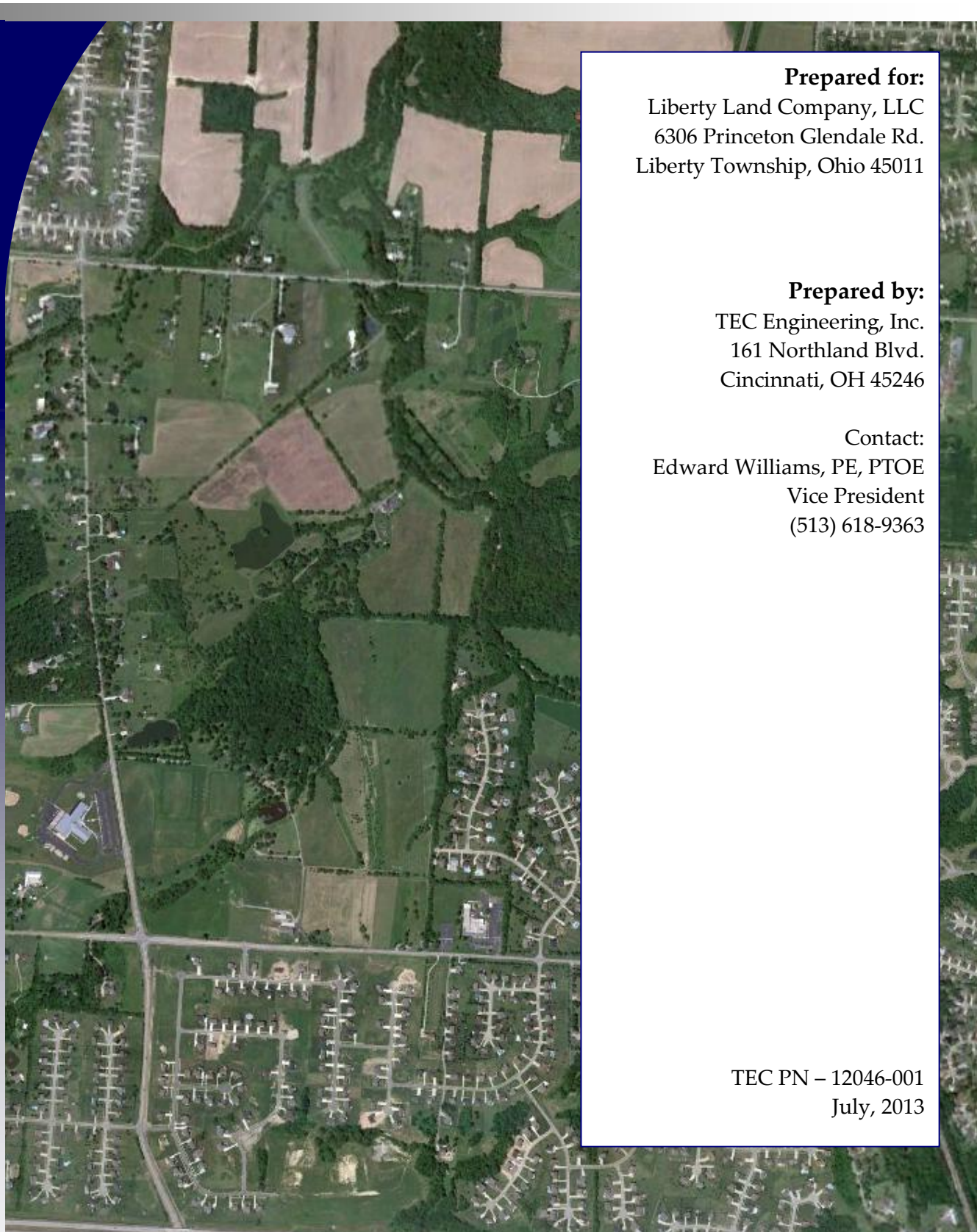
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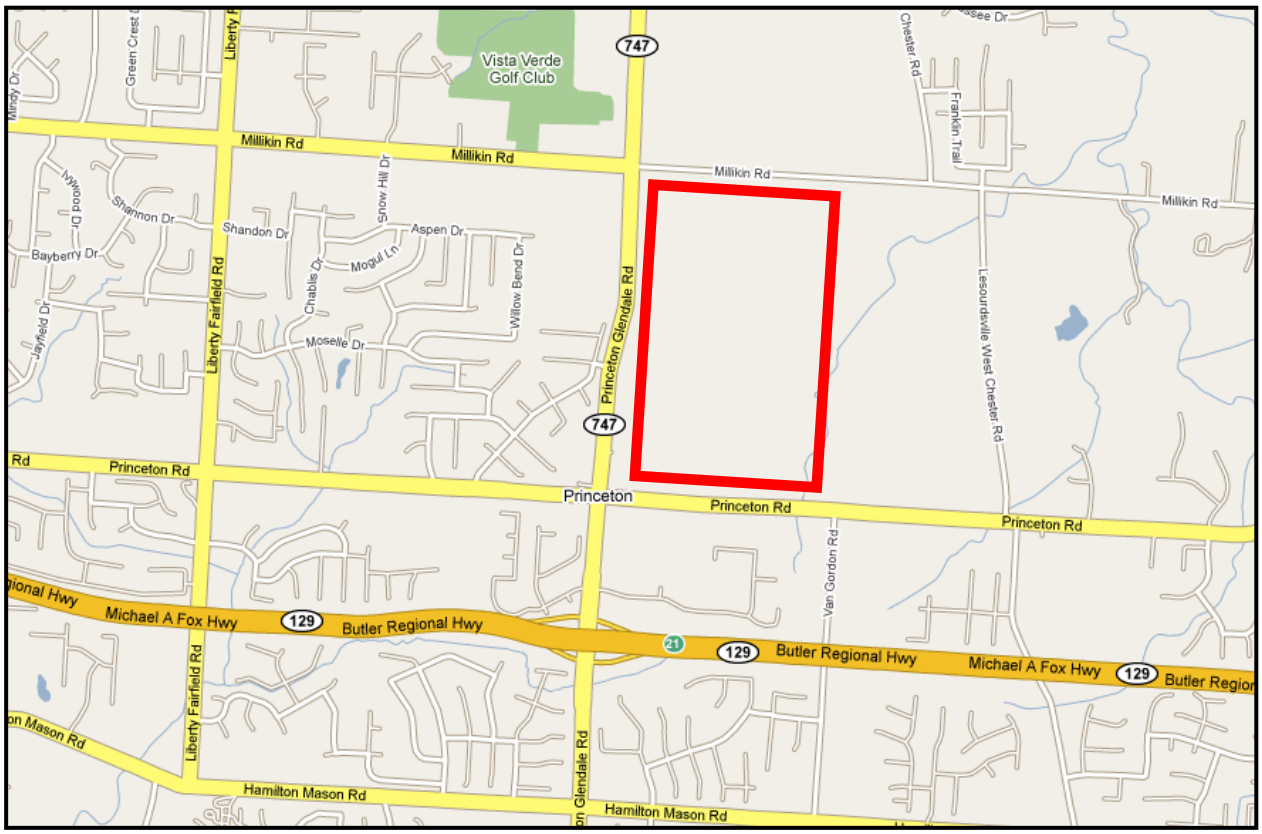
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TEC PN – 12046-001
July, 2013

Traffic Impact Study

Carriage Hill Development
Liberty Township
Butler County, Ohio



Prepared for:

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6306 Princeton Glendale Rd.
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May 2013

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1. Executive Summary

TEC Engineering, Inc. was retained by Liberty Land Company, LLC, to conduct a Traffic Impact Study for the proposed Carriage Hill development in Liberty Township, Ohio. The proposed subdivision will be located in the northeast corner of the intersection of Princeton Road and Princeton Glendale Road.

The project area for the study includes Princeton Glendale Road (SR 747) from Millikin Road to Princeton Road, two additional access points on Millikin and Princeton Road, and also the intersection of Princeton Road and Van Gordon Road. The traffic characteristics of the study area include a mix of commuter traffic and residential area traffic.

Existing traffic conditions were collected and utilized in the development of this report. Mechanical 24 hour counts were conducted by TEC Engineering in the vicinity of the proposed development in March 2009. Manual turning movement counts were collected at the major study intersections during the AM and PM peak hours in March 2009 as well. This was used to obtain Certified Traffic from ODOT.

Field observations were performed to check the existing physical conditions of the roadway surrounding the proposed development, including pavement markings and other roadway features. General pictures of the area were taken and are included throughout this report.

Trip Generation and Distribution

The first Phase of the Carriage Hill development is anticipated to generate about 387 vehicle-trips in the AM peak hour (95 inbound and 291 outbound) and 491 vehicle-trips in the PM peak hour (310 inbound and 181 outbound).

The second Phase of the Carriage Hill development is anticipated to generate about 457 vehicle-trips in the AM peak hour (110 inbound and 348 outbound) and 570 vehicle-trips in the PM peak hour (362 inbound and 209 outbound).

The trips generated by the proposed development were distributed throughout the project area based on the location of the development accesses and existing traffic flow.

Roadway Network Conclusions

The purpose of this traffic study is to determine whether the project will have an adverse impact on the surrounding transportation network, and what mitigation measures might be required. With this purpose in mind, the recommendations presented within this report have been developed.

Summary

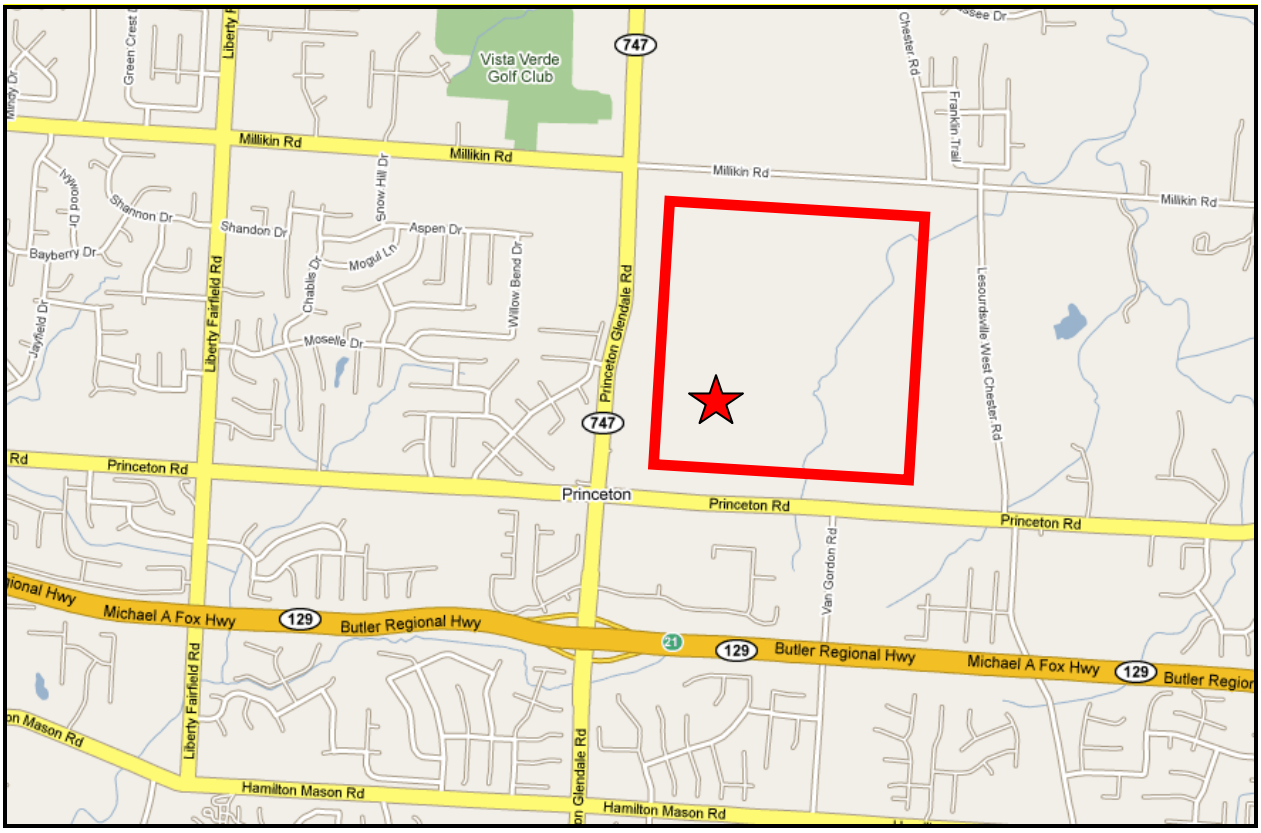
Implementation of the improvements in this report will help to mitigate the impact of added traffic by the Carriage Hill development at intersections within the study area. Most intersections will operate at acceptable levels of service without significant improvements. Turn lanes along the development frontage, a new signal at Willow Ridge, and lane upgrades at Princeton Road are the primary requirements based upon the findings of this study.

In conclusion, the aforementioned recommendations should be implemented and will mitigate the impact of traffic generated by the Carriage Hill development on the local roadways.

2. Introduction

TEC Engineering, Inc. was retained by Liberty Land Company, LLC to conduct a Traffic Impact Study for a proposed Carriage Hill Development in Liberty Township, Ohio. TEC had previously been contracted to complete the report in 2009. Since then, the development plan has had several changes. The new site plan will be considered in this report. The proposed development will be located to the northeast of the intersection of SR 747 (Princeton Glendale Road) and Princeton Road.

Figure 1: Location Map



The purpose of this traffic study is to determine whether the project will have an adverse impact on the surrounding transportation network, and what mitigation measures might be required. Prior to the completion of this study, TEC and representatives of the Liberty Land Company, LLC discussed the requirements and scope of the study.

The following sources were referenced in the study:

- *Institute of Transportation Engineers (ITE) Trip Generation Manual, Eighth Edition*
- *Ohio Manual of Uniform Traffic Control Devices, OMUTCD, 2012 Edition*
- *ODOT Location and Design Manual, Volume One*

The following steps were taken to complete this traffic impact study:

Traffic Counts

Mechanical 24 hours counts were conducted by TEC Engineering in the vicinity of the proposed development in March 2009. Manual turning movement counts were collected at the major study intersections during the AM and PM peak hours in March and April 2009 as well. These counts were submitted to ODOT and Certified Traffic was provided for the area. Certified Traffic is provided in *Appendix A*.

Field Observation

Field observations were performed to check the existing physical conditions of the roadway surrounding the proposed development, including pavement markings and other roadway features. General pictures of the area were taken and are included throughout this study.

Generated Traffic

Trip Generation was completed using the proposed land use types to estimate the number of trips that will be generated due to the proposed development. The projected traffic volumes entering and exiting the development were determined using the *Institute of Transportation Engineers (ITE) Trip Generation Handbook*. Internal Trip reduction worksheet is provided in *Appendix C*,

Analysis & Recommendations

All of the aforementioned steps provided the information used to analyze the proposed Carriage Hill development. Capacity analysis, signal warrant analysis and storage lane length analysis were all used to develop the conclusions and recommendations pertinent to the impact of traffic in the vicinity of the proposed development. Storage lane length calculation information is included in *Appendix D*, and Capacity Analysis Worksheets are located in *Appendix E*.

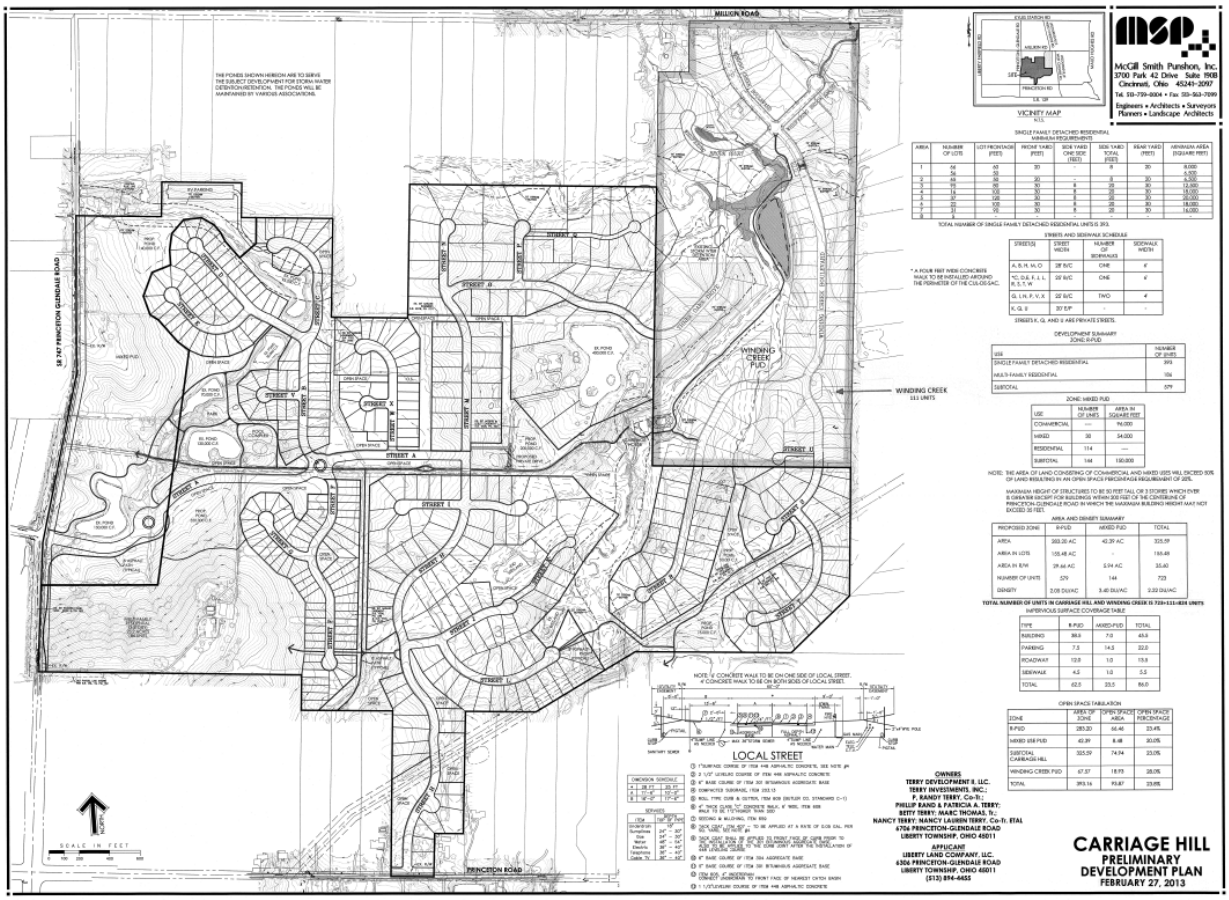
This report summarizes the findings of the traffic impact study conducted by TEC Engineering, Inc.

3. Proposed Development

The proposed site for the Carriage Hill development is located on SR 747 just north of SR 129 in Liberty Township, Butler County, Ohio. SR 747 borders the proposed site to the west, Princeton Road borders the south and Millikin Road borders the north. This development will add one additional intersection to SR 747 with the one access in alignment with Willow Ridge. Also there will be a full access intersection added to Princeton Road. The third access is located on Millikin Road at Winding Creek Drive. The existing site consists of mainly open fields with a few single family houses, along with small farms. Construction has started on several houses on Winding Creek.

The proposed site plan is shown below.

Figure 2: Proposed Site Plan



4. Area Conditions

A. Study Area

The traffic characteristics of the study area include a mix of commuter traffic, residential area traffic and some commercial development traffic. Morning and evening peak hour counts were performed at the following intersections:

- Princeton Glendale Road (SR 747) and Millikin Road (signalized)
- Princeton Glendale Road (SR 747) and Willow Ridge Drive
- Princeton Glendale Road (SR 747) and Princeton Road (signalized)
- Princeton Road and Van Gordon Road
- Millikin Road and Winding Creek Dr

Princeton Glendale Road (SR 747) is a 4 and 2 lane urban collector that runs north-south along the west border of the study area. Princeton Glendale Road (SR 747) is a heavily traveled corridor which provides access to the Butler County Veteran's Highway (SR 129) and Interstate 275 further south. Within the study area, Princeton Glendale Road (SR 747) carries over 16,000 vehicles per day (vpd) with a posted speed of 55 MPH. The speed limit is reduced to 40 mph just south of Millikin Rd.



Looking north along SR 747 at the SR 129 westbound ramp

Within the study area, primary intersections along Princeton Glendale Road (SR 747) include (moving north to south) Millikin Road, Access 1 (Right-in/Right-out), Willow Ridge Drive (full access), and Princeton Road (CR 18). Currently the Millikin Road and Princeton Road intersections are signalized. The proposed full access intersection at Willow Drive is currently stop controlled for Willow Drive. This intersection will require the installation of a traffic signal if a signal warrant is met. The proposed right in/out access points will not require additional signals.



Looking north along SR 747 at Willow Ridge Drive

Along the southern boundary of the study area runs Princeton Road. Princeton Road is an east-west roadway through Liberty Township which provides access to multiple residential developments. Princeton Road is classified by ODOT as an urban collector. The roadway is two lanes in the study area and has a speed limit of 45 mph.

The major study intersections along this road are with Princeton Glendale Road (SR 747) mentioned above, Access 3 (full Access) and Van Gordon Road. The proposed full access may require a

signalized intersection to be added and with the additional traffic the development will produce, the current stop controlled Van Gordon intersection may require a signal. Princeton Road carries approximately 7,650 vehicles per day (vpd) according to ODOT Certified Traffic.

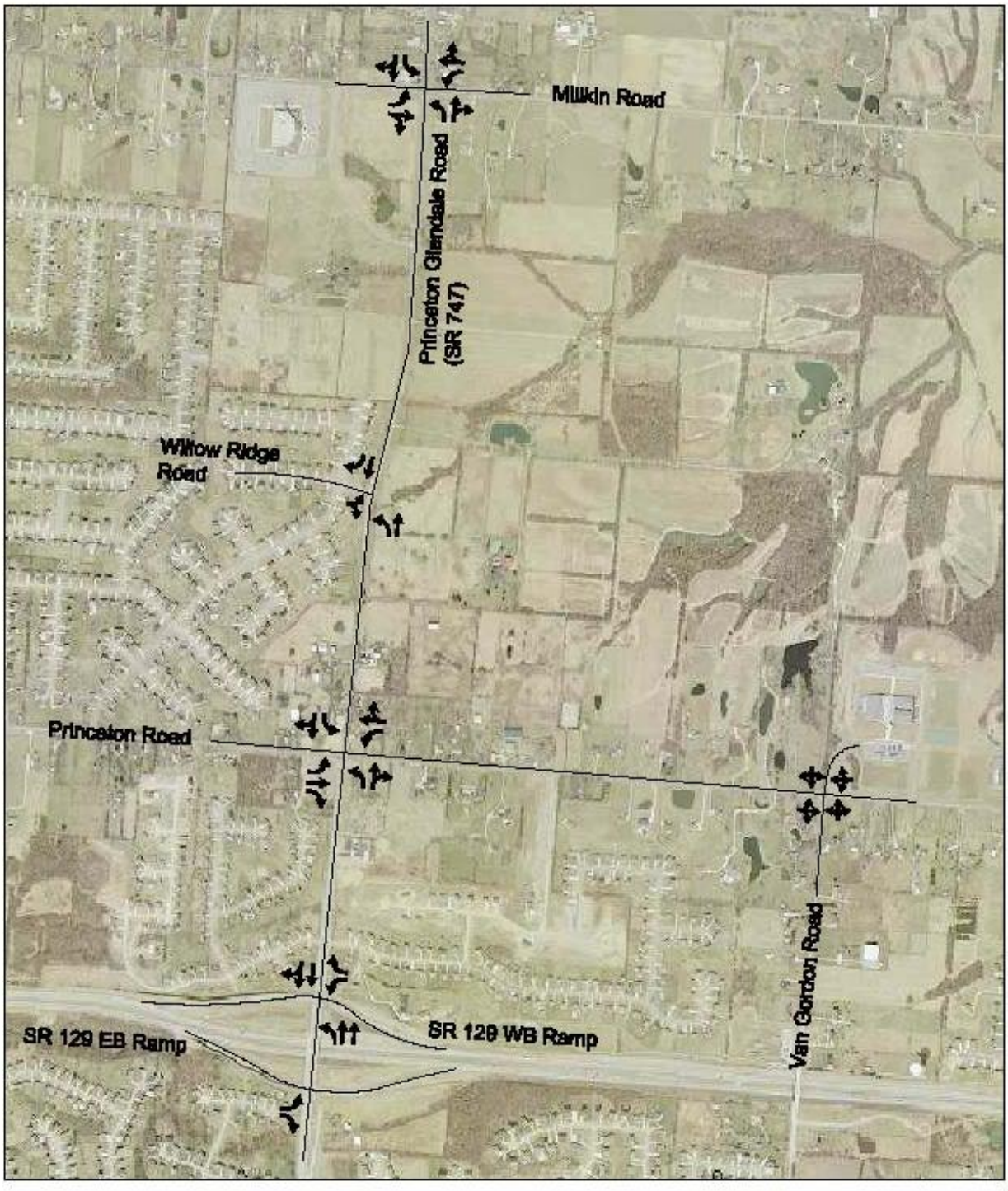
Along the northern boundary of the study area runs Millikin Road. Millikin Road is an east-west roadway through Liberty Township which provides access to multiple residential developments. Millikin Road is classified by ODOT as a local road. The roadway is two lanes in the study area and has a speed limit of 55 mph. The major study intersections along this road are with Princeton Glendale Road (SR 747) mentioned above and Access 4/Winding Creek (full Access). The proposed full access may require a signalized intersection to be added and with the additional traffic the development will produce. Millikin Road carries approximately 7,360 vehicles per day (vpd) according to ODOT Certified Traffic.



Looking west along Princeton Road at Van Gordon Road

The existing lane use for the project area is shown *Figure 3* in on the following page.

Figure 3: Existing Lane Use



B. Existing Volumes

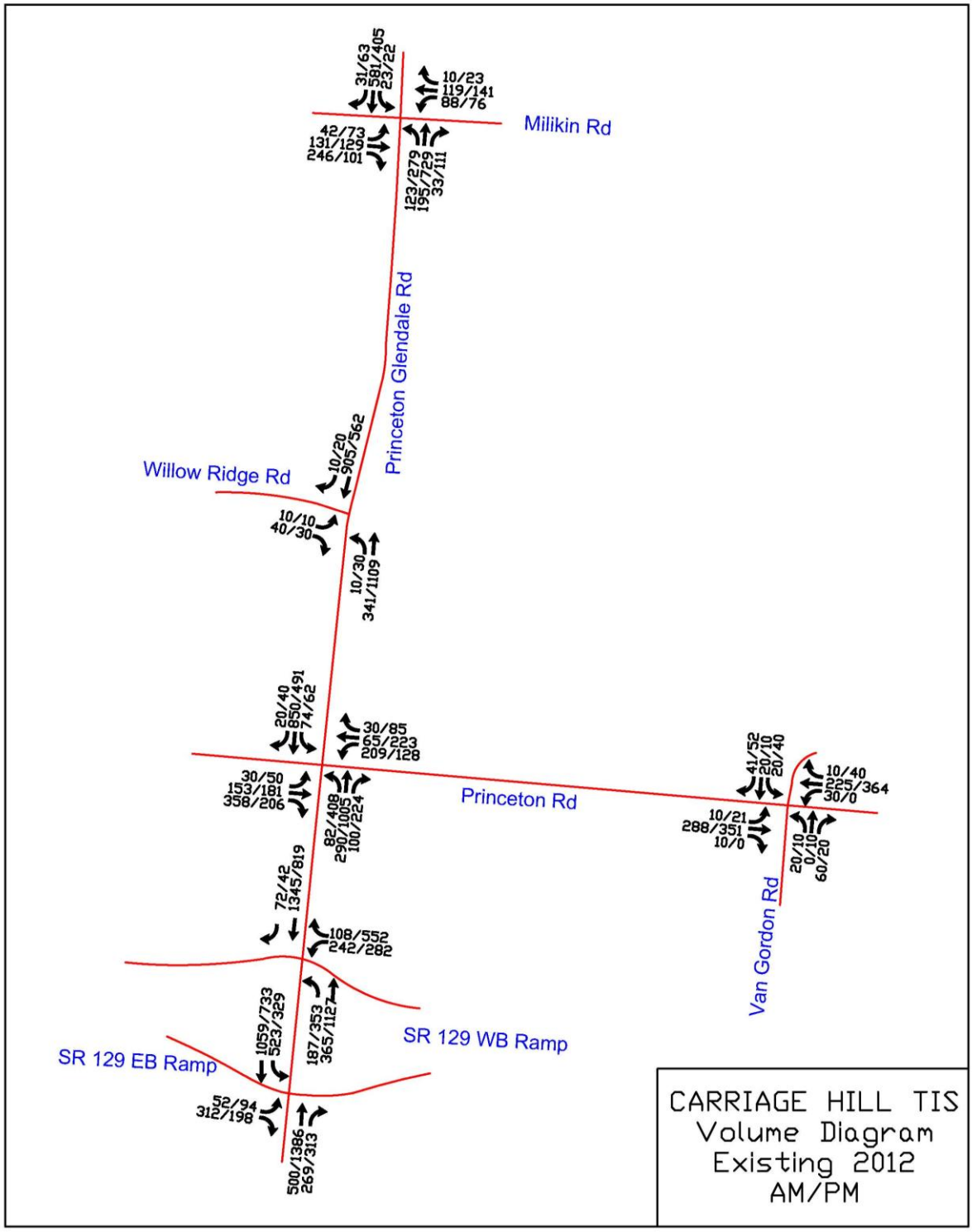
In accordance with the previous study requirements, TEC performed traffic counts to submit to ODOT to obtain Certified Traffic. Mechanical 24 hour counts were conducted by TEC Engineering at the following locations in March 2009:

- NB/SB SR 747 at SR 129
- WB SR 129 On Ramp
- EB SR 129 On Ramp
- WB SR 129 Off Ramp
- EB SR 129 Off Ramp

Manual turning movement counts were collected at the study intersections during the AM and PM peak hours in March and April 2009.

ODOT provided Certified Traffic for 2010 and 2030 No Build conditions. Since it has been several years since the Certified Traffic was acquired, a growth rate was applied to the Certified Traffic to determine 2012 volumes. The growth rates were extrapolated for each movement and applied to the Certified Traffic to determine the 2012 traffic. The 2012 peak hour traffic has been included as *Figure 4.* Certified Traffic been provided in *Appendix A.*

Figure 4: 2012 Existing Volumes



5. Scenario Evaluation

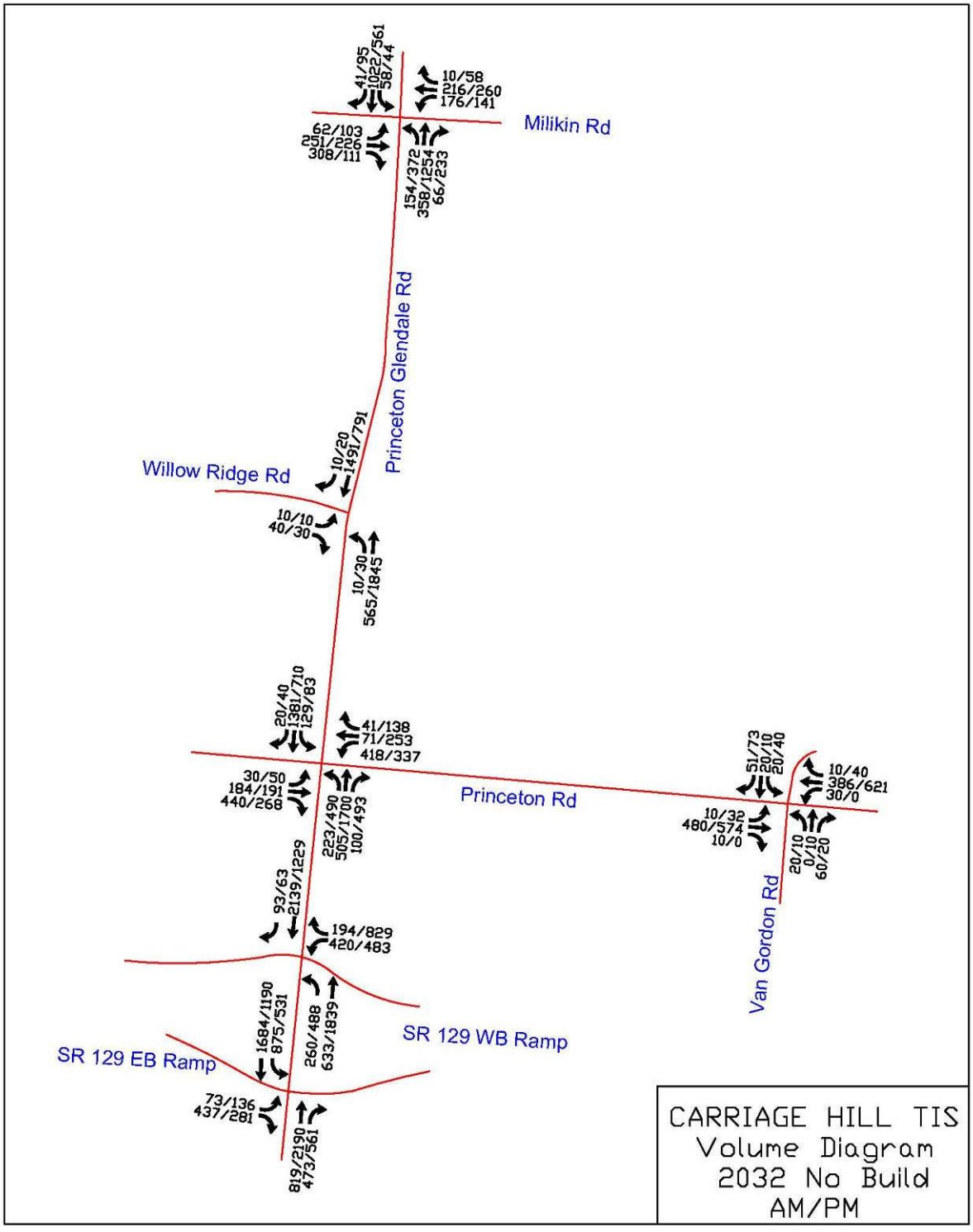
To determine any improvements necessary to accommodate the traffic generated by the proposed development, the following scenarios were compared and analyzed:

- *Existing Conditions (2012)*
- *Design Year No Build (2032)*
- *Design Year Build (2032)*

Since there is now a more clear time frame on the development, a growth rate was applied to the Certified Traffic to determine the future volumes. Using the 2010/2030 Certified Traffic, the growth rates were extrapolated for each movement and applied to the Certified Traffic to determine the future traffic.

The existing balanced volumes (2012) for AM and PM are shown in *Figure 4* in the previous section. Design Year No Build (2032) traffic volumes are shown in *Figure 5*.

Figure 5: 2032 No Build Conditions



6. Traffic Projections

A. Trip Generation

Total Trips
The *Institute of Transportation Engineers (ITE) Trip Generation Handbook* is the most widely accepted publication for projecting traffic volumes. Volume projections are based on specifics of the site usage. The trips generated by the proposed development site were projected using the trip generation rates and equations provided in the handbook.

The development consist of 504 units of single family houses, 186 units of multifamily, which may be apartments or patio homes, and a commercial area with office space.

For this study, TEC will analyze two separate Phases for the development. The first phase includes all 504 single family homes, as well as 42 units of multifamily. The second phase includes all single family homes, all multifamily homes, as well as the commercial area. The multifamily is divided between the two phases because several will be located with the commercial development.

There are two distinct land use types included in the development: Residential and Commercial. The residential aspect of the development will consist of 504 units of single family houses (Land Use 210) and 186 units of multifamily (Land Use 220).

One section of the site will include a commercial development. There will be approximately 150,000 square feet of space which will be general office.

Table 1 shows the total projected trips to be generated by Phase 1 of the Carriage Hill development during the average weekday AM and PM peak hours.

Table 1: Phase 1 Carriage Hill Generated Trips

Land Use	units	AM		PM	
		Enter	Exit	Enter	Exit
Single Family Detached Housing (LU 210)	504 units	91	272	284	167
Apartment (LU 220)	42 units	5	19	26	14
Residential Total	546 units	96	291	310	181

Table 2 on the following page shows the total projected trips to be generated by Phase 2 of the Carriage Hill development during the average weekday AM and PM peak hours.

Table 2: Phase 2 Carriage Hill Generated Trips

Land Use	units	AM		PM	
		Enter	Exit	Enter	Exit
Single Family Detached Housing (LU 210)	504 units	91	272	284	167
Apartment (LU 220)	186 units	19	76	78	72
Residential Total	690 units	110	348	362	239
General Office (LU 710)	150,000 sq ft	228	31	42	205
Total Office	150,000 sq ft	228	31	42	193

Internal Trip Reduction

Since the development is a multi-use development, some of the trips generated by the site can be classified as internal trips. Multi-use developments are defined as follows:

> *A multi-use development is typically a single real-estate project that consists of two or more ITE land use classifications between which trips can be made without using the off-site road system. Multi-use developments are commonly found ranging in size from 100,000 square feet to 2 million square feet.*

A key characteristic of a multi-use development is that trips among various land uses can be made on site and these internal trips are not made on the major street system. These trips are made by walking or vehicles entirely on internal pathways or internal roadways without using streets external to the site. Internal trips within the development were calculated using the methods presented in the *Institute of Transportation Engineers (ITE) Trip Generation Handbook* for the three types of land uses (Office, Retail and Residential). Internal capture rates are only available for the PM peak hour of adjacent street traffic, therefore internal trip reductions were only taken for the PM peak hour.

Pass-by Trips

Pass-by trips are defined as follows:

> *Pass-by trips – trips made as intermediate stops on the way from an origin to a primary trip destination. Pass-by trips are attracted from traffic passing the site on an adjacent street that contains direct access to the generator. These trips do not require a diversion from another roadway.*

Due to the structure of the proposed development, with only residential and office, there are no projected pass-by trips created by the development.

The total trips and internal trips for the Carriage Hill Development can be seen in *Table 3* and the total new trips are summarized in *Table 4*.

Table 3: Generated and Internal Trips Summary – Carriage Hill – Phase 2

Land Use	units	Generated Trips				Internal Reduction			
		AM		PM		AM		PM	
		Enter	Exit	Enter	Exit	Enter	Exit	Enter	Exit
Residential	690 units	110	348	362	209	0	0	-4	0
General Office	150,000 sq ft	228	31	42	205	0	0	0	-4

Table 4: New Trips – Carriage Hill – Phase 2

Land Use	units	Generated Trips			
		AM		PM	
		Enter	Exit	Enter	Exit
Residential	690 units	110	348	358	209
General Office	150,000 sq ft	228	31	42	205
Total		338	379	400	410

B. Trip Distribution

The directional distribution of site traffic depends on several factors including area land use, roadway configuration, levels of congestion, and the location of site access points. The projected directional distributions used in this study were determined from these factors as well as examination of existing traffic patterns in the study area.

The directional distribution percentages were calculated from the Certified Traffic. Most of the traffic will go to/from the south, towards SR 129. The following directional distributions were used in this study:

46% to/from South – SR 747
25% to/from North – SR 747
10% to/from East – Princeton Rd
8% to/from West – Princeton Rd
6% to/from East – Millikin Rd
5% to/from West – Millikin Rd

In addition to the overall directional distribution, TEC Engineering Inc. looked at the individual driveway distribution. The driveway distribution was based on TEC's knowledge of the proposed layout of the development and generated traffic. Routes to and from the proposed development were selected based upon an examination of existing traffic patterns. Figures showing the individual distributions used in this study are shown in *Appendix B*.

