Farmstead
Traffic Impact Study

Prepared For:

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September 2018

REV. 1
9/2018

SSI Project #: 722401

Farmstead
Traffic Impact Study

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APPENDIX

BACKGROUND

Grand Communities, LLC is proposing to develop a site with approximately 415 single family homes and 120 attached single family units. The site is located on the west side of Jackson Pike (SR 104) north of Scioto Meadows Boulevard. Figure 1 shows the location of the site. There is one full access proposed on Jackson Pike (SR 104). There is an access to Hawthorne Parkway which has access to Buckeye Parkway. There is also an access to Windcliff Drive which has access to River Trail Drive. Figure 2 shows the proposed site layout. The City of Grove City is requiring a traffic impact study (TIS) for the development. The Ohio Department of Transportation (ODOT) will also be reviewing the study.

Smart Services, Inc. (SSI) has been retained by the developer to perform the TIS. The scope of the TIS is contained in a memo of understanding (MOU) dated 12/13/2017 that was submitted to the City of Grove City and ODOT. A copy of the MOU is in the Appendix.

A previous version of the study dated 5/31/2018 was submitted to the City of Grove City and ODOT. Comments were received from the City of Grove City in letter dated 7/10/2018 with follow up information in an e-mail dated 8/24/2018. Comments were received from ODOT in an e-mail dated 8/29/2018. This revision incorporates the comments. A copy of the referenced correspondence is in the Appendix.

EXISTING CONDITIONS

The intersection of Jackson Pike (SR 104) & London-Groveport Road (SR 665) is currently controlled by a traffic signal and there are existing northbound and southbound left turn lanes. The signal is owned by the ODOT. The intersection of London-Groveport Road (SR 665) & Buckeye Parkway is currently controlled by a "Stop" sign on the Buckeye Parkway approach and is in the jurisdiction of ODOT. The intersection of Hawthorne Parkway & Buckeye Parkway is currently controlled by "Stop" signs on all four approaches and is in the City of Grove City. Table 1 shows the speed limit of each roadway in the study area.

Street	Speed Limit
Jackson Pike (SR 104)	50 MPH
London-Groveport Road (SR 665)	55 MPH
Hawthorne Parkway	25 MPH
Buckeye Parkway	25 MPH

TABLE 1 – Summary of Roadway Speed Limits

As part of the project, peak hour (7-9 AM & 4-6 PM) turning movement counts were performed at the intersections of Buckeye Parkway & Hawthorne Parkway, London-Groveport Road (SR 665) & Buckeye Parkway, and Jackson Pike (SR 104) & London-Groveport Road (SR 665). A peak hour (7-9 AM & 4-6 PM) link count was also performed on Jackson Pike (SR 104) north of Scioto Meadows Boulevard. Table 2 shows a summary of the existing data source and the hours applied to the study.

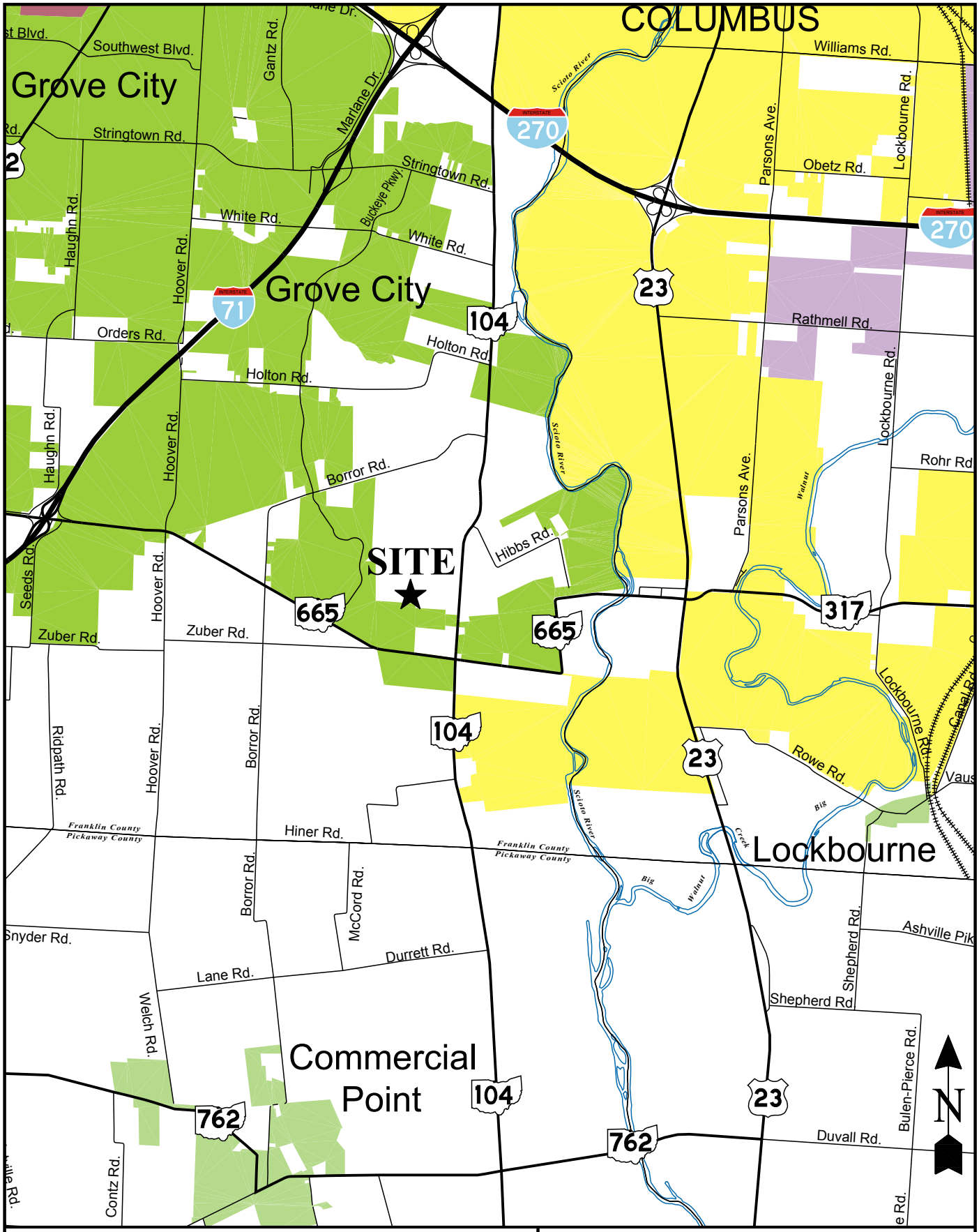

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FIGURE 1

SITE LOCATION

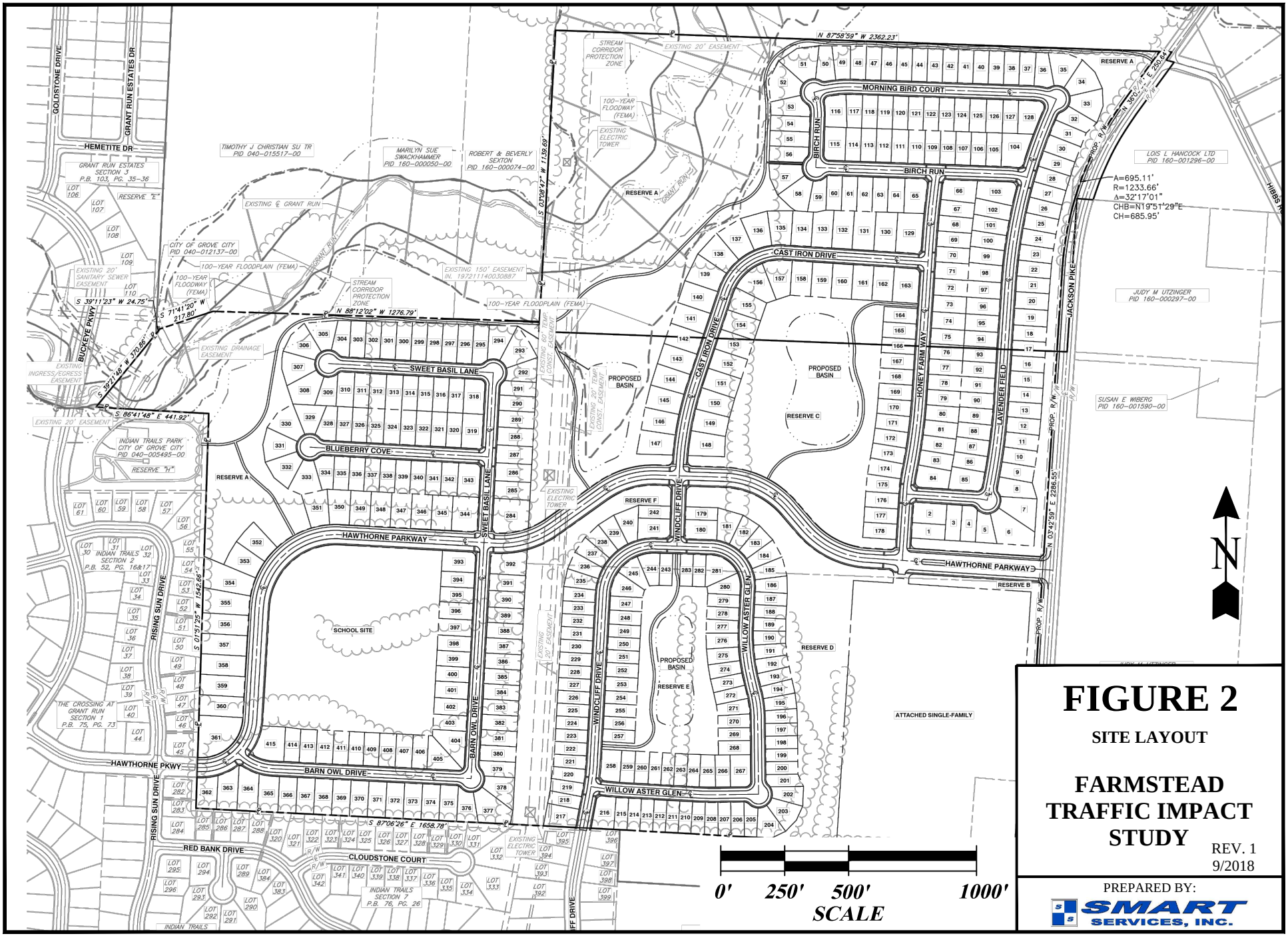

FIGURE 2

SITE LAYOUT

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. Intersection	Source	AM Peak Hour	PM Peak Hour
Jackson Pike (SR 104) & London-Groveport Road (SR 665)	Smart Services, Inc.	7:00-8:00 AM	4:00-5:00 PM
Jackson Pike (SR 104) north of Scioto Meadows Blvd.	Smart Services, Inc.	7:00-8:00 AM	3:45-4:45 PM
London-Groveport Road (SR 665) & Buckeye Parkway	Smart Services, Inc.	7:00-8:00 AM	4:30-5:30 PM
Buckeye Parkway & Hawthorne Parkway	Smart Services, Inc.	7:00-8:00 AM	5:00-6:00 PM

TABLE 2 – Summary of Existing Traffic Basis

PROJECTED SITE TRAFFIC

Trip Generation

The accepted method for computing trip generation in the traffic engineering profession is *Trip Generation Manual, 10th Edition* published by the Institute of Transportation Engineers (ITE). This report provides trip rates for different land uses based on data from sample sites in each category. An elementary school, with a capacity of 625 students, is potentially planned to be built by others within the development area. It would replace 25 single family lots, thereforetwo potential trip generation scenarios were analyzed in the study. It is assumed that the school will be constructed in 4-5 years so traffic from the school is only considered in the design year.

There are three types of residential dwelling units proposed on the site plan: single family detached, patio homes, and single family attached. In the *Trip Generation Manual*, the best representation for single family detached is Single-Family Detached Housing", (ITE Code #210). The patio homes, which are marketed to "empty nesters", are best represented by the land use "Senior Adult Housing-Detached", (ITE Code #251). The 120 single family attached units, which may be duplexes, are not represented in the *Trip Generation Manual*. The multifamily housing data set indicates that there are at least four units per building. Therefore, to be conservative these 120 units were also considered to be "Single-Family Detached Housing", (ITE Code #210). Table 3 shows a summary of the trip generation calculations for the residential only development. The graphs from the *Trip Generation Manual, 10th Edition* are in the Appendix.

The proposed elementary school land use is represented by "Elementary School", (ITE Code #520). Some of the students will be generated by dwelling units that can travel residential streets back and forth to the school and will not go through the study area intersections. To estimate this, data for elementary students per dwelling unit was needed. An internet search provided limited information, but a study titled *Hemet Unified School District Fee Justification Report For New Residential And Commercial Industrial Development*, provided a 0.1843 elementary student generation rate. The title page and page containing the table are in the Appendix.

In addition to the 430 proposed single-family dwelling units, there will be 316 existing dwelling units that can get to the school without taking Buckeye Parkway, SR 665, or SR 104. Figure 3 shows the location of the 316 units. This would result in a reduction of approximately 22% of the students. The calculation is as follows:

([Existing DUs = 316] + [Proposed DUs = 430] = [Total DUs 746]) x (0.1843) = 137 Students

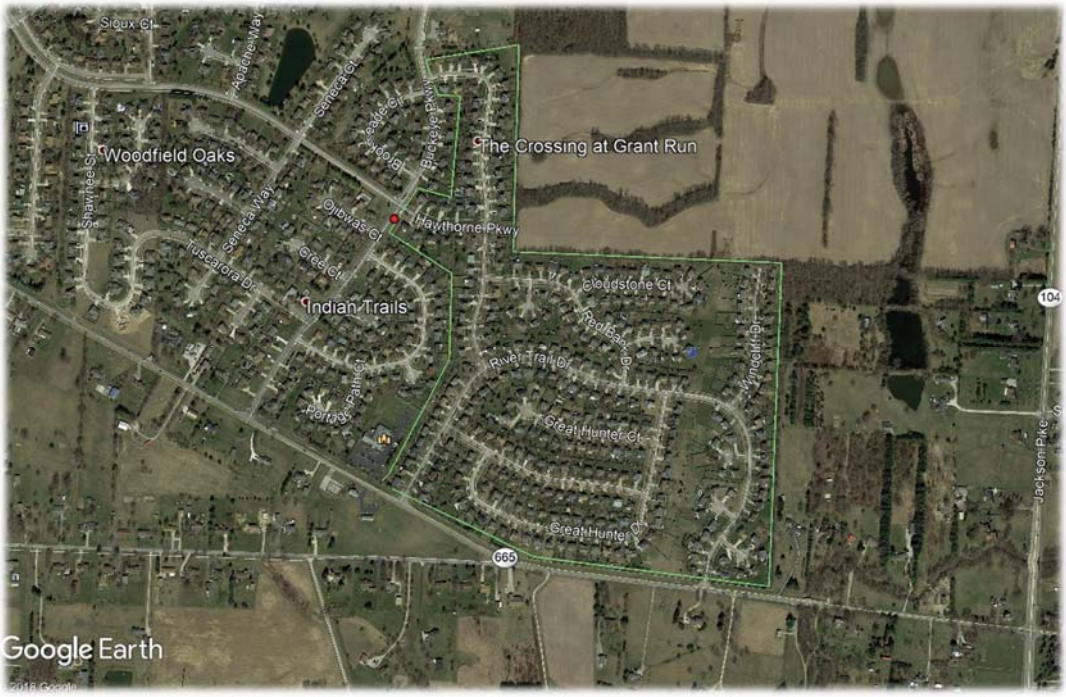

FIGURE 3 – Location of 316 existing dwelling units projected to use internal streets

To estimate traffic, *Trip Generation, 10th Edition* published by the Institute of Transportation Engineers (ITE) was used. Based on the calculations above for students living inside the immediate neighborhood, 488 students (625-137 students) would represent those living outside the neighborhood. Table 4 shows a summary of the trip generation calculations for the case with the potential school site. The graphs from the *Trip Generation Manual, 10th Edition* are in the Appendix.

Trip Distribution

The distribution for the residential traffic was assumed to be as follows:

- 30% to/from the north on SR 104
- 30% to/from the north on Buckeye Parkway
- 25% to/from the west on SR 665
- 10% to/from the east on SR 665
- 5% to/from the south on SR 104

The traffic for the elementary school was distributed to the network based on the following distribution proposed by the City of Grove City:

- 10% to/from the north on SR 104
- 15% to/from the north on Buckeye Parkway
- 15% to/from the west of Buckeye Parkway on Hawthorne Parkway
- 30% to/from the west on SR 665
- 30% to/from the south on SR 104

Traffic Study Subarea	Land Use	Time of Day	Data Set from: *Trip Generation Manual, 10th Edition* (Unless noted Otherwise)	Regression Equation from: *Trip Generation Manual 10th Edition*	Total Trips	Entering		Exiting	
						%	Total Trips	%	Total Trips
1	Single-Family Detached Housing (ITE Code #210)	Daily	Weekday	ln(T)=0.92ln(X)+2.71	4191	50%	2096	50%	2095
		AM Peak	Peak Hour of Adj. Street Traffic, One Hour between 7 & 9 AM	T=0.71(X)+4.80	328	25%	82	75%	246
	Ind. Variable (X) = 455 Dwelling Units	PM Peak	Peak Hour of Adj. Street Traffic, One Hour between 4 & 6 PM	ln(T)=0.96ln(X)+0.20	435	63%	274	37%	161
2	Senior Adult Housing-Detached (ITE Code #251)	Daily	Weekday	Average Rate= 4.27	448	50%	224	50%	224
		AM Peak	Peak Hour of Adj. Street Traffic, One Hour between 7 & 9 AM	ln(T)=0.76ln(X)+0.21	42	33%	14	67%	28
	Ind. Variable (X) = 105 Dwelling Units	PM Peak	Peak Hour of Adj. Street Traffic, One Hour between 4 & 6 PM	ln(T)=0.78ln(X)+0.28	50	61%	31	39%	19
TOTALS		**Daily**			**4639**		**2320**		**2319**
		AM Peak			**370**		**96**		**274**
		PM Peak			**485**		**305**		**180**

TABLE 3 - RESIDENTIAL SITE TRIP GENERATION SUMMARY

Traffic Study Subarea	Land Use	Time of Day	Data Set from: *Trip Generation Manual, 10th Edition* (Unless noted Otherwise)	Overide with Average	Regression Equation from: *Trip Generation Manual 10th Edition*	Total Trips	Entering		Exiting	
							%	Total Trips	%	Total Trips
1	Single-Family Detached Housing (ITE Code #210)	Daily	Weekday	☐	ln(T)=0.92ln(X)+2.71	3978	50%	1989	50%	1989
		AM Peak	Peak Hour of Adj. Street Traffic, One Hour between 7 & 9 AM	☐	T=0.71(X)+4.80	310	25%	78	75%	232
	Ind. Variable (X) = 430 Dwelling Units	PM Peak	Peak Hour of Adj. Street Traffic, One Hour between 4 & 6 PM	☐	ln(T)=0.96ln(X)+0.20	412	63%	260	37%	152
2	Senior Adult Housing-Detached (ITE Code #251)	Daily	Weekday	☐	Average Rate= 4.27	448	50%	224	50%	224
		AM Peak	Peak Hour of Adj. Street Traffic, One Hour between 7 & 9 AM	☐	ln(T)=0.76ln(X)+0.21	42	33%	14	67%	28
	Ind. Variable (X) = 105 Dwelling Units	PM Peak	Peak Hour of Adj. Street Traffic, One Hour between 4 & 6 PM	☐	ln(T)=0.78ln(X)+0.28	50	61%	31	39%	19
3	Elementary School (ITE Code #520)	Daily	Weekday	☐	Average Rate= 1.89	922	50%	461	50%	461
		AM Peak	Peak Hour of Adj. Street Traffic, One Hour between 7 & 9 AM	☐	Average Rate= 0.67	327	54%	177	46%	150
	Ind. Variable (X) = 488 Students	PM Peak	Peak Hour of Adj. Street Traffic, One Hour between 4 & 6 PM	☐	Average Rate= 0.17	83	48%	40	52%	43
TOTALS		**Daily**		☐		**5348**		**2674**		**2674**
		AM Peak				**679**		**269**		**410**
		PM Peak				**545**		**331**		**214**

TABLE 4 - RESIDENTIAL AND SCHOOL SITE TRIP GENERATION SUMMARY

2019, 2029, AND 2039 TRAFFIC

The City of Grove City requires a 10-year design horizon. Per the *State Highway Access Management Manual*, ODOT requires a 10-year design horizon when the peak hour trip ends are below 500 trips and a 20-year design horizon when the peak hour trip ends are 500 or higher. Therefore, the all residential case is a 10-year design and the case with the elementary school is a 20-year design. Opening day is 2019, therefore the design years are 2029 and 2039. Linear annual growth rates were obtained from MORPC. The correspondence from MORPC is in the Appendix. Table 5 shows the growth rates and the corresponding factors applied to the 2017 traffic counts.

Segment	Linear Annual Growth Rate	2017 to 2019 Factor	2017 to 2029 Factor	2017 to 2039 Factor
SR 665 e/o SR 104	2.60%	1.052	1.312	1.572
SR 104 n/o SR 665	1.60%	1.032	1.192	1.352
SR 665 w/o SR 104	2.70%	1.054	1.324	1.594
SR 104 s/o SR 665	2.10%	1.042	1.252	1.462
SR 104 n/o Scioto Meadows Blvd	1.60%	1.032	1.192	*1.352
SR 665 e/o Buckeye Pkwy	2.70%	1.054	1.324	1.594
Buckeye Pkwy n/o SR 665	2.00%	1.040	1.240	1.440
SR 665 w/o Buckeye Pkwy	2.70%	1.054	1.324	1.594
Hawthorne Pkwy e/o Buckeye Pkwy	2.00%	1.040	1.240	NA – City Intersection
Buckeye Pkwy n/o Hawthorne Pkwy	2.00%	1.040	1.240	
Hawthorne Pkwy w/o Buckeye Pkwy	2.00%	1.040	1.240	
Buckeye Pkwy s/o Hawthorne Pkwy	2.00%	1.040	1.240	

*=Split ROW between City and ODOT so more conservative design year used.

TABLE 5 – 2017 Based Growth Factor Summary

Figures 4 and 5 show the components of the 2019 'Build' traffic. Figures 6 and 7 show the components of the 2029 'Build' traffic. Figures 8 and 9 show the components of the 2039 'Build' traffic with the future elementary traffic. To assist with the review, exhibits showing the 2019, 2029, and 2039 'No Build' volumes have been provided in the Appendix.

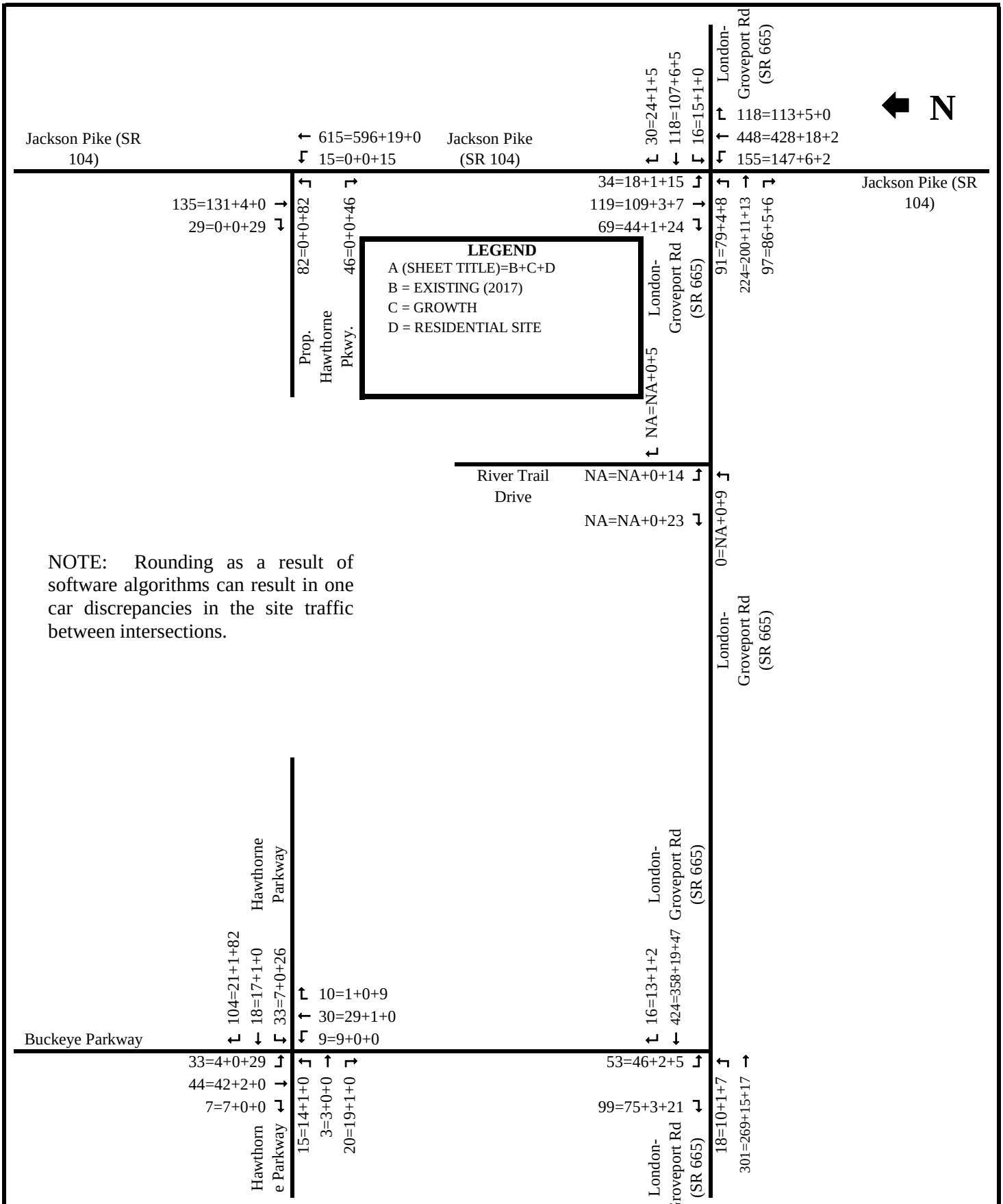

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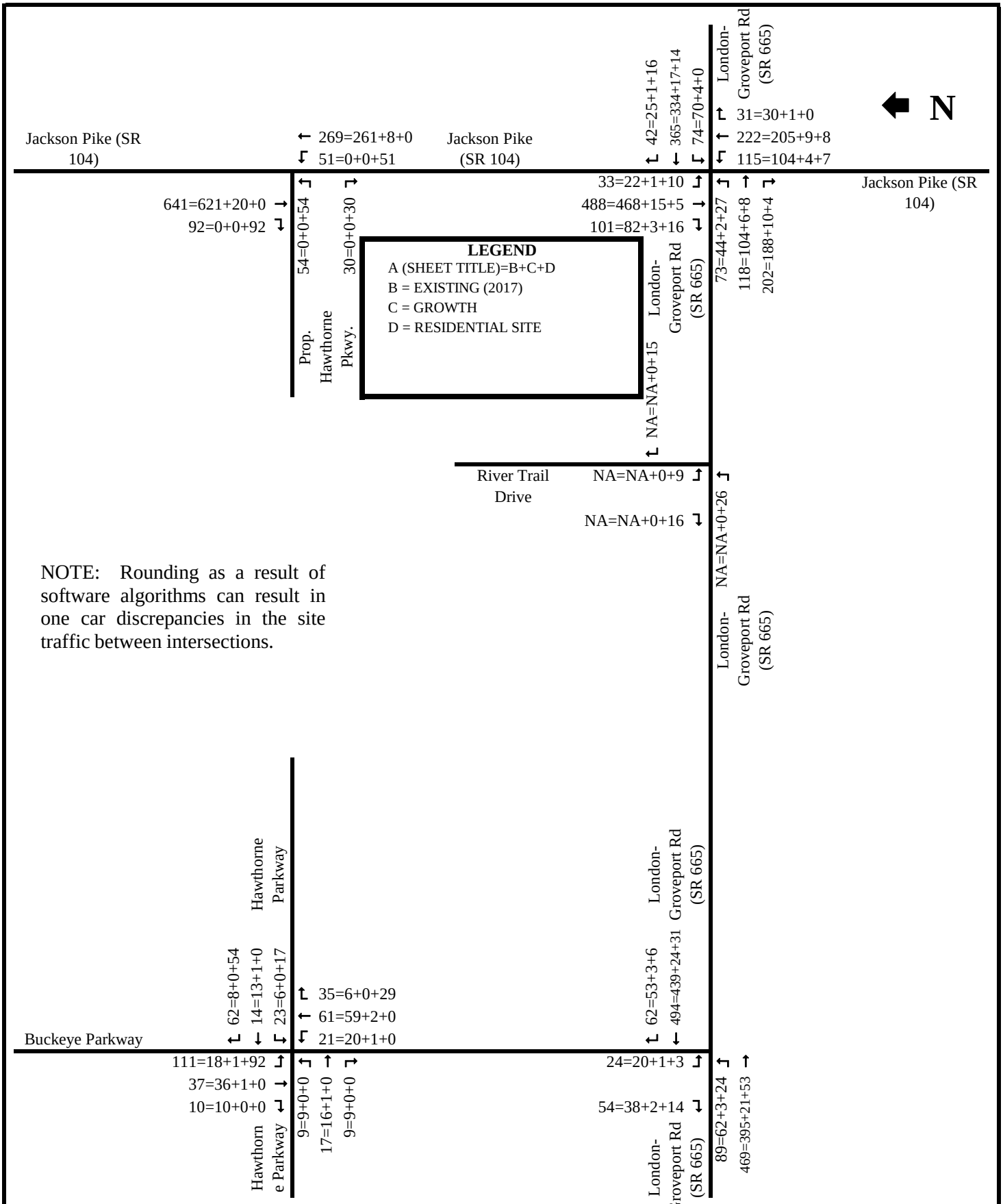
FIGURE 4

2019 RESIDENTIAL 'BUILD' - AM PEAK



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

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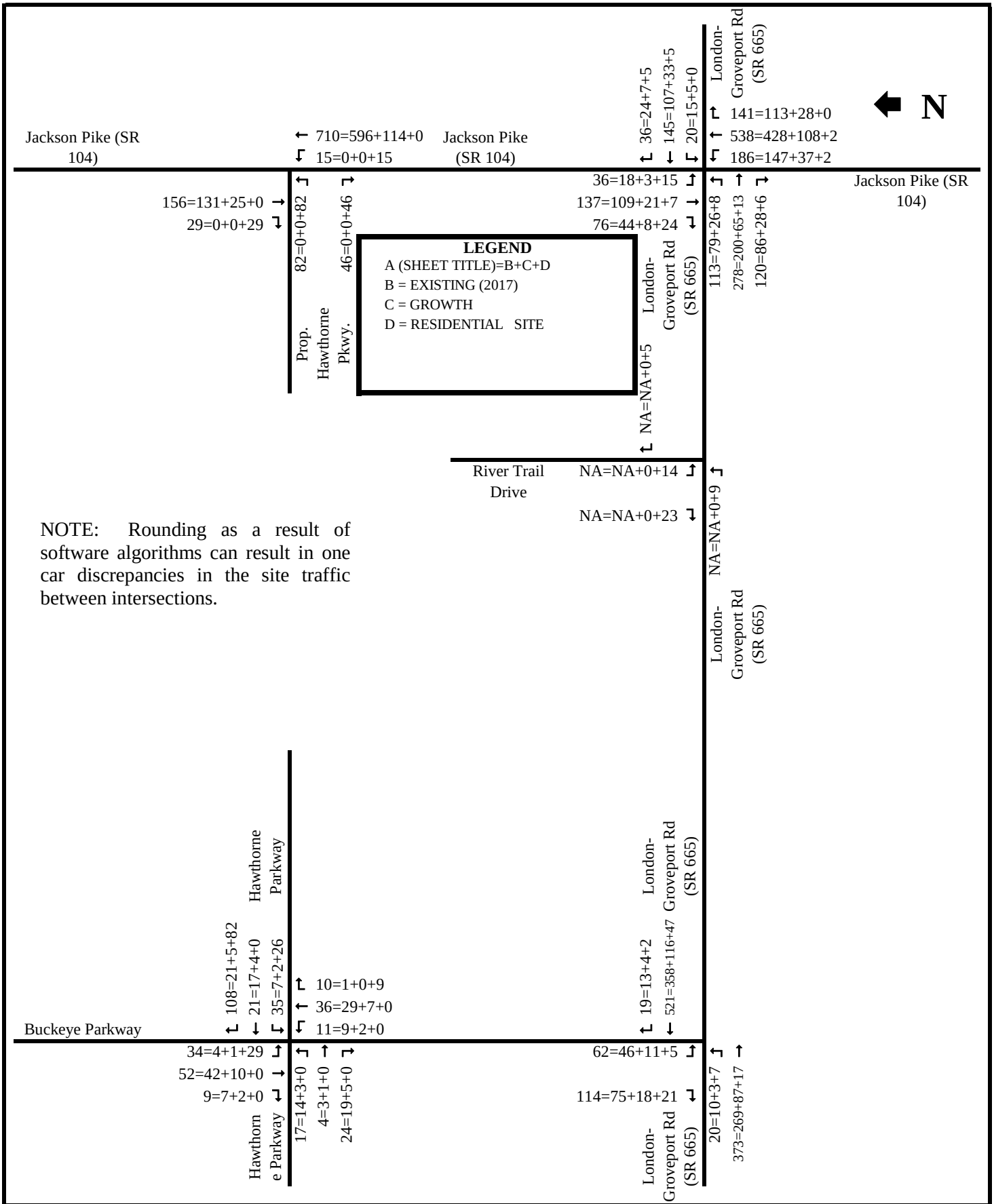
FIGURE 5

2019 RESIDENTIAL 'BUILD' - PM PEAK



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

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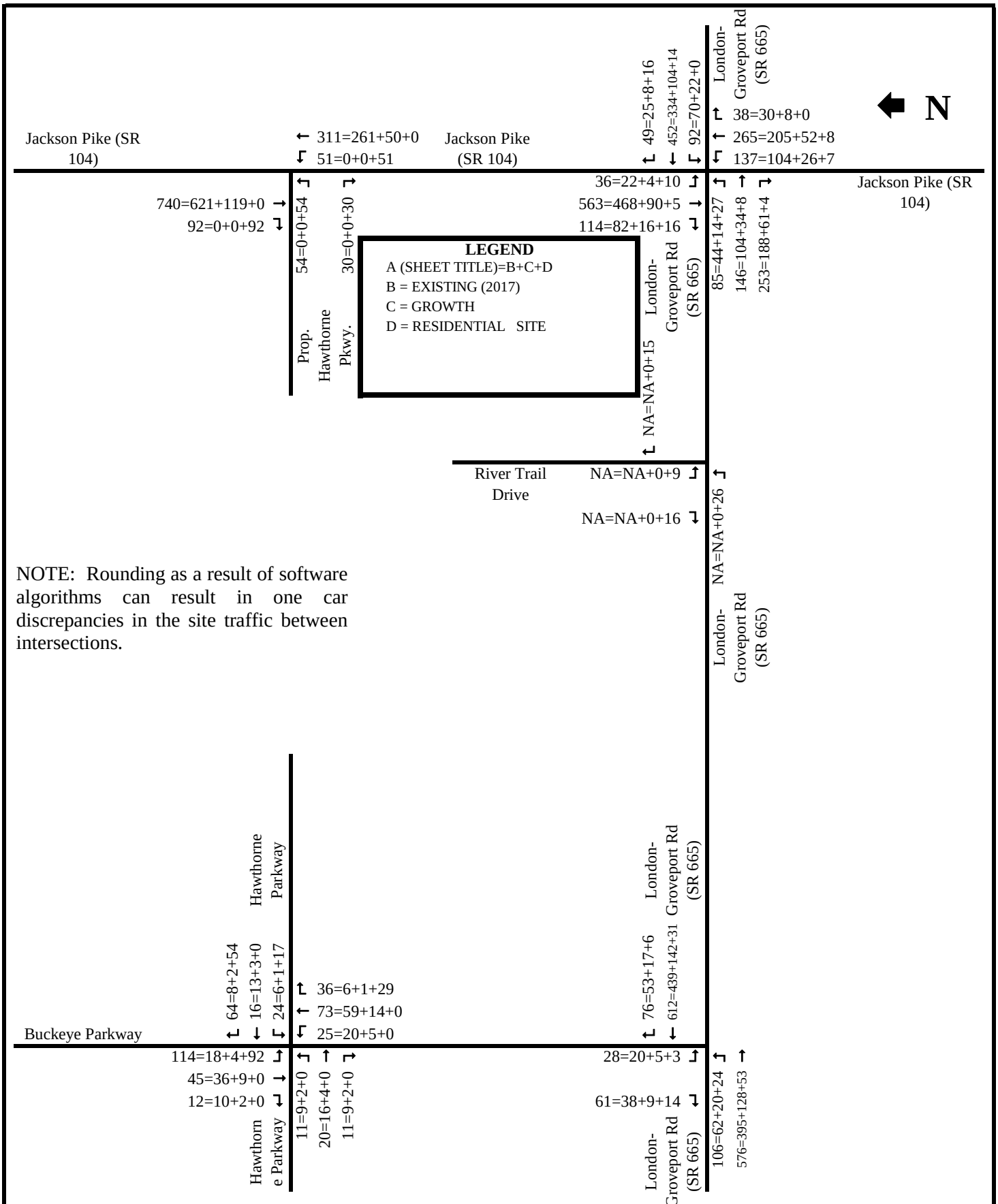
FIGURE 6

2029 RESIDENTIAL 'BUILD' - AM PEAK



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

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FIGURE 7

2029 RESIDENTIAL 'BUILD' - PM PEAK

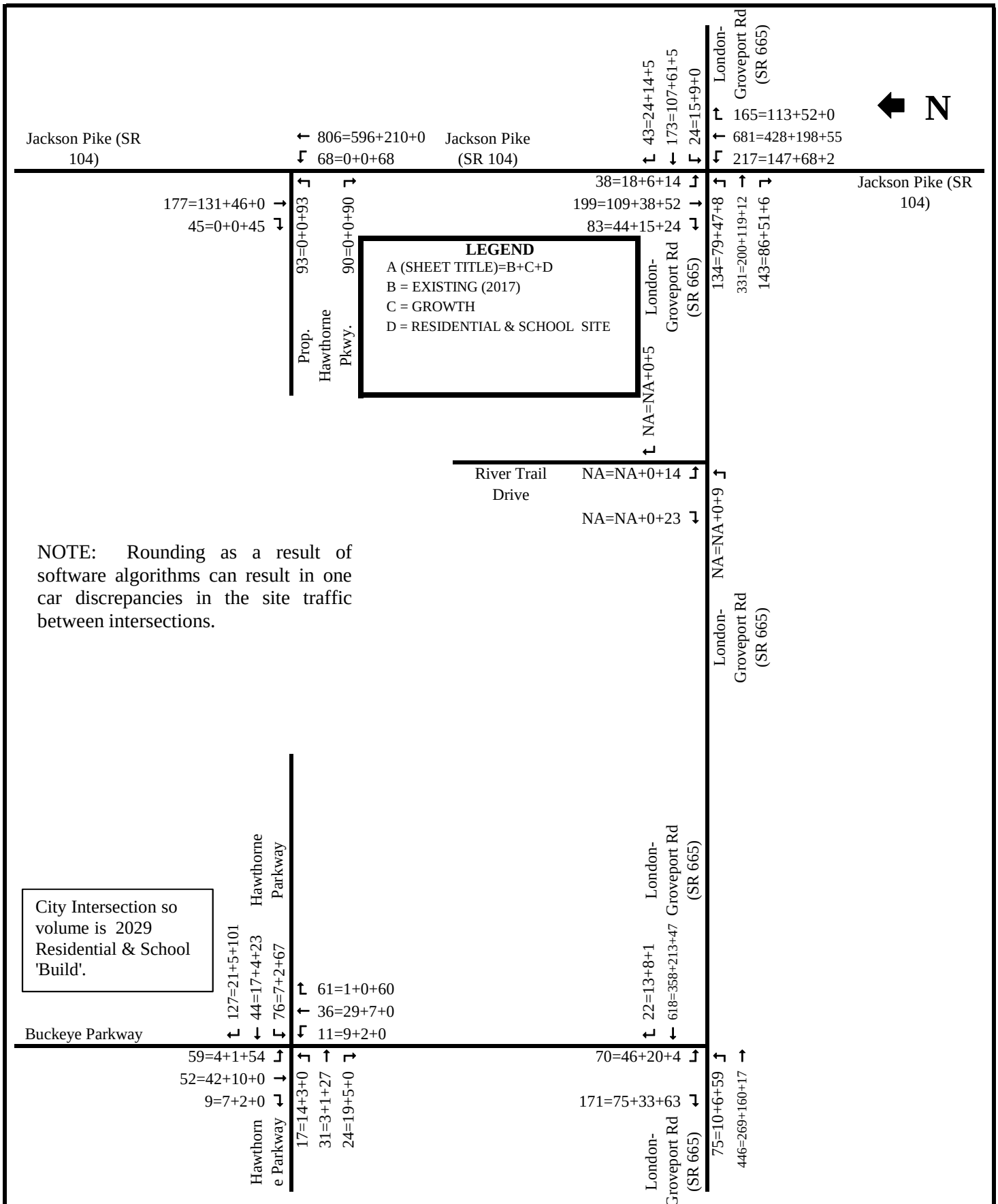

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FIGURE 8
2039 RESIDENTIAL & SCHOOL 'BUILD' - AM PEAK

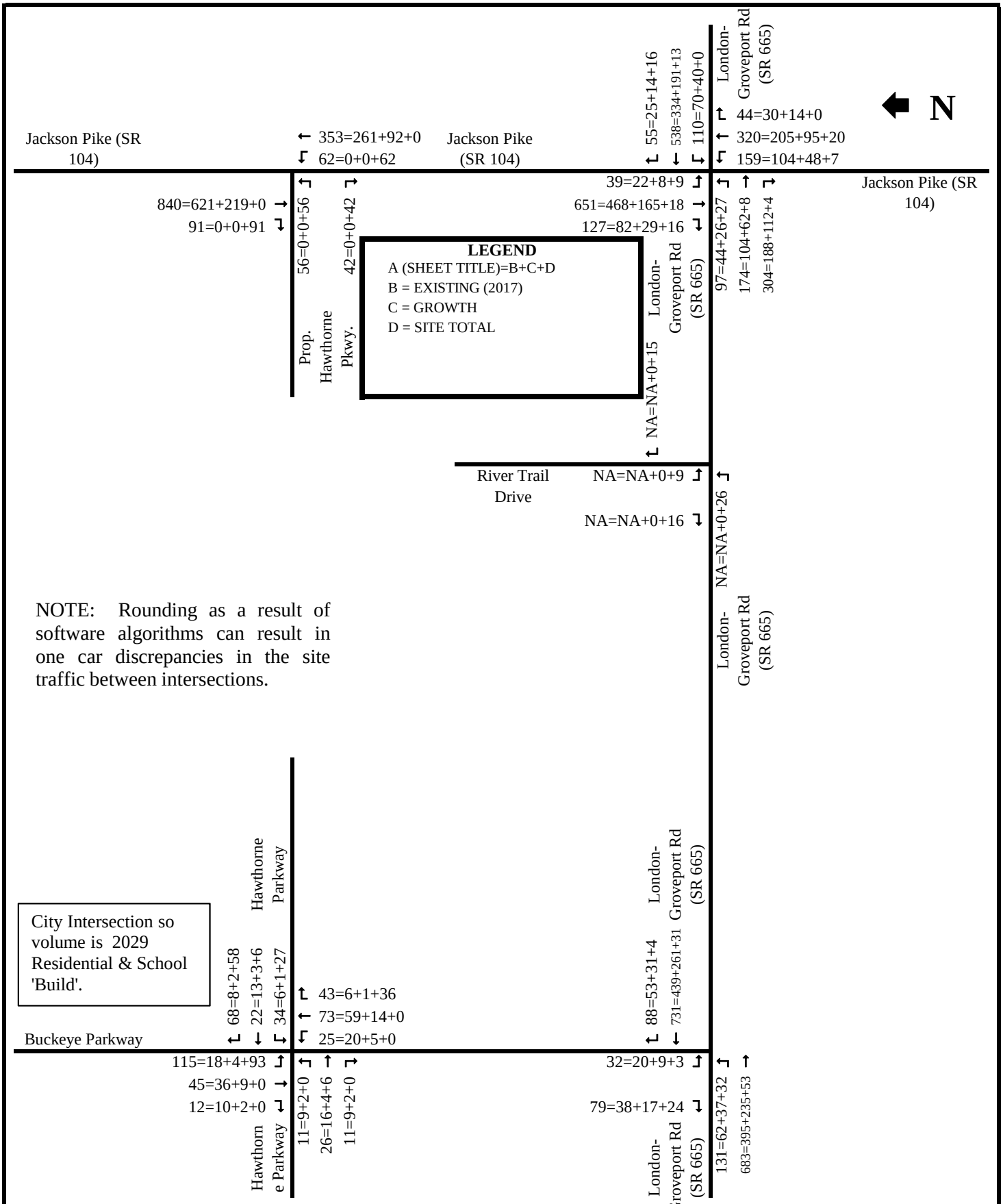

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FIGURE 9
2039 RESIDENTIAL & SCHOOL 'BUILD' - PM PEAK

TRAFFIC ANALYSES

Signal Warrants

Signal warrant analyses were performed for the 'Build' conditions at the intersection of Jackson Pike (SR 104) & Prop. Hawthorne Parkway. There is a total of 9 warrants in the *Ohio Manual of Uniform Traffic Control Devices, 2012 Edition (OMUTCD)*. If any of these are met, a signal is "warranted." If a signal is warranted, it means it is above the minimum level that a signal is desirable and may or may not be recommended for installation. A listing of the 9 warrants follows:

- Warrant # 1 – Eight-Hour Vehicular Volume
- Warrant # 2 – Four-Hour Vehicular Volume
- Warrant # 3 – Peak Hour
- Warrant # 4 – Pedestrian Volume
- Warrant # 5 – School Crossing
- Warrant # 6 – Coordinated Signal System
- Warrant # 7 – Crash Experience
- Warrant # 8 – Roadway Network
- Warrant # 9 – Intersection Near a Grade Crossing

For the vehicular volume-based warrants, the *OMUTCD* specifies two levels of volume criteria depending on the 85th percentile speed and the population of the municipality. The volumes necessary are lower for speeds greater than 40 MPH or for communities with a population less than 10,000. For the higher speed or lower population criteria, traffic volumes required to meet the warrants are 70 percent of the volumes required for a lower speed or high population community. When speed data is not collected as part of the study, it is common practice to use the speed limit which is 50 MPH on Jackson Pike (SR 104).

For the analysis, daily distributions for the site had to be projected for use in the warrant analyses. The assumed daily distributions were based on counts Smart Services, Inc. had on file. Supporting calculations of the daily distribution are in the Appendix.

The *OMUTCD* states under "guidance" that engineering judgment should be used to determine what portion of the right-turn vehicles from the minor street approach should be deducted in the analysis. The right turn reduction factors found in the ODOT *Traffic Engineering Manual* (*TEM*) were calculated and applied. The calculations for these factors are attached.

The Eight-Hour and Four-Hour warrants are the volume-based warrants that are typically considered when going forward with the installation of a traffic signal. The results show that neither the Eight-Hour nor Four-Hour warrants are met in any of the conditions. The warrant worksheets are attached.

Turn Lane Warrants

The procedure to determine whether turn lanes are warranted at Jackson Pike (SR 104) & Prop. Hawthorne Parkway and London-Groveport Rd. (SR 665) & Buckeye Parkway is according to the *ODOT L&D Manual* which is referenced from the *State Highway Access Management Manual (SHAMM)* published by the Ohio Department of Transportation (ODOT). The posted speed limit is above 40 MPH for both intersections. The results are shown in Table 6. The graphs from the *ODOT L&D Manual* are in the Appendix.

Movement	2019 'No Build'	2019 Residential 'Build'	2029 'No Build'	2029 Residential 'Build'	2039 'No Build'	2039 Residential & School 'Build'
Jackson Pike (SR 104) NB LT at Prop. Hawthorne Pkwy.	NA	**Warranted**	NA	**Warranted**	NA	**Warranted**
Jackson Pike (SR 104) SB RT at Prop. Hawthorne Pkwy.	NA	**Warranted**	NA	**Warranted**	NA	**Warranted**
London-Groveport Rd. (SR 665) EB LT at Buckeye Parkway	**Warranted**	**Warranted**	**Warranted**	**Warranted**	**Warranted**	**Warranted**
London-Groveport Rd. (SR 665) WB RT at Buckeye Parkway	**Warranted**	**Warranted**	**Warranted**	**Warranted**	**Warranted**	**Warranted**

TABLE 6 – Summary of Turn Lane Warrant Analysis

Unsignalized Capacity Analyses

Unsignalized capacity analyses were performed at the unsignalized off-site intersections within the study area. In the analysis, 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. Since driver expectations are different for various types of traffic control, there are different LOS criteria for unsignalized intersections versus signalized intersections. The LOS criteria for both two-way stop control and all-way stop control is shown in Table 7.

Level of Service	Delay Range (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 7- Level of Service Criteria for Unsignalized Intersections

The following comprises the background of the analysis:

- *HCS 7 V7.6* was used to perform the analysis.
- A Peak Hour Factor (PHF) of 0.92 was used in the analysis.
- At existing intersections, the existing lane arrangement was considered in the analysis. For the proposed intersection, eastbound left and right turn lanes were assumed to be provided.
- A 2% heavy vehicle percentage was assumed for all movements.

The results are shown in Tables 8, 9, & 10. 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	Eastbound Left	Eastbound Right	Westbound All
10-Prop. Hawthorne Pkwy. & Jackson Pike (SR 104)	AM Peak	2019 Residential 'Build' Traffic	7.2 (A)		16.2 (C)	20.1 (C)	9.3 (A)	
		2029 Residential 'Build' Traffic	7.7 (A)		18.9 (C)	24.3 (C)	9.4 (A)	
		2039 Residential & School 'Build' Traffic	7.9 (A)		27.5 (D)	44.6 (E)	9.8 (A)	
	PM Peak	2019 Residential 'Build' Traffic	9.7 (A)		22.6 (C)	27.5 (D)	13.9 (B)	
		2029 Residential 'Build' Traffic	10.2 (B)		28.4 (D)	35.6 (E)	15.3 (C)	
		2039 Residential & School 'Build' Traffic	10.9 (B)		38.1 (E)	53.3 (F)	17.7 (C)	

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TABLE 8 - Unsignalized Capacity Summary - (2-Way-Stop, North-South Major Street)

Intersection	Time	Year	Delay (Level of Service)					
			Main Street		Minor Street			
			Eastbound Left	Westbound Left	Northbound All	Northbound	Southbound	Southbound All
7270-London-Groveport Rd (SR 665) & Buckeye Parkway	AM Peak	2019 'No Build' Traffic	8.2 (A)					14.9 (B)
		2019 Residential 'Build' Traffic	8.4 (A)					17.1 (C)
		2029 'No Build' Traffic	8.6 (A)					19.6 (C)
		2029 Residential 'Build' Traffic	8.7 (A)					24.1 (C)
		2039 'No Build' Traffic	8.9 (A)					29.8 (D)
		2039 Residential & School 'Build' Traffic	9.4 (A)					76.7 (F)
	PM Peak	2019 'No Build' Traffic	8.9 (A)					17.9 (C)
		2019 Residential 'Build' Traffic	9.1 (A)					21.3 (C)
		2029 'No Build' Traffic	9.5 (A)					26.9 (D)
		2029 Residential 'Build' Traffic	9.9 (A)					36.7 (E)
		2039 'No Build' Traffic	10.3 (B)					52.7 (F)
		2039 Residential & School 'Build' Traffic	10.9 (B)					111.5 (F)

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TABLE 9 - Unsignalized Capacity Summary - (2-Way Stop, East-West Major Street)

Intersection	Time	Year	Delay (Level of Service)				
			Intersection	Eastbound	Westbound	Northbound	Southbound
Hawthorne Parkway & Buckeye Parkway	AM Peak	2019 'No Build' Traffic	7.3 (A)	7.2 (A)	7.2 (A)	7.4 (A)	7.4 (A)
		2019 Residential 'Build' Traffic	7.8 (A)	7.4 (A)	7.8 (A)	7.7 (A)	8.0 (A)
		2029 'No Build' Traffic	7.4 (A)	7.3 (A)	7.3 (A)	7.6 (A)	7.5 (A)
		2029 Residential 'Build' Traffic	8.0 (A)	7.5 (A)	8.0 (A)	7.9 (A)	8.2 (A)
		2029 Residential & School 'Build' Traffic W/ Improvements	9.0 (A)	8.3 (A)	9.5 (A)	8.4 (A)	9.0 (A)
	PM Peak	2019 'No Build' Traffic	7.5 (A)	7.4 (A)	7.4 (A)	7.7 (A)	7.5 (A)
		2019 Residential 'Build' Traffic	8.3 (A)	7.9 (A)	8.0 (A)	8.1 (A)	8.8 (A)
		2029 'No Build' Traffic	7.7 (A)	7.6 (A)	7.5 (A)	7.9 (A)	7.7 (A)
		2029 Residential 'Build' Traffic	8.5 (A)	8.0 (A)	8.2 (A)	8.4 (A)	9.0 (A)
		2029 Residential & School 'Build' Traffic W/ Improvements	8.7 (A)	8.2 (A)	8.5 (A)	8.5 (A)	9.1 (A)

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TABLE 10 - Unsignalized Capacity Summary - (All-Way Stop)

Signalized Capacity Analysis

A signalized capacity analysis was performed at the intersection of Jackson Pike (SR104) & London-Groveport Road (SR665). In the analysis, 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. Since driver expectations are different for various types of traffic control, there are different LOS criteria for unsignalized intersections versus signalized intersections. The LOS criteria for signalized intersections are shown in Table 11.

