TMS Engineers, Inc

Traffic Impact Study

DHL Facility
Village of Ashville, Ohio

August 22, 2022
October 24, 2022
REVISED
December 5, 2022

Prepared for:

Poggemeyer Design Group, Inc.
101 Clinton Street
Defiance, Ohio 43512

TRAFFIC IMPACT STUDY

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Prepared For:

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APPENDIX

Executive Summary

This Traffic Impact Study (TIS) has been prepared at the request of Poggemeyer Design Group for a proposed DHL facility. The proposed development is located in the Village of Ashville, Pickaway County, Ohio.

The development is expected to consist of a single 545,200 square foot building. The proposed building is located along the south side of State Route 752 to the east of US Route 23 and to the west of Business Place North. The building and site is expected to accommodate land uses related to commerce and fulfillment operations.

The year 2024 will be analyzed for the opening year conditions of the development based on the expected time line.

The development is proposed with two access locations. The project proposes an intersection along State Route 752 that would provide full access to the site. A second access location is proposed along Business Place North.

A **Traffic Volume Forecast** was previously prepared for use in this Traffic Impact Study. The development and submission of the traffic volume forecasts for the proposed project are intended to follow the TIS Review Process detailed in *Section 9.32* and the TIS Flow Chart shown *Figure 9.1* of the ODOT **State Highway Access Management Manual** (7). A copy of the July 18, 2022 Traffic Volume Forecast report can be seen in **Appendix B**.

The project has significantly changed to include only one proposed building since the completion of the **July 18, 2022 Traffic Volume Forecast**. The traffic volume forecast was updated within this TIS per the procedures, guidelines, and assumptions that were made in the July 18, 2022 forecast document.

The weekday peak hours of traffic for the study area roadways were based on the traffic data collected for this report. The weekday AM peak hour of traffic was determined to be 7:00 AM to 8:00 AM. The weekday PM peak hour of traffic was found to be 3:45 PM to 4:45 PM. These periods were analyzed since they reflect the period of the highest volume of traffic flow for the study area roadways.

The proposed development is expected to generate the following hourly traffic volumes during the peak period as shown in the table below:

OPENING YEAR	SIZE	TRIP ENDS							
		Weekday Peak Hour Between 7-9 AM				Weekday Peak Hour Between 4-6 PM			
		ENTER		EXIT		ENTER		EXIT	
		Vehicles	*Trucks*	Vehicles	*Trucks*	Vehicles	*Trucks*	Vehicles	*Trucks*
2024	545,200 SF	103	*15*	102	*15*	139	*10*	66	*10*
TOTAL NEW TRIPS		**118**		**117**		**149**		**76**	
		235				**225**			

The year 2044 was forecasted for the twenty year design hour conditions in the July 18, 2022 forecast document. The year 2044 will continued to be used for the design year in order to provide a conservative analysis of the expected future conditions in the study area and to provide consistency with the previously prepared forecast document.

Recommended Improvements to Mitigate the Traffic Associated with the Development

The following improvements are recommended to improve the levels-of-service under the 2024 No-Build conditions at the study area intersections.

SR 752 and SR 316/Ashville Pike (Village of Ashville)

- Extend the length of the southbound left turn lane (600').

Recommended Improvements to Mitigate the Traffic Associated with the Development

The following improvements are recommended to improve the levels-of-service under the 2024 Build conditions at the study area intersections.

US Route 23 and SR 752 (ODOT)

- Construct a northbound right turn lane (800').

Development Access Recommendations

The following lane use and traffic control is recommended at the intersection where access to the site is proposed.

State Route 752 & Proposed Site Access Driveway (Village of Ashville)

- Construct an exclusive eastbound right turn lane (345') for the opening year of the development (2024 Build).
- Construct an exclusive westbound left turn lane (345') in the opening year of the development (2024 Build).
- Construct the proposed south approach with one egress lanes and one ingress lane (2024 Build).
- Install stop sign control on the northbound approach (2024 Build).

Conclusion

Based upon the results of the analysis in this study and the corresponding recommendations, it can be seen that the development traffic can be accommodated without adversely impacting the area roadway network.

Chapter 1
Introduction

1.1 Purpose of Report

This Traffic Impact Study (TIS) has been prepared at the request of Poggemeyer Design Group for a proposed DHL facility. The proposed development is located in the Village of Ashville, Pickaway County, Ohio. **Figure 1.1, Appendix A** details the development location.

The development is expected to consist of a single 545,200 square foot building. The building and site is expected to accommodate land uses related to commerce and fulfillment operations.

The year 2024 will be analyzed for the opening year conditions of the development based on the expected time line. The design year for the proposed project will be based on the opening year and the expected volume of new site generated traffic under the full build condition of the building.

The proposed building is located along the south side of State Route 752 to the east of US Route 23 and to the west of Business Place North.

The development is proposed with two access locations. The project proposes an intersection along State Route 752 that would provide full access to the site. A second access location is proposed along Business Place North. **Figure 1.2, Appendix A** shows the proposed development site plan.

A Traffic Volume Forecast was previously prepared for use in this Traffic Impact Study. The development and submission of the traffic volume forecasts for the proposed project are intended to follow the TIS Review Process detailed in *Section 9.32* and the TIS Flow Chart shown *Figure 9.1* of the ODOT **State Highway Access Management Manual** (7). A copy of the **July 18, 2022 Traffic Volume Forecast** report can be seen in **Appendix B**.

It should be noted that since the completion of the **July 18, 2022 Traffic Volume Forecast** the project has significantly changed to include only one proposed building. The traffic volume forecast will be updated within this TIS per the procedures, guidelines, and assumptions that were made in the July 18, 2022 forecast document.

1.2 Study Objectives

This study is structured for the following purposes;

- to adequately assess the traffic impacts associated with the proposed 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, Volume 1** **(4)** **& Volume 2** **(5)**.

The traffic impacts will be determined by comparing the existing intersection levels-of-service, delay or density, volume to capacity ratio and queue storage ratio before the construction of the proposed development to the anticipated measures after the development is completed. Traffic analyses for the study area and access intersections will be calculated using the computerized version of the Transportation Research Board's **Highway Capacity Manual 7TH Edition** **(1)**, **(HCS2022, Release 8.1)** and Synchro. Data inputs for the HCS software program will be based on the guidance found in the Ohio Department of Transportation's **Analysis & Traffic Simulation Manual (OATS)** **(6)**.

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** **(2)** 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** **(3)**. The left and right turn lane warrants provided in *Section 401-6* of the **Location & Design Manual, Volume 1** **(3)** will be used in addition to the capacity analyses to determine the need for deceleration and exclusive turn lanes at unsignalized site access locations.

1.3 Intersection Capacity & Levels-of-Service

Intersection capacity analyses will be performed at the study area and development access intersections using the procedures outlined in the computerized version of the Transportation Research Board's **Highway Capacity Manual** [(1)].

The **HCM** [(1)] is the most widely used document in the transportation industry. It contains a set of methodologies and application procedures for evaluating the capacity and quality of service of various transportation facilities. The **HCM** [(1)] is built from more than 60 years or research work and represents a body of expert transportation consensus.

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 Levels-of-Service

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

Intersection capacity analyses will be performed in order to estimate the maximum amount of traffic that can be accommodated by the intersection while maintaining recommended operational qualities. No-Build and Build peak hour traffic volumes will be analyzed to determine the level-of-service (LOS) at the study area intersections.

The selection of the design level-of-service is most frequently chosen from *Section 5.9* of the Ohio Department of Transportation's **OATS Manual** [(6)]. In most cases, a level-of-service D is considered the maximum delay threshold after which improvements should be investigated to determine if the delay can be reduced to a level of D or better. The following table from *Section 5.9* details the operation goals for intersection analyses (All-Way Stop Control, Two-Way Stop Control, Signalized, & Roundabout).

Table 1.2 Intersection Operational Goals

RESULT	INSIDE AN MPO	OUTSIDE AN MPO
Intersection LOS	D or BETTER	C or BETTER
Approach LOS	E or BETTER	
Control LOS	E or BETTER	
v/c	All movements < 1.0 (<= 0.93 preferred)	
QSR (Queue Storage Ratio)	All movements <1.0 from HCS analysis, TransModeler may be needed to determine if queuing impacts upstream intersections.	

MPO = Metropolitan Planning Organization
v/c = Volume to Capacity Ratio
QSR = Queue Storage Ratio

The capacity analyses will determine if there are any locations, approaches or movements in which the delay, v/c, and QSR exceeds the operational goals shown in Table 1.2.

The capacity analyses for signalized intersections will be based on the process detailed in *Section 6.2.2.1* of the ODOT **OATS Manual** [(6)]. All stop controlled intersections will be analyzed using the computerized version of the Transportation Research Board's **Highway Capacity Manual 7TH Edition** [(1)]**, (HCS2022, Release 8.1).** The signalized intersections will be analyzed as coordinated signal system.

It should be noted that any values for queue length, shown in the HCS analysis summary sheets that are displayed in red, indicate that the movement is expected to experience a "spillback" condition where the queue may exceed the existing length of the turn lane and extend into the adjacent through lane. These instances, if they occur, will be investigated for mitigation.

1.4 Intersection Turn Lanes

Turn Lane Warrants

The ODOT **Location and Design Manual, Volume 1** [(3)] and the **State Highway Access Management Manual** [(7)] describes the need for auxiliary turn lanes at unsignalized intersections. The Auxiliary Lane Graphs found in *Section 401-6* of the **Location and Design Manual, Volume 1** [(4)] are used for this determination. This applies to the free-flow approaches at unsignalized intersections. *Section 401.6.3* of the ODOT **Location and Design Manual** [(4)] 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 the proposed access location along State Route 752.

Turn Lane Length

Proposed turn lanes and existing turn lanes will be analyzed to determine the necessary turn lane storage length in accordance with the procedure found in the Ohio Department of Transportation's **Location and Design Manual, Volume 1** [(3)], *Section 401*. The ODOT criteria and procedures are furnished in **Appendix B**.

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.

Design Speed

The procedure for determining the necessary turn lane storage length with the procedure found in the Ohio Department of Transportation's **Location and Design Manual, Volume 1** [3], *Section 401* is in part based on the design speed of the roadway.

The AASHTO publication, **A Policy on Geometric Design of Highway Streets (Green Book)** [11]**,** defines design speed as a selected speed used to determine the various geometric design features of the roadway. The assumed design speed should be a logical one with respect to the topography, anticipated operating speed, the adjacent land use and the functional classification of highway.

The ODOT **Location and Design Manual, Volume 1** [3] provides guidance for determining the design speed of a roadway. *Section 104.2* of the ODOT **Location and Design Manual** [3] states that:

"The design speed should match the legal speed for facilities with a legal speed of 35 mph or less. For facilities with a legal speed of 40 or 45 mph the design speed should either match the legal speed, or be 5 mph greater than the legal speed, depending on the context of the area. For facilities with a legal speed 50 mph or greater, the design speed should be 5 mph greater than the legal speed."

1.5 References

The following list of references will be utilized for this report and the analysis contained within it:

1. *Highway Capacity Manual, 7th Edition*, Transportation Research Board of the National Academies, Washington, D.C.

2. *Ohio Manual of Uniform Traffic Control Devices for Streets and Highways,* 2012 Edition. Ohio Department of Transportation, Office of Traffic Engineering, Columbus, Ohio.

3. *Location and Design Manual,* Volume 1, Roadway Design. Ohio Department of Transportation, Office of Roadway Engineering, Columbus, Ohio.

4. *Ohio Traffic Forecasting Manual,* Volume 1, Traffic Forecasting Background. Ohio Department of Transportation, Office of Statewide Planning & Research, Columbus, Ohio.

5. *Ohio Traffic Forecasting Manual,* Volume 2, Traffic Forecasting Methodologies. Ohio Department of Transportation, Office of Statewide Planning & Research, Columbus, Ohio.

6. *ODOT Analysis and Traffic Simulation Manual (OATS),* Ohio Department of Transportation, Office of Roadway Engineering, Columbus, Ohio.

7. *State Highway Access Management Manual,* Ohio Department of Transportation, Office of Roadway Engineering, Columbus, Ohio.

8. *Trip Generation Manual,* 11th Edition, September 2021, Institute of Transportation Engineers, (ITE), Washington, D.C.

9. *Trip Generation Handbook,* 3rd Edition, September 2017, Institute of Transportation Engineers, (ITE), Washington, D.C.

10. *Traffic Engineering Manual,* October 23, 2002 Edition (Revised January 15, 2021), Ohio Department of Transportation, Office of Roadway Engineering, Columbus, Ohio.

11. *A Policy on Geometric Design of Highways and Streets (Green Book)*, 7TH Edition, September 2018, American Association of State Highway and Transportation Officials, Washington, D.C.

12. *Access Management Manual*, 2ND Edition, 2014. Transportation Research Board of the National Academies, Washington, D.C.

Chapter 2
Area Conditions

2.1 Transportation Network Study Area

The study area for the proposed development includes the previously discussed development access locations as shown in **Figure 1.2, Appendix A** and the following intersections:

1. **US Route 23 & State Route 752/*Rudi Lane***
2. **State Route 752 & Business Place North**
3. **State Route 752 & Ashville Pike**

Rudi Lane is a proposed roadway that will be constructed as the west approach at the intersection of US Route 23 and State Route 752. The proposed roadway is part of the project to construct a Sheetz development at the intersection.

The Ohio Department of Transportation maintains the traffic signal control facilities at the intersection of State Route 752 and US Route 23. The Village of Ashville maintains the traffic signal control facility at the intersection of State Route 752 and State Route 316/Ashville Pike.

A location map detailing the traffic count locations can be seen in **Figure 2.1, Appendix A.**

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

Table 2.1 Roadway Characteristics

ROADWAY	# LANES	ORIENTATION	SPEED LIMIT (MPH)	
			POSTED	DESIGN
US Route 23 @ SR 752	4	North-South	50	55
US Route 23 @ SR 316 (North)	4	North-South	35	35
US Route 23 @ SR 316 (South)	4	North-South	50	35
Ashville Pike	2	North-South	35	35
State Route 752 @ US 23	2	East-West	55	60
State Route 752 @ Proposed Access	***2***	***East-West***	***55***	***60***
State Route 752 @ Ashville Pike	2	East-West	35	35
Business Place North	2	North-South	25	25
Rudi Lane	2	East-West	25	25

An aerial view of the of the study area can be seen in **Figure 2.2 Appendix A**.

Figure 2.3, Appendix A shows the lane use and traffic control conditions based upon the existing conditions in the study area. These will be considered the existing base conditions for this report.

2.2 Functional Classification

The Ohio Department of Transportation 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. The 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 in the State of Ohio.

Roadways 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 ODOT functional classification of the roadways in the study area can currently be found using the ODOT Transportation Information Mapping System (TIMS). TIMS is ODOT's web-mapping portal where information about Ohio's transportation system can be found. TIMS can currently be found at the following web address:

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

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
US Route 23	Urban	3	Principal Arterial
State Route 752	Urban	5	Major Collector
Ashville Pike	Urban	7	Local Roadway
Business Place North	Urban	7	Local Roadway
Rudi Lane	Urban	7	Local Roadway

Figure 2.4, Appendix A illustrates the section of the functional classification map for the study area.

2.3 Traffic

The traffic data and resulting traffic forecast for the expected No-Build and Build conditions were previously detailed in the "Traffic Volume Forecast - DHL Facility" that was dated July 18, 2022. A copy of the traffic volume forecast report can be found in **Appendix B**. The development project has since changed to include only one building along the south side of the State Route 752. The TIS will update the traffic forecast using the procedures and guidelines that were detailed in the July 18, 2022 forecast.

Weekday Peak Hours

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

1. **US Route 23 & State Route 752 (Thursday, 2/17/2022)**
2. **State Route 752 & Business Place North (Tuesday, 8/9/2022)**
3. **State Route 752 & Ashville Pike (Wednesday, 2/16/2022)**

The weekday traffic counts were conducted in fifteen (15) minute intervals between the hours of 7AM - 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.

Copies of the intersection turn movement counts are included in **Appendix B** for the intersections of State Route 752 at US Route 23 and Ashville Pike. A copy of the intersection turn movement count for the intersection of State Route 752 and Business Place North is included in **Appendix D**.

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 7:00 AM to 8:00 AM. The weekday PM peak hour of traffic was found to be 3:45 PM to 4:45: 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 on a weekday.

The existing AM and PM peak hour traffic volumes are shown in **Figure 2.5, Appendix A.** It should be noted that the discrepancy between traffic volumes at the intersection of SR 752/Business Place North and the adjacent intersections can be attributed to the data collection being performed on different dates.

Chapter 3
Projected Traffic Conditions

3.1 Site Traffic

Trip Generation

Calculating future total driveway trips requires an estimate of the traffic generated by the proposed development. 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**" [8], 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 11TH edition and was utilized for this study.

The ITE **Trip Generation Manual** [8] was used in conjunction with available site specific data provided by DHL in order to forecast the expected development site generated traffic. Site generated traffic was prepared for passenger vehicle **(vehicle)** type traffic and truck **(truck)** traffic.

The following table details a breakdown of the building that is expected to occupy the site:

Table 3.1 Development Summary

BUILDING LOCATION	OPENING YEAR	SIZE (Square Feet)
South of SR 752 - East of US 23	2024	545,200

The developer provided an overview of the their North American facility operations. The overview showed that for buildings over 400,000 square feet that the 90% are operating 2 or 3 shift operations. The overview also provided a total headcount for each of the sectors that are served at the facilities. The sectors for the AM and PM peak hour vehicle traffic were determined to be the five highest. A copy of the facilities overview can be seen in **Appendix B**.

In order to determine the volume of expected site generated **vehicle** traffic a weighted average of the total headcount for the 5 largest sectors was calculated. It was assumed for the purpose of this report that one employee was equal to one trip in the peak hour due to the shift operations. The following table details the calculation of the site generated trip rate that will be used to forecast the volume of **vehicle** generated traffic by each building in the development:

Table 3.2 Vehicle Trip Rate Calculation

SECTOR	HEADCOUNT per 100,000 sf	WEIGHTED AVERAGE	WEIGHTED VALUE
Automotive	24	15.00%	3.600
Consumer	20	12.50%	2.500
Retail	51	31.88%	16.256
Technology	45	28.13%	12.656
Life Science/Healthcare	20	12.50%	2.500
TOTAL	**160**	**100%**	**37.513**

The weighted average should provide a conservative estimate of future traffic as the sectors being served at each building are currently unknown.

A rate of 37.5125 trips per 100,000 square foot will be applied to each building in the development in order to determine the peak hour site generated trips based on the results shown above in **Table 3.2**.

The peak hour site generated trips will be split in to entering and exiting trips based on the peak hour directional distributions provided for land use #156 - High Cube Parcel Hub Warehouse from the ITE **Trip Generation Manual [8].**

The developer provided the expected facility truck volumes from the consumer and ecommerce sectors. These sectors were selected as they provide the highest peak hour volume of truck traffic at DHL facilities and should provide a conservative estimate of the expected truck volumes during the AM and PM peak hours. These truck volumes were applied to the each of the proposed buildings based on the square footage of each. A copy of the provided truck data can be seen in **Appendix B**.

Trip generation calculations for the development were performed utilizing the supplied site specific data for **vehicle and truck** trips as well as data contained in the **Trip Generation Manual** [(8)] and the methods outlined in the (ITE) **Trip Generation Handbook** [(9)]. A spreadsheet detailing the **vehicle** trip generation calculations can be found in **Appendix E**. The following table details the site generated **vehicle** and **truck** traffic volumes for each building in the proposed development.

Table 3.3 New Trip Summary

OPENING YEAR	SIZE	TRIP ENDS							
		Weekday Peak Hour Between 7-9 AM				Weekday Peak Hour Between 4-6 PM			
		ENTER		EXIT		ENTER		EXIT	
		Vehicles	*Trucks*	Vehicles	*Trucks*	Vehicles	*Trucks*	Vehicles	*Trucks*
2024	545,200 SF	103	*15*	102	*15*	139	*10*	66	*10*
TOTAL NEW TRIPS		**118**		**117**		**149**		**76**	
		235				**225**			

The ODOT **State Highway Access Management Manual** [(7)] requires that ten year design hour traffic volumes be analyzed for a proposed development when the number of generated trips is below 500 in the peak hour and twenty year design hour traffic volumes when the number of generated trips is greater than 500 in the peak hour.

The proposed development is expected to generate a total of 235 driveway trips in the AM peak hour and a total of 225 driveway trips in the PM peak hour.

The year 2044 was forecasted for the twenty year design hour conditions in the **July 18, 2022 Traffic Volume Forecast**. The year 2044 will continued to be used for the design year in order to provide a conservative analysis of the expected future conditions in the study area and to provide consistency with the previously prepared forecast document.

Distribution of New Site Generated Weekday Traffic

Separate directional distributions will be prepared for passenger vehicle **(vehicle)** type traffic and truck **(truck)** traffic.

The directional distribution for the new generated **vehicle** traffic is a function of the prevailing operating conditions on the existing roadways. The distribution pattern that was assumed is shown in the tables that follow and is based upon the distributions detailed in the **July 18, 2022 Traffic Volume Forecast**. The vehicle trips were assumed to be primary trips made by people leaving home for work and then returning home. The **vehicle** trips were therefore assumed to enter and exit the study using the same route.

The following tables detail the distribution of the new generated **vehicle** trips for the proposed development under the opening and design year conditions.

Table 3.4 AM New Trip Origins and Destinations

ORIGIN/ DESTINATION	ROUTE	ENTER % TOTAL	ENTER NEW TRIPS	EXIT % TOTAL	EXIT NEW TRIPS
North	US 23	20%	21	20%	21
South	US 23	40%	41	40%	41
East	SR 752	20%	21	20%	20
North	Ashville Pike	10%	10	10%	10
South	Long Street (SR 316)	10%	10	10%	10
	TOTALS	**100%**	**103**	**100%**	**102**

Table 3.5 PM New Trip Origins and Destinations
2024 Opening Year

ORIGIN/ DESTINATION	ROUTE	ENTER % TOTAL	ENTER NEW TRIPS	EXIT % TOTAL	EXIT NEW TRIPS
North	US 23	20%	28	20%	13
South	US 23	30%	41	30%	20
East	SR 752	20%	28	20%	13
North	Ashville Pike	20%	28	20%	13
South	Long Street (SR 316)	10%	14	10%	7
	TOTALS	**100%**	**139**	**100%**	**66**

All **truck** traffic will enter and exit the development at the proposed intersection along State Route 752. **Trucks** will be prohibited from exiting the site to the east along State Route 752 through the use of way finding signs both on-site and off-site.

The distribution of the **truck** traffic was based on the all **trucks** using US Route 23 to travel north or south. The trucks were split with 60% originating from and destined to the north. The remaining 40% were assumed to enter from or exit to the south. The distribution was based on the existing volume patterns on US Route 23, the location of Rickenbacker International Airport, and the location of the facility to the south of the greater Columbus area.

Distribution of Site Generated Traffic

The distribution of new site generated **vehicle** traffic between the proposed access and the Business Place North access were based on the following assumptions:

- The site plan shows two symmetric parking fields on the on the east and west sides of the building. It will be assumed that the vehicles will park in the two areas at 50/50 split.

- It was assumed that 75% of entering traffic would use the first available access they encounter and 25% would use the other location. For example 50% of the vehicles from the west would use the west parking and 50% of the vehicles from the west would use the east parking area. 100% of the 50% of vehicles parking in the west parking lot would use the proposed SR 752 access. 50% of the 50% of vehicles parking in the east parking lot would use the proposed SR 752 access and travel through the site to the east parking lot and the remaining 50% of the 50% of vehicles parking in the east parking lot would use the Business Place North access.

- It was assumed that exiting traffic would use the access closest to the parking area to exit the site. Exiting traffic was therefore split 50/50 between the access locations.

The directional distribution for the new AM and PM peak hour generated **vehicle** traffic is shown graphically in **Figure 3.1, Appendix A** for the opening year conditions.

The directional distribution for the new AM and PM peak hour generated **truck** traffic is shown graphically in **Figure 3.2, Appendix A** for the opening year conditions.

Assignment of Site Generated Traffic - 2024 Opening Year

Based upon the distribution patterns shown in **Figure 3.1**, the new AM and PM peak site generated **vehicle** traffic was assigned to the study intersections. The assignment of the estimated site generated new **vehicle** traffic for the proposed development under the opening year conditions is shown graphically in **Figure 3.3, Appendix A**.

Based upon the distribution patterns shown in **Figure 3.2** , the new AM and PM peak site generated **truck** traffic was assigned to the study intersections. The assignment of the estimated site generated new **truck** traffic for the proposed development under the opening year conditions is shown graphically in **Figure 3.4, Appendix A**.

3.2 Adjusted Traffic

The collected peak hour traffic volumes detailed in the **Traffic Volume Forecast, Appendix A** were reviewed to determine if they have been impacted due to the COVID-19 pandemic. The traffic volumes as they were collected may not be 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 is included in the **Traffic Volume Forecast, Appendix B.**

A calculated factor greater than 1.0 indicates that the 2022 volumes do not exceed the 2020 historical data, therefore a calibration factor ***is*** necessary to account for the impact of the COVID-19 pandemic.

A calculated factor of less than 1.0 indicates that the 2022 volumes exceed the 2020 historical data, therefore a calibration factor ***is not*** necessary to account for the impact of the COVID-19 pandemic.

A COVID adjustment factor of 0.9682 detailed in the **Traffic Volume Forecast, Appendix B** indicates that the 2022 volumes exceed the 2020 historical data, therefore a calibration factor ***is not*** necessary to account for the impact of the COVID-19 pandemic on the collected traffic data.

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. A period of ten years is currently specified by the Ohio Department of Transportation for smaller 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 year 2044 (Design Year) will be analyzed for the proposed development. Therefore, it is necessary to estimate historical growth rates in order to establish the future traffic on the study area roadways due to non-site related conditions.

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 on these roadways may increase in future years.

The Mid-Ohio Regional Planning Commision (MORPC) was contacted in order to determine appropriate growth rates for the study area roadways. MORPC provided linear annual growth rates for the approaches at the study area intersections. A copy of the email correspondence regarding growth rates for the study area can be seen in the **Traffic Volume Forecast, Appendix B**.

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 rural streets. There is typically very little difference between the volumes in this range. The Ohio Department of Transportation provides factors or a methodology to determine 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** [(7)], 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** [(4 & 5)] 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 the **Traffic Volume Forecast, Appendix B**.

The peak hour to design hour factors assigned to the study area roadways can be seen in the **Traffic Volume Forecast, Appendix B.**

Peak Hour Factors

The intersection peak hour factor (PHF) is used to convert the hourly traffic volume into the flow rate that represents the busiest 15 minutes of the peak hour. The PHF is the sum of the traffic entering the intersection during the peak hour divided by four times the highest 15 minute volume during the peak hour. A PHF of 1 indicates that the traffic volume in each 15 minute volume is the same and therefore traffic flow is consistent throughout the hour. A lower PHF indicates a more variable traffic flow and that traffic volume has a spike during the peak 15 minute interval. PHF's under 0.80 occur in locations with highly peaked demand, such as at schools and factories during shift changes.

The ODOT **Analysis and Traffic Simulation Manual** [(6)] provides guidance to use the existing year PHF for all intersections from traffic counts collected for the project. The PHF is calculated for the intersection as a whole and not individual approaches or movements. A minimum of 0.80 for the PHF is required to be utilized unless justified by highly peaked demands such as for schools and factories noted above. If project specific counts are not available, a default value of 0.92 is to be utilized for arterials.

It is assumed for this report that the PHF for the opening and design years are the same as the calculated PHF from the collected existing year traffic counts. The intersection PHF's are included in **Appendices B & D.**

Sheetz Development

A Sheetz development is currently under construction at the intersection of US Route 23 and State Route 752. The Sheetz development was analyzed in a Traffic Impact Study dated March 17, 2021. The TIS was reviewed and approved by ODOT.

A copy of the traffic volume figures from the Sheetz TIS that were added to the No-Build background traffic volumes can be seen in the **Traffic Volume Forecast, Appendix B**.

The site generated traffic as detailed in the Sheetz TIS were added to the calculated No-Build traffic volumes detailed in the **Traffic Volume Forecast, Appendix B**.

US Route 23 & SR-316 Development

A Traffic Impact Study is currently being performed for a proposed mixed-used development at the southeast quadrant of the US Route 23 and State Route 316/Northup Avenue intersection. The development is expected to consist of retail space, commercial out lot parcels, multi-family units, duplex units, and single-family lots.

A copy of the traffic volume figures from the US 23/SR 316 Development TIS that were added to the No-Build background traffic volumes can be seen in the **Traffic Volume Forecast, Appendix B**.

The site generated traffic as detailed in the US 23/SR 316 Development TIS were added to the calculated No-Build traffic volumes detailed in the **Traffic Volume Forecast, Appendix B**.

3.4 Future Traffic

No-Build Conditions w/out Sheetz & US 23/SR 316 Development

The previously discussed calculation of design hour factors and growth rates for each movement were applied to the existing 2022 traffic volumes in order to estimate the future traffic considering non-project traffic conditions without the development of the Sheetz or the proposed mixed-use development.

Spreadsheets detailing the use of the calculated growth rates and the design hour factors and the resulting expected 2024 and 2044 No-Build traffic volumes can be found in **Appendix D** for the intersection of State Route 752 and Business Place North. The remaining intersections can be seen in **Appendix B**.

The No-Build traffic volumes detailed in **Appendices B & D** do not include the site generated traffic volumes from the Sheetz or the US 23/SR316 mixed-use development

Balancing traffic volumes is a process by which the differences between traffic volume data at adjacent traffic count locations is eliminated. The traffic volumes along State Route 752 were not "balanced" for the purpose of this report due to the number of driveways, intersections, and commercial/retail businesses between the three SR 752 count locations.

This traffic is the expected traffic if the proposed additional developments and the DHL facility **are not** constructed, a **"No-Build w/out Additional Developments"** condition. The estimated 2024 and 2044 No-Build w/out Additional Developments traffic volumes for the study area are shown graphically in **Figures 3.5 & 3.6, Appendix A**.

The No-Build w/out Additional Developments traffic volumes have been rounded to the nearest 10 to adhere to preferred ODOT practices.

No-Build Conditions w/ Sheetz & US 23/SR 316 Development

In order to estimate the 2024 opening year No-Build traffic considering the background traffic and the additional developments in the study area, the sum of the 2024 No-Build volumes, shown in **Figure 3.5, Appendix A**, were added to the new generated traffic (**Appendix B**). These traffic volumes are the expected volumes if the additional developments in the study area are constructed and the proposed DHL development **is not** constructed, or a **"No-Build with Additional Development"** condition.

The estimated 2024 opening year No-Build with Additional Development traffic volumes for the study area are shown graphically in **Figure 3.7, Appendix A** for the study area.

In order to estimate the 2044 design year No-Build traffic considering the background traffic and the additional developments in the study area, the sum of the 2044 No-Build volumes, shown in **Figure 3.6, Appendix A**, were added to the new generated traffic (**Appendix B**). These traffic volumes are the expected volumes if the additional developments in the study area are constructed and the proposed DHL development **is not** constructed, or a **"No-Build with Additional Development"** condition.

The estimated 2044 design year No-Build with Additional Development traffic volumes for the study area are shown graphically in **Figure 3.8, Appendix A** for the study area.

Project Build Conditions

In order to estimate the future opening year traffic considering project traffic conditions, the sum of the 2024 No-Build with Additional Development volumes, shown in **Figure 3.7, Appendix A**, were added to the new generated traffic (**Figures 3.3 & 3.4**) to equal the future 2024 Build peak hour volumes.

The estimated 2024 Build traffic volumes for the study area are shown graphically in **Figure 3.9, Appendix A** for the proposed development. These traffic volumes are the expected volumes if the proposed development **is** constructed, or a **"Build"** condition. These conditions represent the expected opening year conditions.

In order to estimate the future design year traffic considering project traffic conditions, the sum of the 2044 with Additional Development No-Build volumes, shown in **Figure 3.8, Appendix A**, were added to the new generated traffic (**Figures 3.3 - 3.4**) to equal the future 2044 Build peak hour volumes.

The estimated 2044 Build traffic volumes for the study area are shown graphically in **Figure 3.10, Appendix A** for the proposed development. These traffic volumes are the expected volumes if the proposed development **is** constructed, or a **"Build"** condition. These conditions represent the expected design year conditions.

Chapter 4
Traffic Analysis

4.1 Capacity & LOS at Study Area Intersection

2024 Traffic Analysis - No-Build & Build Conditions

Traffic analyses were performed for the projected 2024 conditions under the No-Build and Build scenarios so:

1. any existing roadway/intersection deficiencies can be identified in the No-Build scenario which would not be attributable to the development, and;

2. a comparison can be made to determine the changes in the traffic operations which may be attributed to the development.

The traffic volumes used in the No-Build analyses can be seen in **Figure 3.7, Appendix A**. Copies of the capacity worksheets for the No-Build analyses are included in **Appendix F.**

The traffic volumes used in the Build analyses can be seen in **Figure 3.9, Appendix A**. Copies of the capacity worksheets for the Build analyses are included in **Appendix G.**

Intersection #1 - US Route 23 & State Route 752

Comparison tables of the 2024 No-Build versus Build traffic analyses for the signalized intersection of US Route 23 and State Route 752 are shown in the following tables:

Table 4.1 - 2024 AM Peak Hour Traffic Analysis Results (US 23 & SR 752)

Intersection #1	2024 AM No-Build Conditions				Traffic Signal Control	Intersection #1	2024 AM Build Conditions				Traffic Signal Control
US 23 & SR 752	LOS	Delay (sec/veh)	v/c	QSR	95th %tile Queue (ft)	US 23 & SR 752	LOS	Delay (sec/veh)	v/c	QSR	95th %tile Queue (ft)
EBT	D	37.1	0.522	0.00	125	EBT	D	39.3	0.446	0.00	145
EBR	C	34.6	0.304	0.22	62	EBR	D	36.5	0.217	0.26	73
EB Approach	D	36.2	-	-	-	EB Approach	D	38.3	-	-	-
WBT	D	38.1	0.659	0.00	178	WBT	D	43.8	0.774	0.00	290
WB Approach	D	38.1	-	-	-	WB Approach	D	43.8	-	-	-
NBL	A	8.9	0.279	0.08	36	NBL	B	12.4	0.319	0.11	50
NBT	D	36.1	0.940	0.46	736	NBT	D	50.3	0.985	0.63	1008
NBR	D	42.8	0.972	0.50	800	NBR	F	63.0	1.030	0.69	1104
NB Approach	D	37.7	-	-	-	NB Approach	D	54.2	-	-	-
SBL	C	21.4	0.544	0.28	62	SBL	C	33.3	0.835	0.49	108
SBT	B	15.7	0.566	0.00	275	SBT	B	19.1	0.572	0.00	340
SBR	B	15.7	0.566	0.00	270	SBR	B	19.2	0.572	0.00	335
SB Approach	B	16.2	-	-	-	SB Approach	C	20.9	-	-	-
Intersection	**C**	**30.6**	-	-	-	**Intersection**	**D**	**41.8**	-	-	-

Table 4.2 - 2024 PM Peak Hour Traffic Analysis Results (US 23 & SR 752)

Intersection #1	2024 PM No-Build Conditions				Traffic Signal Control	Intersection #1	2024 PM Build Conditions				Traffic Signal Control
US 23 & SR 752	LOS	Delay (sec/veh)	v/c	QSR	95th %tile Queue (ft)	US 23 & SR 752	LOS	Delay (sec/veh)	v/c	QSR	95th %tile Queue (ft)
EBT	C	30.1	0.269	0.00	83	EBT	C	31.1	0.250	0.00	90
EBR	C	30.0	0.251	0.24	67	EBR	C	30.9	0.221	0.26	73
EB Approach	C	30.0	-	-	-	EB Approach	C	31.0	-	-	-
WBT	D	35.4	0.720	0.00	233	WBT	D	38.8	0.772	0.00	290
WB Approach	D	35.4	-	-	-	WB Approach	D	38.8	-	-	-
NBL	C	20.1	0.366	0.08	36	NBL	C	22.6	0.398	0.09	41
NBT	C	21.8	0.686	0.25	400	NBT	C	25.3	0.722	0.30	480
NBR	C	22.1	0.687	0.24	384	NBR	C	25.7	0.724	0.28	448
NB Approach	C	21.8	-	-	-	NB Approach	C	25.3	-	-	-
SBL	B	13.0	0.309	0.17	37	SBL	B	16.5	0.464	0.29	64
SBT	D	43.4	0.958	0.00	695	SBT	D	46.2	0.960	0.00	765
SBR	D	44.7	0.964	0.00	703	SBR	D	47.6	0.965	0.00	770
SB Approach	D	42.4	-	-	-	SB Approach	D	44.7	-	-	-
Intersection	**C**	**33.9**	-	-	-	**Intersection**	**D**	**36.6**	-	-	-

Conditions at the signalized intersection of US Route 23 and State Route 752 during the AM and PM peak hours were determined to operate with level-of-service D or better under the forecasted 2024 No-Build conditions. No improvements were found to be necessary to improve the levels-of-service under the 2024 No-Build conditions at the study area intersection.

The 2024 AM and PM peak hour comparison tables for the intersection of US Route 23 and State Route 752 shown previously, indicate that the intersection and approach delays are impacted with the addition of the development generated traffic under the forecasted 2024 AM and PM peak hour conditions. An analysis will be performed in a later section of this report to determine what improvement will provide an acceptable level of service in the AM and PM peak periods that will adhere to the acceptable ranges shown in *Table 1.3* as stated in the ODOT **OATS Manual** [(6)].

Intersection #2 - State Route 752 & Business Place North

Comparison tables of the 2024 No-Build versus Build traffic analyses for the unsignalized intersection of State Route 752 and Business Place North are shown in the following tables:

Table 4.3 - 2024 Traffic Analysis Results
(SR 752 & Business Place North)

Intersection #2	2024 AM No-Build Conditions			Two-Way Stop Control	Intersection #2	2024 AM Build Conditions			Two-Way Stop Control
SR 752 & Business Place	LOS	Delay (sec/veh)	v/c	Q_{95} %tile (Veh/Ln)	SR 752 & Business Place	LOS	Delay (sec/veh)	v/c	Q_{95} %tile (Veh/Ln)
EBL	A	7.7	0.01	0.0	EBL	A	7.8	0.01	0.0
EB Approach	A	0.5	--	--	EB Approach	A	0.4	--	--
WBL	A	7.7	0.01	0.0	WBL	A	7.8	0.04	0.1
WB Approach	A	0.4	--	--	WB Approach	A	1.6	--	--
NBT	B	11.3	0.04	0.1	NBT	B	14.1	0.18	0.6
NB Approach	B	11.3	--	--	NB Approach	B	14.1	--	--
SBT	A	9.4	0.00	0.0	SBT	A	9.5	0.00	0.0
SB Approach	A	9.4	--	--	SB Approach	A	9.5	--	--

Table 4.4 - 2024 Traffic Analysis Results
(SR 752 & Business Place North)

Intersection #2	2024 PM No-Build Conditions			Two-Way Stop Control	Intersection #2	2024 PM Build Conditions			Two-Way Stop Control
SR 752 & Business Place	LOS	Delay (sec/veh)	v/c	Q_{95} %tile (Veh/Ln)	SR 752 & Business Place	LOS	Delay (sec/veh)	v/c	Q_{95} %tile (Veh/Ln)
EBL	A	7.8	0.00	0.0	EBL	A	7.8	0.00	0.0
EB Approach	A	0.0	--	--	EB Approach	A	0.0	--	--
WBL	A	7.9	0.01	0.0	WBL	A	8.2	0.06	0.2
WB Approach	A	0.4	--	--	WB Approach	A	2.2	--	--
NBT	B	12.5	0.05	0.2	NBT	C	15.8	0.16	0.6
NB Approach	B	12.5	--	--	NB Approach	C	15.8	--	--
SBT	B	12.5	0.05	0.2	SBT	B	14.9	0.06	0.2
SB Approach	B	12.5	--	--	SB Approach	B	14.9	--	--

Conditions at the unsignalized intersection of State Route 752 and Business Place North during the AM and PM peak hours were determined to operate with level-of-service C or better under the forecasted 2024 No-Build conditions. No improvements were found to be necessary to improve the levels-of-service under the 2024 No-Build conditions at the study area intersection.

The 2024 AM and PM peak hour comparison tables for the intersection of State Route 752 and Business Place North shown previously, indicate that the approach delays are not significantly impacted with the addition of the development generated traffic under the forecasted 2024 AM and PM peak hour conditions. The Build levels of service for all movements and approaches are within the acceptable range shown in *Table 1.3* as stated in the ODOT **OATS Manual** [(6)].

Intersection #3 - State Route 752 & State Route 316/Ashville Pike

Comparison tables of the 2024 No-Build versus Build traffic analyses for the signalized intersection of State Route 752 and State Route 316/Ashville Pike are shown in the following tables:

Table 4.5 - 2024 AM Peak Hour Traffic Analysis Results (SR 752 & SR 316/Ashville Pike)

Intersection #3	2024 AM No-Build Conditions				Traffic Signal Control	Intersection #3	2024 AM Build Conditions				Traffic Signal Control
SR 752 & SR 316	LOS	Delay (sec/veh)	v/c	QSR	95th %tile Queue (ft)	SR 752 & SR 316	LOS	Delay (sec/veh)	v/c	QSR	95th %tile Queue (ft)
EBL	B	18.1	0.212	0.21	42	EBL	B	18.3	0.252	0.24	48
EBT	C	26.8	0.749	0.00	203	EBT	C	27.7	0.828	0.00	228
EB Approach	C	25.0	-	-	-	EB Approach	C	25.7	-	-	-
WBL	B	19.5	0.188	0.13	26	WBL	B	19.9	0.204	0.13	0
WBT	C	25.2	0.594	0.00	145	WBT	C	26.0	0.660	0.00	168
WB Approach	C	24.2	-	-	-	WB Approach	C	25.0	-	-	-
NBL	B	18.2	0.145	0.23	32	NBL	B	18.3	0.179	0.27	38
NBT	C	26.3	0.689	0.00	180	NBT	C	26.6	0.694	0.00	183
NB Approach	C	24.8	-	-	-	NB Approach	C	24.8	-	-	-
SBL	C	20.4	0.579	1.05	126	SBL	C	20.8	0.586	1.07	128
SBT	C	21.5	0.385	0.00	100	SBT	C	22.4	0.430	0.00	110
SB Approach	C	20.9	-	-	-	SB Approach	C	21.6	-	-	-
Intersection	**C**	**23.6**	-	-	-	**Intersection**	**C**	**24.2**	-	-	-

Table 4.6 - 2024 PM Peak Hour Traffic Analysis Results (SR 752 & SR 316/Ashville Pike)

Intersection #3	2024 PM No-Build Conditions				Traffic Signal Control	Intersection #3	2024 PM Build Conditions				Traffic Signal Control
SR 752 & SR 316	LOS	Delay (sec/veh)	v/c	QSR	95th %tile Queue (ft)	SR 752 & SR 316	LOS	Delay (sec/veh)	v/c	QSR	95th %tile Queue (ft)
EBL	B	19.6	0.339	0.30	60	EBL	C	21.3	0.434	0.37	74
EBT	C	27.5	0.701	0.00	185	EBT	C	29.7	0.788	0.00	208
EB Approach	C	25.2	-	-	-	EB Approach	C	27.2	-	-	-
WBL	B	19.2	0.292	0.28	56	WBL	C	20.6	0.322	0.29	58
WBT	C	26.8	0.711	0.00	195	WBT	C	30.0	0.822	0.00	228
WB Approach	C	24.8	-	-	-	WB Approach	C	27.7	-	-	-
NBL	B	19.9	0.225	0.22	31	NBL	B	19.7	0.289	0.27	38
NBT	C	25.8	0.568	0.00	158	NBT	C	24.4	0.518	0.00	153
NB Approach	C	24.7	-	-	-	NB Approach	C	23.3	-	-	-
SBL	B	18.0	0.227	0.39	47	SBL	B	17.5	0.218	0.39	47
SBT	C	27.5	0.865	0.00	265	SBT	C	28.6	0.898	0.00	293
SB Approach	C	25.8	-	-	-	SB Approach	C	26.7	-	-	-
Intersection	**C**	**25.2**	-	-	-	**Intersection**	**C**	**26.4**	-	-	-

Conditions at the signalized intersection of State Route 752 and State Route 316 during the AM and PM peak hours were determined to operate with level-of-service C or better under the forecasted 2024 No-Build conditions. The comparison tables indicates that the storage length of the southbound left turn lane may be inadequate for future 2024 No-Build conditions. An analysis will be performed in a later section of this report to determine the queue length need to mitigate the effect or any other improvement that could reduce the queue storage length. No improvements were found to be necessary to improve the levels-of-service under the 2024 No-Build conditions at the study area intersection.

The 2024 AM and PM peak hour comparison tables for the intersection of State Route 752 and State Route 316 shown previously, indicate that the intersection and approach delays are not significantly impacted with the addition of the development generated traffic under the forecasted 2024 AM and PM peak hour conditions. The Build levels of service for all movements, approaches and the intersection are within the acceptable range shown in as *Table 1.3* stated in the ODOT **OATS Manual** [(6)].

2024 Traffic Analysis - Improvements

Traffic analyses for 2024 Build conditions indicate that the development will impact the capacity at the intersection of US 23 at SR 752. The northbound right turn movement level-of-service was not found to be within the acceptable range shown in *Table 1.3* as stated in the ODOT **OATS Manual** [(6)].

Certain improvements were tested with further capacity analyses in order to determine what mitigation would be necessary to improve the levels-of-service at the this intersection under the forecasted 2024 Build conditions.

The following Build improvements were determined to improve the levels-of-service at the signalized intersection of US Route 23 and SR 752.

- Construct a northbound right turn lane.
- Update signal sequence to include right turn overlap phase for eastbound right turn movement with protected left turn phase for northbound left turn movement.

The following table shows the capacity analysis results of the recommended improvements. Copies of the capacity worksheets for the intersection are included in **Appendix H.**

Table 4.7 - 2024 Traffic Analysis Results - Improvements
(US 23 & SR 752)

Intersection #1	2024 AM Build Conditions		Traffic Signal Control Improvements			Intersection #1	2024 PM Build Conditions		Traffic Signal Control Improvements		
US 23 & SR 752	LOS	Delay (sec/veh)	v/c	QSR	95th %tile Queue (ft)	US 23 & SR 752	LOS	Delay (sec/veh)	v/c	QSR	95th %tile Queue (ft)
EBT	C	31.7	0.412	0.00	113	EBT	C	31.1	0.249	0.00	90
EBR	C	23.6	0.153	0.18	50	EBR	C	25.5	0.170	0.23	64
EB Approach	C	28.9	-	-	-	EB Approach	C	28.6	-	-	-
WBT	D	35.3	0.736	0.00	240	WBT	D	38.2	0.772	0.00	290
WB Approach	D	35.3	-	-	-	WB Approach	D	38.2	-	-	-
NBL	B	12.1	0.316	0.10	45	NBL	C	22.6	0.398	0.09	41
NBT	D	38.8	0.971	0.43	688	NBT	C	20.2	0.614	0.22	352
NBR	B	15.5	0.361	0.00	163	NBR	B	15.4	0.249	0.00	120
NB Approach	C	34.0	-	-	-	NB Approach	B	19.6	-	-	-
SBL	C	21.8	0.703	0.32	70	SBL	B	13.9	0.391	0.29	64
SBT	C	20.9	0.638	0.00	320	SBT	D	46.3	0.960	0.00	765
SBR	C	21.0	0.638	0.00	315	SBR	D	47.7	0.966	0.00	770
SB Approach	C	21.0	-	-	-	SB Approach	D	44.6	-	-	-
Intersection	**C**	**29.6**	-	-	-	**Intersection**	**C**	**34.4**	-	-	-

The identified 2024 Build improvements will be included in all Build analysis going forward in this report.

2044 Traffic Analysis - No-Build & Build Conditions

Traffic analyses were performed for the projected 2044 conditions under the No-Build and Build scenarios so:

1. any existing roadway/intersection deficiencies can be identified in the No-Build scenario which would not be attributable to the development, and;

2. a comparison can be made to determine the changes in the traffic operations which may be attributed to the development.

The traffic volumes used in the No-Build analyses can be seen in **Figure 3.8, Appendix A**. Copies of the capacity worksheets for the No-Build analyses are included in **Appendix I.**

The traffic volumes used in the Build analyses can be seen in **Figure 3.10, Appendix A**. Copies of the capacity worksheets for the Build analyses are included in **Appendix J.**

Intersection #1 - US Route 23 & State Route 752

Comparison tables of the 2044 No-Build versus Build traffic analyses for the signalized intersection of US Route 23 and State Route 752 are shown in the following tables:

Table 4.8 - 2044 AM Peak Hour Traffic Analysis Results
(US 23 & SR 752)

Intersection #1	2044 AM No-Build Conditions		Traffic Signal Control			Intersection #1	2044 AM Build Conditions		Traffic Signal Control		
US 23 & SR 752	LOS	Delay (sec/veh)	v/c	QSR	95th %tile Queue (ft)	US 23 & SR 752	LOS	Delay (sec/veh)	v/c	QSR	95th %tile Queue (ft)
EBT	D	47.4	0.543	0.00	170	EBT	D	40.9	0.439	0.00	155
EBR	D	42.8	0.254	0.30	84	EBR	C	31.8	0.154	0.25	70
EB Approach	D	45.8	-	-	-	EB Approach	D	37.8	-	-	-
WBT	E	65.1	0.829	0.00	343	WBT	E	72.6	0.913	0.00	465
WB Approach	E	65.1	-	-	-	WB Approach	E	72.6	-	-	-
NBL	B	15.9	0.409	0.13	59	NBL	C	20.4	0.460	0.15	68
NBT	F	82.0	1.096	0.99	1584	NBT	F	83.4	1.106	0.89	1424
NBR	F	100.7	1.143	1.10	1760	NBR	B	16.7	0.373	0.14	224
NB Approach	F	87.9	-	-	-	NB Approach	E	71.6	-	-	-
SBL	D	51.7	0.788	0.64	141	SBL	F	106.6	0.992	1.55	341
SBT	C	21.8	0.721	0.00	508	SBT	C	28.3	0.785	0.00	583
SBR	C	21.9	0.723	0.00	505	SBR	C	28.5	0.786	0.00	580
SB Approach	C	24.1	-	-	-	SB Approach	D	36.0	-	-	-
Intersection	**E**	**62.4**	-	-	-	**Intersection**	**E**	**58.0**	-	-	-

Table 4.9 - 2044 PM Peak Hour Traffic Analysis Results
(US 23 & SR 752)

Intersection #1	2044 PM No-Build Conditions		Traffic Signal Control			Intersection #1	2044 PM Build Conditions		Traffic Signal Control		
US 23 & SR 752	LOS	Delay (sec/veh)	v/c	QSR	95th %tile Queue (ft)	US 23 & SR 752	LOS	Delay (sec/veh)	v/c	QSR	95th %tile Queue (ft)
EBT	C	34.0	0.283	0.00	95	EBT	D	37.5	0.257	0.00	110
EBR	C	33.8	0.259	0.27	76	EBR	C	31.5	0.176	0.29	81
EB Approach	C	33.9	-	-	-	EB Approach	C	34.8	-	-	-
WBT	F	95.6	1.022	0.00	503	WBT	F	104.5	1.040	0.00	628
WB Approach	F	95.6	-	-	-	WB Approach	F	104.5	-	-	-
NBL	C	22.9	0.406	0.10	45	NBL	C	28.3	0.473	0.13	59
NBT	C	30.8	0.859	0.41	656	NBT	C	25.1	0.769	0.37	592
NBR	C	32.3	0.871	0.41	656	NBR	B	15.6	0.264	0.10	160
NB Approach	C	31.1	-	-	-	NB Approach	C	24.0	-	-	-
SBL	C	21.2	0.514	0.30	66	SBL	C	22.3	0.632	0.44	97
SBT	F	107.3	1.160	0.00	1458	SBT	F	104.1	1.142	0.00	1565
SBR	F	111.8	1.171	0.00	1493	SBR	F	108.5	1.153	0.00	1598
SB Approach	F	105.1	-	-	-	SB Approach	F	100.9	-	-	-
Intersection	**E**	**74.5**	-	-	-	**Intersection**	**E**	**70.6**	-	-	-

Conditions at the signalized intersection of US Route 23 and State Route 752 during the AM and PM peak hours were determined to operate with movement and approach levels-of-service under the forecasted 2044 No-Build conditions that fail to meet the acceptable ranges as detailed in Table 1.3 as stated in the ODOT **OATS Manual** [(6)].

The 2044 AM and PM peak hour comparison tables for the intersection of US Route 23 and State Route 752 shown previously, indicate that the intersection and approach delays are impacted with the addition of the development generated traffic under the forecasted 2044 AM and PM peak hour conditions. An analysis will be performed in a later section of this report to determine what improvement will provide an acceptable level-of-service in the AM and PM peak periods that will adhere to the acceptable ranges shown in *Table 1.3* as stated in the ODOT **OATS Manual** [(6)].

Intersection #2 - State Route 752 & Business Place North

Comparison tables of the 2044 No-Build versus Build traffic analyses for the unsignalized intersection of State Route 752 and Business Place North are shown in the following tables:

Table 4.10- 2044 Traffic Analysis Results
(SR 752 & Business Place North)

Intersection #2	2044 AM No-Build Conditions			Two-Way Stop Control	Intersection #2	2044 AM Build Conditions			Two-Way Stop Control
SR 752 & Business Place	LOS	Delay (sec/veh)	v/c	Q_{95} %tile (Veh/Ln)	SR 752 & Business Place	LOS	Delay (sec/veh)	v/c	Q_{95} %tile (Veh/Ln)
EBL	A	7.9	0.01	0.0	EBL	A	7.9	0.01	0.0
EB Approach	A	0.4	--	--	EB Approach	A	0.4	--	--
WBL	A	7.8	0.01	0.0	WBL	A	8.0	0.04	0.1
WB Approach	A	0.4	--	--	WB Approach	A	1.4	--	--
NBT	B	12.5	0.05	0.1	NBT	C	16.3	0.21	0.8
NB Approach	B	12.5	--	--	NB Approach	C	16.3	--	--
SBT	A	9.8	0.00	0.0	SBT	A	9.9	0.00	0.0
SB Approach	A	9.8	--	--	SB Approach	A	9.9	--	--

Table 4.11 - 2044 Traffic Analysis Results
(SR 752 & Business Place North)

Intersection #2	2044 PM No-Build Conditions			Two-Way Stop Control	Intersection #2	2044 PM Build Conditions			Two-Way Stop Control
SR 752 & Business Place	LOS	Delay (sec/veh)	v/c	Q_{95} %tile (Veh/Ln)	SR 752 & Business Place	LOS	Delay (sec/veh)	v/c	Q_{95} %tile (Veh/Ln)
EBL	A	8.0	0.00	0.0	EBL	A	8.1	0.00	0.0
EB Approach	A	0.0	--	--	EB Approach	A	0.0	--	--
WBL	A	8.2	0.01	0.0	WBL	A	8.5	0.07	0.2
WB Approach	A	0.4	--	--	WB Approach	A	2.0	--	--
NBT	B	14.9	0.06	0.2	NBT	C	20.3	0.21	0.8
NB Approach	B	14.9	--	--	NB Approach	C	20.3	--	--
SBT	B	14.9	0.06	0.2	SBT	C	18.5	0.08	0.3
SB Approach	B	14.9	--	--	SB Approach	C	18.5	--	--

Conditions at the unsignalized intersection of State Route 752 and Business Place North during the AM and PM peak hours were determined to operate with level-of-service C or better under the forecasted 2044 No-Build conditions. No improvements were found to be necessary to improve the levels-of-service under the 2044 No-Build conditions at the study area intersection.

The 2044 AM and PM peak hour comparison tables for the intersection of State Route 752 and Business Place North shown previously, indicate that the approach delays are not significantly impacted with the addition of the development generated traffic under the forecasted 2044 AM and PM peak hour conditions. The Build levels of service for all movements and approaches are within the acceptable range shown in *Table 1.3* as stated in the ODOT **OATS Manual** [(6)].

Intersection #3 - State Route 752 & State Route 316/Ashville Pike

Comparison tables of the 2044 No-Build versus Build traffic analyses for the signalized intersection of State Route 752 and State Route 316/Ashville Pike are shown in the following tables:

Table 4.12 - 2044 AM Peak Hour Traffic Analysis Results
(SR 752 & SR 316-Long Street/Ashville Pike)

Intersection #3	2044 AM No-Build Conditions			Traffic Signal Control		Intersection #3	2044 AM Build Conditions			Traffic Signal Control	
SR 752 & SR 316	LOS	Delay (sec/veh)	v/c	QSR	95th %tile Queue (ft)	SR 752 & SR 316	LOS	Delay (sec/veh)	v/c	QSR	95th %tile Queue (ft)
EBL	C	24.7	0.358	0.39	78	EBL	C	25.3	0.395	0.46	92
EBT	D	37.3	0.897	0.00	365	EBT	D	39.2	0.922	0.00	415
EB Approach	C	34.7	-	-	-	EB Approach	D	36.3	-	-	-
WBL	C	26.0	0.295	0.24	48	WBL	C	27.3	0.329	0.25	50
WBT	D	37.0	0.710	0.00	285	WBT	D	38.2	0.722	0.00	318
WB Approach	D	35.2	-	-	-	WB Approach	D	36.5	-	-	-
NBL	C	23.4	0.227	0.52	73	NBL	C	25.1	0.265	0.64	90
NBT	D	38.1	0.896	0.00	355	NBT	D	39.9	0.898	0.00	373
NB Approach	D	35.1	-	-	-	NB Approach	D	36.6	-	-	-
SBL	D	41.6	0.871	2.38	286	SBL	D	44.5	0.883	2.52	302
SBT	C	25.3	0.435	0.00	193	SBT	C	26.9	0.458	0.00	213
SB Approach	C	34.6	-	-	-	SB Approach	D	36.7	-	-	-
Intersection	**C**	**34.9**	-	-	-	**Intersection**	**D**	**36.5**	-	-	-

Table 4.13 - 2044 PM Peak Hour Traffic Analysis Results
(SR 752 & SR 316-Long Street/Ashville Pike)

Intersection #3	2044 PM No-Build Conditions			Traffic Signal Control		Intersection #3	2044 PM Build Conditions			Traffic Signal Control	
SR 752 & SR 316	LOS	Delay (sec/veh)	v/c	QSR	95th %tile Queue (ft)	SR 752 & SR 316	LOS	Delay (sec/veh)	v/c	QSR	95th %tile Queue (ft)
EBL	C	29.9	0.549	0.66	132	EBL	C	34.3	0.630	0.85	170
EBT	D	41.1	0.782	0.00	383	EBT	D	42.8	0.756	0.00	440
EB Approach	D	38.0	-	-	-	EB Approach	D	40.4	-	-	-
WBL	C	31.0	0.535	0.64	128	WBL	D	35.4	0.551	0.75	150
WBT	D	41.2	0.838	0.00	400	WBT	D	46.8	0.857	0.00	490
WB Approach	D	38.6	-	-	-	WB Approach	D	44.0	-	-	-
NBL	C	27.0	0.370	0.44	62	NBL	C	32.1	0.498	0.62	87
NBT	C	31.0	0.558	0.00	305	NBT	C	33.8	0.533	0.00	340
NB Approach	C	30.3	-	-	-	NB Approach	C	33.4	-	-	-
SBL	C	22.5	0.342	0.89	107	SBL	C	24.8	0.337	1.03	124
SBT	D	36.0	0.884	0.00	528	SBT	D	40.5	0.898	0.00	638
SB Approach	C	33.4	-	-	-	SB Approach	D	37.6	-	-	-
Intersection	**D**	**35.2**	-	-	-	**Intersection**	**D**	**39.1**	-	-	-

Conditions at the signalized intersection of State Route 752 and State Route 316 during the AM and PM peak hours were determined to operate with level-of-service D or better under the forecasted 2044 No-Build conditions. The comparison tables indicates that the storage length of the southbound left turn lane may be inadequate for future 2044 No-Build conditions. An analysis will be performed in a later section of this report to determine the queue length need to mitigate the effect or any other improvement that could reduce the queue storage length. No improvements were found to be necessary to improve the levels-of-service under the 2044 No-Build conditions at the study area intersection.

The 2044 AM and PM peak hour comparison tables for the intersection of State Route 752 and State Route 316 shown previously, indicate that the intersection and approach delays are not significantly impacted with the addition of the development generated traffic under the forecasted 2044 AM and PM peak hour conditions. The Build levels of service for all movements and approaches are within the acceptable range shown in *Table 1.3* as stated in the ODOT **OATS Manual** [(6)].

2044 Traffic Analysis - Improvements

Traffic analyses for 2044 No-Build conditions revealed issues at the intersection of US Route 23 and State Route 752 where levels-of-service were not found to be within the acceptable range shown in *Table 1.3* as stated in the ODOT **OATS Manual** [(6)].

Certain improvements were tested with further capacity analyses in order to determine what mitigation would be necessary to improve the levels-of-service at this intersection under the forecasted 2044 No-Build conditions.

The following No-Build improvement were determined to improve the levels-of-service at the signalized intersection of US Route 23 and SR 752.

- Construct a northbound right turn lane (2024 Build).
- Construct a southbound right turn lane.
- Construct a westbound right turn lane.
- Update signal sequence to include right turn overlap phases with the protected left turn phases.

The following table shows the capacity analysis results of the recommended improvements. Copies of the capacity worksheets for the intersection are included in **Appendix K.**

Table 4.14 - 2044 Traffic Analysis Results - Improvements (US 23 & SR 752)

Intersection #1	2044 AM No-Build Conditions		Traffic Signal Control Improvements			Intersection #1	2044 PM No-Build Conditions		Traffic Signal Control Improvements		
US 23 & SR 752	LOS	Delay (sec/veh)	v/c	QSR	95th %tile Queue (ft)	US 23 & SR 752	LOS	Delay (sec/veh)	v/c	QSR	95th %tile Queue (ft)
EBT	D	41.8	0.513	0.00	140	EBT	D	41.7	0.285	0.00	118
EBR	C	32.9	0.214	0.23	64	EBR	D	35.3	0.205	0.31	87
EB Approach	D	38.7	-	-	-	EB Approach	D	38.8	-	-	-
WBT	D	43.1	0.609	0.00	165	WBT	E	61.5	0.808	0.00	340
WBR	C	34.4	0.317	0.00	95	WBR	D	36.1	0.241	0.00	103
WB Approach	D	39.6	-	-	-	WB Approach	D	54.6	-	-	-
NBL	B	13.1	0.366	0.10	45	NBL	C	29.1	0.473	0.14	63
NBT	F	43.9	1.014	0.60	960	NBT	C	20.3	0.713	0.33	528
NBR	B	10.6	0.288	0.08	130	NBR	B	12.3	0.195	0.07	105
NB Approach	D	38.7	-	-	-	NB Approach	B	19.8	-	-	-
SBL	C	25.4	0.664	0.39	86	SBL	B	16.4	0.438	0.25	55
SBT	B	17.2	0.734	0.00	398	SBT	F	72.7	1.085	0.00	1288
SBR	A	8.5	0.042	0.00	15	SBR	B	10.9	0.060	0.00	30
SB Approach	B	17.6	-	-	-	SB Approach	E	68.3	-	-	-
Intersection	**C**	**31.4**	-	-	-	**Intersection**	**D**	**48.4**	-	-	-

In order to further improve the levels-of-service at intersection of US Route 23 and State Route 752 additional through lanes would likely be necessary. Due to the existing lane use and adjacent land uses any geometric improvements would be high cost and would likely impact the adjacent intersections and land uses. These type of improvements at the intersection would likely be unfeasible and therefore no further consideration to mitigating the levels of service will be given at this location.

Traffic analyses for 2044 Build conditions indicates that the development will impact the capacity at the intersection of US Route 23 and State Route 752 . Certain improvements were tested with further capacity analyses in order to determine what further mitigation would be necessary to improve the levels-of-service at the this intersection under the forecasted 2044 Build conditions.

The following Build improvement were determined to improve the levels-of-service at the signalized intersection of US Route 23 and SR 752.

- Construct a northbound right turn lane (2044 No-Build).
- Construct a southbound right turn lane (2044 No-Build).
- Construct a westbound right turn lane (2044 No-Build).
- Update signal sequence to include right turn overlap phases with the protected left turn phases (2044 No-Build).

The following table shows the capacity analysis results of the recommended improvements. Copies of the capacity worksheets for the intersection are included in **Appendix L.**

Table 4.15 - 2044 Traffic Analysis Results - Improvements (US 23 & SR 752)

Intersection #1	2044 AM Build Conditions		Traffic Signal Control Improvements			Intersection #1	2044 PM Build Conditions		Traffic Signal Control Improvements		
US 23 & SR 752	LOS	Delay (sec/veh)	v/c	QSR	95th %tile Queue (ft)	US 23 & SR 752	LOS	Delay (sec/veh)	v/c	QSR	95th %tile Queue (ft)
EBT	D	45.9	0.441	0.00	165	EBT	D	40.0	0.283	0.00	113
EBR	D	37.1	0.192	0.27	76	EBR	C	33.7	0.204	0.30	84
EB Approach	D	42.8	-	-	-	EB Approach	D	37.2	-	-	-
WBT	D	53.6	0.720	0.00	260	WBT	E	69.1	0.876	0.00	380
WBR	D	37.9	0.349	0.00	150	WBR	C	34.8	0.286	0.00	118
WB Approach	D	47.3	-	-	-	WB Approach	E	59.1	-	-	-
NBL	B	16.2	0.408	0.13	59	NBL	C	27.5	0.456	0.13	59
NBT	F	52.4	1.028	0.73	1168	NBT	C	20.6	0.726	0.32	512
NBR	B	13.7	0.347	0.13	205	NBR	B	13.0	0.249	0.08	135
NB Approach	D	45.6	-	-	-	NB Approach	B	19.9	-	-	-
SBL	D	41.8	0.857	1.06	233	SBL	B	18.1	0.567	0.37	81
SBT	B	19.1	0.722	0.00	470	SBT	F	78.8	1.102	0.00	1303
SBR	A	9.7	0.042	0.00	20	SBR	B	10.9	0.061	0.00	30
SB Approach	C	21.1	-	-	-	SB Approach	E	73.2	-	-	-
Intersection	**D**	**37.2**	-	-	-	**Intersection**	**D**	**51.1**	-	-	-

In order to further improve the levels-of-service at intersection of US Route 23 and State Route 752 additional through lanes would likely be necessary. Due to the existing lane use and adjacent land uses any geometric improvements would be high cost and would likely impact the adjacent intersections and land uses. These type of improvements at the intersection would likely be unfeasible and therefore no further consideration to mitigating the levels of service will be given at this location.

Comparative Analysis

A comparison was performed to show the incremental effects on the capacity at the study area intersections due to the construction of the proposed development under the opening and design year conditions.

The following tables shows a side by side comparison of the Build versus No-Build conditions including improvements for the 2024 AM and PM peak hours at the study area intersections.

Table 4.16 - 2024 AM Peak Hour Comparison Table

	No-Build - AM		Build - AM No Improvement		Build - AM Improvement	
	LOS	Delay	LOS	Delay	LOS	Delay
#1 - US 23 & SR 752						
EB	D	36.2	D	38.3	C	28.9
WB	D	38.1	D	43.8	D	35.3
NB	D	37.7	D	54.2	C	34.0
SB	B	16.2	C	20.9	C	21.0
Overall Int.	**C**	**30.6**	**D**	**41.8**	**C**	**29.6**
#2 - SR 752 & BUSINESS PLACE NORTH						
EBL	A	7.7	A	7.8		
WBL	A	7.7	A	7.8		
NB	B	11.3	B	14.1		
SB	A	9.4	A	9.5		
Overall Int.	**--**	**--**	**--**	**--**		
#3 - SR 752 & SR 316						
EB	C	25.0	C	25.7		
WB	C	24.2	C	25.0		
NB	C	24.8	C	24.8		
SB	C	20.9	C	21.6		
Overall Int.	**C**	**23.3**	**C**	**24.2**		

Table 4.17 - 2024 PM Peak Hour Comparison Table

	No-Build - PM		Build - PM No Improvement		Build - AM Improvement	
	LOS	Delay	LOS	Delay	LOS	Delay
#1 - US 23 & SR 752						
EB	C	30.0	C	31.0	C	28.6
WB	D	35.4	D	38.8	D	38.2
NB	C	21.8	C	25.3	B	19.6
SB	D	42.4	D	44.7	D	44.6
Overall Int.	**C**	**33.9**	**D**	**36.6**	**C**	**34.4**
#2 - SR 752 & BUSINESS PLACE NORTH						
EBL	A	7.8	A	7.8		
WBL	A	7.9	A	8.2		
NB	B	12.5	C	15.8		
SB	B	12.5	B	14.9		
Overall Int.	**--**	**--**	**--**	**--**		
#3 - SR 752 & SR 316						
EB	C	25.2	C	27.2		
WB	C	24.8	C	27.7		
NB	C	24.7	C	23.3		
SB	C	25.8	C	26.7		
Overall Int.	**C**	**25.2**	**C**	**26.4**		

The following tables shows a side by side comparison of the Build versus No-Build conditions including improvements for the 2044 AM and PM peak hours at the study area intersections.

Table 4.18 - 2044 AM Peak Hour Comparison Table

	No-Build - AM		No-Build - AM Improvement		Build - AM No Improvement		Build - AM Improvement	
	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
#1 - US 23 & SR 752								
EB	D	45.8	D	38.7	D	37.8	D	42.8
WB	E	65.1	D	39.6	E	72.6	D	47.3
NB	F	87.9	D	38.7	E	71.6	D	45.6
SB	C	24.1	B	17.6	D	36.0	C	21.1
Overall Int.	**E**	**62.4**	**C**	**31.4**	**E**	**58.0**	**D**	**37.2**
#2 - SR 752 & BUSINESS PLACE NORTH								
EBL	A	7.9			A	7.9		
WBL	A	7.8			A	8.0		
NB	B	12.5			C	16.3		
SB	A	9.8			A	9.9		
Overall Int.	--	--			--	--		
#3 - SR 752 & SR 316								
EB	C	34.7			D	36.3		
WB	D	35.2			D	36.5		
NB	D	35.1			D	36.6		
SB	C	34.6			D	36.7		
Overall Int.	**C**	**34.9**			**D**	**36.5**		

Table 4.19 - 2044 PM Peak Hour Comparison Table

	No Build - PM		No-Build - PM Improvement		Build - PM No Improvement		Build - PM Improvement	
	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
#1 - US 23 & SR 752								
EB	C	33.9	D	38.8	C	34.8	D	37.2
WB	F	95.6	D	54.6	F	104.5	E	59.1
NB	C	31.1	B	19.8	C	24.0	B	19.9
SB	F	105.1	E	68.3	F	100.9	E	73.2
Overall Int.	**E**	**74.5**	**D**	**48.4**	**E**	**70.6**	**D**	**51.1**
#2 - SR 752 & BUSINESS PLACE NORTH								
EBL	A	8.0			A	8.1		
WBL	A	8.2			A	8.5		
NB	B	14.9			C	20.3		
SB	B	14.9			C	18.5		
Overall Int.	--	--			--	--		
#3 - SR 752 & SR 316								
EB	D	38.0			D	40.4		
WB	D	38.6			D	44.0		
NB	C	30.3			C	33.4		
SB	C	33.4			D	37.6		
Overall Int.	**D**	**35.2**			**D**	**39.1**		

4.2 Capacity & LOS at Development Access Intersections

Capacity analyses were performed for the proposed site access driveway on State Route752. The procedures outlined in the computerized version of the Transportation Research Board's **Highway Capacity Manual 7TH Edition** [1]**, (HCS2022, Release 8.1)** were utilized for stop sign controlled intersections.

Build Condition - 2024 Capacity Analysis

Analyses were performed for the projected 2024 conditions under the Build scenario to determine the future levels-of-service at the intersection where site access is available. The analysis will be based on permitting all ingress and egress movements at the proposed access location. The traffic volumes used in this analysis can be seen in **Figure 3.9, Appendix A.** Copies of the capacity worksheets are included in **Appendix M**. The results of the 2024 Build analyses are shown in the following table.

