

Technical Memo

Date: Thursday, April 08, 2021

Project: Watertown Master Transportation Plan

To: Study Advisory Team

From: HDR

Subject: Existing Conditions

Introduction

The purpose of this memorandum is to evaluate the existing conditions of the Watertown transportation system. This consisted of a review of the existing roadway network, bike and pedestrian systems, transit service, intercity transportation, freight system, and traffic volumes and operations. Ultimately, this evaluation will assist in the identification of transportation system and traffic operations issues and aid in the development of recommendations for the final master transportation plan report.

Existing Roadway Network

The existing Watertown City roadway network comprises approximately 197 miles of streets (as of June 2015)¹. The network is largely laid out in a rectilinear grid system with some non-conforming areas in the northeastern and northwestern sections of the City as well as south of US 212 (9th Avenue S)¹.

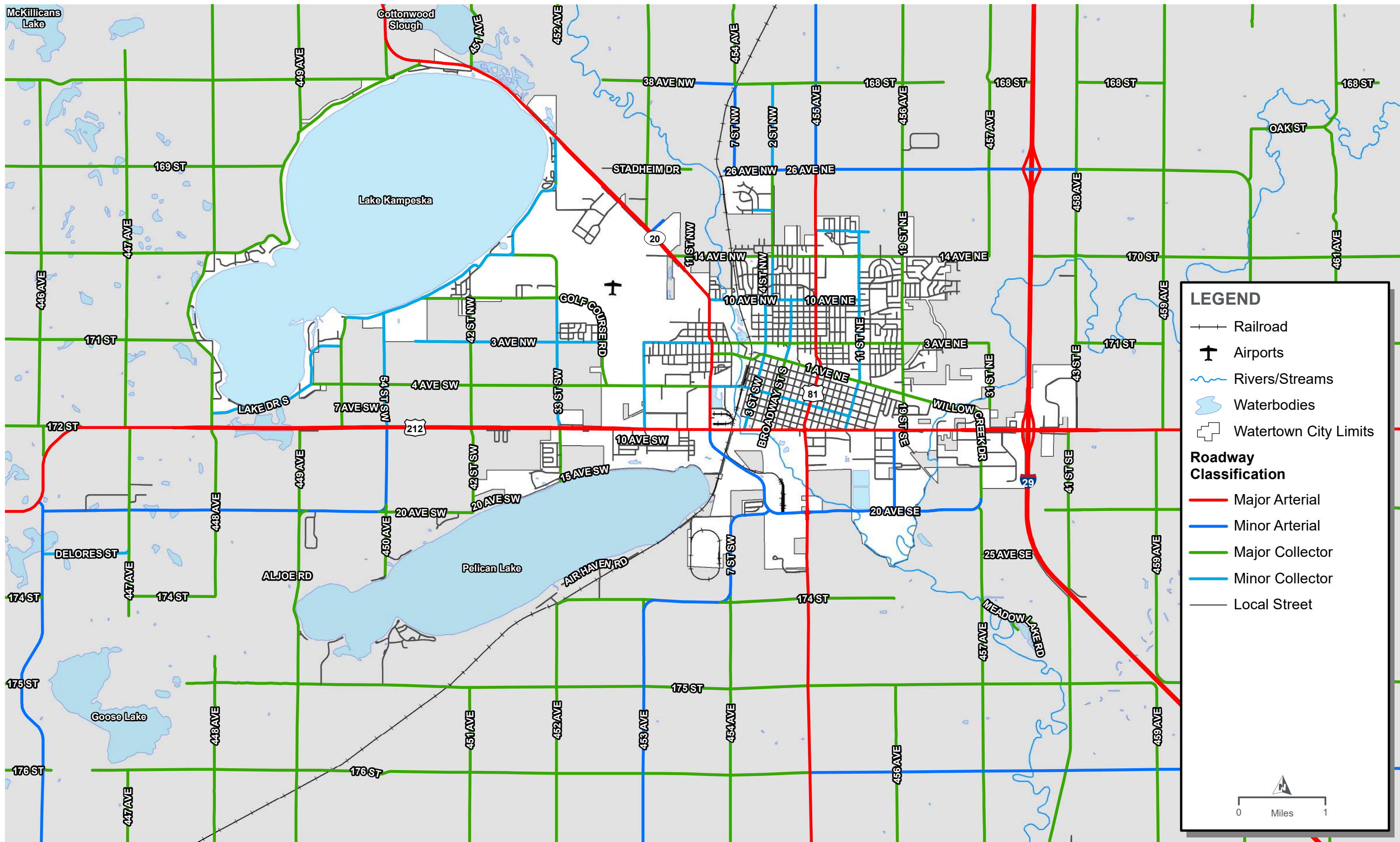
Primary routes throughout the city and surrounding area are identified in the current City major street plan. In this plan, roads are defined by roadway classification which indicates the level of mobility or access. These classifications range from major arterials with the greatest degree of mobility to local streets with the greatest degree of access. According to the major street plan, roadways are classified as major arterials, minor arterials, major collectors, alternative major collectors, minor collectors, and alternative minor collectors. An adapted version of this plan depicting existing roadway classification is shown in **Figure 1**. The primary routes within the City and surrounding area include:

- Major Arterials
 - **Interstate 29** is a north-south route that runs along the eastern fringe of the City with interchanges at US 212 (9th Street S) and US 81 (26th Avenue NE). 2019 daily traffic volumes on Interstate mainline segments are around 4,100 vehicles per day (vpd) at the US 212 interchange (Exit 177) and around 4,000 vpd at the US 81 interchange (Exit 180). Exit 177 interchange ramp daily volumes ranged between 1,400 and 2,200 vpd while Exit 180 interchange ramp daily volumes ranged between around 300 to 500 vpd.

¹ City of Watertown – 2020 Comprehensive Land Use Plan
<https://www.watertownsd.us/DocumentCenter/View/3859/DraftCompPlanUpdate2018?bidId=>

- **US 212 (9th Avenue South)** is the only east-west major arterial through route, providing connection to the other major and minor arterials and access to a large portion of commercial and business areas within the City. This multi-lane route serves pass-through trips as the major eastern and western entrance and exit points to Watertown. 2019 daily traffic volumes ranged from 3,000 vpd east of the Interstate 29 interchange to a high of near 18,300 vpd in central Watertown to around 3,100 vpd west of Lake Kampeska.
- **US 81 (5th Street East)** is a north-south route providing connections through the central part of the City. 2019 daily traffic volumes ranged from 4,000 vpd south of US 212 to 11,000 vpd near the central business district to around 4,300 vpd north of 14th Avenue North.
- **SD 20 (10th Street West)** is a north-south route providing connections on the western edge of the City. 2019 daily traffic volumes ranged between 3,200 vpd by Lake Kampeska and 11,700 vpd near 3rd Avenue North.
- **Minor Arterials**
 - **US 81 (26th Avenue Northeast)** is an east-west route, just north of city limits, that connects Interstate 29 Exit 180 to US 81 (5th Street E). 2019 daily traffic volumes ranged from 1,300 vpd near the Exit 180 interchange to 4,300 vpd near the intersection with US 81 (5th Street E).
 - **20th Avenue South** is an east-west bypass route, located on the southern extent of the city, between 29th Street SE and the intersection of US 212 and SD20. 2017 daily traffic volumes ranged between 2,300 vpd near 29th Street SE and 5,700 vpd west of the intersection with US 81 (5th Street E).
- **Major Collectors**
 - **19th Street East** is a north-south route on the eastern edge of the City, spanning between US 212 and 14th Avenue NE.
 - **17th Street East** is a north-south route on the southeastern part of the City that provides a connection between US 212 and 20th Avenue SE.
 - **14th Avenue North** is an east-west route on the northern edge of the City, spanning between 3rd Street E and 19th Street E.
 - **1st Avenue North/Willow Creek Drive/29th Street Southeast** is a route spanning primarily east-west between 3rd Street W and US 212 and north-south between US 212 and 20th Ave SE.
 - **3rd Avenue North** is an east-west route spanning between SD 20 and 19th Street N in the central section of the City.
 - **Broadway Street** is a north-south route between US 212 and 1st Avenue N in the central downtown business area.
 - **4th Ave South** is an east-west route between South Lake Drive and SD 20 which provides a connection to Lake Kampeska.

- Minor Collectors
 - **11th Street East** is a north-south route running between US 212 and 14th Avenue N on the eastern side of the City.
 - **Broadway Street North** is a north-south route between 1st Avenue N and 10th Avenue N on the northwestern side of the City.
 - **3rd Street West** is a north-south route in the western central part of the City between US 212 and 10th Avenue N.
 - **2nd Street West** is a north-south route in the northwestern section of the City between 10th Avenue NW and 14th Avenue NW.
 - **21st Street West** is a north-south route near the western edge of the City between US 212 and 3rd Avenue NW.
 - **33rd Street West** is a north-south route near the south side of Lake Kampeska between US 212 and Golf Course Road.
 - **10th Avenue North** is an east-west route in the northern section of the City between SD 20 and 19th Street E.
 - **4th Ave South** is an east-west route between SD 20 and 11th Street E which covers primarily the central area of the City.



EXISTING ROADWAY CLASSIFICATION
 (ADAPTED FROM CITY OF WATERTOWN MAJOR STREET PLAN)

FIGURE 1



Bike and Pedestrian Systems

The adoption of a comprehensive sidewalk plan in 2002 and Trail Master Plan in 2012 formalized the City of Watertown’s intent to develop an efficient network of facilities for pedestrians and cyclists, offering alternatives to vehicle travel through enhanced connections to destinations and promoting improved public health through activity-based transportation in the region.

Currently, the bicycle and pedestrian network maintains numerous bicycle and pedestrian facilities, including sidewalks, separated paths/trails and shoulder/bike shared-lanes. Continued investment in these facilities can aid the City in maintaining a welcoming environment for both pedestrians and bicyclists and benefit the overall transportation system by allowing residents ample opportunity to take trips utilizing these modal options instead of a private vehicle.

The trail network provides recreational opportunities for users and connectivity to recreational areas such as public parks, the Redlin Art Center, the Cattail Crossing Golf Course, the Bramble Park Zoo, and the uptown business district. While the Watertown trail network offers several recreational opportunities for bicyclists and pedestrians, the use of these transportation mode for commuting purposes remains low. American Community Survey (ACS) data for 2018 indicates that 0.08% of Watertown residents commute to work via bicycling and 1.52% commute to work via walking.

Current Bicycle and Pedestrian Facilities

The bulk of existing bicycle facilities in the Watertown area are shared-use paths/trails, which total 22.6 miles. These facilities are separated from roadways and offer both bicyclists and pedestrians a wider path and increased safety due to the separation from motor vehicles. The total number of miles of shoulder bikeways is 3.4 miles, and these facilities are the second most common. Regarding planned investments in bicycle/trail facilities, Watertown has identified an additional 32.8 miles of shared-used paths/trails. **Table 1** displays the breakdown of all existing bicycle and pedestrian facilities in the Watertown area.

Table 1: Existing Bicycle and Pedestrian Facilities Length

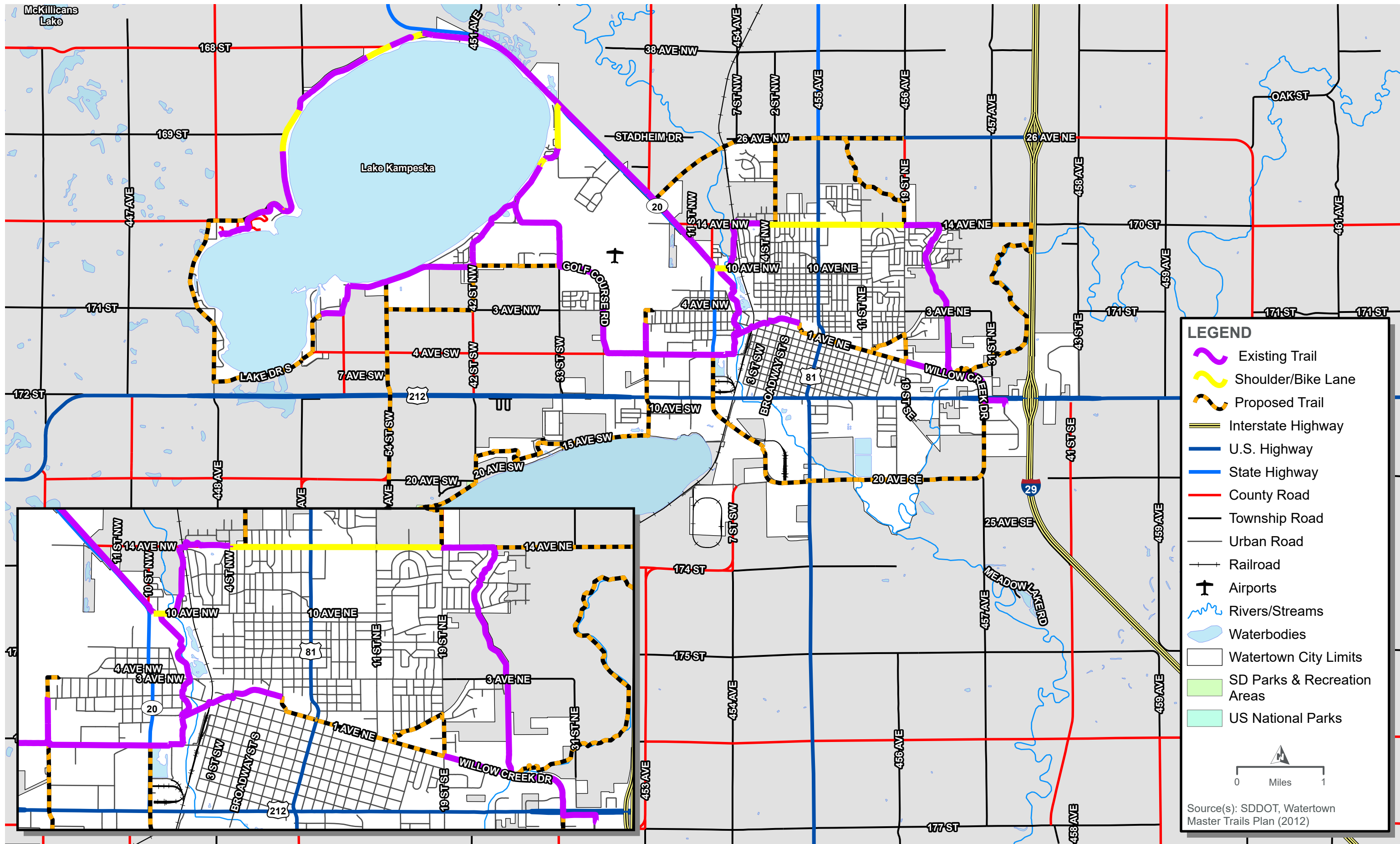
Facility Type	Length (mi.)
Shared-use Path/Trail	22.6
Shoulder/Bike Lane	3.4
Sidewalk	100.1
Total Existing Mileage	126.1



Sidewalks are a critical facility for any urban transportation network as they allow for pedestrian connections and encourage active transportation, connecting the other modes of transportation. Furthermore, sidewalks have shown to generate increased economic activity in commercial and mixed-use areas as they facilitate increased foot traffic.

The 2002 sidewalk plan noted that at the time, there was more than 148 miles of sidewalk missing (gaps/no sidewalk installed/etc.) of 237 miles where sidewalk was possible (both sides of all street facilities). As a result, a prioritization process was identified to strategically improve the sidewalk network which the City continues to utilize.

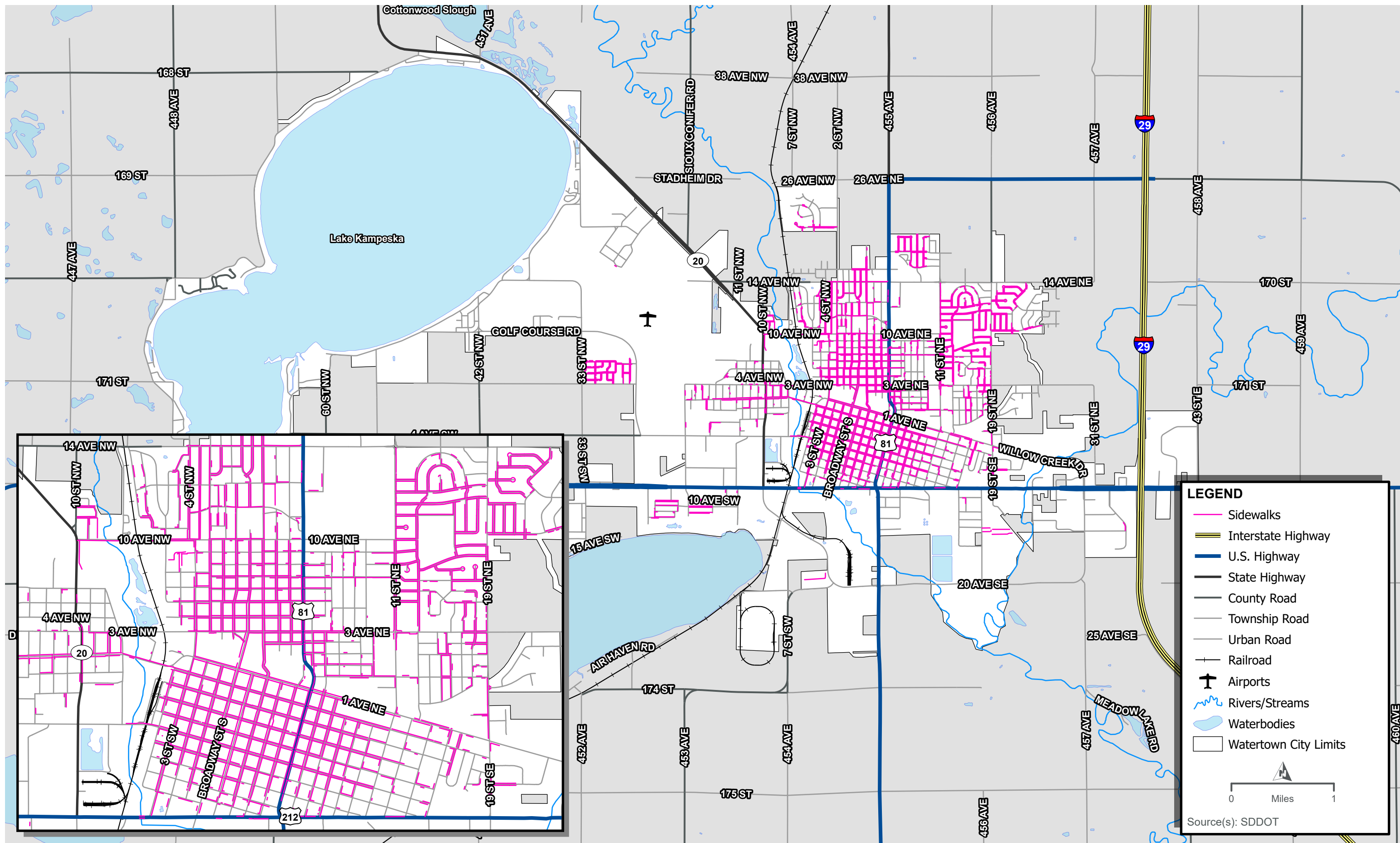
Existing and proposed bicycle and pedestrian trails are shown in **Figure 2** and existing sidewalks are shown in **Figure 3**.



BICYCLE AND PEDESTRIAN TRAILS



FIGURE 2



SIDEWALKS

FIGURE 3

Transit Service

Transit service in the Watertown Area is provided by Community Transit of Watertown/Sisseton, Inc. via a curb-to-curb program comprised of 9 buses and 4 vans in the Codington County fleet. The program within the City of Watertown currently operates Monday through Saturday. Passengers must schedule rides one business day prior to the requested service. Out of town trips require a one-week notice. Passengers are encouraged to schedule return pick ups for round trip services or alternately can schedule a “will call” return trip which is subject to service availability at the time. Current fees for curb-to-curb transit service within Watertown proper are based upon service areas as follows:

One Way Trips:

Area No. 1 – Immediate Service Area (Watertown Proper) - \$3.00

Area No. 2 – Outlying Service Area (Lake Pelican/Lake Kampeska) - \$5.00

Area No. 3 – Extended Service Area (Dakota Sioux Casino/Destinations with access to Sioux Conifer Road from 167th Street to 164th Street) - \$8.00

Currently, through a partnership with Prairie Lakes Hospital, medical trips within the immediate service area of Watertown are free. These free services include appointments with optometrists, doctors, dentists, physical therapists, etc.

Intercity Transportation

In addition to the highway links that connect the Watertown area to other parts of the state and country, there are additional modes for intercity travel including aviation and bus service.

Aviation

The Watertown Regional Airport is the home of commercial and general aviation within the Watertown area and is owned by the City of Watertown and operated through the City appointed Airport Board. The airport plays a fundamental role in the region’s transportation network with a catchment area population of 150,000.

The airlines currently operating out of the Watertown Regional Airport are:

- United Airlines (operated by SkyWest): Flights to Chicago, IL and Denver, CO

Current services include daily flights to Chicago O’Hare and Denver International airports, which connect to approximately 130 cities.

Figure 4 displays the annual enplanements at Watertown Regional airport for the period 2009-2019. As indicated by the figure, annual enplanements have fluctuated from year to year based upon the services provided and flights available. Since 2017, annual enplanements have been holding steady in the 11,000 to 12,000 range.

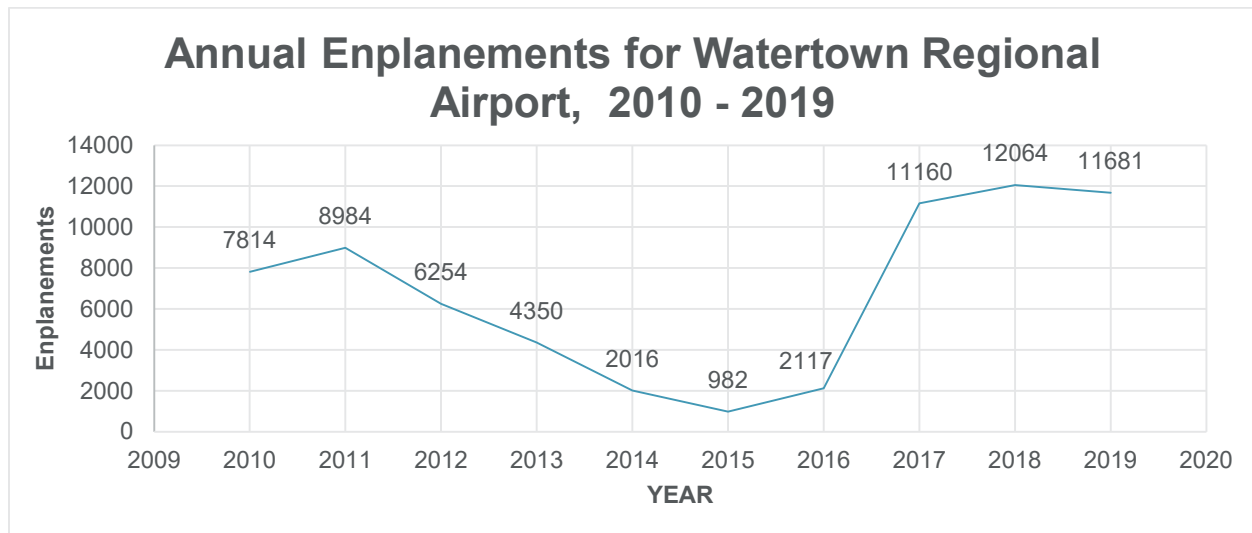


Figure 4: Annual Enplanements for Watertown Regional Airport, 2010 – 2019²

Intercity Bus Service

The Watertown region’s intercity bus service is operated by Jefferson Lines, with passenger pick-ups and drop-offs conducted at the Watertown/Jefferson Lines Curbside Bus Stop located at 820 35th Circle. Jefferson Lines serves as the regional intercity bus carrier, connecting Watertown with other communities in South Dakota, along the I-29 and I-90 corridors as well communities within the Region in North Dakota, Minnesota, Iowa, and Nebraska. Jefferson Lines main service area includes the central and northwest United States, from Arkansas to Washington state.

² Air Carrier Activity Information System (ACAIS) Data (Federal Aviation Administration)

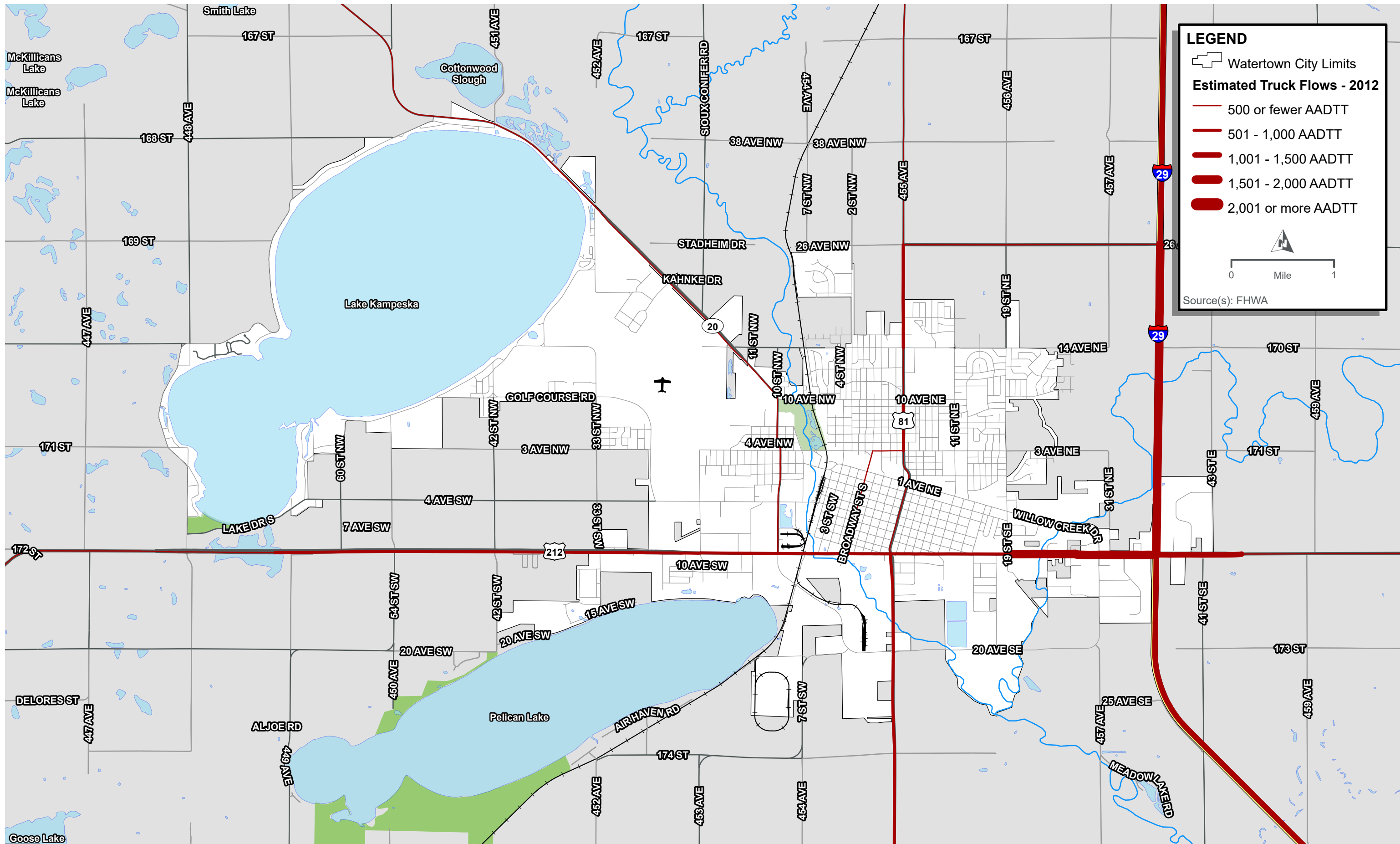
Freight System

Freight activities play an important role in the Watertown area economy and facilitating an efficient movement of goods on local and national highways is of paramount importance. To gain a better understanding of how highway freight volumes are expected to change in the Watertown Area boundaries over the next 25 years, freight forecast data was obtained from the Federal Highway Administration's Freight Analysis Framework (FAF) database. This data estimates the movement of commodities on the national highway system by using average truck payloads and assigning them to individual highways for forecasting purposes. Additional data points used by the FAF include functional classifications, number of lanes, and other pertinent highway characteristics to project future increases in tonnage moving along U.S. highways.

The assessment of FAF data for the Watertown area found that:

- Truck volumes are predicted to increase substantially over the planning horizon. FAF data indicate a predicted 60% increase in truck volumes between the 2012 baseline and year 2045. **Figure 5** illustrates current truck volumes from FAF.
- Commodity tonnage increases are predicted to also increase over the planning horizon. FAF data predict a 73% increase in commodity tonnage between the 2012 baseline and year 2045. **Figure 6** illustrates current commodity flows from FAF.

This marks a significant increase in freight activity traveling along highways in the area and has implications on public expenditures related to roadway maintenance, expansion, and the operational capabilities of the roadway network to support this increased amount of traffic.



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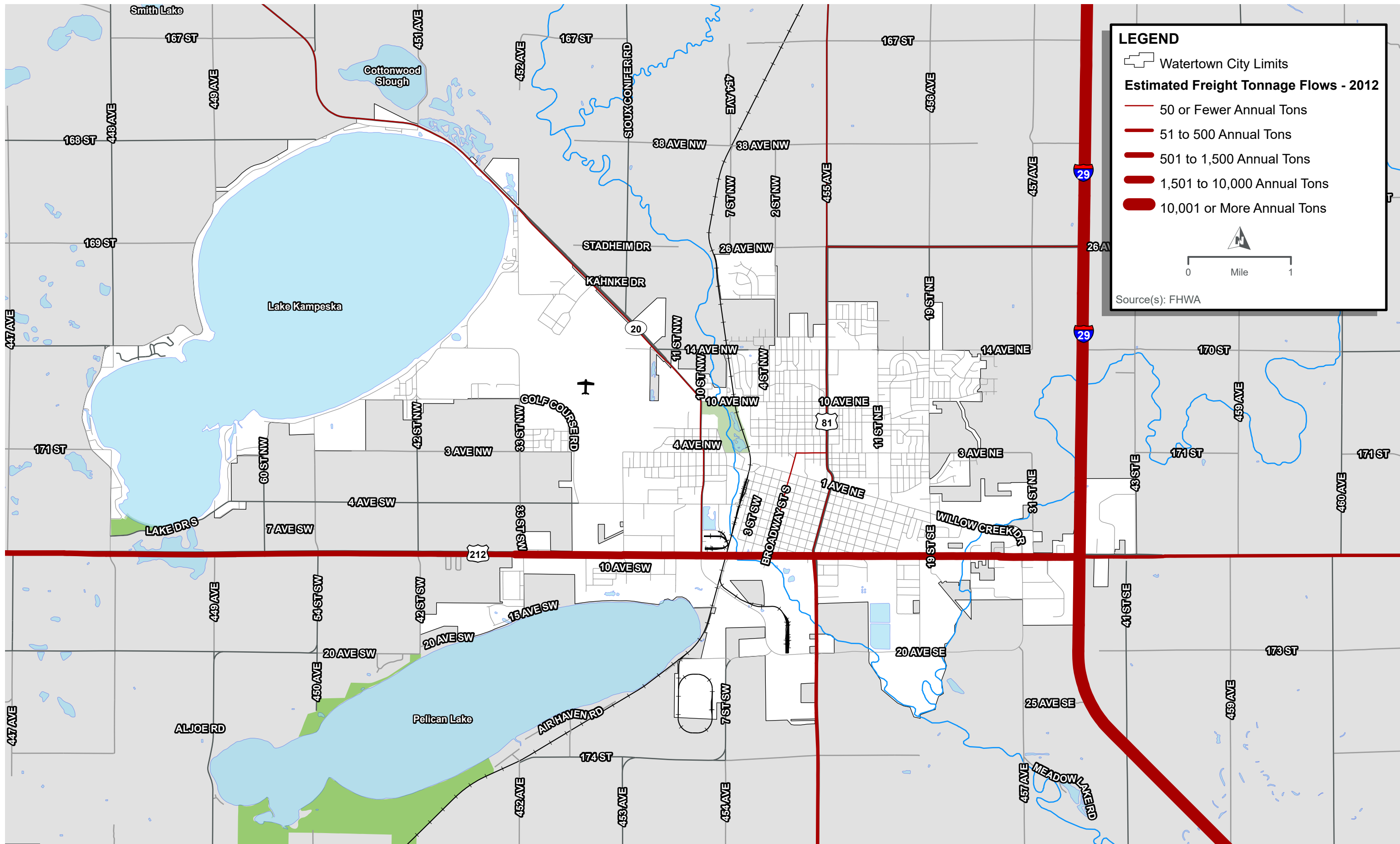
- Watertown City Limits
- Estimated Truck Flows - 2012**
- 500 or fewer AADTT
- 501 - 1,000 AADTT
- 1,001 - 1,500 AADTT
- 1,501 - 2,000 AADTT
- 2,001 or more AADTT

0 Mile 1

Source(s): FHWA

ESTIMATED TRUCK FLOWS (2012)





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- Watertown City Limits
- Estimated Freight Tonnage Flows - 2012**
- 50 or Fewer Annual Tons
- 51 to 500 Annual Tons
- 501 to 1,500 Annual Tons
- 1,501 to 10,000 Annual Tons
- 10,001 or More Annual Tons

0 Mile 1

Source(s): FHWA

ESTIMATED HIGHWAY FREIGHT TONNAGE FLOWS (2012)



Existing Conditions Traffic Volume Scenario

The 2020 Existing Conditions traffic volumes were developed from recent and existing traffic counts for traffic operation analysis. This section develops the existing conditions volumes, which lays the foundation for identifying transportation needs and development of future-year traffic volumes.

Existing Traffic Data

Existing conditions traffic volumes were developed from the following traffic data:

- Daily (24-hour) roadway segment counts were provided to the study team from SDDOT.
 - SDDOT collected segment counts on Interstate 29, US 212, US 81, and SD 20 annually between 2010 and 2019.
 - SDDOT collected segment counts throughout roads in Watertown between 2010 and 2018.
- Morning and afternoon/evening (AM and PM) peak hour intersection turning movement counts were collected as part of this study and provided by SDDOT for the study intersections as indicated in **Table 2**.
 - In addition to study intersections, the following intersection turning movement counts were provided by SDDOT to aid in corridor volume balancing for the Existing Conditions scenario:
 - US 212 and 29th Street SE (collected on January 18th, 2018)
 - US 212 and 33rd Street SE (collected on January 18th, 2018)

Scenario Development

AM and PM peak hour intersection turning movement volumes were developed for the existing conditions traffic volumes scenario along the following corridors (shown in **Figure 7**):

- **US 212 (9th Avenue SE)** – from Broadway Street S to I-29 NB Exit 177 RTI
- **US 81(5th Street E/26th Avenue NE)** – from 20th Avenue SE to I-29 NB Exit 180 RTI
- **1st Avenue NE/Willow Creek Drive (29th Street SE)** – from US 212 to 13th Street NE
- **19th Street (456th Avenue)** – from 1st Avenue NE to US 81 (26th Avenue NE)
- **3rd Street NW** – from W Kemp Avenue to 1st Avenue NW
- **10th Avenue NW** – from 2nd Street W to N Maple Street
- **N Maple Street** – from 10th Avenue N to 14th Avenue N

In addition, similar peak hour scenarios were developed for the isolated South Lake Drive and 4th Avenue SW intersection.

Existing counts were factored to year 2020 and reflect a September design season.

Table 2: Study Intersections

Intersection No.	Intersection Name	Collected by HDR	Provided by SDDOT
1	US 212 (9 th Avenue SE) & Interstate 29 NB Exit 177 RTI ¹		X
2	US 212 (9 th Avenue SE) & Interstate 29 SB Exit 177 RTI ¹		X
3	US 212 (9 th Avenue SE) & 23 rd Street SE (Willow Creek Drive) ²	X	
4	US 212 (9 th Avenue S) & Broadway Street S ³		X
5	US 81 (26 th Avenue NE) & Interstate 29 NB Exit 180 RTI ¹		X
6	US 81 (26 th Avenue NE) & Interstate 29 SB Exit 180 RTI ¹		X
7	US 81 (26 th Avenue NE) & 19 th Street NE (456 th Avenue) ²	X	
8	US 81 (5 th Street NE) & 18 th Avenue NE ²	X	
9	US 81 (5 th Street NE) & 14 th Avenue NE ⁴		X
10	US 81 (5 th Street NE) & 3 rd Avenue NE ⁴		X
11	US 81 (5 th Street NE) & E Kemp Avenue ⁵		X
12	US 81 (5 th Street SE) & 1 st Avenue SE ⁵		X
13	US 81 (5 th Street SE) & 4 th Avenue SE ⁶		X
14	US 81 (5 th Street SE) & 20 th Avenue SE ⁷	X	
15	15 th Avenue SE & 29 th Street SE ²	X	
16	8 th Avenue SE & Willow Creek Drive ²	X	
17	1 st Avenue NE & 19 th Street NE ²	X	
18	1 st Avenue NE & 13 th Street NE (SB) ²	X	
19	1 st Avenue NE & 13 th Street NE (NB) ²	X	
20	1 st Avenue NW & 3 rd Street NW ²	X	
21	W Kemp Avenue & 3 rd Street W ²	X	
22	10 th Avenue NE & Maple Street NE ²	X	
23	10 th Avenue NW and 2 nd Street W ²	X	
24	14 th Avenue NE & 19 th Street NE ²	X	
25	14 th Avenue & N Maple Street NE ²	X	
26	South Lake Drive & 4 th Avenue SW ²	X	

1 Collected on September 10th, 2019 as part of the 2020 Decennial Interstate Corridor Study.

2 Collected on September 15th, 2020 as part of the 2020 Watertown Master Transportation Plan.

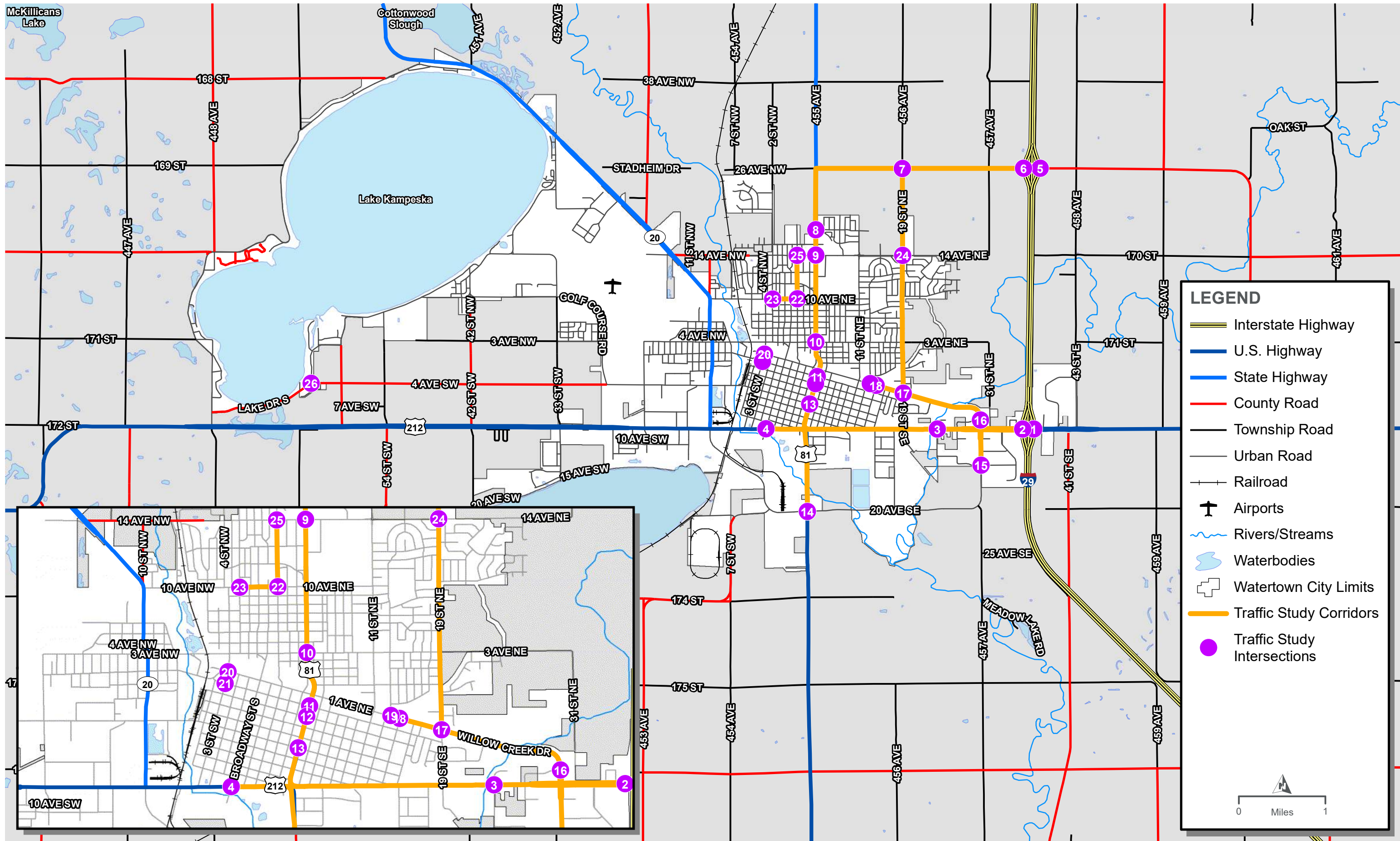
3 Collect on November 9th, 2016.

4 Collected on November 19th, 2020 as part of the 2020 Watertown Master Transportation Plan.

5 Collected on November 17th, 2020 as part of the 2020 Watertown Master Transportation Plan.

6 Collected on March 14th, 2018.

7 Collected on January 19th, 2021.



TRAFFIC STUDY CORRIDORS AND INTERSECTIONS



FIGURE 7

Scenario Notes

The following provides discussion on various findings from the traffic scenario development process.

GROWTH FACTORS

Two different ADT growth rate forecasting methodologies, annual traffic change from historical daily traffic counts and county-wide growth rates were compared for reasonableness. The percentages observed from the annual traffic change from historical daily traffic counts between 2014 and 2019 varied between by +/- 3-6% depending on the roadway segment observed. The county-wide growth factors, however, provided a more uniform growth rate for each type of roadway observed. Because of the uniformity of the latter method, county-growth rates were used for this scenario and will be carried out throughout this study. Interpolation was used to calculate growth factors in between the 2020 baseline year and the given projected 20-year growth rate.

