

# ***TRAFFIC IMPACT STUDY***

REPORT FOR:

## ***AVENIDA SENIORS***



### **MILL STREET AND COMMONS STREET NAPERVILLE, ILLINOIS**

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V3 Project No. 16130

**September 19, 2016**  
**Updated June 6, 2017**



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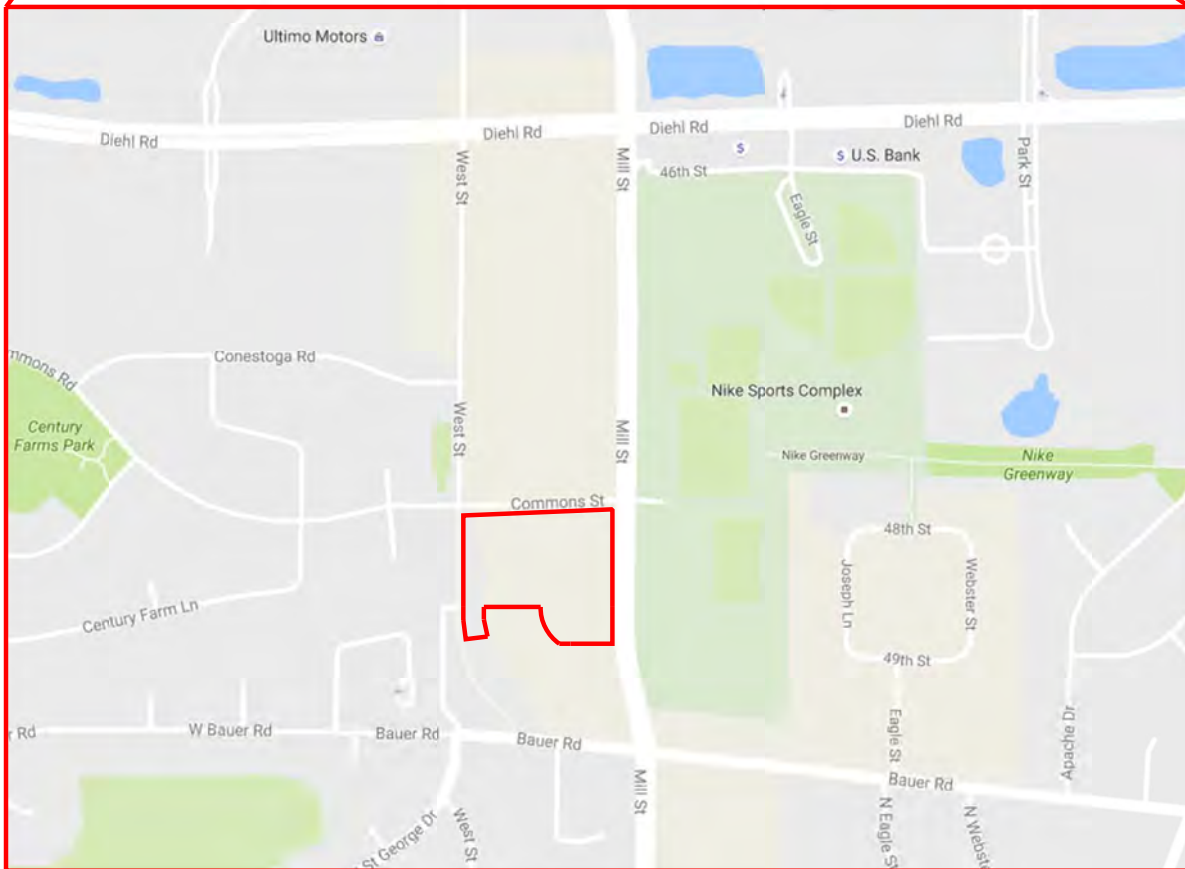
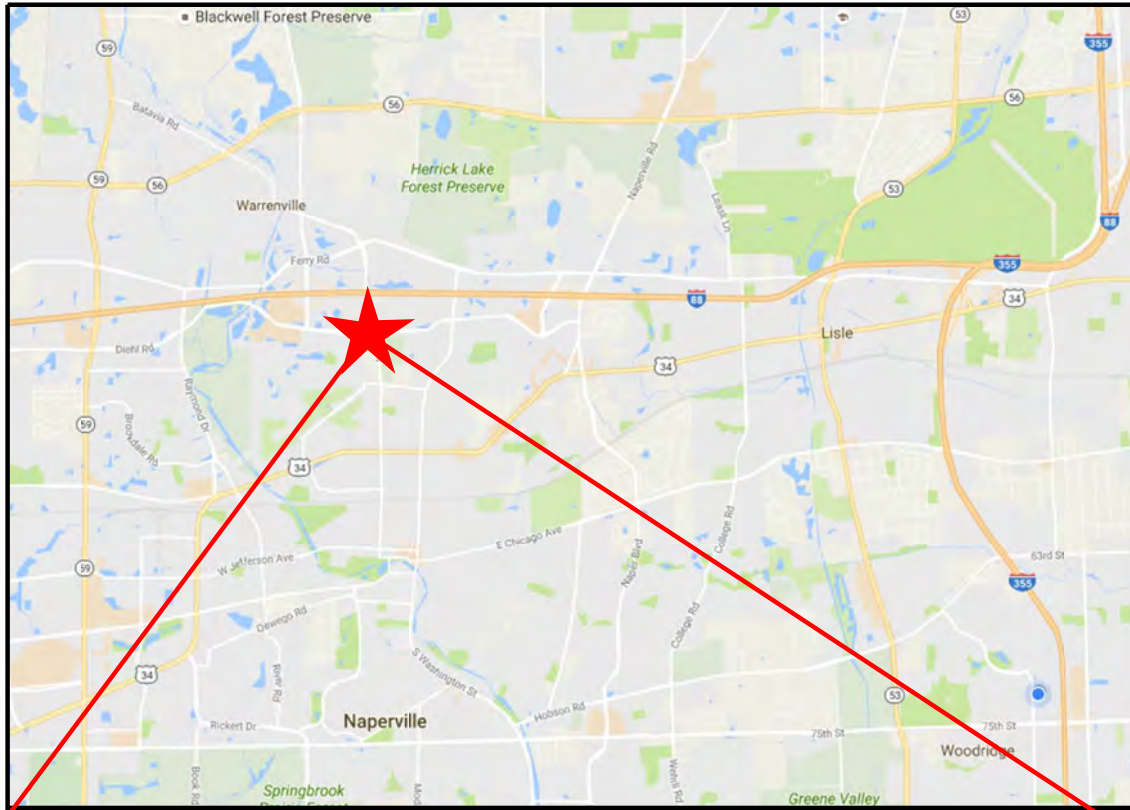
## ***I. INTRODUCTION***

V3 Companies has been retained by Avenida Partners, LLC to conduct a traffic impact study for a proposed active adult, age-restricted housing development located in the southwest quadrant of the intersection of Mill Street and Commons Street in unincorporated DuPage County, Illinois. The property, which is expected to be annexed into the City of Naperville, is bounded by Commons Street to the north, Mill Street to the east, undeveloped land to the south, and an extension of West Street that is not open to traffic to the west. A site location map is included as Figure 1.

The planned active adult, age-restricted housing will consist of 146 attached dwelling units. The site will be accessible via one full access driveway and one right out driveway on Commons Street. A new driveway is also proposed on West Street. The existing barricades that are currently blocking West Street at Commons Street will be removed and a gate installed at the entrance to the townhome development to the south. Therefore, the proposed driveway will operate as the northbound approach to the intersection of West Street and Commons Street. A conceptual site plan is included as Figure 2.

The purpose of this report is to evaluate the potential traffic impacts of the proposed development which is expected to be built out in 2017. Traffic estimates are projected for 2022, which is five years beyond the opening date. The study area consists of the signalized intersection of Mill Street/Bauer Street, and the unsignalized intersections of Mill Street/Commons Street, Commons Street/West Street, and Diehl Road/West Street. The intersection of Mill Street/Commons Street has previously met traffic signal warrants by the City of Naperville and is anticipated to be signalized by the design year of this study.

This report includes a description of existing conditions, data collection, capacity analysis, evaluation of data, and conclusions.



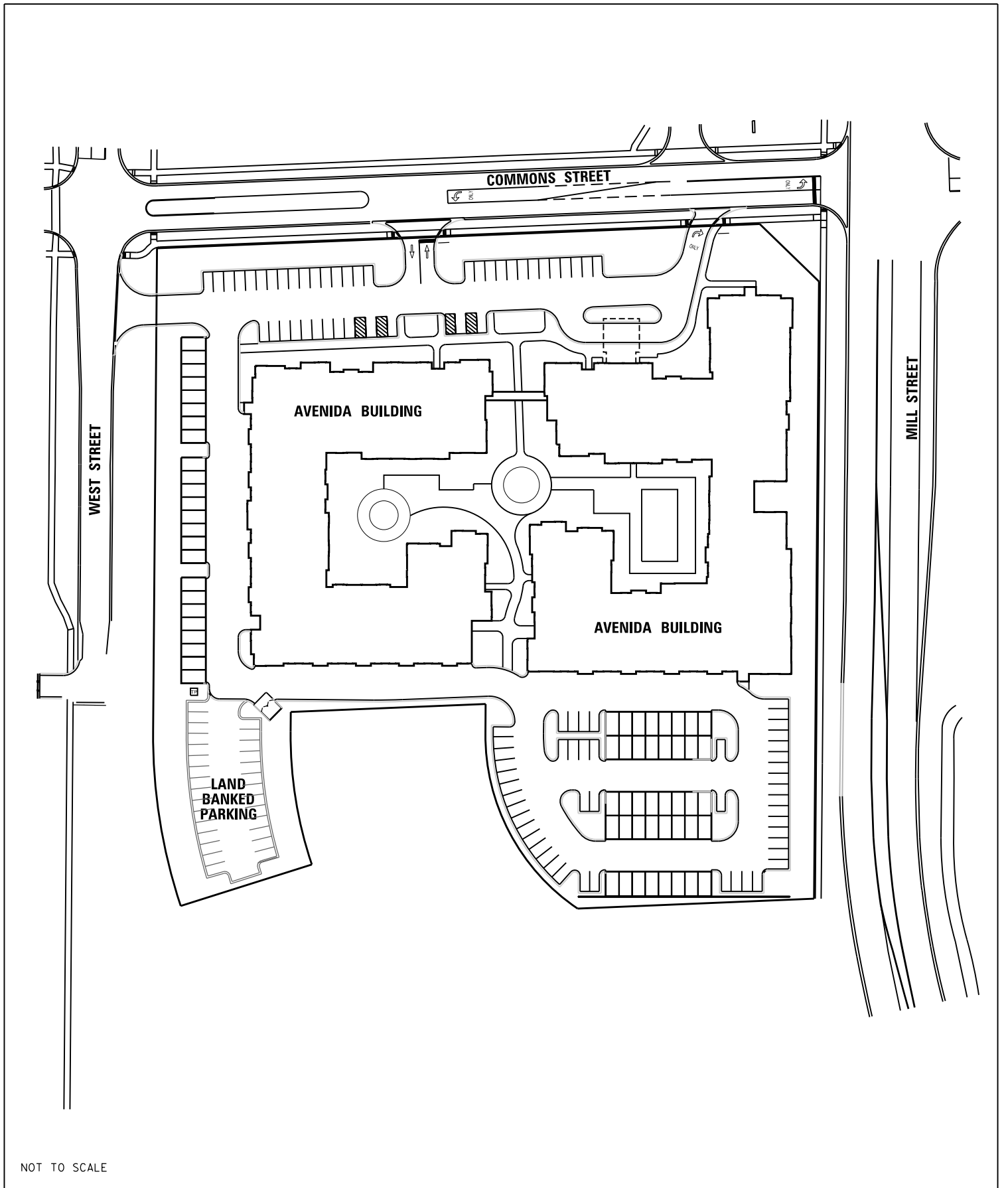
**AVENIDA  
NAPERVILLE**

**FIGURE 1  
SITE LOCATION MAP**

NAPERVILLE

ILLINOIS





NOT TO SCALE

**AVENIDA  
NAPERVILLE**

**FIGURE 2  
CONCEPTUAL SITE PLAN**

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## **II. PROJECT CONDITIONS**

### ***Land Uses***

A variety of land uses exist near the project site, primarily consisting of office, residential, and service uses, a proposed assisted living facility to the north, and the Nike Sports Complex to the east. The surrounding land uses are illustrated in Figure 3.

### ***Roadway System***

The characteristics of the roadways in the vicinity of the site are presented below. The existing lane configurations at the study area intersections are illustrated in Figure 4.

Mill Street is under the jurisdiction of the DuPage County Division of Transportation (DuDOT) and is classified by the County as a minor arterial typically consisting of two through lanes in each direction and a posted speed limit of 40 miles per hour. DuDOT defines minor arterials as arterials that carry traffic between principal arterials and are primarily inter-county and inter-community with moderate development access. South of Commons Street, a multiuse path is provided on the east side that travels through the Nike Sports Complex. North of Commons Street, a sidewalk is provided on the west side adjacent to the proposed assisted living facility.

Commons Street is a two-lane, east-west local road with a posted speed limit of 25 miles per hour. The City of Naperville states the primary function of a local road is to serve adjoining property and should be arranged to discourage use by non-local traffic. A sidewalk is provided along the north side of the street.

West Street is a two-lane, north-south local road with a sidewalk on both sides of the roadway north of Commons Street and no posted speed limit. West Street provides access to Conestoga Road, which serves the Cress Creek neighborhood, and a secondary private driveway into an office park south of Diehl Road.

Bauer Road is a two-lane, east-west neighborhood collector with a posted speed of 25 miles per hour. The City of Naperville defines a neighborhood collector as a street with the primary function to connect residential and local streets within a neighborhood to collector streets and to the arterial street network.

Diehl Road is a four-lane, divided, east-west arterial with a posted speed limit of 40 miles per hour. Diehl Road is under DuPage County jurisdiction.

Mill Street and Bauer Road is a signalized intersection to the south of the project site. The northbound and southbound approaches to the intersection consist of one left turn lane, one through lane, and one shared through/right turn lane, while the eastbound and westbound approaches consist of one left turn lane and one shared through/right turn lane. The signal runs





as actuated-uncoordinated with a 130 second cycle length during the peak hours and a 115 second cycle length during off peak hours.

Mill Street and Commons Street is an unsignalized intersection to the east of the project site. The northbound approach to this intersection consists of one left turn lane, two through lanes, and one right turn lane and the southbound approach consists of one left turn lane, one through lane, and one shared through/right turn lane. The eastbound and westbound approaches consist of one left turn lane and one shared through/right turn lane. The eastbound and westbound approaches are stop controlled. The east leg of this intersection serves as the Nike Park entrance and is not a through street.

The City of Naperville conducted a Traffic Signal Warrant Analysis for the intersection of Mill Street/Commons Street in 2012. The warrant analysis document is included as Appendix A. The analysis concluded that the following warrants were met:

- Warrant 1, Eight-Hour Vehicular Volume
- Warrant 2, Four-Hour Vehicular Volume
- Warrant 3, Peak Hour Volume

It is our understanding that the City intends to signalize this intersection by the future study year, independent of the Avenida Seniors development. Therefore, the signalization of the intersection of Mill Street/Commons Street will be modeled in all future scenarios.

Commons Street and West Street is an unsignalized intersection to the west of the project area. The eastbound and westbound approaches consists of one approach lane, while the southbound approach consists of one left turn lane and one right turn lane. The southbound approach operates under stop control. A barricade is present on the south leg of the roadway, closing West Street from Commons Street to Bauer Road. The existing barricades on the south leg of the intersection will be removed and a gate installed at the entrance to the townhome development to the south to prevent through traffic. Since West Street will be gated to the south, all traffic on the south leg of the intersection of Commons Street and West Street will be associated with the Avenida Seniors development.

The existing barricades that are currently blocking West Street at Commons Street will be removed and a gate installed at the entrance to the townhome development to the south. Therefore, the proposed driveway will operate as the northbound approach to the intersection of West Street and Commons Street.

Diehl Road and West Street is an unsignalized intersection to the north of the project site. The major eastbound and westbound approaches consist of one left turn lane, one through lane and one shared through/right turn lane. The northbound approach consists of one left turn lane and one shared through/right turn lane and the southbound approach consists of one approach lane. The minor northbound and southbound approaches operate under stop control.

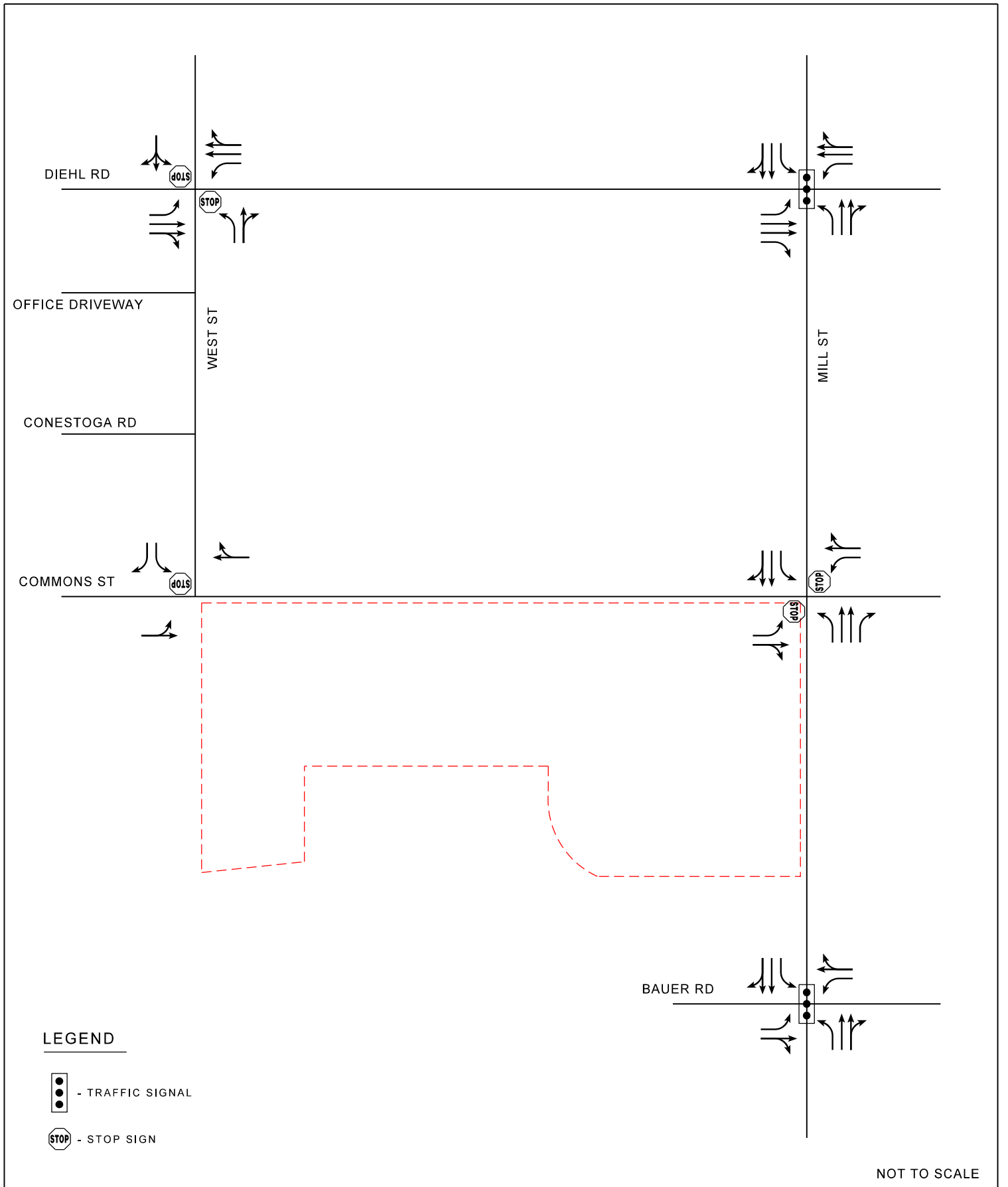




**AVENIDA  
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**FIGURE 3  
LAND USE MAP**





**LEGEND**

-  - TRAFFIC SIGNAL
-  - STOP SIGN

NOT TO SCALE

**AVENIDA  
NAPERVILLE**

**FIGURE 4  
EXISTING LANE CONFIGURATION**

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## **Traffic Volumes**

To assist in the evaluation of the traffic impact on the roadway system resulting from the proposed development, existing vehicular volumes were collected at the study area intersections.

Vehicle counts were conducted on Wednesday, July 13<sup>th</sup>, 2016 at the intersections of Diehl Road/West Street and Commons Street/West Street. The morning peak period counts occurred from 7:00 am to 9:00 am and the evening peak period counts occurred from 4:00 pm to 6:00 pm. The count periods were selected to be consistent with traditional peak hours for arterial roadways.

Additionally, the City of Naperville has provided weekday peak hour traffic counts at the intersections Mill Street/Bauer Road and Mill Street/Commons Street, which were conducted on Tuesday, June 23<sup>rd</sup>, 2015 and Thursday, June 25<sup>th</sup>, 2015, respectively. A one percent growth rate was applied to the counts to adjust them to 2016.

Since the counts were conducted on different days, the various approaches do not balance properly, including a discrepancy between the southbound approaches to Mill Street/Commons Street and Mill Street/Bauer Road. All approaches have been adjusted to properly balance traffic volumes between intersections by advancing the highest approach counts through the other intersections to maintain a conservative analysis. In general, adjustments on the major approaches are applied as increased through movements while adjustments to the minor approaches are applied to the movement that will result in the most conservative analysis (i.e. increased volumes are generally applied as left turns instead of right turn or through movements).

Additionally, the collected volumes do not directly balance between the Diehl Road/West Street and Commons Street/West Street intersections. This is attributed to vehicles entering and exiting West Street at Conestoga Road and the secondary office park driveway. Since direct counts were not conducted at these driveways, the specific movements at the Conestoga Road and office park driveway intersections cannot be quantified. However, the net change in vehicles traveling along West Street is highlighted in the existing traffic volume exhibit.

The traffic volumes collected indicate that the weekday peak hours occur from 7:30 am to 8:30 am and 4:45 pm to 5:45 pm. The existing peak hour vehicular volumes at the study area intersections are illustrated in Figure 5. A summary of the traffic volumes collected in fifteen minute increments is provided in Appendix B.



## ***Proposed Development***

### *Land Use Development*

The HarborChase assisted living community is currently under construction to the north of the proposed Avenida Seniors development. HarborChase will be accessible through one full access driveway on Commons Street and two full access driveways on West Street. Occupancy of HarborChase is expected to occur in 2016 and will therefore impact the future traffic scenarios.

Traffic projections for the HarborChase development have been obtained from the City-approved Traffic Impact Study by CEMCON, Ltd. dated December 13, 2013. The study includes trips generated by the Avenida Seniors site to the south of HarborChase, but the development proposed in this study reflects a different land use type. Therefore, only the projected HarborChase trips are used.

The December 13, 2013 study assumed that all inbound and outbound trips for HarborChase will travel through the one full access drive on Commons Street. However, there are two full access drives on West Street that are likely to accommodate some portion of trips. This is supported by the fact that nearly one-third of the available HarborChase parking is located adjacent to the West Street driveways. Therefore, the HarborChase trips are reassigned in the background and future with project conditions in a manner that is more consistent with the trip assignment of the Avenida Seniors site, rather than the distribution that is used in the HarborChase study. The anticipated HarborChase traffic is included as background traffic and illustrated in Figure 8.

Another development is also expected to the south of the Avenida Seniors site. Truth Lutheran Church is planning a new 15,000 square foot church in the northwest quadrant of the Mill Street/Bauer Road intersection, adjacent to the Avenida Seniors site. The church currently has a 90 member congregation and is expected to host one service a week at 9:30 am on Sundays. The site will be accessed from Bauer Road and there will be no cross access to the Avenida Seniors site. Since the church will only have service on Sunday and is only accessed through Bauer Road, traffic for the future church is not included in this study.

There are no other known proposed land development projects in the vicinity of the site that will impact the study area.

### *Roadway Development*

The conceptual site plan for the development includes two proposed driveways on Commons Street and one on West Street. On Commons Street, the western driveway will operate as full access and the eastern driveway will operate as right-out only. A westbound left turn lane is recommended on Commons Street at the West Avenida Seniors Driveway. The driveway on Mill Street will operate as a right-in/right-out only driveway.

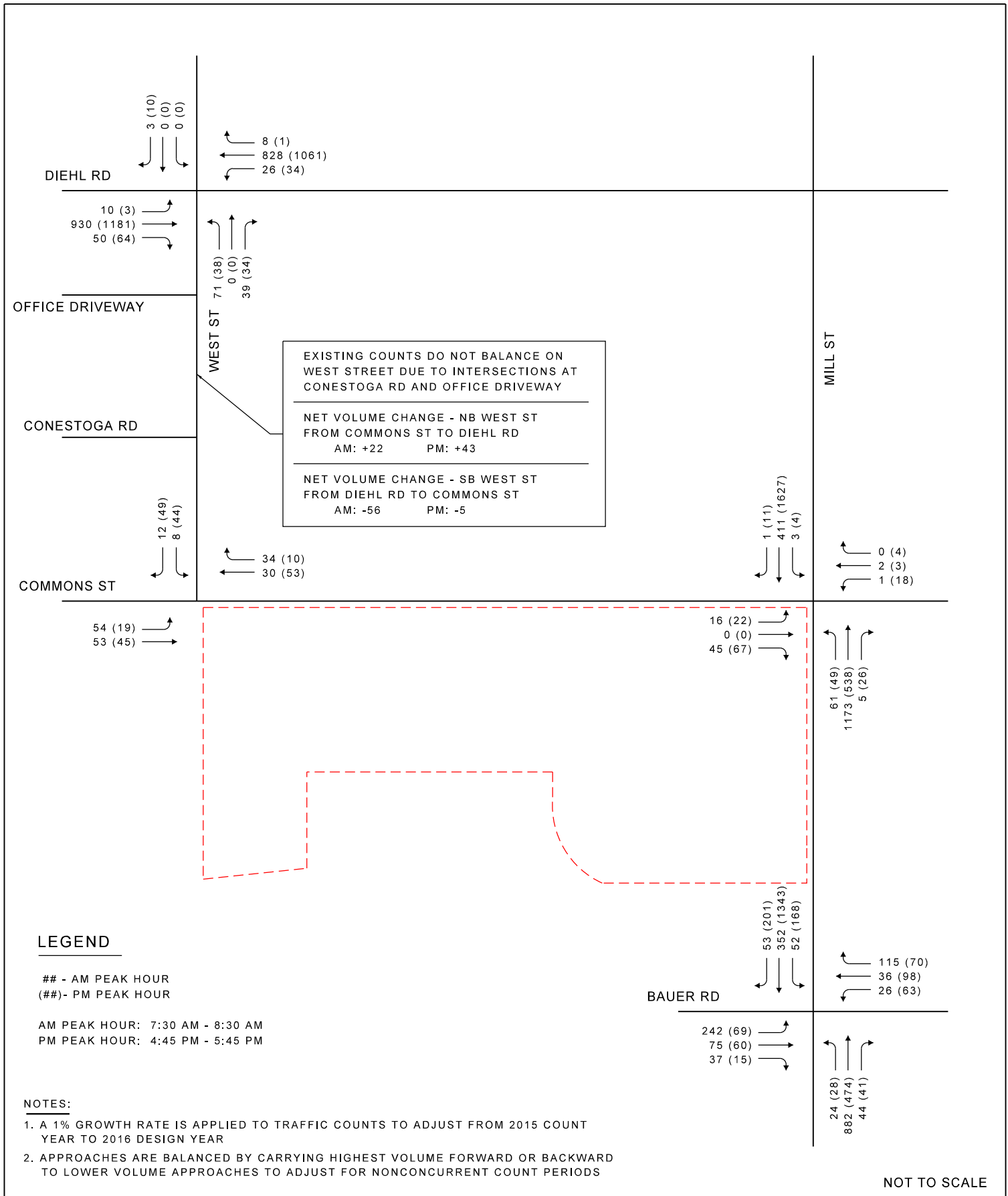




As previously stated, it is our understanding that the City of Naperville plans to signalize the intersection of Mill Street/Commons Street prior to 2022. Therefore, the background and future with project analysis scenarios will include a traffic signal at this intersection. It is assumed that the intersections of Mill Street/Bauer Road and Mill Street/Commons Street will be coordinated. The coordinated signal system is analyzed with a 90 second cycle length, which is approximately the effective cycle length that occurs with the existing uncoordinated system.

In addition, the barricades on West Street at the intersection of Commons Street will be removed. This segment of West Street will be maintained as a secondary emergency access for the existing townhome development, Cress Creek Townhomes, to the south on the west side of West Street. A hammerhead turnaround will be constructed at the townhome driveway and a gate will be provided to prevent pass-through traffic. A driveway will be provided to the Avenida Seniors development on West Street just south of Commons Street.

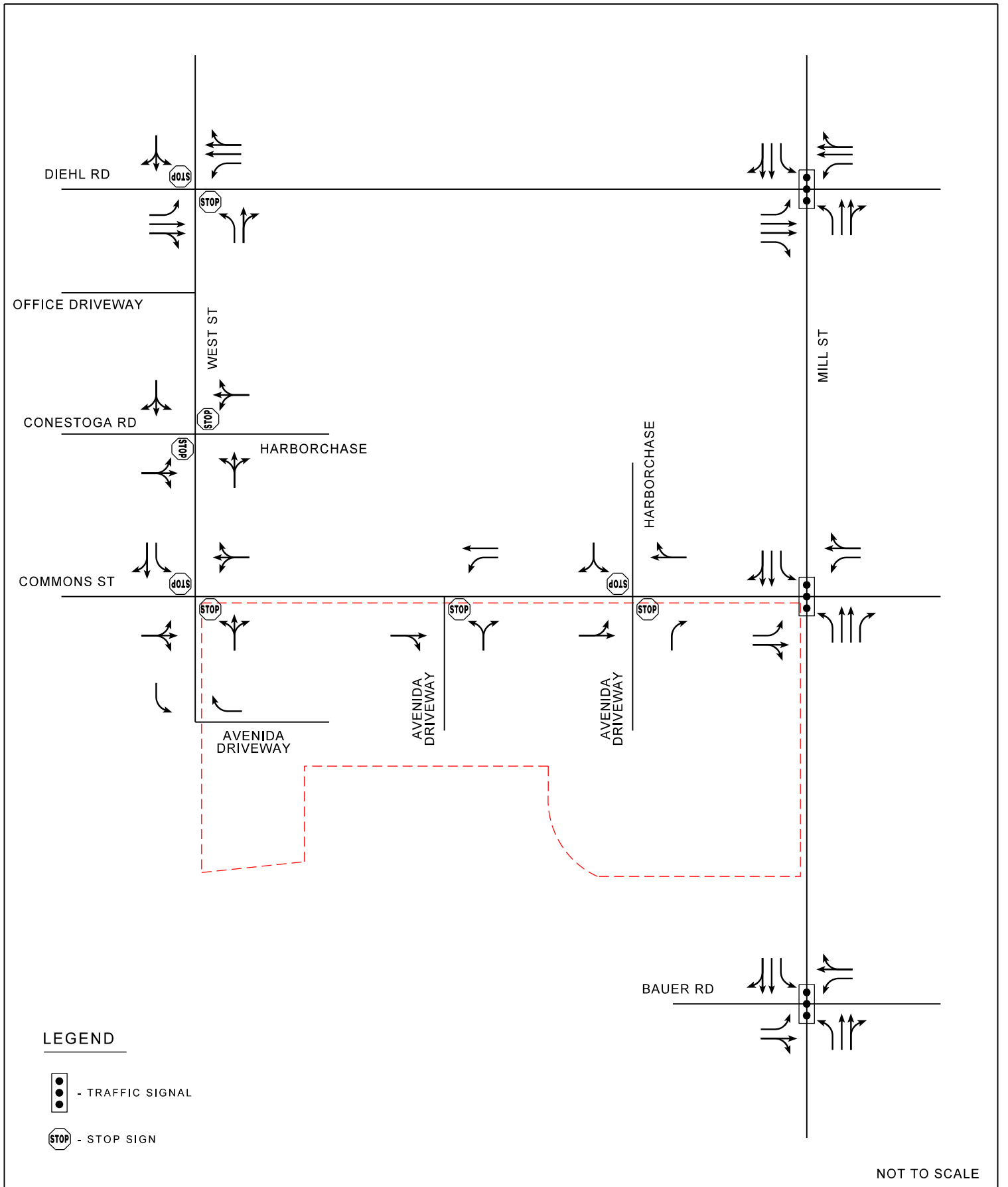
There are no other known proposed roadway projects in the vicinity of the site that will impact the study area. The anticipated future lane configuration for the study area intersections are illustrated in Figure 6.



