FOUNDRY FLASK

456 E. CADY STREET
TRAFFIC IMPACT STUDY

NORTHVILLE, MICHIGAN

AUGUST 31, 2021

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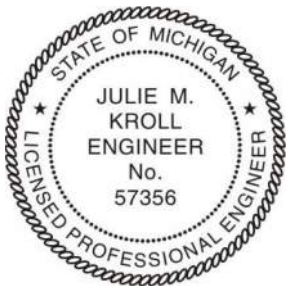

I hereby certify that this engineering document was prepared by me or under my direct personal supervision and that I am a duly licensed Professional Engineer under the laws of the State of Michigan.

Julie M. Kroll

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Agency Review	Date	Comments

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EXECUTIVE SUMMARY

This report presents the results of a Traffic Impact Study (TIS) for the proposed mixed-use retail and multi-family residential development in City of Northville, Michigan. The project site is located at 456 E. Cady Street, generally in the southeast quadrant of the Cady Street and Griswold Street intersection, on the property that was previously occupied by Foundry Flask site, as shown on **Figure E1**. The proposed development includes the construction of a mixed-use retail and multi-family residential development. Site access is proposed via two (2) driveways on Cady Street, which is under the jurisdiction of the City of Northville.

FIGURE E1: SITE LOCATION

BACKGROUND DATA

The existing weekday turning movement traffic volume data were collected by F&V subconsultant Traffic Data Collection, Inc. (TDC) on Tuesday, May 15, 2018, and Thursday, October 18, 2018 at the following intersections.

- Cady Street & Griswold Street
- Main Street & Griswold Street
- Beal Street & Northville Road
- Beal Street & River Street

An annual growth rate of 0.2% was applied to the 2018 traffic volume data, in order to determine the existing baseline 2021 volumes. Additionally, F&V collected turning movement traffic volume data at the intersection of

Main Street and Cady Street on Thursday, August 12, 2021. Due to the impact of COVID-19, the current traffic volume data is not representative of "typical" operations. Therefore, following COVID adjustment factors were applied to the 2021 turning movement counts at the intersection of Main Street and Cady Street to determine an existing baseline 2021 data.

COVID Traffic Volume Adjustment Factors

Intersection	AM Peak Hour	PM Peak Hour
Cady Street & Main Street	+34%	+44%

In addition, the following background developments identified by the City of Northville were included in the analysis:

- Cady Project – 6-unit condominium (South side of Cady Street, east of Center Street)
- 355 E. Cady St. - 3-story mixed-use building; first floor Retail, office above
- 455 E. Cady St "Hanger Building"- office space

TRIP GENERATION

The number of peak hour (AM and PM), and daily vehicle trips that would be generated by the proposed developments were forecast based on data published in the Institute of Transportation Engineers (ITE) *Trip Generation Manual 10th Edition* and the ITE *Trip Generation Handbook, 3rd Edition*. The trip generation is summarized in **Table E1**. *Note: Pass-by trip reductions were not included in this study to provide a conservative analysis.*

Table E1: Trip Generation Summary

Land Use	ITE Code	Amount	Units	Average Daily Traffic (vpd)	AM Peak Hour (vph)			PM Peak Hour (vph)		
					In	Out	Total	In	Out	Total
Shopping Center	820	10,000	S.F.	1,256	6	3	9	48	51	99
Multi-Family Housing (Mid-Rise)	221	78	D.U.	423	7	20	27	21	14	35
			Total	**1,679**	**13**	**23**	**36**	**69**	**65**	**134**

A trip generation comparison was performed between the previously proposed Northville Downs Planned Unit Development (PUD) and the Foundry Flask. **Table E2** shows the trip generation comparison and indicates that the proposed development is expected to generate approximately 24% of the overall traffic generated by Northville Downs PUD.

Table E2: Trip Generation Comparison

Development	Average Daily Traffic (vpd)	AM Peak Hour (vph)			PM Peak Hour (vph)		
		In	Out	Total	In	Out	Total
Foundry Flask	1,679	13	23	36	69	65	134
Northville Downs	5,188	58	154	212	183	132	315
Total Trips	*6,867*	*71*	*177*	*248*	*252*	*197*	*449*
Foundry Flask Percentage of Total Trips	**24%**	**18%**	**13%**	**15%**	**27%**	**33%**	**30%**

SITE TRIP DISTRIBUTION

The vehicular trips that would be generated by the proposed development were assigned to the study roads based on existing peak hour traffic patterns in the adjacent roadway network and the methodologies published by ITE. Separate trip distributions were determined for the commercial (retail) and residential portions of the proposed development. The trip distributions used in this study is summarized in **Table E3**.

Table E3: Trip Distribution

Commercial		To/From	via	Residential	
AM	PM			AM	PM
26%	33%	West	Main Street	29%	22%
18%	5%		Cady Street	6%	10%
22%	32%	North	Griswold Street	35%	28%
34%	30%	South	Northville Road	30%	40%
100%	**100%**	**Total**		**100%**	**100%**

CONCLUSIONS

The existing peak hour vehicle delays and Levels of Service (LOS) were calculated at the study intersections using Synchro (Version 11) traffic analysis software. The results of the analysis are summarized below.

1. **Existing Conditions:** All study intersection approaches and movements currently operate acceptably at a LOS D or better during both peak periods. A review of SimTraffic network simulations indicates generally acceptable operation during both peak periods; however, microsimulation during the PM peak hour indicate the southbound approach of the intersection of Main Street and Griswold Street experiences occasional periods of long vehicle queues. Mitigation measures were evaluated to reduce the existing vehicle queueing and signal timing optimization was found to be adequate to reduce queues on the southbound approach during the PM peak hour.

2. **Background (2023) Growth:** An annual growth rate of 0.2% per year was determined based on SEMCOG economic and population data. In addition, the following background developments were identified by the City of Northville and were included in this analysis:

   - Cady Project – 6-unit condominium (South side of Cady Street, east of Center Street)
   - 355 E. Cady St. - 3-story mixed-use building; first floor Retail, office above
   - 455 E. Cady St "Hanger Building"- office space

   Background (2023) Conditions: With the addition of the 2023 background traffic, all study intersection approaches and movements are expected to continue operating in a manner similar to existing conditions with occasional periods of long vehicle queues at the southbound approach of Main Street and Griswold Street intersection during the PM peak hour. A review of network simulations indicates that signal timing optimization was observed to reduce vehicle queues on the southbound approach during the PM peak hour in background conditions.

3. **Trip Generation Comparison:** The trip generation of the previously proposed Northville Downs PUD was compared with the proposed Foundry Flask development. The proposed development is expected to generate approximately 24% of the overall traffic generated by Northville Downs PUD.

4. **Future Conditions:** With the addition of the site-generated traffic, all study intersection approaches and movements are expected to continue operating in a manner similar to background conditions. A review of SimTraffic network simulations also indicates similar operations to those observed under existing and background conditions with occasional periods of long vehicle queues at the southbound approach of Main Street and Griswold Street intersection during the PM peak hour.

   However, the signal timing optimization was found to be adequate to reduce vehicle queues on the southbound approach of the Main Street and Griswold Street intersection during the PM peak hour.

RECOMMENDATIONS

1. Optimize the signal timing at the intersection of Main Street and Griswold Street.

1 INTRODUCTION

This report presents the results of a Traffic Impact Study (TIS) for the proposed mixed-use retail and multi-family residential development in the City of Northville, Michigan. The project site is located at 456 E. Cady Street, generally in the southeast quadrant of the Cady Street and Griswold Street intersection, on the property that was previously occupied by Foundry Flask site, as shown in **Figure 1**. The proposed development includes the construction of a mixed-use retail and multi-family residential development. Site access is proposed via two (2) driveways on Cady Street, which is under the jurisdiction of the City of Northville. The developer has provided a Traffic Impact Study (TIS) for the project as part of the site plan approval process.

The purpose of this study is to identify the traffic related impacts, if any, of the proposed development project on the adjacent road network. Specific tasks undertaken for this study include the following:

1. Study Area

a. Provide a description of the study area including: intersection and roadway geometries, speed limits, functional classifications and traffic volume data (where available). In addition, a study area site map showing the site location and the study intersections will also be provided.

2. Proposed Land Use

a. Obtain and review the proposed site plan which includes the proposed land uses, densities, and desired site access locations. A description of the current and proposed land use will be accompanied with a complete project site plan (with buildings identified as to proposed use). A schedule for construction of the development and proposed development stages (if any) will also be provided.

3. Existing Conditions

a. Provide an analysis of the traffic-related impacts of the proposed development at the following study intersections:

- Cady Street & Griswold Street
- Cady Street & Main Street
- Main Street & Griswold Street
- Beal Street & Northville Road
- Beal Street & River Street
- Cady Street & Site Drives (2 locations)

b. Due to the impact of COVID-19, current traffic volume data is not representative of “typical” operations. Therefore, the data collection necessary for this study is proposed as follows:

- Use pre-COVID (2018) turning movement count data collected by F&V at the study intersections, where available and apply a background growth rate to calculate the ‘existing’ 2021 traffic volumes for use in the study.
- Collect existing AM (7:00AM to 9:00 AM) and PM (4:00 to 6:00 PM) peak period turning movement count data at Cady Street & Main Street (not collected in 2018).
- Compare the existing traffic volumes collected with the historical (2018) traffic volumes. Calculate a COVID adjustment factor to determine the baseline existing 2021 traffic volumes for use in the study.
- Apply the COVID adjustment factor to existing 2021 traffic volumes to determine the ‘existing’ 2021 traffic volumes at Cady Street & Main Street.

c. Calculate the **Existing** vehicle delays, LOS, and vehicle queues at the study intersections during the AM and PM peak hours. Intersection analysis shall include LOS determination for all approaches and movements. The LOS will be based on the procedures outlined in the HCM 6th Edition, the latest edition of Transportation Research Board’s Highway Capacity Manual.

FIGURE 1

SITE LOCATION

FOUNDRY FLASK TIS - NORTHVILLE, MI

LEGEND

SITE — SITE LOCATION

NORTH

SCALE: NOT TO SCALE

4. Background Conditions

b. Calculate the future background traffic volumes based on an appropriate traffic growth determined from local or statewide data to the project build-out year and/or any applicable background developments (not included in the 2018 traffic counts) in the vicinity of this project as identified by the City of Northville.

- Cady Project – 6-unit condominium (South side of Cady Street, east of Center Street)
- 355 E. Cady St. - 3-story mixed-use building; first floor Retail, office above
- 455 E. Cady St "Hanger Building"- office space

c. Calculate the **Background (*without the proposed development***) vehicle delays, LOS, and vehicle queues at the study intersections during the AM and PM peak periods. Intersection analysis shall include LOS determination for all approaches and movements. The LOS will be based on the procedures outlined in the HCM 6th Edition, the latest edition of Transportation Research Board's Highway Capacity Manual.

d. Any state, local, or private transportation improvement projects in the project study area that will be underway in the build-out year as identified by the City of Northville and/or WCDPS will be included as background conditions.

5. Trip Generation

a. Forecast the number of Weekday AM and PM peak hour trips and daily trips that would be generated by the proposed development based on data published by the Institute of Transportation Engineers (ITE) in Trip Generation, 10th Edition and the ITE Trip Generation Handbook, *3rd Edition*.

b. A table will be provided in the report outlining the categories and quantities of land uses, with the corresponding trip generation rates or equations, and the resulting number of trips. The trip generation will be submitted to the Township for review and approval prior to use in the analysis.

c. Provide a trip generation summary of the previously considered Northville Downs PUD and the additional trip generation associated with the Foundry Flask project. Provide a quantitative and qualitative impact summary of the impact of Foundry Flask as compared to the overall development plan for the area.

6. Trip Distribution and Traffic Assignment

a. Assign the trips that would be generated by the proposed development to the adjacent road network based on existing traffic patterns and methodologies outlined in the ITE *Transportation* and *Land Development, 2nd Edition*.

b. The distribution percentages with the corresponding volumes will be provided in a graphical format to include in the report and the basis will be explained.

c. Combine the site-generated traffic assignments with the background traffic forecasts to establish the Future AM and PM peak hour traffic volumes.

7. Future Conditions

a. Calculate the **Future (with the proposed development)** vehicle delays, LOS, and vehicle queues at the study intersections. Intersection analysis shall include LOS determination for all approaches and movements. The LOS will be based on the procedures outlined in the HCM 6th Edition, the latest edition of Transportation Research Board's Highway Capacity Manual.

b. Identify improvements (if any) for the study road network that would be required to accommodate the site-generated traffic volumes.

The scope of this study was developed based on Fleis & VandenBrink's (F&V) knowledge of the study area, understanding of the development program, accepted traffic engineering practices and information published by the Institute of Transportation Engineers (ITE). The study analyses were completed using Synchro/SimTraffic (Version 11). Sources of data for this study include F&V subconsultant Traffic Data Collection, Inc. (TDC), information provided by Michigan Department of Transportation (MDOT), the Southeast Michigan Council of Governments (SEMCOG) and ITE. All background information is provided in **Appendix A**.

2 BACKGROUND

2.1 EXISTING ROAD NETWORK

Vehicle transportation for the study area is provided by Griswold Street, Main Street, Northville Road, and Cady Street. The lane uses and traffic control at the study intersections are shown on **Figure 2** and the study roadways are further described below. For the purposes of this study, all minor streets and driveways are assumed to have an operating speed of 25 miles per hour (mph).

Main Street generally runs in the east and west directions, north of the project site. The roadway is classified as a *Minor Arterial* and is under the jurisdiction of the City of Northville. The roadway has a posted speed limit of 25 mph and an Average Annual Daily Traffic (AADT) of 11,800 vehicles per day (SEMCOG 2016). The roadway geometry has a typical two-lane cross section, with one lane in each direction and has on-street parking west of Griswold Street. The section of roadway east of Griswold Street becomes S. Main Street; for the purposes of this report S. Main Street is labeled Northville Road.

Northville Road generally runs in the north and south directions adjacent to the east side of the proposed development. The roadway is classified as a *Minor Arterial* and is under the jurisdiction of the Wayne County Department of Public Service (WCDPS). Northville Road has a posted speed limit of 35 mph, and an AADT of 12,100 vehicles per day (SEMCOG 2016). The roadway geometry is a four-lane cross-section with two lanes in each direction; the roadway begins undivided then, splits and becomes median separated just south of Beal Street.

Griswold Street generally runs in the north and south directions, west of the project site. The roadway is classified as a *Minor Arterial* and is under the jurisdiction of the Wayne County Department of Public Service (WCDPS) and has a posted speed limit of 35 mph. The roadway has an AADT volume of 6,700 vehicles per day (SEMCOG 2016) and has a typical two-lane cross section, with one lane in each direction.

Cady Street generally runs in the east and west directions adjacent to the east side of the proposed development. The roadway is classified as a *Local Road* and is under the jurisdiction of the City of Northville. Cady Street has a posted speed limit of 25 mph and has a typical two-lane cross section, with one lane in each direction and has on-street parking west of Griswold Street.

2.2 EXISTING TRAFFIC VOLUMES

F&V subconsultant Traffic Data Collection, Inc. (TDC) performed weekday AM (7:00 AM to 9:00 AM) and PM (4:00 PM to 6:00 PM) turning movement counts at the following study intersections on Tuesday, May 15, 2018 and Thursday, October 18, 2018.

- Cady Street & Griswold Street
- Main Street & Griswold Street
- Beal Street & Northville Road
- Beal Street & River Street

An annual growth rate of **0.2%** was applied to the 2018 traffic volumes to get a baseline 2021 traffic volumes at the abovementioned study intersections. Additionally, F&V performed weekday AM (7:00 AM to 9:00 AM) and PM (4:00 PM to 6:00 PM) turning movement counts at Cady Street & Main Street on Thursday, August 12, 2021. However, due to the impact of COVID-19 and the subsequent closure of businesses and schools, current 2021 traffic volume data is not representative of "typical" operations. Therefore, COVID adjustment factors were applied to the collected traffic counts at the intersection of Cady Street & Main Street. Pre-COVID 2018 traffic volume data at the adjacent intersections were reviewed and compared with the 2021 traffic volume data in order to calculate COVID adjustment factors shown below.

COVID Traffic Volume Adjustment Factors

Intersection	AM Peak Hour	PM Peak Hour
Cady Street & Main Street	+34%	+44%

The existing 2021 traffic volumes are shown on **Figure 3**.

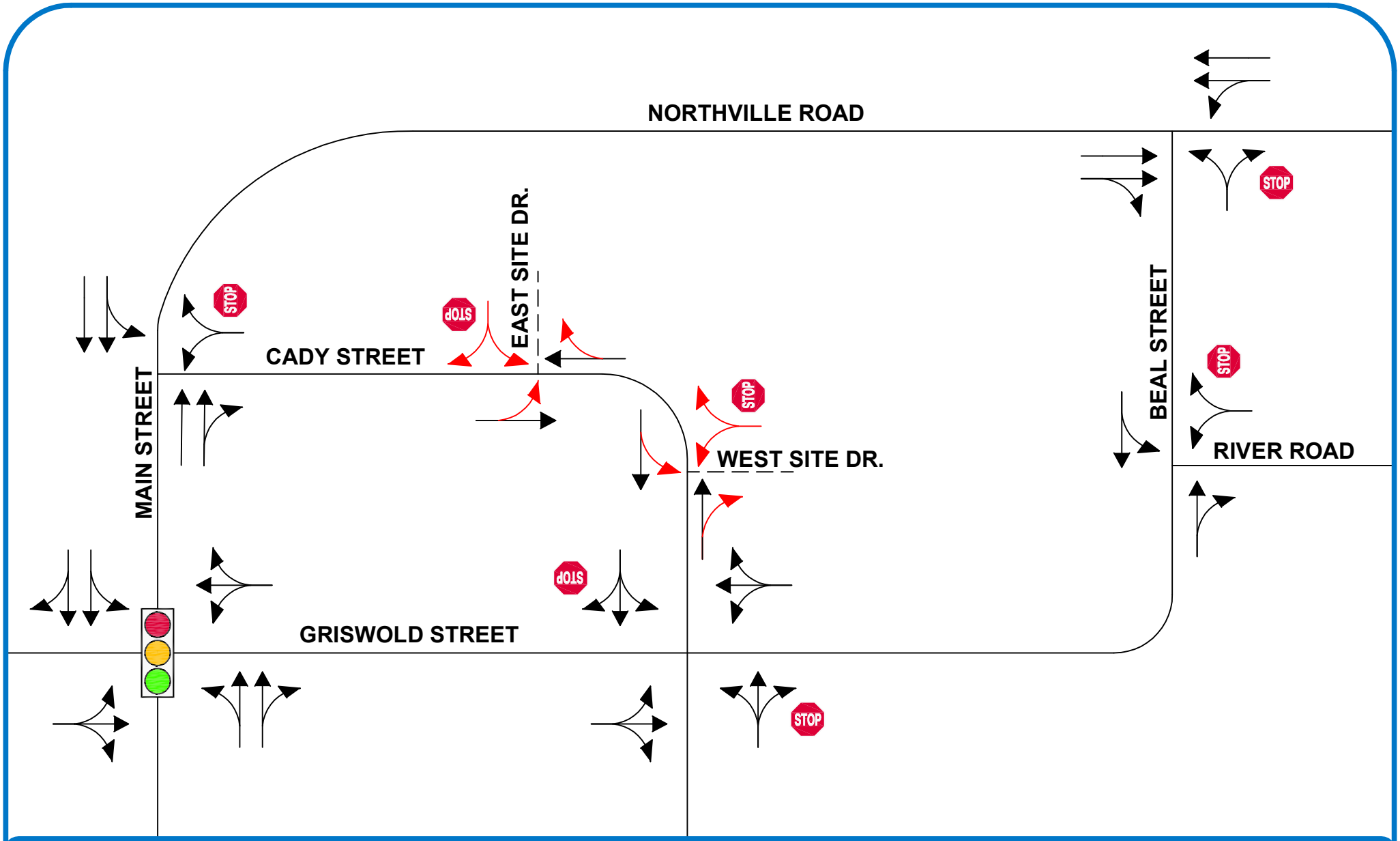


FIGURE 2

LANE USE AND TRAFFIC CONTROL

FOUNDRY FLASK TIS - NORTHVILLE, MI

LEGEND

- ROADS
- PROPOSED ROADS
- LANE USE
- PROPOSED LANE USE
- SIGNALIZED INTERSECTION
- UNSIGNALIZED INTERSECTION
- ROUNDABOUT INTERSECTION

NORTH

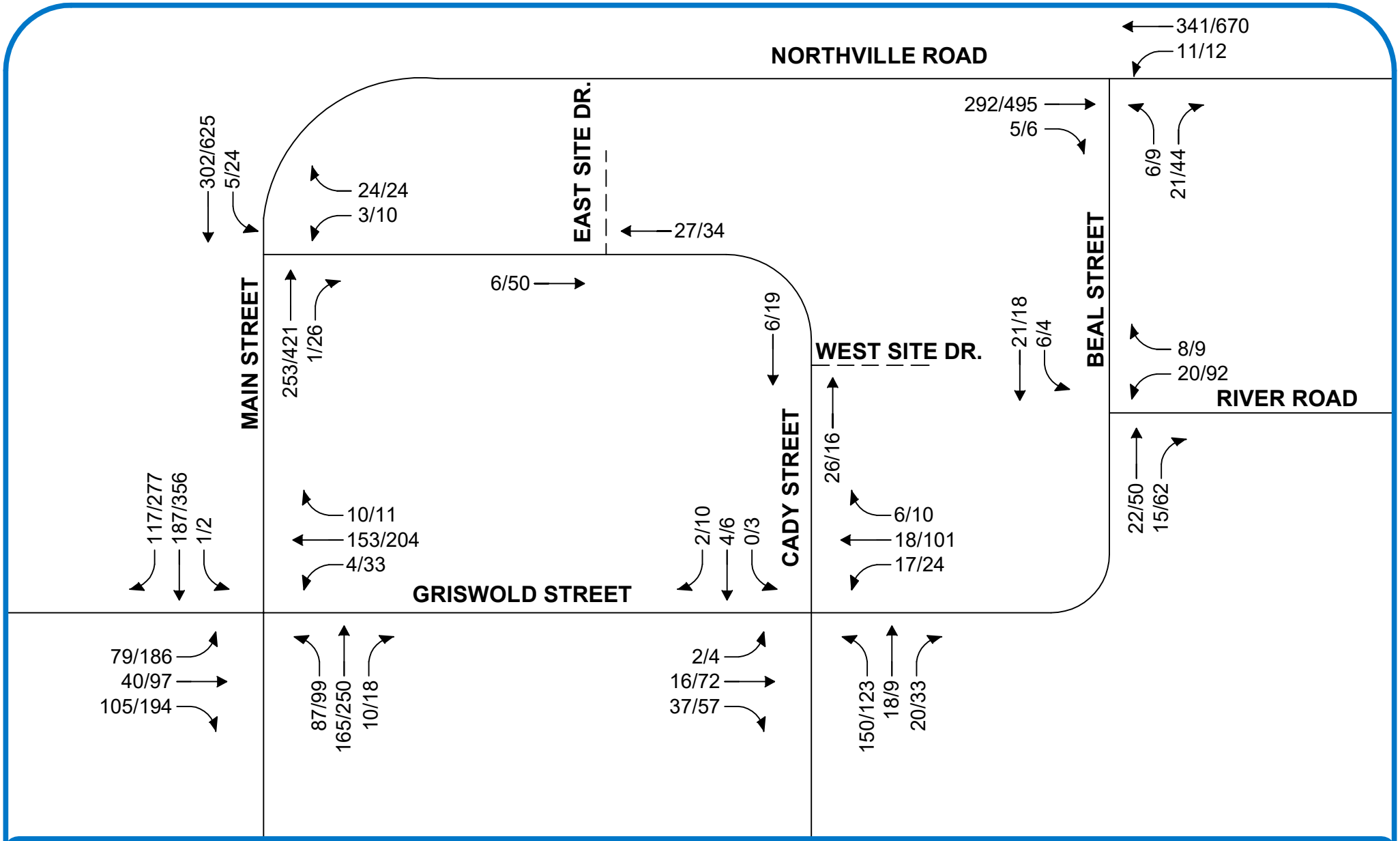


FIGURE 3

EXISTING TRAFFIC VOLUMES

FOUNDRY FLASK TIS - NORTHVILLE, MI

LEGEND

ROADS

PROPOSED ROADS

TRAFFIC VOLUMES (AM/PM)

NORTH

3 EXISTING CONDITIONS

3.1 EXISTING OPERATIONS

The existing AM and PM peak hour vehicle delays and Levels of Service (LOS) were calculated at the study intersections using Synchro (Version 11) traffic analysis software. The results of the analysis of existing conditions were based on the existing lane use and traffic control shown on **Figure 2**, the existing traffic volumes shown on **Figure 3**, and the methodologies presented in the Highway Capacity Manual 6th Edition (HCM6).

Descriptions of LOS "A" through "F", as defined in the HCM, are provided in **Appendix B** for signalized and unsignalized intersections. Typically, LOS D is considered acceptable, with LOS A representing minimal delay, and LOS F indicating failing conditions. Microsimulations were also conducted at the study intersections using SimTraffic to further evaluate the network performance. The results of the analysis of existing conditions are presented in **Appendix B** and are summarized in **Table 1**.

Table 1: Existing Intersection Operations

Intersection		Control	Approach	Existing Conditions			
				AM Peak		PM Peak	
				Delay (s/veh)	LOS	Delay (s/veh)	LOS
1	Main Street & Griswold Street	Signalized	EBTL	12.0	B	15.7	B
			EBTR	10.1	B	11.0	B
			WBTL	10.1	B	11.8	B
			WBTR	10.5	B	12.5	B
			NB	15.0	B	16.4	B
			SB	16.8	B	29.7	C
			Overall	**12.7**	**B**	**17.7**	**B**
2	Main Street & Cady Street	Stop (Minor)	EB	Free		Free	
			WBL	7.9	A	8.6	A
			NB	9.7	A	13.3	B
3	Griswold Street & Cady Street	Stop (Minor)	EB	10.7	B	13.0	B
			WB	9.5	A	10.2	B
			NBL	7.4	A	7.6	A
			SBL	7.3	A	7.4	A
4	Beal Street & River Street	Stop (Minor)	EB	Free		Free	
			WBL	7.3	A	7.4	A
			NB	9.1	A	9.8	A
5	Northville Road & Beal Street	Stop (Minor)	EB	10.4	B	12.1	B
			NBL	8.0	A	8.5	A
			SB	Free		Free	

The results of the existing conditions analysis indicate that all study intersection approaches and movements currently operate acceptably at LOS D or better during both peak periods. A review of SimTraffic network simulations showed generally acceptable operation during both peak periods; however, the southbound approach of the intersection of Main Street and Griswold Street experiences occasional periods of long vehicle queues.

3.2 EXISTING IMPROVEMENTS

In order to improve the vehicle queuing associated with the southbound approach to the Main Street & Griswold Street intersection during the PM peak hour, mitigation measures were evaluated.

3.2.1 Main Street and Griswold Street

A review of network simulations indicates that signal timing was found to be adequate to reduce vehicle queues on the southbound approach of the intersection of Main Street and Griswold Street during the PM Peak. Intersection operations and vehicle queues with the recommended improvements are summarized in **Table 2**.

Table 2: Existing Intersection Operations with Improvements

Intersection		Control	Approach	PM Peak Hour Operation											
				Existing Conditions				Existing Conditions (with Improvements)				Difference			
				Delay (s/veh)	LOS	Avg. Que.	95th Que.	Delay (s/veh)	LOS	Avg. Que.	95th Que.	Delay (s/veh)	LOS	Avg. Que.	95th Que.
1	Main Street & Griswold Street	Signalized	EBTL	15.7	B	77	118	25.7	C	91	138	10.0	B→C	14	20
			EBTR	11.0	B	52	94	16.4	B	70	120	5.4	-	18	26
			WBTL	11.8	B	69	107	17.6	B	81	126	5.8	-	12	19
			WBTR	12.5	B	101	158	19.2	B	119	181	6.7	-	18	23
			NB	16.4	B	84	139	11.2	B	72	127	-5.2	-	-12	-12
			SB	29.7	C	338	558	16.8	B	161	294	-12.9	C→B	-177	-264
			Overall	**17.7**	**B**	**-**	**-**	**17.3**	**B**	91	138	**-0.4**	**-**	-	-

4 BACKGROUND CONDITIONS

In order to determine the applicable traffic growth rate for the existing 2021 conditions to background 2023 conditions, historical population and economic profile data was obtained for the City of Northville from Southeast Michigan Council of Governments (SEMCOG). Population and employment projections from 2020 to 2045 were reviewed which show an average annual growth of 0.20% and 0.07%, respectively. Therefore, a background growth rate of **0.2%** per year was applied to the existing 2021 traffic volumes to forecast the background 2023 traffic volume conditions ***without the proposed development,*** as shown on **Figure 4**.

In addition to background growth, it is important to account for traffic that will be generated by approved developments within the vicinity of the study area that have yet to be constructed or are currently under construction. The following developments were identified by the City of Northville:

- Cady Project – 6-unit condominium (South side of Cady Street, east of Center Street)
- 355 E. Cady St. - 3-story mixed-use building; first floor Retail, office above
- 455 E. Cady St "Hanger Building"- office space

4.1 BACKGROUND (2023) OPERATIONS

The background peak hour vehicle delays and LOS ***without the proposed development*** were calculated based on the existing lane use and traffic control shown on **Figure 2**, the background traffic volumes shown on **Figure 4**, and the methodologies presented in the HCM6. The results of the analysis of background conditions are presented in **Appendix C** and are summarized in **Table 3**.

Table 3: Background Intersection Operations

Intersection		Control	Approach	Existing Conditions				Background Conditions				Difference			
				AM Peak		PM Peak		AM Peak		PM Peak		AM Peak		PM Peak	
				Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS
1	Main Street & Griswold Street	Signalized	EBTL	12.0	B	15.7	B	12.0	B	15.8	B	0.0	-	0.1	-
			EBTR	10.1	B	11.0	B	10.2	B	11.1	B	0.1	-	0.1	-
			WBTL	10.1	B	11.8	B	10.2	B	11.9	B	0.1	-	0.1	-
			WBTR	10.5	B	12.5	B	10.5	B	12.6	B	0.0	-	0.1	-
			NB	15.0	B	16.4	B	15.1	B	17.1	B	0.1	-	0.7	-
			SB	16.8	B	29.7	C	17.0	B	32.2	C	0.2	-	2.5	-
			Overall	**12.7**	**B**	**17.7**	**B**	**12.8**	**B**	**18.5**	**B**	**0.1**	**-**	**0.8**	**-**
2	Main Street & Cady Street	Stop (Minor)	EB	Free		Free		Free		Free		Free		Free	
			WBL	7.9	A	8.6	A	7.9	A	8.7	A	0.0	-	0.1	-
			NB	9.7	A	13.3	B	9.8	A	13.9	B	0.1	-	0.6	-
3	Griswold Street & Cady Street	Stop (Minor)	EB	10.7	B	13.0	B	10.9	B	13.3	B	0.2	-	0.3	-
			WB	9.5	A	10.2	B	9.5	A	10.2	B	0.0	-	0.0	-
			NBL	7.4	A	7.6	A	7.4	A	7.6	A	0.0	-	0.0	-
			SBL	7.3	A	7.4	A	7.3	A	7.4	A	0.0	-	0.0	-
4	Beal Street & River Street	Stop (Minor)	EB	Free		Free		Free		Free		Free		Free	
			WBL	7.3	A	7.4	A	7.3	A	7.4	A	0.0	-	0.0	-
			NB	9.1	A	9.8	A	9.1	A	9.8	A	0.0	-	0.0	-
5	Northville Road & Beal Street	Stop (Minor)	EB	10.4	B	12.1	B	10.4	B	12.2	B	0.0	-	0.1	-
			NBL	8.0	A	8.5	A	8.0	A	8.5	A	0.0	-	0.0	-
			SB	Free		Free		Free		Free		Free		Free	

The results of the background conditions analysis indicates that all study intersection approaches and movements will continue to operate acceptably, in a manner similar to existing conditions. A review of SimTraffic network simulations indicated periods of long vehicle queues for the southbound approach of the intersection of Main Street and Griswold Street during the PM peak hour.

