

County State Aid Highway 32 (Cliff Road) and Dodd Road Intersection Study

City of Eagan,
Dakota County, Minnesota

Date:
Project No.

March 2012
14957.000

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**County State Aid Highway 32 (Cliff Road) and
Dodd Road Intersection Study**

**City of Eagan,
Dakota County, Minnesota**

CERTIFICATION

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.



Bryant J. Ficek, P.E.
License Number: 42802 Date: 15 Mar '12

County State Aid Highway 32 (Cliff Road) and Dodd Road Intersection Study

City of Eagan, Dakota County, Minnesota

TABLE OF CONTENTS

A.	Purpose.....	1
B.	Description of Location.....	1
C.	Traffic Volumes.....	1
D.	Existing Conditions.....	5
E.	Analysis of Alternatives.....	7
F.	Pedestrian/Bicycle Considerations.....	12
G.	Recommended Alternative.....	12

List of Figures

Figure 1	Project Location.....	2
Figure 2	Existing Traffic Volumes.....	3
Figure 3	2030 Projected Volumes.....	4

List of Tables

Table 1	CSAH 32 and Dodd Road Existing Warrant Analysis Summary.....	6
Table 2	CSAH 32 and Dodd Road Crash Rate Comparison.....	6
Table 3	CSAH 32 and Dodd Road Existing Operations Analysis.....	7
Table 4	CSAH 32 and Dodd Road Warrant Analysis Summary.....	7
Table 5	Crash Expectations by Traffic Control Type for the CSAH 32 and Dodd Road Intersection.....	9
Table 6	CSAH 32 and Dodd Road Operations Analyses with Existing Traffic Control.....	10
Table 7	CSAH 32 and Dodd Road Operations Analyses with Different Traffic Control.....	11

Appendix

Intersection Observations
Traffic Counts
Warrant Analyses
Collision Diagram
Traffic Analyses

County State Aid Highway 32 (Cliff Road) and Dodd Road Intersection Study

City of Eagan, Dakota County, Minnesota

A. Purpose

The Dakota County Transportation Department, along with the City of Eagan, has determined that the intersection of County State Aid Highway (CSAH) 32 (Cliff Road) and Dodd Road be assessed to determine the need and timeline of intersection traffic control and/or geometric improvement. In addition, residential complaints have been received in regard to the traffic operations at this location. The most common complaints have been in regard to making right turns from CSAH 32 onto Dodd Road and making left turns from Dodd Road onto CSAH 32. Specifically, motorists on CSAH 32 do not anticipate or feel unjustifiably slowed down by other drivers on CSAH 32 turning right onto Dodd Road. This often results in “tail-gating” making the turning drivers feel uncomfortable or the through vehicle uses the left turn lane to quickly move around the turning vehicle. Conversely on Dodd Road, drivers turning left onto CSAH 32 feel the wait time for an appropriate gap in traffic on CSAH 32 to complete their turning movement is too long. The high peak period volumes at this intersection combined with the citizen complaints make it a candidate to be reviewed for proper control and capacity. Consistent with the goals and strategies of the Dakota County Transportation Plan, this study examines the intersection to determine:

- The existing and projected operations under the current characteristics and traffic control
- The need for improved geometry or traffic control, either now or in the future

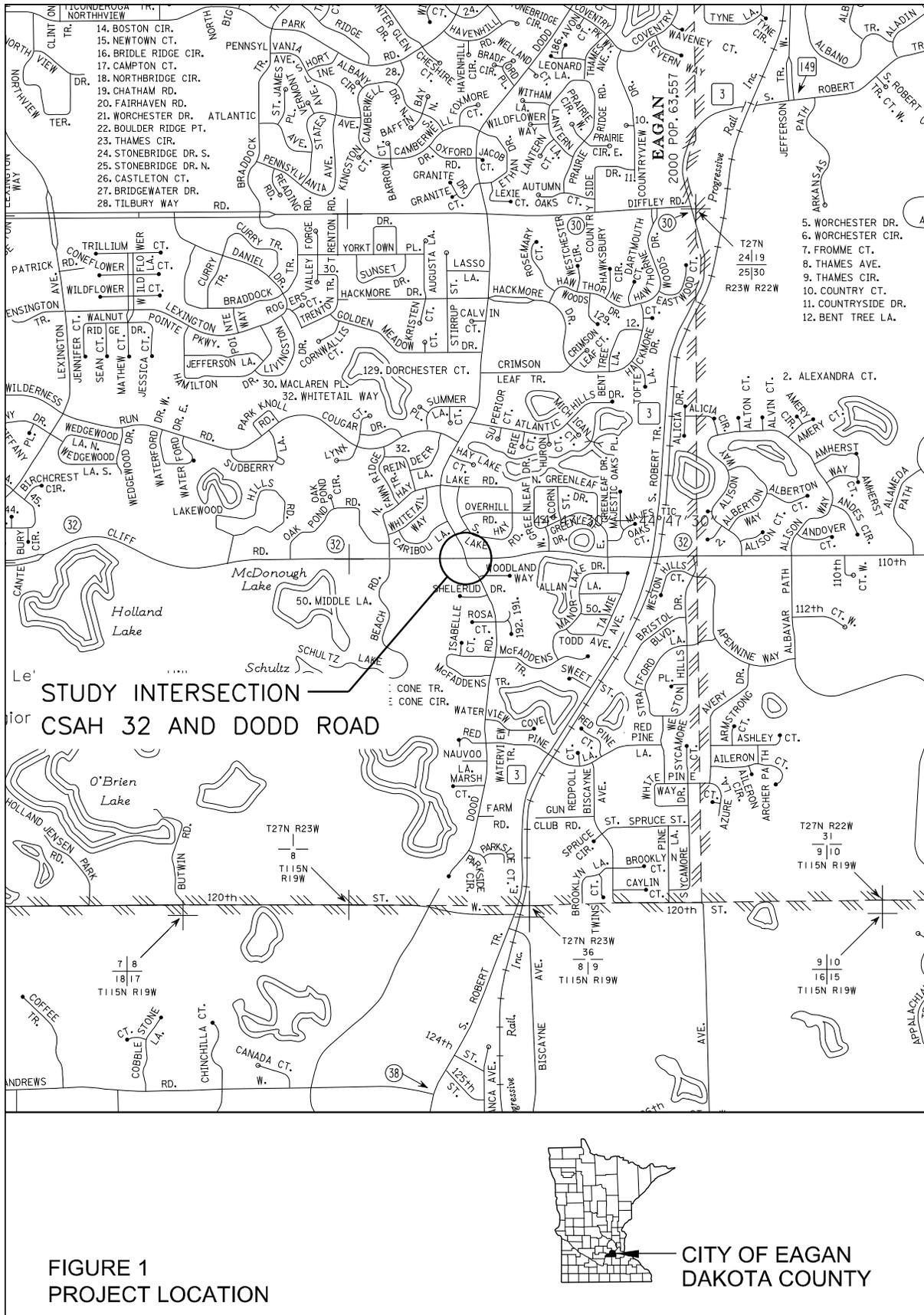
B. Description of Location

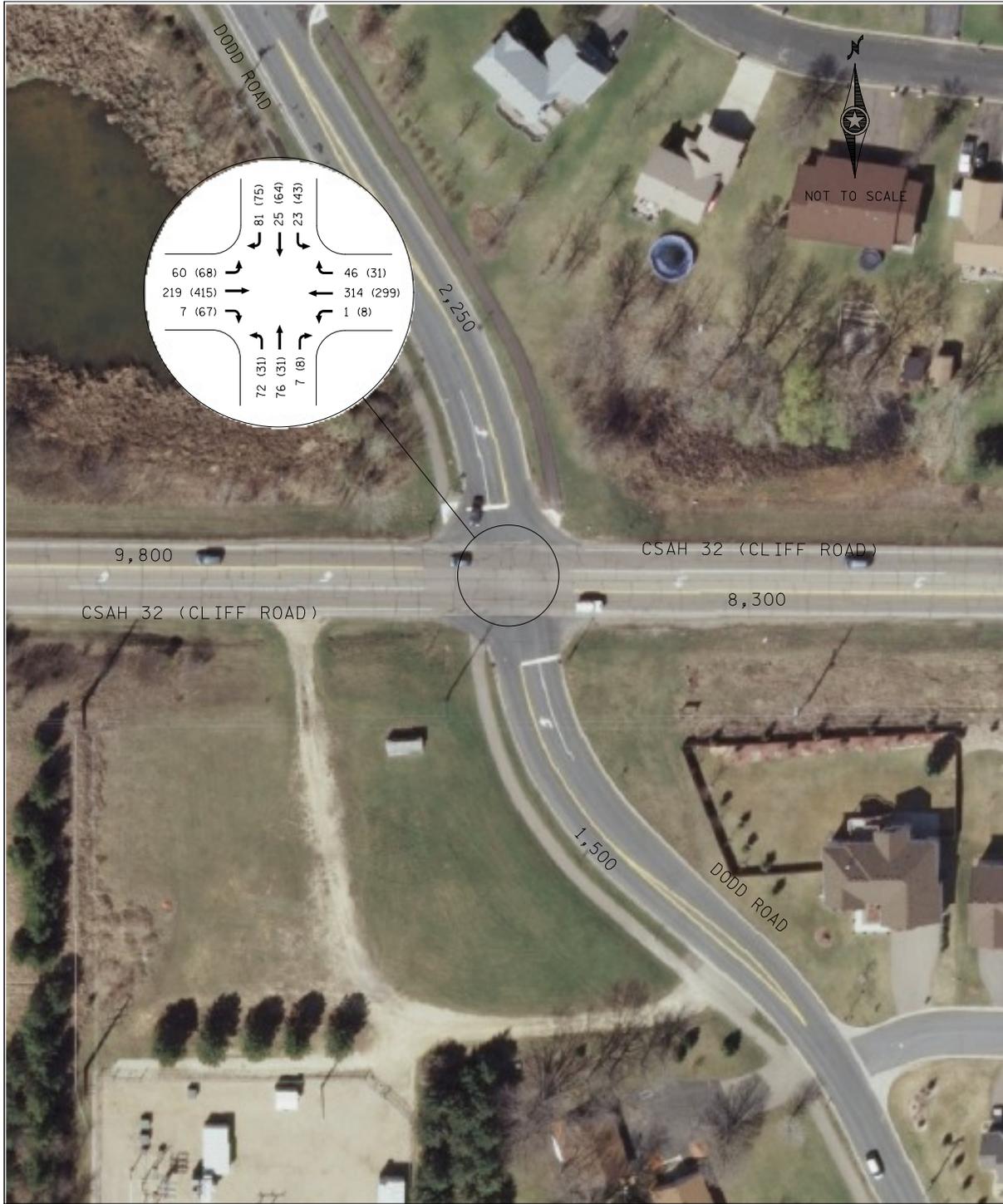
The intersection of CSAH 32 and Dodd Road is located in the City of Eagan, Dakota County. The intersection is approximately 1/2 mile west of the CSAH 32 and TH 3 intersection. Figure 1 shows the location of this intersection.

C. Traffic Volumes

Intersection turning movement counts and hourly approach counts were collected by the County on two separate occasions: July 6 – 8, 2011, and September 28 – 30, 2011. The September counts were taken due to the potential of seasonal fluctuations in traffic volumes at this location. After comparing the two counts, three hours of the September count (6 a.m. to 9 a.m.) were used in place of those hours in the July count. This composite represents a conservative approach of analysis, capturing the highest volumes from each count. The full data from each count is provided in the Appendix. See Figure 2 for the existing peak hour and daily counts for this study intersection.

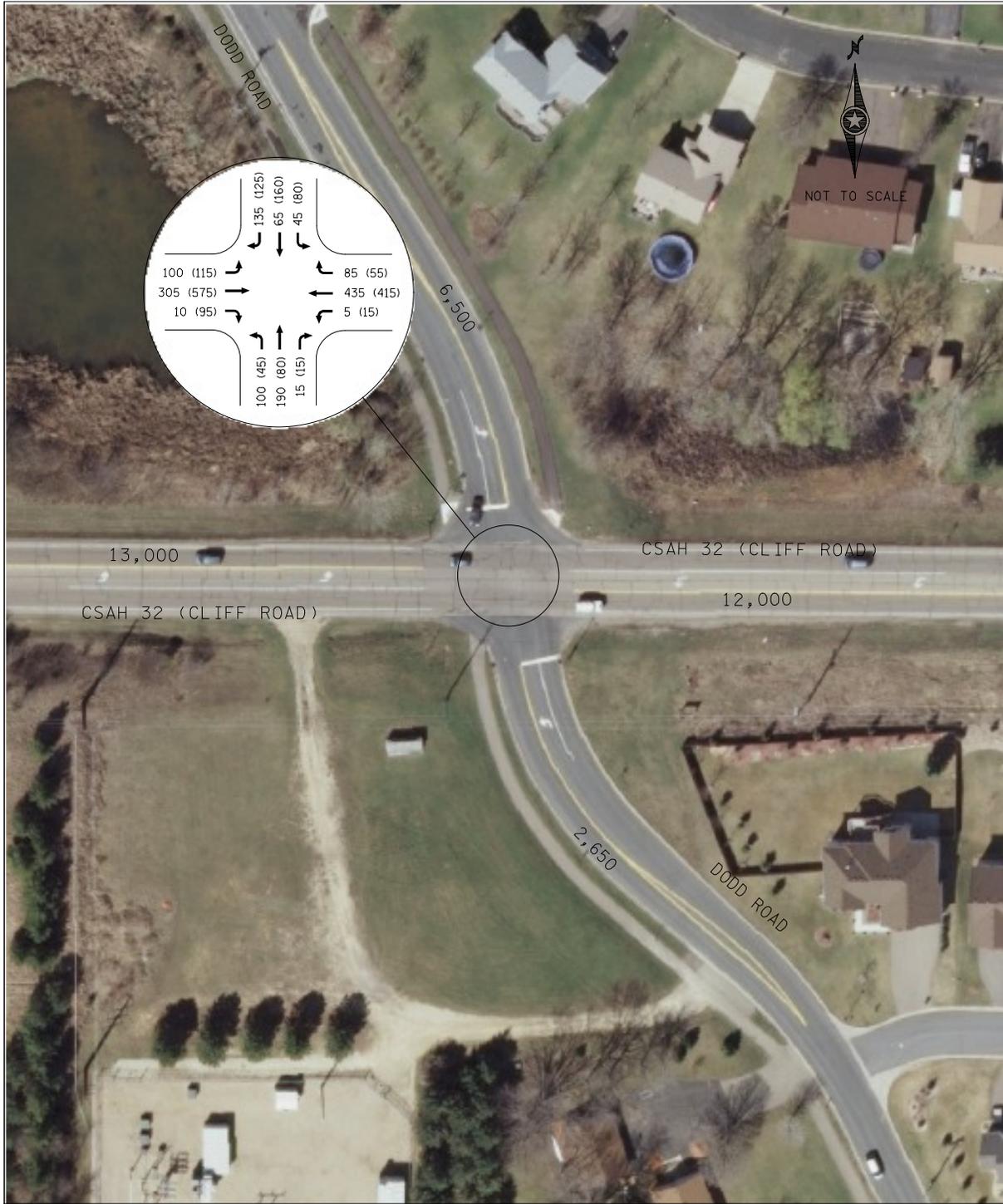
Projected daily traffic for the year 2030 was also provided by the County, except for the south leg of the intersection. The City of Eagan provided the expected growth rate for that approach. Using the ratio of expected traffic increase from existing to 2030, the projected peak hour volumes for year 2030 were also determined. Figure 3 shows the projected 2030 volumes for this study intersection.





AM PEAK
 (PM PEAK)
 XX (XX)
 X,XXX - AVERAGE DAILY TRAFFIC

FIGURE 2
EXISTING TRAFFIC VOLUMES



AM PEAK
 (PM PEAK)
 XX (XX)
 X,XXX - AVERAGE DAILY TRAFFIC

NOTE: TURNING MOVEMENT VOLUMES HAVE BEEN ROUNDED.

FIGURE 3
2030 PROJECTED VOLUMES

D. Existing Conditions

CSAH 32 is an east-west, two-lane, undivided roadway designated as an A Minor Arterial. The posted speed limit is 50 mph. Dodd Road is a north-south, two-lane, undivided roadway. It is designated as a Minor Collector by the City. The posted speed limit is 40 mph to the north of CSAH 32 and 30 mph to the south of CSAH 32.

At the intersection of these two roadways, Dodd Road is under stop sign control with CSAH 32 traffic able to proceed without stopping. Each approach to the intersection provides one exclusive left-turn lane and one combined through/right-turn lane.

A trail is provided on the east and west sides of Dodd Road to the north of CSAH 32 and on the west side to the south of CSAH 32. Although not marked, crossings are generally expected on the north and west sides of the intersection. ADA-compliant ramps are provided on the north side of the intersection where the trails reach the roadways.

The intersection is primarily surrounded by residences. Dakota County Lebanon Hills Regional Park is located in the southwest quadrant of the intersection.

Operations at the intersection were observed on September 27, 2011, during evening peak period and on September 28, 2011, during the morning peak period. The key observations include:

- Vehicles on CSAH 32 arrived in bunches, resulting in a range of delay to motorists stopped on Dodd Road from zero seconds to over one minute depending on when they arrived.
- Pedestrian/bicycle wait time to cross CSAH 32 similarly varied depending upon when they arrived at the intersection.
- The left-turn lane was often used as a right-turn bypass lane by motorists on CSAH 32.

The complete intersection observations are provided in the Appendix.

In addition to observations of the intersection, the existing volumes, safety, and operations are reviewed below.

The review of volumes uses information from the *Minnesota Manual on Uniform Traffic Control Devices* outlines thresholds when it may be appropriate for a traffic control device at an intersection. The criteria, also called warrants, are applicable for all-way stop control and traffic signal control. Generally, one or more warrants must be satisfied before all-way stop or traffic signal control is considered, although meeting one or more warrants does not in itself require installation of a traffic control device.

For this analysis, the major roadway is CSAH 32 and the minor roadway is Dodd Road. Two or more lanes are assumed for every approach. The posted speed of 50 mph on CSAH 32 results in a 70 percent reduction in warrant volume thresholds. Dakota County uses the method of 100 percent reduction to right-turning volume from the side street, reflecting ease of this movement in comparison with the through and left-turning movements. So, all right-turning volume on Dodd Road has been removed for the analysis.

The traffic signal warrants were first examined using existing traffic and the results are shown in Table 1. No volume warrants were satisfied under these conditions. The full warrant analysis is provided in the Appendix.

Table 1: CSAH 32 and Dodd Road Existing Warrant Analysis Summary

Warrant	Existing Volumes
Warrant 1 – 8-Hour Volume	No (4 of 8 hrs)
Warrant 2 – 4-Hour Volume	No (1 of 4 hrs)
Warrant 3 – Peak Hour Volume	No (0 of 1 hr)

Note: Yes or No indicates whether the warrant is satisfied or not. The parentheses indicate how many of the required hours are met.

Crashes for the years 2008 to 2010 were provided by the County and examined. The crash diagram for the intersection is provided in the Appendix.

Seven State reported crashes occurred at this intersection during the three study years. Table 2 presents the crash rate for this intersection. The average side-street stop control intersection crash rates for Mn/DOT Metro District and the state are presented for comparison.

In addition to the average rates, the critical crash rate is presented. This is a statistically adjusted crash rate designed to account for the random nature of crashes. A crash rate above the calculated critical crash rate identifies the intersection as potentially hazardous, with a statistically significant higher rate of crashes. The critical crash rate shown is calculated to a 90 percent confidence level.

Table 2: CSAH 32 and Dodd Road Crash Rate Comparison

	Crash Rate
CSAH 32 and Dodd Road Intersection	0.59/MEV
Benchmarks	
Metro District: Urban – Rural	0.20/MEV – 0.20/MEV
State: Urban – Rural	0.24/MEV – 0.29/MEV
Critical Crash Rate	0.41/MEV

Note: MEV stands for Million Entering Vehicles

Finally, the study intersection was analyzed with the existing peak hour volumes and characteristics. The Synchro/SimTraffic software package was used for this analysis and provided results in terms of levels of service (LOS), delay times, and expected vehicle queues. LOS is a qualitative measurement designed as a report card assessment of traffic operations. LOS A represents the best operations with little to no delay, while LOS F represents the worst operations with excessive congestion. Generally, an intersection LOS D is considered acceptable. Table 3 shows the results of the existing peak hour analysis.

Table 3: CSAH 32 and Dodd Road Existing Operations Analysis

	Overall Intersection Results		Worst Individual Movement				
	LOS	Delay (sec.)	App.	LOS	Delay (sec.)	Ave. Queue (ft)	95 %ile Queue (ft) ¹
Existing Volumes							
AM Peak Hour	A	4.9	NBL	B	13.9	33	58
PM Peak Hour	A	4.9	SBL	C	16.4	24	61

¹ 95 %ile Queue represents a distance that vehicle stacking is at or below 95 percent of the time.

The traffic model was calibrated to reflect actual observed conditions. As shown, the intersection currently operates at an acceptable level of service. It is important to note that the delay times are an average. Individual motorists will have delays above or below this time. The full results are provided in the Appendix.

E. Analysis of Alternatives

The analysis of alternatives takes into consideration several elements including traffic volumes, overall intersection operations, geometrics, and safety. Methods used to evaluate these include analysis of warrants, crash data, and vehicle delay.

Warrant Analysis

As mentioned earlier, warrants are available for all-way stop control and traffic signal control. Currently, no warrants exist for the installation of roundabouts, which can be considered both a traffic control device and a roadway feature. However, the Minnesota Department of Transportation (Mn/DOT) states in its Intersection Control Evaluation procedures that roundabouts are considered warranted if traffic volumes meet the criteria for either all-way stop or traffic signal control.

Using an assumption of straight-line growth from existing to projected 2030 volumes, the warrants were reexamined to determine what year each volume warrant would be satisfied. Table 4 shows the results of these analyses along with the earlier results using the existing volumes for comparison.

Table 4: CSAH 32 and Dodd Road Warrant Analysis Summary

Warrant	Existing Volumes	Projected 2016 Volumes	Projected 2019 Volumes	Projected 2023 Volumes
Warrant 1 – 8-Hour Volume	No (4 of 8 hrs)	No (5 of 8 hrs)	No (6 of 8 hrs)	Yes (8 of 8 hrs)
Warrant 2 – 4-Hour Volume	No (1 of 4 hrs)	No (3 of 4 hrs)	Yes (4 of 4 hrs)	Yes (5 of 8 hrs)
Warrant 3 – Peak Hour Volume	No (0 of 1 hr)	Yes (1 of 1 hr)	Yes (1 of 1 hr)	Yes (2 of 1 hr)

Note: Yes or No indicates whether the warrant is satisfied or not. The parentheses indicate how many of the required hours are met.

Based on the above assumptions and analyses, the intersection of CSAH 32 and Dodd Road will not begin to meet the volume warrants until 2016, with the Eight-Hour Warrant not satisfied until 2023.

Although not meeting warrants does not necessarily exclude a change in traffic control, it does suggest that the current intersection control is adequate for the existing volumes. The full warrant analyses for projected years 2016, 2019, and 2023 are provided in the Appendix.