# AVENIDA NAPERVILLE

## FIGURE 5 EXISTING (2016) TRAFFIC VOLUME





**AVENIDA  
NAPERVILLE**

**FIGURE 6  
PROPOSED LANE  
CONFIGURATION**

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### III. TRAFFIC FORECASTS

#### Project Traffic Volumes

##### Trip Generation

The proposed site plan consists of 175 units of attached active adult, age-restricted housing. Project traffic is estimated using the Institute of Transportation Engineers (ITE) Trip Generation Manual, 9<sup>th</sup> Edition. The following land use categories are used to determine project traffic:

Senior Adult Housing – Attached (ITE Land Use Code 252) – Senior adult housing consists of attached independent living developments, including retirement communities, age-restricted housing and active adult communities. These developments may include limited social or recreational services. However, they generally lack centralized dining and on site medical facilities. Residents in these communities live independently, are typically active (requiring little to no medical supervision) and may or may not be retired.

The Trip Generation Manual assigns trip generation rates based on a peak period and an independent variable. In this case, dwelling units is the applicable variable for senior adult housing-attached. The am and pm trip generation rates are selected as the average rate for weekday, peak hour of adjacent street traffic for one hour from 7 am to 9 am and 4 pm to 6 pm.

The Trip Generation Manual includes a note that the peak hour of trips generated by this land use typically does not coincide with the peak hour of the adjacent street traffic. This is due to the fact that residents are largely retired and do not travel during traditional commuting hours and employee shift-changes typically occur at non-commuter peak times. The peak hour of the adjacent roadway network is used in this analysis because the higher peak hour volumes on the local roadways will likely represent the highest delays that may occur into and out of the proposed development.

A summary of trip generation is provided in Table 1.

**Table 1: Trip Generation**

Trip Generation Rates				Daily		AM Peak Hour			PM Peak Hour				
ITE LUC	Land Use	Size	Variable	Rate <sup>(1)</sup>	Trips	Rate <sup>(1)</sup>	In	Out	Total	Rate <sup>(1)</sup>	In	Out	Total
252	Senior Adult Housing - Attached	146	Dwelling Units	3.44	502	0.20	10	19	29	0.25	20	17	37

Note:

1. Rate is defined as "Trips per Dwelling Unit"

##### Trip Distribution and Assignment

The direction from which traffic approaches and departs a site is a function of numerous variables, including location of residences, location of employment centers, location of



commercial/retail centers, available roadway systems, location and number of access points, and level of congestion on adjacent road systems.

For this study, the two most likely sources for trips are the I-88 interchange northwest of the site and downtown Naperville to the south. Therefore, a significant portion of trips are assigned to Diehl Road northwest of the site and Mill Street south of the site. A small portion of trips are assigned to the area to the northeast of the site. Trips are assigned to the driveways in ways that reflect the most direct or convenient routes. For example, few peak hour outbound trips are expected to attempt a northbound left turn at the Diehl Road/West Street intersection due to the difficulty of completing that maneuver that was observed in the field. Trips generated by Avenida Seniors are likely to be residents or staff members that are aware of the high delays that are present for that movement and are more likely to use the signalized intersection at Mill Street/Diehl Road to make a protected left turn onto westbound Diehl Road.

The directional distribution and assignment of new project traffic is illustrated in Figure 7.

### **Background Traffic Volumes**

Background traffic volumes are estimated for the year 2022, which is five years beyond the anticipated build out in 2016. These volumes account for future non-project related growth in the area. The growth rate is determined after reviewing historic ADT's that are available from IDOT. An evaluation of several roadway segments near the study area is summarized in Table 2.

**Table 2: Historic IDOT ADT Growth Rates**

Street	Year	IDOT ADT	Annual Growth Rate		Street	Year	IDOT ADT	Annual Growth Rate	
			From Previous Count Year	Rate from First to Last Count Year				From Previous Count Year	Rate from First to Last Count Year
Mill St North of Diehl St	2001	12,400	-	-1.32%	Mill St	2005	13,600	-	3.99%
	2008	11,400	-1.15%		South of Bauer St	2008	16,000	5.88%	
	2012	10,600	-1.75%		2012	17,400	2.19%		
Street	Year	IDOT ADT	Annual Growth Rate		Street	Year	IDOT ADT	Annual Growth Rate	
			From Previous Count Year	Rate from First to Last Count Year				From Previous Count Year	Rate from First to Last Count Year
Bauer Street	2005	5,100	-	-8.96%	Diehl St	2005	16,800	-	-3.49%
	2008	3,700	-9.15%			2008	19,000	4.37%	
	2012	1,900	-12.16%			2012	12,700	-8.29%	

The growth rates vary substantially across the various roadway segments, but generally volumes tend to decrease over time. In order to maintain conservative analysis, a negative growth rate will not be used in this study. Instead, the annual growth rate is assumed to be one percent per year at all study area intersections. This methodology is typical in situations involving potentially negative traffic volume growth rates.

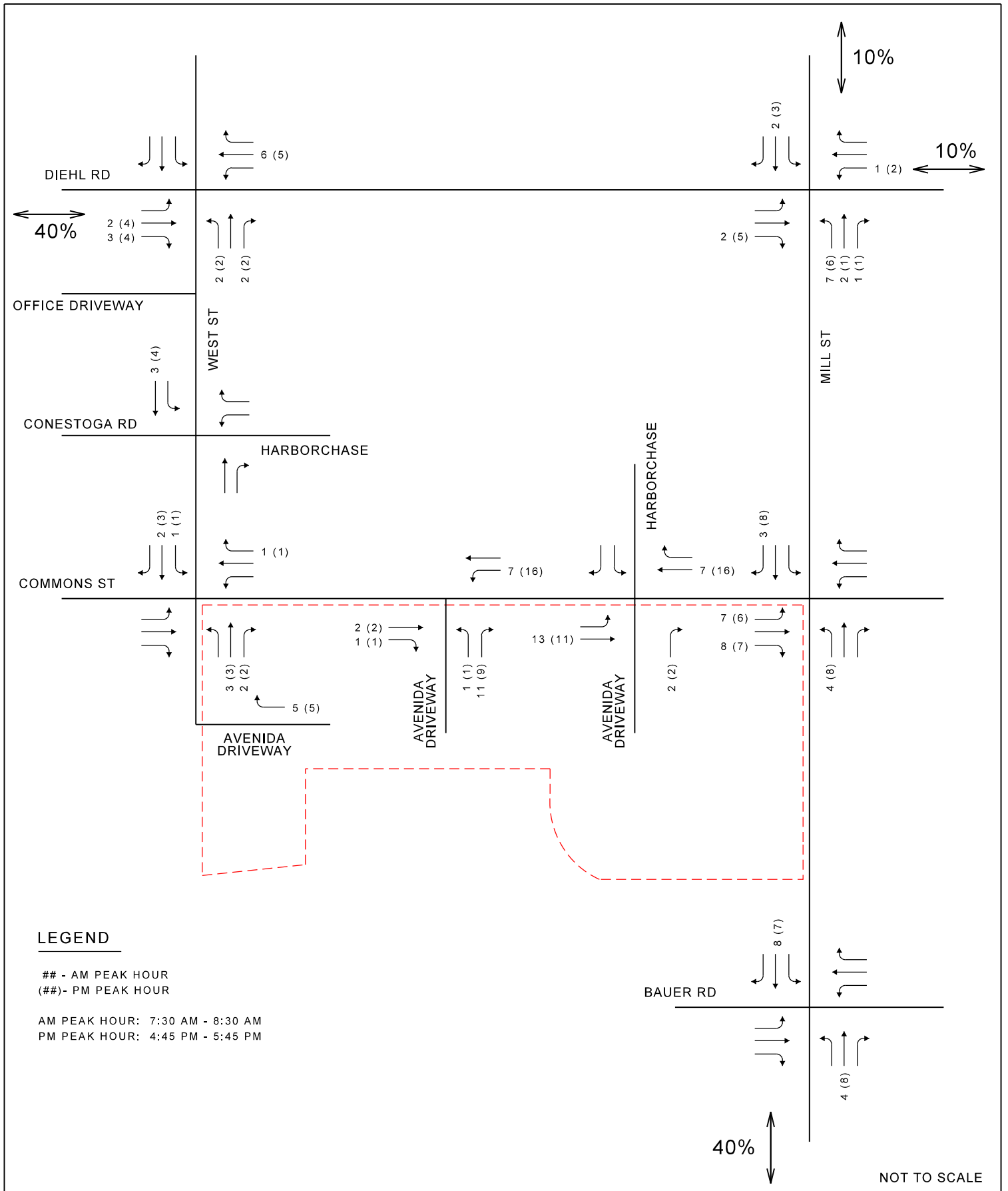


As previously stated, trips for the proposed HarborChase development have also been added in the background condition. The HarborChase trip distribution has been adjusted to reflect additional usage of the HarborChase driveways on West Street.

The background traffic volumes are illustrated in Figure 8.

### ***Future Traffic Volumes***

The project traffic volume is added to the background volume to obtain the future traffic volumes for the study intersections. Future with project traffic volumes are depicted in Figure 9.



# AVENIDA NAPERVILLE

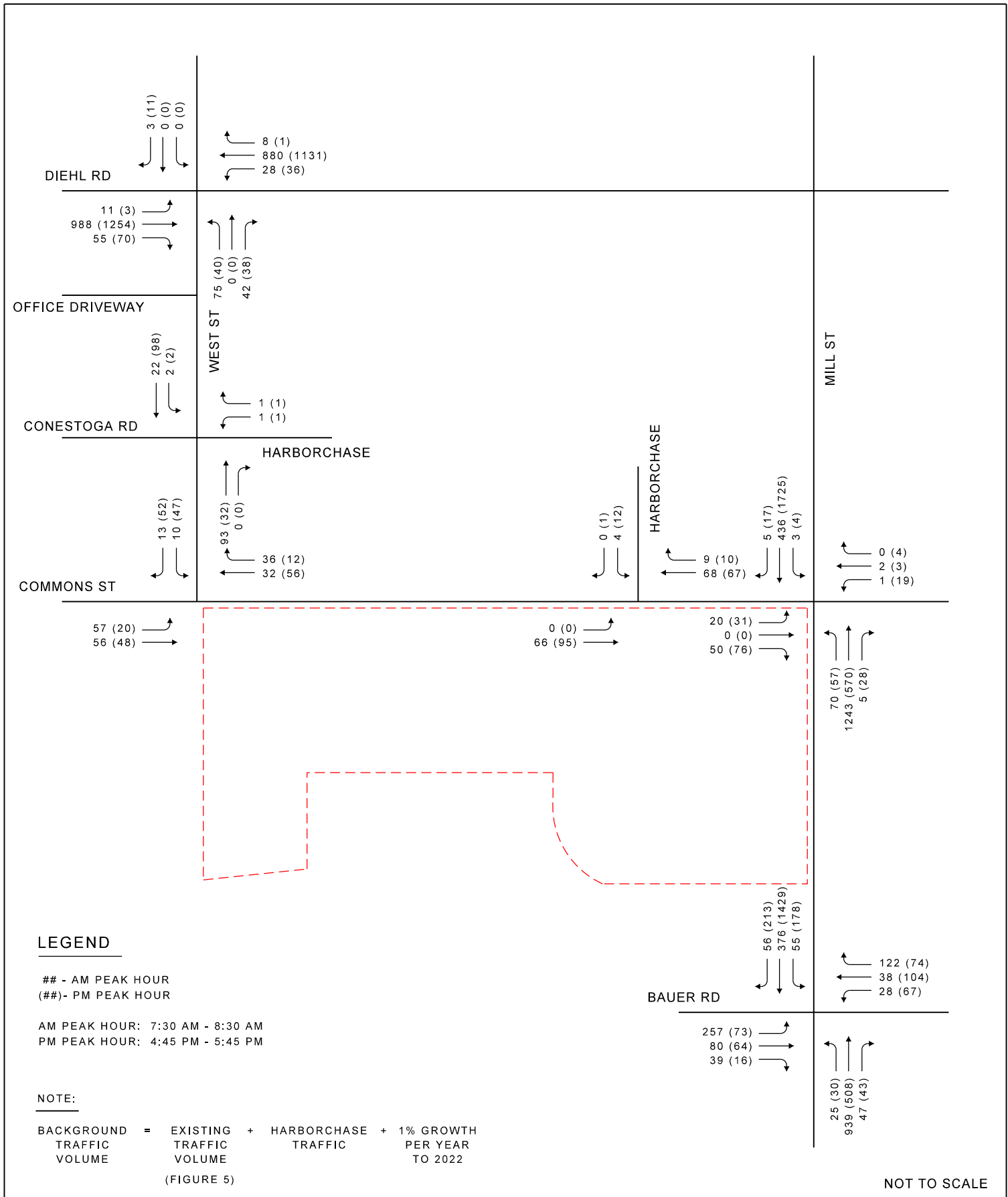
# FIGURE 7 NEW PROJECT TRIPS

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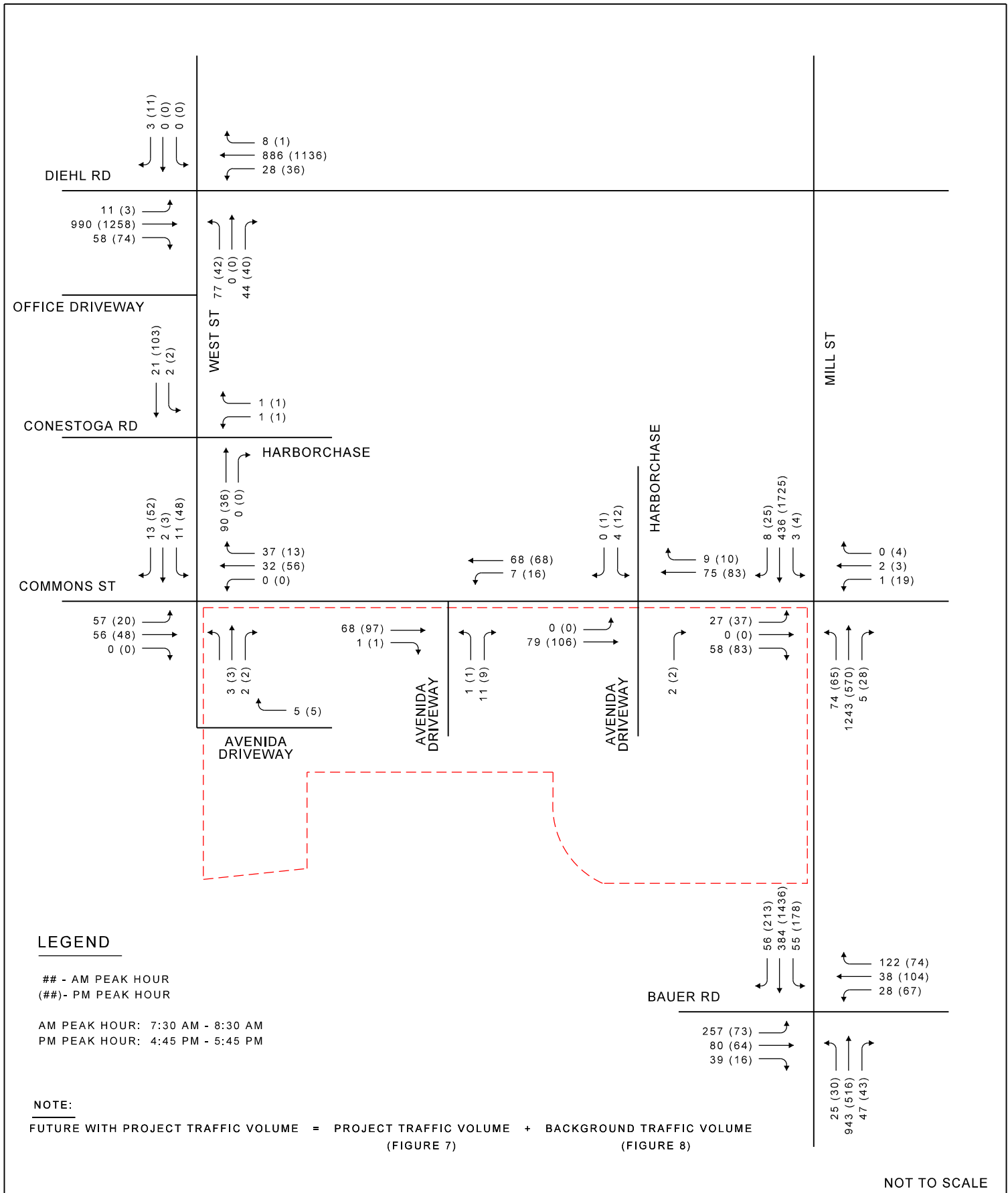
# AVENIDA NAPERVILLE

# FIGURE 8 BACKGROUND TRAFFIC VOLUME

NAPERVILLE

ILLINOIS





# AVENIDA NAPERVILLE

## FIGURE 9 FUTURE WITH PROJECT TRAFFIC VOLUME





## IV. TRAFFIC ANALYSIS

### Capacity Analysis

The operation of a facility is evaluated based on level of service (LOS) calculations obtained by analytical methods defined in the Transportation Research Board's Highway Capacity Manual (HCM), 2010 Edition. The concept of LOS is defined as a quality measure describing operational conditions within a traffic stream, generally in terms of such service measures as speed and travel time, freedom to maneuver, traffic interruptions, and comfort and convenience.

There are six LOS letter designations, from A to F, with LOS A representing the best operating conditions and LOS F the worst.

The LOS of an intersection is based on the average control delay per vehicle. For a signalized intersection, the delay is calculated for each lane group and then aggregated for each approach and for the intersection as a whole. Generally, the LOS is reported for the intersection as a whole. For an unsignalized intersection, the delay is only calculated and reported for each minor movement. An overall intersection LOS is not calculated.

There are different LOS criteria for signalized and unsignalized intersections primarily due to driver perceptions of transportation facilities. The perception is that a signalized intersection is expected to carry higher traffic volumes and experience a greater average delay than an unsignalized intersection. Typically, various state and local governments adopt operating standards varying between LOS C and LOS E, depending on the area's size and roadway characteristics. The LOS criteria for signalized and unsignalized intersections are provided in Table 3.

**Table 3: Level of Service Definitions for Signalized and Unsignalized Intersections**

Level of Service	Signalized Intersection Control Delay (seconds/vehicle)	Unsignalized Intersection Control Delay (seconds/vehicle)
A	≤ 10	≤ 10.0
B	> 10.0 and ≤ 20.0	> 10.0 and ≤ 15.0
C	> 20.0 and ≤ 35.0	> 15.0 and ≤ 25.0
D	> 35.0 and ≤ 55.0	> 25.0 and ≤ 35.0
E	> 55.0 and ≤ 80.0	> 35.0 and ≤ 50.0
F	> 80.0	> 50.0

Source: Transportation Research Board, *Highway Capacity Manual 2010*, National Research Council, 2010.

The study area consists of the signalized intersection of Mill Street/Bauer Road, the unsignalized intersections of Mill Street/Commons Street, Diehl Road/West Street, and Commons Street/West Street, and the proposed site driveways. The intersection of Mill Street/Commons Street is expected to be signalized by the design year regardless of the





Avenida Seniors development. The proposed signal will be coordinated with the existing signal at Mill Street/Bauer Road, which will be accommodated by a shared 90 second cycle length.

Capacity analysis is performed with Synchro 9.1, build 909, revision 20. Multiple Synchro scenarios are created to evaluate the existing, background, and future with project traffic volumes for the weekday am and pm peak hours. Results for the signalized intersections are summarized in Table 4 and the results for the unsignalized intersection are summarized in Table 5. Supporting analysis worksheets from Synchro 9.1 for the existing, background and future traffic conditions are provided in Appendices C, D, and E.

**Table 4: Signalized Intersection LOS**

Intersection	Peak Hour	Scenario	Eastbound		Westbound		Northbound		Southbound		Intersection	
			Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS
Mill Street and Commons Street	AM	Existing <sup>(1)</sup>	-	-	-	-	-	-	-	-	-	-
		Background <sup>(3)</sup>	9.5	A	35.3	D	3.0	A	6.6	A	4.1	A
		Future with Project <sup>(3)</sup>	10.7	B	35.0	C	3.5	A	7.4	A	4.8	A
	PM	Existing <sup>(1)</sup>	-	-	-	-	-	-	-	-	-	-
		Background <sup>(3)</sup>	9.3	A	32.6	C	11.0	B	18.1	B	16.0	B
		Future with Project <sup>(3)</sup>	9.9	A	32.5	C	11.1	B	18.5	B	16.3	B
Mill Street and Bauer Road	AM	Existing <sup>(2)</sup>	27.5	C	22.5	C	23.0	C	14.4	B	21.7	C
		Background <sup>(3)</sup>	32.9	C	19.6	B	20.5	C	11.2	B	20.5	C
		Future with Project <sup>(3)</sup>	33.4	C	19.6	B	20.4	C	11.2	B	20.5	C
	PM	Existing <sup>(2)</sup>	33.2	C	40.8	D	18.1	B	25.0	C	25.4	C
		Background <sup>(3)</sup>	27.3	C	35.5	D	18.4	B	21.4	C	22.3	C
		Future with Project <sup>(3)</sup>	27.9	C	37.4	D	18.0	B	20.3	C	21.7	C

Notes:

1. Mill/Commons intersection is currently unsignalized.
2. Mill/Bauer is currently uncoordinated with a maximum cycle length of 130 seconds during the peak hours
3. Mill/Commons and Mill/Bauer intersections will be coordinated in the future with a shared 90 second cycle length

Under existing conditions, all approaches at Mill Street/Bauer Road operate at LOS D or better during both the am and pm peak hour and the overall intersection operates at LOS C or better. Traffic signal timings were obtained from DuPage County through the City of Naperville, which indicate the signal runs free. The intersection of Mill Street/Commons Street is unsignalized in the existing condition.

It is assumed that the intersection of Mill Street/Commons Street will be signalized in the background condition, with coordination and a 90 second cycle length between the signalized intersections. At the intersection of Mill Street/Commons Street all approaches operate at LOS



D or better, while the overall signal operates at LOS A. At the intersection of Mill Street/Bauer Road, the proposed coordination and optimized signal timing results in decreased delays on several approaches. Overall, there are no major changes in levels of service on any approach or the overall intersection.

With the addition of the project trips from the proposed development, the delays at each approach at both signalized intersections increase by no more than two seconds during the am and pm peak hours with each approach operating at LOS D or better. The delay for the overall intersection at both signalized intersections exhibit minor changes with the addition of the project trips during the am and pm peak hours and continues to operate at LOS C or better. Therefore, it is concluded that the addition of Avenida Seniors traffic will not adversely impact operation of the signalized intersections during the peak hours; therefore, no mitigation is warranted.

**Table 5: Unsignalized Intersection LOS**

Intersection / Approach	AM Peak Hour						PM Peak Hour					
	Existing		Background		Future w/ Project		Existing		Background		Future w/ Project	
	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS
<b>Mill Street/Commons Street</b>												
NB Left	8.4	A	Signalized	Signalized			16.6	C	Signalized			
SB Left	11.5	B					8.6	A				
EB Left	35.7	E					429.4	F				
EB Through/Right	9.9	A					20.8	C				
WB Left	61.3	F					104.1	F				
WB Through/Right	55.1	F					70.7	F				
<b>Diehl Road/West Street</b>												
NB Left	183.1	F	289.2	F	310.0	F	323.7	F	505.7	F	533.1	F
NB Through/Right	12.8	B	13.3	B	13.3	B	14.6	B	15.5	C	15.6	C
SB Approach	11.4	B	11.7	B	11.7	B	12.8	B	13.3	B	13.3	B
EB Left	9.8	A	10.0	B	10.1	B	10.8	B	11.2	B	11.3	B
WB Left	10.6	B	11.0	B	11.0	B	12.4	B	13.0	B	13.1	B
<b>Commons Street/West Street</b>												
EB Left	7.4	A	7.5	A	7.5	A	7.4	A	7.4	A	7.4	A
NB Approach	-	-	-	-	9.9	A	-	-	-	-	9.5	A
SB Left	9.9	A	10.0	B	10.3	B	9.6	A	9.7	A	9.9	A
SB Through/Right	8.6	A	8.6	A	8.9	A	8.8	A	8.8	A	8.9	A
<b>Commons Street/West Avenida Driveway</b>												
NB Approach	-	-	-	-	8.8	A	-	-	-	-	8.9	A
WB Left	-	-	-	-	7.4	A	-	-	-	-	7.4	A
<b>Commons Street/HarborChase &amp; East Avenida Driveway</b>												
NB Right	-	-	-	-	8.7	A	-	-	-	-	8.8	A
SB Approach	-	-	9.3	A	9.6	A	-	-	9.4	A	9.8	A



Several unsignalized movements operate with high delay in the existing condition. Both the left and through/right movements on the westbound approach and the left turn movement on the eastbound approach at the Mill Street/Commons Street operate at LOS E or LOS F during both the am and pm peak hours. Similarly, the left turn movement on the northbound approach at Diehl Road/West Street operates at LOS F during both the am and pm peak hours. All other movements operate at LOS C or better.

The intersection of Mill Street/Commons Street is assumed to be signalized in the background condition, which mitigates the high delays that are present in the existing condition. At the remaining unsignalized intersections, delay generally increases on all movements but continue to operate at LOS C or better with the exception of the northbound left turn movement at Diehl Road/West Street, which operates at LOS F in the existing condition. Delay increases substantially, particularly in the pm peak hour, in the background scenario.

As in the background condition, delay tends to increase for all movements during the future with project scenario, but there are no notable changes in level of service. All movements continue to operate at LOS C or better with the exception of the northbound left turn at Diehl Road/West Street which remains at LOS F. Due to the high delays for this unsignalized northbound left turn, it is anticipated that Avenida Seniors trips will be familiar with this delay and use the protected left turn at the signalized intersection of Mill Street/Diehl Road to travel westbound on Diehl Road. A small number of trips are assigned to this movement to demonstrate what the impact to delay would be. The proposed site driveways operate at LOS C or better during both the am and pm peak hours. It is concluded that no mitigation is required for the unsignalized intersections and driveways in relation to the proposed Avenida Seniors development.

### ***Auxiliary Lane Analysis***

This study evaluated whether additional auxiliary lanes are warranted at any study area intersections. The warrant analysis follows the methodology detailed in IDOT's Bureau of Design and Environmental Manual (BDE). Warrants are determined based on factors such as through volume, opposing volume, and percentage of turning vehicles. Different warrants are used for left and right turn lanes, and factors such as design speed. Applicable figures from the BDE are included in Appendix F.

Overall, no movements meet the warrant for additional auxiliary lanes, with the exception of the southbound right turn movement at the intersection of Mill Street/Bauer Road. The typical criteria for an auxiliary right turn lane at a signalized intersection is if the right turning volume is 150 vehicles per hour and the mainline volume is greater than 300 vehicles per lane per hour. The southbound approach meets this criterion in the existing traffic volume condition. Since the criteria is met in the existing condition and the Avenida Seniors development is not expected to add southbound right turns, no mitigation at the intersection of Mill Street/Bauer Road is recommended as part of this study.



While the warrant for a westbound left turn lane at the proposed full access Avenida Seniors Driveway on Commons Street is not met, a left turn lane is recommended. The addition of the turn lane will mitigate any potential queues interfering with the upstream traffic signal at the intersection of Mill Street/Commons Street. The existing Commons Street pavement section is forty feet wide, so only restriping is needed to provide the westbound left turn lane at the full access Avenida Seniors Driveway on Commons Street.

The 95<sup>th</sup> percentile queue lengths for the future eastbound left turn lane at future signalized intersection of Mill Street/Commons Street is 34 feet in the am peak hour and 42 feet in the pm peak hour. The 95<sup>th</sup> percentile queue lengths for the future westbound left turn on Commons Street at the West Avenida Seniors Driveway are negligible based on the minimal amount of left turning traffic at the driveway. It is recommended that the minimal left turn storage lengths should be 50 feet for both left turns to accommodate two turning vehicles which exceed the 95<sup>th</sup> percentile queues. The distance from the West Avenida Seniors Driveway to the stop bar at Mill Street is approximately 307 feet. One option would be to provide 132 feet of eastbound left turn storage length at the Mill Street intersection, a 100-foot shared taper, and 75 feet of westbound left turn storage length at the West Avenida Seniors Driveway.

### ***Neighborhood Traffic Study***

The City of Naperville conducted a traffic study for the Cress Creek neighborhood, which is located west of the proposed development. The study analyzed travel speeds, warrants for all-way stops, sight distance, and crosswalks at several roadways and intersections within the neighborhood and is documented in the July 2016 *Cress Creek Traffic Study*. The City performed traffic speed and volume collection along several roadways and found that speeds and volumes were generally consistent with other similarly classified roadways throughout the City. The study recommended roadway striping along Bauer Road as a traffic calming feature in addition to installing yellow banding around the existing 25 mph speed limit signs. The study stated that the low vehicular volumes on the roadways indicated that the roadways are predominantly used by residents within Cress Creek.

New trips related to the Avenida Seniors development are not anticipated to travel through the Cress Creek neighborhood. This study assumes that all external vehicle trips will travel on Bauer Road, Diehl Road, and Mill Street. The Avenida Seniors development will not affect traffic conditions in the Cress Creek neighborhood and will not alter the conclusions stated in the Cress Creek Traffic Study.



## **V. CONCLUSIONS**

The purpose of this study is to evaluate the potential traffic impact of the proposed Avenida Seniors active adult, age-restricted housing development located at the intersection of Mill Street and Commons Street in unincorporated DuPage County, Illinois. It is anticipated that the property will be annexed into the City of Naperville. The development consists of 146 dwelling units. The site will be accessible via one full access driveway and one right out driveway on Commons Street and a driveway on West Street.

The capacity analysis was conducted for existing, background, and future with project conditions during the am and pm peak hours. Traffic was estimated to the year 2022, which is five years beyond the anticipated opening date. The background condition also includes trips for the proposed HarborChase assisted living development north of the proposed Avenida Seniors site, and the signalization of the currently unsignalized intersection of Mill Street/Commons Street. The study area consists of the signalized intersection of Mill Street/Bauer Road, the unsignalized intersections of Mill Street/Commons Street, Diehl Road/West Street, and Commons Street/West Street, and the proposed site driveways.

Under existing conditions, all movements at the signalized intersection of Mill Street/Bauer Road operate at LOS D or better and the overall intersection operates at LOS C or better during both the am and pm peak hours. Delay increases slightly in both the background and future with project scenarios, but there are no notable changes in levels of service. The future signal at the intersection of Mill Street/Commons Street operates similarly, with all movements and overall intersections operating at LOS C or better during the am and pm peak hours in the background and future with project scenarios. It is concluded that the addition of Avenida Seniors traffic will not adversely impact operation of the signalized intersections during the peak hours and mitigation is not warranted.

High delay is present for several movements in the existing condition at the unsignalized intersections of Mill Street/Commons Street and Diehl Road/West Street. The intersection of Mill Street/Commons Street is expected to be signalized by 2022, regardless of the status of the proposed Avenida Seniors development, which will mitigate the high delays at that intersection. High delays remain for the northbound left turn at the intersection of Diehl Road/West Street in the background condition. Few Avenida Seniors trips are assigned to the northbound left at Diehl Road/West Street, as most trips are expected to be residents or employees that will be aware of the high delays on that movement and choose an alternate route. Since the proposed Avenida Seniors development is not expected to add many northbound left turns at Diehl Road/West Street, no mitigation is recommended as part of this development. All other unsignalized intersections and the proposed site driveways operate with relatively low delays.

It is recommended that a westbound left turn lane be striped on Commons Street at the proposed western driveway to the Avenida Seniors site. Based on the projected 95<sup>th</sup> percentile queue lengths, it is recommended that the minimal left turn storage lengths should be 50 feet for both the eastbound left turn at Mill Street and the westbound left turn at the West Avenida



Seniors Driveway. One option would be to provide 132 feet of eastbound left turn storage length at the Mill Street intersection, a 100-foot shared taper, and 75 feet of westbound left turn storage length at the West Avenida Seniors Driveway.



