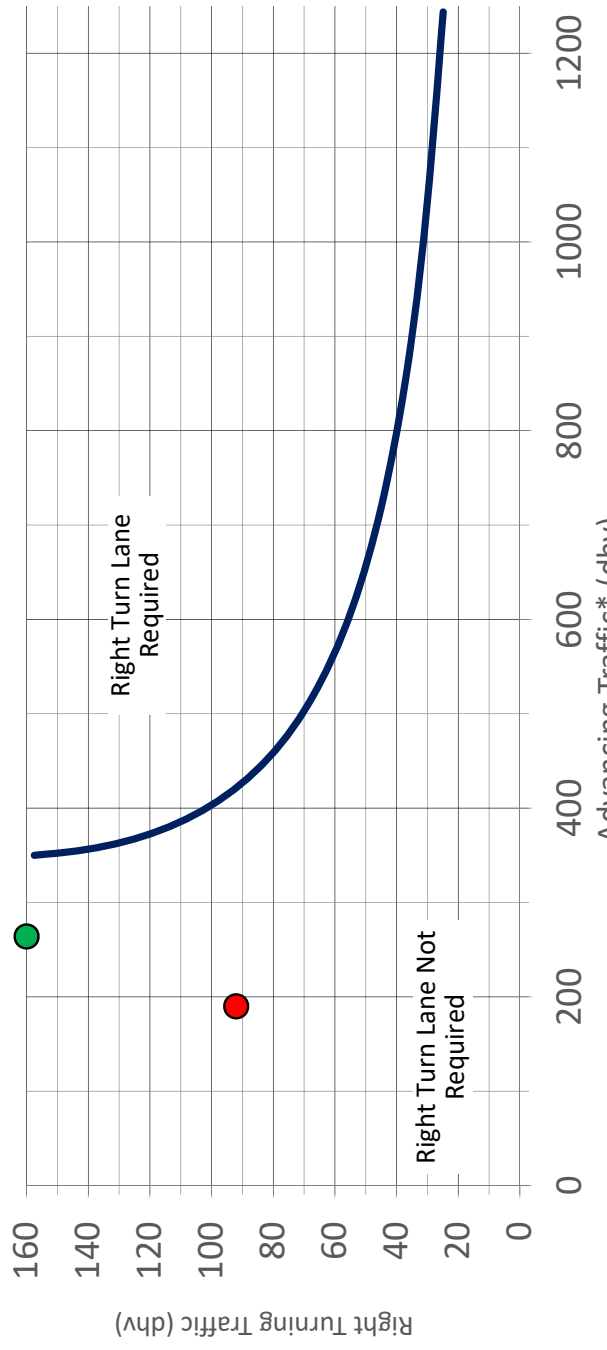
REFERENCE SECTION 401.6.3

COOPER FOSTER PARK & EAST BY-PASS

2042 BUILD — **WARRANT IS NOT MET**

2-Lane Highway Right Turn Lane Warrant

(=<40 mph or 70 kph Posted Speed)



*Includes Right Turns

TIME	WESTBOUND THRU	WESTBOUND RIGHT	WESTBOUND ADVANCING	WARRANT?
AM	98	92	190	NO
PM	104	160	264	NO

AUXILLIARY TURN LANE WARRANTS

PROJECT INFORMATION

1. Client	CITY OF AMHERST
2. Job Number	20-039
3. Jurisdiction	CITY OF AMHERST
4. Name of roadway where turn lanes are to be analyzed	BUCK HORN BOULEVAD & WEST BY-PASS
5. Roadway speed limit	25
6. Number of Lanes	2
7. Analysis Condition (Year / Build)	2042 BUILD
8. Direction of Roadway	EB/WB
9. Direction of Side Street Approach	NB
10. Is the Roadway Divided or Undivided	Divided

11. Enter Volume Data for Intersection

EASTBOUND

- Right Turn	Right	Thru	Advancing
AM	10	90	100
PM	10	200	210

	WESTBOUND	EASTBOUND				
- Left Turn	Left	Thru	Thru	Right	Advancing	Opposing	LT%
AM	55	66	90	10	121	100	45.5%
PM	128	270	200	10	398	210	32.2%

Notes:

1. Analyst to fill in all blue areas.
2. Green areas are calculated for the analyst

2-LANE LEFT TURN LANE WARRANT (LOW SPEED)

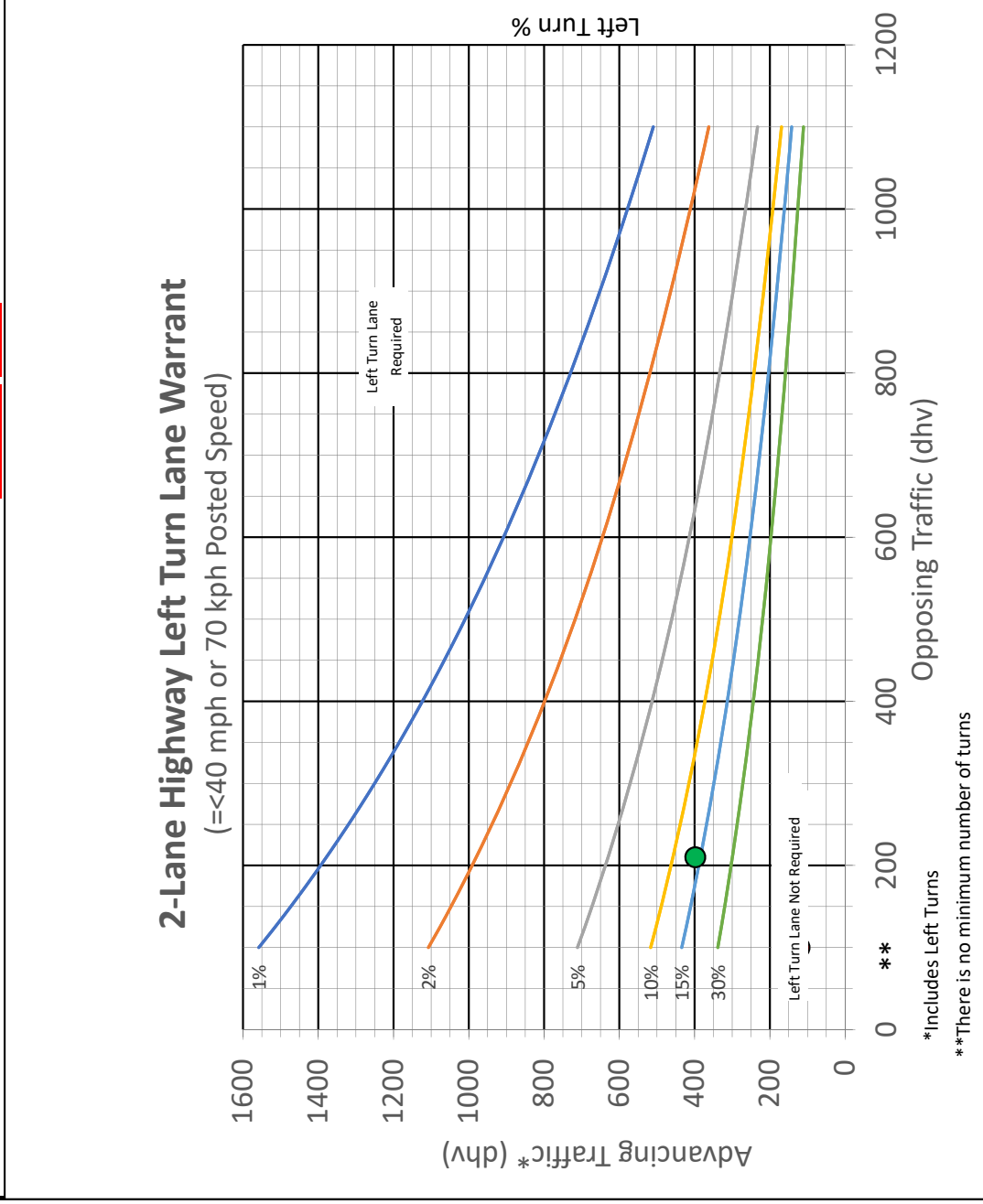
401-5aM

REFERENCE SECTION
401.6.1

BUCK HORN BOULEVAD & WEST BY-PASS

2042 BUILD

WARRANT IS MET



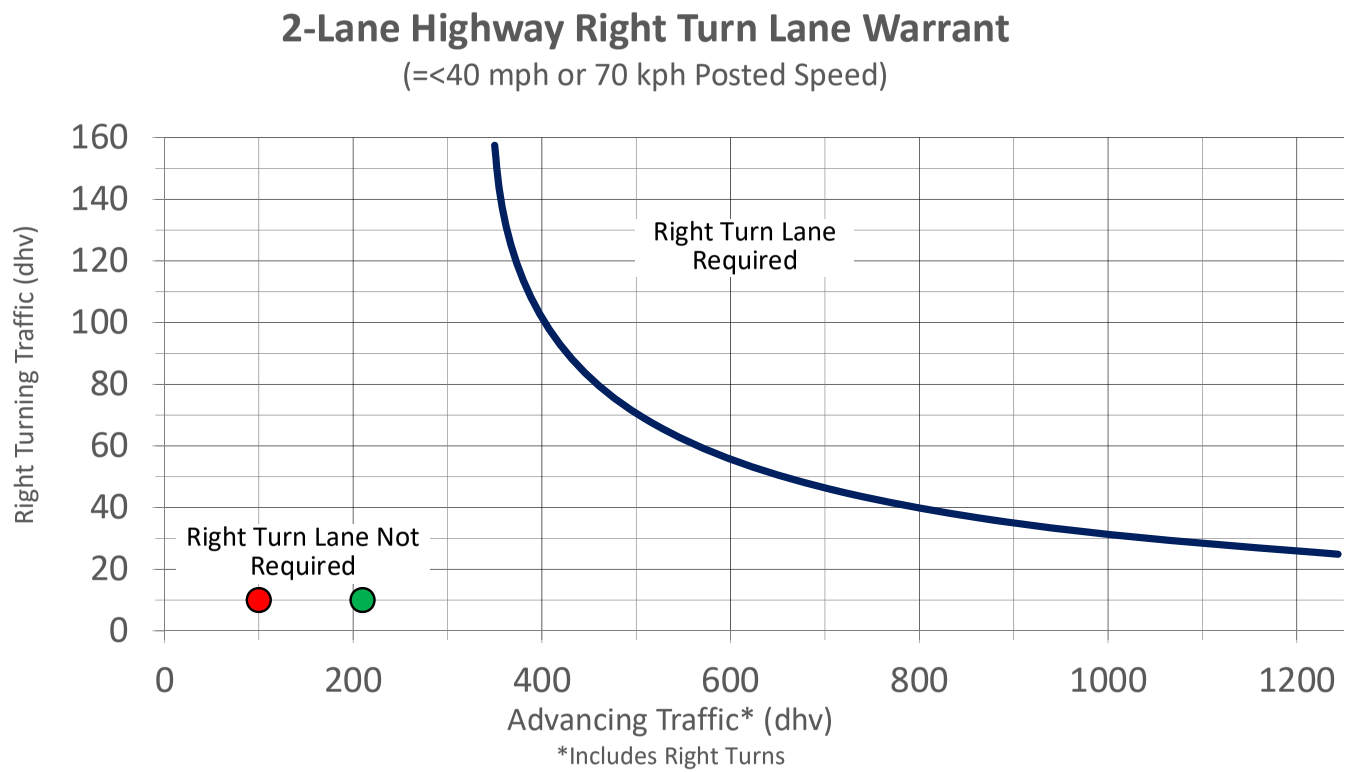
*Includes Left Turns

**There is no minimum number of turns

TIME	WESTBOUND		EASTBOUND		ADVANCING	OPPOSING	LT%	WARRANT?
	LEFT	THRU	THRU	RIGHT				
AM	55	66	90	10	121	100	45.5%	NO
PM	128	270	200	10	398	210	32.2%	YES

BUCK HORN BOULEVAD & WEST BY-PASS

2042 BUILD **WARRANT IS NOT MET**



TIME	EASTBOUND			WARRANT?
	THRU	RIGHT	ADVANCING	
AM	90	10	100	NO
PM	200	10	210	NO

2-LANE RIGHT TURN LANE WARRANT (LOW SPEED)

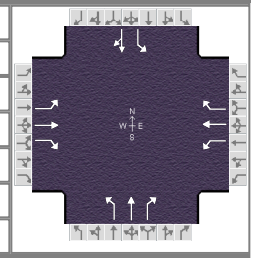
401-6aM

REFERENCE SECTION 401.6.3

Appendix M
Alternative #1 - 2042 Capacity Analysis Worksheets

HCS7 Signalized Intersection Results Summary

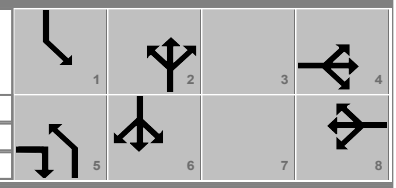
General Information				Intersection Information	
Agency	TMS Engineers, Inc.			Duration, h	0.250
Analyst	ABC	Analysis Date	Jun 2, 2020	Area Type	Other
Jurisdiction	Amherst, OH	Time Period	AM Peak	PHF	0.92
Urban Street	Oak Point Road	Analysis Year	2042	Analysis Period	1> 7:00
Intersection	@ Cooper Foster Park…	File Name	AM 42 CooperFoster TL.xus		
Project Description	IMP - Turn Lanes & Signal Phasing				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	12	36	163	129	55	46	165	240	404	68	338	46

Signal Information			
Cycle, s	90.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	7.0	36.5	28.5	0.0	0.0	0.0
Yellow	4.0	4.0	4.0	0.0	0.0	0.0
Red	2.0	2.0	2.0	0.0	0.0	0.0



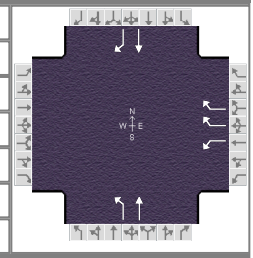
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2	1	6
Case Number		5.0		5.0	1.1	3.0	1.1	4.0
Phase Duration, s		34.5		34.5	13.0	42.5	13.0	42.5
Change Period, ($Y+R_c$), s		6.0		6.0	6.0	6.0	6.0	6.0
Max Allow Headway (*MAH*), s		3.2		3.2	3.1	3.2	3.1	3.2
Queue Clearance Time (g_s), s		9.2		10.5	7.3	22.5	4.0	17.8
Green Extension Time (g_e), s		0.9		0.0	0.0	0.0	0.0	2.3
Phase Call Probability		1.00		1.00	1.00	1.00	1.00	1.00
Max Out Probability		0.00		1.00	1.00	1.00	1.00	0.01

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	13	39	177	140	60	50	179	261	439	74	417	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1364	1767	1522	1390	1856	1610	1753	1870	1585	1810	1831	
Queue Service Time (g_s), s	0.6	1.4	7.2	7.1	2.0	2.0	5.3	8.7	20.5	2.0	15.8	
Cycle Queue Clearance Time (g_c), s	2.7	1.4	7.2	8.5	2.0	2.0	5.3	8.7	20.5	2.0	15.8	
Green Ratio (*g/C*)	0.32	0.32	0.39	0.32	0.32	0.32	0.48	0.41	0.41	0.48	0.41	
Capacity (*c*), veh/h	481	559	600	498	588	510	415	758	643	547	743	
Volume-to-Capacity Ratio (*X*)	0.027	0.070	0.295	0.281	0.102	0.098	0.433	0.344	0.683	0.135	0.562	
Back of Queue (*Q*), ft/ln (95 th percentile)	8.7	27.1	115.4	101.7	40	32.6	92.1	164	307.6	34	270.2	
Back of Queue (*Q*), veh/ln (95 th percentile)	0.3	1.0	4.4	4.1	1.6	1.3	3.6	6.5	12.1	1.4	10.6	
Queue Storage Ratio (*RQ*) (95 th percentile)	0.00	0.00	1.54	0.00	0.00	0.00	0.77	0.00	2.56	0.10	0.00	
Uniform Delay (d_1), s/veh	22.7	21.5	18.7	24.4	21.7	21.7	15.5	18.5	22.0	13.2	20.6	
Incremental Delay (d_2), s/veh	0.0	0.0	0.1	0.1	0.0	0.0	0.3	0.1	2.5	0.0	0.6	
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Control Delay (*d*), s/veh	22.7	21.5	18.8	24.6	21.7	21.7	15.8	18.6	24.5	13.2	21.2	
Level of Service (LOS)	C	C	B	C	C	C	B	B	C	B	C	
Approach Delay, s/veh / LOS	19.5	B		23.3	C		21.0	C		20.0	C	
Intersection Delay, s/veh / LOS	20.8						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS								
Bicycle LOS Score / LOS								

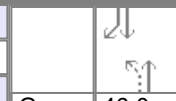
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	TMS Engineers, Inc.			Duration, h	0.250
Analyst	ABC	Analysis Date	Jun 2, 2020	Area Type	Other
Jurisdiction	Amherst, OH	Time Period	AM Peak	PHF	0.92
Urban Street	North Lake Street	Analysis Year	2042	Analysis Period	1> 7:00
Intersection	@ SR 2 WB Ramps	File Name	AM 42 Westbound2 TL.xus		
Project Description	IMP - Turn Lanes & Signal Phasing				

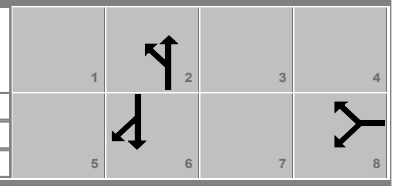


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h				80		388	50	421			479	151

Signal Information			
Cycle, s	90.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	46.0	32.0	0.0	0.0	0.0	0.0	
Yellow	4.0	4.0	0.0	0.0	0.0	0.0	
Red	2.0	2.0	0.0	0.0	0.0	0.0	



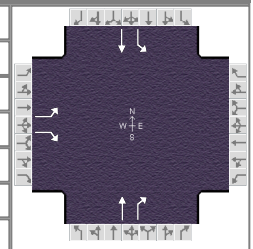
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase				8		2		6
Case Number				9.0		6.0		7.0
Phase Duration, s				38.0		52.0		52.0
Change Period, ($Y+R_c$), s				6.0		6.0		6.0
Max Allow Headway (*MAH*), s				3.3		3.1		3.1
Queue Clearance Time (g_s), s				12.4		23.1		19.2
Green Extension Time (g_e), s				1.3		0.0		2.6
Phase Call Probability				1.00		1.00		1.00
Max Out Probability				0.00		1.00		0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement				3		18	5	2			6	16
Adjusted Flow Rate (*v*), veh/h				87		422	54	458			521	164
Adjusted Saturation Flow Rate (*s*), veh/h/ln				1626		1392	895	1870			1856	1598
Queue Service Time (g_s), s				3.3		10.4	4.0	14.3			17.2	5.0
Cycle Queue Clearance Time (g_c), s				3.3		10.4	21.1	14.3			17.2	5.0
Green Ratio (*g/C*)				0.36		0.36	0.51	0.51			0.51	0.51
Capacity (*c*), veh/h				578		990	367	956			948	817
Volume-to-Capacity Ratio (*X*)				0.150		0.426	0.148	0.479			0.549	0.201
Back of Queue (*Q*), ft/ln (95 th percentile)				59.6		149.4	36.5	239.7			279.7	75.9
Back of Queue (*Q*), veh/ln (95 th percentile)				2.2		5.8	1.5	9.4			10.9	3.0
Queue Storage Ratio (*RQ*) (95 th percentile)				0.43		0.00	0.21	0.00			0.00	0.63
Uniform Delay (d_1), s/veh				19.7		22.0	22.1	14.2			15.0	12.0
Incremental Delay (d_2), s/veh				0.0		0.1	0.1	0.1			0.4	0.0
Initial Queue Delay (d_3), s/veh				0.0		0.0	0.0	0.0			0.0	0.0
Control Delay (*d*), s/veh				19.8		22.1	22.2	14.4			15.3	12.0
Level of Service (LOS)				B		C	C	B			B	B
Approach Delay, s/veh / LOS	0.0			21.7		C	15.2		B	14.5		B
Intersection Delay, s/veh / LOS	16.9						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS								
Bicycle LOS Score / LOS								

HCS7 Signalized Intersection Results Summary

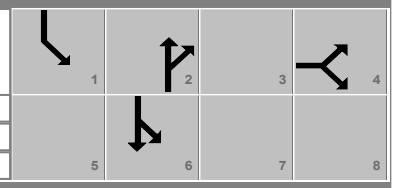
General Information				Intersection Information	
Agency	TMS Engineers, Inc.			Duration, h	0.250
Analyst	ABC	Analysis Date	Jun 2, 2020	Area Type	Other
Jurisdiction	Amherst, OH	Time Period	AM Peak	PHF	0.92
Urban Street	North Lake Street	Analysis Year	2042	Analysis Period	1> 7:00
Intersection	@ SR 2 EB Ramps	File Name	AM 42 Eastbound2 TL.xus		
Project Description	Existing Conditions				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	192		40					279	330	364	195	

Signal Information			
Cycle, s	90.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	7.0	37.3	27.7	0.0	0.0	0.0
Yellow	4.0	4.0	4.0	0.0	0.0	0.0
Red	2.0	2.0	2.0	0.0	0.0	0.0



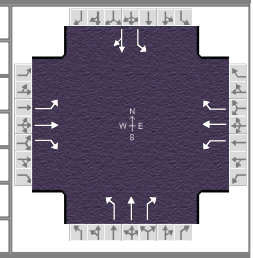
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4				2	1	6
Case Number		9.0				7.3	1.0	4.0
Phase Duration, s		33.7				43.3	13.0	56.3
Change Period, (*Y+R c*), s		6.0				6.0	6.0	6.0
Max Allow Headway (*MAH*), s		3.2				3.2	3.1	3.2
Queue Clearance Time (*g s*), s		10.3				17.1	9.0	7.3
Green Extension Time (*g e*), s		0.4				0.0	0.0	1.8
Phase Call Probability		1.00				1.00	1.00	1.00
Max Out Probability		0.00				1.00	1.00	0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7		14					2	12	1	6	
Adjusted Flow Rate (*v*), veh/h	209		43					303	359	396	212	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1767		1560					1885	1610	1753	1811	
Queue Service Time (*g s*), s	8.3		1.8					10.1	15.1	7.0	5.3	
Cycle Queue Clearance Time (*g c*), s	8.3		1.8					10.1	15.1	7.0	5.3	
Green Ratio (*g/C*)	0.31		0.31					0.41	0.41	0.51	0.56	
Capacity (*c*), veh/h	544		480					781	667	536	1012	
Volume-to-Capacity Ratio (*X*)	0.384		0.091					0.388	0.538	0.738	0.209	
Back of Queue (*Q*), ft/ln (95 th percentile)	156.1		29.7					190.3	230.9	199.6	89.9	
Back of Queue (*Q*), veh/ln (95 th percentile)	6.1		1.2					7.6	9.2	7.7	3.4	
Queue Storage Ratio (*RQ*) (95 th percentile)	0.82		0.00					0.00	0.00	1.17	0.00	
Uniform Delay (*d 1*), s/veh	24.5		22.2					18.4	19.9	19.9	9.9	
Incremental Delay (*d 2*), s/veh	0.2		0.0					0.1	0.5	4.7	0.0	
Initial Queue Delay (*d 3*), s/veh	0.0		0.0					0.0	0.0	0.0	0.0	
Control Delay (*d*), s/veh	24.6		22.2					18.5	20.3	24.6	10.0	
Level of Service (LOS)	C		C					B	C	C	A	
Approach Delay, s/veh / LOS	24.2		C	0.0			19.5		B	19.5		B
Intersection Delay, s/veh / LOS	20.3						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS								
Bicycle LOS Score / LOS								

HCS7 Signalized Intersection Results Summary

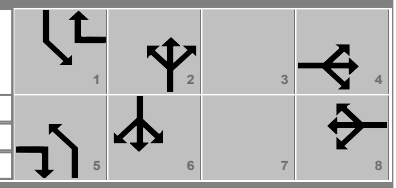
General Information				Intersection Information	
Agency	TMS Engineers, Inc.			Duration, h	0.250
Analyst	ABC	Analysis Date	Jun 2, 2020	Area Type	Other
Jurisdiction	Amherst, OH	Time Period	PM Peak	PHF	0.92
Urban Street	Oak Point Road	Analysis Year	2042	Analysis Period	1> 7:00
Intersection	@ Cooper Foster Park…	File Name	PM 42 CooperFoster TL.xus		
Project Description	IMP - Turn Lanes & Phasing				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	78	121	479	242	128	84	454	550	180	84	494	65

Signal Information			
Cycle, s	100.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	7.0	10.9	34.0	24.1	0.0	0.0
Yellow	4.0	4.0	4.0	4.0	0.0	0.0
Red	2.0	2.0	2.0	2.0	0.0	0.0



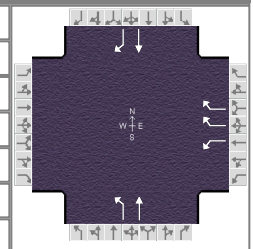
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2	1	6
Case Number		5.0		5.0	1.1	3.0	1.1	4.0
Phase Duration, s		30.1		30.1	29.9	56.9	13.0	40.0
Change Period, ($Y+R_c$), s		6.0		6.0	6.0	6.0	6.0	6.0
Max Allow Headway (*MAH*), s		3.3		3.3	3.1	3.1	3.1	3.1
Queue Clearance Time (g_s), s		26.1		26.1	24.8	25.1	5.2	34.4
Green Extension Time (g_e), s		0.0		0.0	0.0	3.1	0.0	0.0
Phase Call Probability		1.00		1.00	1.00	1.00	1.00	1.00
Max Out Probability		1.00		1.00	1.00	0.01	1.00	1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	85	132	521	263	139	91	493	598	196	91	608	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1270	1885	1585	1278	1841	1610	1767	1870	1560	1767	1847	
Queue Service Time (g_s), s	5.9	5.7	24.1	18.4	6.2	4.1	22.8	23.1	7.0	3.2	32.4	
Cycle Queue Clearance Time (g_c), s	12.1	5.7	24.1	24.1	6.2	4.1	22.8	23.1	7.0	3.2	32.4	
Green Ratio (*g/C*)	0.24	0.24	0.48	0.24	0.24	0.31	0.60	0.51	0.51	0.41	0.34	
Capacity (*c*), veh/h	299	454	761	307	444	501	507	952	794	406	628	
Volume-to-Capacity Ratio (*X*)	0.283	0.289	0.684	0.856	0.314	0.182	0.973	0.628	0.246	0.225	0.968	
Back of Queue (*Q*), ft/ln (95 th percentile)	81.3	115.9	360.9	321.1	126.5	70.1	579.3	370.7	110.1	59.2	648.6	
Back of Queue (*Q*), veh/ln (95 th percentile)	3.3	4.6	14.2	12.8	4.9	2.8	22.6	14.6	4.3	2.3	25.7	
Queue Storage Ratio (*RQ*) (95 th percentile)	0.00	0.00	4.81	0.00	0.00	0.00	4.83	0.00	0.92	0.17	0.00	
Uniform Delay (d_1), s/veh	36.1	31.0	20.1	41.8	31.2	25.2	28.7	17.7	13.8	18.7	32.5	
Incremental Delay (d_2), s/veh	0.2	0.1	2.1	19.7	0.1	0.1	32.7	1.0	0.1	0.1	27.8	
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Control Delay (*d*), s/veh	36.3	31.1	22.3	61.5	31.3	25.2	61.4	18.7	13.8	18.8	60.3	
Level of Service (LOS)	D	C	C	E	C	C	E	B	B	B	E	
Approach Delay, s/veh / LOS	25.4	C		46.3	D		34.4	C		54.8	D	
Intersection Delay, s/veh / LOS	38.6						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS								
Bicycle LOS Score / LOS								