Safety Analysis

A safety analysis generally consists of presenting past crash history and future crash potential. As mentioned, seven State reported crashes occurred at this intersection during the three year study period. Table 2 previously presented the crash rate for this intersection and several benchmark comparisons. That table shows that the crash rate is higher than the expected average and the calculated critical crash rate for this type of intersection. This indicates a potential issue that could be correctable. Examining the crashes, the most common type of crash (four of the seven crashes) was a right-angle crash between a southbound vehicle and a westbound vehicle. Two of those four crashes occurred when the southbound vehicle was unable to stop due to ice and snow. Another was the result of a driver losing control of their vehicle.

A further review of the sight distance for a southbound vehicle looking to the east found it to be acceptable. Based upon site observations and the review of sight lines, no site characteristics that could lead to these crashes were found and, therefore, no engineering solutions are readily apparent. Therefore, the number of crashes in 2009 appears to be an anomaly due to factors other than intersection design. The crashes at the intersection should continue to be monitored to confirm this conclusion.

The potential future crashes for different types of traffic control were examined using several different methods:

- The actual crash and severity rates from years 2008 to 2010, as presented earlier.
- The Mn/DOT State Aid "Green Sheets," which present average crash and severity rates for different types of intersections within the Metro area.
- The Federal Highway Administration's (FHWA) Reduction Factors as presented in "Desktop Reference for Crash Reduction Factors."
- National Cooperative Highway Research Program (NCHRP) Report 572, which presents intersection-level safety prediction models for roundabouts.

Using these different methods, the projected crashes for each type of traffic control can be examined. Table 5 shows this information for the study intersection.

Table 5: Crash Expectations by Traffic Control Type for the CSAH 32 and Dodd Road Intersection

Scenario	Fatal	A Injury	B Injury	C Injury	Property Damage	Total	Crash Rate	Severity Rate
Existing*								
Existing Volumes	0	0	0 – 1	1	1	2 – 3	0.59	0.93
2030 Volumes	0	0	0 – 1	1	2	3 – 4	0.59	0.93
Mn/DOT Averages**								
2030 No Build (Side Street Stop)	0	0	0 – 1	0 – 1	1	1 – 2	0.20	0.20
2030 Signal Option	0	0	0 – 1	1	2 – 3	3 – 4	0.60	0.90
2030 Roundabout Option	0	0	0 – 1	0 – 1	2	2 – 3	0.37	0.54
FHWA Reduction Factors***								
2030 Signal Option (range)	0	0	0 – 1	1	1.2-1.7	2 – 3	0.33-0.47	0.51-0.74
NCHRP 572****								
2030 Roundabout Option			0 – 1		3	3 – 4	0.55	0.81

* Crash Rate and Severity Rate based on actual crash data from years 2008 to 2010.

** Mn/DOT Averages reflect the Mn/DOT Metro average Crash and Severity Rates.

*** FHWA Reduction Factors reflect changes in the existing crashes from the “Desktop Reference for Crash Reduction Factors.”

**** NCHRP Report 572, Intersection-level safety prediction models.

As shown, side street stop control should have the lowest number of crashes based on the average for the Metro area. Between traffic signal and roundabout control, the expected results switch depending upon which criteria are used. However, in general, roundabouts would be expected to have fewer and less severe crashes.

Operational Analysis

The study intersection analysis results using the existing peak hour volumes and characteristics were shown previously in this report. As shown, the intersection currently operates at an acceptable level of service.

Another analysis was then accomplished examining the existing geometry and traffic control with future volumes. Three timeframes were sought: the year an individual movement is expected to have a poor LOS, the year the intersection as a whole is expected to have a poor LOS, and the expected operations at year 2030. As with the warrant analysis, a straight-line growth from existing to 2030 projected volumes was assumed. Table 6 shows the results of these analyses with the existing results for comparison purposes.

Table 6: CSAH 32 and Dodd Road Operations Analyses with Existing Traffic Control

	Overall Intersection Results		Worst Individual Movement				
	LOS	Delay (sec.)	App.	LOS	Delay (sec.)	Ave. Queue (ft)	95 %ile Queue (ft) ¹
Existing Volumes							
AM Peak Hour	A	4.9	NBL	B	13.9	33	58
PM Peak Hour	A	4.9	SBL	C	16.4	24	61
Proj. 2023 Volumes							
AM Peak Hour	A	8.5	NBL	C	20.9	43	79
PM Peak Hour	A	10.0	SBT	E	35.3	95	184
Proj. 2029 Volumes							
AM Peak Hour	B	13.2	NBT	E	36.0	96	189
PM Peak Hour	D	33.3	SBT	F	148.0	369	827
Proj. 2030 Volumes							
AM Peak Hour	B	14.4	NBT	E	42.1	110	211
PM Peak Hour	F	56.1	SBT	F	260.1	659	1,091

¹ 95 %ile Queue represents a distance that vehicle stacking is at or below 95 percent of the time.

As shown, traffic operations are expected to be satisfactory until year 2023, when individual movements on Dodd Road begin to experience higher than desired delays. In projected year 2029, the poor operations on Dodd Road are to cause the entire intersection to have a LOS D in the p.m. peak hour. Considering that the traffic on CSAH 32 does not stop, the side street delays are extremely high in this case. Projected year 2030 is similar to 2029, except that the delays continue to increase. The full results of these analyses are provided in the Appendix.

A final analysis was undertaken examining appropriate different types of intersection traffic control and geometrics for the intersection. For this study, two different scenarios were reviewed:

- Traffic signal control assuming three lanes on every approach: one left-turn lane, one through lane, and one right-turn lane
- Roundabout control assuming single lane entry, a circulating lane, and an exit lane for every direction

Noticeably missing from the above list is all-way stop sign control. The majority of traffic during the existing and projected year peak hours is on CSAH 32 (approximately 74 percent of existing traffic). With this heavily unbalanced traffic flow between CSAH 32 and Dodd Road, adding all-way stop sign control would result in a large delay to most traffic on CSAH 32. During nonpeak times, most traffic is again on CSAH 32 and would be delayed, with little or no traffic on Dodd Road. Studies have shown that many drivers feel the need to increase speed to make up time after a stop they feel is not warranted or unnecessary. These same studies have suggested that, over time, drivers conclude that traffic from the side street is never present, resulting in a failure to come to a complete stop and potentially increasing the risk of crashes at an intersection. This behavior can

also breed disobedience at other all-way stop controlled locations. Given the unbalanced traffic flows, expected increases in delay on CSAH 32, and potential safety issues, all-way stop control was not appropriate for this intersection and was not evaluated further.

Similarly, adding right-turn lanes to the intersection without a change in traffic control would not be expected to significantly improve traffic operations. The right-turn movement is generally easier to make and has less delay compared with through or left-turn movements. The added lanes would also require drivers at the stop signs on Dodd Road to track more vehicles, counterintuitively adding delay to some movements. Therefore, a simple improvement in geometry was not evaluated further in this study.

The traffic signal control scenario was examined using Synchro/SimTraffic for each peak hour analysis. For the roundabout scenario, the software RODEL was used. Table 7 shows the results of these analyses.

Table 7: CSAH 32 and Dodd Road Operations Analyses with Different Traffic Control

	Overall Intersection Results		Worst Individual Movement				
	LOS	Delay (sec.)	App.	LOS	Delay (sec.)	Ave. Queue (ft)	95 %ile Queue (ft) ¹
Existing Control							
Existing Volumes							
AM Peak Hour	A	4.9	NBL	B	13.9	33	58
PM Peak Hour	A	4.9	SBL	C	16.4	24	61
Proj. 2030 Volumes							
AM Peak Hour	B	14.4	NBT	E	42.1	110	211
PM Peak Hour	F	56.1	SBT	F	260.1	659	1,091
Traf. Signal Control							
Existing Volumes							
AM Peak Hour	B	14.4	WBT	B	18.2	90	165
PM Peak Hour	B	14.2	WBL	B	18.7	5	19
Proj. 2030 Volumes							
AM Peak Hour	B	18.8	WBT	C	24.3	147	253
PM Peak Hour	B	20.0	SBL	C	24.0	38	74
Roundabout Control							
Existing Volumes							
AM Peak Hour	A	4.1	WB	A	4.8	0	36
PM Peak Hour	A	4.9	EB	A	5.4	25	68
Proj. 2030 Volumes							
AM Peak Hour	A	5.8	WB	A	7.2	25	87
PM Peak Hour	A	9.1	EB	B	13.2	75	253

As shown, either traffic signal or roundabout control would provide improved traffic operations for minor movements, but overall LOS would decrease in some cases because traffic on CSAH 32 would now be required to stop instead of having free flow movements. The roundabout would provide slightly better results in comparison with traffic signal control. However, the eastbound approach during the PM peak hour with projected 2030 volumes is approaching capacity. If traffic volumes were to continue to grow beyond 2030, another eastbound through lane would likely be necessary.

F. Pedestrian/Bicycle Considerations

As detailed earlier, trails are provided to the north and south of this study intersection. Although unmarked, pedestrians could cross on any of the four options. If crossing east-west, vehicles are under stop control and should be stopped for pedestrians or bicyclists to cross. North-south crossings are more challenging as vehicles are not required to stop by the traffic control. Pedestrians and bicyclists need to wait for an appropriate gap in traffic on CSAH 32, like other vehicles on Dodd Road.

Based on counts of the intersection and observations, pedestrian and bicycle movements through the intersection are light. Of the traffic counts and observations of the intersection, a maximum of 14 individual crossings were recorded in one hour. Of those, only five were across CSAH 32. The land use around the intersection suggests that these crossings are likely to remain relatively minor into the future, as only recreational crossings between residences or to/from the regional park are expected.

Of the crossings that do occur, crash data suggests that they occur relatively safely, with no pedestrian/bicycle and vehicle collisions in the three years examined. Observations also suggest that acceptable crossing gaps do occur frequently during the peak periods, although a pedestrian or bicyclist may have some delay waiting for that gap.

Based on today's conditions, additional crossing improvements do not appear warranted. However, it should be noted that the trail ramp on the south side of the intersection should be reconstructed to the most current ADA design guidelines, including truncated domes, at the time of a road or trail improvement project.

If traffic control is changed in the future, both traffic signal and roundabout control offer benefits to pedestrian and bicycle crossings. Under traffic signal control, all crossings would have positive guidance as to when a pedestrian or bicyclist has the right-of-way to cross. Specific guidelines for the traffic signal timing would also allow for sufficient time for the crossing movement.

Using roundabout control for the intersection, crosswalks would be set back from the intersection, and pedestrians and bicyclists would need to wait for appropriate gaps in traffic. Roundabouts do reduce driving speeds and pedestrians and bicyclists would be required to cross only one lane at a time. The location of the crosswalk farther back from the intersection and the presence of a refuge splitter island would allow pedestrians and bicyclists to focus on traffic from one direction only, further reducing vehicular exposure and improving safety.

G. Recommended Alternative

Present

Based on this analysis, presented in detail in this report, the existing traffic control at the intersection of CSAH 32 (Cliff Road) and Dodd Road is appropriate for today's traffic and into the near future with assumed traffic growth. Operations are acceptable during the peak travel time periods and no signal warrants are satisfied. Although the existing crash rate is higher than expected, no specific intersection design issues were identified by the crash data and site reviews.

Future

Traffic signal warrants are not currently satisfied, and the peak hour volume warrant is not expected to be met until at least year 2016. The most substantial volume warrants, Four-Hour and Eight-Hour, are not expected to be met until year 2019 or later.

The intersection should continue to be reviewed, both crashes and operations. With traffic volume growth and/or safety issues as defined by the crash record, the traffic control may need to be changed in the future. The Eight Hour Vehicular Volume Warrant, the warrant most used to justify a traffic signal by Dakota County practices, is not expected to be met until at least year 2019. When it has been determined by the County that a change is needed, two alternatives for improvement should be considered: roundabout control or traffic signal control. Each would be expected to provide satisfactory traffic operations into the future and to maintain or improve the safety of the operations. Roundabout control would have less delay with fewer anticipated crashes as compared to traffic signal control. Both options would improve pedestrian/bicycle movements at the intersection. A reevaluation at the time of need could further explore the differences between traffic signal and roundabout control, including off-peak operations and benefit-cost analyses.

Trail ramps to the intersection crossings should be reconstructed to the most current ADA design guidelines with an associated trail or roadway improvement project.

APPENDIX

Intersection Observations

Intersection Observations

CSAH 32 (Cliff Road) and Dodd Road
Eagan, Dakota County, MN

Tuesday, September 27, 2011, 4:40 p.m. to 5:15 p.m.

Overcast with periodic light rain

Side-street stop control on Dodd Road (CSAH 32 able to proceed without stopping)

General –

Vehicles arrived in bunches, particularly on the eastbound and westbound directions
Side street delay varied greatly from no delay to approximately 62 seconds
Eastbound and westbound volumes were clearly heavier than the side street
Southbound volumes heavier than northbound volumes
Pedestrians/bicyclists crossing ability depended upon arrival time
Left turn lane often used as a right turn by-pass lane, eastbound and westbound

Maximum Queues –

Northbound Left – 1 vehicle

Northbound Thru/Right – 2 vehicles

Southbound Left – 2 vehicles

Southbound Thru/Right – 3 vehicles

Eastbound Left – 2 vehicles

Eastbound Thru/Right – 6 vehicles

Westbound Left – 3 vehicles

Westbound Thru/Right – 2 vehicles

Pedestrian/Bicycle Crossings –

Bicycle on east crossing, south to north

Bicycle in southbound thru lane (25 seconds delay)

Gaps in Eastbound and Westbound Traffic –

8 seconds, 17 seconds, 20 seconds, 30 seconds, 31 seconds, 68 seconds

Sight Distance to East

Timed from when a vehicle's headlights are seen to when it reaches the intersection

9.9, 8.4, 9.3, 10.6, 8.5, 9.2, 10.4, 10.0, 8.7, 9.2 (seconds)

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Intersection Observations

CSAH 32 (Cliff Road) and Dodd Road
Eagan, Dakota County, MN

Wednesday, September 28, 2011, 7:10 a.m. to 7:45 a.m.

Sunny and clear

Side-street stop control on Dodd Road (CSAH 32 able to proceed without stopping)

General –

Vehicles arrived in bunches, particularly on the eastbound and westbound directions
Side street delay varied greatly from no delay to approximately 46 seconds
Eastbound and westbound volumes were clearly heavier than the side street
Southbound volumes appeared only slightly heavier than northbound volumes
Left turn lane often used as a right turn by-pass lane, eastbound and westbound

Maximum Queues –

Northbound Left – 3 vehicles
Northbound Thru/Right – 4 vehicles

Southbound Left – none
Southbound Thru/Right – 4 vehicles

Eastbound Left – 2 vehicles
Eastbound Thru/Right – 2 vehicles

Westbound Left – 3 vehicles
Westbound Thru/Right – 2 vehicles

Pedestrian/Bicycle Crossings –

Ped on west crossing, north to south

Gaps in Eastbound and Westbound Traffic –

16 seconds, 20 seconds, 21 seconds, 26 seconds, 28 seconds, 52 seconds, 56 seconds

Sight Distance to East

Timed from when a vehicle's headlights are seen to when it reaches the intersection
9.0, 9.6, 10.3, 9.5, 8.3, 7.9, 8.8, 8.4, 8.5, 9.9 (seconds)

APPENDIX

Traffic Counts

DAKOTA COUNTY TRANSPORTATION

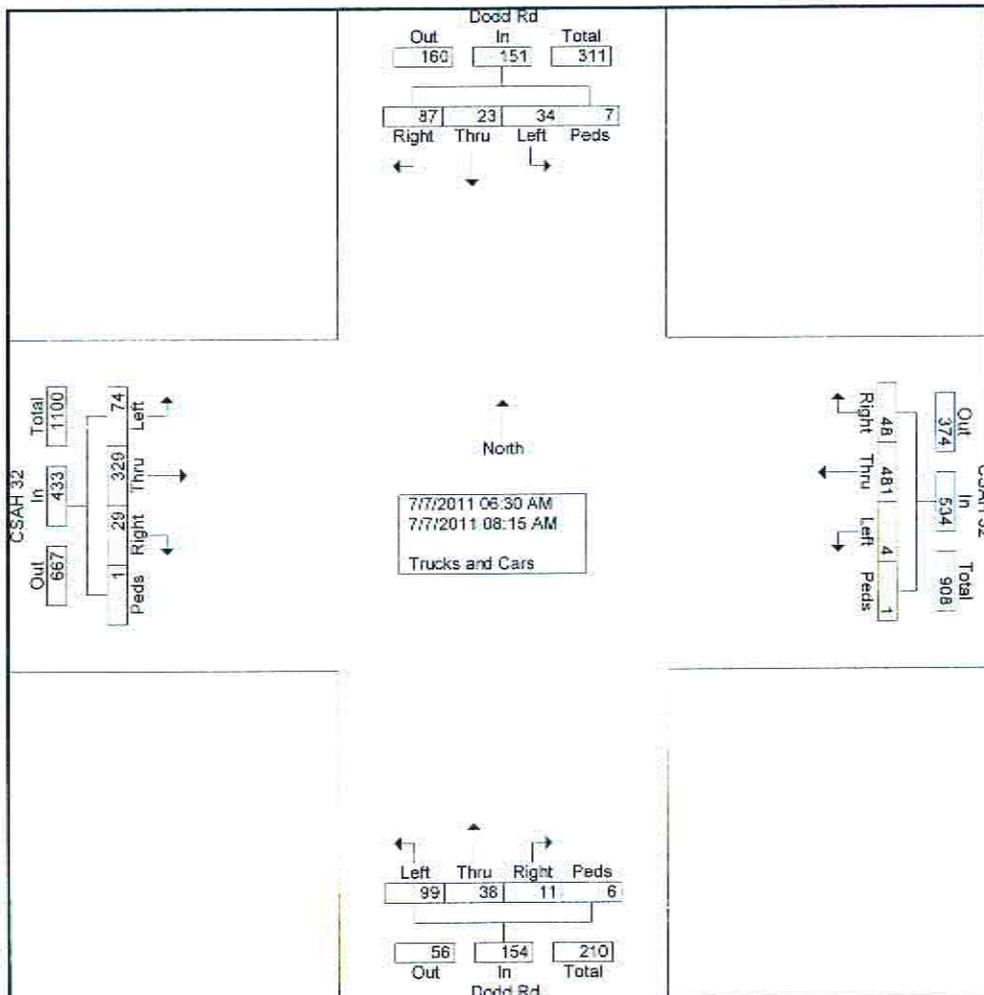
TMC TRAFFIC DATA

Location : CSAH 32 and Dodd Rd
 Date : July 7th, Thursday
 Time : 6:30-8:30 AM
 Weather: Partly Cloudy, 70 F

File Name : CSAH 32 & Dodd Rd AM
 Site Code : 07071101
 Start Date : 7/7/2011
 Page No : 1

Groups Printed- Trucks and Cars

Start Time	Dodd Rd Southbound					CSAH 32 Westbound					Dodd Rd Northbound					CSAH 32 Eastbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
06:30 AM	5	3	8	0	16	0	45	5	0	50	9	0	2	0	11	8	65	2	0	75	152
06:45 AM	2	4	6	0	12	0	63	6	0	69	12	7	0	1	20	3	42	1	0	46	147
Total	7	7	14	0	28	0	108	11	0	119	21	7	2	1	31	11	107	3	0	121	299
07:00 AM	5	3	7	1	16	0	49	6	1	56	15	4	1	0	20	9	33	3	0	45	137
07:15 AM	2	2	13	1	18	2	78	9	0	89	15	6	2	0	23	13	35	5	0	53	183
07:30 AM	4	4	18	1	27	0	83	8	0	91	16	10	3	1	30	12	44	5	0	61	209
07:45 AM	6	1	16	0	23	1	67	6	0	74	11	4	0	2	17	13	39	2	0	54	168
Total	17	10	54	3	84	3	277	29	1	310	57	24	6	3	90	47	151	15	0	213	697
08:00 AM	5	3	8	2	18	0	52	2	0	54	9	4	1	1	15	12	40	9	0	61	148
08:15 AM	5	3	11	2	21	1	44	6	0	51	12	3	2	1	18	4	31	2	1	38	128
Grand Total	34	23	87	7	151	4	481	48	1	534	99	38	11	6	154	74	329	29	1	433	1272
Approch %	22.5	15.2	57.6	4.6		0.7	90.1	9	0.2		64.3	24.7	7.1	3.9		17.1	76	6.7	0.2		
Total %	2.7	1.8	6.8	0.6	11.9	0.3	37.8	3.8	0.1	42	7.8	3	0.9	0.5	12.1	5.8	25.9	2.3	0.1	34	

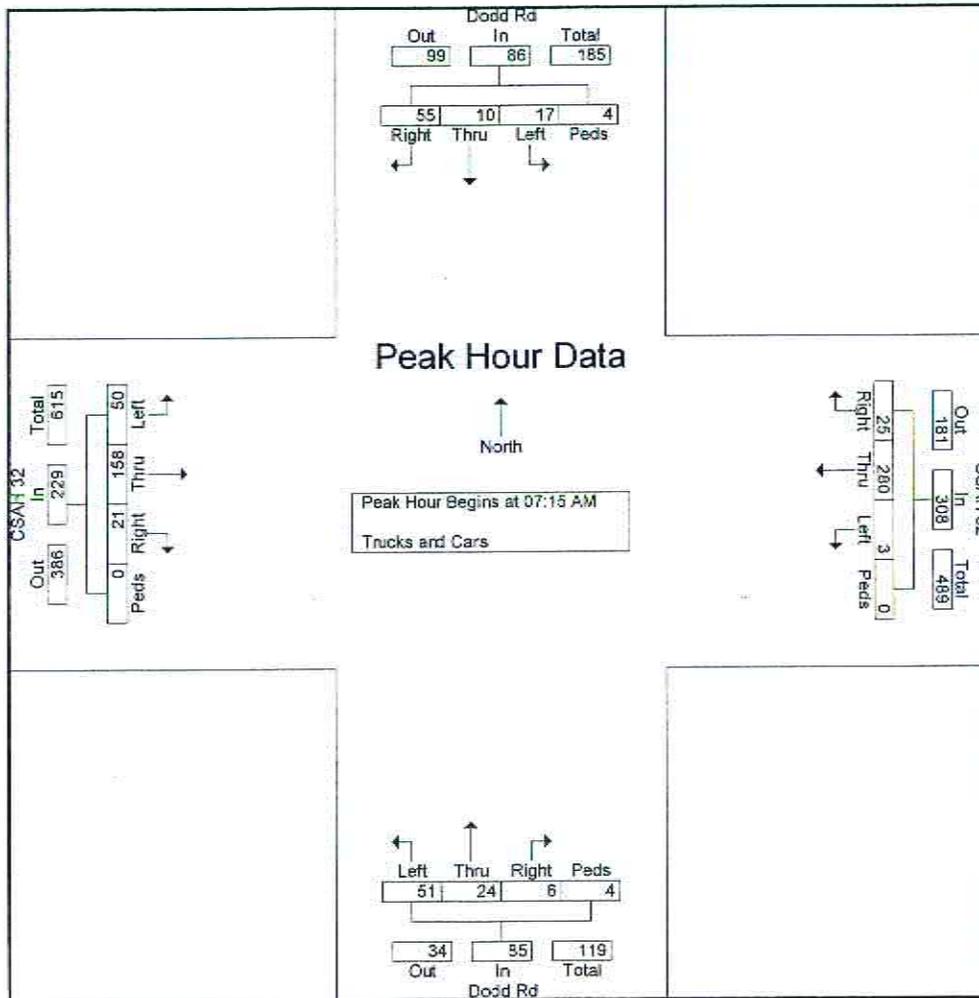


DAKOTA COUNTY TRANSPORTATION

TMC TRAFFIC DATA

File Name : CSAH 32 & Dodd Rd AM
 Site Code : 07071101
 Start Date : 7/7/2011
 Page No : 2