Level of Service	Delay Range (seconds/vehicle)
A	< 10
B	> 10 and ≤ 20
C	> 20 and ≤ 35
D	> 35 and ≤ 55
E	> 55 and ≤ 80
F	> 80

Source: *Highway Capacity Manual 2010*

TABLE 11 - Level of Service Criteria for Signalized Intersections

The following comprises the background of the analysis:

- *HCS 7 V7.6* was used to perform the analysis.
- The existing lane configurations were used in the analysis. When improvements were necessary, they are noted in the description.
- A 2% heavy vehicle percentage was assumed for all movements.
- The following default values and guidance were applied per the ODOT *L&D Manual:*
  - The HCM 2010 default values for Intersection Peak Hour Factor were used:
    - If the analysis period is 0.25 h and hourly data are used:
      - Total entering volume >= 1,000 veh/h: 0.92
      - Total entering volume <= 1,000 veh/h: 0.90
  - The signal was assumed to be uncoordinated and the timing input was entered as field measured phase times.
  - Right turn on red (RTOR) = 0
  - Cycle length = 60 to 120 seconds. [120 seconds was assumed.]
- Existing Yellow and All Red Intervals were assumed.
- Critical approach delays were balanced to within one second when possible.

A summary of the results is shown in Table 12. The *HCS7* reports are in the Appendix.

Intersection	Time	Year	Delay (Level of Service)				
			Intersection	Eastbound	Westbound	Northbound	Southbound
London-Groveport Rd (SR 665) & Jackson Pike (SR 104) (#3222)	AM Peak	2019 'No Build' Traffic	**31.5 (C)**	33.8 (C)	26.6 (C)	33.5 (C)	22.7 (C)
		2019 Residential 'Build' Traffic	**32.3 (C)**	34.9 (C)	26.4 (C)	34.7 (C)	23.6 (C)
		2029 'No Build' Traffic	**42.4 (D)**	47.3 (D)	28.2 (C)	47.4 (D)	22.7 (C)
		2029 Residential 'Build' Traffic	**45.3 (D)**	52.4 (D)	27.9 (C)	51.4 (D)	23.9 (C)
		2039 'No Build' Traffic	**75.9 (E)**	90.8 (F)	28.6 (C)	90.2 (F)	23.4 (C)
		2039 Residential & School 'Build' Traffic	**92.3 (F)**	114.2 (F)	28.9 (C)	114.5 (F)	24.6 (C)
		2039 Residential & School 'Build' Traffic W/ Southbound Right Turn Lane	**91.9 (F)**	114.2 (F)	28.9 (C)	114.1 (F)	22.8 (C)
	PM Peak	2019 'No Build' Traffic	**35.8 (D)**	32.0 (C)	40.1 (D)	26.0 (C)	40.6 (D)
		2019 Residential 'Build' Traffic	**45.5 (D)**	44.6 (D)	51.0 (D)	29.8 (C)	51.2 (D)
		2029 'No Build' Traffic	**71.2 (E)**	39.4 (D)	93.4 (F)	39.9 (D)	93.1 (F)
		2029 Residential 'Build' Traffic	**95.8 (F)**	76.3 (E)	119.9 (F)	44.5 (D)	120.6 (F)
		2029 Residential 'Build' Traffic W/ Southbound Right Turn Lane	**69.0 (E)**	51.8 (D)	82.2 (F)	48.4 (D)	82.3 (F)
		2039 'No Build' Traffic	**159.4 (F)**	59.3 (E)	238.5 (F)	38.5 (D)	237.4 (F)
		2039 Residential & School 'Build' Traffic	**173.3 (F)**	143.9 (F)	230.5 (F)	39.0 (D)	230.9 (F)
		2039 Residential & School 'Build' Traffic W/ Southbound Right Turn Lane	**133.0 (F)**	101.6 (F)	175.3 (F)	44.5 (D)	175.4 (F)

Farmstead Traffic Impact Study - REV. 1: 9/2018

TABLE 12 - Signalized (HCS 7) Capacity Summary

Turn Lane Length Analysis

Turn lane lengths for the warranted or considered turn lanes per the analyses were calculated. The calculations were performed per Section 400 of the *ODOT L&D Manual*. Per the *State Highway Access Management Manual* definition of design speed, a design speed of 5 MPH above the posted speed limit was used in the calculations. Table 13 shows a summary of the results. The calculations are in the Appendix.

LOCATION	**2019 'No Build'**	**2019 Residential 'Build'**	**2029 'No Build'**	**2029 Residential 'Build'**	**2039 'No Build'**	**2039 Residential & School 'Build'**
	ODOT L&D Manual	*ODOT L&D Manual*	*ODOT L&D Manual*	*ODOT L&D Manual*	*ODOT L&D Manual*	*ODOT L&D Manual*
Jackson Pike (SR 104) NB Left Turn Lane at Site Access	NA	285'	NA	285'	NA	285'
Jackson Pike (SR 104) SB Right Turn Lane at Site Access	NA	285'	NA	285'	NA	285'
London-Groveport Rd. (SR 665) EB LT at Buckeye Parkway	345'	345'	345'	345'	345'	345'
London-Groveport Rd. (SR 665) WB RT at Buckeye Parkway	345'	345'	345'	345'	345'	345'
Jackson Pike (SR 104) SB Right Turn Lane at London-Groveport Road (SR 665)	NA	NA	NA	340'	NA	365'

TABLE 13–Turn Lane Length Results (includes 50' diverging taper)

CONCLUSIONS

2019, 2039, and 2039 'No Build' and 'Build' volumes were developed for use in signal warrant, turn lane warrant, capacity, and turn lane length analyses. The following is a summary of the conclusions for each analysis condition:

2019 'No Build'

- Jackson Pike (SR 104) & London-Groveport Road (SR 665)
  - It is noted that this is an ODOT maintained intersection.
  - The intersection and all approaches operate at LOS D or above.

- London-Groveport Road (SR 665) & Buckeye Parkway
  - It is noted that this is an ODOT maintained intersection.
  - An eastbound left turn lane is warranted. Based on a design speed of 60 MPH, the length of the lane is 345 feet which includes the 50-foot diverging taper.
  - A westbound right turn lane is warranted. Based on a design speed of 60 MPH, the length of the lane is 345 feet which includes the 50-foot diverging taper.
  - The southbound approach operates at LOS D or above.

- Buckeye Parkway & Hawthorne Parkway
  - The intersection and all approaches operate at LOS A.

2019 Residential 'Build'

- Jackson Pike (SR 104) & Prop. Hawthorne Parkway
  - A traffic signal is not warranted.
  - A northbound left turn lane is warranted. Based on a design speed of 55 MPH, the length of the lane is 285 feet which includes the 50-foot diverging taper.
  - A southbound right turn lane is warranted. Based on a design speed of 55 MPH, the length of the lane is 285 feet which includes the 50-foot diverging taper.
  - The eastbound approach operates at LOS C.

- Jackson Pike (SR 104) & London-Groveport Road (SR 665)
  - It is noted that this is an ODOT maintained intersection.
  - Same as 'No Build': The intersection and all approaches operate at LOS D or above.

- London-Groveport Road (SR 665) & Buckeye Parkway
  - It is noted that this is an ODOT maintained intersection.
  - Same as 'No Build': An eastbound left turn lane is warranted. Based on a design speed of 60 MPH, the length of the lane is 345 feet which includes the 50-foot diverging taper. There is no change to the warrant status because of the addition of the site traffic so there are no improvements associated with the site traffic.
  - Same as 'No Build': A westbound right turn lane is warranted. Based on a design speed of 60 MPH, the length of the lane is 345 feet which includes the 50-foot diverging taper. There is no change to the warrant status because of the addition of

the site traffic. There is no change to the warrant status because of the addition of the site traffic so there are no improvements associated with the site traffic.
○Same as 'No Build': The southbound approach operates at LOS D or above.

●Buckeye Parkway & Hawthorne Parkway
○Same as 'No Build': The intersection and all approaches operate at LOS A.

2029 'No Build'

●Jackson Pike (SR 104) & London-Groveport Road (SR 665)
○It is noted that this is an ODOT maintained intersection.
○The intersection operates at LOS E with the westbound and southbound approaches operating at LOS F.

●London-Groveport Road (SR 665) & Buckeye Parkway
○It is noted that this is an ODOT maintained intersection.
○An eastbound left turn lane is warranted. Based on a design speed of 60 MPH, the length of the lane is 345 feet which includes the 50-foot diverging taper.
○A westbound right turn lane is warranted. Based on a design speed of 60 MPH, the length of the lane is 345 feet which includes the 50-foot diverging taper.
○The southbound approach operates at LOS D or above.

●Buckeye Parkway & Hawthorne Parkway
○The intersection and all approaches operate at LOS A.

2029 Residential 'Build'

●Jackson Pike (SR 104) & Prop. Hawthorne Parkway
○A traffic signal is not warranted.
○A northbound left turn lane is warranted. Based on a design speed of 55 MPH, the length of the lane is 285 feet which includes the 50-foot diverging taper.
○A southbound right turn lane is warranted. Based on a design speed of 55 MPH, the length of the lane is 285 feet which includes the 50-foot diverging taper.
○The eastbound approach operates at LOS D.

●Jackson Pike (SR 104) & London-Groveport Road (SR 665)
○It is noted that this is an ODOT maintained intersection.
○The intersection operates at LOS F with the westbound and southbound approaches operating at LOS F and the eastbound approach operating at LOS E. To mitigate the impact of the residential site, a southbound right turn lane is needed. The length of the lane is 340 feet.

●London-Groveport Road (SR 665) & Buckeye Parkway
○It is noted that this is an ODOT maintained intersection
○Same as 'No Build': An eastbound left turn lane is warranted. Based on a design speed of 60 MPH, the length of the lane is 345 feet which includes the 50-foot diverging taper. There is no change to the warrant status because of the addition of the site traffic so there are no improvements associated with the site traffic.

○Same as 'No Build': A westbound right turn lane is warranted. Based on a design speed of 60 MPH, the length of the lane is 345 feet which includes the 50-foot diverging taper. There is no change to the warrant status because of the addition of the site traffic so there are no improvements associated with the site traffic.
○The southbound approach operates just below the at LOS D-E threshold.

●Buckeye Parkway & Hawthorne Parkway
○Same as 'No Build': The intersection and all approaches operate at LOS A.

2029 Residential & School 'Build'

●Buckeye Parkway & Hawthorne Parkway
○Same as 'No Build': The intersection and all approaches operate at LOS A.

2039 'No Build'

●Jackson Pike (SR 104) & London-Groveport Road (SR 665)
○It is noted that this is an ODOT maintained intersection.
○The intersection operates at LOS F with the westbound and southbound approaches operating at LOS F and the eastbound approach operating at LOS E.

●London-Groveport Road (SR 665) & Buckeye Parkway
○It is noted that this is an ODOT maintained intersection.
○An eastbound left turn lane is warranted. Based on a design speed of 60 MPH, the length of the lane is 345 feet which includes the 50-foot diverging taper. There is no change to the warrant status because of the addition of the site traffic so there are no improvements associated with the site traffic.
○A westbound right turn lane is warranted. Based on a design speed of 60 MPH, the length of the lane is 345 feet which includes the 50-foot diverging taper. There is no change to the warrant status because of the addition of the site traffic so there are no improvements associated with the site traffic.
○The southbound approach operates at LOS F.

●Buckeye Parkway & Hawthorne Parkway
○This is a City intersection so it does not require a 20 year design traffic. See 2029 'No Build'.

2039 Residential & School 'Build'

●Jackson Pike (SR 104) & Prop. Hawthorne Parkway
○A traffic signal is not warranted.
○A northbound left turn lane is warranted. Based on a design speed of 55 MPH, the length of the lane is 285 feet which includes the 50-foot diverging taper.
○A southbound right turn lane is warranted. Based on a design speed of 55 MPH, the length of the lane is 285 feet which includes the 50-foot diverging taper.
○The eastbound approach operates just below the LOS D-E threshold.

- Jackson Pike (SR 104) & London-Groveport Road (SR 665)
  - It is noted that this is an ODOT maintained intersection.
  - The intersection operates at LOS F with the westbound and southbound approaches operating at LOS F and the eastbound approach operating at LOS E. The addition of the southbound right turn lane for the residential site mitigates the impact of the school site in the critical PM Peak hour with the exception that the southbound right turn lane would need to be extended 25 feet to 365 feet (includes 50-foot diverging taper)
  - The residential and school Site traffic represents 6.6% of the traffic at this intersection. The calculations for this percentage are in the Appendix.

- London-Groveport Road (SR 665) & Buckeye Parkway
  - It is noted that this is an ODOT maintained intersection
  - Same as 'No Build': An eastbound left turn lane is warranted. Based on a design speed of 60 MPH, the length of the lane is 345 feet which includes the 50-foot diverging taper.
  - Same as 'No Build': A westbound right turn lane is warranted. Based on a design speed of 60 MPH, the length of the lane is 345 feet which includes the 50-foot diverging taper.
  - Same as 'No Build': The southbound approach operates at LOS F.

- Buckeye Parkway & Hawthorne Parkway
  - This is a City intersection so it does not require a 20 year design traffic. See 2029 Residential & School 'Build' traffic.

The conclusion of the study is that the site associated improvements are a 285' northbound left turn lane and a 285' southbound right turn lane at the site access (Proposed Hawthorne Parkway) on Jackson Pike (SR 104).

Based on the results of the capacity analysis at the intersection of Jackson Pike (SR 104) & London-Groveport Road (SR 665), improvements are required at the intersection of Jackson Pike (SR 104) & London-Groveport Road (SR 665) in the horizon year of 2039. A recommended solution to improve the intersection is a southbound right turn lane, consisting of a 365 foot turn lane. The amount of traffic generated by the Farmstead development represents 6.6% of the total traffic at this intersection in 2039. The analysis shows the Farmstead development contributes to the requirement for improvements, but the 6.6% value clearly shows its traffic contributes little to the overall traffic at the intersection. Because of this, the developer would expect further discussion with ODOT to determine a fair cost-share amount for improvements to the Jackson Pike (SR 104) & London-Groveport Road (SR 665) intersection.

APPENDIX

From: Stachler, Jennifer
To: Todd Stanhope
Cc: Fitzpatrick, Cindi; Keller, Mike
Subject: RE: Traffic Study Review Farmstead
Date: Friday, August 24, 2018 3:46:04 PM

Todd,

I am sorry for the delay in replying. After reviewing the map provided by the district and looking at the distributions for the school, I would propose to use the following:
2.

- 10% to/from the north on SR 104
- 15% to/from the north on Buckeye Parkway
- 15% to/from the west of Buckeye Parkway on Hawthorne Parkway
- 30% to/from west on SR 665
- 30% to/from south on SR 104

6. In regard to the reduction for school trips within the development, I think a more detailed analysis is in order. We are not disagreeing with the generation rate necessarily. We are suggesting that the cottage homes should be removed from the calculations for proposed DU's and that new homes on the outskirts of the development will likely find it easier to use SR 104, SR 665and Buckeye Parkway than to use the low speed residential roads to get to the school. The 316 existing DU's shall be evaluated more closely, perhaps providing a map of these areas to help support the theory that these homes will use the internal network.

We look forward to your revised submission. Have a great weekend.

Jennifer S. Stachler P.E.
City of Grove City
Service Superintendent
jstachler@grovecityohio.gov
Direct Line 614-277-1110
Business Cell 614-980-1070

3262 Ventura Blvd
Grove City, OH 43123

From: Todd Stanhope <tstanhope@smartservices-inc.com>
Sent: Wednesday, July 25, 2018 10:37 AM
To: Stachler, Jennifer <jstachler@grovecityohio.gov>
Cc: 'Michael Kady' <mkady@fischerhomes.com>; Rauch, Kyle <krauch@grovecityohio.gov>; Shields, Kimberly <kshields@grovecityohio.gov>; Fitzpatrick, Cindi <cfitzpatrick@grovecityohio.gov>; Boso, Chuck <cboso@grovecityohio.gov>
Subject: RE: Traffic Study Review Farmsted

Hello Jennifer

Regarding the City's comments on the subject study, we have the following questions:

2. What distribution is acceptable to the City? Also. a map from the school district with the anticipated limits of the proposed school would be more helpful.

6. We provided a 25% reduction based on an elementary student generation rate found in a web search. If 25% is not acceptable, what would be acceptable to the City? If an acceptable elementary student per household generation could be provided, a more specific distribution that could reflect school traffic from existing housing in the area could be provided based on a map of anticipated limits for the proposed school (see number 2).

Thank you for your attention to this. We just provided the TIS to ODOT so we do not have their comments yet.

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

***Smart Services, Inc.* (Columbus Office)**
*A **DBE / EDGE** Certified Business*

1900 Crown Park Court, Suite E
Columbus, Ohio 43235
Ph: 614-914-5543
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From: Stachler, Jennifer [mailto:jstachler@grovecityohio.gov]
Sent: Tuesday, July 10, 2018 3:57 PM
To: Todd Stanhope <tstanhope@smartservices-inc.com>
Cc: Michael Kady <mkady@fischerhomes.com>; Rauch, Kyle <krauch@grovecityohio.gov>; Shields, Kimberly <kshields@grovecityohio.gov>; Fitzpatrick, Cindi <cfitzpatrick@grovecityohio.gov>; Boso, Chuck <cboso@grovecityohio.gov>
Subject: Traffic Study Review Farmsted

Hi Todd,

Please see the attached review letter for the TIS submitted at the end of May. I have also attached a map with the proposed school district boundary that is referenced in one of the comments. Please call if you have questions or if you feel we need to meet to discuss.

Thanks,

Jennifer S. Stachler P.E.
City of Grove City
Service Superintendent
jstachler@grovecityohio.gov

From: Andrew.Hurst@dot.ohio.gov
To: Todd Stanhope
Subject: RE: Farmstead TIS
Date: Wednesday, August 29, 2018 11:54:13 AM

Here are our comments:

- SR 665 and Buckeye Pkwy is ODOT maintained
  - Are turn lanes warranted here?
- If there are more than 500 trips, this would be a level 2 TIS, requiring a 20 year design.
  - 10 year design is fine for less than 500 trips
- SR 104 is scheduled for resurfacing in 2020

From: Hurst, Andrew
Sent: Monday, August 20, 2018 9:02 AM
To: 'Todd Stanhope' <tstanhope@smartservices-inc.com>
Subject: RE: Farmstead TIS

We should have comments within the next couple of weeks. It looks like SR 665 is not within Grove City at the Buckeye Pkwy intersections.

From: Todd Stanhope [mailto:tstanhope@smartservices-inc.com]
Sent: Tuesday, July 24, 2018 12:54 PM
To: Hurst, Andrew <Andrew.Hurst@dot.ohio.gov>
Cc: Gross, Dirk <Dirk.Gross@dot.ohio.gov>; Michael Kady <mkady@fischerhomes.com>; 'Amanda Webb' <awebb@fischerhomes.com>
Subject: Farmstead TIS

Andrew

Thanks again for meeting with us today. Per your request, I have attached a digital file of the traffic study. Thank you.

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

***Smart Services, Inc.* (Columbus Office)**
*A **DBE / EDGE** Certified Business*

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The City of Grove City, Ohio

4035 Broadway • Grove City, Ohio 43123
(614) 277-3000

July 10, 2018

Todd Stanhope, P.E.

Smart Services, Inc.

1900 Crown Park Ct., Suite E

Columbus, OH 43235

Mr. Stanhope,

I have reviewed the traffic study for the Farmstead project. Please revise the study to incorporate the comments below.

1. Please provide ODOT's review comments when they are available.
2. See the attached map with the proposed district boundary. The map shows that the majority of the district's students will be coming from the west and south. As such, the proposed trip distributions for the study area may need to be revised. In particular; the 25% volume from the north on S.R.104 does not appear to be accurate given the proposed boundary lines.
3. Please provide the pages from the ITE manual that have been used to generate future traffic volumes in the study. The city does not have copies of the manual to compare to your study.
4. Trip distributions submitted for the overall development appear to accurately depict traffic patterns and are acceptable.
5. A signal warrant analysis shall be performed for the site access and SR 104 intersection. 2029 Build Traffic reflects LOS E for both AM and PM peaks. In addition to this, we feel that the increased volume of traffic entering and exiting SR 104 in this area will create a hazardous condition. We would like to review ODOT's response to improvements at this intersection as well.
6. The City does not agree with the 25% reduction attributed to school trips within the internal network. While some reduction seems logical due to trips generated by new residences, 25% seems excessive. Subarea C contains 105 cottage homes that, as a rule, are designed to appeal to empty nesters and are unlikely to house elementary age students. In addition, students living on the lots on the outskirts of the development may still elect to use Buckeye Parkway to 665 to avoid traveling through the low speed neighborhood streets to reach the school. This reduction shall be reevaluated.

Please revise the study in accordance with these comments. If you have any questions or feel we need to discuss these comments further in a meeting, give me a call.

Sincerely,

Jennifer S. Stachler

Jennifer S. Stachler, P.E.

Service Superintendent

City of Grove City

SMART SERVICES, INC.
Surveying ◆ Environmental ◆ Traffic ◆ CA/CM
An Ohio DBE/EDGE Certified Firm

December 13, 2017

Ms. Jennifer Stachler, PE
City of Grove City
3262 Ventura Blvd
Grove City, OH 43123

Re: Hancock Property Site Traffic Study MOU
City of Grove City, Franklin County, Ohio

Dear Jennifer:

Please consider this letter as a Memo of Understanding (MOU) for the traffic study required for the subject site. The subject site is proposed to be developed with 400 single family homes and 100 multi-family units. The site is located on the west side of Jackson Pike (SR 104) north of Scioto Meadows Boulevard. There is one full access proposed on Jackson Pike (SR 104). There is also access to Hawthorne Parkway which has access to Buckeye Parkway. The site is proposed to be annexed to the City of Grove City.

Per our conversations with the City regarding the scope, the following is our understanding of the scope of the traffic study:

- The study area is the proposed site access point on Jackson Pike (SR 104) and the intersections of Buckeye Parkway & Hawthorne Parkway, London-Groveport Road (SR 665) & Buckeye Parkway, and Jackson Pike (SR 104) & London-Groveport Road (SR 665).
- 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).
- Peak hour (7-9 AM & 4-6 PM) turning movement counts will be performed at the intersections of Buckeye Parkway & Hawthorne Parkway, London-Groveport Road (SR 665) & Buckeye Parkway, and Jackson Pike (SR 104) & London-Groveport Road (SR 665). A peak hour (7-9 AM & 4-6 PM) link count will be performed on Jackson Pike (SR 104) north of Scioto Meadows Boulevard.
- Trip Generation - Site traffic will be computed using *Trip Generation Manual, 10th Edition* published by ITE.
- Design Year Traffic Development – The City of Grove City requires a 10-year design horizon. Opening Day will be assumed to be 2019. Therefore, the design year is 2029. Smart Services will attempt to obtain annual growth rates from the Mid-Ohio Regional Planning Commission (MORPC). The schedule for the study may not permit time to receive a response from MORPC. Therefore, we may have to discuss with the City assumptions that can be used for growth rates in order to meet a schedule. It is noted that for the intersection of Jackson Pike (SR 104) & London-Groveport Road (SR 665), potential improvements are identified using 10-year traffic. However, since the

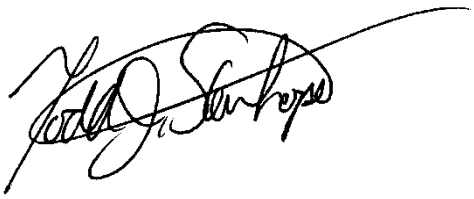
intersection is in ODOT's jurisdiction, any improvements identified will have to be designed using a 20-year design traffic.

- Analyses
  - Turn lane warrants will be performed at the site access on Jackson Pike (SR 104).
  - The lengths of any warranted turn lanes will be calculated.
  - Capacity analyses will be performed at all study area intersections.

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

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

cc: A. Hurst – Ohio Department of Transportation District 6
T. Volchko – Civil & Environmental Consultants, Inc.

City of Grove City

Approved: _____ Date: _____

Smart Services, Inc.
88 W. Church Street

Newark, Ohio, United States 43055
(740) 345 4700 tstanhope@smartservices-inc.com
www.smartservices-inc.com

Count Name: Jackson Pike (SR 104) North of Scioto Meadows Blvd
Site Code:
Start Date: 12/12/2017

Direction (Southbound)

Start Time	Total
12/12/2017 12:00 AM	5
12:15 AM	6
12:30 AM	3
12:45 AM	4
1:00 AM	5
1:15 AM	9
1:30 AM	2
1:45 AM	4
2:00 AM	4
2:15 AM	1
2:30 AM	3
2:45 AM	4
3:00 AM	1
3:15 AM	3
3:30 AM	5
3:45 AM	5
4:00 AM	4
4:15 AM	4
4:30 AM	2
4:45 AM	3
5:00 AM	3
5:15 AM	9
5:30 AM	9
5:45 AM	11
6:00 AM	13
6:15 AM	25
6:30 AM	24
6:45 AM	25
7:00 AM	31
7:15 AM	31
7:30 AM	33
7:45 AM	36
8:00 AM	28
8:15 AM	39
8:30 AM	29
8:45 AM	27
9:00 AM	26
9:15 AM	24

9:30 AM	32
9:45 AM	36
10:00 AM	29
10:15 AM	30
10:30 AM	39
10:45 AM	39
11:00 AM	41
11:15 AM	29
11:30 AM	35
11:45 AM	49
12:00 PM	52
12:15 PM	55
12:30 PM	49
12:45 PM	60
1:00 PM	55
1:15 PM	56
1:30 PM	55
1:45 PM	53
2:00 PM	65
2:15 PM	68
2:30 PM	75
2:45 PM	82
3:00 PM	107
3:15 PM	93
3:30 PM	124
3:45 PM	145
4:00 PM	165
4:15 PM	169
4:30 PM	142
4:45 PM	124
5:00 PM	136
5:15 PM	134
5:30 PM	145
5:45 PM	109
6:00 PM	95
6:15 PM	112
6:30 PM	83
6:45 PM	77
7:00 PM	80
7:15 PM	48
7:30 PM	67
7:45 PM	57
8:00 PM	51
8:15 PM	52
8:30 PM	37
8:45 PM	35
9:00 PM	38
9:15 PM	26
9:30 PM	40
9:45 PM	31
10:00 PM	29
10:15 PM	30

10:30 PM	31
10:45 PM	15
11:00 PM	19
11:15 PM	11
11:30 PM	22
11:45 PM	9
Total	4272
Total %	100.0
AM Times	7:00 AM
AM Peaks	131
PM Times	3:45 PM
PM Peaks	621

Smart Services, Inc.
88 W. Church Street

Newark, Ohio, United States 43055
(740) 345 4700 tstanhope@smartservices-inc.com
www.smartservices-inc.com

Count Name: Jackson Pike (SR 104) North of Scioto Meadows Blvd
Site Code:
Start Date: 12/12/2017

Direction (Northbound)

Start Time	Total
12/12/2017 12:00 AM	6
12:15 AM	4
12:30 AM	1
12:45 AM	3
1:00 AM	0
1:15 AM	3
1:30 AM	2
1:45 AM	0
2:00 AM	1
2:15 AM	2
2:30 AM	5
2:45 AM	2
3:00 AM	3
3:15 AM	0
3:30 AM	6
3:45 AM	4
4:00 AM	12
4:15 AM	16
4:30 AM	37
4:45 AM	20
5:00 AM	24
5:15 AM	38
5:30 AM	70
5:45 AM	57
6:00 AM	81
6:15 AM	116
6:30 AM	143
6:45 AM	122
7:00 AM	124
7:15 AM	148
7:30 AM	171
7:45 AM	153
8:00 AM	114
8:15 AM	101
8:30 AM	92
8:45 AM	83
9:00 AM	63
9:15 AM	60

9:30 AM	52
9:45 AM	63
10:00 AM	55
10:15 AM	47
10:30 AM	62
10:45 AM	49
11:00 AM	45
11:15 AM	53
11:30 AM	53
11:45 AM	44
12:00 PM	52
12:15 PM	55
12:30 PM	49
12:45 PM	55
1:00 PM	47
1:15 PM	45
1:30 PM	37
1:45 PM	42
2:00 PM	49
2:15 PM	57
2:30 PM	45
2:45 PM	56
3:00 PM	47
3:15 PM	57
3:30 PM	57
3:45 PM	54
4:00 PM	67
4:15 PM	78
4:30 PM	62
4:45 PM	66
5:00 PM	65
5:15 PM	80
5:30 PM	79
5:45 PM	58
6:00 PM	59
6:15 PM	59
6:30 PM	42
6:45 PM	47
7:00 PM	40
7:15 PM	18
7:30 PM	21
7:45 PM	22
8:00 PM	18
8:15 PM	17
8:30 PM	19
8:45 PM	22
9:00 PM	11
9:15 PM	12
9:30 PM	15
9:45 PM	14
10:00 PM	7
10:15 PM	14

10:30 PM	10
10:45 PM	5
11:00 PM	9
11:15 PM	5
11:30 PM	9
11:45 PM	4
Total	4268
Total %	100.0
AM Times	7:00 AM
AM Peaks	596
PM Times	3:45 PM
PM Peaks	261

Smart Services, Inc.

88 W. Church Street
Newark, OH 43055
(740) 345-4700

File Name : Buckeye_Parkway_&_Hawthorne_Parkway_480968_12-12-2017
Site Code : 480968
Start Date : 12/12/2017
Page No : 1

Groups Printed- Cars - Trucks

	Buckeye Pkwy Southbound				Hawthorne Pkwy Westbound				Buckeye Pkwy Northbound				Hawthorne Pkwy Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
07:00 AM	1	14	0	15	3	4	3	10	2	5	0	7	3	0	5	8	40
07:15 AM	0	13	0	13	0	6	7	13	1	5	0	6	5	0	3	8	40
07:30 AM	0	11	4	15	2	6	8	16	4	10	1	15	2	2	4	8	54
07:45 AM	3	4	3	10	2	1	3	6	2	9	0	11	4	1	7	12	39
Total	4	42	7	53	7	17	21	45	9	29	1	39	14	3	19	36	173
08:00 AM	1	14	1	16	0	3	9	12	0	3	0	3	0	0	3	3	34
08:15 AM	7	10	1	18	3	1	4	8	3	6	1	10	1	1	0	2	38
08:30 AM	0	8	2	10	1	2	2	5	3	8	0	11	4	0	1	5	31
08:45 AM	3	4	1	8	1	1	6	8	2	8	1	11	1	2	6	9	36
Total	11	36	5	52	5	7	21	33	8	25	2	35	6	3	10	19	139
04:00 PM	6	15	3	24	0	3	3	6	2	13	1	16	4	6	0	10	56
04:15 PM	5	7	1	13	1	3	2	6	7	7	3	17	1	3	4	8	44
04:30 PM	2	8	5	15	2	2	3	7	5	6	3	14	2	1	3	6	42
04:45 PM	4	10	4	18	0	0	2	2	5	15	3	23	1	3	3	7	50
Total	17	40	13	70	3	8	10	21	19	41	10	70	8	13	10	31	192
05:00 PM	3	12	4	19	2	3	4	9	3	9	0	12	3	3	1	7	47
05:15 PM	7	5	4	16	2	3	2	7	7	13	3	23	3	3	3	9	55
05:30 PM	4	9	2	15	0	4	1	5	3	18	2	23	2	1	3	6	49
05:45 PM	4	10	0	14	2	3	1	6	7	19	1	27	1	9	2	12	59
Total	18	36	10	64	6	13	8	27	20	59	6	85	9	16	9	34	210
Grand Total	50	154	35	239	21	45	60	126	56	154	19	229	37	35	48	120	714
Apprch %	20.9	64.4	14.6		16.7	35.7	47.6		24.5	67.2	8.3		30.8	29.2	40		
Total %	7	21.6	4.9	33.5	2.9	6.3	8.4	17.6	7.8	21.6	2.7	32.1	5.2	4.9	6.7	16.8	
Cars	49	150	33	232	19	44	59	122	49	150	17	216	35	35	46	116	686
% Cars	98	97.4	94.3	97.1	90.5	97.8	98.3	96.8	87.5	97.4	89.5	94.3	94.6	100	95.8	96.7	96.1
Trucks	1	4	2	7	2	1	1	4	7	4	2	13	2	0	2	4	28
% Trucks	2	2.6	5.7	2.9	9.5	2.2	1.7	3.2	12.5	2.6	10.5	5.7	5.4	0	4.2	3.3	3.9

Smart Services, Inc.

88 W. Church Street
Newark, OH 43055
(740) 345-4700

File Name : Buckeye_Parkway_&_Hawthorne_Parkway_480968_12-12-2017
Site Code : 480968
Start Date : 12/12/2017
Page No : 2

	Buckeye Pkwy Southbound				Hawthorne Pkwy Westbound				Buckeye Pkwy Northbound				Hawthorne Pkwy Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 11:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:00 AM																	
07:00 AM	1	**14**	**0**	**15**	**3**	4	3	10	2	5	0	7	3	0	5	8	40
07:15 AM	0	13	0	13	0	**6**							**5**	0	3	8	40
07:30 AM	0	11	**4**				**8**	**16**	**4**	**10**	**1**	**15**	2	**2**			**54**
07:45 AM	**3**	4	3	10	2	1	3	6	2	9	0	11	4	1	**7**	**12**	39
Total Volume	4	42	7	53	7	17	21	45	9	29	1	39	14	3	19	36	173
% App. Total	7.5	79.2	13.2		15.6	37.8	46.7		23.1	74.4	2.6		38.9	8.3	52.8		
PHF	.333	.750	.438	.883	.583	.708	.656	.703	.563	.725	.250	.650	.700	.375	.679	.750	.801
Peak Hour Analysis From 12:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:00 PM																	
05:00 PM	3	**12**	**4**	**19**	**2**	3	**4**	**9**	3	9	0	12	**3**	3	1	7	47
05:15 PM	**7**	5	4	16	2	3	2	7	**7**	13	**3**	**23**	**3**	**3**	**3**	**9**	**55**
05:30 PM	**4**	**9**	**2**	**15**	**0**	**4**	**1**	**5**	**3**	**18**	**2**	**23**	**2**	**1**	**3**	**6**	**49**
05:45 PM	**4**	**10**	**0**	**14**	**2**	**3**	**1**	**6**	**7**	**19**	**1**	**27**		**9**	**2**	**12**	**59**
Total Volume	18	36	10	64	6	13	8	27	20	59	6	85	9	16	9	34	210
% App. Total	28.1	56.2	15.6		22.2	48.1	29.6		23.5	69.4	7.1		26.5	47.1	26.5		
PHF	.643	.750	.625	.842	.750	.813	.500	.750	.714	.776	.500	.787	.750	.444	.750	.708	.890

Smart Services, Inc.

88 W. Church Street
Newark, OH 43055
(740) 345-4700

File Name : London-Groveport_Rd_(SR_665)_&_Buckeye_Pkwy_480970_12-12-2017
Site Code : 480970
Start Date : 12/12/2017
Page No : 1

Groups Printed- Cars - Trucks

	Buckeye Pkwy Southbound			London-Groveport Rd (SR 665) Westbound			London-Groveport Rd (SR 665) Eastbound			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	Int. Total
07:00 AM	7	27	34	87	1	88	3	59	62	184
07:15 AM	19	15	34	83	2	85	2	67	69	188
07:30 AM	11	21	32	107	6	113	2	77	79	224
07:45 AM	9	12	21	81	4	85	3	66	69	175
Total	46	75	121	358	13	371	10	269	279	771
08:00 AM	13	16	29	64	2	66	2	55	57	152
08:15 AM	3	13	16	83	2	85	2	55	57	158
08:30 AM	7	9	16	89	5	94	6	47	53	163
08:45 AM	6	14	20	56	6	62	5	48	53	135
Total	29	52	81	292	15	307	15	205	220	608
04:00 PM	6	7	13	101	12	113	17	78	95	221
04:15 PM	2	6	8	103	8	111	15	99	114	233
04:30 PM	5	14	19	104	17	121	13	102	115	255
04:45 PM	6	7	13	136	14	150	10	103	113	276
Total	19	34	53	444	51	495	55	382	437	985
05:00 PM	4	10	14	94	6	100	18	80	98	212
05:15 PM	5	7	12	105	16	121	21	110	131	264
05:30 PM	5	9	14	103	13	116	14	104	118	248
05:45 PM	5	12	17	92	19	111	16	107	123	251
Total	19	38	57	394	54	448	69	401	470	975
Grand Total	113	199	312	1488	133	1621	149	1257	1406	3339
Apprch %	36.2	63.8		91.8	8.2		10.6	89.4		
Total %	3.4	6	9.3	44.6	4	48.5	4.5	37.6	42.1	
Cars	111	192	303	1344	130	1474	145	1159	1304	3081
% Cars	98.2	96.5	97.1	90.3	97.7	90.9	97.3	92.2	92.7	92.3
Trucks	2	7	9	144	3	147	4	98	102	258
% Trucks	1.8	3.5	2.9	9.7	2.3	9.1	2.7	7.8	7.3	7.7

Smart Services, Inc.
88 W. Church Street
Newark, OH 43055
(740) 345-4700

File Name : London-Groveport_Rd_(SR_665)_&_Buckeye_Pkwy_480970_12-12-2017
Site Code : 480970
Start Date : 12/12/2017
Page No : 2

	Buckeye Pkwy Southbound			London-Groveport Rd (SR 665) Westbound			London-Groveport Rd (SR 665) Eastbound			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 11:45 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 07:00 AM										
07:00 AM	7	**27**	**34**	87	1	88	**3**	**59**	**62**	**184**
07:15 AM	**19**	**15**	**34**	**83**	**2**	**85**	**2**	**67**	**69**	**188**
07:30 AM	**11**	**21**	**32**	**107**	**6**	**113**	2	**77**	**79**	**224**
07:45 AM	9	12	21	81	4	85	3	66	69	175
Total Volume	46	75	121	358	13	371	10	269	279	771
% App. Total	38	62		96.5	3.5		3.6	96.4		
PHF	.605	.694	.890	.836	.542	.821	.833	.873	.883	.860
Peak Hour Analysis From 12:00 PM to 05:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 04:30 PM										
04:30 PM	5	**14**	**19**	104	**17**	**121**	**13**	**102**	**115**	**255**
04:45 PM	**6**	**7**	**13**	**136**		**150**				**276**
05:00 PM	4	10	14	94	6	100	18	80	98	212
05:15 PM	5	7	12	105	16	121	**21**	**110**	**131**	264
Total Volume	20	38	58	439	53	492	62	395	457	1007
% App. Total	34.5	65.5		89.2	10.8		13.6	86.4		
PHF	.833	.679	.763	.807	.779	.820	.738	.898	.872	.912

Smart Services, Inc.

88 W. Church Street
Newark, OH 43055
(740) 345-4700

File Name : London-Groveport_Rd_(SR_665)_&_Jackson_Pike_(SR_104)_480962_12-12-2017
Site Code : 480962
Start Date : 12/12/2017
Page No : 1

Groups Printed- Cars - Trucks

	Jackson Pike (SR 104) Southbound				London-Groveport Rd (SR 665) Westbound				Jackson Pike (SR 104) Northbound				London-Groveport Rd (SR 665) Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
07:00 AM	4	32	10	46	4	24	1	29	38	106	35	179	12	45	17	74	328
07:15 AM	3	26	8	37	3	25	4	32	39	122	30	191	16	50	30	96	356
07:30 AM	6	26	17	49	3	25	12	40	40	107	33	180	27	59	19	105	374
07:45 AM	5	25	9	39	5	33	7	45	30	93	15	138	24	46	20	90	312
Total	18	109	44	171	15	107	24	146	147	428	113	688	79	200	86	365	1370
08:00 AM	7	14	4	25	3	28	4	35	22	80	24	126	26	42	13	81	267
08:15 AM	2	30	11	43	3	32	6	41	26	82	12	120	14	29	22	65	269
08:30 AM	5	20	12	37	7	26	7	40	41	69	11	121	14	31	11	56	254
08:45 AM	8	16	6	30	7	33	7	47	15	54	9	78	16	29	18	63	218
Total	22	80	33	135	20	119	24	163	104	285	56	445	70	131	64	265	1008
04:00 PM	4	130	24	158	15	77	6	98	25	48	8	81	13	24	49	86	423
04:15 PM	9	137	14	160	17	72	9	98	27	59	5	91	15	24	36	75	424
04:30 PM	4	109	22	135	21	95	2	118	22	49	7	78	8	28	56	92	423
04:45 PM	5	92	22	119	17	90	8	115	30	49	10	89	8	28	47	83	406
Total	22	468	82	572	70	334	25	429	104	205	30	339	44	104	188	336	1676
05:00 PM	7	109	20	136	28	74	6	108	22	49	11	82	11	28	35	74	400
05:15 PM	6	101	22	129	15	69	5	89	30	63	5	98	9	29	57	95	411
05:30 PM	6	102	24	132	19	86	6	111	26	56	8	90	8	42	48	98	431
05:45 PM	7	77	7	91	21	78	3	102	20	37	9	66	17	36	57	110	369
Total	26	389	73	488	83	307	20	410	98	205	33	336	45	135	197	377	1611
Grand Total	88	1046	232	1366	188	867	93	1148	453	1123	232	1808	238	570	535	1343	5665
Apprch %	6.4	76.6	17		16.4	75.5	8.1		25.1	62.1	12.8		17.7	42.4	39.8		
Total %	1.6	18.5	4.1	24.1	3.3	15.3	1.6	20.3	8	19.8	4.1	31.9	4.2	10.1	9.4	23.7	
Cars	66	1021	214	1301	185	768	73	1026	427	1096	227	1750	215	507	514	1236	5313
% Cars	75	97.6	92.2	95.2	98.4	88.6	78.5	89.4	94.3	97.6	97.8	96.8	90.3	88.9	96.1	92	93.8
Trucks	22	25	18	65	3	99	20	122	26	27	5	58	23	63	21	107	352
% Trucks	25	2.4	7.8	4.8	1.6	11.4	21.5	10.6	5.7	2.4	2.2	3.2	9.7	11.1	3.9	8	6.2

Smart Services, Inc.

88 W. Church Street
Newark, OH 43055
(740) 345-4700

File Name : London-Groveport_Rd_(SR_665)_&_Jackson_Pike_(SR_104)_480962_12-12-2017
Site Code : 480962
Start Date : 12/12/2017
Page No : 2

	Jackson Pike (SR 104) Southbound				London-Groveport Rd (SR 665) Westbound				Jackson Pike (SR 104) Northbound				London-Groveport Rd (SR 665) Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 11:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:00 AM																	
07:00 AM	4	**32**	**10**	**46**	**4**	**24**	**1**	**29**	**38**	**106**	**35**	**179**	**12**	**45**	**17**	**74**	**328**
07:15 AM	**3**	**26**	**8**	**37**	**3**	**25**	**4**	**32**	**39**	**122**	**30**	**191**	16	50	**30**	**96**	**356**
07:30 AM	**6**	26	**17**	**49**	3	25	**12**	**40**	**40**	107	33	180	**27**	**59**	**19**	**105**	**374**
07:45 AM	5	25	9	39	**5**	**33**		**45**	30	93	15	138	24	46	20	90	312
Total Volume	18	109	44	171	15	107	24	146	147	428	113	688	79	200	86	365	1370
% App. Total	10.5	63.7	25.7		10.3	73.3	16.4		21.4	62.2	16.4		21.6	54.8	23.6		
PHF	.750	.852	.647	.872	.750	.811	.500	.811	.919	.877	.807	.901	.731	.847	.717	.869	.916
Peak Hour Analysis From 12:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:00 PM																	
04:00 PM	4	130	**24**	**158**	**15**	**77**	**6**	**98**	**25**	**48**	**8**	**81**	**13**	**24**	**49**	**86**	**423**
04:15 PM	**9**	**137**	**14**	**160**			**9**	**98**	**27**	**59**	**5**	**91**	**15**				**424**
04:30 PM	4	109	22	135	**21**	**95**	**2**	**118**	22	49	7	78	8	**28**	**56**	**92**	423
04:45 PM	5	92	22	119	17	90	8	115	**30**	49	**10**	**89**	**8**	**28**	**47**	**83**	**406**
Total Volume	**22**	**468**	**82**	**572**	**70**	**334**	**25**	**429**	**104**	**205**	**30**	**339**	**44**	**104**	**188**	**336**	**1676**
% App. Total	**3.8**	**81.8**	**14.3**		**16.3**	**77.9**	**5.8**		**30.7**	**60.5**	**8.8**		**13.1**	**31**	**56**		
PHF	**.611**	**.854**	**.854**	**.894**	**.833**	**.879**	**.694**	**.909**	**.867**	**.869**	**.750**	**.931**	**.733**	**.929**	**.839**	**.913**	**.988**

SDFA

Hemet Unified School District

FEE JUSTIFICATION REPORT FOR NEW RESIDENTIAL AND COMMERCIAL/INDUSTRIAL DEVELOPMENT

March 18, 2016

Hemet Unified School District
Professional Development Service Center
1791 W. Acacia Avenue
Hemet, CA 92545
Tel: (951) 765-5100 Ext. 5000 Fax: (951) 766-0629
Contact:
Vincent Christakos; Assistant Superintendent, Business Services

SPECIAL DISTRICT FINANCING & ADMINISTRATION
437 West Grand Avenue
Escondido CA 92025
760·233·2630 Fax 233·2631

generation rate, or factor, which represents the number of students, or portion thereof, expected to attend District schools from each new house. In order to accurately determine the cost of school facilities impacts at each grade level, a distinct student generation rate must be ascertained for elementary, middle and high school levels because the facilities cost per student at the elementary, middle and high school levels vary. This difference exists because generally the square footage of educational facilities per student increases as students progress to higher grades.