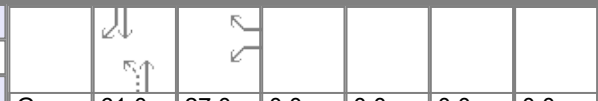
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	TMS Engineers, Inc.			Duration, h	0.250
Analyst	ABC	Analysis Date	Jun 2, 2020	Area Type	Other
Jurisdiction	Amherst, OH	Time Period	PM Peak	PHF	0.92
Urban Street	North Lake Street	Analysis Year	2042	Analysis Period	1> 7:00
Intersection	@ SR 2 WB Ramps	File Name	PM 42 Westbound2 TL.xus		
Project Description	IMP - Turn Lanes & Signal Phasing				

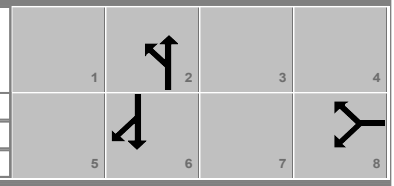


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h				380		582	80	602			941	274

Signal Information			
Cycle, s	100.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	61.0	27.0	0.0	0.0	0.0	0.0
Yellow	4.0	4.0	0.0	0.0	0.0	0.0
Red	2.0	2.0	0.0	0.0	0.0	0.0



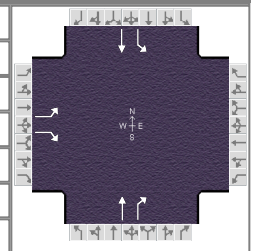
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase				8		2		6
Case Number				9.0		6.0		7.0
Phase Duration, s				33.0		67.0		67.0
Change Period, ($Y+R_c$), s				6.0		6.0		6.0
Max Allow Headway (*MAH*), s				3.3		3.2		3.2
Queue Clearance Time (g_s), s				23.8		63.0		49.1
Green Extension Time (g_e), s				1.1		0.0		4.9
Phase Call Probability				1.00		1.00		1.00
Max Out Probability				1.00		1.00		0.40

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement				3		18	5	2			6	16
Adjusted Flow Rate (*v*), veh/h				413		633	87	654			1023	298
Adjusted Saturation Flow Rate (*s*), veh/h/ln				1795		1414	560	1870			1870	1585
Queue Service Time (g_s), s				21.8		21.0	13.9	21.0			47.1	9.0
Cycle Queue Clearance Time (g_c), s				21.8		21.0	61.0	21.0			47.1	9.0
Green Ratio (*g/C*)				0.27		0.27	0.61	0.61			0.61	0.61
Capacity (*c*), veh/h				485		763	150	1141			1141	967
Volume-to-Capacity Ratio (*X*)				0.852		0.829	0.580	0.574			0.896	0.308
Back of Queue (*Q*), ft/ln (95 th percentile)				412.8		310.4	103.2	319.1			704.6	130.2
Back of Queue (*Q*), veh/ln (95 th percentile)				16.4		12.3	4.1	12.6			27.7	5.1
Queue Storage Ratio (*RQ*) (95 th percentile)				2.95		0.00	0.61	0.00			0.00	1.08
Uniform Delay (d_1), s/veh				34.6		34.3	43.8	11.7			16.8	9.4
Incremental Delay (d_2), s/veh				13.0		7.1	3.7	0.5			9.2	0.1
Initial Queue Delay (d_3), s/veh				0.0		0.0	0.0	0.0			0.0	0.0
Control Delay (*d*), s/veh				47.6		41.5	47.5	12.2			26.0	9.4
Level of Service (LOS)				D		D	D	B			C	A
Approach Delay, s/veh / LOS	0.0			43.9	D		16.3	B		22.3	C	
Intersection Delay, s/veh / LOS	28.1						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS								
Bicycle LOS Score / LOS								

HCS7 Signalized Intersection Results Summary

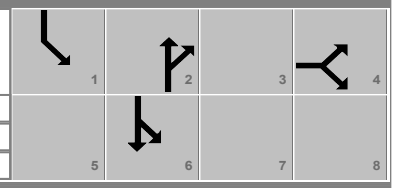
General Information				Intersection Information	
Agency	TMS Engineers, Inc.			Duration, h	0.250
Analyst	ABC	Analysis Date	Jun 2, 2020	Area Type	Other
Jurisdiction	Amherst, OH	Time Period	PM Peak	PHF	0.92
Urban Street	North Lake Street	Analysis Year	2042	Analysis Period	1> 7:00
Intersection	@ SR 2 EB Ramps	File Name	PM 42 Eastbound2 TL.xus		
Project Description	IMP - Turn Lanes & Signal Phasing				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	197		90					485	190	541	780	

Signal Information			
Cycle, s	100.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	28.0	33.8	20.2	0.0	0.0	0.0
Yellow	4.0	4.0	4.0	0.0	0.0	0.0
Red	2.0	2.0	2.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4				2	1	6
Case Number		9.0				7.3	1.0	4.0
Phase Duration, s		26.2				39.8	34.0	73.8
Change Period, ($Y+R_c$), s		6.0				6.0	6.0	6.0
Max Allow Headway (*MAH*), s		3.2				3.1	3.1	3.1
Queue Clearance Time (g_s), s		12.9				27.4	25.0	28.3
Green Extension Time (g_e), s		0.4				0.0	0.5	3.7
Phase Call Probability		1.00				1.00	1.00	1.00
Max Out Probability		0.04				1.00	1.00	0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7		14					2	12	1	6	
Adjusted Flow Rate (*v*), veh/h	214		98					527	207	588	848	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1781		1610					1900	1610	1795	1885	
Queue Service Time (g_s), s	10.9		5.2					25.4	9.7	23.0	26.3	
Cycle Queue Clearance Time (g_c), s	10.9		5.2					25.4	9.7	23.0	26.3	
Green Ratio (*g/C*)	0.20		0.20					0.34	0.34	0.64	0.68	
Capacity (*c*), veh/h	360		325					642	544	649	1278	
Volume-to-Capacity Ratio (*X*)	0.595		0.301					0.821	0.379	0.907	0.663	
Back of Queue (*Q*), ft/ln (95 th percentile)	213.9		90					459.3	164.3	588.5	361.8	
Back of Queue (*Q*), veh/ln (95 th percentile)	8.4		3.6					18.4	6.6	23.4	14.4	
Queue Storage Ratio (*RQ*) (95 th percentile)	1.13		0.00					0.00	0.00	3.46	0.00	
Uniform Delay (d_1), s/veh	36.2		33.9					30.3	25.1	21.8	9.4	
Incremental Delay (d_2), s/veh	1.9		0.2					7.9	0.2	16.1	1.0	
Initial Queue Delay (d_3), s/veh	0.0		0.0					0.0	0.0	0.0	0.0	
Control Delay (*d*), s/veh	38.0		34.1					38.2	25.3	38.0	10.5	
Level of Service (LOS)	D		C					D	C	D	B	
Approach Delay, s/veh / LOS	36.8	D		0.0			34.6	C		21.7	C	
Intersection Delay, s/veh / LOS	27.4						C					

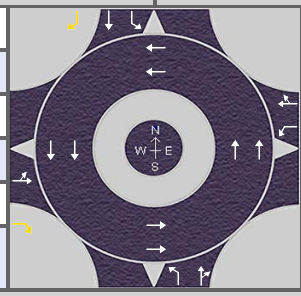
Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS								
Bicycle LOS Score / LOS								

Appendix N
Alternative #2 - 2042 Capacity Analysis Worksheets

HCS7 Roundabouts Report

General Information

Analyst	ABC
Agency or Co.	TMS Engineers, Inc.
Date Performed	6/2/2020
Analysis Year	2042
Time Analyzed	AM Peak
Project Description	Roundabout Control



Site Information

Intersection	Oak Point & Cooper Foster
E/W Street Name	Cooper Foster Park Road
N/S Street Name	Oak Point Road
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	Amherst, OH

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	1	1	0	0	1	1	0	0	1	1	0
Lane Assignment			LT		L		TR		L		TR		L		T	
Volume (V), veh/h	0	12	36	163	0	129	55	46	0	165	240	404	0	68	338	46
Percent Heavy Vehicles, %	0	13	13	2	0	2	5	0	0	3	2	2	0	0	2	0
Flow Rate (v_{PCE}), pc/h	0	15	44	181	0	143	63	50	0	185	266	448	0	74	375	50
Right-Turn Bypass	Yielding				None				None				Yielding			
Conflicting Lanes	2				2				2				2			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		4.3276	4.9763	4.6453	4.3276		4.6453	4.3276		4.6453	4.3276	4.9763
Follow-Up Headway (s)		2.5352	2.6087	2.6667	2.5352		2.6667	2.5352		2.6667	2.5352	2.6087

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		59	181	143	113		185	714		74	375	50
Entry Volume, veh/h		52	177	140	110		181	699		73	369	50
Circulating Flow (v_c), pc/h	592			466			133			391		
Exiting Flow (v_{ex}), pc/h	566			248			331			518		
Capacity (c_{pce}), pc/h		859	814	879	956		1195	1268		942	1018	1072
Capacity (c), veh/h		760	798	859	934		1169	1241		927	1002	1072
v/c Ratio (x)		0.07	0.22	0.16	0.12		0.15	0.56		0.08	0.37	0.05

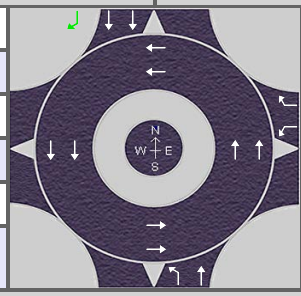
Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		5.4	6.9	5.8	5.0		4.4	9.4		4.6	7.5	3.8
Lane LOS		A	A	A	A		A	A		A	A	A
95% Queue, veh		0.2	0.8	0.6	0.4		0.5	3.7		0.3	1.7	0.1
Approach Delay, s/veh	6.6			5.4			8.4			6.7		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh | LOS	7.3						A					

HCS7 Roundabouts Report

General Information

Analyst	ABC
Agency or Co.	TMS Engineers, Inc.
Date Performed	6/2/2020
Analysis Year	2042
Time Analyzed	AM Peak
Project Description	Roundabout Control



Site Information

Intersection	North Lake & SR 2 WB
E/W Street Name	SR 2 WB Ramps
N/S Street Name	North Lake Street
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	Amherst, OH

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	0	0	0	1	0	1	0	1	1	0	0	0	2	0
Lane Assignment					L		R		L		T		T		T	
Volume (V), veh/h					0	80		388	0	50	421		0		479	151
Percent Heavy Vehicles, %					0	13		3	0	0	2		0		3	1
Flow Rate (v_{PCE}), pc/h					0	98		434	0	54	467		0		536	166
Right-Turn Bypass	None				None				None				Non-Yielding			
Conflicting Lanes					2				2				2			
Pedestrians Crossing, p/h					0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)				4.6453	4.3276		4.6453	4.3276		4.6453	4.3276	
Follow-Up Headway (s)				2.6667	2.5352		2.6667	2.5352		2.6667	2.5352	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h				98	434		54	467		252	284	166
Entry Volume, veh/h				94	414		53	459		245	276	164
Circulating Flow (v_c), pc/h	634			521			0			152		
Exiting Flow (v_{ex}), pc/h	0			54			901			634		
Capacity (c_{pce}), pc/h				836	912		1350	1420		1174	1248	
Capacity (c), veh/h				798	871		1326	1395		1140	1212	
v/c Ratio (x)				0.12	0.48		0.04	0.33		0.21	0.23	

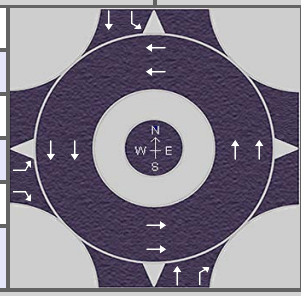
Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh				5.7	10.2		3.0	5.5		5.1	5.0	
Lane LOS				A	B		A	A		A	A	A
95% Queue, veh				0.4	2.6		0.1	1.5		0.8	0.9	
Approach Delay, s/veh				9.4			5.2			3.8		
Approach LOS				A			A			A		
Intersection Delay, s/veh | LOS	5.9						A					

HCS7 Roundabouts Report

General Information

Analyst	ABC
Agency or Co.	TMS Engineers, Inc.
Date Performed	6/2/2020
Analysis Year	2042
Time Analyzed	AM Peak
Project Description	Roundabout Control



Site Information

Intersection	North Lake & SR 2 EB Ramp
E/W Street Name	SR 2 EB Ramps
N/S Street Name	North Lake Street
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	Amherst, OH

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	1	0	1	0	0	0	0	0	0	1	1	0	1	1	0
Lane Assignment	L		R						T		R		L		T	
Volume (V), veh/h	0	192		40					0		279	330	0	364	195	
Percent Heavy Vehicles, %	0	3		4					0		0	1	0	4	6	
Flow Rate (v_{PCE}), pc/h	0	215		45					0		303	362	0	411	225	
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	2								2				2			
Pedestrians Crossing, p/h	0								0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)	4.6453	4.3276					4.6453	4.3276		4.6453	4.3276	
Follow-Up Headway (s)	2.6667	2.5352					2.6667	2.5352		2.6667	2.5352	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h	215	45					303	362		411	225	
Entry Volume, veh/h	208	44					301	360		393	215	
Circulating Flow (v_c), pc/h	636			518			626			0		
Exiting Flow (v_{ex}), pc/h	773			0			518			270		
Capacity (c_{pce}), pc/h	752	827					759	834		1350	1420	
Capacity (c), veh/h	729	802					755	830		1289	1356	
v/c Ratio (x)	0.29	0.05					0.40	0.43		0.30	0.16	

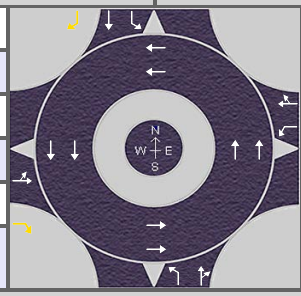
Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh	8.3	5.0					9.9	9.8		5.5	3.9	
Lane LOS	A	A					A	A		A	A	
95% Queue, veh	1.2	0.2					1.9	2.2		1.3	0.6	
Approach Delay, s/veh	7.8						9.8			5.0		
Approach LOS	A						A			A		
Intersection Delay, s/veh | LOS	7.6						A					

HCS7 Roundabouts Report

General Information

Analyst	ABC
Agency or Co.	TMS Engineers, Inc.
Date Performed	6/2/2020
Analysis Year	2042
Time Analyzed	PM Peak
Project Description	Roundabout Control



Site Information

Intersection	Oak Point & Cooper Foster
E/W Street Name	Cooper Foster Park Road
N/S Street Name	Oak Point Road
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	Amherst, OH

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	1	1	0	0	1	1	0	0	1	1	0
Lane Assignment			LT		L		TR		L		TR		L		T	
Volume (V), veh/h	0	78	121	479	0	242	128	84	0	454	550	180	0	84	494	65
Percent Heavy Vehicles, %	0	3	0	2	0	3	2	0	0	3	2	4	0	3	1	0
Flow Rate (v_{PCE}), pc/h	0	87	132	531	0	271	142	91	0	508	610	203	0	94	542	71
Right-Turn Bypass	Yielding				None				None				Yielding			
Conflicting Lanes	2				2				2				2			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		4.3276	4.9763	4.6453	4.3276		4.6453	4.3276		4.6453	4.3276	4.9763
Follow-Up Headway (s)		2.5352	2.6087	2.6667	2.5352		2.6667	2.5352		2.6667	2.5352	2.6087

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		219	531	271	233		508	813		94	542	71
Entry Volume, veh/h		216	521	265	228		495	792		93	535	71
Circulating Flow (v_c), pc/h	907			1205			313			921		
Exiting Flow (v_{ex}), pc/h	429			650			788			813		
Capacity (c_{pce}), pc/h		657	602	446	510		1012	1088		579	649	711
Capacity (c), veh/h		649	590	436	499		986	1060		571	641	711
v/c Ratio (x)		0.33	0.88	0.61	0.46		0.50	0.75		0.16	0.84	0.10

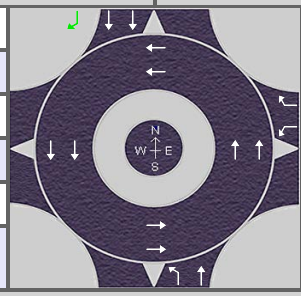
Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		10.0	39.8	23.3	15.4		9.8	16.4		8.3	31.7	6.1
Lane LOS		A	E	C	C		A	C		A	D	A
95% Queue, veh		1.5	10.3	3.9	2.4		2.9	7.3		0.6	9.0	0.3
Approach Delay, s/veh	31.1			19.7			13.9			26.0		
Approach LOS	D			C			B			D		
Intersection Delay, s/veh | LOS	21.3						C					

HCS7 Roundabouts Report

General Information

Analyst	ABC
Agency or Co.	TMS Engineers, Inc.
Date Performed	6/2/2020
Analysis Year	2042
Time Analyzed	PM Peak
Project Description	Roundabout Control



Site Information

Intersection	North Lake & SR 2 WB
E/W Street Name	SR 2 WB Ramps
N/S Street Name	North Lake Street
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	Amherst, OH

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	0	0	0	1	0	1	0	1	1	0	0	0	2	0
Lane Assignment					L		R		L		T		T		T	
Volume (V), veh/h					0	380		582	0	80	602		0		941	274
Percent Heavy Vehicles, %					0	13		3	0	0	2		0		3	1
Flow Rate (v_{PCE}), pc/h					0	467		652	0	87	667		0		1054	301
Right-Turn Bypass	None				None				None				Non-Yielding			
Conflicting Lanes					2				2				2			
Pedestrians Crossing, p/h					0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)				4.6453	4.3276		4.6453	4.3276		4.6453	4.3276	
Follow-Up Headway (s)				2.6667	2.5352		2.6667	2.5352		2.6667	2.5352	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h				467	652		87	667		495	559	301
Entry Volume, veh/h				437	610		85	655		481	542	298
Circulating Flow (v_c), pc/h	1521			754			0			554		
Exiting Flow (v_{ex}), pc/h	0			87			1319			1521		
Capacity (c_{pce}), pc/h				675	748		1350	1420		811	887	
Capacity (c), veh/h				631	699		1327	1395		787	861	
v/c Ratio (x)				0.69	0.87		0.06	0.47		0.61	0.63	

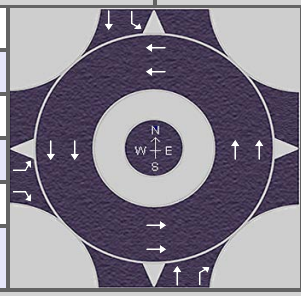
Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh				21.0	34.0		3.2	7.2		14.5	14.2	
Lane LOS				C	D		A	A		B	B	A
95% Queue, veh				5.5	10.5		0.2	2.6		4.2	4.6	
Approach Delay, s/veh				28.6			6.7			11.1		
Approach LOS				D			A			B		
Intersection Delay, s/veh | LOS	15.9						C					

HCS7 Roundabouts Report

General Information

Analyst	ABC
Agency or Co.	TMS Engineers, Inc.
Date Performed	6/2/2020
Analysis Year	2042
Time Analyzed	PM Peak
Project Description	Roundabout Control



Site Information

Intersection	North Lake & SR 2 EB Ramp
E/W Street Name	SR 2 EB Ramps
N/S Street Name	North Lake Street
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	Amherst, OH

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	1	0	1	0	0	0	0	0	0	1	1	0	1	1	0
Lane Assignment	L		R						T		R		L		T	
Volume (V), veh/h	0	197		90					0		485	190	0	541	780	
Percent Heavy Vehicles, %	0	2		0					0		0	0	0	1	1	
Flow Rate (v_{PCE}), pc/h	0	218		98					0		527	207	0	594	856	
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	2								2				2			
Pedestrians Crossing, p/h	0								0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)	4.6453	4.3276					4.6453	4.3276		4.6453	4.3276	
Follow-Up Headway (s)	2.6667	2.5352					2.6667	2.5352		2.6667	2.5352	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h	218	98					527	207		594	856	
Entry Volume, veh/h	215	97					527	207		588	848	
Circulating Flow (v_c), pc/h	1450			745			812			0		
Exiting Flow (v_{ex}), pc/h	801			0			745			954		
Capacity (c_{pce}), pc/h	356	414					640	712		1350	1420	
Capacity (c), veh/h	351	408					640	712		1337	1406	
v/c Ratio (x)	0.61	0.24					0.82	0.29		0.44	0.60	

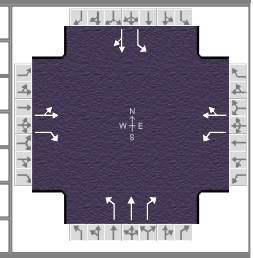
Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh	28.3	12.7					30.6	8.6		7.0	9.4	
Lane LOS	D	B					D	A		A	A	
95% Queue, veh	3.9	0.9					8.7	1.2		2.3	4.3	
Approach Delay, s/veh	23.5						24.4			8.4		
Approach LOS	C						C			A		
Intersection Delay, s/veh | LOS	15.0						C					

Appendix O
Alternative #3 - 2042 Capacity Analysis Worksheets

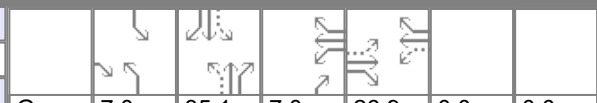
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	TMS Engineers, Inc.			Duration, h	0.250
Analyst	ABC	Analysis Date	Jun 2, 2020	Area Type	Other
Jurisdiction	Lorain, OH	Time Period	AM Peak	PHF	0.92
Urban Street	Oak Point Road	Analysis Year	2042	Analysis Period	1> 7:00
Intersection	@ Buck Horn/Park Square	File Name	AM 42 BuckHorn QuadNE.xus		
Project Description	NE Quadrant Roadway				

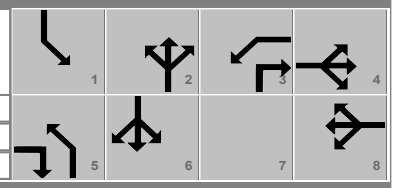


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	30	10	50	139	0	22	30	226	195	68	324	30

Signal Information			
Cycle, s	100.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	7.0	35.1	7.0	26.9	0.0	0.0
Yellow	4.0	4.0	4.0	4.0	0.0	0.0
Red	2.0	2.0	2.0	2.0	0.0	0.0



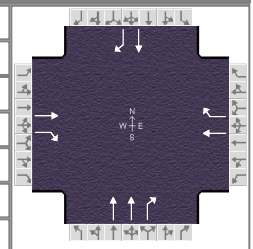
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4	3	8	5	2	1	6
Case Number		7.3	1.0	4.0	1.1	3.0	1.1	4.0
Phase Duration, s		32.9	13.0	45.9	13.0	41.1	13.0	41.1
Change Period, ($Y+R_c$), s		6.0	6.0	6.0	6.0	6.0	6.0	6.0
Max Allow Headway (*MAH*), s		3.3	3.1	3.3	3.1	3.1	3.1	3.1
Queue Clearance Time (g_s), s		4.5	7.8	2.9	3.1	11.7	4.5	19.0
Green Extension Time (g_e), s		0.2	0.0	0.1	0.0	0.0	0.0	1.6
Phase Call Probability		1.00	1.00	1.00	1.00	1.00	1.00	1.00
Max Out Probability		0.00	1.00	0.37	0.22	1.00	1.00	0.01

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h		43	54	151	24		33	246	212	74	385	
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1516	1510	1810	1610		1810	1885	1610	1810	1857	
Queue Service Time (g_s), s		1.3	2.5	5.8	0.9		1.1	9.7	8.8	2.5	17.0	
Cycle Queue Clearance Time (g_c), s		2.0	2.5	5.8	0.9		1.1	9.7	8.8	2.5	17.0	
Green Ratio (*g/C*)		0.27	0.34	0.36	0.40		0.42	0.35	0.42	0.42	0.35	
Capacity (*c*), veh/h		471	512	553	642		362	662	678	468	652	
Volume-to-Capacity Ratio (*X*)		0.092	0.106	0.273	0.037		0.090	0.371	0.313	0.158	0.590	
Back of Queue (*Q*), ft/ln (95 th percentile)		34.7	41.4	109.5	14.9		19.5	192	143.1	45.1	299.3	
Back of Queue (*Q*), veh/ln (95 th percentile)		1.4	1.6	4.4	0.6		0.8	7.6	5.7	1.8	11.9	
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00	0.28	0.00	0.00		0.06	0.00	0.00	0.17	0.00	
Uniform Delay (d_1), s/veh		27.4	22.7	22.5	18.3		18.9	24.2	19.3	18.2	26.6	
Incremental Delay (d_2), s/veh		0.0	0.0	0.1	0.0		0.0	0.1	0.1	0.1	1.0	
Initial Queue Delay (d_3), s/veh		0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Control Delay (*d*), s/veh		27.4	22.7	22.6	18.3		19.0	24.3	19.4	18.3	27.5	
Level of Service (LOS)		C	C	C	B		B	C	B	B	C	
Approach Delay, s/veh / LOS	24.8	C		22.0	C		21.9	C		26.0	C	
Intersection Delay, s/veh / LOS	23.7						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS								
Bicycle LOS Score / LOS								

HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	TMS Engineers, Inc.			Duration, h	0.250
Analyst	ABC	Analysis Date	Jun 2, 2020	Area Type	Other
Jurisdiction	Amherst, OH	Time Period	AM Peak	PHF	0.92
Urban Street	Oak Point Road	Analysis Year	2042	Analysis Period	1> 7:00
Intersection	@ Cooper Foster Park…	File Name	AM 42 CooperFoster QuadNE.xus		
Project Description	NE Quadrant Roadway				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h		48	163		220	46		405	404		437	129

Signal Information			
Cycle, s	90.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	42.0	36.0	0.0	0.0	0.0	0.0	1	2	3	4		
Yellow	4.0	4.0	0.0	0.0	0.0	0.0						
Red	2.0	2.0	0.0	0.0	0.0	0.0	5	6	7	8		

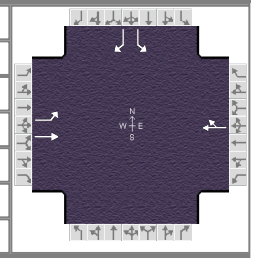
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8		2		6
Case Number		7.0		7.0		7.0		7.0
Phase Duration, s		42.0		42.0		48.0		48.0
Change Period, ($Y+R_c$), s		6.0		6.0		6.0		6.0
Max Allow Headway (*MAH*), s		3.2		3.2		3.2		3.2
Queue Clearance Time (g_s), s		9.1		10.0		20.4		18.3
Green Extension Time (g_e), s		1.0		0.0		0.0		3.5
Phase Call Probability		1.00		1.00		1.00		1.00
Max Out Probability		0.00		1.00		1.00		0.01