Table 4.20 - 2024 Traffic Analysis Results
(SR 752 & Proposed Access)

Access #1	2024 AM Build Conditions			Minor Street Stop Control	Access #1	2024 PM Build Conditions			Minor Street Stop Control
SR 752 & Access	LOS	Delay (sec/veh)	v/c	Q_{95} %tile (Veh/Ln)	SR 752 & Access	LOS	Delay (sec/veh)	v/c	Q_{95} %tile (Veh/Ln)
WBL	A	8.3	0.01	0.0	EBL	A	8.2	0.02	0.0
WB Approach	A	0.5	--	--	EB Approach	A	0.6	--	--
NBT	B	14.8	0.16	0.6	SBR	B	14.4	0.11	0.4
NB Approach	B	14.8	--	--	SB Approach	B	14.4	--	--

The capacity of the approaches and critical movements at the proposed access intersection along State Route 752 were found to be at a level-of-service B or better in the AM and PM peak hours.

Build Condition - 2044 Capacity Analysis

Analyses were performed for the projected 2044 conditions under the Build scenario to determine the future levels-of-service at the proposed intersection where site access is available. The analysis will be based on permitting all ingress and egress movements at the proposed access location. The traffic volumes used in this analysis can be seen in **Figure 3.10, Appendix A.** Copies of the capacity worksheets are included in **Appendix N**. The results of the 2044 Build analyses are shown in the following table.

Table 4.21 - 2024 Traffic Analysis Results
(SR 752 & Proposed Access)

Access #1	2044 AM Build Conditions			Minor Street Stop Control	Access #1	2044 PM Build Conditions			Minor Street Stop Control
SR 752 & Access	LOS	Delay (sec/veh)	v/c	Q_{95} %tile (Veh/Ln)	SR 752 & Access	LOS	Delay (sec/veh)	v/c	Q_{95} %tile (Veh/Ln)
WBL	A	8.5	0.01	0.0	EBL	A	8.4	0.02	0.1
WB Approach	A	0.4	--	--	EB Approach	A	0.5	--	--
NBT	C	16.7	0.19	0.7	SBR	C	16.5	0.13	0.4
NB Approach	C	16.7	--	--	SB Approach	C	16.5	--	--

The capacity of the approaches and critical movements at the proposed access intersection along State Route 752 were found to be at a level-of-service C or better in the AM and PM peak hours.

4.3 Auxiliary Turning Lane Warrant Analysis

It is the intent of this report to evaluate the need for exclusive deceleration and turning lanes at the proposed State Route 752 access location based on the following conditions:

- Two-lane roadway
- Posted speed limit of 55 miles per hour

The following table shows the results of the analysis of the need for exclusive deceleration and turn lanes on State Route 752 at the access driveway under the forecasted 2024 and 2044 Build conditions. Copies of the ODOT turn lane warrant graphs can be seen in **Appendix O**.

Table 4.22 Turn Lane Warrants
(SR 752 & Access Driveway)

State Route 752 @ Development Access Driveway	2024		2044	
	AM	PM	AM	PM
Westbound Left Turn Lane	NO	NO	NO	**YES**
Eastbound Right Turn Lane	**YES**	**YES**	**YES**	**YES**

The results of the turn lane analyses indicate an exclusive westbound left turn lane on State Route 752 at the access driveway ***is*** warranted under the expected 2044 PM peak hour Build conditions.

The results of the turn lane analyses indicate that an exclusive eastbound right turn lane on State Route 752 at the access driveway ***is*** warranted under the expected 2024 and 2044 Build conditions.

4.4 Turn Lane Length Analysis

Analyses were performed to determine the necessary turn lane storage lengths in order to accommodate the recommended turns lanes and turn lanes found deficient in length at the study area intersections.

The calculations will be based on the Year 2044 peak hour Build conditions.

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

US Route 23 & State Route 752

- Traffic Control (Signalized)
- Design Speed > 40 Miles Per Hour
- NB & WB Right Turn Movement > 10% of Approach Volume
  = High Turn Demand Volume
    - Condition B or C
- SB Right Turn Movement < 10% of Approach Volume
  = Low Turn Demand Volume
    - Condition B

State Route 752 & SR 316/Ashville Pike

- Traffic Control (Signalized)
- Design Speed < 40 Miles Per Hour
- Condition A

State Route 752 & Proposed Access Driveway

- Traffic Control (Un-Signalized)
- Design Speed > 40 Miles Per Hour
- WB Left Turn Movement < 10% of Approach Volume
  = Low Turn Demand Volume
    - Condition B
- EB Right Turn Movement > 10% of Approach Volume
  = High Turn Demand Volume
  - Condition B or C

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 2044 Build peak hour conditions.

Table 4.23 Turn Lane Length Analysis
(US Route 23 & SR 752)

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 T	2067	2	30	34.45	60	1125			1125	
SB RT	55	1	30	1.83	60	100	345			800*
NB T	1797	2	30	29.95	60	975			975	
NB RT	293	1	30	9.77	60	375	345	560		800*
WB RT	121	2	30	2.02	60	150	345	335		375*
WB T/LT	277	1	30	9.23	60	375			375	

*** Includes 50' Taper**

Table 4.24 Turn Lane Length Analysis
(SR 752 & SR 316/Ashville Pike)

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 A*	Backup Length (ft)	Turn Lane Length* (ft)
SB LT	260	1	30	8.67	35	350	400		600*
SB T/R	526	1	30	17.53	35	625		625	

*** Includes 50' Taper**

Table 4.25 Turn Lane Length Analysis
(SR 752 & Proposed Driveway)

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*		
WB LT	17	2	30	0.28	60	50	345			345*
EB RT	62	1	30	2.07	60	100	345	285		345*

*** Includes 50' Taper**

4.5 Improvements to Accommodate Study Area Traffic

Recommended Improvements to Serve Future Conditions without the Development
The following improvements are recommended to improve the levels-of-service under the 2024 No-Build conditions at the study area intersections.

SR 752 and SR 316/Ashville Pike (Village of Ashville)

- Extend the length of the southbound left turn lane (600').

Recommended Improvements to Mitigate the Traffic Associated with the Development
The following improvements are recommended to improve the levels-of-service under the 2024 Build conditions at the study area intersections.

US Route 23 and SR 752 (ODOT)

- Construct a northbound right turn lane (800').

2024 Development Access Recommendations
The following lane use and traffic control is recommended at the intersections where access to the site is proposed.

State Route 752 & Proposed Site Access Driveway (Village of Ashville)

- Construct an exclusive eastbound right turn lane (345') for the opening year of the development.
- Construct the proposed south approach with one egress lanes and one ingress lane.
- Install stop sign control on the northbound approach.

2044 Development Access Recommendations
The following lane use and traffic control is recommended at the intersections where access to the site is proposed.

State Route 752 & Proposed Site Access Driveway (Village of Ashville)

- Construct an exclusive westbound left turn lane (345') in the opening year of the development.

The recommended lane use and traffic control for the study area to accommodate expected traffic volumes can be seen in **Figure 4.1, Appendix A.**

Chapter 5
Conclusions

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

5.1 This Traffic Impact Study (TIS) has been prepared at the request of Poggemeyer Design Group for a proposed DHL facility. The proposed development is located in the Village of Ashville, Pickaway County, Ohio.

5.2 The development is expected to consist of a single 545,200 square foot building. The proposed building is located along the south side of State Route 752 to the east of US Route 23 and to the west of Business Place North. The building and site is expected to accommodate land uses related to commerce and fulfillment operations.

5.3 The year 2024 was analyzed for the opening year conditions of the development based on the expected development time line.

5.4 The development is proposed with two access locations. The project proposes an intersection along State Route 752 that would provide full access to the site. A second access location is proposed along Business Place North.

5.5 A **Traffic Volume Forecast** was previously prepared for use in this Traffic Impact Study. The development and submission of the traffic volume forecasts for the proposed project are intended to follow the TIS Review Process detailed in *Section 9.32* and the TIS Flow Chart shown *Figure 9.1* of the ODOT **State Highway Access Management Manual** (7). A copy of the **July 18, 2022 Traffic Volume Forecast** report can be seen in **Appendix A**.

5.6 The project has significantly changed to include only one proposed building since the completion of the **July 18, 2022 Traffic Volume Forecast**. The traffic volume forecast was updated within this TIS per the procedures, guidelines, and assumptions that were made in the July 18, 2022 forecast document.

5.7 The weekday peak hours of traffic for the study area roadways were based on the traffic data collected for this report. The weekday AM peak hour of traffic was determined to be 7:00 AM to 8:00 AM. The weekday PM peak hour of traffic was found to be 3:45 PM to 4:45 PM. These periods were analyzed since they reflect the period of the highest volume of traffic flow for the study area roadways.

5.8 The proposed development is expected to generate the following hourly traffic volumes during the peak periods as shown in the table below:

OPENING YEAR	SIZE	TRIP ENDS							
		Weekday Peak Hour Between 7-9 AM				Weekday Peak Hour Between 4-6 PM			
		ENTER		EXIT		ENTER		EXIT	
		Vehicles	*Trucks*	Vehicles	*Trucks*	Vehicles	*Trucks*	Vehicles	*Trucks*
2024	545,200 SF	103	*15*	102	*15*	139	*10*	66	*10*
TOTAL NEW TRIPS		**118**		**117**		**149**		**76**	
		235				**225**			

5.9 The year 2044 was forecasted for the twenty year design hour conditions in the July 18, 2022 forecast document. The year 2044 will continued to be used for the design year in order to provide a conservative analysis of the expected future conditions in the study area and to provide consistency with the previously prepared forecast document.

5.10 The following improvements are recommended to improve the levels-of-service under the 2024 No-Build conditions at the study area intersections.

SR 752 and SR 316/Ashville Pike (Village of Ashville)

- Extend the length of the southbound left turn lane (600').

5.11 The following improvements are recommended to improve the levels-of-service under the 2024 Build conditions at the study area intersections.

US Route 23 and SR 752 (ODOT)

- Construct a northbound right turn lane (800').

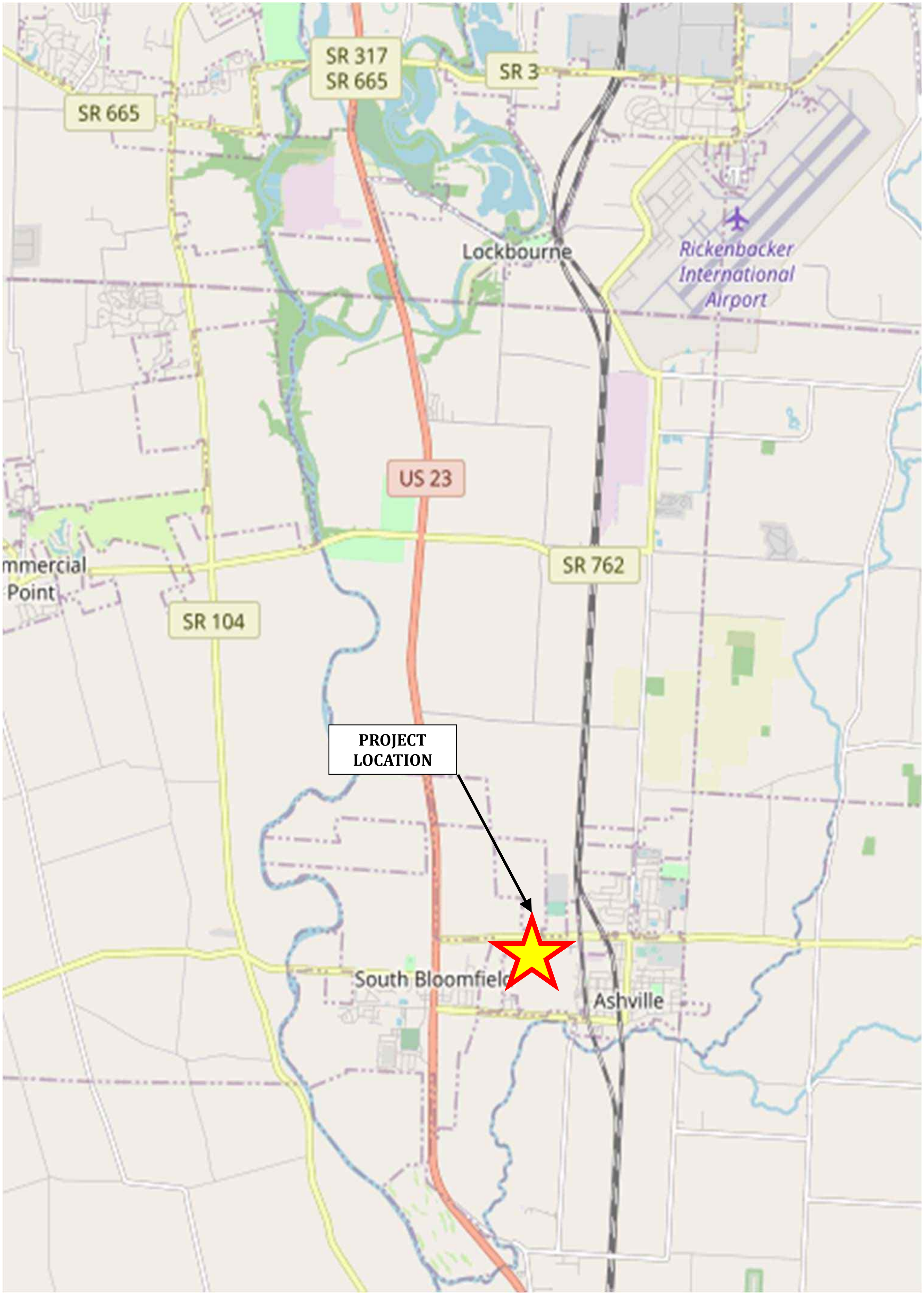
5.12 The following lane use and traffic control is recommended at the intersection where access to the site is proposed.

State Route 752 & Proposed Site Access Driveway (Village of Ashville)

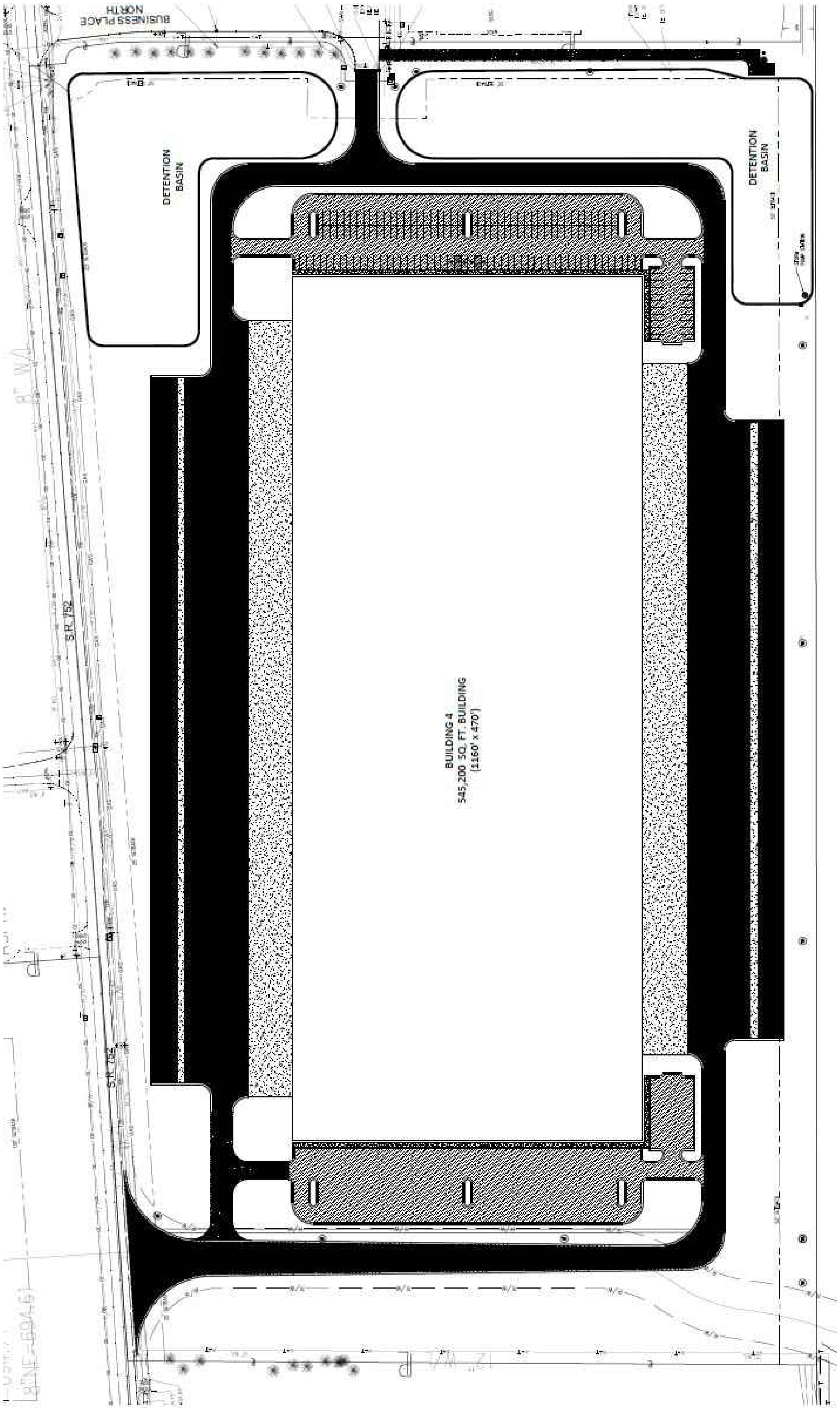
- Construct an exclusive eastbound right turn lane (345') for the opening year of the development (2024 Build).
- Construct an exclusive westbound left turn lane (345') in the opening year of the development (2024 Build).
- Construct the proposed south approach with one egress lanes and one ingress lane (2024 Build).
- Install stop sign control on the northbound approach (2024 Build).

5.13 Based upon the results of the analysis in this study and the corresponding recommendations, it can be seen that the development traffic can be accommodated without adversely impacting the area roadway network.

Appendix A
Figures



TMS Engineers, Inc. Transportation Management Services 2112 Case Parkway S., Unit 7, Twinsburg, Ohio 44087 www.TMSEngineers.com	DHL Development Traffic Impact Study Ashville, Ohio	Project Location Map	NORTH NOT TO SCALE	Figure: 1.1 Appendix: A



TMS Engineers, Inc. Transportation Management Services 2112 Case Parkway S., Unit 7, Twinsburg, Ohio 44087 www.TMSEngineers.com	**DHL Development** **Traffic Impact Study** **Ashville, Ohio**	**Site Plan**	**NORTH** NOT TO SCALE	**Figure:** 1.2 **Appendix:** A

TMS Engineers, Inc. Transportation Management Services 2112 Case Parkway S., Unit 7, Twinsburg, Ohio 44087 www.TMSEngineers.com	DHL Development Traffic Impact Study Ashville, Ohio	Traffic Count Locations	NORTH NOT TO SCALE	Figure: 2.1 Appendix: A

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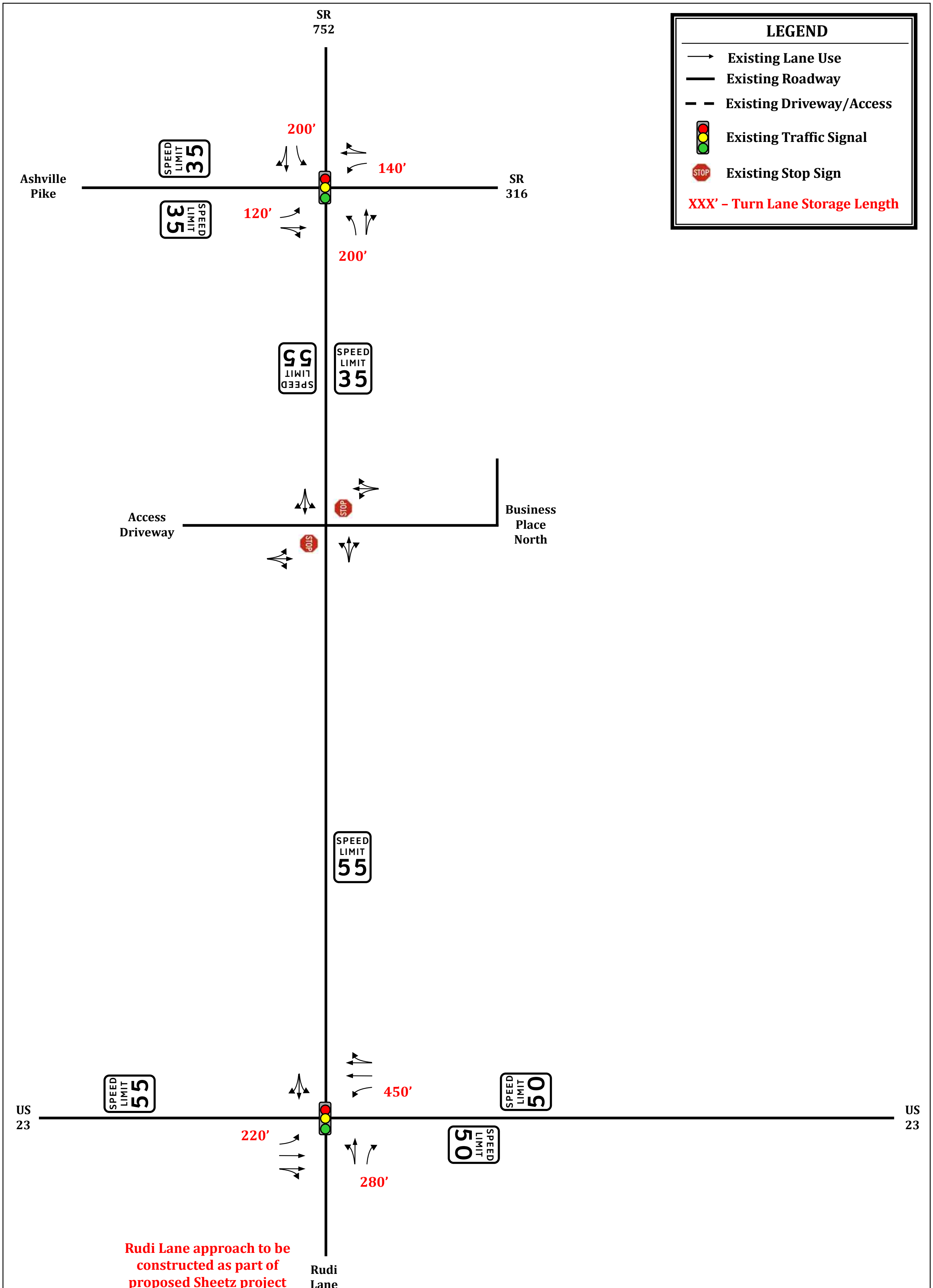

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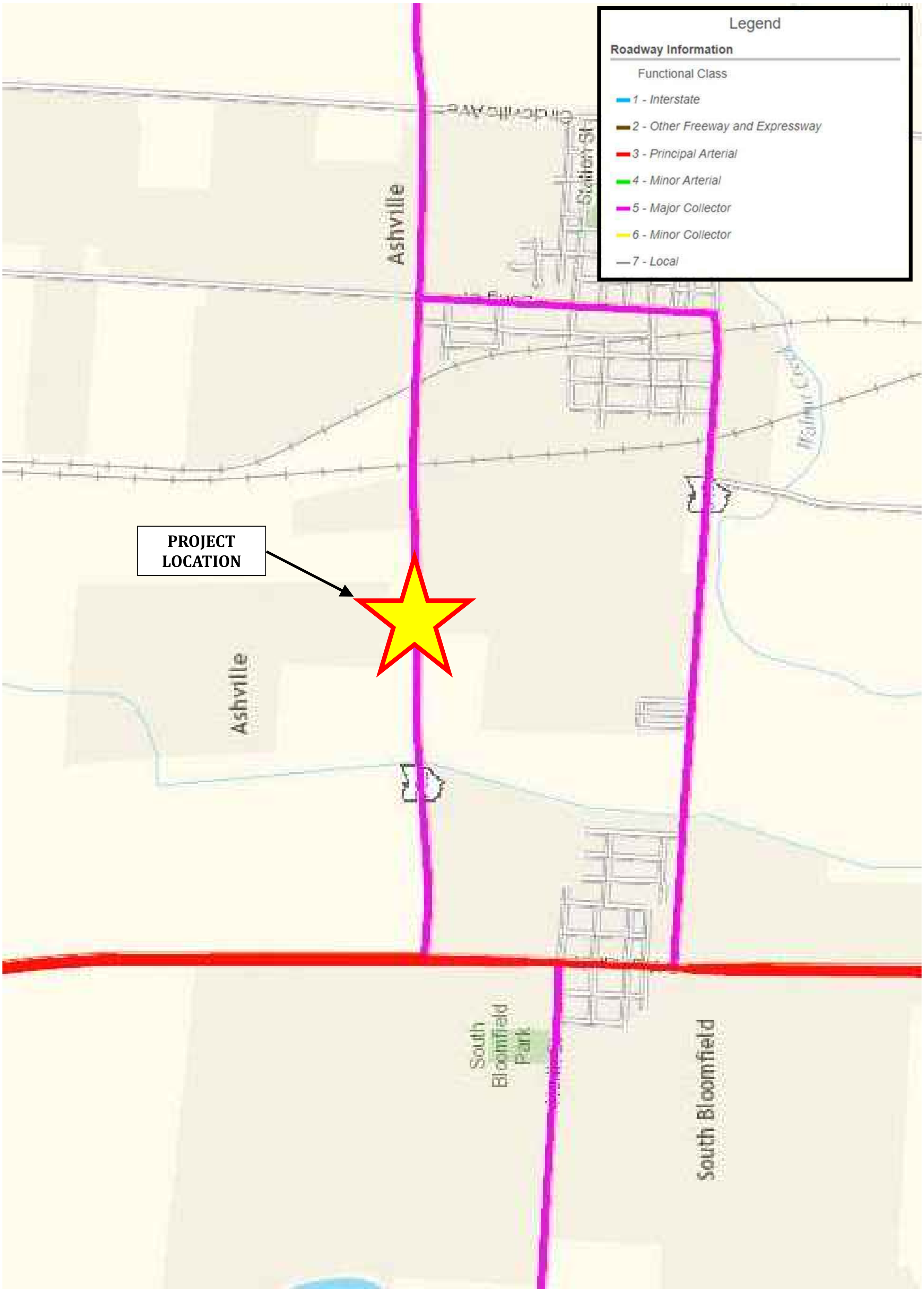
Ashville, Ohio

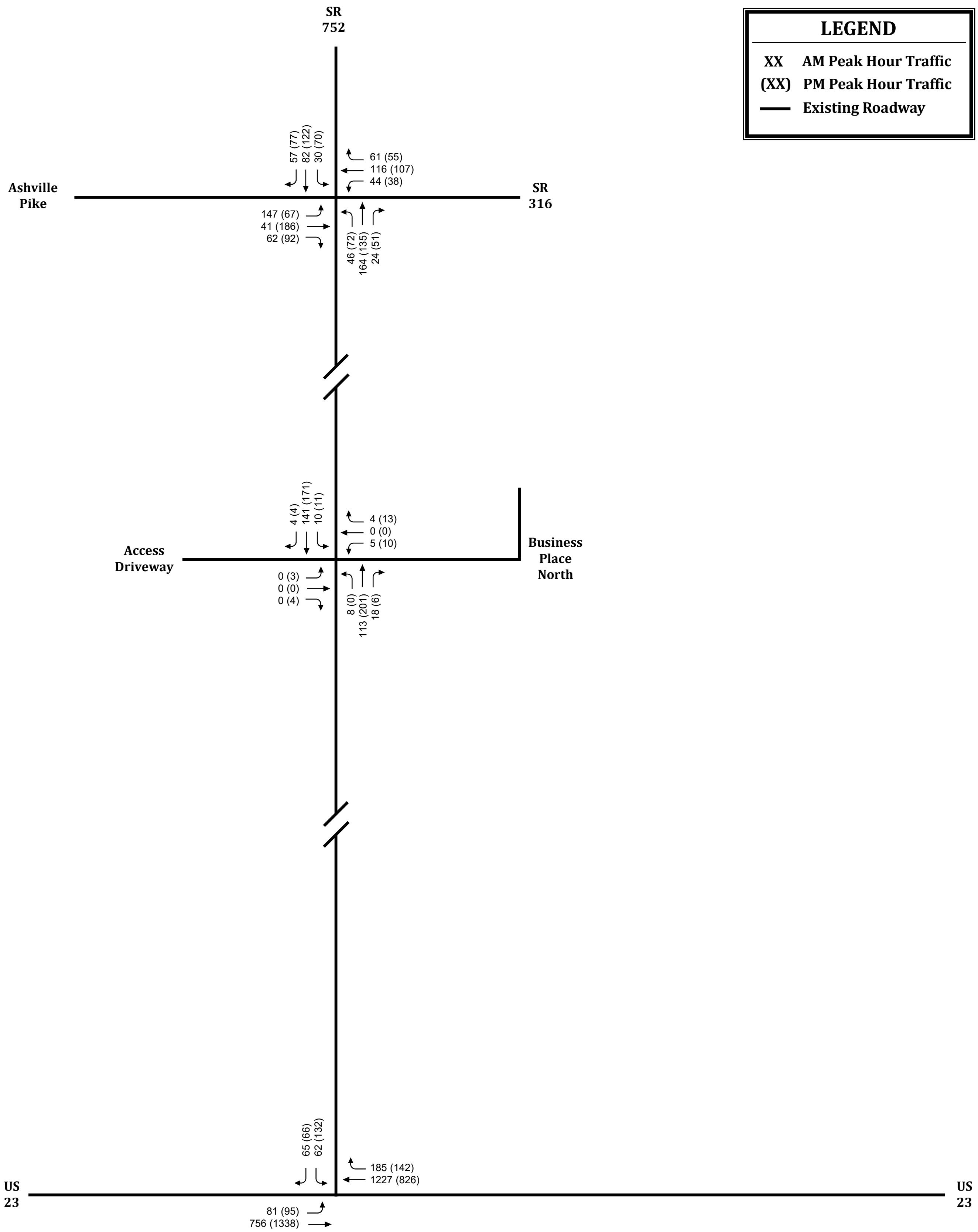
Existing Conditions
Lane Use & Traffic Control

NORTH
NOT TO SCALE

Figure: 2.3
Appendix: A

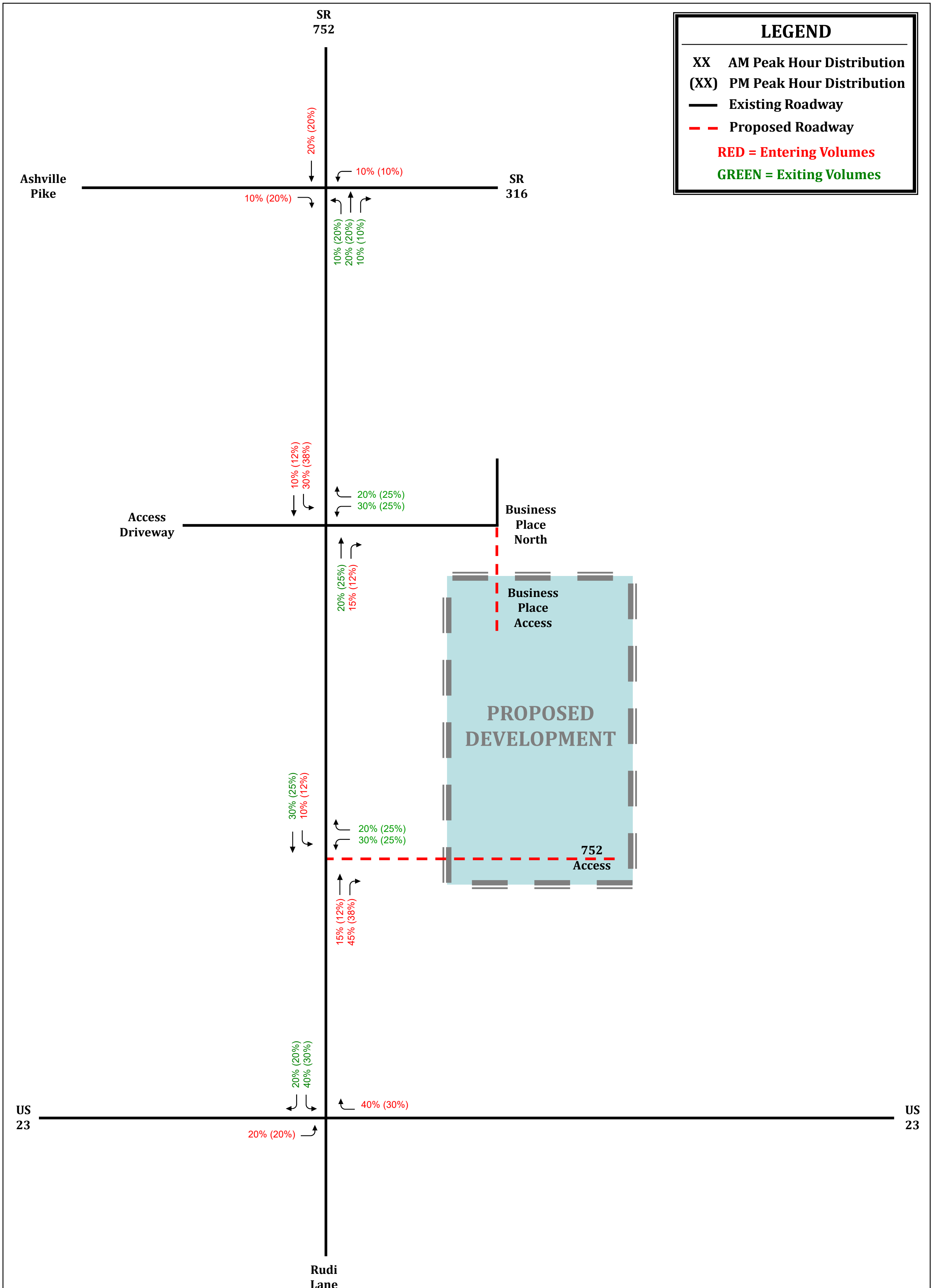


TMS Engineers, Inc. Transportation Management Services 2112 Case Parkway S., Unit 7, Twinsburg, Ohio 44087 www.TMSEngineers.com	DHL Development Traffic Impact Study Ashville, Ohio	Functional Classification	NORTH NOT TO SCALE	Figure: 2.4 Appendix: A



It should be noted that the discrepancy between traffic volumes at the intersection of SR 752/Business Place North and the adjacent intersections can be attributed to the data collection being performed on different dates.

TMS Engineers, Inc. Transportation Management Services 2112 Case Parkway S., Unit 7, Twinsburg, Ohio 44087 www.TMSEngineers.com	DHL Development Traffic Impact Study Ashville, Ohio	Existing 2022 Weekday Peak Hour Traffic Volumes	NORTH NOT TO SCALE	Figure: 2.5 Appendix: A



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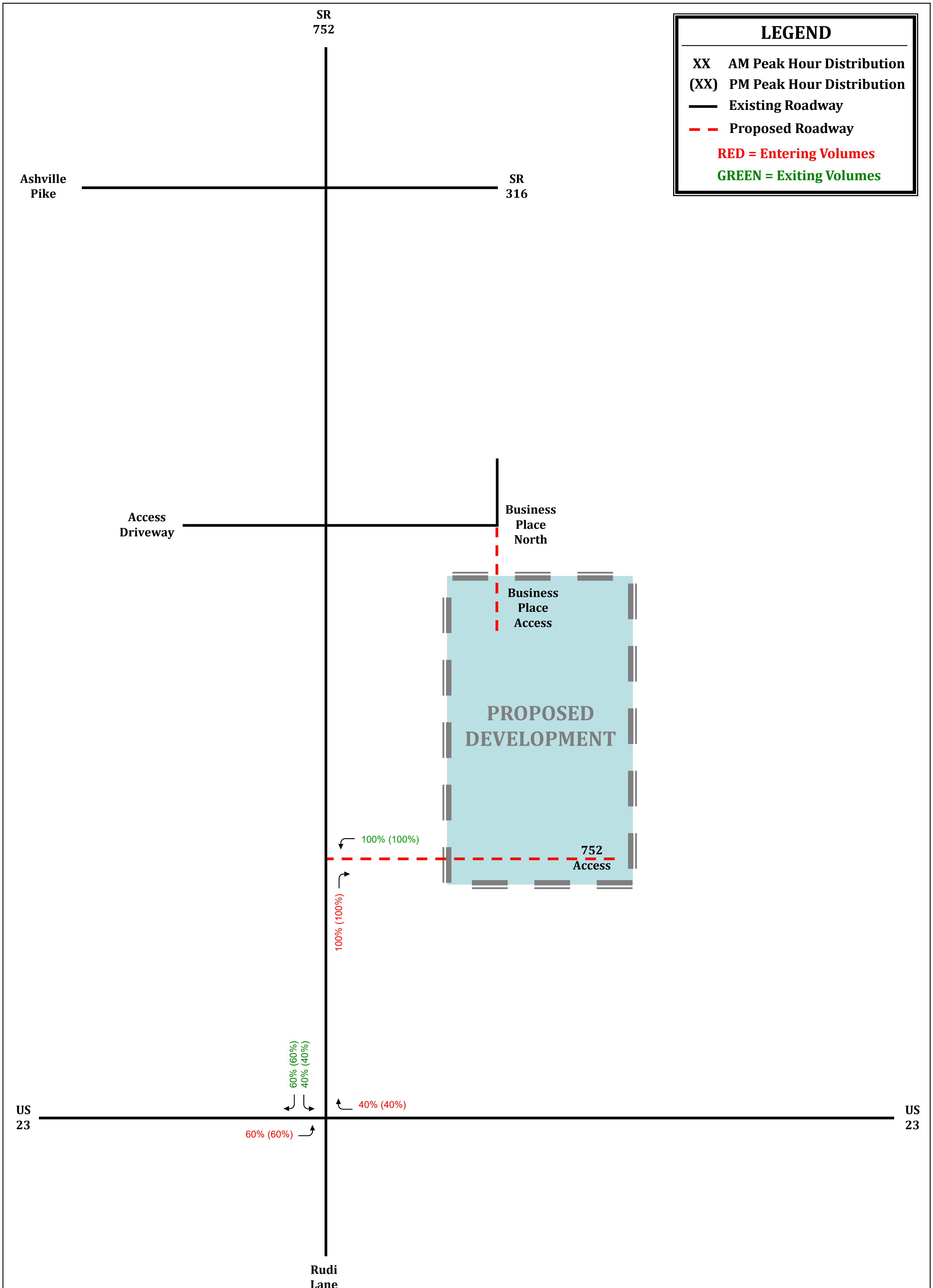
DHL Development
Traffic Impact Study
Ashville, Ohio

Directional Distribution
New Generated Vehicle Traffic

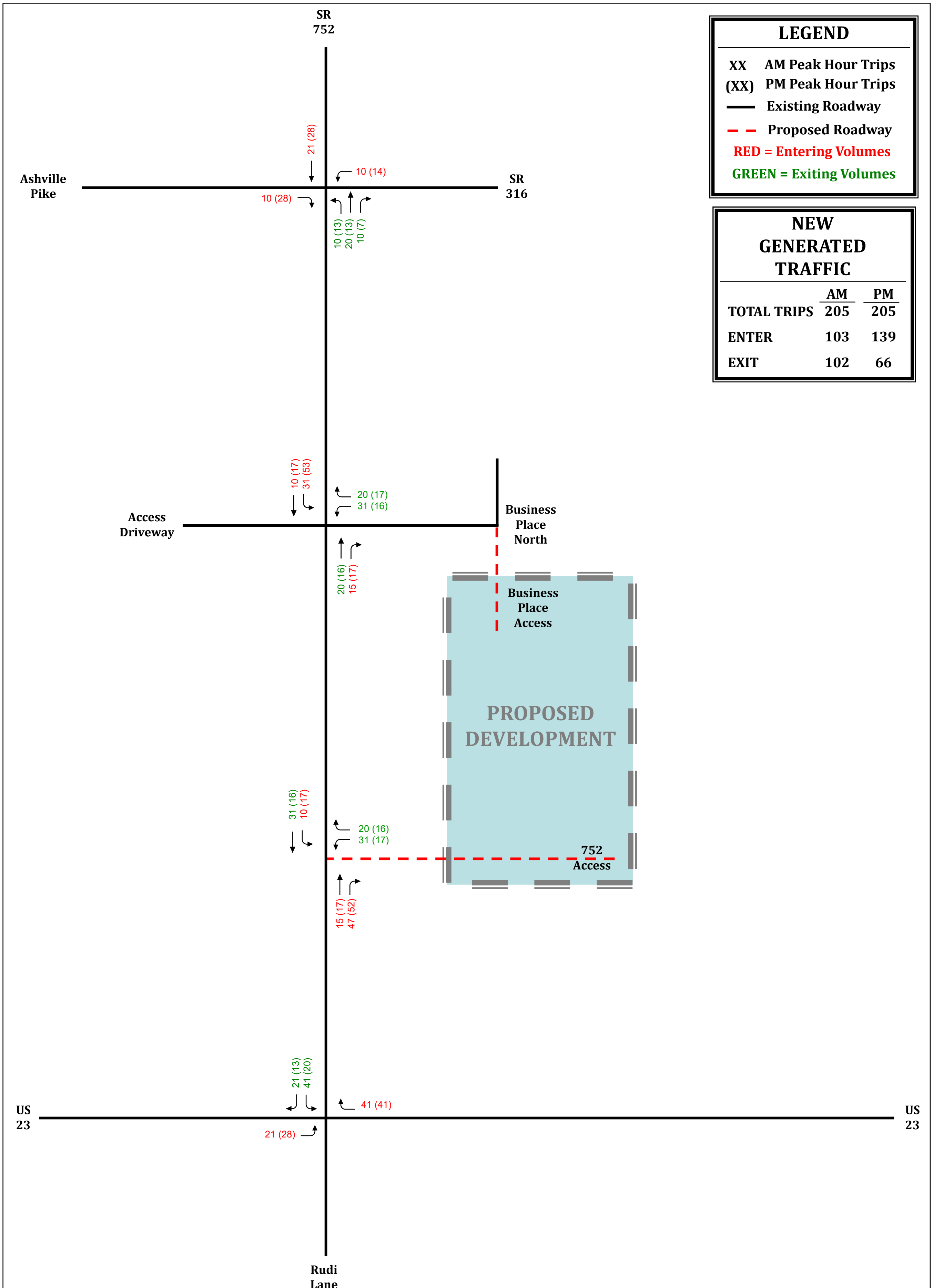
NORTH
NOT TO SCALE

Figure: 3.1

Appendix: A



TMS Engineers, Inc. Transportation Management Services 2112 Case Parkway S., Unit 7, Twinsburg, Ohio 44087 www.TMSEngineers.com	DHL Development Traffic Impact Study Ashville, Ohio	Directional Distribution New Generated Truck Traffic	NORTH NOT TO SCALE	Figure: 3.2 Appendix: A



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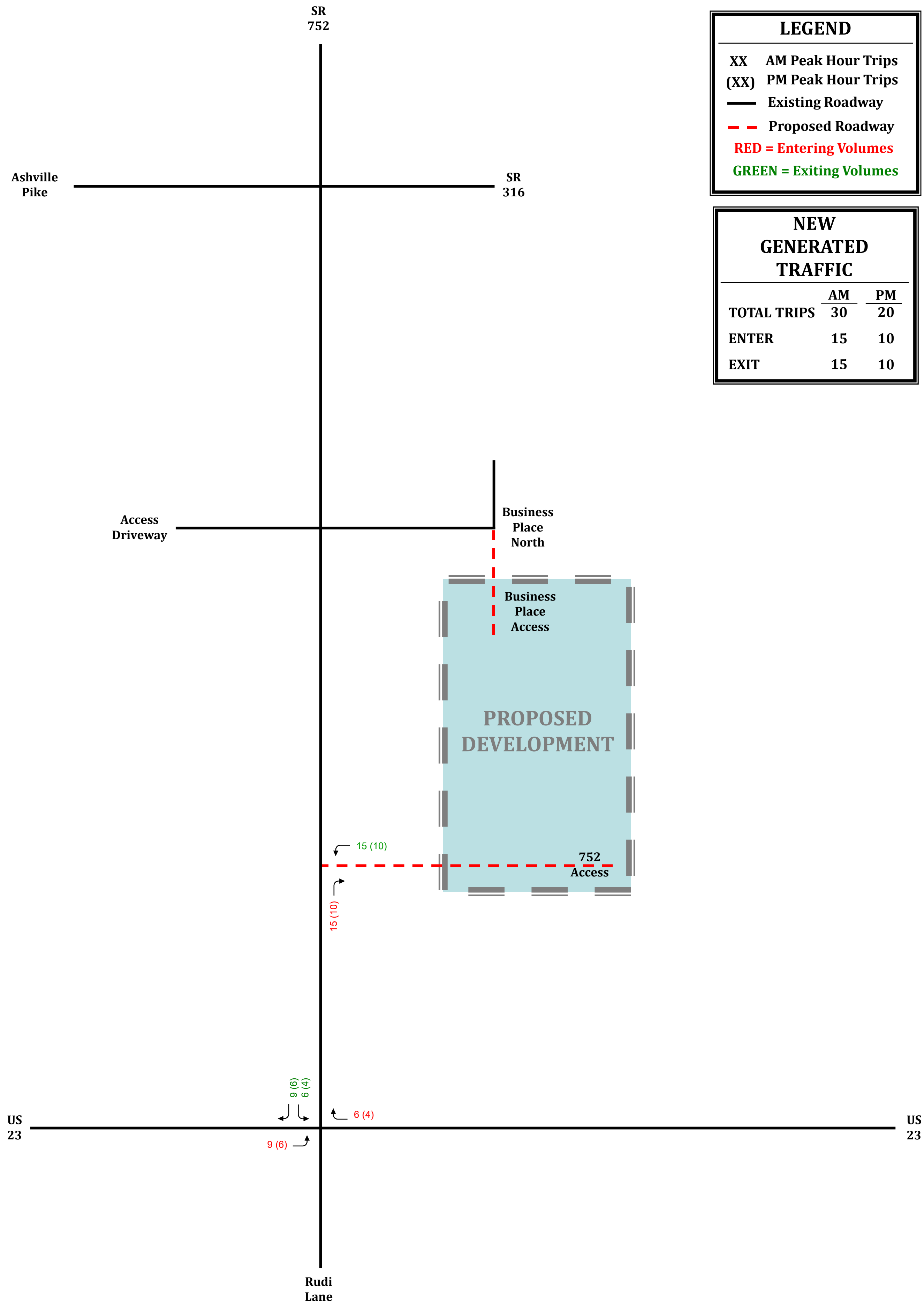
DHL Development
Traffic Impact Study
Ashville, Ohio

New Generated
Vehicle Traffic

NORTH
NOT TO SCALE

Figure: 3.3

Appendix: A



LEGEND

XX AM Peak Hour Trips
(XX) PM Peak Hour Trips
Existing Roadway
Proposed Roadway
RED = Entering Volumes
GREEN = Exiting Volumes

NEW GENERATED TRAFFIC

	AM	PM
TOTAL TRIPS	30	20
ENTER	15	10
EXIT	15	10

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DHL Development
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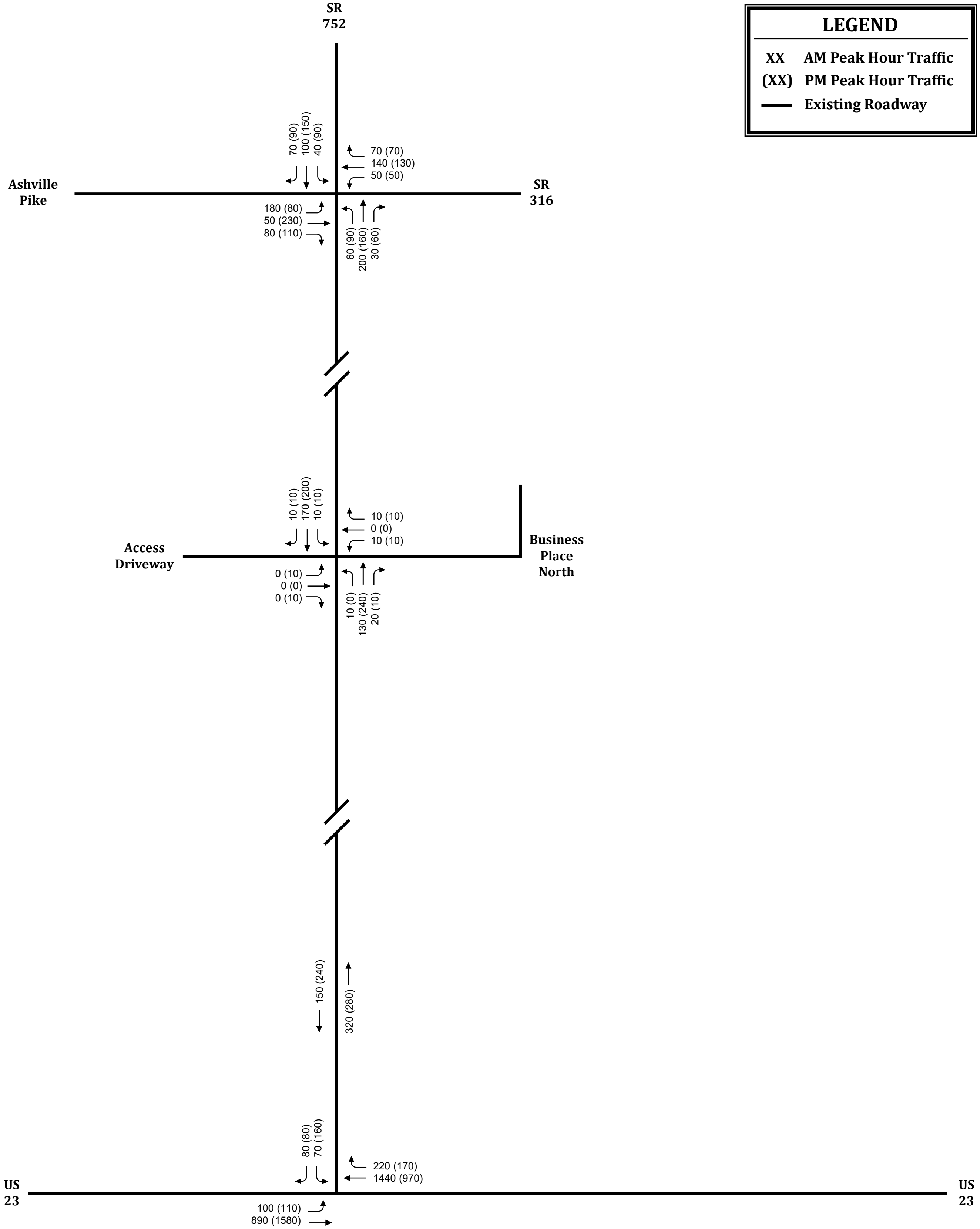
New Generated
Truck Traffic

NORTH
NOT TO SCALE

Figure: 3.4
Appendix: A



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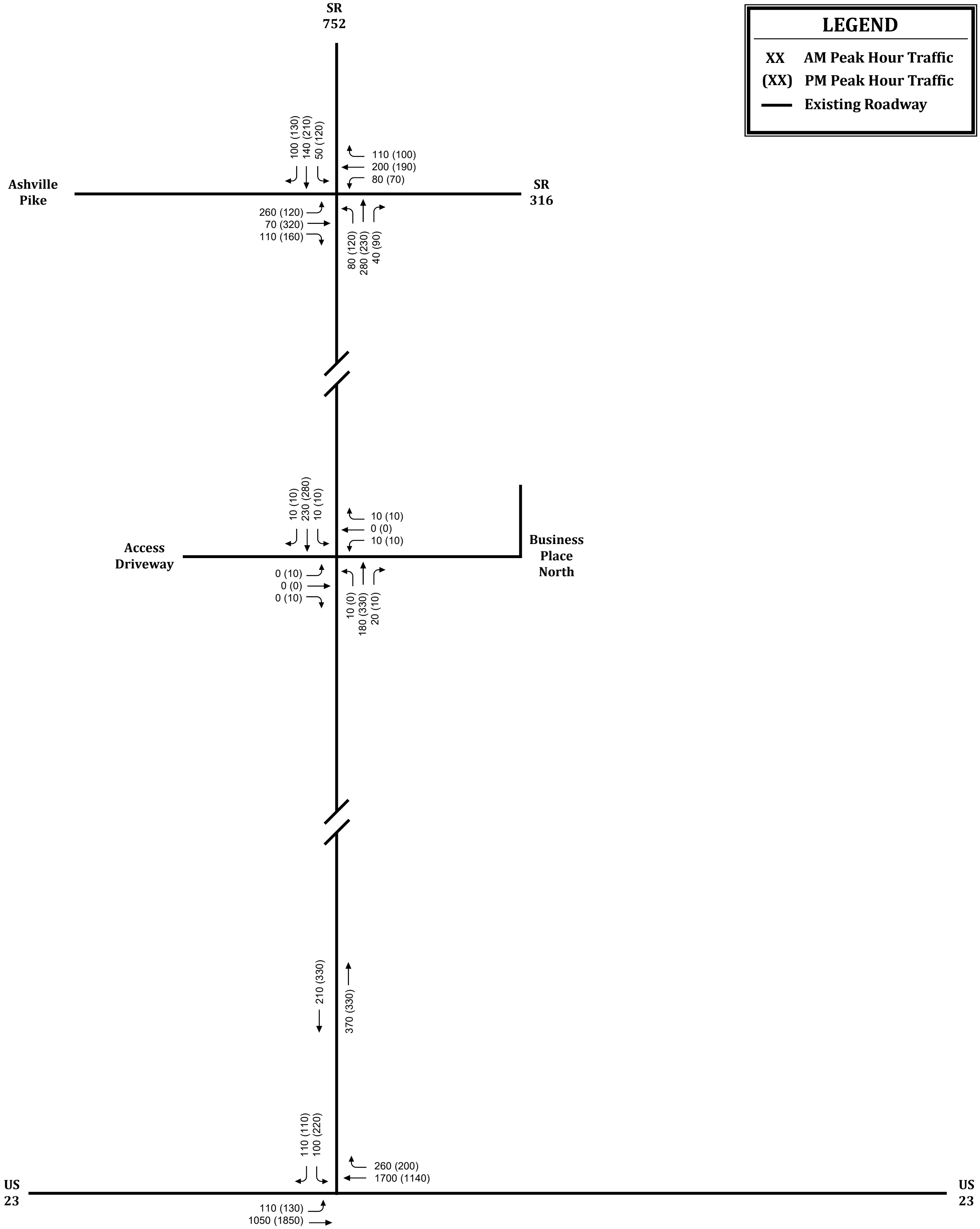
DHL Development
Traffic Impact Study
Ashville, Ohio

2024 No-Build
Peak Hour Traffic Volumes
W/OUT
Additional Developments

NORTH
NOT TO SCALE

Figure: 3.5

Appendix: A



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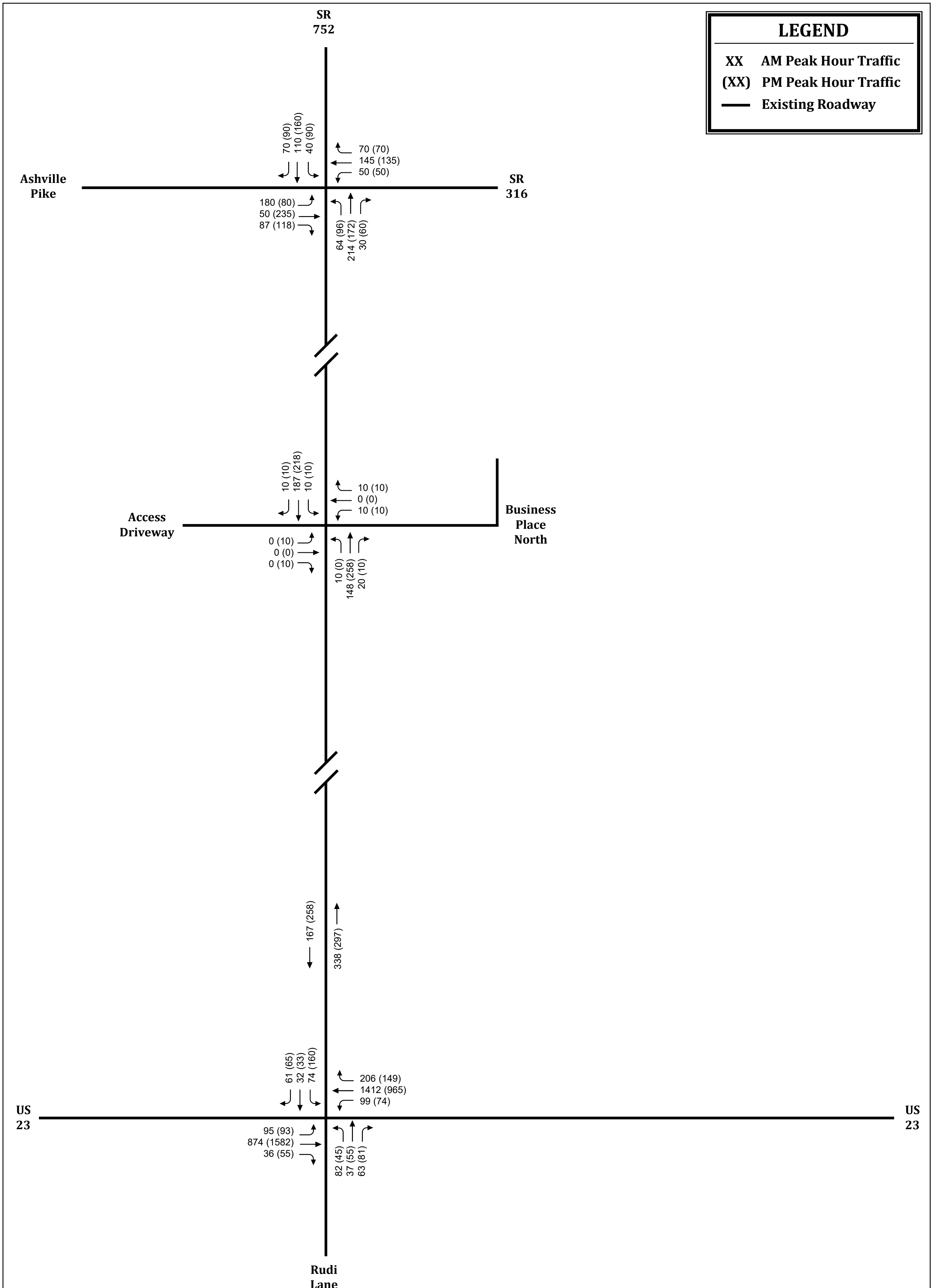
Traffic Impact Study
Ashville, Ohio

2044 No-Build
Peak Hour Traffic Volumes
W/OUT
Additional Developments

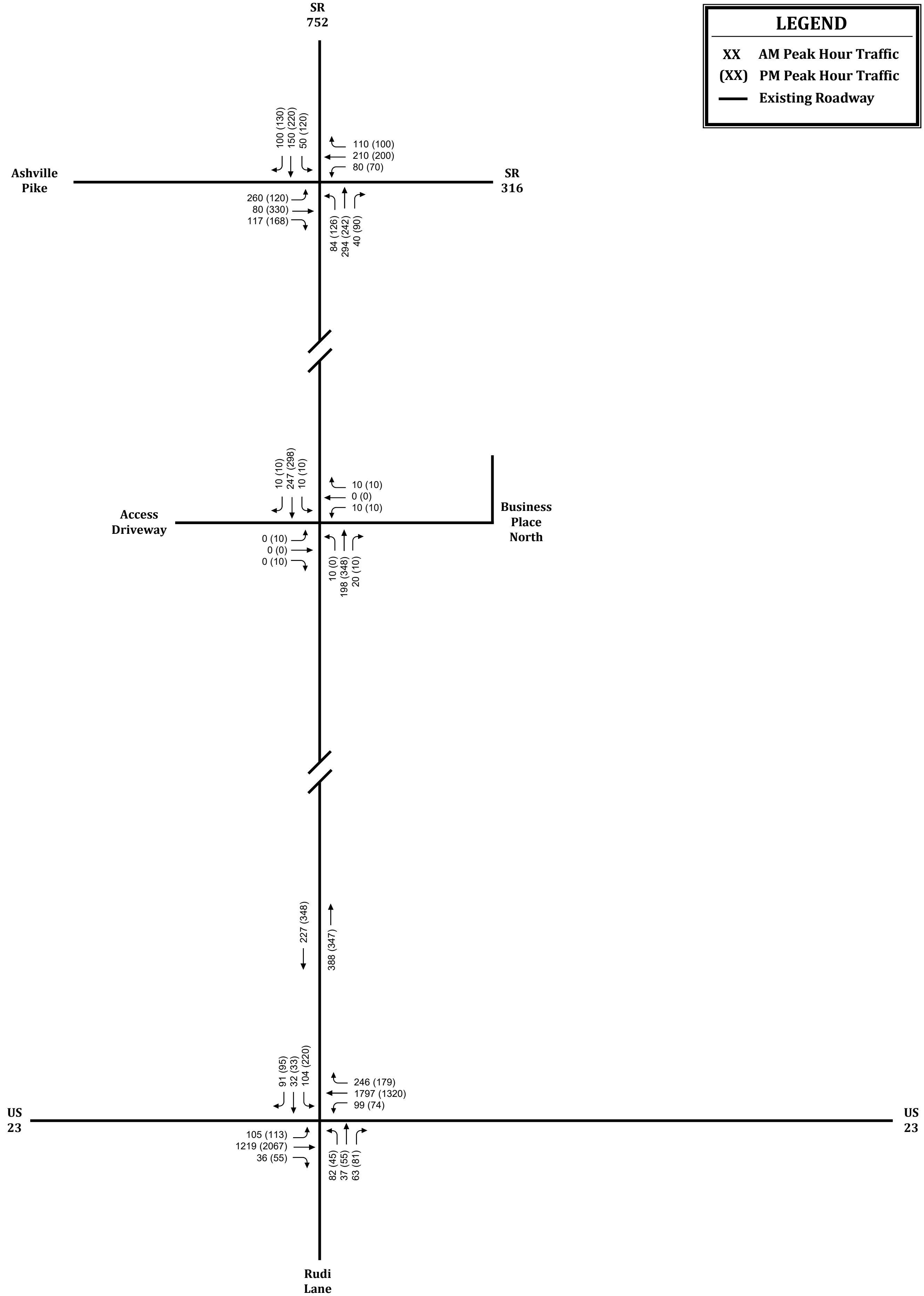
NORTH
NOT TO SCALE

Figure: 3.6

Appendix: A



TMS Engineers, Inc. Transportation Management Services 2112 Case Parkway S., Unit 7, Twinsburg, Ohio 44087 www.TMSEngineers.com	DHL Development Traffic Impact Study Ashville, Ohio	2024 No-Build Peak Hour Traffic Volumes WITH Additional Developments	NORTH NOT TO SCALE	Figure: 3.7 Appendix: A



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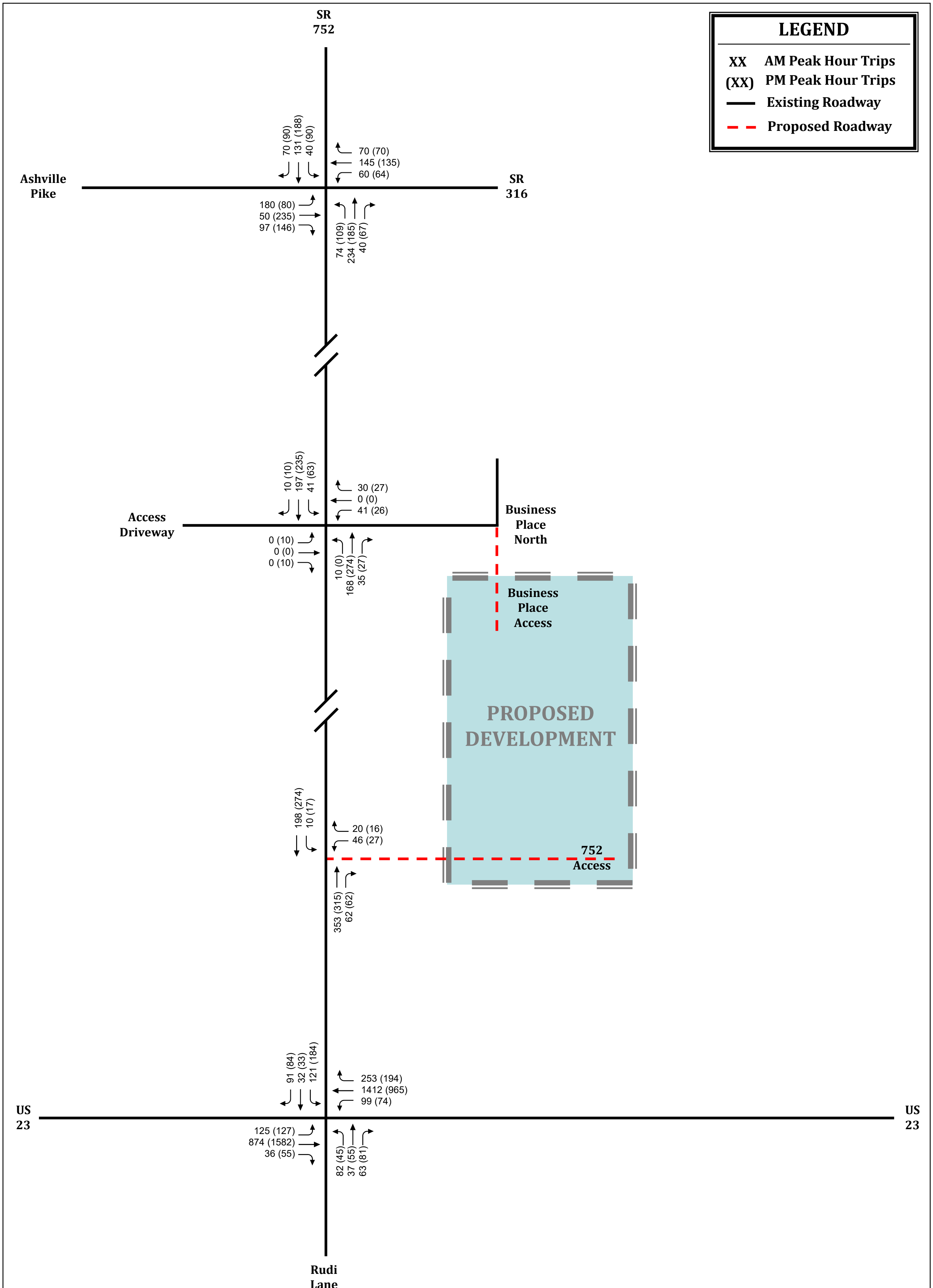
DHL Development
Traffic Impact Study
Ashville, Ohio

2044 No-Build
Peak Hour Traffic Volumes
WITH
Additional Developments

NORTH
NOT TO SCALE

Figure: 3.8

Appendix: A



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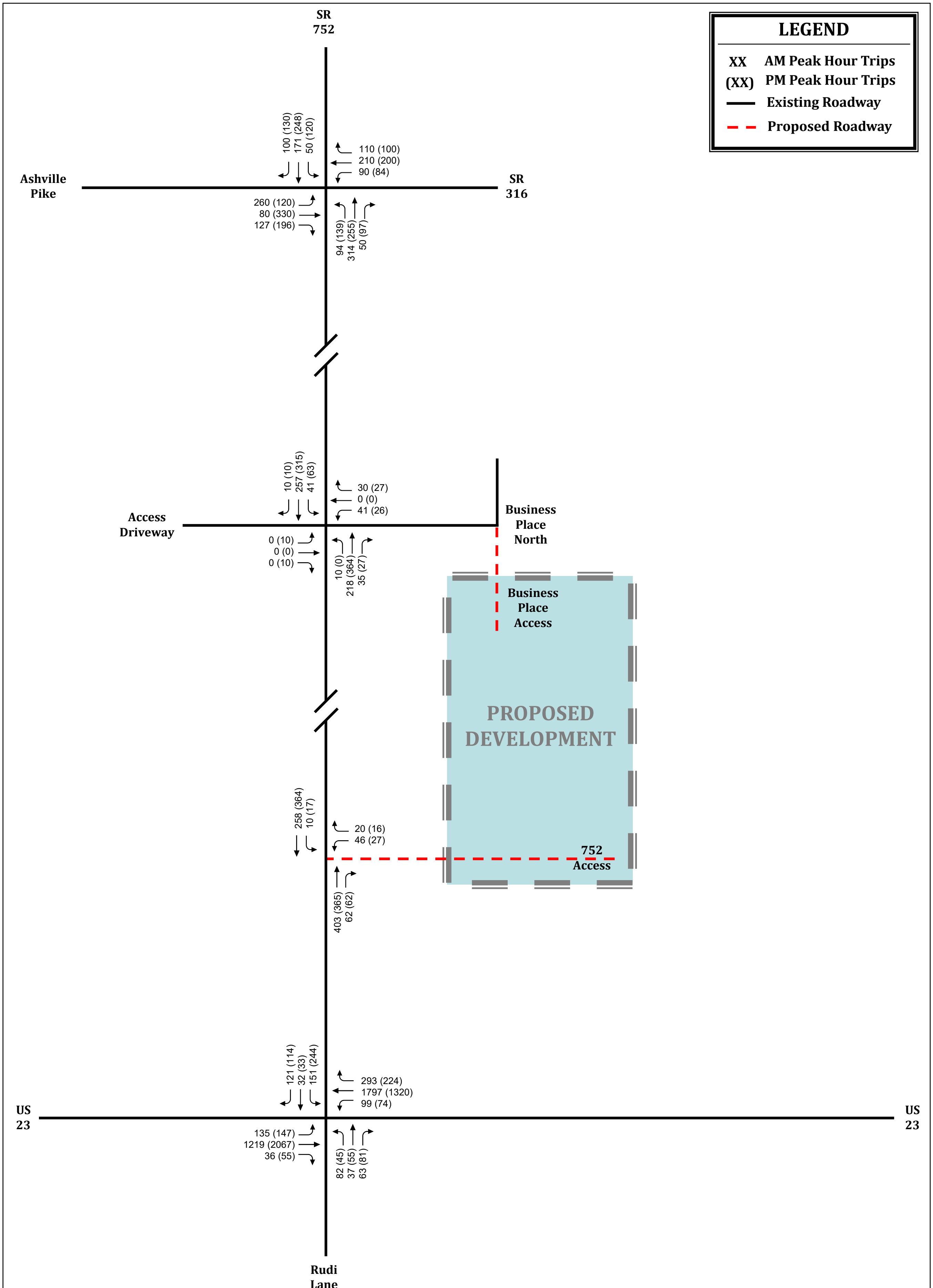
DHL Development
Traffic Impact Study
Ashville, Ohio

2024
Build Peak Hour
Traffic Volumes

NORTH
NOT TO SCALE

Figure: 3.9

Appendix: A



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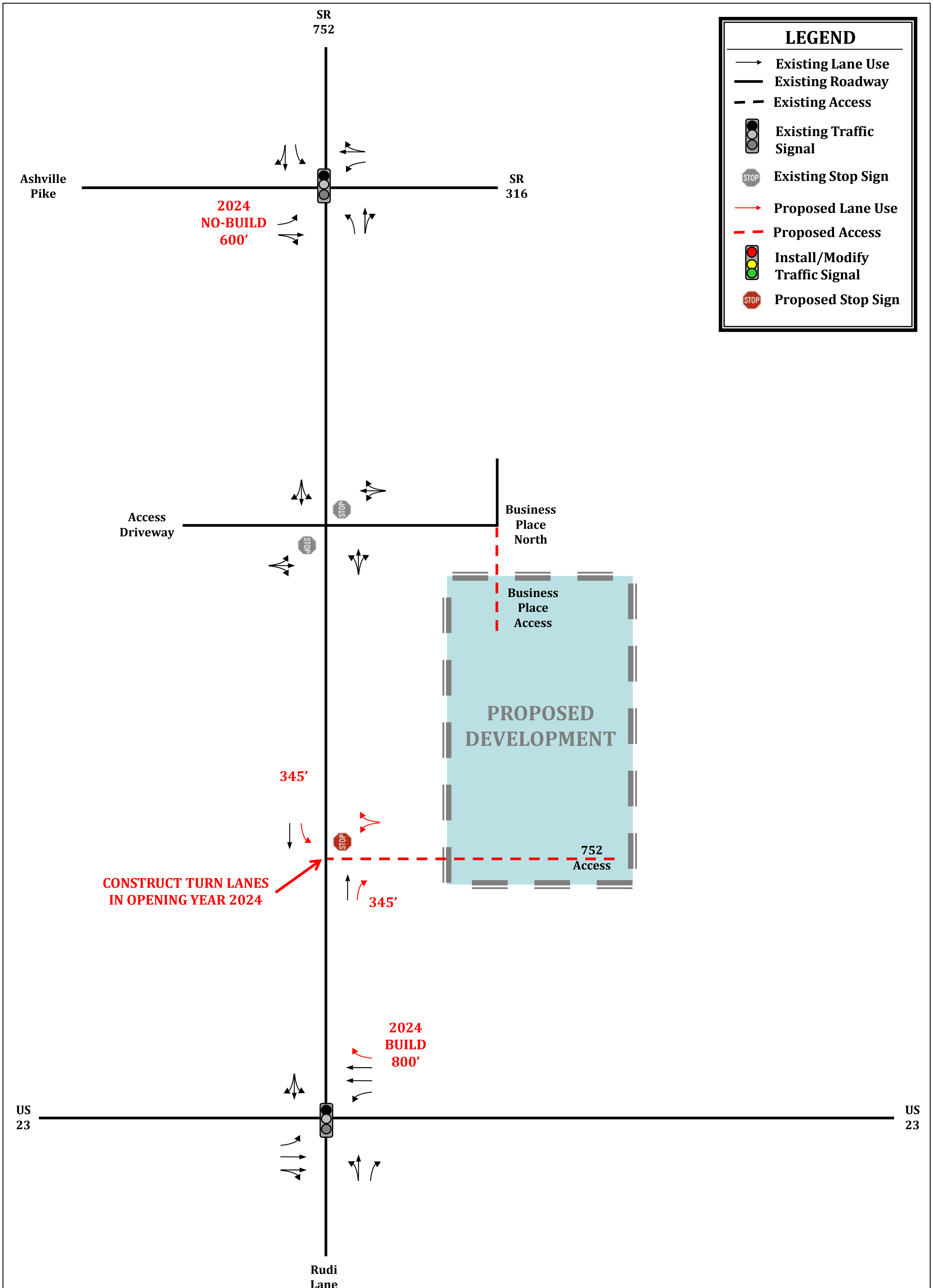
DHL Development
Traffic Impact Study
Ashville, Ohio

2044
Build Peak Hour
Traffic Volumes

NORTH
NOT TO SCALE

Figure: 3.10

Appendix: A



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DHL Development Traffic Impact Study Ashville, Ohio	Recommended Lane Use & Traffic Control	NORTH NOT TO SCALE	Figure: 4.1 Appendix: A

Appendix B
Traffic Volume Forecast - July 18, 2022

TMS Engineers, Inc.

