BOLTON & MENK

Real People. Real Solutions.

DEPARTMENT OF TRANSPORTATION

MnDOT District 7

TH 14 Intersection Control Evaluation

New Ulm to Nicollet

Nicollet County, MN

Submitted by:
Bolton & Menk, Inc.
1960 Premier Drive
Mankato, MN 56001
P: 507-625-4171
F: 507-625-4177

EXECUTIVE SUMMARY

Trunk Highway (TH) 14 from New Ulm to Nicollet is located in Nicollet County, MN. The highway is classified as a principle arterial that provides essential east-west connection for the region and is an important route for commercial and industrial heavy vehicles. The current volume on the two-lane rural highway ranges between 5,300 to 8,300 vehicles per day between New Ulm and Nicollet. The roadway is projected to carry up to 10,700 vehicles per day by 2040. TH 14 is being designed for four-lane expansion from TH 15 to the recently completed four-lane highway approximately 1.9 miles west of the Nicollet CSAH 23 Interchange.

This study was initiated by the Minnesota Department of Transportation (MnDOT) district 7, in participation with the New Ulm to Nicollet Task Force, to provide a detailed analysis of the corridor needs and evaluation of alternatives to ensure an appropriate design. An appropriate design increases mobility and safety of all users now and into the future, is cost effective, and minimizes impacts. Multiple intersection alternatives were considered including Traditional At-Grade, Restricted Crossing U-Turn, Green T, High T, Roundabouts, and interchanges at various locations throughout the corridor. Additionally, various segment alternatives were considered including two-lane, constrained four-lane divided and unconstrained four-lane divided highway sections.

Evaluation of the alternatives focused on three primary criteria: safety, operations, and financial impacts. Safety includes crashes, crash severity, and potential crash reduction. Operations include delay to traffic due to intersection control and travel time on the corridor. Financial impacts not only include construction and right-of-way cost, but also operating cost and safety benefits of the alternatives.

Data from the past 10 years indicates that one intersection in the study area, TH 14 at CSAH 37, has an observed crash rate greater than the critical rate established for similar intersections statewide. Additionally, the intersection of TH 14 at CSAH 24 has an observed crash rate higher than the statewide average and a fatal and serious rate near the critical rate. As traffic increases, delay and crashes are anticipated to increase. The two- to four- lane expansion provides a safety benefit to the corridor. Furthermore, all of the alternatives considered provide an additional safety benefit to the intersections and segments.

The current traffic operations are deemed acceptable (less than 35 seconds delay per vehicle and LOS A to D) at the intersections studied with the exception of some unacceptable delay (over 35 seconds delay per vehicle and LOS E to F) for some individual movements during the peak hours. As traffic increases, the current operational deficiencies are anticipated to increase and additional movements are anticipated to have unacceptable delay. All of the alternatives considered, with the exception of the Traditional At-Grade intersection at TH 14 and CSAH 37, are anticipated to operate at acceptable levels through the design year and would be reasonable designs from a traffic operations perspective. Furthermore, the expansion for two- to four-lanes is anticipated to decrease the travel time on TH 14 for all users due to higher speeds.

The project cost provides the most significant differentiating factor between the alternatives. In general, the at-grade alternatives (Traditional At-Grade, Restricted Crossing U-Turn, Green T, and Roundabouts) cost approximately two to three times less than the grade-separated alternatives (High T and interchange alternatives) considered as part of this project. The higher cost is associated with the additional right-of-way (ROW), grading requirements, and cost of realigning local, township and country roads. Although the project cost is higher, grade-separated alternatives may provide higher operational benefits over the 20-year project life.

All alternatives are acceptable, with the exception of the Traditional At-Grade intersection at TH 14 and CSAH 37, and will provide safety and operational benefits to the corridor. Based on the considerations of safety, operations, and financial impacts, the following alternatives are recommended for the TH 14 corridor and intersections:

TH 14 at CSAH 37 and 446th Street

Multi-lane Roundabout or Restricted Crossing U-Turn (RCUT)

TH 14 at 571st Lane

Restricted Crossing U-Turn (RCUT) with eastbound acceleration lane

TH 14 at 561st Avenue

Restricted Crossing U-Turn (RCUT)

Courtland Area

Restricted Crossing U-Turn (RCUT) intersections on the east and west ends of Courtland

TH 14 from TH 15 to CSAH 37

Constrained Four-Lane Divided

TH 14 from 571st Lane to 561st Avenue

Constrained Four-Lane Divided

Taking into account public input and the Task Force evaluation, the Task Force selected the interchange at CSAH 37 and Concept C for the Courtland area, one interchange centered on Courtland, as the preferred alternative. These options do not have the highest scoring based on the criteria identified. The preference for interchanges at CSAH 37 and CSAH 24 is a result of apprehension from the locals regarding RCUTs and a disinterest from having access to town different than what is at the Cities of Nicollet, Waseca, and Janesville. Additionally, Nicollet county has committed to cost participate in interchanges at both New Ulm and Courtland. Furthermore, if two RCUTs are built on each end of Courtland now and an interchange is desired at a later date, it is anticipated that the land will cost substantially more based on an expected land use changes given the City of Courtland's current long-term planning for development. Industrial development is planned along CSAH 24 and there is a desire to limit the heavy commercial vehicles going through town. One access to the propose TH 14 across from the existing CSAH 24 location would potentially reduce the volume of heavy commercial vehicles using old TH 14.

MnDOT endorses the Task Force recommendation due to the local cost participation on interchanges, a compromise to end the 4-lane expansion at CSAH 37, building RCUTs at 571st Lane and 561st Avenue, and conceptual agreement on the turnbacks in Courtland. The following alternatives are recommended for the TH 14 corridor and intersections:

TH 14 at CSAH 37 and 446th Street

Interchange at CSAH 37 with roundabouts – realign 446th with CSAH 37

TH 14 at 571st Lane

Restricted Crossing U-Turn (RCUT) with eastbound acceleration lane

TH 14 at 561st Avenue

Restricted Crossing U-Turn (RCUT)

Courtland Area

Concept C – Interchange centered on Courtland, extending CSAH 24 to proposed TH 14 alignment

TH 14 from TH 15 to CSAH 37

Constrained Four-Lane Divided

TH 14 from 571st Lane to 561st Avenue

Constrained Four-Lane Divided

Certification

TH 14 Intersection Control Evaluation Report
New Ulm to Nicollet

Minnesota Department of Transportation
District 7

December 28, 2018

I hereby certify that this plan, specification or 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.