4.2 Background (2023) Improvements

In order to improve the vehicle queuing associated with the southbound approach to the Main Street & Griswold Street intersection during the PM peak hour, mitigation measures evaluated in existing conditions were applied to background conditions.

4.2.1 Main Street and Griswold Street

A review of network simulations indicates that signal timing optimization were observed to reduce vehicle queues on the southbound approach of the Main Street and Griswold Street intersection during the PM peak hour. Intersection operations and vehicle queues with the recommended improvements are summarized in **Table 4**.

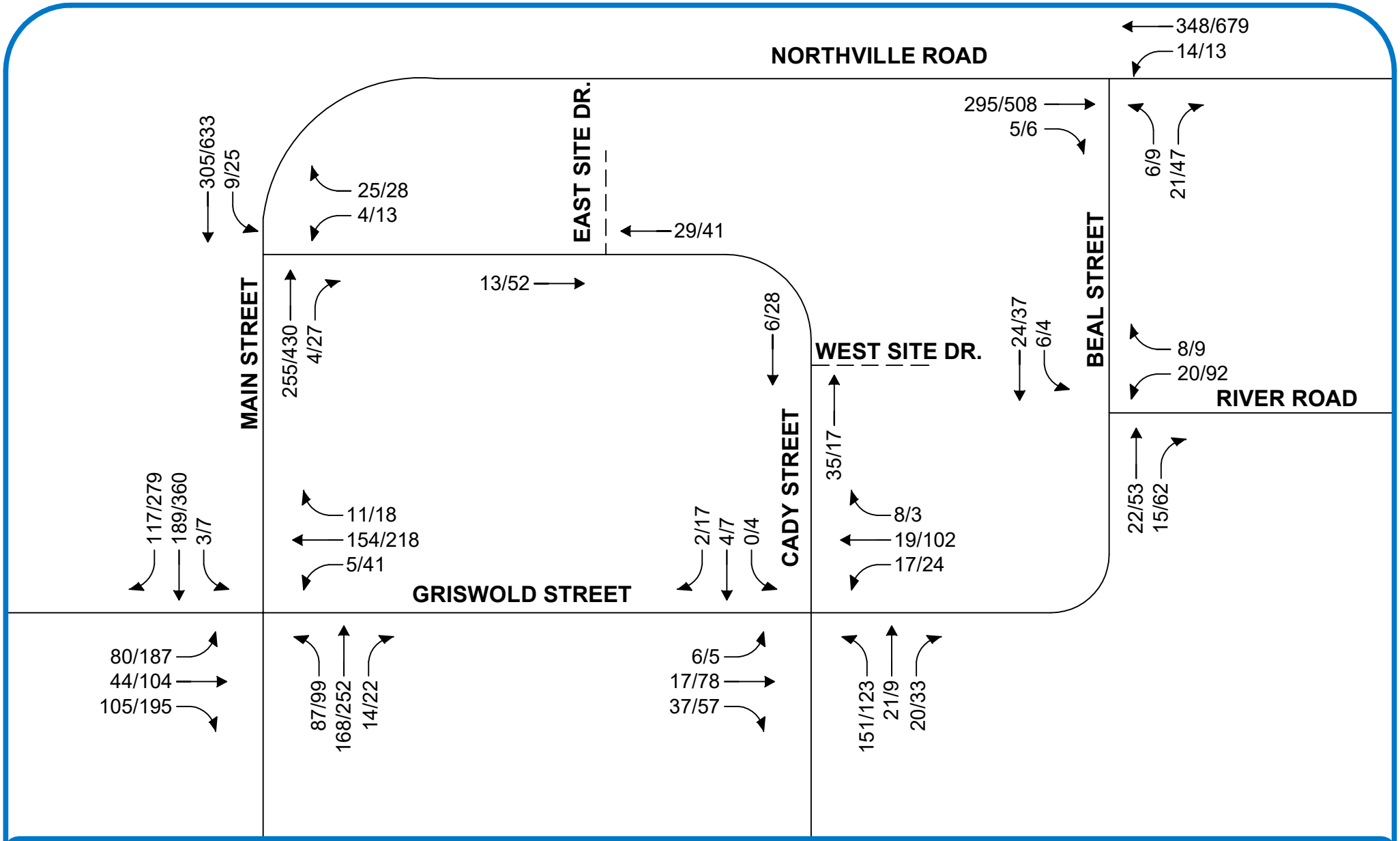


FIGURE 4

BACKGROUND TRAFFIC VOLUMES

FOUNDRY FLASK TIS - NORTHVILLE, MI

LEGEND

ROADS

PROPOSED ROADS

TRAFFIC VOLUMES (AM/PM)

NORTH

Table 4: Background Intersection Operations with Improvements

Intersection		Control	Approach	PM Peak Hour Operation											
				Background Condition				Background Conditions (with Improvements)				Difference			
				Delay (s/veh)	LOS	Avg. Que.	95th Que.	Delay (s/veh)	LOS	Avg. Que.	95th Que.	Delay (s/veh)	LOS	Avg. Que.	95th Que.
1	Main Street & Griswold Street	Signalized	EBTL	15.8	B	80	124	26.0	C	95	145	10.2	B→C	15	21
			EBTR	11.1	B	53	97	16.5	B	76	129	5.4	-	23	32
			WBTL	11.9	B	70	107	17.7	B	82	128	5.8	-	12	21
			WBTR	12.6	B	106	167	19.4	B	120	180	6.8	-	14	13
			NB	17.1	B	92	145	11.6	B	80	135	-5.5	-	-12	-10
			SB	32.2	C	354	601	17.0	B	174	301	-15.2	C→B	-180	-300
			Overall	**18.5**	**B**	**-**	**-**	**17.4**	**B**	-	-	**-1.1**	**-**	-	-

5 SITE TRIP GENERATION

The number of peak hour (AM and PM), and daily vehicle trips that would be generated by the proposed development were forecast based on data published in the Institute of Transportation Engineers (ITE) Trip Generation Manual 10th Edition and the ITE Trip Generation Handbook, 3rd Edition. The trip generation is summarized in **Table 5**. *Note: Pass-by trip reductions were not included in this study to provide a conservative analysis.*

Table 5: Trip Generation Summary

Land Use	ITE Code	Amount	Units	Average Daily Traffic (vpd)	AM Peak Hour (vph)			PM Peak Hour (vph)		
					In	Out	Total	In	Out	Total
Shopping Center-Small	820	10,000	S.F.	1,256	6	3	9	48	51	99
Multi-Family Housing (Mid-Rise)	221	78	D.U.	423	7	20	27	21	14	35
			Total	**1,679**	**13**	**23**	**36**	**69**	**65**	**134**

In addition, a trip generation comparison was performed between the previously proposed Northville Downs PUD and the proposed Foundry Flask site. **Table 6** shows the trips generations comparison and indicates that the Foundry Flask site expected to generate approximately 24% of the overall traffic generated by Northville Downs PUD.

Table 6: Trip Generation Comparison

Development	Average Daily Traffic (vpd)	AM Peak Hour (vph)			PM Peak Hour (vph)		
		In	Out	Total	In	Out	Total
Foundry Flask	1,679	13	23	36	69	65	134
Northville Downs	5,188	58	154	212	183	132	315
Total Trips	*6,867*	*71*	*177*	*248*	*252*	*197*	*449*
Foundry Flask Percentage of Total Trips	**24%**	**18%**	**13%**	**15%**	**27%**	**33%**	**30%**

6 SITE TRIP DISTRIBUTION

The vehicular trips that would be generated by the proposed development were assigned to the study roads based on the proposed site access plan, the existing peak hour traffic patterns in the adjacent roadway network, and the methodologies published by ITE. The adjacent street traffic volumes were used to develop the trip distribution. Separate trip distributions were determined for the commercial and residential components of the proposed development. It is assumed that the residential traffic in the AM are home-to-work based trips and are work-to-home trips in the PM. Therefore, the residential trip distribution is based on residents exiting the

study network in the AM and entering the study network in the PM. The commercial (retail) trip distribution is based on employees entering the study network in the AM and exiting the study network in the PM. The site trip distributions used in the analysis are summarized in **Table 7**.

Table 7: Site Trip Distribution

Commercial		To/From	via	Residential	
AM	PM			AM	PM
26%	33%	West	Main Street	29%	22%
18%	5%		Cady Street	6%	10%
22%	32%	North	Griswold Street	35%	28%
34%	30%	South	Northville Road	30%	40%
100%	**100%**	**Total**		**100%**	**100%**

The vehicular traffic volumes shown in **Table 4** were distributed to the roadway network according to the distribution shown in **Table 5**. The site generated trips are shown on **Figure 5** and were added to the background traffic volumes shown on **Figure 4** to calculate the future peak hour traffic volumes shown on **Figure 6**.

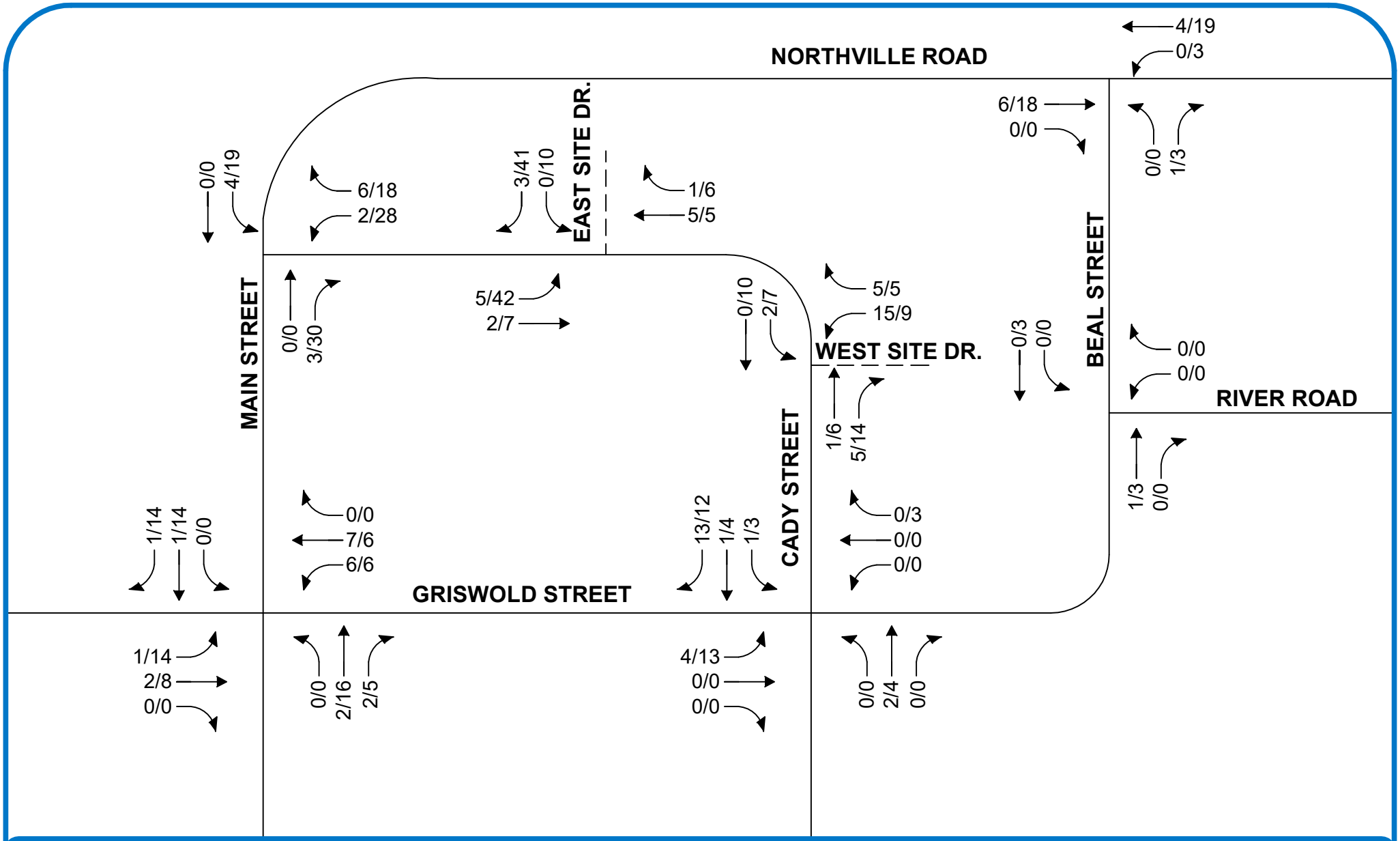


FIGURE 5

SITE-GENERATED TRAFFIC VOLUMES

FOUNDRY FLASK TIS - NORTHVILLE, MI

LEGEND

ROADS

PROPOSED ROADS

TRAFFIC VOLUMES (AM/PM)

NORTH

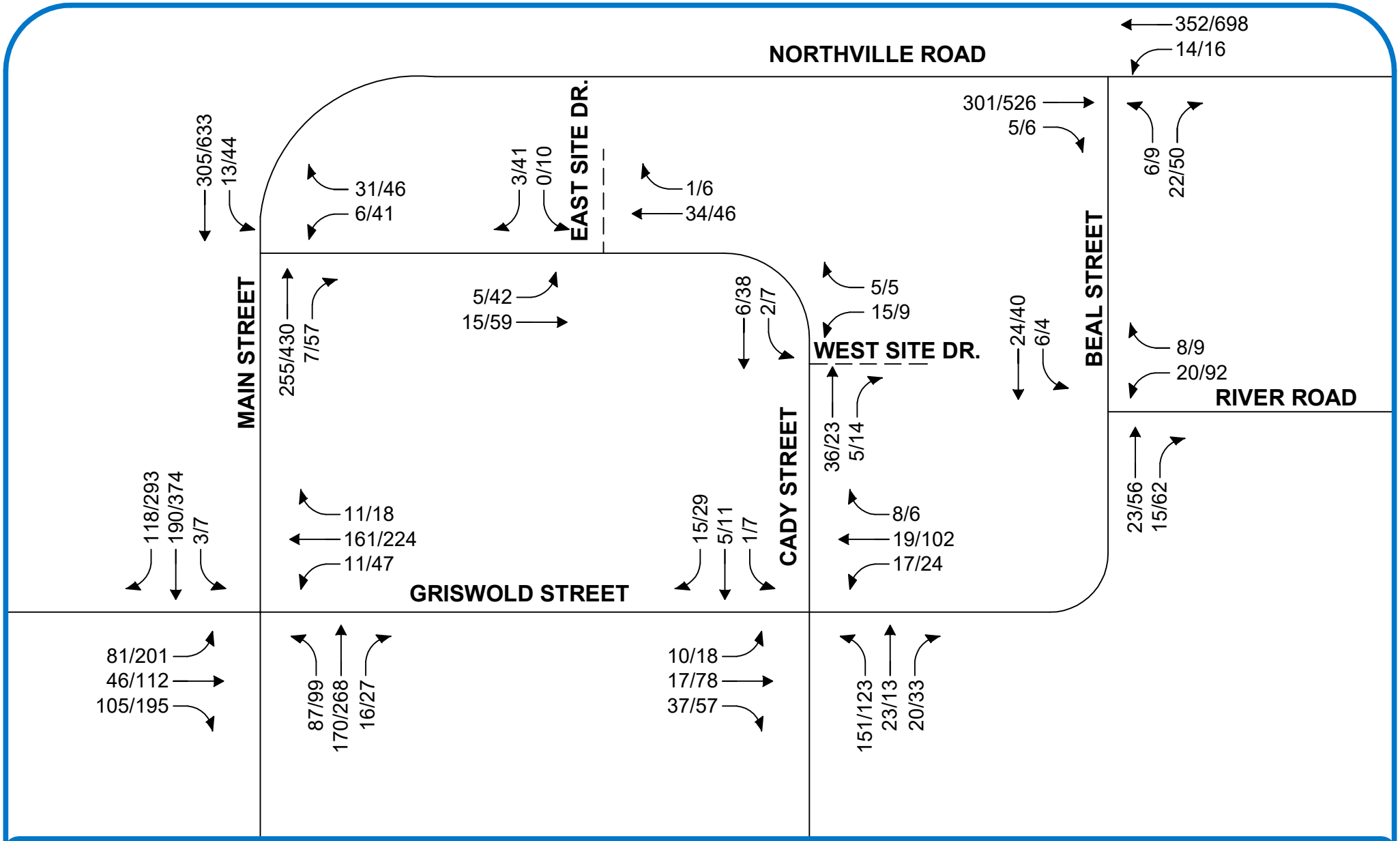


FIGURE 6

FUTURE TRAFFIC VOLUMES

FOUNDRY FLASK TIS - NORTHVILLE, MI

LEGEND

ROADS

PROPOSED ROADS

TRAFFIC VOLUMES (AM/PM)

NORTH

7 FUTURE CONDITIONS

7.1 FUTURE OPERATIONS

Future peak hour vehicle delays and LOS ***with the proposed development*** were calculated based on the current lane use shown on **Figure 2**, the proposed site access plan, the future traffic volumes shown on **Figure 6**, and the methodologies presented in the HCM6. The results of the future conditions analysis are presented in **Appendix D** and are summarized in **Table 8.**

Table 8: Future Intersection Operations

Intersection		Control	Approach	Background Conditions				Future Conditions				Difference			
				AM Peak		PM Peak		AM Peak		PM Peak		AM Peak		PM Peak	
				Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS
1	Main Street & Griswold Street	Signalized	EBTL	12.0	B	15.8	B	12.0	B	16.1	B	0.0	-	0.3	-
			EBTR	10.2	B	11.1	B	10.2	B	11.3	B	0.0	-	0.2	-
			WBTL	10.2	B	11.9	B	10.2	B	12.1	B	0.0	-	0.2	-
			WBTR	10.5	B	12.6	B	10.5	B	12.8	B	0.0	-	0.2	-
			NB	15.1	B	17.1	B	15.3	B	17.4	B	0.2	-	0.3	-
			SB	17.0	B	32.2	C	17.0	B	37.8	D	0.0	-	5.6	C→D
			Overall	**12.8**	**B**	**18.5**	**B**	**12.9**	**B**	**20.2**	**C**	**0.1**	**-**	**1.7**	**B→C**
2	Main Street & Cady Street	Stop (Minor)	EB	Free		Free		Free		Free		Free		Free	
			WBL	7.9	A	8.7	A	7.9	A	8.9	A	0.0	-	0.3	-
			NB	9.8	A	13.9	B	10.0	B	20.1	C	0.2	A→B	6.2	B→C
3	Griswold Street & Cady Street	Stop (Minor)	EB	10.9	B	13.3	B	11.4	B	14.6	B	0.5	-	1.3	-
			WB	9.5	A	10.2	B	9.0	A	10.5	B	-0.5*	-	0.3	-
			NBL	7.4	A	7.6	A	7.4	A	7.6	A	0.0	-	0.0	-
			SBL	7.3	A	7.4	A	7.3	A	7.5	A	0.0	-	0.1	-
4	Beal Street & River Street	Stop (Minor)	EB	Free		Free		Free		Free		Free		Free	
			WBL	7.3	A	7.4	A	7.3	A	7.5	A	0.0	-	0.1	-
			NB	9.1	A	9.8	A	9.1	A	9.9	A	0.0	-	0.1	-
5	Northville Road & Beal Street	Stop (Minor)	EB	10.4	B	12.2	B	10.5	B	12.4	B	0.1	-	0.2	-
			NBL	8.0	A	8.5	A	8.0	A	8.6	A	0.0	-	0.1	-
			SB	Free		Free		Free		Free		Free		Free	
6	Cady Street & W. Site Dr.	Stop (Minor)	EB	N/A		N/A		Free		Free		Free		Free	
			WBL					7.3	A	7.3	A	7.3	A	7.3	A
			NB					8.8	A	8.9	A	8.8	A	8.9	A
7	Cady Street & E. Site Dr.	Stop (Minor)	WB	N/A		N/A		8.5	A	9.0	A	8.5	A	9.0	A
			NB					Free		Free		Free		Free	
			SBL					7.3	A	7.4	A	7.3	A	7.4	A

*Decreased delays are due to HCM methodologies

The results of the future conditions analysis indicates that all study intersection approaches and movements will continue to operate acceptably, in a manner similar to background conditions. A review of SimTraffic network simulations indicated periods of long vehicle queues for the southbound approach of the intersection of Main Street and Griswold Street during the PM peak hour.

7.2 FUTURE IMPROVEMENTS

In order to improve the vehicle queuing associated with the southbound approach to the Main Street & Griswold Street intersection during the PM peak hour. The mitigation measures evaluated for existing and background conditions were applied to the future conditions and determined to be adequate to improve the intersection operations.

7.2.1 Main Street and Griswold Street

A review of network simulations indicates that signal timing optimization would reduce vehicle queues on the southbound approach of the Main Street and Griswold Street intersection during the PM peak hour. Intersection operations and vehicle queues with the recommended improvements are summarized in **Table 9**.

Table 9: Future Intersection Operations with Improvements

Intersection		Control	Approach	PM Peak Hour Operation											
				Future Condition				Future Conditions (with Improvements)				Difference			
				Delay (s/veh)	LOS	Avg. Que.	95th Que.	Delay (s/veh)	LOS	Avg. Que.	95th Que.	Delay (s/veh)	LOS	Avg. Que.	95th Que.
1	Main Street & Griswold Street	Signalized	EBTL	16.1	B	83	132	27.2	C	97	149	11.1	B→C	14	17
			EBTR	11.3	B	60	110	16.9	B	79	131	5.6	-	19	21
			WBTL	12.1	B	74	117	18.1	B	88	140	6.0	-	14	23
			WBTR	12.8	B	109	172	19.9	B	124	192	7.1	-	15	20
			NB	17.4	B	96	148	11.7	B	80	134	-5.7	-	-16	-14
			SB	37.8	D	451	590	18.1	B	189	342	-19.7	D→B	-262	-248
			Overall	**20.2**	**C**	**-**	**-**	**18.1**	**B**	-	-	**-2.1**	**C→B**	-	-

8 CONCLUSIONS

The conclusions of this TIS are as follows:

1. **Existing Conditions:** All study intersection approaches and movements currently operate acceptably at a LOS D or better during both peak periods. A review of SimTraffic network simulations indicates generally acceptable operation during both peak periods; however, microsimulation during the PM peak hour indicate the southbound approach of the intersection of Main Street and Griswold Street experiences occasional periods of long vehicle queues. Mitigation measures were evaluated to reduce the projected vehicle queueing and signal timing optimization was found to be adequate to reduce queues on the southbound approach during the PM peak hour.
2. **Background (2023) Growth:** An annual growth rate of 0.2% per year was determined based on SEMCOG economic and population data. In addition, the following background developments were identified by the City of Northville and were included in this analysis:
    a. Cady Project – 6-unit condominium (South side of Cady Street, east of Center Street)
    b. 355 E. Cady St. - 3-story mixed-use building; first floor Retail, office above
    c. 455 E. Cady St “Hanger Building”- office space
3. **Background (2023) Conditions:** With the addition of the 2023 background traffic, all study intersection approaches and movements are expected to continue operating in a manner similar to existing conditions with occasional periods of long vehicle queues at the southbound approach of Main Street and Griswold Street intersection during the PM peak hour. A review of network simulations indicates that signal timing optimization was observed to reduce vehicle queues on the southbound approach during the PM peak hour in background conditions.
4. **Trip Generation Comparison:** The trip generation of the previously proposed Northville Downs PUD was compared with the proposed Foundry Flask development. The proposed development is expected to generate approximately 24% of the overall traffic generated by Northville Downs PUD.

5. **Future Conditions:** With the addition of the site-generated traffic, all study intersection approaches and movements are expected to continue operating in a manner similar to background conditions. A review of SimTraffic network simulations also indicates similar operations to those observed under existing and background conditions with occasional periods of long vehicle queues at the southbound approach of Main Street and Griswold Street intersection during the PM peak hour.

   However, the signal timing optimization was found to be adequate to reduce vehicle queues on the southbound approach of the Main Street and Griswold Street intersection during the PM peak hour.

9 RECOMMENDATIONS

1. Optimize the signal timing at the intersection of Main Street and Griswold Street.

Appendix A

BACKGROUND INFORMATION

Traffic Data Collection, LLC

www:tdccounts.com

Phone: 586.786-5407

Traffic Study Performed For:

Fleis & Vandenbrink

Project: Northville Traffic Impact Study
Study:4 Hr. Video Turning Movement Count
Weather: Sunny/Cldy. Dry Deg's 50's
Count By Miovision Video VCU 24L SE

File Name : TMC_1 Northville & Beal_10-18-18
Site Code : TMC_1
Start Date : 10/18/2018
Page No : 1

4 Hour traffic study was conducted during typical weekday (Tuesday-Thursday) from 7:00 AM - 9:00 AM morning & 4:00 PM - 6:00 PM afternoon peak hours, while school was in session.

Groups Printed- Pass Cars - Single Units - Heavy Trucks - Peds

	Northville Road Southbound				Northville Road Northbound				7 Mile Road Eastbound				
Start Time	Right	Thru	Peds	App. Total	Thru	Left	Peds	App. Total	Right	Left	Peds	App. Total	Int. Total
07:00 AM	4	62	0	66	34	0	0	34	2	0	0	2	102
07:15 AM	3	52	0	55	50	2	0	52	6	2	0	8	115
07:30 AM	2	58	0	60	55	1	0	56	7	0	0	7	123
07:45 AM	0	66	0	66	81	3	0	84	6	1	0	7	157
Total	9	238	0	247	220	6	0	226	21	3	0	24	497
08:00 AM	2	63	0	65	67	2	0	69	3	1	0	4	138
08:15 AM	1	74	0	75	79	2	0	81	5	1	0	6	162
08:30 AM	2	71	0	73	87	4	0	91	7	4	0	11	175
08:45 AM	0	81	0	81	93	3	0	96	6	0	0	6	183
Total	5	289	0	294	326	11	0	337	21	6	0	27	658
*** BREAK ***													
04:00 PM	3	96	0	99	137	5	0	142	12	0	3	15	256
04:15 PM	1	86	0	87	155	1	0	156	10	1	0	11	254
04:30 PM	1	93	0	94	170	2	0	172	10	1	1	12	278
04:45 PM	3	124	0	127	156	4	0	160	8	1	1	10	297
Total	8	399	0	407	618	12	0	630	40	3	5	48	1085
05:00 PM	1	126	0	127	156	3	0	159	12	2	1	15	301
05:15 PM	1	123	0	124	181	4	0	185	12	4	1	17	326
05:30 PM	1	118	0	119	172	1	0	173	12	2	0	14	306
05:45 PM	1	110	0	111	170	0	0	170	0	0	0	0	281
Total	4	477	0	481	679	8	0	687	36	8	2	46	1214
Grand Total	26	1403	0	1429	1843	37	0	1880	118	20	7	145	3454
Apprch %	1.8	98.2	0		98	2	0		81.4	13.8	4.8		
Total %	0.8	40.6	0	41.4	53.4	1.1	0	54.4	3.4	0.6	0.2	4.2	
Pass Cars	26	1390	0	1416	1815	37	0	1852	117	19	0	136	3404
% Pass Cars	100	99.1	0	99.1	98.5	100	0	98.5	99.2	95	0	93.8	98.6
Single Units	0	11	0	11	22	0	0	22	1	1	0	2	35
% Single Units	0	0.8	0	0.8	1.2	0	0	1.2	0.8	5	0	1.4	1
Heavy Trucks	0	2	0	2	6	0	0	6	0	0	0	0	8
% Heavy Trucks	0	0.1	0	0.1	0.3	0	0	0.3	0	0	0	0	0.2
Peds	0	0	0	0	0	0	0	0	0	0	7	7	7
% Peds	0	0	0	0	0	0	0	0	0	0	100	4.8	0.2

TDC Traffic Comments: Non-signalized intersection. Northville Road is a divided roadway. Video VCU camera was located within SE intersection quadrant. Note: Peds. are excluded from peak hour reports. Traffic study was performed for Northville Traffic Impact Study for Fleis & Vandenbrink.