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		4	14		8	18		2	12		6	16
Adjusted Flow Rate (*v*), veh/h		52	177		239	50		440	439		475	140
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1767	1522		1856	1610		1781	1585		1870	1610
Queue Service Time (g_s), s		1.6	7.1		8.0	1.7		6.8	18.4		16.3	4.6
Cycle Queue Clearance Time (g_c), s		1.6	7.1		8.0	1.7		6.8	18.4		16.3	4.6
Green Ratio (*g/C*)		0.40	0.40		0.40	0.40		0.47	0.47		0.47	0.47
Capacity (*c*), veh/h		707	609		742	644		1662	740		873	751
Volume-to-Capacity Ratio (*X*)		0.074	0.291		0.322	0.078		0.265	0.594		0.544	0.187
Back of Queue (*Q*), ft/ln (95 th percentile)		31	114		151.5	27.8		118	268.1		274.7	71
Back of Queue (*Q*), veh/ln (95 th percentile)		1.2	4.3		5.9	1.1		4.6	10.6		10.8	2.8
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00	1.52		0.00	0.00		0.00	2.23		0.00	0.00
Uniform Delay (d_1), s/veh		16.7	18.3		18.6	16.7		14.6	17.7		17.2	14.0
Incremental Delay (d_2), s/veh		0.0	0.1		0.1	0.0		0.0	0.9		0.4	0.0
Initial Queue Delay (d_3), s/veh		0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0
Control Delay (*d*), s/veh		16.7	18.4		18.7	16.7		14.6	18.6		17.6	14.1
Level of Service (LOS)		B	B		B	B		B	B		B	B
Approach Delay, s/veh / LOS	18.0	B		18.4	B		16.6	B		16.8	B	
Intersection Delay, s/veh / LOS	17.1						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS								
Bicycle LOS Score / LOS								

HCS7 Signalized Intersection Results Summary

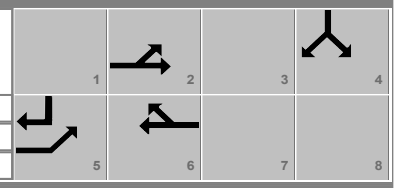
General Information				Intersection Information	
Agency	TMS Engineers, Inc.			Duration, h	0.250
Analyst	ABC	Analysis Date	Jun 2, 2020	Area Type	Other
Jurisdiction	Amherst, OH	Time Period	AM Peak	PHF	0.92
Urban Street	Cooper Foster Park Road	Analysis Year	2042	Analysis Period	1> 7:00
Intersection	@ Quadrant Roadway	File Name	AM 43 Quadrant.xus		
Project Description	NE Quadrant Roadway				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	76	134			125	65				34		199

Signal Information			
Cycle, s	90.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	7.0	34.0	31.0	0.0	0.0	0.0
Yellow	4.0	4.0	4.0	0.0	0.0	0.0
Red	2.0	2.0	2.0	0.0	0.0	0.0



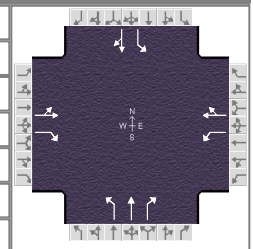
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2		6				4
Case Number	1.0	4.0		8.3				9.0
Phase Duration, s	13.0	53.0		40.0				37.0
Change Period, ($Y+R_c$), s	6.0	6.0		6.0				6.0
Max Allow Headway (*MAH*), s	3.3	3.2		3.2				3.5
Queue Clearance Time (g_s), s	4.3	5.7		9.5				10.3
Green Extension Time (g_e), s	0.0	0.7		0.0				0.6
Phase Call Probability	1.00	1.00		1.00				1.00
Max Out Probability	1.00	0.00		1.00				0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2			6	16				7		14
Adjusted Flow Rate (*v*), veh/h	83	146			207					37		216
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1767	1856			1748					1767		1572
Queue Service Time (g_s), s	2.3	3.7			7.5					1.3		8.3
Cycle Queue Clearance Time (g_c), s	2.3	3.7			7.5					1.3		8.3
Green Ratio (*g/C*)	0.48	0.52			0.38					0.34		0.42
Capacity (*c*), veh/h	561	969			660					609		664
Volume-to-Capacity Ratio (*X*)	0.147	0.150			0.313					0.061		0.326
Back of Queue (*Q*), ft/ln (95 th percentile)	41.6	67.8			140.2					24		136.8
Back of Queue (*Q*), veh/ln (95 th percentile)	1.6	2.6			5.5					0.9		5.3
Queue Storage Ratio (*RQ*) (95 th percentile)	0.00	0.00			0.00					0.00		0.00
Uniform Delay (d_1), s/veh	13.4	11.1			19.8					19.8		17.4
Incremental Delay (d_2), s/veh	0.0	0.0			0.1					0.0		0.1
Initial Queue Delay (d_3), s/veh	0.0	0.0			0.0					0.0		0.0
Control Delay (*d*), s/veh	13.5	11.2			19.9					19.8		17.5
Level of Service (LOS)	B	B			B					B		B
Approach Delay, s/veh / LOS	12.0	B		19.9	B		0.0			17.9	B	
Intersection Delay, s/veh / LOS	16.5						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS								
Bicycle LOS Score / LOS								

HCS7 Signalized Intersection Results Summary

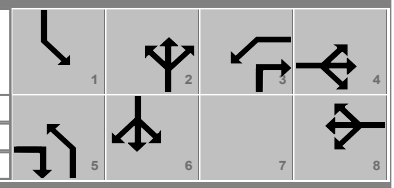
General Information				Intersection Information	
Agency	TMS Engineers, Inc.			Duration, h	0.250
Analyst	ABC	Analysis Date	Jun 2, 2020	Area Type	Other
Jurisdiction	Lorain, OH	Time Period	PM Peak	PHF	0.92
Urban Street	Oak Point Road	Analysis Year	2042	Analysis Period	1> 7:00
Intersection	@ Buck Horn/Park Square	File Name	PM 42 BuckHornQuadNE.xus		
Project Description	NE Quadrant Roadway				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	130	10	60	322	10	108	140	484	464	94	419	120

Signal Information			
Cycle, s	100.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	7.0	37.2	15.2	16.6	0.0	0.0
Yellow	4.0	4.0	4.0	4.0	0.0	0.0
Red	2.0	2.0	2.0	2.0	0.0	0.0



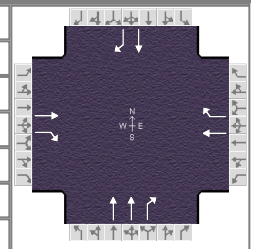
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4	3	8	5	2	1	6
Case Number		7.3	1.0	4.0	1.1	3.0	1.1	4.0
Phase Duration, s		22.6	21.2	43.8	13.0	43.2	13.0	43.2
Change Period, ($Y+R_c$), s		6.0	6.0	6.0	6.0	6.0	6.0	6.0
Max Allow Headway (*MAH*), s		3.3	3.1	3.3	3.1	3.2	3.1	3.2
Queue Clearance Time (g_s), s		13.0	17.2	7.4	7.3	26.3	5.3	32.0
Green Extension Time (g_e), s		0.3	0.0	0.0	0.0	0.0	0.0	2.1
Phase Call Probability		1.00	1.00	1.00	1.00	1.00	1.00	1.00
Max Out Probability		0.86	1.00	1.00	1.00	1.00	1.00	0.69

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h		152	65	350	128		152	526	504	102	586	
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1301	1610	1810	1606		1767	1885	1610	1810	1813	
Queue Service Time (g_s), s		11.0	3.2	15.2	5.4		5.3	24.3	21.7	3.3	30.0	
Cycle Queue Clearance Time (g_c), s		11.0	3.2	15.2	5.4		5.3	24.3	21.7	3.3	30.0	
Green Ratio (*g/C*)		0.17	0.24	0.34	0.38		0.44	0.37	0.52	0.44	0.37	
Capacity (*c*), veh/h		285	380	425	607		239	701	844	295	674	
Volume-to-Capacity Ratio (*X*)		0.533	0.172	0.823	0.211		0.638	0.750	0.598	0.346	0.869	
Back of Queue (*Q*), ft/ln (95 th percentile)		160.3	55.7	315.4	90.9		107.9	422.5	303.6	61	523.6	
Back of Queue (*Q*), veh/ln (95 th percentile)		6.4	2.2	12.6	3.6		4.2	16.8	12.1	2.4	20.8	
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00	0.37	0.00	0.00		0.33	0.00	0.00	0.23	0.00	
Uniform Delay (d_1), s/veh		39.4	30.4	28.8	21.0		23.2	27.4	16.5	20.4	29.1	
Incremental Delay (d_2), s/veh		1.0	0.1	11.6	0.1		4.3	4.0	0.8	0.3	11.3	
Initial Queue Delay (d_3), s/veh		0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Control Delay (*d*), s/veh		40.4	30.5	40.4	21.1		27.5	31.4	17.3	20.7	40.4	
Level of Service (LOS)		D	C	D	C		C	C	B	C	D	
Approach Delay, s/veh / LOS	37.4	D		35.2	D		24.9	C		37.5	D	
Intersection Delay, s/veh / LOS	31.3						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS								
Bicycle LOS Score / LOS								

HCS7 Signalized Intersection Results Summary

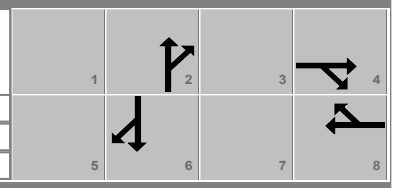
General Information				Intersection Information	
Agency	TMS Engineers, Inc.			Duration, h	0.250
Analyst	ABC	Analysis Date	Jun 2, 2020	Area Type	Other
Jurisdiction	Amherst, OH	Time Period	PM Peak	PHF	0.92
Urban Street	Oak Point Road	Analysis Year	2042	Analysis Period	1> 7:00
Intersection	@ Cooper Foster Park…	File Name	PM 42 CooperFoster QuadNE.xus		
Project Description	NE Quadrant Roadway				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h		199	479		582	84		1004	180		736	292

Signal Information			
Cycle, s	100.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	47.4	40.6	0.0	0.0	0.0	0.0	
Yellow	4.0	4.0	0.0	0.0	0.0	0.0	
Red	2.0	2.0	0.0	0.0	0.0	0.0	



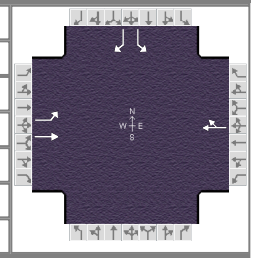
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8		2		6
Case Number		7.0		7.0		7.0		7.0
Phase Duration, s		46.6		46.6		53.4		53.4
Change Period, ($Y+R_c$), s		6.0		6.0		6.0		6.0
Max Allow Headway (*MAH*), s		3.2		3.2		3.1		3.1
Queue Clearance Time (g_s), s		31.1		33.1		25.2		40.8
Green Extension Time (g_e), s		0.0		2.4		0.0		3.8
Phase Call Probability		1.00		1.00		1.00		1.00
Max Out Probability		1.00		0.41		1.00		0.70

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		4	14		8	18		2	12		6	16
Adjusted Flow Rate (*v*), veh/h		216	521		633	91		1091	196		800	317
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1885	1585		1841	1610		1781	1560		1885	1610
Queue Service Time (g_s), s		7.7	29.1		31.1	3.6		23.2	7.5		38.8	12.9
Cycle Queue Clearance Time (g_c), s		7.7	29.1		31.1	3.6		23.2	7.5		38.8	12.9
Green Ratio (*g/C*)		0.41	0.41		0.41	0.41		0.47	0.47		0.47	0.47
Capacity (*c*), veh/h		765	643		747	654		1688	739		894	763
Volume-to-Capacity Ratio (*X*)		0.283	0.809		0.846	0.140		0.647	0.265		0.895	0.416
Back of Queue (*Q*), ft/ln (95 th percentile)		149.3	438.7		540.2	58.5		360.8	120.3		652.6	202.2
Back of Queue (*Q*), veh/ln (95 th percentile)		5.9	17.3		20.9	2.3		14.2	4.7		25.9	8.1
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00	5.85		0.00	0.00		0.00	1.00		0.00	0.00
Uniform Delay (d_1), s/veh		19.9	26.3		26.9	18.7		19.9	15.8		24.0	17.2
Incremental Delay (d_2), s/veh		0.1	7.1		8.5	0.0		0.7	0.1		11.2	0.1
Initial Queue Delay (d_3), s/veh		0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0
Control Delay (*d*), s/veh		20.0	33.4		35.4	18.7		20.6	15.9		35.3	17.4
Level of Service (LOS)		C	C		D	B		C	B		D	B
Approach Delay, s/veh / LOS	29.5	C		33.3	C		19.9	B		30.2	C	
Intersection Delay, s/veh / LOS	27.2						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS								
Bicycle LOS Score / LOS								

HCS7 Signalized Intersection Results Summary

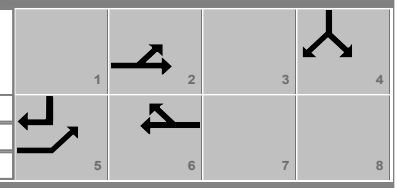
General Information				Intersection Information	
Agency	TMS Engineers, Inc.			Duration, h	0.250
Analyst	ABC	Analysis Date	Jun 2, 2020	Area Type	Other
Jurisdiction	Amherst, OH	Time Period	PM Peak	PHF	0.92
Urban Street	Cooper Foster Park Road	Analysis Year	2042	Analysis Period	1> 7:00
Intersection	@ Quadrant Roadway	File Name	PM 43 Quadrant.xus		
Project Description	NE Quadrant Roadway				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	199	303			53	121				42		496

Signal Information			
Cycle, s	100.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	7.0	34.7	40.3	0.0	0.0	0.0
Yellow	4.0	4.0	4.0	0.0	0.0	0.0
Red	2.0	2.0	2.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2		6				4
Case Number	1.0	4.0		8.3				9.0
Phase Duration, s	13.0	53.7		40.7				46.3
Change Period, ($Y+R_c$), s	6.0	6.0		6.0				6.0
Max Allow Headway (*MAH*), s	3.3	3.2		3.2				3.5
Queue Clearance Time (g_s), s	9.0	13.3		10.5				29.5
Green Extension Time (g_e), s	0.0	1.1		0.0				1.3
Phase Call Probability	1.00	1.00		1.00				1.00
Max Out Probability	1.00	0.00		1.00				0.04

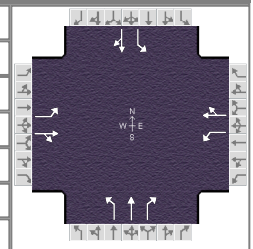
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2			6	16				7		14
Adjusted Flow Rate (*v*), veh/h	216	329			189					46		539
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1767	1856			1649					1767		1572
Queue Service Time (g_s), s	7.0	11.3			8.5					1.6		27.5
Cycle Queue Clearance Time (g_c), s	7.0	11.3			8.5					1.6		27.5
Green Ratio (*g/C*)	0.44	0.48			0.35					0.40		0.47
Capacity (*c*), veh/h	507	885			572					712		744
Volume-to-Capacity Ratio (*X*)	0.427	0.372			0.331					0.064		0.725
Back of Queue (*Q*), ft/ln (95 th percentile)	147.8	214.2			153.4					30.2		403
Back of Queue (*Q*), veh/ln (95 th percentile)	5.8	8.4			6.0					1.2		15.7
Queue Storage Ratio (*RQ*) (95 th percentile)	0.00	0.00			0.00					0.00		0.00
Uniform Delay (d_1), s/veh	19.5	16.6			24.1					18.3		21.1
Incremental Delay (d_2), s/veh	0.2	0.1			0.1					0.0		3.1
Initial Queue Delay (d_3), s/veh	0.0	0.0			0.0					0.0		0.0
Control Delay (*d*), s/veh	19.7	16.7			24.2					18.3		24.2
Level of Service (LOS)	B	B			C					B		C
Approach Delay, s/veh / LOS	17.9	B		24.2	C		0.0			23.7	C	
Intersection Delay, s/veh / LOS	21.4						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS								
Bicycle LOS Score / LOS								

Appendix P
Alternative #4 - 2042 Capacity Analysis Worksheets

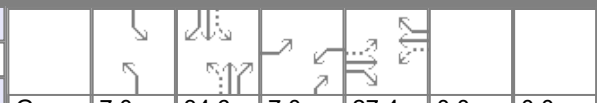
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	TMS Engineers, Inc.			Duration, h	0.250
Analyst	ABC	Analysis Date	Jun 2, 2020	Area Type	Other
Jurisdiction	Lorain, OH	Time Period	AM Peak	PHF	0.92
Urban Street	Oak Point Road	Analysis Year	2042	Analysis Period	1> 7:00
Intersection	@ Buck Horn/Park Square	File Name	AM 42 BuckHorn BP.xus		
Project Description	By-Pass Roadway				

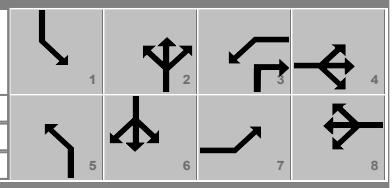


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	42	46	50	139	55	10	30	226	30	108	324	30

Signal Information			
Cycle, s	100.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	7.0	34.6	7.0	27.4	0.0	0.0
Yellow	4.0	4.0	4.0	4.0	0.0	0.0
Red	2.0	2.0	2.0	2.0	0.0	0.0



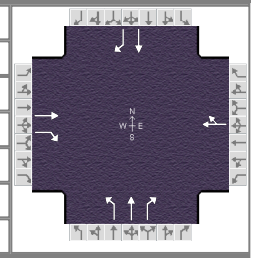
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	7	4	3	8	5	2	1	6
Case Number	1.1	4.0	1.1	4.0	1.1	3.0	1.1	4.0
Phase Duration, s	13.0	33.4	13.0	33.4	13.0	40.6	13.0	40.6
Change Period, ($Y+R_c$), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Max Allow Headway (*MAH*), s	3.1	3.2	3.1	3.2	3.1	3.1	3.1	3.1
Queue Clearance Time (g_s), s	3.7	6.6	8.0	4.9	3.1	11.8	6.1	19.1
Green Extension Time (g_e), s	0.0	0.3	0.0	0.1	0.0	0.0	0.0	1.2
Phase Call Probability	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Max Out Probability	0.73	0.00	1.00	1.00	0.22	1.00	1.00	0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	46	104		151	71		33	246	33	117	385	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1810	1737		1810	1849		1810	1885	1610	1810	1857	
Queue Service Time (g_s), s	1.7	4.6		6.0	2.9		1.1	9.8	1.2	4.1	17.1	
Cycle Queue Clearance Time (g_c), s	1.7	4.6		6.0	2.9		1.1	9.8	1.2	4.1	17.1	
Green Ratio (*g/C*)	0.34	0.27		0.34	0.27		0.42	0.35	0.42	0.42	0.35	
Capacity (*c*), veh/h	503	476		471	507		356	652	670	461	642	
Volume-to-Capacity Ratio (*X*)	0.091	0.219		0.321	0.139		0.092	0.377	0.049	0.255	0.599	
Back of Queue (*Q*), ft/ln (95 th percentile)	32	85.8		112.7	56.7		19.7	193.4	19.7	74.4	302	
Back of Queue (*Q*), veh/ln (95 th percentile)	1.3	3.4		4.5	2.3		0.8	7.7	0.8	3.0	12.0	
Queue Storage Ratio (*RQ*) (95 th percentile)	0.00	0.00		0.00	0.00		0.06	0.00	0.00	0.29	0.00	
Uniform Delay (d_1), s/veh	22.2	28.0		23.7	27.4		19.3	24.6	17.4	19.0	27.0	
Incremental Delay (d_2), s/veh	0.0	0.1		0.1	0.0		0.0	0.1	0.0	0.1	1.1	
Initial Queue Delay (d_3), s/veh	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Control Delay (*d*), s/veh	22.2	28.1		23.9	27.4		19.3	24.7	17.4	19.1	28.1	
Level of Service (LOS)	C	C		C	C		B	C	B	B	C	
Approach Delay, s/veh / LOS	26.3	C		25.0	C		23.4	C		26.0	C	
Intersection Delay, s/veh / LOS	25.2						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS								
Bicycle LOS Score / LOS								

HCS7 Signalized Intersection Results Summary

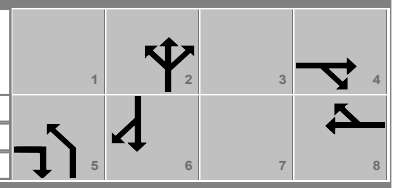
General Information				Intersection Information	
Agency	TMS Engineers, Inc.			Duration, h	0.250
Analyst	ABC	Analysis Date	Jun 2, 2020	Area Type	Other
Jurisdiction	Amherst, OH	Time Period	AM Peak	PHF	0.92
Urban Street	Oak Point Road	Analysis Year	2042	Analysis Period	1> 7:00
Intersection	@ Cooper Foster Park…	File Name	AM 42 CooperFoster BP.xus		
Project Description	By-Pass Roadway				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h		0	163		0	46	165	240	404		467	46

Signal Information			
Cycle, s	90.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	7.0	37.5	27.5	0.0	0.0	0.0
Yellow	4.0	4.0	4.0	0.0	0.0	0.0
Red	2.0	2.0	2.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2		6
Case Number		7.0		8.0	1.0	3.0		7.3
Phase Duration, s		33.5		33.5	13.0	56.5		43.5
Change Period, (*Y+R c*), s		6.0		6.0	6.0	6.0		6.0
Max Allow Headway (*MAH*), s		3.4		3.4	3.1	3.2		3.2
Queue Clearance Time (*g s*), s		9.3		4.1	7.0	17.1		21.6
Green Extension Time (*g e*), s		0.4		0.1	0.0	0.0		2.6
Phase Call Probability		1.00		1.00	1.00	1.00		1.00
Max Out Probability		0.00		1.00	1.00	1.00		0.04

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		4	14		8	18	5	2	12		6	16
Adjusted Flow Rate (*v*), veh/h		0	177		50		179	261	439		508	50
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1767	1522		1572		1753	1870	1585		1870	1610
Queue Service Time (*g s*), s		0.0	7.3		2.1		5.0	6.4	15.1		19.6	1.7
Cycle Queue Clearance Time (*g c*), s		0.0	7.3		2.1		5.0	6.4	15.1		19.6	1.7
Green Ratio (*g/C*)		0.31	0.38		0.31		0.52	0.56	0.56		0.42	0.42
Capacity (*c*), veh/h		540	584		480		391	1049	889		779	671
Volume-to-Capacity Ratio (*X*)		0.000	0.304		0.104		0.459	0.249	0.494		0.651	0.075
Back of Queue (*Q*), ft/ln (95 th percentile)		0	118		34.1		84.4	109.9	213.9		331.2	26.8
Back of Queue (*Q*), veh/ln (95 th percentile)		0.0	4.5		1.3		3.3	4.3	8.4		13.0	1.1
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00	0.00		0.00		0.70	0.00	1.78		0.00	0.00
Uniform Delay (*d 1*), s/veh		0.0	19.4		22.4		15.0	10.1	12.0		21.0	15.8
Incremental Delay (*d 2*), s/veh		0.0	0.1		0.0		0.3	0.0	0.2		1.5	0.0
Initial Queue Delay (*d 3*), s/veh		0.0	0.0		0.0		0.0	0.0	0.0		0.0	0.0
Control Delay (*d*), s/veh		0.0	19.5		22.5		15.3	10.1	12.1		22.5	15.8
Level of Service (LOS)			B		C		B	B	B		C	B
Approach Delay, s/veh / LOS	19.5	B		22.5	C		12.2	B		21.9	C	
Intersection Delay, s/veh / LOS	16.5						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS								
Bicycle LOS Score / LOS								

HCS7 Two-Way Stop-Control Report

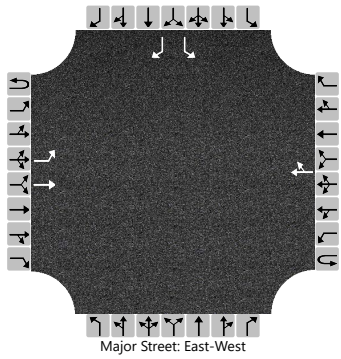
General Information

Analyst	ABC
Agency/Co.	TMS Engineers, Inc.
Date Performed	6/2/2020
Analysis Year	2042
Time Analyzed	AM Peak
Intersection Orientation	East-West
Project Description	By-Pass Roadway

Site Information

Intersection	Cooper Foster & West
Jurisdiction	Amherst, OH
East/West Street	Cooper Foster Park Road
North/South Street	By-Pass Roadway West
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	1	0	0	0	1	0		0	0	0		1	0	1
Configuration		L	T					TR						L		R
Volume (veh/h)		48	163				165	10						28		27
Percent Heavy Vehicles (%)		2												2		2
Proportion Time Blocked																
Percent Grade (%)													0			
Right Turn Channelized													No			
Median Type | Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1												7.1		6.2
Critical Headway (sec)		4.12												6.42		6.22
Base Follow-Up Headway (sec)		2.2												3.5		3.3
Follow-Up Headway (sec)		2.22												3.52		3.32

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		52												30		29
Capacity, c (veh/h)		1384												534		857
v/c Ratio		0.04												0.06		0.03
95% Queue Length, Q_{95} (veh)		0.1												0.2		0.1
Control Delay (s/veh)		7.7												12.2		9.3
Level of Service (LOS)		A												B		A
Approach Delay (s/veh)	1.8												10.8			
Approach LOS													B			

HCS7 Two-Way Stop-Control Report

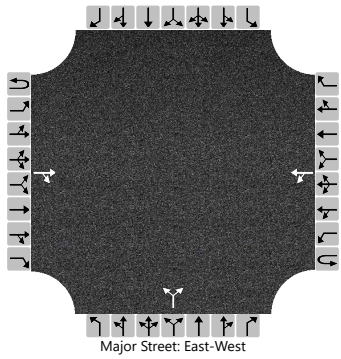
General Information

Analyst	ABC
Agency/Co.	TMS Engineers, Inc.
Date Performed	6/2/2020
Analysis Year	2042
Time Analyzed	AM Peak
Intersection Orientation	East-West
Project Description	By-Pass Roadway

Site Information

Intersection	Buck Horn & By-Pass
Jurisdiction	Amherst, OH
East/West Street	Buck Horn Boulevard
North/South Street	By-Pass Roadway West
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	0	0
Configuration				TR		LT					LR					
Volume (veh/h)			90	10		55	60			10		48				
Percent Heavy Vehicles (%)						2				2		2				
Proportion Time Blocked																
Percent Grade (%)										0						
Right Turn Channelized																
Median Type | Storage						Undivided										

