Approved 2/15/2024
MAL

DULIN FARMS

Traffic ***Memorandum***

Delaware, Ohio

February, 2024

Prepared for:

Maronda Homes

Kimley»Horn

CONTENTS

TABLES

INTRODUCTION

Kimley-Horn and Associates, Inc. (Kimley-Horn) was retained by Maronda Homes to perform a traffic memorandum for proposed residential development located north of Clark-Shaw Road and south of Bean-Oller Road, in Delaware County, Ohio. *Smart Services, Clarkshaw Village Traffic Impact Study, 2022* was approved on January 15th, 2022, and can be referenced in **Appendix E.**

An aerial view of the study location and the surrounding roadway network is presented in the conceptual site plan and can be referenced in **Appendix A**.

As part of this study, the site access intersections were analyzed to determine if turn lanes are needed along Bean-Oller Road and Clark-Shaw Road to accommodate the projected future traffic volumes at these intersections. This report presents and documents Kimley-Horn's data collection, summarizes the evaluation of projected future traffic volumes, and outlines recommendations for the site access intersections.

NO BUILD CONDITIONS

This section of the report details information on the existing roadway conditions.

Area Land Uses and Existing Roadway Characteristics

The proposed development is located south of **Bean-Oller Road** and north of **Clark-Shaw Road**, in Delaware County, Ohio. This project would replace approximately 63.6 acres of agricultural and residential land use. The study area for this analysis includes the following intersections:

- Bean-Oller Road and Access A
- Clark-Shaw Road and Access B

Bean-Oller Road is a two-lane major collector generally running west-east in the site vicinity and provides one travel lane in each direction. This roadway has a posted speed limit of 50 mph. There are no designated sidewalks are currently present on either side of **Bean-Oller Road**.

Clark-Shaw Road is a two-lane minor collector generally running north-south in the site vicinity and provides one travel lane in each direction. This roadway has an assumed unposted speed limit of 50 mph. There are no designated sidewalks are currently present on either side of **Clark-Shaw Road.**

Traffic Count Data Collection

Historical traffic counts can be referenced in the *Smart Services, Clarkshaw Village Traffic Impact Study, 2022***.** The 2032 background traffic volumes are illustrated in **Exhibit 1.**

Expected Growth Traffic Assignment

Per request Delaware County Engineer's Office (DCEO) request, a 5% linear growth factor was assumed along Bean-Oller Road and Clark-Shaw Road. The linear growth was applied to the 2032 Background traffic volumes to obtain the 2034 No Build traffic volumes.

2034 No Build traffic volumes are illustrated in **Exhibit 2.**

Exhibit 1: 2032 Background Traffic AM & PM Peak Hour Vehicle Volumes

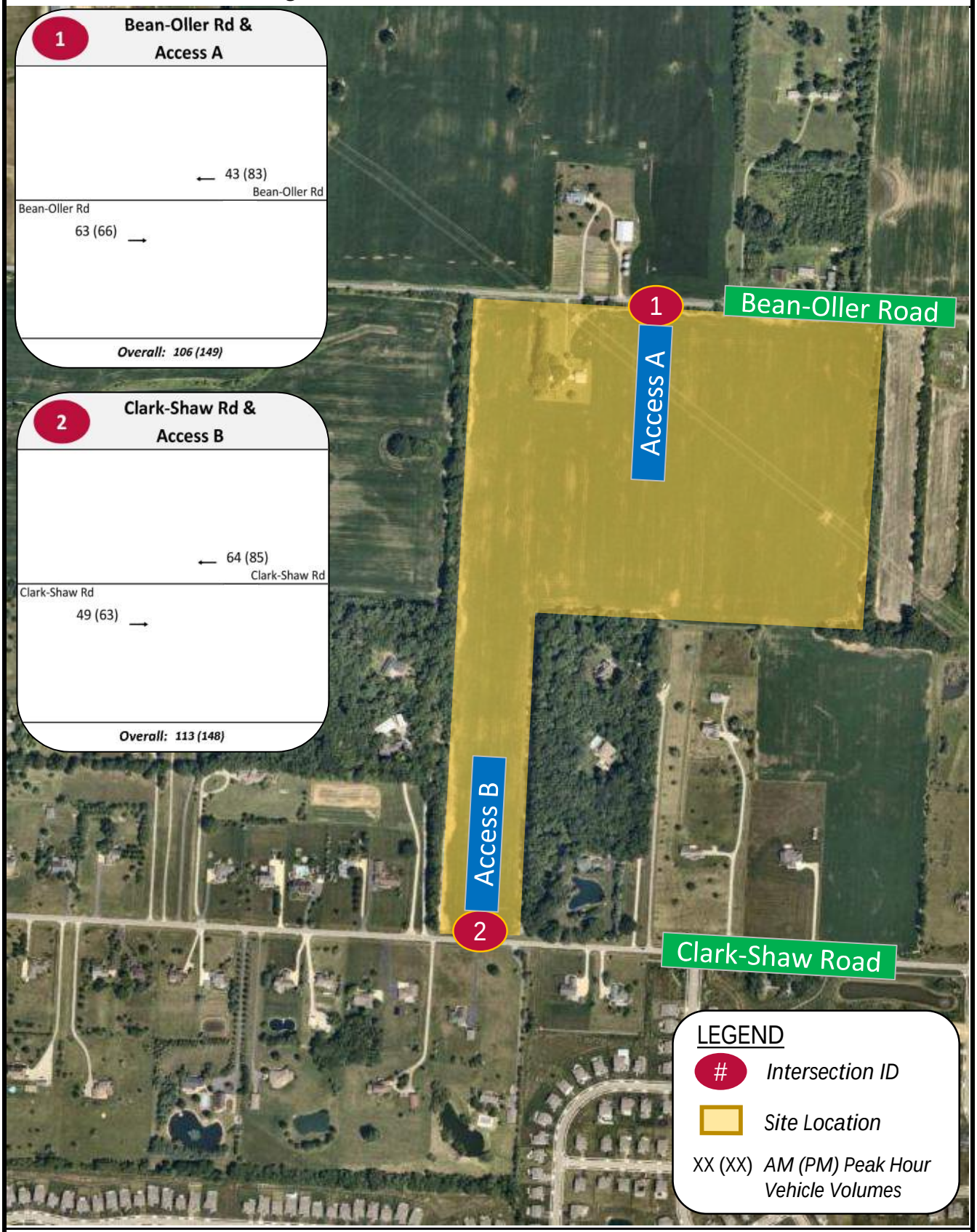
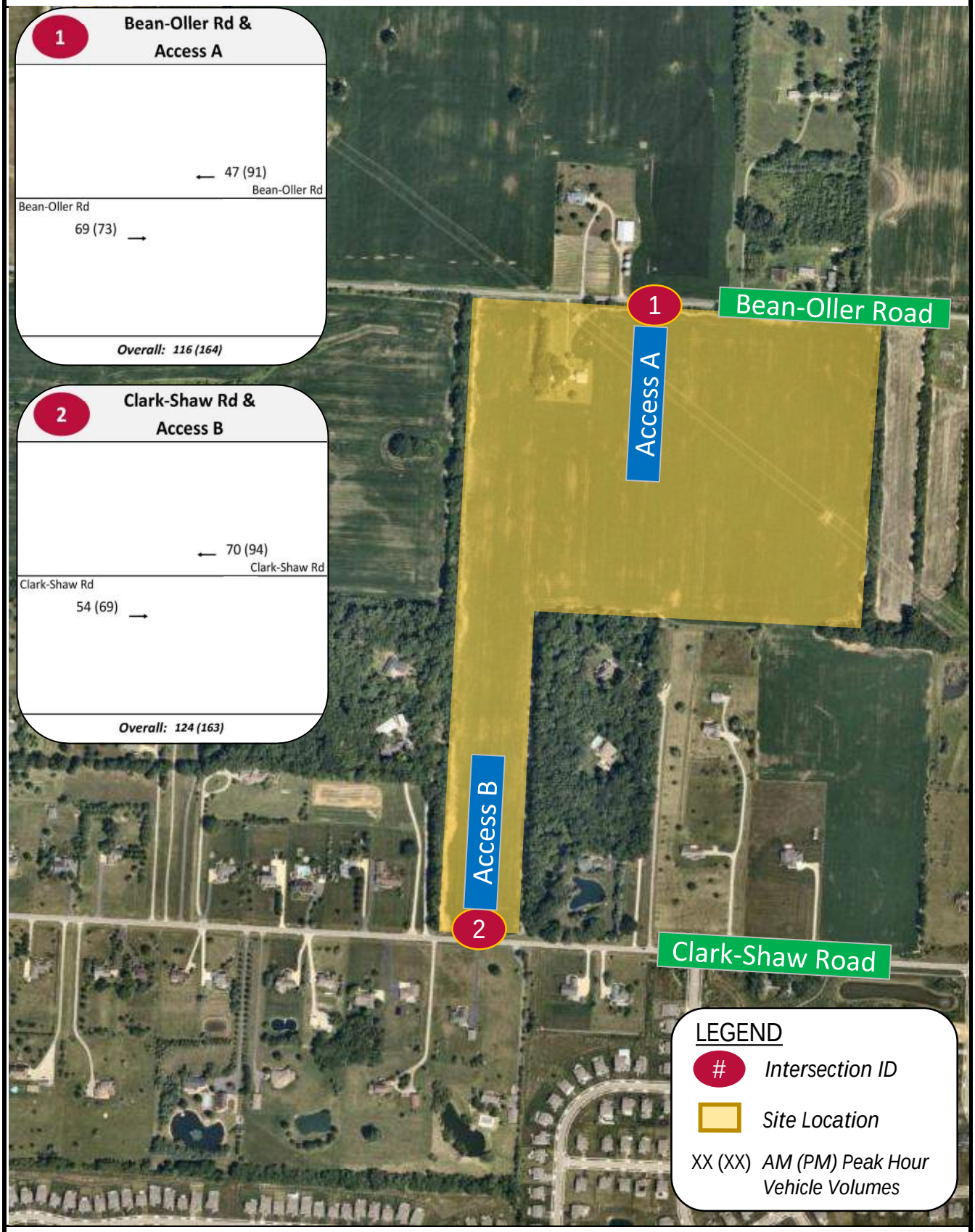


Exhibit 2: 2034 No-Build AM & PM Peak Hour Vehicle Volumes



BUILD CONDITIONS

This section of the report outlines the proposed site plan and summarizes site-specific traffic characteristics.

Development Characteristics

The proposed development would include a 63.6-acre site, containing 95 single-family residential units. Access to the site includes two full-access drives, one access along Bean-Oller Road and another on Clark-Shaw Road. This access configuration is illustrated on the conceptual site plan included in **Appendix A**.

Trip Generation

To calculate trips generated by the proposed residential development, data was referenced from the Institute of Transportation Engineers (ITE) manual titled Trip Generation, Eleventh Edition. Trip generation rates for the ITE Land Use Code (LUC) corresponding to the proposed use are shown in **Table 1** and are calculated using the fitted equations. Copies of the ITE data are included in **Appendix B**.

Table 1: ITE Trip Generation Data – Land-Use Code 210 (Single-Family Detached Housing)

ITE Land Use	Units	Weekday		
		Daily	AM Peak Hour	PM Peak Hour
Single-Family Detached Housing (210)	95	$ln(T) = 0.92\,ln(X) + 2.68$ 50% in/50% out	$ln(T) = 0.91\,ln(X) + 0.12$ 25% in/75% out	$ln(T) = 0.94\,ln(X) + 0.27$ 63% in/37% out

T – Site-generated trips X – Square Feet of Building

The proposed site generated traffic projections are illustrated in **Table 2.**

Table 2: Site Generated Traffic Projections

ITE Land Use	Units	Vehicle Type	Daily	AM Peak Hour			PM Peak Hour		
				In	Out	Total	In	Out	Total
Single-Family Detached Housing (210)	*95*	*All*	*963*	*18*	*53*	*71*	*60*	*35*	*95*

Directional Distribution

The estimated distribution of primary site-generated traffic on the surrounding roadway network as it approaches and departs the site is a function of several variables, such as the nature of surrounding land uses, prevailing traffic volumes/patterns, characteristics of the street system, and the ease with which motorists can travel over various sections of that system. The distribution of trips entering/exiting the proposed site was referenced from the *Smart Services, Clarkshaw Village Traffic Impact Study, 2022*. The anticipated directional distributions estimated for primary trips are outlined in **Table 3**. The proposed total site generated trips are illustrated in **Exhibit 3.**

Table 3: Estimated Trip Distribution

Traveling to/from:	*Estimated Total Trip Distribution*
West Bean-Oller Road	*20%*
East Bean-Oller-Road	*30%*
West Clark-Shaw Road	*17%*
East on Clark-Shaw Road	*33%*

Build Traffic Assignment

The build traffic assignment represents traffic volumes at the study intersections upon construction of the proposed development. The 2034 Build traffic assignment consists of the 2034 No Build trips plus the total site generated trips. The 2034 Build traffic volumes for the study intersections are illustrated in **Exhibit 4.** Per DCEO request, the internal site AADT volumes are provided in **Appendix F.**

Exhibit 3: Site Generated Trips AM & PM Peak Hour Vehicle Volumes

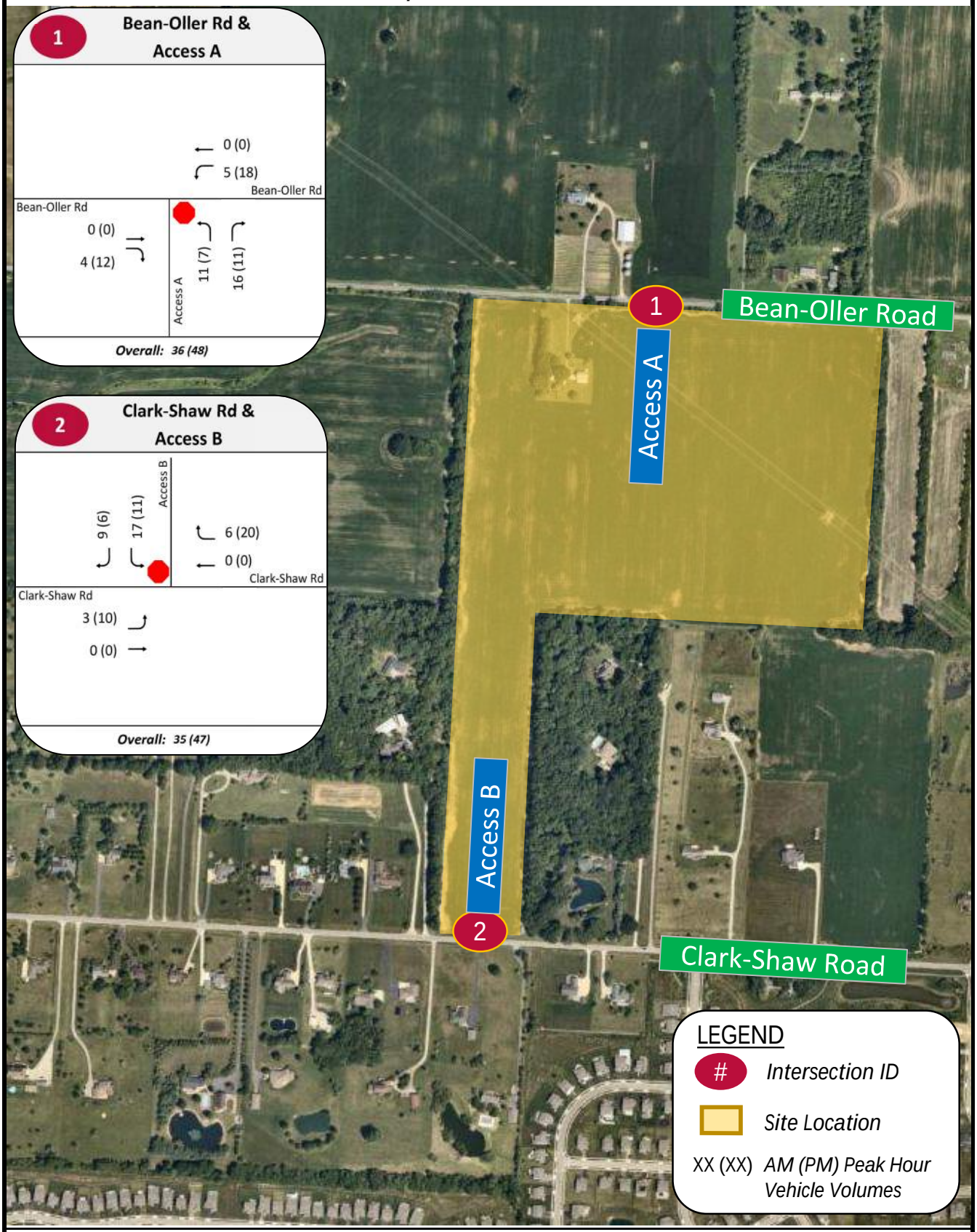
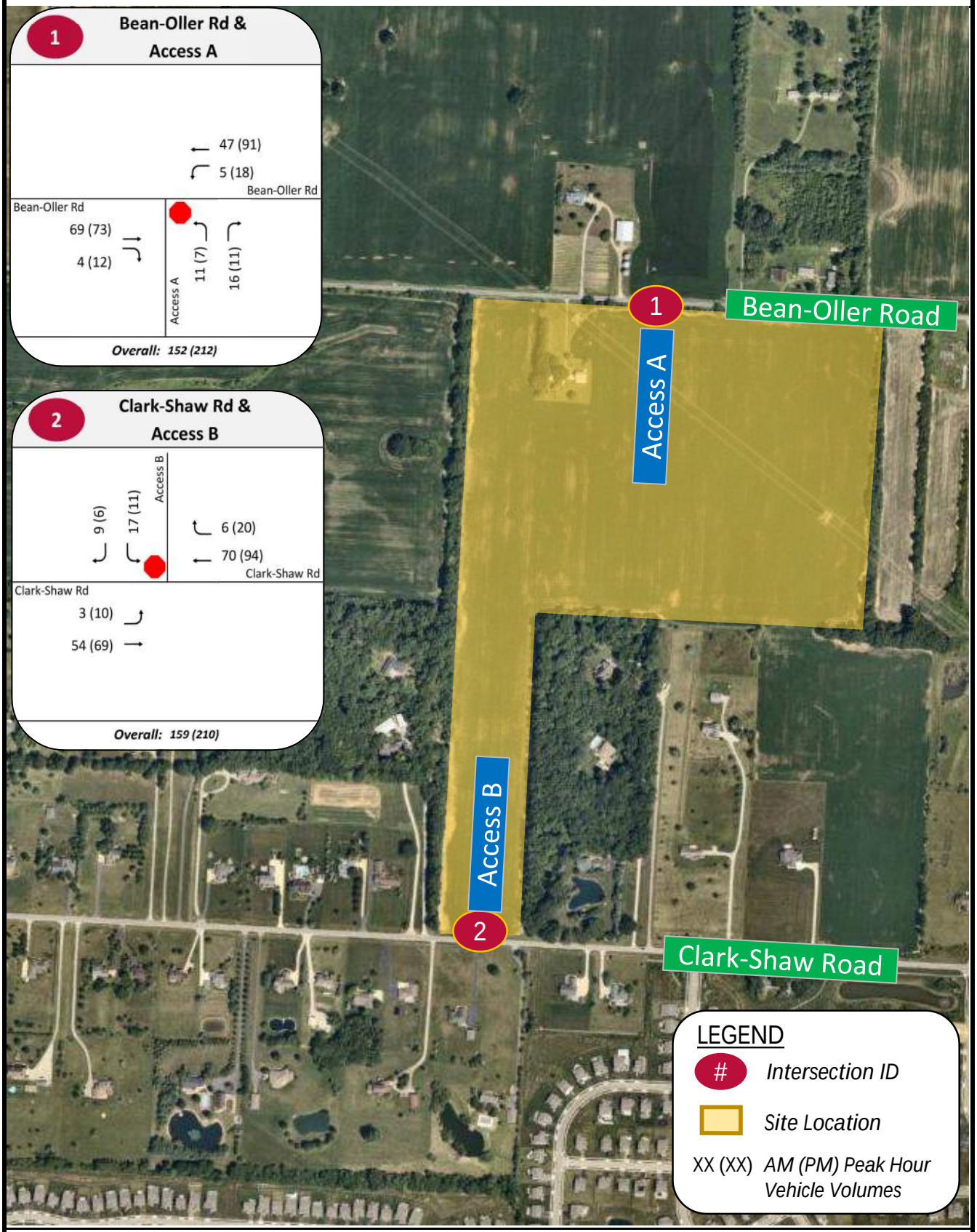


Exhibit 4: 2034 Build AM & PM Peak Hour Vehicle Volumes



ANALYSIS

This section of the report provides an overview of turn lane analysis and capacity analysis for the design year (2034) traffic volumes for the study intersections.

Turn-Lane Warrant Analysis

The ODOT Location and Design Manual, and Delaware County Engineer's Office (DCEO) Traffic Impact Study (TIS) Standards, *Appendix I* were used to determine if turn lanes are warranted at the study intersections. **Table 4** provides a summary of the turn-lane warrant analysis and calculated storage length per ODOT location and Design Manual Standards.

A copy of the turn-lane analysis and turn-lane length calculations are provided in **Appendix C and D**.

Table 4: Turn Lane Warrant Analysis Summary

Intersection	Movement	Warranted Turn Lane? 2034 Build		Recommended Turn Lane Length (ft)
		AM	PM	
Bean-Oller Road and Access A	WBLT	Yes[1]	Yes[1]	225
	EBRT	No	No	-
Clark-Shaw Road and Access B	WBRT	No	No	-
	EBLT	No	No	-

[1]Per Delaware County Traffic Impact Study Standards, major collector roads (speed limit >40) with more than 10 left-turning vehicles during peak hour warrants left-turn lane.

CONCLUSIONS

The following improvements are recommended based on the analysis of this study. Improvements recommended during “Build Conditions” represent items which were warranted based on the addition of site-generated trips.

2034 Build Condition

- Construct a westbound left-turn lane at Bean-Oller Road and Access A intersection. The recommended length of this turn-lane is 225 feet including a 50-foot diverging taper.

APPENDIX

A – Conceptual Site Plan

B - Data from ITE Trip Generation, 11th Edition

C – Turn Lane Warrant Analysis

D – Turn Lane Length Calculations

E – Approved Clarkshaw Village Traffic Impact Study

F – Internal Site AADT Volumes

APPENDIX

A. Conceptual Site Plan

SITE DATA

TOTAL ACRES	± 63.63 ACRES
DENSITY AT 1.5 DU/AC	95 LOTS
LOT SIZE	62' x 120'

CONCEPT PLAN - CLARKSHAW ROAD

DULIN PROPERTY

PREPARED FOR MARONDA HOMES

DATE: 12.15.23

NORTH
1"=100'

0 50 100 200 300

Faris Planning & Design

LAND PLANNING • LANDSCAPE ARCHITECTURE

4876 Cemetery Road
p (614) 487-1964

Hilliard, OH 43026
www.farisplanninganddesign.com

APPENDIX

B. Data from ITE Trip Generation, 11th Edition

Single-Family Detached Housing
(210)

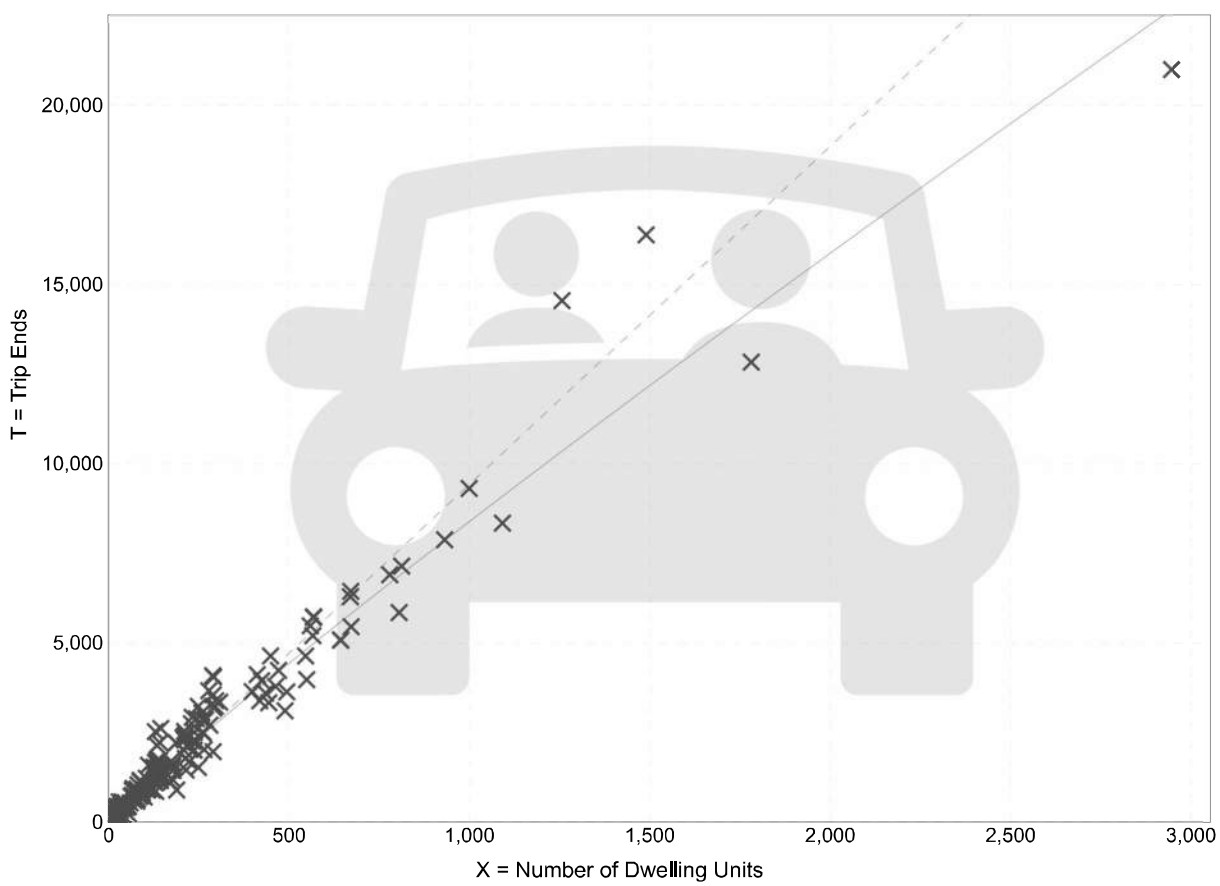
Vehicle Trip Ends vs: **Dwelling Units**
On a: **Weekday**

Setting/Location: **General Urban/Suburban**
Number of Studies: 174
Avg. Num. of Dwelling Units: 246
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
9.43	4.45 - 22.61	2.13