County-wide Growth Factors:

- Urban Arterials/Collectors/Locals (Codington County):
 - 1-year: 1.018
 - 2-year: 1.035
 - 3-year: 1.050
 - 4-year: 1.071
 - 5-year: 1.088
- Rural Arterials/Collectors/Locals (Codington County):
 - 1-year: 1.017
 - 2-year: 1.033
 - 3-year: 1.050
 - 4-year: 1.066
 - 5-year: 1.083

INTERSECTION BALANCING

Traffic volumes presented in this study include locations where peak hour intersection turning movement volumes were not balanced across intersections. This was largely due to the available turning movement counts, as some corridors had greater distance between intersections which enlarged the disparity of traffic volumes. Thus, a significant number of vehicles would either enter or exit the study corridor roadway between the analysis intersections. Due to this, any effort to balance traffic between such intersections would have notably altered traffic volumes for upstream or downstream intersections. Examples of these high-volume mid-segment intersections include:

- US 212 between Broadway Street S and 23rd Street SE
- US 81 between 4th Avenue SE and 20th Avenue SE
- 29th Street SE between US 212 and 15th Avenue SE
- 10th Avenue N between 2nd Street W and N Maple Street
- N Maple Street between 10th Avenue N and 14th Avenue N
- 19th Street NE between 1st Avenue NE and 14th Avenue N

These intersections were smoothed for reasonableness and the impact of mid-segment turning movements will be noted and accounted for in the operations analysis.

Traffic Volumes

2020 Existing Conditions traffic volumes are presented in the following figures.

CITY-WIDE DAILY SEGMENT VOLUMES

2020 Existing Conditions Daily Traffic Volumes (**Figure 8**)

CORRIDOR SCENARIOS – PEAK HOUR INTERSECTION VOLUMES

US 212 (9th Avenue SE) – from Broadway Street S to I-29 NB Exit 177 RTI (**Figure 9**)

US 81 (5th Street E/26th Avenue NE) – from 20th Avenue SE to I-29 NB Exit 180 RTI
(**Figure 10** and **Figure 11**)

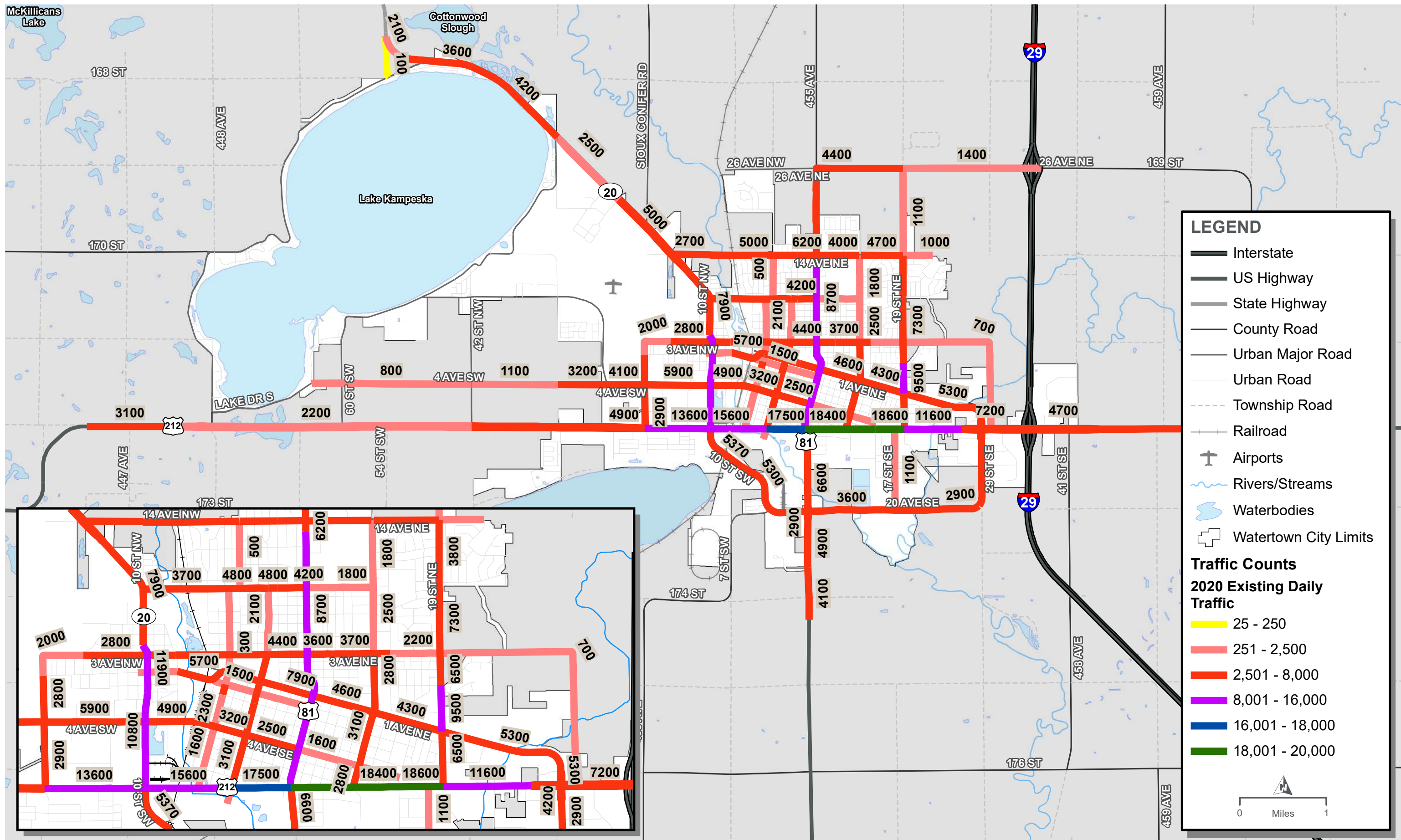
1st Avenue NE/Willow Creek Drive (29th Street SE) – from US 212 to 13th Street NE (**Figure 12**)

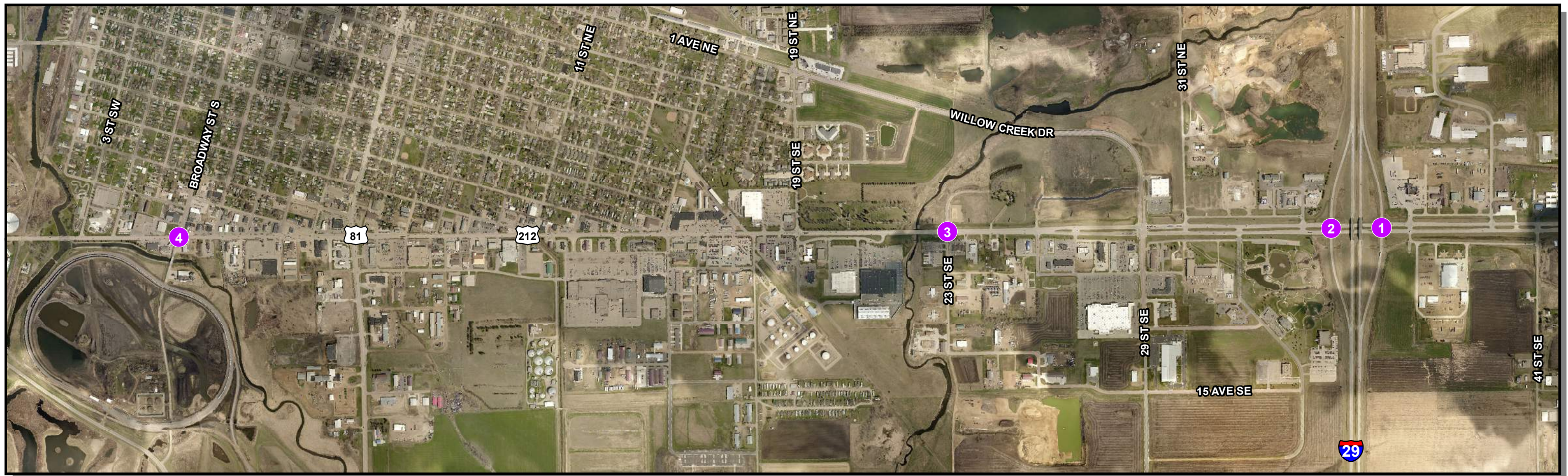
19th Street (456th Avenue) – from 1st Avenue NE to US 81 (26th Avenue NE) (**Figure 13**)

3rd Street NW – from W Kemp Avenue to 1st Avenue NW (**Figure 14**)

10th Avenue NW – from 2nd Street W to N Maple Street
N Maple Street – from 10th Avenue N to 14th Avenue N (**Figure 15**)

South Lake Drive and 4th Avenue SW – Isolated Intersection (**Figure 16**)



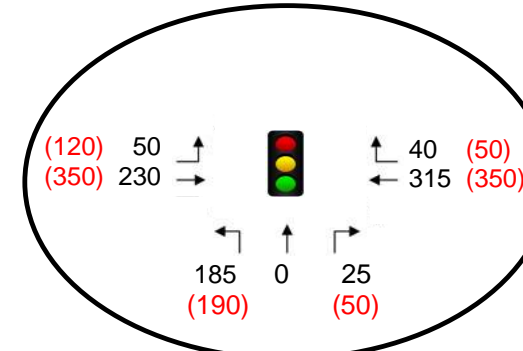
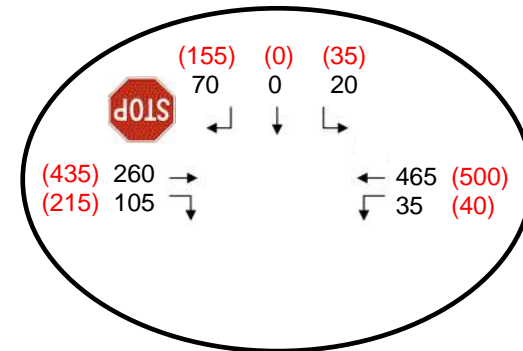
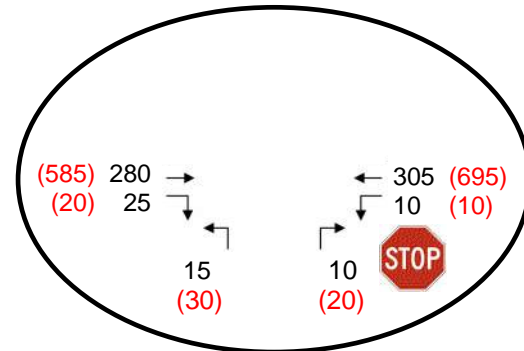
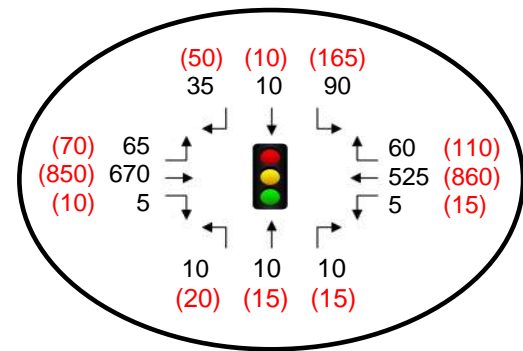


4. US 212 & Broadway Street S

3. US 212 & 23rd Street SE

2. US 212 & I-29 SB Exit 177 RTI

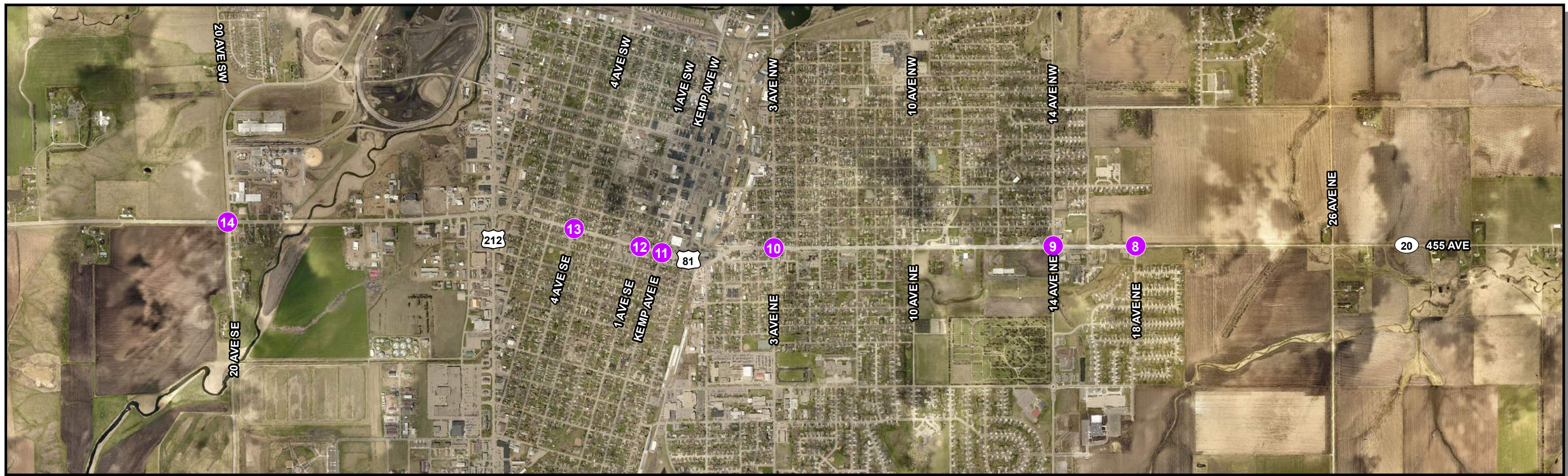
1. US 212 & I-29 NB Exit 177 RTI



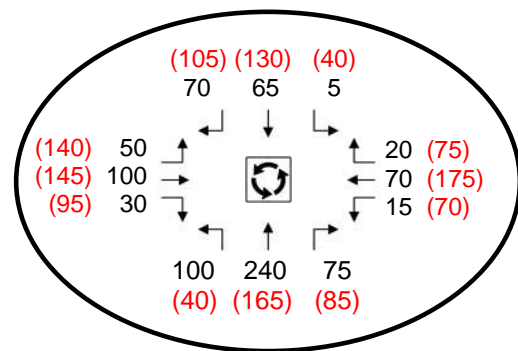
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- Study Intersection
- AM (PM) 2020 Peak Hour Traffic Volumes
- Existing Traffic Control
- Signal
- Stop Control

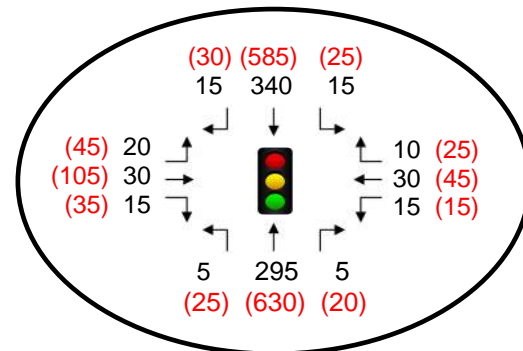
Notes:
* Volumes reflect September design season.



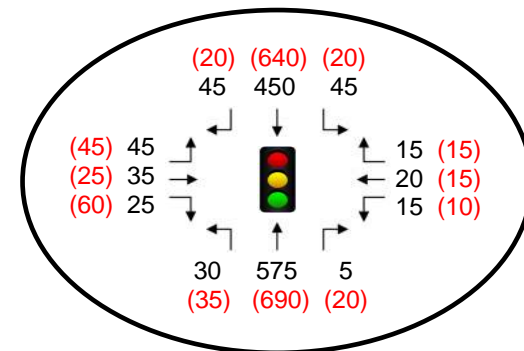
14. US 81 & 20th Ave SE



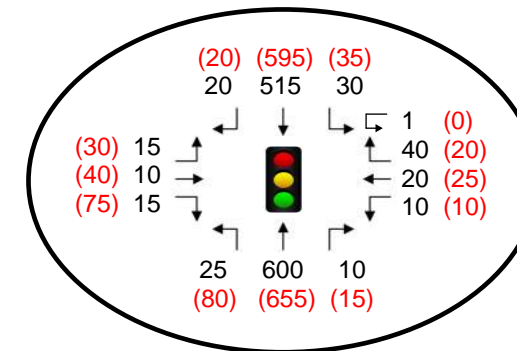
13. US 81 & 4th Avenue SE



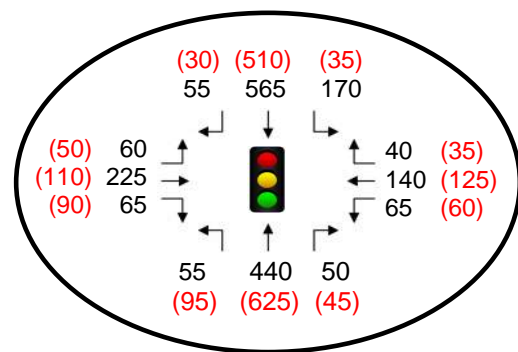
12. US 81 & 1st Avenue SE



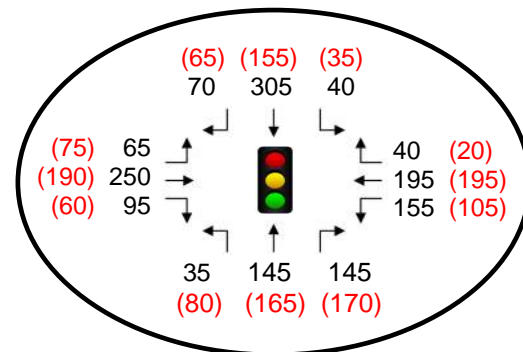
11. US 81 & E Kemp Avenue



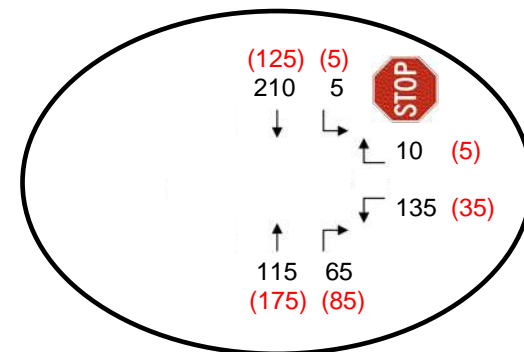
10. US 81 & 3rd Avenue NE



9. US 81 & 14th Avenue NE



12. US 81 & 18th Avenue NE



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1 Study Intersection

AM (PM) 2020 Peak Hour Traffic Volumes

Existing Traffic Control



Signal



Stop Control

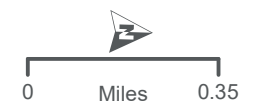


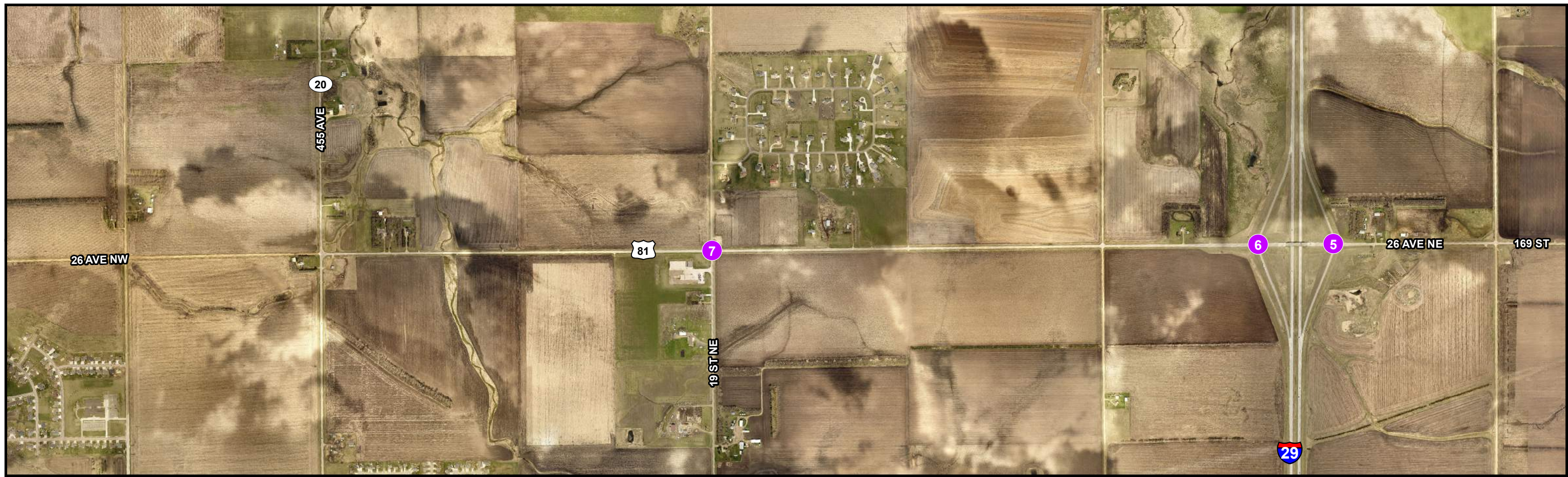
Roundabout Control

Notes:

* Volumes reflect September design season.

** US 81 (5th Street E) corridor turning movements are shown with the same northbound orientation as previous figures.

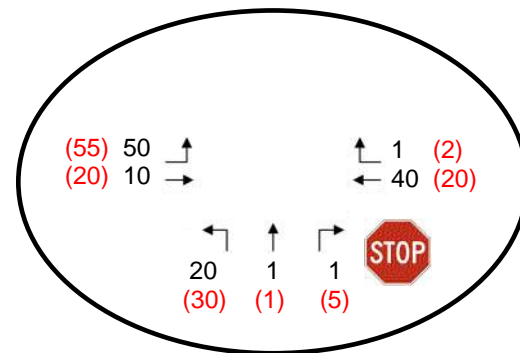
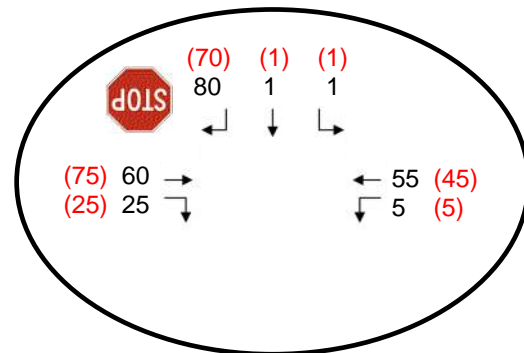
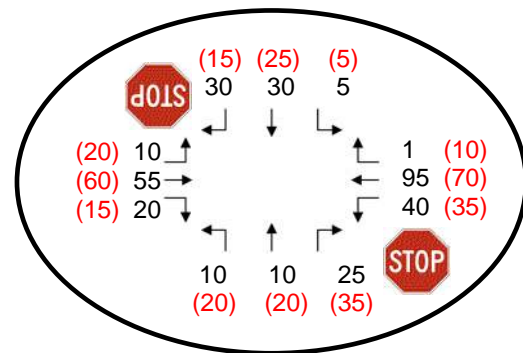




7. US 81 & 19th Street NE (456th Avenue)

6. US 81 & I-29 SB Exit 180 RTI

5. US 81 & I-29 NB Exit 180 RTI



LEGEND

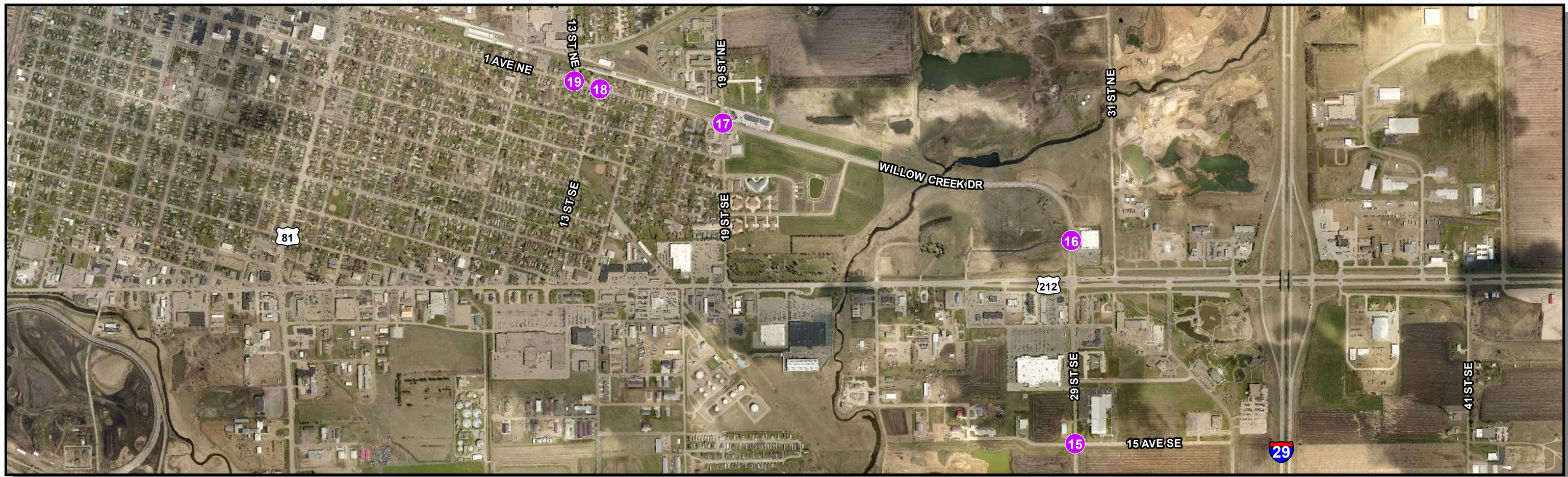
- Study Intersection
- AM (PM) 2020 Peak Hour Traffic Volumes
- Existing Traffic Control
- Signal
- Stop Control

Notes:
* Volumes reflect September design season.

2020 PEAK HOUR TRAFFIC VOLUMES (EXISTING)
US 81 (26TH AVENUE NE) CORRIDOR

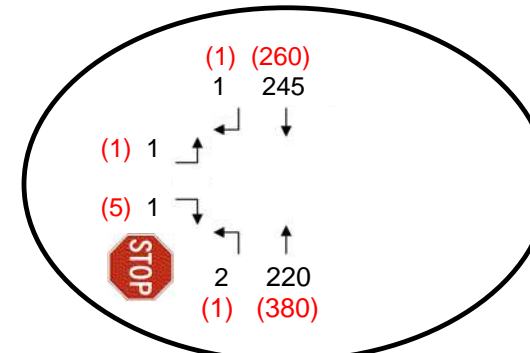
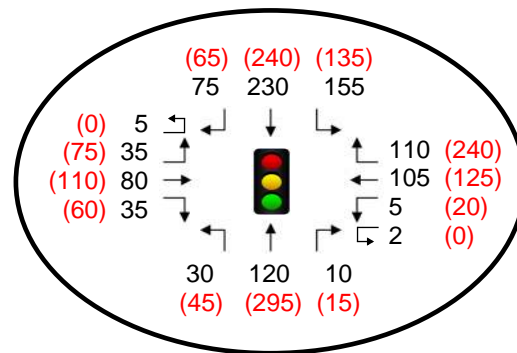
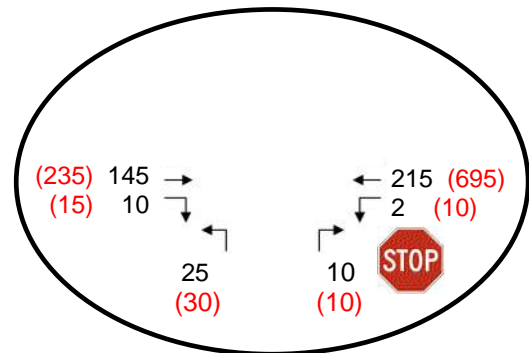
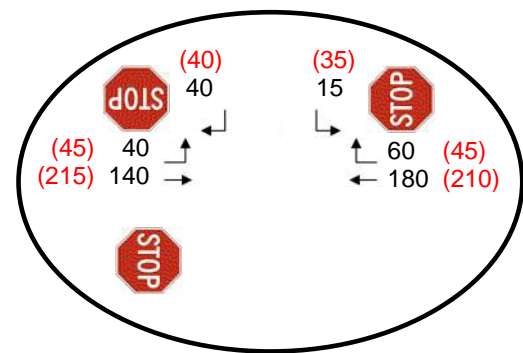
FIGURE 11



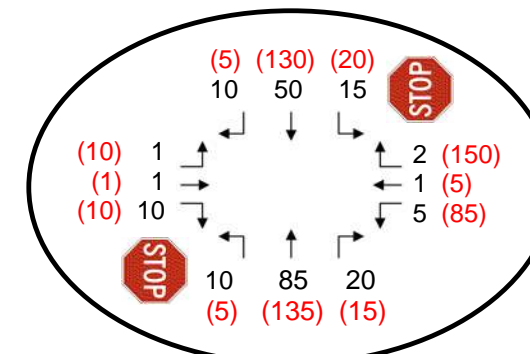


19. 1st Avenue NE & 13th Street NE (NB) 18. 1st Avenue NE & 13th Street NE (SB) 17. 1st Avenue NE & 19th Street NE

16. Willow Creek Drive & 8th Avenue SE



15. 29th Street SE & 15th Avenue SE



LEGEND

- Study Intersection
- AM (PM) 2020 Peak Hour Traffic Volumes
- Existing Traffic Control
- Signal
- Stop Control

Notes:
* Volumes reflect September design season.



2020 PEAK HOUR TRAFFIC VOLUMES (EXISTING)
1ST AVENUE NE / WILLOW CREEK DRIVE (29TH STREET SE) CORRIDOR

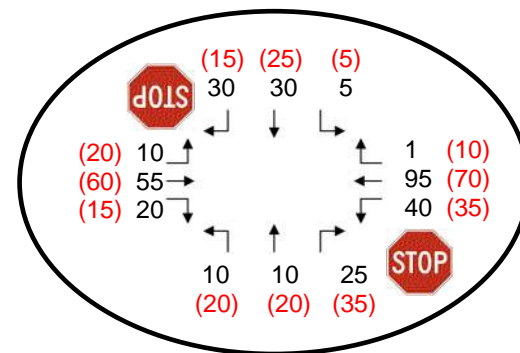
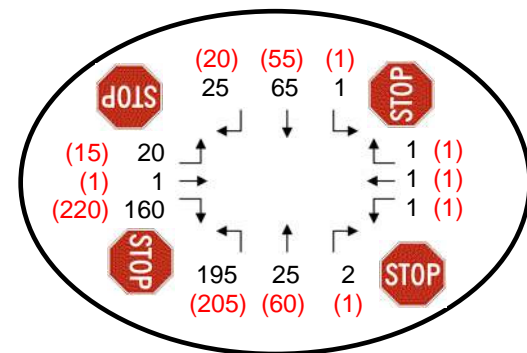
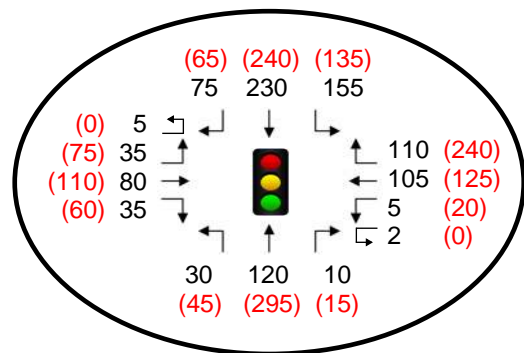
FIGURE 12



17. 1st Avenue NE & 19th Street NE

24. 19th Street NE & 14th Avenue NE

7. US 81 & 19th Street NE (456th Avenue)



LEGEND

- 1 Study Intersection

AM (PM) 2020 Peak Hour Traffic Volumes

Existing Traffic Control

- Signal
- Stop Control
- Roundabout

Notes:

- * Volumes reflect September design season.
- ** 19th Street NE corridor turning movements are shown with the same northbound orientation as previous figures.

0 Miles 0.3

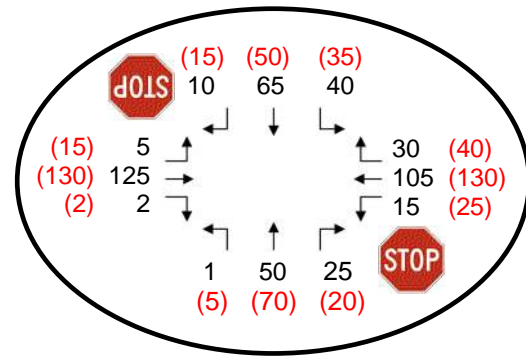
**2020 PEAK HOUR TRAFFIC VOLUMES (EXISTING)
19TH STREET (456TH AVENUE) CORRIDOR**

FIGURE 13

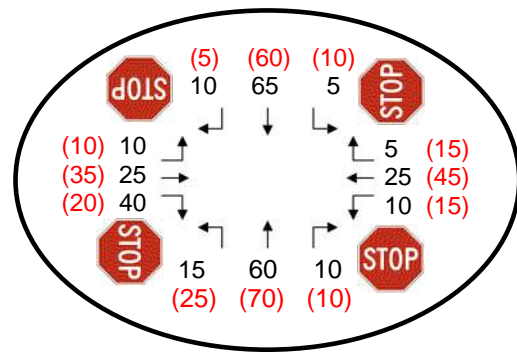




20. 3rd Street NW & 1st Avenue NW



21. 3rd Street NW & W Kemp Avenue



LEGEND

- 1 Study Intersection
- AM (PM) 2020 Peak Hour Traffic Volumes
- Existing Traffic Control
- Signal
- Stop Control
- Roundabout

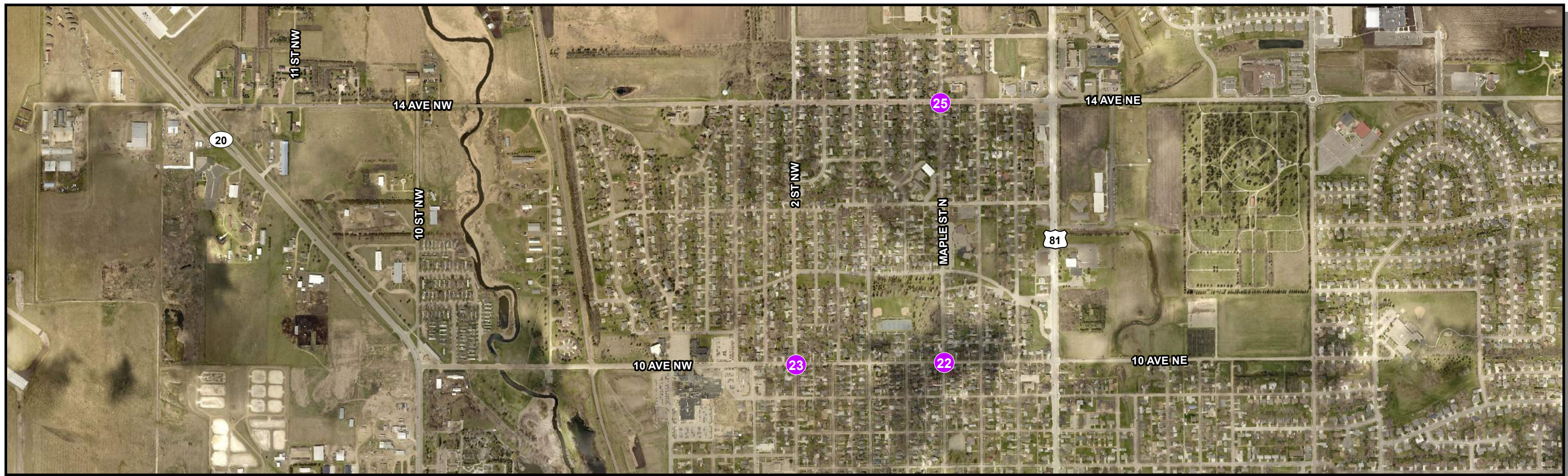
Notes:
* Volumes reflect September design season.

0 Miles 0.05

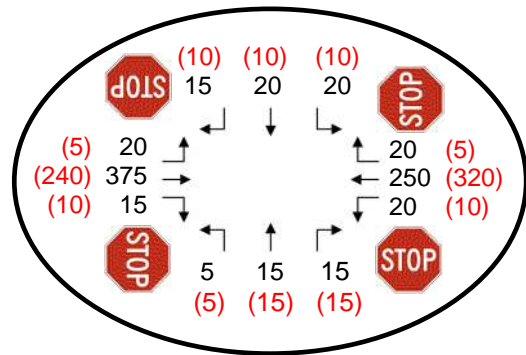
**2020 PEAK HOUR TRAFFIC VOLUMES (EXISTING)
3RD STREET NW CORRIDOR**

FIGURE 14

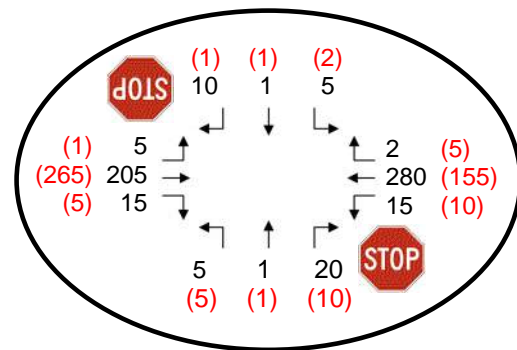




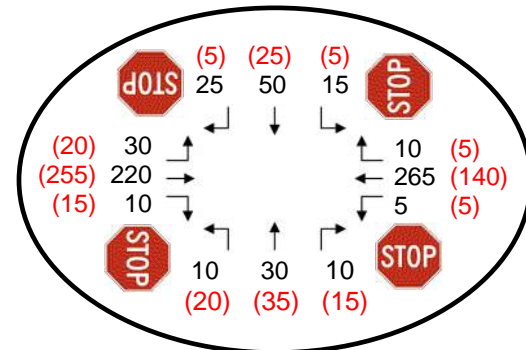
25. N Maple Street & 14th Avenue N



23. 10th Avenue NW & 2nd Street W



22. 10th Avenue N & N Maple Street



LEGEND

- 1 Study Intersection
- AM (PM) 2020 Peak Hour Traffic Volumes
- Existing Traffic Control
- Signal
- Stop Control
- Roundabout

Notes:
* Volumes reflect September design season.

0 Miles 0.15

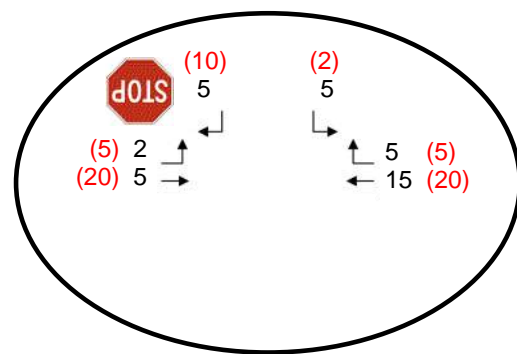
**2020 PEAK HOUR TRAFFIC VOLUMES (EXISTING)
10TH AVENUE N / N MAPLE STREET CORRIDOR**

FIGURE 15





26. South Lake Drive & 4th Avenue SW



LEGEND

1 Study Intersection

AM (PM) 2020 Peak Hour Traffic Volumes

Existing Traffic Control

 Signal

 Stop Control

 Roundabout

Notes:
* Volumes reflect September design season.



Existing Conditions Traffic Operations

The following section presents the results of the traffic operations analysis based on the 2020 existing conditions traffic volume scenario. This analysis consisted of a planning level number of lanes review which evaluates segment capacity and an intersection operations analysis for study intersections.

Planning Level Number of Lanes Review

Planning-level number of lanes review is based on LOS-based capacity thresholds for different roadway cross-sections presented in the SDDOT Road Design Manual Chapter 15 (Table 15-10). Color-coding in **Figure 17** is based on where the volume falls within **Table 3** thresholds. Traffic patterns, traffic signals or other intersection control, number of access points, and number of major intersecting roadways are considerations that typically dictate design needs. Therefore, it is recommended that planning-level number of lanes on either side of the thresholds be considered for segments where volumes are near the cut-off point and specific improvements be analyzed in a more detailed traffic operations analysis.

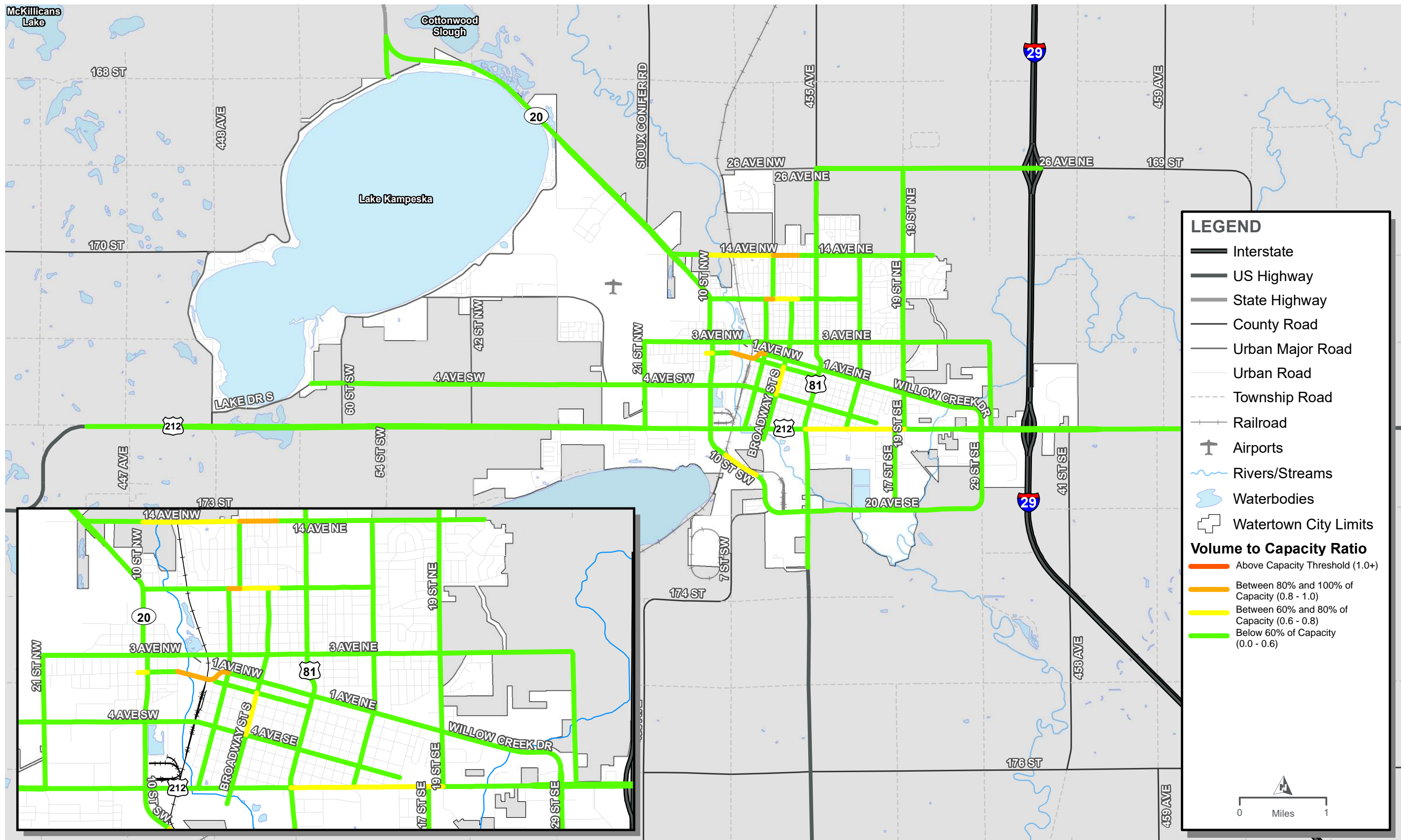
Table 3: Estimated Number of Lanes³

Total Number of Lanes	Total Design Year (ADT) ¹	
	Rural Level	Urban
2	< 8,000	< 6,000*
3	²	2,500 to 16,000
4	8,000 to 20,000 ³	³
5	²	16,000 to 30,000
6	> 20,000 ⁴	> 30,000 ⁴

* Urban ADT threshold for 2 lanes was modified for this study to approximate LOS C conditions.