Traffic Volume Forecast

DHL Facility

Village of Ashville, Ohio

April 1, 2022
May 4, 2022
June 30, 2022
REVISED
July 18, 2002

Prepared for:

Poggemeyer Design Group, Inc.
101 Clinton Street
Defiance, Ohio 43512

TRAFFIC VOLUME FORECAST

DHL Facility

Village of Ashville, Ohio

April 1, 2022
May 4, 2022
June 30, 2022
REVISED
July 18, 2022

Prepared For:

Poggemeyer Design Group, Inc.
101 Clinton Street
Defiance, Ohio 43512

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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Chapter 1
Introduction

1.1 Purpose of Report

This traffic volume forecast has been prepared at the request of the Poggemeyer Design Group, Inc. for a Traffic Impact Study that will be prepared for a proposed DHL facility. The development and submission of the traffic volume forecasts for the proposed project are intended to follow the TIS Review Process detailed in *Section 9.32* and the TIS Flow Chart shown *Figure 9.1* of the ODOT **State Highway Access Management Manual** [(7)].

The proposed development is located in the Village of Ashville, Pickaway County, Ohio. **Figure 1.1, Appendix A** details the development location.

The development is expected to consist of an industrial park type development. The site is expected to accommodate land uses related to commerce and fulfillment operations. The following table details the proposed buildings, the development schedule, and building sizes:

Table 1.1 - Development Details

BUILDING #	LOCATION	OPENING YEAR	SIZE (Square Feet)
#1	North of SR 752	2024	1,006,880
#2	North of SR 752	2025	793,440
#3	North of SR 752	2026	1,006,880
#4	South of SR 752	2027	572,460
#5	South of SR 752	2028	1,006,880
#6	South of SR 752	2029	1,006,880
#7	South of SR 752	2030	517,940
		TOTAL	**5,911,360**

The year 2024 with Building #1 will be analyzed for the opening year conditions of the development based on the expected time line. The development is currently expected to reach full build out of the seven buildings in the year 2030. The year 2030 will be analyzed for the full build conditions, the build year. The design year for the proposed project will be based on the opening year and the expected volume of new site generated traffic under the full build condition of the seven buildings.

Buildings #1 - #3 are located north of State Route 752 and to the east of US Route 23. Buildings #4 - #7 are located between State Route 752 to the north and State Route 316 to the south and east of US Route 23.

The development is proposed with two access locations. The project proposes an intersection along State Route 752 that would provide full access to the portions of the development along the north and south side of State Route 752. A second full access intersection is proposed along State Route 316 and would provide direct access to the south side of the development and a connection to the proposed intersection at State Route 752. **Figure 1.2, Appendix A** shows the proposed development site plan.

It should noted that the site plan shown in **Figure 1.2** details two additional access driveways with one each along State Route 752 and State Route 316. These driveways will not provide ingress/egress to the building sites and will not be constructed as part of the proposed project.

1.2 References

The following list of references may be utilized for this report and the forecasts contained within it:

1. *Highway Capacity Manual, 7th Edition*, Transportation Research Board of the National Academies, Washington, D.C.

2. *Ohio Manual of Uniform Traffic Control Devices for Streets and Highways,* 2012 Edition. Ohio Department of Transportation, Office of Traffic Engineering, Columbus, Ohio.

3. *Location and Design Manual,* Volume 1, Roadway Design. Ohio Department of Transportation, Office of Roadway Engineering, Columbus, Ohio.

4. *Ohio Traffic Forecasting Manual,* Volume 1, Traffic Forecasting Background. Ohio Department of Transportation, Office of Statewide Planning & Research, Columbus, Ohio.

5. *Ohio Traffic Forecasting Manual,* Volume 2, Traffic Forecasting Methodologies. Ohio Department of Transportation, Office of Statewide Planning & Research, Columbus, Ohio.

6. *ODOT Analysis and Traffic Simulation Manual (OATS),* Ohio Department of Transportation, Office of Roadway Engineering, Columbus, Ohio.

7. *State Highway Access Management Manual,* Ohio Department of Transportation, Office of Roadway Engineering, Columbus, Ohio.

8. *Trip Generation Manual,* 11th Edition, September 2021, Institute of Transportation Engineers, (ITE), Washington, D.C.

9. *Trip Generation Handbook,* 3rd Edition, September 2017, Institute of Transportation Engineers, (ITE), Washington, D.C.

10. *Traffic Engineering Manual,* October 23, 2002 Edition (Revised January 15, 2021), Ohio Department of Transportation, Office of Roadway Engineering, Columbus, Ohio.

11. *A Policy on Geometric Design of Highways and Streets (Green Book)*, 7TH Edition, September 2018, American Association of State Highway and Transportation Officials, Washington, D.C.

12. *Access Management Manual*, 2ND Edition, 2014. Transportation Research Board of the National Academies, Washington, D.C.

Chapter 2
Area Conditions

2.1 Transportation Network Study Area

The study area for the proposed development includes the previously discussed development access locations as shown in **Figure 1.2, Appendix A** and the following intersections:

1. **US Route 23 & State Route 752/*Rudi Lane***
2. **US Route 23 & State Route 316/North Street**
3. **US Route 23 & Northup Avenue/State Route 316**
4. **State Route 752 & Ashville Pike**
5. **State Route 316 & Miller Avenue/County Road 28**

Rudi Lane is proposed roadway that will be constructed as the west approach at the intersection of US Route 23 and State Route 752. The proposed roadway is part of the project to construct a Sheetz development at the intersection.

The Ohio Department of Transportation maintains the traffic signal control facilities at the intersections along US Route 23. The Village of Ashville maintains the traffic signal control facility at the intersection of State Route 752 and State Route 316/Ashville Pike.

A location map detailing the traffic count locations can be seen in **Figure 2.1, Appendix A..**

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

Table 2.1 Roadway Characteristics

ROADWAY	# LANES	ORIENTATION	SPEED LIMIT (MPH)	
			POSTED	DESIGN
US Route 23 @ SR 752	4	North-South	50	55
US Route 23 @ SR 316 (North)	4	North-South	35	35
US Route 23 @ SR 316 (South)	4	North-South	50	35
Ashville Pike	2	North-South	35	35
Miller Avenue	2	North-South	25	25
County Road 28	2	North-South	55	60
State Route 752 @ US 23	2	East-West	55	60
State Route 752 @ Proposed Access	***2***	***East-West***	***55***	***60***
State Route 752 @ Ashville Pike	2	East-West	35	35
State Route 316 (West of US 23)	2	East-West	35	35
State Route 316 (East of US 23)	2	East-West	35	35
State Route 316 @ Proposed Access	***2***	***East-West***	***55***	***60***
State Route 316 @ CR 28	2	East-West	35	35
Rudi Lane	2	East-West	25	25
North Street	2	East-West	25	25
Northup Avenue	2	East-West	25	25

An aerial view of the of the study area can be seen in **Figure 2.2 Appendix A**.

Figure 2.3, Appendix A shows the lane use and traffic control conditions based upon the existing conditions in the study area. These will be considered the existing base conditions for this report.

2.2 Functional Classification

The Ohio Department of Transportation 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.

Roadways 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 ODOT functional classification of the roadways in the study area can currently be found using the ODOT Transportation Information Mapping System (TIMS). TIMS is ODOT's web-mapping portal where information about Ohio's transportation system can be found. TIMS can currently be found at the following web address:

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

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

Table 2.2 Functional Classification

ROADWAY	AREA	FC #	CLASSIFICATION
US Route 23	Urban	3	Principal Arterial
State Route 752	Urban	5	Major Collector
State Route 316 (West of US 23)	Urban	5	Major Collector
State Route 316 (East of US 23)	Urban	5	Major Collector
State Route 316 (Long Street)	Urban	5	Major Collector
Ashville Pike	Urban	7	Local Roadway
Miller Avenue	Urban	7	Local Roadway
County Road 28	Urban	7	Local Roadway
Rudi Lane	Urban	7	Local Roadway
North Street	Urban	7	Local Roadway
Northup Avenue	Urban	7	Local Roadway

Figure 2.4, Appendix A illustrates the section of the functional classification map for the study area.

2.3 Traffic

Weekday Peak Hours

Weekday nine hour turning movement counts were performed between Wednesday, February 16, 2022 and Thursday, March 3, 2022 at the following intersections:

1. **US Route 23 & State Route 752 (Thursday, 2/17/2022)**
2. **US Route 23 & State Route 316/North Street (Wednesday, 3/2/2022)**
3. **US Route 23 & Northup Avenue/State Route 316 (Tuesday, 3/1/2022)**
4. **State Route 752 & Ashville Pike (Wednesday, 2/16/2022)**
5. **State Route 316 & Miller Avenue/County Road 28 (Thursday, 3/3/2022)**

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. Copies of the intersection turn movement counts are included in **Appendix B**. 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.

The AM and PM intersection peak hours are selected by reviewing data in 15-minute intervals. When there is more than one intersection within the study area, a consistent time period should be used for all intersections within the study area in order to develop an existing conditions traffic volume set, the system peak hour. The following questions should be considered when choosing the peak hours for a study area with multiple intersections:

- What are the individual intersection peak hours?
- Are the individual peak hours the same time or close to each other?
- Would it result in significantly fewer vehicles to use a different peak hour for intersections that are not the same?
- What is the peak hour for intersections with the highest overall volume?
- What peak hour contributes the highest volume to the entire system?

The use of summary tables for the entering traffic volumes during the AM and PM time periods are used to evaluate the previously discussed questions, to identify the peak hours for each intersection, and to determine the peak hour of the system.

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.

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

	HOUR BEGINS								
	7:00	7:15	7:30	7:45	8:00	8:15	8:30	8:45	9:00
US23 & SR752	**2376**	2276	2085	2018	1973	1936	1903	1826	1756
US23 & SR316 (N)	**2527**	2433	2278	2114	1983	1889	1843	1821	1821
US23 & SR 316 (S)	**2513**	2385	2340	2183	2126	2021	1887	1869	1806
SR752 & Ashville Pike	**874**	781	560	497	507	510	507	469	432
SR316 & CR 28	**367**	331	337	340	337	327	314	289	294
TOTAL	**8657**	8206	7600	7152	6926	6683	6454	6274	6109

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

	HOUR BEGINS								
	3:00	3:15	3:30	3:45	4:00	4:15	4:30	4:45	5:00
US23 & SR752	2492	2571	2597	**2599**	2584	2570	25941	2534	2467
US23 & SR316 (N)	2662	2772	2884	2914	**2954**	2892	2876	2782	2684
US23 & SR 316 (S)	2692	2822	2961	**3026**	2951	3018	2978	2968	2890
SR752 & Ashville Pike	825	886	990	1072	**1094**	1083	1000	912	853
SR316 & CR 28	502	524	531	535	**537**	530	533	514	501
TOTAL	9173	9575	9963	**10146**	10120	10093	33328	9710	9395

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 7:00 AM to 8:00 AM. The weekday PM peak hour of traffic was found to be 3:45 PM to 4:45: 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 on a weekday.

The existing AM and PM peak hour traffic volumes are shown in **Figure 2.5, Appendix A.**

It should be noted that it may be necessary to adjust these volumes due to the effects of the COVID-19 pandemic. The ODOT guidance and procedures will be used to determine any necessary adjustments.

Chapter 3
Projected Traffic Conditions

3.1 Site Traffic

Trip Generation

Calculating future total driveway trips requires an estimate of the traffic generated by the proposed development. 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**" [8], 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 11TH edition and was utilized for this study.

The ITE **Trip Generation Manual** [8] will be used in conjunction with available site specific data provided by DHL in order to forecast the expected development site generated traffic. Site generated traffic will be prepared for passenger vehicle **(vehicle)** type traffic and truck **(truck)** traffic.

The following table details a breakdown of the buildings that are expected to occupy the development site:

Table 3.1 Development Summary

BUILDING #	BUILDING LOCATION	OPENING YEAR	SIZE (Sq Ft)
#1	North of SR 752	2024	1,006,880
#2	North of SR 752	2025	793,440
#3	North of SR 752	2026	1,006,880
#4	South of SR 752	2027	572,460
#5	South of SR 752	2028	1,006,880
#6	South of SR 752	2029	1,006,880
#7	South of SR 752	2030	517,940
		TOTAL	**5,911,360**

The developer provided an overview of the their North American facility operations. The overview showed that for buildings over 400,000 square feet that the 90% are operating 2 or 3 shift operations. The overview also provided a total headcount for each of the sectors that are served at the facilities. The sectors for the AM and PM peak hour vehicle traffic were determined to be the five highest. A copy of the facilities overview can be seen in **Appendix C**.

In order to determine the volume of expected site generated **vehicle** traffic a weighted average of the total headcount for the 5 largest sectors was calculated. It was assumed for the purpose of this report that one employee was equal to one trip in the peak hour due to the shift operations. The following table details the calculation of the site generated trip rate that will be used to forecast the volume of **vehicle** generated traffic by each building in the development:

Table 3.2 Vehicle Trip Rate Calculation

SECTOR	HEADCOUNT per 100,000 sf	WEIGHTED AVERAGE	WEIGHTED VALUE
Automotive	24	15.00%	3.600
Consumer	20	12.50%	2.500
Retail	51	31.88%	16.256
Technology	45	28.13%	12.656
Life Science/Healthcare	20	12.50%	2.500
TOTAL	**160**	**100%**	**37.513**

The weighted average should provide a conservative estimate of future traffic as the sectors being served at each building are currently unknown.

A rate of 37.5125 trips per 100,000 square foot will be applied to each building in the development in order to determine the peak hour site generated trips based on the results shown above in **Table 3.2**.

The peak hour site generated trips will be split in to entering and exiting trips based on the peak hour directional distributions provided for land use #156 - High Cube Parcel Hub Warehouse from the ITE **Trip Generation Manual** [8]**.**

The developer provided the expected facility truck volumes from the consumer and ecommerce sectors. These sectors were selected as they provide the highest peak hour volume of truck traffic at DHL facilities and should provide a conservative estimate of the expected truck volumes during the AM and PM peak hours. These truck volumes were applied to the each of the proposed buildings based on the square footage of each. A copy of the provided truck data can be seen in **Appendix C**.

Trip generation calculations for the development were performed utilizing the supplied site specific data for **vehicle and truck** trips as well as data contained in the **Trip Generation Manual** (8) and the methods outlined in the (ITE) **Trip Generation Handbook** (9). A spreadsheet detailing the **vehicle** trip generation calculations can be found in **Appendix C**. The following table details the site generated **vehicle** and **truck** traffic volumes for each building in the proposed development.

Table 3.3 New Trip Summary

BUILDING	OPENING YEAR	SIZE	TRIP ENDS							
			Weekday Peak Hour Between 7-9 AM				Weekday Peak Hour Between 4-6 PM			
			ENTER		EXIT		ENTER		EXIT	
			Vehicles	*Trucks*	Vehicles	*Trucks*	Vehicles	*Trucks*	Vehicles	*Trucks*
1 (North of SR 752)	2024	1,006,880 SF	189	*25*	189	*25*	257	*18*	121	*18*
2 (North of SR 752)	2025	793,440 SF	149	*23*	149	*22*	202	*18*	95	*18*
3 (North of SR 752)	2026	1,006,880 SF	189	*25*	189	*25*	257	*18*	121	*18*
4 (South of SR 752)	2027	572,460 SF	107	*15*	107	*15*	146	*10*	69	*10*
5 (South of SR 752)	2028	1,006,880 SF	189	*25*	189	*25*	257	*18*	121	*18*
6 (South of SR 752)	2029	1,006,880 SF	189	*25*	189	*25*	257	*18*	121	*18*
7 (South of SR 752)	2030	517,940 SF	97	*15*	97	*15*	132	*10*	62	*10*
TOTAL NEW TRIPS			**1109**	***153***	**1109**	***152***	**1508**	***110***	**710**	***110***
			1262		**1261**		**1618**		**820**	
			2523				**2438**			

The ODOT **State Highway Access Management Manual** (7) requires that ten year design hour traffic volumes be analyzed for a proposed development when the number of generated trips is below 500 in the peak hour and twenty year design hour traffic volumes when the number of generated trips is greater than 500 in the peak hour.

The proposed development is expected to generate a total of 2,523 driveway trips in the AM peak hour and a total of 2,438 driveway trips in the PM peak hour. The year 2044 will therefore be analyzed for the twenty year design hour conditions.

Distribution of New Site Generated Weekday Traffic

Separate directional distributions will be prepared for passenger vehicle **(vehicle)** type traffic and truck **(truck)** traffic.

The directional distribution for the new generated **vehicle** traffic is a function of the prevailing operating conditions on the existing roadways. The distribution pattern that was assumed is shown in the tables that follow and is based upon engineering judgement of the existing traffic volumes entering the study area at the five study area intersections during the AM and PM peak hours shown in **Figure 2.5, Appendix A**, the adjacent land uses, functional classification of the roadways, and routes to avoid known areas of congestion. The vehicle trips were assumed to be primary trips made by people leaving home for work and then returning home. The **vehicle** trips were therefore assumed to enter and exit the study using the same route.

The following tables detail the distribution of the new generated **vehicle** trips for the proposed development under the opening and design year conditions.

Table 3.4 AM New Trip Origins and Destinations
2024 Opening Year

ORIGIN/ DESTINATION	ROUTE	ENTER % TOTAL	ENTER NEW TRIPS	EXIT % TOTAL	EXIT NEW TRIPS
North	US 23	20%	38	20%	38
South	US 23	30%	56	30%	56
East	SR 752	20%	38	20%	38
West	SR 316	10%	19	10%	19
North	Ashville Pike	10%	19	10%	19
East	SR 316	10%	19	10%	19
	TOTALS	**100%**	**189**	**100%**	**189**

Table 3.5 PM New Trip Origins and Destinations
2024 Opening Year

ORIGIN/ DESTINATION	ROUTE	ENTER % TOTAL	ENTER NEW TRIPS	EXIT % TOTAL	EXIT NEW TRIPS
North	US 23	20%	51	20%	24
South	US 23	20%	52	20%	25
East	SR 752	20%	51	20%	24
West	SR 316	10%	26	10%	12
North	Ashville Pike	20%	51	20%	24
East	SR 316	10%	26	10%	12
	TOTALS	**100%**	**257**	**100%**	**121**

Table 3.6 AM New Trip Origins and Destinations
2030/2044 Build/Design Year

ORIGIN/ DESTINATION	ROUTE	ENTER % TOTAL	ENTER NEW TRIPS	EXIT % TOTAL	EXIT NEW TRIPS
North	US 23	20%	222	20%	222
South	US 23	30%	333	30%	332
East	SR 752	20%	221	20%	222
West	SR 316	10%	111	10%	111
North	Ashville Pike	10%	111	10%	111
East	SR 316	10%	111	10%	111
	TOTALS	**100%**	**1109**	**100%**	**1109**

Table 3.7 PM New Trip Origins and Destinations
2030/2044 Build/Design Year

ORIGIN/ DESTINATION	ROUTE	ENTER % TOTAL	ENTER NEW TRIPS	EXIT % TOTAL	EXIT NEW TRIPS
North	US 23	20%	302	20%	142
South	US 23	20%	302	20%	142
East	SR 752	20%	301	20%	142
West	SR 316	10%	151	10%	71
North	Ashville Pike	20%	301	20%	142
East	SR 316	10%	151	10%	71
	TOTALS	**100%**	**1508**	**100%**	**710**

All **truck** traffic will enter and exit the development at the proposed intersection along State Route 752. **Trucks** will be prohibited from using the State Route 316 access location and exiting the site to the east along State Route 752 through the use of way finding signs both on-site and off-site.

The distribution of the **truck** traffic was based on the all **trucks** using US Route 23 to travel north or south. The trucks were split with 60% originating from and destined to the north. The remaining 40% were assumed to enter from or exit to the south. The distribution was based on the existing volume patterns on US Route 23, the location of Rickenbacker International Airport, and the location of the facility to the south of the greater Columbus area.

Distribution of Site Generated Traffic - 2024 Opening Year

The directional distribution for the new AM and PM peak hour generated **vehicle** traffic is shown graphically in **Figure 3.1, Appendix A** for the opening year conditions.

The directional distribution for the new AM and PM peak hour generated **truck** traffic is shown graphically in **Figure 3.2, Appendix A** for the opening year conditions.

Distribution of Site Generated Traffic - 2030/2044 Design Year

The distribution of new site generated **vehicle** traffic for the portion of the development north of State Route 752 was based on the following assumptions:

- Entering traffic would take the most direct route available to either the SR 752 or SR 316 access. It was assumed that traffic would use the on-site connector road to avoid the section of US 23 between SR 752 and SR 316.
- Exiting traffic would take the most direct route exit the study area using either the SR 752 or SR 316 access. It was assumed that traffic would use the on-site connector road to avoid the section of US 23 between SR 752 and SR 316.

The build and design year conditions directional distribution for the new AM and PM peak hour generated **vehicle** traffic is shown graphically in **Figure 3.3, Appendix A** for the portion of the development located to the north of State Route 752.

The design year conditions directional distribution for the new AM and PM peak hour generated **truck** traffic is shown graphically in **Figure 3.4, Appendix A** for the portion of the development located to the north of State Route 752.

The distribution of new site generated **vehicle** traffic for the portion of the development south of State Route 752 was based on the following assumptions:

- Entering traffic would take the most direct route available to either the SR 752 or SR 316 access. It was assumed that traffic would use the on-site connector road to avoid the section of US 23 between SR 752 and SR 316.
- Exiting traffic would take the most direct route exit the study area using either the SR 752 or SR 316 access. It was assumed that traffic would use the on-site connector road to avoid the section of US 23 between SR 752 and SR 316.

The design year conditions directional distribution for the new AM and PM peak hour generated **vehicle** traffic is shown graphically in **Figure 3.5, Appendix A** for the portion of the development located to the south of State Route 752.

The design year conditions directional distribution for the new AM and PM peak hour generated **truck** traffic is shown graphically in **Figure 3.6, Appendix A** for the portion of the development located to the south of State Route 752.

Assignment of Site Generated Traffic - 2024 Opening Year

Based upon the distribution patterns shown in **Figure 3.1**, the new AM and PM peak site generated **vehicle** traffic was assigned to the study intersections. The assignment of the estimated site generated new **vehicle** traffic for the proposed development under the opening year conditions is shown graphically in **Figure 3.7, Appendix A**.

Based upon the distribution patterns shown in **Figure 3.2** , the new AM and PM peak site generated **truck** traffic was assigned to the study intersections. The assignment of the estimated site generated new **truck** traffic for the proposed development under the opening year conditions is shown graphically in **Figure 3.8, Appendix A**.

Assignment of Site Generated Traffic - 2030/2044 Design Year

Based upon the distribution patterns shown in **Figure 3.3**, the new AM and PM peak site generated **vehicle** traffic was assigned to the study intersections. The assignment of the estimated design year site generated new **vehicle** traffic for the portion of the development north of State Route 752 is shown graphically in **Figure 3.9, Appendix A**.

Based upon the distribution patterns shown in **Figure 3.4**, the new AM and PM peak site generated **truck** traffic was assigned to the study intersections. The assignment of the estimated design year site generated new **truck** traffic for the portion of the development north of State Route 752 is shown graphically in **Figure 3.10, Appendix A**.

Based upon the distribution patterns shown in **Figure 3.5**, the new AM and PM peak site generated **vehicle** traffic was assigned to the study intersections. The assignment of the estimated design year site generated new **vehicle** traffic for the portion of the development south of State Route 752 is shown graphically in **Figure 3.11, Appendix A**.

Based upon the distribution patterns shown in **Figure 3.6**, the new AM and PM peak site generated **truck** traffic was assigned to the study intersections. The assignment of the estimated design year site generated new **truck** traffic for the portion of the development south of State Route 752 is shown graphically in **Figure 3.12, Appendix A**.

3.2 Adjusted Traffic

The collected peak hour traffic volumes detailed in **Appendix B** and **Figure 2.5, Appendix A** should be reviewed to determine if they have been impacted due to the COVID-19 pandemic. The traffic volumes as they were collected may not be 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 D.** The development of calibration factors for the study area roadways is described in the following paragraphs.

The ODOT Traffic Monitoring Management System (TMMS) was first consulted to determine available Peak Hour and Average Daily Traffic along the study area roadways. The ODOT guidance indicates that only counts prior to March 15, 2020 are suitable for use in the calculation of adjustment factors.

Data from the following location will be used to determine if the collected data should be adjusted to account for the COVID-19 pandemic.

1. **US Route 23 (North of SR 752) - Location ID 2765**

Location 2765 is a continuous count station that provides daily historical traffic volumes. The location listed provides both ADT and hourly traffic data in 15 minute increments.

The corresponding peak hour data from this location will be used to determine if calibration factors are necessary for the AM and PM peak hours at the study area intersections. The traffic count data collected for this report was collected on February 20, 2022. This was the third Thursday in February. The ODOT historical ADT data from Thursday, February 20, 2022 will be compared to the Thursday, February 17, 2020 data Copies of the 2020 and 2022 historical data can be seen in **Appendix E**.

A calculated factor greater than 1.0 indicates that the 2022 volumes do not exceed the 2020 historical data, therefore a calibration factor ***is*** necessary to account for the impact of the COVID-19 pandemic.

A calculated factor of less than 1.0 indicates that the 2022 volumes exceed the 2020 historical data, therefore a calibration factor ***is not*** necessary to account for the impact of the COVID-19 pandemic.

The following table details the calculation of peak hour COVID adjustment factors for the study area roadways using the peak hour traffic volumes from the collected traffic data for this report and the 2019 historical data from the ODOT TMMS website:

Table 3.8 - COVID Adjustment Factor

LOCATION	TIME PERIOD	2020 PRE-COVID	2022 CURRENT	ADJUSTMENT FACTOR
US Route 23 (North of SR 72) ID 2765	ADT	28692	29633	0.9682

A COVID adjustment factor of 0.9682 indicates that the 2022 volumes exceed the 2020 historical data, therefore a calibration factor ***is not*** necessary to account for the impact of the COVID-19 pandemic on the collected traffic data.

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. A period of ten years is currently specified by the Ohio Department of Transportation for smaller 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 **State Highway Access Management Manual** [7] requires that opening year and ten year design hour traffic volumes be analyzed for a proposed development when the number of generated trips is less than 500 in the peak hour.

The year 2044 (Design Year) will be analyzed for the proposed development as the peak hour site generated traffic volumes are greater than 500 trips. Therefore, it is necessary to estimate historical growth rates in order to establish the future traffic on the study area roadways due to non-site related conditions.

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 on these roadways may increase in future years.

The Mid-Ohio Regional Planning Commision (MORPC) was contacted in order to determine appropriate growth rates for the study area roadways. MORPC provided linear annual growth rates for the approaches at the study area intersections. A copy of the email correspondence regarding growth rates for the study area can be seen in **Appendix H**.

The growth rate and factors for they study area can be seen in the following table:

Table 3.9 - Growth Rate & Factors

APPROACH/LOCATION	GROWTH RATE (Annual Growth)	GROWTH FACTORS		
		2024	2030	2044
SR 752 East @ US 23	2.00%	1.040	1.160	1.440
US 23 North @ SR 752	0.90%	1.018	1.072	1.198
US 23 South @ SR 752	0.90%	1.018	1.072	1.198
US 23 North @ SR 316	0.90%	1.018	1.072	1.198
SR 316 West @ US 23	1.60%	1.032	1.128	1.352
US 23 South @ SR 316	0.90%	1.018	1.072	1.198
SR 316 East @ US 23	2.00%	1.040	1.160	1.440
US 23 North @ SR 316	1.00%	1.020	1.080	1.220
Northup West @ US 23	2.00%	1.040	1.160	1.440
US 23 South @ SR 316	0.90%	1.018	1.072	1.198
SR 752 East @ Ashville Pike	2.00%	1.040	1.160	1.440
Ashville Pike North @ SR 752	2.20%	1.044	1.176	1.484
SR 752 West @ Ashville Pike	2.00%	1.040	1.160	1.440
Long South @ SR 752	2.20%	1.044	1.176	1.484
SR 316 East @ CR 28	2.00%	1.040	1.160	1.440
SR 316 West @ CR 28	2.00%	1.040	1.160	1.440

The study area intersection approaches that did not have a growth rate supplied by MORPC will not have a growth factor applied to the existing traffic volumes.

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 or a methodology to determine 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** (7), 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** (4, 5) 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**.

The following table details the peak hour to design hour factors for the study area roadways.

Table 3.10 - Peak Hour to Design Hour Factors

ROADWAY	AREA	FUNCTIONAL CLASSIFICATION	MONTH	DAY	DHV FACTOR
US 23 @ SR 752	Urban	Principal Arterial	February	Thursday	1.16
SR 752 @ US 23	Urban	Major Collector	February	Thursday	1.16
US 23 @ SR 316	Urban	Principal Arterial	March	Wednesday	1.16
SR 316 @ US 23	Urban	Major Collector	March	Wednesday	1.16
North Street	Urban	Local Roadway	March	Wednesday	1.16
US 23 @ SR 316	Urban	Principal Arterial	March	Tuesday	1.16
US 316 @ US 23	Urban	Major Collector	March	Tuesday	1.16
Northup Avenue	Urban	Local Roadway	March	Tuesday	1.16
SR 752 @ Ashville Pike	Urban	Major Collector	February	Wednesday	1.17
Long Street (SR 316)	Urban	Major Collector	February	Wednesday	1.17
Ashville Pike	Urban	Local Roadway	February	Wednesday	1.17
SR 316 @ CR 28	Urban	Major Collector	March	Thursday	1.13
Miller Avenue	Urban	Local Roadway	March	Thursday	1.13
CR 28	Urban	Local Roadway	March	Thursday	1.13

Intersection Peak Hour Factors

The intersection peak hour factor (PHF) is used to convert the hourly traffic volume into the flow rate that represents the busiest 15 minutes of the peak hour. The PHF is the sum of the traffic entering the intersection during the peak hour divided by four times the highest 15 minute volume during the peak hour. A PHF of 1 indicates that the traffic volume in each 15 minute volume is the same and therefore traffic flow is consistent throughout the hour. A lower PHF indicates a more variable traffic flow and that traffic volume has a spike during the peak 15 minute interval. PHF's under 0.80 occur in locations with highly peaked demand, such as at schools and factories during shift changes.

The ODOT **Analysis and Traffic Simulation Manual** [(6)] provides guidance to use the existing year PHF for all intersections from traffic counts collected for the project. The PHF is calculated for the intersection as a whole and not individual approaches or movements. A minimum of 0.80 for the PHF is required to be utilized unless justified by highly peaked demands such as for schools and factories noted above. If project specific counts are not available, a default value of 0.92 is to be utilized for arterials.

It is assumed for this report that the PHF for the opening and design years are the same as the calculated PHF from the collected existing year traffic counts. The intersection PHF's are included in **Appendix B**. The following table shows the PHF's calculated for the study area intersections during the AM and PM peak hours:

Table 3.11 - Intersection Peak Hour Factors

ROADWAY/INTERSECTION	AM PHF	PM PHF
US 23 & SR 752	0.888	0.976
US 23 & SR 316/North Street	0.956	0.970
US 23 & SR 316/Northup Avenue	0.952	0.946
SR 752 & Ashville Pike	0.646*	0.882
SR 316 & CR 28/Miller Avenue	0.812	0.942

*** A minimum PHF of 0.80 will be used.**

The peak hour factors detailed in **Table 3.11** will be used in the intersection capacity calculations for the Traffic Impact Study.

Additional Study Area Development - Sheetz

A Sheetz development is currently under construction at the intersection of US Route 23 and State Route 752. The Sheetz development was analyzed in a Traffic Impact Study dated March 17, 2021. The TIS was reviewed and approved by ODOT.

A copy of the traffic volume figures from the pages 9 and 10 of the Sheetz TIS that will be added to the background traffic volumes can be seen in **Appendix F**. The Sheetz TIS did not account for the distribution of the site generated traffic to the adjacent intersections that under study for this report.

Figure 3.13, Appendix A details the total site generated Sheetz traffic for the study area of this report and their distribution to the adjacent intersections under study. The volumes were based on Pages 9 and 10 of the March 17, 2021 Sheetz TIS. This traffic will be included in the 2024, 2030, and 2044 analysis for this report.

Additional Study Area Development - US Route 23 & SR-316 Development

A Traffic Impact Study is currently being performed for a proposed mixed-used development at the southeast quadrant of the US Route 23 and State Route 316/Northup Avenue intersection. The development is expected to consist of retail space, commercial out lot parcels, multi-family units, duplex units, and single-family lots.

A copy of the traffic volume figures from the TIS that were added to the No-Build background traffic volumes can be seen in **Appendix G**. The TIS did not account for the distribution of the site generated traffic to the adjacent intersections that under study for this report.

Figure 3.14, Appendix A details the new site generated traffic for the proposed opening year of 2022 for the mixed-used development. The volumes are based on those shown in Exhibit 5 of the July 2021 TIS. This traffic will be included in the 2024 analysis for this report.

Figure 3.15, Appendix A details the new site generated traffic for the proposed design year of 2042 for the mixed-used development. The volumes are based on those shown in Exhibit 9 of the July 2021 TIS. This traffic will be included in the 2030 and 2044 analysis for this report.

3.4 Future Traffic

No-Build Conditions w/out Sheetz & US 23/SR 316 Development

The previously discussed calculation of design hour factors and growth rates for each movement were applied to the existing 2022 traffic volumes shown in **Figure 2.5, Appendix A** in order to estimate the future traffic considering non-project traffic conditions without the development of the Sheetz or the proposed mixed-use development.

Spreadsheets detailing the use of the calculated growth rates and the design hour factors and the resulting expected 2024, 2030, and 2044 No-Build traffic volumes can be found in **Appendix J**. The No-Build traffic volumes detailed in **Appendix J** do not include the site generated traffic volumes from the Sheetz or the US 23/SR316 mixed-use development

Balancing traffic volumes is a process by which the differences between traffic volume data at adjacent traffic count locations is eliminated. The traffic volumes along US Route 23 were not "balanced" for the purpose of this report due to the number of driveways, intersections, and commercial retail businesses between the three US Route 23 count locations.

This traffic is the expected traffic if the proposed additional developments and the DHL facility **are not** constructed, a **"No-Build w/out Additional Developments"** condition. The estimated 2024, 2030, and 2044 No-Build w/out Additional Developments traffic volumes for the study area are shown graphically in **Figures 3.16 - 3.18, Appendix A**.

The No-Build w/out Additional Developments traffic volumes have been rounded to the nearest 10 to adhere to preferred ODOT practices.

No-Build Conditions w/ Sheetz & US 23/SR 316 Development

In order to estimate the 2024 opening year No-Build traffic considering the background traffic and the additional developments in the study area, the sum of the 2024 No-Build volumes, shown in **Figure 3.16, Appendix A**, were added to the new generated traffic (**Figures 3.13 & 3.14**). These traffic volumes are the expected volumes if the additional developments in the study area are constructed and the proposed DHL development **is not** constructed, or a **"No-Build with Additional Development"** condition.

The estimated 2024 opening year No-Build with Additional Development traffic volumes for the study area are shown graphically in **Figure 3.19, Appendix A** for the study area.

In order to estimate the 2030 No-Build traffic considering the background traffic and the additional developments in the study area, the sum of the 2030 No-Build volumes, shown in **Figure 3.17, Appendix A**, were added to the new generated traffic (**Figures 3.13 & 3.15**). These traffic volumes are the expected volumes if the additional developments in the study area are constructed and the proposed DHL development **is not** constructed, or a **"No-Build with Additional Development"** condition.

The estimated 2030 No-Build with Additional Development traffic volumes for the study area are shown graphically in **Figure 3.20, Appendix A** for the study area.

In order to estimate the 2044 design year No-Build traffic considering the background traffic and the additional developments in the study area, the sum of the 2044 No-Build volumes, shown in **Figure 3.18, Appendix A**, were added to the new generated traffic (**Figures 3.13 & 3.15**). These traffic volumes are the expected volumes if the additional developments in the study area are constructed and the proposed DHL development **is not** constructed, or a **"No-Build with Additional Development"** condition.

The estimated 2044 design year No-Build with Additional Development traffic volumes for the study area are shown graphically in **Figure 3.21, Appendix A** for the study area.

Project Build Conditions

In order to estimate the future opening year traffic considering project traffic conditions, the sum of the 2024 No-Build with Additional Development volumes, shown in **Figure 3.19, Appendix A**, were added to the new generated traffic (**Figures 3.7 & 3.8**) to equal the future 2024 Build peak hour volumes.

The estimated 2024 Build traffic volumes for the study area are shown graphically in **Figure 3.22, Appendix A** for the proposed development. These traffic volumes are the expected volumes if the proposed development **is** constructed, or a **"Build"** condition. These conditions represent the expected opening year conditions with the construction of Building #1.

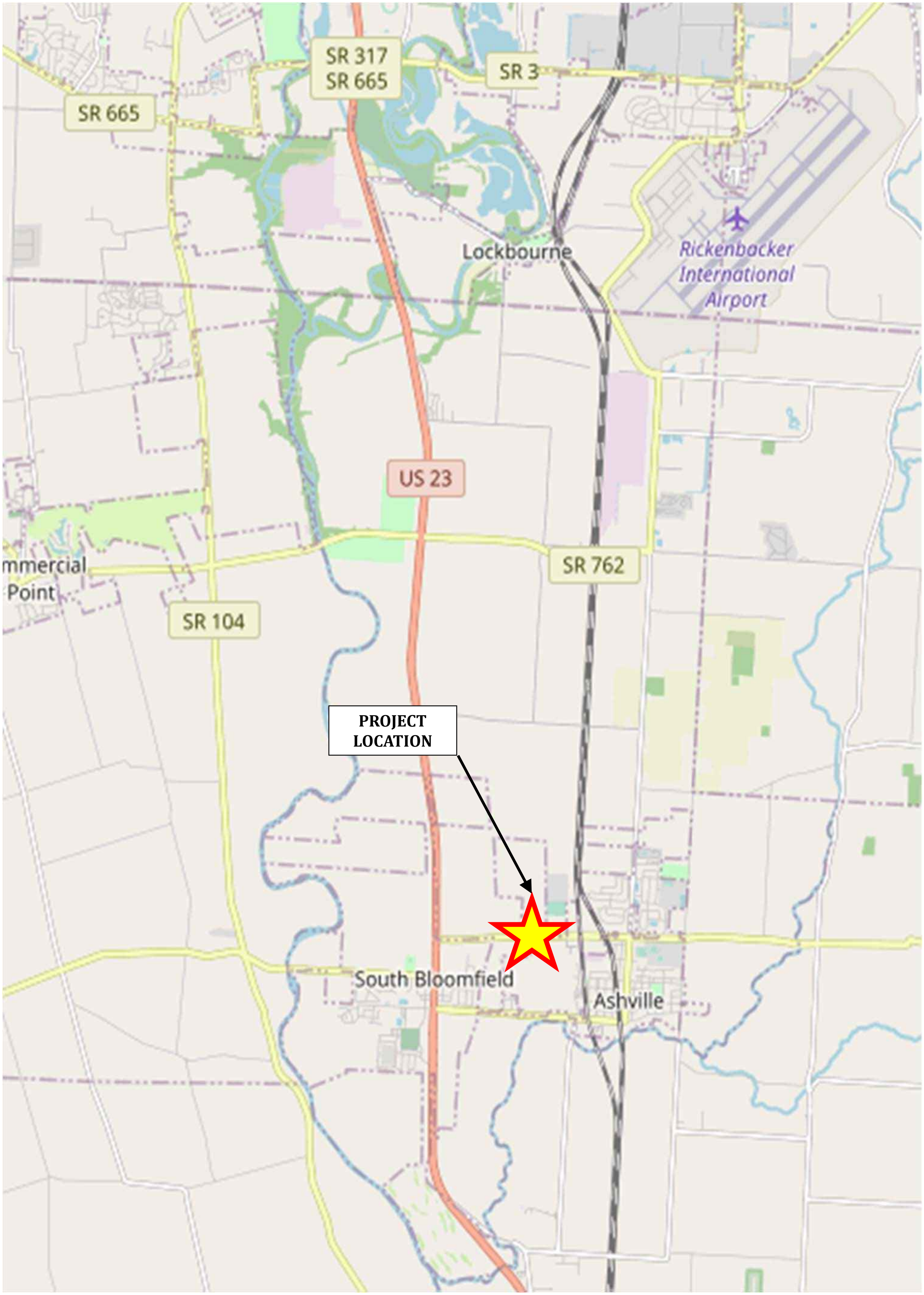
In order to estimate the build year traffic considering project traffic conditions, the sum of the 2030 No-Build with Additional Development volumes, shown in **Figure 3.20, Appendix A**, were added to the new generated traffic (**Figures 3.9 - 3.12**) to equal the future 2030 Build peak hour volumes.

The estimated 2030 Build traffic volumes for the study area are shown graphically in **Figure 3.23, Appendix A** for the proposed development. These traffic volumes are the expected volumes if the proposed development **is** constructed, or a **"Build"** condition. These conditions represent the expected build year conditions with the construction of all seven buildings

In order to estimate the future design year traffic considering project traffic conditions, the sum of the 2044 with Additional Development No-Build volumes, shown in **Figure 3.21, Appendix A**, were added to the new generated traffic (**Figures 3.9 - 3.12**) to equal the future 2044 Build peak hour volumes.

The estimated 2044 Build traffic volumes for the study area are shown graphically in **Figure 3.24, Appendix A** for the proposed development. These traffic volumes are the expected volumes if the proposed development **is** constructed, or a **"Build"** condition. These conditions represent the expected design year conditions with the construction of all seven buildings.

Appendix A
Traffic Volume Figures



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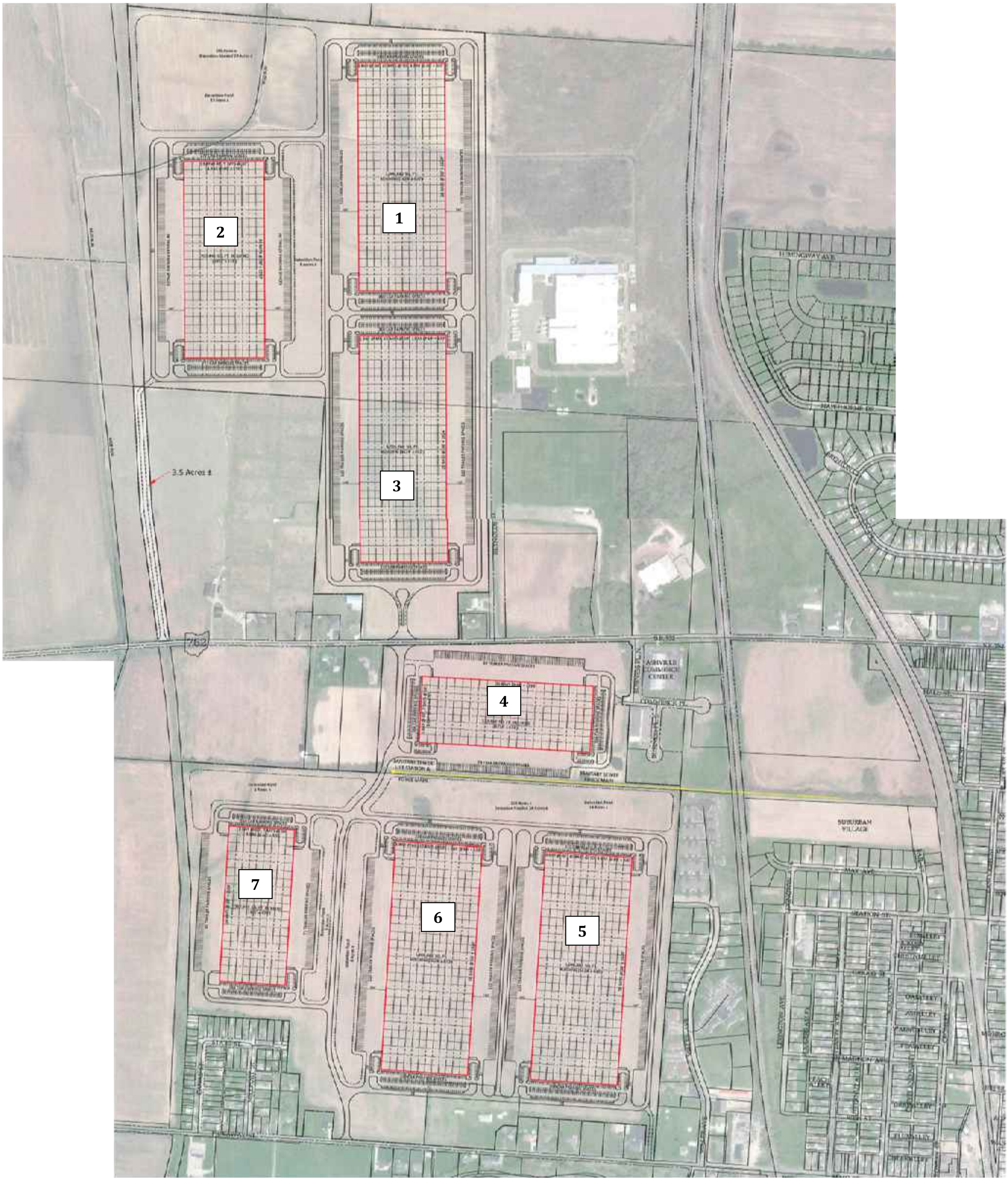
TMS Engineers, Inc.	DHL Development Traffic Impact Study Ashville, Ohio	Project Location Map	NORTH NOT TO SCALE	Figure: 1.1 Appendix: A



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DHL Development Traffic Impact Study Ashville, Ohio	Site Plan	NORTH NOT TO SCALE	Figure: 1.2 Appendix: A

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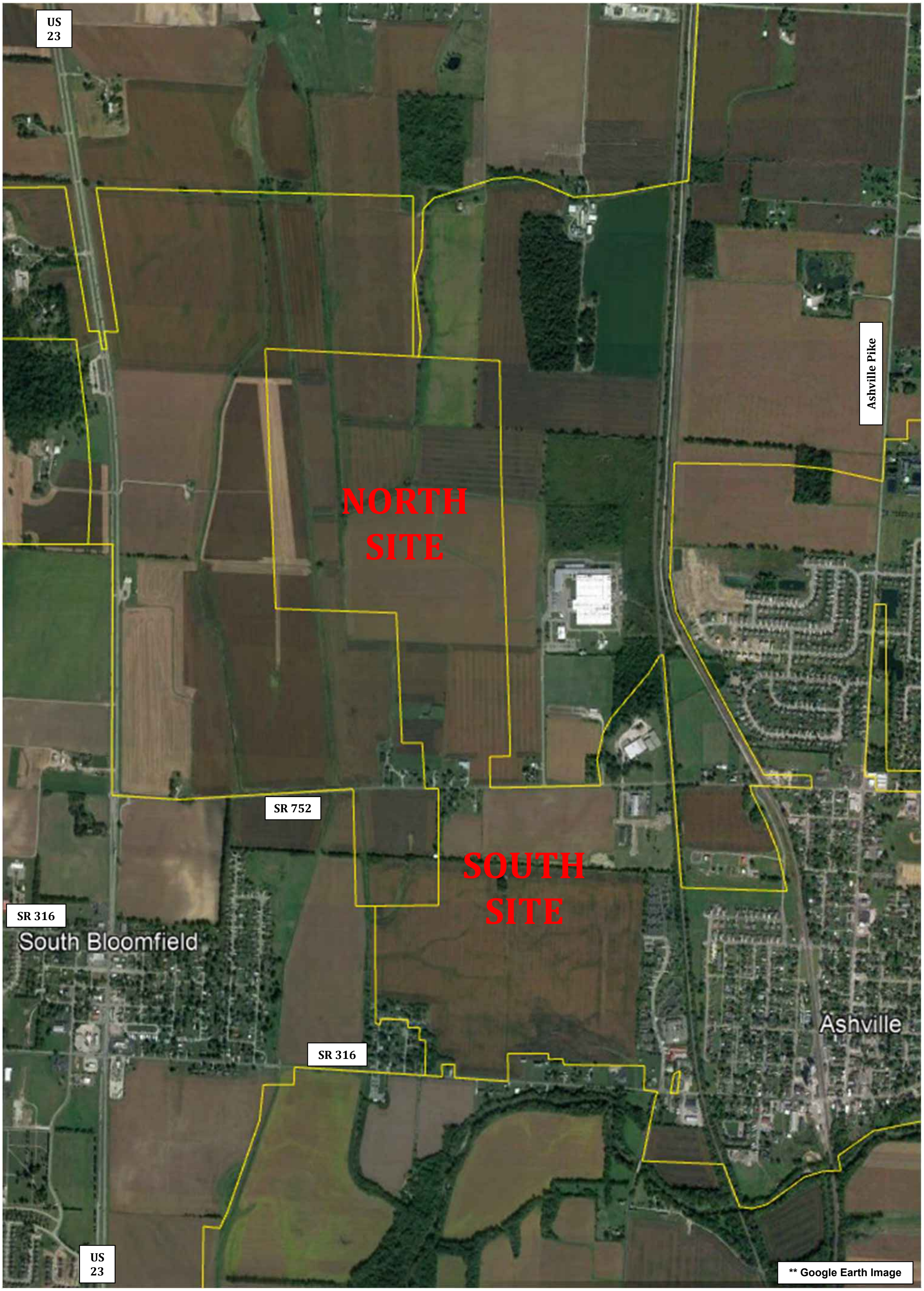
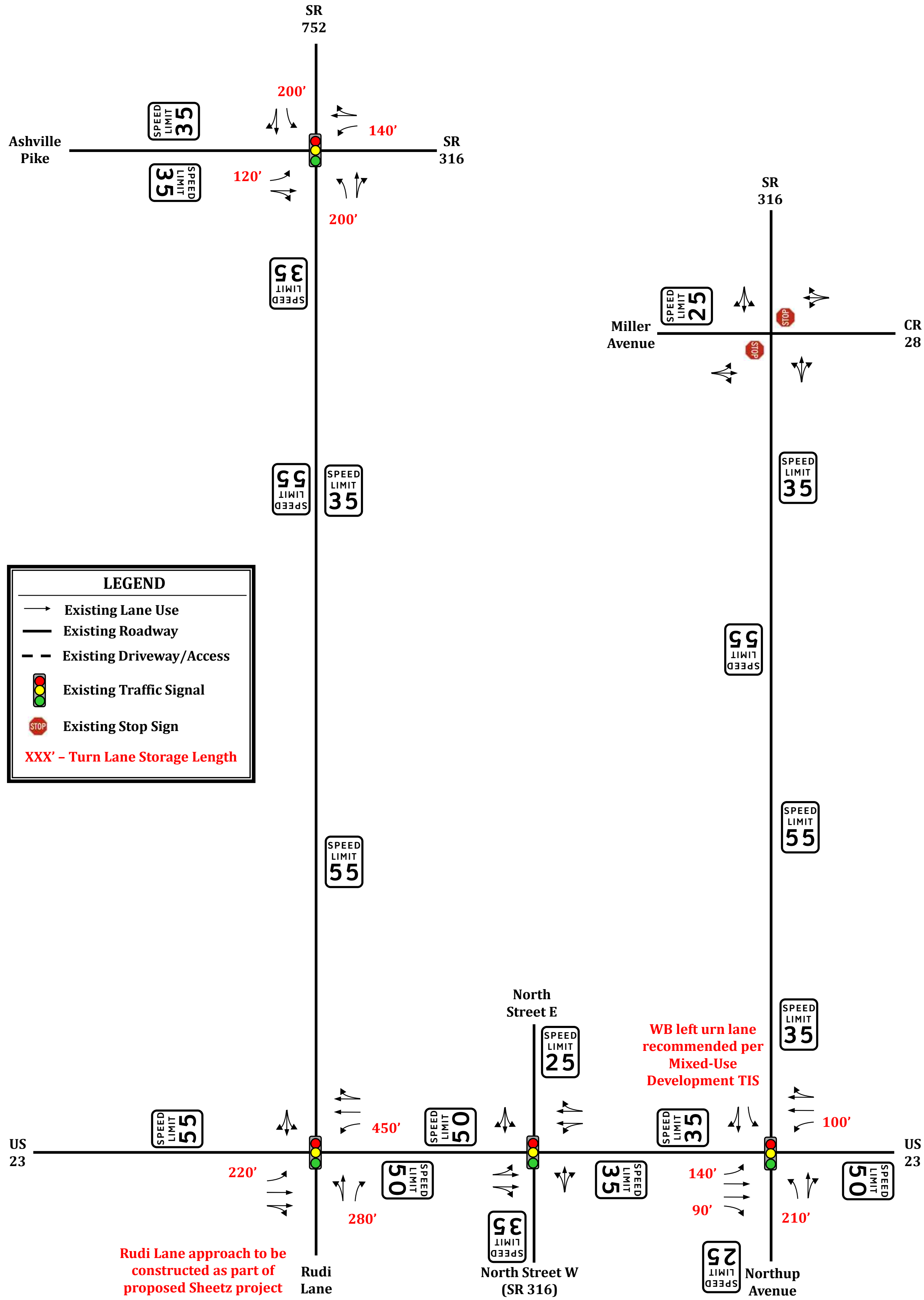


TMS Engineers, Inc. Transportation Management Services 2112 Case Parkway S., Unit 7, Twinsburg, Ohio 44087 www.TMSEngineers.com	DHL Development Traffic Impact Study Ashville, Ohio	Aerial View	NORTH NOT TO SCALE	Figure: 2.2 Appendix: A



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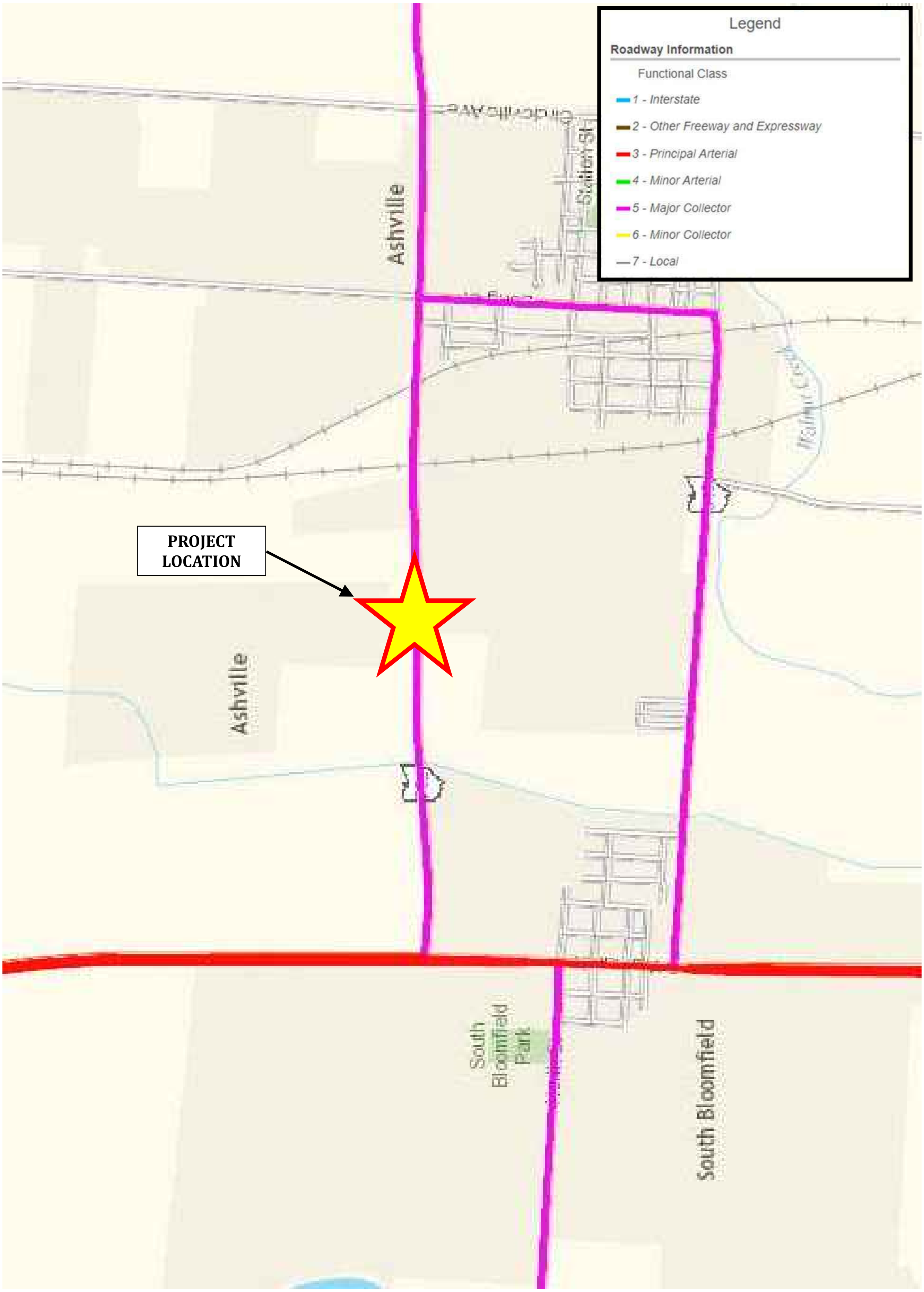

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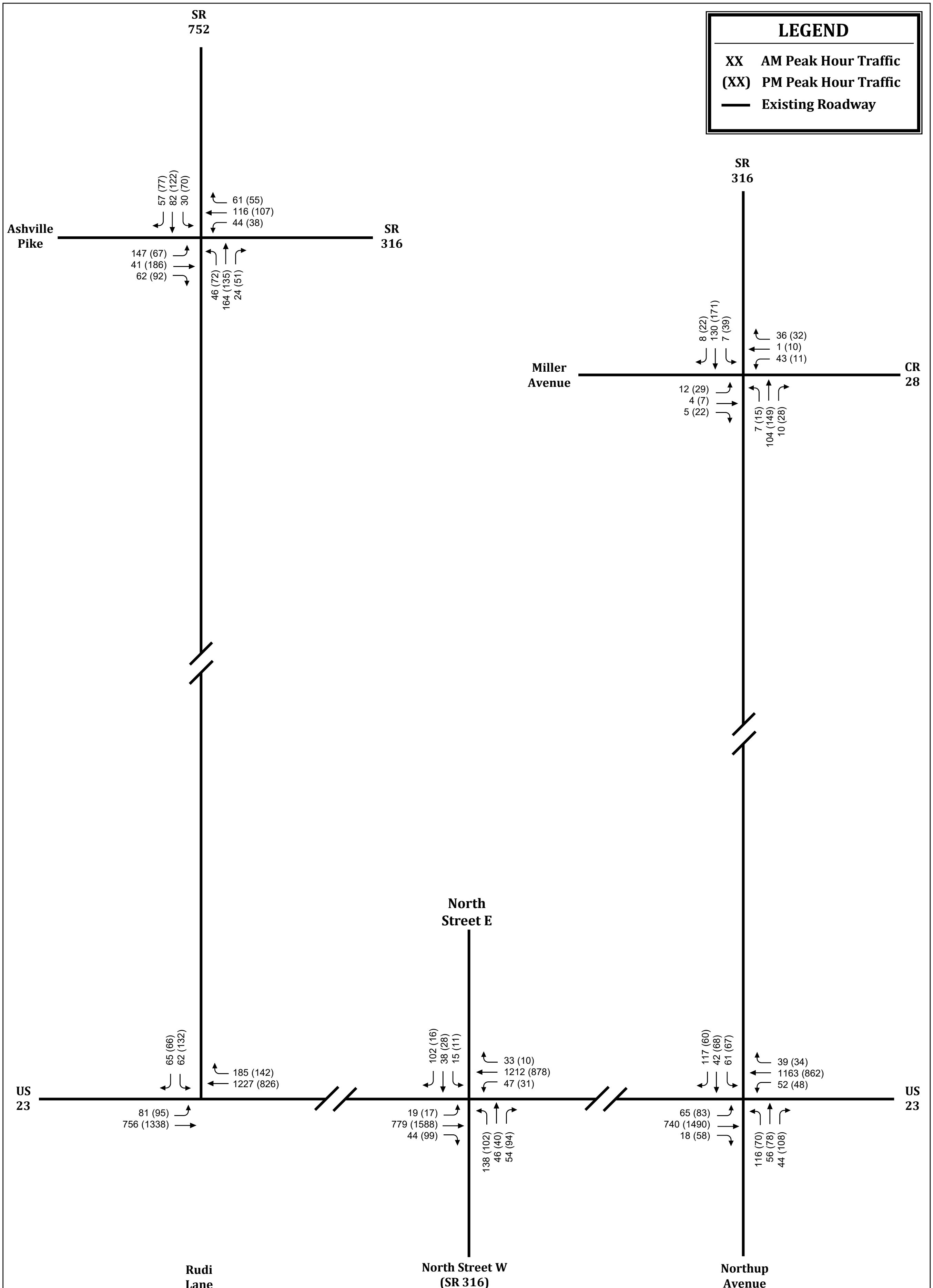

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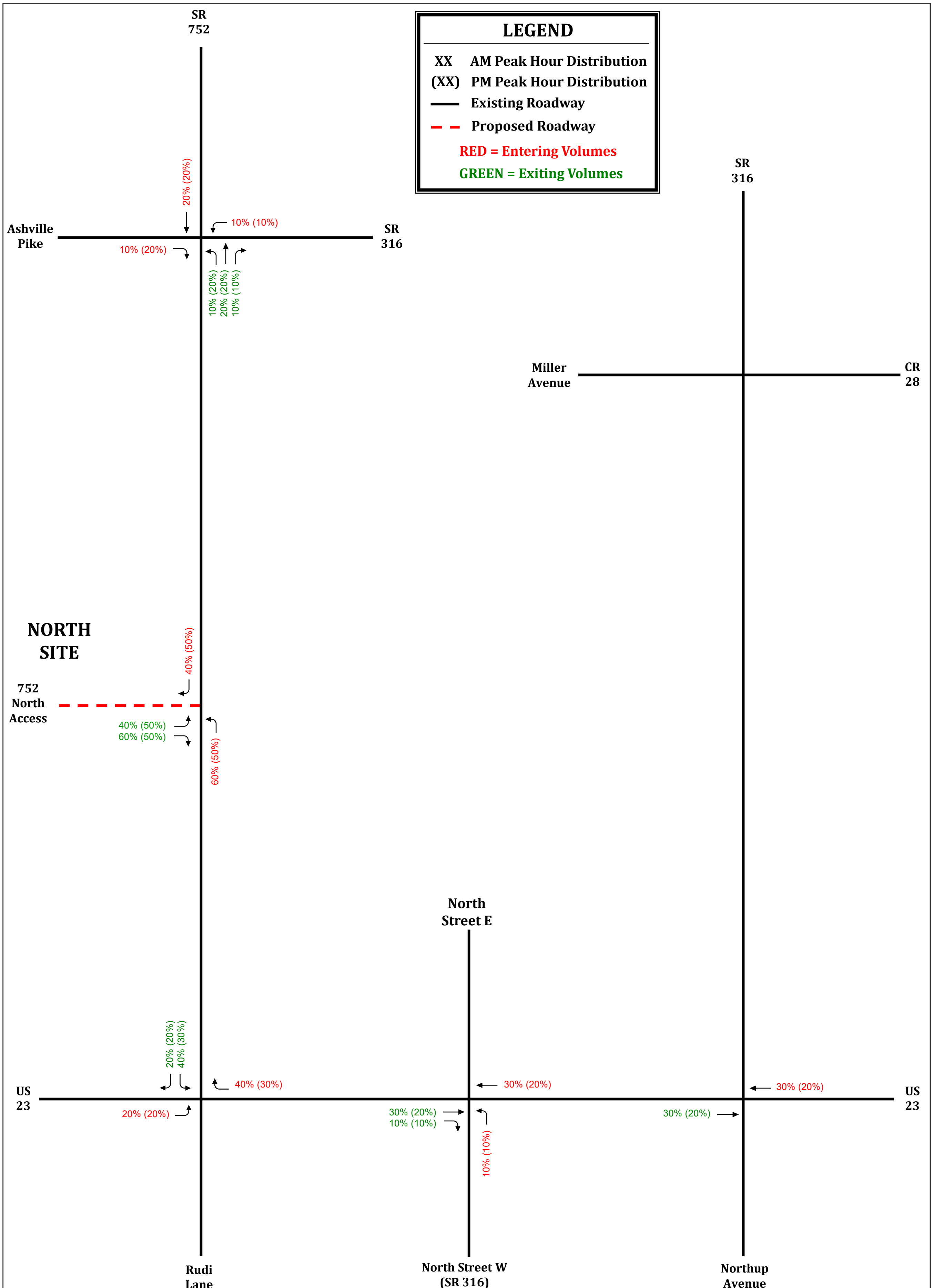
Existing 2022
Weekday Peak Hour
Traffic Volumes

NORTH
NOT TO SCALE

Figure: 2.5

Appendix: A



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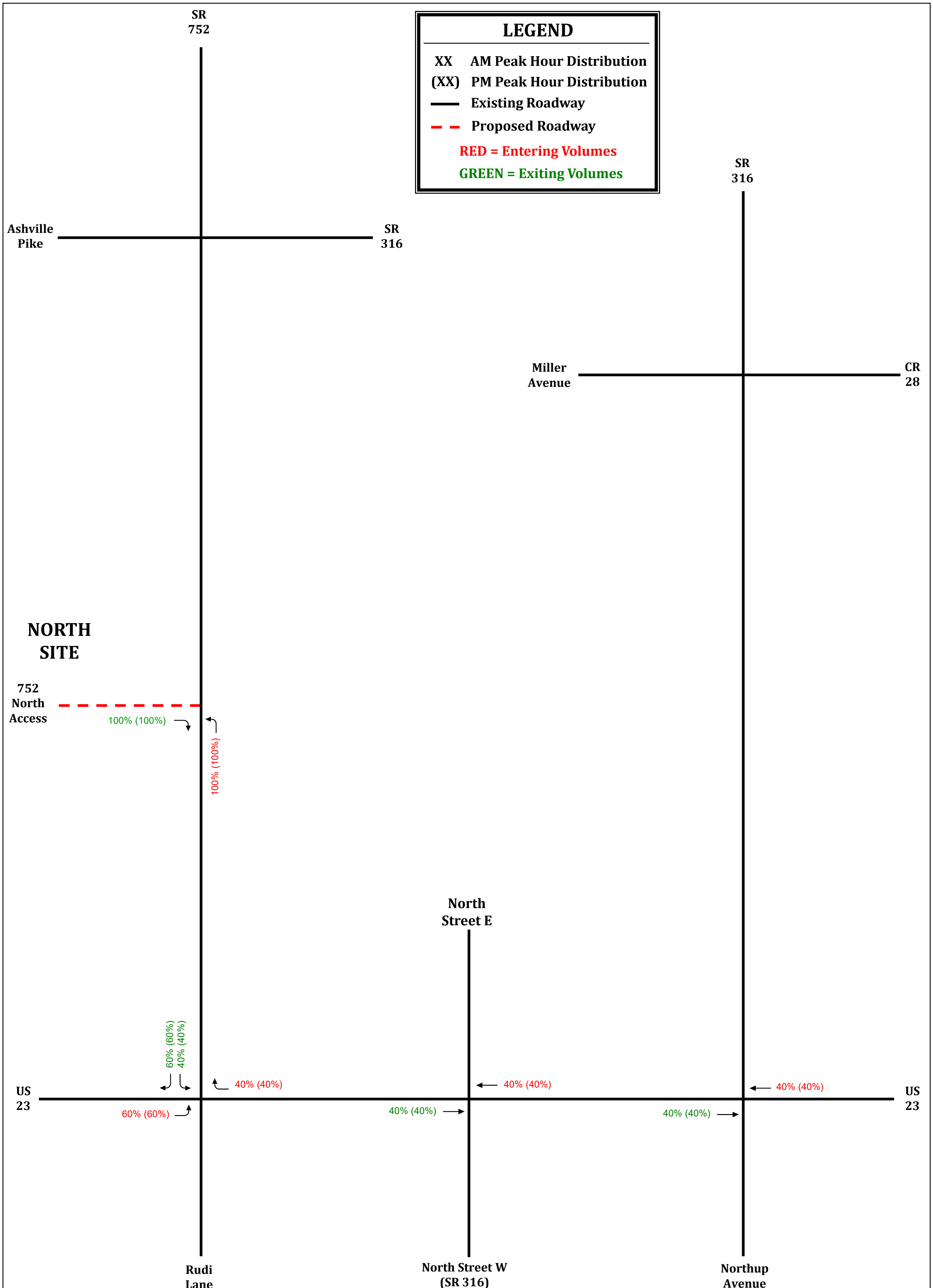
Ashville, Ohio