Data Plot and Equation



Fitted Curve Equation: Ln(T) = 0.92 Ln(X) + 2.68 **R^2= 0.95**

Trip Gen Manual, 11th Edition • Institute of Transportation Engineers

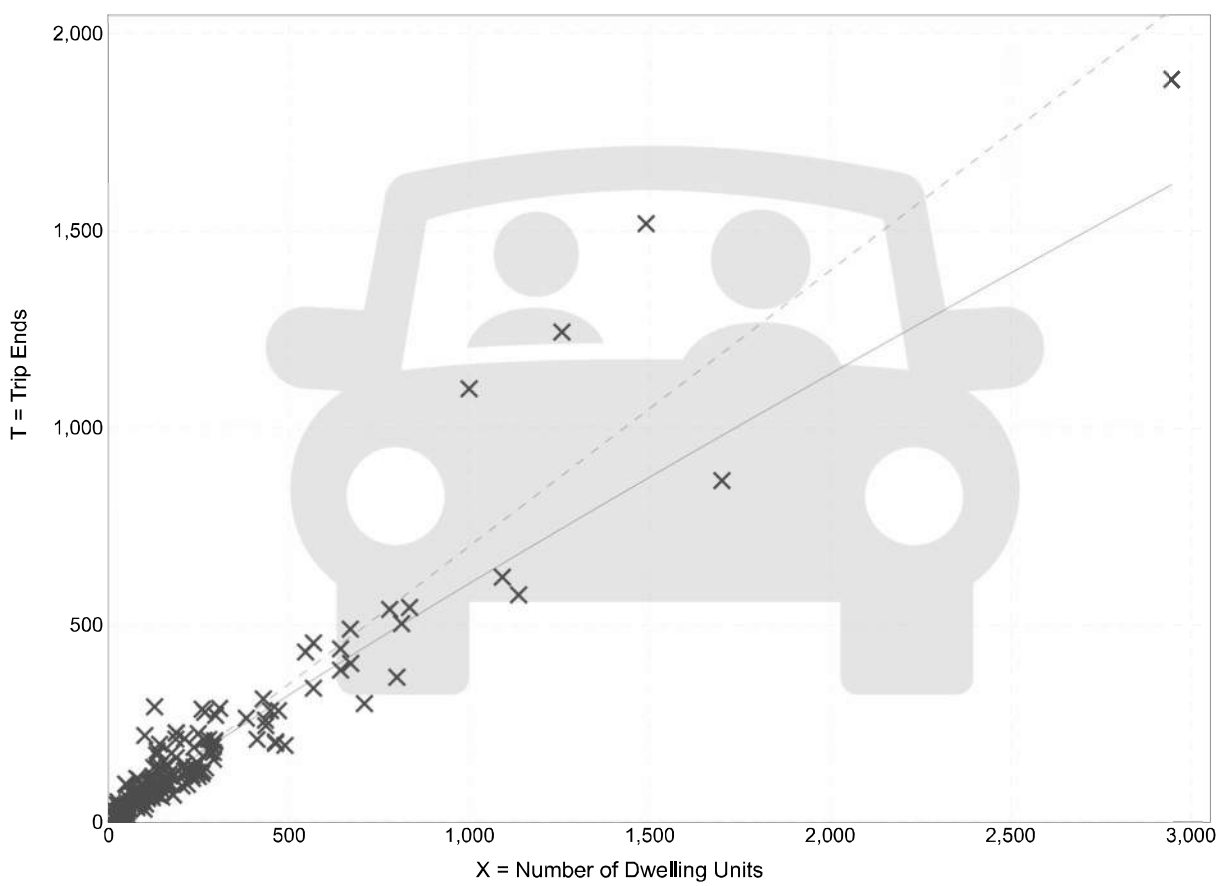
Single-Family Detached Housing
(210)

Vehicle Trip Ends vs:	**Dwelling Units**
On a:	**Weekday,**
	Peak Hour of Adjacent Street Traffic,
	One Hour Between 7 and 9 a.m.
Setting/Location:	**General Urban/Suburban**
Number of Studies:	192
Avg. Num. of Dwelling Units:	226
Directional Distribution:	25% entering, 75% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.70	0.27 - 2.27	0.24

Data Plot and Equation



Fitted Curve Equation: Ln(T) = 0.91 Ln(X) + 0.12 **R^2= 0.90**

Trip Gen Manual, 11th Edition • Institute of Transportation Engineers

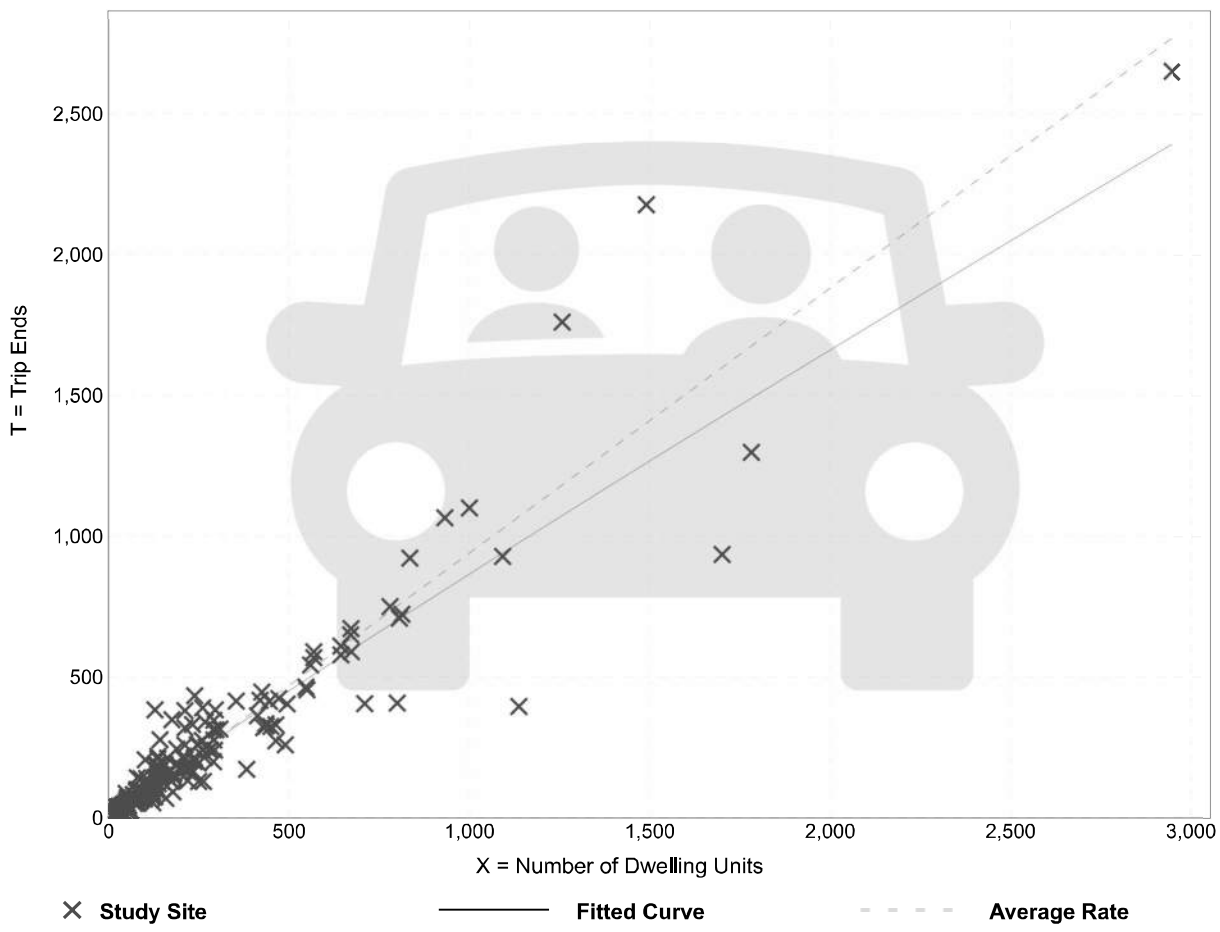
Single-Family Detached Housing
(210)

Vehicle Trip Ends vs:	**Dwelling Units**
On a:	**Weekday,**
	Peak Hour of Adjacent Street Traffic,
	One Hour Between 4 and 6 p.m.
Setting/Location:	**General Urban/Suburban**
Number of Studies:	208
Avg. Num. of Dwelling Units:	248
Directional Distribution:	63% entering, 37% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.94	0.35 - 2.98	0.31

Data Plot and Equation



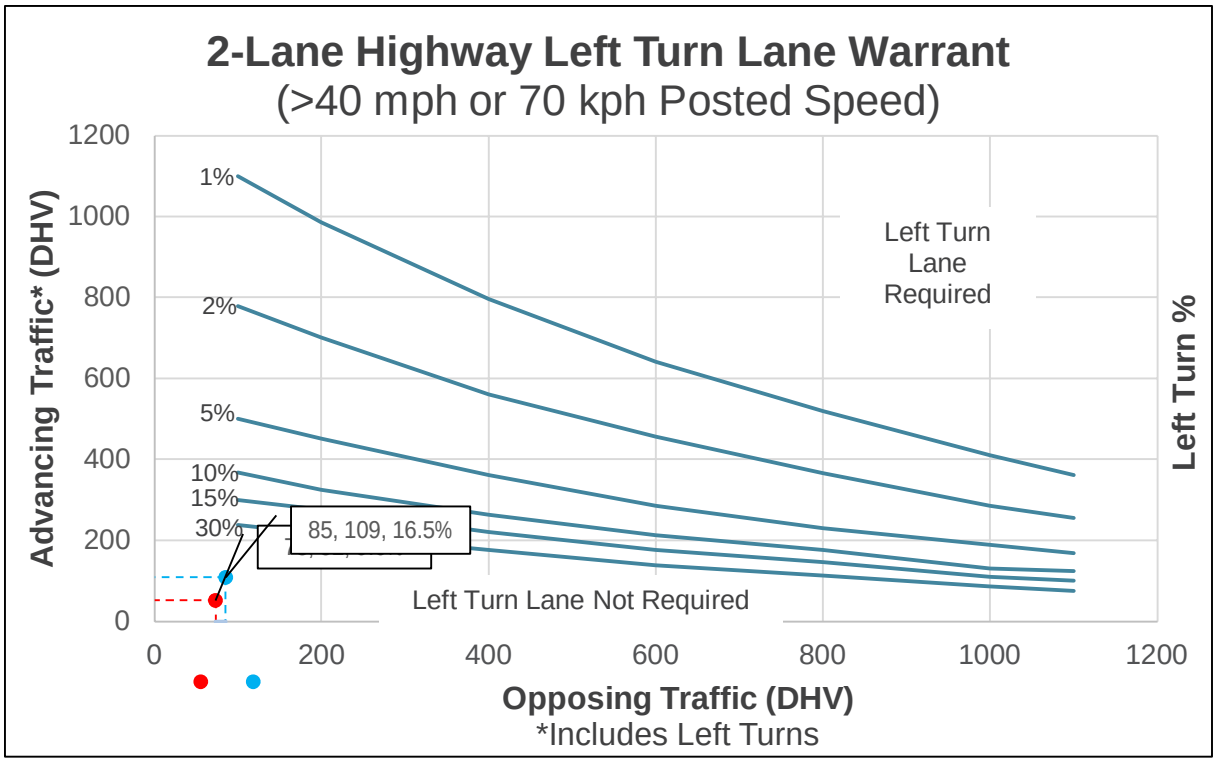
Fitted Curve Equation: Ln(T) = 0.94 Ln(X) + 0.27 **R^2= 0.92**

Trip Gen Manual, 11th Edition • Institute of Transportation Engineers

APPENDIX

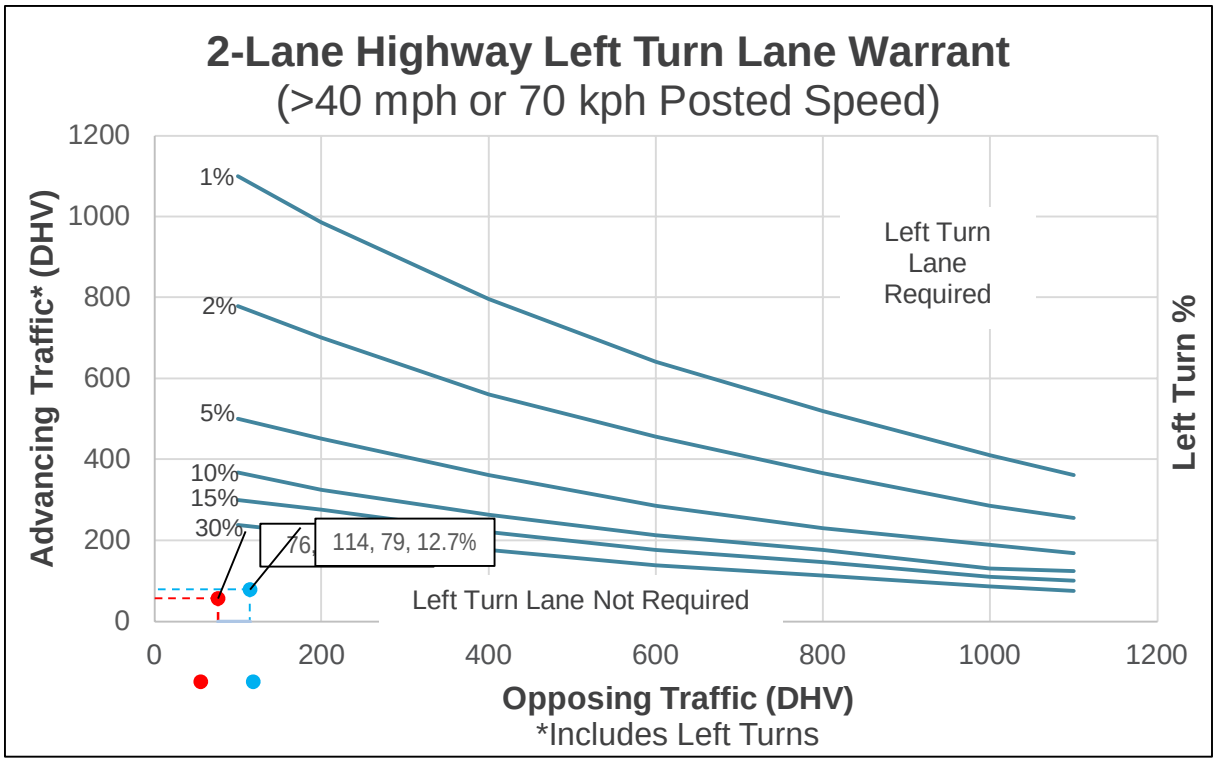
C. Turn Lane Warrant Charts

Project: Dulin Farms
Intersection: Bean-Oller Rd and Access A
Turning Movement: 2034 Build



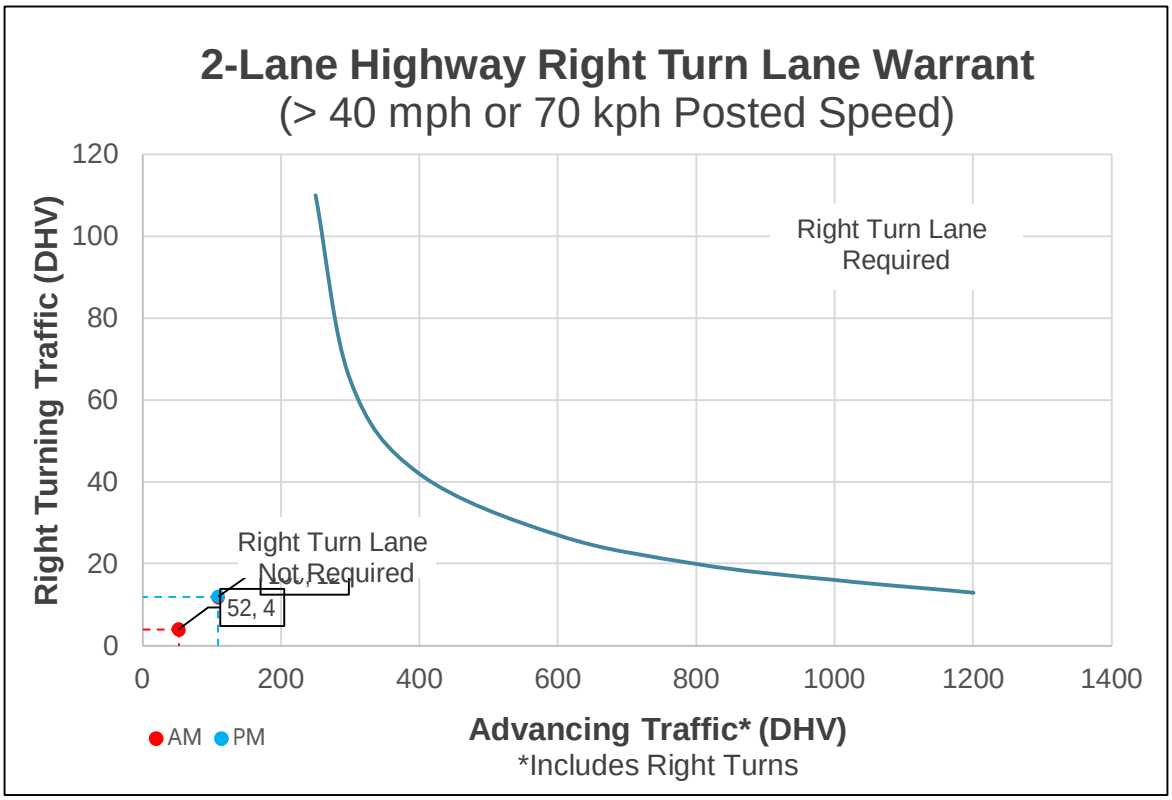
	AM Peak	PM Peak
Design Speed (mph)	50	50
Left Turn Volume (VPH)	5	18
Advancing Traffic (DHV)	52	109
Opposing Volume (VPH)	73	85
Left Turn Percentage	9.6%	16.5%
Is Left Turn Warrant Met?	No	No

Project: Dulin Farms
Intersection: Clark-Shaw Rd and Access B
Turning Movement: 2034 Build



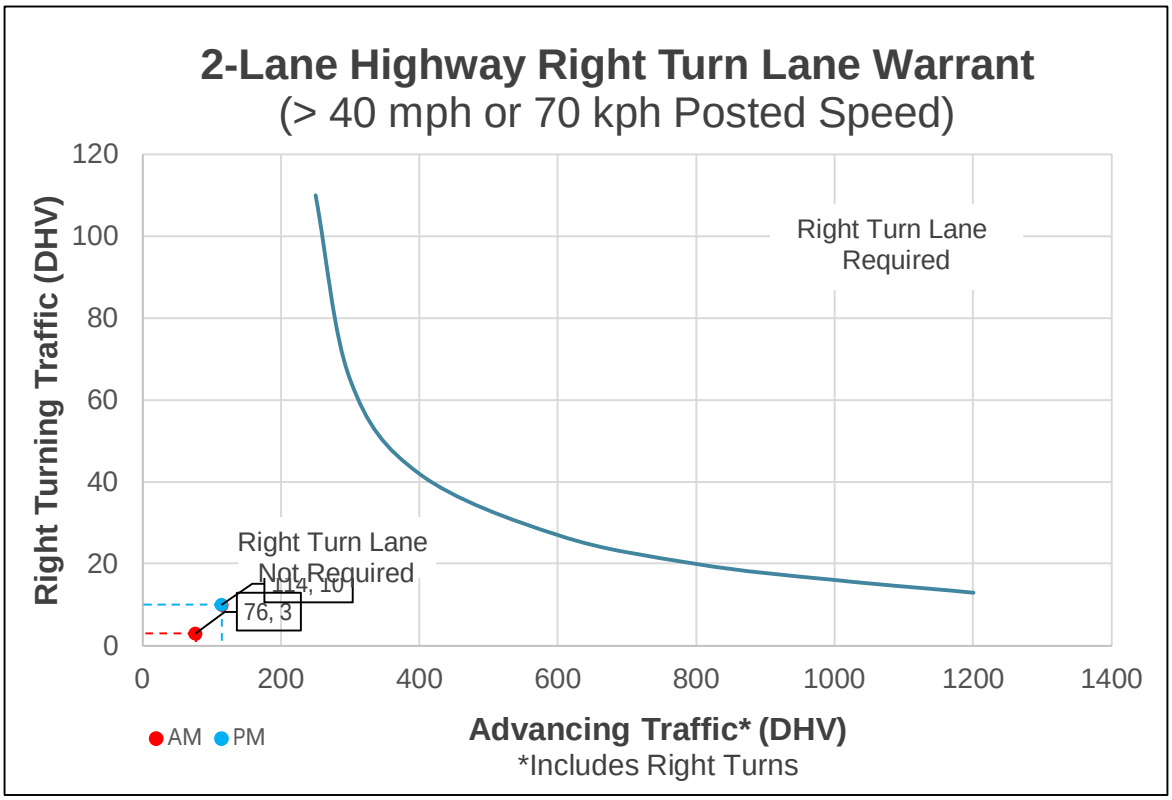
	AM Peak	PM Peak
Design Speed (mph)	55	55
Left Turn Volume (VPH)	3	10
Advancing Traffic (DHV)	57	79
Opposing Volume (VPH)	76	114
Left Turn Percentage	5.3%	12.7%
Is Left Turn Warrant Met?	No	No

Project: Dulin Farms
Intersection: Bean-Oller Rd and Access A
Turning Movement: 2034 Build



	AM Peak	PM Peak
Design Speed (mph)	50	50
Right Turning Traffic (dhv)	4	12
Advancing Traffic (VPH)	52	109
Is Right Turn Warrant Met?	No	No

Project: Dulin Farms
Intersection: Clark-Shaw Rd and Access B
Turning Movement: 2034 Build



	AM Peak	PM Peak
Design Speed (mph)	55	55
Right Turning Traffic (dhv)	3	10
Advancing Traffic (VPH)	76	114
Is Right Turn Warrant Met?	No	No

APPENDIX

D. Turn Lane Length Calculations

2034 Build		Bean-Oller Road & Access A									
Cycle Length (Secs.)	Movement	Design Speed (mph)	# of Lanes		Peak	Thru Lane DHV	Turn Lane DHV	Calculated Turn Lane (FT)	Thru Movement Backup (FT)	Blocked	Reccommended Turn Lane (FT)
			Thru	Turn							
60	EBL	50	1	0	AM	73	0	N/A	N/A	N/A	N/A
					PM	85	0	N/A	N/A	N/A	
	EBR		1	0	AM	69	4	N/A	N/A	N/A	N/A
					PM	73	12	N/A	N/A	N/A	
	WBL	50	1	1	AM	47	5	225	100	N/A	225
					PM	91	18	225	150	N/A	
	WBR		1	0	AM	47	0	N/A	N/A	N/A	N/A
					PM	91	0	N/A	N/A	N/A	
	NBL	25	1	0	AM	16	11	N/A	N/A	N/A	N/A
					PM	11	7	N/A	N/A	N/A	
	NBR		1	0	AM	11	16	N/A	N/A	N/A	N/A
					PM	7	11	N/A	N/A	N/A	
	SBL	0	0	0	AM	0	0	N/A	N/A	N/A	N/A
					PM	0	0	N/A	N/A	N/A	
	SBR		0	0	AM	0	0	N/A	N/A	N/A	N/A
					PM	0	0	N/A	N/A	N/A	

APPENDIX

E. Approved Clarkshaw Village Traffic Impact Study

APPROVED
By mlove at 8:48 am, Jan 15, 2022

Clarkshaw Village
Traffic Impact Study

Prepared For:

Metro Development, LLC

Prepared By:

SMART SERVICES
SURVEYING · ENGINEERING · ENVIRONMENTAL

1900 Crown Park Court, Suite E
Columbus, OH 43235
(614) 914-5543
www.SmartServices-Inc.com

December 2021

SSI Project #: 814901

Clarkshaw Village
Traffic Impact Study

Prepared For:

Metro Development, LLC
470 Olde Worthington Road
Westerville, OH 43082

Telephone: (614) 540-2400

Prepared By:

Smart Services, Inc.
1900 Crown Park Court, Suite E
Columbus, OH 43235

Telephone: (614) 914-5543
e-mail: tstanhope@smartservices-inc.com

Under the direction of:

Registered Engineer No. E-64507, Ohio

12-3-2021
Date

STATE OF OHIO
TODD J. STANHOPE
E-64507
REGISTERED PROFESSIONAL ENGINEER

December 2021

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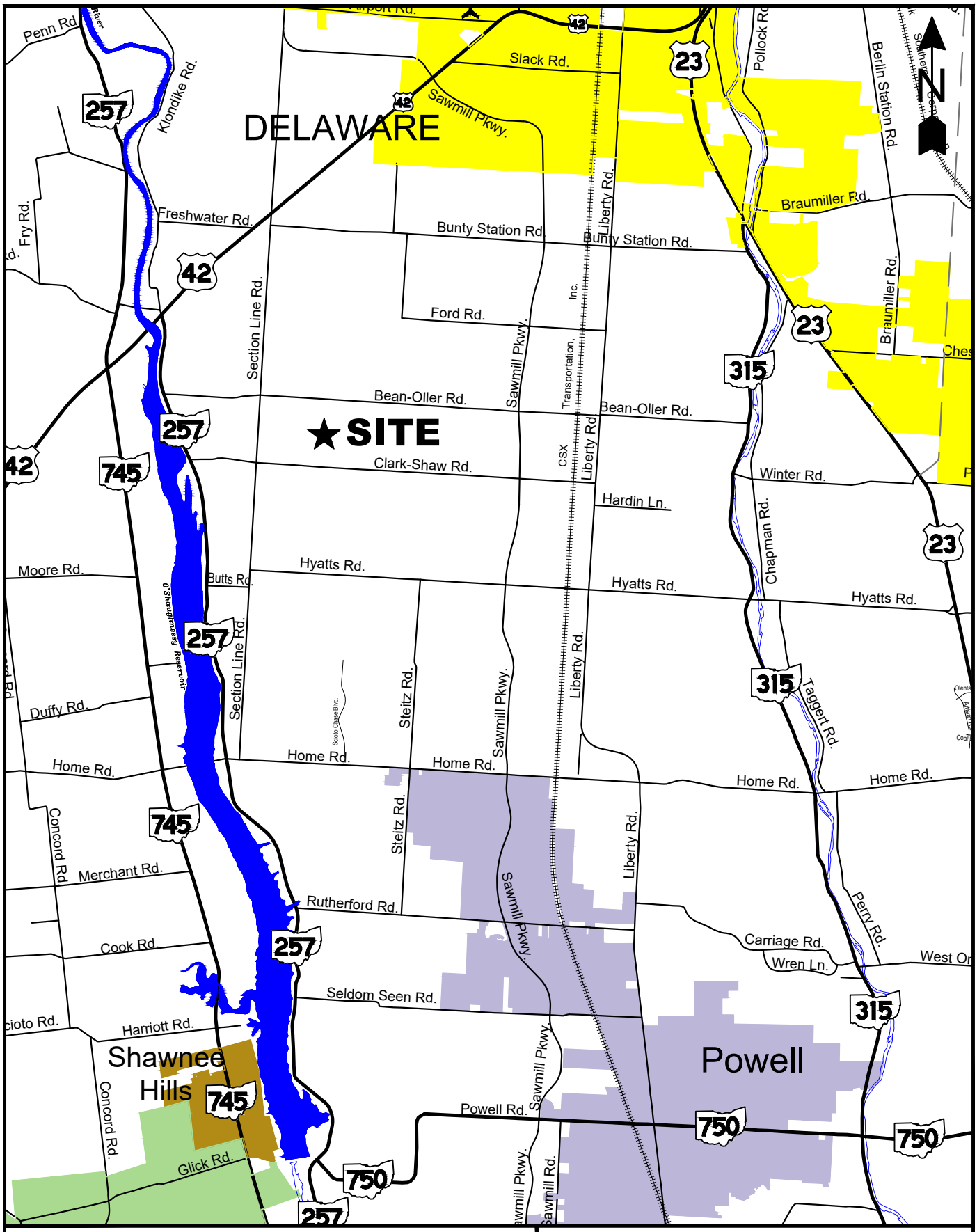
APPENDIX

BACKGROUND

Metro Development is proposing to develop a site with approximately 126 single family lots. The site is located on the north side of Clark-Shaw Road and the south side of Bean-Oller Road in the segment between S. Section Line Road and Sawmill Parkway. Figure 1 shows the location of the site. There are two proposed full access points: one on Clark-Shaw Road and one on Bean-Oller Road. Figure 2 shows the site plan. In addition, there are stub streets near Bean-Oller Road into adjacent parcels. The permitting agency for the accesses is the Delaware County Engineer's Office (DCEO). The proposed development will exceed the 100 peak hour trip threshold for a Traffic Impact Study (TIS). Therefore, the DCEO is requiring a TIS.

The scope of the TIS is contained in a Memo of Understanding (MOU) dated 11/3/2021 that was submitted to the DCEO. The MOU was approved with comment by the DCEO on 11/19/2021. A copy of the approved MOU is in Appendix.



CLARKSHAW VILLAGE TRAFFIC IMPACT STUDY

PREPARED BY: SMART SERVICES

12/2021

FIGURE 1

SITE LOCATION

CLARKSHAW VILLAGE TRAFFIC IMPACT STUDY

PREPARED BY: SMART SERVICES

12/2021

FIGURE 2

SITE LAYOUT

EXISTING CONDITIONS

Table 1 shows the speed limit and classification for the roadways in the study area.