By: _____
Bryan T. Nemeth, P.E., PTOE
License No. 43354

Date: December 28, 2018

Reviewed by:

_____ _____
Nicollet County Date

_____ _____
MnDOT State Aid Date

Approved by:

_____ _____
MnDOT District 7 Date

Table of Contents

Figures

Tables

Appendix

I. INTRODUCTION

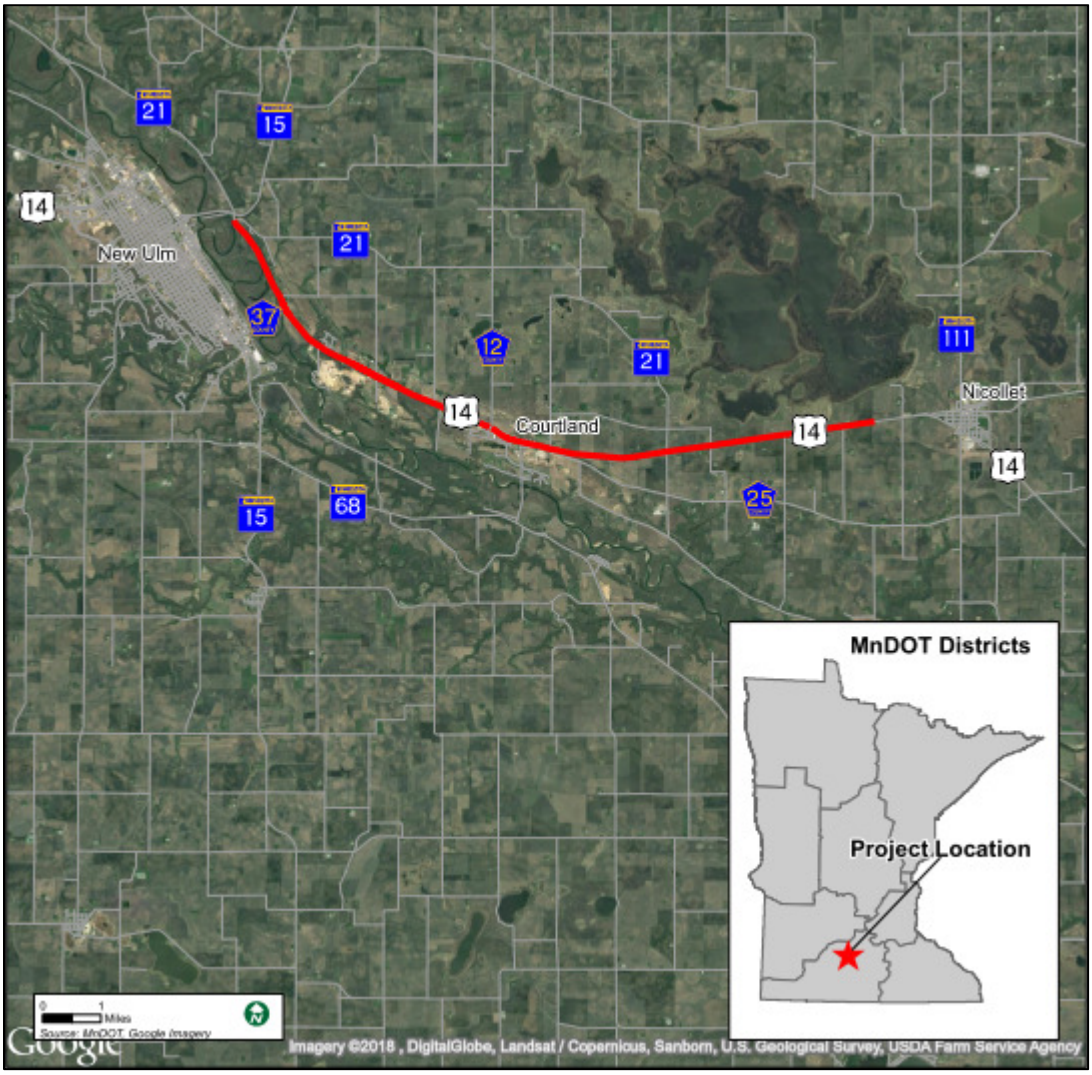
This report documents the analysis and conclusions for the study of Trunk Highway (TH) 14 from New Ulm to Nicollet in Minnesota Department of Transportation (MnDOT) District 7.

TH 14 is being designed for a 4-lane expansion from TH 15 to approximately 1.9 miles west of the Nicollet CSAH 23 Interchange. As part of this study, the following intersections and segments were analyzed for multiple alternatives:

- TH 14 at CSAH 37 and 446th Street
- TH 14 at 571st Lane
- TH 14 at 561st Avenue
- TH 14 through Courtland
- TH 14 from TH 15 to CSAH 37
- TH 14 from 571st Lane to 561st Avenue

The goal of this study is to determine the preferred intersection and segment alternatives to increase mobility and safety while ensuring improvements are cost effective and minimize impacts. A thorough analysis of the needs of TH 14, intersection roads and the surrounding area was conducted to determine the most appropriate design.

Figure 1 Project Location Map



A. Task Force Involvement

The study was guided by a Task Force that consisted of technical staff, elected officials, council members, and other stakeholder representatives from MnDOT District 7, Nicollet County, City of New Ulm, City of Courtland, New Ulm Chamber of Commerce, Courtland Area Chamber of Commerce, New Ulm Quartzite Quarry OMG Midwest, and Minnesota Valley Lutheran High School (MVLHS). The group met throughout the traffic study to review the data, analyze methodologies, assumptions, alternatives and study results.

The Task Force evaluated the alternatives and assessed the best solutions for TH 14, intersecting local, township and county roads, and the surrounding area.

B. Study Objectives

The study included technical analysis and assessment of specific factors for TH 14 with involvement of the Task Force. Five primary objectives were analyzed to ensure the project goal is accomplished:

1. Evaluate the existing conditions.
    a. Determine existing mobility and safety issues.
2. Determine future conditions.
    a. Develop future traffic forecasts.
    b. Determine future mobility and safety issues.
3. Evaluate alternatives
    a. Determine safety improvements provided by alternatives.
    b. Determine mobility improvements provided by alternatives.
    c. Determine cost of alternatives.
4. Present results of the alternatives.
    a. Determine what is favorable to the Task Force.
    b. Determine what is acceptable to the public.
5. Determine preferred alternative.

The study assessed traffic conditions of current and long-term needs of TH 14 and intersecting roadways. Multiple alternatives were evaluated to develop a preferred alternative for TH 14.

II. BACKGROUND

A. Location

TH 14 is being designed for a four-lane expansion from TH 15 to approximately 1.9 miles west of the Nicollet CSAH 23 Interchange. The 12.5 mile project will complete the four-lane highway connection to the Cities of New Ulm, Courtland, and Nicollet from Mankato. TH 14 is a Principle Arterial located within the southern portion of Nicollet County, aligning parallel with the Minnesota River.

TH 14 is currently a two-lane rural highway that serves as the key east-west connection for the region and is an important route for commercial and industrial heavy vehicles. The study area is in close proximity to multiple truck generating industries and businesses including concrete services and waste management facilities. Additionally, the New Ulm Quartzite Quarry is located adjacent to the south side of TH 14 and has access to the highway at 571st Lane.