Data used to calculate student generation rates was provided by SCAG and the District. A tabulation of this calculation by school level is included in Appendix C and is summarized in Table VI below:

Table VI
District Wide Student Generation Rate

School Type	Generation Rate
Elementary School	0.1843
Middle School	0.0942
High School	0.1352
Totals	**0.4138**

Students Generated By New Development

The number of students estimated to be generated from projected Unmitigated New and Reconstructed Dwelling Units is determined by multiplying the projected number of Unmitigated New and Reconstructed Dwelling Units (Table V) by the student generation rate (Table VI). This computation is reflected in Table VII:

Table VII
Student Generation by Projected Unmitigated New and Reconstructed Dwelling Units

Type of Projected Dwelling Unit	Unmitigated Dwelling Units	School Type	Student Generation Rate	Students Generated
New Dwelling Unit	24,904	Elementary	0.1843	4,590
New Dwelling Unit	24,904	Middle	0.0942	2,346
New Dwelling Unit	24,904	High	0.1352	3,367
Subtotal New Dwelling Unit				**10,303**
Reconstructed Dwelling Unit	1,664	Elementary	0.1843	307
Reconstructed Dwelling Unit	1,664	Middle	0.0942	157
Reconstructed Dwelling Unit	1,664	High	0.1352	225
Subtotal Reconstructed Dwelling Unit				**689**
Total	**26,568**			**10,992**

Single-Family Detached Housing
(210)

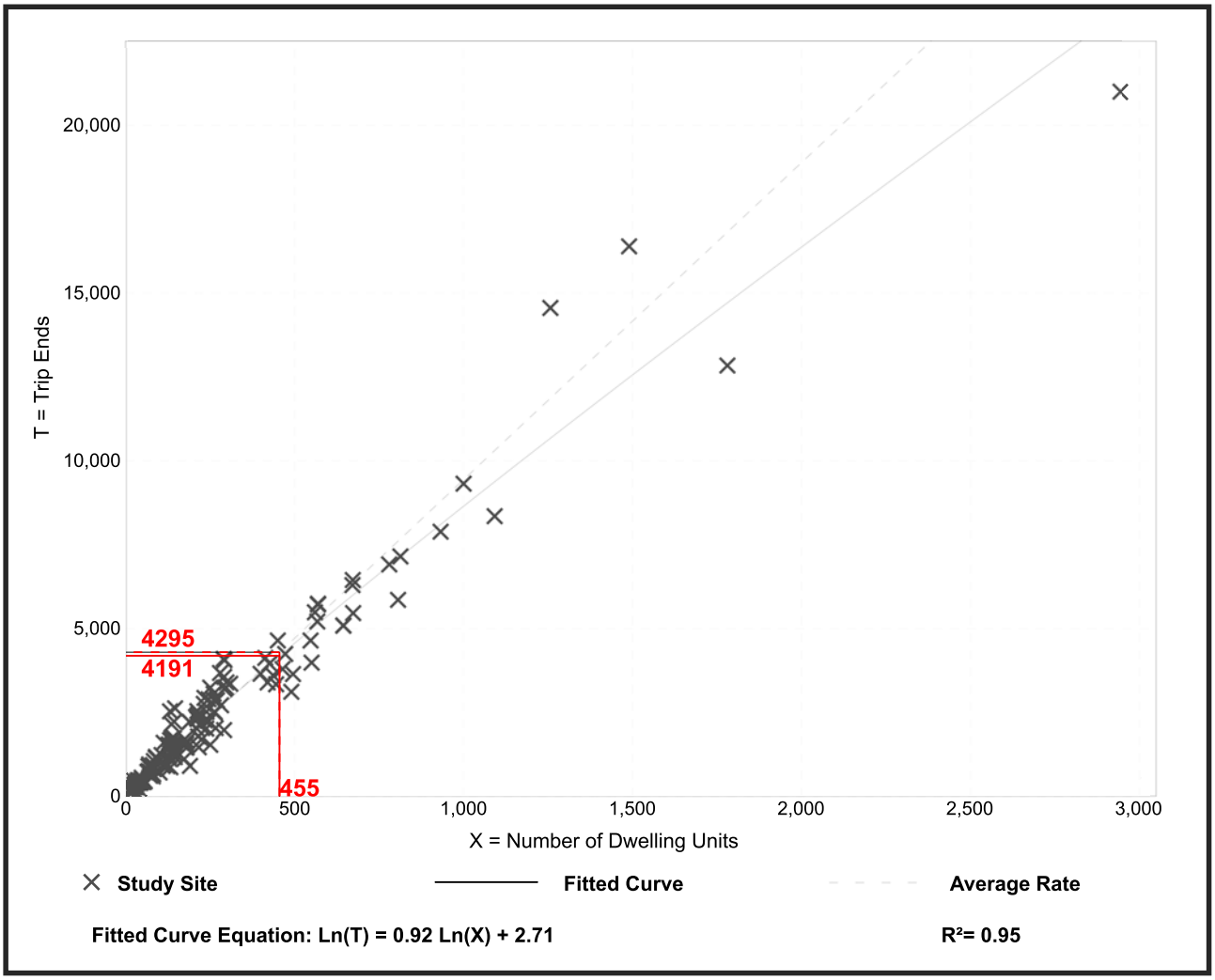
Vehicle Trip Ends vs: **Dwelling Units**
On a: **Weekday**

Setting/Location: **General Urban/Suburban**
Number of Studies: 159
Avg. Num. of Dwelling Units: 264
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
9.44	4.81 - 19.39	2.10

Data Plot and Equation



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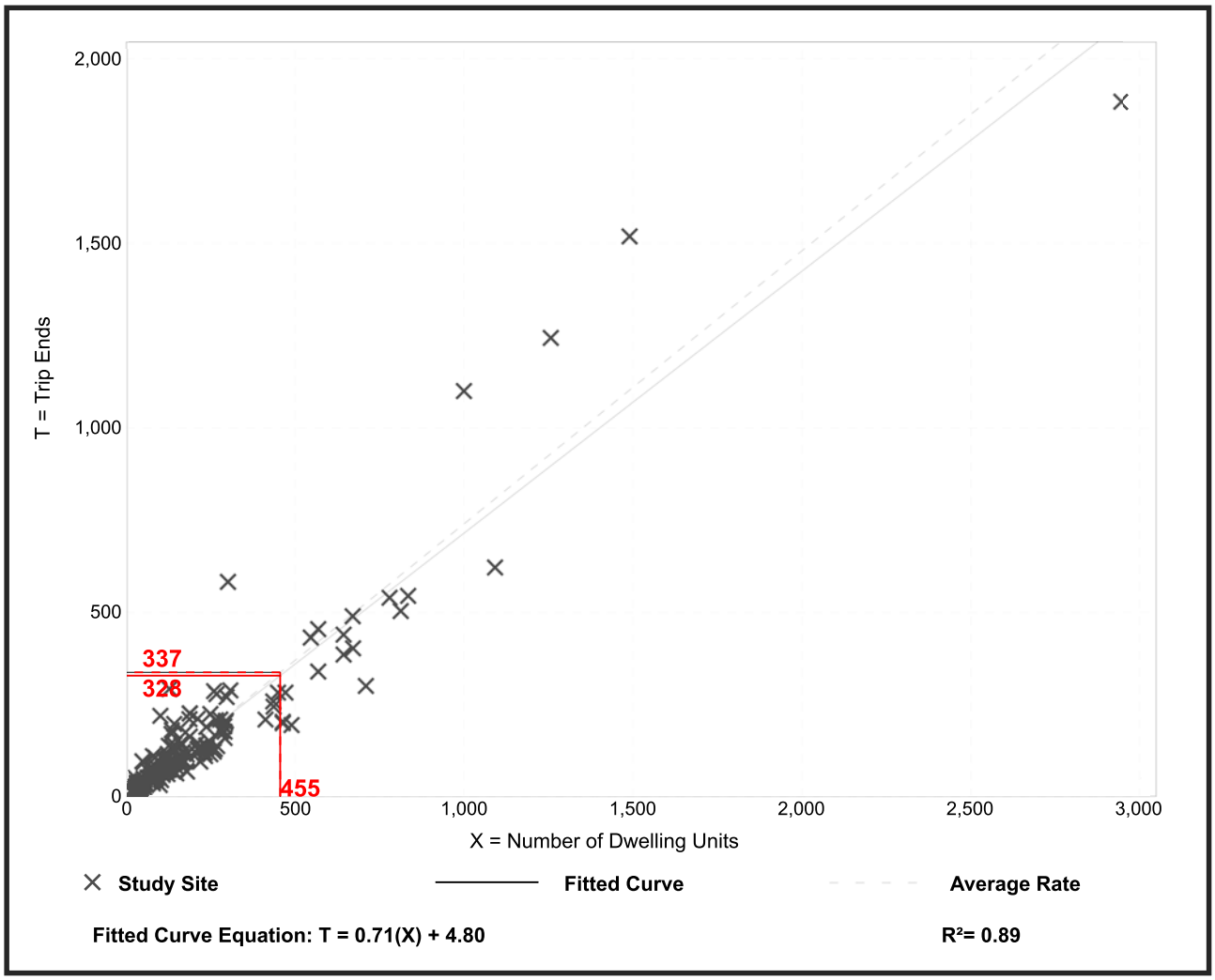
Single-Family Detached Housing
(210)

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: 173
Avg. Num. of Dwelling Units: 219
Directional Distribution: 25% entering, 75% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.74	0.33 - 2.27	0.27

Data Plot and Equation



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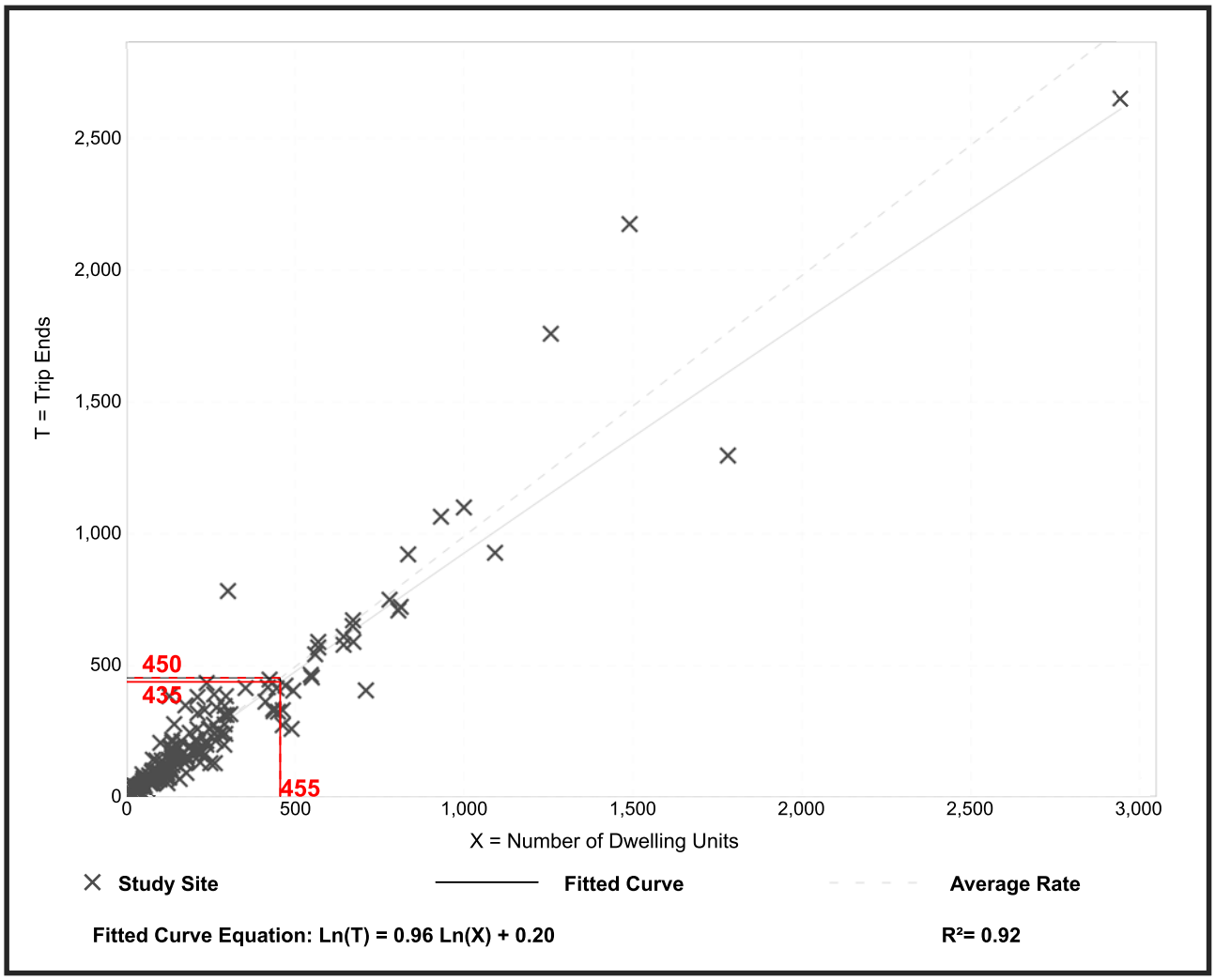
Single-Family Detached Housing
(210)

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: 190
Avg. Num. of Dwelling Units: 242
Directional Distribution: 63% entering, 37% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.99	0.44 - 2.98	0.31

Data Plot and Equation



Trip Generation Manual, 10th Edition ● Institute of Transportation Engineers

Single-Family Detached Housing
(210)

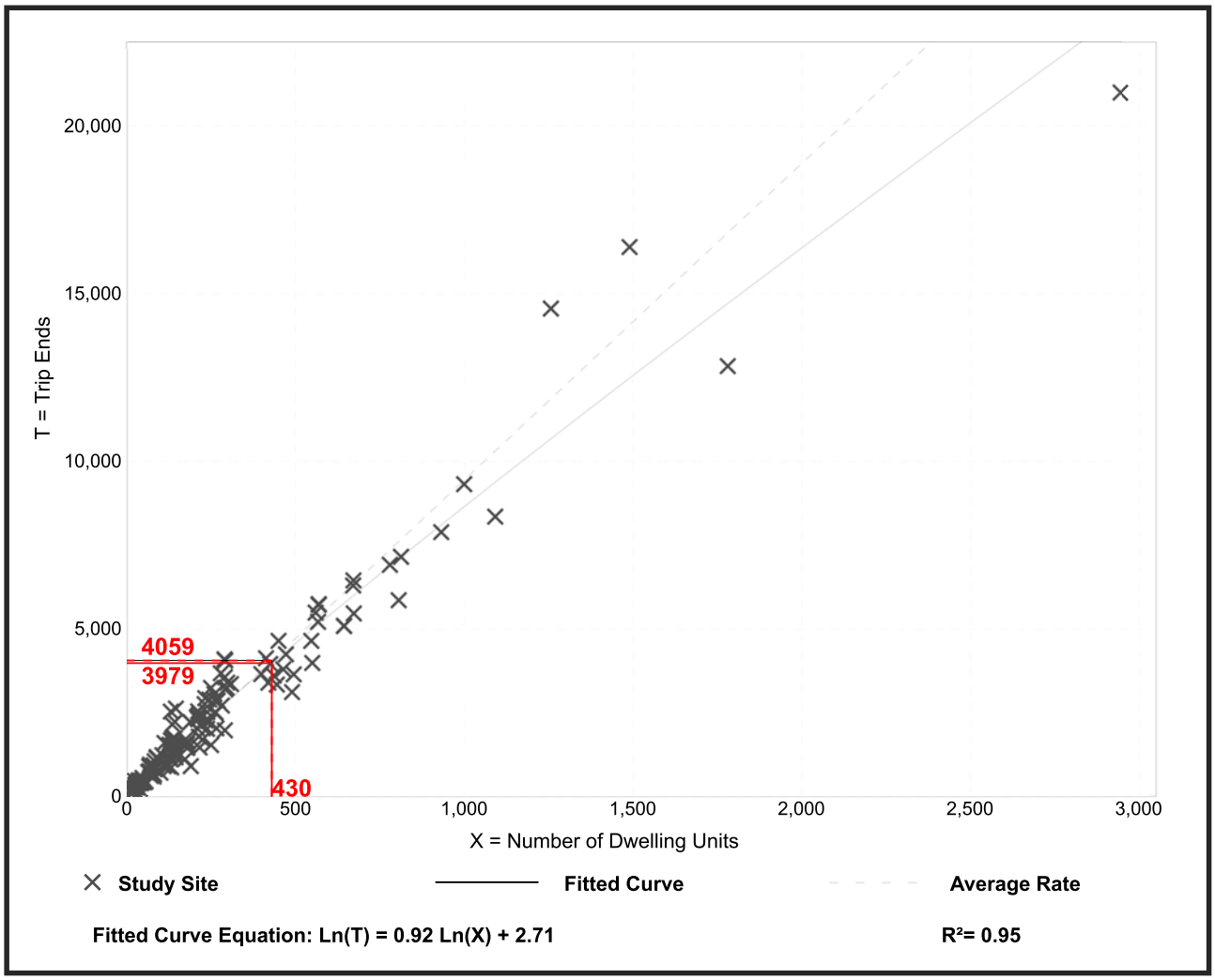
Vehicle Trip Ends vs: **Dwelling Units**
On a: **Weekday**

Setting/Location: **General Urban/Suburban**
Number of Studies: 159
Avg. Num. of Dwelling Units: 264
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
9.44	4.81 - 19.39	2.10

Data Plot and Equation



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Single-Family Detached Housing
(210)

Vehicle Trip Ends vs: **Dwelling Units**
On a: **Weekday,**
Peak Hour of Adjacent Street Traffic,
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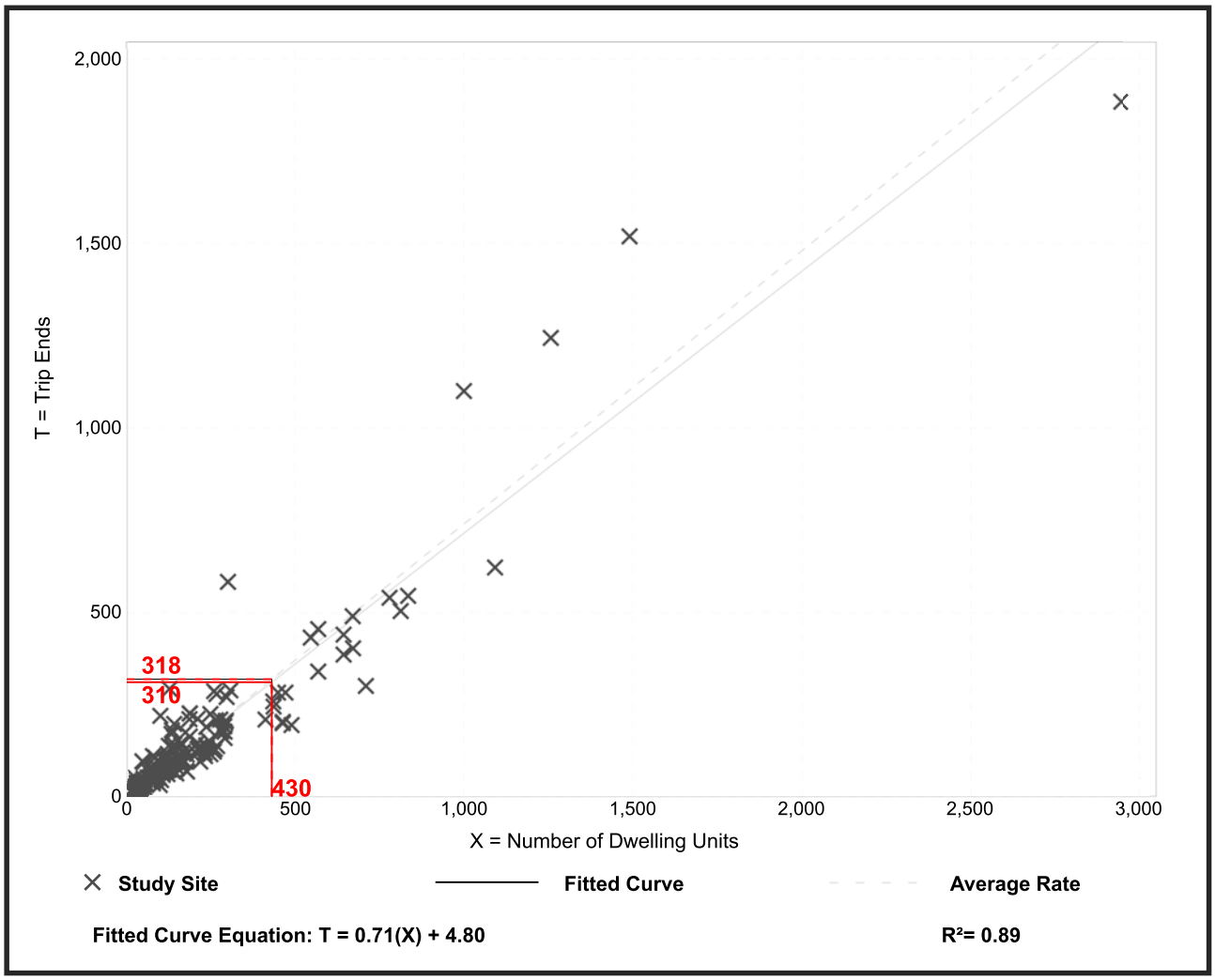
Data Plot and Equation



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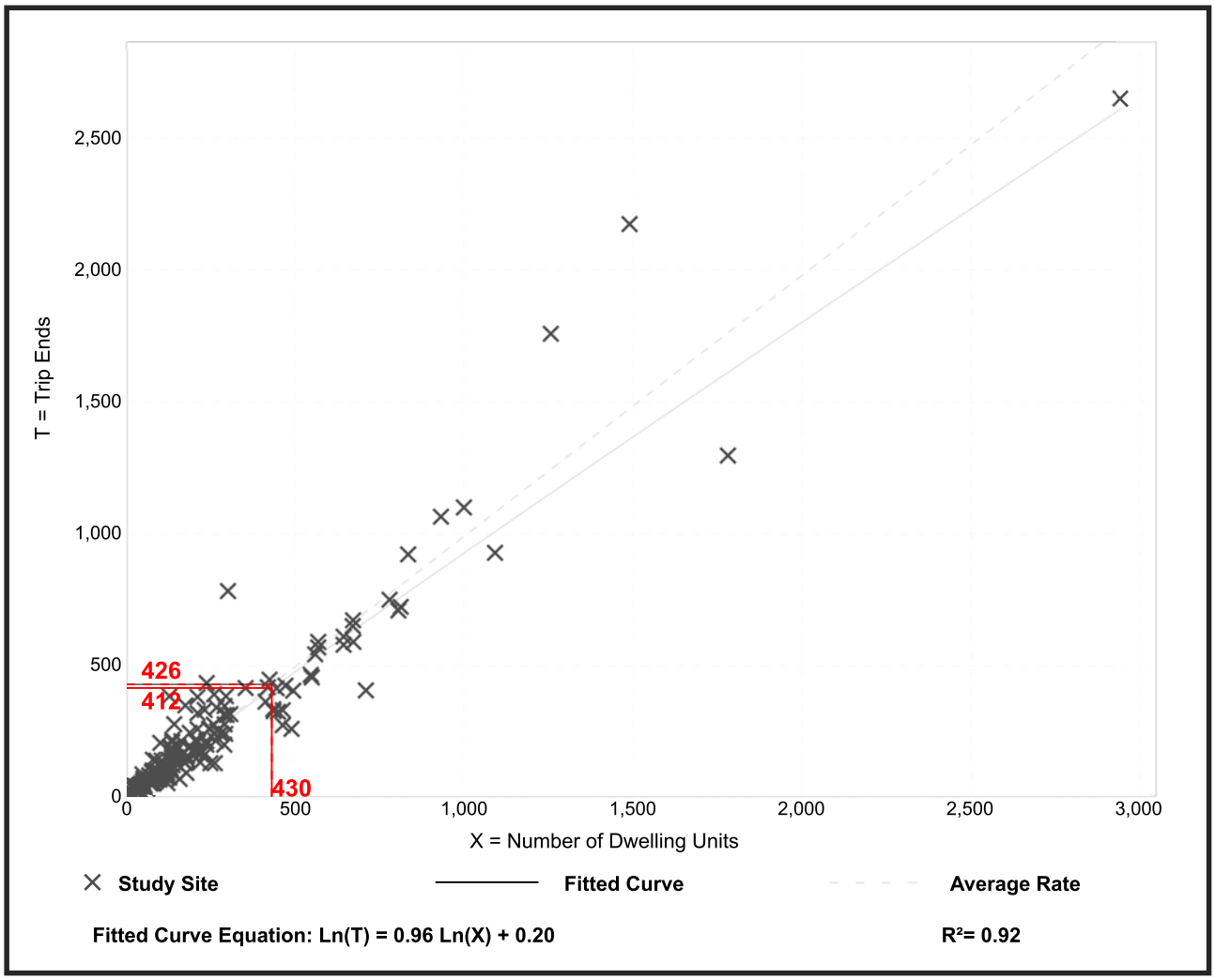
Single-Family Detached Housing
(210)

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: 190
Avg. Num. of Dwelling Units: 242
Directional Distribution: 63% entering, 37% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.99	0.44 - 2.98	0.31

Data Plot and Equation



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Senior Adult Housing - Detached
(251)

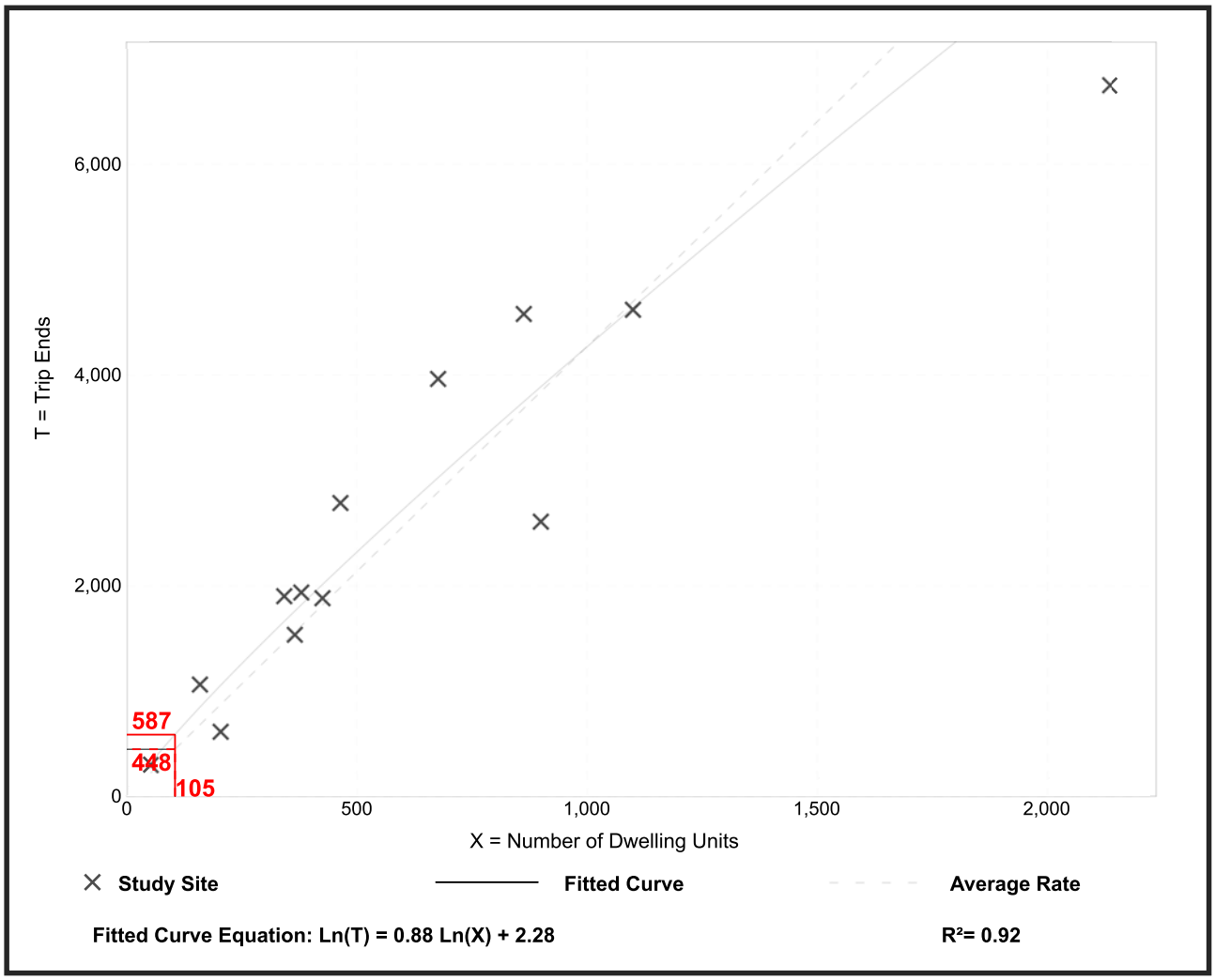
Vehicle Trip Ends vs: **Dwelling Units**
On a: **Weekday**

Setting/Location: **General Urban/Suburban**
Number of Studies: 14
Avg. Num. of Dwelling Units: 655
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
4.27	2.90 - 6.66	1.11

Data Plot and Equation



Trip Generation Manual, 10th Edition ● Institute of Transportation Engineers

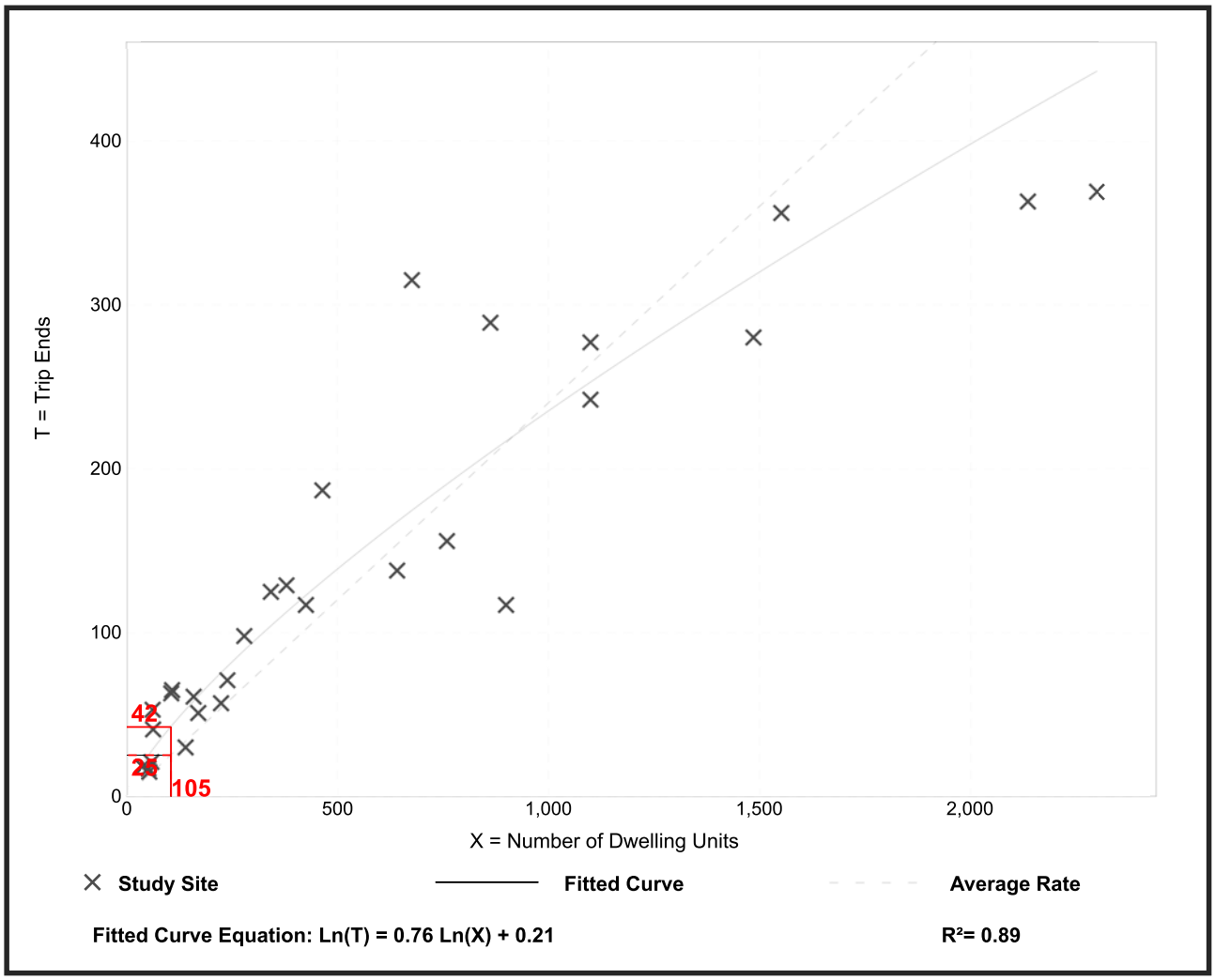
Senior Adult Housing - Detached
(251)

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: 29
Avg. Num. of Dwelling Units: 583
Directional Distribution: 33% entering, 67% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.24	0.13 - 0.84	0.10

Data Plot and Equation



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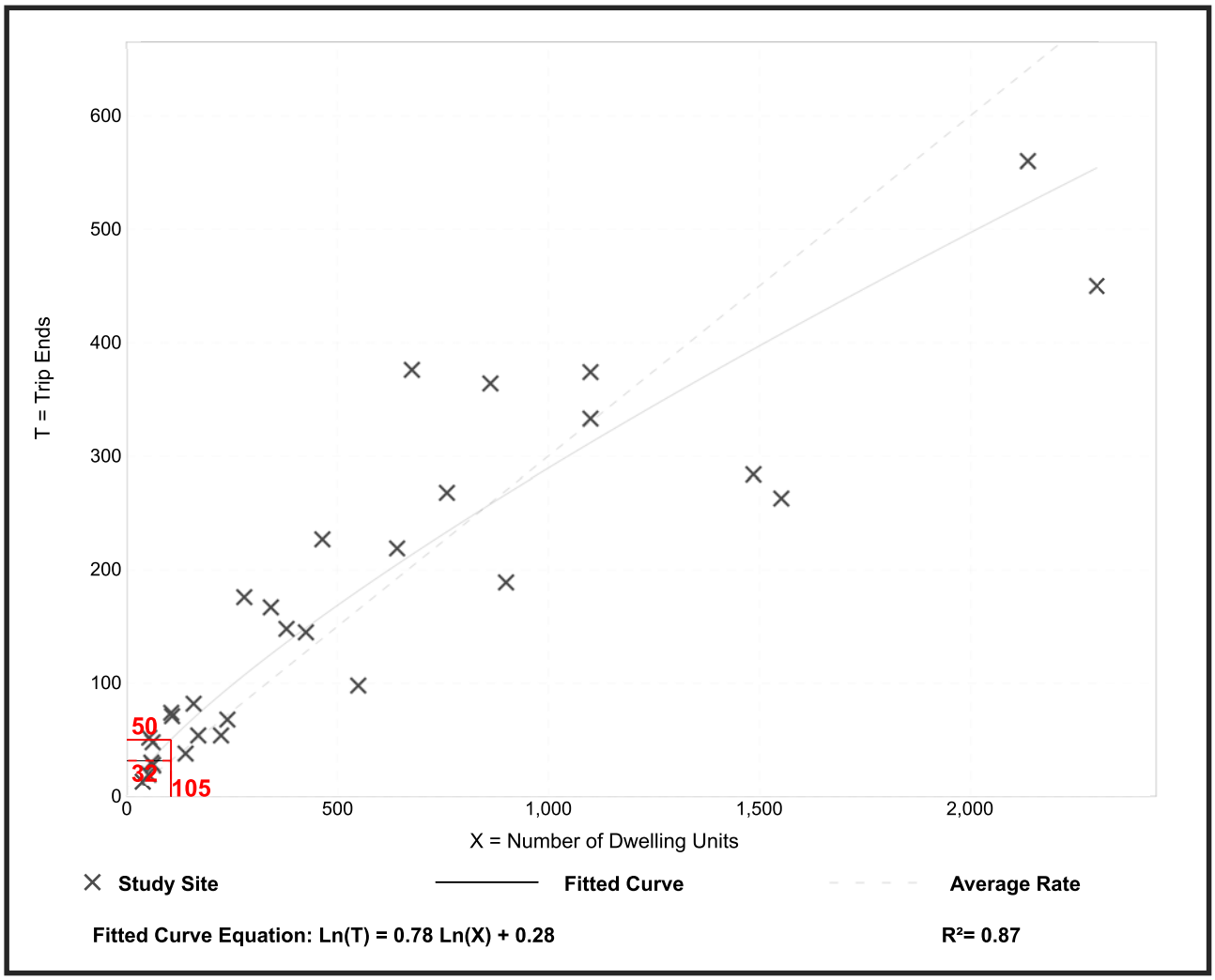
Senior Adult Housing - Detached
(251)

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: 30
Avg. Num. of Dwelling Units: 582
Directional Distribution: 61% entering, 39% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.30	0.17 - 0.95	0.13

Data Plot and Equation



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Elementary School
(520)

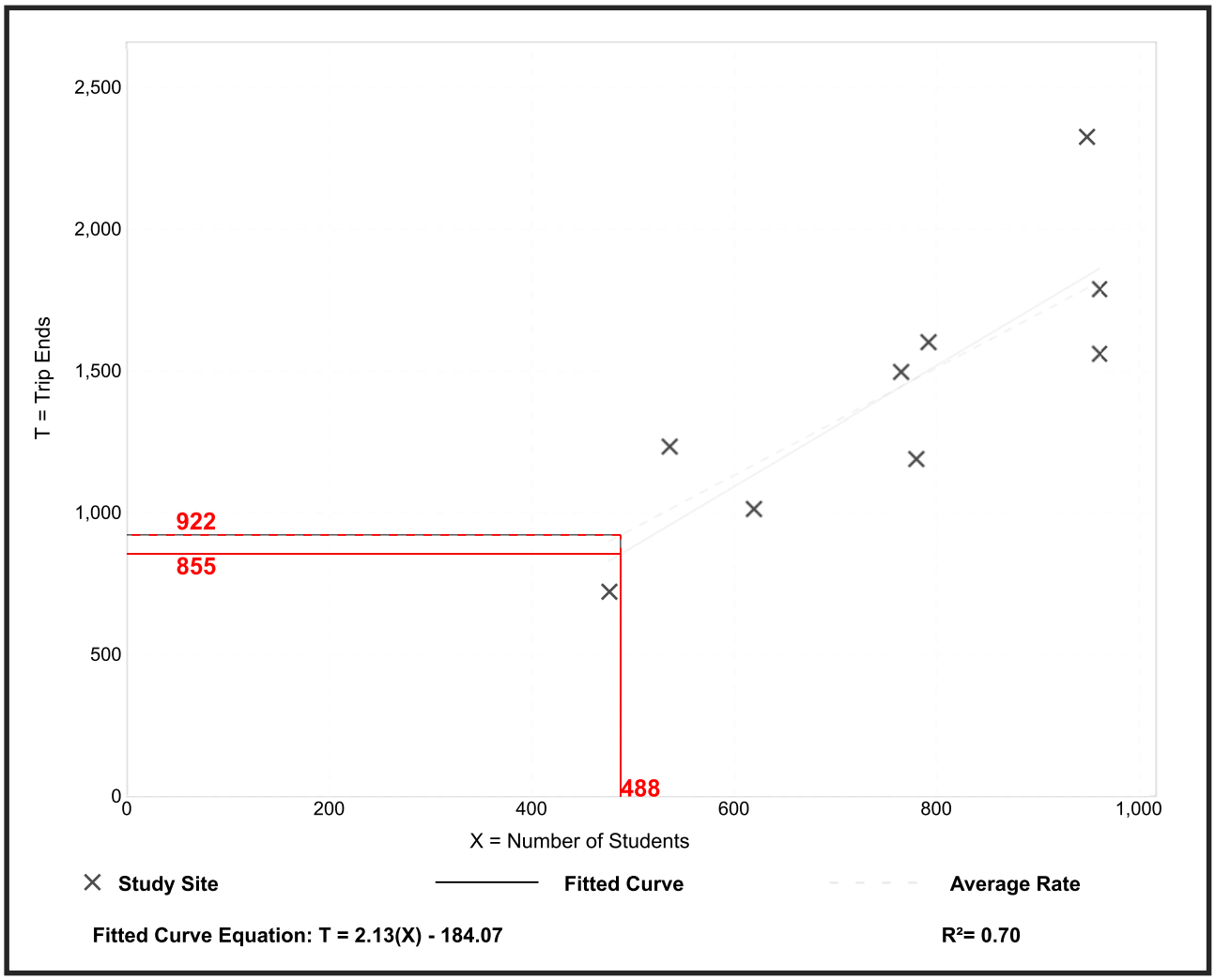
Vehicle Trip Ends vs: **Students**
On a: **Weekday**

Setting/Location: **General Urban/Suburban**
Number of Studies: 9
Avg. Num. of Students: 760
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Student

Average Rate	Range of Rates	Standard Deviation
1.89	1.51 - 2.45	0.34

Data Plot and Equation



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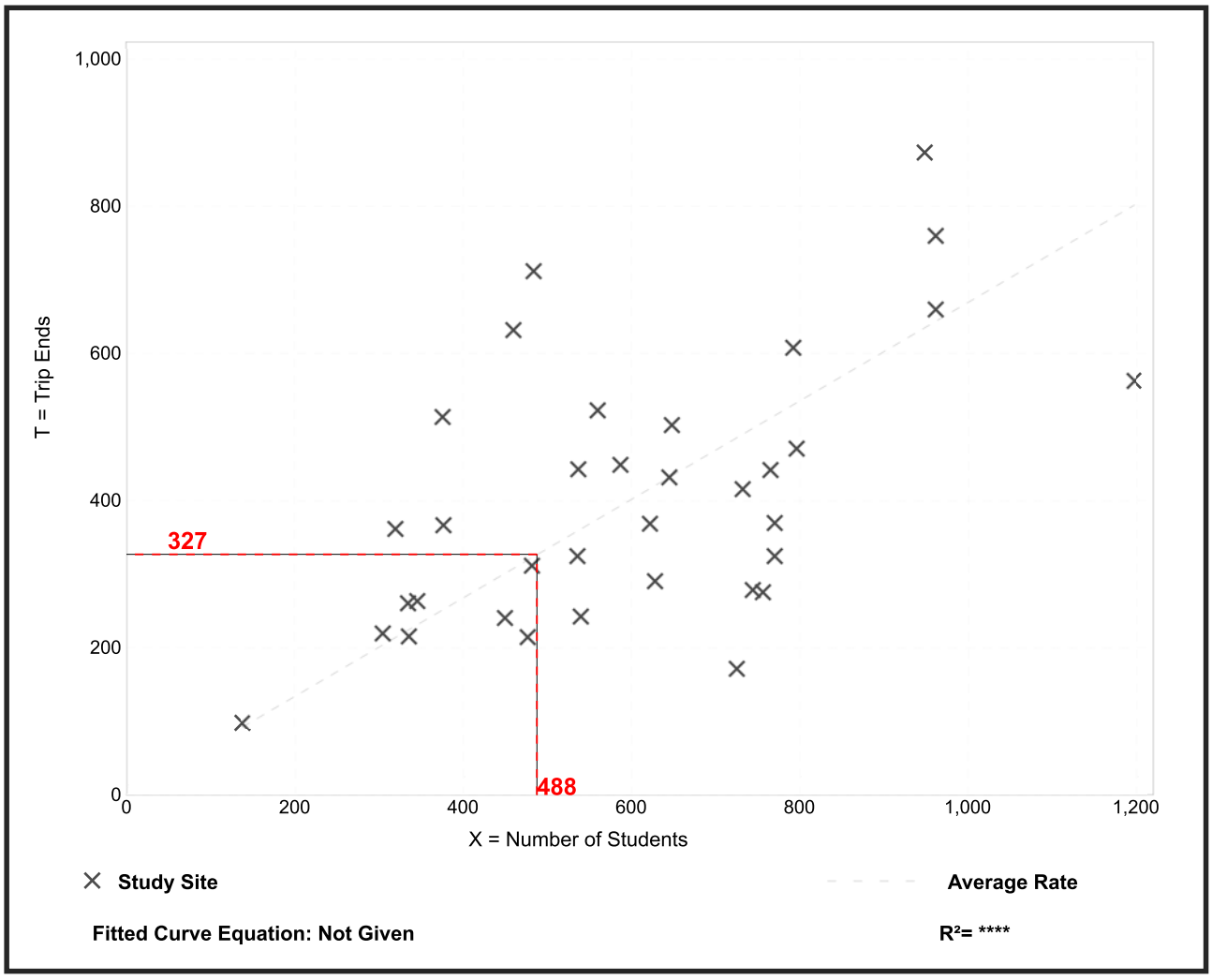
Elementary School
(520)

Vehicle Trip Ends vs: **Students**
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: 35
Avg. Num. of Students: 603
Directional Distribution: 54% entering, 46% exiting

Vehicle Trip Generation per Student

Average Rate	Range of Rates	Standard Deviation
0.67	0.24 - 1.47	0.27

Data Plot and Equation



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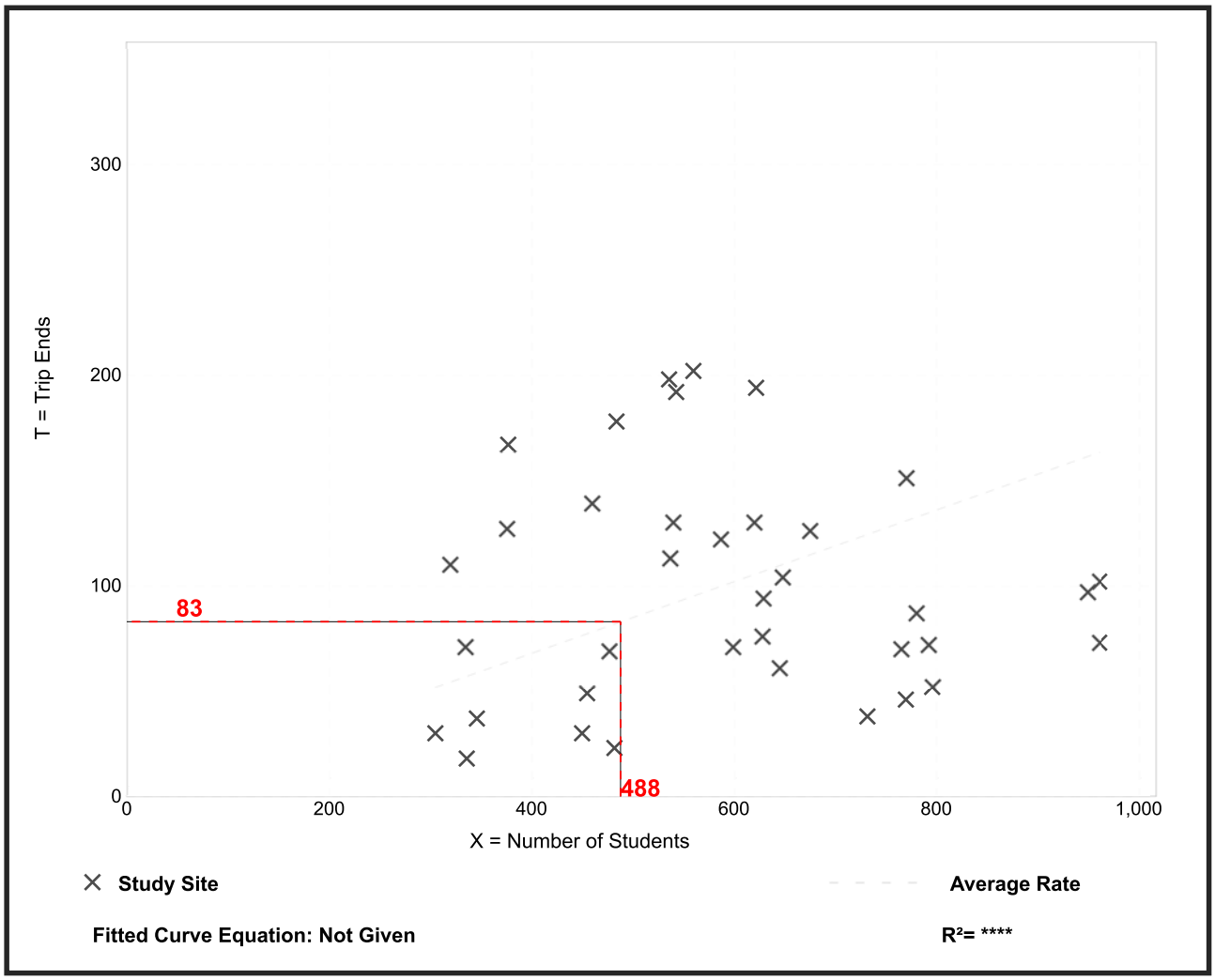
Elementary School
(520)

Vehicle Trip Ends vs: **Students**
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: 37
Avg. Num. of Students: 590
Directional Distribution: 48% entering, 52% exiting

Vehicle Trip Generation per Student

Average Rate	Range of Rates	Standard Deviation
0.17	0.05 - 0.44	0.11

Data Plot and Equation



Trip Generation Manual, 10th Edition ● Institute of Transportation Engineers

From: Hwashik Jang
To: Todd Stanhope
Cc: Nick Gill; Jennifer S. Stachler ,P.E.; Andrew Hurst; "Kirk Ridder"; "Volchko, Tim"; Zhuojun Jiang
Subject: RE: Growth Rate Request - Hancock Property
Date: Monday, January 22, 2018 12:11:42 PM

Todd,

We have completed processing growth rates for your traffic study.
Please use a linear annual growth rate as summarized in the following table below.

Location	**Linear Annual Growth Rate**
SR 665 e/o SR 104	2.60%
SR 104 n/o SR 665	1.60%
SR 665 w/o SR 104	2.70%
SR 104 s/o SR 665	2.10%
SR 104 n/o Scioto Meadows Blvd	1.60%
SR 665 e/o Buckeye Pkwy	2.70%
Buckeye Pkwy n/o SR 665	2.00%
SR 665 w/o Buckeye Pkwy	2.70%
Hawthorne Pkwy e/o Buckeye Pkwy	2.00%
Buckeye Pkwy n/o Hawthorne Pkwy	2.00%
Hawthorne Pkwy w/o Buckeye Pkwy	2.00%
Buckeye Pkwy s/o Hawthorne Pkwy	2.00%

Note: This is planning level analysis based on MORPC regional travel demand model.

If you have any other questions, please let me know.

Thanks,

Hwashik

Hwashik Jang | hjang@morpc.org | **MORPC**
Tel 614.233.4145 | **Fax 614.233.4245**

From: Todd Stanhope [mailto:tstanhope@smartservices-inc.com]
Sent: Wednesday, December 20, 2017 12:19 PM
To: Zhuojun Jiang <zjiang@morpc.org>
Cc: Nick Gill <ngill@morpc.org>; Hwashik Jang <hjang@morpc.org>; Jennifer S. Stachler ,P.E.

<jstachler@grovecityohio.gov>; Andrew Hurst <andrew.hurst@dot.state.oh.us>; 'Kirk Ridder' <kridder@fischerhomes.com>; 'Volchko, Tim' <tvolchko@cecinc.com>
Subject: Growth Rate Request - Hancock Property

Zhuojun

We are performing a traffic study for the subject site that has access on both Jackson Pike (SR 104) and Hawthorne Parkway. The site will be in the City of Grove City but ODOT will also be reviewing the study. Please provide growth rates for all legs of the study area intersections which include:

Buckeye Parkway & Hawthorne Parkway
London-Groveport Road (SR 665) & Buckeye Parkway
Jackson Pike (SR 104) & London-Groveport Road (SR 665)
Jackson Pike (SR 104) north of Scioto Meadows Boulevard

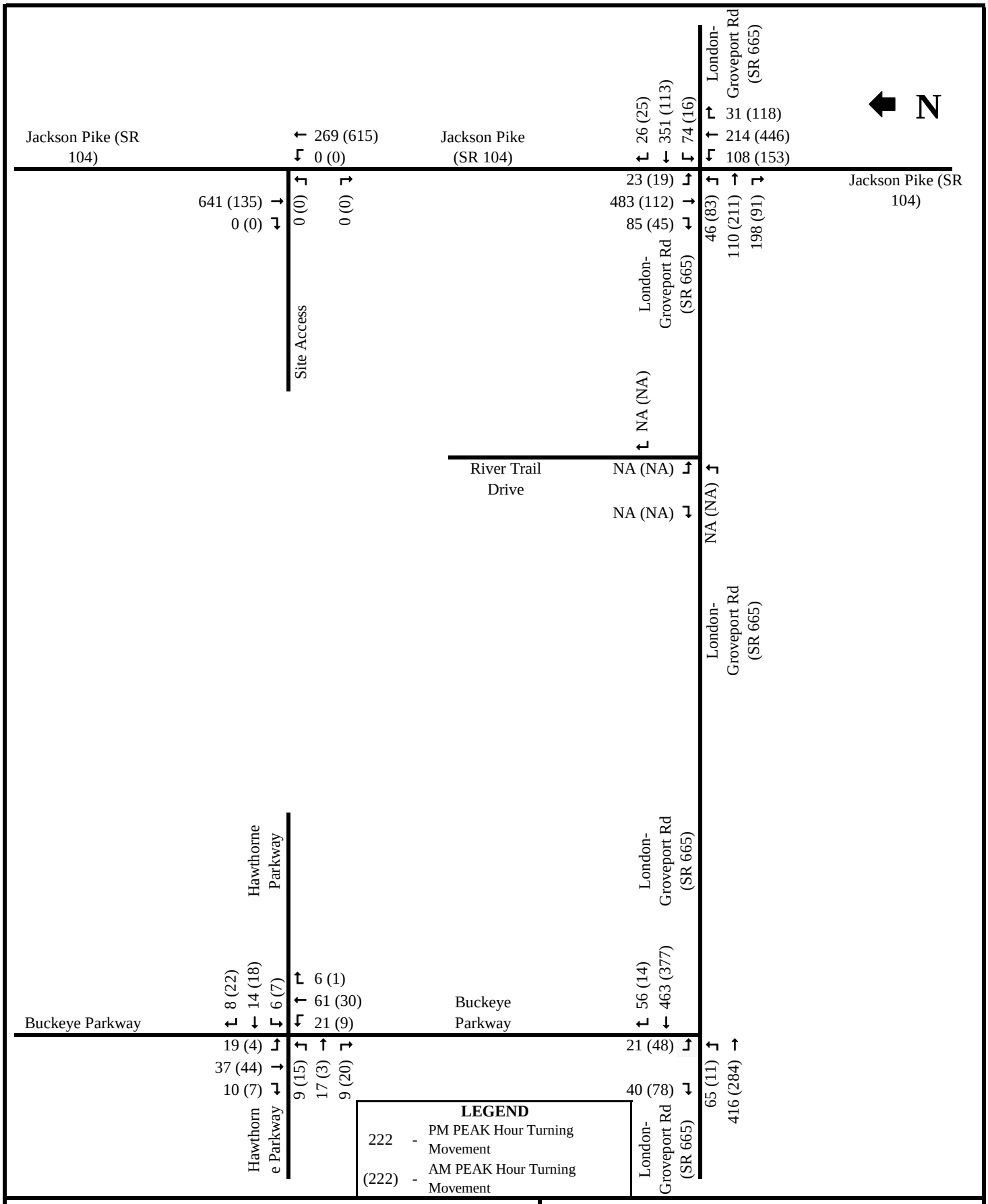
1. Traffic Data upon which you would be applying these growth rates (preferably 24 hour counts). As part of the project, a 24 hour link count was taken on Jackson Pike (SR 104) north of Scioto Meadows Boulevard. Also, peak hour (7-9 AM & 4-6 PM) turning movement counts were taken at the intersections of Buckeye Parkway & Hawthorne Parkway, London-Groveport Road (SR 665) & Buckeye Parkway, and Jackson Pike (SR 104) & London-Groveport Road (SR 665). The count reports are attached.
2. Open Year & Design Year, for this study: 2019 and 2029
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 proposed to be developed with 400 single family homes and 100 multi-family units. The site is located on the west side of Jackson Pike (SR 104) north of Scioto Meadows Boulevard. Trip generation calculations for the residential units will be calculated as part of the study and are not available at this time.
5. Project Review Contact Person: Jennifer Stachler will be coordinating the review of the study for the City of Grove City. Andrew Hurst from ODOT District 6 will also be reviewing the study. Their e-mail addresses are in the cc: line.