STREET	POSTED SPEED LIMIT	DESIGN SPEED	DELAWARE COUNTY THOROUGHFARE PLAN CLASS
Clark-Shaw Road	**Unposted**	**55 MPH**	**Minor Collector**
Bean-Oller Road	**50 MPH**	**50 MPH**	**Major Collector**
S. Section Line Road	**45 MPH**	**45 MPH**	**Major Arterial**

TABLE 1 - Summary of Roadway Designations

Table 2 shows the summary of the basis of existing traffic volumes.

INTERSECTION	SOURCE	AM PEAK HOUR	PM PEAK HOUR
***S. Section Line Rd & Bean-Oller Road**	**Smart Services, Inc.**	**11/4/2021 7:15-8:15 AM**	**11/4/2021 4:45-5:45 PM**
***S. Section Line Rd & Clark-Shaw Rd**	**Smart Services, Inc.**	**11/4/2021 7:15-8:15 AM**	**11/4/2021 4:30-5:30 PM**
****Sawmill Parkway & Clark-Shaw Rd**	**Smart Services, Inc.**	**11/18/2021 7:15-8:15 AM**	**11/18/2021 4:30-5:30 PM**

*=Volumes on the east leg was carried to the site access.
**=Not part of study area but referenced in distribution calculations.

TABLE 2 – Summary of Existing Traffic Basis

PROJECTED SITE TRAFFIC

Trip Generation

The site traffic was computed using *Trip Generation Manual, 11th Edition*, published by the Institute of Transportation Engineers (ITE). The land use that represents development on the site is "Single Family Detached Housing" (ITE Code #210). Table 3 shows the proposed trip generation.

Trip Distribution

The gateway distribution of traffic is based on existing traffic going away from the site in the AM Peak on Clark-Shaw Road. The following is the resulting distribution with the calculations in brackets:

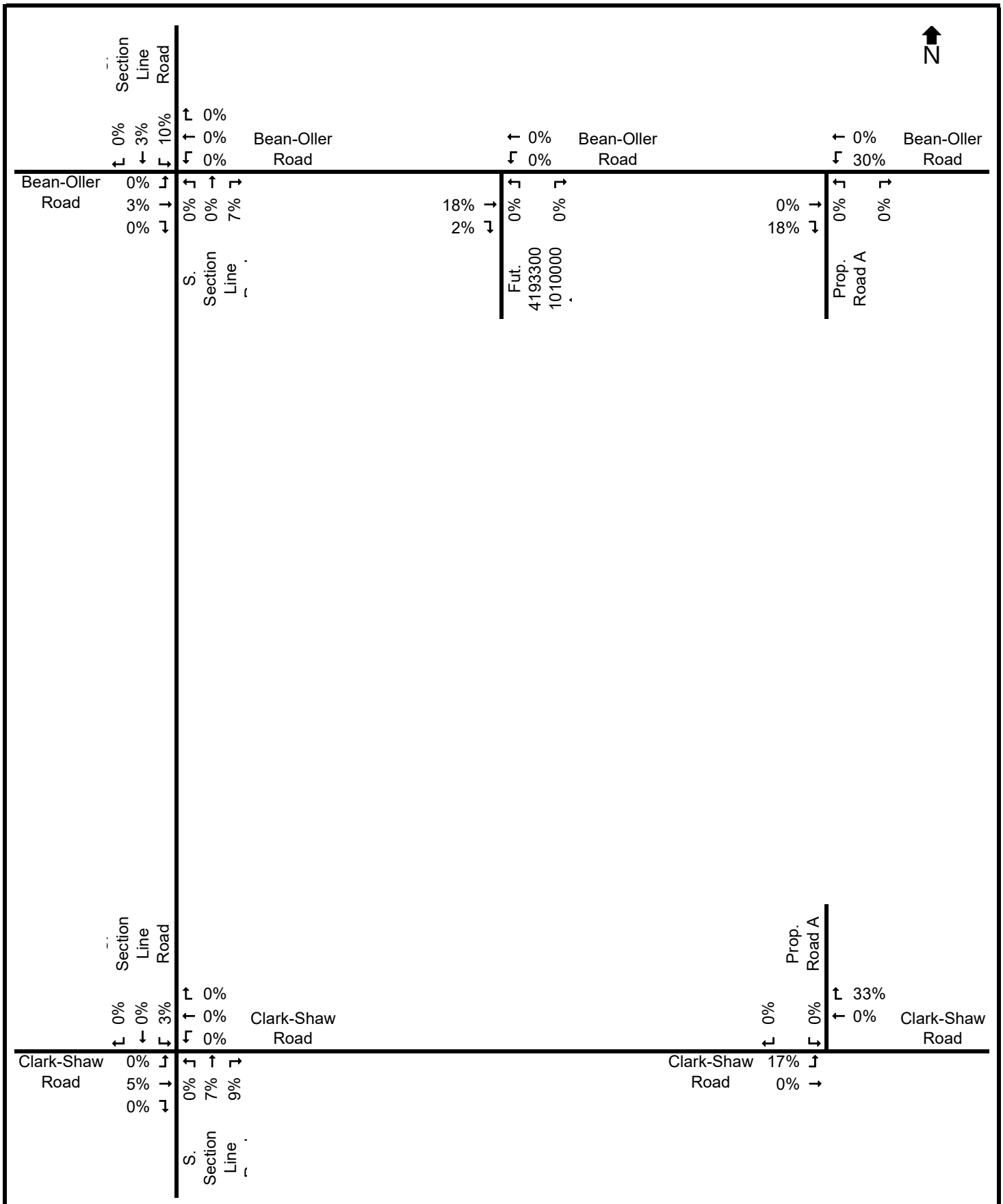
- 37% to/from the west [48/(48+81)]
  - 8% to/from west of Section Line Road [0.37*(10/48)]
  - 13% to/from the north on Section Line Road [0.37*(17/48)]
  - 16% to/from the south on Section Line Road [0.37*(21/48)]
- 63% to/from the east [81/(48+81)]

Figures 3 and 4 show graphically the assignment of the site trips.

TRAFFIC STUDY SUBAREA	LAND USE	TIME OF DAY	DATA SET *Trip Generation Manual, 11th Edition* (Unless noted Otherwise)	RATE OR EQUATION FROM: *Trip Generation Manual 11th Edition*	TOTAL TRIPS	ENTERING		EXITING	
						%	TOTAL TRIPS	%	TOTAL TRIPS
1	**Single-Family Detached Housing (ITE Code #210)**	**Daily**	**Weekday**	**ln(T)=0.92ln(X)+2.68**	**1175**	**50%**	**588**	**50%**	**587**
		AM Peak	**Peak Hour of Adj. Street Traffic, One Hour between 7 & 9 AM**	**ln(T)=0.91ln(X)-0.12**	**87**	**26%**	**23**	**74%**	**64**
	Ind. Variable (X) = 118 Dwelling Units	**PM Peak**	**Peak Hour of Adj. Street Traffic, One Hour between 4 & 6 PM**	**ln(T)=0.94ln(X)+0.27**	**116**	**63%**	**73**	**37%**	**43**
TOTALS		**Daily**			**1175**		**588**		**587**
		AM Peak			**87**		**23**		**64**
		PM Peak			**116**		**73**		**43**

Clarkshaw Village Traffic Impact Study - 12/2021

TABLE 3 - SITE TRIP GENERATION SUMMARY

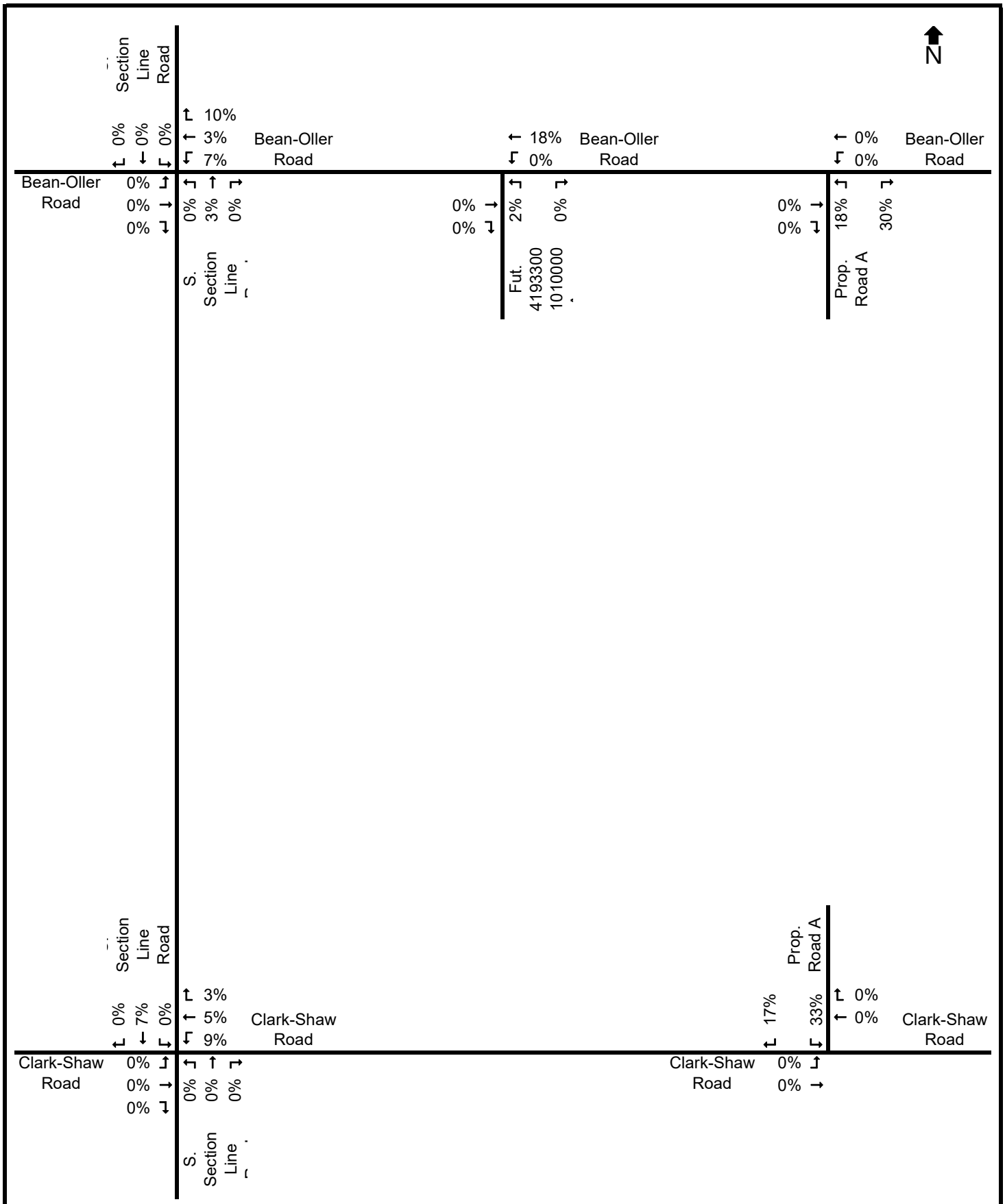


CLARKSHAW VILLAGE
TRAFFIC IMPACT STUDY

PREPARED BY: SMART SERVICES 12/2021

FIGURE 3

SITE PRIMARY DISTRIBUTION (ENTERING)



CLARKSHAW VILLAGE
TRAFFIC IMPACT STUDY

PREPARED BY: SMART SERVICES 12/2021

FIGURE 4

SITE TRAFFIC DISTRIBUTION (EXITING)

2022 & 2032 TRAFFIC

Per the MOU, a 10-Year design horizon is required. Opening Day is assumed to be 2022, therefore the design year is 2032. There are two components to the background traffic. The first is the application of background growth rates and the second is traffic from adjacent developments.

Background Growth Rates

Annual growth rates were obtained from the Mid-Ohio Regional Planning Commission (MORPC). Table 4 shows the growth rates and corresponding factors. The correspondence from MORPC is in the Appendix.

SEGMENT	LINEAR ANNUAL GROWTH RATE	2021 TO 2022 FACTOR	2021 TO 2032 FACTOR
Section Line Road north of Bean-Oller Road	**1.70%**	**1.017**	**1.187**
Section Line Road south of Bean-Oller Road	**1.90%**	**1.019**	**1.209**
Clark-Shaw Road and Bean-Oller Road Segments	**3.00%**	**1.030**	**1.330**

TABLE 4 – Growth Factor Summary for 2021 Counts

Adjacent Parcels

Per the MOU, an estimate of the traffic generated by undeveloped parcels totaling 85.96 acres to the east and west of the site is to be included in the background traffic. Both adjacent sites are assumed to have at least one full access on their frontage. The specific parcels and sizes included are as follows:

- 41933001010000 (67 acres west of site)
- 41933001007002 (18.96 acres east site)

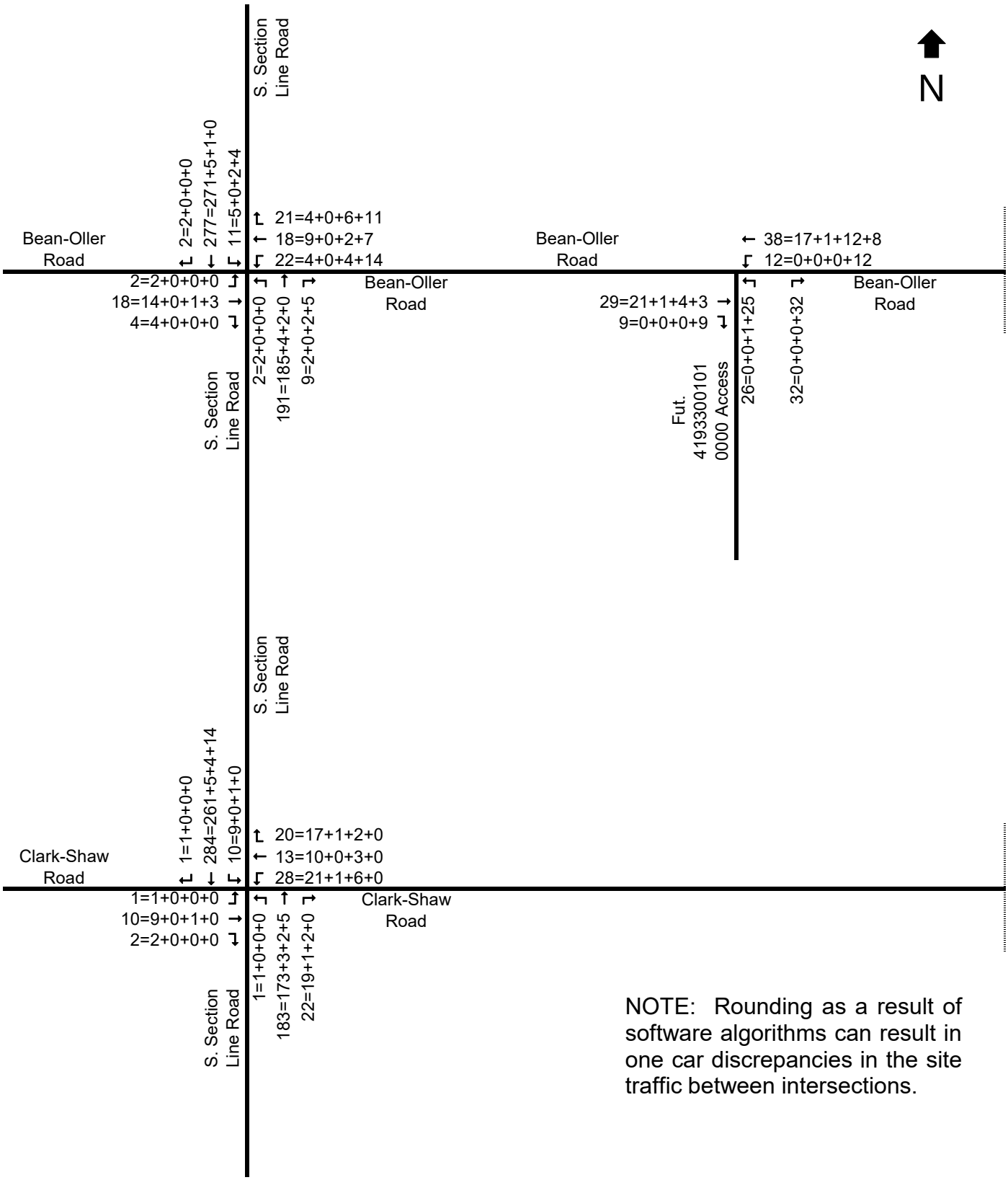
The Clarkshaw Village development is approximately 63.63 Acres which results in a density of 1.85 single family dwelling units per acre. Applying this density to the 67 acres to the west results in an assumption of 124 dwelling units. Applying this density to the 18.962 acres to the east results in an assumption of 35 dwelling units. Table 5 shows the trip generation calculations for the adjacent parcels based on the trips per acre of the Clarkshaw Village. The trips generated were assigned to the network with the same distribution as the site traffic. Based on location and size of the adjacent site to the east, it was assumed that site traffic would not go through the development to the east and vice versa.

Exhibits

Figures 5A, 5B, 6A, and 6B show the components of the 2022 Build' traffic. Figures 7A, 7B, 8A, and 8B show the components of the 2032 'Build' traffic. To assist with review, exhibits showing the 2022 'No Build' and 2032 'No Build' are in the Appendix. Figure 9 shows the daily traffic at the site accesses.

DESCRIPTION	LAND USE	DATA SET *Trip Generation Manual, 11th Edition* (Unless noted Otherwise)	RATE OR EQUATION FROM: *Trip Generation Manual 11th Edition*	TOTAL TRIPS	ENTERING		EXITING	
					%	TOTAL TRIPS	%	TOTAL TRIPS
41933001010000	Single-Family Detached Housing (ITE Code #210)	Weekday	ln(T)=0.92ln(X)+2.68	1230	50%	615	50%	615
		Peak Hour of Adj. Street Traffic, One Hour between 7 & 9 AM	ln(T)=0.91ln(X)-0.12	91	26%	24	74%	67
	Ind. Variable (X) = 124 Dwelling Units	Peak Hour of Adj. Street Traffic, One Hour between 4 & 6 PM	ln(T)=0.94ln(X)+0.27	122	63%	77	37%	45
41933001007002	Single-Family Detached Housing (ITE Code #210)	Weekday	ln(T)=0.92ln(X)+2.68	384	50%	192	50%	192
		Peak Hour of Adj. Street Traffic, One Hour between 7 & 9 AM	ln(T)=0.91ln(X)-0.12	29	26%	8	74%	21
	Ind. Variable (X) = 35 Dwelling Units	Peak Hour of Adj. Street Traffic, One Hour between 4 & 6 PM	ln(T)=0.94ln(X)+0.27	37	63%	23	37%	14

TABLE 5 - SITE TRIP GENERATION SUMMARY



NOTE: Rounding as a result of software algorithms can result in one car discrepancies in the site traffic between intersections.

LEGEND
A=B+C+D+E

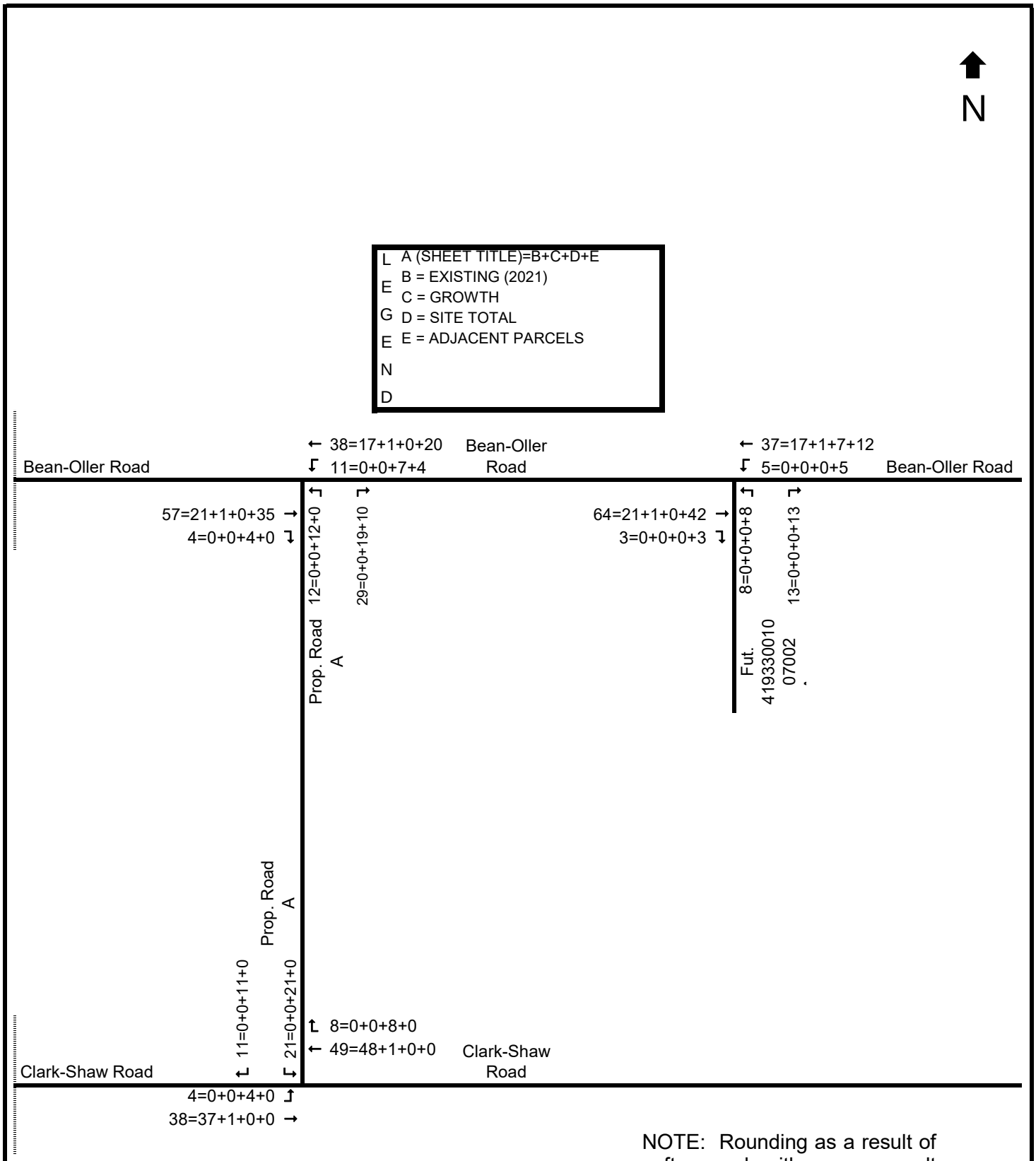
A = 2022 'BUILD' - AM PEAK
B = EXISTING (2021)
C = GROWTH
D = SITE TOTAL
E = ADJACENT PARCELS

CLARKSHAW VILLAGE
TRAFFIC IMPACT STUDY

PREPARED BY: SMART SERVICES 12/2021

FIGURE 5A

2022 'BUILD' - AM PEAK



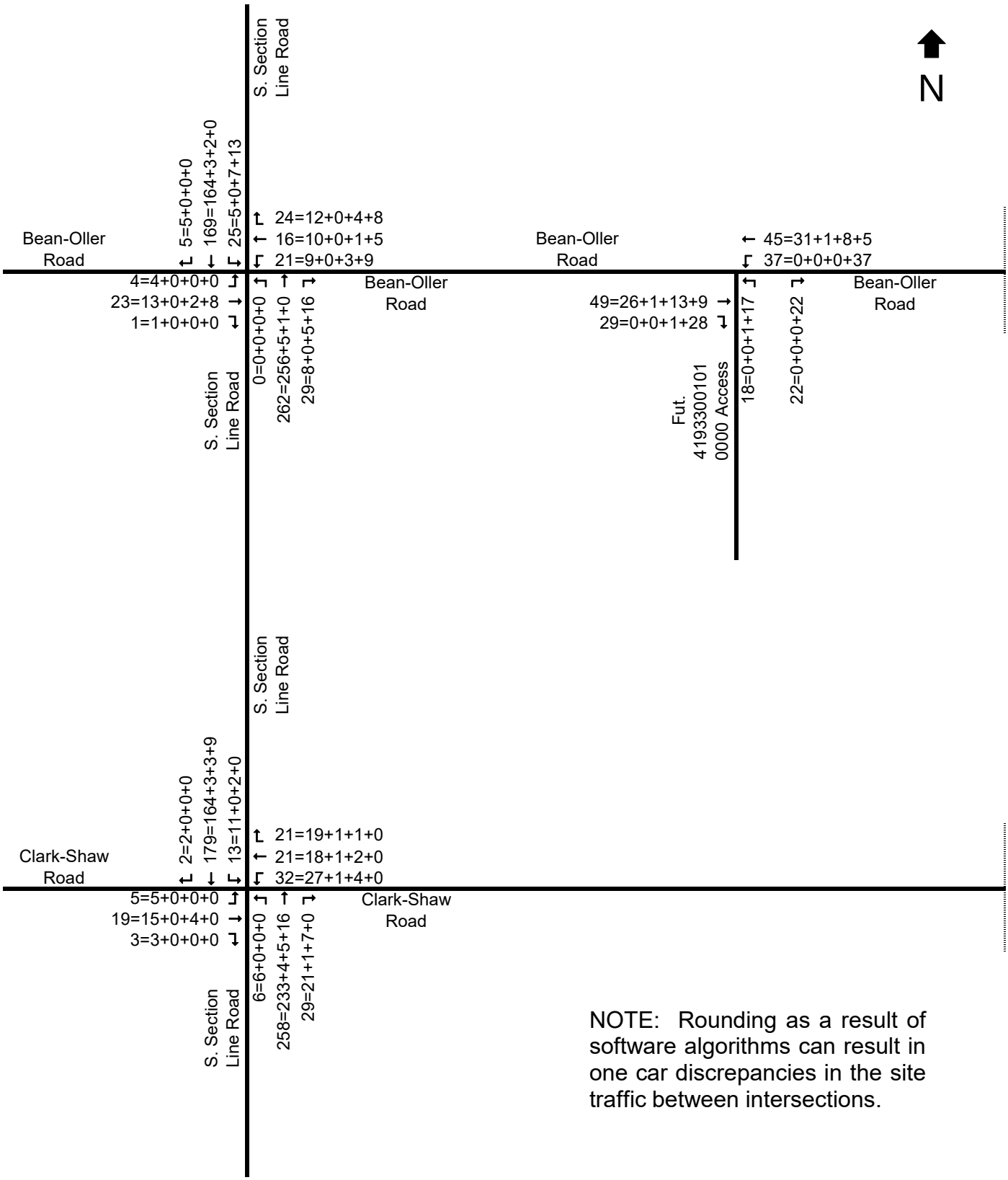
NOTE: Rounding as a result of software algorithms can result in one car discrepancies in the site traffic between intersections.

CLARKSHAW VILLAGE
TRAFFIC IMPACT STUDY

PREPARED BY: SMART SERVICES 12/2021

FIGURE 5B

2022 'BUILD' - AM PEAK



NOTE: Rounding as a result of software algorithms can result in one car discrepancies in the site traffic between intersections.