Start Time	Dodd Rd Southbound					CSAH 32 Westbound					Dodd Rd Northbound					CSAH 32 Eastbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
Peak Hour Analysis From 06:30 AM to 08:15 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:15 AM																					
07:15 AM	2	2	13	1	18	2	78	9	0	89	15	6	2	0	23	13	35	5	0	53	183
07:30 AM	4	4	18	1	27	0	83	8	0	91	16	10	3	1	30	12	44	5	0	61	209
07:45 AM	6	1	16	0	23	1	67	6	0	74	11	4	0	2	17	13	39	2	0	54	168
08:00 AM	5	3	8	2	18	0	52	2	0	54	9	4	1	1	15	12	40	9	0	61	148
Total Volume	17	10	55	4	86	3	280	25	0	308	51	24	6	4	85	50	158	21	0	229	708
% App. Total	19.8	11.6	64	4.7		1	90.9	8.1	0		60	28.2	7.1	4.7		21.8	69	9.2	0		
PHF	.708	.625	.764	.500	.796	.375	.843	.894	.000	.846	.797	.600	.500	.500	.708	.962	.898	.583	.000	.939	.847



DAKOTA COUNTY TRANSPORTATION

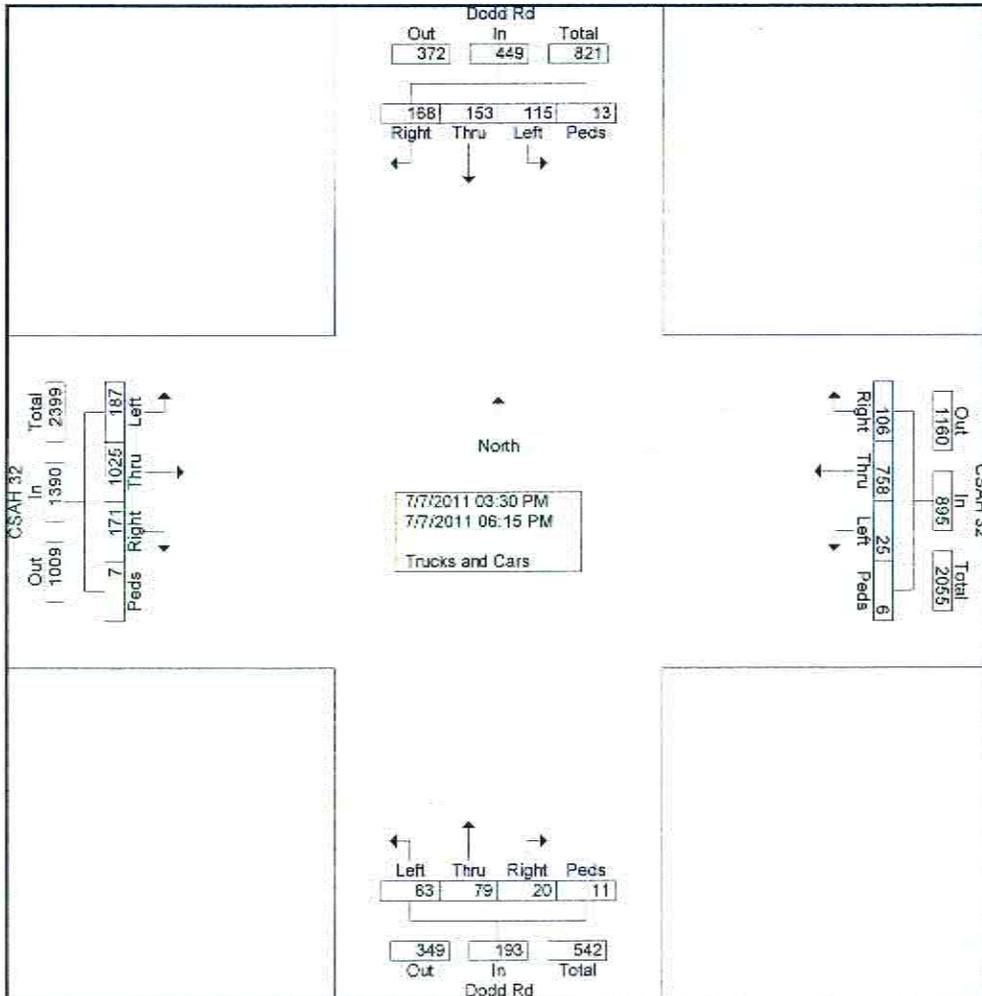
TMC TRAFFIC DATA

Location : CSAH 32 & Dodd Rd
 Date : July 7th, 2011 Thursday
 Time : 3:30-6:30 PM
 Weather: Mostly Sunny, 85 F

File Name : CSAH 32 & Dodd Rd PM
 Site Code : 07071103
 Start Date : 7/7/2011
 Page No : 1

Groups Printed- Trucks and Cars

Start Time	Dodd Rd Southbound					CSAH 32 Westbound					Dodd Rd Northbound					CSAH 32 Eastbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
03:30 PM	2	13	8	0	23	1	47	10	0	58	8	6	1	0	15	15	61	10	0	86	182
03:45 PM	11	14	11	2	38	1	54	10	1	66	5	4	1	1	11	12	87	11	0	110	225
Total	13	27	19	2	61	2	101	20	1	124	13	10	2	1	26	27	148	21	0	196	407
04:00 PM	10	13	17	0	40	3	64	11	0	78	5	5	5	1	16	10	79	11	3	103	237
04:15 PM	14	10	7	1	32	1	53	10	2	66	6	3	1	0	10	10	73	11	1	95	203
04:30 PM	5	12	17	1	35	2	75	14	0	91	8	2	2	0	12	7	89	15	2	113	251
04:45 PM	11	10	14	1	36	2	78	3	0	83	4	9	2	1	16	15	117	21	0	153	288
Total	40	45	55	3	143	8	270	38	2	318	23	19	10	2	54	42	358	58	6	464	979
05:00 PM	7	18	22	2	49	1	69	15	0	85	11	10	0	3	24	9	102	14	0	125	283
05:15 PM	15	19	19	0	53	3	71	6	1	81	7	4	6	0	17	18	101	17	0	136	287
05:30 PM	10	17	20	5	52	2	81	7	0	90	9	8	0	1	18	26	95	15	0	136	296
05:45 PM	12	10	17	1	40	4	73	10	1	88	8	5	1	0	14	25	69	19	0	113	255
Total	44	64	78	8	194	10	294	38	2	344	35	27	7	4	73	78	367	65	0	510	1121
06:00 PM	8	8	8	0	24	1	46	4	0	51	5	12	0	1	18	17	91	18	0	126	219
06:15 PM	10	9	8	0	27	4	47	6	1	58	7	11	1	3	22	23	61	9	1	94	201
Grand Total	115	153	168	13	449	25	758	106	6	895	83	79	20	11	193	187	1025	171	7	1390	2927
Approch %	25.6	34.1	37.4	2.9		2.8	84.7	11.8	0.7		43	40.9	10.4	5.7		13.5	73.7	12.3	0.5		
Total %	3.9	5.2	5.7	0.4	15.3	0.9	25.9	3.6	0.2	30.6	2.8	2.7	0.7	0.4	6.6	6.4	35	5.8	0.2	47.5	

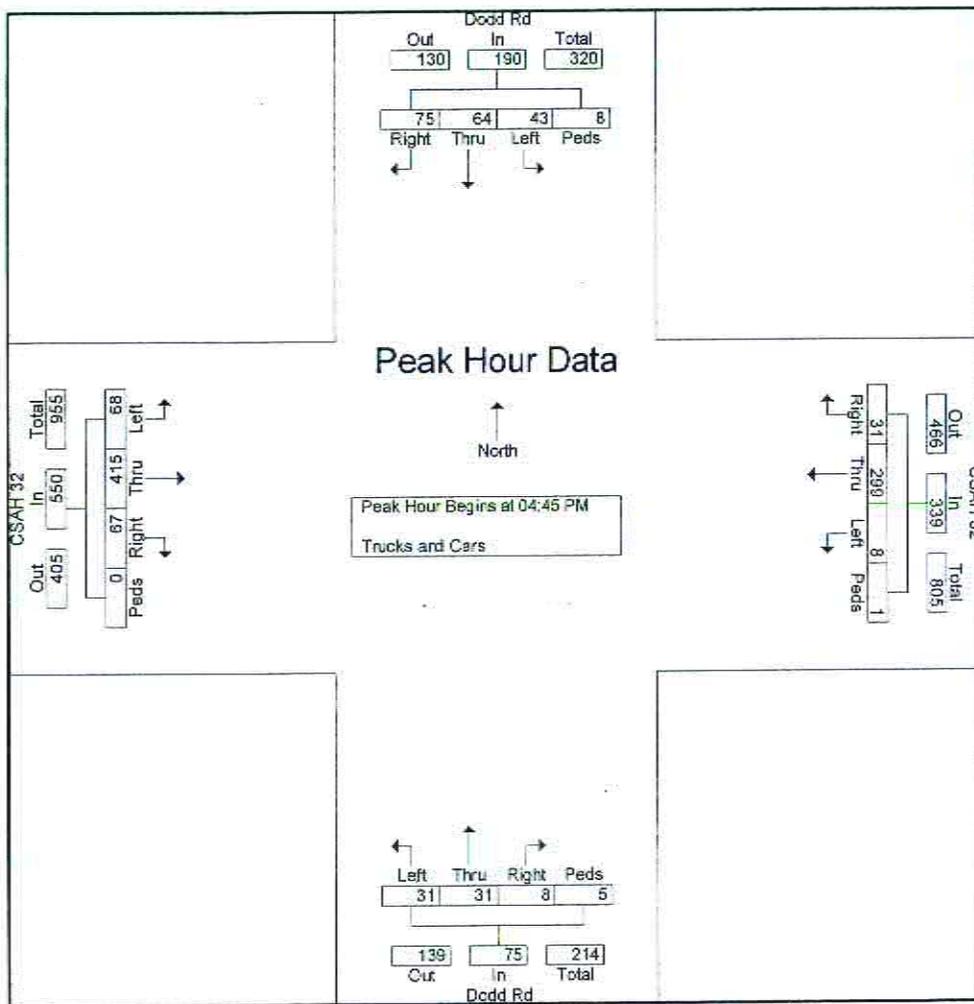


DAKOTA COUNTY TRANSPORTATION

TMC TRAFFIC DATA

File Name : CSAH 32 & Dodd Rd PM
 Site Code : 07071103
 Start Date : 7/7/2011
 Page No : 2

Start Time	Dodd Rd Southbound					CSAH 32 Westbound					Dodd Rd Northbound					CSAH 32 Eastbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
Peak Hour Analysis From 03:30 PM to 06:15 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:45 PM																					
04:45 PM	11	10	14	1	36	2	78	3	0	83	4	9	2	1	16	15	117	21	0	153	288
05:00 PM	7	18	22	2	49	1	69	15	0	85	11	10	0	3	24	9	102	14	0	125	283
05:15 PM	15	19	19	0	53	3	71	6	1	81	7	4	6	0	17	18	101	17	0	136	287
05:30 PM	10	17	20	5	52	2	81	7	0	90	9	8	0	1	18	26	95	15	0	136	296
Total Volume	43	64	75	8	190	8	299	31	1	339	31	31	8	5	75	68	415	67	0	550	1154
% App. Total	22.6	33.7	39.5	4.2		2.4	88.2	9.1	0.3		41.3	41.3	10.7	6.7		12.4	75.5	12.2	0		
PHF	.717	.842	.852	.400	.896	.667	.923	.517	.250	.942	.705	.775	.333	.417	.781	.654	.887	.798	.000	.899	.975



DAKOTA COUNTY TRANSPORTATION

TRAFFIC TRAFFIC COUNT DATA

Road: : CSAH 32
 Location: : West of Dodd Rd EB
 Notes: : Approach

Site: 2011155
 Date: 07/04/11

DirectorEB

Interval	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Weekday	Week
Begin	7/4	7/5	7/6	7/7	7/8	7/9	7/10	Avg	Avg
12:AM	*	*	*	44	42	*	*	43	43
1:00	*	*	*	14	18	*	*	16	16
2:00	*	*	*	14	18	*	*	16	16
3:00	*	*	*	20	26	*	*	23	23
4:00	*	*	*	23	28	*	*	25	25
5:00	*	*	*	75	66	*	*	70	70
6:00	*	*	*	200	166	*	*	183	183
7:00	*	*	209	227	191	*	*	209	209
8:00	*	*	214	226	*	*	*	220	220
9:00	*	*	208	203	*	*	*	205	205
10:00	*	*	206	236	*	*	*	221	221
11:00	*	*	222	256	*	*	*	239	239
12:PM	*	*	288	276	*	*	*	282	282
1:00	*	*	280	274	*	*	*	277	277
2:00	*	*	324	321	*	*	*	322	322
3:00	*	*	376	368	*	*	*	372	372
4:00	*	*	515	455	*	*	*	485	485
5:00	*	*	596	514	*	*	*	555	555
6:00	*	*	412	388	*	*	*	400	400
7:00	*	*	351	266	*	*	*	308	308
8:00	*	*	294	304	*	*	*	299	299
9:00	*	*	213	222	*	*	*	217	217
10:00	*	*	128	118	*	*	*	123	123
11:00	*	*	60	64	*	*	*	62	62
Totals	0	0	4,896	5,108	555	0	0	5,172	5,172
AM Peak	*	*	11:00	11:00	7:00	*	*	11:00	11:00
Volume	*	*	222	256	191	*	*	239	239
PM Peak	*	*	5:00	5:00	*	*	*	5:00	5:00
Volume	*	*	596	514	*	*	*	555	555

DAKOTA COUNTY TRANSPORTATION

TRAFFIC

TRAFFIC COUNT DATA

Road: : CSAH 32
 Location: : East of Dodd Rd
 Notes: : Approach

Site: 2011156
 Date: 07/04/11

DirectorWB

Interval	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Weekday	Week
Begin	7/4	7/5	7/6	7/7	7/8	7/9	7/10	Avg	Avg
12:AM	*	*	*	18	24	*	*	21	21
1:00	*	*	*	9	12	*	*	10	10
2:00	*	*	*	4	14	*	*	9	9
3:00	*	*	*	16	21	*	*	18	18
4:00	*	*	*	20	24	*	*	22	22
5:00	*	*	*	75	74	*	*	74	74
6:00	*	*	*	233	216	*	*	224	224
7:00	*	*	303	325	281	*	*	303	303
8:00	*	*	246	256	229	*	*	243	243
9:00	*	*	212	216	*	*	*	214	214
10:00	*	*	202	220	*	*	*	211	211
11:00	*	*	216	259	*	*	*	237	237
12:PM	*	*	264	275	*	*	*	269	269
1:00	*	*	234	234	*	*	*	234	234
2:00	*	*	213	203	*	*	*	208	208
3:00	*	*	276	268	*	*	*	272	272
4:00	*	*	298	326	*	*	*	312	312
5:00	*	*	332	358	*	*	*	345	345
6:00	*	*	281	232	*	*	*	256	256
7:00	*	*	192	192	*	*	*	192	192
8:00	*	*	162	166	*	*	*	164	164
9:00	*	*	148	136	*	*	*	142	142
10:00	*	*	72	82	*	*	*	77	77
11:00	*	*	53	36	*	*	*	44	44
Totals	0	0	3,704	4,159	895	0	0	4,101	4,101
AM Peak	*	*	7:00	7:00	7:00	*	*	7:00	7:00
Volume	*	*	303	325	281	*	*	303	303
PM Peak	*	*	5:00	5:00	*	*	*	5:00	5:00
Volume	*	*	332	358	*	*	*	345	345

DAKOTA COUNTY TRANSPORTATION

TRAFFIC

TRAFFIC COUNT DATA

Road: : Dodd Rd
 Location: : North of CSAH 32
 Notes: : Approach

Site: 2011157
 Date: 07/04/11

Interval	Mon 4		Tue 5		Wed 6		Thu 7		Fri 8		Sat 9		Sun 10		Weekday Avg.	
Begin	SB		SB		SB		SB		SB		SB		SB		SB	
12:AM	*	*	*	*	*	*	0	19	0	12	*	*	*	*	0	15
01:00	*	*	*	*	*	*	0	6	0	5	*	*	*	*	0	5
02:00	*	*	*	*	*	*	0	2	0	5	*	*	*	*	0	3
03:00	*	*	*	*	*	*	0	5	0	4	*	*	*	*	0	4
04:00	*	*	*	*	*	*	0	5	0	8	*	*	*	*	0	6
05:00	*	*	*	*	*	*	0	23	0	20	*	*	*	*	0	21
06:00	*	*	*	*	*	*	0	55	0	47	*	*	*	*	0	51
07:00	*	*	*	*	0	84	0	86	0	82	*	*	*	*	0	84
08:00	*	*	*	*	0	88	0	96	*	*	*	*	*	*	0	92
09:00	*	*	*	*	0	72	0	90	*	*	*	*	*	*	0	81
10:00	*	*	*	*	0	70	0	72	*	*	*	*	*	*	0	71
11:00	*	*	*	*	0	86	0	86	*	*	*	*	*	*	0	86
12:PM	*	*	*	*	0	90	0	82	*	*	*	*	*	*	0	86
01:00	*	*	*	*	0	104	0	88	*	*	*	*	*	*	0	96
02:00	*	*	*	*	0	83	0	84	*	*	*	*	*	*	0	83
03:00	*	*	*	*	0	100	0	132	*	*	*	*	*	*	0	116
04:00	*	*	*	*	0	185	0	157	*	*	*	*	*	*	0	171
05:00	*	*	*	*	0	176	0	182	*	*	*	*	*	*	0	179
06:00	*	*	*	*	0	143	0	113	*	*	*	*	*	*	0	128
07:00	*	*	*	*	0	94	0	89	*	*	*	*	*	*	0	91
08:00	*	*	*	*	0	99	0	86	*	*	*	*	*	*	0	92
09:00	*	*	*	*	0	49	0	64	*	*	*	*	*	*	0	56
10:00	*	*	*	*	0	39	0	46	*	*	*	*	*	*	0	42
11:00	*	*	*	*	0	22	0	24	*	*	*	*	*	*	0	23
Totals	0	0	0	0	0	1,584	0	1,692	0	183	0	0	0	0	0	1,682
Combined	0		0		1,584		1,692		183		0		0		1,682	
Split %	0.0	.0	0.0	.0	0.0	100	0.0	100	0.0	100	0.0	.0	0.0	.0	0.0	100
AM																
Peak Hr	*	*	*	*	-1:00	08:00	08:00	08:00	08:00	07:00	*	*	*	*	07:00	08:00
Volume	*	*	*	*	0	88	0	96	0	82	*	*	*	*	0	92
PM																
PeakHr	*	*	*	*	-1:00	04:00	04:00	05:00	*	*	*	*	*	*	05:00	05:00
Volume	*	*	*	*	0	185	0	182	*	*	*	*	*	*	0	179

DAKOTA COUNTY TRANSPORTATION

TRAFFIC

TRAFFIC COUNT DATA

Road: : Dodd Rd
 Location: : South of CSAH 32
 Notes: : Approach

Site: 2011158
 Date: 07/04/11

Direction NB

Interval	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Weekday	Week
Begin	7/4	7/5	7/6	7/7	7/8	7/9	7/10	Avg	Avg
12:AM	*	*	*	8	12	*	*	10	10
1:00	*	*	*	1	4	*	*	2	2
2:00	*	*	*	2	5	*	*	3	3
3:00	*	*	*	2	2	*	*	2	2
4:00	*	*	*	9	4	*	*	6	6
5:00	*	*	*	17	21	*	*	19	19
6:00	*	*	*	60	58	*	*	59	59
7:00	*	*	103	102	104	*	*	103	103
8:00	*	*	72	67	*	*	*	69	69
9:00	*	*	58	62	*	*	*	60	60
10:00	*	*	62	51	*	*	*	56	56
11:00	*	*	82	58	*	*	*	70	70
12:PM	*	*	70	74	*	*	*	72	72
1:00	*	*	72	52	*	*	*	62	62
2:00	*	*	52	62	*	*	*	57	57
3:00	*	*	68	73	*	*	*	70	70
4:00	*	*	94	74	*	*	*	84	84
5:00	*	*	106	104	*	*	*	105	105
6:00	*	*	100	96	*	*	*	98	98
7:00	*	*	80	82	*	*	*	81	81
8:00	*	*	68	56	*	*	*	62	62
9:00	*	*	56	47	*	*	*	51	51
10:00	*	*	22	38	*	*	*	30	30
11:00	*	*	26	20	*	*	*	23	23
Totals	0	0	1,191	1,217	210	0	0	1,254	1,254
AM Peak	*	*	7:00	7:00	7:00	*	*	7:00	7:00
Volume	*	*	103	102	104	*	*	103	103
PM Peak	*	*	5:00	5:00	*	*	*	5:00	5:00
Volume	*	*	106	104	*	*	*	105	105

DAKOTA COUNTY TRANSPORTATION

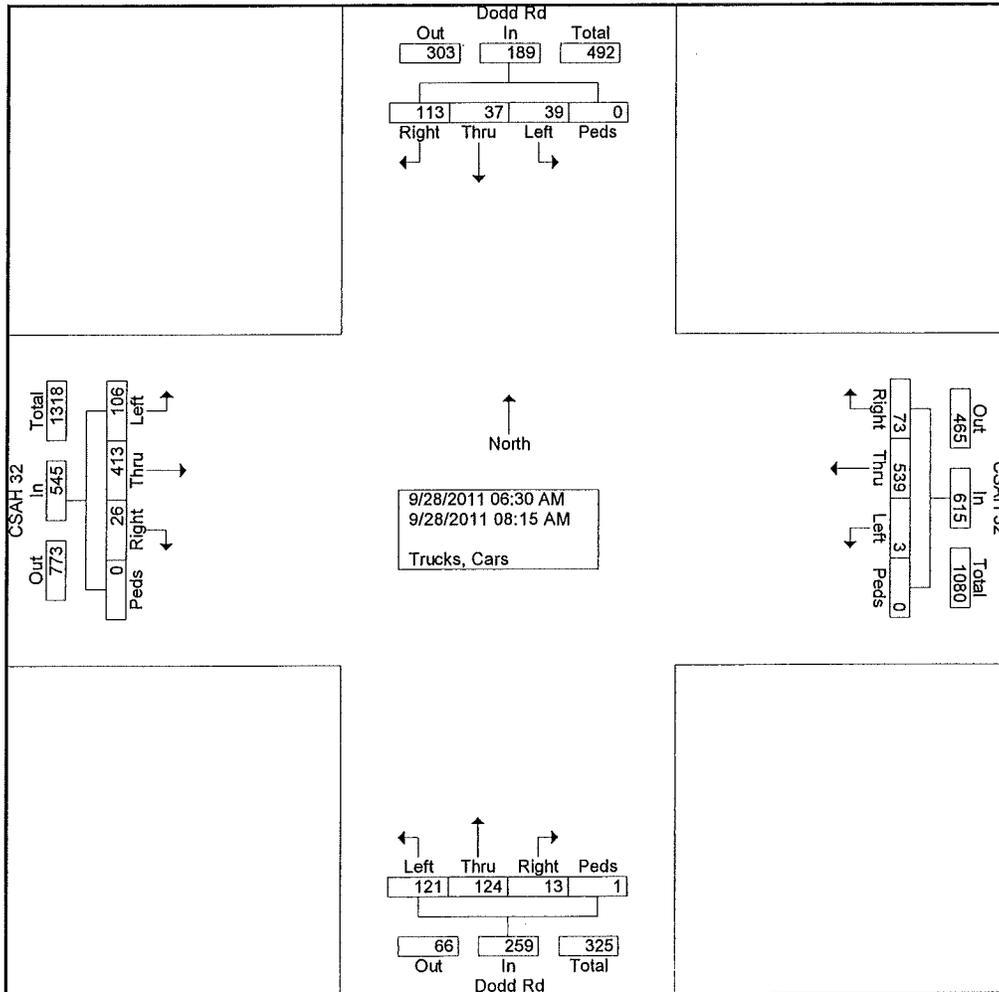
TMC TRAFFIC DATA

Location : CSAH 32 and Dodd Rd
 Date : Sept 28, 2011 Wednesday
 Time : 6:30 to 8:30 AM
 Weather : Sunny, 60F