Critical and Follow-up Headways

Base Critical Headway (sec)						4.1				7.1		6.2				
Critical Headway (sec)						4.12				6.42		6.22				
Base Follow-Up Headway (sec)						2.2				3.5		3.3				
Follow-Up Headway (sec)						2.22				3.52		3.32				

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						60					63					
Capacity, c (veh/h)						1482					888					
v/c Ratio						0.04					0.07					
95% Queue Length, Q_{95} (veh)						0.1					0.2					
Control Delay (s/veh)						7.5					9.4					
Level of Service (LOS)						A					A					
Approach Delay (s/veh)						3.8				9.4						
Approach LOS										A						

HCS7 Two-Way Stop-Control Report

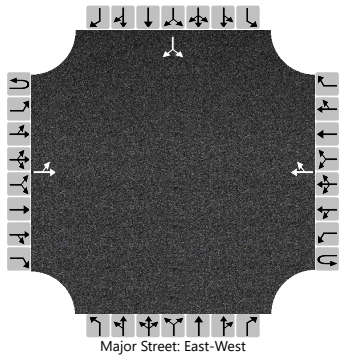
General Information

Analyst	ABC
Agency/Co.	TMS Engineers, Inc.
Date Performed	6/2/2020
Analysis Year	2042
Time Analyzed	AM Peak
Intersection Orientation	East-West
Project Description	By-Pass Roadway

Site Information

Intersection	Cooper Foster & East
Jurisdiction	Amherst, OH
East/West Street	Cooper Foster Park Road
North/South Street	By-Pass Roadway East
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	0	0		0	1	0
Configuration		LT						TR							LR	
Volume (veh/h)		92	150				98	92						52		52
Percent Heavy Vehicles (%)		2												2		2
Proportion Time Blocked																
Percent Grade (%)														0		
Right Turn Channelized																
Median Type | Storage			Undivided													

Critical and Follow-up Headways

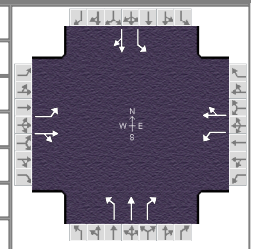
Base Critical Headway (sec)		4.1												7.1		6.2
Critical Headway (sec)		4.12												6.42		6.22
Base Follow-Up Headway (sec)		2.2												3.5		3.3
Follow-Up Headway (sec)		2.22												3.52		3.32

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		100													113	
Capacity, c (veh/h)		1365													619	
v/c Ratio		0.07													0.18	
95% Queue Length, Q_{95} (veh)		0.2													0.7	
Control Delay (s/veh)		7.8													12.1	
Level of Service (LOS)		A													B	
Approach Delay (s/veh)		3.4												12.1		
Approach LOS														B		

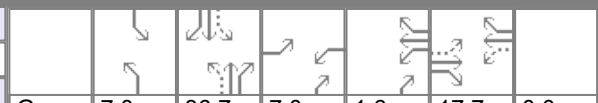
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	TMS Engineers, Inc.			Duration, h	0.250
Analyst	ABC	Analysis Date	Jun 2, 2020	Area Type	Other
Jurisdiction	Lorain, OH	Time Period	PM Peak	PHF	0.92
Urban Street	Oak Point Road	Analysis Year	2042	Analysis Period	1> 7:00
Intersection	@ Buck Horn/Park Square	File Name	PM 42 BuckHorn BP.xus		
Project Description	By-Pass Roadway				

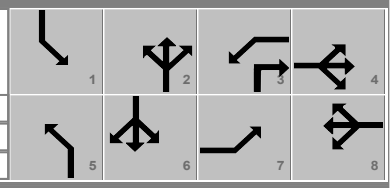


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	208	131	60	322	138	30	140	484	10	94	419	120

Signal Information			
Cycle, s	100.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	7.0	36.7	7.0	1.6	17.7	0.0
Yellow	4.0	4.0	4.0	4.0	4.0	0.0
Red	2.0	2.0	2.0	2.0	2.0	0.0



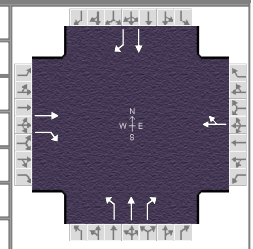
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	7	4	3	8	5	2	1	6
Case Number	1.1	4.0	1.1	4.0	1.1	3.0	1.1	4.0
Phase Duration, s	13.0	23.7	20.6	31.3	13.0	42.7	13.0	42.7
Change Period, ($Y+R_c$), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Max Allow Headway (*MAH*), s	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1
Queue Clearance Time (g_s), s	9.0	12.8	16.6	10.4	7.3	26.5	5.4	32.2
Green Extension Time (g_e), s	0.0	0.4	0.0	0.0	0.0	0.0	0.0	1.3
Phase Call Probability	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Max Out Probability	1.00	0.29	1.00	1.00	1.00	1.00	1.00	0.66

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	226	208		350	183		152	526	11	102	586	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1810	1784		1810	1812		1767	1885	1610	1810	1813	
Queue Service Time (g_s), s	7.0	10.8		14.6	8.4		5.3	24.5	0.3	3.4	30.2	
Cycle Queue Clearance Time (g_c), s	7.0	10.8		14.6	8.4		5.3	24.5	0.3	3.4	30.2	
Green Ratio (*g/C*)	0.25	0.18		0.34	0.25		0.44	0.37	0.51	0.44	0.37	
Capacity (*c*), veh/h	381	316		418	458		232	692	826	289	665	
Volume-to-Capacity Ratio (*X*)	0.594	0.657		0.837	0.398		0.655	0.760	0.013	0.353	0.881	
Back of Queue (*Q*), ft/ln (95 th percentile)	70.1	217.8		318.2	165.2		111.2	427.8	5.1	61.7	534.4	
Back of Queue (*Q*), veh/ln (95 th percentile)	2.8	8.6		12.7	6.5		4.3	17.0	0.2	2.5	21.2	
Queue Storage Ratio (*RQ*) (95 th percentile)	0.00	0.00		0.00	0.00		0.34	0.00	0.00	0.24	0.00	
Uniform Delay (d_1), s/veh	33.6	38.3		28.8	31.0		23.5	27.8	11.9	20.8	29.6	
Incremental Delay (d_2), s/veh	1.7	3.9		13.2	0.2		5.2	4.4	0.0	0.3	12.6	
Initial Queue Delay (d_3), s/veh	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Control Delay (*d*), s/veh	35.4	42.3		42.0	31.2		28.7	32.2	11.9	21.0	42.2	
Level of Service (LOS)	D	D		D	C		C	C	B	C	D	
Approach Delay, s/veh / LOS	38.7	D		38.3	D		31.1	C		39.1	D	
Intersection Delay, s/veh / LOS	36.5						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS								
Bicycle LOS Score / LOS								

HCS7 Signalized Intersection Results Summary

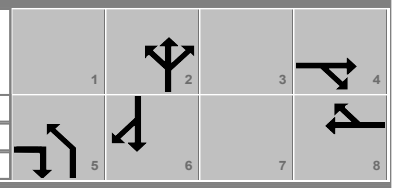
General Information				Intersection Information	
Agency	TMS Engineers, Inc.			Duration, h	0.250
Analyst	ABC	Analysis Date	Jun 2, 2020	Area Type	Other
Jurisdiction	Amherst, OH	Time Period	PM Peak	PHF	0.92
Urban Street	Oak Point Road	Analysis Year	2042	Analysis Period	1> 7:00
Intersection	@ Cooper Foster Park…	File Name	PM 42 CooperFoster BP.xus		
Project Description	By-Pass Roadway				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h		0	479		0	84	454	550	180		736	65

Signal Information			
Cycle, s	100.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	25.5	45.0	11.5	0.0	0.0	0.0
Yellow	4.0	4.0	4.0	0.0	0.0	0.0
Red	2.0	2.0	2.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2		6
Case Number		7.0		8.0	1.0	3.0		7.3
Phase Duration, s		17.5		17.5	31.5	82.5		51.0
Change Period, ($Y+R_c$), s		6.0		6.0	6.0	6.0		6.0
Max Allow Headway (*MAH*), s		3.4		3.4	3.1	3.1		3.1
Queue Clearance Time (g_s), s		13.5		7.5	22.9	13.0		42.5
Green Extension Time (g_e), s		0.0		0.0	0.3	0.0		1.2
Phase Call Probability		1.00		1.00	1.00	1.00		1.00
Max Out Probability		1.00		1.00	1.00	1.00		1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		4	14		8	18	5	2	12		6	16
Adjusted Flow Rate (*v*), veh/h		0	521		91		493	598	196		800	71
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1885	1585		1560		1767	1870	1560		1885	1610
Queue Service Time (g_s), s		0.0	11.5		5.5		20.9	11.0	3.4		40.5	2.5
Cycle Queue Clearance Time (g_c), s		0.0	11.5		5.5		20.9	11.0	3.4		40.5	2.5
Green Ratio (*g/C*)		0.12	0.37		0.11		0.72	0.76	0.76		0.45	0.45
Capacity (*c*), veh/h		217	586		179		552	1431	1193		848	725
Volume-to-Capacity Ratio (*X*)		0.000	0.888		0.509		0.893	0.418	0.164		0.943	0.098
Back of Queue (*Q*), ft/ln (95 th percentile)		0	498.3		99.1		498.2	139.5	36		724.8	40.6
Back of Queue (*Q*), veh/ln (95 th percentile)		0.0	19.6		3.8		19.5	5.5	1.4		28.8	1.6
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00	0.00		0.00		4.15	0.00	0.30		0.00	0.00
Uniform Delay (d_1), s/veh		0.0	29.6		41.6		27.6	4.1	3.2		26.3	15.8
Incremental Delay (d_2), s/veh		0.0	14.9		1.0		16.3	0.1	0.0		18.3	0.0
Initial Queue Delay (d_3), s/veh		0.0	0.0		0.0		0.0	0.0	0.0		0.0	0.0
Control Delay (*d*), s/veh		0.0	44.4		42.6		43.9	4.1	3.2		44.6	15.8
Level of Service (LOS)			D		D		D	A	A		D	B
Approach Delay, s/veh / LOS	44.4		D	42.6		D	19.2		B	42.3		D
Intersection Delay, s/veh / LOS	32.0						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS								
Bicycle LOS Score / LOS								

HCS7 Two-Way Stop-Control Report

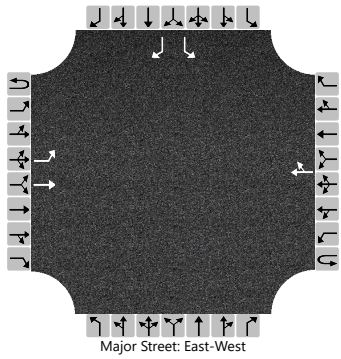
General Information

Analyst	ABC
Agency/Co.	TMS Engineers, Inc.
Date Performed	6/2/2020
Analysis Year	2042
Time Analyzed	PM Peak
Intersection Orientation	East-West
Project Description	By-Pass Roadway

Site Information

Intersection	Cooper Foster & West
Jurisdiction	Amherst, OH
East/West Street	Cooper Foster Park Road
North/South Street	By-Pass Roadway West
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	1	0	0	0	1	0		0	0	0		1	0	1
Configuration		L	T					TR						L		R
Volume (veh/h)		199	479				454	10						64		64
Percent Heavy Vehicles (%)		2												2		2
Proportion Time Blocked																
Percent Grade (%)														0		
Right Turn Channelized														No		
Median Type | Storage			Undivided													

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1												7.1		6.2
Critical Headway (sec)		4.12												6.42		6.22
Base Follow-Up Headway (sec)		2.2												3.5		3.3
Follow-Up Headway (sec)		2.22												3.52		3.32

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		216												70		70
Capacity, c (veh/h)		1060												114		572
v/c Ratio		0.20												0.61		0.12
95% Queue Length, Q_{95} (veh)		0.8												3.0		0.4
Control Delay (s/veh)		9.3												76.3		12.2
Level of Service (LOS)		A												F		B
Approach Delay (s/veh)		2.7												44.2		
Approach LOS														E		

HCS7 Two-Way Stop-Control Report

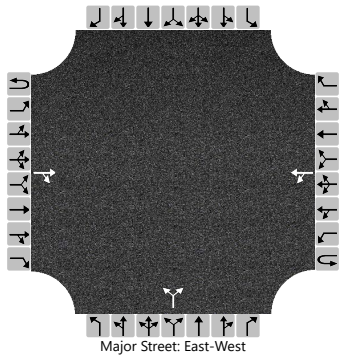
General Information

Analyst	ABC
Agency/Co.	TMS Engineers, Inc.
Date Performed	6/2/2020
Analysis Year	2042
Time Analyzed	PM Peak
Intersection Orientation	East-West
Project Description	By-Pass Roadway

Site Information

Intersection	Buck Horn & By-Pass
Jurisdiction	Amherst, OH
East/West Street	Buck Horn Boulevard
North/South Street	By-Pass Roadway West
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	0	0
Configuration				TR		LT					LR					
Volume (veh/h)			200	10		128	270			10		199				
Percent Heavy Vehicles (%)						2				2		2				
Proportion Time Blocked																
Percent Grade (%)										0						
Right Turn Channelized																
Median Type | Storage				Undivided												

Critical and Follow-up Headways

Base Critical Headway (sec)						4.1				7.1		6.2				
Critical Headway (sec)						4.12				6.42		6.22				
Base Follow-Up Headway (sec)						2.2				3.5		3.3				
Follow-Up Headway (sec)						2.22				3.52		3.32				

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						139					227					
Capacity, c (veh/h)						1340					758					
v/c Ratio						0.10					0.30					
95% Queue Length, Q_{95} (veh)						0.3					1.3					
Control Delay (s/veh)						8.0					11.8					
Level of Service (LOS)						A					B					
Approach Delay (s/veh)						3.2				11.8						
Approach LOS										B						

HCS7 Two-Way Stop-Control Report

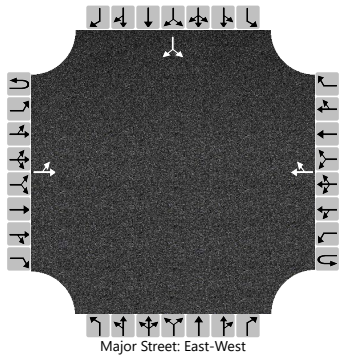
General Information

Analyst	ABC
Agency/Co.	TMS Engineers, Inc.
Date Performed	6/2/2020
Analysis Year	2042
Time Analyzed	PM Peak
Intersection Orientation	East-West
Project Description	By-Pass Roadway

Site Information

Intersection	Cooper Foster & East
Jurisdiction	Amherst, OH
East/West Street	Cooper Foster Park Road
North/South Street	By-Pass Roadway East
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	0	0		0	1	0
Configuration		LT						TR							LR	
Volume (veh/h)		185	100				79	185						101		102
Percent Heavy Vehicles (%)		2												2		2
Proportion Time Blocked																
Percent Grade (%)														0		
Right Turn Channelized																
Median Type | Storage			Undivided													

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1												7.1		6.2
Critical Headway (sec)		4.12												6.42		6.22
Base Follow-Up Headway (sec)		2.2												3.5		3.3
Follow-Up Headway (sec)		2.22												3.52		3.32

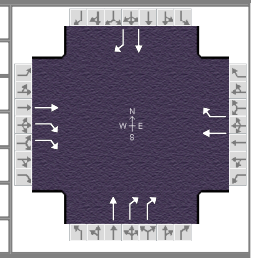
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		201													221	
Capacity, c (veh/h)		1275													486	
v/c Ratio		0.16													0.45	
95% Queue Length, Q_{95} (veh)		0.6													2.3	
Control Delay (s/veh)		8.4													18.4	
Level of Service (LOS)		A													C	
Approach Delay (s/veh)		5.9												18.4		
Approach LOS														C		

Appendix Q
Alternative #5 - 2042 Capacity Analysis Worksheets

HCS7 Signalized Intersection Results Summary

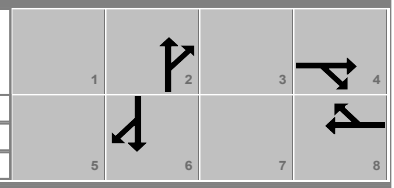
General Information				Intersection Information	
Agency	TMS Engineers, Inc.			Duration, h	0.250
Analyst	ABC	Analysis Date	Jun 2, 2020	Area Type	Other
Jurisdiction	Amherst, OH	Time Period	AM Peak	PHF	0.92
Urban Street	Oak Point Road	Analysis Year	2042	Analysis Period	1> 7:00
Intersection	@ Cooper Foster Park…	File Name	AM 42 CooperFoster BowTie.xus		
Project Description	Bow Tie				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h		116	292		349	58		240	569		338	114

Signal Information			
Cycle, s	90.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	39.2	38.8	0.0	0.0	0.0	0.0	
Yellow	4.0	4.0	0.0	0.0	0.0	0.0	
Red	2.0	2.0	0.0	0.0	0.0	0.0	



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8		2		6
Case Number		7.0		7.0		7.0		7.0
Phase Duration, s		44.8		44.8		45.2		45.2
Change Period, ($Y+R_c$), s		6.0		6.0		6.0		6.0
Max Allow Headway (*MAH*), s		3.2		3.2		3.2		3.2
Queue Clearance Time (g_s), s		8.8		15.2		16.4		14.4
Green Extension Time (g_e), s		0.0		1.9		3.4		0.0
Phase Call Probability		1.00		1.00		1.00		1.00
Max Out Probability		1.00		0.00		0.01		1.00

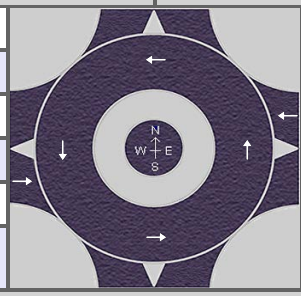
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		4	14		8	18		2	12		6	16
Adjusted Flow Rate (*v*), veh/h		126	317		379	63		261	618		367	124
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1767	1347		1856	1610		1870	1403		1870	1610
Queue Service Time (g_s), s		3.9	6.8		13.2	2.1		8.2	14.4		12.4	4.2
Cycle Queue Clearance Time (g_c), s		3.9	6.8		13.2	2.1		8.2	14.4		12.4	4.2
Green Ratio (*g/C*)		0.43	0.43		0.43	0.43		0.44	0.44		0.44	0.44
Capacity (*c*), veh/h		762	1162		800	694		815	1222		815	701
Volume-to-Capacity Ratio (*X*)		0.166	0.273		0.474	0.091		0.320	0.506		0.451	0.177
Back of Queue (*Q*), ft/ln (95 th percentile)		73.2	95.5		233.2	33		153.6	199		222.7	67
Back of Queue (*Q*), veh/ln (95 th percentile)		2.7	3.6		9.1	1.3		6.0	7.8		8.8	2.7
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00	1.27		0.00	0.00		0.00	1.66		0.00	0.00
Uniform Delay (d_1), s/veh		15.7	16.5		18.3	15.2		16.7	18.4		17.8	15.5
Incremental Delay (d_2), s/veh		0.0	0.0		0.2	0.0		0.1	0.1		0.1	0.0
Initial Queue Delay (d_3), s/veh		0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0
Control Delay (*d*), s/veh		15.7	16.6		18.5	15.2		16.7	18.5		18.0	15.6
Level of Service (LOS)		B	B		B	B		B	B		B	B
Approach Delay, s/veh / LOS	16.3	B		18.0	B		18.0	B		17.4	B	
Intersection Delay, s/veh / LOS	17.5						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS								
Bicycle LOS Score / LOS								

HCS7 Roundabouts Report

General Information

Analyst	ABC
Agency or Co.	TMS Engineers, Inc.
Date Performed	6/2/2020
Analysis Year	2042
Time Analyzed	AM Peak
Project Description	Bow Tie



Site Information

Intersection	Cooper Foster & West BT
E/W Street Name	Cooper Foster Park Road
N/S Street Name	West Bow Tie
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	Amherst, OH

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
Lane Assignment			T				T									
Volume (V), veh/h	0		211		197		266									
Percent Heavy Vehicles, %	0		2		2		2									
Flow Rate (v_{PCE}), pc/h	0		234		218		295									
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1											
Pedestrians Crossing, p/h	0				0											

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		4.9763			4.9763							
Follow-Up Headway (s)		2.6087			2.6087							

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		234			513							
Entry Volume, veh/h		229			503							
Circulating Flow (v_c), pc/h	218			0			452			513		
Exiting Flow (v_{ex}), pc/h	452			295			0			0		
Capacity (c_{pce}), pc/h		1105			1380							
Capacity (c), veh/h		1083			1353							
v/c Ratio (x)		0.21			0.37							

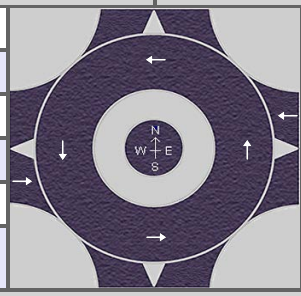
Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		5.3			6.1							
Lane LOS		A			A							
95% Queue, veh		0.8			1.7							
Approach Delay, s/veh	5.3			6.1								
Approach LOS	A			A								
Intersection Delay, s/veh | LOS	5.8						A					

HCS7 Roundabouts Report

General Information

Analyst	ABC
Agency or Co.	TMS Engineers, Inc.
Date Performed	6/2/2020
Analysis Year	2042
Time Analyzed	AM Peak
Project Description	Bow Tie



Site Information

Intersection	Cooper Foster & East BT
E/W Street Name	Cooper Foster Park Road
N/S Street Name	East Bow Tie
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	Amherst, OH

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
Lane Assignment			T				T									
Volume (V), veh/h	177		168		0		190									
Percent Heavy Vehicles, %	2		2		2		2									
Flow Rate (v_{PCE}), pc/h	196		186		0		211									
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1											
Pedestrians Crossing, p/h	0				0											

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		4.9763			4.9763							
Follow-Up Headway (s)		2.6087			2.6087							

Flow Computations, Capacity and v/c Ratios

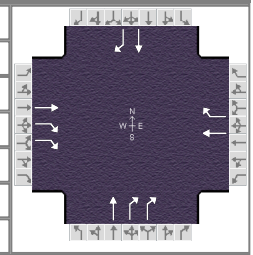
Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		382			211							
Entry Volume, veh/h		375			207							
Circulating Flow (v_c), pc/h	0			196			382			407		
Exiting Flow (v_{ex}), pc/h	186			407			0			0		
Capacity (c_{pce}), pc/h		1380			1130							
Capacity (c), veh/h		1353			1108							
v/c Ratio (x)		0.28			0.19							

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		5.1			4.9							
Lane LOS		A			A							
95% Queue, veh		1.1			0.7							
Approach Delay, s/veh	5.1			4.9								
Approach LOS	A			A								
Intersection Delay, s/veh | LOS	5.0						A					

HCS7 Signalized Intersection Results Summary

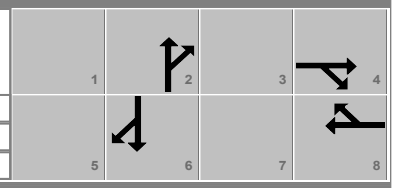
General Information				Intersection Information	
Agency	TMS Engineers, Inc.			Duration, h	0.250
Analyst	ABC	Analysis Date	Jun 2, 2020	Area Type	Other
Jurisdiction	Amherst, OH	Time Period	PM Peak	PHF	0.92
Urban Street	Oak Point Road	Analysis Year	2042	Analysis Period	1> 7:00
Intersection	@ Cooper Foster Park…	File Name	PM 42 CooperFoster BowTie.xus		
Project Description	Bow Tie				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h		283	721		824	162		550	634		494	149

Signal Information			
Cycle, s	100.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	36.7	51.3	0.0	0.0	0.0	0.0	
Yellow	4.0	4.0	0.0	0.0	0.0	0.0	
Red	2.0	2.0	0.0	0.0	0.0	0.0	



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8		2		6
Case Number		7.0		7.0		7.0		7.0
Phase Duration, s		57.3		57.3		42.7		42.7
Change Period, ($Y+R_c$), s		6.0		6.0		6.0		6.0
Max Allow Headway (*MAH*), s		3.2		3.2		3.2		3.2
Queue Clearance Time (g_s), s		20.9		48.2		31.7		27.2
Green Extension Time (g_e), s		0.0		2.0		2.6		0.0
Phase Call Probability		1.00		1.00		1.00		1.00
Max Out Probability		1.00		1.00		0.78		1.00

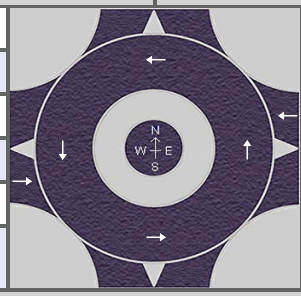
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		4	14		8	18		2	12		6	16
Adjusted Flow Rate (*v*), veh/h		308	784		896	176		598	689		537	162
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1885	1403		1841	1610		1870	1381		1885	1610
Queue Service Time (g_s), s		9.5	18.9		46.2	6.0		29.7	21.1		25.2	7.1
Cycle Queue Clearance Time (g_c), s		9.5	18.9		46.2	6.0		29.7	21.1		25.2	7.1
Green Ratio (*g/C*)		0.51	0.51		0.51	0.51		0.37	0.37		0.37	0.37
Capacity (*c*), veh/h		967	1439		944	826		686	1013		692	591
Volume-to-Capacity Ratio (*X*)		0.318	0.545		0.948	0.213		0.871	0.680		0.776	0.274
Back of Queue (*Q*), ft/ln (95 th percentile)		174.9	244.9		792.2	93.2		539	288.1		440.7	118.1
Back of Queue (*Q*), veh/ln (95 th percentile)		6.9	9.6		30.7	3.7		21.2	11.2		17.5	4.7
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00	3.27		0.00	0.00		0.00	2.40		0.00	0.00
Uniform Delay (d_1), s/veh		14.2	16.5		23.1	13.3		29.4	26.7		28.0	22.3
Incremental Delay (d_2), s/veh		0.1	0.2		17.9	0.0		11.3	1.5		5.1	0.1
Initial Queue Delay (d_3), s/veh		0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0
Control Delay (*d*), s/veh		14.2	16.7		41.0	13.4		40.7	28.2		33.1	22.4
Level of Service (LOS)		B	B		D	B		D	C		C	C
Approach Delay, s/veh / LOS	16.0	B		36.5	D		34.0	C		30.6	C	
Intersection Delay, s/veh / LOS	29.3						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS								
Bicycle LOS Score / LOS								

HCS7 Roundabouts Report

General Information

Analyst	ABC
Agency or Co.	TMS Engineers, Inc.
Date Performed	6/2/2020
Analysis Year	2042
Time Analyzed	PM Peak
Project Description	Bow Tie



Site Information

Intersection	Cooper Foster & West BT
E/W Street Name	Cooper Foster Park Road
N/S Street Name	West Bow Tie
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	Amherst, OH

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
Lane Assignment			T				T									
Volume (V), veh/h	0		678		326		647									
Percent Heavy Vehicles, %	0		2		2		2									
Flow Rate (v_{PCE}), pc/h	0		752		361		717									
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1											
Pedestrians Crossing, p/h	0				0											