LEGEND
A=B+C+D+E

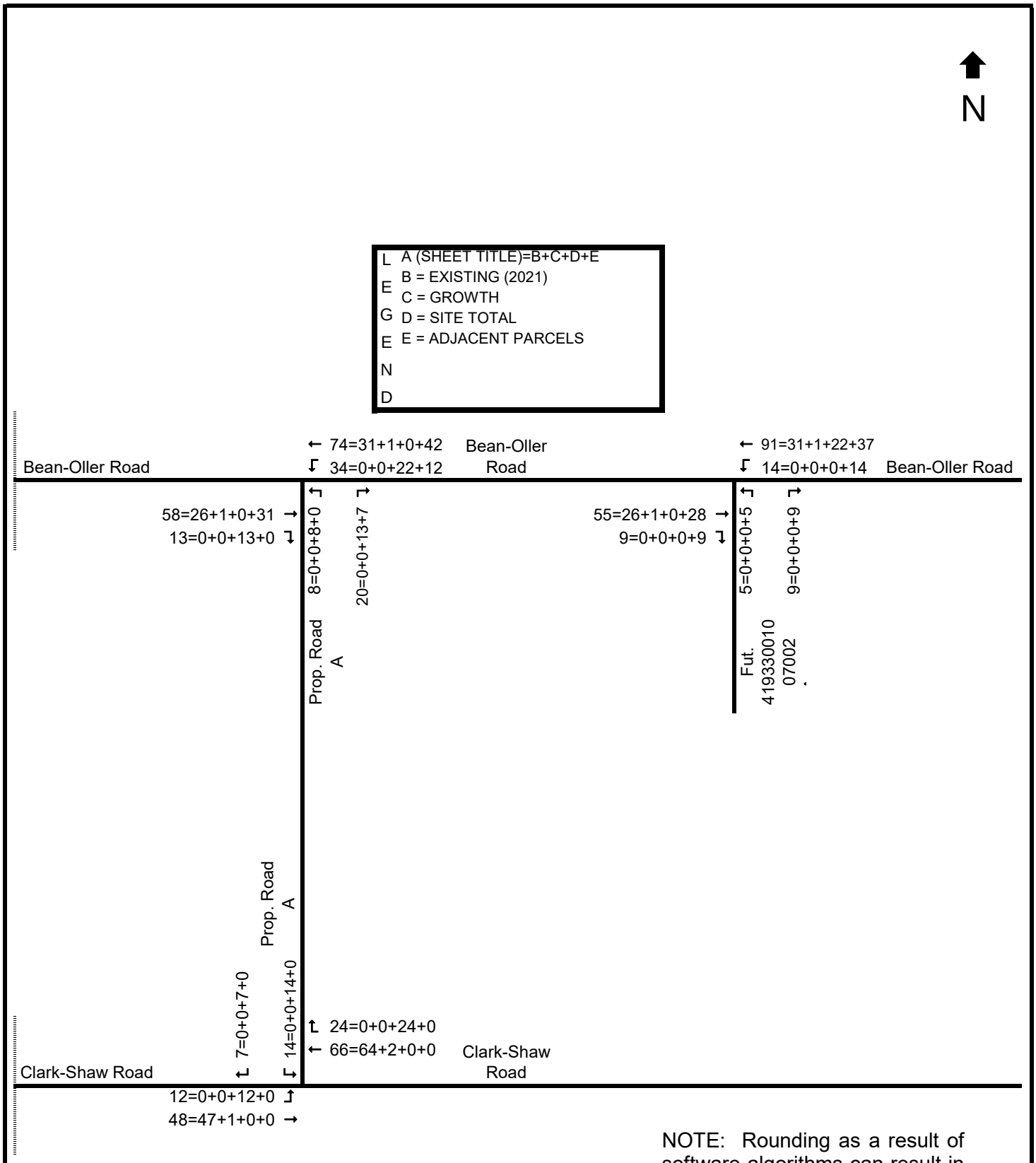
A = 2022 'BUILD' - PM PEAK
B = EXISTING (2021)
C = GROWTH
D = SITE TOTAL
E = ADJACENT PARCELS

CLARKSHAW VILLAGE
TRAFFIC IMPACT STUDY

PREPARED BY: SMART SERVICES 12/2021

FIGURE 6A

2022 'BUILD' - PM PEAK



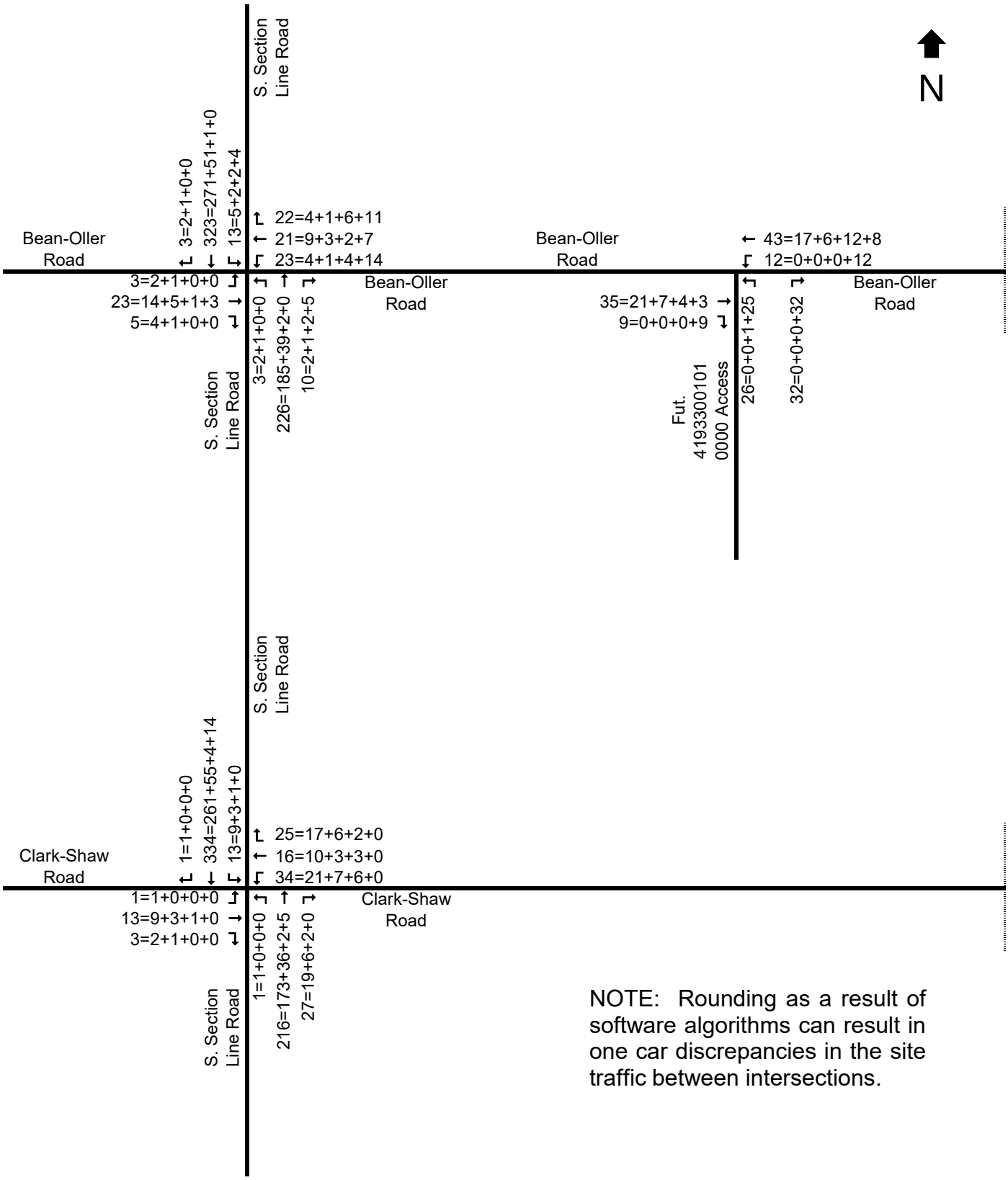
NOTE: Rounding as a result of software algorithms can result in one car discrepancies in the site traffic between intersections.

CLARKSHAW VILLAGE
TRAFFIC IMPACT STUDY

PREPARED BY: SMART SERVICES 12/2021

FIGURE 6B

2022 'BUILD' - PM PEAK



NOTE: Rounding as a result of software algorithms can result in one car discrepancies in the site traffic between intersections.

LEGEND
A=B+C+D+E

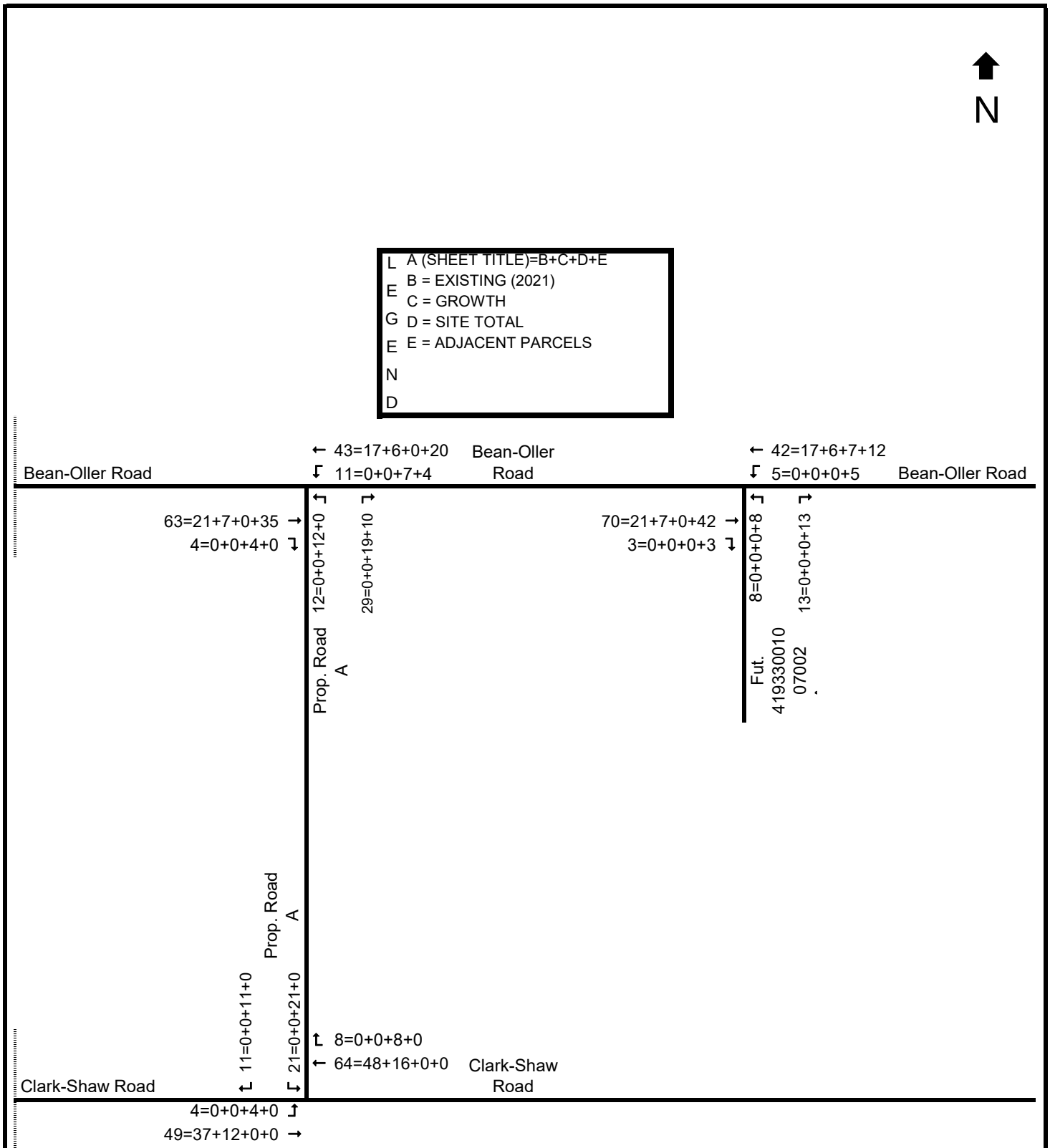
A = 2032 'BUILD' - AM PEAK
B = EXISTING (2021)
C = GROWTH
D = SITE TOTAL
E = ADJACENT PARCELS

CLARKSHAW VILLAGE
TRAFFIC IMPACT STUDY

PREPARED BY: SMART SERVICES 12/2021

FIGURE 7A

2032 'BUILD' - AM PEAK



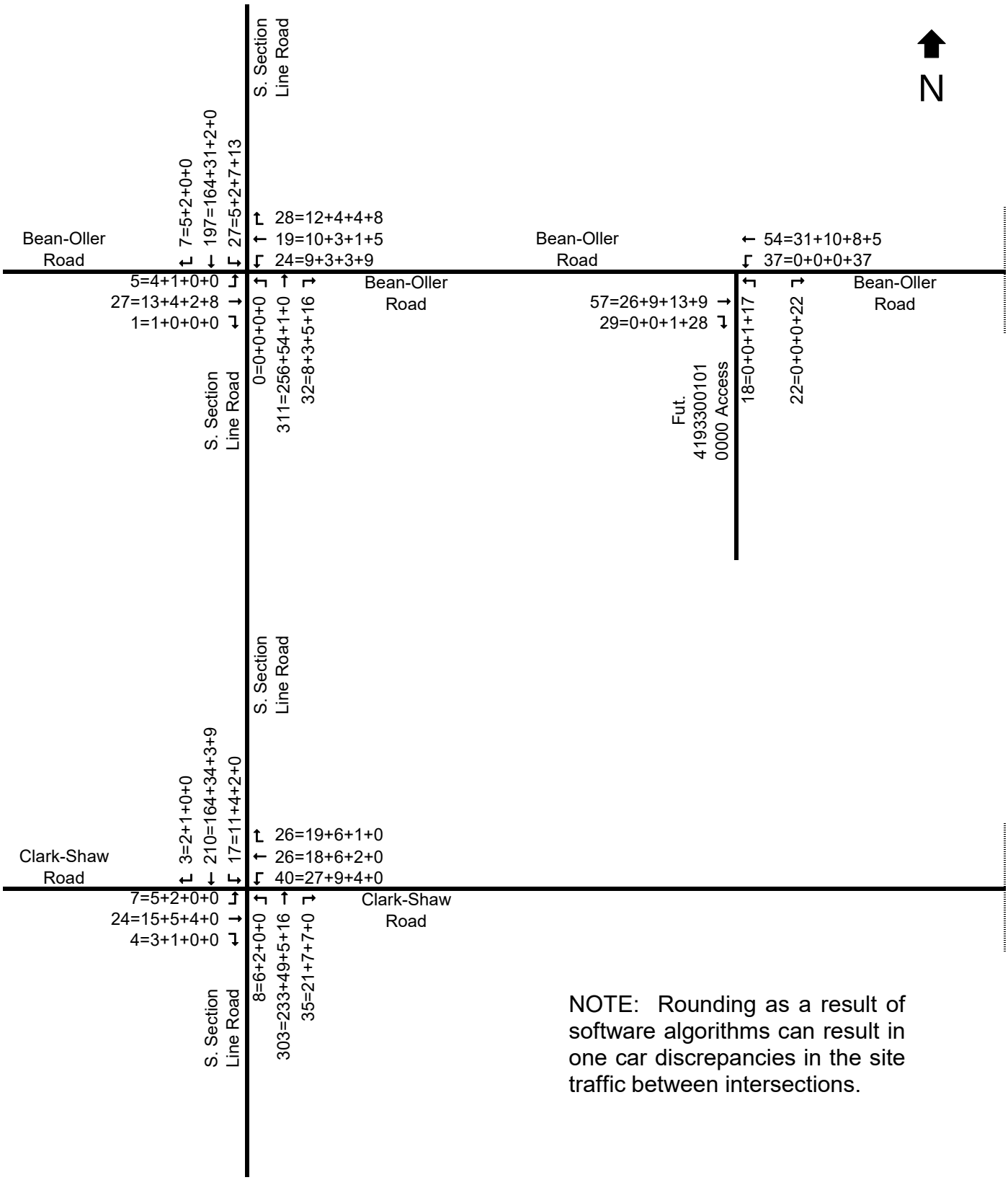
NOTE: Rounding as a result of software algorithms can result in one car discrepancies in the site traffic between intersections.

CLARKSHAW VILLAGE
TRAFFIC IMPACT STUDY

PREPARED BY: SMART SERVICES 12/2021

FIGURE 7B

2032 'BUILD' - AM PEAK



NOTE: Rounding as a result of software algorithms can result in one car discrepancies in the site traffic between intersections.

LEGEND
A=B+C+D+E

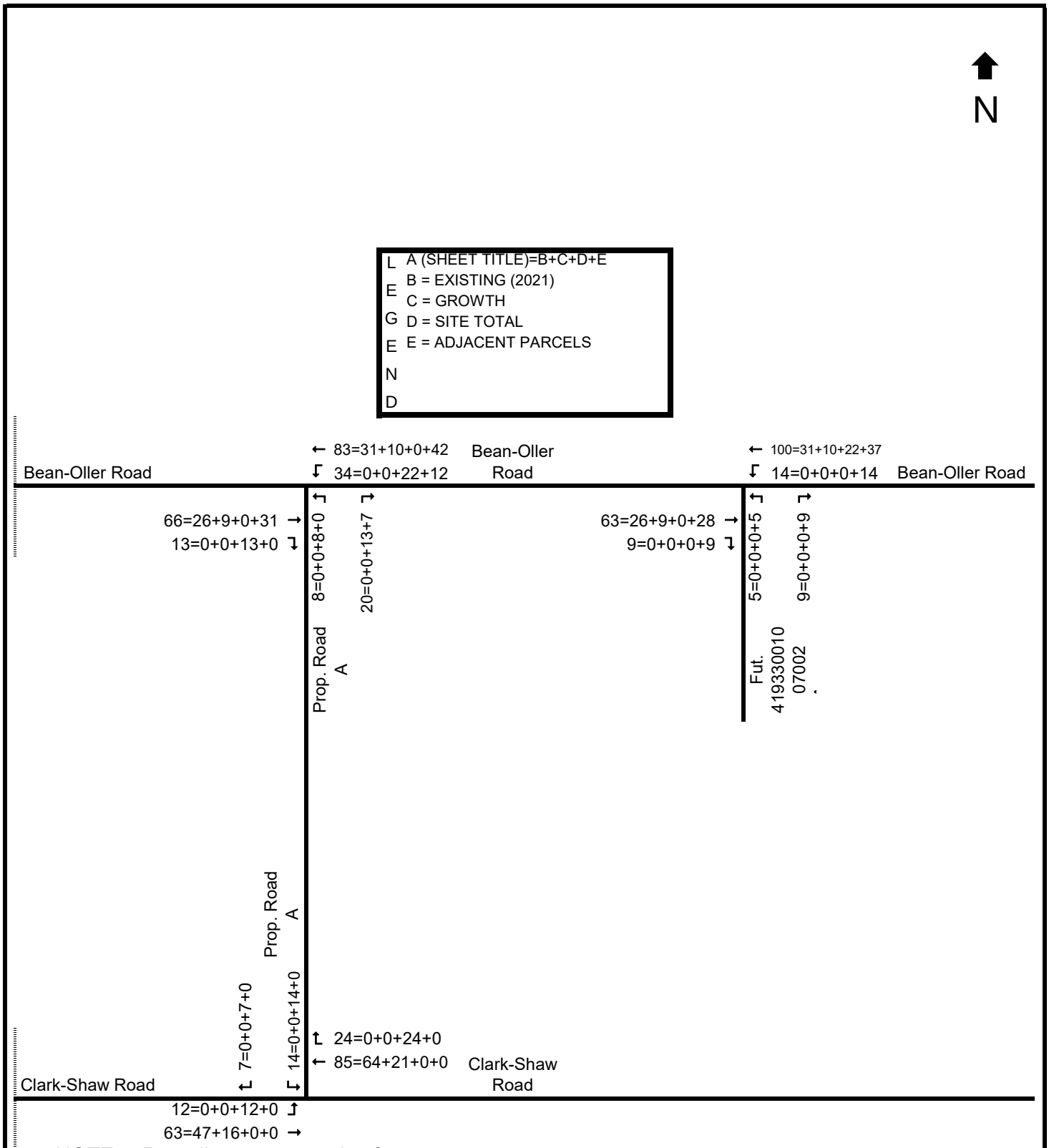
A = 2032 'BUILD' - PM PEAK
B = EXISTING (2021)
C = GROWTH
D = SITE TOTAL
E = ADJACENT PARCELS

CLARKSHAW VILLAGE
TRAFFIC IMPACT STUDY

PREPARED BY: SMART SERVICES 12/2021

FIGURE 8A

2032 'BUILD' - PM PEAK



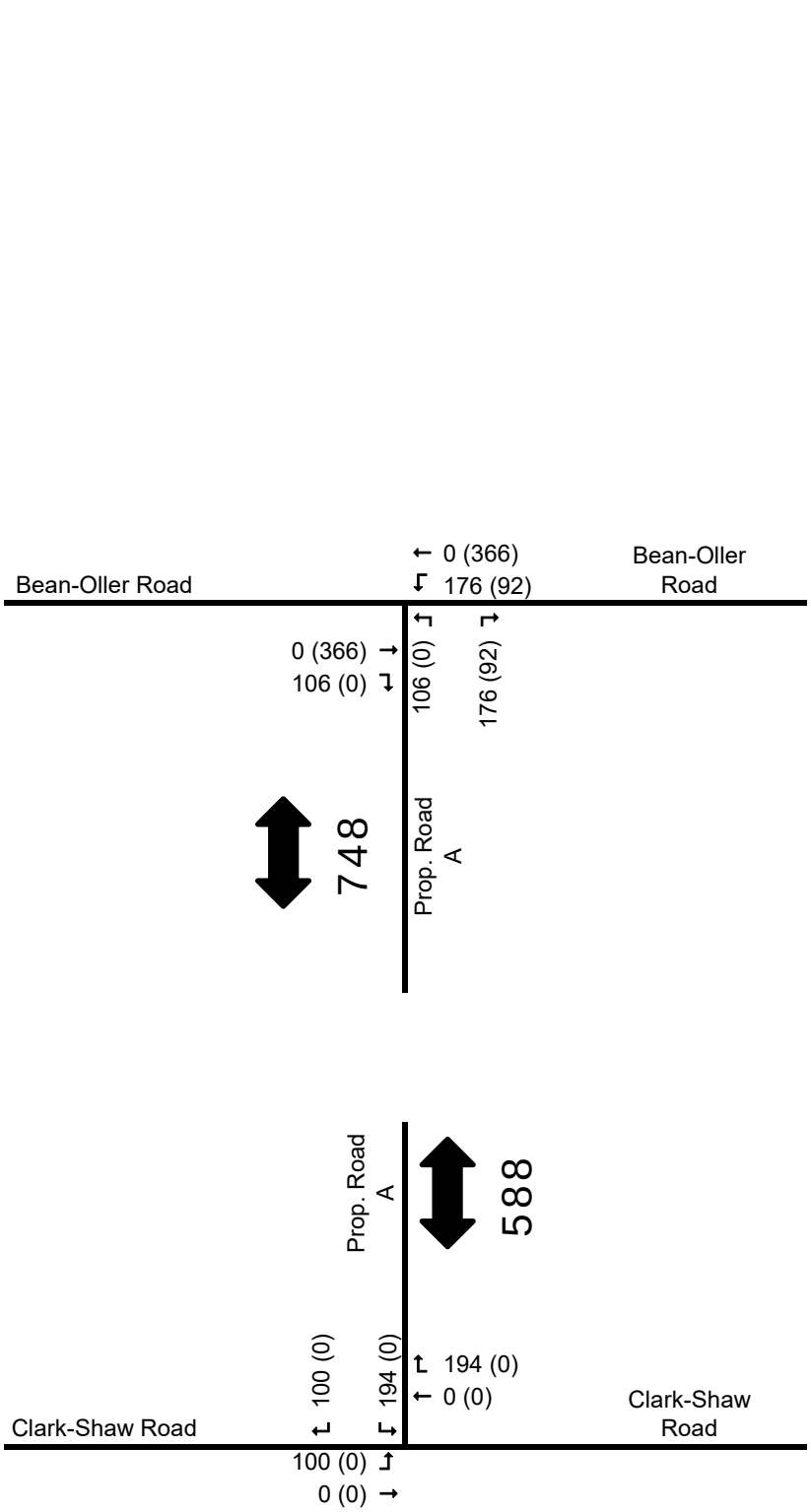
NOTE: Rounding as a result of software algorithms can result in one car discrepancies in the site traffic between intersections.

CLARKSHAW VILLAGE
TRAFFIC IMPACT STUDY

PREPARED BY: SMART SERVICES 12/2021

FIGURE 8B

2032 'BUILD' - PM PEAK



LEGEND

222 - SITE GENERATED TRAFFIC

(222) - 2032 ADJACENT PARCELS TRAFFIC

CLARKSHAW VILLAGE
TRAFFIC IMPACT STUDY

PREPARED BY: SMART SERVICES 12/2021

FIGURE 9

SITE GENERATED TRAFFIC - DAILY

Turn Lane Warrant Analysis

Left Turn Lanes – According to the *TIS Standards*, the criteria to determine if left turn lanes are warranted on major collector streets (Bean-Oller Road) with posted speeds 40 MPH and above is if there are more than 10 left turning vehicles during the peak hour for full build-out of the development.

According to the *TIS Standards*, the procedures for determining whether left turn lanes are required on minor collector streets (Clark-Shaw Road) are found in the *ODOT L&D Manual* which is referenced from the *State Highway Access Management Manual (SHAMM).* The graph from the *ODOT L&D Manual* are in Appendix.

Table 6 shows a summary of the results.

Right Turn Lanes - Per the *TIS Standards,* the procedures for determining whether right turn lanes are required are found in the *ODOT L&D Manual* which is referenced from the *State Highway Access Management Manual (SHAMM).* Table 6 also shows a summary of the results of the right turn lane warrants. The graphs from the *ODOT L&D Manual* are in Appendix.

INTERSECTION	MOVE-MENT	PEAK HOUR	2022 'BUILD'	2032 'BUILD'
Bean-Oller Road & Prop. Road A	**WB LT**	**AM Peak**	**Warranted >10 WB LT**	**Warranted >10 WB LT**
		PM Peak	**Warranted >10 WB LT**	**Warranted >10 WB LT**
	EB RT	**AM Peak**	**Warrant Not Met**	**Warrant Not Met**
		PM Peak	**Warrant Not Met**	**Warrant Not Met**
Clark-Shaw Road & Prop. Road A	**EB LT**	**AM Peak**	**Warrant Not Met**	**Warrant Not Met**
		PM Peak	**Warrant Not Met**	**Warrant Not Met**
	WB RT	**AM Peak**	**Warrant Not Met**	**Warrant Not Met**
		PM Peak	**Warrant Not Met**	**Warrant Not Met**

TABLE 6 – Summary of Turn Lane Warrant Analyses

Turn Lane Length Analysis

Turn lane lengths for the warranted turn lanes per the turn lane analyses were calculated. The calculations were performed per Section 400 of the *ODOT L&D Manual*. The design speed in Table 1 was used in the calculations. Table 7 shows a summary of the results. The calculations are in Appendix.

INTERSECTION	DIRECTION	2022 'BUILD'	2032 'BUILD'
		ODOT L&D Manual	***ODOT L&D Manual***
Bean-Oller Road & Prop. Road A	**WB LT**	**225'**	**225'**

TABLE 7 – Turn Lane Length Results (Includes the 50' diverging taper)

Internal ADT

The daily site traffic shown in Figure 9, page 19, indicates that there are no streets over the 1500 ADT threshold.

Unsignalized Capacity Analysis

Unsignalized capacity analyses were performed at unsignalized off-site intersections in the study area. In the analyses, delays are computed which correspond to a Level of Service (LOS) "A" through "F". Typically, Level of Service (LOS) "D" or above is considered an acceptable LOS. For a Two-Way Stop condition, the unsignalized capacity analysis gives LOS results for vehicles that must wait for gaps to make their maneuver. In this case, it would be the left turns from the major street and the minor street movements. All other movements are free flowing, so they don't encounter delay. The LOS criteria for two-way stop control and all-way stop control is shown in Table 8.

LEVEL OF SERVICE	DELAY (seconds/vehicle)
A	**<10**
B	**> 10 and ≤ 15**
C	**> 15 and ≤ 25**
D	**> 25 and ≤ 35**
E	**> 35 and ≤ 50**
F	**> 50**

Source: *Highway Capacity Manual 2010*

TABLE 8 - Level of Service Criteria for Unsignalized Intersections

The following comprises the background of the analysis:

- *HCS 7* was used to perform the analysis.
- A Peak Hour Factor (PHF) of 0.92 was assumed.
- The existing heavy vehicle percentage was applied to all movements.

The results are shown in Table 9. The results are discussed in the Conclusions section. The *HCS 7* reports are in the Appendix.