Thank you!

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

***Smart Services, Inc.* (Columbus Office)**
*A **DBE / EDGE** Certified Business*

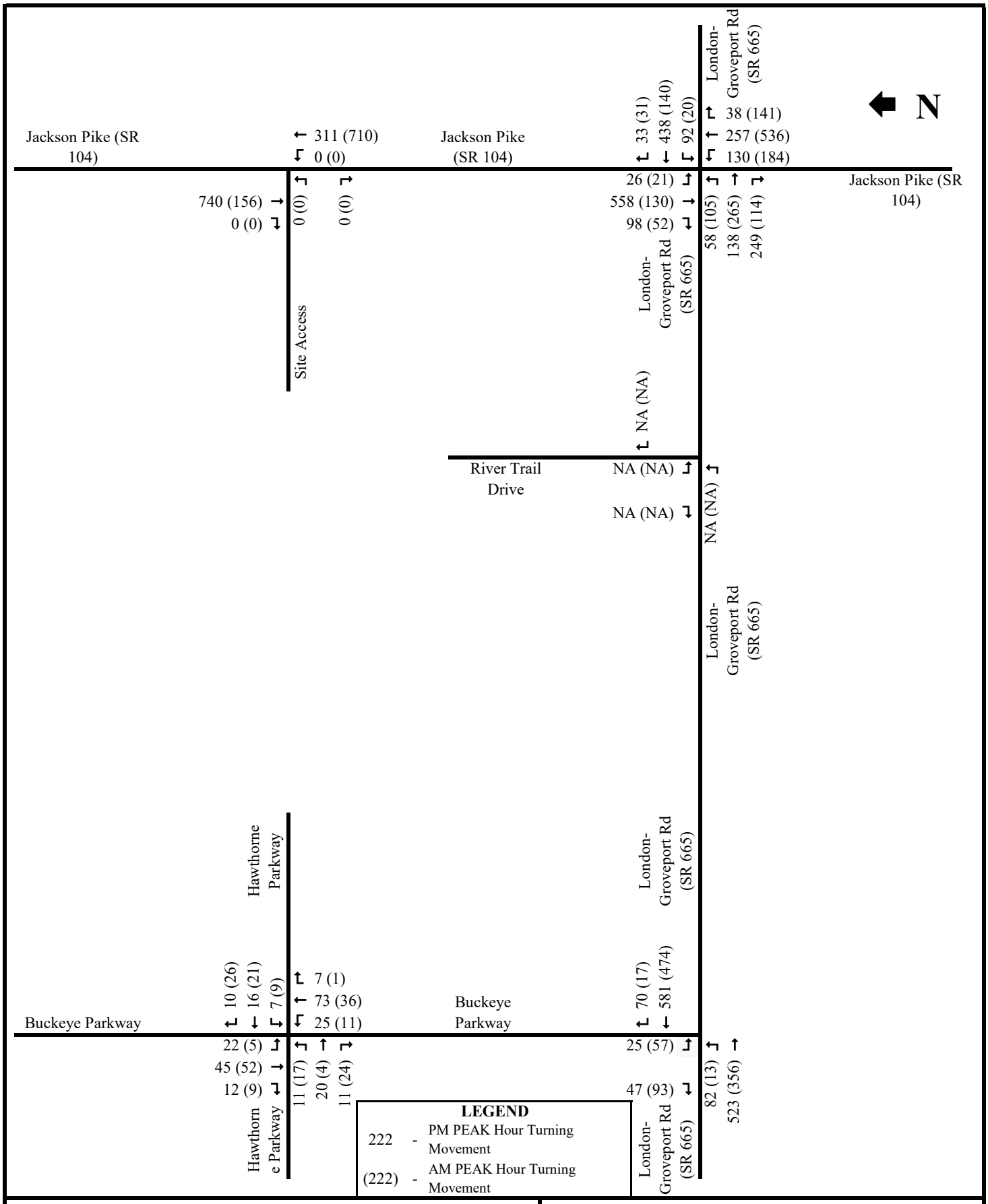
1900 Crown Park Court, Suite E
Columbus, Ohio 43235
Ph: 614-914-5543
www.SmartServices-Inc.com



FARMSTEAD
TRAFFIC IMPACT STUDY
PREPARED BY: SMART SERVICES, INC. 5/2018

APPENDIX EXHIBIT

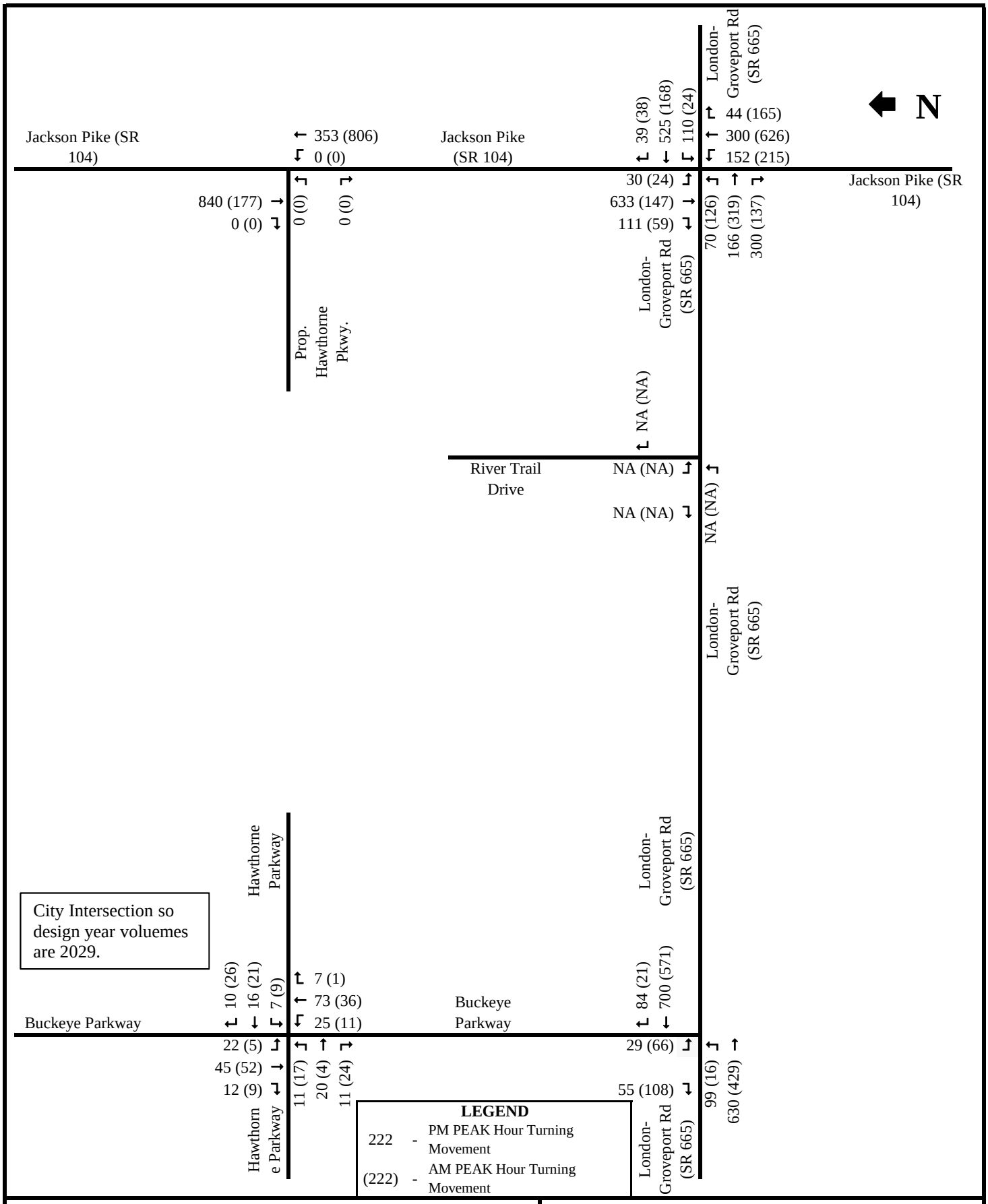
2019 'NO BUILD' TRAFFIC



FARMSTEAD
TRAFFIC IMPACT STUDY
PREPARED BY: SMART SERVICES, INC. 5/2018

APPENDIX EXHIBIT

2029 'NO BUILD' TRAFFIC



FARMSTEAD
TRAFFIC IMPACT STUDY

PREPARED BY: SMART SERVICES, INC. REV. 1 9/2018

APPENDIX EXHIBIT

2039 'NO BUILD' TRAFFIC

Smart Services, Inc.
88 W. Church Street

Newark, Ohio, United States 43055
(740) 345 4700 tstanhope@smartservices-inc.com
www.smartservices-inc.com

Count Name: Jackson Pike (SR 104) North of Scioto Meadows Blvd
Site Code:
Start Date: 12/12/2017

Direction (Southbound)

Start Time	Total
12/12/2017 12:00 AM	18
1:00 AM	20
2:00 AM	12
3:00 AM	14
4:00 AM	13
5:00 AM	32
6:00 AM	87
7:00 AM	131
8:00 AM	123
9:00 AM	118
10:00 AM	137
11:00 AM	154
12:00 PM	216
1:00 PM	219
2:00 PM	290
3:00 PM	469
4:00 PM	600
5:00 PM	524
6:00 PM	367
7:00 PM	252
8:00 PM	175
9:00 PM	135
10:00 PM	105
11:00 PM	61
Total	4272
Total %	100.0
AM Times	7:00 AM
AM Peaks	131
PM Times	4:00 PM
PM Peaks	600

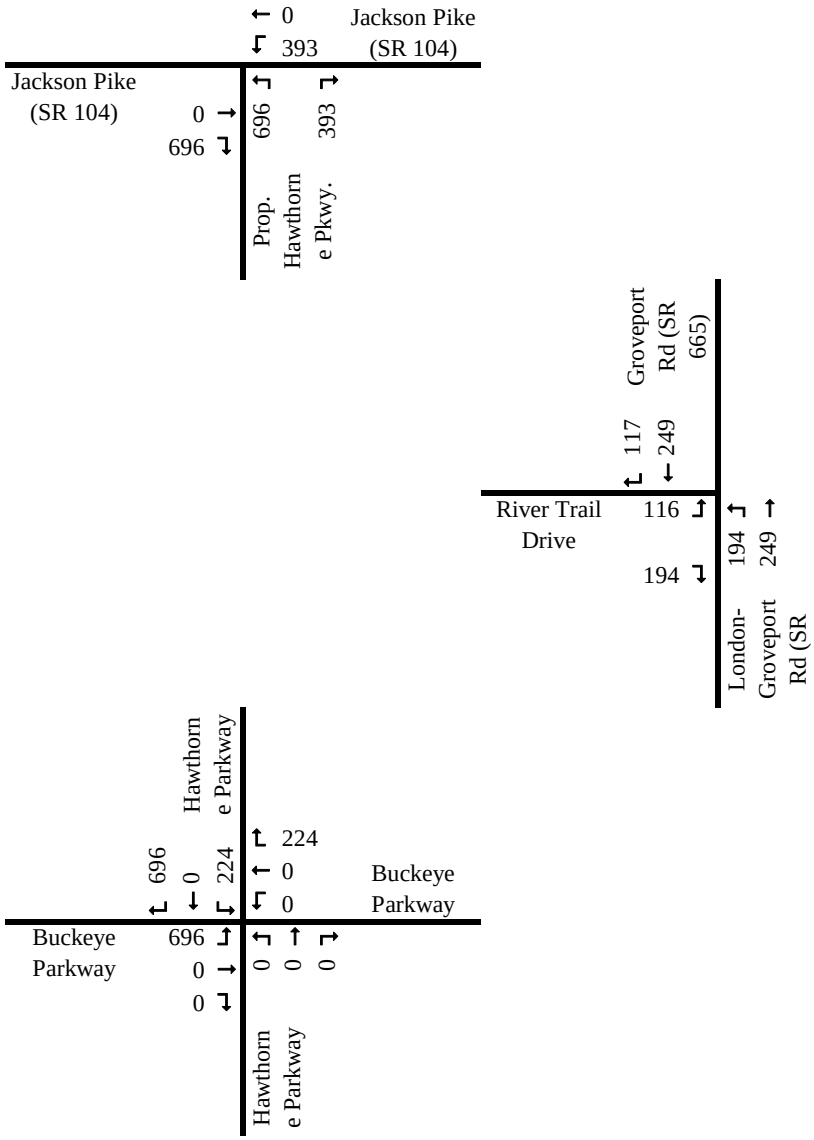
Smart Services, Inc.
88 W. Church Street

Newark, Ohio, United States 43055
(740) 345 4700 tstanhope@smartservices-inc.com
www.smartservices-inc.com

Count Name: Jackson Pike (SR 104) North of Scioto Meadows Blvd
Site Code:
Start Date: 12/12/2017

Direction (Northbound)

Start Time	Total
12/12/2017 12:00 AM	14
1:00 AM	5
2:00 AM	10
3:00 AM	13
4:00 AM	85
5:00 AM	189
6:00 AM	462
7:00 AM	596
8:00 AM	390
9:00 AM	238
10:00 AM	213
11:00 AM	195
12:00 PM	211
1:00 PM	171
2:00 PM	207
3:00 PM	215
4:00 PM	273
5:00 PM	282
6:00 PM	207
7:00 PM	101
8:00 PM	76
9:00 PM	52
10:00 PM	36
11:00 PM	27
Total	4268
Total %	100.0
AM Times	7:00 AM
AM Peaks	596
PM Times	4:00 PM
PM Peaks	273



FARMSTEAD
TRAFFIC IMPACT STUDY
PREPARED BY: SMART SERVICES, INC. REV. 1 9/2018

APPENDIX EXHIBIT

RESIDENTIAL SITE GENERATED TRAFFIC - DAILY

Time	Residential Source: *Locust Curve Drive - Delaware, Ohio*										TOTAL DAILY DISTRIBUTION			
	% of 24 Hour Entering (Weekday)	% of 24 Hour Exiting (Weekday)	Volume Entering (Weekday)					Volume Exiting (Weekday)				Volume			
			NB	SB	EB			NB	SB	EB		NB	SB	EB	
					LT	TH	RT			LT	RT			LT	RT
			393	696	0	0	0	0	0	696	393	393	696	696	393
000	0.2%	0.1%	1	2	0	0	0	0	0	1	0	1	2	1	0
100	0.3%	0.0%	1	2	0	0	0	0	0	0	0	1	2	0	0
200	0.5%	0.1%	2	3	0	0	0	0	0	1	0	2	3	1	0
300	0.2%	0.1%	1	2	0	0	0	0	0	1	0	1	2	1	0
400	0.0%	0.3%	0	0	0	0	0	0	0	2	1	0	0	2	1
500	0.1%	1.5%	0	1	0	0	0	0	0	10	6	0	1	10	6
600	1.2%	5.7%	5	9	0	0	0	0	0	40	22	5	9	40	22
700	3.3%	13.5%	13	23	0	0	0	0	0	94	53	13	23	94	53
800	5.0%	9.5%	19	34	0	0	0	0	0	66	37	19	34	66	37
900	4.4%	6.4%	17	31	0	0	0	0	0	44	25	17	31	44	25
1000	4.6%	4.5%	18	32	0	0	0	0	0	31	18	18	32	31	18
1100	5.5%	5.2%	22	38	0	0	0	0	0	36	20	22	38	36	20
1200	5.4%	7.1%	21	38	0	0	0	0	0	49	28	21	38	49	28
1300	4.5%	4.6%	18	31	0	0	0	0	0	32	18	18	31	32	18
1400	5.3%	4.8%	21	37	0	0	0	0	0	34	19	21	37	34	19
1500	6.9%	4.9%	27	48	0	0	0	0	0	34	19	27	48	34	19
1600	7.4%	6.8%	29	52	0	0	0	0	0	48	27	29	52	48	27
1700	11.8%	6.7%	46	82	0	0	0	0	0	47	26	46	82	47	26
1800	8.7%	6.3%	34	60	0	0	0	0	0	44	25	34	60	44	25
1900	8.3%	4.8%	33	58	0	0	0	0	0	34	19	33	58	34	19
2000	7.9%	3.8%	31	55	0	0	0	0	0	27	15	31	55	27	15
2100	4.6%	2.0%	18	32	0	0	0	0	0	14	8	18	32	14	8
2200	2.8%	1.1%	11	20	0	0	0	0	0	8	4	11	20	8	4
2300	1.0%	0.1%	4	7	0	0	0	0	0	1	0	4	7	1	0
TOTAL	100.00%	100.0%	393	696	0	0	0	0	0	696	393	393	696	696	393

TABLE - Daily Site Traffic Distribution-Prop. Hawthorne Pkwy. & Jackson Pike (SR 104) (Ref. #1)

Hour	EB				Calculation Parameters										Minor Street Configurations					Base Right Turn Reduction	Mainline Approach Volume per Lane	Mainline Congestion Factor	Adjusted Right Turn Reduction	Right Turn Reduction	Adjusted Minor Street Volume
	Lane Configuration = 3																				SB				
	Left (L)	Thru (T)	Right (R)	(A) Total	0.7A	0.35A	3T	T/3	T+L	T+R	3R	3L	T/2	T/4	1	2	3	4	5		Approach				
6-7 AM	40	0	22	62	44	22	0	0	40	22	67	119	0	0	0%	0%	75%	0%	0%	75%	90	0%	75%	17	45
7-8 AM	94	0	53	147	103	51	0	0	94	53	159	281	0	0	0%	0%	75%	0%	0%	75%	135	0%	75%	40	107
8-9 AM	66	0	37	104	73	36	0	0	66	37	112	199	0	0	0%	0%	75%	0%	0%	75%	127	0%	75%	28	76
9-10 AM	44	0	25	70	49	24	0	0	44	25	75	133	0	0	0%	0%	75%	0%	0%	75%	122	0%	75%	19	51
10-11 AM	31	0	18	49	34	17	0	0	31	18	53	94	0	0	0%	0%	75%	0%	0%	75%	141	0%	75%	13	36
11-12 Noon	36	0	20	56	39	20	0	0	36	20	61	108	0	0	0%	0%	75%	0%	0%	75%	159	0%	75%	15	41
12-1 PM	49	0	28	77	54	27	0	0	49	28	83	147	0	0	0%	0%	75%	0%	0%	75%	223	0%	75%	21	56
1-2 PM	32	0	18	50	35	18	0	0	32	18	54	96	0	0	0%	0%	75%	0%	0%	75%	226	0%	75%	14	37
2-3 PM	34	0	19	52	37	18	0	0	34	19	57	101	0	0	0%	0%	75%	0%	0%	75%	299	0%	75%	14	38
3-4 PM	34	0	19	54	38	19	0	0	34	19	58	103	0	0	0%	0%	75%	0%	0%	75%	484	5%	70%	14	40
4-5 PM	48	0	27	74	52	26	0	0	48	27	81	143	0	0	0%	0%	75%	0%	0%	75%	619	15%	60%	16	58
5-6 PM	47	0	26	73	51	26	0	0	47	26	79	140	0	0	0%	0%	75%	0%	0%	75%	541	10%	65%	17	56
6-7 PM	44	0	25	68	48	24	0	0	44	25	74	131	0	0	0%	0%	75%	0%	0%	75%	379	0%	75%	19	50
7-8 PM	34	0	19	52	37	18	0	0	34	19	57	101	0	0	0%	0%	75%	0%	0%	75%	260	0%	75%	14	38
8-9 PM	27	0	15	42	29	15	0	0	27	15	45	80	0	0	0%	0%	75%	0%	0%	75%	181	0%	75%	11	30

TABLE - EB Right Reduction at Prop. Hawthorne Pkwy. & Jackson Pike (SR 104) (Ref. #1)

Signal Warrant #1 Worksheet (Ref. #1)

Prop. Hawthorne Pkwy. & Jackson Pike (SR 104)

2019 Residential 'Build' Traffic

Speed Limit on Jackson Pike (Sr 104): 50 MPH (Community Population >10,000)

CONDITION	# OF LANES	JACKSON PIKE (SR 104) MAJOR STREET Existing NB	Existing SB	Growth NB	Growth SB	Site NB	Site SB	Total NB	Total SB	Total 2-WAY	PROP. HAWTHORNE PKWY. MINOR STREET Existing EB	Growth EB	Site EB	Right Turn Reduction EB	Total EB	MAX 1-WAY
Warrant	1															
Warrant	2															
70% Warrant	1									X						
70% Warrant	2															X
6-7 AM		462	87	15	3	5	9	482	98	**580**	0	0	62	-17	45	**45**
7-8 AM		596	131	19	4	13	23	628	158	**786**	0	0	147	-40	107	**107**
8-9 AM		390	123	12	4	19	34	422	161	**583**	0	0	104	-28	76	**76**
9-10 AM		238	118	8	4	17	31	263	152	**415**	0	0	70	-19	51	**51**
10-11 AM		213	137	7	4	18	32	238	174	**411**	0	0	49	-13	36	**36**
11-12 Noon		195	154	6	5	22	38	223	197	**420**	0	0	56	-15	41	**41**
12-1 PM		211	216	7	7	21	38	239	261	**500**	0	0	77	-21	56	**56**
1-2 PM		171	219	5	7	18	31	194	257	**452**	0	0	50	-14	37	**37**
2-3 PM		207	290	7	9	21	37	234	336	**571**	0	0	52	-14	38	**38**
3-4 PM		215	469	7	15	27	48	249	532	**781**	0	0	54	-14	40	**40**
4-5 PM		273	600	9	19	29	52	311	671	**982**	0	0	74	-16	58	**58**
5-6 PM		282	524	9	17	46	82	337	623	**961**	0	0	73	-17	56	**56**
6-7 PM		207	367	7	12	34	60	248	439	**687**	0	0	68	-19	50	**50**
7-8 PM		101	252	3	8	33	58	137	318	**455**	0	0	52	-14	38	**38**
8-9 PM		76	175	2	6	31	55	109	235	**345**	0	0	42	-11	30	**30**
														WARRANT STATUS		

WARRANT #1 - CONDITION A MAJOR 100%	MAJOR 80%	MINOR 100%	MINOR 80%	WARRANT #1 - CONDITION B MAJOR 100%	MAJOR 80%	MINOR 100%	MINOR 80%
500	400	150	120	750	600	75	60
600	480	200	160	900	720	100	80
350	**280**	105	84	**525**	**420**	53	42
420	336	**140**	**112**	630	504	**70**	**56**
YES	YES	NO	NO	YES	YES	NO	NO
YES	YES	NO	NO	YES	YES	YES	YES
YES	YES	NO	NO	YES	YES	YES	YES
YES	YES	NO	NO	NO	NO	NO	NO
YES	YES	NO	NO	NO	NO	NO	NO
YES	YES	NO	NO	NO	YES	NO	NO
YES	YES	NO	NO	NO	YES	NO	YES
YES	YES	NO	NO	NO	YES	NO	NO
YES	YES	NO	NO	YES	YES	NO	NO
YES	YES	NO	NO	YES	YES	NO	NO
YES	YES	NO	NO	YES	YES	NO	YES
YES	YES	NO	NO	YES	YES	NO	YES
YES	YES	NO	NO	YES	YES	NO	NO
YES	YES	NO	NO	NO	YES	NO	NO
NO	YES	NO	NO	NO	NO	NO	NO
0 Hours Met (8 Required) CONDITION NOT MET				**2 Hours Met (8 Required) CONDITION NOT MET**			

WARRANT #1 - COMBINATION OF 80% CONDITION A & 80% CONDITION B
WARRANT STATUS: **0 Hours Met (8 Required) CONDITION NOT MET**

WARRANT #1 : NOT MET

NOTE(S)

Existing traffic component on Jackson Pike (Sr 104) is based on count taken 12/12/2017.

Right turn reduction based on ODOT TEM 402-5 with exception that all approach traffic was considered for mainline congestion factor.
A growth factor of 1.032 was applied to the existing Jackson Pike (Sr 104) counts.

Prepared By:

SMART SERVICES, INC.

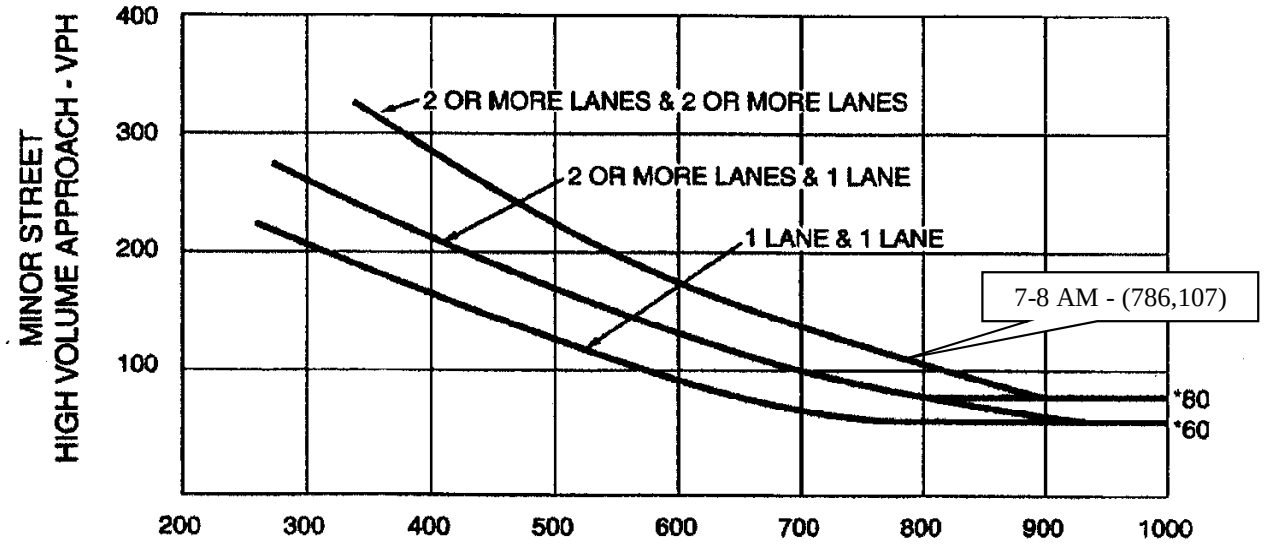
REV. 1
9/2018

Appendix

Signal Warrant 2 (Ref. #1)

Prop. Hawthorne Pkwy. & Jackson Pike (SR 104)
2019 Residential 'Build' Traffic

Figure 4C-2. Warrant 2, Four-Hour Vehicular Volume (70% Factor)
(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 70 km/h (40 mph) ON MAJOR STREET)



MAJOR STREET—TOTAL OF BOTH APPROACHES—
VEHICLES PER HOUR (VPH)

*Note: 80 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 60 vph applies as the lower threshold volume for a minor-street approach with one lane.

Lanes	Time	Major Street Volume (2-Way)	Minor Street Volume (1-Way)	Criteria Met in Hour	Warrant Result
1 Lane & 2 Or More	6-7 AM	580	45	NO	NOT MET
	7-8 AM	786	107	YES	
	8-9 AM	583	76	NO	
	9-10 AM	415	51	NO	
	10-11 AM	411	36	NO	
	11-12 Noon	420	41	NO	
	12-1 PM	500	56	NO	
	1-2 PM	452	37	NO	
	2-3 PM	571	38	NO	
	3-4 PM	781	40	NO	
	4-5 PM	982	58	NO	
	5-6 PM	961	56	NO	
	6-7 PM	687	50	NO	
	7-8 PM	455	38	NO	
	8-9 PM	345	30	NO	

NOTE(S)

Existing traffic component on Jackson Pike (Sr 104) is based on count taken 12/12/2017.

Right turn reduction based on ODOT TEM 402-5 with exception that all approach traffic was considered for mainline congestion factor.
A growth factor of 1.032 was applied to the existing Jackson Pike (Sr 104) counts.

Hour	EB				Calculation Parameters										Minor Street Configurations					Base Right Turn Reduction	Mainline Approach Volume per Lane	Mainline Congestion Factor	Adjusted Right Turn Reduction	Right Turn Reduction	Adjusted Minor Street Volume
	Lane Configuration = 3																				SB				
	Left (L)	Thru (T)	Right (R)	(A) Total	0.7A	0.35A	3T	T/3	T+L	T+R	3R	3L	T/2	T/4	1	2	3	4	5		Approach				
6-7 AM	40	0	30	70	49	25	0	0	40	30	90	121	0	0	0%	0%	75%	0%	0%	75%	104	0%	75%	22	48
7-8 AM	95	0	70	165	116	58	0	0	95	70	211	285	0	0	0%	0%	75%	0%	0%	75%	156	0%	75%	53	113
8-9 AM	67	0	50	117	82	41	0	0	67	50	150	202	0	0	0%	0%	75%	0%	0%	75%	147	0%	75%	37	80
9-10 AM	45	0	33	79	55	27	0	0	45	33	100	135	0	0	0%	0%	75%	0%	0%	75%	141	0%	75%	25	53
10-11 AM	32	0	23	55	39	19	0	0	32	23	70	95	0	0	0%	0%	75%	0%	0%	75%	163	0%	75%	18	38
11-12 Noon	36	0	27	63	44	22	0	0	36	27	81	109	0	0	0%	0%	75%	0%	0%	75%	184	0%	75%	20	43
12-1 PM	50	0	37	87	61	30	0	0	50	37	111	150	0	0	0%	0%	75%	0%	0%	75%	257	0%	75%	28	59
1-2 PM	32	0	24	56	40	20	0	0	32	24	72	97	0	0	0%	0%	75%	0%	0%	75%	261	0%	75%	18	38
2-3 PM	34	0	25	59	41	21	0	0	34	25	76	102	0	0	0%	0%	75%	0%	0%	75%	346	0%	75%	19	40
3-4 PM	35	0	26	61	42	21	0	0	35	26	77	104	0	0	0%	0%	75%	0%	0%	75%	559	10%	65%	17	44
4-5 PM	48	0	36	84	59	29	0	0	48	36	107	145	0	0	0%	0%	75%	0%	0%	75%	715	20%	55%	20	64
5-6 PM	47	0	35	83	58	29	0	0	47	35	106	142	0	0	0%	0%	75%	0%	0%	75%	625	15%	60%	21	62
6-7 PM	44	0	33	77	54	27	0	0	44	33	99	133	0	0	0%	0%	75%	0%	0%	75%	437	5%	70%	23	54
7-8 PM	34	0	25	59	41	21	0	0	34	25	76	102	0	0	0%	0%	75%	0%	0%	75%	300	0%	75%	19	40
8-9 PM	27	0	20	47	33	16	0	0	27	20	60	81	0	0	0%	0%	75%	0%	0%	75%	209	0%	75%	15	32

TABLE - EB Right Reduction at Prop. Hawthorne Pkwy. & Jackson Pike (SR 104) (Ref. #2)

Signal Warrant #1 Worksheet (Ref. #2)

Prop. Hawthorne Pkwy. & Jackson Pike (SR 104)

2029 Residential 'Build' Traffic

Speed Limit on Jackson Pike (Sr 104): 50 MPH (Community Population >10,000)

CONDITION	# OF LANES	JACKSON PIKE (SR 104) MAJOR STREET Existing NB	Existing SB	Site NB	Site SB	Total NB	Total SB	Total 2-WAY	PROP. HAWTHORNE PKWY. MINOR STREET Existing EB	Growth EB	Site EB	Right Turn Reduction EB	Total EB	MAX 1-WAY	WARRANT #1 - CONDITION A MAJOR		MINOR		WARRANT #1 - CONDITION B MAJOR		MINOR	
															100%	80%	100%	80%	100%	80%	100%	80%
Warrant	1														500	400	150	120	750	600	75	60
Warrant	2														600	480	200	160	900	720	100	80
70% Warrant	1							X							**350**	**280**	105	84	**525**	**420**	53	42
70% Warrant	2													X	420	336	**140**	**112**	630	504	**70**	**56**
6-7 AM		462	87	6	9	557	112	**670**	0	0	70	-22	48	**48**	YES	YES	NO	NO	YES	YES	NO	NO
7-8 AM		596	131	17	23	728	179	**907**	0	0	165	-53	113	**113**	YES	YES	NO	YES	YES	YES	YES	YES
8-9 AM		390	123	26	35	491	182	**672**	0	0	117	-37	80	**80**	YES	YES	NO	NO	YES	YES	YES	YES
9-10 AM		238	118	23	31	307	172	**478**	0	0	79	-25	53	**53**	YES	YES	NO	NO	NO	YES	NO	NO
10-11 AM		213	137	24	33	278	196	**474**	0	0	55	-18	38	**38**	YES	YES	NO	NO	NO	YES	NO	NO
11-12 Noon		195	154	29	39	261	223	**484**	0	0	63	-20	43	**43**	YES	YES	NO	NO	NO	YES	NO	NO
12-1 PM		211	216	28	38	280	296	**575**	0	0	87	-28	59	**59**	YES	YES	NO	NO	YES	YES	NO	YES
1-2 PM		171	219	24	32	227	293	**520**	0	0	56	-18	38	**38**	YES	YES	NO	NO	NO	YES	NO	NO
2-3 PM		207	290	28	37	274	383	**658**	0	0	59	-19	40	**40**	YES	YES	NO	NO	YES	YES	NO	NO
3-4 PM		215	469	36	48	292	608	**900**	0	0	61	-17	44	**44**	YES	YES	NO	NO	YES	YES	NO	NO
4-5 PM		273	600	39	52	364	768	**1132**	0	0	84	-20	64	**64**	YES	YES	NO	NO	YES	YES	NO	YES
5-6 PM		282	524	62	83	398	708	**1106**	0	0	83	-21	62	**62**	YES	YES	NO	NO	YES	YES	NO	YES
6-7 PM		207	367	45	61	292	499	**791**	0	0	77	-23	54	**54**	YES	YES	NO	NO	YES	YES	NO	NO
7-8 PM		101	252	44	59	164	359	**523**	0	0	59	-19	40	**40**	YES	YES	NO	NO	NO	YES	NO	NO
8-9 PM		76	175	41	56	132	264	**396**	0	0	47	-15	32	**32**	YES	YES	NO	NO	NO	NO	NO	NO
													WARRANT STATUS		**0 Hours Met (8 Required) CONDITION NOT MET**				**2 Hours Met (8 Required) CONDITION NOT MET**			

	WARRANT #1 - COMBINATION OF 80% CONDITION A & 80% CONDITION B
WARRANT STATUS	**1 Hours Met (8 Required) CONDITION NOT MET**

WARRANT #1 : NOT MET

NOTE(S)

Existing traffic component on Jackson Pike (Sr 104) is based on count taken 12/12/2017.

Right turn reduction based on ODOT TEM 402-5 with exception that all approach traffic was considered for mainline congestion factor.
A growth factor of 1.192 was applied to the existing Jackson Pike (Sr 104) counts.

Prepared By:

SMART SERVICES, INC.

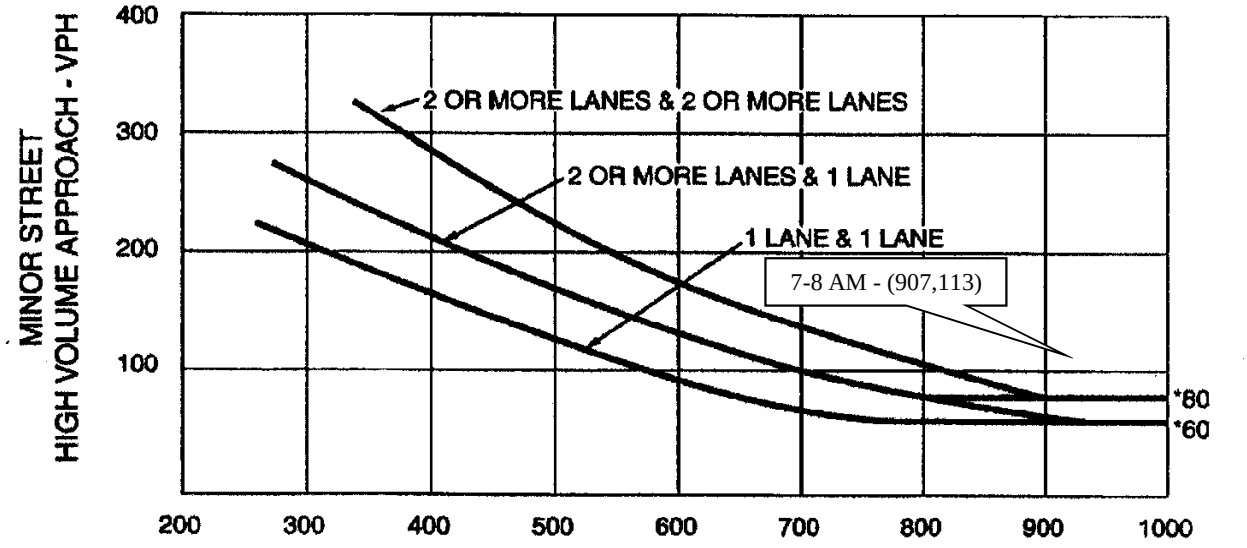
REV. 1
9/2018

Appendix

Signal Warrant 2 (Ref. #2)

Prop. Hawthorne Pkwy. & Jackson Pike (SR 104)
2029 Residential 'Build' Traffic

Figure 4C-2. Warrant 2, Four-Hour Vehicular Volume (70% Factor)
(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 70 km/h (40 mph) ON MAJOR STREET)



MAJOR STREET—TOTAL OF BOTH APPROACHES—
VEHICLES PER HOUR (VPH)

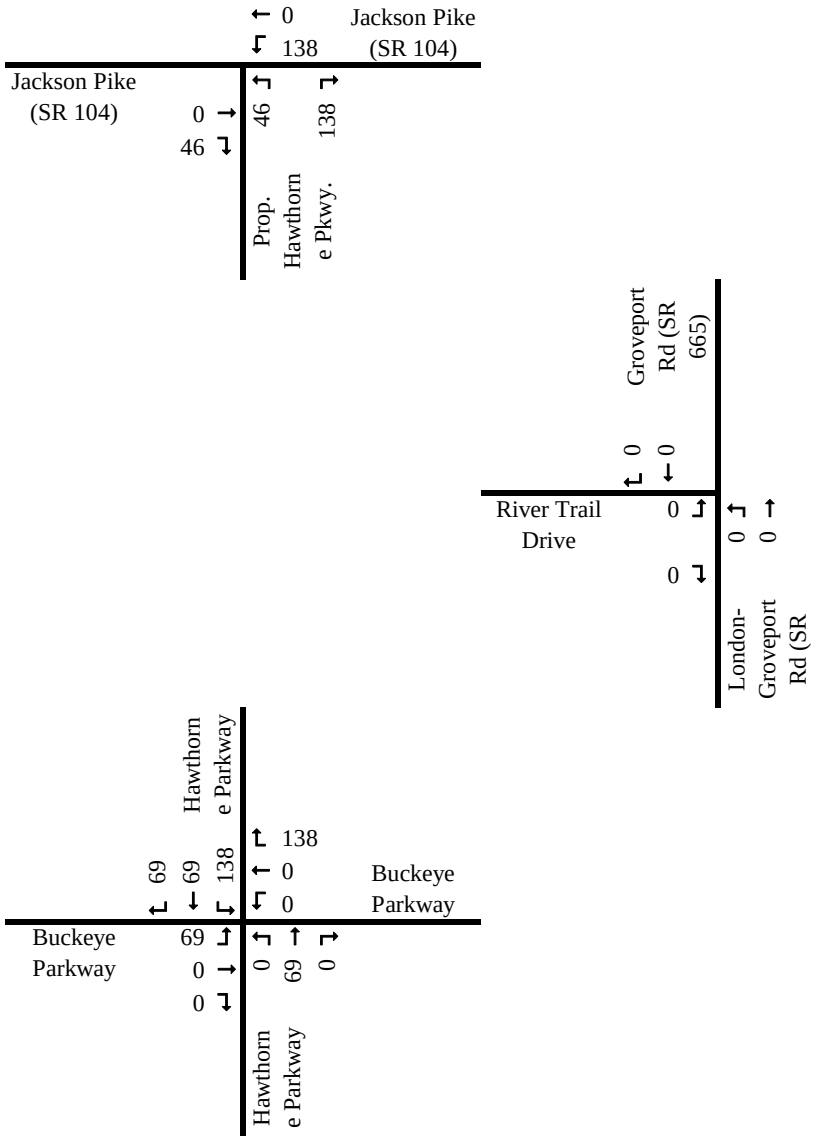
*Note: 80 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 60 vph applies as the lower threshold volume for a minor-street approach with one lane.

Lanes	Time	Major Street Volume (2-Way)	Minor Street Volume (1-Way)	Criteria Met in Hour	Warrant Result
1 Lane & 2 Or More	6-7 AM	670	48	NO	NOT MET
	7-8 AM	907	113	YES	
	8-9 AM	672	80	NO	
	9-10 AM	478	53	NO	
	10-11 AM	474	38	NO	
	11-12 Noon	484	43	NO	
	12-1 PM	575	59	NO	
	1-2 PM	520	38	NO	
	2-3 PM	658	40	NO	
	3-4 PM	900	44	NO	
	4-5 PM	1132	64	NO	
	5-6 PM	1106	62	NO	
	6-7 PM	791	54	NO	
	7-8 PM	523	40	NO	
	8-9 PM	396	32	NO	

NOTE(S)

Existing traffic component on Jackson Pike (Sr 104) is based on count taken 12/12/2017.

Right turn reduction based on ODOT TEM 402-5 with exception that all approach traffic was considered for mainline congestion factor.
A growth factor of 1.192 was applied to the existing Jackson Pike (Sr 104) counts.



FARMSTEAD
TRAFFIC IMPACT STUDY

PREPARED BY: SMART SERVICES, INC. REV. 1 9/2018

APPENDIX EXHIBIT

SCHOOL SITE GENERATED TRAFFIC - DAILY

Time	Residential Source: *Locust Curve Drive - Delaware, Ohio*										School Source: *Portsmouth West Middle School - Scioto County*										TOTAL DAILY DISTRIBUTION			
	% of 24 Hour Entering (Weekday)	% of 24 Hour Exiting (Weekday)	Volume Entering (Weekday)				Volume Exiting (Weekday)				% of 24 Hour Entering (Weekday)	% of 24 Hour Exiting (Weekday)	Volume Entering (Weekday)				Volume Exiting (Weekday)				Volume			
			NB	SB	EB		NB	SB	EB				NB	SB	EB		NB	SB	EB		NB	SB	EB	
					LT	RT			LT	RT					LT	RT			LT	RT			LT	RT
			393	696	0	0	0	0	696	393			138	46	0	0	0	0	46	138	531	742	742	531
000	0.2%	0.1%	1	2	0	0	0	0	1	0	0.0%	0.0%	0	0	0	0	0	0	0	0	1	2	1	0
100	0.3%	0.0%	1	2	0	0	0	0	0	0	0.3%	0.3%	0	0	0	0	0	0	0	0	2	2	0	0
200	0.5%	0.1%	2	3	0	0	0	0	1	0	0.0%	0.0%	0	0	0	0	0	0	0	0	2	3	1	0
300	0.2%	0.1%	1	2	0	0	0	0	1	0	0.0%	0.0%	0	0	0	0	0	0	0	0	1	2	1	0
400	0.0%	0.3%	0	0	0	0	0	0	2	1	0.0%	0.0%	0	0	0	0	0	0	0	0	0	0	2	1
500	0.1%	1.5%	0	1	0	0	0	0	10	6	0.5%	0.0%	1	0	0	0	0	0	0	0	1	1	10	6
600	1.2%	5.7%	5	9	0	0	0	0	40	22	10.4%	7.6%	14	5	0	0	0	0	4	11	19	13	43	33
700	3.3%	13.5%	13	23	0	0	0	0	94	53	42.8%	31.3%	59	20	0	0	0	0	14	43	72	42	108	96
800	5.0%	9.5%	19	34	0	0	0	0	66	37	2.5%	3.1%	3	1	0	0	0	0	1	4	23	36	68	42
900	4.4%	6.4%	17	31	0	0	0	0	44	25	0.8%	2.5%	1	0	0	0	0	0	1	4	18	31	46	29
1000	4.6%	4.5%	18	32	0	0	0	0	31	18	2.5%	1.5%	3	1	0	0	0	0	1	2	22	33	32	20
1100	5.5%	5.2%	22	38	0	0	0	0	36	20	1.5%	2.3%	2	1	0	0	0	0	1	3	24	39	37	23
1200	5.4%	7.1%	21	38	0	0	0	0	49	28	1.8%	2.8%	2	1	0	0	0	0	1	4	24	38	50	32
1300	4.5%	4.6%	18	31	0	0	0	0	32	18	2.8%	3.3%	4	1	0	0	0	0	2	5	22	33	34	23
1400	5.3%	4.8%	21	37	0	0	0	0	34	19	15.9%	18.6%	22	7	0	0	0	0	9	26	43	44	42	45
1500	6.9%	4.9%	27	48	0	0	0	0	34	19	3.8%	9.9%	5	2	0	0	0	0	5	14	32	50	39	33
1600	7.4%	6.8%	29	52	0	0	0	0	48	27	6.6%	5.9%	9	3	0	0	0	0	3	8	38	55	50	35
1700	11.8%	6.7%	46	82	0	0	0	0	47	26	3.0%	1.8%	4	1	0	0	0	0	1	2	51	84	48	29
1800	8.7%	6.3%	34	60	0	0	0	0	44	25	3.5%	5.1%	5	2	0	0	0	0	2	7	39	62	46	32
1900	8.3%	4.8%	33	58	0	0	0	0	34	19	1.0%	4.1%	1	0	0	0	0	0	2	6	34	58	35	25
2000	7.9%	3.8%	31	55	0	0	0	0	27	15	0.0%	0.0%	0	0	0	0	0	0	0	0	31	55	27	15
2100	4.6%	2.0%	18	32	0	0	0	0	14	8	0.0%	0.0%	0	0	0	0	0	0	0	0	18	32	14	8
2200	2.8%	1.1%	11	20	0	0	0	0	8	4	0.0%	0.0%	0	0	0	0	0	0	0	0	11	20	8	4
2300	1.0%	0.1%	4	7	0	0	0	0	1	0	0.3%	0.0%	0	0	0	0	0	0	0	0	4	7	1	0
TOTAL	100.00%	100.0%	393	696	0	0	0	0	696	393	100.00%	100.0%	138	46	0	0	0	0	46	138	531	742	742	531

TABLE - Daily Site Traffic Distribution-Prop. Hawthorne Pkwy. & Jackson Pike (SR 104) (Ref. #3)

Hour	EB				Calculation Parameters										Minor Street Configurations					Base Right Turn Reduction	Mainline Approach Volume per Lane	Mainline Congestion Factor	Adjusted Right Turn Reduction	Right Turn Reduction	Adjusted Minor Street Volume
	Lane Configuration = 3																				SB				
	Left (L)	Thru (T)	Right (R)	(A) Total	0.7A	0.35A	3T	T/3	T+L	T+R	3R	3L	T/2	T/4	1	2	3	4	5		Approach				
6-7 AM	43	0	33	76	53	27	0	0	43	33	99	130	0	0	0%	0%	75%	0%	0%	75%	118	0%	75%	25	52
7-8 AM	108	0	96	204	143	71	0	0	108	96	288	324	0	0	0%	0%	75%	0%	0%	75%	177	0%	75%	72	132
8-9 AM	68	0	42	109	77	38	0	0	68	42	125	203	0	0	0%	0%	75%	0%	0%	75%	166	0%	75%	31	78
9-10 AM	46	0	29	74	52	26	0	0	46	29	86	137	0	0	0%	0%	75%	0%	0%	75%	160	0%	75%	21	53
10-11 AM	32	0	20	52	36	18	0	0	32	20	59	96	0	0	0%	0%	75%	0%	0%	75%	185	0%	75%	15	37
11-12 Noon	37	0	23	60	42	21	0	0	37	23	70	111	0	0	0%	0%	75%	0%	0%	75%	208	0%	75%	18	43
12-1 PM	50	0	32	82	57	29	0	0	50	32	95	151	0	0	0%	0%	75%	0%	0%	75%	292	0%	75%	24	58
1-2 PM	34	0	23	56	39	20	0	0	34	23	68	101	0	0	0%	0%	75%	0%	0%	75%	296	0%	75%	17	39
2-3 PM	42	0	45	87	61	30	0	0	42	45	134	126	0	0	0%	0%	75%	0%	0%	75%	392	0%	75%	33	53
3-4 PM	39	0	33	72	50	25	0	0	39	33	99	117	0	0	0%	0%	75%	0%	0%	75%	634	15%	60%	20	52
4-5 PM	50	0	35	85	60	30	0	0	50	35	105	151	0	0	0%	0%	75%	0%	0%	75%	811	25%	50%	17	68
5-6 PM	48	0	29	77	54	27	0	0	48	29	87	143	0	0	0%	0%	75%	0%	0%	75%	708	20%	55%	16	61
6-7 PM	46	0	32	78	54	27	0	0	46	32	95	138	0	0	0%	0%	75%	0%	0%	75%	496	5%	70%	22	56
7-8 PM	35	0	25	60	42	21	0	0	35	25	74	106	0	0	0%	0%	75%	0%	0%	75%	341	0%	75%	18	42
8-9 PM	27	0	15	42	29	15	0	0	27	15	45	80	0	0	0%	0%	75%	0%	0%	75%	237	0%	75%	11	30

TABLE - EB Right Reduction at Prop. Hawthorne Pkwy. & Jackson Pike (SR 104) (Ref. #3)

Signal Warrant #1 Worksheet (Ref. #3)

Prop. Hawthorne Pkwy. & Jackson Pike (SR 104)

2039 Residential & School 'Build' Traffic

Speed Limit on Jackson Pike (Sr 104): 50 MPH (Community Population >10,000)

CONDITION	# OF LANES	JACKSON PIKE (SR 104) MAJOR STREET Existing NB	Existing SB	Growth NB	Growth SB	Site NB	Site SB	Total NB	Total SB	Total 2-WAY	PROP. HAWTHORNE PKWY. MINOR STREET Existing EB	Growth EB	Site EB	Right Turn Reduction EB	Total EB	MAX 1-WAY	WARRANT #1 - CONDITION A MAJOR		MINOR		WARRANT #1 - CONDITION B MAJOR		MINOR	
																	100%	80%	100%	80%	100%	80%	100%	80%
Warrant	1																500	400	150	120	750	600	75	60
Warrant	2																600	480	200	160	900	720	100	80
70% Warrant	1									X							**350**	**280**	105	84	**525**	**420**	53	42
70% Warrant	2															X	420	336	**140**	**112**	630	504	**70**	**56**
6-7 AM		462	87	163	31	19	13	644	131	**775**	0	0	76	-25	52	**52**	YES	YES	NO	NO	YES	YES	NO	NO
7-8 AM		596	131	210	46	72	42	878	220	**1097**	0	0	204	-72	132	**132**	YES	YES	NO	YES	YES	YES	YES	YES
8-9 AM		390	123	137	43	23	36	550	202	**752**	0	0	109	-31	78	**78**	YES	YES	NO	NO	YES	YES	YES	YES
9-10 AM		238	118	84	42	18	31	340	190	**531**	0	0	74	-21	53	**53**	YES	YES	NO	NO	YES	YES	NO	NO
10-11 AM		213	137	75	48	22	33	310	219	**528**	0	0	52	-15	37	**37**	YES	YES	NO	NO	YES	YES	NO	NO
11-12 Noon		195	154	69	54	24	39	287	247	**535**	0	0	60	-18	43	**43**	YES	YES	NO	NO	YES	YES	NO	NO
12-1 PM		211	216	74	76	24	38	309	330	**639**	0	0	82	-24	58	**58**	YES	YES	NO	NO	YES	YES	NO	YES
1-2 PM		171	219	60	77	22	33	253	329	**581**	0	0	56	-17	39	**39**	YES	YES	NO	NO	YES	YES	NO	NO
2-3 PM		207	290	73	102	43	44	323	436	**759**	0	0	87	-33	53	**53**	YES	YES	NO	NO	YES	YES	NO	NO
3-4 PM		215	469	76	165	32	50	323	684	**1007**	0	0	72	-20	52	**52**	YES	YES	NO	NO	YES	YES	NO	NO
4-5 PM		273	600	96	211	38	55	407	866	**1273**	0	0	85	-17	68	**68**	YES	YES	NO	NO	YES	YES	NO	YES
5-6 PM		282	524	99	184	51	84	432	792	**1224**	0	0	77	-16	61	**61**	YES	YES	NO	NO	YES	YES	NO	YES
6-7 PM		207	367	73	129	39	62	319	558	**877**	0	0	78	-22	56	**56**	YES	YES	NO	NO	YES	YES	NO	YES
7-8 PM		101	252	36	89	34	58	171	399	**570**	0	0	60	-18	42	**42**	YES	YES	NO	NO	YES	YES	NO	NO
8-9 PM		76	175	27	62	31	55	134	291	**425**	0	0	42	-11	30	**30**	YES	YES	NO	NO	NO	YES	NO	NO
															WARRANT STATUS		**0 Hours Met (8 Required) CONDITION NOT MET**				**2 Hours Met (8 Required) CONDITION NOT MET**			

	WARRANT #1 - COMBINATION OF 80% CONDITION A & 80% CONDITION B
WARRANT STATUS	**1 Hours Met (8 Required) CONDITION NOT MET**

WARRANT #1 : NOT MET

NOTE(S)

Existing traffic component on Jackson Pike (Sr 104) is based on count taken 12/12/2017.

