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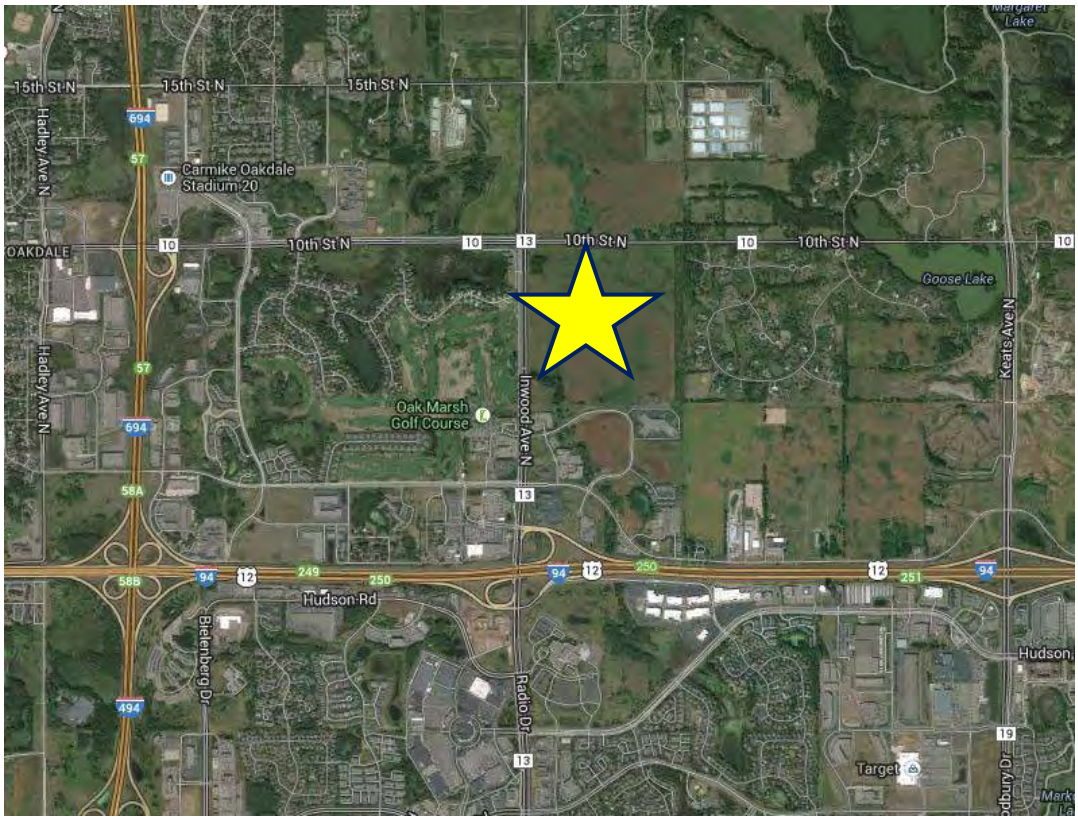

Traffic Impact Study

Inwood Creek
Lake Elmo, MN

I hereby certify that this report was prepared by me or under my direct supervision, and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.

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Date: July 8, 2014

Executive Summary

Background: Hans Hagen Homes is proposing to develop the plot of land on the southeast corner of the CSAH 13 & CSAH 10 intersection in Lake Elmo, MN. The development will consist of a mix of residential and commercial uses. This study analyzed the potential traffic impacts of the built out development on key intersections surrounding the site.

Results: The traffic impacts of the proposed development on the study intersections were analyzed in the 2019 build-out conditions. The principal findings are that all study intersections will operate acceptably through the 2019 build-out condition except the CSAH 13/Eagle Point Boulevard and CSAH 13/5th Street intersections.

Recommendations:

i. The CSAH 13/5th Street intersection will likely need a signal before the development is fully built and occupied and should be monitored as construction occurs to determine when a signal should be installed.
ii. The CSAH 13/5th Street intersection should be built with an exclusive southbound left turn lane, a northbound right turn lane, a westbound left turn lane and a westbound right turn lane.
iii. The traffic signal at the CSAH 13/5th Street intersection as well as alternate routes should allow the CSAH 13/Eagle Point Boulevard intersection to operate acceptably. The County should monitor the intersection, however, in case the traffic balancing does not occur and a traffic signal is needed at the intersection. The need for improvements to the CSAH 13/Eagle Point Boulevard intersection are not due to the proposed development.
iv. The site access at CSAH 13/9th Street and the CSAH 10/Western Site Access should be built as ¾ intersections with vehicles exiting the development only able to make right turns.
v. The Eastern Site Access on CSAH 10 should be built as a full access intersection.

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a. Purpose of Study

Hans Hagen Homes is proposing to develop the plot of land on the southeast corner of the CSAH 13 & CSAH 10 intersection in Lake Elmo, MN. The development will consist of a mix of residential and commercial uses. The purpose of this study is to determine if improvements are needed to nearby intersections that may be impacted by traffic from the built out development.

b. Study Objectives

The objectives of this study are:

i. Document how the study intersections currently operate.
ii. Forecast the amount of traffic expected to be generated by the proposed development.
iii. Determine how the study intersections will operate in the year 2019 with no development traffic.
iv. Determine how the study intersections will operate in the year 2019 with development traffic.
v. Determine how the surrounding roadways will operate in the year 2030 with development traffic added.
vi. Recommend improvements, if needed.

The study intersections are:

i. CSAH 13 & I-94 Southern Ramp
ii. CSAH 13 & I-94 Northern Ramp
iii. CSAH 13 & Hudson Boulevard
iv. CSAH 13 & Eagle Point Road
v. CSAH 13 & 5th Street Access Road
vi. CSAH 13 & 9th Street
vii. CSAH 13 & CSAH 10
viii. CSAH 10 & Western Site Access Road
ix. CSAH 10 & Eastern Site Access Road
x. Eagle Point Road & Site Access Road

2. Proposed Development

a. Site Location

The site is located southeast of the CSAH 10/CSAH 13 intersection in Lake Elmo, Minnesota (see Figure 1 in the Appendix).

b. Land Use Intensity and Development Timing

The proposed site is planned to have a mix of residential and commercial uses. The residential uses are proposed to be 272 single family homes, 12 townhome units, 176 rental townhome units, 120 senior housing units in one building and 150 apartment units in two other buildings. The commercial uses are proposed to be a 6,000 square foot office, a 12,000 square foot pharmacy, a 2,000 square foot coffee/food shop, a 3,000 square foot gas station, a 5,000 square foot daycare, two 12,500 square foot retail buildings and a 20,000 square foot office showroom. In total, there are 730 residential units and 73,000 square feet of commercial space proposed. A conceptual site plan is shown in Figure 2 in the Appendix.

The development is planned to have access to CSAH 13 via a 9th Street extension as well as via 5th Street, which is to be constructed south of 9th Street. There are also two planned accesses from CSAH 10 and an access from Eagle Point Boulevard.

For the purposes of this study, the full development is anticipated to be built out by 2019.

3. Analysis of Existing Conditions

a. Transportation Network Characteristics

Washington County State Aid Highway 10, also known as 10th Street North, is a four lane, divided road that transitions to a two lane, undivided road east of CSAH 13. CSAH 10 has a 55 mph speed limit near the site.

Washington County State Aid Highway 13 (CSAH 13) is known as Radio Drive south of Interstate 94 and as Inwood Avenue north of Interstate 94. It is a four lane, divided road with a 55 mph speed limit north of Eagle Point Road and a 45 mph speed limit south.

Interstate 94 is a six lane, divided freeway with a 65 mph speed limit near the site. It is a major east-west corridor through the Twin Cities region.

Woodbury Lakes Road is east of CSAH 13 and lines up with the eastbound Interstate 94 ramps at CSAH 13. East of the ramps, it is a local, one lane, one-way eastbound road.

3rd Street North is west of CSAH 13 and lines up with the westbound Interstate 94 ramps at CSAH 13. It is a local, four lane, divided road with a 30 mph speed limit.

Hudson Boulevard is Lake Elmo Municipal State Aid Street 120 east of CSAH 13. East of the CSAH 13 intersection it is a two lane, undivided road with a 40 mph speed limit near the site. West of CSAH 13 it is known as 4th Street North and is Oakdale Municipal State Aid Street 239. There it is a partially divided, four lane road with a 40 mph speed limit that transitions to an undivided, two lane road further west.

Eagle Point Boulevard is Lake Elmo Municipal State Aid Street 112 east of CSAH 13. It is a two lane, undivided road with a 30 mph speed limit near the site. West of CSAH 13 it is a local City of Oakdale road known as Oak Marsh. It is a two lane, undivided road with a 30 mph speed limit.

9th Street North is a local City of Oakdale road. It is a two lane, undivided road with a 30 mph speed limit near the site.

Existing traffic control and travel lanes are shown in Figure 3 in the Appendix for each study intersection.

b. Traffic Volumes

Intersection video was collected at each of the study intersections under normal weekday conditions on Thursday, May 29, 2014 when there was clear weather. Using these videos, a turning movement count was collected from 6:00 a.m. to 7:00 p.m. at the CSAH 10/CSAH 13 intersection. Based on the peak hours for that intersection, turning movement counts were collected at each of the other existing study intersections from 6:45 to 8:45 a.m. and 4:15 to 6:15 p.m. The peak hours for each intersection were found to be:

- CSAH 13/I-94 Southern Ramp: 7:15 - 8:15 a.m. & 4:45 - 5:45 p.m.
- CSAH 13/I-94 Northern Ramp: 7:15 - 8:15 a.m. & 4:45 - 5:45 p.m.
- CSAH 13/Hudson Boulevard: 7:45 - 8:45 a.m. & 4:30 - 5:30 p.m.
- CSAH 13/Eagle Point Road: 7:15 - 8:15 a.m. & 4:30 - 5:30 p.m.
- CSAH 13/9th Street: 7:15 - 8:15 a.m. & 4:30 - 5:30 p.m.
- CSAH 13/CSAH 10: 7:15 - 8:15 a.m. & 4:45 - 5:45 p.m.

The turning movement count data from the counts are contained in fifteen minute intervals in the Appendix.

c. Level of Service

Source: City of San Jose, CA

An intersection capacity analysis was conducted for the existing intersections per the *Highway Capacity Manual, 2010*. Intersections are assigned a "Level of Service" letter grade for the peak hour of traffic based on the number of lanes at the intersection, traffic volumes, and traffic control. Level of Service A (LOS A) represents light traffic flow (free flow conditions) while Level of Service F (LOS F) represents heavy traffic flow (over capacity conditions). LOS D at intersections is typically considered acceptable in the Twin Cities region. Individual movements are also assigned LOS grades. One or more individual movements typically operate at LOS F when the overall intersection is operating acceptably at LOS D. The pictures on the left represent some of the LOS grades (from a signal controlled intersection in San Jose, CA). These LOS grades represent the overall intersection operation, not individual movements.

The LOS results for the existing study hours are shown in Table 1. These are based on the existing traffic control and lane configurations as shown in Figure 3 in the Appendix. The existing turning movement volumes from the Appendix were used in the LOS calculations. The LOS calculations were done in accordance with the *Highway Capacity Manual 2010* using VISTRO™ software. Signal timings were provided by Washington County except for the CSAH 13/CSAH 10 intersection which was estimated. The complete LOS calculations, which include grades for individual movements, are included in the Appendix.

Table 1 – Existing Peak Hour Level of Service (LOS)[1]

Intersection	A.M. Peak	P.M. Peak
CSAH 13 & Southern I-94 Ramp	B (d)	C (e)
CSAH 13 & Northern I-94 Ramp	C (d)	D (e)
CSAH 13 & Hudson Blvd	C (e)	C (e)
CSAH 13 & Eagle Point Blvd	A (d)	C (f)
CSAH 13 & 9th St	A (c)	A (d)
CSAH 13 & CSAH 10	B (c)	C (c)

[1]The first letter is the Level of Service for the intersection. The second letter (in parentheses) is the Level of Service for the worst operating movement.

The study intersections currently operate acceptably at LOS D or better. The eastbound and westbound left turns at the CSAH 13/Eagle Point Boulevard intersection operate at LOS F in the p.m. peak hour.

4. Projected Traffic

a. Site Traffic Forecasting

A trip generation analysis was performed for the development site based on the methods and rates published in the *ITE Trip Generation Manual, 9th Edition* and the *ITE Trip Generation Handbook, 2nd Edition*. The resultant trip generation is shown in Table A1 in the Appendix.

There are three different types of trips that will visit a development located in the proposed site; new trips, pass-by trips and internal trips. New trips are trips that visit the site specifically to go to a location in the site and then return from where they came. Pass-by trips are trips that are passing by the site when they decide to turn and go into the site. When these vehicles leave the site they then continue in the direction they were originally heading. Internal trips are trips to or from a location within the site to or from a different location within the site. These would be vehicles that visit two or more locations within the site and therefore do not generate a new trip at the surrounding study intersections for each place they visit. For this site, internal trips could include many different kinds of trips such as residents of the site going to the coffee shop or people at the pharmacy on site going to the gas station. Internal trips are a reduction from the overall number of generated trips.

The site generated trips were then added to the study roadways through the use of a trip distribution pattern. This pattern is based partially on the trip distribution for the nearby Savona development (as shown in the Traffic Impact Study completed in 2013 by Westwood) as well as taking into account site access and access to the regional transportation system. The trip distribution pattern is:

- 20% to/from the south on CSAH 13
- 35% to/from the west on I-94
- 20% to/from the east on I-94
- 2% to/from the west on 4th Street
- 15% to/from the west on CSAH 10
- 5% to/from the north on CSAH 13
- 3% to/from the east on CSAH 10

This trip distribution pattern can be seen in Figure 4 in the Appendix. The traffic generated by the site development was assigned to the area roadways per this distribution pattern. The resultant peak hour traffic volumes due to the development are shown in the Appendix under the capacity analysis section for the Build scenarios.

b. Non-site Traffic Forecasting

Traffic forecasts were developed for the year 2019 No-Build Scenario based on the growth rate assigned to Washington County by MnDOT. This compound growth rate is 1.7% per year which is taken from a 20 year factor of 1.4. This growth rate was applied to all movements and the resultant 2019 No-Build peak hour forecasts are shown in the Appendix under the capacity analysis section for the No-Build scenarios.

c. Total Traffic

Traffic forecasts were developed for the year 2019 Build Scenarios by adding the traffic generated by the proposed development to the 2019 No-Build volumes. The resultant 2019 Build peak hour forecasts are shown in the Appendix under the capacity analysis section for the Build scenarios.

5. Traffic and Improvement Analysis for 2019 Scenarios

a. Level of Service Analysis

The LOS results for the 2019 Scenario study hours are shown in Table 2. These are based on the existing traffic control and lane configurations at the study intersections with the addition of an eastern leg into the development at the CSAH 13/9th Street intersection as well as a site access at CSAH 13/5th Street, a site access at Eagle Point Boulevard and two site accesses on CSAH 10. The site access at CSAH 13/5th Street, the CSAH 10/Eastern Site access and the site access on Eagle Point Boulevard are modeled as full access intersections. The site access at CSAH 13/9th Street and the CSAH 10/Western Site Access are modeled as ¾ access intersections. A ¾ intersection means vehicles can turn into the site from either direction, but can only make right turns exiting the site. The west leg of the CSAH 13/9th Street intersection is left as full movement to be able to service the existing residential area. See Figure 5 in the Appendix for the intersection configurations assumed to be in place for the Build Scenario.

The forecast turning movement volumes for the 2019 peak hour scenarios as shown in the Appendix were used in the LOS calculations. The LOS calculations were done in accordance with the 2010 *Highway Capacity Manual* using VISTRO™ software. Signal splits were optimized for each scenario. The complete LOS calculations, which include queue lengths and grades for individual movements, are included in the Appendix.

Table 2 – 2019 Level of Service (LOS)[1]

Intersection	A.M. Peak Hour		P.M. Peak Hour	
	No-Build	Build	No-Build	Build
CSAH 13 & Southern I-94 Ramp	B (d)	B (d)	C (e)	C (e)
CSAH 13 & Northern I-94 Ramp	C (d)	C (e)	D (e)	D (f)
CSAH 13 & Hudson Blvd	C (e)	C (e)	D (e)	D (e)
CSAH 13 & Eagle Point Blvd	A (d)	A (f)	D (f)	**F (f)**
CSAH 13 & 5th St	n/a	**F (f)**	n/a	**F (f)**
CSAH 13 & 9th St	A (c)	A (d)	A (e)	A (f)
CSAH 13 & CSAH 10	B (c)	C (c)	C (d)	C (d)
CSAH 10 & Western Site Access	n/a	A (c)	n/a	A (b)
CSAH 10 & Eastern Site Access	n/a	A (c)	n/a	A (e)
Eagle Point Blvd & Site Access	n/a	A (a)	n/a	A (a)

[1]The first letter is the Level of Service for the intersection. The second letter (in parentheses) is the Level of Service for the worst operating movement.

As shown in Table 2, the study intersections will operate acceptably in the 2019 study scenarios with the exceptions of the CSAH 13/Eagle Point Boulevard intersection in the p.m. peak hour and the CSAH 13/5th Street intersection in both peak hours. It can be noted that the movement at LOS F at the CSAH 13/9th Street intersection in the p.m. peak hour Build scenario is the eastbound left turns out of the existing residential area. This movement has less than 10 vehicles in the peak hour and a 95th percentile queue length of less than one vehicle.

Other than CSAH 13/Eagle Point Boulevard and CSAH 13/5th Street intersections, the LOS results between the No-Build and Build scenarios are similar. This means the development will not have a significant enough impact on the other study intersections to warrant improvements.

b. Improvement Analysis

Table 2 shows that the side street stop sign controlled CSAH 13/Eagle Point Boulevard and CSAH 13/5th Street intersections are forecast to operate at LOS F in the 2019 p.m. peak hour build scenario with the CSAH 13/5th Street intersection also forecast to operate at LOS F in the 2019 a.m. peak hour Build scenario.

One or both of these intersections will likely need to be signalized by the time the development is fully built and operational. Due to the close spacing of these two intersections it is not recommended that both of them be signalized. Since the CSAH 13/5th Street intersection is forecast to have higher turning volumes in the future build scenarios, that intersection was analyzed with a signal. The layout was also modified to include an exclusive southbound left turn lane, a northbound right turn lane, a

westbound left turn lane and a westbound right turn lane. This new layout without a signal was also analyzed. These results can be seen in Table 3.

Placing a signal at the CSAH 13/5th Street intersection may affect the driving behaviors of some vehicles. Most notably, some vehicles that may leave the development by taking the connection down to Eagle Point Boulevard and accessing CSAH 13 there may reroute themselves to access CSAH 13 at the 5th Street access if that intersection is signalized. This is especially the case if there are long delays for vehicles turning from Eagle Point Boulevard onto CSAH 13.

To see if the CSAH 13/5th Street intersection will be able to handle additional traffic if a signal is placed there, that intersection was analyzed with all of the development traffic that was entering/exiting at Eagle Point Boulevard now going through the 5th Street access. The CSAH 13/Eagle Point Boulevard intersection was also analyzed in this scenario. These results can be seen in Table 3.

The forecast turning movement volumes for the 2019 p.m. peak hour Build scenario as shown in the Appendix were used in the LOS calculations for the various improvements. The p.m. peak hour was chosen over the a.m. peak hour because there were worse operating conditions in the p.m. peak hour. Any improvements that work in the p.m. peak hour should also work in the a.m. peak hour. The LOS calculations were done in accordance with the 2010 *Highway Capacity Manual* using VISTRO™ software. Signal cycles and splits were optimized for each scenario as needed. The complete LOS calculations, which include queue lengths and grades for individual movements, are included in the Appendix.

Table 3 – 2019 PM Peak Hour Improvement Level of Service (LOS)[1]

Intersection	P.M. Peak Hour
	Build
CSAH 13 & 5th St - Stop Controlled with Turn Lanes	**F (f)**
CSAH 13 & 5th St - Signalized	B (c)
CSAH 13 & Eagle Point Blvd – Without Eagle Point Connection	**F (f)**
CSAH 13 & 5th St - Signalized Without Eagle Point Connection	B (c)

[1]The first letter is the Level of Service for the intersection. The second letter (in parentheses) is the Level of Service for the worst operating movement.

As can be seen in Table 3, only adding turn lanes to the CSAH 13/5th Street intersection does not allow it to operate better than LOS F. Placing a signal at the intersection allows it to operate acceptably at LOS B with all movements at LOS C or better. Even with the additional traffic that may use the Eagle Point Boulevard access to CSAH 13, CSAH 13/5th Street operates acceptably with a signal.

The CSAH 13/Eagle Point Boulevard intersection is forecast to operate at LOS F with the site traffic rerouted to 5th Street. The eastbound and westbound left turns are the movements operating at LOS F. If the queuing and delay become too large at this intersection for these movements, both approaches do have the option to take alternate routes. Eastbound left turns can go down to 4th Street and make a left to get to CSAH 13 while westbound left turns can go up to 5th Street or down around to Hudson Boulevard to be able to access CSAH 13 at a signalized intersection. If a signal is placed at the CSAH 13/5th Street intersection, it is not recommended that a signal be placed at the CSAH 13/Eagle Point Boulevard intersection as well due to the close proximity of the signals on CSAH 13 at 4th Street and 5th Street.

c. Improvement Timeframe

It is recommended that a signal be placed at the CSAH 13/5th Street intersection by the time the proposed development is built and fully occupied. In order to determine when the signal should be installed, an iterative analysis was performed for the intersection. This analysis looked at how much of the development needs to be built for the peak hour signal warrant at CSAH 13/5th Street to be fulfilled.

An iterative peak hour warrant analysis was done at this intersection for the p.m. peak hour Build scenario. This was done by iterating the development traffic generation and background growth rate and performing peak hour warrant analyses with VISTRO™ software. The background growth rate iteration was tied to the development traffic iteration (e.g., for 50% of development traffic, 50% of the final growth rate was used). The intersection was modeled with free flowing traffic on CSAH 13 and a stop sign on 5th Street with an exclusive southbound left turn lane, a northbound right turn lane, a westbound left turn lane and a westbound right turn lane.

It was found the CSAH 13/5th Street intersection will meet the peak hour warrant for a traffic signal with 30% of the full forecast site traffic accessing the development. The full results for the different iterations can be seen in the capacity analysis section of the Appendix.

It is recommended the CSAH 13/5th Street intersection be monitored as construction occurs to determine when the peak hour warrant will be met and a signal is needed at the intersection. The intersection should be built with an exclusive southbound left turn lane, a northbound right turn lane, a westbound left turn lane and a westbound right turn lane to provide safe access and facilitate the future construction of the traffic signal.

d. Daily Traffic Volumes

The City of Lake Elmo 2030 Comprehensive Plan lists forecast traffic volumes on the roadways in the city for the year 2030. These volumes are estimated using existing data and forecasts based on the planned land uses in the city. The proposed development includes more commercial space and less residential space than the Lake Elmo 2030 plan. In order to be able to estimate the amount of traffic on the roadways surrounding the site, the Lake Elmo 2030 plan volumes were adjusted to account for the extra commercial space proposed on the site.

Comparing the concept plan shown in Figure 2 in the Appendix to the City of Lake Elmo's proposed land use, there are approximately 20 acres of land the city had planned as residential that this development is planning as commercial. Assuming the residential area was planned to be single family homes and estimating five homes per acre, that leads to 100 single family homes. Using the *ITE Trip Generation Manual, 9th Edition*, this leads to approximately 950 vehicles per day using this portion of the site. Using the trip generation for the site shown in Table A1 in the Appendix, there are approximately 2,860 new trips using the commercial spaces in this portion of the site. That means that there are approximately 1,900 additional vehicles accessing the site with the added commercial space than if the space was residential.

These additional 1,900 vehicles were added to the surrounding roadways and the forecast 2030 volumes can be seen in Figure 6 in the Appendix.

6. Conclusions and Recommendations

The traffic impacts of the proposed development on the study intersections were analyzed in the 2019 build-out conditions. The principal findings are:

i. All study intersections will operate acceptably through the 2019 build-out condition except the CSAH 13/Eagle Point Boulevard and CSAH 13/5th Street intersections.

ii. The CSAH 13/5th Street intersection will likely need a signal before the development is fully built and occupied and should be monitored as construction occurs to determine when a signal should be installed.

iii. The CSAH 13/5th Street intersection should be built with an exclusive southbound left turn lane, a northbound right turn lane, a westbound left turn lane and a westbound right turn lane.

iv. The traffic signal at the CSAH 13/5th Street intersection as well as alternate routes should allow the CSAH 13/Eagle Point Boulevard intersection to operate acceptably. The County should monitor the intersection, however, in case the traffic balancing does not occur and a traffic signal is needed at the intersection. The need for improvements to the CSAH 13/Eagle Point Boulevard intersection are not due to the proposed development.

v. The site access at CSAH 13/9th Street and the CSAH 10/Western Site Access should be built as ¾ intersections with vehicles exiting the development only able to make right turns.
vi. The Eastern Site Access on CSAH 10 should be built as a full access intersection.

Other than constructing the roadways per the concept plan and the above recommendations, no modifications are needed to be made by the developer to the existing study intersections.

7. Appendix

A. Trip Generation Table

B. Figures 1-6

C. Traffic Counts

D. Capacity Analysis Backup

- AM Existing
- PM Existing
- AM 2019 No-Build
- PM 2019 No-Build
- AM 2019 Build
- PM 2019 Build
- PM 2019 Build - CSAH 13/5th Street with Turn Lanes
- PM 2019 Build - CSAH 13/5th Street with Turn Lanes & Signal
- PM 2019 Build - CSAH 13/5th Street with Turn Lanes & Signal minus Eagle Point Connection and CSAH 13/Eagle Point Blvd minus Eagle Point Connection
- Iterative Signal Warrant Analysis - 25% of Development Traffic
- Iterative Signal Warrant Analysis - 30% of Development Traffic

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Table A1
Forecast Trip Generation

Daily Volumes

LAND USE	ITE CODE #	DEVELOPMENT UNITS (GFA)	QUANTITY	DAILY RATE	ENTER PERCENT	EXIT PERCENT	INTERNAL PERCENT	INTERNAL TRIPS	PASSBY PERCENT	PASSBY TRIPS	NEW TRIPS	
											ENTER	EXIT
Single Family Homes	210	Dwelling Units	272.0	9.52	50%	50%	14%	363	0%	0	1,113	1,113
Apartments	220	Dwelling Units	150.0	6.65	50%	50%	14%	140	0%	0	429	429
Rental Townhomes	224	Dwelling Units	176.0	5.81	50%	50%	14%	143	0%	0	440	440
Townhomes	230	Dwelling Units	12.0	5.81	50%	50%	14%	10	0%	0	30	30
Senior Housing	252	Dwelling Units	120.0	3.44	50%	50%	14%	58	0%	0	178	178
Daycare Center	565	1,000 GFA	5.0	74.06	50%	50%	12%	44	0%	0	163	163
Office	710	1,000 GFA	6.0	11.03	50%	50%	28%	19	0%	0	24	24
Office Showroom	710	1,000 GFA	20.0	11.03	50%	50%	28%	62	0%	0	79	79
Shopping Center	820	1,000 GFA	25.0	42.70	50%	50%	12%	128	34%	363	288	288
Pharmacy	881	1,000 GFA	12.0	96.91	50%	50%	12%	140	49%	570	227	227
Coffee/Donut Shop w/ Drive Thru	937	1,000 GFA	2.0	818.58	50%	50%	12%	196	50%	819	311	311
Gas Station w/ Convenience Market	945	Fueling Positions	16.0	162.78	50%	50%	12%	313	56%	1,459	417	417
TOTALS								1,614		3,210	3,699	3,699

AM Peak Hour

LAND USE	ITE CODE #	DEVELOPMENT UNITS (GFA)	QUANTITY	AM RATE	ENTER PERCENT	EXIT PERCENT	INTERNAL PERCENT	INTERNAL TRIPS	PASSBY PERCENT	PASSBY TRIPS	NEW TRIPS	
											ENTER	EXIT
Single Family Homes	210	Dwelling Units	272.0	0.75	25%	75%	12%	24	0%	0	39	141
Apartments	220	Dwelling Units	150.0	0.51	20%	80%	12%	9	0%	0	11	57
Rental Townhomes	224	Dwelling Units	176.0	0.70	33%	67%	12%	15	0%	0	33	75
Townhomes	230	Dwelling Units	12.0	0.44	17%	83%	12%	1	0%	0	1	4
Senior Housing	252	Dwelling Units	120.0	0.20	34%	66%	12%	3	0%	0	7	14
Daycare Center	565	1,000 GFA	5.0	12.18	53%	47%	12%	7	0%	0	29	25
Office	710	1,000 GFA	6.0	1.56	88%	12%	20%	2	0%	0	7	0
Office Showroom	710	1,000 GFA	20.0	1.56	88%	12%	20%	6	0%	0	24	1
Shopping Center	820	1,000 GFA	25.0	0.96	62%	38%	12%	3	34%	8	9	4
Pharmacy	881	1,000 GFA	12.0	3.45	52%	48%	12%	5	49%	20	9	7
Coffee/Donut Shop w/ Drive Thru	937	1,000 GFA	2.0	100.58	51%	49%	12%	24	50%	101	40	36
Gas Station w/ Convenience Market	945	Fueling Positions	16.0	10.16	50%	50%	12%	20	56%	91	26	26
TOTALS								52		220	235	390

PM Peak Hour

LAND USE	ITE CODE #	DEVELOPMENT UNITS (GFA)	QUANTITY	PM RATE	ENTER PERCENT	EXIT PERCENT	INTERNAL PERCENT	INTERNAL TRIPS	PASSBY PERCENT	PASSBY TRIPS	NEW TRIPS	
											ENTER	EXIT
Single Family Homes	210	Dwelling Units	272.0	1.00	63%	37%	12%	33	0%	0	155	84
Apartments	220	Dwelling Units	150.0	0.62	65%	35%	12%	11	0%	0	55	27
Rental Townhomes	224	Dwelling Units	176.0	0.72	51%	49%	12%	15	0%	0	57	54
Townhomes	230	Dwelling Units	12.0	0.52	67%	33%	12%	1	0%	0	4	2
Senior Housing	252	Dwelling Units	120.0	0.25	54%	46%	12%	4	0%	0	14	12
Daycare Center	565	1,000 GFA	5.0	12.34	47%	53%	12%	7	0%	0	25	29
Office	710	1,000 GFA	6.0	1.49	17%	83%	23%	2	0%	0	0	6
Office Showroom	710	1,000 GFA	20.0	1.49	17%	83%	23%	7	0%	0	2	21
Shopping Center	820	1,000 GFA	25.0	3.71	48%	52%	12%	11	34%	32	23	27
Pharmacy	881	1,000 GFA	12.0	9.91	50%	50%	12%	14	49%	58	23	23
Coffee/Donut Shop w/ Drive Thru	937	1,000 GFA	2.0	42.80	50%	50%	12%	10	50%	43	16	16
Gas Station w/ Convenience Market	945	Fueling Positions	16.0	13.51	50%	50%	12%	26	56%	121	35	35
TOTALS								63		254	409	336

NOTES:

1. GFA = Gross Floor Area
2. All trip generation rates based on "Trip Generation", Institute of Transportation Engineers, 9th Edition.
3. Reduction for internal trips (Internal Percent) is based on "Trip Generation Handbook", Institute of Transportation Engineers, 2nd Edition.
4. Reduction for pass-by trips (Passby Percent) is based on "Trip Generation Handbook", Institute of Transportation Engineers, 2nd Edition.
5. A.M. Trip Generation is for the peak hour of adjacent street traffic (one hour between 7 and 9 a.m.).
6. P.M. Trip Generation is for the peak hour of adjacent street traffic (one hour between 4 and 6 p.m.).
7. No data is available in "Trip Generation" for the daily rate for the rental townhomes. The daily rate for Townhomes was used.
8. The Coffee/Donut Shop w/ Drive Thru (ITE code 937) does not have a pass-by percentage in "Trip Generation." A 50% pass-by rate was used. This is the same as a fast food w/ drive thru.

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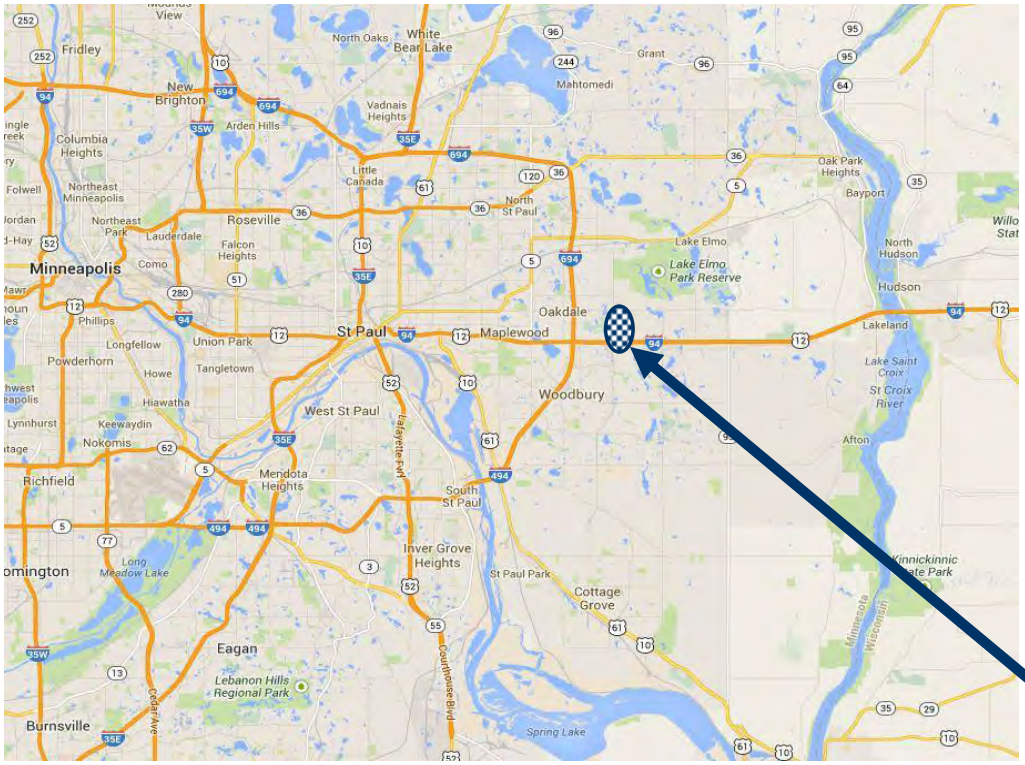
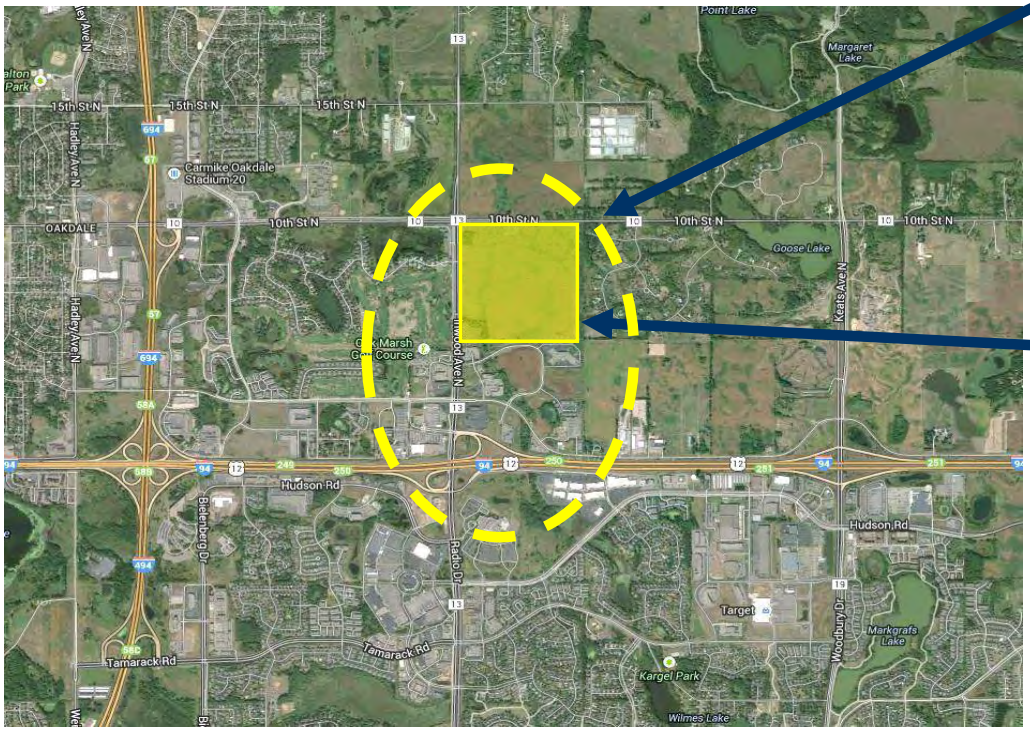
THE TRAFFIC STUDY COMPANY

Figure 1
Location Maps

North
No Scale



Study Area



Proposed Site

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THE TRAFFIC STUDY COMPANY

Figure 2
Concept Plan

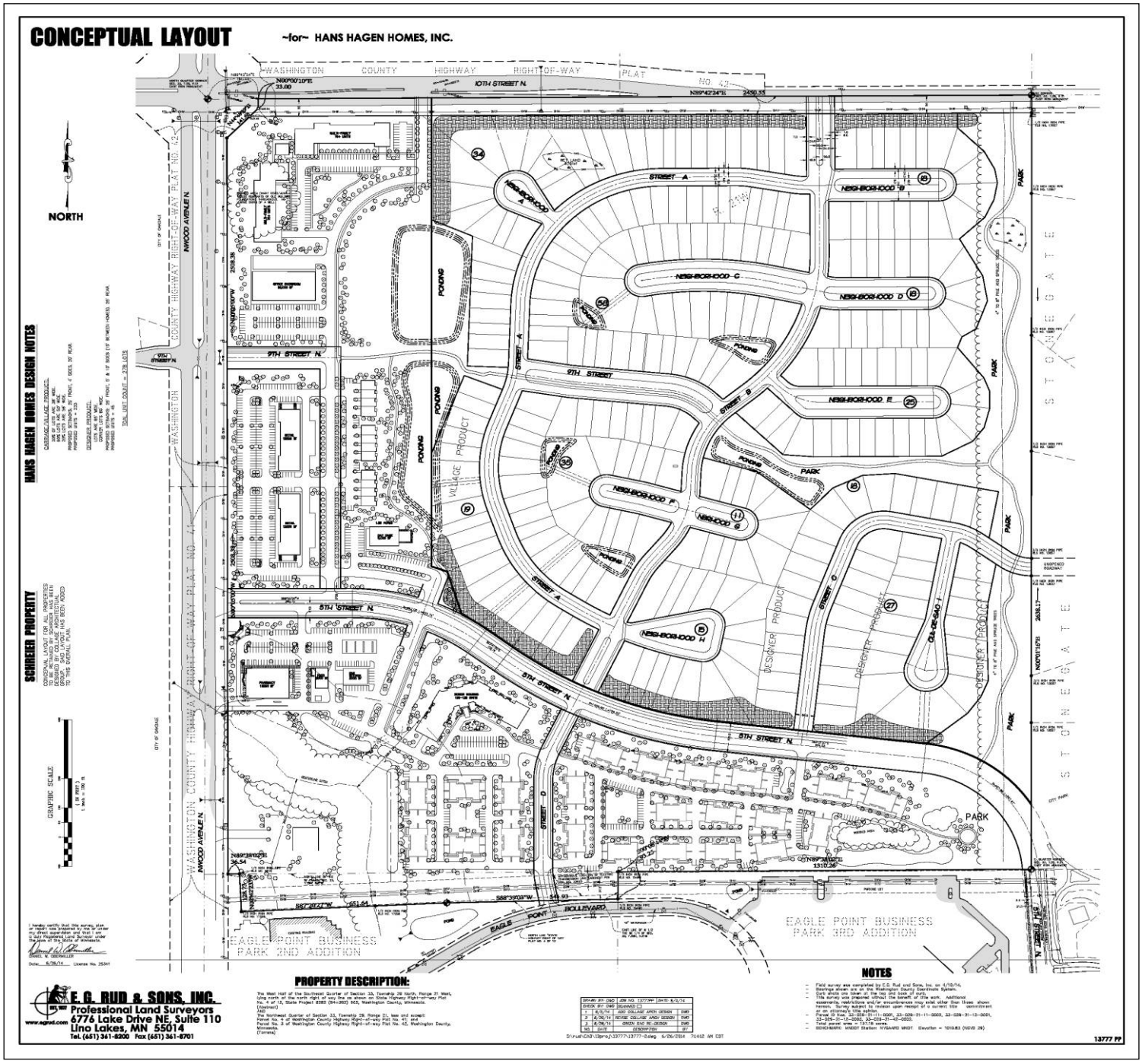

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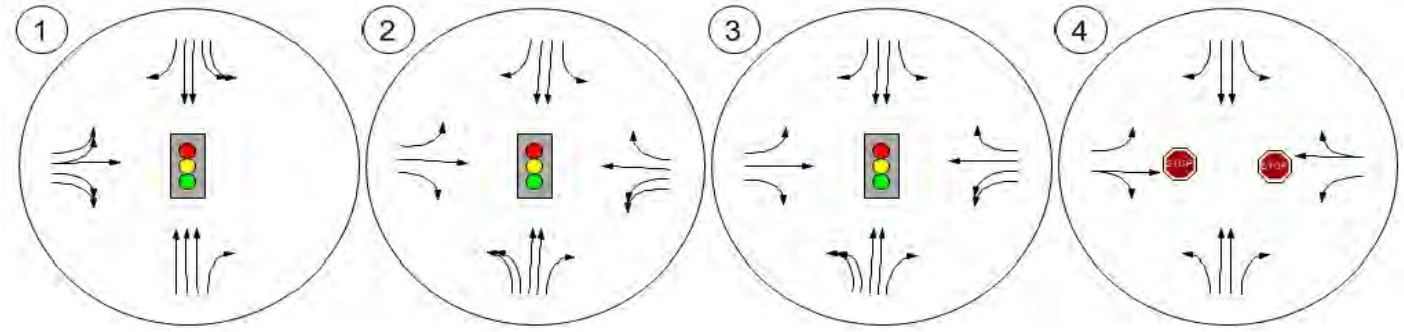
Figure 3
Existing Lanes & Traffic Control



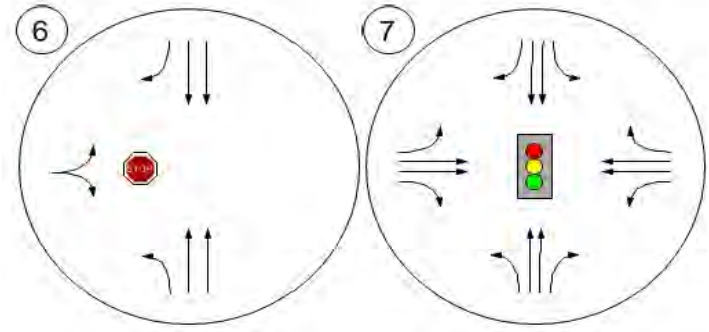


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Figure 4
Trip Distribution

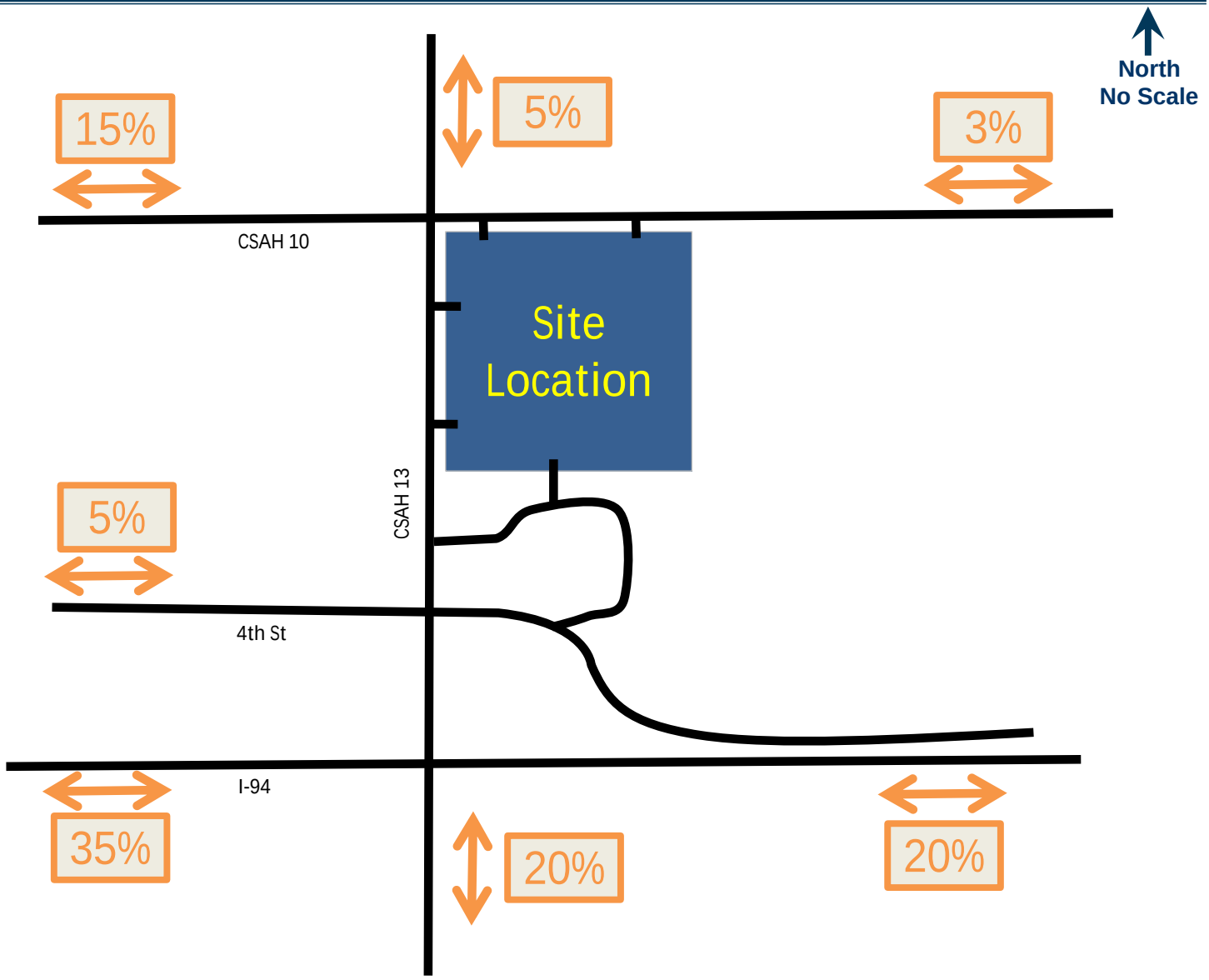

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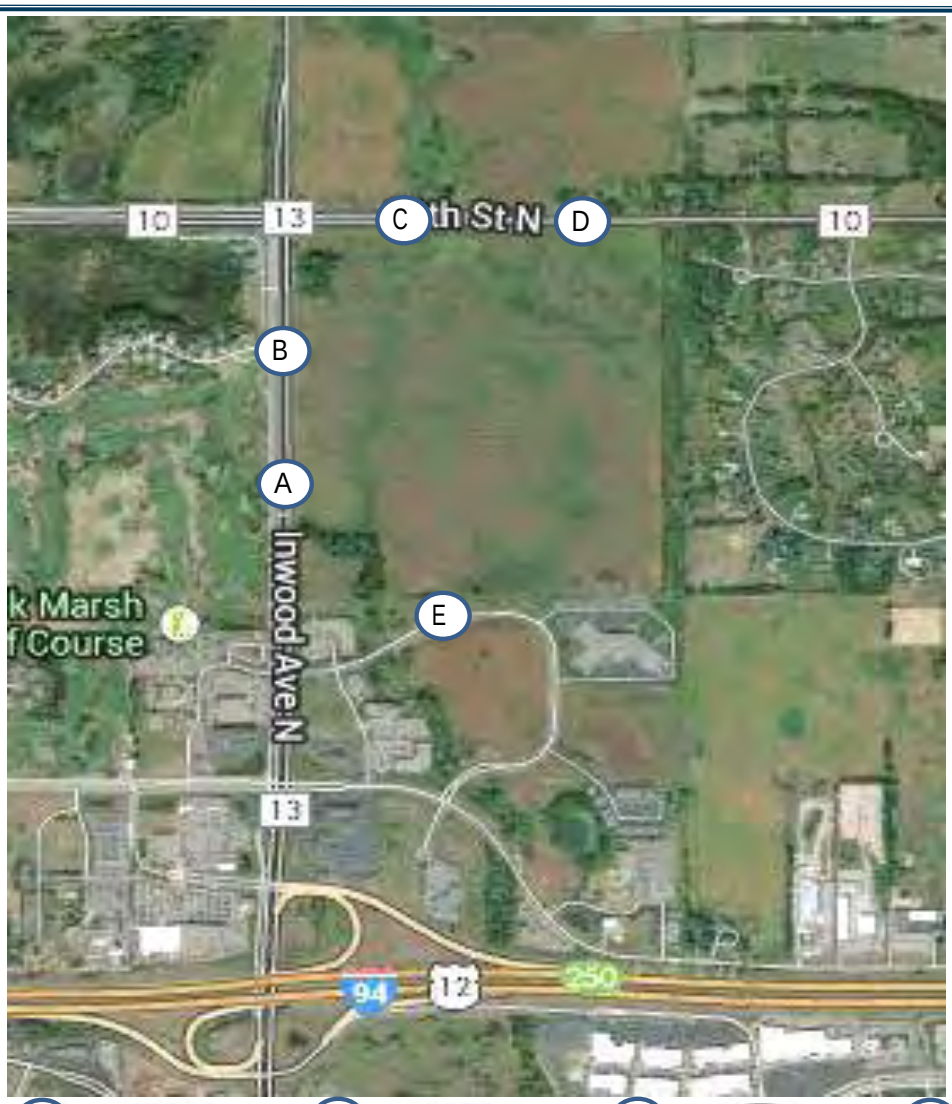
Figure 5
Site Access Configurations



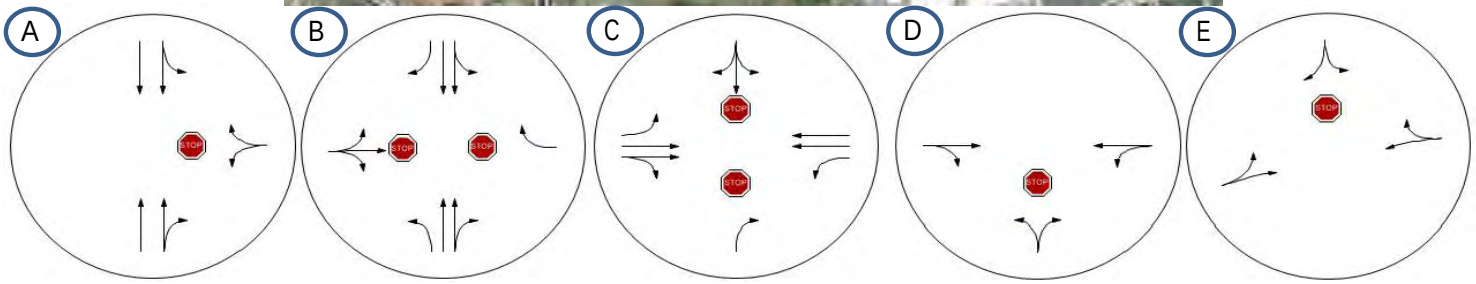


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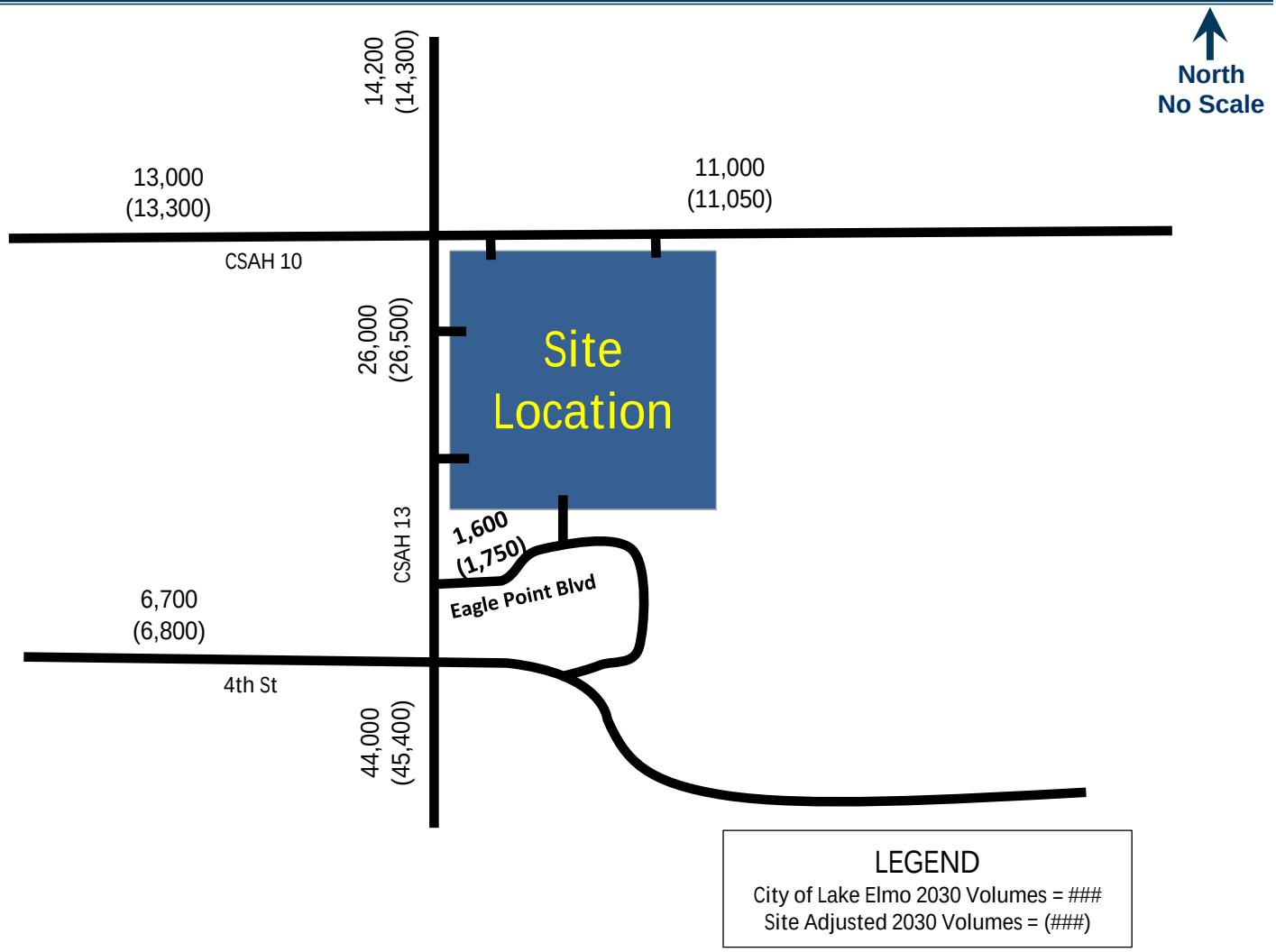
Figure 6
Daily Volumes