- 1 Construction/Reconstruction projects are designed based on a typical 20 year ADT project beyond the anticipated year of project construction.
- 2 Continuous left turn lanes may be considered based on left turn volumes and/or when intersections and/or approaches are closely spaced together.
- 3 Undivided sections may be used if left turn movements are low and there is no crash history, otherwise consider installing a median or 5 lane section.
- 4 Medians should be used.

³ Road Design Manual – Chapter 15: Table 15-10 (South Dakota Department of Transportation)



2020 PLANNING LEVEL NUMBER OF LANES REVIEW



FIGURE 17

Intersection Operations

The intersection traffic operations analysis was conducted using Synchro 10 software. Level of Service (LOS) results, which is a measure of average vehicular delay at the intersection, are presented from the Highway Capacity Manual 6th Edition (HCM6) reporting module from Synchro. Thresholds for applicable LOS measures are provide in **Table 4**.

Table 4: Level of Service Definitions⁴

Level of Service	Signalized Intersection Control Delay (seconds/vehicle)	All-Way Stop, Two-Way Stop, and Roundabout Intersection Control Delay (seconds/vehicle)
A	≤ 10	≤ 10
B	> 10 – 20	> 10 – 15
C	> 20 – 35	> 15 – 25
D	> 35 – 55	> 25 – 35
E	> 55 – 80	> 35 – 50
F	> 80; volume exceeds capacity	> 50; volume exceeds capacity

LOS goals for this study are as follows:

- Signalized Intersections:
 - Rural area minimum allowable LOS – LOS B
 - Urban area minimum allowable LOS – LOS C
 - Individual movements allowed to operate at LOS E or better.
- Roundabouts:
 - Minimum allowable LOS – LOS C
- Two-Way Stop-Controlled Intersections:
 - Rural area minimum allowable LOS – LOS B (worst-case stop-controlled approach)
 - Urban area minimum allowable LOS – LOS C (weighted average intersection approach)

Urban area analysis is applicable for facilities within Watertown City limits. Locations where the LOS exceeds (worse) these study goals demonstrates an operation or capacity-related need to be addressed later in the study.

2020 Existing Conditions scenario operational measures are presented in the following figures. Synchro reports are included in Appendix A.

⁴ Highway Capacity Manual – 6th Edition (Transportation Research Board), 2016.

CORRIDOR SCENARIOS – PEAK HOUR INTERSECTION LEVEL OF SERVICE (LOS)

US 212 (9th Avenue SE) – from Broadway Street S to I-29 NB Exit 177 RTI (**Figure 18**)

US 81(5th Street E/26th Avenue NE) – from 20th Avenue SE to I-29 NB Exit 180 RTI
(**Figure 19** and **Figure 20**)

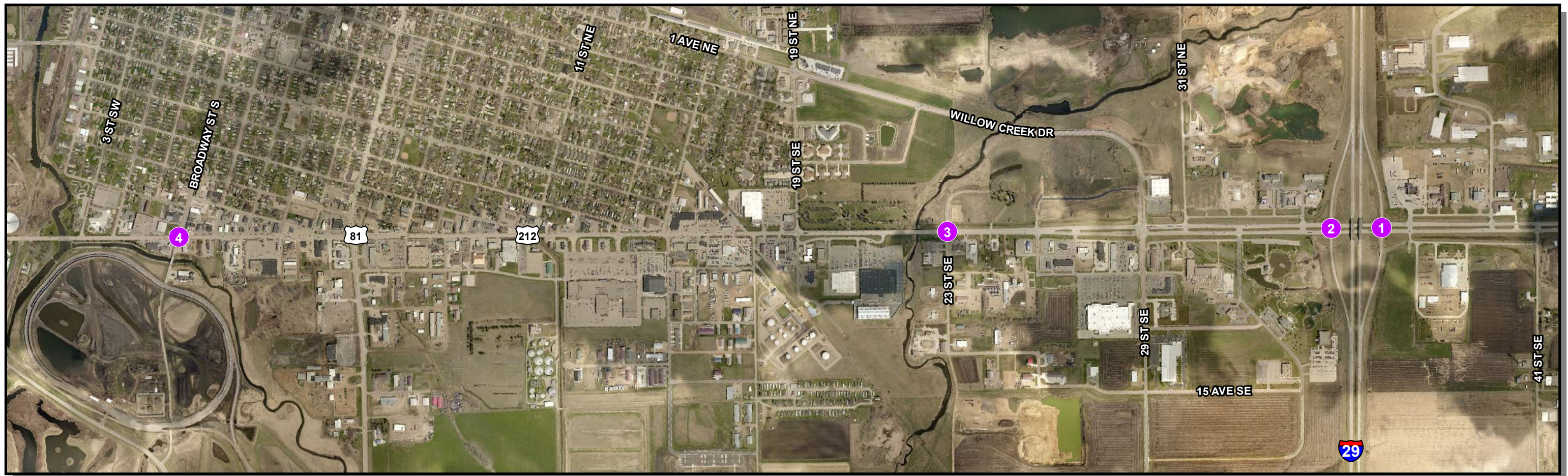
1st Avenue NE/Willow Creek Drive (29th Street SE) – from US 212 to 13th Street NE (**Figure 21**)

19th Street (456th Avenue) – from 1st Avenue NE to US 81 (26th Avenue NE) (**Figure 22**)

3rd Street NW – from W Kemp Avenue to 1st Avenue NW (**Figure 23**)

10th Avenue NW – from 2nd Street W to N Maple Street
N Maple Street – from 10th Avenue N to 14th Avenue N (**Figure 24**)

South Lake Drive and 4th Avenue SW – Isolated Intersection (**Figure 25**)

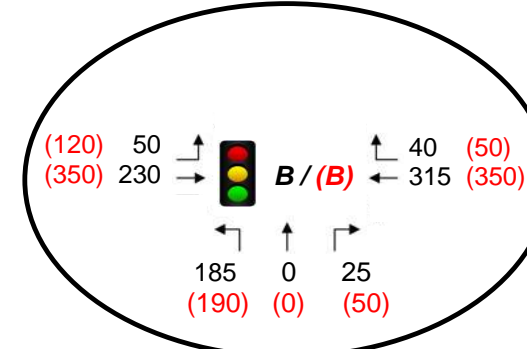
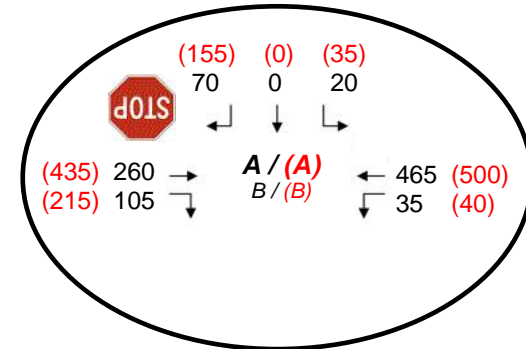
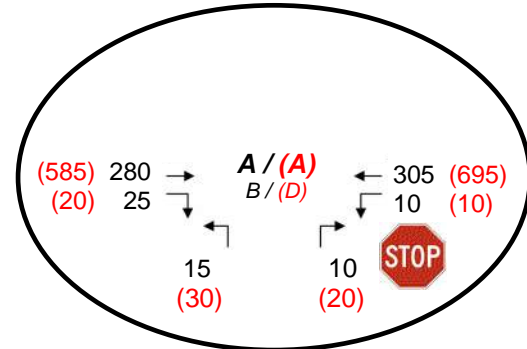
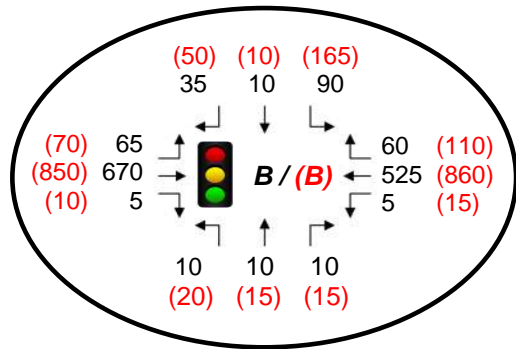


4. US 212 & Broadway Street S

3. US 212 & 23rd Street SE

2. US 212 & I-29 SB Exit 177 RTI

1. US 212 & I-29 NB Exit 177 RTI



LEGEND

1 Study Intersection

AM (PM) 2020 Peak Hour Traffic Volumes

Intersection LOS

A/(B) Overall Intersection

B/(B) Worst-case Approach LOS (TWSC)

Intersection Control

Signal

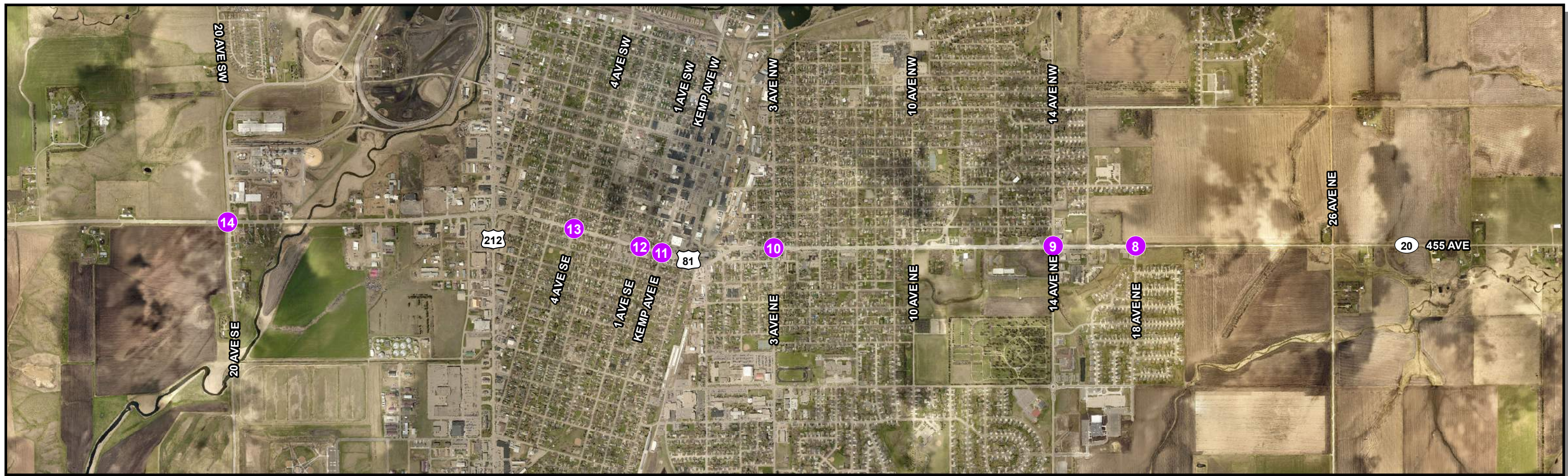
Stop Control

Roundabout

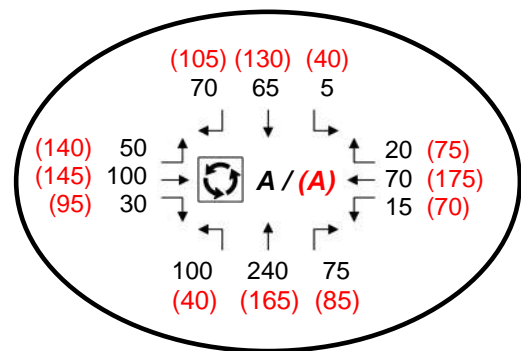
0 Miles 0.2

2020 PEAK HOUR INTERSECTION LEVEL OF SERVICE (EXISTING)
US 212 (9TH AVENUE S) CORRIDOR

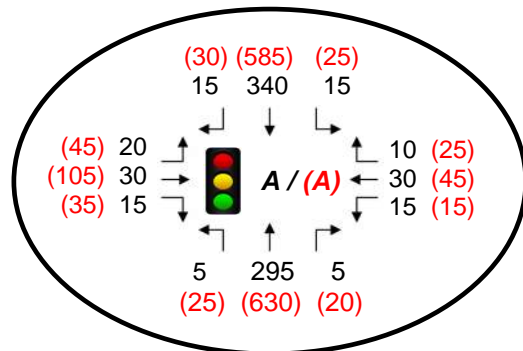




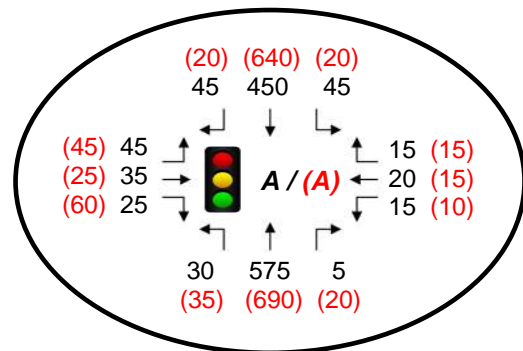
14. US 81 & 20th Ave SE



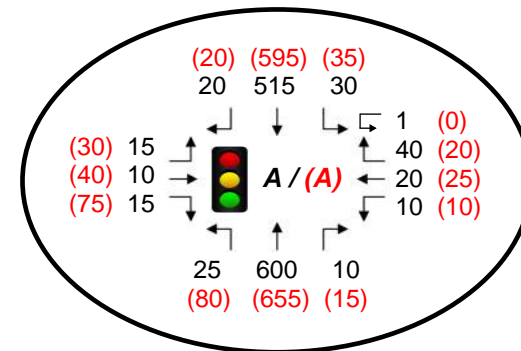
13. US 81 & 4th Avenue SE



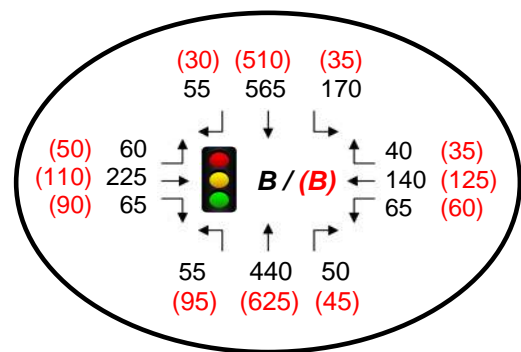
12. US 81 & 1st Avenue SE



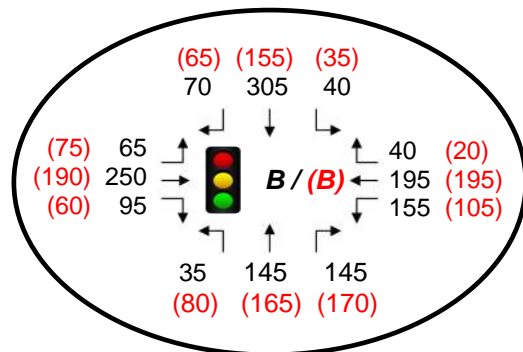
11. US 81 & E Kemp Avenue



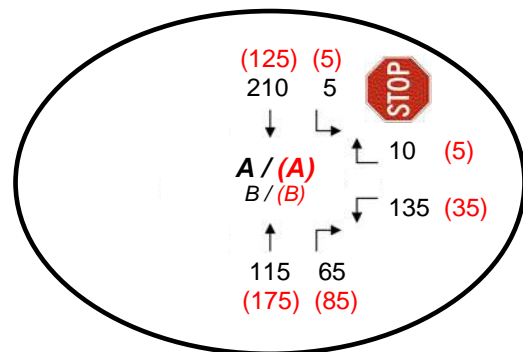
10. US 81 & 3rd Avenue NE



9. US 81 & 14th Avenue NE



12. US 81 & 18th Avenue NE



LEGEND

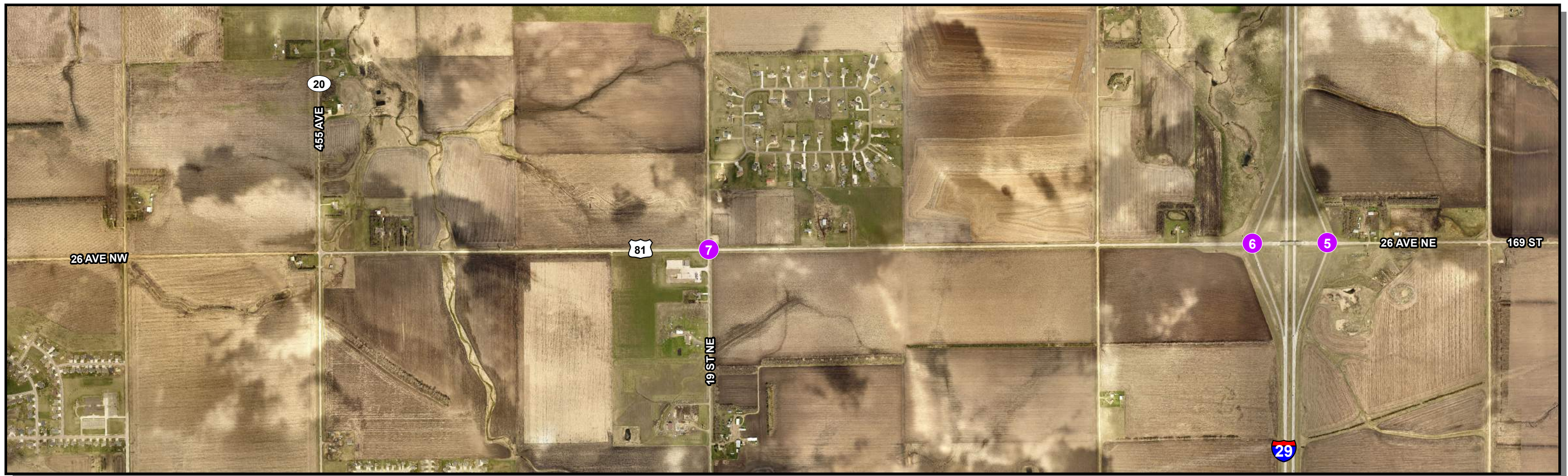
- 1 Study Intersection
- AM (PM) 2020 Peak Hour Traffic Volumes
- Intersection LOS
 - A / (B) Overall Intersection
 - B / (B) Worst-case Approach LOS (TWSC)
- Intersection Control
 - Signal
 - Stop Control
 - Roundabout Control

0 Miles 0.35



2020 PEAK HOUR INTERSECTION LEVEL OF SERVICE (EXISTING)
US 81 (5TH STREET E) CORRIDOR

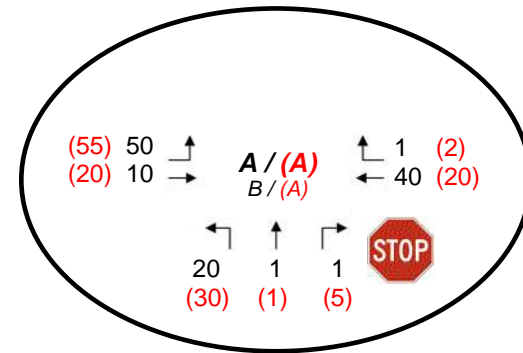
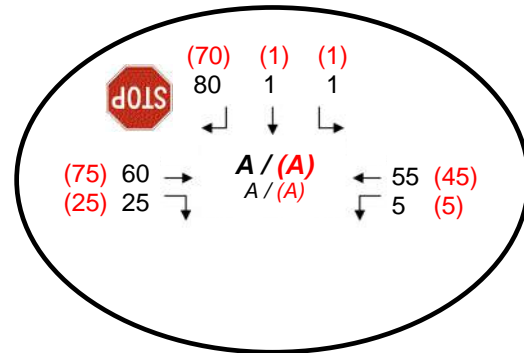
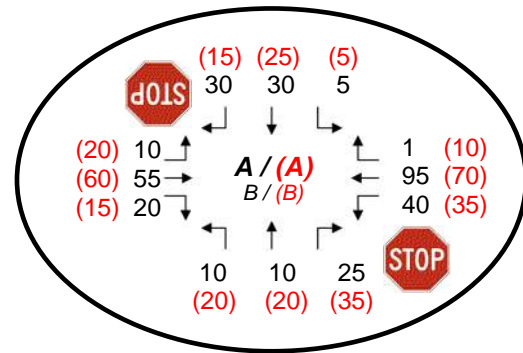
FIGURE 19



7. US 81 & 19th Street NE (456th Avenue)

6. US 81 & I-29 SB Exit 180 RTI

5. US 81 & I-29 NB Exit 180 RTI



LEGEND

- 1 Study Intersection
- AM (PM) 2020 Peak Hour Traffic Volumes

Intersection LOS

- A / (B) Overall Intersection
- B / (B) Worst-case Approach LOS (TWSC)

Intersection Control

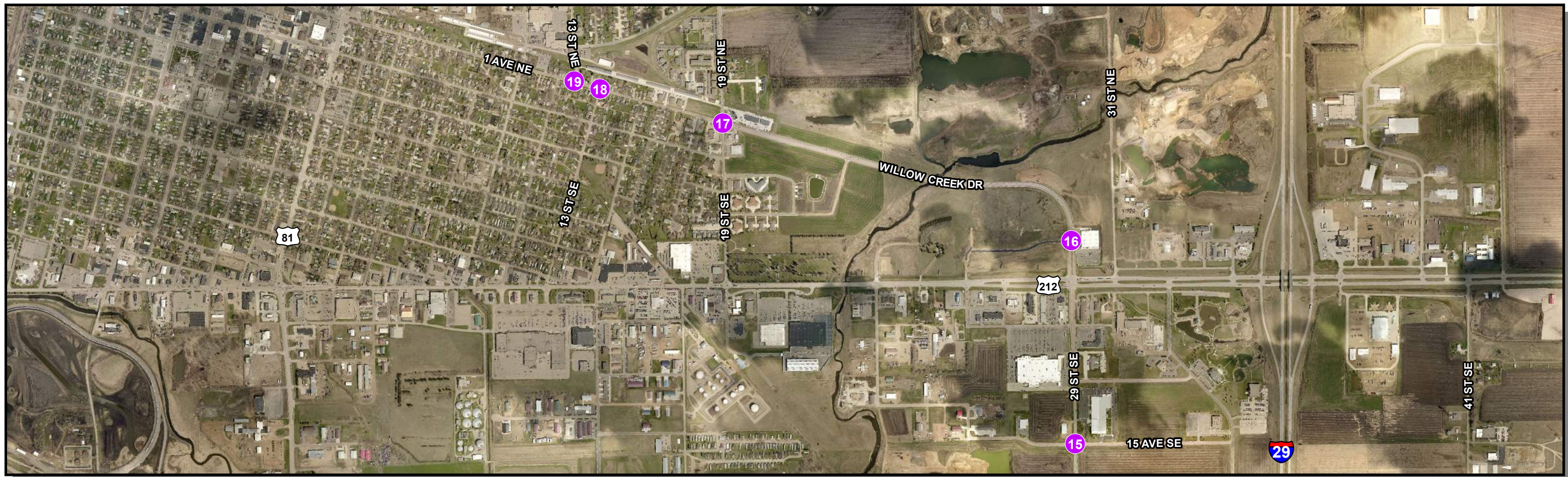
- Signal
- STOP Stop Control
- Roundabout Control

0 Miles 0.25



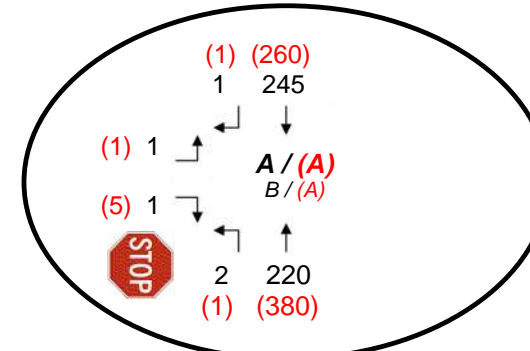
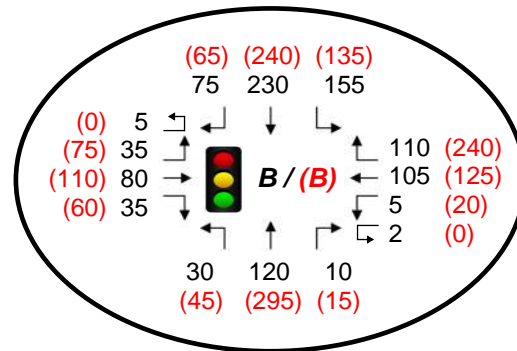
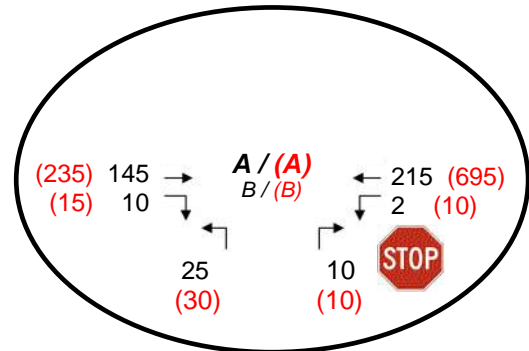
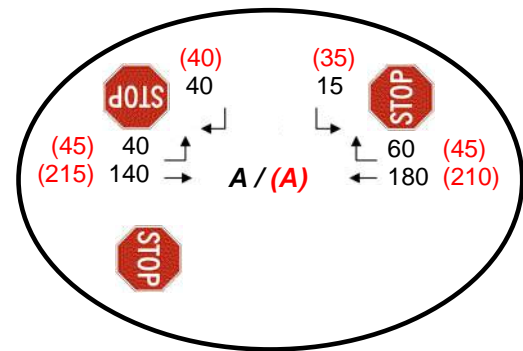
2020 PEAK HOUR INTERSECTION LEVEL OF SERVICE (EXISTING)
US 81 (26TH AVENUE NE) CORRIDOR

FIGURE 20

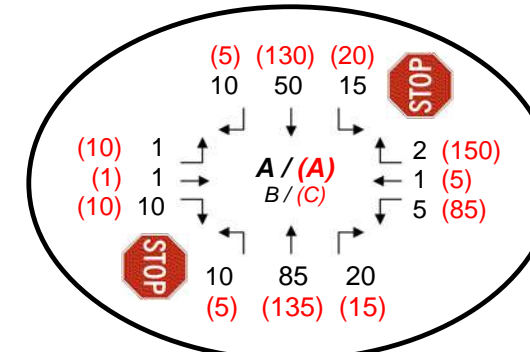


19. 1st Avenue NE & 13th Street NE (NB) 18. 1st Avenue NE & 13th Street NE (SB) 17. 1st Avenue NE & 19th Street NE

16. Willow Creek Drive & 8th Avenue SE



15. 29th Street SE & 15th Avenue SE



LEGEND

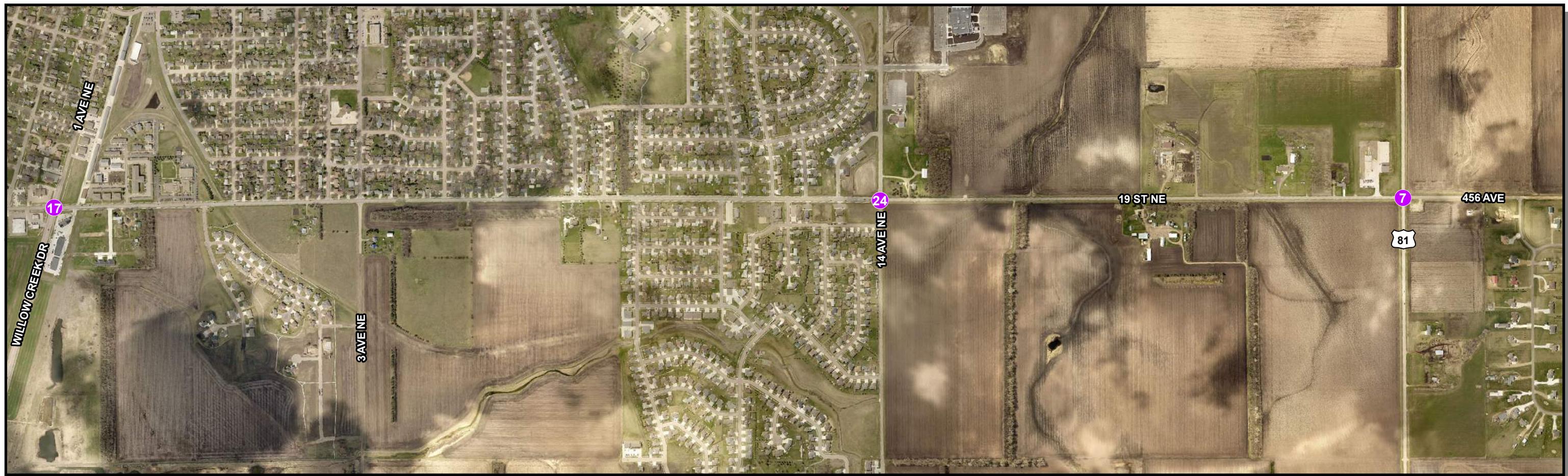
- 1** Study Intersection
- AM (PM) 2020 Peak Hour Traffic Volumes
- Intersection LOS
 - A / (B) Overall Intersection
 - B / (B) Worst-case Approach LOS (TWSC)
- Intersection Control
 - Signal
 - Stop Control
 - Roundabout Control

0 Miles 0.2

2020 PEAK HOUR INTERSECTION LEVEL OF SERVICE (EXISTING)
1ST AVENUE NE / WILLOW CREEK DRIVE (29TH STREET SE) CORRIDOR

FIGURE 21

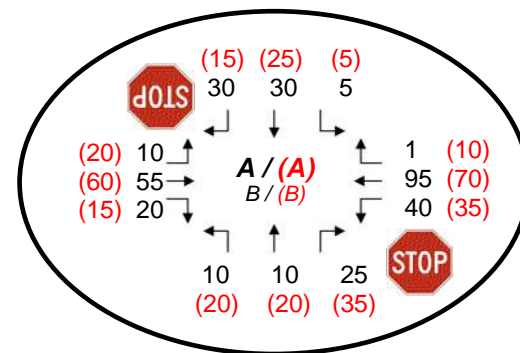
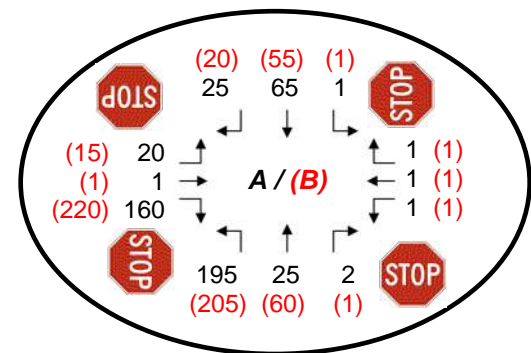
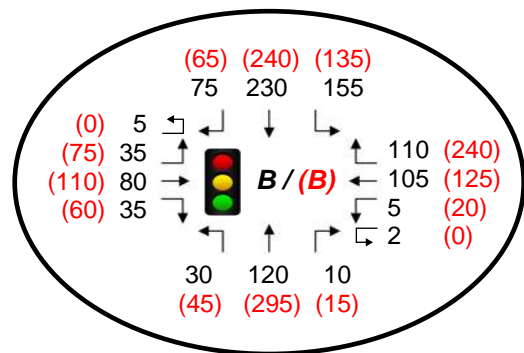




17. 1st Avenue NE & 19th Street NE

24. 19th Street NE & 14th Avenue NE

7. US 81 & 19th Street NE (456th Avenue)



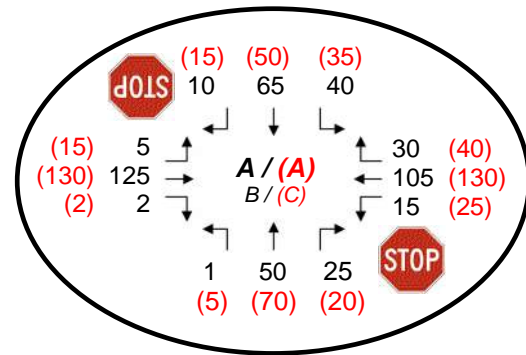
LEGEND

- 1** Study Intersection
- AM (PM) 2020 Peak Hour Traffic Volumes
- Intersection LOS
 - A/(B) Overall Intersection
 - B/(B) Worst-case Approach LOS (TWSC)
- Intersection Control
 - Signal
 - Stop Control
 - Roundabout

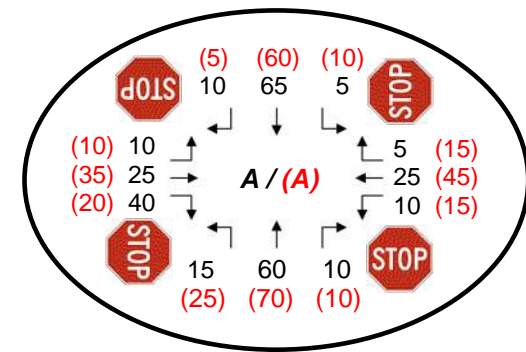
0 Miles 0.3



20. 3rd Street NW & 1st Avenue NW



21. 3rd Street NW & W Kemp Avenue



LEGEND

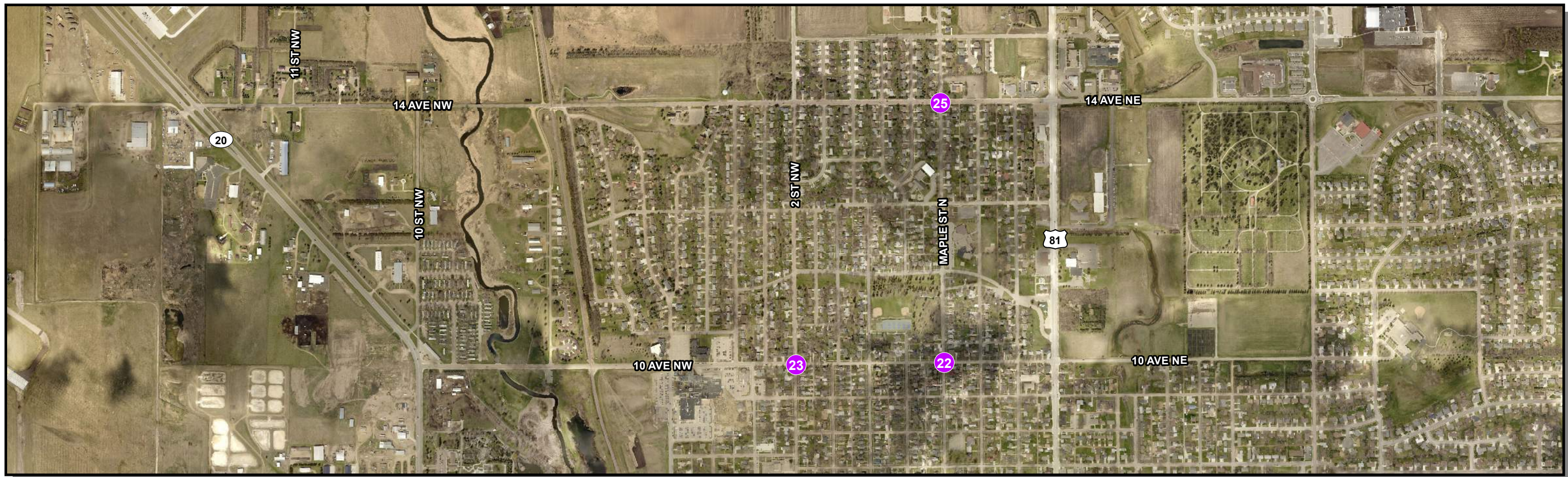
- 1** Study Intersection
- AM (PM) 2020 Peak Hour Traffic Volumes
- Intersection LOS
 - A / (B) Overall Intersection
 - B / (B) Worst-case Approach LOS (TWSC)
- Intersection Control
 - Signal
 - Stop Control
 - Roundabout

0 Miles 0.05

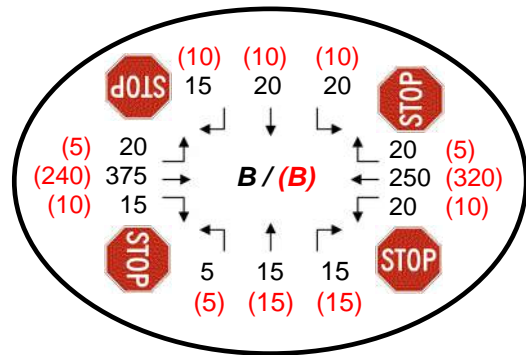
2020 PEAK HOUR INTERSECTION LEVEL OF SERVICE (EXISTING)
3RD STREET NW CORRIDOR

FIGURE 23

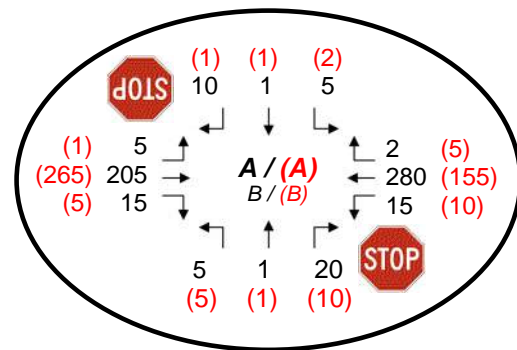




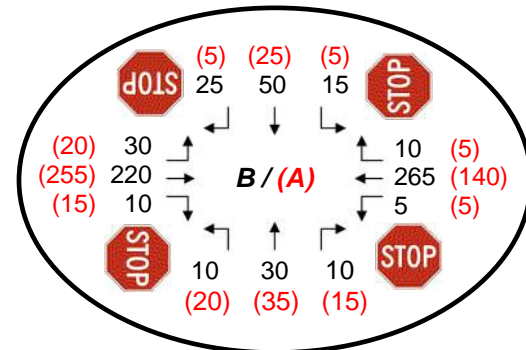
25. N Maple Street & 14th Avenue N



23. 10th Avenue NW & 2nd Street W



22. 10th Avenue N & N Maple Street



LEGEND

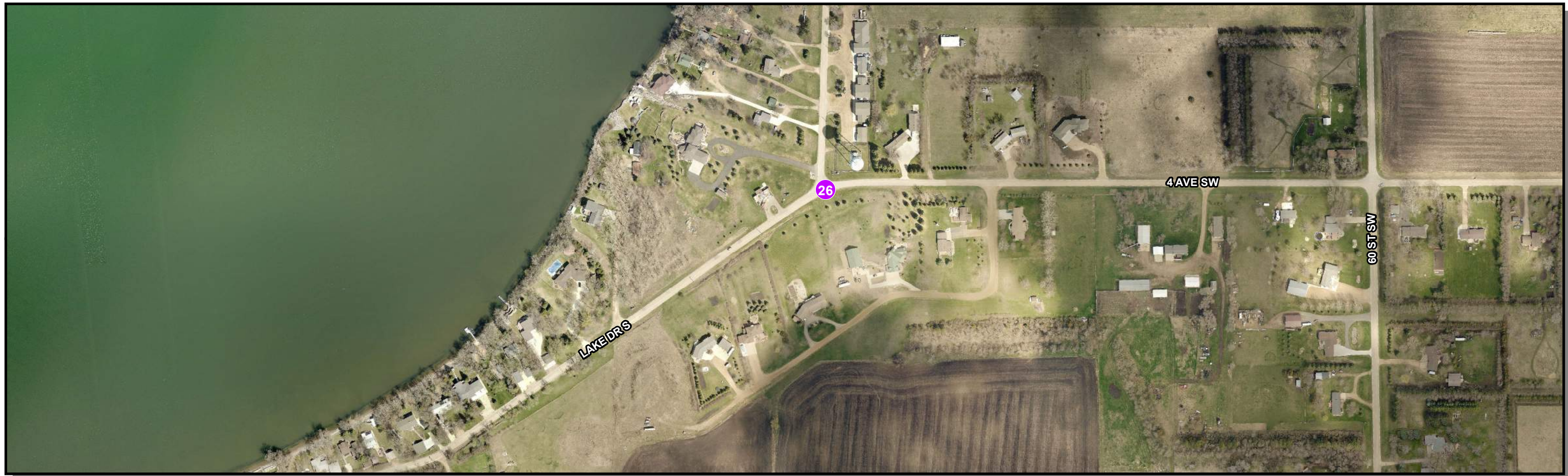
- 1** Study Intersection
- AM (PM) 2020 Peak Hour Traffic Volumes
- Intersection LOS
 - A / (B) Overall Intersection
 - B / (B) Worst-case Approach LOS (TWSC)
- Intersection Control
 - Signal
 - Stop Control
 - Roundabout

0 Miles 0.15

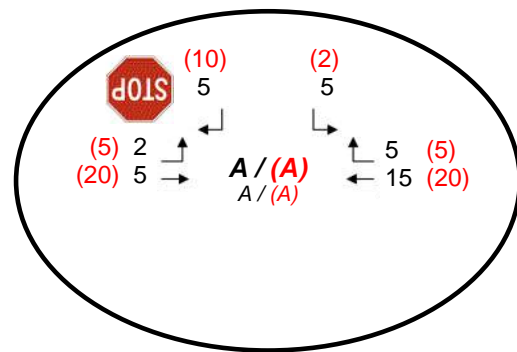


2020 PEAK HOUR INTERSECTION LEVEL OF SERVICE (EXISTING)
10TH AVENUE N / N MAPLE STREET CORRIDOR

FIGURE 24



26. South Lake Drive & 4th Avenue SW



LEGEND

- 1 Study Intersection
- AM (PM) 2020 Peak Hour Traffic Volumes
- Intersection LOS
 - A / (B) Overall Intersection
 - B / (B) Worst-case Approach LOS (TWSC)
- Intersection Control
 - Signal
 - Stop Control
 - Roundabout

0 Miles 0.05

Traffic Operations Findings

The following are general findings derived from the 2020 existing conditions traffic operations analysis:

PLANNING LEVEL NUMBER OF LANES REVIEW

- No road segments currently function above SDDOT planning level capacity thresholds.
- A majority of roads within City limits function below 60% of SDDOT planning level capacity thresholds under existing daily traffic volumes.
- US 212 functions between 60% and 80% of capacity from 19th Street SE to US 81 with a volume to capacity (V/C) ratio of approximately 0.62. This is due to the highest daily volumes occurring on this segment of US 212. Since the existing V/C ratio remains low, this is indicative of a less significant future capacity concern.
- 14th Avenue North functions the following ways based on planning level capacity thresholds:
 - From 10th Street NW to 2nd Street NW, 14th Avenue NW operates between 60% and 80% of capacity. This is due to being classified as a rural segment with a greater volume capacity, as these segments are near the northern edge of the City and have more rural section attributes and few access points. V/C ratios for segments in this area were approximately 0.63, indicating a less significant future capacity issue.
 - From 2nd Street NW to N Maple Street, 14th Avenue North operates between 80% and 100% of capacity due to this segment being classified as an urban segment and the lack of left-turn lanes at major intersections. This represents a potentially more significant future capacity issue.
- 10th Avenue North functions the following ways based on planning level capacity thresholds:
 - From 3rd Street NW to 2nd Street NW, 10th Avenue NW operates between 80% and 100% of capacity. This is due to a lack of left-turn lanes at major intersections along an urbanized segment.
 - From 2nd Street NW to N Maple Street, 10th Avenue North operates between 60% and 80% of capacity. Similar to the adjacent segment, this is due to a lack of left-turn lanes at major along an urbanized segment.