Right turn reduction based on ODOT TEM 402-5 with exception that all approach traffic was considered for mainline congestion factor.
A growth factor of 1.352 was applied to the existing Jackson Pike (Sr 104) counts.

Prepared By:

SMART SERVICES, INC.

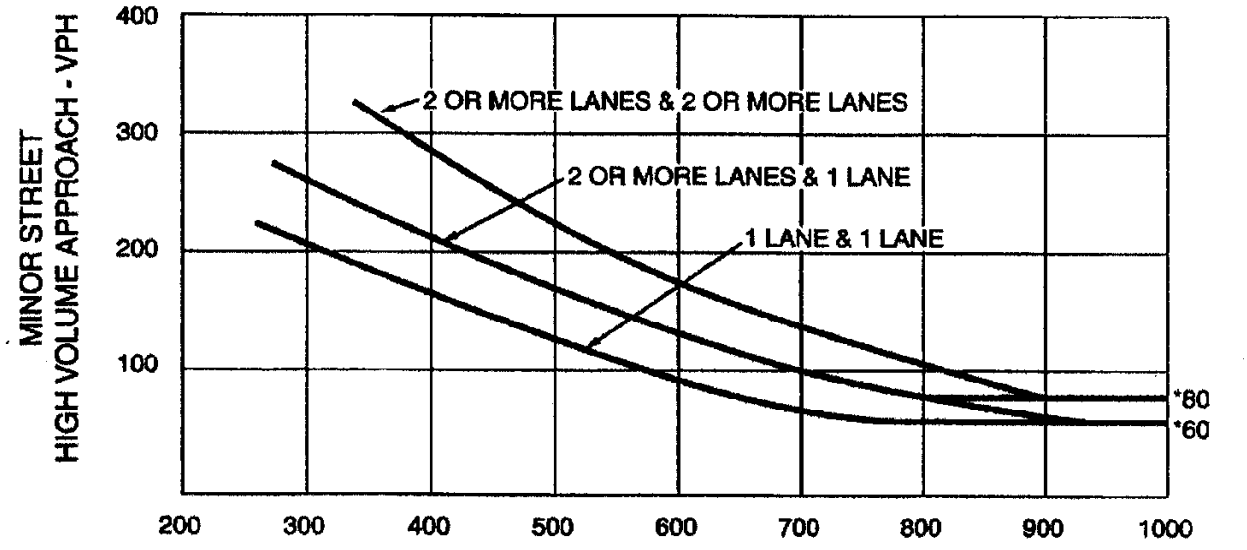
REV. 1
9/2018

Appendix

Signal Warrant 2 (Ref. #3)

Prop. Hawthorne Pkwy. & Jackson Pike (SR 104)
2039 Residential & School 'Build' Traffic

Figure 4C-2. Warrant 2, Four-Hour Vehicular Volume (70% Factor)
(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 70 km/h (40 mph) ON MAJOR STREET)



*Note: 80 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 60 vph applies as the lower threshold volume for a minor-street approach with one lane.

Lanes	Time	Major Street Volume (2-Way)	Minor Street Volume (1-Way)	Criteria Met in Hour	Warrant Result
1 Lane & 2 Or More	6-7 AM	775	52	NO	NOT MET
	7-8 AM	1097	132	YES	
	8-9 AM	752	78	NO	
	9-10 AM	531	53	NO	
	10-11 AM	528	37	NO	
	11-12 Noon	535	43	NO	
	12-1 PM	639	58	NO	
	1-2 PM	581	39	NO	
	2-3 PM	759	53	NO	
	3-4 PM	1007	52	NO	
	4-5 PM	1273	68	NO	
	5-6 PM	1224	61	NO	
	6-7 PM	877	56	NO	
	7-8 PM	570	42	NO	
	8-9 PM	425	30	NO	

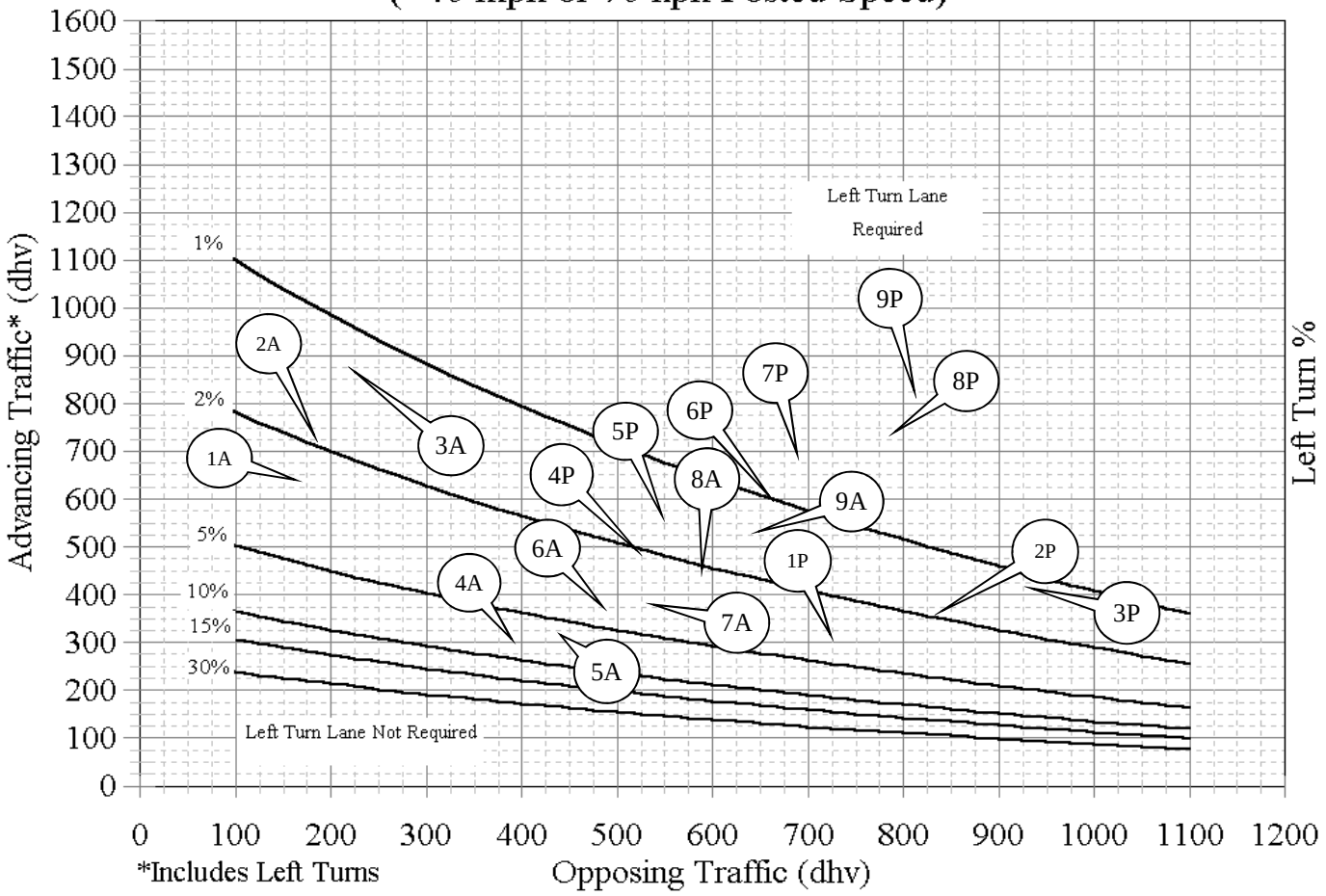
NOTE(S)

Existing traffic component on Jackson Pike (Sr 104) is based on count taken 12/12/2017.

Right turn reduction based on ODOT TEM 402-5 with exception that all approach traffic was considered for mainline congestion factor.
A growth factor of 1.352 was applied to the existing Jackson Pike (Sr 104) counts.

2-Lane Highway Left Turn Lane Warrant

(>40 mph or 70 kph Posted Speed)



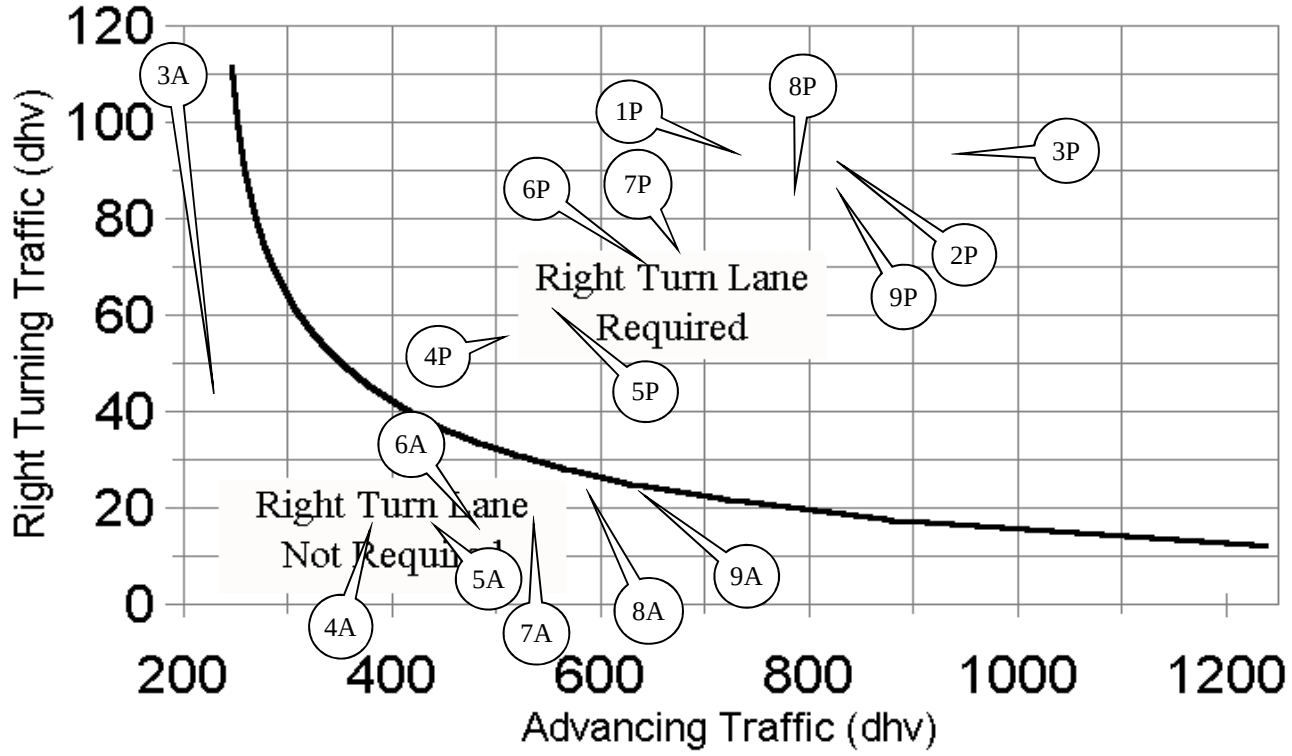
WARRANT SUMMARY

ID	INTERSECTION [MOVEMENT] - VOLUME SET	AM PEAK (A)	PM PEAK (P)		RESULT
1	**Prop. Hawthorne Pkwy. & Jackson Pike (SR 104) [NB LT] - 2019 RESIDENTIAL 'BUILD'**	**(164,630 / 2.4%)**	**(733,320 / 15.9%)**		**MET**
2	**Prop. Hawthorne Pkwy. & Jackson Pike (SR 104) [NB LT] - 2029 RESIDENTIAL 'BUILD'**	**(185,725 / 2.1%)**	**(832,362 / 14.1%)**		**MET**
3	**Prop. Hawthorne Pkwy. & Jackson Pike (SR 104) [NB LT] - 2039 RESIDENTIAL & SCHOOL 'BUILD' W/ DIVERTED**	**(222,874 / 7.8%)**	**(931,415 / 14.9%)**		**MET**
4	**London-Groveport Rd (SR 665) & Buckeye Parkway [EB LT] - 2019 'NO BUILD'**	(391,295 / 3.7%)	**(519,481 / 13.5%)**		**MET**
5	**London-Groveport Rd (SR 665) & Buckeye Parkway [EB LT] - 2019 RESIDENTIAL 'BUILD'**	(440,319 / 5.6%)	**(556,558 / 15.9%)**		**MET**
6	**London-Groveport Rd (SR 665) & Buckeye Parkway [EB LT] - 2029 'NO BUILD'**	(491,369 / 3.5%)	**(651,605 / 13.6%)**		**MET**
7	**London-Groveport Rd (SR 665) & Buckeye Parkway [EB LT] - 2029 RESIDENTIAL 'BUILD'**	**(540,393 / 5.1%)**	**(688,682 / 15.5%)**		**MET**
8	**London-Groveport Rd (SR 665) & Buckeye Parkway [EB LT] - 2039 'NO BUILD'**	**(592,445 / 3.6%)**	**(784,729 / 13.6%)**		**MET**
9	**London-Groveport Rd (SR 665) & Buckeye Parkway [EB LT] - 2039 RESIDENTIAL & SCHOOL 'BUILD'**	**(640,521 / 14.4%)**	**(819,814 / 16.1%)**		**MET**

2-Lane Highway Right Turn Lane Warrant

> 40 mph or 70 kph Posted Speed

Note: Only the volumes within the chart were plotted.



WARRANT SUMMARY

ID	INTERSECTION [MOVEMENT] - VOLUME SET	AM PEAK (A)	PM PEAK (P)		RESULT
1	Prop. Hawthorne Pkwy. & Jackson Pike (SR 104) [SB RT] - 2019 RESIDENTIAL 'BUILD'	(164,29)	**(733,92)**		MET
2	Prop. Hawthorne Pkwy. & Jackson Pike (SR 104) [SB RT] - 2029 RESIDENTIAL 'BUILD'	(185,29)	**(832,92)**		MET
3	Prop. Hawthorne Pkwy. & Jackson Pike (SR 104) [SB RT] - 2039 RESIDENTIAL & SCHOOL 'BUILD'	(222,45)	**(931,91)**		MET
4	London-Groveport Rd (SR 665) & Buckeye Parkway [WB RT] - 2019 'NO BUILD'	(391,14)	**(519,56)**		MET
5	London-Groveport Rd (SR 665) & Buckeye Parkway [WB RT] - 2019 RESIDENTIAL 'BUILD'	(440,16)	**(556,62)**		MET
6	London-Groveport Rd (SR 665) & Buckeye Parkway [WB RT] - 2029 'NO BUILD'	(491,17)	**(651,70)**		MET
7	London-Groveport Rd (SR 665) & Buckeye Parkway [WB RT] - 2029 RESIDENTIAL 'BUILD'	(540,19)	**(688,76)**		MET
8	London-Groveport Rd (SR 665) & Buckeye Parkway [WB RT] - 2039 'NO BUILD'	(592,21)	**(784,84)**		MET
9	London-Groveport Rd (SR 665) & Buckeye Parkway [WB RT] - 2039 RESIDENTIAL & SCHOOL 'BUILD'	(640,22)	**(819,88)**		MET

HCS7 Two-Way Stop-Control Report

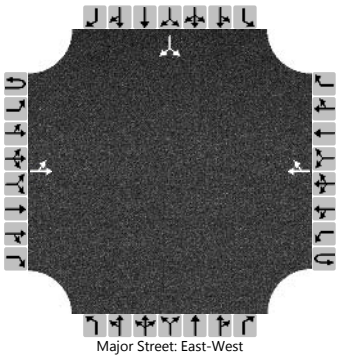
General Information

Analyst	BCK
Agency/Co.	Smart Services Inc.
Date Performed	9/19/2018
Analysis Year	2019
Time Analyzed	AM Peak
Intersection Orientation	East-West
Project Description	2019 No Build AM Peak

Site Information

Intersection	Lndn Grovport & Buckeye
Jurisdiction	City of Grove City
East/West Street	London-Groveport Rd
North/South Street	Buckeye Pkwy
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes


Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	0	0		0	1	0
Configuration		LT						TR							LR	
Volume (veh/h)		11	284				377	14						48		78
Percent Heavy Vehicles (%)		3												3		3
Proportion Time Blocked																
Percent Grade (%)														0		
Right Turn Channelized																
Median Type | Storage																

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1												7.1		6.2
Critical Headway (sec)		4.13												6.43		6.23
Base Follow-Up Headway (sec)		2.2												3.5		3.3
Follow-Up Headway (sec)		2.23												3.53		3.33

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		12													137	
Capacity, c (veh/h)		1128													500	
v/c Ratio		0.01													0.27	
95% Queue Length, Q_{95} (veh)		0.0													1.1	
Control Delay (s/veh)		8.2													14.9	
Level of Service (LOS)		A													B	
Approach Delay (s/veh)		0.4												14.9		
Approach LOS														B		

HCS7 Two-Way Stop-Control Report

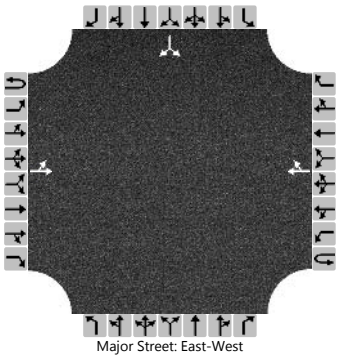
General Information

Analyst	BCK
Agency/Co.	Smart Services Inc.
Date Performed	9/19/2018
Analysis Year	2019
Time Analyzed	PM Peak
Intersection Orientation	East-West
Project Description	2019 No Build PM Peak

Site Information

Intersection	Lndn Grovport & Buckeye
Jurisdiction	City of Grove City
East/West Street	London-Groveport Rd
North/South Street	Buckeye Pkwy
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes


Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	0	0		0	1	0
Configuration		LT						TR							LR	
Volume (veh/h)		65	416				463	56						21		40
Percent Heavy Vehicles (%)		3												3		3
Proportion Time Blocked																
Percent Grade (%)														0		
Right Turn Channelized																
Median Type | Storage																

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1												7.1		6.2
Critical Headway (sec)		4.13												6.43		6.23
Base Follow-Up Headway (sec)		2.2												3.5		3.3
Follow-Up Headway (sec)		2.23												3.53		3.33

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		71													66	
Capacity, c (veh/h)		1001													346	
v/c Ratio		0.07													0.19	
95% Queue Length, Q_{95} (veh)		0.2													0.7	
Control Delay (s/veh)		8.9													17.9	
Level of Service (LOS)		A													C	
Approach Delay (s/veh)		1.9												17.9		
Approach LOS														C		

HCS7 Two-Way Stop-Control Report

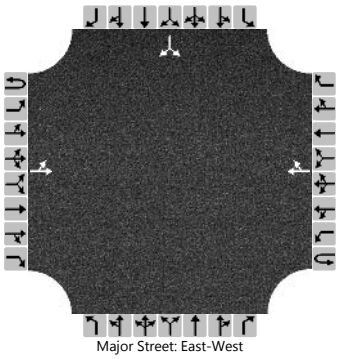
General Information

Analyst	BCK
Agency/Co.	Smart Services Inc.
Date Performed	9/19/2018
Analysis Year	2019
Time Analyzed	AM Peak
Intersection Orientation	East-West
Project Description	2019 Residential Build AM Peak

Site Information

Intersection	Lndn Grovport & Buckeye
Jurisdiction	City of Grove City
East/West Street	London-Groveport Rd
North/South Street	Buckeye Pkwy
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes


Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	0	0		0	1	0
Configuration		LT						TR							LR	
Volume (veh/h)		18	301				424	16						53		99
Percent Heavy Vehicles (%)		3												3		3
Proportion Time Blocked																
Percent Grade (%)														0		
Right Turn Channelized																
Median Type | Storage			Undivided													

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1												7.1		6.2
Critical Headway (sec)		4.13												6.43		6.23
Base Follow-Up Headway (sec)		2.2												3.5		3.3
Follow-Up Headway (sec)		2.23												3.53		3.33

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		20													165	
Capacity, c (veh/h)		1078													462	
v/c Ratio		0.02													0.36	
95% Queue Length, Q_{95} (veh)		0.1													1.6	
Control Delay (s/veh)		8.4													17.1	
Level of Service (LOS)		A													C	
Approach Delay (s/veh)		0.7												17.1		
Approach LOS														C		

HCS7 Two-Way Stop-Control Report

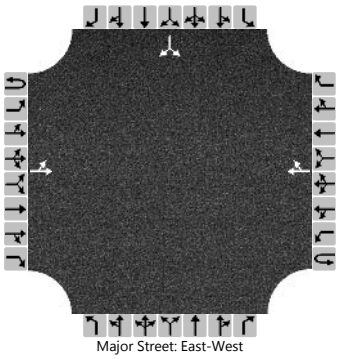
General Information

Analyst	BCK
Agency/Co.	Smart Services Inc.
Date Performed	9/19/2018
Analysis Year	2019
Time Analyzed	PM Peak
Intersection Orientation	East-West
Project Description	2019 Residential Build PM Peak

Site Information

Intersection	Lndn Grovport & Buckeye
Jurisdiction	City of Grove City
East/West Street	London-Groveport Rd
North/South Street	Buckeye Pkwy
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes


Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	0	0		0	1	0
Configuration		LT						TR							LR	
Volume (veh/h)		89	469				494	62						24		54
Percent Heavy Vehicles (%)		3												3		3
Proportion Time Blocked																
Percent Grade (%)														0		
Right Turn Channelized																
Median Type | Storage					Undivided											

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1												7.1		6.2
Critical Headway (sec)		4.13												6.43		6.23
Base Follow-Up Headway (sec)		2.2												3.5		3.3
Follow-Up Headway (sec)		2.23												3.53		3.33

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		97													85	
Capacity, c (veh/h)		967													305	
v/c Ratio		0.10													0.28	
95% Queue Length, Q_{95} (veh)		0.3													1.1	
Control Delay (s/veh)		9.1													21.3	
Level of Service (LOS)		A													C	
Approach Delay (s/veh)		2.5												21.3		
Approach LOS														C		

HCS7 Two-Way Stop-Control Report

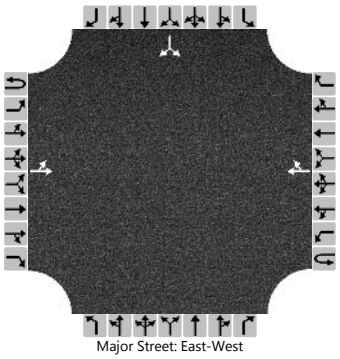
General Information

Analyst	BCK
Agency/Co.	Smart Services Inc.
Date Performed	9/19/2018
Analysis Year	2029
Time Analyzed	AM Peak
Intersection Orientation	East-West
Project Description	2029 No Build AM Peak

Site Information

Intersection	Lndn Grovport & Buckeye
Jurisdiction	City of Grove City
East/West Street	London-Groveport Rd
North/South Street	Buckeye Pkwy
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes


Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	0	0		0	1	0
Configuration		LT						TR							LR	
Volume (veh/h)		13	356				474	17						57		93
Percent Heavy Vehicles (%)		3												3		3
Proportion Time Blocked																
Percent Grade (%)														0		
Right Turn Channelized																
Median Type | Storage					Undivided											

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1												7.1		6.2
Critical Headway (sec)		4.13												6.43		6.23
Base Follow-Up Headway (sec)		2.2												3.5		3.3
Follow-Up Headway (sec)		2.23												3.53		3.33

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		14													163	
Capacity, c (veh/h)		1028													408	
v/c Ratio		0.01													0.40	
95% Queue Length, Q_{95} (veh)		0.0													1.9	
Control Delay (s/veh)		8.6													19.6	
Level of Service (LOS)		A													C	
Approach Delay (s/veh)		0.4												19.6		
Approach LOS														C		

HCS7 Two-Way Stop-Control Report

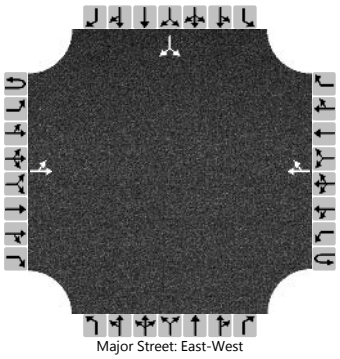
General Information

Analyst	BCK
Agency/Co.	Smart Services Inc.
Date Performed	9/19/2018
Analysis Year	2029
Time Analyzed	PM Peak
Intersection Orientation	East-West
Project Description	2029 No Build PM Peak

Site Information

Intersection	Lndn Grovport & Buckeye
Jurisdiction	City of Grove City
East/West Street	London-Groveport Rd
North/South Street	Buckeye Pkwy
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes


Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	0	0		0	1	0
Configuration		LT						TR							LR	
Volume (veh/h)		82	523				581	70						25		47
Percent Heavy Vehicles (%)		3												3		3
Proportion Time Blocked																
Percent Grade (%)														0		
Right Turn Channelized																
Median Type | Storage																

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1												7.1		6.2
Critical Headway (sec)		4.13												6.43		6.23
Base Follow-Up Headway (sec)		2.2												3.5		3.3
Follow-Up Headway (sec)		2.23												3.53		3.33

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		89													78	
Capacity, c (veh/h)		885													241	
v/c Ratio		0.10													0.32	
95% Queue Length, Q_{95} (veh)		0.3													1.3	
Control Delay (s/veh)		9.5													26.9	
Level of Service (LOS)		A													D	
Approach Delay (s/veh)		2.5												26.9		
Approach LOS														D		

HCS7 Two-Way Stop-Control Report

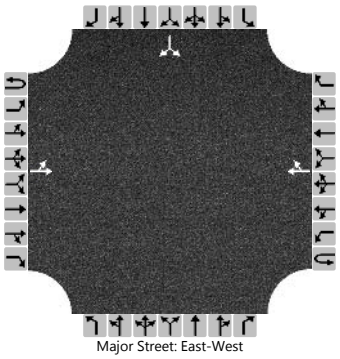
General Information

Analyst	BCK
Agency/Co.	Smart Services Inc.
Date Performed	9/19/2018
Analysis Year	2029
Time Analyzed	AM Peak
Intersection Orientation	East-West
Project Description	2029 Residential Build AM Peak

Site Information

Intersection	Lndn Grovport & Buckeye
Jurisdiction	City of Grove City
East/West Street	London-Groveport Rd
North/South Street	Buckeye Pkwy
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes


Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	0	0		0	1	0
Configuration		LT						TR							LR	
Volume (veh/h)		20	373				521	19						62		114
Percent Heavy Vehicles (%)		3												3		3
Proportion Time Blocked																
Percent Grade (%)														0		
Right Turn Channelized																
Median Type | Storage																

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1												7.1		6.2
Critical Headway (sec)		4.13												6.43		6.23
Base Follow-Up Headway (sec)		2.2												3.5		3.3
Follow-Up Headway (sec)		2.23												3.53		3.33

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		22													191	
Capacity, c (veh/h)		982													376	
v/c Ratio		0.02													0.51	
95% Queue Length, Q_{95} (veh)		0.1													2.8	
Control Delay (s/veh)		8.7													24.1	
Level of Service (LOS)		A													C	
Approach Delay (s/veh)		0.7												24.1		
Approach LOS														C		

HCS7 Two-Way Stop-Control Report

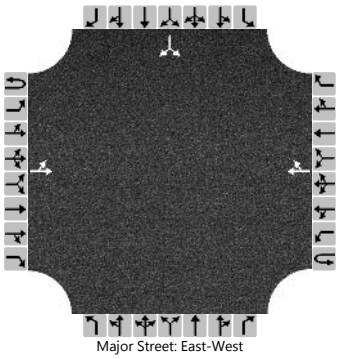
General Information

Analyst	BCK
Agency/Co.	Smart Services Inc.
Date Performed	9/19/2018
Analysis Year	2029
Time Analyzed	PM Peak
Intersection Orientation	East-West
Project Description	2029 Residential Build PM Peak

Site Information

Intersection	Lndn Grovport & Buckeye
Jurisdiction	City of Grove City
East/West Street	London-Groveport Rd
North/South Street	Buckeye Pkwy
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes


Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	0	0		0	1	0
Configuration		LT						TR							LR	
Volume (veh/h)		106	576				612	76						28		61
Percent Heavy Vehicles (%)		3												3		3
Proportion Time Blocked																
Percent Grade (%)														0		
Right Turn Channelized																
Median Type | Storage																

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1												7.1		6.2
Critical Headway (sec)		4.13												6.43		6.23
Base Follow-Up Headway (sec)		2.2												3.5		3.3
Follow-Up Headway (sec)		2.23												3.53		3.33

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		115													97	
Capacity, c (veh/h)		855													207	
v/c Ratio		0.13													0.47	
95% Queue Length, Q_{95} (veh)		0.5													2.3	
Control Delay (s/veh)		9.9													36.7	
Level of Service (LOS)		A													E	
Approach Delay (s/veh)		3.3												36.7		
Approach LOS														E		

HCS7 Two-Way Stop-Control Report

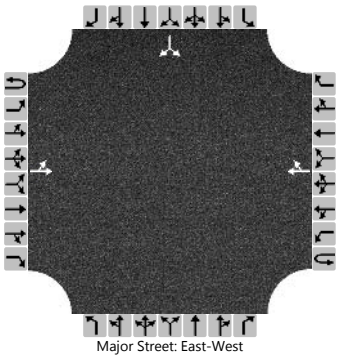
General Information

Analyst	BCK
Agency/Co.	Smart Services Inc.
Date Performed	9/19/2018
Analysis Year	2039
Time Analyzed	AM Peak
Intersection Orientation	East-West
Project Description	2039 No Build AM Peak

Site Information

Intersection	Lndn Grovport & Buckeye
Jurisdiction	City of Grove City
East/West Street	London-Groveport Rd
North/South Street	Buckeye Pkwy
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes


Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	0	0		0	1	0
Configuration		LT						TR							LR	
Volume (veh/h)		16	429				571	21						66		108
Percent Heavy Vehicles (%)		3												3		3
Proportion Time Blocked																
Percent Grade (%)														0		
Right Turn Channelized																
Median Type | Storage																

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1												7.1		6.2
Critical Headway (sec)		4.13												6.43		6.23
Base Follow-Up Headway (sec)		2.2												3.5		3.3
Follow-Up Headway (sec)		2.23												3.53		3.33

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		17													189	
Capacity, c (veh/h)		936													329	
v/c Ratio		0.02													0.58	
95% Queue Length, Q_{95} (veh)		0.1													3.4	
Control Delay (s/veh)		8.9													29.8	
Level of Service (LOS)		A													D	
Approach Delay (s/veh)		0.5												29.8		
Approach LOS														D		

HCS7 Two-Way Stop-Control Report

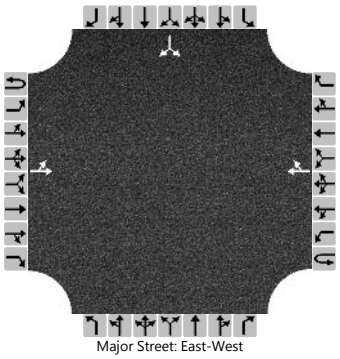
General Information

Analyst	BCK
Agency/Co.	Smart Services Inc.
Date Performed	9/19/2018
Analysis Year	2039
Time Analyzed	PM Peak
Intersection Orientation	East-West
Project Description	2039 No Build PM Peak

Site Information

Intersection	Lndn Grovport & Buckeye
Jurisdiction	City of Grove City
East/West Street	London-Groveport Rd
North/South Street	Buckeye Pkwy
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	0	0		0	1	0
Configuration		LT						TR							LR	
Volume (veh/h)		99	630				700	84						29		55
Percent Heavy Vehicles (%)		3												3		3
Proportion Time Blocked																
Percent Grade (%)													0			
Right Turn Channelized																
Median Type | Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1												7.1		6.2
Critical Headway (sec)		4.13												6.43		6.23
Base Follow-Up Headway (sec)		2.2												3.5		3.3
Follow-Up Headway (sec)		2.23												3.53		3.33

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		108													91	
Capacity, c (veh/h)		782													162	
v/c Ratio		0.14													0.56	
95% Queue Length, Q_{95} (veh)		0.5													2.9	
Control Delay (s/veh)		10.3													52.7	
Level of Service (LOS)		B													F	
Approach Delay (s/veh)	3.4												52.7			
Approach LOS													F			

HCS7 Two-Way Stop-Control Report

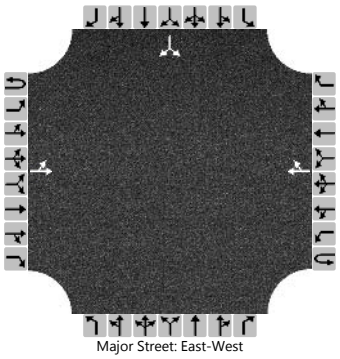
General Information

Analyst	BCK
Agency/Co.	Smart Services Inc.
Date Performed	9/19/2018
Analysis Year	2039
Time Analyzed	AM Peak
Intersection Orientation	East-West
Project Description	2039 Residential & School Build AM Peak

Site Information

Intersection	Lndn Grovport & Buckeye
Jurisdiction	City of Grove City
East/West Street	London-Groveport Rd
North/South Street	Buckeye Pkwy
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes


Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	0	0		0	1	0
Configuration		LT						TR							LR	
Volume (veh/h)		75	446				618	22						70		171
Percent Heavy Vehicles (%)		3												3		3
Proportion Time Blocked																
Percent Grade (%)														0		
Right Turn Channelized																
Median Type | Storage			Undivided													

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1												7.1		6.2
Critical Headway (sec)		4.13												6.43		6.23
Base Follow-Up Headway (sec)		2.2												3.5		3.3
Follow-Up Headway (sec)		2.23												3.53		3.33

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		82													262	
Capacity, c (veh/h)		895													282	
v/c Ratio		0.09													0.93	
95% Queue Length, Q_{95} (veh)		0.3													8.7	
Control Delay (s/veh)		9.4													76.7	
Level of Service (LOS)		A													F	
Approach Delay (s/veh)		2.4												76.7		
Approach LOS														F		

HCS7 Two-Way Stop-Control Report

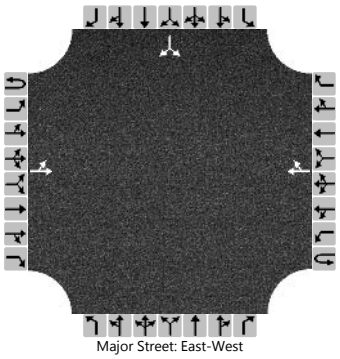
General Information

Analyst	BCK
Agency/Co.	Smart Services Inc.
Date Performed	9/19/2018
Analysis Year	2039
Time Analyzed	PM Peak
Intersection Orientation	East-West
Project Description	2039 Residential & School Build PM Peak

Site Information

Intersection	Lndn Grovport & Buckeye
Jurisdiction	City of Grove City
East/West Street	London-Groveport Rd
North/South Street	Buckeye Pkwy
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes


Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	0	0		0	1	0
Configuration		LT						TR							LR	
Volume (veh/h)		131	683				731	88						32		79
Percent Heavy Vehicles (%)		3												3		3
Proportion Time Blocked																
Percent Grade (%)														0		
Right Turn Channelized																
Median Type | Storage					Undivided											

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1												7.1		6.2
Critical Headway (sec)		4.13												6.43		6.23
Base Follow-Up Headway (sec)		2.2												3.5		3.3
Follow-Up Headway (sec)		2.23												3.53		3.33

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		142													121	
Capacity, c (veh/h)		756													136	
v/c Ratio		0.19													0.89	
95% Queue Length, Q_{95} (veh)		0.7													5.8	
Control Delay (s/veh)		10.9													111.5	
Level of Service (LOS)		B													F	
Approach Delay (s/veh)		4.7												111.5		
Approach LOS														F		

HCS7 Two-Way Stop-Control Report

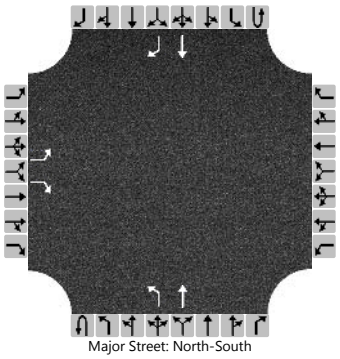
General Information

Analyst	BCK
Agency/Co.	Smart Services Inc.
Date Performed	9/17/2018
Analysis Year	2019
Time Analyzed	AM Peak
Intersection Orientation	North-South
Project Description	2019 Residential Build AM Peak

Site Information

Intersection	Jackson & Hawthorne Pkwy
Jurisdiction	City of Grove City
East/West Street	Prop Hawthorne Pkwy
North/South Street	Jackson Pike (SR 104)
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		1	0	1		0	0	0	0	1	1	0	0	0	1	1
Configuration		L		R						L	T				T	R
Volume (veh/h)		82		46						15	615				135	29
Percent Heavy Vehicles (%)		3		3						3						
Proportion Time Blocked																
Percent Grade (%)		0														
Right Turn Channelized		No												No		
Median Type | Storage		Undivided														

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1		6.2						4.1						
Critical Headway (sec)		6.43		6.23						4.13						
Base Follow-Up Headway (sec)		3.5		3.3						2.2						
Follow-Up Headway (sec)		3.53		3.33						2.23						

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		89		50						16						
Capacity, c (veh/h)		326		897						1390						
v/c Ratio		0.27		0.06						0.01						
95% Queue Length, Q_{95} (veh)		1.1		0.2						0.0						
Control Delay (s/veh)		20.1		9.3						7.6						
Level of Service (LOS)		C		A						A						
Approach Delay (s/veh)		16.2								0.2						
Approach LOS		C														

HCS7 Two-Way Stop-Control Report

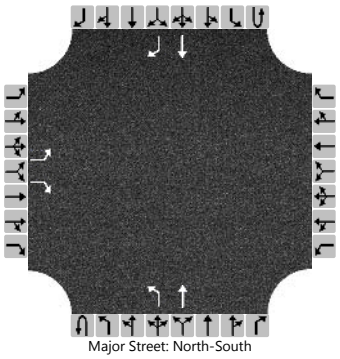
General Information

Analyst	BCK
Agency/Co.	Smart Services Inc.
Date Performed	9/17/2018
Analysis Year	2019
Time Analyzed	PM Peak
Intersection Orientation	North-South
Project Description	2019 Residential Build PM Peak

Site Information

Intersection	Jackson & Hawthorne Pkwy
Jurisdiction	City of Grove City
East/West Street	Prop Hawthorne Pkwy
North/South Street	Jackson Pike (SR 104)
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		1	0	1		0	0	0	0	1	1	0	0	0	1	1
Configuration		L		R						L	T				T	R
Volume (veh/h)		54		30						51	269				641	92
Percent Heavy Vehicles (%)		3		3						3						
Proportion Time Blocked																
Percent Grade (%)		0														
Right Turn Channelized		No												No		
Median Type | Storage		Undivided														

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1		6.2						4.1						
Critical Headway (sec)		6.43		6.23						4.13						
Base Follow-Up Headway (sec)		3.5		3.3						2.2						
Follow-Up Headway (sec)		3.53		3.33						2.23						

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		59		33						55						
Capacity, c (veh/h)		218		439						820						
v/c Ratio		0.27		0.07						0.07						
95% Queue Length, Q_{95} (veh)		1.1		0.2						0.2						
Control Delay (s/veh)		27.5		13.9						9.7						
Level of Service (LOS)		D		B						A						
Approach Delay (s/veh)		22.6								1.5						
Approach LOS		C														

HCS7 Two-Way Stop-Control Report

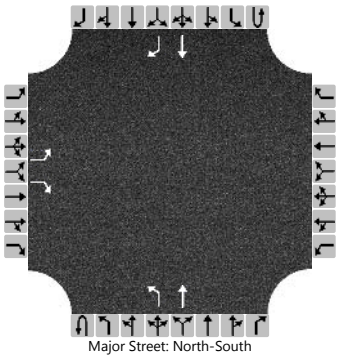
General Information

Analyst	BCK
Agency/Co.	Smart Services Inc.
Date Performed	9/17/2018
Analysis Year	2029
Time Analyzed	AM Peak
Intersection Orientation	North-South
Project Description	2029 Residential Build AM Peak

Site Information

Intersection	Jackson & Hawthorne Pkwy
Jurisdiction	City of Grove City
East/West Street	Prop Hawthorne Pkwy
North/South Street	Jackson Pike (SR 104)
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		1	0	1		0	0	0	0	1	1	0	0	0	1	1
Configuration		L		R						L	T				T	R
Volume (veh/h)		82		46						15	710				156	29
Percent Heavy Vehicles (%)		3		3						3						
Proportion Time Blocked																
Percent Grade (%)		0														
Right Turn Channelized		No												No		
Median Type | Storage		Undivided														

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1		6.2						4.1						
Critical Headway (sec)		6.43		6.23						4.13						
Base Follow-Up Headway (sec)		3.5		3.3						2.2						
Follow-Up Headway (sec)		3.53		3.33						2.23						

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		89		50						16						
Capacity, c (veh/h)		275		871						1363						
v/c Ratio		0.32		0.06						0.01						
95% Queue Length, Q_{95} (veh)		1.4		0.2						0.0						
Control Delay (s/veh)		24.3		9.4						7.7						
Level of Service (LOS)		C		A						A						
Approach Delay (s/veh)		18.9								0.2						
Approach LOS		C														

HCS7 Two-Way Stop-Control Report

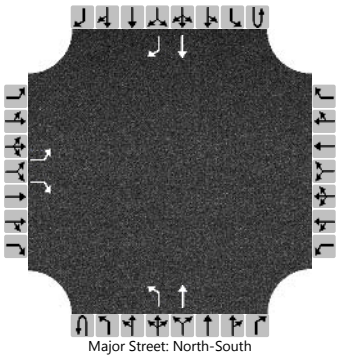
General Information

Analyst	BCK
Agency/Co.	Smart Services Inc.
Date Performed	9/17/2018
Analysis Year	2029
Time Analyzed	PM Peak
Intersection Orientation	North-South
Project Description	2029 Residential Build PM Peak

Site Information

Intersection	Jackson & Hawthorne Pkwy
Jurisdiction	City of Grove City
East/West Street	Prop Hawthorne Pkwy
North/South Street	Jackson Pike (SR 104)
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		1	0	1		0	0	0	0	1	1	0	0	0	1	1
Configuration		L		R						L	T				T	R
Volume (veh/h)		54		30						51	311				740	92
Percent Heavy Vehicles (%)		3		3						3						
Proportion Time Blocked																
Percent Grade (%)		0														
Right Turn Channelized		No												No		
Median Type | Storage		Undivided														

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1		6.2						4.1						
Critical Headway (sec)		6.43		6.23						4.13						
Base Follow-Up Headway (sec)		3.5		3.3						2.2						
Follow-Up Headway (sec)		3.53		3.33						2.23						

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		59		33						55						
Capacity, c (veh/h)		175		381						747						
v/c Ratio		0.34		0.09						0.07						
95% Queue Length, Q_{95} (veh)		1.4		0.3						0.2						
Control Delay (s/veh)		35.6		15.3						10.2						
Level of Service (LOS)		E		C						B						
Approach Delay (s/veh)		28.4								1.4						
Approach LOS		D														

HCS7 Two-Way Stop-Control Report

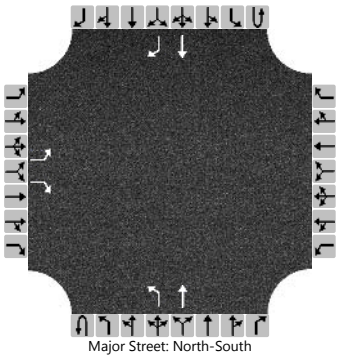
General Information

Analyst	BCK
Agency/Co.	Smart Services Inc.
Date Performed	9/17/2018
Analysis Year	2039
Time Analyzed	AM Peak
Intersection Orientation	North-South
Project Description	2039 Residential & School Build AM Peak

Site Information

Intersection	Jackson & Hawthorne Pkwy
Jurisdiction	City of Grove City
East/West Street	Prop Hawthorne Pkwy
North/South Street	Jackson Pike (SR 104)
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		1	0	1		0	0	0	0	1	1	0	0	0	1	1
Configuration		L		R						L	T				T	R
Volume (veh/h)		93		90						68	806				177	45
Percent Heavy Vehicles (%)		3		3						3						
Proportion Time Blocked																
Percent Grade (%)		0														
Right Turn Channelized		No												No		
Median Type | Storage		Undivided														

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1		6.2						4.1						
Critical Headway (sec)		6.43		6.23						4.13						
Base Follow-Up Headway (sec)		3.5		3.3						2.2						
Follow-Up Headway (sec)		3.53		3.33						2.23						

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		101		98						74						
Capacity, c (veh/h)		188		846						1318						
v/c Ratio		0.54		0.12						0.06						
95% Queue Length, Q_{95} (veh)		2.8		0.4						0.2						
Control Delay (s/veh)		44.6		9.8						7.9						
Level of Service (LOS)		E		A						A						
Approach Delay (s/veh)		27.5								0.6						
Approach LOS		D														

HCS7 Two-Way Stop-Control Report

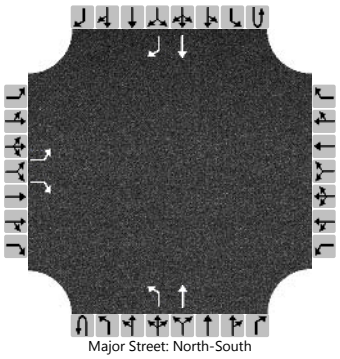
General Information

Analyst	BCK
Agency/Co.	Smart Services Inc.
Date Performed	9/17/2018
Analysis Year	2039
Time Analyzed	PM Peak
Intersection Orientation	North-South
Project Description	2039 Residential & School Build PM Peak

Site Information

Intersection	Jackson & Hawthorne Pkwy
Jurisdiction	City of Grove City
East/West Street	Prop Hawthorne Pkwy
North/South Street	Jackson Pike (SR 104)
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		1	0	1		0	0	0	0	1	1	0	0	0	1	1
Configuration		L		R						L	T				T	R
Volume (veh/h)		56		42						62	353				840	91
Percent Heavy Vehicles (%)		3		3						3						
Proportion Time Blocked																
Percent Grade (%)		0														
Right Turn Channelized		No												No		
Median Type | Storage		Undivided														

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1		6.2						4.1						
Critical Headway (sec)		6.43		6.23						4.13						
Base Follow-Up Headway (sec)		3.5		3.3						2.2						
Follow-Up Headway (sec)		3.53		3.33						2.23						

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		61		46						67						
Capacity, c (veh/h)		133		330						681						
v/c Ratio		0.46		0.14						0.10						
95% Queue Length, Q_{95} (veh)		2.1		0.5						0.3						
Control Delay (s/veh)		53.3		17.7						10.9						
Level of Service (LOS)		F		C						B						
Approach Delay (s/veh)		38.1								1.6						
Approach LOS		E														

HCS7 All-Way Stop Control Report

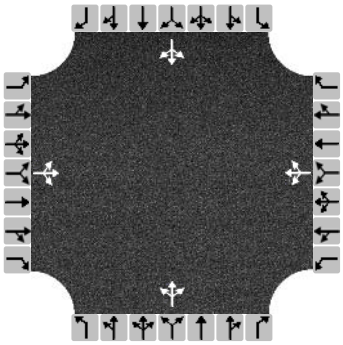
General Information

Analyst	BCK
Agency/Co.	Smart Services Inc.
Date Performed	9/19/2018
Analysis Year	2019
Analysis Time Period (hrs)	0.25
Time Analyzed	2019 AM
Project Description	2019 No Build AM Peak

Site Information

Intersection	Buckeye Pkwy & Hawthorne
Jurisdiction	City of Grove City
East/West Street	Buckeye Pkwy
North/South Street	Hawthorne Pkwy
Peak Hour Factor	0.92

Lanes



Vehicle Volume and Adjustments

Approach	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T	R	L	T	R
Volume	15	3	20	7	18	22	9	30	1	4	44	7
% Thrus in Shared Lane												
Lane	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Configuration	LTR			LTR			LTR			LTR		
Flow Rate, v (veh/h)	41			51			43			60		
Percent Heavy Vehicles	2			2			2			2		

Departure Headway and Service Time

Initial Departure Headway, hd (s)	3.20			3.20			3.20			3.20		
Initial Degree of Utilization, x	0.037			0.045			0.039			0.053		
Final Departure Headway, hd (s)	3.97			3.95			4.22			4.11		
Final Degree of Utilization, x	0.046			0.056			0.051			0.068		
Move-Up Time, m (s)	2.0			2.0			2.0			2.0		
Service Time, ts (s)	1.97			1.95			2.22			2.11		

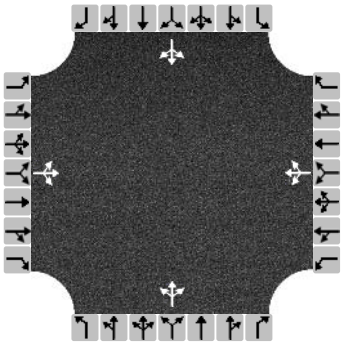
Capacity, Delay and Level of Service

Flow Rate, v (veh/h)	41			51			43			60		
Capacity	907			912			854			876		
95% Queue Length, Q_{95} (veh)	0.1			0.2			0.2			0.2		
Control Delay (s/veh)	7.2			7.2			7.4			7.4		
Level of Service, LOS	A			A			A			A		
Approach Delay (s/veh)	7.2			7.2			7.4			7.4		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh | LOS	7.3						A					

HCS7 All-Way Stop Control Report

General Information		Site Information	
Analyst	BCK	Intersection	Buckeye Pkwy & Hawthorne
Agency/Co.	Smart Services Inc.	Jurisdiction	City of Grove City
Date Performed	9/19/2018	East/West Street	Buckeye Pkwy
Analysis Year	2019	North/South Street	Hawthorne Pkwy
Analysis Time Period (hrs)	0.25	Peak Hour Factor	0.92
Time Analyzed	2019 PM		
Project Description	2019 No Build PM Peak		

Lanes



Vehicle Volume and Adjustments

Approach	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T	R	L	T	R
Volume	9	17	9	6	14	8	21	61	6	19	37	10
% Thrus in Shared Lane												
Lane	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Configuration	LTR			LTR			LTR			LTR		
Flow Rate, v (veh/h)	38			30			96			72		
Percent Heavy Vehicles	2			2			2			2		

Departure Headway and Service Time

Initial Departure Headway, hd (s)	3.20			3.20			3.20			3.20		
Initial Degree of Utilization, x	0.034			0.027			0.085			0.064		
Final Departure Headway, hd (s)	4.23			4.21			4.16			4.15		
Final Degree of Utilization, x	0.045			0.036			0.111			0.083		
Move-Up Time, m (s)	2.0			2.0			2.0			2.0		
Service Time, ts (s)	2.23			2.21			2.16			2.15		