Traffic Data Inc

PO Box 16296
St. Louis Park, MN 55416

File Name : 1 - Radio Dr & Southern I-94 Ramp, 5-29-14, 645-845am, 415-615pm
Site Code : 1
Start Date : 5/29/2014
Page No : 1

Radio Dr & Southern I-94 Ramp
Woodbury, MN

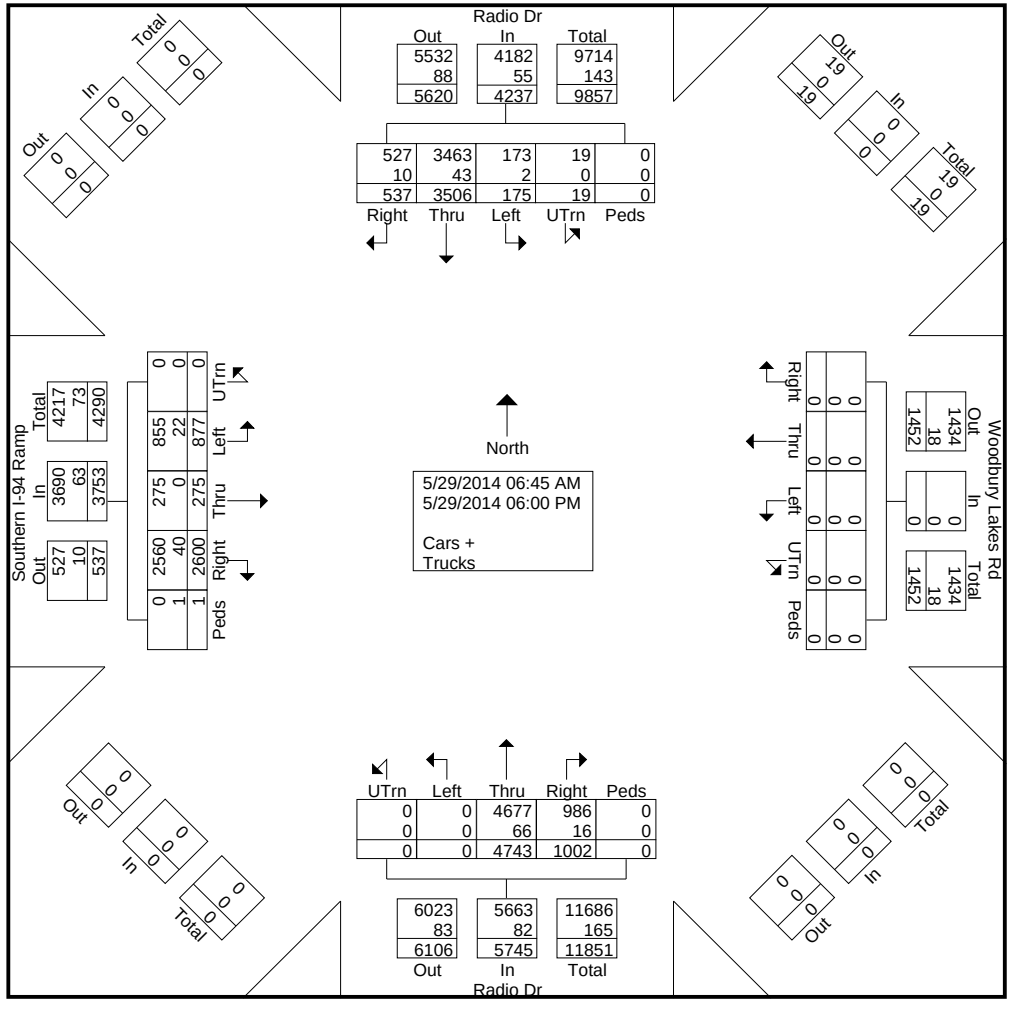
Groups Printed- Cars + - Trucks

	Radio Dr Southbound						Woodbury Lakes Rd Westbound						Radio Dr Northbound						Southern I-94 Ramp Eastbound						
Start Time	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	Int. Total
06:45 AM	1	2	115	10	0	128	0	0	0	0	0	0	0	0	225	24	0	249	0	35	14	66	0	115	492
Total	1	2	115	10	0	128	0	0	0	0	0	0	0	0	225	24	0	249	0	35	14	66	0	115	492
07:00 AM	0	0	113	13	0	126	0	0	0	0	0	0	0	0	242	15	0	257	0	36	1	56	0	93	476
07:15 AM	0	0	128	16	0	144	0	0	0	0	0	0	0	0	290	21	0	311	0	68	3	71	0	142	597
07:30 AM	1	0	131	14	0	146	0	0	0	0	0	0	0	0	282	17	0	299	0	69	4	83	0	156	601
07:45 AM	1	6	180	7	0	194	0	0	0	0	0	0	0	0	300	18	0	318	0	88	8	142	0	238	750
Total	2	6	552	50	0	610	0	0	0	0	0	0	0	0	1114	71	0	1185	0	261	16	352	0	629	2424
08:00 AM	1	3	174	18	0	196	0	0	0	0	0	0	0	0	300	20	0	320	0	61	5	114	0	180	696
08:15 AM	0	4	159	14	0	177	0	0	0	0	0	0	0	0	241	20	0	261	0	54	9	94	0	157	595
08:30 AM	1	1	172	13	0	187	0	0	0	0	0	0	0	0	206	17	0	223	0	43	6	103	0	152	562
Total	2	8	505	45	0	560	0	0	0	0	0	0	0	0	747	57	0	804	0	158	20	311	0	489	1853
04:15 PM	0	19	266	68	0	353	0	0	0	0	0	0	0	0	349	114	0	463	0	54	33	252	0	339	1155
04:30 PM	2	21	339	57	0	419	0	0	0	0	0	0	0	0	309	94	0	403	0	48	35	252	0	335	1157
04:45 PM	1	26	267	71	0	365	0	0	0	0	0	0	0	0	307	92	0	399	0	59	36	252	0	347	1111
Total	3	66	872	196	0	1137	0	0	0	0	0	0	0	0	965	300	0	1265	0	161	104	756	0	1021	3423
05:00 PM	1	22	361	59	0	443	0	0	0	0	0	0	0	0	362	138	0	500	0	59	25	190	0	274	1217
05:15 PM	1	19	278	60	0	358	0	0	0	0	0	0	0	0	352	125	0	477	0	53	42	244	1	340	1175
05:30 PM	3	17	314	64	0	398	0	0	0	0	0	0	0	0	346	111	0	457	0	62	16	230	0	308	1163
05:45 PM	6	24	272	24	0	326	0	0	0	0	0	0	0	0	306	75	0	381	0	42	26	243	0	311	1018
Total	11	82	1225	207	0	1525	0	0	0	0	0	0	0	0	1366	449	0	1815	0	216	109	907	1	1233	4573
06:00 PM	0	11	237	29	0	277	0	0	0	0	0	0	0	0	326	101	0	427	0	46	12	208	0	266	970
Grand Total	19	175	3506	537	0	4237	0	0	0	0	0	0	0	0	4743	1002	0	5745	0	877	275	2600	1	3753	13735
Apprch %	0.4	4.1	82.7	12.7	0		0	0	0	0	0		0	0	82.6	17.4	0		0	23.4	7.3	69.3	0		
Total %	0.1	1.3	25.5	3.9	0	30.8	0	0	0	0	0	0	0	0	34.5	7.3	0	41.8	0	6.4	2	18.9	0	27.3	
Cars +	19	173	3463	527	0	4182	0	0	0	0	0	0	0	0	4677	986	0	5663	0	855	275	2560	0	3690	13535
% Cars +	100	98.9	98.8	98.1	0	98.7	0	0	0	0	0	0	0	0	98.6	98.4	0	98.6	0	97.5	100	98.5	0	98.3	98.5
Trucks	0	2	43	10	0	55	0	0	0	0	0	0	0	0	66	16	0	82	0	22	0	40	1	63	200
% Trucks	0	1.1	1.2	1.9	0	1.3	0	0	0	0	0	0	0	0	1.4	1.6	0	1.4	0	2.5	0	1.5	100	1.7	1.5

Traffic Data Inc
PO Box 16296
St. Louis Park, MN 55416

File Name : 1 - Radio Dr & Southern I-94 Ramp, 5-29-14, 645-845am, 415-615pm
Site Code : 1
Start Date : 5/29/2014
Page No : 2

Radio Dr & Southern I-94 Ramp
Woodbury, MN



Traffic Data Inc
PO Box 16296
St. Louis Park, MN 55416

File Name : 1 - Radio Dr & Southern I-94 Ramp, 5-29-14, 645-845am, 415-615pm
Site Code : 1
Start Date : 5/29/2014
Page No : 3

Radio Dr & Southern I-94 Ramp
Woodbury, MN

	Radio Dr Southbound						Woodbury Lakes Rd Westbound						Radio Dr Northbound						Southern I-94 Ramp Eastbound						
Start Time	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 06:45 AM to 12:30 PM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 07:15 AM																									
07:15 AM	0	0	128	16	0	144	0	0	0	0	0	0	0	0	290	21	0	311	0	68	3	71	0	142	597
07:30 AM	1	0	131	14	0	146	0	0	0	0	0	0	0	0	282	17	0	299	0	69	4	83	0	156	601
07:45 AM	1	6	180	7	0	194	0	0	0	0	0	0	0	0	300	18	0	318	0	88	8	142	0	238	750
08:00 AM	1	3	174	18	0	196	0	0	0	0	0	0	0	0	300	20	0	320	0	61	5	114	0	180	696
Total Volume	3	9	613	55	0	680	0	0	0	0	0	0	0	0	1172	76	0	1248	0	286	20	410	0	716	2644
% App. Total	0.4	1.3	90.1	8.1	0		0	0	0	0	0		0	0	93.9	6.1	0		0	39.9	2.8	57.3	0		
PHF	.750	.375	.851	.764	.000	.867	.000	.000	.000	.000	.000	.000	.000	.000	.977	.905	.000	.975	.000	.813	.625	.722	.000	.752	.881
Peak Hour Analysis From 12:45 PM to 06:00 PM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 04:45 PM																									
04:45 PM	1	26	267	71	0	365	0	0	0	0	0	0	0	0	307	92	0	399	0	59	36	252	0	347	1111
05:00 PM	1	22	361	59	0	443	0	0	0	0	0	0	0	0	362	138	0	500	0	59	25	190	0	274	1217
05:15 PM	1	19	278	60	0	358	0	0	0	0	0	0	0	0	352	125	0	477	0	53	42	244	1	340	1175
05:30 PM	3	17	314	64	0	398	0	0	0	0	0	0	0	0	346	111	0	457	0	62	16	230	0	308	1163
Total Volume	6	84	1220	254	0	1564	0	0	0	0	0	0	0	0	1367	466	0	1833	0	233	119	916	1	1269	4666
% App. Total	0.4	5.4	78	16.2	0		0	0	0	0	0		0	0	74.6	25.4	0		0	18.4	9.4	72.2	0.1		
PHF	.500	.808	.845	.894	.000	.883	.000	.000	.000	.000	.000	.000	.000	.000	.944	.844	.000	.917	.000	.940	.708	.909	.250	.914	.959

Traffic Data Inc
PO Box 16296
St. Louis Park, MN 55416

File Name : 2 - Inwood Ave & Northern I-94 Ramp, 5-29-14, 645-845am, 415-615pm
Site Code : 2
Start Date : 5/29/2014
Page No : 1

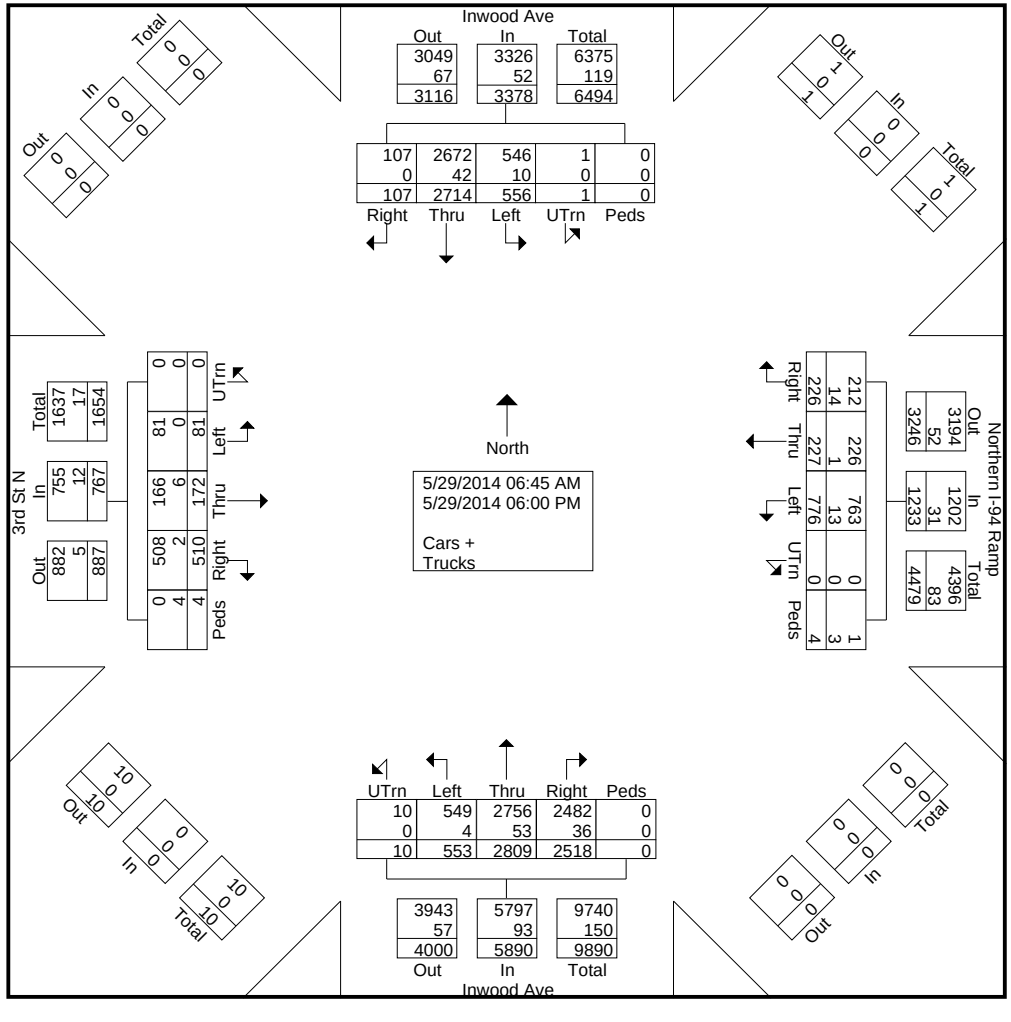
Inwood Ave & Northern I-94 Ramp
Lake Elmo, MN

Groups Printed- Cars + - Trucks

	Inwood Ave Southbound						Northern I-94 Ramp Westbound						Inwood Ave Northbound						3rd St N Eastbound						
Start Time	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	Int. Total
06:45 AM	0	15	75	3	0	93	0	43	36	16	0	95	0	14	78	158	0	250	0	1	5	6	1	13	451
Total	0	15	75	3	0	93	0	43	36	16	0	95	0	14	78	158	0	250	0	1	5	6	1	13	451
07:00 AM	0	15	70	4	0	89	0	41	26	9	1	77	0	14	83	176	0	273	0	1	6	3	0	10	449
07:15 AM	0	12	107	0	0	119	0	33	20	8	0	61	0	20	152	177	0	349	0	3	4	7	0	14	543
07:30 AM	0	14	98	2	0	114	0	29	19	9	0	57	0	18	151	186	0	355	0	2	7	11	0	20	546
07:45 AM	1	22	128	4	0	155	0	41	8	23	0	72	0	23	168	175	0	366	0	1	6	5	0	12	605
Total	1	63	403	10	0	477	0	144	73	49	1	267	0	75	554	714	0	1343	0	7	23	26	0	56	2143
08:00 AM	0	42	129	3	0	174	0	57	6	17	0	80	0	19	165	172	0	356	0	2	4	2	0	8	618
08:15 AM	0	42	106	1	0	149	0	52	5	15	0	72	2	23	122	145	0	292	0	3	5	9	0	17	530
08:30 AM	0	30	127	6	0	163	0	39	9	15	1	64	2	10	128	147	0	287	0	1	10	17	0	28	542
Total	0	114	362	10	0	486	0	148	20	47	1	216	4	52	415	464	0	935	0	6	19	28	0	53	1690
04:15 PM	0	42	215	18	0	275	0	66	17	17	0	100	1	52	232	120	0	405	0	9	15	43	0	67	847
04:30 PM	0	61	268	8	0	337	0	59	8	11	0	78	0	40	217	167	0	424	0	7	11	43	0	61	900
04:45 PM	0	40	251	12	0	303	0	50	14	15	0	79	0	35	184	152	0	371	0	15	11	61	0	87	840
Total	0	143	734	38	0	915	0	175	39	43	0	257	1	127	633	439	0	1200	0	31	37	147	0	215	2587
05:00 PM	0	68	270	7	0	345	0	61	10	21	0	92	2	54	262	160	0	478	0	8	26	79	2	115	1030
05:15 PM	0	46	214	13	0	273	0	55	14	10	0	79	1	60	252	129	0	442	0	6	20	70	1	97	891
05:30 PM	0	38	274	6	0	318	0	65	13	15	0	93	2	67	235	136	0	440	0	10	16	48	0	74	925
05:45 PM	0	40	201	6	0	247	0	35	12	13	0	60	0	49	193	148	0	390	0	8	13	60	0	81	778
Total	0	192	959	32	0	1183	0	216	49	59	0	324	5	230	942	573	0	1750	0	32	75	257	3	367	3624
06:00 PM	0	29	181	14	0	224	0	50	10	12	2	74	0	55	187	170	0	412	0	4	13	46	0	63	773
Grand Total	1	556	2714	107	0	3378	0	776	227	226	4	1233	10	553	2809	2518	0	5890	0	81	172	510	4	767	11268
Apprch %	0	16.5	80.3	3.2	0		0	62.9	18.4	18.3	0.3		0.2	9.4	47.7	42.8	0		0	10.6	22.4	66.5	0.5		
Total %	0	4.9	24.1	0.9	0	30	0	6.9	2	2	0	10.9	0.1	4.9	24.9	22.3	0	52.3	0	0.7	1.5	4.5	0	6.8	
Cars +	1	546	2672	107	0	3326	0	763	226	212	1	1202	10	549	2756	2482	0	5797	0	81	166	508	0	755	11080
% Cars +	100	98.2	98.5	100	0	98.5	0	98.3	99.6	93.8	25	97.5	100	99.3	98.1	98.6	0	98.4	0	100	96.5	99.6	0	98.4	98.3
Trucks	0	10	42	0	0	52	0	13	1	14	3	31	0	4	53	36	0	93	0	0	6	2	4	12	188
% Trucks	0	1.8	1.5	0	0	1.5	0	1.7	0.4	6.2	75	2.5	0	0.7	1.9	1.4	0	1.6	0	0	3.5	0.4	100	1.6	1.7

File Name : 2 - Inwood Ave & Northern I-94 Ramp, 5-29-14, 645-845am, 415-615pm
Site Code : 2
Start Date : 5/29/2014
Page No : 2

Inwood Ave & Northern I-94 Ramp
Lake Elmo, MN



Traffic Data Inc
PO Box 16296
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File Name : 2 - Inwood Ave & Northern I-94 Ramp, 5-29-14, 645-845am, 415-615pm
Site Code : 2
Start Date : 5/29/2014
Page No : 3

Inwood Ave & Northern I-94 Ramp
Lake Elmo, MN

	Inwood Ave Southbound						Northern I-94 Ramp Westbound						Inwood Ave Northbound						3rd St N Eastbound						
Start Time	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 06:45 AM to 12:30 PM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 07:15 AM																									
07:15 AM	0	12	107	0	0	119	0	33	20	8	0	61	0	20	152	177	0	349	0	3	4	7	0	14	543
07:30 AM	0	14	98	2	0	114	0	29	19	9	0	57	0	18	151	186	0	355	0	2	7	11	0	20	546
07:45 AM	1	22	128	4	0	155	0	41	8	23	0	72	0	23	168	175	0	366	0	1	6	5	0	12	605
08:00 AM	0	42	129	3	0	174	0	57	6	17	0	80	0	19	165	172	0	356	0	2	4	2	0	8	618
Total Volume	1	90	462	9	0	562	0	160	53	57	0	270	0	80	636	710	0	1426	0	8	21	25	0	54	2312
% App. Total	0.2	16	82.2	1.6	0		0	59.3	19.6	21.1	0		0	5.6	44.6	49.8	0		0	14.8	38.9	46.3	0		
PHF	.250	.536	.895	.563	.000	.807	.000	.702	.663	.620	.000	.844	.000	.870	.946	.954	.000	.974	.000	.667	.750	.568	.000	.675	.935
Peak Hour Analysis From 12:45 PM to 06:00 PM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 04:45 PM																									
04:45 PM	0	40	251	12	0	303	0	50	14	15	0	79	0	35	184	152	0	371	0	15	11	61	0	87	840
05:00 PM	0	68	270	7	0	345	0	61	10	21	0	92	2	54	262	160	0	478	0	8	26	79	2	115	1030
05:15 PM	0	46	214	13	0	273	0	55	14	10	0	79	1	60	252	129	0	442	0	6	20	70	1	97	891
05:30 PM	0	38	274	6	0	318	0	65	13	15	0	93	2	67	235	136	0	440	0	10	16	48	0	74	925
Total Volume	0	192	1009	38	0	1239	0	231	51	61	0	343	5	216	933	577	0	1731	0	39	73	258	3	373	3686
% App. Total	0	15.5	81.4	3.1	0		0	67.3	14.9	17.8	0		0.3	12.5	53.9	33.3	0		0	10.5	19.6	69.2	0.8		
PHF	.000	.706	.921	.731	.000	.898	.000	.888	.911	.726	.000	.922	.625	.806	.890	.902	.000	.905	.000	.650	.702	.816	.375	.811	.895

Traffic Data Inc
PO Box 16296
St. Louis Park, MN 55416

File Name : 3 - Inwood Ave & Hudson Blvd, 5-29-14, 645-845am, 415-615pm
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Inwood Ave & Hudson Blvd
Lake Elmo, MN

Groups Printed- Cars + - Trucks

	Inwood Ave Southbound						Hudson Blvd Westbound						Inwood Ave Northbound						4th St Eastbound						
Start Time	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	Int. Total
06:45 AM	0	5	53	13	0	71	0	9	22	2	0	33	0	27	49	10	0	86	0	2	5	28	2	37	227
Total	0	5	53	13	0	71	0	9	22	2	0	33	0	27	49	10	0	86	0	2	5	28	2	37	227
07:00 AM	0	2	62	25	0	89	0	6	15	4	1	26	0	31	48	16	0	95	0	3	3	20	0	26	236
07:15 AM	0	5	76	18	0	99	0	10	16	4	1	31	0	48	79	13	0	140	0	3	5	36	1	45	315
07:30 AM	0	4	87	20	1	112	0	6	25	7	1	39	0	42	88	28	0	158	0	11	9	32	0	52	361
07:45 AM	0	13	117	12	7	149	0	20	45	10	1	76	0	54	94	43	0	191	0	4	3	31	0	38	454
Total	0	24	342	75	8	449	0	42	101	25	4	172	0	175	309	100	0	584	0	21	20	119	1	161	1366
08:00 AM	0	8	98	16	0	122	0	40	37	7	0	84	0	57	77	42	0	176	0	1	9	45	0	55	437
08:15 AM	0	4	53	11	1	69	0	44	43	10	1	98	0	34	68	30	0	132	0	5	5	42	0	52	351
08:30 AM	0	8	105	13	3	129	0	33	42	21	1	97	0	31	75	24	0	130	0	4	5	31	0	40	396
Total	0	20	256	40	4	320	0	117	122	38	2	279	0	122	220	96	0	438	0	10	19	118	0	147	1184
04:15 PM	0	4	141	8	4	157	0	49	12	14	3	78	0	39	169	36	0	244	0	12	35	90	0	137	616
04:30 PM	0	6	228	11	0	245	0	51	14	9	0	74	0	30	160	30	0	220	0	10	25	87	1	123	662
04:45 PM	0	6	183	8	0	197	0	24	6	7	0	37	0	52	130	23	0	205	0	18	26	81	2	127	566
Total	0	16	552	27	4	599	0	124	32	30	3	189	0	121	459	89	0	669	0	40	86	258	3	387	1844
05:00 PM	0	7	181	10	0	198	0	48	6	10	0	64	0	67	161	19	1	248	0	14	37	113	0	164	674
05:15 PM	0	10	153	8	4	175	0	33	7	4	0	44	1	57	195	24	5	282	0	17	40	103	1	161	662
05:30 PM	0	10	217	14	0	241	0	36	11	7	0	54	0	42	150	24	1	217	0	16	24	82	0	122	634
05:45 PM	0	3	183	9	0	195	0	22	13	9	0	44	0	53	163	19	1	236	0	17	16	75	0	108	583
Total	0	30	734	41	4	809	0	139	37	30	0	206	1	219	669	86	8	983	0	64	117	373	1	555	2553
06:00 PM	1	3	156	9	3	172	0	28	12	6	0	46	0	33	140	13	0	186	0	15	12	41	0	68	472
Grand Total	1	98	2093	205	23	2420	0	459	326	131	9	925	1	697	1846	394	8	2946	0	152	259	937	7	1355	7646
Apprch %	0	4	86.5	8.5	1		0	49.6	35.2	14.2	1		0	23.7	62.7	13.4	0.3		0	11.2	19.1	69.2	0.5		
Total %	0	1.3	27.4	2.7	0.3	31.7	0	6	4.3	1.7	0.1	12.1	0	9.1	24.1	5.2	0.1	38.5	0	2	3.4	12.3	0.1	17.7	
Cars +	1	96	2071	203	16	2387	0	446	326	130	8	910	1	670	1821	390	0	2882	0	151	258	928	3	1340	7519
% Cars +	100	98	98.9	99	69.6	98.6	0	97.2	100	99.2	88.9	98.4	100	96.1	98.6	99	0	97.8	0	99.3	99.6	99	42.9	98.9	98.3
Trucks	0	2	22	2	7	33	0	13	0	1	1	15	0	27	25	4	8	64	0	1	1	9	4	15	127
% Trucks	0	2	1.1	1	30.4	1.4	0	2.8	0	0.8	11.1	1.6	0	3.9	1.4	1	100	2.2	0	0.7	0.4	1	57.1	1.1	1.7

File Name : 3 - Inwood Ave & Hudson Blvd, 5-29-14, 645-845am, 415-615pm
Site Code : 3
Start Date : 5/29/2014
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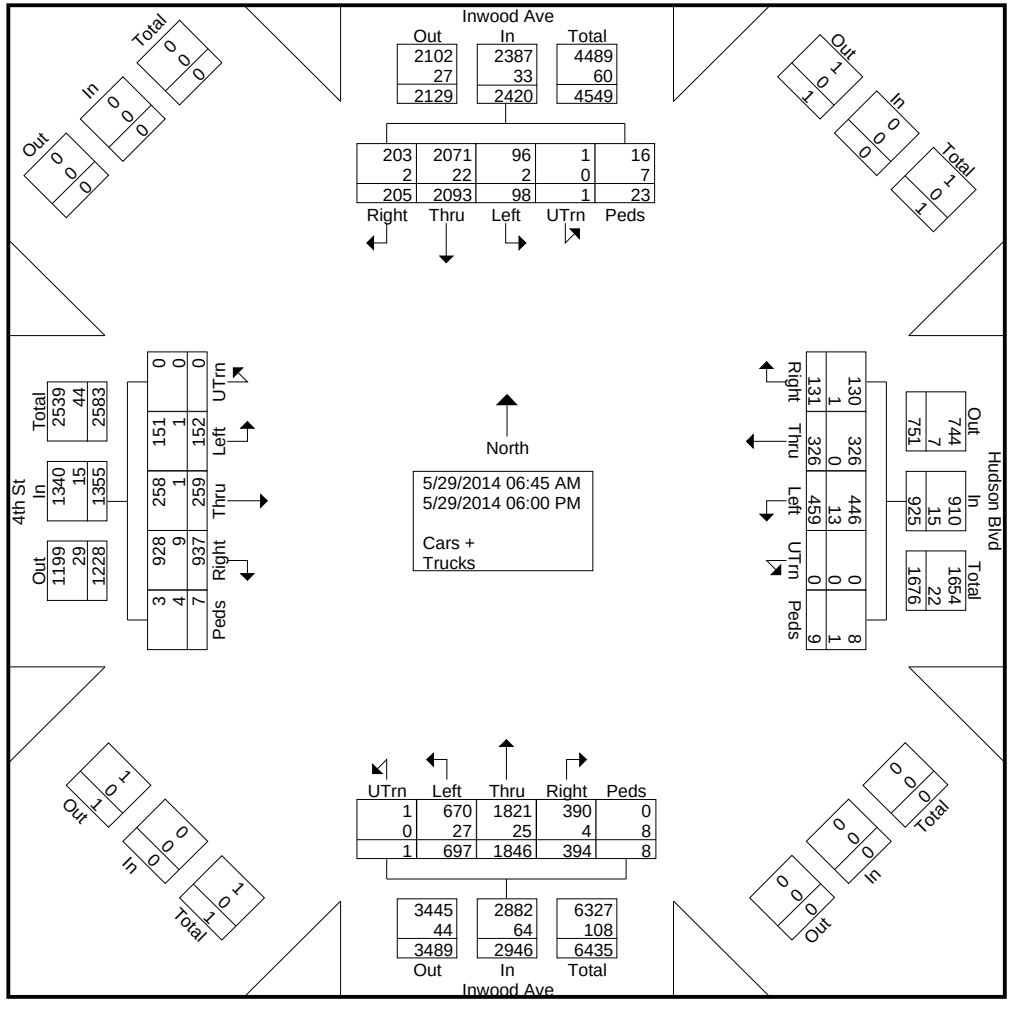
Inwood Ave & Hudson Blvd
Lake Elmo, MN



Traffic Data Inc
PO Box 16296
St. Louis Park, MN 55416

File Name : 3 - Inwood Ave & Hudson Blvd, 5-29-14, 645-845am, 415-615pm
Site Code : 3
Start Date : 5/29/2014
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Inwood Ave & Hudson Blvd
Lake Elmo, MN

	Inwood Ave Southbound						Hudson Blvd Westbound						Inwood Ave Northbound						4th St Eastbound						
Start Time	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 06:45 AM to 12:30 PM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 07:45 AM																									
07:45 AM	0	13	117	12	7	149	0	20	45	10	1	76	0	54	94	43	0	191	0	4	3	31	0	38	454
08:00 AM	0	8	98	16	0	122	0	40	37	7	0	84	0	57	77	42	0	176	0	1	9	45	0	55	437
08:15 AM	0	4	53	11	1	69	0	44	43	10	1	98	0	34	68	30	0	132	0	5	5	42	0	52	351
08:30 AM	0	8	105	13	3	129	0	33	42	21	1	97	0	31	75	24	0	130	0	4	5	31	0	40	396
Total Volume	0	33	373	52	11	469	0	137	167	48	3	355	0	176	314	139	0	629	0	14	22	149	0	185	1638
% App. Total	0	7	79.5	11.1	2.3		0	38.6	47	13.5	0.8		0	28	49.9	22.1	0		0	7.6	11.9	80.5	0		
PHF	.000	.635	.797	.813	.393	.787	.000	.778	.928	.571	.750	.906	.000	.772	.835	.808	.000	.823	.000	.700	.611	.828	.000	.841	.902
Peak Hour Analysis From 12:45 PM to 06:00 PM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 04:30 PM																									
04:30 PM	0	6	228	11	0	245	0	51	14	9	0	74	0	30	160	30	0	220	0	10	25	87	1	123	662
04:45 PM	0	6	183	8	0	197	0	24	6	7	0	37	0	52	130	23	0	205	0	18	26	81	2	127	566
05:00 PM	0	7	181	10	0	198	0	48	6	10	0	64	0	67	161	19	1	248	0	14	37	113	0	164	674
05:15 PM	0	10	153	8	4	175	0	33	7	4	0	44	1	57	195	24	5	282	0	17	40	103	1	161	662
Total Volume	0	29	745	37	4	815	0	156	33	30	0	219	1	206	646	96	6	955	0	59	128	384	4	575	2564
% App. Total	0	3.6	91.4	4.5	0.5		0	71.2	15.1	13.7	0		0.1	21.6	67.6	10.1	0.6		0	10.3	22.3	66.8	0.7		
PHF	.000	.725	.817	.841	.250	.832	.000	.765	.589	.750	.000	.740	.250	.769	.828	.800	.300	.847	.000	.819	.800	.850	.500	.877	.951

Traffic Data Inc
PO Box 16296
St. Louis Park, MN 55416

File Name : 4 - Inwood Ave & Eagle Point Blvd, 5-29-14, 645-845am, 415-615pm
Site Code : 4
Start Date : 5/29/2014
Page No : 1

Inwood Ave & Eagle Point Blvd
Lake Elmo, MN

Groups Printed- Cars + - Trucks

	Inwood Ave Southbound						Eagle Point Blvd Westbound						Inwood Ave Northbound						Oak Marsh Eastbound						
Start Time	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	Int. Total
06:45 AM	0	8	69	5	0	82	0	0	0	0	0	0	0	11	36	9	0	56	0	1	0	2	1	4	142
Total	0	8	69	5	0	82	0	0	0	0	0	0	0	11	36	9	0	56	0	1	0	2	1	4	142
07:00 AM	0	14	87	6	0	107	0	1	0	0	1	2	0	10	27	10	0	47	0	2	0	4	1	7	163
07:15 AM	0	17	99	11	0	127	0	0	0	0	0	0	0	14	63	19	0	96	0	1	0	2	2	5	228
07:30 AM	0	16	110	5	0	131	0	0	0	1	0	1	0	21	66	17	0	104	0	1	0	2	0	3	239
07:45 AM	0	26	142	10	0	178	0	0	0	2	0	2	0	14	82	25	0	121	0	3	0	2	1	6	307
Total	0	73	438	32	0	543	0	1	0	3	1	5	0	59	238	71	0	368	0	7	0	10	4	21	937
08:00 AM	0	33	123	6	0	162	0	3	0	1	0	4	0	12	65	23	0	100	0	3	0	3	0	6	272
08:15 AM	0	14	70	6	0	90	0	1	0	0	0	1	0	12	46	21	0	79	0	1	0	3	0	4	174
08:30 AM	0	23	100	9	0	132	0	3	0	1	0	4	0	14	78	14	0	106	0	1	0	6	0	7	249
08:45 AM	0	0	2	0	0	2	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	3
Total	0	70	295	21	0	386	0	7	0	2	0	9	0	38	190	58	0	286	0	5	0	12	0	17	698
04:15 PM	0	3	141	5	0	149	0	17	2	13	0	32	0	15	185	3	0	203	0	3	0	9	0	12	396
04:30 PM	0	4	170	13	0	187	0	35	0	21	0	56	0	22	178	0	0	200	0	7	0	14	0	21	464
04:45 PM	0	5	168	12	0	185	0	23	0	19	0	42	0	21	160	1	0	182	0	6	0	16	2	24	433
Total	0	12	479	30	0	521	0	75	2	53	0	130	0	58	523	4	0	585	0	16	0	39	2	57	1293
05:00 PM	0	4	153	18	0	175	0	19	0	24	0	43	0	31	176	2	0	209	0	13	0	22	0	35	462
05:15 PM	0	2	140	26	0	168	0	12	0	14	0	26	0	21	220	0	0	241	0	12	0	16	1	29	464
05:30 PM	0	0	183	14	0	197	0	18	0	9	1	28	1	18	164	1	0	184	0	12	0	8	0	20	429
05:45 PM	0	1	163	14	0	178	0	9	1	16	0	26	0	22	166	1	0	189	0	7	0	8	1	16	409
Total	0	7	639	72	0	718	0	58	1	63	1	123	1	92	726	4	0	823	0	44	0	54	2	100	1764
06:00 PM	0	2	131	6	1	140	0	6	0	6	0	12	0	17	147	0	0	164	0	4	0	9	1	14	330
Grand Total	0	172	2051	166	1	2390	0	147	3	127	2	279	1	275	1860	146	0	2282	0	77	0	126	10	213	5164
Apprch %	0	7.2	85.8	6.9	0		0	52.7	1.1	45.5	0.7		0	12.1	81.5	6.4	0		0	36.2	0	59.2	4.7		
Total %	0	3.3	39.7	3.2	0	46.3	0	2.8	0.1	2.5	0	5.4	0	5.3	36	2.8	0	44.2	0	1.5	0	2.4	0.2	4.1	
Cars +	0	171	2035	165	1	2372	0	147	3	127	0	277	1	273	1840	146	0	2260	0	76	0	125	4	205	5114
% Cars +	0	99.4	99.2	99.4	100	99.2	0	100	100	100	0	99.3	100	99.3	98.9	100	0	99	0	98.7	0	99.2	40	96.2	99
Trucks	0	1	16	1	0	18	0	0	0	0	2	2	0	2	20	0	0	22	0	1	0	1	6	8	50
% Trucks	0	0.6	0.8	0.6	0	0.8	0	0	0	0	100	0.7	0	0.7	1.1	0	0	1	0	1.3	0	0.8	60	3.8	1

Traffic Data Inc
PO Box 16296
St. Louis Park, MN 55416

File Name : 4 - Inwood Ave & Eagle Point Blvd, 5-29-14, 645-845am, 415-615pm
Site Code : 4
Start Date : 5/29/2014
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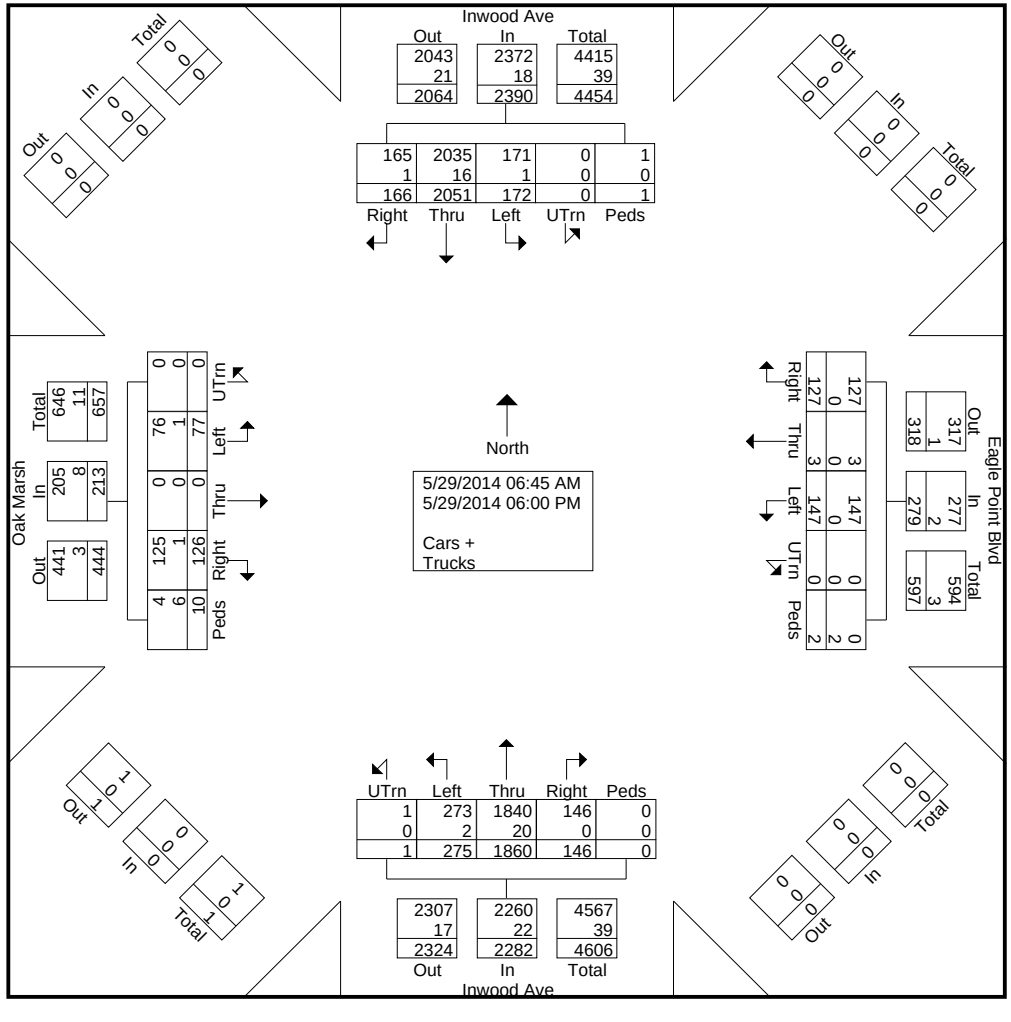
Inwood Ave & Eagle Point Blvd
Lake Elmo, MN



Traffic Data Inc
PO Box 16296
St. Louis Park, MN 55416

File Name : 4 - Inwood Ave & Eagle Point Blvd, 5-29-14, 645-845am, 415-615pm
Site Code : 4
Start Date : 5/29/2014
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Inwood Ave & Eagle Point Blvd
Lake Elmo, MN

	Inwood Ave Southbound						Eagle Point Blvd Westbound						Inwood Ave Northbound						Oak Marsh Eastbound						
Start Time	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 06:45 AM to 12:30 PM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 07:15 AM																									
07:15 AM	0	17	99	11	0	127	0	0	0	0	0	0	0	14	63	19	0	96	0	1	0	2	2	5	228
07:30 AM	0	16	110	5	0	131	0	0	0	1	0	1	0	21	66	17	0	104	0	1	0	2	0	3	239
07:45 AM	0	26	142	10	0	178	0	0	0	2	0	2	0	14	82	25	0	121	0	3	0	2	1	6	307
08:00 AM	0	33	123	6	0	162	0	3	0	1	0	4	0	12	65	23	0	100	0	3	0	3	0	6	272
Total Volume	0	92	474	32	0	598	0	3	0	4	0	7	0	61	276	84	0	421	0	8	0	9	3	20	1046
% App. Total	0	15.4	79.3	5.4	0		0	42.9	0	57.1	0		0	14.5	65.6	20	0		0	40	0	45	15		
PHF	.000	.697	.835	.727	.000	.840	.000	.250	.000	.500	.000	.438	.000	.726	.841	.840	.000	.870	.000	.667	.000	.750	.375	.833	.852
Peak Hour Analysis From 12:45 PM to 06:00 PM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 04:30 PM																									
04:30 PM	0	4	170	13	0	187	0	35	0	21	0	56	0	22	178	0	0	200	0	7	0	14	0	21	464
04:45 PM	0	5	168	12	0	185	0	23	0	19	0	42	0	21	160	1	0	182	0	6	0	16	2	24	433
05:00 PM	0	4	153	18	0	175	0	19	0	24	0	43	0	31	176	2	0	209	0	13	0	22	0	35	462
05:15 PM	0	2	140	26	0	168	0	12	0	14	0	26	0	21	220	0	0	241	0	12	0	16	1	29	464
Total Volume	0	15	631	69	0	715	0	89	0	78	0	167	0	95	734	3	0	832	0	38	0	68	3	109	1823
% App. Total	0	2.1	88.3	9.7	0		0	53.3	0	46.7	0		0	11.4	88.2	0.4	0		0	34.9	0	62.4	2.8		
PHF	.000	.750	.928	.663	.000	.956	.000	.636	.000	.813	.000	.746	.000	.766	.834	.375	.000	.863	.000	.731	.000	.773	.375	.779	.982

Traffic Data Inc
PO Box 16296
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File Name : 5 - Inwood Ave & 9th St, 5-29-14, 645-845am, 415-615pm
Site Code : 5
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Page No : 1

Inwood Ave & 9th St
Lake Elmo, MN

Groups Printed- Cars + - Trucks

	Inwood Ave Southbound						Westbound						Inwood Ave Northbound						9th St N Eastbound						
Start Time	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	Int. Total
06:45 AM	0	0	90	0	0	90	0	0	0	0	0	0	0	0	37	0	0	37	0	2	0	1	0	3	130
Total	0	0	90	0	0	90	0	0	0	0	0	0	0	0	37	0	0	37	0	2	0	1	0	3	130
07:00 AM	0	0	96	2	0	98	0	0	0	0	1	1	0	1	35	0	0	36	0	1	0	1	0	2	137
07:15 AM	0	0	125	2	0	127	0	0	0	0	0	0	0	0	69	0	0	69	0	3	0	3	1	7	203
07:30 AM	0	0	137	0	0	137	0	0	0	0	0	0	0	1	68	0	0	69	0	2	0	2	0	4	210
07:45 AM	0	0	168	1	0	169	0	0	0	0	0	0	0	1	78	0	0	79	1	0	0	4	1	6	254
Total	0	0	526	5	0	531	0	0	0	0	1	1	0	3	250	0	0	253	1	6	0	10	2	19	804
08:00 AM	0	0	135	1	0	136	0	0	0	0	0	0	1	2	63	0	0	66	0	0	0	6	2	8	210
08:15 AM	0	0	86	1	0	87	0	0	0	0	0	0	0	0	45	0	0	45	0	0	0	4	0	4	136
08:30 AM	0	0	128	0	0	128	0	0	0	0	0	0	0	2	77	0	0	79	1	0	0	4	2	7	214
08:45 AM	0	0	11	0	0	11	0	0	0	0	0	0	1	0	11	0	0	12	0	0	0	0	0	0	23
Total	0	0	360	2	0	362	0	0	0	0	0	0	2	4	196	0	0	202	1	0	0	14	4	19	583
03:45 PM	0	0	0	1	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0	2	0	0	0	2	4
Total	0	0	0	1	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0	2	0	0	0	2	4
04:15 PM	1	0	142	1	0	144	0	0	0	0	0	0	2	7	187	0	0	196	0	0	0	4	0	4	344
04:30 PM	1	0	191	3	0	195	0	0	0	0	0	0	0	6	219	0	0	225	0	0	0	1	0	1	421
04:45 PM	1	0	195	2	0	198	0	0	0	0	0	0	0	5	175	0	0	180	0	3	0	3	1	7	385
Total	3	0	528	6	0	537	0	0	0	0	0	0	2	18	581	0	0	601	0	3	0	8	1	12	1150
05:00 PM	1	0	170	3	0	174	0	0	0	0	0	0	2	6	210	0	0	218	0	2	0	4	0	6	398
05:15 PM	0	0	171	4	0	175	0	0	0	0	0	0	2	2	228	0	0	232	0	1	0	5	1	7	414
05:30 PM	0	0	180	3	0	183	0	0	0	0	1	1	1	5	173	0	0	179	0	1	0	4	1	6	369
05:45 PM	1	0	160	4	0	165	0	0	0	0	0	0	3	5	176	0	0	184	0	0	0	4	0	4	353
Total	2	0	681	14	0	697	0	0	0	0	1	1	8	18	787	0	0	813	0	4	0	17	2	23	1534
06:00 PM	1	0	135	0	0	136	0	0	0	0	0	0	1	4	143	0	0	148	0	1	0	4	5	10	294
Grand Total	6	0	2320	28	0	2354	0	0	0	0	3	3	13	47	1994	0	0	2054	2	18	0	54	14	88	4499
Apprch %	0.3	0	98.6	1.2	0		0	0	0	0	100		0.6	2.3	97.1	0	0		2.3	20.5	0	61.4	15.9		
Total %	0.1	0	51.6	0.6	0	52.3	0	0	0	0	0.1	0.1	0.3	1	44.3	0	0	45.7	0	0.4	0	1.2	0.3	2	
Cars +	6	0	2299	24	0	2329	0	0	0	0	0	0	13	47	1961	0	0	2021	0	17	0	53	5	75	4425
% Cars +	100	0	99.1	85.7	0	98.9	0	0	0	0	0	0	100	100	98.3	0	0	98.4	0	94.4	0	98.1	35.7	85.2	98.4
Trucks	0	0	21	4	0	25	0	0	0	0	3	3	0	0	33	0	0	33	2	1	0	1	9	13	74
% Trucks	0	0	0.9	14.3	0	1.1	0	0	0	0	100	100	0	0	1.7	0	0	1.6	100	5.6	0	1.9	64.3	14.8	1.6

File Name : 5 - Inwood Ave & 9th St, 5-29-14, 645-845am, 415-615pm
Site Code : 5
Start Date : 5/29/2014
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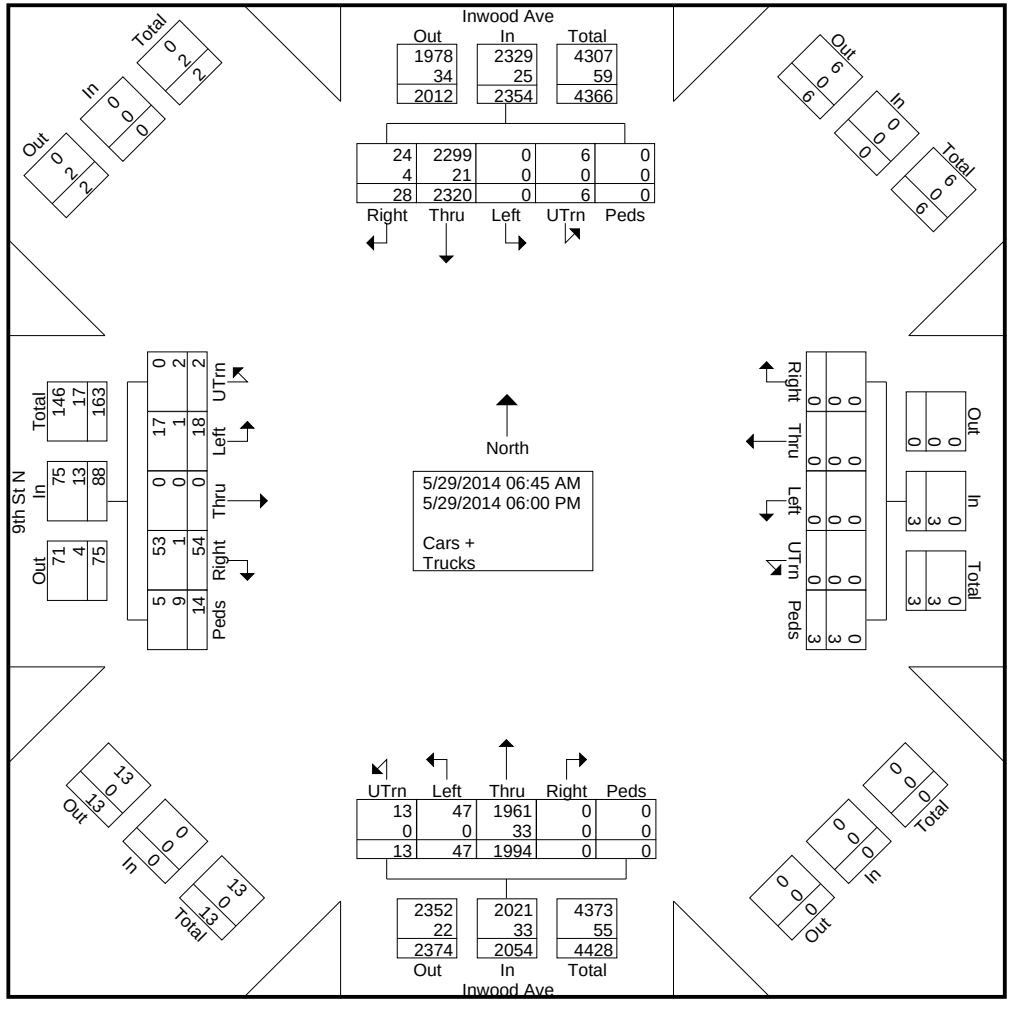
Inwood Ave & 9th St
Lake Elmo, MN



Traffic Data Inc
PO Box 16296
St. Louis Park, MN 55416

File Name : 5 - Inwood Ave & 9th St, 5-29-14, 645-845am, 415-615pm
Site Code : 5
Start Date : 5/29/2014
Page No : 3

Inwood Ave & 9th St
Lake Elmo, MN

	Inwood Ave Southbound						Westbound						Inwood Ave Northbound						9th St N Eastbound						
Start Time	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 06:45 AM to 12:30 PM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 07:15 AM																									
07:15 AM	0	0	125	2	0	127	0	0	0	0	0	0	0	0	69	0	0	69	0	3	0	3	1	7	203
07:30 AM	0	0	137	0	0	137	0	0	0	0	0	0	0	1	68	0	0	69	0	2	0	2	0	4	210
07:45 AM	0	0	168	1	0	169	0	0	0	0	0	0	0	1	78	0	0	79	1	0	0	4	1	6	254
08:00 AM	0	0	135	1	0	136	0	0	0	0	0	0	1	2	63	0	0	66	0	0	0	6	2	8	210
Total Volume	0	0	565	4	0	569	0	0	0	0	0	0	1	4	278	0	0	283	1	5	0	15	4	25	877
% App. Total	0	0	99.3	0.7	0		0	0	0	0	0		0.4	1.4	98.2	0	0		4	20	0	60	16		
PHF	.000	.000	.841	.500	.000	.842	.000	.000	.000	.000	.000	.000	.250	.500	.891	.000	.000	.896	.250	.417	.000	.625	.500	.781	.863
Peak Hour Analysis From 12:45 PM to 06:00 PM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 04:30 PM																									
04:30 PM	1	0	191	3	0	195	0	0	0	0	0	0	0	6	219	0	0	225	0	0	0	1	0	1	421
04:45 PM	1	0	195	2	0	198	0	0	0	0	0	0	0	5	175	0	0	180	0	3	0	3	1	7	385
05:00 PM	1	0	170	3	0	174	0	0	0	0	0	0	2	6	210	0	0	218	0	2	0	4	0	6	398
05:15 PM	0	0	171	4	0	175	0	0	0	0	0	0	2	2	228	0	0	232	0	1	0	5	1	7	414
Total Volume	3	0	727	12	0	742	0	0	0	0	0	0	4	19	832	0	0	855	0	6	0	13	2	21	1618
% App. Total	0.4	0	98	1.6	0		0	0	0	0	0		0.5	2.2	97.3	0	0		0	28.6	0	61.9	9.5		
PHF	.750	.000	.932	.750	.000	.937	.000	.000	.000	.000	.000	.000	.500	.792	.912	.000	.000	.921	.000	.500	.000	.650	.500	.750	.961