INTERSECTION	TIME	YEAR	DELAY (LEVEL OF SERVICE)			
			Main Street		Minor Street	
			Northbound Left	Southbound Left	Eastbound All	Westbound All
S. Section Line Road & Bean-Oller Road	AM Peak	2022 'No Build' Traffic	7.8 (A)	7.9 (A)	12.9 (B)	12.8 (B)
		2022 'Build' Traffic	7.8 (A)	7.9 (A)	13.1 (B)	13.0 (B)
		2032 'No Build' Traffic	8.0 (A)	8.0 (A)	14.3 (B)	14.3 (B)
		2032 'Build' Traffic	8.0 (A)	8.0 (A)	14.5 (B)	14.5 (B)
	PM Peak	2022 'No Build' Traffic	7.6 (A)	8.2 (A)	13.7 (B)	12.7 (B)
		2022 'Build' Traffic	7.6 (A)	8.2 (A)	14.1 (B)	13.1 (B)
		2032 'No Build' Traffic	7.6 (A)	8.3 (A)	15.2 (C)	14.1 (B)
		2032 'Build' Traffic	7.6 (A)	8.4 (A)	15.7 (C)	14.6 (B)
S. Section Line Road & Clark-Shaw Road	AM Peak	2022 'No Build' Traffic	7.8 (A)	7.8 (A)	13.5 (B)	12.5 (B)
		2022 'Build' Traffic	7.9 (A)	7.8 (A)	13.7 (B)	13.0 (B)
		2032 'No Build' Traffic	8.0 (A)	7.9 (A)	14.8 (B)	14.0 (B)
		2032 'Build' Traffic	8.0 (A)	7.9 (A)	15.1 (C)	14.7 (B)
	PM Peak	2022 'No Build' Traffic	7.6 (A)	7.9 (A)	13.0 (B)	13.6 (B)
		2022 'Build' Traffic	7.6 (A)	7.9 (A)	13.4 (B)	14.2 (B)
		2032 'No Build' Traffic	7.7 (A)	8.0 (A)	14.6 (B)	15.9 (C)
		2032 'Build' Traffic	7.7 (A)	8.0 (A)	15.1 (C)	16.8 (C)

Clarkshaw Village Traffic Impact Study - 12/2021

TABLE 9 - Unsignalized Capacity Summary - (2-Way-Stop, North-South Major Street)

CONCLUSIONS

2022 and 2032 volumes were developed for use in turn lane warrant analyses, capacity analyses, and turn lane length analyses. The following is a summary of the conclusions for each analysis condition:

2022/2032 'No Build'

- S. Section Line Road & Bean-Oller Road
  - The impeded movements operate at an acceptable Level of Service (LOS).
- S. Section Line Road & Clark-Shaw Road
  - The impeded movements operate at an acceptable Level of Service (LOS).

2022/2032 'Build'

- Clark-Shaw Road & Prop. Road A
  - An eastbound left turn lane is not warranted.
  - A westbound right turn lane is not warranted.
  - Prop. Road A is less than 1500 ADT at Clark-Shaw Road.
- Bean-Oller Road & Prop. Road A
  - A westbound left turn lane is warranted. The length of the lane is 225 feet which includes the 50-foot diverging taper.
  - An eastbound right turn lane is not warranted.
  - Prop. Road A is less than 1500 ADT at Bean-Oller Road.
- S. Section Line Road & Bean-Oller Road
  - Same as 'No Build': The impeded movements operate at an acceptable Level of Service (LOS).
- S. Section Line Road & Clark-Shaw Road
  - Same as 'No Build': The impeded movements operate at an acceptable Level of Service (LOS).

The conclusion of the study is that a 225-foot westbound left turn lane on Bean-Oller Road at Prop. Road A is the only improvement associated with development of the site.

APPENDIX

November 3, 2021

APPROVED As Noted
By mlove at 7:03 am, Nov 19, 2021

Mr. Michael Love, PE, PTOE
Delaware County Engineer's Office
50 Channing Street
Delaware, OH 43015

Re: Dulin Property Traffic Impact Study MOU
Concord Township, Delaware County, Ohio

Dear Mike:

Please consider this letter a Memo of Understanding (MOU) for the traffic impact study (TIS) for the subject development.

Metro Development is proposing to develop a site with approximately 126 single family lots. The site is located on the north side of Clark Shaw Road and the south side of Bean Oller Road in the segment between S. Section Line Road and Sawmill Parkway. There are two proposed full access points: one on Clark Shaw Road and one on Bean Oller Road. In addition, there are stub streets near Bean Oller Road into adjacent parcels. The permitting agency for the accesses is the Delaware County Engineer's Office (DCEO). The proposed development will exceed the 100 peak hour trip threshold for a Traffic Impact Study (TIS). Therefore, the DCEO is requiring a TIS.

We had an initial conversation with the DCEO regarding the scope of the study on 10/19/2021. Below is our understanding of the required scope of the TIS:

- The following intersections are in the study area and Table A shows the area roadway designation.:
  - Clark Shaw Road & Prop. Site Access
  - Bean Oller Road & Prop. Site Access
  - S. Section Line Road & Clark Shaw Road
  - S. Section Line Road & Bean Oller Road

unposted

STREET	POSTED SPEED LIMIT	DESIGN SPEED	DELAWARE COUNTY THOROUGHFARE PLAN CLASS
Clark Shaw Road	**55 MPH**	**55 MPH**	**Minor Collector**
Bean Oller Road	**50 MPH**	**50 MPH**	**Major Collector**
S. Section Line Road	**55 MPH**	**55 MPH**	**Major Arterial**

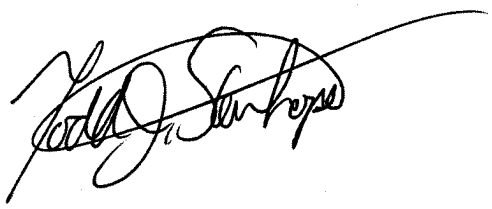
Table A - Summary of Roadway Designations

45

- The time of analysis will be the weekday AM Peak hour (one hour between 7 and 9 AM) and the PM Peak hour (one hour between 4 and 6 PM).
- Data Collection – A new peak hour (7-9 AM & 4-6 PM) turning movement count will be taken at the intersections of S. Section Line Road & Clark Shaw Road and S. Section Line Road & Bean Oller Road. It is assumed that the east legs of these intersections would reflect traffic near the site accesses.
- Trip Generation - Site traffic will be computed using *Trip Generation Manual, 11th Edition* published by ITE.
- Design Year Traffic Development - The DCEO requires a 10-Year design horizon. Opening Day is assumed to be 2022, therefore the design year is 2032. An annual linear growth rate will be obtained from the Mid-Ohio Regional Planning Commission (MORPC).
- Internal ADTs will be provided for any street that exceeds 1,500 ADT. If all streets will be less than 1500 ADT, this will be noted in the TIS.
- Analyses
  - Turn lane warrant analyses will be performed at the site accesses on Clark Shaw Road and Bean Oller Road
  - The length of any warranted turn lane will be calculated per Section 400 of the *ODOT L&D Manual*. The design speed in the calculations will be the posted speed limit.
  - Unsignalized capacity analyses comparing the 'No Build' and 'Build' conditions will be performed for the intersections of S. Section Line Road & Clark Shaw Road and S. Section Line Road & Bean Oller Road.

A report will be produced that includes the data and provides the conclusions as well as the methods and analyses used.
If this MOU is acceptable to you, please indicate your approval in the space provided below. If not, please let us know what items need to be changed. If you have any questions, please contact me. Thank you!

Sincerely,
SMART SERVICES, INC.



Todd J. Stanhope, PE, PTOE
Director of Traffic Engineering

Inlcude development from the adjacent parcels that might use thiese entrances. Assume same density as this develoment. It is safe to assume that both east and west parcels will have an access point on Bean Oller Road. You can state that the "net" traffic change will be insignifant at the Clarkshaw Village entrance on Bean Oller

Submitted: One electronic copy (PDF format) via e-mail

Delaware County Engineer's Office

Approved:_____ Date:_____

CONCEPT PLAN

DULIN PROPERTY

PREPARED FOR METRO DEVELOPMENT

DATE: 10.7.21

NORTH
1"=100'
0 50 100 200 300

Faris Planning & Design
LAND PLANNING • LANDSCAPE ARCHITECTURE
4876 Cemetery Road
p (614) 487-1964
Hilliard, OH 43026
www.farisplanninganddesign.com

Section Line Rd & Clark Shaw Rd - TMC

Thu Nov 4, 2021
Full Length (7 AM-9 AM, 4 PM-6 PM)
All Classes (Lights and Motorcycles, Heavy)
All Movements
ID: 895954, Location: 40.229513, -83.132129

Provided by: Smart Services, Inc.
88 W. Church Street, Newark, OH, 43055, US

Leg	Clark Shaw Rd					Clark Shaw Rd					Section Line Rd					Section Line Rd					
Direction	Eastbound					Westbound					Northbound					Southbound					
Time	L	T	R	U	**App**	L	T	R	U	**App**	L	T	R	U	**App**	L	T	R	U	**App**	**Int**
2021-11-04 7:00AM	0	1	0	0	**1**	2	3	1	0	**6**	0	40	3	0	**43**	2	41	0	0	**43**	**93**
7:15AM	0	3	0	0	**3**	2	0	6	0	**8**	0	51	2	0	**53**	0	61	0	0	**61**	**125**
7:30AM	1	1	0	0	**2**	6	5	5	0	**16**	0	46	6	0	**52**	3	76	0	0	**79**	**149**
7:45AM	0	4	1	0	**5**	6	2	4	0	**12**	0	45	9	0	**54**	3	56	1	0	**60**	**131**
Hourly Total	1	9	1	0	**11**	16	10	16	0	**42**	0	182	20	0	**202**	8	234	1	0	**243**	**498**
8:00AM	0	1	1	0	**2**	7	3	2	0	**12**	1	31	2	0	**34**	3	68	0	0	**71**	**119**
8:15AM	1	0	0	0	**1**	6	4	3	0	**13**	1	26	0	0	**27**	2	53	1	0	**56**	**97**
8:30AM	1	0	0	0	**1**	5	4	2	0	**11**	2	28	1	0	**31**	4	50	0	0	**54**	**97**
8:45AM	0	1	0	0	**1**	3	6	0	0	**9**	3	34	7	0	**44**	3	50	0	0	**53**	**107**
Hourly Total	2	2	1	0	**5**	21	17	7	0	**45**	7	119	10	0	**136**	12	221	1	0	**234**	**420**
4:00PM	0	6	0	0	**6**	1	2	3	0	**6**	1	56	7	0	**64**	1	46	0	0	**47**	**123**
4:15PM	0	4	1	0	**5**	2	4	2	0	**8**	0	64	1	0	**65**	1	50	3	0	**54**	**132**
4:30PM	0	4	2	0	**6**	8	6	7	0	**21**	0	60	10	0	**70**	2	40	1	0	**43**	**140**
4:45PM	2	2	0	0	**4**	6	4	3	0	**13**	3	64	3	0	**70**	3	37	0	0	**40**	**127**
Hourly Total	2	16	3	0	**21**	17	16	15	0	**48**	4	244	21	0	**269**	7	173	4	0	**184**	**522**
5:00PM	3	5	1	0	**9**	7	3	2	0	**12**	1	49	6	0	**56**	1	39	1	0	**41**	**118**
5:15PM	0	4	0	0	**4**	6	5	7	0	**18**	2	60	2	0	**64**	5	48	0	0	**53**	**139**
5:30PM	0	2	2	0	**4**	3	3	3	0	**9**	1	60	6	0	**67**	3	38	0	0	**41**	**121**
5:45PM	1	7	1	0	**9**	6	0	2	1	**9**	1	39	8	0	**48**	1	39	0	0	**40**	**106**
Hourly Total	4	18	4	0	**26**	22	11	14	1	**48**	5	208	22	0	**235**	10	164	1	0	**175**	**484**
Total	9	45	9	0	**63**	76	54	52	1	**183**	16	753	73	0	**842**	37	792	7	0	**836**	**1924**
% Approach	14.3%	71.4%	14.3%	0%	**-**	41.5%	29.5%	28.4%	0.5%	**-**	1.9%	89.4%	8.7%	0%	**-**	4.4%	94.7%	0.8%	0%	**-**	-
% Total	0.5%	2.3%	0.5%	0%	**3.3%**	4.0%	2.8%	2.7%	0.1%	**9.5%**	0.8%	39.1%	3.8%	0%	**43.8%**	1.9%	41.2%	0.4%	0%	**43.5%**	-
Lights and Motorcycles	8	42	8	0	**58**	71	51	49	1	**172**	16	671	67	0	**754**	31	729	6	0	**766**	1750
% Lights and Motorcycles	88.9%	93.3%	88.9%	0%	**92.1%**	93.4%	94.4%	94.2%	100%	**94.0%**	100%	89.1%	91.8%	0%	**89.5%**	83.8%	92.0%	85.7%	0%	**91.6%**	91.0%
Heavy	1	3	1	0	**5**	5	3	3	0	**11**	0	82	6	0	**88**	6	63	1	0	**70**	174
% Heavy	11.1%	6.7%	11.1%	0%	**7.9%**	6.6%	5.6%	5.8%	0%	**6.0%**	0%	10.9%	8.2%	0%	**10.5%**	16.2%	8.0%	14.3%	0%	**8.4%**	9.0%

*L: Left, R: Right, T: Thru, U: U-Turn

Section Line Rd & Clark Shaw Rd - TMC

Thu Nov 4, 2021
AM Peak (7:15 AM - 8:15 AM) - Overall Peak Hour
All Classes (Lights and Motorcycles, Heavy)
All Movements
ID: 895954, Location: 40.229513, -83.132129

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Direction	Eastbound					Westbound					Northbound					Southbound					
Time	L	T	R	U	**App**	L	T	R	U	**App**	L	T	R	U	**App**	L	T	R	U	**App**	**Int**
2021-11-04 7:15AM	0	3	0	0	**3**	2	0	6	0	**8**	0	51	2	0	**53**	0	61	0	0	**61**	**125**
7:30AM	1	1	0	0	**2**	6	5	5	0	**16**	0	46	6	0	**52**	3	76	0	0	**79**	**149**
7:45AM	0	4	1	0	**5**	6	2	4	0	**12**	0	45	9	0	**54**	3	56	1	0	**60**	**131**
8:00AM	0	1	1	0	**2**	7	3	2	0	**12**	1	31	2	0	**34**	3	68	0	0	**71**	**119**
Total	1	9	2	0	**12**	21	10	17	0	**48**	1	173	19	0	**193**	9	261	1	0	**271**	**524**
% Approach	8.3%	75.0%	16.7%	0%	**-**	43.8%	20.8%	35.4%	0%	**-**	0.5%	89.6%	9.8%	0%	**-**	3.3%	96.3%	0.4%	0%	**-**	-
% Total	0.2%	1.7%	0.4%	0%	**2.3%**	4.0%	1.9%	3.2%	0%	**9.2%**	0.2%	33.0%	3.6%	0%	**36.8%**	1.7%	49.8%	0.2%	0%	**51.7%**	-
PHF	0.250	0.563	0.500	-	**0.600**	0.750	0.500	0.708	-	**0.750**	0.250	0.848	0.528	-	**0.894**	0.750	0.859	0.250	-	**0.858**	0.879
Lights and Motorcycles	1	6	2	0	**9**	21	10	17	0	**48**	1	138	15	0	**154**	8	235	1	0	**244**	455
% Lights and Motorcycles	100%	66.7%	100%	0%	**75.0%**	100%	100%	100%	0%	**100%**	100%	79.8%	78.9%	0%	**79.8%**	88.9%	90.0%	100%	0%	**90.0%**	86.8%
Heavy	0	3	0	0	**3**	0	0	0	0	**0**	0	35	4	0	**39**	1	26	0	0	**27**	69
% Heavy	0%	33.3%	0%	0%	**25.0%**	0%	0%	0%	0%	**0%**	0%	20.2%	21.1%	0%	**20.2%**	11.1%	10.0%	0%	0%	**10.0%**	13.2%

*L: Left, R: Right, T: Thru, U: U-Turn

Section Line Rd & Clark Shaw Rd - TMC

Thu Nov 4, 2021
PM Peak (4:30 PM - 5:30 PM)
All Classes (Lights and Motorcycles, Heavy)
All Movements
ID: 895954, Location: 40.229513, -83.132129

Provided by: Smart Services, Inc.
88 W. Church Street, Newark, OH, 43055, US

Leg	Clark Shaw Rd					Clark Shaw Rd					Section Line Rd					Section Line Rd					
Direction	Eastbound					Westbound					Northbound					Southbound					
Time	L	T	R	U	**App**	L	T	R	U	**App**	L	T	R	U	**App**	L	T	R	U	**App**	**Int**
2021-11-04 4:30PM	0	4	2	0	**6**	8	6	7	0	**21**	0	60	10	0	**70**	2	40	1	0	**43**	**140**
4:45PM	2	2	0	0	**4**	6	4	3	0	**13**	3	64	3	0	**70**	3	37	0	0	**40**	**127**
5:00PM	3	5	1	0	**9**	7	3	2	0	**12**	1	49	6	0	**56**	1	39	1	0	**41**	**118**
5:15PM	0	4	0	0	**4**	6	5	7	0	**18**	2	60	2	0	**64**	5	48	0	0	**53**	**139**
Total	5	15	3	0	**23**	27	18	19	0	**64**	6	233	21	0	**260**	11	164	2	0	**177**	**524**
% Approach	21.7%	65.2%	13.0%	0%	**-**	42.2%	28.1%	29.7%	0%	**-**	2.3%	89.6%	8.1%	0%	**-**	6.2%	92.7%	1.1%	0%	**-**	-
% Total	1.0%	2.9%	0.6%	0%	**4.4%**	5.2%	3.4%	3.6%	0%	**12.2%**	1.1%	44.5%	4.0%	0%	**49.6%**	2.1%	31.3%	0.4%	0%	**33.8%**	-
PHF	0.417	0.750	0.375	-	**0.639**	0.844	0.750	0.679	-	**0.762**	0.500	0.910	0.525	-	**0.929**	0.550	0.854	0.500	-	**0.835**	0.936
Lights and Motorcycles	5	15	3	0	**23**	22	16	18	0	**56**	6	218	21	0	**245**	11	160	1	0	**172**	496
% Lights and Motorcycles	100%	100%	100%	0%	**100%**	81.5%	88.9%	94.7%	0%	**87.5%**	100%	93.6%	100%	0%	**94.2%**	100%	97.6%	50.0%	0%	**97.2%**	94.7%
Heavy	0	0	0	0	**0**	5	2	1	0	**8**	0	15	0	0	**15**	0	4	1	0	**5**	28
% Heavy	0%	0%	0%	0%	**0%**	18.5%	11.1%	5.3%	0%	**12.5%**	0%	6.4%	0%	0%	**5.8%**	0%	2.4%	50.0%	0%	**2.8%**	5.3%

*L: Left, R: Right, T: Thru, U: U-Turn

Section Line Rd & Bean Oller Rd - TMC

Thu Nov 4, 2021
Full Length (7 AM-9 AM, 4 PM-6 PM)
All Classes (Lights and Motorcycles, Heavy)
All Movements
ID: 895972, Location: 40.236848, -83.131587

Provided by: Smart Services, Inc.
88 W. Church Street, Newark, OH, 43055, US

Leg	Bean Oller Rd					Bean Oller Rd					Section Line Rd					Section Line Rd					
Direction	Eastbound					Westbound					Northbound					Southbound					
Time	L	T	R	U	**App**	L	T	R	U	**App**	L	T	R	U	**App**	L	T	R	U	**App**	**Int**
2021-11-04 7:00AM	0	2	2	0	**4**	0	0	0	0	**0**	0	41	1	0	**42**	6	40	0	0	**46**	**92**
7:15AM	0	5	2	0	**7**	1	3	1	0	**5**	1	56	1	0	**58**	1	63	0	0	**64**	**134**
7:30AM	1	2	0	0	**3**	1	2	1	0	**4**	0	48	1	0	**49**	1	80	0	0	**81**	**137**
7:45AM	1	4	2	0	**7**	1	3	1	0	**5**	1	52	0	0	**53**	2	55	0	0	**57**	**122**
Hourly Total	2	13	6	0	**21**	3	8	3	0	**14**	2	197	3	0	**202**	10	238	0	0	**248**	**485**
8:00AM	0	3	0	0	**3**	1	1	1	0	**3**	0	29	0	0	**29**	1	73	2	0	**76**	**111**
8:15AM	0	3	1	0	**4**	2	0	0	0	**2**	0	30	0	0	**30**	1	52	2	0	**55**	**91**
8:30AM	0	1	0	0	**1**	0	1	0	0	**1**	1	24	2	0	**27**	2	54	0	0	**56**	**85**
8:45AM	1	3	0	0	**4**	0	1	1	0	**2**	3	35	0	0	**38**	0	54	0	0	**54**	**98**
Hourly Total	1	10	1	0	**12**	3	3	2	0	**8**	4	118	2	0	**124**	4	233	4	0	**241**	**385**
4:00PM	2	1	0	0	**3**	0	2	5	0	**7**	2	52	3	0	**57**	2	46	2	0	**50**	**117**
4:15PM	1	0	0	0	**1**	1	3	1	0	**5**	1	65	0	0	**66**	3	51	0	0	**54**	**126**
4:30PM	2	1	1	0	**4**	3	2	2	0	**7**	1	58	1	0	**60**	1	38	1	0	**40**	**111**
4:45PM	0	4	0	0	**4**	2	1	3	0	**6**	0	78	2	0	**80**	2	40	0	0	**42**	**132**
Hourly Total	5	6	1	0	**12**	6	8	11	0	**25**	4	253	6	0	**263**	8	175	3	0	**186**	**486**
5:00PM	0	3	0	0	**3**	3	1	2	0	**6**	0	53	0	0	**53**	1	36	2	0	**39**	**101**
5:15PM	3	0	0	0	**3**	3	3	4	0	**10**	0	62	3	0	**65**	1	47	1	0	**49**	**127**
5:30PM	1	6	1	0	**8**	1	5	3	0	**9**	0	63	3	0	**66**	1	41	2	0	**44**	**127**
5:45PM	0	3	2	0	**5**	2	4	1	0	**7**	1	45	4	0	**50**	3	38	0	0	**41**	**103**
Hourly Total	4	12	3	0	**19**	9	13	10	0	**32**	1	223	10	0	**234**	6	162	5	0	**173**	**458**
Total	12	41	11	0	**64**	21	32	26	0	**79**	11	791	21	0	**823**	28	808	12	0	**848**	**1814**
% Approach	18.8%	64.1%	17.2%	0%	**-**	26.6%	40.5%	32.9%	0%	**-**	1.3%	96.1%	2.6%	0%	**-**	3.3%	95.3%	1.4%	0%	**-**	-
% Total	0.7%	2.3%	0.6%	0%	**3.5%**	1.2%	1.8%	1.4%	0%	**4.4%**	0.6%	43.6%	1.2%	0%	**45.4%**	1.5%	44.5%	0.7%	0%	**46.7%**	-
Lights and Motorcycles	12	39	9	0	**60**	20	32	25	0	**77**	9	704	19	0	**732**	24	743	12	0	**779**	1648
% Lights and Motorcycles	100%	95.1%	81.8%	0%	**93.8%**	95.2%	100%	96.2%	0%	**97.5%**	81.8%	89.0%	90.5%	0%	**88.9%**	85.7%	92.0%	100%	0%	**91.9%**	90.8%
Heavy	0	2	2	0	**4**	1	0	1	0	**2**	2	87	2	0	**91**	4	65	0	0	**69**	166
% Heavy	0%	4.9%	18.2%	0%	**6.3%**	4.8%	0%	3.8%	0%	**2.5%**	18.2%	11.0%	9.5%	0%	**11.1%**	14.3%	8.0%	0%	0%	**8.1%**	9.2%

*L: Left, R: Right, T: Thru, U: U-Turn

Section Line Rd & Bean Oller Rd - TMC

Thu Nov 4, 2021
AM Peak (7:15 AM - 8:15 AM) - Overall Peak Hour
All Classes (Lights and Motorcycles, Heavy)
All Movements
ID: 895972, Location: 40.236848, -83.131587

Provided by: Smart Services, Inc.
88 W. Church Street, Newark, OH, 43055, US

Leg	Bean Oller Rd					Bean Oller Rd					Section Line Rd					Section Line Rd					
Direction	Eastbound					Westbound					Northbound					Southbound					
Time	L	T	R	U	**App**	L	T	R	U	**App**	L	T	R	U	**App**	L	T	R	U	**App**	**Int**
2021-11-04 7:15AM	0	5	2	0	**7**	1	3	1	0	**5**	1	56	1	0	**58**	1	63	0	0	**64**	**134**
7:30AM	1	2	0	0	**3**	1	2	1	0	**4**	0	48	1	0	**49**	1	80	0	0	**81**	**137**
7:45AM	1	4	2	0	**7**	1	3	1	0	**5**	1	52	0	0	**53**	2	55	0	0	**57**	**122**
8:00AM	0	3	0	0	**3**	1	1	1	0	**3**	0	29	0	0	**29**	1	73	2	0	**76**	**111**
Total	2	14	4	0	**20**	4	9	4	0	**17**	2	185	2	0	**189**	5	271	2	0	**278**	**504**
% Approach	10.0%	70.0%	20.0%	0%	**-**	23.5%	52.9%	23.5%	0%	**-**	1.1%	97.9%	1.1%	0%	**-**	1.8%	97.5%	0.7%	0%	**-**	-
% Total	0.4%	2.8%	0.8%	0%	**4.0%**	0.8%	1.8%	0.8%	0%	**3.4%**	0.4%	36.7%	0.4%	0%	**37.5%**	1.0%	53.8%	0.4%	0%	**55.2%**	-
PHF	0.500	0.700	0.500	-	**0.714**	1.000	0.750	1.000	-	**0.850**	0.500	0.826	0.500	-	**0.815**	0.625	0.847	0.250	-	**0.858**	0.920
Lights and Motorcycles	2	14	4	0	**20**	4	9	4	0	**17**	2	149	2	0	**153**	4	244	2	0	**250**	440
% Lights and Motorcycles	100%	100%	100%	0%	**100%**	100%	100%	100%	0%	**100%**	100%	80.5%	100%	0%	**81.0%**	80.0%	90.0%	100%	0%	**89.9%**	87.3%
Heavy	0	0	0	0	**0**	0	0	0	0	**0**	0	36	0	0	**36**	1	27	0	0	**28**	64
% Heavy	0%	0%	0%	0%	**0%**	0%	0%	0%	0%	**0%**	0%	19.5%	0%	0%	**19.0%**	20.0%	10.0%	0%	0%	**10.1%**	12.7%

*L: Left, R: Right, T: Thru, U: U-Turn

Section Line Rd & Bean Oller Rd - TMC

Thu Nov 4, 2021
PM Peak (4:45 PM - 5:45 PM)
All Classes (Lights and Motorcycles, Heavy)
All Movements
ID: 895972, Location: 40.236848, -83.131587

Provided by: Smart Services, Inc.
88 W. Church Street, Newark, OH, 43055, US

Leg Direction	Bean Oller Rd Eastbound					Bean Oller Rd Westbound					Section Line Rd Northbound					Section Line Rd Southbound					
Time	L	T	R	U	**App**	L	T	R	U	**App**	L	T	R	U	**App**	L	T	R	U	**App**	**Int**
2021-11-04 4:45PM	0	4	0	0	**4**	2	1	3	0	**6**	0	78	2	0	**80**	2	40	0	0	**42**	**132**
5:00PM	0	3	0	0	**3**	3	1	2	0	**6**	0	53	0	0	**53**	1	36	2	0	**39**	**101**
5:15PM	3	0	0	0	**3**	3	3	4	0	**10**	0	62	3	0	**65**	1	47	1	0	**49**	**127**
5:30PM	1	6	1	0	**8**	1	5	3	0	**9**	0	63	3	0	**66**	1	41	2	0	**44**	**127**
Total	4	13	1	0	**18**	9	10	12	0	**31**	0	256	8	0	**264**	5	164	5	0	**174**	**487**
% Approach	22.2%	72.2%	5.6%	0%	**-**	29.0%	32.3%	38.7%	0%	**-**	0%	97.0%	3.0%	0%	**-**	2.9%	94.3%	2.9%	0%	**-**	-
% Total	0.8%	2.7%	0.2%	0%	**3.7%**	1.8%	2.1%	2.5%	0%	**6.4%**	0%	52.6%	1.6%	0%	**54.2%**	1.0%	33.7%	1.0%	0%	**35.7%**	-
PHF	0.333	0.542	0.250	-	**0.563**	0.750	0.500	0.750	-	**0.775**	-	0.821	0.667	-	**0.825**	0.625	0.872	0.625	-	**0.888**	0.922
Lights and Motorcycles	4	12	1	0	**17**	9	10	12	0	**31**	0	241	8	0	**249**	5	161	5	0	**171**	468
% Lights and Motorcycles	100%	92.3%	100%	0%	**94.4%**	100%	100%	100%	0%	**100%**	0%	94.1%	100%	0%	**94.3%**	100%	98.2%	100%	0%	**98.3%**	96.1%
Heavy	0	1	0	0	**1**	0	0	0	0	**0**	0	15	0	0	**15**	0	3	0	0	**3**	19
% Heavy	0%	7.7%	0%	0%	**5.6%**	0%	0%	0%	0%	**0%**	0%	5.9%	0%	0%	**5.7%**	0%	1.8%	0%	0%	**1.7%**	3.9%