2024
Directional Distribution
New Generated Vehicle Traffic

NORTH
NOT TO SCALE

Figure: 3.1
Appendix: A



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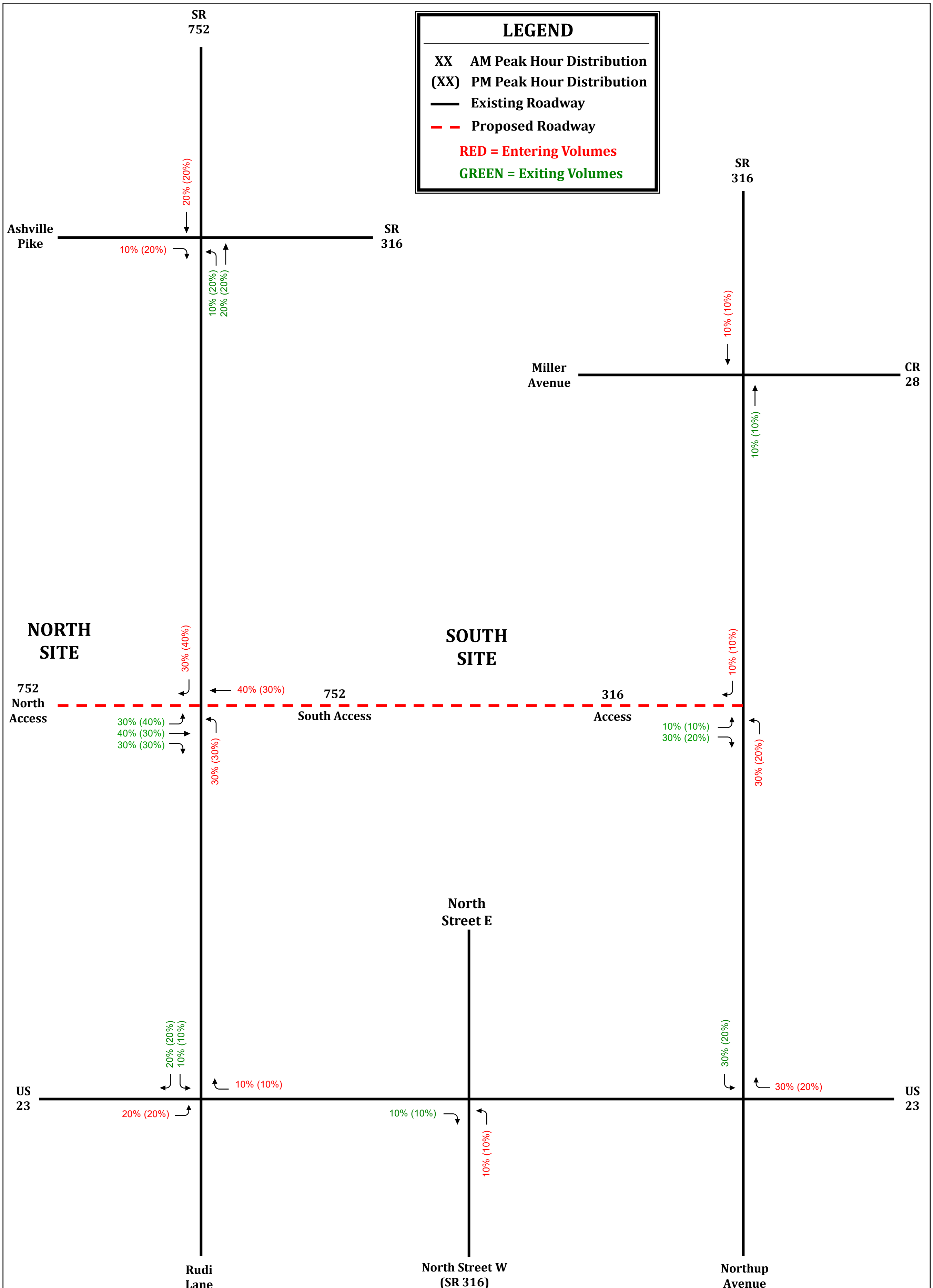
Traffic Impact Study
Ashville, Ohio

2024
Directional Distribution
New Generated Truck Traffic

NORTH
NOT TO SCALE

Figure: 3.2
Appendix: A



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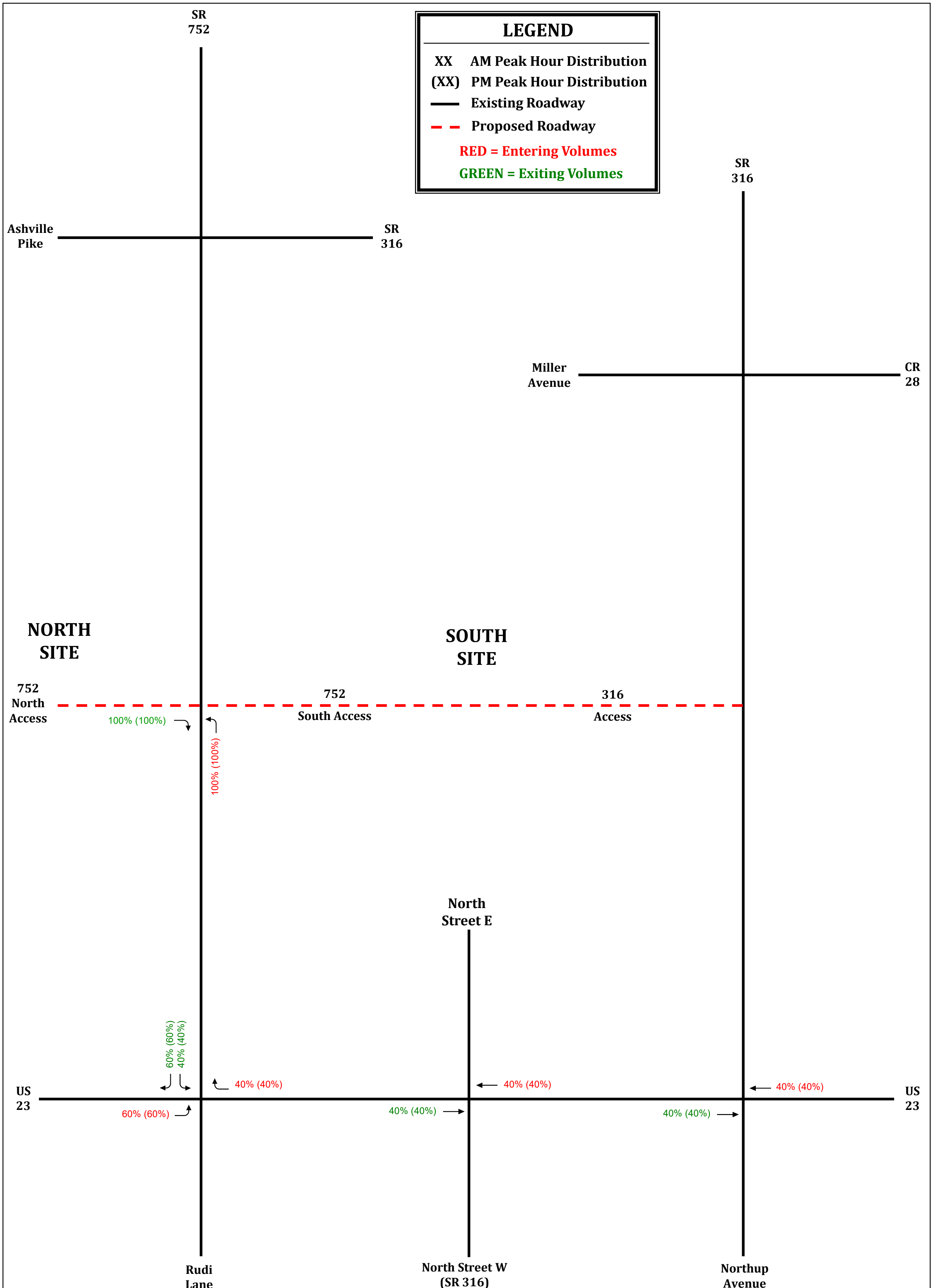
Traffic Impact Study
Ashville, Ohio

2030/2044
North Directional Distribution
New Generated Vehicle Traffic

NORTH
NOT TO SCALE

Figure: 3.3
Appendix: A



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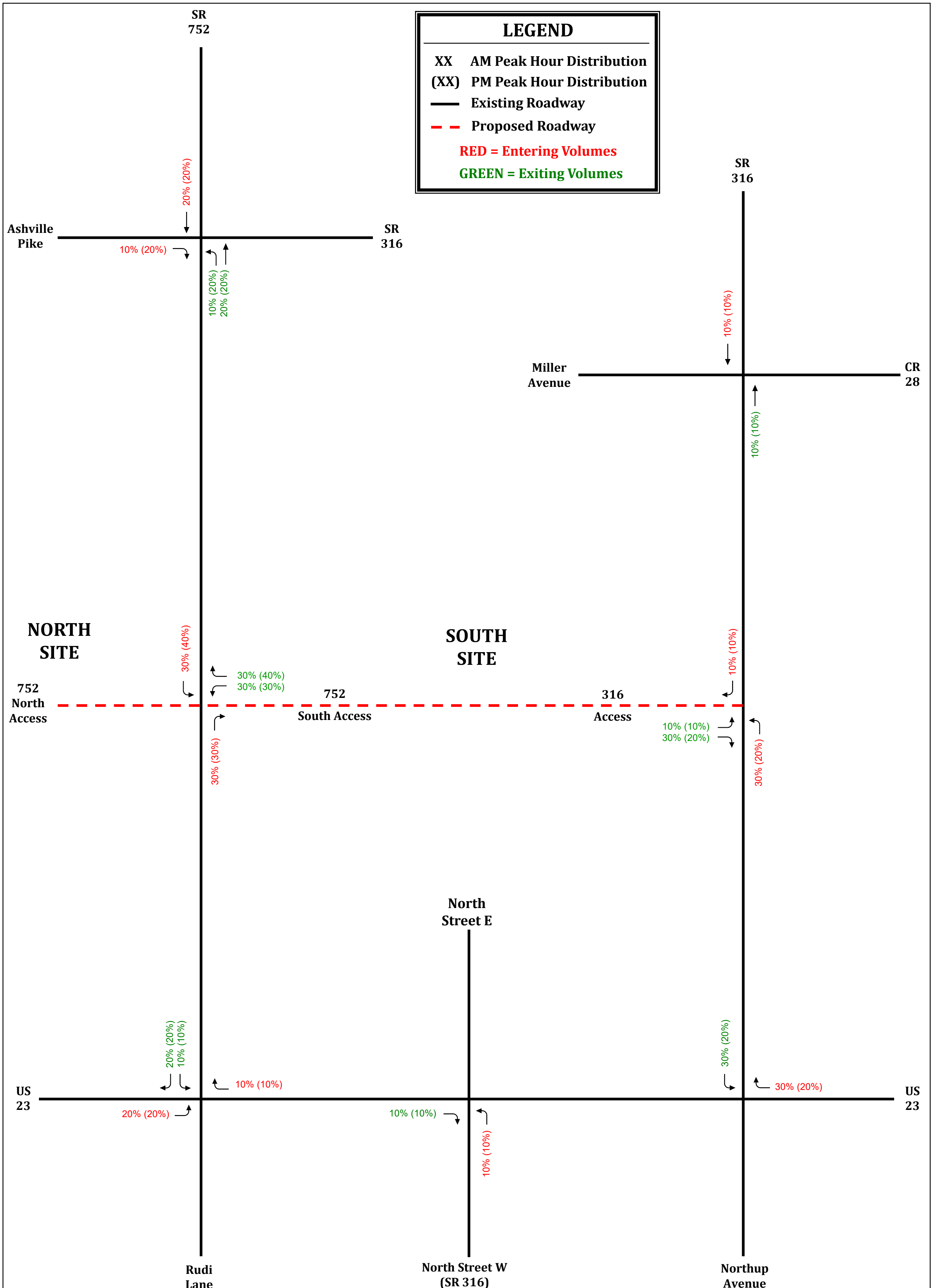
2030/2044
North Directional Distribution
New Generated Truck Traffic

NORTH
NOT TO SCALE

Figure: 3.4
Appendix: A



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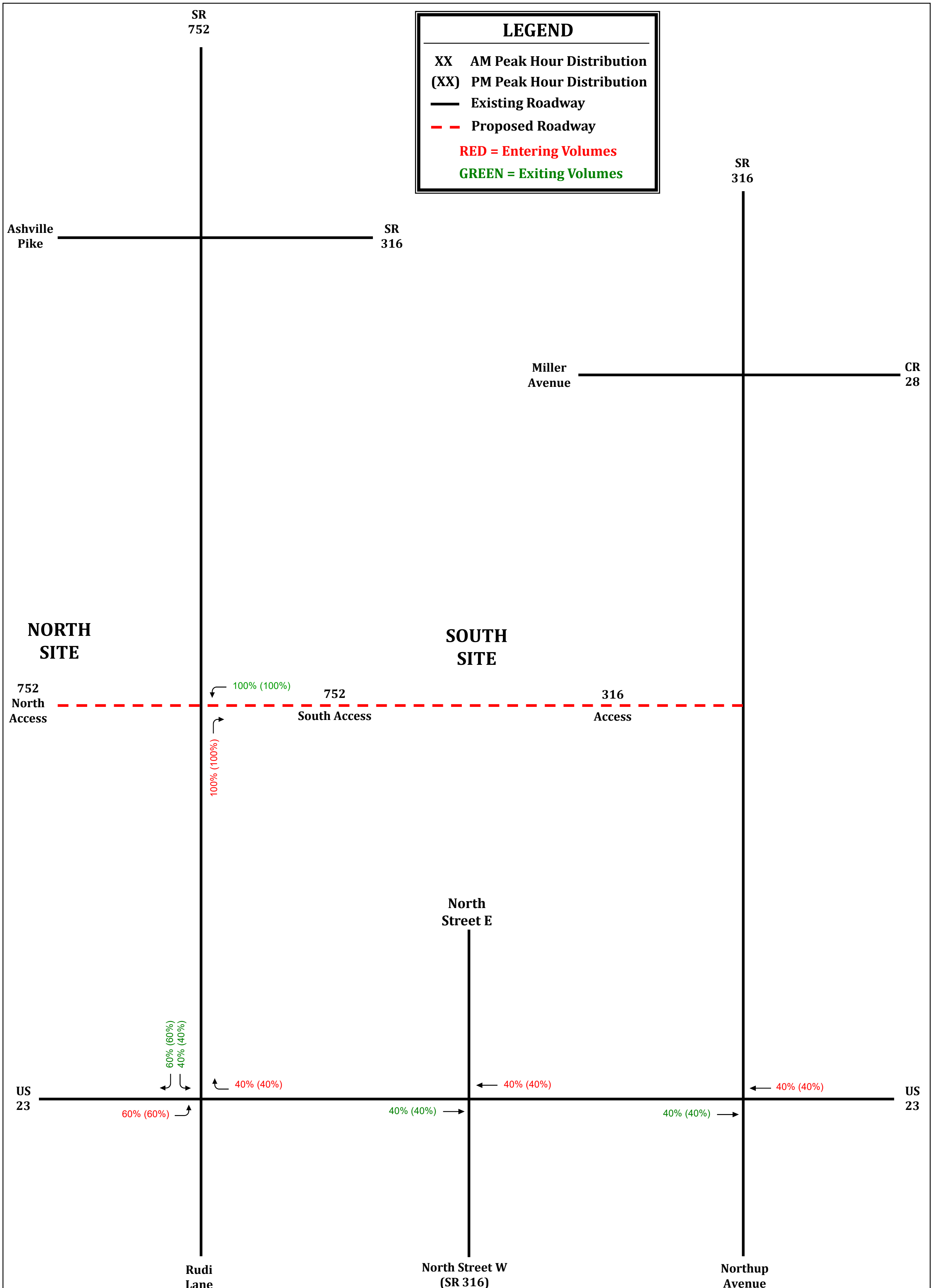
2033/2044
South Directional Distribution
New Generated Vehicle Traffic

NORTH
NOT TO SCALE

Figure: 3.5

Appendix: A



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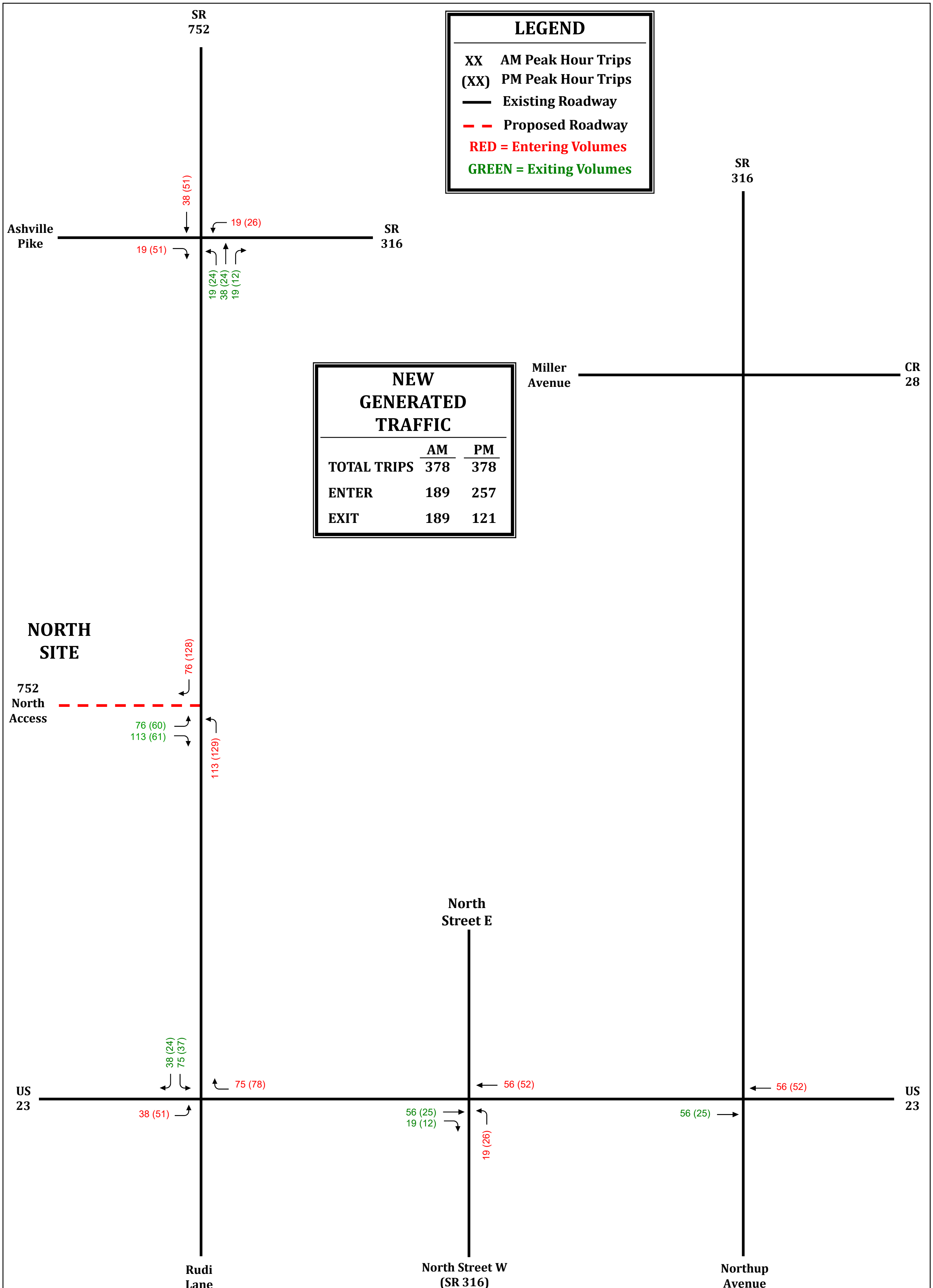
2033/2044
South Directional Distribution
New Generated Truck Traffic

NORTH
NOT TO SCALE

Figure: 3.6
Appendix: A



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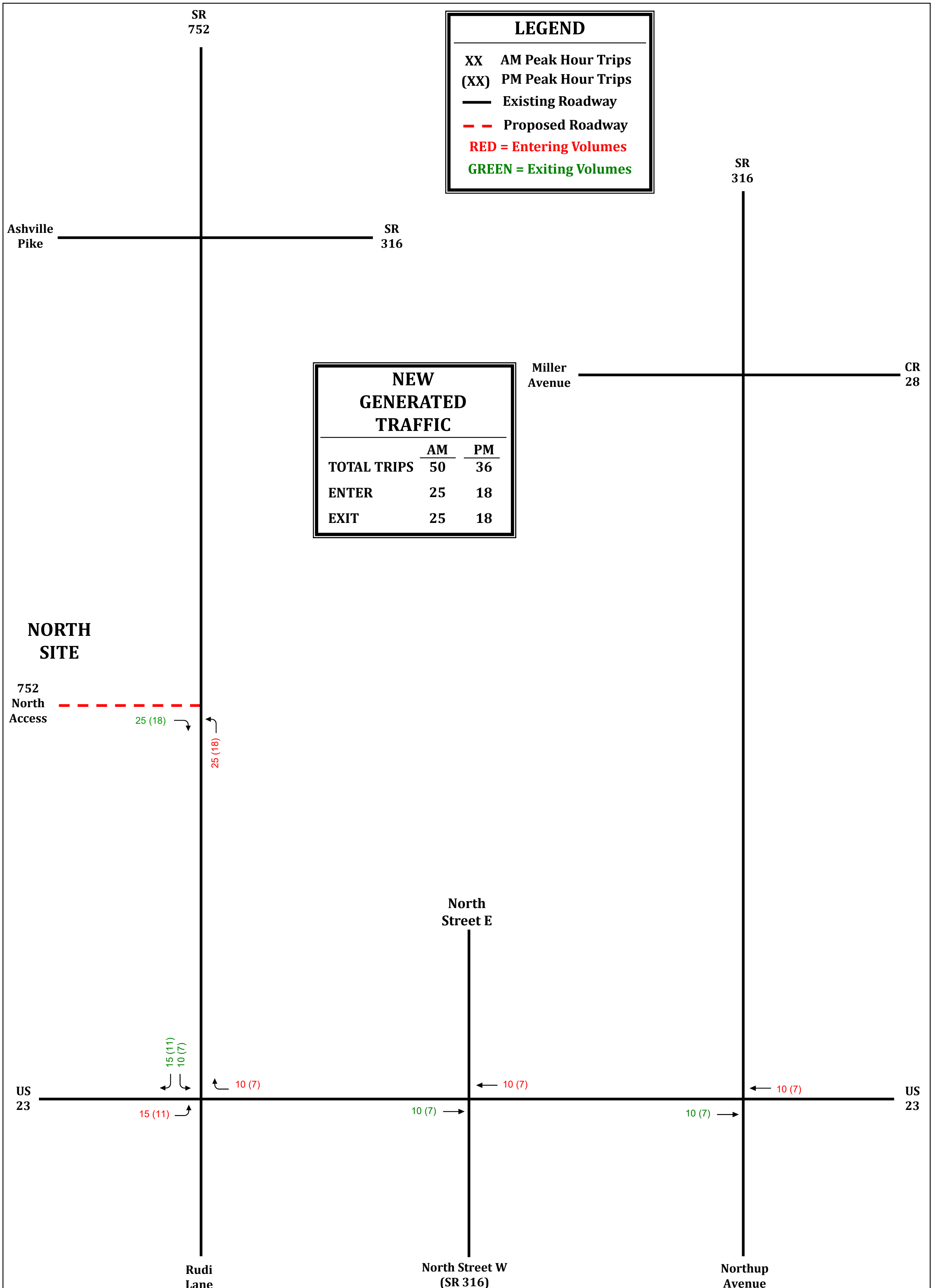
2024
New Generated
Vehicle Traffic

NORTH
NOT TO SCALE

Figure: 3.7
Appendix: A



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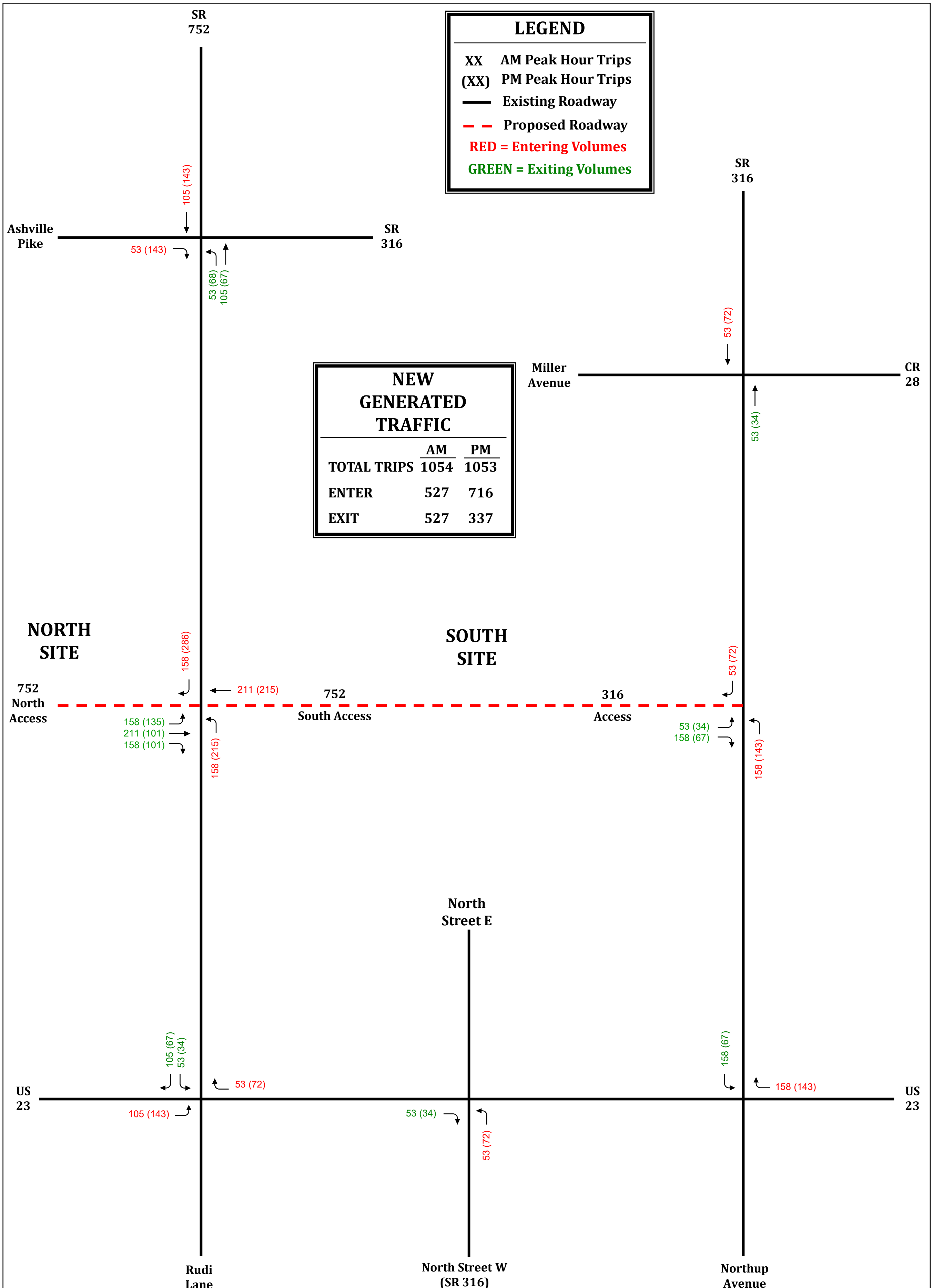
2024
New Generated
Truck Traffic

NORTH
NOT TO SCALE

Figure: 3.8
Appendix: A



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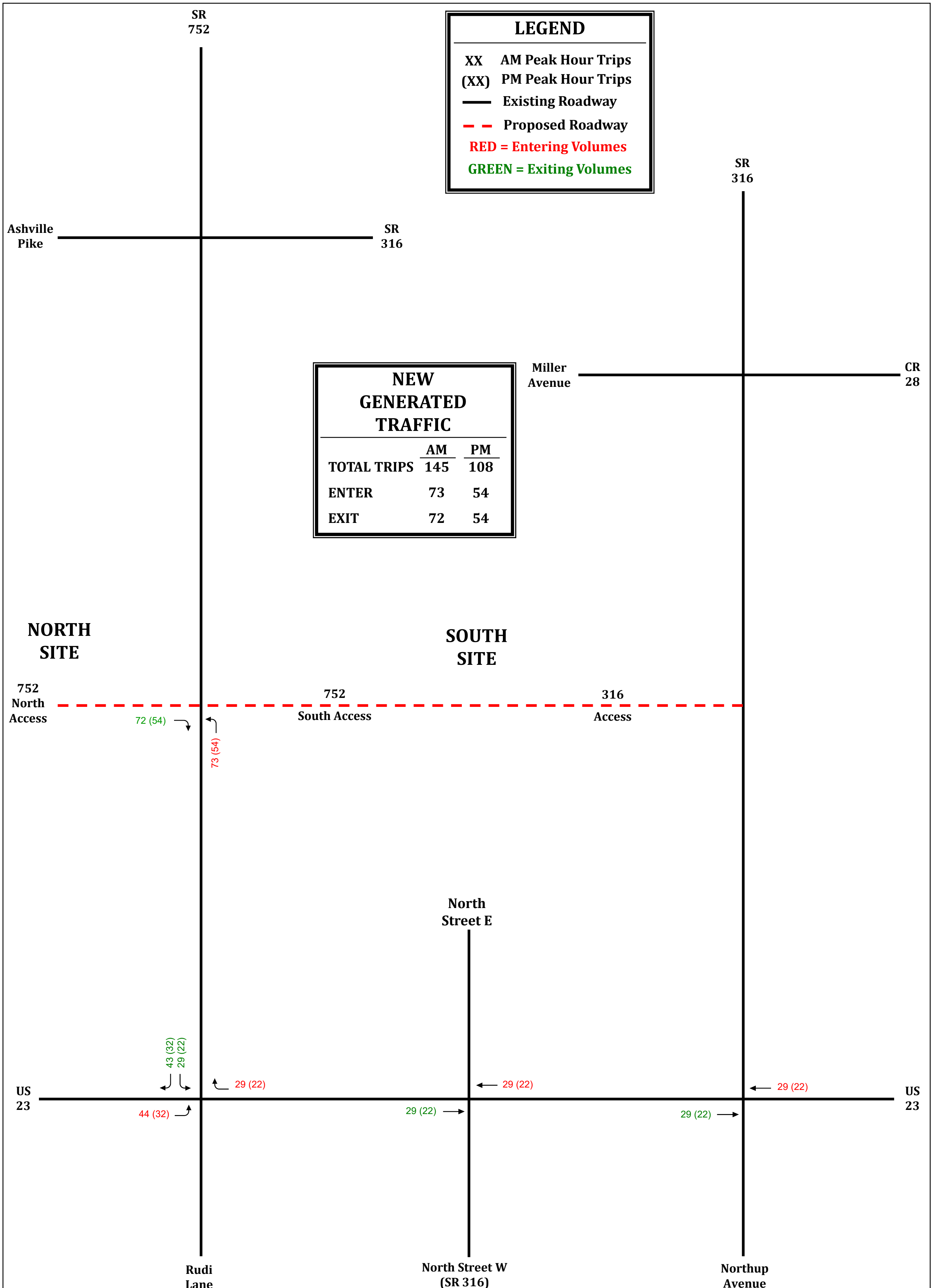
Full Build
North New Generated
Vehicle Traffic

NORTH
NOT TO SCALE

Figure: 3.9

Appendix: A



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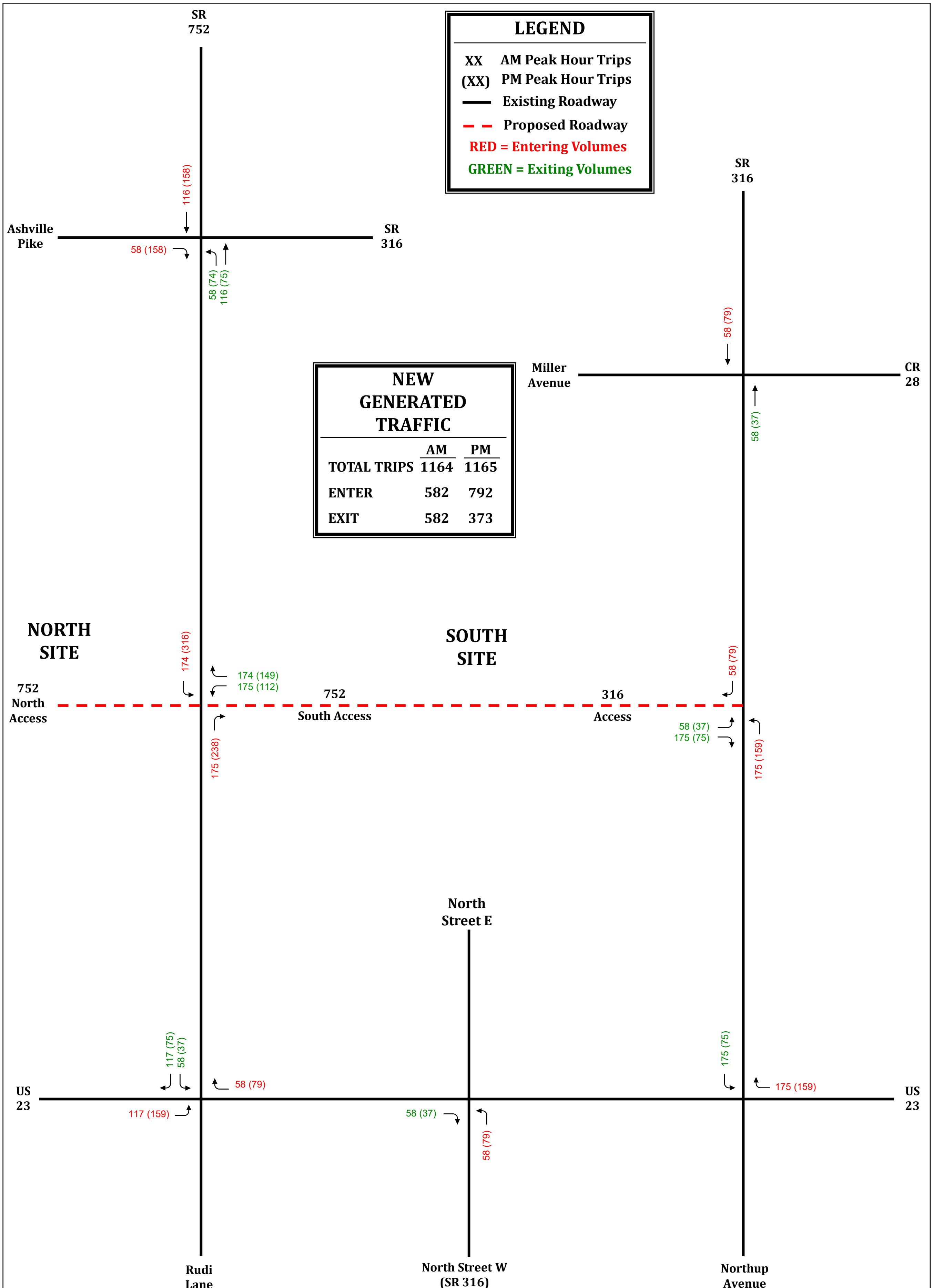
Full Build
North New Generated
Truck Traffic

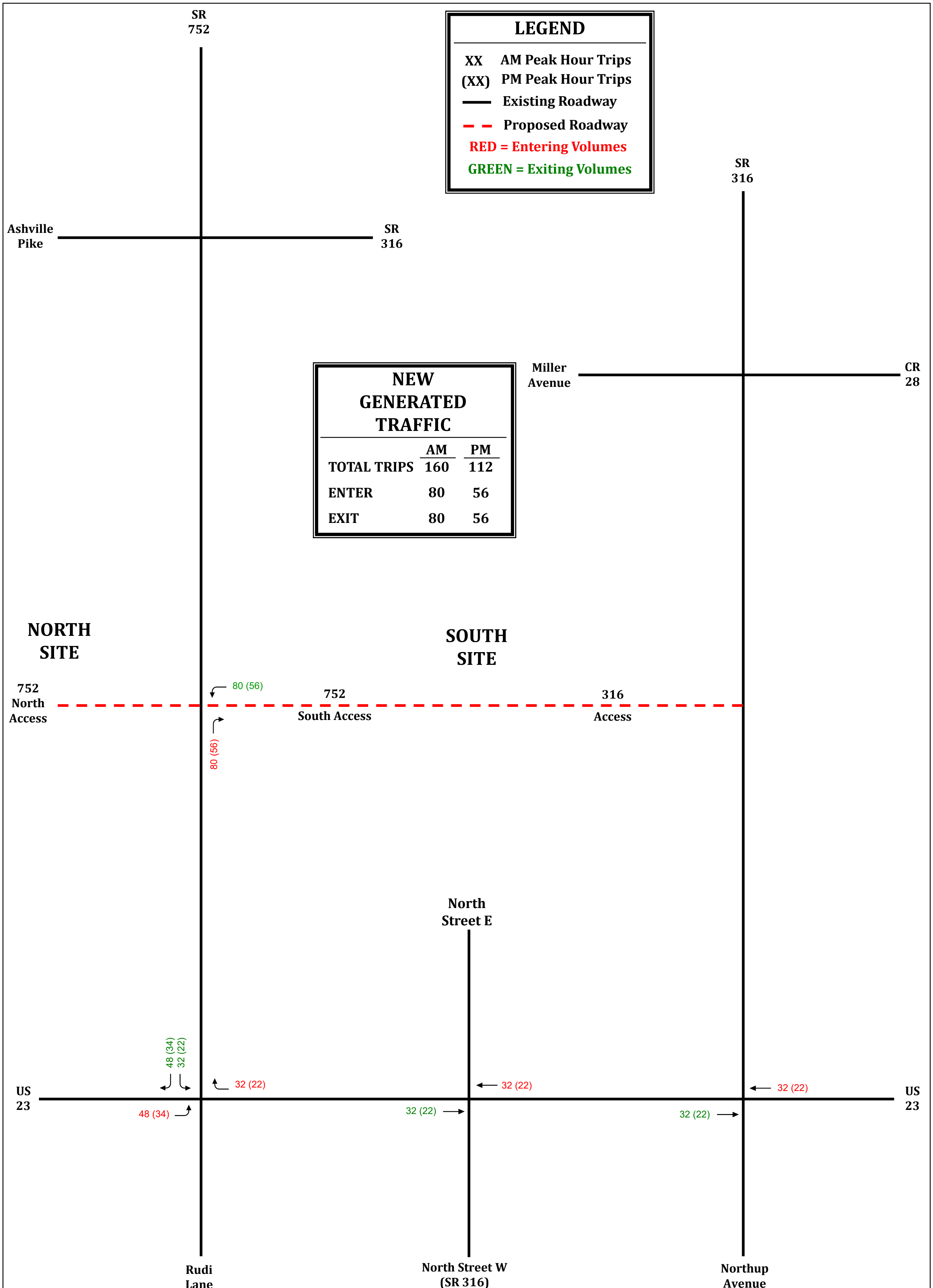
NORTH
NOT TO SCALE

Figure: 3.10

Appendix: A



NEW GENERATED TRAFFIC	AM	PM
TOTAL TRIPS	1164	1165
ENTER	582	792
EXIT	582	373



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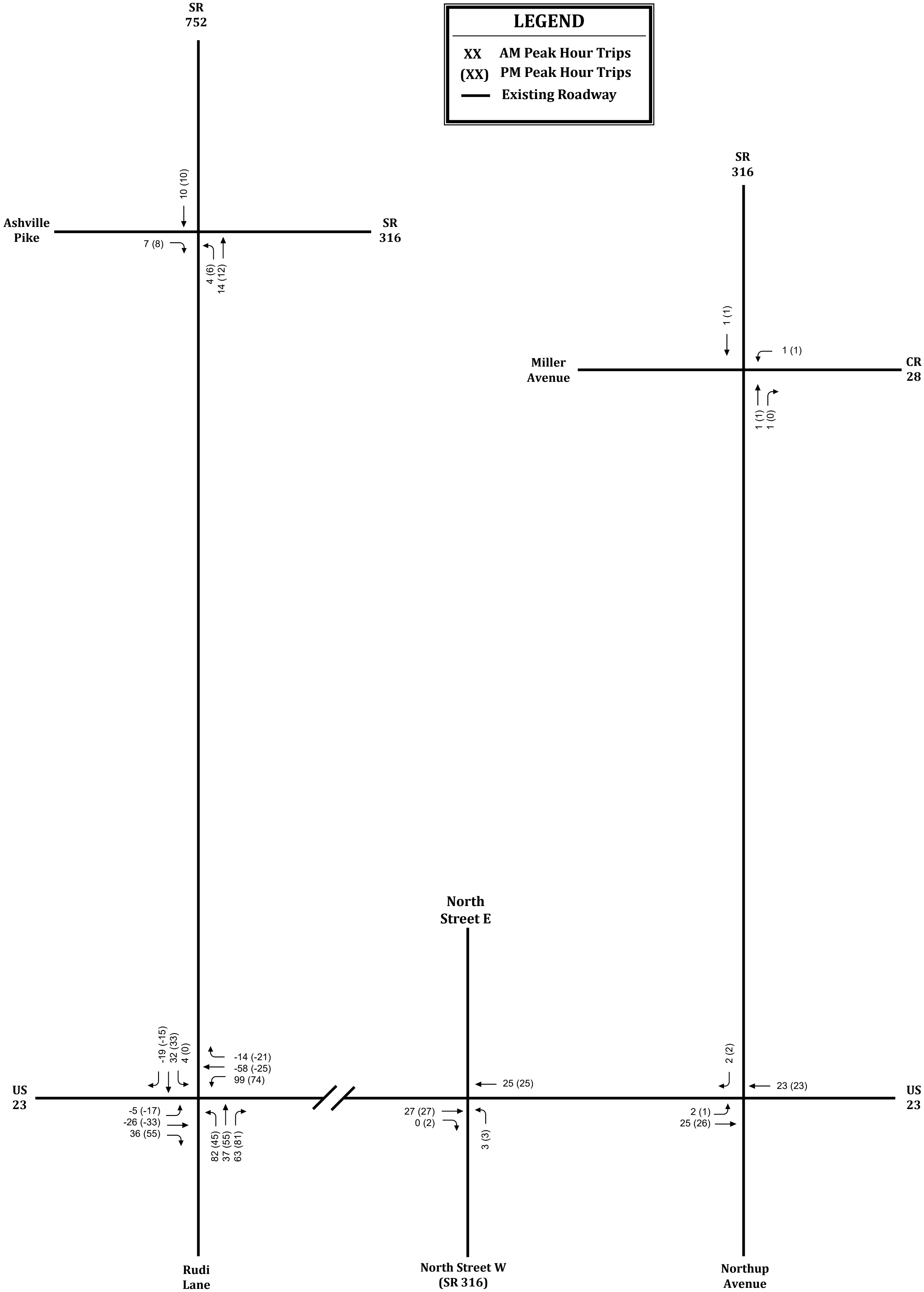
Design Year 2044
South New Generated
Truck Traffic

NORTH
NOT TO SCALE

Figure: 3.12

Appendix: A



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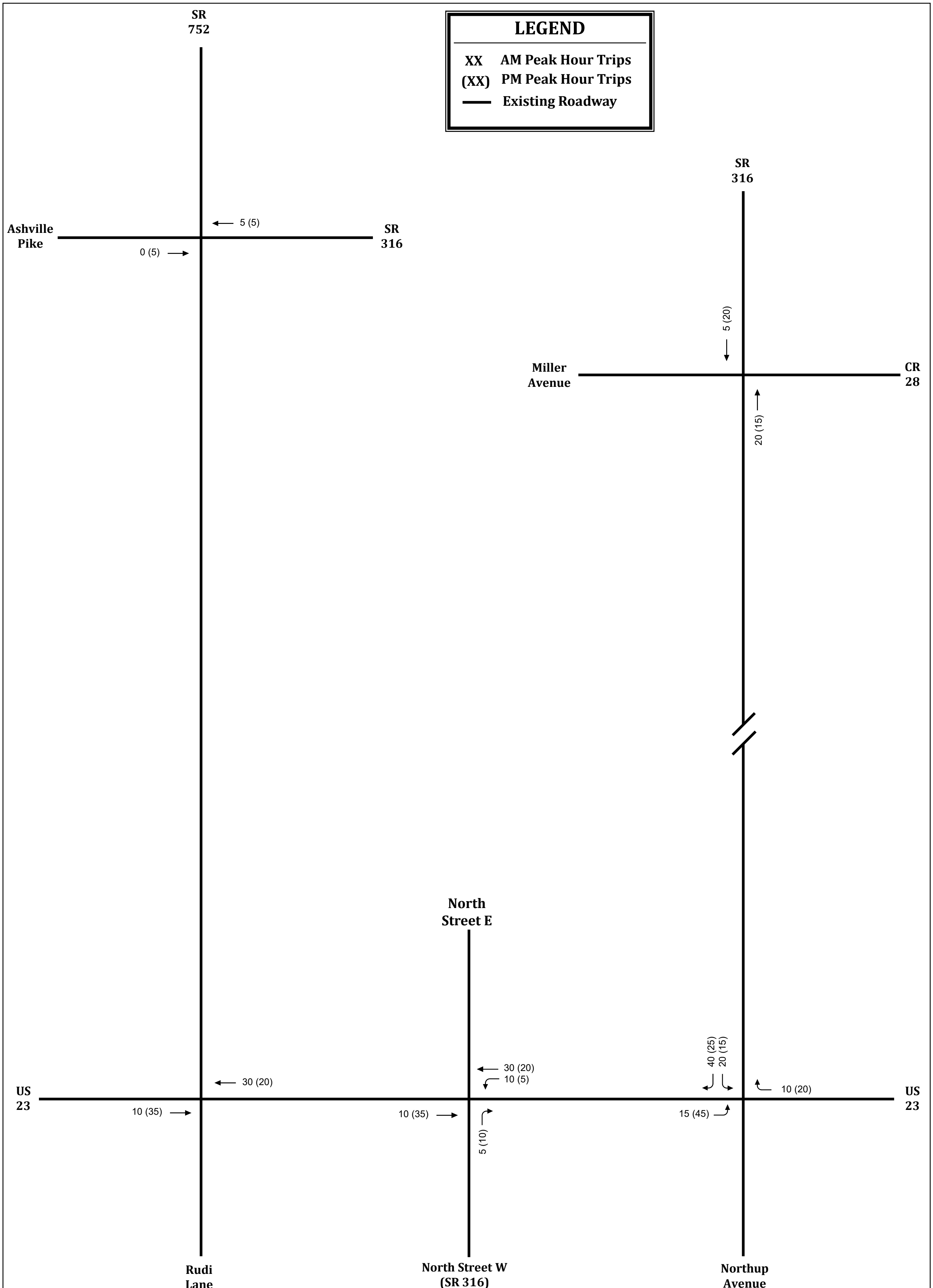

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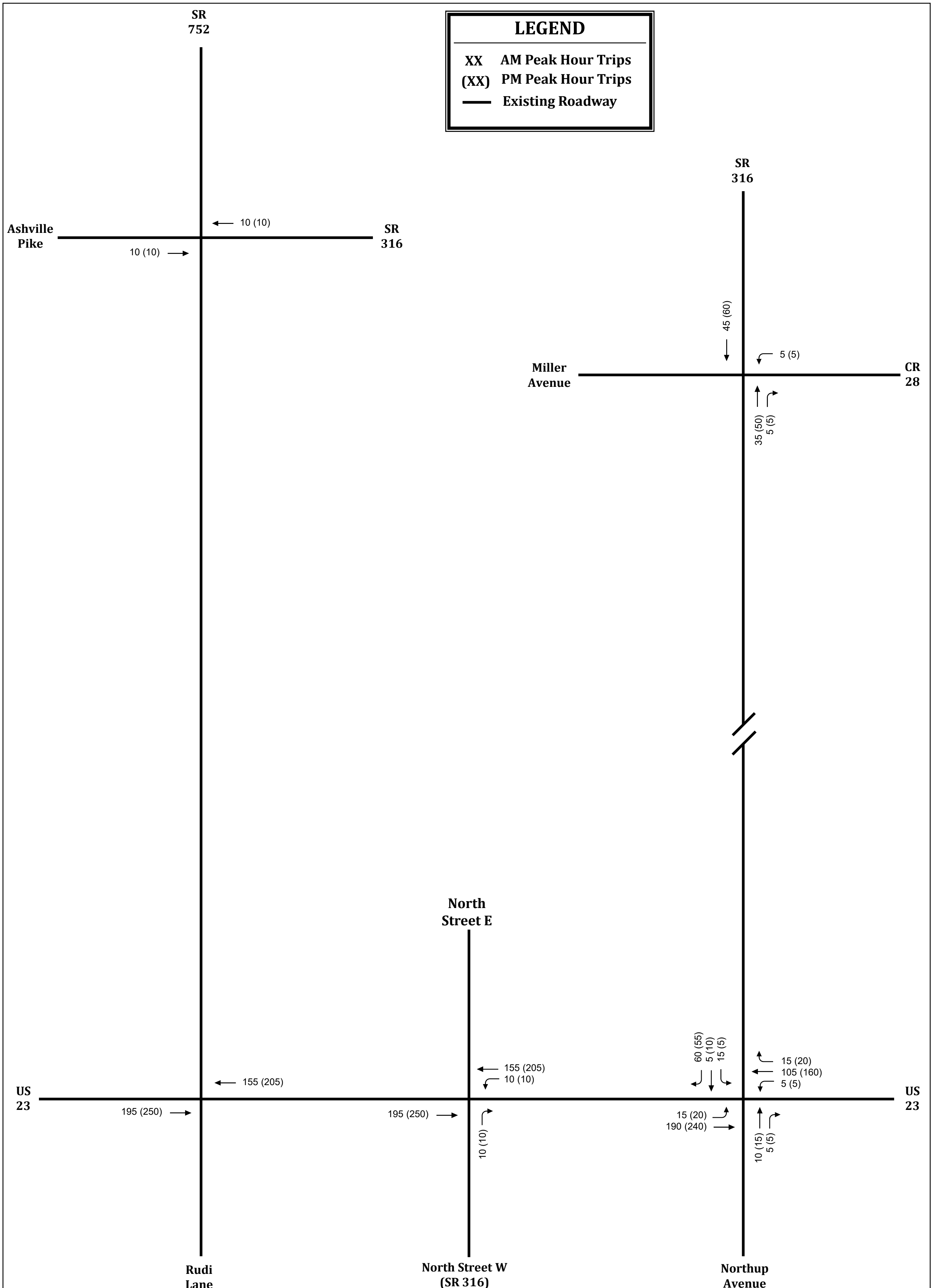

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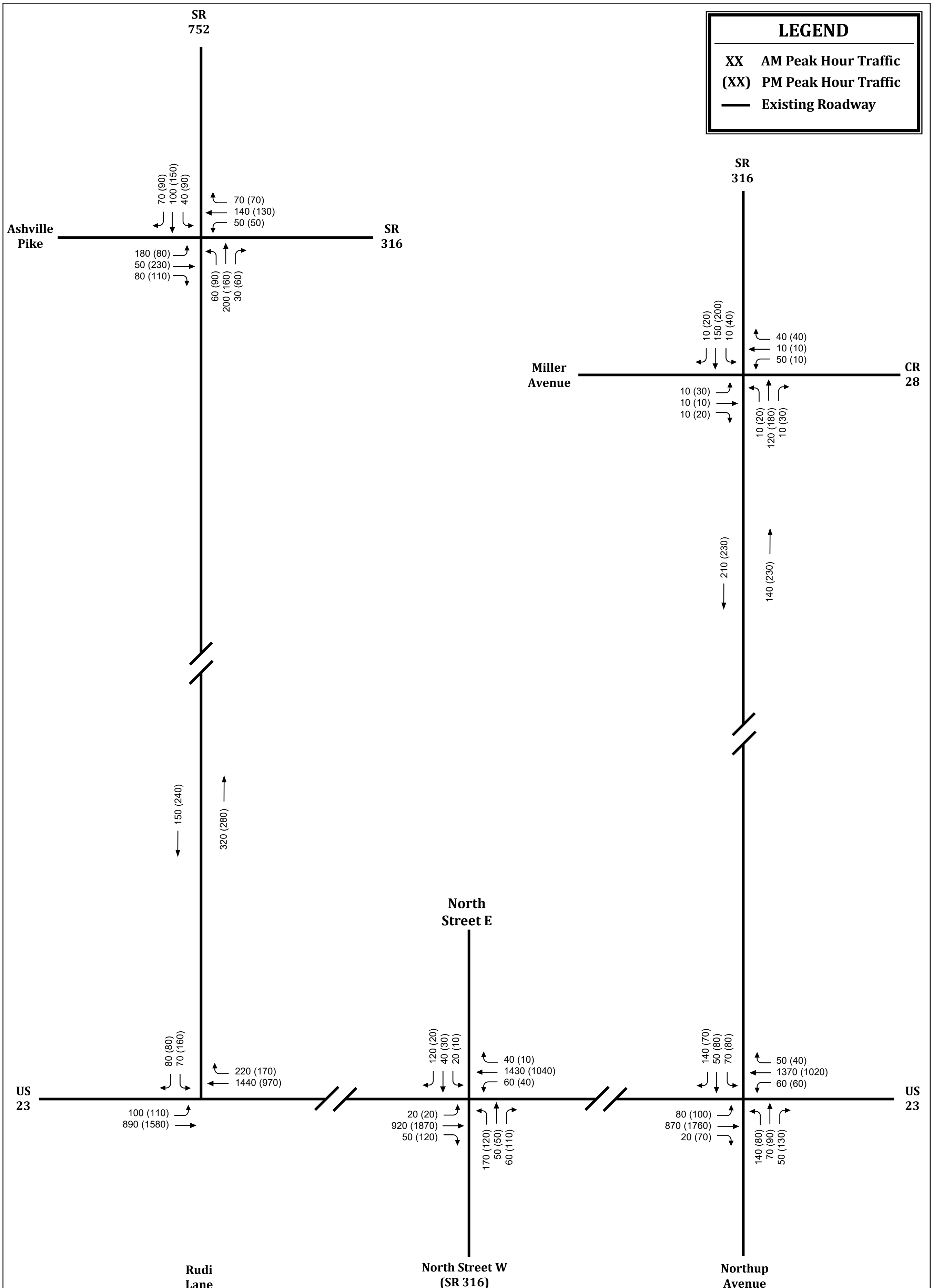
US23/SR316 Development
Design Year
Generated Traffic
(Exhibit 9 of July 2021 TIS)

NORTH
NOT TO SCALE

Figure: 3.15

Appendix: A



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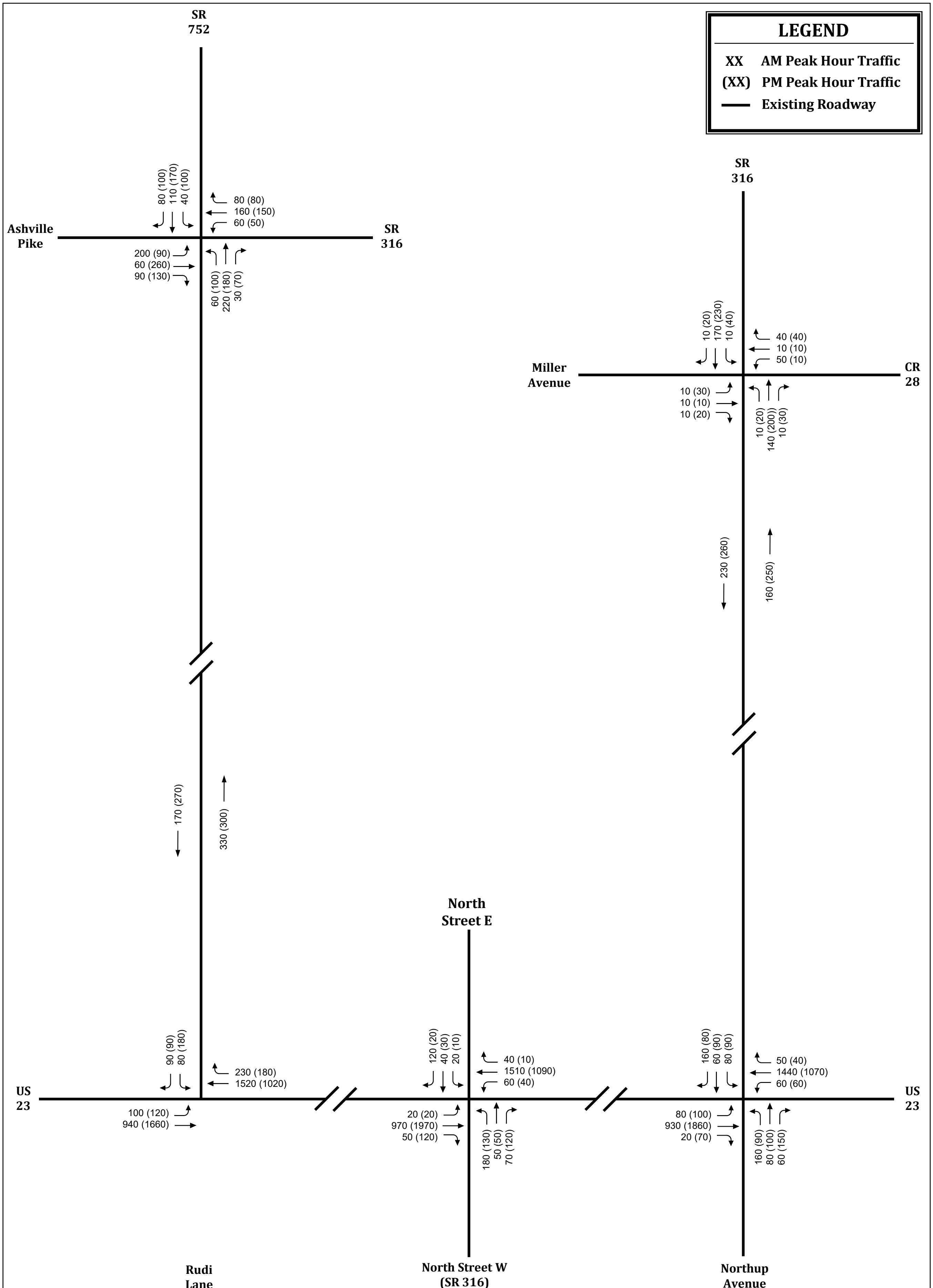
2024 No-Build
Peak Hour Traffic Volumes
W/OUT
Additional Developments

NORTH
NOT TO SCALE

Figure: 3.16

Appendix: A



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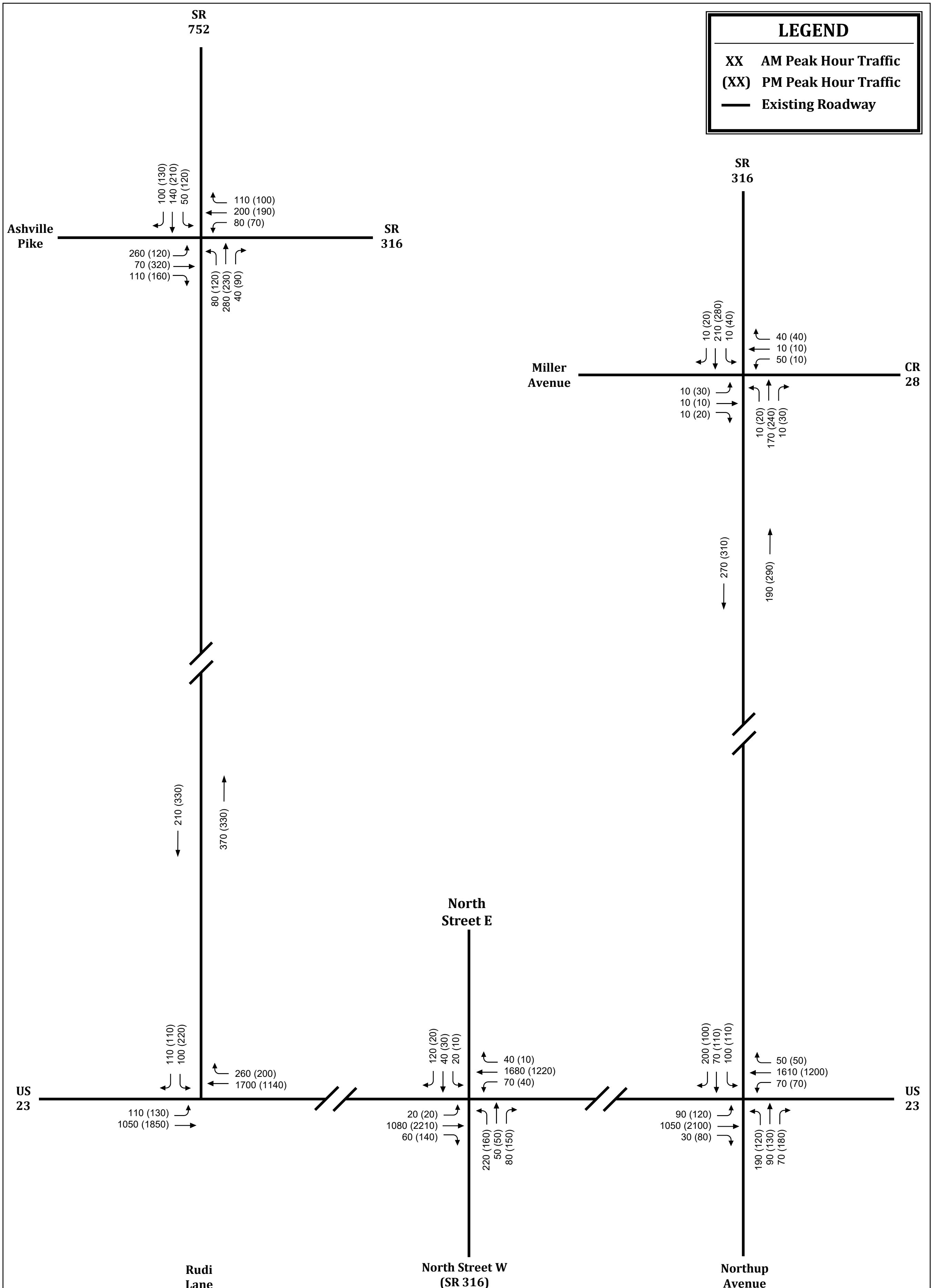
2030 No-Build
Peak Hour Traffic Volumes
W/OUT
Additional Developments

NORTH
NOT TO SCALE

Figure: 3.17

Appendix: A



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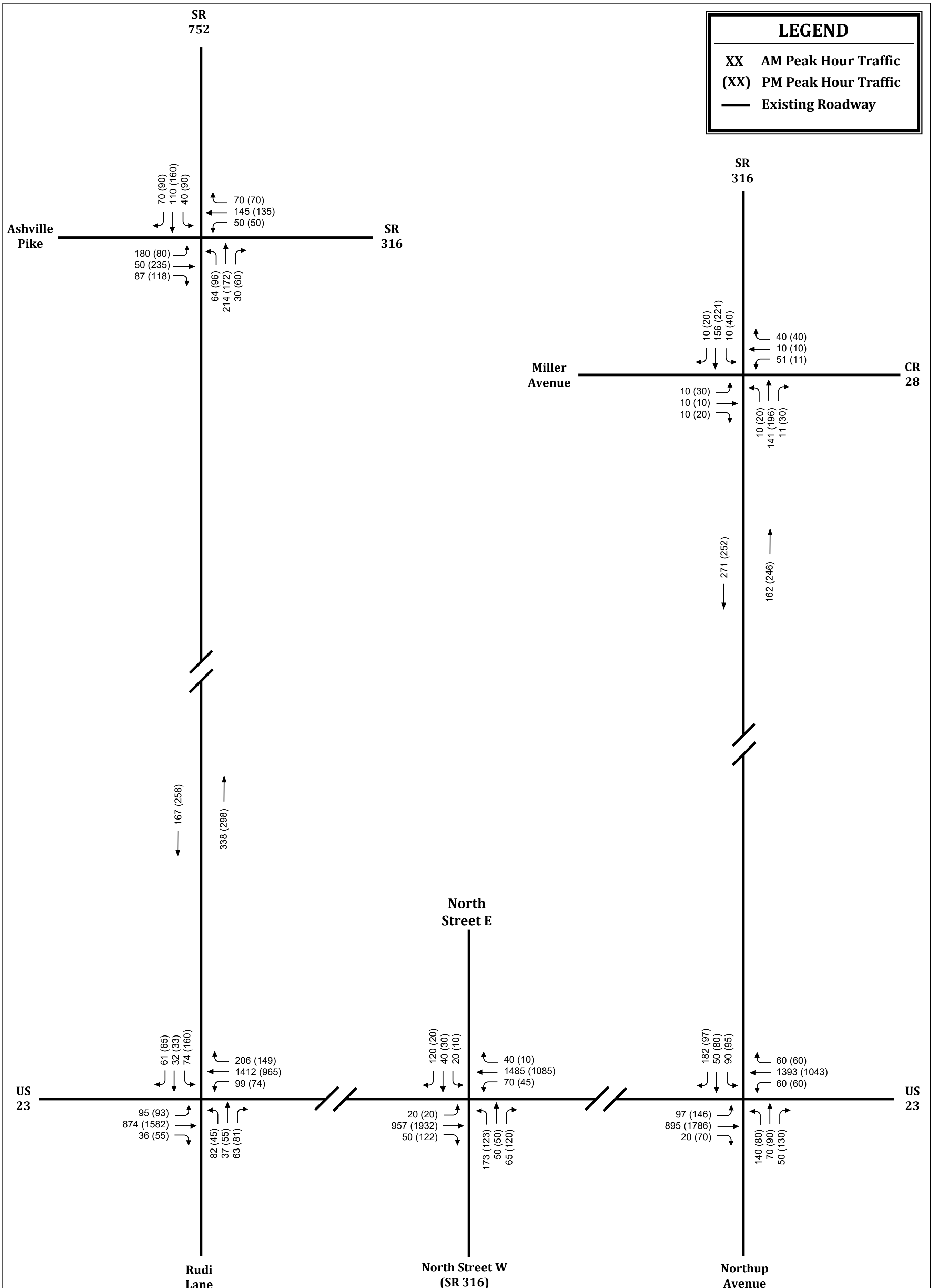
2044 No-Build
Peak Hour Traffic Volumes
W/OUT
Additional Developments

NORTH
NOT TO SCALE

Figure: 3.18

Appendix: A



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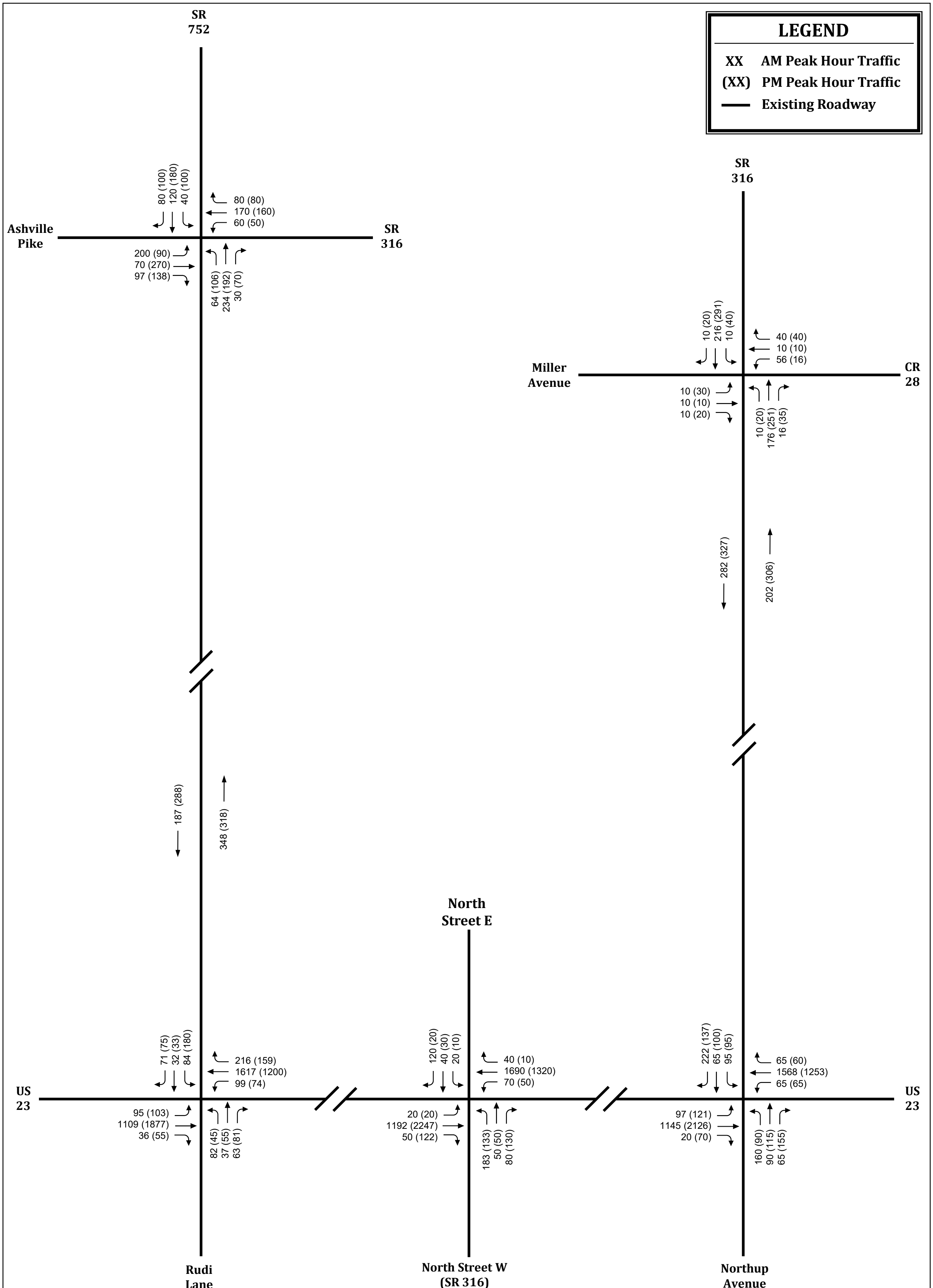
2024 No-Build
Peak Hour Traffic Volumes
WITH
Additional Developments

NORTH
NOT TO SCALE

Figure: 3.19

Appendix: A



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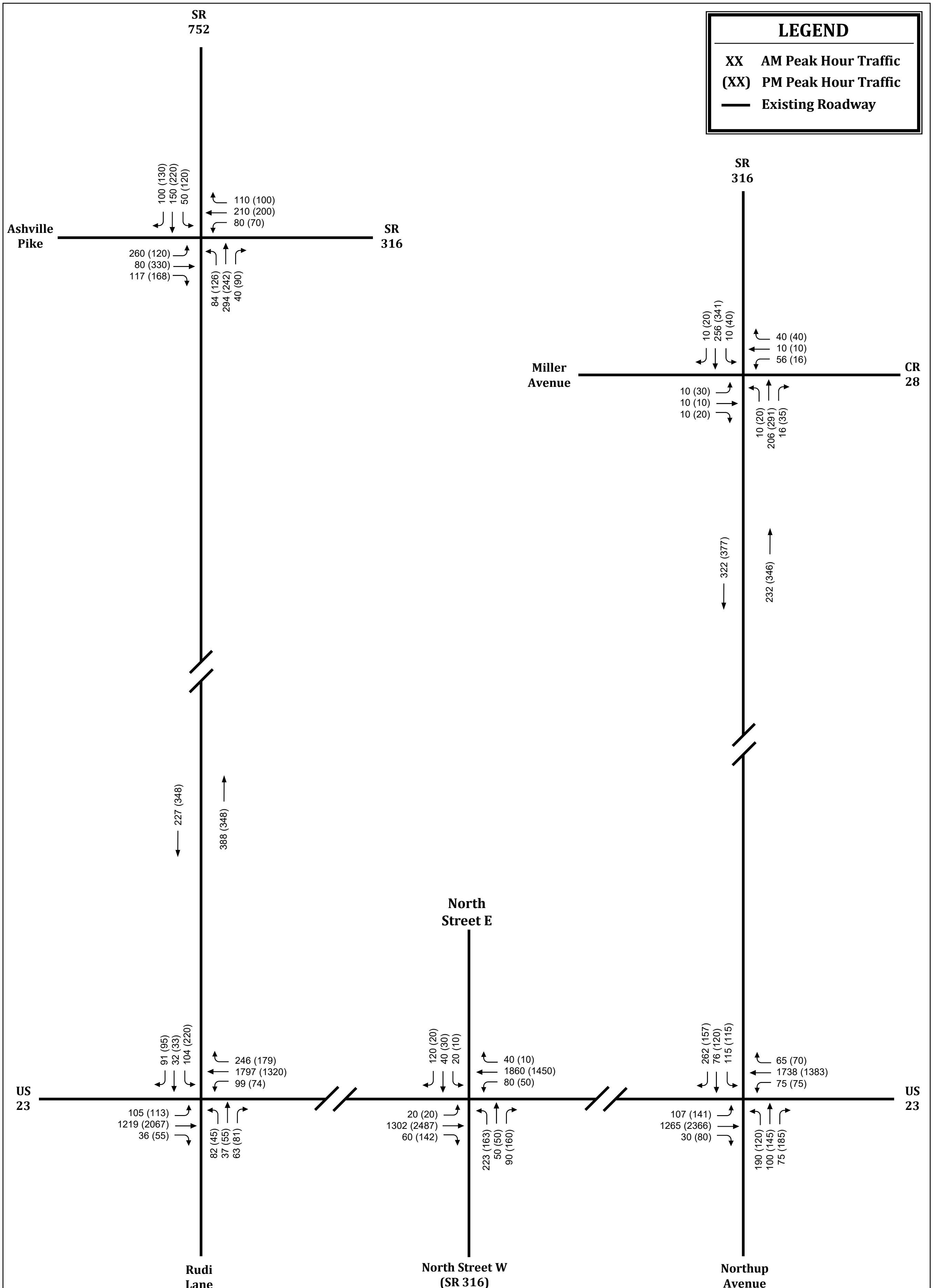
2030 No-Build
Peak Hour Traffic Volumes
WITH
Additional Developments