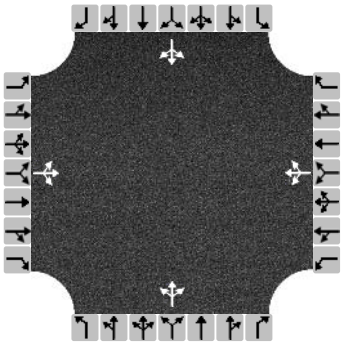
Capacity, Delay and Level of Service

Flow Rate, v (veh/h)	38			30			96			72		
Capacity	852			855			865			868		
95% Queue Length, Q_{95} (veh)	0.1			0.1			0.4			0.3		
Control Delay (s/veh)	7.4			7.4			7.7			7.5		
Level of Service, LOS	A			A			A			A		
Approach Delay (s/veh)	7.4			7.4			7.7			7.5		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh | LOS	7.5						A					

HCS7 All-Way Stop Control Report

General Information		Site Information	
Analyst	BCK	Intersection	Buckeye Pkwy & Hawthorne
Agency/Co.	Smart Services Inc.	Jurisdiction	City of Grove City
Date Performed	9/17/2018	East/West Street	Buckeye Pkwy
Analysis Year	2019	North/South Street	Hawthorne Pkwy
Analysis Time Period (hrs)	0.25	Peak Hour Factor	0.92
Time Analyzed	2019 AM		
Project Description	2019 Residential Build AM Peak		

Lanes



Vehicle Volume and Adjustments

Approach	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T	R	L	T	R
Volume	15	3	20	33	18	104	9	30	10	33	44	7
% Thrus in Shared Lane												
Lane	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Configuration	LTR			LTR			LTR			LTR		
Flow Rate, v (veh/h)	41			168			53			91		
Percent Heavy Vehicles	2			2			2			2		

Departure Headway and Service Time

Initial Departure Headway, hd (s)	3.20			3.20			3.20			3.20		
Initial Degree of Utilization, x	0.037			0.150			0.047			0.081		
Final Departure Headway, hd (s)	4.19			3.95			4.39			4.46		
Final Degree of Utilization, x	0.048			0.185			0.065			0.113		
Move-Up Time, m (s)	2.0			2.0			2.0			2.0		
Service Time, ts (s)	2.19			1.95			2.39			2.46		

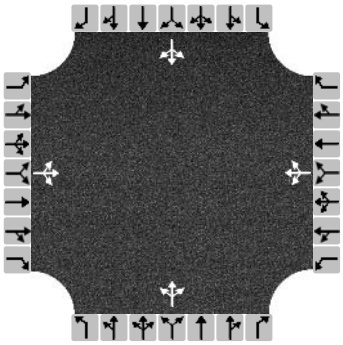
Capacity, Delay and Level of Service

Flow Rate, v (veh/h)	41			168			53			91		
Capacity	859			912			820			807		
95% Queue Length, Q_{95} (veh)	0.2			0.7			0.2			0.4		
Control Delay (s/veh)	7.4			7.8			7.7			8.0		
Level of Service, LOS	A			A			A			A		
Approach Delay (s/veh)	7.4			7.8			7.7			8.0		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh | LOS	7.8						A					

HCS7 All-Way Stop Control Report

General Information		Site Information	
Analyst	BCK	Intersection	Buckeye Pkwy & Hawthorne
Agency/Co.	Smart Services Inc.	Jurisdiction	City of Grove City
Date Performed	9/17/2018	East/West Street	Buckeye Pkwy
Analysis Year	2019	North/South Street	Hawthorne Pkwy
Analysis Time Period (hrs)	0.25	Peak Hour Factor	0.92
Time Analyzed	2019 PM		
Project Description	2019 Residential Build PM Peak		

Lanes



Vehicle Volume and Adjustments

Approach	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T	R	L	T	R
Volume	9	17	9	23	14	62	21	61	35	111	37	10
% Thrus in Shared Lane												
Lane	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Configuration	LTR			LTR			LTR			LTR		
Flow Rate, v (veh/h)	38			108			127			172		
Percent Heavy Vehicles	2			2			2			2		

Departure Headway and Service Time

Initial Departure Headway, hd (s)	3.20			3.20			3.20			3.20		
Initial Degree of Utilization, x	0.034			0.096			0.113			0.153		
Final Departure Headway, hd (s)	4.65			4.34			4.33			4.52		
Final Degree of Utilization, x	0.049			0.130			0.153			0.215		
Move-Up Time, m (s)	2.0			2.0			2.0			2.0		
Service Time, ts (s)	2.65			2.34			2.33			2.52		

Capacity, Delay and Level of Service

Flow Rate, v (veh/h)	38			108			127			172		
Capacity	774			829			832			797		
95% Queue Length, Q_{95} (veh)	0.2			0.4			0.5			0.8		
Control Delay (s/veh)	7.9			8.0			8.1			8.8		
Level of Service, LOS	A			A			A			A		
Approach Delay (s/veh)	7.9			8.0			8.1			8.8		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh | LOS	8.3						A					

HCS7 All-Way Stop Control Report

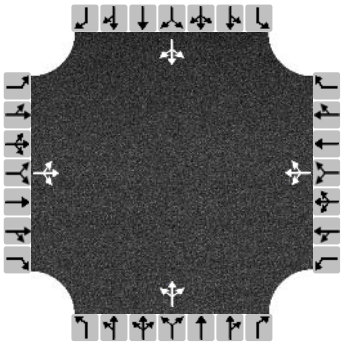
General Information

Analyst	BCK
Agency/Co.	Smart Services Inc.
Date Performed	9/19/2018
Analysis Year	2029
Analysis Time Period (hrs)	0.25
Time Analyzed	2029 AM
Project Description	2029 No Build AM Peak

Site Information

Intersection	Buckeye Pkwy & Hawthorne
Jurisdiction	City of Grove City
East/West Street	Buckeye Pkwy
North/South Street	Hawthorne Pkwy
Peak Hour Factor	0.92

Lanes



Vehicle Volume and Adjustments

Approach	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T	R	L	T	R
Volume	17	4	24	9	21	26	11	36	1	5	52	9
% Thrus in Shared Lane												
Lane	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Configuration	LTR			LTR			LTR			LTR		
Flow Rate, v (veh/h)	49			61			52			72		
Percent Heavy Vehicles	2			2			2			2		

Departure Headway and Service Time

Initial Departure Headway, hd (s)	3.20			3.20			3.20			3.20		
Initial Degree of Utilization, x	0.043			0.054			0.046			0.064		
Final Departure Headway, hd (s)	4.02			4.01			4.27			4.15		
Final Degree of Utilization, x	0.055			0.068			0.062			0.083		
Move-Up Time, m (s)	2.0			2.0			2.0			2.0		
Service Time, ts (s)	2.02			2.01			2.27			2.15		

Capacity, Delay and Level of Service

Flow Rate, v (veh/h)	49			61			52			72		
Capacity	895			898			843			867		
95% Queue Length, Q_{95} (veh)	0.2			0.2			0.2			0.3		
Control Delay (s/veh)	7.3			7.3			7.6			7.5		
Level of Service, LOS	A			A			A			A		
Approach Delay (s/veh)	7.3			7.3			7.6			7.5		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh | LOS	7.4						A					

HCS7 All-Way Stop Control Report

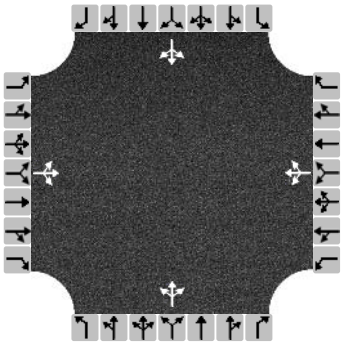
General Information

Analyst	BCK
Agency/Co.	Smart Services Inc.
Date Performed	9/19/2018
Analysis Year	2029
Analysis Time Period (hrs)	0.25
Time Analyzed	2029 PM
Project Description	2029 No Build PM Peak

Site Information

Intersection	Buckeye Pkwy & Hawthorne
Jurisdiction	City of Grove City
East/West Street	Buckeye Pkwy
North/South Street	Hawthorne Pkwy
Peak Hour Factor	0.92

Lanes



Vehicle Volume and Adjustments

Approach	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T	R	L	T	R
Volume	11	20	11	7	16	10	25	73	7	22	45	12
% Thrus in Shared Lane												
Lane	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Configuration	LTR			LTR			LTR			LTR		
Flow Rate, v (veh/h)	46			36			114			86		
Percent Heavy Vehicles	2			2			2			2		

Departure Headway and Service Time

Initial Departure Headway, hd (s)	3.20			3.20			3.20			3.20		
Initial Degree of Utilization, x	0.041			0.032			0.101			0.076		
Final Departure Headway, hd (s)	4.31			4.28			4.21			4.20		
Final Degree of Utilization, x	0.055			0.043			0.134			0.100		
Move-Up Time, m (s)	2.0			2.0			2.0			2.0		
Service Time, ts (s)	2.31			2.28			2.21			2.20		

Capacity, Delay and Level of Service

Flow Rate, v (veh/h)	46			36			114			86		
Capacity	836			841			855			858		
95% Queue Length, Q_{95} (veh)	0.2			0.1			0.5			0.3		
Control Delay (s/veh)	7.6			7.5			7.9			7.7		
Level of Service, LOS	A			A			A			A		
Approach Delay (s/veh)	7.6			7.5			7.9			7.7		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh | LOS	7.7						A					

HCS7 All-Way Stop Control Report

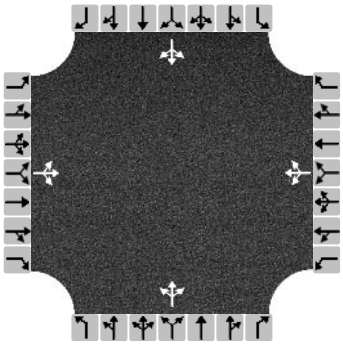
General Information

Analyst	BCK
Agency/Co.	Smart Services Inc.
Date Performed	9/17/2018
Analysis Year	2029
Analysis Time Period (hrs)	0.25
Time Analyzed	2029 AM
Project Description	2029 Residential Build AM Peak

Site Information

Intersection	Buckeye Pkwy & Hawthorne
Jurisdiction	City of Grove City
East/West Street	Buckeye Pkwy
North/South Street	Hawthorne Pkwy
Peak Hour Factor	0.92

Lanes



Vehicle Volume and Adjustments

Approach	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T	R	L	T	R
Volume	17	4	24	35	21	108	11	36	10	34	52	9
% Thrus in Shared Lane												
Lane	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Configuration	LTR			LTR			LTR			LTR		
Flow Rate, v (veh/h)	49			178			62			103		
Percent Heavy Vehicles	2			2			2			2		

Departure Headway and Service Time

Initial Departure Headway, hd (s)	3.20			3.20			3.20			3.20		
Initial Degree of Utilization, x	0.043			0.158			0.055			0.092		
Final Departure Headway, hd (s)	4.27			4.03			4.48			4.51		
Final Degree of Utilization, x	0.058			0.199			0.077			0.129		
Move-Up Time, m (s)	2.0			2.0			2.0			2.0		
Service Time, ts (s)	2.27			2.03			2.48			2.51		

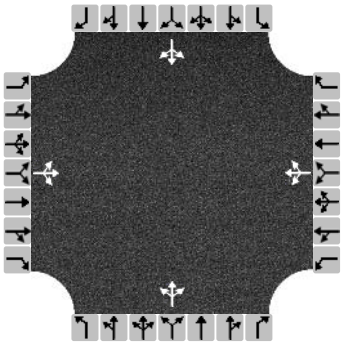
Capacity, Delay and Level of Service

Flow Rate, v (veh/h)	49			178			62			103		
Capacity	844			894			804			798		
95% Queue Length, Q_{95} (veh)	0.2			0.7			0.2			0.4		
Control Delay (s/veh)	7.5			8.0			7.9			8.2		
Level of Service, LOS	A			A			A			A		
Approach Delay (s/veh)	7.5			8.0			7.9			8.2		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh | LOS	8.0						A					

HCS7 All-Way Stop Control Report

General Information		Site Information	
Analyst	BCK	Intersection	Buckeye Pkwy & Hawthorne
Agency/Co.	Smart Services Inc.	Jurisdiction	City of Grove City
Date Performed	9/17/2018	East/West Street	Buckeye Pkwy
Analysis Year	2029	North/South Street	Hawthorne Pkwy
Analysis Time Period (hrs)	0.25	Peak Hour Factor	0.92
Time Analyzed	2029 PM		
Project Description	2029 Residential Build PM Peak		

Lanes



Vehicle Volume and Adjustments

Approach	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T	R	L	T	R
Volume	11	20	11	24	16	64	25	73	36	114	45	12
% Thrus in Shared Lane												
Lane	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Configuration	LTR			LTR			LTR			LTR		
Flow Rate, v (veh/h)	46			113			146			186		
Percent Heavy Vehicles	2			2			2			2		

Departure Headway and Service Time

Initial Departure Headway, hd (s)	3.20			3.20			3.20			3.20		
Initial Degree of Utilization, x	0.041			0.100			0.129			0.165		
Final Departure Headway, hd (s)	4.74			4.44			4.40			4.57		
Final Degree of Utilization, x	0.060			0.139			0.178			0.236		
Move-Up Time, m (s)	2.0			2.0			2.0			2.0		
Service Time, ts (s)	2.74			2.44			2.40			2.57		

Capacity, Delay and Level of Service

Flow Rate, v (veh/h)	46			113			146			186		
Capacity	759			810			817			788		
95% Queue Length, Q_{95} (veh)	0.2			0.5			0.6			0.9		
Control Delay (s/veh)	8.0			8.2			8.4			9.0		
Level of Service, LOS	A			A			A			A		
Approach Delay (s/veh)	8.0			8.2			8.4			9.0		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh | LOS	8.5						A					

HCS7 All-Way Stop Control Report

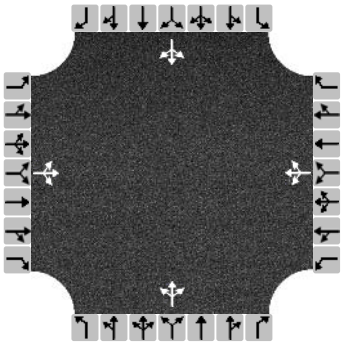
General Information

Analyst	BCK
Agency/Co.	Smart Services Inc.
Date Performed	9/19/2018
Analysis Year	2029
Analysis Time Period (hrs)	0.25
Time Analyzed	2029 AM
Project Description	2029 Residential & School Build AM Peak

Site Information

Intersection	Buckeye Pkwy & Hawthorne
Jurisdiction	City of Grove City
East/West Street	Buckeye Pkwy
North/South Street	Hawthorne Pkwy
Peak Hour Factor	0.92

Lanes



Vehicle Volume and Adjustments

Approach	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T	R	L	T	R
Volume	17	31	24	76	44	127	11	36	61	59	52	9
% Thrus in Shared Lane												
Lane	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Configuration	LTR			LTR			LTR			LTR		
Flow Rate, v (veh/h)	78			268			117			130		
Percent Heavy Vehicles	2			2			2			2		

Departure Headway and Service Time

Initial Departure Headway, hd (s)	3.20			3.20			3.20			3.20		
Initial Degree of Utilization, x	0.070			0.239			0.104			0.116		
Final Departure Headway, hd (s)	4.72			4.40			4.61			4.95		
Final Degree of Utilization, x	0.103			0.328			0.150			0.179		
Move-Up Time, m (s)	2.0			2.0			2.0			2.0		
Service Time, ts (s)	2.72			2.40			2.61			2.95		

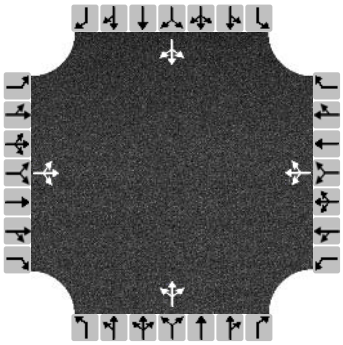
Capacity, Delay and Level of Service

Flow Rate, v (veh/h)	78			268			117			130		
Capacity	763			818			782			727		
95% Queue Length, Q_{95} (veh)	0.3			1.4			0.5			0.6		
Control Delay (s/veh)	8.3			9.5			8.4			9.0		
Level of Service, LOS	A			A			A			A		
Approach Delay (s/veh)	8.3			9.5			8.4			9.0		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh | LOS	9.0						A					

HCS7 All-Way Stop Control Report

General Information		Site Information	
Analyst	BCK	Intersection	Buckeye Pkwy & Hawthorne
Agency/Co.	Smart Services Inc.	Jurisdiction	City of Grove City
Date Performed	9/19/2018	East/West Street	Buckeye Pkwy
Analysis Year	2029	North/South Street	Hawthorne Pkwy
Analysis Time Period (hrs)	0.25	Peak Hour Factor	0.92
Time Analyzed	2029 PM		
Project Description	2029 Residential & School Build PM Peak		

Lanes



Vehicle Volume and Adjustments

Approach	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T	R	L	T	R
Volume	11	26	11	34	22	68	25	73	43	115	45	12
% Thrus in Shared Lane												
Lane	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Configuration	LTR			LTR			LTR			LTR		
Flow Rate, v (veh/h)	52			135			153			187		
Percent Heavy Vehicles	2			2			2			2		

Departure Headway and Service Time

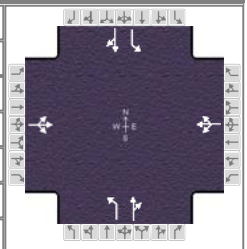
Initial Departure Headway, hd (s)	3.20			3.20			3.20			3.20		
Initial Degree of Utilization, x	0.046			0.120			0.136			0.166		
Final Departure Headway, hd (s)	4.82			4.53			4.47			4.66		
Final Degree of Utilization, x	0.070			0.170			0.190			0.242		
Move-Up Time, m (s)	2.0			2.0			2.0			2.0		
Service Time, ts (s)	2.82			2.53			2.47			2.66		

Capacity, Delay and Level of Service

Flow Rate, v (veh/h)	52			135			153			187		
Capacity	747			794			806			773		
95% Queue Length, Q_{95} (veh)	0.2			0.6			0.7			0.9		
Control Delay (s/veh)	8.2			8.5			8.5			9.1		
Level of Service, LOS	A			A			A			A		
Approach Delay (s/veh)	8.2			8.5			8.5			9.1		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh | LOS	8.7						A					

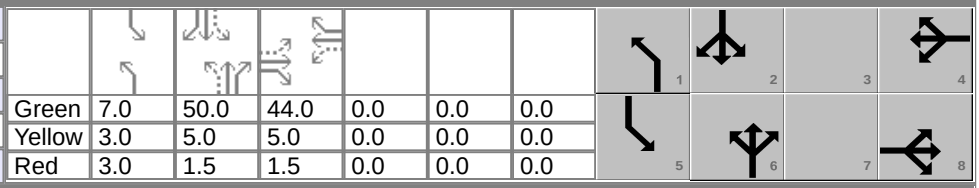
HCS7 Signalized Intersection Input Data

General Information				Intersection Information	
Agency	Smart Services Inc			Duration, h	0.25
Analyst	TJS	Analysis Date	Sep 18, 2018	Area Type	Other
Jurisdiction	City of Grove City	Time Period	2019 AM Peak	PHF	0.92
Urban Street	Jackson Pike (SR 104)	Analysis Year	2019	Analysis Period	1> 7:00
Intersection	Jackson Pike & London-…	File Name	London-Groveport Rd (SR 665) & Jackson Pike (…		
Project Description	2019 No Build AM Peak				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	83	211	91	16	113	25	153	446	118	19	112	45

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	7.0	50.0	44.0	0.0	0.0	0.0						
Yellow	3.0	5.0	5.0	0.0	0.0	0.0						
Red	3.0	1.5	1.5	0.0	0.0	0.0						

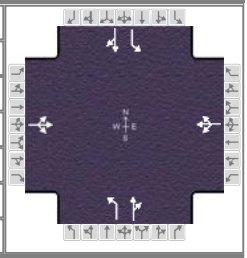
Traffic Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	83	211	91	16	113	25	153	446	118	19	112	45
Initial Queue (Q_b), veh/h	0	0	0	0	0	0	0	0	0	0	0	0
Base Saturation Flow Rate (s_o), veh/h	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Parking (N_m), man/h		None			None			None			None	
Heavy Vehicles (P_{HV}), %		2			2		2	2		2	2	
Ped / Bike / RTOR, /h	0	0	0	0	0	0	0	0	0	0	0	0
Buses (N_b), buses/h	0	0	0	0	0	0	0	0	0	0	0	0
Arrival Type (*AT*)	3	3	3	3	3	3	3	3	3	3	3	3
Upstream Filtering (*I*)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lane Width (*W*), ft		12.0			12.0		12.0	12.0		12.0	12.0	
Turn Bay Length, ft		0			0		0	0		0	0	
Grade (*Pg*), %		0			0			0			0	
Speed Limit, mi/h	50	50	50	50	50	50	50	50	50	50	50	50

Phase Information	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Maximum Green (G_{max}) or Phase Split, s		44.0		44.0	7.0	50.0	7.0	50.0
Yellow Change Interval (*Y*), s		5.0		5.0	3.0	5.0	3.0	5.0
Red Clearance Interval (R_c), s		1.5		1.5	3.0	1.5	3.0	1.5
Minimum Green (G_{min}), s		10		10	7	10	7	10
Start-Up Lost Time (*l*t), s	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Extension of Effective Green (*e*), s	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Passage (*PT*), s		2.0		2.0	2.0	2.0	2.0	2.0
Recall Mode		Off		Off	Off	Off	Off	Off
Dual Entry		Yes		Yes	No	Yes	No	Yes
Walk (*Walk*), s		0.0		0.0		0.0		0.0
Pedestrian Clearance Time (*PC*), s		0.0		0.0		0.0		0.0

Multimodal Information	EB			WB			NB			SB		
85th % Speed / Rest in Walk / Corner Radius	0	No	25	0	No	25	0	No	25	0	No	25
Walkway / Crosswalk Width / Length, ft	9.0	12	0	9.0	12	0	9.0	12	0	9.0	12	0
Street Width / Island / Curb	0	0	No	0	0	No	0	0	No	0	0	No
Width Outside / Bike Lane / Shoulder, ft	12	5.0	2.0	12	5.0	2.0	12	5.0	2.0	12	5.0	2.0
Pedestrian Signal / Occupied Parking	No	0.50		No	0.50		No	0.50		No	0.50	

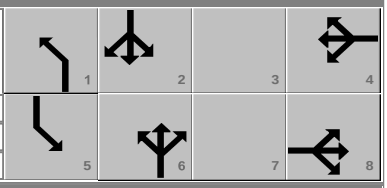
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Smart Services Inc			Duration, h	0.25
Analyst	TJS	Analysis Date	Sep 18, 2018	Area Type	Other
Jurisdiction	City of Grove City	Time Period	2019 AM Peak	PHF	0.92
Urban Street	Jackson Pike (SR 104)	Analysis Year	2019	Analysis Period	1> 7:00
Intersection	Jackson Pike & London-…	File Name	London-Groveport Rd (SR 665) & Jackson Pike (…		
Project Description	2019 No Build AM Peak				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	83	211	91	16	113	25	153	446	118	19	112	45

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	7.0	50.0	44.0	0.0	0.0	0.0		
Yellow	3.0	5.0	5.0	0.0	0.0	0.0		
Red	3.0	1.5	1.5	0.0	0.0	0.0		

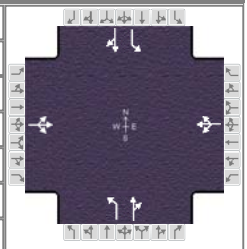
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		8		4	1	6	5	2
Case Number		8.0		8.0	1.1	4.0	1.1	4.0
Phase Duration, s		50.5		50.5	13.0	56.5	13.0	56.5
Change Period, ($Y+R_c$), s		6.5		6.5	6.0	6.5	6.0	6.5
Max Allow Headway (*MAH*), s		3.0		3.0	3.0	3.0	3.0	3.0
Queue Clearance Time (g_s), s		27.5		9.7	8.5	38.1	2.7	9.4
Green Extension Time (g_e), s		1.0		1.1	0.0	1.3	0.0	1.4
Phase Call Probability		1.00		1.00	1.00	1.00	1.00	1.00
Max Out Probability		0.00		0.00	1.00	0.02	0.06	0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3	8	18	7	4	14	1	6	16	5	2	12
Adjusted Flow Rate (*v*), veh/h		418			167		166	613		21	171	
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1648			1726		1781	1802		1781	1779	
Queue Service Time (g_s), s		17.8			0.0		6.5	36.1		0.7	7.4	
Cycle Queue Clearance Time (g_c), s		25.5			7.7		6.5	36.1		0.7	7.4	
Green Ratio (*g/C*)		0.37			0.37		0.48	0.42		0.48	0.42	
Capacity (*c*), veh/h		641			666		574	751		244	741	
Volume-to-Capacity Ratio (*X*)		0.653			0.251		0.289	0.816		0.085	0.230	
Back of Queue (*Q*), ft/ln (50 th percentile)		253.3			81.4		64	404		7.3	75.3	
Back of Queue (*Q*), veh/ln (50 th percentile)		10.0			3.2		2.5	15.9		0.3	3.0	
Queue Storage Ratio (*RQ*) (50 th percentile)		0.00			0.00		0.00	0.00		0.00	0.00	
Uniform Delay (d_1), s/veh		31.9			26.5		18.7	30.9		22.9	22.6	
Incremental Delay (d_2), s/veh		1.9			0.1		0.1	6.5		0.1	0.1	
Initial Queue Delay (d_3), s/veh		0.0			0.0		0.0	0.0		0.0	0.0	
Control Delay (*d*), s/veh		33.8			26.6		18.8	37.5		23.0	22.6	
Level of Service (LOS)		C			C		B	D		C	C	
Approach Delay, s/veh / LOS	33.8	C		26.6	C		33.5	C		22.7	C	
Intersection Delay, s/veh / LOS	31.5						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.93	B	1.93	B	1.69	B	1.69	B
Bicycle LOS Score / LOS	1.18	A	0.76	A	1.77	B	0.80	A

HCS7 Signalized Intersection Input Data

General Information				Intersection Information	
Agency	Smart Services Inc			Duration, h	0.25
Analyst	BCK	Analysis Date	Sep 18, 2018	Area Type	Other
Jurisdiction	City of Grove City	Time Period	2019 PM Peak	PHF	0.92
Urban Street	Jackson Pike (SR 104)	Analysis Year	2019	Analysis Period	1> 7:00
Intersection	Jackson Pike & London-…	File Name	London-Groveport Rd (SR 665) & Jackson Pike (…		
Project Description	2019 No Build PM Peak				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	46	110	198	74	351	26	108	214	31	23	483	85

Signal Information												
Cycle, s	120.0	Reference Phase	2							1	2	3	4
Offset, s	0	Reference Point	End	Green	7.0	48.0	46.0	0.0	0.0	0.0	5	6	7	8
Uncoordinated	Yes	Simult. Gap E/W	On	Yellow	3.0	5.0	5.0	0.0	0.0	0.0				
Force Mode	Fixed	Simult. Gap N/S	On	Red	3.0	1.5	1.5	0.0	0.0	0.0				

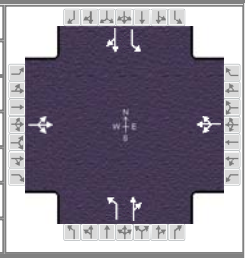
Traffic Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	46	110	198	74	351	26	108	214	31	23	483	85
Initial Queue (Q_b), veh/h	0	0	0	0	0	0	0	0	0	0	0	0
Base Saturation Flow Rate (s_o), veh/h	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Parking (N_m), man/h		None			None			None			None	
Heavy Vehicles (P_{HV}), %		2			2		2	2		2	2	
Ped / Bike / RTOR, /h	0	0	0	0	0	0	0	0	0	0	0	0
Buses (N_b), buses/h	0	0	0	0	0	0	0	0	0	0	0	0
Arrival Type (*AT*)	3	3	3	3	3	3	3	3	3	3	3	3
Upstream Filtering (*I*)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lane Width (*W*), ft		12.0			12.0		12.0	12.0		12.0	12.0	
Turn Bay Length, ft		0			0		0	0		0	0	
Grade (*Pg*), %		0			0			0			0	
Speed Limit, mi/h	50	50	50	50	50	50	50	50	50	50	50	50

Phase Information	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Maximum Green (G_{max}) or Phase Split, s		46.0		46.0	7.0	48.0	7.0	48.0
Yellow Change Interval (*Y*), s		5.0		5.0	3.0	5.0	3.0	5.0
Red Clearance Interval (R_c), s		1.5		1.5	3.0	1.5	3.0	1.5
Minimum Green (G_{min}), s		10		10	7	10	7	10
Start-Up Lost Time (*l*t), s	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Extension of Effective Green (*e*), s	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Passage (*PT*), s		2.0		2.0	2.0	2.0	2.0	2.0
Recall Mode		Off		Off	Off	Off	Off	Off
Dual Entry		Yes		Yes	No	Yes	No	Yes
Walk (*Walk*), s		0.0		0.0		0.0		0.0
Pedestrian Clearance Time (*PC*), s		0.0		0.0		0.0		0.0

Multimodal Information	EB			WB			NB			SB		
85th % Speed / Rest in Walk / Corner Radius	0	No	25	0	No	25	0	No	25	0	No	25
Walkway / Crosswalk Width / Length, ft	9.0	12	0	9.0	12	0	9.0	12	0	9.0	12	0
Street Width / Island / Curb	0	0	No	0	0	No	0	0	No	0	0	No
Width Outside / Bike Lane / Shoulder, ft	12	5.0	2.0	12	5.0	2.0	12	5.0	2.0	12	5.0	2.0
Pedestrian Signal / Occupied Parking	No	0.50		No	0.50		No	0.50		No	0.50	

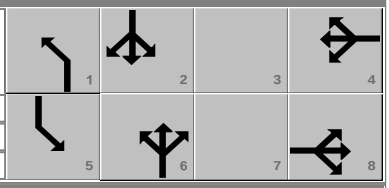
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Smart Services Inc			Duration, h	0.25
Analyst	BCK	Analysis Date	Sep 18, 2018	Area Type	Other
Jurisdiction	City of Grove City	Time Period	2019 PM Peak	PHF	0.92
Urban Street	Jackson Pike (SR 104)	Analysis Year	2019	Analysis Period	1> 7:00
Intersection	Jackson Pike & London-…	File Name	London-Groveport Rd (SR 665) & Jackson Pike (…		
Project Description	2019 No Build PM Peak				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	46	110	198	74	351	26	108	214	31	23	483	85

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	7.0	48.0	46.0	0.0	0.0	0.0
Yellow	3.0	5.0	5.0	0.0	0.0	0.0
Red	3.0	1.5	1.5	0.0	0.0	0.0

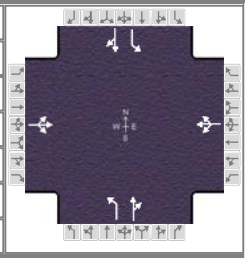
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		8		4	1	6	5	2
Case Number		8.0		8.0	1.1	4.0	1.1	4.0
Phase Duration, s		52.5		52.5	13.0	54.5	13.0	54.5
Change Period, ($Y+R_c$), s		6.5		6.5	6.0	6.5	6.0	6.5
Max Allow Headway (*MAH*), s		3.1		3.1	3.0	2.9	3.0	2.9
Queue Clearance Time (g_s), s		27.6		38.2	6.6	14.3	2.9	38.9
Green Extension Time (g_e), s		1.7		1.4	0.0	1.6	0.0	1.3
Phase Call Probability		1.00		1.00	1.00	1.00	1.00	1.00
Max Out Probability		0.00		0.17	1.00	0.00	0.10	0.08

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3	8	18	7	4	14	1	6	16	5	2	12
Adjusted Flow Rate (*v*), veh/h		385			490		117	266		25	617	
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1462			1525		1781	1829		1781	1821	
Queue Service Time (g_s), s		0.0			10.5		4.6	12.3		0.9	36.9	
Cycle Queue Clearance Time (g_c), s		25.6			36.2		4.6	12.3		0.9	36.9	
Green Ratio (*g/C*)		0.38			0.38		0.46	0.40		0.46	0.40	
Capacity (*c*), veh/h		594			619		225	731		477	729	
Volume-to-Capacity Ratio (*X*)		0.647			0.791		0.522	0.364		0.052	0.847	
Back of Queue (*Q*), ft/ln (50 th percentile)		225.8			341.2		47.1	128.9		9.2	429.2	
Back of Queue (*Q*), veh/ln (50 th percentile)		8.9			13.4		1.9	5.1		0.4	16.9	
Queue Storage Ratio (*RQ*) (50 th percentile)		0.00			0.00		0.00	0.00		0.00	0.00	
Uniform Delay (d_1), s/veh		30.0			33.8		26.2	25.3		18.7	32.7	
Incremental Delay (d_2), s/veh		1.9			6.4		1.1	0.1		0.0	8.8	
Initial Queue Delay (d_3), s/veh		0.0			0.0		0.0	0.0		0.0	0.0	
Control Delay (*d*), s/veh		32.0			40.1		27.3	25.4		18.7	41.4	
Level of Service (LOS)		C			D		C	C		B	D	
Approach Delay, s/veh / LOS	32.0	C		40.1	D		26.0	C		40.6	D	
Intersection Delay, s/veh / LOS	35.8						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.92	B	1.92	B	1.70	B	1.70	B
Bicycle LOS Score / LOS	1.12	A	1.30	A	1.12	A	1.55	B

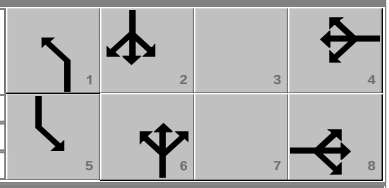
HCS7 Signalized Intersection Input Data

General Information				Intersection Information	
Agency	Smart Services Inc			Duration, h	0.25
Analyst	TJS	Analysis Date	Sep 18, 2018	Area Type	Other
Jurisdiction	City of Grove City	Time Period	2019 AM Peak	PHF	0.92
Urban Street	Jackson Pike (SR 104)	Analysis Year	2019	Analysis Period	1> 7:00
Intersection	Jackson Pike & London-…	File Name	London-Groveport Rd (SR 665) & Jackson Pike (…		
Project Description	2019 Residential Build AM Peak				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	91	224	97	16	118	30	155	448	118	34	119	69

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	7.0	49.4	44.6	0.0	0.0	0.0
Yellow	3.0	5.0	5.0	0.0	0.0	0.0
Red	3.0	1.5	1.5	0.0	0.0	0.0

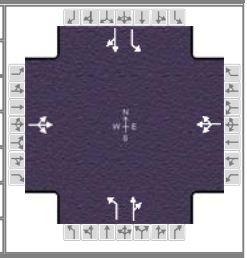
Traffic Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	91	224	97	16	118	30	155	448	118	34	119	69
Initial Queue (Q_b), veh/h	0	0	0	0	0	0	0	0	0	0	0	0
Base Saturation Flow Rate (s_o), veh/h	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Parking (N_m), man/h		None			None			None			None	
Heavy Vehicles (P_{HV}), %		2			2		2	2		2	2	
Ped / Bike / RTOR, /h	0	0	0	0	0	0	0	0	0	0	0	0
Buses (N_b), buses/h	0	0	0	0	0	0	0	0	0	0	0	0
Arrival Type (*AT*)	3	3	3	3	3	3	3	3	3	3	3	3
Upstream Filtering (*I*)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lane Width (*W*), ft		12.0			12.0		12.0	12.0		12.0	12.0	
Turn Bay Length, ft		0			0		0	0		0	0	
Grade (*Pg*), %		0			0			0			0	
Speed Limit, mi/h	50	50	50	50	50	50	50	50	50	50	50	50

Phase Information	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Maximum Green (G_{max}) or Phase Split, s		44.6		44.6	7.0	49.4	7.0	49.4
Yellow Change Interval (*Y*), s		5.0		5.0	3.0	5.0	3.0	5.0
Red Clearance Interval (R_c), s		1.5		1.5	3.0	1.5	3.0	1.5
Minimum Green (G_{min}), s		10		10	7	10	7	10
Start-Up Lost Time (*l*t), s	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Extension of Effective Green (*e*), s	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Passage (*PT*), s		2.0		2.0	2.0	2.0	2.0	2.0
Recall Mode		Off		Off	Off	Off	Off	Off
Dual Entry		Yes		Yes	No	Yes	No	Yes
Walk (*Walk*), s		0.0		0.0		0.0		0.0
Pedestrian Clearance Time (*PC*), s		0.0		0.0		0.0		0.0

Multimodal Information	EB			WB			NB			SB		
85th % Speed / Rest in Walk / Corner Radius	0	No	25	0	No	25	0	No	25	0	No	25
Walkway / Crosswalk Width / Length, ft	9.0	12	0	9.0	12	0	9.0	12	0	9.0	12	0
Street Width / Island / Curb	0	0	No	0	0	No	0	0	No	0	0	No
Width Outside / Bike Lane / Shoulder, ft	12	5.0	2.0	12	5.0	2.0	12	5.0	2.0	12	5.0	2.0
Pedestrian Signal / Occupied Parking	No	0.50		No	0.50		No	0.50		No	0.50	

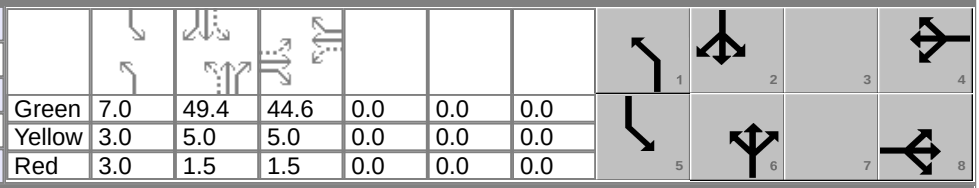
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Smart Services Inc			Duration, h	0.25
Analyst	TJS	Analysis Date	Sep 18, 2018	Area Type	Other
Jurisdiction	City of Grove City	Time Period	2019 AM Peak	PHF	0.92
Urban Street	Jackson Pike (SR 104)	Analysis Year	2019	Analysis Period	1> 7:00
Intersection	Jackson Pike & London-…	File Name	London-Groveport Rd (SR 665) & Jackson Pike (…		
Project Description	2019 Residential Build AM Peak				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	91	224	97	16	118	30	155	448	118	34	119	69

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	7.0	49.4	44.6	0.0	0.0	0.0
Yellow	3.0	5.0	5.0	0.0	0.0	0.0
Red	3.0	1.5	1.5	0.0	0.0	0.0

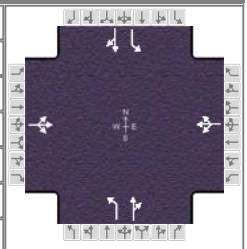
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		8		4	1	6	5	2
Case Number		8.0		8.0	1.1	4.0	1.1	4.0
Phase Duration, s		51.1		51.1	13.0	55.9	13.0	55.9
Change Period, ($Y+R_c$), s		6.5		6.5	6.0	6.5	6.0	6.5
Max Allow Headway (*MAH*), s		3.0		3.0	3.0	3.0	3.0	3.0
Queue Clearance Time (g_s), s		30.0		10.2	8.6	38.6	3.3	11.3
Green Extension Time (g_e), s		1.1		1.2	0.0	1.3	0.0	1.5
Phase Call Probability		1.00		1.00	1.00	1.00	1.00	1.00
Max Out Probability		0.00		0.00	1.00	0.03	0.27	0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3	8	18	7	4	14	1	6	16	5	2	12
Adjusted Flow Rate (*v*), veh/h		448			178		168	615		37	204	
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1639			1718		1781	1803		1781	1754	
Queue Service Time (g_s), s		19.8			0.0		6.6	36.6		1.3	9.3	
Cycle Queue Clearance Time (g_c), s		28.0			8.2		6.6	36.6		1.3	9.3	
Green Ratio (*g/C*)		0.37			0.37		0.47	0.41		0.47	0.41	
Capacity (*c*), veh/h		646			672		538	742		237	722	
Volume-to-Capacity Ratio (*X*)		0.693			0.265		0.313	0.829		0.156	0.283	
Back of Queue (*Q*), ft/ln (50 th percentile)		278.6			86.5		65.8	414.4		13.4	93.5	
Back of Queue (*Q*), veh/ln (50 th percentile)		11.0			3.4		2.6	16.3		0.5	3.7	
Queue Storage Ratio (*RQ*) (50 th percentile)		0.00			0.00		0.00	0.00		0.00	0.00	
Uniform Delay (d_1), s/veh		32.3			26.3		19.2	31.5		23.7	23.5	
Incremental Delay (d_2), s/veh		2.7			0.1		0.1	7.4		0.1	0.1	
Initial Queue Delay (d_3), s/veh		0.0			0.0		0.0	0.0		0.0	0.0	
Control Delay (*d*), s/veh		34.9			26.4		19.4	38.9		23.8	23.6	
Level of Service (LOS)		C			C		B	D		C	C	
Approach Delay, s/veh / LOS	34.9	C		26.4	C		34.7	C		23.6	C	
Intersection Delay, s/veh / LOS	32.2						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.92	B	1.92	B	1.69	B	1.69	B
Bicycle LOS Score / LOS	1.23	A	0.78	A	1.78	B	0.89	A

HCS7 Signalized Intersection Input Data

General Information				Intersection Information	
Agency	Smart Services Inc			Duration, h	0.25
Analyst	BCK	Analysis Date	Sep 18, 2018	Area Type	Other
Jurisdiction	City of Grove City	Time Period	2019 PM Peak	PHF	0.92
Urban Street	Jackson Pike (SR 104)	Analysis Year	2019	Analysis Period	1> 16:30
Intersection	Jackson Pike & London-…	File Name	London-Groveport Rd (SR 665) & Jackson Pike (…		
Project Description	2019 Residential Build PM Peak				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	73	118	202	74	365	42	115	222	31	33	488	101

Signal Information					EB			WB			NB			SB		
Cycle, s	120.0	Reference Phase	2													
Offset, s	0	Reference Point	End	Green	7.0	45.9		48.1	0.0	0.0	0.0					
Uncoordinated	Yes	Simult. Gap E/W	On	Yellow	3.0	5.0		5.0	0.0	0.0	0.0					
Force Mode	Fixed	Simult. Gap N/S	On	Red	3.0	1.5		1.5	0.0	0.0	0.0					

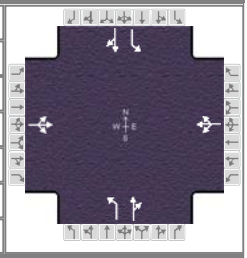
Traffic Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	73	118	202	74	365	42	115	222	31	33	488	101
Initial Queue (Q_b), veh/h	0	0	0	0	0	0	0	0	0	0	0	0
Base Saturation Flow Rate (s_o), veh/h	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Parking (N_m), man/h		None			None			None			None	
Heavy Vehicles (P_{HV}), %		2			2		2	2		2	2	
Ped / Bike / RTOR, /h	0	0	0	0	0	0	0	0	0	0	0	0
Buses (N_b), buses/h	0	0	0	0	0	0	0	0	0	0	0	0
Arrival Type (*AT*)	3	3	3	3	3	3	3	3	3	3	3	3
Upstream Filtering (*I*)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lane Width (*W*), ft		12.0			12.0		12.0	12.0		12.0	12.0	
Turn Bay Length, ft		0			0		0	0		0	0	
Grade (*Pg*), %		0			0			0			0	
Speed Limit, mi/h	50	50	50	50	50	50	50	50	50	50	50	50

Phase Information	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Maximum Green (G_{max}) or Phase Split, s		48.1		48.1	7.0	45.9	7.0	45.9
Yellow Change Interval (*Y*), s		5.0		5.0	3.0	5.0	3.0	5.0
Red Clearance Interval (R_c), s		1.5		1.5	3.0	1.5	3.0	1.5
Minimum Green (G_{min}), s		10		10	7	10	7	10
Start-Up Lost Time (*l*t), s	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Extension of Effective Green (*e*), s	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Passage (*PT*), s		2.0		2.0	2.0	2.0	2.0	2.0
Recall Mode		Off		Off	Off	Off	Off	Off
Dual Entry		Yes		Yes	No	Yes	No	Yes
Walk (*Walk*), s		0.0		0.0		0.0		0.0
Pedestrian Clearance Time (*PC*), s		0.0		0.0		0.0		0.0

Multimodal Information	EB			WB			NB			SB		
85th % Speed / Rest in Walk / Corner Radius	0	No	25	0	No	25	0	No	25	0	No	25
Walkway / Crosswalk Width / Length, ft	9.0	12	0	9.0	12	0	9.0	12	0	9.0	12	0
Street Width / Island / Curb	0	0	No	0	0	No	0	0	No	0	0	No
Width Outside / Bike Lane / Shoulder, ft	12	5.0	2.0	12	5.0	2.0	12	5.0	2.0	12	5.0	2.0
Pedestrian Signal / Occupied Parking	No	0.50		No	0.50		No	0.50		No	0.50	

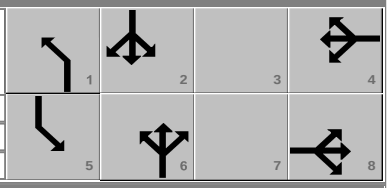
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Smart Services Inc			Duration, h	0.25
Analyst	BCK	Analysis Date	Sep 18, 2018	Area Type	Other
Jurisdiction	City of Grove City	Time Period	2019 PM Peak	PHF	0.92
Urban Street	Jackson Pike (SR 104)	Analysis Year	2019	Analysis Period	1> 16:30
Intersection	Jackson Pike & London-…	File Name	London-Groveport Rd (SR 665) & Jackson Pike (…		
Project Description	2019 Residential Build PM Peak				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	73	118	202	74	365	42	115	222	31	33	488	101

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	7.0	45.9	48.1	0.0	0.0	0.0
Yellow	3.0	5.0	5.0	0.0	0.0	0.0
Red	3.0	1.5	1.5	0.0	0.0	0.0

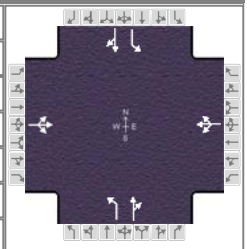
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		8		4	1	6	5	2
Case Number		8.0		8.0	1.1	4.0	1.1	4.0
Phase Duration, s		54.6		54.6	13.0	52.4	13.0	52.4
Change Period, ($Y+R_c$), s		6.5		6.5	6.0	6.5	6.0	6.5
Max Allow Headway (*MAH*), s		3.2		3.2	3.0	2.9	3.0	2.9
Queue Clearance Time (g_s), s		43.9		47.6	7.1	15.1	3.4	42.4
Green Extension Time (g_e), s		1.1		0.2	0.0	1.7	0.0	0.8
Phase Call Probability		1.00		1.00	1.00	1.00	1.00	1.00
Max Out Probability		0.70		1.00	1.00	0.00	0.29	0.80

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3	8	18	7	4	14	1	6	16	5	2	12
Adjusted Flow Rate (*v*), veh/h		427			523		125	275		36	640	
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1167			1362		1781	1830		1781	1814	
Queue Service Time (g_s), s		0.0			3.8		5.1	13.1		1.4	40.4	
Cycle Queue Clearance Time (g_c), s		41.9			45.6		5.1	13.1		1.4	40.4	
Green Ratio (*g/C*)		0.40			0.40		0.44	0.38		0.44	0.38	
Capacity (*c*), veh/h		503			581		187	700		447	694	
Volume-to-Capacity Ratio (*X*)		0.848			0.901		0.669	0.393		0.080	0.923	
Back of Queue (*Q*), ft/ln (50 th percentile)		315.9			421.5		60.1	139		13.8	509	
Back of Queue (*Q*), veh/ln (50 th percentile)		12.4			16.6		2.4	5.5		0.5	20.0	
Queue Storage Ratio (*RQ*) (50 th percentile)		0.00			0.00		0.00	0.00		0.00	0.00	
Uniform Delay (d_1), s/veh		32.3			34.3		28.6	26.9		20.1	35.4	
Incremental Delay (d_2), s/veh		12.2			16.7		7.2	0.1		0.0	17.6	
Initial Queue Delay (d_3), s/veh		0.0			0.0		0.0	0.0		0.0	0.0	
Control Delay (*d*), s/veh		44.6			51.0		35.9	27.1		20.2	52.9	
Level of Service (LOS)		D			D		D	C		C	D	
Approach Delay, s/veh / LOS	44.6	D		51.0	D		29.8	C		51.2	D	
Intersection Delay, s/veh / LOS	45.5						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.92	B	1.92	B	1.70	B	1.70	B
Bicycle LOS Score / LOS	1.19	A	1.35	A	1.15	A	1.60	B

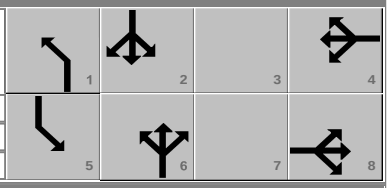
HCS7 Signalized Intersection Input Data

General Information				Intersection Information	
Agency	Smart Services Inc			Duration, h	0.25
Analyst	BCK	Analysis Date	Sep 18, 2018	Area Type	Other
Jurisdiction	City of Grove City	Time Period	2029 AM Peak	PHF	0.92
Urban Street	Jackson Pike (SR 104)	Analysis Year	2029	Analysis Period	1> 7:00
Intersection	Jackson Pike & London-…	File Name	London-Groveport Rd (SR 665) & Jackson Pike (…		
Project Description	2029 No Build AM Peak				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	105	265	114	20	140	31	184	536	141	21	130	52

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	7.0	51.3	42.7	0.0	0.0	0.0						
Yellow	3.0	5.0	5.0	0.0	0.0	0.0						
Red	3.0	1.5	1.5	0.0	0.0	0.0						

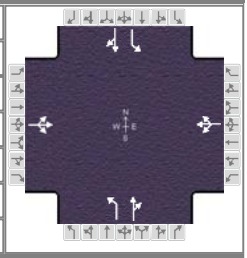
Traffic Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	105	265	114	20	140	31	184	536	141	21	130	52
Initial Queue (Q_b), veh/h	0	0	0	0	0	0	0	0	0	0	0	0
Base Saturation Flow Rate (s_o), veh/h	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Parking (N_m), man/h		None			None			None			None	
Heavy Vehicles (P_{HV}), %		2			2		2	2		2	2	
Ped / Bike / RTOR, /h	0	0	0	0	0	0	0	0	0	0	0	0
Buses (N_b), buses/h	0	0	0	0	0	0	0	0	0	0	0	0
Arrival Type (*AT*)	3	3	3	3	3	3	3	3	3	3	3	3
Upstream Filtering (*I*)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lane Width (*W*), ft		12.0			12.0		12.0	12.0		12.0	12.0	
Turn Bay Length, ft		0			0		0	0		0	0	
Grade (*Pg*), %		0			0			0			0	
Speed Limit, mi/h	50	50	50	50	50	50	50	50	50	50	50	50

Phase Information	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Maximum Green (G_{max}) or Phase Split, s		42.7		42.7	7.0	51.3	7.0	51.3
Yellow Change Interval (*Y*), s		5.0		5.0	3.0	5.0	3.0	5.0
Red Clearance Interval (R_c), s		1.5		1.5	3.0	1.5	3.0	1.5
Minimum Green (G_{min}), s		10		10	7	10	7	10
Start-Up Lost Time (*l*t), s	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Extension of Effective Green (*e*), s	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Passage (*PT*), s		2.0		2.0	2.0	2.0	2.0	2.0
Recall Mode		Off		Off	Off	Off	Off	Off
Dual Entry		Yes		Yes	No	Yes	No	Yes
Walk (*Walk*), s		0.0		0.0		0.0		0.0
Pedestrian Clearance Time (*PC*), s		0.0		0.0		0.0		0.0

Multimodal Information	EB			WB			NB			SB		
85th % Speed / Rest in Walk / Corner Radius	0	No	25	0	No	25	0	No	25	0	No	25
Walkway / Crosswalk Width / Length, ft	9.0	12	0	9.0	12	0	9.0	12	0	9.0	12	0
Street Width / Island / Curb	0	0	No	0	0	No	0	0	No	0	0	No
Width Outside / Bike Lane / Shoulder, ft	12	5.0	2.0	12	5.0	2.0	12	5.0	2.0	12	5.0	2.0
Pedestrian Signal / Occupied Parking	No	0.50		No	0.50		No	0.50		No	0.50	