## **APPENDIX A**

### **TRAFFIC SIGNAL WARRANT ANALYSIS (2012) MILL STREET AND COMMONS STREET**



**Summary of the Signal Warrant Analysis**  
**Mill and Commons**  
**Naperville, Illinois**

7/27/2012

Warrant	Warrant Met (Yes or No)
1 - Eight-Hour Vehicular Volume	Yes
2 - Four-Hour Vehicular Volume	Yes
3 - Peak Hour Vehicular Volume	Yes
4 - Pedestrian Volume	No
5 - School Crossing	No
6 - Coordinated Signal System	No
7 - Crash Experience	No
8 - Roadway Network	No
9 - Intersection Near a Grade Crossing	No

### Warrant 1: Eight-Hour Vehicular Volume Condition A - Minimum Vehicular Volume

The need for a traffic control signal shall be considered if an engineering study finds that one of the following conditions exist for each of any 8 hours of an average day:

- A. The vehicles per hour given in both directions of the 100 percent columns of Condition A in Table 4C-1 exist on the major-street and the higher-volume minor street approaches, respectively, to the intersection; or
- B. The vehicles per hour given in both of the 100 percent columns of Condition B in Table 4C-1 exist on the major-street and the higher-volume minor-street approaches, respectively, to the intersection.

In applying each condition the major-street and minor-street volumes shall be for the same 8 hours. On the minor-street, the higher volume shall not be required to be on the same approach during each of these 8 hours.

If the posted or statutory speed limit or the 85th-percentile speed on the major street exceeds 40 mph or if the intersection lies within the built-up area of an isolated community having a population of less than 10,000, the traffic volumes in the 70 percent columns in Table 4C-1 may be used in place of the 100 percent columns.

Pass/Fail: Fail

Discussion

Major Street: Mill	<u>Thru Lanes</u>	<u>Minimum</u>	
Minor Street: Commons	2	420	
	1	105	

Time	Major Street Both Approaches	Minor Street Higher Volume Approach	Pass/Fail
6:00	639	23	Fail
7:00	1253	48	Fail
8:00	1462	59	Fail
9:00	796	21	Fail
10:00	732	24	Fail
11:00	1155	53	Fail
12:00	1385	57	Fail
1:00	1173	47	Fail
2:00	1100	65	Fail
3:00	1349	57	Fail
4:00	1845	90	Fail
5:00	2111	73	Fail
6:00	1694	75	Fail
7:00	1141	63	Fail

**Warrant 1: Eight-Hour Vehicular Volume  
Condition A - Minimum Vehicular Volume**

Table 4C -1: Condition A - Minimum Vehicular Volume

Number of lanes for moving traffic on each approach	Vehicles per hour on major street (both approaches)				Vehicles per hour on higher volume minor street approach (one direction only)					
	Major Street	Minor Street	100% <sup>a</sup>	80% <sup>b</sup>	70% <sup>c</sup>	56% <sup>d</sup>	100% <sup>a</sup>	80% <sup>b</sup>	70% <sup>c</sup>	56% <sup>d</sup>
1			500	400	350	280	150	120	105	84
2 or more			600	480	420	336	150	120	105	84
2 or more			600	480	420	336	200	160	140	112
1			500	400	350	280	200	160	140	112

a - Basic minimum hourly volume

b - Used for combination of Conditions A and B after adequate trial of other remedial measures

c - May be used when the major street exceeds 40mph or in an isolated community with a population of less than 10,000

d - May be used for combination of Conditions A and B after adequate trial of other remedial measures when the major speed exceeds 40mph or in an isolated community of less than 10,000.

**Warrant 1: Eight-Hour Vehicular Volume  
Condition B - Interruption of Continuous Traffic**

The need for a traffic control signal shall be considered if an engineering study finds that one of the following conditions exist for each of any 8 hours of an average day:

- A. The vehicles per hour given in both directions of the 100 percent columns of Condition A in Table 4C-1 exist on the major-street and the higher-volume minor street approaches, respectively, to the intersection; or
- B. The vehicles per hour given in both of the 100 percent columns of Condition B in Table 4C-1 exist on the major-street and the higher-volume minor-street approaches, respectively, to the intersection.

In applying each condition the major-street and minor-street volumes shall be for the same 8 hours. On the minor-street, the higher volume shall not be required to be on the same approach during each of these 8 hours.

If the posted or statutory speed limit or the 85th-percentile speed on the major street exceeds 40 mph or if the intersection lies within the built-up area of an isolated community having a population of less than 10,000, the traffic volumes in the 70 percent columns in Table 4C-1 may be used in place of the 100 percent columns.

Pass/Fail: **Pass**

Discussion

Thru Lanes 2 Minimum 630  
1 53

Major Street: Mill  
 Minor Street: Commons

Time	Major Street Both Approaches	Minor Street Higher Volume Approach	Pass
6:00	639	23	Fail
7:00	1253	48	Fail
8:00	1462	59	Pass
9:00	796	21	Fail
10:00	732	24	Fail
11:00	1155	53	Fail
12:00	1385	57	Pass
1:00	1173	47	Fail
2:00	1100	65	Pass
3:00	1349	57	Pass
4:00	1845	90	Pass
5:00	2111	73	Pass
6:00	1694	75	Pass
7:00	1141	63	Pass

**Warrant 1: Eight-Hour Vehicular Volume  
Condition B - Interruption of Continuous Traffic**

Table 4C-1: Condition A - Minimum Vehicular Volume

Number of lanes for Major Street	Minor Street	Vehicles per hour on major street (both)				Vehicles per hour on higher volume minor			
		100% <sup>a</sup>	80% <sup>b</sup>	70% <sup>c</sup>	56% <sup>d</sup>	100% <sup>a</sup>	80% <sup>b</sup>	70% <sup>c</sup>	56% <sup>d</sup>
1	1	750	600	525	420	75	60	53	42
2 or more	1	900	720	630	504	75	60	53	42
2 or more	2 or more	900	720	630	504	100	80	70	56
1	2 or more	750	600	525	420	100	80	70	56

a - Basic minimum hourly volume

b - Used for combination of Conditions A and B after adequate trial of other remedial measures

c - May be used when the major street exceeds 40mph or in an isolated community with a population of less than 10,000

d - May be used for combination of Conditions A and B after adequate trial of other remedial measures when the major speed exceeds 40mph or in an isolated community of less than 10,000.

## Warrant 2: Four-Hour Vehicular Volume

The need for a traffic control signal shall be considered if an engineering study finds that for each of any 4 hours of an average day, the plotted points representing the vehicles per hour on the major street (total of both approaches) and the corresponding vehicles per hour on the higher-volume minor street approach (one direction only) all fall above the applicable curve in Figure 4C-1 for the existing combination of approach lanes. On the minor street, the higher volume shall not be required to be on the same approach during each of these 4 hours.

If the posted or statutory speed limit or the 85th-percentile speed on the major street exceeds 40 mph or if the intersection lies within the built-up area of an isolated community having a population of less than 10,000, Figure 4C-2 may be used in place of Figure 4C-1.

Major Route Speed = 40

Use: Figure 4C-2

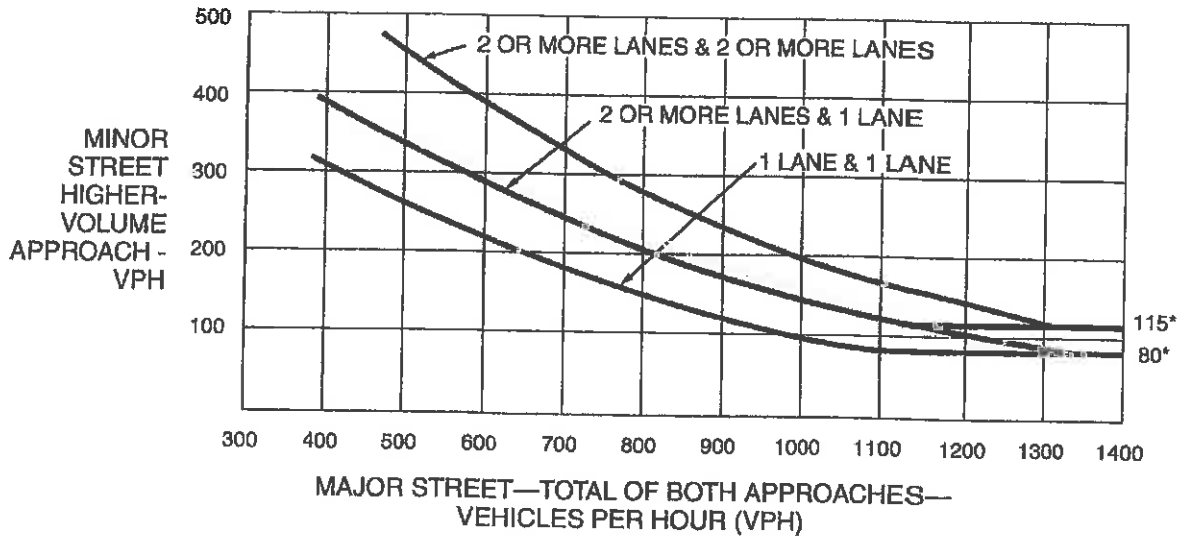
Pass/Fail:	Pass
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### Discussion

Time	Major Street		Minor Street	Pass?
	Both Approaches		Higher Volume Approach	
6:00	639		23	
7:00	1253		48	
8:00	1462		59	
9:00	796		21	
10:00	732		24	
11:00	1155		53	
12:00	1385		57	
1:00	1173		47	
2:00	1100		65	Pass
3:00	1349		57	
4:00	1845		90	Pass
5:00	2111		73	Pass
6:00	1694		75	Pass
7:00	1141		63	Pass

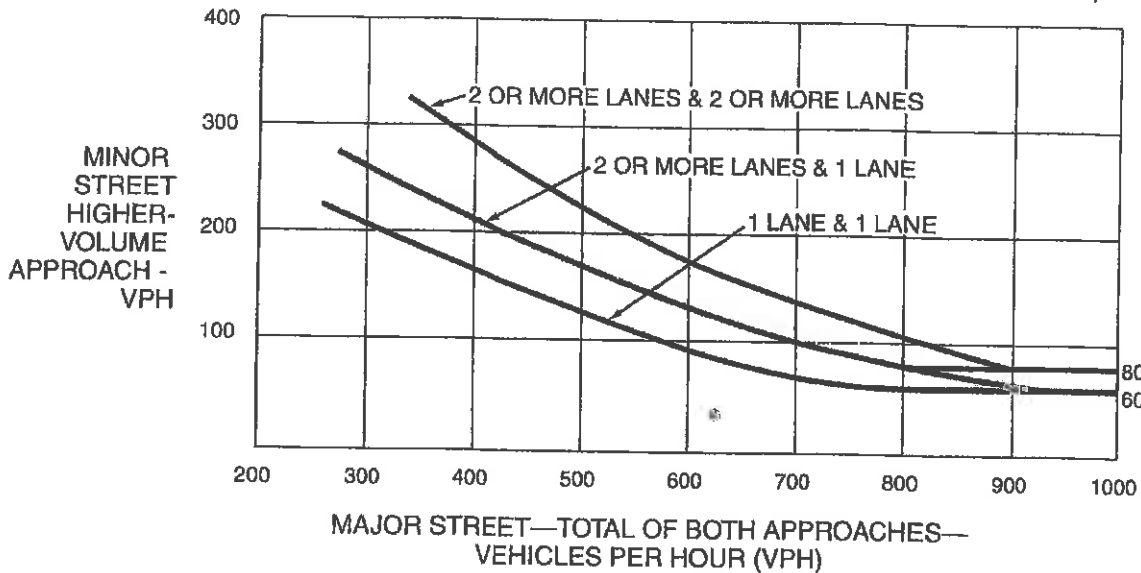
Mill Commons  
2012

Figure 4C-1. Warrant 2, Four-Hour Vehicular Volume



\*Note: 115 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 80 vph applies as the lower threshold volume for a minor-street approach with one lane.

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



meet

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



### Warrant 3: Peak Hour Vehicular Volume

This signal warrant shall be applied only in unusual cases. Such cases include, but are not limited to, office complexes, manufacturing plants, industrial complexes, or high-occupancy vehicle facilities that attract or discharge large numbers of vehicles over a short time.

The need for a traffic control signal shall be considered if an engineering study finds that the criteria in either of the following two categories are met:

A. If all three of the following conditions exist for the same 1 hour (any four consecutive 15-minute periods) of an average day.

1. The total stopped time delay experienced by the traffic on one minor-street approach (one direction only) controlled by a STOP sign equals or exceeds: 4-vehicle-hours for a one-lane approach; or 5 vehicle-hours for a two-lane approach, and
2. The volume on the same minor-street approach (one direction only) equals or exceeds 100 vehicles per hour for one moving lane of traffic or 150 vehicles per hour for two moving lanes, and

3. The total entering volume serviced during the hour equals or exceeds 650 vehicles per hour for intersections with three approaches or 800 vehicles per hour for intersections with four or more approaches.

B. The plotted point representing the vehicles per hour on the major street (total of both approaches) and the corresponding vehicles per hour on the higher-volume minor-street approach (one direction only) for 1 hour (any four consecutive 15-minute periods) of an average day falls above the applicable curve in Figure 4C-3 for the existing combination of approach lanes.

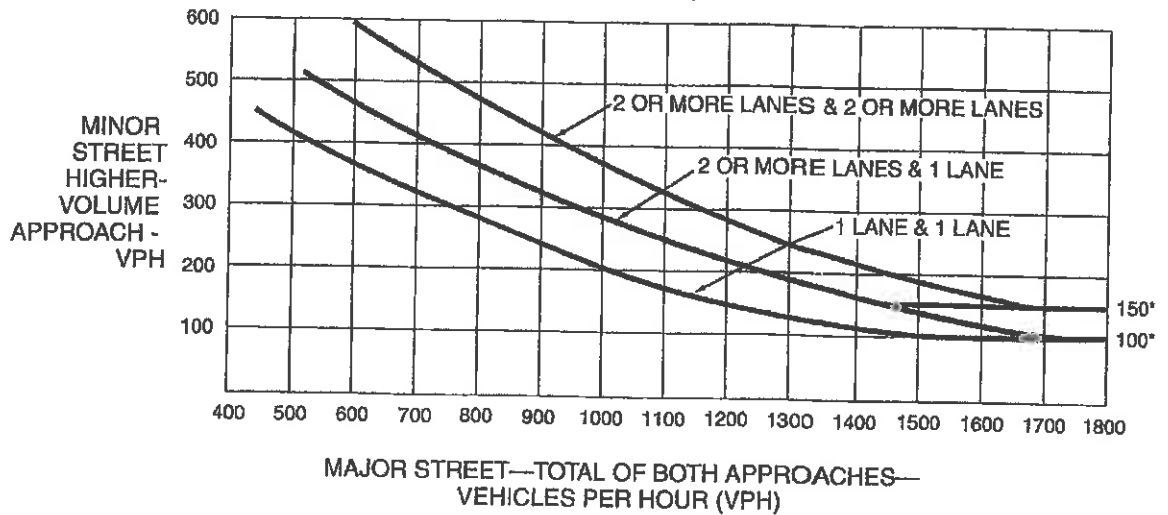
If the posted or statutory speed limit or the 85th-percentile speed on the major street exceeds 40 mph or if the intersection lies within the built-up area of an isolated community having a population of less than 10,000, Figure 4C-2 may be used in place of Figure 4C-1.

Pass/Fail:	Pass
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Time	Major Street Both Approaches	Minor Street Higher Volume Approach	Pass
6:00	639	23	
7:00	1253	48	
8:00	1462	59	
9:00	796	21	
10:00	732	24	
11:00	1155	53	
12:00	1385	57	
1:00	1173	47	
2:00	1100	65	
3:00	1349	57	
4:00	1845	90	Pass
5:00	2111	73	
6:00	1694	75	Pass
7:00	1141	63	

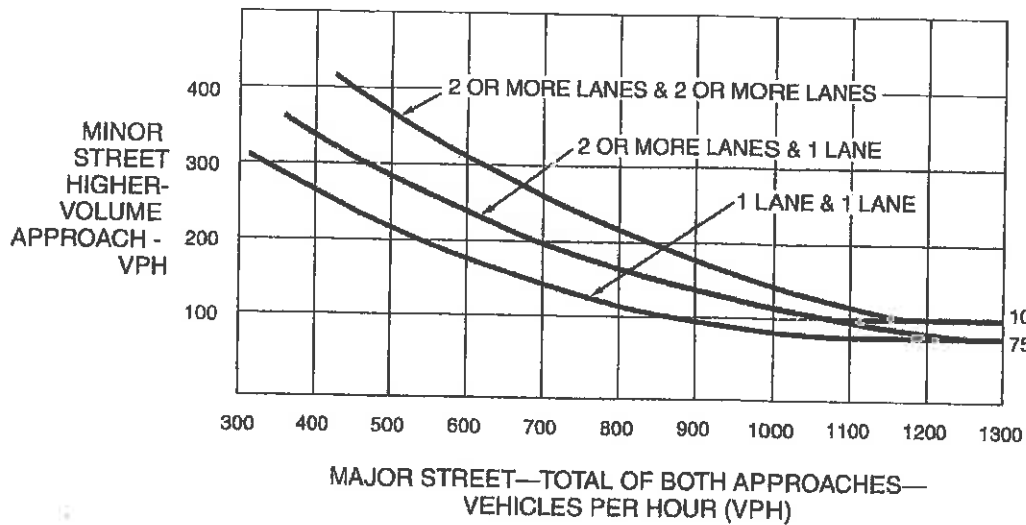
Mill and Commons  
2012

Figure 4C-3. Warrant 3, Peak Hour



\*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)  
(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



\*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

*meet*

### Warrant 4 - Pedestrian Volume

The need for a traffic control signal at an intersection or midblock crossing shall be considered if an engineering study finds that one of the following criteria is met:

- A. For each of any 4 hours of an average day, the plotted points representing the vehicles per hour on the major street (total of both approaches) and the corresponding pedestrians per hour crossing the major street (total of all crossings) all fall above the curve in Figure 4C-5; or
- B. For 1 hour (any four consecutive 15-minute periods) of an average day, the plotted point representing the vehicles per hour on the major street (total of both approaches) and the corresponding pedestrians per hour on the major street (total of all approaches) falls above the curve in Figure 4C-7.

If the posted or statutory speed limit or the 85th-percentile speed on the major street exceeds 35 mph, or if the intersection lies within the built-up area of an isolated community having a population of less than 10,000, Figure 4C-6 may be used in place of 4C-5 to evaluate Criterion A and Figure 4C-8 may be used in place of Figure 4C-7 to evaluate Criterion B.

The Pedestrian Volume signal warrant shall not be applied at locations where the distance to the nearest traffic control signal along the major street is less than 90m (300ft), unless the proposed traffic control signal will not restrict the progressive movement of traffic.

If a traffic control signal is justified by both this signal warrant and a traffic engineering study, the traffic control signal shall be equipped with pedestrian signal heads conforming to the requirements set forth in Chapter 4E.

Pass/Fail:  Pass  Fail

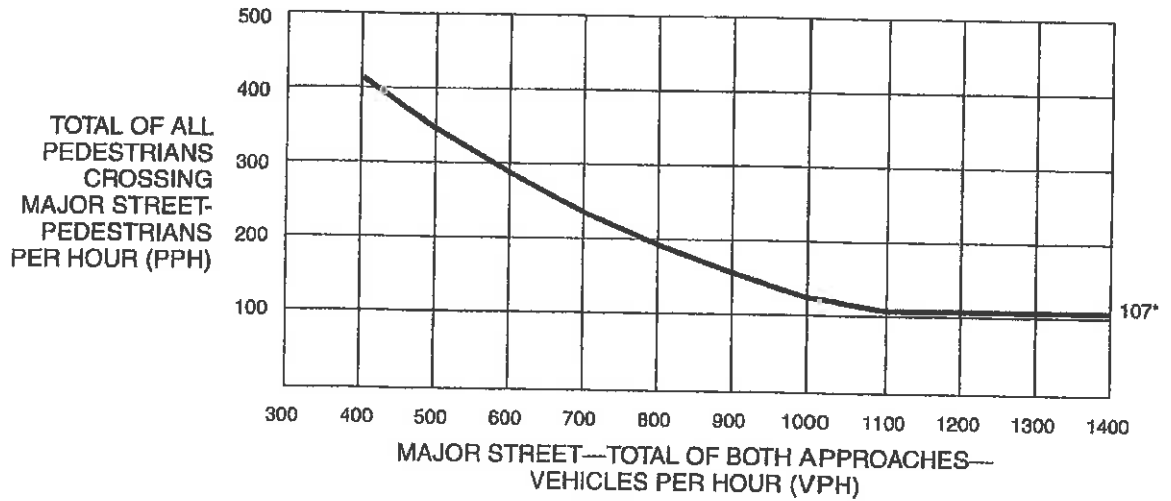
Discussion

Time	Major Street Both Approaches	Ped crossing Major Street
6:00	639	3
7:00	1253	0
8:00	1462	2
9:00	796	0
10:00	732	1
11:00	1155	1
12:00	1385	1
1:00	1173	5
2:00	1100	3
3:00	1349	2
4:00	1845	2
5:00	2111	6
6:00	1694	0
7:00	1141	0

The intersection did not meet either of the criteria for meeting the warrant.

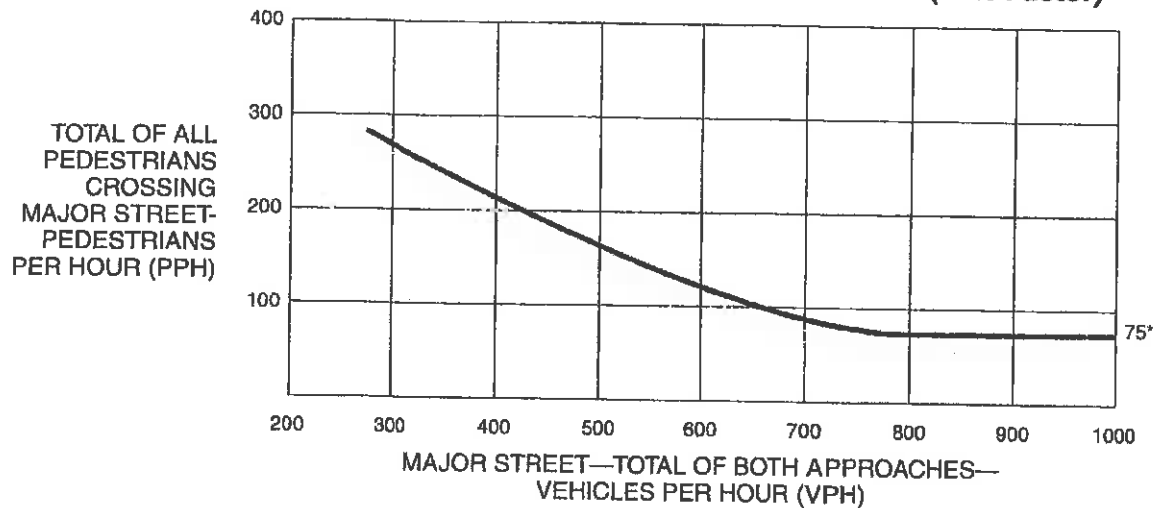
Mill and Commons  
2012

Figure 4C-5. Warrant 4, Pedestrian Four-Hour Volume



\*Note: 107 pph applies as the lower threshold volume.

Figure 4C-6. Warrant 4, Pedestrian Four-Hour Volume (70% Factor)

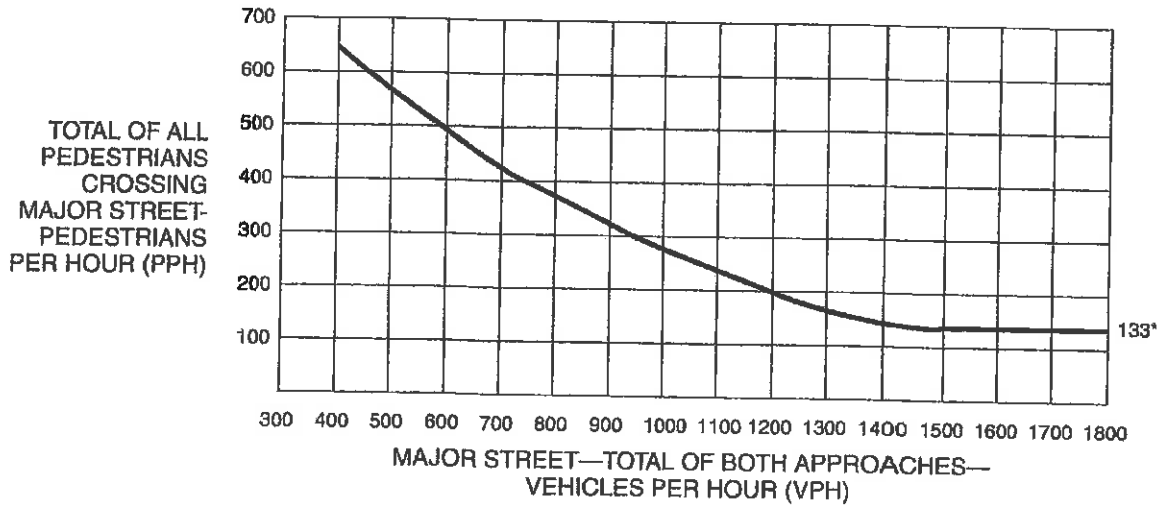


\*Note: 75 pph applies as the lower threshold volume.

Maximum pedestrians crossing the major route in 14 hours was 6. Does not meet the warrant.

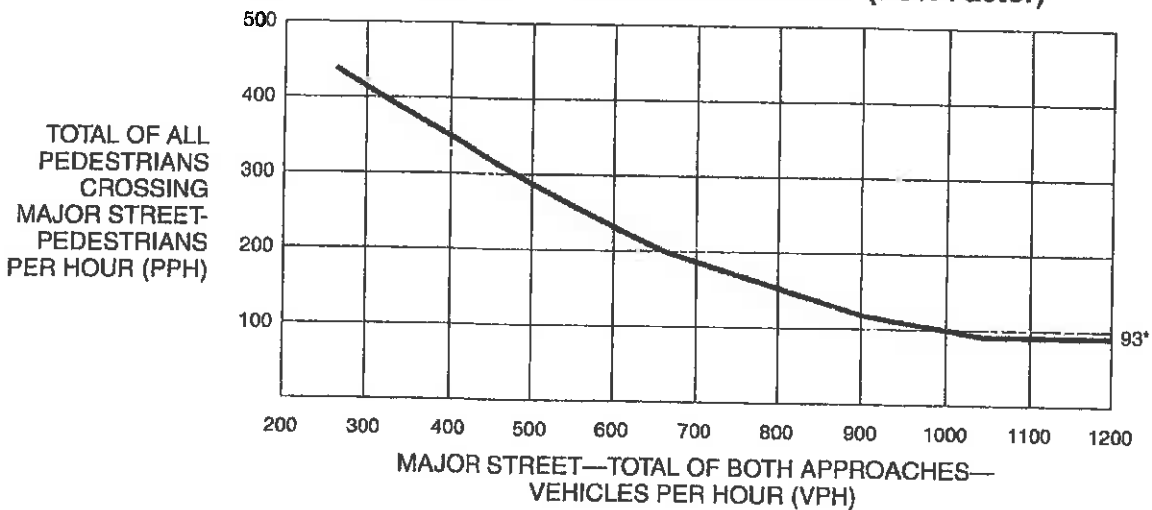
Mill and Commons  
2012

Figure 4C-7. Warrant 4, Pedestrian Peak Hour



\*Note: 133 pph applies as the lower threshold volume.

Figure 4C-8. Warrant 4, Pedestrian Peak Hour (70% Factor)



\*Note: 93 pph applies as the lower threshold volume.

The maximum pedestrian volume crossing the major street was 6. Does not meet the warrant

### Warrant 5 - School Crossing

The need for a traffic control signal shall be considered when an engineering study of the frequency and adequacy of gaps in the vehicular traffic stream as related to the number and size of groups of school children at an established school crossing across the major street shows that the number of adequate gaps in the traffic stream during the period when the children are using the crossing is less than the number of minutes in the same period and there are a minimum of 20 students during the highest crossing hour.

Before a decision is made to install a traffic control signal, consideration shall be given to the implementation of other remedial measures, such as warning signs, and flashers, school speed zones, school crossing guards, or a grade-separated crossing.

The School Crossing signal warrant shall not be applied at locations where the distance to the nearest traffic control signal along the major street is less than 90m (300ft), unless the proposed traffic control signal will not restrict the progressive movement of traffic.

#### Minimum Pedestrian Gap Equation

$$G = W/S + (N-1) \times H + R$$

G = Minimum Gap Size (sec)

W = Crossing Width (ft)

S = Walking Speed (ft/s)

N = Number of Rows in 85th Percentile Group

H = Time Headway between Rows

R = Pedestrian Startup Time

2.0

3.0

Minimum Gap = #DIV/0! seconds

Pass/Fail:	Fail
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#### Discussion

Time	Ped crossing Major Street
6:00	3
7:00	0
8:00	2
9:00	0
10:00	1
11:00	1
12:00	1
1:00	5
2:00	3
3:00	2
4:00	2
5:00	6
6:00	0
7:00	0

Observed Gap = seconds

This intersection is not considered a school walk route intersection. Therefore, the warrant is not satisfied.

### Warrant 6 - Coordinated Signal System

A. On a one-way street or a street that has traffic predominantly in one direction, the adjacent traffic control signals are so far apart that they do not provide the necessary degree of vehicular platooning.

B. On a two-way street, adjacent traffic control signals do not provide the necessary degree of platooning and the proposed and adjacent traffic control signals will collectively provide a progressive operation.

The coordinated Signal System signal warrant should not be applied where the resultant spacing of traffic control signals would be less than 300m (1000ft)

Pass/Fail:	Fail
------------	------

Discussion

No information based on progression is provided. Therefore, the status of the intersection with respect to this warrant cannot be determined.

### Warrant 7 - Crash Experience

The need for a traffic control signal shall be considered if an engineering study finds that all of the following criteria are met:

- A. Adequate trial of alternatives with satisfactory observance and enforcement has failed to reduce the crash frequency; and
- B. Five or more reported crashes, of types susceptible to correction by a traffic control signal, have occurred within a 12-month period, each crash involving personal injury or property damage apparently exceeding the applicable requirements for a reportable crash; and
- C. For each of any 8 hours of an average day, the vehicles per hour (vph) given in both of the 80 percent columns of Condition A in Table 4C-1 or the vph in both of the 80 percent columns of Condition B in Table 4C-1 exists on the major street and the higher-volume minor street

Pass/Fail:	Fail
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#### Discussion

The intersection did not experience 5 or more crashes, of types susceptible to correction by a traffic signal, in a 12-month period. Therefore, the warrant is not met



Signal Warrant Analysis

Intersection

Collision Type	Summary of Collision Types by Year Mill Street and Commons Road (2009 - 2011)					
	2009		2010		2011	
	Number of Collision	% of Total Collisions	Number of Collision	% of Total Collisions	Number of Collision	% of Total Collisions
Pedestrian		0%		0%		0%
Pedalcyclist		0%		0%		0%
Train		0%		0%		0%
Animal		0%		0%		0%
Overturned		0%		0%		0%
Fixed Object		0%		0%		0%
Other Object		0%		0%		0%
Other not collision		0%		0%		0%
Parked vehicle		0%		0%		0%
Turning		0%		0%		0%
Rear End	2	100%	1	100%	1	100%
Sideswipe - same direction		0%		0%		0%
sideswipe - opposite		0%		0%		0%
Head on		0%		0%		0%
Angle		0%		0%		0%
Total	2	100%	1	100%	1	100%

### Warrant 8 - Roadway Network

The need for a traffic control signal shall be considered if an engineering study finds that the common intersection of two or more major routes meets one or both of the following criteria:

- A. The intersection has a total existing or immediately projected, entering volume of at least 1,000 vehicles per hour during the peak hour of a typical weekday and has 5-year projected traffic volumes, based on an engineering study, that meet one or more of Warrants 1, 2, and 3 during an average weekday; or
- B. The intersection has a total existing or immediately projected entering volume of at least 1,000 vehicles per hour for each of any 5 hours of a nonnormal business day (Saturday or Sunday)

A major route as used in this signal warrant shall have one or more of the following characteristics:

- A. It is part of the street or highway system that serves as the principal roadway network for the through traffic flow; or
- B. It appears as a major route on an unofficial plan, such as a major street plan in an urban area traffic and transportation study.

Pass/Fail: <input type="checkbox"/> Pass <input checked="" type="checkbox"/> Fail
---

#### DISCUSSION

Are both of the streets designated as an arterial route in the Master Thoroughfare Plan?  No

Both streets are not considered major streets within the city's Master Thoroughfare Plan. Therefore, the warrant cannot be met.