The site generated trips for the 2032 AM and PM peak hours are shown in *Figure 6 - Figure 9.*

C. Build Volumes

The Build AM and PM traffic volumes for 2032 are shown *Figure 10 - Figure 13.*

Figure 6: 2032 AM Generated Trips – Phase 1

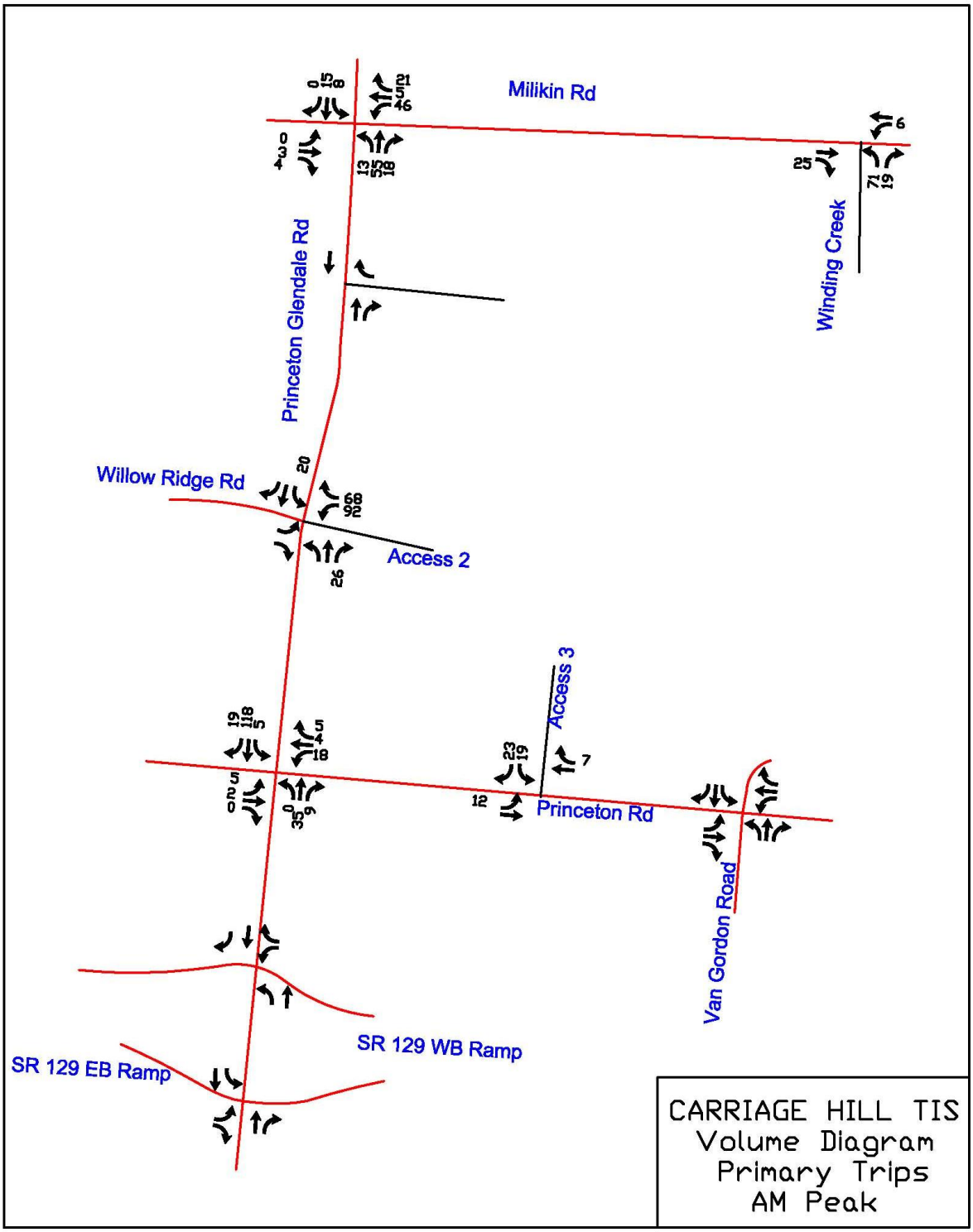


Figure 7: 2032 PM Generated Trips – Phase 1

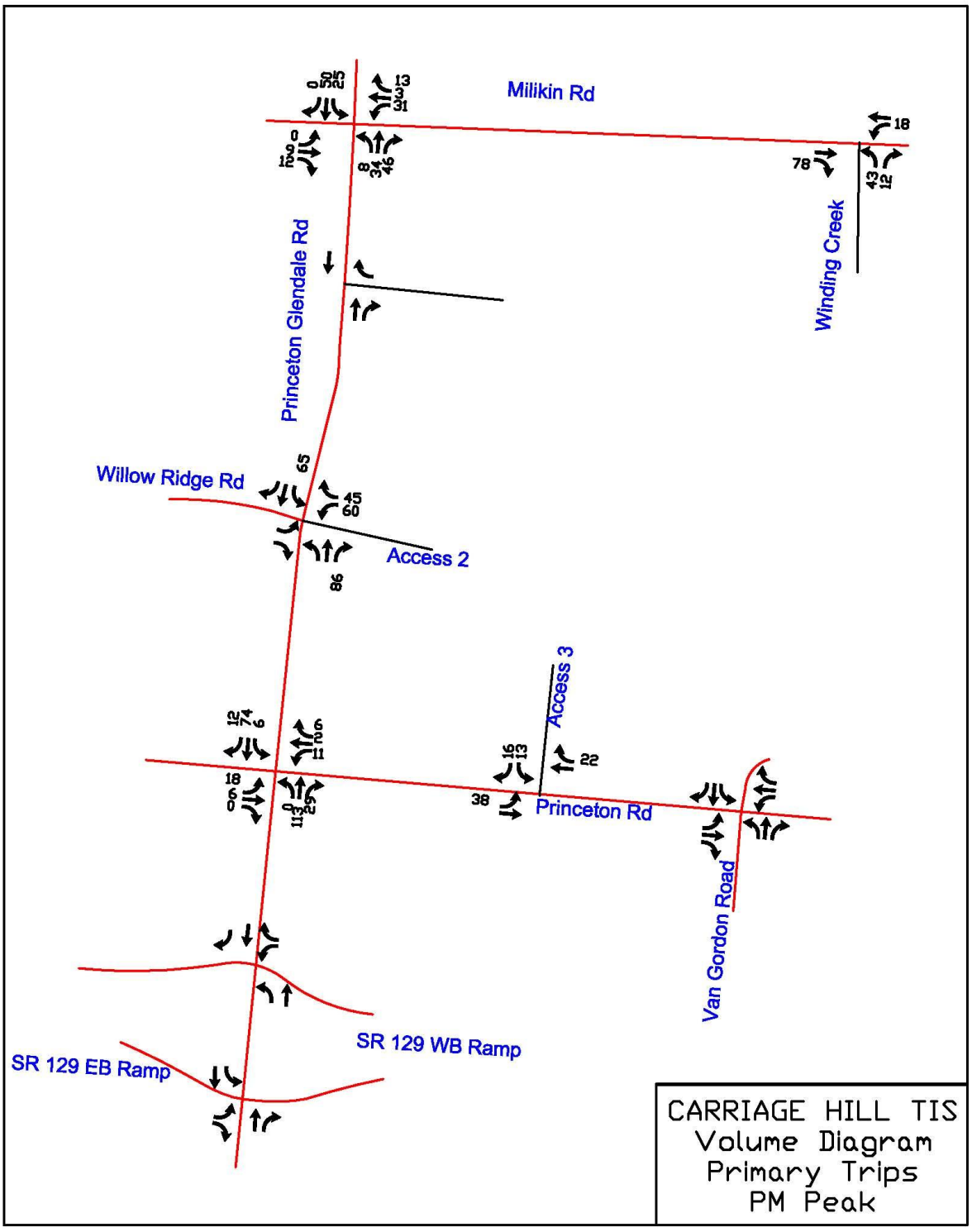


Figure 8: 2032 AM Generated Trips – Phase 2

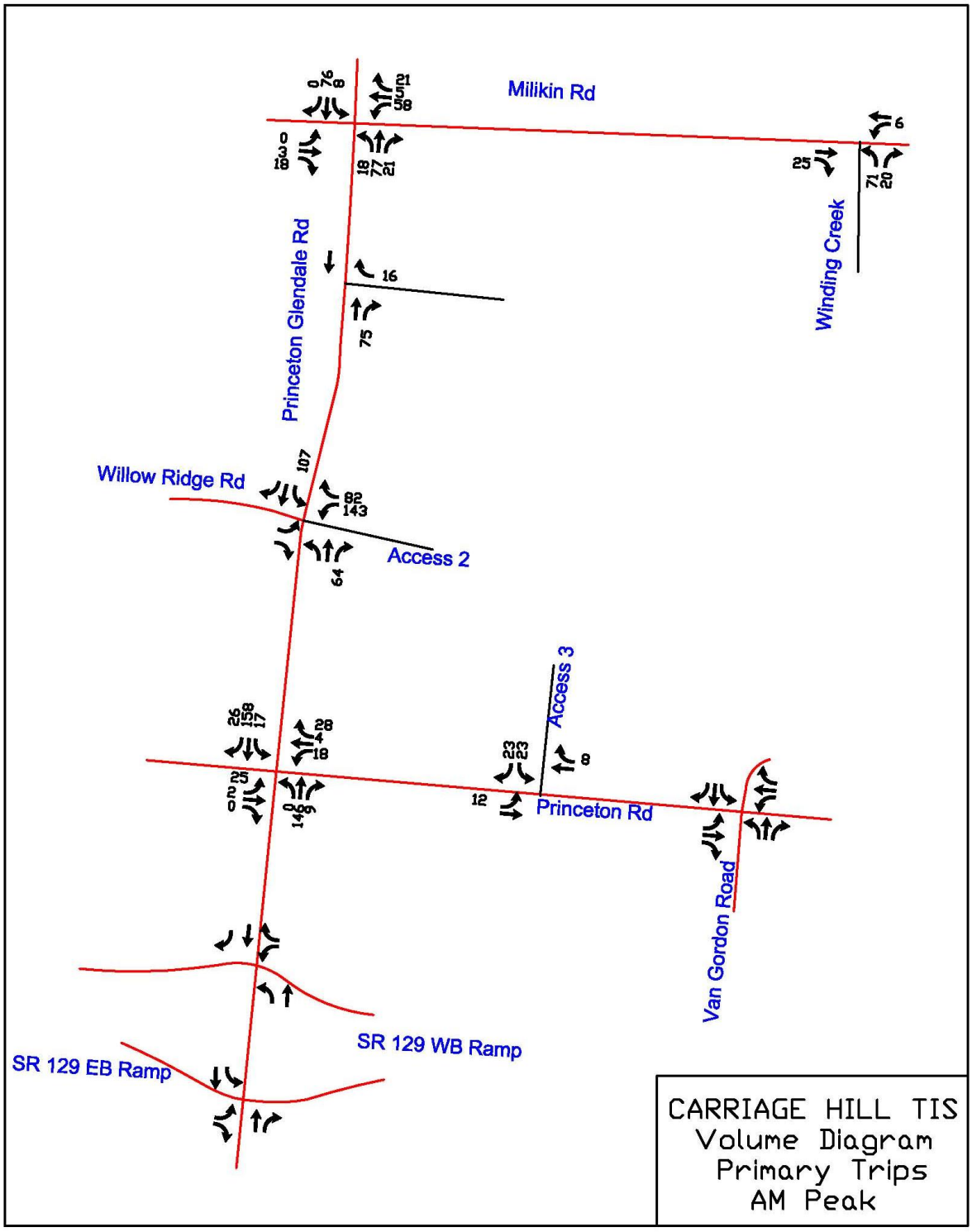


Figure 9: 2032 PM Generated Trips – Phase 2

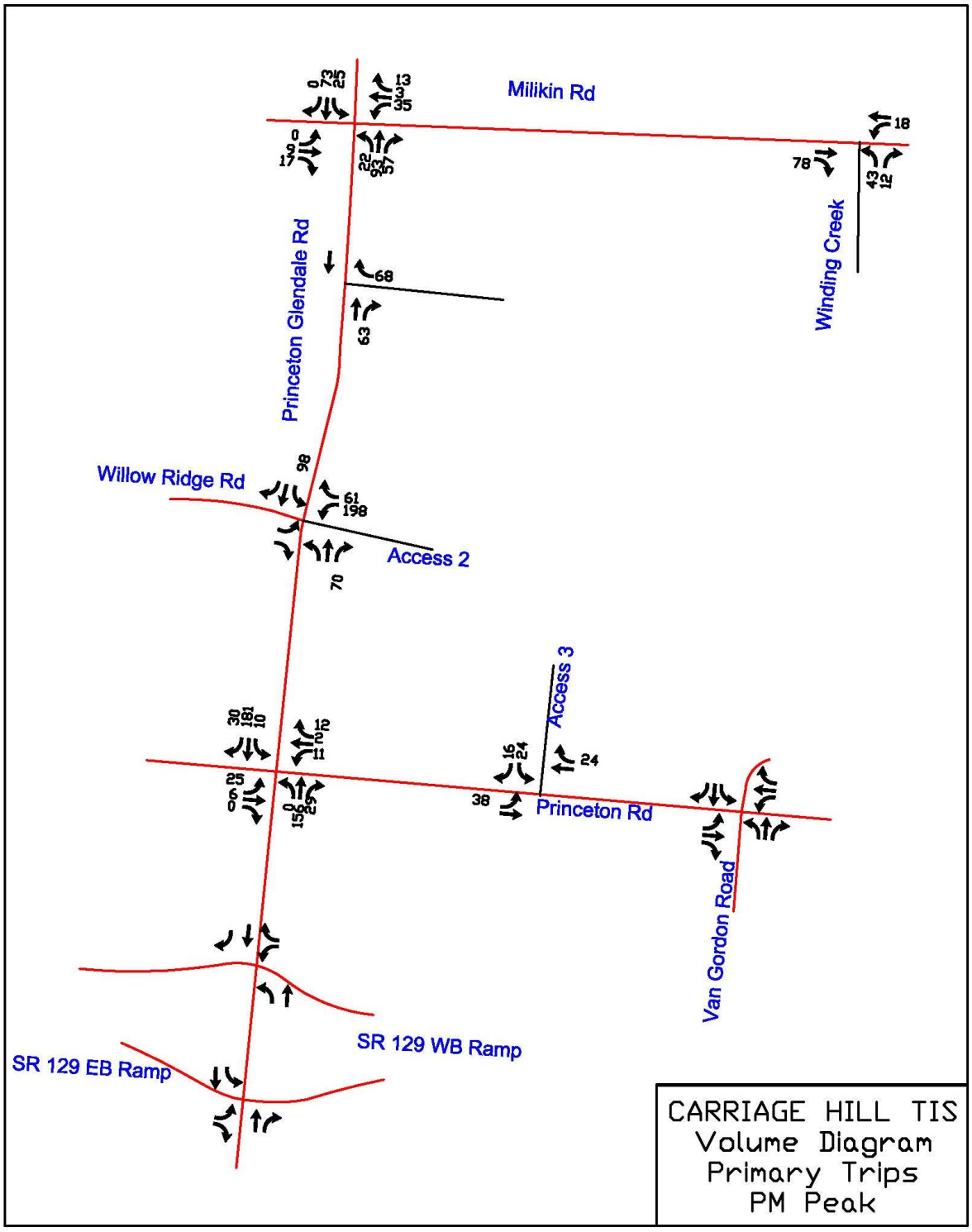


Figure 10: 2032 AM Build Volumes – Phase 1

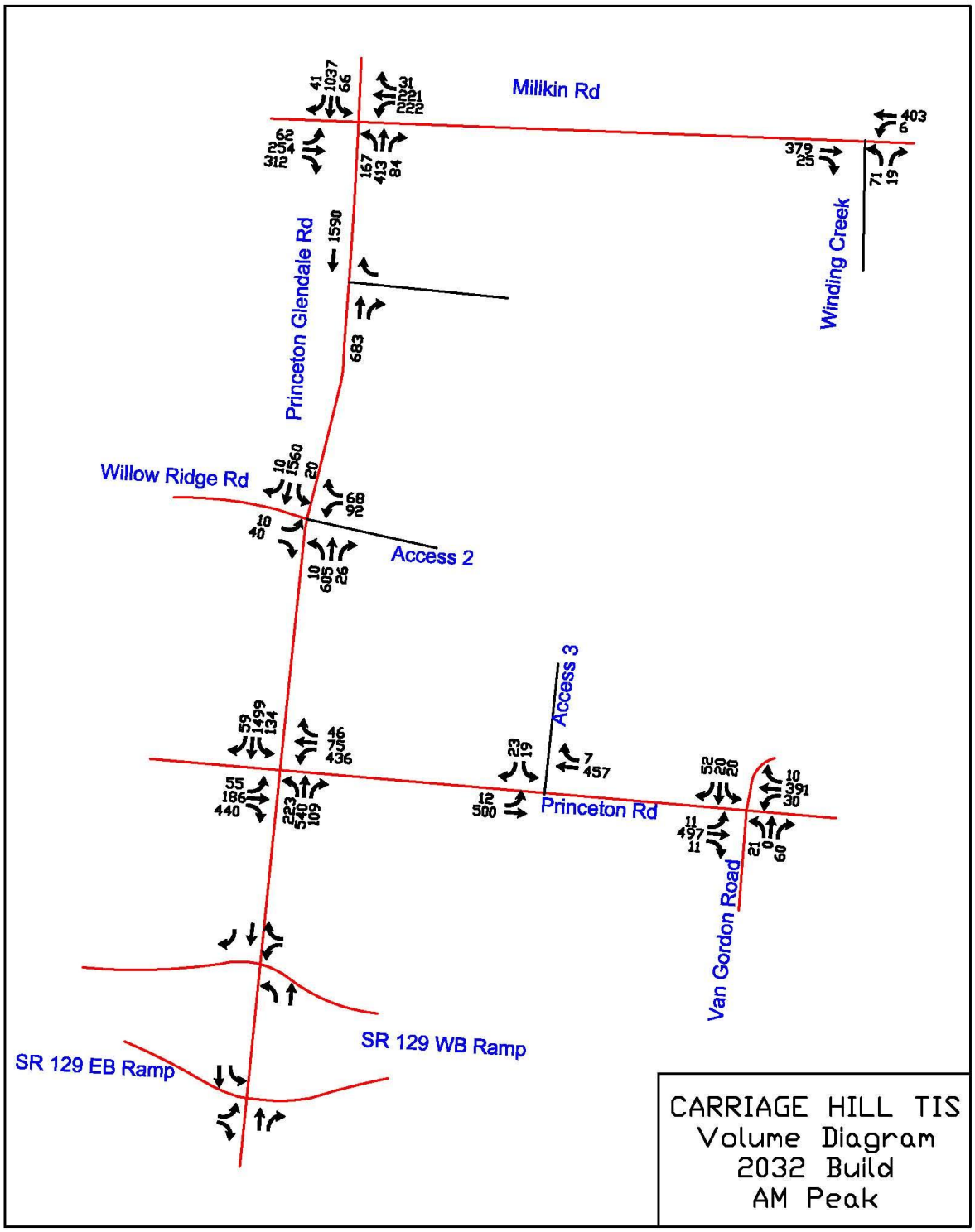


Figure 11: 2032 PM Build Volumes – Phase 1

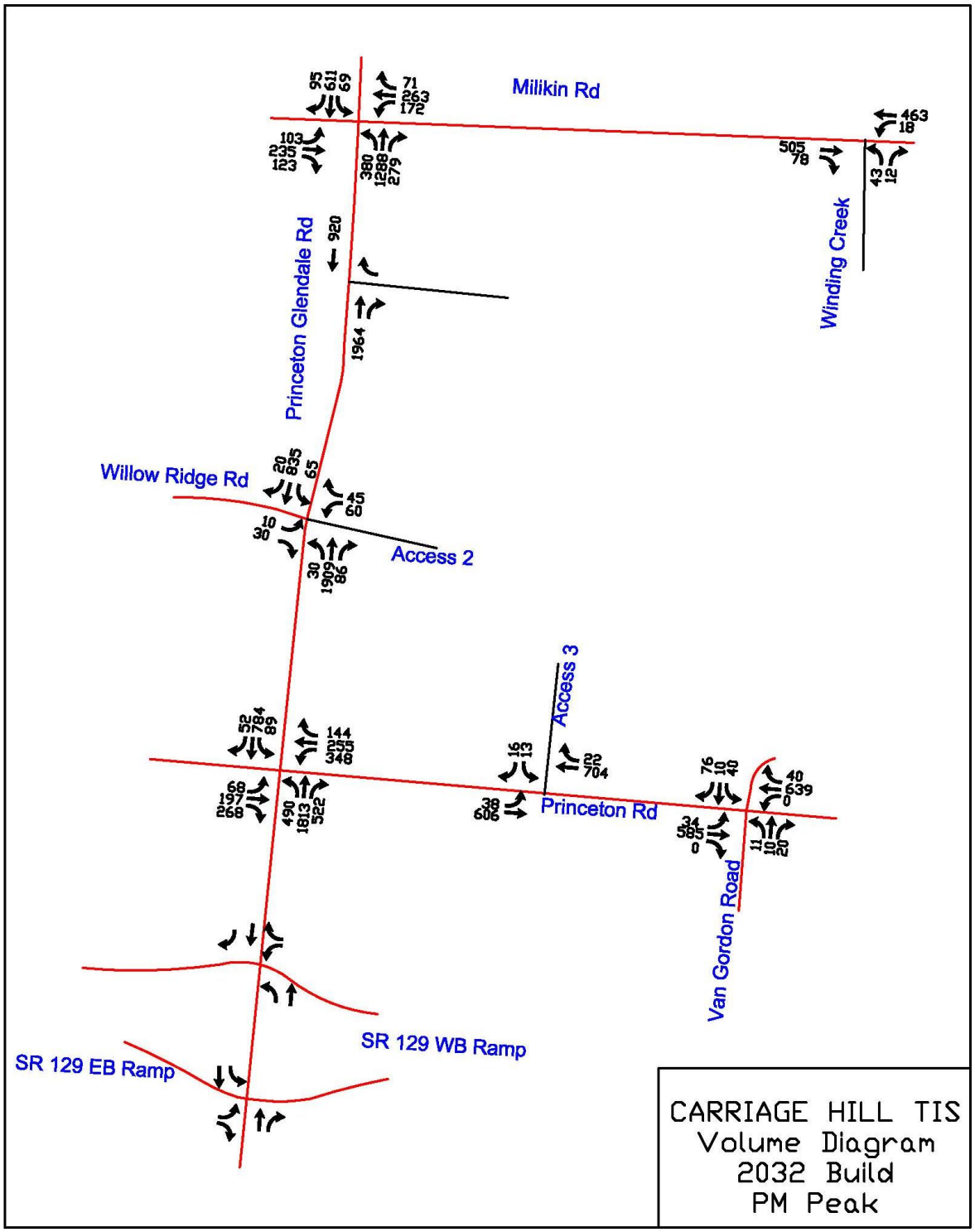


Figure 12: 2032 AM Build Volumes – Phase 2

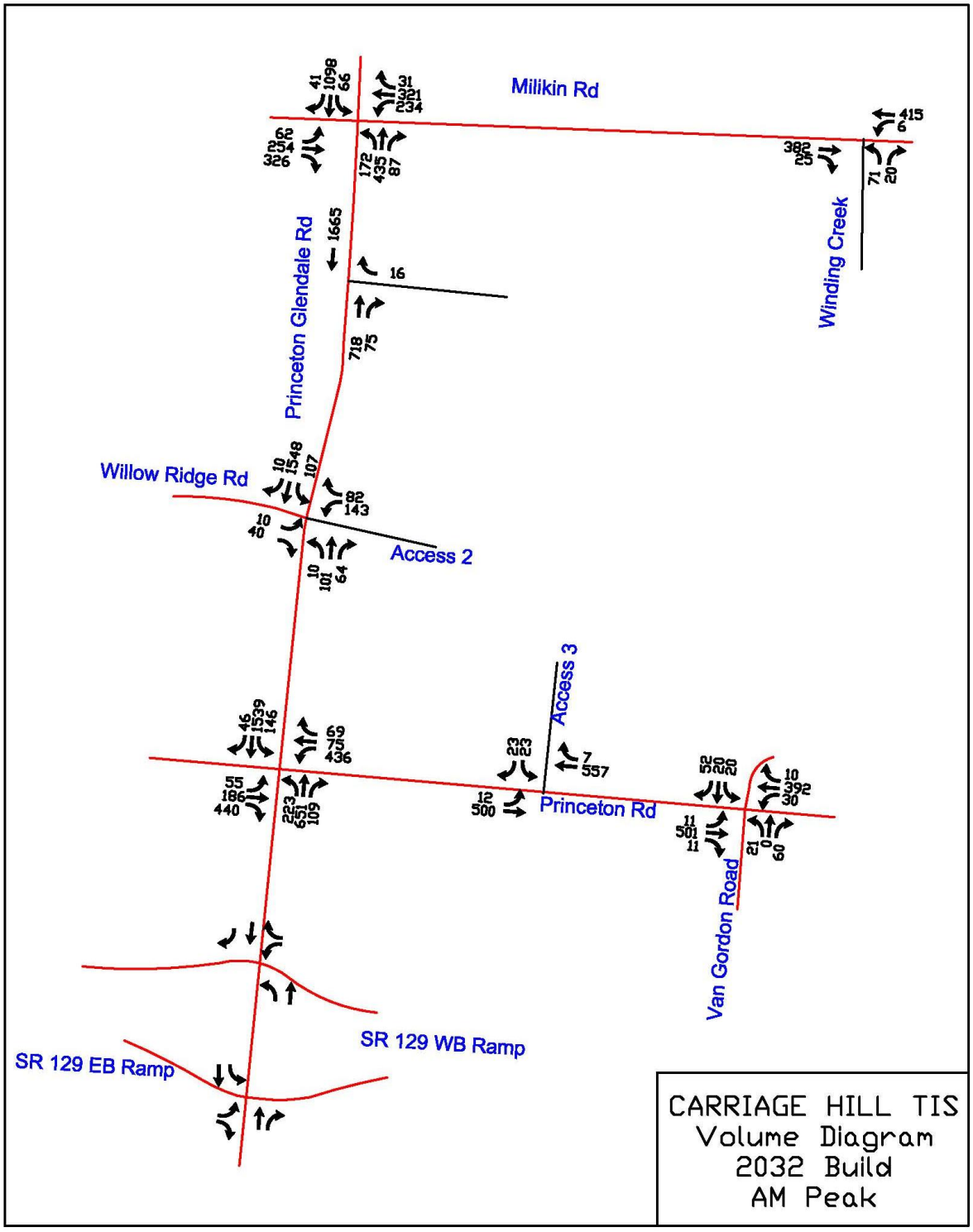
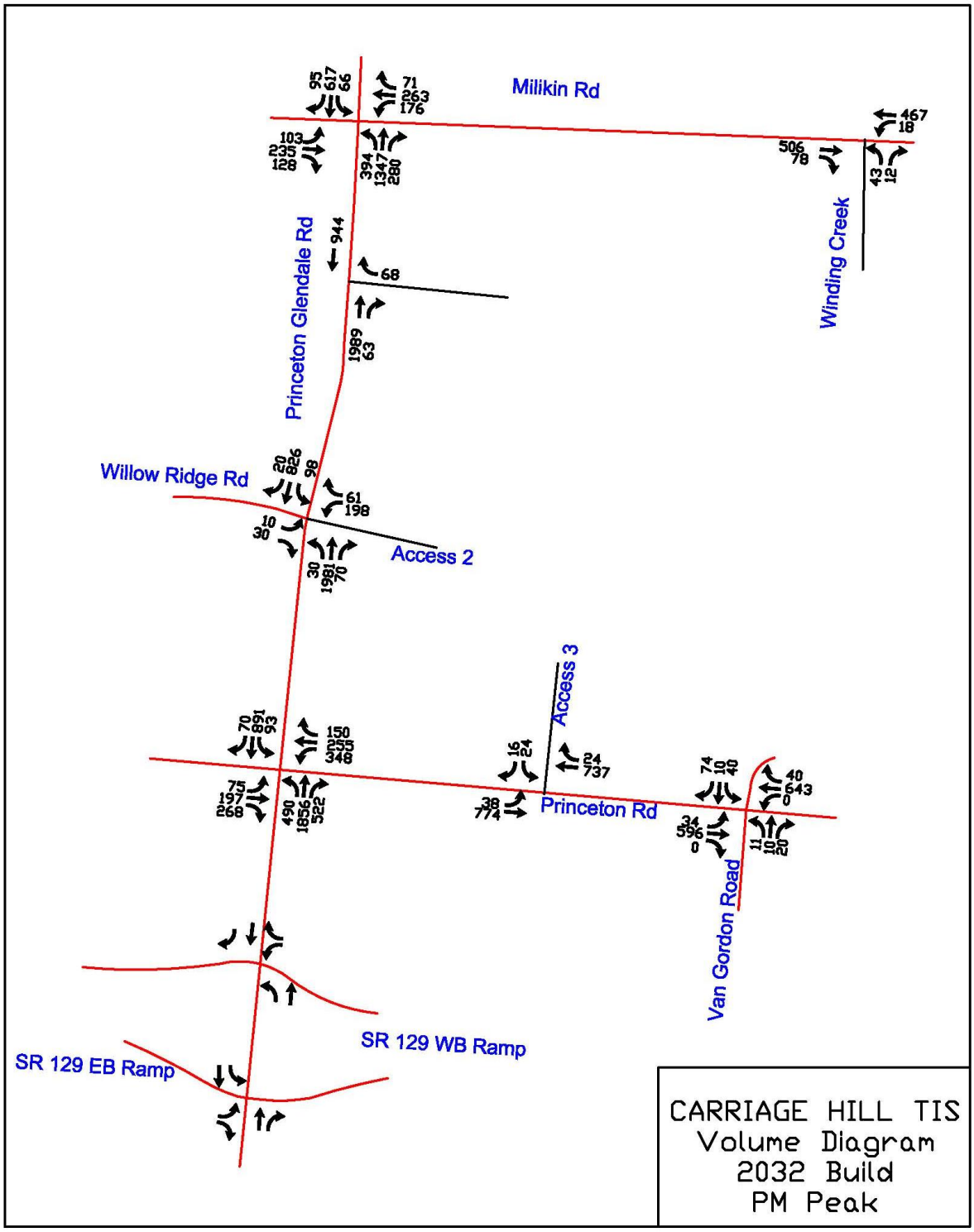


Figure 13: 2032 PM Build Volumes – Phase 2



7. Traffic Analysis

A. Signal Warrant Analysis

The Ohio Manual of Uniform Traffic Control Devices (OMUTCD) provides criteria and guidance for the installation of stop signs and traffic signals. This manual was used to determine if any of the intersections warranted a traffic signal. The Minimum Vehicular Volume, Condition A, is intended for application at locations where a large volume of intersecting traffic is the principal reason to consider installing a traffic control signal. The Interruption of Continuous Traffic, Condition B, is intended for application at locations where Condition A is not satisfied and where the traffic volume on a major street is so heavy that traffic on a minor intersecting street suffers excessive delay or conflict in entering or crossing the major street.

Since there is not enough data to utilize the full eight hour warrant, an 8th highest factor was used along with the ADT to complete Warrant 1-Eight hour volume. The daily trips for the development were generated using the ITE Trip Generation Manual. A factor of 0.050 was used to determine the 8th highest hour volume. If the volume during this hour meets the 8 hour criteria, the 8 hour warrant will be met. The table below shows the results of the signal warrants. The required volumes are the necessary volumes as prescribed in Warrant 1b-Interruption of Continuous Traffic. The side streets volumes did not meet the requirements for Warrant 1a (min. 105 vehicles), so Warrant 1b was used to determine if a signal is needed.

Table 5: Signal Warrant Summary

	Warrant 1b		Build		
Intersection	**Required Main St Volume (both approaches)**	**Required Side Street volume (highest approach)**	**Main Street Volume**	**Side Street Volume**	**Meets Warrants?**
SR 747 & Willow Ridge Drive /Access 2 – Phase 1	630	53	1270	57	**YES**
SR 747 & Willow Ridge Drive /Access 2 – Phase 2	630	53	1270	90	**YES**
Millikin Road & Winding Creek	630	53	354	32	NO
Princeton Road & Access 3	630	53	487	16	NO
Princeton Road & Van Gordon	630	53	408	39	NO

B. Storage Lane Warrant Analysis

The *ODOT State Highway Access Management Manual* provides warrants to assist in considering the need for separate turn lanes at unsignalized driveway locations. For signalized intersections the need for separate turn lanes should be determined from capacity analysis. Storage lane warrant analysis was performed for the unsignalized access locations associated with the proposed development. Storage lane analysis was conducted for the 2032 Build scenarios at the following locations:

- SR 747 and Access 2/Willow Ridge
- Princeton Road and Access 3
- Millikin Road and Winding Creek

The results of the storage lane warrant analysis have been summarized in *Table 6.*

Table 6: Unsignalized Intersection Turn Lane Warrant Summary

Intersection	Road/Direction	Movement	Year	Phase	Warranted?
Princeton Road & Access 3	Princeton Road	EB LT	2032 Build	1	YES
		WB RT	2032 Build	1	No
Princeton Glendale & Access 1	Princeton Glendale Road	NB RT	2032 Build	1	YES
Princeton Glendale Road and Willow Ridge	Princeton Glendale Road	NB RT	2032 Build	1	YES
		SB LT	2032 Build	1	YES
Millikin Rd and Winding Creek	Millikin Rd	WB RT	2032 Build	1	YES
		EB LT	2032 Build	1	YES
Princeton Road & Access 3	Princeton Road	WB LT	2032 Build	2	YES
		EB RT	2032 Build	2	YES
Princeton Glendale & Access 1	Princeton Glendale Road	NB RT	2032 Build	2	YES
Princeton Glendale Road and Willow Ridge	Princeton Glendale Road	NB RT	2032 Build	2	YES
		SB LT	2032 Build	2	YES
Millikin Rd and Winding Creek	Millikin Rd	WB RT	2032 Build	2	YES
		EB LT	2032 Build	2	YES

The graphs associated with the unsignalized intersection storage lane warrants have been included in *Appendix D.*

C. Storage Lane Length

The recommended storage lengths for the turn lanes throughout the study area have been calculated using the procedures detailed in the *ODOT Location and Design Manual, Volume One (401-9E,401-10E).* The higher of the AM or PM peak hour traffic volumes were used for the storage calculations. The storage length calculations/recommendations for the unsignalized accesses have been summarized in the following table.

Table 7: Storage Lane Length Summary – Development Accesses

Phase	Intersection	Movement	Existing Storage Lengths (feet) *	Calculated Lengths (feet) 2032 Build	Recommended Storage Lengths (feet) *
1	Millikin and Winding Creek	WB Left	n/a	285'	285'
		EB Right	n/a	285’	285'
	Princeton Glendale Road & Willow Ridge	NB Right	n/a	285'	285'
		SB Left	n/a	285'	285'
	Princeton Rd and Access 3	NB Right	n/a	285'	285’
	Princeton Rd and Access 3	EB Left	n/a	285'	285’
2	Millikin and Winding Creek	WB Left	n/a	285'	285'
		EB Right	n/a	285’	285'
	Princeton Glendale Road & Willow Ridge	NB Right	n/a	285'	285'
		SB Left	n/a	285'	285'
	Princeton Road and Access 3	WB Right	n/a	285'	285'
		EB Left	n/a	285'	285'
	Princeton Rd and Access 3	SB Left	n/a	285'	285'

* Includes 50’ diverging taper

D. Capacity and Level of Service Analysis

The software program *HCS 2010 was* used to analyze capacity at the study intersections for the 2012 and 2032 AM and PM peak hours. *HCS 2010* uses the methods prescribed in the Highway Capacity Manual to determine the Level-of-Service (LOS). LOS is defined in terms of delay and is a measure of driver discomfort and intersection performance with respect to vehicular capacity and quality of service provided to road users. Delay refers to total average stopped delay experienced by motorists at the referenced intersection. The level of service is classified into six different levels, ranging from A to F. *Table 8* shows the definitions of each level:

Table 8: Level of Service (LOS) Definitions

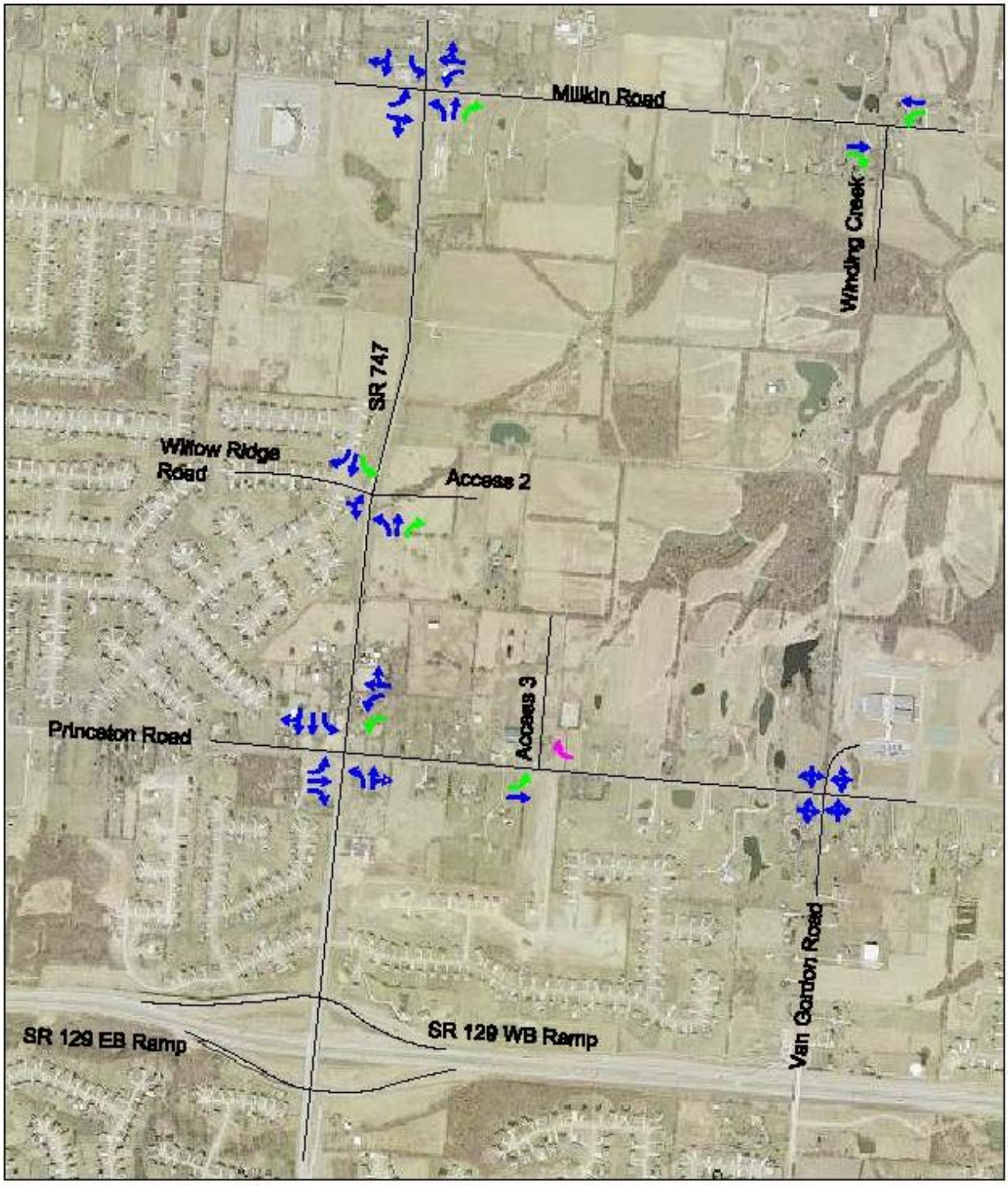
Level of Service	Signalized Delay	Stop Control Delay	Description
A	<10 seconds per vehicle	<10 seconds per vehicle	Very low delay
B	10-20 seconds per vehicle	10-15 seconds per vehicle	Good Progression
C	20-35 seconds per vehicle	15-25 seconds per vehicle	Limit of acceptable delay
D	35-55 seconds per vehicle	25-35 seconds per vehicle	Start of traffic breakdown
E	55-80 seconds per vehicle	35-50 seconds per vehicle	High delay
F	>80 seconds per vehicle	>50 seconds per vehicle	Congested conditions, unacceptable delay

A capacity analysis was conducted for the 2012 and 2032 AM & PM peak hours at the following intersections:

- SR 747 and Princeton Road (signalized)
- SR 747 and Willow Ridge Dr/Access 2 (signalized and unsignalized)
- SR 747 and Millikin Road (Signalized)
- Millikin Road and Winding Creek Drive
- Princeton Road and Access 3
- Princeton Road and Van Gordon Drive

TEC used the ODOT delay-balancing technique in to determine the capacity of the intersection. This includes balancing the worst approach delay on the main street with the worst approach delay of the side street. This was first completed for the No Build scenarios. This analysis was used to determine what improvements need to be made to the network, regardless of the proposed development. These improvements were then used in the base analysis for the build conditions. These improvements include adding turn lanes at intersections as well as adding thru lanes in both directions on SR 747. *Figure 14* shows the lanes necessary to achieve an acceptable LOS at each intersection. Note that the future analysis, both no build and build, includes a southbound thru lane on SR 747 at Princeton Road, which will be built in 2013.

Figure 14: Future lane configuration



(Blue = Existing, Green = Proposed Phase 1, Magenta = Proposed Phase 2)

The tables summarizing the results of the capacity analyses have been provided in *Table 9 through Table 15*. The tables list the Level of Service and the Delay (in parenthesis). The "Future Condition" analysis uses the lanes necessary to achieve acceptable LOS for the No Build condition. This "future condition" was used for all Build analysis. If the build condition does not degrade the LOS, no additional analysis was completed. If additional improvements are necessary under the build condition, the analysis results are shown as "build with improvements". For the proposed accesses, the analysis assumes all turn lanes that were warranted are built. The capacity analysis worksheets have been included in *Appendix E*.