INTERSECTION OPERATIONS

- All study intersections met peak hour LOS goals and all intersections had an overall LOS of LOS B or above.
- US 212 and 23rd Street SE intersection has a TWSC worst-case approach LOS D for the northbound approach in the PM peak hour, indicating a notable delay for vehicles attempting to turn left or right onto US 212.



Appendix

Section A – Synchro Traffic Operations Reports

Section A – Synchro Traffic Operations Reports

2020 EXISTING CONDITIONS - AM

US 212 & Interstate 29 NB Exit 177 RTI
 US 212 & Interstate 29 SB Exit 177 RTI
 US 212 & 23rd Street SE
 US 212 & Broadway Street S
 US 81 & Interstate 29 NB Exit 180 RTI
 US 81 & Interstate 29 SB Exit 180 RTI
 US 81 & 19th Street NE
 US 81 & 18th Avenue NE
 US 81 & 14th Avenue NE
 US 81 & 3rd Avenue NE
 US 81 & E Kemp Avenue
 US 81 & 1st Avenue SE
 US 81 & 4th Avenue SE
 US 81 & 20th Avenue SE
 1st Avenue NE & 13th Street NE (NB)
 1st Avenue NE & 13th Street NE (SB)
 1st Avenue NE & 19th Street NE
 Willow Creek Drive & 8th Avenue SE
 29th Street SE & 15th Avenue SE
 19th Street NE & 14th Avenue NE
 3rd Street NW & 1st Avenue NW
 3rd Street W & W Kemp Avenue
 10th Avenue N & N Maple St
 10th Avenue N & 2nd Street W
 N Maple Street & 14th Avenue NE
 South Lake Drive & 4th Avenue SW





















2020 EXISTING CONDITIONS - PM

US 212 & Interstate 29 NB Exit 177 RTI
 US 212 & Interstate 29 SB Exit 177 RTI
 US 212 & 23rd Street SE
 US 212 & Broadway Street S
 US 81 & Interstate 29 NB Exit 180 RTI
 US 81 & Interstate 29 SB Exit 180 RTI
 US 81 & 19th Street NE
 US 81 & 18th Avenue NE
 US 81 & 14th Avenue NE
 US 81 & 3rd Avenue NE
 US 81 & E Kemp Avenue
 US 81 & 1st Avenue SE
 US 81 & 4th Avenue SE
 US 81 & 20th Avenue SE
 1st Avenue NE & 13th Street NE (NB)
 1st Avenue NE & 13th Street NE (SB)
 1st Avenue NE & 19th Street NE
 Willow Creek Drive & 8th Avenue SE
 29th Street SE & 15th Avenue SE
 19th Street NE & 14th Avenue NE
 3rd Street NW & 1st Avenue NW
 3rd Street W & W Kemp Avenue
 10th Avenue N & N Maple St
 10th Avenue N & 2nd Street W
 N Maple Street & 14th Avenue NE
 South Lake Drive & 4th Avenue SW

2020 Existing Conditions - AM

Lanes, Volumes, Timings
5: I-29 NB Exit 177 RTI & US 212

12/09/2020

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 							
Traffic Volume (vph)	50	230	0	0	315	40	185	0	25	0	0	0
Future Volume (vph)	50	230	0	0	315	40	185	0	25	0	0	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (ft)	300		0	0		850	0		0	0		0
Storage Lanes	1		0	0		1	0		1	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt						0.850			0.850			
Flt Protected	0.950							0.950				
Satd. Flow (prot)	1676	3353	0	0	3353	1500	0	1676	1500	0	0	0
Flt Permitted	0.373							0.950				
Satd. Flow (perm)	658	3353	0	0	3353	1500	0	1676	1500	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						164			164			
Link Speed (mph)		45			45			55			55	
Link Distance (ft)		690			1249			322			321	
Travel Time (s)		10.5			18.9			4.0			4.0	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	59	271	0	0	371	47	218	0	29	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	59	271	0	0	371	47	0	218	29	0	0	0
Turn Type	pm+pt	NA			NA	Perm	Perm	NA	Prot			
Protected Phases	5	2			6			8	8			
Permitted Phases	2					6	8					
Detector Phase	5	2			6	6	8	8	8			
Switch Phase												
Minimum Initial (s)	5.0	10.0			10.0	10.0	12.0	12.0	12.0			
Minimum Split (s)	11.0	24.0			24.0	24.0	24.0	24.0	24.0			
Total Split (s)	11.0	36.0			25.0	25.0	24.0	24.0	24.0			
Total Split (%)	18.3%	60.0%			41.7%	41.7%	40.0%	40.0%	40.0%			
Yellow Time (s)	4.0	4.0			4.0	4.0	4.0	4.0	4.0			
All-Red Time (s)	2.0	2.0			2.0	2.0	2.0	2.0	2.0			
Lost Time Adjust (s)	0.0	0.0			0.0	0.0		0.0	0.0			
Total Lost Time (s)	6.0	6.0			6.0	6.0		6.0	6.0			
Lead/Lag	Lead				Lag	Lag						
Lead-Lag Optimize?	Yes				Yes	Yes						
Recall Mode	None	Min			Min	Min	None	None	None			
Act Effct Green (s)	18.0	18.0			14.2	14.2		13.4	13.4			
Actuated g/C Ratio	0.41	0.41			0.32	0.32		0.31	0.31			
v/c Ratio	0.15	0.20			0.34	0.08		0.43	0.05			
Control Delay	8.8	8.6			14.0	0.2		16.0	0.2			
Queue Delay	0.0	0.0			0.0	0.0		0.0	0.0			
Total Delay	8.8	8.6			14.0	0.2		16.0	0.2			
LOS	A	A			B	A		B	A			
Approach Delay		8.6			12.5			14.1				
Approach LOS		A			B			B				
Queue Length 50th (ft)	8	19			27	0		28	0			
Queue Length 95th (ft)	24	39			78	0		100	0			

Lanes, Volumes, Timings
 5: I-29 NB Exit 177 RTI & US 212

12/09/2020

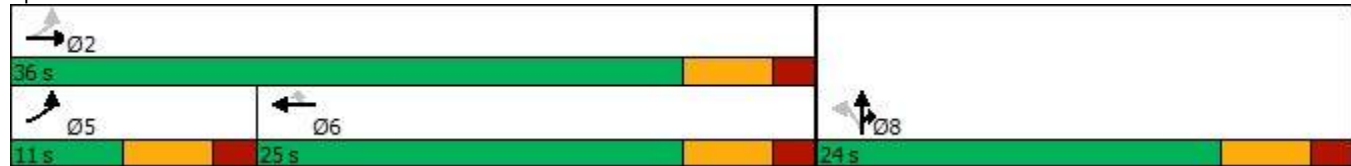


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		610			1169			242			241	
Turn Bay Length (ft)	300					850						
Base Capacity (vph)	390	2381			1590	797		714	733			
Starvation Cap Reductn	0	0			0	0		0	0			
Spillback Cap Reductn	0	0			0	0		0	0			
Storage Cap Reductn	0	0			0	0		0	0			
Reduced v/c Ratio	0.15	0.11			0.23	0.06		0.31	0.04			

Intersection Summary

Area Type:	Other
Cycle Length:	60
Actuated Cycle Length:	43.9
Natural Cycle:	60
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.43
Intersection Signal Delay:	11.6
Intersection LOS:	B
Intersection Capacity Utilization	39.2%
ICU Level of Service	A
Analysis Period (min)	15

Splits and Phases: 5: I-29 NB Exit 177 RTI & US 212



HCM 6th Signalized Intersection Summary

5: I-29 NB Exit 177 RTI & US 212













12/09/2020



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	50	230	0	0	315	40	185	0	25	0	0	0
Future Volume (veh/h)	50	230	0	0	315	40	185	0	25	0	0	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Work Zone On Approach		No			No			No				
Adj Sat Flow, veh/h/ln	1772	1772	0	0	1772	1772	1772	1772	1772			
Adj Flow Rate, veh/h	59	271	0	0	371	47	218	0	29			
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85			
Percent Heavy Veh, %	2	2	0	0	2	2	2	2	2			
Cap, veh/h	413	1488	0	0	805	359	457	0	407			
Arrive On Green	0.06	0.44	0.00	0.00	0.24	0.24	0.27	0.00	0.27			
Sat Flow, veh/h	1688	3455	0	0	3455	1502	1688	0	1502			
Grp Volume(v), veh/h	59	271	0	0	371	47	218	0	29			
Grp Sat Flow(s),veh/h/ln	1688	1683	0	0	1683	1502	1688	0	1502			
Q Serve(g_s), s	1.0	2.0	0.0	0.0	3.9	1.0	4.5	0.0	0.6			
Cycle Q Clear(g_c), s	1.0	2.0	0.0	0.0	3.9	1.0	4.5	0.0	0.6			
Prop In Lane	1.00		0.00	0.00		1.00	1.00		1.00			
Lane Grp Cap(c), veh/h	413	1488	0	0	805	359	457	0	407			
V/C Ratio(X)	0.14	0.18	0.00	0.00	0.46	0.13	0.48	0.00	0.07			
Avail Cap(c_a), veh/h	515	2416	0	0	1530	683	727	0	647			
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(l)	1.00	1.00	0.00	0.00	1.00	1.00	1.00	0.00	1.00			
Uniform Delay (d), s/veh	9.7	7.1	0.0	0.0	13.6	12.5	12.8	0.0	11.3			
Incr Delay (d2), s/veh	0.2	0.1	0.0	0.0	0.4	0.2	0.8	0.0	0.1			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	0.3	0.4	0.0	0.0	1.1	0.3	1.2	0.0	0.1			
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	9.9	7.1	0.0	0.0	14.0	12.6	13.5	0.0	11.4			
LnGrp LOS	A	A	A	A	B	B	B	A	B			
Approach Vol, veh/h		330			418			247				
Approach Delay, s/veh		7.6			13.9			13.3				
Approach LOS		A			B			B				
Timer - Assigned Phs		2			5	6		8				
Phs Duration (G+Y+Rc), s		24.5			8.5	16.0		17.3				
Change Period (Y+Rc), s		6.0			6.0	6.0		6.0				
Max Green Setting (Gmax), s		30.0			5.0	19.0		18.0				
Max Q Clear Time (g_c+I1), s		4.0			3.0	5.9		6.5				
Green Ext Time (p_c), s		1.5			0.0	1.9		0.8				
Intersection Summary												
HCM 6th Ctrl Delay					11.6							
HCM 6th LOS					B							

Lanes, Volumes, Timings
 2: I-29 SB Exit 177 RTI & US 212

12/09/2020

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↗	↖	↑↑						↕	
Traffic Volume (vph)	0	260	105	35	465	0	0	0	0	20	0	70
Future Volume (vph)	0	260	105	35	465	0	0	0	0	20	0	70
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (ft)	0		420	300		0	0		0	0		0
Storage Lanes	0		1	1		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850									0.894
Flt Protected				0.950								0.989
Satd. Flow (prot)	0	3353	1500	1676	3353	0	0	0	0	0	1560	0
Flt Permitted				0.950								0.989
Satd. Flow (perm)	0	3353	1500	1676	3353	0	0	0	0	0	1560	0
Link Speed (mph)		45			45			55				55
Link Distance (ft)		1232			690			351				342
Travel Time (s)		18.7			10.5			4.4				4.2
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	0	292	118	39	522	0	0	0	0	22	0	79
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	292	118	39	522	0	0	0	0	0	101	0
Sign Control		Free			Free			Free				Stop

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	39.2%
ICU Level of Service	A
Analysis Period (min)	15

Intersection												
Int Delay, s/veh	1.5											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↑	↑	↑↑						↔	
Traffic Vol, veh/h	0	260	105	35	465	0	0	0	0	20	0	70
Future Vol, veh/h	0	260	105	35	465	0	0	0	0	20	0	70
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	420	300	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	16974	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	89	89	89	89	89	89	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	292	118	39	522	0	0	0	0	22	0	79



















Major/Minor	Major1			Major2			Minor2			
Conflicting Flow All	-	0	0	410	0	0		746	1010	261
Stage 1	-	-	-	-	-	-		600	600	-
Stage 2	-	-	-	-	-	-		146	410	-
Critical Hdwy	-	-	-	4.14	-	-		6.84	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-		5.84	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-		5.84	5.54	-
Follow-up Hdwy	-	-	-	2.22	-	-		3.52	4.02	3.32
Pot Cap-1 Maneuver	0	-	-	1145	-	0		349	238	738
Stage 1	0	-	-	-	-	0		511	488	-
Stage 2	0	-	-	-	-	0		866	594	-
Platoon blocked, %	-	-	-	-	-	-		-	-	-
Mov Cap-1 Maneuver	-	-	-	1145	-	-		337	0	738
Mov Cap-2 Maneuver	-	-	-	-	-	-		337	0	-
Stage 1	-	-	-	-	-	-		511	0	-
Stage 2	-	-	-	-	-	-		837	0	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0.6	12.5
HCM LOS			B

Minor Lane/Major Mvmt	EBT	EBR	WBL	WBT	SBLn1
Capacity (veh/h)	-	-	1145	-	584
HCM Lane V/C Ratio	-	-	0.034	-	0.173
HCM Control Delay (s)	-	-	8.3	-	12.5
HCM Lane LOS	-	-	A	-	B
HCM 95th %tile Q(veh)	-	-	0.1	-	0.6

Lanes, Volumes, Timings
11: 23rd St SE & US 212

12/09/2020

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	280	25	10	305	0	15	0	10	0	0	0
Future Volume (vph)	0	280	25	10	305	0	15	0	10	0	0	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (ft)	130		0	150		0	0		0	0		0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.988						0.945				
Flt Protected				0.950				0.971				
Satd. Flow (prot)	1800	3318	0	1513	3288	0	0	1342	0	0	1800	0
Flt Permitted				0.950				0.971				
Satd. Flow (perm)	1800	3318	0	1513	3288	0	0	1342	0	0	1800	0
Link Speed (mph)		45			45			30			30	
Link Distance (ft)		902			1331			481			333	
Travel Time (s)		13.7			20.2			10.9			7.6	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	0%	2%	0%	13%	4%	0%	19%	0%	29%	0%	0%	0%
Adj. Flow (vph)	0	301	27	11	328	0	16	0	11	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	328	0	11	328	0	0	27	0	0	0	0
Sign Control		Free			Free			Stop			Stop	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	19.0%
Analysis Period (min)	15
	ICU Level of Service A

Intersection												
Int Delay, s/veh	0.6											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↕		↔	↕			↕			↕	
Traffic Vol, veh/h	0	280	25	10	305	0	15	0	10	0	0	0
Future Vol, veh/h	0	280	25	10	305	0	15	0	10	0	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	130	-	-	150	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	0	2	0	13	4	0	19	0	29	0	0	0
Mvmt Flow	0	301	27	11	328	0	16	0	11	0	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	328	0	0	328	0	0	501	665	164	501	678	164
Stage 1	-	-	-	-	-	-	315	315	-	350	350	-
Stage 2	-	-	-	-	-	-	186	350	-	151	328	-
Critical Hdwy	4.1	-	-	4.36	-	-	7.88	6.5	7.48	7.5	6.5	6.9
Critical Hdwy Stg 1	-	-	-	-	-	-	6.88	5.5	-	6.5	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.88	5.5	-	6.5	5.5	-
Follow-up Hdwy	2.2	-	-	2.33	-	-	3.69	4	3.59	3.5	4	3.3
Pot Cap-1 Maneuver	1243	-	-	1153	-	-	417	383	773	458	377	858
Stage 1	-	-	-	-	-	-	625	659	-	645	636	-
Stage 2	-	-	-	-	-	-	751	636	-	842	651	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1243	-	-	1153	-	-	414	379	773	448	373	858
Mov Cap-2 Maneuver	-	-	-	-	-	-	414	379	-	448	373	-
Stage 1	-	-	-	-	-	-	625	659	-	645	630	-
Stage 2	-	-	-	-	-	-	744	630	-	830	651	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	0			0.3			12.5			0		
HCM LOS							B			A		

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	508	1243	-	-	1153	-	-	-
HCM Lane V/C Ratio	0.053	-	-	-	0.009	-	-	-
HCM Control Delay (s)	12.5	0	-	-	8.2	-	-	0
HCM Lane LOS	B	A	-	-	A	-	-	A
HCM 95th %tile Q(veh)	0.2	0	-	-	0	-	-	-

Lanes, Volumes, Timings
23: Broadway St S & US 212

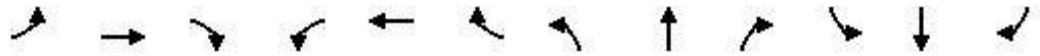
12/09/2020



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	65	670	5	5	525	60	10	10	10	90	10	35
Future Volume (vph)	65	670	5	5	525	60	10	10	10	90	10	35
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (ft)	205		0	215		0	105		0	115		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.999			0.985			0.925				0.884
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1676	3350	0	1676	3303	0	1676	1632	0	1676	1560	0
Flt Permitted	0.373			0.373			0.725			0.743		
Satd. Flow (perm)	658	3350	0	658	3303	0	1279	1632	0	1311	1560	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1			21			11				38
Link Speed (mph)		35			35			40				25
Link Distance (ft)		1772			1929			688				588
Travel Time (s)		34.5			37.6			11.7				16.0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	71	728	5	5	571	65	11	11	11	98	11	38
Shared Lane Traffic (%)												
Lane Group Flow (vph)	71	733	0	5	636	0	11	22	0	98	49	0
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8				4
Permitted Phases	2			6			8			4		
Detector Phase	5	2		1	6		8	8		4		4
Switch Phase												
Minimum Initial (s)	5.0	10.0		5.0	10.0		7.0	7.0		7.0		7.0
Minimum Split (s)	11.0	24.0		11.0	24.0		24.0	24.0		24.0		24.0
Total Split (s)	11.0	25.0		11.0	25.0		24.0	24.0		24.0		24.0
Total Split (%)	18.3%	41.7%		18.3%	41.7%		40.0%	40.0%		40.0%		40.0%
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0		4.0
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0		2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0		0.0
Total Lost Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0		6.0
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?	Yes	Yes		Yes	Yes							
Recall Mode	None	Min		None	Min		None	None		None		None
Act Effct Green (s)	24.8	25.8		22.7	21.8		9.3	9.3		9.3		9.3
Actuated g/C Ratio	0.56	0.59		0.52	0.50		0.21	0.21		0.21		0.21
v/c Ratio	0.14	0.37		0.01	0.39		0.04	0.06		0.35		0.14
Control Delay	6.5	9.2		5.8	12.1		16.6	12.7		20.9		9.3
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0		0.0
Total Delay	6.5	9.2		5.8	12.1		16.6	12.7		20.9		9.3
LOS	A	A		A	B		B	B		C		A
Approach Delay		8.9			12.1			14.0				17.1
Approach LOS		A			B			B				B
Queue Length 50th (ft)	8	50		1	71		2	2		23		2
Queue Length 95th (ft)	25	153		4	127		13	17		61		24

Lanes, Volumes, Timings
 23: Broadway St S & US 212

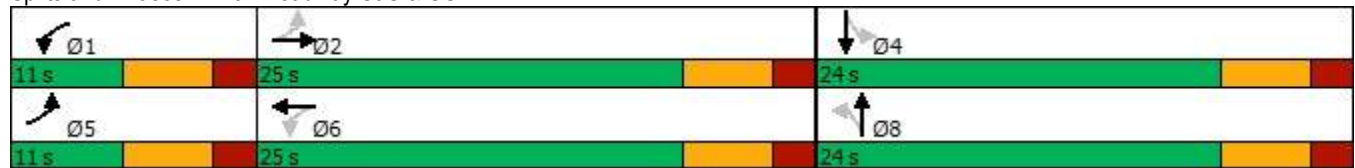
12/09/2020



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		1692			1849			608			508	
Turn Bay Length (ft)	205			215			105			115		
Base Capacity (vph)	492	1992		460	1758		547	705		561	689	
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	0.14	0.37		0.01	0.36		0.02	0.03		0.17	0.07	

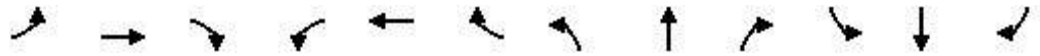
Intersection Summary	
Area Type:	Other
Cycle Length:	60
Actuated Cycle Length:	44
Natural Cycle:	60
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.39
Intersection Signal Delay:	11.0
Intersection LOS:	B
Intersection Capacity Utilization	50.8%
ICU Level of Service	A
Analysis Period (min)	15

Splits and Phases: 23: Broadway St S & US 212



HCM 6th Signalized Intersection Summary
 23: Broadway St S & US 212

12/09/2020

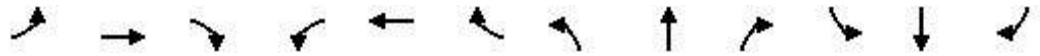


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	65	670	5	5	525	60	10	10	10	90	10	35
Future Volume (veh/h)	65	670	5	5	525	60	10	10	10	90	10	35
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1772	1772	1772	1772	1772	1772	1772	1772	1772	1772	1772	1772
Adj Flow Rate, veh/h	71	728	5	5	571	65	11	11	11	98	11	38
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	412	1218	8	335	891	101	369	128	128	395	55	191
Arrive On Green	0.07	0.36	0.36	0.01	0.29	0.29	0.16	0.16	0.16	0.16	0.16	0.16
Sat Flow, veh/h	1688	3427	24	1688	3047	346	1356	813	813	1390	349	1206
Grp Volume(v), veh/h	71	358	375	5	315	321	11	0	22	98	0	49
Grp Sat Flow(s),veh/h/ln	1688	1683	1768	1688	1683	1710	1356	0	1626	1390	0	1555
Q Serve(g_s), s	1.1	6.5	6.5	0.1	6.1	6.1	0.3	0.0	0.4	2.4	0.0	1.0
Cycle Q Clear(g_c), s	1.1	6.5	6.5	0.1	6.1	6.1	1.3	0.0	0.4	2.9	0.0	1.0
Prop In Lane	1.00		0.01	1.00		0.20	1.00		0.50	1.00		0.78
Lane Grp Cap(c), veh/h	412	598	628	335	492	500	369	0	257	395	0	246
V/C Ratio(X)	0.17	0.60	0.60	0.01	0.64	0.64	0.03	0.00	0.09	0.25	0.00	0.20
Avail Cap(c_a), veh/h	519	853	895	548	853	866	806	0	780	843	0	746
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	8.5	9.9	9.9	9.5	11.5	11.6	14.3	0.0	13.5	14.7	0.0	13.7
Incr Delay (d2), s/veh	0.2	1.0	0.9	0.0	1.4	1.4	0.0	0.0	0.1	0.3	0.0	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	1.8	1.9	0.0	1.8	1.9	0.1	0.0	0.1	0.7	0.0	0.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	8.7	10.9	10.8	9.5	12.9	12.9	14.3	0.0	13.6	15.0	0.0	14.1
LnGrp LOS	A	B	B	A	B	B	B	A	B	B	A	B
Approach Vol, veh/h		804			641			33				147
Approach Delay, s/veh		10.6			12.9			13.9				14.7
Approach LOS		B			B			B				B
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	6.3	19.3		11.9	8.6	17.0		11.9				
Change Period (Y+Rc), s	6.0	6.0		6.0	6.0	6.0		6.0				
Max Green Setting (Gmax), s	5.0	19.0		18.0	5.0	19.0		18.0				
Max Q Clear Time (g_c+I1), s	2.1	8.5		4.9	3.1	8.1		3.3				
Green Ext Time (p_c), s	0.0	3.2		0.4	0.0	2.8		0.1				
Intersection Summary												
HCM 6th Ctrl Delay				12.0								
HCM 6th LOS				B								

Lanes, Volumes, Timings

1: I-29 NB Exit 180 RTI & US 81 (26th Avenue NE)

12/29/2020



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕				
Traffic Volume (vph)	50	10	0	0	40	1	20	1	1	0	0	0
Future Volume (vph)	50	10	0	0	40	1	20	1	1	0	0	0
Ideal Flow (vphpl)	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700
Lane Util. 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
Fr _t					0.997			0.995				
Fl _t Protected		0.960						0.956				
Satd. Flow (prot)	0	1600	0	0	1662	0	0	1585	0	0	0	0
Fl _t Permitted		0.960						0.956				
Satd. Flow (perm)	0	1600	0	0	1662	0	0	1585	0	0	0	0
Link Speed (mph)		55			55			55				55
Link Distance (ft)		1035			897			617				615
Travel Time (s)		12.8			11.1			7.6				7.6
Peak Hour Factor	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78
Adj. Flow (vph)	64	13	0	0	51	1	26	1	1	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	77	0	0	52	0	0	28	0	0	0	0
Sign Control		Free			Free			Stop				Free

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 20.3% ICU Level of Service A

Analysis Period (min) 15

HCM 6th TWSC
 1: I-29 NB Exit 180 RTI & US 81 (26th Avenue NE)

12/29/2020

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	50	10	0	0	40	1	20	1	1	0	0	0
Future Vol, veh/h	50	10	0	0	40	1	20	1	1	0	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	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	16965	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	78	78	78	78	78	78	78	78	78	78	78	78
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	64	13	0	0	51	1	26	1	1	0	0	0

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	52	0	-
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.12	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.218	-	-
Pot Cap-1 Maneuver	1554	-	0
Stage 1	-	-	0
Stage 2	-	-	0
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1554	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	6.2	0	9.8
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	WBT	WBR
Capacity (veh/h)	773	1554	-	-	-
HCM Lane V/C Ratio	0.036	0.041	-	-	-
HCM Control Delay (s)	9.8	7.4	0	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0.1	0.1	-	-	-

Lanes, Volumes, Timings

2: I-29 SB Exit 180 RTI & US 81 (26th Avenue NE)

12/29/2020



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	60	25	5	55	0	0	0	0	1	1	80
Future Volume (vph)	0	60	25	5	55	0	0	0	0	1	1	80
Ideal Flow (vphpl)	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700
Lane Util. 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
Fr _t		0.961									0.868	
Fl _t Protected					0.996							
Satd. Flow (prot)	0	1602	0	0	1660	0	0	0	0	0	1447	0
Fl _t Permitted					0.996							
Satd. Flow (perm)	0	1602	0	0	1660	0	0	0	0	0	1447	0
Link Speed (mph)		55			55			55			55	
Link Distance (ft)		2073			1035			625			611	
Travel Time (s)		25.7			12.8			7.7			7.6	
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Adj. Flow (vph)	0	73	30	6	67	0	0	0	0	1	1	98
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	103	0	0	73	0	0	0	0	0	100	0
Sign Control		Free			Free			Free			Stop	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	20.2%
Analysis Period (min)	15
	ICU Level of Service A

HCM 6th TWSC
 2: I-29 SB Exit 180 RTI & US 81 (26th Avenue NE)

12/29/2020

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	0	60	25	5	55	0	0	0	0	1	1	80
Future Vol, veh/h	0	60	25	5	55	0	0	0	0	1	1	80
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	16974	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	82	82	82	82	82	82	82	82	82	82	82	82
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	73	30	6	67	0	0	0	0	1	1	98

Major/Minor	Major1			Major2			Minor2			
Conflicting Flow All	-	0	0	103	0	0		167	182	67
Stage 1	-	-	-	-	-	-		79	79	-
Stage 2	-	-	-	-	-	-		88	103	-
Critical Hdwy	-	-	-	4.12	-	-		6.42	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-		5.42	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-		5.42	5.52	-
Follow-up Hdwy	-	-	-	2.218	-	-		3.518	4.018	3.318
Pot Cap-1 Maneuver	0	-	-	1489	-	0		823	712	997
Stage 1	0	-	-	-	-	0		944	829	-
Stage 2	0	-	-	-	-	0		935	810	-
Platoon blocked, %	-	-	-	-	-	-		-	-	-
Mov Cap-1 Maneuver	-	-	-	1489	-	-		820	0	997
Mov Cap-2 Maneuver	-	-	-	-	-	-		820	0	-
Stage 1	-	-	-	-	-	-		944	0	-
Stage 2	-	-	-	-	-	-		931	0	-

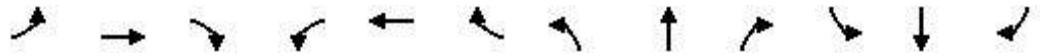
Approach	EB	WB	SB
HCM Control Delay, s	0	0.6	9
HCM LOS			A

Minor Lane/Major Mvmt	EBT	EBR	WBL	WBT	SBLn1
Capacity (veh/h)	-	-	1489	-	994
HCM Lane V/C Ratio	-	-	0.004	-	0.101
HCM Control Delay (s)	-	-	7.4	0	9
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0	-	0.3

Lanes, Volumes, Timings

10: 19th Street NE (456th Avenue) & US 81 (26th Avenue NE)

12/29/2020



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (vph)	10	55	20	40	95	1	10	10	25	5	30	30
Future Volume (vph)	10	55	20	40	95	1	10	10	25	5	30	30
Ideal Flow (vphpl)	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700
Lane Util. 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
Frt		0.969			0.999			0.926			0.937	
Flt Protected		0.994			0.985			0.989			0.996	
Satd. Flow (prot)	0	1605	0	0	1640	0	0	1526	0	0	1555	0
Flt Permitted		0.994			0.985			0.989			0.996	
Satd. Flow (perm)	0	1605	0	0	1640	0	0	1526	0	0	1555	0
Link Speed (mph)		55			55			55			55	
Link Distance (ft)		4507			2073			773			992	
Travel Time (s)		55.9			25.7			9.6			12.3	
Peak Hour Factor	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79
Adj. Flow (vph)	13	70	25	51	120	1	13	13	32	6	38	38
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	108	0	0	172	0	0	58	0	0	82	0
Sign Control		Free			Free			Stop			Stop	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 27.4% ICU Level of Service A

Analysis Period (min) 15

HCM 6th TWSC

10: 19th Street NE (456th Avenue) & US 81 (26th Avenue NE)

12/29/2020

Intersection												
Int Delay, s/veh	4.7											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	10	55	20	40	95	1	10	10	25	5	30	30
Future Vol, veh/h	10	55	20	40	95	1	10	10	25	5	30	30
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	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	79	79	79	79	79	79	79	79	79	79	79	79
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	13	70	25	51	120	1	13	13	32	6	38	38

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	121	0	0	95	0	0	370	332	83	354	344	121
Stage 1	-	-	-	-	-	-	109	109	-	223	223	-
Stage 2	-	-	-	-	-	-	261	223	-	131	121	-
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	1467	-	-	1499	-	-	587	588	976	601	579	930
Stage 1	-	-	-	-	-	-	896	805	-	780	719	-
Stage 2	-	-	-	-	-	-	744	719	-	873	796	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1467	-	-	1499	-	-	515	562	976	552	553	930
Mov Cap-2 Maneuver	-	-	-	-	-	-	515	562	-	552	553	-
Stage 1	-	-	-	-	-	-	888	798	-	773	693	-
Stage 2	-	-	-	-	-	-	650	693	-	824	789	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.9			2.2			10.5			11		
HCM LOS							B			B		

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	716	1467	-	-	1499	-	-	680
HCM Lane V/C Ratio	0.08	0.009	-	-	0.034	-	-	0.121
HCM Control Delay (s)	10.5	7.5	0	-	7.5	0	-	11
HCM Lane LOS	B	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.3	0	-	-	0.1	-	-	0.4

Lanes, Volumes, Timings

15: US 81 (4th Street NE)/US 81 (5th Street NE) & 18th Avenue NE

12/29/2020



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	135	10	115	65	5	210
Future Volume (vph)	135	10	115	65	5	210
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Storage Length (ft)	0	0		100	190	
Storage Lanes	1	0		0	1	
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.991			0.850		
Flt Protected	0.955				0.950	
Satd. Flow (prot)	1670	0	1765	1500	1676	1765
Flt Permitted	0.955				0.950	
Satd. Flow (perm)	1670	0	1765	1500	1676	1765
Link Speed (mph)	25		35			35
Link Distance (ft)	791		1566			1307
Travel Time (s)	21.6		30.5			25.5
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82
Adj. Flow (vph)	165	12	140	79	6	256
Shared Lane Traffic (%)						
Lane Group Flow (vph)	177	0	140	79	6	256
Sign Control	Stop		Free			Free

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	26.9%
ICU Level of Service	A
Analysis Period (min)	15

Intersection						
Int Delay, s/veh	3.4					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	135	10	115	65	5	210
Future Vol, veh/h	135	10	115	65	5	210
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	190	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	82	82	82	82	82	82
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	165	12	140	79	6	256

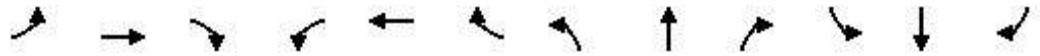
Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	408	140	0	0	219
Stage 1	140	-	-	-	-
Stage 2	268	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12
Critical Hdwy Stg 1	5.42	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218
Pot Cap-1 Maneuver	599	908	-	-	1350
Stage 1	887	-	-	-	-
Stage 2	777	-	-	-	-
Platoon blocked, %					
Mov Cap-1 Maneuver	597	908	-	-	1350
Mov Cap-2 Maneuver	645	-	-	-	-
Stage 1	887	-	-	-	-
Stage 2	774	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	12.5	0	0.2
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	658	1350
HCM Lane V/C Ratio	-	-	0.269	0.005
HCM Control Delay (s)	-	-	12.5	7.7
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	1.1	0

Lanes, Volumes, Timings
 17: US 81 (4th Street NE) & 14th Avenue NE

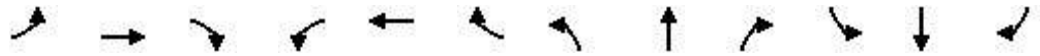
12/29/2020



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	65	250	95	155	195	40	35	145	145	40	305	70
Future Volume (vph)	65	250	95	155	195	40	35	145	145	40	305	70
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (ft)	120		0	120		0	120		0	120		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
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		0.959			0.975			0.925			0.972	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1676	1692	0	1676	1721	0	1676	3101	0	1676	3259	0
Flt Permitted	0.590			0.415			0.503			0.553		
Satd. Flow (perm)	1041	1692	0	732	1721	0	888	3101	0	976	3259	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		33			17			165			48	
Link Speed (mph)		35			35			35			35	
Link Distance (ft)		1194			1025			1109			1566	
Travel Time (s)		23.3			20.0			21.6			30.5	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	74	284	108	176	222	45	40	165	165	45	347	80
Shared Lane Traffic (%)												
Lane Group Flow (vph)	74	392	0	176	267	0	40	330	0	45	427	0
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	24.0	24.0		24.0	24.0		11.0	24.0		11.0	24.0	
Total Split (s)	24.0	24.0		24.0	24.0		11.0	25.0		11.0	25.0	
Total Split (%)	40.0%	40.0%		40.0%	40.0%		18.3%	41.7%		18.3%	41.7%	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None		Min	Min		Min	Min	
Act Effct Green (s)	17.4	17.4		17.4	17.4		17.2	12.1		17.2	12.1	
Actuated g/C Ratio	0.33	0.33		0.33	0.33		0.33	0.23		0.33	0.23	
v/c Ratio	0.22	0.67		0.73	0.46		0.11	0.39		0.12	0.54	
Control Delay	15.5	21.8		38.3	16.6		9.5	10.0		9.6	18.5	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	15.5	21.8		38.3	16.6		9.5	10.0		9.6	18.5	
LOS	B	C		D	B		A	B		A	B	
Approach Delay		20.8			25.2			10.0			17.6	
Approach LOS		C			C			A			B	
Queue Length 50th (ft)	16	90		46	57		7	22		8	54	
Queue Length 95th (ft)	45	#196		#141	122		19	47		21	87	

Lanes, Volumes, Timings
 17: US 81 (4th Street NE) & 14th Avenue NE

12/29/2020

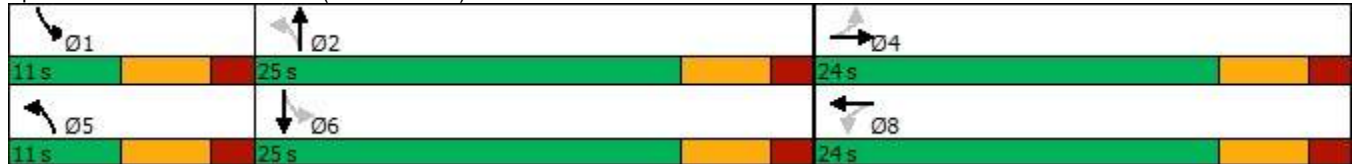


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		1114			945			1029			1486	
Turn Bay Length (ft)	120			120			120			120		
Base Capacity (vph)	357	602		251	601		364	1228		384	1211	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.21	0.65		0.70	0.44		0.11	0.27		0.12	0.35	

Intersection Summary

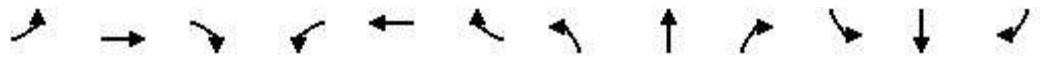
Area Type:	Other
Cycle Length:	60
Actuated Cycle Length:	52.6
Natural Cycle:	60
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.73
Intersection Signal Delay:	18.8
Intersection LOS:	B
Intersection Capacity Utilization	64.5%
ICU Level of Service	C
Analysis Period (min)	15
# 95th percentile volume exceeds capacity, queue may be longer.	
Queue shown is maximum after two cycles.	