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		4.9763			4.9763							
Follow-Up Headway (s)		2.6087			2.6087							

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		752			1078							
Entry Volume, veh/h		737			1057							
Circulating Flow (v_c), pc/h	361			0			1113			1078		
Exiting Flow (v_{ex}), pc/h	1113			717			0			0		
Capacity (c_{pce}), pc/h		955			1380							
Capacity (c), veh/h		936			1353							
v/c Ratio (x)		0.79			0.78							

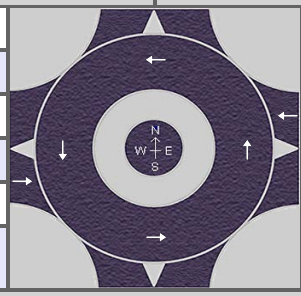
Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		20.4			15.3							
Lane LOS		C			C							
95% Queue, veh		8.3			8.7							
Approach Delay, s/veh	20.4			15.3								
Approach LOS	C			C								
Intersection Delay, s/veh | LOS	17.4						C					

HCS7 Roundabouts Report

General Information

Analyst	ABC
Agency or Co.	TMS Engineers, Inc.
Date Performed	6/2/2020
Analysis Year	2042
Time Analyzed	PM Peak
Project Description	Bow Tie



Site Information

Intersection	Cooper Foster & East BT
E/W Street Name	Cooper Foster Park Road
N/S Street Name	East Bow Tie
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	Amherst, OH

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
Lane Assignment			T				T									
Volume (V), veh/h	532		345		0		264									
Percent Heavy Vehicles, %	2		2		2		2									
Flow Rate (v_{PCE}), pc/h	590		382		0		293									
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1											
Pedestrians Crossing, p/h	0				0											

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		4.9763			4.9763							
Follow-Up Headway (s)		2.6087			2.6087							

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		972			293							
Entry Volume, veh/h		953			287							
Circulating Flow (v_c), pc/h	0			590			972			883		
Exiting Flow (v_{ex}), pc/h	382			883			0			0		
Capacity (c_{pce}), pc/h		1380			756							
Capacity (c), veh/h		1353			741							
v/c Ratio (x)		0.70			0.39							

Delay and Level of Service

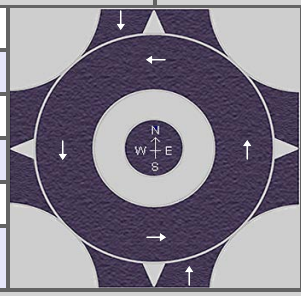
Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		12.2			9.8							
Lane LOS		B			A							
95% Queue, veh		6.3			1.8							
Approach Delay, s/veh	12.2			9.8								
Approach LOS	B			A								
Intersection Delay, s/veh | LOS	11.7						B					

Appendix R
Alternative #6 - 2042 Capacity Analysis Worksheets

HCS7 Roundabouts Report

General Information

Analyst	ABC
Agency or Co.	TMS Engineers, Inc.
Date Performed	6/2/22020
Analysis Year	2042
Time Analyzed	AM Peak
Project Description	Major Bow Tie



Site Information

Intersection	Oak Point & North Bow Tie
E/W Street Name	North Bow Tie
N/S Street Name	Oak Point Road
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	Amherst, OH

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0
Lane Assignment											T				T	
Volume (V), veh/h									184		278		0		462	
Percent Heavy Vehicles, %									2		2		0		2	
Flow Rate (v_{PCE}), pc/h									204		308		0		512	
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes									1				1			
Pedestrians Crossing, p/h									0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)								4.9763			4.9763	
Follow-Up Headway (s)								2.6087			2.6087	

Flow Computations, Capacity and v/c Ratios

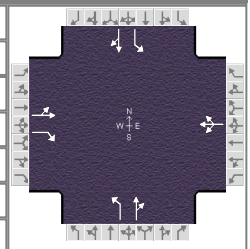
Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h								512			512	
Entry Volume, veh/h								502			502	
Circulating Flow (v_c), pc/h	716			512			0			204		
Exiting Flow (v_{ex}), pc/h	0			0			308			716		
Capacity (c_{pce}), pc/h								1380			1121	
Capacity (c), veh/h								1353			1099	
v/c Ratio (x)								0.37			0.46	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh								6.1			8.3	
Lane LOS								A			A	
95% Queue, veh								1.7			2.4	
Approach Delay, s/veh							6.1			8.3		
Approach LOS							A			A		
Intersection Delay, s/veh | LOS	7.2						A					

HCS7 Signalized Intersection Results Summary

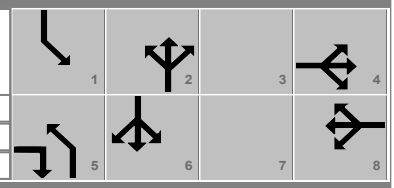
General Information				Intersection Information	
Agency	TMS Engineers, Inc.			Duration, h	0.250
Analyst	ABC	Analysis Date	Jun 2, 2020	Area Type	Other
Jurisdiction	Lorain, OH	Time Period	AM Peak	PHF	0.92
Urban Street	Oak Point Road	Analysis Year	2042	Analysis Period	1> 7:00
Intersection	@ Buck Horn/Park Square	File Name	AM 42 BuckHorn MajorBT.xus		
Project Description	Major Bow Tie				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	30	10	50	10	0	10	30	422	30	40	576	30

Signal Information			
Cycle, s	90.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	7.0	41.0	24.0	0.0	0.0	0.0
Yellow	4.0	4.0	4.0	0.0	0.0	0.0
Red	2.0	2.0	2.0	0.0	0.0	0.0



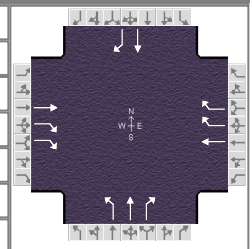
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2	1	6
Case Number		7.0		8.0	1.1	4.0	1.1	4.0
Phase Duration, s		30.0		30.0	13.0	47.0	13.0	47.0
Change Period, ($Y+R_c$), s		6.0		6.0	6.0	6.0	6.0	6.0
Max Allow Headway (*MAH*), s		3.2		3.2	3.1	3.0	3.1	3.0
Queue Clearance Time (g_s), s		4.2		2.8	2.8	19.6	3.0	28.7
Green Extension Time (g_e), s		0.2		0.1	0.0	0.0	0.0	2.1
Phase Call Probability		1.00		1.00	1.00	1.00	1.00	1.00
Max Out Probability		0.00		0.32	0.13	1.00	0.23	0.07

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h		43	54		22		33	491		43	659	
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1531	1510		1532		1810	1863		1810	1869	
Queue Service Time (g_s), s		0.9	2.2		0.0		0.8	17.6		1.0	26.7	
Cycle Queue Clearance Time (g_c), s		1.8	2.2		0.8		0.8	17.6		1.0	26.7	
Green Ratio (*g/C*)		0.27	0.34		0.27		0.53	0.46		0.53	0.46	
Capacity (*c*), veh/h		478	520		468		329	849		440	851	
Volume-to-Capacity Ratio (*X*)		0.091	0.105		0.046		0.099	0.579		0.099	0.774	
Back of Queue (*Q*), ft/ln (95 th percentile)		30.7	36		15.2		12.9	291.3		17.2	433.9	
Back of Queue (*Q*), veh/ln (95 th percentile)		1.2	1.4		0.6		0.5	11.6		0.7	17.2	
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00	0.24		0.00		0.04	0.00		0.07	0.00	
Uniform Delay (d_1), s/veh		24.8	20.1		24.5		14.7	18.1		12.3	20.6	
Incremental Delay (d_2), s/veh		0.0	0.0		0.0		0.0	0.7		0.0	4.1	
Initial Queue Delay (d_3), s/veh		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Control Delay (*d*), s/veh		24.8	20.1		24.5		14.8	18.8		12.3	24.7	
Level of Service (LOS)		C	C		C		B	B		B	C	
Approach Delay, s/veh / LOS	22.2	C		24.5	C		18.5	B		23.9	C	
Intersection Delay, s/veh / LOS	21.7						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS								
Bicycle LOS Score / LOS								

HCS7 Signalized Intersection Results Summary

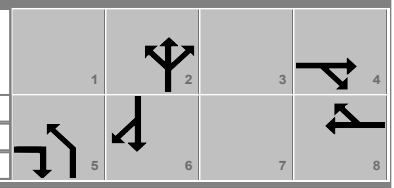
General Information				Intersection Information	
Agency	TMS Engineers, Inc.			Duration, h	0.250
Analyst	ABC	Analysis Date	Jun 2, 2020	Area Type	Other
Jurisdiction	Amherst, OH	Time Period	AM Peak	PHF	0.92
Urban Street	Oak Point Road	Analysis Year	2042	Analysis Period	1> 7:00
Intersection	@ Cooper Foster Park…	File Name	AM 42 CooperFoster MajorBT.xus		
Project Description	Major Bow Tie				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h		0	211		0	230	165	252	440		467	101

Signal Information			
Cycle, s	90.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	7.0	36.8	28.2	0.0	0.0	0.0
Yellow	4.0	4.0	4.0	0.0	0.0	0.0
Red	2.0	2.0	2.0	0.0	0.0	0.0



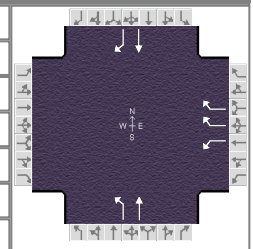
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2		6
Case Number		7.0		7.0	1.0	3.0		7.3
Phase Duration, s		34.2		34.2	13.0	55.8		42.8
Change Period, (*Y+R c*), s		6.0		6.0	6.0	6.0		6.0
Max Allow Headway (*MAH*), s		3.4		3.4	3.1	3.2		3.2
Queue Clearance Time (*g s*), s		7.1		7.9	7.0	19.4		21.8
Green Extension Time (*g e*), s		1.3		0.0	0.0	0.0		2.8
Phase Call Probability		1.00		1.00	1.00	1.00		1.00
Max Out Probability		0.00		1.00	1.00	1.00		0.07

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		4	14		8	18	5	2	12		6	16
Adjusted Flow Rate (*v*), veh/h		0	229		0	250	179	274	478		508	110
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1767	1347		1856	1425	1753	1870	1585		1870	1610
Queue Service Time (*g s*), s		0.0	5.1		0.0	5.9	5.0	6.9	17.4		19.8	3.9
Cycle Queue Clearance Time (*g c*), s		0.0	5.1		0.0	5.9	5.0	6.9	17.4		19.8	3.9
Green Ratio (*g/C*)		0.31	0.39		0.31	0.31	0.51	0.55	0.55		0.41	0.41
Capacity (*c*), veh/h		554	1054		581	893	382	1035	877		765	658
Volume-to-Capacity Ratio (*X*)		0.000	0.218		0.000	0.280	0.470	0.265	0.545		0.664	0.167
Back of Queue (*Q*), ft/ln (95 th percentile)		0	72.3		0	87.1	86.3	118.9	241.7		337.1	62.1
Back of Queue (*Q*), veh/ln (95 th percentile)		0.0	2.7		0.0	3.5	3.3	4.7	9.5		13.3	2.5
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00	0.96		0.00	0.00	0.72	0.00	2.01		0.00	0.00
Uniform Delay (*d 1*), s/veh		0.0	18.2		0.0	23.3	15.4	10.5	12.9		21.6	16.9
Incremental Delay (*d 2*), s/veh		0.0	0.0		0.0	0.1	0.3	0.1	0.4		1.8	0.0
Initial Queue Delay (*d 3*), s/veh		0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0
Control Delay (*d*), s/veh		0.0	18.3		0.0	23.3	15.8	10.6	13.3		23.3	16.9
Level of Service (LOS)			B			C	B	B	B		C	B
Approach Delay, s/veh / LOS	18.3		B	23.3		C	12.9		B	22.2		C
Intersection Delay, s/veh / LOS	17.6						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS								
Bicycle LOS Score / LOS								

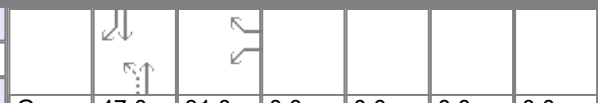
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	TMS Engineers, Inc.			Duration, h	0.250
Analyst	ABC	Analysis Date	Jun 2, 2020	Area Type	Other
Jurisdiction	Amherst, OH	Time Period	AM Peak	PHF	0.92
Urban Street	North Lake Street	Analysis Year	2042	Analysis Period	1> 7:00
Intersection	@ SR 2 WB Ramps	File Name	AM 42 Westbound2 MajorBT.xus		
Project Description	Major Bow Tie				

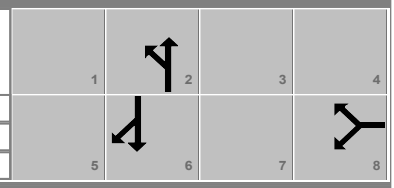


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h				80		388	50	469			526	151

Signal Information			
Cycle, s	90.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	47.0	31.0	0.0	0.0	0.0	0.0	
Yellow	4.0	4.0	0.0	0.0	0.0	0.0	
Red	2.0	2.0	0.0	0.0	0.0	0.0	



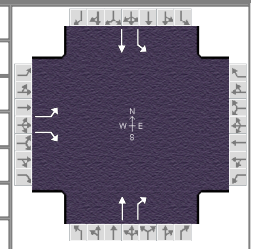
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase				8		2		6
Case Number				9.0		6.0		7.0
Phase Duration, s				37.0		53.0		53.0
Change Period, ($Y+R_c$), s				6.0		6.0		6.0
Max Allow Headway (*MAH*), s				3.3		3.1		3.1
Queue Clearance Time (g_s), s				12.5		25.4		21.1
Green Extension Time (g_e), s				1.3		0.0		2.8
Phase Call Probability				1.00		1.00		1.00
Max Out Probability				0.00		1.00		0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement				3		18	5	2			6	16
Adjusted Flow Rate (*v*), veh/h				87		422	54	510			572	164
Adjusted Saturation Flow Rate (*s*), veh/h/ln				1626		1392	854	1870			1856	1598
Queue Service Time (g_s), s				3.3		10.5	4.2	16.1			19.1	4.9
Cycle Queue Clearance Time (g_c), s				3.3		10.5	23.4	16.1			19.1	4.9
Green Ratio (*g/C*)				0.34		0.34	0.52	0.52			0.52	0.52
Capacity (*c*), veh/h				560		959	344	977			969	834
Volume-to-Capacity Ratio (*X*)				0.155		0.440	0.158	0.522			0.590	0.197
Back of Queue (*Q*), ft/ln (95 th percentile)				61		152.7	37.3	263.5			305.8	73.7
Back of Queue (*Q*), veh/ln (95 th percentile)				2.2		6.0	1.5	10.4			11.9	2.9
Queue Storage Ratio (*RQ*) (95 th percentile)				0.44		0.00	0.22	0.00			0.00	0.61
Uniform Delay (d_1), s/veh				20.4		22.8	22.9	14.1			14.8	11.4
Incremental Delay (d_2), s/veh				0.0		0.1	0.1	0.2			0.7	0.0
Initial Queue Delay (d_3), s/veh				0.0		0.0	0.0	0.0			0.0	0.0
Control Delay (*d*), s/veh				20.5		22.9	23.0	14.4			15.5	11.5
Level of Service (LOS)				C		C	C	B			B	B
Approach Delay, s/veh / LOS	0.0			22.5		C	15.2		B	14.6		B
Intersection Delay, s/veh / LOS	17.0						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS								
Bicycle LOS Score / LOS								

HCS7 Signalized Intersection Results Summary

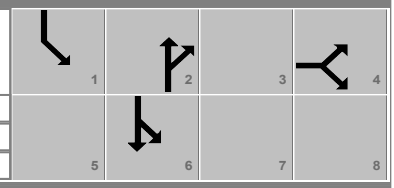
General Information				Intersection Information	
Agency	TMS Engineers, Inc.			Duration, h	0.250
Analyst	ABC	Analysis Date	Jun 2, 2020	Area Type	Other
Jurisdiction	Amherst, OH	Time Period	AM Peak	PHF	0.92
Urban Street	North Lake Street	Analysis Year	2042	Analysis Period	1> 7:00
Intersection	@ SR 2 EB Ramps	File Name	AM 42 Eastbound2 MajorBT.xus		
Project Description	Major Bow Tie				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	192		40					327	330	364	243	

Signal Information			
Cycle, s	90.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	7.0	38.8	26.2	0.0	0.0	0.0
Yellow	4.0	4.0	4.0	0.0	0.0	0.0
Red	2.0	2.0	2.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4				2	1	6
Case Number		9.0				7.3	1.0	4.0
Phase Duration, s		32.2				44.8	13.0	57.8
Change Period, ($Y+R_c$), s		6.0				6.0	6.0	6.0
Max Allow Headway (*MAH*), s		3.2				3.2	3.1	3.2
Queue Clearance Time (g_s), s		10.5				16.7	9.0	8.5
Green Extension Time (g_e), s		0.4				0.0	0.0	2.0
Phase Call Probability		1.00				1.00	1.00	1.00
Max Out Probability		0.00				1.00	1.00	0.00

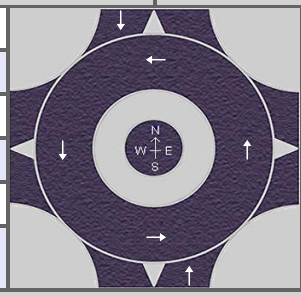
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7		14					2	12	1	6	
Adjusted Flow Rate (*v*), veh/h	209		43					355	359	396	264	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1767		1560					1885	1610	1753	1811	
Queue Service Time (g_s), s	8.5		1.8					11.9	14.7	7.0	6.5	
Cycle Queue Clearance Time (g_c), s	8.5		1.8					11.9	14.7	7.0	6.5	
Green Ratio (*g/C*)	0.29		0.29					0.43	0.43	0.53	0.58	
Capacity (*c*), veh/h	514		454					813	694	518	1042	
Volume-to-Capacity Ratio (*X*)	0.406		0.096					0.437	0.517	0.764	0.253	
Back of Queue (*Q*), ft/ln (95 th percentile)	160.7		30.6					215.3	223.2	211.4	110	
Back of Queue (*Q*), veh/ln (95 th percentile)	6.3		1.2					8.5	8.9	8.2	4.2	
Queue Storage Ratio (*RQ*) (95 th percentile)	0.85		0.00					0.00	0.00	1.24	0.00	
Uniform Delay (d_1), s/veh	25.6		23.3					17.9	18.7	19.8	9.5	
Incremental Delay (d_2), s/veh	0.2		0.0					0.1	0.3	6.0	0.0	
Initial Queue Delay (d_3), s/veh	0.0		0.0					0.0	0.0	0.0	0.0	
Control Delay (*d*), s/veh	25.8		23.3					18.1	19.0	25.8	9.5	
Level of Service (LOS)	C		C					B	B	C	A	
Approach Delay, s/veh / LOS	25.4		C	0.0			18.6		B	19.3		B
Intersection Delay, s/veh / LOS	19.9						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS								
Bicycle LOS Score / LOS								

HCS7 Roundabouts Report

General Information

Analyst	ABC
Agency or Co.	TMS Engineers, Inc.
Date Performed	6/2/2020
Analysis Year	2042
Time Analyzed	AM Peak
Project Description	Major Bow Tie



Site Information

Intersection	North Lake & South BT
E/W Street Name	South Bow Tie
N/S Street Name	North Lake Street
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	Amherst, OH

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0
Lane Assignment											T				T	
Volume (V), veh/h									0		609		48		235	
Percent Heavy Vehicles, %									0		2		2		2	
Flow Rate (v_{PCE}), pc/h									0		675		53		261	
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes									1				1			
Pedestrians Crossing, p/h									0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)								4.9763			4.9763	
Follow-Up Headway (s)								2.6087			2.6087	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h								675			314	
Entry Volume, veh/h								662			308	
Circulating Flow (v_c), pc/h	314			728			53			0		
Exiting Flow (v_{ex}), pc/h	0			0			728			261		
Capacity (c_{pce}), pc/h								1307			1380	
Capacity (c), veh/h								1282			1353	
v/c Ratio (x)								0.52			0.23	

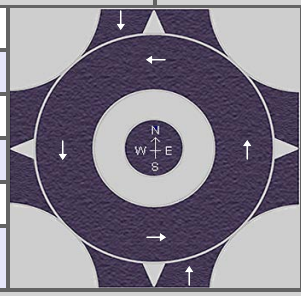
Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh								8.3			4.6	
Lane LOS								A			A	
95% Queue, veh								3.1			0.9	
Approach Delay, s/veh							8.3			4.6		
Approach LOS							A			A		
Intersection Delay, s/veh | LOS	7.2						A					

HCS7 Roundabouts Report

General Information

Analyst	ABC
Agency or Co.	TMS Engineers, Inc.
Date Performed	6/2/22020
Analysis Year	2042
Time Analyzed	PM Peak
Project Description	Major Bow Tie



Site Information

Intersection	Oak Point & North Bow Tie
E/W Street Name	North Bow Tie
N/S Street Name	Oak Point Road
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	Amherst, OH

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0
Lane Assignment											T				T	
Volume (V), veh/h									370		722		0		633	
Percent Heavy Vehicles, %									2		2		0		2	
Flow Rate (v_{PCE}), pc/h									410		800		0		702	
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes									1				1			
Pedestrians Crossing, p/h									0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)								4.9763			4.9763	
Follow-Up Headway (s)								2.6087			2.6087	

Flow Computations, Capacity and v/c Ratios

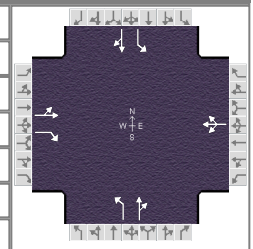
Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h								1210			702	
Entry Volume, veh/h								1186			688	
Circulating Flow (v_c), pc/h	1112			1210			0			410		
Exiting Flow (v_{ex}), pc/h	0			0			800			1112		
Capacity (c_{pce}), pc/h								1380			908	
Capacity (c), veh/h								1353			891	
v/c Ratio (x)								0.88			0.77	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh								22.0			20.2	
Lane LOS								C			C	
95% Queue, veh								13.1			7.8	
Approach Delay, s/veh							22.0			20.2		
Approach LOS							C			C		
Intersection Delay, s/veh | LOS	21.3						C					

HCS7 Signalized Intersection Results Summary

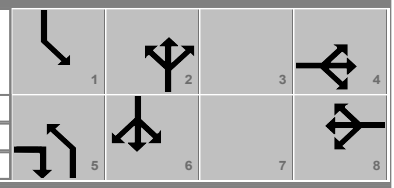
General Information				Intersection Information	
Agency	TMS Engineers, Inc.			Duration, h	0.250
Analyst	ABC	Analysis Date	Jun 2, 2020	Area Type	Other
Jurisdiction	Lorain, OH	Time Period	AM Peak	PHF	0.92
Urban Street	Oak Point Road	Analysis Year	2042	Analysis Period	1> 7:00
Intersection	@ Buck Horn/Park Square	File Name	PM 42 BuckHorn MajorBT.xus		
Project Description	Major Bow Tie				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	130	10	60	80	10	30	140	932	10	10	873	120

Signal Information			
Cycle, s	100.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	7.0	59.8	15.2	0.0	0.0	0.0
Yellow	4.0	4.0	4.0	0.0	0.0	0.0
Red	2.0	2.0	2.0	0.0	0.0	0.0



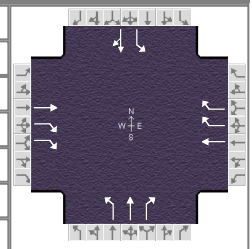
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2	1	6
Case Number		7.0		8.0	1.1	4.0	1.1	4.0
Phase Duration, s		21.2		21.2	13.0	65.8	13.0	65.8
Change Period, ($Y+R_c$), s		6.0		6.0	6.0	6.0	6.0	6.0
Max Allow Headway (*MAH*), s		3.2		3.2	3.1	3.1	3.1	3.1
Queue Clearance Time (g_s), s		12.2		9.6	5.8	50.0	2.2	58.7
Green Extension Time (g_e), s		0.2		0.0	0.0	0.0	0.0	0.8
Phase Call Probability		1.00		1.00	1.00	1.00	1.00	1.00
Max Out Probability		1.00		1.00	1.00	1.00	0.02	1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h		152	65		130		152	1024		11	1079	
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1412	1510		1555		1810	1882		1810	1845	
Queue Service Time (g_s), s		2.7	3.5		0.0		3.8	48.0		0.2	56.7	
Cycle Queue Clearance Time (g_c), s		10.2	3.5		7.6		3.8	48.0		0.2	56.7	
Green Ratio (*g/C*)		0.15	0.22		0.15		0.67	0.60		0.67	0.60	
Capacity (*c*), veh/h		284	335		296		205	1125		253	1103	
Volume-to-Capacity Ratio (*X*)		0.536	0.195		0.440		0.743	0.910		0.043	0.978	
Back of Queue (*Q*), ft/ln (95 th percentile)		160.5	60.8		132.2		123.6	733		5.5	913	
Back of Queue (*Q*), veh/ln (95 th percentile)		6.4	2.3		5.3		4.9	29.1		0.2	36.2	
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00	0.41		0.00		0.37	0.00		0.02	0.00	
Uniform Delay (d_1), s/veh		40.3	31.6		39.1		27.0	17.7		18.3	19.5	
Incremental Delay (d_2), s/veh		1.1	0.1		0.4		12.2	10.7		0.0	21.8	
Initial Queue Delay (d_3), s/veh		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Control Delay (*d*), s/veh		41.4	31.7		39.5		39.2	28.4		18.3	41.3	
Level of Service (LOS)		D	C		D		D	C		B	D	
Approach Delay, s/veh / LOS	38.5	D		39.5	D		29.8	C		41.1	D	
Intersection Delay, s/veh / LOS	35.7						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS								
Bicycle LOS Score / LOS								

HCS7 Signalized Intersection Results Summary

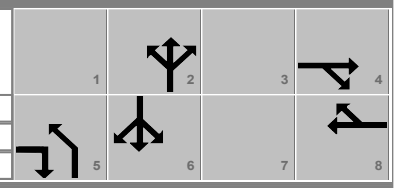
General Information				Intersection Information	
Agency	TMS Engineers, Inc.			Duration, h	0.250
Analyst	ABC	Analysis Date	Jun 2, 2020	Area Type	Other
Jurisdiction	Amherst, OH	Time Period	PM Peak	PHF	0.92
Urban Street	Oak Point Road	Analysis Year	2042	Analysis Period	1> 7:00
Intersection	@ Cooper Foster Park…	File Name	PM 42 CooperFoster MajorBT.xus		
Project Description	Major Bow Tie				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h		0	678		0	454	140	932	10	10	873	120

Signal Information			
Cycle, s	100.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	7.0	55.4	19.6	0.0	0.0	0.0
Yellow	4.0	4.0	4.0	0.0	0.0	0.0
Red	2.0	2.0	2.0	0.0	0.0	0.0