Traffic Data Collection, LLC

www:tdccounts.com

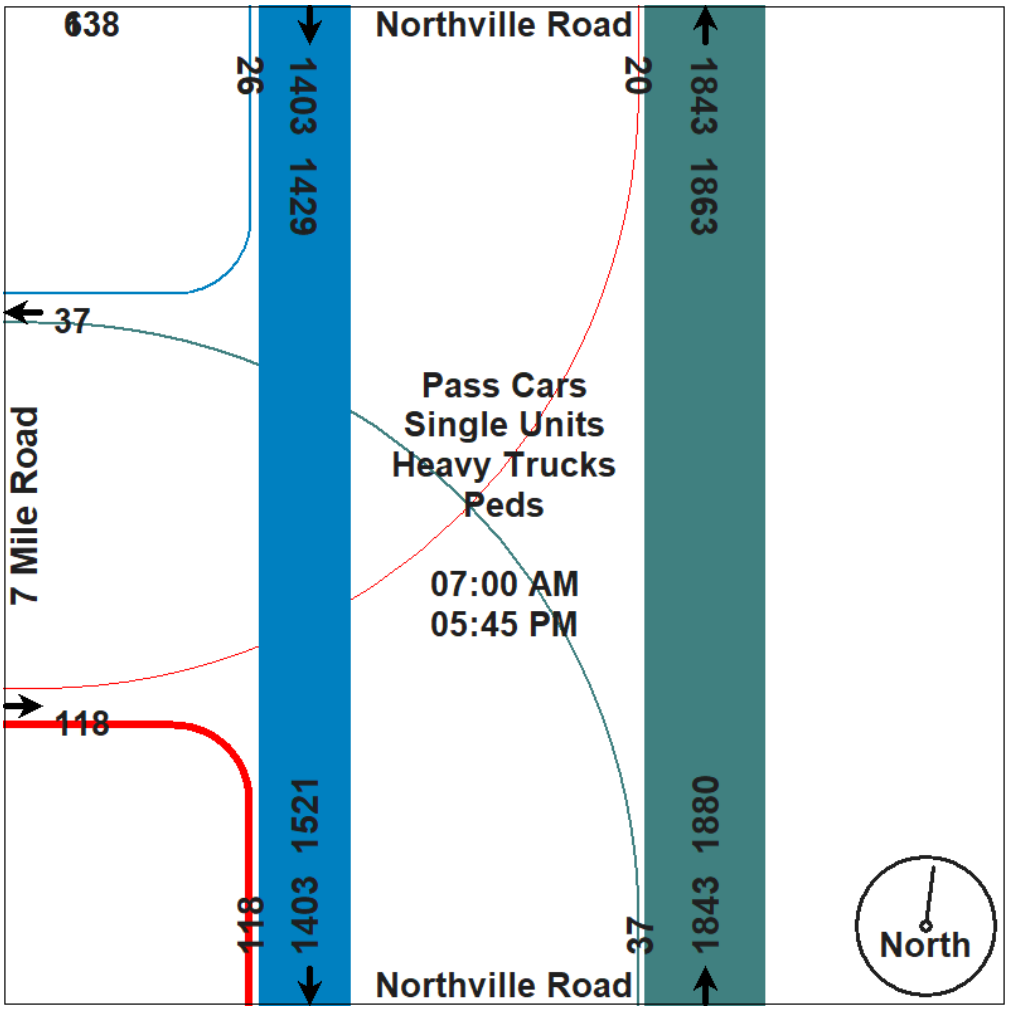
Phone: 586.786-5407

Traffic Study Performed For:

Fleis & Vandenbrink

Project: Northville Traffic Impact Study
Study:4 Hr. Video Turning Movement Count
Weather: Sunny/Cldy. Dry Deg's 50's
Count By Miovision Video VCU 24L SE

File Name : TMC_1 Northville & Beal_10-18-18
Site Code : TMC_1
Start Date : 10/18/2018
Page No : 2



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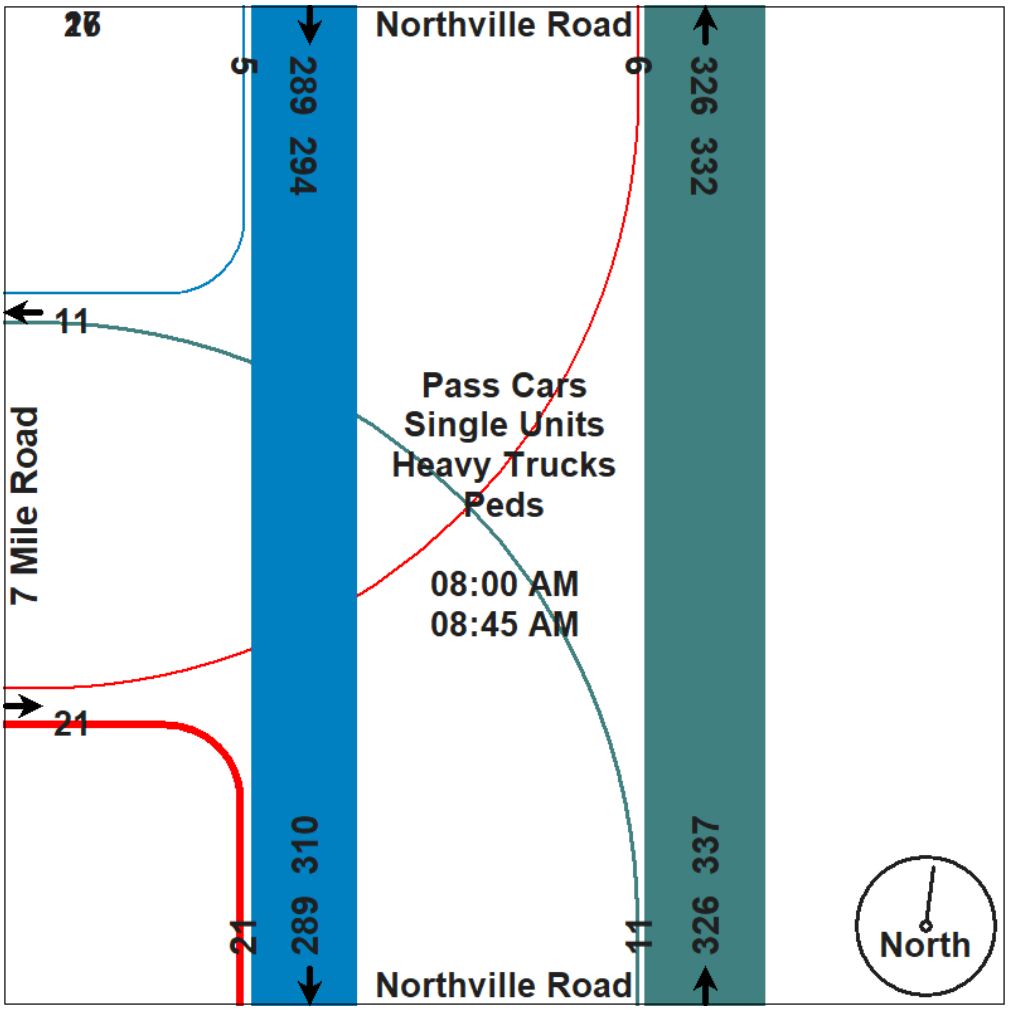
Start Date : 10/18/2018
Page No : 3

	Northville Road Southbound			Northville Road Northbound			7 Mile Road Eastbound			
Start Time	Right	Thru	App. Total	Thru	Left	App. Total	Right	Left	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 11:45 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 08:00 AM										
08:00 AM	**2**	63	65	67	2	69	3	1	4	138
08:15 AM	1	74	75	79	2	81	5	1	6	162
08:30 AM	2	71	73	87	**4**	91	**7**	**4**	**11**	175
08:45 AM	0	**81**	**81**	**93**	3	**96**	6	0	6	**183**
Total Volume	5	289	294	326	11	337	21	6	27	658
% App. Total	1.7	98.3		96.7	3.3		77.8	22.2		
PHF	.625	.892	.907	.876	.688	.878	.750	.375	.614	.899
Pass Cars	5	284	289	316	11	327	21	5	26	642
% Pass Cars	100	98.3	98.3	96.9	100	97.0	100	83.3	96.3	97.6
Single Units	0	5	5	9	0	9	0	1	1	15
% Single Units	0	1.7	1.7	2.8	0	2.7	0	16.7	3.7	2.3
Heavy Trucks	0	0	0	1	0	1	0	0	0	1
% Heavy Trucks	0	0	0	0.3	0	0.3	0	0	0	0.2
Peds	0	0	0	0	0	0	0	0	0	0
% Peds	0	0	0	0	0	0	0	0	0	0



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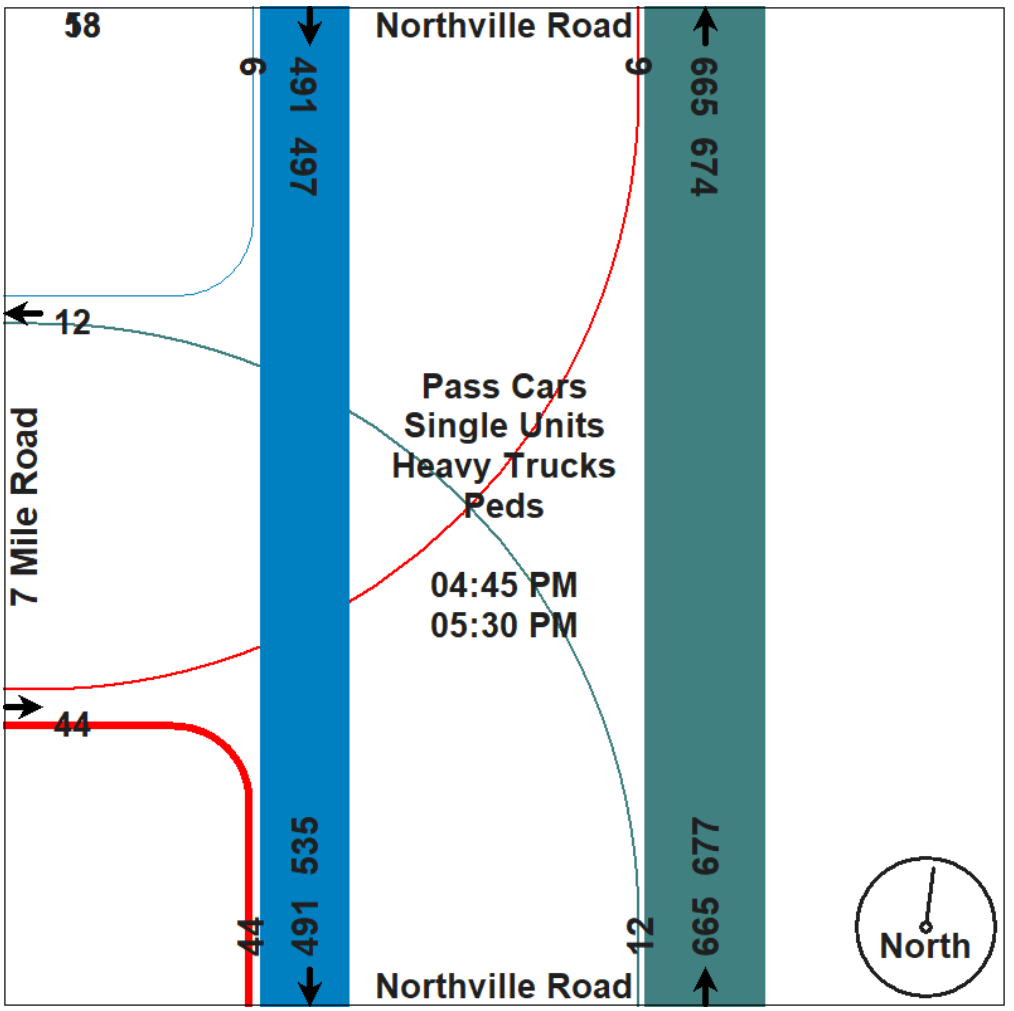
Site Code : TMC_1
Start Date : 10/18/2018
Page No : 4

	Northville Road Southbound			Northville Road Northbound			7 Mile Road Eastbound			
Start Time	Right	Thru	App. Total	Thru	Left	App. Total	Right	Left	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 05:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 04:45 PM										
04:45 PM	**3**	124	**127**	156	**4**	160	8	1	9	296
05:00 PM	1	**126**	127	156	3	159	**12**	2	14	300
05:15 PM	1	123	124	**181**	4	**185**	12	**4**	**16**	**325**
05:30 PM	1	118	119	172	1	173	12	2	14	306
Total Volume	6	491	497	665	12	677	44	9	53	1227
% App. Total	1.2	98.8		98.2	1.8		83	17		
PHF	.500	.974	.978	.919	.750	.915	.917	.563	.828	.944
Pass Cars	6	486	492	660	12	672	44	9	53	1217
% Pass Cars	100	99.0	99.0	99.2	100	99.3	100	100	100	99.2
Single Units	0	3	3	4	0	4	0	0	0	7
% Single Units	0	0.6	0.6	0.6	0	0.6	0	0	0	0.6
Heavy Trucks	0	2	2	1	0	1	0	0	0	3
% Heavy Trucks	0	0.4	0.4	0.2	0	0.1	0	0	0	0.2
Peds	0	0	0	0	0	0	0	0	0	0
% Peds	0	0	0	0	0	0	0	0	0	0



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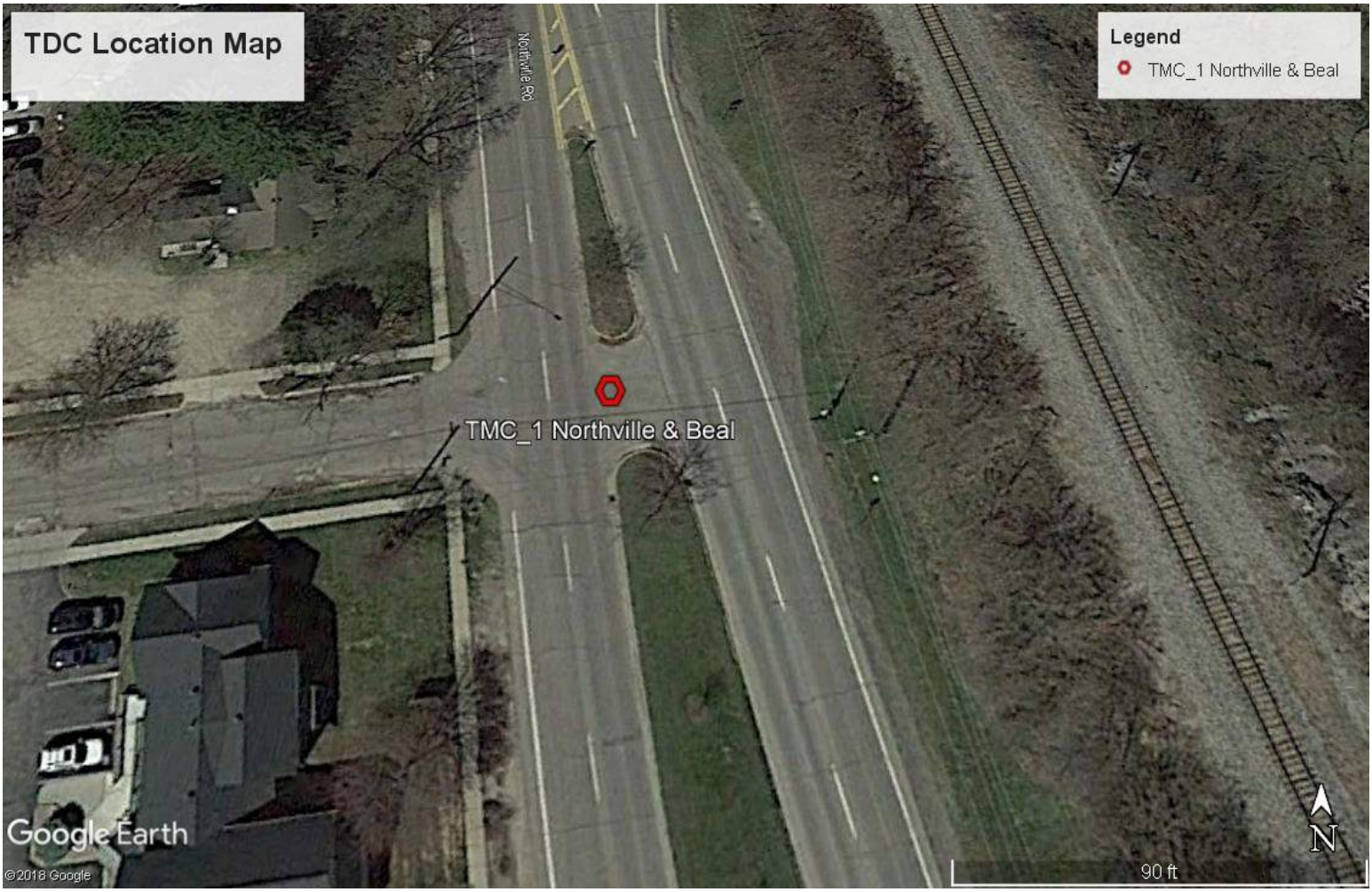
File Name : TMC_1 Northville & Beal_10-18-18
Site Code : TMC_1
Start Date : 10/18/2018
Page No : 5

Aerial Photo



Traffic Data Collection, LLC

www:tdccounts.com

Phone: 586.786-5407

Traffic Study Performed For:

Fleis &VandenBrink

Project: Northville Down TIS
Study:4 Hr. Video Turning Movement Count
Weather: Sunny/Cldy. Dry Deg's 70's
Count By Miovision Video VCU 24L NE

File Name : TMC_3 Main & Griswold_5-15-18
Site Code : TMC_3
Start Date : 5/15/2018
Page No : 1

4 Hour traffic study was conducted during typical weekday (Tuesday-Thursday) from 7:00 AM - 9:00 AM morning & 4:00 PM - 6:00 PM afternoon peak hours, while school was in session.

Groups Printed- Pass Cars - Single Units - Heavy Trucks - Peds

	Griswold Street Southbound					Main Street Westbound					Griswold Street Northbound					Main Street Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
07:00 AM	17	10	13	0	40	15	22	0	0	37	3	16	2	3	24	0	26	12	2	40	141
07:15 AM	23	13	21	0	57	18	28	1	0	47	1	21	3	3	28	0	36	20	4	60	192
07:30 AM	30	8	23	0	61	21	34	0	0	55	0	42	6	2	50	2	33	19	2	56	222
07:45 AM	29	17	21	0	67	33	35	0	0	68	1	36	3	1	41	1	44	14	2	61	237
Total	99	48	78	0	225	87	119	1	0	207	5	115	14	9	143	3	139	65	10	217	792
08:00 AM	22	10	18	1	51	28	41	0	0	69	3	43	1	1	48	3	46	21	0	70	238
08:15 AM	28	9	14	0	51	27	39	1	0	67	1	40	0	0	41	0	36	23	2	61	220
08:30 AM	30	11	19	0	60	29	46	0	1	76	3	38	2	0	43	2	32	16	1	51	230
08:45 AM	24	10	28	0	62	32	59	0	0	91	3	31	1	0	35	5	48	26	1	80	268
Total	104	40	79	1	224	116	185	1	1	303	10	152	4	1	167	10	162	86	4	262	956
*** BREAK ***																					
04:00 PM	31	15	35	0	81	42	96	3	0	141	2	23	9	3	37	5	63	19	2	89	348
04:15 PM	29	15	41	0	85	49	67	1	0	117	3	31	7	0	41	4	47	25	0	76	319
04:30 PM	38	10	37	0	85	55	89	4	0	148	7	46	5	3	61	2	44	14	1	61	355
04:45 PM	44	16	49	0	109	52	101	0	4	157	5	34	10	3	52	2	63	22	4	91	409
Total	142	56	162	0	360	198	353	8	4	563	17	134	31	9	191	13	217	80	7	317	1431
05:00 PM	53	18	40	0	111	57	96	0	1	154	3	55	9	2	69	9	68	23	1	101	435
05:15 PM	47	21	46	0	114	76	81	2	0	159	2	56	8	0	66	1	54	20	0	75	414
05:30 PM	39	27	57	2	125	70	92	0	0	162	6	47	6	3	62	4	71	32	4	111	460
05:45 PM	54	30	42	2	128	72	84	0	1	157	0	45	10	2	57	4	54	23	1	82	424
Total	193	96	185	4	478	275	353	2	2	632	11	203	33	7	254	18	247	98	6	369	1733
Grand Total	538	240	504	5	1287	676	1010	12	7	1705	43	604	82	26	755	44	765	329	27	1165	4912
Apprch %	41.8	18.6	39.2	0.4		39.6	59.2	0.7	0.4		5.7	80	10.9	3.4		3.8	65.7	28.2	2.3		
Total %	11	4.9	10.3	0.1	26.2	13.8	20.6	0.2	0.1	34.7	0.9	12.3	1.7	0.5	15.4	0.9	15.6	6.7	0.5	23.7	
Pass Cars	533	237	491	0	1261	649	1003	12	0	1664	43	599	82	0	724	44	759	324	0	1127	4776
% Pass Cars	99.1	98.8	97.4	0	98	96	99.3	100	0	97.6	100	99.2	100	0	95.9	100	99.2	98.5	0	96.7	97.2
Single Units	5	3	11	0	19	26	7	0	0	33	0	4	0	0	4	0	6	5	0	11	67
% Single Units	0.9	1.2	2.2	0	1.5	3.8	0.7	0	0	1.9	0	0.7	0	0	0.5	0	0.8	1.5	0	0.9	1.4
Heavy Trucks	0	0	2	0	2	1	0	0	0	1	0	1	0	0	1	0	0	0	0	0	4
% Heavy Trucks	0	0	0.4	0	0.2	0.1	0	0	0	0.1	0	0.2	0	0	0.1	0	0	0	0	0	0.1
Peds	0	0	0	5	5	0	0	0	7	7	0	0	0	26	26	0	0	0	27	27	65
% Peds	0	0	0	100	0.4	0	0	0	100	0.4	0	0	0	100	3.4	0	0	0	100	2.3	1.3

TDC Traffic Comments: Signalized intersection with push button ped. signals for all quadrants. Video VCU camera was located within SE intersection quadrant. Note: Peds. are excluded from peak hour reports.

Traffic Data Collection, LLC

www:tdccounts.com

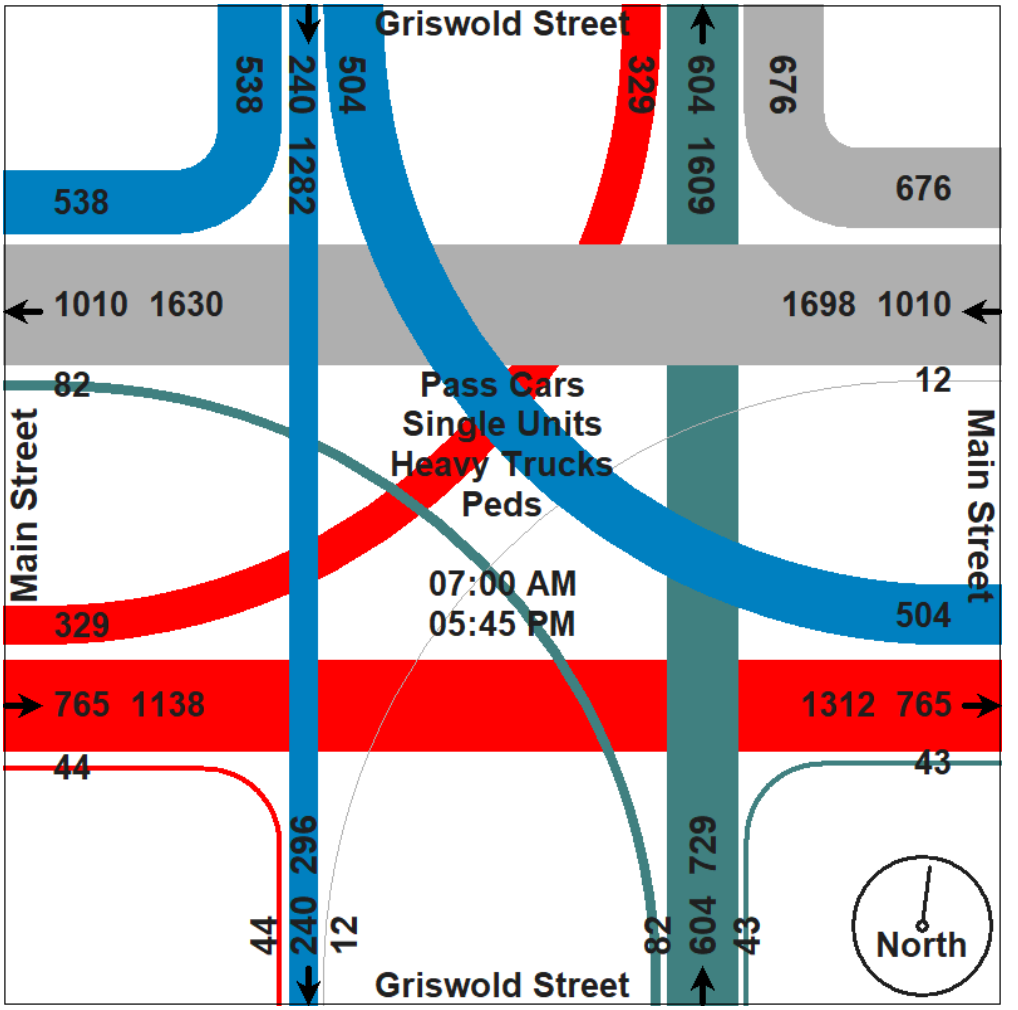
Phone: 586.786-5407

Traffic Study Performed For:

Fleis &VandenBrink

Project: Northville Down TIS
Study:4 Hr. Video Turning Movement Count
Weather: Sunny/Cldy. Dry Deg's 70's
Count By Miovision Video VCU 24L NE

File Name : TMC_3 Main & Griswold_5-15-18
Site Code : TMC_3
Start Date : 5/15/2018
Page No : 2



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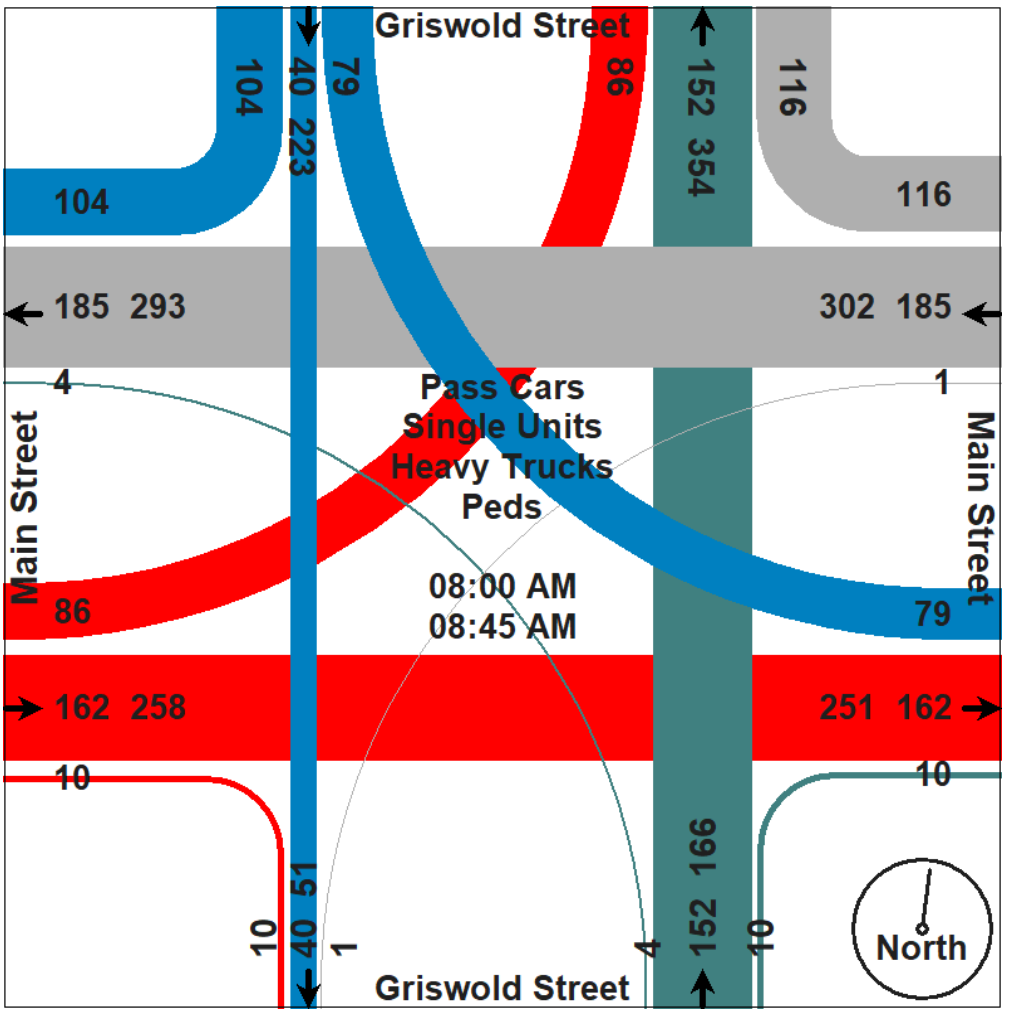
Traffic Study Performed For:

Fleis &VandenBrink

Project: Northville Down TIS
Study:4 Hr. Video Turning Movement Count
Weather: Sunny/Cldy. Dry Deg's 70's
Count By Miovision Video VCU 24L NE

File Name : TMC_3 Main & Griswold_5-15-18
Site Code : TMC_3
Start Date : 5/15/2018
Page No : 3

	Griswold Street Southbound				Main Street Westbound				Griswold Street Northbound				Main Street Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 11:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 08:00 AM																	
08:00 AM	22	10	18	50	28	41	0	69	**3**	**43**	1	**47**	3	46	21	70	236
08:15 AM	28	9	14	51	27	39	**1**	67	1	40	0	41	0	36	23	59	218
08:30 AM	**30**	**11**	19	60	29	46	0	75	3	38	**2**	43	2	32	16	50	228
08:45 AM	24	10	**28**	**62**	**32**	**59**	0	**91**	3	31	1	35	**5**	**48**	**26**	**79**	**267**
Total Volume	104	40	79	223	116	185	1	302	10	152	4	166	10	162	86	258	949
% App. Total	46.6	17.9	35.4		38.4	61.3	0.3		6	91.6	2.4		3.9	62.8	33.3		
PHF	.867	.909	.705	.899	.906	.784	.250	.830	.833	.884	.500	.883	.500	.844	.827	.816	.889
Pass Cars	102	38	76	216	108	182	1	291	10	151	4	165	10	160	85	255	927
% Pass Cars	98.1	95.0	96.2	96.9	93.1	98.4	100	96.4	100	99.3	100	99.4	100	98.8	98.8	98.8	97.7
Single Units	2	2	3	7	8	3	0	11	0	1	0	1	0	2	1	3	22
% Single Units	1.9	5.0	3.8	3.1	6.9	1.6	0	3.6	0	0.7	0	0.6	0	1.2	1.2	1.2	2.3
Heavy Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Heavy Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Peds	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Peds	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