B. Roadways and Intersections

In general, TH 14 is a rural two-lane undivided highway with 12-foot through lanes and eight-foot shoulders. The posted speed limit is 55 miles per hour, with reductions to 45 and

35 miles per hour through Courtland. Within the city of Courtland, TH 14 has curb and gutter, on-street parking and sidewalks from Red Shoe Drive to Fiemeyer Drive. Private driveways have direct access to TH 14 throughout the study area. Multiple public and private access driveways have direct access to TH 14 in the City of Courtland.

The following details the intersections of interest for this study.

1. 446th Street

   At the T-intersection with TH 14, 446th Street is a two-lane gravel road with stop control. There are no turn lanes provided on TH 14 for 446th Street. The 446th Street approach is downhill and intercepts TH 14 at a skew.

2. CSAH 37

   CSAH 37 is a two-lane undivided highway locally known as 448th Street. At the T-intersection with TH 14, there are turn lanes and center medians on all approaches. The northbound approach of CSAH 37 includes a channelized free right turn lane and an acceleration lane of approximately ¼ mile. The intersection is currently stop controlled requiring northbound left turning traffic to stop. CSAH 37 includes a river crossing and is a primary access to New Ulm.

3. 571st Lane

   571st Lane is a two-lane roadway. At the T-intersection with TH 14, there is an eastbound right turn lane and a westbound passing lane. An additional eastbound lane on TH 14 starts at the intersection and continues for approximately ¾ mile. The northbound approach of 571st Lane is stop controlled. 571st Lane is the main access to the New Ulm Quartzite Quarry.

4. 561st Avenue

   561st Avenue is a two-lane roadway. At the intersection with TH 14, there are left and right turn lanes and center medians on TH 14. The northbound and southbound approaches are stop controlled. 561st Avenue is the main access to Minnesota Valley Lutheran High School (MVLHS).

5. CSAH 12

   CSAH 12 is a two-lane undivided highway locally known as 541st Avenue. A private shared driveway is located about 100 feet west of the intersection of CSAH 12 and TH 14. There are right turn lanes on TH 14 for both approaches. The southbound approach of CSAH 12 is stop controlled.

6. CSAH 24

   CSAH 24 is a two-lane undivided highway to the south and a city street to the north of TH 14. Locally, CSAH 24 is known as 4th Street. The northbound and southbound approaches are stop controlled. Pedestrian facilities existing on all four corners and crosswalks are marked across the east and west legs of the intersection. CSAH 24 provides the only river crossing between CSAH 37 to the west and CSAH 42 to the East. The fire station and Hancock Concrete Products are just south of the intersection.

7. 531st Avenue

   At the T-intersection with TH 14, 531st Avenue is a two-lane gravel road with stop control. There is a westbound right turn lane on TH 14 at the intersection. Fiemeyer Drive is parallel to TH 14 and intersects 531st Avenue approximately 40 feet north of TH 14.

8. CSAH 25

   CSAH 25 is a two-lane undivided highway locally known as 478st Street. There is a eastbound right turn lane on TH 14 at the intersection. The northbound approach of CSAH 25 is stop controlled.

C. **Traffic Data and Existing Volumes**

In January and February of 2018, traffic volumes were collected at the following intersections:

- TH 14 at 446th Street
- TH 14 at CSAH 37
- TH 14 at 571st Lane
- TH 14 at 561st Avenue
- TH 14 at CSAH 12 (Courtland)
- TH 14 at CSAH 24 (Courtland)
- TH 14 at 531st Avenue (Courtland)
- TH 14 at CSAH 25 (Courtland)

To ensure that changing weather patterns would not influence the data collection in the winter, weekday 72-hour turning movement counts were completed. Heavy vehicles are approximately 14% of the traffic on TH 14 based on the daily counts.

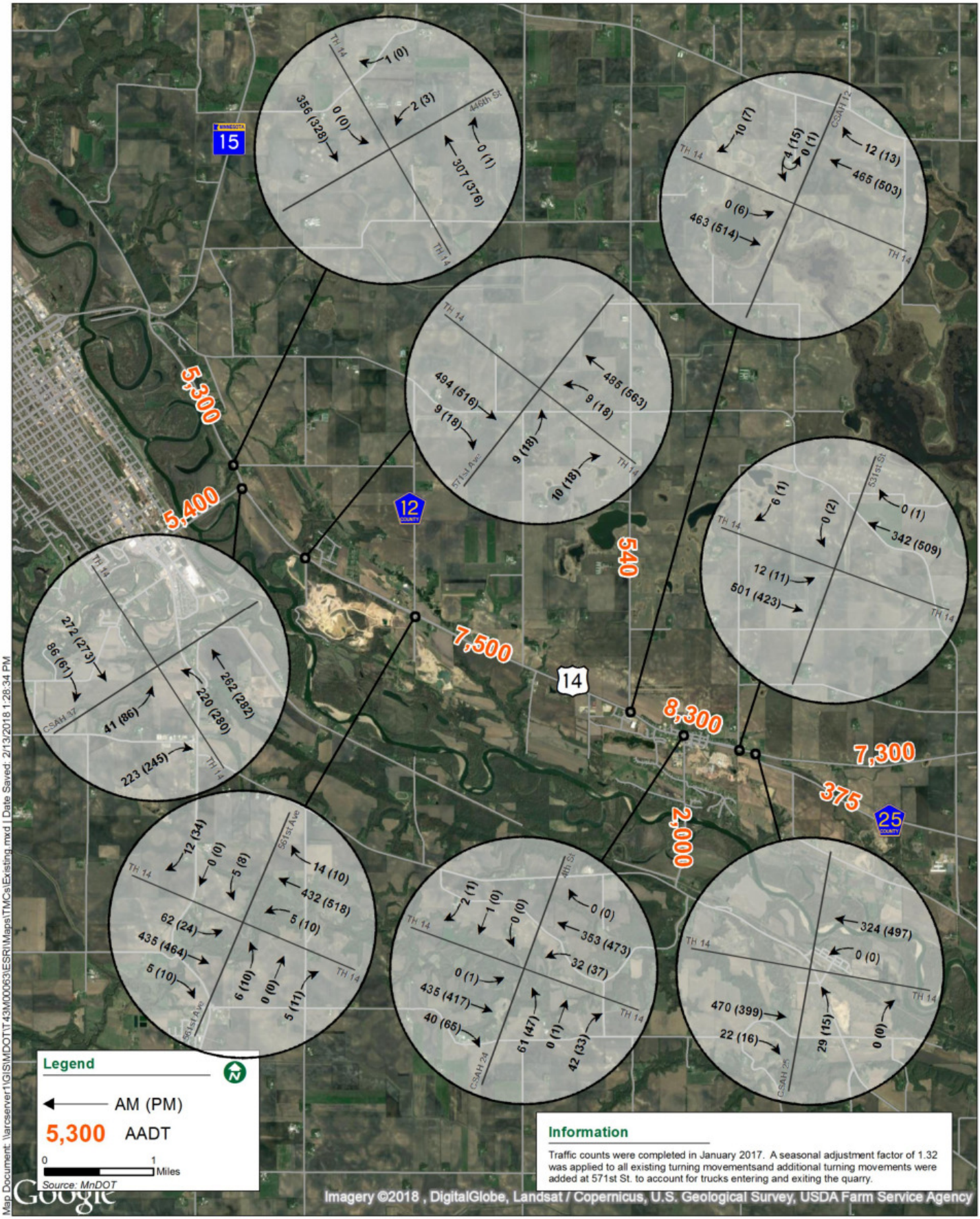
Traffic count data is located in **Appendix A.**