Table 9: Capacity Analysis Summary – SR 747 and Millikin Road (Signalized)

Scenario	Peak Period	Approach LOS (Delay)				Intersection LOS (Delay)
		EB Millikin	WB Millikin	NB SR 747	SB SR 747	
2012 Existing Conditions	AM	C(27.6s)	C(27.8s)	B(15.0s)	C(29.7s)	C(25.8s)
	PM	C(22.7s)	C(22.9s)	B(17.0s)	C(21.0s)	B(19.4s)
2032 No Build- Existing Conditions	AM	F(237.4s)	D(47.7s)	C(29.3s)	F(252.0s)	F(171.2s)
	PM	F(169.3s)	F(129.2s)	F(175.1s)	F(171.3s)	F(167.5s)
2032 Build (Res + MF)- Existing Conditions	AM	F(244.9s)	F(81.9s)	C(34.6s)	F(259.4s)	F(176.1s)
	PM	F(199.1s)	F(149.9s)	F(205.4s)	F(214.5s)	F(198.9s)
2032 Build (Res + MF + Comm)- Existing Conditions	AM	F(261.0s)	F(93.9s)	D(37.4s)	F(296.2s)	F(196.9s)
	PM	F(206.8s)	F(150.6s)	F(225.7s)	F(232.1s)	F(214.7s)
2032 Build (Res + MF)- Imp	AM	F(250.0s)	F(82.1s)	C(30.3s)	F(256.1s)	F(174.9s)
	PM	F(122.7s)	F(94.4s)	F(115.6s)	F(110.4s)	F(112.5s)
2032 Build (Res + MF + Comm)- Imp	AM	F(119.6s)	F(148.3s)	C(27.2s)	F(147.1s)	F(114.0s)
	PM	D(41.1s)	F(124.5s)	F(115.6s)	F(122.7s)	F(109.2s)

Table 10: Capacity Analysis Summary – SR 747 and Access 1

Scenario	Peak Period	Approach LOS (Delay)			Intersection LOS (Delay)
		WB Access 1	NB SR 747	SB SR 747	
2032 Build (Res + MF)- Existing Conditions	AM	-	-	-	-
	PM	-	-	-	-
2032 Build (Res + MF + Comm)- Existing Conditions	AM	B(14.4s)	-	-	-
	PM	F(292.0s)	-	-	-

Table 11: Capacity Analysis Summary – SR 747 and Willow Ridge Dr/Access 2

Scenario	Peak Period	Approach LOS (Delay)				Intersection LOS (Delay)
		WB Willow Ridge	EB Access 2	NB SR 747	SB SR 747	
2012 Existing Conditions	AM	C (24.4s)		-	-	-
	PM	D (28.4s)		-	-	-
2032 No Build- Existing Conditions	AM	F(82.7s)				
	PM	F(155.3s)				
2032 Build (Res + MF)- Existing Conditions	AM	F(2049s)	F(230.9s)			
	PM	F(6991s)	F(6013s)			
2032 Build (Res + MF + Comm)- Existing Conditions	AM	F(4002s)	F(411.0s)			
	PM	F(5017s)	F(6013s)			
2032 Build (Res + MF)- Signal	AM	E(59.0s)	F(89.2s)	F(139.4s)	B(19.0s)	F(100.8s)
	PM	D(51.7s)	F(135.8s)	A(2.6s)	F(114.9s)	F(89.6s)
2032 Build (Res + MF + Comm)- Signal	AM	D(42.8s)	E(76.4s)	A(4.1s)	F(81.8s)	F(58.5s)
	PM	D(44.4s)	F(219.6s)	F(201.2s)	D(38.5s)	F(154.6s)

***Delay too high to quantify

Table 12: Capacity Analysis Summary – Millikin Road and Winding Creek Drive – includes Turn Lanes

Scenario	Peak Period	Approach LOS (Delay)			Intersection LOS (Delay)
		EB Millikin	WB Millikin	NB Winding Creek	
2032 Build (Res + MF) - Existing Conditions	AM		-	C(18.5s)	-
	PM	-	-	C(22.2s)	-
2032 Build (Res + MF + Comm) -Existing Conditions	AM	-	-	C(18.9s)	-
	PM	-	-	C(22.3a)	-

Table 13: Capacity Analysis Summary – SR 747 and Princeton Road (signalized)

Scenario	Peak Period	Approach LOS (Delay)				Intersection LOS (Delay)
		EB Princeton	WB Princeton	NB SR 747	SB SR 747	
2012 Existing Conditions	AM	E (79.7s)	D (49.2s)	B (14.1s)	E (69.5s)	E (57.6s)
	PM	D (42.1s)	D(40.8s)	D (38.2s)	D (37.3s)	D (38.9s)
2032 No Build- Existing Conditions	AM	F(115.2s)	D(51.0s)	E(56.1s)	F(120.7s)	F(93.8s)
	PM	F(133.0s)	F(175.6s)	F(157.6s)	D(52.9s)	F(139.4s)
2032 Build (Res + MF)- Existing Conditions	AM	F(127.7s)	F(155.2s)	D(37.4s)	F(86.5s)	F(92.7s)
	PM	D(46.1s)	F(224.2s)	F(273.5s)	E(60.4s)	F(202.9s)
2032 Build (Res + MF + Comm)- Existing Conditions	AM	F(127.7s)	F(151.7s)	D(45.5s)	F(92.3s)	F(95.5s)
	PM	D(46.0s)	F(230.4s)	F(298.0s)	E(61.8s)	F(214.4s)
2032 Build (Res + MF)- Imp Conditions	AM	F(88.4s)	F(83.3s)	F(66.6s)	F(87.5s)	F(82.3s)
	PM	F(188.9s)	F(131.2s)	F(179.0s)	E(54.3s)	F(150.0s)
2032 Build (Res + MF + Comm)- Imp Conditions	AM	F(99.3s)	F(80.3s)	D(48.6s)	F(102.7s)	F(85.5s)
	PM	E(54.8s)	F(247.7s)	F(256.4s)	D(57.6s)	F(194.1s)

Table 14: Capacity Analysis Summary – Princeton Road and Access 3 – Includes Turn Lanes

Scenario	Peak Period				Intersection LOS (Delay)
		EB Princeton	WB Princeton	SB Access 3	
2032 Build (Res + MF) - Existing Conditions	AM	-	-	C(16.6s)	-
	PM	-	-	D(26.0s)	-
2032 Build (Res + MF + Comm) -Existing Conditions	AM	-	-	C(18.3s)	-
	PM	-	-	E(44.5s)	-

Table 15: Capacity Analysis Summary – Princeton Road and Van Gordon

Scenario	Peak Period	Approach LOS (Delay)				Intersection LOS (Delay)
		EB Princeton	WB Princeton	NB Van Gordon	SB Van Gordon	
2012 Existing Conditions	AM	-	-	B(13.2s)	B(14.9s)	-
	PM	-	-	C (16.2s)	C (21.1s)	-
2032 No Build- Existing Conditions	AM	-	-	C(18.7s)	C(21.3s)	-
	PM	-	-	D(32.4s)	F(54.6s)	-
2032 Build (Res + MF)- Existing Conditions	AM	-	-	C(19.8s)	C(22.0s)	-
	PM	-	-	E(35.8s)	F(62.5s)	-
2032 Build (Res + MF + Comm)- Existing Conditions	AM	-	-	C(20.0s)	C(22.2s)	-
	PM	-	-	E(36.6s)	F(64.3s)	-

7. Conclusions & Recommendations

SR 747 Widening

The developer is currently working with the Township, as well as the County to pursue the widening of SR 747. Based on discussions with ODOT, all right turn lanes should be implemented with this widening. ***Furthermore, it is recommended that all improvements along SR 747, including the improvements at the study intersections be reviewed with the planning of the SR 747 Widening.***

The improvements within this study were made keeping in mind the movements that were directly affected by the development traffic. These improvements may not be necessary if improvements to other movements are made. For example at the intersection of SR 747 & Millikin Road, the major movement is the EB Right turn. Certified traffic shows over 400 vehicles turning right during the peak hour. If improvements are made to this movement, other improvements, such as the northbound right may not be needed. Similarly, the volume of traffic along SR 747 is substantially high enough to necessitate widening SR 747, especially at Princeton Road. If this occurs the westbound dual left required by this study may not be necessary.

In addition, all improvements made as the result of this development will be impacted during the widening of SR 747. This impact should be considered before improvements are made as the result of this development.

Millikin Road and Winding Creek (being completed with Butler County)

Build Conditions

- This intersection will mainly be used access the homes on the northeast quadrant of the site. A signal is not warranted at this intersection and it should remain stop controlled.
- An eastbound right turn lane is warranted and should be added for both the Phase 1 and Phase 2 development. This lane should be 285' in length.
- A westbound left turn lane is warranted and should be added for both the Phase 1 and Phase 2 development. This lane should be 285' in length.

SR 747 and Access 1

Build Conditions

- This right in right out access is being requested for the Phase 2 development. However, this access was analyzed for both the Phase 1 and Phase 2 development.
- A northbound right turn lane (285') is required for both Phase 1 and Phase 2 development.

SR 747 & Willow Ridge/Access 2

Build Conditions

- This intersection will be the major access to the residential segment and will also be the exit for most vehicles traveling to the south. A signal is warranted given the build volumes for both the Phase 1 and Phase 2 development. This intersection is 0.42 miles from Princeton Road. This meets the minimum 0.25 mile signal spacing as shown in the ODOT Access Management Manual for a Category III roadway.

- A southbound left turn lane (285') and a northbound right turn lane (285') are necessary.

Summary

It is recommended that the widening of SR 747 be pursued before any improvements to SR 747 be implemented. A southbound left turn lane is recommended at the intersection of SR 747 & Willow Ridge. All other improvements should be considered at the time of the SR 747 widening.

The developer will resubmit the traffic impact study once the planning of the commercial development phase begins. This development will include Access 1.

Appendix A: Certified Traffic

INTER-OFFICE COMMUNICATION

TO: **Jennifer Elston, Pavement Planning Engineer, District 8**

FROM: Lori Duguid, Transportation Engineer, Office of Multi-Modal Planning

SUBJECT: **BUT-747-5.35 (Princeton Road), No PID**

DATE: July 10, 2009

In reply to a request dated May 6, 2009, plates are attached showing 2010 and 2030 ADT, A.M. and P.M. DHV turning movement volumes. Please use the following design designations:

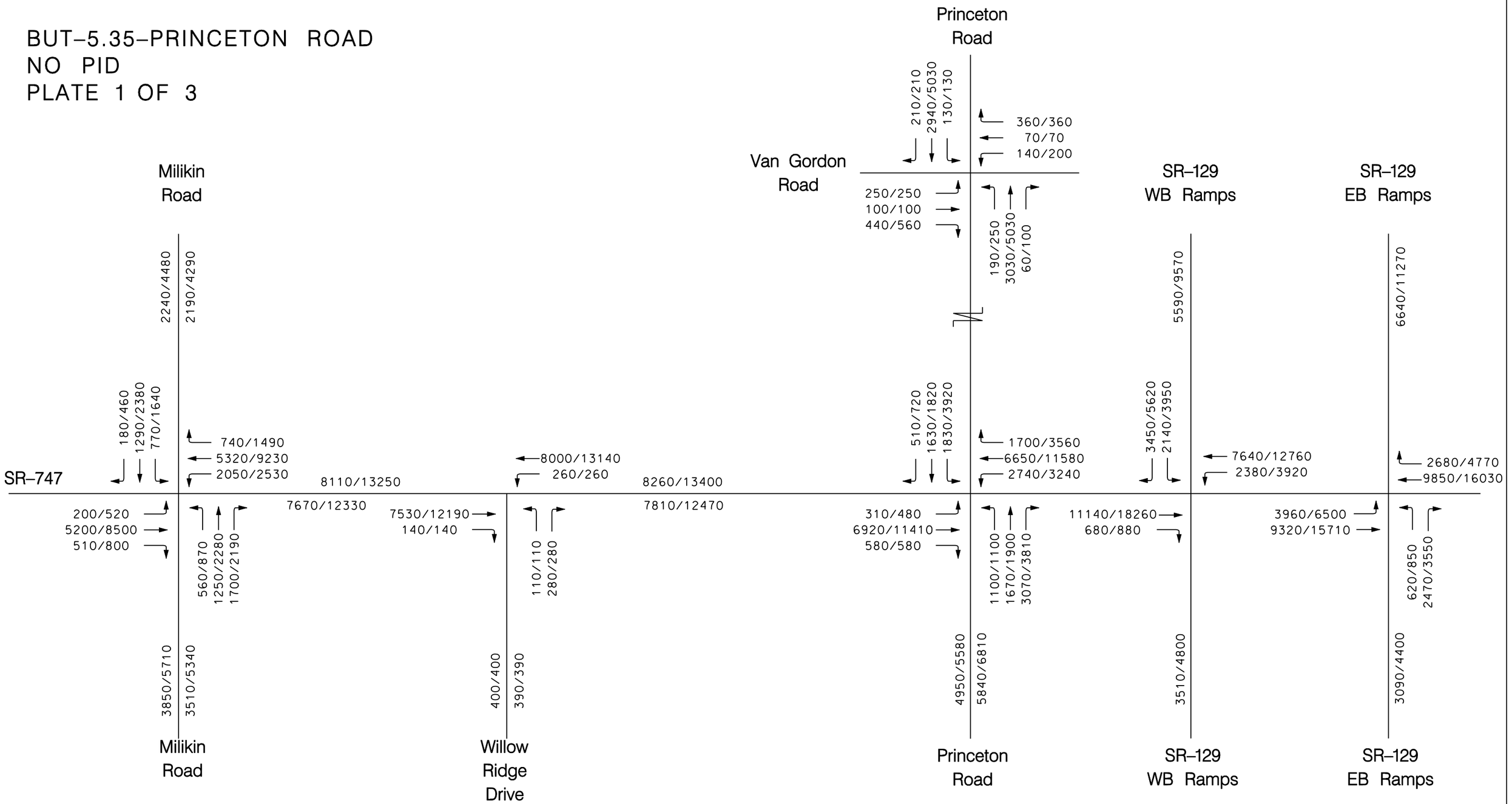
	SR-747			*Milikin Road*	*Willow Ridge Drive*	*Princeton Road*			*SR-129 WB Ramp*	*SR-129 EB Ramp*
	north of Milikin	*between Milikin & Princeton*	*south of Princeton*			*west of SR-747*	*between SR-747 & Van Gordon*	*east of Van Gordon*		
2010 ADT:	11,970	16,070	24,320	7,360	790	10,790	7,650	6,920	5,590	6,640
2030 ADT:	20,380	25,870	40,060	11,050	790	12,390	12,400	11,010	9,570	11,270
K:	0.10	0.10	0.10	0.10	0.11	0.10	0.11	0.11	0.11	0.09
D:	0.66	0.69	0.65	0.62	0.55	0.63	0.51	0.51	-	-
T24:	0.04	0.04	0.04	0.02	0.02	0.02	0.02	0.02	0.04	0.04
A.M. TD:	0.03	0.03	0.03	0.01	0.01	0.01	0.01	0.01	0.03	0.03
P.M. TD:	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01

If you have any questions, please contact me at (614) 752-5747.

LD:ld

c: M. Byram, OMP – File

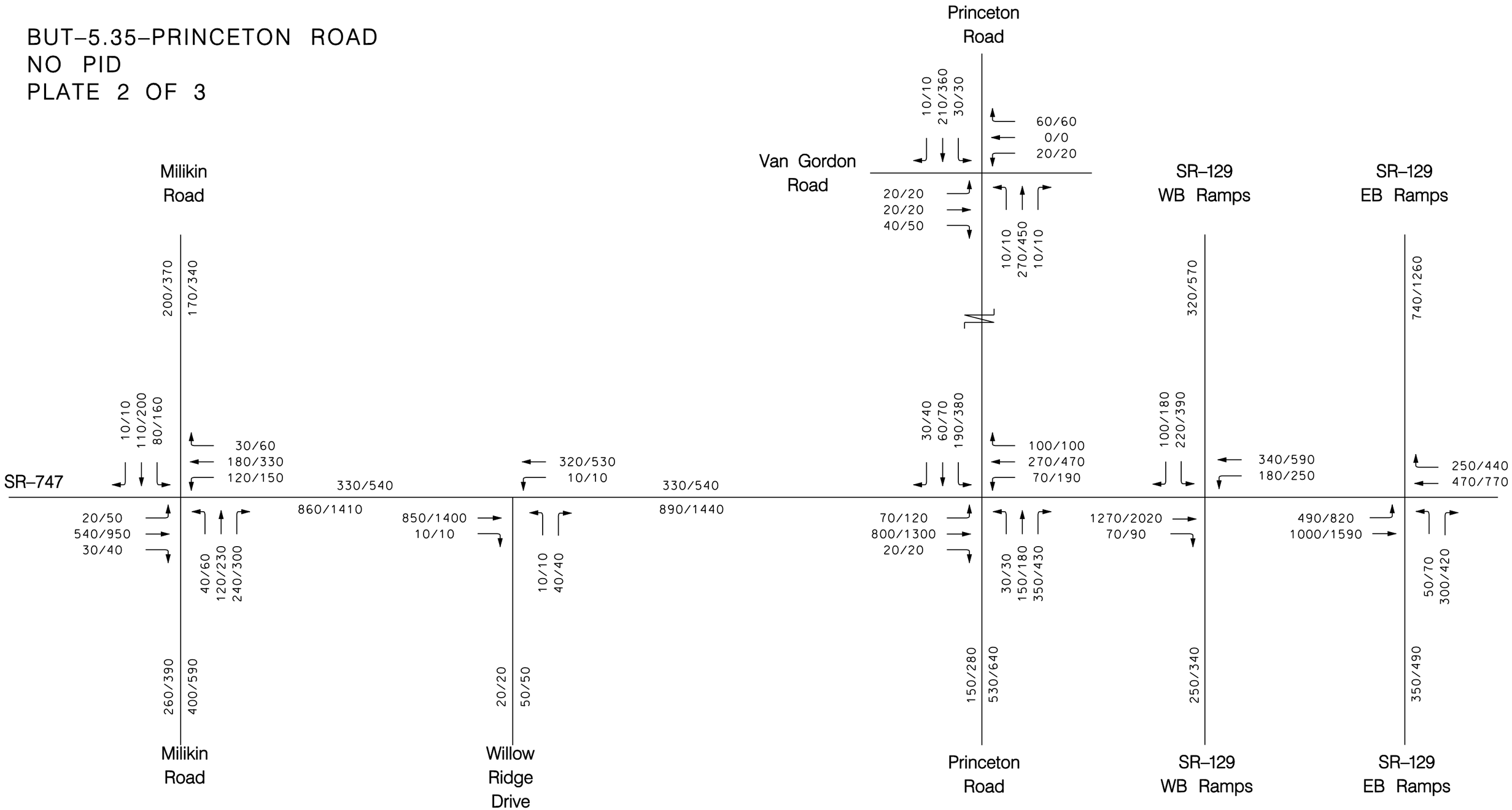
BUT–5.35–PRINCETON ROAD
NO PID
PLATE 1 OF 3



BUT–747–5.35 PRINCETON RD NO PID	
2010/2030 ADT	
OHIO DEPARTMENT OF TRANSPORTATION	
OFFICE OF TECHNICAL SERVICES	
JULY 10, 2009	NOT TO SCALE

N

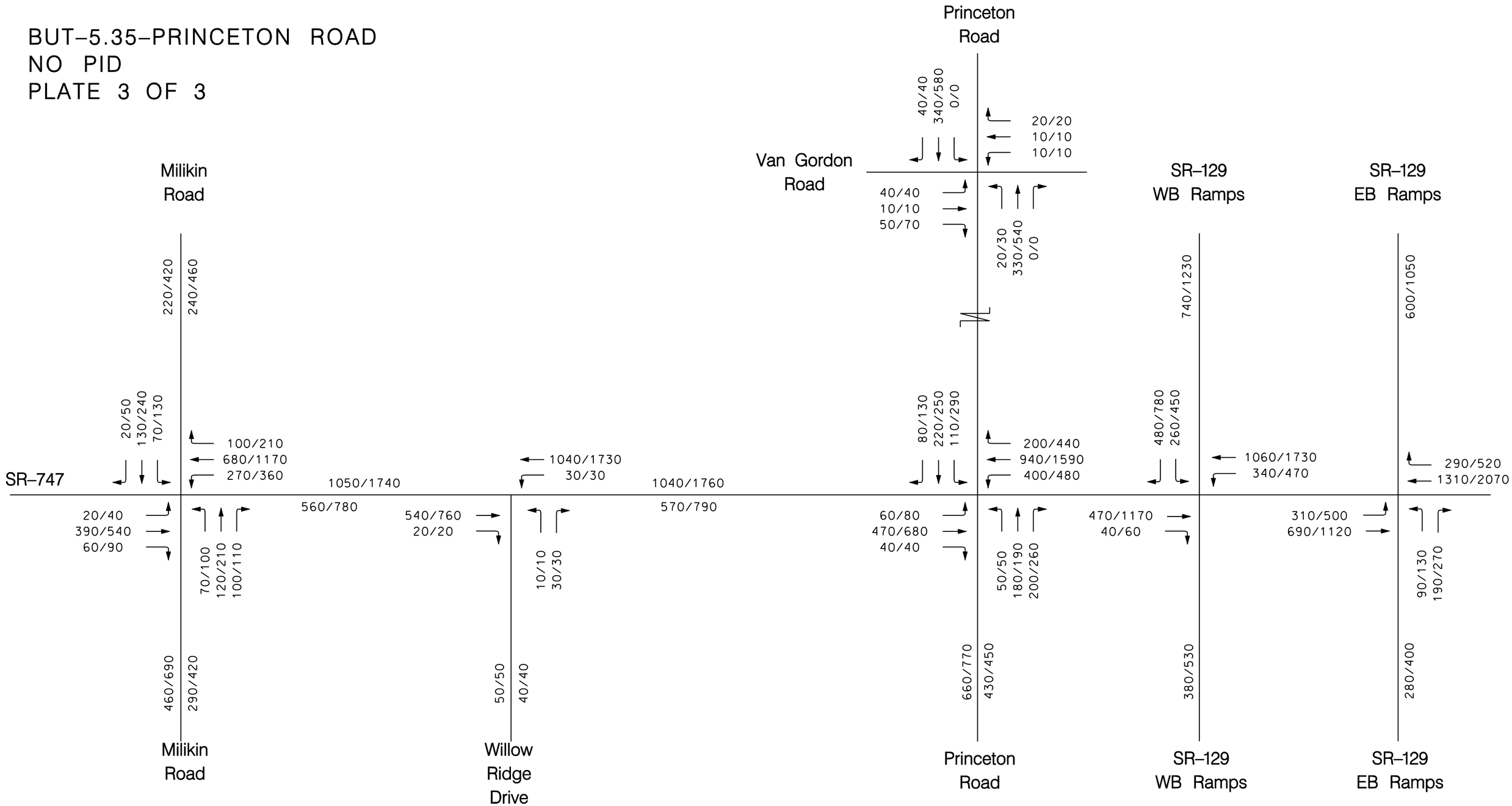
BUT–5.35–PRINCETON ROAD
NO PID
PLATE 2 OF 3



BUT–747–5.35 PRINCETON RD NO PID
2010/2030 AM DHV
OHIO DEPARTMENT OF TRANSPORTATION
OFFICE OF TECHNICAL SERVICES
JULY 10, 2009 | NOT TO SCALE

N

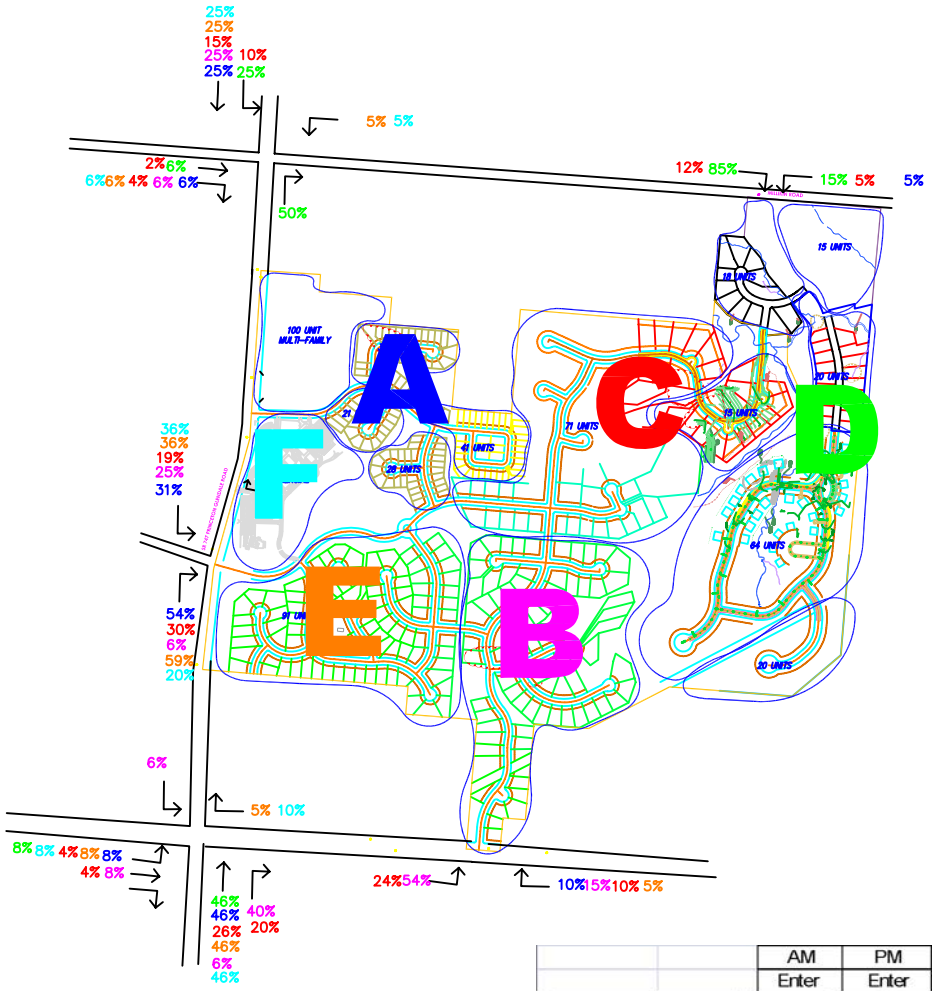
BUT–5.35–PRINCETON ROAD
NO PID
PLATE 3 OF 3



BUT–747–5.35 PRINCETON RD NO PID
2010/2030 PM DHV
OHIO DEPARTMENT OF TRANSPORTATION
OFFICE OF TECHNICAL SERVICES
JULY 10, 2009 | NOT TO SCALE

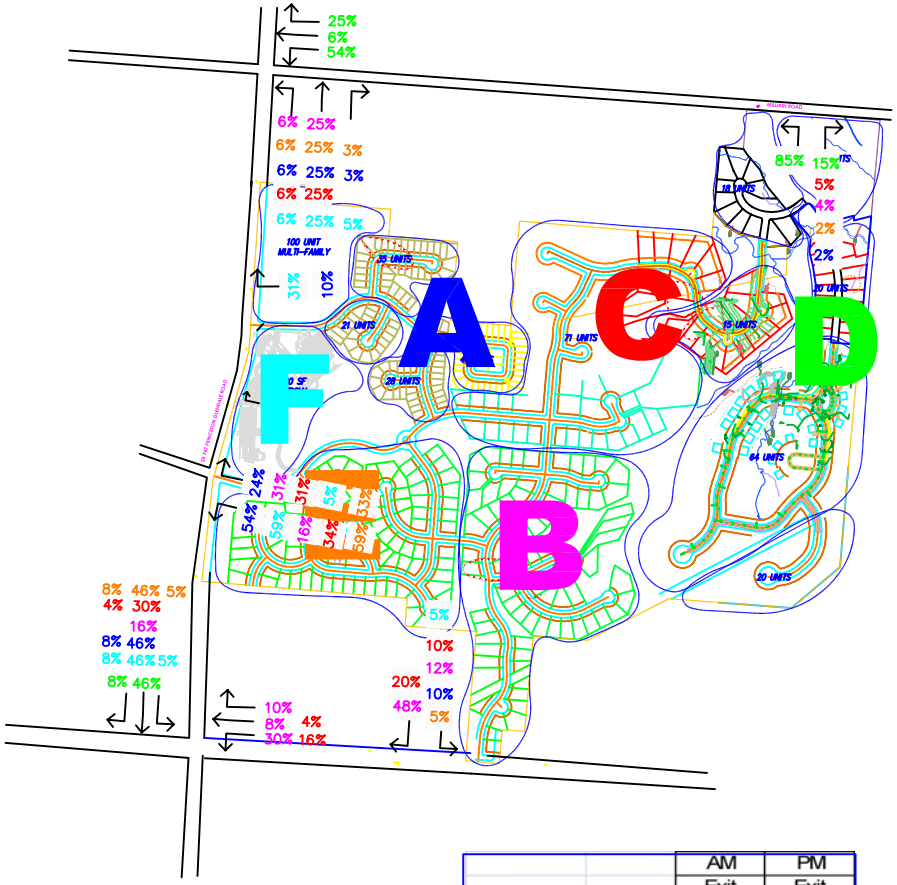
Appendix B:
Driveway Distribution

Entering Driveway Distribution



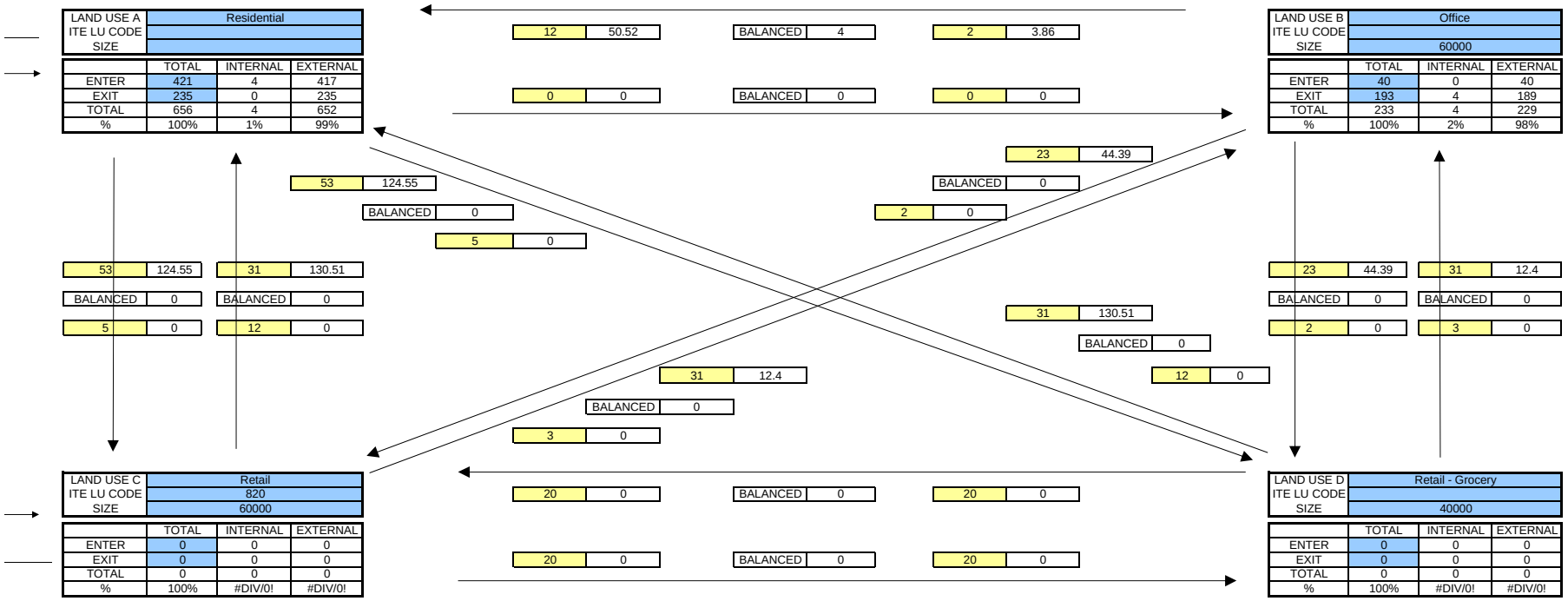
		AM	PM
		Enter	Enter
A	110	20	63
B	80	14	46
C	40	7	23
D	100	18	57
E	500	58	209
F (office+apt)	n/a	222	74

Exiting Driveway Distribution



		AM	PM
		Exit	Exit
A	430	60	37
B	110	43	27
C	80	22	13
D	40	54	34
E	500	213	115
F (office+apt)	n/a	65	212

Appendix C: Internal Trips


LAND USE A
ITE LU CODE
SIZE
Residential
TOTAL INTERNAL EXTERNAL
ENTER 421 4 417
EXIT 235 0 235
TOTAL 656 4 652
% 100% 1% 99%
LAND USE B
ITE LU CODE
SIZE
Office
60000
TOTAL INTERNAL EXTERNAL
ENTER 40 0 40
EXIT 193 4 189
TOTAL 233 4 229
% 100% 2% 98%
LAND USE C
ITE LU CODE
SIZE
Retail
820
60000
TOTAL INTERNAL EXTERNAL
ENTER 0 0 0
EXIT 0 0 0
TOTAL 0 0 0
% 100% #DIV/0! #DIV/0!
LAND USE D
ITE LU CODE
SIZE
Retail - Grocery
40000
TOTAL INTERNAL EXTERNAL
ENTER 0 0 0
EXIT 0 0 0
TOTAL 0 0 0
% 100% #DIV/0! #DIV/0!
12 50.52
BALANCED 4
2 3.86
0 0
BALANCED 0
0 0
23 44.39
53 124.55
BALANCED 0
2 0
5 0
53 124.55
BALANCED 0
5 0
31 130.51
BALANCED 0
12 0
23 44.39
BALANCED 0
2 0
31 12.4
BALANCED 0
3 0
31 130.51
BALANCED 0
12 0
31 12.4
BALANCED 0
3 0
20 0
BALANCED 0
20 0
20 0
BALANCED 0
20 0

		AM Peak					PM Peak					ADT		
Single Family Detached Housing (LU 210)	Units	Total	Enter	Exit		Units	Total	Enter	Exit		Units	Total	Enter	Exit
Total Primary Trips	430	311	78	233		430	390	246	144		430	2091	1015	1077
A	110	79	20	60		110	100	63	37		110	100	63	37
B	80	58	14	43		80	73	46	27		80	73	46	27
C	40	29	7	22		40	36	23	13		40	36	23	13
D	100	72	18	54		100	91	57	34		100	91	57	34
E	100	72	18	54		100	90	57	33		100	90	57	33
	430	311	78	233		430	390	246	144		430	390	245	144

		AM Peak					PM Peak					ADT		
Apartment	Units	Total	Enter	Exit			Total	Enter	Exit			Total	Enter	Exit
LU 220	490	244	49	195		490	287	187	101			1864	932	932
E	400	199	40	159		400	234	152	82		400	1521	304	1217
F	90	45	9	36		90	53	34	18		90	342	68	274

General Office	Sq ft	Total	Enter	Exit			Total	Enter	Exit		Total	Enter	Exit
LU 710	138	242	213	29			233	40	193		1705	852	852
		797	339	457			910	472	438				

A

		AM Enter	PM Enter
A	110	20	63
B	80	14	46
C	40	7	23
D	100	18	57
E	500	58	209
F (office+apt)	n/a	222	74

		AM Exit	PM Exit
A	430	60	37
B	110	43	27
C	80	22	13
D	40	54	34
E	500	213	115
F (office+apt)	n/a	65	212

Total;s		339	472			457	438

AM enter	5	6	8	10	25	46
A	1	1	2	2	5	9
B	1	1	1	1	4	7
C	0	0	1	1	2	3
D	1	1	1	2	5	8
E	3	3	5	6	14	27
F (office+apt)	11	13	18	22	55	102
339						

AM Exit	5	6	8	10	25	46
A	3	4	5	6	15	27
B	2	3	3	4	11	20
C	1	1	2	2	6	10
D	3	3	4	6	14	25
E	11	13	17	21	53	98
F (office+apt)	3	4	5	6	16	30
457						

Percentage

PM enter	5	6	8	10	25	46
A	3	4	5	6	16	29
B	2	3	4	5	11	21
C	1	1	2	2	6	11
D	3	3	5	6	14	27
E	10	13	17	21	52	96
F (office+apt)	4	4	6	7	18	34
472						

Percentage

PM Exit	5	6	8	10	25	46
A	2	2	3	4	9	17
B	1	2	2	3	7	12
C	1	1	1	1	3	6
D	2	2	3	3	8	15
E	6	7	9	12	29	53
F (office+apt)	11	13	17	21	53	97
438						

Appendix D:
Storage Lane Analysis

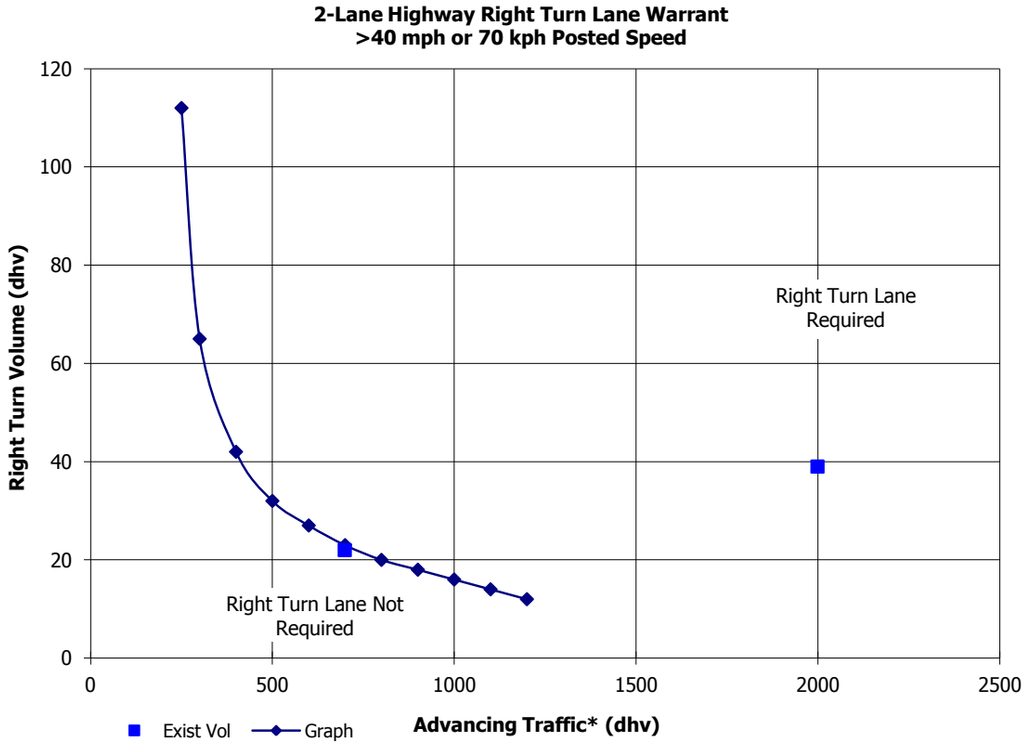
Phase 1

2-Lane RT Graphs

2-LANE HIGHWAY RIGHT TURN LANE WARRANT
>40 MPH OR 70 KPH POSTED SPEED

Winding Creek @ Milikin

Location	Right Turn Volume	Advancing Traffic			
	Right	Left	Thru	Right	Total
					0
					0
2032 AM Build	22	0	677	22	699
2032 PM Build	39	0	1960	39	1999
		0	0	0	0
		0	0	0	0
		0	0	0	0



*Includes Right Turns

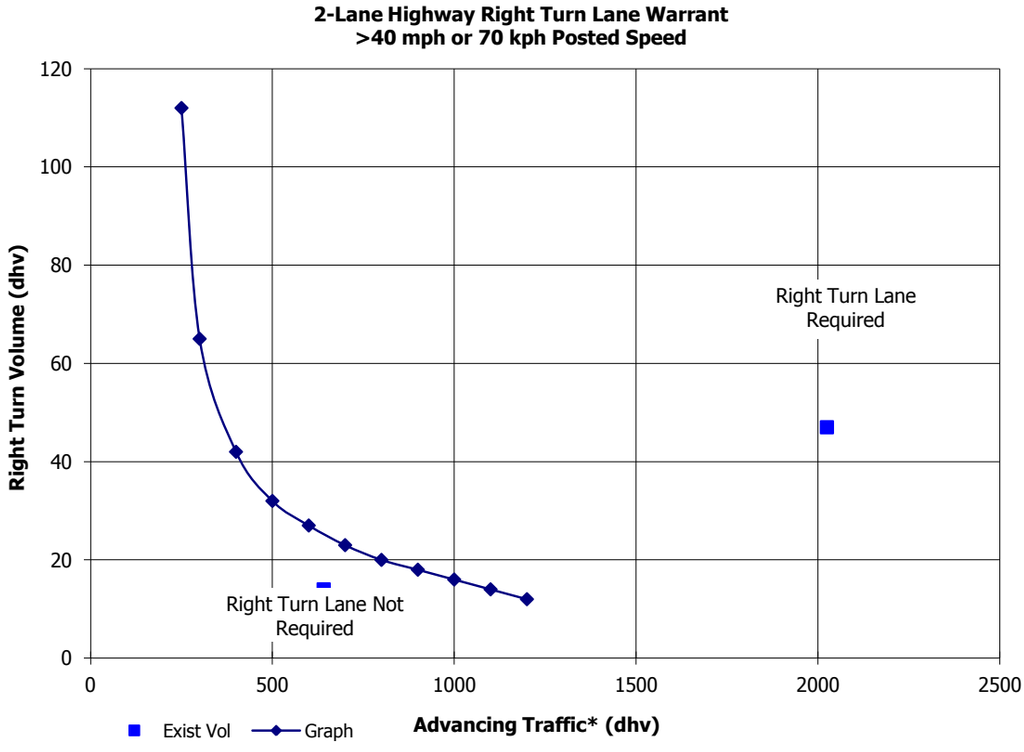
Is Right Turn Lane Warrant met? YES

2-Lane RT Graphs

2-LANE HIGHWAY RIGHT TURN LANE WARRANT
>40 MPH OR 70 KPH POSTED SPEED

Winding Creek @ Milikin

Location	Right Turn Volume	Advancing Traffic			
	Right	Left	Thru	Right	Total
					0
					0
2032 AM Build	14	10	617	14	641
2032 PM Build	47	30	1948	47	2025
		0	0	0	0
		0	0	0	0
		0	0	0	0



*Includes Right Turns

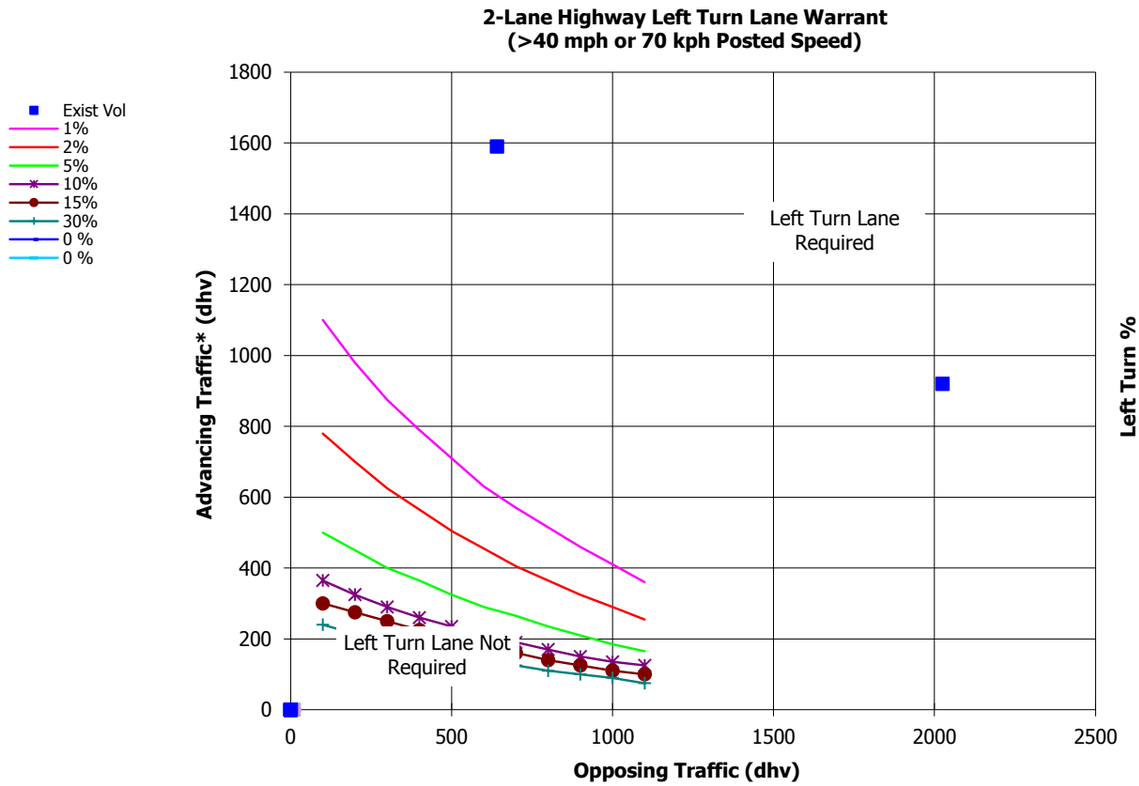
Is Right Turn Lane Warrant met? YES

2-Lane LT Graphs

FIGURE B: 2-LANE HIGHWAY LEFT TURN LANE WARRANT (>40 MPH OR 70 KPH POSTED SPEED)