Traffic Data Collection, LLC

www:tdccounts.com

Phone: 586.786-5407

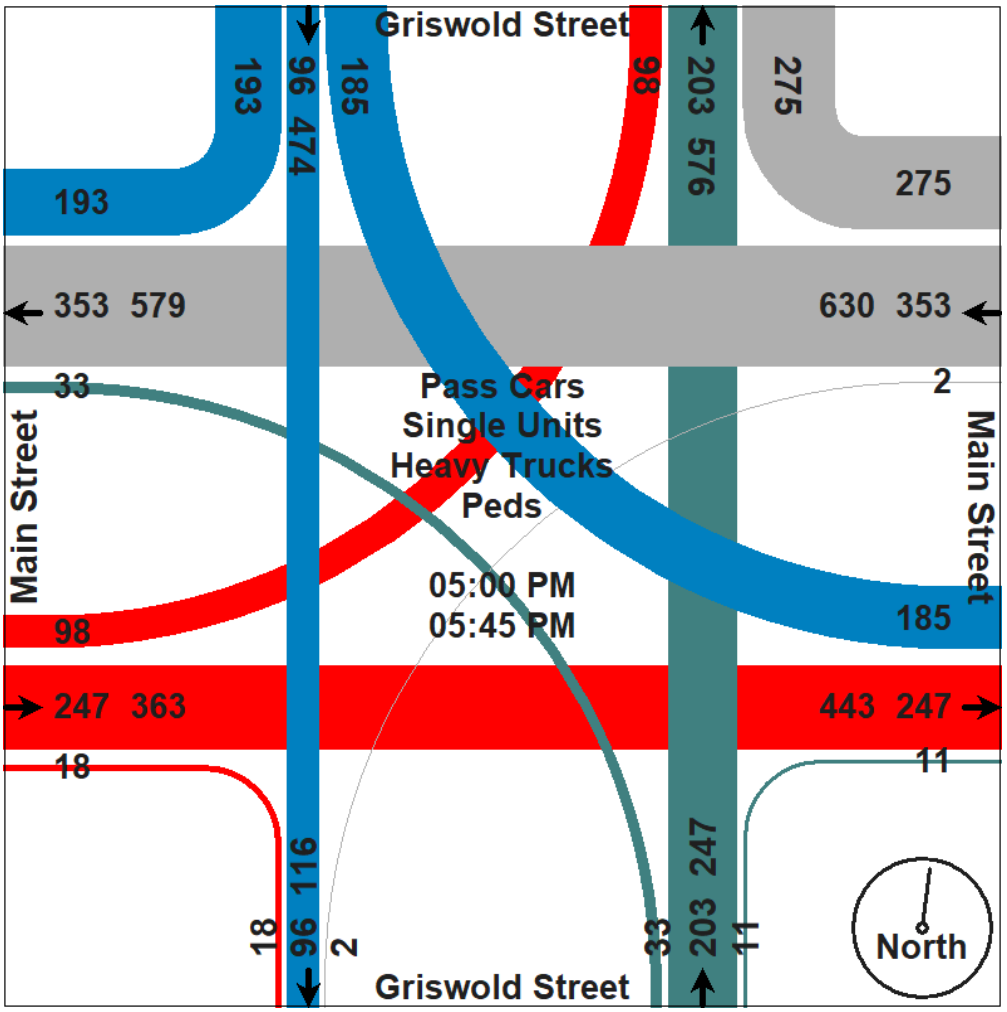
Traffic Study Performed For:

Fleis &VandenBrink

Project: Northville Down TIS
Study:4 Hr. Video Turning Movement Count
Weather: Sunny/Cldy. Dry Deg's 70's
Count By Miovision Video VCU 24L NE

File Name : TMC_3 Main & Griswold_5-15-18
Site Code : TMC_3
Start Date : 5/15/2018
Page No : 4

	Griswold Street Southbound				Main Street Westbound				Griswold Street Northbound				Main Street Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:00 PM																	
05:00 PM	53	18	40	111	57	**96**	0	153	3	55	9	**67**	**9**	68	23	100	431
05:15 PM	47	21	46	114	**76**	81	**2**	159	2	**56**	8	66	1	54	20	75	414
05:30 PM	39	27	**57**	123	70	92	0	**162**	**6**	47	6	59	4	**71**	**32**	**107**	**451**
05:45 PM	**54**	**30**	42	**126**	72	84	0	156	0	45	**10**	55	4	54	23	81	418
Total Volume	193	96	185	474	275	353	2	630	11	203	33	247	18	247	98	363	1714
% App. Total	40.7	20.3	39		43.7	56	0.3		4.5	82.2	13.4		5	68	27		
PHF	.894	.800	.811	.940	.905	.919	.250	.972	.458	.906	.825	.922	.500	.870	.766	.848	.950
Pass Cars	192	96	182	470	272	352	2	626	11	201	33	245	18	244	97	359	1700
% Pass Cars	99.5	100	98.4	99.2	98.9	99.7	100	99.4	100	99.0	100	99.2	100	98.8	99.0	98.9	99.2
Single Units	1	0	3	4	3	1	0	4	0	2	0	2	0	3	1	4	14
% Single Units	0.5	0	1.6	0.8	1.1	0.3	0	0.6	0	1.0	0	0.8	0	1.2	1.0	1.1	0.8
Heavy Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Heavy Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Peds	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Peds	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



Traffic Data Collection, LLC

www:tdccounts.com

Phone: 586.786-5407

Traffic Study Performed For:

Fleis &VandenBrink

Project: Northville Down TIS
Study:4 Hr. Video Turning Movement Count
Weather: Sunny/Cldy. Dry Deg's 70's
Count By Miovision Video VCU 24L NE

File Name : TMC_3 Main & Griswold_5-15-18
Site Code : TMC_3
Start Date : 5/15/2018
Page No : 5

Aerial Photo

Traffic Data Collection, LLC

www:tdccounts.com

Phone: 586.786-5407

Traffic Study Performed For:

Fleis &VandenBrink

Project: Northville Down TIS
Study:4 Hr. Video Turning Movement Count
Weather: Sunny/Cldy. Dry Deg's 70's
Count By Miovision Video VCU 4SY NW

File Name : TMC_6 Cady & Griswold_5-15-18
Site Code : TMC_6
Start Date : 5/15/2018
Page No : 1

4 Hour traffic study was conducted during typical weekday (Tuesday-Thursday) from 7:00 AM - 9:00 AM morning & 4:00 PM - 6:00 PM afternoon peak hours, while school was in session.

Groups Printed- Pass Cars - Single Units - Heavy Trucks - Peds

	Griswold Street Southbound					Cady Street Westbound					Griswold Street Northbound					Cady Street Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
07:00 AM	8	1	1	0	10	0	0	0	0	0	0	7	2	0	9	2	4	11	1	18	37
07:15 AM	8	5	0	0	13	0	1	1	0	2	0	5	1	0	6	6	2	21	0	29	50
07:30 AM	5	4	0	0	9	0	0	0	1	1	0	9	2	0	11	6	1	39	0	46	67
07:45 AM	10	3	0	0	13	0	0	0	0	0	0	4	2	0	6	6	5	35	1	47	66
Total	31	13	1	0	45	0	1	1	1	3	0	25	7	0	32	20	12	106	2	140	220
08:00 AM	6	9	1	0	16	1	2	0	0	3	0	4	3	0	7	6	4	41	1	52	78
08:15 AM	7	0	1	4	12	0	1	0	0	1	1	8	1	0	10	5	2	35	0	42	65
08:30 AM	11	2	0	1	14	1	1	0	0	2	2	3	7	0	12	4	3	39	1	47	75
08:45 AM	13	5	0	0	18	0	0	0	0	0	3	3	6	0	12	4	9	34	1	48	78
Total	37	16	2	5	60	2	4	0	0	6	6	18	17	0	41	19	18	149	3	189	296
*** BREAK ***																					
04:00 PM	7	11	0	0	18	1	3	0	0	4	1	9	6	0	16	9	2	16	0	27	65
04:15 PM	11	12	2	0	25	2	2	1	0	5	2	18	2	0	22	8	5	17	0	30	82
04:30 PM	9	13	1	0	23	2	3	0	0	5	0	24	4	0	28	9	3	31	1	44	100
04:45 PM	7	12	2	0	21	1	4	1	0	6	0	15	7	0	22	7	5	30	1	43	92
Total	34	48	5	0	87	6	12	2	0	20	3	66	19	0	88	33	15	94	2	144	339
05:00 PM	13	18	0	0	31	2	1	0	0	3	0	26	4	0	30	12	3	34	0	49	113
05:15 PM	11	16	2	0	29	3	1	3	0	7	1	30	5	0	36	7	2	30	0	39	111
05:30 PM	17	22	1	0	40	2	2	0	0	4	2	21	8	0	31	7	2	32	0	41	116
05:45 PM	16	15	1	0	32	3	2	0	0	5	0	23	7	0	30	5	2	26	3	36	103
Total	57	71	4	0	132	10	6	3	0	19	3	100	24	0	127	31	9	122	3	165	443
Grand Total	159	148	12	5	324	18	23	6	1	48	12	209	67	0	288	103	54	471	10	638	1298
Apprch %	49.1	45.7	3.7	1.5		37.5	47.9	12.5	2.1		4.2	72.6	23.3	0		16.1	8.5	73.8	1.6		
Total %	12.2	11.4	0.9	0.4	25	1.4	1.8	0.5	0.1	3.7	0.9	16.1	5.2	0	22.2	7.9	4.2	36.3	0.8	49.2	
Pass Cars	158	146	12	0	316	18	23	5	0	46	12	209	67	0	288	103	54	466	0	623	1273
% Pass Cars	99.4	98.6	100	0	97.5	100	100	83.3	0	95.8	100	100	100	0	100	100	100	98.9	0	97.6	98.1
Single Units	1	2	0	0	3	0	0	1	0	1	0	0	0	0	0	0	0	5	0	5	9
% Single Units	0.6	1.4	0	0	0.9	0	0	16.7	0	2.1	0	0	0	0	0	0	0	1.1	0	0.8	0.7
Heavy Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Heavy Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Peds	0	0	0	5	5	0	0	0	1	1	0	0	0	0	0	0	0	0	10	10	16
% Peds	0	0	0	100	1.5	0	0	0	100	2.1	0	0	0	0	0	0	0	0	100	1.6	1.2

TDC Traffic Comments: Non-signalized intersection. Cady St. is stop controlled for Griswold St. Video VCU camera was located within NW intersection quadrant. Note: Peds. are excluded from peak hour reports.

Traffic Data Collection, LLC

www:tdccounts.com

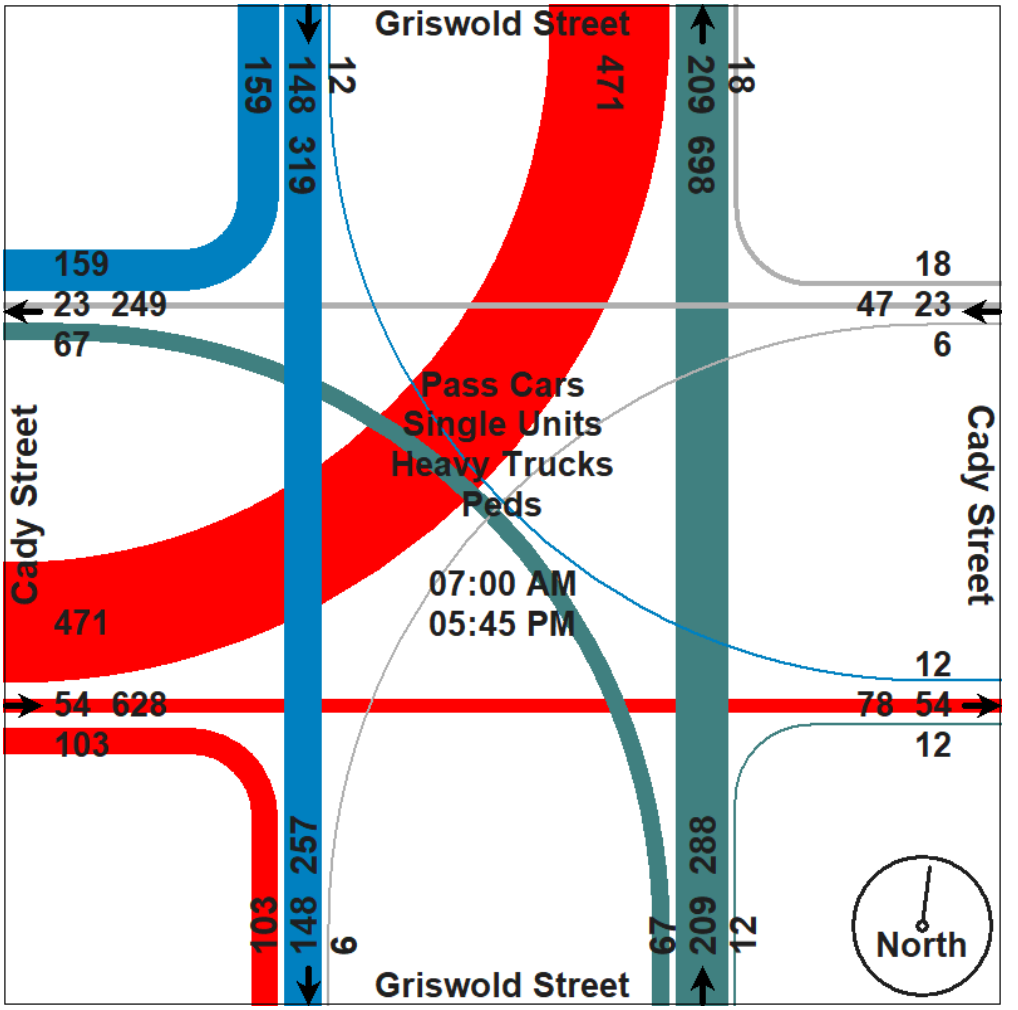
Phone: 586.786-5407

Traffic Study Performed For:

Fleis &VandenBrink

Project: Northville Down TIS
Study:4 Hr. Video Turning Movement Count
Weather: Sunny/Cldy. Dry Deg's 70's
Count By Miovision Video VCU 4SY NW

File Name : TMC_6 Cady & Griswold_5-15-18
Site Code : TMC_6
Start Date : 5/15/2018
Page No : 2



Traffic Data Collection, LLC

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Phone: 586.786-5407

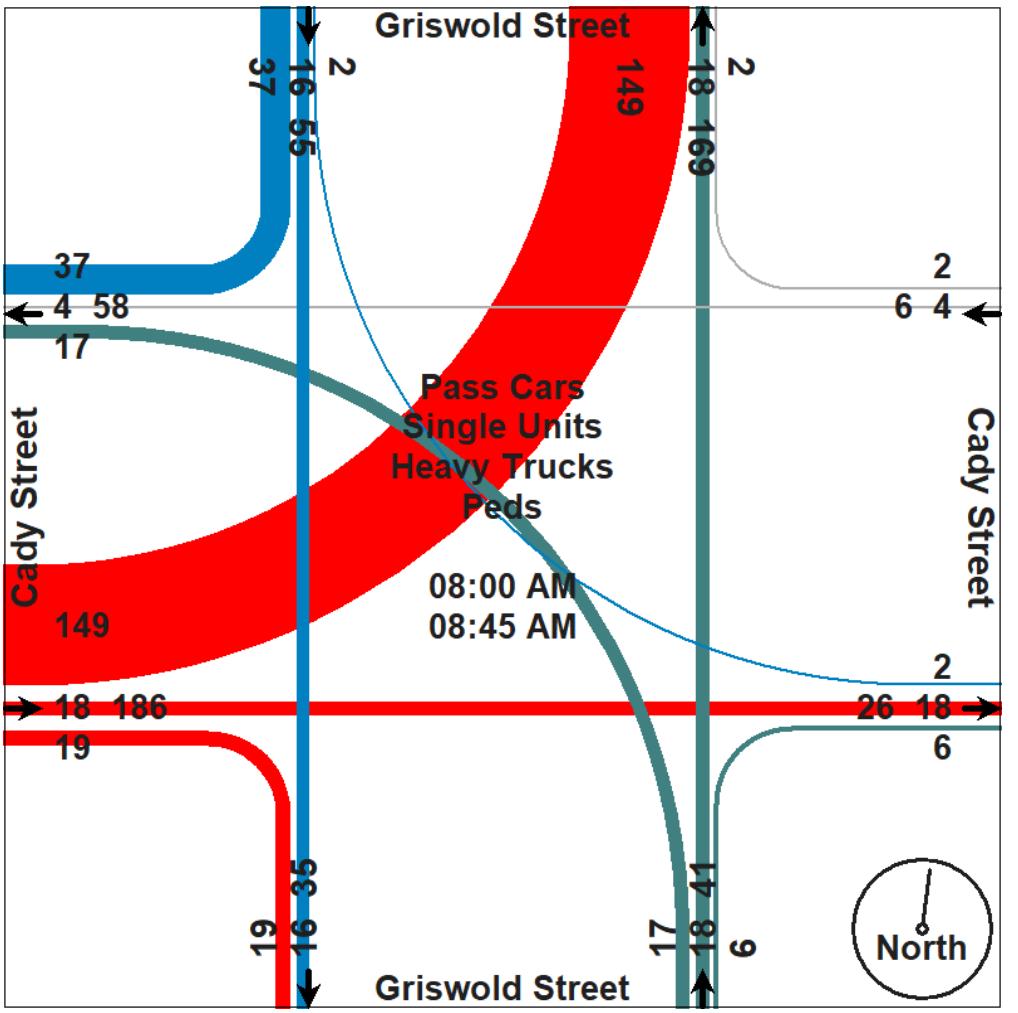
Traffic Study Performed For:

Fleis &VandenBrink

Project: Northville Down TIS
Study:4 Hr. Video Turning Movement Count
Weather: Sunny/Cldy. Dry Deg's 70's
Count By Miovision Video VCU 4SY NW

File Name : TMC_6 Cady & Griswold_5-15-18
Site Code : TMC_6
Start Date : 5/15/2018
Page No : 3

	Griswold Street Southbound				Cady Street Westbound				Griswold Street Northbound				Cady Street Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 11:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 08:00 AM																	
08:00 AM	6	**9**	**1**	16	**1**	**2**	0	**3**	0	4	3	7	**6**	4	**41**	**51**	**77**
08:15 AM	7	0	1	8	0	1	0	1	1	**8**	1	10	5	2	35	42	61
08:30 AM	11	2	0	13	1	1	0	2	2	3	**7**	**12**	4	3	39	46	73
08:45 AM	**13**	5	0	**18**	0	0	0	0	**3**	3	6	12	4	**9**	34	47	77
Total Volume	37	16	2	55	2	4	0	6	6	18	17	41	19	18	149	186	288
% App. Total	67.3	29.1	3.6		33.3	66.7	0		14.6	43.9	41.5		10.2	9.7	80.1		
PHF	.712	.444	.500	.764	.500	.500	.000	.500	.500	.563	.607	.854	.792	.500	.909	.912	.935
Pass Cars	36	15	2	53	2	4	0	6	6	18	17	41	19	18	148	185	285
% Pass Cars	97.3	93.8	100	96.4	100	100	0	100	100	100	100	100	100	100	99.3	99.5	99.0
Single Units	1	1	0	2	0	0	0	0	0	0	0	0	0	0	1	1	3
% Single Units	2.7	6.3	0	3.6	0	0	0	0	0	0	0	0	0	0	0.7	0.5	1.0
Heavy Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Heavy Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Peds	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Peds	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



Traffic Data Collection, LLC

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Phone: 586.786-5407

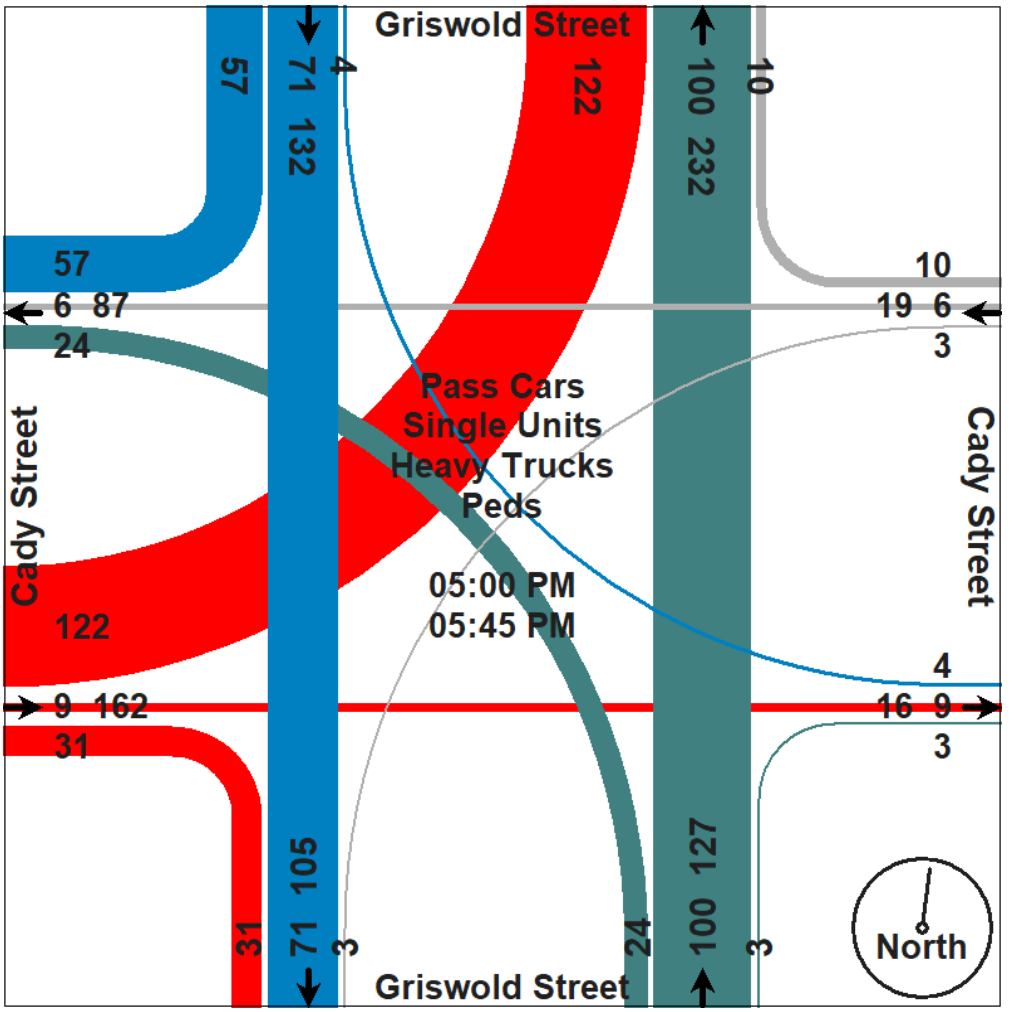
Traffic Study Performed For:

Fleis &VandenBrink

Project: Northville Down TIS
Study:4 Hr. Video Turning Movement Count
Weather: Sunny/Cldy. Dry Deg's 70's
Count By Miovision Video VCU 4SY NW

File Name : TMC_6 Cady & Griswold_5-15-18
Site Code : TMC_6
Start Date : 5/15/2018
Page No : 4

	Griswold Street Southbound				Cady Street Westbound				Griswold Street Northbound				Cady Street Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:00 PM																	
05:00 PM	13	18	0	31	2	1	0	3	0	26	4	30	**12**	**3**	**34**	**49**	113
05:15 PM	11	16	**2**	29	**3**	1	**3**	**7**	1	**30**	5	**36**	7	2	30	39	111
05:30 PM	**17**	**22**	1	**40**	2	**2**	0	4	**2**	21	**8**	31	7	2	32	41	**116**
05:45 PM	16	15	1	32	3	2	0	5	0	23	7	30	5	2	26	33	100
Total Volume	57	71	4	132	10	6	3	19	3	100	24	127	31	9	122	162	440
% App. Total	43.2	53.8	3		52.6	31.6	15.8		2.4	78.7	18.9		19.1	5.6	75.3		
PHF	.838	.807	.500	.825	.833	.750	.250	.679	.375	.833	.750	.882	.646	.750	.897	.827	.948
Pass Cars	57	71	4	132	10	6	3	19	3	100	24	127	31	9	120	160	438
% Pass Cars	100	100	100	100	100	100	100	100	100	100	100	100	100	100	98.4	98.8	99.5
Single Units	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	2
% Single Units	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.6	1.2	0.5
Heavy Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Heavy Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Peds	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Peds	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



Traffic Data Collection, LLC

www:tdccounts.com

Phone: 586.786-5407

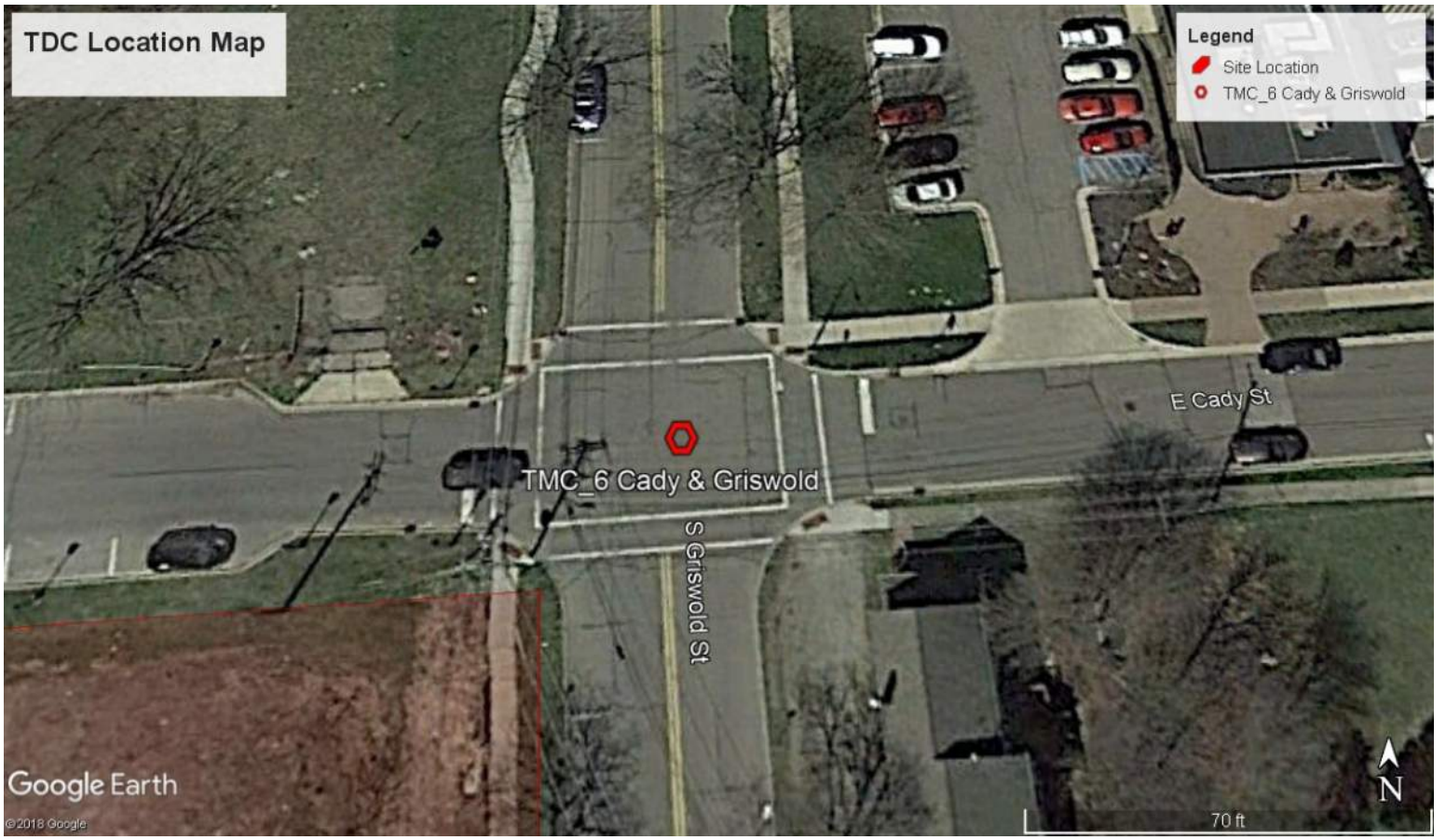
Traffic Study Performed For:

Fleis &VandenBrink

Project: Northville Down TIS
Study:4 Hr. Video Turning Movement Count
Weather: Sunny/Cldy. Dry Deg's 70's
Count By Miovision Video VCU 4SY NW

File Name : TMC_6 Cady & Griswold_5-15-18
Site Code : TMC_6
Start Date : 5/15/2018

Aerial Photo



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Project: Northville Down TIS
Study:4 Hr. Video Turning Movement Count
Weather: Sunny/Cldy. Dry Deg's 70's
Count By Miovision Video VCU 3CU NW

File Name : TMC_8 Beal & River_5-15-18
Site Code : TMC_8
Start Date : 5/15/2018
Page No : 1

4 Hour traffic study was conducted during typical weekday (Tuesday-Thursday) from 7:00 AM - 9:00 AM morning & 4:00 PM - 6:00 PM afternoon peak hours, while school was in session.

Groups Printed- Pass Cars - Single Units - Heavy Trucks - Peds

	Beal Street Westbound				River Street Northbound				Beal Street Eastbound				
Start Time	Thru	Left	Peds	App. Total	Right	Left	Peds	App. Total	Right	Thru	Peds	App. Total	Int. Total
07:00 AM	2	0	0	2	1	6	0	7	0	3	0	3	12
07:15 AM	2	1	0	3	1	4	0	5	7	5	0	12	20
07:30 AM	6	1	0	7	1	5	0	6	1	9	0	10	23
07:45 AM	3	0	0	3	1	2	1	4	2	6	0	8	15
Total	13	2	0	15	4	17	1	22	10	23	0	33	70
08:00 AM	2	0	0	2	3	4	0	7	6	9	1	16	25
08:15 AM	7	2	0	9	1	5	0	6	2	4	0	6	21
08:30 AM	6	3	0	9	4	6	0	10	4	3	0	7	26
08:45 AM	5	1	1	7	0	5	0	5	3	6	0	9	21
Total	20	6	1	27	8	20	0	28	15	22	1	38	93
*** BREAK ***													
04:00 PM	5	2	0	7	2	7	0	9	7	11	0	18	34
04:15 PM	6	2	0	8	1	11	1	13	10	15	2	27	48
04:30 PM	5	1	1	7	1	16	1	18	9	15	0	24	49
04:45 PM	5	0	3	8	0	13	0	13	9	7	0	16	37
Total	21	5	4	30	4	47	2	53	35	48	2	85	168
05:00 PM	3	1	3	7	4	24	0	28	14	16	0	30	65
05:15 PM	4	2	0	6	1	25	0	26	18	11	0	29	61
05:30 PM	3	1	0	4	2	24	0	26	13	14	0	27	57
05:45 PM	5	0	3	8	2	18	1	21	17	9	0	26	55
Total	15	4	6	25	9	91	1	101	62	50	0	112	238
*** BREAK ***													
Grand Total	69	17	11	97	25	175	4	204	122	143	3	268	569
Apprch %	71.1	17.5	11.3		12.3	85.8	2		45.5	53.4	1.1		
Total %	12.1	3	1.9	17	4.4	30.8	0.7	35.9	21.4	25.1	0.5	47.1	
Pass Cars	68	17	0	85	24	174	0	198	120	141	0	261	544
% Pass Cars	98.6	100	0	87.6	96	99.4	0	97.1	98.4	98.6	0	97.4	95.6
Single Units	1	0	0	1	1	1	0	2	2	2	0	4	7
% Single Units	1.4	0	0	1	4	0.6	0	1	1.6	1.4	0	1.5	1.2
Heavy Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
% Heavy Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
Peds	0	0	11	11	0	0	4	4	0	0	3	3	18
% Peds	0	0	100	11.3	0	0	100	2	0	0	100	1.1	3.2

TDC Traffic Comments: Non-signalized "T" intersection. River St.is stop controlled for Beal St. Video VCU camera was located within NW intersection quadrant. Note: Peds. are excluded from peak hour reports.