File Name : CSAH 32 & Dodd Rd AM (1)
 Site Code : 09281101
 Start Date : 9/28/2011
 Page No : 1

Groups Printed- Trucks, Cars

Start Time Factor	Dodd Rd Southbound					CSAH 32 Westbound					Dodd Rd Northbound					CSAH 32 Eastbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
06:30 AM	5	5	10	0	20	0	54	7	0	61	19	6	1	1	27	4	59	1	0	64	172
06:45 AM	5	3	3	0	11	0	67	12	0	79	19	25	3	0	47	10	57	5	0	72	209
Total	10	8	13	0	31	0	121	19	0	140	38	31	4	1	74	14	116	6	0	136	381
07:00 AM	3	5	27	0	35	0	87	17	0	104	17	22	1	0	40	15	45	1	0	61	240
07:15 AM	6	11	29	0	46	0	69	8	0	77	20	10	1	0	31	13	46	2	0	61	215
07:30 AM	6	3	18	0	27	0	74	13	0	87	22	27	3	0	52	8	58	1	0	67	233
07:45 AM	8	6	7	0	21	0	84	8	0	92	13	17	2	0	32	24	70	3	0	97	242
Total	23	25	81	0	129	0	314	46	0	360	72	76	7	0	155	60	219	7	0	286	930
08:00 AM	1	3	10	0	14	3	56	5	0	64	7	11	2	0	20	17	37	9	0	63	161
08:15 AM	5	1	9	0	15	0	48	3	0	51	4	6	0	0	10	15	41	4	0	60	136
Grand Total	39	37	113	0	189	3	539	73	0	615	121	124	13	1	259	106	413	26	0	545	1608
Apprch %	20.6	19.6	59.8	0		0.5	87.6	11.9	0		46.7	47.9	5	0.4		19.4	75.8	4.8	0		
Total %	2.4	2.3	7	0	11.8	0.2	33.5	4.5	0	38.2	7.5	7.7	0.8	0.1	16.1	6.6	25.7	1.6	0	33.9	

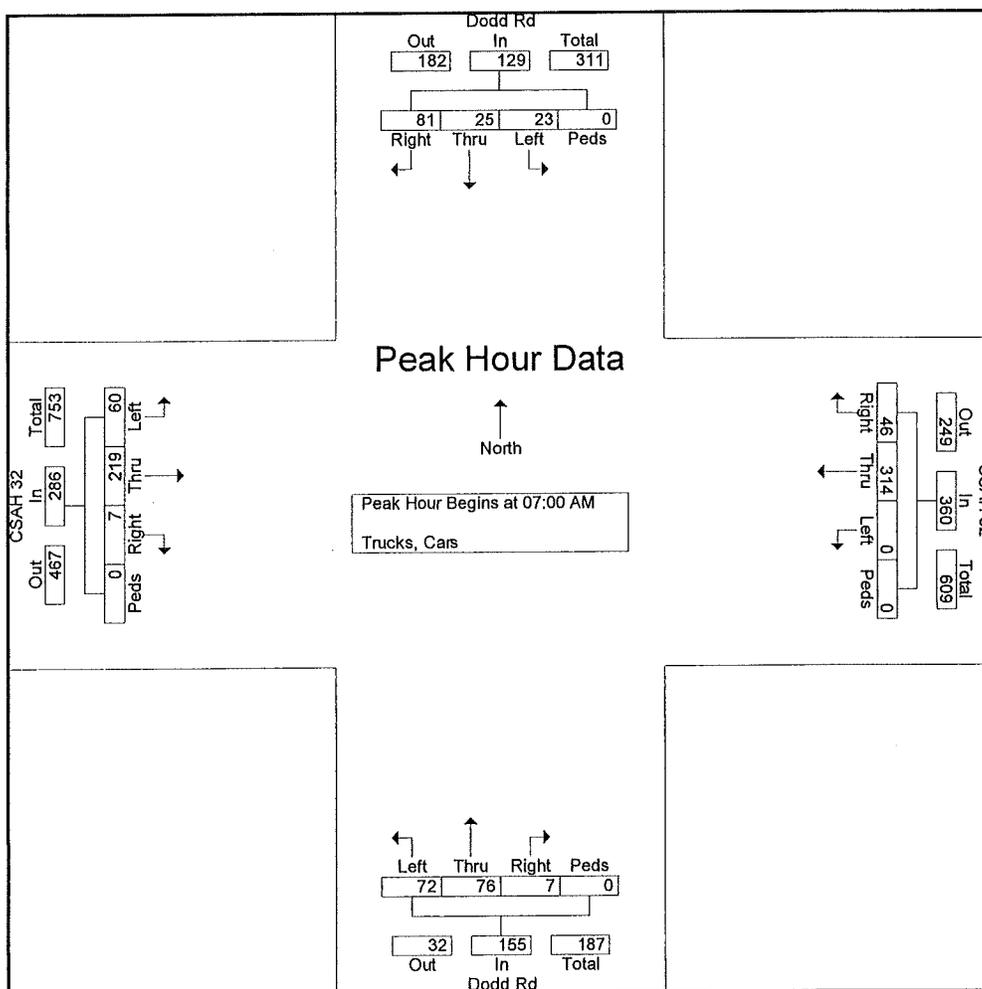


DAKOTA COUNTY TRANSPORTATION TMC TRAFFIC DATA

Location : CSAH 32 and Dodd Rd
 Date : Sept 28, 2011 Wednesday
 Time : 6:30 to 8:30 AM
 Weather : Sunny, 60F

File Name : CSAH 32 & Dodd Rd AM (1)
 Site Code : 09281101
 Start Date : 9/28/2011
 Page No : 2

Start Time	Dodd Rd Southbound					CSAH 32 Westbound					Dodd Rd Northbound					CSAH 32 Eastbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
Peak Hour Analysis From 06:30 AM to 08:15 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00 AM																					
07:00 AM	3	5	27	0	35	0	87	17	0	104	17	22	1	0	40	15	45	1	0	61	240
07:15 AM	6	11	29	0	46	0	69	8	0	77	20	10	1	0	31	13	46	2	0	61	215
07:30 AM	6	3	18	0	27	0	74	13	0	87	22	27	3	0	52	8	58	1	0	67	233
07:45 AM	8	6	7	0	21	0	84	8	0	92	13	17	2	0	32	24	70	3	0	97	242
Total Volume	23	25	81	0	129	0	314	46	0	360	72	76	7	0	155	60	219	7	0	286	930
% App. Total	17.8	19.4	62.8	0		0	87.2	12.8	0		46.5	49	4.5	0		21	76.6	2.4	0		
PHF	.719	.568	.698	.000	.701	.000	.902	.676	.000	.865	.818	.704	.583	.000	.745	.625	.782	.583	.000	.737	.961



DAKOTA COUNTY TRANSPORTATION

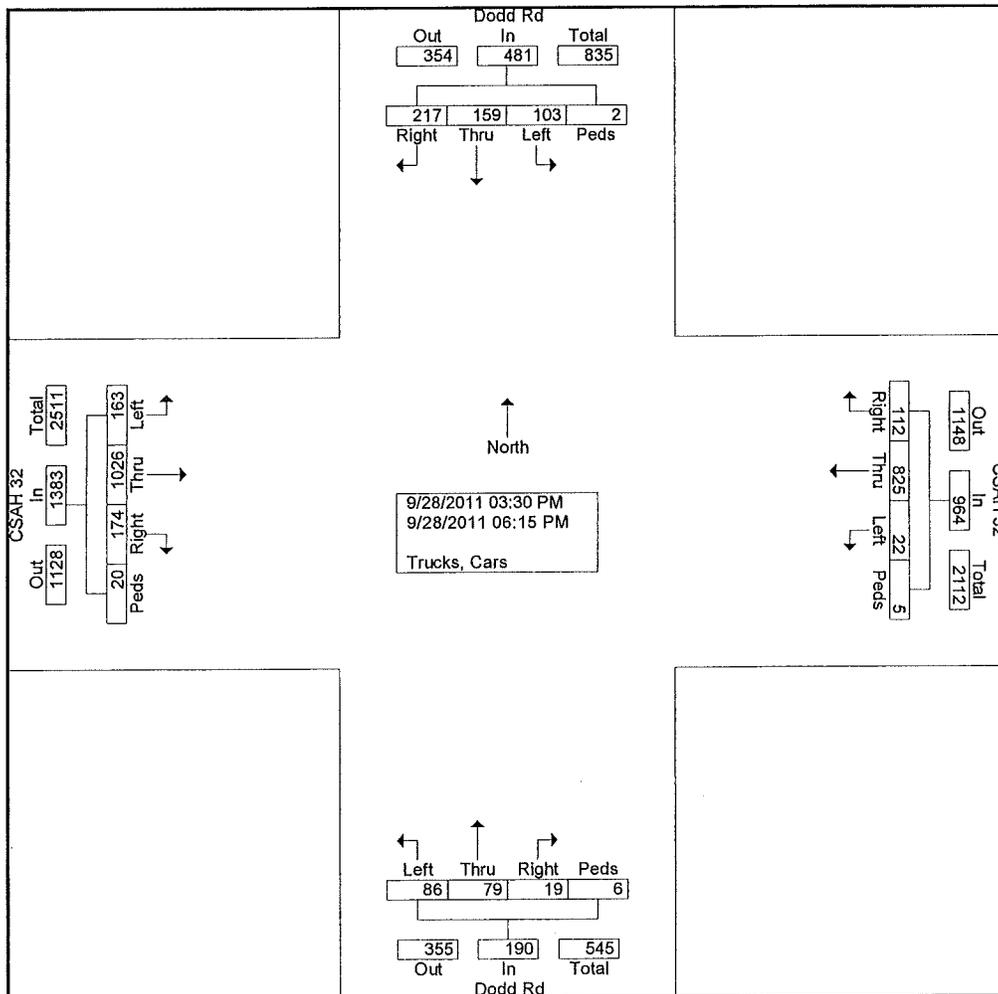
TMC TRAFFIC DATA

Location: CSAH 32 and Dodd Rd
 Date : Sept 28, 2011 Wednesday
 Time : 3:30 to 6:30 PM
 Weather: Sunny, 75F

File Name : CSAH 32 & Dodd Rd PM (1)
 Site Code : 09280903
 Start Date : 9/28/2011
 Page No : 1

Groups Printed- Trucks, Cars

Start Time Factor	Dodd Rd Southbound					CSAH 32 Westbound					Dodd Rd Northbound					CSAH 32 Eastbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
03:30 PM	6	8	15	0	29	3	68	6	0	77	7	6	1	1	15	11	79	8	2	100	221
03:45 PM	16	11	26	0	53	0	70	6	0	76	4	6	1	0	11	13	71	15	1	100	240
Total	22	19	41	0	82	3	138	12	0	153	11	12	2	1	26	24	150	23	3	200	461
04:00 PM	8	11	22	0	41	3	54	11	1	69	2	4	0	0	6	9	85	9	1	104	220
04:15 PM	6	8	15	0	29	3	62	10	0	75	11	4	2	1	18	16	86	14	0	116	238
04:30 PM	4	21	12	1	38	2	73	8	0	83	10	9	2	1	22	11	88	22	1	122	265
04:45 PM	12	16	28	0	56	2	47	14	2	65	9	8	1	0	18	16	86	16	4	122	261
Total	30	56	77	1	164	10	236	43	3	292	32	25	5	2	64	52	345	61	6	464	984
05:00 PM	11	14	17	0	42	1	84	15	0	100	6	3	2	0	11	12	84	19	4	119	272
05:15 PM	6	20	22	0	48	1	79	8	2	90	7	6	1	1	15	13	97	23	4	137	290
05:30 PM	12	18	14	0	44	2	83	17	0	102	5	11	3	1	20	16	104	20	0	140	306
05:45 PM	10	13	20	0	43	2	78	4	0	84	12	11	0	0	23	17	86	12	1	116	266
Total	39	65	73	0	177	6	324	44	2	376	30	31	6	2	69	58	371	74	9	512	1134
06:00 PM	6	9	10	1	26	2	70	5	0	77	7	6	4	0	17	9	72	10	1	92	212
06:15 PM	6	10	16	0	32	1	57	8	0	66	6	5	2	1	14	20	88	6	1	115	227
Grand Total	103	159	217	2	481	22	825	112	5	964	86	79	19	6	190	163	1026	174	20	1383	3018
Apprch %	21.4	33.1	45.1	0.4		2.3	85.6	11.6	0.5		45.3	41.6	10	3.2		11.8	74.2	12.6	1.4		
Total %	3.4	5.3	7.2	0.1	15.9	0.7	27.3	3.7	0.2	31.9	2.8	2.6	0.6	0.2	6.3	5.4	34	5.8	0.7	45.8	

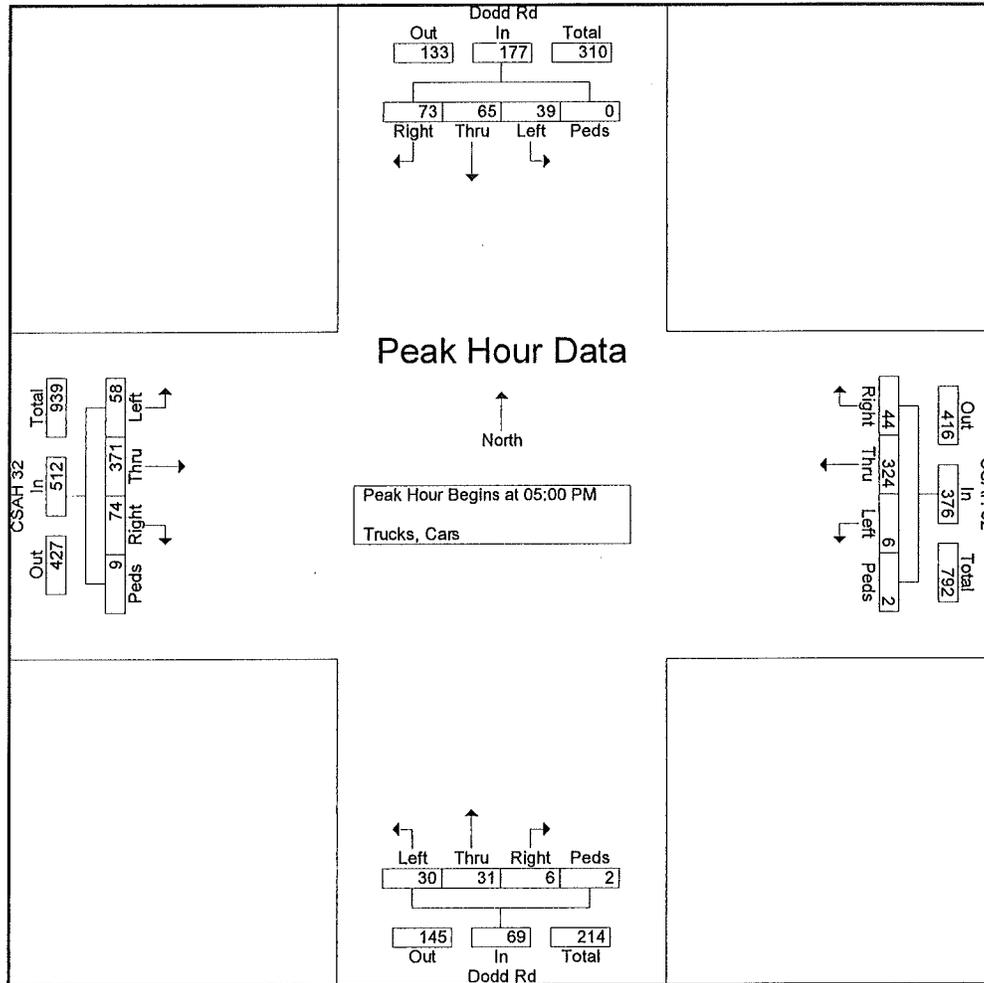


DAKOTA COUNTY TRANSPORTATION TMC TRAFFIC DATA

Location: CSAH 32 and Dodd Rd
 Date : Sept 28, 2011 Wednesday
 Time : 3:30 to 6:30 PM
 Weather: Sunny, 75F

File Name : CSAH 32 & Dodd Rd PM (1)
 Site Code : 09280903
 Start Date : 9/28/2011
 Page No : 2

Start Time	Dodd Rd Southbound					CSAH 32 Westbound					Dodd Rd Northbound					CSAH 32 Eastbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
Peak Hour Analysis From 03:30 PM to 06:15 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 05:00 PM																					
05:00 PM	11	14	17	0	42	1	84	15	0	100	6	3	2	0	11	12	84	19	4	119	272
05:15 PM	6	20	22	0	48	1	79	8	2	90	7	6	1	1	15	13	97	23	4	137	290
05:30 PM	12	18	14	0	44	2	83	17	0	102	5	11	3	1	20	16	104	20	0	140	306
05:45 PM	10	13	20	0	43	2	78	4	0	84	12	11	0	0	23	17	86	12	1	116	266
Total Volume	39	65	73	0	177	6	324	44	2	376	30	31	6	2	69	58	371	74	9	512	1134
% App. Total	22	36.7	41.2	0		1.6	86.2	11.7	0.5		43.5	44.9	8.7	2.9		11.3	72.5	14.5	1.8		
PHF	.813	.813	.830	.000	.922	.750	.964	.647	.250	.922	.625	.705	.500	.500	.750	.853	.892	.804	.563	.914	.926



DAKOTA COUNTY TRANSPORTATION

TRAFFIC

TRAFFIC COUNT DATA

Road: : CSAH 32
 Location: : West of Dodd Rd
 Notes: : Approach Count

Site: 2011321
 Date: 09/26/11

DirectorEB

Interval	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Weekday	Week
Begin	9/26	9/27	9/28	9/29	9/30	10/1	10/2	Avg	Avg
12:AM	*	*	18	28	*	*	*	23	23
1:00	*	*	18	9	*	*	*	13	13
2:00	*	*	16	24	*	*	*	20	20
3:00	*	*	30	20	*	*	*	25	25
4:00	*	*	21	26	*	*	*	23	23
5:00	*	*	79	66	*	*	*	72	72
6:00	*	*	218	222	*	*	*	220	220
7:00	*	*	308	248	*	*	*	278	278
8:00	*	*	260	249	*	*	*	254	254
9:00	*	*	227	224	*	*	*	225	225
10:00	*	205	222	189	*	*	*	205	205
11:00	*	238	216	*	*	*	*	227	227
12:PM	*	250	248	*	*	*	*	249	249
1:00	*	212	272	*	*	*	*	242	242
2:00	*	303	267	*	*	*	*	285	285
3:00	*	380	359	*	*	*	*	369	369
4:00	*	420	469	*	*	*	*	444	444
5:00	*	524	536	*	*	*	*	530	530
6:00	*	406	392	*	*	*	*	399	399
7:00	*	268	292	*	*	*	*	280	280
8:00	*	191	256	*	*	*	*	223	223
9:00	*	174	154	*	*	*	*	164	164
10:00	*	70	75	*	*	*	*	72	72
11:00	*	29	54	*	*	*	*	41	41
Totals	0	3,670	5,007	1,305	0	0	0	4,883	4,883
AM Peak	*	11:00	7:00	8:00	*	*	*	7:00	7:00
Volume	*	238	308	249	*	*	*	278	278
PM Peak	*	5:00	5:00	*	*	*	*	5:00	5:00
Volume	*	524	536	*	*	*	*	530	530

DAKOTA COUNTY TRANSPORTATION

TRAFFIC TRAFFIC COUNT DATA

Road: : CSAH 32
 Location: : East of Dodd Rd
 Notes: : Approach Count

Site: 2011322
 Date: 09/26/11

DirectorWB

Interval	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Weekday	Week
Begin	9/26	9/27	9/28	9/29	9/30	10/1	10/2	Avg	Avg
12:AM	*	*	13	9	*	*	*	11	11
1:00	*	*	8	4	*	*	*	6	6
2:00	*	*	16	15	*	*	*	15	15
3:00	*	*	14	16	*	*	*	15	15
4:00	*	*	37	22	*	*	*	29	29
5:00	*	*	98	95	*	*	*	96	96
6:00	*	*	238	228	*	*	*	233	233
7:00	*	*	390	384	*	*	*	387	387
8:00	*	*	226	255	*	*	*	240	240
9:00	*	*	256	228	*	*	*	242	242
10:00	*	168	171	166	*	*	*	168	168
11:00	*	184	189	*	*	*	*	186	186
12:PM	*	174	190	*	*	*	*	182	182
1:00	*	180	208	*	*	*	*	194	194
2:00	*	201	190	*	*	*	*	195	195
3:00	*	259	275	*	*	*	*	267	267
4:00	*	326	296	*	*	*	*	311	311
5:00	*	358	384	*	*	*	*	371	371
6:00	*	226	286	*	*	*	*	256	256
7:00	*	176	174	*	*	*	*	175	175
8:00	*	126	170	*	*	*	*	148	148
9:00	*	78	73	*	*	*	*	75	75
10:00	*	33	51	*	*	*	*	42	42
11:00	*	25	17	*	*	*	*	21	21
Totals	0	2,514	3,970	1,422	0	0	0	3,865	3,865
AM Peak	*	11:00	7:00	7:00	*	*	*	7:00	7:00
Volume	*	184	390	384	*	*	*	387	387
PM Peak	*	5:00	5:00	*	*	*	*	5:00	5:00
Volume	*	358	384	*	*	*	*	371	371