Splits and Phases: 17: US 81 (4th Street NE) & 14th Avenue NE



HCM 6th Signalized Intersection Summary
 17: US 81 (4th Street NE) & 14th Avenue NE

12/29/2020



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗		↖	↕	↗	↖	↕	↗
Traffic Volume (veh/h)	65	250	95	155	195	40	35	145	145	40	305	70
Future Volume (veh/h)	65	250	95	155	195	40	35	145	145	40	305	70
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1772	1772	1772	1772	1772	1772	1772	1772	1772	1772	1772	1772
Adj Flow Rate, veh/h	74	284	108	176	222	45	40	165	165	45	347	80
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	417	432	164	306	505	102	385	330	294	414	534	122
Arrive On Green	0.35	0.35	0.35	0.35	0.35	0.35	0.10	0.20	0.20	0.10	0.20	0.20
Sat Flow, veh/h	1178	1223	465	1050	1430	290	1688	1683	1502	1688	2723	620
Grp Volume(v), veh/h	74	0	392	176	0	267	40	165	165	45	213	214
Grp Sat Flow(s),veh/h/ln	1178	0	1688	1050	0	1720	1688	1683	1502	1688	1683	1660
Q Serve(g_s), s	2.6	0.0	10.0	8.0	0.0	6.1	0.9	4.5	5.1	1.0	5.9	6.1
Cycle Q Clear(g_c), s	8.7	0.0	10.0	18.0	0.0	6.1	0.9	4.5	5.1	1.0	5.9	6.1
Prop In Lane	1.00		0.28	1.00		0.17	1.00		1.00	1.00		0.37
Lane Grp Cap(c), veh/h	417	0	596	306	0	607	385	330	294	414	330	326
V/C Ratio(X)	0.18	0.00	0.66	0.57	0.00	0.44	0.10	0.50	0.56	0.11	0.64	0.66
Avail Cap(c_a), veh/h	417	0	596	306	0	607	385	627	559	414	627	619
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	16.0	0.0	13.9	21.7	0.0	12.6	13.4	18.3	18.5	13.3	18.9	18.9
Incr Delay (d2), s/veh	0.2	0.0	2.6	2.6	0.0	0.5	0.1	1.2	1.7	0.1	2.1	2.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.6	0.0	3.5	2.1	0.0	2.0	0.3	1.6	1.7	0.3	2.2	2.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	16.2	0.0	16.6	24.3	0.0	13.1	13.5	19.4	20.2	13.4	21.0	21.2
LnGrp LOS	B	A	B	C	A	B	B	B	C	B	C	C
Approach Vol, veh/h		466			443			370			472	
Approach Delay, s/veh		16.5			17.6			19.1			20.4	
Approach LOS		B			B			B			C	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	11.0	16.0		24.0	11.0	16.0		24.0				
Change Period (Y+Rc), s	6.0	6.0		6.0	6.0	6.0		6.0				
Max Green Setting (Gmax), s	5.0	19.0		18.0	5.0	19.0		18.0				
Max Q Clear Time (g_c+I1), s	3.0	7.1		12.0	2.9	8.1		20.0				
Green Ext Time (p_c), s	0.0	1.5		1.4	0.0	1.8		0.0				

Intersection Summary

HCM 6th Ctrl Delay	18.4
HCM 6th LOS	B

Lanes, Volumes, Timings
 23: US 81 (4th Street NE) & 3rd Avenue NE

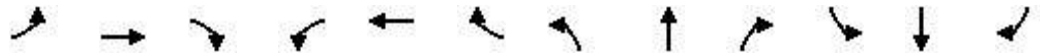
12/29/2020



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	60	225	65	65	140	40	55	440	50	170	565	55
Future Volume (vph)	60	225	65	65	140	40	55	440	50	170	565	55
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (ft)	75		0	75		0	100		0	165		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
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		0.966			0.967			0.985			0.987	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1676	1705	0	1676	1706	0	1676	3303	0	1676	3309	0
Flt Permitted	0.635			0.476			0.319			0.432		
Satd. Flow (perm)	1121	1705	0	840	1706	0	563	3303	0	762	3309	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		25			24			21			18	
Link Speed (mph)		25			25			35			35	
Link Distance (ft)		1200			1304			1548			1564	
Travel Time (s)		32.7			35.6			30.2			30.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	65	245	71	71	152	43	60	478	54	185	614	60
Shared Lane Traffic (%)												
Lane Group Flow (vph)	65	316	0	71	195	0	60	532	0	185	674	0
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	24.0	24.0		24.0	24.0		11.0	24.0		11.0	24.0	
Total Split (s)	24.0	24.0		24.0	24.0		11.0	25.0		11.0	25.0	
Total Split (%)	40.0%	40.0%		40.0%	40.0%		18.3%	41.7%		18.3%	41.7%	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None		Min	Min		Min	Min	
Act Effct Green (s)	13.7	13.7		13.7	13.7		20.7	15.6		20.7	15.6	
Actuated g/C Ratio	0.26	0.26		0.26	0.26		0.39	0.30		0.39	0.30	
v/c Ratio	0.22	0.68		0.33	0.42		0.18	0.54		0.48	0.68	
Control Delay	17.9	24.8		20.8	17.6		9.2	17.6		13.5	20.3	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	17.9	24.8		20.8	17.6		9.2	17.6		13.5	20.3	
LOS	B	C		C	B		A	B		B	C	
Approach Delay		23.7			18.4			16.7			18.9	
Approach LOS		C			B			B			B	
Queue Length 50th (ft)	16	82		18	44		9	69		29	94	
Queue Length 95th (ft)	44	161		49	96		26	118		67	155	

Lanes, Volumes, Timings
 23: US 81 (4th Street NE) & 3rd Avenue NE

12/29/2020

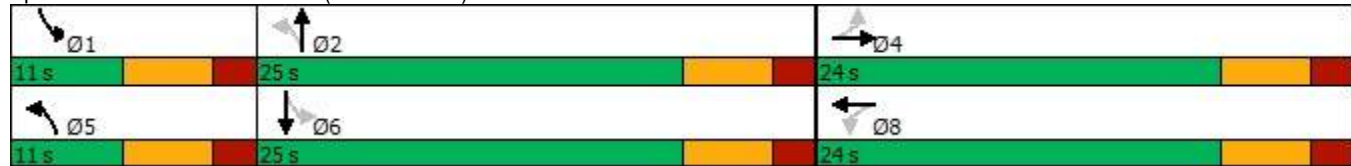


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		1120			1224			1468			1484	
Turn Bay Length (ft)	75			75			100			165		
Base Capacity (vph)	390	610		292	609		327	1226		386	1227	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.17	0.52		0.24	0.32		0.18	0.43		0.48	0.55	

Intersection Summary

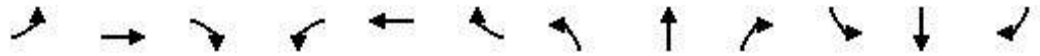
Area Type:	Other
Cycle Length:	60
Actuated Cycle Length:	52.8
Natural Cycle:	60
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.68
Intersection Signal Delay:	19.1
Intersection LOS:	B
Intersection Capacity Utilization	67.0%
ICU Level of Service	C
Analysis Period (min)	15

Splits and Phases: 23: US 81 (4th Street NE) & 3rd Avenue NE



HCM 6th Signalized Intersection Summary
 23: US 81 (4th Street NE) & 3rd Avenue NE

12/29/2020



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗		↖	↕		↖	↗	
Traffic Volume (veh/h)	60	225	65	65	140	40	55	440	50	170	565	55
Future Volume (veh/h)	60	225	65	65	140	40	55	440	50	170	565	55
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1772	1772	1772	1772	1772	1772	1772	1772	1772	1772	1772	1772
Adj Flow Rate, veh/h	65	245	71	71	152	43	60	478	54	185	614	60
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	371	364	105	267	366	104	381	822	92	432	835	81
Arrive On Green	0.28	0.28	0.28	0.28	0.28	0.28	0.10	0.27	0.27	0.10	0.27	0.27
Sat Flow, veh/h	1258	1320	383	1126	1328	376	1688	3050	343	1688	3099	302
Grp Volume(v), veh/h	65	0	316	71	0	195	60	263	269	185	333	341
Grp Sat Flow(s),veh/h/ln	1258	0	1703	1126	0	1704	1688	1683	1710	1688	1683	1718
Q Serve(g_s), s	2.3	0.0	8.3	3.0	0.0	4.7	1.2	6.8	6.9	3.9	9.1	9.1
Cycle Q Clear(g_c), s	7.0	0.0	8.3	11.4	0.0	4.7	1.2	6.8	6.9	3.9	9.1	9.1
Prop In Lane	1.00		0.22	1.00		0.22	1.00		0.20	1.00		0.18
Lane Grp Cap(c), veh/h	371	0	469	267	0	470	381	454	461	432	454	463
V/C Ratio(X)	0.18	0.00	0.67	0.27	0.00	0.42	0.16	0.58	0.58	0.43	0.73	0.74
Avail Cap(c_a), veh/h	473	0	606	358	0	607	381	633	643	432	633	645
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	17.8	0.0	16.3	21.3	0.0	15.0	11.4	16.0	16.0	11.9	16.8	16.8
Incr Delay (d2), s/veh	0.2	0.0	1.9	0.5	0.0	0.6	0.2	1.2	1.2	0.7	2.8	2.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.6	0.0	3.2	0.8	0.0	1.7	0.4	2.4	2.4	1.3	3.3	3.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	18.1	0.0	18.2	21.9	0.0	15.6	11.5	17.2	17.2	12.6	19.6	19.6
LnGrp LOS	B	A	B	C	A	B	B	B	B	B	B	B
Approach Vol, veh/h		381			266			592			859	
Approach Delay, s/veh		18.2			17.2			16.6			18.1	
Approach LOS		B			B			B			B	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	11.0	19.6		19.9	11.0	19.6		19.9				
Change Period (Y+Rc), s	6.0	6.0		6.0	6.0	6.0		6.0				
Max Green Setting (Gmax), s	5.0	19.0		18.0	5.0	19.0		18.0				
Max Q Clear Time (g_c+I1), s	5.9	8.9		10.3	3.2	11.1		13.4				
Green Ext Time (p_c), s	0.0	2.2		1.3	0.0	2.5		0.6				
Intersection Summary												
HCM 6th Ctrl Delay				17.6								
HCM 6th LOS				B								

Lanes, Volumes, Timings

28: US 81 (5th Street SE)/US 81 (5th Street NE) & E Kemp Avenue

12/29/2020



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT
Lane Configurations		↕			↕		↗	↕			↖	↕
Traffic Volume (vph)	15	10	15	10	20	40	25	600	10	1	30	515
Future Volume (vph)	15	10	15	10	20	40	25	600	10	1	30	515
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1700	1800	1800
Storage Length (ft)	0		0	0		0	100		0		100	
Storage Lanes	0		0	0		0	1		0		1	
Taper Length (ft)	25			25			25				25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	1.00	0.95
Frt		0.949			0.923			0.998				0.994
Flt Protected		0.981			0.993		0.950				0.950	
Satd. Flow (prot)	0	1643	0	0	1617	0	1676	3346	0	0	1676	3333
Flt Permitted					0.940		0.352				0.394	
Satd. Flow (perm)	0	1675	0	0	1531	0	621	3346	0	0	695	3333
Right Turn on Red			Yes			Yes			Yes			
Satd. Flow (RTOR)		17			44			4				7
Link Speed (mph)		25			25			35				35
Link Distance (ft)		761			745			370				380
Travel Time (s)		20.8			20.3			7.2				7.4
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.92	0.90	0.90
Adj. Flow (vph)	17	11	17	11	22	44	28	667	11	1	33	572
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	45	0	0	77	0	28	678	0	0	34	594
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		Perm	Perm	NA
Protected Phases		4			8		5	2				6
Permitted Phases	4			8			2			6	6	
Detector Phase	4	4		8	8		5	2		6	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		10.0	10.0	10.0
Minimum Split (s)	22.5	22.5		22.5	22.5		9.5	22.5		22.5	22.5	22.5
Total Split (s)	22.5	22.5		22.5	22.5		9.5	32.5		23.0	23.0	23.0
Total Split (%)	40.9%	40.9%		40.9%	40.9%		17.3%	59.1%		41.8%	41.8%	41.8%
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	3.5
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)		0.0			0.0		0.0	0.0			0.0	0.0
Total Lost Time (s)		4.5			4.5		4.5	4.5			4.5	4.5
Lead/Lag							Lead			Lag	Lag	Lag
Lead-Lag Optimize?							Yes			Yes	Yes	Yes
Recall Mode	None	None		None	None		None	Min		Min	Min	Min
Act Effct Green (s)		6.9			6.9		22.1	25.4			24.1	24.1
Actuated g/C Ratio		0.22			0.22		0.71	0.82			0.77	0.77
v/c Ratio		0.12			0.21		0.04	0.25			0.06	0.23
Control Delay		9.8			8.8		3.5	3.0			6.4	4.7
Queue Delay		0.0			0.0		0.0	0.0			0.0	0.0
Total Delay		9.8			8.8		3.5	3.0			6.4	4.7
LOS		A			A		A	A			A	A
Approach Delay		9.8			8.8			3.0				4.8
Approach LOS		A			A			A				A
Queue Length 50th (ft)		2			2		1	0			0	0
Queue Length 95th (ft)		26			33		8	57			19	88

Lanes, Volumes, Timings

28: US 81 (5th Street SE)/US 81 (5th Street NE) & E Kemp Avenue

12/29/2020

Lane Group	SBR
Lane Configurations	
Traffic Volume (vph)	20
Future Volume (vph)	20
Ideal Flow (vphpl)	1800
Storage Length (ft)	0
Storage Lanes	0
Taper Length (ft)	
Lane Util. Factor	0.95
Frt	
Flt Protected	
Satd. Flow (prot)	0
Flt Permitted	
Satd. Flow (perm)	0
Right Turn on Red	Yes
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	0.90
Adj. Flow (vph)	22
Shared Lane Traffic (%)	
Lane Group Flow (vph)	0
Turn Type	
Protected Phases	
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	
Minimum Split (s)	
Total Split (s)	
Total Split (%)	
Yellow Time (s)	
All-Red Time (s)	
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	

Lanes, Volumes, Timings

28: US 81 (5th Street SE)/US 81 (5th Street NE) & E Kemp Avenue

12/29/2020

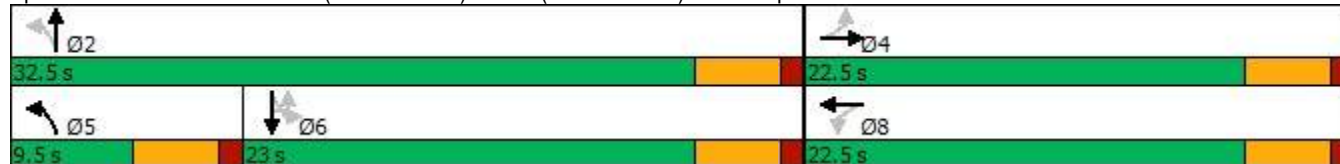


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT
Internal Link Dist (ft)		681			665			290				300
Turn Bay Length (ft)							100				100	
Base Capacity (vph)		1047			968		623	2949			547	2628
Starvation Cap Reductn		0			0		0	0			0	0
Spillback Cap Reductn		0			0		0	0			0	0
Storage Cap Reductn		0			0		0	0			0	0
Reduced v/c Ratio		0.04			0.08		0.04	0.23			0.06	0.23

Intersection Summary

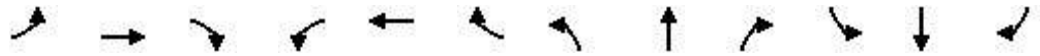
Area Type:	Other
Cycle Length:	55
Actuated Cycle Length:	31.1
Natural Cycle:	55
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.25
Intersection Signal Delay:	4.3
Intersection LOS:	A
Intersection Capacity Utilization	39.8%
ICU Level of Service	A
Analysis Period (min)	15

Splits and Phases: 28: US 81 (5th Street SE)/US 81 (5th Street NE) & E Kemp Avenue



Lanes, Volumes, Timings
 9: US 81 (5th Street SE) & 1st Avenue SE

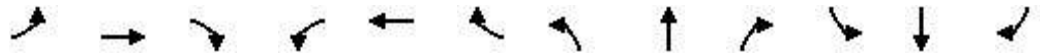
12/29/2020



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	45	35	25	15	20	15	30	575	5	45	450	45
Future Volume (vph)	45	35	25	15	20	15	30	575	5	45	450	45
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (ft)	80		80	0		0	100		0	0		0
Storage Lanes	1		1	0		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
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			0.850		0.960			0.999			0.986	
Flt Protected	0.950				0.985		0.950			0.950		
Satd. Flow (prot)	1676	1765	1500	0	1669	0	1676	3350	0	1676	3306	0
Flt Permitted	0.889				0.885		0.441			0.401		
Satd. Flow (perm)	1569	1765	1500	0	1499	0	778	3350	0	708	3306	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			65		17			2			24	
Link Speed (mph)		25			25			35			35	
Link Distance (ft)		642			750			1323			370	
Travel Time (s)		17.5			20.5			25.8			7.2	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	51	40	28	17	23	17	34	653	6	51	511	51
Shared Lane Traffic (%)												
Lane Group Flow (vph)	51	40	28	0	57	0	34	659	0	51	562	0
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Detector Phase	4	4	4	8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	24.0	24.0	24.0	24.0	24.0		24.0	24.0		24.0	24.0	
Total Split (s)	25.0	25.0	25.0	25.0	25.0		25.0	25.0		25.0	25.0	
Total Split (%)	50.0%	50.0%	50.0%	50.0%	50.0%		50.0%	50.0%		50.0%	50.0%	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0	6.0		6.0		6.0	6.0		6.0	6.0	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None	None	None	None		Min	Min		Min	Min	
Act Effct Green (s)	7.6	7.6	7.6		7.6		22.0	22.0		22.0	22.0	
Actuated g/C Ratio	0.23	0.23	0.23		0.23		0.66	0.66		0.66	0.66	
v/c Ratio	0.14	0.10	0.07		0.16		0.07	0.30		0.11	0.26	
Control Delay	12.4	11.9	2.2		10.2		6.4	5.9		6.8	5.5	
Queue Delay	0.0	0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Delay	12.4	11.9	2.2		10.2		6.4	5.9		6.8	5.5	
LOS	B	B	A		B		A	A		A	A	
Approach Delay		9.8			10.2			5.9			5.6	
Approach LOS		A			B			A			A	
Queue Length 50th (ft)	7	5	0		5		3	38		5	30	
Queue Length 95th (ft)	27	22	6		26		14	71		19	58	

Lanes, Volumes, Timings
 9: US 81 (5th Street SE) & 1st Avenue SE

12/29/2020



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		562			670			1243				290
Turn Bay Length (ft)	80		80				100					
Base Capacity (vph)	898	1011	887		866		566	2438		515	2412	
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	0.06	0.04	0.03		0.07		0.06	0.27		0.10	0.23	

Intersection Summary

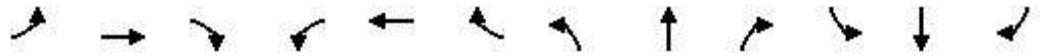
Area Type:	Other
Cycle Length:	50
Actuated Cycle Length:	33.5
Natural Cycle:	50
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.30
Intersection Signal Delay:	6.3
Intersection LOS:	A
Intersection Capacity Utilization	49.9%
ICU Level of Service	A
Analysis Period (min)	15

Splits and Phases: 9: US 81 (5th Street SE) & 1st Avenue SE



HCM 6th Signalized Intersection Summary
 9: US 81 (5th Street SE) & 1st Avenue SE

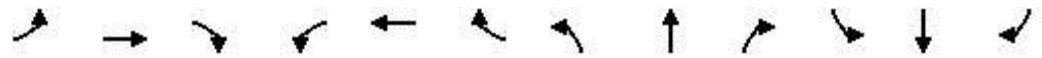
12/29/2020



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	45	35	25	15	20	15	30	575	5	45	450	45
Future Volume (veh/h)	45	35	25	15	20	15	30	575	5	45	450	45
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1772	1772	1772	1772	1772	1772	1772	1772	1772	1772	1772	1772
Adj Flow Rate, veh/h	51	40	28	17	23	17	34	653	6	51	511	51
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	542	334	283	223	161	91	487	1279	12	448	1157	115
Arrive On Green	0.19	0.19	0.19	0.19	0.19	0.19	0.37	0.37	0.37	0.37	0.37	0.37
Sat Flow, veh/h	1448	1772	1502	280	853	481	898	3418	31	821	3092	308
Grp Volume(v), veh/h	51	40	28	57	0	0	34	322	337	51	277	285
Grp Sat Flow(s),veh/h/ln	1448	1772	1502	1614	0	0	898	1683	1766	821	1683	1717
Q Serve(g_s), s	0.0	0.5	0.4	0.0	0.0	0.0	0.8	4.1	4.1	1.4	3.4	3.4
Cycle Q Clear(g_c), s	0.7	0.5	0.4	0.8	0.0	0.0	4.2	4.1	4.1	5.5	3.4	3.4
Prop In Lane	1.00		1.00	0.30		0.30	1.00		0.02	1.00		0.18
Lane Grp Cap(c), veh/h	542	334	283	474	0	0	487	630	661	448	630	642
V/C Ratio(X)	0.09	0.12	0.10	0.12	0.00	0.00	0.07	0.51	0.51	0.11	0.44	0.44
Avail Cap(c_a), veh/h	1272	1227	1040	1265	0	0	773	1166	1223	710	1166	1189
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	1.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	9.3	9.2	9.2	9.4	0.0	0.0	8.0	6.6	6.6	8.8	6.4	6.4
Incr Delay (d2), s/veh	0.1	0.2	0.2	0.1	0.0	0.0	0.1	0.6	0.6	0.1	0.5	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	0.2	0.1	0.2	0.0	0.0	0.1	0.8	0.8	0.2	0.6	0.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	9.4	9.4	9.4	9.5	0.0	0.0	8.1	7.3	7.3	8.9	6.9	6.9
LnGrp LOS	A	A	A	A	A	A	A	A	A	A	A	A
Approach Vol, veh/h		119			57			693			613	
Approach Delay, s/veh		9.4			9.5			7.3			7.1	
Approach LOS		A			A			A			A	
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		16.3		11.2		16.3		11.2				
Change Period (Y+Rc), s		6.0		6.0		6.0		6.0				
Max Green Setting (Gmax), s		19.0		19.0		19.0		19.0				
Max Q Clear Time (g_c+I1), s		6.2		2.7		7.5		2.8				
Green Ext Time (p_c), s		3.3		0.3		2.8		0.2				
Intersection Summary												
HCM 6th Ctrl Delay				7.5								
HCM 6th LOS				A								

Lanes, Volumes, Timings
 13: US 81 (5th Street SE) & 4th Avenue SE

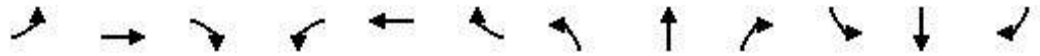
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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↗		↕	↗	↗	↕↗		↗	↕↗	
Traffic Volume (vph)	20	30	15	15	30	10	5	295	5	15	340	15
Future Volume (vph)	20	30	15	15	30	10	5	295	5	15	340	15
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (ft)	0		75	0		75	100		0	100		0
Storage Lanes	0		1	0		1	1		0	1		0
Taper Length (ft)	25			25			25			25		
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			0.850			0.850		0.998			0.994	
Flt Protected		0.981			0.984		0.950			0.950		
Satd. Flow (prot)	0	1731	1500	0	1736	1500	1676	3346	0	1676	3333	0
Flt Permitted		0.961			0.915		0.500			0.534		
Satd. Flow (perm)	0	1696	1500	0	1615	1500	882	3346	0	942	3333	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			65			65		4			10	
Link Speed (mph)		30			25			35			35	
Link Distance (ft)		870			848			999			1323	
Travel Time (s)		19.8			23.1			19.5			25.8	
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Adj. Flow (vph)	24	37	18	18	37	12	6	360	6	18	415	18
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	61	18	0	55	12	6	366	0	18	433	0
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8		8	2			6		
Detector Phase	4	4	4	8	8	8	2	2		6	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	7.0	10.0	10.0		10.0	10.0	
Minimum Split (s)	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0		24.0	24.0	
Total Split (s)	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0		25.0	25.0	
Total Split (%)	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%		50.0%	50.0%	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0	6.0		6.0	6.0	6.0	6.0		6.0	6.0	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None	None	None	None	None	Min	Min		Min	Min	
Act Effct Green (s)		7.5	7.5		7.5	7.5	21.9	21.9		21.9	21.9	
Actuated g/C Ratio		0.26	0.26		0.26	0.26	0.75	0.75		0.75	0.75	
v/c Ratio		0.14	0.04		0.13	0.03	0.01	0.15		0.03	0.17	
Control Delay		9.6	0.5		9.5	0.1	5.8	4.4		5.8	4.4	
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay		9.6	0.5		9.5	0.1	5.8	4.4		5.8	4.4	
LOS		A	A		A	A	A	A		A	A	
Approach Delay		7.5			7.8			4.4			4.5	
Approach LOS		A			A			A			A	
Queue Length 50th (ft)		4	0		3	0	0	0		0	0	
Queue Length 95th (ft)		22	1		20	0	4	34		8	40	

Lanes, Volumes, Timings
 13: US 81 (5th Street SE) & 4th Avenue SE

12/29/2020



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		790			768			919			1243	
Turn Bay Length (ft)			75			75	100			100		
Base Capacity (vph)		1132	1023		1078	1023	725	2754		775	2744	
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		0.05	0.02		0.05	0.01	0.01	0.13		0.02	0.16	

Intersection Summary

Area Type:	Other
Cycle Length:	50
Actuated Cycle Length:	29.2
Natural Cycle:	50
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.17
Intersection Signal Delay:	4.9
Intersection LOS:	A
Intersection Capacity Utilization	37.1%
ICU Level of Service	A
Analysis Period (min)	15

Splits and Phases: 13: US 81 (5th Street SE) & 4th Avenue SE



HCM 6th Signalized Intersection Summary
 13: US 81 (5th Street SE) & 4th Avenue SE

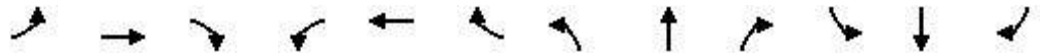
12/29/2020



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↖	↗		↖	↗	↖	↗		↖	↗	
Traffic Volume (veh/h)	20	30	15	15	30	10	5	295	5	15	340	15
Future Volume (veh/h)	20	30	15	15	30	10	5	295	5	15	340	15
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1772	1772	1772	1772	1772	1772	1772	1772	1772	1772	1772	1772
Adj Flow Rate, veh/h	24	37	18	18	37	12	6	360	6	18	415	18
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	261	218	261	237	236	261	559	1273	21	595	1235	53
Arrive On Green	0.17	0.17	0.17	0.17	0.17	0.17	0.38	0.38	0.38	0.38	0.38	0.38
Sat Flow, veh/h	420	1254	1502	333	1358	1502	1011	3389	56	1076	3287	142
Grp Volume(v), veh/h	61	0	18	55	0	12	6	179	187	18	212	221
Grp Sat Flow(s),veh/h/ln	1674	0	1502	1692	0	1502	1011	1683	1762	1076	1683	1746
Q Serve(g_s), s	0.0	0.0	0.3	0.0	0.0	0.2	0.1	2.0	2.0	0.3	2.4	2.4
Cycle Q Clear(g_c), s	0.8	0.0	0.3	0.7	0.0	0.2	2.5	2.0	2.0	2.3	2.4	2.4
Prop In Lane	0.39		1.00	0.33		1.00	1.00		0.03	1.00		0.08
Lane Grp Cap(c), veh/h	479	0	261	473	0	261	559	632	662	595	632	656
V/C Ratio(X)	0.13	0.00	0.07	0.12	0.00	0.05	0.01	0.28	0.28	0.03	0.34	0.34
Avail Cap(c_a), veh/h	1355	0	1072	1360	0	1072	901	1201	1257	958	1201	1246
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	9.4	0.0	9.2	9.4	0.0	9.2	6.8	5.8	5.8	6.6	5.9	5.9
Incr Delay (d2), s/veh	0.1	0.0	0.1	0.1	0.0	0.1	0.0	0.2	0.2	0.0	0.3	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	0.0	0.1	0.2	0.0	0.0	0.0	0.3	0.4	0.0	0.4	0.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	9.5	0.0	9.3	9.5	0.0	9.2	6.8	6.0	6.0	6.6	6.2	6.2
LnGrp LOS	A	A	A	A	A	A	A	A	A	A	A	A
Approach Vol, veh/h		79			67			372			451	
Approach Delay, s/veh		9.5			9.4			6.1			6.3	
Approach LOS		A			A			A			A	
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		16.0		10.6		16.0		10.6				
Change Period (Y+Rc), s		6.0		6.0		6.0		6.0				
Max Green Setting (Gmax), s		19.0		19.0		19.0		19.0				
Max Q Clear Time (g_c+I1), s		4.5		2.8		4.4		2.7				
Green Ext Time (p_c), s		1.7		0.2		2.2		0.2				
Intersection Summary												
HCM 6th Ctrl Delay			6.7									
HCM 6th LOS			A									

Lanes, Volumes, Timings
 37: US 81 (5th Street SE) & 20th Avenue SE

01/22/2021



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (vph)	50	100	30	15	70	20	100	240	75	5	65	70
Future Volume (vph)	50	100	30	15	70	20	100	240	75	5	65	70
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Util. 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
Frt		0.977			0.974			0.976			0.932	
Flt Protected		0.986			0.993			0.988			0.998	
Satd. Flow (prot)	0	1700	0	0	1707	0	0	1702	0	0	1641	0
Flt Permitted		0.986			0.993			0.988			0.998	
Satd. Flow (perm)	0	1700	0	0	1707	0	0	1702	0	0	1641	0
Link Speed (mph)		40			50			65			45	
Link Distance (ft)		2250			2754			1476			1428	
Travel Time (s)		38.4			37.6			15.5			21.6	
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Adj. Flow (vph)	60	120	36	18	84	24	120	289	90	6	78	84
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	216	0	0	126	0	0	499	0	0	168	0
Sign Control		Yield			Yield			Yield			Yield	

Intersection Summary

Area Type:	Other
Control Type:	Roundabout
Intersection Capacity Utilization	59.5%
ICU Level of Service	B
Analysis Period (min)	15

HCM 6th Roundabout
 37: US 81 (5th Street SE) & 20th Avenue SE

01/22/2021

Intersection				
Intersection Delay, s/veh	6.5			
Intersection LOS	A			
Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	216	126	499	168
Demand Flow Rate, veh/h	220	128	509	172
Vehicles Circulating, veh/h	104	478	189	226
Vehicles Exiting, veh/h	294	220	135	380
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	4.5	5.8	8.0	4.8
Approach LOS	A	A	A	A
Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976	4.976
Entry Flow, veh/h	220	128	509	172
Cap Entry Lane, veh/h	1241	847	1138	1096
Entry HV Adj Factor	0.980	0.987	0.981	0.979
Flow Entry, veh/h	216	126	499	168
Cap Entry, veh/h	1216	836	1116	1073
V/C Ratio	0.177	0.151	0.447	0.157
Control Delay, s/veh	4.5	5.8	8.0	4.8
LOS	A	A	A	A
95th %tile Queue, veh	1	1	2	1

Lanes, Volumes, Timings
 9: 1st Ave NE & 13th St NE (NB)

12/09/2020



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	40	140	180	60	15	40
Future Volume (vph)	40	140	180	60	15	40
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Storage Length (ft)	0			0	70	0
Storage Lanes	0			0	1	1
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.966			0.850
Flt Protected		0.989			0.950	
Satd. Flow (prot)	0	1759	1730	0	1598	1530
Flt Permitted		0.989			0.950	
Satd. Flow (perm)	0	1759	1730	0	1598	1530
Link Speed (mph)		25	25		25	
Link Distance (ft)		791	278		1006	
Travel Time (s)		21.6	7.6		27.4	
Peak Hour Factor	0.69	0.69	0.69	0.69	0.69	0.69
Heavy Vehicles (%)	2%	1%	0%	2%	7%	0%
Adj. Flow (vph)	58	203	261	87	22	58
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	261	348	0	22	58
Sign Control		Stop	Stop		Stop	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	37.3%
Analysis Period (min)	15
	ICU Level of Service A

Intersection	
Intersection Delay, s/veh	9.9
Intersection LOS	A

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↔		↕	↕
Traffic Vol, veh/h	40	140	180	60	15	40
Future Vol, veh/h	40	140	180	60	15	40
Peak Hour Factor	0.69	0.69	0.69	0.69	0.69	0.69
Heavy Vehicles, %	2	1	0	2	7	0
Mvmt Flow	58	203	261	87	22	58
Number of Lanes	0	1	1	0	1	1

Approach	EB	WB	SB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left	SB		WB
Conflicting Lanes Left	2	0	1
Conflicting Approach Right		SB	EB
Conflicting Lanes Right	0	2	1
HCM Control Delay	9.8	10.2	8.6
HCM LOS	A	B	A

Lane	EBLn1	WBLn1	SBLn1	SBLn2
Vol Left, %	22%	0%	100%	0%
Vol Thru, %	78%	75%	0%	0%
Vol Right, %	0%	25%	0%	100%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	180	240	15	40
LT Vol	40	0	15	0
Through Vol	140	180	0	0
RT Vol	0	60	0	40
Lane Flow Rate	261	348	22	58
Geometry Grp	2	2	7	7
Degree of Util (X)	0.329	0.41	0.039	0.082
Departure Headway (Hd)	4.544	4.246	6.439	5.106
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	790	849	555	700
Service Time	2.572	2.27	4.184	2.85
HCM Lane V/C Ratio	0.33	0.41	0.04	0.083
HCM Control Delay	9.8	10.2	9.4	8.3
HCM Lane LOS	A	B	A	A
HCM 95th-tile Q	1.4	2	0.1	0.3

Lanes, Volumes, Timings
 4: 13th St NE (SB) & 1st Ave NE

12/09/2020



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	145	10	2	215	25	10
Future Volume (vph)	145	10	2	215	25	10
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Flt	0.992			0.962		
Flt Protected				0.965		
Satd. Flow (prot)	1769	0	0	1782	1671	0
Flt Permitted				0.965		
Satd. Flow (perm)	1769	0	0	1782	1671	0
Link Speed (mph)	25			25	25	
Link Distance (ft)	278			1819	482	
Travel Time (s)	7.6			49.6	13.1	
Peak Hour Factor	0.69	0.69	0.69	0.69	0.69	0.69
Heavy Vehicles (%)	1%	0%	0%	1%	0%	0%
Adj. Flow (vph)	210	14	3	312	36	14
Shared Lane Traffic (%)						
Lane Group Flow (vph)	224	0	0	315	50	0
Sign Control	Free			Free	Stop	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	23.6%
ICU Level of Service	A
Analysis Period (min)	15

Intersection						
Int Delay, s/veh	1.1					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	145	10	2	215	25	10
Future Vol, veh/h	145	10	2	215	25	10
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	69	69	69	69	69	69
Heavy Vehicles, %	1	0	0	1	0	0
Mvmt Flow	210	14	3	312	36	14

Major/Minor	Major1	Major2	Minor1		
Conflicting Flow All	0	0	224	0	535
Stage 1	-	-	-	-	217
Stage 2	-	-	-	-	318
Critical Hdwy	-	-	4.1	-	6.4
Critical Hdwy Stg 1	-	-	-	-	5.4
Critical Hdwy Stg 2	-	-	-	-	5.4
Follow-up Hdwy	-	-	2.2	-	3.5
Pot Cap-1 Maneuver	-	-	1357	-	510
Stage 1	-	-	-	-	824
Stage 2	-	-	-	-	742
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1357	-	508
Mov Cap-2 Maneuver	-	-	-	-	508
Stage 1	-	-	-	-	824
Stage 2	-	-	-	-	740

Approach	EB	WB	NB
HCM Control Delay, s	0	0.1	11.9
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	571	-	-	1357	-
HCM Lane V/C Ratio	0.089	-	-	0.002	-
HCM Control Delay (s)	11.9	-	-	7.7	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.3	-	-	0	-

Lanes, Volumes, Timings
2: 19th St NE & 1st Ave NE/Willow Creek Dr

12/09/2020



Lane Group	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL
Lane Configurations												
Traffic Volume (vph)	5	35	80	35	2	5	105	110	30	120	10	155
Future Volume (vph)	5	35	80	35	2	5	105	110	30	120	10	155
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (ft)		215		215		145		0	150		0	150
Storage Lanes		1		1		1		1	1		0	1
Taper Length (ft)		25				25			25			25
Lane Util. 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
Frt				0.850				0.850		0.988		
Flt Protected		0.950				0.950			0.950			0.950
Satd. Flow (prot)	0	1624	1800	1485	0	1699	1782	1485	1644	1731	0	1693
Flt Permitted		0.671				0.690			0.531			0.455
Satd. Flow (perm)	0	1147	1800	1485	0	1234	1782	1485	919	1731	0	811
Right Turn on Red				Yes				Yes			Yes	
Satd. Flow (RTOR)				164				141		7		
Link Speed (mph)			25				45			35		
Link Distance (ft)			1819				1221			982		
Travel Time (s)			49.6				18.5			19.1		
Peak Hour Factor	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78
Heavy Vehicles (%)	0%	6%	0%	3%	2%	0%	1%	3%	4%	3%	0%	1%
Adj. Flow (vph)	6	45	103	45	3	6	135	141	38	154	13	199
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	51	103	45	0	9	135	141	38	167	0	199
Turn Type	Perm	Perm	NA	Perm	Perm	Perm	NA	pt+ov	Perm	NA		pm+pt
Protected Phases			4				8	8 1		2		1
Permitted Phases	4	4		4	8	8			2			6
Detector Phase	4	4	4	4	8	8	8	8 1	2	2		1
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0		7.0	7.0		5.0
Minimum Split (s)	24.0	24.0	24.0	24.0	24.0	24.0	24.0		24.0	24.0		11.0
Total Split (s)	24.0	24.0	24.0	24.0	24.0	24.0	24.0		24.0	24.0		12.0
Total Split (%)	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%		40.0%	40.0%		20.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0
Lost Time Adjust (s)		0.0	0.0	0.0			0.0	0.0		0.0		0.0
Total Lost Time (s)		6.0	6.0	6.0			6.0	6.0		6.0		6.0
Lead/Lag									Lag	Lag		Lead
Lead-Lag Optimize?									Yes	Yes		Yes
Recall Mode	None	None	None	None	None	None	None		Min	Min		None
Act Effct Green (s)		8.9	8.9	8.9			8.9	8.9	17.9	15.6	15.6	22.9
Actuated g/C Ratio		0.22	0.22	0.22			0.22	0.22	0.44	0.39	0.39	0.57
v/c Ratio		0.20	0.26	0.10			0.03	0.34	0.19	0.11	0.25	0.34
Control Delay		16.7	16.5	0.4			14.4	17.7	2.4	14.8	15.1	7.8
Queue Delay		0.0	0.0	0.0			0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		16.7	16.5	0.4			14.4	17.7	2.4	14.8	15.1	7.8
LOS		B	B	A			B	B	A	B	B	A
Approach Delay			12.9				10.0			15.0		
Approach LOS			B				B			B		
Queue Length 50th (ft)		10	21	0			2	28	0	7	32	23

Lanes, Volumes, Timings
 2: 19th St NE & 1st Ave NE/Willow Creek Dr

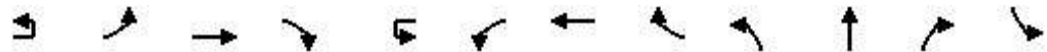
12/09/2020



Lane Group	SBT	SBR
Lane Configurations		
Traffic Volume (vph)	230	75
Future Volume (vph)	230	75
Ideal Flow (vphpl)	1800	1800
Storage Length (ft)		0
Storage Lanes		0
Taper Length (ft)		
Lane Util. Factor	1.00	1.00
Frt	0.963	
Flt Protected		
Satd. Flow (prot)	1708	0
Flt Permitted		
Satd. Flow (perm)	1708	0
Right Turn on Red		Yes
Satd. Flow (RTOR)	39	
Link Speed (mph)	35	
Link Distance (ft)	5295	
Travel Time (s)	103.1	
Peak Hour Factor	0.78	0.78
Heavy Vehicles (%)	2%	0%
Adj. Flow (vph)	295	96
Shared Lane Traffic (%)		
Lane Group Flow (vph)	391	0
Turn Type	NA	
Protected Phases	6	
Permitted Phases		
Detector Phase	6	
Switch Phase		
Minimum Initial (s)	7.0	
Minimum Split (s)	24.0	
Total Split (s)	36.0	
Total Split (%)	60.0%	
Yellow Time (s)	4.0	
All-Red Time (s)	2.0	
Lost Time Adjust (s)	0.0	
Total Lost Time (s)	6.0	
Lead/Lag		
Lead-Lag Optimize?		
Recall Mode	Min	
Act Effct Green (s)	24.6	
Actuated g/C Ratio	0.61	
v/c Ratio	0.37	
Control Delay	7.2	
Queue Delay	0.0	
Total Delay	7.2	
LOS	A	
Approach Delay	7.4	
Approach LOS	A	
Queue Length 50th (ft)	44	

Lanes, Volumes, Timings
 2: 19th St NE & 1st Ave NE/Willow Creek Dr

12/09/2020

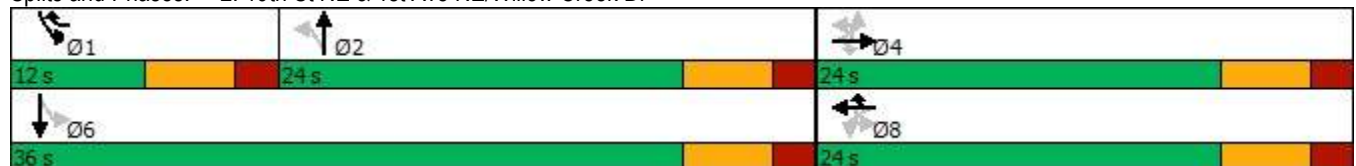


Lane Group	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL
Queue Length 95th (ft)		29	47	0		9	58	14	23	65		48
Internal Link Dist (ft)			1739				1141			902		
Turn Bay Length (ft)		215		215		145			150			150
Base Capacity (vph)		529	830	773		569	822	841	489	925		593
Starvation Cap Reductn		0	0	0		0	0	0	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		0.10	0.12	0.06		0.02	0.16	0.17	0.08	0.18		0.34

Intersection Summary

Area Type:	Other
Cycle Length:	60
Actuated Cycle Length:	40.5
Natural Cycle:	60
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.37
Intersection Signal Delay:	10.1
Intersection LOS:	B
Intersection Capacity Utilization:	47.4%
ICU Level of Service:	A
Analysis Period (min):	15

Splits and Phases: 2: 19th St NE & 1st Ave NE/Willow Creek Dr



Lanes, Volumes, Timings
2: 19th St NE & 1st Ave NE/Willow Creek Dr

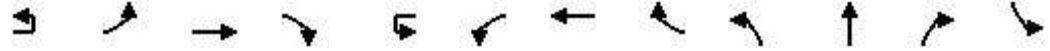
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Lane Group	SBT	SBR
Queue Length 95th (ft)	85	
Internal Link Dist (ft)	5215	
Turn Bay Length (ft)		
Base Capacity (vph)	1298	
Starvation Cap Reductn	0	
Spillback Cap Reductn	0	
Storage Cap Reductn	0	
Reduced v/c Ratio	0.30	
Intersection Summary		

HCM 6th Signalized Intersection Summary
 2: 19th St NE & 1st Ave NE/Willow Creek Dr

12/09/2020



Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL
Lane Configurations												
Traffic Volume (veh/h)	5	35	80	35	2	5	105	110	30	120	10	155
Future Volume (veh/h)	5	35	80	35	2	5	105	110	30	120	10	155
Initial Q (Qb), veh		0	0	0		0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00		1.00		1.00		1.00	1.00		1.00	1.00
Parking Bus, Adj		1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No				No				No		
Adj Sat Flow, veh/h/ln		1716	1800	1758		1800	1786	1758	1744	1758	1800	1786
Adj Flow Rate, veh/h		45	103	45		6	135	141	38	154	13	199
Peak Hour Factor		0.78	0.78	0.78		0.78	0.78	0.78	0.78	0.78	0.78	0.78
Percent Heavy Veh, %		6	0	3		0	1	3	4	3	0	1
Cap, veh/h		331	344	284		377	341	465	386	308	26	535
Arrive On Green		0.19	0.19	0.19		0.19	0.19	0.19	0.19	0.19	0.19	0.12
Sat Flow, veh/h		1068	1800	1490		1259	1786	1490	977	1599	135	1701
Grp Volume(v), veh/h		45	103	45		6	135	141	38	0	167	199
Grp Sat Flow(s),veh/h/ln		1068	1800	1490		1259	1786	1490	977	0	1734	1701
Q Serve(g_s), s		1.4	1.8	0.9		0.1	2.4	2.6	1.2	0.0	3.1	3.0
Cycle Q Clear(g_c), s		3.8	1.8	0.9		1.9	2.4	2.6	1.2	0.0	3.1	3.0
Prop In Lane		1.00		1.00		1.00		1.00	1.00		0.08	1.00
Lane Grp Cap(c), veh/h		331	344	284		377	341	465	386	0	334	535
V/C Ratio(X)		0.14	0.30	0.16		0.02	0.40	0.30	0.10	0.00	0.50	0.37
Avail Cap(c_a), veh/h		656	891	738		760	884	918	682	0	858	610
HCM Platoon Ratio		1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)		1.00	1.00	1.00		1.00	1.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh		14.5	12.6	12.3		13.4	12.9	9.5	12.3	0.0	13.1	8.6
Incr Delay (d2), s/veh		0.2	0.5	0.3		0.0	0.7	0.4	0.1	0.0	1.2	0.4
Initial Q Delay(d3),s/veh		0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln		0.3	0.6	0.3		0.0	0.7	0.6	0.2	0.0	1.0	0.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh		14.7	13.1	12.5		13.5	13.6	9.9	12.4	0.0	14.3	9.1
LnGrp LOS		B	B	B		B	B	A	B	A	B	A
Approach Vol, veh/h		193				282				205		
Approach Delay, s/veh		13.3				11.7				13.9		
Approach LOS		B				B				B		
Timer - Assigned Phs	1	2	4		6	8						
Phs Duration (G+Y+Rc), s	10.4	13.0	12.9		23.4	12.9						
Change Period (Y+Rc), s	6.0	6.0	6.0		6.0	6.0						
Max Green Setting (Gmax), s	6.0	18.0	18.0		30.0	18.0						
Max Q Clear Time (g_c+l1), s	5.0	5.1	5.8		7.7	4.6						
Green Ext Time (p_c), s	0.1	0.8	0.7		2.4	0.9						

Intersection Summary

HCM 6th Ctrl Delay	10.4
HCM 6th LOS	B

Notes

User approved ignoring U-Turning movement.