Traffic Data Collection, LLC

www:tdccounts.com

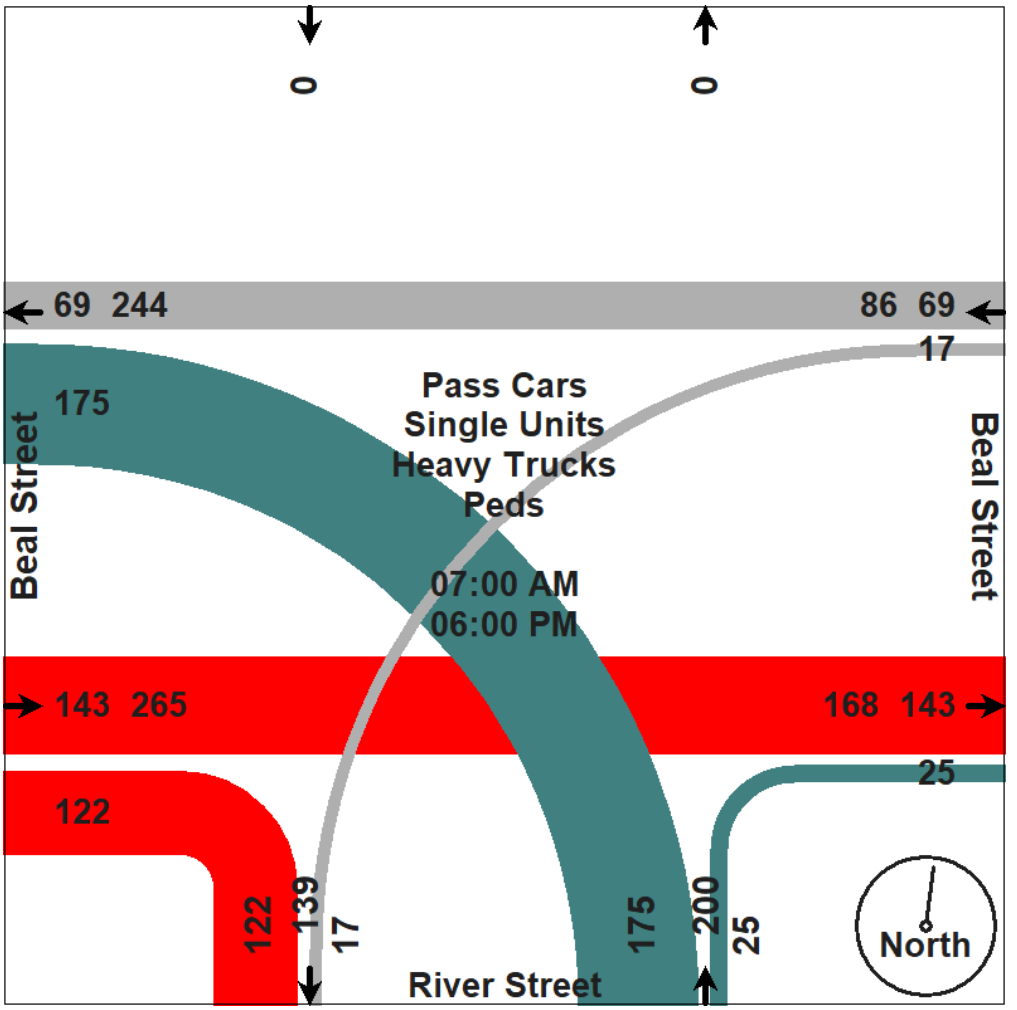
Phone: 586.786-5407

Traffic Study Performed For:

Fleis &VandenBrink

Project: Northville Down TIS
Study:4 Hr. Video Turning Movement Count
Weather: Sunny/Cldy. Dry Deg's 70's
Count By Miovision Video VCU 3CU NW

File Name : TMC_8 Beal & River_5-15-18
Site Code : TMC_8
Start Date : 5/15/2018
Page No : 2



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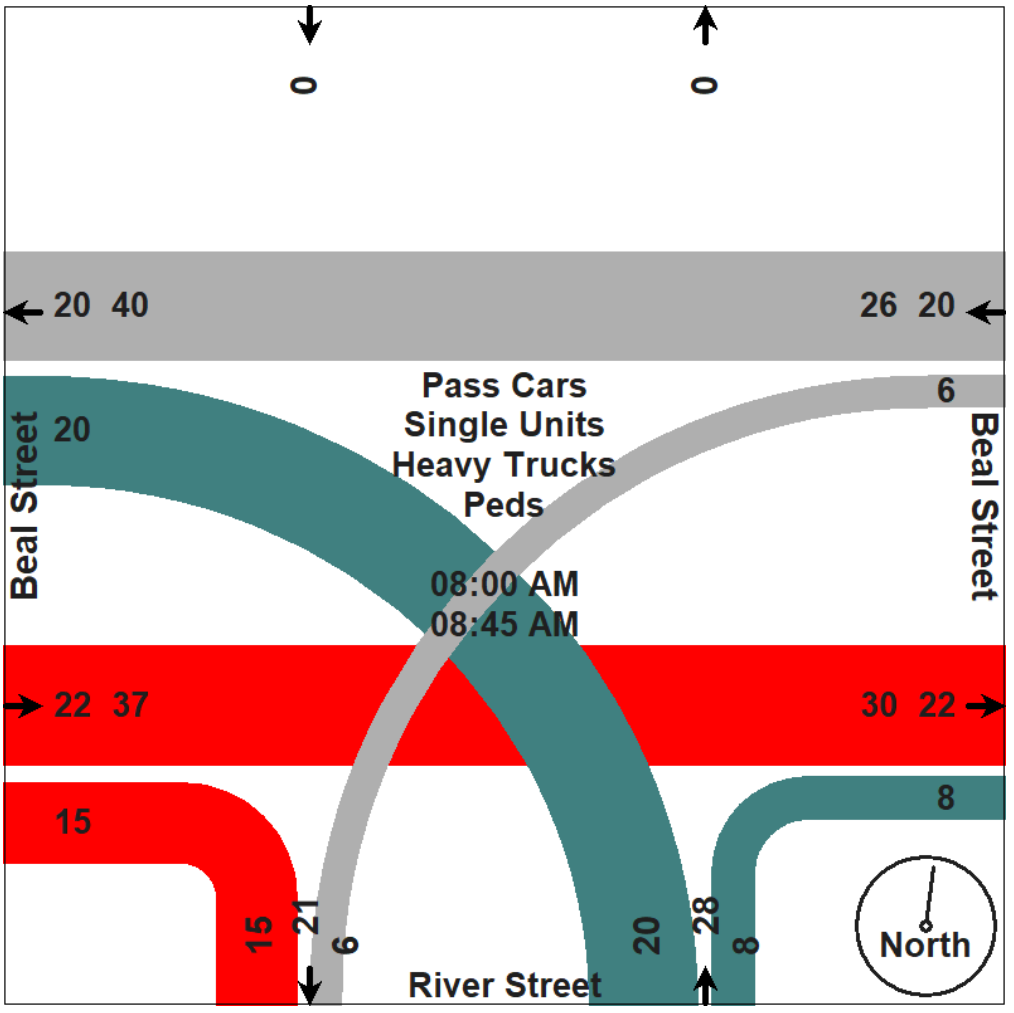
File Name : TMC_8 Beal & River_5-15-18
Site Code : TMC_8
Start Date : 5/15/2018
Page No : 3

	Beal Street Westbound			River Street Northbound			Beal Street Eastbound			
Start Time	Thru	Left	App. Total	Right	Left	App. Total	Right	Thru	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 11:45 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 08:00 AM										
08:00 AM	2	0	2	3	4	7	**6**	**9**	**15**	24
08:15 AM	**7**	2	**9**	1	5	6	2	4	6	21
08:30 AM	6	**3**	9	**4**	**6**	**10**	4	3	7	**26**
08:45 AM	5	1	6	0	5	5	3	6	9	20
Total Volume	20	6	26	8	20	28	15	22	37	91
% App. Total	76.9	23.1		28.6	71.4		40.5	59.5		
PHF	.714	.500	.722	.500	.833	.700	.625	.611	.617	.875
Pass Cars	20	6	26	7	19	26	14	21	35	87
% Pass Cars	100	100	100	87.5	95.0	92.9	93.3	95.5	94.6	95.6
Single Units	0	0	0	1	1	2	1	1	2	4
% Single Units	0	0	0	12.5	5.0	7.1	6.7	4.5	5.4	4.4
Heavy Trucks	0	0	0	0	0	0	0	0	0	0
% Heavy Trucks	0	0	0	0	0	0	0	0	0	0
Peds	0	0	0	0	0	0	0	0	0	0
% Peds	0	0	0	0	0	0	0	0	0	0



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Project: Northville Down TIS
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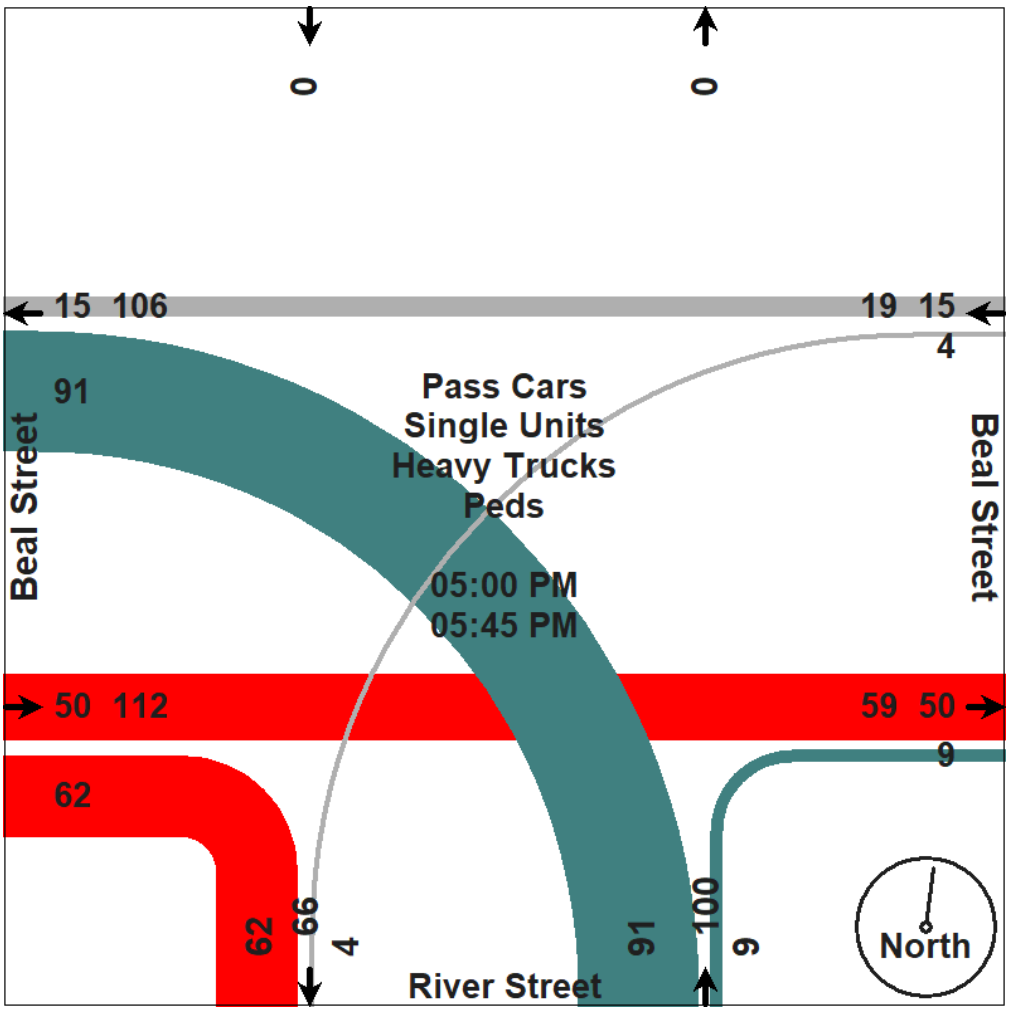
Count By Miovision Video VCU 3CU NW

File Name : TMC_8 Beal & River_5-15-18
Site Code : TMC_8
Start Date : 5/15/2018
Page No : 4

	Beal Street Westbound			River Street Northbound			Beal Street Eastbound			
Start Time	Thru	Left	App. Total	Right	Left	App. Total	Right	Thru	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 05:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 05:00 PM										
05:00 PM	3	1	4	**4**	24	**28**	14	**16**	**30**	**62**
05:15 PM	4	**2**	**6**	1	**25**	26	**18**	11	29	61
05:30 PM	3	1	4	2	24	26	13	14	27	57
05:45 PM	**5**	0	5	2	18	20	17	9	26	51
Total Volume	15	4	19	9	91	100	62	50	112	231
% App. Total	78.9	21.1		9	91		55.4	44.6		
PHF	.750	.500	.792	.563	.910	.893	.861	.781	.933	.931
Pass Cars	15	4	19	9	91	100	62	50	112	231
% Pass Cars	100	100	100	100	100	100	100	100	100	100
Single Units	0	0	0	0	0	0	0	0	0	0
% Single Units	0	0	0	0	0	0	0	0	0	0
Heavy Trucks	0	0	0	0	0	0	0	0	0	0
% Heavy Trucks	0	0	0	0	0	0	0	0	0	0
Peds	0	0	0	0	0	0	0	0	0	0
% Peds	0	0	0	0	0	0	0	0	0	0



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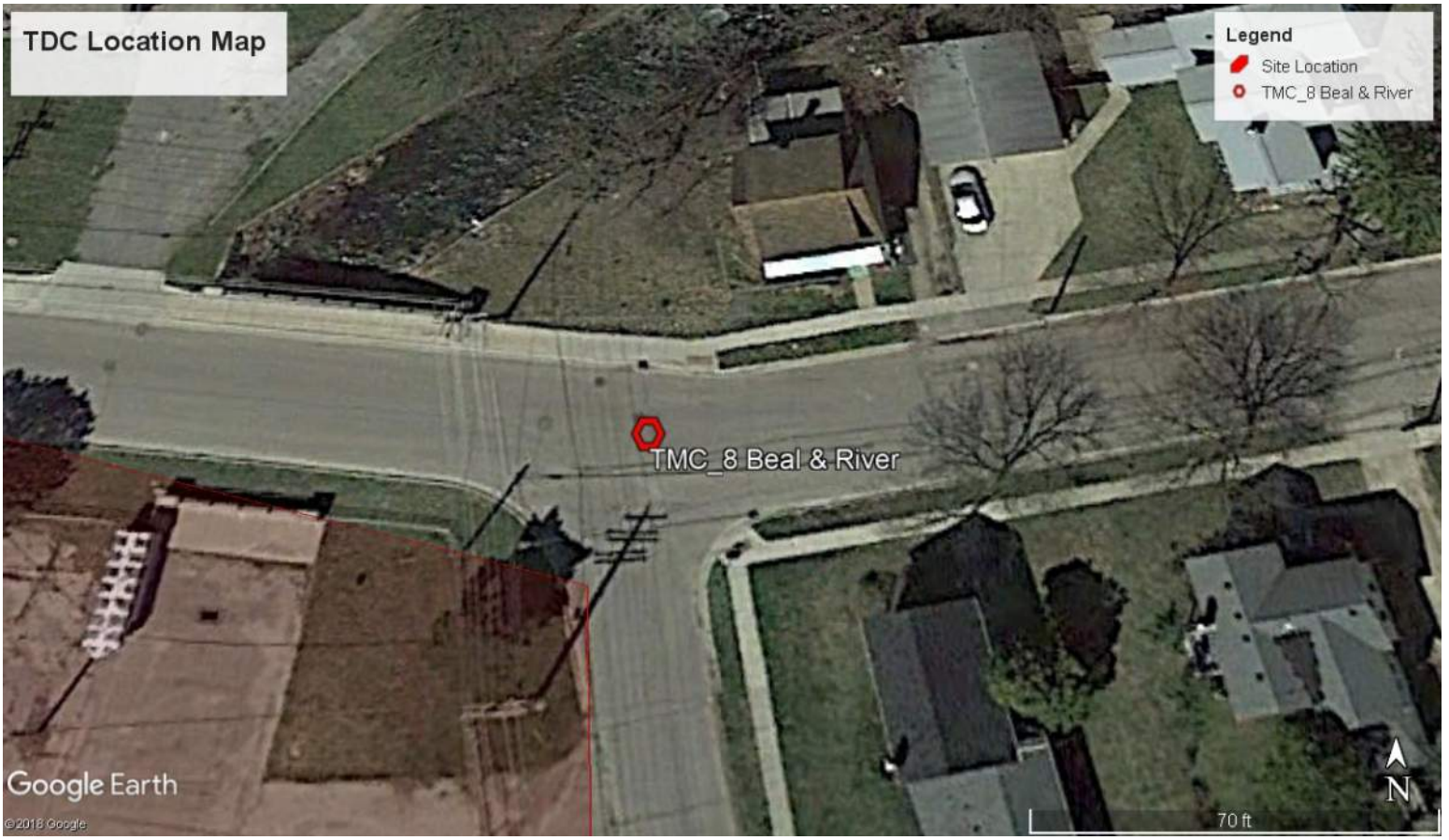
File Name : TMC_8 Beal & River_5-15-18
Site Code : TMC_8
Start Date : 5/15/2018

Aerial Photo



	Main Street Westbound		Cady Street Northbound		Main Street Eastbound		
Start Time	Left	Thru	Left	Right	Thru	Right	**Total**
7:00 AM	0	28	0	2	25	0	**55**
7:15 AM	0	40	0	4	22	0	**66**
7:30 AM	2	30	0	1	34	0	**67**
7:45 AM	1	57	0	1	43	1	**103**
8:00 AM	1	44	0	3	39	1	**88**
8:15 AM	0	64	1	4	37	0	**106**
8:30 AM	1	68	1	6	49	0	**125**
8:45 AM	2	70	2	5	46	0	**125**

Peak Hour

Total	**4**	**246**	**4**	**18**	**171**	**1**	**444**
PHF	0.87		0.79		0.88		
HV	14		1		6		

4:00 PM	4	94	1	6	78	6	**189**
4:15 PM	1	88	2	9	73	10	**183**
4:30 PM	2	96	1	7	69	2	**177**
4:45 PM	5	120	4	4	88	4	**225**
5:00 PM	3	113	2	5	75	6	**204**
5:15 PM	3	101	2	6	76	4	**192**
5:30 PM	4	114	0	1	63	2	**184**
5:45 PM	7	114	3	5	96	5	**230**

Peak Hour

Total	**17**	**442**	**7**	**17**	**310**	**17**	**810**
PHF	0.95		0.75		0.81		
HV	6		1		6		

SEMCOG | Southeast Michigan Council of Governments

Community Profiles

YOU ARE VIEWING DATA FOR:

City of Northville

215 W Main St
Northville, MI 48167-1599
http://www.ci.northville.mi.us/

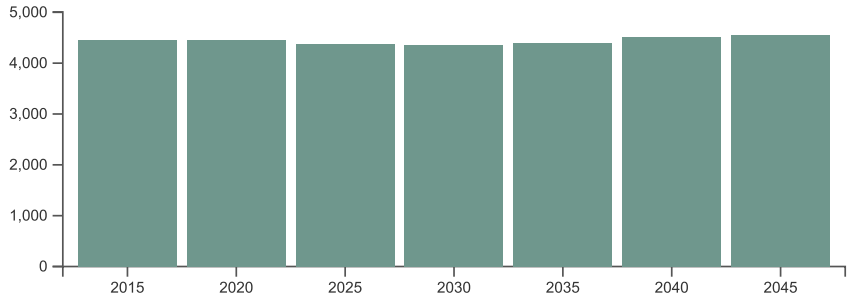
SEMCOG MEMBER

Census 2010 Population: 5,970
Area: 2 square miles

Economy & Jobs

Link to American Community Survey (ACS) Profiles: **Select a Year** 2012-2016 ▼ **Economic**

Forecasted Jobs



Source: **SEMCOG 2045 Regional Development Forecast**

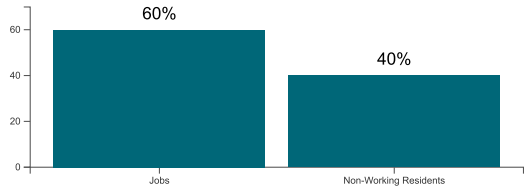
Forecasted Jobs by Industry Sector

Forecasted Jobs By Industry Sector	2015	2020	2025	2030	2035	2040	2045	Change 2015-2045	Pct Change 2015-2045
Natural Resources, Mining, & Construction	98	103	97	99	100	102	101	3	3.1%
Manufacturing	120	110	90	83	79	69	59	-61	-50.8%
Wholesale Trade	67	64	68	62	64	63	67	0	0%
Retail Trade	330	307	297	283	267	279	283	-47	-14.2%
Transportation, Warehousing, & Utilities	135	102	86	74	65	60	55	-80	-59.3%
Information & Financial Activities	881	863	822	811	792	849	839	-42	-4.8%
Professional and Technical Services & Corporate HQ	500	501	514	522	549	564	568	68	13.6%
Administrative, Support, & Waste Services	277	287	290	293	301	309	314	37	13.4%
Education Services	486	499	496	494	496	502	506	20	4.1%
Healthcare Services	487	524	536	551	582	617	651	164	33.7%
Leisure & Hospitality	511	529	527	529	535	551	558	47	9.2%
Other Services	432	434	428	424	425	424	419	-13	-3%
Public Administration	136	132	132	132	132	132	132	-4	-2.9%
Total Employment Numbers	4,460	4,455	4,383	4,357	4,387	4,521	4,552	92	2.1%

Source: **SEMCOG 2045 Regional Development Forecast**

Daytime Population

Daytime Population	SEMCOG and ACS 2015
Jobs	4,460
Non-Working Residents	2,984
Age 15 and under	1,014
Not in labor force	1,724
Unemployed	246
Daytime Population	7,444



Source: **SEMCOG 2045 Regional Development Forecast** and **2015 American Community Survey 5-Year Estimates**

Note: The number of residents attending school outside Southeast Michigan is not available. Likewise, the number of students commuting into Southeast Michigan to attend school is also not known.

SEMCOG | Southeast Michigan Council of Governments

Community Profiles

YOU ARE VIEWING DATA FOR:

City of Northville

215 W Main St
Northville, MI 48167-1599
http://www.ci.northville.mi.us/

SEMCOG MEMBER

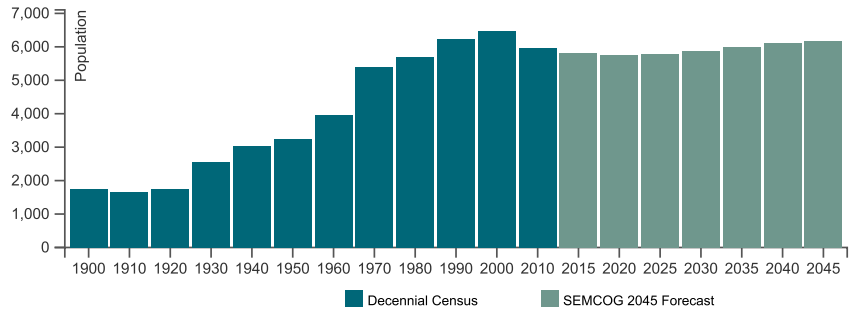
Census 2010 Population: 5,970
Area: 2 square miles

Population and Households

Link to American Community Survey (ACS) Profiles: **Select a Year** 2012-2016 ▼ **Social** | **Demographic**

Population and Household Estimates for Southeast Michigan, 2017

Population Forecast



Note for City of Northville : Incorporated as a city in 1955 from Village of Northville. Village of Northville incorporated in 1867. Oakland County portion of the Village of Northville was annexed into the village in the early 1900s but not reported separately in the Census until 1930. Population numbers prior to 1955 are of the village.

Population and Households

Population and Households	Census 2010	Change 2000-2010	Pct Change 2000-2010	SEMCOG Jul 2017	SEMCOG 2045
Total Population	5,970	-489	-7.6%	5,835	6,183
Group Quarters Population	34	-4	-10.5%	34	36
Household Population	5,936	-485	-7.6%	5,801	6,147
Housing Units	2,767	-34	-1.2%	2,648	-
Households (Occupied Units)	2,596	-124	-4.6%	2,495	2,602
Residential Vacancy Rate	6.2%	3.3%	-	5.8%	-
Average Household Size	2.29	-0.07	-	2.33	2.36

Source: **U.S. Census Bureau**, **SEMCOG Population and Household Estimates**, and **SEMCOG 2045 Regional Development Forecast**

Components of Population Change

Components of Population Change	2000-2005 Avg.	2006-2010 Avg.	2011-2015 Avg.
Natural Increase (Births - Deaths)	109	90	33
Births	231	230	130
Deaths	122	140	97
Net Migration (Movement In - Movement Out)	-157	-140	-61
Population Change (Natural Increase + Net Migration)	-48	-50	-28

Source: **Michigan Department of Community Health Vital Statistics**, **U.S. Census Bureau**, and SEMCOG

SEMCOG | Southeast Michigan Council of Governments

Crash and Road Data

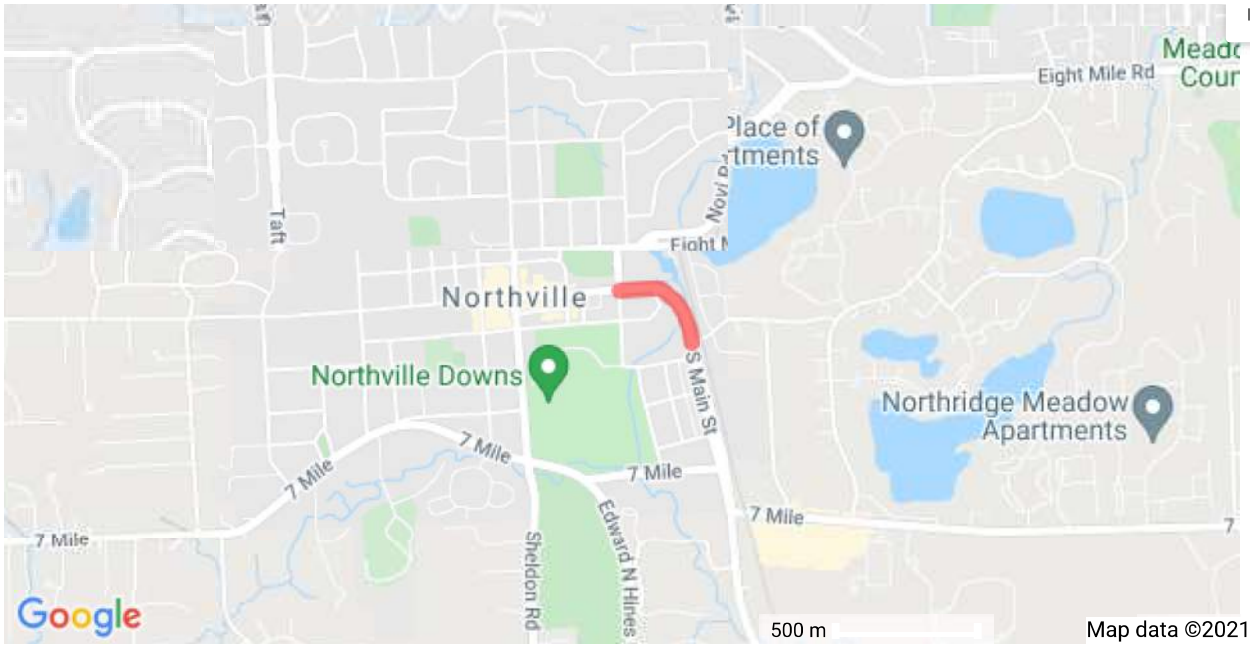
Road Segment Report

Main St E, (PR Number 1680704)

From:	Griswold St 1.712 BMP
To:	Main St S 1.946 EMP
FALINK ID:	15974
Community:	City of Northville (Wayne County)
County:	Wayne
Functional Class:	4 - Minor Arterial
Direction:	1 Way
Length:	0.234 miles
Number of Lanes:	4
Posted Speed:	25 (source: TCO)
Route Classification:	Not a route
Annual Crash Average 2016-2020:	2
Traffic Volume (2016)*:	11,800 (Observed AADT)
Pavement Type (2018):	Asphalt
Pavement Rating (2018):	Poor
Short Range (TIP) Projects:	No TIP projects for this segment.
Long Range (RTP) Projects:	No long-range projects for this segment.

* AADT values are derived from **Traffic Counts**

Street View


Eight Mile Rd
Northville
Northville Downs
Northridge Meadow Apartments
S Main St
Taft
7 Mile
Sheldon Rd
Edward N Hines
500 m
Map data ©2021 Google

SEMCOG | Southeast Michigan Council of Governments

Crash and Road Data

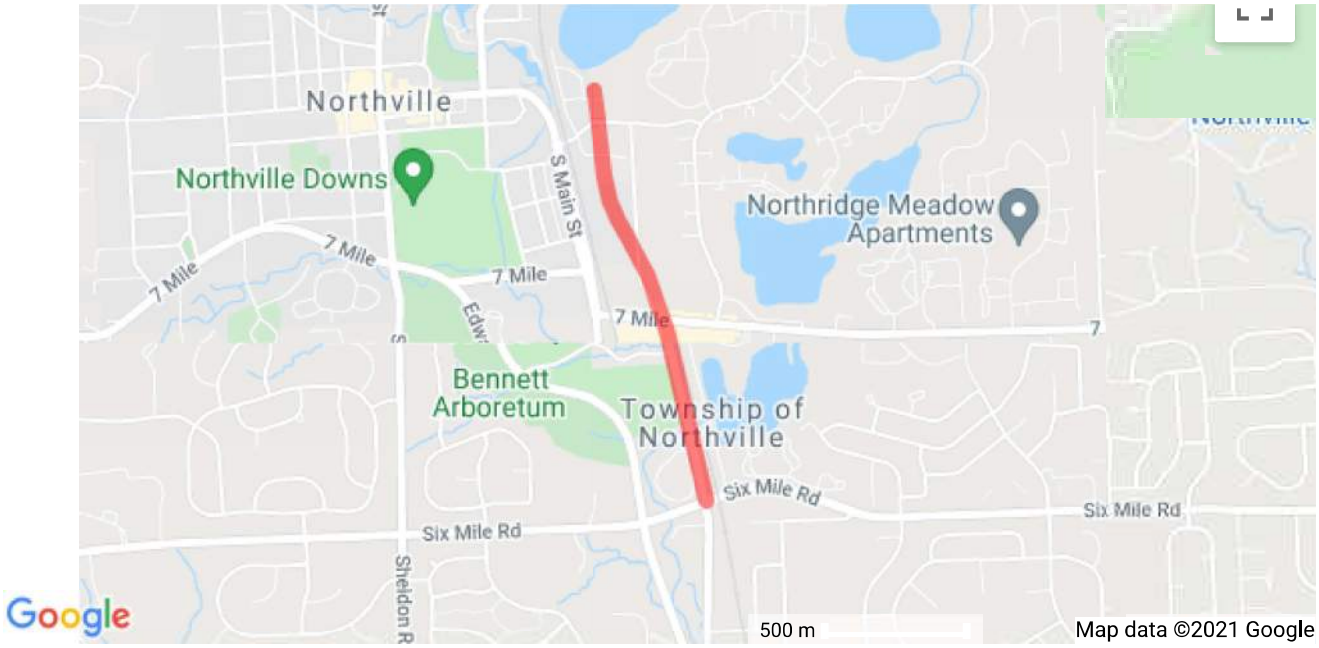
Road Segment Report

Northville Rd, (PR Number 1679402)

From:	6 Mile Rd 1.975 BMP
To:	7 Mile Rd 2.913 EMP
FALINK ID:	15863
Community:	Northville Township
County:	Wayne
Functional Class:	4 - Minor Arterial
Direction:	1 Way
Length:	0.938 miles
Number of Lanes:	2
Posted Speed:	40 (source: TCO)
Route Classification:	Not a route
Annual Crash Average 2016-2020:	11
Traffic Volume (2016)*:	12,100 (Observed AADT)
Pavement Type (2018):	Asphalt
Pavement Rating (2018):	Poor
Short Range (TIP) Projects:	No TIP projects for this segment.
Long Range (RTP) Projects:	No long-range projects for this segment.