Access 2 @ Princeton

Location	Advancing Traffic					Opposing Traffic			
	Left	Thru	Right	Total	% Left	Left	Thru	Right	Total
				0					0
				0					0
2032 B AM	20	1560	10	1590	1%	10	605	26	641
2032 B PM	65	835	20	920	7%	30	1909	86	2025
	0	0	0	0		0	0	0	0
	0	0	0	0		0	0	0	0
	0	0	0	0		0	0	0	0



*Includes Left Turns

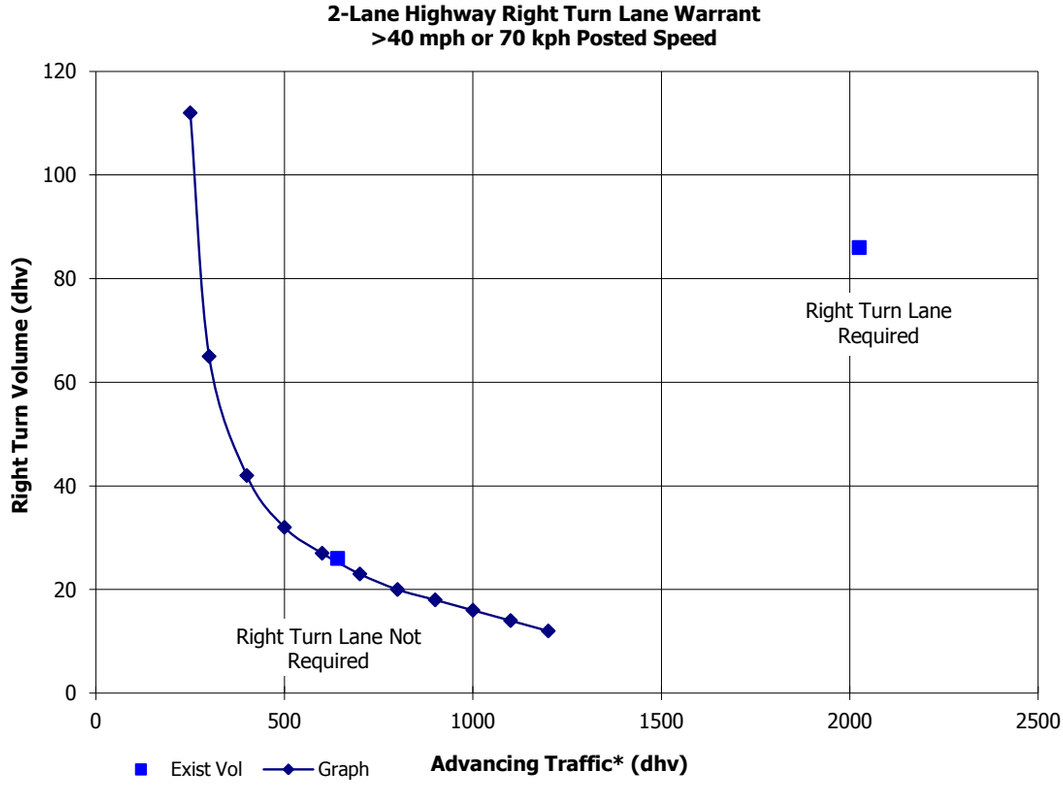
Is Left Turn Lane Warrant met? YES

2-Lane RT Graphs

2-LANE HIGHWAY RIGHT TURN LANE WARRANT
>40 MPH OR 70 KPH POSTED SPEED

Winding Creek @ Milikin

Location	Right Turn Volume	Advancing Traffic			
	Right	Left	Thru	Right	Total
					0
					0
2032 AM Build	26	10	605	26	641
2032 PM Build	86	30	1909	86	2025
		0	0	0	0
		0	0	0	0
		0	0	0	0



*Includes Right Turns

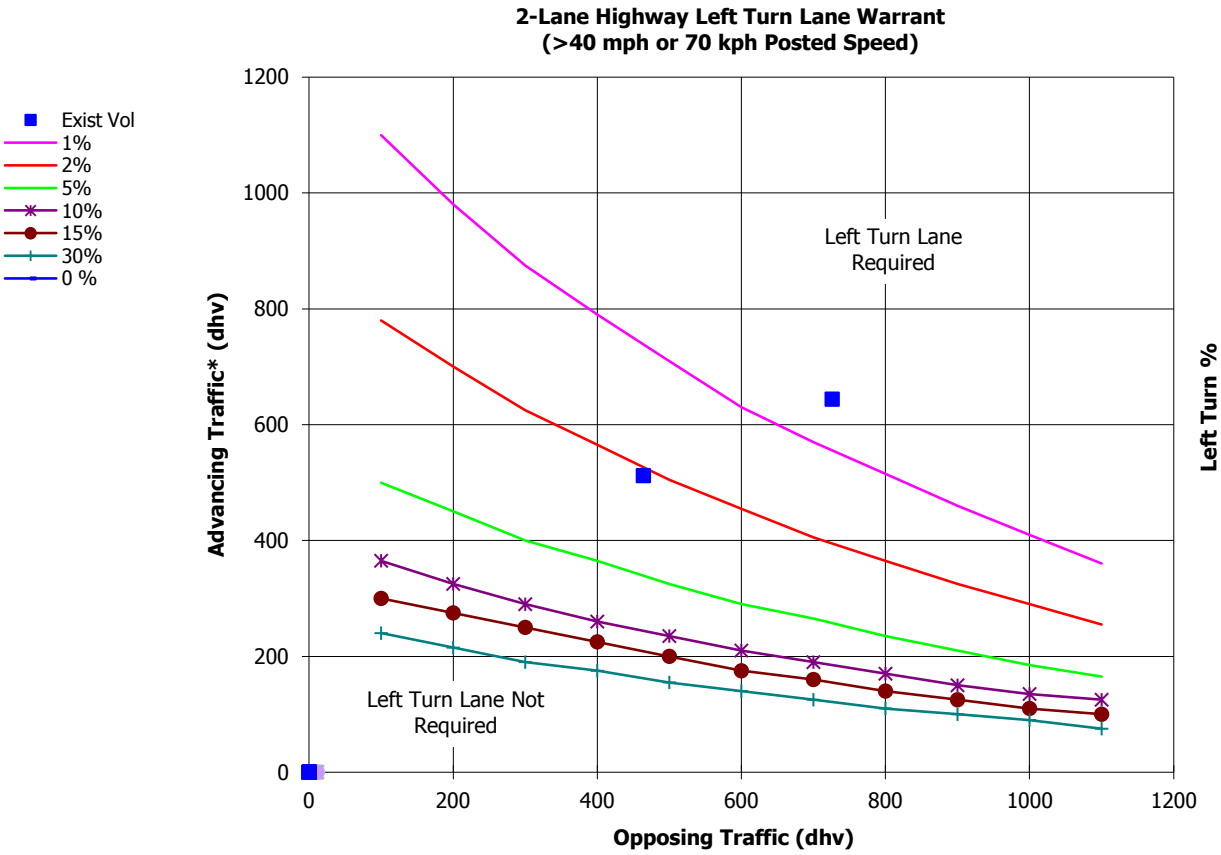
Is Right Turn Lane Warrant met? YES

2-Lane LT Graphs

FIGURE B: 2-LANE HIGHWAY LEFT TURN LANE WARRANT (>40 MPH OR 70 KPH POSTED SPEED)

Access 3 @ Princeton

Location	Advancing Traffic					Opposing Traffic			
	Left	Thru	Right	Total	% Left	Left	Thru	Right	Total
				0					0
				0					0
2032 B AM	12	500	0	512	2%	0	457	7	464
2032 B PM	38	606	0	644	6%	0	704	22	726
	0	0	0	0		0	0	0	0
	0	0	0	0		0	0	0	0
	0	0	0	0		0	0	0	0



*Includes Left Turns

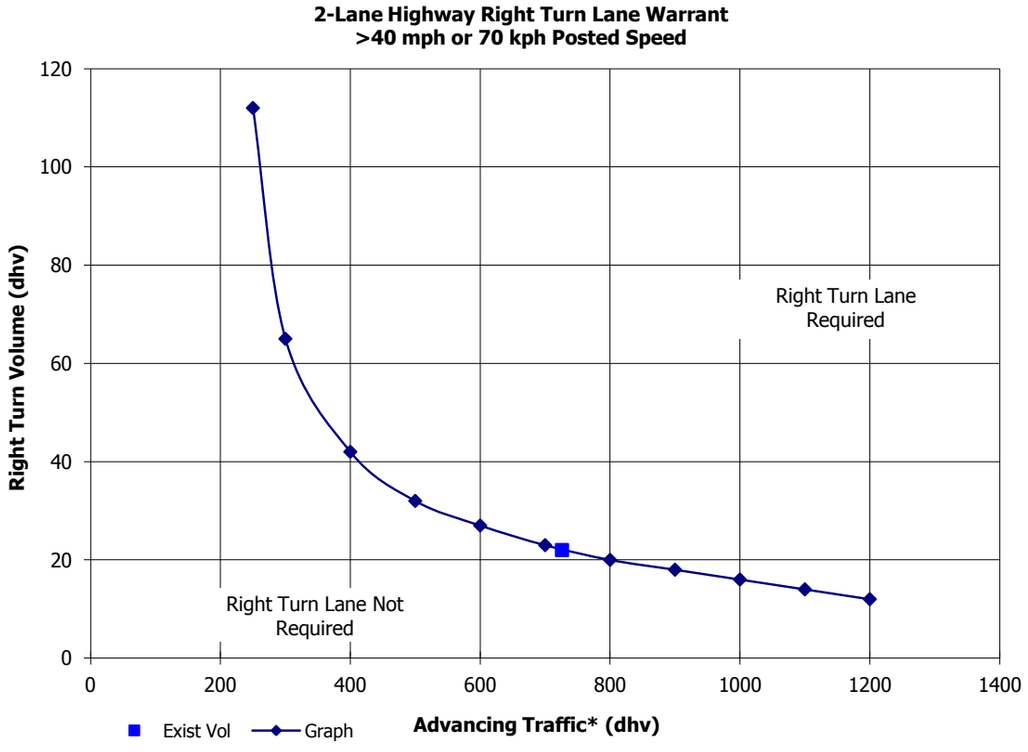
Is Left Turn Lane Warrant met? YES

2-Lane RT Graphs

2-LANE HIGHWAY RIGHT TURN LANE WARRANT
>40 MPH OR 70 KPH POSTED SPEED

Access 3 & Princeton Road

Location	Right Turn Volume	Advancing Traffic			
	Right	Left	Thru	Right	Total
					0
					0
2032 AM Build	7	0	457	7	464
2032 PM Build	22	0	704	22	726
		0	0	0	0
		0	0	0	0
		0	0	0	0



*Includes Right Turns

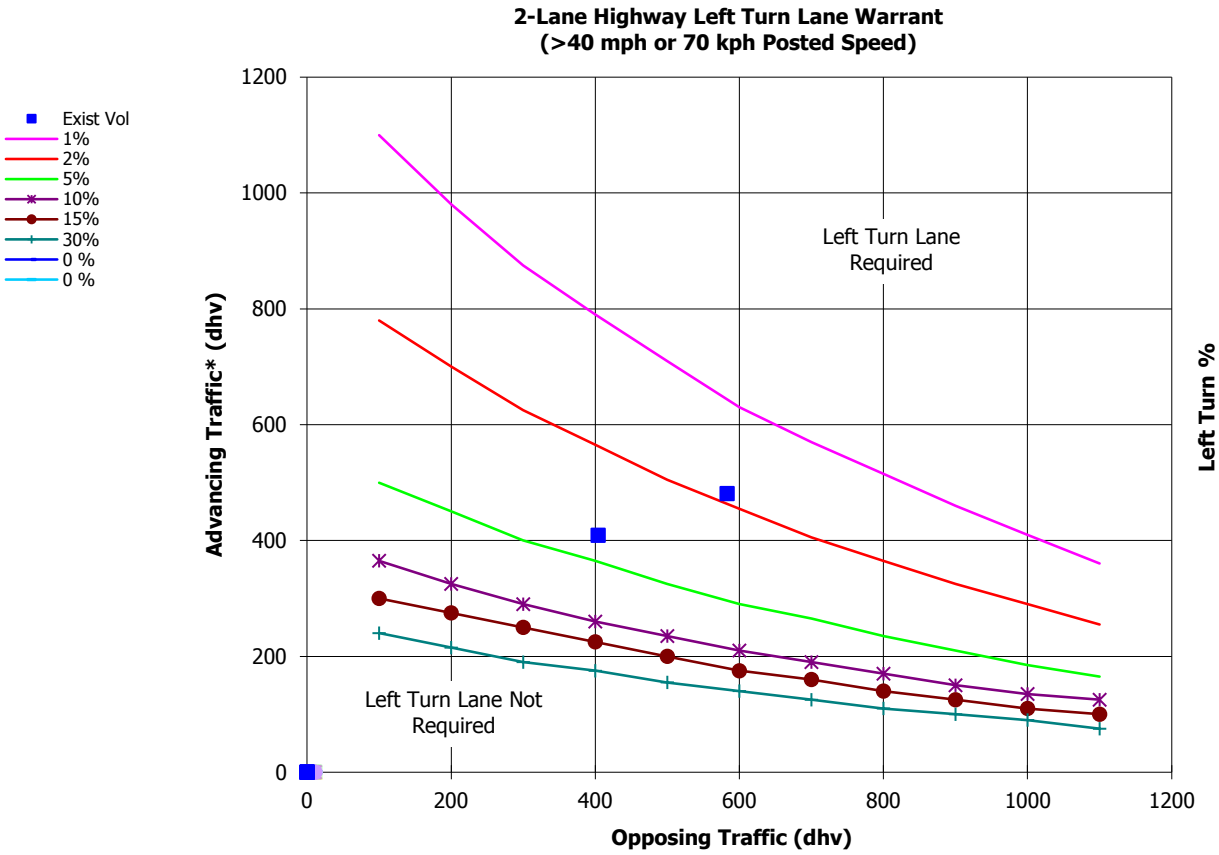
Is Right Turn Lane Warrant met? YES

2-Lane LT Graphs

FIGURE B: 2-LANE HIGHWAY LEFT TURN LANE WARRANT (>40 MPH OR 70 KPH POSTED SPEED)

Milikin @ Winding Creek

Location	Advancing Traffic					Opposing Traffic			
	Left	Thru	Right	Total	% Left	Left	Thru	Right	Total
				0					0
				0					0
2032 B AM	6	403	0	409	1%	0	379	25	404
2032 B PM	18	463	0	481	4%	0	505	78	583
	0	0	0	0		0	0	0	0
	0	0	0	0		0	0	0	0
	0	0	0	0		0	0	0	0



*Includes Left Turns

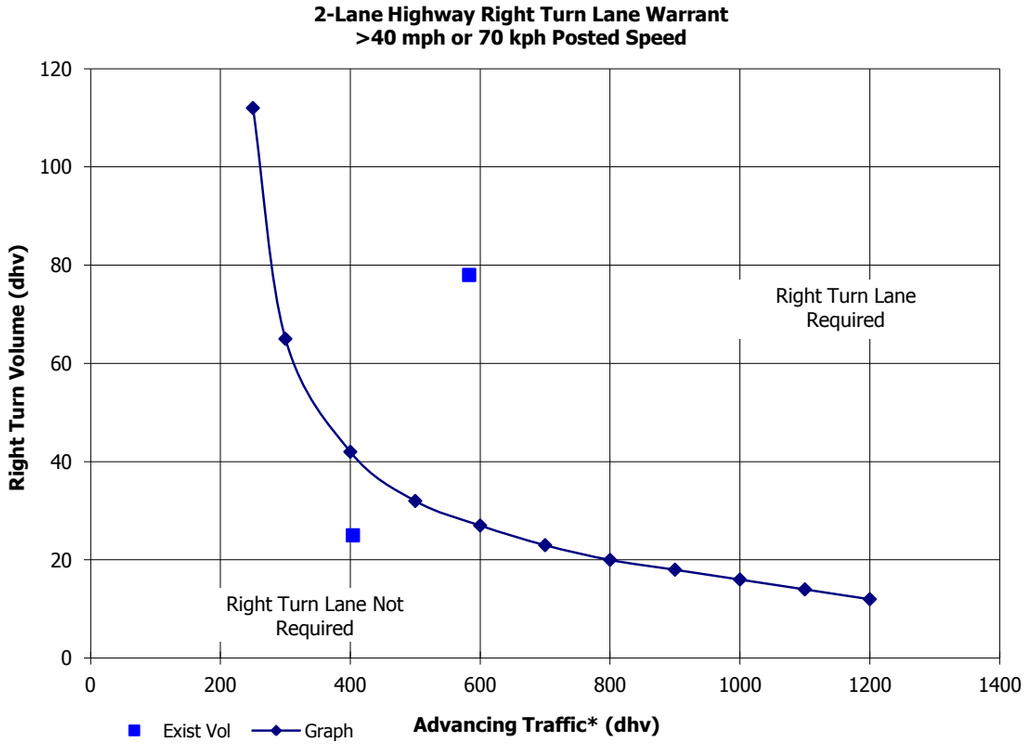
Is Left Turn Lane Warrant met? YES

2-Lane RT Graphs

2-LANE HIGHWAY RIGHT TURN LANE WARRANT
>40 MPH OR 70 KPH POSTED SPEED

Winding Creek @ Milikin

Location	Right Turn Volume	Advancing Traffic			
	Right	Left	Thru	Right	Total
					0
					0
2032 AM Build	25	0	379	25	404
2032 PM Build	78	0	505	78	583
		0	0	0	0
		0	0	0	0
		0	0	0	0



*Includes Right Turns

Is Right Turn Lane Warrant met? YES

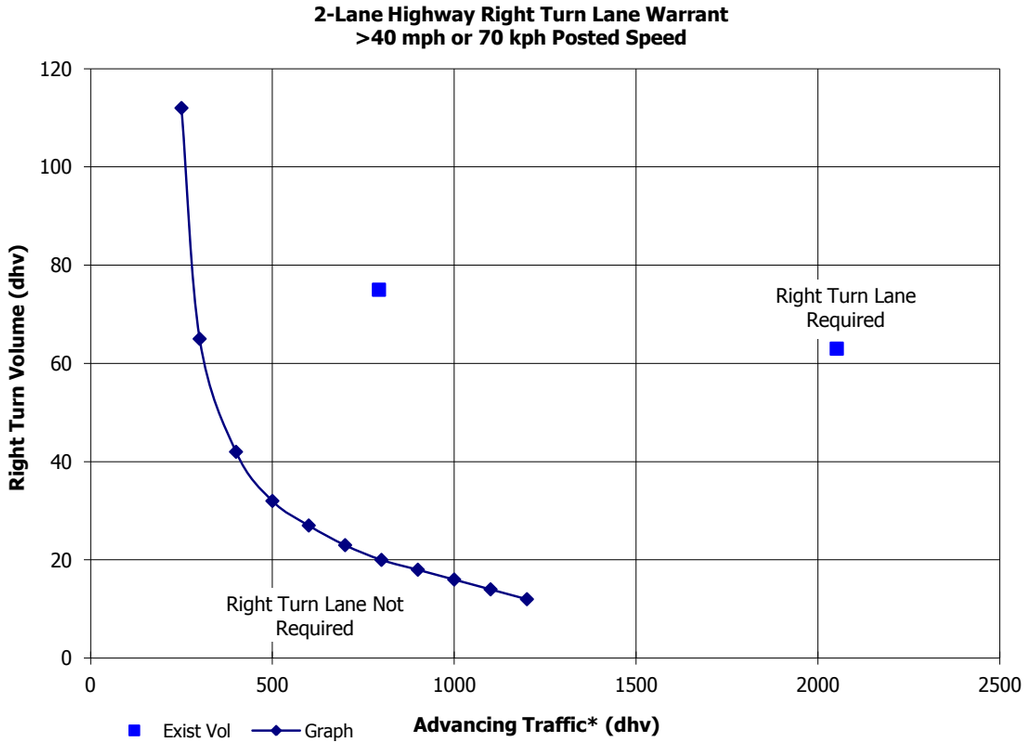
Phase 2

2-Lane RT Graphs

2-LANE HIGHWAY RIGHT TURN LANE WARRANT
>40 MPH OR 70 KPH POSTED SPEED

Winding Creek @ Milikin

Location	Right Turn Volume	Advancing Traffic			
	Right	Left	Thru	Right	Total
					0
					0
2032 AM Build	75	0	718	75	793
2032 PM Build	63	0	1989	63	2052
		0	0	0	0
		0	0	0	0
		0	0	0	0



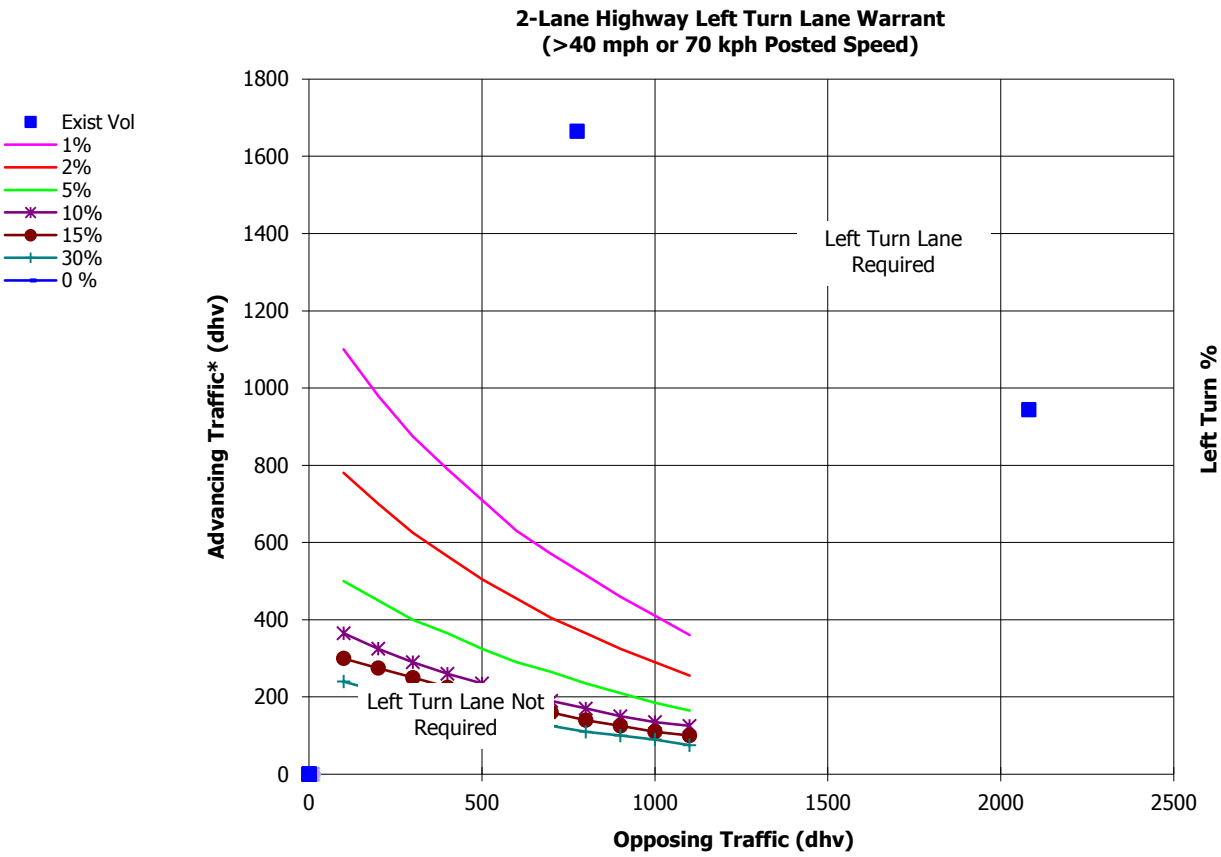
*Includes Right Turns

Is Right Turn Lane Warrant met? YES

FIGURE B: 2-LANE HIGHWAY LEFT TURN LANE WARRANT (>40 MPH OR 70 KPH POSTED SPEED)

Access 2 @ Princeton

Location	Advancing Traffic					Opposing Traffic			
	Left	Thru	Right	Total	% Left	Left	Thru	Right	Total
				0					0
				0					0
2032 B AM	107	1548	10	1665	6%	10	701	64	775
2032 B PM	98	826	20	944	10%	30	1981	70	2081
	0	0	0	0		0	0	0	0
	0	0	0	0		0	0	0	0
	0	0	0	0		0	0	0	0



*Includes Left Turns

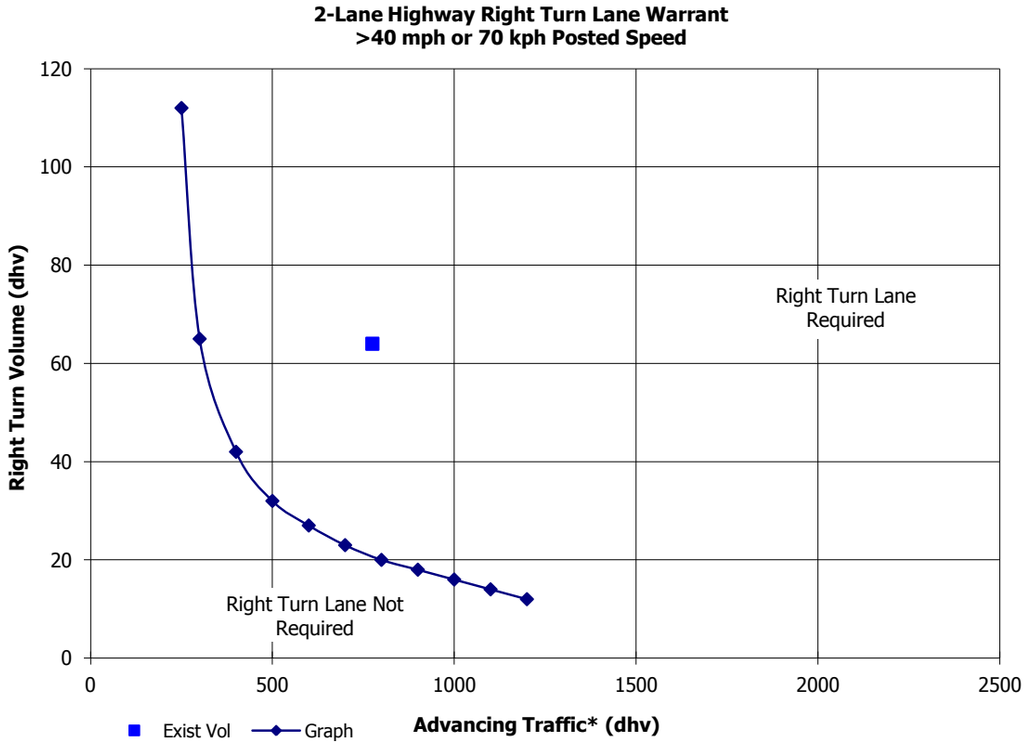
Is Left Turn Lane Warrant met? YES

2-Lane RT Graphs

2-LANE HIGHWAY RIGHT TURN LANE WARRANT
>40 MPH OR 70 KPH POSTED SPEED

Winding Creek @ Milikin

Location	Right Turn Volume	Advancing Traffic			
	Right	Left	Thru	Right	Total
					0
					0
2032 AM Build	64	10	701	64	775
2032 PM Build	70	30	1981	70	2081
		0	0	0	0
		0	0	0	0
		0	0	0	0



*Includes Right Turns

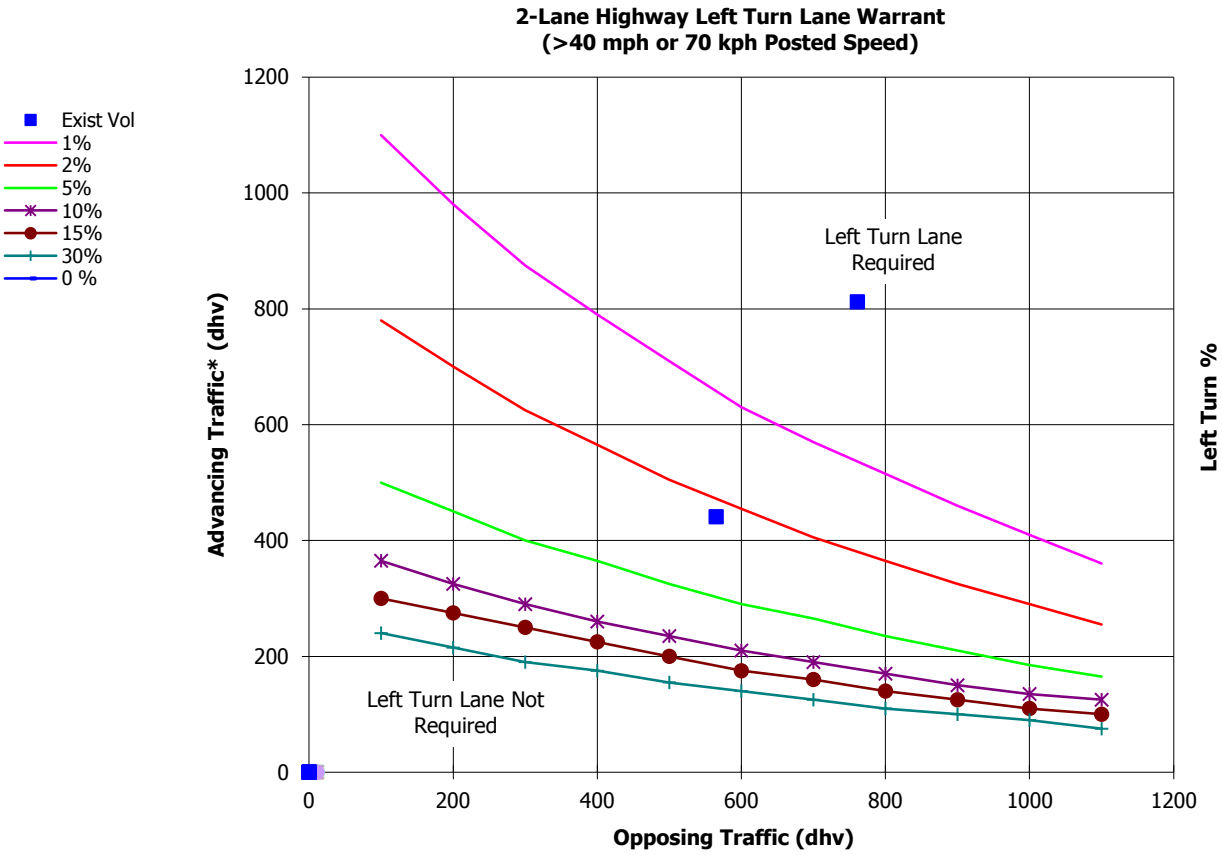
Is Right Turn Lane Warrant met? YES

2-Lane LT Graphs

FIGURE B: 2-LANE HIGHWAY LEFT TURN LANE WARRANT (>40 MPH OR 70 KPH POSTED SPEED)

Access 3 @ Princeton

Location	Advancing Traffic					Opposing Traffic			
	Left	Thru	Right	Total	% Left	Left	Thru	Right	Total
				0					0
				0					0
2032 B AM	12	429	0	441	3%	0	557	8	565
2032 B PM	38	774	0	812	5%	0	737	24	761
	0	0	0	0		0	0	0	0
	0	0	0	0		0	0	0	0
	0	0	0	0		0	0	0	0



*Includes Left Turns

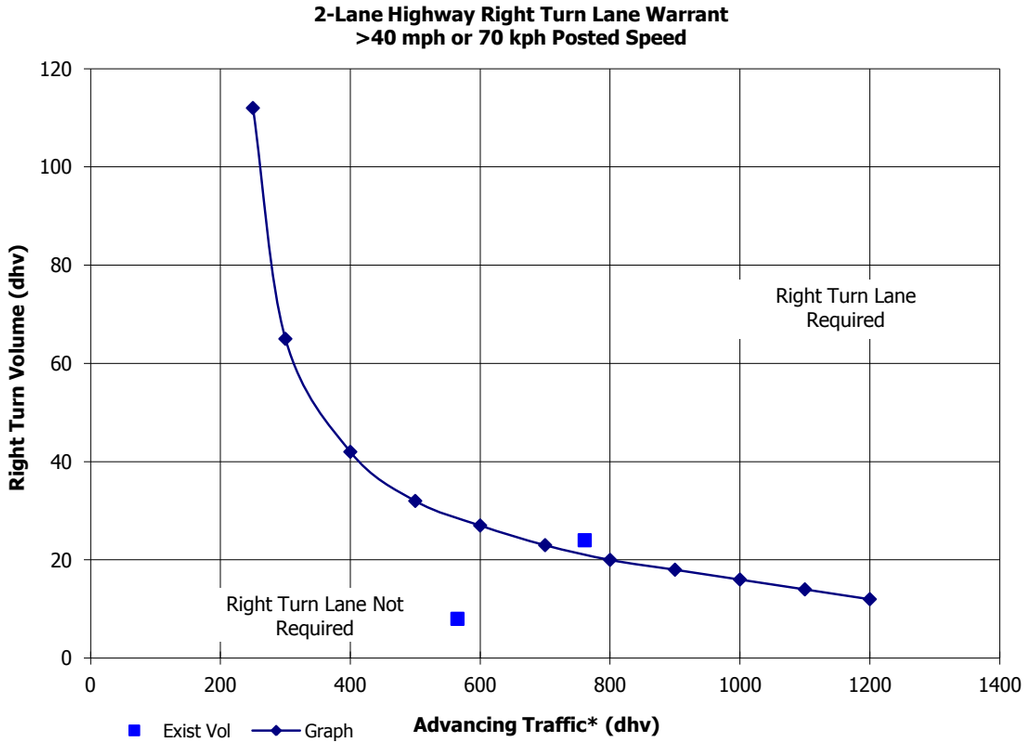
Is Left Turn Lane Warrant met? YES

2-Lane RT Graphs

2-LANE HIGHWAY RIGHT TURN LANE WARRANT
>40 MPH OR 70 KPH POSTED SPEED

Access 3 & Princeton Road

Location	Right Turn Volume	Advancing Traffic			
	Right	Left	Thru	Right	Total
					0
					0
2032 AM Build	8	0	557	8	565
2032 PM Build	24	0	737	24	761
		0	0	0	0
		0	0	0	0
		0	0	0	0



*Includes Right Turns

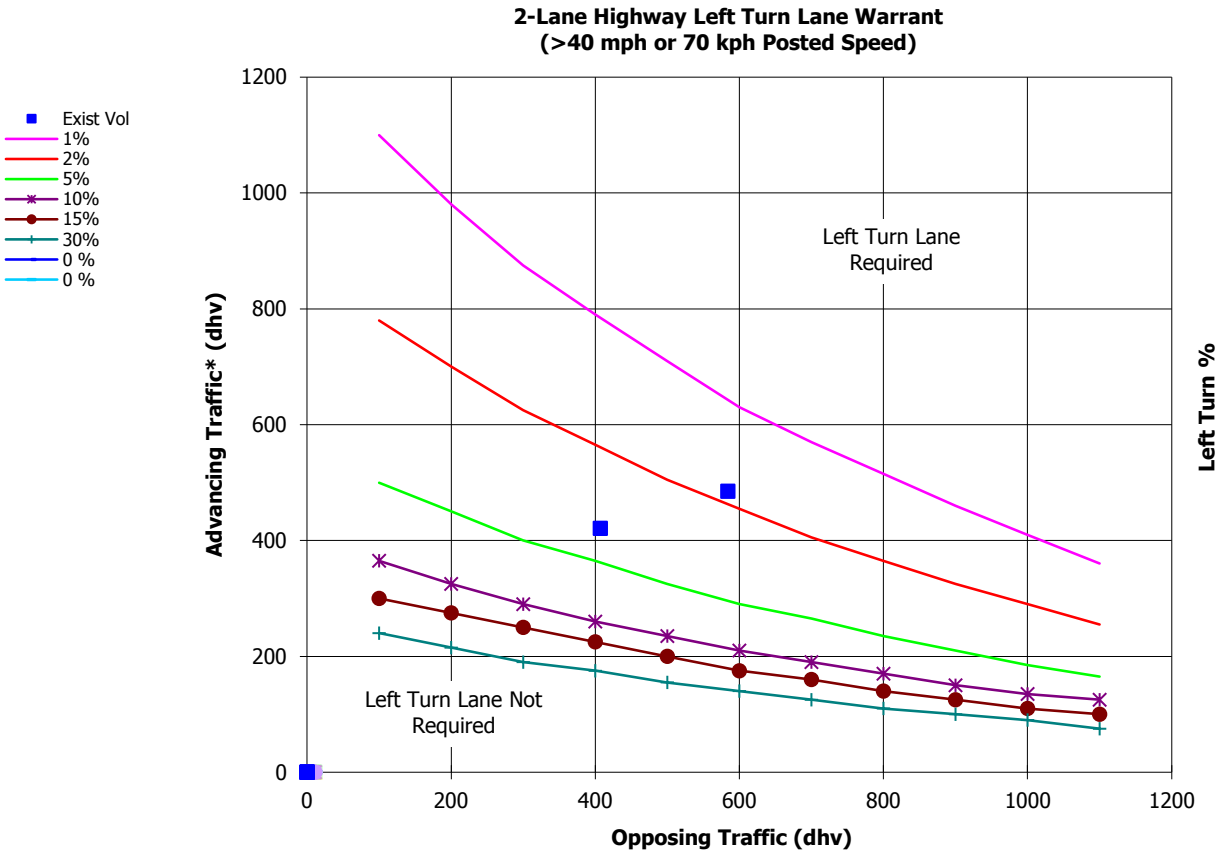
Is Right Turn Lane Warrant met? YES

2-Lane LT Graphs

FIGURE B: 2-LANE HIGHWAY LEFT TURN LANE WARRANT (>40 MPH OR 70 KPH POSTED SPEED)

Milikin @ Winding Creek

Location	Advancing Traffic					Opposing Traffic			
	Left	Thru	Right	Total	% Left	Left	Thru	Right	Total
				0					0
				0					0
2032 B AM	6	415	0	421	1%	0	382	25	407
2032 B PM	18	467	0	485	4%	0	506	78	584
	0	0	0	0		0	0	0	0
	0	0	0	0		0	0	0	0
	0	0	0	0		0	0	0	0



*Includes Left Turns

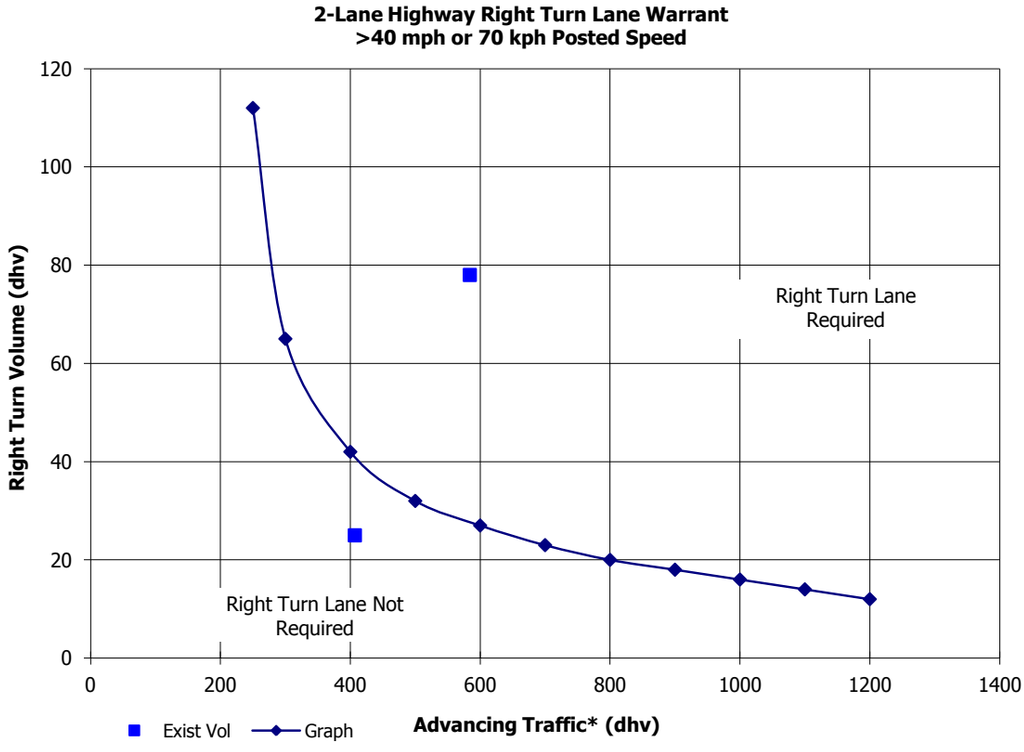
Is Left Turn Lane Warrant met? YES

2-Lane RT Graphs

2-LANE HIGHWAY RIGHT TURN LANE WARRANT
>40 MPH OR 70 KPH POSTED SPEED

Winding Creek @ Milikin

Location	Right Turn Volume	Advancing Traffic			
	Right	Left	Thru	Right	Total
					0
					0
2032 AM Build	25	0	382	25	407
2032 PM Build	78	0	506	78	584
		0	0	0	0
		0	0	0	0
		0	0	0	0



*Includes Right Turns

Is Right Turn Lane Warrant met? YES

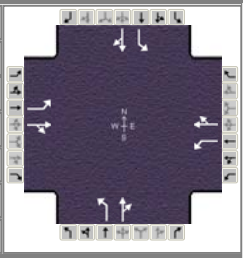
Appendix E:
Capacity Analysis

SR 747 & Milikin Rd

2012

HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	0.99
Analyst		Analysis Date	11/26/2012	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	SR 747 and Milikin	Analysis Year	2012	Analysis Period	1> 7:00
File Name	Existing 2012 AM- SR 747 and Milikin.xus				
Project Description	Exising 2012 AM Volumes				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	42	131	246	88	119	10	123	195	33	23	581	31

Signal Information													
Cycle, s	88.5	Reference Phase	2							1	2	3	4
Offset, s	0	Reference Point	End	Green	5.7	34.4	30.3	0.0	0.0	0.0	5	6	7	8
Uncoordinated	Yes	Simult. Gap E/W	On	Yellow	4.0	4.0	4.0	0.0	0.0	0.0				
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.0	2.0	2.0	0.0	0.0	0.0				