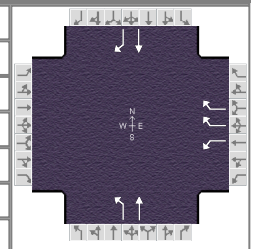
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2		6
Case Number		7.0		7.0	1.0	3.0		6.3
Phase Duration, s		25.6		25.6	13.0	74.4		61.4
Change Period, (*Y+R c*), s		6.0		6.0	6.0	6.0		6.0
Max Allow Headway (*MAH*), s		3.4		3.4	3.1	3.1		3.1
Queue Clearance Time (*g s*), s		21.6		18.8	6.3	39.3		57.4
Green Extension Time (*g e*), s		0.0		0.4	0.0	0.0		0.0
Phase Call Probability		1.00		1.00	1.00	1.00		1.00
Max Out Probability		1.00		1.00	1.00	1.00		1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		4	14		8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h		0	737		0	493	152	1013	11	11	1079	
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1885	1403		1841	1425	1767	1870	1560	552	1845	
Queue Service Time (*g s*), s		0.0	19.6		0.0	16.8	4.3	37.3	0.2	1.4	55.4	
Cycle Queue Clearance Time (*g c*), s		0.0	19.6		0.0	16.8	4.3	37.3	0.2	25.8	55.4	
Green Ratio (*g/C*)		0.20	0.27		0.20	0.20	0.64	0.68	0.68	0.55	0.55	
Capacity (*c*), veh/h		369	746		361	559	196	1279	1067	243	1022	
Volume-to-Capacity Ratio (*X*)		0.000	0.988		0.000	0.883	0.778	0.792	0.010	0.045	1.056	
Back of Queue (*Q*), ft/ln (95 th percentile)		0	439.8		0	279.8	130.9	502.6	2.9	8.3	1143.8	
Back of Queue (*Q*), veh/ln (95 th percentile)		0.0	17.3		0.0	11.2	5.1	19.8	0.1	0.3	45.4	
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00	5.86		0.00	0.00	1.09	0.00	0.02	0.02	0.00	
Uniform Delay (*d 1*), s/veh		0.0	36.5		0.0	39.1	27.4	10.9	5.0	24.3	22.3	
Incremental Delay (*d 2*), s/veh		0.0	29.7		0.0	14.9	16.3	3.2	0.0	0.0	44.1	
Initial Queue Delay (*d 3*), s/veh		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Control Delay (*d*), s/veh		0.0	66.2		0.0	54.0	43.7	14.1	5.0	24.3	66.4	
Level of Service (LOS)			E			D	D	B	A	C	F	
Approach Delay, s/veh / LOS	66.2	E		54.0	D		17.8	B		66.0	E	
Intersection Delay, s/veh / LOS	48.2						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS								
Bicycle LOS Score / LOS								

HCS7 Signalized Intersection Results Summary

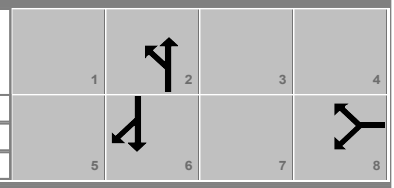
General Information				Intersection Information	
Agency	TMS Engineers, Inc.			Duration, h	0.250
Analyst	ABC	Analysis Date	Jun 2, 2020	Area Type	Other
Jurisdiction	Amherst, OH	Time Period	PM Peak	PHF	0.92
Urban Street	North Lake Street	Analysis Year	2042	Analysis Period	1> 7:00
Intersection	@ SR 2 WB Ramps	File Name	PM 42 Westbound2 MajorBT.xus		
Project Description	Major Bow Tie				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h				380		582	80	801			1140	274

Signal Information			
Cycle, s	100.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	67.7	20.3	0.0	0.0	0.0	0.0	
Yellow	4.0	4.0	0.0	0.0	0.0	0.0	
Red	2.0	2.0	0.0	0.0	0.0	0.0	



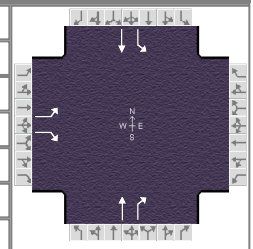
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase				8		2		6
Case Number				9.0		6.0		7.0
Phase Duration, s				26.3		73.7		73.7
Change Period, (*Y+R c*), s				6.0		6.0		6.0
Max Allow Headway (*MAH*), s				3.3		3.2		3.2
Queue Clearance Time (*g s*), s				22.3		69.7		65.4
Green Extension Time (*g e*), s				0.0		0.0		1.8
Phase Call Probability				1.00		1.00		1.00
Max Out Probability				1.00		1.00		1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement				3		18	5	2			6	16
Adjusted Flow Rate (*v*), veh/h				413		633	87	871			1239	298
Adjusted Saturation Flow Rate (*s*), veh/h/ln				1795		1414	456	1870			1870	1585
Queue Service Time (*g s*), s				20.3		20.3	4.3	28.1			63.4	7.5
Cycle Queue Clearance Time (*g c*), s				20.3		20.3	67.7	28.1			63.4	7.5
Green Ratio (*g/C*)				0.20		0.20	0.68	0.68			0.68	0.68
Capacity (*c*), veh/h				364		574	91	1266			1266	1073
Volume-to-Capacity Ratio (*X*)				1.133		1.102	0.950	0.688			0.979	0.278
Back of Queue (*Q*), ft/ln (95 th percentile)				660.3		478.6	184.5	387			952.5	99.4
Back of Queue (*Q*), veh/ln (95 th percentile)				26.2		19.0	7.4	15.2			37.5	3.9
Queue Storage Ratio (*RQ*) (95 th percentile)				4.72		0.00	1.09	0.00			0.00	0.83
Uniform Delay (*d 1*), s/veh				39.9		39.9	49.5	9.8			15.5	6.4
Incremental Delay (*d 2*), s/veh				88.4		68.6	77.0	1.3			20.2	0.1
Initial Queue Delay (*d 3*), s/veh				0.0		0.0	0.0	0.0			0.0	0.0
Control Delay (*d*), s/veh				128.3		108.4	126.5	11.1			35.6	6.5
Level of Service (LOS)				F		F	F	B			D	A
Approach Delay, s/veh / LOS	0.0			116.3		F	21.6		C	30.0		C
Intersection Delay, s/veh / LOS	53.2						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS								
Bicycle LOS Score / LOS								

HCS7 Signalized Intersection Results Summary

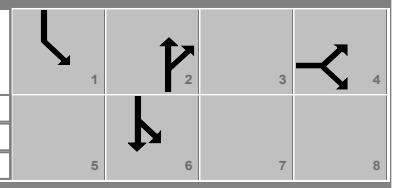
General Information				Intersection Information	
Agency	TMS Engineers, Inc.			Duration, h	0.250
Analyst	ABC	Analysis Date	Jun 2, 2020	Area Type	Other
Jurisdiction	Amherst, OH	Time Period	PM Peak	PHF	0.92
Urban Street	North Lake Street	Analysis Year	2042	Analysis Period	1> 7:00
Intersection	@ SR 2 EB Ramps	File Name	PM 42 Eastbound2 MajorBT.xus		
Project Description	Major Bow Tie				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	197		90					684	190	541	979	

Signal Information			
Cycle, s	100.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	29.0	38.9	14.1	0.0	0.0	0.0
Yellow	4.0	4.0	4.0	0.0	0.0	0.0
Red	2.0	2.0	2.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4				2	1	6
Case Number		9.0				7.3	1.0	4.0
Phase Duration, s		20.1				44.9	35.0	79.9
Change Period, (*Y+R c*), s		6.0				6.0	6.0	6.0
Max Allow Headway (*MAH*), s		3.2				3.1	3.1	3.1
Queue Clearance Time (*g s*), s		13.7				40.9	30.6	35.8
Green Extension Time (*g e*), s		0.0				0.0	0.0	5.7
Phase Call Probability		1.00				1.00	1.00	1.00
Max Out Probability		1.00				1.00	1.00	0.01

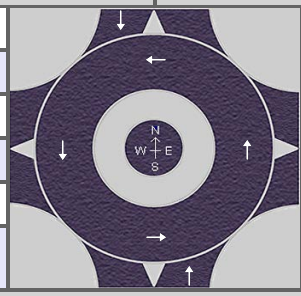
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7		14					2	12	1	6	
Adjusted Flow Rate (*v*), veh/h	214		98					743	207	588	1064	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1781		1610					1900	1610	1795	1885	
Queue Service Time (*g s*), s	11.7		5.6					38.9	9.0	28.6	33.8	
Cycle Queue Clearance Time (*g c*), s	11.7		5.6					38.9	9.0	28.6	33.8	
Green Ratio (*g/C*)	0.14		0.14					0.39	0.39	0.70	0.74	
Capacity (*c*), veh/h	251		227					739	626	593	1393	
Volume-to-Capacity Ratio (*X*)	0.853		0.431					1.006	0.330	0.992	0.764	
Back of Queue (*Q*), ft/ln (95 th percentile)	275.4		98.6					801.2	148.8	637.5	414.4	
Back of Queue (*Q*), veh/ln (95 th percentile)	10.8		3.9					32.0	6.0	25.3	16.4	
Queue Storage Ratio (*RQ*) (95 th percentile)	1.45		0.00					0.00	0.00	3.75	0.00	
Uniform Delay (*d 1*), s/veh	41.9		39.3					30.6	21.4	29.9	7.8	
Incremental Delay (*d 2*), s/veh	22.5		0.5					34.6	0.1	34.8	2.3	
Initial Queue Delay (*d 3*), s/veh	0.0		0.0					0.0	0.0	0.0	0.0	
Control Delay (*d*), s/veh	64.5		39.8					65.1	21.5	64.7	10.1	
Level of Service (LOS)	E		D					F	C	E	B	
Approach Delay, s/veh / LOS	56.7	E		0.0			55.6	E		29.5	C	
Intersection Delay, s/veh / LOS	41.0						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS								
Bicycle LOS Score / LOS								

HCS7 Roundabouts Report

General Information

Analyst	ABC
Agency or Co.	TMS Engineers, Inc.
Date Performed	6/2/2020
Analysis Year	2042
Time Analyzed	PM Peak
Project Description	Major Bow Tie



Site Information

Intersection	North Lake & South BT
E/W Street Name	South Bow Tie
N/S Street Name	North Lake Street
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	Amherst, OH

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0
Lane Assignment											T				T	
Volume (V), veh/h									0		675		199		870	
Percent Heavy Vehicles, %									0		2		2		2	
Flow Rate (v_{PCE}), pc/h									0		748		221		965	
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes									1				1			
Pedestrians Crossing, p/h									0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)								4.9763			4.9763	
Follow-Up Headway (s)								2.6087			2.6087	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h								748			1186	
Entry Volume, veh/h								733			1163	
Circulating Flow (v_c), pc/h	1186			969			221			0		
Exiting Flow (v_{ex}), pc/h	0			0			969			965		
Capacity (c_{pce}), pc/h								1101			1380	
Capacity (c), veh/h								1080			1353	
v/c Ratio (x)								0.68			0.86	

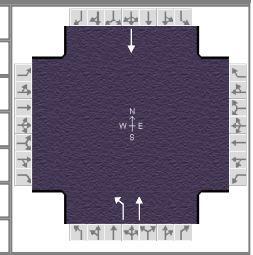
Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh								13.5			20.4	
Lane LOS								B			C	
95% Queue, veh								5.6			12.1	
Approach Delay, s/veh							13.5			20.4		
Approach LOS							B			C		
Intersection Delay, s/veh | LOS	17.7						C					

Appendix S
Alternative #7 - 2042 Capacity Analysis Worksheets

HCS7 Signalized Intersection Results Summary

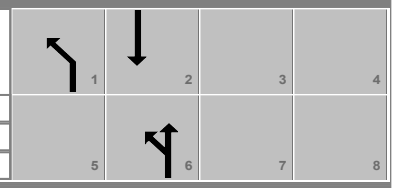
General Information				Intersection Information	
Agency	TMS Engineers, Inc.			Duration, h	0.250
Analyst	ABC	Analysis Date	Jun 2, 2020	Area Type	Other
Jurisdiction	Amherst, OH	Time Period	AM Peak	PHF	0.92
Urban Street	Oak Point Road	Analysis Year	2042	Analysis Period	1> 7:00
Intersection	@ North U-Turn	File Name	AM 42 North RCUT.xus		
Project Description	RCUT				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h							184	278			462	

Signal Information			
Cycle, s	45.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	7.0	26.0	0.0	0.0	0.0	0.0	
Yellow	4.0	4.0	0.0	0.0	0.0	0.0	
Red	2.0	2.0	0.0	0.0	0.0	0.0	



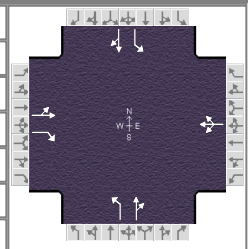
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase					1	6		2
Case Number					1.0	4.0		8.3
Phase Duration, s					13.0	45.0		32.0
Change Period, ($Y+R_c$), s					6.0	6.0		6.0
Max Allow Headway (*MAH*), s					3.1	3.0		3.0
Queue Clearance Time (g_s), s					3.3	3.2		9.1
Green Extension Time (g_e), s					0.1	0.8		1.5
Phase Call Probability					1.00	1.00		1.00
Max Out Probability					0.55	0.71		0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement							1	6			2	
Adjusted Flow Rate (*v*), veh/h							200	302			502	
Adjusted Saturation Flow Rate (*s*), veh/h/ln							1767	1856			1856	
Queue Service Time (g_s), s							1.3	1.2			7.1	
Cycle Queue Clearance Time (g_c), s							1.3	1.2			7.1	
Green Ratio (*g/C*)							0.78	0.87			0.58	
Capacity (*c*), veh/h							809	1608			1072	
Volume-to-Capacity Ratio (*X*)							0.247	0.188			0.468	
Back of Queue (*Q*), ft/ln (95 th percentile)							0.6	0.4			69.8	
Back of Queue (*Q*), veh/ln (95 th percentile)							0.0	0.0			2.7	
Queue Storage Ratio (*RQ*) (95 th percentile)							0.00	0.00			0.00	
Uniform Delay (d_1), s/veh							2.4	0.5			5.5	
Incremental Delay (d_2), s/veh							0.1	0.0			0.1	
Initial Queue Delay (d_3), s/veh							0.0	0.0			0.0	
Control Delay (*d*), s/veh							2.5	0.5			5.6	
Level of Service (LOS)							A	A			A	
Approach Delay, s/veh / LOS	0.0			0.0			1.3		A	5.6		A
Intersection Delay, s/veh / LOS	3.5						A					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS								
Bicycle LOS Score / LOS								

HCS7 Signalized Intersection Results Summary

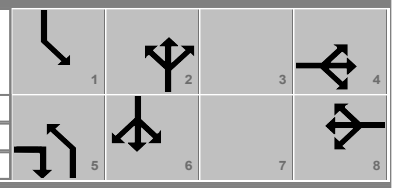
General Information				Intersection Information	
Agency	TMS Engineers, Inc.			Duration, h	0.250
Analyst	ABC	Analysis Date	Jun 2, 2020	Area Type	Other
Jurisdiction	Lorain, OH	Time Period	AM Peak	PHF	0.92
Urban Street	Oak Point Road	Analysis Year	2042	Analysis Period	1> 7:00
Intersection	@ Buck Horn/Park Square	File Name	AM 42 BuckHorn MajorBT.xus		
Project Description	RCUT				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	30	10	50	10	0	10	30	422	30	40	576	30

Signal Information			
Cycle, s	90.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	7.0	41.0	24.0	0.0	0.0	0.0
Yellow	4.0	4.0	4.0	0.0	0.0	0.0
Red	2.0	2.0	2.0	0.0	0.0	0.0



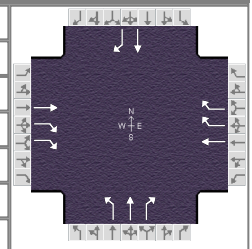
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2	1	6
Case Number		7.0		8.0	1.1	4.0	1.1	4.0
Phase Duration, s		30.0		30.0	13.0	47.0	13.0	47.0
Change Period, ($Y+R_c$), s		6.0		6.0	6.0	6.0	6.0	6.0
Max Allow Headway (*MAH*), s		3.2		3.2	3.1	3.0	3.1	3.0
Queue Clearance Time (g_s), s		4.2		2.8	2.8	19.6	3.0	28.7
Green Extension Time (g_e), s		0.2		0.1	0.0	0.0	0.0	2.1
Phase Call Probability		1.00		1.00	1.00	1.00	1.00	1.00
Max Out Probability		0.00		0.32	0.13	1.00	0.23	0.07

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h		43	54		22		33	491		43	659	
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1531	1510		1532		1810	1863		1810	1869	
Queue Service Time (g_s), s		0.9	2.2		0.0		0.8	17.6		1.0	26.7	
Cycle Queue Clearance Time (g_c), s		1.8	2.2		0.8		0.8	17.6		1.0	26.7	
Green Ratio (*g/C*)		0.27	0.34		0.27		0.53	0.46		0.53	0.46	
Capacity (*c*), veh/h		478	520		468		329	849		440	851	
Volume-to-Capacity Ratio (*X*)		0.091	0.105		0.046		0.099	0.579		0.099	0.774	
Back of Queue (*Q*), ft/ln (95 th percentile)		30.7	36		15.2		12.9	291.3		17.2	433.9	
Back of Queue (*Q*), veh/ln (95 th percentile)		1.2	1.4		0.6		0.5	11.6		0.7	17.2	
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00	0.24		0.00		0.04	0.00		0.07	0.00	
Uniform Delay (d_1), s/veh		24.8	20.1		24.5		14.7	18.1		12.3	20.6	
Incremental Delay (d_2), s/veh		0.0	0.0		0.0		0.0	0.7		0.0	4.1	
Initial Queue Delay (d_3), s/veh		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Control Delay (*d*), s/veh		24.8	20.1		24.5		14.8	18.8		12.3	24.7	
Level of Service (LOS)		C	C		C		B	B		B	C	
Approach Delay, s/veh / LOS	22.2	C		24.5	C		18.5	B		23.9	C	
Intersection Delay, s/veh / LOS	21.7						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS								
Bicycle LOS Score / LOS								

HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	TMS Engineers, Inc.			Duration, h	0.250
Analyst	ABC	Analysis Date	Jun 2, 2020	Area Type	Other
Jurisdiction	Amherst, OH	Time Period	AM Peak	PHF	0.92
Urban Street	Oak Point Road	Analysis Year	2042	Analysis Period	1> 7:00
Intersection	@ Cooper Foster Park…	File Name	AM 42 CooperFoster MajorBT.xus		
Project Description	RCUT				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h		0	211		0	230	165	252	440		467	101

Signal Information			
Cycle, s	90.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

							1	2	3	4
Green	7.0	36.8	28.2	0.0	0.0	0.0	5	6	7	8
Yellow	4.0	4.0	4.0	0.0	0.0	0.0				
Red	2.0	2.0	2.0	0.0	0.0	0.0				

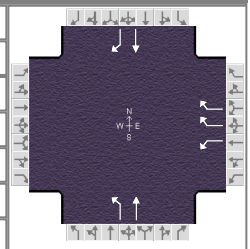
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2		6
Case Number		7.0		7.0	1.0	3.0		7.3
Phase Duration, s		34.2		34.2	13.0	55.8		42.8
Change Period, (*Y+R c*), s		6.0		6.0	6.0	6.0		6.0
Max Allow Headway (*MAH*), s		3.4		3.4	3.1	3.2		3.2
Queue Clearance Time (*g s*), s		7.1		7.9	7.0	19.4		21.8
Green Extension Time (*g e*), s		1.3		0.0	0.0	0.0		2.8
Phase Call Probability		1.00		1.00	1.00	1.00		1.00
Max Out Probability		0.00		1.00	1.00	1.00		0.07

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		4	14		8	18	5	2	12		6	16
Adjusted Flow Rate (*v*), veh/h		0	229		0	250	179	274	478		508	110
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1767	1347		1856	1425	1753	1870	1585		1870	1610
Queue Service Time (*g s*), s		0.0	5.1		0.0	5.9	5.0	6.9	17.4		19.8	3.9
Cycle Queue Clearance Time (*g c*), s		0.0	5.1		0.0	5.9	5.0	6.9	17.4		19.8	3.9
Green Ratio (*g/C*)		0.31	0.39		0.31	0.31	0.51	0.55	0.55		0.41	0.41
Capacity (*c*), veh/h		554	1054		581	893	382	1035	877		765	658
Volume-to-Capacity Ratio (*X*)		0.000	0.218		0.000	0.280	0.470	0.265	0.545		0.664	0.167
Back of Queue (*Q*), ft/ln (95 th percentile)		0	72.3		0	87.1	86.3	118.9	241.7		337.1	62.1
Back of Queue (*Q*), veh/ln (95 th percentile)		0.0	2.7		0.0	3.5	3.3	4.7	9.5		13.3	2.5
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00	0.96		0.00	0.00	0.72	0.00	2.01		0.00	0.00
Uniform Delay (*d 1*), s/veh		0.0	18.2		0.0	23.3	15.4	10.5	12.9		21.6	16.9
Incremental Delay (*d 2*), s/veh		0.0	0.0		0.0	0.1	0.3	0.1	0.4		1.8	0.0
Initial Queue Delay (*d 3*), s/veh		0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0
Control Delay (*d*), s/veh		0.0	18.3		0.0	23.3	15.8	10.6	13.3		23.3	16.9
Level of Service (LOS)			B			C	B	B	B		C	B
Approach Delay, s/veh / LOS	18.3		B	23.3		C	12.9		B	22.2		C
Intersection Delay, s/veh / LOS	17.6						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS								
Bicycle LOS Score / LOS								

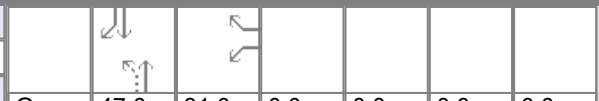
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	TMS Engineers, Inc.			Duration, h	0.250
Analyst	ABC	Analysis Date	Jun 2, 2020	Area Type	Other
Jurisdiction	Amherst, OH	Time Period	AM Peak	PHF	0.92
Urban Street	North Lake Street	Analysis Year	2042	Analysis Period	1> 7:00
Intersection	@ SR 2 WB Ramps	File Name	AM 42 Westbound2 MajorBT.xus		
Project Description	RCUT				

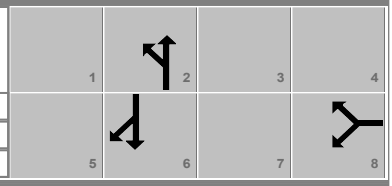


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h				80		388	50	469			526	151

Signal Information			
Cycle, s	90.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	47.0	31.0	0.0	0.0	0.0	0.0	
Yellow	4.0	4.0	0.0	0.0	0.0	0.0	
Red	2.0	2.0	0.0	0.0	0.0	0.0	



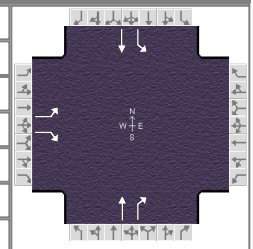
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase				8		2		6
Case Number				9.0		6.0		7.0
Phase Duration, s				37.0		53.0		53.0
Change Period, ($Y+R_c$), s				6.0		6.0		6.0
Max Allow Headway (*MAH*), s				3.3		3.1		3.1
Queue Clearance Time (g_s), s				12.5		25.4		21.1
Green Extension Time (g_e), s				1.3		0.0		2.8
Phase Call Probability				1.00		1.00		1.00
Max Out Probability				0.00		1.00		0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement				3		18	5	2			6	16
Adjusted Flow Rate (*v*), veh/h				87		422	54	510			572	164
Adjusted Saturation Flow Rate (*s*), veh/h/ln				1626		1392	854	1870			1856	1598
Queue Service Time (g_s), s				3.3		10.5	4.2	16.1			19.1	4.9
Cycle Queue Clearance Time (g_c), s				3.3		10.5	23.4	16.1			19.1	4.9
Green Ratio (*g/C*)				0.34		0.34	0.52	0.52			0.52	0.52
Capacity (*c*), veh/h				560		959	344	977			969	834
Volume-to-Capacity Ratio (*X*)				0.155		0.440	0.158	0.522			0.590	0.197
Back of Queue (*Q*), ft/ln (95 th percentile)				61		152.7	37.3	263.5			305.8	73.7
Back of Queue (*Q*), veh/ln (95 th percentile)				2.2		6.0	1.5	10.4			11.9	2.9
Queue Storage Ratio (*RQ*) (95 th percentile)				0.44		0.00	0.22	0.00			0.00	0.61
Uniform Delay (d_1), s/veh				20.4		22.8	22.9	14.1			14.8	11.4
Incremental Delay (d_2), s/veh				0.0		0.1	0.1	0.2			0.7	0.0
Initial Queue Delay (d_3), s/veh				0.0		0.0	0.0	0.0			0.0	0.0
Control Delay (*d*), s/veh				20.5		22.9	23.0	14.4			15.5	11.5
Level of Service (LOS)				C		C	C	B			B	B
Approach Delay, s/veh / LOS	0.0			22.5		C	15.2		B	14.6		B
Intersection Delay, s/veh / LOS	17.0						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS								
Bicycle LOS Score / LOS								

HCS7 Signalized Intersection Results Summary

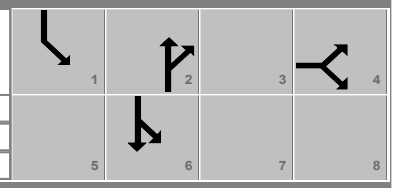
General Information				Intersection Information	
Agency	TMS Engineers, Inc.			Duration, h	0.250
Analyst	ABC	Analysis Date	Jun 2, 2020	Area Type	Other
Jurisdiction	Amherst, OH	Time Period	AM Peak	PHF	0.92
Urban Street	North Lake Street	Analysis Year	2042	Analysis Period	1> 7:00
Intersection	@ SR 2 EB Ramps	File Name	AM 42 Eastbound2 MajorBT.xus		
Project Description	RCUT				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	192		40					327	330	364	243	

Signal Information			
Cycle, s	90.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	7.0	38.8	26.2	0.0	0.0	0.0
Yellow	4.0	4.0	4.0	0.0	0.0	0.0
Red	2.0	2.0	2.0	0.0	0.0	0.0