*L: Left, R: Right, T: Thru, U: U-Turn

Sawmill Pkwy & Clark Shaw Rd - TMC

Thu Nov 18, 2021
Full Length (7 AM-9 AM, 4 PM-6 PM)
All Classes (Lights and Motorcycles, Heavy, Pedestrians)
All Movements
ID: 901504, Location: 40.228014, -83.095209

Provided by: Smart Services, Inc.
88 W. Church Street, Newark, OH, 43055, US

Leg	Clark Shaw Rd						Clark Shaw Rd						Sawmill Pkwy						Sawmill Pkwy						
Direction	Eastbound						Westbound						Northbound						Southbound						
Time	L	T	R	U	**App**	Ped*	L	T	R	U	**App**	Ped*	L	T	R	U	**App**	Ped*	L	T	R	U	**App**	Ped*	**Int**
2021-11-18 7:00AM	3	5	21	0	**29**	0	6	0	0	0	**6**	0	4	7	0	0	**11**	0	0	22	1	0	**23**	0	**69**
7:15AM	0	7	15	0	**22**	0	6	0	1	0	**7**	0	5	23	1	0	**29**	0	1	51	1	0	**53**	0	**111**
7:30AM	1	6	20	0	**27**	0	11	4	0	0	**15**	0	5	25	4	0	**34**	0	0	26	4	0	**30**	0	**106**
7:45AM	2	2	9	0	**13**	0	4	6	0	0	**10**	0	9	26	2	0	**37**	1	1	38	0	0	**39**	0	**99**
Hourly Total	6	20	65	0	**91**	0	27	10	1	0	**38**	0	23	81	7	0	**111**	1	2	137	6	0	**145**	0	**385**
8:00AM	1	1	17	0	**19**	0	4	2	0	0	**6**	0	3	17	2	0	**22**	0	0	22	1	0	**23**	0	**70**
8:15AM	0	1	10	0	**11**	1	5	0	0	0	**5**	0	11	21	1	0	**33**	0	0	24	1	0	**25**	0	**74**
8:30AM	1	3	10	0	**14**	0	1	3	0	0	**4**	0	2	22	0	0	**24**	0	0	25	0	0	**25**	0	**67**
8:45AM	2	4	18	0	**24**	0	3	0	0	0	**3**	0	13	18	4	1	**36**	0	0	22	1	0	**23**	0	**86**
Hourly Total	4	9	55	0	**68**	1	13	5	0	0	**18**	0	29	78	7	1	**115**	0	0	93	3	0	**96**	0	**297**
4:00PM	2	1	8	0	**11**	0	2	7	0	0	**9**	1	15	37	4	0	**56**	1	0	17	5	0	**22**	0	**98**
4:15PM	2	6	17	0	**25**	0	7	8	0	0	**15**	0	9	41	4	0	**54**	0	1	33	0	0	**34**	0	**128**
4:30PM	1	6	20	0	**27**	0	4	9	0	0	**13**	2	20	44	5	0	**69**	0	0	21	2	0	**23**	0	**132**
4:45PM	1	6	15	0	**22**	0	7	2	1	0	**10**	0	21	47	9	0	**77**	0	0	26	1	0	**27**	0	**136**
Hourly Total	6	19	60	0	**85**	0	20	26	1	0	**47**	3	65	169	22	0	**256**	1	1	97	8	0	**106**	0	**494**
5:00PM	0	5	15	0	**20**	0	5	9	0	0	**14**	0	18	42	4	0	**64**	0	0	34	2	0	**36**	2	**134**
5:15PM	2	6	13	0	**21**	0	4	8	1	0	**13**	0	18	44	5	0	**67**	0	0	31	1	0	**32**	0	**133**
5:30PM	4	5	13	0	**22**	0	2	8	0	0	**10**	0	20	37	5	0	**62**	0	0	30	1	0	**31**	0	**125**
5:45PM	0	2	14	0	**16**	0	3	4	0	0	**7**	0	12	31	4	0	**47**	0	0	23	3	0	**26**	0	**96**
Hourly Total	6	18	55	0	**79**	0	14	29	1	0	**44**	0	68	154	18	0	**240**	0	0	118	7	0	**125**	2	**488**
Total	22	66	235	0	**323**	1	74	70	3	0	**147**	3	185	482	54	1	**722**	2	3	445	24	0	**472**	2	**1664**
% Approach	6.8%	20.4%	72.8%	0%	**-**	-	50.3%	47.6%	2.0%	0%	**-**	-	25.6%	66.8%	7.5%	0.1%	**-**	-	0.6%	94.3%	5.1%	0%	**-**	-	-
% Total	1.3%	4.0%	14.1%	0%	**19.4%**	-	4.4%	4.2%	0.2%	0%	**8.8%**	-	11.1%	29.0%	3.2%	0.1%	**43.4%**	-	0.2%	26.7%	1.4%	0%	**28.4%**	-	-
Lights and Motorcycles	22	65	232	0	**319**	-	72	69	3	0	**144**	-	182	476	53	1	**712**	-	3	435	24	0	**462**	-	1637
% Lights and Motorcycles	100%	98.5%	98.7%	0%	**98.8%**	-	97.3%	98.6%	100%	0%	**98.0%**	-	98.4%	98.8%	98.1%	100%	**98.6%**	-	100%	97.8%	100%	0%	**97.9%**	-	98.4%
Heavy	0	1	3	0	**4**	-	2	1	0	0	**3**	-	3	6	1	0	**10**	-	0	10	0	0	**10**	-	27
% Heavy	0%	1.5%	1.3%	0%	**1.2%**	-	2.7%	1.4%	0%	0%	**2.0%**	-	1.6%	1.2%	1.9%	0%	**1.4%**	-	0%	2.2%	0%	0%	**2.1%**	-	1.6%
Pedestrians	-	-	-	-	-	1	-	-	-	-	-	3	-	-	-	-	-	2	-	-	-	-	-	2	
% Pedestrians	-	-	-	-	-	100%	-	-	-	-	-	100%	-	-	-	-	-	100%	-	-	-	-	-	100%	-

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

Sawmill Pkwy & Clark Shaw Rd - TMC

Thu Nov 18, 2021
AM Peak (7:15 AM - 8:15 AM)
All Classes (Lights and Motorcycles, Heavy, Pedestrians)
All Movements
ID: 901504, Location: 40.228014, -83.095209

Provided by: Smart Services, Inc.
88 W. Church Street, Newark, OH, 43055, US

Leg	Clark Shaw Rd						Clark Shaw Rd						Sawmill Pkwy						Sawmill Pkwy						
Direction	Eastbound						Westbound						Northbound						Southbound						
Time	L	T	R	U	**App**	Ped*	L	T	R	U	**App**	Ped*	L	T	R	U	**App**	Ped*	L	T	R	U	**App**	Ped*	**Int**
2021-11-18 7:15AM	0	7	15	0	**22**	0	6	0	1	0	**7**	0	5	23	1	0	**29**	0	1	51	1	0	**53**	0	**111**
7:30AM	1	6	20	0	**27**	0	11	4	0	0	**15**	0	5	25	4	0	**34**	0	0	26	4	0	**30**	0	**106**
7:45AM	2	2	9	0	**13**	0	4	6	0	0	**10**	0	9	26	2	0	**37**	1	1	38	0	0	**39**	0	**99**
8:00AM	1	1	17	0	**19**	0	4	2	0	0	**6**	0	3	17	2	0	**22**	0	0	22	1	0	**23**	0	**70**
Total	4	16	61	0	**81**	0	25	12	1	0	**38**	0	22	91	9	0	**122**	1	2	137	6	0	**145**	0	**386**
% Approach	4.9%	19.8%	75.3%	0%	**-**	-	65.8%	31.6%	2.6%	0%	**-**	-	18.0%	74.6%	7.4%	0%	**-**	-	1.4%	94.5%	4.1%	0%	**-**	-	-
% Total	1.0%	4.1%	15.8%	0%	**21.0%**	-	6.5%	3.1%	0.3%	0%	**9.8%**	-	5.7%	23.6%	2.3%	0%	**31.6%**	-	0.5%	35.5%	1.6%	0%	**37.6%**	-	-
PHF	0.500	0.571	0.763	-	**0.750**	-	0.568	0.500	0.250	-	**0.633**	-	0.611	0.875	0.563	-	**0.824**	-	0.500	0.672	0.375	-	**0.684**	-	0.869
Lights and Motorcycles	4	16	61	0	**81**	-	24	12	1	0	**37**	-	20	90	8	0	**118**	-	2	135	6	0	**143**	-	379
% Lights and Motorcycles	100%	100%	100%	0%	**100%**	-	96.0%	100%	100%	0%	**97.4%**	-	90.9%	98.9%	88.9%	0%	**96.7%**	-	100%	98.5%	100%	0%	**98.6%**	-	98.2%
Heavy	0	0	0	0	**0**	-	1	0	0	0	**1**	-	2	1	1	0	**4**	-	0	2	0	0	**2**	-	7
% Heavy	0%	0%	0%	0%	**0%**	-	4.0%	0%	0%	0%	**2.6%**	-	9.1%	1.1%	11.1%	0%	**3.3%**	-	0%	1.5%	0%	0%	**1.4%**	-	1.8%
Pedestrians	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	1	-	-	-	-	-	0	
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100%	-	-	-	-	-	-	-

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

Sawmill Pkwy & Clark Shaw Rd - TMC

Thu Nov 18, 2021
PM Peak (4:30 PM - 5:30 PM) - Overall Peak Hour
All Classes (Lights and Motorcycles, Heavy, Pedestrians)
All Movements
ID: 901504, Location: 40.228014, -83.095209

Provided by: Smart Services, Inc.
88 W. Church Street, Newark, OH, 43055, US

Leg	Clark Shaw Rd						Clark Shaw Rd						Sawmill Pkwy						Sawmill Pkwy						
Direction	Eastbound						Westbound						Northbound						Southbound						
Time	L	T	R	U	**App**	Ped*	L	T	R	U	**App**	Ped*	L	T	R	U	**App**	Ped*	L	T	R	U	**App**	Ped*	**Int**
2021-11-18 4:30PM	1	6	20	0	**27**	0	4	9	0	0	**13**	2	20	44	5	0	**69**	0	0	21	2	0	**23**	0	**132**
4:45PM	1	6	15	0	**22**	0	7	2	1	0	**10**	0	21	47	9	0	**77**	0	0	26	1	0	**27**	0	**136**
5:00PM	0	5	15	0	**20**	0	5	9	0	0	**14**	0	18	42	4	0	**64**	0	0	34	2	0	**36**	2	**134**
5:15PM	2	6	13	0	**21**	0	4	8	1	0	**13**	0	18	44	5	0	**67**	0	0	31	1	0	**32**	0	**133**
Total	4	23	63	0	**90**	0	20	28	2	0	**50**	2	77	177	23	0	**277**	0	0	112	6	0	**118**	2	**535**
% Approach	4.4%	25.6%	70.0%	0%	**-**	-	40.0%	56.0%	4.0%	0%	**-**	-	27.8%	63.9%	8.3%	0%	**-**	-	0%	94.9%	5.1%	0%	**-**	-	**-**
% Total	0.7%	4.3%	11.8%	0%	**16.8%**	-	3.7%	5.2%	0.4%	0%	**9.3%**	-	14.4%	33.1%	4.3%	0%	**51.8%**	-	0%	20.9%	1.1%	0%	**22.1%**	-	**-**
PHF	0.500	0.958	0.788	-	**0.833**	-	0.714	0.778	0.500	-	**0.893**	-	0.917	0.941	0.639	-	**0.899**	-	-	0.824	0.750	-	**0.819**	-	0.983
Lights and Motorcycles	4	23	61	0	**88**	-	20	28	2	0	**50**	-	77	175	23	0	**275**	-	0	110	6	0	**116**	-	529
% Lights and Motorcycles	100%	100%	96.8%	0%	**97.8%**	-	100%	100%	100%	0%	**100%**	-	100%	98.9%	100%	0%	**99.3%**	-	0%	98.2%	100%	0%	**98.3%**	-	98.9%
Heavy	0	0	2	0	**2**	-	0	0	0	0	**0**	-	0	2	0	0	**2**	-	0	2	0	0	**2**	-	6
% Heavy	0%	0%	3.2%	0%	**2.2%**	-	0%	0%	0%	0%	**0%**	-	0%	1.1%	0%	0%	**0.7%**	-	0%	1.8%	0%	0%	**1.7%**	-	1.1%
Pedestrians	-	-	-	-	-	0	-	-	-	-	-	2	-	-	-	-	-	0	-	-	-	-	-	2	
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	100%	-	-	-	-	-	-	-	-	-	-	-	100%	-

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

From: Hwashik Jang
To: Todd Stanhope
Cc: Michael A. Love (mlove@co.delaware.oh.us); Joseph D. Thomas Jr.; Nick Gill
Subject: RE: Section Line Road - Growth Rate Request
Date: Wednesday, November 24, 2021 5:00:17 PM
Attachments: image002.png

Todd,

We have completed processing growth rates for your traffic study intersections.
Please use linear annual growth rates as summarized below.

Location	Linear Annual Growth Rate
Bean-Oller Rd e/o Section Line Rd	3.00%
Section Line Rd n/o Bean-Oller Rd	1.70%
Bean-Oller Rd w/o Section Line Rd	3.00%
Section Line Rd s/o Bean-Oller Rd	1.90%
Clark-Shaw Rd e/o Section Line Rd	3.00%
Section Line Rd n/o Clark-Shaw Rd	1.90%
Clark-Shaw Rd w/o Section Line Rd	3.00%
Section Line Rd s/o Clark-Shaw Rd	1.90%

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, Transportation & Infrastructure Development | **Mid-Ohio Regional Planning Commission**
T: 614.233.4145 | hjang@morpc.org
111 Liberty Street, Suite 100 | Columbus, OH 43215

Given increasing concerns and rapid changing conditions due to COVID-19, MORPC offices are currently closed to the public. 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 its operations remotely to provide services to our members and community partners. 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: Todd Stanhope <TStanhope@smartservices-inc.com>

Sent: Thursday, November 11, 2021 9:22 AM
To: Nick Gill <NGILL@morpc.org>
Cc: Hwashik Jang <hjang@morpc.org>; Michael A. Love (mlove@co.delaware.oh.us) <mlove@co.delaware.oh.us>; Joseph D. Thomas Jr. <JThomasJr@drkmetro.com>
Subject: Section Line Road - Growth Rate Request

Nick

We are performing a traffic impact study for a site that has proposed access on both Clark Shaw Road and Bean Oller Road. Please provide growth rates for:

-All legs of the Section Line Road & Bean Oller Road intersection
-All legs of the Section Line Road & Clark Shaw Road intersection

Below is MORPC's requested information about the study:

1. Traffic Data upon which you would be applying these growth rates (preferably 24 hour counts). As part of the project, AM and PM peak hour turning movement counts were taken at the intersections of Section Line Road & Bean Oller Road and Section Line Road & Clark Shaw Road. The count reports are attached.
2. Open Year & Design Year, for this study: 2022 and 2032
3. Roadway network assumptions: Any roadway assumptions/changes in the vicinity, such as change in number of lanes or roadway alignments, etc: None anticipated.
4. Land use assumptions: General info on proposed site location & development, such as: site map, Trip Generation (excel file, preferably). The subject site is located on the north side of Clark Shaw Road and the south side of Bean Oller Road in the segment between S. Section Line Road and Sawmill Parkway. Trip generation for the 126 single family units will be calculated as part of the TIS and is not available at this time.
5. Project Review Contact Person: Mike Love will be coordinating the review for the Delaware County Engineer's Office. His e-mail address is in the cc: line.

Thank you!

TODD STANHOPE, PE, PTOE
SMART SERVICES
DIRECTOR OF TRAFFIC ENGINEERING

tstanhope@smartservices-inc.com
1900 Crown Park Ct, Columbus, OH 43235
OFFICE 614.914.5543 FAX 740.522.4706
SmartServices-Inc.com

Delaware County Auditor

George Kaitsa, Auditor

Property Report for 419-330-01-010-000

Property Information

Parcel Number:	41933001010000
Owner(s)	JOHNBERT ENTERPRISES LLC
Address	BEAN-OLLER RD
Tax Dist	07
School	2102 BUCKEYE VALLEY
Use Code:	101
Acres:	67.00000

Description
LANDS 19 4 3 24
Property Address
BEAN-OLLER RD DELAWARE

Current Value

Land	Impr	Total
662900	0	662900

Current Tax

Due	Paid	Balance
1180.84	1180.84	0

Assessment Information

Board of Revision:	N	Homestead/Disability:	N
Owner Occ Credit:	N	Divided Property:	N
New Construction:	N	Foreclosure:	N
Other Assessments:	N	Front Ft.:	Y

Land

Land Type	Acres	Square Ft.	Actual Frontage	Eff. Frontage	No. Units	Value
A0-Row	1.5	0	0	0	0	0

Land

Land Type	Acres	Square Ft.	Actual Frontage	Eff. Frontage	No. Units	Value
A5-Tillable	65.5	0	0	0	0	576400

CAUV Land

Land Type	Acres	Soil Type	Acres	Adj. Rate	Value
A0	0.536	BOA-BLOUNT SILT LOAM	0.536	0	0
A0	0.134	GWB-GLYNWOOD SILT LOAM	0.134	0	0
A0	0.134	PWA-PEWAMO SILTY CLAY	0.134	0	0
A5	17.286	PWA-PEWAMO SILTY CLAY	17.286	2020	34920
A5	15.41	GWB-GLYNWOOD SILT LOAM	15.41	530	8170
A5	31.758	BOA-BLOUNT SILT LOAM	31.758	1320	41920
A8	1.005	BOA-BLOUNT SILT LOAM	1.005	230	230
A8	0.067	GWB-GLYNWOOD SILT LOAM	0.067	230	20
A8	0.67	PWA-PEWAMO SILTY CLAY	0.67	240	160

Transfer History

Date	Amount	To	Type	Conveyance
3/24/2014	0	JOHNBERT ENTERPRISES LLC	Change Owner	
3/24/2014	0	PARSONS JOHN L & STEVEN C TRUSTEES	Change Owner	
3/15/1995	0	PARSONS JOHN L	Change Owner	0

Value History

Year	Land	Improvement	Total	Reason
2020	662900	0	662900	Reappraisal, Update or Annual Equalization
2017	576400	0	576400	Reappraisal, Update or Annual Equalization
2014	540600	0	540600	Reappraisal, Update or Annual Equalization
2011	482700	0	482700	Reappraisal, Update or Annual Equalization
2008	484200	0	484200	Reappraisal, Update or Annual Equalization
2005	432300	0	432300	Reappraisal, Update or Annual Equalization
2002	450300	0	450300	Reappraisal, Update or Annual Equalization
1999	360300	0	360300	Reappraisal, Update or Annual Equalization
1996	170300	0	170300	Miscellaneous

Tax Detail Information

Full Rate: 58.66 Effective Rate 43.363388

Annual Tax: $1180.84

	Prior		1st Half		2nd Half	
	Chg	Adj	Chg	Adj	Chg	Adj
Orig Tax	$0.00	$0.00	$876.97	$0.00	$876.97	$0.00
Reduction			$228.68	$0.00	$228.68	$0.00
Subtotal	$0.00		$648.29		$648.29	
10% Rollback			$57.87	$0.00	$57.87	$0.00
Own Occ Cred			$0.00	$0.00	$0.00	$0.00
Homestead			$0.00	$0.00	$0.00	$0.00
CR			$0.00	$0.00	$0.00	$0.00
NET	$0.00		$590.42		$590.42	
Penalty/Int	$0.00		$0.00	$0.00	$0.00	$0.00
RE Chg	$0.00		$0.00		$0.00	
RE Paid	$0.00		$590.42		$590.42	
SPA Chg	$0.00		$0.00		$0.00	
SPA Paid	$0.00		$0.00		$0.00	
Total Owed	$0.00		$590.42		$590.42	
Total Paid	$0.00		$590.42		$590.42	
Balance Due	$0.00		$0.00		$0.00	

Eff. Rate	Amount	Type

24.980006	$682.62	BUCKEYE VALLEY LSD
2.23097	$60.04	DELAWARE AREA CAREER CENTER
0.489363	$13.17	DELAWARE COUNTY HEALTH DEPT.
0.735558	$20.59	PRESERVATION PARK DISTRICT
0.780423	$21.00	DELAWARE CO. DISTRICT LIBRARY
5.317055	$144.01	CONCORD TWP
2.1	$56.51	CONCORD TWP EXC DUBLIN CITY
5.446415	$147.90	DELAWARE COUNTY
0.785542	$21.14	DELAWARE-MORROW MENTAL HEALTH
0.498056	$13.84	DELAWARE COUNTY 9-1-1 DISTRICT

Delaware County Auditor

George Kaitsa, Auditor

Property Report for 419-330-01-007-002

Property Information

Parcel Number:	41933001007002
Owner(s)	BEAN OLLER FARMS LLC
Address	3549 BEAN-OLLER RD
Tax Dist	07
School	2102 BUCKEYE VALLEY
Use Code:	100
Acres:	18.96200

Description
LANDS 19 4 3 23

Property Address
3549 BEAN-OLLER RD DELAWARE

Current Value

Land	Impr	Total
326000	0	326000

Current Tax

Due	Paid	Balance
435.60	435.60	0

Assessment Information

Board of Revision:	N	Homestead/Disability:	N
Owner Occ Credit:	N	Divided Property:	N
New Construction:	N	Foreclosure:	N
Other Assessments:	N	Front Ft.:	Y

Land

Land Type	Acres	Square Ft.	Actual Frontage	Eff. Frontage	No. Units	Value
A0-Row	0.26	0	0	0	0	0

Land

Land Type	Acres	Square Ft.	Actual Frontage	Eff. Frontage	No. Units	Value
A5-Tillable	18.702	0	0	0	0	336640

CAUV Land

Land Type	Acres	Soil Type	Acres	Adj. Rate	Value
A0	0.057	PWA-PEWAMO SILTY CLAY	0.057	0	0
A0	0.095	BOA-BLOUNT SILT LOAM	0.095	0	0
A5	6.466	BOA-BLOUNT SILT LOAM	6.466	1320	8540
A5	11.073	PWA-PEWAMO SILTY CLAY	11.073	2020	22370
A5	0.455	GWB-GLYNWOOD SILT LOAM	0.455	530	240
A5	0.209	BOB-BLOUNT SILT LOAM	0.209	1070	220
A8	0.379	BOA-BLOUNT SILT LOAM	0.379	230	90
A8	0.228	PWA-PEWAMO SILTY CLAY	0.228	240	50

Transfer History

Date	Amount	To	Type	Conveyance
4/14/2017	497500	BEAN OLLER FARMS LLC	Change Owner	1276
4/14/2017	0	KISE MAXINE V	Split Property	

Value History

Year	Land	Improvement	Total	Reason
2020	326000	0	326000	Reappraisal, Update or Annual Equalization
2018	336600	0	336600	Reappraisal, Update or Annual Equalization

Tax Detail Information

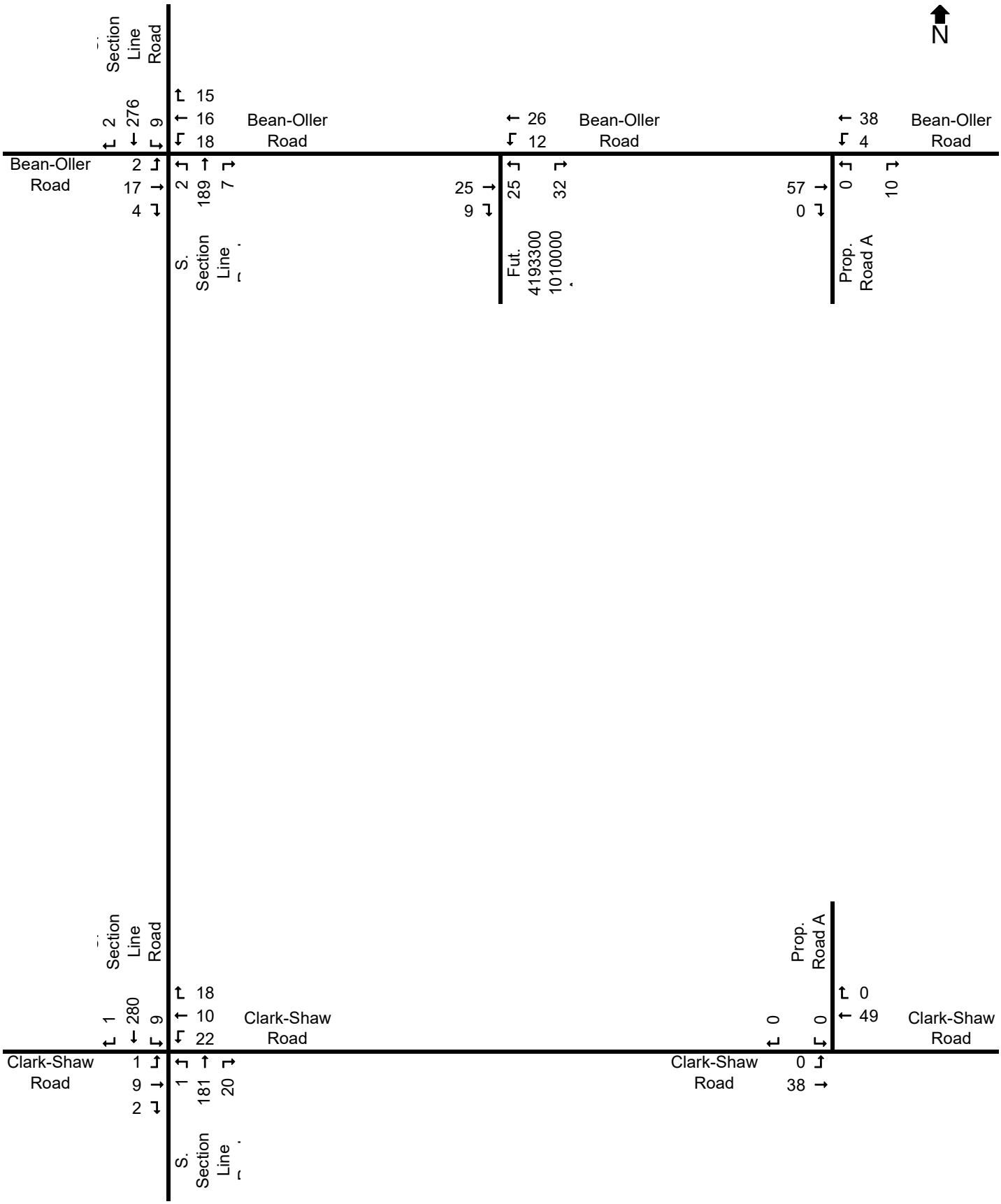
Full Rate: 58.66 Effective Rate 43.363388

Annual Tax: $435.60

	Prior Chg	Adj	1st Half Chg	Adj	2nd Half Chg	Adj
Orig Tax	$0.00	$0.00	$323.51	$0.00	$323.51	$0.00
Reduction			$84.36	$0.00	$84.36	$0.00
Subtotal	$0.00		$239.15		$239.15	
10% Rollback			$21.35	$0.00	$21.35	$0.00
Own Occ Cred			$0.00	$0.00	$0.00	$0.00
Homestead			$0.00	$0.00	$0.00	$0.00
CR			$0.00	$0.00	$0.00	$0.00
NET	$0.00		$217.80		$217.80	
Penalty/Int	$0.00		$0.00	$0.00	$0.00	$0.00
RE Chg	$0.00		$0.00		$217.80	
RE Paid	$0.00		$217.80		$0.00	
SPA Chg	$0.00		$0.00		$0.00	
SPA Paid	$0.00		$0.00		$0.00	
Total Owed	$0.00		$217.80		$217.80	
Total Paid	$0.00		$217.80		$0.00	
Balance Due	$0.00		$0.00		$217.80	