Two seasonal adjustments were made to the collected traffic data:

1. A seasonal adjustment factor of 1.29 was applied to the turning movement counts based on MnDOT continuous count station data (ATRs) for the months of January/February.
2. An additional 640 trucks were assumed to enter and exit the New Ulm Quartzite Quarry at 571st Street between the hours of 8 am and 5 pm to account for low quarry activity during the time of data collection. This assumption considers the approximate acreage of the quarry, compared to a previous traffic study involving a quarry access in Scandia, Minnesota [*Trunk Highway 97 & Trunk Highway 95 (Zavoral Mine) Traffic Monitoring Memorandum, Scandia, MN. - City of Scandia and Bolton & Menk, Inc.].* Trip distribution on TH 14 assumed 50% east and 50% west.

Figure 2 shows the current MnDOT Average Annual Daily Traffic (AADT) volumes and the existing peak hour turning volumes.

Figure 2: Existing Turning Movement Figure and AADTs



III. STUDY EVALUATION CRITERIA

The evaluation of the alternatives considers many factors including safety, operations, and cost.

A. Safety

Safety is an important consideration when evaluating all traffic projects. Different geometry and traffic control options will change the look and character of an intersection, altering how a motorist will react to a potential conflict. Additionally, different traffic control and geometry typically have different crash trends and expected number of crashes at an intersection.

Crashes can differ from one year to the next at a specific intersection or segment of roadway. The total number of crashes over the analysis period can indicate crash trends. The crash frequency (crashes per year) is averaging the number of crashes over the analysis period to account for variability from year to year. While crashes and crash frequency at intersections and segments can provide a comparison, they tend to be a function of the volume of traffic traveling through the intersection or segment. As a result, crash rate is a more reasonable measure that takes into account the exposure of volume variability of an intersection. Crash rate is measured as the number of crashes per million entering vehicles (MEV).

Crash severity is a measure how severe a crash is. Crashes can be categorized into five major categories:

Fatal (K)
Incapacitating Injury (Type A)
Non-incapacitating Injury (Type B)
Possible Injury (Type C), and
Property Damage Only (PDO)

The crash fatal and serious rate applies a higher factor to more severe crashes (K + A) to determine the fatal and serious rate of an intersection. This can be used to determine which intersections have a higher number of severe crashes for the traffic volume.

Statewide average crash rates, fatal and serious rates, and critical rates were attained from MnDOT using the 2015 version of the State Aid for Local Transportation (SALT) intersection safety screening.

B. Operations

The operational analysis of the traffic volume scenarios and alternatives were performed using the 2010 Highway Capacity Manual methodology through SYNCHRO traffic analysis software.

Measures of effectiveness display quantitative information about the performance of an intersection or network of intersections. The primary measures that are used in this study are Level of Service (LOS) and delay.

The operational analysis results are described as a LOS ranging from A to F. These letters serve to describe a range of operating conditions for different types of facilities. Levels of Service are calculated based on the 2010 Highway Capacity Manual, which base the level of service on control delay. Control delay is the delay experienced by vehicles slowing down as they are approaching the intersection, the wait time at the intersection, and the time for the vehicle to speed up through the intersection and enter into the traffic stream. The average intersection control delay is a volume weighted average of delay experienced by all motorists entering the intersection on all intersection approaches for signalized and roundabout intersections. Level of Service D is commonly taken as an acceptable design year LOS. The level of service and its associated intersection delay for a signalized and unsignalized intersection is presented below. The delay threshold for unsignalized intersections is lower

for each LOS compared to signalized intersections, which accounts for the fact that people expect a higher level of service when at a stop-controlled intersection. Roundabout intersections are evaluated as unsignalized intersection.

Table 1: Level of Service Criteria

	Signalized Intersection	Unsignalized Intersection
LOS	**Control Delay per Vehicle (sec.)**	**Control Delay per Vehicle (sec.)**
A	≤ 10	≤ 10
B	>10 and ≤ 20	>10 and ≤ 15
C	>20 and ≤ 35	>15 and ≤ 25
D	>35 and ≤ 55	>25 and ≤ 35
E	>55 and ≤ 80	>35 and ≤ 50
F	>80	>50

C. Right-of-way

Right-of-way is the boundary line between the property owned by a private citizen and the land that is granted to or owned by a public entity for transportation purposes such as trail of highway. A right-of-way is reserved for the purposes of maintenance and/or expansion of existing services with the right-of-way. Right-of-way may be acquired from neighboring properties to construct an intersection, segment alternative, or a new roadway alignment if there is not enough right-of-way currently available.

D. Financial Impacts

The cost of a roadway improvement is imperative when evaluating an intersection alternative. Different geometry and traffic control options can affect the cost of an alternative and can affect how much land is taken from adjacent properties to build the alternative.

1. Project Cost

   Project costs consider the capital and maintenance cost of an alternative. These are expressed in terms of current (2018) dollars. The capital cost of each of the alternatives includes all of the improvements as designated by the concept designs.

   Overall, the difference in operating and maintenance cost of the alternatives is minimal, except for the interchange options, over the 20-year time frame of analysis and was not added into the project cost for the benefit of cost calculations. It is noted that the bridge maintenance costs, additional roadway maintenance costs, and higher costs for snow removal for the interchange alternatives have not been fully accounted for in this analysis and would provide for a lower benefit to cost ratio than identified in this study. Additional accounting for these maintenance differences could be added if they can be fully identified.

2. Safety Cost (Safety Benefit)

   Safety benefits are the benefits that an alternative provides in terms of crash reduction. The severity of a crash is assigned a cost per crash. The number of crashes can be reduced with roadway and intersection improvements. For this study, the safety benefits were calculated using the methodology of the Highway Safety Improvement Program (HSIP) to determine the crash reduction. This included taking Crash Modification Factors (CMFs) from the Crash Modification Factors Clearinghouse for the different alternatives including Restricted Crossing Intersections, roundabouts, lane expansion and interchanges. Three to five-star CMFs were utilized.