Traffic Data Inc
PO Box 16296
St. Louis Park, MN 55416

File Name : 6 - Inwood Ave & 10th St, 5-29-14, 6am-7pm
Site Code : 6
Start Date : 5/29/2014
Page No : 1

Inwood Ave & 10th St
Lake Elmo, MN

Groups Printed- Cars + - Trucks

	Inwood Ave Southbound						10th St N Westbound						Inwood Ave Northbound						10th St N Eastbound						
Start Time	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	Int. Total
06:00 AM	0	2	22	9	0	33	0	0	14	5	0	19	0	6	17	3	0	26	0	1	8	5	0	14	92
06:15 AM	0	2	19	8	0	29	0	1	24	7	0	32	0	10	20	2	0	32	0	1	11	12	0	24	117
06:30 AM	0	7	41	9	0	57	0	3	45	13	0	61	0	5	16	0	0	21	0	3	8	15	0	26	165
06:45 AM	0	11	58	13	1	83	0	7	33	15	0	55	0	15	20	5	0	40	0	4	12	25	0	41	219
Total	0	22	140	39	1	202	0	11	116	40	0	167	0	36	73	10	0	119	0	9	39	57	0	105	593
07:00 AM	0	9	61	17	0	87	0	12	78	28	1	119	0	13	15	5	0	33	0	5	20	23	2	50	289
07:15 AM	0	12	64	20	0	96	0	21	74	29	0	124	0	22	38	9	0	69	0	3	31	44	0	78	367
07:30 AM	0	18	79	23	0	120	0	17	103	26	0	146	1	26	39	10	0	76	0	6	25	40	0	71	413
07:45 AM	0	11	83	21	0	115	0	27	124	32	0	183	3	29	47	8	0	87	0	9	42	57	1	109	494
Total	0	50	287	81	0	418	0	77	379	115	1	572	4	90	139	32	0	265	0	23	118	164	3	308	1563
08:00 AM	0	8	95	18	0	121	0	22	118	34	2	176	3	23	28	7	2	63	0	9	19	33	0	61	421
08:15 AM	0	8	39	8	0	55	0	19	109	26	0	154	1	24	20	2	0	47	0	11	27	29	0	67	323
08:30 AM	0	13	81	18	0	112	0	13	84	37	0	134	0	21	51	5	0	77	0	10	20	46	1	77	400
08:45 AM	0	22	73	9	0	104	0	14	54	14	0	82	0	27	33	3	2	65	0	2	35	52	1	90	341
Total	0	51	288	53	0	392	0	68	365	111	2	546	4	95	132	17	4	252	0	32	101	160	2	295	1485
09:00 AM	0	16	53	11	0	80	0	6	38	7	0	51	3	24	36	10	0	73	0	9	24	26	2	61	265
09:15 AM	0	11	34	10	0	55	0	8	25	15	0	48	0	18	31	5	0	54	0	2	27	40	2	71	228
09:30 AM	0	11	42	8	3	64	0	11	11	8	2	32	0	19	35	7	0	61	0	6	22	32	2	62	219
09:45 AM	0	7	48	5	0	60	0	11	27	13	0	51	0	27	38	6	1	72	0	5	26	28	2	61	244
Total	0	45	177	34	3	259	0	36	101	43	2	182	3	88	140	28	1	260	0	22	99	126	8	255	956
10:00 AM	0	15	30	4	5	54	0	4	36	4	0	44	0	32	30	5	0	67	1	2	25	21	0	49	214
10:15 AM	0	6	40	2	1	49	0	12	31	14	0	57	1	22	41	4	0	68	0	5	29	35	0	69	243
10:30 AM	0	9	40	13	0	62	0	9	41	8	0	58	0	23	37	7	0	67	0	4	20	52	0	76	263
10:45 AM	0	14	37	2	0	53	0	13	21	16	0	50	1	28	47	17	0	93	0	4	28	42	0	74	270
Total	0	44	147	21	6	218	0	38	129	42	0	209	2	105	155	33	0	295	1	15	102	150	0	268	990
11:00 AM	0	7	34	7	2	50	0	10	31	9	0	50	0	28	36	14	0	78	0	2	35	43	1	81	259
11:15 AM	1	15	44	4	0	64	1	8	27	8	0	44	1	36	52	11	6	106	0	4	40	33	2	79	293
11:30 AM	0	13	42	2	0	57	0	4	28	8	3	43	1	40	48	6	0	95	0	4	28	43	1	76	271
11:45 AM	0	16	45	7	0	68	0	10	21	8	0	39	1	28	39	11	0	79	0	12	26	36	0	74	260
Total	1	51	165	20	2	239	1	32	107	33	3	176	3	132	175	42	6	358	0	22	129	155	4	310	1083
12:00 PM	0	8	58	6	0	72	0	16	19	10	0	45	1	34	48	8	0	91	0	11	35	38	2	86	294
12:15 PM	0	5	28	10	0	43	0	14	16	15	0	45	0	43	57	27	0	127	0	4	31	48	0	83	298
12:30 PM	0	10	42	6	1	59	0	11	29	10	1	51	0	34	47	14	0	95	0	6	40	27	1	74	279
12:45 PM	0	9	38	6	0	53	0	16	39	15	0	70	3	60	47	16	0	126	0	11	31	35	0	77	326
Total	0	32	166	28	1	227	0	57	103	50	1	211	4	171	199	65	0	439	0	32	137	148	3	320	1197
01:00 PM	0	13	44	7	1	65	0	5	21	19	0	45	2	43	46	13	0	104	0	8	20	37	0	65	279
01:15 PM	0	6	45	7	0	58	0	8	21	10	0	39	1	31	47	8	0	87	0	5	39	30	0	74	258
01:30 PM	0	5	47	2	0	54	0	8	28	14	0	50	1	36	44	15	0	96	0	4	35	29	0	68	268
01:45 PM	0	17	47	11	0	75	0	15	37	10	0	62	1	29	55	8	0	93	0	5	26	33	0	64	294
Total	0	41	183	27	1	252	0	36	107	53	0	196	5	139	192	44	0	380	0	22	120	129	0	271	1099

Traffic Data Inc
PO Box 16296
St. Louis Park, MN 55416

File Name : 6 - Inwood Ave & 10th St, 5-29-14, 6am-7pm
Site Code : 6
Start Date : 5/29/2014
Page No : 2

Inwood Ave & 10th St
Lake Elmo, MN

Groups Printed- Cars + - Trucks

	Inwood Ave Southbound						10th St N Westbound						Inwood Ave Northbound						10th St N Eastbound						
Start Time	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	Int. Total
02:00 PM	0	12	35	5	0	52	0	10	39	15	0	64	2	38	42	8	0	90	0	6	37	29	0	72	278
02:15 PM	0	13	40	8	0	61	0	11	34	16	0	61	1	46	42	17	0	106	0	10	39	36	0	85	313
02:30 PM	0	14	37	10	0	61	0	17	24	13	0	54	0	40	55	13	0	108	1	12	29	50	0	92	315
02:45 PM	0	12	47	6	0	65	0	8	33	19	0	60	0	28	59	11	1	99	0	13	45	51	0	109	333
Total	0	51	159	29	0	239	0	46	130	63	0	239	3	152	198	49	1	403	1	41	150	166	0	358	1239
03:00 PM	0	23	42	5	0	70	0	8	24	17	0	49	1	43	69	11	0	124	0	20	58	38	0	116	359
03:15 PM	0	23	47	11	0	81	0	12	26	18	0	56	0	50	59	22	0	131	0	18	55	42	0	115	383
03:30 PM	1	32	73	10	0	116	0	8	42	12	0	62	0	48	74	15	0	137	0	9	62	58	1	130	445
03:45 PM	0	20	66	12	0	98	0	14	38	22	0	74	1	42	73	18	0	134	1	13	97	73	0	184	490
Total	1	98	228	38	0	365	0	42	130	69	0	241	2	183	275	66	0	526	1	60	272	211	1	545	1677
04:00 PM	0	26	66	13	1	106	0	13	31	22	0	66	2	60	78	16	1	157	0	17	85	61	0	163	492
04:15 PM	0	33	57	5	2	97	0	20	35	35	0	90	0	66	93	19	0	178	0	25	94	57	0	176	541
04:30 PM	0	53	81	8	1	143	0	12	33	14	0	59	2	70	110	27	2	211	0	38	121	98	2	259	672
04:45 PM	0	41	80	6	0	127	0	14	36	36	1	87	0	47	91	21	0	159	1	35	162	78	0	276	649
Total	0	153	284	32	4	473	0	59	135	107	1	302	4	243	372	83	3	705	1	115	462	294	2	874	2354
05:00 PM	0	39	83	9	0	131	0	11	30	22	0	63	1	64	125	44	0	234	0	35	132	70	0	237	665
05:15 PM	0	51	70	8	1	130	0	5	50	19	0	74	1	69	100	28	0	198	0	33	176	107	0	316	718
05:30 PM	0	50	92	9	0	151	0	15	40	35	0	90	1	50	118	22	0	191	0	28	183	76	3	290	722
05:45 PM	0	25	75	16	0	116	0	23	37	28	0	88	0	68	101	23	0	192	0	22	150	66	0	238	634
Total	0	165	320	42	1	528	0	54	157	104	0	315	3	251	444	117	0	815	0	118	641	319	3	1081	2739
06:00 PM	0	34	57	15	0	106	0	10	44	22	0	76	0	45	81	23	0	149	0	12	76	60	3	151	482
06:15 PM	0	28	57	8	1	94	0	10	37	25	0	72	0	33	61	17	0	111	0	19	66	45	0	130	407
06:30 PM	0	17	42	8	0	67	0	11	30	19	0	60	0	27	68	16	0	111	0	12	55	38	1	106	344
06:45 PM	0	13	52	4	0	69	0	8	28	16	0	52	0	31	47	12	0	90	0	14	53	36	4	107	318
Total	0	92	208	35	1	336	0	39	139	82	0	260	0	136	257	68	0	461	0	57	250	179	8	494	1551
Grand Total	2	895	2752	479	20	4148	1	595	2098	912	10	3616	37	1821	2751	654	15	5278	4	568	2620	2258	34	5484	18526
Apprch %	0	21.6	66.3	11.5	0.5		0	16.5	58	25.2	0.3		0.7	34.5	52.1	12.4	0.3		0.1	10.4	47.8	41.2	0.6		
Total %	0	4.8	14.9	2.6	0.1	22.4	0	3.2	11.3	4.9	0.1	19.5	0.2	9.8	14.8	3.5	0.1	28.5	0	3.1	14.1	12.2	0.2	29.6	
Cars +	2	872	2714	473	1	4062	1	581	2043	887	5	3517	36	1788	2704	639	3	5170	4	557	2611	2224	15	5411	18160
% Cars +	100	97.4	98.6	98.7	5	97.9	100	97.6	97.4	97.3	50	97.3	97.3	98.2	98.3	97.7	20	98	100	98.1	99.7	98.5	44.1	98.7	98
Trucks	0	23	38	6	19	86	0	14	55	25	5	99	1	33	47	15	12	108	0	11	9	34	19	73	366
% Trucks	0	2.6	1.4	1.3	95	2.1	0	2.4	2.6	2.7	50	2.7	2.7	1.8	1.7	2.3	80	2	0	1.9	0.3	1.5	55.9	1.3	2

File Name : 6 - Inwood Ave & 10th St, 5-29-14, 6am-7pm
Site Code : 6
Start Date : 5/29/2014
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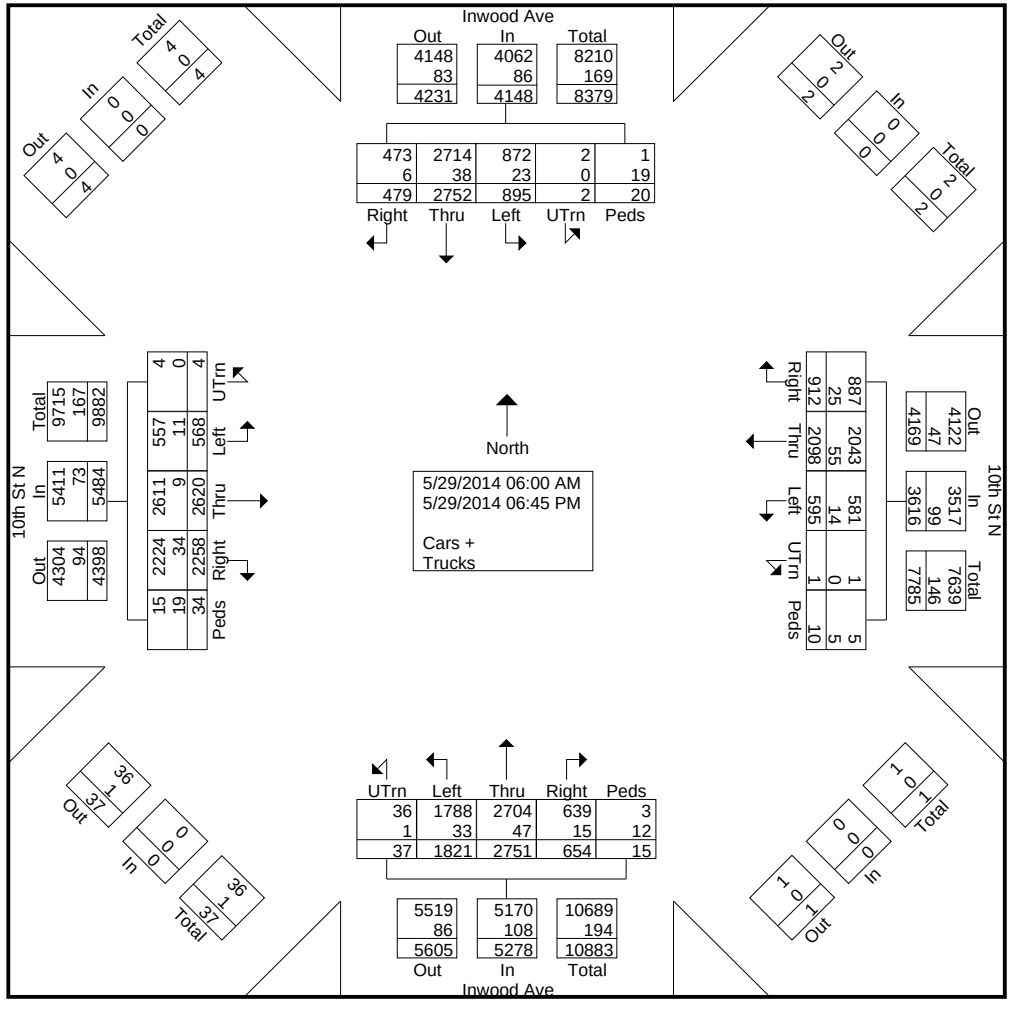
Inwood Ave & 10th St
Lake Elmo, MN



Traffic Data Inc
PO Box 16296
St. Louis Park, MN 55416

File Name : 6 - Inwood Ave & 10th St, 5-29-14, 6am-7pm
Site Code : 6
Start Date : 5/29/2014
Page No : 4

Inwood Ave & 10th St
Lake Elmo, MN

	Inwood Ave Southbound						10th St N Westbound						Inwood Ave Northbound						10th St N Eastbound						
Start Time	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 09:45 AM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 07:15 AM																									
07:15 AM	0	12	64	20	0	96	0	21	74	29	0	124	0	22	38	9	0	69	0	3	31	44	0	78	367
07:30 AM	0	18	79	23	0	120	0	17	103	26	0	146	1	26	39	10	0	76	0	6	25	40	0	71	413
07:45 AM	0	11	83	21	0	115	0	27	124	32	0	183	3	29	47	8	0	87	0	9	42	57	1	109	494
08:00 AM	0	8	95	18	0	121	0	22	118	34	2	176	3	23	28	7	2	63	0	9	19	33	0	61	421
Total Volume	0	49	321	82	0	452	0	87	419	121	2	629	7	100	152	34	2	295	0	27	117	174	1	319	1695
% App. Total	0	10.8	71	18.1	0		0	13.8	66.6	19.2	0.3		2.4	33.9	51.5	11.5	0.7		0	8.5	36.7	54.5	0.3		
PHF	.000	.681	.845	.891	.000	.934	.000	.806	.845	.890	.250	.859	.583	.862	.809	.850	.250	.848	.000	.750	.696	.763	.250	.732	.858
Peak Hour Analysis From 10:00 AM to 01:45 PM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 12:00 PM																									
12:00 PM	0	8	58	6	0	72	0	16	19	10	0	45	1	34	48	8	0	91	0	11	35	38	2	86	294
12:15 PM	0	5	28	10	0	43	0	14	16	15	0	45	0	43	57	27	0	127	0	4	31	48	0	83	298
12:30 PM	0	10	42	6	1	59	0	11	29	10	1	51	0	34	47	14	0	95	0	6	40	27	1	74	279
12:45 PM	0	9	38	6	0	53	0	16	39	15	0	70	3	60	47	16	0	126	0	11	31	35	0	77	326
Total Volume	0	32	166	28	1	227	0	57	103	50	1	211	4	171	199	65	0	439	0	32	137	148	3	320	1197
% App. Total	0	14.1	73.1	12.3	0.4		0	27	48.8	23.7	0.5		0.9	39	45.3	14.8	0		0	10	42.8	46.2	0.9		
PHF	.000	.800	.716	.700	.250	.788	.000	.891	.660	.833	.250	.754	.333	.713	.873	.602	.000	.864	.000	.727	.856	.771	.375	.930	.918
Peak Hour Analysis From 02:00 PM to 06:45 PM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 04:45 PM																									
04:45 PM	0	41	80	6	0	127	0	14	36	36	1	87	0	47	91	21	0	159	1	35	162	78	0	276	649
05:00 PM	0	39	83	9	0	131	0	11	30	22	0	63	1	64	125	44	0	234	0	35	132	70	0	237	665
05:15 PM	0	51	70	8	1	130	0	5	50	19	0	74	1	69	100	28	0	198	0	33	176	107	0	316	718
05:30 PM	0	50	92	9	0	151	0	15	40	35	0	90	1	50	118	22	0	191	0	28	183	76	3	290	722
Total Volume	0	181	325	32	1	539	0	45	156	112	1	314	3	230	434	115	0	782	1	131	653	331	3	1119	2754
% App. Total	0	33.6	60.3	5.9	0.2		0	14.3	49.7	35.7	0.3		0.4	29.4	55.5	14.7	0		0.1	11.7	58.4	29.6	0.3		
PHF	.000	.887	.883	.889	.250	.892	.000	.750	.780	.778	.250	.872	.750	.833	.868	.653	.000	.835	.250	.936	.892	.773	.250	.885	.954

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Lake Elmo Development

Vistro File: C:\...\Lake Elmo.vistropdb
Report File: C:\...\AM Existing.pdf

Scenario 1: AM Existing
7/2/2014

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	CSAH 13 & I-94 Southern Ramp	Signalized	HCM2010	SBL	0.364	15.8	B
2	CSAH 13 & I-94 Northern Ramp	Signalized	HCM2010	SBL	0.383	21.4	C
3	Inwood Ave & Hudson Blvd	Signalized	HCM2010	EBL	0.292	29.8	C
4	CSAH 13 & Eagle Point Blvd	Two-way stop	HCM2010	EBT	0.000	29.6	D
6	CSAH 13 & 9th St	Two-way stop	HCM2010	EBL	0.021	16.3	C
7	CSAH 13 & CSAH 10	Signalized	HCM2010	WBL	0.348	18.5	B

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value; for all other control types, they are taken for the whole intersection.

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Intersection Level Of Service Report
#1: CSAH 13 & I-94 Southern Ramp

Control Type:	Signalized	Delay (sec / veh):	15.8
Analysis Method:	HCM2010	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.364

Intersection Setup

Name	CSAH 13			CSAH 13			I-94 Ramp			I-94		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	1	2	0	1	1	0	2	0	0	0
Pocket Length [ft]	100.00	100.00	400.00	175.00	100.00	150.00	500.00	100.00	500.00	100.00	100.00	100.00
Speed [mph]	45.00			45.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	no			no			yes			no		

Volumes

Name	CSAH 13			CSAH 13			I-94 Ramp			I-94		
Base Volume Input [veh/h]	0	1172	76	12	613	55	286	20	410	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	38	0	0	28	0	0	205	0	0	0
Total Hourly Volume [veh/h]	0	1172	38	12	613	27	286	20	205	0	0	0
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	318	10	3	167	7	78	5	56	0	0	0
Total Analysis Volume [veh/h]	0	1274	41	13	666	29	311	22	223	0	0	0
Presence of On-Street Parking			no	no		no	no		no			
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Appendix D - Capacity Analysis Backup

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Intersection Settings

Located in CBD	no
Signal Coordination Group	-
Cycle Length [s]	110
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	81.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	5.00

Phasing & Timing

Control Type	Permiss	Permiss	Permiss	Protecte	Permiss	Permiss	Permiss	Permiss	Overlap	Permiss	Protecte	Permiss
Signal Group	0	2	0	1	6	0	0	4	5	0	0	0
Lead / Lag	-	-	-	Lag	-	-	-	-	-	-	-	-
Minimum Green [s]	0	20	0	7	20	0	0	10	10	0	0	0
Maximum Green [s]	0	57	0	10	58	0	0	25	13	0	0	0
Amber [s]	0.0	4.5	0.0	3.0	4.5	0.0	0.0	3.5	3.5	0.0	0.0	0.0
All red [s]	0.0	1.0	0.0	2.0	1.5	0.0	0.0	3.5	3.5	0.0	0.0	0.0
Split [s]	0	63	0	15	61	0	0	32	17	0	0	0
Vehicle Extension [s]	0.0	4.6	0.0	2.0	4.6	0.0	0.0	3.0	2.0	0.0	0.0	0.0
Walk [s]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Clearance [s]	0	0	0	0	0	0	0	0	0	0	0	0
I1, Start-Up Lost Time [s]	0.0	2.0	0.0	2.0	2.0	0.0	0.0	2.0	2.0	0.0	0.0	0.0
I2, Clearance Lost Time [s]	0.0	3.5	0.0	3.0	4.0	0.0	0.0	5.0	5.0	0.0	0.0	0.0
Minimum Recall		no		no	no			no	no			
Maximum Recall		yes		no	yes			no	no			
Pedestrian Recall		no		no	no			no	no			
Detector Location [ft]	0.0	400.0	0.0	20.0	400.0	0.0	0.0	100.0	100.0	0.0	0.0	0.0
Detector Length [ft]	0.0	6.0	0.0	6.0	6.0	0.0	0.0	6.0	6.0	0.0	0.0	0.0
I, Upstream Filtering 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

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Lane Group Calculations

Lane Group	C	R	L	C	R	L	C	R	
L, Total Lost Time per Cycle [s]	5.50	5.50	5.00	6.00	6.00	7.00	7.00	7.00	
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
l2, Clearance Lost Time [s]	3.50	3.50	3.00	4.00	4.00	5.00	5.00	0.00	
g_i, Effective Green Time [s]	77	77	2	67	67	13	13	30	
g / C, Green / Cycle	0.70	0.70	0.02	0.61	0.61	0.12	0.12	0.27	
(v / s)_i Volume / Saturation Flow Rate	0.25	0.03	0.00	0.19	0.02	0.09	0.09	0.08	
s, saturation flow rate [veh/h]	5025	1568	3412	3512	1568	1757	1757	2775	
c, Capacity [veh/h]	3528	1101	75	2144	957	205	205	753	
d1, Uniform Delay [s]	6.54	5.01	52.84	10.31	8.51	47.08	47.08	31.75	
k, delay calibration	0.50	0.50	0.04	0.50	0.50	0.11	0.11	0.11	
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
d2, Incremental Delay [s]	0.29	0.06	0.41	0.38	0.06	5.61	5.61	0.22	
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	

Lane Group Results

X, volume / capacity	0.36	0.04	0.17	0.31	0.03	0.76	0.76	0.30	
d, Delay for Lane Group [s/veh]	6.83	5.08	53.25	10.69	8.57	52.69	52.69	31.97	
Lane Group LOS	A	A	D	B	A	D	D	C	
Critical Lane Group	no	no	no	yes	no	yes	no	yes	
50th-Percentile Queue Length [veh]	3.23	0.25	0.18	3.54	0.26	4.43	4.43	2.37	
50th-Percentile Queue Length [ft]	80.77	6.29	4.40	88.42	6.55	110.85	110.85	59.34	
95th-Percentile Queue Length [veh]	5.82	0.45	0.32	6.37	0.47	7.89	7.89	4.27	
95th-Percentile Queue Length [ft]	145.39	11.32	7.92	159.15	11.78	197.19	197.19	106.82	

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Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	0.00	6.83	5.08	53.25	10.69	8.57	52.69	52.69	31.97	0.00	0.00	0.00
Movement LOS		A	A	D	B	A	D	D	C			
d_A, Approach Delay [s/veh]	6.77			11.38			44.04			0.00		
Approach LOS	A			B			D			A		
d_I, Intersection Delay [s/veh]	15.83											
Intersection LOS	B											
Intersection V/C	0.364											

Sequence

Ring 1	1	2	4	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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Intersection Level Of Service Report
#2: CSAH 13 & I-94 Northern Ramp

Control Type:	Signalized	Delay (sec / veh):	21.4
Analysis Method:	HCM2010	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.383

Intersection Setup

Name	CSAH 13			CSAH 13			3rd St N			I-94 Ramp		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	2	0	0	1	0	1	1	0	0	2	0	1
Pocket Length [ft]	325.00	100.00	100.00	250.00	100.00	275.00	175.00	100.00	100.00	400.00	100.00	250.00
Speed [mph]	45.00			45.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	no			no			yes			no		

Volumes

Name	CSAH 13			CSAH 13			3rd St N			I-94 Ramp		
Base Volume Input [veh/h]	80	636	710	91	462	9	8	21	25	160	53	57
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	355	0	0	5	0	0	13	0	0	29
Total Hourly Volume [veh/h]	80	636	355	91	462	4	8	21	12	160	53	28
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	22	173	96	25	126	1	2	6	3	43	14	8
Total Analysis Volume [veh/h]	87	691	386	99	502	4	9	23	13	174	58	30
Presence of On-Street Parking	no		no	no		no	no		no	no		no
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Appendix D - Capacity Analysis Backup

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Intersection Settings

Located in CBD	no
Signal Coordination Group	-
Cycle Length [s]	110
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	89.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	5.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal Group	5	2	0	1	6	0	7	4	0	3	8	0
Lead / Lag	Lag	-	-	Lag	-	-	Lag	-	-	Lag	-	-
Minimum Green [s]	7	20	0	7	20	0	7	10	0	7	10	0
Maximum Green [s]	10	44	0	15	49	0	10	11	0	18	30	0
Amber [s]	3.0	4.5	0.0	3.0	4.5	0.0	3.0	3.5	0.0	3.0	3.5	0.0
All red [s]	2.0	1.5	0.0	2.0	2.0	0.0	2.0	3.5	0.0	2.0	3.0	0.0
Split [s]	15	50	0	20	55	0	15	18	0	22	25	0
Vehicle Extension [s]	2.0	4.6	0.0	2.0	4.6	0.0	2.0	3.0	0.0	2.0	3.0	0.0
Walk [s]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Clearance [s]	0	0	0	0	0	0	0	0	0	0	0	0
l1, Start-Up Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
l2, Clearance Lost Time [s]	3.0	4.0	0.0	3.0	4.5	0.0	3.0	5.0	0.0	3.0	4.5	0.0
Minimum Recall	no	no		no	no		no	no		no	no	
Maximum Recall	no	yes		no	yes		no	no		no	no	
Pedestrian Recall	no	no		no	no		no	no		no	no	
Detector Location [ft]	39.0	300.0	0.0	39.0	300.0	0.0	39.0	120.0	0.0	120.0	120.0	0.0
Detector Length [ft]	6.0	6.0	0.0	6.0	6.0	0.0	6.0	6.0	0.0	6.0	6.0	0.0
I, Upstream Filtering 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

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Lane Group Calculations

Lane Group	L	C	R	L	C	R	L	C	R	L	C	R
L, Total Lost Time per Cycle [s]	5.00	6.00	6.00	5.00	6.50	6.50	5.00	7.00	7.00	5.00	6.50	6.50
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	3.00	4.00	4.00	3.00	4.50	4.50	3.00	5.00	5.00	3.00	4.50	4.50
g_i, Effective Green Time [s]	7	65	65	8	66	66	6	7	7	8	9	9
g / C, Green / Cycle	0.06	0.59	0.59	0.07	0.60	0.60	0.05	0.06	0.06	0.07	0.09	0.09
(v / s)_i Volume / Saturation Flow Rate	0.03	0.20	0.25	0.06	0.14	0.00	0.01	0.01	0.01	0.05	0.03	0.02
s, saturation flow rate [veh/h]	3412	3512	1568	1757	3512	1568	1757	1845	1568	3412	1845	1568
c, Capacity [veh/h]	203	2064	922	125	2089	933	89	113	96	243	159	135
d1, Uniform Delay [s]	49.97	11.64	12.41	50.34	10.54	9.06	49.88	49.14	48.93	50.04	47.46	46.86
k, delay calibration	0.04	0.50	0.50	0.04	0.50	0.50	0.04	0.11	0.11	0.04	0.11	0.11
I, Upstream Filtering 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
d2, Incremental Delay [s]	0.53	0.44	1.40	4.23	0.27	0.01	0.18	0.88	0.64	1.49	1.40	0.82
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, 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
PF, progression 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

Lane Group Results

X, volume / capacity	0.43	0.33	0.42	0.79	0.24	0.00	0.10	0.20	0.14	0.72	0.36	0.22
d, Delay for Lane Group [s/veh]	50.51	12.08	13.81	54.57	10.81	9.07	50.06	50.02	49.57	51.53	48.85	47.68
Lane Group LOS	D	B	B	D	B	A	D	D	D	D	D	D
Critical Lane Group	no	no	yes	yes	no	no	no	yes	no	yes	no	no
50th-Percentile Queue Length [veh]	1.14	4.00	4.97	2.75	2.65	0.04	0.24	0.63	0.36	2.39	1.56	0.80
50th-Percentile Queue Length [ft]	28.49	99.97	124.24	68.82	66.35	0.94	6.03	15.73	8.89	59.76	39.08	19.94
95th-Percentile Queue Length [veh]	2.05	7.20	8.63	4.95	4.78	0.07	0.43	1.13	0.64	4.30	2.81	1.44
95th-Percentile Queue Length [ft]	51.28	179.95	215.63	123.87	119.43	1.68	10.85	28.31	16.00	107.57	70.34	35.89

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Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	50.51	12.08	13.81	54.57	10.81	9.07	50.06	50.02	49.57	51.53	48.85	47.68
Movement LOS	D	B	B	D	B	A	D	D	D	D	D	D
d_A, Approach Delay [s/veh]	15.53			17.96			49.90			50.50		
Approach LOS	B			B			D			D		
d_I, Intersection Delay [s/veh]	21.40											
Intersection LOS	C											
Intersection V/C	0.383											

Sequence

Ring 1	1	2	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	7	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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Intersection Level Of Service Report
#3: Inwood Ave & Hudson Blvd

Control Type:	Signalized	Delay (sec / veh):	29.8
Analysis Method:	HCM2010	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.292

Intersection Setup

Name	CSAH 13			CSAH 13			4th St N			Hudson Blvd		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	2	0	1	1	0	1	1	0	0	2	0	1
Pocket Length [ft]	175.00	100.00	250.00	100.00	100.00	100.00	175.00	100.00	100.00	250.00	100.00	250.00
Speed [mph]	45.00			45.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	no			yes			yes			yes		

Volumes

Name	CSAH 13			CSAH 13			4th St N			Hudson Blvd		
Base Volume Input [veh/h]	176	314	139	33	373	52	14	22	149	137	167	48
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	70	0	0	26	0	0	75	0	0	24
Total Hourly Volume [veh/h]	176	314	69	33	373	26	14	22	74	137	167	24
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	48	85	19	9	101	7	4	6	20	37	45	7
Total Analysis Volume [veh/h]	191	341	75	36	405	28	15	24	80	149	182	26
Presence of On-Street Parking	no		no	no		no	no		no	no		no
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Volume [ped/h]	0			11			0			3		
Bicycle Volume [bicycles/h]	0			0			0			0		

Appendix D - Capacity Analysis Backup

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Intersection Settings

Located in CBD	no
Signal Coordination Group	-
Cycle Length [s]	110
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	94.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	5.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal Group	5	2	0	1	6	0	7	4	0	3	8	0
Lead / Lag	Lag	-	-	Lead	-	-	Lead	-	-	Lag	-	-
Minimum Green [s]	7	20	0	7	20	0	7	10	0	7	10	0
Maximum Green [s]	16	39	0	12	35	0	12	24	0	12	25	0
Amber [s]	3.0	4.5	0.0	3.0	4.5	0.0	3.0	4.0	0.0	3.0	4.0	0.0
All red [s]	2.0	1.5	0.0	2.0	1.5	0.0	2.0	2.5	0.0	2.0	2.5	0.0
Split [s]	21	45	0	17	41	0	17	31	0	17	31	0
Vehicle Extension [s]	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0
Walk [s]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Clearance [s]	0	0	0	0	0	0	0	0	0	0	0	0
l1, Start-Up Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
l2, Clearance Lost Time [s]	3.0	4.0	0.0	3.0	4.0	0.0	3.0	4.5	0.0	3.0	4.5	0.0
Minimum Recall	no	no		no	no		no	no		no	no	
Maximum Recall	no	yes		no	yes		no	no		no	no	
Pedestrian Recall	no	no		no	no		no	no		no	no	
Detector Location [ft]	55.0	300.0	0.0	55.0	475.0	0.0	50.0	250.0	0.0	50.0	250.0	0.0
Detector Length [ft]	6.0	6.0	0.0	6.0	6.0	0.0	6.0	6.0	0.0	6.0	6.0	0.0
I, Upstream Filtering 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

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Lane Group Calculations

Lane Group	L	C	R	L	C	R	L	C	R	L	C	R
L, Total Lost Time per Cycle [s]	5.00	6.00	6.00	5.00	6.00	6.00	5.00	6.50	6.50	5.00	6.50	6.50
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	3.00	4.00	4.00	3.00	4.00	4.00	3.00	4.50	4.50	3.00	4.50	4.50
g_i, Effective Green Time [s]	8	66	66	5	63	63	3	10	10	7	14	14
g / C, Green / Cycle	0.08	0.60	0.60	0.04	0.57	0.57	0.02	0.09	0.09	0.06	0.13	0.13
(v / s)_i Volume / Saturation Flow Rate	0.06	0.10	0.05	0.02	0.12	0.02	0.01	0.01	0.05	0.04	0.10	0.02
s, saturation flow rate [veh/h]	3412	3512	1568	1757	3512	1568	1757	1845	1568	3412	1845	1568
c, Capacity [veh/h]	258	2112	943	75	1996	891	42	162	137	218	236	200
d1, Uniform Delay [s]	49.77	9.68	9.18	51.46	11.59	10.44	52.87	46.39	48.25	50.41	46.43	42.55
k, delay calibration	0.11	0.50	0.50	0.11	0.50	0.50	0.11	0.11	0.11	0.11	0.11	0.11
I, Upstream Filtering 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
d2, Incremental Delay [s]	4.12	0.16	0.16	4.68	0.23	0.07	5.15	0.42	3.87	3.77	5.33	0.29
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, 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
PF, progression 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

Lane Group Results

X, volume / capacity	0.74	0.16	0.08	0.48	0.20	0.03	0.36	0.15	0.58	0.68	0.77	0.13
d, Delay for Lane Group [s/veh]	53.89	9.85	9.35	56.14	11.82	10.50	58.02	46.81	52.11	54.18	51.76	42.84
Lane Group LOS	D	A	A	E	B	B	E	D	D	D	D	D
Critical Lane Group	yes	no	no	no	yes	no	yes	no	no	no	yes	no
50th-Percentile Queue Length [veh]	2.64	1.67	0.72	1.04	2.26	0.29	0.47	0.63	2.26	2.12	5.15	0.64
50th-Percentile Queue Length [ft]	66.11	41.82	18.02	26.05	56.61	7.26	11.68	15.67	56.38	52.95	128.73	16.12
95th-Percentile Queue Length [veh]	4.76	3.01	1.30	1.88	4.08	0.52	0.84	1.13	4.06	3.81	8.87	1.16
95th-Percentile Queue Length [ft]	119.00	75.28	32.44	46.88	101.89	13.06	21.03	28.20	101.48	95.31	221.77	29.01

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Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	53.89	9.85	9.35	56.14	11.82	10.50	58.02	46.81	52.11	54.18	51.76	42.84
Movement LOS	D	A	A	E	B	B	E	D	D	D	D	D
d_A, Approach Delay [s/veh]	23.64			15.14			51.79			52.12		
Approach LOS	C			B			D			D		
d_I, Intersection Delay [s/veh]	29.78											
Intersection LOS	C											
Intersection V/C	0.292											

Sequence

Ring 1	1	2	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	7	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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Intersection Level Of Service Report
#4: CSAH 13 & Eagle Point Blvd

Control Type:	Two-way stop	Delay (sec / veh):	29.6
Analysis Method:	HCM2010	Level Of Service:	D
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.000

Intersection Setup

Name	CSAH 13			CSAH 13			Oak Marsh Rd			Eagle Point Blvd		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	1	1	0	1	1	0	0	1	0	0
Pocket Length [ft]	200.00	100.00	250.00	250.00	100.00	250.00	50.00	100.00	100.00	200.00	100.00	100.00
Speed [mph]	45.00			55.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	no			no			yes			no		

Volumes

Name	CSAH 13			CSAH 13			Oak Marsh Rd			Eagle Point Blvd		
Base Volume Input [veh/h]	61	276	84	92	474	32	8	0	9	3	0	4
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	61	276	84	92	474	32	8	0	9	3	0	4
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	17	75	23	25	129	9	2	0	2	1	0	1
Total Analysis Volume [veh/h]	66	300	91	100	515	35	9	0	10	3	0	4
Pedestrian Volume [ped/h]	0			0			3			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Appendix D - Capacity Analysis Backup

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Intersection Settings

Priority Scheme	Free	Free	Stop	Stop
Flared Lane	no	no	no	no
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	no	no	no	no
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.07	0.00	0.00	0.09	0.01	0.00	0.05	0.00	0.01	0.01	0.00	0.00
d_M, Delay for Movement [s/veh]	8.84	0.00	0.00	8.41	0.00	0.00	27.00	29.62	9.98	22.68	27.74	9.17
Movement LOS	A	A	A	A	A	A	D	D	A	C	D	A
95th-Percentile Queue Length [veh]	0.21	0.00	0.00	0.28	0.00	0.00	0.16	0.04	0.04	0.04	0.01	0.01
95th-Percentile Queue Length [ft]	5.27	0.00	0.00	7.08	0.00	0.00	4.09	1.04	1.04	1.10	0.35	0.35
d_A, Approach Delay [s/veh]	1.28			1.29			18.04			14.96		
Approach LOS	A			A			C			B		
d_I, Intersection Delay [s/veh]	1.65											
Intersection LOS	D											

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Spack CONSULTING THE TRAFFIC STUDY COMPANY

Intersection Level Of Service Report
#6: CSAH 13 & 9th St

Control Type:	Two-way stop	Delay (sec / veh):	16.3
Analysis Method:	HCM2010	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.021

Intersection Setup

Name	CSAH 13		CSAH 13		9th St	
Approach	Northbound		Southbound		Eastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	0	1	0	0
Pocket Length [ft]	300.00	100.00	100.00	200.00	100.00	100.00
Speed [mph]	55.00		55.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	no		no		yes	

Volumes

Name	CSAH 13		CSAH 13		9th St	
Base Volume Input [veh/h]	5	278	565	4	6	15
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	3.00	3.00	3.00	3.00	3.00	3.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	5	278	565	4	6	15
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	1	76	154	1	2	4
Total Analysis Volume [veh/h]	5	302	614	4	7	16
Pedestrian Volume [ped/h]	0		0		4	
Bicycle Volume [bicycles/h]	0		0		0	

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Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane	no	no	no
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	no	no	no
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.01	0.00	0.01	0.00	0.02	0.02
d_M, Delay for Movement [s/veh]	8.83	0.00	0.00	0.00	16.32	10.63
Movement LOS	A	A	A	A	C	B
95th-Percentile Queue Length [veh]	0.02	0.00	0.00	0.00	0.14	0.14
95th-Percentile Queue Length [ft]	0.40	0.00	0.00	0.00	3.52	3.52
d_A, Approach Delay [s/veh]	0.14		0.00		12.36	
Approach LOS	A		A		B	
d_I, Intersection Delay [s/veh]	0.35					
Intersection LOS	C					

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Spack CONSULTING THE TRAFFIC STUDY COMPANY

Intersection Level Of Service Report
#7: CSAH 13 & CSAH 10

Control Type:	Signalized	Delay (sec / veh):	18.5
Analysis Method:	HCM2010	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.348

Intersection Setup

Name	CSAH 13			CSAH 13			CSAH 10			CSAH 10		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	1	1	0	1	1	0	1	1	0	1
Pocket Length [ft]	250.00	100.00	250.00	250.00	100.00	250.00	275.00	100.00	275.00	250.00	100.00	250.00
Speed [mph]	55.00			55.00			55.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	yes			yes			yes			yes		

Volumes

Name	CSAH 13			CSAH 13			CSAH 10			CSAH 10		
Base Volume Input [veh/h]	107	152	34	49	321	82	27	117	174	87	419	121
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	17	0	0	41	0	0	87	0	0	61
Total Hourly Volume [veh/h]	107	152	17	49	321	41	27	117	87	87	419	60
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	29	41	5	13	87	11	7	32	24	24	114	16
Total Analysis Volume [veh/h]	116	165	18	53	349	45	29	127	95	95	455	65
Presence of On-Street Parking	no		no	no		no	no		no	no		no
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Volume [ped/h]	2			0			1			2		
Bicycle Volume [bicycles/h]	0			0			0			0		

Appendix D - Capacity Analysis Backup

Generated with PTV VISTRO
Version 2.00-06

Spack CONSULTING THE TRAFFIC STUDY COMPANY

Intersection Settings

Located in CBD	no
Signal Coordination Group	-
Cycle Length [s]	110
Coordination Type	Time of Day Pattern Isolated
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	5.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal Group	5	2	0	1	6	0	7	4	0	3	8	0
Lead / Lag	Lag	-	-	Lag	-	-	Lag	-	-	Lag	-	-
Minimum Green [s]	5	10	0	5	10	0	5	10	0	5	10	0
Maximum Green [s]	30	30	0	30	30	0	30	40	0	30	40	0
Amber [s]	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0
All red [s]	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
Split [s]	24	34	0	24	34	0	10	27	0	25	42	0
Vehicle Extension [s]	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0
Walk [s]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Clearance [s]	0	0	0	0	0	0	0	0	0	0	0	0
l1, Start-Up Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
l2, Clearance Lost Time [s]	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0
Minimum Recall	no	no		no	no		no	yes		no	yes	
Maximum Recall	no	no		no	no		no	no		no	no	
Pedestrian Recall	no	no		no	no		no	no		no	no	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering 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

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Spack CONSULTING THE TRAFFIC STUDY COMPANY

Lane Group Calculations

Lane Group	L	C	R	L	C	R	L	C	R	L	C	R
L, Total Lost Time per Cycle [s]	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
g_i, Effective Green Time [s]	4	9	9	5	10	10	3	9	9	4	10	10
g / C, Green / Cycle	0.09	0.19	0.19	0.11	0.21	0.21	0.07	0.20	0.20	0.08	0.21	0.21
(v / s)_i Volume / Saturation Flow Rate	0.07	0.05	0.01	0.03	0.10	0.03	0.02	0.04	0.06	0.05	0.13	0.04
s, saturation flow rate [veh/h]	1757	3512	1568	1757	3512	1568	1757	3512	1568	1757	3512	1568
c, Capacity [veh/h]	158	680	303	187	739	330	117	706	315	136	744	332
d1, Uniform Delay [s]	21.03	16.18	15.60	19.51	16.42	15.22	21.02	15.71	16.11	21.35	16.92	15.37
k, delay calibration	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11
I, Upstream Filtering 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
d2, Incremental Delay [s]	6.51	0.18	0.08	0.82	0.47	0.19	1.10	0.12	0.53	6.41	0.82	0.28
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, 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
PF, progression 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

Lane Group Results

X, volume / capacity	0.74	0.24	0.06	0.28	0.47	0.14	0.25	0.18	0.30	0.70	0.61	0.20
d, Delay for Lane Group [s/veh]	27.54	16.37	15.68	20.33	16.89	15.41	22.12	15.83	16.65	27.76	17.74	15.65
Lane Group LOS	C	B	B	C	B	B	C	B	B	C	B	B
Critical Lane Group	yes	no	no	no	yes	no	yes	no	no	no	yes	no
50th-Percentile Queue Length [veh]	1.27	0.59	0.13	0.46	1.28	0.31	0.28	0.44	0.70	1.06	1.74	0.46
50th-Percentile Queue Length [ft]	31.79	14.65	3.16	11.60	31.92	7.77	6.97	10.95	17.52	26.38	43.45	11.38
95th-Percentile Queue Length [veh]	2.29	1.05	0.23	0.84	2.30	0.56	0.50	0.79	1.26	1.90	3.13	0.82
95th-Percentile Queue Length [ft]	57.22	26.37	5.69	20.89	57.46	13.99	12.55	19.71	31.54	47.49	78.20	20.48

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Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	27.54	16.37	15.68	20.33	16.89	15.41	22.12	15.83	16.65	27.76	17.74	15.65
Movement LOS	C	B	B	C	B	B	C	B	B	C	B	B
d_A, Approach Delay [s/veh]	20.66			17.15			16.86			19.07		
Approach LOS	C			B			B			B		
d_I, Intersection Delay [s/veh]	18.49											
Intersection LOS	B											
Intersection V/C	0.348											

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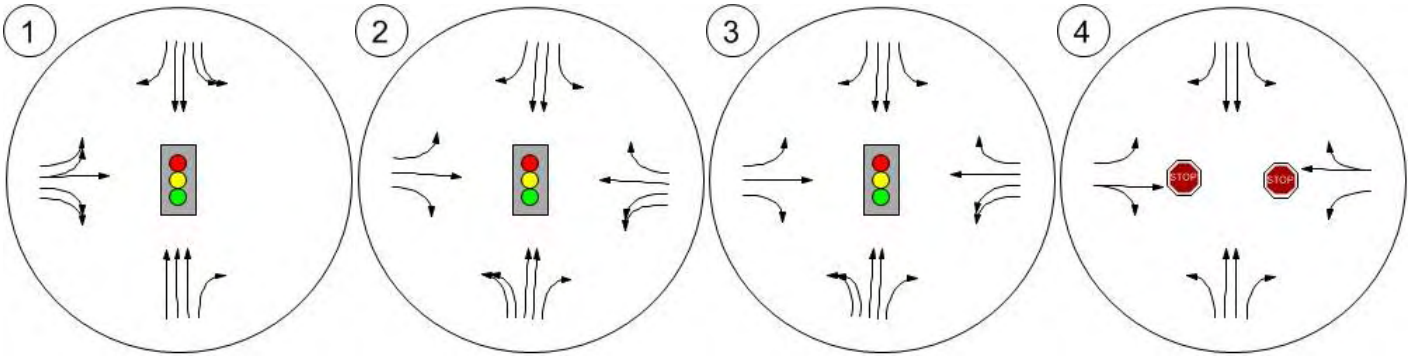
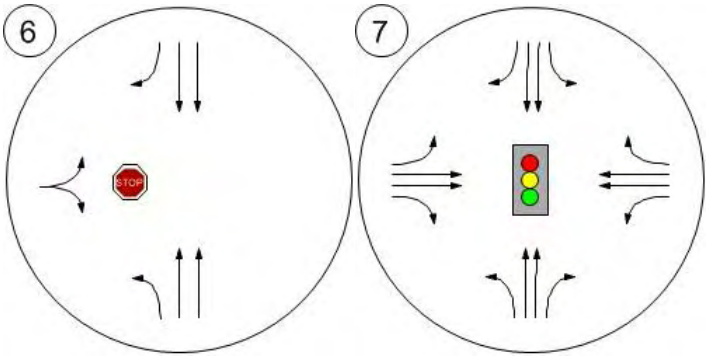
Lane Configuration and Traffic Control





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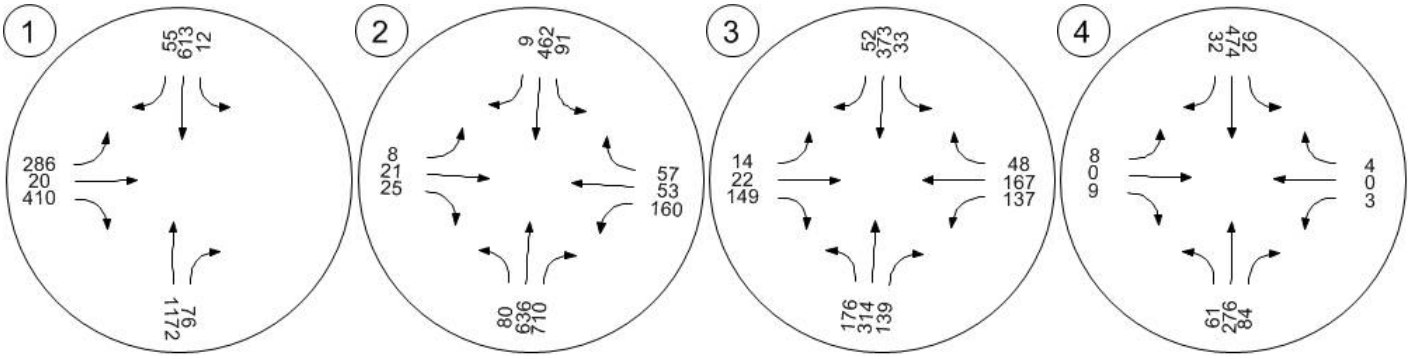
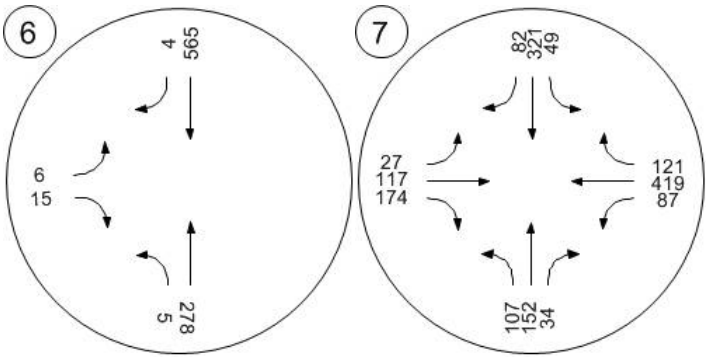
Traffic Volume - Base Volume





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Lake Elmo Development

Vistro File: C:\...\Lake Elmo.vistropdb
Report File: C:\...\PM Existing.pdf

Scenario 2: PM Existing
7/2/2014

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	CSAH 13 & I-94 Southern Ramp	Signalized	HCM2010	EBL	0.659	23.1	C
2	CSAH 13 & I-94 Northern Ramp	Signalized	HCM2010	EBR	0.592	35.7	D
3	Inwood Ave & Hudson Blvd	Signalized	HCM2010	SBL	0.497	34.9	C
4	CSAH 13 & Eagle Point Blvd	Two-way stop	HCM2010	WBL	1.195	253.7	F
6	CSAH 13 & 9th St	Two-way stop	HCM2010	EBL	0.047	30.3	D
7	CSAH 13 & CSAH 10	Signalized	HCM2010	WBL	0.521	23.4	C

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value; for all other control types, they are taken for the whole intersection.