HCM 6th Signalized Intersection Summary
 2: 19th St NE & 1st Ave NE/Willow Creek Dr

12/09/2020



Movement	SBT	SBR
Lane Configurations		
Traffic Volume (veh/h)	230	75
Future Volume (veh/h)	230	75
Initial Q (Qb), veh	0	0
Ped-Bike Adj(A_pbT)		1.00
Parking Bus, Adj	1.00	1.00
Work Zone On Approach	No	
Adj Sat Flow, veh/h/ln	1772	1800
Adj Flow Rate, veh/h	295	96
Peak Hour Factor	0.78	0.78
Percent Heavy Veh, %	2	0
Cap, veh/h	613	200
Arrive On Green	0.48	0.48
Sat Flow, veh/h	1280	417
Grp Volume(v), veh/h	0	391
Grp Sat Flow(s),veh/h/ln	0	1697
Q Serve(g_s), s	0.0	5.7
Cycle Q Clear(g_c), s	0.0	5.7
Prop In Lane		0.25
Lane Grp Cap(c), veh/h	0	813
V/C Ratio(X)	0.00	0.48
Avail Cap(c_a), veh/h	0	1400
HCM Platoon Ratio	1.00	1.00
Upstream Filter(l)	0.00	1.00
Uniform Delay (d), s/veh	0.0	6.4
Incr Delay (d2), s/veh	0.0	0.4
Initial Q Delay(d3),s/veh	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	1.2
Unsig. Movement Delay, s/veh		
LnGrp Delay(d),s/veh	0.0	6.9
LnGrp LOS	A	A
Approach Vol, veh/h	590	
Approach Delay, s/veh	7.6	
Approach LOS	A	
Timer - Assigned Phs		

Lanes, Volumes, Timings

14: Willow Creek Dr/Willow Creek Dr & 8th Avenue SE

12/09/2020



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	1	1	2	220	245	1
Future Volume (vph)	1	1	2	220	245	1
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Util. Factor	1.00	1.00	0.95	0.95	0.95	0.95
Frt	0.932					
Flt Protected	0.976			0.999		
Satd. Flow (prot)	1637	0	0	3350	3386	0
Flt Permitted	0.976			0.999		
Satd. Flow (perm)	1637	0	0	3350	3386	0
Link Speed (mph)	30			35	45	
Link Distance (ft)	233			583	1620	
Travel Time (s)	5.3			11.4	24.5	
Peak Hour Factor	0.79	0.79	0.79	0.79	0.79	0.79
Heavy Vehicles (%)	0%	0%	0%	2%	1%	0%
Adj. Flow (vph)	1	1	3	278	310	1
Shared Lane Traffic (%)						
Lane Group Flow (vph)	2	0	0	281	311	0
Sign Control	Stop			Free	Free	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	17.9%
ICU Level of Service	A
Analysis Period (min)	15

Intersection						
Int Delay, s/veh	0.1					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	T			T		
Traffic Vol, veh/h	1	1	2	220	245	1
Future Vol, veh/h	1	1	2	220	245	1
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	79	79	79	79	79	79
Heavy Vehicles, %	0	0	0	2	1	0
Mvmt Flow	1	1	3	278	310	1



















Major/Minor	Minor2	Major1		Major2	
Conflicting Flow All	456	156	311	0	0
Stage 1	311	-	-	-	-
Stage 2	145	-	-	-	-
Critical Hdwy	6.8	6.9	4.1	-	-
Critical Hdwy Stg 1	5.8	-	-	-	-
Critical Hdwy Stg 2	5.8	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-
Pot Cap-1 Maneuver	538	868	1261	-	-
Stage 1	722	-	-	-	-
Stage 2	873	-	-	-	-
Platoon blocked, %				-	-
Mov Cap-1 Maneuver	536	868	1261	-	-
Mov Cap-2 Maneuver	536	-	-	-	-
Stage 1	720	-	-	-	-
Stage 2	873	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.5	0.1	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1261	-	663	-	-
HCM Lane V/C Ratio	0.002	-	0.004	-	-
HCM Control Delay (s)	7.9	0	10.5	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0	-	-

Lanes, Volumes, Timings
13: 29th St SE & 15th Ave SE

12/09/2020

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	1	10	5	1	2	10	85	20	15	50	10
Future Volume (vph)	1	1	10	5	1	2	10	85	20	15	50	10
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (ft)	0		0	0		0	150		0	150		0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. 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
Frt		0.884			0.970			0.971			0.975	
Flt Protected		0.996			0.968		0.950			0.950		
Satd. Flow (prot)	0	1235	0	0	1690	0	1583	1720	0	1710	1718	0
Flt Permitted		0.996			0.968		0.950			0.950		
Satd. Flow (perm)	0	1235	0	0	1690	0	1583	1720	0	1710	1718	0
Link Speed (mph)		25			25			50			40	
Link Distance (ft)		1149			1233			937			1680	
Travel Time (s)		31.3			33.6			12.8			28.6	
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Heavy Vehicles (%)	0%	0%	33%	0%	0%	0%	8%	2%	0%	0%	0%	13%
Adj. Flow (vph)	1	1	12	6	1	2	12	102	24	18	60	12
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	14	0	0	9	0	12	126	0	18	72	0
Sign Control		Stop			Stop			Free			Free	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	17.5%
Analysis Period (min)	15
	ICU Level of Service A

Intersection												
Int Delay, s/veh	1.8											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↕	↕		↕	↕	
Traffic Vol, veh/h	1	1	10	5	1	2	10	85	20	15	50	10
Future Vol, veh/h	1	1	10	5	1	2	10	85	20	15	50	10
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	-	-	-	-	-	-	150	-	-	150	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	83	83	83	83	83	83	83	83	83	83	83	83
Heavy Vehicles, %	0	0	33	0	0	0	8	2	0	0	0	13
Mvmt Flow	1	1	12	6	1	2	12	102	24	18	60	12



















Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	242	252	66	247	246	114	72	0	0	126	0	0
Stage 1	102	102	-	138	138	-	-	-	-	-	-	-
Stage 2	140	150	-	109	108	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.53	7.1	6.5	6.2	4.18	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.597	3.5	4	3.3	2.272	-	-	2.2	-	-
Pot Cap-1 Maneuver	716	655	918	711	660	944	1491	-	-	1473	-	-
Stage 1	909	815	-	870	786	-	-	-	-	-	-	-
Stage 2	868	777	-	901	810	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	702	642	918	690	647	944	1491	-	-	1473	-	-
Mov Cap-2 Maneuver	702	642	-	690	647	-	-	-	-	-	-	-
Stage 1	902	805	-	863	780	-	-	-	-	-	-	-
Stage 2	857	771	-	877	800	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	9.2	10	0.6	1.5
HCM LOS	A	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1491	-	-	865	733	1473	-
HCM Lane V/C Ratio	0.008	-	-	0.017	0.013	0.012	-
HCM Control Delay (s)	7.4	-	-	9.2	10	7.5	-
HCM Lane LOS	A	-	-	A	B	A	-
HCM 95th %tile Q(veh)	0	-	-	0.1	0	0	-

Lanes, Volumes, Timings
 6: 19th St NE/456th Ave (19th St NE) & 14th Ave NE

12/09/2020

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	1	160	1	1	1	195	25	2	1	65	25
Future Volume (vph)	20	1	160	1	1	1	195	25	2	1	65	25
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (ft)	0		0	150		0	130		0	0		0
Storage Lanes	0		0	1		0	1		0	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. 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
Frt		0.881			0.925			0.990				0.963
Flt Protected		0.994		0.950			0.950					0.999
Satd. Flow (prot)	0	1506	0	1710	1665	0	1693	1677	0	0	1605	0
Flt Permitted		0.994		0.950			0.950					0.999
Satd. Flow (perm)	0	1506	0	1710	1665	0	1693	1677	0	0	1605	0
Link Speed (mph)		35			25			35				55
Link Distance (ft)		2344			2504			8403				5196
Travel Time (s)		45.7			68.3			163.7				64.4
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	42%	0%	0%	0%	0%	0%	1%	3%	50%	0%	11%	0%
Adj. Flow (vph)	22	1	174	1	1	1	212	27	2	1	71	27
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	197	0	1	2	0	212	29	0	0	99	0
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	43.1%
ICU Level of Service	A
Analysis Period (min)	15

HCM 6th AWSC
 6: 19th St NE/456th Ave (19th St NE) & 14th Ave NE

12/09/2020

Intersection	
Intersection Delay, s/veh	10.7
Intersection LOS	B

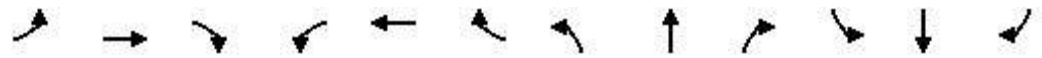
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔		↔	↔		↔	↔			↔	
Traffic Vol, veh/h	20	1	160	1	1	1	195	25	2	1	65	25
Future Vol, veh/h	20	1	160	1	1	1	195	25	2	1	65	25
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	42	0	0	0	0	0	1	3	50	0	11	0
Mvmt Flow	22	1	174	1	1	1	212	27	2	1	71	27
Number of Lanes	0	1	0	1	1	0	1	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	1	1	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	2	1	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	1	2	1
HCM Control Delay	11.2	8.4	10.9	9.2
HCM LOS	B	A	B	A

Lane	NBLn1	NBLn2	EBLn1	WBLn1	WBLn2	SBLn1
Vol Left, %	100%	0%	11%	100%	0%	1%
Vol Thru, %	0%	93%	1%	0%	50%	71%
Vol Right, %	0%	7%	88%	0%	50%	27%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	195	27	181	1	2	91
LT Vol	195	0	20	1	0	1
Through Vol	0	25	1	0	1	65
RT Vol	0	2	160	0	1	25
Lane Flow Rate	212	29	197	1	2	99
Geometry Grp	7	7	6	7	7	6
Degree of Util (X)	0.335	0.042	0.307	0.002	0.003	0.144
Departure Headway (Hd)	5.69	5.169	5.622	6.177	5.319	5.242
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	632	691	637	576	668	681
Service Time	3.436	2.916	3.671	3.95	3.091	3.298
HCM Lane V/C Ratio	0.335	0.042	0.309	0.002	0.003	0.145
HCM Control Delay	11.3	8.1	11.2	9	8.1	9.2
HCM Lane LOS	B	A	B	A	A	A
HCM 95th-tile Q	1.5	0.1	1.3	0	0	0.5

Lanes, Volumes, Timings
 3: 3rd Street NW & 1st Avenue NW

12/10/2020



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕		↖	↗			↕			↕	
Traffic Volume (vph)	5	125	2	15	105	30	1	50	25	40	65	10
Future Volume (vph)	5	125	2	15	105	30	1	50	25	40	65	10
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Util. 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
Fr _t		0.998			0.966			0.956			0.988	
Fl _t Protected		0.998		0.950				0.999			0.983	
Satd. Flow (prot)	0	1727	0	1629	1694	0	0	1686	0	0	1718	0
Fl _t Permitted		0.998		0.950				0.999			0.983	
Satd. Flow (perm)	0	1727	0	1629	1694	0	0	1686	0	0	1718	0
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		577			733			480			518	
Travel Time (s)		15.7			20.0			13.1			14.1	
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Heavy Vehicles (%)	0%	4%	0%	5%	2%	5%	0%	0%	6%	5%	0%	0%
Adj. Flow (vph)	6	156	3	19	131	38	1	63	31	50	81	13
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	165	0	19	169	0	0	95	0	0	144	0
Sign Control		Free			Free			Stop			Stop	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	31.3%
Analysis Period (min)	15
	ICU Level of Service A

HCM 6th TWSC
3: 3rd Street NW & 1st Avenue NW

12/10/2020

Intersection												
Int Delay, s/veh	5.6											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕		↕	↕			↕			↕	
Traffic Vol, veh/h	5	125	2	15	105	30	1	50	25	40	65	10
Future Vol, veh/h	5	125	2	15	105	30	1	50	25	40	65	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	-	-	-	0	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	80	80	80	80	80	80	80	80	80	80	80	80
Heavy Vehicles, %	0	4	0	5	2	5	0	0	6	5	0	0
Mvmt Flow	6	156	3	19	131	38	1	63	31	50	81	13




















Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	169	0	0	159	0	0	405	377	158	405	359	150
Stage 1	-	-	-	-	-	-	170	170	-	188	188	-
Stage 2	-	-	-	-	-	-	235	207	-	217	171	-
Critical Hdwy	4.1	-	-	4.15	-	-	7.1	6.5	6.26	7.15	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.15	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.15	5.5	-
Follow-up Hdwy	2.2	-	-	2.245	-	-	3.5	4	3.354	3.545	4	3.3
Pot Cap-1 Maneuver	1421	-	-	1402	-	-	560	558	877	551	571	902
Stage 1	-	-	-	-	-	-	837	762	-	807	748	-
Stage 2	-	-	-	-	-	-	773	734	-	779	761	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1421	-	-	1402	-	-	484	547	877	478	560	902
Mov Cap-2 Maneuver	-	-	-	-	-	-	484	547	-	478	560	-
Stage 1	-	-	-	-	-	-	833	758	-	803	738	-
Stage 2	-	-	-	-	-	-	669	724	-	686	757	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.3			0.8			11.8			14		
HCM LOS							B			B		

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	623	1421	-	-	1402	-	-	545
HCM Lane V/C Ratio	0.152	0.004	-	-	0.013	-	-	0.264
HCM Control Delay (s)	11.8	7.5	0	-	7.6	-	-	14
HCM Lane LOS	B	A	A	-	A	-	-	B
HCM 95th %tile Q(veh)	0.5	0	-	-	0	-	-	1.1

Lanes, Volumes, Timings
4: 3rd Street NW & W Kemp Avenue

12/10/2020

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	25	40	10	25	5	15	60	10	5	65	10
Future Volume (vph)	10	25	40	10	25	5	15	60	10	5	65	10
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (ft)	0		250	0		250	0		0	0		0
Storage Lanes	0		1	0		1	0		0	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. 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
Frt			0.850			0.850		0.984			0.983	
Flt Protected		0.986			0.986			0.991			0.997	
Satd. Flow (prot)	0	1655	1485	0	1726	1308	0	1719	0	0	1722	0
Flt Permitted		0.986			0.986			0.991			0.997	
Satd. Flow (perm)	0	1655	1485	0	1726	1308	0	1719	0	0	1722	0
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		765			2317			386			480	
Travel Time (s)		20.9			63.2			10.5			13.1	
Peak Hour Factor	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77
Heavy Vehicles (%)	25%	0%	3%	0%	4%	17%	0%	3%	0%	0%	3%	0%
Adj. Flow (vph)	13	32	52	13	32	6	19	78	13	6	84	13
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	45	52	0	45	6	0	110	0	0	103	0
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	24.6%
Analysis Period (min)	15
	ICU Level of Service A

HCM 6th AWSC
 4: 3rd Street NW & W Kemp Avenue

12/10/2020

Intersection	
Intersection Delay, s/veh	8
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↕		↕	↕		↕			↕	
Traffic Vol, veh/h	10	25	40	10	25	5	15	60	10	5	65	10
Future Vol, veh/h	10	25	40	10	25	5	15	60	10	5	65	10
Peak Hour Factor	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77
Heavy Vehicles, %	25	0	3	0	4	17	0	3	0	0	3	0
Mvmt Flow	13	32	52	13	32	6	19	78	13	6	84	13
Number of Lanes	0	1	1	0	1	1	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	2	2
HCM Control Delay	8	8.2	8	8
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1
Vol Left, %	18%	29%	0%	29%	0%	6%
Vol Thru, %	71%	71%	0%	71%	0%	81%
Vol Right, %	12%	0%	100%	0%	100%	12%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	85	35	40	35	5	80
LT Vol	15	10	0	10	0	5
Through Vol	60	25	0	25	0	65
RT Vol	10	0	40	0	5	10
Lane Flow Rate	110	45	52	45	6	104
Geometry Grp	2	7	7	7	7	2
Degree of Util (X)	0.133	0.071	0.062	0.066	0.008	0.125
Departure Headway (Hd)	4.348	5.606	4.331	5.221	4.442	4.329
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	827	640	829	688	807	831
Service Time	2.362	3.325	2.05	2.941	2.162	2.342
HCM Lane V/C Ratio	0.133	0.07	0.063	0.065	0.007	0.125
HCM Control Delay	8	8.8	7.3	8.3	7.2	8
HCM Lane LOS	A	A	A	A	A	A
HCM 95th-tile Q	0.5	0.2	0.2	0.2	0	0.4

Lanes, Volumes, Timings
5: N Maple Street & 10th Avenue NW

12/10/2020



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (vph)	30	220	10	5	265	10	10	30	10	15	50	25
Future Volume (vph)	30	220	10	5	265	10	10	30	10	15	50	25
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Util. 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
Frt		0.995			0.995			0.973			0.962	
Flt Protected		0.994			0.999			0.990			0.992	
Satd. Flow (prot)	0	1743	0	0	1772	0	0	1672	0	0	1699	0
Flt Permitted		0.994			0.999			0.990			0.992	
Satd. Flow (perm)	0	1743	0	0	1772	0	0	1672	0	0	1699	0
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		1515			1128			1396			2664	
Travel Time (s)		41.3			30.8			38.1			72.7	
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Heavy Vehicles (%)	4%	2%	0%	0%	1%	0%	9%	0%	10%	0%	2%	0%
Adj. Flow (vph)	34	253	11	6	305	11	11	34	11	17	57	29
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	298	0	0	322	0	0	56	0	0	103	0
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	44.3%
ICU Level of Service	A
Analysis Period (min)	15

HCM 6th AWSC
5: N Maple Street & 10th Avenue NW

12/10/2020

Intersection	
Intersection Delay, s/veh	10.6
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Vol, veh/h	30	220	10	5	265	10	10	30	10	15	50	25
Future Vol, veh/h	30	220	10	5	265	10	10	30	10	15	50	25
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Heavy Vehicles, %	4	2	0	0	1	0	9	0	10	0	2	0
Mvmt Flow	34	253	11	6	305	11	11	34	11	17	57	29
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	10.9	11.1	9.2	9.3
HCM LOS	B	B	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	20%	12%	2%	17%
Vol Thru, %	60%	85%	95%	56%
Vol Right, %	20%	4%	4%	28%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	50	260	280	90
LT Vol	10	30	5	15
Through Vol	30	220	265	50
RT Vol	10	10	10	25
Lane Flow Rate	57	299	322	103
Geometry Grp	1	1	1	1
Degree of Util (X)	0.089	0.395	0.417	0.152
Departure Headway (Hd)	5.558	4.763	4.659	5.274
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	637	750	766	673
Service Time	3.656	2.828	2.721	3.362
HCM Lane V/C Ratio	0.089	0.399	0.42	0.153
HCM Control Delay	9.2	10.9	11.1	9.3
HCM Lane LOS	A	B	B	A
HCM 95th-tile Q	0.3	1.9	2.1	0.5

Lanes, Volumes, Timings
6: 2nd Street NW & 10th Avenue NW

12/10/2020



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (vph)	5	205	15	15	280	2	5	1	20	5	1	10
Future Volume (vph)	5	205	15	15	280	2	5	1	20	5	1	10
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Util. 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
Frt		0.991			0.999			0.895			0.915	
Flt Protected		0.999			0.997			0.990			0.984	
Satd. Flow (prot)	0	1709	0	0	1771	0	0	1535	0	0	1621	0
Flt Permitted		0.999			0.997			0.990			0.984	
Satd. Flow (perm)	0	1709	0	0	1771	0	0	1535	0	0	1621	0
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		1128			1515			1440			909	
Travel Time (s)		30.8			41.3			39.3			24.8	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Heavy Vehicles (%)	17%	3%	17%	6%	1%	0%	0%	0%	5%	0%	0%	0%
Adj. Flow (vph)	6	241	18	18	329	2	6	1	24	6	1	12
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	265	0	0	349	0	0	31	0	0	19	0
Sign Control		Free			Free			Stop			Stop	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 33.6% ICU Level of Service A

Analysis Period (min) 15

HCM 6th TWSC
6: 2nd Street NW & 10th Avenue NW

12/10/2020

Intersection												
Int Delay, s/veh	1.1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	5	205	15	15	280	2	5	1	20	5	1	10
Future Vol, veh/h	5	205	15	15	280	2	5	1	20	5	1	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	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	85	85	85	85	85	85	85	85	85	85	85	85
Heavy Vehicles, %	17	3	17	6	1	0	0	0	5	0	0	0
Mvmt Flow	6	241	18	18	329	2	6	1	24	6	1	12

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	331	0	0	259	0	0	635	629	250	641	637	330
Stage 1	-	-	-	-	-	-	262	262	-	366	366	-
Stage 2	-	-	-	-	-	-	373	367	-	275	271	-
Critical Hdwy	4.27	-	-	4.16	-	-	7.1	6.5	6.25	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.353	-	-	2.254	-	-	3.5	4	3.345	3.5	4	3.3
Pot Cap-1 Maneuver	1149	-	-	1283	-	-	394	402	781	390	398	716
Stage 1	-	-	-	-	-	-	747	695	-	657	626	-
Stage 2	-	-	-	-	-	-	652	626	-	736	689	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1149	-	-	1283	-	-	380	393	781	371	389	716
Mov Cap-2 Maneuver	-	-	-	-	-	-	380	393	-	371	389	-
Stage 1	-	-	-	-	-	-	743	691	-	653	615	-
Stage 2	-	-	-	-	-	-	629	615	-	708	685	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.2			0.4			11			12		
HCM LOS							B			B		

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	629	1149	-	-	1283	-	-	533
HCM Lane V/C Ratio	0.049	0.005	-	-	0.014	-	-	0.035
HCM Control Delay (s)	11	8.1	0	-	7.8	0	-	12
HCM Lane LOS	B	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.2	0	-	-	0	-	-	0.1

Lanes, Volumes, Timings

3: N Maple Street & 14th Avenue NW/14th Avenue NE

12/10/2020



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (vph)	20	375	15	20	250	20	5	15	15	20	20	15
Future Volume (vph)	20	375	15	20	250	20	5	15	15	20	20	15
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Util. 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
Frt		0.995			0.991			0.942			0.964	
Flt Protected		0.998			0.997			0.993			0.982	
Satd. Flow (prot)	0	1735	0	0	1737	0	0	1641	0	0	1601	0
Flt Permitted		0.998			0.997			0.993			0.982	
Satd. Flow (perm)	0	1735	0	0	1737	0	0	1641	0	0	1601	0
Link Speed (mph)		35			35			25			25	
Link Distance (ft)		5564			5965			2664			2577	
Travel Time (s)		108.4			116.2			72.7			70.3	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	0%	3%	8%	0%	2%	10%	0%	6%	0%	0%	0%	24%
Adj. Flow (vph)	22	412	16	22	275	22	5	16	16	22	22	16
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	450	0	0	319	0	0	37	0	0	60	0
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	41.1%
ICU Level of Service	A
Analysis Period (min)	15

HCM 6th AWSC
 3: N Maple Street & 14th Avenue NW/14th Avenue NE

12/10/2020

Intersection	
Intersection Delay, s/veh	11.9
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Vol, veh/h	20	375	15	20	250	20	5	15	15	20	20	15
Future Vol, veh/h	20	375	15	20	250	20	5	15	15	20	20	15
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles, %	0	3	8	0	2	10	0	6	0	0	0	24
Mvmt Flow	22	412	16	22	275	22	5	16	16	22	22	16
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	13.3	10.9	8.9	9.2
HCM LOS	B	B	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	14%	5%	7%	36%
Vol Thru, %	43%	91%	86%	36%
Vol Right, %	43%	4%	7%	27%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	35	410	290	55
LT Vol	5	20	20	20
Through Vol	15	375	250	20
RT Vol	15	15	20	15
Lane Flow Rate	38	451	319	60
Geometry Grp	1	1	1	1
Degree of Util (X)	0.058	0.564	0.409	0.093
Departure Headway (Hd)	5.465	4.506	4.625	5.558
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	649	797	774	639
Service Time	3.553	2.55	2.674	3.641
HCM Lane V/C Ratio	0.059	0.566	0.412	0.094
HCM Control Delay	8.9	13.3	10.9	9.2
HCM Lane LOS	A	B	B	A
HCM 95th-tile Q	0.2	3.6	2	0.3

Lanes, Volumes, Timings
 3: S Lake Dr & 4th Ave SW

12/10/2020



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↔		↕	
Traffic Volume (vph)	2	5	15	5	5	5
Future Volume (vph)	2	5	15	5	5	5
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width (ft)	10	10	10	10	10	10
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.965		0.932	
Flt Protected		0.987			0.976	
Satd. Flow (prot)	0	1303	1541	0	1223	0
Flt Permitted		0.987			0.976	
Satd. Flow (perm)	0	1303	1541	0	1223	0
Link Speed (mph)		30	30		30	
Link Distance (ft)		250	315		248	
Travel Time (s)		5.7	7.2		5.6	
Peak Hour Factor	0.66	0.66	0.66	0.66	0.66	0.66
Heavy Vehicles (%)	100%	0%	7%	0%	0%	50%
Adj. Flow (vph)	3	8	23	8	8	8
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	11	31	0	16	0
Sign Control		Free	Free		Stop	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	13.3%
Analysis Period (min)	15
	ICU Level of Service A

Intersection						
Int Delay, s/veh	2.8					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↶	↷		↶	
Traffic Vol, veh/h	2	5	15	5	5	5
Future Vol, veh/h	2	5	15	5	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	66	66	66	66	66	66
Heavy Vehicles, %	100	0	7	0	0	50
Mvmt Flow	3	8	23	8	8	8

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	31	0	-	0	41 27
Stage 1	-	-	-	-	27 -
Stage 2	-	-	-	-	14 -
Critical Hdwy	5.1	-	-	-	6.4 6.7
Critical Hdwy Stg 1	-	-	-	-	5.4 -
Critical Hdwy Stg 2	-	-	-	-	5.4 -
Follow-up Hdwy	3.1	-	-	-	3.5 3.75
Pot Cap-1 Maneuver	1126	-	-	-	975 926
Stage 1	-	-	-	-	1001 -
Stage 2	-	-	-	-	1014 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	1126	-	-	-	972 926
Mov Cap-2 Maneuver	-	-	-	-	972 -
Stage 1	-	-	-	-	998 -
Stage 2	-	-	-	-	1014 -

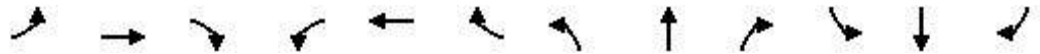
Approach	EB	WB	SB
HCM Control Delay, s	2.3	0	8.9
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1126	-	-	-	948
HCM Lane V/C Ratio	0.003	-	-	-	0.016
HCM Control Delay (s)	8.2	0	-	-	8.9
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

2020 Existing Conditions - PM

Lanes, Volumes, Timings
5: I-29 NB Exit 177 RTI & US 212

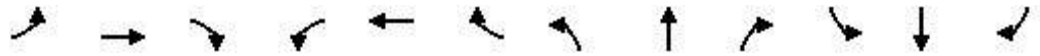
12/09/2020



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	120	350	0	0	350	50	190	0	50	0	0	0
Future Volume (vph)	120	350	0	0	350	50	190	0	50	0	0	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (ft)	300		0	0		850	0		0	0		0
Storage Lanes	1		0	0		1	0		1	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt						0.850			0.850			
Flt Protected	0.950							0.950				
Satd. Flow (prot)	1676	3353	0	0	3353	1500	0	1676	1500	0	0	0
Flt Permitted	0.385							0.950				
Satd. Flow (perm)	679	3353	0	0	3353	1500	0	1676	1500	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						164			164			
Link Speed (mph)		45			45			55				55
Link Distance (ft)		690			1249			322				321
Travel Time (s)		10.5			18.9			4.0				4.0
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	129	376	0	0	376	54	204	0	54	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	129	376	0	0	376	54	0	204	54	0	0	0
Turn Type	pm+pt	NA			NA	Perm	Perm	NA	Prot			
Protected Phases	5	2			6			8	8			
Permitted Phases	2					6	8					
Detector Phase	5	2			6	6	8	8	8			
Switch Phase												
Minimum Initial (s)	5.0	10.0			10.0	10.0	12.0	12.0	12.0			
Minimum Split (s)	11.0	24.0			24.0	24.0	24.0	24.0	24.0			
Total Split (s)	12.0	36.0			24.0	24.0	24.0	24.0	24.0			
Total Split (%)	20.0%	60.0%			40.0%	40.0%	40.0%	40.0%	40.0%			
Yellow Time (s)	4.0	4.0			4.0	4.0	4.0	4.0	4.0			
All-Red Time (s)	2.0	2.0			2.0	2.0	2.0	2.0	2.0			
Lost Time Adjust (s)	0.0	0.0			0.0	0.0		0.0	0.0			
Total Lost Time (s)	6.0	6.0			6.0	6.0		6.0	6.0			
Lead/Lag	Lead				Lag	Lag						
Lead-Lag Optimize?	Yes				Yes	Yes						
Recall Mode	None	Min			Min	Min	None	None	None			
Act Effct Green (s)	25.0	26.8			17.8	17.8		13.3	13.3			
Actuated g/C Ratio	0.55	0.59			0.39	0.39		0.29	0.29			
v/c Ratio	0.25	0.19			0.29	0.08		0.42	0.10			
Control Delay	8.7	7.3			15.7	0.2		18.1	0.3			
Queue Delay	0.0	0.0			0.0	0.0		0.0	0.0			
Total Delay	8.7	7.3			15.7	0.2		18.1	0.3			
LOS	A	A			B	A		B	A			
Approach Delay		7.6			13.8			14.4				
Approach LOS		A			B			B				
Queue Length 50th (ft)	18	27			46	0		46	0			
Queue Length 95th (ft)	46	56			86	0		104	0			

Lanes, Volumes, Timings
 5: I-29 NB Exit 177 RTI & US 212

12/09/2020

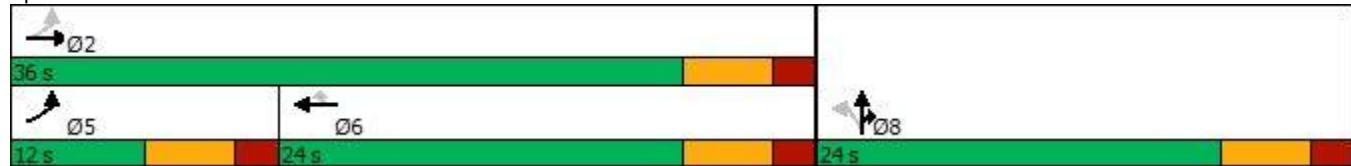


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		610			1169			242			241	
Turn Bay Length (ft)	300					850						
Base Capacity (vph)	509	2296			1659	825		688	712			
Starvation Cap Reductn	0	0			0	0		0	0			
Spillback Cap Reductn	0	0			0	0		0	0			
Storage Cap Reductn	0	0			0	0		0	0			
Reduced v/c Ratio	0.25	0.16			0.23	0.07		0.30	0.08			

Intersection Summary

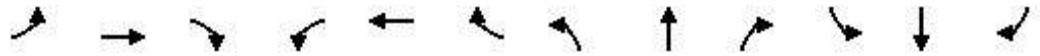
Area Type:	Other
Cycle Length:	60
Actuated Cycle Length:	45.5
Natural Cycle:	60
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.42
Intersection Signal Delay:	11.3
Intersection LOS:	B
Intersection Capacity Utilization	43.3%
ICU Level of Service	A
Analysis Period (min)	15

Splits and Phases: 5: I-29 NB Exit 177 RTI & US 212



HCM 6th Signalized Intersection Summary
 5: I-29 NB Exit 177 RTI & US 212













12/09/2020



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↑↑			↑↑	↗		↖	↗			
Traffic Volume (veh/h)	120	350	0	0	350	50	190	0	50	0	0	0
Future Volume (veh/h)	120	350	0	0	350	50	190	0	50	0	0	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Work Zone On Approach		No			No			No				
Adj Sat Flow, veh/h/ln	1772	1772	0	0	1772	1772	1772	1772	1772			
Adj Flow Rate, veh/h	129	376	0	0	376	54	204	0	54			
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93			
Percent Heavy Veh, %	2	2	0	0	2	2	2	2	2			
Cap, veh/h	447	1547	0	0	776	346	446	0	397			
Arrive On Green	0.09	0.46	0.00	0.00	0.23	0.23	0.26	0.00	0.26			
Sat Flow, veh/h	1688	3455	0	0	3455	1502	1688	0	1502			
Grp Volume(v), veh/h	129	376	0	0	376	54	204	0	54			
Grp Sat Flow(s),veh/h/ln	1688	1683	0	0	1683	1502	1688	0	1502			
Q Serve(g_s), s	2.3	3.0	0.0	0.0	4.2	1.2	4.4	0.0	1.2			
Cycle Q Clear(g_c), s	2.3	3.0	0.0	0.0	4.2	1.2	4.4	0.0	1.2			
Prop In Lane	1.00		0.00	0.00		1.00	1.00		1.00			
Lane Grp Cap(c), veh/h	447	1547	0	0	776	346	446	0	397			
V/C Ratio(X)	0.29	0.24	0.00	0.00	0.48	0.16	0.46	0.00	0.14			
Avail Cap(c_a), veh/h	527	2327	0	0	1396	623	700	0	623			
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	1.00	1.00	0.00	0.00	1.00	1.00	1.00	0.00	1.00			
Uniform Delay (d), s/veh	9.9	7.1	0.0	0.0	14.5	13.3	13.4	0.0	12.2			
Incr Delay (d2), s/veh	0.4	0.1	0.0	0.0	0.5	0.2	0.7	0.0	0.2			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	0.6	0.6	0.0	0.0	1.3	0.3	1.2	0.0	0.3			
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	10.3	7.2	0.0	0.0	14.9	13.5	14.1	0.0	12.3			
LnGrp LOS	B	A	A	A	B	B	B	A	B			
Approach Vol, veh/h		505			430			258				
Approach Delay, s/veh		8.0			14.8			13.7				
Approach LOS		A			B			B				
Timer - Assigned Phs		2			5	6		8				
Phs Duration (G+Y+Rc), s		25.9			9.9	16.0		17.5				
Change Period (Y+Rc), s		6.0			6.0	6.0		6.0				
Max Green Setting (Gmax), s		30.0			6.0	18.0		18.0				
Max Q Clear Time (g_c+I1), s		5.0			4.3	6.2		6.4				
Green Ext Time (p_c), s		2.2			0.0	1.8		0.8				
Intersection Summary												
HCM 6th Ctrl Delay					11.7							
HCM 6th LOS					B							

Lanes, Volumes, Timings
 2: I-29 SB Exit 177 RTI & US 212

12/09/2020

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↗	↖	↑↑						↕	
Traffic Volume (vph)	0	435	215	35	490	0	0	0	0	35	0	155
Future Volume (vph)	0	435	215	35	490	0	0	0	0	35	0	155
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (ft)	0		420	300		0	0		0	0		0
Storage Lanes	0		1	1		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850									0.890
Flt Protected				0.950								0.991
Satd. Flow (prot)	0	3353	1500	1676	3353	0	0	0	0	0	1556	0
Flt Permitted				0.950								0.991
Satd. Flow (perm)	0	3353	1500	1676	3353	0	0	0	0	0	1556	0
Link Speed (mph)		45			45			55				55
Link Distance (ft)		1232			690			351				342
Travel Time (s)		18.7			10.5			4.4				4.2
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	0	453	224	36	510	0	0	0	0	36	0	161
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	453	224	36	510	0	0	0	0	0	197	0
Sign Control		Free			Free			Free				Stop

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	43.3%
ICU Level of Service	A
Analysis Period (min)	15

Intersection												
Int Delay, s/veh	2.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↑	↑	↑↑						↔	
Traffic Vol, veh/h	0	435	215	35	490	0	0	0	0	35	0	155
Future Vol, veh/h	0	435	215	35	490	0	0	0	0	35	0	155
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	420	300	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	16974	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	453	224	36	510	0	0	0	0	36	0	161



















Major/Minor	Major1			Major2			Minor2			
Conflicting Flow All	-	0	0	677	0	0		809	1259	255
Stage 1	-	-	-	-	-	-		582	582	-
Stage 2	-	-	-	-	-	-		227	677	-
Critical Hdwy	-	-	-	4.14	-	-		6.84	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-		5.84	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-		5.84	5.54	-
Follow-up Hdwy	-	-	-	2.22	-	-		3.52	4.02	3.32
Pot Cap-1 Maneuver	0	-	-	911	-	0		318	169	744
Stage 1	0	-	-	-	-	0		522	497	-
Stage 2	0	-	-	-	-	0		789	450	-
Platoon blocked, %	-	-	-	-	-	-		-	-	-
Mov Cap-1 Maneuver	-	-	-	911	-	-		305	0	744
Mov Cap-2 Maneuver	-	-	-	-	-	-		305	0	-
Stage 1	-	-	-	-	-	-		522	0	-
Stage 2	-	-	-	-	-	-		757	0	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0.6	14.2
HCM LOS			B

Minor Lane/Major Mvmt	EBT	EBR	WBL	WBT	SBLn1
Capacity (veh/h)	-	-	911	-	588
HCM Lane V/C Ratio	-	-	0.04	-	0.337
HCM Control Delay (s)	-	-	9.1	-	14.2
HCM Lane LOS	-	-	A	-	B
HCM 95th %tile Q(veh)	-	-	0.1	-	1.5

Lanes, Volumes, Timings
11: 23rd St SE & US 212

12/09/2020

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	585	20	10	695	0	30	0	20	0	0	0
Future Volume (vph)	0	585	20	10	695	0	30	0	20	0	0	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (ft)	130		0	150		0	0		0	0		0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.995						0.946				
Flt Protected				0.950				0.971				
Satd. Flow (prot)	1800	3233	0	1286	3288	0	0	1527	0	0	1800	0
Flt Permitted				0.950				0.971				
Satd. Flow (perm)	1800	3233	0	1286	3288	0	0	1527	0	0	1800	0
Link Speed (mph)		45			45			30			30	
Link Distance (ft)		902			1331			481			333	
Travel Time (s)		13.7			20.2			10.9			7.6	
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Heavy Vehicles (%)	0%	4%	42%	33%	4%	0%	3%	0%	16%	0%	0%	0%
Adj. Flow (vph)	0	672	23	11	799	0	34	0	23	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	695	0	11	799	0	0	57	0	0	0	0
Sign Control		Free			Free			Stop			Stop	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	30.3%
Analysis Period (min)	15
	ICU Level of Service A

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	0	585	20	10	695	0	30	0	20	0	0	0
Future Vol, veh/h	0	585	20	10	695	0	30	0	20	0	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	130	-	-	150	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	87	87	87	87	87	87	87	87	87	87	87	87
Heavy Vehicles, %	0	4	42	33	4	0	3	0	16	0	0	0
Mvmt Flow	0	672	23	11	799	0	34	0	23	0	0	0





















Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	799	0	0	695	0	0	1106	1505	348	1157	1516	400
Stage 1	-	-	-	-	-	-	684	684	-	821	821	-
Stage 2	-	-	-	-	-	-	422	821	-	336	695	-
Critical Hdwy	4.1	-	-	4.76	-	-	7.56	6.5	7.22	7.5	6.5	6.9
Critical Hdwy Stg 1	-	-	-	-	-	-	6.56	5.5	-	6.5	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.56	5.5	-	6.5	5.5	-
Follow-up Hdwy	2.2	-	-	2.53	-	-	3.53	4	3.46	3.5	4	3.3
Pot Cap-1 Maneuver	833	-	-	718	-	-	164	122	609	154	121	605
Stage 1	-	-	-	-	-	-	402	452	-	339	391	-
Stage 2	-	-	-	-	-	-	577	391	-	657	447	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	833	-	-	718	-	-	162	120	609	146	119	605
Mov Cap-2 Maneuver	-	-	-	-	-	-	162	120	-	146	119	-
Stage 1	-	-	-	-	-	-	402	452	-	339	385	-
Stage 2	-	-	-	-	-	-	568	385	-	632	447	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.1	25.9	0
HCM LOS			D	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	229	833	-	-	718	-	-	-
HCM Lane V/C Ratio	0.251	-	-	-	0.016	-	-	-
HCM Control Delay (s)	25.9	0	-	-	10.1	-	-	0
HCM Lane LOS	D	A	-	-	B	-	-	A
HCM 95th %tile Q(veh)	1	0	-	-	0	-	-	-

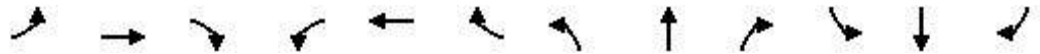
Lanes, Volumes, Timings
23: Broadway St S & US 212

12/09/2020

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	70	850	10	15	860	110	20	15	15	165	10	50
Future Volume (vph)	70	850	10	15	860	110	20	15	15	165	10	50
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (ft)	205		0	215		0	105		0	115		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.998			0.983			0.925				0.875
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1676	3346	0	1676	3296	0	1676	1632	0	1676	1544	0
Flt Permitted	0.128			0.228			0.710			0.734		
Satd. Flow (perm)	226	3346	0	402	3296	0	1253	1632	0	1295	1544	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		2			24			18				60
Link Speed (mph)		35			35			40				25
Link Distance (ft)		1772			1929			688				588
Travel Time (s)		34.5			37.6			11.7				16.0
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Adj. Flow (vph)	84	1024	12	18	1036	133	24	18	18	199	12	60
Shared Lane Traffic (%)												
Lane Group Flow (vph)	84	1036	0	18	1169	0	24	36	0	199	72	0
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8				4
Permitted Phases	2			6			8			4		
Detector Phase	5	2		1	6		8	8		4		4
Switch Phase												
Minimum Initial (s)	5.0	10.0		5.0	10.0		7.0	7.0		7.0		7.0
Minimum Split (s)	11.0	24.0		11.0	24.0		24.0	24.0		24.0		24.0
Total Split (s)	11.0	30.0		11.0	30.0		24.0	24.0		24.0		24.0
Total Split (%)	16.9%	46.2%		16.9%	46.2%		36.9%	36.9%		36.9%		36.9%
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0		4.0
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0		2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0		0.0
Total Lost Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0		6.0
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?	Yes	Yes		Yes	Yes							
Recall Mode	None	Min		None	Min		None	None		None		None
Act Effct Green (s)	34.0	33.0		30.4	26.5		13.8	13.8		13.8		13.8
Actuated g/C Ratio	0.56	0.54		0.50	0.44		0.23	0.23		0.23		0.23
v/c Ratio	0.34	0.57		0.06	0.81		0.08	0.09		0.68		0.18
Control Delay	11.2	13.2		7.5	23.5		18.6	12.5		33.9		8.4
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0		0.0
Total Delay	11.2	13.2		7.5	23.5		18.6	12.5		33.9		8.4
LOS	B	B		A	C		B	B		C		A
Approach Delay		13.1			23.2			14.9				27.1
Approach LOS		B			C			B				C
Queue Length 50th (ft)	13	111		3	202		7	5		67		4
Queue Length 95th (ft)	30	235		10	#311		21	21		116		26

Lanes, Volumes, Timings
23: Broadway St S & US 212

12/09/2020

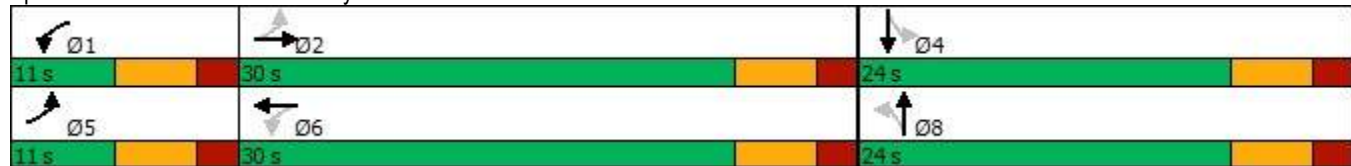


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		1692			1849			608			508	
Turn Bay Length (ft)	205			215			105			115		
Base Capacity (vph)	245	1814		305	1446		371	497		384	500	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.34	0.57		0.06	0.81		0.06	0.07		0.52	0.14	

Intersection Summary

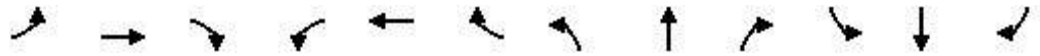
Area Type:	Other
Cycle Length:	65
Actuated Cycle Length:	60.9
Natural Cycle:	65
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.81
Intersection Signal Delay:	19.1
Intersection LOS:	B
Intersection Capacity Utilization	64.3%
ICU Level of Service	C
Analysis Period (min)	15
# 95th percentile volume exceeds capacity, queue may be longer.	
Queue shown is maximum after two cycles.	