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2		6
Case Number		6.0		6.0	1.0	4.0		6.3
Phase Duration, s		36.3		36.3	11.7	52.2		40.4
Change Period, *(Y+Rc)*, s		6.0		6.0	6.0	6.0		6.0
Max Allow Headway *(MAH)*, s		3.2		3.2	2.9	2.9		2.9
Queue Clearance Time *(g_s)*, s		21.1		29.6	5.8	8.7		32.6
Green Extension Time *(g_e)*, s		1.3		0.6	0.1	1.7		1.7
Phase Call Probability		1.00		1.00	0.97	1.00		1.00
Max Out Probability		0.01		0.89	0.00	0.00		0.00

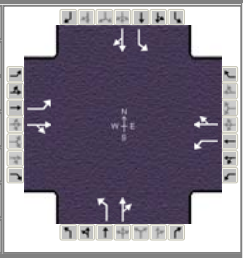
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	47	419		98	143		137	253		26	680	
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1265	1700		983	1874		1810	1852		1144	1883	
Queue Service Time *(g_s)*, s	2.4	19.1		8.5	4.8		3.8	6.7		1.2	30.6	
Cycle Queue Clearance Time *(g_c)*, s	7.1	19.1		27.6	4.8		3.8	6.7		1.2	30.6	
Capacity *(c)*, veh/h	448	583		207	642		232	967		527	733	
Volume-to-Capacity Ratio *(X)*	0.104	0.719		0.472	0.223		0.588	0.262		0.049	0.927	
Available Capacity *(c_a)*, veh/h	499	651		236	697		441	1252		855	1273	
Back of Queue *(Q)*, veh/ln (95th percentile)	1.2	11.6		3.5	3.4		2.5	4.1		0.5	18.5	
Overflow Queue *(Q_3)*, veh/ln	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Queue Storage Ratio *(RQ)* (95th percentile)	0.21	0.00		0.87	0.00		0.21	0.00		0.04	0.00	
Uniform Delay *(d_1)*, s/veh	23.2	25.4		37.5	20.8		20.2	11.7		16.9	25.9	
Incremental Delay *(d_2)*, s/veh	0.0	2.7		0.6	0.1		0.9	0.1		0.0	4.3	
Initial Queue Delay *(d_3)*, s/veh	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Control Delay *(d)*, s/veh	23.3	28.1		38.1	20.8		21.1	11.8		16.9	30.2	
Level of Service (LOS)	C	C		D	C		C	B		B	C	
Approach Delay, s/veh / LOS	27.6	C		27.8	C		15.0	B		29.7	C	
Intersection Delay, s/veh / LOS	25.8						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.3	B	2.2	B	2.3	B
Bicycle LOS Score / LOS	1.3	A	0.9	A	1.1	A	1.7	A

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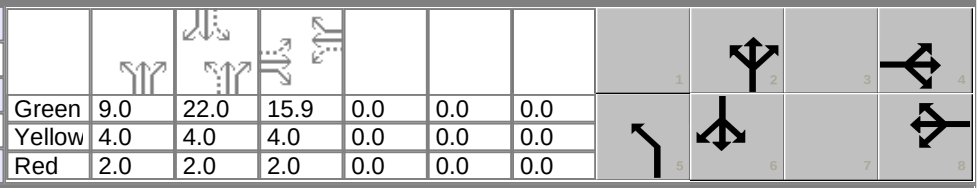
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	0.99
Analyst		Analysis Date	11/26/2012	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	SR 747 and Milikin	Analysis Year	2012	Analysis Period	1> 7:00
File Name	Existing 2012 PM- SR 747 and Milikin.xus				
Project Description	Exising 2012 PM Volumes				



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	129	101	76	141	23	279	729	111	22	405	63

Signal Information			
Cycle, s	64.9	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	9.0	22.0	15.9	0.0	0.0	0.0
Yellow	4.0	4.0	4.0	0.0	0.0	0.0
Red	2.0	2.0	2.0	0.0	0.0	0.0

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2		6
Case Number		6.0		6.0	1.0	4.0		6.3
Phase Duration, s		21.9		21.9	15.0	43.0		28.0
Change Period, *(Y+Rc)*, s		6.0		6.0	6.0	6.0		6.0
Max Allow Headway *(MAH)*, s		3.1		3.1	2.9	2.9		2.9
Queue Clearance Time *(g_s)*, s		11.1		14.8	8.6	30.3		18.8
Green Extension Time *(g_e)*, s		1.1		1.0	0.3	3.0		3.1
Phase Call Probability		1.00		1.00	1.00	1.00		1.00
Max Out Probability		0.00		0.00	0.02	0.06		0.01

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	81	256		84	182		310	933		24	520	
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1221	1761		1142	1853		1810	1856		609	1855	
Queue Service Time *(g_s)*, s	3.9	8.3		4.6	5.4		6.6	28.3		2.4	16.8	
Cycle Queue Clearance Time *(g_c)*, s	9.1	8.3		12.8	5.4		6.6	28.3		15.8	16.8	
Capacity *(c)*, veh/h	313	433		247	455		435	1058		191	630	
Volume-to-Capacity Ratio *(X)*	0.259	0.591		0.342	0.400		0.713	0.882		0.128	0.825	
Available Capacity *(c_a)*, veh/h	650	919		545	939		629	1311		387	1225	
Back of Queue *(Q)*, veh/ln (95th percentile)	1.8	5.3		2.0	3.5		3.4	13.7		0.5	9.9	
Overflow Queue *(Q_3)*, veh/ln	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Queue Storage Ratio *(RQ)* (95th percentile)	0.31	0.00		0.50	0.00		0.30	0.00		0.05	0.00	
Uniform Delay *(d_1)*, s/veh	24.3	21.7		27.3	20.5		13.3	12.1		25.5	19.7	
Incremental Delay *(d_2)*, s/veh	0.2	0.5		0.3	0.2		0.8	5.8		0.1	1.1	
Initial Queue Delay *(d_3)*, s/veh	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Control Delay *(d)*, s/veh	24.4	22.2		27.6	20.8		14.1	17.9		25.6	20.8	
Level of Service (LOS)	C	C		C	C		B	B		C	C	
Approach Delay, s/veh / LOS	22.7	C		22.9	C		17.0	B		21.0	C	
Intersection Delay, s/veh / LOS	19.4						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.3	B	2.2	B	2.3	B
Bicycle LOS Score / LOS	1.0	A	0.9	A	2.5	B	1.4	A

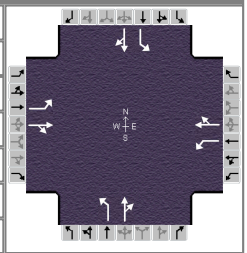
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2032

AM Peak

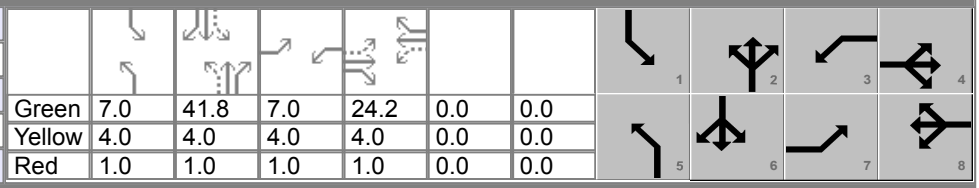
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	0.25
Analyst		Analysis Date	3/29/2013	Area Type	Other
Jurisdiction		Time Period		PHF	0.92
Intersection	Milkin & SR747	Analysis Year	2013	Analysis Period	1> 7:00
File Name	NoBuildAMMilkin&747.xus				
Project Description	2032 AM No-Build				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	62	251	308	176	216	10	154	358	66	58	1022	41

Signal Information			
Cycle, s	100.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	7.0	41.8	7.0	24.2	0.0	0.0
Yellow	4.0	4.0	4.0	4.0	0.0	0.0
Red	1.0	1.0	1.0	1.0	0.0	0.0

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	7	4	3	8	5	2	1	6
Case Number	1.1	4.0	1.1	4.0	1.1	4.0	1.1	4.0
Phase Duration, s	12.0	29.2	12.0	29.2	12.0	46.8	12.0	46.8
Change Period, *(Y+Rc)*, s	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Max Allow Headway *(MAH)*, s	3.1	3.2	3.1	3.2	3.1	3.0	3.1	3.0
Queue Clearance Time *(g_s)*, s	4.7	26.2	9.0	13.5	7.4	22.1	3.9	43.8
Green Extension Time *(g_e)*, s	0.0	0.0	0.0	1.6	0.0	4.3	0.0	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Max Out Probability	1.00	1.00	1.00	0.06	1.00	0.07	1.00	1.00

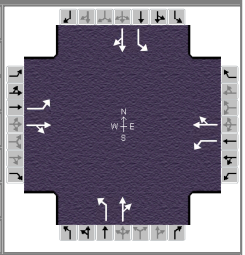
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	67	608		191	246		167	461		63	1155	
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1792	1711		1792	1866		1757	1794		1757	1832	
Queue Service Time *(g_s)*, s	2.7	24.2		7.0	11.5		5.4	20.1		1.9	41.8	
Cycle Queue Clearance Time *(g_c)*, s	2.7	24.2		7.0	11.5		5.4	20.1		1.9	41.8	
Capacity *(c)*, veh/h	342	414		214	452		205	750		394	766	
Volume-to-Capacity Ratio *(X)*	0.197	1.467		0.895	0.544		0.818	0.614		0.160	1.509	
Available Capacity *(c_a)*, veh/h	342	414		214	452		205	750		394	766	
Back of Queue *(Q)*, veh/ln (50th percentile)	1.1	35.5		5.4	5.2		5.3	8.3		0.7	67.3	
Overflow Queue *(Q_3)*, veh/ln	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Queue Storage Ratio *(RQ)* (50th percentile)	0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00	
Uniform Delay *(d_1)*, s/veh	25.3	37.9		31.8	33.1		23.2	22.8		15.8	29.1	
Incremental Delay *(d_2)*, s/veh	0.1	223.0		33.8	0.8		21.0	1.1		0.1	235.8	
Initial Queue Delay *(d_3)*, s/veh	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Control Delay *(d)*, s/veh	25.4	260.9		65.5	33.8		44.2	23.9		15.8	264.9	
Level of Service (LOS)	C	F		E	C		D	C		B	F	
Approach Delay, s/veh / LOS	237.4	F		47.7	D		29.3	C		252.0	F	
Intersection Delay, s/veh / LOS	171.2						F					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.3	B	2.3	B	2.3	B
Bicycle LOS Score / LOS	1.6	A	1.2	A	1.5	A	2.5	B

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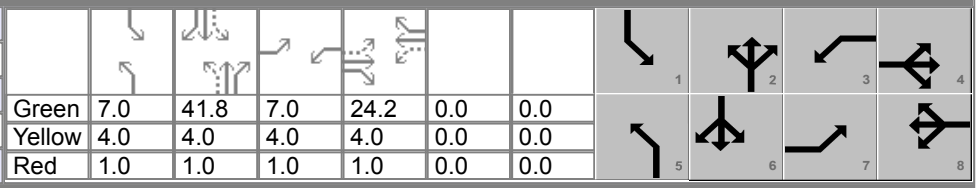
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	0.25
Analyst		Analysis Date	3/29/2013	Area Type	Other
Jurisdiction		Time Period		PHF	0.92
Intersection	Milkin & SR747	Analysis Year	2013	Analysis Period	1> 7:00
File Name	BuildAMMilkin&747.xus				
Project Description	2032 AM Build				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	62	254	312	222	221	31	167	413	84	66	1037	41

Signal Information			
Cycle, s	100.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	7.0	41.8	7.0	24.2	0.0	0.0
Yellow	4.0	4.0	4.0	4.0	0.0	0.0
Red	1.0	1.0	1.0	1.0	0.0	0.0

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	7	4	3	8	5	2	1	6
Case Number	1.1	4.0	1.1	4.0	1.1	4.0	1.1	4.0
Phase Duration, s	12.0	29.2	12.0	29.2	12.0	46.8	12.0	46.8
Change Period, *(Y+Rc)*, s	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Max Allow Headway *(MAH)*, s	3.1	3.2	3.1	3.2	3.1	3.1	3.1	3.1
Queue Clearance Time *(g_s)*, s	4.7	26.2	9.0	15.3	7.9	27.2	4.2	43.8
Green Extension Time *(g_e)*, s	0.0	0.0	0.0	1.6	0.0	4.3	0.0	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Max Out Probability	1.00	1.00	1.00	0.13	1.00	0.18	1.00	1.00

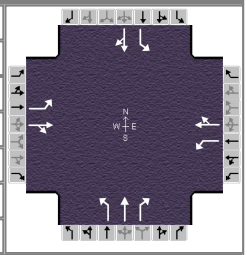
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	67	615		241	274		182	540		72	1172	
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1792	1711		1792	1840		1757	1790		1757	1832	
Queue Service Time *(g_s)*, s	2.7	24.2		7.0	13.3		5.9	25.2		2.2	41.8	
Cycle Queue Clearance Time *(g_c)*, s	2.7	24.2		7.0	13.3		5.9	25.2		2.2	41.8	
Capacity *(c)*, veh/h	319	414		214	445		204	748		337	766	
Volume-to-Capacity Ratio *(X)*	0.211	1.485		1.129	0.615		0.888	0.722		0.213	1.530	
Available Capacity *(c_a)*, veh/h	319	414		214	445		204	748		337	766	
Back of Queue *(Q)*, veh/ln (50th percentile)	1.1	36.4		7.8	6.0		6.4	10.7		0.8	69.3	
Overflow Queue *(Q_3)*, veh/ln	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Queue Storage Ratio *(RQ)* (50th percentile)	0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00	
Uniform Delay *(d_1)*, s/veh	25.5	37.9		33.7	33.8		23.3	24.3		17.1	29.1	
Incremental Delay *(d_2)*, s/veh	0.1	231.0		100.7	1.9		33.3	3.0		0.1	245.1	
Initial Queue Delay *(d_3)*, s/veh	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Control Delay *(d)*, s/veh	25.6	268.9		134.4	35.6		56.7	27.2		17.2	274.2	
Level of Service (LOS)	C	F		F	D		E	C		B	F	
Approach Delay, s/veh / LOS	244.9	F		81.9	F		34.6	C		259.4	F	
Intersection Delay, s/veh / LOS	176.1						F					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.3	B	2.3	B	2.3	B
Bicycle LOS Score / LOS	1.6	A	1.3	A	1.7	A	2.5	B

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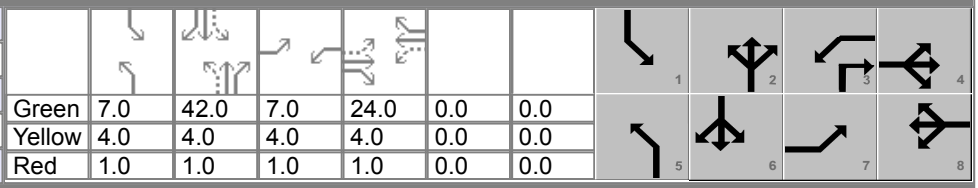
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	0.25
Analyst		Analysis Date	3/29/2013	Area Type	Other
Jurisdiction		Time Period		PHF	0.92
Intersection	Milkin & SR747	Analysis Year	2013	Analysis Period	1> 7:00
File Name	BuildAMMilkin&747 rev.xus				
Project Description	2032 AM Build - Imp				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	62	254	312	222	221	31	167	413	84	66	1037	41

Signal Information			
Cycle, s	100.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	7.0	42.0	7.0	24.0	0.0	0.0
Yellow	4.0	4.0	4.0	4.0	0.0	0.0
Red	1.0	1.0	1.0	1.0	0.0	0.0

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	7	4	3	8	5	2	1	6
Case Number	1.1	4.0	1.1	4.0	1.1	3.0	1.1	4.0
Phase Duration, s	12.0	29.0	12.0	29.0	12.0	47.0	12.0	47.0
Change Period, *(Y+Rc)*, s	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Max Allow Headway *(MAH)*, s	3.1	3.2	3.1	3.2	3.1	3.1	3.1	3.1
Queue Clearance Time *(gs)*, s	4.7	26.0	9.0	15.3	7.9	20.7	4.2	44.0
Green Extension Time *(ge)*, s	0.0	0.0	0.0	1.5	0.0	4.7	0.0	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Max Out Probability	1.00	1.00	1.00	0.14	1.00	0.06	1.00	1.00

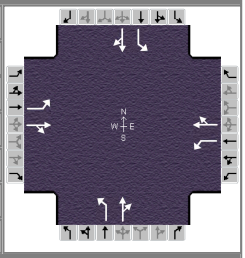
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	67	615		241	274		182	449	91	72	1172	
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1792	1711		1792	1840		1757	1845	1610	1757	1832	
Queue Service Time *(gs)*, s	2.7	24.0		7.0	13.3		5.9	18.7	3.1	2.2	42.0	
Cycle Queue Clearance Time *(gc)*, s	2.7	24.0		7.0	13.3		5.9	18.7	3.1	2.2	42.0	
Capacity *(c)*, veh/h	316	411		214	442		204	775	789	412	769	
Volume-to-Capacity Ratio *(X)*	0.213	1.498		1.129	0.620		0.888	0.579	0.116	0.174	1.523	
Available Capacity *(ca)*, veh/h	316	411		214	442		204	775	789	412	769	
Back of Queue *(Q)*, veh/ln (50th percentile)	1.1	36.7		7.8	6.0		4.1	7.9	1.1	0.8	68.9	
Overflow Queue *(Q3)*, veh/ln	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Queue Storage Ratio *(RQ)* (50th percentile)	0.00	0.00		0.00	0.00		0.00	0.00	0.00	0.00	0.00	
Uniform Delay *(d1)*, s/veh	25.7	38.0		33.8	33.9		23.3	22.2	13.8	15.4	29.0	
Incremental Delay *(d2)*, s/veh	0.1	236.5		100.7	2.0		33.3	0.7	0.0	0.1	241.9	
Initial Queue Delay *(d3)*, s/veh	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Control Delay *(d)*, s/veh	25.8	274.5		134.5	35.9		56.6	23.0	13.8	15.5	270.9	
Level of Service (LOS)	C	F		F	D		E	C	B	B	F	
Approach Delay, s/veh / LOS	250.0	F		82.1	F		30.3	C		256.1	F	
Intersection Delay, s/veh / LOS	174.9						F					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.4	B	2.3	B	2.3	B	2.3	B
Bicycle LOS Score / LOS	1.6	A	1.3	A	1.7	A	2.5	B

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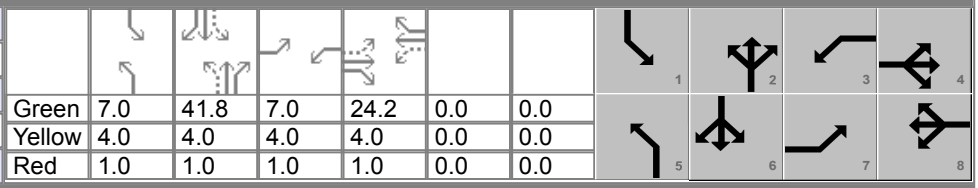
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	0.25
Analyst		Analysis Date	3/29/2013	Area Type	Other
Jurisdiction		Time Period		PHF	0.92
Intersection	Milkin & SR747	Analysis Year	2013	Analysis Period	1> 7:00
File Name	BuildAMMilkin&747.xus				
Project Description	2032 AM Build (Full)				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	62	254	326	234	221	31	172	435	87	66	1098	41

Signal Information			
Cycle, s	100.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	7.0	41.8	7.0	24.2	0.0	0.0
Yellow	4.0	4.0	4.0	4.0	0.0	0.0
Red	1.0	1.0	1.0	1.0	0.0	0.0

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	7	4	3	8	5	2	1	6
Case Number	1.1	4.0	1.1	4.0	1.1	4.0	1.1	4.0
Phase Duration, s	12.0	29.2	12.0	29.2	12.0	46.8	12.0	46.8
Change Period, *(Y+Rc)*, s	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Max Allow Headway *(MAH)*, s	3.1	3.2	3.1	3.2	3.1	3.1	3.1	3.1
Queue Clearance Time *(g_s)*, s	4.7	26.2	9.0	15.3	8.1	29.0	4.2	43.8
Green Extension Time *(g_e)*, s	0.0	0.0	0.0	1.6	0.0	4.5	0.0	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Max Out Probability	1.00	1.00	1.00	0.13	1.00	0.28	1.00	1.00

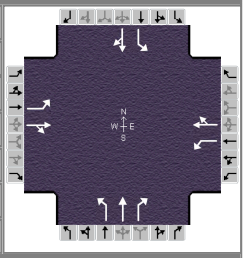
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	67	630		254	274		187	567		72	1238	
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1792	1708		1792	1840		1757	1791		1757	1833	
Queue Service Time *(g_s)*, s	2.7	24.2		7.0	13.3		6.1	27.0		2.2	41.8	
Cycle Queue Clearance Time *(g_c)*, s	2.7	24.2		7.0	13.3		6.1	27.0		2.2	41.8	
Capacity *(c)*, veh/h	319	413		213	445		204	749		318	766	
Volume-to-Capacity Ratio *(X)*	0.211	1.525		1.192	0.615		0.917	0.758		0.225	1.616	
Available Capacity *(c_a)*, veh/h	319	413		213	445		204	749		318	766	
Back of Queue *(Q)*, veh/ln (50th percentile)	1.1	38.3		9.1	6.0		6.9	11.7		0.8	77.4	
Overflow Queue *(Q_3)*, veh/ln	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Queue Storage Ratio *(RQ)* (50th percentile)	0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00	
Uniform Delay *(d_1)*, s/veh	25.5	37.9		33.6	33.8		23.4	24.8		17.7	29.1	
Incremental Delay *(d_2)*, s/veh	0.1	248.2		123.0	1.9		40.0	4.0		0.1	283.2	
Initial Queue Delay *(d_3)*, s/veh	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Control Delay *(d)*, s/veh	25.6	286.1		156.7	35.6		63.3	28.8		17.8	312.3	
Level of Service (LOS)	C	F		F	D		E	C		B	F	
Approach Delay, s/veh / LOS	261.0	F		93.9	F		37.4	D		296.2	F	
Intersection Delay, s/veh / LOS	196.9						F					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.3	B	2.3	B	2.3	B
Bicycle LOS Score / LOS	1.6	A	1.4	A	1.7	A	2.6	B

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HCS 2010 Signalized Intersection Results Summary

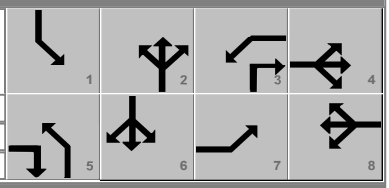
General Information				Intersection Information	
Agency				Duration, h	0.25
Analyst		Analysis Date	3/29/2013	Area Type	Other
Jurisdiction		Time Period		PHF	0.92
Intersection	Milkin & SR747	Analysis Year	2013	Analysis Period	1> 7:00
File Name	BuildAMMilkin&747.xus				
Project Description	2032 AM Build (Full) - Imp				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	62	254	326	234	221	31	172	435	87	66	1098	41

Signal Information			
Cycle, s	100.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	7.0	43.0	7.0	23.0	0.0	0.0	
Yellow	4.0	4.0	4.0	4.0	0.0	0.0	
Red	1.0	1.0	1.0	1.0	0.0	0.0	



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	7	4	3	8	5	2	1	6
Case Number	1.1	4.0	1.1	4.0	1.1	3.0	1.1	4.0
Phase Duration, s	12.0	28.0	12.0	28.0	12.0	48.0	12.0	48.0
Change Period, *(Y+Rc)*, s	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Max Allow Headway *(MAH)*, s	3.1	3.2	3.1	3.2	3.1	3.0	3.1	3.0
Queue Clearance Time *(gs)*, s	4.7	25.0	9.0	15.5	8.0	21.6	4.1	45.0
Green Extension Time *(ge)*, s	0.0	0.0	0.0	1.5	0.0	5.2	0.0	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Max Out Probability	1.00	1.00	1.00	0.22	1.00	0.09	1.00	1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	67	630		254	274		187	473	95	72	1238	
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1792	1708		1792	1840		1757	1845	1610	1757	1833	
Queue Service Time *(gs)*, s	2.7	23.0		7.0	13.5		6.0	19.6	3.1	2.1	43.0	
Cycle Queue Clearance Time *(gc)*, s	2.7	23.0		7.0	13.5		6.0	19.6	3.1	2.1	43.0	
Capacity *(c)*, veh/h	303	393		213	423		204	793	805	407	788	
Volume-to-Capacity Ratio *(X)*	0.222	1.604		1.192	0.647		0.917	0.596	0.117	0.176	1.571	
Available Capacity *(ca)*, veh/h	303	393		213	423		204	793	805	407	788	
Back of Queue *(Q)*, veh/ln (50th percentile)	1.2	40.3		9.1	6.2		4.5	8.3	1.1	0.8	75.2	
Overflow Queue *(Q3)*, veh/ln	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Queue Storage Ratio *(RQ)* (50th percentile)	0.00	0.00		0.00	0.00		0.00	0.00	0.00	0.00	0.00	
Uniform Delay *(d1)*, s/veh	26.4	38.5		34.4	34.8		23.2	21.8	13.3	15.1	28.5	
Incremental Delay *(d2)*, s/veh	0.1	283.7		123.0	2.7		40.0	0.9	0.0	0.1	263.0	
Initial Queue Delay *(d3)*, s/veh	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Control Delay *(d)*, s/veh	26.6	322.2		157.4	37.5		63.2	22.7	13.3	15.2	291.5	
Level of Service (LOS)	C	F		F	D		E	C	B	B	F	
Approach Delay, s/veh / LOS	293.6	F		95.2	F		31.6	C		276.4	F	
Intersection Delay, s/veh / LOS	194.8						F					

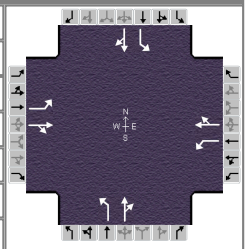
Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.4	B	2.3	B	2.3	B	2.3	B
Bicycle LOS Score / LOS	1.6	A	1.4	A	1.7	A	2.6	B

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PM Peak

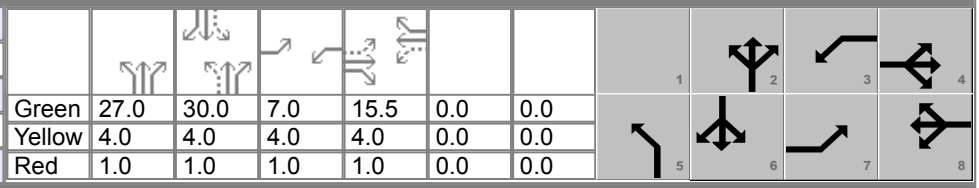
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	0.25
Analyst		Analysis Date	3/29/2013	Area Type	Other
Jurisdiction		Time Period		PHF	0.92
Intersection	Milkin & SR747	Analysis Year	2013	Analysis Period	1> 7:00
File Name	NoBuildPMMilkin&747.xus				
Project Description	2032 PM No-Build				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	103	226	111	141	260	58	372	1254	233	44	561	95

Signal Information			
Cycle, s	99.5	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	27.0	30.0	7.0	15.5	0.0	0.0						
Yellow	4.0	4.0	4.0	4.0	0.0	0.0						
Red	1.0	1.0	1.0	1.0	0.0	0.0						

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	7	4	3	8	5	2		6
Case Number	1.1	4.0	1.1	4.0	1.0	4.0		6.3
Phase Duration, s	12.0	20.5	12.0	20.5	32.0	67.0		35.0
Change Period, *(Y+Rc)*, s	5.0	5.0	5.0	5.0	5.0	5.0		5.0
Max Allow Headway *(MAH)*, s	3.1	3.1	3.1	3.1	3.1	3.2		3.2
Queue Clearance Time *(g_s)*, s	7.1	17.5	9.0	17.5	17.9	64.0		32.0
Green Extension Time *(g_e)*, s	0.0	0.0	0.0	0.0	0.6	0.0		0.0
Phase Call Probability	1.00	1.00	1.00	1.00	1.00	1.00		1.00
Max Out Probability	1.00	1.00	1.00	1.00	0.02	1.00		1.00

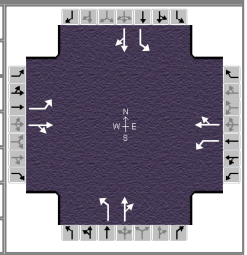
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	112	366		153	346		404	1616		48	713	
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1792	1776		1792	1821		1792	1830		315	1833	
Queue Service Time *(g_s)*, s	5.1	15.5		7.0	15.5		15.9	62.0		0.0	30.0	
Cycle Queue Clearance Time *(g_c)*, s	5.1	15.5		7.0	15.5		15.9	62.0		30.0	30.0	
Capacity *(c)*, veh/h	219	277		219	284		559	1140		72	553	
Volume-to-Capacity Ratio *(X)*	0.510	1.324		0.700	1.218		0.724	1.418		0.661	1.290	
Available Capacity *(c_a)*, veh/h	219	277		219	284		559	1140		72	553	
Back of Queue *(Q)*, veh/ln (50th percentile)	2.2	19.6		3.5	16.7		8.9	83.4		1.5	34.9	
Overflow Queue *(Q_3)*, veh/ln	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Queue Storage Ratio *(RQ)* (50th percentile)	0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00	
Uniform Delay *(d_1)*, s/veh	32.8	42.0		34.0	42.0		23.5	18.8		49.7	34.8	
Incremental Delay *(d_2)*, s/veh	0.8	168.8		8.1	125.8		4.0	193.2		16.4	143.6	
Initial Queue Delay *(d_3)*, s/veh	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Control Delay *(d)*, s/veh	33.7	210.8		42.1	167.8		27.6	212.0		66.2	178.4	
Level of Service (LOS)	C	F		D	F		C	F		E	F	
Approach Delay, s/veh / LOS	169.3	F		129.2	F		175.1	F		171.3	F	
Intersection Delay, s/veh / LOS	167.5						F					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.3	B	2.2	B	2.3	B
Bicycle LOS Score / LOS	1.3	A	1.3	A	3.8	D	1.7	A

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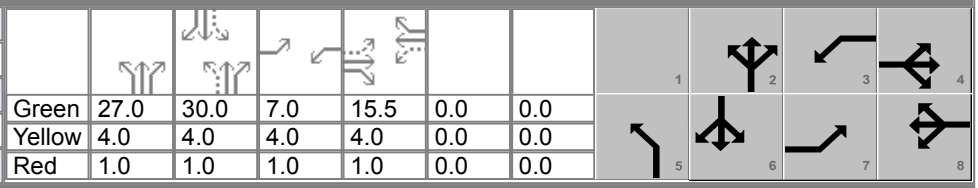
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	0.25
Analyst		Analysis Date	3/29/2013	Area Type	Other
Jurisdiction		Time Period		PHF	0.92
Intersection	Milkin & SR747	Analysis Year	2013	Analysis Period	1> 7:00
File Name	BuildPMMilkin&747.xus				
Project Description	2032 PM Build				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	103	235	123	172	263	71	380	1288	279	69	611	95

Signal Information			
Cycle, s	99.5	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	27.0	30.0	7.0	15.5	0.0	0.0						
Yellow	4.0	4.0	4.0	4.0	0.0	0.0						
Red	1.0	1.0	1.0	1.0	0.0	0.0						

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	7	4	3	8	5	2		6
Case Number	1.1	4.0	1.1	4.0	1.0	4.0		6.3
Phase Duration, s	12.0	20.5	12.0	20.5	32.0	67.0		35.0
Change Period, *(Y+Rc)*, s	5.0	5.0	5.0	5.0	5.0	5.0		5.0
Max Allow Headway *(MAH)*, s	3.1	3.1	3.1	3.1	3.1	3.2		3.2
Queue Clearance Time *(g_s)*, s	7.1	17.5	9.0	17.5	18.5	64.0		32.0
Green Extension Time *(g_e)*, s	0.0	0.0	0.0	0.0	0.6	0.0		0.0
Phase Call Probability	1.00	1.00	1.00	1.00	1.00	1.00		1.00
Max Out Probability	1.00	1.00	1.00	1.00	0.03	1.00		1.00

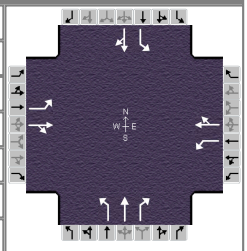
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	112	389		187	363		413	1703		75	767	
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1792	1772		1792	1812		1792	1823		289	1837	
Queue Service Time *(g_s)*, s	5.1	15.5		7.0	15.5		16.5	62.0		0.0	30.0	
Cycle Queue Clearance Time *(g_c)*, s	5.1	15.5		7.0	15.5		16.5	62.0		30.0	30.0	
Capacity *(c)*, veh/h	219	276		219	282		559	1136		72	554	
Volume-to-Capacity Ratio *(X)*	0.511	1.410		0.856	1.286		0.740	1.500		1.036	1.386	
Available Capacity *(c_a)*, veh/h	219	276		219	282		559	1136		72	554	
Back of Queue *(Q)*, veh/ln (50th percentile)	2.2	22.3		2.7	18.7		9.2	94.5		4.1	41.2	
Overflow Queue *(Q_3)*, veh/ln	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Queue Storage Ratio *(RQ)* (50th percentile)	0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00	
Uniform Delay *(d_1)*, s/veh	32.8	42.0		36.8	42.0		23.9	18.8		49.7	34.8	
Incremental Delay *(d_2)*, s/veh	0.9	204.7		25.7	152.9		4.6	229.5		116.0	184.6	
Initial Queue Delay *(d_3)*, s/veh	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Control Delay *(d)*, s/veh	33.7	246.7		62.5	194.9		28.5	248.3		165.8	219.3	
Level of Service (LOS)	C	F		E	F		C	F		F	F	
Approach Delay, s/veh / LOS	199.1	F		149.9	F		205.4	F		214.5	F	
Intersection Delay, s/veh / LOS	198.9						F					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.3	B	2.2	B	2.3	B
Bicycle LOS Score / LOS	1.3	A	1.4	A	4.0	D	1.9	A

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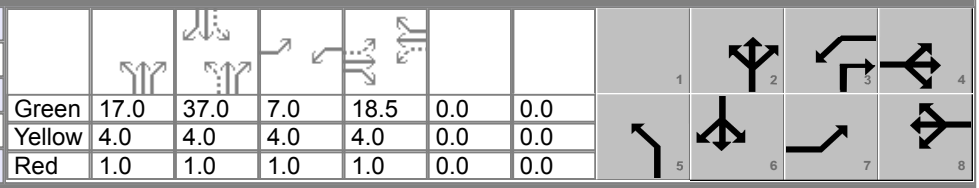
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	0.25
Analyst		Analysis Date	3/29/2013	Area Type	Other
Jurisdiction		Time Period		PHF	0.92
Intersection	Milkin & SR747	Analysis Year	2013	Analysis Period	1> 7:00
File Name	BuildPMMilkin&747 rev.xus				
Project Description	2032 PM Build - Imp				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	103	235	123	172	263	71	380	1288	279	69	611	95

Signal Information			
Cycle, s	99.5	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	17.0	37.0	7.0	18.5	0.0	0.0
Yellow	4.0	4.0	4.0	4.0	0.0	0.0
Red	1.0	1.0	1.0	1.0	0.0	0.0

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	7	4	3	8	5	2		6
Case Number	1.1	4.0	1.1	4.0	1.0	3.0		6.3
Phase Duration, s	12.0	23.5	12.0	23.5	22.0	64.0		42.0
Change Period, *(Y+Rc)*, s	5.0	5.0	5.0	5.0	5.0	5.0		5.0
Max Allow Headway *(MAH)*, s	3.1	3.1	3.1	3.1	3.1	3.2		3.2
Queue Clearance Time *(g_s)*, s	6.9	20.5	9.0	20.5	19.0	61.0		39.0
Green Extension Time *(g_e)*, s	0.0	0.0	0.0	0.0	0.0	0.0		0.0
Phase Call Probability	1.00	1.00	1.00	1.00	1.00	1.00		1.00
Max Out Probability	1.00	1.00	1.00	1.00	1.00	1.00		1.00

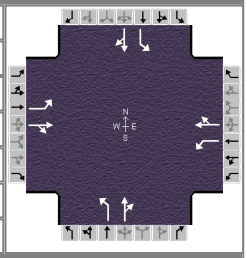
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	112	389		187	363		413	1400	303	75	767	
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1792	1772		1792	1812		1792	1881	1610	387	1837	
Queue Service Time *(g_s)*, s	4.9	18.5		7.0	18.5		17.0	59.0	7.8	0.0	37.0	
Cycle Queue Clearance Time *(g_c)*, s	4.9	18.5		7.0	18.5		17.0	59.0	7.8	37.0	37.0	
Capacity *(c)*, veh/h	219	329		219	337		378	1115	1068	72	683	
Volume-to-Capacity Ratio *(X)*	0.511	1.181		0.856	1.078		1.091	1.255	0.284	1.036	1.124	
Available Capacity *(c_a)*, veh/h	219	329		219	337		378	1115	1068	72	683	
Back of Queue *(Q)*, veh/ln (50th percentile)	2.1	17.8		2.7	14.7		16.7	60.2	2.3	4.1	29.5	
Overflow Queue *(Q_3)*, veh/ln	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Queue Storage Ratio *(RQ)* (50th percentile)	0.00	0.00		0.00	0.00		0.00	0.00	0.00	0.00	0.00	
Uniform Delay *(d_1)*, s/veh	30.9	40.5		34.8	40.5		31.3	20.3	6.9	49.7	31.3	
Incremental Delay *(d_2)*, s/veh	0.9	108.4		25.7	71.3		73.1	122.2	0.1	116.0	73.7	
Initial Queue Delay *(d_3)*, s/veh	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Control Delay *(d)*, s/veh	31.8	148.9		60.5	111.8		104.4	142.5	7.0	165.8	104.9	
Level of Service (LOS)	C	F		E	F		F	F	A	F	F	
Approach Delay, s/veh / LOS	122.7	F		94.4	F		115.6	F		110.4	F	
Intersection Delay, s/veh / LOS	112.5						F					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.5	B	2.3	B	2.2	B	2.3	B
Bicycle LOS Score / LOS	1.3	A	1.4	A	4.0	D	1.9	A

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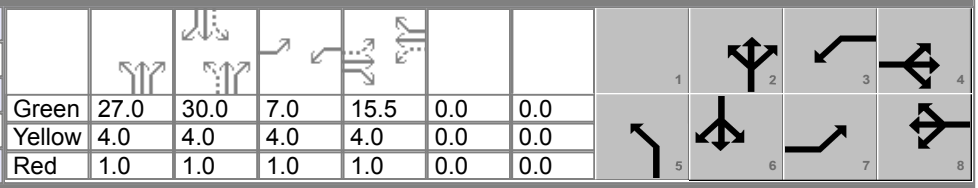
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	0.25
Analyst		Analysis Date	3/29/2013	Area Type	Other
Jurisdiction		Time Period		PHF	0.92
Intersection	Milkin & SR747	Analysis Year	2013	Analysis Period	1> 7:00
File Name	BuildPMMilkin&747.xus				
Project Description	2032 PM Build (Full)				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	103	235	128	176	263	71	394	1347	280	69	634	95

Signal Information			
Cycle, s	99.5	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	27.0	30.0	7.0	15.5	0.0	0.0
Yellow	4.0	4.0	4.0	4.0	0.0	0.0
Red	1.0	1.0	1.0	1.0	0.0	0.0

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	7	4	3	8	5	2		6
Case Number	1.1	4.0	1.1	4.0	1.0	4.0		6.3
Phase Duration, s	12.0	20.5	12.0	20.5	32.0	67.0		35.0
Change Period, *(Y+Rc)*, s	5.0	5.0	5.0	5.0	5.0	5.0		5.0
Max Allow Headway *(MAH)*, s	3.1	3.1	3.1	3.1	3.1	3.2		3.2
Queue Clearance Time *(g_s)*, s	7.1	17.5	9.0	17.5	19.5	64.0		32.0
Green Extension Time *(g_e)*, s	0.0	0.0	0.0	0.0	0.6	0.0		0.0
Phase Call Probability	1.00	1.00	1.00	1.00	1.00	1.00		1.00
Max Out Probability	1.00	1.00	1.00	1.00	0.06	1.00		1.00

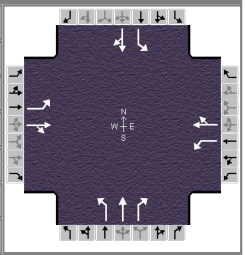
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	112	395		191	363		428	1768		75	792	
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1792	1769		1792	1812		1792	1825		271	1838	
Queue Service Time *(g_s)*, s	5.1	15.5		7.0	15.5		17.5	62.0		0.0	30.0	
Cycle Queue Clearance Time *(g_c)*, s	5.1	15.5		7.0	15.5		17.5	62.0		30.0	30.0	
Capacity *(c)*, veh/h	219	276		218	282		559	1137		72	554	
Volume-to-Capacity Ratio *(X)*	0.511	1.432		0.876	1.286		0.767	1.555		1.036	1.430	
Available Capacity *(c_a)*, veh/h	219	276		218	282		559	1137		72	554	
Back of Queue *(Q)*, veh/ln (50th percentile)	2.2	23.0		3.0	18.7		9.8	102.4		4.1	44.2	
Overflow Queue *(Q_3)*, veh/ln	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Queue Storage Ratio *(RQ)* (50th percentile)	0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00	
Uniform Delay *(d_1)*, s/veh	32.8	42.0		37.1	42.0		24.5	18.8		49.7	34.8	
Incremental Delay *(d_2)*, s/veh	0.9	214.0		29.4	152.9		5.7	254.3		116.0	203.7	
Initial Queue Delay *(d_3)*, s/veh	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Control Delay *(d)*, s/veh	33.7	256.0		66.5	194.9		30.2	273.1		165.8	238.4	
Level of Service (LOS)	C	F		E	F		C	F		F	F	
Approach Delay, s/veh / LOS	206.8	F		150.6	F		225.7	F		232.1	F	
Intersection Delay, s/veh / LOS	214.7						F					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.3	B	2.2	B	2.3	B
Bicycle LOS Score / LOS	1.3	A	1.4	A	4.1	D	1.9	A