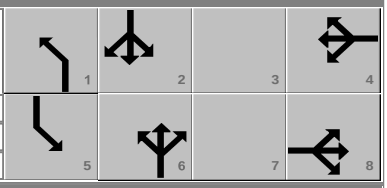
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Smart Services Inc			Duration, h	0.25
Analyst	BCK	Analysis Date	Sep 18, 2018	Area Type	Other
Jurisdiction	City of Grove City	Time Period	2029 AM Peak	PHF	0.92
Urban Street	Jackson Pike (SR 104)	Analysis Year	2029	Analysis Period	1> 7:00
Intersection	Jackson Pike & London-…	File Name	London-Groveport Rd (SR 665) & Jackson Pike (…		
Project Description	2029 No Build AM Peak				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	105	265	114	20	140	31	184	536	141	21	130	52

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	7.0	51.3	42.7	0.0	0.0	0.0		
Yellow	3.0	5.0	5.0	0.0	0.0	0.0		
Red	3.0	1.5	1.5	0.0	0.0	0.0		

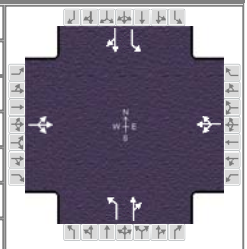
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		8		4	1	6	5	2
Case Number		8.0		8.0	1.1	4.0	1.1	4.0
Phase Duration, s		49.2		49.2	13.0	57.8	13.0	57.8
Change Period, ($Y+R_c$), s		6.5		6.5	6.0	6.5	6.0	6.5
Max Allow Headway (*MAH*), s		3.1		3.1	3.0	3.0	3.0	3.0
Queue Clearance Time (g_s), s		38.8		12.0	9.0	49.4	2.8	10.6
Green Extension Time (g_e), s		0.7		1.4	0.0	0.5	0.0	1.8
Phase Call Probability		1.00		1.00	1.00	1.00	1.00	1.00
Max Out Probability		0.67		0.00	1.00	1.00	0.07	0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3	8	18	7	4	14	1	6	16	5	2	12
Adjusted Flow Rate (*v*), veh/h		526			208		200	736		23	198	
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1628			1627		1781	1803		1781	1779	
Queue Service Time (g_s), s		26.8			0.0		7.0	47.4		0.8	8.6	
Cycle Queue Clearance Time (g_c), s		36.8			10.0		7.0	47.4		0.8	8.6	
Green Ratio (*g/C*)		0.36			0.36		0.49	0.43		0.49	0.43	
Capacity (*c*), veh/h		616			612		566	771		175	760	
Volume-to-Capacity Ratio (*X*)		0.854			0.339		0.353	0.955		0.130	0.260	
Back of Queue (*Q*), ft/ln (50 th percentile)		394.2			105.8		76.8	602.6		8	87	
Back of Queue (*Q*), veh/ln (50 th percentile)		15.5			4.2		3.0	23.7		0.3	3.4	
Queue Storage Ratio (*RQ*) (50 th percentile)		0.00			0.00		0.00	0.00		0.00	0.00	
Uniform Delay (d_1), s/veh		36.5			28.1		19.1	33.2		26.6	22.1	
Incremental Delay (d_2), s/veh		10.8			0.1		0.1	21.8		0.1	0.1	
Initial Queue Delay (d_3), s/veh		0.0			0.0		0.0	0.0		0.0	0.0	
Control Delay (*d*), s/veh		47.3			28.2		19.3	55.1		26.7	22.2	
Level of Service (LOS)		D			C		B	E		C	C	
Approach Delay, s/veh / LOS	47.3	D		28.2	C		47.4	D		22.7	C	
Intersection Delay, s/veh / LOS	42.4						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.93	B	1.93	B	1.69	B	1.69	B
Bicycle LOS Score / LOS	1.36	A	0.83	A	2.03	B	0.85	A

HCS7 Signalized Intersection Input Data

General Information				Intersection Information	
Agency	Smart Services Inc			Duration, h	0.25
Analyst	BCK	Analysis Date	Sep 18, 2018	Area Type	Other
Jurisdiction	City of Grove City	Time Period	2029 PM Peak	PHF	0.92
Urban Street	Jackson Pike (SR 104)	Analysis Year	2029	Analysis Period	1> 7:00
Intersection	Jackson Pike & London-…	File Name	London-Groveport Rd (SR 665) & Jackson Pike (…		
Project Description	2029 No Build PM Peak				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	58	138	249	92	438	33	130	257	38	26	558	98

Signal Information													
Cycle, s	120.0	Reference Phase	2							1	2	3	4
Offset, s	0	Reference Point	End	Green	7.0	43.6	50.4	0.0	0.0	0.0	5	6	7	8
Uncoordinated	Yes	Simult. Gap E/W	On	Yellow	3.0	5.0	5.0	0.0	0.0	0.0				
Force Mode	Fixed	Simult. Gap N/S	On	Red	3.0	1.5	1.5	0.0	0.0	0.0				

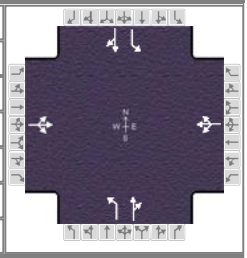
Traffic Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	58	138	249	92	438	33	130	257	38	26	558	98
Initial Queue (Q_b), veh/h	0	0	0	0	0	0	0	0	0	0	0	0
Base Saturation Flow Rate (s_o), veh/h	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Parking (N_m), man/h		None			None			None			None	
Heavy Vehicles (P_{HV}), %		2			2		2	2		2	2	
Ped / Bike / RTOR, /h	0	0	0	0	0	0	0	0	0	0	0	0
Buses (N_b), buses/h	0	0	0	0	0	0	0	0	0	0	0	0
Arrival Type (*AT*)	3	3	3	3	3	3	3	3	3	3	3	3
Upstream Filtering (*I*)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lane Width (*W*), ft		12.0			12.0		12.0	12.0		12.0	12.0	
Turn Bay Length, ft		0			0		0	0		0	0	
Grade (*Pg*), %		0			0			0			0	
Speed Limit, mi/h	50	50	50	50	50	50	50	50	50	50	50	50

Phase Information	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Maximum Green (G_{max}) or Phase Split, s		50.4		50.4	7.0	43.6	7.0	43.6
Yellow Change Interval (*Y*), s		5.0		5.0	3.0	5.0	3.0	5.0
Red Clearance Interval (R_c), s		1.5		1.5	3.0	1.5	3.0	1.5
Minimum Green (G_{min}), s		10		10	7	10	7	10
Start-Up Lost Time (*l*t), s	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Extension of Effective Green (*e*), s	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Passage (*PT*), s		2.0		2.0	2.0	2.0	2.0	2.0
Recall Mode		Off		Off	Off	Off	Off	Off
Dual Entry		Yes		Yes	No	Yes	No	Yes
Walk (*Walk*), s		0.0		0.0		0.0		0.0
Pedestrian Clearance Time (*PC*), s		0.0		0.0		0.0		0.0

Multimodal Information	EB			WB			NB			SB		
85th % Speed / Rest in Walk / Corner Radius	0	No	25	0	No	25	0	No	25	0	No	25
Walkway / Crosswalk Width / Length, ft	9.0	12	0	9.0	12	0	9.0	12	0	9.0	12	0
Street Width / Island / Curb	0	0	No	0	0	No	0	0	No	0	0	No
Width Outside / Bike Lane / Shoulder, ft	12	5.0	2.0	12	5.0	2.0	12	5.0	2.0	12	5.0	2.0
Pedestrian Signal / Occupied Parking	No	0.50		No	0.50		No	0.50		No	0.50	

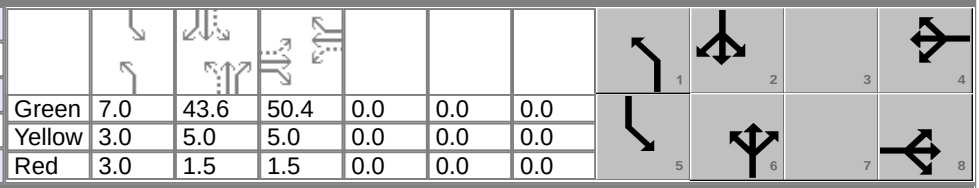
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Smart Services Inc			Duration, h	0.25
Analyst	BCK	Analysis Date	Sep 18, 2018	Area Type	Other
Jurisdiction	City of Grove City	Time Period	2029 PM Peak	PHF	0.92
Urban Street	Jackson Pike (SR 104)	Analysis Year	2029	Analysis Period	1> 7:00
Intersection	Jackson Pike & London-…	File Name	London-Groveport Rd (SR 665) & Jackson Pike (…		
Project Description	2029 No Build PM Peak				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	58	138	249	92	438	33	130	257	38	26	558	98

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	7.0	43.6	50.4	0.0	0.0	0.0
Yellow	3.0	5.0	5.0	0.0	0.0	0.0
Red	3.0	1.5	1.5	0.0	0.0	0.0

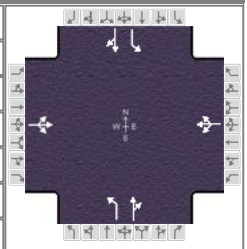
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		8		4	1	6	5	2
Case Number		8.0		8.0	1.1	4.0	1.1	4.0
Phase Duration, s		56.9		56.9	13.0	50.1	13.0	50.1
Change Period, ($Y+R_c$), s		6.5		6.5	6.0	6.5	6.0	6.5
Max Allow Headway (*MAH*), s		3.2		3.2	3.0	2.9	3.0	2.9
Queue Clearance Time (g_s), s		41.4		52.4	8.0	18.3	3.1	45.6
Green Extension Time (g_e), s		2.0		0.0	0.0	1.9	0.0	0.0
Phase Call Probability		1.00		1.00	1.00	1.00	1.00	1.00
Max Out Probability		0.19		1.00	1.00	0.00	0.16	1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3	8	18	7	4	14	1	6	16	5	2	12
Adjusted Flow Rate (*v*), veh/h		484			612		141	321		28	713	
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1309			1282		1781	1828		1781	1821	
Queue Service Time (g_s), s		0.0			11.0		6.0	16.3		1.1	43.6	
Cycle Queue Clearance Time (g_c), s		39.4			50.4		6.0	16.3		1.1	43.6	
Green Ratio (*g/C*)		0.42			0.42		0.42	0.36		0.42	0.36	
Capacity (*c*), veh/h		584			573		164	664		388	662	
Volume-to-Capacity Ratio (*X*)		0.829			1.067		0.862	0.483		0.073	1.077	
Back of Queue (*Q*), ft/ln (50 th percentile)		332.5			646.7		144.5	173.1		11.3	729.4	
Back of Queue (*Q*), veh/ln (50 th percentile)		13.1			25.5		5.7	6.8		0.4	28.7	
Queue Storage Ratio (*RQ*) (50 th percentile)		0.00			0.00		0.00	0.00		0.00	0.00	
Uniform Delay (d_1), s/veh		30.3			36.5		29.7	29.5		21.8	38.2	
Incremental Delay (d_2), s/veh		9.1			56.9		33.3	0.2		0.0	57.7	
Initial Queue Delay (d_3), s/veh		0.0			0.0		0.0	0.0		0.0	0.0	
Control Delay (*d*), s/veh		39.4			93.4		63.0	29.7		21.8	95.9	
Level of Service (LOS)		D			F		E	C		C	F	
Approach Delay, s/veh / LOS	39.4	D		93.4	F		39.9	D		93.1	F	
Intersection Delay, s/veh / LOS	71.2						E					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.92	B	1.92	B	1.70	B	1.70	B
Bicycle LOS Score / LOS	1.29	A	1.50	A	1.25	A	1.71	B

HCS7 Signalized Intersection Input Data

General Information				Intersection Information	
Agency	Smart Services Inc			Duration, h	0.25
Analyst	TJS	Analysis Date	Sep 18, 2018	Area Type	Other
Jurisdiction	City of Grove City	Time Period	2029 AM Peak	PHF	0.92
Urban Street	Jackson Pike (SR 104)	Analysis Year	2029	Analysis Period	1> 7:00
Intersection	Jackson Pike & London-…	File Name	London-Groveport Rd (SR 665) & Jackson Pike (…		
Project Description	2029 Residential Build AM Peak				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	113	278	120	20	145	36	186	538	141	36	137	76

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

							1	2	3	4
Green	7.0	50.5	43.5	0.0	0.0	0.0	5	6	7	8
Yellow	3.0	5.0	5.0	0.0	0.0	0.0				
Red	3.0	1.5	1.5	0.0	0.0	0.0				

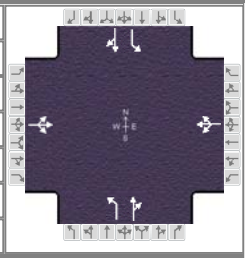
Traffic Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	113	278	120	20	145	36	186	538	141	36	137	76
Initial Queue (Q_b), veh/h	0	0	0	0	0	0	0	0	0	0	0	0
Base Saturation Flow Rate (s_o), veh/h	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Parking (N_m), man/h		None			None			None			None	
Heavy Vehicles (P_{HV}), %		2			2		2	2		2	2	
Ped / Bike / RTOR, /h	0	0	0	0	0	0	0	0	0	0	0	0
Buses (N_b), buses/h	0	0	0	0	0	0	0	0	0	0	0	0
Arrival Type (*AT*)	3	3	3	3	3	3	3	3	3	3	3	3
Upstream Filtering (*I*)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lane Width (*W*), ft		12.0			12.0		12.0	12.0		12.0	12.0	
Turn Bay Length, ft		0			0		0	0		0	0	
Grade (*Pg*), %		0			0			0			0	
Speed Limit, mi/h	50	50	50	50	50	50	50	50	50	50	50	50

Phase Information	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Maximum Green (G_{max}) or Phase Split, s		43.5		43.5	7.0	50.5	7.0	50.5
Yellow Change Interval (*Y*), s		5.0		5.0	3.0	5.0	3.0	5.0
Red Clearance Interval (R_c), s		1.5		1.5	3.0	1.5	3.0	1.5
Minimum Green (G_{min}), s		10		10	7	10	7	10
Start-Up Lost Time (*l*t), s	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Extension of Effective Green (*e*), s	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Passage (*PT*), s		2.0		2.0	2.0	2.0	2.0	2.0
Recall Mode		Off		Off	Off	Off	Off	Off
Dual Entry		Yes		Yes	No	Yes	No	Yes
Walk (*Walk*), s		0.0		0.0		0.0		0.0
Pedestrian Clearance Time (*PC*), s		0.0		0.0		0.0		0.0

Multimodal Information	EB			WB			NB			SB		
85th % Speed / Rest in Walk / Corner Radius	0	No	25	0	No	25	0	No	25	0	No	25
Walkway / Crosswalk Width / Length, ft	9.0	12	0	9.0	12	0	9.0	12	0	9.0	12	0
Street Width / Island / Curb	0	0	No	0	0	No	0	0	No	0	0	No
Width Outside / Bike Lane / Shoulder, ft	12	5.0	2.0	12	5.0	2.0	12	5.0	2.0	12	5.0	2.0
Pedestrian Signal / Occupied Parking	No	0.50		No	0.50		No	0.50		No	0.50	

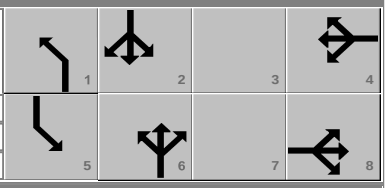
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Smart Services Inc			Duration, h	0.25
Analyst	TJS	Analysis Date	Sep 18, 2018	Area Type	Other
Jurisdiction	City of Grove City	Time Period	2029 AM Peak	PHF	0.92
Urban Street	Jackson Pike (SR 104)	Analysis Year	2029	Analysis Period	1> 7:00
Intersection	Jackson Pike & London-…	File Name	London-Groveport Rd (SR 665) & Jackson Pike (…		
Project Description	2029 Residential Build AM Peak				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	113	278	120	20	145	36	186	538	141	36	137	76

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	7.0	50.5	43.5	0.0	0.0	0.0
Yellow	3.0	5.0	5.0	0.0	0.0	0.0
Red	3.0	1.5	1.5	0.0	0.0	0.0

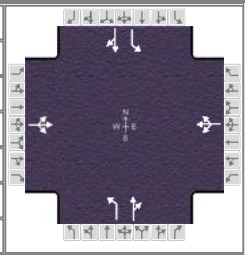
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		8		4	1	6	5	2
Case Number		8.0		8.0	1.1	4.0	1.1	4.0
Phase Duration, s		50.0		50.0	13.0	57.0	13.0	57.0
Change Period, ($Y+R_c$), s		6.5		6.5	6.0	6.5	6.0	6.5
Max Allow Headway (*MAH*), s		3.1		3.1	3.0	3.0	3.0	3.0
Queue Clearance Time (g_s), s		42.3		12.5	9.0	50.2	3.4	12.5
Green Extension Time (g_e), s		0.3		1.5	0.0	0.1	0.0	1.9
Phase Call Probability		1.00		1.00	1.00	1.00	1.00	1.00
Max Out Probability		1.00		0.00	1.00	1.00	0.31	0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3	8	18	7	4	14	1	6	16	5	2	12
Adjusted Flow Rate (*v*), veh/h		555			218		202	738		39	232	
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1609			1616		1781	1803		1781	1757	
Queue Service Time (g_s), s		29.8			0.0		7.0	48.2		1.4	10.5	
Cycle Queue Clearance Time (g_c), s		40.3			10.5		7.0	48.2		1.4	10.5	
Green Ratio (*g/C*)		0.36			0.36		0.48	0.42		0.48	0.42	
Capacity (*c*), veh/h		620			619		527	759		166	740	
Volume-to-Capacity Ratio (*X*)		0.896			0.353		0.383	0.973		0.236	0.313	
Back of Queue (*Q*), ft/ln (50 th percentile)		441.8			110.6		78.9	631		14	105.3	
Back of Queue (*Q*), veh/ln (50 th percentile)		17.4			4.4		3.1	24.8		0.6	4.1	
Queue Storage Ratio (*RQ*) (50 th percentile)		0.00			0.00		0.00	0.00		0.00	0.00	
Uniform Delay (d_1), s/veh		37.1			27.7		20.2	34.1		27.3	23.2	
Incremental Delay (d_2), s/veh		15.3			0.1		0.2	25.9		0.3	0.1	
Initial Queue Delay (d_3), s/veh		0.0			0.0		0.0	0.0		0.0	0.0	
Control Delay (*d*), s/veh		52.4			27.9		20.3	59.9		27.5	23.3	
Level of Service (LOS)		D			C		C	E		C	C	
Approach Delay, s/veh / LOS	52.4	D		27.9	C		51.4	D		23.9	C	
Intersection Delay, s/veh / LOS	45.3						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.93	B	1.93	B	1.69	B	1.69	B
Bicycle LOS Score / LOS	1.40	A	0.85	A	2.04	B	0.93	A

HCS7 Signalized Intersection Input Data

General Information				Intersection Information	
Agency	Smart Services Inc			Duration, h	0.25
Analyst	TJS	Analysis Date	Sep 18, 2018	Area Type	Other
Jurisdiction	City of Grove City	Time Period	2029 PM Peak	PHF	0.92
Urban Street	Jackson Pike (SR 104)	Analysis Year	2029	Analysis Period	1> 16:30
Intersection	Jackson Pike & London-…	File Name	London-Groveport Rd (SR 665) & Jackson Pike (…		
Project Description	2029 Residential Build PM Peak				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	85	146	253	92	452	49	137	265	38	36	563	114

Signal Information					EB			WB			NB			SB		
Cycle, s	120.0	Reference Phase	2													
Offset, s	0	Reference Point	End	Green	7.0	42.1	51.9	0.0	0.0	0.0						
Uncoordinated	Yes	Simult. Gap E/W	On	Yellow	3.0	5.0	5.0	0.0	0.0	0.0						
Force Mode	Fixed	Simult. Gap N/S	On	Red	3.0	1.5	1.5	0.0	0.0	0.0						

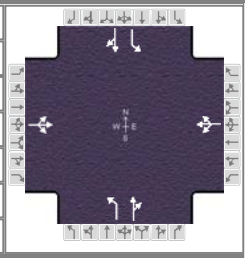
Traffic Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	85	146	253	92	452	49	137	265	38	36	563	114
Initial Queue (Q_b), veh/h	0	0	0	0	0	0	0	0	0	0	0	0
Base Saturation Flow Rate (s_o), veh/h	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Parking (N_m), man/h		None			None			None			None	
Heavy Vehicles (P_{HV}), %		2			2		2	2		2	2	
Ped / Bike / RTOR, /h	0	0	0	0	0	0	0	0	0	0	0	0
Buses (N_b), buses/h	0	0	0	0	0	0	0	0	0	0	0	0
Arrival Type (*AT*)	3	3	3	3	3	3	3	3	3	3	3	3
Upstream Filtering (*I*)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lane Width (*W*), ft		12.0			12.0		12.0	12.0		12.0	12.0	
Turn Bay Length, ft		0			0		0	0		0	0	
Grade (*Pg*), %		0			0			0			0	
Speed Limit, mi/h	50	50	50	50	50	50	50	50	50	50	50	50

Phase Information	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Maximum Green (G_{max}) or Phase Split, s		51.9		51.9	7.0	42.1	7.0	42.1
Yellow Change Interval (*Y*), s		5.0		5.0	3.0	5.0	3.0	5.0
Red Clearance Interval (R_c), s		1.5		1.5	3.0	1.5	3.0	1.5
Minimum Green (G_{min}), s		10		10	7	10	7	10
Start-Up Lost Time (*l*t), s	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Extension of Effective Green (*e*), s	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Passage (*PT*), s		2.0		2.0	2.0	2.0	2.0	2.0
Recall Mode		Off		Off	Off	Off	Off	Off
Dual Entry		Yes		Yes	No	Yes	No	Yes
Walk (*Walk*), s		0.0		0.0		0.0		0.0
Pedestrian Clearance Time (*PC*), s		0.0		0.0		0.0		0.0

Multimodal Information	EB			WB			NB			SB		
85th % Speed / Rest in Walk / Corner Radius	0	No	25	0	No	25	0	No	25	0	No	25
Walkway / Crosswalk Width / Length, ft	9.0	12	0	9.0	12	0	9.0	12	0	9.0	12	0
Street Width / Island / Curb	0	0	No	0	0	No	0	0	No	0	0	No
Width Outside / Bike Lane / Shoulder, ft	12	5.0	2.0	12	5.0	2.0	12	5.0	2.0	12	5.0	2.0
Pedestrian Signal / Occupied Parking	No	0.50		No	0.50		No	0.50		No	0.50	

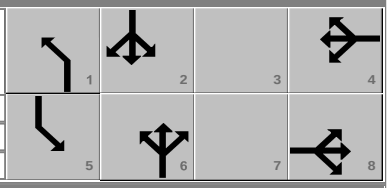
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Smart Services Inc			Duration, h	0.25
Analyst	TJS	Analysis Date	Sep 18, 2018	Area Type	Other
Jurisdiction	City of Grove City	Time Period	2029 PM Peak	PHF	0.92
Urban Street	Jackson Pike (SR 104)	Analysis Year	2029	Analysis Period	1> 16:30
Intersection	Jackson Pike & London-…	File Name	London-Groveport Rd (SR 665) & Jackson Pike (…		
Project Description	2029 Residential Build PM Peak				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	85	146	253	92	452	49	137	265	38	36	563	114

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	7.0	42.1	51.9	0.0	0.0	0.0
Yellow	3.0	5.0	5.0	0.0	0.0	0.0
Red	3.0	1.5	1.5	0.0	0.0	0.0

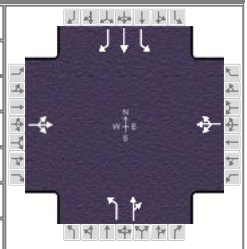
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		8		4	1	6	5	2
Case Number		8.0		8.0	1.1	4.0	1.1	4.0
Phase Duration, s		58.4		58.4	13.0	48.6	13.0	48.6
Change Period, ($Y+R_c$), s		6.5		6.5	6.0	6.5	6.0	6.5
Max Allow Headway (*MAH*), s		3.2		3.2	3.0	2.9	3.0	2.9
Queue Clearance Time (g_s), s		53.9		53.9	8.5	19.1	3.6	44.1
Green Extension Time (g_e), s		0.0		0.0	0.0	2.0	0.0	0.0
Phase Call Probability		1.00		1.00	1.00	1.00	1.00	1.00
Max Out Probability		1.00		1.00	1.00	0.00	0.44	1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3	8	18	7	4	14	1	6	16	5	2	12
Adjusted Flow Rate (*v*), veh/h		526			645		149	329		39	736	
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1122			1218		1781	1829		1781	1815	
Queue Service Time (g_s), s		0.0			0.0		6.5	17.1		1.6	42.1	
Cycle Queue Clearance Time (g_c), s		51.9			51.9		6.5	17.1		1.6	42.1	
Green Ratio (*g/C*)		0.43			0.43		0.41	0.35		0.41	0.35	
Capacity (*c*), veh/h		520			562		164	642		365	637	
Volume-to-Capacity Ratio (*X*)		1.011			1.148		0.909	0.513		0.107	1.155	
Back of Queue (*Q*), ft/ln (50 th percentile)		525.9			738.5		162.4	183.3		16.2	835.2	
Back of Queue (*Q*), veh/ln (50 th percentile)		20.7			29.1		6.4	7.2		0.6	32.9	
Queue Storage Ratio (*RQ*) (50 th percentile)		0.00			0.00		0.00	0.00		0.00	0.00	
Uniform Delay (d_1), s/veh		34.1			34.1		30.2	30.8		23.0	39.0	
Incremental Delay (d_2), s/veh		42.2			85.8		43.9	0.3		0.0	86.9	
Initial Queue Delay (d_3), s/veh		0.0			0.0		0.0	0.0		0.0	0.0	
Control Delay (*d*), s/veh		76.3			119.9		74.1	31.1		23.0	125.8	
Level of Service (LOS)		F			F		E	C		C	F	
Approach Delay, s/veh / LOS	76.3	E		119.9	F		44.5	D		120.6	F	
Intersection Delay, s/veh / LOS	95.8						F					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.92	B	1.92	B	1.70	B	1.70	B
Bicycle LOS Score / LOS	1.36	A	1.55	B	1.28	A	1.77	B

HCS7 Signalized Intersection Input Data

General Information				Intersection Information	
Agency	Smart Services Inc			Duration, h	0.25
Analyst	TJS	Analysis Date	Sep 18, 2018	Area Type	Other
Jurisdiction	City of Grove City	Time Period	2029 PM Peak	PHF	0.92
Urban Street	Jackson Pike (SR 104)	Analysis Year	2029	Analysis Period	1> 16:30
Intersection	Jackson Pike & London-…	File Name	London-Groveport Rd (SR 665) & Jackson Pike (…		
Project Description	2029 Residential Build PM Peak w SB RT				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	85	146	253	92	452	49	137	265	38	36	563	114

Signal Information													
Cycle, s	120.0	Reference Phase	2							1	2	3	4
Offset, s	0	Reference Point	End										
Uncoordinated	Yes	Simult. Gap E/W	On	Green	7.0	37.0	57.0	0.0	0.0	0.0	5	6	7	8
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	3.0	5.0	5.0	0.0	0.0	0.0				
				Red	3.0	1.5	1.5	0.0	0.0	0.0				

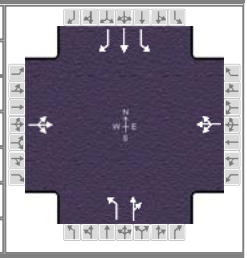
Traffic Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	85	146	253	92	452	49	137	265	38	36	563	114
Initial Queue (Q_b), veh/h	0	0	0	0	0	0	0	0	0	0	0	0
Base Saturation Flow Rate (s_o), veh/h	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Parking (N_m), man/h		None			None			None			None	
Heavy Vehicles (P_{HV}), %		2			2		2	2		2	2	0
Ped / Bike / RTOR, /h	0	0	0	0	0	0	0	0	0	0	0	0
Buses (N_b), buses/h	0	0	0	0	0	0	0	0	0	0	0	0
Arrival Type (*AT*)	3	3	3	3	3	3	3	3	3	3	3	3
Upstream Filtering (*I*)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lane Width (*W*), ft		12.0			12.0		12.0	12.0		12.0	12.0	12.0
Turn Bay Length, ft		0			0		0	0		0	0	0
Grade (*Pg*), %		0			0			0			0	
Speed Limit, mi/h	50	50	50	50	50	50	50	50	50	50	50	50

Phase Information	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Maximum Green (G_{max}) or Phase Split, s		57.0		57.0	7.0	37.0	7.0	37.0
Yellow Change Interval (*Y*), s		5.0		5.0	3.0	5.0	3.0	5.0
Red Clearance Interval (R_c), s		1.5		1.5	3.0	1.5	3.0	1.5
Minimum Green (G_{min}), s		10		10	7	10	7	10
Start-Up Lost Time (*l*t), s	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Extension of Effective Green (*e*), s	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Passage (*PT*), s		2.0		2.0	2.0	2.0	2.0	2.0
Recall Mode		Off		Off	Off	Off	Off	Off
Dual Entry		Yes		Yes	No	Yes	No	Yes
Walk (*Walk*), s		0.0		0.0		0.0		0.0
Pedestrian Clearance Time (*PC*), s		0.0		0.0		0.0		0.0

Multimodal Information	EB			WB			NB			SB		
85th % Speed / Rest in Walk / Corner Radius	0	No	25	0	No	25	0	No	25	0	No	25
Walkway / Crosswalk Width / Length, ft	9.0	12	0	9.0	12	0	9.0	12	0	9.0	12	0
Street Width / Island / Curb	0	0	No	0	0	No	0	0	No	0	0	No
Width Outside / Bike Lane / Shoulder, ft	12	5.0	2.0	12	5.0	2.0	12	5.0	2.0	12	5.0	2.0
Pedestrian Signal / Occupied Parking	No	0.50		No	0.50		No	0.50		No	0.50	

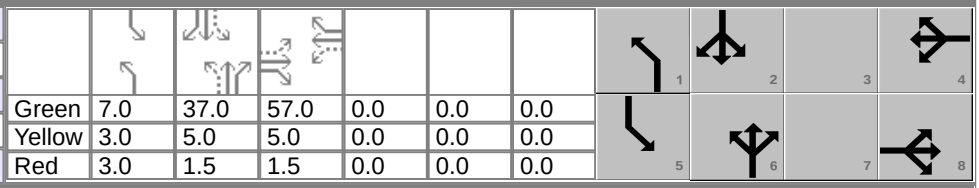
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Smart Services Inc			Duration, h	0.25
Analyst	TJS	Analysis Date	Sep 18, 2018	Area Type	Other
Jurisdiction	City of Grove City	Time Period	2029 PM Peak	PHF	0.92
Urban Street	Jackson Pike (SR 104)	Analysis Year	2029	Analysis Period	1> 16:30
Intersection	Jackson Pike & London-…	File Name	London-Groveport Rd (SR 665) & Jackson Pike (…		
Project Description	2029 Residential Build PM Peak w SB RT				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	85	146	253	92	452	49	137	265	38	36	563	114

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	7.0	37.0	57.0	0.0	0.0	0.0
Yellow	3.0	5.0	5.0	0.0	0.0	0.0
Red	3.0	1.5	1.5	0.0	0.0	0.0

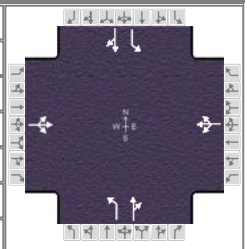
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		8		4	1	6	5	2
Case Number		8.0		8.0	1.1	4.0	1.1	3.0
Phase Duration, s		63.5		63.5	13.0	43.5	13.0	43.5
Change Period, ($Y+R_c$), s		6.5		6.5	6.0	6.5	6.0	6.5
Max Allow Headway (*MAH*), s		3.2		3.2	3.0	2.9	3.0	2.9
Queue Clearance Time (g_s), s		58.5		59.0	8.9	20.2	3.7	39.0
Green Extension Time (g_e), s		0.0		0.0	0.0	1.8	0.0	0.0
Phase Call Probability		1.00		1.00	1.00	1.00	1.00	1.00
Max Out Probability		1.00		1.00	1.00	0.01	0.55	1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3	8	18	7	4	14	1	6	16	5	2	12
Adjusted Flow Rate (*v*), veh/h		526			645		149	329		39	612	124
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1112			1217		1781	1829		1781	1870	1610
Queue Service Time (g_s), s		0.0			0.5		6.9	18.2		1.7	37.0	6.9
Cycle Queue Clearance Time (g_c), s		56.5			57.0		6.9	18.2		1.7	37.0	6.9
Green Ratio (*g/C*)		0.48			0.48		0.37	0.31		0.37	0.31	0.31
Capacity (*c*), veh/h		563			613		164	564		311	577	496
Volume-to-Capacity Ratio (*X*)		0.934			1.052		0.909	0.584		0.126	1.061	0.250
Back of Queue (*Q*), ft/ln (50 th percentile)		429.1			645.3		122	200.7		17.7	630.9	64.9
Back of Queue (*Q*), veh/ln (50 th percentile)		16.9			25.4		4.8	7.9		0.7	24.8	2.6
Queue Storage Ratio (*RQ*) (50 th percentile)		0.00			0.00		0.00	0.00		0.00	0.00	0.00
Uniform Delay (d_1), s/veh		29.2			31.5		32.0	35.0		26.4	41.5	31.1
Incremental Delay (d_2), s/veh		22.5			50.7		43.9	1.0		0.1	54.7	0.1
Initial Queue Delay (d_3), s/veh		0.0			0.0		0.0	0.0		0.0	0.0	0.0
Control Delay (*d*), s/veh		51.8			82.2		75.9	36.1		26.4	96.2	31.2
Level of Service (LOS)		D			F		E	D		C	F	C
Approach Delay, s/veh / LOS	51.8	D		82.2	F		48.4	D		82.3	F	
Intersection Delay, s/veh / LOS	69.0						E					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.91	B	2.10	B	1.71	B	1.71	B
Bicycle LOS Score / LOS	1.36	A	1.55	B	1.28	A	1.77	B

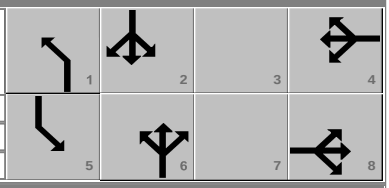
HCS7 Signalized Intersection Input Data

General Information				Intersection Information	
Agency	Smart Services Inc			Duration, h	0.25
Analyst	BCK	Analysis Date	Sep 18, 2018	Area Type	Other
Jurisdiction	City of Grove City	Time Period	2039 AM Peak	PHF	0.92
Urban Street	Jackson Pike (SR 104)	Analysis Year	2039	Analysis Period	1> 7:00
Intersection	Jackson Pike & London-…	File Name	London-Groveport Rd (SR 665) & Jackson Pike (…		
Project Description	2039 No Build AM Peak				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	126	319	137	24	168	38	215	626	165	24	147	59

Signal Information					EB			WB			NB			SB		
Cycle, s	120.0	Reference Phase	2													
Offset, s	0	Reference Point	End	Green	7.0	50.7		43.3	0.0	0.0	0.0					
Uncoordinated	Yes	Simult. Gap E/W	On	Yellow	3.0	5.0		5.0	0.0	0.0	0.0					
Force Mode	Fixed	Simult. Gap N/S	On	Red	3.0	1.5		1.5	0.0	0.0	0.0					



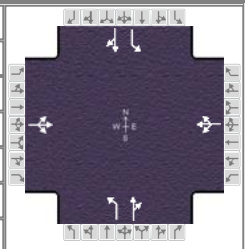
Traffic Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	126	319	137	24	168	38	215	626	165	24	147	59
Initial Queue (Q_b), veh/h	0	0	0	0	0	0	0	0	0	0	0	0
Base Saturation Flow Rate (s_o), veh/h	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Parking (N_m), man/h		None			None			None			None	
Heavy Vehicles (P_{HV}), %		2			2		2	2		2	2	
Ped / Bike / RTOR, /h	0	0	0	0	0	0	0	0	0	0	0	0
Buses (N_b), buses/h	0	0	0	0	0	0	0	0	0	0	0	0
Arrival Type (*AT*)	3	3	3	3	3	3	3	3	3	3	3	3
Upstream Filtering (*I*)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lane Width (*W*), ft		12.0			12.0		12.0	12.0		12.0	12.0	
Turn Bay Length, ft		0			0		0	0		0	0	
Grade (*Pg*), %		0			0			0			0	
Speed Limit, mi/h	50	50	50	50	50	50	50	50	50	50	50	50

Phase Information	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Maximum Green (G_{max}) or Phase Split, s		43.3		43.3	7.0	50.7	7.0	50.7
Yellow Change Interval (*Y*), s		5.0		5.0	3.0	5.0	3.0	5.0
Red Clearance Interval (R_c), s		1.5		1.5	3.0	1.5	3.0	1.5
Minimum Green (G_{min}), s		10		10	7	10	7	10
Start-Up Lost Time (*l*t), s	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Extension of Effective Green (*e*), s	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Passage (*PT*), s		2.0		2.0	2.0	2.0	2.0	2.0
Recall Mode		Off		Off	Off	Off	Off	Off
Dual Entry		Yes		Yes	No	Yes	No	Yes
Walk (*Walk*), s		0.0		0.0		0.0		0.0
Pedestrian Clearance Time (*PC*), s		0.0		0.0		0.0		0.0

Multimodal Information	EB			WB			NB			SB		
85th % Speed / Rest in Walk / Corner Radius	0	No	25	0	No	25	0	No	25	0	No	25
Walkway / Crosswalk Width / Length, ft	9.0	12	0	9.0	12	0	9.0	12	0	9.0	12	0
Street Width / Island / Curb	0	0	No	0	0	No	0	0	No	0	0	No
Width Outside / Bike Lane / Shoulder, ft	12	5.0	2.0	12	5.0	2.0	12	5.0	2.0	12	5.0	2.0
Pedestrian Signal / Occupied Parking	No	0.50		No	0.50		No	0.50		No	0.50	

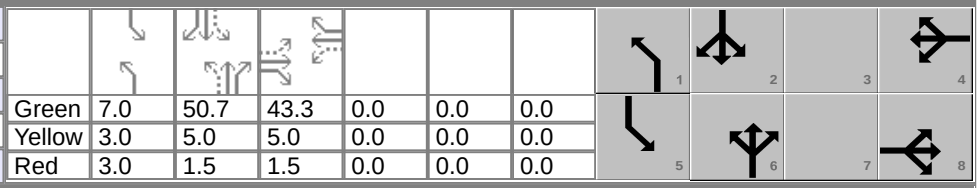
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Smart Services Inc			Duration, h	0.25
Analyst	BCK	Analysis Date	Sep 18, 2018	Area Type	Other
Jurisdiction	City of Grove City	Time Period	2039 AM Peak	PHF	0.92
Urban Street	Jackson Pike (SR 104)	Analysis Year	2039	Analysis Period	1> 7:00
Intersection	Jackson Pike & London-…	File Name	London-Groveport Rd (SR 665) & Jackson Pike (…		
Project Description	2039 No Build AM Peak				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	126	319	137	24	168	38	215	626	165	24	147	59

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	7.0	50.7	43.3	0.0	0.0	0.0
Yellow	3.0	5.0	5.0	0.0	0.0	0.0
Red	3.0	1.5	1.5	0.0	0.0	0.0

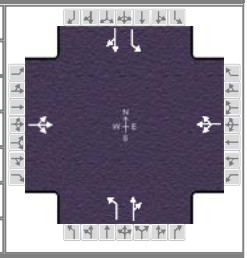
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		8		4	1	6	5	2
Case Number		8.0		8.0	1.1	4.0	1.1	4.0
Phase Duration, s		49.8		49.8	13.0	57.2	13.0	57.2
Change Period, ($Y+R_c$), s		6.5		6.5	6.0	6.5	6.0	6.5
Max Allow Headway (*MAH*), s		3.1		3.1	3.0	3.0	3.0	3.0
Queue Clearance Time (g_s), s		45.3		14.2	9.0	52.7	2.9	12.0
Green Extension Time (g_e), s		0.0		1.8	0.0	0.0	0.0	2.3
Phase Call Probability		1.00		1.00	1.00	1.00	1.00	1.00
Max Out Probability		1.00		0.00	1.00	1.00	0.10	0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3	8	18	7	4	14	1	6	16	5	2	12
Adjusted Flow Rate (*v*), veh/h		633			250		234	860		26	224	
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1566			1572		1781	1803		1781	1779	
Queue Service Time (g_s), s		31.1			0.0		7.0	50.7		0.9	10.0	
Cycle Queue Clearance Time (g_c), s		43.3			12.2		7.0	50.7		0.9	10.0	
Green Ratio (*g/C*)		0.36			0.36		0.48	0.42		0.48	0.42	
Capacity (*c*), veh/h		602			600		537	762		164	751	
Volume-to-Capacity Ratio (*X*)		1.051			0.416		0.435	1.129		0.159	0.298	
Back of Queue (*Q*), ft/ln (50 th percentile)		651.4			129.8		30.4	916.6		9.2	101.1	
Back of Queue (*Q*), veh/ln (50 th percentile)		25.6			5.1		1.2	36.1		0.4	4.0	
Queue Storage Ratio (*RQ*) (50 th percentile)		0.00			0.00		0.00	0.00		0.00	0.00	
Uniform Delay (d_1), s/veh		39.8			28.4		21.5	34.7		27.1	22.9	
Incremental Delay (d_2), s/veh		50.9			0.2		0.2	74.2		0.2	0.1	
Initial Queue Delay (d_3), s/veh		0.0			0.0		0.0	0.0		0.0	0.0	
Control Delay (*d*), s/veh		90.8			28.6		21.7	108.8		27.3	23.0	
Level of Service (LOS)		F			C		C	F		C	C	
Approach Delay, s/veh / LOS	90.8	F		28.6	C		90.2	F		23.4	C	
Intersection Delay, s/veh / LOS	75.9						E					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.93	B	1.93	B	1.69	B	1.69	B
Bicycle LOS Score / LOS	1.53	B	0.90	A	2.29	B	0.90	A

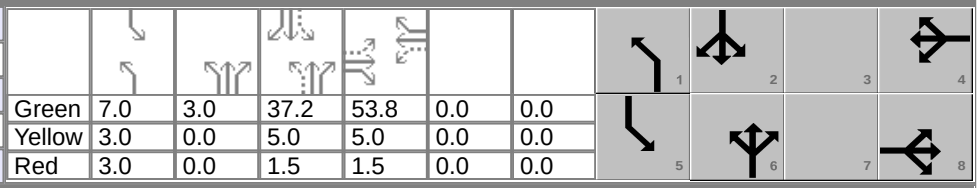
HCS7 Signalized Intersection Input Data

General Information				Intersection Information	
Agency	Smart Services Inc			Duration, h	0.25
Analyst	BCK	Analysis Date	Sep 18, 2018	Area Type	Other
Jurisdiction	City of Grove City	Time Period	2039 PM Peak	PHF	0.92
Urban Street	Jackson Pike (SR 104)	Analysis Year	2039	Analysis Period	1> 16:50
Intersection	Jackson Pike & London-…	File Name	London-Groveport Rd (SR 665) & Jackson Pike (…		
Project Description	2039 No Build PM Peak				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	70	166	300	110	525	39	152	300	44	30	633	111

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	7.0	3.0	37.2	53.8	0.0	0.0						
Yellow	3.0	0.0	5.0	5.0	0.0	0.0						
Red	3.0	0.0	1.5	1.5	0.0	0.0						

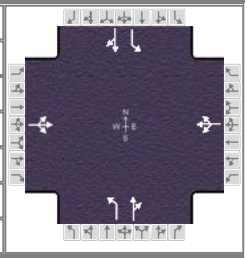
Traffic Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	70	166	300	110	525	39	152	300	44	30	633	111
Initial Queue (Q_b), veh/h	0	0	0	0	0	0	0	0	0	0	0	0
Base Saturation Flow Rate (s_o), veh/h	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Parking (N_m), man/h		None			None			None			None	
Heavy Vehicles (P_{HV}), %		2			2		2	2		2	2	
Ped / Bike / RTOR, /h	0	0	0	0	0	0	0	0	0	0	0	0
Buses (N_b), buses/h	0	0	0	0	0	0	0	0	0	0	0	0
Arrival Type (*AT*)	3	3	3	3	3	3	3	3	3	3	3	3
Upstream Filtering (*I*)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lane Width (*W*), ft		12.0			12.0		12.0	12.0		12.0	12.0	
Turn Bay Length, ft		0			0		0	0		0	0	
Grade (*Pg*), %		0			0			0			0	
Speed Limit, mi/h	50	50	50	50	50	50	50	50	50	50	50	50

Phase Information	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Maximum Green (G_{max}) or Phase Split, s		53.8		53.8	10.0	40.2	7.0	37.2
Yellow Change Interval (*Y*), s		5.0		5.0	3.0	5.0	3.0	5.0
Red Clearance Interval (R_c), s		1.5		1.5	3.0	1.5	3.0	1.5
Minimum Green (G_{min}), s		10		10	7	10	7	10
Start-Up Lost Time (*l*t), s	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Extension of Effective Green (*e*), s	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Passage (*PT*), s		2.0		2.0	2.0	2.0	2.0	2.0
Recall Mode		Off		Off	Off	Off	Off	Off
Dual Entry		Yes		Yes	No	Yes	No	Yes
Walk (*Walk*), s		0.0		0.0		0.0		0.0
Pedestrian Clearance Time (*PC*), s		0.0		0.0		0.0		0.0

Multimodal Information	EB			WB			NB			SB		
85th % Speed / Rest in Walk / Corner Radius	0	No	25	0	No	25	0	No	25	0	No	25
Walkway / Crosswalk Width / Length, ft	9.0	12	0	9.0	12	0	9.0	12	0	9.0	12	0
Street Width / Island / Curb	0	0	No	0	0	No	0	0	No	0	0	No
Width Outside / Bike Lane / Shoulder, ft	12	5.0	2.0	12	5.0	2.0	12	5.0	2.0	12	5.0	2.0
Pedestrian Signal / Occupied Parking	No	0.50		No	0.50		No	0.50		No	0.50	

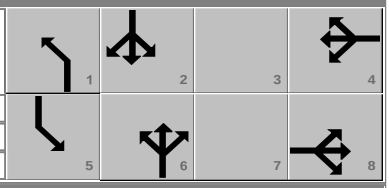
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Smart Services Inc			Duration, h	0.25
Analyst	BCK	Analysis Date	Sep 18, 2018	Area Type	Other
Jurisdiction	City of Grove City	Time Period	2039 PM Peak	PHF	0.92
Urban Street	Jackson Pike (SR 104)	Analysis Year	2039	Analysis Period	1> 16:50
Intersection	Jackson Pike & London-…	File Name	London-Groveport Rd (SR 665) & Jackson Pike (…		
Project Description	2039 No Build PM Peak				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	70	166	300	110	525	39	152	300	44	30	633	111

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	7.0	3.0	37.2	53.8	0.0	0.0
Yellow	3.0	0.0	5.0	5.0	0.0	0.0
Red	3.0	0.0	1.5	1.5	0.0	0.0

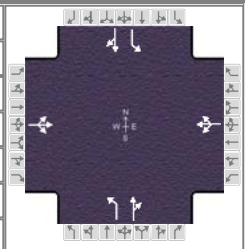
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		8		4	1	6	5	2
Case Number		8.0		8.0	1.1	4.0	1.1	4.0
Phase Duration, s		60.3		60.3	16.0	46.7	13.0	43.7
Change Period, ($Y+R_c$), s		6.5		6.5	6.0	6.5	6.0	6.5
Max Allow Headway (*MAH*), s		3.2		3.2	3.0	2.9	3.0	2.9
Queue Clearance Time (g_s), s		55.8		55.8	9.4	22.5	3.4	39.2
Green Extension Time (g_e), s		0.0		0.0	0.0	2.2	0.0	0.0
Phase Call Probability		1.00		1.00	1.00	1.00	1.00	1.00
Max Out Probability		1.00		1.00	1.00	0.01	0.30	1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3	8	18	7	4	14	1	6	16	5	2	12
Adjusted Flow Rate (*v*), veh/h		583			733		165	374		33	809	
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1274			1064		1781	1828		1781	1821	
Queue Service Time (g_s), s		0.0			0.0		7.4	20.5		1.4	37.2	
Cycle Queue Clearance Time (g_c), s		53.8			53.8		7.4	20.5		1.4	37.2	
Green Ratio (*g/C*)		0.45			0.45		0.39	0.34		0.37	0.31	
Capacity (*c*), veh/h		605			512		208	612		313	565	
Volume-to-Capacity Ratio (*X*)		0.963			1.432		0.793	0.610		0.104	1.432	
Back of Queue (*Q*), ft/ln (50 th percentile)		509.7			1104.7		101.1	224.8		14.6	1213.6	
Back of Queue (*Q*), veh/ln (50 th percentile)		20.1			43.5		4.0	8.9		0.6	47.8	
Queue Storage Ratio (*RQ*) (50 th percentile)		0.00			0.00		0.00	0.00		0.00	0.00	
Uniform Delay (d_1), s/veh		32.1			33.2		30.1	33.4		26.0	41.4	
Incremental Delay (d_2), s/veh		27.2			205.3		17.2	1.3		0.1	204.5	
Initial Queue Delay (d_3), s/veh		0.0			0.0		0.0	0.0		0.0	0.0	
Control Delay (*d*), s/veh		59.3			238.5		47.3	34.7		26.1	245.9	
Level of Service (LOS)		E			F		D	C		C	F	
Approach Delay, s/veh / LOS	59.3	E		238.5	F		38.5	D		237.4	F	
Intersection Delay, s/veh / LOS	159.4						F					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.91	B	1.91	B	1.70	B	1.71	B
Bicycle LOS Score / LOS	1.45	A	1.70	B	1.38	A	1.88	B

HCS7 Signalized Intersection Input Data

General Information				Intersection Information	
Agency	Smart Services Inc			Duration, h	0.25
Analyst	BCK	Analysis Date	Sep 18, 2018	Area Type	Other
Jurisdiction	City of Grove City	Time Period	2039 AM Peak	PHF	0.92
Urban Street	Jackson Pike (SR 104)	Analysis Year	2039	Analysis Period	1> 7:00
Intersection	Jackson Pike & London-…	File Name	London-Groveport Rd (SR 665) & Jackson Pike (…		
Project Description	2039 Residential & School Build AM Peak				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	134	331	143	24	173	43	217	681	165	38	199	83

Signal Information					EB			WB			NB			SB		
Cycle, s	120.0	Reference Phase	2													
Offset, s	0	Reference Point	End	Green	7.0	50.8	43.2	0.0	0.0	0.0						
Uncoordinated	Yes	Simult. Gap E/W	On	Yellow	3.0	5.0	5.0	0.0	0.0	0.0						
Force Mode	Fixed	Simult. Gap N/S	On	Red	3.0	1.5	1.5	0.0	0.0	0.0						

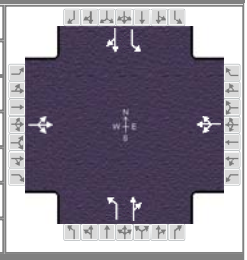
Traffic Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	134	331	143	24	173	43	217	681	165	38	199	83
Initial Queue (Q_b), veh/h	0	0	0	0	0	0	0	0	0	0	0	0
Base Saturation Flow Rate (s_o), veh/h	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Parking (N_m), man/h		None			None			None			None	
Heavy Vehicles (P_{HV}), %		2			2		2	2		2	2	
Ped / Bike / RTOR, /h	0	0	0	0	0	0	0	0	0	0	0	0
Buses (N_b), buses/h	0	0	0	0	0	0	0	0	0	0	0	0
Arrival Type (*AT*)	3	3	3	3	3	3	3	3	3	3	3	3
Upstream Filtering (*I*)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lane Width (*W*), ft		12.0			12.0		12.0	12.0		12.0	12.0	
Turn Bay Length, ft		0			0		0	0		0	0	
Grade (*Pg*), %		0			0			0			0	
Speed Limit, mi/h	50	50	50	50	50	50	50	50	50	50	50	50