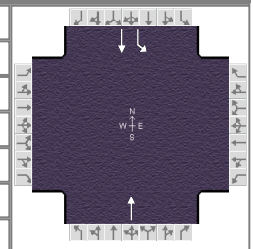
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4				2	1	6
Case Number		9.0				7.3	1.0	4.0
Phase Duration, s		32.2				44.8	13.0	57.8
Change Period, (*Y+R c*), s		6.0				6.0	6.0	6.0
Max Allow Headway (*MAH*), s		3.2				3.2	3.1	3.2
Queue Clearance Time (*g s*), s		10.5				16.7	9.0	8.5
Green Extension Time (*g e*), s		0.4				0.0	0.0	2.0
Phase Call Probability		1.00				1.00	1.00	1.00
Max Out Probability		0.00				1.00	1.00	0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7		14					2	12	1	6	
Adjusted Flow Rate (*v*), veh/h	209		43					355	359	396	264	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1767		1560					1885	1610	1753	1811	
Queue Service Time (*g s*), s	8.5		1.8					11.9	14.7	7.0	6.5	
Cycle Queue Clearance Time (*g c*), s	8.5		1.8					11.9	14.7	7.0	6.5	
Green Ratio (*g/C*)	0.29		0.29					0.43	0.43	0.53	0.58	
Capacity (*c*), veh/h	514		454					813	694	518	1042	
Volume-to-Capacity Ratio (*X*)	0.406		0.096					0.437	0.517	0.764	0.253	
Back of Queue (*Q*), ft/ln (95 th percentile)	160.7		30.6					215.3	223.2	211.4	110	
Back of Queue (*Q*), veh/ln (95 th percentile)	6.3		1.2					8.5	8.9	8.2	4.2	
Queue Storage Ratio (*RQ*) (95 th percentile)	0.85		0.00					0.00	0.00	1.24	0.00	
Uniform Delay (*d 1*), s/veh	25.6		23.3					17.9	18.7	19.8	9.5	
Incremental Delay (*d 2*), s/veh	0.2		0.0					0.1	0.3	6.0	0.0	
Initial Queue Delay (*d 3*), s/veh	0.0		0.0					0.0	0.0	0.0	0.0	
Control Delay (*d*), s/veh	25.8		23.3					18.1	19.0	25.8	9.5	
Level of Service (LOS)	C		C					B	B	C	A	
Approach Delay, s/veh / LOS	25.4	C		0.0			18.6	B		19.3	B	
Intersection Delay, s/veh / LOS	19.9						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS								
Bicycle LOS Score / LOS								

HCS7 Signalized Intersection Results Summary

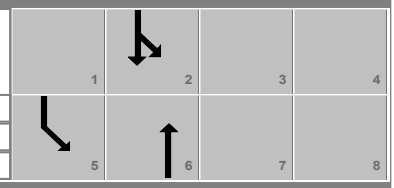
General Information				Intersection Information	
Agency	TMS Engineers, Inc.			Duration, h	0.250
Analyst	ABC	Analysis Date	Jun 2, 2020	Area Type	Other
Jurisdiction	Amherst, OH	Time Period	AM Peak	PHF	0.92
Urban Street	Oak Point Road	Analysis Year	2042	Analysis Period	1> 7:00
Intersection	@ South U-Turn	File Name	AM 42 South RCUT.xus		
Project Description	RCUT				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h								235		48	609	

Signal Information			
Cycle, s	45.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	7.0	26.0	0.0	0.0	0.0	0.0	
Yellow	4.0	4.0	0.0	0.0	0.0	0.0	
Red	2.0	2.0	0.0	0.0	0.0	0.0	



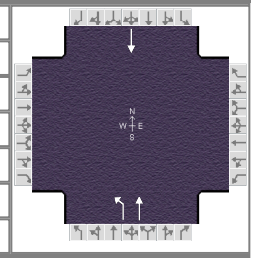
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase						6	5	2
Case Number						8.3	1.0	4.0
Phase Duration, s						32.0	13.0	45.0
Change Period, ($Y+R_c$), s						6.0	6.0	6.0
Max Allow Headway (*MAH*), s						3.0	3.1	3.0
Queue Clearance Time (g_s), s						5.0	2.3	5.3
Green Extension Time (g_e), s						0.6	0.0	1.8
Phase Call Probability						1.00	1.00	1.00
Max Out Probability						1.00	0.07	0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement								6		5	2	
Adjusted Flow Rate (*v*), veh/h								255		52	662	
Adjusted Saturation Flow Rate (*s*), veh/h/ln								1856		1767	1856	
Queue Service Time (g_s), s								3.0		0.3	3.3	
Cycle Queue Clearance Time (g_c), s								3.0		0.3	3.3	
Green Ratio (*g/C*)								0.58		0.78	0.87	
Capacity (*c*), veh/h								1072		1004	1608	
Volume-to-Capacity Ratio (*X*)								0.238		0.052	0.412	
Back of Queue (*Q*), ft/ln (95 th percentile)								30.3		0.1	1.3	
Back of Queue (*Q*), veh/ln (95 th percentile)								1.2		0.0	0.1	
Queue Storage Ratio (*RQ*) (95 th percentile)								0.00		0.00	0.00	
Uniform Delay (d_1), s/veh								4.7		1.4	0.6	
Incremental Delay (d_2), s/veh								0.0		0.0	0.1	
Initial Queue Delay (d_3), s/veh								0.0		0.0	0.0	
Control Delay (*d*), s/veh								4.7		1.4	0.7	
Level of Service (LOS)								A		A	A	
Approach Delay, s/veh / LOS	0.0			0.0			4.7		A	0.7		A
Intersection Delay, s/veh / LOS	1.8						A					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS								
Bicycle LOS Score / LOS								

HCS7 Signalized Intersection Results Summary

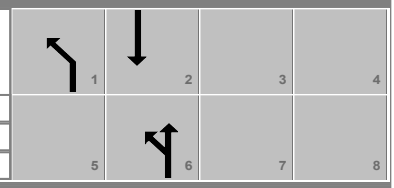
General Information				Intersection Information	
Agency	TMS Engineers, Inc.			Duration, h	0.250
Analyst	ABC	Analysis Date	Jun 2, 2020	Area Type	Other
Jurisdiction	Amherst, OH	Time Period	PM Peak	PHF	0.92
Urban Street	Oak Point Road	Analysis Year	2042	Analysis Period	1> 7:00
Intersection	@ North U-Turn	File Name	PM 42 North RCUT.xus		
Project Description	RCUT				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h							370	722			633	

Signal Information			
Cycle, s	50.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	7.0	31.0	0.0	0.0	0.0	0.0	
Yellow	4.0	4.0	0.0	0.0	0.0	0.0	
Red	2.0	2.0	0.0	0.0	0.0	0.0	



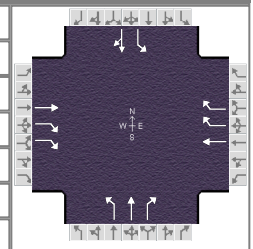
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase					1	6		2
Case Number					1.0	4.0		8.3
Phase Duration, s					13.0	50.0		37.0
Change Period, ($Y+R_c$), s					6.0	6.0		6.0
Max Allow Headway (*MAH*), s					3.1	3.0		3.0
Queue Clearance Time (g_s), s					4.9	6.4		13.2
Green Extension Time (g_e), s					0.2	0.3		3.2
Phase Call Probability					1.00	1.00		1.00
Max Out Probability					1.00	1.00		0.04

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement							1	6			2	
Adjusted Flow Rate (*v*), veh/h							402	785			688	
Adjusted Saturation Flow Rate (*s*), veh/h/ln							1767	1856			1856	
Queue Service Time (g_s), s							2.9	4.4			11.2	
Cycle Queue Clearance Time (g_c), s							2.9	4.4			11.2	
Green Ratio (*g/C*)							0.80	0.88			0.62	
Capacity (*c*), veh/h							688	1633			1150	
Volume-to-Capacity Ratio (*X*)							0.585	0.481			0.598	
Back of Queue (*Q*), ft/ln (95 th percentile)							30.8	1.7			117.2	
Back of Queue (*Q*), veh/ln (95 th percentile)							1.2	0.1			4.6	
Queue Storage Ratio (*RQ*) (95 th percentile)							0.00	0.00			0.00	
Uniform Delay (d_1), s/veh							5.1	0.6			5.7	
Incremental Delay (d_2), s/veh							0.9	0.1			0.6	
Initial Queue Delay (d_3), s/veh							0.0	0.0			0.0	
Control Delay (*d*), s/veh							5.9	0.7			6.3	
Level of Service (LOS)							A	A			A	
Approach Delay, s/veh / LOS	0.0			0.0			2.5		A	6.3		A
Intersection Delay, s/veh / LOS	3.9						A					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS								
Bicycle LOS Score / LOS								

HCS7 Signalized Intersection Results Summary

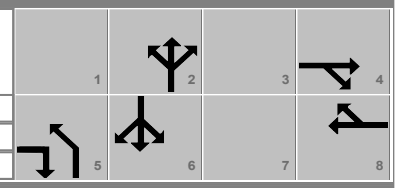
General Information				Intersection Information	
Agency	TMS Engineers, Inc.			Duration, h	0.250
Analyst	ABC	Analysis Date	Jun 2, 2020	Area Type	Other
Jurisdiction	Amherst, OH	Time Period	PM Peak	PHF	0.92
Urban Street	Oak Point Road	Analysis Year	2042	Analysis Period	1> 7:00
Intersection	@ Cooper Foster Park…	File Name	PM 42 CooperFoster MajorBT.xus		
Project Description	RCUT				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h		0	678		0	454	140	932	10	10	873	120

Signal Information			
Cycle, s	100.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	7.0	55.4	19.6	0.0	0.0	0.0
Yellow	4.0	4.0	4.0	0.0	0.0	0.0
Red	2.0	2.0	2.0	0.0	0.0	0.0



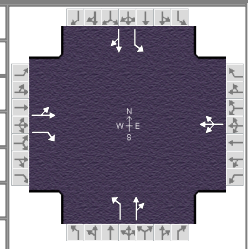
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2		6
Case Number		7.0		7.0	1.0	3.0		6.3
Phase Duration, s		25.6		25.6	13.0	74.4		61.4
Change Period, (*Y+R c*), s		6.0		6.0	6.0	6.0		6.0
Max Allow Headway (*MAH*), s		3.4		3.4	3.1	3.1		3.1
Queue Clearance Time (*g s*), s		21.6		18.8	6.3	39.3		57.4
Green Extension Time (*g e*), s		0.0		0.4	0.0	0.0		0.0
Phase Call Probability		1.00		1.00	1.00	1.00		1.00
Max Out Probability		1.00		1.00	1.00	1.00		1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		4	14		8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h		0	737		0	493	152	1013	11	11	1079	
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1885	1403		1841	1425	1767	1870	1560	552	1845	
Queue Service Time (*g s*), s		0.0	19.6		0.0	16.8	4.3	37.3	0.2	1.4	55.4	
Cycle Queue Clearance Time (*g c*), s		0.0	19.6		0.0	16.8	4.3	37.3	0.2	25.8	55.4	
Green Ratio (*g/C*)		0.20	0.27		0.20	0.20	0.64	0.68	0.68	0.55	0.55	
Capacity (*c*), veh/h		369	746		361	559	196	1279	1067	243	1022	
Volume-to-Capacity Ratio (*X*)		0.000	0.988		0.000	0.883	0.778	0.792	0.010	0.045	1.056	
Back of Queue (*Q*), ft/ln (95 th percentile)		0	439.8		0	279.8	130.9	502.6	2.9	8.3	1143.8	
Back of Queue (*Q*), veh/ln (95 th percentile)		0.0	17.3		0.0	11.2	5.1	19.8	0.1	0.3	45.4	
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00	5.86		0.00	0.00	1.09	0.00	0.02	0.02	0.00	
Uniform Delay (*d 1*), s/veh		0.0	36.5		0.0	39.1	27.4	10.9	5.0	24.3	22.3	
Incremental Delay (*d 2*), s/veh		0.0	29.7		0.0	14.9	16.3	3.2	0.0	0.0	44.1	
Initial Queue Delay (*d 3*), s/veh		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Control Delay (*d*), s/veh		0.0	66.2		0.0	54.0	43.7	14.1	5.0	24.3	66.4	
Level of Service (LOS)			E			D	D	B	A	C	F	
Approach Delay, s/veh / LOS	66.2	E		54.0	D		17.8	B		66.0	E	
Intersection Delay, s/veh / LOS	48.2						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS								
Bicycle LOS Score / LOS								

HCS7 Signalized Intersection Results Summary

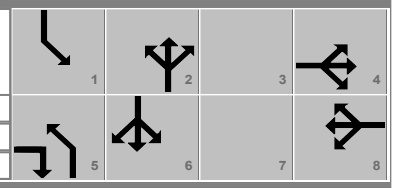
General Information				Intersection Information	
Agency	TMS Engineers, Inc.			Duration, h	0.250
Analyst	ABC	Analysis Date	Jun 2, 2020	Area Type	Other
Jurisdiction	Lorain, OH	Time Period	AM Peak	PHF	0.92
Urban Street	Oak Point Road	Analysis Year	2042	Analysis Period	1> 7:00
Intersection	@ Buck Horn/Park Square	File Name	PM 42 BuckHorn MajorBT.xus		
Project Description	RCUT				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	130	10	60	80	10	30	140	932	10	10	873	120

Signal Information			
Cycle, s	100.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	7.0	59.8	15.2	0.0	0.0	0.0						
Yellow	4.0	4.0	4.0	0.0	0.0	0.0						
Red	2.0	2.0	2.0	0.0	0.0	0.0						



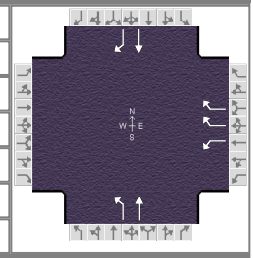
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2	1	6
Case Number		7.0		8.0	1.1	4.0	1.1	4.0
Phase Duration, s		21.2		21.2	13.0	65.8	13.0	65.8
Change Period, ($Y+R_c$), s		6.0		6.0	6.0	6.0	6.0	6.0
Max Allow Headway (*MAH*), s		3.2		3.2	3.1	3.1	3.1	3.1
Queue Clearance Time (g_s), s		12.2		9.6	5.8	50.0	2.2	58.7
Green Extension Time (g_e), s		0.2		0.0	0.0	0.0	0.0	0.8
Phase Call Probability		1.00		1.00	1.00	1.00	1.00	1.00
Max Out Probability		1.00		1.00	1.00	1.00	0.02	1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h		152	65		130		152	1024		11	1079	
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1412	1510		1555		1810	1882		1810	1845	
Queue Service Time (g_s), s		2.7	3.5		0.0		3.8	48.0		0.2	56.7	
Cycle Queue Clearance Time (g_c), s		10.2	3.5		7.6		3.8	48.0		0.2	56.7	
Green Ratio (*g/C*)		0.15	0.22		0.15		0.67	0.60		0.67	0.60	
Capacity (*c*), veh/h		284	335		296		205	1125		253	1103	
Volume-to-Capacity Ratio (*X*)		0.536	0.195		0.440		0.743	0.910		0.043	0.978	
Back of Queue (*Q*), ft/ln (95 th percentile)		160.5	60.8		132.2		123.6	733		5.5	913	
Back of Queue (*Q*), veh/ln (95 th percentile)		6.4	2.3		5.3		4.9	29.1		0.2	36.2	
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00	0.41		0.00		0.37	0.00		0.02	0.00	
Uniform Delay (d_1), s/veh		40.3	31.6		39.1		27.0	17.7		18.3	19.5	
Incremental Delay (d_2), s/veh		1.1	0.1		0.4		12.2	10.7		0.0	21.8	
Initial Queue Delay (d_3), s/veh		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Control Delay (*d*), s/veh		41.4	31.7		39.5		39.2	28.4		18.3	41.3	
Level of Service (LOS)		D	C		D		D	C		B	D	
Approach Delay, s/veh / LOS	38.5	D		39.5	D		29.8	C		41.1	D	
Intersection Delay, s/veh / LOS	35.7						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS								
Bicycle LOS Score / LOS								

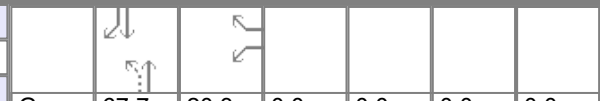
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	TMS Engineers, Inc.			Duration, h	0.250
Analyst	ABC	Analysis Date	Jun 2, 2020	Area Type	Other
Jurisdiction	Amherst, OH	Time Period	PM Peak	PHF	0.92
Urban Street	North Lake Street	Analysis Year	2042	Analysis Period	1> 7:00
Intersection	@ SR 2 WB Ramps	File Name	PM 42 Westbound2 MajorBT.xus		
Project Description	RCUT				

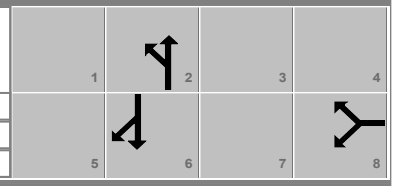


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h				380		582	80	801			1140	274

Signal Information			
Cycle, s	100.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	67.7	20.3	0.0	0.0	0.0	0.0	
Yellow	4.0	4.0	0.0	0.0	0.0	0.0	
Red	2.0	2.0	0.0	0.0	0.0	0.0	



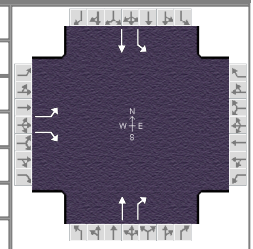
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase				8		2		6
Case Number				9.0		6.0		7.0
Phase Duration, s				26.3		73.7		73.7
Change Period, (*Y+R c*), s				6.0		6.0		6.0
Max Allow Headway (*MAH*), s				3.3		3.2		3.2
Queue Clearance Time (*g s*), s				22.3		69.7		65.4
Green Extension Time (*g e*), s				0.0		0.0		1.8
Phase Call Probability				1.00		1.00		1.00
Max Out Probability				1.00		1.00		1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement				3		18	5	2			6	16
Adjusted Flow Rate (*v*), veh/h				413		633	87	871			1239	298
Adjusted Saturation Flow Rate (*s*), veh/h/ln				1795		1414	456	1870			1870	1585
Queue Service Time (*g s*), s				20.3		20.3	4.3	28.1			63.4	7.5
Cycle Queue Clearance Time (*g c*), s				20.3		20.3	67.7	28.1			63.4	7.5
Green Ratio (*g/C*)				0.20		0.20	0.68	0.68			0.68	0.68
Capacity (*c*), veh/h				364		574	91	1266			1266	1073
Volume-to-Capacity Ratio (*X*)				1.133		1.102	0.950	0.688			0.979	0.278
Back of Queue (*Q*), ft/ln (95 th percentile)				660.3		478.6	184.5	387			952.5	99.4
Back of Queue (*Q*), veh/ln (95 th percentile)				26.2		19.0	7.4	15.2			37.5	3.9
Queue Storage Ratio (*RQ*) (95 th percentile)				4.72		0.00	1.09	0.00			0.00	0.83
Uniform Delay (*d 1*), s/veh				39.9		39.9	49.5	9.8			15.5	6.4
Incremental Delay (*d 2*), s/veh				88.4		68.6	77.0	1.3			20.2	0.1
Initial Queue Delay (*d 3*), s/veh				0.0		0.0	0.0	0.0			0.0	0.0
Control Delay (*d*), s/veh				128.3		108.4	126.5	11.1			35.6	6.5
Level of Service (LOS)				F		F	F	B			D	A
Approach Delay, s/veh / LOS	0.0			116.3		F	21.6		C	30.0		C
Intersection Delay, s/veh / LOS	53.2						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS								
Bicycle LOS Score / LOS								

HCS7 Signalized Intersection Results Summary

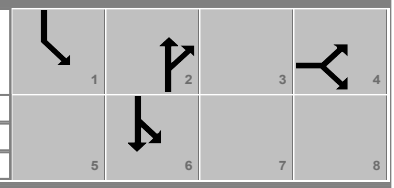
General Information				Intersection Information	
Agency	TMS Engineers, Inc.			Duration, h	0.250
Analyst	ABC	Analysis Date	Jun 2, 2020	Area Type	Other
Jurisdiction	Amherst, OH	Time Period	PM Peak	PHF	0.92
Urban Street	North Lake Street	Analysis Year	2042	Analysis Period	1> 7:00
Intersection	@ SR 2 EB Ramps	File Name	PM 42 Eastbound2 MajorBT.xus		
Project Description	RCUT				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	197		90					684	190	541	979	

Signal Information			
Cycle, s	100.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	29.0	38.9	14.1	0.0	0.0	0.0
Yellow	4.0	4.0	4.0	0.0	0.0	0.0
Red	2.0	2.0	2.0	0.0	0.0	0.0



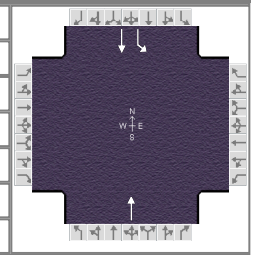
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4				2	1	6
Case Number		9.0				7.3	1.0	4.0
Phase Duration, s		20.1				44.9	35.0	79.9
Change Period, (*Y+R c*), s		6.0				6.0	6.0	6.0
Max Allow Headway (*MAH*), s		3.2				3.1	3.1	3.1
Queue Clearance Time (*g s*), s		13.7				40.9	30.6	35.8
Green Extension Time (*g e*), s		0.0				0.0	0.0	5.7
Phase Call Probability		1.00				1.00	1.00	1.00
Max Out Probability		1.00				1.00	1.00	0.01

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7		14					2	12	1	6	
Adjusted Flow Rate (*v*), veh/h	214		98					743	207	588	1064	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1781		1610					1900	1610	1795	1885	
Queue Service Time (*g s*), s	11.7		5.6					38.9	9.0	28.6	33.8	
Cycle Queue Clearance Time (*g c*), s	11.7		5.6					38.9	9.0	28.6	33.8	
Green Ratio (*g/C*)	0.14		0.14					0.39	0.39	0.70	0.74	
Capacity (*c*), veh/h	251		227					739	626	593	1393	
Volume-to-Capacity Ratio (*X*)	0.853		0.431					1.006	0.330	0.992	0.764	
Back of Queue (*Q*), ft/ln (95 th percentile)	275.4		98.6					801.2	148.8	637.5	414.4	
Back of Queue (*Q*), veh/ln (95 th percentile)	10.8		3.9					32.0	6.0	25.3	16.4	
Queue Storage Ratio (*RQ*) (95 th percentile)	1.45		0.00					0.00	0.00	3.75	0.00	
Uniform Delay (*d 1*), s/veh	41.9		39.3					30.6	21.4	29.9	7.8	
Incremental Delay (*d 2*), s/veh	22.5		0.5					34.6	0.1	34.8	2.3	
Initial Queue Delay (*d 3*), s/veh	0.0		0.0					0.0	0.0	0.0	0.0	
Control Delay (*d*), s/veh	64.5		39.8					65.1	21.5	64.7	10.1	
Level of Service (LOS)	E		D					F	C	E	B	
Approach Delay, s/veh / LOS	56.7	E		0.0			55.6	E		29.5	C	
Intersection Delay, s/veh / LOS	41.0	D										

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS								
Bicycle LOS Score / LOS								

HCS7 Signalized Intersection Results Summary

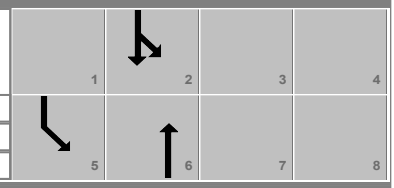
General Information				Intersection Information	
Agency	TMS Engineers, Inc.			Duration, h	0.250
Analyst	ABC	Analysis Date	Jun 2, 2020	Area Type	Other
Jurisdiction	Amherst, OH	Time Period	PM Peak	PHF	0.92
Urban Street	Oak Point Road	Analysis Year	2042	Analysis Period	1> 7:00
Intersection	@ South U-Turn	File Name	PM 42 South RCUT.xus		
Project Description	RCUT				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h								675		199	870	

Signal Information			
Cycle, s	45.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	7.0	26.0	0.0	0.0	0.0	0.0	
Yellow	4.0	4.0	0.0	0.0	0.0	0.0	
Red	2.0	2.0	0.0	0.0	0.0	0.0	



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase						6	5	2
Case Number						8.3	1.0	4.0
Phase Duration, s						32.0	13.0	45.0
Change Period, ($Y+R_c$), s						6.0	6.0	6.0
Max Allow Headway (*MAH*), s						3.0	3.1	3.0
Queue Clearance Time (g_s), s						14.4	3.4	8.2
Green Extension Time (g_e), s						0.0	0.1	4.2
Phase Call Probability						1.00	1.00	1.00
Max Out Probability						1.00	0.63	0.01

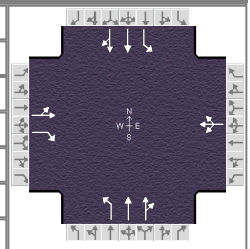
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement								6		5	2	
Adjusted Flow Rate (*v*), veh/h								734		216	946	
Adjusted Saturation Flow Rate (*s*), veh/h/ln								1856		1767	1856	
Queue Service Time (g_s), s								12.4		1.4	6.2	
Cycle Queue Clearance Time (g_c), s								12.4		1.4	6.2	
Green Ratio (*g/C*)								0.58		0.78	0.87	
Capacity (*c*), veh/h								1072		651	1608	
Volume-to-Capacity Ratio (*X*)								0.684		0.332	0.588	
Back of Queue (*Q*), ft/ln (95 th percentile)								142.8		13.9	7.9	
Back of Queue (*Q*), veh/ln (95 th percentile)								5.6		0.5	0.3	
Queue Storage Ratio (*RQ*) (95 th percentile)								0.00		0.00	0.00	
Uniform Delay (d_1), s/veh								6.6		4.6	0.8	
Incremental Delay (d_2), s/veh								1.5		0.1	0.4	
Initial Queue Delay (d_3), s/veh								0.0		0.0	0.0	
Control Delay (*d*), s/veh								8.1		4.7	1.2	
Level of Service (LOS)								A		A	A	
Approach Delay, s/veh / LOS	0.0			0.0			8.1		A	1.9		A
Intersection Delay, s/veh / LOS	4.3						A					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS								
Bicycle LOS Score / LOS								

Appendix T
Alternative #8 - 2042 Capacity Analysis Worksheets

HCS7 Signalized Intersection Results Summary

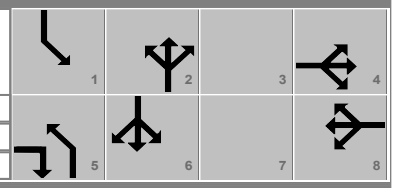
General Information				Intersection Information	
Agency	TMS Engineers, Inc.			Duration, h	0.250
Analyst	ABC	Analysis Date	Jun 2, 2020	Area Type	Other
Jurisdiction	Lorain, OH	Time Period	AM Peak	PHF	0.92
Urban Street	Oak Point Road	Analysis Year	2042	Analysis Period	1> 7:00
Intersection	@ Buck Horn/Park Square	File Name	AM 42 BuckHorn.xus		
Project Description	4-Lane Corridor				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	30	10	50	10	0	10	30	238	30	40	392	30

Signal Information			
Cycle, s	90.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	7.0	34.1	30.9	0.0	0.0	0.0						
Yellow	4.0	4.0	4.0	0.0	0.0	0.0						
Red	2.0	2.0	2.0	0.0	0.0	0.0						