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Intersection Level Of Service Report
#1: CSAH 13 & I-94 Southern Ramp

Control Type:	Signalized	Delay (sec / veh):	23.1
Analysis Method:	HCM2010	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.659

Intersection Setup

Name	CSAH 13			CSAH 13			I-94 Ramp			I-94		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	1	2	0	1	1	0	2	0	0	0
Pocket Length [ft]	100.00	100.00	400.00	175.00	100.00	150.00	500.00	100.00	500.00	100.00	100.00	100.00
Speed [mph]	45.00			45.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	no			no			yes			no		

Volumes

Name	CSAH 13			CSAH 13			I-94 Ramp			I-94		
Base Volume Input [veh/h]	0	1367	466	90	1220	254	233	119	916	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	233	0	0	127	0	0	458	0	0	0
Total Hourly Volume [veh/h]	0	1367	233	90	1220	127	233	119	458	0	0	0
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	371	63	24	332	35	63	32	124	0	0	0
Total Analysis Volume [veh/h]	0	1486	253	98	1326	138	253	129	498	0	0	0
Presence of On-Street Parking			no	no		no	no		no			
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Volume [ped/h]	0			0			1			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Appendix D - Capacity Analysis Backup

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Spack CONSULTING THE TRAFFIC STUDY COMPANY

Intersection Settings

Located in CBD	no
Signal Coordination Group	-
Cycle Length [s]	140
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	81.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	5.00

Phasing & Timing

Control Type	Permiss	Permiss	Permiss	Protecte	Permiss	Permiss	Permiss	Permiss	Overlap	Permiss	Protecte	Permiss
Signal Group	0	2	0	1	6	0	0	4	5	0	0	0
Lead / Lag	-	-	-	Lag	-	-	-	-	-	-	-	-
Minimum Green [s]	0	20	0	7	20	0	0	10	10	0	0	0
Maximum Green [s]	0	57	0	10	58	0	0	25	13	0	0	0
Amber [s]	0.0	4.5	0.0	3.0	4.5	0.0	0.0	3.5	3.5	0.0	0.0	0.0
All red [s]	0.0	1.0	0.0	2.0	1.5	0.0	0.0	3.5	3.5	0.0	0.0	0.0
Split [s]	0	94	0	15	72	0	0	31	37	0	0	0
Vehicle Extension [s]	0.0	4.6	0.0	2.0	4.6	0.0	0.0	3.0	2.0	0.0	0.0	0.0
Walk [s]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Clearance [s]	0	0	0	0	0	0	0	0	0	0	0	0
l1, Start-Up Lost Time [s]	0.0	2.0	0.0	2.0	2.0	0.0	0.0	2.0	2.0	0.0	0.0	0.0
l2, Clearance Lost Time [s]	0.0	3.5	0.0	3.0	4.0	0.0	0.0	5.0	5.0	0.0	0.0	0.0
Minimum Recall		no		no	no			no	no			
Maximum Recall		yes		no	yes			no	no			
Pedestrian Recall		no		no	no			no	no			
Detector Location [ft]	0.0	400.0	0.0	20.0	400.0	0.0	0.0	100.0	100.0	0.0	0.0	0.0
Detector Length [ft]	0.0	6.0	0.0	6.0	6.0	0.0	0.0	6.0	6.0	0.0	0.0	0.0
I, Upstream Filtering 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

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Lane Group Calculations

Lane Group	C	R	L	C	R	L	C	R	
L, Total Lost Time per Cycle [s]	5.50	5.50	5.00	6.00	6.00	7.00	7.00	7.00	
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
l2, Clearance Lost Time [s]	3.50	3.50	3.00	4.00	4.00	5.00	5.00	0.00	
g_i, Effective Green Time [s]	94	94	7	88	88	22	22	39	
g / C, Green / Cycle	0.67	0.67	0.05	0.63	0.63	0.16	0.16	0.28	
(v / s)_i Volume / Saturation Flow Rate	0.30	0.16	0.03	0.38	0.09	0.13	0.08	0.18	
s, saturation flow rate [veh/h]	5025	1568	3412	3512	1568	1757	1835	2775	
c, Capacity [veh/h]	3358	1048	169	2201	982	276	288	778	
d1, Uniform Delay [s]	10.93	9.18	65.03	15.66	10.69	57.40	53.92	44.11	
k, delay calibration	0.50	0.50	0.04	0.50	0.50	0.18	0.11	0.11	
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
d2, Incremental Delay [s]	0.42	0.55	1.18	1.23	0.30	11.78	1.36	0.88	
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	

Lane Group Results

X, volume / capacity	0.44	0.24	0.58	0.60	0.14	0.86	0.50	0.64	
d, Delay for Lane Group [s/veh]	11.35	9.72	66.21	16.89	10.99	69.19	55.27	44.99	
Lane Group LOS	B	A	E	B	B	E	E	D	
Critical Lane Group	no	no	no	yes	no	yes	no	yes	
50th-Percentile Queue Length [veh]	6.69	2.97	1.71	12.04	1.74	9.09	4.81	7.70	
50th-Percentile Queue Length [ft]	167.21	74.28	42.80	301.04	43.47	227.17	120.22	192.59	
95th-Percentile Queue Length [veh]	10.93	5.35	3.08	17.73	3.13	14.03	8.41	12.26	
95th-Percentile Queue Length [ft]	273.24	133.70	77.04	443.32	78.25	350.77	210.14	306.39	

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Spack CONSULTING THE TRAFFIC STUDY COMPANY

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	0.00	11.35	9.72	66.21	16.89	10.99	66.88	55.27	44.99	0.00	0.00	0.00
Movement LOS		B	A	E	B	B	E	E	D			
d_A, Approach Delay [s/veh]	11.12			19.47			53.20			0.00		
Approach LOS	B			B			D			A		
d_I, Intersection Delay [s/veh]	23.09											
Intersection LOS	C											
Intersection V/C	0.659											

Sequence

Ring 1	1	2	4	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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Spack CONSULTING THE TRAFFIC STUDY COMPANY

Intersection Level Of Service Report
#2: CSAH 13 & I-94 Northern Ramp

Control Type:	Signalized	Delay (sec / veh):	35.7
Analysis Method:	HCM2010	Level Of Service:	D
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.592

Intersection Setup

Name	CSAH 13			CSAH 13			3rd St N			I-94 Ramp		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	2	0	0	1	0	1	1	0	0	2	0	1
Pocket Length [ft]	325.00	100.00	100.00	250.00	100.00	275.00	175.00	100.00	100.00	400.00	100.00	250.00
Speed [mph]	45.00			45.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	no			no			yes			no		

Volumes

Name	CSAH 13			CSAH 13			3rd St N			I-94 Ramp		
Base Volume Input [veh/h]	221	933	577	192	1009	38	39	73	258	231	51	61
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	289	0	0	19	0	0	129	0	0	31
Total Hourly Volume [veh/h]	221	933	288	192	1009	19	39	73	129	231	51	30
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	60	254	78	52	274	5	11	20	35	63	14	8
Total Analysis Volume [veh/h]	240	1014	313	209	1097	21	42	79	140	251	55	33
Presence of On-Street Parking	no		no	no		no	no		no	no		no
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Volume [ped/h]	0			0			3			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Appendix D - Capacity Analysis Backup

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Intersection Settings

Located in CBD	no
Signal Coordination Group	-
Cycle Length [s]	140
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	89.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	5.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal Group	5	2	0	1	6	0	7	4	0	3	8	0
Lead / Lag	Lag	-	-	Lag	-	-	Lag	-	-	Lag	-	-
Minimum Green [s]	7	20	0	7	20	0	7	10	0	7	10	0
Maximum Green [s]	10	44	0	15	49	0	10	11	0	18	30	0
Amber [s]	3.0	4.5	0.0	3.0	4.5	0.0	3.0	3.5	0.0	3.0	3.5	0.0
All red [s]	2.0	1.5	0.0	2.0	2.0	0.0	2.0	3.5	0.0	2.0	3.0	0.0
Split [s]	24	63	0	35	74	0	15	24	0	18	27	0
Vehicle Extension [s]	2.0	4.6	0.0	2.0	4.6	0.0	2.0	3.0	0.0	2.0	3.0	0.0
Walk [s]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Clearance [s]	0	0	0	0	0	0	0	0	0	0	0	0
l1, Start-Up Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
l2, Clearance Lost Time [s]	3.0	4.0	0.0	3.0	4.5	0.0	3.0	5.0	0.0	3.0	4.5	0.0
Minimum Recall	no	no		no	no		no	no		no	no	
Maximum Recall	no	yes		no	yes		no	no		no	no	
Pedestrian Recall	no	no		no	no		no	no		no	no	
Detector Location [ft]	39.0	300.0	0.0	39.0	300.0	0.0	39.0	120.0	0.0	120.0	120.0	0.0
Detector Length [ft]	6.0	6.0	0.0	6.0	6.0	0.0	6.0	6.0	0.0	6.0	6.0	0.0
I, Upstream Filtering 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

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Spack CONSULTING THE TRAFFIC STUDY COMPANY

Lane Group Calculations

Lane Group	L	C	R	L	C	R	L	C	R	L	C	R
L, Total Lost Time per Cycle [s]	5.00	6.00	6.00	5.00	6.50	6.50	5.00	7.00	7.00	5.00	6.50	6.50
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	3.00	4.00	4.00	3.00	4.50	4.50	3.00	5.00	5.00	3.00	4.50	4.50
g_i, Effective Green Time [s]	12	71	71	19	77	77	18	15	15	12	10	10
g / C, Green / Cycle	0.08	0.51	0.51	0.13	0.55	0.55	0.13	0.11	0.11	0.09	0.07	0.07
(v / s)_i Volume / Saturation Flow Rate	0.07	0.29	0.20	0.12	0.31	0.01	0.02	0.04	0.09	0.07	0.03	0.02
s, saturation flow rate [veh/h]	3412	3512	1568	1757	3512	1568	1757	1845	1568	3412	1845	1568
c, Capacity [veh/h]	289	1789	799	232	1943	868	224	193	164	304	130	110
d1, Uniform Delay [s]	63.03	23.65	21.02	59.80	20.29	14.15	54.55	58.54	61.53	62.61	62.31	61.75
k, delay calibration	0.04	0.50	0.50	0.04	0.50	0.50	0.04	0.11	0.11	0.04	0.11	0.11
I, Upstream Filtering 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
d2, Incremental Delay [s]	2.39	1.31	1.44	5.54	1.19	0.05	0.15	1.38	11.58	2.17	2.19	1.50
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, 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
PF, progression 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

Lane Group Results

X, volume / capacity	0.83	0.57	0.39	0.90	0.56	0.02	0.19	0.41	0.85	0.82	0.42	0.30
d, Delay for Lane Group [s/veh]	65.41	24.96	22.47	65.34	21.49	14.20	54.70	59.92	73.10	64.79	64.50	63.25
Lane Group LOS	E	C	C	E	C	B	D	E	E	E	E	E
Critical Lane Group	no	yes	no	yes	no	no	no	no	yes	yes	no	no
50th-Percentile Queue Length [veh]	4.23	11.38	6.39	7.51	11.33	0.31	1.34	2.71	5.43	4.50	1.97	1.17
50th-Percentile Queue Length [ft]	105.68	284.48	159.63	187.80	283.30	7.66	33.59	67.68	135.82	112.44	49.14	29.19
95th-Percentile Queue Length [veh]	7.60	16.91	10.53	12.01	16.85	0.55	2.42	4.87	9.26	7.98	3.54	2.10
95th-Percentile Queue Length [ft]	189.98	422.78	263.24	300.18	421.32	13.78	60.46	121.83	231.38	199.39	88.45	52.55

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Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	65.41	24.96	22.47	65.34	21.49	14.20	54.70	59.92	73.10	64.79	64.50	63.25
Movement LOS	E	C	C	E	C	B	D	E	E	E	E	E
d_A, Approach Delay [s/veh]	30.66			28.28			66.15			64.59		
Approach LOS	C			C			E			E		
d_I, Intersection Delay [s/veh]	35.70											
Intersection LOS	D											
Intersection V/C	0.592											

Sequence

Ring 1	1	2	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	7	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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Spack CONSULTING THE TRAFFIC STUDY COMPANY

Intersection Level Of Service Report
#3: Inwood Ave & Hudson Blvd

Control Type:	Signalized	Delay (sec / veh):	34.9
Analysis Method:	HCM2010	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.497

Intersection Setup

Name	CSAH 13			CSAH 13			4th St N			Hudson Blvd		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	2	0	1	1	0	1	1	0	0	2	0	1
Pocket Length [ft]	175.00	100.00	250.00	100.00	100.00	100.00	175.00	100.00	100.00	250.00	100.00	250.00
Speed [mph]	45.00			45.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	no			yes			yes			yes		

Volumes

Name	CSAH 13			CSAH 13			4th St N			Hudson Blvd		
Base Volume Input [veh/h]	207	646	96	29	745	37	59	128	384	156	33	30
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	48	0	0	19	0	0	192	0	0	15
Total Hourly Volume [veh/h]	207	646	48	29	745	18	59	128	192	156	33	15
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	56	176	13	8	202	5	16	35	52	42	9	4
Total Analysis Volume [veh/h]	225	702	52	32	810	20	64	139	209	170	36	16
Presence of On-Street Parking	no		no	no		no	no		no	no		no
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Volume [ped/h]	0			4			4			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Appendix D - Capacity Analysis Backup

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Intersection Settings

Located in CBD	no
Signal Coordination Group	-
Cycle Length [s]	140
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	94.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	5.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal Group	5	2	0	1	6	0	7	4	0	3	8	0
Lead / Lag	Lag	-	-	Lag	-	-	Lag	-	-	Lag	-	-
Minimum Green [s]	7	20	0	7	20	0	7	10	0	7	10	0
Maximum Green [s]	16	39	0	12	35	0	12	24	0	12	25	0
Amber [s]	3.0	4.5	0.0	3.0	4.5	0.0	3.0	4.0	0.0	3.0	4.0	0.0
All red [s]	2.0	1.5	0.0	2.0	1.5	0.0	2.0	2.5	0.0	2.0	2.5	0.0
Split [s]	16	56	0	15	55	0	20	48	0	21	49	0
Vehicle Extension [s]	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0
Walk [s]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Clearance [s]	0	0	0	0	0	0	0	0	0	0	0	0
l1, Start-Up Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
l2, Clearance Lost Time [s]	3.0	4.0	0.0	3.0	4.0	0.0	3.0	4.5	0.0	3.0	4.5	0.0
Minimum Recall	no	no		no	no		no	no		no	no	
Maximum Recall	no	yes		no	yes		no	no		no	no	
Pedestrian Recall	no	no		no	no		no	no		no	no	
Detector Location [ft]	55.0	300.0	0.0	55.0	475.0	0.0	50.0	250.0	0.0	50.0	250.0	0.0
Detector Length [ft]	6.0	6.0	0.0	6.0	6.0	0.0	6.0	6.0	0.0	6.0	6.0	0.0
I, Upstream Filtering 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

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Lane Group Calculations

Lane Group	L	C	R	L	C	R	L	C	R	L	C	R
L, Total Lost Time per Cycle [s]	5.00	6.00	6.00	5.00	6.00	6.00	5.00	6.50	6.50	5.00	6.50	6.50
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	3.00	4.00	4.00	3.00	4.00	4.00	3.00	4.50	4.50	3.00	4.50	4.50
g_i, Effective Green Time [s]	11	82	82	5	76	76	22	21	21	9	9	9
g / C, Green / Cycle	0.08	0.59	0.59	0.04	0.54	0.54	0.16	0.15	0.15	0.07	0.06	0.06
(v / s)_i Volume / Saturation Flow Rate	0.07	0.20	0.03	0.02	0.23	0.01	0.04	0.08	0.13	0.05	0.02	0.01
s, saturation flow rate [veh/h]	3412	3512	1568	1757	3512	1568	1757	1845	1568	3412	1845	1568
c, Capacity [veh/h]	268	2058	919	63	1907	851	273	278	237	227	115	98
d1, Uniform Delay [s]	63.57	14.99	12.40	66.24	18.98	14.79	51.81	54.53	58.18	64.14	62.71	62.12
k, delay calibration	0.11	0.50	0.50	0.11	0.50	0.50	0.11	0.11	0.11	0.11	0.11	0.11
I, Upstream Filtering 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
d2, Incremental Delay [s]	6.89	0.45	0.12	6.27	0.69	0.05	0.44	1.38	10.37	4.89	1.53	0.78
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, 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
PF, progression 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

Lane Group Results

X, volume / capacity	0.84	0.34	0.06	0.51	0.42	0.02	0.23	0.50	0.88	0.75	0.31	0.16
d, Delay for Lane Group [s/veh]	70.46	15.44	12.52	72.52	19.68	14.84	52.25	55.92	68.55	69.03	64.25	62.90
Lane Group LOS	E	B	B	E	B	B	D	E	E	E	E	E
Critical Lane Group	yes	no	no	no	yes	no	no	no	yes	yes	no	no
50th-Percentile Queue Length [veh]	4.14	5.63	0.70	1.21	7.66	0.30	2.02	4.63	7.94	3.14	1.28	0.56
50th-Percentile Queue Length [ft]	103.53	140.70	17.60	30.37	191.53	7.49	50.54	115.85	198.59	78.55	32.04	14.09
95th-Percentile Queue Length [veh]	7.45	9.52	1.27	2.19	12.20	0.54	3.64	8.16	12.57	5.66	2.31	1.01
95th-Percentile Queue Length [ft]	186.36	237.97	31.69	54.67	305.02	13.49	90.98	204.11	314.14	141.39	57.67	25.37

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Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	70.46	15.44	12.52	72.52	19.68	14.84	52.25	55.92	68.55	69.03	64.25	62.90
Movement LOS	E	B	B	E	B	B	D	E	E	E	E	E
d_A, Approach Delay [s/veh]	27.93			21.53			61.76			67.81		
Approach LOS	C			C			E			E		
d_I, Intersection Delay [s/veh]	34.91											
Intersection LOS	C											
Intersection V/C	0.497											

Sequence

Ring 1	1	2	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	7	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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Spack CONSULTING THE TRAFFIC STUDY COMPANY

Intersection Level Of Service Report
#4: CSAH 13 & Eagle Point Blvd

Control Type:	Two-way stop	Delay (sec / veh):	253.7
Analysis Method:	HCM2010	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	1.195

Intersection Setup

Name	CSAH 13			CSAH 13			Oak Marsh Rd			Eagle Point Blvd		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	1	1	0	1	1	0	0	1	0	0
Pocket Length [ft]	200.00	100.00	250.00	250.00	100.00	250.00	50.00	100.00	100.00	200.00	100.00	100.00
Speed [mph]	45.00			55.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	no			no			yes			no		

Volumes

Name	CSAH 13			CSAH 13			Oak Marsh Rd			Eagle Point Blvd		
Base Volume Input [veh/h]	95	734	3	15	631	69	38	0	68	89	0	78
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	95	734	3	15	631	69	38	0	68	89	0	78
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	26	199	1	4	171	19	10	0	18	24	0	21
Total Analysis Volume [veh/h]	103	798	3	16	686	75	41	0	74	97	0	85
Pedestrian Volume [ped/h]	0			0			3			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

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Spack CONSULTING THE TRAFFIC STUDY COMPANY

Intersection Settings

Priority Scheme	Free	Free	Stop	Stop
Flared Lane	no	no	no	no
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	no	no	no	no
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.12	0.01	0.00	0.02	0.01	0.00	0.48	0.00	0.11	1.19	0.00	0.14
d_M, Delay for Movement [s/veh]	9.91	0.00	0.00	9.53	0.00	0.00	80.42	54.19	11.30	253.72	59.75	12.02
Movement LOS	A	A	A	A	A	A	F	F	B	F	F	B
95th-Percentile Queue Length [veh]	0.42	0.00	0.00	0.06	0.00	0.00	2.02	0.39	0.39	7.10	0.49	0.49
95th-Percentile Queue Length [ft]	10.49	0.00	0.00	1.51	0.00	0.00	50.39	9.66	9.66	177.51	12.34	12.34
d_A, Approach Delay [s/veh]	1.13			0.20			35.94			140.84		
Approach LOS	A			A			E			F		
d_I, Intersection Delay [s/veh]	15.64											
Intersection LOS	F											

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Intersection Level Of Service Report
#6: CSAH 13 & 9th St

Control Type:	Two-way stop	Delay (sec / veh):	30.3
Analysis Method:	HCM2010	Level Of Service:	D
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.047

Intersection Setup

Name	CSAH 13		CSAH 13		9th St	
Approach	Northbound		Southbound		Eastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	0	1	0	0
Pocket Length [ft]	300.00	100.00	100.00	200.00	100.00	100.00
Speed [mph]	55.00		55.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	no		no		yes	

Volumes

Name	CSAH 13		CSAH 13		9th St	
Base Volume Input [veh/h]	23	832	727	12	6	13
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	3.00	3.00	3.00	3.00	3.00	3.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	23	832	727	12	6	13
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	6	226	198	3	2	4
Total Analysis Volume [veh/h]	25	904	790	13	7	14
Pedestrian Volume [ped/h]	0		0		2	
Bicycle Volume [bicycles/h]	0		0		0	

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Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane	no	no	no
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	no	no	no
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.03	0.01	0.01	0.00	0.05	0.02
d_M, Delay for Movement [s/veh]	9.60	0.00	0.00	0.00	30.26	11.94
Movement LOS	A	A	A	A	D	B
95th-Percentile Queue Length [veh]	0.10	0.00	0.00	0.00	0.23	0.23
95th-Percentile Queue Length [ft]	2.39	0.00	0.00	0.00	5.67	5.67
d_A, Approach Delay [s/veh]	0.26		0.00		18.05	
Approach LOS	A		A		C	
d_I, Intersection Delay [s/veh]	0.35					
Intersection LOS	D					

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Intersection Level Of Service Report
#7: CSAH 13 & CSAH 10

Control Type:	Signalized	Delay (sec / veh):	23.4
Analysis Method:	HCM2010	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.521

Intersection Setup

Name	CSAH 13			CSAH 13			CSAH 10			CSAH 10		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	1	1	0	1	1	0	1	1	0	1
Pocket Length [ft]	250.00	100.00	250.00	250.00	100.00	250.00	275.00	100.00	275.00	250.00	100.00	250.00
Speed [mph]	55.00			55.00			55.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	yes			yes			yes			yes		

Volumes

Name	CSAH 13			CSAH 13			CSAH 10			CSAH 10		
Base Volume Input [veh/h]	233	434	115	181	325	32	132	653	331	45	156	112
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	58	0	0	16	0	0	166	0	0	56
Total Hourly Volume [veh/h]	233	434	57	181	325	16	132	653	165	45	156	56
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	63	118	15	49	88	4	36	177	45	12	42	15
Total Analysis Volume [veh/h]	253	472	62	197	353	17	143	710	179	49	170	61
Presence of On-Street Parking	no		no	no		no	no		no	no		no
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Volume [ped/h]	0			1			3			1		
Bicycle Volume [bicycles/h]	0			0			0			0		

Appendix D - Capacity Analysis Backup

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Intersection Settings

Located in CBD	no
Signal Coordination Group	-
Cycle Length [s]	140
Coordination Type	Time of Day Pattern Isolated
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	5.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal Group	5	2	0	1	6	0	7	4	0	3	8	0
Lead / Lag	Lag	-	-	Lag	-	-	Lag	-	-	Lag	-	-
Minimum Green [s]	5	10	0	5	10	0	5	10	0	5	10	0
Maximum Green [s]	30	30	0	30	30	0	30	40	0	30	40	0
Amber [s]	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0
All red [s]	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
Split [s]	41	39	0	33	31	0	41	56	0	12	27	0
Vehicle Extension [s]	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0
Walk [s]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Clearance [s]	0	0	0	0	0	0	0	0	0	0	0	0
l1, Start-Up Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
l2, Clearance Lost Time [s]	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0
Minimum Recall	no	no		no	no		no	yes		no	yes	
Maximum Recall	no	no		no	no		no	no		no	no	
Pedestrian Recall	no	no		no	no		no	no		no	no	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering 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

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Lane Group Calculations

Lane Group	L	C	R	L	C	R	L	C	R	L	C	R
L, Total Lost Time per Cycle [s]	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
g_i, Effective Green Time [s]	10	11	11	10	10	10	8	15	15	3	10	10
g / C, Green / Cycle	0.18	0.18	0.18	0.17	0.17	0.17	0.14	0.26	0.26	0.05	0.17	0.17
(v / s)_i Volume / Saturation Flow Rate	0.14	0.13	0.04	0.11	0.10	0.01	0.08	0.20	0.11	0.03	0.05	0.04
s, saturation flow rate [veh/h]	1757	3512	1568	1757	3512	1568	1757	3512	1568	1757	3512	1568
c, Capacity [veh/h]	316	638	285	296	598	267	249	917	409	83	586	262
d1, Uniform Delay [s]	23.02	22.66	20.42	22.81	22.41	20.38	23.50	20.05	18.06	27.35	21.36	21.15
k, delay calibration	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11
I, Upstream Filtering 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
d2, Incremental Delay [s]	4.71	1.71	0.38	2.57	0.93	0.10	2.10	1.44	0.74	6.46	0.27	0.45
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, 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
PF, progression 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

Lane Group Results

X, volume / capacity	0.80	0.74	0.22	0.67	0.59	0.06	0.58	0.77	0.44	0.59	0.29	0.23
d, Delay for Lane Group [s/veh]	27.73	24.37	20.80	25.38	23.34	20.48	25.60	21.49	18.79	33.80	21.63	21.60
Lane Group LOS	C	C	C	C	C	C	C	C	B	C	C	C
Critical Lane Group	no	yes	no	yes	no	no	no	yes	no	yes	no	no
50th-Percentile Queue Length [veh]	3.16	2.68	0.63	2.31	1.93	0.17	1.69	3.74	1.70	0.73	0.87	0.64
50th-Percentile Queue Length [ft]	79.08	66.98	15.71	57.85	48.26	4.24	42.28	93.40	42.43	18.16	21.77	15.90
95th-Percentile Queue Length [veh]	5.69	4.82	1.13	4.17	3.47	0.31	3.04	6.72	3.06	1.31	1.57	1.14
95th-Percentile Queue Length [ft]	142.34	120.57	28.29	104.13	86.87	7.63	76.10	168.12	76.38	32.69	39.18	28.61

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Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	27.73	24.37	20.80	25.38	23.34	20.48	25.60	21.49	18.79	33.80	21.63	21.60
Movement LOS	C	C	C	C	C	C	C	C	B	C	C	C
d_A, Approach Delay [s/veh]	25.17			23.97			21.59			23.76		
Approach LOS	C			C			C			C		
d_I, Intersection Delay [s/veh]	23.38											
Intersection LOS	C											
Intersection V/C	0.521											

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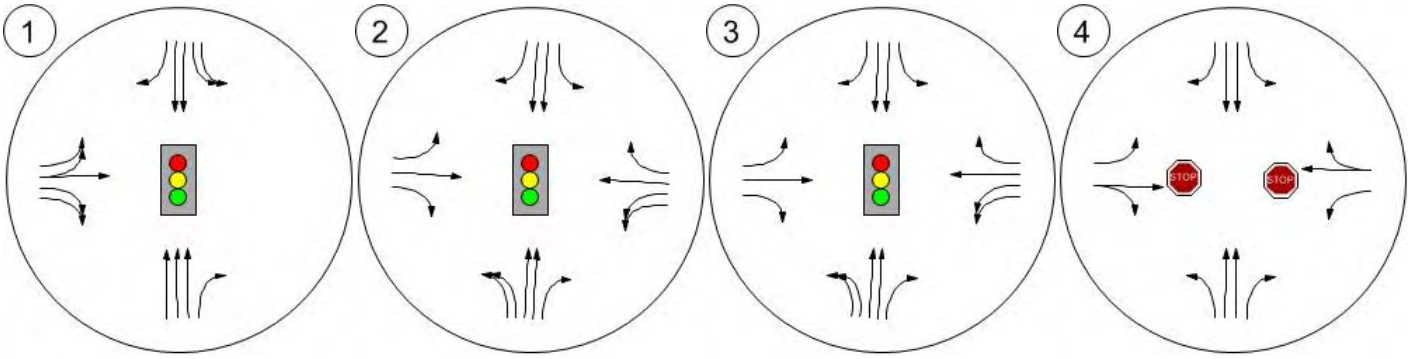
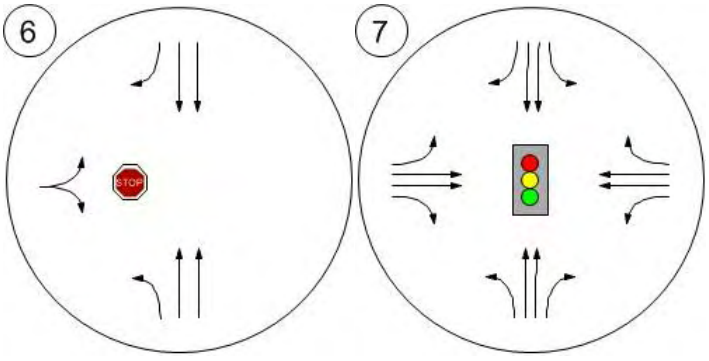
Lane Configuration and Traffic Control





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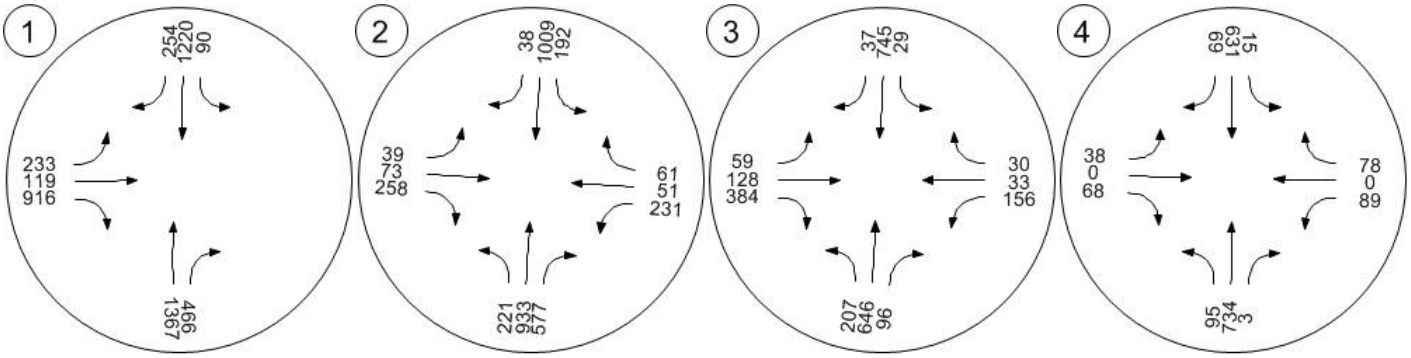
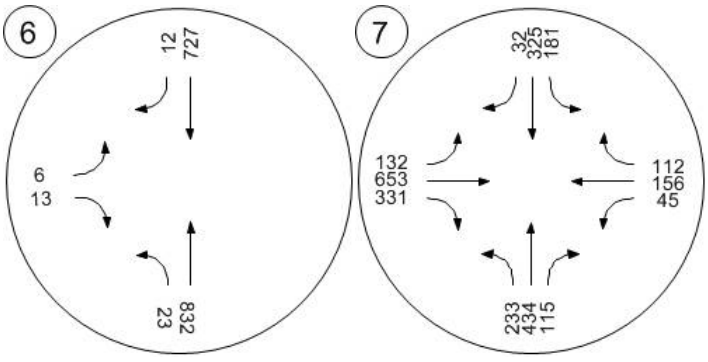
Traffic Volume - Base Volume





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Lake Elmo Development

Vistro File: C:\...\Lake Elmo.vistropdb
Report File: C:\...\AM 2019 No-Build.pdf

Scenario 3: AM 2019 No-Build
7/2/2014

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	CSAH 13 & I-94 Southern Ramp	Signalized	HCM2010	SBL	0.396	16.3	B
2	CSAH 13 & I-94 Northern Ramp	Signalized	HCM2010	SBL	0.418	22.1	C
3	Inwood Ave & Hudson Blvd	Signalized	HCM2010	EBL	0.318	30.2	C
4	CSAH 13 & Eagle Point Blvd	Two-way stop	HCM2010	EBT	0.000	34.5	D
6	CSAH 13 & 9th St	Two-way stop	HCM2010	EBL	0.027	17.6	C
7	CSAH 13 & CSAH 10	Signalized	HCM2010	WBL	0.380	19.1	B

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value; for all other control types, they are taken for the whole intersection.

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Intersection Level Of Service Report
#1: CSAH 13 & I-94 Southern Ramp

Control Type:	Signalized	Delay (sec / veh):	16.3
Analysis Method:	HCM2010	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.396

Intersection Setup

Name	CSAH 13			CSAH 13			I-94 Ramp			I-94		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	1	2	0	1	1	0	2	0	0	0
Pocket Length [ft]	100.00	100.00	400.00	175.00	100.00	150.00	500.00	100.00	500.00	100.00	100.00	100.00
Speed [mph]	45.00			45.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	no			no			yes			no		

Volumes

Name	CSAH 13			CSAH 13			I-94 Ramp			I-94		
Base Volume Input [veh/h]	0	1172	76	12	613	55	286	20	410	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Growth Rate	1.00	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	42	0	0	30	0	0	224	0	0	0
Total Hourly Volume [veh/h]	0	1277	41	13	668	30	312	22	223	0	0	0
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	347	11	4	182	8	85	6	61	0	0	0
Total Analysis Volume [veh/h]	0	1388	45	14	726	33	339	24	242	0	0	0
Presence of On-Street Parking			no	no		no	no		no			
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

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Intersection Settings

Located in CBD	no
Signal Coordination Group	-
Cycle Length [s]	110
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	81.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	5.00

Phasing & Timing

Control Type	Permiss	Permiss	Permiss	Protecte	Permiss	Permiss	Permiss	Permiss	Overlap	Permiss	Protecte	Permiss
Signal Group	0	2	0	1	6	0	0	4	5	0	0	0
Lead / Lag	-	-	-	Lag	-	-	-	-	-	-	-	-
Minimum Green [s]	0	20	0	7	20	0	0	10	10	0	0	0
Maximum Green [s]	0	57	0	10	58	0	0	25	13	0	0	0
Amber [s]	0.0	4.5	0.0	3.0	4.5	0.0	0.0	3.5	3.5	0.0	0.0	0.0
All red [s]	0.0	1.0	0.0	2.0	1.5	0.0	0.0	3.5	3.5	0.0	0.0	0.0
Split [s]	0	67	0	12	62	0	0	31	17	0	0	0
Vehicle Extension [s]	0.0	4.6	0.0	2.0	4.6	0.0	0.0	3.0	2.0	0.0	0.0	0.0
Walk [s]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Clearance [s]	0	0	0	0	0	0	0	0	0	0	0	0
I1, Start-Up Lost Time [s]	0.0	2.0	0.0	2.0	2.0	0.0	0.0	2.0	2.0	0.0	0.0	0.0
I2, Clearance Lost Time [s]	0.0	3.5	0.0	3.0	4.0	0.0	0.0	5.0	5.0	0.0	0.0	0.0
Minimum Recall		no		no	no			no	no			
Maximum Recall		yes		no	yes			no	no			
Pedestrian Recall		no		no	no			no	no			
Detector Location [ft]	0.0	400.0	0.0	20.0	400.0	0.0	0.0	100.0	100.0	0.0	0.0	0.0
Detector Length [ft]	0.0	6.0	0.0	6.0	6.0	0.0	0.0	6.0	6.0	0.0	0.0	0.0
I, Upstream Filtering 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

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Lane Group Calculations

Lane Group	C	R	L	C	R	L	C	R	
L, Total Lost Time per Cycle [s]	5.50	5.50	5.00	6.00	6.00	7.00	7.00	7.00	
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
l2, Clearance Lost Time [s]	3.50	3.50	3.00	4.00	4.00	5.00	5.00	0.00	
g_i, Effective Green Time [s]	76	76	2	66	66	14	14	31	
g / C, Green / Cycle	0.69	0.69	0.02	0.60	0.60	0.12	0.12	0.28	
(v / s)_i Volume / Saturation Flow Rate	0.28	0.03	0.00	0.21	0.02	0.10	0.10	0.09	
s, saturation flow rate [veh/h]	5025	1568	3412	3512	1568	1757	1757	2775	
c, Capacity [veh/h]	3481	1086	79	2115	944	220	220	776	
d1, Uniform Delay [s]	7.18	5.35	52.72	10.98	8.90	46.62	46.62	31.27	
k, delay calibration	0.50	0.50	0.04	0.50	0.50	0.11	0.11	0.11	
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
d2, Incremental Delay [s]	0.34	0.07	0.39	0.44	0.07	5.66	5.66	0.23	
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	

Lane Group Results

X, volume / capacity	0.40	0.04	0.18	0.34	0.03	0.77	0.77	0.31	
d, Delay for Lane Group [s/veh]	7.52	5.42	53.11	11.42	8.97	52.27	52.27	31.50	
Lane Group LOS	A	A	D	B	A	D	D	C	
Critical Lane Group	no	no	no	yes	no	yes	no	yes	
50th-Percentile Queue Length [veh]	3.82	0.29	0.19	4.06	0.31	4.82	4.82	2.56	
50th-Percentile Queue Length [ft]	95.52	7.26	4.73	101.48	7.69	120.55	120.55	64.04	
95th-Percentile Queue Length [veh]	6.88	0.52	0.34	7.31	0.55	8.42	8.42	4.61	
95th-Percentile Queue Length [ft]	171.94	13.07	8.51	182.66	13.84	210.58	210.58	115.26	

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Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	0.00	7.52	5.42	53.11	11.42	8.97	52.27	52.27	31.50	0.00	0.00	0.00
Movement LOS		A	A	D	B	A	D	D	C			
d_A, Approach Delay [s/veh]	7.46			12.07			43.62			0.00		
Approach LOS	A			B			D			A		
d_I, Intersection Delay [s/veh]	16.28											
Intersection LOS	B											
Intersection V/C	0.396											

Sequence

Ring 1	1	2	4	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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Intersection Level Of Service Report
#2: CSAH 13 & I-94 Northern Ramp

Control Type:	Signalized	Delay (sec / veh):	22.1
Analysis Method:	HCM2010	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.418

Intersection Setup

Name	CSAH 13			CSAH 13			3rd St N			I-94 Ramp		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	2	0	0	1	0	1	1	0	0	2	0	1
Pocket Length [ft]	325.00	100.00	100.00	250.00	100.00	275.00	175.00	100.00	100.00	400.00	100.00	250.00
Speed [mph]	45.00			45.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	no			no			yes			no		

Volumes

Name	CSAH 13			CSAH 13			3rd St N			I-94 Ramp		
Base Volume Input [veh/h]	80	636	710	91	462	9	8	21	25	160	53	57
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Growth Rate	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	387	0	0	5	0	0	14	0	0	31
Total Hourly Volume [veh/h]	87	693	387	99	504	5	9	23	13	174	58	31
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	24	188	105	27	137	1	2	6	4	47	16	8
Total Analysis Volume [veh/h]	95	753	421	108	548	5	10	25	14	189	63	34
Presence of On-Street Parking	no		no	no		no	no		no	no		no
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Appendix D - Capacity Analysis Backup

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Intersection Settings

Located in CBD	no
Signal Coordination Group	-
Cycle Length [s]	110
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	89.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	5.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal Group	5	2	0	1	6	0	7	4	0	3	8	0
Lead / Lag	Lag	-	-	Lag	-	-	Lag	-	-	Lag	-	-
Minimum Green [s]	7	20	0	7	20	0	7	10	0	7	10	0
Maximum Green [s]	10	44	0	15	49	0	10	11	0	18	30	0
Amber [s]	3.0	4.5	0.0	3.0	4.5	0.0	3.0	3.5	0.0	3.0	3.5	0.0
All red [s]	2.0	1.5	0.0	2.0	2.0	0.0	2.0	3.5	0.0	2.0	3.0	0.0
Split [s]	15	60	0	17	62	0	12	17	0	16	21	0
Vehicle Extension [s]	2.0	4.6	0.0	2.0	4.6	0.0	2.0	3.0	0.0	2.0	3.0	0.0
Walk [s]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Clearance [s]	0	0	0	0	0	0	0	0	0	0	0	0
l1, Start-Up Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
l2, Clearance Lost Time [s]	3.0	4.0	0.0	3.0	4.5	0.0	3.0	5.0	0.0	3.0	4.5	0.0
Minimum Recall	no	no		no	no		no	no		no	no	
Maximum Recall	no	yes		no	yes		no	no		no	no	
Pedestrian Recall	no	no		no	no		no	no		no	no	
Detector Location [ft]	39.0	300.0	0.0	39.0	300.0	0.0	39.0	120.0	0.0	120.0	120.0	0.0
Detector Length [ft]	6.0	6.0	0.0	6.0	6.0	0.0	6.0	6.0	0.0	6.0	6.0	0.0
I, Upstream Filtering 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

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Lane Group Calculations

Lane Group	L	C	R	L	C	R	L	C	R	L	C	R
L, Total Lost Time per Cycle [s]	5.00	6.00	6.00	5.00	6.50	6.50	5.00	7.00	7.00	5.00	6.50	6.50
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	3.00	4.00	4.00	3.00	4.50	4.50	3.00	5.00	5.00	3.00	4.50	4.50
g_i, Effective Green Time [s]	7	63	63	8	65	65	6	7	7	8	10	10
g / C, Green / Cycle	0.06	0.58	0.58	0.08	0.59	0.59	0.06	0.06	0.06	0.07	0.09	0.09
(v / s)_i Volume / Saturation Flow Rate	0.03	0.21	0.27	0.06	0.16	0.00	0.01	0.01	0.01	0.06	0.03	0.02
s, saturation flow rate [veh/h]	3412	3512	1568	1757	3512	1568	1757	1845	1568	3412	1845	1568
c, Capacity [veh/h]	206	2022	903	135	2063	921	98	118	100	256	162	137
d1, Uniform Delay [s]	49.99	12.62	13.55	50.01	11.10	9.40	49.37	48.92	48.69	49.85	47.44	46.83
k, delay calibration	0.04	0.50	0.50	0.04	0.50	0.50	0.04	0.11	0.11	0.04	0.11	0.11
I, Upstream Filtering 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
d2, Incremental Delay [s]	0.60	0.53	1.73	4.16	0.32	0.01	0.17	0.89	0.63	1.57	1.53	0.93
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, 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
PF, progression 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

Lane Group Results

X, volume / capacity	0.46	0.37	0.47	0.80	0.27	0.01	0.10	0.21	0.14	0.74	0.39	0.25
d, Delay for Lane Group [s/veh]	50.59	13.14	15.28	54.17	11.42	9.41	49.54	49.81	49.33	51.42	48.96	47.76
Lane Group LOS	D	B	B	D	B	A	D	D	D	D	D	D
Critical Lane Group	no	no	yes	yes	no	no	no	yes	no	yes	no	no
50th-Percentile Queue Length [veh]	1.25	4.64	5.83	2.99	3.02	0.05	0.27	0.68	0.38	2.60	1.70	0.91
50th-Percentile Queue Length [ft]	31.16	116.05	145.76	74.86	75.50	1.20	6.65	17.04	9.53	64.94	42.52	22.63
95th-Percentile Queue Length [veh]	2.24	8.18	9.79	5.39	5.44	0.09	0.48	1.23	0.69	4.68	3.06	1.63
95th-Percentile Queue Length [ft]	56.09	204.38	244.76	134.75	135.91	2.16	11.97	30.67	17.16	116.89	76.54	40.73

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Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	50.59	13.14	15.28	54.17	11.42	9.41	49.54	49.81	49.33	51.42	48.96	47.76
Movement LOS	D	B	B	D	B	A	D	D	D	D	D	D
d_A, Approach Delay [s/veh]	16.65			18.39			49.62			50.44		
Approach LOS	B			B			D			D		
d_I, Intersection Delay [s/veh]	22.14											
Intersection LOS	C											
Intersection V/C	0.418											

Sequence

Ring 1	1	2	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	7	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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Intersection Level Of Service Report
#3: Inwood Ave & Hudson Blvd

Control Type:	Signalized	Delay (sec / veh):	30.2
Analysis Method:	HCM2010	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.318

Intersection Setup

Name	CSAH 13			CSAH 13			4th St N			Hudson Blvd		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	2	0	1	1	0	1	1	0	0	2	0	1
Pocket Length [ft]	175.00	100.00	250.00	100.00	100.00	100.00	175.00	100.00	100.00	250.00	100.00	250.00
Speed [mph]	45.00			45.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	no			yes			yes			yes		

Volumes

Name	CSAH 13			CSAH 13			4th St N			Hudson Blvd		
Base Volume Input [veh/h]	176	314	139	33	373	52	14	22	149	137	167	48
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Growth Rate	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	76	0	0	29	0	0	81	0	0	26
Total Hourly Volume [veh/h]	192	342	76	36	407	28	15	24	81	149	182	26
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	52	93	21	10	111	8	4	7	22	40	49	7
Total Analysis Volume [veh/h]	209	372	83	39	442	30	16	26	88	162	198	28
Presence of On-Street Parking	no		no	no		no	no		no	no		no
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Volume [ped/h]	0			11			0			3		
Bicycle Volume [bicycles/h]	0			0			0			0		

Appendix D - Capacity Analysis Backup

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Spack CONSULTING THE TRAFFIC STUDY COMPANY

Intersection Settings

Located in CBD	no
Signal Coordination Group	-
Cycle Length [s]	110
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	94.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	5.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal Group	5	2	0	1	6	0	7	4	0	3	8	0
Lead / Lag	Lag	-	-	Lead	-	-	Lead	-	-	Lag	-	-
Minimum Green [s]	7	20	0	7	20	0	7	10	0	7	10	0
Maximum Green [s]	16	39	0	12	35	0	12	24	0	12	25	0
Amber [s]	3.0	4.5	0.0	3.0	4.5	0.0	3.0	4.0	0.0	3.0	4.0	0.0
All red [s]	2.0	1.5	0.0	2.0	1.5	0.0	2.0	2.5	0.0	2.0	2.5	0.0
Split [s]	22	48	0	14	40	0	12	26	0	22	36	0
Vehicle Extension [s]	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0
Walk [s]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Clearance [s]	0	0	0	0	0	0	0	0	0	0	0	0
l1, Start-Up Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
l2, Clearance Lost Time [s]	3.0	4.0	0.0	3.0	4.0	0.0	3.0	4.5	0.0	3.0	4.5	0.0
Minimum Recall	no	no		no	no		no	no		no	no	
Maximum Recall	no	yes		no	yes		no	no		no	no	
Pedestrian Recall	no	no		no	no		no	no		no	no	
Detector Location [ft]	55.0	300.0	0.0	55.0	475.0	0.0	50.0	250.0	0.0	50.0	250.0	0.0
Detector Length [ft]	6.0	6.0	0.0	6.0	6.0	0.0	6.0	6.0	0.0	6.0	6.0	0.0
I, Upstream Filtering 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

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Spack CONSULTING THE TRAFFIC STUDY COMPANY

Lane Group Calculations

Lane Group	L	C	R	L	C	R	L	C	R	L	C	R
L, Total Lost Time per Cycle [s]	5.00	6.00	6.00	5.00	6.00	6.00	5.00	6.50	6.50	5.00	6.50	6.50
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	3.00	4.00	4.00	3.00	4.00	4.00	3.00	4.50	4.50	3.00	4.50	4.50
g_i, Effective Green Time [s]	9	65	65	5	61	61	3	10	10	7	14	14
g / C, Green / Cycle	0.08	0.59	0.59	0.04	0.56	0.56	0.02	0.09	0.09	0.07	0.13	0.13
(v / s)_i Volume / Saturation Flow Rate	0.06	0.11	0.05	0.02	0.13	0.02	0.01	0.01	0.06	0.05	0.11	0.02
s, saturation flow rate [veh/h]	3412	3512	1568	1757	3512	1568	1757	1845	1568	3412	1845	1568
c, Capacity [veh/h]	278	2084	930	79	1955	873	44	164	140	232	243	207
d1, Uniform Delay [s]	49.42	10.17	9.60	51.32	12.37	11.02	52.74	46.29	48.35	50.14	46.42	42.19
k, delay calibration	0.11	0.50	0.50	0.11	0.50	0.50	0.11	0.11	0.11	0.11	0.11	0.11
I, Upstream Filtering 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
d2, Incremental Delay [s]	4.06	0.19	0.19	4.75	0.27	0.07	4.85	0.44	4.60	3.74	6.46	0.29
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, 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
PF, progression 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

Lane Group Results

X, volume / capacity	0.75	0.18	0.09	0.50	0.23	0.03	0.36	0.16	0.63	0.70	0.81	0.14
d, Delay for Lane Group [s/veh]	53.49	10.36	9.79	56.07	12.64	11.10	57.59	46.73	52.95	53.89	52.88	42.49
Lane Group LOS	D	B	A	E	B	B	E	D	D	D	D	D
Critical Lane Group	yes	no	no	no	yes	no	yes	no	no	no	yes	no
50th-Percentile Queue Length [veh]	2.88	1.89	0.82	1.13	2.59	0.32	0.49	0.68	2.51	2.30	5.68	0.69
50th-Percentile Queue Length [ft]	72.12	47.30	20.58	28.15	64.77	8.06	12.36	16.97	62.65	57.43	142.05	17.28
95th-Percentile Queue Length [veh]	5.19	3.41	1.48	2.03	4.66	0.58	0.89	1.22	4.51	4.14	9.59	1.24
95th-Percentile Queue Length [ft]	129.82	85.13	37.04	50.67	116.58	14.51	22.25	30.54	112.78	103.38	239.78	31.10

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Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	53.49	10.36	9.79	56.07	12.64	11.10	57.59	46.73	52.95	53.89	52.88	42.49
Movement LOS	D	B	A	E	B	B	E	D	D	D	D	D
d_A, Approach Delay [s/veh]	23.86			15.86			52.28			52.55		
Approach LOS	C			B			D			D		
d_I, Intersection Delay [s/veh]	30.20											
Intersection LOS	C											
Intersection V/C	0.318											

Sequence

Ring 1	1	2	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	7	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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Intersection Level Of Service Report
#4: CSAH 13 & Eagle Point Blvd

Control Type:	Two-way stop	Delay (sec / veh):	34.5
Analysis Method:	HCM2010	Level Of Service:	D
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.000

Intersection Setup

Name	CSAH 13			CSAH 13			Oak Marsh Rd			Eagle Point Blvd		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	1	1	0	1	1	0	0	1	0	0
Pocket Length [ft]	200.00	100.00	250.00	250.00	100.00	250.00	50.00	100.00	100.00	200.00	100.00	100.00
Speed [mph]	45.00			55.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	no			no			yes			no		

Volumes

Name	CSAH 13			CSAH 13			Oak Marsh Rd			Eagle Point Blvd		
Base Volume Input [veh/h]	61	276	84	92	474	32	8	0	9	3	0	4
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Growth Rate	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	66	301	92	100	517	35	9	0	10	3	0	4
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	18	82	25	27	140	10	2	0	3	1	0	1
Total Analysis Volume [veh/h]	72	327	100	109	562	38	10	0	11	3	0	4
Pedestrian Volume [ped/h]	0			0			3			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

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Intersection Settings

Priority Scheme	Free	Free	Stop	Stop
Flared Lane	no	no	no	no
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	no	no	no	no
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.07	0.00	0.00	0.10	0.01	0.00	0.07	0.00	0.02	0.02	0.00	0.00
d_M, Delay for Movement [s/veh]	9.05	0.00	0.00	8.55	0.00	0.00	31.51	34.45	10.17	25.66	31.96	9.26
Movement LOS	A	A	A	A	A	A	D	D	B	D	D	A
95th-Percentile Queue Length [veh]	0.24	0.00	0.00	0.32	0.00	0.00	0.22	0.05	0.05	0.05	0.01	0.01
95th-Percentile Queue Length [ft]	6.06	0.00	0.00	8.05	0.00	0.00	5.45	1.18	1.18	1.29	0.35	0.35
d_A, Approach Delay [s/veh]	1.31			1.32			20.33			16.29		
Approach LOS	A			A			C			C		
d_I, Intersection Delay [s/veh]	1.72											
Intersection LOS	D											

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Intersection Level Of Service Report
#6: CSAH 13 & 9th St

Control Type:	Two-way stop	Delay (sec / veh):	17.6
Analysis Method:	HCM2010	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.027

Intersection Setup

Name	CSAH 13		CSAH 13		9th St	
Approach	Northbound		Southbound		Eastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	0	1	0	0
Pocket Length [ft]	300.00	100.00	100.00	200.00	100.00	100.00
Speed [mph]	55.00		55.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	no		no		yes	

Volumes

Name	CSAH 13		CSAH 13		9th St	
Base Volume Input [veh/h]	5	278	565	4	6	15
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	3.00	3.00	3.00	3.00	3.00	3.00
Growth Rate	1.09	1.09	1.09	1.09	1.09	1.09
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	5	303	616	4	7	16
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	1	82	167	1	2	4
Total Analysis Volume [veh/h]	5	329	670	4	8	17
Pedestrian Volume [ped/h]	0		0		4	
Bicycle Volume [bicycles/h]	0		0		0	

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Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane	no	no	no
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	no	no	no
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.01	0.00	0.01	0.00	0.03	0.03
d_M, Delay for Movement [s/veh]	9.02	0.00	0.00	0.00	17.61	10.96
Movement LOS	A	A	A	A	C	B
95th-Percentile Queue Length [veh]	0.02	0.00	0.00	0.00	0.17	0.17
95th-Percentile Queue Length [ft]	0.42	0.00	0.00	0.00	4.20	4.20
d_A, Approach Delay [s/veh]	0.14		0.00		13.09	
Approach LOS	A		A		B	
d_I, Intersection Delay [s/veh]	0.36					
Intersection LOS	C					

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Intersection Level Of Service Report
#7: CSAH 13 & CSAH 10

Control Type:	Signalized	Delay (sec / veh):	19.1
Analysis Method:	HCM2010	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.380

Intersection Setup

Name	CSAH 13			CSAH 13			CSAH 10			CSAH 10		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	1	1	0	1	1	0	1	1	0	1
Pocket Length [ft]	250.00	100.00	250.00	250.00	100.00	250.00	275.00	100.00	275.00	250.00	100.00	250.00
Speed [mph]	55.00			55.00			55.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	yes			yes			yes			yes		

Volumes

Name	CSAH 13			CSAH 13			CSAH 10			CSAH 10		
Base Volume Input [veh/h]	107	152	34	49	321	82	27	117	174	87	419	121
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Growth Rate	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	19	0	0	45	0	0	95	0	0	66
Total Hourly Volume [veh/h]	117	166	18	53	350	44	29	128	95	95	457	66
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	32	45	5	14	95	12	8	35	26	26	124	18
Total Analysis Volume [veh/h]	127	180	20	58	380	48	32	139	103	103	497	72
Presence of On-Street Parking	no		no	no		no	no		no	no		no
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Volume [ped/h]	2			0			1			2		
Bicycle Volume [bicycles/h]	0			0			0			0		

Appendix D - Capacity Analysis Backup

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Intersection Settings

Located in CBD	no
Signal Coordination Group	-
Cycle Length [s]	110
Coordination Type	Time of Day Pattern Isolated
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	5.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal Group	5	2	0	1	6	0	7	4	0	3	8	0
Lead / Lag	Lag	-	-	Lag	-	-	Lag	-	-	Lag	-	-
Minimum Green [s]	5	10	0	5	10	0	5	10	0	5	10	0
Maximum Green [s]	30	30	0	30	30	0	30	40	0	30	40	0
Amber [s]	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0
All red [s]	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
Split [s]	24	34	0	24	34	0	10	27	0	25	42	0
Vehicle Extension [s]	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0
Walk [s]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Clearance [s]	0	0	0	0	0	0	0	0	0	0	0	0
l1, Start-Up Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
l2, Clearance Lost Time [s]	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0
Minimum Recall	no	no		no	no		no	yes		no	yes	
Maximum Recall	no	no		no	no		no	no		no	no	
Pedestrian Recall	no	no		no	no		no	no		no	no	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering 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

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Lane Group Calculations

Lane Group	L	C	R	L	C	R	L	C	R	L	C	R
L, Total Lost Time per Cycle [s]	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
g_i, Effective Green Time [s]	5	9	9	5	10	10	3	10	10	4	10	10
g / C, Green / Cycle	0.10	0.19	0.19	0.11	0.21	0.21	0.07	0.20	0.20	0.08	0.21	0.21
(v / s)_i Volume / Saturation Flow Rate	0.07	0.05	0.01	0.03	0.11	0.03	0.02	0.04	0.07	0.06	0.14	0.05
s, saturation flow rate [veh/h]	1757	3512	1568	1757	3512	1568	1757	3512	1568	1757	3512	1568
c, Capacity [veh/h]	173	683	305	196	727	325	126	703	314	141	733	327
d1, Uniform Delay [s]	21.15	16.52	15.88	19.72	17.02	15.66	21.21	16.08	16.53	21.71	17.61	15.85
k, delay calibration	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11
I, Upstream Filtering 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
d2, Incremental Delay [s]	5.90	0.20	0.09	0.84	0.58	0.21	1.05	0.14	0.60	7.17	1.11	0.33
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, 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
PF, progression 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

Lane Group Results

X, volume / capacity	0.73	0.26	0.07	0.30	0.52	0.15	0.25	0.20	0.33	0.73	0.68	0.22
d, Delay for Lane Group [s/veh]	27.05	16.73	15.97	20.56	17.61	15.87	22.26	16.22	17.13	28.88	18.72	16.18
Lane Group LOS	C	B	B	C	B	B	C	B	B	C	B	B
Critical Lane Group	yes	no	no	no	yes	no	yes	no	no	no	yes	no
50th-Percentile Queue Length [veh]	1.38	0.66	0.14	0.52	1.46	0.34	0.31	0.50	0.79	1.19	2.01	0.53
50th-Percentile Queue Length [ft]	34.62	16.48	3.61	12.93	36.47	8.60	7.76	12.39	19.69	29.66	50.26	13.13
95th-Percentile Queue Length [veh]	2.49	1.19	0.26	0.93	2.63	0.62	0.56	0.89	1.42	2.14	3.62	0.95
95th-Percentile Queue Length [ft]	62.31	29.67	6.49	23.28	65.65	15.48	13.97	22.31	35.44	53.40	90.47	23.63

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Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	27.05	16.73	15.97	20.56	17.61	15.87	22.26	16.22	17.13	28.88	18.72	16.18
Movement LOS	C	B	B	C	B	B	C	B	B	C	B	B
d_A, Approach Delay [s/veh]	20.69			17.79			17.27			20.00		
Approach LOS	C			B			B			C		
d_I, Intersection Delay [s/veh]	19.09											
Intersection LOS	B											
Intersection V/C	0.380											

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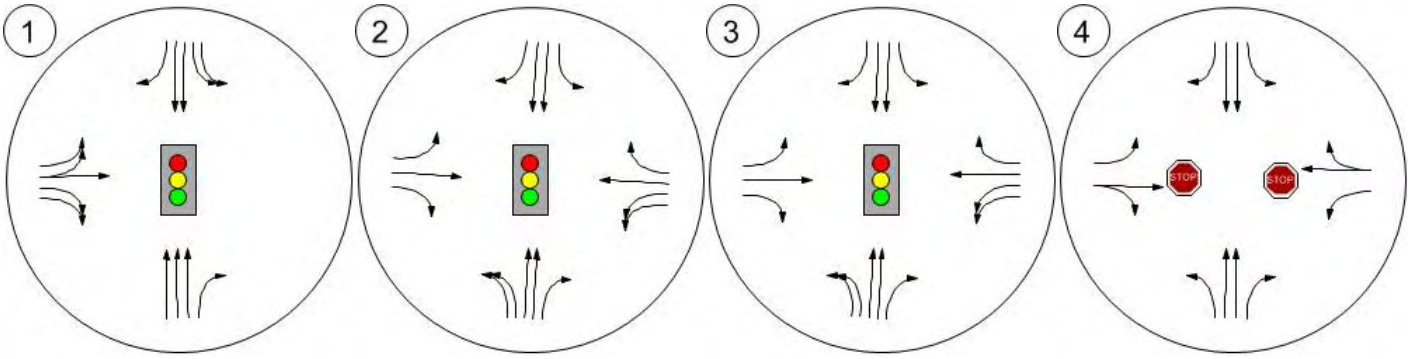
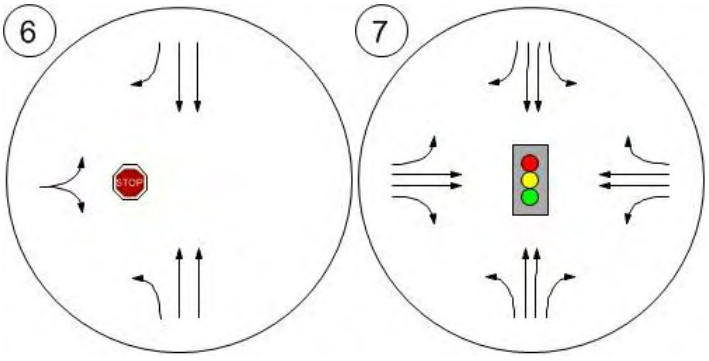
Lane Configuration and Traffic Control





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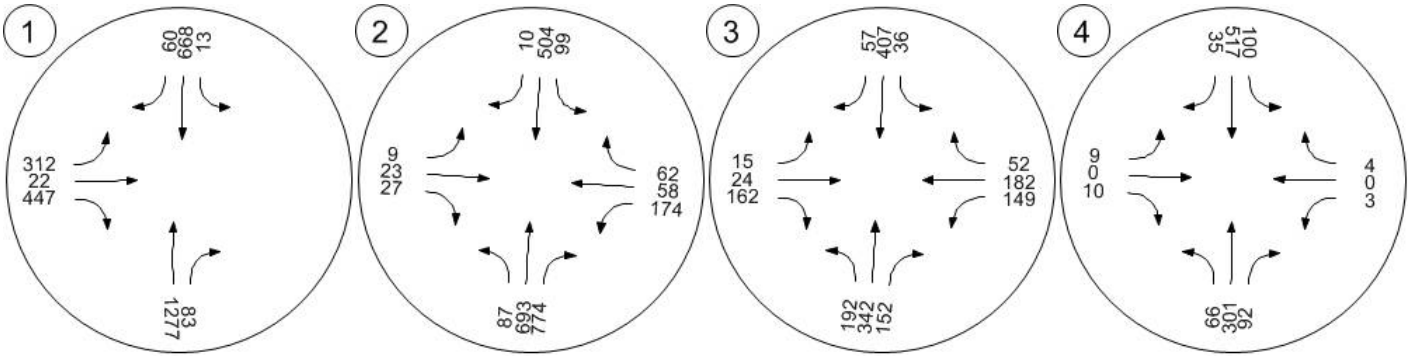
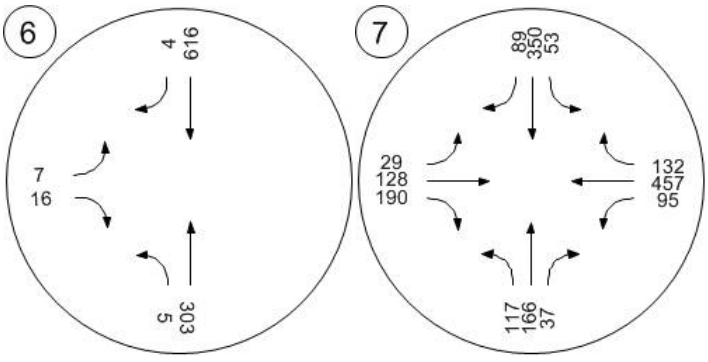
Traffic Volume - Future Total Volume





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Lake Elmo Development

Vistro File: C:\...\Lake Elmo.vistropdb
Report File: C:\...\PM 2019 No-Build.pdf

Scenario 4: PM 2019 No-Build
7/2/2014

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	CSAH 13 & I-94 Southern Ramp	Signalized	HCM2010	EBL	0.704	24.3	C
2	CSAH 13 & I-94 Northern Ramp	Signalized	HCM2010	SBL	0.644	38.8	D
3	Inwood Ave & Hudson Blvd	Signalized	HCM2010	SBL	0.542	36.2	D
4	CSAH 13 & Eagle Point Blvd	Two-way stop	HCM2010	WBL	1.664	466.5	F
6	CSAH 13 & 9th St	Two-way stop	HCM2010	EBL	0.065	35.6	E
7	CSAH 13 & CSAH 10	Signalized	HCM2010	WBL	0.564	24.9	C

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value; for all other control types, they are taken for the whole intersection.