## Warrant 9 - Intersection Near a Grade Crossing

The need for a traffic control signal shall be considered if an engineering study finds that both of the following criteria are met:

- A. A grade crossing exists on an approach controlled by a STOP or YIELD sign and the center of the track nearest to the intersection is within 140 feet of the stop line or yield line on the approach; and
- B. During the highest traffic volume hour during which rail traffic uses the crossing, the plotted point representing the vehicles per hour on the major street (total of both approaches) and the corresponding vehicles per hour on the minor-street approach that crosses the track (one direction only, approaching the intersection) falls above the applicable curve in Figure 4C-9 or 4C-10 for the existing combination of approach lanes over the track and the distance D, which is the clear storage distance as defined in Section 1A.13.

Pass/Fail: **Fail**

### DISCUSSION

The intersection was not able to meet both of the required criteria of the engineering study.

The following considerations apply when plotting the traffic volume data on Figure 4C-9 or 4C-10:

- A. Figure 4C-9 should be used if there is only one lane approaching the intersection at track crossing location and Figure 4C-10 should be used if there are two or more lanes approaching the intersection at the track crossing location.
- B. After determining the actual distance, D, the curve for the distance D that is nearest to the actual distance D should be used.
- C. If the rail traffic arrival times are unknown, the highest traffic volume hour of the day should be used.

Guidance:

The minor-street approach volume may be multiplied by up to three adjustment factors as provided below:

TABLE 4C-2: Adjustment Factor for Daily Frequency of Rail Traffic

TABLE 4C-3: Adjustment Factor for Percentage of High-Occupancy Buses

TABLE 4C-4: Adjustment Factor for Percentage of Tractor-Trailer Trucks

**Warrant 9 Adjustment Factors**

**Table 4C-2:  
Adjustment Factor for Daily Frequency of Rail Traffic**

Rail Traffic Per Day	Adjust Factor
1	0.67
2	0.91
3 to 5	1
6 to 8	1.18
9 to 11	1.25
12 or more	1.33

**Table 4C-3:  
Adjustment Factor for Percentage of High-Occupancy Buses**

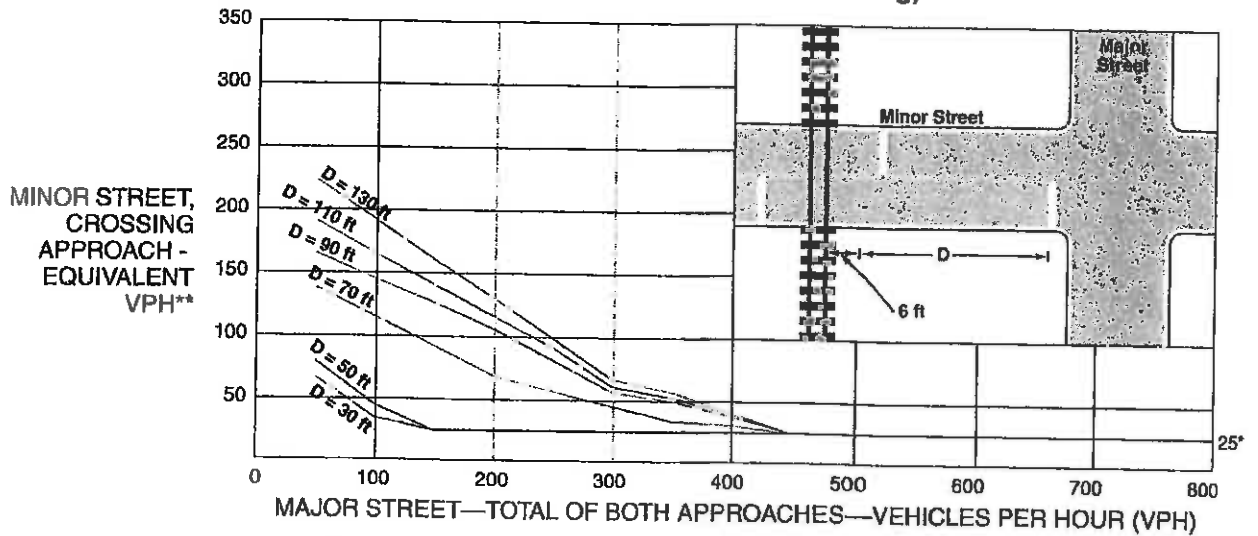
% Bus on Minor Street Approach	Adjust Factor
0	1
2	1.09
4	1.19
6 or more	1.32

**Table 4C-4:  
Adjustment Factor for Percentage of Tractor-Trailer Trucks**

% T-T Trucks on Minor Approach	D < 70	D > or = 70
0 to 2.5	0.5	0.5
2.6 to 7.5	0.75	0.75
7.6 to 12.5	1	1
12.6 to 17.5	2.3	1.15
17.6 to 22.5	2.7	1.35
22.6 to 27.5	3.28	1.64
More than 27.5	4.18	2.09

Mill and Commons  
2012

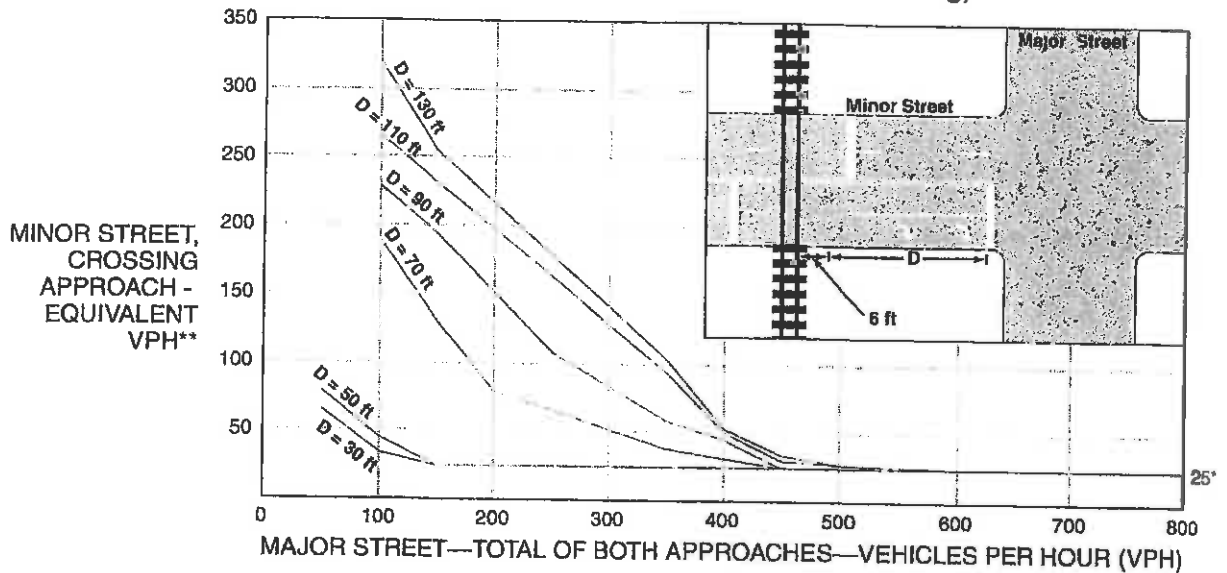
Figure 4C-9. Warrant 9, Intersection Near a Grade Crossing  
(One Approach Lane at the Track Crossing)



\* 25 vph applies as the lower threshold volume

\*\* VPH after applying the adjustment factors in Tables 4C-2, 4C-3, and/or 4C-4, if appropriate

Figure 4C-10. Warrant 9, Intersection Near a Grade Crossing  
(Two or More Approach Lanes at the Track Crossing)



\* 25 vph applies as the lower threshold volume

\*\* VPH after applying the adjustment factors in Tables 4C-2, 4C-3, and/or 4C-4, if appropriate

~~Project~~ Intersection is not located near railroad tracks.

# City of Naperville

400 S. Eagle Street  
Naperville, IL 60566

## Turning Movement Count

File Name : Mill and Commons  
Site Code : 20120562  
Start Date : 5/25/2012  
Page No : 1

Start Time	Mill												Commons														
	From North						From East						From South						From West								
	Right	Thru	Left	Peds	App. Total	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	
06:00	0	33	0	2	35	0	0	0	0	0	0	63	3	0	66	1	0	1	0	2	1	0	1	0	2	103	
06:15	2	37	0	0	39	0	0	0	0	0	0	69	5	0	74	2	0	3	0	5	2	0	3	0	5	118	
06:30	0	77	0	1	78	0	0	0	0	0	2	125	4	0	131	5	0	2	0	7	7	0	2	0	7	216	
06:45	1	82	0	0	83	0	0	0	0	0	0	133	3	0	136	7	0	2	0	9	7	0	2	0	9	228	
Total	3	229	0	3	235	0	0	0	0	0	2	390	15	0	407	15	0	8	0	23	15	0	8	0	23	665	
07:00	1	91	1	0	93	0	0	0	0	0	1	198	9	0	208	9	0	0	0	9	9	0	0	0	0	9	310
07:15	3	102	1	0	106	0	0	0	0	0	0	206	6	0	212	13	0	5	0	18	212	0	5	0	0	18	336
07:30	1	79	0	0	80	0	0	0	0	0	0	178	8	0	186	4	0	1	0	5	4	0	1	0	0	5	271
07:45	2	89	2	0	93	0	0	1	0	1	5	248	22	0	275	15	0	1	0	17	15	0	1	1	1	17	386
Total	7	361	4	0	372	0	0	1	0	1	6	830	45	0	881	41	0	7	1	49	41	0	7	1	1	49	1303
08:00	5	102	1	0	108	0	0	0	0	0	2	258	17	0	277	15	0	7	0	22	15	0	7	0	0	22	407
08:15	0	89	1	1	91	0	0	0	0	0	0	209	14	0	223	5	1	0	0	6	223	5	1	0	0	6	320
08:30	0	101	2	0	104	0	0	2	0	2	0	257	13	0	270	10	1	0	0	13	270	10	1	0	0	13	389
08:45	7	113	2	0	122	2	0	1	0	3	1	252	16	0	269	16	0	4	0	20	16	0	4	0	0	20	414
Total	12	403	6	2	425	2	0	3	0	5	3	976	60	0	1039	46	2	11	2	61	46	2	11	2	0	61	1530
09:00	0	86	1	0	87	0	0	0	0	0	2	222	9	0	233	1	0	1	1	3	233	1	0	1	1	3	323
09:15	2	31	1	0	34	0	0	0	0	0	0	109	5	0	114	10	0	3	0	13	114	0	3	0	0	13	161
09:30	0	41	0	0	41	0	0	0	0	0	3	72	7	0	82	0	0	0	0	0	82	0	0	0	0	0	123
09:45	2	79	0	0	81	1	0	4	0	5	2	117	5	0	124	6	0	0	0	6	124	6	0	0	0	6	216
Total	4	237	2	0	243	1	0	4	0	5	7	520	26	0	553	17	0	4	1	22	17	0	4	1	0	22	823
10:00	2	120	3	0	125	0	0	0	0	0	1	116	10	0	127	8	0	2	0	10	127	8	0	2	0	10	262
10:15	0	40	2	0	42	0	0	2	0	2	1	40	1	0	42	0	0	1	0	4	42	0	1	0	0	4	87
10:30	3	71	3	0	77	1	0	1	0	1	0	79	2	0	81	4	1	1	0	6	81	4	1	1	0	6	165
10:45	3	135	3	0	141	1	0	3	0	4	6	84	7	1	98	7	0	0	0	7	98	7	0	0	0	7	250
Total	8	366	11	0	385	1	0	6	0	7	8	319	20	1	348	19	1	4	0	24	19	1	4	0	0	24	764
11:00	0	155	5	0	160	1	0	7	0	8	9	121	6	1	137	8	0	0	0	8	137	8	0	0	0	8	313
11:15	1	150	12	0	163	0	0	3	0	3	8	95	1	0	104	12	0	1	0	13	104	12	0	1	0	13	283
11:30	2	161	6	0	169	1	0	5	0	6	5	107	3	0	115	16	0	3	0	19	115	16	0	3	0	19	309
11:45	3	151	2	0	156	0	0	5	0	5	5	139	8	0	152	11	0	2	2	15	11	0	2	2	2	15	328
Total	6	617	25	0	648	2	0	20	0	22	27	462	18	1	508	47	0	6	2	55	47	0	6	2	2	55	1233
12:00	7	157	2	0	166	2	0	3	0	5	3	146	6	0	155	11	0	2	0	13	155	11	0	2	0	13	339
12:15	1	202	6	1	210	1	0	6	0	7	0	142	3	0	145	13	1	1	1	16	145	13	1	1	1	16	378
12:30	2	171	2	0	175	1	1	4	0	6	4	159	8	0	171	11	1	2	0	13	171	11	1	2	0	13	365
12:45	2	183	3	0	188	2	0	3	0	5	2	166	8	0	176	13	1	2	0	16	176	13	1	2	0	16	385
Total	12	713	13	1	739	6	1	16	0	23	9	613	25	0	647	48	2	7	1	58	48	2	7	1	1	58	1467

Groups Printed - Unshifted

**City of Naperville**  
 400 S. Eagle Street  
 Naperville, IL 60566

File Name : Mill and Commons  
 Site Code : 20120562  
 Start Date : 5/25/2012  
 Page No : 2

Start Time	Groups Printed - Unshifted																											
	Mill From North						Commons From East						Mill From South						Commons From West									
	Right	Thru	Left	Peds	App. Total	Thru	Right	Thru	Left	Peds	App. Total	Thru	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Intr. Total
13:00	5	128	4	0	137	0	0	6	0	6	7	162	7	0	176	9	1	2	0	0	12	331	9	1	2	0	12	331
13:15	3	142	4	0	149	0	0	11	2	14	3	149	9	1	162	11	1	2	1	1	15	340	11	1	2	1	15	340
13:30	3	109	2	0	114	0	0	7	3	8	2	141	7	0	150	6	0	0	0	0	6	278	6	0	0	0	6	278
13:45	0	127	6	2	135	3	0	10	0	13	8	142	3	2	155	12	2	1	1	1	16	319	12	2	1	1	16	319
Total	11	506	16	2	535	4	0	34	3	41	20	594	26	3	643	38	4	5	2	2	49	1268	38	4	5	2	49	1268
14:00	3	139	2	0	144	1	0	3	0	4	5	114	7	0	126	12	0	2	3	3	17	291	12	0	2	3	17	291
14:15	1	120	2	0	131	0	0	6	1	7	9	121	7	0	137	13	1	1	0	0	15	290	13	1	1	0	15	290
14:30	2	145	0	0	147	2	1	4	0	7	2	126	6	0	134	9	1	1	0	0	11	299	9	1	1	0	11	299
14:45	7	149	4	3	163	0	0	6	0	6	6	106	9	0	121	23	1	1	0	0	25	315	23	1	1	0	25	315
Total	13	561	8	3	585	3	1	19	1	24	22	467	29	0	518	57	3	5	3	3	68	1195	57	3	5	3	68	1195
15:00	3	154	2	0	159	2	1	3	0	6	6	126	6	1	139	14	0	0	0	0	3	321	14	0	0	0	3	321
15:15	3	145	6	0	154	3	2	12	0	17	9	125	7	0	141	10	0	0	0	0	2	324	10	0	0	0	2	324
15:30	2	201	7	0	210	0	0	1	1	3	4	136	7	0	147	18	2	0	1	1	21	381	18	2	0	1	21	381
15:45	5	203	16	0	224	0	0	5	2	7	23	135	18	1	177	13	0	0	0	0	13	421	13	0	0	0	13	421
Total	13	703	31	0	747	5	4	21	3	33	42	522	38	2	604	55	2	0	0	0	6	1447	55	2	0	0	6	1447
16:00	4	259	22	0	285	1	0	13	0	14	34	111	8	1	154	19	1	3	0	0	23	476	19	1	3	0	23	476
16:15	7	282	26	0	315	1	0	10	0	11	21	146	8	1	176	18	1	3	0	0	22	524	18	1	3	0	22	524
16:30	4	279	9	0	292	4	0	13	3	20	13	133	9	0	155	24	0	1	0	0	25	492	24	0	1	0	25	492
16:45	4	302	7	0	313	4	0	9	0	13	11	134	12	0	157	18	0	2	0	0	20	503	18	0	2	0	20	503
Total	19	1122	64	0	1205	10	0	45	3	58	79	524	37	2	642	79	2	9	0	0	90	1995	79	2	9	0	90	1995
17:00	6	359	3	0	368	6	0	13	1	20	15	149	13	0	177	14	0	5	0	0	19	584	14	0	5	0	19	584
17:15	4	313	1	0	318	2	5	14	0	21	11	127	12	1	151	13	3	5	2	2	23	513	13	3	5	2	23	513
17:30	6	319	14	0	339	5	3	11	0	19	11	122	7	0	140	4	1	2	0	0	7	505	4	1	2	0	7	505
17:45	4	387	29	0	420	5	0	9	2	16	30	145	24	5	204	22	0	3	0	0	25	665	22	0	3	0	25	665
Total	20	1378	47	0	1445	18	8	47	3	76	67	543	56	6	672	53	4	15	2	2	74	2267	53	4	15	2	74	2267
18:00	7	397	31	0	435	0	0	0	0	0	28	165	16	0	209	13	2	4	0	0	19	663	13	2	4	0	19	663
18:15	4	277	12	0	293	6	2	30	1	39	16	126	9	0	151	11	0	0	1	1	12	495	11	0	0	1	12	495
18:30	6	190	6	0	202	1	0	6	0	7	4	100	5	0	109	16	1	0	1	1	18	336	16	1	0	1	18	336
18:45	5	154	8	0	167	6	1	23	0	30	12	115	1	0	128	2	1	4	0	0	7	332	2	1	4	0	7	332
Total	22	1018	57	0	1097	13	3	59	1	76	60	506	31	0	597	42	4	8	2	2	56	1826	42	4	8	2	56	1826
19:00	3	171	11	0	185	1	1	7	0	9	6	111	14	0	131	8	2	1	0	0	11	336	8	2	1	0	11	336
19:15	1	167	9	0	177	2	2	6	0	10	17	102	13	0	132	21	1	0	1	1	23	342	21	1	0	1	23	342
19:30	3	144	13	0	160	2	2	7	0	11	10	98	3	0	111	6	1	2	0	0	9	291	6	1	2	0	9	291
19:45	0	137	8	0	145	10	2	21	0	33	12	79	9	0	100	5	2	3	0	0	30	288	5	2	3	0	30	288
Total	7	619	41	0	667	15	7	41	0	63	45	390	39	0	474	40	6	6	1	1	53	1257	40	6	6	1	53	1257
Grand Total	157	8835	325	11	9528	80	24	316	14	434	397	7656	465	15	8533	597	30	95	23	23	745	19040	597	30	95	23	745	19040
Approach %	1.7	94.7	3.5	0.1	18.4	0.4	5.5	72.8	3.2	2.3	4.7	89.7	5.4	0.2	44.8	3.1	4	12.8	0.5	0.1	3.1	3.9	3.1	0.2	0.5	0.1	3.9	3.9
Total %	0.8	46.4	1.7	0.1	49	0.4	0.1	1.7	0.1	2.3	2.1	40.2	2.4	0.1	44.8	3.1	0.2	0.5	0.1	0.1	3.1	3.9	3.1	0.2	0.5	0.1	3.9	3.9



## **APPENDIX B**

### **EXISTING TRAFFIC COUNTS**



# City of Naperville

400 South Eagle Street  
Naperville, Illinois, 60540

File Name : MILL ST & COMMONS RD  
Site Code : 20150562  
Start Date : 6/25/2015  
Page No : 1

Groups Printed- Unshifted

Start Time	MILL ST From North					COMMONS RD From East					MILL ST From South					COMMONS RD From West					Int. Total
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	
06:00 AM	1	27	2	0	30	0	0	0	0	0	1	69	3	0	73	1	0	0	0	1	104
06:15 AM	0	40	0	0	40	0	0	0	0	0	3	118	4	0	125	2	0	0	0	2	167
06:30 AM	1	33	0	0	34	0	0	0	0	0	1	112	5	0	118	7	0	0	0	7	159
06:45 AM	1	25	0	0	26	0	0	0	0	0	0	188	8	0	196	2	0	0	0	2	224
<b>Total</b>	<b>3</b>	<b>125</b>	<b>2</b>	<b>0</b>	<b>130</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>5</b>	<b>487</b>	<b>20</b>	<b>0</b>	<b>512</b>	<b>12</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>12</b>	<b>654</b>
07:00 AM	0	30	0	0	30	0	0	0	0	0	1	205	12	0	218	5	0	1	0	6	254
07:15 AM	0	93	0	0	93	0	0	0	0	0	4	195	11	0	210	14	0	1	0	15	318
07:30 AM	0	81	1	0	82	0	0	0	0	0	0	275	12	0	287	11	0	1	0	12	381
07:45 AM	0	95	0	1	96	0	1	0	0	1	2	308	11	0	321	11	0	1	0	12	430
<b>Total</b>	<b>0</b>	<b>299</b>	<b>1</b>	<b>1</b>	<b>301</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>7</b>	<b>983</b>	<b>46</b>	<b>0</b>	<b>1036</b>	<b>41</b>	<b>0</b>	<b>4</b>	<b>0</b>	<b>45</b>	<b>1383</b>
08:00 AM	0	118	2	0	120	0	0	0	0	0	0	279	12	0	291	6	0	3	0	9	420
08:15 AM	1	113	0	0	114	0	1	1	0	2	3	299	14	0	316	17	0	0	0	17	449
08:30 AM	4	136	2	0	142	0	0	0	0	0	2	262	11	0	275	10	1	0	0	11	428
08:45 AM	1	148	0	0	149	1	0	0	0	1	6	214	9	0	229	12	0	0	0	12	391
<b>Total</b>	<b>6</b>	<b>515</b>	<b>4</b>	<b>0</b>	<b>525</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>3</b>	<b>11</b>	<b>1054</b>	<b>46</b>	<b>0</b>	<b>1111</b>	<b>45</b>	<b>1</b>	<b>3</b>	<b>0</b>	<b>49</b>	<b>1688</b>
09:00 AM	2	174	2	1	179	0	0	1	0	1	4	206	8	0	218	9	0	1	0	10	408
09:15 AM	1	118	0	0	119	0	0	0	0	0	2	173	9	0	184	7	0	0	0	7	310
09:30 AM	3	63	0	0	66	0	0	1	0	1	2	135	14	0	151	8	0	3	0	11	229
09:45 AM	0	95	4	0	99	0	0	0	0	0	1	129	2	0	132	8	0	1	0	9	240
<b>Total</b>	<b>6</b>	<b>450</b>	<b>6</b>	<b>1</b>	<b>463</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>2</b>	<b>9</b>	<b>643</b>	<b>33</b>	<b>0</b>	<b>685</b>	<b>32</b>	<b>0</b>	<b>5</b>	<b>0</b>	<b>37</b>	<b>1187</b>
10:00 AM	1	132	6	0	139	0	0	1	0	1	3	86	7	0	96	4	0	1	0	5	241
10:15 AM	4	92	1	0	97	1	0	1	0	2	6	101	10	0	117	11	0	0	0	11	227
10:30 AM	2	105	1	0	108	0	0	1	0	1	7	105	5	0	117	9	0	2	0	11	237
10:45 AM	0	100	5	0	105	0	0	1	0	1	6	122	8	0	136	6	1	0	0	7	249
<b>Total</b>	<b>7</b>	<b>429</b>	<b>13</b>	<b>0</b>	<b>449</b>	<b>1</b>	<b>0</b>	<b>4</b>	<b>0</b>	<b>5</b>	<b>22</b>	<b>414</b>	<b>30</b>	<b>0</b>	<b>466</b>	<b>30</b>	<b>1</b>	<b>3</b>	<b>0</b>	<b>34</b>	<b>954</b>
11:00 AM	2	100	1	0	103	0	0	1	0	1	5	125	8	0	138	11	0	0	0	11	253
11:15 AM	0	105	2	0	107	0	1	3	0	4	3	109	11	0	123	5	0	2	0	7	241
11:30 AM	1	116	6	0	123	0	0	6	0	6	3	116	6	0	125	11	0	2	0	13	267
11:45 AM	1	104	2	0	107	0	0	1	0	1	13	124	5	0	142	12	0	4	0	16	266
<b>Total</b>	<b>4</b>	<b>425</b>	<b>11</b>	<b>0</b>	<b>440</b>	<b>0</b>	<b>1</b>	<b>11</b>	<b>0</b>	<b>12</b>	<b>24</b>	<b>474</b>	<b>30</b>	<b>0</b>	<b>528</b>	<b>39</b>	<b>0</b>	<b>8</b>	<b>0</b>	<b>47</b>	<b>1027</b>
12:00 PM	0	86	7	0	93	0	0	4	0	4	17	138	14	0	169	16	0	0	0	16	282
12:15 PM	5	103	4	1	113	0	0	9	0	9	12	155	8	0	175	9	0	2	0	11	308

# City of Naperville

400 South Eagle Street  
Naperville, Illinois, 60540

File Name : MILL ST & COMMONS RD  
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Groups Printed- Unshifted

Start Time	MILL ST From North					COMMONS RD From East					MILL ST From South					COMMONS RD From West					Int. Total
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	
12:30 PM	3	124	1	1	129	4	1	9	0	14	5	142	14	0	161	6	1	5	0	12	316
12:45 PM	0	71	1	0	72	0	0	1	0	1	3	160	10	0	173	12	0	4	0	16	262
Total	8	384	13	2	407	4	1	23	0	28	37	595	46	0	678	43	1	11	0	55	1168
01:00 PM	1	96	1	0	98	0	1	0	0	1	3	137	11	0	151	5	0	5	0	10	260
01:15 PM	0	98	0	0	98	0	0	0	0	0	3	138	14	0	155	9	0	0	0	9	262
01:30 PM	1	110	0	0	111	2	0	2	0	4	10	145	7	0	162	8	1	2	0	11	288
01:45 PM	0	90	0	0	90	0	0	2	0	2	9	114	4	0	127	8	0	2	0	10	229
Total	2	394	1	0	397	2	1	4	0	7	25	534	36	0	595	30	1	9	0	40	1039
02:00 PM	2	117	0	0	119	1	0	2	0	3	5	116	4	0	125	10	0	1	0	11	258
02:15 PM	1	127	2	0	130	1	0	1	0	2	5	125	5	0	135	5	1	1	0	7	274
02:30 PM	2	73	0	0	75	2	3	0	0	5	4	141	4	0	149	6	0	3	0	9	238
02:45 PM	2	69	0	0	71	2	0	2	0	4	1	107	10	0	118	7	1	0	0	8	201
Total	7	386	2	0	395	6	3	5	0	14	15	489	23	0	527	28	2	5	0	35	971
03:00 PM	1	152	1	0	154	1	0	2	0	3	4	99	8	0	111	7	1	2	0	10	278
03:15 PM	1	167	2	0	170	2	0	1	0	3	3	106	8	0	117	6	0	1	0	7	297
03:30 PM	4	199	0	0	203	1	0	3	0	4	1	106	9	0	116	7	1	3	0	11	334
03:45 PM	1	170	1	0	172	0	1	0	0	1	2	128	10	0	140	15	0	0	0	15	328
Total	7	688	4	0	699	4	1	6	0	11	10	439	35	0	484	35	2	6	0	43	1237
04:00 PM	2	144	1	0	147	1	0	1	0	2	3	105	3	0	111	11	0	5	0	16	276
04:15 PM	1	148	1	0	150	0	1	0	0	1	22	118	15	0	155	19	0	1	0	20	326
04:30 PM	0	155	0	0	155	0	0	0	0	0	4	105	6	0	115	9	0	4	0	13	283
04:45 PM	7	222	0	0	229	2	2	5	0	9	5	112	6	0	123	13	0	1	0	14	375
Total	10	669	2	0	681	3	3	6	0	12	34	440	30	0	504	52	0	11	0	63	1260
05:00 PM	1	280	2	0	283	0	1	4	0	5	8	132	8	0	148	20	0	0	0	20	456
05:15 PM	0	147	1	0	148	0	0	3	0	3	9	137	12	0	158	17	0	1	0	18	327
05:30 PM	3	172	1	0	176	2	0	6	0	8	4	152	8	0	164	16	0	1	0	17	365
05:45 PM	2	160	1	0	163	1	0	3	0	4	19	119	7	0	145	18	0	7	0	25	337
Total	6	759	5	0	770	3	1	16	0	20	40	540	35	0	615	71	0	9	0	80	1485
06:00 PM	2	222	0	0	224	0	1	3	0	4	5	141	12	0	158	16	0	2	0	18	404
06:15 PM	5	219	13	0	237	2	1	4	0	7	6	107	15	0	128	14	0	2	0	16	388
06:30 PM	3	138	11	0	152	2	0	2	0	4	5	117	9	0	131	10	0	0	0	10	297
06:45 PM	3	116	7	0	126	2	0	5	0	7	15	133	16	0	164	13	0	0	0	13	310
Total	13	695	31	0	739	6	2	14	0	22	31	498	52	0	581	53	0	4	0	57	1399

# City of Naperville

400 South Eagle Street  
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File Name : MILL ST & COMMONS RD  
Site Code : 20150562  
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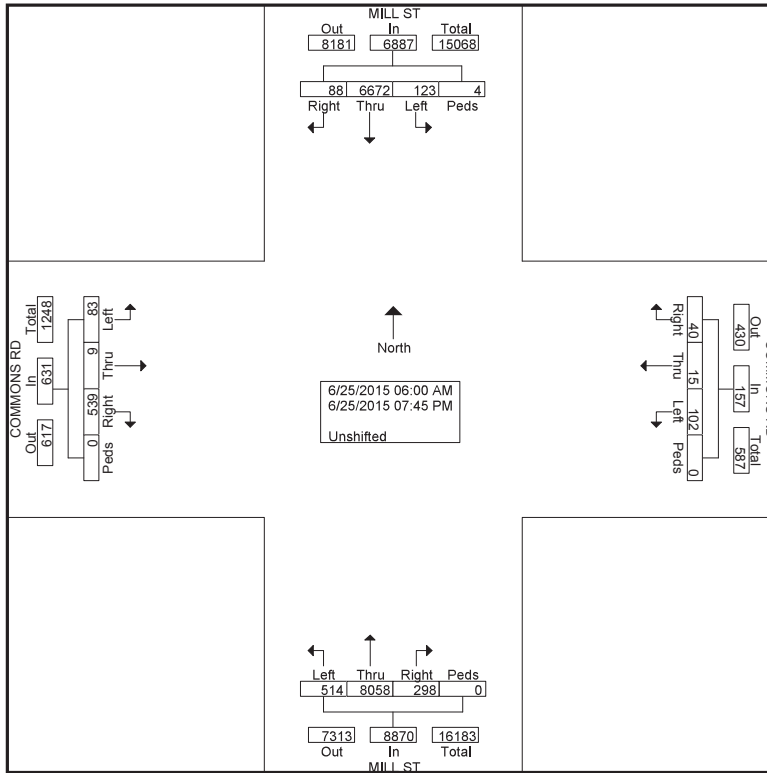
Groups Printed- Unshifted

Start Time	MILL ST From North					COMMONS RD From East					MILL ST From South					COMMONS RD From West					Int. Total
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	
07:00 PM	3	132	11	0	146	7	0	5	0	12	11	110	15	0	136	5	0	0	0	5	299
07:15 PM	3	117	14	0	134	3	0	5	0	8	12	140	10	0	162	8	0	1	0	9	313
07:30 PM	2	110	2	0	114	0	0	0	0	0	1	106	13	0	120	10	1	1	0	12	246
07:45 PM	1	95	1	0	97	0	0	0	0	0	4	112	14	0	130	5	0	3	0	8	235
Total	9	454	28	0	491	10	0	10	0	20	28	468	52	0	548	28	1	5	0	34	1093
Grand Total	88	6672	123	4	6887	40	15	102	0	157	298	8058	514	0	8870	539	9	83	0	631	16545
Apprch %	1.3	96.9	1.8	0.1		25.5	9.6	65	0		3.4	90.8	5.8	0		85.4	1.4	13.2	0		
Total %	0.5	40.3	0.7	0	41.6	0.2	0.1	0.6	0	0.9	1.8	48.7	3.1	0	53.6	3.3	0.1	0.5	0	3.8	