Splits and Phases: 23: Broadway St S & US 212



HCM 6th Signalized Intersection Summary
 23: Broadway St S & US 212

12/09/2020



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↕		↖	↕		↖	↕		↖	↕	
Traffic Volume (veh/h)	70	850	10	15	860	110	20	15	15	165	10	50
Future Volume (veh/h)	70	850	10	15	860	110	20	15	15	165	10	50
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1772	1772	1772	1772	1772	1772	1772	1772	1772	1772	1772	1772
Adj Flow Rate, veh/h	84	1024	12	18	1036	133	24	18	18	199	12	60
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	285	1527	18	283	1213	156	348	165	165	384	52	260
Arrive On Green	0.07	0.45	0.45	0.02	0.40	0.40	0.20	0.20	0.20	0.20	0.20	0.20
Sat Flow, veh/h	1688	3408	40	1688	3001	385	1328	813	813	1372	257	1284
Grp Volume(v), veh/h	84	506	530	18	581	588	24	0	36	199	0	72
Grp Sat Flow(s),veh/h/ln	1688	1683	1765	1688	1683	1703	1328	0	1626	1372	0	1541
Q Serve(g_s), s	1.5	13.0	13.0	0.3	17.2	17.3	0.8	0.0	1.0	7.6	0.0	2.1
Cycle Q Clear(g_c), s	1.5	13.0	13.0	0.3	17.2	17.3	3.0	0.0	1.0	8.6	0.0	2.1
Prop In Lane	1.00		0.02	1.00		0.23	1.00		0.50	1.00		0.83
Lane Grp Cap(c), veh/h	285	754	791	283	680	688	348	0	329	384	0	312
V/C Ratio(X)	0.29	0.67	0.67	0.06	0.85	0.86	0.07	0.00	0.11	0.52	0.00	0.23
Avail Cap(c_a), veh/h	328	754	791	400	735	744	514	0	533	556	0	505
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	11.4	12.0	12.0	10.2	14.9	14.9	19.6	0.0	17.9	21.4	0.0	18.3
Incr Delay (d2), s/veh	0.6	2.3	2.2	0.1	9.1	9.1	0.1	0.0	0.1	1.1	0.0	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	4.3	4.5	0.1	7.0	7.1	0.2	0.0	0.3	2.4	0.0	0.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	12.0	14.3	14.2	10.3	24.0	24.0	19.7	0.0	18.0	22.5	0.0	18.7
LnGrp LOS	B	B	B	B	C	C	B	A	B	C	A	B
Approach Vol, veh/h		1120			1187			60				271
Approach Delay, s/veh		14.1			23.8			18.7				21.5
Approach LOS		B			C			B				C
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	7.2	30.6		17.1	9.6	28.2		17.1				
Change Period (Y+Rc), s	6.0	6.0		6.0	6.0	6.0		6.0				
Max Green Setting (Gmax), s	5.0	24.0		18.0	5.0	24.0		18.0				
Max Q Clear Time (g_c+I1), s	2.3	15.0		10.6	3.5	19.3		5.0				
Green Ext Time (p_c), s	0.0	4.2		0.6	0.0	2.9		0.1				

Intersection Summary												
HCM 6th Ctrl Delay											19.3	
HCM 6th LOS											B	

Lanes, Volumes, Timings

1: I-29 NB Exit 180 RTI & US 81 (26th Avenue NE)

12/29/2020



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕				
Traffic Volume (vph)	55	20	0	0	20	2	30	1	5	0	0	0
Future Volume (vph)	55	20	0	0	20	2	30	1	5	0	0	0
Ideal Flow (vphpl)	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700
Lane Util. 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
Fr _t					0.989			0.983				
Fl _t Protected		0.965						0.959				
Satd. Flow (prot)	0	1608	0	0	1648	0	0	1571	0	0	0	0
Fl _t Permitted		0.965						0.959				
Satd. Flow (perm)	0	1608	0	0	1648	0	0	1571	0	0	0	0
Link Speed (mph)		55			55			55				55
Link Distance (ft)		1035			897			617				615
Travel Time (s)		12.8			11.1			7.6				7.6
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	60	22	0	0	22	2	33	1	5	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	82	0	0	24	0	0	39	0	0	0	0
Sign Control		Free			Free			Stop				Free

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 21.2% ICU Level of Service A

Analysis Period (min) 15

HCM 6th TWSC
 1: I-29 NB Exit 180 RTI & US 81 (26th Avenue NE)

12/29/2020

Intersection												
Int Delay, s/veh	5.6											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔				
Traffic Vol, veh/h	55	20	0	0	20	2	30	1	5	0	0	0
Future Vol, veh/h	55	20	0	0	20	2	30	1	5	0	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	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	16965	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	91	91	91	91	91	91	91	91	91	91	91	91
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	60	22	0	0	22	2	33	1	5	0	0	0

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	24	0	-
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.12	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.218	-	-
Pot Cap-1 Maneuver	1591	0	0
Stage 1	-	0	0
Stage 2	-	0	0
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1591	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

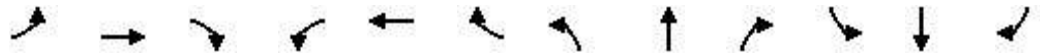
Approach	EB	WB	NB
HCM Control Delay, s	5.4	0	9.6
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	WBT	WBR
Capacity (veh/h)	824	1591	-	-	-
HCM Lane V/C Ratio	0.048	0.038	-	-	-
HCM Control Delay (s)	9.6	7.4	0	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0.2	0.1	-	-	-

Lanes, Volumes, Timings

2: I-29 SB Exit 180 RTI & US 81 (26th Avenue NE)

12/29/2020



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	0	75	25	5	45	0	0	0	0	1	1	70	
Future Volume (vph)	0	75	25	5	45	0	0	0	0	1	1	70	
Ideal Flow (vphpl)	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	
Lane Util. 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	
Fr _t	0.967										0.868		
Fl _t Protected						0.995							0.999
Satd. Flow (prot)	0	1612	0	0	1658	0	0	0	0	0	1445	0	
Fl _t Permitted						0.995							0.999
Satd. Flow (perm)	0	1612	0	0	1658	0	0	0	0	0	1445	0	
Link Speed (mph)					55						55		
Link Distance (ft)					2073						611		
Travel Time (s)					25.7						7.6		
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	
Adj. Flow (vph)	0	82	27	5	49	0	0	0	0	1	1	77	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	0	109	0	0	54	0	0	0	0	0	79	0	
Sign Control	Free		Free				Free			Stop			

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 18.9% ICU Level of Service A

Analysis Period (min) 15

HCM 6th TWSC
 2: I-29 SB Exit 180 RTI & US 81 (26th Avenue NE)

12/29/2020

Intersection												
Int Delay, s/veh	3											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔						↔	
Traffic Vol, veh/h	0	75	25	5	45	0	0	0	0	1	1	70
Future Vol, veh/h	0	75	25	5	45	0	0	0	0	1	1	70
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	16974	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	91	91	91	91	91	91	91	91	91	91	91	91
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	82	27	5	49	0	0	0	0	1	1	77

















Major/Minor	Major1			Major2			Minor2			
Conflicting Flow All	-	0	0	109	0	0		155	168	49
Stage 1	-	-	-	-	-	-		59	59	-
Stage 2	-	-	-	-	-	-		96	109	-
Critical Hdwy	-	-	-	4.12	-	-		6.42	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-		5.42	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-		5.42	5.52	-
Follow-up Hdwy	-	-	-	2.218	-	-		3.518	4.018	3.318
Pot Cap-1 Maneuver	0	-	-	1481	-	0		836	725	1020
Stage 1	0	-	-	-	-	0		964	846	-
Stage 2	0	-	-	-	-	0		928	805	-
Platoon blocked, %	-	-	-	-	-	-		-	-	-
Mov Cap-1 Maneuver	-	-	-	1481	-	-		833	0	1020
Mov Cap-2 Maneuver	-	-	-	-	-	-		833	0	-
Stage 1	-	-	-	-	-	-		964	0	-
Stage 2	-	-	-	-	-	-		925	0	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0.7	8.8
HCM LOS			A

Minor Lane/Major Mvmt	EBT	EBR	WBL	WBT	SBLn1
Capacity (veh/h)	-	-	1481	-	1017
HCM Lane V/C Ratio	-	-	0.004	-	0.078
HCM Control Delay (s)	-	-	7.4	0	8.8
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0	-	0.3

Lanes, Volumes, Timings
 10: 19th Street NE (456th Avenue) & US 81 (26th Avenue NE)

12/29/2020

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	60	15	35	70	10	20	20	35	5	25	15
Future Volume (vph)	20	60	15	35	70	10	20	20	35	5	25	15
Ideal Flow (vphpl)	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700
Lane Util. 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
Frt		0.979			0.988			0.936			0.955	
Flt Protected		0.990			0.985			0.987			0.994	
Satd. Flow (prot)	0	1615	0	0	1622	0	0	1540	0	0	1582	0
Flt Permitted		0.990			0.985			0.987			0.994	
Satd. Flow (perm)	0	1615	0	0	1622	0	0	1540	0	0	1582	0
Link Speed (mph)		55			55			55			55	
Link Distance (ft)		4507			2073			773			992	
Travel Time (s)		55.9			25.7			9.6			12.3	
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Adj. Flow (vph)	24	73	18	43	85	12	24	24	43	6	30	18
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	115	0	0	140	0	0	91	0	0	54	0
Sign Control		Free			Free			Stop			Stop	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 26.8% ICU Level of Service A

Analysis Period (min) 15

HCM 6th TWSC

10: 19th Street NE (456th Avenue) & US 81 (26th Avenue NE)

12/29/2020

Intersection												
Int Delay, s/veh	5.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	20	60	15	35	70	10	20	20	35	5	25	15
Future Vol, veh/h	20	60	15	35	70	10	20	20	35	5	25	15
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	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	82	82	82	82	82	82	82	82	82	82	82	82
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	24	73	18	43	85	12	24	24	43	6	30	18

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	97	0	0	91	0	0	331	313	82	341	316	91
Stage 1	-	-	-	-	-	-	130	130	-	177	177	-
Stage 2	-	-	-	-	-	-	201	183	-	164	139	-
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	1496	-	-	1504	-	-	622	602	978	613	600	967
Stage 1	-	-	-	-	-	-	874	789	-	825	753	-
Stage 2	-	-	-	-	-	-	801	748	-	838	782	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1496	-	-	1504	-	-	565	574	978	547	572	967
Mov Cap-2 Maneuver	-	-	-	-	-	-	565	574	-	547	572	-
Stage 1	-	-	-	-	-	-	859	776	-	811	730	-
Stage 2	-	-	-	-	-	-	730	726	-	763	769	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	1.6			2.3			10.8			11		
HCM LOS							B			B		

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	707	1496	-	-	1504	-	-	658
HCM Lane V/C Ratio	0.129	0.016	-	-	0.028	-	-	0.083
HCM Control Delay (s)	10.8	7.4	0	-	7.5	0	-	11
HCM Lane LOS	B	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.4	0.1	-	-	0.1	-	-	0.3

Lanes, Volumes, Timings

15: US 81 (4th Street NE)/US 81 (5th Street NE) & 18th Avenue NE

12/29/2020



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	35	5	175	85	5	125
Future Volume (vph)	35	5	175	85	5	125
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Storage Length (ft)	0	0		100	190	
Storage Lanes	1	0		0	1	
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.983			0.850		
Flt Protected	0.958				0.950	
Satd. Flow (prot)	1662	0	1765	1500	1676	1765
Flt Permitted	0.958				0.950	
Satd. Flow (perm)	1662	0	1765	1500	1676	1765
Link Speed (mph)	25		35			35
Link Distance (ft)	791		1566			1307
Travel Time (s)	21.6		30.5			25.5
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	41	6	203	99	6	145
Shared Lane Traffic (%)						
Lane Group Flow (vph)	47	0	203	99	6	145
Sign Control	Stop		Free			Free

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	19.7%
ICU Level of Service	A
Analysis Period (min)	15

Intersection						
Int Delay, s/veh	1.1					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↔		↑	↗	↘	↑
Traffic Vol, veh/h	35	5	175	85	5	125
Future Vol, veh/h	35	5	175	85	5	125
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	190	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	86	86	86	86	86	86
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	41	6	203	99	6	145

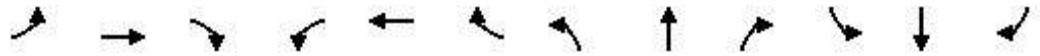
Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	360	203	0	0	302
Stage 1	203	-	-	-	-
Stage 2	157	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12
Critical Hdwy Stg 1	5.42	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218
Pot Cap-1 Maneuver	639	838	-	-	1259
Stage 1	831	-	-	-	-
Stage 2	871	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	636	838	-	-	1259
Mov Cap-2 Maneuver	677	-	-	-	-
Stage 1	831	-	-	-	-
Stage 2	867	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.6	0	0.3
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	694	1259
HCM Lane V/C Ratio	-	-	0.067	0.005
HCM Control Delay (s)	-	-	10.6	7.9
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	0.2	0

Lanes, Volumes, Timings
 17: US 81 (4th Street NE) & 14th Avenue NE

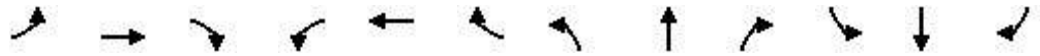
12/29/2020



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	75	190	60	105	195	20	80	165	170	35	155	65
Future Volume (vph)	75	190	60	105	195	20	80	165	170	35	155	65
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (ft)	120		0	120		0	120		0	120		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
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		0.964			0.986			0.924			0.955	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1676	1701	0	1676	1740	0	1676	3098	0	1676	3202	0
Flt Permitted	0.604			0.559			0.593			0.521		
Satd. Flow (perm)	1066	1701	0	986	1740	0	1046	3098	0	919	3202	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		27			9			198			76	
Link Speed (mph)		35			35			35			35	
Link Distance (ft)		1194			1025			1109			1566	
Travel Time (s)		23.3			20.0			21.6			30.5	
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	87	221	70	122	227	23	93	192	198	41	180	76
Shared Lane Traffic (%)												
Lane Group Flow (vph)	87	291	0	122	250	0	93	390	0	41	256	0
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	24.0	24.0		24.0	24.0		11.0	24.0		11.0	24.0	
Total Split (s)	24.0	24.0		24.0	24.0		11.0	25.0		11.0	25.0	
Total Split (%)	40.0%	40.0%		40.0%	40.0%		18.3%	41.7%		18.3%	41.7%	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None		Min	Min		Min	Min	
Act Effct Green (s)	12.2	12.2		12.2	12.2		15.7	10.6		15.7	10.6	
Actuated g/C Ratio	0.26	0.26		0.26	0.26		0.34	0.23		0.34	0.23	
v/c Ratio	0.31	0.62		0.47	0.54		0.22	0.45		0.10	0.32	
Control Delay	16.5	19.6		20.6	18.4		9.7	10.0		8.9	12.3	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	16.5	19.6		20.6	18.4		9.7	10.0		8.9	12.3	
LOS	B	B		C	B		A	A		A	B	
Approach Delay		18.9			19.1			9.9			11.8	
Approach LOS		B			B			A			B	
Queue Length 50th (ft)	18	59		26	52		12	21		5	20	
Queue Length 95th (ft)	46	118		64	105		36	53		19	46	

Lanes, Volumes, Timings
 17: US 81 (4th Street NE) & 14th Avenue NE

12/29/2020



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR			
Internal Link Dist (ft)		1114				945				1029				1486	
Turn Bay Length (ft)	120			120			120			120					
Base Capacity (vph)	420	687		389	691		425	1405		395	1377				
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	0.42		0.31	0.36		0.22	0.28		0.10	0.19				

Intersection Summary

Area Type:	Other
Cycle Length:	60
Actuated Cycle Length:	46.1
Natural Cycle:	60
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.62
Intersection Signal Delay:	14.7
Intersection LOS:	B
Intersection Capacity Utilization	55.3%
ICU Level of Service	B
Analysis Period (min)	15

Splits and Phases: 17: US 81 (4th Street NE) & 14th Avenue NE



HCM 6th Signalized Intersection Summary
 17: US 81 (4th Street NE) & 14th Avenue NE

12/29/2020



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗		↖	↕		↖	↗	
Traffic Volume (veh/h)	75	190	60	105	195	20	80	165	170	35	155	65
Future Volume (veh/h)	75	190	60	105	195	20	80	165	170	35	155	65
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1772	1772	1772	1772	1772	1772	1772	1772	1772	1772	1772	1772
Adj Flow Rate, veh/h	87	221	70	122	227	23	93	192	198	41	180	76
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	374	390	123	334	478	48	500	356	317	427	494	201
Arrive On Green	0.30	0.30	0.30	0.30	0.30	0.30	0.11	0.21	0.21	0.11	0.21	0.21
Sat Flow, veh/h	1196	1290	409	1152	1583	160	1688	1683	1502	1688	2336	949
Grp Volume(v), veh/h	87	0	291	122	0	250	93	192	198	41	128	128
Grp Sat Flow(s),veh/h/ln	1196	0	1698	1152	0	1743	1688	1683	1502	1688	1683	1601
Q Serve(g_s), s	3.0	0.0	6.8	4.7	0.0	5.5	1.9	4.8	5.7	0.8	3.1	3.2
Cycle Q Clear(g_c), s	8.5	0.0	6.8	11.5	0.0	5.5	1.9	4.8	5.7	0.8	3.1	3.2
Prop In Lane	1.00		0.24	1.00		0.09	1.00		1.00	1.00		0.59
Lane Grp Cap(c), veh/h	374	0	513	334	0	527	500	356	317	427	356	339
V/C Ratio(X)	0.23	0.00	0.57	0.36	0.00	0.47	0.19	0.54	0.62	0.10	0.36	0.38
Avail Cap(c_a), veh/h	468	0	646	425	0	663	500	676	603	427	676	643
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	16.9	0.0	13.9	18.8	0.0	13.4	11.8	16.6	16.9	11.7	15.9	16.0
Incr Delay (d2), s/veh	0.3	0.0	1.0	0.7	0.0	0.7	0.2	1.3	2.0	0.1	0.6	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.7	0.0	2.3	1.1	0.0	1.9	0.6	1.7	1.8	0.3	1.1	1.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	17.2	0.0	14.9	19.4	0.0	14.1	12.0	17.9	18.9	11.8	16.5	16.7
LnGrp LOS	B	A	B	B	A	B	B	B	B	B	B	B
Approach Vol, veh/h		378			372			483			297	
Approach Delay, s/veh		15.4			15.8			17.2			15.9	
Approach LOS		B			B			B			B	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	11.0	16.0		20.3	11.0	16.0		20.3				
Change Period (Y+Rc), s	6.0	6.0		6.0	6.0	6.0		6.0				
Max Green Setting (Gmax), s	5.0	19.0		18.0	5.0	19.0		18.0				
Max Q Clear Time (g_c+I1), s	2.8	7.7		10.5	3.9	5.2		13.5				
Green Ext Time (p_c), s	0.0	1.7		1.2	0.0	1.1		0.8				

Intersection Summary

HCM 6th Ctrl Delay	16.2
HCM 6th LOS	B

Lanes, Volumes, Timings
 23: US 81 (4th Street NE) & 3rd Avenue NE

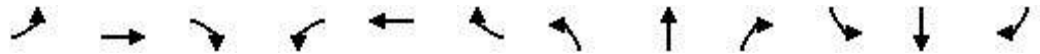
12/29/2020



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	50	110	90	60	125	35	95	625	45	35	510	30
Future Volume (vph)	50	110	90	60	125	35	95	625	45	35	510	30
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (ft)	75		0	75		0	100		0	165		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
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		0.932			0.967			0.990			0.992	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1676	1645	0	1676	1706	0	1676	3319	0	1676	3326	0
Flt Permitted	0.645			0.620			0.393			0.291		
Satd. Flow (perm)	1138	1645	0	1094	1706	0	694	3319	0	514	3326	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		70			24			13			10	
Link Speed (mph)		25			25			35			35	
Link Distance (ft)		1200			1304			1548			1564	
Travel Time (s)		32.7			35.6			30.2			30.5	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	56	122	100	67	139	39	106	694	50	39	567	33
Shared Lane Traffic (%)												
Lane Group Flow (vph)	56	222	0	67	178	0	106	744	0	39	600	0
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	24.0	24.0		24.0	24.0		11.0	24.0		11.0	24.0	
Total Split (s)	24.0	24.0		24.0	24.0		11.0	25.0		11.0	25.0	
Total Split (%)	40.0%	40.0%		40.0%	40.0%		18.3%	41.7%		18.3%	41.7%	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None		Min	Min		Min	Min	
Act Effct Green (s)	10.7	10.7		10.7	10.7		21.0	16.0		21.0	16.0	
Actuated g/C Ratio	0.21	0.21		0.21	0.21		0.42	0.32		0.42	0.32	
v/c Ratio	0.23	0.55		0.29	0.47		0.27	0.70		0.12	0.56	
Control Delay	19.3	18.0		20.4	19.6		8.6	19.0		7.5	16.6	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	19.3	18.0		20.4	19.6		8.6	19.0		7.5	16.6	
LOS	B	B		C	B		A	B		A	B	
Approach Delay		18.2			19.8			17.7			16.0	
Approach LOS		B			B			B			B	
Queue Length 50th (ft)	14	40		17	41		13	93		5	71	
Queue Length 95th (ft)	39	94		45	88		39	171		18	133	

Lanes, Volumes, Timings
 23: US 81 (4th Street NE) & 3rd Avenue NE

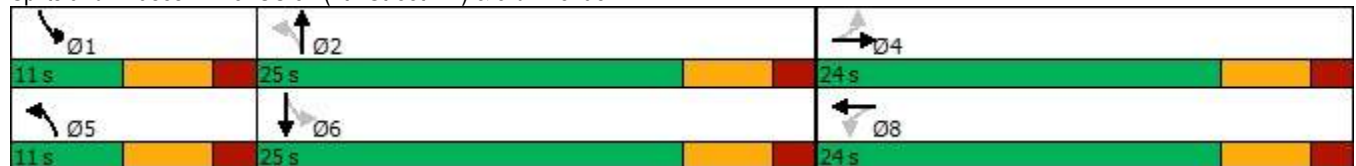
12/29/2020



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		1120			1224			1468			1484	
Turn Bay Length (ft)	75			75			100			165		
Base Capacity (vph)	416	646		400	639		392	1289		334	1290	
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	0.13	0.34		0.17	0.28		0.27	0.58		0.12	0.47	

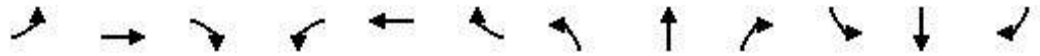
Intersection Summary	
Area Type:	Other
Cycle Length:	60
Actuated Cycle Length:	50
Natural Cycle:	60
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.70
Intersection Signal Delay:	17.5
Intersection LOS:	B
Intersection Capacity Utilization	61.7%
ICU Level of Service	B
Analysis Period (min)	15

Splits and Phases: 23: US 81 (4th Street NE) & 3rd Avenue NE



HCM 6th Signalized Intersection Summary
 23: US 81 (4th Street NE) & 3rd Avenue NE

12/29/2020



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗		↖	↕	↗	↖	↕	↗
Traffic Volume (veh/h)	50	110	90	60	125	35	95	625	45	35	510	30
Future Volume (veh/h)	50	110	90	60	125	35	95	625	45	35	510	30
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1772	1772	1772	1772	1772	1772	1772	1772	1772	1772	1772	1772
Adj Flow Rate, veh/h	56	122	100	67	139	39	106	694	50	39	567	33
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	327	206	169	282	305	85	449	936	67	398	950	55
Arrive On Green	0.23	0.23	0.23	0.23	0.23	0.23	0.10	0.29	0.29	0.10	0.29	0.29
Sat Flow, veh/h	1277	901	738	1227	1331	373	1688	3185	229	1688	3233	188
Grp Volume(v), veh/h	56	0	222	67	0	178	106	367	377	39	295	305
Grp Sat Flow(s),veh/h/ln	1277	0	1639	1227	0	1705	1688	1683	1731	1688	1683	1738
Q Serve(g_s), s	1.9	0.0	5.8	2.5	0.0	4.3	1.9	9.5	9.5	0.7	7.2	7.2
Cycle Q Clear(g_c), s	6.2	0.0	5.8	8.3	0.0	4.3	1.9	9.5	9.5	0.7	7.2	7.2
Prop In Lane	1.00		0.45	1.00		0.22	1.00		0.13	1.00		0.11
Lane Grp Cap(c), veh/h	327	0	375	282	0	390	449	495	509	398	495	511
V/C Ratio(X)	0.17	0.00	0.59	0.24	0.00	0.46	0.24	0.74	0.74	0.10	0.60	0.60
Avail Cap(c_a), veh/h	512	0	612	460	0	637	449	664	683	398	664	685
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	18.7	0.0	16.6	20.3	0.0	16.0	9.9	15.4	15.4	9.9	14.6	14.6
Incr Delay (d2), s/veh	0.2	0.0	1.5	0.4	0.0	0.8	0.3	3.0	3.0	0.1	1.2	1.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	0.0	2.1	0.7	0.0	1.6	0.6	3.4	3.5	0.2	2.4	2.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	18.9	0.0	18.1	20.7	0.0	16.8	10.2	18.4	18.3	10.0	15.7	15.7
LnGrp LOS	B	A	B	C	A	B	B	B	B	B	B	B
Approach Vol, veh/h		278			245			850			639	
Approach Delay, s/veh		18.2			17.9			17.3			15.4	
Approach LOS		B			B			B			B	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	11.0	20.2		17.0	11.0	20.2		17.0				
Change Period (Y+Rc), s	6.0	6.0		6.0	6.0	6.0		6.0				
Max Green Setting (Gmax), s	5.0	19.0		18.0	5.0	19.0		18.0				
Max Q Clear Time (g_c+I1), s	2.7	11.5		8.2	3.9	9.2		10.3				
Green Ext Time (p_c), s	0.0	2.7		1.1	0.0	2.5		0.7				

Intersection Summary

HCM 6th Ctrl Delay	16.9
HCM 6th LOS	B

Lanes, Volumes, Timings

28: US 81 (5th Street SE)/US 81 (5th Street NE) & E Kemp Avenue

12/29/2020

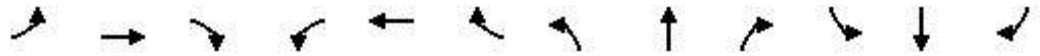


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↗	↕↔		↗	↕↔	
Traffic Volume (vph)	30	40	75	10	25	20	80	655	15	35	595	20
Future Volume (vph)	30	40	75	10	25	20	80	655	15	35	595	20
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (ft)	0		0	0		0	100		0	100		0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
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		0.930			0.951			0.997			0.995	
Flt Protected		0.990			0.991		0.950			0.950		
Satd. Flow (prot)	0	1625	0	0	1663	0	1676	3343	0	1676	3336	0
Flt Permitted		0.912			0.943		0.286			0.360		
Satd. Flow (perm)	0	1497	0	0	1583	0	505	3343	0	635	3336	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		86			23			6			6	
Link Speed (mph)		25			25			35			35	
Link Distance (ft)		761			745			370			380	
Travel Time (s)		20.8			20.3			7.2			7.4	
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	34	46	86	11	29	23	92	753	17	40	684	23
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	166	0	0	63	0	92	770	0	40	707	0
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		5	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		10.0	10.0	
Minimum Split (s)	22.5	22.5		22.5	22.5		9.5	22.5		22.5	22.5	
Total Split (s)	22.5	22.5		22.5	22.5		9.5	32.5		23.0	23.0	
Total Split (%)	40.9%	40.9%		40.9%	40.9%		17.3%	59.1%		41.8%	41.8%	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		4.5			4.5		4.5	4.5		4.5	4.5	
Lead/Lag							Lead			Lag	Lag	
Lead-Lag Optimize?							Yes			Yes	Yes	
Recall Mode	None	None		None	None		None	Min		Min	Min	
Act Effct Green (s)		8.1			8.1		23.7	24.9		20.1	20.1	
Actuated g/C Ratio		0.21			0.21		0.61	0.64		0.52	0.52	
v/c Ratio		0.43			0.18		0.20	0.36		0.12	0.41	
Control Delay		12.5			12.0		5.4	5.3		10.9	10.2	
Queue Delay		0.0			0.0		0.0	0.0		0.0	0.0	
Total Delay		12.5			12.0		5.4	5.3		10.9	10.2	
LOS		B			B		A	A		B	B	
Approach Delay		12.5			12.0			5.3			10.2	
Approach LOS		B			B			A			B	
Queue Length 50th (ft)		16			8		7	38		6	65	
Queue Length 95th (ft)		54			30		24	80		23	117	

Lanes, Volumes, Timings

28: US 81 (5th Street SE)/US 81 (5th Street NE) & E Kemp Avenue

12/29/2020

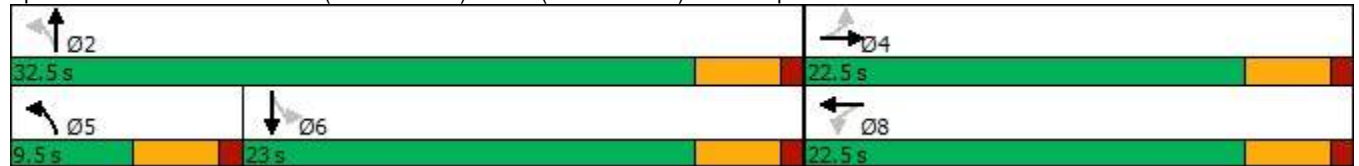


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		681			665			290			300	
Turn Bay Length (ft)							100			100		
Base Capacity (vph)		779			789		468	2542		368	1936	
Starvation Cap Reductn		0			0		0	0		0	0	
Spillback Cap Reductn		0			0		0	0		0	0	
Storage Cap Reductn		0			0		0	0		0	0	
Reduced v/c Ratio		0.21			0.08		0.20	0.30		0.11	0.37	

Intersection Summary

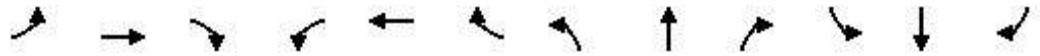
Area Type:	Other
Cycle Length:	55
Actuated Cycle Length:	38.8
Natural Cycle:	55
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.43
Intersection Signal Delay:	8.2
Intersection LOS:	A
Intersection Capacity Utilization	51.6%
ICU Level of Service	A
Analysis Period (min)	15

Splits and Phases: 28: US 81 (5th Street SE)/US 81 (5th Street NE) & E Kemp Avenue



HCM 6th Signalized Intersection Summary
 28: US 81 (5th Street SE)/US 81 (5th Street NE) & E Kemp Avenue






















12/29/2020



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↗	↕		↗	↕	
Traffic Volume (veh/h)	30	40	75	10	25	20	80	655	15	35	595	20
Future Volume (veh/h)	30	40	75	10	25	20	80	655	15	35	595	20
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1772	1772	1772	1772	1772	1772	1772	1772	1772	1772	1772	1772
Adj Flow Rate, veh/h	34	46	86	11	29	23	92	753	17	40	684	23
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	170	84	130	156	141	96	499	1896	43	472	1123	38
Arrive On Green	0.16	0.16	0.16	0.16	0.16	0.16	0.09	0.56	0.56	0.34	0.34	0.34
Sat Flow, veh/h	229	528	814	162	884	601	1688	3366	76	740	3323	112
Grp Volume(v), veh/h	166	0	0	63	0	0	92	377	393	40	346	361
Grp Sat Flow(s),veh/h/ln	1571	0	0	1647	0	0	1688	1683	1758	740	1683	1752
Q Serve(g_s), s	1.8	0.0	0.0	0.0	0.0	0.0	1.0	4.1	4.1	1.2	5.6	5.6
Cycle Q Clear(g_c), s	3.2	0.0	0.0	1.1	0.0	0.0	1.0	4.1	4.1	1.2	5.6	5.6
Prop In Lane	0.20		0.52	0.17		0.37	1.00		0.04	1.00		0.06
Lane Grp Cap(c), veh/h	384	0	0	393	0	0	499	948	990	472	569	592
V/C Ratio(X)	0.43	0.00	0.00	0.16	0.00	0.00	0.18	0.40	0.40	0.08	0.61	0.61
Avail Cap(c_a), veh/h	997	0	0	1016	0	0	612	1452	1516	643	959	998
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	12.8	0.0	0.0	11.9	0.0	0.0	5.5	4.0	4.0	7.5	9.0	9.0
Incr Delay (d2), s/veh	0.8	0.0	0.0	0.2	0.0	0.0	0.2	0.3	0.3	0.1	1.1	1.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.0	0.0	0.0	0.3	0.0	0.0	0.2	0.5	0.5	0.1	1.4	1.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	13.6	0.0	0.0	12.1	0.0	0.0	5.7	4.3	4.2	7.6	10.0	10.0
LnGrp LOS	B	A	A	B	A	A	A	A	A	A	B	A
Approach Vol, veh/h		166			63			862			747	
Approach Delay, s/veh		13.6			12.1			4.4			9.9	
Approach LOS		B			B			A			A	
Timer - Assigned Phs		2		4	5	6		8				
Phs Duration (G+Y+Rc), s		22.8		9.7	7.3	15.5		9.7				
Change Period (Y+Rc), s		4.5		4.5	4.5	4.5		4.5				
Max Green Setting (Gmax), s		28.0		18.0	5.0	18.5		18.0				
Max Q Clear Time (g_c+I1), s		6.1		5.2	3.0	7.6		3.1				
Green Ext Time (p_c), s		4.7		0.7	0.0	3.4		0.2				
Intersection Summary												
HCM 6th Ctrl Delay				7.7								
HCM 6th LOS				A								

Lanes, Volumes, Timings
 9: US 81 (5th Street SE) & 1st Avenue SE

12/29/2020

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	45	25	60	10	15	15	35	690	20	20	640	20
Future Volume (vph)	45	25	60	10	15	15	35	690	20	20	640	20
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (ft)	80		80	0		0	100		0	0		0
Storage Lanes	1		1	0		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
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			0.850		0.949			0.996				0.995
Flt Protected	0.950				0.988		0.950			0.950		
Satd. Flow (prot)	1676	1765	1500	0	1655	0	1676	3340	0	1676	3336	0
Flt Permitted	0.889				0.907		0.373			0.353		
Satd. Flow (perm)	1569	1765	1500	0	1519	0	658	3340	0	623	3336	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			67		17			7				7
Link Speed (mph)		25			25			35				35
Link Distance (ft)		642			750			1323				370
Travel Time (s)		17.5			20.5			25.8				7.2
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	50	28	67	11	17	17	39	767	22	22	711	22
Shared Lane Traffic (%)												
Lane Group Flow (vph)	50	28	67	0	45	0	39	789	0	22	733	0
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2				6
Permitted Phases	4		4	8			2			6		
Detector Phase	4	4	4	8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	24.0	24.0	24.0	24.0	24.0		24.0	24.0		24.0	24.0	
Total Split (s)	25.0	25.0	25.0	25.0	25.0		25.0	25.0		25.0	25.0	
Total Split (%)	50.0%	50.0%	50.0%	50.0%	50.0%		50.0%	50.0%		50.0%	50.0%	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0	6.0		6.0		6.0	6.0		6.0	6.0	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None	None	None	None		Min	Min		Min	Min	
Act Effct Green (s)	7.6	7.6	7.6		7.6		23.3	23.3		23.3	23.3	
Actuated g/C Ratio	0.22	0.22	0.22		0.22		0.68	0.68		0.68	0.68	
v/c Ratio	0.15	0.07	0.18		0.13		0.09	0.35		0.05	0.33	
Control Delay	13.2	12.4	5.8		10.2		6.4	5.9		6.2	5.7	
Queue Delay	0.0	0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Delay	13.2	12.4	5.8		10.2		6.4	5.9		6.2	5.7	
LOS	B	B	A		B		A	A		A	A	
Approach Delay		9.6			10.2			5.9			5.8	
Approach LOS		A			B			A			A	
Queue Length 50th (ft)	7	4	0		4		4	48		2	44	
Queue Length 95th (ft)	28	18	20		22		16	90		11	83	

Lanes, Volumes, Timings
 9: US 81 (5th Street SE) & 1st Avenue SE

12/29/2020



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		562			670			1243			290	
Turn Bay Length (ft)	80		80				100					
Base Capacity (vph)	873	982	864		853		468	2378		443	2375	
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	0.06	0.03	0.08		0.05		0.08	0.33		0.05	0.31	

Intersection Summary

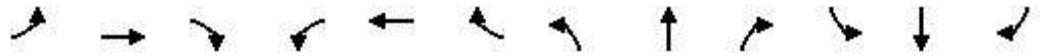
Area Type:	Other
Cycle Length:	50
Actuated Cycle Length:	34.5
Natural Cycle:	50
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.35
Intersection Signal Delay:	6.3
Intersection LOS:	A
Intersection Capacity Utilization	49.8%
ICU Level of Service	A
Analysis Period (min)	15

Splits and Phases: 9: US 81 (5th Street SE) & 1st Avenue SE



HCM 6th Signalized Intersection Summary
 9: US 81 (5th Street SE) & 1st Avenue SE

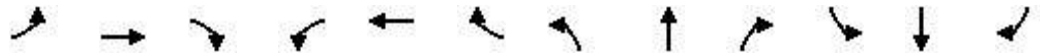
12/29/2020



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	45	25	60	10	15	15	35	690	20	20	640	20
Future Volume (veh/h)	45	25	60	10	15	15	35	690	20	20	640	20
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1772	1772	1772	1772	1772	1772	1772	1772	1772	1772	1772	1772
Adj Flow Rate, veh/h	50	28	67	11	17	17	39	767	22	22	711	22
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	525	333	283	191	150	114	430	1343	39	409	1339	41
Arrive On Green	0.19	0.19	0.19	0.19	0.19	0.19	0.40	0.40	0.40	0.40	0.40	0.40
Sat Flow, veh/h	1456	1772	1502	204	795	606	766	3342	96	727	3334	103
Grp Volume(v), veh/h	50	28	67	45	0	0	39	386	403	22	359	374
Grp Sat Flow(s),veh/h/ln	1456	1772	1502	1604	0	0	766	1683	1755	727	1683	1753
Q Serve(g_s), s	0.1	0.4	1.1	0.0	0.0	0.0	1.2	5.2	5.2	0.7	4.7	4.7
Cycle Q Clear(g_c), s	0.7	0.4	1.1	0.7	0.0	0.0	5.9	5.2	5.2	5.9	4.7	4.7
Prop In Lane	1.00		1.00	0.24		0.38	1.00		0.05	1.00		0.06
Lane Grp Cap(c), veh/h	525	333	283	455	0	0	430	676	705	409	676	704
V/C Ratio(X)	0.10	0.08	0.24	0.10	0.00	0.00	0.09	0.57	0.57	0.05	0.53	0.53
Avail Cap(c_a), veh/h	1196	1150	975	1173	0	0	619	1093	1139	589	1093	1138
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	1.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	9.9	9.8	10.1	9.9	0.0	0.0	8.9	6.8	6.8	9.1	6.7	6.7
Incr Delay (d2), s/veh	0.1	0.1	0.4	0.1	0.0	0.0	0.1	0.8	0.7	0.1	0.6	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	0.1	0.3	0.2	0.0	0.0	0.1	1.0	1.1	0.1	0.9	1.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	10.0	9.9	10.5	10.0	0.0	0.0	9.0	7.6	7.5	9.2	7.3	7.3
LnGrp LOS	B	A	B	B	A	A	A	A	A	A	A	A
Approach Vol, veh/h		145			45			828			755	
Approach Delay, s/veh		10.2			10.0			7.6			7.3	
Approach LOS		B			B			A			A	
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		17.8		11.5		17.8		11.5				
Change Period (Y+Rc), s		6.0		6.0		6.0		6.0				
Max Green Setting (Gmax), s		19.0		19.0		19.0		19.0				
Max Q Clear Time (g_c+I1), s		7.9		3.1		7.9		2.7				
Green Ext Time (p_c), s		3.8		0.4		3.5		0.1				
Intersection Summary												
HCM 6th Ctrl Delay				7.8								
HCM 6th LOS				A								

Lanes, Volumes, Timings
 13: US 81 (5th Street SE) & 4th Avenue SE

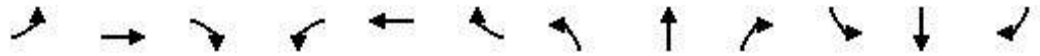
12/29/2020



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↖	↗		↖	↗	↖	↗	↖	↗	↖	↗
Traffic Volume (vph)	45	105	35	15	45	25	25	630	20	25	585	30
Future Volume (vph)	45	105	35	15	45	25	25	630	20	25	585	30
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (ft)	0		75	0		75	100		0	100		0
Storage Lanes	0		1	0		1	1		0	1		0
Taper Length (ft)	25			25			25			25		
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			0.850			0.850		0.995			0.993	
Flt Protected		0.985			0.987		0.950			0.950		
Satd. Flow (prot)	0	1738	1500	0	1742	1500	1676	3336	0	1676	3329	0
Flt Permitted		0.877			0.863		0.406			0.392		
Satd. Flow (perm)	0	1548	1500	0	1523	1500	716	3336	0	692	3329	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			65			65		7			12	
Link Speed (mph)		30			25			35			35	
Link Distance (ft)		870			848			999			1323	
Travel Time (s)		19.8			23.1			19.5			25.8	
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)	47	111	37	16	47	26	26	663	21	26	616	32
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	158	37	0	63	26	26	684	0	26	648	0
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8		8	2			6		
Detector Phase	4	4	4	8	8	8	2	2		6	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	7.0	10.0	10.0		10.0	10.0	
Minimum Split (s)	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0		24.0	24.0	
Total Split (s)	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0		25.0	25.0	
Total Split (%)	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%		50.0%	50.0%	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0	6.0		6.0	6.0	6.0	6.0		6.0	6.0	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None	None	None	None	None	Min	Min		Min	Min	
Act Effct Green (s)		9.2	9.2		9.2	9.2	18.6	18.6		18.6	18.6	
Actuated g/C Ratio		0.26	0.26		0.26	0.26	0.52	0.52		0.52	0.52	
v/c Ratio		0.40	0.08		0.16	0.06	0.07	0.39		0.07	0.37	
Control Delay		14.8	2.6		12.0	1.6	7.8	8.4		7.9	8.2	
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay		14.8	2.6		12.0	1.6	7.8	8.4		7.9	8.2	
LOS		B	A		B	A	A	A		A	A	
Approach Delay		12.5			9.0			8.4			8.2	
Approach LOS		B			A			A			A	
Queue Length 50th (ft)		24	0		9	0	3	46		3	42	
Queue Length 95th (ft)		68	9		32	5	14	94		14	87	