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Intersection Level Of Service Report
#1: CSAH 13 & I-94 Southern Ramp

Control Type:	Signalized	Delay (sec / veh):	24.3
Analysis Method:	HCM2010	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.704

Intersection Setup

Name	CSAH 13			CSAH 13			I-94 Ramp			I-94		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	1	2	0	1	1	0	2	0	0	0
Pocket Length [ft]	100.00	100.00	400.00	175.00	100.00	150.00	500.00	100.00	500.00	100.00	100.00	100.00
Speed [mph]	45.00			45.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	no			no			yes			no		

Volumes

Name	CSAH 13			CSAH 13			I-94 Ramp			I-94		
Base Volume Input [veh/h]	0	1367	466	90	1220	254	233	119	916	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Growth Rate	1.00	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	254	0	0	139	0	0	499	0	0	0
Total Hourly Volume [veh/h]	0	1490	254	98	1330	138	254	130	499	0	0	0
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	405	69	27	361	38	69	35	136	0	0	0
Total Analysis Volume [veh/h]	0	1620	276	107	1446	150	276	141	542	0	0	0
Presence of On-Street Parking			no	no		no	no		no			
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Volume [ped/h]	0			0			1			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Appendix D - Capacity Analysis Backup

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Intersection Settings

Located in CBD	no
Signal Coordination Group	-
Cycle Length [s]	140
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	81.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	5.00

Phasing & Timing

Control Type	Permiss	Permiss	Permiss	Protecte	Permiss	Permiss	Permiss	Permiss	Overlap	Permiss	Protecte	Permiss
Signal Group	0	2	0	1	6	0	0	4	5	0	0	0
Lead / Lag	-	-	-	Lag	-	-	-	-	-	-	-	-
Minimum Green [s]	0	20	0	7	20	0	0	10	10	0	0	0
Maximum Green [s]	0	57	0	10	58	0	0	25	13	0	0	0
Amber [s]	0.0	4.5	0.0	3.0	4.5	0.0	0.0	3.5	3.5	0.0	0.0	0.0
All red [s]	0.0	1.0	0.0	2.0	1.5	0.0	0.0	3.5	3.5	0.0	0.0	0.0
Split [s]	0	94	0	14	91	0	0	32	17	0	0	0
Vehicle Extension [s]	0.0	4.6	0.0	2.0	4.6	0.0	0.0	3.0	2.0	0.0	0.0	0.0
Walk [s]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Clearance [s]	0	0	0	0	0	0	0	0	0	0	0	0
I1, Start-Up Lost Time [s]	0.0	2.0	0.0	2.0	2.0	0.0	0.0	2.0	2.0	0.0	0.0	0.0
I2, Clearance Lost Time [s]	0.0	3.5	0.0	3.0	4.0	0.0	0.0	5.0	5.0	0.0	0.0	0.0
Minimum Recall		no		no	no			no	no			
Maximum Recall		yes		no	yes			no	no			
Pedestrian Recall		no		no	no			no	no			
Detector Location [ft]	0.0	400.0	0.0	20.0	400.0	0.0	0.0	100.0	100.0	0.0	0.0	0.0
Detector Length [ft]	0.0	6.0	0.0	6.0	6.0	0.0	0.0	6.0	6.0	0.0	0.0	0.0
I, Upstream Filtering 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

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Lane Group Calculations

Lane Group	C	R	L	C	R	L	C	R	
L, Total Lost Time per Cycle [s]	5.50	5.50	5.00	6.00	6.00	7.00	7.00	7.00	
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
l2, Clearance Lost Time [s]	3.50	3.50	3.00	4.00	4.00	5.00	5.00	0.00	
g_i, Effective Green Time [s]	92	92	7	87	87	23	23	40	
g / C, Green / Cycle	0.66	0.66	0.05	0.62	0.62	0.17	0.17	0.29	
(v / s)_i Volume / Saturation Flow Rate	0.32	0.18	0.03	0.41	0.10	0.15	0.09	0.20	
s, saturation flow rate [veh/h]	5025	1568	3412	3512	1568	1757	1833	2775	
c, Capacity [veh/h]	3309	1033	170	2173	970	292	305	800	
d1, Uniform Delay [s]	12.03	9.89	65.16	17.27	11.23	56.82	53.28	44.01	
k, delay calibration	0.50	0.50	0.04	0.50	0.50	0.21	0.11	0.11	
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
d2, Incremental Delay [s]	0.52	0.63	1.43	1.63	0.34	14.29	1.43	1.01	
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	

Lane Group Results

X, volume / capacity	0.49	0.27	0.63	0.67	0.15	0.87	0.53	0.68	
d, Delay for Lane Group [s/veh]	12.55	10.52	66.60	18.90	11.57	71.10	54.71	45.03	
Lane Group LOS	B	B	E	B	B	E	D	D	
Critical Lane Group	no	no	no	yes	no	yes	no	yes	
50th-Percentile Queue Length [veh]	7.89	3.43	1.88	14.32	1.96	9.96	5.36	8.46	
50th-Percentile Queue Length [ft]	197.24	85.78	46.93	357.98	48.94	249.06	134.04	211.39	
95th-Percentile Queue Length [veh]	12.50	6.18	3.38	20.53	3.52	15.14	9.16	13.22	
95th-Percentile Queue Length [ft]	312.40	154.40	84.47	513.13	88.09	378.47	228.97	330.61	

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Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	0.00	12.55	10.52	66.60	18.90	11.57	68.31	54.71	45.03	0.00	0.00	0.00
Movement LOS		B	B	E	B	B	E	D	D			
d_A, Approach Delay [s/veh]	12.25			21.25			53.60			0.00		
Approach LOS	B			C			D			A		
d_I, Intersection Delay [s/veh]	24.31											
Intersection LOS	C											
Intersection V/C	0.704											

Sequence

Ring 1	1	2	4	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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Intersection Level Of Service Report
#2: CSAH 13 & I-94 Northern Ramp

Control Type:	Signalized	Delay (sec / veh):	38.8
Analysis Method:	HCM2010	Level Of Service:	D
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.644

Intersection Setup

Name	CSAH 13			CSAH 13			3rd St N			I-94 Ramp		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	2	0	0	1	0	1	1	0	0	2	0	1
Pocket Length [ft]	325.00	100.00	100.00	250.00	100.00	275.00	175.00	100.00	100.00	400.00	100.00	250.00
Speed [mph]	45.00			45.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	no			no			yes			no		

Volumes

Name	CSAH 13			CSAH 13			3rd St N			I-94 Ramp		
Base Volume Input [veh/h]	221	933	577	192	1009	38	39	73	258	231	51	61
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Growth Rate	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	315	0	0	21	0	0	141	0	0	33
Total Hourly Volume [veh/h]	241	1017	314	209	1100	20	43	80	140	252	56	33
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	65	276	85	57	299	5	12	22	38	68	15	9
Total Analysis Volume [veh/h]	262	1105	341	227	1196	22	47	87	152	274	61	36
Presence of On-Street Parking	no		no	no		no	no		no	no		no
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Volume [ped/h]	0			0			3			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Appendix D - Capacity Analysis Backup

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Intersection Settings

Located in CBD	no
Signal Coordination Group	-
Cycle Length [s]	140
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	89.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	5.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal Group	5	2	0	1	6	0	7	4	0	3	8	0
Lead / Lag	Lag	-	-	Lag	-	-	Lag	-	-	Lag	-	-
Minimum Green [s]	7	20	0	7	20	0	7	10	0	7	10	0
Maximum Green [s]	10	44	0	15	49	0	10	11	0	18	30	0
Amber [s]	3.0	4.5	0.0	3.0	4.5	0.0	3.0	3.5	0.0	3.0	3.5	0.0
All red [s]	2.0	1.5	0.0	2.0	2.0	0.0	2.0	3.5	0.0	2.0	3.0	0.0
Split [s]	20	65	0	30	75	0	20	25	0	20	25	0
Vehicle Extension [s]	2.0	4.6	0.0	2.0	4.6	0.0	2.0	3.0	0.0	2.0	3.0	0.0
Walk [s]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Clearance [s]	0	0	0	0	0	0	0	0	0	0	0	0
l1, Start-Up Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
l2, Clearance Lost Time [s]	3.0	4.0	0.0	3.0	4.5	0.0	3.0	5.0	0.0	3.0	4.5	0.0
Minimum Recall	no	no		no	no		no	no		no	no	
Maximum Recall	no	yes		no	yes		no	no		no	no	
Pedestrian Recall	no	no		no	no		no	no		no	no	
Detector Location [ft]	39.0	300.0	0.0	39.0	300.0	0.0	39.0	120.0	0.0	120.0	120.0	0.0
Detector Length [ft]	6.0	6.0	0.0	6.0	6.0	0.0	6.0	6.0	0.0	6.0	6.0	0.0
I, Upstream Filtering 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

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Lane Group Calculations

Lane Group	L	C	R	L	C	R	L	C	R	L	C	R
L, Total Lost Time per Cycle [s]	5.00	6.00	6.00	5.00	6.50	6.50	5.00	7.00	7.00	5.00	6.50	6.50
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	3.00	4.00	4.00	3.00	4.50	4.50	3.00	5.00	5.00	3.00	4.50	4.50
g_i, Effective Green Time [s]	13	68	68	20	75	75	20	16	16	13	10	10
g / C, Green / Cycle	0.09	0.49	0.49	0.14	0.53	0.53	0.14	0.11	0.11	0.10	0.07	0.07
(v / s)_i Volume / Saturation Flow Rate	0.08	0.31	0.22	0.13	0.34	0.01	0.03	0.05	0.10	0.08	0.03	0.02
s, saturation flow rate [veh/h]	3412	3512	1568	1757	3512	1568	1757	1845	1568	3412	1845	1568
c, Capacity [veh/h]	308	1708	763	249	1876	838	246	206	175	326	131	111
d1, Uniform Delay [s]	62.69	26.92	23.58	59.15	23.00	15.39	53.13	57.90	61.09	62.19	62.42	61.78
k, delay calibration	0.04	0.50	0.50	0.17	0.50	0.50	0.04	0.11	0.11	0.04	0.11	0.11
I, Upstream Filtering 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
d2, Incremental Delay [s]	2.57	1.91	1.90	17.85	1.67	0.06	0.14	1.37	12.04	2.25	2.57	1.66
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, 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
PF, progression 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

Lane Group Results

X, volume / capacity	0.85	0.65	0.45	0.91	0.64	0.03	0.19	0.42	0.87	0.84	0.47	0.32
d, Delay for Lane Group [s/veh]	65.26	28.83	25.48	76.99	24.67	15.44	53.27	59.27	73.13	64.43	64.99	63.44
Lane Group LOS	E	C	C	E	C	B	D	E	E	E	E	E
Critical Lane Group	no	yes	no	yes	no	no	no	no	yes	yes	no	no
50th-Percentile Queue Length [veh]	4.62	13.68	7.55	9.00	13.62	0.34	1.48	2.97	5.91	4.91	2.19	1.28
50th-Percentile Queue Length [ft]	115.52	342.05	188.83	224.96	340.59	8.45	37.08	74.16	147.77	122.73	54.77	31.91
95th-Percentile Queue Length [veh]	8.15	19.75	12.06	13.92	19.68	0.61	2.67	5.34	9.90	8.54	3.94	2.30
95th-Percentile Queue Length [ft]	203.65	493.71	301.50	347.95	491.92	15.21	66.74	133.49	247.44	213.58	98.59	57.44

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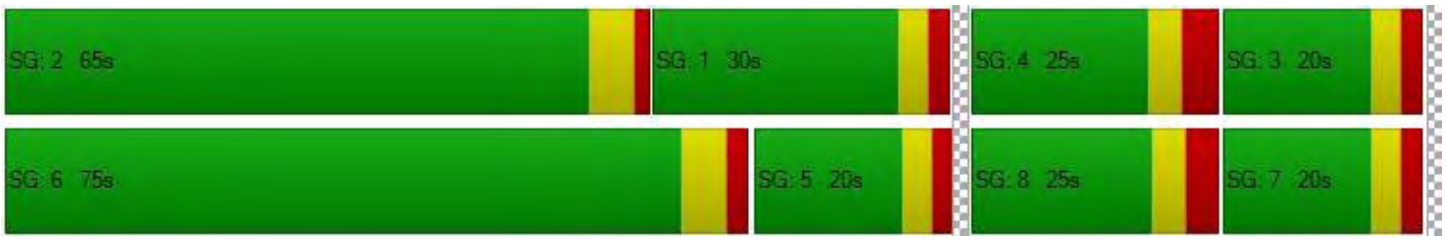
Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	65.26	28.83	25.48	76.99	24.67	15.44	53.27	59.27	73.13	64.43	64.99	63.44
Movement LOS	E	C	C	E	C	B	D	E	E	E	E	E
d_A, Approach Delay [s/veh]	33.75			32.75			65.65			64.43		
Approach LOS	C			C			E			E		
d_I, Intersection Delay [s/veh]	38.75											
Intersection LOS	D											
Intersection V/C	0.644											

Sequence

Ring 1	1	2	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	7	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



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Intersection Level Of Service Report
#3: Inwood Ave & Hudson Blvd

Control Type:	Signalized	Delay (sec / veh):	36.2
Analysis Method:	HCM2010	Level Of Service:	D
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.542

Intersection Setup

Name	CSAH 13			CSAH 13			4th St N			Hudson Blvd		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	2	0	1	1	0	1	1	0	0	2	0	1
Pocket Length [ft]	175.00	100.00	250.00	100.00	100.00	100.00	175.00	100.00	100.00	250.00	100.00	250.00
Speed [mph]	45.00			45.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	no			yes			yes			yes		

Volumes

Name	CSAH 13			CSAH 13			4th St N			Hudson Blvd		
Base Volume Input [veh/h]	207	646	96	29	745	37	59	128	384	156	33	30
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Growth Rate	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	53	0	0	20	0	0	210	0	0	17
Total Hourly Volume [veh/h]	226	704	52	32	812	20	64	140	209	170	36	16
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	61	191	14	9	221	5	17	38	57	46	10	4
Total Analysis Volume [veh/h]	246	765	57	35	883	22	70	152	227	185	39	17
Presence of On-Street Parking	no		no	no		no	no		no	no		no
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Volume [ped/h]	0			4			4			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Appendix D - Capacity Analysis Backup

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Intersection Settings

Located in CBD	no
Signal Coordination Group	-
Cycle Length [s]	140
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	94.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	5.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal Group	5	2	0	1	6	0	7	4	0	3	8	0
Lead / Lag	Lag	-	-	Lag	-	-	Lag	-	-	Lag	-	-
Minimum Green [s]	7	20	0	7	20	0	7	10	0	7	10	0
Maximum Green [s]	16	39	0	12	35	0	12	24	0	12	25	0
Amber [s]	3.0	4.5	0.0	3.0	4.5	0.0	3.0	4.0	0.0	3.0	4.0	0.0
All red [s]	2.0	1.5	0.0	2.0	1.5	0.0	2.0	2.5	0.0	2.0	2.5	0.0
Split [s]	21	72	0	12	63	0	34	39	0	17	22	0
Vehicle Extension [s]	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0
Walk [s]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Clearance [s]	0	0	0	0	0	0	0	0	0	0	0	0
l1, Start-Up Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
l2, Clearance Lost Time [s]	3.0	4.0	0.0	3.0	4.0	0.0	3.0	4.5	0.0	3.0	4.5	0.0
Minimum Recall	no	no		no	no		no	no		no	no	
Maximum Recall	no	yes		no	yes		no	no		no	no	
Pedestrian Recall	no	no		no	no		no	no		no	no	
Detector Location [ft]	55.0	300.0	0.0	55.0	475.0	0.0	50.0	250.0	0.0	50.0	250.0	0.0
Detector Length [ft]	6.0	6.0	0.0	6.0	6.0	0.0	6.0	6.0	0.0	6.0	6.0	0.0
I, Upstream Filtering 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

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Lane Group Calculations

Lane Group	L	C	R	L	C	R	L	C	R	L	C	R
L, Total Lost Time per Cycle [s]	5.00	6.00	6.00	5.00	6.00	6.00	5.00	6.50	6.50	5.00	6.50	6.50
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	3.00	4.00	4.00	3.00	4.00	4.00	3.00	4.50	4.50	3.00	4.50	4.50
g_i, Effective Green Time [s]	12	80	80	5	73	73	24	23	23	10	9	9
g / C, Green / Cycle	0.09	0.57	0.57	0.04	0.52	0.52	0.17	0.16	0.16	0.07	0.06	0.06
(v / s)_i Volume / Saturation Flow Rate	0.07	0.22	0.04	0.02	0.25	0.01	0.04	0.08	0.14	0.05	0.02	0.01
s, saturation flow rate [veh/h]	3412	3512	1568	1757	3512	1568	1757	1845	1568	3412	1845	1568
c, Capacity [veh/h]	296	2001	893	66	1827	816	296	298	254	240	118	100
d1, Uniform Delay [s]	62.85	16.55	13.43	66.14	21.51	16.33	50.38	53.57	57.47	63.91	62.64	61.98
k, delay calibration	0.11	0.50	0.50	0.11	0.50	0.50	0.11	0.11	0.13	0.11	0.11	0.11
I, Upstream Filtering 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
d2, Incremental Delay [s]	5.93	0.56	0.14	6.60	0.92	0.06	0.41	1.35	12.14	5.17	1.63	0.80
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, 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
PF, progression 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

Lane Group Results

X, volume / capacity	0.83	0.38	0.06	0.53	0.48	0.03	0.24	0.51	0.90	0.77	0.33	0.17
d, Delay for Lane Group [s/veh]	68.78	17.11	13.57	72.74	22.43	16.39	50.79	54.91	69.61	69.08	64.27	62.78
Lane Group LOS	E	B	B	E	C	B	D	D	E	E	E	E
Critical Lane Group	yes	no	no	no	yes	no	no	no	yes	yes	no	no
50th-Percentile Queue Length [veh]	4.48	6.59	0.81	1.33	9.14	0.35	2.18	5.03	8.74	3.42	1.39	0.60
50th-Percentile Queue Length [ft]	111.91	164.80	20.32	33.23	228.45	8.77	54.47	125.76	218.42	85.61	34.72	14.95
95th-Percentile Queue Length [veh]	7.95	10.80	1.46	2.39	14.10	0.63	3.92	8.71	13.58	6.16	2.50	1.08
95th-Percentile Queue Length [ft]	198.65	270.07	36.57	59.82	352.38	15.78	98.04	217.72	339.61	154.10	62.50	26.92

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Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	68.78	17.11	13.57	72.74	22.43	16.39	50.79	54.91	69.61	69.08	64.27	62.78
Movement LOS	E	B	B	E	C	B	D	D	E	E	E	E
d_A, Approach Delay [s/veh]	28.82			24.16			61.70			67.86		
Approach LOS	C			C			E			E		
d_I, Intersection Delay [s/veh]	36.16											
Intersection LOS	D											
Intersection V/C	0.542											

Sequence

Ring 1	1	2	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	7	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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Intersection Level Of Service Report
#4: CSAH 13 & Eagle Point Blvd

Control Type:	Two-way stop	Delay (sec / veh):	466.5
Analysis Method:	HCM2010	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	1.664

Intersection Setup

Name	CSAH 13			CSAH 13			Oak Marsh Rd			Eagle Point Blvd		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	1	1	0	1	1	0	0	1	0	0
Pocket Length [ft]	200.00	100.00	250.00	250.00	100.00	250.00	50.00	100.00	100.00	200.00	100.00	100.00
Speed [mph]	45.00			55.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	no			no			yes			no		

Volumes

Name	CSAH 13			CSAH 13			Oak Marsh Rd			Eagle Point Blvd		
Base Volume Input [veh/h]	95	734	3	15	631	69	38	0	68	89	0	78
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Growth Rate	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	104	800	3	16	688	75	41	0	74	97	0	85
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	28	217	1	4	187	20	11	0	20	26	0	23
Total Analysis Volume [veh/h]	113	870	3	17	748	82	45	0	80	105	0	92
Pedestrian Volume [ped/h]	0			0			3			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

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Intersection Settings

Priority Scheme	Free	Free	Stop	Stop
Flared Lane	no	no	no	no
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	no	no	no	no
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.14	0.01	0.00	0.02	0.01	0.00	0.67	0.00	0.13	1.66	0.00	0.16
d_M, Delay for Movement [s/veh]	10.34	0.00	0.00	9.83	0.00	0.00	132.39	68.15	11.71	466.46	76.07	12.59
Movement LOS	B	A	A	A	A	A	F	F	B	F	F	B
95th-Percentile Queue Length [veh]	0.50	0.00	0.00	0.07	0.00	0.00	2.96	0.44	0.44	9.42	0.58	0.58
95th-Percentile Queue Length [ft]	12.50	0.00	0.00	1.71	0.00	0.00	73.99	11.12	11.12	235.45	14.41	14.41
d_A, Approach Delay [s/veh]	1.19			0.20			55.16			254.50		
Approach LOS	A			A			F			F		
d_I, Intersection Delay [s/veh]	27.08											
Intersection LOS	F											

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Intersection Level Of Service Report
#6: CSAH 13 & 9th St

Control Type:	Two-way stop	Delay (sec / veh):	35.6
Analysis Method:	HCM2010	Level Of Service:	E
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.065

Intersection Setup

Name	CSAH 13		CSAH 13		9th St	
Approach	Northbound		Southbound		Eastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	0	1	0	0
Pocket Length [ft]	300.00	100.00	100.00	200.00	100.00	100.00
Speed [mph]	55.00		55.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	no		no		yes	

Volumes

Name	CSAH 13		CSAH 13		9th St	
Base Volume Input [veh/h]	23	832	727	12	6	13
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	3.00	3.00	3.00	3.00	3.00	3.00
Growth Rate	1.09	1.09	1.09	1.09	1.09	1.09
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	25	907	792	13	7	14
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	7	246	215	4	2	4
Total Analysis Volume [veh/h]	27	986	861	14	8	15
Pedestrian Volume [ped/h]	0		0		2	
Bicycle Volume [bicycles/h]	0		0		0	

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Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane	no	no	no
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	no	no	no
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.04	0.01	0.01	0.00	0.06	0.03
d_M, Delay for Movement [s/veh]	9.92	0.00	0.00	0.00	35.61	12.78
Movement LOS	A	A	A	A	E	B
95th-Percentile Queue Length [veh]	0.11	0.00	0.00	0.00	0.30	0.30
95th-Percentile Queue Length [ft]	2.77	0.00	0.00	0.00	7.46	7.46
d_A, Approach Delay [s/veh]	0.26		0.00		20.72	
Approach LOS	A		A		C	
d_I, Intersection Delay [s/veh]	0.39					
Intersection LOS	E					

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Spack CONSULTING THE TRAFFIC STUDY COMPANY

Intersection Level Of Service Report
#7: CSAH 13 & CSAH 10

Control Type:	Signalized	Delay (sec / veh):	24.9
Analysis Method:	HCM2010	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.564

Intersection Setup

Name	CSAH 13			CSAH 13			CSAH 10			CSAH 10		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	1	1	0	1	1	0	1	1	0	1
Pocket Length [ft]	250.00	100.00	250.00	250.00	100.00	250.00	275.00	100.00	275.00	250.00	100.00	250.00
Speed [mph]	55.00			55.00			55.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	yes			yes			yes			yes		

Volumes

Name	CSAH 13			CSAH 13			CSAH 10			CSAH 10		
Base Volume Input [veh/h]	233	434	115	181	325	32	132	653	331	45	156	112
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Growth Rate	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	63	0	0	18	0	0	181	0	0	61
Total Hourly Volume [veh/h]	254	473	62	197	354	17	144	712	180	49	170	61
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	69	129	17	54	96	5	39	193	49	13	46	17
Total Analysis Volume [veh/h]	276	514	67	214	385	18	157	774	196	53	185	66
Presence of On-Street Parking	no		no	no		no	no		no	no		no
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Volume [ped/h]	0			1			3			1		
Bicycle Volume [bicycles/h]	0			0			0			0		

Appendix D - Capacity Analysis Backup

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Version 2.00-06

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Intersection Settings

Located in CBD	no
Signal Coordination Group	-
Cycle Length [s]	140
Coordination Type	Time of Day Pattern Isolated
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	5.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal Group	5	2	0	1	6	0	7	4	0	3	8	0
Lead / Lag	Lag	-	-	Lag	-	-	Lag	-	-	Lag	-	-
Minimum Green [s]	5	10	0	5	10	0	5	10	0	5	10	0
Maximum Green [s]	30	30	0	30	30	0	30	40	0	30	40	0
Amber [s]	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0
All red [s]	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
Split [s]	41	39	0	33	31	0	41	56	0	12	27	0
Vehicle Extension [s]	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0
Walk [s]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Clearance [s]	0	0	0	0	0	0	0	0	0	0	0	0
l1, Start-Up Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
l2, Clearance Lost Time [s]	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0
Minimum Recall	no	no		no	no		no	yes		no	yes	
Maximum Recall	no	no		no	no		no	no		no	no	
Pedestrian Recall	no	no		no	no		no	no		no	no	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering 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

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Lane Group Calculations

Lane Group	L	C	R	L	C	R	L	C	R	L	C	R
L, Total Lost Time per Cycle [s]	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
g_i, Effective Green Time [s]	12	12	12	10	10	10	10	17	17	3	10	10
g / C, Green / Cycle	0.19	0.19	0.19	0.16	0.16	0.16	0.17	0.28	0.28	0.05	0.16	0.16
(v / s)_i Volume / Saturation Flow Rate	0.16	0.15	0.04	0.12	0.11	0.01	0.09	0.22	0.13	0.03	0.05	0.04
s, saturation flow rate [veh/h]	1757	3512	1568	1757	3512	1568	1757	3512	1568	1757	3512	1568
c, Capacity [veh/h]	337	674	301	282	564	252	295	977	436	85	557	249
d1, Uniform Delay [s]	24.14	23.84	21.26	25.00	24.66	22.22	23.68	20.83	18.56	29.08	23.29	23.03
k, delay calibration	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11
I, Upstream Filtering 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
d2, Incremental Delay [s]	4.91	1.83	0.37	4.18	1.47	0.12	1.48	1.50	0.73	7.16	0.35	0.56
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, 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
PF, progression 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

Lane Group Results

X, volume / capacity	0.82	0.76	0.22	0.76	0.68	0.07	0.53	0.79	0.45	0.62	0.33	0.27
d, Delay for Lane Group [s/veh]	29.05	25.66	21.63	29.18	26.14	22.34	25.16	22.32	19.28	36.25	23.64	23.60
Lane Group LOS	C	C	C	C	C	C	C	C	B	D	C	C
Critical Lane Group	no	yes	no	yes	no	no	no	yes	no	yes	no	no
50th-Percentile Queue Length [veh]	3.72	3.16	0.73	2.88	2.38	0.20	1.91	4.40	1.98	0.85	1.05	0.76
50th-Percentile Queue Length [ft]	92.91	79.12	18.17	72.00	59.50	4.98	47.70	110.00	49.55	21.21	26.32	19.08
95th-Percentile Queue Length [veh]	6.69	5.70	1.31	5.18	4.28	0.36	3.43	7.84	3.57	1.53	1.90	1.37
95th-Percentile Queue Length [ft]	167.24	142.41	32.71	129.61	107.10	8.96	85.86	196.01	89.19	38.17	47.38	34.34

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Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	29.05	25.66	21.63	29.18	26.14	22.34	25.16	22.32	19.28	36.25	23.64	23.60
Movement LOS	C	C	C	C	C	C	C	C	B	D	C	C
d_A, Approach Delay [s/veh]	26.44			27.08			22.19			25.83		
Approach LOS	C			C			C			C		
d_I, Intersection Delay [s/veh]	24.86											
Intersection LOS	C											
Intersection V/C	0.564											

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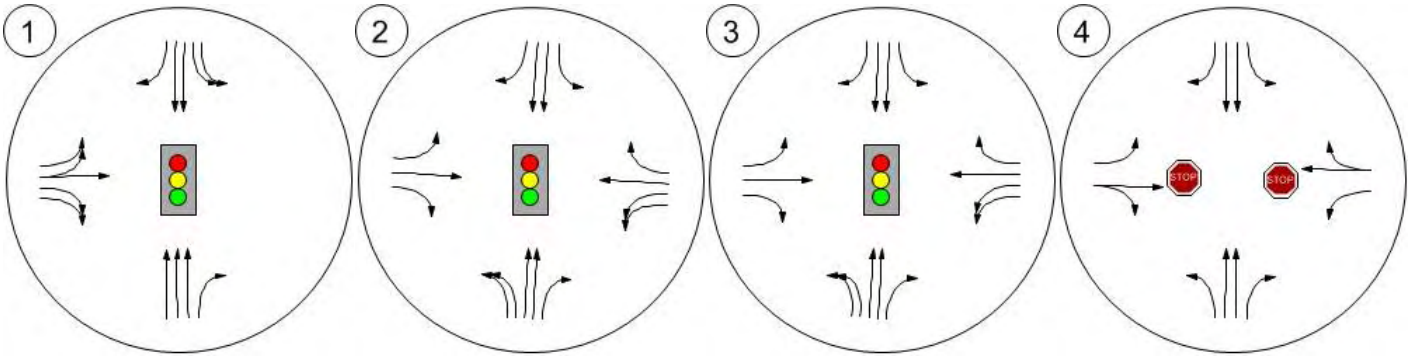
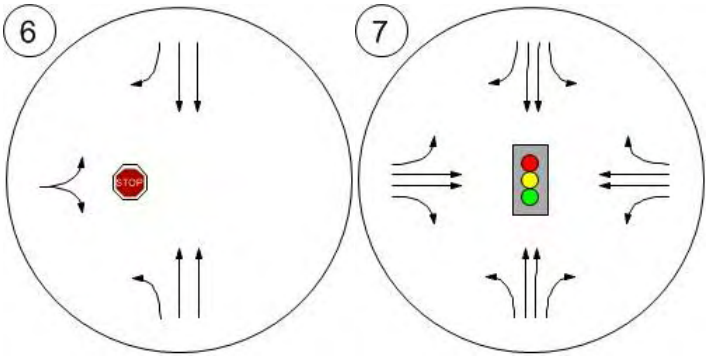
Lane Configuration and Traffic Control





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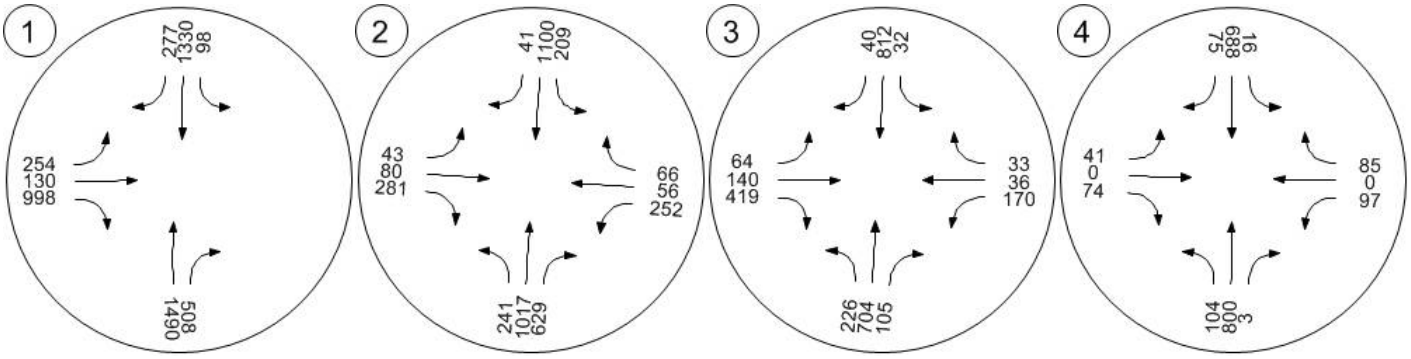
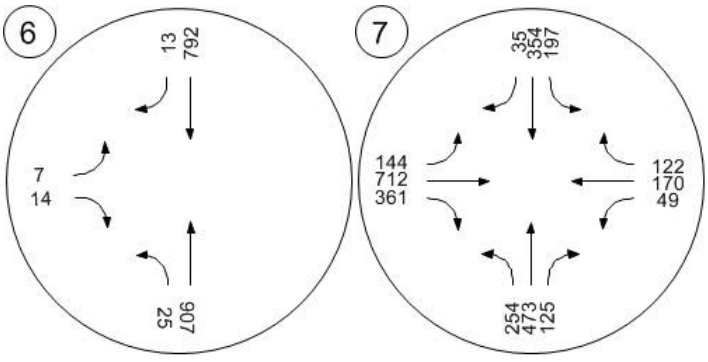
Traffic Volume - Future Total Volume





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Lake Elmo Development

Vistro File: C:\...\Lake Elmo.vistropdb
Report File: C:\...\AM 2019 Build.pdf

Scenario 5: AM 2019 Build
7/2/2014

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	CSAH 13 & I-94 Southern Ramp	Signalized	HCM2010	SBL	0.446	17.9	B
2	CSAH 13 & I-94 Northern Ramp	Signalized	HCM2010	SBL	0.506	26.8	C
3	Inwood Ave & Hudson Blvd	Signalized	HCM2010	EBL	0.417	27.0	C
4	CSAH 13 & Eagle Point Blvd	Two-way stop	HCM2010	WBL	0.475	69.4	F
5	CSAH 13 & 5th St	Two-way stop	HCM2010	WBL	1.716	431.3	F
6	CSAH 13 & 9th St	Two-way stop	HCM2010	EBT	0.000	25.8	D
7	CSAH 13 & CSAH 10	Signalized	HCM2010	WBL	0.417	20.9	C
8	CSAH 10 & Western Site Access	Two-way stop	HCM2010	SBT	0.000	21.0	C
9	CSAH 10 & Eastern Site Access	Two-way stop	HCM2010	NBL	0.146	20.7	C
10	Eagle Point Blvd & Site Access	Two-way stop	HCM2010	SBL	0.000	10.4	B

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value; for all other control types, they are taken for the whole intersection.

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Intersection Level Of Service Report
#1: CSAH 13 & I-94 Southern Ramp

Control Type:	Signalized	Delay (sec / veh):	17.9
Analysis Method:	HCM2010	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.446

Intersection Setup

Name	CSAH 13			CSAH 13			I-94 Ramp			I-94		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	1	2	0	1	1	0	2	0	0	0
Pocket Length [ft]	100.00	100.00	400.00	175.00	100.00	150.00	500.00	100.00	500.00	100.00	100.00	100.00
Speed [mph]	45.00			45.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	no			no			yes			no		

Volumes

Name	CSAH 13			CSAH 13			I-94 Ramp			I-94		
Base Volume Input [veh/h]	0	1172	76	12	613	55	286	20	410	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Growth Rate	1.00	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	47	0	0	79	79	83	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	42	0	0	70	0	0	224	0	0	0
Total Hourly Volume [veh/h]	0	1324	41	13	747	69	395	22	223	0	0	0
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	360	11	4	203	19	107	6	61	0	0	0
Total Analysis Volume [veh/h]	0	1439	45	14	812	75	429	24	242	0	0	0
Presence of On-Street Parking			no	no		no	no		no			
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

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Intersection Settings

Located in CBD	no
Signal Coordination Group	-
Cycle Length [s]	110
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	81.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	5.00

Phasing & Timing

Control Type	Permiss	Permiss	Permiss	Protecte	Permiss	Permiss	Permiss	Permiss	Overlap	Permiss	Protecte	Permiss
Signal Group	0	2	0	1	6	0	0	4	5	0	0	0
Lead / Lag	-	-	-	Lag	-	-	-	-	-	-	-	-
Minimum Green [s]	0	20	0	7	20	0	0	10	10	0	0	0
Maximum Green [s]	0	57	0	10	58	0	0	25	13	0	0	0
Amber [s]	0.0	4.5	0.0	3.0	4.5	0.0	0.0	3.5	3.5	0.0	0.0	0.0
All red [s]	0.0	1.0	0.0	2.0	1.5	0.0	0.0	3.5	3.5	0.0	0.0	0.0
Split [s]	0	64	0	12	59	0	0	34	17	0	0	0
Vehicle Extension [s]	0.0	4.6	0.0	2.0	4.6	0.0	0.0	3.0	2.0	0.0	0.0	0.0
Walk [s]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Clearance [s]	0	0	0	0	0	0	0	0	0	0	0	0
I1, Start-Up Lost Time [s]	0.0	2.0	0.0	2.0	2.0	0.0	0.0	2.0	2.0	0.0	0.0	0.0
I2, Clearance Lost Time [s]	0.0	3.5	0.0	3.0	4.0	0.0	0.0	5.0	5.0	0.0	0.0	0.0
Minimum Recall		no		no	no			no	no			
Maximum Recall		yes		no	yes			no	no			
Pedestrian Recall		no		no	no			no	no			
Detector Location [ft]	0.0	400.0	0.0	20.0	400.0	0.0	0.0	100.0	100.0	0.0	0.0	0.0
Detector Length [ft]	0.0	6.0	0.0	6.0	6.0	0.0	0.0	6.0	6.0	0.0	0.0	0.0
I, Upstream Filtering 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

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Lane Group Calculations

Lane Group	C	R	L	C	R	L	C	R	
L, Total Lost Time per Cycle [s]	5.50	5.50	5.00	6.00	6.00	7.00	7.00	7.00	
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
l2, Clearance Lost Time [s]	3.50	3.50	3.00	4.00	4.00	5.00	5.00	0.00	
g_i, Effective Green Time [s]	73	73	2	63	63	17	17	34	
g / C, Green / Cycle	0.67	0.67	0.02	0.58	0.58	0.15	0.15	0.31	
(v / s)_i Volume / Saturation Flow Rate	0.29	0.03	0.00	0.23	0.05	0.12	0.12	0.09	
s, saturation flow rate [veh/h]	5025	1568	3412	3512	1568	1757	1757	2775	
c, Capacity [veh/h]	3347	1044	79	2021	902	267	267	850	
d1, Uniform Delay [s]	8.60	6.32	52.72	12.90	10.41	45.10	45.10	29.00	
k, delay calibration	0.50	0.50	0.04	0.50	0.50	0.11	0.11	0.11	
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
d2, Incremental Delay [s]	0.41	0.08	0.39	0.60	0.18	5.64	5.64	0.18	
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	

Lane Group Results

X, volume / capacity	0.43	0.04	0.18	0.40	0.08	0.80	0.80	0.28	
d, Delay for Lane Group [s/veh]	9.00	6.40	53.11	13.50	10.60	50.74	50.74	29.18	
Lane Group LOS	A	A	D	B	B	D	D	C	
Critical Lane Group	no	no	no	yes	no	yes	no	yes	
50th-Percentile Queue Length [veh]	4.58	0.33	0.19	5.13	0.79	6.05	6.05	2.45	
50th-Percentile Queue Length [ft]	114.41	8.23	4.73	128.33	19.65	151.21	151.21	61.25	
95th-Percentile Queue Length [veh]	8.08	0.59	0.34	8.85	1.41	10.08	10.08	4.41	
95th-Percentile Queue Length [ft]	202.12	14.82	8.51	221.22	35.37	252.04	252.04	110.25	

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Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	0.00	9.00	6.40	53.11	13.50	10.60	50.74	50.74	29.18	0.00	0.00	0.00
Movement LOS		A	A	D	B	B	D	D	C			
d_A, Approach Delay [s/veh]	8.93			13.87			42.96			0.00		
Approach LOS	A			B			D			A		
d_I, Intersection Delay [s/veh]	17.86											
Intersection LOS	B											
Intersection V/C	0.446											

Sequence

Ring 1	1	2	4	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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Intersection Level Of Service Report
#2: CSAH 13 & I-94 Northern Ramp

Control Type:	Signalized	Delay (sec / veh):	26.8
Analysis Method:	HCM2010	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.506

Intersection Setup

Name	CSAH 13			CSAH 13			3rd St N			I-94 Ramp		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	2	0	0	1	0	1	1	0	0	2	0	1
Pocket Length [ft]	325.00	100.00	100.00	250.00	100.00	275.00	175.00	100.00	100.00	400.00	100.00	250.00
Speed [mph]	45.00			45.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	no			no			yes			no		

Volumes

Name	CSAH 13			CSAH 13			3rd St N			I-94 Ramp		
Base Volume Input [veh/h]	80	636	710	91	462	9	8	21	25	160	53	57
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Growth Rate	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	130	0	136	158	0	0	0	0	0	0	47
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	387	0	0	5	0	0	14	0	0	55
Total Hourly Volume [veh/h]	87	823	387	235	662	5	9	23	13	174	58	54
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	24	224	105	64	180	1	2	6	4	47	16	15
Total Analysis Volume [veh/h]	95	895	421	255	720	5	10	25	14	189	63	59
Presence of On-Street Parking	no		no	no		no	no		no	no		no
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Appendix D - Capacity Analysis Backup

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Spack CONSULTING THE TRAFFIC STUDY COMPANY

Intersection Settings

Located in CBD	no
Signal Coordination Group	-
Cycle Length [s]	110
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	89.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	5.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal Group	5	2	0	1	6	0	7	4	0	3	8	0
Lead / Lag	Lag	-	-	Lag	-	-	Lag	-	-	Lag	-	-
Minimum Green [s]	7	20	0	7	20	0	7	10	0	7	10	0
Maximum Green [s]	10	44	0	15	49	0	10	11	0	18	30	0
Amber [s]	3.0	4.5	0.0	3.0	4.5	0.0	3.0	3.5	0.0	3.0	3.5	0.0
All red [s]	2.0	1.5	0.0	2.0	2.0	0.0	2.0	3.5	0.0	2.0	3.0	0.0
Split [s]	13	50	0	29	66	0	12	17	0	14	19	0
Vehicle Extension [s]	2.0	4.6	0.0	2.0	4.6	0.0	2.0	3.0	0.0	2.0	3.0	0.0
Walk [s]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Clearance [s]	0	0	0	0	0	0	0	0	0	0	0	0
l1, Start-Up Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
l2, Clearance Lost Time [s]	3.0	4.0	0.0	3.0	4.5	0.0	3.0	5.0	0.0	3.0	4.5	0.0
Minimum Recall	no	no		no	no		no	no		no	no	
Maximum Recall	no	yes		no	yes		no	no		no	no	
Pedestrian Recall	no	no		no	no		no	no		no	no	
Detector Location [ft]	39.0	300.0	0.0	39.0	300.0	0.0	39.0	120.0	0.0	120.0	120.0	0.0
Detector Length [ft]	6.0	6.0	0.0	6.0	6.0	0.0	6.0	6.0	0.0	6.0	6.0	0.0
I, Upstream Filtering 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

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Spack CONSULTING THE TRAFFIC STUDY COMPANY

Lane Group Calculations

Lane Group	L	C	R	L	C	R	L	C	R	L	C	R
L, Total Lost Time per Cycle [s]	5.00	6.00	6.00	5.00	6.50	6.50	5.00	7.00	7.00	5.00	6.50	6.50
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	3.00	4.00	4.00	3.00	4.50	4.50	3.00	5.00	5.00	3.00	4.50	4.50
g_i, Effective Green Time [s]	7	54	54	18	65	65	6	7	7	8	10	10
g / C, Green / Cycle	0.06	0.49	0.49	0.16	0.59	0.59	0.05	0.06	0.06	0.07	0.09	0.09
(v / s)_i Volume / Saturation Flow Rate	0.03	0.25	0.27	0.15	0.20	0.00	0.01	0.01	0.01	0.06	0.03	0.04
s, saturation flow rate [veh/h]	3412	3512	1568	1757	3512	1568	1757	1845	1568	3412	1845	1568
c, Capacity [veh/h]	206	1721	768	285	2063	921	94	118	100	257	166	141
d1, Uniform Delay [s]	49.99	19.21	19.57	45.20	11.80	9.41	49.61	48.92	48.69	49.84	47.18	47.35
k, delay calibration	0.04	0.50	0.50	0.12	0.50	0.50	0.04	0.11	0.11	0.04	0.11	0.11
I, Upstream Filtering 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
d2, Incremental Delay [s]	0.60	1.13	2.80	10.91	0.47	0.01	0.18	0.89	0.63	1.55	1.42	1.96
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, 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
PF, progression 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

Lane Group Results

X, volume / capacity	0.46	0.52	0.55	0.90	0.35	0.01	0.11	0.21	0.14	0.74	0.38	0.42
d, Delay for Lane Group [s/veh]	50.59	20.34	22.37	56.11	12.26	9.42	49.80	49.81	49.33	51.39	48.60	49.31
Lane Group LOS	D	C	C	E	B	A	D	D	D	D	D	D
Critical Lane Group	no	no	yes	yes	no	no	no	yes	no	yes	no	no
50th-Percentile Queue Length [veh]	1.25	7.48	7.50	7.44	4.22	0.05	0.27	0.68	0.38	2.60	1.69	1.61
50th-Percentile Queue Length [ft]	31.16	186.89	187.60	186.01	105.54	1.20	6.67	17.04	9.53	64.92	42.33	40.16
95th-Percentile Queue Length [veh]	2.24	11.96	12.00	11.91	7.59	0.09	0.48	1.23	0.69	4.67	3.05	2.89
95th-Percentile Queue Length [ft]	56.09	298.99	299.91	297.85	189.78	2.16	12.01	30.67	17.16	116.86	76.19	72.29

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Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	50.59	20.34	22.37	56.11	12.26	9.42	49.80	49.81	49.33	51.39	48.60	49.31
Movement LOS	D	C	C	E	B	A	D	D	D	D	D	D
d_A, Approach Delay [s/veh]	22.98			23.66			49.67			50.43		
Approach LOS	C			C			D			D		
d_I, Intersection Delay [s/veh]	26.80											
Intersection LOS	C											
Intersection V/C	0.506											

Sequence

Ring 1	1	2	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	7	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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Spack CONSULTING THE TRAFFIC STUDY COMPANY

Intersection Level Of Service Report
#3: Inwood Ave & Hudson Blvd

Control Type:	Signalized	Delay (sec / veh):	27.0
Analysis Method:	HCM2010	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.417

Intersection Setup

Name	CSAH 13			CSAH 13			4th St N			Hudson Blvd		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	2	0	1	1	0	1	1	0	0	2	0	1
Pocket Length [ft]	175.00	100.00	250.00	100.00	100.00	100.00	175.00	100.00	100.00	250.00	100.00	250.00
Speed [mph]	45.00			45.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	no			yes			yes			yes		

Volumes

Name	CSAH 13			CSAH 13			4th St N			Hudson Blvd		
Base Volume Input [veh/h]	176	314	139	33	373	52	14	22	149	137	167	48
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Growth Rate	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	177	0	0	294	8	5	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	76	0	0	33	0	0	81	0	0	26
Total Hourly Volume [veh/h]	192	519	76	36	701	32	20	24	81	149	182	26
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	52	141	21	10	190	9	5	7	22	40	49	7
Total Analysis Volume [veh/h]	209	564	83	39	762	35	22	26	88	162	198	28
Presence of On-Street Parking	no		no	no		no	no		no	no		no
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Volume [ped/h]	0			11			0			3		
Bicycle Volume [bicycles/h]	0			0			0			0		