* AADT values are derived from **Traffic Counts**

Street View


Northville
Northville Downs
S Main St
Northridge Meadow Apartments
7 Mile
7 Mile
7 Mile
7 Mile
7
Bennett Arboretum
Township of Northville
Six Mile Rd
Six Mile Rd
Six Mile Rd
Sheldon R
Google
500 m
Map data ©2021 Google

SEMCOG | Southeast Michigan Council of Governments

Crash and Road Data

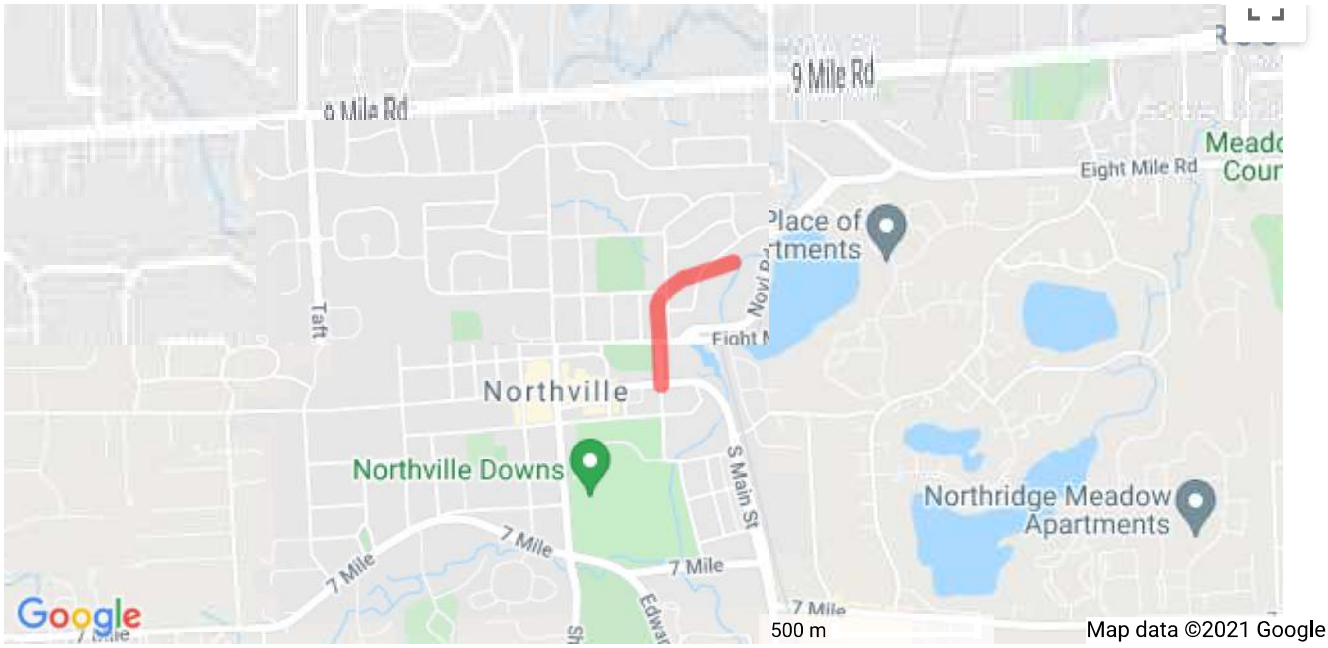
Road Segment Report

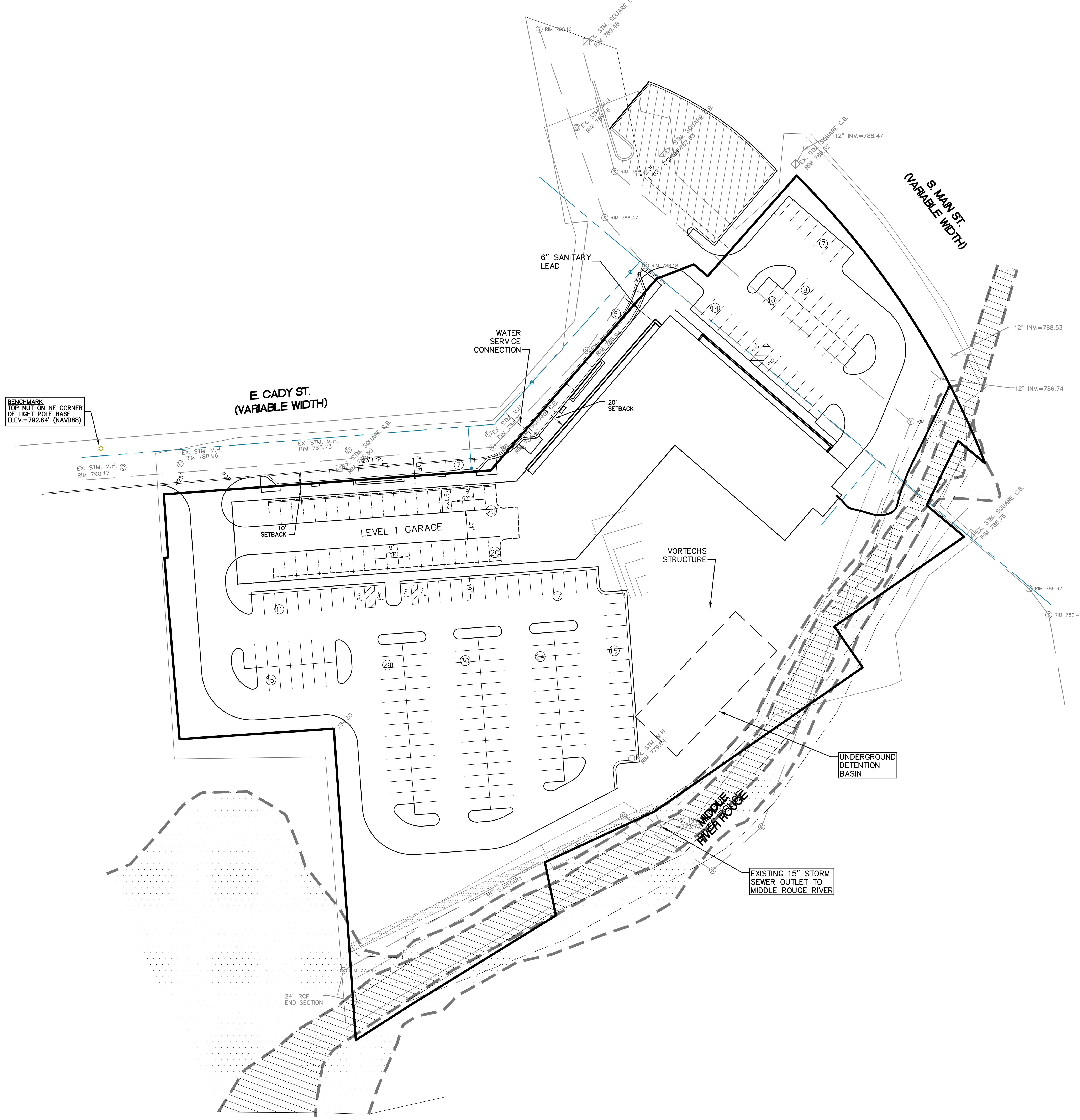
Griswold St, (PR Number 1680204)

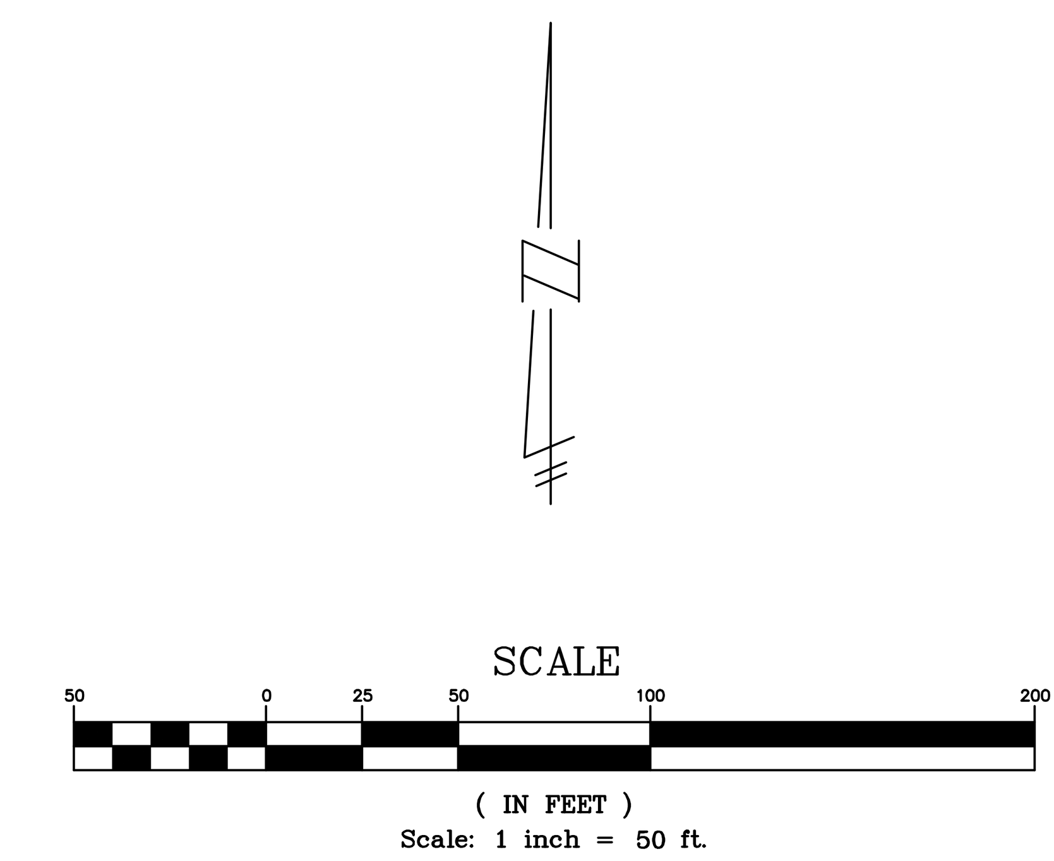
From:	Main St E 0.165 BMP
To:	Griswold St 0.533 EMP
FALINK ID:	15869
Community:	City of Northville (Wayne County)
County:	Wayne
Functional Class:	4 - Minor Arterial
Direction:	1 Way
Length:	0.368 miles
Number of Lanes:	2
Posted Speed:	25 (source: TCO)
Route Classification:	Not a route
Annual Crash Average 2016-2020:	2
Traffic Volume (2016)*:	6,700 (Observed AADT)
Pavement Type (2018):	Concrete
Pavement Rating (2018):	Fair
Short Range (TIP) Projects:	No TIP projects for this segment.
Long Range (RTP) Projects:	No long-range projects for this segment.

* AADT values are derived from **Traffic Counts**

Street View


9 Mile Rd
8 Mile Rd
Eight Mile Rd
Taft
Northville
Northville Downs
S Main St
7 Mile
7 Mile
7 Mile
Northridge Meadow Apartments
Google
500 m
Map data ©2021 Google





SITE SUMMERY

SITE AREA	4.71 AC.
EXISTING UNDERLYING ZONING	PR-1
EXISTING OVERLAY ZONING	CSO
APPARTMENT UNITS	78 UNITS
COMMERCIAL AREA	8,000-10,000 S.F.

PARKING PROVIDED SUMMARY

CADY STREET	=	13 SPACES	
RESIDENTIAL PARKING	=	141 SPACES	
PUBLIC COMMERCIAL	=	~~29~~ SPACES	39
LEVEL 1 GARAGE	=	40 SPACES	
TOTAL	=	~~223~~ SPACES	233

LEGEND

EXISTING / PROPOSED

- PAVEMENT (ASPHALT)
- SIDE WALK (CONCRETE)
- CONCRETE CURB AND GUTTER
- STORM SEWER
- SANITARY SEWER
- WATER MAIN
- MANHOLE
- CATCH BASIN
- CURB INLET W/SILT SAC
- END SECTION
- GATE VALVE
- HYDRANT
- FLOOD PLAIN
- 1000 CONTOURS
- 1000.0 / 1000.00 T/C SPOT ELEVATION
- SURFACE DRAINAGE
- OVERFLOW ROUTE
- TREE FENCE
- SILT FENCE
- PROPOSED DRIVEWAY LOCATION
- LIMIT OF DISTURBANCE

456 CADY STREET

SECTION 3, TOWN 1 SOUTH, RANGE 8 EAST
CITY OF NORTHVILLE, WAYNE COUNTY, MICHIGAN

R E V I S I O N S

NO.	ITEM	DATE

UTILITY WARNING

UNDERGROUND UTILITY LOCATIONS AS SHOWN ON THE PLAN, WERE OBTAINED FROM UTILITY OWNER AND NOT FIELD LOCATED.

811 Know what's **below.** **Call** before you dig.

THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF AND/OR RELOCATION OF ALL UTILITIES THAT MAY INTERFERE WITH CONSTRUCTION.

DATE: 07-08-21 | DESIGNED BY: A.A. | CHECKED BY: B.E. | JOB NUMBER: 21-008 | DRAWING FILE:210080A.dwg

OVERALL SITEPLAN

SEIBER, KEAST ENGINEERING, L.L.C.
CONSULTING ENGINEERS
100 MAINCENTRE • SUITE 10 • NORTHVILLE, MI • 48167
PHONE: 248.308.3331 EMAIL: info@seiberkeast.com

SHEET 2

\\192.168.0.3\Pro\21-008 Foundy Flask - Schonsheck\1-Site Plan\210080A.dwg 8/9/2021 2:42 PM

Appendix B

EXISTING TRAFFIC CONDITIONS

Level of Service Criteria for Stop Sign Controlled Intersections

The level of service criteria are given in Exhibit 20-2. As used here, control delay is defined as the total elapsed time from the time a vehicle stops at the end of the queue until the vehicle departs from the stop line; this time includes the time required for the vehicle to travel from the last-in-queue position to the first-in-queue position, including deceleration of vehicles from free-flow speed to the speed of vehicles in queue.

The average total delay for any particular controlled movement is a function three (capacity) factors: distribution of gaps in the major-street traffic stream, driver judgment in selecting gaps through which to execute the desired maneuvers, and the follow-up headways required by each driver in a queue.

The basic capacity model assumes gaps in the conflicting movements are randomly distributed. When traffic signals are present on the major street, upstream of the subject intersection, flows may not be random but will likely have some platoon structure. Although the procedures in this chapter provide a method for approximating the operations of a TWSC intersection with an upstream signal, the operations of such an intersection is arguably best handled by including it in a complete simulation

Exhibit 20-2. Level of Service Criteria for Stop-Controlled Intersections (Motor Vehciles)

LEVEL OF SERVICE	AVERAGE CONTROL DELAY (sec/veh)
A	$\leq$ 10
B	> 10 and $\leq$ 15
C	> 15 and $\leq$ 25
D	> 25 and $\leq$ 35
E	> 35 and $\leq$ 50
F	> 50

Average total delay less than 10 sec/veh is defined as Level of Service (LOS) A. Follow-up times of less than 5 sec have been measured when there is no conflicting traffic for a minor street movement, so control delays of less than 10 sec/veh are appropriate for low flow conditions. A total delay of 50 sec/veh is assumed as the break point between LOS E and F.

The LOS criteria for TWSC intersections differ somewhat from the criteria used in Chapter 19 for signalized intersections, primarily because user perceptions differ among transportation facility types. The expectation is that a signalized intersection is designed to carry higher traffic volumes and will present greater delay than an unsignalized intersection. Additionally, several driver behavior considerations combine to make delays at signalized intersections less onerous than at unsignalized intersections. For example, drivers at signalized intersections are able to relax during the red interval, where drivers on the minor approaches to unsignalized intersections must remain attentive to the task of identifying acceptable gaps and vehicle conflicts. Also, there is often much more variability in the amount of delay experienced by individual drivers at unsignalized than signalized intersections. For these reasons, it is considered that the total delay threshold for any given level of service is less for an unsignalized intersection than for a signalized intersection.

LOS F exists when there are insufficient gaps of suitable size to allow a side street demand to cross safely through a major street traffic stream. This level of service is generally evident from extremely long total delays experienced by side street traffic and by queueing on the minor approaches. The method, however, is based on a constant critical gap size - that is, the critical gap remains constant, no matter how long the side street motorist waits. LOS F may also appear in the form of side street vehicles' selecting smaller-than-usual gaps. In such cases, safety may be a problem and some disruption to the major traffic stream may result. It is important to note that LOS F may not always result in long queues but may result in adjustments to normal gap acceptance behavior. The latter is more difficult to observe on the field than queueing, which is more obvious.

Source: Highway Capacity Manual, 6th Edition. Transportation Research Board, National Research Council

Level of Service for Signalized Intersections

Level of service for signalized intersections is defined in terms of delay, which is a measure of driver discomfort and frustration, fuel consumption, and lost travel time. LOS can be characterized for the entire intersection, each intersection approach, and each lane group. Specifically, level-of-service (LOS) criteria are stated in terms of the average stopped delay per vehicle. The criteria are given in Exhibit 19-8. Delay may be measured in the field or estimated using procedures presented later in this chapter. Delay is a complex measure and is dependent on a number of variables, including the quality of progression, the cycle length, the green ratio, and the v/c ratio for the lane group in question.

LOS A describes operations with a control delay of 10 s/veh or less. This level is typically assigned when the volume-to-capacity ratio is low and either progression is extremely favorable or the cycle length is very short. If LOS A is the result of favorable progression, most vehicles arrive during a green indication and travel through the intersection without stopping.

LOS B describes operations with control delay between 10 and 20 s/veh. This level is typically assigned when the volume-to-capacity ratio is low and either progression is highly favorable or the cycle length is short. More vehicles stop than with LOS A.

Exhibit 19.8. Level-of-Service Criteria for Signalized Intersections (Motorized Vehicles)

LEVEL OF SERVICE	STOPPED DELAY PER VEHICLE (SEC)
A	≤10.0
B	> 10.0 and ≤20.0
C	> 20.0 and ≤ 35.0
D	> 35.0 and ≤ 55.0
E	> 55.0 and ≤ 80.0
F	>80.0

1. If the v/c ratio for a lane group exceeds 1.0, a LOS F is assigned to the individual lane group. LOS for approach-based and intersection-wide assessments are determined solely by the control delay.

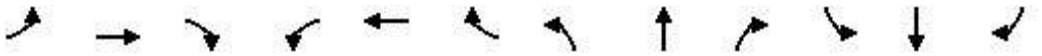
LOS C describes operations with control delay between 20 and 35 s/veh. This level is typically assigned when progression is favorable or the cycle length is moderate. Individual *cycle failures* (i.e. one or more queued vehicles are not able to depart as a result of insufficient capacity during the cycle) may begin to appear at this level. The number if vehicle stopping is significant, although many vehicles still pass through the intersection without stopping.

LOS D describes operations with control delay between 35 and 55 s/veh. This level is typically assigned when when the volume-to-capacity ratio is high and either progression is ineffective or the cycle length is long. Many vehicles stop and individual cycle failures are noticeable.

LOS E describes operations with control delay between 55 and 80 s/veh. This level is typically assigned when when the volume-to-capacity ratio is high, progression is unfavorable, and the cycle length is long. Individual cycle failures are frequent.

LOS F describes operations with control delay exceeding 80 s/veh or a volume-to-capacity ratio greater than 1.0. This level, considered to be unacceptable to most drivers, often occurs with over-saturation, that is, when arrival flow rates exceed the capacity of the intersection. This level is typically assigned when the volume-to-capacity ratio is high, progression is very poor, and the cycle length is long. Most cycles fail to clear the queue.

Source: Highway Capacity Manual, 6th Edition. Transportation Research Board, National Research Council



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	87	165	10	1	187	117	4	153	10	79	40	105
Future Volume (veh/h)	87	165	10	1	187	117	4	153	10	79	40	105
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1984	1984	1984	1938	1938	1938	1984	1984	1984	1953	1953	1953
Adj Flow Rate, veh/h	106	201	12	1	225	141	5	174	11	88	44	117
Peak Hour Factor	0.82	0.82	0.82	0.83	0.83	0.83	0.88	0.88	0.88	0.90	0.90	0.90
Percent Heavy Veh, %	1	1	1	4	4	4	1	1	1	3	3	3
Cap, veh/h	441	927	58	61	1005	598	66	634	39	233	134	253
Arrive On Green	0.46	0.46	0.46	0.46	0.46	0.46	0.35	0.35	0.35	0.35	0.35	0.35
Sat Flow, veh/h	729	2001	125	1	2169	1291	13	1829	113	439	385	730
Grp Volume(v), veh/h	148	0	171	201	0	166	190	0	0	249	0	0
Grp Sat Flow(s),veh/h/ln	1072	0	1783	1937	0	1524	1956	0	0	1554	0	0
Q Serve(g_s), s	3.6	0.0	3.4	0.0	0.0	3.9	0.0	0.0	0.0	2.6	0.0	0.0
Cycle Q Clear(g_c), s	7.6	0.0	3.4	3.7	0.0	3.9	4.2	0.0	0.0	6.8	0.0	0.0
Prop In Lane	0.72		0.07	0.00		0.85	0.03		0.06	0.35		0.47
Lane Grp Cap(c), veh/h	600	0	826	958	0	706	740	0	0	620	0	0
V/C Ratio(X)	0.25	0.00	0.21	0.21	0.00	0.24	0.26	0.00	0.00	0.40	0.00	0.00
Avail Cap(c_a), veh/h	600	0	826	958	0	706	740	0	0	620	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	11.0	0.0	9.6	9.6	0.0	9.7	14.2	0.0	0.0	14.9	0.0	0.0
Incr Delay (d2), s/veh	1.0	0.0	0.6	0.5	0.0	0.8	0.8	0.0	0.0	1.9	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.3	0.0	1.3	1.5	0.0	1.3	1.8	0.0	0.0	2.6	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	12.0	0.0	10.1	10.1	0.0	10.5	15.0	0.0	0.0	16.8	0.0	0.0
LnGrp LOS	B	A	B	B	A	B	B	A	A	B	A	A
Approach Vol, veh/h		319			367			190			249	
Approach Delay, s/veh		11.0			10.3			15.0			16.8	
Approach LOS		B			B			B			B	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		33.4		26.6		33.4		26.6				
Change Period (Y+Rc), s		5.6		* 5.8		5.6		* 5.8				
Max Green Setting (Gmax), s		27.8		* 21		27.8		* 21				
Max Q Clear Time (g_c+I1), s		9.6		8.8		5.9		6.2				
Green Ext Time (p_c), s		2.0		1.1		2.3		0.8				

Intersection Summary	
HCM 6th Ctrl Delay	12.7
HCM 6th LOS	B

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Int Delay, s/veh	0.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	253	1	5	302	3	24
Future Vol, veh/h	253	1	5	302	3	24
Conflicting Peds, #/hr	0	1	1	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	88	88	87	87	79	79
Heavy Vehicles, %	1	1	3	3	5	5
Mvmt Flow	288	1	6	347	4	30

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	290	0	476	146
Stage 1	-	-	-	-	290	-
Stage 2	-	-	-	-	186	-
Critical Hdwy	-	-	4.16	-	6.9	7
Critical Hdwy Stg 1	-	-	-	-	5.9	-
Critical Hdwy Stg 2	-	-	-	-	5.9	-
Follow-up Hdwy	-	-	2.23	-	3.55	3.35
Pot Cap-1 Maneuver	-	-	1261	-	510	865
Stage 1	-	-	-	-	725	-
Stage 2	-	-	-	-	818	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1260	-	506	864
Mov Cap-2 Maneuver	-	-	-	-	506	-
Stage 1	-	-	-	-	724	-
Stage 2	-	-	-	-	813	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.1	9.7
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	801	-	-	1260	-
HCM Lane V/C Ratio	0.043	-	-	0.005	-
HCM Control Delay (s)	9.7	-	-	7.9	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0	-

Intersection	
Int Delay, s/veh	7.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	150	18	20	0	4	2	17	18	6	2	17	37
Future Vol, veh/h	150	18	20	0	4	2	17	18	6	2	17	37
Conflicting Peds, #/hr	0	0	3	3	0	0	5	0	0	0	0	5
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	91	91	91	60	60	60	85	85	85	76	76	76
Heavy Vehicles, %	1	1	1	0	0	0	0	0	0	4	4	4
Mvmt Flow	165	20	22	0	7	3	20	21	7	3	22	49

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	128	126	55	142	147	25	76	0	0	28	0	0
Stage 1	58	58	-	65	65	-	-	-	-	-	-	-
Stage 2	70	68	-	77	82	-	-	-	-	-	-	-
Critical Hdwy	7.11	6.51	6.21	7.1	6.5	6.2	4.1	-	-	4.14	-	-
Critical Hdwy Stg 1	6.11	5.51	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.11	5.51	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.509	4.009	3.309	3.5	4	3.3	2.2	-	-	2.236	-	-
Pot Cap-1 Maneuver	848	766	1015	832	748	1057	1536	-	-	1573	-	-
Stage 1	956	849	-	951	845	-	-	-	-	-	-	-
Stage 2	942	840	-	937	831	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	826	751	1007	786	733	1057	1529	-	-	1573	-	-
Mov Cap-2 Maneuver	826	751	-	786	733	-	-	-	-	-	-	-
Stage 1	939	843	-	939	834	-	-	-	-	-	-	-
Stage 2	919	829	-	891	825	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	10.7	9.5	3.1	0.3
HCM LOS	B	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1529	-	-	834	816	1573	-	-
HCM Lane V/C Ratio	0.013	-	-	0.248	0.012	0.002	-	-
HCM Control Delay (s)	7.4	0	-	10.7	9.5	7.3	0	-
HCM Lane LOS	A	A	-	B	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	1	0	0	-	-

Intersection	
Int Delay, s/veh	3.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	22	15	6	21	20	8
Future Vol, veh/h	22	15	6	21	20	8
Conflicting Peds, #/hr	0	1	1	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	62	62	72	72	70	70
Heavy Vehicles, %	5	5	0	0	7	7
Mvmt Flow	35	24	8	29	29	11

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	60	0	93	48
Stage 1	-	-	-	-	48	-
Stage 2	-	-	-	-	45	-
Critical Hdwy	-	-	4.1	-	6.47	6.27
Critical Hdwy Stg 1	-	-	-	-	5.47	-
Critical Hdwy Stg 2	-	-	-	-	5.47	-
Follow-up Hdwy	-	-	2.2	-	3.563	3.363
Pot Cap-1 Maneuver	-	-	1556	-	895	1007
Stage 1	-	-	-	-	962	-
Stage 2	-	-	-	-	965	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1555	-	890	1006
Mov Cap-2 Maneuver	-	-	-	-	890	-
Stage 1	-	-	-	-	961	-
Stage 2	-	-	-	-	960	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.6	9.1
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	920	-	-	1555	-
HCM Lane V/C Ratio	0.043	-	-	0.005	-
HCM Control Delay (s)	9.1	-	-	7.3	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0	-

Intersection	
Int Delay, s/veh	0.8

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	6	21	11	341	292	5
Future Vol, veh/h	6	21	11	341	292	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	61	61	88	88	91	91
Heavy Vehicles, %	4	4	3	3	2	2
Mvmt Flow	10	34	13	388	321	5

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	544	163	326	0	-	0
Stage 1	324	-	-	-	-	-
Stage 2	220	-	-	-	-	-
Critical Hdwy	6.88	6.98	4.16	-	-	-
Critical Hdwy Stg 1	5.88	-	-	-	-	-
Critical Hdwy Stg 2	5.88	-	-	-	-	-
Follow-up Hdwy	3.54	3.34	2.23	-	-	-
Pot Cap-1 Maneuver	464	847	1223	-	-	-
Stage 1	700	-	-	-	-	-
Stage 2	790	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	458	847	1223	-	-	-
Mov Cap-2 Maneuver	458	-	-	-	-	-
Stage 1	690	-	-	-	-	-
Stage 2	790	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.4	0.3	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1223	-	713	-	-
HCM Lane V/C Ratio	0.01	-	0.062	-	-
HCM Control Delay (s)	8	0.1	10.4	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0.2	-	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	99	250	18	2	356	277	33	204	11	186	97	194
Future Volume (veh/h)	99	250	18	2	356	277	33	204	11	186	97	194
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		0.99	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1984	1984	1984	1984	1984	1984	1984	1984	1984	1984	1984	1984
Adj Flow Rate, veh/h	116	294	21	2	375	292	36	222	12	198	103	206
Peak Hour Factor	0.85	0.85	0.85	0.95	0.95	0.95	0.92	0.92	0.92	0.94	0.94	0.94
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	314	904	68	61	920	703	114	570	29	278	126	219
Arrive On Green	0.46	0.46	0.46	0.46	0.46	0.46	0.35	0.35	0.35	0.35	0.35	0.35
Sat Flow, veh/h	464	1952	147	2	1986	1517	133	1645	83	560	363	632
Grp Volume(v), veh/h	177	0	254	376	0	293	270	0	0	507	0	0
Grp Sat Flow(s),veh/h/ln	786	0	1778	1983	0	1521	1860	0	0	1556	0	0
Q Serve(g_s), s	6.2	0.0	5.4	0.0	0.0	7.7	0.0	0.0	0.0	12.5	0.0	0.0
Cycle Q Clear(g_c), s	13.9	0.0	5.4	7.5	0.0	7.7	6.2	0.0	0.0	18.8	0.0	0.0
Prop In Lane	0.65		0.08	0.01		1.00	0.13		0.04	0.39		0.41
Lane Grp Cap(c), veh/h	463	0	824	979	0	705	713	0	0	623	0	0
V/C Ratio(X)	0.38	0.00	0.31	0.38	0.00	0.42	0.38	0.00	0.00	0.81	0.00	0.00
Avail Cap(c_a), veh/h	463	0	824	979	0	705	713	0	0	623	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	13.3	0.0	10.1	10.7	0.0	10.7	14.8	0.0	0.0	18.5	0.0	0.0
Incr Delay (d2), s/veh	2.4	0.0	1.0	1.1	0.0	1.8	1.5	0.0	0.0	11.2	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.0	0.0	2.1	3.2	0.0	2.6	2.7	0.0	0.0	7.7	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	15.7	0.0	11.0	11.8	0.0	12.5	16.4	0.0	0.0	29.7	0.0	0.0
LnGrp LOS	B	A	B	B	A	B	B	A	A	C	A	A
Approach Vol, veh/h		431			669			270			507	
Approach Delay, s/veh		13.0			12.1			16.4			29.7	
Approach LOS		B			B			B			C	