3. Operational Cost (Operational Benefit)

   An alternative can have a cost savings if travel distance or travel time is reduced. A reduction in travel distance results in less fuel consumption whereas a reduction in travel time results in an increase in time available for other activities. As far as

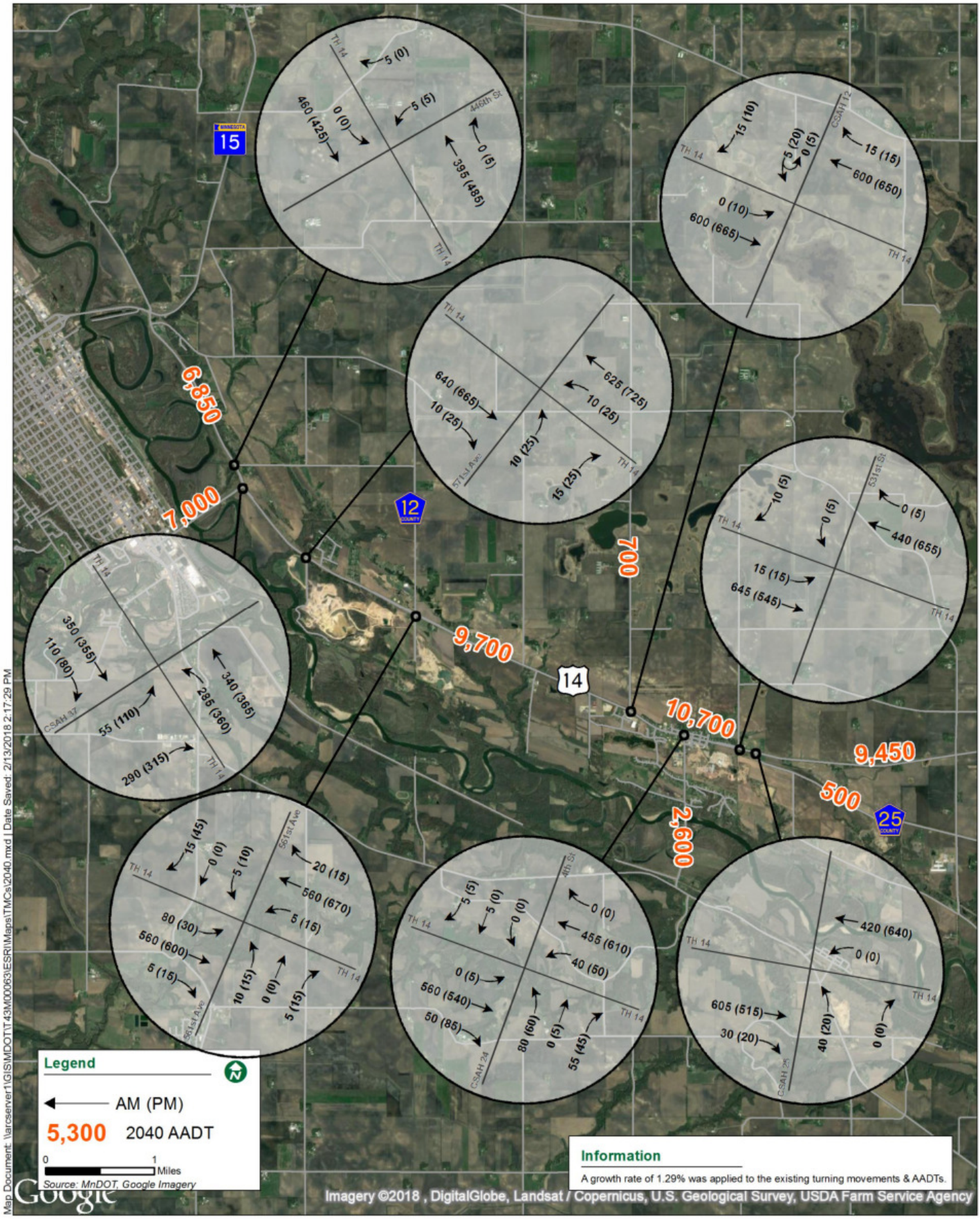
intersection and segment improvements, travel time reduction is the most appropriate measure. The travel time (or operating cost) savings are calculated based on the difference between the Base Condition (existing) and each alternative. Travel time is expressed as vehicle-hours traveled (VHT). The estimation of travel time savings includes both the driver and passengers in the vehicle. The valuation of travel time savings is calculated using a standard cost-per-hour-per-person for different vehicles (auto or truck).

IV. TRAFFIC FORECAST

Traffic forecasts for the design year (2040) were developed with the MnDOT 2016 Traffic Forecast Least Squares worksheet. Using the demographically adjusted forecasts for Nicollet County, the highest expected growth rate in the study area is 1.29% for the segment of TH 14 from CSAH 12 to CSAH 24. As a conservative measure, a 1.29% growth rate was applied to all existing traffic volumes.

The 2040 turning movement volumes and AADTs are shown in **Figure 3**. Traffic forecast calculations can be found in **Appendix B.**

Figure 3: 2040 Turning Movement Figure and AADTs



V. EXISTING CONDITIONS ANALYSIS

The evaluation of the existing conditions considers many factors including traffic operations and safety. The following three sections detail the existing crash data (Safety), signal warrant analysis, and existing traffic operations.

A. Existing Crash Data (Safety)

The following tables detail 10 years (2006-2015) crash data from the Minnesota Crash Mapping Application Tool (MnCMAT). Statewide average crash rates (all crashes), fatal and serious rates, and critical rates are attained from the 2015 version of the State Aid for Local Transportation (SALT) intersection safety screening. **Table 2** shows the total crashes over the analysis period, the intersections current observed rates, and the critical index, which compares each intersection to similar intersections statewide. A critical index greater than 1.00 indicates that the intersection operates outside the expected, normal range for similar intersections or sections statewide.

Crash diagrams can be found in **Appendix C.**

Table 2: Crash Rate Results

Intersection	Traffic Control	Total Crashes (10 Years)	Crash Rate				Fatal & Serious Injury Crash Rate			
			Observed	Statewide Average	Critical Rate	Critical Index	Observed	Statewide Average	Critical Rate	Critical Index
446th Street	Thru-Stop	0	0.00	0.27	0.58	0.00	0.00	1.14	6.55	0.00
CSAH 37	Thru-Stop	25	0.75	0.27	0.51	1.47	0.00	1.14	5.03	0.00
571st Lane	Thru-Stop	4	0.15	0.27	0.54	0.28	0.00	1.14	5.59	0.00
561st Avenue	Thru-Stop	5	0.18	0.27	0.53	0.34	0.00	1.14	5.49	0.00
CSAH 12	Thru-Stop	3	0.10	0.27	0.53	0.19	0.00	1.14	5.33	0.00
CSAH 24	All-Way Stop	12	0.37	0.35	0.64	0.58	3.11	0.60	3.92	0.79
531st Avenue	Thru-Stop	1	0.04	0.27	0.54	0.07	0.00	1.14	5.59	0.00
CSAH 25	Thru-Stop	3	0.11	0.27	0.54	0.20	0.00	1.14	5.68	0.00

Generally, there are few crashes on the corridor. They are widespread throughout the corridor with higher numbers at the higher volume intersection locations including CSAH 37 and CSAH 24. The intersection of TH 14 at CSAH 37 has a crash index of 1.47 indicating that this intersection has an observed crash rate 47% greater than similar intersections statewide based on geometry, traffic control, speed limit and traffic volume. At CSAH 37, four crashes are classified as deer strikes, three as ran-off-road (ROR), and two as rollover. These crashes were included as part of the analysis; however, it is unclear if these crashes were a result the intersection control or geometry. The deer related crashes typically are not a crash type that can be reduced by engineering improvements, but the crash type may be reduced if sight lines are improved or more lighting is provided. Consequently, the crash reduction is applied to all of the crashes since the alternative may provide improved safety.