# City of Naperville

400 South Eagle Street  
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# City of Naperville

400 South Eagle Street  
Naperville, Illinois, 60540

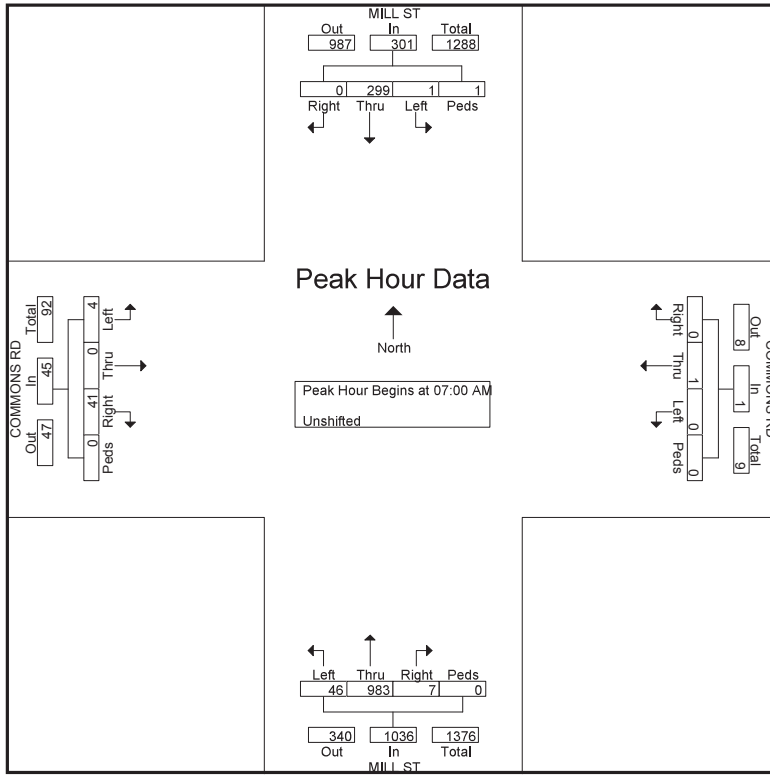
File Name : MILL ST & COMMONS RD  
Site Code : 20150562  
Start Date : 6/25/2015  
Page No : 5

Start Time	MILL ST From North					COMMONS RD From East					MILL ST From South					COMMONS RD From West					Int. Total
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	
Peak Hour Analysis From 07:00 AM to 07:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00 AM																					
07:00 AM	0	30	0	0	30	0	0	0	0	0	1	205	12	0	218	5	0	1	0	6	254
07:15 AM	0	93	0	0	93	0	0	0	0	0	4	195	11	0	210	14	0	1	0	15	318
07:30 AM	0	81	1	0	82	0	0	0	0	0	0	275	12	0	287	11	0	1	0	12	381
07:45 AM	0	95	0	1	96	0	1	0	0	1	2	308	11	0	321	11	0	1	0	12	430
Total Volume	0	299	1	1	301	0	1	0	0	1	7	983	46	0	1036	41	0	4	0	45	1383
% App. Total	0	99.3	0.3	0.3		0	100	0	0		0.7	94.9	4.4	0		91.1	0	8.9	0		
PHF	.000	.787	.250	.250	.784	.000	.250	.000	.000	.250	.438	.798	.958	.000	.807	.732	.000	1.00	.000	.750	.804

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400 South Eagle Street  
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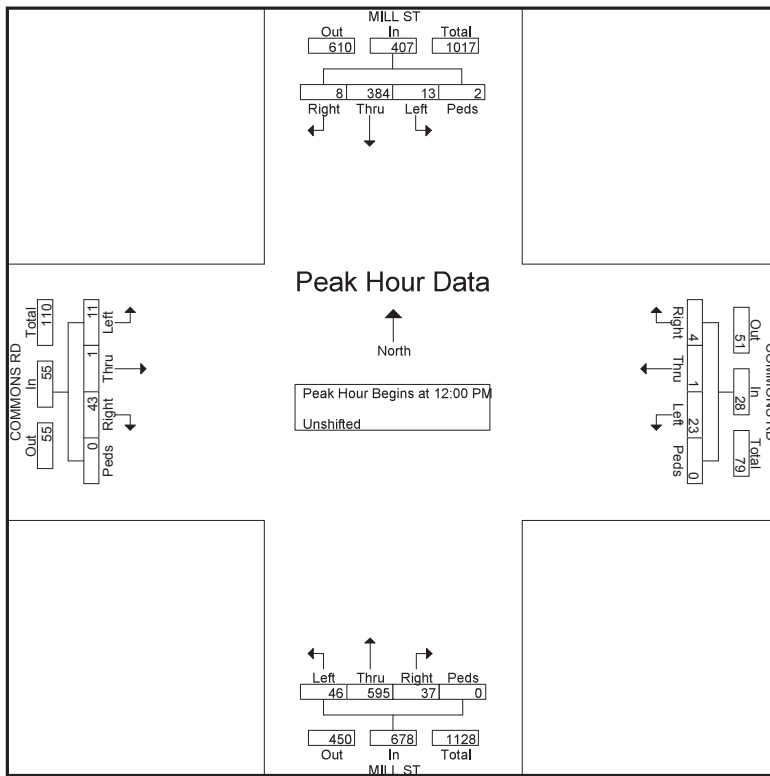
File Name : MILL ST & COMMONS RD  
Site Code : 20150562  
Start Date : 6/25/2015  
Page No : 7

Start Time	MILL ST From North					COMMONS RD From East					MILL ST From South					COMMONS RD From West					Int. Total
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	
Peak Hour Analysis From 12:00 PM to 12:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 12:00 PM																					
12:00 PM	0	86	7	0	93	0	0	4	0	4	17	138	14	0	169	16	0	0	0	16	282
12:15 PM	5	103	4	1	113	0	0	9	0	9	12	155	8	0	175	9	0	2	0	11	308
12:30 PM	3	124	1	1	129	4	1	9	0	14	5	142	14	0	161	6	1	5	0	12	316
12:45 PM	0	71	1	0	72	0	0	1	0	1	3	160	10	0	173	12	0	4	0	16	262
Total Volume	8	384	13	2	407	4	1	23	0	28	37	595	46	0	678	43	1	11	0	55	1168
% App. Total	2	94.3	3.2	0.5		14.3	3.6	82.1	0		5.5	87.8	6.8	0		78.2	1.8	20	0		
PHF	.400	.774	.464	.500	.789	.250	.250	.639	.000	.500	.544	.930	.821	.000	.969	.672	.250	.550	.000	.859	.924

# City of Naperville

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# City of Naperville

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Naperville, Illinois, 60540

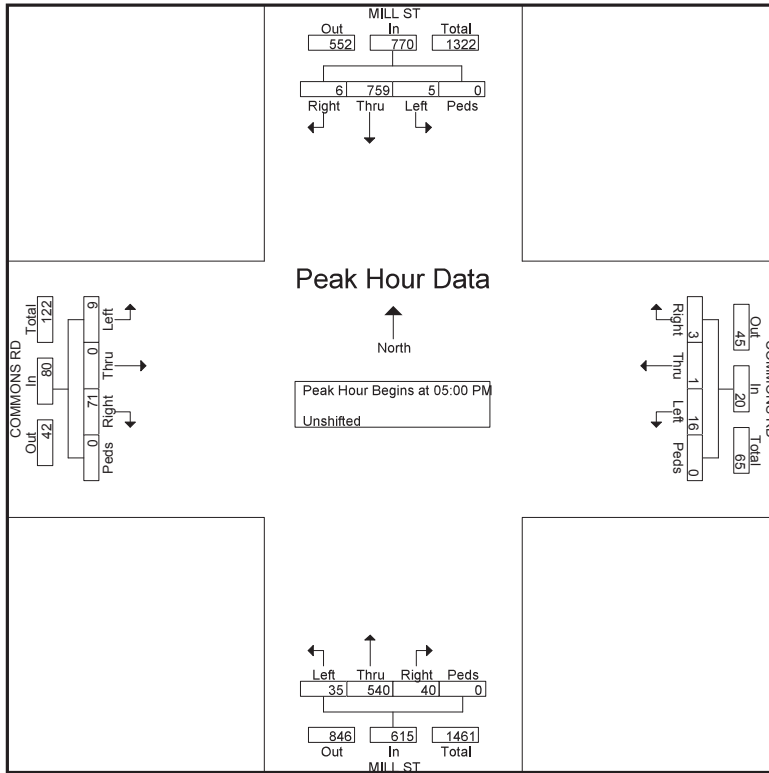
File Name : MILL ST & COMMONS RD  
Site Code : 20150562  
Start Date : 6/25/2015  
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Start Time	MILL ST From North					COMMONS RD From East					MILL ST From South					COMMONS RD From West					Int. Total
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	
Peak Hour Analysis From 05:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 05:00 PM																					
05:00 PM	1	280	2	0	283	0	1	4	0	5	8	132	8	0	148	20	0	0	0	20	456
05:15 PM	0	147	1	0	148	0	0	3	0	3	9	137	12	0	158	17	0	1	0	18	327
05:30 PM	3	172	1	0	176	2	0	6	0	8	4	152	8	0	164	16	0	1	0	17	365
05:45 PM	2	160	1	0	163	1	0	3	0	4	19	119	7	0	145	18	0	7	0	25	337
Total Volume	6	759	5	0	770	3	1	16	0	20	40	540	35	0	615	71	0	9	0	80	1485
% App. Total	0.8	98.6	0.6	0		15	5	80	0		6.5	87.8	5.7	0		88.8	0	11.2	0		
PHF	.500	.678	.625	.000	.680	.375	.250	.667	.000	.625	.526	.888	.729	.000	.938	.888	.000	.321	.000	.800	.814

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# City of Naperville

400 South Eagle Street  
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File Name : MILL ST & BAUER RD  
Site Code : 20150683  
Start Date : 6/23/2015  
Page No : 1

Groups Printed- Unshifted

Start Time	MILL ST From North					BAUER RD From East					MILL ST From South					BAUER RD From West					Int. Total
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	
06:00 AM	4	22	7	1	34	3	1	2	1	7	3	52	0	0	55	0	3	12	0	15	111
06:15 AM	2	24	3	0	29	1	1	1	0	3	2	73	0	1	76	0	3	11	0	14	122
06:30 AM	3	27	6	0	36	1	1	1	0	3	1	119	1	0	121	0	10	37	0	47	207
06:45 AM	2	24	4	0	30	1	1	1	0	3	1	111	1	0	113	0	10	7	0	17	163
Total	11	97	20	1	129	6	4	5	1	16	7	355	2	1	365	0	26	67	0	93	603
07:00 AM	4	37	5	4	50	4	1	2	0	7	9	131	6	0	146	9	9	29	0	47	250
07:15 AM	7	62	12	1	82	20	2	4	0	26	5	166	9	1	181	8	12	44	1	65	354
07:30 AM	6	58	11	0	75	23	2	7	0	32	15	166	9	1	191	12	20	52	1	85	383
07:45 AM	7	58	7	0	72	22	5	8	0	35	9	208	1	0	218	3	17	66	1	87	412
Total	24	215	35	5	279	69	10	21	0	100	38	671	25	2	736	32	58	191	3	284	1399
08:00 AM	18	111	18	5	152	33	14	4	4	55	4	170	0	0	174	10	11	59	0	80	461
08:15 AM	21	107	15	0	143	36	15	7	0	58	16	172	14	5	207	12	26	63	2	103	511
08:30 AM	17	108	18	6	149	36	16	9	5	66	14	138	9	2	163	4	19	44	0	67	445
08:45 AM	18	105	20	2	145	45	12	4	4	65	10	152	2	0	164	8	15	47	2	72	446
Total	74	431	71	13	589	150	57	24	13	244	44	632	25	7	708	34	71	213	4	322	1863
09:00 AM	18	112	14	0	144	28	11	5	0	44	16	131	4	1	152	8	13	22	0	43	383
09:15 AM	22	117	19	0	158	40	0	3	0	43	10	120	3	0	133	2	6	32	1	41	375
09:30 AM	7	100	17	3	127	13	7	11	4	35	2	96	9	1	108	4	10	15	0	29	299
09:45 AM	15	89	20	0	124	12	14	10	1	37	9	70	1	3	83	1	14	22	0	37	281
Total	62	418	70	3	553	93	32	29	5	159	37	417	17	5	476	15	43	91	1	150	1338
10:00 AM	18	97	22	0	137	10	7	6	0	23	12	92	9	3	116	7	10	19	0	36	312
10:15 AM	9	113	5	0	127	15	10	9	1	35	8	75	2	3	88	8	9	16	4	37	287
10:30 AM	14	119	15	0	148	5	13	14	0	32	10	78	6	1	95	5	10	24	0	39	314
10:45 AM	16	121	15	0	152	7	5	8	1	21	5	94	5	2	106	5	7	20	0	32	311
Total	57	450	57	0	564	37	35	37	2	111	35	339	22	9	405	25	36	79	4	144	1224
11:00 AM	10	109	15	0	134	8	9	6	1	24	6	84	8	1	99	0	15	23	0	38	295
11:15 AM	18	101	13	0	132	8	11	7	0	26	12	97	4	1	114	9	10	30	0	49	321
11:30 AM	21	129	15	0	165	13	5	10	0	28	6	74	1	0	81	7	17	33	0	57	331
11:45 AM	15	134	15	0	164	10	11	2	0	23	17	102	9	0	128	11	10	28	0	49	364
Total	64	473	58	0	595	39	36	25	1	101	41	357	22	2	422	27	52	114	0	193	1311
12:00 PM	17	107	12	0	136	8	2	6	0	16	20	135	10	0	165	5	13	17	1	36	353
12:15 PM	16	113	13	0	142	10	2	5	0	17	11	125	0	0	136	4	11	25	0	40	335

# City of Naperville

400 South Eagle Street  
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File Name : MILL ST & BAUER RD  
Site Code : 20150683  
Start Date : 6/23/2015  
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Groups Printed- Unshifted

Start Time	MILL ST From North					BAUER RD From East					MILL ST From South					BAUER RD From West					Int. Total
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	
12:30 PM	15	113	14	2	144	9	3	3	4	19	12	126	0	0	138	9	15	20	0	44	345
12:45 PM	20	119	15	1	155	9	9	15	2	35	11	122	0	0	133	10	16	29	0	55	378
Total	68	452	54	3	577	36	16	29	6	87	54	508	10	0	572	28	55	91	1	175	1411
01:00 PM	29	128	15	1	173	14	14	10	0	38	19	94	7	0	120	6	19	11	0	36	367
01:15 PM	24	133	13	0	170	12	13	11	0	36	17	117	10	0	144	4	8	19	0	31	381
01:30 PM	17	126	22	0	165	23	14	9	0	46	11	132	7	2	152	9	7	21	1	38	401
01:45 PM	22	120	16	0	158	16	21	13	0	50	9	121	5	0	135	6	10	19	0	35	378
Total	92	507	66	1	666	65	62	43	0	170	56	464	29	2	551	25	44	70	1	140	1527
02:00 PM	21	119	17	2	159	17	16	6	0	39	8	115	6	0	129	4	11	18	0	33	360
02:15 PM	22	114	30	2	168	12	9	11	2	34	13	113	4	0	130	5	8	25	0	38	370
02:30 PM	19	115	16	0	150	22	9	9	1	41	11	102	3	1	117	4	4	16	0	24	332
02:45 PM	25	120	25	0	170	16	13	9	1	39	12	115	2	1	130	2	8	18	0	28	367
Total	87	468	88	4	647	67	47	35	4	153	44	445	15	2	506	15	31	77	0	123	1429
03:00 PM	20	102	22	0	144	24	10	14	4	52	9	91	6	1	107	4	13	25	3	45	348
03:15 PM	20	147	24	0	191	24	16	12	0	52	13	95	7	3	118	3	4	13	0	20	381
03:30 PM	16	151	25	0	192	9	19	10	5	43	13	105	3	1	122	6	10	10	0	26	383
03:45 PM	35	185	17	0	237	19	25	9	1	54	11	89	3	1	104	5	10	14	0	29	424
Total	91	585	88	0	764	76	70	45	10	201	46	380	19	6	451	18	37	62	3	120	1536
04:00 PM	33	240	28	0	301	21	12	6	0	39	13	105	12	1	131	3	17	18	0	38	509
04:15 PM	36	262	30	0	328	17	18	12	0	47	15	113	9	1	138	2	8	24	1	35	548
04:30 PM	45	283	40	0	368	14	14	8	3	39	13	143	3	0	159	4	11	19	2	36	602
04:45 PM	44	305	41	0	390	20	28	12	1	61	9	123	7	0	139	5	29	11	0	45	635
Total	158	1090	139	0	1387	72	72	38	4	186	50	484	31	2	567	14	65	72	3	154	2294
05:00 PM	30	249	37	0	316	11	10	23	0	44	13	95	9	2	119	3	10	21	0	34	513
05:15 PM	61	399	43	0	503	16	34	16	0	66	8	73	4	1	86	7	13	20	0	40	695
05:30 PM	64	377	45	0	486	22	25	11	5	63	11	104	8	6	129	0	7	16	1	24	702
05:45 PM	55	319	29	0	403	26	22	11	2	61	15	130	9	0	154	6	15	18	0	39	657
Total	210	1344	154	0	1708	75	91	61	7	234	47	402	30	9	488	16	45	75	1	137	2567
06:00 PM	39	263	25	0	327	21	21	11	0	53	10	96	7	0	113	3	8	11	0	22	515
06:15 PM	48	296	27	0	371	26	22	11	0	59	12	114	10	3	139	3	20	32	0	55	624
06:30 PM	25	183	28	0	236	21	15	4	3	43	14	96	2	1	113	7	10	9	1	27	419
06:45 PM	25	50	30	0	105	23	17	6	0	46	5	70	1	1	77	3	12	13	1	29	257
Total	137	792	110	0	1039	91	75	32	3	201	41	376	20	5	442	16	50	65	2	133	1815

# City of Naperville

400 South Eagle Street  
Naperville, Illinois, 60540

File Name : MILL ST & BAUER RD  
Site Code : 20150683  
Start Date : 6/23/2015  
Page No : 3

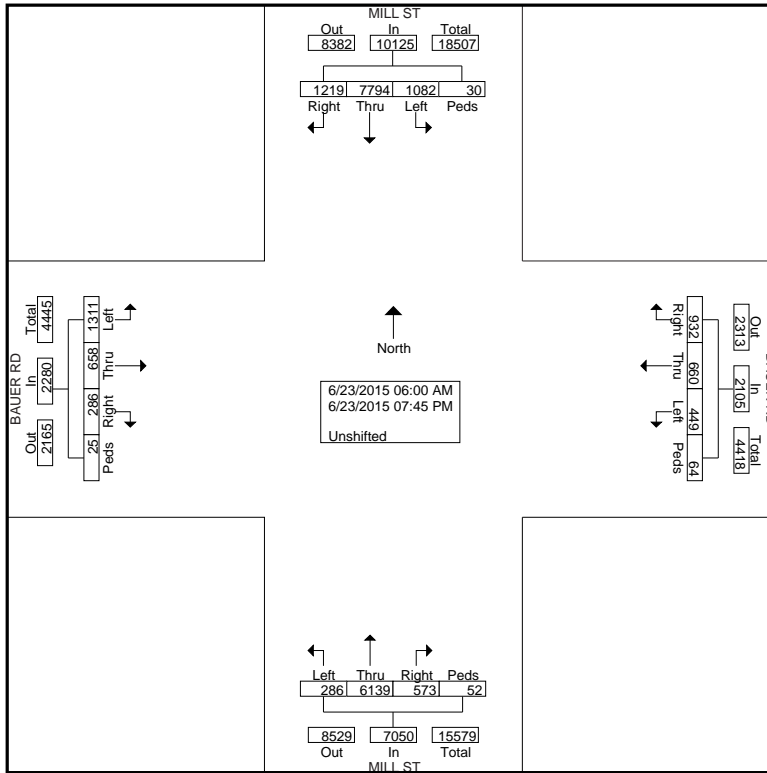
Groups Printed- Unshifted

Start Time	MILL ST From North					BAUER RD From East					MILL ST From South					BAUER RD From West					Int. Total
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	
07:00 PM	25	151	15	0	191	20	17	3	3	43	3	64	5	0	72	5	3	9	0	17	323
07:15 PM	22	91	20	0	133	16	16	11	2	45	17	103	7	0	127	3	9	11	2	25	330
07:30 PM	23	125	21	0	169	4	6	8	2	20	6	77	2	0	85	2	26	9	0	37	311
07:45 PM	14	105	16	0	135	16	14	3	1	34	7	65	5	0	77	11	7	15	0	33	279
Total	84	472	72	0	628	56	53	25	8	142	33	309	19	0	361	21	45	44	2	112	1243
Grand Total	1219	7794	1082	30	10125	932	660	449	64	2105	573	6139	286	52	7050	286	658	1311	25	2280	21560
Apprch %	12	77	10.7	0.3		44.3	31.4	21.3	3		8.1	87.1	4.1	0.7		12.5	28.9	57.5	1.1		
Total %	5.7	36.2	5	0.1	47	4.3	3.1	2.1	0.3	9.8	2.7	28.5	1.3	0.2	32.7	1.3	3.1	6.1	0.1	10.6	

# City of Naperville

400 South Eagle Street  
Naperville, Illinois, 60540

File Name : MILL ST & BAUER RD  
Site Code : 20150683  
Start Date : 6/23/2015  
Page No : 4



# City of Naperville

400 South Eagle Street  
Naperville, Illinois, 60540

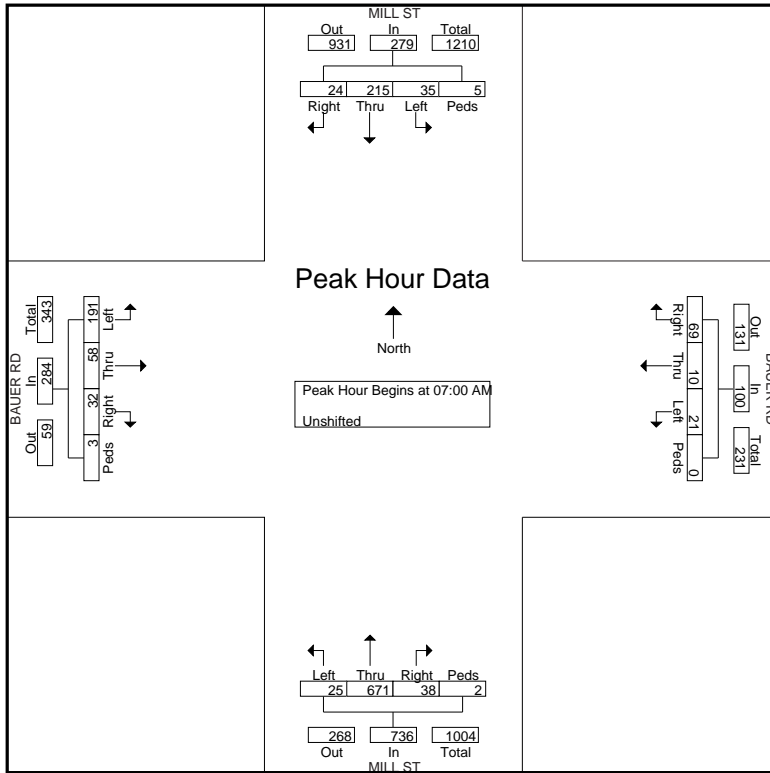
File Name : MILL ST & BAUER RD  
Site Code : 20150683  
Start Date : 6/23/2015  
Page No : 5

Start Time	MILL ST From North					BAUER RD From East					MILL ST From South					BAUER RD From West					Int. Total
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	
Peak Hour Analysis From 07:00 AM to 07:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00 AM																					
07:00 AM	4	37	5	4	50	4	1	2	0	7	9	131	6	0	146	9	9	29	0	47	250
07:15 AM	7	62	12	1	82	20	2	4	0	26	5	166	9	1	181	8	12	44	1	65	354
07:30 AM	6	58	11	0	75	23	2	7	0	32	15	166	9	1	191	12	20	52	1	85	383
07:45 AM	7	58	7	0	72	22	5	8	0	35	9	208	1	0	218	3	17	66	1	87	412
Total Volume	24	215	35	5	279	69	10	21	0	100	38	671	25	2	736	32	58	191	3	284	1399
% App. Total	8.6	77.1	12.5	1.8		69	10	21	0		5.2	91.2	3.4	0.3		11.3	20.4	67.3	1.1		
PHF	.857	.867	.729	.313	.851	.750	.500	.656	.000	.714	.633	.806	.694	.500	.844	.667	.725	.723	.750	.816	.849

# City of Naperville

400 South Eagle Street  
Naperville, Illinois, 60540

File Name : MILL ST & BAUER RD  
Site Code : 20150683  
Start Date : 6/23/2015  
Page No : 6





# City of Naperville

400 South Eagle Street  
Naperville, Illinois, 60540

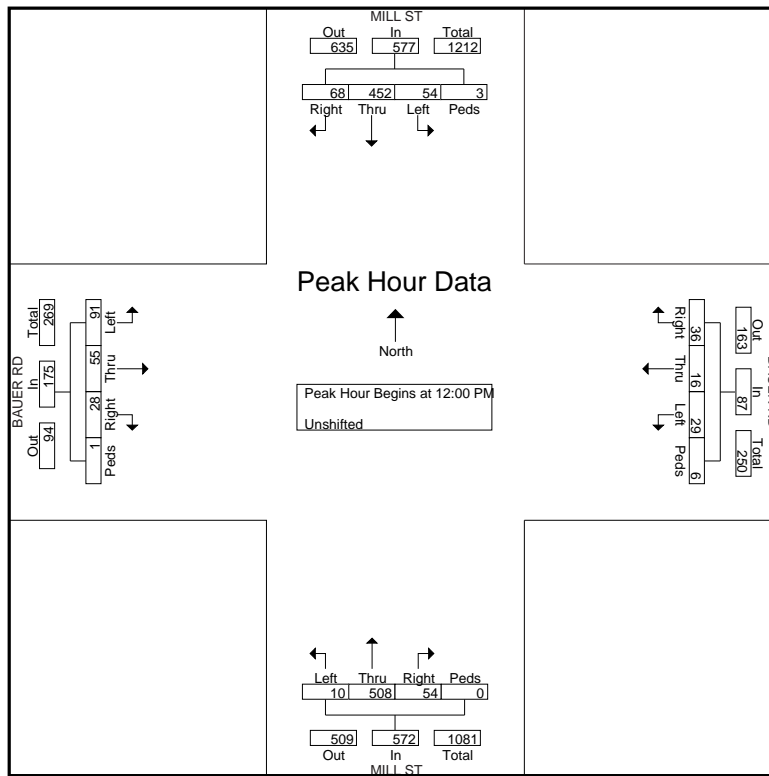
File Name : MILL ST & BAUER RD  
Site Code : 20150683  
Start Date : 6/23/2015  
Page No : 7

Start Time	MILL ST From North					BAUER RD From East					MILL ST From South					BAUER RD From West					Int. Total
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	
Peak Hour Analysis From 12:00 PM to 12:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 12:00 PM																					
12:00 PM	17	107	12	0	136	8	2	6	0	16	20	135	10	0	165	5	13	17	1	36	353
12:15 PM	16	113	13	0	142	10	2	5	0	17	11	125	0	0	136	4	11	25	0	40	335
12:30 PM	15	113	14	2	144	9	3	3	4	19	12	126	0	0	138	9	15	20	0	44	345
12:45 PM	20	119	15	1	155	9	9	15	2	35	11	122	0	0	133	10	16	29	0	55	378
Total Volume	68	452	54	3	577	36	16	29	6	87	54	508	10	0	572	28	55	91	1	175	1411
% App. Total	11.8	78.3	9.4	0.5		41.4	18.4	33.3	6.9		9.4	88.8	1.7	0		16	31.4	52	0.6		
PHF	.850	.950	.900	.375	.931	.900	.444	.483	.375	.621	.675	.941	.250	.000	.867	.700	.859	.784	.250	.795	.933

# City of Naperville

400 South Eagle Street  
Naperville, Illinois, 60540

File Name : MILL ST & BAUER RD  
Site Code : 20150683  
Start Date : 6/23/2015  
Page No : 8



# City of Naperville

400 South Eagle Street  
Naperville, Illinois, 60540

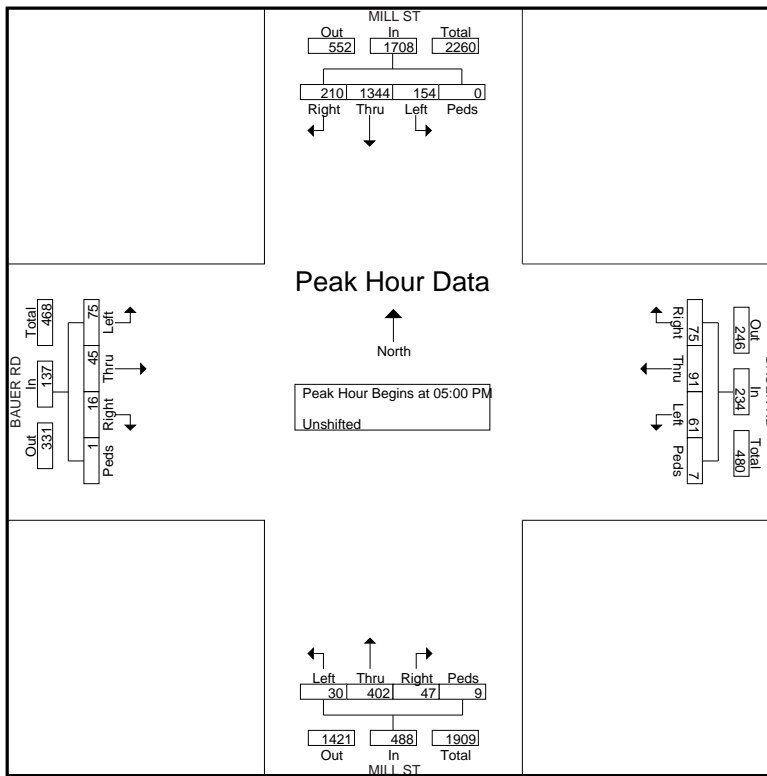
File Name : MILL ST & BAUER RD  
Site Code : 20150683  
Start Date : 6/23/2015  
Page No : 9

Start Time	MILL ST From North					BAUER RD From East					MILL ST From South					BAUER RD From West					Int. Total
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	
Peak Hour Analysis From 05:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 05:00 PM																					
05:00 PM	30	249	37	0	316	11	10	23	0	44	13	95	9	2	119	3	10	21	0	34	513
05:15 PM	61	399	43	0	503	16	34	16	0	66	8	73	4	1	86	7	13	20	0	40	695
05:30 PM	64	377	45	0	486	22	25	11	5	63	11	104	8	6	129	0	7	16	1	24	702
05:45 PM	55	319	29	0	403	26	22	11	2	61	15	130	9	0	154	6	15	18	0	39	657
Total Volume	210	1344	154	0	1708	75	91	61	7	234	47	402	30	9	488	16	45	75	1	137	2567
% App. Total	12.3	78.7	9	0		32.1	38.9	26.1	3		9.6	82.4	6.1	1.8		11.7	32.8	54.7	0.7		
PHF	.820	.842	.856	.000	.849	.721	.669	.663	.350	.886	.783	.773	.833	.375	.792	.571	.750	.893	.250	.856	.914

# City of Naperville

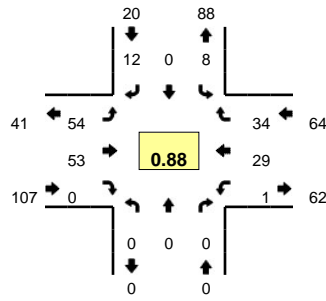
400 South Eagle Street  
Naperville, Illinois, 60540

File Name : MILL ST & BAUER RD  
Site Code : 20150683  
Start Date : 6/23/2015  
Page No : 10

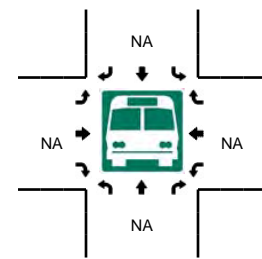
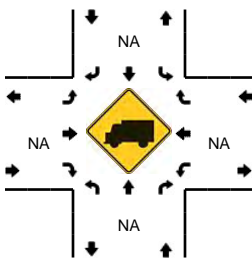
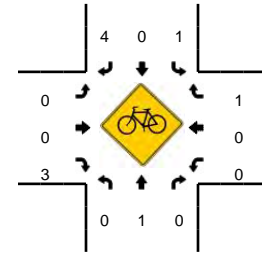
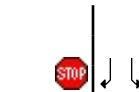
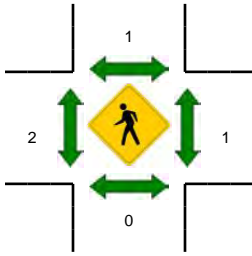
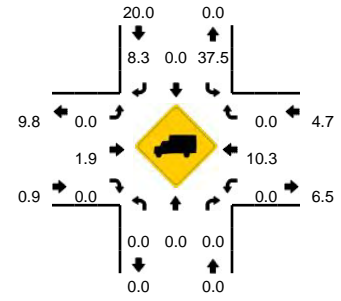