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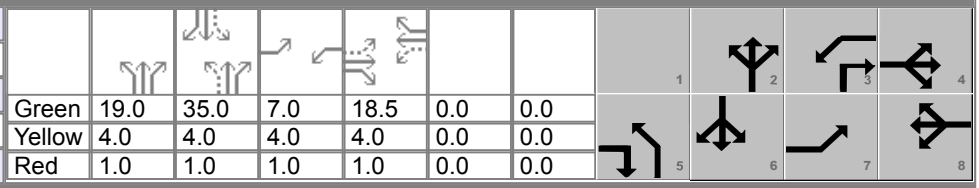
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	0.25
Analyst		Analysis Date	3/29/2013	Area Type	Other
Jurisdiction		Time Period		PHF	0.92
Intersection	Milkin & SR747	Analysis Year	2013	Analysis Period	1> 7:00
File Name	BuildPMMilkin&747.xus				
Project Description	2032 PM Build (Full) - Imp				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	103	235	128	176	263	71	394	1347	280	69	634	95

Signal Information			
Cycle, s	99.5	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



							1	2	3	4
Green	19.0	35.0	7.0	18.5	0.0	0.0	5	6	7	8
Yellow	4.0	4.0	4.0	4.0	0.0	0.0				
Red	1.0	1.0	1.0	1.0	0.0	0.0				

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	7	4	3	8	5	2		6
Case Number	1.1	4.0	1.1	4.0	1.0	3.0		6.3
Phase Duration, s	12.0	23.5	12.0	23.5	24.0	64.0		40.0
Change Period, *(Y+Rc)*, s	5.0	5.0	5.0	5.0	5.0	5.0		5.0
Max Allow Headway *(MAH)*, s	3.1	3.1	3.1	3.1	3.1	3.2		3.2
Queue Clearance Time *(g_s)*, s	6.9	20.5	9.0	20.5	21.0	61.0		37.0
Green Extension Time *(g_e)*, s	0.0	0.0	0.0	0.0	0.0	0.0		0.0
Phase Call Probability	1.00	1.00	1.00	1.00	1.00	1.00		1.00
Max Out Probability	1.00	1.00	1.00	1.00	1.00	1.00		1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	112	395		191	363		428	1464	304	75	792	
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1792	1769		1792	1812		1792	1881	1610	364	1838	
Queue Service Time *(g_s)*, s	4.9	18.5		7.0	18.5		19.0	59.0	7.8	0.0	35.0	
Cycle Queue Clearance Time *(g_c)*, s	4.9	18.5		7.0	18.5		19.0	59.0	7.8	35.0	35.0	
Capacity *(c)*, veh/h	219	329		218	337		414	1115	1068	72	647	
Volume-to-Capacity Ratio *(X)*	0.511	1.200		0.876	1.078		1.033	1.313	0.285	1.036	1.226	
Available Capacity *(c_a)*, veh/h	219	329		218	337		414	1115	1068	72	647	
Back of Queue *(Q)*, veh/ln (50th percentile)	2.1	18.4		3.0	14.7		15.9	68.0	2.3	4.1	35.4	
Overflow Queue *(Q_3)*, veh/ln	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Queue Storage Ratio *(RQ)* (50th percentile)	0.00	0.00		0.00	0.00		0.00	0.00	0.00	0.00	0.00	
Uniform Delay *(d_1)*, s/veh	30.9	40.5		35.2	40.5		31.0	20.3	7.0	49.7	32.3	
Incremental Delay *(d_2)*, s/veh	0.9	115.4		29.4	71.3		53.0	147.1	0.1	116.0	114.9	
Initial Queue Delay *(d_3)*, s/veh	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Control Delay *(d)*, s/veh	31.8	155.9		64.6	111.8		84.0	167.4	7.0	165.8	147.1	
Level of Service (LOS)	C	F		E	F		F	F	A	F	F	
Approach Delay, s/veh / LOS	128.5	F		95.5	F		128.9	F		148.7	F	
Intersection Delay, s/veh / LOS	128.5						F					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.5	B	2.3	B	2.2	B	2.3	B
Bicycle LOS Score / LOS	1.3	A	1.4	A	4.1	D	1.9	A

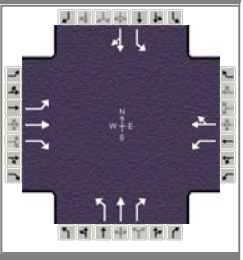
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SR 747 & Princeton Rd

2012

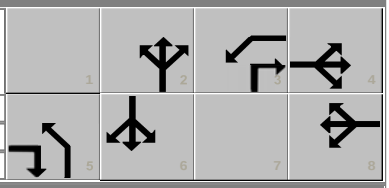
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	0.99
Analyst		Analysis Date	11/27/2012	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	SR 747 and Princeton Roa	Analysis Year	2012	Analysis Period	1> 7:00
File Name	Existing 2012 AM- SR 747 and Princeton.xus				
Project Description	2012 AM Existing Conditions				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	30	153	358	209	65	30	82	290	100	74	850	20

Signal Information					EB			WB			NB			SB		
Cycle, s	119.8	Reference Phase	2													
Offset, s	0	Reference Point	End	Green	4.8	62.0		7.0	26.0	0.0	0.0					
Uncoordinated	Yes	Simult. Gap E/W	On	Yellow	4.0	4.0		4.0	4.0	0.0	0.0					
Force Mode	Fixed	Simult. Gap N/S	On	Red	1.0	1.0		1.0	1.0	0.0	0.0					



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4	3	8	5	2		6
Case Number		5.3	1.0	4.0	1.0	3.0		6.3
Phase Duration, s		31.0	12.0	43.0	9.8	76.8		67.0
Change Period, *(Y+Rc)*, s		5.0	5.0	5.0	5.0	5.0		5.0
Max Allow Headway *(MAH)*, s		3.1	2.9	3.1	2.9	2.9		2.9
Queue Clearance Time *(g_s)*, s		28.0	9.0	7.1	4.7	11.8		62.3
Green Extension Time *(g_e)*, s		0.0	0.0	1.3	0.0	3.2		0.0
Phase Call Probability		1.00	1.00	1.00	0.95	1.00		1.00
Max Out Probability		1.00	1.00	0.00	0.03	0.00		1.00

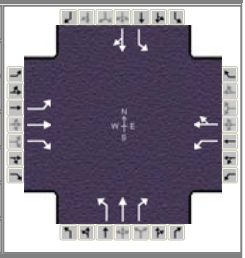
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	33	170	398	232	106		91	322	111	82	967	
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1309	1900	1610	1810	1798		1810	1900	1610	970	1892	
Queue Service Time *(g_s)*, s	2.5	9.2	26.0	7.0	5.1		2.7	9.8	3.0	5.4	60.3	
Cycle Queue Clearance Time *(g_c)*, s	2.5	9.2	26.0	7.0	5.1		2.7	9.8	3.0	5.4	60.3	
Capacity *(c)*, veh/h	344	412	414	286	570		140	1138	1059	562	980	
Volume-to-Capacity Ratio *(X)*	0.097	0.412	0.962	0.812	0.185		0.650	0.283	0.105	0.146	0.987	
Available Capacity *(c_a)*, veh/h	344	412	414	286	570		219	1138	1059	562	980	
Back of Queue *(Q)*, veh/ln (95th percentile)	1.4	7.5	24.2	7.8	3.8		2.4	6.5	1.6	2.0	46.1	
Overflow Queue *(Q_3)*, veh/ln	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Queue Storage Ratio *(RQ)* (95th percentile)	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	
Uniform Delay *(d_1)*, s/veh	37.7	40.3	43.9	41.2	29.6		28.5	11.6	7.5	15.2	28.5	
Incremental Delay *(d_2)*, s/veh	0.0	0.2	56.0	16.9	0.1		1.9	0.1	0.0	0.0	45.6	
Initial Queue Delay *(d_3)*, s/veh	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Control Delay *(d)*, s/veh	37.7	40.6	99.9	58.1	29.7		30.4	11.6	7.6	15.3	74.1	
Level of Service (LOS)	D	D	F	E	C		C	B	A	B	E	
Approach Delay, s/veh / LOS	79.7	E		49.2	D		14.0	B		69.5	E	
Intersection Delay, s/veh / LOS	57.6						E					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.5	B	2.3	B	2.2	B	2.4	B
Bicycle LOS Score / LOS	1.5	A	1.0	A	1.4	A	2.2	B

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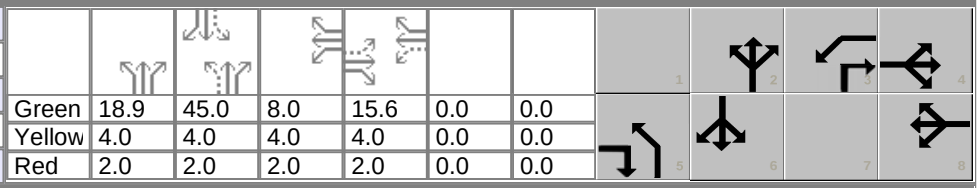
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	0.99
Analyst		Analysis Date	11/27/2012	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	SR 747 and Princeton	Analysis Year	2012	Analysis Period	1> 7:00
File Name	Existing 2012 PM- SR 747 and Princeton.xus				
Project Description	2012 PM Existing cond				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	50	181	206	128	223	85	408	1005	224	62	491	40

Signal Information			
Cycle, s	111.5	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	18.9	45.0	8.0	15.6	0.0	0.0
Yellow	4.0	4.0	4.0	4.0	0.0	0.0
Red	2.0	2.0	2.0	2.0	0.0	0.0

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4	3	8	5	2		6
Case Number		5.3	1.0	4.0	1.0	3.0		6.3
Phase Duration, s		21.6	14.0	35.6	24.9	75.9		51.0
Change Period, *(Y+Rc)*, s		6.0	6.0	6.0	6.0	6.0		6.0
Max Allow Headway *(MAH)*, s		3.0	2.9	3.0	2.9	3.1		3.1
Queue Clearance Time (g_s), s		14.8	9.3	21.1	18.7	61.3		47.0
Green Extension Time (g_e), s		0.8	0.0	1.3	0.1	2.1		0.0
Phase Call Probability		1.00	0.99	1.00	1.00	1.00		1.00
Max Out Probability		0.59	1.00	0.05	1.00	0.92		1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	56	201	229	142	342		453	1117	249	69	590	
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1055	1900	1610	1810	1810		1810	1900	1610	404	1875	
Queue Service Time (g_s), s	5.6	11.4	12.8	7.3	19.1		16.7	59.3	6.1	10.7	30.6	
Cycle Queue Clearance Time (g_c), s	10.8	11.4	12.8	7.3	19.1		16.7	59.3	6.1	45.0	30.6	
Capacity *(c)*, veh/h	163	265	499	231	480		480	1192	1125	103	756	
Volume-to-Capacity Ratio *(X)*	0.340	0.758	0.459	0.616	0.713		0.944	0.937	0.221	0.666	0.780	
Available Capacity (c_a), veh/h	196	324	548	231	503		497	1192	1125	103	756	
Back of Queue *(Q)*, veh/ln (95th percentile)	2.6	9.4	8.2	5.9	13.2		16.6	34.5	2.8	4.0	19.5	
Overflow Queue (Q_3), veh/ln	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Queue Storage Ratio *(RQ)* (95th percentile)	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	
Uniform Delay (d_1), s/veh	48.4	46.2	31.0	36.9	37.1		23.1	18.8	6.0	52.7	29.0	
Incremental Delay (d_2), s/veh	0.5	6.3	0.2	3.6	3.8		38.2	17.2	0.0	13.1	5.0	
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Control Delay *(d)*, s/veh	48.8	52.5	31.2	40.5	40.9		61.3	36.0	6.0	65.8	33.9	
Level of Service (LOS)	D	D	C	D	D		E	D	A	E	C	
Approach Delay, s/veh / LOS	42.1	D		40.8	D		38.2	D		37.3	D	
Intersection Delay, s/veh / LOS	38.9						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.5	B	2.3	B	2.2	B	2.4	B
Bicycle LOS Score / LOS	1.3	A	1.3	A	3.5	C	1.6	A

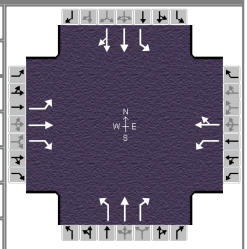
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2032

AM Peak

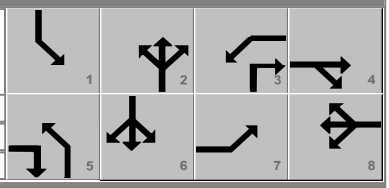
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	0.25
Analyst		Analysis Date	3/29/2013	Area Type	Other
Jurisdiction		Time Period		PHF	0.92
Intersection		Analysis Year	2013	Analysis Period	1> 7:00
File Name	NoBuildAMPrinceton&747.xus				
Project Description	No-Build 2032 AM				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	30	184	440	418	71	41	253	505	100	129	1381	20

Signal Information					EB			WB			NB			SB		
Cycle, s	100.0	Reference Phase	2													
Offset, s	0	Reference Point	End	Green	10.0	35.0		20.0	15.0	0.0	0.0					
Uncoordinated	Yes	Simult. Gap E/W	On	Yellow	4.0	4.0		4.0	4.0	0.0	0.0					
Force Mode	Fixed	Simult. Gap N/S	On	Red	1.0	1.0		1.0	1.0	0.0	0.0					



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	7	4	3	8	5	2	1	6
Case Number	2.0	3.0	1.1	4.0	1.1	3.0	1.1	4.0
Phase Duration, s	25.0	20.0	25.0	20.0	15.0	40.0	15.0	40.0
Change Period, *(Y+Rc)*, s	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Max Allow Headway *(MAH)*, s	3.1	3.3	3.1	3.3	3.1	3.0	3.1	3.0
Queue Clearance Time *(g_s)*, s	3.5	17.0	22.0	8.3	12.0	29.5	6.8	37.0
Green Extension Time *(g_e)*, s	0.0	0.0	0.0	1.2	0.0	2.8	0.1	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Max Out Probability	0.00	1.00	1.00	0.26	1.00	0.75	0.88	1.00

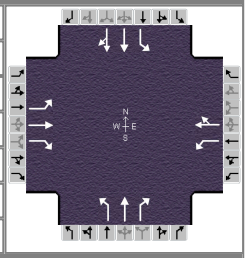
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	33	200	478	454	122		275	549	109	140	763	760
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1792	1881	1594	1792	1765		1757	1845	1563	1757	1845	1835
Queue Service Time *(g_s)*, s	1.5	10.1	15.0	20.0	6.3		10.0	27.5	3.4	4.8	35.0	35.0
Cycle Queue Clearance Time *(g_c)*, s	1.5	10.1	15.0	20.0	6.3		10.0	27.5	3.4	4.8	35.0	35.0
Capacity *(c)*, veh/h	358	282	399	488	265		254	646	860	311	646	642
Volume-to-Capacity Ratio *(X)*	0.091	0.709	1.200	0.930	0.460		1.081	0.850	0.126	0.451	1.181	1.183
Available Capacity *(c_a)*, veh/h	358	282	399	488	265		254	646	860	311	646	642
Back of Queue *(Q)*, veh/ln (50th percentile)	0.6	5.1	21.8	12.4	2.7		9.2	13.5	1.1	1.9	32.2	32.2
Overflow Queue *(Q_3)*, veh/ln	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Queue Storage Ratio *(RQ)* (50th percentile)	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00
Uniform Delay *(d_1)*, s/veh	32.6	40.4	37.5	30.0	38.8		26.4	30.1	10.9	21.0	32.5	32.5
Incremental Delay *(d_2)*, s/veh	0.0	6.8	111.8	24.2	0.5		79.6	10.0	0.0	0.4	96.9	97.8
Initial Queue Delay *(d_3)*, s/veh	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Control Delay *(d)*, s/veh	32.6	47.3	149.3	54.2	39.3		106.0	40.1	10.9	21.4	129.4	130.3
Level of Service (LOS)	C	D	F	D	D		F	D	B	C	F	F
Approach Delay, s/veh / LOS	115.2	F		51.0	D		56.1	E		120.7	F	
Intersection Delay, s/veh / LOS	93.8						F					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.9	C	2.5	B	2.3	B	2.4	B
Bicycle LOS Score / LOS	1.7	A	1.4	A	2.0	B	1.9	A

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HCS 2010 Signalized Intersection Results Summary

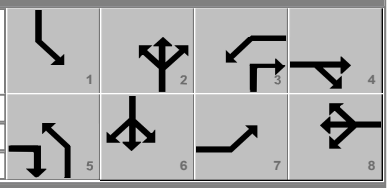
General Information				Intersection Information	
Agency				Duration, h	0.25
Analyst		Analysis Date	3/29/2013	Area Type	Other
Jurisdiction		Time Period		PHF	0.92
Intersection		Analysis Year	2013	Analysis Period	1> 7:00
File Name	BuildAMPrinceton&747.xus				
Project Description	Build 2032 AM				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	55	186	440	436	75	46	223	540	109	134	1499	59

Signal Information			
Cycle, s	100.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	10.0	42.0	14.0	14.0	0.0	0.0	
Yellow	4.0	4.0	4.0	4.0	0.0	0.0	
Red	1.0	1.0	1.0	1.0	0.0	0.0	



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	7	4	3	8	5	2	1	6
Case Number	2.0	3.0	1.1	4.0	1.1	3.0	1.1	4.0
Phase Duration, s	19.0	19.0	19.0	19.0	15.0	47.0	15.0	47.0
Change Period, *(Y+Rc)*, s	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Max Allow Headway *(MAH)*, s	3.1	3.3	3.1	3.3	3.1	3.1	3.1	3.1
Queue Clearance Time *(g_s)*, s	5.0	16.0	16.0	8.9	11.3	29.1	6.3	44.0
Green Extension Time *(g_e)*, s	0.0	0.0	0.0	1.1	0.0	5.2	0.1	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Max Out Probability	0.00	1.00	1.00	0.50	1.00	0.39	0.54	1.00

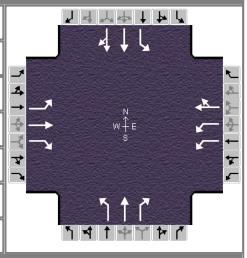
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	60	202	478	474	132		242	587	118	146	849	844
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1792	1881	1594	1792	1761		1757	1845	1563	1757	1845	1820
Queue Service Time *(g_s)*, s	3.0	10.4	14.0	14.0	6.9		9.3	27.1	3.6	4.3	42.0	42.0
Cycle Queue Clearance Time *(g_c)*, s	3.0	10.4	14.0	14.0	6.9		9.3	27.1	3.6	4.3	42.0	42.0
Capacity *(c)*, veh/h	251	263	383	366	247		253	775	875	370	775	764
Volume-to-Capacity Ratio *(X)*	0.238	0.768	1.250	1.295	0.534		0.957	0.758	0.135	0.394	1.096	1.104
Available Capacity *(c_a)*, veh/h	251	263	383	366	247		253	775	875	370	775	764
Back of Queue *(Q)*, veh/ln (50th percentile)	1.3	5.6	23.1	17.5	3.0		6.0	12.0	1.2	1.6	30.7	30.9
Overflow Queue *(Q_3)*, veh/ln	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Queue Storage Ratio *(RQ)* (50th percentile)	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00
Uniform Delay *(d_1)*, s/veh	38.3	41.4	38.0	35.4	40.0		27.8	24.7	10.5	17.0	29.0	29.0
Incremental Delay *(d_2)*, s/veh	0.2	11.6	132.5	151.5	1.2		44.2	3.9	0.0	0.3	61.9	65.0
Initial Queue Delay *(d_3)*, s/veh	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Control Delay *(d)*, s/veh	38.4	53.1	170.5	186.9	41.1		71.9	28.6	10.5	17.3	90.9	94.0
Level of Service (LOS)	D	D	F	F	D		E	C	B	B	F	F
Approach Delay, s/veh / LOS	127.7	F		155.2	F		37.4	D		86.5	F	
Intersection Delay, s/veh / LOS	92.7						F					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.9	C	2.5	B	2.3	B	2.4	B
Bicycle LOS Score / LOS	1.7	A	1.5	A	2.1	B	2.0	B

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HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	0.25
Analyst		Analysis Date	3/29/2013	Area Type	Other
Jurisdiction		Time Period		PHF	0.92
Intersection		Analysis Year	2013	Analysis Period	1> 7:00
File Name	BuildAMPrinceton&747.xus				
Project Description	Build 2032 AM - Imp				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	55	186	440	436	75	46	223	540	109	134	1499	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

							1	2	3	4
Green	9.0	51.0	16.0	24.0	0.0	0.0	5	6	7	8
Yellow	4.0	4.0	4.0	4.0	0.0	0.0				
Red	1.0	1.0	1.0	1.0	0.0	0.0				

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4	3	8	5	2	1	6
Case Number		5.3	2.0	4.0	1.1	3.0	1.1	4.0
Phase Duration, s		29.0	21.0	50.0	14.0	56.0	14.0	56.0
Change Period, $(Y+R_c)$, s		5.0	5.0	5.0	5.0	5.0	5.0	5.0
Max Allow Headway *(MAH)*, s		3.3	3.1	3.3	3.1	3.1	3.1	3.1
Queue Clearance Time (g_s), s		26.0	18.0	8.1	11.0	34.2	7.4	53.0
Green Extension Time (g_e), s		0.0	0.0	1.3	0.0	5.8	0.0	0.0
Phase Call Probability		1.00	1.00	1.00	1.00	1.00	1.00	1.00
Max Out Probability		1.00	1.00	0.38	1.00	0.27	1.00	1.00

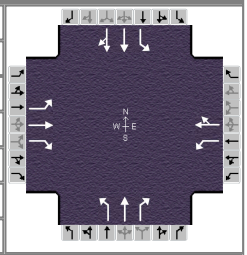
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	60	202	478	474	132		242	587	118	146	849	844
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1266	1881	1594	1740	1761		1757	1845	1563	1757	1845	1820
Queue Service Time (g_s), s	4.8	11.6	24.0	16.0	6.1		9.0	32.2	4.3	5.4	51.0	51.0
Cycle Queue Clearance Time (g_c), s	4.8	11.6	24.0	16.0	6.1		9.0	32.2	4.3	5.4	51.0	51.0
Capacity *(c)*, veh/h	313	376	438	464	660		197	784	873	320	784	773
Volume-to-Capacity Ratio *(X)*	0.191	0.537	1.091	1.022	0.199		1.233	0.749	0.136	0.455	1.083	1.091
Available Capacity (c_a), veh/h	313	376	438	464	660		197	784	873	320	784	773
Back of Queue *(Q)*, veh/ln (50th percentile)	1.5	5.4	21.2	9.9	2.5		10.7	14.6	1.5	2.2	34.3	34.5
Overflow Queue (Q_3), veh/ln	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Queue Storage Ratio *(RQ)* (50th percentile)	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00
Uniform Delay (d_1), s/veh	40.3	43.0	43.5	52.0	25.3		34.2	29.1	12.7	21.6	34.5	34.5
Incremental Delay (d_2), s/veh	0.1	0.8	69.8	47.4	0.1		141.0	3.6	0.0	0.4	57.1	60.2
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Control Delay *(d)*, s/veh	40.4	43.8	113.3	99.4	25.4		175.3	32.7	12.7	22.0	91.6	94.7
Level of Service (LOS)	D	D	F	F	C		F	C	B	C	F	F
Approach Delay, s/veh / LOS	88.4	F		83.3	F		66.6	E		87.5	F	
Intersection Delay, s/veh / LOS	82.3						F					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.9	C	2.4	B	2.4	B	2.4	B
Bicycle LOS Score / LOS	1.7	A	1.5	A	2.1	B	2.0	B

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HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	0.25
Analyst		Analysis Date	3/29/2013	Area Type	Other
Jurisdiction		Time Period		PHF	0.92
Intersection		Analysis Year	2013	Analysis Period	1> 7:00
File Name	BuildAMPrinceton&747.xus				
Project Description	Build 2032 AM (Full)				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	55	186	440	436	75	69	223	651	109	146	1539	46

Signal Information			
Cycle, s	100.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

							1	2	3	4
Green	10.0	42.0	14.0	14.0	0.0	0.0	5	6	7	8
Yellow	4.0	4.0	4.0	4.0	0.0	0.0				
Red	1.0	1.0	1.0	1.0	0.0	0.0				

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	7	4	3	8	5	2	1	6
Case Number	2.0	3.0	1.1	4.0	1.1	3.0	1.1	4.0
Phase Duration, s	19.0	19.0	19.0	19.0	15.0	47.0	15.0	47.0
Change Period, *(Y+Rc)*, s	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Max Allow Headway *(MAH)*, s	3.1	3.3	3.1	3.3	3.1	3.0	3.1	3.0
Queue Clearance Time *(g_s)*, s	5.0	16.0	16.0	10.5	11.3	38.1	6.8	44.0
Green Extension Time *(g_e)*, s	0.0	0.0	0.0	0.8	0.0	2.6	0.1	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Max Out Probability	0.00	1.00	1.00	0.93	1.00	0.93	0.88	1.00

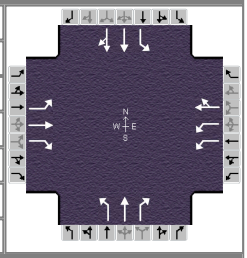
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	60	202	478	474	157		242	708	118	159	863	860
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1792	1881	1594	1792	1732		1757	1845	1563	1757	1845	1826
Queue Service Time *(g_s)*, s	3.0	10.4	14.0	14.0	8.5		9.3	36.1	3.6	4.8	42.0	42.0
Cycle Queue Clearance Time *(g_c)*, s	3.0	10.4	14.0	14.0	8.5		9.3	36.1	3.6	4.8	42.0	42.0
Capacity *(c)*, veh/h	251	263	383	366	242		253	775	875	291	775	767
Volume-to-Capacity Ratio *(X)*	0.238	0.768	1.250	1.295	0.646		0.957	0.913	0.135	0.546	1.114	1.121
Available Capacity *(c_a)*, veh/h	251	263	383	366	242		253	775	875	291	775	767
Back of Queue *(Q)*, veh/ln (50th percentile)	1.3	5.6	23.1	17.5	3.9		6.0	18.1	1.2	1.9	32.1	32.3
Overflow Queue *(Q_3)*, veh/ln	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Queue Storage Ratio *(RQ)* (50th percentile)	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00
Uniform Delay *(d_1)*, s/veh	38.3	41.4	38.0	35.4	40.7		27.8	27.3	10.5	20.7	29.0	29.0
Incremental Delay *(d_2)*, s/veh	0.2	11.6	132.5	151.5	4.6		44.3	14.9	0.0	1.2	68.4	71.1
Initial Queue Delay *(d_3)*, s/veh	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Control Delay *(d)*, s/veh	38.4	53.1	170.5	186.9	45.2		72.1	42.2	10.5	21.9	97.4	100.1
Level of Service (LOS)	D	D	F	F	D		E	D	B	C	F	F
Approach Delay, s/veh / LOS	127.7	F		151.7	F		45.5	D		92.3	F	
Intersection Delay, s/veh / LOS	95.5						F					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.9	C	2.5	B	2.3	B	2.4	B
Bicycle LOS Score / LOS	1.7	A	1.5	A	2.3	B	2.0	B

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HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	0.25
Analyst		Analysis Date	3/29/2013	Area Type	Other
Jurisdiction		Time Period		PHF	0.92
Intersection		Analysis Year	2013	Analysis Period	1> 7:00
File Name	BuildAMPrinceton&747.xus				
Project Description	Build 2032 AM (Full) - Imp				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	55	186	440	436	75	69	223	651	109	146	1539	46

Signal Information			
Cycle, s	100.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

							1	2	3	4
Green	10.0	41.0	13.0	16.0	0.0	0.0	5	6	7	8
Yellow	4.0	4.0	4.0	4.0	0.0	0.0				
Red	1.0	1.0	1.0	1.0	0.0	0.0				

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4	3	8	5	2	1	6
Case Number		5.3	2.0	4.0	1.1	3.0	1.1	4.0
Phase Duration, s		21.0	18.0	39.0	15.0	46.0	15.0	46.0
Change Period, *(Y+Rc)*, s		5.0	5.0	5.0	5.0	5.0	5.0	5.0
Max Allow Headway *(MAH)*, s		3.3	3.1	3.3	3.1	3.0	3.1	3.0
Queue Clearance Time *(g_s)*, s		18.0	15.0	8.6	11.3	38.7	6.9	43.0
Green Extension Time *(g_e)*, s		0.0	0.0	1.5	0.0	1.6	0.1	0.0
Phase Call Probability		1.00	1.00	1.00	1.00	1.00	1.00	1.00
Max Out Probability		1.00	1.00	0.23	1.00	1.00	0.99	1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	60	202	478	474	157		242	708	118	159	863	860
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1237	1881	1594	1740	1732		1757	1845	1563	1757	1845	1826
Queue Service Time *(g_s)*, s	4.3	10.1	16.0	13.0	6.6		9.3	36.7	3.8	4.9	41.0	41.0
Cycle Queue Clearance Time *(g_c)*, s	4.3	10.1	16.0	13.0	6.6		9.3	36.7	3.8	4.9	41.0	41.0
Capacity *(c)*, veh/h	270	301	414	452	589		253	756	844	279	756	748
Volume-to-Capacity Ratio *(X)*	0.222	0.672	1.154	1.048	0.266		0.957	0.936	0.140	0.569	1.141	1.148
Available Capacity *(c_a)*, veh/h	270	301	414	452	589		253	756	844	279	756	748
Back of Queue *(Q)*, veh/ln (50th percentile)	1.3	5.0	20.5	9.0	2.6		6.1	19.1	1.2	2.0	33.6	33.9
Overflow Queue *(Q_3)*, veh/ln	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Queue Storage Ratio *(RQ)* (50th percentile)	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00
Uniform Delay *(d_1)*, s/veh	37.1	39.5	37.0	43.5	23.9		27.5	28.2	11.4	21.2	29.5	29.5
Incremental Delay *(d_2)*, s/veh	0.2	4.7	93.4	55.4	0.1		44.3	18.6	0.0	1.7	79.1	82.0
Initial Queue Delay *(d_3)*, s/veh	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Control Delay *(d)*, s/veh	37.2	44.2	130.4	98.9	24.0		71.8	46.8	11.5	22.9	108.6	111.5
Level of Service (LOS)	D	D	F	F	C		E	D	B	C	F	F
Approach Delay, s/veh / LOS	99.3	F		80.3	F		48.6	D		102.7	F	
Intersection Delay, s/veh / LOS	85.5						F					

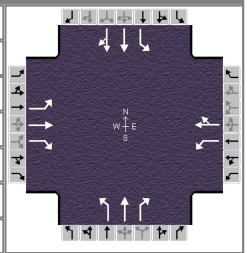
Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.8	C	2.4	B	2.4	B	2.4	B
Bicycle LOS Score / LOS	1.7	A	1.5	A	2.3	B	2.0	B

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PM Peak

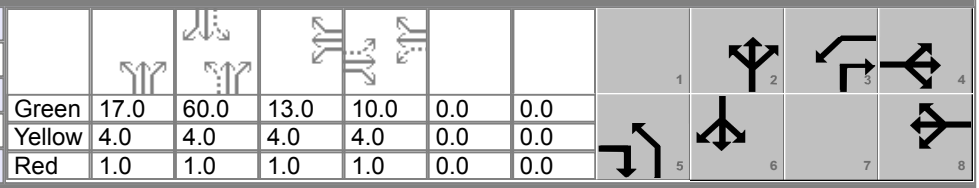
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	0.25
Analyst		Analysis Date	3/29/2013	Area Type	Other
Jurisdiction		Time Period		PHF	0.92
Intersection	SR 747 & Princeton	Analysis Year	2013	Analysis Period	1> 16:00
File Name	NoBuildPMPrinceton&747.xus				
Project Description	2032 Build - Imp				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	50	191	268	337	253	138	490	1700	493	83	710	40

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	17.0	60.0	13.0	10.0	0.0	0.0
Yellow	4.0	4.0	4.0	4.0	0.0	0.0
Red	1.0	1.0	1.0	1.0	0.0	0.0

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4	3	8	5	2		6
Case Number		5.3	1.0	4.0	1.0	3.0		6.3
Phase Duration, s		15.0	18.0	33.0	22.0	87.0		65.0
Change Period, *(Y+Rc)*, s		5.0	5.0	5.0	5.0	5.0		5.0
Max Allow Headway *(MAH)*, s		3.2	3.1	3.2	3.1	3.2		3.2
Queue Clearance Time *(g_s)*, s		12.0	15.0	30.0	19.0	84.0		62.0
Green Extension Time *(g_e)*, s		0.0	0.0	0.0	0.0	0.0		0.0
Phase Call Probability		1.00	1.00	1.00	1.00	1.00		1.00
Max Out Probability		1.00	1.00	1.00	1.00	1.00		1.00

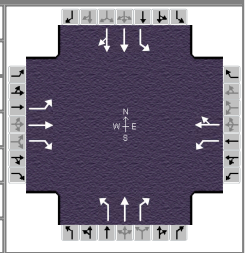
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	54	208	291	366	425		533	1848	536	90	411	404
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	968	1881	1594	1792	1769		1757	1845	1563	246	1845	1810
Queue Service Time *(g_s)*, s	0.0	10.0	10.0	13.0	28.0		17.0	82.0	13.0	0.0	17.2	17.2
Cycle Queue Clearance Time *(g_c)*, s	10.0	10.0	10.0	13.0	28.0		17.0	82.0	13.0	60.0	17.2	17.2
Capacity *(c)*, veh/h	60	157	359	254	413		544	1260	1238	60	922	905
Volume-to-Capacity Ratio *(X)*	0.905	1.324	0.812	1.442	1.030		0.978	1.466	0.433	1.503	0.446	0.446
Available Capacity *(c_a)*, veh/h	60	157	359	254	413		544	1260	1238	60	922	905
Back of Queue *(Q)*, veh/ln (50th percentile)	3.0	12.7	9.3	16.7	18.1		12.6	104.7	3.1	6.7	7.2	7.1
Overflow Queue *(Q_3)*, veh/ln	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Queue Storage Ratio *(RQ)* (50th percentile)	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00
Uniform Delay *(d_1)*, s/veh	60.0	55.0	44.1	45.9	46.0		17.6	19.0	4.0	60.0	19.3	19.3
Incremental Delay *(d_2)*, s/veh	81.2	183.3	12.4	219.7	52.1		32.9	214.1	0.1	295.1	0.1	0.1
Initial Queue Delay *(d_3)*, s/veh	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Control Delay *(d)*, s/veh	141.2	238.3	56.5	265.5	98.1		50.5	233.1	4.1	355.1	19.4	19.4
Level of Service (LOS)	F	F	E	F	F		D	F	A	F	B	B
Approach Delay, s/veh / LOS	133.0	F		175.6	F		157.6	F		52.9	D	
Intersection Delay, s/veh / LOS	139.4						F					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.9	C	2.5	B	2.2	B	2.4	B
Bicycle LOS Score / LOS	1.4	A	1.8	A	5.3	F	1.2	A

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HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	0.25
Analyst		Analysis Date	3/29/2013	Area Type	Other
Jurisdiction		Time Period		PHF	0.92
Intersection	SR 747 & Princeton	Analysis Year	2013	Analysis Period	1> 16:00
File Name	BuildPMPrinceton&747.xus				
Project Description	2032 Build				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	68	197	268	348	255	144	490	1813	522	89	784	52

Signal Information			
Cycle, s	121.0	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	12.0	56.0	13.0	20.0	0.0	0.0	5	6	7	8		
Yellow	4.0	4.0	4.0	4.0	0.0	0.0						
Red	1.0	1.0	1.0	1.0	0.0	0.0						

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	7	4	3	8	5	2		6
Case Number	1.1	3.0	1.1	4.0	1.0	3.0		6.3
Phase Duration, s	18.0	25.0	18.0	25.0	17.0	78.0		61.0
Change Period, *(Y+Rc)*, s	5.0	5.0	5.0	5.0	5.0	5.0		5.0
Max Allow Headway *(MAH)*, s	3.1	3.2	3.1	3.2	3.1	3.2		3.2
Queue Clearance Time *(g_s)*, s	5.8	21.9	15.0	22.0	14.0	75.0		58.0
Green Extension Time *(g_e)*, s	0.0	0.0	0.0	0.0	0.0	0.0		0.0
Phase Call Probability	1.00	1.00	1.00	1.00	1.00	1.00		1.00
Max Out Probability	0.00	1.00	1.00	1.00	1.00	1.00		1.00

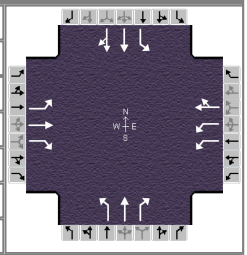
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	74	214	291	378	434		533	1971	567	97	459	449
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1792	1881	1594	1792	1766		1757	1845	1563	219	1845	1804
Queue Service Time *(g_s)*, s	3.8	13.0	19.9	13.0	20.0		12.0	73.0	19.9	0.0	21.6	21.6
Cycle Queue Clearance Time *(g_c)*, s	3.8	13.0	19.9	13.0	20.0		12.0	73.0	19.9	56.0	21.6	21.6
Capacity *(c)*, veh/h	268	311	422	320	292		406	1113	1111	60	854	835
Volume-to-Capacity Ratio *(X)*	0.276	0.689	0.691	1.181	1.485		1.312	1.771	0.511	1.625	0.538	0.538
Available Capacity *(c_a)*, veh/h	268	311	422	320	292		406	1113	1111	60	854	835
Back of Queue *(Q)*, veh/ln (50th percentile)	1.7	6.5	8.2	13.0	27.8		24.2	137.1	5.9	7.5	9.2	9.0
Overflow Queue *(Q_3)*, veh/ln	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Queue Storage Ratio *(RQ)* (50th percentile)	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00
Uniform Delay *(d_1)*, s/veh	34.8	47.6	40.0	43.8	50.5		25.7	24.0	7.9	60.5	23.2	23.2
Incremental Delay *(d_2)*, s/veh	0.2	5.3	4.0	109.1	235.9		157.0	350.5	0.2	345.4	0.4	0.4
Initial Queue Delay *(d_3)*, s/veh	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Control Delay *(d)*, s/veh	35.0	52.8	44.1	152.9	286.4		182.7	374.5	8.1	405.9	23.6	23.6
Level of Service (LOS)	D	D	D	F	F		F	F	A	F	C	C
Approach Delay, s/veh / LOS	46.1	D		224.2	F		273.5	F		60.4	E	
Intersection Delay, s/veh / LOS	202.9						F					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.9	C	2.5	B	2.2	B	2.4	B
Bicycle LOS Score / LOS	1.4	A	1.8	A	5.6	F	1.3	A

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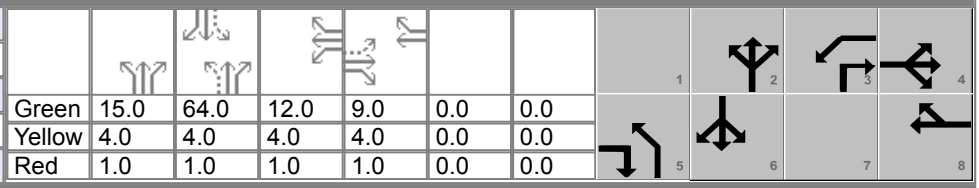
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	0.25
Analyst		Analysis Date	3/29/2013	Area Type	Other
Jurisdiction		Time Period		PHF	0.92
Intersection	SR 747 & Princeton	Analysis Year	2013	Analysis Period	1> 16:00
File Name	BuildPMPrinceton&747.xus				
Project Description	2032 Build - Imp				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	68	197	268	348	255	144	490	1813	522	89	784	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	15.0	64.0	12.0	9.0	0.0	0.0
Yellow	4.0	4.0	4.0	4.0	0.0	0.0
Red	1.0	1.0	1.0	1.0	0.0	0.0

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4	3	8	5	2		6
Case Number		5.3	2.0	4.0	1.0	3.0		6.3
Phase Duration, s		14.0	17.0	31.0	20.0	89.0		69.0
Change Period, *(Y+Rc)*, s		5.0	5.0	5.0	5.0	5.0		5.0
Max Allow Headway *(MAH)*, s		3.3	3.1	3.3	3.1	3.2		3.2
Queue Clearance Time *(g_s)*, s		11.0	14.0	28.0	17.0	86.0		66.0
Green Extension Time *(g_e)*, s		0.0	0.0	0.0	0.0	0.0		0.0
Phase Call Probability		1.00	1.00	1.00	1.00	1.00		1.00
Max Out Probability		1.00	1.00	1.00	1.00	1.00		1.00

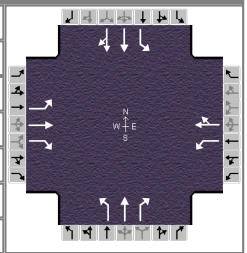
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	74	214	291	378	434		533	1971	567	97	459	449
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	960	1881	1594	1740	1766		1757	1845	1563	219	1845	1804
Queue Service Time *(g_s)*, s	0.0	9.0	9.0	12.0	26.0		15.0	84.0	13.7	0.0	18.6	18.6
Cycle Queue Clearance Time *(g_c)*, s	9.0	9.0	9.0	12.0	26.0		15.0	84.0	13.7	64.0	18.6	18.6
Capacity *(c)*, veh/h	60	141	319	348	383		509	1291	1251	60	984	962
Volume-to-Capacity Ratio *(X)*	1.231	1.518	0.914	1.087	1.133		1.047	1.526	0.454	1.612	0.467	0.467
Available Capacity *(c_a)*, veh/h	60	141	319	348	383		509	1291	1251	60	984	962
Back of Queue *(Q)*, veh/ln (50th percentile)	5.0	14.6	10.9	8.8	20.5		15.5	116.1	3.2	7.5	7.6	7.5
Overflow Queue *(Q_3)*, veh/ln	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Queue Storage Ratio *(RQ)* (50th percentile)	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00
Uniform Delay *(d_1)*, s/veh	60.0	55.5	47.0	54.0	47.0		18.0	18.0	3.8	60.0	17.4	17.4
Incremental Delay *(d_2)*, s/veh	191.1	265.7	28.8	73.6	87.4		52.7	240.7	0.1	339.6	0.1	0.1
Initial Queue Delay *(d_3)*, s/veh	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Control Delay *(d)*, s/veh	251.1	321.2	75.8	127.6	134.4		70.7	258.7	3.9	399.6	17.5	17.5
Level of Service (LOS)	F	F	E	F	F		F	F	A	F	B	B
Approach Delay, s/veh / LOS	188.9	F		131.2	F		179.0	F		54.3	D	
Intersection Delay, s/veh / LOS	150.0						F					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.9	C	2.5	B	2.4	B	2.4	B
Bicycle LOS Score / LOS	1.4	A	1.8	A	5.6	F	1.3	A