DAKOTA COUNTY TRANSPORTATION

TRAFFIC TRAFFIC COUNT DATA

Road: : Dodd Rd
 Location: : North of CSAH 32
 Notes: : Approach Count

Site: 2011323
 Date: 09/26/11

DirectorSB

Interval	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Weekday	Week
Begin	9/26	9/27	9/28	9/29	9/30	10/1	10/2	Avg	Avg
12:AM	*	*	4	5	*	*	*	4	4
1:00	*	*	5	1	*	*	*	3	3
2:00	*	*	2	2	*	*	*	2	2
3:00	*	*	3	6	*	*	*	4	4
4:00	*	*	5	5	*	*	*	5	5
5:00	*	*	25	24	*	*	*	24	24
6:00	*	*	54	62	*	*	*	58	58
7:00	*	*	134	114	*	*	*	124	124
8:00	*	*	70	74	*	*	*	72	72
9:00	*	83	82	84	*	*	*	83	83
10:00	*	48	48	*	*	*	*	48	48
11:00	*	52	56	*	*	*	*	54	54
12:PM	*	70	75	*	*	*	*	72	72
1:00	*	64	48	*	*	*	*	56	56
2:00	*	96	124	*	*	*	*	110	110
3:00	*	128	152	*	*	*	*	140	140
4:00	*	178	178	*	*	*	*	178	178
5:00	*	196	186	*	*	*	*	191	191
6:00	*	128	132	*	*	*	*	130	130
7:00	*	102	110	*	*	*	*	106	106
8:00	*	63	69	*	*	*	*	66	66
9:00	*	35	34	*	*	*	*	34	34
10:00	*	17	12	*	*	*	*	14	14
11:00	*	12	12	*	*	*	*	12	12
Totals	0	1,272	1,620	377	0	0	0	1,590	1,590
AM Peak	*	9:00	7:00	7:00	*	*	*	7:00	7:00
Volume	*	83	134	114	*	*	*	124	124
PM Peak	*	5:00	5:00	*	*	*	*	5:00	5:00
Volume	*	196	186	*	*	*	*	191	191

DAKOTA COUNTY TRANSPORTATION

TRAFFIC

TRAFFIC COUNT DATA

Road: : Dodd Rd
 Location: : South of CSAH 32
 Notes: : Approach Count

Site: 2011324
 Date: 09/26/11

DirectorNB

Interval	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Weekday	Week
Begin	9/26	9/27	9/28	9/29	9/30	10/1	10/2	Avg	Avg
12:AM	*	*	3	5	*	*	*	4	4
1:00	*	*	2	2	*	*	*	2	2
2:00	*	*	2	2	*	*	*	2	2
3:00	*	*	3	1	*	*	*	2	2
4:00	*	*	8	8	*	*	*	8	8
5:00	*	*	24	18	*	*	*	21	21
6:00	*	*	97	83	*	*	*	90	90
7:00	*	*	150	138	*	*	*	144	144
8:00	*	*	63	50	*	*	*	56	56
9:00	*	58	57	59	*	*	*	58	58
10:00	*	30	39	*	*	*	*	34	34
11:00	*	44	30	*	*	*	*	37	37
12:PM	*	21	44	*	*	*	*	32	32
1:00	*	21	37	*	*	*	*	29	29
2:00	*	41	54	*	*	*	*	47	47
3:00	*	50	57	*	*	*	*	53	53
4:00	*	73	78	*	*	*	*	75	75
5:00	*	81	87	*	*	*	*	84	84
6:00	*	65	63	*	*	*	*	64	64
7:00	*	65	65	*	*	*	*	65	65
8:00	*	51	44	*	*	*	*	47	47
9:00	*	29	30	*	*	*	*	29	29
10:00	*	5	17	*	*	*	*	11	11
11:00	*	3	8	*	*	*	*	5	5
Totals	0	637	1,062	366	0	0	0	999	999
AM Peak	*	9:00	7:00	7:00	*	*	*	7:00	7:00
Volume	*	58	150	138	*	*	*	144	144
PM Peak	*	5:00	5:00	*	*	*	*	5:00	5:00
Volume	*	81	87	*	*	*	*	84	84

APPENDIX

Warrant Analyses

Traffic Signal Warrant Analysis - Cliff Road (CSAH 32) and Dodd Road

Count Date: July 2011

TKDA Project No.: 14957.000

Major Street Approaches:

Eastbound: Cliff Road (CSAH 32)

Number of Lanes: 2+
 Approach Speed: 50
 Total App. Vehicles: 5,312
 Rt Turn Percentage: 100%

Westbound: Cliff Road (CSAH 32)

Number of Lanes: 2+
 Approach Speed: 50
 Total App. Vehicles: 4,191
 Rt Turn Percentage: 100%

Minor Street Approaches:

Northbound: Dodd Road

Number of Lanes: 2
 Approach Speed: 30
 Total App. Vehicles: 1,215
 Rt Turn Percentage: 0%

Southbound: Dodd Road

Number of Lanes: 2
 Approach Speed: 40
 Total App. Vehicles: 941
 Rt Turn Percentage: 0%

Analysis of Warrant 1: 8-Hour Volumes

Hour Begin	Major (Total)	Minor Street			Condition A Meets Criteria?	Condition B Meets Criteria?	Condition A+B Meets Criteria?
		Volume	Direction	Rank			
12 AM	64	9	NB	20			
1 AM	26	3	SB	23			
2 AM	25	3	NB	22			
3 AM	41	2	SB	24			
4 AM	47	6	NB	21			
5 AM	144	18	NB	19			
6 AM	453	83	NB	5	Major St	Minor St	
7 AM	665	133	NB	1	Major St	---BOTH---	
8 AM	494	52	NB	14	Major St		
9 AM	419	56	NB	12			
10 AM	432	52	NB	14	Major St		
11 AM	476	65	NB	8	Major St		
12 PM	551	67	NB	7	Major St		
1 PM	511	57	NB	10	Major St		
2 PM	530	53	NB	13	Major St		
3 PM	644	65	NB	8	Major St	Major St	
4 PM	797	94	SB	3	Major St	---BOTH---	B ONLY
5 PM	900	99	SB	2	Major St	---BOTH---	B ONLY
6 PM	656	91	NB	4	Major St	---BOTH---	
7 PM	500	75	NB	6	Major St	Minor St	
8 PM	463	57	NB	10	Major St		
9 PM	359	47	NB	16			
10 PM	200	28	NB	17			
11 PM	106	21	NB	18			

Condition A is the Minimum Vehicular Volume Warrant.

Condition B is the Interruption of Continuous Traffic Warrant.

Condition A+B is the combination of Conditions A and B at 80%.

Traffic Signal Warrant Analysis - Cliff Road (CSAH 32) and Dodd Road

Traffic Signal Warrant Summary:

TKDA Project No.: 14957.000

Warrant 1 - Eight Hour Vehicular Volume

Condition A: **Not satisfied.** Required values reached for 0 hours. Eight hours required.

Criteria - Major Street 420 Minor Street 140

Condition B: **Not satisfied.** Required values reached for 4 hours. Eight hours required.

Criteria - Major Street 630 Minor Street 70

Condition A+B: **Not satisfied.** Required values reached for 0 hours. Requires volumes to meet 80 percent of requirement of A and of B for eight hours, not necessary the same eight hours.

Criteria - Major Street 480 720 Minor Street 160 80

Warrant 2 - Four Hour Vehicular Volume

Not satisfied. Required values reached for 1 hour. Four hours required.

See chart for criteria.

Warrant 3 - Peak Hour Vehicular Volume

Condition A: **Minor street delay requirement not met.**

Criteria - Total Approach Volume: 800

- Minor Street High Side Volume: 150

- Minor Street High Side Delay: 5 vehicle-hours

Condition B: **Not satisfied.** Required values reached for 0 hours. One hour required.

See chart for criteria.

Warrant 4 - Pedestrian Volume

Not examined.

Criteria - Pedestrian volume crossing the major street is at least 100 per hour for any 4 hours or at least 190 during any one hour.

Warrant 5 - School Crossing

Not examined.

Criteria - At least 20 students crossing during the highest crossing hour.

- Consider implementing other measures, such as warning signs and flashers, school speed zones, school crossing guards, or a grade-separated crossing.

- Do not apply at locations where distance to nearest signal is less than 300 feet.

Warrant 6 - Coordinated Signal System

Not examined

Criteria - Adjacent traffic control signals do not provide the necessary degree of platooning.

- Proposed and adjacent traffic control signals will collectively provide a progressive operation.

- Warrant should not be used where resultant spacing of traffic control signals would be less than 1,000 feet.

Traffic Signal Warrant Analysis - Cliff Road (CSAH 32) and Dodd Road

Traffic Signal Warrant Summary (cont.):

TKDA Project No.: 14957.000

Warrant 7 - Crash Experience

Crash requirements not met.

Criteria - 5 or more correctable crashes, and

- Vehicular volumes meeting 80 percent of Warrant 1 condition A or B, or.
- Pedestrian volumes meeting 80 percent of Warrant 4 conditions.

Warrant 8 - Roadway Network

Not examined.

Criteria - Total existing entering volume of at least 1,000 vehicles per hour during the peak hour of a typical weekday.

- 5-year projected traffic volumes that meet one or more of Warrants 1, 2, and 3 during an average weekday.
- Common intersection of two or more major routes.

Multiway Stop Warrant Summary

Warrant Condition A - Traffic Signal Warrant

Traffic signal warrants are not met.

Criteria - One or more traffic signal warrants are satisfied.

- Multiway stop may be used as an interim control before traffic signal installation if this warrant is met.

Warrant Condition B - Crash Experience

Not satisfied.

Criteria - 5 or more correctable crashes in a twelve month period.

Warrant Condition C - Intersection Volume & Delay

Delay and volume criteria not satisfied.

Criteria - Average delay to minor street vehicular traffic of at least 21 seconds per vehicle during the highest hour.

- Total volume from the major approaches of at least 210 vehicles per hour and total volume from the minor approaches of at least 140 vehicles per hour for any 8 hours of an average day.

Warrant Condition D - Combination Volume, Crash Experience, & Delay

Volume, crash, and delay criteria not satisfied.

Criteria - 4 or more correctable crashes in a twelve month period.

- Average delay to minor street vehicular traffic of at least 24 seconds per vehicle during the highest hour.
- Total volume from the major approaches of at least 240 vehicles per hour and total volume from the minor approaches of at least 160 vehicles per hour for any 8 hours of an average day.

Traffic Signal Warrant Analysis - Cliff Road (CSAH 32) and Dodd Road

Traffic Signal Warrant Graphs:

TKDA Project No.: 14957.000

Figure 4C-2
Warrant 2 - Four-Hour Vehicular Volume

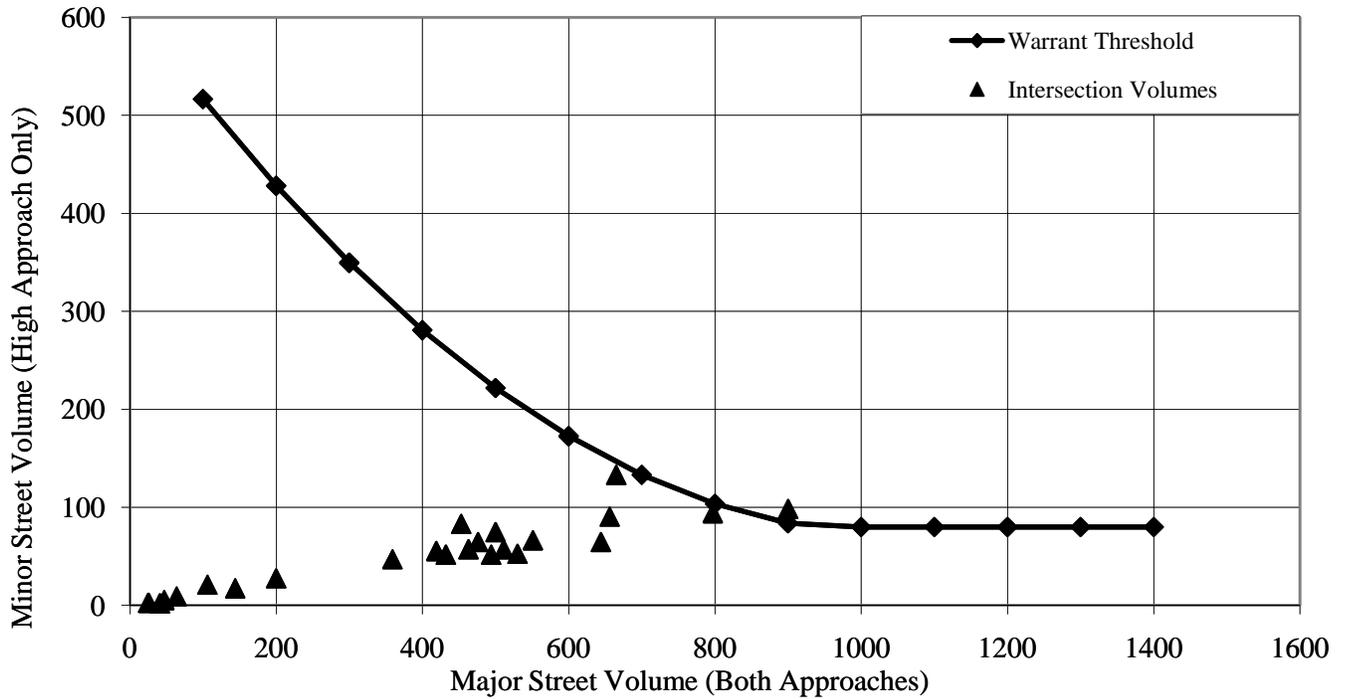
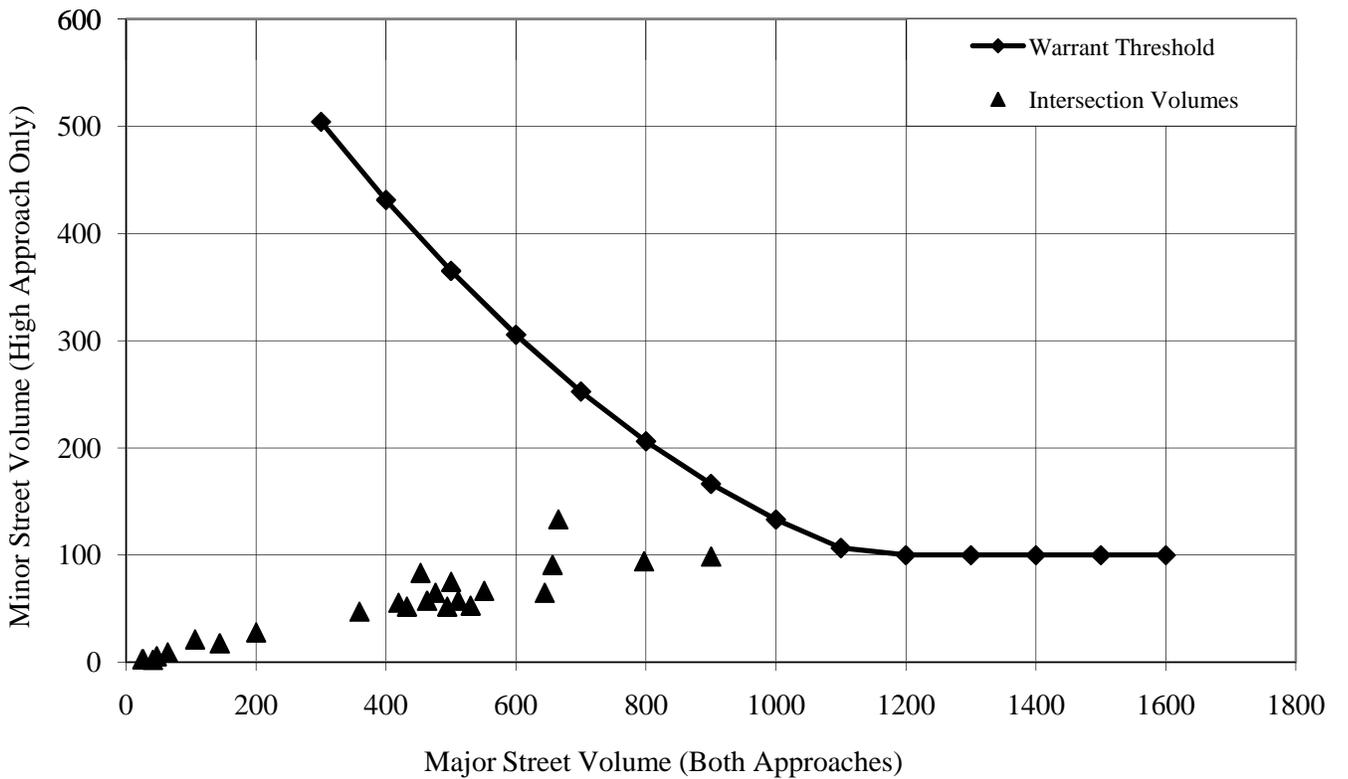


Figure 4C-4
Warrant 3 - Peak-Hour Vehicular Volume



Traffic Signal Warrant Analysis - Cliff Road (CSAH 32) and Dodd Road

TKDA Project No.: 14957.000

Major Street Approaches:

Eastbound: Cliff Road (CSAH 32)

Number of Lanes: 2+
 Approach Speed: 50
 Total App. Vehicles: 5,855
 Rt Turn Percentage: 100%

Westbound: Cliff Road (CSAH 32)

Number of Lanes: 2+
 Approach Speed: 50
 Total App. Vehicles: 4,745
 Rt Turn Percentage: 100%

Minor Street Approaches:

Northbound: Dodd Road

Number of Lanes: 2
 Approach Speed: 30
 Total App. Vehicles: 1,503
 Rt Turn Percentage: 0%

Southbound: Dodd Road

Number of Lanes: 2
 Approach Speed: 40
 Total App. Vehicles: 1,329
 Rt Turn Percentage: 0%

Analysis of Warrant 1: 8-Hour Volumes

Hour Begin	Major (Total)	Minor Street			Condition A Meets Criteria?	Condition B Meets Criteria?	Condition A+B Meets Criteria?
		Volume	Direction	Rank			
12 AM	75	14	NB	20			
1 AM	35	6	SB	22			
2 AM	35	5	NB	24			
3 AM	55	6	SB	22			
4 AM	55	9	NB	21			
5 AM	165	23	NB	19			
6 AM	505	102	NB	5	Major St	Minor St	
7 AM	740	162	NB	1	---BOTH---	---BOTH---	---A + B---
8 AM	550	65	NB	13	Major St		
9 AM	465	69	NB	12	Major St		
10 AM	485	65	NB	13	Major St		
11 AM	530	79	NB	9	Major St	Minor St	
12 PM	615	83	NB	8	Major St	Minor St	
1 PM	570	74	SB	10	Major St	Minor St	
2 PM	590	65	NB	13	Major St		
3 PM	710	88	SB	7	Major St	---BOTH---	
4 PM	880	132	SB	3	Major St	---BOTH---	B ONLY
5 PM	995	138	SB	2	Major St	---BOTH---	B ONLY
6 PM	730	111	NB	4	Major St	---BOTH---	B ONLY
7 PM	555	93	NB	6	Major St	Minor St	
8 PM	515	72	SB	11	Major St	Minor St	
9 PM	400	60	NB	16			
10 PM	225	37	NB	17			
11 PM	120	28	NB	18			

Condition A is the Minimum Vehicular Volume Warrant.

Condition B is the Interruption of Continuous Traffic Warrant.

Condition A+B is the combination of Conditions A and B at 80%.

Traffic Signal Warrant Analysis - Cliff Road (CSAH 32) and Dodd Road

Traffic Signal Warrant Summary:

TKDA Project No.: 14957.000

Warrant 1 - Eight Hour Vehicular Volume

Condition A: **Not satisfied.** Required values reached for 1 hour. Eight hours required.

Criteria - Major Street 420 Minor Street 140

Condition B: **Not satisfied.** Required values reached for 5 hours. Eight hours required.

Criteria - Major Street 630 Minor Street 70

Condition A+B: **Not satisfied.** Required values reached for 1 hour. Requires volumes to meet 80 percent of requirement of A and of B for eight hours, not necessary the same eight hours.

Criteria - Major Street 480 720 Minor Street 160 80

Warrant 2 - Four Hour Vehicular Volume

Not satisfied. Required values reached for 3 hours. Four hours required.

See chart for criteria.

Warrant 3 - Peak Hour Vehicular Volume

Condition A: **Not examined.**

Criteria - Total Approach Volume: 800

- Minor Street High Side Volume: 150

- Minor Street High Side Delay: 5 vehicle-hours

Condition B: **Satisfied.** Required values reached for 1 hour. One hour required.

See chart for criteria.

Warrant 4 - Pedestrian Volume

Not examined.

Criteria - Pedestrian volume crossing the major street is at least 100 per hour for any 4 hours or at least 190 during any one hour.

Warrant 5 - School Crossing

Not examined.

Criteria - At least 20 students crossing during the highest crossing hour.

- Consider implementing other measures, such as warning signs and flashers, school speed zones, school crossing guards, or a grade-separated crossing.

- Do not apply at locations where distance to nearest signal is less than 300 feet.

Warrant 6 - Coordinated Signal System

Not examined

Criteria - Adjacent traffic control signals do not provide the necessary degree of platooning.

- Proposed and adjacent traffic control signals will collectively provide a progressive operation.

- Warrant should not be used where resultant spacing of traffic control signals would be less than 1,000 feet.

Traffic Signal Warrant Analysis - Cliff Road (CSAH 32) and Dodd Road

Traffic Signal Warrant Summary (cont.):

TKDA Project No.: 14957.000

Warrant 7 - Crash Experience

Not examined.

Criteria - 5 or more correctable crashes, and

- Vehicular volumes meeting 80 percent of Warrant 1 condition A or B, or.
- Pedestrian volumes meeting 80 percent of Warrant 4 conditions.

Warrant 8 - Roadway Network

Not examined.

Criteria - Total existing entering volume of at least 1,000 vehicles per hour during the peak hour of a typical weekday.

- 5-year projected traffic volumes that meet one or more of Warrants 1, 2, and 3 during an average weekday.
- Common intersection of two or more major routes.