**LOCATION:** West St -- Commons St  
**CITY/STATE:** Naperville, IL

**QC JOB #:** 13858205  
**DATE:** Wed, Jul 13 2016



**Peak-Hour: 7:30 AM -- 8:30 AM**  
**Peak 15-Min: 8:00 AM -- 8:15 AM**

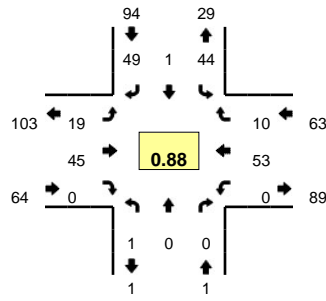


15-Min Count Period Beginning At	West St (Northbound)				West St (Southbound)				Commons St (Eastbound)				Commons St (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	0	0	0	0	1	0	2	0	9	6	0	0	0	4	3	0	25	
7:15 AM	0	0	0	0	1	0	5	0	10	13	0	0	0	2	7	0	38	
7:30 AM	0	0	0	0	3	0	2	0	13	10	0	0	0	6	11	1	46	
7:45 AM	0	0	0	0	1	0	2	0	12	9	0	0	0	5	8	0	37	146
8:00 AM	0	0	0	0	2	0	2	0	11	18	0	0	0	11	10	0	54	175
8:15 AM	0	0	0	0	2	0	6	0	18	16	0	0	0	7	5	0	54	191
8:30 AM	0	0	0	0	2	0	4	0	10	6	0	0	0	1	5	0	28	173
8:45 AM	0	0	0	0	2	0	3	0	13	16	0	0	0	3	5	1	43	179
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	0	0	0	0	8	0	8	0	44	72	0	0	0	44	40	0	216	
Heavy Trucks	0	0	0	0	8	0	4	0	0	0	0	0	0	8	0	0	20	
Pedestrians	0	0	0	0	0	4	0	0	0	4	0	0	0	0	0	0	8	
Bicycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Railroad	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Stopped Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

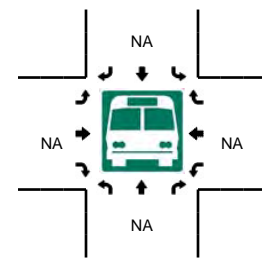
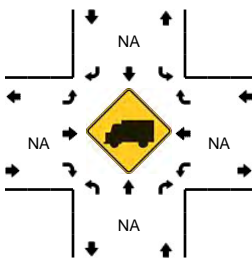
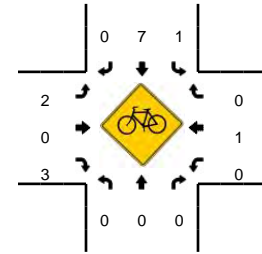
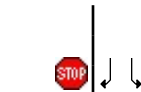
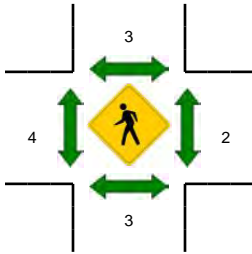
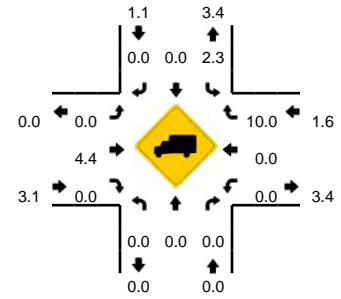
Comments:

**LOCATION:** West St -- Commons St  
**CITY/STATE:** Naperville, IL

**QC JOB #:** 13858206  
**DATE:** Wed, Jul 13 2016



**Peak-Hour: 4:45 PM -- 5:45 PM**  
**Peak 15-Min: 5:30 PM -- 5:45 PM**

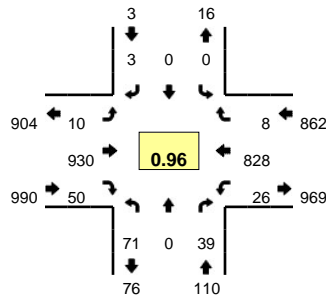


15-Min Count Period Beginning At	West St (Northbound)				West St (Southbound)				Commons St (Eastbound)				Commons St (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	0	0	0	0	13	0	7	0	4	9	0	0	0	9	1	0	43	
4:15 PM	0	0	0	0	8	0	8	0	4	7	0	0	0	4	5	0	36	
4:30 PM	0	0	0	0	16	0	1	0	4	6	0	0	0	18	5	0	50	
4:45 PM	0	0	0	0	15	0	10	0	1	15	0	0	0	12	2	0	55	184
5:00 PM	0	0	0	0	14	0	11	0	5	11	0	0	0	8	2	0	51	192
5:15 PM	0	0	0	0	8	0	15	0	5	8	0	0	0	14	3	0	53	209
5:30 PM	1	0	0	0	7	1	13	0	8	11	0	0	0	19	3	0	63	222
5:45 PM	0	0	0	0	7	0	11	0	8	5	1	0	0	12	2	0	46	213
<b>Peak 15-Min Flowrates</b>	<b>Northbound</b>				<b>Southbound</b>				<b>Eastbound</b>				<b>Westbound</b>				<b>Total</b>	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	4	0	0	0	28	4	52	0	32	44	0	0	0	76	12	0	252	
Heavy Trucks	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	4	
Pedestrians		0				0				12				0			12	
Bicycles	0	0	0		0	3	0		0	0	0		0	0	0		3	
Railroad																		
Stopped Buses																		

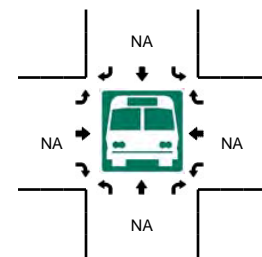
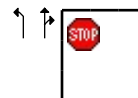
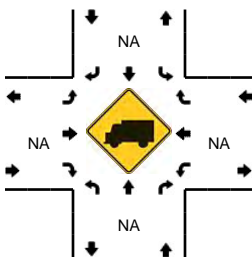
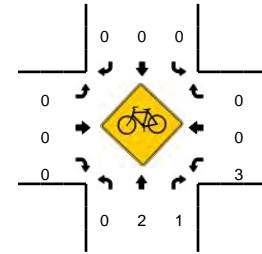
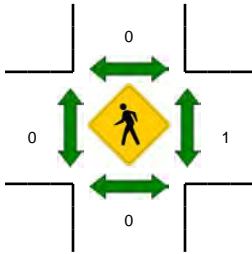
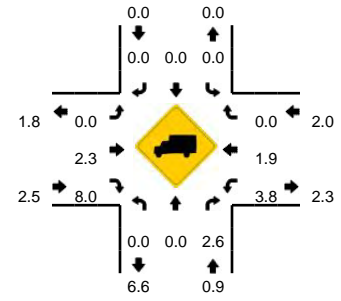
Comments:

**LOCATION:** West St -- Diehl Rd  
**CITY/STATE:** Naperville, IL

**QC JOB #:** 13858201  
**DATE:** Wed, Jul 13 2016



**Peak-Hour: 7:30 AM -- 8:30 AM**  
**Peak 15-Min: 7:30 AM -- 7:45 AM**

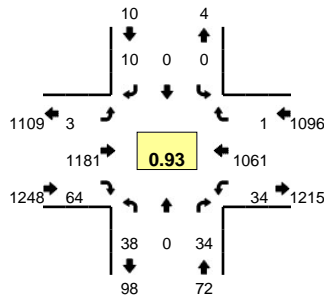


15-Min Count Period Beginning At	West St (Northbound)				West St (Southbound)				Diehl Rd (Eastbound)				Diehl Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	10	0	6	0	0	0	0	0	1	178	10	0	8	121	0	0	334	
7:15 AM	15	0	11	0	0	0	0	0	0	194	11	0	7	174	1	1	414	
7:30 AM	17	0	9	0	0	0	1	0	1	235	6	1	9	232	2	0	513	
7:45 AM	16	0	13	0	0	0	0	0	0	242	13	0	5	218	1	0	508	1769
8:00 AM	15	0	8	0	0	0	1	0	4	210	7	0	7	201	3	0	456	1891
8:15 AM	23	0	9	0	0	0	1	0	3	243	24	1	5	177	2	0	488	1965
8:30 AM	10	0	10	0	0	0	0	0	1	219	9	2	3	178	0	0	432	1884
8:45 AM	16	0	7	0	0	0	1	0	2	224	12	1	3	174	2	0	442	1818
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	68	0	36	0	0	0	4	0	4	940	24	4	36	928	8	0	2052	
Heavy Trucks	0	0	4		0	0	0		0	16	0		0	24	0		44	
Pedestrians		0				0				0				0			0	
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0	
Railroad																	0	
Stopped Buses																	0	

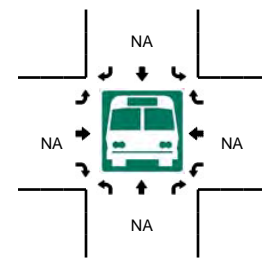
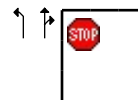
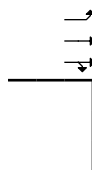
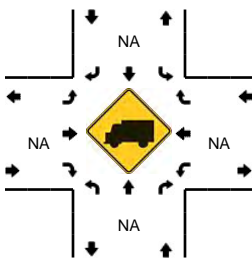
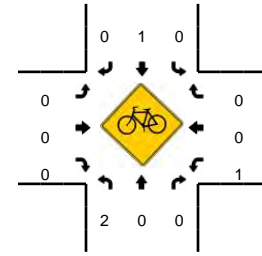
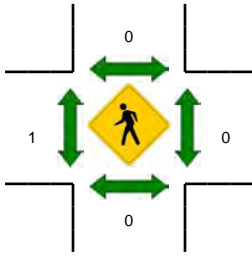
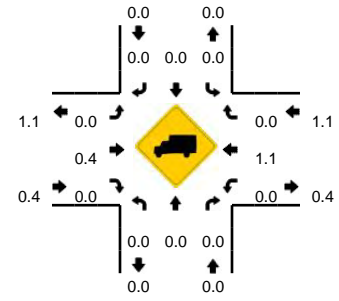
Comments:

**LOCATION:** West St -- Diehl Rd  
**CITY/STATE:** Naperville, IL

**QC JOB #:** 13858202  
**DATE:** Wed, Jul 13 2016



**Peak-Hour: 4:45 PM -- 5:45 PM**  
**Peak 15-Min: 5:00 PM -- 5:15 PM**



15-Min Count Period Beginning At	West St (Northbound)				West St (Southbound)				Diehl Rd (Eastbound)				Diehl Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	11	0	8	0	1	0	4	0	3	210	14	0	2	238	0	0	491	
4:15 PM	13	0	3	0	1	0	3	0	0	206	18	0	3	237	3	0	487	
4:30 PM	8	0	8	0	2	0	2	0	0	252	4	0	2	222	0	0	500	
4:45 PM	4	0	5	0	0	0	2	0	0	285	16	0	5	264	1	0	582	2060
5:00 PM	12	0	9	0	0	0	5	0	2	302	11	0	8	303	0	0	652	2221
5:15 PM	9	0	9	0	0	0	3	0	1	317	21	0	12	262	0	0	634	2368
5:30 PM	13	0	11	0	0	0	0	0	0	277	16	0	9	232	0	0	558	2426
5:45 PM	19	0	7	0	1	0	4	0	3	253	18	0	4	202	0	1	512	2356
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	48	0	36	0	0	0	20	0	8	1208	44	0	32	1212	0	0	2608	
Heavy Trucks	0	0	0		0	0	0		0	12	0		0	8	0		20	
Pedestrians	0				0				0	0			0	0			0	
Bicycles	2	0	0		0	1	0		0	0	0		0	0	0		3	
Railroad																		
Stopped Buses																		

Comments:





**APPENDIX C**

**CAPACITY ANALYSIS WORKSHEETS**

**EXISTING**

Existing (2016)  
1: Mill St & Bauer Rd

Timing Plan: AM Peak Hour



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	242	75	37	26	36	115	24	882	44	52	352	53
Future Volume (vph)	242	75	37	26	36	115	24	882	44	52	352	53
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	220		0	200		0	150		0	150		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	60			200			180			190		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt		0.950			0.886			0.993			0.980	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1770	0	1770	1650	0	1770	3514	0	1770	3468	0
Flt Permitted	0.443			0.681			0.503			0.165		
Satd. Flow (perm)	825	1770	0	1269	1650	0	937	3514	0	307	3468	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		17			108			5			16	
Link Speed (mph)		25			25			40			40	
Link Distance (ft)		1021			872			620			1004	
Travel Time (s)		27.8			23.8			10.6			17.1	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	255	79	39	27	38	121	25	928	46	55	371	56
Shared Lane Traffic (%)												
Lane Group Flow (vph)	255	118	0	27	159	0	25	974	0	55	427	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Detector Phase	7	4		3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	3.0	8.0		3.0	8.0		3.0	15.0		3.0	15.0	
Minimum Split (s)	7.0	14.0		7.0	14.0		7.0	21.0		7.0	21.0	
Total Split (s)	20.0	30.0		20.0	30.0		20.0	60.0		20.0	60.0	
Total Split (%)	15.4%	23.1%		15.4%	23.1%		15.4%	46.2%		15.4%	46.2%	
Yellow Time (s)	3.0	4.0		3.0	4.0		3.0	4.5		3.0	4.5	
All-Red Time (s)	1.0	2.0		1.0	2.0		1.0	1.5		1.0	1.5	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None		None	Min		None	Min	
Act Effct Green (s)	31.9	25.9		19.3	10.7		44.2	37.3		46.6	41.9	
Actuated g/C Ratio	0.36	0.29		0.22	0.12		0.50	0.42		0.53	0.48	
v/c Ratio	0.55	0.22		0.09	0.54		0.05	0.65		0.20	0.26	

Existing (2016)  
1: Mill St & Bauer Rd

Timing Plan: AM Peak Hour



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	28.1	26.3		22.6	22.5		10.0	23.3		11.4	14.7	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	28.1	26.3		22.6	22.5		10.0	23.3		11.4	14.7	
LOS	C	C		C	C		A	C		B	B	
Approach Delay		27.5			22.5			23.0				14.4
Approach LOS		C			C			C				B
Queue Length 50th (ft)	102	38		9	26		6	226		13	60	
Queue Length 95th (ft)	206	111		32	95		19	336		34	126	
Internal Link Dist (ft)		941			792			540			924	
Turn Bay Length (ft)	220			200			150			150		
Base Capacity (vph)	477	550		512	543		665	2236		442	2211	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.53	0.21		0.05	0.29		0.04	0.44		0.12	0.19	

Intersection Summary

Area Type:	Other
Cycle Length:	130
Actuated Cycle Length:	87.9
Natural Cycle:	60
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.65
Intersection Signal Delay:	21.7
Intersection LOS:	C
Intersection Capacity Utilization:	68.2%
ICU Level of Service:	C
Analysis Period (min):	15

Splits and Phases: 1: Mill St & Bauer Rd



**Intersection**

Int Delay, s/veh 1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↶	↷		↶	↷		↶	↶↶	↷	↶	↶↶	
Traffic Vol, veh/h	16	0	45	1	2	0	61	1173	5	3	411	1
Future Vol, veh/h	16	0	45	1	2	0	61	1173	5	3	411	1
Conflicting Peds, #/hr	0	0	0	0	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	0	-	-	0	-	-	190	-	190	190	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	17	0	47	1	2	0	64	1235	5	3	433	1

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1186	1802	217	1586	1803	617	434	0	0	1235	0	0
Stage 1	439	439	-	1363	1363	-	-	-	-	-	-	-
Stage 2	747	1363	-	223	440	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	6.94	4.14	-	-	4.14	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	3.32	2.22	-	-	2.22	-	-
Pot Cap-1 Maneuver	144	79	787	73	79	433	1122	-	-	560	-	-
Stage 1	567	576	-	156	214	-	-	-	-	-	-	-
Stage 2	371	214	-	759	576	-	-	-	-	-	-	-
Platoon blocked, %												
Mov Cap-1 Maneuver	134	74	787	65	74	433	1122	-	-	560	-	-
Mov Cap-2 Maneuver	134	74	-	65	74	-	-	-	-	-	-	-
Stage 1	535	573	-	147	202	-	-	-	-	-	-	-
Stage 2	346	202	-	709	573	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	16.7	57.2	0.4	0.1
HCM LOS	C	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1122	-	-	134	787	65	74	560	-	-
HCM Lane V/C Ratio	0.057	-	-	0.126	0.06	0.016	0.028	0.006	-	-
HCM Control Delay (s)	8.4	-	-	35.7	9.9	61.3	55.1	11.5	-	-
HCM Lane LOS	A	-	-	E	A	F	F	B	-	-
HCM 95th %tile Q(veh)	0.2	-	-	0.4	0.2	0	0.1	0	-	-

**Intersection**

Int Delay, s/veh 3.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↖	↗		↖	↗
Traffic Vol, veh/h	54	53	30	34	8	12
Future Vol, veh/h	54	53	30	34	8	12
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	80	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	57	56	32	36	8	13

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	67	0	49
Stage 1	-	-	49
Stage 2	-	-	169
Critical Hdwy	4.12	-	6.22
Critical Hdwy Stg 1	-	-	5.42
Critical Hdwy Stg 2	-	-	5.42
Follow-up Hdwy	2.218	-	3.318
Pot Cap-1 Maneuver	1535	-	1020
Stage 1	-	-	973
Stage 2	-	-	861
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1535	-	1020
Mov Cap-2 Maneuver	-	-	741
Stage 1	-	-	973
Stage 2	-	-	828

Approach	EB	WB	SB
HCM Control Delay, s	3.8	0	9.1
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1535	-	-	-	741	1020
HCM Lane V/C Ratio	0.037	-	-	-	0.011	0.012
HCM Control Delay (s)	7.4	0	-	-	9.9	8.6
HCM Lane LOS	A	A	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	-	0	0

Intersection												
Int Delay, s/veh	7.1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	10	930	50	26	828	8	71	0	39	0	0	3
Future Vol, veh/h	10	930	50	26	828	8	71	0	39	0	0	3
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	110	-	-	110	-	-	200	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	11	979	53	27	872	8	75	0	41	0	0	3
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	880	0	0	1032	0	0	1517	1961	516	1442	1984	440
Stage 1	-	-	-	-	-	-	1026	1026	-	931	931	-
Stage 2	-	-	-	-	-	-	491	935	-	511	1053	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	764	-	-	669	-	-	82	63	504	93	61	565
Stage 1	-	-	-	-	-	-	251	310	-	287	344	-
Stage 2	-	-	-	-	-	-	528	342	-	514	301	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	764	-	-	669	-	-	78	60	504	82	58	565
Mov Cap-2 Maneuver	-	-	-	-	-	-	78	60	-	82	58	-
Stage 1	-	-	-	-	-	-	247	306	-	283	330	-
Stage 2	-	-	-	-	-	-	504	328	-	465	297	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.1			0.3			122.7			11.4		
HCM LOS							F			B		
Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1			
Capacity (veh/h)	78	504	764	-	-	669	-	-	565			
HCM Lane V/C Ratio	0.958	0.081	0.014	-	-	0.041	-	-	0.006			
HCM Control Delay (s)	183.1	12.8	9.8	-	-	10.6	-	-	11.4			
HCM Lane LOS	F	B	A	-	-	B	-	-	B			
HCM 95th %tile Q(veh)	5.1	0.3	0	-	-	0.1	-	-	0			

Existing (2016)  
1: Mill St & Bauer Rd

Timing Plan: PM Peak Hour



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	69	60	15	63	98	70	28	474	41	168	1343	201
Future Volume (vph)	69	60	15	63	98	70	28	474	41	168	1343	201
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	220		0	200		0	150		0	150		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	60			200			180			190		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt		0.970			0.937			0.988			0.980	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1807	0	1770	1745	0	1770	3497	0	1770	3468	0
Flt Permitted	0.478			0.706			0.081			0.384		
Satd. Flow (perm)	890	1807	0	1315	1745	0	151	3497	0	715	3468	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		9			24			8			16	
Link Speed (mph)		25			25			40			40	
Link Distance (ft)		1021			872			620			1004	
Travel Time (s)		27.8			23.8			10.6			17.1	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	73	63	16	66	103	74	29	499	43	177	1414	212
Shared Lane Traffic (%)												
Lane Group Flow (vph)	73	79	0	66	177	0	29	542	0	177	1626	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Detector Phase	7	4		3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	3.0	8.0		3.0	8.0		3.0	15.0		3.0	15.0	
Minimum Split (s)	7.0	14.0		7.0	14.0		7.0	21.0		7.0	21.0	
Total Split (s)	20.0	30.0		20.0	30.0		20.0	60.0		20.0	60.0	
Total Split (%)	15.4%	23.1%		15.4%	23.1%		15.4%	46.2%		15.4%	46.2%	
Yellow Time (s)	3.0	4.0		3.0	4.0		3.0	4.5		3.0	4.5	
All-Red Time (s)	1.0	2.0		1.0	2.0		1.0	1.5		1.0	1.5	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None		None	Min		None	Min	
Act Effect Green (s)	25.0	15.6		23.8	15.0		56.0	47.3		63.3	55.4	
Actuated g/C Ratio	0.25	0.16		0.24	0.15		0.57	0.48		0.64	0.56	
v/c Ratio	0.24	0.27		0.19	0.62		0.15	0.32		0.31	0.84	

Existing (2016)  
1: Mill St & Bauer Rd

Timing Plan: PM Peak Hour



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	28.6	37.5		27.8	45.6		11.1	18.4		10.4	26.6	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	28.6	37.5		27.8	45.6		11.1	18.4		10.4	26.6	
LOS	C	D		C	D		B	B		B	C	
Approach Delay		33.2			40.8			18.1			25.0	
Approach LOS		C			D			B			C	
Queue Length 50th (ft)	36	42		33	98		7	111		44	497	
Queue Length 95th (ft)	72	88		66	176		22	191		94	#811	
Internal Link Dist (ft)		941			792			540			924	
Turn Bay Length (ft)	220			200			150			150		
Base Capacity (vph)	403	455		455	451		364	1957		632	1944	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.18	0.17		0.15	0.39		0.08	0.28		0.28	0.84	

Intersection Summary

Area Type:	Other
Cycle Length:	130
Actuated Cycle Length:	99.1
Natural Cycle:	65
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.84
Intersection Signal Delay:	25.4
Intersection LOS:	C
Intersection Capacity Utilization	76.8%
ICU Level of Service	D
Analysis Period (min)	15
# 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.	

Splits and Phases: 1: Mill St & Bauer Rd





**Intersection**

Int Delay, s/veh 5.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗		↖	↗	↖	↖	↗	↖
Traffic Vol, veh/h	22	0	67	18	3	4	49	538	26	4	1627	11
Future Vol, veh/h	22	0	67	18	3	4	49	538	26	4	1627	11
Conflicting Peds, #/hr	0	0	0	0	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	0	-	-	0	-	-	190	-	190	190	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	23	0	71	19	3	4	52	566	27	4	1713	12

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	2115	2396	862	1534	2402	283	1724	0	0	566	0	0
Stage 1	1727	1727	-	669	669	-	-	-	-	-	-	-
Stage 2	388	669	-	865	1733	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	6.94	4.14	-	-	4.14	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	3.32	2.22	-	-	2.22	-	-
Pot Cap-1 Maneuver	29	33	298	79	33	714	363	-	-	1002	-	-
Stage 1	92	142	-	413	454	-	-	-	-	-	-	-
Stage 2	607	454	-	315	141	-	-	-	-	-	-	-
Platoon blocked, %												
Mov Cap-1 Maneuver	~ 23	28	298	54	28	714	363	-	-	1002	-	-
Mov Cap-2 Maneuver	~ 23	28	-	54	28	-	-	-	-	-	-	-
Stage 1	79	141	-	354	389	-	-	-	-	-	-	-
Stage 2	513	389	-	239	140	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	121.8	94.7	1.3	0
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	363	-	-	23	298	54	62	1002	-	-
HCM Lane V/C Ratio	0.142	-	-	1.007	0.237	0.351	0.119	0.004	-	-
HCM Control Delay (s)	16.6	-	-	429.4	20.8	104.1	70.7	8.6	-	-
HCM Lane LOS	C	-	-	F	C	F	F	A	-	-
HCM 95th %tile Q(veh)	0.5	-	-	3	0.9	1.3	0.4	0	-	-

**Notes**

~: Volume exceeds capacity    \$: Delay exceeds 300s    +: Computation Not Defined    \*: All major volume in platoon

Intersection						
Int Delay, s/veh	4.5					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↖	↗		↖	↗
Traffic Vol, veh/h	19	45	53	10	44	49
Future Vol, veh/h	19	45	53	10	44	49
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	80	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	20	47	56	11	46	52

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	66	0	61
Stage 1	-	-	61
Stage 2	-	-	87
Critical Hdwy	4.12	-	6.22
Critical Hdwy Stg 1	-	-	5.42
Critical Hdwy Stg 2	-	-	5.42
Follow-up Hdwy	2.218	-	3.318
Pot Cap-1 Maneuver	1536	-	1004
Stage 1	-	-	962
Stage 2	-	-	936
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1536	-	1004
Mov Cap-2 Maneuver	-	-	833
Stage 1	-	-	962
Stage 2	-	-	924

Approach	EB	WB	SB
HCM Control Delay, s	2.2	0	9.2
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1536	-	-	-	833	1004
HCM Lane V/C Ratio	0.013	-	-	-	0.056	0.051
HCM Control Delay (s)	7.4	0	-	-	9.6	8.8
HCM Lane LOS	A	A	-	-	A	A
HCM 95th %tile Q(veh)	0	-	-	-	0.2	0.2

Intersection												
Int Delay, s/veh	5.5											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖ ↗			↖ ↗			↖ ↗			↖ ↗		
Traffic Vol, veh/h	3	1181	64	34	1061	1	38	0	34	0	0	10
Future Vol, veh/h	3	1181	64	34	1061	1	38	0	34	0	0	10
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	110	-	-	110	-	-	200	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	3	1243	67	36	1117	1	40	0	36	0	0	11

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1118	0	0	1311	0	0	1913	2472	655	1817	2506	559
Stage 1	-	-	-	-	-	-	1283	1283	-	1189	1189	-
Stage 2	-	-	-	-	-	-	630	1189	-	628	1317	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	620	-	-	524	-	-	41	30	409	49	28	472
Stage 1	-	-	-	-	-	-	175	234	-	199	260	-
Stage 2	-	-	-	-	-	-	436	260	-	437	225	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	620	-	-	524	-	-	~ 38	28	409	42	26	472
Mov Cap-2 Maneuver	-	-	-	-	-	-	~ 38	28	-	42	26	-
Stage 1	-	-	-	-	-	-	174	233	-	198	242	-
Stage 2	-	-	-	-	-	-	397	242	-	397	224	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.4	177.7	12.8
HCM LOS			F	B

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	38	409	620	-	-	524	-	-	472
HCM Lane V/C Ratio	1.053	0.088	0.005	-	-	0.068	-	-	0.022
HCM Control Delay (s)	\$ 323.7	14.6	10.8	-	-	12.4	-	-	12.8
HCM Lane LOS	F	B	B	-	-	B	-	-	B
HCM 95th %tile Q(veh)	4	0.3	0	-	-	0.2	-	-	0.1

Notes  
 ~: Volume exceeds capacity    \$: Delay exceeds 300s    +: Computation Not Defined    \*: All major volume in platoon

























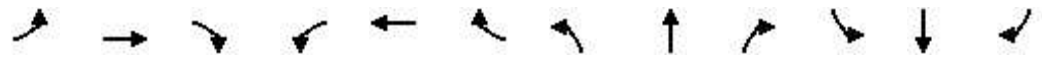
**APPENDIX D**

**CAPACITY ANALYSIS WORKSHEETS**  
**BACKGROUND**

Background (2022)  
1: Mill St & Bauer Rd

Timing Plan: AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	257	80	39	28	38	122	25	939	47	55	376	56
Future Volume (vph)	257	80	39	28	38	122	25	939	47	55	376	56
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	220		0	200		0	150		0	150		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	60			200			180			190		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt		0.951			0.886			0.993			0.981	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1771	0	1770	1650	0	1770	3514	0	1770	3472	0
Flt Permitted	0.413			0.677			0.490			0.153		
Satd. Flow (perm)	769	1771	0	1261	1650	0	913	3514	0	285	3472	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		23			128			6			20	
Link Speed (mph)		25			25			40			40	
Link Distance (ft)		1021			872			620			1004	
Travel Time (s)		27.8			23.8			10.6			17.1	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	271	84	41	29	40	128	26	988	49	58	396	59
Shared Lane Traffic (%)												
Lane Group Flow (vph)	271	125	0	29	168	0	26	1037	0	58	455	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Detector Phase	7	4		3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	3.0	8.0		3.0	8.0		3.0	15.0		3.0	15.0	
Minimum Split (s)	7.0	14.0		7.0	14.0		7.0	21.0		7.0	21.0	
Total Split (s)	16.0	20.0		16.0	20.0		16.0	38.0		16.0	38.0	
Total Split (%)	17.8%	22.2%		17.8%	22.2%		17.8%	42.2%		17.8%	42.2%	
Yellow Time (s)	3.0	4.0		3.0	4.0		3.0	4.5		3.0	4.5	
All-Red Time (s)	1.0	2.0		1.0	2.0		1.0	1.5		1.0	1.5	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None		None	C-Min		None	C-Min	
Act Effct Green (s)	28.4	21.8		18.5	10.0		49.7	42.7		52.4	47.3	
Actuated g/C Ratio	0.32	0.24		0.21	0.11		0.55	0.47		0.58	0.53	
v/c Ratio	0.71	0.28		0.10	0.57		0.05	0.62		0.21	0.25	

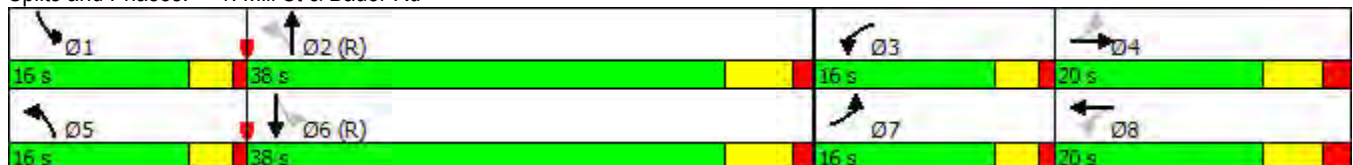


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	36.2	25.8		21.8	19.2		8.6	20.8		14.2	10.8	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	36.2	25.8		21.8	19.2		8.6	20.8		14.2	10.8	
LOS	D	C		C	B		A	C		B	B	
Approach Delay		32.9			19.6			20.5				11.2
Approach LOS		C			B			C				B
Queue Length 50th (ft)	127	45		12	21		5	220		12	50	
Queue Length 95th (ft)	186	100		29	78		18	335		40	70	
Internal Link Dist (ft)		941			792			540			924	
Turn Bay Length (ft)	220			200			150			150		
Base Capacity (vph)	381	446		403	364		657	1670		367	1834	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.71	0.28		0.07	0.46		0.04	0.62		0.16	0.25	

Intersection Summary

Area Type: Other  
 Cycle Length: 90  
 Actuated Cycle Length: 90  
 Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green, Master Intersection  
 Natural Cycle: 60  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.71  
 Intersection Signal Delay: 20.5  
 Intersection LOS: C  
 Intersection Capacity Utilization 71.2%  
 ICU Level of Service C  
 Analysis Period (min) 15