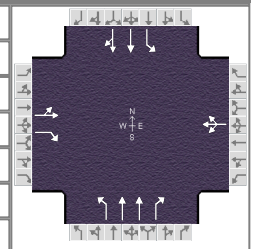
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2	1	6
Case Number		7.0		8.0	1.1	4.0	1.1	4.0
Phase Duration, s		36.9		36.9	13.0	40.1	13.0	40.1
Change Period, (*Y+R c*), s		6.0		6.0	6.0	6.0	6.0	6.0
Max Allow Headway (*MAH*), s		3.2		3.2	3.1	3.1	3.1	3.1
Queue Clearance Time (*g s*), s		3.9		2.7	2.9	6.8	3.2	9.9
Green Extension Time (*g e*), s		0.2		0.1	0.0	0.0	0.0	1.3
Phase Call Probability		1.00		1.00	1.00	1.00	1.00	1.00
Max Out Probability		0.00		0.29	0.16	1.00	0.31	0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h		43	54		22		33	147	144	43	231	227
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1529	1510		1527		1810	1885	1811	1810	1885	1838
Queue Service Time (*g s*), s		0.8	1.9		0.0		0.9	4.7	4.8	1.2	7.8	7.9
Cycle Queue Clearance Time (*g c*), s		1.6	1.9		0.7		0.9	4.7	4.8	1.2	7.8	7.9
Green Ratio (*g/C*)		0.34	0.42		0.34		0.46	0.38	0.38	0.46	0.38	0.38
Capacity (*c*), veh/h		595	636		584		476	714	686	555	714	696
Volume-to-Capacity Ratio (*X*)		0.073	0.085		0.037		0.069	0.206	0.210	0.078	0.324	0.326
Back of Queue (*Q*), ft/ln (95 th percentile)		26.9	30.8		13.3		15.7	90.4	88.1	21.1	149.3	145.7
Back of Queue (*Q*), veh/ln (95 th percentile)		1.1	1.2		0.5		0.6	3.6	3.5	0.8	5.9	5.8
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00	0.21		0.00		0.05	0.00	0.00	0.08	0.00	0.00
Uniform Delay (*d 1*), s/veh		19.9	15.6		19.7		14.1	18.8	18.9	13.9	19.8	19.8
Incremental Delay (*d 2*), s/veh		0.0	0.0		0.0		0.0	0.1	0.1	0.0	0.1	0.1
Initial Queue Delay (*d 3*), s/veh		0.0	0.0		0.0		0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh		19.9	15.7		19.7		14.1	18.9	18.9	13.9	19.9	19.9
Level of Service (LOS)		B	B		B		B	B	B	B	B	B
Approach Delay, s/veh / LOS	17.6	B		19.7	B		18.4	B		19.4	B	
Intersection Delay, s/veh / LOS	18.9						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS								
Bicycle LOS Score / LOS								

HCS7 Signalized Intersection Results Summary

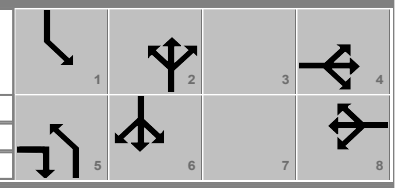
General Information				Intersection Information	
Agency	TMS Engineers, Inc.			Duration, h	0.250
Analyst	ABC	Analysis Date	Jun 2, 2020	Area Type	Other
Jurisdiction	Amherst, OH	Time Period	AM Peak	PHF	0.92
Urban Street	Oak Point Road	Analysis Year	2042	Analysis Period	1> 7:00
Intersection	@ Cooper Foster Park…	File Name	AM 42 CooperFoster.xus		
Project Description	4-Lane Corridor				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	12	36	163	129	55	46	165	240	404	68	338	46

Signal Information			
Cycle, s	90.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	7.0	36.2	28.8	0.0	0.0	0.0
Yellow	4.0	4.0	4.0	0.0	0.0	0.0
Red	2.0	2.0	2.0	0.0	0.0	0.0



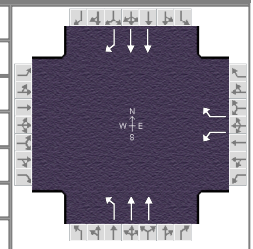
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2	1	6
Case Number		7.0		8.0	1.1	3.0	1.1	4.0
Phase Duration, s		34.8		34.8	13.0	42.2	13.0	42.2
Change Period, (*Y+R c*), s		6.0		6.0	6.0	6.0	6.0	6.0
Max Allow Headway (*MAH*), s		3.2		3.2	3.1	3.2	3.1	3.2
Queue Clearance Time (*g s*), s		9.1		13.9	7.3	22.6	4.0	9.0
Green Extension Time (*g e*), s		0.9		0.0	0.0	0.0	0.0	2.5
Phase Call Probability		1.00		1.00	1.00	1.00	1.00	1.00
Max Out Probability		0.00		1.00	1.00	1.00	1.00	0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h		52	177		250		179	261	439	74	212	206
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1623	1522		1511		1753	1781	1585	1810	1870	1792
Queue Service Time (*g s*), s		0.0	7.1		10.0		5.3	4.3	20.6	2.0	6.9	7.0
Cycle Queue Clearance Time (*g c*), s		1.9	7.1		11.9		5.3	4.3	20.6	2.0	6.9	7.0
Green Ratio (*g/C*)		0.32	0.40		0.32		0.48	0.40	0.40	0.48	0.40	0.40
Capacity (*c*), veh/h		569	606		546		505	1432	638	599	752	721
Volume-to-Capacity Ratio (*X*)		0.092	0.293		0.458		0.355	0.182	0.689	0.123	0.281	0.285
Back of Queue (*Q*), ft/ln (95 th percentile)		36.2	0.8		192.3		92.4	76.4	309.9	34.3	130.1	124.6
Back of Queue (*Q*), veh/ln (95 th percentile)		1.4	0.0		7.5		3.6	3.0	12.2	1.4	5.1	5.0
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00	0.01		0.00		0.77	0.00	2.58	0.10	0.00	0.00
Uniform Delay (*d 1*), s/veh		21.4	18.5		24.7		14.1	17.4	22.2	12.9	18.1	18.2
Incremental Delay (*d 2*), s/veh		0.0	0.1		0.2		0.2	0.0	2.6	0.0	0.1	0.1
Initial Queue Delay (*d 3*), s/veh		0.0	0.0		0.0		0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh		21.5	18.6		25.0		14.3	17.4	24.9	13.0	18.2	18.2
Level of Service (LOS)		C	B		C		B	B	C	B	B	B
Approach Delay, s/veh / LOS	19.2	B		25.0	C		20.5	C		17.4	B	
Intersection Delay, s/veh / LOS	20.1						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS								
Bicycle LOS Score / LOS								

HCS7 Signalized Intersection Results Summary

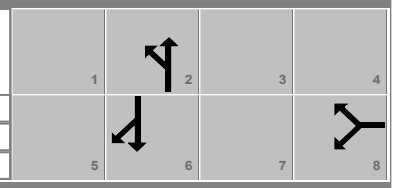
General Information				Intersection Information	
Agency	TMS Engineers, Inc.			Duration, h	0.250
Analyst	ABC	Analysis Date	Jun 2, 2020	Area Type	Other
Jurisdiction	Amherst, OH	Time Period	AM Peak	PHF	0.92
Urban Street	North Lake Street	Analysis Year	2042	Analysis Period	1> 7:00
Intersection	@ SR 2 WB Ramps	File Name	AM 42 Westbound2.xus		
Project Description	Existing Conditions				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h				80		388	50	421			479	151

Signal Information			
Cycle, s	90.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	39.1	38.9	0.0	0.0	0.0	0.0	
Yellow	4.0	4.0	0.0	0.0	0.0	0.0	
Red	2.0	2.0	0.0	0.0	0.0	0.0	



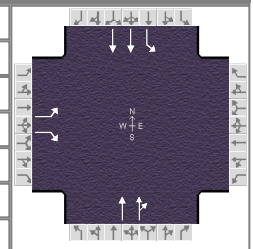
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase				8		2		6
Case Number				9.0		6.0		7.0
Phase Duration, s				44.9		45.1		45.1
Change Period, ($Y+R_c$), s				6.0		6.0		6.0
Max Allow Headway (*MAH*), s				3.3		3.1		3.1
Queue Clearance Time (g_s), s				20.7		14.7		10.8
Green Extension Time (g_e), s				1.1		0.0		3.0
Phase Call Probability				1.00		1.00		1.00
Max Out Probability				0.00		1.00		0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement				3		18	5	2			6	16
Adjusted Flow Rate (*v*), veh/h				87		422	54	458			521	164
Adjusted Saturation Flow Rate (*s*), veh/h/ln				1626		1572	895	1781			1766	1598
Queue Service Time (g_s), s				2.9		18.7	3.9	7.5			8.8	5.8
Cycle Queue Clearance Time (g_c), s				2.9		18.7	12.7	7.5			8.8	5.8
Green Ratio (*g/C*)				0.43		0.43	0.43	0.43			0.43	0.43
Capacity (*c*), veh/h				703		680	381	1547			1535	694
Volume-to-Capacity Ratio (*X*)				0.124		0.621	0.143	0.296			0.339	0.236
Back of Queue (*Q*), ft/ln (95 th percentile)				50.9		278.2	35.4	132.9			155.4	92
Back of Queue (*Q*), veh/ln (95 th percentile)				1.8		10.9	1.4	5.2			6.1	3.6
Queue Storage Ratio (*RQ*) (95 th percentile)				0.36		0.00	0.21	0.00			0.00	0.77
Uniform Delay (d_1), s/veh				15.3		19.8	21.1	16.5			16.9	16.0
Incremental Delay (d_2), s/veh				0.0		1.3	0.1	0.0			0.0	0.1
Initial Queue Delay (d_3), s/veh				0.0		0.0	0.0	0.0			0.0	0.0
Control Delay (*d*), s/veh				15.4		21.1	21.2	16.6			16.9	16.1
Level of Service (LOS)				B		C	C	B			B	B
Approach Delay, s/veh / LOS	0.0			20.1	C		17.0	B		16.7	B	
Intersection Delay, s/veh / LOS	17.8						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS								
Bicycle LOS Score / LOS								

HCS7 Signalized Intersection Results Summary

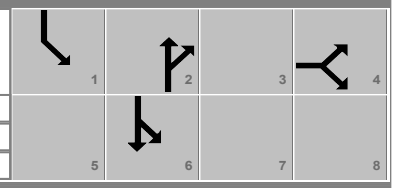
General Information				Intersection Information	
Agency	TMS Engineers, Inc.			Duration, h	0.250
Analyst	ABC	Analysis Date	Jun 2, 2020	Area Type	Other
Jurisdiction	Amherst, OH	Time Period	AM Peak	PHF	0.92
Urban Street	North Lake Street	Analysis Year	2042	Analysis Period	1> 7:00
Intersection	@ SR 2 EB Ramps	File Name	AM 42 Eastbound2.xus		
Project Description	4-Lane Corridor				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	192		40					279	330	364	195	

Signal Information			
Cycle, s	90.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	14.4	31.7	25.9	0.0	0.0	0.0
Yellow	4.0	4.0	4.0	0.0	0.0	0.0
Red	2.0	2.0	2.0	0.0	0.0	0.0



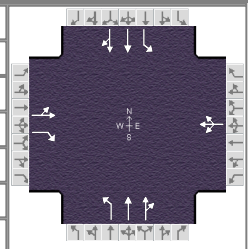
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4				2	1	6
Case Number		9.0				8.3	1.0	4.0
Phase Duration, s		31.9				37.7	20.4	58.1
Change Period, (*Y+R c*), s		6.0				6.0	6.0	6.0
Max Allow Headway (*MAH*), s		3.2				3.2	3.1	3.2
Queue Clearance Time (*g s*), s		10.6				18.9	14.2	4.5
Green Extension Time (*g e*), s		0.4				0.0	0.0	1.9
Phase Call Probability		1.00				1.00	1.00	1.00
Max Out Probability		0.00				1.00	1.00	0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7		14					2	12	1	6	
Adjusted Flow Rate (*v*), veh/h	209		43					303	359	396	212	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1767		1560					1885	1598	1753	1724	
Queue Service Time (*g s*), s	8.6		1.8					15.9	16.9	12.2	2.5	
Cycle Queue Clearance Time (*g c*), s	8.6		1.8					15.9	16.9	12.2	2.5	
Green Ratio (*g/C*)	0.29		0.29					0.35	0.35	0.53	0.58	
Capacity (*c*), veh/h	509		449					664	563	486	1996	
Volume-to-Capacity Ratio (*X*)	0.410		0.097					0.457	0.637	0.815	0.106	
Back of Queue (*Q*), ft/ln (95 th percentile)	161.6		30.8					210.4	262	246	39.5	
Back of Queue (*Q*), veh/ln (95 th percentile)	6.3		1.2					8.3	10.5	9.5	1.5	
Queue Storage Ratio (*RQ*) (95 th percentile)	0.85		0.00					0.00	0.00	1.45	0.00	
Uniform Delay (*d 1*), s/veh	25.9		23.5					22.5	24.4	16.6	8.5	
Incremental Delay (*d 2*), s/veh	0.2		0.0					0.2	1.9	9.6	0.0	
Initial Queue Delay (*d 3*), s/veh	0.0		0.0					0.0	0.0	0.0	0.0	
Control Delay (*d*), s/veh	26.1		23.5					22.7	26.2	26.2	8.5	
Level of Service (LOS)	C		C					C	C	C	A	
Approach Delay, s/veh / LOS	25.6	C		0.0			24.6	C		20.0	C	
Intersection Delay, s/veh / LOS	22.9						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS								
Bicycle LOS Score / LOS								

HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	TMS Engineers, Inc.			Duration, h	0.250
Analyst	ABC	Analysis Date	Jun 2, 2020	Area Type	Other
Jurisdiction	Lorain, OH	Time Period	PM Peak	PHF	0.92
Urban Street	Oak Point Road	Analysis Year	2042	Analysis Period	1> 7:00
Intersection	@ Buck Horn/Park Square	File Name	PM 42 BuckHorn.xus		
Project Description	4-Lane Corridor				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	130	10	60	80	10	30	140	562	10	10	503	120

Signal Information			
Cycle, s	100.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

							1	2	3	4
Green	7.0	39.0	36.0	0.0	0.0	0.0	5	6	7	8
Yellow	4.0	4.0	4.0	0.0	0.0	0.0				
Red	2.0	2.0	2.0	0.0	0.0	0.0				

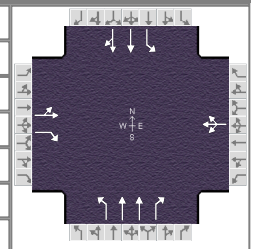
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2	1	6
Case Number		7.0		8.0	1.1	4.0	1.1	4.0
Phase Duration, s		42.0		42.0	13.0	45.0	13.0	45.0
Change Period, ($Y+R_c$), s		6.0		6.0	6.0	6.0	6.0	6.0
Max Allow Headway (*MAH*), s		3.2		3.2	3.1	3.1	3.1	3.1
Queue Clearance Time (g_s), s		9.7		7.8	7.1	14.1	2.3	16.0
Green Extension Time (g_e), s		0.6		0.0	0.0	0.0	0.0	2.5
Phase Call Probability		1.00		1.00	1.00	1.00	1.00	1.00
Max Out Probability		0.00		1.00	1.00	1.00	0.02	0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h		152	65		130		152	312	310	11	349	328
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1403	1610		1496		1767	1885	1873	1810	1885	1759
Queue Service Time (g_s), s		2.0	2.4		0.0		5.1	12.1	12.1	0.3	13.9	14.0
Cycle Queue Clearance Time (g_c), s		7.7	2.4		5.8		5.1	12.1	12.1	0.3	13.9	14.0
Green Ratio (*g/C*)		0.36	0.43		0.36		0.46	0.39	0.39	0.46	0.39	0.39
Capacity (*c*), veh/h		574	692		598		370	735	731	402	735	686
Volume-to-Capacity Ratio (*X*)		0.265	0.094		0.218		0.412	0.424	0.424	0.027	0.475	0.478
Back of Queue (*Q*), ft/ln (95 th percentile)		114	39.1		95.9		92.3	225.2	222.5	5.9	251.2	237.4
Back of Queue (*Q*), veh/ln (95 th percentile)		4.5	1.6		3.8		3.6	8.9	8.9	0.2	10.0	9.5
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00	0.26		0.00		0.28	0.00	0.00	0.02	0.00	0.00
Uniform Delay (d_1), s/veh		22.9	16.9		22.3		17.6	22.3	22.3	15.7	22.8	22.9
Incremental Delay (d_2), s/veh		0.1	0.0		0.1		0.3	0.1	0.1	0.0	0.2	0.2
Initial Queue Delay (d_3), s/veh		0.0	0.0		0.0		0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh		23.0	17.0		22.3		17.8	22.4	22.4	15.7	23.0	23.1
Level of Service (LOS)		C	B		C		B	C	C	B	C	C
Approach Delay, s/veh / LOS	21.2	C		22.3	C		21.5	C		22.9	C	
Intersection Delay, s/veh / LOS	22.1						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS								
Bicycle LOS Score / LOS								

HCS7 Signalized Intersection Results Summary

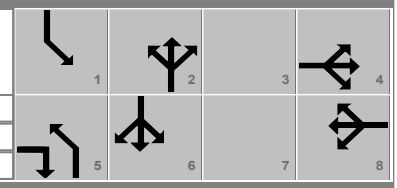
General Information				Intersection Information	
Agency	TMS Engineers, Inc.			Duration, h	0.250
Analyst	ABC	Analysis Date	Jun 2, 2020	Area Type	Other
Jurisdiction	Amherst, OH	Time Period	PM Peak	PHF	0.92
Urban Street	Oak Point Road	Analysis Year	2042	Analysis Period	1> 7:00
Intersection	@ Cooper Foster Park…	File Name	PM 42 CooperFoster.xus		
Project Description	4-Lane Corridor				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	78	121	479	242	128	84	454	550	180	84	494	65

Signal Information			
Cycle, s	100.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	7.0	10.3	21.5	37.2	0.0	0.0
Yellow	4.0	4.0	4.0	4.0	0.0	0.0
Red	2.0	2.0	2.0	2.0	0.0	0.0



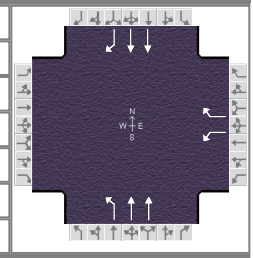
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2	1	6
Case Number		7.0		8.0	1.1	3.0	1.1	4.0
Phase Duration, s		43.2		43.2	29.3	43.8	13.0	27.5
Change Period, ($Y+R_c$), s		6.0		6.0	6.0	6.0	6.0	6.0
Max Allow Headway (*MAH*), s		3.3		3.3	3.1	3.1	3.1	3.1
Queue Clearance Time (g_s), s		21.3		37.4	22.6	14.5	5.9	17.5
Green Extension Time (g_e), s		2.9		0.0	0.1	0.0	0.0	1.5
Phase Call Probability		1.00		1.00	1.00	1.00	1.00	1.00
Max Out Probability		0.05		1.00	1.00	1.00	1.00	0.80

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h		216	521		493		493	598	196	91	309	298
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1449	1585		1371		1767	1781	1560	1767	1885	1808
Queue Service Time (g_s), s		0.0	19.3		25.2		20.6	12.5	8.9	3.9	15.4	15.5
Cycle Queue Clearance Time (g_c), s		10.2	19.3		35.4		20.6	12.5	8.9	3.9	15.4	15.5
Green Ratio (*g/C*)		0.37	0.61		0.37		0.47	0.38	0.38	0.28	0.22	0.22
Capacity (*c*), veh/h		589	959		565		532	1346	590	371	405	389
Volume-to-Capacity Ratio (*X*)		0.367	0.543		0.873		0.928	0.444	0.332	0.246	0.763	0.767
Back of Queue (*Q*), ft/ln (95 th percentile)		164	260.6		493.5		429.5	224.1	148.3	74.7	310.8	301.3
Back of Queue (*Q*), veh/ln (95 th percentile)		6.5	10.3		19.1		16.8	8.8	5.7	2.9	12.3	12.1
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00	3.48		0.00		3.58	0.00	1.24	0.22	0.00	0.00
Uniform Delay (d_1), s/veh		22.7	11.6		31.3		22.1	23.2	22.1	27.0	36.9	36.9
Incremental Delay (d_2), s/veh		0.1	0.4		13.6		22.3	0.1	0.1	0.1	7.5	8.1
Initial Queue Delay (d_3), s/veh		0.0	0.0		0.0		0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh		22.8	12.0		44.9		44.4	23.3	22.2	27.1	44.4	45.0
Level of Service (LOS)		C	B		D		D	C	C	C	D	D
Approach Delay, s/veh / LOS	15.2	B		44.9	D		31.2	C		42.4	D	
Intersection Delay, s/veh / LOS	32.1						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS								
Bicycle LOS Score / LOS								

HCS7 Signalized Intersection Results Summary

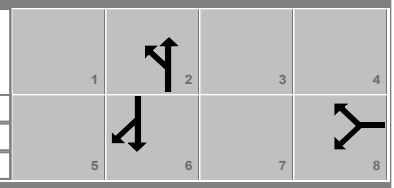
General Information				Intersection Information	
Agency	TMS Engineers, Inc.			Duration, h	0.250
Analyst	ABC	Analysis Date	Jun 2, 2020	Area Type	Other
Jurisdiction	Amherst, OH	Time Period	PM Peak	PHF	0.92
Urban Street	North Lake Street	Analysis Year	2042	Analysis Period	1> 7:00
Intersection	@ SR 2 WB Ramps	File Name	PM 42 Westbound2.xus		
Project Description	4-Lane Corridor				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h				380		582	80	602			941	274

Signal Information			
Cycle, s	100.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	43.4	44.6	0.0	0.0	0.0	0.0	
Yellow	4.0	4.0	0.0	0.0	0.0	0.0	
Red	2.0	2.0	0.0	0.0	0.0	0.0	



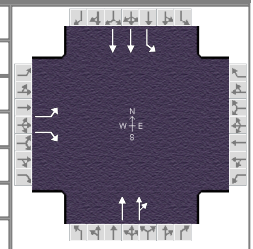
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase				8		2		6
Case Number				9.0		6.0		7.0
Phase Duration, s				50.6		49.4		49.4
Change Period, ($Y+R_c$), s				6.0		6.0		6.0
Max Allow Headway (*MAH*), s				3.3		3.2		3.2
Queue Clearance Time (g_s), s				38.3		39.4		24.8
Green Extension Time (g_e), s				1.7		0.0		6.1
Phase Call Probability				1.00		1.00		1.00
Max Out Probability				0.43		1.00		0.13

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement				3		18	5	2			6	16
Adjusted Flow Rate (*v*), veh/h				413		633	87	654			1023	298
Adjusted Saturation Flow Rate (*s*), veh/h/ln				1795		1598	560	1781			1781	1585
Queue Service Time (g_s), s				16.6		36.3	14.6	12.7			22.8	13.1
Cycle Queue Clearance Time (g_c), s				16.6		36.3	37.4	12.7			22.8	13.1
Green Ratio (*g/C*)				0.45		0.45	0.43	0.43			0.43	0.43
Capacity (*c*), veh/h				801		713	187	1545			1546	688
Volume-to-Capacity Ratio (*X*)				0.516		0.888	0.464	0.423			0.662	0.433
Back of Queue (*Q*), ft/ln (95 th percentile)				274		548.9	89.4	222.8			361.6	208.4
Back of Queue (*Q*), veh/ln (95 th percentile)				10.9		21.8	3.6	8.8			14.2	8.2
Queue Storage Ratio (*RQ*) (95 th percentile)				1.96		0.00	0.53	0.00			0.00	1.74
Uniform Delay (d_1), s/veh				19.9		25.4	37.3	19.6			22.5	19.7
Incremental Delay (d_2), s/veh				0.3		12.7	0.7	0.1			0.9	0.2
Initial Queue Delay (d_3), s/veh				0.0		0.0	0.0	0.0			0.0	0.0
Control Delay (*d*), s/veh				20.2		38.1	38.0	19.7			23.3	19.9
Level of Service (LOS)				C		D	D	B			C	B
Approach Delay, s/veh / LOS	0.0			31.0		C	21.8		C	22.6		C
Intersection Delay, s/veh / LOS	25.2						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS								
Bicycle LOS Score / LOS								

HCS7 Signalized Intersection Results Summary

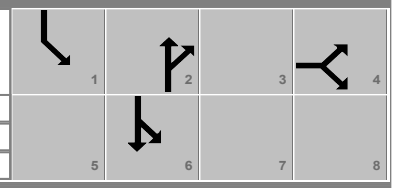
General Information				Intersection Information	
Agency	TMS Engineers, Inc.			Duration, h	0.250
Analyst	ABC	Analysis Date	Jun 2, 2020	Area Type	Other
Jurisdiction	Amherst, OH	Time Period	PM Peak	PHF	0.92
Urban Street	North Lake Street	Analysis Year	2042	Analysis Period	1> 7:00
Intersection	@ SR 2 EB Ramps	File Name	PM 42 Eastbound2.xus		
Project Description	4-Lane Corridor				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	197		90					485	190	541	780	

Signal Information			
Cycle, s	100.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	30.6	29.2	22.2	0.0	0.0	0.0
Yellow	4.0	4.0	4.0	0.0	0.0	0.0
Red	2.0	2.0	2.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4				2	1	6
Case Number		9.0				8.3	1.0	4.0
Phase Duration, s		28.2				35.2	36.6	71.8
Change Period, ($Y+R_c$), s		6.0				6.0	6.0	6.0
Max Allow Headway (*MAH*), s		3.2				3.1	3.1	3.1
Queue Clearance Time (g_s), s		12.6				25.1	26.1	12.6
Green Extension Time (g_e), s		0.4				0.0	0.7	3.9
Phase Call Probability		1.00				1.00	1.00	1.00
Max Out Probability		0.01				1.00	0.50	0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7		14					2	12	1	6	
Adjusted Flow Rate (*v*), veh/h	214		98					384	349	588	848	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1781		1610					1900	1717	1795	1795	
Queue Service Time (g_s), s	10.6		5.0					23.1	18.1	24.1	10.6	
Cycle Queue Clearance Time (g_c), s	10.6		5.0					23.1	18.1	24.1	10.6	
Green Ratio (*g/C*)	0.22		0.22					0.29	0.29	0.62	0.66	
Capacity (*c*), veh/h	395		357					555	501	666	2362	
Volume-to-Capacity Ratio (*X*)	0.541		0.274					0.693	0.697	0.883	0.359	
Back of Queue (*Q*), ft/ln (95 th percentile)	206		87.4					330.9	308.4	346.7	161.3	
Back of Queue (*Q*), veh/ln (95 th percentile)	8.1		3.5					13.2	12.3	13.8	6.4	
Queue Storage Ratio (*RQ*) (95 th percentile)	1.08		0.00					0.00	0.00	2.04	0.00	
Uniform Delay (d_1), s/veh	34.4		32.2					31.4	31.5	22.2	7.7	
Incremental Delay (d_2), s/veh	0.8		0.2					3.1	3.6	12.8	0.0	
Initial Queue Delay (d_3), s/veh	0.0		0.0					0.0	0.0	0.0	0.0	
Control Delay (*d*), s/veh	35.2		32.4					34.5	35.0	35.1	7.7	
Level of Service (LOS)	D		C					C	D	D	A	
Approach Delay, s/veh / LOS	34.3	C		0.0			34.8	C		18.9	B	
Intersection Delay, s/veh / LOS	25.5						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS								
Bicycle LOS Score / LOS								