Appendix D - Capacity Analysis Backup

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Spack CONSULTING THE TRAFFIC STUDY COMPANY

Intersection Settings

Located in CBD	no
Signal Coordination Group	-
Cycle Length [s]	110
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	94.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	5.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal Group	5	2	0	1	6	0	7	4	0	3	8	0
Lead / Lag	Lag	-	-	Lead	-	-	Lead	-	-	Lag	-	-
Minimum Green [s]	7	20	0	7	20	0	7	10	0	7	10	0
Maximum Green [s]	16	39	0	12	35	0	12	24	0	12	25	0
Amber [s]	3.0	4.5	0.0	3.0	4.5	0.0	3.0	4.0	0.0	3.0	4.0	0.0
All red [s]	2.0	1.5	0.0	2.0	1.5	0.0	2.0	2.5	0.0	2.0	2.5	0.0
Split [s]	18	57	0	12	51	0	12	22	0	19	29	0
Vehicle Extension [s]	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0
Walk [s]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Clearance [s]	0	0	0	0	0	0	0	0	0	0	0	0
l1, Start-Up Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
l2, Clearance Lost Time [s]	3.0	4.0	0.0	3.0	4.0	0.0	3.0	4.5	0.0	3.0	4.5	0.0
Minimum Recall	no	no		no	no		no	no		no	no	
Maximum Recall	no	yes		no	yes		no	no		no	no	
Pedestrian Recall	no	no		no	no		no	no		no	no	
Detector Location [ft]	55.0	300.0	0.0	55.0	475.0	0.0	50.0	250.0	0.0	50.0	250.0	0.0
Detector Length [ft]	6.0	6.0	0.0	6.0	6.0	0.0	6.0	6.0	0.0	6.0	6.0	0.0
I, Upstream Filtering 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

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Lane Group Calculations

Lane Group	L	C	R	L	C	R	L	C	R	L	C	R
L, Total Lost Time per Cycle [s]	5.00	6.00	6.00	5.00	6.00	6.00	5.00	6.50	6.50	5.00	6.50	6.50
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	3.00	4.00	4.00	3.00	4.00	4.00	3.00	4.50	4.50	3.00	4.50	4.50
g_i, Effective Green Time [s]	9	65	65	5	61	61	3	10	10	8	14	14
g / C, Green / Cycle	0.08	0.59	0.59	0.04	0.56	0.56	0.03	0.09	0.09	0.07	0.13	0.13
(v / s)_i Volume / Saturation Flow Rate	0.06	0.16	0.05	0.02	0.22	0.02	0.01	0.01	0.06	0.05	0.11	0.02
s, saturation flow rate [veh/h]	3412	3512	1568	1757	3512	1568	1757	1845	1568	3412	1845	1568
c, Capacity [veh/h]	275	2077	927	79	1952	871	56	164	140	239	235	200
d1, Uniform Delay [s]	49.54	10.94	9.70	51.32	13.86	11.10	52.22	46.29	48.35	49.93	46.90	42.63
k, delay calibration	0.11	0.50	0.50	0.11	0.50	0.50	0.11	0.11	0.11	0.11	0.11	0.11
I, Upstream Filtering 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
d2, Incremental Delay [s]	4.34	0.32	0.19	4.75	0.59	0.09	4.46	0.44	4.60	3.33	7.91	0.32
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, 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
PF, progression 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

Lane Group Results

X, volume / capacity	0.76	0.27	0.09	0.50	0.39	0.04	0.39	0.16	0.63	0.68	0.84	0.14
d, Delay for Lane Group [s/veh]	53.89	11.26	9.89	56.07	14.45	11.19	56.68	46.73	52.95	53.26	54.82	42.95
Lane Group LOS	D	B	A	E	B	B	E	D	D	D	D	D
Critical Lane Group	yes	no	no	no	yes	no	yes	no	no	no	yes	no
50th-Percentile Queue Length [veh]	2.90	3.08	0.83	1.13	5.02	0.38	0.66	0.68	2.51	2.28	5.79	0.70
50th-Percentile Queue Length [ft]	72.43	77.07	20.73	28.15	125.52	9.46	16.61	16.97	62.65	57.04	144.80	17.39
95th-Percentile Queue Length [veh]	5.21	5.55	1.49	2.03	8.70	0.68	1.20	1.22	4.51	4.11	9.74	1.25
95th-Percentile Queue Length [ft]	130.37	138.72	37.31	50.67	217.39	17.04	29.89	30.54	112.78	102.67	243.47	31.30

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Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	53.89	11.26	9.89	56.07	14.45	11.19	56.68	46.73	52.95	53.26	54.82	42.95
Movement LOS	D	B	A	E	B	B	E	D	D	D	D	D
d_A, Approach Delay [s/veh]	21.54			16.26			52.37			53.31		
Approach LOS	C			B			D			D		
d_I, Intersection Delay [s/veh]	27.00											
Intersection LOS	C											
Intersection V/C	0.417											

Sequence

Ring 1	1	2	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	7	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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Spack CONSULTING THE TRAFFIC STUDY COMPANY

Intersection Level Of Service Report
#4: CSAH 13 & Eagle Point Blvd

Control Type:	Two-way stop	Delay (sec / veh):	69.4
Analysis Method:	HCM2010	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.475

Intersection Setup

Name	CSAH 13			CSAH 13			Oak Marsh Rd			Eagle Point Blvd		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	1	1	0	1	1	0	0	1	0	0
Pocket Length [ft]	200.00	100.00	250.00	250.00	100.00	250.00	50.00	100.00	100.00	200.00	100.00	100.00
Speed [mph]	45.00			55.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	no			no			yes			no		

Volumes

Name	CSAH 13			CSAH 13			Oak Marsh Rd			Eagle Point Blvd		
Base Volume Input [veh/h]	61	276	84	92	474	32	8	0	9	3	0	4
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Growth Rate	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	154	28	0	261	0	0	0	0	41	0	6
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	66	455	120	100	778	35	9	0	10	44	0	10
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	18	124	33	27	211	10	2	0	3	12	0	3
Total Analysis Volume [veh/h]	72	495	130	109	846	38	10	0	11	48	0	11
Pedestrian Volume [ped/h]	0			0			3			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Appendix D - Capacity Analysis Backup

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Intersection Settings

Priority Scheme	Free	Free	Stop	Stop
Flared Lane	no	no	no	no
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	no	no	no	no
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.10	0.00	0.00	0.12	0.01	0.00	0.13	0.00	0.02	0.48	0.00	0.01
d_M, Delay for Movement [s/veh]	10.30	0.00	0.00	9.30	0.00	0.00	60.67	65.95	11.41	69.37	58.36	9.87
Movement LOS	B	A	A	A	A	A	F	F	B	F	F	A
95th-Percentile Queue Length [veh]	0.32	0.00	0.00	0.39	0.00	0.00	0.44	0.06	0.06	2.07	0.04	0.04
95th-Percentile Queue Length [ft]	7.93	0.00	0.00	9.74	0.00	0.00	11.02	1.47	1.47	51.73	1.12	1.12
d_A, Approach Delay [s/veh]	1.06			1.02			34.87			58.28		
Approach LOS	A			A			D			F		
d_I, Intersection Delay [s/veh]	3.35											
Intersection LOS	F											

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Intersection Level Of Service Report
#5: CSAH 13 & 5th St

Control Type:	Two-way stop	Delay (sec / veh):	431.3
Analysis Method:	HCM2010	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	1.716

Intersection Setup

Name	CSAH 13		CSAH 13		5th St	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	55.00		55.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	no		no		no	

Volumes

Name	CSAH 13		CSAH 13		5th St	
Base Volume Input [veh/h]	288	0	0	598	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	3.00	3.00	3.00	3.00	3.00	3.00
Growth Rate	1.09	1.09	1.09	1.09	1.09	1.09
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	52	108	34	22	239	47
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	-36	36	71	-74	74	36
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	330	144	105	600	313	83
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	90	39	29	163	85	23
Total Analysis Volume [veh/h]	359	157	114	652	340	90
Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

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Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane	no	no	no
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	no	no	no
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.11	0.01	1.72	0.12
d_M, Delay for Movement [s/veh]	0.00	0.00	8.89	0.00	431.33	418.04
Movement LOS	A	A	A	A	F	F
95th-Percentile Queue Length [veh]	0.00	0.00	1.72	0.86	29.90	29.90
95th-Percentile Queue Length [ft]	0.00	0.00	42.89	21.45	747.40	747.40
d_A, Approach Delay [s/veh]	0.00		1.32		428.55	
Approach LOS	A		A		F	
d_I, Intersection Delay [s/veh]	108.23					
Intersection LOS	F					

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Intersection Level Of Service Report
#6: CSAH 13 & 9th St

Control Type:	Two-way stop	Delay (sec / veh):	25.8
Analysis Method:	HCM2010	Level Of Service:	D
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.000

Intersection Setup

Name	CSAH 13			CSAH 13			9th St					
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	0	0	0	1	0	0	0	0	0	0
Pocket Length [ft]	300.00	100.00	100.00	100.00	100.00	200.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	55.00			55.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	no			no			yes			no		

Volumes

Name	CSAH 13			CSAH 13			9th St					
Base Volume Input [veh/h]	5	278	0	0	565	4	6	0	15	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Growth Rate	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.00	1.00	1.09
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	59	40	6	55	0	0	0	0	0	0	17
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	3	-3	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	5	362	40	9	668	4	7	0	16	0	0	17
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	1	98	11	2	182	1	2	0	4	0	0	5
Total Analysis Volume [veh/h]	5	393	43	10	726	4	8	0	17	0	0	18
Pedestrian Volume [ped/h]	0			0			4			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

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Intersection Settings

Priority Scheme	Free	Free	Stop	Stop
Flared Lane	no	no	no	no
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	no	no	no	no
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.01	0.00	0.00	0.01	0.01	0.00	0.04	0.00	0.03	0.00	0.00	0.02
d_M, Delay for Movement [s/veh]	9.23	0.00	0.00	8.26	0.00	0.00	23.52	25.83	11.45	0.00	0.00	9.70
Movement LOS	A	A	A	A	A	A	C	D	B			A
95th-Percentile Queue Length [veh]	0.02	0.00	0.00	1.46	0.73	0.00	0.21	0.21	0.21	0.00	0.00	0.07
95th-Percentile Queue Length [ft]	0.44	0.00	0.00	36.47	18.24	0.00	5.35	5.35	5.35	0.00	0.00	1.76
d_A, Approach Delay [s/veh]	0.10			0.11			15.31			9.70		
Approach LOS	A			A			C			A		
d_I, Intersection Delay [s/veh]	0.56											
Intersection LOS	D											

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Intersection Level Of Service Report
#7: CSAH 13 & CSAH 10

Control Type:	Signalized	Delay (sec / veh):	20.9
Analysis Method:	HCM2010	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.417

Intersection Setup

Name	CSAH 13			CSAH 13			CSAH 10			CSAH 10		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	1	1	0	1	1	0	1	1	0	1
Pocket Length [ft]	250.00	100.00	250.00	250.00	100.00	250.00	275.00	100.00	275.00	250.00	100.00	250.00
Speed [mph]	55.00			55.00			55.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	yes			yes			yes			yes		

Volumes

Name	CSAH 13			CSAH 13			CSAH 10			CSAH 10		
Base Volume Input [veh/h]	107	152	34	49	321	82	27	117	174	87	419	121
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Growth Rate	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	49	17	11	3	9	0	0	8	27	24	11	4
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	24	0	0	45	0	0	109	0	0	68
Total Hourly Volume [veh/h]	166	183	24	56	359	44	29	136	108	119	468	68
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	45	50	7	15	98	12	8	37	29	32	127	18
Total Analysis Volume [veh/h]	180	199	26	61	390	48	32	148	117	129	509	74
Presence of On-Street Parking	no		no	no		no	no		no	no		no
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Volume [ped/h]	2			0			1			2		
Bicycle Volume [bicycles/h]	0			0			0			0		

Appendix D - Capacity Analysis Backup

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Intersection Settings

Located in CBD	no
Signal Coordination Group	-
Cycle Length [s]	110
Coordination Type	Time of Day Pattern Isolated
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	5.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal Group	5	2	0	1	6	0	7	4	0	3	8	0
Lead / Lag	Lag	-	-	Lag	-	-	Lag	-	-	Lag	-	-
Minimum Green [s]	5	10	0	5	10	0	5	10	0	5	10	0
Maximum Green [s]	30	30	0	30	30	0	30	40	0	30	40	0
Amber [s]	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0
All red [s]	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
Split [s]	29	37	0	24	32	0	10	25	0	24	39	0
Vehicle Extension [s]	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0
Walk [s]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Clearance [s]	0	0	0	0	0	0	0	0	0	0	0	0
l1, Start-Up Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
l2, Clearance Lost Time [s]	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0
Minimum Recall	no	no		no	no		no	yes		no	yes	
Maximum Recall	no	no		no	no		no	no		no	no	
Pedestrian Recall	no	no		no	no		no	no		no	no	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering 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

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Lane Group Calculations

Lane Group	L	C	R	L	C	R	L	C	R	L	C	R
L, Total Lost Time per Cycle [s]	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
g_i, Effective Green Time [s]	7	10	10	7	10	10	5	10	10	5	10	10
g / C, Green / Cycle	0.13	0.19	0.19	0.14	0.19	0.19	0.09	0.19	0.19	0.10	0.20	0.20
(v / s)_i Volume / Saturation Flow Rate	0.10	0.06	0.02	0.03	0.11	0.03	0.02	0.04	0.07	0.07	0.14	0.05
s, saturation flow rate [veh/h]	1757	3512	1568	1757	3512	1568	1757	3512	1568	1757	3512	1568
c, Capacity [veh/h]	238	652	291	250	676	302	152	663	296	173	705	315
d1, Uniform Delay [s]	21.64	18.28	17.54	19.81	19.07	17.49	22.09	17.86	18.49	22.79	19.42	17.43
k, delay calibration	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11
I, Upstream Filtering 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
d2, Incremental Delay [s]	4.85	0.26	0.13	0.50	0.78	0.24	0.68	0.17	0.86	6.19	1.42	0.38
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, 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
PF, progression 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

Lane Group Results

X, volume / capacity	0.76	0.31	0.09	0.24	0.58	0.16	0.21	0.22	0.40	0.74	0.72	0.24
d, Delay for Lane Group [s/veh]	26.50	18.54	17.67	20.31	19.85	17.73	22.77	18.03	19.34	28.98	20.83	17.81
Lane Group LOS	C	B	B	C	B	B	C	B	B	C	C	B
Critical Lane Group	yes	no	no	no	yes	no	yes	no	no	no	yes	no
50th-Percentile Queue Length [veh]	2.01	0.84	0.21	0.56	1.74	0.40	0.33	0.61	1.04	1.55	2.37	0.62
50th-Percentile Queue Length [ft]	50.35	20.92	5.36	14.05	43.56	9.93	8.16	15.19	25.98	38.69	59.29	15.39
95th-Percentile Queue Length [veh]	3.63	1.51	0.39	1.01	3.14	0.71	0.59	1.09	1.87	2.79	4.27	1.11
95th-Percentile Queue Length [ft]	90.63	37.66	9.65	25.29	78.41	17.87	14.69	27.34	46.77	69.63	106.71	27.71

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Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	26.50	18.54	17.67	20.31	19.85	17.73	22.77	18.03	19.34	28.98	20.83	17.81
Movement LOS	C	B	B	C	B	B	C	B	B	C	C	B
d_A, Approach Delay [s/veh]	22.02			19.70			19.06			22.00		
Approach LOS	C			B			B			C		
d_I, Intersection Delay [s/veh]	20.95											
Intersection LOS	C											
Intersection V/C	0.417											

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Intersection Level Of Service Report
#8: CSAH 10 & Western Site Access

Control Type:	Two-way stop	Delay (sec / veh):	21.0
Analysis Method:	HCM2010	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.000

Intersection Setup

Name	Western Site Access						CSAH 10			CSAH 10		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	1	0	0	1	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	125.00	100.00	100.00	275.00	100.00	100.00
Speed [mph]	30.00			30.00			55.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	no			no			no			no		

Volumes

Name	Western Site Access						CSAH 10			CSAH 10		
Base Volume Input [veh/h]	0	0	0	0	0	0	0	200	0	0	627	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Growth Rate	1.00	1.00	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	3	0	0	0	0	15	6	1	38	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	0	3	0	0	0	0	233	6	1	721	0
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	1	0	0	0	0	63	2	0	196	0
Total Analysis Volume [veh/h]	0	0	3	0	0	0	0	253	7	1	784	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

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Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	no	no	no	no
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	no	no	no	no
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00
d_M, Delay for Movement [s/veh]	0.00	0.00	9.05	20.92	20.98	10.96	9.37	0.00	0.00	7.78	0.00	0.00
Movement LOS			A	C	C	B	A	A	A	A	A	
95th-Percentile Queue Length [veh]	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft]	0.00	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.00
d_A, Approach Delay [s/veh]	9.05			17.62			0.00			0.01		
Approach LOS	A			C			A			A		
d_I, Intersection Delay [s/veh]	0.03											
Intersection LOS	C											

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Intersection Level Of Service Report
#9: CSAH 10 & Eastern Site Access

Control Type:	Two-way stop	Delay (sec / veh):	20.7
Analysis Method:	HCM2010	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.146

Intersection Setup

Name	Eastern Site Access		CSAH 10		CSAH 10	
Approach	Northbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Thru	Right	Left	Thru
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		55.00		55.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	no		no		no	

Volumes

Name	Eastern Site Access		CSAH 10		CSAH 10	
Base Volume Input [veh/h]	0	0	200	0	0	627
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	3.00	3.00	3.00	3.00	3.00	3.00
Growth Rate	1.09	1.09	1.09	1.09	1.09	1.09
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	36	5	7	10	2	4
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	36	5	225	10	2	687
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	10	1	61	3	1	187
Total Analysis Volume [veh/h]	39	5	245	11	2	747
Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

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Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane	no	no	no
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	no	no	no
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.15	0.01	0.00	0.00	0.00	0.01
d_M, Delay for Movement [s/veh]	20.71	11.81	0.00	0.00	7.77	0.00
Movement LOS	C	B	A	A	A	A
95th-Percentile Queue Length [veh]	0.53	0.53	0.00	0.00	3.84	3.84
95th-Percentile Queue Length [ft]	13.25	13.25	0.00	0.00	96.06	96.06
d_A, Approach Delay [s/veh]	19.70		0.00		0.02	
Approach LOS	C		A		A	
d_I, Intersection Delay [s/veh]	0.84					
Intersection LOS	C					

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Intersection Level Of Service Report
#10: Eagle Point Blvd & Site Access

Control Type:	Two-way stop	Delay (sec / veh):	10.4
Analysis Method:	HCM2010	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.000

Intersection Setup

Name	Site Access		Eagle Point Blvd		Eagle Point Blvd	
Approach	Southbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	no		no		no	

Volumes

Name	Site Access		Eagle Point Blvd		Eagle Point Blvd	
Base Volume Input [veh/h]	0	0	0	176	7	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	3.00	3.00	3.00	3.00	3.00	3.00
Growth Rate	1.09	1.09	1.09	1.09	1.09	1.09
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	48	28	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	48	28	192	8	0
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	13	8	52	2	0
Total Analysis Volume [veh/h]	0	52	30	209	9	0
Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

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Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane	no	no	no
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	no	no	no
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.05	0.02	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	10.36	8.54	7.29	0.00	0.00	0.00
Movement LOS	B	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.15	0.15	0.52	0.52	0.00	0.00
95th-Percentile Queue Length [ft]	3.83	3.83	13.09	13.09	0.00	0.00
d_A, Approach Delay [s/veh]	8.54		0.91		0.00	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	2.21					
Intersection LOS	B					

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Signal Warrants Report For Intersection #4: CSAH 13 & Eagle Point Blvd

Warrants Summary

Warrant	Name	Met?
#1	Eight Hour Vehicular Volume	No
#2	Four Hour Vehicular Volume	No
#3	Peak Hour	No

Intersection Warrants Parameters

Major Approaches	N, S
Minor Approaches	E, W
Speed > 40mph	Yes
Population < 10,000	Yes
Warrant Factor	70%

Warrant Analysis Traffic Volumes

Hour	Major Streets		Minor Streets	
	N	S	E	W
1	913	641	54	19
2	876	615	52	18
3	858	603	51	18
4	730	513	43	15
5	694	487	41	14
6	621	436	37	13
7	575	404	34	12
8	548	385	32	11
9	438	308	26	9
10	411	288	24	9
11	411	288	24	9
12	393	276	23	8
13	356	250	21	7
14	329	231	19	7
15	329	231	19	7
16	320	224	19	7
17	183	128	11	4
18	100	71	6	2
19	91	64	5	2
20	37	26	2	1
21	27	19	2	1
22	27	19	2	1
23	18	13	1	0
24	18	13	1	0

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Warrant Analysis by Hour

Hour	Major Lanes		Minor Lanes		Warrant 1 Condition A				Warrant 1 Condition B				Warrant 2	Warrant 3
	Number	Volume	Number	Volume	100%	80%	70%	56%	100%	80%	70%	56%		Condition B
1	8	1554	4	73	No	No	No	No	No	No	No	No	No	No
2	8	1491	4	70	No	No	No	No	No	No	No	No	No	No
3	8	1461	4	69	No	No	No	No	No	No	No	No	No	No
4	8	1243	4	58	No	No	No	No	No	No	No	No	No	No
5	8	1181	4	55	No	No	No	No	No	No	No	No	No	No
6	8	1057	4	50	No	No	No	No	No	No	No	No	No	No
7	8	979	4	46	No	No	No	No	No	No	No	No	No	No
8	8	933	4	43	No	No	No	No	No	No	No	No	No	No
9	8	746	4	35	No	No	No	No	No	No	No	No	No	No
10	8	699	4	33	No	No	No	No	No	No	No	No	No	No
11	8	699	4	33	No	No	No	No	No	No	No	No	No	No
12	8	669	4	31	No	No	No	No	No	No	No	No	No	No
13	8	606	4	28	No	No	No	No	No	No	No	No	No	No
14	8	560	4	26	No	No	No	No	No	No	No	No	No	No
15	8	560	4	26	No	No	No	No	No	No	No	No	No	No
16	8	544	4	26	No	No	No	No	No	No	No	No	No	No
17	8	311	4	15	No	No	No	No	No	No	No	No	No	No
18	8	171	4	8	No	No	No	No	No	No	No	No	No	No
19	8	155	4	7	No	No	No	No	No	No	No	No	No	No
20	8	63	4	3	No	No	No	No	No	No	No	No	No	No
21	8	46	4	3	No	No	No	No	No	No	No	No	No	No
22	8	46	4	3	No	No	No	No	No	No	No	No	No	No
23	8	31	4	1	No	No	No	No	No	No	No	No	No	No
24	8	31	4	1	No	No	No	No	No	No	No	No	No	No
Hours Met					0	0	0	0	0	0	0	0	0	0

Warrant 3 Condition A

Orientation	E	W
Total Stopped Delay Per Vehicle on Minor Approach (s)	58.3	34.9
Number of Lanes on Minor Street Approach	2	2
VehicleHours of Stopped Delay on Minor Approach ([h]h:mm)	0:52	0:11
Delay Condition Met	No	No
Volume on Minor Street Approach During Same Hour	54	19
High Minor Volume Condition Met	No	No
Total Entering Volume on All Approaches During Same Hour	1627	1627
Number of Approaches on Intersection	4	4
Total Volume Condition Met	Yes	Yes
Warrant Met for Approach	No	No
Warrant Met for Intersection	**No**	

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Signal Warrants Report For Intersection #5: CSAH 13 & 5th St

Warrants Summary

Warrant	Name	Met?
#1	Eight Hour Vehicular Volume	Yes
#2	Four Hour Vehicular Volume	Yes
#3	Peak Hour	Yes

Intersection Warrants Parameters

Major Approaches	S, N
Minor Approaches	E
Speed > 40mph	Yes
Population < 10,000	Yes
Warrant Factor	70%

Warrant Analysis Traffic Volumes

Hour	Major Streets		Minor Streets
	S	N	E
1	474	705	396
2	455	677	380
3	446	663	372
4	379	564	317
5	360	536	301
6	322	479	269
7	299	444	249
8	284	423	238
9	228	338	190
10	213	317	178
11	213	317	178
12	204	303	170
13	185	275	154
14	171	254	143
15	171	254	143
16	166	247	139
17	95	141	79
18	52	78	44
19	47	71	40
20	19	28	16
21	14	21	12
22	14	21	12
23	9	14	8
24	9	14	8

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Warrant Analysis by Hour

Hour	Major Lanes		Minor Lanes		Warrant 1 Condition A				Warrant 1 Condition B				Warrant 2	Warrant 3
	Number	Volume	Number	Volume	100%	80%	70%	56%	100%	80%	70%	56%		Condition B
1	4	1179	1	396	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
2	4	1132	1	380	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
3	4	1109	1	372	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
4	4	943	1	317	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
5	4	896	1	301	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes
6	4	801	1	269	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes
7	4	743	1	249	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes
8	4	707	1	238	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes	Yes
9	4	566	1	190	No	Yes	Yes	Yes	No	No	No	Yes	Yes	Yes
10	4	530	1	178	No	Yes	Yes	Yes	No	No	No	Yes	Yes	No
11	4	530	1	178	No	Yes	Yes	Yes	No	No	No	Yes	Yes	No
12	4	507	1	170	No	Yes	Yes	Yes	No	No	No	Yes	Yes	No
13	4	460	1	154	No	No	Yes	Yes	No	No	No	No	Yes	No
14	4	425	1	143	No	No	Yes	Yes	No	No	No	No	Yes	No
15	4	425	1	143	No	No	Yes	Yes	No	No	No	No	Yes	No
16	4	413	1	139	No	No	No	Yes	No	No	No	No	Yes	No
17	4	236	1	79	No	No	No	No	No	No	No	No	No	No
18	4	130	1	44	No	No	No	No	No	No	No	No	No	No
19	4	118	1	40	No	No	No	No	No	No	No	No	No	No
20	4	47	1	16	No	No	No	No	No	No	No	No	No	No
21	4	35	1	12	No	No	No	No	No	No	No	No	No	No
22	4	35	1	12	No	No	No	No	No	No	No	No	No	No
23	4	23	1	8	No	No	No	No	No	No	No	No	No	No
24	4	23	1	8	No	No	No	No	No	No	No	No	No	No
Hours Met					8	12	15	16	4	7	8	12	16	9

Warrant 3 Condition A

Orientation	E
Total Stopped Delay Per Vehicle on Minor Approach (s)	428.6
Number of Lanes on Minor Street Approach	1
VehicleHours of Stopped Delay on Minor Approach ([h]h:mm)	47:08
Delay Condition Met	Yes
Volume on Minor Street Approach During Same Hour	396
High Minor Volume Condition Met	Yes
Total Entering Volume on All Approaches During Same Hour	1575
Number of Approaches on Intersection	3
Total Volume Condition Met	Yes
Warrant Met for Approach	Yes
Warrant Met for Intersection	**Yes**

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Signal Warrants Report For Intersection #6: CSAH 13 & 9th St

Warrants Summary

Warrant	Name	Met?
#1	Eight Hour Vehicular Volume	No
#2	Four Hour Vehicular Volume	No
#3	Peak Hour	No

Intersection Warrants Parameters

Major Approaches	S, N
Minor Approaches	E, W
Speed > 40mph	Yes
Population < 10,000	Yes
Warrant Factor	70%

Warrant Analysis Traffic Volumes

Hour	Major Streets		Minor Streets	
	S	N	E	W
1	407	681	17	23
2	391	654	16	22
3	383	640	16	22
4	326	545	14	18
5	309	518	13	17
6	277	463	12	16
7	256	429	11	14
8	244	409	10	14
9	195	327	8	11
10	183	306	8	10
11	183	306	8	10
12	175	293	7	10
13	159	266	7	9
14	147	245	6	8
15	147	245	6	8
16	142	238	6	8
17	81	136	3	5
18	45	75	2	3
19	41	68	2	2
20	16	27	1	1
21	12	20	1	1
22	12	20	1	1
23	8	14	0	0
24	8	14	0	0

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Warrant Analysis by Hour

Hour	Major Lanes		Minor Lanes		Warrant 1 Condition A				Warrant 1 Condition B				Warrant 2	Warrant 3
	Number	Volume	Number	Volume	100%	80%	70%	56%	100%	80%	70%	56%		Condition B
1	6	1088	2	40	No	No	No	No	No	No	No	No	No	No
2	6	1045	2	38	No	No	No	No	No	No	No	No	No	No
3	6	1023	2	38	No	No	No	No	No	No	No	No	No	No
4	6	871	2	32	No	No	No	No	No	No	No	No	No	No
5	6	827	2	30	No	No	No	No	No	No	No	No	No	No
6	6	740	2	28	No	No	No	No	No	No	No	No	No	No
7	6	685	2	25	No	No	No	No	No	No	No	No	No	No
8	6	653	2	24	No	No	No	No	No	No	No	No	No	No
9	6	522	2	19	No	No	No	No	No	No	No	No	No	No
10	6	489	2	18	No	No	No	No	No	No	No	No	No	No
11	6	489	2	18	No	No	No	No	No	No	No	No	No	No
12	6	468	2	17	No	No	No	No	No	No	No	No	No	No
13	6	425	2	16	No	No	No	No	No	No	No	No	No	No
14	6	392	2	14	No	No	No	No	No	No	No	No	No	No
15	6	392	2	14	No	No	No	No	No	No	No	No	No	No
16	6	380	2	14	No	No	No	No	No	No	No	No	No	No
17	6	217	2	8	No	No	No	No	No	No	No	No	No	No
18	6	120	2	5	No	No	No	No	No	No	No	No	No	No
19	6	109	2	4	No	No	No	No	No	No	No	No	No	No
20	6	43	2	2	No	No	No	No	No	No	No	No	No	No
21	6	32	2	2	No	No	No	No	No	No	No	No	No	No
22	6	32	2	2	No	No	No	No	No	No	No	No	No	No
23	6	22	2	0	No	No	No	No	No	No	No	No	No	No
24	6	22	2	0	No	No	No	No	No	No	No	No	No	No
Hours Met					0	0	0	0	0	0	0	0	0	0

Warrant 3 Condition A

Orientation	E	W
Total Stopped Delay Per Vehicle on Minor Approach (s)	9.7	15.3
Number of Lanes on Minor Street Approach	1	1
VehicleHours of Stopped Delay on Minor Approach ([h]h:mm)	0:02	0:05
Delay Condition Met	No	No
Volume on Minor Street Approach During Same Hour	17	23
High Minor Volume Condition Met	No	No
Total Entering Volume on All Approaches During Same Hour	1128	1128
Number of Approaches on Intersection	4	4
Total Volume Condition Met	Yes	Yes
Warrant Met for Approach	No	No
Warrant Met for Intersection	**No**	

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Signal Warrants Report For Intersection #8: CSAH 10 & Western Site Access

Warrants Summary

Warrant	Name	Met?
#1	Eight Hour Vehicular Volume	No
#2	Four Hour Vehicular Volume	No
#3	Peak Hour	No

Intersection Warrants Parameters

Major Approaches	E, W
Minor Approaches	S, N
Speed > 40mph	Yes
Population < 10,000	Yes
Warrant Factor	70%

Warrant Analysis Traffic Volumes

Hour	Major Streets		Minor Streets	
	E	W	S	N
1	722	239	3	0
2	693	229	3	0
3	679	225	3	0
4	578	191	2	0
5	549	182	2	0
6	491	163	2	0
7	455	151	2	0
8	433	143	2	0
9	347	115	1	0
10	325	108	1	0
11	325	108	1	0
12	310	103	1	0
13	282	93	1	0
14	260	86	1	0
15	260	86	1	0
16	253	84	1	0
17	144	48	1	0
18	79	26	0	0
19	72	24	0	0
20	29	10	0	0
21	22	7	0	0
22	22	7	0	0
23	14	5	0	0
24	14	5	0	0

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Warrant Analysis by Hour

Hour	Major Lanes		Minor Lanes		Warrant 1 Condition A				Warrant 1 Condition B				Warrant 2	Warrant 3
	Number	Volume	Number	Volume	100%	80%	70%	56%	100%	80%	70%	56%		Condition B
1	6	961	2	3	No	No	No	No	No	No	No	No	No	No
2	6	922	2	3	No	No	No	No	No	No	No	No	No	No
3	6	904	2	3	No	No	No	No	No	No	No	No	No	No
4	6	769	2	2	No	No	No	No	No	No	No	No	No	No
5	6	731	2	2	No	No	No	No	No	No	No	No	No	No
6	6	654	2	2	No	No	No	No	No	No	No	No	No	No
7	6	606	2	2	No	No	No	No	No	No	No	No	No	No
8	6	576	2	2	No	No	No	No	No	No	No	No	No	No
9	6	462	2	1	No	No	No	No	No	No	No	No	No	No
10	6	433	2	1	No	No	No	No	No	No	No	No	No	No
11	6	433	2	1	No	No	No	No	No	No	No	No	No	No
12	6	413	2	1	No	No	No	No	No	No	No	No	No	No
13	6	375	2	1	No	No	No	No	No	No	No	No	No	No
14	6	346	2	1	No	No	No	No	No	No	No	No	No	No
15	6	346	2	1	No	No	No	No	No	No	No	No	No	No
16	6	337	2	1	No	No	No	No	No	No	No	No	No	No
17	6	192	2	1	No	No	No	No	No	No	No	No	No	No
18	6	105	2	0	No	No	No	No	No	No	No	No	No	No
19	6	96	2	0	No	No	No	No	No	No	No	No	No	No
20	6	39	2	0	No	No	No	No	No	No	No	No	No	No
21	6	29	2	0	No	No	No	No	No	No	No	No	No	No
22	6	29	2	0	No	No	No	No	No	No	No	No	No	No
23	6	19	2	0	No	No	No	No	No	No	No	No	No	No
24	6	19	2	0	No	No	No	No	No	No	No	No	No	No
Hours Met					0	0	0	0	0	0	0	0	0	0

Warrant 3 Condition A

Orientation	S	N
Total Stopped Delay Per Vehicle on Minor Approach (s)	9	17.6
Number of Lanes on Minor Street Approach	1	1
VehicleHours of Stopped Delay on Minor Approach ([h]h:mm)	0:00	0:00
Delay Condition Met	No	No
Volume on Minor Street Approach During Same Hour	3	0
High Minor Volume Condition Met	No	No
Total Entering Volume on All Approaches During Same Hour	964	964
Number of Approaches on Intersection	4	4
Total Volume Condition Met	Yes	Yes
Warrant Met for Approach	No	No
Warrant Met for Intersection	**No**	

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Signal Warrants Report For Intersection #9: CSAH 10 & Eastern Site Access

Warrants Summary

Warrant	Name	Met?
#1	Eight Hour Vehicular Volume	No
#2	Four Hour Vehicular Volume	No
#3	Peak Hour	No

Intersection Warrants Parameters

Major Approaches	E, W
Minor Approaches	S
Speed > 40mph	Yes
Population < 10,000	Yes
Warrant Factor	70%

Warrant Analysis Traffic Volumes

Hour	Major Streets		Minor Streets
	E	W	S
1	689	235	41
2	661	226	39
3	648	221	39
4	551	188	33
5	524	179	31
6	469	160	28
7	434	148	26
8	413	141	25
9	331	113	20
10	310	106	18
11	310	106	18
12	296	101	18
13	269	92	16
14	248	85	15
15	248	85	15
16	241	82	14
17	138	47	8
18	76	26	5
19	69	24	4
20	28	9	2
21	21	7	1
22	21	7	1
23	14	5	1
24	14	5	1

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Warrant Analysis by Hour

Hour	Major Lanes		Minor Lanes		Warrant 1 Condition A				Warrant 1 Condition B				Warrant 2	Warrant 3
	Number	Volume	Number	Volume	100%	80%	70%	56%	100%	80%	70%	56%		Condition B
1	2	924	1	41	No	No	No	No	No	No	No	No	No	No
2	2	887	1	39	No	No	No	No	No	No	No	No	No	No
3	2	869	1	39	No	No	No	No	No	No	No	No	No	No
4	2	739	1	33	No	No	No	No	No	No	No	No	No	No
5	2	703	1	31	No	No	No	No	No	No	No	No	No	No
6	2	629	1	28	No	No	No	No	No	No	No	No	No	No
7	2	582	1	26	No	No	No	No	No	No	No	No	No	No
8	2	554	1	25	No	No	No	No	No	No	No	No	No	No
9	2	444	1	20	No	No	No	No	No	No	No	No	No	No
10	2	416	1	18	No	No	No	No	No	No	No	No	No	No
11	2	416	1	18	No	No	No	No	No	No	No	No	No	No
12	2	397	1	18	No	No	No	No	No	No	No	No	No	No
13	2	361	1	16	No	No	No	No	No	No	No	No	No	No
14	2	333	1	15	No	No	No	No	No	No	No	No	No	No
15	2	333	1	15	No	No	No	No	No	No	No	No	No	No
16	2	323	1	14	No	No	No	No	No	No	No	No	No	No
17	2	185	1	8	No	No	No	No	No	No	No	No	No	No
18	2	102	1	5	No	No	No	No	No	No	No	No	No	No
19	2	93	1	4	No	No	No	No	No	No	No	No	No	No
20	2	37	1	2	No	No	No	No	No	No	No	No	No	No
21	2	28	1	1	No	No	No	No	No	No	No	No	No	No
22	2	28	1	1	No	No	No	No	No	No	No	No	No	No
23	2	19	1	1	No	No	No	No	No	No	No	No	No	No
24	2	19	1	1	No	No	No	No	No	No	No	No	No	No
Hours Met					0	0	0	0	0	0	0	0	0	0

Warrant 3 Condition A

Orientation	S
Total Stopped Delay Per Vehicle on Minor Approach (s)	19.7
Number of Lanes on Minor Street Approach	1
VehicleHours of Stopped Delay on Minor Approach ([h]h:mm)	0:13
Delay Condition Met	No
Volume on Minor Street Approach During Same Hour	41
High Minor Volume Condition Met	No
Total Entering Volume on All Approaches During Same Hour	965
Number of Approaches on Intersection	3
Total Volume Condition Met	Yes
Warrant Met for Approach	No
Warrant Met for Intersection	**No**

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Signal Warrants Report For Intersection #10: Eagle Point Blvd & Site Access

Warrants Summary

Warrant	Name	Met?
#1	Eight Hour Vehicular Volume	No
#2	Four Hour Vehicular Volume	No
#3	Peak Hour	No

Intersection Warrants Parameters

Major Approaches	E, W
Minor Approaches	N
Speed > 40mph	No
Population < 10,000	No
Warrant Factor	100%

Warrant Analysis Traffic Volumes

Hour	Major Streets		Minor Streets
	E	W	N
1	8	220	48
2	8	211	46
3	8	207	45
4	6	176	38
5	6	167	36
6	5	150	33
7	5	139	30
8	5	132	29
9	4	106	23
10	4	99	22
11	4	99	22
12	3	95	21
13	3	86	19
14	3	79	17
15	3	79	17
16	3	77	17
17	2	44	10
18	1	24	5
19	1	22	5
20	0	9	2
21	0	7	1
22	0	7	1
23	0	4	1
24	0	4	1

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Warrant Analysis by Hour

Hour	Major Lanes		Minor Lanes		Warrant 1 Condition A				Warrant 1 Condition B				Warrant 2	Warrant 3
	Number	Volume	Number	Volume	100%	80%	70%	56%	100%	80%	70%	56%		Condition B
1	2	228	1	48	No	No	No	No	No	No	No	No	No	No
2	2	219	1	46	No	No	No	No	No	No	No	No	No	No
3	2	215	1	45	No	No	No	No	No	No	No	No	No	No
4	2	182	1	38	No	No	No	No	No	No	No	No	No	No
5	2	173	1	36	No	No	No	No	No	No	No	No	No	No
6	2	155	1	33	No	No	No	No	No	No	No	No	No	No
7	2	144	1	30	No	No	No	No	No	No	No	No	No	No
8	2	137	1	29	No	No	No	No	No	No	No	No	No	No
9	2	110	1	23	No	No	No	No	No	No	No	No	No	No
10	2	103	1	22	No	No	No	No	No	No	No	No	No	No
11	2	103	1	22	No	No	No	No	No	No	No	No	No	No
12	2	98	1	21	No	No	No	No	No	No	No	No	No	No
13	2	89	1	19	No	No	No	No	No	No	No	No	No	No
14	2	82	1	17	No	No	No	No	No	No	No	No	No	No
15	2	82	1	17	No	No	No	No	No	No	No	No	No	No
16	2	80	1	17	No	No	No	No	No	No	No	No	No	No
17	2	46	1	10	No	No	No	No	No	No	No	No	No	No
18	2	25	1	5	No	No	No	No	No	No	No	No	No	No
19	2	23	1	5	No	No	No	No	No	No	No	No	No	No
20	2	9	1	2	No	No	No	No	No	No	No	No	No	No
21	2	7	1	1	No	No	No	No	No	No	No	No	No	No
22	2	7	1	1	No	No	No	No	No	No	No	No	No	No
23	2	4	1	1	No	No	No	No	No	No	No	No	No	No
24	2	4	1	1	No	No	No	No	No	No	No	No	No	No
Hours Met					0	0	0	0	0	0	0	0	0	0

Warrant 3 Condition A

Orientation	N
Total Stopped Delay Per Vehicle on Minor Approach (s)	8.5
Number of Lanes on Minor Street Approach	1
VehicleHours of Stopped Delay on Minor Approach ([h]h:mm)	0:06
Delay Condition Met	No
Volume on Minor Street Approach During Same Hour	48
High Minor Volume Condition Met	No
Total Entering Volume on All Approaches During Same Hour	276
Number of Approaches on Intersection	3
Total Volume Condition Met	No
Warrant Met for Approach	No
Warrant Met for Intersection	**No**

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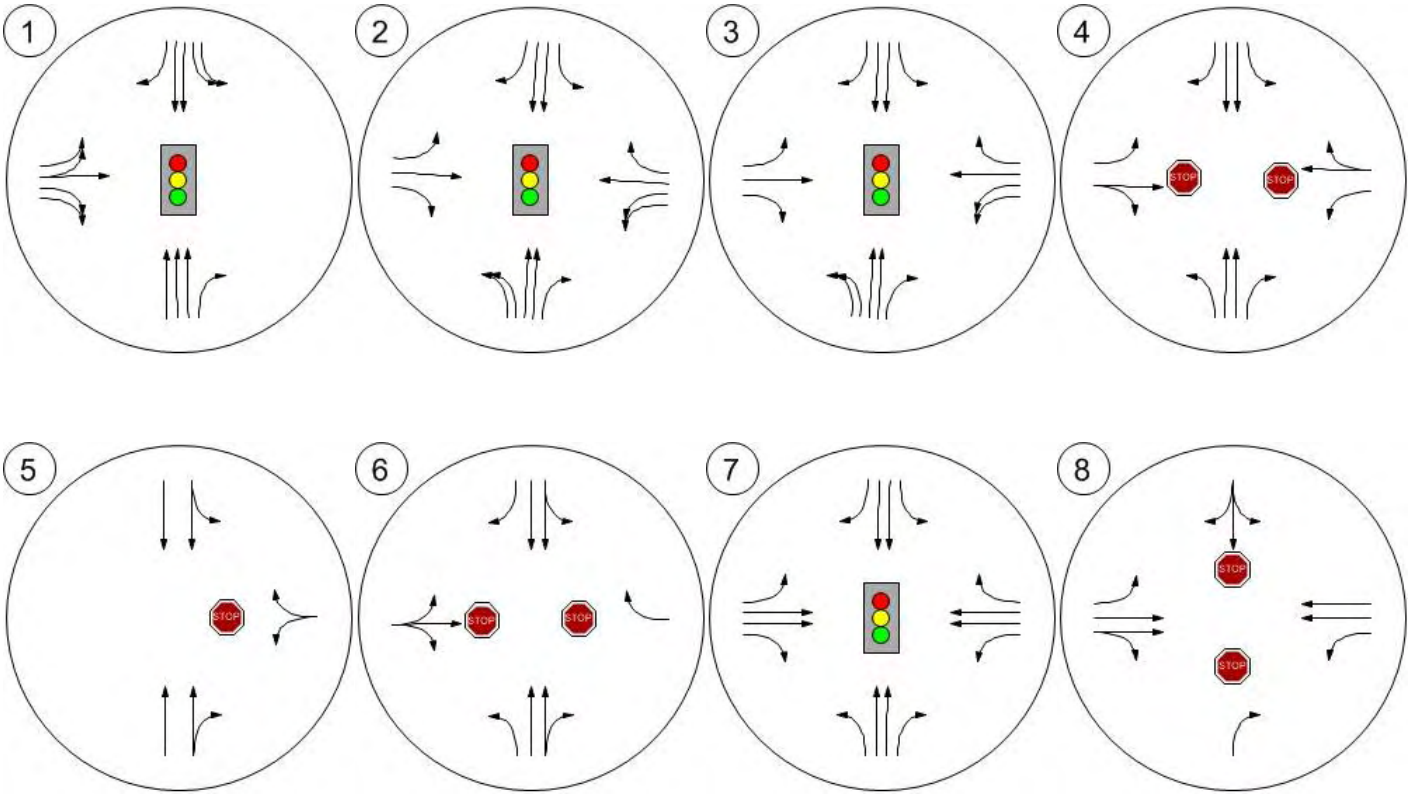
Lane Configuration and Traffic Control



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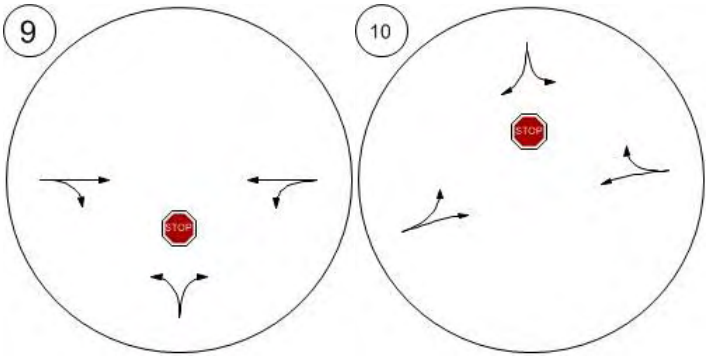
Lane Configuration and Traffic Control



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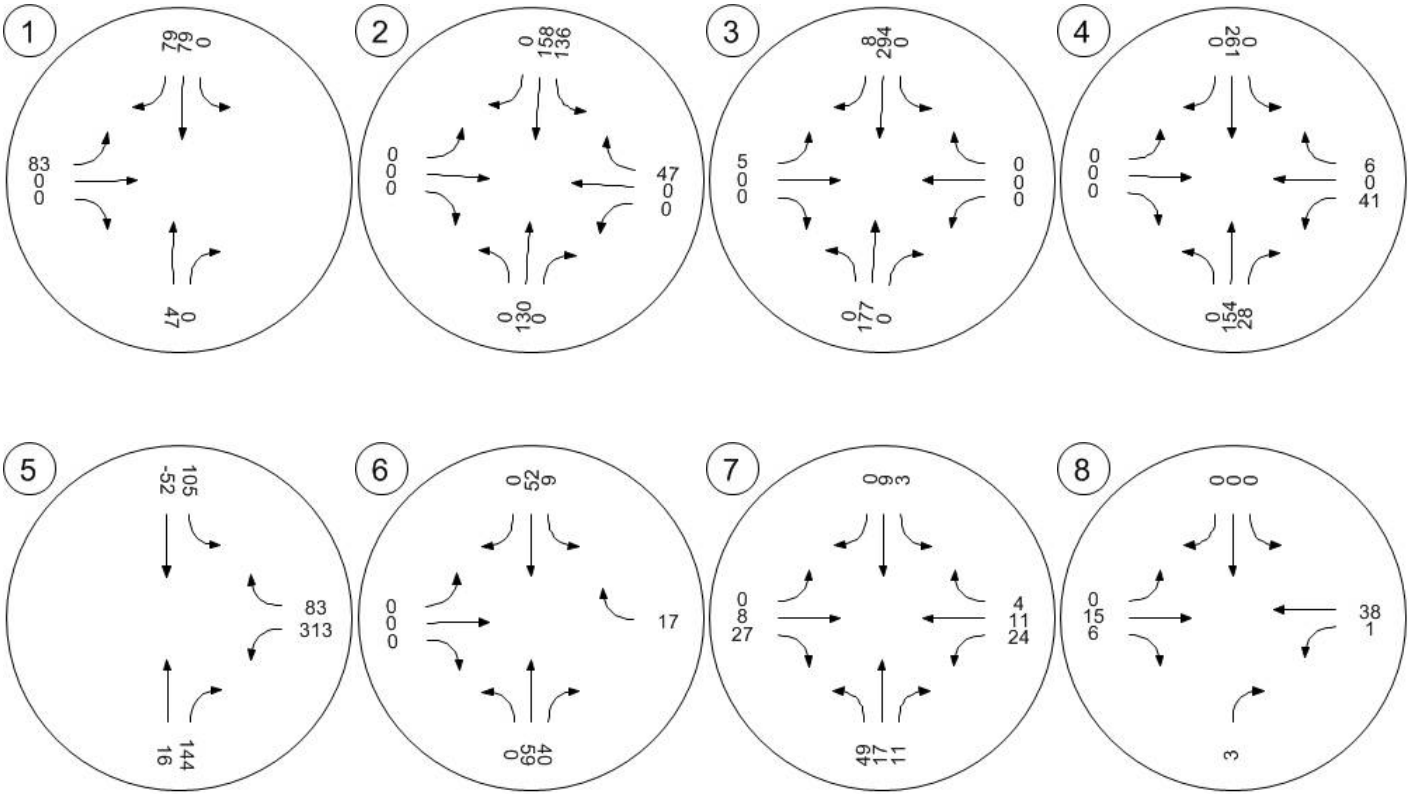
Traffic Volume - Net New Site Trips



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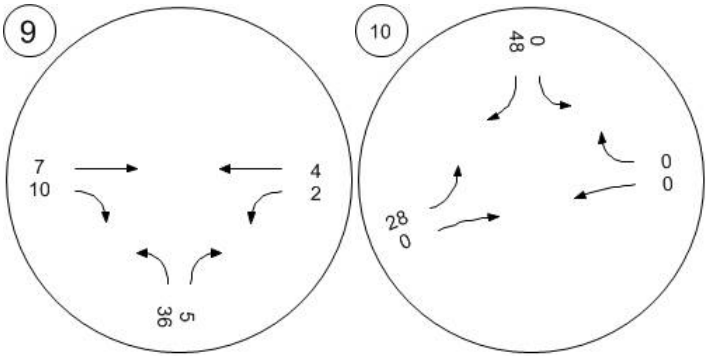
Traffic Volume - Net New Site Trips



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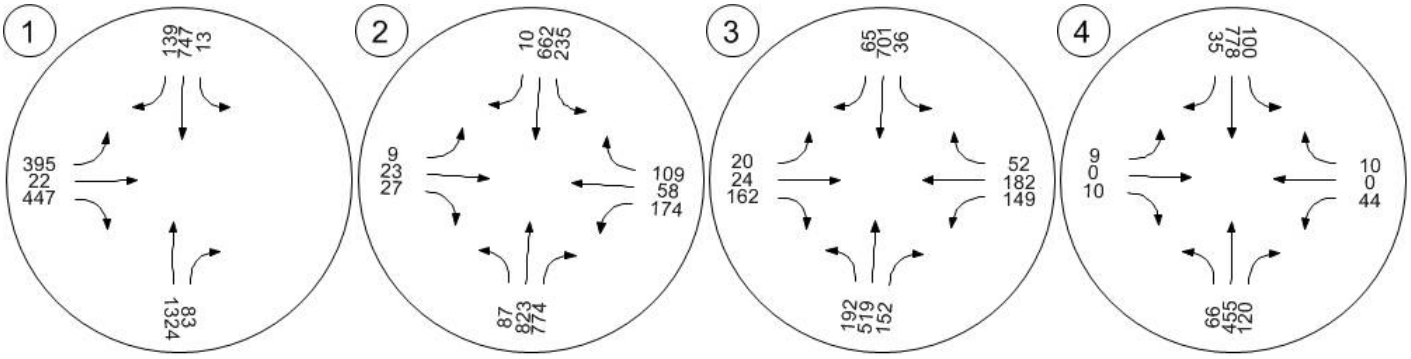
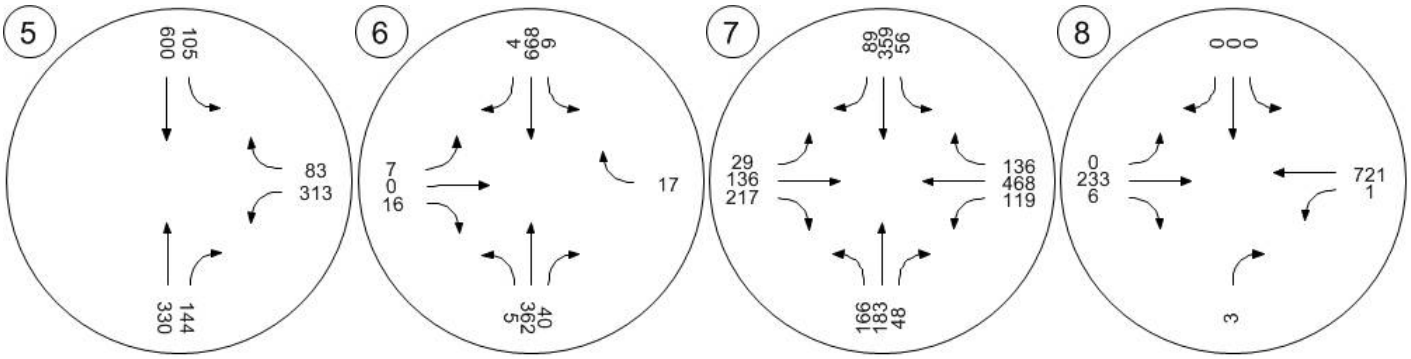
Traffic Volume - Future Total Volume





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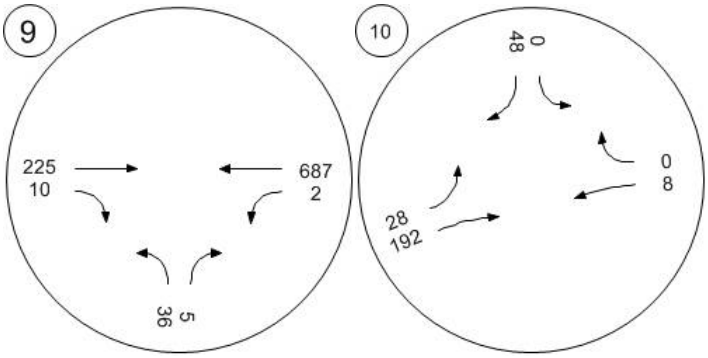
Traffic Volume - Future Total Volume



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Lake Elmo Development

Vistro File: C:\...\Lake Elmo.vistropdb
Report File: C:\...\PM 2019 Build.pdf

Scenario 6: PM 2019 Build
7/2/2014

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	CSAH 13 & I-94 Southern Ramp	Signalized	HCM2010	SBL	0.750	27.0	C
2	CSAH 13 & I-94 Northern Ramp	Signalized	HCM2010	EBR	0.791	47.2	D
3	Inwood Ave & Hudson Blvd	Signalized	HCM2010	EBR	0.623	35.4	D
4	CSAH 13 & Eagle Point Blvd	Two-way stop	HCM2010	WBL	4.886	2,021.6	F
5	CSAH 13 & 5th St	Two-way stop	HCM2010	WBL	7.815	3,367.1	F
6	CSAH 13 & 9th St	Two-way stop	HCM2010	EBT	0.000	92.4	F
7	CSAH 13 & CSAH 10	Signalized	HCM2010	WBL	0.612	27.2	C
8	CSAH 10 & Western Site Access	Two-way stop	HCM2010	SBT	0.000	39.2	E
9	CSAH 10 & Eastern Site Access	Two-way stop	HCM2010	NBL	0.194	41.3	E
10	Eagle Point Blvd & Site Access	Two-way stop	HCM2010	SBL	0.000	10.8	B

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value; for all other control types, they are taken for the whole intersection.