Left turn and right-angle crashes account for 48% of the crash types. These types of crashes can be eliminated with certain intersection treatments. The intersection of TH 14 at CSAH 24 has a fatal and serious index of 0.79. Although this is not statistically unsafe, one crash resulted in an incapacitating injury (A-injury). **Table 3** shows the breakdown of crash severity and crash type at each intersection.

Table 3: Crash Severity and Type

Intersection	Crash Severity					Crash Type							
	F	A	B	C	PDO	Rear End	Right Angle	Left Turn	Sideswipe Opposing	Sideswipe Passing	Ran Off Road	Deer Strike	Rollover
446th Street	0	0	0	0	0	0	0	0	0	0	0	0	0
CSAH 37	0	0	4	7	14	2	6	6	1	1	3	4	2
571st Lane	0	0	0	0	4	0	0	0	0	2	0	2	0
561st Avenue	0	0	0	1	4	1	1	0	0	0	1	2	0
CSAH 12	0	0	0	1	2	1	0	0	0	1	0	1	0
CSAH 24	0	1	1	1	9	9	0	2	0	1	0	0	0
531st Avenue	0	0	0	1	0	1	0	0	0	0	0	0	0
CSAH 25	0	0	1	0	2	0	0	0	0	0	1	2	0

B. Signal Warrant Results

None of the eight intersections meet signal warrants with existing traffic volumes. Warrant analysis is not applied to future volumes as traffic increases are anticipated to be minimal and are not imminent.

Signal warrant results are shown in detail in **Appendix D.**

C. Traffic Operations

Existing traffic operations are summarized in **Table 4.** All intersections are functioning within acceptable service levels during the peak hours. The northbound left turning movement at 571st Lane has LOS F during the PM peak hour. The northbound left turning movement at CSAH 37 and 561st Avenue, and the southbound left turning movement at 561st Avenue have LOS E during the peak hours. All other movements are LOS D or better for the peak hours.

Table 4: Existing No Build Traffic Operations

Intersection	Peak Hour	Intersection Delay (sec/veh)		Movement Delay (sec/veh)																									
				NBL		NBT		NBR		SBL		SBT		SBR		EBL		EBT		EBR		WBL		WBT		WBR	
CSAH 37 & TH 14	AM	3	A	17	C	-		4	A	-		-		-		-		1	A	0	A	4	A	1	A	-	
Stop Controlled	PM	5	A	40	E	-		4	A	-		-		-		-		2	A	0	A	5	A	1	A	-	
TH 14 & 446th	AM	1	A	-		-		-		7	A	-		2	A	-		1	A	-		-		2	A	-	
Stop Controlled	PM	2	A	-		-		-		9	A	-		-		-		1	A	-		-		3	A	1	A
571st Ln & TH 14	AM	4	A	30	D	-		12	B	-		-		-		-		3	A	1	A	7	A	3	A	-	
Stop Controlled	PM	6	A	110	F	-		34	D	-		-		-		-		3	A	1	A	10	B	4	A	-	
TH 14 & 561st	AM	4	A	38	E	-		11	B	46	E	-		7	A	5	A	4	A	2	A	5	A	3	A	1	A
Stop Controlled	PM	5	A	41	E	-		13	B	33	D	-		9	A	6	A	4	A	2	A	6	A	4	A	1	A
TH 14 & CSAH 12 (541st)	AM	3	A	-		-		-		9	A	-		3	A	-		2	A	-		-		4	A	2	A
Stop Controlled	PM	4	A	-		-		-		11	B	-		5	A	4	A	3	A	-		-		5	A	4	A
CSAH 24 (4th) & TH 14	AM	5	A	11	B	-		7	A	-		7	A	5	A	-		5	A	4	A	7	A	3	A	-	
Stop Controlled	PM	5	A	14	B	16	C	5	A	-		-		3	A	15	C	5	A	4	A	8	A	4	A	-	
TH 14 & 531st	AM	3	A	-		-		-		-		-		5	A	5	A	4	A	-		-		1	A	-	
Stop Controlled	PM	3	A	-		-		-		16	C	-		4	A	9	A	4	A	-		-		1	A	0	A
CSAH 25 (478th) & TH 14	AM	3	A	11	B	-		-		-		-		-		-		3	A	1	A	-		2	A	-	
Stop Controlled	PM	3	A	11	B	-		-		-		-		-		-		3	A	1	A	-		2	A	-	

Future (2040) no build traffic operations are summarized in **Table 5.** Six of the eight intersections are anticipated to operate at LOS A during the peak hours. The intersections at CSAH 37 and 571st Lane are anticipated to operate at LOS D and LOS E, respectively. One or more northbound and southbound turning movements (minor street approaches) at CSAH 37, 571st Lane, and 561st Avenue are anticipated to operate at LOS F during the peak hours.