NORTH
NOT TO SCALE

Figure: 3.20

Appendix: A



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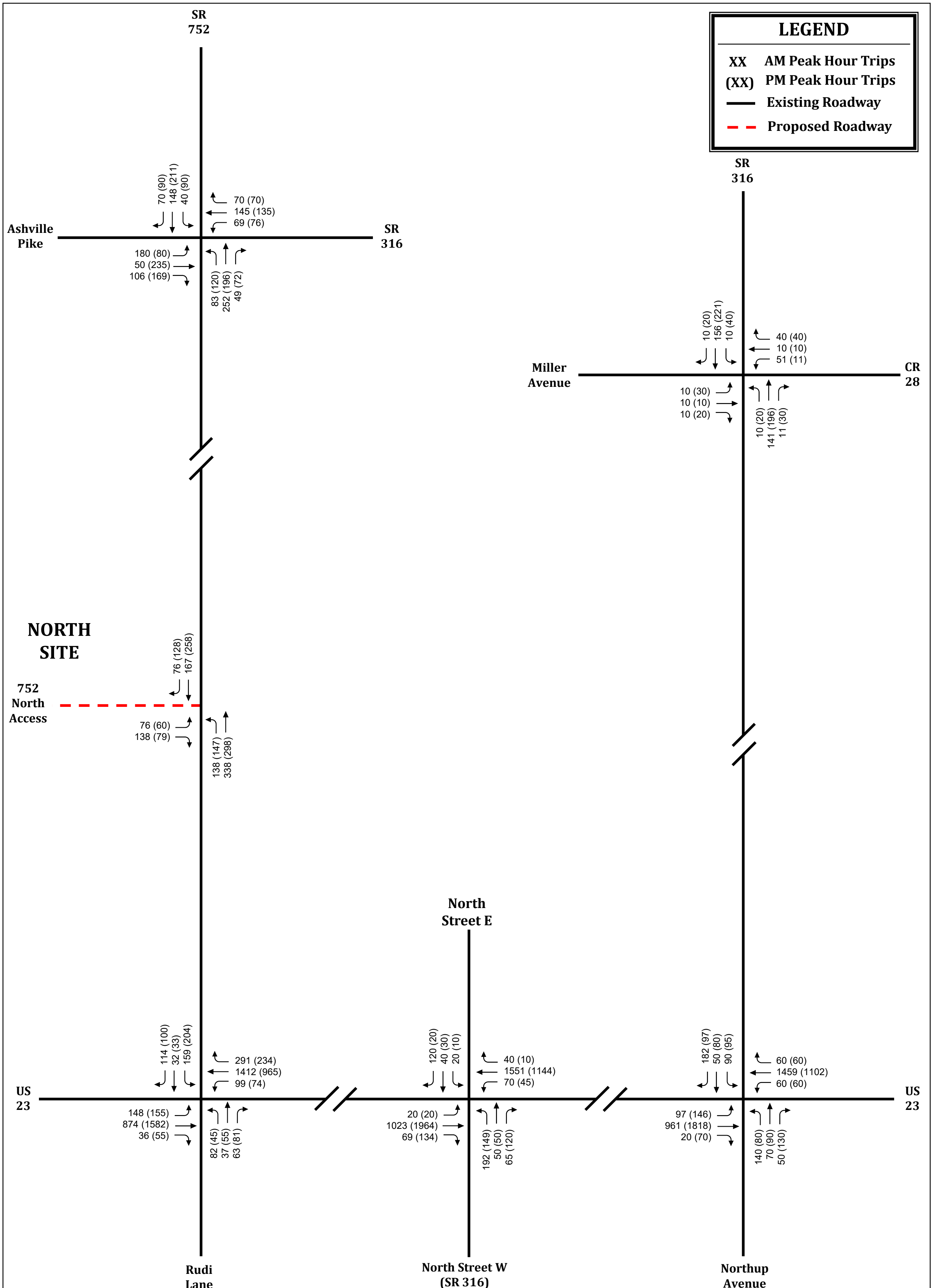
2044 No-Build
Peak Hour Traffic Volumes
WITH
Additional Developments

NORTH
NOT TO SCALE

Figure: 3.21

Appendix: A



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DHL Development
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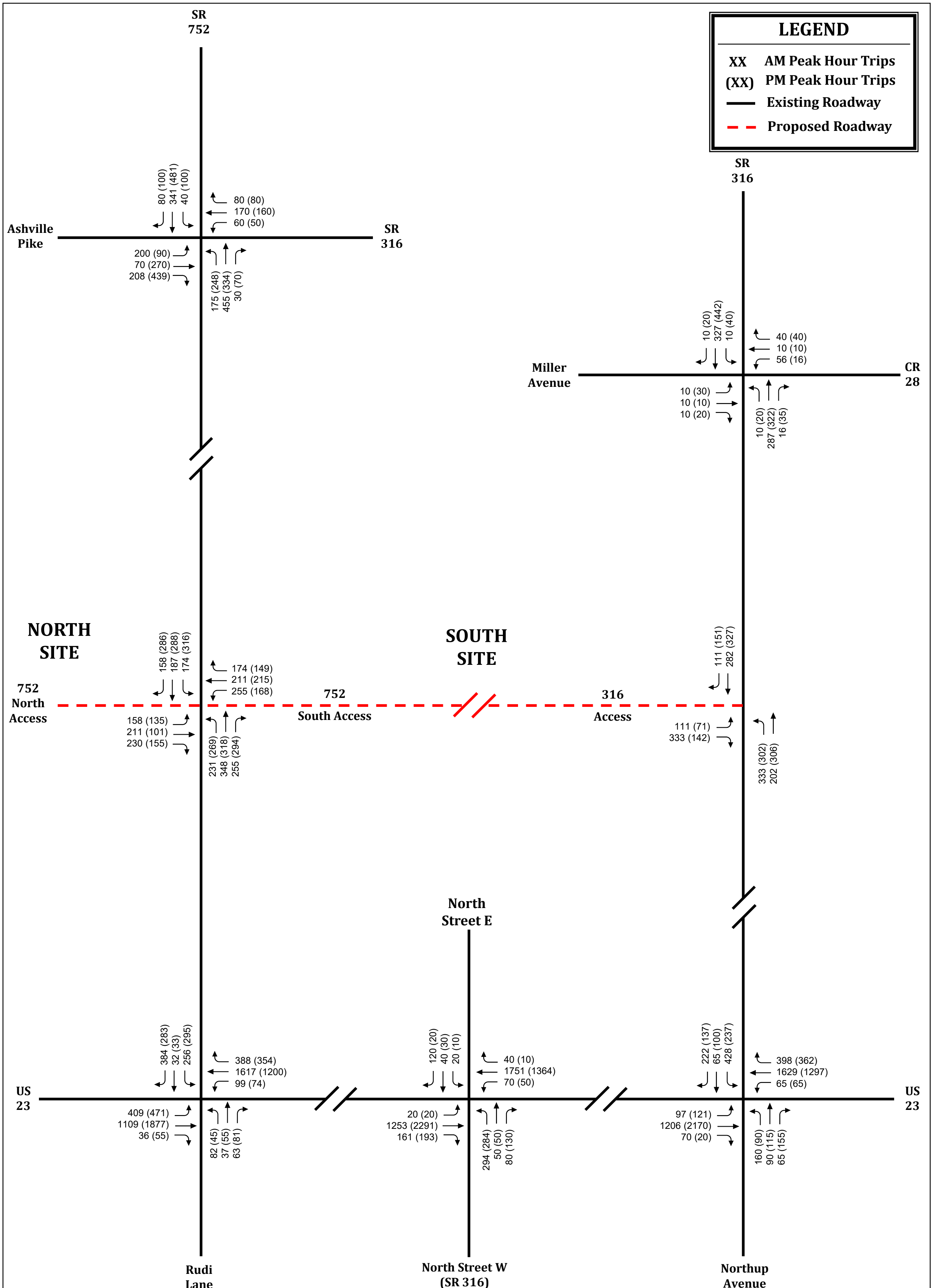
Ashville, Ohio

2024
Build Peak Hour
Traffic Volumes

NORTH
NOT TO SCALE

Figure: 3.22

Appendix: A



TMS Engineers, Inc.
Transportation Management Services
2112 Case Parkway S., Unit 7, Twinsburg, Ohio 44087
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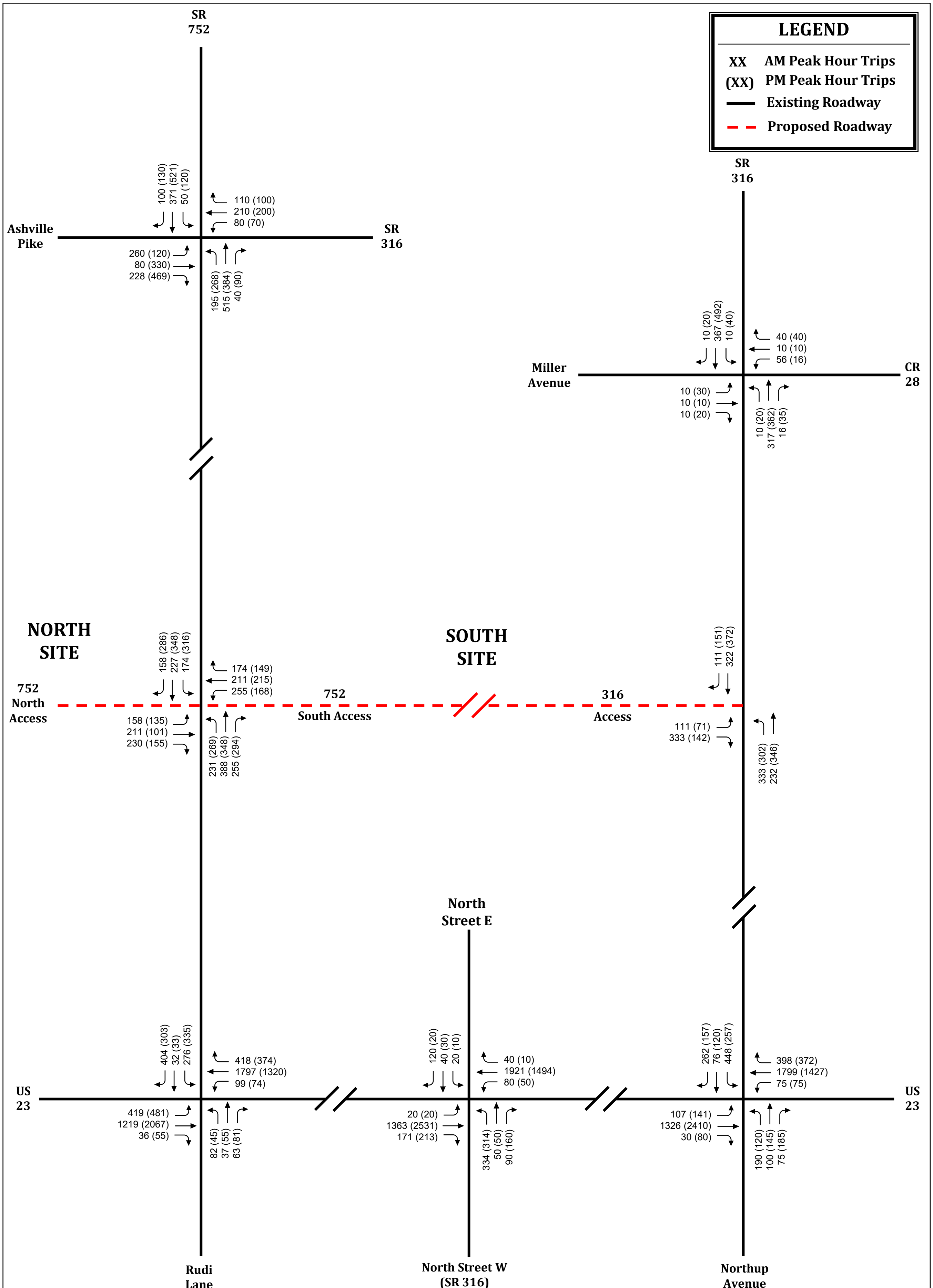
DHL Development
Traffic Impact Study
Ashville, Ohio

2030
Build Peak Hour
Traffic Volumes

NORTH
NOT TO SCALE

Figure: 3.23

Appendix: A



TMS Engineers, Inc.
Transportation Management Services
2112 Case Parkway S., Unit 7, Twinsburg, Ohio 44087
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DHL Development
Traffic Impact Study
Ashville, Ohio

2044
Build Peak Hour
Traffic Volumes

NORTH
NOT TO SCALE

Figure: 3.24

Appendix: A

Appendix B
Collected Traffic Count Data

VEHICULAR TRAFFIC COUNT SUMMARY

Municipality: Ashville **At Intersection of:** State Route 752 **and** South Walnut Street (US 23)

Date: 2/17/2022 **Day:** Thu. **Comments:** **Project:** 22-029

Weather: Clear **Recorder(s):** DJS **Data entry by:** JJO **Date entered:** Feb. 18, 2022 SR 752 & US 23 021722

TIME BEGINS	S. Walnut St. (US 23) FROM NORTH						S. Walnut St. (US 23) FROM SOUTH						TOTAL NORTH SOUTH	SR 752 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	81	756	0	837	139	5	0	1227	185	1412	132	4	**2249**	62	0	65	127	4	4							**127**	**2376**	0.930	0.851	0.722	0.000
08:00	45	722	0	767	144	0	0	998	81	1079	186	6	**1846**	69	0	58	127	4	4							**127**	**1973**	0.954	0.921	0.858	0.000
09:00	38	767	0	805	187	3	0	810	54	864	196	4	**1669**	48	0	39	87	4	0							**87**	**1756**	0.923	0.927	0.725	0.000
10:00																															
11:00	36	749	0	785	186	0	0	613	63	676	153	2	**1461**	65	0	74	139	10	1							**139**	**1600**	0.896	0.867	0.848	0.000
12:00	42	827	0	869	192	3	0	885	83	968	223	3	**1837**	103	0	56	159	15	1							**159**	**1996**	0.961	0.786	0.970	0.000
1:00	26	857	0	883	188	1	0	755	75	830	167	0	**1713**	85	0	57	142	13	3							**142**	**1855**	0.908	0.894	0.807	0.000
2:00																															
3:00	69	1362	0	1431	136	2	0	792	87	879	128	4	**2310**	120	0	62	182	13	1							**182**	**2492**	0.877	0.939	0.948	0.000
4:00	88	1314	0	1402	139	3	0	847	141	988	134	7	**2390**	127	0	67	194	5	0							**194**	**2584**	0.930	0.943	0.851	0.000
5:00	70	1337	0	1407	138	0	0	777	98	875	93	0	**2282**	121	0	64	185	6	0							**185**	**2467**	0.936	0.879	0.797	0.000
6:00																															
7:00																															
8:00																															
9:00																															
TOTALS	**495**	**8691**	**0**	**9186**	**1449**	**17**	**0**	**7704**	**867**	**8571**	**1412**	**30**	**17757**	**800**	**0**	**542**	**1342**	**74**	**14**							**1342**	**19099**				
ADT	**716**	**12577.22**	**0**	**13294**	**16.0%**		**0**	**11149**	**1255**	**12404**	**16.8%**		**25697**	**1132**	**0**	**767**	**1899**	**6.6%**								**1899**	**27596**				

N Leg Hourly Factor:	1.63	**E Leg Hourly Factor:**	1.56
S Leg Hourly Factor:	1.63	**W leg Hourly Factor:**	0.00
N Leg Monthly Factor:	0.89	**E Leg Monthly Factor:**	0.90
S Leg Monthly Factor:	0.89	**W Leg Monthly Factor:**	0.00

N Leg Combined Factor:	1.45	**E Leg Combined Factor:**	1.41
S Leg Combined Factor:	1.45	**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 South #7
Twinsburg, Ohio 44087
Transportation Manangement Services

City: Ashville
Intersection: SR 752 & US 23
Counter: DJS
Day of the Week: Thursday

File Name : TC 1 SR 752 and USR 23 021722 DJS
Site Code : 00000000
Start Date : 2/17/2022
Page No : 1

Groups Printed- Cars - Trucks - Buses

	SOUTH WALNUT STREET (US 23) From North					From East					SOUTH WALNUT STREET (US 23) From South					SR 752 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	185	28	0	213	14	0	12	0	26	47	306	0	0	353	0	0	0	0	0	592
07:15 AM	0	199	26	0	225	15	0	14	0	29	71	344	0	0	415	0	0	0	0	0	669
07:30 AM	0	178	14	0	192	25	0	19	0	44	33	324	0	0	357	0	0	0	0	0	593
07:45 AM	0	194	13	0	207	11	0	17	0	28	34	253	0	0	287	0	0	0	0	0	522
Total	0	756	81	0	837	65	0	62	0	127	185	1227	0	0	1412	0	0	0	0	0	2376
08:00 AM	0	175	17	0	192	12	0	15	0	27	20	253	0	0	273	0	0	0	0	0	492
08:15 AM	0	174	8	0	182	17	0	20	0	37	17	242	0	0	259	0	0	0	0	0	478
08:30 AM	0	188	13	0	201	14	0	18	0	32	22	271	0	0	293	0	0	0	0	0	526
08:45 AM	0	185	7	0	192	15	0	16	0	31	22	232	0	0	254	0	0	0	0	0	477
Total	0	722	45	0	767	58	0	69	0	127	81	998	0	0	1079	0	0	0	0	0	1973
09:00 AM	0	183	13	0	196	13	0	17	0	30	10	219	0	0	229	0	0	0	0	0	455
09:15 AM	0	188	7	0	195	9	0	8	0	17	16	217	0	0	233	0	0	0	0	0	445
09:30 AM	0	205	13	0	218	10	0	16	1	27	10	195	0	0	205	0	0	0	0	0	450
09:45 AM	0	191	5	0	196	7	0	7	0	14	18	179	0	0	197	0	0	0	0	0	407
Total	0	767	38	0	805	39	0	48	1	88	54	810	0	0	864	0	0	0	0	0	1757
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

TMS Engineers, Inc.

2112 Case Parkway South #7
Twinsburg, Ohio 44087
Transportation Manangement Services

File Name : TC 1 SR 752 and USR 23 021722 DJS
Site Code : 00000000
Start Date : 2/17/2022
Page No : 2

Groups Printed- Cars - Trucks - Buses

	SOUTH WALNUT STREET (US 23) From North					From East					SOUTH WALNUT STREET (US 23) From South					SR 752 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
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
11:00 AM	0	189	9	0	198	20	0	15	0	35	14	118	0	0	132	0	0	0	0	0	365
11:15 AM	0	187	11	0	198	22	0	15	0	37	15	169	0	0	184	0	0	0	0	0	419
11:30 AM	0	207	12	0	219	7	0	19	0	26	9	156	0	0	165	0	0	0	0	0	410
11:45 AM	0	166	4	0	170	25	0	16	0	41	25	170	0	0	195	0	0	0	0	0	406
Total	0	749	36	0	785	74	0	65	0	139	63	613	0	0	676	0	0	0	0	0	1600
12:00 PM	0	198	9	0	207	16	0	25	0	41	20	288	0	0	308	0	0	0	0	0	556
12:15 PM	0	200	14	0	214	13	0	26	0	39	16	218	0	0	234	0	0	0	0	0	487
12:30 PM	0	214	8	0	222	15	0	23	0	38	20	198	0	0	218	0	0	0	0	0	478
12:45 PM	0	215	11	0	226	12	0	29	0	41	27	181	0	0	208	0	0	0	0	0	475
Total	0	827	42	0	869	56	0	103	0	159	83	885	0	0	968	0	0	0	0	0	1996
01:00 PM	0	184	7	0	191	15	0	29	0	44	17	179	0	0	196	0	0	0	0	0	431
01:15 PM	0	215	5	0	220	14	0	13	0	27	14	218	0	0	232	0	0	0	0	0	479
01:30 PM	0	235	8	0	243	16	0	17	0	33	21	174	0	0	195	0	0	0	0	0	471
01:45 PM	0	223	6	0	229	12	0	26	0	38	23	184	0	0	207	0	0	0	0	0	474
Total	0	857	26	0	883	57	0	85	0	142	75	755	0	0	830	0	0	0	0	0	1855
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 South #7
Twinsburg, Ohio 44087
Transportation Manangement Services

File Name : TC 1 SR 752 and USR 23 021722 DJS
Site Code : 00000000
Start Date : 2/17/2022
Page No : 3

Groups Printed- Cars - Trucks - Buses

	SOUTH WALNUT STREET (US 23) From North					From East					SOUTH WALNUT STREET (US 23) From South					SR 752 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	268	12	0	280	16	0	32	0	48	25	205	0	0	230	0	0	0	0	0	558
03:15 PM	0	347	12	0	359	13	0	35	0	48	13	201	0	0	214	0	0	0	0	0	621
03:30 PM	0	362	22	0	384	20	0	26	1	47	17	217	0	0	234	0	0	0	0	0	665
03:45 PM	0	385	23	0	408	13	0	27	0	40	32	169	0	0	201	0	0	0	0	0	649
Total	0	1362	69	0	1431	62	0	120	1	183	87	792	0	0	879	0	0	0	0	0	2493
04:00 PM	0	305	19	0	324	14	0	37	0	51	41	221	0	0	262	0	0	0	0	0	637
04:15 PM	0	320	27	0	347	19	0	31	0	50	28	222	0	0	250	0	0	0	0	0	647
04:30 PM	0	328	26	0	354	20	0	37	0	57	41	214	0	0	255	0	0	0	0	0	666
04:45 PM	0	361	16	0	377	14	0	22	0	36	31	190	0	0	221	0	0	0	0	0	634
Total	0	1314	88	0	1402	67	0	127	0	194	141	847	0	0	988	0	0	0	0	0	2584
05:00 PM	0	338	17	0	355	19	0	39	0	58	14	196	0	0	210	0	0	0	0	0	623
05:15 PM	0	364	12	0	376	21	0	25	0	46	28	221	0	0	249	0	0	0	0	0	671
05:30 PM	0	321	24	0	345	12	0	30	0	42	31	188	0	0	219	0	0	0	0	0	606
05:45 PM	0	314	17	0	331	12	0	27	0	39	25	172	0	0	197	0	0	0	0	0	567
Total	0	1337	70	0	1407	64	0	121	0	185	98	777	0	0	875	0	0	0	0	0	2467
Grand Total	0	8691	495	0	9186	542	0	800	2	1344	867	7704	0	0	8571	0	0	0	0	0	19101
Apprch %	0	94.6	5.4	0		40.3	0	59.5	0.1		10.1	89.9	0	0		0	0	0	0		
Total %	0	45.5	2.6	0	48.1	2.8	0	4.2	0	7	4.5	40.3	0	0	44.9	0	0	0	0	0	
Cars	0	7273	447	0	7720	500	0	754	2	1256	810	6319	0	0	7129	0	0	0	0	0	16105
% Cars	0	83.7	90.3	0	84	92.3	0	94.2	100	93.5	93.4	82	0	0	83.2	0	0	0	0	0	84.3
Trucks	0	1408	41	0	1449	36	0	38	0	74	35	1377	0	0	1412	0	0	0	0	0	2935
% Trucks	0	16.2	8.3	0	15.8	6.6	0	4.8	0	5.5	4	17.9	0	0	16.5	0	0	0	0	0	15.4
Buses	0	10	7	0	17	6	0	8	0	14	22	8	0	0	30	0	0	0	0	0	61
% Buses	0	0.1	1.4	0	0.2	1.1	0	1	0	1	2.5	0.1	0	0	0.4	0	0	0	0	0	0.3

TMS Engineers, Inc.

2112 Case Parkway South #7
Twinsburg, Ohio 44087
Transportation Manangement Services

File Name : TC 1 SR 752 and USR 23 021722 DJS
Site Code : 00000000
Start Date : 2/17/2022
Page No : 4

	SOUTH WALNUT STREET (US 23) From North					From East					SOUTH WALNUT STREET (US 23) From South					SR 752 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 07:00 AM																					
07:00 AM	0	185	**28**	0	213	14	0	12	0	26	47	306	0	0	353	0	0	0	0	0	592
07:15 AM	0	**199**	26	0	**225**	15	0	14	0	29	**71**	**344**	0	0	**415**	0	0	0	0	0	**669**
07:30 AM	0	178	14	0	192	**25**	0	**19**	0	**44**	33	324	0	0	357	0	0	0	0	0	593
07:45 AM	0	194	13	0	207	11	0	17	0	28	34	253	0	0	287	0	0	0	0	0	522
Total Volume	0	756	81	0	837	65	0	62	0	127	185	1227	0	0	1412	0	0	0	0	0	2376
% App. Total	0	90.3	9.7	0		51.2	0	48.8	0		13.1	86.9	0	0		0	0	0	0		
PHF	.000	.950	.723	.000	.930	.650	.000	.816	.000	.722	.651	.892	.000	.000	.851	.000	.000	.000	.000	.000	.888
Cars	0	617	76	0	693	60	0	59	0	119	181	1095	0	0	1276	0	0	0	0	0	2088
% Cars	0	81.6	93.8	0	82.8	92.3	0	95.2	0	93.7	97.8	89.2	0	0	90.4	0	0	0	0	0	87.9
Trucks	0	138	1	0	139	2	0	2	0	4	1	131	0	0	132	0	0	0	0	0	275
% Trucks	0	18.3	1.2	0	16.6	3.1	0	3.2	0	3.1	0.5	10.7	0	0	9.3	0	0	0	0	0	11.6
Buses	0	1	4	0	5	3	0	1	0	4	3	1	0	0	4	0	0	0	0	0	13
% Buses	0	0.1	4.9	0	0.6	4.6	0	1.6	0	3.1	1.6	0.1	0	0	0.3	0	0	0	0	0	0.5
Peak Hour Analysis From 03:45 PM to 04:30 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 03:45 PM																					
03:45 PM	0	**385**	23	0	**408**	13	0	27	0	40	32	169	0	0	201	0	0	0	0	0	649
04:00 PM	0	305	19	0	324	14	0	**37**	0	51	**41**	221	0	0	**262**	0	0	0	0	0	637
04:15 PM	0	320	**27**	0	347	19	0	31	0	50	28	**222**	0	0	250	0	0	0	0	0	647
04:30 PM	0	328	26	0	354	**20**	0	37	0	**57**	41	214	0	0	255	0	0	0	0	0	**666**
Total Volume	0	1338	95	0	1433	66	0	132	0	198	142	826	0	0	968	0	0	0	0	0	2599
% App. Total	0	93.4	6.6	0		33.3	0	66.7	0		14.7	85.3	0	0		0	0	0	0		
PHF	.000	.869	.880	.000	.878	.825	.000	.892	.000	.868	.866	.930	.000	.000	.924	.000	.000	.000	.000	.000	.976
Cars	0	1201	91	0	1292	62	0	128	0	190	128	712	0	0	840	0	0	0	0	0	2322
% Cars	0	89.8	95.8	0	90.2	93.9	0	97.0	0	96.0	90.1	86.2	0	0	86.8	0	0	0	0	0	89.3
Trucks	0	135	2	0	137	4	0	4	0	8	8	113	0	0	121	0	0	0	0	0	266
% Trucks	0	10.1	2.1	0	9.6	6.1	0	3.0	0	4.0	5.6	13.7	0	0	12.5	0	0	0	0	0	10.2
Buses	0	2	2	0	4	0	0	0	0	0	6	1	0	0	7	0	0	0	0	0	11
% Buses	0	0.1	2.1	0	0.3	0	0	0	0	0	4.2	0.1	0	0	0.7	0	0	0	0	0	0.4

VEHICULAR TRAFFIC COUNT SUMMARY

Municipality: Ashville **At Intersection of:** Noorth Street **and** South Walnut Street (US 23)

Date: 3/2/2022 **Day:** Wed. **Comments:** **Project:** 22-029

Weather: Clear **Recorder(s):** DJS **Data entry by:** JJO **Date entered:** Mar. 4, 2022 S. Walnut St & North St 030222

TIME BEGINS	S. Walnut St. (US 23) FROM NORTH						S. Walnut St. (US 23) FROM SOUTH						TOTAL NORTH SOUTH	North St. FROM EAST						North St. 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	19	779	44	842	136	4	47	1212	33	1292	165	3	**2134**	15	38	102	155	3	2	138	46	54	238	8	1	**393**	**2527**	0.931	0.942	0.807	0.826
08:00	16	706	41	763	155	2	42	928	10	980	158	4	**1743**	17	28	51	96	1	1	61	32	51	144	4	1	**240**	**1983**	0.921	0.914	0.727	0.923
09:00	12	687	30	729	168	1	26	848	15	889	175	5	**1618**	9	24	32	65	2	0	44	21	73	138	17	2	**203**	**1821**	0.889	0.979	0.774	0.841
10:00																															
11:00	21	764	16	801	175	0	30	771	9	810	181	2	**1611**	10	10	23	43	1	1	42	17	72	131	10	0	**174**	**1785**	0.936	0.888	0.717	0.885
12:00	12	784	53	849	181	2	68	824	7	899	191	0	**1748**	9	23	15	47	0	0	54	19	76	149	9	1	**196**	**1944**	0.842	0.917	0.653	0.847
1:00	5	819	49	873	172	2	41	800	8	849	187	0	**1722**	5	16	15	36	0	0	59	14	63	136	9	0	**172**	**1894**	0.856	0.969	0.600	0.919
2:00																															
3:00	12	1424	83	1519	158	3	40	853	7	900	165	1	**2419**	13	24	11	48	1	1	69	34	92	195	9	4	**243**	**2662**	0.915	0.900	0.800	0.886
4:00	16	1594	103	1713	181	4	27	902	10	939	131	2	**2652**	14	26	17	57	1	2	101	41	103	245	7	6	**302**	**2954**	0.952	0.921	0.750	0.863
5:00	9	1306	100	1415	134	0	46	905	7	958	132	0	**2373**	11	24	19	54	0	0	114	30	113	257	8	0	**311**	**2684**	0.876	0.947	0.844	0.824
6:00																															
7:00																															
8:00																															
9:00																															
TOTALS	122	8863	519	9504	1460	18	367	8043	106	8516	1485	17	18020	103	213	285	601	9	7	682	254	697	1633	81	15	2234	20254				
ADT	200	14497.85	849	15546	15.6%		600	13157	173	13930	17.6%		29477	158	326	436	919	2.7%		1043	389	1066	2498	5.9%		3418	32894				

N Leg Hourly Factor:	1.63
S Leg Hourly Factor:	1.63
N Leg Monthly Factor:	1.01
S Leg Monthly Factor:	1.01
E Leg Hourly Factor:	1.56
W leg Hourly Factor:	1.56
E Leg Monthly Factor:	0.98
W Leg Monthly Factor:	0.98
N Leg Combined Factor:	1.64
S Leg Combined Factor:	1.64
E 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 South #7
Twinsburg, Ohio 44087
Transportation Manangement Services

City: Ashville
Intersection: US 23 & North St
Counter: DJS
Day of the Week: Wednesday

File Name : TC 5 USR 23 and North St 030222 DJS
Site Code : 00000000
Start Date : 3/2/2022
Page No : 1

Groups Printed- Cars - Trucks - Buses

	SOUTH WALNUT STREET (US 23) From North					NORTH STREET From East					SOUTH WALNUT STREET (US 23) From South					NORTH STREET 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	180	5	0	191	33	10	5	0	48	5	317	14	0	336	11	10	36	0	57	632
07:15 AM	7	203	3	0	213	25	10	5	0	40	9	320	7	0	336	8	11	53	0	72	661
07:30 AM	19	203	4	0	226	21	9	3	0	33	8	317	18	0	343	14	13	25	0	52	654
07:45 AM	12	193	7	0	212	23	9	2	0	34	11	258	8	0	277	21	12	24	0	57	580
Total	44	779	19	0	842	102	38	15	0	155	33	1212	47	0	1292	54	46	138	0	238	2527
08:00 AM	13	190	4	0	207	16	6	6	0	28	3	257	8	0	268	11	6	18	0	35	538
08:15 AM	9	187	7	0	203	19	10	4	0	33	0	224	10	0	234	12	10	14	0	36	506
08:30 AM	5	178	2	0	185	5	7	5	1	18	5	236	13	0	254	11	8	15	0	34	491
08:45 AM	14	151	3	1	169	11	5	2	0	18	2	211	11	0	224	17	8	14	0	39	450
Total	41	706	16	1	764	51	28	17	1	97	10	928	42	0	980	51	32	61	0	144	1985
09:00 AM	6	157	5	0	168	7	12	2	0	21	5	199	10	0	214	20	6	15	0	41	444
09:15 AM	11	170	1	0	182	11	5	2	0	18	4	217	6	0	227	16	5	12	0	33	460
09:30 AM	8	195	2	0	205	6	2	2	0	10	5	218	3	0	226	16	2	9	0	27	468
09:45 AM	5	165	4	0	174	8	5	3	0	16	1	214	7	0	222	21	8	8	0	37	449
Total	30	687	12	0	729	32	24	9	0	65	15	848	26	0	889	73	21	44	0	138	1821
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

TMS Engineers, Inc.

2112 Case Parkway South #7
Twinsburg, Ohio 44087
Transportation Manangement Services

File Name : TC 5 USR 23 and North St 030222 DJS
Site Code : 00000000
Start Date : 3/2/2022
Page No : 2

Groups Printed- Cars - Trucks - Buses

	SOUTH WALNUT STREET (US 23) From North					NORTH STREET From East					SOUTH WALNUT STREET (US 23) From South					NORTH STREET 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
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
11:00 AM	5	174	2	0	181	7	6	2	0	15	4	186	8	0	198	18	4	10	0	32	426
11:15 AM	5	184	3	0	192	5	0	1	0	6	0	161	10	0	171	19	4	14	0	37	406
11:30 AM	3	197	14	0	214	4	2	3	0	9	2	221	5	0	228	20	5	9	0	34	485
11:45 AM	3	209	2	0	214	7	2	4	0	13	3	203	7	0	213	15	4	9	0	28	468
Total	16	764	21	0	801	23	10	10	0	43	9	771	30	0	810	72	17	42	0	131	1785
12:00 PM	13	179	6	0	198	3	5	1	0	9	4	192	19	0	215	23	5	12	0	40	462
12:15 PM	19	231	2	0	252	9	4	5	0	18	3	216	24	0	243	13	4	13	0	30	543
12:30 PM	10	176	1	0	187	1	9	1	0	11	0	231	14	0	245	24	5	15	0	44	487
12:45 PM	11	198	3	0	212	2	5	2	0	9	0	185	11	0	196	16	5	14	0	35	452
Total	53	784	12	0	849	15	23	9	0	47	7	824	68	0	899	76	19	54	0	149	1944
01:00 PM	19	179	0	0	198	3	4	0	0	7	1	184	15	0	200	18	5	14	1	38	443
01:15 PM	7	203	1	0	211	6	5	4	0	15	5	207	7	1	220	22	3	11	0	36	482
01:30 PM	11	196	2	0	209	1	5	1	0	7	1	208	8	0	217	9	2	19	0	30	463
01:45 PM	12	241	2	0	255	5	2	0	0	7	1	201	11	0	213	14	4	15	0	33	508
Total	49	819	5	0	873	15	16	5	0	36	8	800	41	1	850	63	14	59	1	137	1896
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 South #7
Twinsburg, Ohio 44087
Transportation Manangement Services

File Name : TC 5 USR 23 and North St 030222 DJS
Site Code : 00000000
Start Date : 3/2/2022
Page No : 3

Groups Printed- Cars - Trucks - Buses

	SOUTH WALNUT STREET (US 23) From North					NORTH STREET From East					SOUTH WALNUT STREET (US 23) From South					NORTH STREET 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	21	347	2	0	370	1	5	3	0	9	1	203	16	0	220	19	5	17	1	42	641
03:15 PM	21	308	3	0	332	4	6	3	0	13	2	215	9	0	226	30	7	15	0	52	623
03:30 PM	17	382	3	0	402	2	8	5	0	15	2	243	5	0	250	19	13	15	0	47	714
03:45 PM	24	387	4	0	415	4	5	2	0	11	2	192	10	0	204	24	9	22	0	55	685
Total	83	1424	12	0	1519	11	24	13	0	48	7	853	40	0	900	92	34	69	1	196	2663
04:00 PM	22	422	6	0	450	4	6	3	0	13	1	225	3	0	229	22	10	26	1	59	751
04:15 PM	24	371	2	0	397	5	6	1	0	12	4	243	8	0	255	28	8	35	0	71	735
04:30 PM	29	408	5	0	442	3	11	5	0	19	3	218	10	0	231	20	13	19	0	52	744
04:45 PM	28	393	3	0	424	5	3	5	0	13	2	216	6	0	224	33	10	21	0	64	725
Total	103	1594	16	0	1713	17	26	14	0	57	10	902	27	0	939	103	41	101	1	246	2955
05:00 PM	30	337	5	0	372	7	5	3	0	15	2	234	6	0	242	29	5	25	2	61	690
05:15 PM	26	377	1	0	404	5	8	3	0	16	1	229	23	0	253	20	5	21	0	46	719
05:30 PM	22	320	0	0	342	2	4	1	0	7	1	218	8	0	227	37	8	29	0	74	650
05:45 PM	22	272	3	0	297	5	7	4	0	16	3	224	9	0	236	27	12	39	0	78	627
Total	100	1306	9	0	1415	19	24	11	0	54	7	905	46	0	958	113	30	114	2	259	2686
Grand Total	519	8863	122	1	9505	285	213	103	1	602	106	8043	367	1	8517	697	254	682	5	1638	20262
Apprch %	5.5	93.2	1.3	0		47.3	35.4	17.1	0.2		1.2	94.4	4.3	0		42.6	15.5	41.6	0.3		
Total %	2.6	43.7	0.6	0	46.9	1.4	1.1	0.5	0	3	0.5	39.7	1.8	0	42	3.4	1.3	3.4	0	8.1	
Cars	466	7441	119	1	8027	279	204	102	1	586	104	6579	331	1	7015	648	248	641	5	1542	17170
% Cars	89.8	84	97.5	100	84.5	97.9	95.8	99	100	97.3	98.1	81.8	90.2	100	82.4	93	97.6	94	100	94.1	84.7
Trucks	47	1410	3	0	1460	5	4	0	0	9	2	1448	35	0	1485	47	2	32	0	81	3035
% Trucks	9.1	15.9	2.5	0	15.4	1.8	1.9	0	0	1.5	1.9	18	9.5	0	17.4	6.7	0.8	4.7	0	4.9	15
Buses	6	12	0	0	18	1	5	1	0	7	0	16	1	0	17	2	4	9	0	15	57
% Buses	1.2	0.1	0	0	0.2	0.4	2.3	1	0	1.2	0	0.2	0.3	0	0.2	0.3	1.6	1.3	0	0.9	0.3

TMS Engineers, Inc.

2112 Case Parkway South #7
Twinsburg, Ohio 44087
Transportation Manangement Services

File Name : TC 5 USR 23 and North St 030222 DJS
Site Code : 00000000
Start Date : 3/2/2022

	SOUTH WALNUT STREET (US 23) From North					NORTH STREET From East					SOUTH WALNUT STREET (US 23) From South					NORTH STREET 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 07:00 AM																					
07:00 AM	6	180	5	0	191	**33**	**10**	**5**	0	**48**	5	317	14	0	336	11	10	36	0	57	632
07:15 AM	7	**203**	3	0	213	25	10	5	0	40	9	**320**	7	0	336	8	11	**53**	0	**72**	**661**
07:30 AM	**19**	203	4	0	**226**	21	9	3	0	33	8	317	**18**	0	**343**	14	**13**	25	0	52	654
07:45 AM	12	193	**7**	0	212	23	9	2	0	34	**11**	258	8	0	277	**21**	12	24	0	57	580
Total Volume	44	779	19	0	842	102	38	15	0	155	33	1212	47	0	1292	54	46	138	0	238	2527
% App. Total	5.2	92.5	2.3	0		65.8	24.5	9.7	0		2.6	93.8	3.6	0		22.7	19.3	58	0		
PHF	.579	.959	.679	.000	.931	.773	.950	.750	.000	.807	.750	.947	.653	.000	.942	.643	.885	.651	.000	.826	.956
Cars	40	643	19	0	702	99	36	15	0	150	33	1045	46	0	1124	49	46	134	0	229	2205
% Cars	90.9	82.5	100	0	83.4	97.1	94.7	100	0	96.8	100	86.2	97.9	0	87.0	90.7	100	97.1	0	96.2	87.3
Trucks	2	134	0	0	136	2	1	0	0	3	0	164	1	0	165	5	0	3	0	8	312
% Trucks	4.5	17.2	0	0	16.2	2.0	2.6	0	0	1.9	0	13.5	2.1	0	12.8	9.3	0	2.2	0	3.4	12.3
Buses	2	2	0	0	4	1	1	0	0	2	0	3	0	0	3	0	0	1	0	1	10
% Buses	4.5	0.3	0	0	0.5	1.0	2.6	0	0	1.3	0	0.2	0	0	0.2	0	0	0.7	0	0.4	0.4
Peak Hour Analysis From 03:45 PM to 04:30 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 03:45 PM																					
03:45 PM	24	387	4	0	415	4	5	2	0	11	2	192	**10**	0	204	24	9	22	0	55	685
04:00 PM	22	**422**	**6**	0	**450**	4	6	3	0	13	1	225	3	0	229	22	10	26	**1**	59	**751**
04:15 PM	24	371	2	0	397	**5**	6	1	0	12	**4**	**243**	8	0	**255**	**28**	8	**35**	0	**71**	735
04:30 PM	**29**	408	5	0	442	3	**11**	**5**	0	**19**	3	218	10	0	231	20	**13**	19	0	52	744
Total Volume	99	1588	17	0	1704	16	28	11	0	55	10	878	31	0	919	94	40	102	1	237	2915
% App. Total	5.8	93.2	1	0		29.1	50.9	20	0		1.1	95.5	3.4	0		39.7	16.9	43	0.4		
PHF	.853	.941	.708	.000	.947	.800	.636	.550	.000	.724	.625	.903	.775	.000	.901	.839	.769	.729	.250	.835	.970
Cars	93	1411	16	0	1520	15	27	10	0	52	10	735	26	0	771	89	38	98	1	226	2569
% Cars	93.9	88.9	94.1	0	89.2	93.8	96.4	90.9	0	94.5	100	83.7	83.9	0	83.9	94.7	95.0	96.1	100	95.4	88.1
Trucks	6	174	1	0	181	1	0	0	0	1	0	141	5	0	146	4	0	1	0	5	333
% Trucks	6.1	11.0	5.9	0	10.6	6.3	0	0	0	1.8	0	16.1	16.1	0	15.9	4.3	0	1.0	0	2.1	11.4
Buses	0	3	0	0	3	0	1	1	0	2	0	2	0	0	2	1	2	3	0	6	13
% Buses	0	0.2	0	0	0.2	0	3.6	9.1	0	3.6	0	0.2	0	0	0.2	1.1	5.0	2.9	0	2.5	0.4

VEHICULAR TRAFFIC COUNT SUMMARY

Municipality: Ashville **At Intersection of:** /ille Road (SR 316) / Northrup I **and** South Walnut Street (US 23)

Date: 3/1/2022 **Day:** Tue. **Comments:** **Project:** 22-029

Weather: Clear **Recorder(s):** DJS & SLC **Data entry by:** JJO **Date entered:** Mar. 4, 2022 ılnut St & Ashville Rd + Northrup Dr 0:

TIME BEGINS	S. Walnut St. (US 23) FROM NORTH						S. Walnut St. (US 23) FROM SOUTH						TOTAL NORTH SOUTH	Ashville Rd. (SR 316) FROM EAST						Northrup Dr. 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	65	740	18	823	126	1	52	1163	39	1254	159	5	**2077**	61	42	117	220	9	0	116	56	44	216	15	2	**436**	**2513**	0.854	0.919	0.873	0.659
08:00	83	695	27	805	142	1	21	920	38	979	183	1	**1784**	59	43	88	190	3	4	65	33	54	152	9	6	**342**	**2126**	0.821	0.900	0.896	0.731
09:00	64	649	24	737	160	2	24	738	27	789	161	1	**1526**	42	42	72	156	8	1	46	38	40	124	8	3	**280**	**1806**	0.931	0.861	0.796	0.838
10:00																															
11:00	87	669	34	790	162	2	44	689	31	764	193	0	**1554**	46	63	90	199	11	0	36	40	51	127	9	1	**326**	**1880**	0.963	0.946	0.921	0.794
12:00	94	727	49	870	167	0	31	709	41	781	175	0	**1651**	56	165	77	298	9	1	55	104	54	213	12	1	**511**	**2162**	0.906	0.939	0.637	0.807
1:00	67	742	28	837	176	3	44	724	37	805	148	1	**1642**	59	54	78	191	5	0	40	68	63	171	9	2	**362**	**2004**	0.894	0.940	0.884	0.807
2:00																															
3:00	80	1335	49	1464	159	2	50	710	31	791	140	2	**2255**	72	80	70	222	2	1	52	74	89	215	12	2	**437**	**2692**	0.806	0.860	0.854	0.747
4:00	82	1429	55	1566	140	2	46	861	36	943	106	0	**2509**	69	73	60	202	7	1	67	62	111	240	11	1	**442**	**2951**	0.896	0.886	0.856	0.822
5:00	129	1314	85	1528	133	1	43	857	43	943	102	2	**2471**	71	75	67	213	3	0	44	64	98	206	10	0	**419**	**2890**	0.907	0.880	0.934	0.831
6:00																															
7:00																															
8:00																															
9:00																															
TOTALS	751	8300	369	9420	1365	14	355	7371	323	8049	1367	12	17469	535	637	719	1891	57	8	521	539	604	1664	95	18	3555	21024				
ADT	1324	14629.59	650	16604	14.6%		626	12992	569	14187	17.1%		30791	877	1045	1179	3101	3.4%		853	883	989	2725	6.8%		5826	36617				

N Leg Hourly Factor:	1.63	E Leg Hourly Factor:	1.56
S Leg Hourly Factor:	1.63	W leg Hourly Factor:	1.56
N Leg Monthly Factor:	1.08	E Leg Monthly Factor:	1.05
S Leg Monthly Factor:	1.08	W Leg Monthly Factor:	1.05

N Leg Combined Factor:	1.76	E Leg Combined Factor:	1.64
S Leg Combined Factor:	1.76	W Leg Combined Factor:	1.64

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 South #7
Twinsburg, Ohio 44087
Transportation Manangement Services

City: Ashville
Intersection: S. Walnut St & Ashville Rd + Northrup Dr
Counter: SLC & DJS
Day of the Week: Tuesday

File Name : Ashville Rd & S. Walnut St 030122
Site Code : 00000000
Start Date : 3/1/2022
Page No : 1

Groups Printed- Cars - Trucks - Buses

	SOUTH WALNUT STREET (US 23) From North					ASHVILLE ROAD (SR 316) From East					SOUTH WALNUT STREET (US 23) From South					NORTHRUP DRIVE 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	168	7	0	181	35	12	16	0	63	13	300	21	0	334	15	26	41	0	82	660
07:15 AM	1	182	19	0	202	21	6	20	0	47	9	318	14	0	341	10	14	29	0	53	643
07:30 AM	7	214	20	0	241	34	16	9	0	59	9	283	12	0	304	8	8	26	0	42	646
07:45 AM	4	176	19	0	199	27	8	16	0	51	8	262	5	0	275	11	8	20	0	39	564
Total	18	740	65	0	823	117	42	61	0	220	39	1163	52	0	1254	44	56	116	0	216	2513
08:00 AM	7	164	20	0	191	27	11	11	0	49	8	244	4	0	256	16	9	11	0	36	532
08:15 AM	9	207	29	0	245	20	9	16	0	45	10	257	5	0	272	9	3	24	0	36	598
08:30 AM	4	161	13	0	178	17	9	17	0	43	12	221	7	0	240	11	9	8	0	28	489
08:45 AM	7	163	21	0	191	24	14	15	0	53	8	198	5	0	211	18	12	22	0	52	507
Total	27	695	83	0	805	88	43	59	0	190	38	920	21	0	979	54	33	65	0	152	2126
09:00 AM	7	168	11	0	186	23	15	11	0	49	2	151	2	0	155	14	9	14	0	37	427
09:15 AM	7	170	21	0	198	15	13	9	0	37	12	184	4	0	200	9	9	11	0	29	464
09:30 AM	5	151	13	0	169	22	4	13	0	39	6	214	9	0	229	12	7	15	0	34	471
09:45 AM	5	160	19	0	184	12	10	9	0	31	7	189	9	0	205	5	13	6	0	24	444
Total	24	649	64	0	737	72	42	42	0	156	27	738	24	0	789	40	38	46	0	124	1806
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

TMS Engineers, Inc.

2112 Case Parkway South #7
Twinsburg, Ohio 44087
Transportation Manangement Services

File Name : Ashville Rd & S. Walnut St 030122
Site Code : 00000000
Start Date : 3/1/2022
Page No : 2

Groups Printed- Cars - Trucks - Buses

	SOUTH WALNUT STREET (US 23) From North					ASHVILLE ROAD (SR 316) From East					SOUTH WALNUT STREET (US 23) From South					NORTHRUP DRIVE 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
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
11:00 AM	8	168	22	0	198	19	17	13	0	49	5	187	10	0	202	9	10	3	0	22	471
11:15 AM	10	162	20	0	192	23	15	12	0	50	6	170	9	0	185	15	11	14	0	40	467
11:30 AM	10	161	24	0	195	21	18	7	0	46	11	156	16	0	183	13	10	5	0	28	452
11:45 AM	6	178	21	0	205	27	13	14	0	54	9	176	9	0	194	14	9	14	0	37	490
Total	34	669	87	0	790	90	63	46	0	199	31	689	44	0	764	51	40	36	0	127	1880
12:00 PM	22	155	29	0	206	26	29	19	0	74	9	160	7	0	176	8	16	14	0	38	494
12:15 PM	10	195	16	0	221	14	95	8	0	117	13	183	10	0	206	17	17	11	0	45	589
12:30 PM	12	198	30	0	240	21	18	19	0	58	12	190	6	0	208	10	43	13	0	66	572
12:45 PM	5	179	19	0	203	16	23	10	0	49	7	176	8	0	191	19	28	17	0	64	507
Total	49	727	94	0	870	77	165	56	0	298	41	709	31	0	781	54	104	55	0	213	2162
01:00 PM	6	171	29	0	206	23	18	13	0	54	10	172	15	0	197	18	14	7	0	39	496
01:15 PM	10	205	19	0	234	14	12	19	0	45	11	192	11	0	214	16	15	7	0	38	531
01:30 PM	8	162	7	0	177	18	11	12	0	41	6	185	5	0	196	15	15	11	0	41	455
01:45 PM	4	204	12	0	220	23	13	15	0	51	10	175	13	0	198	14	24	15	0	53	522
Total	28	742	67	0	837	78	54	59	0	191	37	724	44	0	805	63	68	40	0	171	2004
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 South #7
Twinsburg, Ohio 44087
Transportation Manangement Services

File Name : Ashville Rd & S. Walnut St 030122
Site Code : 00000000
Start Date : 3/1/2022
Page No : 3

Groups Printed- Cars - Trucks - Buses

	SOUTH WALNUT STREET (US 23) From North					ASHVILLE ROAD (SR 316) From East					SOUTH WALNUT STREET (US 23) From South					NORTHRUP DRIVE 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	7	299	15	0	321	16	15	20	0	51	5	163	7	0	175	18	14	9	0	41	588
03:15 PM	11	308	17	0	336	23	20	11	1	55	8	137	19	0	164	27	12	13	0	52	607
03:30 PM	11	317	25	0	353	16	24	25	0	65	10	208	12	0	230	17	18	15	0	50	698
03:45 PM	20	411	23	0	454	15	21	16	0	52	8	202	12	0	222	27	30	15	0	72	800
Total	49	1335	80	0	1464	70	80	72	1	223	31	710	50	0	791	89	74	52	0	215	2693
04:00 PM	12	345	22	0	379	15	20	13	0	48	6	236	10	0	252	16	10	13	0	39	718
04:15 PM	12	338	11	0	361	19	9	18	0	46	14	237	15	0	266	34	13	25	0	72	745
04:30 PM	14	396	27	0	437	11	18	20	0	49	6	187	11	0	204	31	25	17	0	73	763
04:45 PM	17	350	22	0	389	15	26	18	2	61	10	201	10	0	221	30	14	12	0	56	727
Total	55	1429	82	0	1566	60	73	69	2	204	36	861	46	0	943	111	62	67	0	240	2953
05:00 PM	24	360	29	0	413	19	16	21	0	56	11	244	13	0	268	32	12	4	0	48	785
05:15 PM	16	321	26	0	363	17	25	10	0	52	9	215	9	0	233	21	15	21	0	57	705
05:30 PM	35	349	37	0	421	12	20	16	0	48	9	201	12	0	222	24	26	12	0	62	753
05:45 PM	10	284	37	0	331	19	14	24	0	57	14	197	9	0	220	21	11	7	0	39	647
Total	85	1314	129	0	1528	67	75	71	0	213	43	857	43	0	943	98	64	44	0	206	2890
Grand Total	369	8300	751	0	9420	719	637	535	3	1894	323	7371	355	0	8049	604	539	521	0	1664	21027
Apprch %	3.9	88.1	8	0		38	33.6	28.2	0.2		4	91.6	4.4	0		36.3	32.4	31.3	0		
Total %	1.8	39.5	3.6	0	44.8	3.4	3	2.5	0	9	1.5	35.1	1.7	0	38.3	2.9	2.6	2.5	0	7.9	
Cars	351	6960	730	0	8041	692	621	513	3	1829	313	6025	332	0	6670	551	519	481	0	1551	18091
% Cars	95.1	83.9	97.2	0	85.4	96.2	97.5	95.9	100	96.6	96.9	81.7	93.5	0	82.9	91.2	96.3	92.3	0	93.2	86
Trucks	17	1328	20	0	1365	24	14	19	0	57	10	1337	20	0	1367	53	13	29	0	95	2884
% Trucks	4.6	16	2.7	0	14.5	3.3	2.2	3.6	0	3	3.1	18.1	5.6	0	17	8.8	2.4	5.6	0	5.7	13.7
Buses	1	12	1	0	14	3	2	3	0	8	0	9	3	0	12	0	7	11	0	18	52
% Buses	0.3	0.1	0.1	0	0.1	0.4	0.3	0.6	0	0.4	0	0.1	0.8	0	0.1	0	1.3	2.1	0	1.1	0.2

TMS Engineers, Inc.

2112 Case Parkway South #7
Twinsburg, Ohio 44087
Transportation Manangement Services

File Name : Ashville Rd & S. Walnut St 030122
Site Code : 00000000
Start Date : 3/1/2022
Page No : 4

	SOUTH WALNUT STREET (US 23) From North					ASHVILLE ROAD (SR 316) From East					SOUTH WALNUT STREET (US 23) From South					NORTHRUP DRIVE 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 07:00 AM																					
07:00 AM	6	168	7	0	181	**35**	12	16	0	**63**	**13**	300	**21**	0	334	**15**	**26**	**41**	0	**82**	**660**
07:15 AM	1	182	19	0	202	21	6	**20**	0	47	9	**318**	14	0	**341**	10	14	29	0	53	643
07:30 AM	**7**	**214**	**20**	0	**241**	34	**16**	9	0	59	9	283	12	0	304	8	8	26	0	42	646
07:45 AM	4	176	19	0	199	27	8	16	0	51	8	262	5	0	275	11	8	20	0	39	564
Total Volume	18	740	65	0	823	117	42	61	0	220	39	1163	52	0	1254	44	56	116	0	216	2513
% App. Total	2.2	89.9	7.9	0		53.2	19.1	27.7	0		3.1	92.7	4.1	0		20.4	25.9	53.7	0		
PHF	.643	.864	.813	.000	.854	.836	.656	.763	.000	.873	.750	.914	.619	.000	.919	.733	.538	.707	.000	.659	.952
Cars	17	617	62	0	696	115	39	57	0	211	38	1005	47	0	1090	35	54	110	0	199	2196
% Cars	94.4	83.4	95.4	0	84.6	98.3	92.9	93.4	0	95.9	97.4	86.4	90.4	0	86.9	79.5	96.4	94.8	0	92.1	87.4
Trucks	0	123	3	0	126	2	3	4	0	9	1	155	3	0	159	9	2	4	0	15	309
% Trucks	0	16.6	4.6	0	15.3	1.7	7.1	6.6	0	4.1	2.6	13.3	5.8	0	12.7	20.5	3.6	3.4	0	6.9	12.3
Buses	1	0	0	0	1	0	0	0	0	0	0	3	2	0	5	0	0	2	0	2	8
% Buses	5.6	0	0	0	0.1	0	0	0	0	0	0	0.3	3.8	0	0.4	0	0	1.7	0	0.9	0.3
Peak Hour Analysis From 03:45 PM to 04:30 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 03:45 PM																					
03:45 PM	**20**	**411**	23	0	**454**	15	**21**	16	0	**52**	8	202	12	0	222	27	**30**	15	0	72	**800**
04:00 PM	12	345	22	0	379	15	20	13	0	48	6	236	10	0	252	16	10	13	0	39	718
04:15 PM	12	338	11	0	361	**19**	9	18	0	46	**14**	**237**	**15**	0	**266**	**34**	13	**25**	0	72	745
04:30 PM	14	396	**27**	0	437	11	18	**20**	0	49	6	187	11	0	204	31	25	17	0	**73**	763
Total Volume	58	1490	83	0	1631	60	68	67	0	195	34	862	48	0	944	108	78	70	0	256	3026
% App. Total	3.6	91.4	5.1	0		30.8	34.9	34.4	0		3.6	91.3	5.1	0		42.2	30.5	27.3	0		
PHF	.725	.906	.769	.000	.898	.789	.810	.838	.000	.938	.607	.909	.800	.000	.887	.794	.650	.700	.000	.877	.946
Cars	57	1343	82	0	1482	55	67	67	0	189	33	749	48	0	830	102	74	67	0	243	2744
% Cars	98.3	90.1	98.8	0	90.9	91.7	98.5	100	0	96.9	97.1	86.9	100	0	87.9	94.4	94.9	95.7	0	94.9	90.7
Trucks	1	144	1	0	146	4	1	0	0	5	1	112	0	0	113	6	4	2	0	12	276
% Trucks	1.7	9.7	1.2	0	9.0	6.7	1.5	0	0	2.6	2.9	13.0	0	0	12.0	5.6	5.1	2.9	0	4.7	9.1
Buses	0	3	0	0	3	1	0	0	0	1	0	1	0	0	1	0	0	1	0	1	6
% Buses	0	0.2	0	0	0.2	1.7	0	0	0	0.5	0	0.1	0	0	0.1	0	0	1.4	0	0.4	0.2

VEHICULAR TRAFFIC COUNT SUMMARY

Municipality: Ashville **At Intersection of:** State Route 752 **and** Ashville Pike / Long Street

Date: 2/16/2022 **Day:** Wed. **Comments:** **Project:** 22-029

Weather: Clear **Recorder(s):** DJS **Data entry by:** JJO **Date entered:** Feb. 18, 2022 R 752 & Ashville Pike + Long St 02162

TIME BEGINS	Ashville Pike FROM NORTH						Long Street FROM SOUTH						TOTAL NORTH SOUTH	SR 752 FROM EAST						SR 752 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	147	41	62	250	4	3	44	116	61	221	4	1	**471**	30	82	57	169	6	6	46	164	24	234	6	9	**403**	**874**	0.601	0.708	0.782	0.557
08:00	27	81	39	147	6	6	30	75	24	129	2	2	**276**	21	64	22	107	7	6	40	58	26	124	7	1	**231**	**507**	0.735	0.806	0.836	0.939
09:00	22	43	32	97	1	6	31	63	28	122	2	2	**219**	19	70	24	113	4	0	27	54	19	100	11	7	**213**	**432**	0.836	0.782	0.724	0.926
10:00																															
11:00	20	63	26	109	8	2	31	73	21	125	2	1	**234**	52	63	32	147	8	2	30	45	28	103	6	0	**250**	**484**	0.879	0.801	0.919	0.858
12:00	10	97	60	167	9	1	37	83	5	125	4	0	**292**	3	17	42	62	2	0	53	7	45	105	7	1	**167**	**459**	0.888	0.893	0.534	0.772
1:00	28	65	47	140	3	0	26	60	31	117	1	0	**257**	36	63	51	150	3	8	32	32	36	100	3	0	**250**	**507**	0.875	0.750	0.647	0.833
2:00																															
3:00	50	153	73	276	9	3	39	110	27	176	3	5	**452**	45	96	50	191	3	2	50	91	41	182	6	3	**373**	**825**	0.812	0.846	0.823	0.892
4:00	72	191	86	349	6	7	33	117	55	205	5	1	**554**	71	119	75	265	9	2	83	129	63	275	9	6	**540**	**1094**	0.899	0.884	0.728	0.893
5:00	44	149	72	265	6	0	32	120	38	190	3	0	**455**	54	78	35	167	6	0	77	103	51	231	3	1	**398**	**853**	0.839	0.913	0.852	0.862
6:00																															
7:00																															
8:00																															
9:00																															
TOTALS	420	883	497	1800	52	28	303	817	290	1410	26	12	3210	331	652	388	1371	48	26	438	683	333	1454	58	28	2825	6035				
ADT	572	1201.785	676	2450	4.4%		413	1114	395	1922	2.7%		4372	451	889	529	1869	5.4%		597	931	454	1982	5.9%		3851	8222				

N Leg Hourly Factor:	1.56
S Leg Hourly Factor:	1.56
N Leg Monthly Factor:	0.87
S Leg Monthly Factor:	0.87
E Leg Hourly Factor:	1.56
W leg Hourly Factor:	1.56
E Leg Monthly Factor:	0.87
W Leg Monthly Factor:	0.87
N Leg Combined Factor:	1.36
S Leg Combined Factor:	1.36
E Leg Combined Factor:	1.36
W Leg Combined Factor:	1.36

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 South #7
Twinsburg, Ohio 44087
Transportation Manangement Services

City: Ashville
Intersection: SR 752 & Long St / Ashville Pike
Counter: DJS
Day of the Week: Wednesday

File Name : TC 2 SR 752 and Long St Ashville 021622 DJS
Site Code : 00000000
Start Date : 2/16/2022
Page No : 1

Groups Printed- Cars - Trucks - Buses

	ASHVILLE PIKE From North					STATE ROUTE 752 From East					LONG STREET From South					STATE ROUTE 752 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	5	42	0	59	13	19	7	0	39	18	31	8	0	57	6	49	8	0	63	218
07:15 AM	16	12	76	0	104	17	26	8	0	51	22	41	15	0	78	6	85	14	0	105	338
07:30 AM	21	12	21	0	54	19	25	10	0	54	15	25	11	0	51	6	23	15	0	44	203
07:45 AM	13	12	8	0	33	8	12	5	0	25	6	19	10	0	35	6	7	9	0	22	115
Total	62	41	147	0	250	57	82	30	0	169	61	116	44	0	221	24	164	46	0	234	874
08:00 AM	9	11	3	0	23	5	23	4	0	32	11	21	8	0	40	6	16	8	0	30	125
08:15 AM	9	15	9	0	33	9	16	4	0	29	5	11	6	0	22	8	14	11	0	33	117
08:30 AM	11	31	8	0	50	7	15	6	0	28	4	21	6	0	31	6	15	10	0	31	140
08:45 AM	10	24	7	0	41	1	10	7	0	18	4	22	10	0	36	6	13	11	0	30	125
Total	39	81	27	0	147	22	64	21	0	107	24	75	30	0	129	26	58	40	0	124	507
09:00 AM	4	11	8	1	24	8	25	6	0	39	7	23	9	0	39	7	12	8	0	27	129
09:15 AM	9	16	4	1	30	7	20	5	0	32	12	9	5	0	26	3	18	6	0	27	115
09:30 AM	12	9	7	0	28	7	17	4	0	28	2	16	6	0	24	3	13	6	0	22	102
09:45 AM	7	7	3	0	17	2	8	4	0	14	7	15	11	0	33	6	11	7	0	24	88
Total	32	43	22	2	99	24	70	19	0	113	28	63	31	0	122	19	54	27	0	100	434
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

TMS Engineers, Inc.

2112 Case Parkway South #7
Twinsburg, Ohio 44087
Transportation Manangement Services

File Name : TC 2 SR 752 and Long St Ashville 021622 DJS
Site Code : 00000000
Start Date : 2/16/2022
Page No : 2

Groups Printed- Cars - Trucks - Buses

	ASHVILLE PIKE From North					STATE ROUTE 752 From East					LONG STREET From South					STATE ROUTE 752 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
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
11:00 AM	6	14	5	0	25	7	18	9	0	34	10	14	7	0	31	4	4	8	0	16	106
11:15 AM	6	21	4	0	31	10	14	16	0	40	3	12	6	0	21	10	14	6	0	30	122
11:30 AM	4	15	4	0	23	6	13	19	0	38	3	30	6	0	39	7	13	8	0	28	128
11:45 AM	10	13	7	0	30	9	18	8	0	35	5	17	12	0	34	7	14	8	0	29	128
Total	26	63	20	0	109	32	63	52	0	147	21	73	31	0	125	28	45	30	0	103	484
12:00 PM	18	22	2	0	42	1	4	2	0	7	4	21	10	0	35	14	7	13	0	34	118
12:15 PM	17	24	1	0	42	0	6	0	0	6	1	23	10	0	34	10	0	14	3	27	109
12:30 PM	11	21	4	0	36	24	4	1	0	29	0	19	10	0	29	7	0	13	0	20	114
12:45 PM	14	30	3	0	47	17	3	0	0	20	0	20	7	0	27	14	0	13	0	27	121
Total	60	97	10	0	167	42	17	3	0	62	5	83	37	0	125	45	7	53	3	108	462
01:00 PM	21	17	2	0	40	9	19	7	0	35	6	17	8	0	31	10	5	7	0	22	128
01:15 PM	10	12	3	0	25	9	17	11	0	37	5	12	4	0	21	5	7	6	0	18	101
01:30 PM	9	16	12	0	37	10	5	5	0	20	10	11	5	0	26	13	11	6	0	30	113
01:45 PM	7	20	11	2	40	23	22	13	0	58	10	20	9	0	39	8	9	13	1	31	168
Total	47	65	28	2	142	51	63	36	0	150	31	60	26	0	117	36	32	32	1	101	510
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 South #7
Twinsburg, Ohio 44087
Transportation Manangement Services

File Name : TC 2 SR 752 and Long St Ashville 021622 DJS
Site Code : 00000000
Start Date : 2/16/2022
Page No : 3

Groups Printed- Cars - Trucks - Buses

	ASHVILLE PIKE From North					STATE ROUTE 752 From East					LONG STREET From South					STATE ROUTE 752 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	16	39	13	0	68	15	15	5	0	35	8	16	7	0	31	12	25	14	0	51	185
03:15 PM	13	28	8	1	50	6	23	16	0	45	8	32	8	0	48	13	21	13	0	47	190
03:30 PM	17	38	19	3	77	18	30	10	0	58	2	41	9	0	52	7	22	11	0	40	227
03:45 PM	27	48	10	3	88	11	28	14	0	53	9	21	15	0	45	9	23	12	0	44	230
Total	73	153	50	7	283	50	96	45	0	191	27	110	39	0	176	41	91	50	0	182	832
04:00 PM	19	41	13	0	73	8	26	18	0	52	12	25	12	0	49	12	38	22	2	74	248
04:15 PM	19	58	20	2	99	31	23	19	0	73	17	36	5	0	58	14	31	20	0	65	295
04:30 PM	27	39	24	0	90	27	45	19	0	91	17	25	6	0	48	16	43	18	0	77	306
04:45 PM	21	53	15	0	89	9	25	15	0	49	9	31	10	0	50	21	17	23	0	61	249
Total	86	191	72	2	351	75	119	71	0	265	55	117	33	0	205	63	129	83	2	277	1098
05:00 PM	23	42	14	1	80	10	21	10	1	42	10	29	9	0	48	12	29	26	2	69	239
05:15 PM	18	39	9	0	66	10	18	16	0	44	6	29	6	9	50	11	26	22	3	62	222
05:30 PM	20	33	9	1	63	6	25	18	1	50	8	33	8	0	49	16	28	14	0	58	220
05:45 PM	11	35	12	2	60	9	14	10	0	33	14	29	9	0	52	12	20	15	0	47	192
Total	72	149	44	4	269	35	78	54	2	169	38	120	32	9	199	51	103	77	5	236	873
Grand Total	497	883	420	17	1817	388	652	331	2	1373	290	817	303	9	1419	333	683	438	11	1465	6074
Apprch %	27.4	48.6	23.1	0.9		28.3	47.5	24.1	0.1		20.4	57.6	21.4	0.6		22.7	46.6	29.9	0.8		
Total %	8.2	14.5	6.9	0.3	29.9	6.4	10.7	5.4	0	22.6	4.8	13.5	5	0.1	23.4	5.5	11.2	7.2	0.2	24.1	
Cars	461	858	401	17	1737	369	605	323	2	1299	279	801	292	9	1381	324	629	415	11	1379	5796
% Cars	92.8	97.2	95.5	100	95.6	95.1	92.8	97.6	100	94.6	96.2	98	96.4	100	97.3	97.3	92.1	94.7	100	94.1	95.4
Trucks	34	14	4	0	52	8	33	7	0	48	7	8	11	0	26	8	28	22	0	58	184
% Trucks	6.8	1.6	1	0	2.9	2.1	5.1	2.1	0	3.5	2.4	1	3.6	0	1.8	2.4	4.1	5	0	4	3
Buses	2	11	15	0	28	11	14	1	0	26	4	8	0	0	12	1	26	1	0	28	94
% Buses	0.4	1.2	3.6	0	1.5	2.8	2.1	0.3	0	1.9	1.4	1	0	0	0.8	0.3	3.8	0.2	0	1.9	1.5

TMS Engineers, Inc.