Timer - Assigned Phs	2	4	6	8
Phs Duration (G+Y+Rc), s	33.4	26.6	33.4	26.6
Change Period (Y+Rc), s	5.6	* 5.8	5.6	* 5.8
Max Green Setting (Gmax), s	27.8	* 21	27.8	* 21
Max Q Clear Time (g_c+I1), s	15.9	20.8	9.7	8.2
Green Ext Time (p_c), s	2.5	0.0	4.4	1.2

Intersection Summary	
HCM 6th Ctrl Delay	17.7
HCM 6th LOS	B

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Int Delay, s/veh	0.7

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	421	26	24	625	10	24
Future Vol, veh/h	421	26	24	625	10	24
Conflicting Peds, #/hr	0	2	2	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	81	81	95	95	75	75
Heavy Vehicles, %	1	1	1	1	0	0
Mvmt Flow	520	32	25	658	13	32

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	554	0	917	278
Stage 1	-	-	-	-	538	-
Stage 2	-	-	-	-	379	-
Critical Hdwy	-	-	4.12	-	6.8	6.9
Critical Hdwy Stg 1	-	-	-	-	5.8	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	-	-	2.21	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1019	-	275	725
Stage 1	-	-	-	-	555	-
Stage 2	-	-	-	-	668	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1017	-	264	724
Mov Cap-2 Maneuver	-	-	-	-	264	-
Stage 1	-	-	-	-	554	-
Stage 2	-	-	-	-	642	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.5	13.3
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	479	-	-	1017	-
HCM Lane V/C Ratio	0.095	-	-	0.025	-
HCM Control Delay (s)	13.3	-	-	8.6	0.2
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.3	-	-	0.1	-

Intersection	
Int Delay, s/veh	5.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	123	9	33	3	6	10	24	101	3	4	76	57
Future Vol, veh/h	123	9	33	3	6	10	24	101	3	4	76	57
Conflicting Peds, #/hr	0	0	3	3	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	83	83	83	68	68	68	88	88	88	83	83	83
Heavy Vehicles, %	1	1	1	0	0	0	0	0	0	0	0	0
Mvmt Flow	148	11	40	4	9	15	27	115	3	5	92	69

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	320	309	130	336	342	117	161	0	0	118	0	0
Stage 1	137	137	-	171	171	-	-	-	-	-	-	-
Stage 2	183	172	-	165	171	-	-	-	-	-	-	-
Critical Hdwy	7.11	6.51	6.21	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.11	5.51	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.11	5.51	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.509	4.009	3.309	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	635	607	922	622	583	941	1430	-	-	1483	-	-
Stage 1	869	785	-	836	761	-	-	-	-	-	-	-
Stage 2	821	758	-	842	761	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	606	592	919	575	569	941	1430	-	-	1483	-	-
Mov Cap-2 Maneuver	606	592	-	575	569	-	-	-	-	-	-	-
Stage 1	852	782	-	819	746	-	-	-	-	-	-	-
Stage 2	783	743	-	789	758	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	13	10.2	1.4	0.2
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1430	-	-	649	720	1483	-	-
HCM Lane V/C Ratio	0.019	-	-	0.306	0.039	0.003	-	-
HCM Control Delay (s)	7.6	0	-	13	10.2	7.4	0	-
HCM Lane LOS	A	A	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0.1	-	-	1.3	0.1	0	-	-

Intersection	
Int Delay, s/veh	4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	50	62	4	36	92	9
Future Vol, veh/h	50	62	4	36	92	9
Conflicting Peds, #/hr	0	0	0	0	0	1
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	93	93	79	79	89	89
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	54	67	5	46	103	10

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	121	0	144	89
Stage 1	-	-	-	-	88	-
Stage 2	-	-	-	-	56	-
Critical Hdwy	-	-	4.1	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1479	-	853	975
Stage 1	-	-	-	-	940	-
Stage 2	-	-	-	-	972	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1479	-	850	974
Mov Cap-2 Maneuver	-	-	-	-	850	-
Stage 1	-	-	-	-	940	-
Stage 2	-	-	-	-	969	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.7	9.8
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	860	-	-	1479	-
HCM Lane V/C Ratio	0.132	-	-	0.003	-
HCM Control Delay (s)	9.8	-	-	7.4	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.5	-	-	0	-

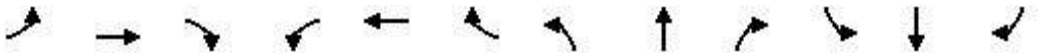
Intersection	
Int Delay, s/veh	0.7

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	9	44	12	670	495	6
Future Vol, veh/h	9	44	12	670	495	6
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	83	83	92	92	95	95
Heavy Vehicles, %	0	0	1	1	1	1
Mvmt Flow	11	53	13	728	521	6

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	914	264	527	0	-	0
Stage 1	524	-	-	-	-	-
Stage 2	390	-	-	-	-	-
Critical Hdwy	6.8	6.9	4.12	-	-	-
Critical Hdwy Stg 1	5.8	-	-	-	-	-
Critical Hdwy Stg 2	5.8	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.21	-	-	-
Pot Cap-1 Maneuver	276	741	1043	-	-	-
Stage 1	564	-	-	-	-	-
Stage 2	659	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	270	741	1043	-	-	-
Mov Cap-2 Maneuver	270	-	-	-	-	-
Stage 1	552	-	-	-	-	-
Stage 2	659	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	12.1	0.2	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1043	-	572	-	-
HCM Lane V/C Ratio	0.013	-	0.112	-	-
HCM Control Delay (s)	8.5	0.1	12.1	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0.4	-	-



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	99	250	18	2	356	277	33	204	11	186	97	194
Future Volume (veh/h)	99	250	18	2	356	277	33	204	11	186	97	194
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		0.99	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1984	1984	1984	1984	1984	1984	1984	1984	1984	1984	1984	1984
Adj Flow Rate, veh/h	116	294	21	2	375	292	36	222	12	198	103	206
Peak Hour Factor	0.85	0.85	0.85	0.95	0.95	0.95	0.92	0.92	0.92	0.94	0.94	0.94
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	230	685	52	61	708	540	133	749	38	328	171	285
Arrive On Green	0.36	0.36	0.36	0.36	0.36	0.36	0.45	0.45	0.45	0.45	0.45	0.45
Sat Flow, veh/h	365	1922	147	2	1984	1515	143	1653	84	540	378	628
Grp Volume(v), veh/h	177	0	254	376	0	293	270	0	0	507	0	0
Grp Sat Flow(s),veh/h/ln	656	0	1778	1983	0	1518	1880	0	0	1546	0	0
Q Serve(g_s), s	7.9	0.0	6.4	0.0	0.0	9.2	0.0	0.0	0.0	9.8	0.0	0.0
Cycle Q Clear(g_c), s	17.2	0.0	6.4	9.0	0.0	9.2	5.2	0.0	0.0	15.0	0.0	0.0
Prop In Lane	0.65		0.08	0.01		1.00	0.13		0.04	0.39		0.41
Lane Grp Cap(c), veh/h	333	0	634	768	0	541	920	0	0	784	0	0
V/C Ratio(X)	0.53	0.00	0.40	0.49	0.00	0.54	0.29	0.00	0.00	0.65	0.00	0.00
Avail Cap(c_a), veh/h	333	0	634	768	0	541	920	0	0	784	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	19.7	0.0	14.5	15.3	0.0	15.4	10.4	0.0	0.0	12.7	0.0	0.0
Incr Delay (d2), s/veh	6.0	0.0	1.9	2.2	0.0	3.8	0.8	0.0	0.0	4.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.7	0.0	2.7	4.2	0.0	3.5	2.1	0.0	0.0	5.2	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	25.7	0.0	16.4	17.6	0.0	19.2	11.2	0.0	0.0	16.8	0.0	0.0
LnGrp LOS	C	A	B	B	A	B	B	A	A	B	A	A
Approach Vol, veh/h		431			669			270			507	
Approach Delay, s/veh		20.2			18.3			11.2			16.8	
Approach LOS		C			B			B			B	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		27.0		33.0		27.0		33.0				
Change Period (Y+Rc), s		5.6		* 5.8		5.6		* 5.8				
Max Green Setting (Gmax), s		21.4		* 27		21.4		* 27				
Max Q Clear Time (g_c+I1), s		19.2		17.0		11.2		7.2				
Green Ext Time (p_c), s		0.7		2.5		3.2		1.5				

Intersection Summary		
HCM 6th Ctrl Delay		17.3
HCM 6th LOS		B

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection: 1: Griswold Street & Main Street

Movement	EB	EB	WB	WB	NB	SB
Directions Served	LT	TR	LT	TR	LTR	LTR
Maximum Queue (ft)	111	90	92	118	127	166
Average Queue (ft)	59	35	43	54	59	68
95th Queue (ft)	92	73	74	97	105	128
Link Distance (ft)	132	132	367	367	109	468
Upstream Blk Time (%)	0	0			1	
Queuing Penalty (veh)	0	0			1	
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 2: Cady Street & Main Street

Movement	WB	NB
Directions Served	LT	LR
Maximum Queue (ft)	20	47
Average Queue (ft)	1	18
95th Queue (ft)	11	43
Link Distance (ft)	714	162
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 3: Griswold Street & Cady Street

Movement	EB	WB	NB
Directions Served	LTR	LTR	LTR
Maximum Queue (ft)	82	30	24
Average Queue (ft)	44	5	2
95th Queue (ft)	69	24	14
Link Distance (ft)	231	116	456
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 4: River Street & Beal Street

Movement	EB	WB	NB
Directions Served	TR	LT	LR
Maximum Queue (ft)	3	3	54
Average Queue (ft)	0	0	18
95th Queue (ft)	3	3	46
Link Distance (ft)	143	273	547
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 5: Northville Road & Beal Street

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (ft)	45	33
Average Queue (ft)	17	3
95th Queue (ft)	43	17
Link Distance (ft)	301	636
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Zone Summary

Zone wide Queuing Penalty: 1

Intersection: 1: Griswold Street & Main Street

Movement	EB	EB	WB	WB	NB	SB
Directions Served	LT	TR	LT	TR	LTR	LTR
Maximum Queue (ft)	133	110	120	183	142	495
Average Queue (ft)	77	52	69	101	84	338
95th Queue (ft)	118	94	107	158	139	558
Link Distance (ft)	132	132	367	367	109	468
Upstream Blk Time (%)	0	0			4	23
Queuing Penalty (veh)	1	0			9	0
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 2: Cady Street & Main Street

Movement	EB	WB	WB	NB
Directions Served	TR	LT	T	LR
Maximum Queue (ft)	2	47	16	46
Average Queue (ft)	0	8	1	21
95th Queue (ft)	2	33	11	44
Link Distance (ft)	367	714	714	162
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 3: Griswold Street & Cady Street

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	88	33	38	16
Average Queue (ft)	44	15	3	1
95th Queue (ft)	71	40	20	7
Link Distance (ft)	231	116	456	148
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 4: River Street & Beal Street

Movement	WB	NB
Directions Served	LT	LR
Maximum Queue (ft)	6	57
Average Queue (ft)	0	33
95th Queue (ft)	4	51
Link Distance (ft)	273	547
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 5: Northville Road & Beal Street

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (ft)	53	70
Average Queue (ft)	27	7
95th Queue (ft)	52	38
Link Distance (ft)	301	636
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Zone Summary

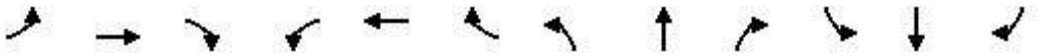
Zone wide Queuing Penalty: 9

Intersection: 1: Griswold Street & Main Street

Movement	EB	EB	WB	WB	NB	SB
Directions Served	LT	TR	LT	TR	LTR	LTR
Maximum Queue (ft)	144	133	149	197	136	346
Average Queue (ft)	91	70	81	119	72	161
95th Queue (ft)	138	120	126	181	127	294
Link Distance (ft)	132	132	367	367	109	468
Upstream Blk Time (%)	4	0			2	0
Queuing Penalty (veh)	8	1			5	0
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Appendix C

BACKGROUND TRAFFIC CONDITIONS



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	87	168	14	3	189	117	5	154	11	80	44	105
Future Volume (veh/h)	87	168	14	3	189	117	5	154	11	80	44	105
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1984	1984	1984	1938	1938	1938	1984	1984	1984	1953	1953	1953
Adj Flow Rate, veh/h	106	205	17	4	228	141	6	175	12	89	49	117
Peak Hour Factor	0.82	0.82	0.82	0.83	0.83	0.83	0.88	0.88	0.88	0.90	0.90	0.90
Percent Heavy Veh, %	1	1	1	4	4	4	1	1	1	3	3	3
Cap, veh/h	432	915	79	64	1010	590	68	629	42	231	143	248
Arrive On Green	0.46	0.46	0.46	0.46	0.46	0.46	0.35	0.35	0.35	0.35	0.35	0.35
Sat Flow, veh/h	713	1975	171	7	2181	1273	17	1814	121	433	411	716
Grp Volume(v), veh/h	152	0	176	204	0	169	193	0	0	255	0	0
Grp Sat Flow(s),veh/h/ln	1085	0	1774	1933	0	1528	1952	0	0	1560	0	0
Q Serve(g_s), s	3.6	0.0	3.5	0.0	0.0	4.0	0.0	0.0	0.0	2.7	0.0	0.0
Cycle Q Clear(g_c), s	7.6	0.0	3.5	3.8	0.0	4.0	4.3	0.0	0.0	6.9	0.0	0.0
Prop In Lane	0.70		0.10	0.02		0.83	0.03		0.06	0.35		0.46
Lane Grp Cap(c), veh/h	604	0	822	957	0	708	739	0	0	622	0	0
V/C Ratio(X)	0.25	0.00	0.21	0.21	0.00	0.24	0.26	0.00	0.00	0.41	0.00	0.00
Avail Cap(c_a), veh/h	604	0	822	957	0	708	739	0	0	622	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	11.0	0.0	9.6	9.7	0.0	9.7	14.2	0.0	0.0	15.0	0.0	0.0
Incr Delay (d2), s/veh	1.0	0.0	0.6	0.5	0.0	0.8	0.9	0.0	0.0	2.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.4	0.0	1.4	1.6	0.0	1.4	1.8	0.0	0.0	2.7	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	12.0	0.0	10.2	10.2	0.0	10.5	15.1	0.0	0.0	17.0	0.0	0.0
LnGrp LOS	B	A	B	B	A	B	B	A	A	B	A	A
Approach Vol, veh/h		328			373			193			255	
Approach Delay, s/veh		11.0			10.3			15.1			17.0	
Approach LOS		B			B			B			B	

Timer - Assigned Phs	2	4	6	8
Phs Duration (G+Y+Rc), s	33.4	26.6	33.4	26.6
Change Period (Y+Rc), s	5.6	* 5.8	5.6	* 5.8
Max Green Setting (Gmax), s	27.8	* 21	27.8	* 21
Max Q Clear Time (g_c+I1), s	9.6	8.9	6.0	6.3
Green Ext Time (p_c), s	2.0	1.2	2.4	0.8

Intersection Summary	
HCM 6th Ctrl Delay	12.8
HCM 6th LOS	B

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Int Delay, s/veh	0.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	255	4	9	305	4	25
Future Vol, veh/h	255	4	9	305	4	25
Conflicting Peds, #/hr	0	1	1	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	88	88	87	87	79	79
Heavy Vehicles, %	1	1	3	3	5	5
Mvmt Flow	290	5	10	351	5	32

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	296	0	490	149
Stage 1	-	-	-	-	294	-
Stage 2	-	-	-	-	196	-
Critical Hdwy	-	-	4.16	-	6.9	7
Critical Hdwy Stg 1	-	-	-	-	5.9	-
Critical Hdwy Stg 2	-	-	-	-	5.9	-
Follow-up Hdwy	-	-	2.23	-	3.55	3.35
Pot Cap-1 Maneuver	-	-	1255	-	500	861
Stage 1	-	-	-	-	722	-
Stage 2	-	-	-	-	809	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1254	-	495	860
Mov Cap-2 Maneuver	-	-	-	-	495	-
Stage 1	-	-	-	-	721	-
Stage 2	-	-	-	-	801	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.2	9.8
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	781	-	-	1254	-
HCM Lane V/C Ratio	0.047	-	-	0.008	-
HCM Control Delay (s)	9.8	-	-	7.9	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0	-

Intersection	
Int Delay, s/veh	7.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		⇕			⇕			⇕			⇕	
Traffic Vol, veh/h	151	21	20	0	4	2	17	19	8	6	17	37
Future Vol, veh/h	151	21	20	0	4	2	17	19	8	6	17	37
Conflicting Peds, #/hr	0	0	3	3	0	0	5	0	0	0	0	5
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	91	91	91	60	60	60	85	85	85	76	76	76
Heavy Vehicles, %	1	1	1	0	0	0	0	0	0	4	4	4
Mvmt Flow	166	23	22	0	7	3	20	22	9	8	22	49

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	140	139	55	155	159	27	76	0	0	31	0	0
Stage 1	68	68	-	67	67	-	-	-	-	-	-	-
Stage 2	72	71	-	88	92	-	-	-	-	-	-	-
Critical Hdwy	7.11	6.51	6.21	7.1	6.5	6.2	4.1	-	-	4.14	-	-
Critical Hdwy Stg 1	6.11	5.51	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.11	5.51	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.509	4.009	3.309	3.5	4	3.3	2.2	-	-	2.236	-	-
Pot Cap-1 Maneuver	832	754	1015	816	737	1054	1536	-	-	1569	-	-
Stage 1	945	840	-	948	843	-	-	-	-	-	-	-
Stage 2	940	838	-	925	823	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	809	737	1007	766	720	1054	1529	-	-	1569	-	-
Mov Cap-2 Maneuver	809	737	-	766	720	-	-	-	-	-	-	-
Stage 1	928	832	-	936	832	-	-	-	-	-	-	-
Stage 2	917	827	-	873	815	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	10.9	9.5	2.9	0.7
HCM LOS	B	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1529	-	-	817	805	1569	-	-
HCM Lane V/C Ratio	0.013	-	-	0.258	0.012	0.005	-	-
HCM Control Delay (s)	7.4	0	-	10.9	9.5	7.3	0	-
HCM Lane LOS	A	A	-	B	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	1	0	0	-	-

Intersection	
Int Delay, s/veh	3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	22	15	6	24	20	8
Future Vol, veh/h	22	15	6	24	20	8
Conflicting Peds, #/hr	0	1	1	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	62	62	72	72	70	70
Heavy Vehicles, %	5	5	0	0	7	7
Mvmt Flow	35	24	8	33	29	11

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	60	0	97	48
Stage 1	-	-	-	-	48	-
Stage 2	-	-	-	-	49	-
Critical Hdwy	-	-	4.1	-	6.47	6.27
Critical Hdwy Stg 1	-	-	-	-	5.47	-
Critical Hdwy Stg 2	-	-	-	-	5.47	-
Follow-up Hdwy	-	-	2.2	-	3.563	3.363
Pot Cap-1 Maneuver	-	-	1556	-	890	1007
Stage 1	-	-	-	-	962	-
Stage 2	-	-	-	-	961	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1555	-	885	1006
Mov Cap-2 Maneuver	-	-	-	-	885	-
Stage 1	-	-	-	-	961	-
Stage 2	-	-	-	-	956	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.5	9.1
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	916	-	-	1555	-
HCM Lane V/C Ratio	0.044	-	-	0.005	-
HCM Control Delay (s)	9.1	-	-	7.3	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0	-

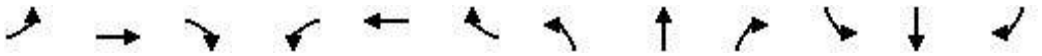
Intersection	
Int Delay, s/veh	0.8

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	6	21	14	348	295	5
Future Vol, veh/h	6	21	14	348	295	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	61	61	88	88	91	91
Heavy Vehicles, %	4	4	3	3	2	2
Mvmt Flow	10	34	16	395	324	5

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	557	165	329	0	-	0
Stage 1	327	-	-	-	-	-
Stage 2	230	-	-	-	-	-
Critical Hdwy	6.88	6.98	4.16	-	-	-
Critical Hdwy Stg 1	5.88	-	-	-	-	-
Critical Hdwy Stg 2	5.88	-	-	-	-	-
Follow-up Hdwy	3.54	3.34	2.23	-	-	-
Pot Cap-1 Maneuver	456	844	1220	-	-	-
Stage 1	697	-	-	-	-	-
Stage 2	780	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	448	844	1220	-	-	-
Mov Cap-2 Maneuver	448	-	-	-	-	-
Stage 1	685	-	-	-	-	-
Stage 2	780	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.4	0.4	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1220	-	705	-	-
HCM Lane V/C Ratio	0.013	-	0.063	-	-
HCM Control Delay (s)	8	0.1	10.4	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0.2	-	-



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	99	252	22	7	360	279	41	218	18	187	104	195
Future Volume (veh/h)	99	252	22	7	360	279	41	218	18	187	104	195
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		0.99	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1984	1984	1984	1984	1984	1984	1984	1984	1984	1984	1984	1984
Adj Flow Rate, veh/h	116	296	26	7	379	294	45	237	20	199	111	207
Peak Hour Factor	0.85	0.85	0.85	0.95	0.95	0.95	0.92	0.92	0.92	0.94	0.94	0.94
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	309	892	83	65	922	696	123	532	42	271	130	212
Arrive On Green	0.46	0.46	0.46	0.46	0.46	0.46	0.35	0.35	0.35	0.35	0.35	0.35
Sat Flow, veh/h	455	1925	179	9	1989	1503	155	1535	120	543	374	613
Grp Volume(v), veh/h	180	0	258	382	0	298	302	0	0	517	0	0
Grp Sat Flow(s),veh/h/ln	786	0	1772	1977	0	1524	1810	0	0	1530	0	0
Q Serve(g_s), s	6.2	0.0	5.5	0.0	0.0	7.8	0.0	0.0	0.0	12.8	0.0	0.0
Cycle Q Clear(g_c), s	14.1	0.0	5.5	7.7	0.0	7.8	7.1	0.0	0.0	19.9	0.0	0.0
Prop In Lane	0.64		0.10	0.02		0.99	0.15		0.07	0.38		0.40
Lane Grp Cap(c), veh/h	463	0	821	977	0	706	696	0	0	613	0	0
V/C Ratio(X)	0.39	0.00	0.31	0.39	0.00	0.42	0.43	0.00	0.00	0.84	0.00	0.00
Avail Cap(c_a), veh/h	463	0	821	977	0	706	696	0	0	613	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	13.3	0.0	10.1	10.7	0.0	10.7	15.1	0.0	0.0	19.0	0.0	0.0
Incr Delay (d2), s/veh	2.5	0.0	1.0	1.2	0.0	1.9	2.0	0.0	0.0	13.2	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.0	0.0	2.1	3.3	0.0	2.7	3.2	0.0	0.0	8.2	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	15.8	0.0	11.1	11.9	0.0	12.6	17.1	0.0	0.0	32.2	0.0	0.0
LnGrp LOS	B	A	B	B	A	B	B	A	A	C	A	A
Approach Vol, veh/h		438			680			302			517	
Approach Delay, s/veh		13.0			12.2			17.1			32.2	
Approach LOS		B			B			B			C	

Timer - Assigned Phs	2	4	6	8
Phs Duration (G+Y+Rc), s	33.4	26.6	33.4	26.6
Change Period (Y+Rc), s	5.6	* 5.8	5.6	* 5.8
Max Green Setting (Gmax), s	27.8	* 21	27.8	* 21
Max Q Clear Time (g_c+I1), s	16.1	21.9	9.8	9.1
Green Ext Time (p_c), s	2.5	0.0	4.4	1.3

Intersection Summary	
HCM 6th Ctrl Delay	18.5
HCM 6th LOS	B

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Int Delay, s/veh	0.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	430	27	25	633	13	28
Future Vol, veh/h	430	27	25	633	13	28
Conflicting Peds, #/hr	0	2	2	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	81	81	95	95	75	75
Heavy Vehicles, %	1	1	1	1	0	0
Mvmt Flow	531	33	26	666	17	37

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	566	0	935	284
Stage 1	-	-	-	-	550	-
Stage 2	-	-	-	-	385	-
Critical Hdwy	-	-	4.12	-	6.8	6.9
Critical Hdwy Stg 1	-	-	-	-	5.8	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	-	-	2.21	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1009	-	268	719
Stage 1	-	-	-	-	547	-
Stage 2	-	-	-	-	663	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1007	-	256	718
Mov Cap-2 Maneuver	-	-	-	-	256	-
Stage 1	-	-	-	-	546	-
Stage 2	-	-	-	-	636	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.5	13.9
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	457	-	-	1007	-
HCM Lane V/C Ratio	0.12	-	-	0.026	-
HCM Control Delay (s)	13.9	-	-	8.7	0.2
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.4	-	-	0.1	-

Intersection	
Int Delay, s/veh	6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	123	9	33	4	7	17	24	102	3	5	78	57
Future Vol, veh/h	123	9	33	4	7	17	24	102	3	5	78	57
Conflicting Peds, #/hr	0	0	3	3	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	83	83	83	68	68	68	88	88	88	83	83	83
Heavy Vehicles, %	1	1	1	0	0	0	0	0	0	0	0	0
Mvmt Flow	148	11	40	6	10	25	27	116	3	6	94	69

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	330	314	132	341	347	118	163	0	0	119	0	0
Stage 1	141	141	-	172	172	-	-	-	-	-	-	-
Stage 2	189	173	-	169	175	-	-	-	-	-	-	-
Critical Hdwy	7.11	6.51	6.21	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.11	5.51	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.11	5.51	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.509	4.009	3.309	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	625	603	920	617	580	939	1428	-	-	1482	-	-
Stage 1	864	782	-	835	760	-	-	-	-	-	-	-
Stage 2	815	758	-	838	758	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	589	589	917	569	566	939	1428	-	-	1482	-	-
Mov Cap-2 Maneuver	589	589	-	569	566	-	-	-	-	-	-	-
Stage 1	847	779	-	818	745	-	-	-	-	-	-	-
Stage 2	767	743	-	785	755	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	13.3	10.1	1.4	0.3
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1428	-	-	634	747	1482	-	-
HCM Lane V/C Ratio	0.019	-	-	0.314	0.055	0.004	-	-
HCM Control Delay (s)	7.6	0	-	13.3	10.1	7.4	0	-
HCM Lane LOS	A	A	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0.1	-	-	1.3	0.2	0	-	-

Intersection	
Int Delay, s/veh	4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	53	62	4	37	92	9
Future Vol, veh/h	53	62	4	37	92	9
Conflicting Peds, #/hr	0	0	0	0	0	1
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	93	93	79	79	89	89
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	57	67	5	47	103	10

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	124	0	148	92
Stage 1	-	-	-	-	91	-
Stage 2	-	-	-	-	57	-
Critical Hdwy	-	-	4.1	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1475	-	849	971
Stage 1	-	-	-	-	938	-
Stage 2	-	-	-	-	971	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1475	-	846	970
Mov Cap-2 Maneuver	-	-	-	-	846	-
Stage 1	-	-	-	-	938	-
Stage 2	-	-	-	-	968	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.7	9.8
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	856	-	-	1475	-
HCM Lane V/C Ratio	0.133	-	-	0.003	-
HCM Control Delay (s)	9.8	-	-	7.4	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.5	-	-	0	-

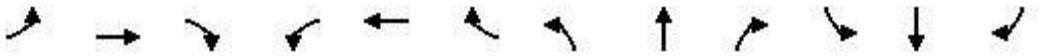
Intersection	
Int Delay, s/veh	0.8

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	9	47	13	679	508	6
Future Vol, veh/h	9	47	13	679	508	6
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	83	83	92	92	95	95
Heavy Vehicles, %	0	0	1	1	1	1
Mvmt Flow	11	57	14	738	535	6

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	935	271	541	0	-	0
Stage 1	538	-	-	-	-	-
Stage 2	397	-	-	-	-	-
Critical Hdwy	6.8	6.9	4.12	-	-	-
Critical Hdwy Stg 1	5.8	-	-	-	-	-
Critical Hdwy Stg 2	5.8	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.21	-	-	-
Pot Cap-1 Maneuver	268	733	1031	-	-	-
Stage 1	555	-	-	-	-	-
Stage 2	654	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	262	733	1031	-	-	-
Mov Cap-2 Maneuver	262	-	-	-	-	-
Stage 1	542	-	-	-	-	-
Stage 2	654	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	12.2	0.3	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1031	-	569	-	-
HCM Lane V/C Ratio	0.014	-	0.119	-	-
HCM Control Delay (s)	8.5	0.1	12.2	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0.4	-	-



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	99	252	22	7	360	279	41	218	18	187	104	195
Future Volume (veh/h)	99	252	22	7	360	279	41	218	18	187	104	195
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		0.99	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1984	1984	1984	1984	1984	1984	1984	1984	1984	1984	1984	1984
Adj Flow Rate, veh/h	116	296	26	7	379	294	45	237	20	199	111	207
Peak Hour Factor	0.85	0.85	0.85	0.95	0.95	0.95	0.92	0.92	0.92	0.94	0.94	0.94
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	225	675	64	64	708	535	145	709	56	326	179	282
Arrive On Green	0.36	0.36	0.36	0.36	0.36	0.36	0.45	0.45	0.45	0.45	0.45	0.45
Sat Flow, veh/h	355	1892	179	10	1986	1501	167	1563	123	535	395	621
Grp Volume(v), veh/h	180	0	258	382	0	298	302	0	0	517	0	0
Grp Sat Flow(s),veh/h/ln	654	0	1772	1976	0	1521	1853	0	0	1552	0	0
Q Serve(g_s), s	8.0	0.0	6.6	0.0	0.0	9.4	0.0	0.0	0.0	9.3	0.0	0.0
Cycle Q Clear(g_c), s	17.4	0.0	6.6	9.2	0.0	9.4	6.0	0.0	0.0	15.2	0.0	0.0
Prop In Lane	0.64		0.10	0.02		0.99	0.15		0.07	0.38		0.40
Lane Grp Cap(c), veh/h	332	0	632	766	0	542	909	0	0	787	0	0
V/C Ratio(X)	0.54	0.00	0.41	0.50	0.00	0.55	0.33	0.00	0.00	0.66	0.00	0.00
Avail Cap(c_a), veh/h	332	0	632	766	0	542	909	0	0	787	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	19.8	0.0	14.5	15.4	0.0	15.4	10.6	0.0	0.0	12.7	0.0	0.0
Incr Delay (d2), s/veh	6.2	0.0	1.9	2.3	0.0	4.0	1.0	0.0	0.0	4.3	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.8	0.0	2.8	4.3	0.0	3.6	2.4	0.0	0.0	5.3	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	26.0	0.0	16.5	17.7	0.0	19.4	11.6	0.0	0.0	17.0	0.0	0.0
LnGrp LOS	C	A	B	B	A	B	B	A	A	B	A	A
Approach Vol, veh/h		438			680			302			517	
Approach Delay, s/veh		20.4			18.4			11.6			17.0	
Approach LOS		C			B			B			B	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		27.0		33.0		27.0		33.0				
Change Period (Y+Rc), s		5.6		* 5.8		5.6		* 5.8				
Max Green Setting (Gmax), s		21.4		* 27		21.4		* 27				
Max Q Clear Time (g_c+I1), s		19.4		17.2		11.4		8.0				
Green Ext Time (p_c), s		0.6		2.6		3.3		1.7				