Eff. Rate	Amount	Type
24.980006	$251.81	BUCKEYE VALLEY LSD
2.23097	$22.15	DELAWARE AREA CAREER CENTER
0.489363	$4.86	DELAWARE COUNTY HEALTH DEPT.
0.735558	$7.60	PRESERVATION PARK DISTRICT
0.780423	$7.75	DELAWARE CO. DISTRICT LIBRARY
5.317055	$53.13	CONCORD TWP
2.1		CONCORD TWP EXC DUBLIN CITY

	$20.85	
5.446415	$54.56	DELAWARE COUNTY
0.785542	$7.80	DELAWARE-MORROW MENTAL HEALTH
0.498056	$5.11	DELAWARE COUNTY 9-1-1 DISTRICT

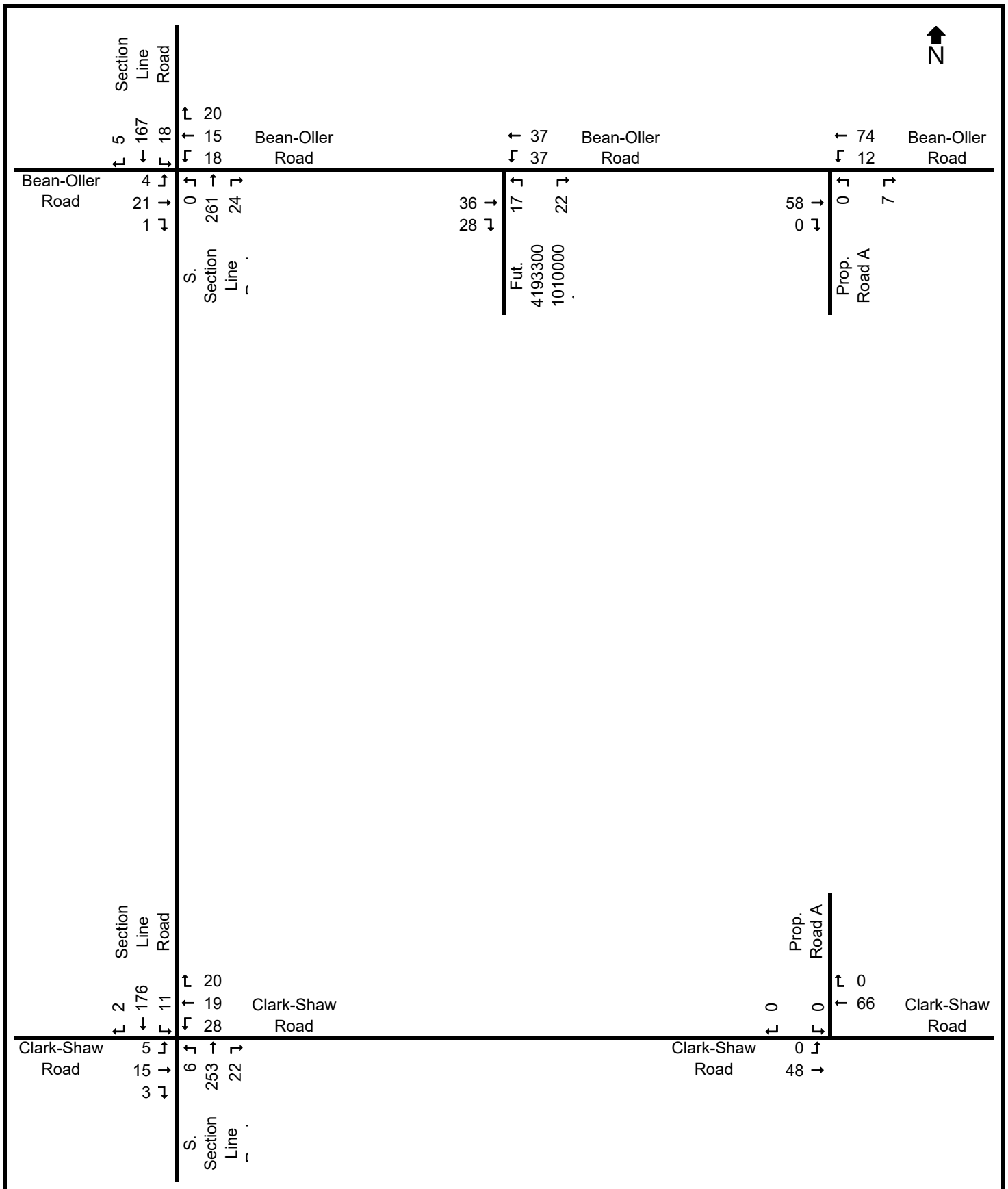


CLARKSHAW VILLAGE
TRAFFIC IMPACT STUDY

PREPARED BY: SMART SERVICES 12/2021

APPENDIX EXHIBIT

2022 'NO BUILD' TRAFFIC - AM PEAK

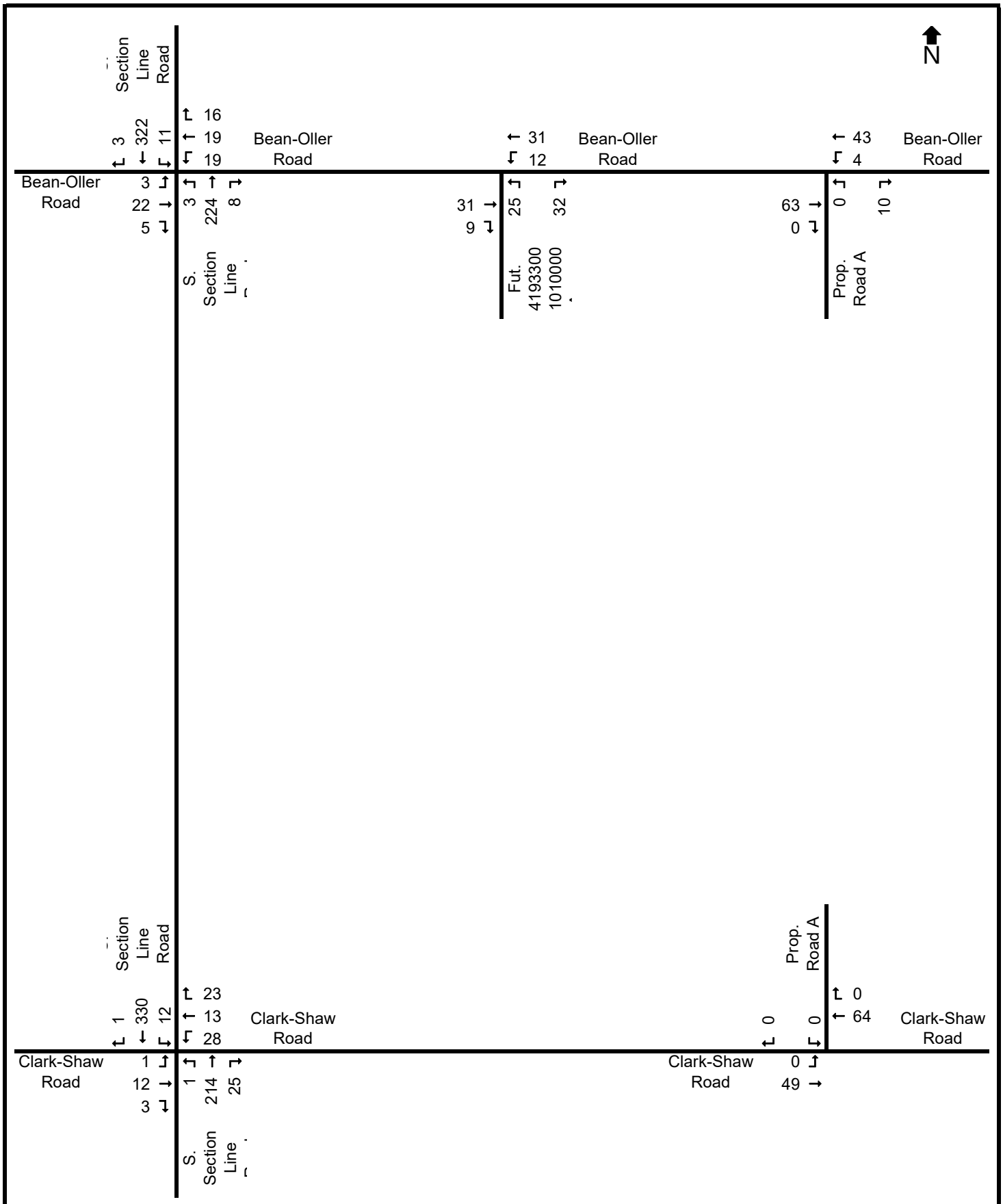


CLARKSHAW VILLAGE
TRAFFIC IMPACT STUDY

PREPARED BY: SMART SERVICES 12/2021

APPENDIX EXHIBIT

2022 'NO BUILD' TRAFFIC - PM PEAK



CLARKSHAW VILLAGE
TRAFFIC IMPACT STUDY

PREPARED BY: SMART SERVICES 12/2021

APPENDIX EXHIBIT

2032 'NO BUILD' TRAFFIC - AM PEAK

CLARKSHAW VILLAGE
TRAFFIC IMPACT STUDY

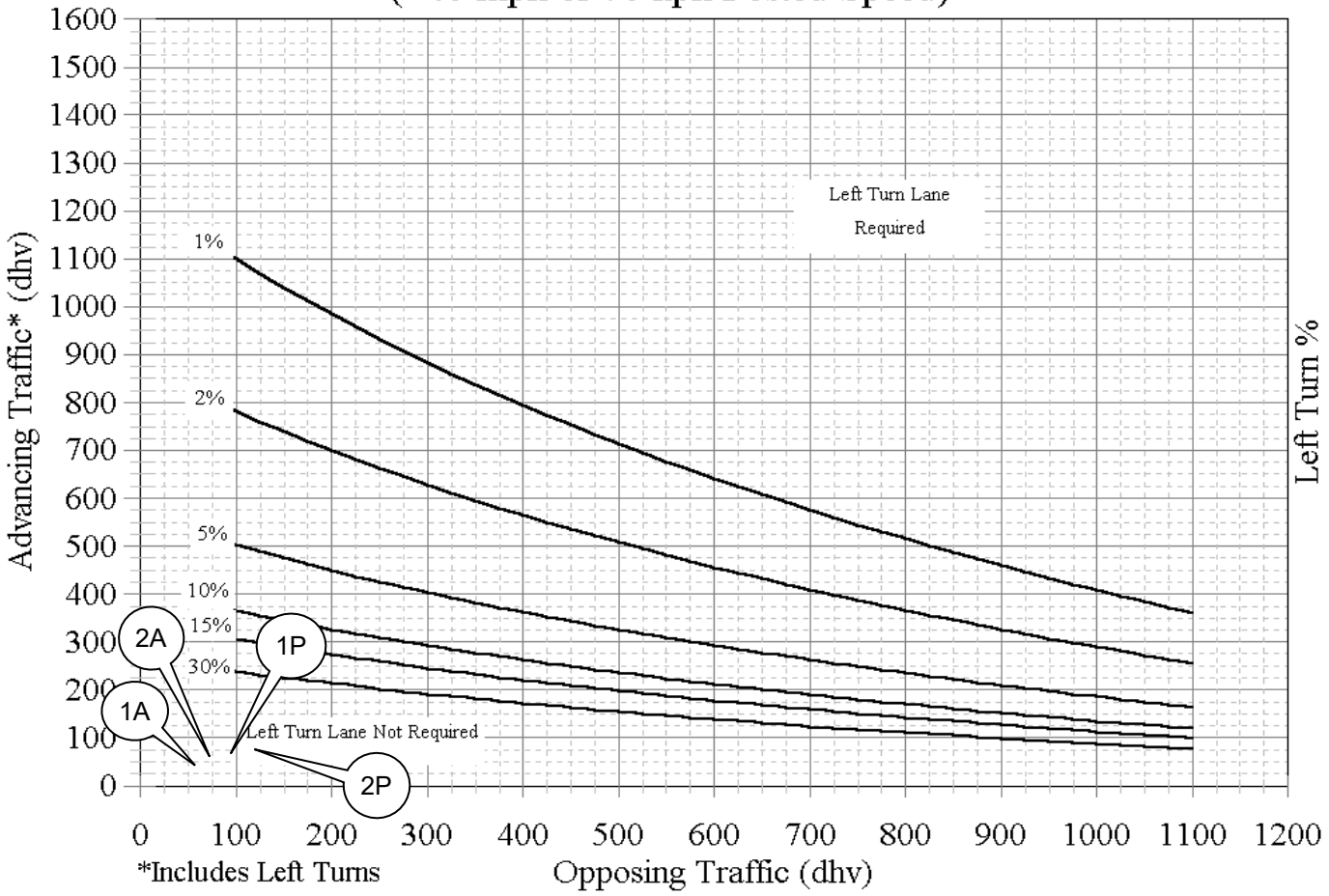
PREPARED BY: SMART SERVICES 12/2021

APPENDIX EXHIBIT

2032 'NO BUILD' TRAFFIC - PM PEAK

2-Lane Highway Left Turn Lane Warrant

(>40 mph or 70 kph Posted Speed)



WARRANT SUMMARY

ID	INTERSECTION [MOVEMENT] - VOLUME SET	AM PEAK (A)	PM PEAK (P)		RESULT
1	Prop. Road A & Clark-Shaw Road [EB LT] - 2022 'BUILD'	(57,42 / 9.5%)	(90,60 / 20%)		NOT MET
2	Prop. Road A & Clark-Shaw Road [EB LT] - 2032 'BUILD'	(72,53 / 7.5%)	(109,75 / 16%)		NOT MET

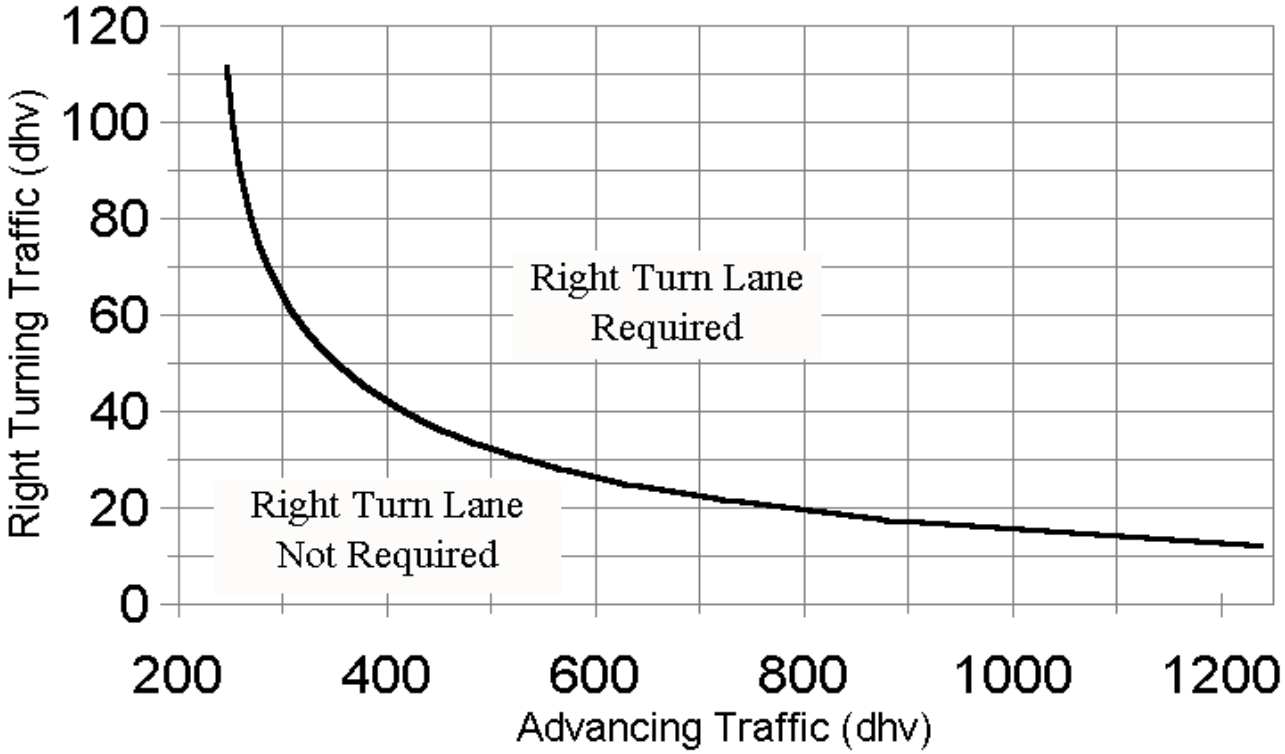
CLARKSHAW VILLAGE
TRAFFIC IMPACT STUDY
PREPARED BY: SMART SERVICES 12/2021

APPENDIX
2 LANE HIGHWAY LEFT TURN LANE WARRANT (> 40 MPH)

2-Lane Highway Right Turn Lane Warrant

> 40 mph or 70 kph Posted Speed

Note: Volumes are not within chart so were not plotted. All are not met.



WARRANT SUMMARY

ID	INTERSECTION [MOVEMENT] - VOLUME SET	AM PEAK (A)	PM PEAK (P)		RESULT
1	Prop. Road A & Clark-Shaw Road [WB RT] - 2022 'BUILD'	(57,8)	(90,24)		NOT MET
2	Prop. Road A & Clark-Shaw Road [WB RT] - 2032 'BUILD'	(72,8)	(109,24)		NOT MET
3	Prop. Road A & Bean-Oller Road [EB RT] - 2022 'BUILD'	(61,4)	(71,13)		NOT MET
4	Prop. Road A & Bean-Oller Road [EB RT] - 2032 'BUILD'	(67,4)	(79,13)		NOT MET

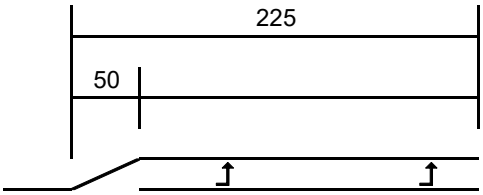
CLARKSHAW VILLAGE
TRAFFIC IMPACT STUDY
PREPARED BY: SMART SERVICES 12/2021

APPENDIX
2 LANE HIGHWAY RIGHT TURN LANE WARRANT (> 40 MPH)

(3) PROP. ROAD A & BEAN-OLLER ROAD - WB LT - 2022 'BUILD'

Critical Analysis Period: PM PEAK

Type =	Unsignalized Through Road		Design Condition (Rev)=	B	
Speed =	50	MPH	Storage Length (Adj) =	NA	
Cycle Length =	60	seconds	Deceleration/Div. Taper =	225	feet
Turning Volume =	34	VPH	Turn Lane Length =	225	feet
# of Turning Lanes =	1				
Advancing Volume =	108	VPH			
Turning % (>10% HIGH)	31.5%	HIGH			
Design Condition =	B or C				
Vehicles per Cycle =	0.6				
Storage Length (Calc) =	50	feet			

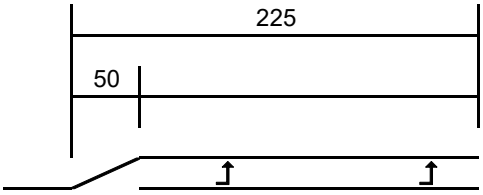


Calculations based on 401-7E in ODOT L&D Manual. All dimensions are in feet.

(4) PROP. ROAD A & BEAN-OLLER ROAD - WB LT - 2032 'BUILD'

Critical Analysis Period: PM PEAK

Type =	Unsignalized Through Road		Design Condition (Rev)=	B	
Speed =	50	MPH	Storage Length (Adj) =	NA	
Cycle Length =	60	seconds	Deceleration/Div. Taper =	225	feet
Turning Volume =	34	VPH	Turn Lane Length =	225	feet
# of Turning Lanes =	1				
Advancing Volume =	117	VPH			
Turning % (>10% HIGH)	29.1%	HIGH			
Design Condition =	B or C				
Vehicles per Cycle =	0.6				
Storage Length (Calc) =	50	feet			



Calculations based on 401-7E in ODOT L&D Manual. All dimensions are in feet.

HCS7 Two-Way Stop-Control Report

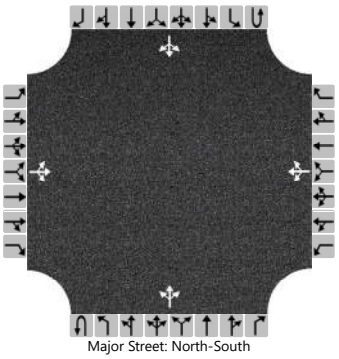
General Information

Analyst	TJS
Agency/Co.	Smart Services, Inc.
Date Performed	12/01/2021
Analysis Year	2022
Time Analyzed	2022 No Build - AM Peak
Intersection Orientation	North-South
Project Description	Clarkshaw Village TIS

Site Information

Intersection	Section Line & Bean-Oller
Jurisdiction	DCEO
East/West Street	Bean-Oller Road
North/South Street	S. Section Line Road
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Major Street: North-South

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		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	0	0	0	1	0	0	0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		2	17	4		18	16	15		2	189	7		9	276	2
Percent Heavy Vehicles (%)		0	0	0		0	0	0		0				20		
Proportion Time Blocked																
Percent Grade (%)	0				0											
Right Turn Channelized																
Median Type | Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1	6.5	6.2		7.1	6.5	6.2		4.1				4.1		
Critical Headway (sec)		7.10	6.50	6.20		7.10	6.50	6.20		4.10				4.30		
Base Follow-Up Headway (sec)		3.5	4.0	3.3		3.5	4.0	3.3		2.2				2.2		
Follow-Up Headway (sec)		3.50	4.00	3.30		3.50	4.00	3.30		2.20				2.38		

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			25				53			2				10		
Capacity, c (veh/h)			478				514			1270				1257		
v/c Ratio			0.05				0.10			0.00				0.01		
95% Queue Length, Q_{95} (veh)			0.2				0.3			0.0				0.0		
Control Delay (s/veh)			12.9				12.8			7.8				7.9		
Level of Service (LOS)			B				B			A				A		
Approach Delay (s/veh)	12.9				12.8				0.1				0.3			
Approach LOS	B				B											

HCS7 Two-Way Stop-Control Report

General Information

Analyst	TJS
Agency/Co.	Smart Services, Inc.
Date Performed	12/01/2021
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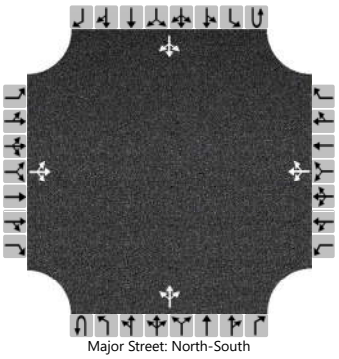
Time Analyzed	2022 No Build - PM Peak
Intersection Orientation	North-South
Project Description	Clarkshaw Village TIS

Site Information

Intersection	Section Line & Bean-Oller
Jurisdiction	DCEO
East/West Street	Bean-Oller Road
North/South Street	S. Section Line Road
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Major Street: North-South

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		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	0	0	0	1	0	0	0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		4	21	1		18	15	20		0	261	24		18	167	5
Percent Heavy Vehicles (%)		0	8	0		0	0	0		0				20		
Proportion Time Blocked																
Percent Grade (%)	0				0											
Right Turn Channelized																
Median Type | Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1	6.5	6.2		7.1	6.5	6.2		4.1				4.1		
Critical Headway (sec)		7.10	6.58	6.20		7.10	6.50	6.20		4.10				4.30		
Base Follow-Up Headway (sec)		3.5	4.0	3.3		3.5	4.0	3.3		2.2				2.2		
Follow-Up Headway (sec)		3.50	4.07	3.30		3.50	4.00	3.30		2.20				2.38		

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			28				58			0				20		
Capacity, c (veh/h)			443				524			1400				1155		
v/c Ratio			0.06				0.11			0.00				0.02		
95% Queue Length, Q_{95} (veh)			0.2				0.4			0.0				0.1		
Control Delay (s/veh)			13.7				12.7			7.6				8.2		
Level of Service (LOS)			B				B			A				A		
Approach Delay (s/veh)	13.7				12.7				0.0				0.9			
Approach LOS	B				B											

HCS7 Two-Way Stop-Control Report

General Information

Analyst	TJS
Agency/Co.	Smart Services, Inc.
Date Performed	12/01/2021
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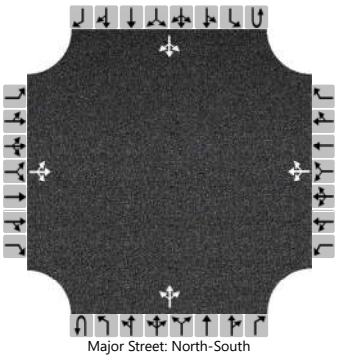
Intersection Orientation	North-South
Project Description	Clarkshaw Village TIS

Site Information

Intersection	Section Line & Bean-Oller
Jurisdiction	DCEO
East/West Street	Bean-Oller Road
North/South Street	S. Section Line Road
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Major Street: North-South

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		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	0	0	0	1	0	0	0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		2	18	4		22	18	21		2	191	9		11	277	2
Percent Heavy Vehicles (%)		0	0	0		0	0	0		0				20		
Proportion Time Blocked																
Percent Grade (%)	0				0											
Right Turn Channelized																
Median Type | Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1	6.5	6.2		7.1	6.5	6.2		4.1				4.1		
Critical Headway (sec)		7.10	6.50	6.20		7.10	6.50	6.20		4.10				4.30		
Base Follow-Up Headway (sec)		3.5	4.0	3.3		3.5	4.0	3.3		2.2				2.2		
Follow-Up Headway (sec)		3.50	4.00	3.30		3.50	4.00	3.30		2.20				2.38		

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			26				66			2				12		
Capacity, c (veh/h)			470				518			1269				1253		
v/c Ratio			0.06				0.13			0.00				0.01		
95% Queue Length, Q_{95} (veh)			0.2				0.4			0.0				0.0		
Control Delay (s/veh)			13.1				13.0			7.8				7.9		
Level of Service (LOS)			B				B			A				A		
Approach Delay (s/veh)	13.1				13.0				0.1				0.4			
Approach LOS	B				B											

HCS7 Two-Way Stop-Control Report

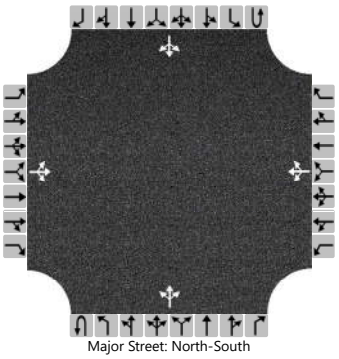
General Information

Analyst	TJS
Agency/Co.	Smart Services, Inc.
Date Performed	12/01/2021
Analysis Year	2022
Time Analyzed	2022 Build - PM Peak
Intersection Orientation	North-South
Project Description	Clarkshaw Village TIS

Site Information

Intersection	Section Line & Bean-Oller
Jurisdiction	DCEO
East/West Street	Bean-Oller Road
North/South Street	S. Section Line Road
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Major Street: North-South

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		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	0	0	0	1	0	0	0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		4	23	1		21	16	24		0	262	29		25	169	5
Percent Heavy Vehicles (%)		0	8	0		0	0	0		0				20		
Proportion Time Blocked																
Percent Grade (%)	0				0											
Right Turn Channelized																
Median Type | Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1	6.5	6.2		7.1	6.5	6.2		4.1				4.1		
Critical Headway (sec)		7.10	6.58	6.20		7.10	6.50	6.20		4.10				4.30		
Base Follow-Up Headway (sec)		3.5	4.0	3.3		3.5	4.0	3.3		2.2				2.2		
Follow-Up Headway (sec)		3.50	4.07	3.30		3.50	4.00	3.30		2.20				2.38		