2112 Case Parkway South #7
Twinsburg, Ohio 44087
Transportation Manangement Services

File Name : TC 2 SR 752 and Long St Ashville 021622 DJS
Site Code : 00000000
Start Date : 2/16/2022
Page No : 4

	ASHVILLE PIKE From North					STATE ROUTE 752 From East					LONG STREET From South					STATE ROUTE 752 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 07:00 AM																					
07:00 AM	12	5	42	0	59	13	19	7	0	39	18	31	8	0	57	**6**	49	8	0	63	218
07:15 AM	16	**12**	**76**	0	**104**	17	**26**	8	0	51	**22**	**41**	**15**	0	**78**	6	**85**	14	0	**105**	**338**
07:30 AM	**21**	12	21	0	54	**19**	25	**10**	0	**54**	15	25	11	0	51	6	23	**15**	0	44	203
07:45 AM	13	12	8	0	33	8	12	5	0	25	6	19	10	0	35	6	7	9	0	22	115
Total Volume	62	41	147	0	250	57	82	30	0	169	61	116	44	0	221	24	164	46	0	234	874
% App. Total	24.8	16.4	58.8	0		33.7	48.5	17.8	0		27.6	52.5	19.9	0		10.3	70.1	19.7	0		
PHF	.738	.854	.484	.000	.601	.750	.788	.750	.000	.782	.693	.707	.733	.000	.708	1.00	.482	.767	.000	.557	.646
Cars	57	39	147	0	243	53	74	30	0	157	61	114	41	0	216	21	154	44	0	219	835
% Cars	91.9	95.1	100	0	97.2	93.0	90.2	100	0	92.9	100	98.3	93.2	0	97.7	87.5	93.9	95.7	0	93.6	95.5
Trucks	3	1	0	0	4	2	4	0	0	6	0	1	3	0	4	3	2	1	0	6	20
% Trucks	4.8	2.4	0	0	1.6	3.5	4.9	0	0	3.6	0	0.9	6.8	0	1.8	12.5	1.2	2.2	0	2.6	2.3
Buses	2	1	0	0	3	2	4	0	0	6	0	1	0	0	1	0	8	1	0	9	19
% Buses	3.2	2.4	0	0	1.2	3.5	4.9	0	0	3.6	0	0.9	0	0	0.5	0	4.9	2.2	0	3.8	2.2
Peak Hour Analysis From 03:45 PM to 04:30 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 03:45 PM																					
03:45 PM	**27**	48	10	**3**	88	11	28	14	0	53	9	21	**15**	0	45	9	23	12	0	44	230
04:00 PM	19	41	13	0	73	8	26	18	0	52	12	25	12	0	49	12	38	**22**	**2**	74	248
04:15 PM	19	**58**	20	2	**99**	**31**	23	**19**	0	73	**17**	**36**	5	0	**58**	14	31	20	0	65	295
04:30 PM	27	39	**24**	0	90	27	**45**	19	0	**91**	17	25	6	0	48	**16**	**43**	18	0	**77**	**306**
Total Volume	92	186	67	5	350	77	122	70	0	269	55	107	38	0	200	51	135	72	2	260	1079
% App. Total	26.3	53.1	19.1	1.4		28.6	45.4	26	0		27.5	53.5	19	0		19.6	51.9	27.7	0.8		
PHF	.852	.802	.698	.417	.884	.621	.678	.921	.000	.739	.809	.743	.633	.000	.862	.797	.785	.818	.250	.844	.882
Cars	88	184	58	5	335	73	117	69	0	259	51	105	36	0	192	51	122	68	2	243	1029
% Cars	95.7	98.9	86.6	100	95.7	94.8	95.9	98.6	0	96.3	92.7	98.1	94.7	0	96.0	100	90.4	94.4	100	93.5	95.4
Trucks	4	1	2	0	7	4	4	1	0	9	3	2	2	0	7	0	6	4	0	10	33
% Trucks	4.3	0.5	3.0	0	2.0	5.2	3.3	1.4	0	3.3	5.5	1.9	5.3	0	3.5	0	4.4	5.6	0	3.8	3.1
Buses	0	1	7	0	8	0	1	0	0	1	1	0	0	0	1	0	7	0	0	7	17
% Buses	0	0.5	10.4	0	2.3	0	0.8	0	0	0.4	1.8	0	0	0	0.5	0	5.2	0	0	2.7	1.6

VEHICULAR TRAFFIC COUNT SUMMARY

Municipality: Ashville **At Intersection of:** West Main Street (SR 316) **and** Miller Avenue / Cromley Road

Date: 3/3/2022 **Day:** Thu. **Comments:** **Project:** 22-029

Weather: Clear **Recorder(s):** JJO **Data entry by:** JJO **Date entered:** Mar. 4, 2022 Main St & Miller Ave + Cromley Rd 03

TIME BEGINS	Miller Ave. FROM NORTH						Cromley Rd. FROM SOUTH						TOTAL NORTH SOUTH	W. Main St. (SR 316) FROM EAST						W. Main St. (SR 316) 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	12	4	5	21	0	1	43	1	36	80	1	1	**101**	7	130	8	145	6	1	7	104	10	121	6	2	**266**	**367**	0.583	0.800	0.863	0.818
08:00	10	2	20	32	0	3	30	3	20	53	1	0	**85**	17	112	17	146	10	6	15	84	7	106	7	2	**252**	**337**	0.571	0.697	0.890	0.803
09:00	12	3	21	36	0	0	8	6	12	26	0	0	**62**	16	101	10	127	7	0	12	84	9	105	6	3	**232**	**294**	0.600	0.722	0.836	0.875
10:00																															
11:00	11	3	20	34	0	0	8	4	22	34	1	0	**68**	26	100	14	140	6	0	7	85	3	95	6	0	**235**	**303**	0.708	0.708	0.972	0.742
12:00	21	4	18	43	3	0	6	2	24	32	1	0	**75**	18	130	18	166	5	0	25	103	19	147	6	0	**313**	**388**	0.672	0.889	0.902	0.875
1:00	15	3	7	25	0	0	13	4	25	42	1	1	**67**	21	85	12	118	4	0	6	102	4	112	5	1	**230**	**297**	0.694	0.700	0.843	0.800
2:00																															
3:00	30	6	24	60	2	3	8	6	38	52	1	3	**112**	29	153	25	207	4	1	17	137	29	183	8	2	**390**	**502**	0.682	0.650	0.892	0.803
4:00	21	5	21	47	0	0	10	10	34	54	1	1	**101**	46	187	18	251	8	1	17	145	23	185	10	0	**436**	**537**	0.734	0.900	0.860	0.907
5:00	13	5	9	27	0	0	14	5	25	44	0	0	**71**	28	152	25	205	2	0	16	176	33	225	6	0	**430**	**501**	0.844	0.786	0.840	0.953
6:00																															
7:00																															
8:00																															
9:00																															
TOTALS	145	35	145	325	5	7	140	41	236	417	7	6	742	208	1150	147	1505	52	9	122	1020	137	1279	60	10	2784	3526				
ADT	218	52.72212	218	490	3.7%		211	62	355	628	3.1%		1118	314	1735	222	2270	4.1%		184	1539	207	1930	5.5%		4200	5318				

N Leg Hourly Factor:	1.56
S Leg Hourly Factor:	1.56
N Leg Monthly Factor:	0.96
S Leg Monthly Factor:	0.96
E Leg Hourly Factor:	1.56
W leg Hourly Factor:	1.56
E Leg Monthly Factor:	0.96
W Leg Monthly Factor:	0.96
N Leg Combined Factor:	1.51
S Leg Combined Factor:	1.51
E Leg Combined Factor:	1.51
W Leg Combined Factor:	1.51

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 South #7
Twinsburg, Ohio 44087
Transportation Manangement Services

City: Ashville
Intersection: W. Main St & Miller Ave + Cromley Rd
Counter: JJO
Day of the Week: Thursday

File Name : W. Main St & Miller Ave + Cromley Rd 030322 JJO
Site Code : 00000000
Start Date : 3/3/2022
Page No : 1

Groups Printed- Cars - Trucks - Buses

	MILLER AVENUE From North					WEST MAIN STREET (SR 316) From East					CROMLEY ROAD From South					WEST MAIN STREET (SR 316) 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	1	7	0	9	2	36	4	0	42	9	0	16	0	25	2	33	2	0	37	113
07:15 AM	2	2	2	0	6	1	28	2	0	31	12	0	12	0	24	1	25	1	0	27	88
07:30 AM	0	1	2	0	3	2	36	1	0	39	9	1	10	0	20	2	24	2	0	28	90
07:45 AM	2	0	1	0	3	3	30	0	0	33	6	0	5	0	11	5	22	2	0	29	76
Total	5	4	12	0	21	8	130	7	0	145	36	1	43	0	80	10	104	7	0	121	367
08:00 AM	2	1	0	0	3	2	30	2	0	34	9	1	6	0	16	1	20	3	0	24	77
08:15 AM	5	1	1	0	7	6	30	5	0	41	7	1	11	0	19	0	18	9	0	27	94
08:30 AM	8	0	6	2	16	5	26	5	0	36	2	1	7	0	10	3	28	2	0	33	95
08:45 AM	5	0	3	0	8	4	26	5	0	35	2	0	6	0	8	3	18	1	0	22	73
Total	20	2	10	2	34	17	112	17	0	146	20	3	30	0	53	7	84	15	0	106	339
09:00 AM	2	0	2	0	4	1	30	3	0	34	4	1	1	0	6	3	18	2	0	23	67
09:15 AM	6	0	3	0	9	4	29	5	1	39	4	2	2	0	8	3	20	3	0	26	82
09:30 AM	3	1	4	0	8	2	22	3	0	27	1	2	0	0	3	1	26	3	0	30	68
09:45 AM	10	2	3	0	15	3	20	5	0	28	3	1	5	1	10	2	20	4	1	27	80
Total	21	3	12	0	36	10	101	16	1	128	12	6	8	1	27	9	84	12	1	106	297
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

TMS Engineers, Inc.

2112 Case Parkway South #7
Twinsburg, Ohio 44087
Transportation Manangement Services

File Name : W. Main St & Miller Ave + Cromley Rd 030322 JJO
Site Code : 00000000
Start Date : 3/3/2022
Page No : 2

Groups Printed- Cars - Trucks - Buses

	MILLER AVENUE From North					WEST MAIN STREET (SR 316) From East					CROMLEY ROAD From South					WEST MAIN STREET (SR 316) 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
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
11:00 AM	6	0	2	0	8	3	25	8	0	36	4	1	1	0	6	0	13	1	0	14	64
11:15 AM	6	2	4	0	12	1	28	5	0	34	3	0	4	0	7	2	20	2	0	24	77
11:30 AM	4	0	2	0	6	6	28	2	0	36	8	0	1	0	9	1	28	3	0	32	83
11:45 AM	4	1	3	0	8	4	19	11	0	34	7	3	2	0	12	0	24	1	0	25	79
Total	20	3	11	0	34	14	100	26	0	140	22	4	8	0	34	3	85	7	0	95	303
12:00 PM	8	1	7	0	16	6	34	2	0	42	6	2	1	0	9	6	24	12	0	42	109
12:15 PM	5	2	4	0	11	6	39	1	0	46	7	0	1	0	8	4	32	6	0	42	107
12:30 PM	2	1	6	0	9	5	28	7	0	40	5	0	3	0	8	3	21	3	0	27	84
12:45 PM	3	0	4	0	7	1	29	8	0	38	6	0	1	0	7	6	26	4	0	36	88
Total	18	4	21	0	43	18	130	18	0	166	24	2	6	0	32	19	103	25	0	147	388
01:00 PM	2	0	6	0	8	4	16	5	0	25	3	0	2	0	5	1	22	2	0	25	63
01:15 PM	0	0	2	0	2	0	25	6	0	31	7	0	2	0	9	1	34	0	0	35	77
01:30 PM	2	2	2	0	6	4	22	9	0	35	6	2	5	0	13	1	30	3	0	34	88
01:45 PM	3	1	5	0	9	4	22	1	0	27	9	2	4	0	15	1	16	1	0	18	69
Total	7	3	15	0	25	12	85	21	0	118	25	4	13	0	42	4	102	6	0	112	297
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 South #7
Twinsburg, Ohio 44087
Transportation Manangement Services

File Name : W. Main St & Miller Ave + Cromley Rd 030322 JJO
Site Code : 00000000
Start Date : 3/3/2022
Page No : 3

Groups Printed- Cars - Trucks - Buses

	MILLER AVENUE From North					WEST MAIN STREET (SR 316) From East					CROMLEY ROAD From South					WEST MAIN STREET (SR 316) 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	3	6	0	14	7	36	8	0	51	9	2	2	0	13	5	24	5	0	34	112
03:15 PM	6	1	6	0	13	4	31	9	0	44	15	3	2	0	20	8	27	6	0	41	118
03:30 PM	7	0	4	0	11	6	47	5	0	58	9	0	1	0	10	7	41	3	0	51	130
03:45 PM	6	2	14	0	22	8	39	7	0	54	5	1	3	0	9	9	45	3	0	57	142
Total	24	6	30	0	60	25	153	29	0	207	38	6	8	0	52	29	137	17	0	183	502
04:00 PM	8	1	7	0	16	6	38	9	0	53	8	4	2	0	14	6	42	3	0	51	134
04:15 PM	6	1	4	0	11	3	45	12	0	60	7	3	5	0	15	5	30	4	0	39	125
04:30 PM	2	3	4	0	9	5	49	11	0	65	12	2	1	0	15	8	32	5	0	45	134
04:45 PM	5	0	6	0	11	4	55	14	0	73	7	1	2	0	10	4	41	5	0	50	144
Total	21	5	21	0	47	18	187	46	0	251	34	10	10	0	54	23	145	17	0	185	537
05:00 PM	4	1	3	0	8	6	37	7	0	50	3	1	6	0	10	13	43	3	0	59	127
05:15 PM	1	2	3	0	6	8	43	7	0	58	9	1	4	0	14	3	42	5	0	50	128
05:30 PM	2	1	3	0	6	7	25	4	0	36	10	2	2	0	14	11	46	2	0	59	115
05:45 PM	2	1	4	0	7	4	47	10	0	61	3	1	2	0	6	6	45	6	0	57	131
Total	9	5	13	0	27	25	152	28	0	205	25	5	14	0	44	33	176	16	0	225	501
Grand Total	145	35	145	2	327	147	1150	208	1	1506	236	41	140	1	418	137	1020	122	1	1280	3531
Apprch %	44.3	10.7	44.3	0.6		9.8	76.4	13.8	0.1		56.5	9.8	33.5	0.2		10.7	79.7	9.5	0.1		
Total %	4.1	1	4.1	0.1	9.3	4.2	32.6	5.9	0	42.7	6.7	1.2	4	0	11.8	3.9	28.9	3.5	0	36.3	
Cars	139	35	139	1	314	143	1097	204	0	1444	230	39	135	1	405	130	963	116	1	1210	3373
% Cars	95.9	100	95.9	50	96	97.3	95.4	98.1	0	95.9	97.5	95.1	96.4	100	96.9	94.9	94.4	95.1	100	94.5	95.5
Trucks	2	0	3	0	5	2	46	4	0	52	3	0	4	0	7	6	51	3	0	60	124
% Trucks	1.4	0	2.1	0	1.5	1.4	4	1.9	0	3.5	1.3	0	2.9	0	1.7	4.4	5	2.5	0	4.7	3.5
Buses	4	0	3	1	8	2	7	0	1	10	3	2	1	0	6	1	6	3	0	10	34
% Buses	2.8	0	2.1	50	2.4	1.4	0.6	0	100	0.7	1.3	4.9	0.7	0	1.4	0.7	0.6	2.5	0	0.8	1

TMS Engineers, Inc.

2112 Case Parkway South #7
Twinsburg, Ohio 44087
Transportation Manangement Services

File Name : W. Main St & Miller Ave + Cromley Rd 030322 JJO
Site Code : 00000000
Start Date : 3/3/2022
Page No : 4

	MILLER AVENUE From North					WEST MAIN STREET (SR 316) From East					CROMLEY ROAD From South					WEST MAIN STREET (SR 316) 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 07:00 AM																					
07:00 AM	1	1	**7**	0	**9**	2	**36**	**4**	0	**42**	9	0	**16**	0	**25**	2	**33**	**2**	0	**37**	**113**
07:15 AM	**2**	**2**	2	0	6	1	28	2	0	31	**12**	0	12	0	24	1	25	1	0	27	88
07:30 AM	0	1	2	0	3	2	36	1	0	39	9	**1**	10	0	20	2	24	2	0	28	90
07:45 AM	2	0	1	0	3	**3**	30	0	0	33	6	0	5	0	11	**5**	22	2	0	29	76
Total Volume	5	4	12	0	21	8	130	7	0	145	36	1	43	0	80	10	104	7	0	121	367
% App. Total	23.8	19	57.1	0		5.5	89.7	4.8	0		45	1.2	53.8	0		8.3	86	5.8	0		
PHF	.625	.500	.429	.000	.583	.667	.903	.438	.000	.863	.750	.250	.672	.000	.800	.500	.788	.875	.000	.818	.812
Cars	5	4	11	0	20	8	123	7	0	138	35	1	42	0	78	10	97	6	0	113	349
% Cars	100	100	91.7	0	95.2	100	94.6	100	0	95.2	97.2	100	97.7	0	97.5	100	93.3	85.7	0	93.4	95.1
Trucks	0	0	0	0	0	0	6	0	0	6	0	0	1	0	1	0	6	0	0	6	13
% Trucks	0	0	0	0	0	0	4.6	0	0	4.1	0	0	2.3	0	1.3	0	5.8	0	0	5.0	3.5
Buses	0	0	1	0	1	0	1	0	0	1	1	0	0	0	1	0	1	1	0	2	5
% Buses	0	0	8.3	0	4.8	0	0.8	0	0	0.7	2.8	0	0	0	1.3	0	1.0	14.3	0	1.7	1.4
Peak Hour Analysis From 03:45 PM to 04:30 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 03:45 PM																					
03:45 PM	6	2	**14**	0	**22**	**8**	39	7	0	54	5	1	3	0	9	**9**	**45**	3	0	**57**	**142**
04:00 PM	**8**	1	7	0	16	6	38	9	0	53	8	**4**	2	0	14	6	42	3	0	51	134
04:15 PM	6	1	4	0	11	3	45	**12**	0	60	7	3	**5**	0	**15**	5	30	4	0	39	125
04:30 PM	2	**3**	4	0	9	5	**49**	11	0	**65**	**12**	2	1	0	15	8	32	**5**	0	45	134
Total Volume	22	7	29	0	58	22	171	39	0	232	32	10	11	0	53	28	149	15	0	192	535
% App. Total	37.9	12.1	50	0		9.5	73.7	16.8	0		60.4	18.9	20.8	0		14.6	77.6	7.8	0		
PHF	.688	.583	.518	.000	.659	.688	.872	.813	.000	.892	.667	.625	.550	.000	.883	.778	.828	.750	.000	.842	.942
Cars	21	7	28	0	56	22	165	38	0	225	31	10	10	0	51	25	140	15	0	180	512
% Cars	95.5	100	96.6	0	96.6	100	96.5	97.4	0	97.0	96.9	100	90.9	0	96.2	89.3	94.0	100	0	93.8	95.7
Trucks	0	0	1	0	1	0	5	1	0	6	0	0	1	0	1	3	8	0	0	11	19
% Trucks	0	0	3.4	0	1.7	0	2.9	2.6	0	2.6	0	0	9.1	0	1.9	10.7	5.4	0	0	5.7	3.6
Buses	1	0	0	0	1	0	1	0	0	1	1	0	0	0	1	0	1	0	0	1	4
% Buses	4.5	0	0	0	1.7	0	0.6	0	0	0.4	3.1	0	0	0	1.9	0	0.7	0	0	0.5	0.7

Appendix C
Development Trip Generation Data

FOR INTERNAL USE

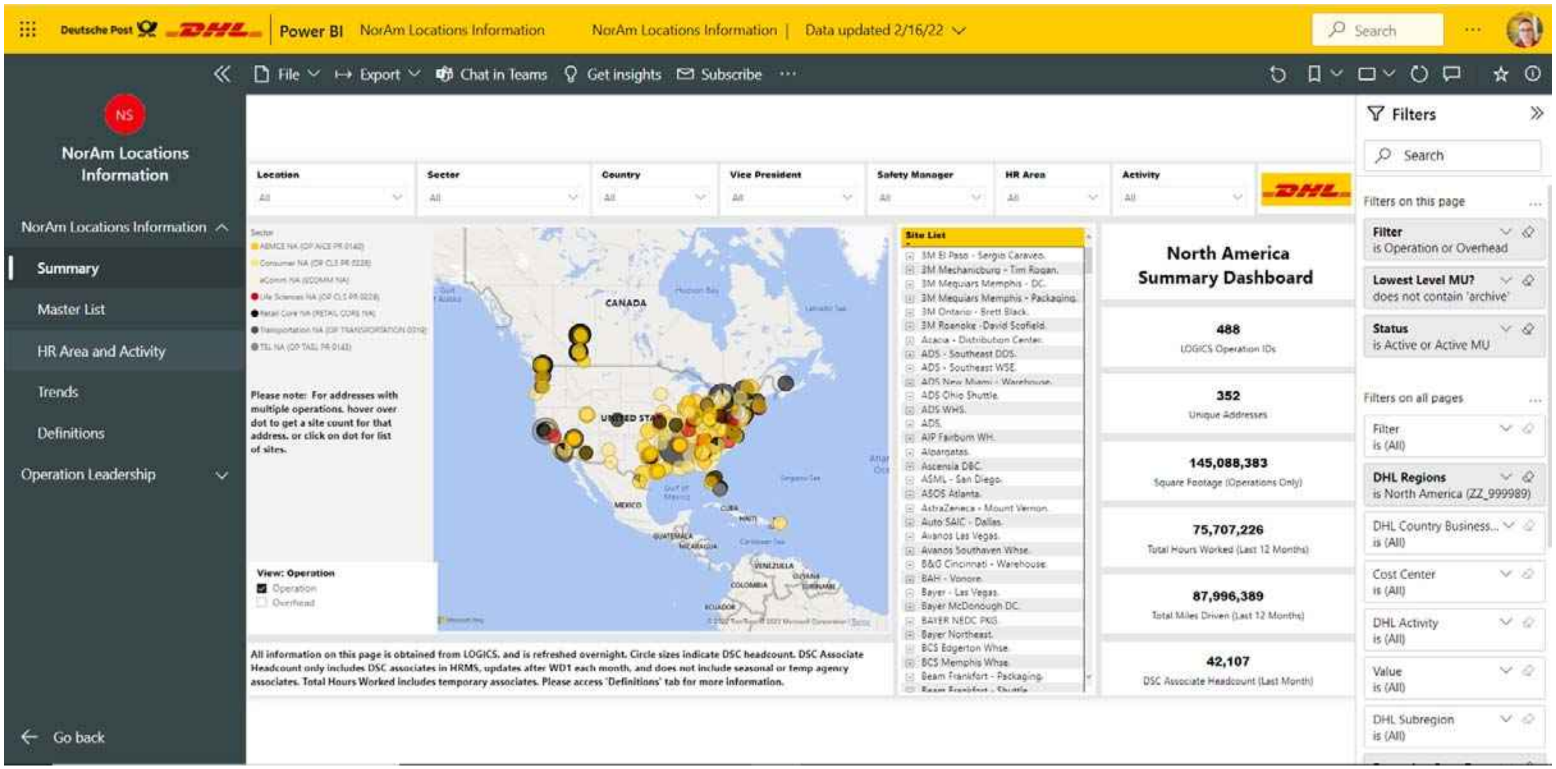
DHL TRAFFIC PROFILES

Westerville, OH, 17 February 2022

DHL Real Estate Development– Excellence. Simply delivered.

FOR INTERNAL USE

DHL NorAm Location Information - PowerBI



Information updated daily LOGICS

FOR INTERNAL USE

DHL NorAm Location Information – Headcount per x sq/ft

Summary below is sorted by sector with the highest amount of square footage

Sectors with the highest concentration of headcount per sq/ft are darker red

Retail leads with 51 heads per 100k sq/ft of space

Chem / engineering & manufacturing are last with 13-14 heads per 100k sq/ft of space

Sector					Heads per x sq/ft (Daily)			
Row Labels	Sum of Square Footage	Sum of Total FTE (Last 12 Months)	% of DHL Sq/Ft	sq/ft per	100k	1,000k	650k	570k
Automotive	162,381,638	39,189	56%	4,143	24	241	157	138
Consumer	73,690,269	14,841	25%	4,965	20	201	131	115
Retail	20,511,676	10,472	7%	1,959	51	511	332	291
Technology	4,855,146	2,171	2%	2,236	45	447	291	255
Life Science & Healthcare	10,708,508	2,103	4%	5,092	20	196	128	112
Engineering & Manufacturing	13,327,534	1,870	5%	7,127	14	140	91	80
Chemicals	3,606,638	480	1%	7,513	13	133	87	76
Energy	1,095,359	253	0%	4,330	23	231	150	132

FOR INTERNAL USE

DHL NorAm Location Information – ITE Results Corrections

ITE provided results on various building sizes on FTE and truck movement over two shifts

Errors were discovered replicating the math (in red)

The summary for ‘Enter’ and ‘Exit’ between 7-9 AM left out the final row for 570k sq/ft

The final total between 4-6 PM (bottom right) was not totaling the entire headcount

ITE							
	Weekday Peak Hour Beween 7-9 AM				Weekday Peak Hour Beween 4-6 PM		
Size	Enter	Exit	Trucks		Enter	Exit	Trucks
1000k	576	576	90	1152	786	370	60
570k	281	281	51	562	374	176	34
1000k	576	576	90	1152	786	370	60
650k	336	336	59	672	450	212	39
1000k	576	576	90	1152	786	370	60
1000k	576	576	90	1152	786	370	60
570k	281	281	51	562	374	176	34
	3202	3202	521		4342	2044	347
	6404				6386		

FOR INTERNAL USE

DHL NorAm Location Information – DHL Results

The results below are based on actual DHL operations for FTE and truck movement over two shifts

The left table 'DHL Operations (All Sectors) are a weighted average of all ops. The right is our max FTE/Truck sector

All sectors are significantly less for FTE than the ITE output

Retail is ~40% of the ITE results while trucks is the same

DHL is speculating that the ITE numbers are theoretical max headcount for given sq/ft

DHL Operations (All Sectors) (as of 2/15/2022)							
	Weekday Peak Hour Beween 7-9 AM				Weekday Peak Hour Beween 4-6 PM		
Size	Enter	Exit	Trucks		Enter	Exit	Trucks
1000k	123	123	62	246	167	79	41
570k	70	70	35	140	95	45	23
1000k	123	123	62	246	167	79	41
650k	80	80	62	160	109	51	41
1000k	123	123	62	246	167	79	41
1000k	123	123	62	246	167	79	41
570k	70	70	35	140	95	45	23
	712	712	380		969	456	253
	1424				1424		

DHL Operations (Retail) (as of 2/15/2022)							
	Weekday Peak Hour Beween 7-9 AM				Weekday Peak Hour Beween 4-6 PM		
Size	Enter	Exit	Trucks		Enter	Exit	Trucks
1000k	255	255	96	511	347	163	64
570k	70	70	54	140	95	45	36
1000k	255	255	96	511	347	163	64
650k	166	166	40	332	226	106	27
1000k	255	255	96	511	347	163	64
1000k	255	255	96	511	347	163	64
570k	70	70	54	140	95	45	36
	1327	1327	531		1805	849	354
	2654				2654		

FOR INTERNAL USE
FOR INTERNAL USE

DHL TRAFFIC PROFILES

Westerville, OH, 2 May 2022

DHL Real Estate Development– Excellence. Simply delivered.

FOR INTERNAL USE

DHL NorAm Location Information – Consumer and Ecommerce

Data is representative of actual DHL operations for the noted sector verticles

DHL Operations (Consumer / Ecommerce) (as of 4/29/2022)		
	Weekday Peak Hour Beween 7-9 AM	Weekday Peak Hour Beween 4-6 PM
Size	Trucks	Trucks
1000k	50	36
800k	45	36
575k	30	20
400k	25	16

DHL SITE GENERATED TRAFFIC CALCULATIONS

TOTAL SITE GENERATED TRIPS - ITE #156

BUILDING	SITE	SIZE (Sq Ft)	OPENING YEAR	TOTAL AM TRIPS TOTAL	ENTER* 50%	EXIT* 50%	PM TOTAL TRIPS TOTAL	ENTER* 68%	EXIT* 32%	
1	North	1,006,880	2024	1161	580	581	1166	793	373	373
2	North	793,440	2025	869	434	435	865	588	277	277
3	North	1,006,880	2026	1161	580	581	1166	793	373	373
4	South	572,460	2027	566	283	283	553	376	177	177
5	South	1,006,880	2028	1161	580	581	1166	793	373	373
6	South	1,006,880	2029	1161	580	581	1166	793	373	373
7	South	517,940	2030	491	245	246	476	324	152	152
	TOTALS:	**5,911,360**		**6570**	**3282**	**3288**	**6558**	**4460**	**2098**	**2098**

VEHICLE & TRUCK GENERATED TRIPS - ITE #156

BUILDING	SITE	SIZE (Sq Ft)	OPENING YEAR	AM VEHICLE TRIPS (Total Trip minus Truck Trips) TOTAL	ENTER	EXIT	AM TRUCK TRIPS TOTAL	ENTER* 50%	EXIT* 50%	PM VEHICLE TRIPS (Total Trip minus Truck Trips) TOTAL	ENTER	EXIT	PM TRUCK TRIPS TOTAL	ENTER* 48%	EXIT* 52%
1	North	1,006,880	2024	1070	535	535	91	45	46	1106	764	342	60	29	31
2	North	793,440	2025	798	399	399	71	35	36	817	565	252	48	23	25
3	North	1,006,880	2026	1070	535	535	91	45	46	1106	764	342	60	29	31
4	South	572,460	2027	514	257	257	52	26	26	519	360	159	34	16	18
5	South	1,006,880	2028	1070	535	535	91	45	46	1106	764	342	60	29	31
6	South	1,006,880	2029	1070	535	535	91	45	46	1106	764	342	60	29	31
7	South	517,940	2030	444	222	222	47	23	24	445	309	136	31	15	16
	TOTALS:	**5,911,360**		**6036**	**3018**	**3018**	**534**	**264**	**270**	**6205**	**4290**	**1915**	**353**	**170**	**183**

*** Truck splits not available for Land Use #156. Enter & Exit splits are based on AVERAGE directional distribution for ITE Land Uses 150/154/155**

VEHICLE & TRUCK GENERATED TRIPS - PER AVAILABLE DHL DATA

BUILDING	SITE	SIZE (Sq Ft)	OPENING YEAR	AM VEHICLE TRIPS AM TRIPS - 37.52 TRIPS/100,000 SF TOTAL	ENTER* 50%	EXIT* 50%	AM TRUCK TRIPS Per DHL Data TOTAL	ENTER** 50%	EXIT** 50%	PM VEHICLE TRIPS PM TRIPS - 37.52 TRIPS/100,000 SF TOTAL	ENTER* 68%	EXIT* 32%	PM TRUCK TRIPS Per DHL Data TOTAL	ENTER** 48%	EXIT** 52%
1	North	1,006,880	2024	378	189	189	50	25	25	378	257	121	36	18	18
2	North	793,440	2025	298	149	149	45	23	22	298	202	95	36	18	18
3	North	1,006,880	2026	378	189	189	50	25	25	378	257	121	36	18	18
4	South	572,460	2027	215	107	107	30	15	15	215	146	69	20	10	10
5	South	1,006,880	2028	378	189	189	50	25	25	378	257	121	36	18	18
6	South	1,006,880	2029	378	189	189	50	25	25	378	257	121	36	18	18
7	South	517,940	2030	194	97	97	30	15	15	194	132	62	20	10	10
	TOTALS:	**5,911,360**		**2218**	**1109**	**1109**	**305**	**153**	**152**	**2218**	**1508**	**710**	**220**	**110**	**110**

*** Enter & Exit splits are based on directional distribution for ITE Land Use 156 - High-Cube Parcel Hub Warehouse**
**** Truck splits not available for Land Use #156. Enter & Exit splits are based on AVERAGE directional distribution for ITE Land Uses 150/154/155**

TOTAL SITE GENERATED TRIPS - PER AVAILABLE DHL DATA

BUILDING	SITE	SIZE (Sq Ft)	OPENING YEAR	TOTAL AM TRIPS TOTAL	ENTER	EXIT	PM TOTAL TRIPS TOTAL	ENTER	EXIT
1	North	1,006,880	2024	428	214	214	414	275	139
2	North	793,440	2025	343	172	171	334	220	113
3	North	1,006,880	2026	428	214	214	414	275	139
4	South	572,460	2027	245	122	122	235	156	79
5	South	1,006,880	2028	428	214	214	414	275	139
6	South	1,006,880	2029	428	214	214	414	275	139
7	South	517,940	2030	224	112	112	214	142	72
	TOTALS:	**5,911,360**		**2523**	**1262**	**1261**	**2438**	**1618**	**820**

Appendix D
ODOT COVID-19 Calibration Guidelines

Decreased traffic as a result of the COVID19 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:

https://www.transportation.ohio.gov/wps/portal/gov/odot/programs/technical-services/resources/regional-traffic-analysis

Currently about a 15% decrease in traffic is occurring. While this is similar to the decrease experienced from May to August, September and early October decreases were closer to 10%. It's too early to tell whether this represents a new trend due to increasing COVID19 trends or additional suppression related to pre-holiday travel, however regardless, 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 provided. **Note, this method is an expedient to keep projects moving, if possible the project sponsor might want to defer collecting new traffic counts for projects until traffic conditions return to normal (at a minimum normal is defined as within 15% of pre-pandemic values, even better would be to wait until post-pandemic volumes can be measured). Additionally, any projects whose forecasts are based upon counts collected during the pandemic will require new traffic counts if they are subsequently resubmitted for certification once ODOT determines traffic levels have returned to normal, note this does not necessarily mean the forecasts must be redone as long as the new counts are in reasonable agreement (usually within 15%) with the counts used for the forecasts.** Since some locations may currently be close to normal, the factoring procedure is optional. However, any forecast submitted for certification must follow Steps 1 and 2 and:

A. Contain count plates showing the prior existing counts and original raw project counts and if the factoring procedure is used 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 (the italicized part only included if factoring is conducted): "Counts collected during COVID19 Pandemic *and factored per ODOT Modeling and Forecasting guidance*".

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:

https://www.transportation.ohio.gov/static/Programs/StatewidePlanning/Modeling-Forecasting/GuidelinesTCTFRoadwayDesign.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 the month in 2019 matching the post-C month selected below. 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 the latest month available in StreetLight. 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.

Appendix E
ODOT Historical Traffic Data

Volume Count Report

LOCATION INFO

Location ID	2765
Type	SPOT
Fnct'l Class	3
Located On	US-23
Loc On Alias	N310
BETWEEN	SR-752 AND DUVALL RD (SR-762)
Direction	2-WAY
County	Pickaway
Community	HARRISON
MPO ID	
HPMS ID	
Agency	ODOT

COUNT DATA INFO

Count Status	Accepted
Start Date	Thu 2/17/2022
End Date	Fri 2/18/2022
Start Time	12:00:00 AM
End Time	12:00:00 AM
Direction	
Notes	
Station	
Study	
Speed Limit	
Description	
Sensor Type	ATR
Source	TCDS_COUNT_IMPORT_COMBINE
Latitude,Longitude	

INTERVAL:15-MIN

Time	15-min Interval				Hourly Count
	1st	2nd	3rd	4th	
0:00-1:00	82	68	60	68	278
1:00-2:00	60	54	62	48	224
2:00-3:00	47	50	59	48	204
3:00-4:00	59	68	61	90	278
4:00-5:00	96	134	168	174	572
5:00-6:00	230	322	329	345	1,226
6:00-7:00	484	581	541	466	2,072
7:00-8:00	494	540	528	449	2,011
8:00-9:00	435	414	438	418	1,705
9:00-10:00	388	408	407	350	1,553
10:00-11:00	374	361	397	340	1,472
11:00-12:00	318	340	375	332	1,365
12:00-13:00	482	421	417	395	1,715
13:00-14:00	363	413	396	406	1,578
14:00-15:00	414	487	490	485	1,876
15:00-16:00	484	551	559	573	2,167
16:00-17:00	523	570	580	545	2,218
17:00-18:00	538	619	502	495	2,154
18:00-19:00	472	383	382	334	1,571
19:00-20:00	242	265	254	224	985
20:00-21:00	241	211	186	180	818
21:00-22:00	201	191	184	158	734
22:00-23:00	145	115	129	103	492
23:00-24:00	88	95	100	82	365
Total					29,633
AM Peak					06:15-07:15 2,082
PM Peak					16:30-17:30 2,282

Count Navigation: |<< < > >>| Count Type: VOLUME

Directions: 2-WAY NB SB
1 2 1 2

Volume Count Report

LOCATION INFO

Location ID	2765
Type	SPOT
Fnct'l Class	3
Located On	US-23
Loc On Alias	N310
BETWEEN	SR-752 AND DUVALL RD (SR-762)
Direction	2-WAY
County	Pickaway
Community	HARRISON
MPO ID	
HPMS ID	
Agency	ODOT

COUNT DATA INFO

Count Status	Accepted
Start Date	Thu 2/20/2020
End Date	Fri 2/21/2020
Start Time	12:00:00 AM
End Time	12:00:00 AM
Direction	
Notes	
Station	
Study	
Speed Limit	
Description	
Sensor Type	ATR
Source	TCDS_COUNT_IMPORT_COMBINE
Latitude,Longitude	

INTERVAL:15-MIN

Time	15-min Interval				Hourly Count
	1st	2nd	3rd	4th	
0:00-1:00	65	67	60	57	249
1:00-2:00	53	48	44	53	198
2:00-3:00	39	43	44	51	177
3:00-4:00	42	52	61	81	236
4:00-5:00	76	146	141	167	530
5:00-6:00	252	313	392	458	1,415
6:00-7:00	536	570	608	539	2,253
7:00-8:00	544	554	577	506	2,181
8:00-9:00	467	500	429	406	1,802
9:00-10:00	419	389	402	353	1,563
10:00-11:00	360	381	377	394	1,512
11:00-12:00	373	333	376	399	1,481
12:00-13:00	384	412	424	377	1,597
13:00-14:00	408	417	436	396	1,657
14:00-15:00	407	471	480	499	1,857
15:00-16:00	527	548	440	301	1,816
16:00-17:00	367	342	360	362	1,431
17:00-18:00	322	526	544	518	1,910
18:00-19:00	455	396	284	318	1,453
19:00-20:00	271	272	233	255	1,031
20:00-21:00	212	190	190	171	763
21:00-22:00	179	181	156	134	650
22:00-23:00	147	130	175	113	565
23:00-24:00	97	98	85	85	365
Total					28,692
AADT					26,224
AM Peak					06:15-07:15 2,261
PM Peak					14:30-15:30 2,054

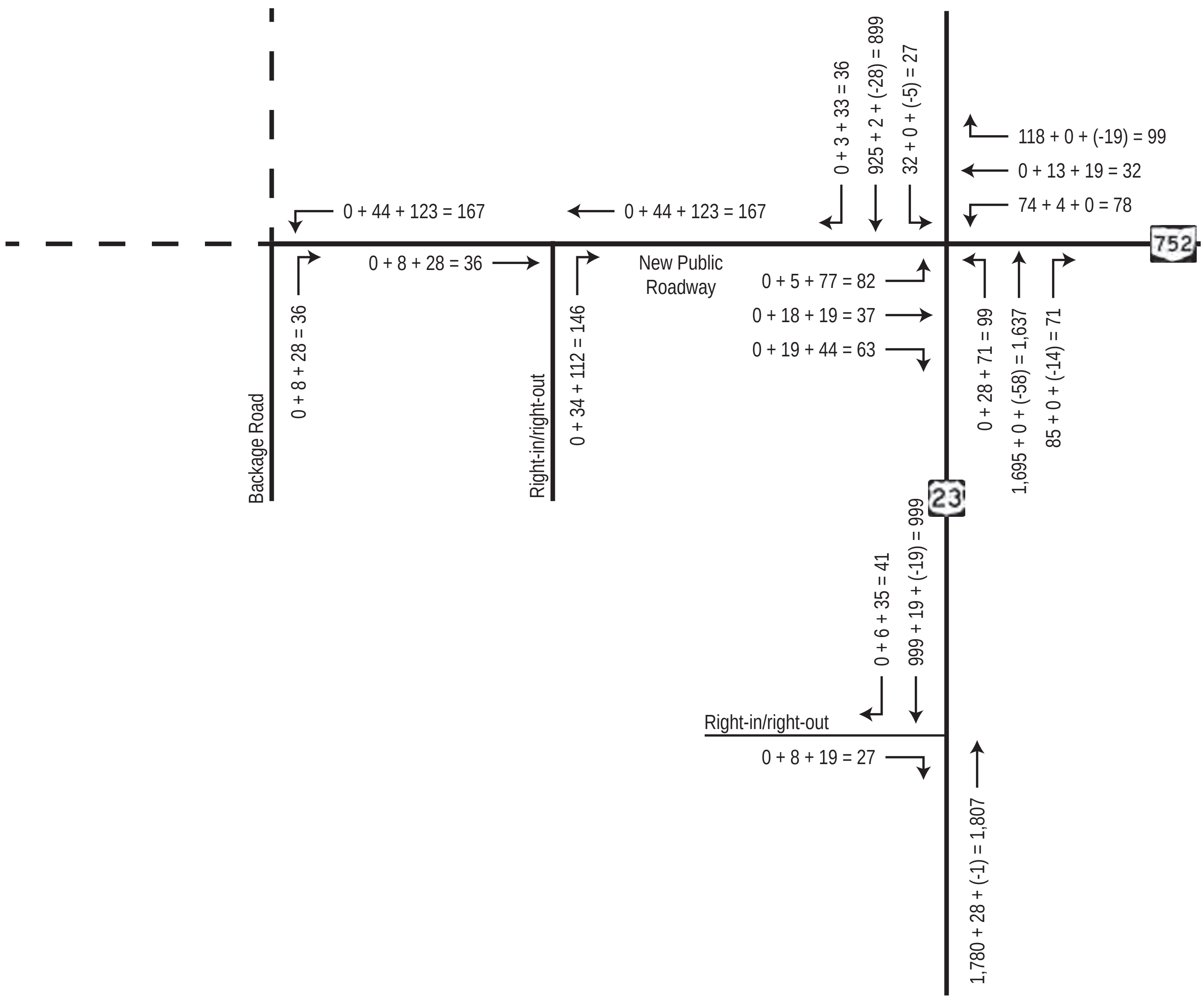
Count Navigation: |<< < > >>| Count Type: VOLUME

Directions: 2-WAY NB SB

Appendix F
Sheetz TIS Trip Generation Figures

N

AM
PEAK



A + B + C = D

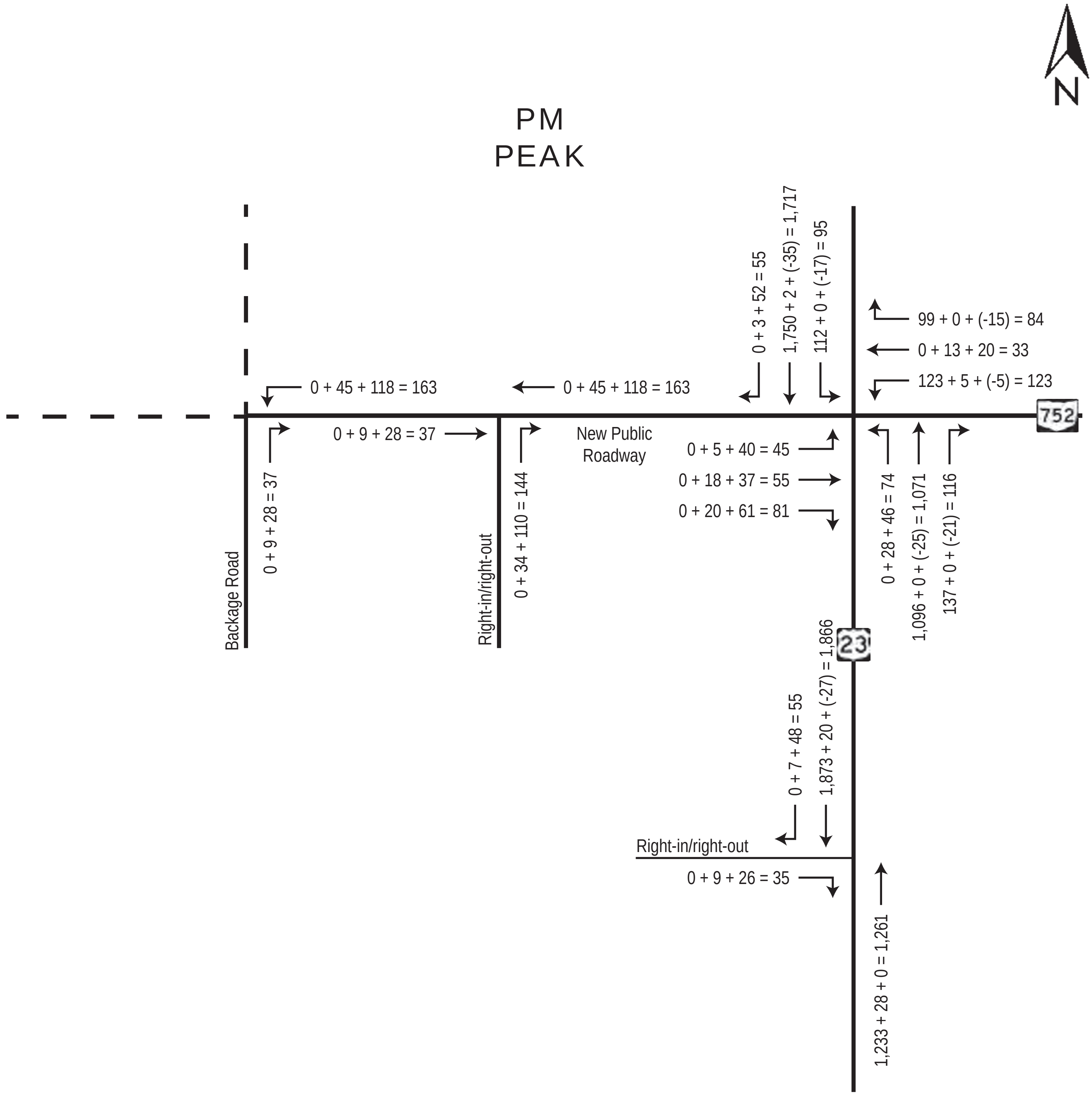
A - Background Volumes (2031)
B - Primary Trips
C - Pass-by Trips
D - Total Volumes

ms consultants, inc.
engineers, architects, planners

South Bloomfield Sheetz
Traffic Impact Study
South Bloomfield, Ohio

Figure 3: AM Peak Hour Turning Movement Volumes

Last Revision: 12/03/2020



A + B + C = D

A - Background Volumes (2031)
B - Primary Trips
C - Pass-by Trips
D - Total Volumes

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Traffic Impact Study
South Bloomfield, Ohio

Figure 4: PM Peak Hour Turning Movement Volumes

Last Revision: 12/03/2020

Appendix G
US23/SR316 Development TIS Trip Generation Figures

Kimley»Horn

EXHIBIT 5
OPENING YEAR (2022)
TOTAL TRIP ASSIGNMENT

Kimley»Horn

EXHIBIT 6

DESIGN YEAR (2042)

RESIDENTIAL TRIP ASSIGNMENT

Kimley»Horn

EXHIBIT 7
DESIGN YEAR (2042)
COMMERCIAL PRIMARY TRIP ASSIGMENT

Kimley»Horn

EXHIBIT 8

DESIGN YEAR (2042)

COMMERCIAL PASS-BY TRIP ASSIGNMENT

Kimley»Horn

EXHIBIT 9

DESIGN YEAR (2042)
TOTAL TRIP ASSIGMENT

Appendix H
MORPC Growth Rate Correspondence

Andy Comer

From: Hwashik Jang <hjang@morpc.org>
Sent: Tuesday, March 29, 2022 2:43 PM
To: Andy Comer
Cc: Nick Gill
Subject: RE: Proposed DHL Facility TIS - Ashville, Pickaway County, Ohio

Andy,

We have completed processing growth rates for your Ashville traffic study area.

Please use linear annual growth rates as summarized below.

Location	Linear Annual Growth Rate
SR 752 e/o US 23	2.00%
US 23 n/o SR 752	0.90%
US 23 s/o SR 752	0.90%
US 23 n/o SR 316	0.90%
SR 316 w/o US 23	1.60%
US 23 s/o SR 316	0.90%
SR 316 e/o US 23	2.00%
US 23 n/o SR 316	1.00%
SR 316 w/o US 23	2.00%
US 23 s/o SR 316	0.90%
SR 752 e/o Long St	2.00%
Long St n/o SR 752	2.20%
SR 752 w/o Long St	2.00%
Long St s/o SR 752	2.20%
W Main St e/o Cromley Rd	2.00%
SR 316 w/o Cromley Rd	2.00%

Note: *The above rate was derived based on planning level analysis by using MORPC's regional travel demand model.*

If you have any questions, please let me know.

Thanks,

HWASHIK JANG
Senior Planner, **Mid-Ohio Regional Planning Commission**
T: 614.233.4145 | hjang@morpc.org
111 Liberty Street, Suite 100 | Columbus, OH 43215

MID-OHIO REGIONAL
MORPC
PLANNING COMMISSION

Given continued concerns and rapidly changing conditions due to COVID-19, MORPC offices are currently open to the public, but on a limited basis for preplanned meetings. In taking such steps, we are protecting the health and safety of our staff, members, and the general public. During this time, MORPC will continue to provide services to our members and community partners remotely. For updates and other information visit our website at www.morpc.org/covid19. Thank you for your patience and understanding as we navigate through these unique challenges.

From: Andy Comer <Andy@tmsengineers.com>
Sent: Friday, March 4, 2022 1:16 PM
To: Hwashik Jang <hjang@morpc.org>
Subject: Proposed DHL Facility TIS - Ashville, Pickaway County, Ohio

Hwashik,

We have been contracted to prepare a Traffic Impact Study for a proposed DHL facility in Ashville, Pickaway County, Ohio. The project is expected to consist of 7 warehouse/spec buildings. The development is proposed with access along SR 752 and SR 316 east of US 23. The SR 752 access is proposed for both car and truck traffic. The SR 316 access will be a car access only. Attached please find a "Project Location Map" detailing the development location. We are providing the following information in order to request a traffic growth rate for the study area roadways (US 23/SR 752/SR 316):

1. Traffic Data – We collected traffic data at five locations as determined with ODOT, Asheville, and South Bloomfield. See attached "Traffic Count Data". Included with the traffic data please find a map detailing the count locations and summary of the peak hour data.
2. Open Year & Design Year – Opening Year 2023 & Design Year 2043
3. Roadway Network Assumptions – The TIS will determine traffic and lane use at the proposed access locations and if any additional improvements are needed at the existing intersections.
4. Land Use Assumptions – The attached "Project Site Plan" includes a breakdown of each development building and the site plans for the development. The trip generation for the development will be based on site specific data.
5. Project Review Contact Person – The project will be reviewed by ODOT, District 6. We had a project scoping meeting with ODOT, District 6 on February 9, 2022. Our contact at ODOT District 6 is currently Andrew Hurst. We have also been in contact with the Village of Ashville engineer – Christopher Tebbe.

Please let me know if you have any questions or if there is any additional information you require to determine a traffic growth rate for the project study area.

Thank you,
Andy

Andrew B. Comer, P.E.

TMS Engineers, Inc.
2112 Case Parkway South #7
Twinsburg, Ohio 44087
T: (330) 686-6402
F: (330) 686-6417

Appendix I
ODOT Peak Hour to Design Hour Chart

PEAK HOUR to DESIGN HOUR FACTORS

FUNCTIONAL CLASSIFICATION = 03, 04, 05u

(Urban Principal Arterial, Urban Minor Arterial, & Urban Minor Collector)

Month \ Day		Monthly Average by Day-of-Week							
		WEEKDAY MON-THUR	Sun	Mon	Tue	Wed	Thu	Fri	Sat
		0	1	2	3	4	5	6	7
January	1	1.20	1.72	1.22	1.21	1.20	1.17	1.15	1.56
February	2	1.17	1.63	1.19	1.16	1.17	1.16	1.11	1.48
March	3	1.15	1.57	1.16	1.16	1.16	1.13	1.11	1.45
April	4	1.11	1.52	1.13	1.12	1.09	1.09	1.06	1.41
May	5	1.08	1.44	1.10	1.09	1.08	1.06	1.04	1.35
June	6	1.14	1.51	1.16	1.15	1.14	1.11	1.09	1.39
July	7	1.16	1.54	1.19	1.17	1.15	1.15	1.13	1.44
August	8	1.13	1.51	1.15	1.14	1.13	1.11	1.08	1.40
September	9	1.12	1.53	1.15	1.11	1.12	1.09	1.04	1.40
October	10	1.10	1.53	1.13	1.10	1.10	1.08	1.05	1.40
November	11	1.13	1.56	1.16	1.12	1.13	1.11	1.06	1.48
December	12	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
Background Traffic Volume Forecast Calculations

WORKSHEET FOR NO BUILD VEHICULAR TRAFFIC VOLUME CALCULATIONS

SR 752 & US 23 021722

			S. Walnut St. (US 23) FROM NORTH						S. Walnut St. (US 23) FROM SOUTH						TOTAL NORTH SOUTH	SR 752 FROM EAST						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	2022	Raw	81	756	0	837			0	1227	185	1412			2249	62	0	65	127			0	0	0	0			127	2376
	COVID	Factor	1.000	1.000	1.000				1.000	1.000	1.000					1.000	1.000	1.000				0.000	0.000	0.000					
	2022	Adjusted	81	756	0	837			0	1227	185	1412			2249	62	0	65	127			0	0	0	0			127	2376
	DHV	Factor	1.156	1.156	1.156				1.156	1.156	1.156					1.156	1.156	1.156				1.000	1.000	1.000					
	2022	No Build	94	874	0	968			0	1419	214	1633			2601	72	0	75	147			0	0	0	0			147	2748
	Growth	Factor	0.009	0.009	0.009				0.009	0.009	0.009					0.020	0.020	0.020				0.000	0.000	0.000					
	2024	Adj +Growth+DHV	95	890	0	985			0	1445	218	1662			2648	75	0	78	153			0	0	0	0			153	2800
	Opening Year	Round	100	890	0	990			0	1440	220	1660			2650	70	0	80	150			0	0	0	0			150	2800
	2030	Adj +Growth+DHV	100	937	0	1038			0	1521	229	1750			2788	83	0	87	170			0	0	0	0			170	2959
	Build Year	Round	**100**	**940**	**0**	**1040**			**0**	**1520**	**230**	**1750**			**2790**	**80**	**0**	**90**	**170**			**0**	**0**	**0**	**0**			**170**	**2960**
	2044	Adj +Growth+DHV	112	1047	0	1160			0	1700	256	1956			3116	103	0	108	211			0	0	0	0			211	3327
	Design Year	Round	**110**	**1050**	**0**	**1160**			**0**	**1700**	**260**	**1960**			**3120**	**100**	**0**	**110**	**210**			**0**	**0**	**0**	**0**			**210**	**3330**
PM PEAK	2022	Raw	95	1338	0	1433			0	826	142	968			2401	132	0	66	198			0	0	0	0			198	2599
	COVID	Factor	1.000	1.000	1.000				1.000	1.000	1.000					1.000	1.000	1.000				0.000	0.000	0.000					
	2022	Adjusted	95	1338	0	1433			0	826	142	968			2401	132	0	66	198			0	0	0	0			198	2599
	DHV	Factor	1.156	1.156	1.156				1.156	1.156	1.156					1.156	1.156	1.156				1.000	1.000	1.000					
	2022	No Build	110	1547	0	1657			0	955	164	1119			2777	153	0	76	229			0	0	0	0			229	3006
	Growth	Factor	0.009	0.009	0.009				0.009	0.009	0.009					0.020	0.020	0.020				0.000	0.000	0.000					
	2024	Adj+Growth+DHV	112	1575	0	1687			0	972	167	1140			2827	159	0	79	238			0	0	0				######	######
	Opening Year	Round	**110**	**1580**	**0**	**1690**			**0**	**970**	**170**	**1140**			**2830**	**160**	**0**	**80**	**240**			**0**	**0**	**0**				**######**	**######**
	2030	Adj+Growth+DHV	118	1659	0	1777			0	1024	176	1200			2977	177	0	89	266			0	0	0	0			266	3242
	Build Year	Round	**120**	**1660**	**0**	**1780**			**0**	**1020**	**180**	**1200**			**2980**	**180**	**0**	**90**	**270**			**0**	**0**	**0**	**0**			**270**	**3250**
	2044	Adj+Growth+DHV	132	1854	0	1985			0	1144	197	1341			3326	220	0	110	330			0	0	0	0			330	3656
	Design Year	Round	**130**	**1850**	**0**	**1980**			**0**	**1140**	**200**	**1340**			**3320**	**220**	**0**	**110**	**330**			**0**	**0**	**0**	**0**			**330**	**3650**

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

WORKSHEET FOR NO BUILD VEHICULAR TRAFFIC VOLUME CALCULATIONS

S. Walnut St & North St 030222

			S. Walnut St. (US 23) FROM NORTH						S. Walnut St. (US 23) FROM SOUTH						TOTAL NORTH SOUTH	E. North St. FROM EAST						W. North St. 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	2022	Raw	19	779	44	842			47	1212	33	1292			2134	15	38	102	155			138	46	54	238			393	2527
	COVID	Factor	1.000	1.000	1.000				1.000	1.000	1.000					1.000	1.000	1.000				1.000	1.000	1.000					
	2022	Adjusted	19	779	44	842			47	1212	33	1292			2134	15	38	102	155			138	46	54	238			393	2527
	DHV	Factor	1.159	1.159	1.159				1.159	1.159	1.159					1.159	1.159	1.159				1.159	1.159	1.159					
	2022	No Build	22	903	51	976			54	1405	38	1498			2474	17	44	118	180			160	53	63	276			456	2929
	Growth	Factor	0.000	0.009	0.009				0.009	0.009	0.000					0.000	0.000	0.000				0.016	0.000	0.016					
	2024	Adj +Growth+DHV	22	919	52	993			55	1430	38	1524			2517	17	44	118	180			165	53	65	283			463	2980
	Opening Year	Round	20	920	50	990			60	1430	40	1530			2520	20	40	120	180			170	50	60	280			460	2980
	2030	Adj +Growth+DHV	22	968	55	1045			58	1506	38	1603			2647	17	44	118	180			180	53	71	304			484	3131
	Build Year	Round	**20**	**970**	**50**	**1040**			**60**	**1510**	**40**	**1610**			**2650**	**20**	**40**	**120**	**180**			**180**	**50**	**70**	**300**			**480**	**3130**
	2044	Adj +Growth+DHV	22	1082	61	1165			65	1683	38	1787			2951	17	44	118	180			216	53	85	354			534	3485
	Design Year	Round	**20**	**1080**	**60**	**1160**			**70**	**1680**	**40**	**1790**			**2950**	**20**	**40**	**120**	**180**			**220**	**50**	**80**	**350**			**530**	**3480**
PM PEAK	2022	Raw	17	1588	99	1704			31	878	10	919			2623	11	28	16	55			102	40	94	236			291	2914
	COVID	Factor	1.000	1.000	1.000				1.000	1.000	1.000					1.000	1.000	1.000				1.000	1.000	1.000					
	2022	Adjusted	17	1588	99	1704			31	878	10	919			2623	11	28	16	55			102	40	94	236			291	2914
	DHV	Factor	1.159	1.159	1.159				1.159	1.159	1.159					1.159	1.159	1.159				1.159	1.159	1.159					
	2022	No Build	20	1841	115	1975			36	1018	12	1065			3040	13	32	19	64			118	46	109	274			337	3378
	Growth	Factor	0.000	0.009	0.009				0.009	0.009	0.000					0.000	0.000	0.000				0.016	0.000	0.016					
	2024	Adj+Growth+DHV	20	1874	117	2010			37	1036	12	1084			3095	13	32	19	64			122	46	112	281			345	3439
	Opening Year	Round	**20**	**1870**	**120**	**2010**			**40**	**1040**	**10**	**1090**			**3100**	**10**	**30**	**20**	**60**			**120**	**50**	**110**	**280**			**340**	**3440**
	2030	Adj+Growth+DHV	20	1973	123	2116			39	1091	12	1141			3257	13	32	19	64			133	46	123	303			366	3623
	Build Year	Round	**20**	**1970**	**120**	**2110**			**40**	**1090**	**10**	**1140**			**3250**	**10**	**30**	**20**	**60**			**130**	**50**	**120**	**300**			**360**	**3610**
	2044	Adj+Growth+DHV	20	2205	137	2362			43	1219	12	1274			3636	13	32	19	64			160	46	147	354			417	4054
	Design Year	Round	**20**	**2210**	**140**	**2370**			**40**	**1220**	**10**	**1270**			**3640**	**10**	**30**	**20**	**60**			**160**	**50**	**150**	**360**			**420**	**4060**

TMS Engineers, Inc.
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WORKSHEET FOR NO BUILD VEHICULAR TRAFFIC VOLUME CALCULATIONS

S. Walnut St & Ashville Rd + Northrup Dr 030122

			S. Walnut St. (US 23) FROM NORTH						S. Walnut St. (US 23) FROM SOUTH						TOTAL NORTH SOUTH	Ashville Rd. (SR 316) FROM EAST						Northup Ave. 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	2022	Raw	65	740	18	823			52	1163	39	1254			2077	61	42	117	220			116	56	44	216			436	2513
	COVID	Factor	1.000	1.000	1.000				1.000	1.000	1.000					1.000	1.000	1.000				1.000	1.000	1.000					
	2022	Adjusted	65	740	18	823			52	1163	39	1254			2077	61	42	117	220			116	56	44	216			436	2513
	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					
	2022	No Build	75	857	21	953			60	1346	45	1452			2405	71	49	135	255			134	65	51	250			505	2909
	Growth	Factor	0.010	0.010	0.010				0.009	0.009	0.009					0.020	0.020	0.020				0.020	0.020	0.020					
	2024	Adj +Growth+DHV	77	874	21	972			61	1371	46	1478			2450	73	51	141	265			140	67	53	260			525	2975
	Opening Year	Round	80	870	20	970			60	1370	50	1480			2450	70	50	140	260			140	70	50	260			520	2970
	2030	Adj +Growth+DHV	81	925	23	1029			65	1443	48	1556			2585	82	56	157	295			156	75	59	290			586	3171
	Build Year	Round	**80**	**930**	**20**	**1030**			**60**	**1440**	**50**	**1550**			**2580**	**80**	**60**	**160**	**300**			**160**	**80**	**60**	**300**			**600**	**3180**
	2044	Adj +Growth+DHV	92	1045	25	1162			72	1613	54	1739			2902	102	70	195	367			193	93	73	360			727	3628
	Design Year	Round	**90**	**1050**	**30**	**1170**			**70**	**1610**	**50**	**1730**			**2900**	**100**	**70**	**200**	**370**			**190**	**90**	**70**	**350**			**720**	**3620**
PM PEAK	2022	Raw	83	1490	58	1631			48	862	34	944			2575	67	68	60	195			70	78	108	256			451	3026
	COVID	Factor	1.000	1.000	1.000				1.000	1.000	1.000					1.000	1.000	1.000				1.000	1.000	1.000					
	2022	Adjusted	83	1490	58	1631			48	862	34	944			2575	67	68	60	195			70	78	108	256			451	3026
	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					
	2022	No Build	96	1725	67	1888			56	998	39	1093			2981	78	79	69	226			81	90	125	296			522	3503
	Growth	Factor	0.010	0.010	0.010				0.009	0.009	0.009					0.020	0.020	0.020				0.020	0.020	0.020					
	2024	Adj+Growth+DHV	98	1759	68	1926			57	1016	40	1113			3039	81	82	72	235			84	94	130	308			543	3582
	Opening Year	Round	**100**	**1760**	**70**	**1930**			**60**	**1020**	**40**	**1120**			**3050**	**80**	**80**	**70**	**230**			**80**	**90**	**130**	**300**			**530**	**3580**
	2030	Adj+Growth+DHV	104	1863	73	2039			60	1070	42	1172			3211	90	91	81	262			94	105	145	344			606	3817
	Build Year	Round	**100**	**1860**	**70**	**2030**			**60**	**1070**	**40**	**1170**			**3200**	**90**	**90**	**80**	**260**			**90**	**100**	**150**	**340**			**600**	**3800**
	2044	Adj+Growth+DHV	117	2104	82	2304			67	1196	47	1309			3613	112	113	100	325			117	130	180	427			752	4365
	Design Year	Round	**120**	**2100**	**80**	**2300**			**70**	**1200**	**50**	**1320**			**3620**	**110**	**110**	**100**	**320**			**120**	**130**	**180**	**430**			**750**	**4370**

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WORKSHEET FOR NO BUILD VEHICULAR TRAFFIC VOLUME CALCULATIONS

SR 752 & Ashville Pike + Long St 021622

			Ashville Pike FROM NORTH						Long Street (SR 316) FROM SOUTH						TOTAL NORTH SOUTH	SR 752 FROM EAST						SR 752 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	2022	Raw	147	41	62	250			44	116	61	221			471	30	82	57	169			46	164	24	234			403	874
	COVID	Factor	1.000	1.000	1.000				1.000	1.000	1.000					1.000	1.000	1.000				1.000	1.000	1.000					
	2022	Adjusted	147	41	62	250			44	116	61	221			471	30	82	57	169			46	164	24	234			403	874
	DHV	Factor	1.171	1.171	1.171				1.171	1.171	1.171					1.171	1.171	1.171				1.171	1.171	1.171					
	2022	No Build	172	48	73	293			52	136	71	259			551	35	96	67	198			54	192	28	274			472	1023
	Growth	Factor	0.022	0.022	0.022				0.022	0.022	0.022					0.020	0.020	0.020				0.020	0.020	0.020					
	2024	Adj +Growth+DHV	180	50	76	306			54	142	75	270			576	37	100	69	206			56	200	29	285			491	1066
	Opening Year	Round	180	50	80	310			50	140	70	260			570	40	100	70	210			60	200	30	290			500	1070
	2030	Adj +Growth+DHV	202	56	85	344			61	160	84	304			648	41	111	77	229			62	223	33	318			547	1196
	Build Year	Round	**200**	**60**	**90**	**350**			**60**	**160**	**80**	**300**			**650**	**40**	**110**	**80**	**230**			**60**	**220**	**30**	**310**			**540**	**1190**
	2044	Adj +Growth+DHV	255	71	108	434			76	202	106	384			818	51	138	96	285			78	276	40	394			679	1498
	Design Year	Round	**260**	**70**	**110**	**440**			**80**	**200**	**110**	**390**			**830**	**50**	**140**	**100**	**290**			**80**	**280**	**40**	**400**			**690**	**1520**
PM PEAK	2022	Raw	67	186	92	345			38	107	55	200			545	70	122	77	269			72	135	51	258			527	1072
	COVID	Factor	1.000	1.000	1.000				1.000	1.000	1.000					1.000	1.000	1.000				1.000	1.000	1.000					
	2022	Adjusted	67	186	92	345			38	107	55	200			545	70	122	77	269			72	135	51	258			527	1072
	DHV	Factor	1.171	1.171	1.171				1.171	1.171	1.171					1.171	1.171	1.171				1.171	1.171	1.171					
	2022	No Build	78	218	108	404			44	125	64	234			638	82	143	90	315			84	158	60	302			617	1255
	Growth	Factor	0.022	0.022	0.022				0.022	0.022	0.022					0.020	0.020	0.020				0.020	0.020	0.020					
	2024	Adj+Growth+DHV	82	227	112	422			46	131	67	244			666	85	149	94	327			88	164	62	314			642	1308
	Opening Year	Round	**80**	**230**	**110**	**420**			**50**	**130**	**70**	**250**			**670**	**90**	**150**	**90**	**330**			**90**	**160**	**60**	**310**			**640**	**1310**
	2030	Adj+Growth+DHV	92	256	127	475			52	147	76	275			750	95	166	105	365			98	183	69	350			716	1466
	Build Year	Round	**90**	**260**	**130**	**480**			**50**	**150**	**80**	**280**			**760**	**100**	**170**	**100**	**370**			**100**	**180**	**70**	**350**			**720**	**1480**
	2044	Adj+Growth+DHV	116	323	160	599			66	186	96	347			947	118	206	130	453			121	228	86	435			888	1835
	Design Year	Round	**120**	**320**	**160**	**600**			**70**	**190**	**100**	**360**			**960**	**120**	**210**	**130**	**460**			**120**	**230**	**90**	**440**			**900**	**1860**

TMS Engineers, Inc.
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WORKSHEET FOR NO BUILD VEHICULAR TRAFFIC VOLUME CALCULATIONS

W. Main St & Miller Ave + Cromley Rd 030322

			Miller Ave. FROM NORTH						Cromley Rd. (CR 28) FROM SOUTH						TOTAL NORTH SOUTH	W. Main St. (SR 316) FROM EAST						W. Main St. (SR 316) 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	2022	Raw	12	4	5	21			43	1	36	80			101	7	130	8	145			7	104	10	121			266	367
	COVID	Factor	1.000	1.000	1.000				1.000	1.000	1.000					1.000	1.000	1.000				1.000	1.000	1.000					
	2022	Adjusted	12	4	5	21			43	1	36	80			101	7	130	8	145			7	104	10	121			266	367
	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					
	2022	No Build	14	5	6	24			49	1	41	91			115	8	148	9	165			8	118	11	137			302	417
	Growth	Factor	0.000	0.000	0.000				0.000	0.000	0.000					0.000	0.020	0.000				0.000	0.020	0.000					
	2024	Adj +Growth+DHV	14	5	6	24			49	1	41	91			115	8	153	9	170			8	123	11	142			313	427
	Opening Year	Round	10	10	10	30			50	10	40	100			130	10	150	10	170			10	120	10	140			310	440
	2030	Adj +Growth+DHV	14	5	6	24			49	1	41	91			115	8	171	9	188			8	137	11	156			344	459
	Build Year	Round	**10**	**10**	**10**	**30**			**50**	**10**	**40**	**100**			**130**	**10**	**170**	**10**	**190**			**10**	**140**	**10**	**160**			**350**	**480**
	2044	Adj +Growth+DHV	14	5	6	24			49	1	41	91			115	8	212	9	229			8	170	11	189			419	533
	Design Year	Round	**10**	**10**	**10**	**30**			**50**	**10**	**40**	**100**			**130**	**10**	**210**	**10**	**230**			**10**	**170**	**10**	**190**			**420**	**550**
PM PEAK	2022	Raw	29	7	22	58			11	10	32	53			111	39	171	22	232			15	149	28	192			424	535
	COVID	Factor	1.000	1.000	1.000				1.000	1.000	1.000					1.000	1.000	1.000				1.000	1.000	1.000					
	2022	Adjusted	29	7	22	58			11	10	32	53			111	39	171	22	232			15	149	28	192			424	535
	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					
	2022	No Build	33	8	25	66			12	11	36	60			126	44	194	25	263			17	169	32	218			481	607
	Growth	Factor	0.000	0.000	0.000				0.000	0.000	0.000					0.000	0.020	0.000				0.000	0.020	0.000					
	2024	Adj+Growth+DHV	33	8	25	66			12	11	36	60			126	44	202	25	271			17	176	32	225			496	622
	Opening Year	Round	**30**	**10**	**20**	**60**			**10**	**10**	**40**	**60**			**120**	**40**	**200**	**20**	**260**			**20**	**180**	**30**	**230**			**490**	**610**
	2030	Adj+Growth+DHV	33	8	25	66			12	11	36	60			126	44	225	25	294			17	196	32	245			539	665
	Build Year	Round	**30**	**10**	**20**	**60**			**10**	**10**	**40**	**60**			**120**	**40**	**230**	**20**	**290**			**20**	**200**	**30**	**250**			**540**	**660**
	2044	Adj+Growth+DHV	33	8	25	66			12	11	36	60			126	44	279	25	349			17	244	32	292			641	767
	Design Year	Round	**30**	**10**	**20**	**60**			**10**	**10**	**40**	**60**			**120**	**40**	**280**	**20**	**340**			**20**	**240**	**30**	**290**			**630**	**750**

TMS Engineers, Inc.
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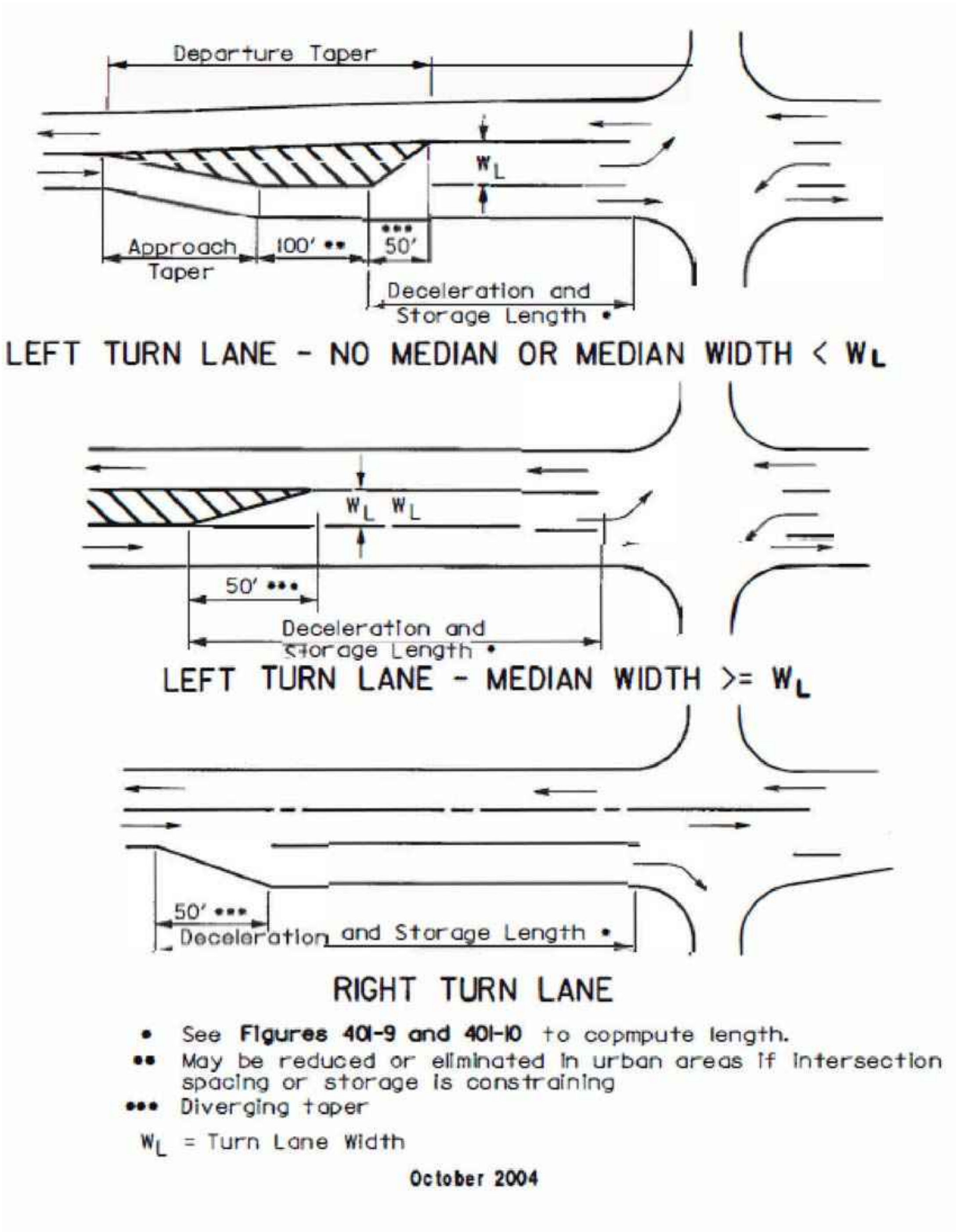
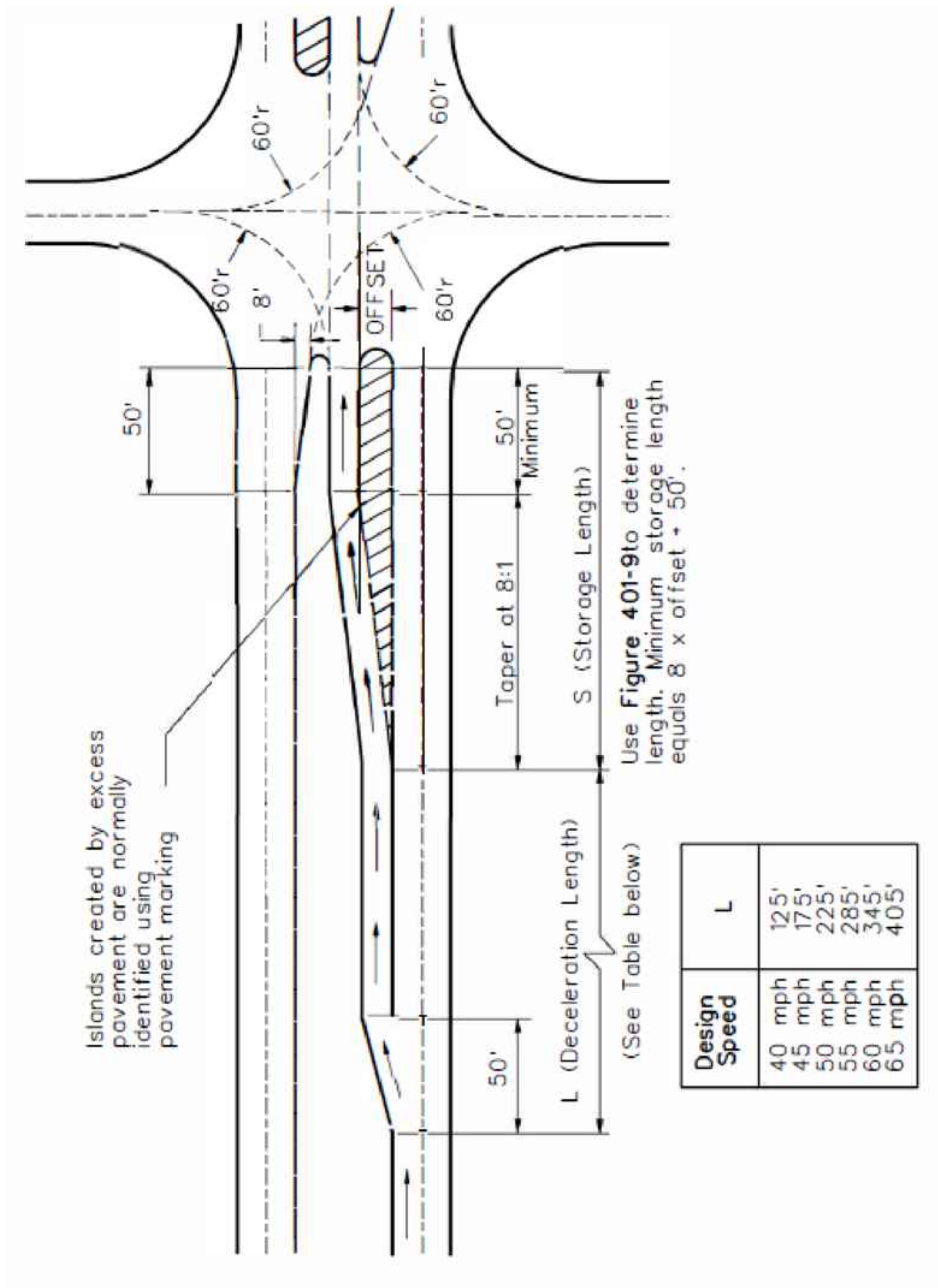
Appendix C
ODOT Turn Lane Design Criteria

TURNING LANE DESIGN	401-7
	REFERENCE SECTION 401.6.1 & 401.6.3



OFFSET LEFT TURN LANE	401-8
	REFERENCE SECTION 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	401-9
	REFERENCE SECTION 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	401-10 REFERENCE SECTION 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

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

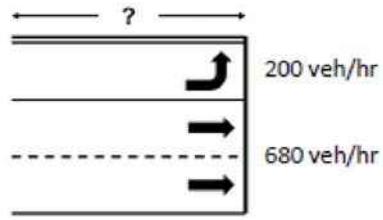
IF CYCLES ARE UNKNOWN ASSUME:

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) = $\frac{\left(200\frac{veh}{hr}\right)}{200\frac{veh}{hr}+680\frac{veh}{hr}}$ = 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).