Intersection Summary												
HCM 6th Ctrl Delay			17.4									
HCM 6th LOS			B									

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection: 1: Griswold Street & Main Street

Movement	EB	EB	WB	WB	NB	SB
Directions Served	LT	TR	LT	TR	LTR	LTR
Maximum Queue (ft)	111	78	91	110	122	169
Average Queue (ft)	58	33	42	53	59	76
95th Queue (ft)	95	68	73	94	103	138
Link Distance (ft)	132	132	367	367	109	468
Upstream Blk Time (%)	0				1	
Queuing Penalty (veh)	0				1	
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 2: Cady Street & Main Street

Movement	WB	NB
Directions Served	LT	LR
Maximum Queue (ft)	30	62
Average Queue (ft)	2	19
95th Queue (ft)	15	47
Link Distance (ft)	714	162
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 3: Griswold Street & Cady Street

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	81	33	26	3
Average Queue (ft)	45	7	1	0
95th Queue (ft)	71	28	11	3
Link Distance (ft)	231	116	456	148
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 4: River Street & Beal Street

Movement	WB	NB
Directions Served	LT	LR
Maximum Queue (ft)	6	58
Average Queue (ft)	0	20
95th Queue (ft)	4	49
Link Distance (ft)	273	547
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 5: Northville Road & Beal Street

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (ft)	50	39
Average Queue (ft)	18	4
95th Queue (ft)	44	24
Link Distance (ft)	301	636
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Zone Summary

Zone wide Queuing Penalty: 1

Intersection: 1: Griswold Street & Main Street

Movement	EB	EB	WB	WB	NB	SB
Directions Served	LT	TR	LT	TR	LTR	LTR
Maximum Queue (ft)	137	115	118	192	146	500
Average Queue (ft)	80	53	70	106	92	354
95th Queue (ft)	124	97	107	167	145	601
Link Distance (ft)	132	132	367	367	109	468
Upstream Blk Time (%)	1	0			5	39
Queuing Penalty (veh)	2	0			14	0
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 2: Cady Street & Main Street

Movement	EB	WB	WB	NB
Directions Served	TR	LT	T	LR
Maximum Queue (ft)	2	52	8	54
Average Queue (ft)	0	10	0	22
95th Queue (ft)	2	38	7	46
Link Distance (ft)	367	714	714	162
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 3: Griswold Street & Cady Street

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	83	43	34	14
Average Queue (ft)	43	19	3	1
95th Queue (ft)	69	44	18	8
Link Distance (ft)	231	116	456	148
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 4: River Street & Beal Street

Movement	WB	NB
Directions Served	LT	LR
Maximum Queue (ft)	15	60
Average Queue (ft)	1	32
95th Queue (ft)	7	53
Link Distance (ft)	273	547
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 5: Northville Road & Beal Street

Movement	EB	NB	NB
Directions Served	LR	LT	T
Maximum Queue (ft)	53	47	4
Average Queue (ft)	27	4	0
95th Queue (ft)	51	24	4
Link Distance (ft)	301	636	636
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Zone Summary

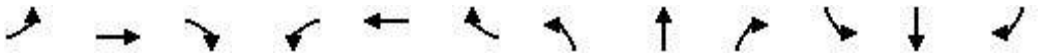
Zone wide Queuing Penalty: 16

Intersection: 1: Griswold Street & Main Street

Movement	EB	EB	WB	WB	NB	SB
Directions Served	LT	TR	LT	TR	LTR	LTR
Maximum Queue (ft)	145	138	150	201	139	356
Average Queue (ft)	95	76	82	120	80	174
95th Queue (ft)	145	129	128	180	135	301
Link Distance (ft)	132	132	367	367	109	468
Upstream Blk Time (%)	6	1			3	0
Queuing Penalty (veh)	12	2			8	0
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Appendix D

Future Traffic Conditions



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	87	170	16	3	190	118	11	161	11	81	46	105
Future Volume (veh/h)	87	170	16	3	190	118	11	161	11	81	46	105
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1984	1984	1984	1938	1938	1938	1984	1984	1984	1953	1953	1953
Adj Flow Rate, veh/h	106	207	20	4	229	142	12	183	12	90	51	117
Peak Hour Factor	0.82	0.82	0.82	0.83	0.83	0.83	0.88	0.88	0.88	0.90	0.90	0.90
Percent Heavy Veh, %	1	1	1	4	4	4	1	1	1	3	3	3
Cap, veh/h	427	907	92	64	1009	591	77	619	39	231	146	246
Arrive On Green	0.46	0.46	0.46	0.46	0.46	0.46	0.35	0.35	0.35	0.35	0.35	0.35
Sat Flow, veh/h	704	1959	198	7	2178	1275	40	1787	112	434	421	709
Grp Volume(v), veh/h	155	0	178	205	0	170	207	0	0	258	0	0
Grp Sat Flow(s),veh/h/ln	1092	0	1769	1933	0	1527	1939	0	0	1564	0	0
Q Serve(g_s), s	3.6	0.0	3.6	0.0	0.0	4.0	0.0	0.0	0.0	2.3	0.0	0.0
Cycle Q Clear(g_c), s	7.7	0.0	3.6	3.8	0.0	4.0	4.6	0.0	0.0	6.9	0.0	0.0
Prop In Lane	0.69		0.11	0.02		0.83	0.06		0.06	0.35		0.45
Lane Grp Cap(c), veh/h	607	0	820	957	0	708	736	0	0	623	0	0
V/C Ratio(X)	0.25	0.00	0.22	0.21	0.00	0.24	0.28	0.00	0.00	0.41	0.00	0.00
Avail Cap(c_a), veh/h	607	0	820	957	0	708	736	0	0	623	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	11.0	0.0	9.6	9.7	0.0	9.7	14.3	0.0	0.0	15.0	0.0	0.0
Incr Delay (d2), s/veh	1.0	0.0	0.6	0.5	0.0	0.8	1.0	0.0	0.0	2.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.4	0.0	1.4	1.6	0.0	1.4	2.0	0.0	0.0	2.7	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	12.0	0.0	10.2	10.2	0.0	10.5	15.3	0.0	0.0	17.0	0.0	0.0
LnGrp LOS	B	A	B	B	A	B	B	A	A	B	A	A
Approach Vol, veh/h		333			375			207			258	
Approach Delay, s/veh		11.0			10.3			15.3			17.0	
Approach LOS		B			B			B			B	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		33.4		26.6		33.4		26.6				
Change Period (Y+Rc), s		5.6		* 5.8		5.6		* 5.8				
Max Green Setting (Gmax), s		27.8		* 21		27.8		* 21				
Max Q Clear Time (g_c+I1), s		9.7		8.9		6.0		6.6				
Green Ext Time (p_c), s		2.1		1.2		2.4		0.9				

Intersection Summary		
HCM 6th Ctrl Delay	12.9	
HCM 6th LOS	B	

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Int Delay, s/veh	0.9

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	255	7	13	305	6	31
Future Vol, veh/h	255	7	13	305	6	31
Conflicting Peds, #/hr	0	1	1	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	88	88	87	87	79	79
Heavy Vehicles, %	1	1	3	3	5	5
Mvmt Flow	290	8	15	351	8	39

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	299	0	501	150
Stage 1	-	-	-	-	295	-
Stage 2	-	-	-	-	206	-
Critical Hdwy	-	-	4.16	-	6.9	7
Critical Hdwy Stg 1	-	-	-	-	5.9	-
Critical Hdwy Stg 2	-	-	-	-	5.9	-
Follow-up Hdwy	-	-	2.23	-	3.55	3.35
Pot Cap-1 Maneuver	-	-	1252	-	492	860
Stage 1	-	-	-	-	721	-
Stage 2	-	-	-	-	799	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1251	-	484	859
Mov Cap-2 Maneuver	-	-	-	-	484	-
Stage 1	-	-	-	-	720	-
Stage 2	-	-	-	-	787	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.4	10
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	763	-	-	1251	-
HCM Lane V/C Ratio	0.061	-	-	0.012	-
HCM Control Delay (s)	10	-	-	7.9	0.1
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.2	-	-	0	-

Intersection	
Int Delay, s/veh	7.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	151	23	20	1	5	15	17	19	8	10	17	37
Future Vol, veh/h	151	23	20	1	5	15	17	19	8	10	17	37
Conflicting Peds, #/hr	0	0	3	3	0	0	5	0	0	0	0	5
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	91	91	91	60	60	60	85	85	85	76	76	76
Heavy Vehicles, %	1	1	1	0	0	0	0	0	0	4	4	4
Mvmt Flow	166	25	22	2	8	25	20	22	9	13	22	49

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	161	149	55	166	169	27	76	0	0	31	0	0
Stage 1	78	78	-	67	67	-	-	-	-	-	-	-
Stage 2	83	71	-	99	102	-	-	-	-	-	-	-
Critical Hdwy	7.11	6.51	6.21	7.1	6.5	6.2	4.1	-	-	4.14	-	-
Critical Hdwy Stg 1	6.11	5.51	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.11	5.51	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.509	4.009	3.309	3.5	4	3.3	2.2	-	-	2.236	-	-
Pot Cap-1 Maneuver	807	744	1015	803	728	1054	1536	-	-	1569	-	-
Stage 1	933	832	-	948	843	-	-	-	-	-	-	-
Stage 2	928	838	-	912	815	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	764	724	1007	750	708	1054	1529	-	-	1569	-	-
Mov Cap-2 Maneuver	764	724	-	750	708	-	-	-	-	-	-	-
Stage 1	916	820	-	936	832	-	-	-	-	-	-	-
Stage 2	885	827	-	854	804	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	11.4	9	2.9	1.1
HCM LOS	B	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1529	-	-	778	928	1569	-	-
HCM Lane V/C Ratio	0.013	-	-	0.274	0.038	0.008	-	-
HCM Control Delay (s)	7.4	0	-	11.4	9	7.3	0	-
HCM Lane LOS	A	A	-	B	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	1.1	0.1	0	-	-

Intersection	
Int Delay, s/veh	3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	23	15	6	24	20	8
Future Vol, veh/h	23	15	6	24	20	8
Conflicting Peds, #/hr	0	1	1	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	62	62	72	72	70	70
Heavy Vehicles, %	5	5	0	0	7	7
Mvmt Flow	37	24	8	33	29	11

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	62	0	99	50
Stage 1	-	-	-	-	50	-
Stage 2	-	-	-	-	49	-
Critical Hdwy	-	-	4.1	-	6.47	6.27
Critical Hdwy Stg 1	-	-	-	-	5.47	-
Critical Hdwy Stg 2	-	-	-	-	5.47	-
Follow-up Hdwy	-	-	2.2	-	3.563	3.363
Pot Cap-1 Maneuver	-	-	1554	-	888	1004
Stage 1	-	-	-	-	960	-
Stage 2	-	-	-	-	961	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1553	-	883	1003
Mov Cap-2 Maneuver	-	-	-	-	883	-
Stage 1	-	-	-	-	959	-
Stage 2	-	-	-	-	956	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.5	9.1
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	914	-	-	1553	-
HCM Lane V/C Ratio	0.044	-	-	0.005	-
HCM Control Delay (s)	9.1	-	-	7.3	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0	-

Intersection	
Int Delay, s/veh	0.8

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	6	22	14	352	301	5
Future Vol, veh/h	6	22	14	352	301	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	61	61	88	88	91	91
Heavy Vehicles, %	4	4	3	3	2	2
Mvmt Flow	10	36	16	400	331	5

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	566	168	336	0	-	0
Stage 1	334	-	-	-	-	-
Stage 2	232	-	-	-	-	-
Critical Hdwy	6.88	6.98	4.16	-	-	-
Critical Hdwy Stg 1	5.88	-	-	-	-	-
Critical Hdwy Stg 2	5.88	-	-	-	-	-
Follow-up Hdwy	3.54	3.34	2.23	-	-	-
Pot Cap-1 Maneuver	450	840	1213	-	-	-
Stage 1	691	-	-	-	-	-
Stage 2	779	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	442	840	1213	-	-	-
Mov Cap-2 Maneuver	442	-	-	-	-	-
Stage 1	679	-	-	-	-	-
Stage 2	779	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.5	0.4	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1213	-	704	-	-
HCM Lane V/C Ratio	0.013	-	0.065	-	-
HCM Control Delay (s)	8	0.1	10.5	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0.2	-	-

Intersection	
Int Delay, s/veh	2.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	36	5	2	6	15	5
Future Vol, veh/h	36	5	2	6	15	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	39	5	2	7	16	5

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	44	0	53	42
Stage 1	-	-	-	-	42	-
Stage 2	-	-	-	-	11	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1564	-	955	1029
Stage 1	-	-	-	-	980	-
Stage 2	-	-	-	-	1012	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1564	-	954	1029
Mov Cap-2 Maneuver	-	-	-	-	954	-
Stage 1	-	-	-	-	980	-
Stage 2	-	-	-	-	1011	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.8	8.8
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	972	-	-	1564	-
HCM Lane V/C Ratio	0.022	-	-	0.001	-
HCM Control Delay (s)	8.8	-	-	7.3	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0	-

Intersection	
Int Delay, s/veh	1.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	3	34	1	5	15
Future Vol, veh/h	0	3	34	1	5	15
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	3	37	1	5	16

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	64	38	0	0	38	0
Stage 1	38	-	-	-	-	-
Stage 2	26	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	942	1034	-	-	1572	-
Stage 1	984	-	-	-	-	-
Stage 2	997	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	939	1034	-	-	1572	-
Mov Cap-2 Maneuver	939	-	-	-	-	-
Stage 1	984	-	-	-	-	-
Stage 2	994	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	8.5	0	1.8
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	1034	1572	-
HCM Lane V/C Ratio	-	-	0.003	0.003	-
HCM Control Delay (s)	-	-	8.5	7.3	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0	0	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	99	268	27	7	374	293	47	224	18	201	112	195
Future Volume (veh/h)	99	268	27	7	374	293	47	224	18	201	112	195
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		0.99	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1984	1984	1984	1984	1984	1984	1984	1984	1984	1984	1984	1984
Adj Flow Rate, veh/h	116	315	32	7	394	308	51	243	20	214	119	207
Peak Hour Factor	0.85	0.85	0.85	0.95	0.95	0.95	0.92	0.92	0.92	0.94	0.94	0.94
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	294	890	96	65	917	700	130	518	39	277	128	200
Arrive On Green	0.46	0.46	0.46	0.46	0.46	0.46	0.35	0.35	0.35	0.35	0.35	0.35
Sat Flow, veh/h	425	1921	207	8	1979	1511	173	1494	113	557	369	576
Grp Volume(v), veh/h	190	0	273	399	0	310	314	0	0	540	0	0
Grp Sat Flow(s),veh/h/ln	786	0	1767	1977	0	1522	1780	0	0	1501	0	0
Q Serve(g_s), s	6.4	0.0	5.9	0.0	0.0	8.2	0.0	0.0	0.0	13.3	0.0	0.0
Cycle Q Clear(g_c), s	14.7	0.0	5.9	8.1	0.0	8.2	7.5	0.0	0.0	20.8	0.0	0.0
Prop In Lane	0.61		0.12	0.02		0.99	0.16		0.06	0.40		0.38
Lane Grp Cap(c), veh/h	461	0	819	977	0	705	687	0	0	604	0	0
V/C Ratio(X)	0.41	0.00	0.33	0.41	0.00	0.44	0.46	0.00	0.00	0.89	0.00	0.00
Avail Cap(c_a), veh/h	461	0	819	977	0	705	687	0	0	604	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	13.4	0.0	10.2	10.8	0.0	10.9	15.2	0.0	0.0	19.7	0.0	0.0
Incr Delay (d2), s/veh	2.7	0.0	1.1	1.3	0.0	2.0	2.2	0.0	0.0	18.2	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.2	0.0	2.3	3.5	0.0	2.8	3.3	0.0	0.0	9.5	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	16.1	0.0	11.3	12.1	0.0	12.8	17.4	0.0	0.0	37.8	0.0	0.0
LnGrp LOS	B	A	B	B	A	B	B	A	A	D	A	A
Approach Vol, veh/h		463			709			314			540	
Approach Delay, s/veh		13.3			12.4			17.4			37.8	
Approach LOS		B			B			B			D	

Timer - Assigned Phs	2	4	6	8
Phs Duration (G+Y+Rc), s	33.4	26.6	33.4	26.6
Change Period (Y+Rc), s	5.6	* 5.8	5.6	* 5.8
Max Green Setting (Gmax), s	27.8	* 21	27.8	* 21
Max Q Clear Time (g_c+I1), s	16.7	22.8	10.2	9.5
Green Ext Time (p_c), s	2.6	0.0	4.6	1.4

Intersection Summary	
HCM 6th Ctrl Delay	20.2
HCM 6th LOS	C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Int Delay, s/veh	2.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	430	57	44	633	41	46
Future Vol, veh/h	430	57	44	633	41	46
Conflicting Peds, #/hr	0	2	2	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	81	81	95	95	75	75
Heavy Vehicles, %	1	1	1	1	0	0
Mvmt Flow	531	70	46	666	55	61

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	603	0	993	303
Stage 1	-	-	-	-	568	-
Stage 2	-	-	-	-	425	-
Critical Hdwy	-	-	4.12	-	6.8	6.9
Critical Hdwy Stg 1	-	-	-	-	5.8	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	-	-	2.21	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	977	-	246	699
Stage 1	-	-	-	-	536	-
Stage 2	-	-	-	-	633	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	975	-	227	698
Mov Cap-2 Maneuver	-	-	-	-	227	-
Stage 1	-	-	-	-	535	-
Stage 2	-	-	-	-	586	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.9	20.1
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	353	-	-	975	-
HCM Lane V/C Ratio	0.329	-	-	0.048	-
HCM Control Delay (s)	20.1	-	-	8.9	0.3
HCM Lane LOS	C	-	-	A	A
HCM 95th %tile Q(veh)	1.4	-	-	0.1	-

Intersection	
Int Delay, s/veh	6.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	123	13	33	7	11	29	24	102	6	18	78	57
Future Vol, veh/h	123	13	33	7	11	29	24	102	6	18	78	57
Conflicting Peds, #/hr	0	0	3	3	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	83	83	83	68	68	68	88	88	88	83	83	83
Heavy Vehicles, %	1	1	1	0	0	0	0	0	0	0	0	0
Mvmt Flow	148	16	40	10	16	43	27	116	7	22	94	69

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	376	350	132	378	381	120	163	0	0	123	0	0
Stage 1	173	173	-	174	174	-	-	-	-	-	-	-
Stage 2	203	177	-	204	207	-	-	-	-	-	-	-
Critical Hdwy	7.11	6.51	6.21	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.11	5.51	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.11	5.51	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.509	4.009	3.309	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	583	576	920	583	555	937	1428	-	-	1477	-	-
Stage 1	831	758	-	833	759	-	-	-	-	-	-	-
Stage 2	801	755	-	803	734	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	528	555	917	529	534	937	1428	-	-	1477	-	-
Mov Cap-2 Maneuver	528	555	-	529	534	-	-	-	-	-	-	-
Stage 1	814	745	-	816	744	-	-	-	-	-	-	-
Stage 2	733	740	-	737	722	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	14.6	10.5	1.4	0.9
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1428	-	-	578	726	1477	-	-
HCM Lane V/C Ratio	0.019	-	-	0.352	0.095	0.015	-	-
HCM Control Delay (s)	7.6	0	-	14.6	10.5	7.5	0	-
HCM Lane LOS	A	A	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0.1	-	-	1.6	0.3	0	-	-

Intersection	
Int Delay, s/veh	3.9

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	56	62	4	40	92	9
Future Vol, veh/h	56	62	4	40	92	9
Conflicting Peds, #/hr	0	0	0	0	0	1
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	93	93	79	79	89	89
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	60	67	5	51	103	10

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	127	0	155	95
Stage 1	-	-	-	-	94	-
Stage 2	-	-	-	-	61	-
Critical Hdwy	-	-	4.1	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1472	-	841	967
Stage 1	-	-	-	-	935	-
Stage 2	-	-	-	-	967	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1472	-	838	966
Mov Cap-2 Maneuver	-	-	-	-	838	-
Stage 1	-	-	-	-	935	-
Stage 2	-	-	-	-	964	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.7	9.9
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	848	-	-	1472	-
HCM Lane V/C Ratio	0.134	-	-	0.003	-
HCM Control Delay (s)	9.9	-	-	7.5	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.5	-	-	0	-

Intersection	
Int Delay, s/veh	0.8

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	9	50	16	698	526	6
Future Vol, veh/h	9	50	16	698	526	6
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	83	83	92	92	95	95
Heavy Vehicles, %	0	0	1	1	1	1
Mvmt Flow	11	60	17	759	554	6

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	971	280	560	0	-	0
Stage 1	557	-	-	-	-	-
Stage 2	414	-	-	-	-	-
Critical Hdwy	6.8	6.9	4.12	-	-	-
Critical Hdwy Stg 1	5.8	-	-	-	-	-
Critical Hdwy Stg 2	5.8	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.21	-	-	-
Pot Cap-1 Maneuver	254	723	1014	-	-	-
Stage 1	543	-	-	-	-	-
Stage 2	641	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	247	723	1014	-	-	-
Mov Cap-2 Maneuver	247	-	-	-	-	-
Stage 1	527	-	-	-	-	-
Stage 2	641	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	12.4	0.3	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1014	-	559	-	-
HCM Lane V/C Ratio	0.017	-	0.127	-	-
HCM Control Delay (s)	8.6	0.1	12.4	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.1	-	0.4	-	-

Intersection	
Int Delay, s/veh	1.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	23	14	7	38	9	5
Future Vol, veh/h	23	14	7	38	9	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	25	15	8	41	10	5

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	40	0	90	33
Stage 1	-	-	-	-	33	-
Stage 2	-	-	-	-	57	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1570	-	910	1041
Stage 1	-	-	-	-	989	-
Stage 2	-	-	-	-	966	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1570	-	905	1041
Mov Cap-2 Maneuver	-	-	-	-	905	-
Stage 1	-	-	-	-	989	-
Stage 2	-	-	-	-	961	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.1	8.9
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	949	-	-	1570	-
HCM Lane V/C Ratio	0.016	-	-	0.005	-
HCM Control Delay (s)	8.9	-	-	7.3	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0	-	-	0	-

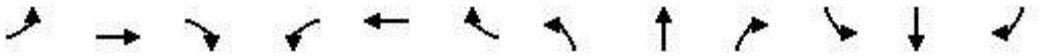
Intersection	
Int Delay, s/veh	3.8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	10	41	46	6	42	59
Future Vol, veh/h	10	41	46	6	42	59
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	11	45	50	7	46	64

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	210	54	0	0	57	0
Stage 1	54	-	-	-	-	-
Stage 2	156	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	778	1013	-	-	1547	-
Stage 1	969	-	-	-	-	-
Stage 2	872	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	754	1013	-	-	1547	-
Mov Cap-2 Maneuver	754	-	-	-	-	-
Stage 1	969	-	-	-	-	-
Stage 2	845	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9	0	3.1
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	949	1547	-
HCM Lane V/C Ratio	-	-	0.058	0.03	-
HCM Control Delay (s)	-	-	9	7.4	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.2	0.1	-



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	99	268	27	7	374	293	47	224	18	201	112	195
Future Volume (veh/h)	99	268	27	7	374	293	47	224	18	201	112	195
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		0.99	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1984	1984	1984	1984	1984	1984	1984	1984	1984	1984	1984	1984
Adj Flow Rate, veh/h	116	315	32	7	394	308	51	243	20	214	119	207
Peak Hour Factor	0.85	0.85	0.85	0.95	0.95	0.95	0.92	0.92	0.92	0.94	0.94	0.94
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	212	672	74	64	705	538	154	690	53	336	178	267
Arrive On Green	0.36	0.36	0.36	0.36	0.36	0.36	0.45	0.45	0.45	0.45	0.45	0.45
Sat Flow, veh/h	325	1884	207	9	1976	1510	187	1523	116	555	393	590
Grp Volume(v), veh/h	190	0	273	399	0	310	314	0	0	540	0	0
Grp Sat Flow(s),veh/h/ln	649	0	1766	1976	0	1519	1826	0	0	1539	0	0
Q Serve(g_s), s	8.4	0.0	7.1	0.0	0.0	9.9	0.0	0.0	0.0	10.5	0.0	0.0
Cycle Q Clear(g_c), s	18.3	0.0	7.1	9.7	0.0	9.9	6.3	0.0	0.0	16.7	0.0	0.0
Prop In Lane	0.61		0.12	0.02		0.99	0.16		0.06	0.40		0.38
Lane Grp Cap(c), veh/h	328	0	630	766	0	542	897	0	0	781	0	0
V/C Ratio(X)	0.58	0.00	0.43	0.52	0.00	0.57	0.35	0.00	0.00	0.69	0.00	0.00
Avail Cap(c_a), veh/h	328	0	630	766	0	542	897	0	0	781	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	20.0	0.0	14.7	15.5	0.0	15.6	10.7	0.0	0.0	13.1	0.0	0.0
Incr Delay (d2), s/veh	7.2	0.0	2.2	2.5	0.0	4.3	1.1	0.0	0.0	5.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.0	0.0	3.0	4.6	0.0	3.8	2.5	0.0	0.0	5.8	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	27.2	0.0	16.9	18.1	0.0	19.9	11.7	0.0	0.0	18.1	0.0	0.0
LnGrp LOS	C	A	B	B	A	B	B	A	A	B	A	A
Approach Vol, veh/h		463			709			314			540	
Approach Delay, s/veh		21.1			18.9			11.7			18.1	
Approach LOS		C			B			B			B	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		27.0		33.0		27.0		33.0				
Change Period (Y+Rc), s		5.6		* 5.8		5.6		* 5.8				
Max Green Setting (Gmax), s		21.4		* 27		21.4		* 27				
Max Q Clear Time (g_c+I1), s		20.3		18.7		11.9		8.3				
Green Ext Time (p_c), s		0.4		2.4		3.3		1.8				

Intersection Summary		
HCM 6th Ctrl Delay		18.1
HCM 6th LOS		B

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection: 1: Griswold Street & Main Street

Movement	EB	EB	WB	WB	NB	SB
Directions Served	LT	TR	LT	TR	LTR	LTR
Maximum Queue (ft)	116	83	97	112	129	168
Average Queue (ft)	61	37	41	51	62	77
95th Queue (ft)	96	72	72	91	112	138
Link Distance (ft)	132	132	367	367	109	468
Upstream Blk Time (%)	0	0			1	
Queuing Penalty (veh)	0	0			2	
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 2: Cady Street & Main Street

Movement	WB	NB
Directions Served	LT	LR
Maximum Queue (ft)	33	54
Average Queue (ft)	3	22
95th Queue (ft)	18	46
Link Distance (ft)	714	162
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 3: Griswold Street & Cady Street

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	84	33	11	9
Average Queue (ft)	46	15	1	0
95th Queue (ft)	71	40	7	6
Link Distance (ft)	231	116	456	148
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 4: River Street & Beal Street

Movement	WB	NB
Directions Served	LT	LR
Maximum Queue (ft)	12	56
Average Queue (ft)	0	19
95th Queue (ft)	6	49
Link Distance (ft)	273	547
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 5: Northville Road & Beal Street

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (ft)	48	36
Average Queue (ft)	19	4
95th Queue (ft)	44	21
Link Distance (ft)	301	636
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 6: West Site Drive & Cady Street

Movement	NB
Directions Served	LR
Maximum Queue (ft)	37
Average Queue (ft)	14
95th Queue (ft)	38
Link Distance (ft)	185
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 7: Cady Street & East Site Drive

Movement	WB	SB
Directions Served	LR	LT
Maximum Queue (ft)	30	3
Average Queue (ft)	3	0
95th Queue (ft)	18	3
Link Distance (ft)	146	162
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Zone Summary

Zone wide Queuing Penalty: 2

Intersection: 1: Griswold Street & Main Street

Movement	EB	EB	WB	WB	NB	SB
Directions Served	LT	TR	LT	TR	LTR	LTR
Maximum Queue (ft)	134	125	134	188	146	513
Average Queue (ft)	83	60	74	109	96	451
95th Queue (ft)	132	110	117	172	148	590
Link Distance (ft)	132	132	367	367	109	468
Upstream Blk Time (%)	2	0			6	73
Queuing Penalty (veh)	3	0			18	0
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 2: Cady Street & Main Street

Movement	EB	WB	WB	NB
Directions Served	TR	LT	T	LR
Maximum Queue (ft)	14	51	26	71
Average Queue (ft)	1	15	0	32
95th Queue (ft)	6	45	8	58
Link Distance (ft)	367	714	714	162
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 3: Griswold Street & Cady Street

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	93	46	43	31
Average Queue (ft)	45	24	5	2
95th Queue (ft)	75	47	24	17
Link Distance (ft)	231	116	456	148
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 4: River Street & Beal Street

Movement	WB	NB
Directions Served	LT	LR
Maximum Queue (ft)	6	59
Average Queue (ft)	0	34
95th Queue (ft)	4	54
Link Distance (ft)	273	547
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 5: Northville Road & Beal Street

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (ft)	55	62	2
Average Queue (ft)	27	8	0
95th Queue (ft)	49	36	2
Link Distance (ft)	301	636	194
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 6: West Site Drive & Cady Street

Movement	NB
Directions Served	LR
Maximum Queue (ft)	32
Average Queue (ft)	11
95th Queue (ft)	34
Link Distance (ft)	185
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 7: Cady Street & East Site Drive

Movement	WB	SB
Directions Served	LR	LT
Maximum Queue (ft)	52	31
Average Queue (ft)	27	2
95th Queue (ft)	48	16
Link Distance (ft)	146	162
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Zone Summary

Zone wide Queuing Penalty: 22

Intersection: 1: Griswold Street & Main Street

Movement	EB	EB	WB	WB	NB	SB
Directions Served	LT	TR	LT	TR	LTR	LTR
Maximum Queue (ft)	145	143	170	223	141	385
Average Queue (ft)	97	79	88	124	80	189
95th Queue (ft)	149	131	140	192	134	342
Link Distance (ft)	132	132	367	367	109	468
Upstream Blk Time (%)	7	1			3	1
Queuing Penalty (veh)	14	2			8	0
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						