Traffic Signal Warrant Analysis - Cliff Road (CSAH 32) and Dodd Road

Traffic Signal Warrant Graphs:

TKDA Project No.: 14957.000

Figure 4C-2
Warrant 2 - Four-Hour Vehicular Volume

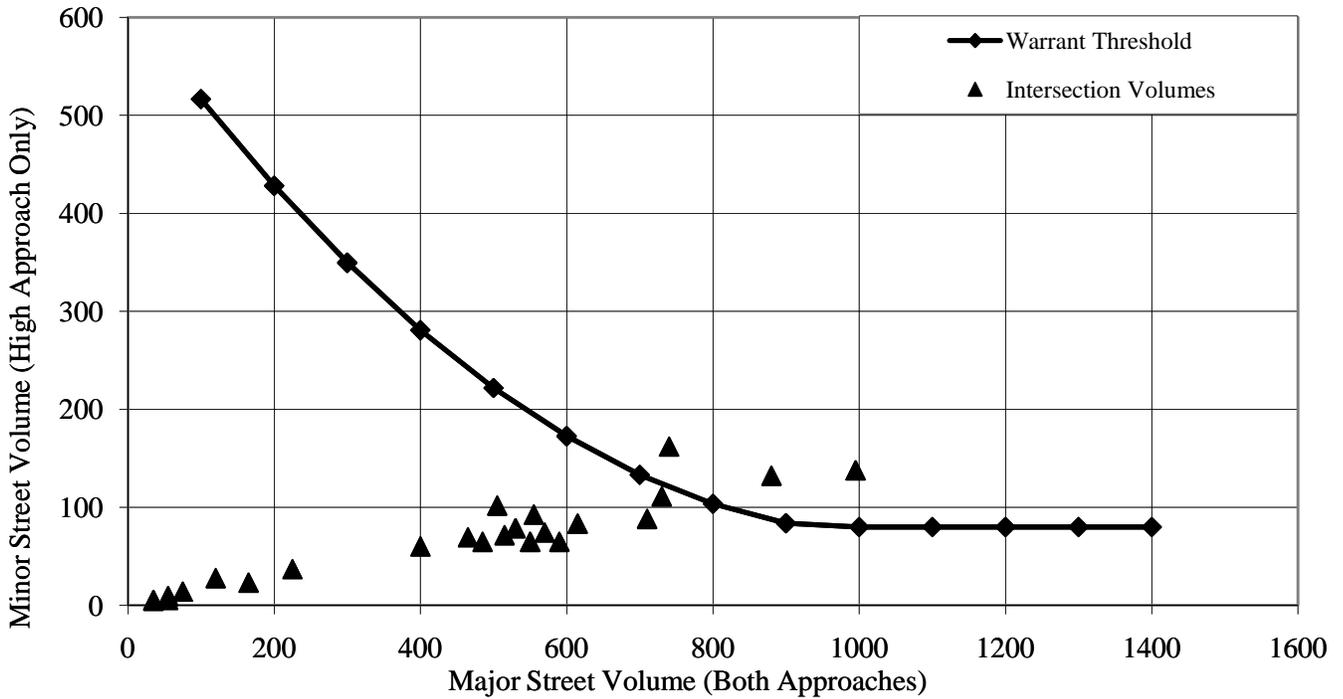
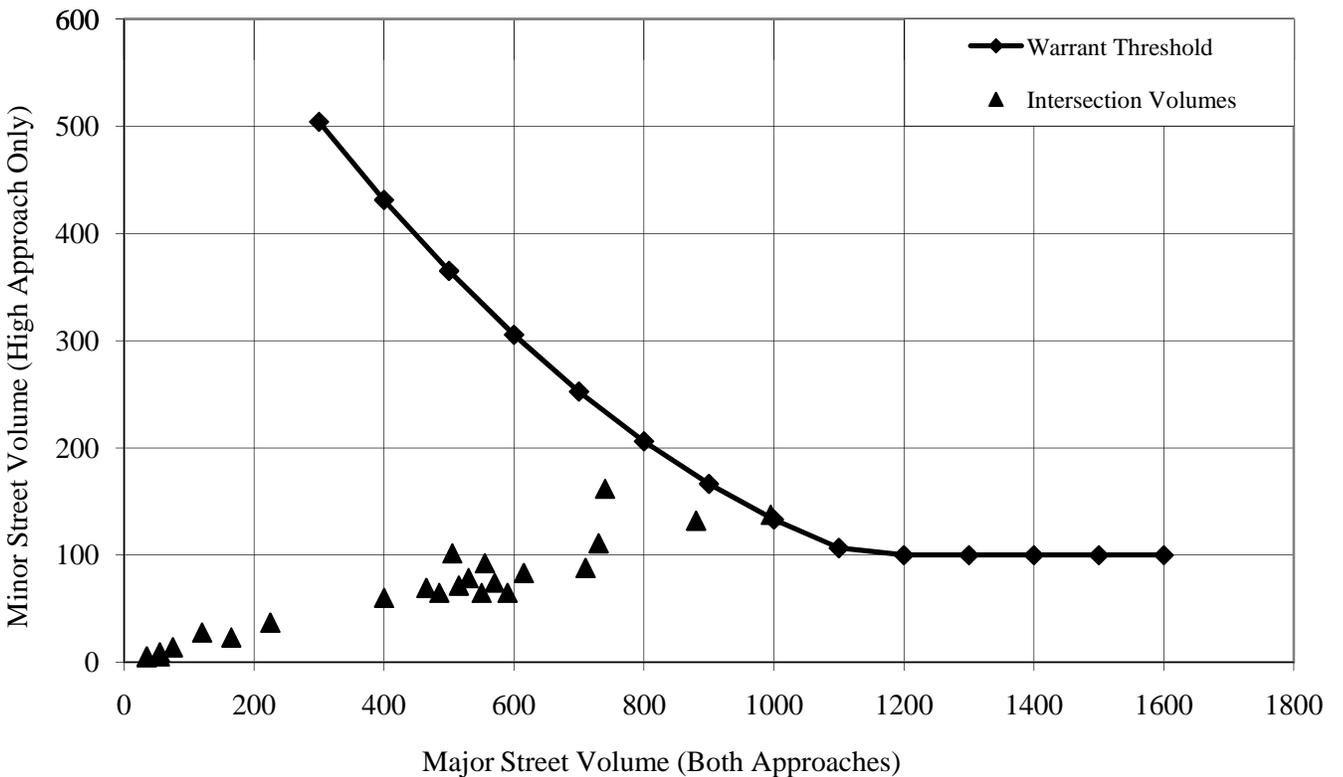


Figure 4C-4
Warrant 3 - Peak-Hour Vehicular Volume



Traffic Signal Warrant Analysis - Cliff Road (CSAH 32) and Dodd Road

TKDA Project No.: 14957.000

Major Street Approaches:

Eastbound: Cliff Road (CSAH 32)

Number of Lanes: 2+
 Approach Speed: 50
 Total App. Vehicles: 6,090
 Rt Turn Percentage: 100%

Westbound: Cliff Road (CSAH 32)

Number of Lanes: 2+
 Approach Speed: 50
 Total App. Vehicles: 5,015
 Rt Turn Percentage: 100%

Minor Street Approaches:

Northbound: Dodd Road

Number of Lanes: 2
 Approach Speed: 30
 Total App. Vehicles: 1,628
 Rt Turn Percentage: 0%

Southbound: Dodd Road

Number of Lanes: 2
 Approach Speed: 40
 Total App. Vehicles: 1,544
 Rt Turn Percentage: 0%

Analysis of Warrant 1: 8-Hour Volumes

Hour Begin	Major (Total)	Minor Street			Condition A Meets Criteria?	Condition B Meets Criteria?	Condition A+B Meets Criteria?
		Volume	Direction	Rank			
12 AM	75	14	NB	20			
1 AM	35	6	SB	22			
2 AM	35	5	NB	24			
3 AM	55	6	SB	22			
4 AM	60	9	NB	21			
5 AM	170	23	NB	19			
6 AM	530	111	NB	5	Major St	Minor St	
7 AM	780	176	NB	1	---BOTH---	---BOTH---	---A + B---
8 AM	575	69	NB	14	Major St		
9 AM	490	74	SB	12	Major St	Minor St	
10 AM	505	69	NB	14	Major St		
11 AM	555	88	NB	8	Major St	Minor St	
12 PM	645	88	NB	8	Major St	---BOTH---	
1 PM	595	85	SB	10	Major St	Minor St	
2 PM	620	74	SB	12	Major St	Minor St	
3 PM	750	105	SB	6	Major St	---BOTH---	B ONLY
4 PM	925	154	SB	3	---BOTH---	---BOTH---	B ONLY
5 PM	1045	160	SB	2	---BOTH---	---BOTH---	B ONLY
6 PM	760	120	NB	4	Major St	---BOTH---	B ONLY
7 PM	580	97	NB	7	Major St	Minor St	
8 PM	535	83	SB	11	Major St	Minor St	
9 PM	420	65	NB	16	Major St		
10 PM	235	39	SB	17			
11 PM	130	28	NB	18			

Condition A is the Minimum Vehicular Volume Warrant.

Condition B is the Interruption of Continuous Traffic Warrant.

Condition A+B is the combination of Conditions A and B at 80%.

Traffic Signal Warrant Analysis - Cliff Road (CSAH 32) and Dodd Road

Traffic Signal Warrant Summary:

TKDA Project No.: 14957.000

Warrant 1 - Eight Hour Vehicular Volume

Condition A: **Not satisfied.** Required values reached for 3 hours. Eight hours required.

Criteria - Major Street 420 Minor Street 140

Condition B: **Not satisfied.** Required values reached for 6 hours. Eight hours required.

Criteria - Major Street 630 Minor Street 70

Condition A+B: **Not satisfied.** Required values reached for 1 hour. Requires volumes to meet 80 percent of requirement of A and of B for eight hours, not necessary the same eight hours.

Criteria - Major Street 480 720 Minor Street 160 80

Warrant 2 - Four Hour Vehicular Volume

Satisfied. Required values reached for 4 hours. Four hours required.

See chart for criteria.

Warrant 3 - Peak Hour Vehicular Volume

Condition A: **Not examined.**

Criteria - Total Approach Volume: 800

- Minor Street High Side Volume: 150

- Minor Street High Side Delay: 5 vehicle-hours

Condition B: **Satisfied.** Required values reached for 1 hour. One hour required.

See chart for criteria.

Warrant 4 - Pedestrian Volume

Not examined.

Criteria - Pedestrian volume crossing the major street is at least 100 per hour for any 4 hours or at least 190 during any one hour.

Warrant 5 - School Crossing

Not examined.

Criteria - At least 20 students crossing during the highest crossing hour.

- Consider implementing other measures, such as warning signs and flashers, school speed zones, school crossing guards, or a grade-separated crossing.

- Do not apply at locations where distance to nearest signal is less than 300 feet.

Warrant 6 - Coordinated Signal System

Not examined

Criteria - Adjacent traffic control signals do not provide the necessary degree of platooning.

- Proposed and adjacent traffic control signals will collectively provide a progressive operation.

- Warrant should not be used where resultant spacing of traffic control signals would be less than 1,000 feet.

Traffic Signal Warrant Analysis - Cliff Road (CSAH 32) and Dodd Road

Traffic Signal Warrant Summary (cont.):

TKDA Project No.: 14957.000

Warrant 7 - Crash Experience

Not examined.

Criteria - 5 or more correctable crashes, and

- Vehicular volumes meeting 80 percent of Warrant 1 condition A or B, or.
- Pedestrian volumes meeting 80 percent of Warrant 4 conditions.

Warrant 8 - Roadway Network

Not examined.

Criteria - Total existing entering volume of at least 1,000 vehicles per hour during the peak hour of a typical weekday.

- 5-year projected traffic volumes that meet one or more of Warrants 1, 2, and 3 during an average weekday.
- Common intersection of two or more major routes.

Traffic Signal Warrant Analysis - Cliff Road (CSAH 32) and Dodd Road

Traffic Signal Warrant Graphs:

TKDA Project No.: 14957.000

Figure 4C-2
Warrant 2 - Four-Hour Vehicular Volume

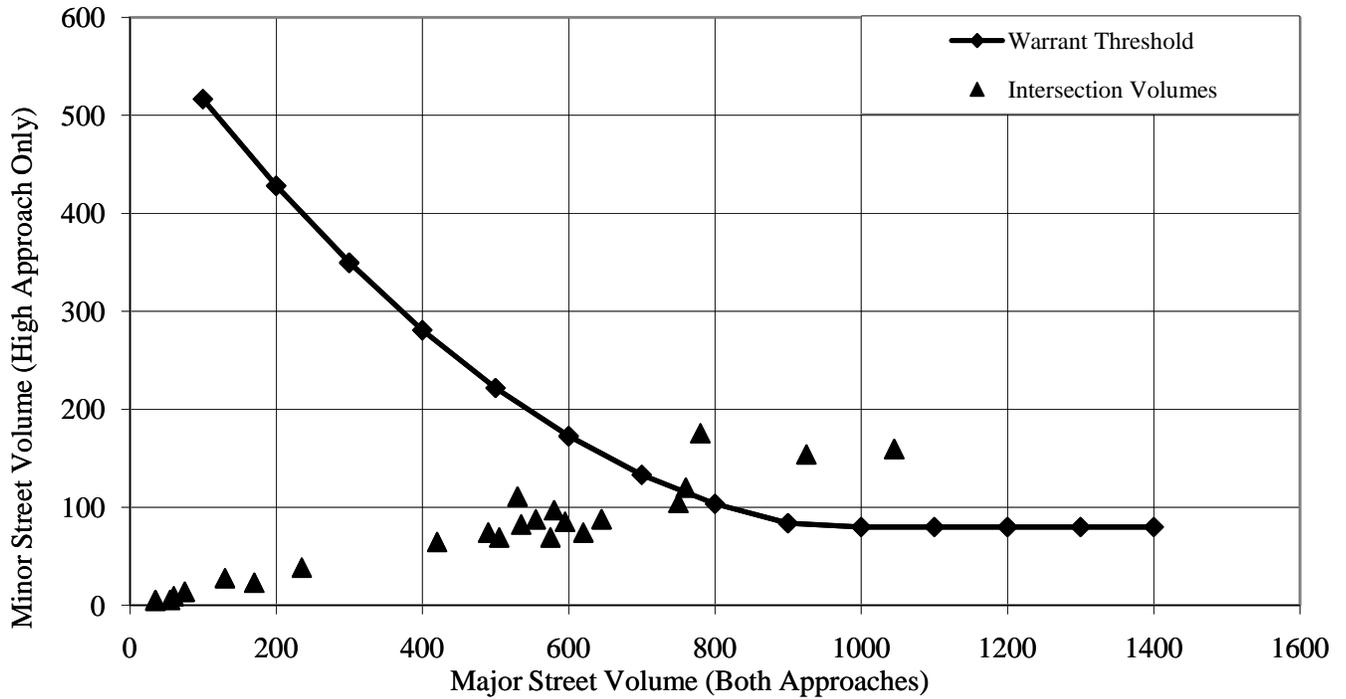
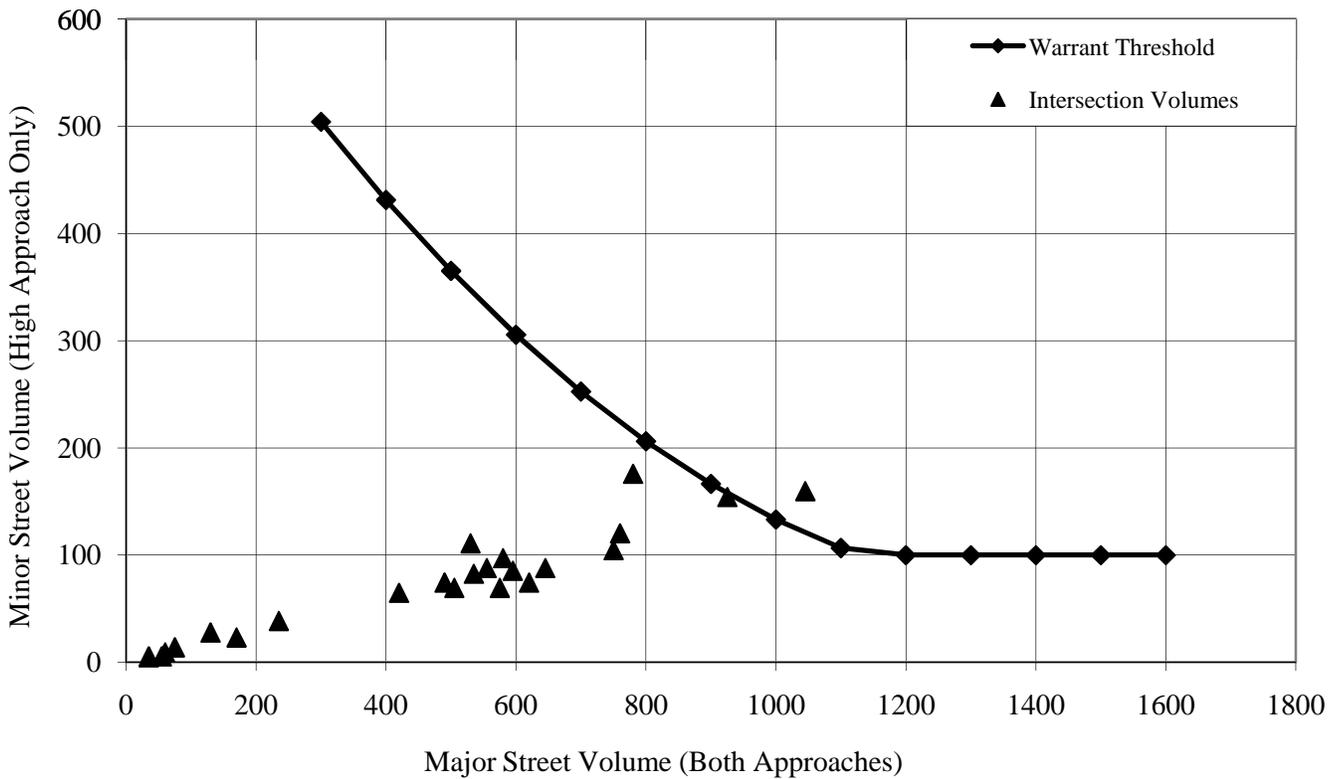


Figure 4C-4
Warrant 3 - Peak-Hour Vehicular Volume



Traffic Signal Warrant Analysis - Cliff Road (CSAH 32) and Dodd Road

TKDA Project No.: 14957.000

Major Street Approaches:

Eastbound: Cliff Road (CSAH 32)

Number of Lanes: 2+
 Approach Speed: 50
 Total App. Vehicles: 6,445
 Rt Turn Percentage: 100%

Westbound: Cliff Road (CSAH 32)

Number of Lanes: 2+
 Approach Speed: 50
 Total App. Vehicles: 5,390
 Rt Turn Percentage: 100%

Minor Street Approaches:

Northbound: Dodd Road

Number of Lanes: 2
 Approach Speed: 30
 Total App. Vehicles: 1,808
 Rt Turn Percentage: 0%

Southbound: Dodd Road

Number of Lanes: 2
 Approach Speed: 40
 Total App. Vehicles: 1,915
 Rt Turn Percentage: 0%

Analysis of Warrant 1: 8-Hour Volumes

Hour Begin	Major (Total)	Minor Street			Condition A Meets Criteria?	Condition B Meets Criteria?	Condition A+B Meets Criteria?
		Volume	Direction	Rank			
12 AM	85	17	SB	20			
1 AM	35	6	SB	22			
2 AM	35	6	SB	22			
3 AM	55	6	SB	22			
4 AM	65	9	NB	21			
5 AM	180	28	NB	19			
6 AM	565	125	NB	6	Major St	Minor St	
7 AM	830	194	NB	2	---BOTH---	---BOTH---	---A + B---
8 AM	615	80	SB	14	Major St	Minor St	
9 AM	525	91	SB	13	Major St	Minor St	
10 AM	540	80	SB	14	Major St	Minor St	
11 AM	595	97	NB	10	Major St	Minor St	
12 PM	685	97	NB	10	Major St	---BOTH---	
1 PM	635	107	SB	8	Major St	---BOTH---	
2 PM	655	94	SB	12	Major St	---BOTH---	
3 PM	800	129	SB	5	Major St	---BOTH---	B ONLY
4 PM	985	190	SB	3	---BOTH---	---BOTH---	---A + B---
5 PM	1110	198	SB	1	---BOTH---	---BOTH---	---A + B---
6 PM	815	143	SB	4	---BOTH---	---BOTH---	B ONLY
7 PM	620	111	NB	7	Major St	Minor St	
8 PM	570	102	SB	9	Major St	Minor St	
9 PM	450	69	NB	16	Major St		
10 PM	250	47	SB	17			
11 PM	135	32	NB	18			

Condition A is the Minimum Vehicular Volume Warrant.

Condition B is the Interruption of Continuous Traffic Warrant.

Condition A+B is the combination of Conditions A and B at 80%.

Traffic Signal Warrant Analysis - Cliff Road (CSAH 32) and Dodd Road

Traffic Signal Warrant Summary:

TKDA Project No.: 14957.000

Warrant 1 - Eight Hour Vehicular Volume

Condition A: **Not satisfied.** Required values reached for 4 hours. Eight hours required.

Criteria - Major Street 420 Minor Street 140

Condition B: **Satisfied.** Required values reached for 8 hours. Eight hours required.

Criteria - Major Street 630 Minor Street 70

Condition A+B: **Not satisfied.** Required values reached for 3 hours. Requires volumes to meet 80 percent of requirement of A and of B for eight hours, not necessary the same eight hours.

Criteria - Major Street 480 720 Minor Street 160 80

Warrant 2 - Four Hour Vehicular Volume

Satisfied. Required values reached for 5 hours. Four hours required.

See chart for criteria.

Warrant 3 - Peak Hour Vehicular Volume

Condition A: **Not examined.**

Criteria - Total Approach Volume: 800

- Minor Street High Side Volume: 150

- Minor Street High Side Delay: 5 vehicle-hours

Condition B: **Satisfied.** Required values reached for 2 hours. One hour required.

See chart for criteria.

Warrant 4 - Pedestrian Volume

Not examined.

Criteria - Pedestrian volume crossing the major street is at least 100 per hour for any 4 hours or at least 190 during any one hour.

Warrant 5 - School Crossing

Not examined.

Criteria - At least 20 students crossing during the highest crossing hour.

- Consider implementing other measures, such as warning signs and flashers, school speed zones, school crossing guards, or a grade-separated crossing.

- Do not apply at locations where distance to nearest signal is less than 300 feet.

Warrant 6 - Coordinated Signal System

Not examined

Criteria - Adjacent traffic control signals do not provide the necessary degree of platooning.

- Proposed and adjacent traffic control signals will collectively provide a progressive operation.

- Warrant should not be used where resultant spacing of traffic control signals would be less than 1,000 feet.

Traffic Signal Warrant Analysis - Cliff Road (CSAH 32) and Dodd Road

Traffic Signal Warrant Summary (cont.):

TKDA Project No.: 14957.000

Warrant 7 - Crash Experience

Not examined.

Criteria - 5 or more correctable crashes, and

- Vehicular volumes meeting 80 percent of Warrant 1 condition A or B, or.
- Pedestrian volumes meeting 80 percent of Warrant 4 conditions.

Warrant 8 - Roadway Network

Not examined.

Criteria - Total existing entering volume of at least 1,000 vehicles per hour during the peak hour of a typical weekday.

- 5-year projected traffic volumes that meet one or more of Warrants 1, 2, and 3 during an average weekday.
- Common intersection of two or more major routes.