Table 5: 2040 No Build Traffic Operations

Intersection	Peak Hour	Intersection Delay (sec/veh)		Movement Delay (sec/veh)																									
				NBL		NBT		NBR		SBL		SBT		SBR		EBL		EBT		EBR		WBL		WBT		WBR	
CSAH 37 & TH 14	AM	4	A	44	E	-		4	A	-		-		-		-		2	A	1	A	7	A	1	A	-	
Stop Controlled	PM	25	D	202	F	-		36	E	-		-		-		-		2	A	1	A	7	A	1	A	-	
TH 14 & 446th	AM	2	A	-		-		-		9	A	-		5	A	-		1	A	-		-		3	A	-	
Stop Controlled	PM	2	A	-		-		-		15	C	-		-		-		1	A	-		-		3	A	0	A
571st Ln & TH 14	AM	5	A	109	F	-		54	F	-		-		-		-		4	A	1	A	13	B	4	A	-	
Stop Controlled	PM	42	E	1098	F	-		964	F	-		-		-		-		4	A	1	A	17	C	5	A	-	
TH 14 & 561st	AM	5	A	87	F	-		21	C	71	F	-		25	D	7	A	4	A	2	A	9	A	4	A	1	A
Stop Controlled	PM	9	A	176	F	-		74	F	118	F	-		62	F	8	A	5	A	2	A	10	B	4	A	1	A
TH 14 & CSAH 12 (541st)	AM	4	A	-		-		-		13	B	-		7	A	-		3	A	-		-		5	A	3	A
Stop Controlled	PM	5	A	-		-		-		16	C	-		6	A	6	A	3	A	-		-		6	A	5	A
CSAH 24 (4th) & TH 14	AM	7	A	24	C	-		15	C	-		11	B	8	A	-		6	A	5	A	8	A	4	A	-	
Stop Controlled	PM	8	A	34	D	16	C	11	B	-		-		7	A	15	C	6	A	5	A	11	B	6	A	-	
TH 14 & 531st	AM	3	A	-		-		-		-		-		4	A	6	A	5	A	-		-		1	A	-	
Stop Controlled	PM	3	A	-		-		-		19	C	-		6	A	10	B	5	A	-		-		1	A	0	A
CSAH 25 (478th) & TH 14	AM	3	A	16	C	-		-		-		-		-		-		4	A	1	A	-		2	A	-	
Stop Controlled	PM	3	A	14	B	-		-		-		-		-		-		3	A	1	A	-		2	A	-	

Additional operation and queuing results can be found in **Appendix E.**

VI. CONCEPT ALTERNATIVES

The alternative analysis is structured into four intersection groups and two segments groups based on the proposed alternatives provided by MnDOT. The alternatives are compared to the base conditions of the group and other alternatives within the group for safety, operations and cost impacts. The following details the intersection and segment groups.

A. Intersection Alternative Groups

The following details the alternatives analyzed for each intersection group. **Figure 4** shows examples of the intersection alternatives for reference.

1. TH 14 CSAH 37 and 446th Street
   a) Traditional At-Grade with Acceleration Lanes
   b) Restricted Crossing U-Turns (RCUT)
   c) High T
   d) Interchange
   e) Roundabout
2. 571st Lane
   a) Traditional At-Grade with Acceleration Lanes
   b) Green T
   c) RCUT
3. 561st Avenue
   a) RCUT
4. Courtland Area
   a) Concept A – RCUT at CSAH 24
   b) Concept B – Two RCUTs (CSAH 12 and East end of Courtland)
   c) Concept C – Interchange at CSAH 24
   d) Concept E – Interchange at CSAH 12 and RCUT at East end of Courtland
   e) Concept F – Quadrant Interchange at CSAH 12 and RCUT at East end of Courtland

Concept Figures can be found in **Appendix F**

Figure 4: Intersection Alternative Examples

B. **Segment Alternative Groups**

The following details the alternatives analyzed for each segment group.

1. TH 14 from TH 15 to CSAH 37

The tight proximity to the Minnesota River and steep grades adjacent to the roadway do not provide enough usable space to implement a rural four-lane divided highway in a feasible manner. Both alternatives for this section have smaller roadway footprints than a typical rural four-lane divided highway and are believed to be feasible for the segment of TH 14.

a) Two-Lane Recondition

The Two-Lane Recondition alternative replaces the existing roadway on the same roadway footprint. This alternative has little impact on the surrounding area of TH 14 and does not require additional ROW.

b) Constrained Four-Lane Divided

The Constrained Four-Lane Divided alternative fully reconstructs TH 14 from TH 15 to CSAH 37, but with a narrower footprint than the rural four-lane divided expansion. The cross section is two lanes in each direction with a center median. This alternative has more impact than the Two-Lane Recondition but less impact than a rural four-lane divided section.

2. TH 14 from 571st Lane to 561st Avenue

Two alternatives for TH 14 from 571st Lane to 561st Avenue are analyzed in an effort to avoid impacts to the Minnesota Valley Lutheran High School (MVLHS) athletic field on the north side of TH 14, residential properties and agricultural properties.

a) Constrained Four-Lane Divided

The Constrained alternative has a narrower footprint than the unconstrained rural four-lane alternative. The centerline spacing between through lanes is 56 feet with a center median dividing the two lanes of traffic in each direction. This alternative is not expected to affect the athletic fields or residential properties.

b) Unconstrained Four-Lane Divided

The Unconstrained alternative has a centerline spacing of 94 feet with a divided median separating the two lanes of traffic in each direction. This alternative would likely require acquisition of the athletic fields adjacent to TH 14, four residential properties and approximately 14.4 acres of agricultural property.

VII. INTERSECTION ALTERNATIVE ANALYSIS

The evaluation of the alternatives considers many factors including safety, operations, and cost. The base conditions are the existing traffic control and geometry detailed in the Existing Conditions Analysis. The following section describes the general methodologies used to calculate crash reduction (safety) and overall delay (operation).

A. **Methodology**

1. Crash Reduction (Safety)

Crash reduction factors (CRF) for the various geometric and traffic control changes are determined using the Crash Modification Factors (CMF) Clearinghouse website. The potential reduction for an alternative is the weighted product of the applicable CMFs, applied to the existing crashes at the intersection.

Example:

Alternative = Conversion to Interchange with Roundabouts

Existing Crashes:

11 Type A, B, C Crashes

10 Property Damage Only Crashes

Applicable CMFs:

$CMF_{\text{All Crashes and All Types, Interchange Conversion}} = 0.71$

$CMF_{\text{All Crashes and All Types, 2- to 4-Lane Conversion}} = 0.75$

$CMF_{\text{All Crashes and All Types, Roundabout}} = 0.58$

$CMF_{\text{A,B,C Crashes and All Types, Interchange Conversion}} = 0.43$

$CMF_{\text{A,B,C Crashes and All Types, 2- to 4-Lane Conversion}} = 0.55$

$CMF_{\text{A,B,C Crashes and All Types, Roundabout}} = 0.28$

Calculations:

$CMF_{\text{All Crashes and All Types}} = 0.71 \times 0.75 \times 0.58 = 0.309$

$CMF_{\text{A,B,C Crashes and All Types}} = 0.43 \times 0.55 \times 0.28 = 0.066$

$$CMF_{\text{Alternative}} = \frac{((0.309\ x\ 10 crashes)+(0.066\ x\ 11 crashes))}{(10\ crashes+11\ Crashes)} = 0.182$$

$$CRF_{\text{Alternative}} = \frac{(1-0.182)}{100} = 81.2\% \sim 82\%$$

2. Overall Delay (Operations)

The intersection alternatives vary in the number of intersections; as a result, the overall delay of each alternative is calculated by a volume-weighted formula. If more than one intersection is included in an alternative, the overall delay calculation weighs the delay at each intersection by the volume at each intersection. This methodology allows each alternative to be compared to each other in terms of overall delay in seconds per vehicle. Grade-separated alternatives assume no delay for eastbound and westbound traffic on TH 14.