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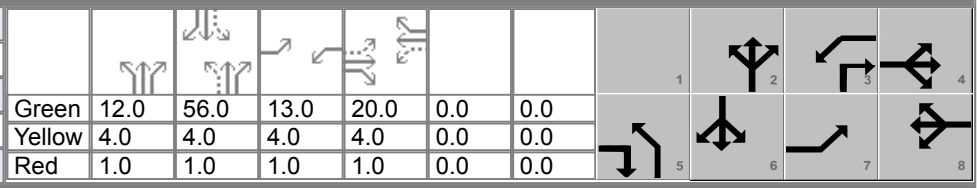
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	0.25
Analyst		Analysis Date	3/29/2013	Area Type	Other
Jurisdiction		Time Period		PHF	0.92
Intersection	SR 747 & Princeton	Analysis Year	2013	Analysis Period	1> 16:00
File Name	BuildPMPrinceton&747.xus				
Project Description	2032 Build				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	75	197	268	348	255	150	490	1856	522	93	891	70

Signal Information			
Cycle, s	121.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	12.0	56.0	13.0	20.0	0.0	0.0
Yellow	4.0	4.0	4.0	4.0	0.0	0.0
Red	1.0	1.0	1.0	1.0	0.0	0.0

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	7	4	3	8	5	2		6
Case Number	1.1	3.0	1.1	4.0	1.0	3.0		6.3
Phase Duration, s	18.0	25.0	18.0	25.0	17.0	78.0		61.0
Change Period, *(Y+Rc)*, s	5.0	5.0	5.0	5.0	5.0	5.0		5.0
Max Allow Headway *(MAH)*, s	3.1	3.2	3.1	3.2	3.1	3.2		3.2
Queue Clearance Time *(g_s)*, s	6.2	21.9	15.0	22.0	14.0	75.0		58.0
Green Extension Time *(g_e)*, s	0.1	0.0	0.0	0.0	0.0	0.0		0.0
Phase Call Probability	1.00	1.00	1.00	1.00	1.00	1.00		1.00
Max Out Probability	0.01	1.00	1.00	1.00	1.00	1.00		1.00

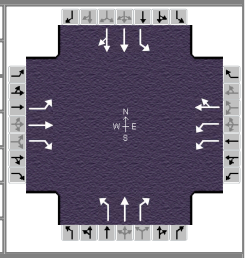
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	82	214	291	378	440		533	2017	567	101	529	515
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1792	1881	1594	1792	1764		1757	1845	1563	209	1845	1797
Queue Service Time *(g_s)*, s	4.2	13.0	19.9	13.0	20.0		12.0	73.0	19.9	0.0	26.1	26.1
Cycle Queue Clearance Time *(g_c)*, s	4.2	13.0	19.9	13.0	20.0		12.0	73.0	19.9	56.0	26.1	26.1
Capacity *(c)*, veh/h	268	311	422	320	292		365	1113	1111	60	854	832
Volume-to-Capacity Ratio *(X)*	0.304	0.689	0.691	1.181	1.510		1.459	1.813	0.511	1.698	0.620	0.620
Available Capacity *(c_a)*, veh/h	268	311	422	320	292		365	1113	1111	60	854	832
Back of Queue *(Q)*, veh/ln (50th percentile)	1.8	6.5	8.2	13.0	28.7		27.7	142.9	5.9	8.0	11.3	11.0
Overflow Queue *(Q_3)*, veh/ln	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Queue Storage Ratio *(RQ)* (50th percentile)	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00
Uniform Delay *(d_1)*, s/veh	35.0	47.6	40.0	43.8	50.5		24.6	24.0	7.9	60.5	24.5	24.5
Incremental Delay *(d_2)*, s/veh	0.2	5.3	4.0	109.1	246.6		221.0	369.3	0.2	375.8	1.0	1.1
Initial Queue Delay *(d_3)*, s/veh	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Control Delay *(d)*, s/veh	35.2	52.8	44.1	152.9	297.1		245.6	393.3	8.1	436.3	25.5	25.5
Level of Service (LOS)	D	D	D	F	F		F	F	A	F	C	C
Approach Delay, s/veh / LOS	46.0	D		230.4	F		298.0	F		61.8	E	
Intersection Delay, s/veh / LOS	214.4						F					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.9	C	2.5	B	2.2	B	2.4	B
Bicycle LOS Score / LOS	1.5	A	1.8	A	5.6	F	1.4	A

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HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	0.25
Analyst		Analysis Date	3/29/2013	Area Type	Other
Jurisdiction		Time Period		PHF	0.92
Intersection	SR 747 & Princeton	Analysis Year	2013	Analysis Period	1> 16:00
File Name	BuildPMPrinceton&747.xus				
Project Description	2032 Build - Imp				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	75	197	268	348	255	150	490	1856	522	93	891	70

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	12.0	60.0	7.0	21.0	0.0	0.0	5	6	7	8
Yellow	4.0	4.0	4.0	4.0	0.0	0.0				
Red	1.0	1.0	1.0	1.0	0.0	0.0				

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4	3	8	5	2		6
Case Number		5.3	2.0	4.0	1.0	3.0		6.3
Phase Duration, s		26.0	12.0	38.0	17.0	82.0		65.0
Change Period, *(Y+Rc)*, s		5.0	5.0	5.0	5.0	5.0		5.0
Max Allow Headway *(MAH)*, s		3.3	3.1	3.3	3.1	3.2		3.2
Queue Clearance Time *(g_s)*, s		23.0	9.0	30.9	14.0	79.0		62.0
Green Extension Time *(g_e)*, s		0.0	0.0	0.0	0.0	0.0		0.0
Phase Call Probability		1.00	1.00	1.00	1.00	1.00		1.00
Max Out Probability		1.00	1.00	1.00	1.00	1.00		1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	82	214	291	378	440		533	2017	567	101	529	515
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	954	1881	1594	1740	1764		1757	1845	1563	209	1845	1797
Queue Service Time *(g_s)*, s	4.1	12.7	19.5	7.0	28.9		12.0	77.0	20.5	0.0	24.1	24.1
Cycle Queue Clearance Time *(g_c)*, s	21.0	12.7	19.5	7.0	28.9		12.0	77.0	20.5	60.0	24.1	24.1
Capacity *(c)*, veh/h	92	329	438	203	485		395	1184	1094	60	922	898
Volume-to-Capacity Ratio *(X)*	0.884	0.650	0.664	1.864	0.908		1.349	1.704	0.519	1.684	0.574	0.574
Available Capacity *(c_a)*, veh/h	92	329	438	203	485		395	1184	1094	60	922	898
Back of Queue *(Q)*, veh/ln (50th percentile)	3.9	6.2	7.9	14.5	15.1		25.0	134.7	6.2	8.0	10.2	9.9
Overflow Queue *(Q_3)*, veh/ln	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Queue Storage Ratio *(RQ)* (50th percentile)	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00
Uniform Delay *(d_1)*, s/veh	59.2	46.1	38.6	56.5	42.0		22.5	21.5	8.5	60.0	21.0	21.0
Incremental Delay *(d_2)*, s/veh	56.2	3.6	3.1	407.0	20.3		173.0	320.6	0.2	369.5	0.6	0.6
Initial Queue Delay *(d_3)*, s/veh	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Control Delay *(d)*, s/veh	115.4	49.6	41.6	463.5	62.4		195.5	342.1	8.7	429.5	21.6	21.6
Level of Service (LOS)	F	D	D	F	E		F	F	A	F	C	C
Approach Delay, s/veh / LOS	54.8	D		247.7	F		256.4	F		57.6	E	
Intersection Delay, s/veh / LOS	194.1						F					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.9	C	2.4	B	2.4	B	2.4	B
Bicycle LOS Score / LOS	1.5	A	1.8	A	5.6	F	1.4	A

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SR 747 & Willow Ridge

2012

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*ALH*
Agency/Co.	*TEC*
Date Performed	*6/29/2012*
Analysis Time Period	*AM Peak*

Site Information

Intersection	*SR 747 and Willow Ridge*
Jurisdiction	*Liberty Township*
Analysis Year	*2012*

Project Description *Existing 2012 AM Volumes*

East/West Street: *Willow Ridge Dr* | North/South Street: *SR 747*

Intersection Orientation: *North-South* | Study Period (hrs): *1.00*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*10*	*341*			*905*	*10*
Peak-Hour Factor, PHF	*0.90*	*0.90*	*1.00*	*1.00*	*0.90*	*0.90*
Hourly Flow Rate, HFR (veh/h)	*11*	*378*	*0*	*0*	*1005*	*11*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*1*	*1*	*0*	*0*	*1*	*1*
Configuration	*L*	*T*			*T*	*R*
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*11*		*41*			
Peak-Hour Factor, PHF	*0.90*	*1.00*	*0.90*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*12*	*0*	*45*	*0*	*0*	*0*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration		*LR*				

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*L*						*LR*	
v (veh/h)	*11*						*57*	
C (m) (veh/h)	*691*						*247*	
v/c	*0.02*						*0.23*	
95% queue length	*0.05*						*0.89*	
Control Delay (s/veh)	*10.3*						*23.9*	
LOS	*B*						*C*	
Approach Delay (s/veh)	--	--					*23.9*	
Approach LOS	--	--					*C*	

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*ALH*
Agency/Co.	*TEC*
Date Performed	*6/29/2012*
Analysis Time Period	*PM Peak*

Site Information

Intersection	*SR 747 and Willow Ridge*
Jurisdiction	*Liberty Township*
Analysis Year	*2012*

Project Description *Existing 2012 PM Volumes*

East/West Street: *Willow Ridge Dr* | North/South Street: *SR 747*

Intersection Orientation: *North-South* | Study Period (hrs): *1.00*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*30*	*1109*			*562*	*20*
Peak-Hour Factor, PHF	*0.90*	*0.90*	*1.00*	*1.00*	*0.90*	*0.90*
Hourly Flow Rate, HFR (veh/h)	*33*	*1232*	*0*	*0*	*624*	*22*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*1*	*1*	*0*	*0*	*1*	*1*
Configuration	*L*	*T*			*T*	*R*
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*10*		*30*			
Peak-Hour Factor, PHF	*0.90*	*1.00*	*0.90*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*11*	*0*	*33*	*0*	*0*	*0*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration		*LR*				

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*L*						*LR*	
v (veh/h)	*33*						*44*	
C (m) (veh/h)	*949*						*200*	
v/c	*0.03*						*0.22*	
95% queue length	*0.11*						*0.84*	
Control Delay (s/veh)	*8.9*						*28.1*	
LOS	*A*						*D*	
Approach Delay (s/veh)	--	--					*28.1*	
Approach LOS	--	--					*D*	

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2032

AM Peak

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*ERW*
Agency/Co.	*TEC*
Date Performed	*4/9/13*
Analysis Time Period	*AM Peak*

Site Information

Intersection	*SR 747 and Willow Ridge*
Jurisdiction	*Liberty Township*
Analysis Year	*2032*

Project Description *Projected 2032 AM Build Volumes*

East/West Street: *Willow Ridge Dr* | North/South Street: *SR 747*

Intersection Orientation: *North-South* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*10*	*605*	*26*	*20*	*1560*	*10*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*10*	*657*	*28*	*21*	*1695*	*10*
Percent Heavy Vehicles	*3*	--	--	*3*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*1*	*1*	*1*	*1*	*1*	*1*
Configuration	*L*	*T*	*R*	*L*	*T*	*R*
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*10*		*40*	*92*		*68*
Peak-Hour Factor, PHF	*0.92*	*1.00*	*0.92*	*0.92*	*1.00*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*10*	*0*	*43*	*99*	*0*	*73*
Percent Heavy Vehicles	*1*	*0*	*1*	*1*	*0*	*1*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*1*	*0*	*1*
Configuration		*LR*		*L*		*R*

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*L*	*L*	*L*		*R*		*LR*	
v (veh/h)	*10*	*21*	*99*		*73*		*53*	
C (m) (veh/h)	*370*	*904*	*13*		*467*		*55*	
v/c	*0.03*	*0.02*	*7.62*		*0.16*		*0.96*	
95% queue length	*0.08*	*0.07*	*13.50*		*0.55*		*4.33*	
Control Delay (s/veh)	*15.0*	*9.1*	*3549*		*14.1*		*230.9*	
LOS	*B*	*A*	*F*		*B*		*F*	
Approach Delay (s/veh)	--	--	*2049*			*230.9*		
Approach LOS	--	--	*F*			*F*		

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*ERW*
Agency/Co.	*TEC*
Date Performed	*4/9/13*
Analysis Time Period	*AM Peak*

Site Information

Intersection	*SR 747 and Willow Ridge*
Jurisdiction	*Liberty Township*
Analysis Year	*2032*

Project Description *Projected 2032 AM Build Volumes*

East/West Street: *Willow Ridge Dr* | North/South Street: *SR 747*

Intersection Orientation: *North-South* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*10*	*605*	*26*	*20*	*1753*	*10*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*10*	*657*	*28*	*21*	*1905*	*10*
Percent Heavy Vehicles	*3*	--	--	*3*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*1*	*1*	*1*	*1*	*1*	*1*
Configuration	*L*	*T*	*R*	*L*	*T*	*R*
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*10*		*40*	*92*		*68*
Peak-Hour Factor, PHF	*0.92*	*1.00*	*0.92*	*0.92*	*1.00*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*10*	*0*	*43*	*99*	*0*	*73*
Percent Heavy Vehicles	*1*	*0*	*1*	*1*	*0*	*1*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*1*	*0*	*1*
Configuration		*LR*		*L*		*R*

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*L*	*L*	*L*		*R*		*LR*	
v (veh/h)	*10*	*21*	*99*		*73*		*53*	
C (m) (veh/h)	*307*	*904*	*7*		*467*		*40*	
v/c	*0.03*	*0.02*	*14.14*		*0.16*		*1.33*	
95% queue length	*0.10*	*0.07*	*14.13*		*0.55*		*5.34*	
Control Delay (s/veh)	*17.1*	*9.1*	*6943*		*14.1*		*411.0*	
LOS	*C*	*A*	*F*		*B*		*F*	
Approach Delay (s/veh)	--	--	*4002*			*411.0*		
Approach LOS	--	--	*F*			*F*		

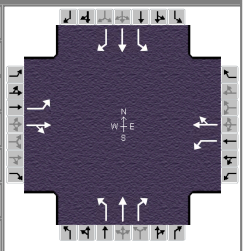
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HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	TEC Engineering			Duration, h	0.25
Analyst	ERW	Analysis Date	Feb 28, 2013	Area Type	Other
Jurisdiction		Time Period	AM Peak	PHF	0.90
Intersection	SR 747 & Willow Ridge	Analysis Year	2032	Analysis Period	1> 7:00
File Name	2032 AM Peak 747 & Willow.xus				
Project Description	2032 AM Peak Build w/Signal				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	10	0	40	92	0	68	10	605	26	20	1753	10

Signal Information			
Cycle, s	100.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

								1	2	3	4	
Green	85.0	5.0	0.0	0.0	0.0	0.0						
Yellow	4.0	4.0	0.0	0.0	0.0	0.0		5	6	7	8	
Red	1.0	1.0	0.0	0.0	0.0	0.0						

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8		2		6
Case Number		6.0		6.0		5.0		5.0
Phase Duration, s		10.0		10.0		90.0		90.0
Change Period, *(Y+Rc)*, s		5.0		5.0		5.0		5.0
Max Allow Headway *(MAH)*, s		3.3		3.3		3.1		3.1
Queue Clearance Time *(g_s)*, s		7.0		7.0		87.0		87.0
Green Extension Time *(g_e)*, s		0.0		0.0		0.0		0.0
Phase Call Probability		1.00		1.00		1.00		1.00
Max Out Probability		1.00		1.00		1.00		1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	11	44		102	76		11	672	29	22	1948	11
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1319	1579		1356	1579		226	1863	1579	763	1863	1579
Queue Service Time *(g_s)*, s	0.2	2.8		2.2	4.8		0.0	8.5	0.3	0.7	85.0	0.1
Cycle Queue Clearance Time *(g_c)*, s	5.0	2.8		5.0	4.8		85.0	8.5	0.3	9.2	85.0	0.1
Capacity *(c)*, veh/h	75	79		102	79		72	1583	1342	656	1583	1342
Volume-to-Capacity Ratio *(X)*	0.148	0.563		0.997	0.957		0.154	0.425	0.022	0.034	1.230	0.008
Available Capacity *(c_a)*, veh/h	75	79		102	79		72	1583	1342	656	1583	1342
Back of Queue *(Q)*, veh/ln (50th percentile)	0.3	1.2		5.0	3.7		0.3	1.1	0.0	0.1	59.2	0.0
Overflow Queue *(Q_3)*, veh/ln	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Queue Storage Ratio *(RQ)* (50th percentile)	0.00	0.00		0.00	0.00		0.03	0.00	0.00	0.01	0.00	0.00
Uniform Delay *(d_1)*, s/veh	50.0	46.4		49.7	47.4		50.0	1.8	1.1	2.8	7.5	1.1
Incremental Delay *(d_2)*, s/veh	0.3	5.6		88.0	86.0		0.4	0.1	0.0	0.0	109.3	0.0
Initial Queue Delay *(d_3)*, s/veh	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Control Delay *(d)*, s/veh	50.3	52.0		137.7	133.3		50.4	1.8	1.1	2.8	116.8	1.1
Level of Service (LOS)	D	D		F	F		D	A	A	A	F	A
Approach Delay, s/veh / LOS	51.7	D		135.8	F		2.6	A		114.9	F	
Intersection Delay, s/veh / LOS	87.6						F					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.5	B	2.5	B	2.2	B	2.2	B
Bicycle LOS Score / LOS	0.6	A	0.8	A	1.7	A	3.8	D

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*ERW*
Agency/Co.	*TEC*
Date Performed	*4/9/13*
Analysis Time Period	*AM Peak*

Site Information

Intersection	*SR 747 and Willow Ridge*
Jurisdiction	*Liberty Township*
Analysis Year	*2032*

Project Description *Projected 2032 AM Build Volumes (Full)*

East/West Street: *Willow Ridge Dr* | North/South Street: *SR 747*

Intersection Orientation: *North-South* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*10*	*701*	*64*	*107*	*1548*	*10*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*10*	*761*	*69*	*116*	*1682*	*10*
Percent Heavy Vehicles	*3*	--	--	*3*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*1*	*1*	*1*	*1*	*1*	*1*
Configuration	*L*	*T*	*R*	*L*	*T*	*R*
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*10*		*40*	*143*		*82*
Peak-Hour Factor, PHF	*0.92*	*1.00*	*0.92*	*0.92*	*1.00*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*10*	*0*	*43*	*155*	*0*	*89*
Percent Heavy Vehicles	*1*	*0*	*1*	*1*	*0*	*1*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*1*	*0*	*1*
Configuration		*LR*		*L*		*R*

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*L*	*L*	*L*		*R*		*LR*	
v (veh/h)	*10*	*116*	*155*		*89*		*53*	
C (m) (veh/h)	*374*	*798*	*8*		*407*		*33*	
v/c	*0.03*	*0.15*	*19.38*		*0.22*		*1.61*	
95% queue length	*0.08*	*0.51*	*21.13*		*0.82*		*5.88*	
Control Delay (s/veh)	*14.9*	*10.3*	*9174*		*16.3*		*562.6*	
LOS	*B*	*B*	*F*		*C*		*F*	
Approach Delay (s/veh)	--	--	*5834*			*562.6*		
Approach LOS	--	--	*F*			*F*		

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*ERW*
Agency/Co.	*TEC*
Date Performed	*4/9/13*
Analysis Time Period	*AM Peak*

Site Information

Intersection	*SR 747 and Willow Ridge*
Jurisdiction	*Liberty Township*
Analysis Year	*2032*

Project Description *Projected 2032 AM Build Volumes (Full)*

East/West Street: *Willow Ridge Dr* | North/South Street: *SR 747*

Intersection Orientation: *North-South* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*10*	*701*	*64*	*107*	*1548*	*10*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*10*	*761*	*69*	*116*	*1682*	*10*
Percent Heavy Vehicles	*3*	--	--	*3*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*1*	*1*	*1*	*1*	*1*	*1*
Configuration	*L*	*T*	*R*	*L*	*T*	*R*
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*10*		*40*	*143*		*82*
Peak-Hour Factor, PHF	*0.92*	*1.00*	*0.92*	*0.92*	*1.00*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*10*	*0*	*43*	*155*	*0*	*89*
Percent Heavy Vehicles	*1*	*0*	*1*	*1*	*0*	*1*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*1*	*0*	*1*
Configuration		*LR*		*L*		*R*

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*L*	*L*	*L*		*R*		*LR*	
v (veh/h)	*10*	*116*	*155*		*89*		*53*	
C (m) (veh/h)	*374*	*798*	*8*		*407*		*33*	
v/c	*0.03*	*0.15*	*19.38*		*0.22*		*1.61*	
95% queue length	*0.08*	*0.51*	*21.13*		*0.82*		*5.88*	
Control Delay (s/veh)	*14.9*	*10.3*	*9174*		*16.3*		*562.6*	
LOS	*B*	*B*	*F*		*C*		*F*	
Approach Delay (s/veh)	--	--	*5834*			*562.6*		
Approach LOS	--	--	*F*			*F*		

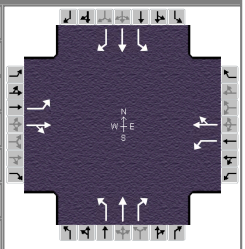
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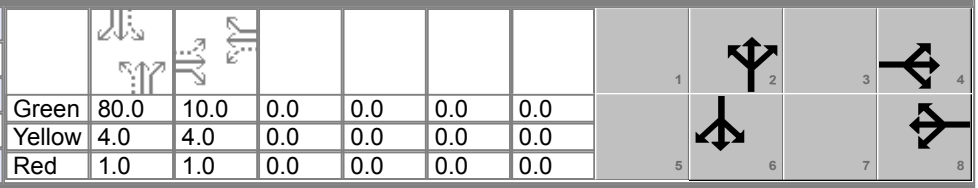
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	TEC Engineering			Duration, h	0.25
Analyst	ERW	Analysis Date	Feb 28, 2013	Area Type	Other
Jurisdiction		Time Period	AM Peak	PHF	0.90
Intersection	SR 747 & Willow Ridge	Analysis Year	2032	Analysis Period	1> 7:00
File Name	2032 AM Peak 747 & Willow.xus				
Project Description	2032 AM Peak Build w/Signal				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	10	0	40	143	0	82	10	701	64	107	1548	10

Signal Information			
Cycle, s	100.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	80.0	10.0	0.0	0.0	0.0	0.0						
Yellow	4.0	4.0	0.0	0.0	0.0	0.0						
Red	1.0	1.0	0.0	0.0	0.0	0.0						

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8		2		6
Case Number		6.0		6.0		5.0		5.0
Phase Duration, s		15.0		15.0		85.0		85.0
Change Period, *(Y+Rc)*, s		5.0		5.0		5.0		5.0
Max Allow Headway *(MAH)*, s		3.3		3.3		3.1		3.1
Queue Clearance Time *(gs)*, s		8.3		12.0		82.0		82.0
Green Extension Time *(ge)*, s		0.1		0.0		0.0		0.0
Phase Call Probability		1.00		1.00		1.00		1.00
Max Out Probability		1.00		1.00		1.00		1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	11	44		159	91		11	779	71	119	1720	11
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1300	1579		1356	1579		282	1863	1579	690	1863	1579
Queue Service Time *(gs)*, s	0.8	2.6		7.4	5.5		0.0	14.4	0.9	7.2	80.0	0.1
Cycle Queue Clearance Time *(gc)*, s	6.3	2.6		10.0	5.5		80.0	14.4	0.9	21.5	80.0	0.1
Capacity *(c)*, veh/h	130	158		172	158		72	1490	1263	525	1490	1263
Volume-to-Capacity Ratio *(X)*	0.085	0.282		0.922	0.577		0.154	0.523	0.056	0.226	1.154	0.009
Available Capacity *(ca)*, veh/h	130	158		172	158		72	1490	1263	525	1490	1263
Back of Queue *(Q)*, veh/ln (50th percentile)	0.3	1.0		6.1	2.3		0.3	3.3	0.2	0.9	50.3	0.0
Overflow Queue *(Q3)*, veh/ln	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Queue Storage Ratio *(RQ)* (50th percentile)	0.00	0.00		0.00	0.00		0.03	0.00	0.02	0.09	0.00	0.00
Uniform Delay *(d1)*, s/veh	46.0	41.7		47.7	43.0		50.0	3.4	2.1	7.1	10.0	2.0
Incremental Delay *(d2)*, s/veh	0.1	0.4		46.0	3.4		0.4	0.2	0.0	0.1	77.5	0.0
Initial Queue Delay *(d3)*, s/veh	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Control Delay *(d)*, s/veh	46.1	42.0		93.6	46.4		50.4	3.6	2.1	7.2	87.5	2.0
Level of Service (LOS)	D	D		F	D		D	A	A	A	F	A
Approach Delay, s/veh / LOS	42.8	D		76.4	E		4.1	A		81.8	F	
Intersection Delay, s/veh / LOS	58.5						E					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.5	B	2.5	B	2.2	B	2.2	B
Bicycle LOS Score / LOS	0.6	A	0.9	A	1.9	A	3.5	D

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PM Peak

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*ERW*
Agency/Co.	*TEC*
Date Performed	*4/9/13*
Analysis Time Period	*PM Peak*

Site Information

Intersection	*SR 747 and Willow Ridge*
Jurisdiction	*Liberty Township*
Analysis Year	*2032*

Project Description *Projected 2032 PM Build Volumes*

East/West Street: *Willow Ridge Dr* | North/South Street: *SR 747*

Intersection Orientation: *North-South* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*30*	*1909*	*86*	*65*	*835*	*20*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*32*	*2074*	*93*	*70*	*907*	*21*
Percent Heavy Vehicles	*1*	--	--	*1*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*1*	*1*	*1*	*1*	*1*	*1*
Configuration	*L*	*T*	*R*	*L*	*T*	*R*
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*10*		*30*	*60*		*45*
Peak-Hour Factor, PHF	*0.92*	*1.00*	*0.92*	*0.92*	*1.00*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*10*	*0*	*32*	*65*	*0*	*48*
Percent Heavy Vehicles	*1*	*0*	*1*	*1*	*0*	*1*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*1*	*0*	*1*
Configuration		*LR*		*L*		*R*

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*L*	*L*	*L*		*R*		*LR*	
v (veh/h)	*32*	*70*	*65*		*48*		*42*	
C (m) (veh/h)	*741*	*248*	*4*		*68*		*4*	
v/c	*0.04*	*0.28*	*16.25*		*0.71*		*10.50*	
95% queue length	*0.14*	*1.12*	*10.05*		*3.17*		*7.00*	
Control Delay (s/veh)	*10.1*	*25.1*	*8620*		*137.4*		*6013*	
LOS	*B*	*D*	*F*		*F*		*F*	
Approach Delay (s/veh)	--	--	*5017*			*6013*		
Approach LOS	--	--	*F*			*F*		

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*ERW*
Agency/Co.	*TEC*
Date Performed	*4/9/13*
Analysis Time Period	*PM Peak*

Site Information

Intersection	*SR 747 and Willow Ridge*
Jurisdiction	*Liberty Township*
Analysis Year	*2032*

Project Description *Projected 2032 PM Build Volumes*

East/West Street: *Willow Ridge Dr* | North/South Street: *SR 747*

Intersection Orientation: *North-South* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*30*	*1909*	*86*	*65*	*835*	*20*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*32*	*2074*	*93*	*70*	*907*	*21*
Percent Heavy Vehicles	*1*	--	--	*1*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*1*	*1*	*1*	*1*	*1*	*1*
Configuration	*L*	*T*	*R*	*L*	*T*	*R*
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*10*		*30*	*60*		*45*
Peak-Hour Factor, PHF	*0.92*	*1.00*	*0.92*	*0.92*	*1.00*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*10*	*0*	*32*	*65*	*0*	*48*
Percent Heavy Vehicles	*1*	*0*	*1*	*1*	*0*	*1*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*1*	*0*	*1*
Configuration		*LR*		*L*		*R*

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*L*	*L*	*L*		*R*		*LR*	
v (veh/h)	*32*	*70*	*65*		*48*		*42*	
C (m) (veh/h)	*741*	*248*	*4*		*68*		*4*	
v/c	*0.04*	*0.28*	*16.25*		*0.71*		*10.50*	
95% queue length	*0.14*	*1.12*	*10.05*		*3.17*		*7.00*	
Control Delay (s/veh)	*10.1*	*25.1*	*8620*		*137.4*		*6013*	
LOS	*B*	*D*	*F*		*F*		*F*	
Approach Delay (s/veh)	--	--	*5017*			*6013*		
Approach LOS	--	--	*F*			*F*		

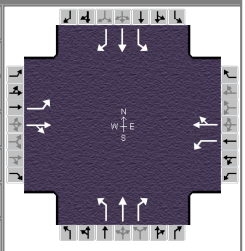
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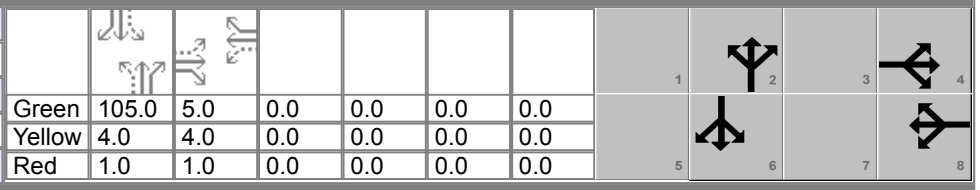
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	TEC Engineering			Duration, h	0.25
Analyst	ERW	Analysis Date	Feb 28, 2013	Area Type	Other
Jurisdiction		Time Period	AM Peak	PHF	0.90
Intersection	SR 747 & Willow Ridge	Analysis Year	2032	Analysis Period	1> 7:00
File Name	2032 PM Peak 747 & Willow.xus				
Project Description	2032 AM Peak Build w/Signal				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	10	0	30	60	0	45	30	1909	86	65	835	20

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	105.0	5.0	0.0	0.0	0.0	0.0		
Yellow	4.0	4.0	0.0	0.0	0.0	0.0		
Red	1.0	1.0	0.0	0.0	0.0	0.0		

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8		2		6
Case Number		6.0		6.0		5.0		5.0
Phase Duration, s		10.0		10.0		110.0		110.0
Change Period, *(Y+Rc)*, s		5.0		5.0		5.0		5.0
Max Allow Headway *(MAH)*, s		3.3		3.3		3.1		3.1
Queue Clearance Time *(g_s)*, s		6.7		7.0		107.0		107.0
Green Extension Time *(g_e)*, s		0.0		0.0		0.0		0.0
Phase Call Probability		1.00		1.00		1.00		1.00
Max Out Probability		1.00		1.00		1.00		1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	11	33		67	50		33	2121	96	72	928	22
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1349	1579		1370	1579		601	1863	1579	190	1863	1579
Queue Service Time *(g_s)*, s	1.0	2.5		2.5	3.8		1.8	105.0	1.0	0.0	14.9	0.2
Cycle Queue Clearance Time *(g_c)*, s	4.7	2.5		5.0	3.8		16.6	105.0	1.0	105.0	14.9	0.2
Capacity *(c)*, veh/h	74	66		89	66		511	1630	1381	60	1630	1381
Volume-to-Capacity Ratio *(X)*	0.150	0.507		0.751	0.760		0.065	1.301	0.069	1.204	0.569	0.016
Available Capacity *(c_a)*, veh/h	74	66		89	66		511	1630	1381	60	1630	1381
Back of Queue *(Q)*, veh/ln (50th percentile)	0.3	1.0		2.7	2.1		0.2	77.3	0.1	4.8	2.1	0.0
Overflow Queue *(Q_3)*, veh/ln	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Queue Storage Ratio *(RQ)* (50th percentile)	0.00	0.00		0.00	0.00		0.02	0.00	0.01	0.47	0.00	0.00
Uniform Delay *(d_1)*, s/veh	59.3	56.3		59.5	56.9		3.9	7.5	1.0	60.0	1.9	1.0
Incremental Delay *(d_2)*, s/veh	0.3	2.6		26.8	36.3		0.0	140.2	0.0	181.3	0.3	0.0
Initial Queue Delay *(d_3)*, s/veh	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Control Delay *(d)*, s/veh	59.6	58.9		86.2	93.2		4.0	147.7	1.0	241.3	2.2	1.0
Level of Service (LOS)	E	E		F	F		A	F	A	F	A	A
Approach Delay, s/veh / LOS	59.0	E		89.2	F		139.4	F		19.0	B	
Intersection Delay, s/veh / LOS	100.8						F					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.5	B	2.5	B	2.2	B	2.2	B
Bicycle LOS Score / LOS	0.6	A	0.7	A	4.2	D	2.2	B

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*ERW*
Agency/Co.	*TEC*
Date Performed	*4/9/13*
Analysis Time Period	*PM Peak*

Site Information

Intersection	*SR 747 and Willow Ridge*
Jurisdiction	*Liberty Township*
Analysis Year	*2032*

Project Description *Projected 2032 PM Build Volumes (Full)*

East/West Street: *Willow Ridge Dr* | North/South Street: *SR 747*

Intersection Orientation: *North-South* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*30*	*1981*	*70*	*98*	*826*	*20*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*32*	*2153*	*76*	*106*	*897*	*21*
Percent Heavy Vehicles	*1*	--	--	*1*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*1*	*1*	*1*	*1*	*1*	*1*
Configuration	*L*	*T*	*R*	*L*	*T*	*R*
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*10*		*30*	*198*		*61*
Peak-Hour Factor, PHF	*0.92*	*1.00*	*0.92*	*0.92*	*1.00*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*10*	*0*	*32*	*215*	*0*	*66*
Percent Heavy Vehicles	*1*	*0*	*1*	*1*	*0*	*1*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*1*	*0*	*1*
Configuration		*LR*		*L*		*R*

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*L*	*L*	*L*		*R*		*LR*	
v (veh/h)	*32*	*106*	*215*		*66*		*42*	
C (m) (veh/h)	*747*	*235*	*3*		*61*		*0*	
v/c	*0.04*	*0.45*	*71.67*		*1.08*			
95% queue length	*0.13*	*2.17*	*29.26*		*5.30*			
Control Delay (s/veh)	*10.0*	*32.3*	*34179*		*253.0*			
LOS	*B*	*D*	*F*		*F*		*F*	
Approach Delay (s/veh)	--	--	*26210*					
Approach LOS	--	--	*F*					

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*ERW*
Agency/Co.	*TEC*
Date Performed	*4/9/13*
Analysis Time Period	*PM Peak*

Site Information

Intersection	*SR 747 and Willow Ridge*
Jurisdiction	*Liberty Township*
Analysis Year	*2032*

Project Description *Projected 2032 PM Build Volumes (Full)*

East/West Street: *Willow Ridge Dr* | North/South Street: *SR 747*

Intersection Orientation: *North-South* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*30*	*1981*	*70*	*98*	*826*	*20*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*32*	*2153*	*76*	*106*	*897*	*21*
Percent Heavy Vehicles	*1*	--	--	*1*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*1*	*1*	*1*	*1*	*1*	*1*
Configuration	*L*	*T*	*R*	*L*	*T*	*R*
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*10*		*30*	*198*		*61*
Peak-Hour Factor, PHF	*0.92*	*1.00*	*0.92*	*0.92*	*1.00*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*10*	*0*	*32*	*215*	*0*	*66*
Percent Heavy Vehicles	*1*	*0*	*1*	*1*	*0*	*1*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*1*	*0*	*1*
Configuration		*LR*		*L*		*R*

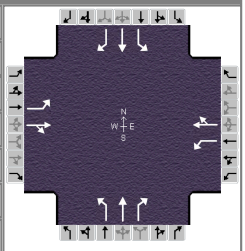
Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*L*	*L*	*L*		*R*		*LR*	
v (veh/h)	*32*	*106*	*215*		*66*		*42*	
C (m) (veh/h)	*747*	*235*	*3*		*61*		*0*	
v/c	*0.04*	*0.45*	*71.67*		*1.08*			
95% queue length	*0.13*	*2.17*	*29.26*		*5.30*			
Control Delay (s/veh)	*10.0*	*32.3*	*34179*		*253.0*			
LOS	*B*	*D*	*F*		*F*		*F*	
Approach Delay (s/veh)	--	--	*26210*					
Approach LOS	--	--	*F*					

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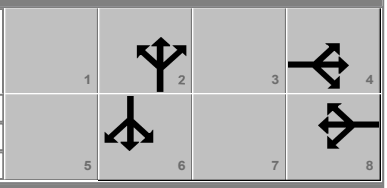
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	TEC Engineering			Duration, h	0.25
Analyst	ERW	Analysis Date	Feb 28, 2013	Area Type	Other
Jurisdiction		Time Period	AM Peak	PHF	0.90
Intersection	SR 747 & Willow Ridge	Analysis Year	2032	Analysis Period	1> 7:00
File Name	2032 PM Peak 747 & Willow.xus				
Project Description	2032 AM Peak Build w/Signal				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	10	0	30	198	0	61	30	1981	70	98	826	20

Signal Information													
Cycle, s	100.0	Reference Phase	2										
Offset, s	0	Reference Point	End										
Uncoordinated	Yes	Simult. Gap E/W	On	Green	82.0	8.0	0.0	0.0	0.0	0.0			
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	4.0	4.0	0.0	0.0	0.0	0.0			
				Red	1.0	1.0	0.0	0.0	0.0	0.0			



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8		2		6
Case Number		6.0		6.0		5.0		5.0
Phase Duration, s		13.0		13.0		87.0		87.0
Change Period, *(Y+Rc)*, s		5.0		5.0		5.0		5.0
Max Allow Headway *(MAH)*, s		3.2		3.2		3.2		3.2
Queue Clearance Time *(gs)*, s		6.9		10.0		84.0		84.0
Green Extension Time *(ge)*, s		0.1		0.0		0.0		0.0
Phase Call Probability		1.00		1.00		1.00		1.00
Max Out Probability		1.00		1.00		1.00		1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	11	33		220	68		33	2201	78	109	918	22
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1328	1579		1370	1579		606	1863	1579	176	1863	1579
Queue Service Time *(gs)*, s	0.8	2.0		6.0	4.1		2.1	82.0	0.9	0.0	17.5	0.3
Cycle Queue Clearance Time *(gc)*, s	4.9	2.0		8.0	4.1		19.5	82.0	0.9	82.0	17.5	0.3
Capacity *(c)*, veh/h	123	126		154	126		463	1527	1294	72	1527	1294
Volume-to-Capacity Ratio *(X)*	0.090	0.264		1.425	0.537		0.072	1.441	0.060	1.512	0.601	0.017
Available Capacity *(ca)*, veh/h	123	126		154	126		463	1527	1294	72	1527	1294
Back of Queue *(Q)*, veh/ln (50th percentile)	0.3	0.8		13.4	1.7		0.2	101.8	0.2	7.6	3.6	0.0
Overflow Queue *(Q3)*, veh/ln	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Queue Storage Ratio *(RQ)* (50th percentile)	0.00	0.00		0.00	0.00		0.02	0.00	0.02	0.73	0.00	0.00
Uniform Delay *(d1)*, s/veh	46.6	43.2		48.4	44.2		6.7	9.0	1.7	50.0	3.2	1.6
Incremental Delay *(d2)*, s/veh	0.1	0.4		224.5	2.4		0.0	202.2	0.0	289.4	0.5	0.0
Initial Queue Delay *(d3)*, s/veh	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Control Delay *(d)*, s/veh	46.7	43.6		272.9	46.6		6.7	211.2	1.7	339.4	3.7	1.6
Level of Service (LOS)	D	D		F	D		A	F	A	F	A	A
Approach Delay, s/veh / LOS	44.4	D		219.6	F		201.2	F		38.5	D	
Intersection Delay, s/veh / LOS	154.6						F					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.5	B	2.5	B	2.2	B	2.2	B
Bicycle LOS Score / LOS	0.6	A	1.0	A	4.3	E	2.2	B

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Princeton Rd & Van Gordon

2012

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*ALH*	Intersection	*Princeton and Van Gordon*
Agency/Co.	*TEC*	Jurisdiction	*Liberty Township*
Date Performed	*6/29/2012*	Analysis Year	*2012*
Analysis Time Period	*AM Peak*		

Project Description

East/West Street: *Princeton Rd* | North/South Street: *Van Gordon Rd*

Intersection Orientation: *East-West* | Study Period (hrs): *1.00*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*10*	*288*	*10*	*30*	*225*	*10*
Peak-Hour Factor, PHF	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*
Hourly Flow Rate, HFR (veh/h)	*11*	*320*	*11*	*33*	*250*	*11*
Percent Heavy Vehicles	*2*	--	--	*2*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LTR*			*LTR*		
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*20*	*0*	*60*	*20*	*20*	*41*
Peak-Hour Factor, PHF	*0.90*	*1.00*	*0.90*	*1.00*	*0.90*	*0.90*
Hourly Flow Rate, HFR (veh/h)	*22*	*0*	*66*	*20*	*22*	*45*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration		*LTR*			*LTR*	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LTR*	*LTR*		*LTR*			*LTR*	
v (veh/h)	*11*	*33*		*88*			*87*	
C (m) (veh/h)	*1303*	*1228*		*540*			*478*	
v/c	*0.01*	*0.03*		*0.16*			*0.18*	
95% queue length	*0.03*	*0.08*		*0.58*			*0.67*	
Control Delay (s/veh)	*7.8*	*8.0*		*13.0*			*14.2*	
LOS	*A*	*A*		*B*			*B*	
Approach Delay (s/veh)	--	--	*13.0*			*14.2*		
Approach LOS	--	--	*B*			*B*		

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*ALH*
Agency/Co.	*TEC*
Date Performed	*6/29/2012*
Analysis Time Period	*PM Peak*

Site Information

Intersection	*Princeton and Van Gordon*
Jurisdiction	*Liberty Township*
Analysis Year	*2012*