Traffic Signal Warrant Analysis - Cliff Road (CSAH 32) and Dodd Road

Traffic Signal Warrant Graphs:

TKDA Project No.: 14957.000

Figure 4C-2
Warrant 2 - Four-Hour Vehicular Volume

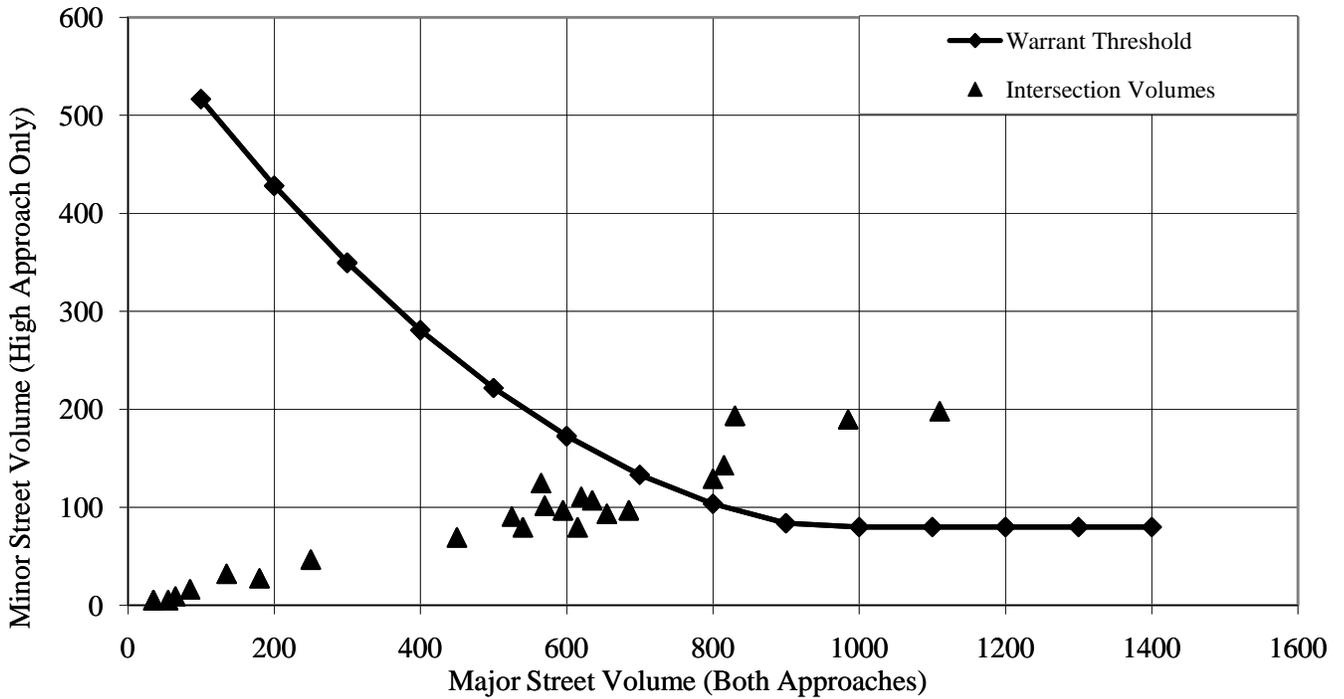
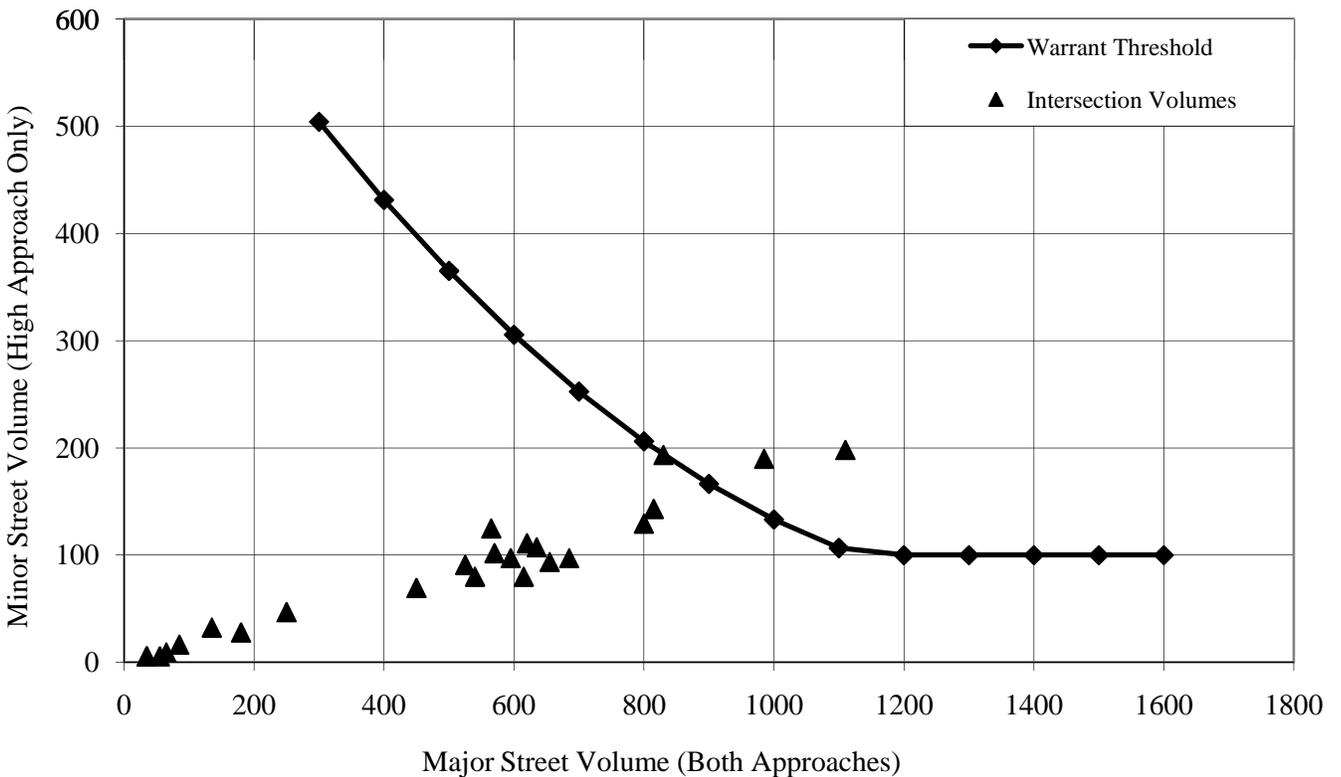


Figure 4C-4
Warrant 3 - Peak-Hour Vehicular Volume



APPENDIX

Collision Diagram

Dakota County Highway Department



CSAH 32
Cliff Rd
R.P.: 8.769

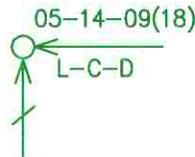
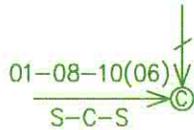
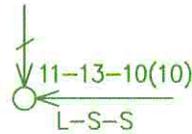
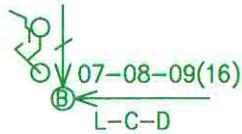
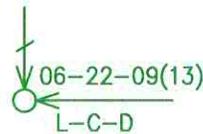
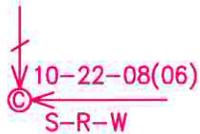
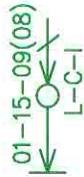
Dodd Rd
MSAS 115
R.P.: 0.000

Collision Diagram

ACCIDENT TOTALS

2008..... 1
2009..... 4
2010..... 2

DATE PREPARED: 09-30-11
PREPARED BY: PV



ACCIDENTS SUMMARY

7 ACCIDENTS . . . 3 YEARS
3 . . . PERSONAL INJURY
4 . . . PROPERTY DAMAGE

1 . . NB	1 . . EB	5 . . DAY
7 . . SB	5 . . WB	2 . . NIGHT

5 . . CLEAR	3 . . DRY
1 . . RAIN	1 . . WET
1 . . SNOW	1 . . ICE
0 . . FOG	2 . . SNOW

ACCIDENTS SUMMARY

6 . . . RIGHT ANGLE
1 . . . REAR END

Standard Symbols

	M V MOVING AHEAD		SCHOOL BUS		PEDESTRIAN		BICYCLE		MOTORCYCLE
	M V BACKING UP				PARKING		FIXED OBJECT		ANIMAL
	MOTOR VEHICLE STOPPED								
	PARTY AT FAULT	●	FATAL ACCIDENT						
	OUT OF CONTROL	ⒶⒷⒸ	PERSONAL INJURY						
	OVERTURN	○	PROPERTY DAMAGE						
	REAR END								
	RIGHT ANGLE								

LIGHT:	WEATHER:	SURFACE:
L = DAYLIGHT	C = CLEAR	D = DRY
D = DARK	R = RAINING	W = WET
S = DARK W/ STREET LIGHTS	S = SNOWING	S = SNOW
	F = FOG	I = ICE

INTERSECTION CSAH 32 & DODD RD
FROM 01-01-08 TO 12-31-10

IN EAGAN
SOURCE MNDOT PRINTOUT

APPENDIX

Traffic Analyses

SimTraffic Performance Report
Existing AM Peak

200: Dodd Road & Cliff Road (CSAH 32) Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay (hr)	0.1	0.1	0.0	0.0	0.2	0.0	0.3	0.3	0.0	0.1	0.1	0.1
Total Del/Veh (s)	6.7	1.3	1.1	4.5	2.4	0.8	13.9	12.4	6.2	13.1	13.8	6.2
Speed Delay (hr)	0.0	0.1	0.0	0.0	0.2	0.0	0.2	0.3	0.0	0.1	0.1	0.1
Speed Del/Veh (s)	2.8	0.8	0.4	1.1	2.1	0.5	10.0	11.9	6.1	9.0	13.5	5.9
Total Stops	26	0	0	0	0	0	69	78	6	23	24	86
Travel Time (hr)	0.5	1.3	0.0	0.0	2.0	0.3	0.7	0.7	0.1	0.2	0.2	0.6
Avg Speed (mph)	37	48	44	41	45	41	19	19	21	23	22	25
Vehicles Entered	57	224	6	1	321	47	69	77	6	24	24	86
Vehicles Exited	57	223	6	1	321	48	69	78	6	23	24	86
Hourly Exit Rate	57	223	6	1	321	48	69	78	6	23	24	86
Input Volume	60	219	7	1	314	46	72	76	7	23	25	81
% of Volume	95	102	86	100	102	104	96	103	86	100	96	106
Denied Entry Before	0	0	0	0	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0	0	0	0	0	0

200: Dodd Road & Cliff Road (CSAH 32) Performance by movement

Movement	All
Total Delay (hr)	1.3
Total Del/Veh (s)	4.9
Speed Delay (hr)	1.0
Speed Del/Veh (s)	4.0
Total Stops	312
Travel Time (hr)	6.8
Avg Speed (mph)	36
Vehicles Entered	942
Vehicles Exited	942
Hourly Exit Rate	942
Input Volume	931
% of Volume	101
Denied Entry Before	0
Denied Entry After	0

Queuing and Blocking Report
Existing AM Peak

Intersection: 200: Dodd Road & Cliff Road (CSAH 32)

Movement	EB	WB	NB	NB	SB	SB
Directions Served	L	L	L	TR	L	TR
Maximum Queue (ft)	50	5	78	88	43	92
Average Queue (ft)	16	0	33	39	16	38
95th Queue (ft)	40	5	58	70	40	70
Link Distance (ft)				964		966
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)	300	300	100		100	
Storage Blk Time (%)			0	0		0
Queuing Penalty (veh)			0	0		0

SimTraffic Performance Report
Existing PM Peak

200: Dodd Road & Cliff Road (CSAH 32) Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay (hr)	0.1	0.4	0.0	0.0	0.2	0.0	0.1	0.1	0.0	0.2	0.3	0.1
Total Del/Veh (s)	6.7	3.0	1.5	6.1	1.9	0.6	15.3	13.0	4.9	16.4	16.1	6.8
Speed Delay (hr)	0.1	0.3	0.0	0.0	0.1	0.0	0.1	0.1	0.0	0.1	0.3	0.1
Speed Del/Veh (s)	2.6	2.2	0.7	2.3	1.6	0.3	11.4	12.7	4.8	12.2	15.8	6.5
Total Stops	21	0	0	5	0	0	31	29	8	40	61	72
Travel Time (hr)	0.6	2.7	0.5	0.1	1.8	0.2	0.3	0.3	0.1	0.4	0.6	0.5
Avg Speed (mph)	38	44	41	38	46	42	19	19	22	21	20	24
Vehicles Entered	72	422	67	9	295	30	31	30	8	40	60	71
Vehicles Exited	71	423	67	8	295	30	31	29	8	40	61	72
Hourly Exit Rate	71	423	67	8	295	30	31	29	8	40	61	72
Input Volume	68	415	67	8	299	31	31	31	8	43	64	75
% of Volume	104	102	100	100	99	97	100	94	100	93	95	96
Denied Entry Before	0	0	0	0	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0	0	0	0	0	0

200: Dodd Road & Cliff Road (CSAH 32) Performance by movement

Movement	All
Total Delay (hr)	1.5
Total Del/Veh (s)	4.9
Speed Delay (hr)	1.2
Speed Del/Veh (s)	3.8
Total Stops	267
Travel Time (hr)	8.1
Avg Speed (mph)	38
Vehicles Entered	1135
Vehicles Exited	1135
Hourly Exit Rate	1135
Input Volume	1140
% of Volume	100
Denied Entry Before	0
Denied Entry After	0

Queuing and Blocking Report
Existing PM Peak

Intersection: 200: Dodd Road & Cliff Road (CSAH 32)

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	TR	L	TR	L	TR	L	TR
Maximum Queue (ft)	45	6	30	13	43	58	61	108
Average Queue (ft)	13	0	4	0	20	25	24	45
95th Queue (ft)	37	5	19	10	45	52	52	86
Link Distance (ft)		1466		1463		964		966
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)	300		300		100		100	
Storage Blk Time (%)								1
Queuing Penalty (veh)								0

SimTraffic Performance Report
 2023 AM Peak-No Improvements

200: Dodd Road & Cliff Road (CSAH 32) Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay (hr)	0.2	0.1	0.0	0.0	0.4	0.0	0.5	0.8	0.0	0.2	0.2	0.4
Total Del/Veh (s)	8.2	1.9	1.0	4.8	3.7	1.5	20.9	20.4	13.4	21.6	20.2	13.1
Speed Delay (hr)	0.1	0.1	0.0	0.0	0.4	0.0	0.4	0.8	0.0	0.2	0.2	0.4
Speed Del/Veh (s)	4.2	1.2	0.3	1.1	3.3	1.1	16.9	19.7	12.9	17.4	19.7	12.7
Total Stops	41	0	0	1	1	3	89	143	11	32	42	115
Travel Time (hr)	0.7	1.7	0.1	0.0	2.6	0.5	1.1	1.7	0.1	0.4	0.4	1.1
Avg Speed (mph)	35	47	42	38	42	38	16	16	17	18	18	20
Vehicles Entered	83	277	10	4	396	72	90	143	11	32	42	115
Vehicles Exited	83	277	10	4	394	72	89	143	11	32	42	115
Hourly Exit Rate	83	277	10	4	394	72	89	143	11	32	42	115
Input Volume	85	275	10	5	390	70	90	140	10	35	45	115
% of Volume	98	101	100	80	101	103	99	102	110	91	93	100
Denied Entry Before	0	0	0	0	0	0	0	0	0	0	0	0
Denied Entry After	0	1	0	0	0	0	0	0	0	0	0	0

200: Dodd Road & Cliff Road (CSAH 32) Performance by movement

Movement	All
Total Delay (hr)	3.0
Total Del/Veh (s)	8.5
Speed Delay (hr)	2.6
Speed Del/Veh (s)	7.4
Total Stops	478
Travel Time (hr)	10.5
Avg Speed (mph)	31
Vehicles Entered	1275
Vehicles Exited	1272
Hourly Exit Rate	1272
Input Volume	1270
% of Volume	100
Denied Entry Before	0
Denied Entry After	1

Queuing and Blocking Report
 2023 AM Peak-No Improvements

Intersection: 200: Dodd Road & Cliff Road (CSAH 32)

Movement	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	L	TR	L	TR	L	TR
Maximum Queue (ft)	58	20	28	109	164	69	152
Average Queue (ft)	22	1	3	43	63	22	59
95th Queue (ft)	51	7	15	79	117	53	115
Link Distance (ft)			1463		964		966
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)	300	300		100		100	
Storage Blk Time (%)				1	4	0	3
Queuing Penalty (veh)				1	4	0	1

SimTraffic Performance Report
 2023 PM Peak-No Improvements

200: Dodd Road & Cliff Road (CSAH 32) Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay (hr)	0.2	0.7	0.1	0.0	0.3	0.0	0.3	0.3	0.1	0.5	1.1	0.7
Total Del/Veh (s)	7.8	4.6	2.5	7.7	2.8	1.1	25.2	22.1	12.2	28.5	35.3	23.3
Speed Delay (hr)	0.1	0.5	0.0	0.0	0.2	0.0	0.2	0.3	0.1	0.4	1.1	0.7
Speed Del/Veh (s)	3.5	3.4	1.3	3.8	2.4	0.6	21.4	21.9	11.9	24.3	34.7	22.8
Total Stops	39	0	1	7	0	1	40	56	16	62	109	107
Travel Time (hr)	0.9	3.6	0.6	0.1	2.3	0.3	0.5	0.7	0.2	0.8	1.6	1.3
Avg Speed (mph)	36	42	38	35	44	41	15	15	18	15	13	15
Vehicles Entered	94	522	80	14	361	45	40	56	16	61	109	107
Vehicles Exited	95	522	80	14	362	45	40	56	16	61	108	107
Hourly Exit Rate	95	522	80	14	362	45	40	56	16	61	108	107
Input Volume	95	515	85	15	370	45	40	60	15	65	115	105
% of Volume	100	101	94	93	98	100	100	93	107	94	94	102
Denied Entry Before	0	0	0	0	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0	0	0	0	0	0

200: Dodd Road & Cliff Road (CSAH 32) Performance by movement

Movement	All
Total Delay (hr)	4.2
Total Del/Veh (s)	10.0
Speed Delay (hr)	3.7
Speed Del/Veh (s)	8.8
Total Stops	438
Travel Time (hr)	13.0
Avg Speed (mph)	31
Vehicles Entered	1505
Vehicles Exited	1506
Hourly Exit Rate	1506
Input Volume	1525
% of Volume	99
Denied Entry Before	0
Denied Entry After	0

Queuing and Blocking Report
 2023 PM Peak-No Improvements

Intersection: 200: Dodd Road & Cliff Road (CSAH 32)

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	TR	L	TR	L	TR	L	TR
Maximum Queue (ft)	50	20	26	12	68	88	136	230
Average Queue (ft)	22	1	6	1	27	40	42	95
95th Queue (ft)	46	8	23	6	57	75	97	184
Link Distance (ft)		1466		1463		964		966
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)	300		300		100		100	
Storage Blk Time (%)					0	1	1	15
Queuing Penalty (veh)					0	0	1	9

SimTraffic Performance Report
 2029 AM Peak-No Improvements

200: Dodd Road & Cliff Road (CSAH 32) Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay (hr)	0.3	0.2	0.0	0.0	0.5	0.0	0.8	1.8	0.1	0.3	0.5	0.8
Total Del/Veh (s)	9.5	2.2	1.5	5.7	4.2	1.8	28.3	36.0	27.6	28.5	32.6	23.6
Speed Delay (hr)	0.1	0.1	0.0	0.0	0.5	0.0	0.7	1.7	0.1	0.2	0.5	0.8
Speed Del/Veh (s)	5.4	1.4	0.5	2.3	3.8	1.3	24.4	35.2	26.8	24.2	32.1	23.2
Total Stops	58	0	0	1	0	7	102	173	14	37	59	126
Travel Time (hr)	0.9	2.0	0.1	0.0	3.0	0.6	1.5	2.8	0.2	0.5	0.8	1.6
Avg Speed (mph)	34	46	41	36	42	38	14	11	13	15	13	15
Vehicles Entered	95	317	8	3	439	81	101	172	14	36	59	127
Vehicles Exited	95	316	8	3	438	81	100	173	13	36	59	127
Hourly Exit Rate	95	316	8	3	438	81	100	173	13	36	59	127
Input Volume	95	300	10	5	430	80	100	180	15	40	60	130
% of Volume	100	105	80	60	102	101	100	96	87	90	98	98
Denied Entry Before	0	0	0	0	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0	0	0	0	0	0

200: Dodd Road & Cliff Road (CSAH 32) Performance by movement

Movement	All
Total Delay (hr)	5.4
Total Del/Veh (s)	13.2
Speed Delay (hr)	4.9
Speed Del/Veh (s)	12.0
Total Stops	577
Travel Time (hr)	13.9
Avg Speed (mph)	26
Vehicles Entered	1452
Vehicles Exited	1449
Hourly Exit Rate	1449
Input Volume	1445
% of Volume	100
Denied Entry Before	0
Denied Entry After	0

Queuing and Blocking Report
 2029 AM Peak-No Improvements

Intersection: 200: Dodd Road & Cliff Road (CSAH 32)

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	TR	L	TR	L	TR	L	TR
Maximum Queue (ft)	74	4	20	36	173	251	98	194
Average Queue (ft)	28	0	1	4	53	96	28	80
95th Queue (ft)	55	3	9	20	110	189	69	163
Link Distance (ft)		1466		1463		964		966
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)	300		300		100		100	
Storage Blk Time (%)					2	18		11
Queuing Penalty (veh)					4	18		4

SimTraffic Performance Report
 2029 PM Peak-No Improvements

200: Dodd Road & Cliff Road (CSAH 32) Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay (hr)	0.3	0.8	0.1	0.0	0.4	0.0	0.5	0.5	0.1	2.3	6.0	5.0
Total Del/Veh (s)	8.9	5.2	2.9	8.9	3.5	1.3	35.3	26.6	19.4	107.3	148.0	137.1
Speed Delay (hr)	0.1	0.6	0.0	0.0	0.3	0.0	0.4	0.5	0.1	2.1	5.7	4.7
Speed Del/Veh (s)	4.5	4.0	1.6	5.0	3.0	0.8	31.5	26.2	19.0	98.7	140.2	126.9
Total Stops	51	0	4	11	0	1	45	70	17	140	196	181
Travel Time (hr)	1.0	4.1	0.8	0.2	2.6	0.4	0.7	1.0	0.2	2.7	6.7	5.8
Avg Speed (mph)	35	41	37	34	43	39	12	13	15	5	4	4
Vehicles Entered	106	572	96	18	397	54	45	70	17	77	141	127
Vehicles Exited	106	571	96	18	398	54	46	70	17	75	141	127
Hourly Exit Rate	106	571	96	18	398	54	46	70	17	75	141	127
Input Volume	110	565	95	15	410	55	45	75	15	75	150	120
% of Volume	96	101	101	120	97	98	102	93	113	100	94	106
Denied Entry Before	0	0	0	0	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0	0	0	0	2	1

200: Dodd Road & Cliff Road (CSAH 32) Performance by movement

Movement	All
Total Delay (hr)	16.1
Total Del/Veh (s)	33.3
Speed Delay (hr)	14.7
Speed Del/Veh (s)	30.4
Total Stops	716
Travel Time (hr)	26.1
Avg Speed (mph)	18
Vehicles Entered	1720
Vehicles Exited	1719
Hourly Exit Rate	1719
Input Volume	1730
% of Volume	99
Denied Entry Before	0
Denied Entry After	3

Queuing and Blocking Report
 2029 PM Peak-No Improvements

Intersection: 200: Dodd Road & Cliff Road (CSAH 32)

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	TR	L	TR	L	TR	L	TR
Maximum Queue (ft)	68	32	32	13	72	113	219	688
Average Queue (ft)	25	3	8	1	32	48	119	369
95th Queue (ft)	52	17	27	7	66	88	265	827
Link Distance (ft)		1466		1463		964		966
Upstream Blk Time (%)								5
Queuing Penalty (veh)								0
Storage Bay Dist (ft)	300		300		100		100	
Storage Blk Time (%)					0	1	4	69
Queuing Penalty (veh)					0	0	10	52