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Intersection Level Of Service Report
#1: CSAH 13 & I-94 Southern Ramp

Control Type:	Signalized	Delay (sec / veh):	27.0
Analysis Method:	HCM2010	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.750

Intersection Setup

Name	CSAH 13			CSAH 13			I-94 Ramp			I-94		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	1	2	0	1	1	0	2	0	0	0
Pocket Length [ft]	100.00	100.00	400.00	175.00	100.00	150.00	500.00	100.00	500.00	100.00	100.00	100.00
Speed [mph]	45.00			45.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	no			no			yes			no		

Volumes

Name	CSAH 13			CSAH 13			I-94 Ramp			I-94		
Base Volume Input [veh/h]	0	1367	466	90	1220	254	233	119	916	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Growth Rate	1.00	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	81	0	0	68	68	143	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	254	0	0	173	0	0	499	0	0	0
Total Hourly Volume [veh/h]	0	1571	254	98	1398	172	397	130	499	0	0	0
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	427	69	27	380	47	108	35	136	0	0	0
Total Analysis Volume [veh/h]	0	1708	276	107	1520	187	432	141	542	0	0	0
Presence of On-Street Parking			no	no		no	no		no			
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Volume [ped/h]	0			0			1			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Appendix D - Capacity Analysis Backup

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Intersection Settings

Located in CBD	no
Signal Coordination Group	-
Cycle Length [s]	140
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	81.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	5.00

Phasing & Timing

Control Type	Permiss	Permiss	Permiss	Protecte	Permiss	Permiss	Permiss	Permiss	Overlap	Permiss	Protecte	Permiss
Signal Group	0	2	0	1	6	0	0	4	5	0	0	0
Lead / Lag	-	-	-	Lag	-	-	-	-	-	-	-	-
Minimum Green [s]	0	20	0	7	20	0	0	10	10	0	0	0
Maximum Green [s]	0	57	0	10	58	0	0	25	13	0	0	0
Amber [s]	0.0	4.5	0.0	3.0	4.5	0.0	0.0	3.5	3.5	0.0	0.0	0.0
All red [s]	0.0	1.0	0.0	2.0	1.5	0.0	0.0	3.5	3.5	0.0	0.0	0.0
Split [s]	0	90	0	13	86	0	0	37	17	0	0	0
Vehicle Extension [s]	0.0	4.6	0.0	2.0	4.6	0.0	0.0	3.0	2.0	0.0	0.0	0.0
Walk [s]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Clearance [s]	0	0	0	0	0	0	0	0	0	0	0	0
I1, Start-Up Lost Time [s]	0.0	2.0	0.0	2.0	2.0	0.0	0.0	2.0	2.0	0.0	0.0	0.0
I2, Clearance Lost Time [s]	0.0	3.5	0.0	3.0	4.0	0.0	0.0	5.0	5.0	0.0	0.0	0.0
Minimum Recall		no		no	no			no	no			
Maximum Recall		yes		no	yes			no	no			
Pedestrian Recall		no		no	no			no	no			
Detector Location [ft]	0.0	400.0	0.0	20.0	400.0	0.0	0.0	100.0	100.0	0.0	0.0	0.0
Detector Length [ft]	0.0	6.0	0.0	6.0	6.0	0.0	0.0	6.0	6.0	0.0	0.0	0.0
I, Upstream Filtering 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

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Lane Group Calculations

Lane Group	C	R	L	C	R	L	C	R	
L, Total Lost Time per Cycle [s]	5.50	5.50	5.00	6.00	6.00	7.00	7.00	7.00	
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
l2, Clearance Lost Time [s]	3.50	3.50	3.00	4.00	4.00	5.00	5.00	0.00	
g_i, Effective Green Time [s]	89	89	7	83	83	27	27	44	
g / C, Green / Cycle	0.63	0.63	0.05	0.59	0.59	0.19	0.19	0.31	
(v / s)_i Volume / Saturation Flow Rate	0.34	0.18	0.03	0.43	0.12	0.17	0.15	0.20	
s, saturation flow rate [veh/h]	5025	1568	3412	3512	1568	1757	1800	2775	
c, Capacity [veh/h]	3183	993	170	2085	931	337	345	870	
d1, Uniform Delay [s]	14.23	11.40	65.16	20.34	13.10	54.94	54.01	40.96	
k, delay calibration	0.50	0.50	0.04	0.50	0.50	0.23	0.18	0.11	
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
d2, Incremental Delay [s]	0.65	0.70	1.43	2.28	0.49	14.05	7.28	0.74	
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	

Lane Group Results

X, volume / capacity	0.54	0.28	0.63	0.73	0.20	0.88	0.80	0.62	
d, Delay for Lane Group [s/veh]	14.88	12.09	66.60	22.62	13.59	68.99	61.28	41.70	
Lane Group LOS	B	B	E	C	B	E	E	D	
Critical Lane Group	no	no	no	yes	no	yes	no	yes	
50th-Percentile Queue Length [veh]	9.40	3.77	1.88	17.05	2.72	11.46	10.04	8.10	
50th-Percentile Queue Length [ft]	235.06	94.22	46.93	426.15	68.05	286.40	251.08	202.56	
95th-Percentile Queue Length [veh]	14.43	6.78	3.38	23.82	4.90	17.01	15.24	12.77	
95th-Percentile Queue Length [ft]	360.78	169.59	84.47	595.43	122.50	425.17	381.02	319.27	

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Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	0.00	14.88	12.09	66.60	22.62	13.59	66.50	61.28	41.70	0.00	0.00	0.00
Movement LOS		B	B	E	C	B	E	E	D			
d_A, Approach Delay [s/veh]	14.49			24.28			53.81			0.00		
Approach LOS	B			C			D			A		
d_I, Intersection Delay [s/veh]	27.03											
Intersection LOS	C											
Intersection V/C	0.750											

Sequence

Ring 1	1	2	4	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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Intersection Level Of Service Report
#2: CSAH 13 & I-94 Northern Ramp

Control Type:	Signalized	Delay (sec / veh):	47.2
Analysis Method:	HCM2010	Level Of Service:	D
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.791

Intersection Setup

Name	CSAH 13			CSAH 13			3rd St N			I-94 Ramp		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	2	0	0	1	0	1	1	0	0	2	0	1
Pocket Length [ft]	325.00	100.00	100.00	250.00	100.00	275.00	175.00	100.00	100.00	400.00	100.00	250.00
Speed [mph]	45.00			45.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	no			no			yes			no		

Volumes

Name	CSAH 13			CSAH 13			3rd St N			I-94 Ramp		
Base Volume Input [veh/h]	221	933	577	192	1009	38	39	73	258	231	51	61
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Growth Rate	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	224	0	117	136	0	0	0	0	0	0	81
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	315	0	0	21	0	0	141	0	0	74
Total Hourly Volume [veh/h]	241	1241	314	326	1236	20	43	80	140	252	56	73
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	65	337	85	89	336	5	12	22	38	68	15	20
Total Analysis Volume [veh/h]	262	1349	341	354	1343	22	47	87	152	274	61	79
Presence of On-Street Parking	no		no	no		no	no		no	no		no
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Volume [ped/h]	0			0			3			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Appendix D - Capacity Analysis Backup

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Intersection Settings

Located in CBD	no
Signal Coordination Group	-
Cycle Length [s]	140
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	89.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	5.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal Group	5	2	0	1	6	0	7	4	0	3	8	0
Lead / Lag	Lag	-	-	Lag	-	-	Lag	-	-	Lag	-	-
Minimum Green [s]	7	20	0	7	20	0	7	10	0	7	10	0
Maximum Green [s]	10	44	0	15	49	0	10	11	0	18	30	0
Amber [s]	3.0	4.5	0.0	3.0	4.5	0.0	3.0	3.5	0.0	3.0	3.5	0.0
All red [s]	2.0	1.5	0.0	2.0	2.0	0.0	2.0	3.5	0.0	2.0	3.0	0.0
Split [s]	20	65	0	36	81	0	15	22	0	17	24	0
Vehicle Extension [s]	2.0	4.6	0.0	2.0	4.6	0.0	2.0	3.0	0.0	2.0	3.0	0.0
Walk [s]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Clearance [s]	0	0	0	0	0	0	0	0	0	0	0	0
l1, Start-Up Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
l2, Clearance Lost Time [s]	3.0	4.0	0.0	3.0	4.5	0.0	3.0	5.0	0.0	3.0	4.5	0.0
Minimum Recall	no	no		no	no		no	no		no	no	
Maximum Recall	no	yes		no	yes		no	no		no	no	
Pedestrian Recall	no	no		no	no		no	no		no	no	
Detector Location [ft]	39.0	300.0	0.0	39.0	300.0	0.0	39.0	120.0	0.0	120.0	120.0	0.0
Detector Length [ft]	6.0	6.0	0.0	6.0	6.0	0.0	6.0	6.0	0.0	6.0	6.0	0.0
I, Upstream Filtering 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

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Lane Group Calculations

Lane Group	L	C	R	L	C	R	L	C	R	L	C	R
L, Total Lost Time per Cycle [s]	5.00	6.00	6.00	5.00	6.50	6.50	5.00	7.00	7.00	5.00	6.50	6.50
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	3.00	4.00	4.00	3.00	4.50	4.50	3.00	5.00	5.00	3.00	4.50	4.50
g_i, Effective Green Time [s]	13	59	59	30	76	76	19	15	15	13	10	10
g / C, Green / Cycle	0.09	0.42	0.42	0.21	0.54	0.54	0.13	0.11	0.11	0.09	0.07	0.07
(v / s)_i Volume / Saturation Flow Rate	0.08	0.38	0.22	0.20	0.38	0.01	0.03	0.05	0.10	0.08	0.03	0.05
s, saturation flow rate [veh/h]	3412	3512	1568	1757	3512	1568	1757	1845	1568	3412	1845	1568
c, Capacity [veh/h]	309	1477	659	374	1895	846	236	203	173	313	131	112
d1, Uniform Delay [s]	62.70	38.16	30.04	54.27	24.04	15.06	53.89	58.16	61.36	62.78	62.45	63.59
k, delay calibration	0.04	0.50	0.50	0.34	0.50	0.50	0.04	0.11	0.22	0.04	0.11	0.11
I, Upstream Filtering 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
d2, Incremental Delay [s]	2.50	10.19	2.89	27.14	2.27	0.06	0.15	1.42	23.20	3.06	2.54	7.95
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, 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
PF, progression 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

Lane Group Results

X, volume / capacity	0.85	0.91	0.52	0.95	0.71	0.03	0.20	0.43	0.88	0.87	0.46	0.71
d, Delay for Lane Group [s/veh]	65.20	48.35	32.92	81.41	26.31	15.11	54.04	59.58	84.57	65.84	64.99	71.54
Lane Group LOS	E	D	C	F	C	B	D	E	F	E	E	E
Critical Lane Group	no	yes	no	yes	no	no	no	no	yes	yes	no	no
50th-Percentile Queue Length [veh]	4.62	22.85	8.79	14.81	16.17	0.33	1.50	2.98	6.45	4.97	2.19	3.01
50th-Percentile Queue Length [ft]	115.48	571.18	219.71	370.15	404.35	8.33	37.43	74.41	161.32	124.18	54.74	75.29
95th-Percentile Queue Length [veh]	8.14	30.69	13.65	21.12	22.77	0.60	2.69	5.36	10.62	8.62	3.94	5.42
95th-Percentile Queue Length [ft]	203.60	767.15	341.25	527.91	569.24	14.99	67.37	133.94	265.47	215.55	98.53	135.52

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Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	65.20	48.35	32.92	81.41	26.31	15.11	54.04	59.58	84.57	65.84	64.99	71.54
Movement LOS	E	D	C	F	C	B	D	E	F	E	E	E
d_A, Approach Delay [s/veh]	47.91			37.51			71.95			66.80		
Approach LOS	D			D			E			E		
d_I, Intersection Delay [s/veh]	47.19											
Intersection LOS	D											
Intersection V/C	0.791											

Sequence

Ring 1	1	2	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	7	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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Intersection Level Of Service Report
#3: Inwood Ave & Hudson Blvd

Control Type:	Signalized	Delay (sec / veh):	35.4
Analysis Method:	HCM2010	Level Of Service:	D
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.623

Intersection Setup

Name	CSAH 13			CSAH 13			4th St N			Hudson Blvd		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	2	0	1	1	0	1	1	0	0	2	0	1
Pocket Length [ft]	175.00	100.00	250.00	100.00	100.00	100.00	175.00	100.00	100.00	250.00	100.00	250.00
Speed [mph]	45.00			45.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	no			yes			yes			yes		

Volumes

Name	CSAH 13			CSAH 13			4th St N			Hudson Blvd		
Base Volume Input [veh/h]	207	646	96	29	745	37	59	128	384	156	33	30
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Growth Rate	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	305	0	0	253	7	8	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	53	0	0	24	0	0	210	0	0	17
Total Hourly Volume [veh/h]	226	1009	52	32	1065	23	72	140	209	170	36	16
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	61	274	14	9	289	6	20	38	57	46	10	4
Total Analysis Volume [veh/h]	246	1097	57	35	1158	25	78	152	227	185	39	17
Presence of On-Street Parking	no		no	no		no	no		no	no		no
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Volume [ped/h]	0			4			4			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Appendix D - Capacity Analysis Backup

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Intersection Settings

Located in CBD	no
Signal Coordination Group	-
Cycle Length [s]	140
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	94.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	5.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal Group	5	2	0	1	6	0	7	4	0	3	8	0
Lead / Lag	Lag	-	-	Lag	-	-	Lag	-	-	Lag	-	-
Minimum Green [s]	7	20	0	7	20	0	7	10	0	7	10	0
Maximum Green [s]	16	39	0	12	35	0	12	24	0	12	25	0
Amber [s]	3.0	4.5	0.0	3.0	4.5	0.0	3.0	4.0	0.0	3.0	4.0	0.0
All red [s]	2.0	1.5	0.0	2.0	1.5	0.0	2.0	2.5	0.0	2.0	2.5	0.0
Split [s]	19	77	0	12	70	0	32	35	0	16	19	0
Vehicle Extension [s]	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0
Walk [s]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Clearance [s]	0	0	0	0	0	0	0	0	0	0	0	0
l1, Start-Up Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
l2, Clearance Lost Time [s]	3.0	4.0	0.0	3.0	4.0	0.0	3.0	4.5	0.0	3.0	4.5	0.0
Minimum Recall	no	no		no	no		no	no		no	no	
Maximum Recall	no	yes		no	yes		no	no		no	no	
Pedestrian Recall	no	no		no	no		no	no		no	no	
Detector Location [ft]	55.0	300.0	0.0	55.0	475.0	0.0	50.0	250.0	0.0	50.0	250.0	0.0
Detector Length [ft]	6.0	6.0	0.0	6.0	6.0	0.0	6.0	6.0	0.0	6.0	6.0	0.0
I, Upstream Filtering 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

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Lane Group Calculations

Lane Group	L	C	R	L	C	R	L	C	R	L	C	R
L, Total Lost Time per Cycle [s]	5.00	6.00	6.00	5.00	6.00	6.00	5.00	6.50	6.50	5.00	6.50	6.50
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	3.00	4.00	4.00	3.00	4.00	4.00	3.00	4.50	4.50	3.00	4.50	4.50
g_i, Effective Green Time [s]	12	80	80	5	73	73	23	23	23	10	9	9
g / C, Green / Cycle	0.09	0.57	0.57	0.04	0.52	0.52	0.17	0.16	0.16	0.07	0.06	0.06
(v / s)_i Volume / Saturation Flow Rate	0.07	0.31	0.04	0.02	0.33	0.02	0.04	0.08	0.14	0.05	0.02	0.01
s, saturation flow rate [veh/h]	3412	3512	1568	1757	3512	1568	1757	1845	1568	3412	1845	1568
c, Capacity [veh/h]	294	2006	896	66	1835	819	293	297	252	238	118	100
d1, Uniform Delay [s]	62.95	18.70	13.34	66.14	23.80	16.21	50.80	53.68	57.59	63.99	62.64	61.98
k, delay calibration	0.11	0.50	0.50	0.11	0.50	0.50	0.11	0.11	0.17	0.11	0.11	0.11
I, Upstream Filtering 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
d2, Incremental Delay [s]	6.26	1.08	0.14	6.60	1.66	0.07	0.48	1.37	16.32	5.39	1.63	0.80
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, 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
PF, progression 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

Lane Group Results

X, volume / capacity	0.84	0.55	0.06	0.53	0.63	0.03	0.27	0.51	0.90	0.78	0.33	0.17
d, Delay for Lane Group [s/veh]	69.21	19.78	13.48	72.74	25.47	16.28	51.28	55.05	73.91	69.38	64.27	62.78
Lane Group LOS	E	B	B	E	C	B	D	E	E	E	E	E
Critical Lane Group	yes	no	no	no	yes	no	no	no	yes	yes	no	no
50th-Percentile Queue Length [veh]	4.49	10.76	0.81	1.33	13.39	0.40	2.45	5.04	9.03	3.43	1.39	0.60
50th-Percentile Queue Length [ft]	112.29	268.89	20.23	33.23	334.79	9.93	61.14	125.93	225.84	85.81	34.72	14.95
95th-Percentile Queue Length [veh]	7.97	16.13	1.46	2.39	19.39	0.71	4.40	8.72	13.96	6.18	2.50	1.08
95th-Percentile Queue Length [ft]	199.19	403.35	36.42	59.82	484.82	17.87	110.05	217.95	349.07	154.46	62.50	26.92

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Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	69.21	19.78	13.48	72.74	25.47	16.28	51.28	55.05	73.91	69.38	64.27	62.78
Movement LOS	E	B	B	E	C	B	D	E	E	E	E	E
d_A, Approach Delay [s/veh]	28.21			26.63			63.77			68.09		
Approach LOS	C			C			E			E		
d_I, Intersection Delay [s/veh]	35.43											
Intersection LOS	D											
Intersection V/C	0.623											

Sequence

Ring 1	1	2	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	7	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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Intersection Level Of Service Report
#4: CSAH 13 & Eagle Point Blvd

Control Type:	Two-way stop	Delay (sec / veh):	2,021.6
Analysis Method:	HCM2010	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	4.886

Intersection Setup

Name	CSAH 13			CSAH 13			Oak Marsh Rd			Eagle Point Blvd		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	1	1	0	1	1	0	0	1	0	0
Pocket Length [ft]	200.00	100.00	250.00	250.00	100.00	250.00	50.00	100.00	100.00	200.00	100.00	100.00
Speed [mph]	45.00			55.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	no			no			yes			no		

Volumes

Name	CSAH 13			CSAH 13			Oak Marsh Rd			Eagle Point Blvd		
Base Volume Input [veh/h]	95	734	3	15	631	69	38	0	68	89	0	78
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Growth Rate	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	261	52	0	227	0	0	0	0	34	0	6
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	104	1061	55	16	915	75	41	0	74	131	0	91
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	28	288	15	4	249	20	11	0	20	36	0	25
Total Analysis Volume [veh/h]	113	1153	60	17	995	82	45	0	80	142	0	99
Pedestrian Volume [ped/h]	0			0			3			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

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Intersection Settings

Priority Scheme	Free	Free	Stop	Stop
Flared Lane	no	no	no	no
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	no	no	no	no
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.18	0.01	0.00	0.03	0.01	0.00	1.46	0.00	0.16	4.89	0.00	0.22
d_M, Delay for Movement [s/veh]	11.91	0.00	0.00	11.57	0.00	0.00	522.94	161.49	13.33	2021.60	167.53	15.03
Movement LOS	B	A	A	B	A	A	F	F	B	F	F	C
95th-Percentile Queue Length [veh]	0.64	0.00	0.00	0.09	0.00	0.00	5.09	0.55	0.55	17.21	0.81	0.81
95th-Percentile Queue Length [ft]	16.11	0.00	0.00	2.32	0.00	0.00	127.35	13.76	13.76	430.28	20.34	20.34
d_A, Approach Delay [s/veh]	1.01			0.18			196.79			1197.32		
Approach LOS	A			A			F			F		
d_I, Intersection Delay [s/veh]	112.96											
Intersection LOS	F											

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Intersection Level Of Service Report
#5: CSAH 13 & 5th St

Control Type:	Two-way stop	Delay (sec / veh):	3,367.1
Analysis Method:	HCM2010	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	7.815

Intersection Setup

Name	CSAH 13		CSAH 13		5th St	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	55.00		55.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	no		no		no	

Volumes

Name	CSAH 13		CSAH 13		5th St	
Base Volume Input [veh/h]	855	0	0	740	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	3.00	3.00	3.00	3.00	3.00	3.00
Growth Rate	1.09	1.09	1.09	1.09	1.09	1.09
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	82	185	54	13	214	39
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	-64	64	55	-63	63	64
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	950	249	109	757	277	103
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	258	68	30	206	75	28
Total Analysis Volume [veh/h]	1033	271	118	823	301	112
Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

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Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane	no	no	no
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	no	no	no
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.01	0.00	0.23	0.01	7.81	0.27
d_M, Delay for Movement [s/veh]	0.00	0.00	13.91	0.00	3367.12	3282.48
Movement LOS	A	A	B	A	F	F
95th-Percentile Queue Length [veh]	0.00	0.00	10.47	5.24	48.44	48.44
95th-Percentile Queue Length [ft]	0.00	0.00	261.83	130.92	1211.01	1211.01
d_A, Approach Delay [s/veh]	0.00		1.74		3344.17	
Approach LOS	A		A		F	
d_I, Intersection Delay [s/veh]	520.23					
Intersection LOS	F					

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Intersection Level Of Service Report
#6: CSAH 13 & 9th St

Control Type:	Two-way stop	Delay (sec / veh):	92.4
Analysis Method:	HCM2010	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.000

Intersection Setup

Name	CSAH 13			CSAH 13			9th St					
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	0	0	0	1	0	0	0	0	0	0
Pocket Length [ft]	300.00	100.00	100.00	100.00	100.00	200.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	55.00			55.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	no			no			yes			no		

Volumes

Name	CSAH 13			CSAH 13			9th St					
Base Volume Input [veh/h]	23	832	0	0	727	12	6	0	13	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Growth Rate	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.00	1.00	1.09
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	69	53	9	67	0	0	0	0	0	0	19
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	8	-8	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	25	976	53	17	851	13	7	0	14	0	0	19
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	7	265	14	5	231	4	2	0	4	0	0	5
Total Analysis Volume [veh/h]	27	1061	58	18	925	14	8	0	15	0	0	21
Pedestrian Volume [ped/h]	0			0			2			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

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Intersection Settings

Priority Scheme	Free	Free	Stop	Stop
Flared Lane	no	no	no	no
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	no	no	no	no
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.04	0.01	0.00	0.03	0.01	0.00	0.12	0.00	0.03	0.00	0.00	0.04
d_M, Delay for Movement [s/veh]	10.22	0.00	0.00	11.04	0.00	0.00	62.03	92.38	15.52	0.00	0.00	13.03
Movement LOS	B	A	A	B	A	A	F	F	C			B
95th-Percentile Queue Length [veh]	0.12	0.00	0.00	7.09	3.55	0.00	0.50	0.50	0.50	0.00	0.00	0.14
95th-Percentile Queue Length [ft]	2.93	0.00	0.00	177.34	88.67	0.00	12.44	12.44	12.44	0.00	0.00	3.50
d_A, Approach Delay [s/veh]	0.24			0.21			31.70			13.03		
Approach LOS	A			A			D			B		
d_I, Intersection Delay [s/veh]	0.69											
Intersection LOS	F											

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Intersection Level Of Service Report
#7: CSAH 13 & CSAH 10

Control Type:	Signalized	Delay (sec / veh):	27.2
Analysis Method:	HCM2010	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.612

Intersection Setup

Name	CSAH 13			CSAH 13			CSAH 10			CSAH 10		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	1	1	0	1	1	0	1	1	0	1
Pocket Length [ft]	250.00	100.00	250.00	250.00	100.00	250.00	275.00	100.00	275.00	250.00	100.00	250.00
Speed [mph]	55.00			55.00			55.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	yes			yes			yes			yes		

Volumes

Name	CSAH 13			CSAH 13			CSAH 10			CSAH 10		
Base Volume Input [veh/h]	233	434	115	181	325	32	132	653	331	45	156	112
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Growth Rate	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	45	15	28	6	15	0	0	19	43	17	7	2
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	77	0	0	18	0	0	202	0	0	61
Total Hourly Volume [veh/h]	299	488	76	203	369	17	144	731	202	66	177	63
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	81	133	21	55	100	5	39	199	55	18	48	17
Total Analysis Volume [veh/h]	325	530	83	221	401	18	157	795	220	72	192	68
Presence of On-Street Parking	no		no	no		no	no		no	no		no
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Volume [ped/h]	0			1			3			1		
Bicycle Volume [bicycles/h]	0			0			0			0		

Appendix D - Capacity Analysis Backup

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Intersection Settings

Located in CBD	no
Signal Coordination Group	-
Cycle Length [s]	140
Coordination Type	Time of Day Pattern Isolated
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	5.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal Group	5	2	0	1	6	0	7	4	0	3	8	0
Lead / Lag	Lag	-	-	Lag	-	-	Lag	-	-	Lag	-	-
Minimum Green [s]	5	10	0	5	10	0	5	10	0	5	10	0
Maximum Green [s]	30	30	0	30	30	0	30	40	0	30	40	0
Amber [s]	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0
All red [s]	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
Split [s]	44	39	0	34	29	0	40	53	0	14	27	0
Vehicle Extension [s]	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0
Walk [s]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Clearance [s]	0	0	0	0	0	0	0	0	0	0	0	0
l1, Start-Up Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
l2, Clearance Lost Time [s]	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0
Minimum Recall	no	no		no	no		no	yes		no	yes	
Maximum Recall	no	no		no	no		no	no		no	no	
Pedestrian Recall	no	no		no	no		no	no		no	no	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering 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

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Lane Group Calculations

Lane Group	L	C	R	L	C	R	L	C	R	L	C	R
L, Total Lost Time per Cycle [s]	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
g_i, Effective Green Time [s]	15	13	13	12	10	10	13	19	19	4	10	10
g / C, Green / Cycle	0.22	0.19	0.19	0.18	0.15	0.15	0.19	0.28	0.28	0.05	0.15	0.15
(v / s)_i Volume / Saturation Flow Rate	0.18	0.15	0.05	0.13	0.11	0.01	0.09	0.23	0.14	0.04	0.05	0.04
s, saturation flow rate [veh/h]	1757	3512	1568	1757	3512	1568	1757	3512	1568	1757	3512	1568
c, Capacity [veh/h]	383	679	303	310	533	238	333	986	440	97	514	229
d1, Uniform Delay [s]	25.48	26.01	23.32	26.33	27.56	24.70	24.50	22.71	20.43	31.61	26.17	25.86
k, delay calibration	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11
I, Upstream Filtering 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
d2, Incremental Delay [s]	5.30	2.00	0.48	3.04	2.16	0.13	1.04	1.62	0.88	10.75	0.45	0.71
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, 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
PF, progression 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

Lane Group Results

X, volume / capacity	0.85	0.78	0.27	0.71	0.75	0.08	0.47	0.81	0.50	0.75	0.37	0.30
d, Delay for Lane Group [s/veh]	30.78	28.01	23.81	29.38	29.73	24.83	25.54	24.32	21.31	42.36	26.62	26.58
Lane Group LOS	C	C	C	C	C	C	C	C	C	D	C	C
Critical Lane Group	yes	no	no	no	yes	no	no	yes	no	yes	no	no
50th-Percentile Queue Length [veh]	4.83	3.67	1.02	3.16	2.86	0.23	2.03	5.11	2.54	1.32	1.25	0.90
50th-Percentile Queue Length [ft]	120.74	91.77	25.46	79.08	71.55	5.65	50.85	127.78	63.58	33.04	31.35	22.52
95th-Percentile Queue Length [veh]	8.43	6.61	1.83	5.69	5.15	0.41	3.66	8.82	4.58	2.38	2.26	1.62
95th-Percentile Queue Length [ft]	210.84	165.19	45.84	142.34	128.80	10.18	91.53	220.47	114.44	59.47	56.44	40.54

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Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	30.78	28.01	23.81	29.38	29.73	24.83	25.54	24.32	21.31	42.36	26.62	26.58
Movement LOS	C	C	C	C	C	C	C	C	C	D	C	C
d_A, Approach Delay [s/veh]	28.60			29.47			23.92			30.03		
Approach LOS	C			C			C			C		
d_I, Intersection Delay [s/veh]	27.15											
Intersection LOS	C											
Intersection V/C	0.612											

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Intersection Level Of Service Report
#8: CSAH 10 & Western Site Access

Control Type:	Two-way stop	Delay (sec / veh):	39.2
Analysis Method:	HCM2010	Level Of Service:	E
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.000

Intersection Setup

Name	Western Site Access						CSAH 10			CSAH 10		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	1	0	0	1	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	125.00	100.00	100.00	275.00	100.00	100.00
Speed [mph]	30.00			30.00			55.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	no			no			no			no		

Volumes

Name	Western Site Access						CSAH 10			CSAH 10		
Base Volume Input [veh/h]	0	0	0	0	0	0	0	949	0	0	313	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Growth Rate	1.00	1.00	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	3	0	0	0	0	44	10	3	26	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	0	3	0	0	0	0	1078	10	3	367	0
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	1	0	0	0	0	293	3	1	100	0
Total Analysis Volume [veh/h]	0	0	3	0	0	0	0	1172	11	3	399	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

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Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	no	no	no	no
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	no	no	no	no
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00
d_M, Delay for Movement [s/veh]	0.00	0.00	13.10	23.29	39.20	9.47	8.13	0.00	0.00	11.23	0.00	0.00
Movement LOS			B	C	E	A	A	A	A	B	A	
95th-Percentile Queue Length [veh]	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00
95th-Percentile Queue Length [ft]	0.00	0.00	0.51	0.00	0.00	0.00	0.00	0.00	0.00	0.39	0.00	0.00
d_A, Approach Delay [s/veh]	13.10			23.99			0.00			0.08		
Approach LOS	B			C			A			A		
d_I, Intersection Delay [s/veh]	0.05											
Intersection LOS	E											

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Intersection Level Of Service Report
#9: CSAH 10 & Eastern Site Access

Control Type:	Two-way stop	Delay (sec / veh):	41.3
Analysis Method:	HCM2010	Level Of Service:	E
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.194

Intersection Setup

Name	Eastern Site Access		CSAH 10		CSAH 10	
Approach	Northbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Thru	Right	Left	Thru
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		55.00		55.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	no		no		no	

Volumes

Name	Eastern Site Access		CSAH 10		CSAH 10	
Base Volume Input [veh/h]	0	0	949	0	0	313
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	3.00	3.00	3.00	3.00	3.00	3.00
Growth Rate	1.09	1.09	1.09	1.09	1.09	1.09
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	22	4	7	39	6	7
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	22	4	1041	39	6	348
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	6	1	283	11	2	95
Total Analysis Volume [veh/h]	24	4	1132	42	7	378
Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

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Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane	no	no	no
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	no	no	no
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.19	0.02	0.01	0.00	0.01	0.00
d_M, Delay for Movement [s/veh]	41.26	27.16	0.00	0.00	11.16	0.00
Movement LOS	E	D	A	A	B	A
95th-Percentile Queue Length [veh]	0.76	0.76	0.00	0.00	4.73	4.73
95th-Percentile Queue Length [ft]	18.96	18.96	0.00	0.00	118.24	118.24
d_A, Approach Delay [s/veh]	39.24		0.00		0.20	
Approach LOS	E		A		A	
d_I, Intersection Delay [s/veh]	0.74					
Intersection LOS	E					

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Intersection Level Of Service Report
#10: Eagle Point Blvd & Site Access

Control Type:	Two-way stop	Delay (sec / veh):	10.8
Analysis Method:	HCM2010	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.000

Intersection Setup

Name	Site Access		Eagle Point Blvd		Eagle Point Blvd	
Approach	Southbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	no		no		no	

Volumes

Name	Site Access		Eagle Point Blvd		Eagle Point Blvd	
Base Volume Input [veh/h]	0	0	0	176	7	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	3.00	3.00	3.00	3.00	3.00	3.00
Growth Rate	1.09	1.09	1.09	1.09	1.09	1.09
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	39	52	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	39	52	192	8	0
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	11	14	52	2	0
Total Analysis Volume [veh/h]	0	42	57	209	9	0
Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

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Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane	no	no	no
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	no	no	no
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.04	0.04	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	10.82	8.50	7.33	0.00	0.00	0.00
Movement LOS	B	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.12	0.12	0.59	0.59	0.00	0.00
95th-Percentile Queue Length [ft]	3.06	3.06	14.85	14.85	0.00	0.00
d_A, Approach Delay [s/veh]	8.50		1.57		0.00	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	2.44					
Intersection LOS	B					

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Signal Warrants Report For Intersection #4: CSAH 13 & Eagle Point Blvd

Warrants Summary

Warrant	Name	Met?
#1	Eight Hour Vehicular Volume	Yes
#2	Four Hour Vehicular Volume	Yes
#3	Peak Hour	Yes

Intersection Warrants Parameters

Major Approaches	N, S
Minor Approaches	E, W
Speed > 40mph	Yes
Population < 10,000	Yes
Warrant Factor	70%

Warrant Analysis Traffic Volumes

Hour	Major Streets		Minor Streets	
	N	S	E	W
1	1006	1220	222	115
2	966	1171	213	110
3	946	1147	209	108
4	805	976	178	92
5	765	927	169	87
6	684	830	151	78
7	634	769	140	72
8	604	732	133	69
9	483	586	107	55
10	453	549	100	52
11	453	549	100	52
12	433	525	95	49
13	392	476	87	45
14	362	439	80	41
15	362	439	80	41
16	352	427	78	40
17	201	244	44	23
18	111	134	24	13
19	101	122	22	12
20	40	49	9	5
21	30	37	7	3
22	30	37	7	3
23	20	24	4	2
24	20	24	4	2

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Warrant Analysis by Hour

Hour	Major Lanes		Minor Lanes		Warrant 1 Condition A				Warrant 1 Condition B				Warrant 2	Warrant 3
	Number	Volume	Number	Volume	100%	80%	70%	56%	100%	80%	70%	56%		Condition B
1	8	2226	4	337	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
2	8	2137	4	323	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
3	8	2093	4	317	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
4	8	1781	4	270	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
5	8	1692	4	256	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
6	8	1514	4	229	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
7	8	1403	4	212	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
8	8	1336	4	202	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
9	8	1069	4	162	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
10	8	1002	4	152	No	No	No	No	Yes	Yes	Yes	Yes	Yes	No
11	8	1002	4	152	No	No	No	No	Yes	Yes	Yes	Yes	Yes	No
12	8	958	4	144	No	No	No	No	No	Yes	Yes	Yes	Yes	No
13	8	868	4	132	No	No	No	No	No	Yes	Yes	Yes	Yes	No
14	8	801	4	121	No	No	No	No	No	Yes	Yes	Yes	No	No
15	8	801	4	121	No	No	No	No	No	Yes	Yes	Yes	No	No
16	8	779	4	118	No	No	No	No	No	No	Yes	Yes	No	No
17	8	445	4	67	No	No	No	No	No	No	No	No	No	No
18	8	245	4	37	No	No	No	No	No	No	No	No	No	No
19	8	223	4	34	No	No	No	No	No	No	No	No	No	No
20	8	89	4	14	No	No	No	No	No	No	No	No	No	No
21	8	67	4	10	No	No	No	No	No	No	No	No	No	No
22	8	67	4	10	No	No	No	No	No	No	No	No	No	No
23	8	44	4	6	No	No	No	No	No	No	No	No	No	No
24	8	44	4	6	No	No	No	No	No	No	No	No	No	No
Hours Met					3	5	7	8	11	15	16	16	13	9

Warrant 3 Condition A

Orientation	E	W
Total Stopped Delay Per Vehicle on Minor Approach (s)	1197.3	196.8
Number of Lanes on Minor Street Approach	2	2
VehicleHours of Stopped Delay on Minor Approach ([h]h:mm)	73:50	6:17
Delay Condition Met	Yes	Yes
Volume on Minor Street Approach During Same Hour	222	115
High Minor Volume Condition Met	Yes	No
Total Entering Volume on All Approaches During Same Hour	2563	2563
Number of Approaches on Intersection	4	4
Total Volume Condition Met	Yes	Yes
Warrant Met for Approach	Yes	No
Warrant Met for Intersection	**Yes**	

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Signal Warrants Report For Intersection #5: CSAH 13 & 5th St

Warrants Summary

Warrant	Name	Met?
#1	Eight Hour Vehicular Volume	Yes
#2	Four Hour Vehicular Volume	Yes
#3	Peak Hour	Yes

Intersection Warrants Parameters

Major Approaches	S, N
Minor Approaches	E
Speed > 40mph	Yes
Population < 10,000	Yes
Warrant Factor	70%

Warrant Analysis Traffic Volumes

Hour	Major Streets		Minor Streets
	S	N	E
1	1199	866	380
2	1151	831	365
3	1127	814	357
4	959	693	304
5	911	658	289
6	815	589	258
7	755	546	239
8	719	520	228
9	576	416	182
10	540	390	171
11	540	390	171
12	516	372	163
13	468	338	148
14	432	312	137
15	432	312	137
16	420	303	133
17	240	173	76
18	132	95	42
19	120	87	38
20	48	35	15
21	36	26	11
22	36	26	11
23	24	17	8
24	24	17	8

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Warrant Analysis by Hour

Hour	Major Lanes		Minor Lanes		Warrant 1 Condition A				Warrant 1 Condition B				Warrant 2	Warrant 3
	Number	Volume	Number	Volume	100%	80%	70%	56%	100%	80%	70%	56%		Condition B
1	4	2065	1	380	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
2	4	1982	1	365	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
3	4	1941	1	357	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
4	4	1652	1	304	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
5	4	1569	1	289	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
6	4	1404	1	258	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
7	4	1301	1	239	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
8	4	1239	1	228	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
9	4	992	1	182	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
10	4	930	1	171	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
11	4	930	1	171	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
12	4	888	1	163	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes
13	4	806	1	148	No	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes
14	4	744	1	137	No	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes
15	4	744	1	137	No	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes
16	4	723	1	133	No	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes
17	4	413	1	76	No	No	No	No	No	No	No	No	No	No
18	4	227	1	42	No	No	No	No	No	No	No	No	No	No
19	4	207	1	38	No	No	No	No	No	No	No	No	No	No
20	4	83	1	15	No	No	No	No	No	No	No	No	No	No
21	4	62	1	11	No	No	No	No	No	No	No	No	No	No
22	4	62	1	11	No	No	No	No	No	No	No	No	No	No
23	4	41	1	8	No	No	No	No	No	No	No	No	No	No
24	4	41	1	8	No	No	No	No	No	No	No	No	No	No
Hours Met					12	16	16	16	11	16	16	16	16	16

Warrant 3 Condition A

Orientation	E
Total Stopped Delay Per Vehicle on Minor Approach (s)	3344.2
Number of Lanes on Minor Street Approach	1
VehicleHours of Stopped Delay on Minor Approach ([h]h:mm)	352:59
Delay Condition Met	Yes
Volume on Minor Street Approach During Same Hour	380
High Minor Volume Condition Met	Yes
Total Entering Volume on All Approaches During Same Hour	2445
Number of Approaches on Intersection	3
Total Volume Condition Met	Yes
Warrant Met for Approach	Yes
Warrant Met for Intersection	**Yes**

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Signal Warrants Report For Intersection #6: CSAH 13 & 9th St

Warrants Summary

Warrant	Name	Met?
#1	Eight Hour Vehicular Volume	No
#2	Four Hour Vehicular Volume	No
#3	Peak Hour	No

Intersection Warrants Parameters

Major Approaches	S, N
Minor Approaches	E, W
Speed > 40mph	Yes
Population < 10,000	Yes
Warrant Factor	70%

Warrant Analysis Traffic Volumes

Hour	Major Streets		Minor Streets	
	S	N	E	W
1	1054	881	19	21
2	1012	846	18	20
3	991	828	18	20
4	843	705	15	17
5	801	670	14	16
6	717	599	13	14
7	664	555	12	13
8	632	529	11	13
9	506	423	9	10
10	474	396	9	9
11	474	396	9	9
12	453	379	8	9
13	411	344	7	8
14	379	317	7	8
15	379	317	7	8
16	369	308	7	7
17	211	176	4	4
18	116	97	2	2
19	105	88	2	2
20	42	35	1	1
21	32	26	1	1
22	32	26	1	1
23	21	18	0	0
24	21	18	0	0

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Warrant Analysis by Hour

Hour	Major Lanes		Minor Lanes		Warrant 1 Condition A				Warrant 1 Condition B				Warrant 2	Warrant 3
	Number	Volume	Number	Volume	100%	80%	70%	56%	100%	80%	70%	56%		Condition B
1	6	1935	2	40	No	No	No	No	No	No	No	No	No	No
2	6	1858	2	38	No	No	No	No	No	No	No	No	No	No
3	6	1819	2	38	No	No	No	No	No	No	No	No	No	No
4	6	1548	2	32	No	No	No	No	No	No	No	No	No	No
5	6	1471	2	30	No	No	No	No	No	No	No	No	No	No
6	6	1316	2	27	No	No	No	No	No	No	No	No	No	No
7	6	1219	2	25	No	No	No	No	No	No	No	No	No	No
8	6	1161	2	24	No	No	No	No	No	No	No	No	No	No
9	6	929	2	19	No	No	No	No	No	No	No	No	No	No
10	6	870	2	18	No	No	No	No	No	No	No	No	No	No
11	6	870	2	18	No	No	No	No	No	No	No	No	No	No
12	6	832	2	17	No	No	No	No	No	No	No	No	No	No
13	6	755	2	15	No	No	No	No	No	No	No	No	No	No
14	6	696	2	15	No	No	No	No	No	No	No	No	No	No
15	6	696	2	15	No	No	No	No	No	No	No	No	No	No
16	6	677	2	14	No	No	No	No	No	No	No	No	No	No
17	6	387	2	8	No	No	No	No	No	No	No	No	No	No
18	6	213	2	4	No	No	No	No	No	No	No	No	No	No
19	6	193	2	4	No	No	No	No	No	No	No	No	No	No
20	6	77	2	2	No	No	No	No	No	No	No	No	No	No
21	6	58	2	2	No	No	No	No	No	No	No	No	No	No
22	6	58	2	2	No	No	No	No	No	No	No	No	No	No
23	6	39	2	0	No	No	No	No	No	No	No	No	No	No
24	6	39	2	0	No	No	No	No	No	No	No	No	No	No
Hours Met					0	0	0	0	0	0	0	0	0	0

Warrant 3 Condition A

Orientation	E	W
Total Stopped Delay Per Vehicle on Minor Approach (s)	13	31.7
Number of Lanes on Minor Street Approach	1	1
VehicleHours of Stopped Delay on Minor Approach ([h]h:mm)	0:04	0:11
Delay Condition Met	No	No
Volume on Minor Street Approach During Same Hour	19	21
High Minor Volume Condition Met	No	No
Total Entering Volume on All Approaches During Same Hour	1975	1975
Number of Approaches on Intersection	4	4
Total Volume Condition Met	Yes	Yes
Warrant Met for Approach	No	No
Warrant Met for Intersection	**No**	

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Signal Warrants Report For Intersection #8: CSAH 10 & Western Site Access

Warrants Summary

Warrant	Name	Met?
#1	Eight Hour Vehicular Volume	No
#2	Four Hour Vehicular Volume	No
#3	Peak Hour	No

Intersection Warrants Parameters

Major Approaches	E, W
Minor Approaches	S, N
Speed > 40mph	Yes
Population < 10,000	Yes
Warrant Factor	70%

Warrant Analysis Traffic Volumes

Hour	Major Streets		Minor Streets	
	E	W	S	N
1	370	1088	3	0
2	355	1044	3	0
3	348	1023	3	0
4	296	870	2	0
5	281	827	2	0
6	252	740	2	0
7	233	685	2	0
8	222	653	2	0
9	178	522	1	0
10	167	490	1	0
11	167	490	1	0
12	159	468	1	0
13	144	424	1	0
14	133	392	1	0
15	133	392	1	0
16	130	381	1	0
17	74	218	1	0
18	41	120	0	0
19	37	109	0	0
20	15	44	0	0
21	11	33	0	0
22	11	33	0	0
23	7	22	0	0
24	7	22	0	0

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Warrant Analysis by Hour

Hour	Major Lanes		Minor Lanes		Warrant 1 Condition A				Warrant 1 Condition B				Warrant 2	Warrant 3
	Number	Volume	Number	Volume	100%	80%	70%	56%	100%	80%	70%	56%		Condition B
1	6	1458	2	3	No	No	No	No	No	No	No	No	No	No
2	6	1399	2	3	No	No	No	No	No	No	No	No	No	No
3	6	1371	2	3	No	No	No	No	No	No	No	No	No	No
4	6	1166	2	2	No	No	No	No	No	No	No	No	No	No
5	6	1108	2	2	No	No	No	No	No	No	No	No	No	No
6	6	992	2	2	No	No	No	No	No	No	No	No	No	No
7	6	918	2	2	No	No	No	No	No	No	No	No	No	No
8	6	875	2	2	No	No	No	No	No	No	No	No	No	No
9	6	700	2	1	No	No	No	No	No	No	No	No	No	No
10	6	657	2	1	No	No	No	No	No	No	No	No	No	No
11	6	657	2	1	No	No	No	No	No	No	No	No	No	No
12	6	627	2	1	No	No	No	No	No	No	No	No	No	No
13	6	568	2	1	No	No	No	No	No	No	No	No	No	No
14	6	525	2	1	No	No	No	No	No	No	No	No	No	No
15	6	525	2	1	No	No	No	No	No	No	No	No	No	No
16	6	511	2	1	No	No	No	No	No	No	No	No	No	No
17	6	292	2	1	No	No	No	No	No	No	No	No	No	No
18	6	161	2	0	No	No	No	No	No	No	No	No	No	No
19	6	146	2	0	No	No	No	No	No	No	No	No	No	No
20	6	59	2	0	No	No	No	No	No	No	No	No	No	No
21	6	44	2	0	No	No	No	No	No	No	No	No	No	No
22	6	44	2	0	No	No	No	No	No	No	No	No	No	No
23	6	29	2	0	No	No	No	No	No	No	No	No	No	No
24	6	29	2	0	No	No	No	No	No	No	No	No	No	No
Hours Met					0	0	0	0	0	0	0	0	0	0

Warrant 3 Condition A

Orientation	S	N
Total Stopped Delay Per Vehicle on Minor Approach (s)	13.1	24
Number of Lanes on Minor Street Approach	1	1
VehicleHours of Stopped Delay on Minor Approach ([h]h:mm)	0:00	0:00
Delay Condition Met	No	No
Volume on Minor Street Approach During Same Hour	3	0
High Minor Volume Condition Met	No	No
Total Entering Volume on All Approaches During Same Hour	1461	1461
Number of Approaches on Intersection	4	4
Total Volume Condition Met	Yes	Yes
Warrant Met for Approach	No	No
Warrant Met for Intersection	**No**	

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Signal Warrants Report For Intersection #9: CSAH 10 & Eastern Site Access

Warrants Summary

Warrant	Name	Met?
#1	Eight Hour Vehicular Volume	No
#2	Four Hour Vehicular Volume	No
#3	Peak Hour	No

Intersection Warrants Parameters

Major Approaches	E, W
Minor Approaches	S
Speed > 40mph	Yes
Population < 10,000	Yes
Warrant Factor	70%

Warrant Analysis Traffic Volumes

Hour	Major Streets		Minor Streets
	E	W	S
1	354	1080	26
2	340	1037	25
3	333	1015	24
4	283	864	21
5	269	821	20
6	241	734	18
7	223	680	16
8	212	648	16
9	170	518	12
10	159	486	12
11	159	486	12
12	152	464	11
13	138	421	10
14	127	389	9
15	127	389	9
16	124	378	9
17	71	216	5
18	39	119	3
19	35	108	3
20	14	43	1
21	11	32	1
22	11	32	1
23	7	22	1
24	7	22	1

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Warrant Analysis by Hour

Hour	Major Lanes		Minor Lanes		Warrant 1 Condition A				Warrant 1 Condition B				Warrant 2	Warrant 3
	Number	Volume	Number	Volume	100%	80%	70%	56%	100%	80%	70%	56%		Condition B
1	2	1434	1	26	No	No	No	No	No	No	No	No	No	No
2	2	1377	1	25	No	No	No	No	No	No	No	No	No	No
3	2	1348	1	24	No	No	No	No	No	No	No	No	No	No
4	2	1147	1	21	No	No	No	No	No	No	No	No	No	No
5	2	1090	1	20	No	No	No	No	No	No	No	No	No	No
6	2	975	1	18	No	No	No	No	No	No	No	No	No	No
7	2	903	1	16	No	No	No	No	No	No	No	No	No	No
8	2	860	1	16	No	No	No	No	No	No	No	No	No	No
9	2	688	1	12	No	No	No	No	No	No	No	No	No	No
10	2	645	1	12	No	No	No	No	No	No	No	No	No	No
11	2	645	1	12	No	No	No	No	No	No	No	No	No	No
12	2	616	1	11	No	No	No	No	No	No	No	No	No	No
13	2	559	1	10	No	No	No	No	No	No	No	No	No	No
14	2	516	1	9	No	No	No	No	No	No	No	No	No	No
15	2	516	1	9	No	No	No	No	No	No	No	No	No	No
16	2	502	1	9	No	No	No	No	No	No	No	No	No	No
17	2	287	1	5	No	No	No	No	No	No	No	No	No	No
18	2	158	1	3	No	No	No	No	No	No	No	No	No	No
19	2	143	1	3	No	No	No	No	No	No	No	No	No	No
20	2	57	1	1	No	No	No	No	No	No	No	No	No	No
21	2	43	1	1	No	No	No	No	No	No	No	No	No	No
22	2	43	1	1	No	No	No	No	No	No	No	No	No	No
23	2	29	1	1	No	No	No	No	No	No	No	No	No	No
24	2	29	1	1	No	No	No	No	No	No	No	No	No	No
Hours Met					0	0	0	0	0	0	0	0	0	0

Warrant 3 Condition A

Orientation	S
Total Stopped Delay Per Vehicle on Minor Approach (s)	39.2
Number of Lanes on Minor Street Approach	1
VehicleHours of Stopped Delay on Minor Approach ([h]h:mm)	0:17
Delay Condition Met	No
Volume on Minor Street Approach During Same Hour	26
High Minor Volume Condition Met	No
Total Entering Volume on All Approaches During Same Hour	1460
Number of Approaches on Intersection	3
Total Volume Condition Met	Yes
Warrant Met for Approach	No
Warrant Met for Intersection	**No**

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Signal Warrants Report For Intersection #10: Eagle Point Blvd & Site Access

Warrants Summary

Warrant	Name	Met?
#1	Eight Hour Vehicular Volume	No
#2	Four Hour Vehicular Volume	No
#3	Peak Hour	No

Intersection Warrants Parameters

Major Approaches	E, W
Minor Approaches	N
Speed > 40mph	No
Population < 10,000	No
Warrant Factor	100%

Warrant Analysis Traffic Volumes

Hour	Major Streets		Minor Streets
	E	W	N
1	8	244	39
2	8	234	37
3	8	229	37
4	6	195	31
5	6	185	30
6	5	166	27
7	5	154	25
8	5	146	23
9	4	117	19
10	4	110	18
11	4	110	18
12	3	105	17
13	3	95	15
14	3	88	14
15	3	88	14
16	3	85	14
17	2	49	8
18	1	27	4
19	1	24	4
20	0	10	2
21	0	7	1
22	0	7	1
23	0	5	1
24	0	5	1

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Warrant Analysis by Hour

Hour	Major Lanes		Minor Lanes		Warrant 1 Condition A				Warrant 1 Condition B				Warrant 2	Warrant 3
	Number	Volume	Number	Volume	100%	80%	70%	56%	100%	80%	70%	56%		Condition B
1	2	252	1	39	No	No	No	No	No	No	No	No	No	No
2	2	242	1	37	No	No	No	No	No	No	No	No	No	No
3	2	237	1	37	No	No	No	No	No	No	No	No	No	No
4	2	201	1	31	No	No	No	No	No	No	No	No	No	No
5	2	191	1	30	No	No	No	No	No	No	No	No	No	No
6	2	171	1	27	No	No	No	No	No	No	No	No	No	No
7	2	159	1	25	No	No	No	No	No	No	No	No	No	No
8	2	151	1	23	No	No	No	No	No	No	No	No	No	No
9	2	121	1	19	No	No	No	No	No	No	No	No	No	No
10	2	114	1	18	No	No	No	No	No	No	No	No	No	No
11	2	114	1	18	No	No	No	No	No	No	No	No	No	No
12	2	108	1	17	No	No	No	No	No	No	No	No	No	No
13	2	98	1	15	No	No	No	No	No	No	No	No	No	No
14	2	91	1	14	No	No	No	No	No	No	No	No	No	No
15	2	91	1	14	No	No	No	No	No	No	No	No	No	No
16	2	88	1	14	No	No	No	No	No	No	No	No	No	No
17	2	51	1	8	No	No	No	No	No	No	No	No	No	No
18	2	28	1	4	No	No	No	No	No	No	No	No	No	No
19	2	25	1	4	No	No	No	No	No	No	No	No	No	No
20	2	10	1	2	No	No	No	No	No	No	No	No	No	No
21	2	7	1	1	No	No	No	No	No	No	No	No	No	No
22	2	7	1	1	No	No	No	No	No	No	No	No	No	No
23	2	5	1	1	No	No	No	No	No	No	No	No	No	No
24	2	5	1	1	No	No	No	No	No	No	No	No	No	No
Hours Met					0	0	0	0	0	0	0	0	0	0