Project Description

East/West Street: *Princeton Rd* | North/South Street: *Van Gordon Rd*

Intersection Orientation: *East-West* | Study Period (hrs): *1.00*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*21*	*351*	*0*	*0*	*364*	*40*
Peak-Hour Factor, PHF	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*
Hourly Flow Rate, HFR (veh/h)	*23*	*390*	*0*	*0*	*404*	*44*
Percent Heavy Vehicles	*2*	--	--	*2*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LTR*			*LTR*		
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*10*	*10*	*20*	*40*	*10*	*52*
Peak-Hour Factor, PHF	*0.90*	*1.00*	*0.90*	*1.00*	*0.90*	*0.90*
Hourly Flow Rate, HFR (veh/h)	*11*	*10*	*22*	*40*	*11*	*57*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration		*LTR*			*LTR*	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LTR*	*LTR*		*LTR*			*LTR*	
v (veh/h)	*23*	*0*		*43*			*108*	
C (m) (veh/h)	*1112*	*1169*		*366*			*375*	
v/c	*0.02*	*0.00*		*0.12*			*0.29*	
95% queue length	*0.06*	*0.00*		*0.40*			*1.20*	
Control Delay (s/veh)	*8.3*	*8.1*		*16.1*			*18.5*	
LOS	*A*	*A*		*C*			*C*	
Approach Delay (s/veh)	--	--	*16.1*			*18.5*		
Approach LOS	--	--	*C*			*C*		

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2032

AM Peak

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*ERW*
Agency/Co.	*TEC*
Date Performed	*4/9/13*
Analysis Time Period	*AM Peak*

Site Information

Intersection	*Princeton and Van Gordon*
Jurisdiction	*Liberty Township*
Analysis Year	

Project Description

East/West Street: *Princeton Rd* | North/South Street: *Van Gordon Rd*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*10*	*480*	*10*	*30*	*386*	*10*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*10*	*521*	*10*	*32*	*419*	*10*
Percent Heavy Vehicles	*1*	--	--	*1*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LTR*			*LTR*		
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*20*	*0*	*60*	*20*	*20*	*51*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*21*	*0*	*65*	*21*	*21*	*55*
Percent Heavy Vehicles	*1*	*1*	*1*	*1*	*1*	*1*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration		*LTR*			*LTR*	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LTR*	*LTR*		*LTR*			*LTR*	
v (veh/h)	*10*	*32*		*86*			*97*	
C (m) (veh/h)	*1136*	*1042*		*348*			*317*	
v/c	*0.01*	*0.03*		*0.25*			*0.31*	
95% queue length	*0.03*	*0.09*		*0.96*			*1.26*	
Control Delay (s/veh)	*8.2*	*8.6*		*18.7*			*21.3*	
LOS	*A*	*A*		*C*			*C*	
Approach Delay (s/veh)	--	--	*18.7*			*21.3*		
Approach LOS	--	--	*C*			*C*		

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*ERW*
Agency/Co.	*TEC*
Date Performed	*4/9/13*
Analysis Time Period	*AM Peak Build*

Site Information

Intersection	*Princeton and Van Gordon*
Jurisdiction	*Liberty Township*
Analysis Year	*2032*

Project Description

East/West Street: *Princeton Rd* | North/South Street: *Van Gordon Rd*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*11*	*497*	*11*	*30*	*391*	*10*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*11*	*540*	*11*	*32*	*424*	*10*
Percent Heavy Vehicles	*1*	--	--	*1*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LTR*			*LTR*		
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*21*	*0*	*60*	*20*	*20*	*52*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*22*	*0*	*65*	*21*	*21*	*56*
Percent Heavy Vehicles	*1*	*1*	*1*	*1*	*1*	*1*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration		*LTR*			*LTR*	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LTR*	*LTR*		*LTR*			*LTR*	
v (veh/h)	*11*	*32*		*87*			*98*	
C (m) (veh/h)	*1131*	*1024*		*329*			*309*	
v/c	*0.01*	*0.03*		*0.26*			*0.32*	
95% queue length	*0.03*	*0.10*		*1.04*			*1.33*	
Control Delay (s/veh)	*8.2*	*8.6*		*19.8*			*22.0*	
LOS	*A*	*A*		*C*			*C*	
Approach Delay (s/veh)	--	--	*19.8*			*22.0*		
Approach LOS	--	--	*C*			*C*		

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*ERW*
Agency/Co.	*TEC*
Date Performed	*4/9/13*
Analysis Time Period	*AM Peak Build*

Site Information

Intersection	*Princeton and Van Gordon*
Jurisdiction	*Liberty Township*
Analysis Year	*2032*

Project Description

East/West Street: *Princeton Rd* | North/South Street: *Van Gordon Rd*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*11*	*497*	*11*	*30*	*391*	*10*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*11*	*540*	*11*	*32*	*424*	*10*
Percent Heavy Vehicles	*1*	--	--	*1*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LTR*			*LTR*		
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*21*	*0*	*60*	*20*	*20*	*52*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*22*	*0*	*65*	*21*	*21*	*56*
Percent Heavy Vehicles	*1*	*1*	*1*	*1*	*1*	*1*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration		*LTR*			*LTR*	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LTR*	*LTR*		*LTR*			*LTR*	
v (veh/h)	*11*	*32*		*87*			*98*	
C (m) (veh/h)	*1131*	*1024*		*329*			*309*	
v/c	*0.01*	*0.03*		*0.26*			*0.32*	
95% queue length	*0.03*	*0.10*		*1.04*			*1.33*	
Control Delay (s/veh)	*8.2*	*8.6*		*19.8*			*22.0*	
LOS	*A*	*A*		*C*			*C*	
Approach Delay (s/veh)	--	--	*19.8*			*22.0*		
Approach LOS	--	--	*C*			*C*		

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*ERW*
Agency/Co.	*TEC*
Date Performed	*4/9/13*
Analysis Time Period	*AM Peak Build (Full)*

Site Information

Intersection	*Princeton and Van Gordon*
Jurisdiction	*Liberty Township*
Analysis Year	*2032*

Project Description

East/West Street: *Princeton Rd* | North/South Street: *Van Gordon Rd*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*11*	*501*	*11*	*30*	*392*	*10*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*11*	*544*	*11*	*32*	*426*	*10*
Percent Heavy Vehicles	*1*	--	--	*1*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LTR*			*LTR*		
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*21*	*0*	*60*	*20*	*20*	*52*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*22*	*0*	*65*	*21*	*21*	*56*
Percent Heavy Vehicles	*1*	*1*	*1*	*1*	*1*	*1*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration		*LTR*			*LTR*	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LTR*	*LTR*		*LTR*			*LTR*	
v (veh/h)	*11*	*32*		*87*			*98*	
C (m) (veh/h)	*1129*	*1020*		*327*			*306*	
v/c	*0.01*	*0.03*		*0.27*			*0.32*	
95% queue length	*0.03*	*0.10*		*1.05*			*1.34*	
Control Delay (s/veh)	*8.2*	*8.6*		*20.0*			*22.2*	
LOS	*A*	*A*		*C*			*C*	
Approach Delay (s/veh)	--	--	*20.0*			*22.2*		
Approach LOS	--	--	*C*			*C*		

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*ERW*
Agency/Co.	*TEC*
Date Performed	*4/9/13*
Analysis Time Period	*AM Peak Build (Full)*

Site Information

Intersection	*Princeton and Van Gordon*
Jurisdiction	*Liberty Township*
Analysis Year	*2032*

Project Description

East/West Street: *Princeton Rd* | North/South Street: *Van Gordon Rd*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*11*	*501*	*11*	*30*	*392*	*10*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*11*	*544*	*11*	*32*	*426*	*10*
Percent Heavy Vehicles	*1*	--	--	*1*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LTR*			*LTR*		
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*21*	*0*	*60*	*20*	*20*	*52*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*22*	*0*	*65*	*21*	*21*	*56*
Percent Heavy Vehicles	*1*	*1*	*1*	*1*	*1*	*1*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration		*LTR*			*LTR*	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LTR*	*LTR*		*LTR*			*LTR*	
v (veh/h)	*11*	*32*		*87*			*98*	
C (m) (veh/h)	*1129*	*1020*		*327*			*306*	
v/c	*0.01*	*0.03*		*0.27*			*0.32*	
95% queue length	*0.03*	*0.10*		*1.05*			*1.34*	
Control Delay (s/veh)	*8.2*	*8.6*		*20.0*			*22.2*	
LOS	*A*	*A*		*C*			*C*	
Approach Delay (s/veh)	--	--	*20.0*			*22.2*		
Approach LOS	--	--	*C*			*C*		

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PM Peak

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*ERW*
Agency/Co.	*TEC*
Date Performed	*4/9/13*
Analysis Time Period	*PM Peak*

Site Information

Intersection	*Princeton and Van Gordon*
Jurisdiction	*Liberty Township*
Analysis Year	*2032 No Build*

Project Description

East/West Street: *Princeton Rd* | North/South Street: *Van Gordon Rd*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*32*	*574*	*0*	*0*	*621*	*40*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*34*	*623*	*0*	*0*	*674*	*43*
Percent Heavy Vehicles	*1*	--	--	*1*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LTR*			*LTR*		
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*10*	*10*	*20*	*40*	*10*	*73*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*10*	*10*	*21*	*43*	*10*	*79*
Percent Heavy Vehicles	*1*	*1*	*1*	*1*	*1*	*1*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration		*LTR*			*LTR*	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LTR*	*LTR*		*LTR*			*LTR*	
v (veh/h)	*34*	*0*		*41*			*132*	
C (m) (veh/h)	*888*	*963*		*172*			*196*	
v/c	*0.04*	*0.00*		*0.24*			*0.67*	
95% queue length	*0.12*	*0.00*		*0.89*			*4.09*	
Control Delay (s/veh)	*9.2*	*8.7*		*32.4*			*54.6*	
LOS	*A*	*A*		*D*			*F*	
Approach Delay (s/veh)	--	--	*32.4*			*54.6*		
Approach LOS	--	--	*D*			*F*		

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*ERW*
Agency/Co.	*TEC*
Date Performed	*4/9/13*
Analysis Time Period	*PM Peak*

Site Information

Intersection	*Princeton and Van Gordon*
Jurisdiction	*Liberty Township*
Analysis Year	*2032 Build*

Project Description

East/West Street: *Princeton Rd* | North/South Street: *Van Gordon Rd*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*34*	*585*	*0*	*0*	*639*	*40*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*36*	*635*	*0*	*0*	*694*	*43*
Percent Heavy Vehicles	*1*	--	--	*1*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LTR*			*LTR*		
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*11*	*10*	*20*	*40*	*10*	*76*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*11*	*10*	*21*	*43*	*10*	*82*
Percent Heavy Vehicles	*1*	*1*	*1*	*1*	*1*	*1*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration		*LTR*			*LTR*	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LTR*	*LTR*		*LTR*			*LTR*	
v (veh/h)	*36*	*0*		*42*			*135*	
C (m) (veh/h)	*873*	*953*		*158*			*187*	
v/c	*0.04*	*0.00*		*0.27*			*0.72*	
95% queue length	*0.13*	*0.00*		*1.02*			*4.57*	
Control Delay (s/veh)	*9.3*	*8.8*		*35.8*			*62.5*	
LOS	*A*	*A*		*E*			*F*	
Approach Delay (s/veh)	--	--	*35.8*			*62.5*		
Approach LOS	--	--	*E*			*F*		

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*ERW*
Agency/Co.	*TEC*
Date Performed	*4/9/13*
Analysis Time Period	*PM Peak*

Site Information

Intersection	*Princeton and Van Gordon*
Jurisdiction	*Liberty Township*
Analysis Year	*2032 Build*

Project Description

East/West Street: *Princeton Rd* | North/South Street: *Van Gordon Rd*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*34*	*585*	*0*	*0*	*639*	*40*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*36*	*635*	*0*	*0*	*694*	*43*
Percent Heavy Vehicles	*1*	--	--	*1*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LTR*			*LTR*		
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*11*	*10*	*20*	*40*	*10*	*76*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*11*	*10*	*21*	*43*	*10*	*82*
Percent Heavy Vehicles	*1*	*1*	*1*	*1*	*1*	*1*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration		*LTR*			*LTR*	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LTR*	*LTR*		*LTR*			*LTR*	
v (veh/h)	*36*	*0*		*42*			*135*	
C (m) (veh/h)	*873*	*953*		*158*			*187*	
v/c	*0.04*	*0.00*		*0.27*			*0.72*	
95% queue length	*0.13*	*0.00*		*1.02*			*4.57*	
Control Delay (s/veh)	*9.3*	*8.8*		*35.8*			*62.5*	
LOS	*A*	*A*		*E*			*F*	
Approach Delay (s/veh)	--	--	*35.8*			*62.5*		
Approach LOS	--	--	*E*			*F*		

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TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*ERW*	Intersection	*Princeton and Van Gordon*
Agency/Co.	*TEC*	Jurisdiction	*Liberty Township*
Date Performed	*4/9/13*	Analysis Year	*2032 Build (Full)*
Analysis Time Period	*PM Peak*		

Project Description

East/West Street: *Princeton Rd* | North/South Street: *Van Gordon Rd*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*34*	*596*	*0*	*0*	*643*	*40*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*36*	*647*	*0*	*0*	*698*	*43*
Percent Heavy Vehicles	*1*	--	--	*1*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LTR*			*LTR*		
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*11*	*10*	*20*	*40*	*10*	*74*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*11*	*10*	*21*	*43*	*10*	*80*
Percent Heavy Vehicles	*1*	*1*	*1*	*1*	*1*	*1*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration		*LTR*			*LTR*	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LTR*	*LTR*		*LTR*			*LTR*	
v (veh/h)	*36*	*0*		*42*			*133*	
C (m) (veh/h)	*870*	*943*		*155*			*183*	
v/c	*0.04*	*0.00*		*0.27*			*0.73*	
95% queue length	*0.13*	*0.00*		*1.04*			*4.60*	
Control Delay (s/veh)	*9.3*	*8.8*		*36.6*			*64.3*	
LOS	*A*	*A*		*E*			*F*	
Approach Delay (s/veh)	--	--	*36.6*			*64.3*		
Approach LOS	--	--	*E*			*F*		

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TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*ERW*	Intersection	*Princeton and Van Gordon*
Agency/Co.	*TEC*	Jurisdiction	*Liberty Township*
Date Performed	*4/9/13*	Analysis Year	*2032 Build (Full)*
Analysis Time Period	*PM Peak*		

Project Description

East/West Street: *Princeton Rd* | North/South Street: *Van Gordon Rd*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*34*	*596*	*0*	*0*	*643*	*40*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*36*	*647*	*0*	*0*	*698*	*43*
Percent Heavy Vehicles	*1*	--	--	*1*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LTR*			*LTR*		
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*11*	*10*	*20*	*40*	*10*	*74*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*11*	*10*	*21*	*43*	*10*	*80*
Percent Heavy Vehicles	*1*	*1*	*1*	*1*	*1*	*1*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration		*LTR*			*LTR*	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LTR*	*LTR*		*LTR*			*LTR*	
v (veh/h)	*36*	*0*		*42*			*133*	
C (m) (veh/h)	*870*	*943*		*155*			*183*	
v/c	*0.04*	*0.00*		*0.27*			*0.73*	
95% queue length	*0.13*	*0.00*		*1.04*			*4.60*	
Control Delay (s/veh)	*9.3*	*8.8*		*36.6*			*64.3*	
LOS	*A*	*A*		*E*			*F*	
Approach Delay (s/veh)	--	--	*36.6*			*64.3*		
Approach LOS	--	--	*E*			*F*		

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Milikin Rd and Winding Creek

2032

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*ERW*
Agency/Co.	*TEC*
Date Performed	*4/9/2013*
Analysis Time Period	*2032 AM Peak Build*

Site Information

Intersection	*Milikin & Winding Creek*
Jurisdiction	*Liberty Township*
Analysis Year	*2032*

Project Description

East/West Street: *Milikin Road* North/South Street: *Winding Creek*

Intersection Orientation: *East-West* Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		*379*	*25*	*6*	*403*	
Peak-Hour Factor, PHF	*1.00*	*0.92*	*0.92*	*0.92*	*0.92*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*0*	*411*	*27*	*6*	*438*	*0*
Percent Heavy Vehicles	*0*	--	--	*1*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*1*	*1*	*1*	*0*
Configuration		*T*	*R*	*L*	*T*	
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*71*		*19*			
Peak-Hour Factor, PHF	*0.92*	*1.00*	*0.92*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*77*	*0*	*20*	*0*	*0*	*0*
Percent Heavy Vehicles	*1*	*0*	*1*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration		*LR*				

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*L*		*LR*				
v (veh/h)		*6*		*97*				
C (m) (veh/h)		*1127*		*362*				
v/c		*0.01*		*0.27*				
95% queue length		*0.02*		*1.06*				
Control Delay (s/veh)		*8.2*		*18.5*				
LOS		*A*		*C*				
Approach Delay (s/veh)	--	--	*18.5*					
Approach LOS	--	--	*C*					

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*ERW*
Agency/Co.	*TEC*
Date Performed	*4/9/2013*
Analysis Time Period	*2032 AM Peak Build*

Site Information

Intersection	*Milikin & Winding Creek*
Jurisdiction	*Liberty Township*
Analysis Year	*2032*

Project Description

East/West Street: *Milikin Road* | North/South Street: *Winding Creek*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		*379*	*25*	*6*	*403*	
Peak-Hour Factor, PHF	*1.00*	*0.92*	*0.92*	*0.92*	*0.92*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*0*	*411*	*27*	*6*	*438*	*0*
Percent Heavy Vehicles	*0*	--	--	*1*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*1*	*1*	*1*	*0*
Configuration		*T*	*R*	*L*	*T*	
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*71*		*19*			
Peak-Hour Factor, PHF	*0.92*	*1.00*	*0.92*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*77*	*0*	*20*	*0*	*0*	*0*
Percent Heavy Vehicles	*1*	*0*	*1*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration		*LR*				

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*L*		*LR*				
v (veh/h)		*6*		*97*				
C (m) (veh/h)		*1127*		*362*				
v/c		*0.01*		*0.27*				
95% queue length		*0.02*		*1.06*				
Control Delay (s/veh)		*8.2*		*18.5*				
LOS		*A*		*C*				
Approach Delay (s/veh)	--	--	*18.5*					
Approach LOS	--	--	*C*					

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*ERW*
Agency/Co.	*TEC*
Date Performed	*4/9/2013*
Analysis Time Period	*2032 AM Peak Build (Full)*

Site Information

Intersection	*Milikin & Winding Creek*
Jurisdiction	*Liberty Township*
Analysis Year	*2032*

Project Description

East/West Street: *Milikin Road* | North/South Street: *Winding Creek*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		*382*	*25*	*6*	*415*	
Peak-Hour Factor, PHF	*1.00*	*0.92*	*0.92*	*0.92*	*0.92*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*0*	*415*	*27*	*6*	*451*	*0*
Percent Heavy Vehicles	*0*	--	--	*1*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*1*	*1*	*1*	*0*
Configuration		*T*	*R*	*L*	*T*	
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*71*		*20*			
Peak-Hour Factor, PHF	*0.92*	*1.00*	*0.92*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*77*	*0*	*21*	*0*	*0*	*0*
Percent Heavy Vehicles	*1*	*0*	*1*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration		*LR*				

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*L*		*LR*				
v (veh/h)		*6*		*98*				
C (m) (veh/h)		*1123*		*356*				
v/c		*0.01*		*0.28*				
95% queue length		*0.02*		*1.10*				
Control Delay (s/veh)		*8.2*		*18.9*				
LOS		*A*		*C*				
Approach Delay (s/veh)	--	--	*18.9*					
Approach LOS	--	--	*C*					

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*ERW*
Agency/Co.	*TEC*
Date Performed	*4/9/2013*
Analysis Time Period	*2032 AM Peak Build (Full)*

Site Information

Intersection	*Milikin & Winding Creek*
Jurisdiction	*Liberty Township*
Analysis Year	*2032*

Project Description

East/West Street: *Milikin Road* | North/South Street: *Winding Creek*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		*382*	*25*	*6*	*415*	
Peak-Hour Factor, PHF	*1.00*	*0.92*	*0.92*	*0.92*	*0.92*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*0*	*415*	*27*	*6*	*451*	*0*
Percent Heavy Vehicles	*0*	--	--	*1*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*1*	*1*	*1*	*0*
Configuration		*T*	*R*	*L*	*T*	
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*71*		*20*			
Peak-Hour Factor, PHF	*0.92*	*1.00*	*0.92*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*77*	*0*	*21*	*0*	*0*	*0*
Percent Heavy Vehicles	*1*	*0*	*1*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration		*LR*				

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*L*		*LR*				
v (veh/h)		*6*		*98*				
C (m) (veh/h)		*1123*		*356*				
v/c		*0.01*		*0.28*				
95% queue length		*0.02*		*1.10*				
Control Delay (s/veh)		*8.2*		*18.9*				
LOS		*A*		*C*				
Approach Delay (s/veh)	--	--	*18.9*					
Approach LOS	--	--	*C*					

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*ERW*
Agency/Co.	*TEC*
Date Performed	*4/9/2013*
Analysis Time Period	*2032 PM Peak Build*

Site Information

Intersection	*Milikin & Winding Creek*
Jurisdiction	*Liberty Township*
Analysis Year	*2032*

Project Description

East/West Street: *Milikin Road* | North/South Street: *Winding Creek*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		*505*	*78*	*18*	*463*	
Peak-Hour Factor, PHF	*1.00*	*0.92*	*0.92*	*0.92*	*0.92*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*0*	*548*	*84*	*19*	*503*	*0*
Percent Heavy Vehicles	*0*	--	--	*1*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*1*	*1*	*1*	*0*
Configuration		*T*	*R*	*L*	*T*	
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*43*		*12*			
Peak-Hour Factor, PHF	*0.92*	*1.00*	*0.92*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*46*	*0*	*13*	*0*	*0*	*0*
Percent Heavy Vehicles	*1*	*0*	*1*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration		*LR*				

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*L*		*LR*				
v (veh/h)		*19*		*59*				
C (m) (veh/h)		*956*		*268*				
v/c		*0.02*		*0.22*				
95% queue length		*0.06*		*0.82*				
Control Delay (s/veh)		*8.8*		*22.2*				
LOS		*A*		*C*				
Approach Delay (s/veh)	--	--	*22.2*					
Approach LOS	--	--	*C*					

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*ERW*
Agency/Co.	*TEC*
Date Performed	*4/9/2013*
Analysis Time Period	*2032 PM Peak Build*

Site Information

Intersection	*Milikin & Winding Creek*
Jurisdiction	*Liberty Township*
Analysis Year	*2032*

Project Description

East/West Street: *Milikin Road* North/South Street: *Winding Creek*

Intersection Orientation: *East-West* Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		*505*	*78*	*18*	*463*	
Peak-Hour Factor, PHF	*1.00*	*0.92*	*0.92*	*0.92*	*0.92*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*0*	*548*	*84*	*19*	*503*	*0*
Percent Heavy Vehicles	*0*	--	--	*1*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*1*	*1*	*1*	*0*
Configuration		*T*	*R*	*L*	*T*	
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*43*		*12*			
Peak-Hour Factor, PHF	*0.92*	*1.00*	*0.92*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*46*	*0*	*13*	*0*	*0*	*0*
Percent Heavy Vehicles	*1*	*0*	*1*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration		*LR*				

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*L*		*LR*				
v (veh/h)		*19*		*59*				
C (m) (veh/h)		*956*		*268*				
v/c		*0.02*		*0.22*				
95% queue length		*0.06*		*0.82*				
Control Delay (s/veh)		*8.8*		*22.2*				
LOS		*A*		*C*				
Approach Delay (s/veh)	--	--	*22.2*					
Approach LOS	--	--	*C*					

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*ERW*
Agency/Co.	*TEC*
Date Performed	*4/9/2013*
Analysis Time Period	*2032 PM Peak Build (Full)*

Site Information

Intersection	*Milikin & Winding Creek*
Jurisdiction	*Liberty Township*
Analysis Year	*2032*

Project Description

East/West Street: *Milikin Road* | North/South Street: *Winding Creek*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		*506*	*78*	*18*	*467*	
Peak-Hour Factor, PHF	*1.00*	*0.92*	*0.92*	*0.92*	*0.92*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*0*	*549*	*84*	*19*	*507*	*0*
Percent Heavy Vehicles	*0*	--	--	*1*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*1*	*1*	*1*	*0*
Configuration		*T*	*R*	*L*	*T*	
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*43*		*12*			
Peak-Hour Factor, PHF	*0.92*	*1.00*	*0.92*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*46*	*0*	*13*	*0*	*0*	*0*
Percent Heavy Vehicles	*1*	*0*	*1*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration		*LR*				

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*L*		*LR*				
v (veh/h)		*19*		*59*				
C (m) (veh/h)		*955*		*266*				
v/c		*0.02*		*0.22*				
95% queue length		*0.06*		*0.83*				
Control Delay (s/veh)		*8.8*		*22.3*				
LOS		*A*		*C*				
Approach Delay (s/veh)	--	--	*22.3*					
Approach LOS	--	--	*C*					

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*ERW*
Agency/Co.	*TEC*
Date Performed	*4/9/2013*
Analysis Time Period	*2032 PM Peak Build (Full)*

Site Information

Intersection	*Milikin & Winding Creek*
Jurisdiction	*Liberty Township*
Analysis Year	*2032*

Project Description

East/West Street: *Milikin Road* | North/South Street: *Winding Creek*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		*506*	*78*	*18*	*467*	
Peak-Hour Factor, PHF	*1.00*	*0.92*	*0.92*	*0.92*	*0.92*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*0*	*549*	*84*	*19*	*507*	*0*
Percent Heavy Vehicles	*0*	--	--	*1*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*1*	*1*	*1*	*0*
Configuration		*T*	*R*	*L*	*T*	
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*43*		*12*			
Peak-Hour Factor, PHF	*0.92*	*1.00*	*0.92*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*46*	*0*	*13*	*0*	*0*	*0*
Percent Heavy Vehicles	*1*	*0*	*1*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration		*LR*				

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*L*		*LR*				
v (veh/h)		*19*		*59*				
C (m) (veh/h)		*955*		*266*				
v/c		*0.02*		*0.22*				
95% queue length		*0.06*		*0.83*				
Control Delay (s/veh)		*8.8*		*22.3*				
LOS		*A*		*C*				
Approach Delay (s/veh)	--	--	*22.3*					
Approach LOS	--	--	*C*					

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Princeton Rd & Access 3

2032

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*ERW*
Agency/Co.	*TEC*
Date Performed	*4/9/2013*
Analysis Time Period	*PM Peak Hour*

Site Information

Intersection	*Princeton & Access 3*
Jurisdiction	*Liberty Township*
Analysis Year	*2032*

Project Description

East/West Street: *Princeton Road* | North/South Street: *Access 3*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*12*	*500*			*457*	*7*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*1.00*	*1.00*	*0.92*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*13*	*543*	*0*	*0*	*496*	*7*
Percent Heavy Vehicles	*1*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*1*	*1*	*0*	*0*	*1*	*0*
Configuration	*L*	*T*				*TR*
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				*19*		*23*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*0.92*	*1.00*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*20*	*0*	*24*
Percent Heavy Vehicles	*0*	*0*	*0*	*1*	*0*	*1*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration					*LR*	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*L*						*LR*	
v (veh/h)	*13*						*44*	
C (m) (veh/h)	*1067*						*354*	
v/c	*0.01*						*0.12*	
95% queue length	*0.04*						*0.42*	
Control Delay (s/veh)	*8.4*						*16.6*	
LOS	*A*						*C*	
Approach Delay (s/veh)	--	--					*16.6*	
Approach LOS	--	--					*C*	

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*ERW*
Agency/Co.	*TEC*
Date Performed	*4/9/2013*
Analysis Time Period	*PM Peak Hour*

Site Information

Intersection	*Princeton & Access 3*
Jurisdiction	*Liberty Township*
Analysis Year	*2032*

Project Description

East/West Street: *Princeton Road* | North/South Street: *Access 3*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*12*	*500*			*457*	*7*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*1.00*	*1.00*	*0.92*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*13*	*543*	*0*	*0*	*496*	*7*
Percent Heavy Vehicles	*1*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*1*	*1*	*0*	*0*	*1*	*0*
Configuration	*L*	*T*				*TR*
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				*19*		*23*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*0.92*	*1.00*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*20*	*0*	*24*
Percent Heavy Vehicles	*0*	*0*	*0*	*1*	*0*	*1*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration					*LR*	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*L*						*LR*	
v (veh/h)	*13*						*44*	
C (m) (veh/h)	*1067*						*354*	
v/c	*0.01*						*0.12*	
95% queue length	*0.04*						*0.42*	
Control Delay (s/veh)	*8.4*						*16.6*	
LOS	*A*						*C*	
Approach Delay (s/veh)	--	--					*16.6*	
Approach LOS	--	--					*C*	

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*ERW*
Agency/Co.	*TEC*
Date Performed	*4/9/2013*
Analysis Time Period	*PM Peak Hour*

Site Information

Intersection	*Princeton & Access 3*
Jurisdiction	*Liberty Township*
Analysis Year	*2032*

Project Description *2032 Build (Full)*

East/West Street: *Princeton Road* | North/South Street: *Access 3*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*12*	*429*			*557*	*8*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*1.00*	*1.00*	*0.92*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*13*	*466*	*0*	*0*	*605*	*8*
Percent Heavy Vehicles	*1*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*1*	*1*	*0*	*0*	*1*	*1*
Configuration	*L*	*T*			*T*	*R*
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				*23*		*23*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*0.92*	*1.00*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*24*	*0*	*24*
Percent Heavy Vehicles	*0*	*0*	*0*	*1*	*0*	*1*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration					*LR*	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*L*						*LR*	
v (veh/h)	*13*						*48*	
C (m) (veh/h)	*971*						*319*	
v/c	*0.01*						*0.15*	
95% queue length	*0.04*						*0.52*	
Control Delay (s/veh)	*8.8*						*18.3*	
LOS	*A*						*C*	
Approach Delay (s/veh)	--	--					*18.3*	
Approach LOS	--	--					*C*	

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*ERW*
Agency/Co.	*TEC*
Date Performed	*4/9/2013*
Analysis Time Period	*PM Peak Hour*

Site Information

Intersection	*Princeton & Access 3*
Jurisdiction	*Liberty Township*
Analysis Year	*2032*

Project Description *2032 Build (Full)*

East/West Street: *Princeton Road* | North/South Street: *Access 3*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*12*	*429*			*557*	*8*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*1.00*	*1.00*	*0.92*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*13*	*466*	*0*	*0*	*605*	*8*
Percent Heavy Vehicles	*1*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*1*	*1*	*0*	*0*	*1*	*1*
Configuration	*L*	*T*			*T*	*R*
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				*23*		*23*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*0.92*	*1.00*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*24*	*0*	*24*
Percent Heavy Vehicles	*0*	*0*	*0*	*1*	*0*	*1*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration					*LR*	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*L*						*LR*	
v (veh/h)	*13*						*48*	
C (m) (veh/h)	*971*						*319*	
v/c	*0.01*						*0.15*	
95% queue length	*0.04*						*0.52*	
Control Delay (s/veh)	*8.8*						*18.3*	
LOS	*A*						*C*	
Approach Delay (s/veh)	--	--					*18.3*	
Approach LOS	--	--					*C*	

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*ERW*
Agency/Co.	*TEC*
Date Performed	*4/9/2013*
Analysis Time Period	*PM Peak Hour*

Site Information

Intersection	*Princeton & Access 3*
Jurisdiction	*Liberty Township*
Analysis Year	*2032*

Project Description

East/West Street: *Princeton Road* | North/South Street: *Access 3*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*38*	*606*			*704*	*22*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*1.00*	*1.00*	*0.92*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*41*	*658*	*0*	*0*	*765*	*23*
Percent Heavy Vehicles	*1*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*1*	*1*	*0*	*0*	*1*	*0*
Configuration	*L*	*T*				*TR*
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				*13*		*16*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*0.92*	*1.00*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*14*	*0*	*17*
Percent Heavy Vehicles	*0*	*0*	*0*	*1*	*0*	*1*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration					*LR*	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*L*						*LR*	
v (veh/h)	*41*						*31*	
C (m) (veh/h)	*836*						*202*	
v/c	*0.05*						*0.15*	
95% queue length	*0.15*						*0.53*	
Control Delay (s/veh)	*9.5*						*26.0*	
LOS	*A*						*D*	
Approach Delay (s/veh)	--	--					*26.0*	
Approach LOS	--	--					*D*	

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*ERW*
Agency/Co.	*TEC*
Date Performed	*4/9/2013*
Analysis Time Period	*PM Peak Hour*

Site Information

Intersection	*Princeton & Access 3*
Jurisdiction	*Liberty Township*
Analysis Year	*2032*

Project Description

East/West Street: *Princeton Road* | North/South Street: *Access 3*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*38*	*606*			*704*	*22*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*1.00*	*1.00*	*0.92*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*41*	*658*	*0*	*0*	*765*	*23*
Percent Heavy Vehicles	*1*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*1*	*1*	*0*	*0*	*1*	*0*
Configuration	*L*	*T*				*TR*
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				*13*		*16*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*0.92*	*1.00*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*14*	*0*	*17*
Percent Heavy Vehicles	*0*	*0*	*0*	*1*	*0*	*1*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration					*LR*	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*L*						*LR*	
v (veh/h)	*41*						*31*	
C (m) (veh/h)	*836*						*202*	
v/c	*0.05*						*0.15*	
95% queue length	*0.15*						*0.53*	
Control Delay (s/veh)	*9.5*						*26.0*	
LOS	*A*						*D*	
Approach Delay (s/veh)	--	--					*26.0*	
Approach LOS	--	--					*D*	

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*ERW*
Agency/Co.	*TEC*
Date Performed	*4/9/2013*
Analysis Time Period	*PM Peak Hour*

Site Information

Intersection	*Princeton & Access 3*
Jurisdiction	*Liberty Township*
Analysis Year	*2032*

Project Description *2032 Build (Full)*

East/West Street: *Princeton Road* | North/South Street: *Access 3*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*38*	*774*			*737*	*24*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*1.00*	*1.00*	*0.92*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*41*	*841*	*0*	*0*	*801*	*26*
Percent Heavy Vehicles	*1*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*1*	*1*	*0*	*0*	*1*	*1*
Configuration	*L*	*T*			*T*	*R*
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				*24*		*16*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*0.92*	*1.00*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*26*	*0*	*17*
Percent Heavy Vehicles	*0*	*0*	*0*	*1*	*0*	*1*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration					*LR*	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*L*						*LR*	
v (veh/h)	*41*						*43*	
C (m) (veh/h)	*808*						*133*	
v/c	*0.05*						*0.32*	
95% queue length	*0.16*						*1.29*	
Control Delay (s/veh)	*9.7*						*44.5*	
LOS	*A*						*E*	
Approach Delay (s/veh)	--	--					*44.5*	
Approach LOS	--	--					*E*	

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*ERW*
Agency/Co.	*TEC*
Date Performed	*4/9/2013*
Analysis Time Period	*PM Peak Hour*

Site Information

Intersection	*Princeton & Access 3*
Jurisdiction	*Liberty Township*
Analysis Year	*2032*

Project Description *2032 Build (Full)*

East/West Street: *Princeton Road* | North/South Street: *Access 3*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*38*	*774*			*737*	*24*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*1.00*	*1.00*	*0.92*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*41*	*841*	*0*	*0*	*801*	*26*
Percent Heavy Vehicles	*1*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*1*	*1*	*0*	*0*	*1*	*1*
Configuration	*L*	*T*			*T*	*R*
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				*24*		*16*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*0.92*	*1.00*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*26*	*0*	*17*
Percent Heavy Vehicles	*0*	*0*	*0*	*1*	*0*	*1*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration					*LR*	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*L*						*LR*	
v (veh/h)	*41*						*43*	
C (m) (veh/h)	*808*						*133*	
v/c	*0.05*						*0.32*	
95% queue length	*0.16*						*1.29*	
Control Delay (s/veh)	*9.7*						*44.5*	
LOS	*A*						*E*	
Approach Delay (s/veh)	--	--				*44.5*		
Approach LOS	--	--				*E*		

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SR 747 & Access 1

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*ERW*
Agency/Co.	*TEC*
Date Performed	*4/9/2013*
Analysis Time Period	*2032 AM Peak Build*

Site Information

Intersection	*SR 747 & Access 1*
Jurisdiction	*Liberty Township*
Analysis Year	*2032*

Project Description

East/West Street: *Access 1* North/South Street: *SR 747*

Intersection Orientation: *North-South* Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		*677*	*12*		*1783*	
Peak-Hour Factor, PHF	*1.00*	*0.92*	*0.92*	*1.00*	*0.92*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*0*	*735*	*13*	*0*	*1938*	*0*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*1*	*0*	*1*	*0*
Configuration		*T*	*R*		*T*	
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)						*7*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*0*	*0*	*7*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*1*
Configuration						*R*

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration					*R*			
v (veh/h)					*7*			
C (m) (veh/h)					*423*			
v/c					*0.02*			
95% queue length					*0.05*			
Control Delay (s/veh)					*13.7*			
LOS					*B*			
Approach Delay (s/veh)	--	--	*13.7*					
Approach LOS	--	--	*B*					

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*ERW*
Agency/Co.	*TEC*
Date Performed	*4/9/2013*
Analysis Time Period	

Site Information

Intersection	*SR 747 & Access 1*
Jurisdiction	*Liberty Township*
Analysis Year	*2032*

Project Description

East/West Street: *Access 1* North/South Street: *SR 747*

Intersection Orientation: *North-South* Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		*718*	*75*		*1665*	
Peak-Hour Factor, PHF	*1.00*	*0.92*	*0.92*	*1.00*	*0.92*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*0*	*780*	*81*	*0*	*1809*	*0*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*1*	*0*	*1*	*0*
Configuration		*T*	*R*		*T*	
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)						*16*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*0*	*0*	*17*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*1*
Configuration						*R*

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration					*R*			
v (veh/h)					*17*			
C (m) (veh/h)					*399*			
v/c					*0.04*			
95% queue length					*0.13*			
Control Delay (s/veh)					*14.4*			
LOS					*B*			
Approach Delay (s/veh)	--	--	*14.4*					
Approach LOS	--	--	*B*					

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*ERW*
Agency/Co.	*TEC*
Date Performed	*4/9/2013*
Analysis Time Period	

Site Information

Intersection	*SR 747 & Access 1*
Jurisdiction	*Liberty Township*
Analysis Year	*2032*

Project Description

East/West Street: *Access 1* North/South Street: *SR 747*

Intersection Orientation: *North-South* Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		*718*	*75*		*1665*	
Peak-Hour Factor, PHF	*1.00*	*0.92*	*0.92*	*1.00*	*0.92*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*0*	*780*	*81*	*0*	*1809*	*0*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*1*	*0*	*1*	*0*
Configuration		*T*	*R*		*T*	
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)						*16*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*0*	*0*	*17*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*1*
Configuration						*R*

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration					*R*			
v (veh/h)					*17*			
C (m) (veh/h)					*399*			
v/c					*0.04*			
95% queue length					*0.13*			
Control Delay (s/veh)					*14.4*			
LOS					*B*			
Approach Delay (s/veh)	--	--	*14.4*					
Approach LOS	--	--	*B*					

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*ERW*
Agency/Co.	*TEC*
Date Performed	*4/9/2013*
Analysis Time Period	*2032 PM Peak Build*

Site Information

Intersection	*SR 747 & Access 1*
Jurisdiction	*Liberty Township*
Analysis Year	*2032*

Project Description

East/West Street: *Access 1* North/South Street: *SR 747*

Intersection Orientation: *North-South* Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		*1960*	*39*		*835*	
Peak-Hour Factor, PHF	*1.00*	*0.92*	*0.92*	*1.00*	*0.92*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*0*	*2130*	*42*	*0*	*907*	*0*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*1*	*0*	*1*	*0*
Configuration		*T*	*R*		*T*	
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)						*4*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*0*	*0*	*4*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*1*
Configuration						*R*

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration					*R*			
v (veh/h)					*4*			
C (m) (veh/h)					*63*			
v/c					*0.06*			
95% queue length					*0.20*			
Control Delay (s/veh)					*66.0*			
LOS					*F*			
Approach Delay (s/veh)	--	--	*66.0*					
Approach LOS	--	--	*F*					

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*ERW*
Agency/Co.	*TEC*
Date Performed	*4/9/2013*
Analysis Time Period	

Site Information

Intersection	*SR 747 & Access 1*
Jurisdiction	*Liberty Township*
Analysis Year	*2032*

Project Description

East/West Street: *Access 1* North/South Street: *SR 747*

Intersection Orientation: *North-South* Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		*1989*	*63*		*944*	
Peak-Hour Factor, PHF	*1.00*	*0.92*	*0.92*	*1.00*	*0.92*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*0*	*2161*	*68*	*0*	*1026*	*0*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*1*	*0*	*1*	*0*
Configuration		*T*	*R*		*T*	
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)						*68*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*0*	*0*	*73*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*1*
Configuration						*R*

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration					*R*			
v (veh/h)					*73*			
C (m) (veh/h)					*61*			
v/c					*1.20*			
95% queue length					*6.04*			
Control Delay (s/veh)					*292.0*			
LOS					*F*			
Approach Delay (s/veh)	--	--	*292.0*					
Approach LOS	--	--	*F*					

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*ERW*
Agency/Co.	*TEC*
Date Performed	*4/9/2013*
Analysis Time Period	

Site Information

Intersection	*SR 747 & Access 1*
Jurisdiction	*Liberty Township*
Analysis Year	*2032*

Project Description

East/West Street: *Access 1* | North/South Street: *SR 747*

Intersection Orientation: *North-South* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		*1989*	*63*		*944*	
Peak-Hour Factor, PHF	*1.00*	*0.92*	*0.92*	*1.00*	*0.92*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*0*	*2161*	*68*	*0*	*1026*	*0*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*1*	*0*	*1*	*0*
Configuration		*T*	*R*		*T*	
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)						*68*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*0*	*0*	*73*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*1*
Configuration						*R*

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration					*R*			
v (veh/h)					*73*			
C (m) (veh/h)					*61*			
v/c					*1.20*			
95% queue length					*6.04*			
Control Delay (s/veh)					*292.0*			
LOS					*F*			
Approach Delay (s/veh)	--	--	*292.0*					
Approach LOS	--	--	*F*					

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