SimTraffic Performance Report
 2030 AM Peak-No Improvements

200: Dodd Road & Cliff Road (CSAH 32) Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay (hr)	0.2	0.2	0.0	0.0	0.5	0.0	0.8	2.2	0.1	0.4	0.6	0.8
Total Del/Veh (s)	9.2	2.4	1.8	6.9	4.3	1.8	29.7	42.1	32.4	32.5	30.7	22.3
Speed Delay (hr)	0.1	0.1	0.0	0.0	0.5	0.0	0.7	2.1	0.1	0.3	0.6	0.8
Speed Del/Veh (s)	5.0	1.6	0.5	2.9	3.9	1.4	25.6	41.3	31.6	28.2	30.2	21.8
Total Stops	59	0	0	2	0	7	107	185	16	42	69	131
Travel Time (hr)	0.9	2.0	0.1	0.0	2.9	0.7	1.5	3.3	0.3	0.6	0.9	1.6
Avg Speed (mph)	34	46	41	36	41	38	13	10	12	14	14	15
Vehicles Entered	97	322	12	4	423	90	102	185	16	42	70	131
Vehicles Exited	96	322	12	4	422	89	102	185	16	42	69	131
Hourly Exit Rate	96	322	12	4	422	89	102	185	16	42	69	131
Input Volume	100	305	10	5	435	85	100	190	15	45	65	135
% of Volume	96	106	120	80	97	105	102	97	107	93	106	97
Denied Entry Before	0	0	0	0	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	1	0	0	0	0	0

200: Dodd Road & Cliff Road (CSAH 32) Performance by movement

Movement	All
Total Delay (hr)	6.0
Total Del/Veh (s)	14.4
Speed Delay (hr)	5.5
Speed Del/Veh (s)	13.2
Total Stops	618
Travel Time (hr)	14.8
Avg Speed (mph)	25
Vehicles Entered	1494
Vehicles Exited	1490
Hourly Exit Rate	1490
Input Volume	1490
% of Volume	100
Denied Entry Before	0
Denied Entry After	1

Queuing and Blocking Report
 2030 AM Peak-No Improvements

Intersection: 200: Dodd Road & Cliff Road (CSAH 32)

Movement	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	L	TR	L	TR	L	TR
Maximum Queue (ft)	70	26	32	219	251	81	183
Average Queue (ft)	28	1	5	63	110	30	82
95th Queue (ft)	55	11	23	146	211	64	152
Link Distance (ft)			1463		964		966
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)	300	300		100		100	
Storage Blk Time (%)				2	25	0	11
Queuing Penalty (veh)				4	25	1	5

SimTraffic Performance Report
 2030 PM Peak-No Improvements

200: Dodd Road & Cliff Road (CSAH 32) Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay (hr)	0.3	0.9	0.1	0.0	0.4	0.0	0.5	0.6	0.1	4.6	11.4	8.9
Total Del/Veh (s)	9.3	5.6	3.1	9.6	3.4	1.4	42.8	28.8	22.0	212.8	260.1	251.7
Speed Delay (hr)	0.2	0.7	0.0	0.0	0.3	0.0	0.5	0.6	0.1	4.3	11.0	8.4
Speed Del/Veh (s)	4.9	4.1	1.6	5.7	2.9	0.9	38.8	28.4	21.6	196.7	250.3	238.9
Total Stops	55	0	4	10	0	2	43	78	16	199	285	227
Travel Time (hr)	1.1	4.3	0.7	0.1	2.7	0.3	0.8	1.1	0.2	5.0	12.1	9.6
Avg Speed (mph)	34	41	37	33	43	39	10	13	14	3	2	2
Vehicles Entered	112	600	93	15	414	47	43	77	16	76	153	122
Vehicles Exited	112	600	93	15	414	48	43	78	16	72	148	115
Hourly Exit Rate	112	600	93	15	414	48	43	78	16	72	148	115
Input Volume	115	575	95	15	415	55	45	80	15	80	160	125
% of Volume	97	104	98	100	100	87	96	98	107	90	92	92
Denied Entry Before	0	0	0	0	0	0	0	0	0	0	0	0
Denied Entry After	0	1	0	0	0	0	0	0	0	1	2	2

200: Dodd Road & Cliff Road (CSAH 32) Performance by movement

Movement	All
Total Delay (hr)	27.9
Total Del/Veh (s)	56.1
Speed Delay (hr)	26.1
Speed Del/Veh (s)	52.5
Total Stops	919
Travel Time (hr)	38.1
Avg Speed (mph)	12
Vehicles Entered	1768
Vehicles Exited	1754
Hourly Exit Rate	1754
Input Volume	1775
% of Volume	99
Denied Entry Before	0
Denied Entry After	6

Queuing and Blocking Report
 2030 PM Peak-No Improvements

Intersection: 200: Dodd Road & Cliff Road (CSAH 32)

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	TR	L	TR	L	TR	L	TR
Maximum Queue (ft)	68	27	33	27	84	110	219	989
Average Queue (ft)	29	3	7	2	34	51	160	659
95th Queue (ft)	57	15	25	13	71	94	303	1091
Link Distance (ft)		1466		1463		964		966
Upstream Blk Time (%)								12
Queuing Penalty (veh)								0
Storage Bay Dist (ft)	300		300		100		100	
Storage Blk Time (%)					0	2	7	92
Queuing Penalty (veh)					0	1	20	74

SimTraffic Performance Report
 Existing AM Peak-3 Approach Lanes, Traffic Signal

200: Dodd Road & Cliff Road (CSAH 32) Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay (hr)	0.3	0.7	0.0	0.0	1.6	0.1	0.3	0.3	0.0	0.1	0.1	0.2
Total Del/Veh (s)	17.0	11.4	6.5	12.3	18.2	7.2	17.4	13.4	8.3	16.1	15.1	9.2
Speed Delay (hr)	0.2	0.7	0.0	0.0	1.6	0.0	0.3	0.3	0.0	0.1	0.1	0.1
Speed Del/Veh (s)	12.7	10.9	1.9	7.6	17.6	2.9	13.1	12.9	4.1	11.7	14.4	4.7
Total Stops	46	103	3	1	190	29	49	44	5	16	13	58
Travel Time (hr)	0.7	2.0	0.1	0.0	3.4	0.4	0.8	0.8	0.1	0.2	0.2	0.7
Avg Speed (mph)	27	32	39	32	26	35	18	19	23	21	21	26
Vehicles Entered	57	224	6	1	322	47	69	77	6	24	24	86
Vehicles Exited	58	223	6	1	321	48	69	78	6	23	24	86
Hourly Exit Rate	58	223	6	1	321	48	69	78	6	23	24	86
Input Volume	60	219	7	1	314	46	72	76	7	23	25	81
% of Volume	97	102	86	100	102	104	96	103	86	100	96	106
Denied Entry Before	0	0	0	0	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0	0	0	0	0	0

200: Dodd Road & Cliff Road (CSAH 32) Performance by movement

Movement	All
Total Delay (hr)	3.8
Total Del/Veh (s)	14.4
Speed Delay (hr)	3.4
Speed Del/Veh (s)	12.7
Total Stops	557
Travel Time (hr)	9.3
Avg Speed (mph)	26
Vehicles Entered	943
Vehicles Exited	943
Hourly Exit Rate	943
Input Volume	931
% of Volume	101
Denied Entry Before	0
Denied Entry After	0

Queuing and Blocking Report
 Existing AM Peak-3 Approach Lanes, Traffic Signal

Intersection: 200: Dodd Road & Cliff Road (CSAH 32)

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	T	R	L	T	R	L	T	R	L	T	R
Maximum Queue (ft)	60	136	13	12	215	39	78	99	25	47	44	56
Average Queue (ft)	23	50	1	0	90	10	32	32	3	11	9	20
95th Queue (ft)	51	97	8	5	165	25	63	76	17	34	33	45
Link Distance (ft)	1454			1451			955			954		
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	300		300		300		100		100		100	
Storage Blk Time (%)					0		0		0			
Queuing Penalty (veh)					0		0		0			

SimTraffic Performance Report
 Existing PM Peak-3 Approach Lanes, Traffic Signal

200: Dodd Road & Cliff Road (CSAH 32) Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay (hr)	0.3	1.6	0.1	0.0	1.4	0.1	0.2	0.1	0.0	0.2	0.3	0.2
Total Del/Veh (s)	16.2	13.6	7.2	18.7	16.5	7.1	18.3	13.8	8.6	18.4	17.5	9.2
Speed Delay (hr)	0.2	1.5	0.0	0.0	1.3	0.0	0.1	0.1	0.0	0.2	0.3	0.1
Speed Del/Veh (s)	11.3	12.3	2.4	14.5	15.9	2.9	14.0	13.4	4.6	14.0	16.9	4.6
Total Stops	53	179	33	7	166	19	23	19	4	27	36	48
Travel Time (hr)	0.8	4.0	0.6	0.1	3.0	0.3	0.4	0.3	0.1	0.4	0.6	0.6
Avg Speed (mph)	28	31	36	25	27	35	17	18	22	19	20	26
Vehicles Entered	72	422	67	9	295	30	31	30	8	40	60	72
Vehicles Exited	71	422	67	8	296	30	31	29	8	40	61	72
Hourly Exit Rate	71	422	67	8	296	30	31	29	8	40	61	72
Input Volume	68	415	67	8	299	31	31	31	8	43	64	75
% of Volume	104	102	100	100	99	97	100	94	100	93	95	96
Denied Entry Before	0	0	0	0	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0	0	0	0	0	0

200: Dodd Road & Cliff Road (CSAH 32) Performance by movement

Movement	All
Total Delay (hr)	4.5
Total Del/Veh (s)	14.2
Speed Delay (hr)	3.9
Speed Del/Veh (s)	12.2
Total Stops	614
Travel Time (hr)	11.1
Avg Speed (mph)	28
Vehicles Entered	1136
Vehicles Exited	1135
Hourly Exit Rate	1135
Input Volume	1140
% of Volume	100
Denied Entry Before	0
Denied Entry After	0

Queuing and Blocking Report
 Existing PM Peak-3 Approach Lanes, Traffic Signal

Intersection: 200: Dodd Road & Cliff Road (CSAH 32)

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB		
Directions Served	L	T	R	L	T	R	L	T	R	L	T	R		
Maximum Queue (ft)	76	184	36	27	188	40	45	53	24	56	80	62		
Average Queue (ft)	26	87	11	5	82	7	18	15	3	18	22	18		
95th Queue (ft)	58	152	26	19	151	23	45	42	17	45	59	43		
Link Distance (ft)	1454			1451			955			954				
Upstream Blk Time (%)														
Queuing Penalty (veh)														
Storage Bay Dist (ft)	300		300		300		300		100		100		100	
Storage Blk Time (%)												0		
Queuing Penalty (veh)												0		

SimTraffic Performance Report
 2030 AM Peak-3 Approach Lanes, Traffic Signal

200: Dodd Road & Cliff Road (CSAH 32) Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay (hr)	0.6	1.2	0.0	0.0	2.9	0.2	0.7	1.1	0.0	0.2	0.4	0.5
Total Del/Veh (s)	21.2	13.1	6.8	20.3	24.3	9.6	23.2	20.5	9.6	21.2	22.2	13.5
Speed Delay (hr)	0.5	1.1	0.0	0.0	2.7	0.1	0.5	1.0	0.0	0.2	0.4	0.3
Speed Del/Veh (s)	16.5	12.2	2.1	15.4	23.3	4.9	18.6	19.5	4.9	16.4	20.9	8.7
Total Stops	83	137	5	3	277	55	82	126	11	34	48	97
Travel Time (hr)	1.2	3.0	0.1	0.1	5.2	0.9	1.3	2.2	0.2	0.5	0.8	1.3
Avg Speed (mph)	24	31	37	24	23	32	15	16	22	18	17	22
Vehicles Entered	97	322	12	4	422	90	102	185	16	42	70	132
Vehicles Exited	97	321	12	4	421	89	102	185	16	42	69	131
Hourly Exit Rate	97	321	12	4	421	89	102	185	16	42	69	131
Input Volume	100	305	10	5	435	85	100	190	15	45	65	135
% of Volume	97	105	120	80	97	105	102	97	107	93	106	97
Denied Entry Before	0	0	0	0	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	1	0	0	0	0	0

200: Dodd Road & Cliff Road (CSAH 32) Performance by movement

Movement	All
Total Delay (hr)	7.9
Total Del/Veh (s)	18.8
Speed Delay (hr)	6.9
Speed Del/Veh (s)	16.6
Total Stops	958
Travel Time (hr)	16.7
Avg Speed (mph)	23
Vehicles Entered	1494
Vehicles Exited	1489
Hourly Exit Rate	1489
Input Volume	1490
% of Volume	100
Denied Entry Before	0
Denied Entry After	1

Queuing and Blocking Report
 2030 AM Peak-3 Approach Lanes, Traffic Signal

Intersection: 200: Dodd Road & Cliff Road (CSAH 32)

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB		
Directions Served	L	T	R	L	T	R	L	T	R	L	T	R		
Maximum Queue (ft)	105	173	14	26	307	63	105	166	29	67	82	87		
Average Queue (ft)	39	73	2	3	147	17	48	76	8	22	31	34		
95th Queue (ft)	78	140	10	14	253	42	91	138	27	50	70	67		
Link Distance (ft)	1454			1451			955			954				
Upstream Blk Time (%)														
Queuing Penalty (veh)														
Storage Bay Dist (ft)	300		300		300		100		100		100			
Storage Blk Time (%)					0		1		4		0		0	
Queuing Penalty (veh)					0		2		4		0		0	

SimTraffic Performance Report
 2030 PM Peak-3 Approach Lanes, Traffic Signal

200: Dodd Road & Cliff Road (CSAH 32) Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay (hr)	0.7	3.5	0.2	0.1	2.6	0.1	0.3	0.5	0.1	0.5	1.0	0.4
Total Del/Veh (s)	21.8	20.8	9.2	23.1	22.1	8.1	23.8	20.6	12.3	24.0	22.9	12.8
Speed Delay (hr)	0.5	3.1	0.1	0.1	2.5	0.0	0.2	0.4	0.0	0.4	0.9	0.3
Speed Del/Veh (s)	16.3	18.3	3.7	18.8	21.3	3.7	19.5	20.1	8.2	19.1	21.5	7.8
Total Stops	92	311	44	14	253	29	36	54	12	60	100	85
Travel Time (hr)	1.5	6.9	0.9	0.2	4.9	0.4	0.6	0.9	0.2	0.9	1.7	1.2
Avg Speed (mph)	24	26	34	23	24	34	15	15	20	17	17	23
Vehicles Entered	112	600	93	15	414	47	43	77	17	77	155	124
Vehicles Exited	112	601	93	15	412	48	43	78	16	77	156	124
Hourly Exit Rate	112	601	93	15	412	48	43	78	16	77	156	124
Input Volume	115	575	95	15	415	55	45	80	15	80	160	125
% of Volume	97	105	98	100	99	87	96	98	107	96	98	99
Denied Entry Before	0	0	0	0	0	0	0	0	0	0	0	0
Denied Entry After	0	1	0	0	0	0	0	0	0	0	0	0

200: Dodd Road & Cliff Road (CSAH 32) Performance by movement

Movement	All
Total Delay (hr)	10.0
Total Del/Veh (s)	20.0
Speed Delay (hr)	8.6
Speed Del/Veh (s)	17.3
Total Stops	1090
Travel Time (hr)	20.3
Avg Speed (mph)	23
Vehicles Entered	1774
Vehicles Exited	1775
Hourly Exit Rate	1775
Input Volume	1775
% of Volume	100
Denied Entry Before	0
Denied Entry After	1

Queuing and Blocking Report
 2030 PM Peak-3 Approach Lanes, Traffic Signal

Intersection: 200: Dodd Road & Cliff Road (CSAH 32)

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	T	R	L	T	R	L	T	R	L	T	R
Maximum Queue (ft)	89	406	53	46	263	36	71	104	38	86	140	85
Average Queue (ft)	43	164	15	9	131	9	28	39	8	38	58	32
95th Queue (ft)	79	297	33	29	224	24	59	81	28	74	109	64
Link Distance (ft)	1454			1451			955			954		
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	300		300		300		100		100		100	
Storage Blk Time (%)	1				0		0		0		1	
Queuing Penalty (veh)	1				0		0		0		3	

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*****
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*
*           CLIFF ROAD + EXISTING VOLTS                               7
*
*****
*
*
* E (m) 4.30 4.30 4.30 4.30 * TIME PERIOD min 90 *
* L' (m) 10.00 10.00 10.00 10.00 * TIME SLICE min 15 *
* V (m) 3.65 3.65 3.65 3.65 * RESULTS PERIOD min 15 75 *
* RAD (m) 20.00 20.00 20.00 20.00 * TIME COST $/hr 15.00 *
* PHI (d) 20.00 20.00 20.00 20.00 * FLOW PERIOD min 15 75 *
* DIA (m) 30.00 30.00 30.00 30.00 * FLOW TYPE pcu/veh VEH *
* GRAD SEP 0 0 0 0 * FLOW PEAK am/op/pm AM *
*****
* LEG NAME *PCU *VEH TURNS (1st exit, 2nd..U)*FLOF*CL* FLOW RATIO *FLOW TIME*
* * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
*NB DODD *1.05* 007 076 072 0 *1.00*50*0.75 1.125 0.75*15 45 75 *
*WB CSAH 32*1.05* 046 314 001 0 *1.00*50*0.75 1.125 0.75*15 45 75 *
*SB DODD *1.05* 081 025 023 0 *1.00*50*0.75 1.125 0.75*15 45 75 *
*EB CSAH 32*1.05* 007 219 060 0 *1.00*50*0.75 1.125 0.75*15 45 75 *
*****
*
* FLOW veh 155 361 129 286 * AVEDEL s 4.1 *
* CAPACITY veh 1072 1128 1022 1222 * LOS SIG A *
* AVE DELAY mins 0.06 0.08 0.07 0.06 * LOS UNSIG A *
* MAX DELAY mins 0.08 0.10 0.09 0.08 * * *
* AVE QUEUE veh 0 0 0 0 * VEHIC HRS 1.1 *
* MAX QUEUE veh 0 1 0 0 * COST $ 16 *
*****

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*
*
*           CLIFF ROAD + EXISTING VOLTS                               8
*
*****
*
*
* E (m) 4.30 4.30 4.30 4.30 * TIME PERIOD min 90 *
* L' (m) 10.00 10.00 10.00 10.00 * TIME SLICE min 15 *
* V (m) 3.65 3.65 3.65 3.65 * RESULTS PERIOD min 15 75 *
* RAD (m) 20.00 20.00 20.00 20.00 * TIME COST $/hr 15.00 *
* PHI (d) 20.00 20.00 20.00 20.00 * FLOW PERIOD min 15 75 *
* DIA (m) 30.00 30.00 30.00 30.00 * FLOW TYPE pcu/veh VEH *
* GRAD SEP 0 0 0 0 * FLOW PEAK am/op/pm PM *
*****
* LEG NAME *PCU *VEH TURNS (1st exit, 2nd..U)*FLOF*CL* FLOW RATIO *FLOW TIME*
* * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
*NB DODD *1.05* 008 031 031 0 *1.00*50*0.75 1.125 0.75*15 45 75 *
*WB CSAH 32*1.05* 031 299 008 0 *1.00*50*0.75 1.125 0.75*15 45 75 *
*SB DODD *1.05* 075 064 043 0 *1.00*50*0.75 1.125 0.75*15 45 75 *
*EB CSAH 32*1.05* 067 415 068 0 *1.00*50*0.75 1.125 0.75*15 45 75 *
*****
*
* FLOW veh 70 338 182 550 * AVEDEL s 4.9 *
* CAPACITY veh 940 1174 1051 1183 * LOS SIG A *
* AVE DELAY mins 0.07 0.07 0.07 0.09 * LOS UNSIG A *
* MAX DELAY mins 0.09 0.09 0.09 0.13 * * *
* AVE QUEUE veh 0 0 0 1 * VEHIC HRS 1.5 *
* MAX QUEUE veh 0 0 0 1 * COST $ 23 *
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*
*          CLIFF ROAD + PROJECTED 2030 VOLS                      10
*****
*
*
* E      (m)      4.30   4.30   4.30   4.30      * TIME PERIOD      min      90  *
* L'     (m)     10.00  10.00  10.00  10.00     * TIME SLICE       min      15  *
* V      (m)      3.65   3.65   3.65   3.65     * RESULTS PERIOD  min 15 75 *
* RAD    (m)     20.00  20.00  20.00  20.00     * TIME COST        $/hr 15.00 *
* PHI    (d)     20.00  20.00  20.00  20.00     * FLOW PERIOD      min 15 75 *
* DIA    (m)     30.00  30.00  30.00  30.00     * FLOW TYPE        pcu/veh  VEH *
* GRAD SEP      0       0       0       0       * FLOW PEAK        am/op/pm  AM *
*****
* LEG NAME *PCU *VEH TURNS (1st exit, 2nd..U)*FLOF*CL* FLOW RATIO *FLOW TIME*
*
*NB DODD *1.05* 015 190 100 0 *1.00*50*0.75 1.125 0.75*15 45 75 *
*WB CSAH 32*1.05* 085 435 005 0 *1.00*50*0.75 1.125 0.75*15 45 75 *
*SB DODD *1.05* 135 065 045 0 *1.00*50*0.75 1.125 0.75*15 45 75 *
*EB CSAH 32*1.05* 010 305 100 0 *1.00*50*0.75 1.125 0.75*15 45 75 *
*****
*
* FLOW      veh      305   525   245   415      * AVEDEL      s      5.8  *
* CAPACITY  veh      985  1021  932  1183     * LOS SIG     A      *
* AVE DELAY mins    0.09  0.12  0.09  0.08     * LOS UNSIG  A      *
* MAX DELAY mins    0.12  0.17  0.12  0.10     *
* AVE QUEUE  veh      0     1     0     1       * VEHIC HRS   2.4  *
* MAX QUEUE  veh      1     1     0     1       * COST        $      36  *
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*
*
*          CLIFF ROAD + PROJECTED 2030 VOLS                      11
*****
*
*
* E      (m)      4.30   4.30   4.30   4.30      * TIME PERIOD      min      90  *
* L'     (m)     10.00  10.00  10.00  10.00     * TIME SLICE       min      15  *
* V      (m)      3.65   3.65   3.65   3.65     * RESULTS PERIOD  min 15 75 *
* RAD    (m)     20.00  20.00  20.00  20.00     * TIME COST        $/hr 15.00 *
* PHI    (d)     20.00  20.00  20.00  20.00     * FLOW PERIOD      min 15 75 *
* DIA    (m)     30.00  30.00  30.00  30.00     * FLOW TYPE        pcu/veh  VEH *
* GRAD SEP      0       0       0       0       * FLOW PEAK        am/op/pm  PM *
*****
* LEG NAME *PCU *VEH TURNS (1st exit, 2nd..U)*FLOF*CL* FLOW RATIO *FLOW TIME*
*
*NB DODD *1.05* 015 080 045 0 *1.00*50*0.75 1.125 0.75*15 45 75 *
*WB CSAH 32*1.05* 055 415 015 0 *1.00*50*0.75 1.125 0.75*15 45 75 *
*SB DODD *1.05* 080 160 125 0 *1.00*50*0.75 1.125 0.75*15 45 75 *
*EB CSAH 32*1.05* 095 575 115 0 *1.00*50*0.75 1.125 0.75*15 45 75 *
*****
*
* FLOW      veh      140   485   365   785      * AVEDEL      s      9.1  *
* CAPACITY  veh      770  1109  971  1074     * LOS SIG     A      *
* AVE DELAY mins    0.09  0.09  0.10  0.22     * LOS UNSIG  A      *
* MAX DELAY mins    0.13  0.13  0.13  0.36     *
* AVE QUEUE  veh      0     1     1     3       * VEHIC HRS   4.5  *
* MAX QUEUE  veh      0     1     1     4       * COST        $      67  *
*****

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