Phase Information	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Maximum Green (G_{max}) or Phase Split, s		43.2		43.2	7.0	50.8	7.0	50.8
Yellow Change Interval (*Y*), s		5.0		5.0	3.0	5.0	3.0	5.0
Red Clearance Interval (R_c), s		1.5		1.5	3.0	1.5	3.0	1.5
Minimum Green (G_{min}), s		10		10	7	10	7	10
Start-Up Lost Time (*l*t), s	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Extension of Effective Green (*e*), s	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Passage (*PT*), s		2.0		2.0	2.0	2.0	2.0	2.0
Recall Mode		Off		Off	Off	Off	Off	Off
Dual Entry		Yes		Yes	No	Yes	No	Yes
Walk (*Walk*), s		0.0		0.0		0.0		0.0
Pedestrian Clearance Time (*PC*), s		0.0		0.0		0.0		0.0

Multimodal Information	EB			WB			NB			SB		
85th % Speed / Rest in Walk / Corner Radius	0	No	25	0	No	25	0	No	25	0	No	25
Walkway / Crosswalk Width / Length, ft	9.0	12	0	9.0	12	0	9.0	12	0	9.0	12	0
Street Width / Island / Curb	0	0	No	0	0	No	0	0	No	0	0	No
Width Outside / Bike Lane / Shoulder, ft	12	5.0	2.0	12	5.0	2.0	12	5.0	2.0	12	5.0	2.0
Pedestrian Signal / Occupied Parking	No	0.50		No	0.50		No	0.50		No	0.50	

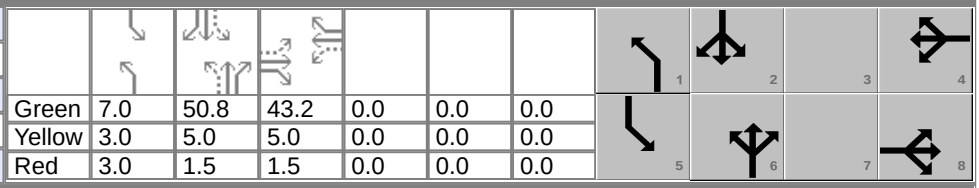
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Smart Services Inc			Duration, h	0.25
Analyst	BCK	Analysis Date	Sep 18, 2018	Area Type	Other
Jurisdiction	City of Grove City	Time Period	2039 AM Peak	PHF	0.92
Urban Street	Jackson Pike (SR 104)	Analysis Year	2039	Analysis Period	1> 7:00
Intersection	Jackson Pike & London-…	File Name	London-Groveport Rd (SR 665) & Jackson Pike (…		
Project Description	2039 Residential & School Build AM Peak				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	134	331	143	24	173	43	217	681	165	38	199	83

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	7.0	50.8	43.2	0.0	0.0	0.0
Yellow	3.0	5.0	5.0	0.0	0.0	0.0
Red	3.0	1.5	1.5	0.0	0.0	0.0

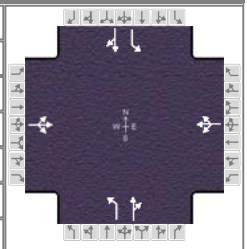
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		8		4	1	6	5	2
Case Number		8.0		8.0	1.1	4.0	1.1	4.0
Phase Duration, s		49.7		49.7	13.0	57.3	13.0	57.3
Change Period, ($Y+R_c$), s		6.5		6.5	6.0	6.5	6.0	6.5
Max Allow Headway (*MAH*), s		3.1		3.1	3.0	3.0	3.0	3.0
Queue Clearance Time (g_s), s		45.2		14.9	9.0	52.8	3.5	16.4
Green Extension Time (g_e), s		0.0		1.9	0.0	0.0	0.0	2.6
Phase Call Probability		1.00		1.00	1.00	1.00	1.00	1.00
Max Out Probability		1.00		0.00	1.00	1.00	0.36	0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3	8	18	7	4	14	1	6	16	5	2	12
Adjusted Flow Rate (*v*), veh/h		661			261		236	920		41	307	
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1539			1590		1781	1807		1781	1776	
Queue Service Time (g_s), s		30.3			0.0		7.0	50.8		1.5	14.4	
Cycle Queue Clearance Time (g_c), s		43.2			12.9		7.0	50.8		1.5	14.4	
Green Ratio (*g/C*)		0.36			0.36		0.48	0.42		0.48	0.42	
Capacity (*c*), veh/h		591			605		471	765		164	752	
Volume-to-Capacity Ratio (*X*)		1.119			0.431		0.501	1.202		0.252	0.408	
Back of Queue (*Q*), ft/ln (50 th percentile)		736.1			136.4		42	1078.3		30	146.2	
Back of Queue (*Q*), veh/ln (50 th percentile)		29.0			5.4		1.7	42.5		1.2	5.8	
Queue Storage Ratio (*RQ*) (50 th percentile)		0.00			0.00		0.00	0.00		0.00	0.00	
Uniform Delay (d_1), s/veh		40.1			28.7		23.0	34.6		27.3	24.1	
Incremental Delay (d_2), s/veh		74.1			0.2		0.3	103.3		0.3	0.1	
Initial Queue Delay (d_3), s/veh		0.0			0.0		0.0	0.0		0.0	0.0	
Control Delay (*d*), s/veh		114.2			28.9		23.3	137.9		27.6	24.2	
Level of Service (LOS)		F			C		C	F		C	C	
Approach Delay, s/veh / LOS	114.2	F		28.9	C		114.5	F		24.6	C	
Intersection Delay, s/veh / LOS	92.3						F					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.93	B	1.93	B	1.69	B	1.69	B
Bicycle LOS Score / LOS	1.58	B	0.92	A	2.39	B	1.06	A

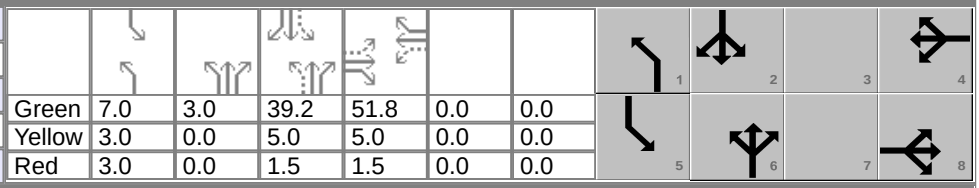
HCS7 Signalized Intersection Input Data

General Information				Intersection Information	
Agency	Smart Services Inc			Duration, h	0.25
Analyst	BCK	Analysis Date	Sep 18, 2018	Area Type	Other
Jurisdiction	City of Grove City	Time Period	2039 AM Peak	PHF	0.92
Urban Street	Jackson Pike (SR 104)	Analysis Year	2039	Analysis Period	1> 16:30
Intersection	Jackson Pike & London-…	File Name	London-Groveport Rd (SR 665) & Jackson Pike (…		
Project Description	2039 Residential & School Build PM Peak				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	97	174	304	110	538	55	159	320	44	39	651	127

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	7.0	3.0	39.2	51.8	0.0	0.0						
Yellow	3.0	0.0	5.0	5.0	0.0	0.0						
Red	3.0	0.0	1.5	1.5	0.0	0.0						

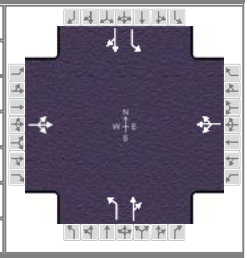
Traffic Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	97	174	304	110	538	55	159	320	44	39	651	127
Initial Queue (Q_b), veh/h	0	0	0	0	0	0	0	0	0	0	0	0
Base Saturation Flow Rate (s_o), veh/h	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Parking (N_m), man/h		None			None			None			None	
Heavy Vehicles (P_{HV}), %		2			2		2	2		2	2	
Ped / Bike / RTOR, /h	0	0	0	0	0	0	0	0	0	0	0	0
Buses (N_b), buses/h	0	0	0	0	0	0	0	0	0	0	0	0
Arrival Type (*AT*)	3	3	3	3	3	3	3	3	3	3	3	3
Upstream Filtering (*I*)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lane Width (*W*), ft		12.0			12.0		12.0	12.0		12.0	12.0	
Turn Bay Length, ft		0			0		0	0		0	0	
Grade (*Pg*), %		0			0			0			0	
Speed Limit, mi/h	50	50	50	50	50	50	50	50	50	50	50	50

Phase Information	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Maximum Green (G_{max}) or Phase Split, s		51.8		51.8	10.0	42.2	7.0	39.2
Yellow Change Interval (*Y*), s		5.0		5.0	3.0	5.0	3.0	5.0
Red Clearance Interval (R_c), s		1.5		1.5	3.0	1.5	3.0	1.5
Minimum Green (G_{min}), s		10		10	7	10	7	10
Start-Up Lost Time (*l*t), s	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Extension of Effective Green (*e*), s	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Passage (*PT*), s		2.0		2.0	2.0	2.0	2.0	2.0
Recall Mode		Off		Off	Off	Off	Off	Off
Dual Entry		Yes		Yes	No	Yes	No	Yes
Walk (*Walk*), s		0.0		0.0		0.0		0.0
Pedestrian Clearance Time (*PC*), s		0.0		0.0		0.0		0.0

Multimodal Information	EB			WB			NB			SB		
85th % Speed / Rest in Walk / Corner Radius	0	No	25	0	No	25	0	No	25	0	No	25
Walkway / Crosswalk Width / Length, ft	9.0	12	0	9.0	12	0	9.0	12	0	9.0	12	0
Street Width / Island / Curb	0	0	No	0	0	No	0	0	No	0	0	No
Width Outside / Bike Lane / Shoulder, ft	12	5.0	2.0	12	5.0	2.0	12	5.0	2.0	12	5.0	2.0
Pedestrian Signal / Occupied Parking	No	0.50		No	0.50		No	0.50		No	0.50	

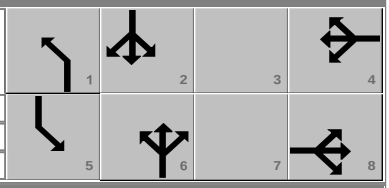
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Smart Services Inc			Duration, h	0.25
Analyst	BCK	Analysis Date	Sep 18, 2018	Area Type	Other
Jurisdiction	City of Grove City	Time Period	2039 AM Peak	PHF	0.92
Urban Street	Jackson Pike (SR 104)	Analysis Year	2039	Analysis Period	1> 16:30
Intersection	Jackson Pike & London-…	File Name	London-Groveport Rd (SR 665) & Jackson Pike (…		
Project Description	2039 Residential & School Build PM Peak				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	97	174	304	110	538	55	159	320	44	39	651	127

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	7.0	3.0	39.2	51.8	0.0	0.0
Yellow	3.0	0.0	5.0	5.0	0.0	0.0
Red	3.0	0.0	1.5	1.5	0.0	0.0

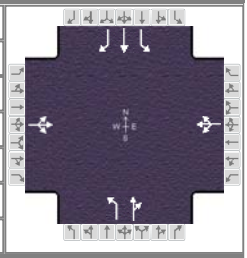
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		8		4	1	6	5	2
Case Number		8.0		8.0	1.1	4.0	1.1	4.0
Phase Duration, s		58.3		58.3	16.0	48.7	13.0	45.7
Change Period, ($Y+R_c$), s		6.5		6.5	6.0	6.5	6.0	6.5
Max Allow Headway (*MAH*), s		3.3		3.3	3.0	2.9	3.0	2.9
Queue Clearance Time (g_s), s		53.8		53.8	9.6	23.5	3.8	41.2
Green Extension Time (g_e), s		0.0		0.0	0.0	2.4	0.0	0.0
Phase Call Probability		1.00		1.00	1.00	1.00	1.00	1.00
Max Out Probability		1.00		1.00	1.00	0.01	0.66	1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3	8	18	7	4	14	1	6	16	5	2	12
Adjusted Flow Rate (*v*), veh/h		625			764		173	396		42	846	
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1120			1174		1781	1831		1781	1817	
Queue Service Time (g_s), s		0.0			0.0		7.6	21.5		1.8	39.2	
Cycle Queue Clearance Time (g_c), s		51.8			51.8		7.6	21.5		1.8	39.2	
Green Ratio (*g/C*)		0.43			0.43		0.41	0.35		0.38	0.33	
Capacity (*c*), veh/h		519			541		208	644		318	594	
Volume-to-Capacity Ratio (*X*)		1.205			1.411		0.829	0.615		0.133	1.425	
Back of Queue (*Q*), ft/ln (50 th percentile)		771.2			1134.2		109.7	234.5		18.5	1258.9	
Back of Queue (*Q*), veh/ln (50 th percentile)		30.4			44.7		4.3	9.2		0.7	49.6	
Queue Storage Ratio (*RQ*) (50 th percentile)		0.00			0.00		0.00	0.00		0.00	0.00	
Uniform Delay (d_1), s/veh		34.4			34.5		29.5	32.2		25.1	40.4	
Incremental Delay (d_2), s/veh		109.5			195.9		22.3	1.3		0.1	200.8	
Initial Queue Delay (d_3), s/veh		0.0			0.0		0.0	0.0		0.0	0.0	
Control Delay (*d*), s/veh		143.9			230.5		51.8	33.5		25.1	241.2	
Level of Service (LOS)		F			F		D	C		C	F	
Approach Delay, s/veh / LOS	143.9	F		230.5	F		39.0	D		230.9	F	
Intersection Delay, s/veh / LOS	173.3						F					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.92	B	1.92	B	1.70	B	1.70	B
Bicycle LOS Score / LOS	1.52	B	1.75	B	1.43	A	1.95	B

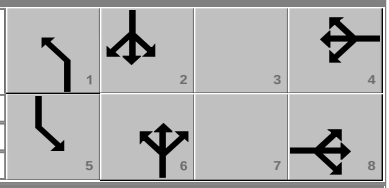
HCS7 Signalized Intersection Input Data

General Information				Intersection Information	
Agency	Smart Services Inc			Duration, h	0.25
Analyst	BCK	Analysis Date	Sep 18, 2018	Area Type	Other
Jurisdiction	City of Grove City	Time Period	2039 AM Peak	PHF	0.92
Urban Street	Jackson Pike (SR 104)	Analysis Year	2039	Analysis Period	1> 7:00
Intersection	Jackson Pike & London-…	File Name	London-Groveport Rd (SR 665) & Jackson Pike (…		
Project Description	2039 Residential & School Build w SBRT AM Peak				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	134	331	143	24	173	43	217	681	165	38	199	83

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	7.0	50.8	43.2	0.0	0.0	0.0
Yellow	3.0	5.0	5.0	0.0	0.0	0.0
Red	3.0	1.5	1.5	0.0	0.0	0.0

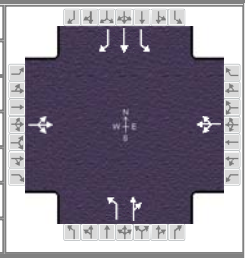
Traffic Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	134	331	143	24	173	43	217	681	165	38	199	83
Initial Queue (Q_b), veh/h	0	0	0	0	0	0	0	0	0	0	0	0
Base Saturation Flow Rate (s_o), veh/h	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Parking (N_m), man/h		None			None			None			None	
Heavy Vehicles (P_{HV}), %		2			2		2	2		2	2	0
Ped / Bike / RTOR, /h	0	0	0	0	0	0	0	0	0	0	0	0
Buses (N_b), buses/h	0	0	0	0	0	0	0	0	0	0	0	0
Arrival Type (*AT*)	3	3	3	3	3	3	3	3	3	3	3	3
Upstream Filtering (*I*)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lane Width (*W*), ft		12.0			12.0		12.0	12.0		12.0	12.0	12.0
Turn Bay Length, ft		0			0		0	0		0	0	0
Grade (*Pg*), %		0			0			0			0	
Speed Limit, mi/h	50	50	50	50	50	50	50	50	50	50	50	50

Phase Information	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Maximum Green (G_{max}) or Phase Split, s		43.2		43.2	7.0	50.8	7.0	50.8
Yellow Change Interval (*Y*), s		5.0		5.0	3.0	5.0	3.0	5.0
Red Clearance Interval (R_c), s		1.5		1.5	3.0	1.5	3.0	1.5
Minimum Green (G_{min}), s		10		10	7	10	7	10
Start-Up Lost Time (*l*t), s	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Extension of Effective Green (*e*), s	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Passage (*PT*), s		2.0		2.0	2.0	2.0	2.0	2.0
Recall Mode		Off		Off	Off	Off	Off	Off
Dual Entry		Yes		Yes	No	Yes	No	Yes
Walk (*Walk*), s		0.0		0.0		0.0		0.0
Pedestrian Clearance Time (*PC*), s		0.0		0.0		0.0		0.0

Multimodal Information	EB			WB			NB			SB		
85th % Speed / Rest in Walk / Corner Radius	0	No	25	0	No	25	0	No	25	0	No	25
Walkway / Crosswalk Width / Length, ft	9.0	12	0	9.0	12	0	9.0	12	0	9.0	12	0
Street Width / Island / Curb	0	0	No	0	0	No	0	0	No	0	0	No
Width Outside / Bike Lane / Shoulder, ft	12	5.0	2.0	12	5.0	2.0	12	5.0	2.0	12	5.0	2.0
Pedestrian Signal / Occupied Parking	No	0.50		No	0.50		No	0.50		No	0.50	

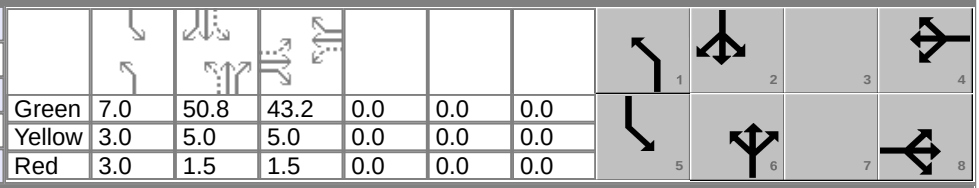
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Smart Services Inc			Duration, h	0.25
Analyst	BCK	Analysis Date	Sep 18, 2018	Area Type	Other
Jurisdiction	City of Grove City	Time Period	2039 AM Peak	PHF	0.92
Urban Street	Jackson Pike (SR 104)	Analysis Year	2039	Analysis Period	1> 7:00
Intersection	Jackson Pike & London-…	File Name	London-Groveport Rd (SR 665) & Jackson Pike (…		
Project Description	2039 Residential & School Build w SBRT AM Peak				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	134	331	143	24	173	43	217	681	165	38	199	83

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	7.0	50.8	43.2	0.0	0.0	0.0
Yellow	3.0	5.0	5.0	0.0	0.0	0.0
Red	3.0	1.5	1.5	0.0	0.0	0.0

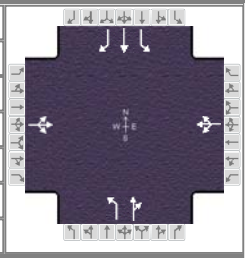
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		8		4	1	6	5	2
Case Number		8.0		8.0	1.1	4.0	1.1	3.0
Phase Duration, s		49.7		49.7	13.0	57.3	13.0	57.3
Change Period, ($Y+R_c$), s		6.5		6.5	6.0	6.5	6.0	6.5
Max Allow Headway (*MAH*), s		3.1		3.1	3.0	3.0	3.0	3.0
Queue Clearance Time (g_s), s		45.2		14.9	9.0	52.8	3.5	11.0
Green Extension Time (g_e), s		0.0		1.9	0.0	0.0	0.0	2.6
Phase Call Probability		1.00		1.00	1.00	1.00	1.00	1.00
Max Out Probability		1.00		0.00	1.00	1.00	0.36	0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3	8	18	7	4	14	1	6	16	5	2	12
Adjusted Flow Rate (*v*), veh/h		661			261		236	920		41	216	90
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1539			1590		1781	1807		1781	1870	1610
Queue Service Time (g_s), s		30.3			0.0		7.0	50.8		1.5	9.0	4.1
Cycle Queue Clearance Time (g_c), s		43.2			12.9		7.0	50.8		1.5	9.0	4.1
Green Ratio (*g/C*)		0.36			0.36		0.48	0.42		0.48	0.42	0.42
Capacity (*c*), veh/h		591			605		550	765		164	792	682
Volume-to-Capacity Ratio (*X*)		1.119			0.431		0.429	1.202		0.252	0.273	0.132
Back of Queue (*Q*), ft/ln (50 th percentile)		736.1			136.4		29.6	1078.3		30	96.2	37.1
Back of Queue (*Q*), veh/ln (50 th percentile)		29.0			5.4		1.2	42.5		1.2	3.8	1.5
Queue Storage Ratio (*RQ*) (50 th percentile)		0.00			0.00		0.00	0.00		0.00	0.00	0.00
Uniform Delay (d_1), s/veh		40.1			28.7		21.2	34.6		27.3	22.6	21.1
Incremental Delay (d_2), s/veh		74.1			0.2		0.2	103.3		0.3	0.1	0.0
Initial Queue Delay (d_3), s/veh		0.0			0.0		0.0	0.0		0.0	0.0	0.0
Control Delay (*d*), s/veh		114.2			28.9		21.4	137.9		27.6	22.6	21.2
Level of Service (LOS)		F			C		C	F		C	C	C
Approach Delay, s/veh / LOS	114.2	F		28.9	C		114.1	F		22.8	C	
Intersection Delay, s/veh / LOS	91.9						F					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.93	B	2.12	B	1.69	B	1.69	B
Bicycle LOS Score / LOS	1.58	B	0.92	A	2.39	B	1.06	A

HCS7 Signalized Intersection Input Data

General Information				Intersection Information	
Agency	Smart Services Inc			Duration, h	0.25
Analyst	BCK	Analysis Date	Sep 18, 2018	Area Type	Other
Jurisdiction	City of Grove City	Time Period	2039 AM Peak	PHF	0.92
Urban Street	Jackson Pike (SR 104)	Analysis Year	2039	Analysis Period	1> 16:30
Intersection	Jackson Pike & London-…	File Name	London-Groveport Rd (SR 665) & Jackson Pike (…		
Project Description	2039 Residential & School Build w SBRT PM Peak				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	97	174	304	110	538	55	159	320	44	39	651	127

Signal Information					EB			WB			NB			SB		
Cycle, s	120.0	Reference Phase	2													
Offset, s	0	Reference Point	End	Green	7.0	3.0		33.7	57.3	0.0	0.0					
Uncoordinated	Yes	Simult. Gap E/W	On	Yellow	3.0	0.0		5.0	5.0	0.0	0.0					
Force Mode	Fixed	Simult. Gap N/S	On	Red	3.0	0.0		1.5	1.5	0.0	0.0					

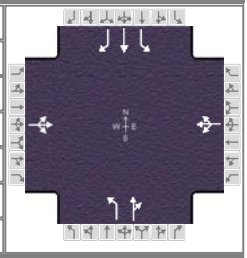
Traffic Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	97	174	304	110	538	55	159	320	44	39	651	127
Initial Queue (Q_b), veh/h	0	0	0	0	0	0	0	0	0	0	0	0
Base Saturation Flow Rate (s_o), veh/h	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Parking (N_m), man/h		None			None			None			None	
Heavy Vehicles (P_{HV}), %		2			2		2	2		2	2	0
Ped / Bike / RTOR, /h	0	0	0	0	0	0	0	0	0	0	0	0
Buses (N_b), buses/h	0	0	0	0	0	0	0	0	0	0	0	0
Arrival Type (*AT*)	3	3	3	3	3	3	3	3	3	3	3	3
Upstream Filtering (*I*)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lane Width (*W*), ft		12.0			12.0		12.0	12.0		12.0	12.0	12.0
Turn Bay Length, ft		0			0		0	0		0	0	0
Grade (*Pg*), %		0			0			0			0	
Speed Limit, mi/h	50	50	50	50	50	50	50	50	50	50	50	50

Phase Information	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Maximum Green (G_{max}) or Phase Split, s		57.3		57.2	10.0	36.7	7.0	33.7
Yellow Change Interval (*Y*), s		5.0		5.0	3.0	5.0	3.0	5.0
Red Clearance Interval (R_c), s		1.5		1.5	3.0	1.5	3.0	1.5
Minimum Green (G_{min}), s		10		10	7	10	7	10
Start-Up Lost Time (*l*t), s	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Extension of Effective Green (*e*), s	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Passage (*PT*), s		2.0		2.0	2.0	2.0	2.0	2.0
Recall Mode		Off		Off	Off	Off	Off	Off
Dual Entry		Yes		Yes	No	Yes	No	Yes
Walk (*Walk*), s		0.0		0.0		0.0		0.0
Pedestrian Clearance Time (*PC*), s		0.0		0.0		0.0		0.0

Multimodal Information	EB			WB			NB			SB		
85th % Speed / Rest in Walk / Corner Radius	0	No	25	0	No	25	0	No	25	0	No	25
Walkway / Crosswalk Width / Length, ft	9.0	12	0	9.0	12	0	9.0	12	0	9.0	12	0
Street Width / Island / Curb	0	0	No	0	0	No	0	0	No	0	0	No
Width Outside / Bike Lane / Shoulder, ft	12	5.0	2.0	12	5.0	2.0	12	5.0	2.0	12	5.0	2.0
Pedestrian Signal / Occupied Parking	No	0.50		No	0.50		No	0.50		No	0.50	

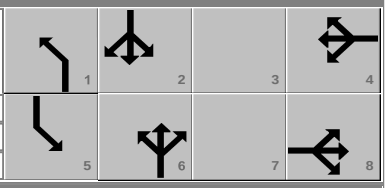
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Smart Services Inc			Duration, h	0.25
Analyst	BCK	Analysis Date	Sep 18, 2018	Area Type	Other
Jurisdiction	City of Grove City	Time Period	2039 AM Peak	PHF	0.92
Urban Street	Jackson Pike (SR 104)	Analysis Year	2039	Analysis Period	1> 16:30
Intersection	Jackson Pike & London-…	File Name	London-Groveport Rd (SR 665) & Jackson Pike (…		
Project Description	2039 Residential & School Build w SBRT PM Peak				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	97	174	304	110	538	55	159	320	44	39	651	127

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	7.0	3.0	33.7	57.3	0.0	0.0
Yellow	3.0	0.0	5.0	5.0	0.0	0.0
Red	3.0	0.0	1.5	1.5	0.0	0.0

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		8		4	1	6	5	2
Case Number		8.0		8.0	1.1	4.0	1.1	3.0
Phase Duration, s		63.8		63.8	16.0	43.2	13.0	40.2
Change Period, ($Y+R_c$), s		6.5		6.5	6.0	6.5	6.0	6.5
Max Allow Headway (*MAH*), s		3.3		3.3	3.0	2.9	3.0	2.9
Queue Clearance Time (g_s), s		59.3		59.3	10.2	25.0	3.9	35.7
Green Extension Time (g_e), s		0.0		0.0	0.0	2.1	0.0	0.0
Phase Call Probability		1.00		1.00	1.00	1.00	1.00	1.00
Max Out Probability		1.00		1.00	1.00	0.08	0.84	1.00

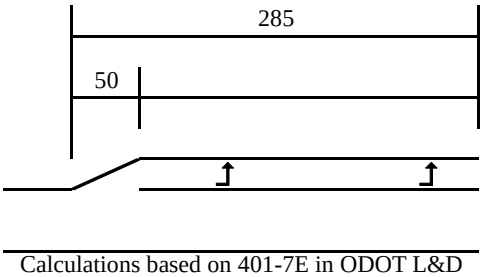
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3	8	18	7	4	14	1	6	16	5	2	12
Adjusted Flow Rate (*v*), veh/h		625			764		173	396		42	708	138
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1110			1166		1781	1831		1781	1870	1610
Queue Service Time (g_s), s		0.0			0.0		8.2	23.0		1.9	33.7	8.1
Cycle Queue Clearance Time (g_c), s		57.3			57.3		8.2	23.0		1.9	33.7	8.1
Green Ratio (*g/C*)		0.48			0.48		0.36	0.31		0.34	0.28	0.28
Capacity (*c*), veh/h		565			591		208	560		261	525	452
Volume-to-Capacity Ratio (*X*)		1.106			1.292		0.829	0.707		0.163	1.347	0.305
Back of Queue (*Q*), ft/ln (50 th percentile)		673.4			1012.8		117.1	261.9		20.2	998.9	76.7
Back of Queue (*Q*), veh/ln (50 th percentile)		26.5			39.9		4.6	10.3		0.8	39.3	3.1
Queue Storage Ratio (*RQ*) (50 th percentile)		0.00			0.00		0.00	0.00		0.00	0.00	0.00
Uniform Delay (d_1), s/veh		31.5			31.6		31.6	36.9		28.9	43.2	33.9
Incremental Delay (d_2), s/veh		70.1			143.7		22.3	3.5		0.1	168.5	0.1
Initial Queue Delay (d_3), s/veh		0.0			0.0		0.0	0.0		0.0	0.0	0.0
Control Delay (*d*), s/veh		101.6			175.3		53.9	40.4		29.0	211.7	34.1
Level of Service (LOS)		F			F		D	D		C	F	C
Approach Delay, s/veh / LOS	101.6	F		175.3	F		44.5	D		175.4	F	
Intersection Delay, s/veh / LOS	133.0						F					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.91	B	2.10	B	1.71	B	1.71	B
Bicycle LOS Score / LOS	1.52	B	1.75	B	1.43	A	1.95	B

(1) PROP. HAWTHORNE PKWY. & JACKSON PIKE (SR 104) - NB LT - 2019 RESIDENTIAL 'BUILD'

Critical Analysis Period: PM PEAK

Type =	Unsignalized Through Road		Design Condition (Rev)=	B	
Speed =	55	MPH	Storage Length (Adj) =	NA	
Cycle Length =	60	seconds	Deceleration/Div. Taper =	285	feet
Turning Volume =	51	VPH	Turn Lane Length =	285	feet
# of Turning Lanes =	1				
Advancing Volume =	320	VPH			
Turning % (>10% HIGH) =	15.9%	HIGH			
Design Condition =	B or C				
Vehicles per Cycle =	0.9				
Storage Length (Calc) =	50	feet			

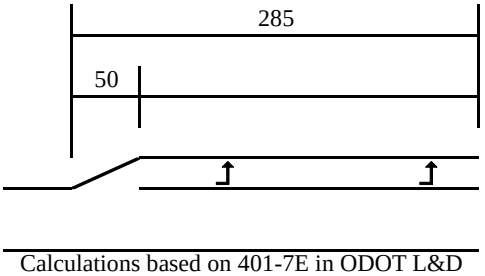


Calculations based on 401-7E in ODOT L&D Manual. All dimensions are in feet.

(2) PROP. HAWTHORNE PKWY. & JACKSON PIKE (SR 104) - NB LT - 2029 RESIDENTIAL 'BUILD'

Critical Analysis Period: PM PEAK

Type =	Unsignalized Through Road		Design Condition (Rev)=	B	
Speed =	55	MPH	Storage Length (Adj) =	NA	
Cycle Length =	60	seconds	Deceleration/Div. Taper =	285	feet
Turning Volume =	51	VPH	Turn Lane Length =	285	feet
# of Turning Lanes =	1				
Advancing Volume =	362	VPH			
Turning % (>10% HIGH) =	14.1%	HIGH			
Design Condition =	B or C				
Vehicles per Cycle =	0.9				
Storage Length (Calc) =	50	feet			

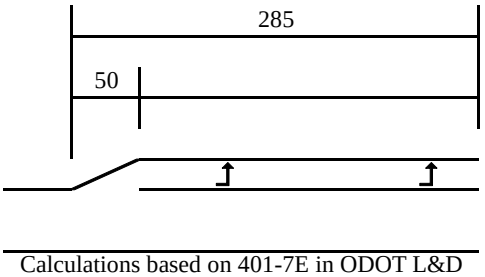


Calculations based on 401-7E in ODOT L&D Manual. All dimensions are in feet.

(3) PROP. HAWTHORNE PKWY. & JACKSON PIKE (SR 104) - NB LT - 2039 RESIDENTIAL & SCHOOL 'BUILD' W/ DIVERTED

Critical Analysis Period: AM PEAK

Type =	Unsignalized Through Road				
Speed =	55	MPH	Storage Length (Adj) =	NA	
Cycle Length =	60	seconds	Deceleration/Div. Taper =	285	feet
Turning Volume =	68	VPH	Turn Lane Length =	285	feet
# of Turning Lanes =	1				
Advancing Volume =	874	VPH			
Turning % (>10% HIGH) =	7.8%	LOW			
Design Condition =	B				
Vehicles per Cycle =	1.1				
Storage Length (Calc) =	100	feet			

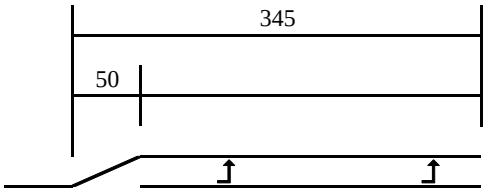


Calculations based on 401-7E in ODOT L&D Manual. All dimensions are in feet.

(4) LONDON-GROVEPORT RD (SR 665) & BUCKEYE PARKWAY - EB LT - 2019 'NO BUILD'

Critical Analysis Period: PM PEAK

Type =	Unsignalized Through Road		Design Condition (Rev)=	B	
Speed =	60	MPH	Storage Length (Adj) =	NA	
Cycle Length =	60	seconds	Deceleration/Div. Taper =	345	feet
Turning Volume =	65	VPH	Turn Lane Length =	345	feet
# of Turning Lanes =	1				
Advancing Volume =	481	VPH			
Turning % (>10% HIGH) =	13.5%	HIGH			
Design Condition =	B or C				
Vehicles per Cycle =	1.1				
Storage Length (Calc) =	50	feet			

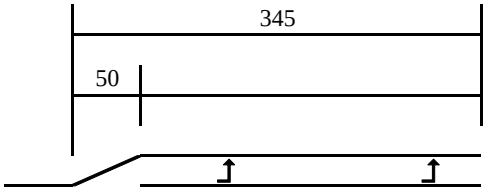


Calculations based on 401-7E in ODOT L&D Manual. All dimensions are in feet.

(5) LONDON-GROVEPORT RD (SR 665) & BUCKEYE PARKWAY - EB LT - 2019 RESIDENTIAL 'BUILD'

Critical Analysis Period: PM PEAK

Type =	Unsignalized Through Road		Design Condition (Rev)=	B	
Speed =	60	MPH	Storage Length (Adj) =	NA	
Cycle Length =	60	seconds	Deceleration/Div. Taper =	345	feet
Turning Volume =	89	VPH	Turn Lane Length =	345	feet
# of Turning Lanes =	1				
Advancing Volume =	558	VPH			
Turning % (>10% HIGH) =	15.9%	HIGH			
Design Condition =	B or C				
Vehicles per Cycle =	1.5				
Storage Length (Calc) =	100	feet			

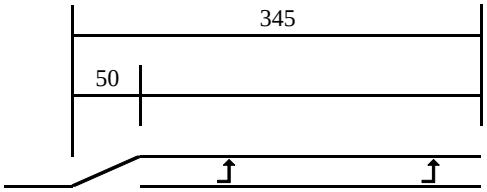


Calculations based on 401-7E in ODOT L&D Manual. All dimensions are in feet.

(6) LONDON-GROVEPORT RD (SR 665) & BUCKEYE PARKWAY - EB LT - 2029 'NO BUILD'

Critical Analysis Period: PM PEAK

Type =	Unsignalized Through Road		Design Condition (Rev)=	B	
Speed =	60	MPH	Storage Length (Adj) =	NA	
Cycle Length =	60	seconds	Deceleration/Div. Taper =	345	feet
Turning Volume =	82	VPH	Turn Lane Length =	345	feet
# of Turning Lanes =	1				
Advancing Volume =	605	VPH			
Turning % (>10% HIGH) =	13.6%	HIGH			
Design Condition =	B or C				
Vehicles per Cycle =	1.4				
Storage Length (Calc) =	100	feet			

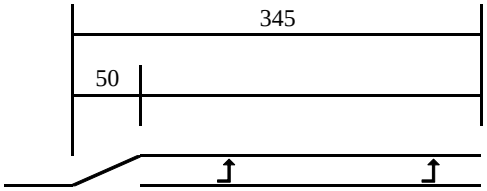


Calculations based on 401-7E in ODOT L&D Manual. All dimensions are in feet.

(7) LONDON-GROVEPORT RD (SR 665) & BUCKEYE PARKWAY - EB LT - 2029 RESIDENTIAL 'BUILD'

Critical Analysis Period: PM PEAK

Type =	Unsignalized Through Road		Design Condition (Rev)=	B	
Speed =	60	MPH	Storage Length (Adj) =	NA	
Cycle Length =	60	seconds	Deceleration/Div. Taper =	345	feet
Turning Volume =	106	VPH	Turn Lane Length =	345	feet
# of Turning Lanes =	1				
Advancing Volume =	682	VPH			
Turning % (>10% HIGH) =	15.5%	HIGH			
Design Condition =	B or C				
Vehicles per Cycle =	1.8				
Storage Length (Calc) =	100	feet			

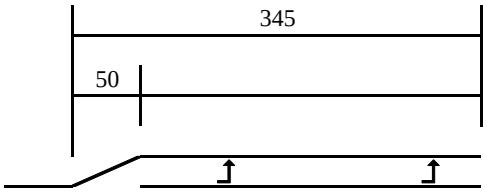


Calculations based on 401-7E in ODOT L&D Manual. All dimensions are in feet.

(8) LONDON-GROVEPORT RD (SR 665) & BUCKEYE PARKWAY - EB LT - 2039 'NO BUILD'

Critical Analysis Period: PM PEAK

Type =	Unsignalized Through Road		Design Condition (Rev)=	B	
Speed =	60	MPH	Storage Length (Adj) =	NA	
Cycle Length =	60	seconds	Deceleration/Div. Taper =	345	feet
Turning Volume =	99	VPH	Turn Lane Length =	345	feet
# of Turning Lanes =	1				
Advancing Volume =	729	VPH			
Turning % (>10% HIGH) =	13.6%	HIGH			
Design Condition =	B or C				
Vehicles per Cycle =	1.7				
Storage Length (Calc) =	100	feet			

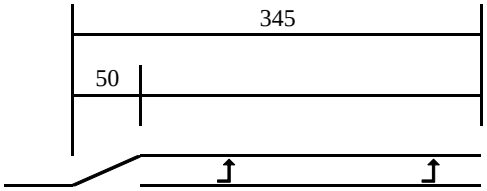


Calculations based on 401-7E in ODOT L&D Manual. All dimensions are in feet.

(9) LONDON-GROVEPORT RD (SR 665) & BUCKEYE PARKWAY - EB LT - 2039 RESIDENTIAL & SCHOOL 'BUILD'

Critical Analysis Period: PM PEAK

Type =	Unsignalized Through Road		Design Condition (Rev)=	B	
Speed =	60	MPH	Storage Length (Adj) =	NA	
Cycle Length =	60	seconds	Deceleration/Div. Taper =	345	feet
Turning Volume =	131	VPH	Turn Lane Length =	345	feet
# of Turning Lanes =	1				
Advancing Volume =	814	VPH			
Turning % (>10% HIGH) =	16.1%	HIGH			
Design Condition =	B or C				
Vehicles per Cycle =	2.2				
Storage Length (Calc) =	150	feet			



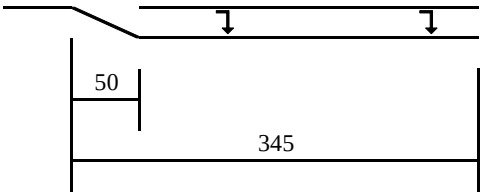
Calculations based on 401-7E in ODOT L&D Manual. All dimensions are in feet.

(4) LONDON-GROVEPORT RD (SR 665) & BUCKEYE PARKWAY - WB RT - 2019 'NO BUILD'

Critical Analysis Period: PM Peak

Type =	Unsignalized Through Road		Design Condition (Rev)=	B	
Speed =	60	MPH	Storage Length (Adj) =	NA	
Cycle Length =	60	seconds	Deceleration/Div. Taper =	345	feet
Turning Volume =	56	VPH	Turn Lane Length =	345	feet
# of Turning Lanes =	1				
Advancing Volume =	519	VPH			
Turning % (>10% HIGH) =	10.8%	HIGH			
Design Condition =	B or C				
Vehicles per Cycle =	0.9				
Storage Length (Calc) =	50	feet			

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

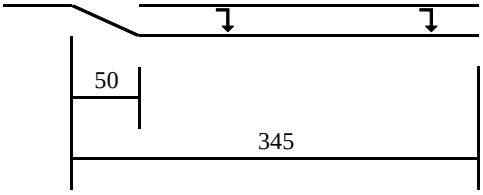


(5) LONDON-GROVEPORT RD (SR 665) & BUCKEYE PARKWAY - WB RT - 2019 RESIDENTIAL 'BUILD'

Critical Analysis Period: PM Peak

Type =	Unsignalized Through Road		Design Condition (Rev)=	B	
Speed =	60	MPH	Storage Length (Adj) =	NA	
Cycle Length =	60	seconds	Deceleration/Div. Taper =	345	feet
Turning Volume =	62	VPH	Turn Lane Length =	345	feet
# of Turning Lanes =	1				
Advancing Volume =	556	VPH			
Turning % (>10% HIGH) =	11.2%	HIGH			
Design Condition =	B or C				
Vehicles per Cycle =	1.0				
Storage Length (Calc) =	50	feet			

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

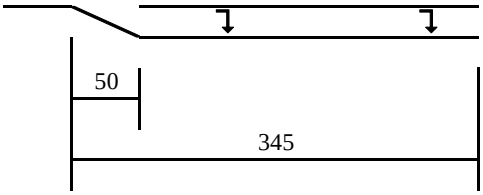


(6) LONDON-GROVEPORT RD (SR 665) & BUCKEYE PARKWAY - WB RT - 2029 'NO BUILD'

Critical Analysis Period: PM Peak

Type =	Unsignalized Through Road		Design Condition (Rev)=	B	
Speed =	60	MPH	Storage Length (Adj) =	NA	
Cycle Length =	60	seconds	Deceleration/Div. Taper =	345	feet
Turning Volume =	70	VPH	Turn Lane Length =	345	feet
# of Turning Lanes =	1				
Advancing Volume =	651	VPH			
Turning % (>10% HIGH) =	10.8%	HIGH			
Design Condition =	B or C				
Vehicles per Cycle =	1.2				
Storage Length (Calc) =	100	feet			

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

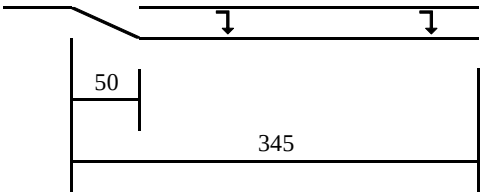


(7) LONDON-GROVEPORT RD (SR 665) & BUCKEYE PARKWAY - WB RT - 2029 RESIDENTIAL 'BUILD'

Critical Analysis Period: PM Peak

Type =	Unsignalized Through Road		Design Condition (Rev)=	B	
Speed =	60	MPH	Storage Length (Adj) =	NA	
Cycle Length =	60	seconds	Deceleration/Div. Taper =	345	feet
Turning Volume =	76	VPH	Turn Lane Length =	345	feet
# of Turning Lanes =	1				
Advancing Volume =	688	VPH			
Turning % (>10% HIGH) =	11.0%	HIGH			
Design Condition =	B or C				
Vehicles per Cycle =	1.3				
Storage Length (Calc) =	100	feet			

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

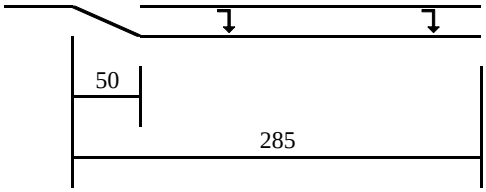


(1) PROP. HAWTHORNE PKWY. & JACKSON PIKE (SR 104) - SB RT - 2019 RESIDENTIAL 'BUILD'

Critical Analysis Period: PM Peak

Type =	Unsignalized Through Road		Design Condition (Rev)=	B	
Speed =	55	MPH	Storage Length (Adj) =	NA	
Cycle Length =	60	seconds	Deceleration/Div. Taper =	285	feet
Turning Volume =	92	VPH	Turn Lane Length =	285	feet
# of Turning Lanes =	1				
Advancing Volume =	733	VPH			
Turning % (>10% HIGH) =	12.6%	HIGH			
Design Condition =	B or C				
Vehicles per Cycle =	1.53				
Storage Length (Calc) =	100	feet			

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

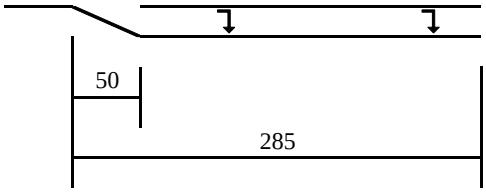


(2) PROP. HAWTHORNE PKWY. & JACKSON PIKE (SR 104) - SB RT - 2029 RESIDENTIAL 'BUILD'

Critical Analysis Period: PM Peak

Type =	Unsignalized Through Road		Design Condition (Rev)=	B	
Speed =	55	MPH	Storage Length (Adj) =	NA	
Cycle Length =	60	seconds	Deceleration/Div. Taper =	285	feet
Turning Volume =	92	VPH	Turn Lane Length =	285	feet
# of Turning Lanes =	1				
Advancing Volume =	832	VPH			
Turning % (>10% HIGH) =	11.1%	HIGH			
Design Condition =	B or C				
Vehicles per Cycle =	1.53				
Storage Length (Calc) =	100	feet			

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

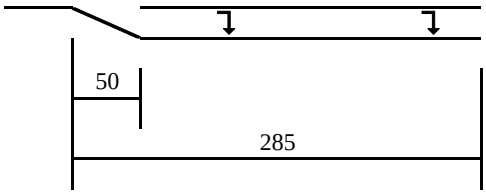


(3) PROP. HAWTHORNE PKWY. & JACKSON PIKE (SR 104) - SB RT - 2039 RESIDENTIAL & SCHOOL 'BUILD'

Critical Analysis Period: PM Peak

Type =	Unsignalized Through Road				
Speed =	55	MPH	Storage Length (Adj) =	NA	
Cycle Length =	60	seconds	Deceleration/Div. Taper =	285	feet
Turning Volume =	91	VPH	Turn Lane Length =	285	feet
# of Turning Lanes =	1				
Advancing Volume =	931	VPH			
Turning % (>10% HIGH) =	9.8%	LOW			
Design Condition =	B				
Vehicles per Cycle =	1.52				
Storage Length (Calc) =	100	feet			

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

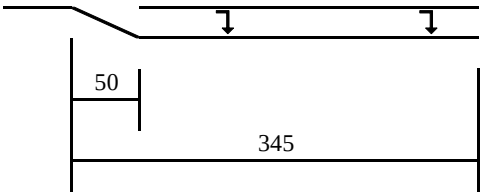


(8) LONDON-GROVEPORT RD (SR 665) & BUCKEYE PARKWAY - WB RT - 2039 'NO BUILD'

Critical Analysis Period: PM Peak

Type =	Unsignalized Through Road		Design Condition (Rev)=	B	
Speed =	60	MPH	Storage Length (Adj) =	NA	
Cycle Length =	60	seconds	Deceleration/Div. Taper =	345	feet
Turning Volume =	84	VPH	Turn Lane Length =	345	feet
# of Turning Lanes =	1				
Advancing Volume =	784	VPH			
Turning % (>10% HIGH) =	10.7%	HIGH			
Design Condition =	B or C				
Vehicles per Cycle =	1.4				
Storage Length (Calc) =	100	feet			

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

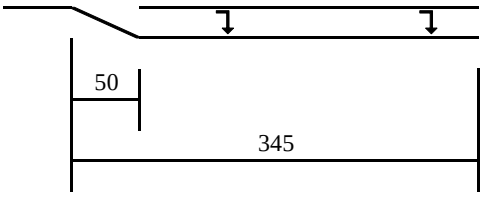


(9) LONDON-GROVEPORT RD (SR 665) & BUCKEYE PARKWAY - WB RT - 2039 RESIDENTIAL & SCHOOL 'BUILD'

Critical Analysis Period: PM Peak

Type =	Unsignalized Through Road		Design Condition (Rev)=	B	
Speed =	60	MPH	Storage Length (Adj) =	NA	
Cycle Length =	60	seconds	Deceleration/Div. Taper =	345	feet
Turning Volume =	88	VPH	Turn Lane Length =	345	feet
# of Turning Lanes =	1				
Advancing Volume =	819	VPH			
Turning % (>10% HIGH) =	10.7%	HIGH			
Design Condition =	B or C				
Vehicles per Cycle =	1.5				
Storage Length (Calc) =	100	feet			

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

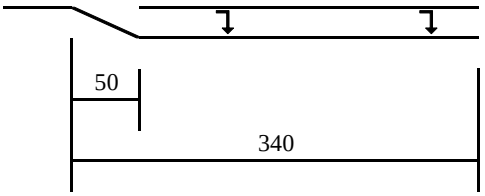


(32) LONDON-GROVEPORT RD (SR 665) & JACKSON PIKE (SR 104) - SB RT - 2029 RESIDENTIAL 'BUILD'

Critical Analysis Period: PM Peak

Type =	Signalized		Design Condition (Rev)=	C	
Speed =	55	MPH	Storage Length (Adj) =	175	feet
Cycle Length =	120	seconds	Deceleration/Div. Taper =	165	feet
Turning Volume =	114	VPH	Turn Lane Length =	340	feet
# of Turning Lanes =	1				
Advancing Volume =	713	VPH			
Turning % (>10% HIGH) =	16.0%	HIGH			
Design Condition =	B or C				
Vehicles per Cycle =	3.8				
Storage Length (Calc) =	175	feet			

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

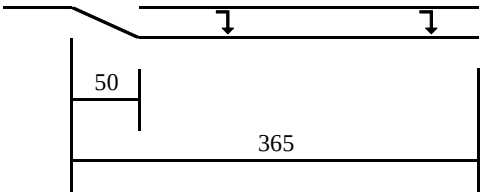


(33) LONDON-GROVEPORT RD (SR 665) & JACKSON PIKE (SR 104) - SB RT - 2039 RESIDENTIAL & SCHOOL 'BUILD'

Critical Analysis Period: PM Peak

Type =	Signalized		Design Condition (Rev)=	C	
Speed =	55	MPH	Storage Length (Adj) =	200	feet
Cycle Length =	120	seconds	Deceleration/Div. Taper =	165	feet
Turning Volume =	127	VPH	Turn Lane Length =	365	feet
# of Turning Lanes =	1				
Advancing Volume =	817	VPH			
Turning % (>10% HIGH) =	15.5%	HIGH			
Design Condition =	B or C				
Vehicles per Cycle =	4.2				
Storage Length (Calc) =	200	feet			

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



ID	Intersection	2039 RESIDENTIAL & SCHOOL 'BUILD' - AM PEAK															2039 RESIDENTIAL & SCHOOL 'BUILD' - PM PEAK															AM PEAK & PM PEAK		
		Intersection			Eastbound Total			Westbound Total			Southbound Total			Northbound Total			Intersection			Eastbound Total			Westbound Total			Southbound Total			Northbound Total			Intersection		
		Site	Total	% Site	Site	Total	% Site	Site	Total	% Site	Site	Total	% Site	Site	Total	% Site	Site	Total	% Site	Site	Total	% Site	Site	Total	% Site	Site	Total	% Site	Site	Total	% Site	Site	Total	% Site
3222	London-Groveport Rd (SR 665) & Jackson Pike (SR 104)	183	2231	**8.2%**	26	608	4.3%	10	240	4.2%	90	320	28.1%	57	1063	5.4%	138	2618	**5.3%**	39	575	6.8%	29	703	4.1%	43	817	5%	27	523	5.2%	321	4849	**6.6%**

APPENDIX EXHIBIT RESIDENTIAL & SCHOOL SITE GENERATED TRAFFIC AT STUDY INTERSECTIONS