Splits and Phases: 1: Mill St & Bauer Rd



Background (2022)  
2: Mill St & Commons St

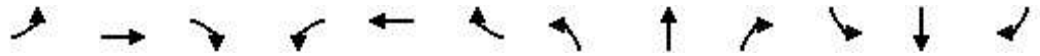
Timing Plan: AM Peak Hour



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	0	50	1	2	0	70	1243	5	3	436	5
Future Volume (vph)	20	0	50	1	2	0	70	1243	5	3	436	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	2000	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	190		190	190		0
Storage Lanes	1		0	1		0	1		1	1		0
Taper Length (ft)	105			25			200			190		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	0.95
Frt		0.850							0.850		0.998	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1583	0	1770	1863	0	1770	3725	1583	1770	3532	0
Flt Permitted	0.714						0.454			0.185		
Satd. Flow (perm)	1330	1583	0	1863	1863	0	846	3725	1583	345	3532	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		582							133			1
Link Speed (mph)		25			30			40				40
Link Distance (ft)		187			314			1004				821
Travel Time (s)		5.1			7.1			17.1				14.0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	21	0	53	1	2	0	74	1308	5	3	459	5
Shared Lane Traffic (%)												
Lane Group Flow (vph)	21	53	0	1	2	0	74	1308	5	3	464	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12				12
Link Offset(ft)		0			0			0				0
Crosswalk Width(ft)		16			16			16				16
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.94	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	
Protected Phases	7	4		3	8		5	2			1	6
Permitted Phases	4			8			2		2	6		
Detector Phase	7	4		3	8		5	2	2	1	6	
Switch Phase												
Minimum Initial (s)	3.0	8.0		3.0	8.0		3.0	15.0	15.0	3.0	15.0	
Minimum Split (s)	7.0	14.0		7.0	14.0		7.0	21.0	21.0	7.0	21.0	
Total Split (s)	16.0	20.0		16.0	20.0		16.0	38.0	38.0	16.0	38.0	
Total Split (%)	17.8%	22.2%		17.8%	22.2%		17.8%	42.2%	42.2%	17.8%	42.2%	
Yellow Time (s)	3.0	4.0		3.0	4.0		3.0	4.5	4.5	3.0	4.5	
All-Red Time (s)	1.0	2.0		1.0	2.0		1.0	1.5	1.5	1.0	1.5	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	4.0	6.0		4.0	6.0		4.0	6.0	6.0	4.0	6.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Recall Mode	None	None		None	None		None	C-Min	C-Min	None	C-Min	
Act Effct Green (s)	10.2	8.4		8.5	8.0		74.9	73.7	73.7	71.2	66.0	
Actuated g/C Ratio	0.11	0.09		0.09	0.09		0.83	0.82	0.82	0.79	0.73	
v/c Ratio	0.11	0.08		0.01	0.01		0.10	0.43	0.00	0.01	0.18	

Background (2022)  
2: Mill St & Commons St

Timing Plan: AM Peak Hour

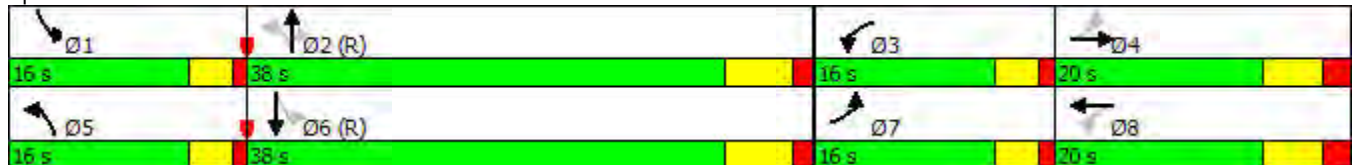


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	33.0	0.2		31.0	37.5		1.9	3.1	0.0	4.0	6.6	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	33.0	0.2		31.0	37.5		1.9	3.1	0.0	4.0	6.6	
LOS	C	A		C	D		A	A	A	A	A	
Approach Delay		9.5			35.3			3.0				6.6
Approach LOS		A			D			A				A
Queue Length 50th (ft)	11	0		1	1		4	87	0	0	47	
Queue Length 95th (ft)	28	0		4	8		m13	146	m0	3	103	
Internal Link Dist (ft)		107			234			924			741	
Turn Bay Length (ft)							190		190	190		
Base Capacity (vph)	265	737		279	289		830	3050	1320	478	2588	
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	
Reduced v/c Ratio	0.08	0.07		0.00	0.01		0.09	0.43	0.00	0.01	0.18	

Intersection Summary

Area Type: Other  
 Cycle Length: 90  
 Actuated Cycle Length: 90  
 Offset: 14 (16%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green  
 Natural Cycle: 60  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.43  
 Intersection Signal Delay: 4.1  
 Intersection LOS: A  
 Intersection Capacity Utilization 57.1%  
 ICU Level of Service B  
 Analysis Period (min) 15  
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Mill St & Commons St





**Intersection**

Int Delay, s/veh 3.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↖	↗		↖	↗
Traffic Vol, veh/h	57	56	32	36	10	13
Future Vol, veh/h	57	56	32	36	10	13
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	80	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	60	59	34	38	11	14

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	72	0	53
Stage 1	-	-	53
Stage 2	-	-	179
Critical Hdwy	4.12	-	6.22
Critical Hdwy Stg 1	-	-	5.42
Critical Hdwy Stg 2	-	-	5.42
Follow-up Hdwy	2.218	-	3.318
Pot Cap-1 Maneuver	1528	-	1014
Stage 1	-	-	970
Stage 2	-	-	852
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1528	-	1014
Mov Cap-2 Maneuver	-	-	725
Stage 1	-	-	970
Stage 2	-	-	817

Approach	EB	WB	SB
HCM Control Delay, s	3.8	0	9.2
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1528	-	-	-	725	1014
HCM Lane V/C Ratio	0.039	-	-	-	0.015	0.013
HCM Control Delay (s)	7.5	0	-	-	10	8.6
HCM Lane LOS	A	A	-	-	B	A
HCM 95th %tile Q(veh)	0.1	-	-	-	0	0

**Intersection**

Int Delay, s/veh 10.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	11	988	55	28	880	8	75	0	42	0	0	3
Future Vol, veh/h	11	988	55	28	880	8	75	0	42	0	0	3
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	110	-	-	110	-	-	200	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	12	1040	58	29	926	8	79	0	44	0	0	3

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	935	0	0	1098	0	0	1614	2086	549	1532	2110	467
Stage 1	-	-	-	-	-	-	1092	1092	-	989	989	-
Stage 2	-	-	-	-	-	-	522	994	-	543	1121	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	728	-	-	631	-	-	~ 69	52	480	80	50	542
Stage 1	-	-	-	-	-	-	229	289	-	265	323	-
Stage 2	-	-	-	-	-	-	506	321	-	492	280	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	728	-	-	631	-	-	~ 65	49	480	69	47	542
Mov Cap-2 Maneuver	-	-	-	-	-	-	~ 65	49	-	69	47	-
Stage 1	-	-	-	-	-	-	225	284	-	261	308	-
Stage 2	-	-	-	-	-	-	480	306	-	439	275	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0.3	190.2	11.7
HCM LOS			F	B

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	65	480	728	-	-	631	-	-	542
HCM Lane V/C Ratio	1.215	0.092	0.016	-	-	0.047	-	-	0.006
HCM Control Delay (s)	289.2	13.3	10	-	-	11	-	-	11.7
HCM Lane LOS	F	B	B	-	-	B	-	-	B
HCM 95th %tile Q(veh)	6.4	0.3	0	-	-	0.1	-	-	0

**Notes**

~: Volume exceeds capacity    \$: Delay exceeds 300s    +: Computation Not Defined    \*: All major volume in platoon

**Intersection**

Int Delay, s/veh 0.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	66	68	9	4	0
Future Vol, veh/h	0	66	68	9	4	0
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	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	69	72	9	4	0

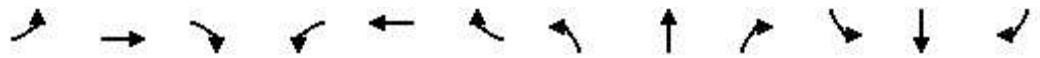
Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	81	0	145
Stage 1	-	-	76
Stage 2	-	-	69
Critical Hdwy	4.12	-	6.42
Critical Hdwy Stg 1	-	-	5.42
Critical Hdwy Stg 2	-	-	5.42
Follow-up Hdwy	2.218	-	3.518
Pot Cap-1 Maneuver	1517	-	847
Stage 1	-	-	947
Stage 2	-	-	954
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1517	-	847
Mov Cap-2 Maneuver	-	-	847
Stage 1	-	-	947
Stage 2	-	-	954

Approach	EB	WB	SB
HCM Control Delay, s	0	0	9.3
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1517	-	-	-	847
HCM Lane V/C Ratio	-	-	-	-	0.005
HCM Control Delay (s)	0	-	-	-	9.3
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

Background (2022)  
1: Mill St & Bauer Rd

Timing Plan: PM Peak Hour



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	73	64	16	67	104	74	30	508	43	178	1429	213
Future Volume (vph)	73	64	16	67	104	74	30	508	43	178	1429	213
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	220		0	200		0	150		0	150		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	60			200			180			190		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt		0.970			0.937			0.988			0.981	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1807	0	1770	1745	0	1770	3497	0	1770	3472	0
Flt Permitted	0.484			0.702			0.100			0.352		
Satd. Flow (perm)	902	1807	0	1308	1745	0	186	3497	0	656	3472	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		12			34			11			20	
Link Speed (mph)		25			25			40			40	
Link Distance (ft)		1021			872			620			1004	
Travel Time (s)		27.8			23.8			10.6			17.1	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	77	67	17	71	109	78	32	535	45	187	1504	224
Shared Lane Traffic (%)												
Lane Group Flow (vph)	77	84	0	71	187	0	32	580	0	187	1728	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Detector Phase	7	4		3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	3.0	8.0		3.0	8.0		3.0	15.0		3.0	15.0	
Minimum Split (s)	7.0	14.0		7.0	14.0		7.0	21.0		7.0	21.0	
Total Split (s)	16.0	20.0		16.0	20.0		16.0	38.0		16.0	38.0	
Total Split (%)	17.8%	22.2%		17.8%	22.2%		17.8%	42.2%		17.8%	42.2%	
Yellow Time (s)	3.0	4.0		3.0	4.0		3.0	4.5		3.0	4.5	
All-Red Time (s)	1.0	2.0		1.0	2.0		1.0	1.5		1.0	1.5	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None		None	C-Min		None	C-Min	
Act Effect Green (s)	22.9	13.6		22.1	13.2		49.0	40.7		56.3	47.9	
Actuated g/C Ratio	0.25	0.15		0.25	0.15		0.54	0.45		0.63	0.53	
v/c Ratio	0.25	0.30		0.20	0.66		0.15	0.37		0.35	0.93	

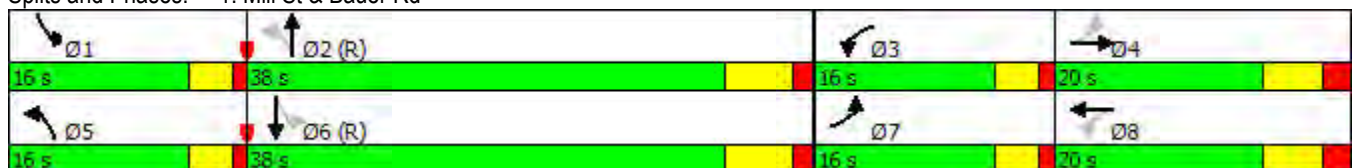


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	23.2	31.0		22.3	40.5		10.8	18.8		4.8	23.2	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	23.2	31.0		22.3	40.5		10.8	18.8		4.8	23.2	
LOS	C	C		C	D		B	B		A	C	
Approach Delay		27.3			35.5			18.4			21.4	
Approach LOS		C			D			B			C	
Queue Length 50th (ft)	31	36		29	82		7	115		9	~581	
Queue Length 95th (ft)	60	77		56	150		20	177		m20	#751	
Internal Link Dist (ft)		941			792			540			924	
Turn Bay Length (ft)	220			200			150			150		
Base Capacity (vph)	369	312		424	313		323	1588		558	1858	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.21	0.27		0.17	0.60		0.10	0.37		0.34	0.93	

Intersection Summary

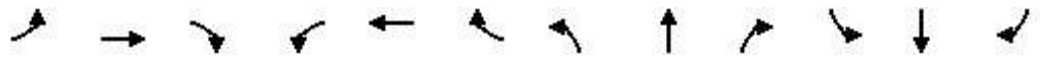
Area Type: Other  
 Cycle Length: 90  
 Actuated Cycle Length: 90  
 Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green, Master Intersection  
 Natural Cycle: 70  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.93  
 Intersection Signal Delay: 22.3  
 Intersection LOS: C  
 Intersection Capacity Utilization 80.3%  
 ICU Level of Service D  
 Analysis Period (min) 15  
 ~ Volume exceeds capacity, queue is theoretically infinite.  
 Queue shown is maximum after two cycles.  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.  
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: Mill St & Bauer Rd



Background (2022)  
2: Mill St & Commons St

Timing Plan: PM Peak Hour



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	31	0	76	19	3	4	57	570	28	4	1725	17
Future Volume (vph)	31	0	76	19	3	4	57	570	28	4	1725	17
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	2000	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	190		190	190		0
Storage Lanes	1		0	1		0	1		1	1		0
Taper Length (ft)	105			25			200			190		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	0.95
Frt		0.850			0.914				0.850		0.999	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1583	0	1770	1703	0	1770	3725	1583	1770	3536	0
Flt Permitted	0.556						0.070			0.425		
Satd. Flow (perm)	1036	1583	0	1863	1703	0	130	3725	1583	792	3536	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		450			4				133			1
Link Speed (mph)		25			30			40				40
Link Distance (ft)		207			314			1004				821
Travel Time (s)		5.6			7.1			17.1				14.0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	33	0	80	20	3	4	60	600	29	4	1816	18
Shared Lane Traffic (%)												
Lane Group Flow (vph)	33	80	0	20	7	0	60	600	29	4	1834	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12				12
Link Offset(ft)		0			0			0				0
Crosswalk Width(ft)		16			16			16				16
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.94	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2		2	6		
Detector Phase	7	4		3	8		5	2	2	1	6	
Switch Phase												
Minimum Initial (s)	3.0	8.0		3.0	8.0		3.0	15.0	15.0	3.0	15.0	
Minimum Split (s)	7.0	14.0		7.0	14.0		7.0	21.0	21.0	7.0	21.0	
Total Split (s)	16.0	20.0		16.0	20.0		16.0	38.0	38.0	16.0	38.0	
Total Split (%)	17.8%	22.2%		17.8%	22.2%		17.8%	42.2%	42.2%	17.8%	42.2%	
Yellow Time (s)	3.0	4.0		3.0	4.0		3.0	4.5	4.5	3.0	4.5	
All-Red Time (s)	1.0	2.0		1.0	2.0		1.0	1.5	1.5	1.0	1.5	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	4.0	6.0		4.0	6.0		4.0	6.0	6.0	4.0	6.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Recall Mode	None	None		None	None		None	C-Min	C-Min	None	C-Min	
Act Effct Green (s)	13.3	8.2		9.4	8.0		69.6	67.3	67.3	66.0	60.7	
Actuated g/C Ratio	0.15	0.09		0.10	0.09		0.77	0.75	0.75	0.73	0.67	
v/c Ratio	0.14	0.14		0.11	0.05		0.28	0.22	0.02	0.01	0.77	

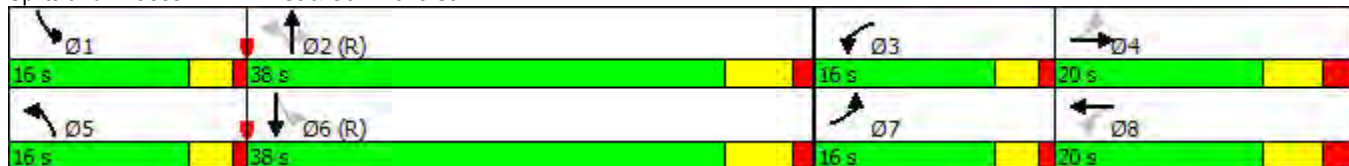


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	30.4	0.6		33.7	29.4		17.8	10.8	1.7	5.0	18.1	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	30.4	0.6		33.7	29.4		17.8	10.8	1.7	5.0	18.1	
LOS	C	A		C	C		B	B	A	A	B	
Approach Delay		9.3			32.6			11.0				18.1
Approach LOS		A			C			B				B
Queue Length 50th (ft)	17	0		11	2		11	27	0	0	336	
Queue Length 95th (ft)	38	0		26	15		m53	174	m5	4	#730	
Internal Link Dist (ft)		127			234			924			741	
Turn Bay Length (ft)							190		190	190		
Base Capacity (vph)	297	626		279	268		319	2783	1216	746	2386	
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	
Reduced v/c Ratio	0.11	0.13		0.07	0.03		0.19	0.22	0.02	0.01	0.77	

Intersection Summary

Area Type: Other  
 Cycle Length: 90  
 Actuated Cycle Length: 90  
 Offset: 80 (89%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green  
 Natural Cycle: 75  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.77  
 Intersection Signal Delay: 16.0 Intersection LOS: B  
 Intersection Capacity Utilization 66.6% ICU Level of Service C  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.  
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Mill St & Commons St



**Intersection**

Int Delay, s/veh 4.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↖	↗		↖	↗
Traffic Vol, veh/h	20	48	56	12	47	52
Future Vol, veh/h	20	48	56	12	47	52
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	80	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	21	51	59	13	49	55

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	72	0	65
Stage 1	-	-	65
Stage 2	-	-	93
Critical Hdwy	4.12	-	6.22
Critical Hdwy Stg 1	-	-	5.42
Critical Hdwy Stg 2	-	-	5.42
Follow-up Hdwy	2.218	-	3.318
Pot Cap-1 Maneuver	1528	-	999
Stage 1	-	-	958
Stage 2	-	-	931
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1528	-	999
Mov Cap-2 Maneuver	-	-	821
Stage 1	-	-	958
Stage 2	-	-	918

Approach	EB	WB	SB
HCM Control Delay, s	2.2	0	9.2
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1528	-	-	-	821	999
HCM Lane V/C Ratio	0.014	-	-	-	0.06	0.055
HCM Control Delay (s)	7.4	0	-	-	9.7	8.8
HCM Lane LOS	A	A	-	-	A	A
HCM 95th %tile Q(veh)	0	-	-	-	0.2	0.2



**Intersection**

Int Delay, s/veh 8.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖ ↗	↖ ↗		↖ ↗	↖ ↗		↖ ↗	↖ ↗			↖ ↗	
Traffic Vol, veh/h	3	1254	70	36	1131	1	40	0	38	0	0	11
Future Vol, veh/h	3	1254	70	36	1131	1	40	0	38	0	0	11
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	110	-	-	110	-	-	200	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	3	1320	74	38	1191	1	42	0	40	0	0	12

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1192	0	0	1394	0	0	2034	2630	697	1933	2667	596
Stage 1	-	-	-	-	-	-	1363	1363	-	1267	1267	-
Stage 2	-	-	-	-	-	-	671	1267	-	666	1400	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	581	-	-	487	-	-	~ 33	23	383	40	22	447
Stage 1	-	-	-	-	-	-	156	214	-	179	238	-
Stage 2	-	-	-	-	-	-	412	238	-	415	205	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	581	-	-	487	-	-	~ 30	21	383	34	20	447
Mov Cap-2 Maneuver	-	-	-	-	-	-	~ 30	21	-	34	20	-
Stage 1	-	-	-	-	-	-	155	213	-	178	219	-
Stage 2	-	-	-	-	-	-	370	219	-	370	204	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.4	266.9	13.3
HCM LOS			F	B

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	30	383	581	-	-	487	-	-	447
HCM Lane V/C Ratio	1.404	0.104	0.005	-	-	0.078	-	-	0.026
HCM Control Delay (s)	\$ 505.7	15.5	11.2	-	-	13	-	-	13.3
HCM Lane LOS	F	C	B	-	-	B	-	-	B
HCM 95th %tile Q(veh)	4.8	0.3	0	-	-	0.3	-	-	0.1

**Notes**  
 ~: Volume exceeds capacity    \$: Delay exceeds 300s    +: Computation Not Defined    \*: All major volume in platoon

**Intersection**

Int Delay, s/veh 0.7

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	95	67	10	12	1
Future Vol, veh/h	0	95	67	10	12	1
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	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	100	71	11	13	1

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	81	0	176
Stage 1	-	-	76
Stage 2	-	-	100
Critical Hdwy	4.12	-	6.42
Critical Hdwy Stg 1	-	-	5.42
Critical Hdwy Stg 2	-	-	5.42
Follow-up Hdwy	2.218	-	3.518
Pot Cap-1 Maneuver	1517	-	814
Stage 1	-	-	947
Stage 2	-	-	924
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1517	-	814
Mov Cap-2 Maneuver	-	-	814
Stage 1	-	-	947
Stage 2	-	-	924

Approach	EB	WB	SB
HCM Control Delay, s	0	0	9.4
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1517	-	-	-	825
HCM Lane V/C Ratio	-	-	-	-	0.017
HCM Control Delay (s)	0	-	-	-	9.4
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0.1

























**APPENDIX E**

**CAPACITY ANALYSIS WORKSHEETS**  
**FUTURE WITH PROJECT**

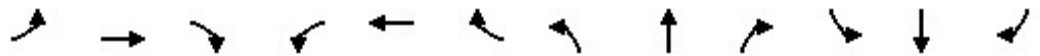
Future with Project (2022)  
1: Mill St & Bauer Rd

Timing Plan: AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	257	80	39	28	38	122	25	943	47	55	384	56
Future Volume (vph)	257	80	39	28	38	122	25	943	47	55	384	56
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	220		0	200		0	150		0	150		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	60			200			180			190		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt		0.951			0.886			0.993			0.981	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1771	0	1770	1650	0	1770	3514	0	1770	3472	0
Flt Permitted	0.413			0.677			0.486			0.152		
Satd. Flow (perm)	769	1771	0	1261	1650	0	905	3514	0	283	3472	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		23			128			6			20	
Link Speed (mph)		25			25			40			40	
Link Distance (ft)		1021			872			620			593	
Travel Time (s)		27.8			23.8			10.6			10.1	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	271	84	41	29	40	128	26	993	49	58	404	59
Shared Lane Traffic (%)												
Lane Group Flow (vph)	271	125	0	29	168	0	26	1042	0	58	463	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Detector Phase	7	4		3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	3.0	8.0		3.0	8.0		3.0	15.0		3.0	15.0	
Minimum Split (s)	7.0	14.0		7.0	14.0		7.0	21.0		7.0	21.0	
Total Split (s)	16.0	20.0		16.0	20.0		16.0	38.0		16.0	38.0	
Total Split (%)	17.8%	22.2%		17.8%	22.2%		17.8%	42.2%		17.8%	42.2%	
Yellow Time (s)	3.0	4.0		3.0	4.0		3.0	4.5		3.0	4.5	
All-Red Time (s)	1.0	2.0		1.0	2.0		1.0	1.5		1.0	1.5	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None		None	C-Min		None	C-Min	
Act Effct Green (s)	28.2	21.6		18.5	10.0		49.9	42.9		52.7	47.5	
Actuated g/C Ratio	0.31	0.24		0.21	0.11		0.55	0.48		0.59	0.53	
v/c Ratio	0.72	0.28		0.10	0.57		0.05	0.62		0.21	0.25	

Future with Project (2022)  
1: Mill St & Bauer Rd

Timing Plan: AM Peak Hour



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	36.9	26.0		21.8	19.2		8.6	20.7		14.4	10.8	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	36.9	26.0		21.8	19.2		8.6	20.7		14.4	10.8	
LOS	D	C		C	B		A	C		B	B	
Approach Delay		33.4			19.6			20.4				11.2
Approach LOS		C			B			C				B
Queue Length 50th (ft)	127	45		12	21		5	222		12	51	
Queue Length 95th (ft)	186	100		29	78		18	337		41	72	
Internal Link Dist (ft)		941			792			540				513
Turn Bay Length (ft)	220			200			150			150		
Base Capacity (vph)	376	441		403	364		655	1679		367	1843	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.72	0.28		0.07	0.46		0.04	0.62		0.16	0.25	

Intersection Summary























Area Type: Other  
 Cycle Length: 90  
 Actuated Cycle Length: 90  
 Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green, Master Intersection  
 Natural Cycle: 60  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.72  
 Intersection Signal Delay: 20.5  
 Intersection LOS: C  
 Intersection Capacity Utilization 71.3%  
 ICU Level of Service C  
 Analysis Period (min) 15

Splits and Phases: 1: Mill St & Bauer Rd



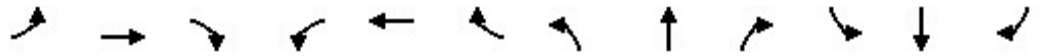
Future with Project (2022)  
2: Mill St & Commons St

Timing Plan: AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	27	0	58	1	2	0	74	1243	5	3	436	8
Future Volume (vph)	27	0	58	1	2	0	74	1243	5	3	436	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	2000	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	190		190	190		0
Storage Lanes	1		0	1		0	1		1	1		0
Taper Length (ft)	105			25			200			190		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	0.95
Frt		0.850							0.850		0.997	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1583	0	1770	1863	0	1770	3725	1583	1770	3529	0
Flt Permitted	0.548			0.833			0.452			0.180		
Satd. Flow (perm)	1021	1583	0	1552	1863	0	842	3725	1583	335	3529	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		582							133			2
Link Speed (mph)		25			30			40				40
Link Distance (ft)		187			314			410				821
Travel Time (s)		5.1			7.1			7.0				14.0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	28	0	61	1	2	0	78	1308	5	3	459	8
Shared Lane Traffic (%)												
Lane Group Flow (vph)	28	61	0	1	2	0	78	1308	5	3	467	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12				12
Link Offset(ft)		0			0			0				0
Crosswalk Width(ft)		16			16			16				16
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.94	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2		2	6		
Detector Phase	7	4		3	8		5	2	2	1	6	
Switch Phase												
Minimum Initial (s)	3.0	8.0		3.0	8.0		3.0	15.0	15.0	3.0	15.0	
Minimum Split (s)	7.0	14.0		7.0	14.0		7.0	21.0	21.0	7.0	21.0	
Total Split (s)	16.0	20.0		16.0	20.0		16.0	38.0	38.0	16.0	38.0	
Total Split (%)	17.8%	22.2%		17.8%	22.2%		17.8%	42.2%	42.2%	17.8%	42.2%	
Yellow Time (s)	3.0	4.0		3.0	4.0		3.0	4.5	4.5	3.0	4.5	
All-Red Time (s)	1.0	2.0		1.0	2.0		1.0	1.5	1.5	1.0	1.5	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	4.0	6.0		4.0	6.0		4.0	6.0	6.0	4.0	6.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Recall Mode	None	None		None	None		None	C-Min	C-Min	None	C-Min	
Act Effct Green (s)	11.3	8.5		9.4	8.0		72.0	69.6	69.6	68.1	62.9	
Actuated g/C Ratio	0.13	0.09		0.10	0.09		0.80	0.77	0.77	0.76	0.70	
v/c Ratio	0.15	0.09		0.01	0.01		0.11	0.45	0.00	0.01	0.19	

Future with Project (2022)  
2: Mill St & Commons St

Timing Plan: AM Peak Hour



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	33.4	0.3		30.0	37.5		2.1	3.6	0.0	4.0	7.4	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	33.4	0.3		30.0	37.5		2.1	3.6	0.0	4.0	7.4	
LOS	C	A		C	D		A	A	A	A	A	
Approach Delay		10.7			35.0			3.5				7.4
Approach LOS		B			C			A				A
Queue Length 50th (ft)	15	0		1	1		5	87	0	0	47	
Queue Length 95th (ft)	34	0		4	8		m14	145	m0	3	106	
Internal Link Dist (ft)		107			234			330			741	
Turn Bay Length (ft)							190		190	190		
Base Capacity (vph)	259	737		270	289		800	2880	1253	460	2466	
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	
Reduced v/c Ratio	0.11	0.08		0.00	0.01		0.10	0.45	0.00	0.01	0.19	

Intersection Summary

Area Type: Other  
 Cycle Length: 90  
 Actuated Cycle Length: 90  
 Offset: 14 (16%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green  
 Natural Cycle: 60  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.45  
 Intersection Signal Delay: 4.8  
 Intersection LOS: A  
 Intersection Capacity Utilization 57.5%  
 ICU Level of Service B  
 Analysis Period (min) 15  
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Mill St & Commons St



Future with Project (2022)  
3: Commons St & West St

Timing Plan: AM Peak Hour

Intersection												
Int Delay, s/veh	3.4											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕		↕	↕	↕
Traffic Vol, veh/h	57	56	0	0	32	37	0	3	2	11	2	13
Future Vol, veh/h	57	56	0	0	32	37	0	3	2	11	2	13
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	80	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	60	59	0	0	34	39	0	3	2	12	2	14
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	73	0	0	59	0	0	240	252	59	235	232	53
Stage 1	-	-	-	-	-	-	179	179	-	53	53	-
Stage 2	-	-	-	-	-	-	61	73	-	182	179	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1527	-	-	1545	-	-	714	651	1007	720	668	1014
Stage 1	-	-	-	-	-	-	823	751	-	960	851	-
Stage 2	-	-	-	-	-	-	950	834	-	820	751	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1527	-	-	1545	-	-	681	624	1007	693	641	1014
Mov Cap-2 Maneuver	-	-	-	-	-	-	681	624	-	693	641	-
Stage 1	-	-	-	-	-	-	789	720	-	921	851	-
Stage 2	-	-	-	-	-	-	935	834	-	781	720	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	3.8			0			9.9			9.5		
HCM LOS							A			A		
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2			
Capacity (veh/h)	736	1527	-	-	1545	-	-	693	941			
HCM Lane V/C Ratio	0.007	0.039	-	-	-	-	-	0.017	0.017			
HCM Control Delay (s)	9.9	7.5	0	-	0	-	-	10.3	8.9			
HCM Lane LOS	A	A	A	-	A	-	-	B	A			
HCM 95th %tile Q(veh)	0	0.1	-	-	0	-	-	0.1	0.1			



**Intersection**

Int Delay, s/veh 11.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖ ↗	↖ ↗		↖ ↗	↖ ↗		↖ ↗	↖ ↗			↖ ↗	
Traffic Vol, veh/h	11	990	58	28	886	8	77	0	44	0	0	3
Future Vol, veh/h	11	990	58	28	886	8	77	0	44	0	0	3
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	110	-	-	110	-	-	200	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	12	1042	61	29	933	8	81	0	46	0	0	3

Major/Minor	Major1	Major2	Minor1	Minor2
Conflicting Flow All	941	0	0	1103
Stage 1	-	-	-	-
Stage 2	-	-	-	-
Critical Hdwy	4.14	-	-	4.14
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-
Follow-up Hdwy	2.22	-	-	2.22
Pot Cap-1 Maneuver	724	-	-	629
Stage 1	-	-	-	-
Stage 2	-	-	-	-
Platoon blocked, %	-	-	-	-
Mov Cap-1 Maneuver	724	-	-	629
Mov Cap-2 Maneuver	-	-	-	-
Stage 1	-	-	-	-
Stage 2	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0.3	202.1	11.7
HCM LOS			F	B

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	64	477	724	-	-	629	-	-	539
HCM Lane V/C Ratio	1.266	0.097	0.016	-	-	0.047	-	-	0.006
HCM Control Delay (s)	\$ 310	13.4	10.1	-	-	11	-	-	11.7
HCM Lane LOS	F	B	B	-	-	B	-	-	B
HCM 95th %tile Q(veh)	6.7	0.3	0	-	-	0.1	-	-	0

**Notes**  
 ~: Volume exceeds capacity    \$: Delay exceeds 300s    +: Computation Not Defined    \*: All major volume in platoon

**Intersection**

Int Delay, s/veh 0.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↖			↗				↖		↗	
Traffic Vol, veh/h	0	79	0	0	75	9	0	0	2	4	0	0
Future Vol, veh/h	0	79	0	0	75	9	0	0	2	4	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	83	0	0	79	9	0	0	2	4	0	0

Major/Minor	Major1	Major2	Minor1	Minor2
Conflicting Flow All	88	0	-	83
Stage 1	-	-	-	-
Stage 2	-	-	-	-
Critical Hdwy	4.12	-	-	6.22
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-
Follow-up Hdwy	2.218	-	-	3.318
Pot Cap-1 Maneuver	1508	0	0	976
Stage 1	-	0	0	-
Stage 2	-	0	0	-
Platoon blocked, %	-	-	-	-
Mov Cap-1 Maneuver	1508	-	-	976
Mov Cap-2 Maneuver	-	-	-	-
Stage 1	-	-	-	-
Stage 2	-	-	-	-























Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	8.7	9.6
HCM LOS			A	A

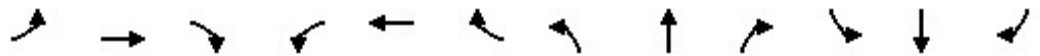
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	976	1508	-	-	-	795
HCM Lane V/C Ratio	0.002	-	-	-	-	0.005
HCM Control Delay (s)	8.7	0	-	-	-	9.6
HCM Lane LOS	A	A	-	-	-	A
HCM 95th %tile Q(veh)	0	0	-	-	-	0

Intersection						
Int Delay, s/veh	1					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↶		↷		↶	
Traffic Vol, veh/h	68	1	7	68	1	11
Future Vol, veh/h	68	1	7	68	1	11
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	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	72	1	7	72	1	12
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	73	0	158	72
Stage 1	-	-	-	-	72	-
Stage 2	-	-	-	-	86	-
Critical Hdwy	-	-	4.12	-	7.12	6.22
Critical Hdwy Stg 1	-	-	-	-	6.12	-
Critical Hdwy Stg 2	-	-	-	-	6.12	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1527	-	808	990
Stage 1	-	-	-	-	938	-
Stage 2	-	-	-	-	922	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1527	-	805	990
Mov Cap-2 Maneuver	-	-	-	-	805	-
Stage 1	-	-	-	-	938	-
Stage 2	-	-	-	-	918	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		0.7		8.8	
HCM LOS					A	
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	971	-	-	1527	-	
HCM Lane V/C Ratio	0.013	-	-	0.005	-	
HCM Control Delay (s)	8.8	-	-	7.4	-	
HCM Lane LOS	A	-	-	A	-	
HCM 95th %tile Q(veh)	0	-	-	0	-	

Future with Project (2022)  
1: Mill St & Bauer Rd

Timing Plan: PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	73	64	16	67	104	74	30	516	43	178	1436	213
Future Volume (vph)	73	64	16	67	104	74	30	516	43	178	1436	213
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	220		0	200		0	150		0	150		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	60			200			180			190		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt		0.970			0.937			0.989			0.981	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1807	0	1770	1745	0	1770	3500	0	1770	3472	0
Flt Permitted	0.472			0.702			0.098			0.351		
Satd. Flow (perm)	879	1807	0	1308	1745	0	183	3500	0	654	3472	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		12			34			11			20	
Link Speed (mph)		25			25			40			40	
Link Distance (ft)		1021			872			620			584	
Travel Time (s)		27.8			23.8			10.6			10.0	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	77	67	17	71	109	78	32	543	45	187	1512	224
Shared Lane Traffic (%)												
Lane Group Flow (vph)	77	84	0	71	187	0	32	588	0	187	1736	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Detector Phase	7	4		3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	3.0	8.0		3.0	8.0		3.0	15.0		3.0	15.0	
Minimum Split (s)	7.0	14.0		7.0	14.0		7.0	21.0		7.0	21.0	
Total Split (s)	16.0	20.0		16.0	20.0		16.0	38.0		16.0	38.0	
Total Split (%)	17.8%	22.2%		17.8%	22.2%		17.8%	42.2%		17.8%	42.2%	
Yellow Time (s)	3.0	4.0		3.0	4.0		3.0	4.5		3.0	4.5	
All-Red Time (s)	1.0	2.0		1.0	2.0		1.0	1.5		1.0	1.5	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None		None	C-Min		None	C-Min	
Act Effct Green (s)	22.2	12.9		21.5	12.5		49.7	41.4		56.9	48.6	
Actuated g/C Ratio	0.25	0.14		0.24	0.14		0.55	0.46		0.63	0.54	
v/c Ratio	0.26	0.31		0.20	0.69		0.15	0.36		0.35	0.92	



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	23.7	31.7		22.8	43.0		10.6	18.4		4.8	22.0	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	23.7	31.7		22.8	43.0		10.6	18.4		4.8	22.0	
LOS	C	C		C	D		B	B		A	C	
Approach Delay		27.9			37.4			18.0			20.3	
Approach LOS		C			D			B			C	
Queue Length 50th (ft)	31	37		29	83		7	114		9	~575	
Queue Length 95th (ft)	60	77		56	150		20	180		m21	#755	
Internal Link Dist (ft)		941			792			540			504	
Turn Bay Length (ft)	220			200			150			150		
Base Capacity (vph)	360	306		416	309		323	1617		562	1882	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.21	0.27		0.17	0.61		0.10	0.36		0.33	0.92	

Intersection Summary

Area Type: Other  
 Cycle Length: 90  
 Actuated Cycle Length: 90  
 Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green, Master Intersection  
 Natural Cycle: 75  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.92  
 Intersection Signal Delay: 21.7  
 Intersection LOS: C  
 Intersection Capacity Utilization 80.5%  
 ICU Level of Service D  
 Analysis Period (min) 15  
 ~ Volume exceeds capacity, queue is theoretically infinite.  
 Queue shown is maximum after two cycles.  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.  
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: Mill St & Bauer Rd



Future with Project (2022)  
2: Mill St & Commons St

Timing Plan: PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	37	0	83	19	3	4	65	570	28	4	1725	25
Future Volume (vph)	37	0	83	19	3	4	65	570	28	4	1725	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	2000	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	190		190	190		0
Storage Lanes	1		0	1		0	1		1	1		0
Taper Length (ft)	105			25			200			190		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	0.95
Frt		0.850			0.914				0.850		0.998	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1583	0	1770	1703	0	1770	3725	1583	1770	3532	0
Flt Permitted	0.556						0.070			0.425		
Satd. Flow (perm)	1036	1583	0	1863	1703	0	130	3725	1583	792	3532	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		450			4				133			2
Link Speed (mph)		25			30			40				40
Link Distance (ft)		207			314			420				821
Travel Time (s)		5.6			7.1			7.2				14.0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	39	0	87	20	3	4	68	600	29	4	1816	26
Shared Lane Traffic (%)												
Lane Group Flow (vph)	39	87	0	20	7	0	68	600	29	4	1842	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12				12
Link Offset(ft)		0			0			0				0
Crosswalk Width(ft)		16			16			16				16
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.94	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2		2	6		
Detector Phase	7	4		3	8		5	2	2	1	6	
Switch Phase												
Minimum Initial (s)	3.0	8.0		3.0	8.0		3.0	15.0	15.0	3.0	15.0	
Minimum Split (s)	7.0	14.0		7.0	14.0		7.0	21.0	21.0	7.0	21.0	
Total Split (s)	16.0	20.0		16.0	20.0		16.0	38.0	38.0	16.0	38.0	
Total Split (%)	17.8%	22.2%		17.8%	22.2%		17.8%	42.2%	42.2%	17.8%	42.2%	
Yellow Time (s)	3.0	4.0		3.0	4.0		3.0	4.5	4.5	3.0	4.5	
All-Red Time (s)	1.0	2.0		1.0	2.0		1.0	1.5	1.5	1.0	1.5	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	4.0	6.0		4.0	6.0		4.0	6.0	6.0	4.0	6.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Recall Mode	None	None		None	None		None	C-Min	C-Min	None	C-Min	
Act Effct Green (s)	13.4	8.3		9.4	8.0		69.6	67.2	67.2	65.8	60.5	
Actuated g/C Ratio	0.15	0.09		0.10	0.09		0.77	0.75	0.75	0.73	0.67	
v/c Ratio	0.16	0.16		0.11	0.05		0.31	0.22	0.02	0.01	0.78	



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	30.7	0.6		33.6	29.4		18.7	10.7	1.7	5.0	18.5	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	30.7	0.6		33.6	29.4		18.7	10.7	1.7	5.0	18.5	
LOS	C	A		C	C		B	B	A	A	B	
Approach Delay		9.9			32.5			11.1				18.5
Approach LOS		A			C			B				B
Queue Length 50th (ft)	21	0		11	2		13	28	0	0	341	
Queue Length 95th (ft)	42	0		26	15		m60	177	m5	4	#745	
Internal Link Dist (ft)		127			234			340			741	
Turn Bay Length (ft)							190		190	190		
Base Capacity (vph)	297	626		279	268		319	2780	1215	746	2375	
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	
Reduced v/c Ratio	0.13	0.14		0.07	0.03		0.21	0.22	0.02	0.01	0.78	

Intersection Summary

Area Type: Other  
 Cycle Length: 90  
 Actuated Cycle Length: 90  
 Offset: 80 (89%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green  
 Natural Cycle: 75  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.78  
 Intersection Signal Delay: 16.3  
 Intersection LOS: B  
 Intersection Capacity Utilization 72.7%  
 ICU Level of Service C  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.  
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Mill St & Commons St



Future with Project (2022)  
3: Commons St & West St

Timing Plan: PM Peak Hour

Intersection												
Int Delay, s/veh	4.8											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕		↕	↕	
Traffic Vol, veh/h	20	48	0	0	56	13	0	3	2	48	3	52
Future Vol, veh/h	20	48	0	0	56	13	0	3	2	48	3	52
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	80	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	21	51	0	0	59	14	0	3	2	51	3	55

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	73	0	0	51	0	0	188	166	51	161	159	66
Stage 1	-	-	-	-	-	-	93	93	-	66	66	-
Stage 2	-	-	-	-	-	-	95	73	-	95	93	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1527	-	-	1555	-	-	772	727	1017	804	733	998
Stage 1	-	-	-	-	-	-	914	818	-	945	840	-
Stage 2	-	-	-	-	-	-	912	834	-	912	818	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1527	-	-	1555	-	-	719	717	1017	791	723	998
Mov Cap-2 Maneuver	-	-	-	-	-	-	719	717	-	791	723	-
Stage 1	-	-	-	-	-	-	901	807	-	932	840	-
Stage 2	-	-	-	-	-	-	859	834	-	894	807	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	2.2	0	9.5	9.4
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	813	1527	-	-	1555	-	-	791	978
HCM Lane V/C Ratio	0.006	0.014	-	-	-	-	-	0.064	0.059
HCM Control Delay (s)	9.5	7.4	0	-	0	-	-	9.9	8.9
HCM Lane LOS	A	A	A	-	A	-	-	A	A
HCM 95th %tile Q(veh)	0	0	-	-	0	-	-	0.2	0.2



Intersection												
Int Delay, s/veh	9.1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↕		↖	↕		↖	↗			↕	
Traffic Vol, veh/h	3	1258	74	36	1136	1	42	0	40	0	0	11
Future Vol, veh/h	3	1258	74	36	1136	1	42	0	40	0	0	11
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	110	-	-	110	-	-	200	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	3	1324	78	38	1196	1	44	0	42	0	0	12

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1197	0	0	1402	0	0	2043	2642	701	1940	2680	598
Stage 1	-	-	-	-	-	-	1369	1369	-	1272	1272	-
Stage 2	-	-	-	-	-	-	674	1273	-	668	1408	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	579	-	-	483	-	-	~ 33	23	381	39	22	445
Stage 1	-	-	-	-	-	-	154	213	-	177	237	-
Stage 2	-	-	-	-	-	-	410	237	-	414	204	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	579	-	-	483	-	-	~ 30	21	381	32	20	445
Mov Cap-2 Maneuver	-	-	-	-	-	-	~ 30	21	-	32	20	-
Stage 1	-	-	-	-	-	-	153	212	-	176	218	-
Stage 2	-	-	-	-	-	-	368	218	-	366	203	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.4	280.7	13.3
HCM LOS			F	B

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	30	381	579	-	-	483	-	-	445
HCM Lane V/C Ratio	1.474	0.111	0.005	-	-	0.078	-	-	0.026
HCM Control Delay (s)	\$ 533.1	15.6	11.3	-	-	13.1	-	-	13.3
HCM Lane LOS	F	C	B	-	-	B	-	-	B
HCM 95th %tile Q(veh)	5.1	0.4	0	-	-	0.3	-	-	0.1

Notes  
 ~: Volume exceeds capacity    \$: Delay exceeds 300s    +: Computation Not Defined    \*: All major volume in platoon

Future with Project (2022)  
 5: Avenida-East Driveway/Harbor Chase & Commons St

Timing Plan: PM Peak Hour

Intersection												
Int Delay, s/veh	0.7											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↖			↗				↖		↗	
Traffic Vol, veh/h	0	106	0	0	83	10	0	0	2	12	0	1
Future Vol, veh/h	0	106	0	0	83	10	0	0	2	12	0	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	112	0	0	87	11	0	0	2	13	0	1

Major/Minor	Major1		Major2		Minor1		Minor2					
Conflicting Flow All	98	0	-	-	-	0	-	-	112	205	205	93
Stage 1	-	-	-	-	-	-	-	-	-	93	93	-
Stage 2	-	-	-	-	-	-	-	-	-	112	112	-
Critical Hdwy	4.12	-	-	-	-	-	-	-	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	-	-	-	-	-	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1495	-	0	0	-	-	0	0	941	753	691	964
Stage 1	-	-	0	0	-	-	0	0	-	914	818	-
Stage 2	-	-	0	0	-	-	0	0	-	893	803	-
Platoon blocked, %		-		-	-			-				
Mov Cap-1 Maneuver	1495	-	-	-	-	-	-	-	941	751	691	964
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	751	691	-
Stage 1	-	-	-	-	-	-	-	-	-	914	818	-
Stage 2	-	-	-	-	-	-	-	-	-	891	803	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	8.8	9.8
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	941	1495	-	-	-	764
HCM Lane V/C Ratio	0.002	-	-	-	-	0.018
HCM Control Delay (s)	8.8	0	-	-	-	9.8
HCM Lane LOS	A	A	-	-	-	A
HCM 95th %tile Q(veh)	0	0	-	-	-	0.1

**Intersection**

Int Delay, s/veh 1.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	97	1	16	68	1	9
Future Vol, veh/h	97	1	16	68	1	9
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	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	102	1	17	72	1	9

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	103	208
Stage 1	-	-	103
Stage 2	-	-	105
Critical Hdwy	-	4.12	6.42
Critical Hdwy Stg 1	-	-	5.42
Critical Hdwy Stg 2	-	-	5.42
Follow-up Hdwy	-	2.218	3.518
Pot Cap-1 Maneuver	-	1489	780
Stage 1	-	-	921
Stage 2	-	-	919
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	1489	771
Mov Cap-2 Maneuver	-	-	771
Stage 1	-	-	921
Stage 2	-	-	908

Approach	EB	WB	NB
HCM Control Delay, s	0	1.4	8.9
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	930	-	-	1489	-
HCM Lane V/C Ratio	0.011	-	-	0.011	-
HCM Control Delay (s)	8.9	-	-	7.4	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0	-	-	0	-



## **APPENDIX F**

### **IDOT BDE GUIDELINES FOR AUXILIARY LANES**

### **36-3 AUXILIARY TURN LANES**

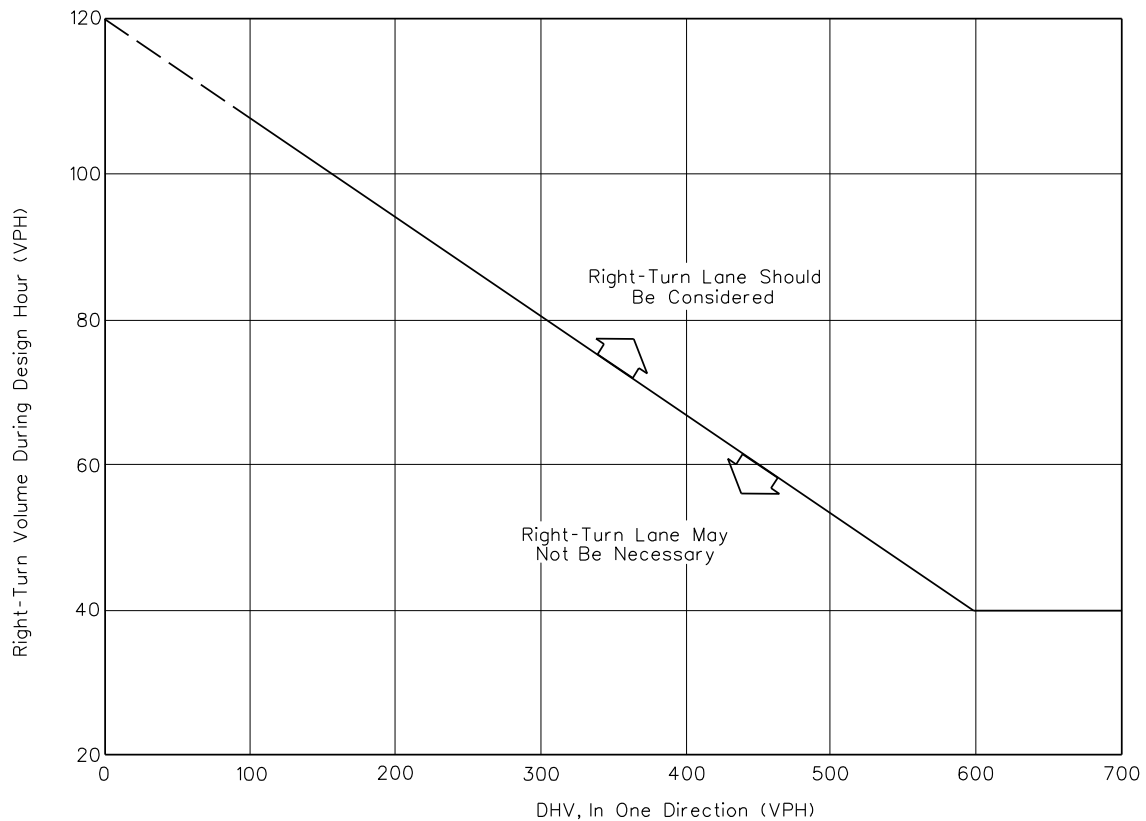
When turning maneuvers for left- and right-turning vehicles occur from the through travel lanes, it typically disrupts the flow of through traffic. This is especially true on high-volume highways. To minimize potential conflicts and to improve the level of service and safety, the use of turn lanes may be warranted for intersections.

#### **36-3.01 Turn Lane Guidelines**

##### **36-3.01(a) Right-Turn Lanes**

The use of right-turn lanes at intersections can significantly improve operations. Consider using an exclusive right-turn lane:

- at any unsignalized intersection on a two-lane urban or rural highway that satisfies the criteria in Figure 36-3.A;
- at any unsignalized intersection on a high-speed, four-lane urban or rural highway that satisfies the criteria in Figure 36-3.B;
- on expressways at all public road intersections where the current ADT on the side road is greater than 250;
- at any intersection where a capacity analysis determines a right-turn lane is necessary to meet the level-of-service criteria;
- at any signalized intersections where the right-turning volume is greater than 150 vph and where there is greater than 300 vphpl on the mainline;
- for uniformity of intersection design along the highway if other intersections have right-turn lanes;
- at any intersection where the mainline is curved to the left and where the mainline curve requires superelevation;
- at railroad crossings where the railroad is located close to the intersection and a right-turn lane would be desirable to efficiently move through traffic on the parallel roadway; or
- at any intersection where the crash experience, existing traffic operations, sight distance restrictions (e.g., intersection beyond a crest vertical curve), or engineering judgment indicates a significant conflict related to right-turning vehicles.



*Note: For highways with a design speed below 50 mph (80 km/h), with a DHV in one direction of less than 300, and where right turns are greater than 40, an adjustment should be used. To read the vertical axis of the chart, subtract 20 from the actual number of right turns.*

### Example

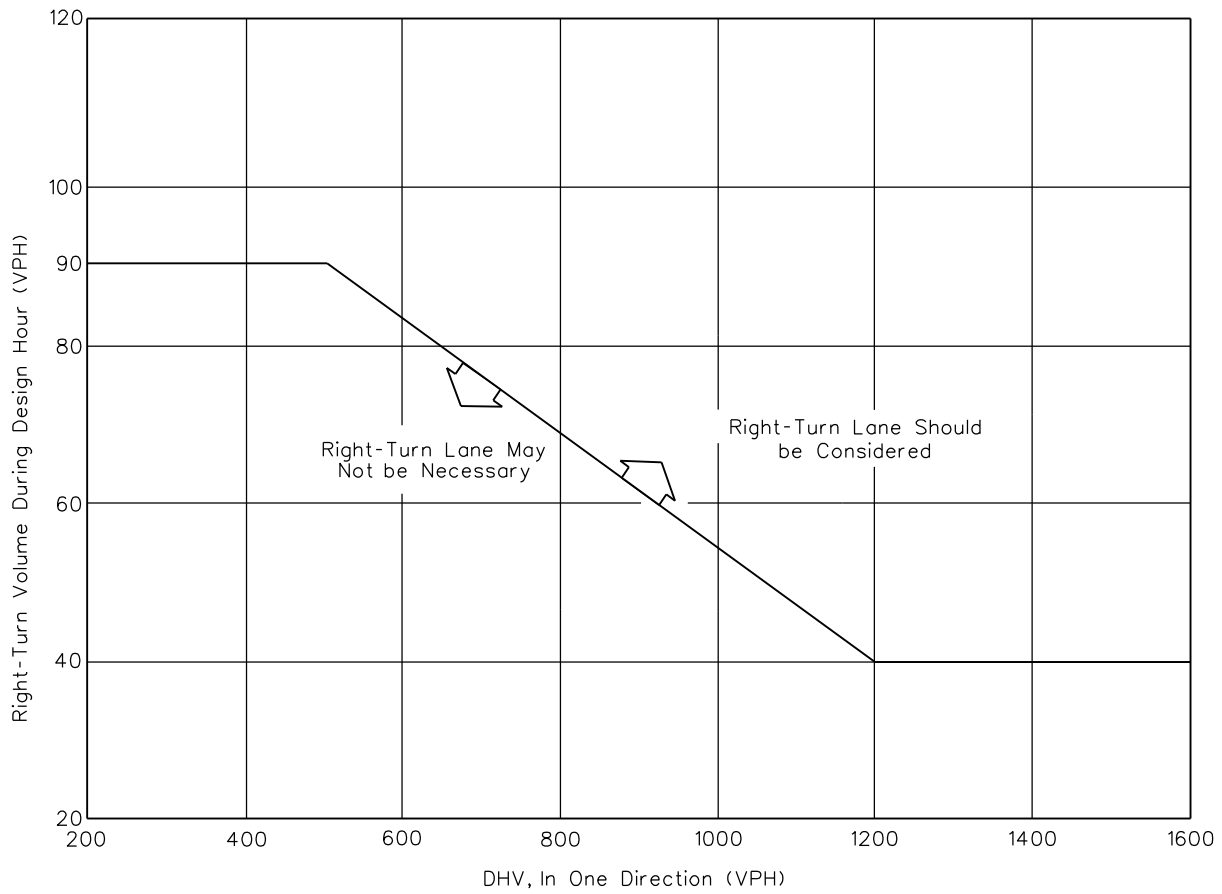
Given:      Design Speed                    =      35 mph (60 km/h)  
               DHV (in one direction)       =      250 vph  
               Right Turns                     =      100 vph

Problem:    Determine if a right-turn lane is warranted.

Solution:    To read the vertical axis, use  $100 - 20 = 80$  vph. The figure indicates that right-turn lane is not necessary, unless other factors (e.g., high crash rate) indicate a lane is needed.

## **GUIDELINES FOR RIGHT-TURN LANES AT UNSIGNALIZED INTERSECTIONS ON TWO-LANE HIGHWAYS**

**Figure 36-3.A**



Note: For speeds less than 50 mph (80 km/h), see Section 36-3.01(a).

**GUIDELINES FOR RIGHT-TURN LANES AT UNSIGNALIZED INTERSECTION  
ON FOUR-LANE HIGHWAYS  
(Design Speed of 50 mph (80 km/h) or Greater)**

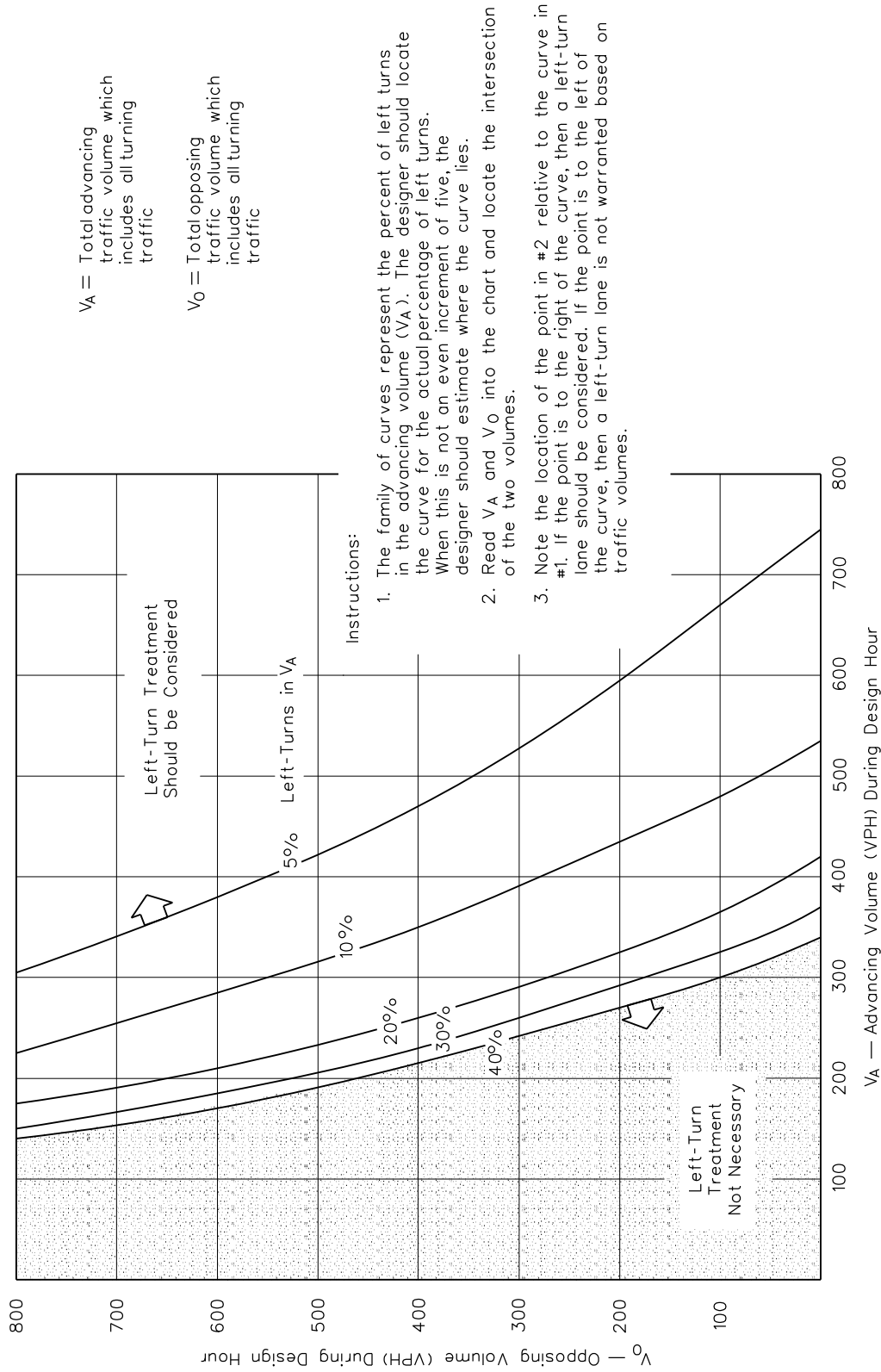
**Figure 36-3.B**

**36-3.01(b) Left-Turn Lanes**

The accommodation of left turns is often the critical factor in proper intersection design. Left-turn lanes can significantly improve both the level of service and intersection safety. Always use an exclusive left-turn lane at all intersections on divided urban and rural highways with a median wide enough to accommodate a left-turn lane, regardless of traffic volumes. Consider using an exclusive left-turn lane for the following:

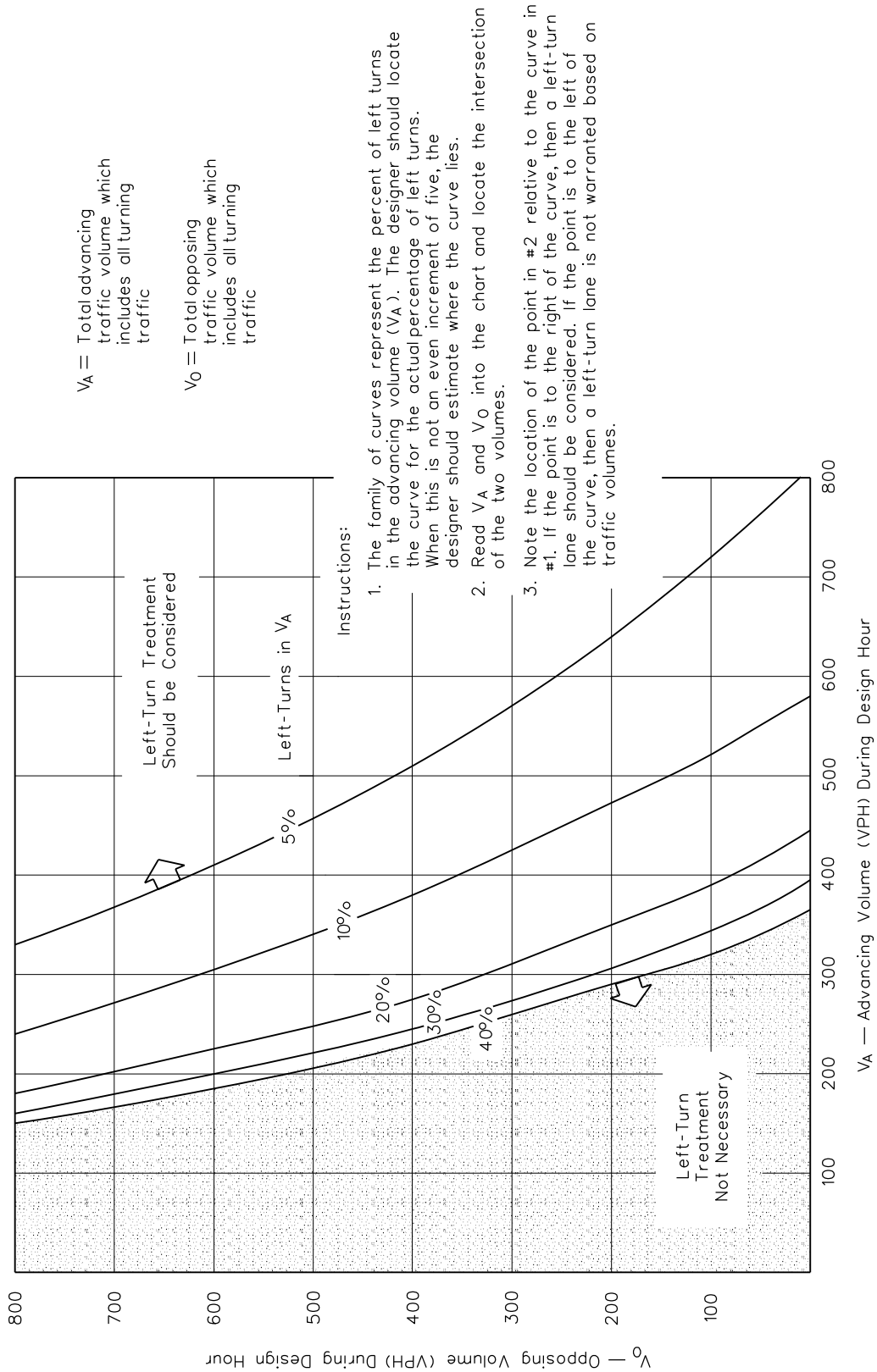
- at any unsignalized intersection on a two-lane urban or rural highway that satisfies the criteria in Figures 36-3.C, D, E, F, or G;
- at any signalized intersection where the left-turning volume is equal to or greater than 75 vph for a single turn lane or 300 vph for a dual turn lane;
- any intersection where a capacity analysis determines a left-turn lane is necessary to meet the level-of-service criteria, including dual left-turn lanes;
- for uniformity of intersection design along the highway if other intersections have left-turn lanes (i.e., to satisfy driver expectancy); or
- any intersection where the crash experience, traffic operations, sight distance restrictions (e.g., intersection beyond a crest vertical curve), or engineering judgment indicates a significant conflict related to left-turning vehicles.





**VOLUME GUIDELINES FOR LEFT-TURN LANES AT UNSIGNALIZED INTERSECTIONS ON TWO-LANE HIGHWAYS (45 mph Design Speed)**

**Figure 36-3.F**



**VOLUME GUIDELINES FOR LEFT-TURN LANES AT UNSIGNALIZED INTERSECTIONS ON TWO-LANE HIGHWAYS (40 mph Design Speed)**

**Figure 36-3.G**