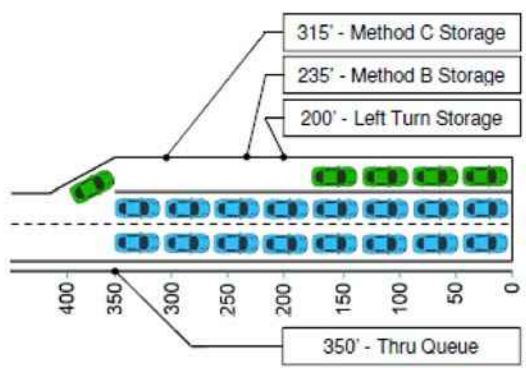
Method C – For 55 mph, 165' + calculated storage length in **Figure 401-10.**

Average Vehicles per Cycle = $\frac{\left(200\frac{veh}{hr}\right)*\left(90\frac{sec}{cyc}\right)}{3600\ sec/hr}$ = 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 = $\frac{\left(340\frac{veh}{hr}\right)*\left(90\frac{sec}{cyc}\right)}{3600\ sec/hr}$ = 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 D
SR 752 & Business Place Traffic Data

VEHICULAR TRAFFIC COUNT SUMMARY

Municipality: Ashville | At Intersection of: OH 752 and North Commerce Street

Date: 8/9/2022 | Day: Tue. | Comments: | Project: 22-029

Weather: Clear | Recorder(s): DJS | Data entry by: JJO | Date entered: Aug. 10, 2022 | OH 752 & N.Commerce St 080922

TIME BEGINS	N.Commerce St. FROM NORTH						N.Commerce St. FROM SOUTH						TOTAL NORTH SOUTH	OH 752 FROM EAST						OH 752 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	0	0	0	0	0	5	0	4	9	2	0	9	10	141	4	155	5	0	8	113	18	139	2	0	294	303	0.000	0.563	0.824	0.869
08:00	0	0	1	1	1	0	4	0	8	12	1	0	13	9	106	2	117	8	0	9	103	8	120	9	0	237	250	0.250	0.600	0.886	0.857
09:00	0	0	2	2	0	0	7	0	14	21	4	0	23	14	96	2	112	4	0	2	77	9	88	9	0	200	223	0.500	0.656	0.848	0.733
10:00																															
11:00	1	0	1	2	0	0	8	0	17	25	4	0	27	14	124	1	139	11	0	1	108	18	127	8	0	266	293	0.250	0.781	0.869	0.814
12:00	1	0	5	6	0	0	10	0	11	21	1	0	27	16	139	4	159	4	0	2	124	15	141	6	0	300	327	0.750	0.656	0.795	0.820
1:00	1	0	0	1	0	0	10	1	15	26	1	0	27	12	136	0	148	6	0	4	123	18	145	10	0	293	320	0.250	0.722	0.685	0.884
2:00																															
3:00	0	1	3	4	1	0	10	1	10	21	1	0	25	11	142	5	158	10	0	0	146	8	154	10	1	312	337	0.500	0.656	0.775	0.856
4:00	3	0	2	5	0	0	13	0	17	30	1	0	35	12	174	1	187	3	0	0	226	6	232	4	0	419	454	0.417	0.682	0.792	0.983
5:00	6	0	10	16	1	0	5	0	15	20	0	0	36	15	177	2	194	5	0	1	261	3	265	4	0	459	495	0.444	0.714	0.735	0.818
6:00																															
7:00																															
8:00																															
9:00																															
TOTALS	12	1	24	37	3	0	72	2	111	185	15	0	222	113	1235	21	1369	56	0	27	1281	103	1411	62	1	2780	3002				
ADT	17	1	33	51	8.1%		99	3	153	256	8.1%		307	156	1709	29	1894	4.1%		37	1772	142	1952	4.5%		3846	4153				

N Leg Hourly Factor:	1.56
S Leg Hourly Factor:	1.56
N Leg Monthly Factor:	0.88
S Leg Monthly Factor:	0.88
E Leg Hourly Factor:	1.56
W leg Hourly Factor:	1.56
E Leg Monthly Factor:	0.88
W Leg Monthly Factor:	0.88
N Leg Combined Factor:	1.38
S Leg Combined Factor:	1.38
E Leg Combined Factor:	1.38
W Leg Combined Factor:	1.38

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 South #7
Twinsburg, Ohio 44087
Transportation Manangement Services

City: Ashville
Intersection: OH 752 & N. Commerce St
Counter: DJS
Day of the Week: Tuesday

File Name : TC OH 752 and N. Commerce St. 080922 DJS
Site Code : 00000000
Start Date : 8/9/2022
Page No : 1

Groups Printed- Cars - Trucks - Buses

	NORTH COMMERCE STREET From North					OH 752 From East					NORTH COMMERCE STREET From South					OH 752 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	0	0	0	0	0	33	2	0	35	0	0	2	0	2	1	26	3	0	30	67
07:15 AM	0	0	0	0	0	0	38	1	0	39	0	0	0	0	0	3	33	0	0	36	75
07:30 AM	0	0	0	0	0	2	41	4	0	47	2	0	1	0	3	3	33	4	0	40	90
07:45 AM	0	0	0	0	0	2	29	3	0	34	2	0	2	0	4	11	21	1	0	33	71
Total	0	0	0	0	0	4	141	10	0	155	4	0	5	0	9	18	113	8	0	139	303
08:00 AM	1	0	0	0	1	0	32	1	0	33	0	0	1	0	1	2	31	2	0	35	70
08:15 AM	0	0	0	0	0	2	21	4	0	27	4	0	1	0	5	2	28	3	0	33	65
08:30 AM	0	0	0	0	0	0	29	1	0	30	3	0	1	0	4	0	20	3	0	23	57
08:45 AM	0	0	0	0	0	0	24	3	0	27	1	0	1	0	2	4	24	1	0	29	58
Total	1	0	0	0	1	2	106	9	0	117	8	0	4	0	12	8	103	9	0	120	250
09:00 AM	1	0	0	0	1	0	22	1	0	23	3	0	1	0	4	0	15	0	0	15	43
09:15 AM	1	0	0	0	1	0	28	3	0	31	0	0	3	0	3	1	21	1	0	23	58
09:30 AM	0	0	0	0	0	1	17	7	1	26	5	0	1	0	6	4	16	0	0	20	52
09:45 AM	0	0	0	0	0	1	29	3	0	33	6	0	2	0	8	4	25	1	0	30	71
Total	2	0	0	0	2	2	96	14	1	113	14	0	7	0	21	9	77	2	0	88	224
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

TMS Engineers, Inc.

2112 Case Parkway South #7
Twinsburg, Ohio 44087
Transportation Manangement Services

File Name : TC OH 752 and N. Commerce St. 080922 DJS
Site Code : 00000000
Start Date : 8/9/2022
Page No : 2

Groups Printed- Cars - Trucks - Buses

	NORTH COMMERCE STREET From North					OH 752 From East					NORTH COMMERCE STREET From South					OH 752 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
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
11:00 AM	0	0	0	0	0	0	22	4	0	26	3	0	2	0	5	3	22	1	0	26	57
11:15 AM	0	0	0	0	0	0	37	1	0	38	6	0	2	0	8	5	25	0	0	30	76
11:30 AM	1	0	1	0	2	1	29	5	0	35	2	0	2	0	4	4	28	0	0	32	73
11:45 AM	0	0	0	0	0	0	36	4	0	40	6	0	2	0	8	6	33	0	0	39	87
Total	1	0	1	0	2	1	124	14	0	139	17	0	8	0	25	18	108	1	0	127	293
12:00 PM	1	0	1	0	2	2	45	3	0	50	3	0	0	0	3	3	40	0	0	43	98
12:15 PM	2	0	0	0	2	1	34	6	0	41	3	0	3	0	6	6	29	1	0	36	85
12:30 PM	2	0	0	0	2	0	40	0	0	40	3	0	5	0	8	5	22	0	0	27	77
12:45 PM	0	0	0	0	0	1	20	7	0	28	2	0	2	0	4	1	33	1	0	35	67
Total	5	0	1	0	6	4	139	16	0	159	11	0	10	0	21	15	124	2	0	141	327
01:00 PM	0	0	0	0	0	0	34	4	0	38	7	0	0	0	7	7	30	2	0	39	84
01:15 PM	0	0	1	0	1	0	24	2	0	26	1	1	2	0	4	2	38	1	0	41	72
01:30 PM	0	0	0	0	0	0	50	4	0	54	5	0	4	0	9	6	32	0	0	38	101
01:45 PM	0	0	0	0	0	0	28	2	0	30	2	0	4	0	6	3	23	1	0	27	63
Total	0	0	1	0	1	0	136	12	0	148	15	1	10	0	26	18	123	4	0	145	320
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 South #7
Twinsburg, Ohio 44087
Transportation Manangement Services

File Name : TC OH 752 and N. Commerce St. 080922 DJS
Site Code : 00000000
Start Date : 8/9/2022
Page No : 3

Groups Printed- Cars - Trucks - Buses

	NORTH COMMERCE STREET From North					OH 752 From East					NORTH COMMERCE STREET From South					OH 752 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	0	0	0	0	1	26	1	0	28	2	0	4	0	6	2	43	0	0	45	79
03:15 PM	0	1	0	0	1	0	29	2	0	31	1	1	1	1	4	2	30	0	0	32	68
03:30 PM	1	0	0	0	1	1	42	5	0	48	4	0	4	0	8	2	41	0	0	43	100
03:45 PM	2	0	0	0	2	3	45	3	0	51	3	0	1	0	4	2	32	0	0	34	91
Total	3	1	0	0	4	5	142	11	0	158	10	1	10	1	22	8	146	0	0	154	338
04:00 PM	0	0	0	0	0	0	31	2	0	33	2	0	3	0	5	2	56	0	0	58	96
04:15 PM	1	0	2	0	3	1	54	4	0	59	6	0	2	0	8	1	56	0	0	57	127
04:30 PM	1	0	1	0	2	0	41	2	0	43	2	0	4	0	6	1	57	0	0	58	109
04:45 PM	0	0	0	0	0	0	48	4	0	52	7	0	4	0	11	2	57	0	0	59	122
Total	2	0	3	0	5	1	174	12	0	187	17	0	13	0	30	6	226	0	0	232	454
05:00 PM	7	0	2	0	9	0	62	4	0	66	5	0	2	0	7	0	56	0	0	56	138
05:15 PM	2	0	1	0	3	1	48	3	0	52	2	0	1	0	3	1	61	1	0	63	121
05:30 PM	1	0	2	0	3	0	38	7	0	45	4	0	2	0	6	1	80	0	0	81	135
05:45 PM	0	0	1	0	1	1	29	1	0	31	4	0	0	0	4	1	64	0	0	65	101
Total	10	0	6	0	16	2	177	15	0	194	15	0	5	0	20	3	261	1	0	265	495
Grand Total	24	1	12	0	37	21	1235	113	1	1370	111	2	72	1	186	103	1281	27	0	1411	3004
Apprch %	64.9	2.7	32.4	0		1.5	90.1	8.2	0.1		59.7	1.1	38.7	0.5		7.3	90.8	1.9	0		
Total %	0.8	0	0.4	0	1.2	0.7	41.1	3.8	0	45.6	3.7	0.1	2.4	0	6.2	3.4	42.6	0.9	0	47	
Cars	22	1	11	0	34	17	1186	110	1	1314	102	2	66	1	171	89	1233	26	0	1348	2867
% Cars	91.7	100	91.7	0	91.9	81	96	97.3	100	95.9	91.9	100	91.7	100	91.9	86.4	96.3	96.3	0	95.5	95.4
Trucks	2	0	1	0	3	4	49	3	0	56	9	0	6	0	15	14	47	1	0	62	136
% Trucks	8.3	0	8.3	0	8.1	19	4	2.7	0	4.1	8.1	0	8.3	0	8.1	13.6	3.7	3.7	0	4.4	4.5
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
% Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0.1	0

TMS Engineers, Inc.
2112 Case Parkway South #7
Twinsburg, Ohio 44087
Transportation Manangement Services

File Name : TC OH 752 and N. Commerce St. 080922 DJS
Site Code : 00000000
Start Date : 8/9/2022

	NORTH COMMERCE STREET From North					OH 752 From East					NORTH COMMERCE STREET From South					OH 752 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 07:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00 AM																					
07:00 AM	0	0	0	0	0	0	33	2	0	35	0	0	**2**	0	2	1	26	3	0	30	67
07:15 AM	0	0	0	0	0	0	38	1	0	39	0	0	0	0	0	3	**33**	0	0	36	75
07:30 AM	0	0	0	0	0	**2**	**41**	**4**	0	**47**	**2**	0	1	0	3	3	33	**4**	0	**40**	**90**
07:45 AM	0	0	0	0	0	2	29	3	0	34	2	0	2	0	**4**	**11**	21	1	0	33	71
Total Volume	0	0	0	0	0	4	141	10	0	155	4	0	5	0	9	18	113	8	0	139	303
% App. Total	0	0	0	0		2.6	91	6.5	0		44.4	0	55.6	0		12.9	81.3	5.8	0		
PHF	.000	.000	.000	.000	.000	.500	.860	.625	.000	.824	.500	.000	.625	.000	.563	.409	.856	.500	.000	.869	.842
Cars	0	0	0	0	0	4	136	10	0	150	4	0	3	0	7	18	111	8	0	137	294
% Cars	0	0	0	0	0	100	96.5	100	0	96.8	100	0	60.0	0	77.8	100	98.2	100	0	98.6	97.0
Trucks	0	0	0	0	0	0	5	0	0	5	0	0	2	0	2	0	2	0	0	2	9
% Trucks	0	0	0	0	0	0	3.5	0	0	3.2	0	0	40.0	0	22.2	0	1.8	0	0	1.4	3.0
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 03:45 PM to 04:30 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 03:45 PM																					
03:45 PM	**2**	0	0	0	2	**3**	45	3	0	51	3	0	1	0	4	**2**	32	0	0	34	91
04:00 PM	0	0	0	0	0	0	31	2	0	33	2	0	3	0	5	2	56	0	0	**58**	96
04:15 PM	1	0	**2**	0	**3**	1	**54**	**4**	0	**59**	**6**	0	2	0	**8**	1	56	0	0	57	**127**
04:30 PM	1	0	1	0	2	0	41	2	0	43	2	0	**4**	0	6	1	**57**	0	0	58	109
Total Volume	4	0	3	0	7	4	171	11	0	186	13	0	10	0	23	6	201	0	0	207	423
% App. Total	57.1	0	42.9	0		2.2	91.9	5.9	0		56.5	0	43.5	0		2.9	97.1	0	0		
PHF	.500	.000	.375	.000	.583	.333	.792	.688	.000	.788	.542	.000	.625	.000	.719	.750	.882	.000	.000	.892	.833
Cars	3	0	3	0	6	3	168	11	0	182	12	0	9	0	21	5	197	0	0	202	411
% Cars	75.0	0	100	0	85.7	75.0	98.2	100	0	97.8	92.3	0	90.0	0	91.3	83.3	98.0	0	0	97.6	97.2
Trucks	1	0	0	0	1	1	3	0	0	4	1	0	1	0	2	1	4	0	0	5	12
% Trucks	25.0	0	0	0	14.3	25.0	1.8	0	0	2.2	7.7	0	10.0	0	8.7	16.7	2.0	0	0	2.4	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

WORKSHEET FOR NO BUILD VEHICULAR TRAFFIC VOLUME CALCULATIONS

OH 752 & N.Commerce St 080922

			N.Commerce St. FROM NORTH						N.Commerce St. FROM SOUTH						TOTAL NORTH SOUTH	OH 752 FROM EAST						OH 752 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	2022	Raw	0	0	0	0			5	0	4	9			9	10	141	4	155			8	113	18	139			294	303
	COVID	Factor	1.000	1.000	1.000				1.000	1.000	1.000					1.000	1.000	1.000				1.000	1.000	1.000					
	2022	Adjusted	0	0	0	0			5	0	4	9			9	10	141	4	155			8	113	18	139			294	303
	DHV	Factor	1.137	1.137	1.137				1.137	1.137	1.137					1.137	1.137	1.137				1.137	1.137	1.137					
	2022	No Build	0	0	0	0			6	0	5	10			10	11	160	5	176			9	128	20	158			334	344
	Growth	Factor	0.000	0.000	0.000				0.000	0.000	0.000					0.000	0.020	0.000				0.000	0.020	0.000					
	2024	Adj +Growth+DHV	0	0	0	0			6	0	5	10			10	11	167	5	183			9	134	20	163			346	356
	Phase 1	Round	0	0	0	0			10	0	10	20			20	10	170	10	190			10	130	20	160			350	370
	2024	Adj +Growth+DHV	0	0	0	0			6	0	5	10			10	11	167	5	183			9	134	20	163			346	356
	Opening Year	Round	**0**	**0**	**0**	**0**			**10**	**0**	**10**	**20**			**20**	**10**	**170**	**10**	**190**			**10**	**130**	**20**	**160**			**350**	**370**
	2044	Adj +Growth+DHV	0	0	0	0			6	0	5	10			10	11	231	5	247			9	185	20	215			461	472
	Design Year	Round	**0**	**0**	**0**	**0**			**10**	**0**	**10**	**20**			**20**	**10**	**230**	**10**	**250**			**10**	**180**	**20**	**210**			**460**	**480**
PM PEAK	2022	Raw	3	0	4	7			10	0	13	23			30	11	171	4	186			0	201	6	207			393	423
	COVID	Factor	1.000	1.000	1.000				1.000	1.000	1.000					1.000	1.000	1.000				1.000	1.000	1.000					
	2022	Adjusted	3	0	4	7			10	0	13	23			30	11	171	4	186			0	201	6	207			393	423
	DHV	Factor	1.137	1.137	1.137				1.137	1.137	1.137					1.137	1.137	1.137				1.137	1.137	1.137					
	2022	No Build	3	0	5	8			11	0	15	26			34	13	194	5	211			0	229	7	235			447	481
	Growth	Factor	0.000	0.000	0.000				0.000	0.000	0.000					0.000	0.020	0.000				0.000	0.020	0.000					
	2024	Adj+Growth+DHV	3	0	5	8			11	0	15	26			34	13	202	5	219			0	238	7	244			464	498
	Phase 1	Round	**10**	**0**	**10**	**20**			**10**	**0**	**10**	**20**			**40**	**10**	**200**	**10**	**220**			**0**	**240**	**10**	**250**			**470**	**510**
	2024	Adj+Growth+DHV	3	0	5	8			11	0	15	26			34	13	202	5	219			0	238	7	244			464	498
	Opening Year	Round	**10**	**0**	**10**	**20**			**10**	**0**	**10**	**20**			**40**	**10**	**200**	**10**	**220**			**0**	**240**	**10**	**250**			**470**	**510**
	2044	Adj+Growth+DHV	3	0	5	8			11	0	15	26			34	13	280	5	297			0	329	7	336			633	667
	Design Year	Round	**10**	**0**	**10**	**20**			**10**	**0**	**10**	**20**			**40**	**10**	**280**	**10**	**300**			**0**	**330**	**10**	**340**			**640**	**680**

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

Appendix E
Trip Generation Calculation Worksheet

DHL SITE GENERATED TRAFFIC CALCULATIONS (10/24/2022)

TOTAL SITE GENERATED TRIPS - ITE #156

BUILDING	SITE	SIZE (Sq Ft)	OPENING YEAR	TOTAL AM TRIPS TOTAL	TOTAL AM TRIPS ENTER* 50%	TOTAL AM TRIPS EXIT* 50%	PM TOTAL TRIPS TOTAL	PM TOTAL TRIPS ENTER* 68%	PM TOTAL TRIPS EXIT* 32%
1	Leatherwood	545,200	2024	529	264	265	515	350	165
	TOTALS:	545,200		529	264	265	515	350	165

VEHICLE & TRUCK GENERATED TRIPS - ITE #156

BUILDING	SITE	SIZE (Sq Ft)	OPENING YEAR	AM VEHICLE TRIPS (Total Trip minus Truck Trips) TOTAL	ENTER	EXIT	AM TRUCK TRIPS TOTAL	ENTER* 50%	EXIT* 50%	PM VEHICLE TRIPS (Total Trip minus Truck Trips) TOTAL	ENTER	EXIT	PM TRUCK TRIPS TOTAL	ENTER* 48%	EXIT* 52%
1	Leatherwood	545,200	2024	458	229	229	71	35	36	467	326	141	48	24	24
	TOTALS:	545,200		458	229	229	71	35	36	467	326	141	48	24	24

* Truck splits not available for Land Use #156. Enter & Exit splits are based on AVERAGE directional distribution for ITE Land Uses 150/154/155

VEHICLE & TRUCK GENERATED TRIPS - PER AVAILABLE DHL DATA

BUILDING	SITE	SIZE (Sq Ft)	OPENING YEAR	AM VEHICLE TRIPS AM TRIPS - 37.52 TRIPS/100,000 SF TOTAL	ENTER* 50%	EXIT* 50%	AM TRUCK TRIPS Per DHL Data TOTAL	ENTER** 50%	EXIT** 50%	PM VEHICLE TRIPS PM TRIPS - 37.52 TRIPS/100,000 SF TOTAL	ENTER* 68%	EXIT* 32%	PM TRUCK TRIPS Per DHL Data TOTAL	ENTER** 48%	EXIT** 52%
1	Leatherwood	545,200	2024	205	102	102	30	15	15	205	139	65	20	10	10
	TOTALS:	545,200		205	102	102	30	15	15	205	139	65	20	10	10

* Enter & Exit splits are based on directional distribution for ITE Land Use 156 - High-Cube Parcel Hub Warehouse

** Truck splits not available for Land Use #156. Enter & Exit splits are based on AVERAGE directional distribution for ITE Land Uses 150/154/155

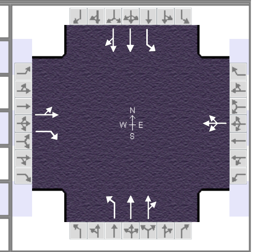
TOTAL SITE GENERATED TRIPS - PER AVAILABLE DHL DATA

BUILDING	SITE	SIZE (Sq Ft)	OPENING YEAR	TOTAL AM TRIPS TOTAL	ENTER	EXIT	PM TOTAL TRIPS TOTAL	ENTER	EXIT
1	Leatherwood	545,200	2024	235	117	117	225	149	75
	TOTALS:	545,200		235	117	117	225	149	75

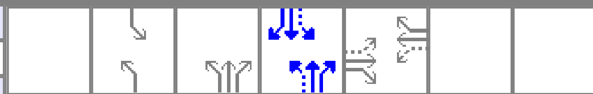
Appendix F
No-Build Capacity Analysis Worksheets - 2024

HCS Signalized Intersection Results Summary

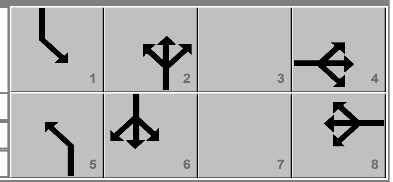
General Information				Intersection Information	
Agency	TMS Engineers, Inc.			Duration, h	0.250
Analyst	ABC	Analysis Date	Aug 9, 2022	Area Type	Other
Jurisdiction	Ashville, OH	Time Period	AM Peak	PHF	0.89
Urban Street	US 23	Analysis Year	2024	Analysis Period	1> 7:00
Intersection	@ SR 752	File Name	1_AM 24NB 23-752.xus		
Project Description	No-Build 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	82	37	63	74	32	61	99	1412	206	95	874	36



Signal Information										
Cycle, s	90.0	Reference Phase	2							
Offset, s	0	Reference Point	End	Green	6.5	0.3	49.7	13.2	0.0	0.0
Uncoordinated	No	Simult. Gap E/W	On	Yellow	4.3	0.0	5.2	3.9	0.0	0.0
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.9	0.0	1.0	3.0	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		20.1		20.1	14.0	56.2	13.7	55.9
Change Period, ($Y+R_c$), s		6.9		6.9	6.5	6.2	7.2	6.2
Max Allow Headway (*MAH*), s		3.2		3.2	3.1	0.0	3.1	0.0
Queue Clearance Time (g_s), s		11.2		12.5	4.3		4.5	
Green Extension Time (g_e), s		0.7		0.7	0.2	0.0	0.2	0.0
Phase Call Probability		1.00		1.00	0.94		0.93	
Max Out Probability		0.00		0.00	0.00		0.00	

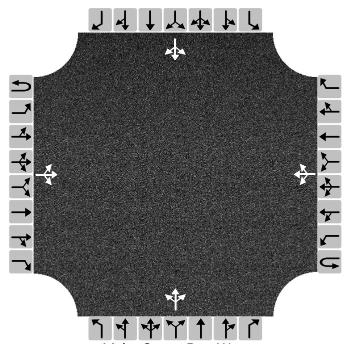
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h		134	71		188		111	914	904	107	515	508
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1285	1585		1545		1668	1752	1675	1570	1648	1625
Queue Service Time (g_s), s		0.0	3.6		1.3		2.3	43.7	46.9	2.5	18.3	18.3
Cycle Queue Clearance Time (g_c), s		9.2	3.6		10.5		2.3	43.7	46.9	2.5	18.3	18.3
Green Ratio (*g/C*)		0.15	0.15		0.15		0.64	0.56	0.56	0.62	0.55	0.55
Capacity (*c*), veh/h		256	233		285		399	973	930	196	910	897
Volume-to-Capacity Ratio (*X*)		0.522	0.304		0.659		0.279	0.940	0.972	0.544	0.566	0.566
Back of Queue (*Q*), ft/ln (95 th percentile)												
Back of Queue (*Q*), veh/ln (95 th percentile)		5.0	2.5		7.1		1.3	27.4	29.5	2.1	11.0	10.8
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00	0.22		0.00		0.08	0.46	0.50	0.28	0.00	0.00
Uniform Delay (d_1), s/veh		36.5	34.3		37.1		8.8	18.6	19.3	20.5	13.1	13.1
Incremental Delay (d_2), s/veh		0.6	0.3		1.0		0.1	17.5	23.5	0.9	2.5	2.6
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		37.1	34.6		38.1		8.9	36.1	42.8	21.4	15.7	15.7
Level of Service (LOS)		D	C		D		A	D	D	C	B	B
Approach Delay, s/veh / LOS	36.2	D		38.1	D		37.7	D		16.2	B	
Intersection Delay, s/veh / LOS	30.6						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS								
Bicycle LOS Score / LOS								

HCS Two-Way Stop-Control Report

General Information		Site Information	
Analyst	ABC	Intersection	SR 752 & Business Place
Agency/Co.	TMS Engineers, Inc.	Jurisdiction	Ashville, OH
Date Performed	8/9/2022	East/West Street	State Route 752
Analysis Year	2024	North/South Street	Business Place North
Time Analyzed	AM Peak	Peak Hour Factor	0.84
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	No-Build Conditions		

Lanes



Major Street: East-West

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	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		10	148	20		10	187	10		10	0	10		0	0	1
Percent Heavy Vehicles (%)		2				3				22	22	22		0	0	0
Proportion Time Blocked																
Percent Grade (%)									0				0			
Right Turn Channelized																
Median Type | Storage	Undivided															

Critical and Follow-up Headways

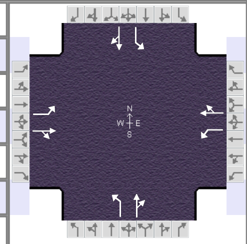
	EB U	EB L	EB T	EB R	WB U	WB L	WB T	WB R	NB U	NB L	NB T	NB R	SB U	SB L	SB T	SB R
Base Critical Headway (sec)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2
Critical Headway (sec)		4.12				4.13				7.32	6.72	6.42		7.10	6.50	6.20
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.22				2.23				3.70	4.20	3.50		3.50	4.00	3.30

Delay, Queue Length, and Level of Service

	EB U	EB L	EB T	EB R	WB U	WB L	WB T	WB R	NB U	NB L	NB T	NB R	SB U	SB L	SB T	SB R
Flow Rate, v (veh/h)		12				12					24				1	
Capacity, c (veh/h)		1333				1366					594				816	
v/c Ratio		0.01				0.01					0.04				0.00	
95% Queue Length, Q_{95} (veh)		0.0				0.0					0.1				0.0	
Control Delay (s/veh)		7.7	0.1	0.1		7.7	0.1	0.1			11.3				9.4	
Level of Service (LOS)		A	A	A		A	A	A			B				A	
Approach Delay (s/veh)	0.5				0.4				11.3				9.4			
Approach LOS	A				A				B				A			

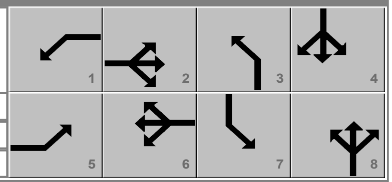
HCS Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	TMS Engineers, Inc.			Duration, h	0.250
Analyst	ABC	Analysis Date	Apr 7, 2022	Area Type	Other
Jurisdiction	Ashville, OH	Time Period	AM Peak	PHF	0.80
Urban Street	SR 752	Analysis Year	2024	Analysis Period	1> 7:00
Intersection	@ SR 316/Ashville Pike	File Name	3_AM 24NB 752-316.xus		
Project Description	No-Build 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	64	214	30	40	110	70	50	145	70	180	50	87

Signal Information										
Cycle, s	71.1	Reference Phase	2							
Offset, s	0	Reference Point	End	Green	5.0	0.3	17.0	5.7	3.3	16.7
Uncoordinated	Yes	Simult. Gap E/W	On	Yellow	4.5	0.0	3.5	3.5	0.0	3.5
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.0	0.0	2.0	2.0	0.0	2.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6	3	8	7	4
Case Number	1.1	4.0	1.1	4.0	1.1	4.0	1.1	4.0
Phase Duration, s	11.9	22.8	11.5	22.5	11.2	22.2	14.5	25.5
Change Period, (*Y+R c*), s	5.5	6.5	6.5	6.5	5.5	6.5	6.5	6.5
Max Allow Headway (*MAH*), s	3.1	3.1	3.1	3.1	3.1	3.2	3.1	3.2
Queue Clearance Time (*g s*), s	4.4	13.4	3.5	10.5	3.8	11.9	8.9	8.0
Green Extension Time (*g e*), s	0.1	0.8	0.0	1.0	0.0	0.5	0.0	0.6
Phase Call Probability	0.79	1.00	0.63	1.00	0.71	1.00	0.99	1.00
Max Out Probability	0.00	0.01	0.10	0.00	0.19	0.00	1.00	0.04

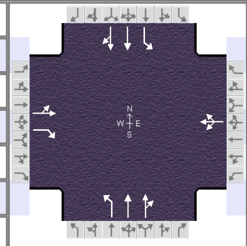
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (*v*), veh/h	80	305		50	225		63	269		225	171	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1725	1772		1711	1679		1781	1767		1767	1665	
Queue Service Time (*g s*), s	2.4	11.4		1.5	8.5		1.8	9.9		6.9	6.0	
Cycle Queue Clearance Time (*g c*), s	2.4	11.4		1.5	8.5		1.8	9.9		6.9	6.0	
Green Ratio (*g/C*)	0.32	0.23		0.30	0.23		0.30	0.22		0.33	0.27	
Capacity (*c*), veh/h	377	407		265	379		431	390		389	445	
Volume-to-Capacity Ratio (*X*)	0.212	0.749		0.188	0.594		0.145	0.689		0.579	0.385	
Back of Queue (*Q*), ft/ln (95 th percentile)												
Back of Queue (*Q*), veh/ln (95 th percentile)	1.6	8.1		1.0	5.8		1.3	7.2		4.9	4.0	
Queue Storage Ratio (*RQ*) (95 th percentile)	0.21	0.00		0.13	0.00		0.23	0.00		1.05	0.00	
Uniform Delay (*d 1*), s/veh	18.0	25.5		19.4	24.6		18.2	25.5		19.0	21.3	
Incremental Delay (*d 2*), s/veh	0.1	1.3		0.1	0.6		0.1	0.8		1.4	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	18.1	26.8		19.5	25.2		18.2	26.3		20.4	21.5	
Level of Service (LOS)	B	C		B	C		B	C		C	C	
Approach Delay, s/veh / LOS	25.0	C		24.2	C		24.8	C		20.9	C	
Intersection Delay, s/veh / LOS	23.6						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS								
Bicycle LOS Score / LOS								

 HCS™ Streets Version 2022 Generated: 8/24/2022 12:16:37 PM

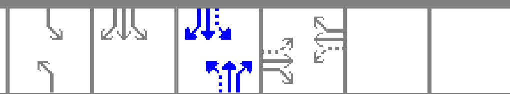
HCS Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	TMS Engineers, Inc.			Duration, h	0.250
Analyst	ABC	Analysis Date	Aug 9, 2022	Area Type	Other
Jurisdiction	Ashville, OH	Time Period	PM Peak	PHF	0.98
Urban Street	US 23	Analysis Year	2024	Analysis Period	1> 7:00
Intersection	@ SR 752	File Name	4_PM 24NB 23-752.xus		
Project Description	No-Build Conditions				

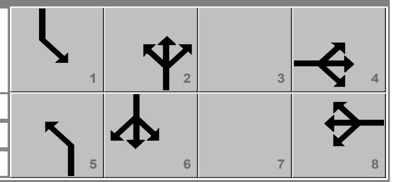


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	45	55	81	160	33	65	74	965	149	93	1582	55

Signal Information			
Cycle, s	90.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	6.8	0.3	44.7	18.7	0.0	0.0
Yellow	3.5	0.0	5.2	3.9	0.0	0.0
Red	3.0	0.0	1.0	3.0	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		25.6		25.6	13.3	50.9	13.5	51.1
Change Period, ($Y+R_c$), s		6.9		6.9	6.5	6.2	7.2	6.2
Max Allow Headway (*MAH*), s		3.2		3.2	3.1	0.0	3.1	0.0
Queue Clearance Time (g_s), s		6.6		17.8	3.9		4.4	
Green Extension Time (g_e), s		0.9		0.9	0.1	0.0	0.1	0.0
Phase Call Probability		1.00		1.00	0.85		0.91	
Max Out Probability		0.00		0.00	0.00		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		102	83		263		76	582	555	95	838	833
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1550	1585		1449		1626	1707	1627	1668	1752	1731
Queue Service Time (g_s), s		0.0	3.9		11.2		1.9	23.4	23.5	2.4	41.3	41.8
Cycle Queue Clearance Time (g_c), s		4.6	3.9		15.8		1.9	23.4	23.5	2.4	41.3	41.8
Green Ratio (*g/C*)		0.21	0.21		0.21		0.57	0.50	0.50	0.57	0.50	0.50
Capacity (*c*), veh/h		380	329		365		206	848	808	307	875	864
Volume-to-Capacity Ratio (*X*)		0.269	0.251		0.720		0.366	0.686	0.687	0.309	0.958	0.964
Back of Queue (*Q*), ft/ln (95 th percentile)												
Back of Queue (*Q*), veh/ln (95 th percentile)		3.3	2.6		9.3		1.3	14.5	14.0	1.4	27.8	28.1
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00	0.24		0.00		0.08	0.25	0.24	0.17	0.00	0.00
Uniform Delay (d_1), s/veh		30.0	29.8		34.4		19.7	17.3	17.3	12.8	21.6	21.7
Incremental Delay (d_2), s/veh		0.1	0.1		1.0		0.4	4.5	4.7	0.2	21.7	23.0
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		30.1	30.0		35.4		20.1	21.8	22.1	13.0	43.4	44.7
Level of Service (LOS)		C	C		D		C	C	C	B	D	D
Approach Delay, s/veh / LOS	30.0	C		35.4	D		21.8	C		42.4	D	
Intersection Delay, s/veh / LOS	33.9						C					

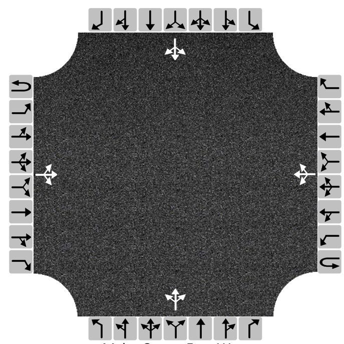
Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS								
Bicycle LOS Score / LOS								

 HCS™ Streets Version 2022 Generated: 8/24/2022 11:44:18 AM

HCS Two-Way Stop-Control Report

General Information		Site Information	
Analyst	ABC	Intersection	SR 752 & Business Place
Agency/Co.	TMS Engineers, Inc.	Jurisdiction	Ashville, OH
Date Performed	8/9/2022	East/West Street	State Route 752
Analysis Year	2024	North/South Street	Business Place North
Time Analyzed	PM Peak	Peak Hour Factor	0.83
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	No-Build Conditions		

Lanes



Major Street: East-West

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	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		0	258	10		10	218	10		10	0	10		10	0	10
Percent Heavy Vehicles (%)		2				2				9	9	9		14	14	14
Proportion Time Blocked																
Percent Grade (%)									0				0			
Right Turn Channelized																
Median Type | Storage	Undivided															

Critical and Follow-up Headways

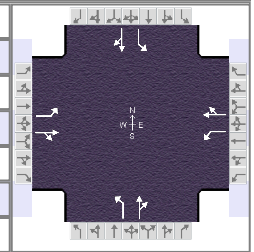
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Base Critical Headway (sec)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2
Critical Headway (sec)		4.12				4.12				7.19	6.59	6.29		7.24	6.64	6.34
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.22				2.22				3.58	4.08	3.38		3.63	4.13	3.43

Delay, Queue Length, and Level of Service

	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Flow Rate, v (veh/h)		0				12					24				24	
Capacity, c (veh/h)		1288				1237					502				505	
v/c Ratio		0.00				0.01					0.05				0.05	
95% Queue Length, Q_{95} (veh)		0.0				0.0					0.2				0.2	
Control Delay (s/veh)		7.8	0.0	0.0		7.9	0.1	0.1			12.5				12.5	
Level of Service (LOS)		A	A	A		A	A	A			B				B	
Approach Delay (s/veh)	0.0				0.4				12.5				12.5			
Approach LOS	A				A				B				B			

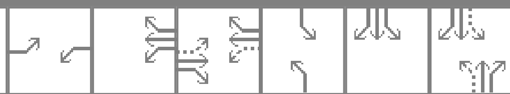
HCS Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	TMS Engineers, Inc.			Duration, h	0.250
Analyst	ABC	Analysis Date	Aug 9, 2022	Area Type	Other
Jurisdiction	Ashville, OH	Time Period	PM Peak	PHF	0.88
Urban Street	SR 752	Analysis Year	2024	Analysis Period	1> 7:00
Intersection	@ SR 316/Ashville Pike	File Name	6_PM 24NB 752-316.xus		
Project Description	No-Build Conditions				

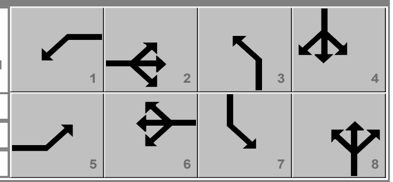


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	96	172	60	90	160	90	50	135	70	80	235	118

Signal Information			
Cycle, s	73.0	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	7.2	0.9	16.0	5.5	2.3	18.2
Yellow	3.5	0.0	4.5	3.5	0.0	3.5
Red	2.0	0.0	2.0	2.0	0.0	2.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6	3	8	7	4
Case Number	1.1	4.0	1.1	4.0	1.1	4.0	1.1	4.0
Phase Duration, s	12.7	22.5	13.5	23.4	11.0	23.7	13.3	26.0
Change Period, (*Y+R* $_c$), s	5.5	6.5	6.5	6.5	5.5	6.5	6.5	6.5
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	5.4	12.4	5.1	13.1	3.7	10.7	4.7	18.1
Green Extension Time (g_e), s	0.2	0.9	0.0	1.1	0.0	0.8	0.2	1.2
Phase Call Probability	0.89	1.00	0.88	1.00	0.69	1.00	0.84	1.00
Max Out Probability	0.00	0.03	1.00	0.00	0.15	0.21	0.00	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	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (*v*), veh/h	109	264		102	284		57	233		91	401	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1711	1716		1753	1729		1753	1734		1753	1736	
Queue Service Time (g_s), s	3.4	10.4		3.1	11.1		1.7	8.7		2.7	16.1	
Cycle Queue Clearance Time (g_c), s	3.4	10.4		3.1	11.1		1.7	8.7		2.7	16.1	
Green Ratio (*g/C*)	0.32	0.22		0.32	0.23		0.31	0.24		0.33	0.27	
Capacity (*c*), veh/h	321	376		350	400		253	410		400	464	
Volume-to-Capacity Ratio (*X*)	0.339	0.701		0.292	0.711		0.225	0.568		0.227	0.865	
Back of Queue (*Q*), ft/ln (95 th percentile)												
Back of Queue (*Q*), veh/ln (95 th percentile)	2.3	7.4		2.1	7.8		1.2	6.3		1.8	10.6	
Queue Storage Ratio (*RQ*) (95 th percentile)	0.30	0.00		0.28	0.00		0.22	0.00		0.39	0.00	
Uniform Delay (d_1), s/veh	19.4	26.4		19.1	25.9		19.7	24.7		17.9	25.6	
Incremental Delay (d_2), s/veh	0.2	1.1		0.2	0.9		0.2	1.2		0.1	1.9	
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	19.6	27.5		19.2	26.8		19.9	25.8		18.0	27.5	
Level of Service (LOS)	B	C		B	C		B	C		B	C	
Approach Delay, s/veh / LOS	25.2	C		24.8	C		24.7	C		25.8	C	
Intersection Delay, s/veh / LOS	25.2						C					

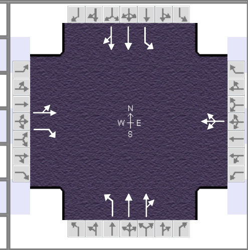
Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS								
Bicycle LOS Score / LOS								

 HCS™ Streets Version 2022 Generated: 8/24/2022 12:16:38 PM

Appendix G
Build Capacity Analysis Worksheets - 2024

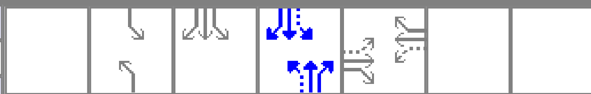
HCS Signalized Intersection Results Summary

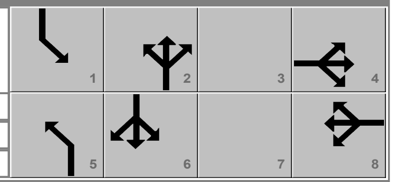
General Information				Intersection Information	
Agency	TMS Engineers, Inc.			Duration, h	0.250
Analyst	ABC	Analysis Date	Aug 9, 2022	Area Type	Other
Jurisdiction	Ashville, OH	Time Period	AM Peak	PHF	0.89
Urban Street	US 23	Analysis Year	2024	Analysis Period	1> 7:00
Intersection	@ SR 752	File Name	1_AM 24 23-752.xus		
Project Description	Build 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	82	37	63	121	32	91	99	1412	253	125	874	36

Signal Information									
Cycle, s	110.0	Reference Phase	2						
Offset, s	0	Reference Point	End	Green	7.7	0.2	59.9	22.6	0.0	0.0
Uncoordinated	No	Simult. Gap E/W	On	Yellow	3.5	0.0	5.2	3.9	0.0	0.0
Force Mode	Fixed	Simult. Gap N/S	On	Red	3.0	0.0	1.0	3.0	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		29.5		29.5	14.2	66.1	14.4	66.3
Change Period, ($Y+R_c$), s		6.9		6.9	6.5	6.2	7.2	6.2
Max Allow Headway (*MAH*), s		3.2		3.2	3.1	0.0	3.1	0.0
Queue Clearance Time (g_s), s		13.1		21.7	5.0		7.1	
Green Extension Time (g_e), s		1.0		0.9	0.2	0.0	0.2	0.0
Phase Call Probability		1.00		1.00	0.97		0.99	
Max Out Probability		0.00		0.00	0.00		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		134	71		274		111	939	932	140	515	508
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1190	1585		1485		1668	1752	1661	1570	1648	1625
Queue Service Time (g_s), s		0.0	4.1		8.6		3.0	57.9	59.9	5.1	22.7	22.7
Cycle Queue Clearance Time (g_c), s		11.1	4.1		19.7		3.0	57.9	59.9	5.1	22.7	22.7
Green Ratio (*g/C*)		0.21	0.21		0.21		0.61	0.54	0.54	0.61	0.55	0.55
Capacity (*c*), veh/h		300	326		354		349	954	904	168	900	887
Volume-to-Capacity Ratio (*X*)		0.446	0.217		0.774		0.319	0.985	1.030	0.835	0.572	0.572
Back of Queue (*Q*), ft/ln (95 th percentile)												
Back of Queue (*Q*), veh/ln (95 th percentile)		5.8	2.8		11.6		1.9	37.5	41.2	3.8	13.6	13.4
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00	0.26		0.00		0.11	0.63	0.69	0.49	0.00	0.00
Uniform Delay (d_1), s/veh		38.9	36.3		42.4		12.2	24.6	25.1	29.2	16.5	16.5
Incremental Delay (d_2), s/veh		0.4	0.1		1.4		0.2	25.7	38.0	4.1	2.6	2.7
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		39.3	36.5		43.8		12.4	50.3	63.0	33.3	19.1	19.2
Level of Service (LOS)		D	D		D		B	D	F	C	B	B
Approach Delay, s/veh / LOS	38.3		D	43.8		D	54.2		D	20.9		C
Intersection Delay, s/veh / LOS	41.8						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS								
Bicycle LOS Score / LOS								

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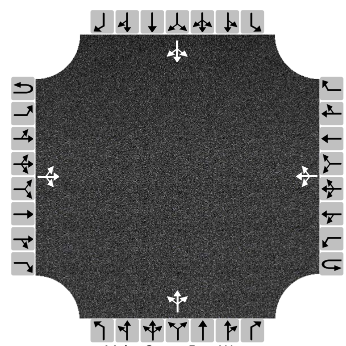
HCS Two-Way Stop-Control Report

General Information		Site Information	
Analyst	ABC	Intersection	SR 752 & Business Place
Agency/Co.	TMS Engineers, Inc.	Jurisdiction	Ashville, OH
Date Performed	8/9/2022	East/West Street	State Route 752
Analysis Year	2024	North/South Street	Business Place North
Time Analyzed	AM Peak	Peak Hour Factor	0.84
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	Build Conditions		

Lanes



Major Street: East-West

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	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		10	168	35		41	197	10		41	0	30		0	0	1
Percent Heavy Vehicles (%)		2				3				22	22	22		0	0	0
Proportion Time Blocked																
Percent Grade (%)									0				0			
Right Turn Channelized																
Median Type | Storage	Undivided															

Critical and Follow-up Headways

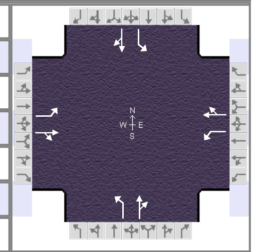
	EB U	EB L	EB T	EB R	WB U	WB L	WB T	WB R	NB U	NB L	NB T	NB R	SB U	SB L	SB T	SB R
Base Critical Headway (sec)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2
Critical Headway (sec)		4.12				4.13				7.32	6.72	6.42		7.10	6.50	6.20
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.22				2.23				3.70	4.20	3.50		3.50	4.00	3.30

Delay, Queue Length, and Level of Service

	EB U	EB L	EB T	EB R	WB U	WB L	WB T	WB R	NB U	NB L	NB T	NB R	SB U	SB L	SB T	SB R
Flow Rate, v (veh/h)		12				49					85				1	
Capacity, c (veh/h)		1320				1319					481				803	
v/c Ratio		0.01				0.04					0.18				0.00	
95% Queue Length, Q_{95} (veh)		0.0				0.1					0.6				0.0	
Control Delay (s/veh)		7.8	0.1	0.1		7.8	0.3	0.3			14.1				9.5	
Level of Service (LOS)		A	A	A		A	A	A			B				A	
Approach Delay (s/veh)	0.4				1.6				14.1				9.5			
Approach LOS	A				A				B				A			

HCS Signalized Intersection Results Summary

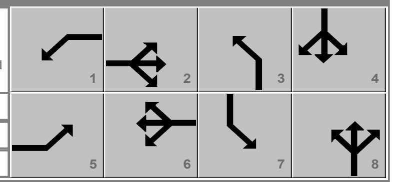
General Information				Intersection Information	
Agency	TMS Engineers, Inc.			Duration, h	0.250
Analyst	ABC	Analysis Date	Apr 7, 2022	Area Type	Other
Jurisdiction	Ashville, OH	Time Period	AM Peak	PHF	0.80
Urban Street	SR 752	Analysis Year	2024	Analysis Period	1> 7:00
Intersection	@ SR 316/Ashville Pike	File Name	3_AM 24 752-316.xus		
Project Description	Build 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	74	234	40	40	131	70	60	145	70	180	50	97

Signal Information			
Cycle, s	71.5	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	5.1	0.7	17.1	6.2	2.8	16.7
Yellow	4.5	0.0	3.5	3.5	0.0	3.5
Red	2.0	0.0	2.0	2.0	0.0	2.0



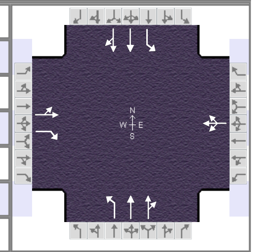
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6	3	8	7	4
Case Number	1.1	4.0	1.1	4.0	1.1	4.0	1.1	4.0
Phase Duration, s	12.3	23.2	11.6	22.6	11.7	22.2	14.5	24.9
Change Period, ($Y+R_c$), s	5.5	6.5	6.5	6.5	5.5	6.5	6.5	6.5
Max Allow Headway (*MAH*), s	3.1	3.1	3.1	3.1	3.1	3.2	3.1	3.2
Queue Clearance Time (g_s), s	4.8	15.2	3.5	11.7	4.2	12.0	9.0	8.6
Green Extension Time (g_e), s	0.2	1.0	0.0	1.1	0.1	0.5	0.0	0.7
Phase Call Probability	0.84	1.00	0.63	1.00	0.77	1.00	0.99	1.00
Max Out Probability	0.00	0.01	0.10	0.00	0.00	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	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (*v*), veh/h	93	343		50	251		75	269		225	184	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1725	1765		1711	1690		1781	1767		1767	1659	
Queue Service Time (g_s), s	2.8	13.2		1.5	9.7		2.2	10.0		7.0	6.6	
Cycle Queue Clearance Time (g_c), s	2.8	13.2		1.5	9.7		2.2	10.0		7.0	6.6	
Green Ratio (*g/C*)	0.32	0.23		0.30	0.22		0.31	0.22		0.33	0.26	
Capacity (*c*), veh/h	367	413		245	380		419	387		384	427	
Volume-to-Capacity Ratio (*X*)	0.252	0.828		0.204	0.660		0.179	0.694		0.586	0.430	
Back of Queue (*Q*), ft/ln (95 th percentile)												
Back of Queue (*Q*), veh/ln (95 th percentile)	1.9	9.1		1.0	6.7		1.5	7.3		5.0	4.4	
Queue Storage Ratio (*RQ*) (95 th percentile)	0.24	0.00		0.13	0.00		0.27	0.00		1.07	0.00	
Uniform Delay (d_1), s/veh	18.2	26.0		19.8	25.2		18.2	25.7		19.3	22.2	
Incremental Delay (d_2), s/veh	0.1	1.7		0.2	0.7		0.1	0.8		1.6	0.3	
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	18.3	27.7		19.9	26.0		18.3	26.6		20.8	22.4	
Level of Service (LOS)	B	C		B	C		B	C		C	C	
Approach Delay, s/veh / LOS	25.7		C	25.0		C	24.8		C	21.6		C
Intersection Delay, s/veh / LOS	24.2						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS								
Bicycle LOS Score / LOS								

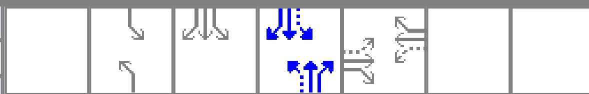
HCS Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	TMS Engineers, Inc.			Duration, h	0.250
Analyst	ABC	Analysis Date	Aug 9, 2022	Area Type	Other
Jurisdiction	Ashville, OH	Time Period	PM Peak	PHF	0.98
Urban Street	US 23	Analysis Year	2024	Analysis Period	1> 7:00
Intersection	@ SR 752	File Name	4_PM 24 23-752.xus		
Project Description	Build Conditions				

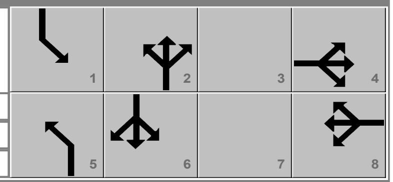


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	45	55	81	184	33	84	74	965	194	127	1582	55

Signal Information			
Cycle, s	100.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	7.0	0.5	49.3	23.5	0.0	0.0
Yellow	3.5	0.0	5.2	3.9	0.0	0.0
Red	3.0	0.0	1.0	3.0	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		30.4		30.4	13.5	55.5	14.0	56.0
Change Period, ($Y+R_c$), s		6.9		6.9	6.5	6.2	7.2	6.2
Max Allow Headway (*MAH*), s		3.2		3.2	3.1	0.0	3.1	0.0
Queue Clearance Time (g_s), s		7.0		22.6	4.1		5.7	
Green Extension Time (g_e), s		1.0		0.9	0.1	0.0	0.2	0.0
Phase Call Probability		1.00		1.00	0.88		0.97	
Max Out Probability		0.00		0.00	0.00		0.00	

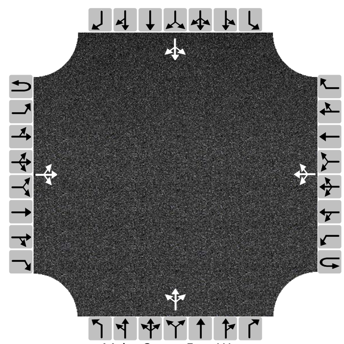
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h		102	83		307		76	608	574	130	838	833
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1514	1585		1443		1626	1707	1608	1668	1752	1731
Queue Service Time (g_s), s		0.0	4.2		15.6		2.1	28.0	28.2	3.7	46.0	46.5
Cycle Queue Clearance Time (g_c), s		5.0	4.2		20.6		2.1	28.0	28.2	3.7	46.0	46.5
Green Ratio (*g/C*)		0.24	0.24		0.24		0.56	0.49	0.49	0.56	0.50	0.50
Capacity (*c*), veh/h		409	373		398		190	842	793	280	873	863
Volume-to-Capacity Ratio (*X*)		0.250	0.221		0.772		0.398	0.722	0.724	0.464	0.960	0.965
Back of Queue (*Q*), ft/ln (95 th percentile)												
Back of Queue (*Q*), veh/ln (95 th percentile)		3.6	2.9		11.6		1.5	17.2	16.5	2.3	30.6	30.8
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00	0.26		0.00		0.09	0.30	0.28	0.29	0.00	0.00
Uniform Delay (d_1), s/veh		31.0	30.8		37.0		22.1	19.9	20.0	16.0	24.1	24.3
Incremental Delay (d_2), s/veh		0.1	0.1		1.7		0.5	5.3	5.7	0.4	22.1	23.3
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		31.1	30.9		38.8		22.6	25.3	25.7	16.5	46.2	47.6
Level of Service (LOS)		C	C		D		C	C	C	B	D	D
Approach Delay, s/veh / LOS	31.0		C	38.8		D	25.3		C	44.7		D
Intersection Delay, s/veh / LOS	36.6						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS								
Bicycle LOS Score / LOS								

HCS Two-Way Stop-Control Report

General Information		Site Information	
Analyst	ABC	Intersection	SR 752 & Business Place
Agency/Co.	TMS Engineers, Inc.	Jurisdiction	Ashville, OH
Date Performed	8/9/2022	East/West Street	State Route 752
Analysis Year	2024	North/South Street	Business Place North
Time Analyzed	PM Peak	Peak Hour Factor	0.83
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	Build Conditions		

Lanes



Major Street: East-West

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	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		0	274	27		63	235	10		26	0	27		10	0	10
Percent Heavy Vehicles (%)		2				2				9	9	9		14	14	14
Proportion Time Blocked																
Percent Grade (%)									0				0			
Right Turn Channelized																
Median Type | Storage	Undivided															

Critical and Follow-up Headways

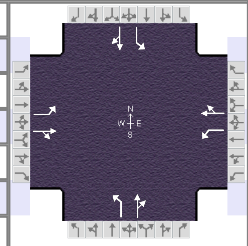
	EB U	EB L	EB T	EB R	WB U	WB L	WB T	WB R	NB U	NB L	NB T	NB R	SB U	SB L	SB T	SB R
Base Critical Headway (sec)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2
Critical Headway (sec)		4.12				4.12				7.19	6.59	6.29		7.24	6.64	6.34
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.22				2.22				3.58	4.08	3.38		3.63	4.13	3.43

Delay, Queue Length, and Level of Service

	EB U	EB L	EB T	EB R	WB U	WB L	WB T	WB R	NB U	NB L	NB T	NB R	SB U	SB L	SB T	SB R
Flow Rate, v (veh/h)		0				76					64				24	
Capacity, c (veh/h)		1266				1196					396				389	
v/c Ratio		0.00				0.06					0.16				0.06	
95% Queue Length, Q_{95} (veh)		0.0				0.2					0.6				0.2	
Control Delay (s/veh)		7.8	0.0	0.0		8.2	0.6	0.6			15.8				14.9	
Level of Service (LOS)		A	A	A		A	A	A			C				B	
Approach Delay (s/veh)	0.0				2.2				15.8				14.9			
Approach LOS	A				A				C				B			

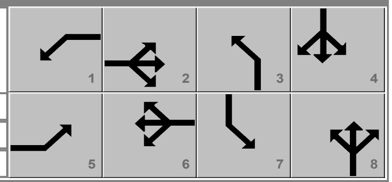
HCS Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	TMS Engineers, Inc.			Duration, h	0.250
Analyst	ABC	Analysis Date	Aug 9, 2022	Area Type	Other
Jurisdiction	Ashville, OH	Time Period	PM Peak	PHF	0.88
Urban Street	SR 752	Analysis Year	2024	Analysis Period	1> 7:00
Intersection	@ SR 316/Ashville Pike	File Name	6_PM 24 752-316.xus		
Project Description	Build 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	109	185	67	90	188	90	64	135	70	80	235	146

Signal Information										
Cycle, s	75.4	Reference Phase	2							
Offset, s	0	Reference Point	End	Green	7.4	0.7	16.0	6.3	1.6	20.6
Uncoordinated	Yes	Simult. Gap E/W	On	Yellow	3.5	0.0	4.5	3.5	0.0	3.5
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.0	0.0	2.0	2.0	0.0	2.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6	3	8	7	4
Case Number	1.1	4.0	1.1	4.0	1.1	4.0	1.1	4.0
Phase Duration, s	12.9	22.5	13.6	23.2	11.8	26.1	13.3	27.6
Change Period, ($Y+R_c$), s	5.5	6.5	6.5	6.5	5.5	6.5	6.5	6.5
Max Allow Headway (*MAH*), s	3.1	3.1	3.1	3.1	3.1	3.2	3.1	3.2
Queue Clearance Time (g_s), s	6.1	13.9	5.2	15.0	4.1	10.7	4.7	20.2
Green Extension Time (g_e), s	0.0	1.0	0.0	1.0	0.0	0.8	0.0	0.9
Phase Call Probability	0.93	1.00	0.88	1.00	0.78	1.00	0.85	1.00
Max Out Probability	1.00	0.02	1.00	0.01	0.34	0.36	0.76	0.00

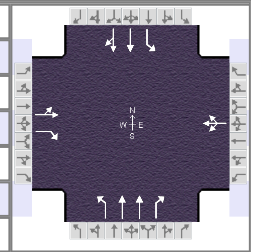
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (*v*), veh/h	124	286		102	316		73	233		91	433	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1711	1714		1753	1739		1753	1734		1753	1722	
Queue Service Time (g_s), s	4.1	11.9		3.2	13.0		2.1	8.7		2.7	18.2	
Cycle Queue Clearance Time (g_c), s	4.1	11.9		3.2	13.0		2.1	8.7		2.7	18.2	
Green Ratio (*g/C*)	0.31	0.21		0.31	0.22		0.34	0.26		0.35	0.28	
Capacity (*c*), veh/h	285	364		318	384		252	450		417	482	
Volume-to-Capacity Ratio (*X*)	0.434	0.788		0.322	0.822		0.289	0.518		0.218	0.898	
Back of Queue (*Q*), ft/ln (95 th percentile)												
Back of Queue (*Q*), veh/ln (95 th percentile)	2.8	8.3		2.3	9.1		1.5	6.1		1.8	11.7	
Queue Storage Ratio (*RQ*) (95 th percentile)	0.37	0.00		0.29	0.00		0.27	0.00		0.39	0.00	
Uniform Delay (d_1), s/veh	20.9	28.1		20.4	28.0		19.5	23.9		17.4	26.1	
Incremental Delay (d_2), s/veh	0.4	1.6		0.2	2.0		0.2	0.5		0.1	2.5	
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	21.3	29.7		20.6	30.0		19.7	24.4		17.5	28.6	
Level of Service (LOS)	C	C		C	C		B	C		B	C	
Approach Delay, s/veh / LOS	27.2	C		27.7	C		23.3	C		26.7	C	
Intersection Delay, s/veh / LOS	26.4						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS								
Bicycle LOS Score / LOS								

Appendix H
Build Capacity Analysis Worksheets - 2024 w/ Improvements

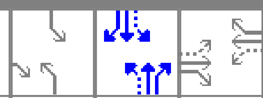
HCS Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	TMS Engineers, Inc.			Duration, h	0.250
Analyst	ABC	Analysis Date	Aug 9, 2022	Area Type	Other
Jurisdiction	Ashville, OH	Time Period	AM Peak	PHF	0.89
Urban Street	US 23	Analysis Year	2024	Analysis Period	1> 7:00
Intersection	@ SR 752	File Name	1_AM 24 23-752 - IMP.xus		
Project Description	BC - NB RTL & EBR Overlap				

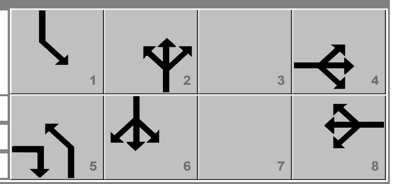


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	82	37	63	121	32	91	99	1412	253	125	874	36

Signal Information			
Cycle, s	90.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	6.8	44.1	18.8	0.0	0.0	0.0
Yellow	4.3	5.2	3.9	0.0	0.0	0.0
Red	2.9	1.0	3.0	0.0	0.0	0.0



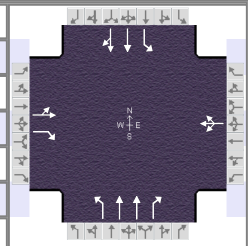
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2	1	6
Case Number		7.0		8.0	1.1	3.0	1.1	4.0
Phase Duration, s		25.7		25.7	14.0	50.3	14.0	50.3
Change Period, (*Y+R* $_c$), s		6.9		6.9	6.5	6.2	7.2	6.2
Max Allow Headway (*MAH*), s		3.2		3.2	3.1	0.0	3.1	0.0
Queue Clearance Time (g_s), s		10.7		17.9	4.7		5.8	
Green Extension Time (g_e), s		1.0		1.0	0.2	0.0	0.2	0.0
Phase Call Probability		1.00		1.00	0.94		0.97	
Max Out Probability		0.00		0.00	0.00		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		134	71		274		111	1587	284	140	515	508
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1227	1585		1494		1668	1668	1610	1570	1648	1625
Queue Service Time (g_s), s		0.0	3.0		7.2		2.7	41.7	9.8	3.8	20.9	20.9
Cycle Queue Clearance Time (g_c), s		8.7	3.0		15.9		2.7	41.7	9.8	3.8	20.9	20.9
Green Ratio (*g/C*)		0.21	0.29		0.21		0.57	0.49	0.49	0.56	0.49	0.49
Capacity (*c*), veh/h		324	464		373		352	1633	788	200	807	795
Volume-to-Capacity Ratio (*X*)		0.412	0.153		0.736		0.316	0.971	0.361	0.703	0.638	0.638
Back of Queue (*Q*), ft/ln (95 th percentile)												
Back of Queue (*Q*), veh/ln (95 th percentile)		4.5	2.0		9.6		1.6	25.4	6.5	2.5	12.8	12.6
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00	0.18		0.00		0.10	0.43	0.00	0.32	0.00	0.00
Uniform Delay (d_1), s/veh		31.4	23.6		34.3		11.9	22.4	14.2	20.1	17.1	17.1
Incremental Delay (d_2), s/veh		0.3	0.1		1.1		0.2	16.5	1.3	1.7	3.8	3.9
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		31.7	23.6		35.3		12.1	38.8	15.5	21.8	20.9	21.0
Level of Service (LOS)		C	C		D		B	D	B	C	C	C
Approach Delay, s/veh / LOS	28.9		C	35.3		D	34.0		C	21.0		C
Intersection Delay, s/veh / LOS	29.6						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS								
Bicycle LOS Score / LOS								

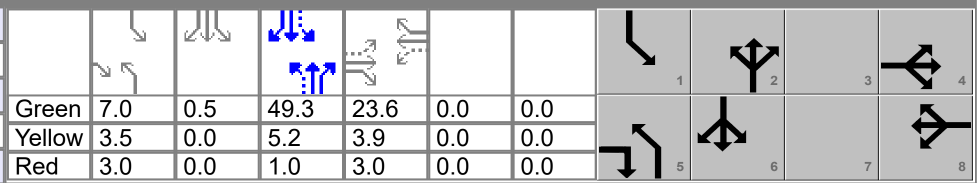
HCS Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	TMS Engineers, Inc.			Duration, h	0.250
Analyst	ABC	Analysis Date	Aug 9, 2022	Area Type	Other
Jurisdiction	Ashville, OH	Time Period	PM Peak	PHF	0.98
Urban Street	US 23	Analysis Year	2024	Analysis Period	1> 7:00
Intersection	@ SR 752	File Name	4_PM 24 23-752 - IMP.xus		
Project Description	BC - NB RTL & EBR Overlap				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	45	55	81	184	33	84	74	965	194	127	1582	55