Lanes, Volumes, Timings
 13: US 81 (5th Street SE) & 4th Avenue SE

12/29/2020



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		790			768			919				1243
Turn Bay Length (ft)			75			75	100			100		
Base Capacity (vph)		840	844		827	844	444	2072		429	2070	
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		0.19	0.04		0.08	0.03	0.06	0.33		0.06	0.31	

Intersection Summary

Area Type:	Other
Cycle Length:	50
Actuated Cycle Length:	35.7
Natural Cycle:	50
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.40
Intersection Signal Delay:	8.8
Intersection LOS:	A
Intersection Capacity Utilization	48.3%
ICU Level of Service	A
Analysis Period (min)	15

Splits and Phases: 13: US 81 (5th Street SE) & 4th Avenue SE



HCM 6th Signalized Intersection Summary
 13: US 81 (5th Street SE) & 4th Avenue SE

12/29/2020



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↖	↗		↖	↗	↖	↗		↖	↗	
Traffic Volume (veh/h)	45	105	35	15	45	25	25	630	20	25	585	30
Future Volume (veh/h)	45	105	35	15	45	25	25	630	20	25	585	30
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1772	1772	1772	1772	1772	1772	1772	1772	1772	1772	1772	1772
Adj Flow Rate, veh/h	47	111	37	16	47	26	26	663	21	26	616	32
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
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	235	297	328	203	326	328	429	1211	38	415	1184	61
Arrive On Green	0.22	0.22	0.22	0.22	0.22	0.22	0.36	0.36	0.36	0.36	0.36	0.36
Sat Flow, veh/h	329	1357	1502	207	1492	1502	829	3331	105	802	3256	169
Grp Volume(v), veh/h	158	0	37	63	0	26	26	335	349	26	318	330
Grp Sat Flow(s),veh/h/ln	1686	0	1502	1699	0	1502	829	1683	1753	802	1683	1742
Q Serve(g_s), s	0.2	0.0	0.6	0.0	0.0	0.4	0.7	4.5	4.5	0.8	4.3	4.3
Cycle Q Clear(g_c), s	2.2	0.0	0.6	0.8	0.0	0.4	5.0	4.5	4.5	5.3	4.3	4.3
Prop In Lane	0.30		1.00	0.25		1.00	1.00		0.06	1.00		0.10
Lane Grp Cap(c), veh/h	531	0	328	529	0	328	429	612	637	415	612	633
V/C Ratio(X)	0.30	0.00	0.11	0.12	0.00	0.08	0.06	0.55	0.55	0.06	0.52	0.52
Avail Cap(c_a), veh/h	1260	0	994	1250	0	994	676	1114	1160	655	1114	1152
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	9.6	0.0	9.0	9.1	0.0	8.9	9.1	7.3	7.3	9.4	7.2	7.2
Incr Delay (d2), s/veh	0.3	0.0	0.2	0.1	0.0	0.1	0.1	0.8	0.7	0.1	0.7	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.6	0.0	0.1	0.2	0.0	0.1	0.1	0.9	1.0	0.1	0.9	0.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	9.9	0.0	9.1	9.2	0.0	9.0	9.2	8.0	8.0	9.4	7.9	7.8
LnGrp LOS	A	A	A	A	A	A	A	A	A	A	A	A
Approach Vol, veh/h		195			89			710			674	
Approach Delay, s/veh		9.8			9.1			8.1			7.9	
Approach LOS		A			A			A			A	
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		16.4		12.3		16.4		12.3				
Change Period (Y+Rc), s		6.0		6.0		6.0		6.0				
Max Green Setting (Gmax), s		19.0		19.0		19.0		19.0				
Max Q Clear Time (g_c+I1), s		7.0		4.2		7.3		2.8				
Green Ext Time (p_c), s		3.4		0.8		3.1		0.3				
Intersection Summary												
HCM 6th Ctrl Delay			8.3									
HCM 6th LOS			A									

Lanes, Volumes, Timings
 37: US 81 (5th Street SE) & 20th Avenue SE

01/22/2021



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (vph)	140	145	95	70	175	75	40	165	85	40	130	105
Future Volume (vph)	140	145	95	70	175	75	40	165	85	40	130	105
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Util. 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
Frt		0.966			0.968			0.961			0.949	
Flt Protected		0.982			0.989			0.993			0.993	
Satd. Flow (prot)	0	1674	0	0	1689	0	0	1684	0	0	1663	0
Flt Permitted		0.982			0.989			0.993			0.993	
Satd. Flow (perm)	0	1674	0	0	1689	0	0	1684	0	0	1663	0
Link Speed (mph)		40			50			65			45	
Link Distance (ft)		2250			2754			1476			1428	
Travel Time (s)		38.4			37.6			15.5			21.6	
Peak Hour Factor	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77
Adj. Flow (vph)	182	188	123	91	227	97	52	214	110	52	169	136
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	493	0	0	415	0	0	376	0	0	357	0
Sign Control		Yield			Yield			Yield			Yield	

Intersection Summary

Area Type:	Other
Control Type:	Roundabout
Intersection Capacity Utilization	66.6%
ICU Level of Service	C
Analysis Period (min)	15

HCM 6th Roundabout
 37: US 81 (5th Street SE) & 20th Avenue SE

01/22/2021

Intersection				
Intersection Delay, s/veh	9.6			
Intersection LOS	A			
Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	493	415	376	357
Demand Flow Rate, veh/h	503	424	383	364
Vehicles Circulating, veh/h	318	457	431	378
Vehicles Exiting, veh/h	424	357	390	503
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	9.9	10.7	9.4	8.3
Approach LOS	A	B	A	A
Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976	4.976
Entry Flow, veh/h	503	424	383	364
Cap Entry Lane, veh/h	998	866	889	938
Entry HV Adj Factor	0.981	0.980	0.981	0.980
Flow Entry, veh/h	493	415	376	357
Cap Entry, veh/h	978	848	872	919
V/C Ratio	0.504	0.490	0.431	0.388
Control Delay, s/veh	9.9	10.7	9.4	8.3
LOS	A	B	A	A
95th %tile Queue, veh	3	3	2	2

Lanes, Volumes, Timings
 9: 1st Ave NE & 13th St NE (NB)

12/09/2020



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	45	215	210	45	35	40
Future Volume (vph)	45	215	210	45	35	40
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Storage Length (ft)	0			0	70	0
Storage Lanes	0			0	1	1
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.976			0.850
Flt Protected		0.991			0.950	
Satd. Flow (prot)	0	1755	1728	0	1710	1530
Flt Permitted		0.991			0.950	
Satd. Flow (perm)	0	1755	1728	0	1710	1530
Link Speed (mph)		25	25		25	
Link Distance (ft)		791	278		1006	
Travel Time (s)		21.6	7.6		27.4	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	0%	2%	2%	0%	0%	0%
Adj. Flow (vph)	51	244	239	51	40	45
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	295	290	0	40	45
Sign Control		Stop	Stop		Stop	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	42.5%
ICU Level of Service	A
Analysis Period (min)	15

Intersection	
Intersection Delay, s/veh	9.8
Intersection LOS	A

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↕		↕	↕
Traffic Vol, veh/h	45	215	210	45	35	40
Future Vol, veh/h	45	215	210	45	35	40
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles, %	0	2	2	0	0	0
Mvmt Flow	51	244	239	51	40	45
Number of Lanes	0	1	1	0	1	1

Approach	EB	WB	SB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left	SB		WB
Conflicting Lanes Left	2	0	1
Conflicting Approach Right		SB	EB
Conflicting Lanes Right	0	2	1
HCM Control Delay	10.1	9.8	8.8
HCM LOS	B	A	A

Lane	EBLn1	WBLn1	SBLn1	SBLn2
Vol Left, %	17%	0%	100%	0%
Vol Thru, %	83%	82%	0%	0%
Vol Right, %	0%	18%	0%	100%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	260	255	35	40
LT Vol	45	0	35	0
Through Vol	215	210	0	0
RT Vol	0	45	0	40
Lane Flow Rate	295	290	40	45
Geometry Grp	2	2	7	7
Degree of Util (X)	0.367	0.352	0.069	0.064
Departure Headway (Hd)	4.473	4.379	6.28	5.067
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	804	823	570	705
Service Time	2.499	2.405	4.028	2.815
HCM Lane V/C Ratio	0.367	0.352	0.07	0.064
HCM Control Delay	10.1	9.8	9.5	8.2
HCM Lane LOS	B	A	A	A
HCM 95th-tile Q	1.7	1.6	0.2	0.2

Lanes, Volumes, Timings
 4: 13th St NE (SB) & 1st Ave NE

12/09/2020



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	235	15	10	225	30	10
Future Volume (vph)	235	15	10	225	30	10
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.992			0.966		
Flt Protected				0.998	0.964	
Satd. Flow (prot)	1745	0	0	1763	1627	0
Flt Permitted				0.998	0.964	
Satd. Flow (perm)	1745	0	0	1763	1627	0
Link Speed (mph)	25			25	25	
Link Distance (ft)	278			1819	482	
Travel Time (s)	7.6			49.6	13.1	
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84
Heavy Vehicles (%)	2%	7%	0%	2%	4%	0%
Adj. Flow (vph)	280	18	12	268	36	12
Shared Lane Traffic (%)						
Lane Group Flow (vph)	298	0	0	280	48	0
Sign Control	Free			Free	Stop	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	31.1% ICU Level of Service A
Analysis Period (min)	15

Intersection						
Int Delay, s/veh	1.1					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	235	15	10	225	30	10
Future Vol, veh/h	235	15	10	225	30	10
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	84	84	84	84	84	84
Heavy Vehicles, %	2	7	0	2	4	0
Mvmt Flow	280	18	12	268	36	12

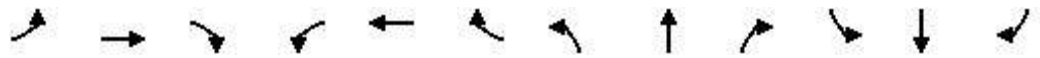
Major/Minor	Major1	Major2	Minor1		
Conflicting Flow All	0	0	298	0	581
Stage 1	-	-	-	-	289
Stage 2	-	-	-	-	292
Critical Hdwy	-	-	4.1	-	6.44
Critical Hdwy Stg 1	-	-	-	-	5.44
Critical Hdwy Stg 2	-	-	-	-	5.44
Follow-up Hdwy	-	-	2.2	-	3.536
Pot Cap-1 Maneuver	-	-	1275	-	473
Stage 1	-	-	-	-	756
Stage 2	-	-	-	-	753
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1275	-	468
Mov Cap-2 Maneuver	-	-	-	-	468
Stage 1	-	-	-	-	756
Stage 2	-	-	-	-	745

Approach	EB	WB	NB
HCM Control Delay, s	0	0.3	12.7
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	517	-	-	1275	-
HCM Lane V/C Ratio	0.092	-	-	0.009	-
HCM Control Delay (s)	12.7	-	-	7.8	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.3	-	-	0	-

Lanes, Volumes, Timings
 2: 19th St NE & 1st Ave NE/Willow Creek Dr

12/09/2020



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	75	110	60	20	125	240	45	295	15	135	240	65
Future Volume (vph)	75	110	60	20	125	240	45	295	15	135	240	65
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (ft)	215		215	145		0	150		0	150		0
Storage Lanes	1		1	1		1	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. 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
Frt			0.850			0.850		0.993			0.968	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1693	1782	1530	1710	1782	1515	1629	1771	0	1693	1722	0
Flt Permitted	0.671			0.681			0.562			0.348		
Satd. Flow (perm)	1196	1782	1530	1226	1782	1515	963	1771	0	620	1722	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			164			258		4			33	
Link Speed (mph)		25			45			35			35	
Link Distance (ft)		1819			1221			1427			5295	
Travel Time (s)		49.6			18.5			27.8			103.1	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	1%	1%	0%	0%	1%	1%	5%	1%	0%	1%	1%	2%
Adj. Flow (vph)	81	118	65	22	134	258	48	317	16	145	258	70
Shared Lane Traffic (%)												
Lane Group Flow (vph)	81	118	65	22	134	258	48	333	0	145	328	0
Turn Type	Perm	NA	Perm	Perm	NA	pt+ov	Perm	NA		pm+pt	NA	
Protected Phases		4			8	8 1		2		1	6	
Permitted Phases	4		4	8			2			6		
Detector Phase	4	4	4	8	8	8 1	2	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0		7.0	7.0		5.0	7.0	
Minimum Split (s)	24.0	24.0	24.0	24.0	24.0		24.0	24.0		11.0	24.0	
Total Split (s)	24.0	24.0	24.0	24.0	24.0		25.0	25.0		11.0	36.0	
Total Split (%)	40.0%	40.0%	40.0%	40.0%	40.0%		41.7%	41.7%		18.3%	60.0%	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	
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)	6.0	6.0	6.0	6.0	6.0		6.0	6.0		6.0	6.0	
Lead/Lag							Lag	Lag		Lead		
Lead-Lag Optimize?							Yes	Yes		Yes		
Recall Mode	None	None	None	None	None		Min	Min		None	Min	
Act Effct Green (s)	9.3	9.3	9.3	9.3	9.3	20.5	13.3	13.3		24.5	24.5	
Actuated g/C Ratio	0.20	0.20	0.20	0.20	0.20	0.44	0.29	0.29		0.53	0.53	
v/c Ratio	0.33	0.33	0.15	0.09	0.37	0.32	0.17	0.65		0.32	0.35	
Control Delay	20.9	19.3	0.7	16.9	20.0	2.8	14.2	20.9		7.9	7.0	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	20.9	19.3	0.7	16.9	20.0	2.8	14.2	20.9		7.9	7.0	
LOS	C	B	A	B	C	A	B	C		A	A	
Approach Delay		15.2			9.1			20.0			7.3	
Approach LOS		B			A			C			A	
Queue Length 50th (ft)	18	27	0	5	31	0	9	72		16	37	

Lanes, Volumes, Timings
 2: 19th St NE & 1st Ave NE/Willow Creek Dr

12/09/2020

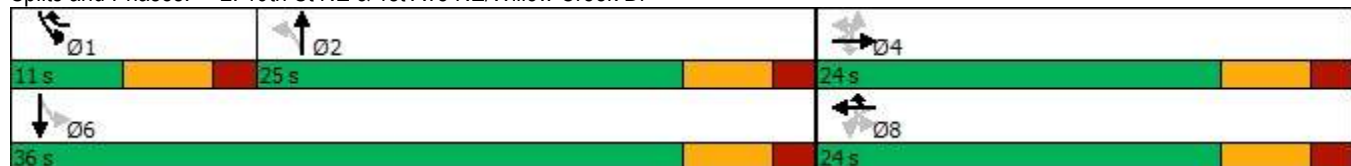


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 95th (ft)	53	68	0	20	76	32	31	155		45	91	
Internal Link Dist (ft)		1739			1141			1347			5215	
Turn Bay Length (ft)	215		215	145			150			150		
Base Capacity (vph)	475	708	706	487	708	810	403	745		448	1152	
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Reduced v/c Ratio	0.17	0.17	0.09	0.05	0.19	0.32	0.12	0.45		0.32	0.28	

Intersection Summary

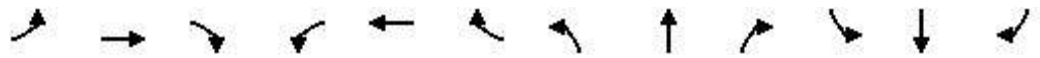
Area Type:	Other
Cycle Length:	60
Actuated Cycle Length:	46.1
Natural Cycle:	60
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.65
Intersection Signal Delay:	12.3
Intersection LOS:	B
Intersection Capacity Utilization	58.0%
ICU Level of Service	B
Analysis Period (min)	15

Splits and Phases: 2: 19th St NE & 1st Ave NE/Willow Creek Dr



HCM 6th Signalized Intersection Summary
 2: 19th St NE & 1st Ave NE/Willow Creek Dr

12/09/2020



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	75	110	60	20	125	240	45	295	15	135	240	65
Future Volume (veh/h)	75	110	60	20	125	240	45	295	15	135	240	65
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1786	1786	1800	1800	1786	1786	1730	1786	1800	1786	1786	1772
Adj Flow Rate, veh/h	81	118	65	22	134	258	48	317	16	145	258	70
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	1	1	0	0	1	1	5	1	0	1	1	2
Cap, veh/h	325	387	331	369	387	475	435	431	22	426	672	182
Arrive On Green	0.22	0.22	0.22	0.22	0.22	0.22	0.26	0.26	0.26	0.10	0.50	0.50
Sat Flow, veh/h	1000	1786	1525	1220	1786	1514	1027	1686	85	1701	1353	367
Grp Volume(v), veh/h	81	118	65	22	134	258	48	0	333	145	0	328
Grp Sat Flow(s),veh/h/ln	1000	1786	1525	1220	1786	1514	1027	0	1771	1701	0	1720
Q Serve(g_s), s	3.1	2.3	1.5	0.6	2.7	5.9	1.5	0.0	7.2	2.3	0.0	5.0
Cycle Q Clear(g_c), s	5.8	2.3	1.5	3.0	2.7	5.9	1.5	0.0	7.2	2.3	0.0	5.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.05	1.00		0.21
Lane Grp Cap(c), veh/h	325	387	331	369	387	475	435	0	453	426	0	854
V/C Ratio(X)	0.25	0.30	0.20	0.06	0.35	0.54	0.11	0.00	0.74	0.34	0.00	0.38
Avail Cap(c_a), veh/h	539	769	656	630	769	799	639	0	804	463	0	1234
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	16.3	13.7	13.4	15.0	13.9	11.9	12.2	0.0	14.3	9.4	0.0	6.6
Incr Delay (d2), s/veh	0.4	0.4	0.3	0.1	0.5	1.0	0.1	0.0	2.3	0.5	0.0	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.7	0.9	0.5	0.1	0.9	1.5	0.3	0.0	2.6	0.7	0.0	1.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	16.7	14.2	13.7	15.0	14.4	12.8	12.3	0.0	16.6	9.9	0.0	6.8
LnGrp LOS	B	B	B	B	B	B	B	A	B	A	A	A
Approach Vol, veh/h		264			414			381				473
Approach Delay, s/veh		14.8			13.5			16.1				7.8
Approach LOS		B			B			B				A
Timer - Assigned Phs	1	2		4		6		8				
Phs Duration (G+Y+Rc), s	10.1	16.7		15.1		26.8		15.1				
Change Period (Y+Rc), s	6.0	6.0		6.0		6.0		6.0				
Max Green Setting (Gmax), s	5.0	19.0		18.0		30.0		18.0				
Max Q Clear Time (g_c+I1), s	4.3	9.2		7.8		7.0		7.9				
Green Ext Time (p_c), s	0.0	1.5		0.9		1.9		1.2				

Intersection Summary

HCM 6th Ctrl Delay	12.6
HCM 6th LOS	B

Lanes, Volumes, Timings

14: Willow Creek Dr/Willow Creek Dr & 8th Avenue SE

12/09/2020



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	1	5	1	380	260	1
Future Volume (vph)	1	5	1	380	260	1
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Util. Factor	1.00	1.00	0.95	0.95	0.95	0.95
Fr _t	0.884				0.999	
Fl _t Protected	0.993					
Satd. Flow (prot)	1580	0	0	3386	3383	0
Fl _t Permitted	0.993					
Satd. Flow (perm)	1580	0	0	3386	3383	0
Link Speed (mph)	30			35	45	
Link Distance (ft)	233			583	1620	
Travel Time (s)	5.3			11.4	24.5	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	0%	0%	0%	1%	1%	0%
Adj. Flow (vph)	1	6	1	422	289	1
Shared Lane Traffic (%)						
Lane Group Flow (vph)	7	0	0	423	290	0
Sign Control	Stop			Free	Free	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	21.8%
ICU Level of Service	A
Analysis Period (min)	15

Intersection						
Int Delay, s/veh	0.1					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	T			T		
Traffic Vol, veh/h	1	5	1	380	260	1
Future Vol, veh/h	1	5	1	380	260	1
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	0	0	0	1	1	0
Mvmt Flow	1	6	1	422	289	1



















Major/Minor	Minor2	Major1		Major2	
Conflicting Flow All	503	145	290	0	0
Stage 1	290	-	-	-	-
Stage 2	213	-	-	-	-
Critical Hdwy	6.8	6.9	4.1	-	-
Critical Hdwy Stg 1	5.8	-	-	-	-
Critical Hdwy Stg 2	5.8	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-
Pot Cap-1 Maneuver	503	882	1283	-	-
Stage 1	740	-	-	-	-
Stage 2	808	-	-	-	-
Platoon blocked, %				-	-
Mov Cap-1 Maneuver	502	882	1283	-	-
Mov Cap-2 Maneuver	502	-	-	-	-
Stage 1	739	-	-	-	-
Stage 2	808	-	-	-	-

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

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1283	-	783	-	-
HCM Lane V/C Ratio	0.001	-	0.009	-	-
HCM Control Delay (s)	7.8	0	9.6	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	0	-	-

Lanes, Volumes, Timings
13: 29th St SE & 15th Ave SE

12/09/2020

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	1	10	85	5	150	5	135	15	20	130	5
Future Volume (vph)	10	1	10	85	5	150	5	135	15	20	130	5
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (ft)	0		0	0		0	150		0	150		0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. 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
Frt		0.935			0.916			0.985			0.995	
Flt Protected		0.976			0.983		0.950			0.950		
Satd. Flow (prot)	0	1517	0	0	1621	0	1024	1587	0	1710	1652	0
Flt Permitted		0.976			0.983		0.950			0.950		
Satd. Flow (perm)	0	1517	0	0	1621	0	1024	1587	0	1710	1652	0
Link Speed (mph)		25			25			50			40	
Link Distance (ft)		1149			1233			937			1680	
Travel Time (s)		31.3			33.6			12.8			28.6	
Peak Hour Factor	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69
Heavy Vehicles (%)	0%	100%	10%	0%	0%	0%	67%	13%	0%	0%	8%	20%
Adj. Flow (vph)	14	1	14	123	7	217	7	196	22	29	188	7
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	29	0	0	347	0	7	218	0	29	195	0
Sign Control		Stop			Stop			Free			Free	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	39.1%
ICU Level of Service	A
Analysis Period (min)	15

Intersection												
Int Delay, s/veh	7.8											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔		↗	↘		↗	↘	
Traffic Vol, veh/h	10	1	10	85	5	150	5	135	15	20	130	5
Future Vol, veh/h	10	1	10	85	5	150	5	135	15	20	130	5
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	-	-	-	-	-	-	150	-	-	150	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	69	69	69	69	69	69	69	69	69	69	69	69
Heavy Vehicles, %	0	100	10	0	0	0	67	13	0	0	8	20
Mvmt Flow	14	1	14	123	7	217	7	196	22	29	188	7



















Major/Minor	Minor2		Minor1		Major1			Major2				
Conflicting Flow All	583	482	192	478	474	207	195	0	0	218	0	0
Stage 1	250	250	-	221	221	-	-	-	-	-	-	-
Stage 2	333	232	-	257	253	-	-	-	-	-	-	-
Critical Hdwy	7.1	7.5	6.3	7.1	6.5	6.2	4.77	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	6.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	6.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4.9	3.39	3.5	4	3.3	2.803	-	-	2.2	-	-
Pot Cap-1 Maneuver	427	367	830	501	492	839	1069	-	-	1364	-	-
Stage 1	759	552	-	786	724	-	-	-	-	-	-	-
Stage 2	685	564	-	752	701	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	306	357	830	480	478	839	1069	-	-	1364	-	-
Mov Cap-2 Maneuver	306	357	-	480	478	-	-	-	-	-	-	-
Stage 1	754	540	-	780	719	-	-	-	-	-	-	-
Stage 2	499	560	-	721	686	-	-	-	-	-	-	-

Approach	EB		WB		NB			SB		
HCM Control Delay, s	13.7		16.5		0.3			1		
HCM LOS	B		C							

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1069	-	-	442	655	1364	-	-
HCM Lane V/C Ratio	0.007	-	-	0.069	0.531	0.021	-	-
HCM Control Delay (s)	8.4	-	-	13.7	16.5	7.7	-	-
HCM Lane LOS	A	-	-	B	C	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.2	3.1	0.1	-	-

Lanes, Volumes, Timings
 6: 19th St NE/456th Ave (19th St NE) & 14th Ave NE

12/09/2020

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	1	220	1	1	1	205	60	1	1	55	20
Future Volume (vph)	15	1	220	1	1	1	205	60	1	1	55	20
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (ft)	0		0	150		0	130		0	0		0
Storage Lanes	0		0	1		0	1		0	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. 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
Frt		0.874			0.925			0.998				0.965
Flt Protected		0.997		0.950			0.950					0.999
Satd. Flow (prot)	0	1548	0	1710	1657	0	1693	1762	0	0	1691	0
Flt Permitted		0.997		0.950			0.950					0.999
Satd. Flow (perm)	0	1548	0	1710	1657	0	1693	1762	0	0	1691	0
Link Speed (mph)		35			25			35				55
Link Distance (ft)		2344			2504			8403				5196
Travel Time (s)		45.7			68.3			163.7				64.4
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Heavy Vehicles (%)	6%	0%	1%	0%	0%	1%	1%	2%	0%	100%	2%	0%
Adj. Flow (vph)	17	1	256	1	1	1	238	70	1	1	64	23
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	274	0	1	2	0	238	71	0	0	88	0
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	47.3%
ICU Level of Service	A
Analysis Period (min)	15

Intersection	
Intersection Delay, s/veh	11.6
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔		↔	↔		↔	↔			↔	
Traffic Vol, veh/h	15	1	220	1	1	1	205	60	1	1	55	20
Future Vol, veh/h	15	1	220	1	1	1	205	60	1	1	55	20
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Heavy Vehicles, %	6	0	1	0	0	1	1	2	0	100	2	0
Mvmt Flow	17	1	256	1	1	1	238	70	1	1	64	23
Number of Lanes	0	1	0	1	1	0	1	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	1	1	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	2	1	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	1	2	1
HCM Control Delay	11.6	8.8	11.6	11.9
HCM LOS	B	A	B	B

Lane	NBLn1	NBLn2	EBLn1	WBLn1	WBLn2	SBLn1
Vol Left, %	100%	0%	6%	100%	0%	1%
Vol Thru, %	0%	98%	0%	0%	50%	72%
Vol Right, %	0%	2%	93%	0%	50%	26%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	205	61	236	1	2	76
LT Vol	205	0	15	1	0	1
Through Vol	0	60	1	0	1	55
RT Vol	0	1	220	0	1	20
Lane Flow Rate	238	71	274	1	2	88
Geometry Grp	7	7	6	7	7	6
Degree of Util (X)	0.388	0.106	0.395	0.002	0.004	0.179
Departure Headway (Hd)	5.862	5.364	5.18	6.606	5.743	7.305
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	608	662	692	545	626	494
Service Time	3.649	3.151	3.241	4.31	3.447	5.305
HCM Lane V/C Ratio	0.391	0.107	0.396	0.002	0.003	0.178
HCM Control Delay	12.4	8.8	11.6	9.3	8.5	11.9
HCM Lane LOS	B	A	B	A	A	B
HCM 95th-tile Q	1.8	0.4	1.9	0	0	0.6

Lanes, Volumes, Timings
 3: 3rd Street NW & 1st Avenue NW

12/10/2020



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕		↖	↗			↕			↕	
Traffic Volume (vph)	15	130	2	25	130	40	5	70	20	35	50	15
Future Volume (vph)	15	130	2	25	130	40	5	70	20	35	50	15
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Util. 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
Fr _t		0.998			0.965			0.971			0.980	
Fl _t Protected		0.995		0.950				0.998			0.983	
Satd. Flow (prot)	0	1726	0	1629	1691	0	0	1722	0	0	1704	0
Fl _t Permitted		0.995		0.950				0.998			0.983	
Satd. Flow (perm)	0	1726	0	1629	1691	0	0	1722	0	0	1704	0
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		577			733			480			518	
Travel Time (s)		15.7			20.0			13.1			14.1	
Peak Hour Factor	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77
Heavy Vehicles (%)	0%	4%	0%	5%	2%	5%	0%	0%	6%	5%	0%	0%
Adj. Flow (vph)	19	169	3	32	169	52	6	91	26	45	65	19
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	191	0	32	221	0	0	123	0	0	129	0
Sign Control		Free			Free			Stop			Stop	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 39.7%

ICU Level of Service A

Analysis Period (min) 15

HCM 6th TWSC
3: 3rd Street NW & 1st Avenue NW

12/10/2020

Intersection												
Int Delay, s/veh	6.1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕		↕	↕			↕			↕	
Traffic Vol, veh/h	15	130	2	25	130	40	5	70	20	35	50	15
Future Vol, veh/h	15	130	2	25	130	40	5	70	20	35	50	15
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	77	77	77	77	77	77	77	77	77	77	77	77
Heavy Vehicles, %	0	4	0	5	2	5	0	0	6	5	0	0
Mvmt Flow	19	169	3	32	169	52	6	91	26	45	65	19

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	221	0	0	172	0	0	510	494	171	526	469	195
Stage 1	-	-	-	-	-	-	209	209	-	259	259	-
Stage 2	-	-	-	-	-	-	301	285	-	267	210	-
Critical Hdwy	4.1	-	-	4.15	-	-	7.1	6.5	6.26	7.15	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.15	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.15	5.5	-
Follow-up Hdwy	2.2	-	-	2.245	-	-	3.5	4	3.354	3.545	4	3.3
Pot Cap-1 Maneuver	1360	-	-	1387	-	-	477	479	862	458	495	851
Stage 1	-	-	-	-	-	-	798	733	-	739	697	-
Stage 2	-	-	-	-	-	-	712	679	-	732	732	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1360	-	-	1387	-	-	405	461	862	366	476	851
Mov Cap-2 Maneuver	-	-	-	-	-	-	405	461	-	366	476	-
Stage 1	-	-	-	-	-	-	786	722	-	728	681	-
Stage 2	-	-	-	-	-	-	615	663	-	611	721	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.8	1	14.4	15.9
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	507	1360	-	-	1387	-	-	458
HCM Lane V/C Ratio	0.243	0.014	-	-	0.023	-	-	0.284
HCM Control Delay (s)	14.4	7.7	0	-	7.7	-	-	15.9
HCM Lane LOS	B	A	A	-	A	-	-	C
HCM 95th %tile Q(veh)	0.9	0	-	-	0.1	-	-	1.2

Lanes, Volumes, Timings

4: 3rd Street NW & W Kemp Avenue/Kemp Avenue

12/10/2020



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↗		↕	↗		↕			↕	
Traffic Volume (vph)	10	35	20	15	45	15	25	70	10	10	60	5
Future Volume (vph)	10	35	20	15	45	15	25	70	10	10	60	5
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (ft)	0		250	0		250	0		0	0		0
Storage Lanes	0		1	0		1	0		0	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. 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
Frt			0.850			0.850		0.987			0.991	
Flt Protected		0.989			0.988			0.988			0.993	
Satd. Flow (prot)	0	1780	1530	0	1778	1530	0	1755	0	0	1771	0
Flt Permitted		0.989			0.988			0.988			0.993	
Satd. Flow (perm)	0	1780	1530	0	1778	1530	0	1755	0	0	1771	0
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		765			2317			386			480	
Travel Time (s)		20.9			63.2			10.5			13.1	
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	12	42	24	18	54	18	30	84	12	12	72	6
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	54	24	0	72	18	0	126	0	0	90	0
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	26.8%
ICU Level of Service	A
Analysis Period (min)	15

HCM 6th AWSC
 4: 3rd Street NW & W Kemp Avenue/Kemp Avenue

12/10/2020

Intersection	
Intersection Delay, s/veh	8.1
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↕		↕	↕		↕			↕	
Traffic Vol, veh/h	10	35	20	15	45	15	25	70	10	10	60	5
Future Vol, veh/h	10	35	20	15	45	15	25	70	10	10	60	5
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	12	42	24	18	54	18	30	84	12	12	72	6
Number of Lanes	0	1	1	0	1	1	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	2	2
HCM Control Delay	8	8.2	8.2	8
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1
Vol Left, %	24%	22%	0%	25%	0%	13%
Vol Thru, %	67%	78%	0%	75%	0%	80%
Vol Right, %	10%	0%	100%	0%	100%	7%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	105	45	20	60	15	75
LT Vol	25	10	0	15	0	10
Through Vol	70	35	0	45	0	60
RT Vol	10	0	20	0	15	5
Lane Flow Rate	127	54	24	72	18	90
Geometry Grp	2	7	7	7	7	2
Degree of Util (X)	0.155	0.078	0.029	0.104	0.022	0.112
Departure Headway (Hd)	4.408	5.197	4.381	5.198	4.368	4.444
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	815	690	817	690	820	808
Service Time	2.426	2.922	2.106	2.922	2.092	2.463
HCM Lane V/C Ratio	0.156	0.078	0.029	0.104	0.022	0.111
HCM Control Delay	8.2	8.4	7.2	8.5	7.2	8
HCM Lane LOS	A	A	A	A	A	A
HCM 95th-tile Q	0.5	0.3	0.1	0.3	0.1	0.4

Lanes, Volumes, Timings
 5: N Maple Street & 10th Avenue NW

12/10/2020



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (vph)	20	250	15	5	140	5	20	35	15	5	25	5
Future Volume (vph)	20	250	15	5	140	5	20	35	15	5	25	5
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Util. 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
Frt		0.993			0.996			0.972			0.982	
Flt Protected		0.996			0.998			0.986			0.993	
Satd. Flow (prot)	0	1765	0	0	1773	0	0	1725	0	0	1755	0
Flt Permitted		0.996			0.998			0.986			0.993	
Satd. Flow (perm)	0	1765	0	0	1773	0	0	1725	0	0	1755	0
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		1515			1128			1396			2664	
Travel Time (s)		41.3			30.8			38.1			72.7	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	0%	1%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	22	269	16	5	151	5	22	38	16	5	27	5
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	307	0	0	161	0	0	76	0	0	37	0
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	37.9%
ICU Level of Service	A
Analysis Period (min)	15

Intersection	
Intersection Delay, s/veh	9.3
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	20	250	15	5	140	5	20	35	15	5	25	5
Future Vol, veh/h	20	250	15	5	140	5	20	35	15	5	25	5
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles, %	0	1	0	0	1	0	0	0	0	0	0	0
Mvmt Flow	22	269	16	5	151	5	22	38	16	5	27	5
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	9.9	8.7	8.5	8.3
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	29%	7%	3%	14%
Vol Thru, %	50%	88%	93%	71%
Vol Right, %	21%	5%	3%	14%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	70	285	150	35
LT Vol	20	20	5	5
Through Vol	35	250	140	25
RT Vol	15	15	5	5
Lane Flow Rate	75	306	161	38
Geometry Grp	1	1	1	1
Degree of Util (X)	0.103	0.369	0.201	0.052
Departure Headway (Hd)	4.918	4.34	4.492	4.987
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	728	830	798	717
Service Time	2.954	2.364	2.521	3.027
HCM Lane V/C Ratio	0.103	0.369	0.202	0.053
HCM Control Delay	8.5	9.9	8.7	8.3
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.3	1.7	0.7	0.2

Lanes, Volumes, Timings
6: 2nd Street NW & 10th Avenue NW

12/10/2020



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (vph)	1	265	5	10	155	5	5	1	10	2	1	1
Future Volume (vph)	1	265	5	10	155	5	5	1	10	2	1	1
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Util. 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
Fr _t		0.998			0.996			0.913			0.966	
Fl _t Protected					0.997			0.986			0.976	
Satd. Flow (prot)	0	1796	0	0	1775	0	0	1620	0	0	1457	0
Fl _t Permitted					0.997			0.986			0.976	
Satd. Flow (perm)	0	1796	0	0	1775	0	0	1620	0	0	1457	0
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		1128			1515			1440			909	
Travel Time (s)		30.8			41.3			39.3			24.8	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	0%	0%	0%	0%	0%	25%	0%	0%	0%	33%	0%	0%
Adj. Flow (vph)	1	291	5	11	170	5	5	1	11	2	1	1
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	297	0	0	186	0	0	17	0	0	4	0
Sign Control		Free			Free			Stop			Stop	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	26.8%
ICU Level of Service	A
Analysis Period (min)	15

HCM 6th TWSC
6: 2nd Street NW & 10th Avenue NW

12/10/2020

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	1	265	5	10	155	5	5	1	10	2	1	1
Future Vol, veh/h	1	265	5	10	155	5	5	1	10	2	1	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	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	91	91	91	91	91	91	91	91	91	91	91	91
Heavy Vehicles, %	0	0	0	0	0	25	0	0	0	33	0	0
Mvmt Flow	1	291	5	11	170	5	5	1	11	2	1	1

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	175	0	0	296	0	0	492	493	294	497	493	173
Stage 1	-	-	-	-	-	-	296	296	-	195	195	-
Stage 2	-	-	-	-	-	-	196	197	-	302	298	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.43	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.43	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.43	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.797	4	3.3
Pot Cap-1 Maneuver	1414	-	-	1277	-	-	490	480	750	437	480	876
Stage 1	-	-	-	-	-	-	717	672	-	740	743	-
Stage 2	-	-	-	-	-	-	810	742	-	646	671	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1414	-	-	1277	-	-	485	475	750	426	475	876
Mov Cap-2 Maneuver	-	-	-	-	-	-	485	475	-	426	475	-
Stage 1	-	-	-	-	-	-	716	671	-	739	736	-
Stage 2	-	-	-	-	-	-	800	735	-	635	670	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	0			0.5			11			12.2		
HCM LOS							B			B		

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	621	1414	-	-	1277	-	-	504
HCM Lane V/C Ratio	0.028	0.001	-	-	0.009	-	-	0.009
HCM Control Delay (s)	11	7.5	0	-	7.8	0	-	12.2
HCM Lane LOS	B	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.1	0	-	-	0	-	-	0

Lanes, Volumes, Timings

3: N Maple Street & 14th Avenue NW/14th Avenue NE

12/10/2020



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (vph)	5	240	10	10	320	5	5	15	15	10	10	10
Future Volume (vph)	5	240	10	10	320	5	5	15	15	10	10	10
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Util. 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
Frt		0.995			0.998			0.943			0.955	
Flt Protected		0.999			0.999			0.993			0.984	
Satd. Flow (prot)	0	1773	0	0	1722	0	0	1686	0	0	1691	0
Flt Permitted		0.999			0.999			0.993			0.984	
Satd. Flow (perm)	0	1773	0	0	1722	0	0	1686	0	0	1691	0
Link Speed (mph)		35			35			25			25	
Link Distance (ft)		5564			5965			2664			2577	
Travel Time (s)		108.4			116.2			72.7			70.3	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Heavy Vehicles (%)	0%	1%	0%	0%	4%	25%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	6	270	11	11	360	6	6	17	17	11	11	11
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	287	0	0	377	0	0	40	0	0	33	0
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	33.7%
ICU Level of Service	A
Analysis Period (min)	15

HCM 6th AWSC
 3: N Maple Street & 14th Avenue NW/14th Avenue NE

12/10/2020

Intersection	
Intersection Delay, s/veh	10.4
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Vol, veh/h	5	240	10	10	320	5	5	15	15	10	10	10
Future Vol, veh/h	5	240	10	10	320	5	5	15	15	10	10	10
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Heavy Vehicles, %	0	1	0	0	4	25	0	0	0	0	0	0
Mvmt Flow	6	270	11	11	360	6	6	17	17	11	11	11
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	9.9	11.1	8.5	8.6
HCM LOS	A	B	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	14%	2%	3%	33%
Vol Thru, %	43%	94%	96%	33%
Vol Right, %	43%	4%	1%	33%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	35	255	335	30
LT Vol	5	5	10	10
Through Vol	15	240	320	10
RT Vol	15	10	5	10
Lane Flow Rate	39	287	376	34
Geometry Grp	1	1	1	1
Degree of Util (X)	0.056	0.355	0.459	0.049
Departure Headway (Hd)	5.165	4.46	4.388	5.269
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	691	805	821	677
Service Time	3.217	2.488	2.414	3.323
HCM Lane V/C Ratio	0.056	0.357	0.458	0.05
HCM Control Delay	8.5	9.9	11.1	8.6
HCM Lane LOS	A	A	B	A
HCM 95th-tile Q	0.2	1.6	2.4	0.2

Lanes, Volumes, Timings
 3: S Lake Dr & 4th Ave SW

12/10/2020



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↔	↔		↔	
Traffic Volume (vph)	5	20	20	5	2	10
Future Volume (vph)	5	20	20	5	2	10
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width (ft)	10	10	10	10	10	10
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.973		0.884	
Flt Protected		0.990			0.993	
Satd. Flow (prot)	0	1341	1635	0	1181	0
Flt Permitted		0.990			0.993	
Satd. Flow (perm)	0	1341	1635	0	1181	0
Link Speed (mph)		30	30		30	
Link Distance (ft)		250	315		248	
Travel Time (s)		5.7	7.2		5.6	
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83
Heavy Vehicles (%)	100%	5%	0%	0%	0%	29%
Adj. Flow (vph)	6	24	24	6	2	12
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	30	30	0	14	0
Sign Control		Free	Free		Stop	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	15.7%
Analysis Period (min)	15
	ICU Level of Service A

Intersection						
Int Delay, s/veh	2.3					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		4	1		2	
Traffic Vol, veh/h	5	20	20	5	2	10
Future Vol, veh/h	5	20	20	5	2	10
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	83	83	83	83	83	83
Heavy Vehicles, %	100	5	0	0	0	29
Mvmt Flow	6	24	24	6	2	12
Major/Minor	Major1	Major2	Minor2			
Conflicting Flow All	30	0	-	0	63	27
Stage 1	-	-	-	-	27	-
Stage 2	-	-	-	-	36	-
Critical Hdwy	5.1	-	-	-	6.4	6.49
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	3.1	-	-	-	3.5	3.561
Pot Cap-1 Maneuver	1127	-	-	-	948	976
Stage 1	-	-	-	-	1001	-
Stage 2	-	-	-	-	992	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1127	-	-	-	943	976
Mov Cap-2 Maneuver	-	-	-	-	943	-
Stage 1	-	-	-	-	996	-
Stage 2	-	-	-	-	992	-
Approach	EB	WB	SB			
HCM Control Delay, s	1.6	0	8.8			
HCM LOS			A			
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	1127	-	-	-	970	
HCM Lane V/C Ratio	0.005	-	-	-	0.015	
HCM Control Delay (s)	8.2	0	-	-	8.8	
HCM Lane LOS	A	A	-	-	A	
HCM 95th %tile Q(veh)	0	-	-	-	0	