Warrant 3 Condition A

Orientation	N
Total Stopped Delay Per Vehicle on Minor Approach (s)	8.5
Number of Lanes on Minor Street Approach	1
VehicleHours of Stopped Delay on Minor Approach ([h]h:mm)	0:05
Delay Condition Met	No
Volume on Minor Street Approach During Same Hour	39
High Minor Volume Condition Met	No
Total Entering Volume on All Approaches During Same Hour	291
Number of Approaches on Intersection	3
Total Volume Condition Met	No
Warrant Met for Approach	No
Warrant Met for Intersection	**No**

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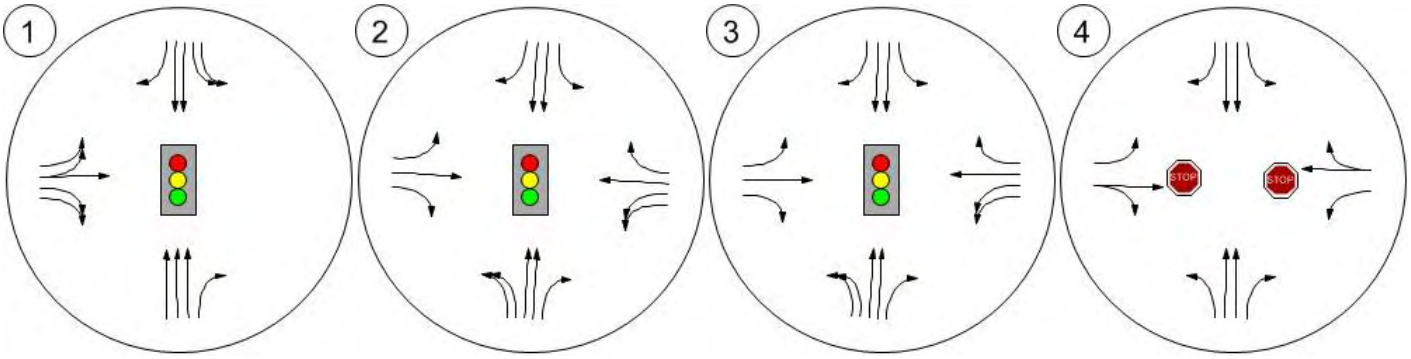
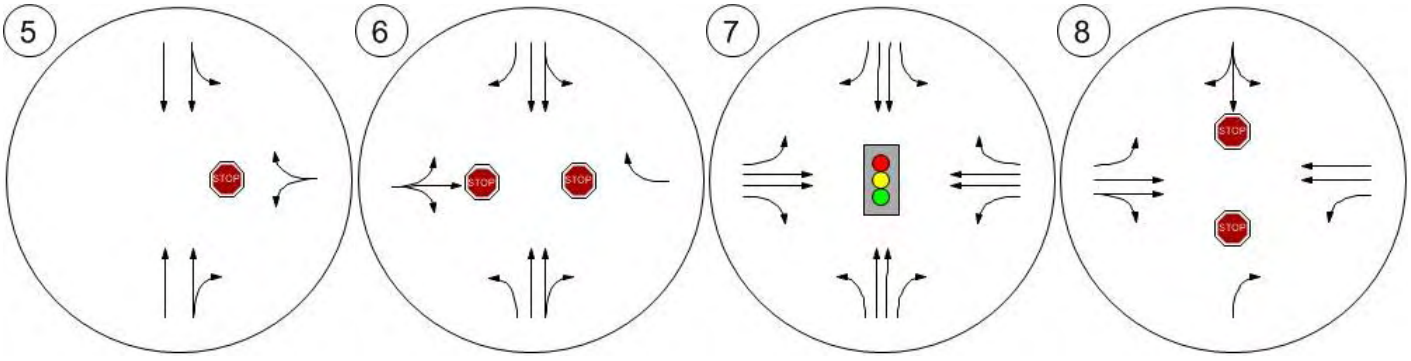
Lane Configuration and Traffic Control





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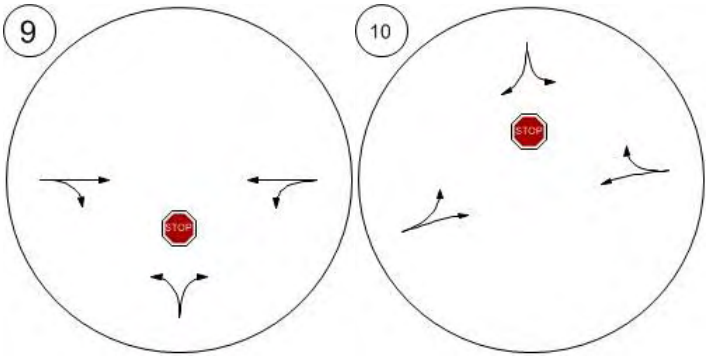
Lane Configuration and Traffic Control



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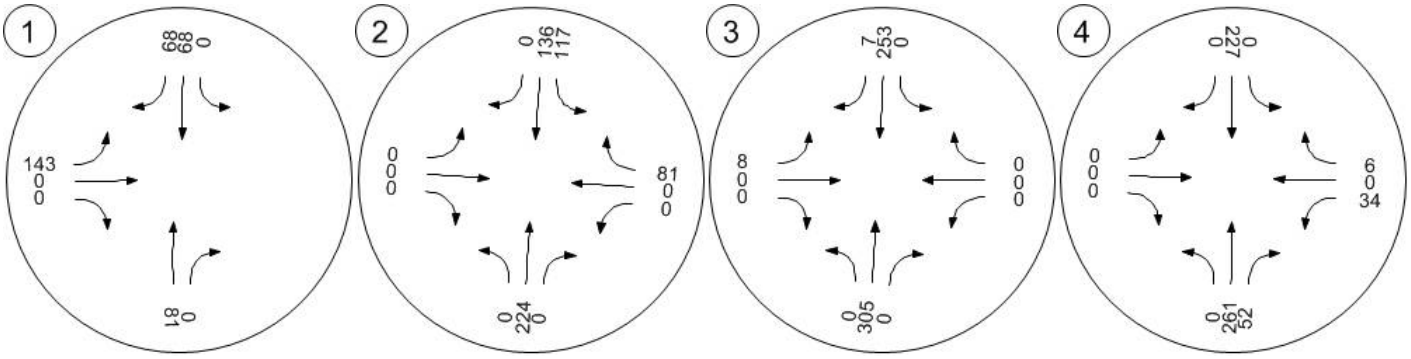
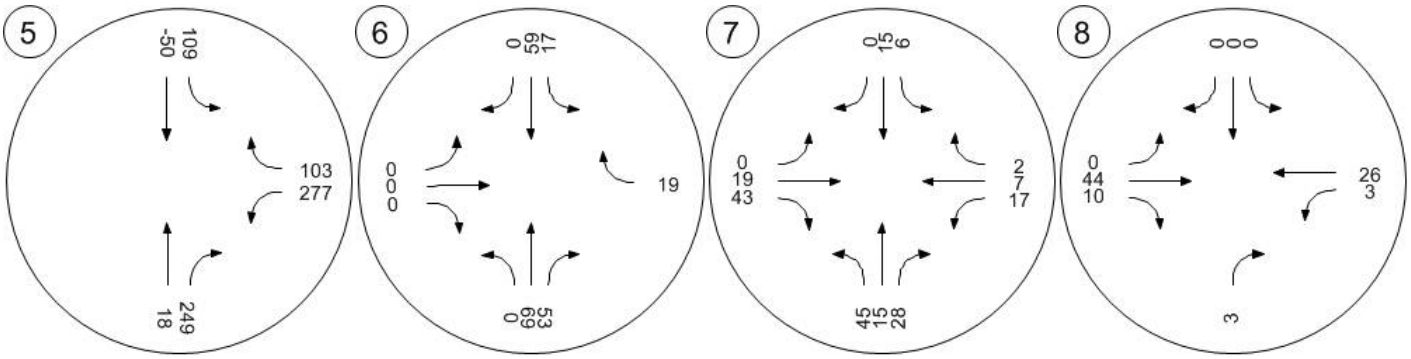
Traffic Volume - Net New Site Trips





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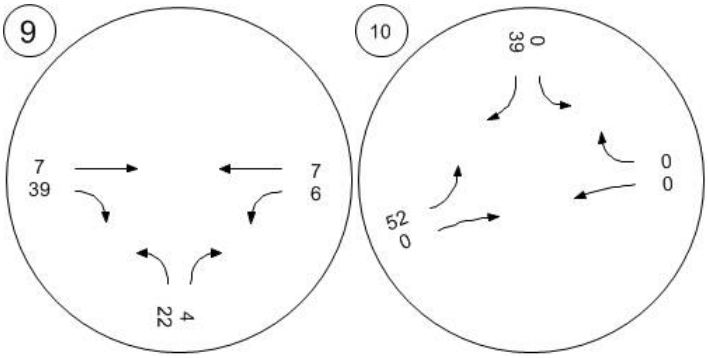
Traffic Volume - Net New Site Trips



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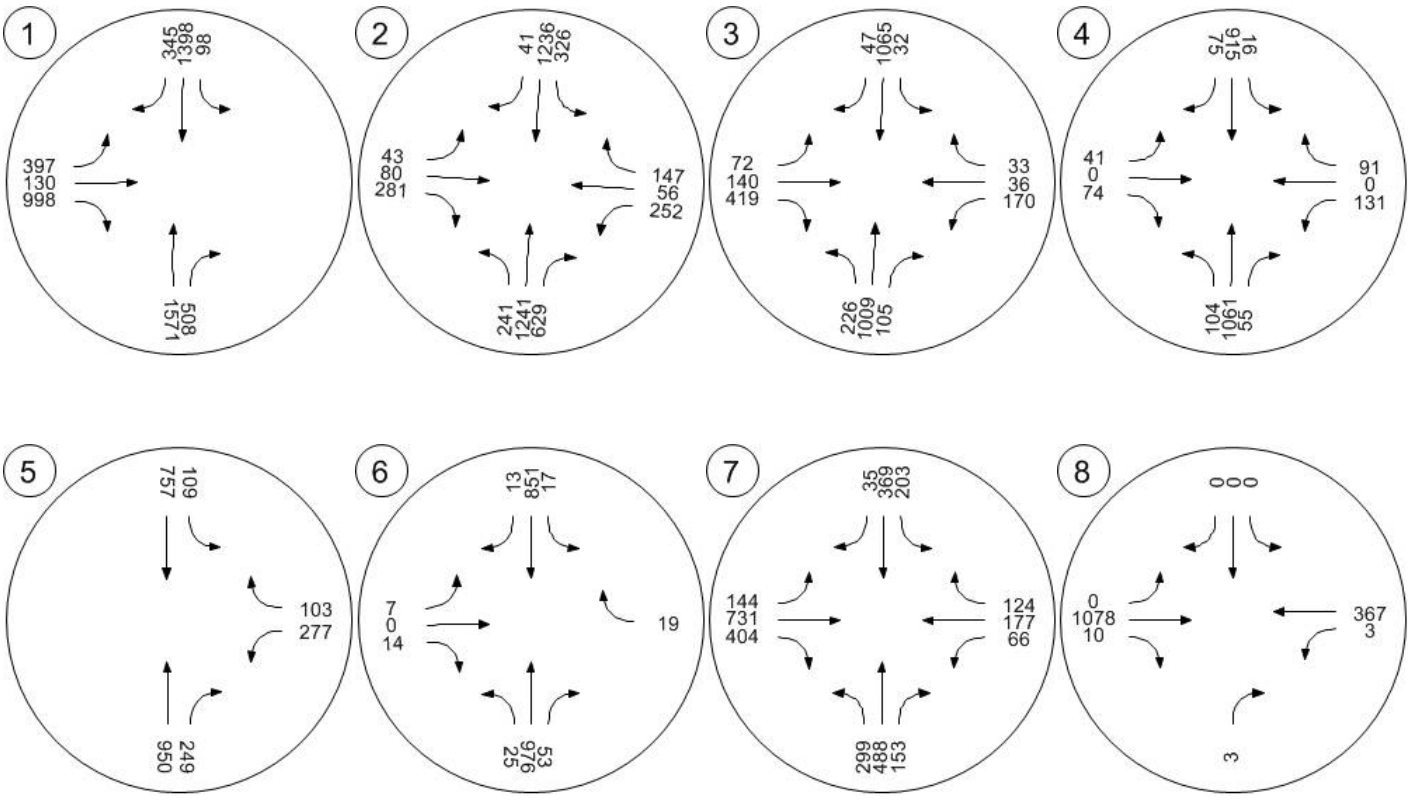
Traffic Volume - Future Total Volume



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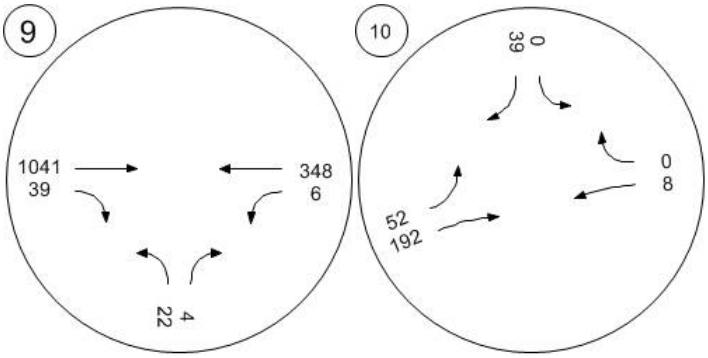
Traffic Volume - Future Total Volume



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Lake Elmo Development

Vistro File: C:\...\Lake Elmo.vistropdb
Scenario 7: PM 2019 Build - Improvements
Report File: C:\...\PM 2019 Build - Turn Lanes at 5th St.pdf
7/7/2014

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
5	CSAH 13 & 5th St	Two-way stop	HCM2010	WBL	4.597	1,745.9	F

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value; for all other control types, they are taken for the whole intersection.

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Intersection Level Of Service Report
#5: CSAH 13 & 5th St

Control Type:	Two-way stop	Delay (sec / veh):	1,745.9
Analysis Method:	HCM2010	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	4.597

Intersection Setup

Name	CSAH 13		CSAH 13		5th St	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	1	1	0	0	1
Pocket Length [ft]	100.00	250.00	250.00	100.00	100.00	250.00
Speed [mph]	55.00		55.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	no		no		no	

Volumes

Name	CSAH 13		CSAH 13		5th St	
Base Volume Input [veh/h]	855	0	0	740	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	3.00	3.00	3.00	3.00	3.00	3.00
Growth Rate	1.09	1.09	1.09	1.09	1.09	1.09
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	82	185	54	13	214	39
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	-64	64	55	-63	63	64
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	950	249	109	757	277	103
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	258	68	30	206	75	28
Total Analysis Volume [veh/h]	1033	271	118	823	301	112
Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

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Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane	no	no	no
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	no	no	no
Number of Storage Spaces in Median	0	0	0

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Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.01	0.00	0.23	0.01	4.60	0.22
d_M, Delay for Movement [s/veh]	0.00	0.00	13.91	0.00	1745.91	14.24
Movement LOS	A	A	B	A	F	B
95th-Percentile Queue Length [veh]	0.00	0.00	0.86	0.00	32.87	0.85
95th-Percentile Queue Length [ft]	0.00	0.00	21.57	0.00	821.83	21.23
d_A, Approach Delay [s/veh]	0.00		1.74		1276.30	
Approach LOS	A		A		F	
d_I, Intersection Delay [s/veh]	198.93					
Intersection LOS	F					

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Signal Warrants Report For Intersection #5: CSAH 13 & 5th St

Warrants Summary

Warrant	Name	Met?
#1	Eight Hour Vehicular Volume	Yes
#2	Four Hour Vehicular Volume	Yes
#3	Peak Hour	Yes

Intersection Warrants Parameters

Major Approaches	S, N
Minor Approaches	E
Speed > 40mph	Yes
Population < 10,000	Yes
Warrant Factor	70%

Warrant Analysis Traffic Volumes

Hour	Major Streets		Minor Streets
	S	N	E
1	1199	866	380
2	1151	831	365
3	1127	814	357
4	959	693	304
5	911	658	289
6	815	589	258
7	755	546	239
8	719	520	228
9	576	416	182
10	540	390	171
11	540	390	171
12	516	372	163
13	468	338	148
14	432	312	137
15	432	312	137
16	420	303	133
17	240	173	76
18	132	95	42
19	120	87	38
20	48	35	15
21	36	26	11
22	36	26	11
23	24	17	8
24	24	17	8

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Warrant Analysis by Hour

Hour	Major Lanes		Minor Lanes		Warrant 1 Condition A				Warrant 1 Condition B				Warrant 2	Warrant 3
	Number	Volume	Number	Volume	100%	80%	70%	56%	100%	80%	70%	56%		Condition B
1	6	2065	2	380	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
2	6	1982	2	365	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
3	6	1941	2	357	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
4	6	1652	2	304	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
5	6	1569	2	289	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
6	6	1404	2	258	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
7	6	1301	2	239	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
8	6	1239	2	228	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
9	6	992	2	182	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
10	6	930	2	171	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
11	6	930	2	171	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
12	6	888	2	163	No	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes
13	6	806	2	148	No	No	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes
14	6	744	2	137	No	No	No	Yes	No	Yes	Yes	Yes	Yes	Yes
15	6	744	2	137	No	No	No	Yes	No	Yes	Yes	Yes	Yes	Yes
16	6	723	2	133	No	No	No	Yes	No	Yes	Yes	Yes	Yes	Yes
17	6	413	2	76	No	No	No	No	No	No	No	No	No	No
18	6	227	2	42	No	No	No	No	No	No	No	No	No	No
19	6	207	2	38	No	No	No	No	No	No	No	No	No	No
20	6	83	2	15	No	No	No	No	No	No	No	No	No	No
21	6	62	2	11	No	No	No	No	No	No	No	No	No	No
22	6	62	2	11	No	No	No	No	No	No	No	No	No	No
23	6	41	2	8	No	No	No	No	No	No	No	No	No	No
24	6	41	2	8	No	No	No	No	No	No	No	No	No	No
Hours Met					8	12	13	16	11	16	16	16	16	16

Warrant 3 Condition A

Orientation	E
Total Stopped Delay Per Vehicle on Minor Approach (s)	1276.3
Number of Lanes on Minor Street Approach	2
VehicleHours of Stopped Delay on Minor Approach ([h]h:mm)	134:43
Delay Condition Met	Yes
Volume on Minor Street Approach During Same Hour	380
High Minor Volume Condition Met	Yes
Total Entering Volume on All Approaches During Same Hour	2445
Number of Approaches on Intersection	3
Total Volume Condition Met	Yes
Warrant Met for Approach	Yes
Warrant Met for Intersection	**Yes**

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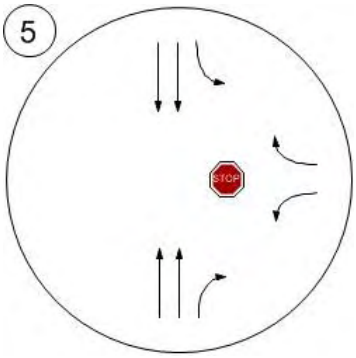
Lane Configuration and Traffic Control



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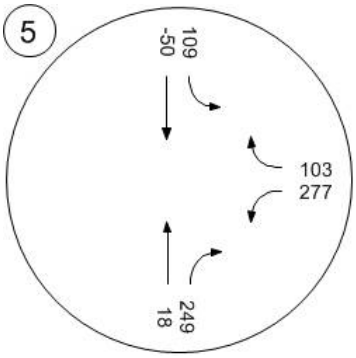
Traffic Volume - Net New Site Trips



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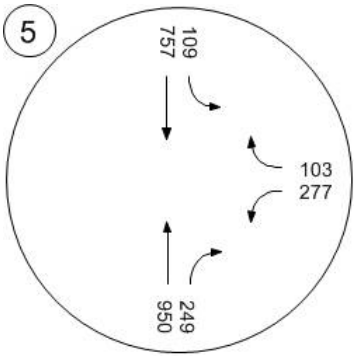
Traffic Volume - Future Total Volume



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Lake Elmo Development

Vistro File: C:\...\Lake Elmo.vistropdb
Scenario 7: PM 2019 Build - Improvements
Report File: C:\...\2019 PM Build - Signal at 5th St.pdf
7/7/2014

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
5	CSAH 13 & 5th St	Signalized	HCM2010	WBL	0.534	12.9	B

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value; for all other control types, they are taken for the whole intersection.

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Intersection Level Of Service Report
#5: CSAH 13 & 5th St

Control Type:	Signalized	Delay (sec / veh):	12.9
Analysis Method:	HCM2010	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.534

Intersection Setup

Name	CSAH 13		CSAH 13		5th St	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	1	1	0	0	1
Pocket Length [ft]	100.00	250.00	250.00	100.00	100.00	250.00
Speed [mph]	55.00		55.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	no		no		no	

Volumes

Name	CSAH 13		CSAH 13		5th St	
Base Volume Input [veh/h]	855	0	0	740	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	3.00	3.00	3.00	3.00	3.00	3.00
Growth Rate	1.09	1.09	1.09	1.09	1.09	1.09
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	82	185	54	13	214	39
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	-64	64	55	-63	63	64
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	125	0	0	0	52
Total Hourly Volume [veh/h]	950	124	109	757	277	51
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	258	34	30	206	75	14
Total Analysis Volume [veh/h]	1033	135	118	823	301	55
Presence of On-Street Parking	no	no	no	no	no	no
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0
Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

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Intersection Settings

Located in CBD	no
Signal Coordination Group	-
Cycle Length [s]	70
Coordination Type	Time of Day Pattern Isolated
Actuation Type	Semi-actuated
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	5.00

Phasing & Timing

Control Type	Permissive	Permissive	ProtectedPermissi	Permissive	Permissive	Permissive
Signal Group	2	0	1	6	8	0
Lead / Lag	-	-	Lead	-	Lag	-
Minimum Green [s]	15	0	5	15	10	0
Maximum Green [s]	30	0	30	30	30	0
Amber [s]	3.0	0.0	3.0	3.0	3.0	0.0
All red [s]	2.0	0.0	2.0	2.0	2.0	0.0
Split [s]	36	0	10	46	24	0
Vehicle Extension [s]	3.0	0.0	3.0	3.0	3.0	0.0
Walk [s]	5	0	0	5	5	0
Pedestrian Clearance [s]	10	0	0	10	10	0
l1, Start-Up Lost Time [s]	2.0	0.0	2.0	2.0	2.0	0.0
l2, Clearance Lost Time [s]	3.0	0.0	3.0	3.0	3.0	0.0
Minimum Recall	no		no	no	no	
Maximum Recall	yes		no	yes	no	
Pedestrian Recall	no		no	no	no	
Detector Location [ft]	0.0	0.0	6.0	0.0	6.0	0.0
Detector Length [ft]	0.0	0.0	6.0	0.0	6.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00

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Lane Group Calculations

Lane Group	C	R	L	C	L	R
L, Total Lost Time per Cycle [s]	5.00	5.00	5.00	5.00	5.00	5.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	3.00	3.00	0.00	3.00	3.00	3.00
g_i, Effective Green Time [s]	36	36	46	46	14	14
g / C, Green / Cycle	0.52	0.52	0.66	0.66	0.20	0.20
(v / s)_i Volume / Saturation Flow Rate	0.29	0.09	0.16	0.23	0.17	0.04
s, saturation flow rate [veh/h]	3512	1568	739	3512	1757	1568
c, Capacity [veh/h]	1821	813	520	2299	356	317
d1, Uniform Delay [s]	11.49	8.88	6.57	5.45	26.86	23.07
k, delay calibration	0.50	0.50	0.50	0.50	0.14	0.11
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	1.29	0.44	1.01	0.44	7.23	0.26
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.57	0.17	0.23	0.36	0.85	0.17
d, Delay for Lane Group [s/veh]	12.78	9.32	7.58	5.89	34.10	23.33
Lane Group LOS	B	A	A	A	C	C
Critical Lane Group	yes	no	yes	no	yes	no
50th-Percentile Queue Length [veh]	4.21	0.88	0.48	1.58	5.31	0.74
50th-Percentile Queue Length [ft]	105.35	22.11	12.11	39.38	132.69	18.58
95th-Percentile Queue Length [veh]	7.58	1.59	0.87	2.84	9.09	1.34
95th-Percentile Queue Length [ft]	189.52	39.80	21.79	70.89	227.14	33.45

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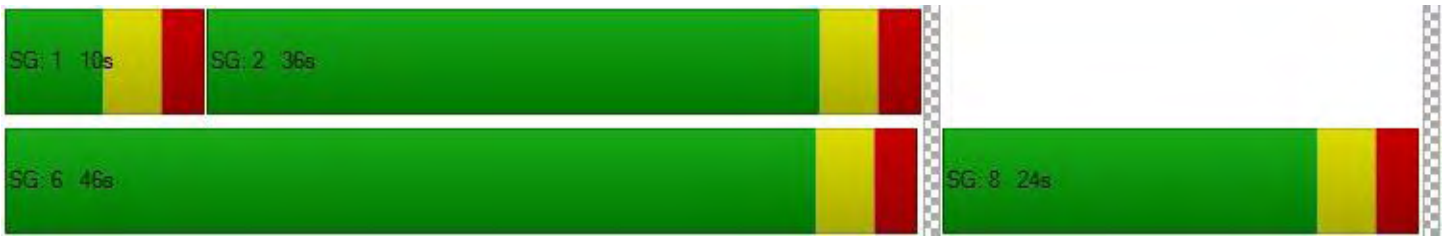
Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	12.78	9.32	7.58	5.89	34.10	23.33
Movement LOS	B	A	A	A	C	C
d_A, Approach Delay [s/veh]	12.38		6.10		32.43	
Approach LOS	B		A		C	
d_I, Intersection Delay [s/veh]	12.88					
Intersection LOS	B					
Intersection V/C	0.534					

Sequence

Ring 1	1	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	-	6	-	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



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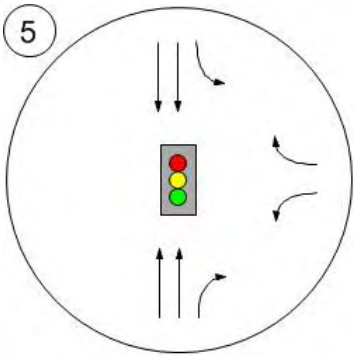
Lane Configuration and Traffic Control



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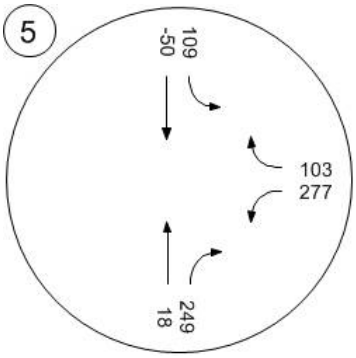
Traffic Volume - Net New Site Trips



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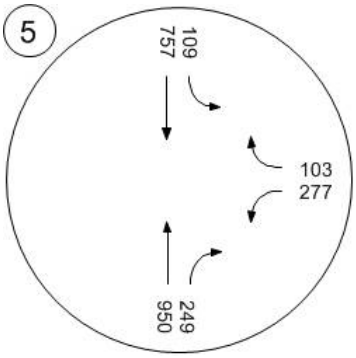
Traffic Volume - Future Total Volume



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Lake Elmo Development

Vistro File: C:\...\Lake Elmo.vistropdb
Scenario 8: PM 2019 Build - Improvements 2
Report File: C:\...\PM 2019 Build - Signal at 5th St no Eagle Point Connection.pdf
7/7/2014

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
4	CSAH 13 & Eagle Point Blvd	Two-way stop	HCM2010	WBL	4.162	1,738.4	F
5	CSAH 13 & 5th St	Signalized	HCM2010	WBL	0.556	14.0	B

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value; for all other control types, they are taken for the whole intersection.

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Intersection Level Of Service Report
#4: CSAH 13 & Eagle Point Blvd

Control Type:	Two-way stop	Delay (sec / veh):	1,738.4
Analysis Method:	HCM2010	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	4.162

Intersection Setup

Name	CSAH 13			CSAH 13			Oak Marsh Rd			Eagle Point Blvd		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	1	1	0	1	1	0	0	1	0	0
Pocket Length [ft]	200.00	100.00	250.00	250.00	100.00	250.00	50.00	100.00	100.00	200.00	100.00	100.00
Speed [mph]	45.00			55.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	no			no			yes			no		

Volumes

Name	CSAH 13			CSAH 13			Oak Marsh Rd			Eagle Point Blvd		
Base Volume Input [veh/h]	95	734	3	15	631	69	38	0	68	89	0	78
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Growth Rate	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	313	0	0	260	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	104	1113	3	16	948	75	41	0	74	97	0	85
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	28	302	1	4	258	20	11	0	20	26	0	23
Total Analysis Volume [veh/h]	113	1210	3	17	1030	82	45	0	80	105	0	92
Pedestrian Volume [ped/h]	0			0			3			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

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Intersection Settings

Priority Scheme	Free	Free	Stop	Stop
Flared Lane	no	no	no	no
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	no	no	no	no
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.18	0.01	0.00	0.03	0.01	0.00	1.63	0.00	0.16	4.16	0.00	0.21
d_M, Delay for Movement [s/veh]	12.17	0.00	0.00	11.57	0.00	0.00	618.02	171.12	13.60	1738.39	192.61	15.38
Movement LOS	B	A	A	B	A	A	F	F	B	F	F	C
95th-Percentile Queue Length [veh]	0.67	0.00	0.00	0.09	0.00	0.00	5.34	0.57	0.57	13.00	0.78	0.78
95th-Percentile Queue Length [ft]	16.72	0.00	0.00	2.32	0.00	0.00	133.45	14.19	14.19	325.00	19.57	19.57
d_A, Approach Delay [s/veh]	1.04			0.17			231.19			933.74		
Approach LOS	A			A			F			F		
d_I, Intersection Delay [s/veh]	77.21											
Intersection LOS	F											

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Intersection Level Of Service Report
#5: CSAH 13 & 5th St

Control Type:	Signalized	Delay (sec / veh):	14.0
Analysis Method:	HCM2010	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.556

Intersection Setup

Name	CSAH 13		CSAH 13		5th St	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	1	1	0	0	1
Pocket Length [ft]	100.00	250.00	250.00	100.00	100.00	250.00
Speed [mph]	55.00		55.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	no		no		no	

Volumes

Name	CSAH 13		CSAH 13		5th St	
Base Volume Input [veh/h]	855	0	0	740	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	3.00	3.00	3.00	3.00	3.00	3.00
Growth Rate	1.09	1.09	1.09	1.09	1.09	1.09
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	77	236	54	13	247	45
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	-64	64	55	-63	63	64
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	150	0	0	0	55
Total Hourly Volume [veh/h]	945	150	109	757	310	54
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	257	41	30	206	84	15
Total Analysis Volume [veh/h]	1027	163	118	823	337	59
Presence of On-Street Parking	no	no	no	no	no	no
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0
Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

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Intersection Settings

Located in CBD	no
Signal Coordination Group	-
Cycle Length [s]	70
Coordination Type	Time of Day Pattern Isolated
Actuation Type	Semi-actuated
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	5.00

Phasing & Timing

Control Type	Permissive	Permissive	ProtectedPermissi	Permissive	Permissive	Permissive
Signal Group	2	0	1	6	8	0
Lead / Lag	-	-	Lead	-	Lag	-
Minimum Green [s]	15	0	5	15	10	0
Maximum Green [s]	30	0	30	30	30	0
Amber [s]	3.0	0.0	3.0	3.0	3.0	0.0
All red [s]	2.0	0.0	2.0	2.0	2.0	0.0
Split [s]	35	0	10	45	25	0
Vehicle Extension [s]	3.0	0.0	3.0	3.0	3.0	0.0
Walk [s]	5	0	0	5	5	0
Pedestrian Clearance [s]	10	0	0	10	10	0
l1, Start-Up Lost Time [s]	2.0	0.0	2.0	2.0	2.0	0.0
l2, Clearance Lost Time [s]	3.0	0.0	3.0	3.0	3.0	0.0
Minimum Recall	no		no	no	no	
Maximum Recall	yes		no	yes	no	
Pedestrian Recall	no		no	no	no	
Detector Location [ft]	0.0	0.0	6.0	0.0	6.0	0.0
Detector Length [ft]	0.0	0.0	6.0	0.0	6.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00

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Lane Group Calculations

Lane Group	C	R	L	C	L	R
L, Total Lost Time per Cycle [s]	5.00	5.00	5.00	5.00	5.00	5.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	3.00	3.00	0.00	3.00	3.00	3.00
g_i, Effective Green Time [s]	35	35	44	44	16	16
g / C, Green / Cycle	0.50	0.50	0.64	0.64	0.22	0.22
(v / s)_i Volume / Saturation Flow Rate	0.29	0.10	0.16	0.23	0.19	0.04
s, saturation flow rate [veh/h]	3512	1568	748	3512	1757	1568
c, Capacity [veh/h]	1751	782	508	2229	391	349
d1, Uniform Delay [s]	12.44	9.82	7.20	6.10	26.18	21.99
k, delay calibration	0.50	0.50	0.50	0.50	0.17	0.11
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	1.45	0.61	1.07	0.47	8.77	0.23
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.59	0.21	0.23	0.37	0.86	0.17
d, Delay for Lane Group [s/veh]	13.88	10.43	8.27	6.57	34.95	22.21
Lane Group LOS	B	B	A	A	C	C
Critical Lane Group	yes	no	yes	no	yes	no
50th-Percentile Queue Length [veh]	4.49	1.17	0.54	1.79	6.06	0.77
50th-Percentile Queue Length [ft]	112.35	29.24	13.47	44.84	151.52	19.33
95th-Percentile Queue Length [veh]	7.97	2.11	0.97	3.23	10.10	1.39
95th-Percentile Queue Length [ft]	199.26	52.64	24.24	80.71	252.46	34.79

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Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	13.88	10.43	8.27	6.57	34.95	22.21
Movement LOS	B	B	A	A	C	C
d_A, Approach Delay [s/veh]	13.41		6.79		33.05	
Approach LOS	B		A		C	
d_I, Intersection Delay [s/veh]	14.02					
Intersection LOS	B					
Intersection V/C	0.556					

Sequence

Ring 1	1	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	-	6	-	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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Signal Warrants Report For Intersection #4: CSAH 13 & Eagle Point Blvd

Warrants Summary

Warrant	Name	Met?
#1	Eight Hour Vehicular Volume	Yes
#2	Four Hour Vehicular Volume	Yes
#3	Peak Hour	Yes

Intersection Warrants Parameters

Major Approaches	N, S
Minor Approaches	E, W
Speed > 40mph	Yes
Population < 10,000	Yes
Warrant Factor	70%

Warrant Analysis Traffic Volumes

Hour	Major Streets		Minor Streets	
	N	S	E	W
1	21	24	4	2
2	21	24	4	2
3	31	37	5	3
4	31	37	5	3
5	42	49	7	5
6	104	122	18	12
7	114	134	20	13
8	208	244	36	23
9	364	427	64	40
10	374	439	66	41
11	374	439	66	41
12	405	476	71	45
13	447	525	78	49
14	468	549	82	52
15	468	549	82	52
16	499	586	87	55
17	623	732	109	69
18	655	769	115	72
19	707	830	124	78
20	790	927	138	87
21	831	976	146	92
22	977	1147	171	108
23	997	1171	175	110
24	1039	1220	182	115

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Warrant Analysis by Hour

Hour	Major Lanes		Minor Lanes		Warrant 1 Condition A				Warrant 1 Condition B				Warrant 2	Warrant 3
	Number	Volume	Number	Volume	100%	80%	70%	56%	100%	80%	70%	56%		Condition B
1	8	45	4	6	No	No	No	No	No	No	No	No	No	No
2	8	45	4	6	No	No	No	No	No	No	No	No	No	No
3	8	68	4	8	No	No	No	No	No	No	No	No	No	No
4	8	68	4	8	No	No	No	No	No	No	No	No	No	No
5	8	91	4	12	No	No	No	No	No	No	No	No	No	No
6	8	226	4	30	No	No	No	No	No	No	No	No	No	No
7	8	248	4	33	No	No	No	No	No	No	No	No	No	No
8	8	452	4	59	No	No	No	No	No	No	No	No	No	No
9	8	791	4	104	No	No	No	No	No	No	No	Yes	No	No
10	8	813	4	107	No	No	No	No	No	No	No	Yes	No	No
11	8	813	4	107	No	No	No	No	No	No	No	Yes	No	No
12	8	881	4	116	No	No	No	No	No	No	Yes	Yes	No	No
13	8	972	4	127	No	No	No	No	No	No	Yes	Yes	No	No
14	8	1017	4	134	No	No	No	No	No	Yes	Yes	Yes	Yes	No
15	8	1017	4	134	No	No	No	No	No	Yes	Yes	Yes	Yes	No
16	8	1085	4	142	No	No	No	No	No	Yes	Yes	Yes	Yes	No
17	8	1355	4	178	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
18	8	1424	4	187	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
19	8	1537	4	202	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
20	8	1717	4	225	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
21	8	1807	4	238	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
22	8	2124	4	279	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
23	8	2168	4	285	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
24	8	2259	4	297	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Hours Met					0	3	4	7	8	11	13	16	11	8

Warrant 3 Condition A

Orientation	E	W
Total Stopped Delay Per Vehicle on Minor Approach (s)	933.7	231.2
Number of Lanes on Minor Street Approach	2	2
VehicleHours of Stopped Delay on Minor Approach ([h]h:mm)	47:12	7:23
Delay Condition Met	Yes	Yes
Volume on Minor Street Approach During Same Hour	182	115
High Minor Volume Condition Met	Yes	No
Total Entering Volume on All Approaches During Same Hour	2556	2556
Number of Approaches on Intersection	4	4
Total Volume Condition Met	Yes	Yes
Warrant Met for Approach	Yes	No
Warrant Met for Intersection	**Yes**	

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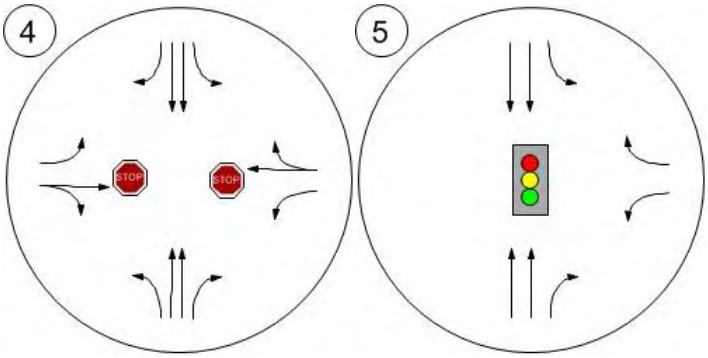
Lane Configuration and Traffic Control



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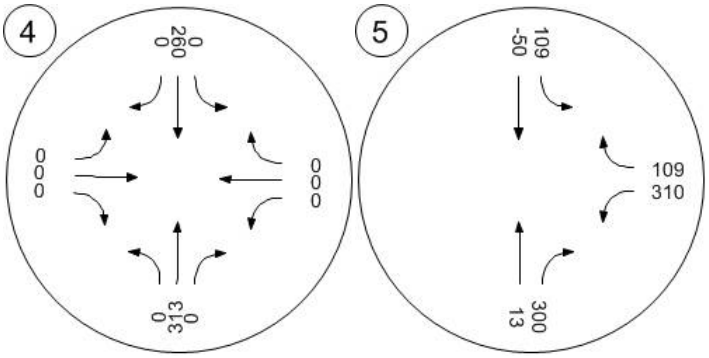
Traffic Volume - Net New Site Trips



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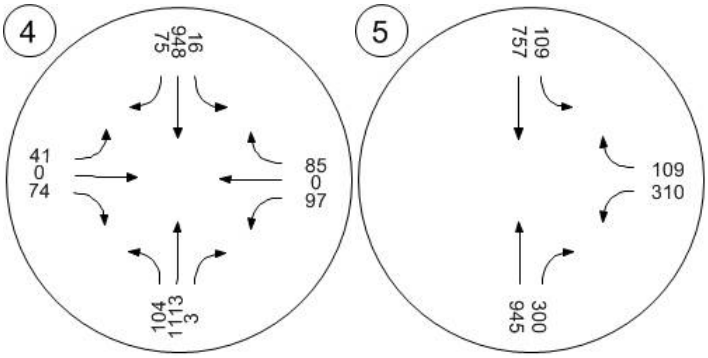
Traffic Volume - Future Total Volume



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Lake Elmo Development

Vistro File: C:\...\Lake Elmo.vistropdb
Report File: C:\...\Signal Warrant - 25%.pdf

Scenario 9: PM 2019 Build - Signal Warrant
7/8/2014

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
5	CSAH 13 & 5th St	Two-way stop	HCM2010	WBL	0.616	73.3	F

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value; for all other control types, they are taken for the whole intersection.

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Intersection Level Of Service Report
#5: CSAH 13 & 5th St

Control Type:	Two-way stop	Delay (sec / veh):	73.3
Analysis Method:	HCM2010	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.616

Intersection Setup

Name	CSAH 13		CSAH 13		5th St	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	1	1	0	0	1
Pocket Length [ft]	100.00	250.00	250.00	100.00	100.00	200.00
Speed [mph]	55.00		55.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	no		no		no	

Volumes

Name	CSAH 13		CSAH 13		5th St	
Base Volume Input [veh/h]	855	0	0	740	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	3.00	3.00	3.00	3.00	3.00	3.00
Growth Rate	1.02	1.02	1.02	1.02	1.02	1.02
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	21	48	13	3	53	10
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	-16	16	14	-16	16	16
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	877	64	27	742	69	26
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	238	17	7	202	19	7
Total Analysis Volume [veh/h]	953	70	29	807	75	28
Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

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Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane	no	no	no
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	no	no	no
Number of Storage Spaces in Median	0	0	0

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Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.01	0.00	0.04	0.01	0.62	0.05
d_M, Delay for Movement [s/veh]	0.00	0.00	10.63	0.00	73.28	12.14
Movement LOS	A	A	B	A	F	B
95th-Percentile Queue Length [veh]	0.00	0.00	0.14	0.00	3.13	0.17
95th-Percentile Queue Length [ft]	0.00	0.00	3.40	0.00	78.30	4.16
d_A, Approach Delay [s/veh]	0.00		0.37		56.66	
Approach LOS	A		A		F	
d_I, Intersection Delay [s/veh]	3.13					
Intersection LOS	F					

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Signal Warrants Report For Intersection #5: CSAH 13 & 5th St

Warrants Summary

Warrant	Name	Met?
#1	Eight Hour Vehicular Volume	No
#2	Four Hour Vehicular Volume	No
#3	Peak Hour	No

Intersection Warrants Parameters

Major Approaches	S, N
Minor Approaches	E
Speed > 40mph	Yes
Population < 10,000	Yes
Warrant Factor	70%

Warrant Analysis Traffic Volumes

Hour	Major Streets		Minor Streets
	S	N	E
1	941	769	95
2	903	738	91
3	885	723	89
4	753	615	76
5	715	584	72
6	640	523	65
7	593	484	60
8	565	461	57
9	452	369	46
10	423	346	43
11	423	346	43
12	405	331	41
13	367	300	37
14	339	277	34
15	339	277	34
16	329	269	33
17	188	154	19
18	104	85	10
19	94	77	10
20	38	31	4
21	28	23	3
22	28	23	3
23	19	15	2
24	19	15	2

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Warrant Analysis by Hour

Hour	Major Lanes		Minor Lanes		Warrant 1 Condition A				Warrant 1 Condition B				Warrant 2	Warrant 3
	Number	Volume	Number	Volume	100%	80%	70%	56%	100%	80%	70%	56%		Condition B
1	6	1710	2	95	No	No	No	No	No	Yes	Yes	Yes	Yes	No
2	6	1641	2	91	No	No	No	No	No	Yes	Yes	Yes	Yes	No
3	6	1608	2	89	No	No	No	No	No	Yes	Yes	Yes	Yes	No
4	6	1368	2	76	No	No	No	No	No	No	Yes	Yes	No	No
5	6	1299	2	72	No	No	No	No	No	No	Yes	Yes	No	No
6	6	1163	2	65	No	No	No	No	No	No	No	Yes	No	No
7	6	1077	2	60	No	No	No	No	No	No	No	Yes	No	No
8	6	1026	2	57	No	No	No	No	No	No	No	Yes	No	No
9	6	821	2	46	No	No	No	No	No	No	No	No	No	No
10	6	769	2	43	No	No	No	No	No	No	No	No	No	No
11	6	769	2	43	No	No	No	No	No	No	No	No	No	No
12	6	736	2	41	No	No	No	No	No	No	No	No	No	No
13	6	667	2	37	No	No	No	No	No	No	No	No	No	No
14	6	616	2	34	No	No	No	No	No	No	No	No	No	No
15	6	616	2	34	No	No	No	No	No	No	No	No	No	No
16	6	598	2	33	No	No	No	No	No	No	No	No	No	No
17	6	342	2	19	No	No	No	No	No	No	No	No	No	No
18	6	189	2	10	No	No	No	No	No	No	No	No	No	No
19	6	171	2	10	No	No	No	No	No	No	No	No	No	No
20	6	69	2	4	No	No	No	No	No	No	No	No	No	No
21	6	51	2	3	No	No	No	No	No	No	No	No	No	No
22	6	51	2	3	No	No	No	No	No	No	No	No	No	No
23	6	34	2	2	No	No	No	No	No	No	No	No	No	No
24	6	34	2	2	No	No	No	No	No	No	No	No	No	No
Hours Met					0	0	0	0	0	3	5	8	3	0

Warrant 3 Condition A

Orientation	E
Total Stopped Delay Per Vehicle on Minor Approach (s)	56.7
Number of Lanes on Minor Street Approach	2
VehicleHours of Stopped Delay on Minor Approach ([h]h:mm)	1:29
Delay Condition Met	No
Volume on Minor Street Approach During Same Hour	95
High Minor Volume Condition Met	No
Total Entering Volume on All Approaches During Same Hour	1805
Number of Approaches on Intersection	3
Total Volume Condition Met	Yes
Warrant Met for Approach	No
Warrant Met for Intersection	**No**

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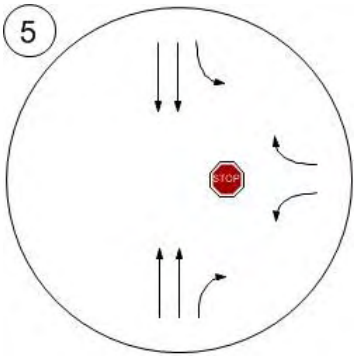
Lane Configuration and Traffic Control



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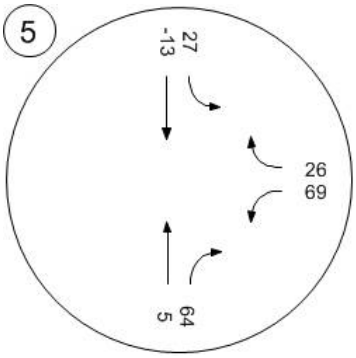
Traffic Volume - Net New Site Trips



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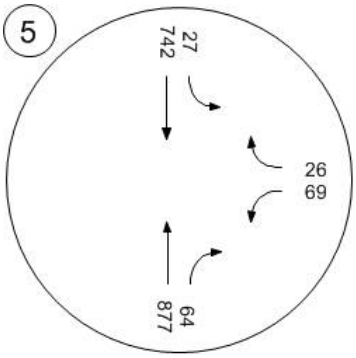
Traffic Volume - Future Total Volume



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Lake Elmo Development

Vistro File: C:\...\Lake Elmo.vistropdb
Scenario 9: PM 2019 Build - Signal Warrant
Report File: C:\...\Signal Warrant - 30%.pdf
7/8/2014

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
5	CSAH 13 & 5th St	Two-way stop	HCM2010	WBL	0.762	98.9	F

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value; for all other control types, they are taken for the whole intersection.

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Intersection Level Of Service Report
#5: CSAH 13 & 5th St

Control Type:	Two-way stop	Delay (sec / veh):	98.9
Analysis Method:	HCM2010	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.762

Intersection Setup

Name	CSAH 13		CSAH 13		5th St	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	1	1	0	0	1
Pocket Length [ft]	100.00	250.00	250.00	100.00	100.00	200.00
Speed [mph]	55.00		55.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	no		no		no	

Volumes

Name	CSAH 13		CSAH 13		5th St	
Base Volume Input [veh/h]	855	0	0	740	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	3.00	3.00	3.00	3.00	3.00	3.00
Growth Rate	1.03	1.03	1.03	1.03	1.03	1.03
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	24	56	16	4	62	12
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	-19	19	17	-19	19	19
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	886	75	33	747	81	31
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	241	20	9	203	22	8
Total Analysis Volume [veh/h]	963	82	36	812	88	34
Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

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Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane	no	no	no
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	no	no	no
Number of Storage Spaces in Median	0	0	0

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Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.01	0.00	0.05	0.01	0.76	0.06
d_M, Delay for Movement [s/veh]	0.00	0.00	10.81	0.00	98.95	12.29
Movement LOS	A	A	B	A	F	B
95th-Percentile Queue Length [veh]	0.00	0.00	0.17	0.00	4.28	0.21
95th-Percentile Queue Length [ft]	0.00	0.00	4.35	0.00	106.89	5.14
d_A, Approach Delay [s/veh]	0.00		0.46		74.80	
Approach LOS	A		A		F	
d_I, Intersection Delay [s/veh]	4.72					
Intersection LOS	F					

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Signal Warrants Report For Intersection #5: CSAH 13 & 5th St

Warrants Summary

Warrant	Name	Met?
#1	Eight Hour Vehicular Volume	No
#2	Four Hour Vehicular Volume	Yes
#3	Peak Hour	Yes

Intersection Warrants Parameters

Major Approaches	S, N
Minor Approaches	E
Speed > 40mph	Yes
Population < 10,000	Yes
Warrant Factor	70%

Warrant Analysis Traffic Volumes

Hour	Major Streets		Minor Streets
	S	N	E
1	961	780	112
2	923	749	108
3	903	733	105
4	769	624	90
5	730	593	85
6	653	530	76
7	605	491	71
8	577	468	67
9	461	374	54
10	432	351	50
11	432	351	50
12	413	335	48
13	375	304	44
14	346	281	40
15	346	281	40
16	336	273	39
17	192	156	22
18	106	86	12
19	96	78	11
20	38	31	4
21	29	23	3
22	29	23	3
23	19	16	2
24	19	16	2

Appendix D - Capacity Analysis Backup

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Warrant Analysis by Hour

Hour	Major Lanes		Minor Lanes		Warrant 1 Condition A				Warrant 1 Condition B				Warrant 2	Warrant 3
	Number	Volume	Number	Volume	100%	80%	70%	56%	100%	80%	70%	56%		Condition B
1	6	1741	2	112	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
2	6	1672	2	108	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
3	6	1636	2	105	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
4	6	1393	2	90	No	No	No	No	No	Yes	Yes	Yes	Yes	No
5	6	1323	2	85	No	No	No	No	No	Yes	Yes	Yes	Yes	No
6	6	1183	2	76	No	No	No	No	No	No	Yes	Yes	No	No
7	6	1096	2	71	No	No	No	No	No	No	Yes	Yes	No	No
8	6	1045	2	67	No	No	No	No	No	No	No	Yes	No	No
9	6	835	2	54	No	No	No	No	No	No	No	No	No	No
10	6	783	2	50	No	No	No	No	No	No	No	No	No	No
11	6	783	2	50	No	No	No	No	No	No	No	No	No	No
12	6	748	2	48	No	No	No	No	No	No	No	No	No	No
13	6	679	2	44	No	No	No	No	No	No	No	No	No	No
14	6	627	2	40	No	No	No	No	No	No	No	No	No	No
15	6	627	2	40	No	No	No	No	No	No	No	No	No	No
16	6	609	2	39	No	No	No	No	No	No	No	No	No	No
17	6	348	2	22	No	No	No	No	No	No	No	No	No	No
18	6	192	2	12	No	No	No	No	No	No	No	No	No	No
19	6	174	2	11	No	No	No	No	No	No	No	No	No	No
20	6	69	2	4	No	No	No	No	No	No	No	No	No	No
21	6	52	2	3	No	No	No	No	No	No	No	No	No	No
22	6	52	2	3	No	No	No	No	No	No	No	No	No	No
23	6	35	2	2	No	No	No	No	No	No	No	No	No	No
24	6	35	2	2	No	No	No	No	No	No	No	No	No	No
Hours Met					0	0	0	1	3	5	7	8	5	3

Warrant 3 Condition A

Orientation	E
Total Stopped Delay Per Vehicle on Minor Approach (s)	74.8
Number of Lanes on Minor Street Approach	2
VehicleHours of Stopped Delay on Minor Approach ([h]h:mm)	2:19
Delay Condition Met	No
Volume on Minor Street Approach During Same Hour	112
High Minor Volume Condition Met	No
Total Entering Volume on All Approaches During Same Hour	1853
Number of Approaches on Intersection	3
Total Volume Condition Met	Yes
Warrant Met for Approach	No
Warrant Met for Intersection	**No**

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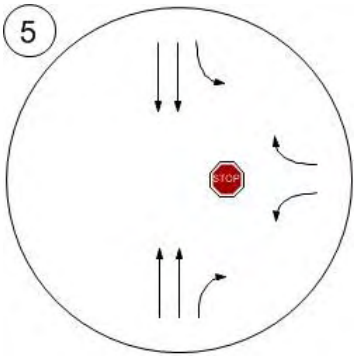
Lane Configuration and Traffic Control



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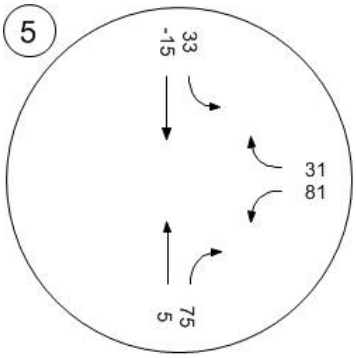
Traffic Volume - Net New Site Trips



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Traffic Volume - Future Total Volume