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			30				66			0				27		
Capacity, c (veh/h)			425				511			1397				1149		
v/c Ratio			0.07				0.13			0.00				0.02		
95% Queue Length, Q_{95} (veh)			0.2				0.4			0.0				0.1		
Control Delay (s/veh)			14.1				13.1			7.6				8.2		
Level of Service (LOS)			B				B			A				A		
Approach Delay (s/veh)	14.1				13.1				0.0				1.2			
Approach LOS	B				B											

HCS7 Two-Way Stop-Control Report

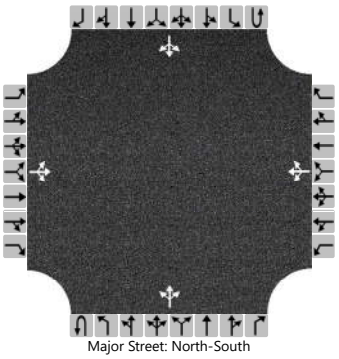
General Information

Analyst	TJS
Agency/Co.	Smart Services, Inc.
Date Performed	12/01/2021
Analysis Year	2032
Time Analyzed	2032 No Build - AM Peak
Intersection Orientation	North-South
Project Description	Clarkshaw Village TIS

Site Information

Intersection	Section Line & Bean-Oller
Jurisdiction	DCEO
East/West Street	Bean-Oller Road
North/South Street	S. Section Line Road
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Major Street: North-South

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		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	0	0	0	1	0	0	0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		3	22	5		19	19	16		3	224	8		11	322	3
Percent Heavy Vehicles (%)		0	0	0		0	0	0		0				20		
Proportion Time Blocked																
Percent Grade (%)	0				0											
Right Turn Channelized																
Median Type | Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1	6.5	6.2		7.1	6.5	6.2		4.1				4.1		
Critical Headway (sec)		7.10	6.50	6.20		7.10	6.50	6.20		4.10				4.30		
Base Follow-Up Headway (sec)		3.5	4.0	3.3		3.5	4.0	3.3		2.2				2.2		
Follow-Up Headway (sec)		3.50	4.00	3.30		3.50	4.00	3.30		2.20				2.38		

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			33				59			3				12		
Capacity, c (veh/h)			419				448			1217				1215		
v/c Ratio			0.08				0.13			0.00				0.01		
95% Queue Length, Q_{95} (veh)			0.3				0.4			0.0				0.0		
Control Delay (s/veh)			14.3				14.3			8.0				8.0		
Level of Service (LOS)			B				B			A				A		
Approach Delay (s/veh)	14.3				14.3				0.1				0.4			
Approach LOS	B				B											

HCS7 Two-Way Stop-Control Report

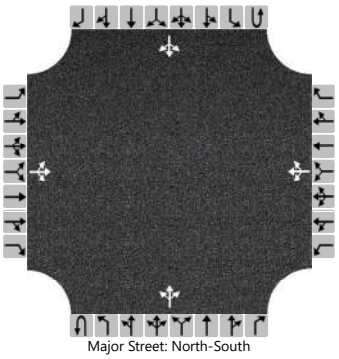
General Information

Analyst	TJS
Agency/Co.	Smart Services, Inc.
Date Performed	12/01/2021
Analysis Year	2032
Time Analyzed	2032 No Build - PM Peak
Intersection Orientation	North-South
Project Description	Clarkshaw Village TIS

Site Information

Intersection	Section Line & Bean-Oller
Jurisdiction	DCEO
East/West Street	Bean-Oller Road
North/South Street	S. Section Line Road
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Major Street: North-South

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		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	0	0	0	1	0	0	0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		5	25	1		21	18	24		0	310	27		20	195	7
Percent Heavy Vehicles (%)		0	8	0		0	0	0		0				20		
Proportion Time Blocked																
Percent Grade (%)	0				0											
Right Turn Channelized																
Median Type | Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1	6.5	6.2		7.1	6.5	6.2		4.1				4.1		
Critical Headway (sec)		7.10	6.58	6.20		7.10	6.50	6.20		4.10				4.30		
Base Follow-Up Headway (sec)		3.5	4.0	3.3		3.5	4.0	3.3		2.2				2.2		
Follow-Up Headway (sec)		3.50	4.07	3.30		3.50	4.00	3.30		2.20				2.38		

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			34				68			0				22		
Capacity, c (veh/h)			387				463			1362				1100		
v/c Ratio			0.09				0.15			0.00				0.02		
95% Queue Length, Q_{95} (veh)			0.3				0.5			0.0				0.1		
Control Delay (s/veh)			15.2				14.1			7.6				8.3		
Level of Service (LOS)			C				B			A				A		
Approach Delay (s/veh)	15.2				14.1				0.0				0.9			
Approach LOS	C				B											

HCS7 Two-Way Stop-Control Report

General Information

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Date Performed	12/01/2021
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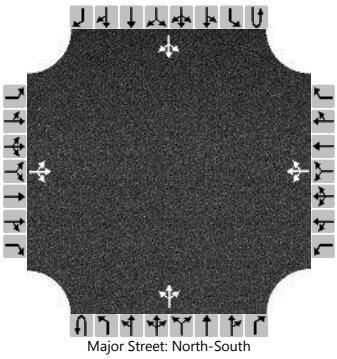
Intersection Orientation	North-South
Project Description	Clarkshaw Village TIS

Site Information

Intersection	Section Line & Bean-Oller
Jurisdiction	DCEO
East/West Street	Bean-Oller Road
North/South Street	S. Section Line Road
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Major Street: North-South

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		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	0	0	0	1	0	0	0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		3	23	5		23	21	22		3	226	10		13	323	3
Percent Heavy Vehicles (%)		0	0	0		0	0	0		0				20		
Proportion Time Blocked																
Percent Grade (%)	0				0											
Right Turn Channelized																
Median Type | Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1	6.5	6.2		7.1	6.5	6.2		4.1				4.1		
Critical Headway (sec)		7.10	6.50	6.20		7.10	6.50	6.20		4.10				4.30		
Base Follow-Up Headway (sec)		3.5	4.0	3.3		3.5	4.0	3.3		2.2				2.2		
Follow-Up Headway (sec)		3.50	4.00	3.30		3.50	4.00	3.30		2.20				2.38		

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			34				72			3				14		
Capacity, c (veh/h)			412				451			1216				1210		
v/c Ratio			0.08				0.16			0.00				0.01		
95% Queue Length, Q_{95} (veh)			0.3				0.6			0.0				0.0		
Control Delay (s/veh)			14.5				14.5			8.0				8.0		
Level of Service (LOS)			B				B			A				A		
Approach Delay (s/veh)	14.5				14.5				0.1				0.4			
Approach LOS	B				B											

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Site Information

Intersection	Section Line & Bean-Oller
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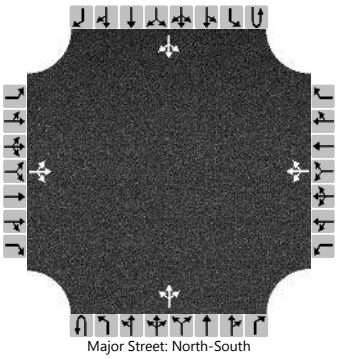
East/West Street	Bean-Oller Road
North/South Street	S. Section Line Road
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Major Street: North-South

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		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	0	0	0	1	0	0	0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		5	27	1		24	19	28		0	311	32		27	197	7
Percent Heavy Vehicles (%)		0	8	0		0	0	0		0				20		
Proportion Time Blocked																
Percent Grade (%)	0				0											
Right Turn Channelized																
Median Type | Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1	6.5	6.2		7.1	6.5	6.2		4.1				4.1		
Critical Headway (sec)		7.10	6.58	6.20		7.10	6.50	6.20		4.10				4.30		
Base Follow-Up Headway (sec)		3.5	4.0	3.3		3.5	4.0	3.3		2.2				2.2		
Follow-Up Headway (sec)		3.50	4.07	3.30		3.50	4.00	3.30		2.20				2.38		

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			36				77			0				29		
Capacity, c (veh/h)			371				451			1359				1093		
v/c Ratio			0.10				0.17			0.00				0.03		
95% Queue Length, Q_{95} (veh)			0.3				0.6			0.0				0.1		
Control Delay (s/veh)			15.7				14.6			7.6				8.4		
Level of Service (LOS)			C				B			A				A		
Approach Delay (s/veh)	15.7				14.6				0.0				1.2			
Approach LOS	C				B											

HCS7 Two-Way Stop-Control Report

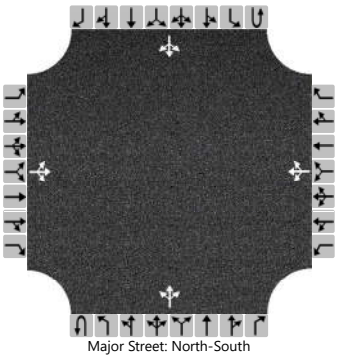
General Information

Analyst	TJS
Agency/Co.	Smart Services, Inc.
Date Performed	12/01/2021
Analysis Year	2022
Time Analyzed	2022 No Build - AM Peak
Intersection Orientation	North-South
Project Description	Clarkshaw Village TIS

Site Information

Intersection	Section Line & Clark-Shaw
Jurisdiction	DCEO
East/West Street	Clark-Shaw Road
North/South Street	S. Section Line Road
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Major Street: North-South

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		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	0	0	0	1	0	0	0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		1	9	2		22	10	18		1	181	20		9	280	1
Percent Heavy Vehicles (%)		0	33	0		0	0	0		0				11		
Proportion Time Blocked																
Percent Grade (%)	0				0											
Right Turn Channelized																
Median Type | Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1	6.5	6.2		7.1	6.5	6.2		4.1				4.1		
Critical Headway (sec)		7.10	6.83	6.20		7.10	6.50	6.20		4.10				4.21		
Base Follow-Up Headway (sec)		3.5	4.0	3.3		3.5	4.0	3.3		2.2				2.2		
Follow-Up Headway (sec)		3.50	4.30	3.30		3.50	4.00	3.30		2.20				2.30		

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			13				54			1				10		
Capacity, c (veh/h)			437				535			1267				1299		
v/c Ratio			0.03				0.10			0.00				0.01		
95% Queue Length, Q_{95} (veh)			0.1				0.3			0.0				0.0		
Control Delay (s/veh)			13.5				12.5			7.8				7.8		
Level of Service (LOS)			B				B			A				A		
Approach Delay (s/veh)	13.5				12.5				0.0				0.3			
Approach LOS	B				B											

HCS7 Two-Way Stop-Control Report

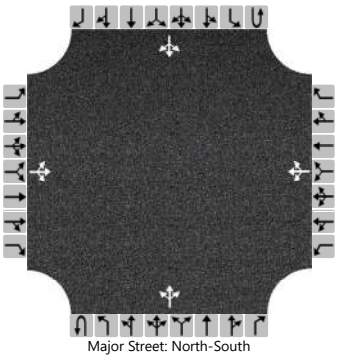
General Information

Analyst	TJS
Agency/Co.	Smart Services, Inc.
Date Performed	12/01/2021
Analysis Year	2022
Time Analyzed	2022 No Build - PM Peak
Intersection Orientation	North-South
Project Description	Clarkshaw Village TIS

Site Information

Intersection	Section Line & Clark-Shaw
Jurisdiction	DCEO
East/West Street	Clark-Shaw Road
North/South Street	S. Section Line Road
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Major Street: North-South

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		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	0	0	0	1	0	0	0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		5	15	3		28	19	20		6	253	22		11	176	2
Percent Heavy Vehicles (%)		0	0	0		19	11	5		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)		7.1	6.5	6.2		7.1	6.5	6.2		4.1				4.1		
Critical Headway (sec)		7.10	6.50	6.20		7.29	6.61	6.25		4.10				4.10		
Base Follow-Up Headway (sec)		3.5	4.0	3.3		3.5	4.0	3.3		2.2				2.2		
Follow-Up Headway (sec)		3.50	4.00	3.30		3.67	4.10	3.35		2.20				2.20		

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			25				73			7				12		
Capacity, c (veh/h)			473				490			1392				1274		
v/c Ratio			0.05				0.15			0.00				0.01		
95% Queue Length, Q_{95} (veh)			0.2				0.5			0.0				0.0		
Control Delay (s/veh)			13.0				13.6			7.6				7.9		
Level of Service (LOS)			B				B			A				A		
Approach Delay (s/veh)	13.0				13.6				0.2				0.5			
Approach LOS	B				B											

HCS7 Two-Way Stop-Control Report

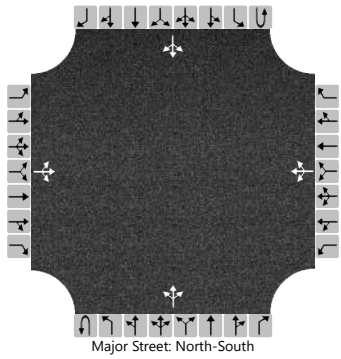
General Information

Analyst	TJS
Agency/Co.	Smart Services, Inc.
Date Performed	12/01/2021
Analysis Year	2022
Time Analyzed	2022 Build - AM Peak
Intersection Orientation	North-South
Project Description	Clarkshaw Village TIS

Site Information

Intersection	Section Line & Clark-Shaw
Jurisdiction	DCEO
East/West Street	Clark-Shaw Road
North/South Street	S. Section Line Road
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Major Street: North-South

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		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	0	0	0	1	0	0	0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		1	10	2		28	13	20		1	183	22		10	284	1
Percent Heavy Vehicles (%)		0	33	0		0	0	0		0				11		
Proportion Time Blocked																
Percent Grade (%)	0				0											
Right Turn Channelized																
Median Type | Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1	6.5	6.2		7.1	6.5	6.2		4.1				4.1		
Critical Headway (sec)		7.10	6.83	6.20		7.10	6.50	6.20		4.10				4.21		
Base Follow-Up Headway (sec)		3.5	4.0	3.3		3.5	4.0	3.3		2.2				2.2		
Follow-Up Headway (sec)		3.50	4.30	3.30		3.50	4.00	3.30		2.20				2.30		

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			14				66			1				11		
Capacity, c (veh/h)			427				518			1262				1295		
v/c Ratio			0.03				0.13			0.00				0.01		
95% Queue Length, Q_{95} (veh)			0.1				0.4			0.0				0.0		
Control Delay (s/veh)			13.7				13.0			7.9				7.8		
Level of Service (LOS)			B				B			A				A		
Approach Delay (s/veh)	13.7				13.0				0.0				0.3			
Approach LOS	B				B											

HCS7 Two-Way Stop-Control Report

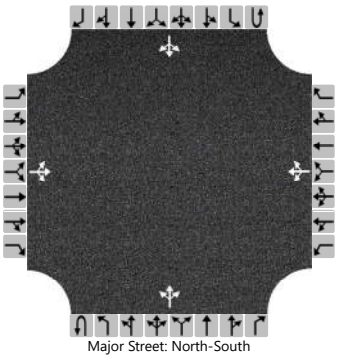
General Information

Analyst	TJS
Agency/Co.	Smart Services, Inc.
Date Performed	12/01/2021
Analysis Year	2022
Time Analyzed	2022 Build - PM Peak
Intersection Orientation	North-South
Project Description	Clarkshaw Village TIS

Site Information

Intersection	Section Line & Clark-Shaw
Jurisdiction	DCEO
East/West Street	Clark-Shaw Road
North/South Street	S. Section Line Road
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Major Street: North-South

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		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	0	0	0	1	0	0	0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		5	19	3		32	21	21		6	258	29		13	179	2
Percent Heavy Vehicles (%)		0	0	0		19	11	5		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)		7.1	6.5	6.2		7.1	6.5	6.2		4.1				4.1		
Critical Headway (sec)		7.10	6.50	6.20		7.29	6.61	6.25		4.10				4.10		
Base Follow-Up Headway (sec)		3.5	4.0	3.3		3.5	4.0	3.3		2.2				2.2		
Follow-Up Headway (sec)		3.50	4.00	3.30		3.67	4.10	3.35		2.20				2.20		

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			29				80			7				14		
Capacity, c (veh/h)			456				472			1388				1260		
v/c Ratio			0.06				0.17			0.00				0.01		
95% Queue Length, Q_{95} (veh)			0.2				0.6			0.0				0.0		
Control Delay (s/veh)			13.4				14.2			7.6				7.9		
Level of Service (LOS)			B				B			A				A		
Approach Delay (s/veh)	13.4				14.2				0.2				0.6			
Approach LOS	B				B											

HCS7 Two-Way Stop-Control Report

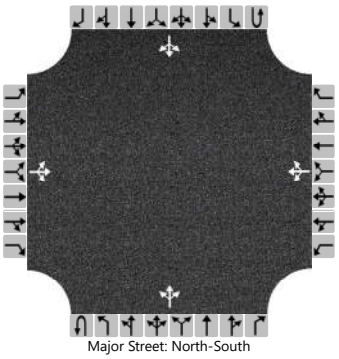
General Information

Analyst	TJS
Agency/Co.	Smart Services, Inc.
Date Performed	12/01/2021
Analysis Year	2032
Time Analyzed	2032 No Build - AM Peak
Intersection Orientation	North-South
Project Description	Clarkshaw Village TIS

Site Information

Intersection	Section Line & Clark-Shaw
Jurisdiction	DCEO
East/West Street	Clark-Shaw Road
North/South Street	S. Section Line Road
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Major Street: North-South

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		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	0	0	0	1	0	0	0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		1	12	3		28	13	23		1	214	25		12	330	1
Percent Heavy Vehicles (%)		0	33	0		0	0	0		0				11		
Proportion Time Blocked																
Percent Grade (%)	0				0											
Right Turn Channelized																
Median Type | Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1	6.5	6.2		7.1	6.5	6.2		4.1				4.1		
Critical Headway (sec)		7.10	6.83	6.20		7.10	6.50	6.20		4.10				4.21		
Base Follow-Up Headway (sec)		3.5	4.0	3.3		3.5	4.0	3.3		2.2				2.2		
Follow-Up Headway (sec)		3.50	4.30	3.30		3.50	4.00	3.30		2.20				2.30		

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			17				70			1				13		
Capacity, c (veh/h)			384				467			1210				1254		
v/c Ratio			0.05				0.15			0.00				0.01		
95% Queue Length, Q_{95} (veh)			0.1				0.5			0.0				0.0		
Control Delay (s/veh)			14.8				14.0			8.0				7.9		
Level of Service (LOS)			B				B			A				A		
Approach Delay (s/veh)	14.8				14.0				0.0				0.4			
Approach LOS	B				B											

HCS7 Two-Way Stop-Control Report

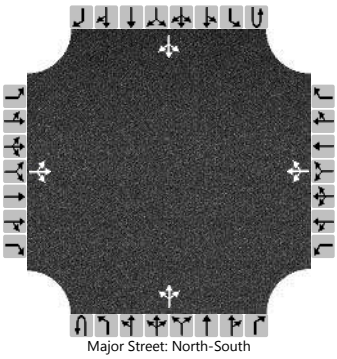
General Information

Analyst	TJS
Agency/Co.	Smart Services, Inc.
Date Performed	12/01/2021
Analysis Year	2032
Time Analyzed	2032 No Build - PM Peak
Intersection Orientation	North-South
Project Description	Clarkshaw Village TIS

Site Information

Intersection	Section Line & Clark-Shaw
Jurisdiction	DCEO
East/West Street	Clark-Shaw Road
North/South Street	S. Section Line Road
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Major Street: North-South

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		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	0	0	0	1	0	0	0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		7	20	4		36	24	25		8	298	28		15	207	3
Percent Heavy Vehicles (%)		0	0	0		19	11	5		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)		7.1	6.5	6.2		7.1	6.5	6.2		4.1				4.1		
Critical Headway (sec)		7.10	6.50	6.20		7.29	6.61	6.25		4.10				4.10		
Base Follow-Up Headway (sec)		3.5	4.0	3.3		3.5	4.0	3.3		2.2				2.2		
Follow-Up Headway (sec)		3.50	4.00	3.30		3.67	4.10	3.35		2.20				2.20		

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			34				92			9				16		
Capacity, c (veh/h)			408				421			1352				1216		
v/c Ratio			0.08				0.22			0.01				0.01		
95% Queue Length, Q_{95} (veh)			0.3				0.8			0.0				0.0		
Control Delay (s/veh)			14.6				15.9			7.7				8.0		
Level of Service (LOS)			B				C			A				A		
Approach Delay (s/veh)	14.6				15.9				0.2				0.6			
Approach LOS	B				C											

HCS7 Two-Way Stop-Control Report

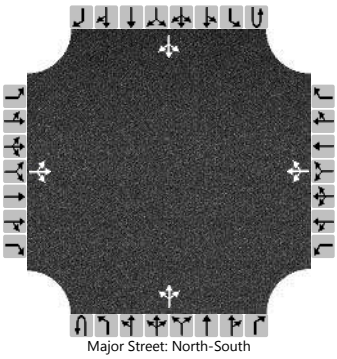
General Information

Analyst	TJS
Agency/Co.	Smart Services, Inc.
Date Performed	12/01/2021
Analysis Year	2032
Time Analyzed	2032 Build - AM Peak
Intersection Orientation	North-South
Project Description	Clarkshaw Village TIS

Site Information

Intersection	Section Line & Clark-Shaw
Jurisdiction	DCEO
East/West Street	Clark-Shaw Road
North/South Street	S. Section Line Road
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Major Street: North-South

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		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	0	0	0	1	0	0	0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		1	13	3		34	16	25		1	216	27		13	334	1
Percent Heavy Vehicles (%)		0	33	0		0	0	0		0				11		
Proportion Time Blocked																
Percent Grade (%)	0				0											
Right Turn Channelized																
Median Type | Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1	6.5	6.2		7.1	6.5	6.2		4.1				4.1		
Critical Headway (sec)		7.10	6.83	6.20		7.10	6.50	6.20		4.10				4.21		
Base Follow-Up Headway (sec)		3.5	4.0	3.3		3.5	4.0	3.3		2.2				2.2		
Follow-Up Headway (sec)		3.50	4.30	3.30		3.50	4.00	3.30		2.20				2.30		

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			18				82			1				14		
Capacity, c (veh/h)			375				453			1206				1249		
v/c Ratio			0.05				0.18			0.00				0.01		
95% Queue Length, Q_{95} (veh)			0.2				0.7			0.0				0.0		
Control Delay (s/veh)			15.1				14.7			8.0				7.9		
Level of Service (LOS)			C				B			A				A		
Approach Delay (s/veh)	15.1				14.7				0.0				0.4			
Approach LOS	C				B											

HCS7 Two-Way Stop-Control Report

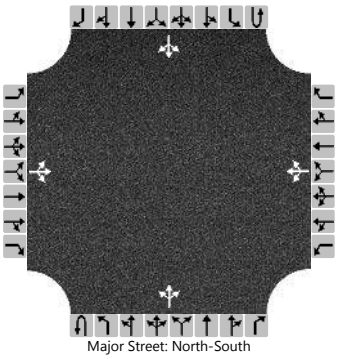
General Information

Analyst	TJS
Agency/Co.	Smart Services, Inc.
Date Performed	12/01/2021
Analysis Year	2032
Time Analyzed	2032 Build - PM Peak
Intersection Orientation	North-South
Project Description	Clarkshaw Village TIS

Site Information

Intersection	Section Line & Clark-Shaw
Jurisdiction	DCEO
East/West Street	Clark-Shaw Road
North/South Street	S. Section Line Road
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Major Street: North-South

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		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	0	0	0	1	0	0	0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		7	24	4		40	26	26		8	303	35		17	210	3
Percent Heavy Vehicles (%)		0	0	0		19	11	5		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)		7.1	6.5	6.2		7.1	6.5	6.2		4.1				4.1		
Critical Headway (sec)		7.10	6.50	6.20		7.29	6.61	6.25		4.10				4.10		
Base Follow-Up Headway (sec)		3.5	4.0	3.3		3.5	4.0	3.3		2.2				2.2		
Follow-Up Headway (sec)		3.50	4.00	3.30		3.67	4.10	3.35		2.20				2.20		

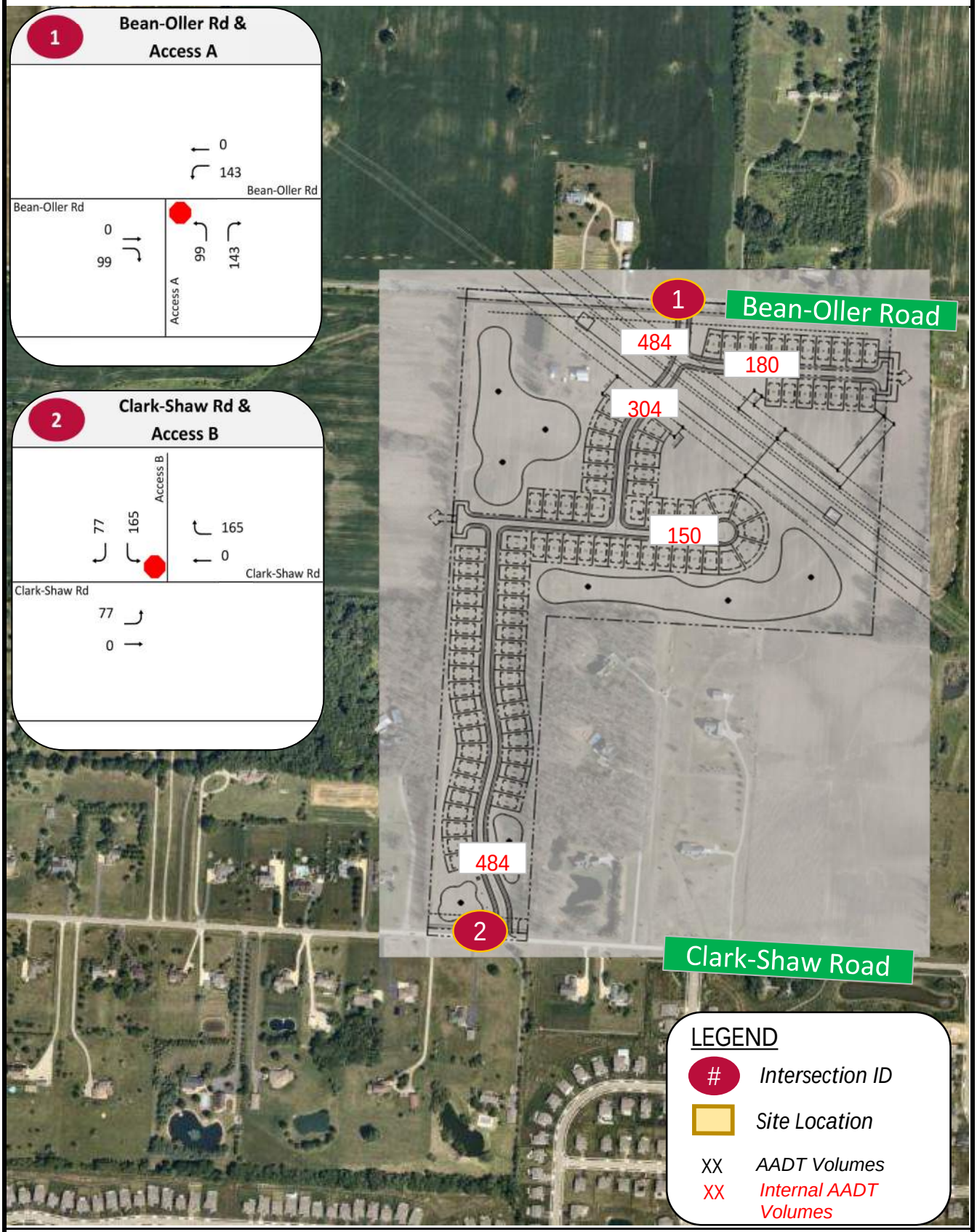
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			38				100			9				18		
Capacity, c (veh/h)			394				405			1348				1202		
v/c Ratio			0.10				0.25			0.01				0.02		
95% Queue Length, Q_{95} (veh)			0.3				1.0			0.0				0.0		
Control Delay (s/veh)			15.1				16.8			7.7				8.0		
Level of Service (LOS)			C				C			A				A		
Approach Delay (s/veh)	15.1				16.8				0.2				0.7			
Approach LOS	C				C											

APPENDIX

F. Internal Site AADT Volumes

Exhibit 5: Internal Street AADT Volumes



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