Signal Information										
Cycle, s	100.0	Reference Phase	2							
Offset, s	0	Reference Point	End	Green	7.0	0.5	49.3	23.6	0.0	0.0
Uncoordinated	No	Simult. Gap E/W	On	Yellow	3.5	0.0	5.2	3.9	0.0	0.0
Force Mode	Fixed	Simult. Gap N/S	On	Red	3.0	0.0	1.0	3.0	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		30.5		30.5	13.5	55.5	14.0	56.0
Change Period, ($Y+R_c$), s		6.9		6.9	6.5	6.2	7.2	6.2
Max Allow Headway (*MAH*), s		3.2		3.2	3.1	0.0	3.1	0.0
Queue Clearance Time (g_s), s		7.0		22.6	4.1		5.7	
Green Extension Time (g_e), s		1.0		0.9	0.1	0.0	0.2	0.0
Phase Call Probability		1.00		1.00	0.88		0.97	
Max Out Probability		0.00		0.00	0.00		0.00	

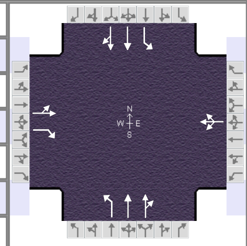
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h		102	83		307		76	985	198	130	838	833
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1514	1585		1443		1626	1625	1610	1668	1752	1731
Queue Service Time (g_s), s		0.0	3.8		15.6		2.1	22.0	7.1	3.7	46.0	46.5
Cycle Queue Clearance Time (g_c), s		5.0	3.8		20.6		2.1	22.0	7.1	3.7	46.0	46.5
Green Ratio (*g/C*)		0.24	0.31		0.24		0.56	0.49	0.49	0.56	0.50	0.50
Capacity (*c*), veh/h		409	485		398		190	1603	794	332	873	862
Volume-to-Capacity Ratio (*X*)		0.249	0.170		0.772		0.398	0.614	0.249	0.391	0.960	0.966
Back of Queue (*Q*), ft/ln (95 th percentile)												
Back of Queue (*Q*), veh/ln (95 th percentile)		3.6	2.6		11.6		1.5	12.8	4.8	2.3	30.6	30.8
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00	0.23		0.00		0.09	0.22	0.00	0.29	0.00	0.00
Uniform Delay (d_1), s/veh		31.0	25.4		37.0		22.1	18.4	14.6	13.6	24.1	24.3
Incremental Delay (d_2), s/veh		0.1	0.1		1.2		0.5	1.8	0.8	0.3	22.2	23.4
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		31.1	25.5		38.2		22.6	20.2	15.4	13.9	46.3	47.7
Level of Service (LOS)		C	C		D		C	C	B	B	D	D
Approach Delay, s/veh / LOS	28.6		C	38.2		D	19.6		B	44.6		D
Intersection Delay, s/veh / LOS	34.4						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS								
Bicycle LOS Score / LOS								

Appendix I
No-Build Capacity Analysis Worksheets - 2044

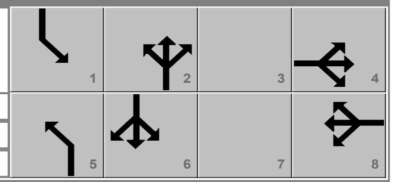
HCS Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	TMS Engineers, Inc.			Duration, h	0.250
Analyst	ABC	Analysis Date	Aug 9, 2022	Area Type	Other
Jurisdiction	Ashville, OH	Time Period	AM Peak	PHF	0.89
Urban Street	US 23	Analysis Year	2044	Analysis Period	1> 7:00
Intersection	@ SR 752	File Name	1_AM 44NB 23-752.xus		
Project Description	No-Build 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	82	37	63	104	32	91	99	1797	246	105	1219	36

Signal Information										
Cycle, s	120.0	Reference Phase	2							
Offset, s	0	Reference Point	End	Green	6.9	0.2	71.5	21.1	0.0	0.0
Uncoordinated	No	Simult. Gap E/W	On	Yellow	4.3	0.0	5.2	3.9	0.0	0.0
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.9	0.0	1.0	3.0	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		28.0		28.0	14.3	77.9	14.1	77.7
Change Period, ($Y+R_c$), s		6.9		6.9	6.5	6.2	7.2	6.2
Max Allow Headway (*MAH*), s		3.2		3.2	3.1	0.0	3.1	0.0
Queue Clearance Time (g_s), s		15.4		22.2	4.9		6.2	
Green Extension Time (g_e), s		0.6		0.0	0.2	0.0	0.0	0.0
Phase Call Probability		1.00		1.00	0.98		0.98	
Max Out Probability		0.23		1.00	0.00		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		134	71		255		111	1148	1148	118	708	702
Adjusted Saturation Flow Rate (s), veh/h/ln		1112	1585		1501		1668	1752	1679	1570	1648	1631
Queue Service Time (g_s), s		0.0	4.6		6.8		2.9	71.7	71.7	4.2	36.5	36.7
Cycle Queue Clearance Time (g_c), s		13.4	4.6		20.2		2.9	71.7	71.7	4.2	36.5	36.7
Green Ratio (g/C)		0.18	0.18		0.18		0.66	0.60	0.60	0.65	0.60	0.60
Capacity (c), veh/h		246	279		308		272	1047	1004	150	982	972
Volume-to-Capacity Ratio (X)		0.543	0.254		0.829		0.409	1.096	1.143	0.788	0.721	0.723
Back of Queue (Q), ft/ln (95 th percentile)												
Back of Queue (Q), veh/ln (95 th percentile)		6.8	3.3		13.7		2.1	58.8	65.0	5.0	20.3	20.2
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00	0.30		0.00		0.13	0.99	1.10	0.64	0.00	0.00
Uniform Delay (d_1), s/veh		46.0	42.7		49.0		15.5	24.1	24.1	33.1	17.2	17.2
Incremental Delay (d_2), s/veh		1.4	0.2		16.1		0.4	57.8	76.6	18.7	4.6	4.6
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		47.4	42.8		65.1		15.9	82.0	100.7	51.7	21.8	21.9
Level of Service (LOS)		D	D		E		B	F	F	D	C	C
Approach Delay, s/veh / LOS	45.8		D	65.1		E	87.9		F	24.1		C
Intersection Delay, s/veh / LOS	62.4						E					

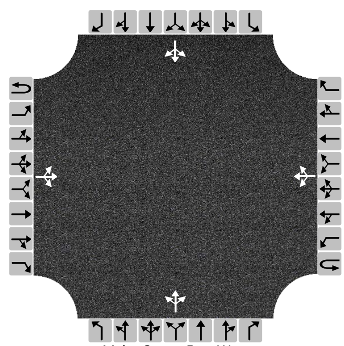
Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS								
Bicycle LOS Score / LOS								

 HCS™ Streets Version 2022 Generated: 8/24/2022 10:17:27 AM

HCS Two-Way Stop-Control Report

General Information		Site Information	
Analyst	ABC	Intersection	SR 752 & Business Place
Agency/Co.	TMS Engineers, Inc.	Jurisdiction	Ashville, OH
Date Performed	8/9/2022	East/West Street	State Route 752
Analysis Year	2044	North/South Street	Business Place North
Time Analyzed	AM Peak	Peak Hour Factor	0.84
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	No-Build Conditions		

Lanes



Major Street: East-West

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	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		10	198	20		10	247	10		10	0	10		0	0	1
Percent Heavy Vehicles (%)		2				3				22	22	22		0	0	0
Proportion Time Blocked																
Percent Grade (%)									0				0			
Right Turn Channelized																
Median Type | Storage	Undivided															

Critical and Follow-up Headways

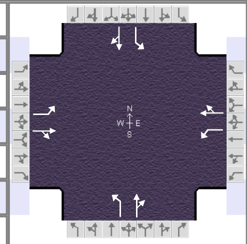
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Base Critical Headway (sec)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2
Critical Headway (sec)		4.12				4.13				7.32	6.72	6.42		7.10	6.50	6.20
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.22				2.23				3.70	4.20	3.50		3.50	4.00	3.30

Delay, Queue Length, and Level of Service

	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Flow Rate, v (veh/h)		12				12					24				1	
Capacity, c (veh/h)		1255				1299					505				744	
v/c Ratio		0.01				0.01					0.05				0.00	
95% Queue Length, Q_{95} (veh)		0.0				0.0					0.1				0.0	
Control Delay (s/veh)		7.9	0.1	0.1		7.8	0.1	0.1			12.5				9.8	
Level of Service (LOS)		A	A	A		A	A	A			B				A	
Approach Delay (s/veh)	0.4				0.4				12.5				9.8			
Approach LOS	A				A				B				A			

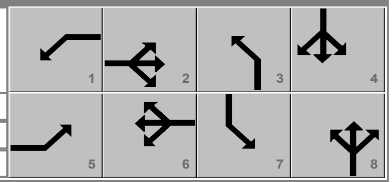
HCS Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	TMS Engineers, Inc.			Duration, h	0.250
Analyst	ABC	Analysis Date	Aug 9, 2022	Area Type	Other
Jurisdiction	Ashville, OH	Time Period	AM Peak	PHF	0.80
Urban Street	SR 752	Analysis Year	2044	Analysis Period	1> 7:00
Intersection	@ SR 316/Ashville Pike	File Name	3_AM 44NB 752-316.xus		
Project Description	No-Build 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	84	294	40	50	150	100	80	210	110	260	80	117

Signal Information										
Cycle, s	97.6	Reference Phase	2							
Offset, s	0	Reference Point	End	Green	6.5	25.6	7.5	1.7	25.7	0.0
Uncoordinated	Yes	Simult. Gap E/W	On	Yellow	4.5	4.5	3.5	4.5	3.5	0.0
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.0	2.0	2.0	2.0	2.0	0.0



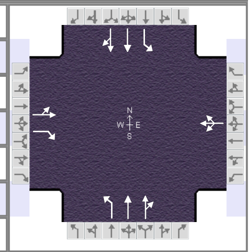
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6	3	8	7	4
Case Number	1.1	4.0	1.1	4.0	1.1	4.0	1.1	4.0
Phase Duration, s	13.0	32.1	13.0	32.1	13.0	31.2	21.2	39.5
Change Period, ($Y+R_c$), s	5.5	6.5	6.5	6.5	5.5	6.5	6.5	6.5
Max Allow Headway (*MAH*), s	3.1	3.1	3.1	3.1	3.1	3.2	3.1	3.2
Queue Clearance Time (g_s), s	6.2	24.2	4.5	18.5	5.9	23.4	14.7	13.1
Green Extension Time (g_e), s	0.0	1.4	0.0	1.1	0.0	1.3	0.0	1.3
Phase Call Probability	0.94	1.00	0.82	1.00	0.93	1.00	1.00	1.00
Max Out Probability	1.00	0.00	0.54	0.14	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	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (*v*), veh/h	105	418		63	313		100	400		325	246	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1725	1773		1711	1676		1781	1761		1767	1676	
Queue Service Time (g_s), s	4.2	22.2		2.5	16.5		3.9	21.4		12.7	11.1	
Cycle Queue Clearance Time (g_c), s	4.2	22.2		2.5	16.5		3.9	21.4		12.7	11.1	
Green Ratio (*g/C*)	0.34	0.26		0.33	0.26		0.33	0.25		0.42	0.34	
Capacity (*c*), veh/h	293	466		212	440		441	446		373	566	
Volume-to-Capacity Ratio (*X*)	0.358	0.897		0.295	0.710		0.227	0.896		0.871	0.435	
Back of Queue (*Q*), ft/ln (95 th percentile)												
Back of Queue (*Q*), veh/ln (95 th percentile)	3.0	14.6		1.8	11.4		2.9	14.2		11.2	7.7	
Queue Storage Ratio (*RQ*) (95 th percentile)	0.39	0.00		0.24	0.00		0.52	0.00		2.38	0.00	
Uniform Delay (d_1), s/veh	24.4	34.7		25.7	32.6		23.3	35.2		23.3	25.1	
Incremental Delay (d_2), s/veh	0.3	2.6		0.3	4.4		0.1	2.9		18.3	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	24.7	37.3		26.0	37.0		23.4	38.1		41.6	25.3	
Level of Service (LOS)	C	D		C	D		C	D		D	C	
Approach Delay, s/veh / LOS	34.7	C		35.2	D		35.1	D		34.6	C	
Intersection Delay, s/veh / LOS	34.9						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS								
Bicycle LOS Score / LOS								

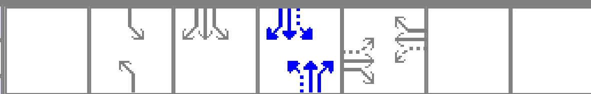
HCS Signalized Intersection Results Summary

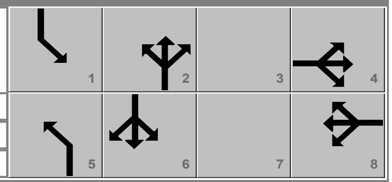
General Information				Intersection Information	
Agency	TMS Engineers, Inc.			Duration, h	0.250
Analyst	ABC	Analysis Date	Aug 9, 2022	Area Type	Other
Jurisdiction	Ashville, OH	Time Period	PM Peak	PHF	0.98
Urban Street	US 23	Analysis Year	2044	Analysis Period	1> 7:00
Intersection	@ SR 752	File Name	4_PM 44NB 23-752.xus		
Project Description	No-Build 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	45	55	81	220	33	95	74	1320	179	113	2067	55

Signal Information										
Cycle, s	100.0	Reference Phase	2							
Offset, s	0	Reference Point	End	Green	7.0	0.4	52.9	20.1	0.0	0.0
Uncoordinated	No	Simult. Gap E/W	On	Yellow	3.5	0.0	5.2	3.9	0.0	0.0
Force Mode	Fixed	Simult. Gap N/S	On	Red	3.0	0.0	1.0	3.0	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		27.0		27.0	13.5	59.1	13.9	59.5
Change Period, ($Y+R_c$), s		6.9		6.9	6.5	6.2	7.2	6.2
Max Allow Headway (*MAH*), s		3.2		3.2	3.1	0.0	3.1	0.0
Queue Clearance Time (g_s), s		7.2		22.1	4.0		5.0	
Green Extension Time (g_e), s		1.0		0.0	0.0	0.0	0.2	0.0
Phase Call Probability		1.00		1.00	0.88		0.96	
Max Out Probability		0.01		1.00	0.12		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		102	83		355		76	776	754	115	1083	1083
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1535	1585		1437		1626	1707	1636	1668	1752	1736
Queue Service Time (g_s), s		0.0	4.4		14.9		2.0	39.2	40.3	3.0	53.3	53.3
Cycle Queue Clearance Time (g_c), s		5.2	4.4		20.1		2.0	39.2	40.3	3.0	53.3	53.3
Green Ratio (*g/C*)		0.20	0.20		0.20		0.60	0.53	0.53	0.60	0.53	0.53
Capacity (*c*), veh/h		361	319		347		186	903	865	224	933	925
Volume-to-Capacity Ratio (*X*)		0.283	0.259		1.022		0.406	0.859	0.871	0.514	1.160	1.171
Back of Queue (*Q*), ft/ln (95 th percentile)												
Back of Queue (*Q*), veh/ln (95 th percentile)		3.8	3.0		20.1		1.6	23.6	23.5	2.5	58.3	59.7
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00	0.27		0.00		0.10	0.41	0.41	0.30	0.00	0.00
Uniform Delay (d_1), s/veh		33.9	33.7		41.6		22.4	20.3	20.6	20.6	23.4	23.4
Incremental Delay (d_2), s/veh		0.2	0.2		54.0		0.5	10.5	11.7	0.7	83.9	88.4
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		34.0	33.8		95.6		22.9	30.8	32.3	21.2	107.3	111.8
Level of Service (LOS)		C	C		F		C	C	C	C	F	F
Approach Delay, s/veh / LOS	33.9	C		95.6	F		31.1	C		105.1	F	
Intersection Delay, s/veh / LOS	74.5						E					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS								
Bicycle LOS Score / LOS								

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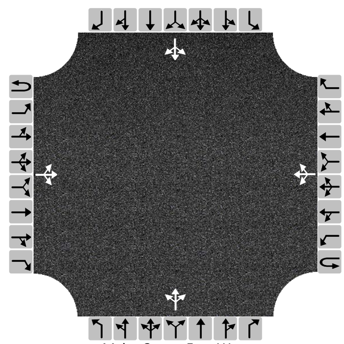
HCS Two-Way Stop-Control Report

General Information		Site Information	
Analyst	ABC	Intersection	SR 752 & Business Place
Agency/Co.	TMS Engineers, Inc.	Jurisdiction	Ashville, OH
Date Performed	8/9/2022	East/West Street	State Route 752
Analysis Year	2044	North/South Street	Business Place North
Time Analyzed	PM Peak	Peak Hour Factor	0.83
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	No-Build Conditions		

Lanes



Major Street: East-West

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	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		0	348	10		10	298	10		10	0	10		10	0	10
Percent Heavy Vehicles (%)		2				2				9	9	9		14	14	14
Proportion Time Blocked																
Percent Grade (%)									0				0			
Right Turn Channelized																
Median Type | Storage	Undivided															

Critical and Follow-up Headways

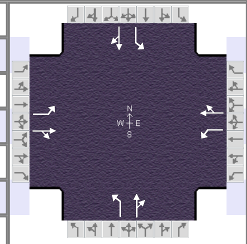
Base Critical Headway (sec)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2
Critical Headway (sec)		4.12				4.12				7.19	6.59	6.29		7.24	6.64	6.34
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.22				2.22				3.58	4.08	3.38		3.63	4.13	3.43

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		0				12					24				24	
Capacity, c (veh/h)		1187				1128					386				388	
v/c Ratio		0.00				0.01					0.06				0.06	
95% Queue Length, Q_{95} (veh)		0.0				0.0					0.2				0.2	
Control Delay (s/veh)		8.0	0.0	0.0		8.2	0.1	0.1			14.9				14.9	
Level of Service (LOS)		A	A	A		A	A	A			B				B	
Approach Delay (s/veh)	0.0				0.4				14.9				14.9			
Approach LOS	A				A				B				B			

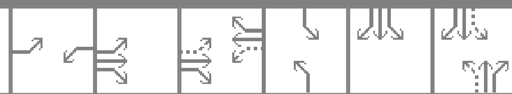
HCS Signalized Intersection Results Summary

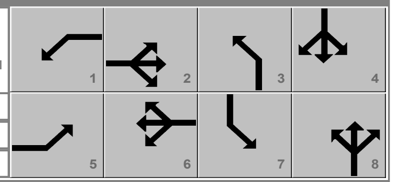
General Information				Intersection Information	
Agency	TMS Engineers, Inc.			Duration, h	0.250
Analyst	ABC	Analysis Date	Apr 7, 2022	Area Type	Other
Jurisdiction	Ashville, OH	Time Period	PM Peak	PHF	0.88
Urban Street	SR 752	Analysis Year	2044	Analysis Period	1> 7:00
Intersection	@ SR 316/Ashville Pike	File Name	6_PM 44NB 752-316.xus		
Project Description	No-Build 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	126	242	90	120	220	130	70	200	100	120	330	168

Signal Information										
Cycle, s	112.0	Reference Phase	2							
Offset, s	0	Reference Point	End	Green	8.0	0.4	31.4	7.5	1.7	40.0
Uncoordinated	Yes	Simult. Gap E/W	On	Yellow	4.5	0.0	3.5	3.5	0.0	3.5
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.0	0.0	2.0	2.0	0.0	2.0





Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6	3	8	7	4
Case Number	1.1	4.0	1.1	4.0	1.1	4.0	1.1	4.0
Phase Duration, s	14.9	37.3	14.5	36.9	13.0	45.5	14.7	47.3
Change Period, ($Y+R_c$), s	5.5	6.5	6.5	6.5	5.5	6.5	6.5	6.5
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	8.8	25.6	8.4	27.2	5.2	20.4	7.6	37.5
Green Extension Time (g_e), s	0.3	1.5	0.0	1.6	0.1	0.0	0.2	1.2
Phase Call Probability	0.99	1.00	0.99	1.00	0.92	1.00	0.99	1.00
Max Out Probability	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00

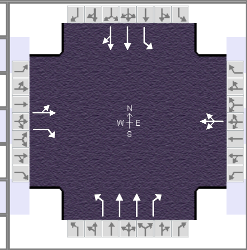
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (v), veh/h	143	377		136	398		80	341		136	566	
Adjusted Saturation Flow Rate (s), veh/h/ln	1711	1713		1753	1725		1753	1737		1753	1735	
Queue Service Time (g_s), s	6.8	23.6		6.4	25.2		3.2	18.4		5.6	35.5	
Cycle Queue Clearance Time (g_c), s	6.8	23.6		6.4	25.2		3.2	18.4		5.6	35.5	
Green Ratio (g/C)	0.37	0.27		0.36	0.27		0.43	0.35		0.44	0.36	
Capacity (c), veh/h	261	483		255	474		215	611		399	640	
Volume-to-Capacity Ratio (X)	0.549	0.782		0.535	0.838		0.370	0.558		0.342	0.884	
Back of Queue (Q), ft/ln (95 th percentile)												
Back of Queue (Q), veh/ln (95 th percentile)	5.0	15.3		4.9	16.0		2.4	12.2		4.1	21.1	
Queue Storage Ratio (RQ) (95 th percentile)	0.66	0.00		0.64	0.00		0.44	0.00		0.89	0.00	
Uniform Delay (d_1), s/veh	29.2	38.4		29.9	39.7		26.7	30.4		22.3	34.3	
Incremental Delay (d_2), s/veh	0.7	2.7		1.2	1.5		0.4	0.7		0.2	1.7	
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	29.9	41.1		31.0	41.2		27.0	31.0		22.5	36.0	
Level of Service (LOS)	C	D		C	D		C	C		C	D	
Approach Delay, s/veh / LOS	38.0	D		38.6	D		30.3	C		33.4	C	
Intersection Delay, s/veh / LOS	35.2						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS								
Bicycle LOS Score / LOS								

Appendix J
Build Capacity Analysis Worksheets - 2044

HCS Signalized Intersection Results Summary

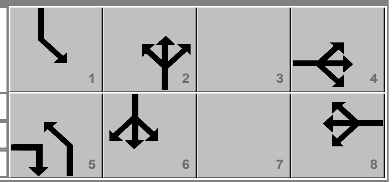
General Information				Intersection Information	
Agency	TMS Engineers, Inc.			Duration, h	0.250
Analyst	ABC	Analysis Date	Aug 9, 2022	Area Type	Other
Jurisdiction	Ashville, OH	Time Period	AM Peak	PHF	0.89
Urban Street	US 23	Analysis Year	2044	Analysis Period	1> 7:00
Intersection	@ SR 752	File Name	1_AM 44 23-752.xus		
Project Description	Build 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	82	37	63	151	32	121	99	1797	293	135	1219	36

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	7.1	65.7	26.9	0.0	0.0	0.0
Yellow	4.3	5.2	3.9	0.0	0.0	0.0
Red	2.9	1.0	3.0	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		33.8		33.8	14.3	71.9	14.3	71.9
Change Period, ($Y+R_c$), s		6.9		6.9	6.5	6.2	7.2	6.2
Max Allow Headway (*MAH*), s		3.3		3.3	3.1	0.0	3.1	0.0
Queue Clearance Time (g_s), s		14.1		28.9	5.3		9.0	
Green Extension Time (g_e), s		1.0		0.0	0.2	0.0	0.0	0.0
Phase Call Probability		1.00		1.00	0.98		0.99	
Max Out Probability		0.01		1.00	0.00		1.00	

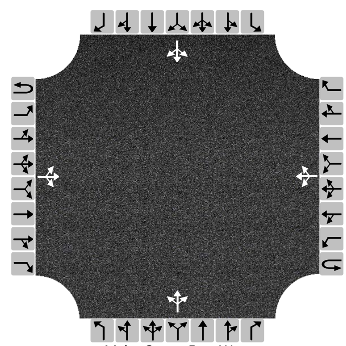
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h		134	71		342		111	2019	329	152	708	702
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1133	1585		1468		1668	1668	1610	1570	1648	1631
Queue Service Time (g_s), s		0.0	4.0		14.8		3.3	65.7	14.0	7.0	40.9	41.0
Cycle Queue Clearance Time (g_c), s		12.1	4.0		26.9		3.3	65.7	14.0	7.0	40.9	41.0
Green Ratio (*g/C*)		0.22	0.29		0.22		0.61	0.55	0.55	0.61	0.55	0.55
Capacity (*c*), veh/h		305	458		374		242	1826	882	153	902	893
Volume-to-Capacity Ratio (*X*)		0.439	0.154		0.913		0.460	1.106	0.373	0.992	0.785	0.786
Back of Queue (*Q*), ft/ln (95 th percentile)		158.5	69.9		488		66.8	1422.8	225.6	341.1	660.9	579.1
Back of Queue (*Q*), veh/ln (95 th percentile)		6.2	2.8		18.6		2.5	52.7	9.0	12.0	23.3	23.2
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00	0.25		0.00		0.15	0.89	0.14	1.55	0.00	0.00
Uniform Delay (d_1), s/veh		40.6	31.7		46.9		19.9	27.2	15.4	36.3	21.5	21.6
Incremental Delay (d_2), s/veh		0.4	0.1		25.7		0.5	56.3	1.2	70.3	6.8	6.9
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		40.9	31.8		72.6		20.4	83.4	16.7	106.6	28.3	28.5
Level of Service (LOS)		D	C		E		C	F	B	F	C	C
Approach Delay, s/veh / LOS	37.8		D	72.6		E	71.6		E	36.0		D
Intersection Delay, s/veh / LOS	58.0						E					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS								
Bicycle LOS Score / LOS								

HCS Two-Way Stop-Control Report

General Information		Site Information	
Analyst	ABC	Intersection	SR 752 & Business Place
Agency/Co.	TMS Engineers, Inc.	Jurisdiction	Ashville, OH
Date Performed	8/9/2022	East/West Street	State Route 752
Analysis Year	2044	North/South Street	Business Place North
Time Analyzed	AM Peak	Peak Hour Factor	0.84
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	Build Conditions		

Lanes



Major Street: East-West

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	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		10	218	35		41	257	10		41	0	30		0	0	1
Percent Heavy Vehicles (%)		2				3				22	22	22		0	0	0
Proportion Time Blocked																
Percent Grade (%)									0				0			
Right Turn Channelized																
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)		4.12				4.13				7.32	6.72	6.42		7.10	6.50	6.20
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)		2.22				2.23				3.70	4.20	3.50		3.50	4.00	3.30

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		12				49					85				1	
Capacity, c (veh/h)		1242				1254					403				733	
v/c Ratio		0.01				0.04					0.21				0.00	
95% Queue Length, Q_{95} (veh)		0.0				0.1					0.8				0.0	
Control Delay (s/veh)		7.9	0.1	0.1		8.0	0.4	0.4			16.3				9.9	
Level of Service (LOS)		A	A	A		A	A	A			C				A	
Approach Delay (s/veh)	0.4				1.4				16.3				9.9			
Approach LOS	A				A				C				A			

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2_AM 44 752-Business.xtw
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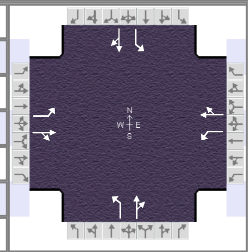
HCS Signalized Intersection Results Summary

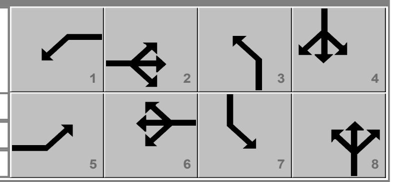
General Information				Intersection Information	
Agency	TMS Engineers, Inc.			Duration, h	0.250
Analyst	ABC	Analysis Date	Aug 9, 2022	Area Type	Other
Jurisdiction	Ashville, OH	Time Period	AM Peak	PHF	0.80
Urban Street	SR 752	Analysis Year	2044	Analysis Period	1> 7:00
Intersection	@ SR 316/Ashville Pike	File Name	3_AM 44 752-316.xus		
Project Description	Build 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	314	50	50	171	100	90	210	110	260	80	127

Signal Information			
Cycle, s	102.7	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	6.7	28.7	7.7	2.3	27.0	0.0
Yellow	4.5	4.5	3.5	4.5	3.5	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	5	2	1	6	3	8	7	4
Case Number	1.1	4.0	1.1	4.0	1.1	4.0	1.1	4.0
Phase Duration, s	13.2	35.2	13.2	35.1	13.2	32.5	22.0	41.2
Change Period, ($Y+R_c$), s	5.5	6.5	6.5	6.5	5.5	6.5	6.5	6.5
Max Allow Headway (*MAH*), s	3.1	3.1	3.1	3.1	3.1	3.2	3.1	3.2
Queue Clearance Time (g_s), s	6.9	27.7	4.6	20.7	6.7	24.6	15.4	14.5
Green Extension Time (g_e), s	0.0	0.9	0.0	0.0	0.0	1.3	0.1	1.3
Phase Call Probability	0.97	1.00	0.83	1.00	0.96	1.00	1.00	1.00
Max Out Probability	1.00	0.00	0.61	1.00	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	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (*v*), veh/h	118	455		63	339		113	400		325	259	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1725	1767		1711	1684		1781	1761		1767	1671	
Queue Service Time (g_s), s	4.9	25.7		2.6	18.7		4.7	22.6		13.4	12.5	
Cycle Queue Clearance Time (g_c), s	4.9	25.7		2.6	18.7		4.7	22.6		13.4	12.5	
Green Ratio (*g/C*)	0.35	0.28		0.34	0.28		0.33	0.25		0.42	0.34	
Capacity (*c*), veh/h	297	493		190	469		425	445		368	565	
Volume-to-Capacity Ratio (*X*)	0.395	0.922		0.329	0.722		0.265	0.898		0.883	0.458	
Back of Queue (*Q*), ft/ln (95 th percentile)												
Back of Queue (*Q*), veh/ln (95 th percentile)	3.5	16.6		1.9	12.7		3.5	14.9		11.8	8.5	
Queue Storage Ratio (*RQ*) (95 th percentile)	0.46	0.00		0.25	0.00		0.64	0.00		2.52	0.00	
Uniform Delay (d_1), s/veh	25.0	36.0		26.9	33.5		25.0	37.1		24.6	26.6	
Incremental Delay (d_2), s/veh	0.3	3.2		0.4	4.7		0.1	2.7		19.9	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	25.3	39.2		27.3	38.2		25.1	39.9		44.5	26.9	
Level of Service (LOS)	C	D		C	D		C	D		D	C	
Approach Delay, s/veh / LOS	36.3		D	36.5		D	36.6		D	36.7		D
Intersection Delay, s/veh / LOS	36.5						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS								
Bicycle LOS Score / LOS								

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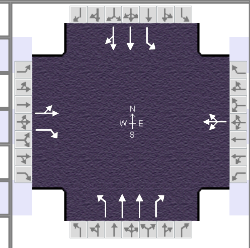
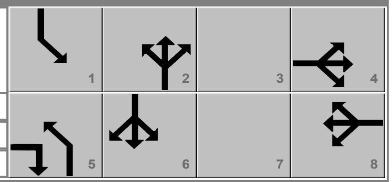
HCS Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	TMS Engineers, Inc.			Duration, h	0.250
Analyst	ABC	Analysis Date	Aug 9, 2022	Area Type	Other
Jurisdiction	Ashville, OH	Time Period	PM Peak	PHF	0.98
Urban Street	US 23	Analysis Year	2044	Analysis Period	1> 7:00
Intersection	@ SR 752	File Name	4_PM 44 23-752.xus		
Project Description	Build 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	45	55	81	244	33	114	74	1320	224	147	2067	55

Signal Information										
Cycle, s	120.0	Reference Phase	2							
Offset, s	0	Reference Point	End	Green	7.4	0.3	64.6	28.1	0.0	0.0
Uncoordinated	No	Simult. Gap E/W	On	Yellow	3.5	0.0	5.2	3.9	0.0	0.0
Force Mode	Fixed	Simult. Gap N/S	On	Red	3.0	0.0	1.0	3.0	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		35.0		35.0	13.9	70.8	14.2	71.1
Change Period, ($Y+R_c$), s		6.9		6.9	6.5	6.2	7.2	6.2
Max Allow Headway (*MAH*), s		3.2		3.2	3.1	0.0	3.1	0.0
Queue Clearance Time (g_s), s		8.1		30.1	4.3		6.8	
Green Extension Time (g_e), s		1.2		0.0	0.0	0.0	0.2	0.0
Phase Call Probability		1.00		1.00	0.92		0.99	
Max Out Probability		0.00		1.00	0.22		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		102	83		399		76	1347	229	150	1083	1083
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1507	1585		1430		1626	1625	1610	1668	1752	1736
Queue Service Time (g_s), s		0.0	4.7		22.0		2.3	39.2	9.2	4.8	64.9	64.9
Cycle Queue Clearance Time (g_c), s		6.1	4.7		28.1		2.3	39.2	9.2	4.8	64.9	64.9
Green Ratio (*g/C*)		0.23	0.30		0.23		0.60	0.54	0.54	0.60	0.54	0.54
Capacity (*c*), veh/h		396	468		384		160	1751	867	237	948	939
Volume-to-Capacity Ratio (*X*)		0.257	0.176		1.040		0.473	0.769	0.264	0.632	1.142	1.153
Back of Queue (*Q*), ft/ln (95 th percentile)		112	81.5		647.4		57.5	586.4	155.2	96.9	1689.6	1596.9
Back of Queue (*Q*), veh/ln (95 th percentile)		4.4	3.2		25.1		2.1	21.2	6.2	3.6	62.6	63.9
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00	0.29		0.00		0.13	0.37	0.10	0.44	0.00	0.00
Uniform Delay (d_1), s/veh		37.4	31.4		47.7		27.5	21.8	14.9	21.3	27.5	27.5
Incremental Delay (d_2), s/veh		0.1	0.1		56.8		0.8	3.3	0.7	1.0	76.6	80.9
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		37.5	31.5		104.5		28.3	25.1	15.6	22.3	104.1	108.5
Level of Service (LOS)		D	C		F		C	C	B	C	F	F
Approach Delay, s/veh / LOS	34.8		C	104.5		F	24.0		C	100.9		F
Intersection Delay, s/veh / LOS	70.6						E					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS								
Bicycle LOS Score / LOS								

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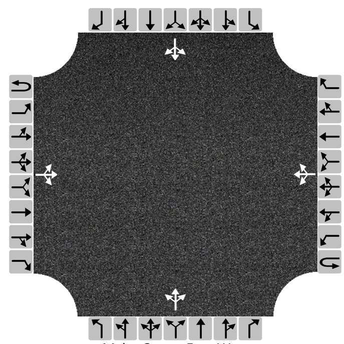
HCS Two-Way Stop-Control Report

General Information		Site Information	
Analyst	ABC	Intersection	SR 752 & Business Place
Agency/Co.	TMS Engineers, Inc.	Jurisdiction	Ashville, OH
Date Performed	8/9/2022	East/West Street	State Route 752
Analysis Year	2044	North/South Street	Business Place North
Time Analyzed	PM Peak	Peak Hour Factor	0.83
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	Build Conditions		

Lanes



Major Street: East-West

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	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		0	364	27		63	315	10		26	0	27		10	0	10
Percent Heavy Vehicles (%)		2				2				9	9	9		14	14	14
Proportion Time Blocked																
Percent Grade (%)									0				0			
Right Turn Channelized																
Median Type | Storage	Undivided															

Critical and Follow-up Headways

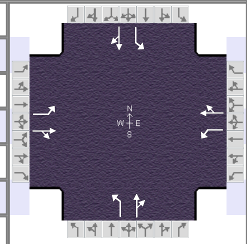
Approach	Eastbound				Westbound				Northbound				Southbound			
Base Critical Headway (sec)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2
Critical Headway (sec)		4.12				4.12				7.19	6.59	6.29		7.24	6.64	6.34
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.22				2.22				3.58	4.08	3.38		3.63	4.13	3.43

Delay, Queue Length, and Level of Service

Approach	Eastbound				Westbound				Northbound				Southbound			
Flow Rate, v (veh/h)		0				76					64				24	
Capacity, c (veh/h)		1167				1091					298				291	
v/c Ratio		0.00				0.07					0.21				0.08	
95% Queue Length, Q_{95} (veh)		0.0				0.2					0.8				0.3	
Control Delay (s/veh)		8.1	0.0	0.0		8.5	0.8	0.8			20.3				18.5	
Level of Service (LOS)		A	A	A		A	A	A			C				C	
Approach Delay (s/veh)	0.0				2.0				20.3				18.5			
Approach LOS	A				A				C				C			

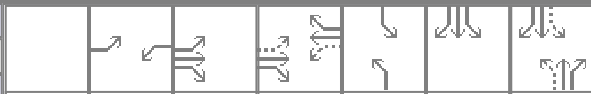
HCS Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	TMS Engineers, Inc.			Duration, h	0.250
Analyst	ABC	Analysis Date	Apr 7, 2022	Area Type	Other
Jurisdiction	Ashville, OH	Time Period	PM Peak	PHF	0.88
Urban Street	SR 752	Analysis Year	2044	Analysis Period	1> 7:00
Intersection	@ SR 316/Ashville Pike	File Name	6_PM 44 752-316.xus		
Project Description	Build Conditions				

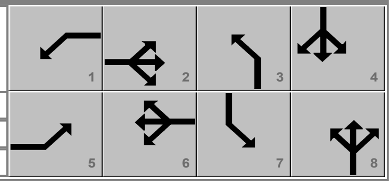


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	139	255	97	120	248	130	84	200	100	120	330	196

Signal Information			
Cycle, s	129.4	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	8.0	2.2	38.0	7.8	2.1	48.3
Yellow	4.5	0.0	3.5	3.5	0.0	3.5
Red	2.0	0.0	2.0	2.0	0.0	2.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6	3	8	7	4
Case Number	1.1	4.0	1.1	4.0	1.1	4.0	1.1	4.0
Phase Duration, s	16.7	45.7	14.5	43.5	13.3	53.8	15.4	55.9
Change Period, ($Y+R_c$), s	5.5	6.5	6.5	6.5	5.5	6.5	6.5	6.5
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	10.5	30.3	9.4	33.4	6.4	22.7	8.4	45.7
Green Extension Time (g_e), s	0.3	1.7	0.0	1.7	0.2	0.0	0.2	1.3
Phase Call Probability	1.00	1.00	0.99	1.00	0.97	1.00	0.99	1.00
Max Out Probability	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00

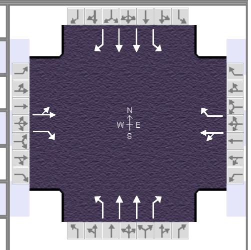
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (*v*), veh/h	158	400		136	430		95	341		136	598	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1711	1711		1753	1733		1753	1737		1753	1725	
Queue Service Time (g_s), s	8.5	28.3		7.4	31.4		4.4	20.7		6.4	43.7	
Cycle Queue Clearance Time (g_c), s	8.5	28.3		7.4	31.4		4.4	20.7		6.4	43.7	
Green Ratio (*g/C*)	0.39	0.30		0.36	0.29		0.44	0.37		0.45	0.38	
Capacity (*c*), veh/h	251	529		248	501		192	639		405	666	
Volume-to-Capacity Ratio (*X*)	0.630	0.756		0.551	0.857		0.498	0.533		0.337	0.898	
Back of Queue (*Q*), ft/ln (95 th percentile)												
Back of Queue (*Q*), veh/ln (95 th percentile)	6.4	17.6		5.8	19.6		3.4	13.6		4.8	25.5	
Queue Storage Ratio (*RQ*) (95 th percentile)	0.85	0.00		0.75	0.00		0.62	0.00		1.03	0.00	
Uniform Delay (d_1), s/veh	33.3	41.8		33.9	45.1		31.3	33.3		24.6	38.7	
Incremental Delay (d_2), s/veh	1.0	1.0		1.5	1.7		0.7	0.5		0.2	1.8	
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	34.3	42.8		35.4	46.8		32.1	33.8		24.8	40.5	
Level of Service (LOS)	C	D		D	D		C	C		C	D	
Approach Delay, s/veh / LOS	40.4	D		44.0	D		33.4	C		37.6	D	
Intersection Delay, s/veh / LOS	39.1						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS								
Bicycle LOS Score / LOS								

Appendix K
No-Build Capacity Analysis Worksheets - 2044 w/ Improvements

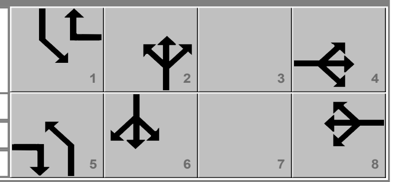
HCS Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	TMS Engineers, Inc.			Duration, h	0.250
Analyst	ABC	Analysis Date	Aug 9, 2022	Area Type	Other
Jurisdiction	Ashville, OH	Time Period	AM Peak	PHF	0.89
Urban Street	US 23	Analysis Year	2044	Analysis Period	1> 7:00
Intersection	@ SR 752	File Name	1_AM 44NB 23-752 - IMP.xus		
Project Description	NBC - w/ Improvements				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	82	37	63	104	32	91	99	1797	246	105	1219	36

Signal Information											
Cycle, s	100.0	Reference Phase	2								
Offset, s	0	Reference Point	End	Green	6.7	0.2	59.5	13.3	0.0	0.0
Uncoordinated	No	Simult. Gap E/W	On	Yellow	4.3	0.0	5.2	3.9	0.0	0.0
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.9	0.0	1.0	3.0	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		7.0	1.1	3.0	1.1	3.0
Phase Duration, s		20.2		20.2	14.1	65.9	13.9	65.7
Change Period, (*Y+R c*), s		6.9		6.9	6.5	6.2	7.2	6.2
Max Allow Headway (*MAH*), s		3.2		3.2	3.1	0.0	3.1	0.0
Queue Clearance Time (g_s), s		10.4		12.5	4.3		4.7	
Green Extension Time (g_e), s		0.8		0.8	0.2	0.0	0.2	0.0
Phase Call Probability		1.00		1.00	0.95		0.96	
Max Out Probability		0.00		0.01	0.00		0.00	

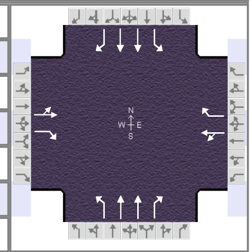
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h		134	71		153	102	111	2019	276	118	1370	40
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1506	1585		1412	1610	1668	1668	1610	1570	1569	1610
Queue Service Time (g_s), s		0.0	3.7		2.1	5.4	2.3	59.7	8.4	2.7	31.4	1.0
Cycle Queue Clearance Time (g_c), s		8.4	3.7		10.5	5.4	2.3	59.7	8.4	2.7	31.4	1.0
Green Ratio (*g/C*)		0.13	0.21		0.13	0.20	0.67	0.60	0.60	0.66	0.59	0.59
Capacity (*c*), veh/h		261	332		251	322	304	1991	961	178	1867	958
Volume-to-Capacity Ratio (*X*)		0.513	0.214		0.609	0.317	0.366	1.014	0.288	0.664	0.734	0.042
Back of Queue (*Q*), ft/ln (95 th percentile)		142.7	64.2		172.5	94.5	44.5	957.8	130.7	84.9	452.2	16.2
Back of Queue (*Q*), veh/ln (95 th percentile)		5.6	2.5		6.6	3.8	1.6	35.5	5.2	3.0	15.9	0.6
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00	0.23		0.00	0.00	0.10	0.60	0.08	0.39	0.00	0.00
Uniform Delay (d_1), s/veh		41.2	32.7		42.2	34.2	12.8	20.2	9.8	23.9	14.6	8.4
Incremental Delay (d_2), s/veh		0.6	0.1		0.9	0.2	0.3	23.8	0.8	1.6	2.6	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	0.0
Control Delay (*d*), s/veh		41.8	32.9		43.1	34.4	13.1	43.9	10.6	25.4	17.2	8.5
Level of Service (LOS)		D	C		D	C	B	F	B	C	B	A
Approach Delay, s/veh / LOS	38.7		D	39.6		D	38.7		D	17.6		B
Intersection Delay, s/veh / LOS	31.4						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS								
Bicycle LOS Score / LOS								

 HCS™ Streets Version 2023 Generated: 11/8/2022 11:44:22 AM

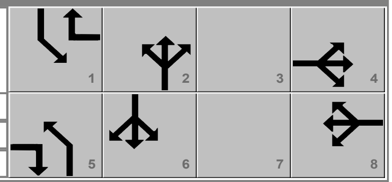
HCS Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	TMS Engineers, Inc.			Duration, h	0.250
Analyst	ABC	Analysis Date	Aug 9, 2022	Area Type	Other
Jurisdiction	Ashville, OH	Time Period	PM Peak	PHF	0.98
Urban Street	US 23	Analysis Year	2044	Analysis Period	1> 7:00
Intersection	@ SR 752	File Name	4_PM 44NB 23-752 - IMP.xus		
Project Description	NBC - w/ Improvements				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	45	55	81	220	33	95	74	1320	179	113	2067	55

Signal Information										
Cycle, s	120.0	Reference Phase	2							
Offset, s	0	Reference Point	End	Green	7.4	0.2	69.7	23.1	0.0	0.0
Uncoordinated	No	Simult. Gap E/W	On	Yellow	3.5	0.0	5.2	3.9	0.0	0.0
Force Mode	Fixed	Simult. Gap N/S	On	Red	3.0	0.0	1.0	3.0	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		7.0	1.1	3.0	1.1	3.0
Phase Duration, s		30.0		30.0	13.9	75.9	14.1	76.1
Change Period, ($Y+R_c$), s		6.9		6.9	6.5	6.2	7.2	6.2
Max Allow Headway (*MAH*), s		3.2		3.2	3.1	0.0	3.1	0.0
Queue Clearance Time (g_s), s		8.1		24.5	4.1		5.2	
Green Extension Time (g_e), s		1.0		0.0	0.0	0.0	0.2	0.0
Phase Call Probability		1.00		1.00	0.92		0.98	
Max Out Probability		0.00		1.00	0.15		0.00	

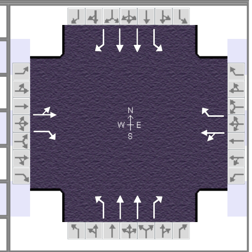
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h		102	83		258	97	76	1347	183	115	2109	56
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1637	1585		1369	1610	1626	1625	1610	1668	1668	1610
Queue Service Time (g_s), s		0.0	4.9		16.4	5.8	2.1	35.6	6.4	3.2	69.9	1.8
Cycle Queue Clearance Time (g_c), s		6.1	4.9		22.5	5.8	2.1	35.6	6.4	3.2	69.9	1.8
Green Ratio (*g/C*)		0.19	0.25		0.19	0.25	0.64	0.58	0.58	0.64	0.58	0.58
Capacity (*c*), veh/h		359	402		320	402	160	1889	936	263	1944	939
Volume-to-Capacity Ratio (*X*)		0.285	0.205		0.808	0.241	0.473	0.713	0.195	0.438	1.085	0.060
Back of Queue (*Q*), ft/ln (95 th percentile)		118.7	87.2		349.8	102.1	62.8	525	106.1	56	1390.9	29.7
Back of Queue (*Q*), veh/ln (95 th percentile)		4.7	3.4		13.6	4.1	2.3	19.0	4.2	2.1	51.5	1.2
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00	0.31		0.00	0.00	0.14	0.33	0.07	0.25	0.00	0.00
Uniform Delay (d_1), s/veh		41.5	35.2		48.3	35.9	28.3	18.0	11.9	16.0	25.0	10.8
Incremental Delay (d_2), s/veh		0.2	0.1		13.3	0.1	0.8	2.3	0.5	0.4	47.7	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	0.0
Control Delay (*d*), s/veh		41.7	35.3		61.5	36.1	29.1	20.3	12.3	16.4	72.7	10.9
Level of Service (LOS)		D	D		E	D	C	C	B	B	F	B
Approach Delay, s/veh / LOS	38.8	D		54.6	D		19.8	B		68.3	E	
Intersection Delay, s/veh / LOS	48.4						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS								
Bicycle LOS Score / LOS								

Appendix L
Build Capacity Analysis Worksheets - 2044 w/ Improvements

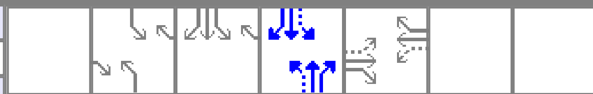
HCS Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	TMS Engineers, Inc.			Duration, h	0.250
Analyst	ABC	Analysis Date	Aug 9, 2022	Area Type	Other
Jurisdiction	Ashville, OH	Time Period	AM Peak	PHF	0.89
Urban Street	US 23	Analysis Year	2044	Analysis Period	1> 7:00
Intersection	@ SR 752	File Name	1_AM 44 23-752 - IMP.xus		
Project Description	BC w/ Improvements				

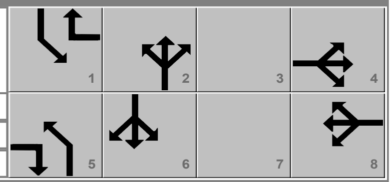


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	82	37	63	151	32	121	99	1797	293	135	1219	36

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	7.8	1.8	70.7	20.1	0.0	0.0
Yellow	3.5	0.0	5.2	3.9	0.0	0.0
Red	3.0	0.0	1.0	3.0	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		7.0	1.1	3.0	1.1	3.0
Phase Duration, s		27.0		27.0	14.3	76.9	16.1	78.7
Change Period, ($Y+R_c$), s		6.9		6.9	6.5	6.2	7.2	6.2
Max Allow Headway (*MAH*), s		3.2		3.2	3.1	0.0	3.1	0.0
Queue Clearance Time (g_s), s		11.6		19.5	5.0		8.8	
Green Extension Time (g_e), s		0.9		0.6	0.2	0.0	0.2	0.0
Phase Call Probability		1.00		1.00	0.98		0.99	
Max Out Probability		0.01		0.46	0.00		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		134	71		206	136	111	2019	329	152	1370	40
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1511	1585		1381	1610	1668	1668	1610	1570	1569	1610
Queue Service Time (g_s), s		0.0	4.3		7.9	8.4	3.0	70.7	12.7	6.8	36.8	1.2
Cycle Queue Clearance Time (g_c), s		9.6	4.3		17.5	8.4	3.0	70.7	12.7	6.8	36.8	1.2
Green Ratio (*g/C*)		0.17	0.23		0.17	0.24	0.65	0.59	0.59	0.66	0.60	0.60
Capacity (*c*), veh/h		304	368		286	389	273	1964	948	177	1896	973
Volume-to-Capacity Ratio (*X*)		0.441	0.192		0.720	0.349	0.408	1.028	0.347	0.857	0.722	0.042
Back of Queue (*Q*), ft/ln (95 th percentile)		166.5	76.5		273.2	148.9	56.6	1170.3	204.8	233.3	533.3	19.8
Back of Queue (*Q*), veh/ln (95 th percentile)		6.6	3.0		10.4	6.0	2.1	43.3	8.2	8.2	18.8	0.8
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00	0.27		0.00	0.00	0.13	0.73	0.13	1.06	0.00	0.00
Uniform Delay (d_1), s/veh		45.5	37.0		48.9	37.7	15.8	24.7	12.7	37.2	16.7	9.6
Incremental Delay (d_2), s/veh		0.4	0.1		4.7	0.2	0.4	27.8	1.0	4.6	2.4	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	0.0
Control Delay (*d*), s/veh		45.9	37.1		53.6	37.9	16.2	52.4	13.7	41.8	19.1	9.7
Level of Service (LOS)		D	D		D	D	B	F	B	D	B	A
Approach Delay, s/veh / LOS	42.8	D		47.3	D		45.6	D		21.1	C	
Intersection Delay, s/veh / LOS	37.2						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS								
Bicycle LOS Score / LOS								

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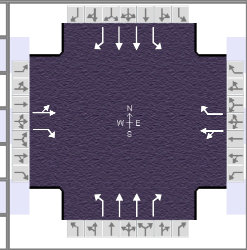
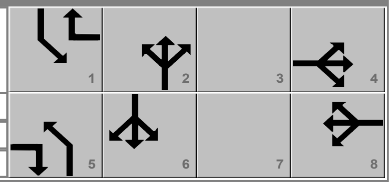
HCS Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	TMS Engineers, Inc.			Duration, h	0.250
Analyst	ABC	Analysis Date	Aug 9, 2022	Area Type	Other
Jurisdiction	Ashville, OH	Time Period	PM Peak	PHF	0.98
Urban Street	US 23	Analysis Year	2044	Analysis Period	1> 7:00
Intersection	@ SR 752	File Name	4_PM 44 23-752 - IMP.xus		
Project Description	BC w/ Improvements				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	45	55	81	244	33	114	74	1320	224	147	2067	55

Signal Information										
Cycle, s	115.0	Reference Phase	2							
Offset, s	0	Reference Point	End	Green	7.3	0.4	65.7	22.1	0.0	0.0
Uncoordinated	No	Simult. Gap E/W	On	Yellow	3.5	0.0	5.2	3.9	0.0	0.0
Force Mode	Fixed	Simult. Gap N/S	On	Red	3.0	0.0	1.0	3.0	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		7.0	1.1	3.0	1.1	3.0
Phase Duration, s		29.0		29.0	13.8	71.9	14.1	72.2
Change Period, ($Y+R_c$), s		6.9		6.9	6.5	6.2	7.2	6.2
Max Allow Headway (*MAH*), s		3.2		3.2	3.1	0.0	3.1	0.0
Queue Clearance Time (g_s), s		7.9		24.1	4.0		6.2	
Green Extension Time (g_e), s		1.1		0.0	0.1	0.0	0.3	0.0
Phase Call Probability		1.00		1.00	0.91		0.99	
Max Out Probability		0.00		1.00	0.00		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		102	83		283	116	76	1347	229	150	2109	56
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1638	1585		1372	1610	1626	1625	1610	1668	1668	1610
Queue Service Time (g_s), s		0.0	4.7		16.2	6.7	2.0	34.9	8.2	4.2	66.0	1.8
Cycle Queue Clearance Time (g_c), s		5.9	4.7		22.1	6.7	2.0	34.9	8.2	4.2	66.0	1.8
Green Ratio (*g/C*)		0.19	0.26		0.19	0.25	0.63	0.57	0.57	0.63	0.57	0.57
Capacity (*c*), veh/h		360	405		322	407	166	1856	919	265	1915	924
Volume-to-Capacity Ratio (*X*)		0.283	0.204		0.876	0.286	0.456	0.726	0.249	0.567	1.102	0.061
Back of Queue (*Q*), ft/ln (95 th percentile)		113.1	82.8		391.7	117.9	58.5	516.8	134.6	82.1	1405.9	28.9
Back of Queue (*Q*), veh/ln (95 th percentile)		4.5	3.3		15.2	4.7	2.1	18.7	5.4	3.0	52.1	1.2
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00	0.30		0.00	0.00	0.13	0.32	0.08	0.37	0.00	0.00
Uniform Delay (d_1), s/veh		39.8	33.6		47.2	34.6	26.8	18.1	12.3	17.4	24.5	10.8
Incremental Delay (d_2), s/veh		0.2	0.1		21.9	0.1	0.7	2.5	0.6	0.7	54.3	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	0.0
Control Delay (*d*), s/veh		40.0	33.7		69.1	34.8	27.5	20.6	13.0	18.1	78.8	10.9
Level of Service (LOS)		D	C		E	C	C	C	B	B	F	B
Approach Delay, s/veh / LOS	37.2	D		59.1	E		19.9	B		73.2	E	
Intersection Delay, s/veh / LOS	51.1						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS								
Bicycle LOS Score / LOS								

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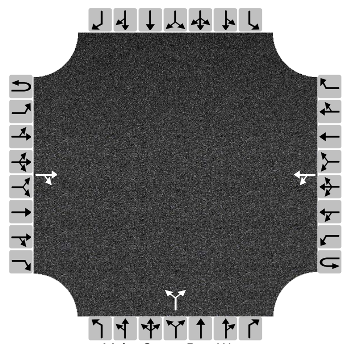
Appendix M
Access Capacity Analysis Worksheets - 2024

HCS Two-Way Stop-Control Report

General Information		Site Information	
Analyst	ABC	Intersection	SR 752 & Access
Agency/Co.	TMS Engineers, Inc.	Jurisdiction	Ashville, OH
Date Performed	8/9/2022	East/West Street	SR 752
Analysis Year	2024	North/South Street	Proposed Access
Time Analyzed	AM Peak	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	Build Conditions		

Lanes



Major Street: East-West

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)			353	62		10	198			46		20				
Percent Heavy Vehicles (%)						3				23		23				
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)						4.13				6.63		6.43				
Base Follow-Up Headway (sec)						2.2				3.5		3.3				
Follow-Up Headway (sec)						2.23				3.71		3.51				

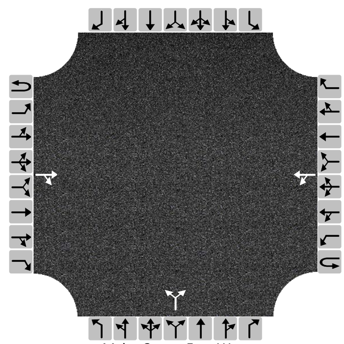
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						11					72					
Capacity, c (veh/h)						1104					440					
v/c Ratio						0.01					0.16					
95% Queue Length, Q_{95} (veh)						0.0					0.6					
Control Delay (s/veh)						8.3	0.1				14.8					
Level of Service (LOS)						A	A				B					
Approach Delay (s/veh)					0.5				14.8							
Approach LOS					A				B							

HCS Two-Way Stop-Control Report

General Information		Site Information	
Analyst	ABC	Intersection	SR 752 & Access
Agency/Co.	TMS Engineers, Inc.	Jurisdiction	Ashville, OH
Date Performed	8/9/2022	East/West Street	SR 752
Analysis Year	2024	North/South Street	Proposed Access
Time Analyzed	PM Peak	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	Build Conditions		

Lanes



Major Street: East-West

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)			315	62		17	274			27		16				
Percent Heavy Vehicles (%)						3				23		23				
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)						4.13				6.63		6.43				
Base Follow-Up Headway (sec)						2.2				3.5		3.3				
Follow-Up Headway (sec)						2.23				3.71		3.51				

Delay, Queue Length, and Level of Service

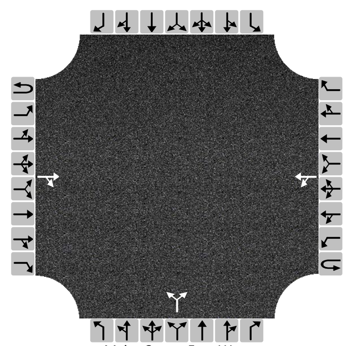
Flow Rate, v (veh/h)						18					47					
Capacity, c (veh/h)						1144					430					
v/c Ratio						0.02					0.11					
95% Queue Length, Q_{95} (veh)						0.0					0.4					
Control Delay (s/veh)						8.2	0.2				14.4					
Level of Service (LOS)						A	A				B					
Approach Delay (s/veh)					0.6				14.4							
Approach LOS					A				B							

Appendix N
Access Capacity Analysis Worksheets - 2044

HCS Two-Way Stop-Control Report

General Information		Site Information	
Analyst	ABC	Intersection	SR 752 & Access
Agency/Co.	TMS Engineers, Inc.	Jurisdiction	Ashville, OH
Date Performed	8/9/2022	East/West Street	SR 752
Analysis Year	2044	North/South Street	Proposed Access
Time Analyzed	AM Peak	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	Build Conditions		

Lanes



Major Street: East-West

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)			403	62		10	258			46		20				
Percent Heavy Vehicles (%)						3				23		23				
Proportion Time Blocked																
Percent Grade (%)									0							
Right Turn Channelized																
Median Type | Storage	Undivided															

Critical and Follow-up Headways

	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Base Critical Headway (sec)						4.1				7.1		6.2				
Critical Headway (sec)						4.13				6.63		6.43				
Base Follow-Up Headway (sec)						2.2				3.5		3.3				
Follow-Up Headway (sec)						2.23				3.71		3.51				

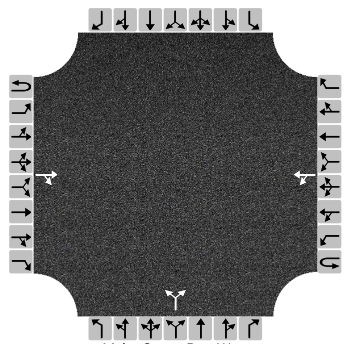
Delay, Queue Length, and Level of Service

	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Flow Rate, v (veh/h)						11					72					
Capacity, c (veh/h)						1054					380					
v/c Ratio						0.01					0.19					
95% Queue Length, Q_{95} (veh)						0.0					0.7					
Control Delay (s/veh)						8.5	0.1				16.7					
Level of Service (LOS)						A	A				C					
Approach Delay (s/veh)					0.4				16.7							
Approach LOS					A				C							

HCS Two-Way Stop-Control Report

General Information		Site Information	
Analyst	ABC	Intersection	SR 752 & Access
Agency/Co.	TMS Engineers, Inc.	Jurisdiction	Ashville, OH
Date Performed	8/9/2022	East/West Street	SR 752
Analysis Year	2044	North/South Street	Proposed Access
Time Analyzed	PM Peak	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	Build Conditions		

Lanes


Major Street: East-West

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)			365	62		17	364			27		16				
Percent Heavy Vehicles (%)						3				23		23				
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)						4.13				6.63		6.43				
Base Follow-Up Headway (sec)						2.2				3.5		3.3				
Follow-Up Headway (sec)						2.23				3.71		3.51				

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						18					47					
Capacity, c (veh/h)						1092					359					
v/c Ratio						0.02					0.13					
95% Queue Length, Q_{95} (veh)						0.1					0.4					
Control Delay (s/veh)						8.4	0.2				16.5					
Level of Service (LOS)						A	A				C					
Approach Delay (s/veh)					0.5				16.5							
Approach LOS					A				C							

Appendix O
ODOT Turn Lane Warrant Graphs

AUXILLIARY TURN LANE WARRANTS

PROJECT INFORMATION

1. Client	POGGEMEYER DESIGN GROUP
2. Job Number	22-029
3. Jurisdiction	Ashville, OH
4. Name of roadway where turn lanes are to be analyzed	SR 752 @ PROPOSED ACCESS
5. Roadway speed limit	55
6. Number of Lanes	2
7. Analysis Condition (Year / Build)	2024 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

- Right Turn		EASTBOUND Right	EASTBOUND Thru	Advancing
	AM	62	353	415
	PM	62	315	377

- Left Turn		WESTBOUND Left	WESTBOUND Thru	EASTBOUND Thru	EASTBOUND Right	Advancing	Opposing	LT%
	AM	10	198	353	62	208	415	4.8%
	PM	17	274	315	62	291	377	5.8%

Notes:

1. Analyst to fill in all blue areas.
2. Green areas are calculated for the analyst

SR 752 @ PROPOSED ACCESS

2024 BUILD **WARRANT IS NOT MET**

Left turn lane is warranted in the AM when the red dot is located on or above the dotted red line.

Left turn lane is warranted in the PM when the green dot is located on or above the dotted green line.

*Includes Left Turns

TIME	WESTBOUND		EASTBOUND		ADVANCING	OPPOSING	LT%	WARRANT?
	LEFT	THRU	THRU	RIGHT				
AM	10	198	353	62	208	415	4.8%	NO
PM	17	274	315	62	291	377	5.8%	NO

2-LANE LEFT TURN LANE WARRANT (HIGHSPEED)

401-5bM

REFERENCE SECTION 401.6.1

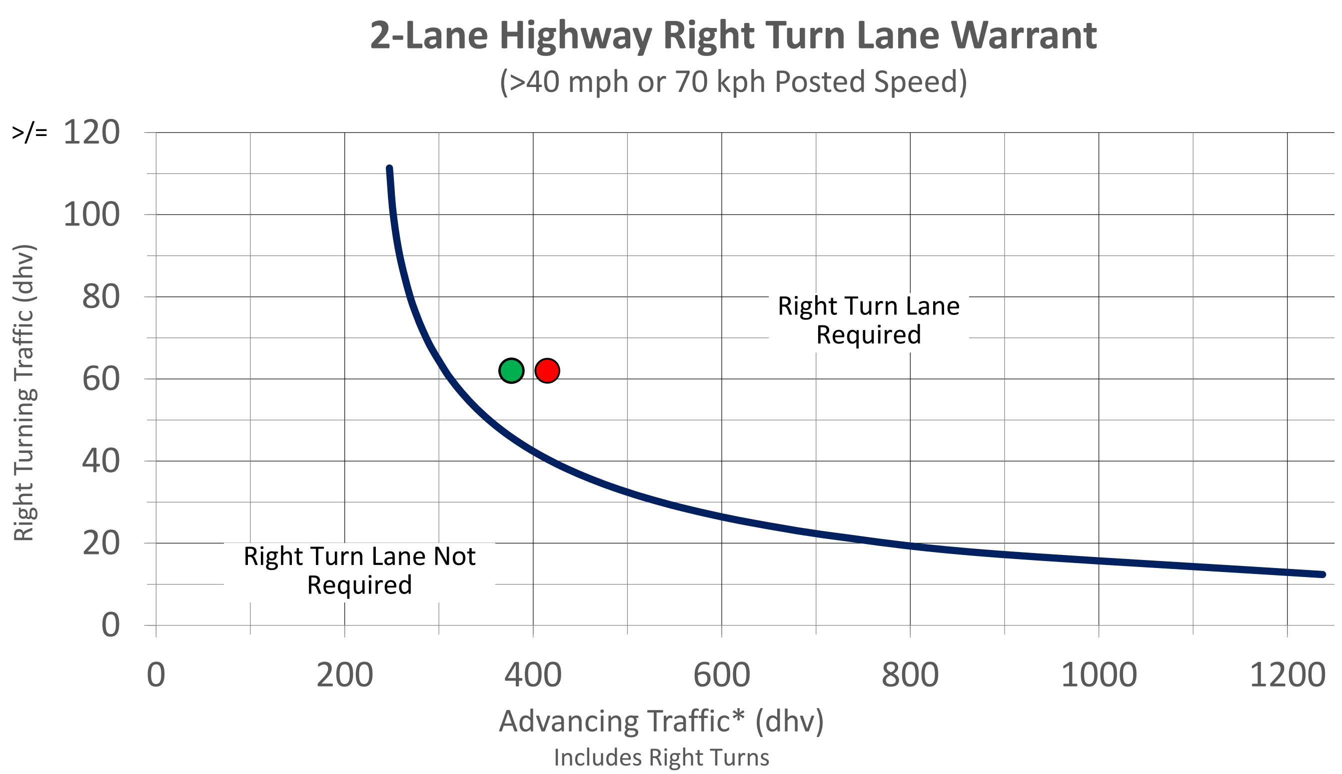
2-LANE RIGHT TURN LANE WARRANT (HIGH SPEED)

401-6bM

REFERENCE SECTION 401.6.3

SR 752 @ PROPOSED ACCESS

2024 BUILD **<u>WARRANT IS MET</u>**



TIME	EASTBOUND			WARRANT?
	THRU	RIGHT	ADVANCING	
AM	353	62	415	YES
PM	315	62	377	YES

AUXILLIARY TURN LANE WARRANTS

PROJECT INFORMATION

1. Client	POGGEMEYER DESIGN GROUP
2. Job Number	22-029
3. Jurisdiction	Ashville, OH
4. Name of roadway where turn lanes are to be analyzed	SR 752 @ PROPOSED ACCESS
5. Roadway speed limit	55
6. Number of Lanes	2
7. Analysis Condition (Year / Build)	2044 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

- Right Turn	EASTBOUND		
	Right	Thru	Advancing
AM	62	403	465
PM	62	365	427

- Left Turn	WESTBOUND		EASTBOUND				
	Left	Thru	Thru	Right	Advancing	Opposing	LT%
AM	10	258	403	62	268	465	3.7%
PM	17	364	365	62	381	427	4.5%

Notes:

1. Analyst to fill in all blue areas.
2. Green areas are calculated for the analyst

2-LANE LEFT TURN LANE WARRANT (HIGHSPEED)

401-5bM

REFERENCE SECTION 401.6.1

SR 752 @ PROPOSED ACCESS

2044 BUILD **WARRANT IS MET**

Left turn lane is warranted in the AM when the red dot is located on or above the dotted red line.

Left turn lane is warranted in the PM when the green dot is located on or above the dotted green line.

*Includes Left Turns

TIME	WESTBOUND		EASTBOUND		ADVANCING	OPPOSING	LT%	WARRANT?
	LEFT	THRU	THRU	RIGHT				
AM	10	258	403	62	268	465	3.7%	NO
PM	17	364	365	62	381	427	4.5%	YES

2-LANE RIGHT TURN LANE WARRANT (HIGH SPEED)

401-6bM

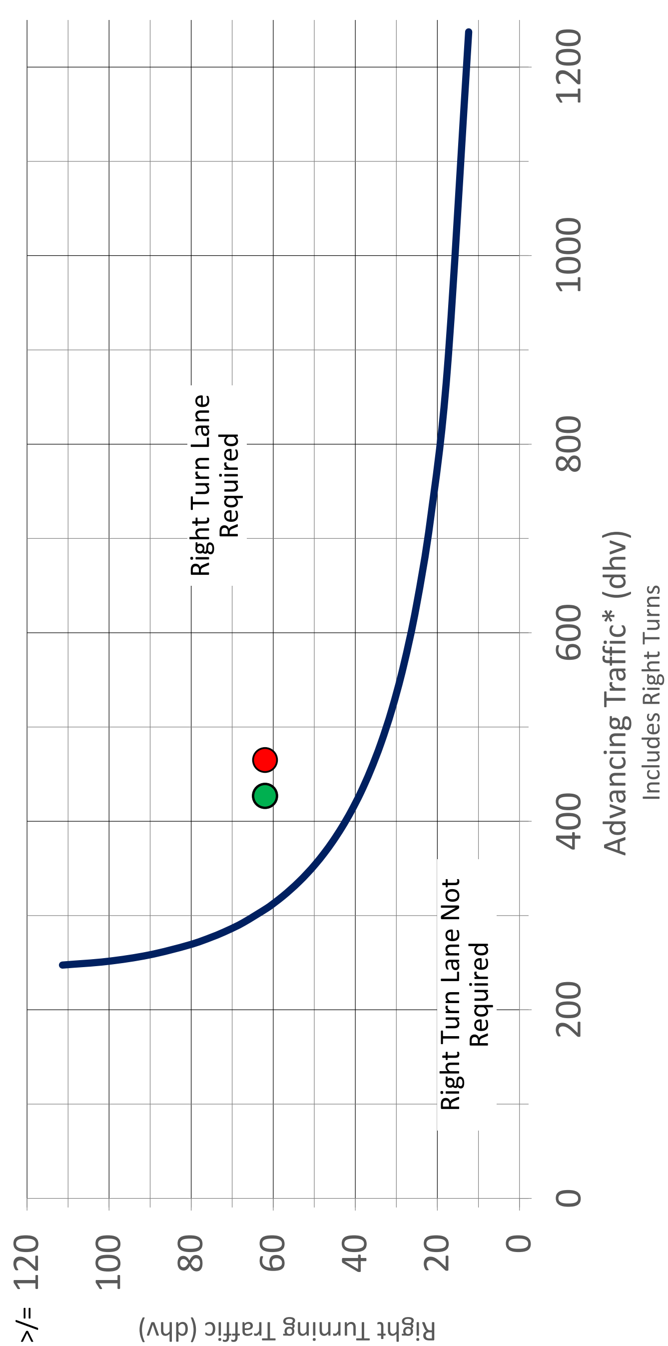
REFERENCE SECTION 401.6.3

SR 752 @ PROPOSED ACCESS

2044 BUILD **WARRANT IS MET**

2-Lane Highway Right Turn Lane Warrant

(>40 mph or 70 kph Posted Speed)



TIME	EASTBOUND			WARRANT?
	THRU	RIGHT	ADVANCING	
AM	403	62	465	YES
PM	365	62	427	YES