Example:

Intersection 1 has an intersection delay A and a total entering volume X

Intersection 2 has an intersection delay B and a total entering volume Y

$$\text{Overall Delay} = \frac{((A*X)+(B*Y))}{(X+Y)}$$

3. Travel Time (Operations)

Travel time on TH 14 is expected to decrease after the two- to four-lane expansion. The proposed roadway alignment will likely have an increased speed limit, and will not require reduction in speed through the city of Courtland. The alternatives are compared in terms of travel time in seconds per vehicle on TH 14 through the length of the alternative. Traffic on TH 14 was assumed to be free flowing (traveling at or near the speed limit) for all the alternatives with the exception of the at-grade roundabout at CSAH 37 and 446th Street because vehicles would be required to slow down to navigate the roundabout.

B. CSAH 37 and 446th Street

1. Safety

The safety of CSAH 37 and 446th Street is expected to be improved with all of the alternatives shown in **Table 6**. Removing conflict points is the best way to reduce crashes at intersections. The interchange has the highest crash reduction (82%) because a majority of the conflict points are eliminated and the remaining conflicts occur at roundabout intersections. While two roundabouts are developed, the total traffic volume conflicting at the roundabout locations is much less since mainline TH 14 volume does not go through the roundabouts. The Roundabout and RCUT alternatives have a potential reduction of 71% and 70%, respectively. These alternatives reduce the possibility for right angle crashes at the intersection by replacing those movements with right turns or merging maneuvers. The High T alternatives has a potential reduction of 65%. Although the eastbound movement is removed from the intersection, the High T alternative does not remove as many conflicts points as the interchange and does not replace the right-angle crashes like the Roundabout and RCUT. The Traditional At-Grade alternative does not reduce the conflict points at the intersection and the potential reduction only includes the benefits of the two- to four-lane expansion.

Table 6: CSAH 37 and 446th Crash Reduction

Measure	Base Condition	Traditional At Grade	RCUT	High T	Interchange	Roundabout
Potential Reduction	-	**25%**	**70%**	**65%**	**82%**	**71%**

2. Operations

a) Overall Delay

The overall intersection delay of the CSAH 37 and 446th Street alternatives are shown in **Table 7** with the existing and 2040 traffic volumes. All alternatives are anticipated to operate with LOS A with the exception of the Traditional At-Grade alternative. The overall LOS F for the Traditional At-Grade alternative is a result of excessive delays for the northbound movements at CSAH 37.

Table 7: CSAH 37 and 446th Street Traffic Operation

Traffic	Peak	Base Condition		Traditional At Grade		RCUT		High T		Interchange		Roundabout	
		Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Existing	AM	2	A	4	A	3	A	2	A	5	A	6	A
	PM	4	A	12	B	4	A	3	A	6	A	7	A
2040	AM	3	A	8	A	3	A	2	A	8	A	8	A
	PM	16	C	125	F	7	A	4	A	9	A	9	A

b) Travel Time

The existing travel time on TH 14 is 112 seconds per vehicle through the CSAH 37 and 446th Street area. The anticipated travel time reduction for the roundabout and two- to four-lane expansion is 13.2 seconds per vehicle. The anticipated travel time reduction for the other alternatives is 17.1 seconds per vehicle.

3. Cost

The cost estimate for the CSAH 37 and 446th Street alternatives are shown in **Table 8.** These estimates include construction and right-of-way cost. The Traditional At-Grade, RCUT and Roundabout have an estimated cost of $5.5 to $5.9 million. The interchange alternative is estimated to cost about twice as much at $11 million. The most expensive

alternative is the High T alternative estimated to cost over $18 million primarily due to walls, which are not required for the other alternatives. All costs are in 2018 dollars.

Table 8: CSAH 37 and 446th Street Cost

Cost	Traditional At Grade	RCUT	High T	Interchange	Roundabout
Construction Cost	$5,628,000	$5,652,800	$17,897,000	$10,739,000	$5,391,000
ROW Cost	$217,600	$156,800	$196,000	$292,000	$141,600
Total Cost	**$5,845,600**	**$5,809,600**	**$18,093,000**	**$11,031,000**	**$5,532,600**

2018 Dollars

C. 571st Lane

1. Safety

The safety of 571st Lane is expected to be improved with all of the alternatives shown in **Table 9**. The RCUT alternative has a potential reduction of 70%. This alternative reduces right angle crashes at the intersection by replacing those movements with right turns and merging maneuvers. The Traditional At-Grade alternative does not reduce the conflict points at the intersection and the potential reduction only includes the benefits of the two- to four-lane expansion. The Green T alternative removes the westbound traffic from the intersection, providing slightly higher potential reduction compared to the Traditional At-Grade alternative.

Table 9: 571st Lane Crash Reduction

Measure	Base Condition	Traditional At Grade	Green T	RCUT
Potential Reduction	**-**	**25%**	**32%**	**70%**

2. Operations

a) Overall Delay

The overall intersection delay of the 571st Lane alternatives are shown in **Table 10** with the existing and 2040 traffic volumes. All alternatives are anticipated to operate with LOS A. The Green T and RCUT alternatives are anticipated to have one second of delay per vehicle less than the Traditional At-Grade alternative during the peak hours.

Table 10: 571st Lane Traffic Operations

Traffic	Peak	Base Condition		Traditional At Grade		Green T		RCUT	
		Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Existing	AM	4	A	2	A	1	A	1	A
	PM	6	A	3	A	1	A	1	A
2040	AM	5	A	3	A	1	A	1	A
	PM	42	E	3	A	2	A	2	A

b) Travel Time

The existing travel time on TH 14 is 19.6 second per vehicle through the 571st Lane area. All the alternatives include the two- to four-lane expansion and the anticipated travel time reduction for the alternatives is 3.0 seconds per vehicle

due to the higher speed with the four-lane divided roadway.

3. Cost

The cost estimate for the 571st Lane alternatives are shown in **Table 11.** These estimates include construction and right-of-way cost. The cost differences between the alternatives is less than $500,000. The RCUT alternative has the highest cost estimate at $4.6 million. All costs are in 2018 dollars.

Table 11: 571st Lane Cost

Cost	Traditional At Grade	Green T	RCUT
Construction Cost	$4,038,000	$4,254,000	$4,461,000
ROW Cost	$143,200	$147,200	$144,800
Total Cost	**$4,181,200**	**$4,401,200**	**$4,605,800**

2018 Dollars

D. 561st Avenue

1. Safety

The RCUT alternative has a potential reduction of 70%. This alternative reduces right angle crashes at the intersection by replacing those movements with right turns and merging maneuvers.

Table 12: 561st Avenue Crash Reduction

Measure	Base Condition	RCUT
Potential Reduction	-	**70%**

2. Operations

a) Overall Delay

The overall intersection delay of the 561st Avenue alternatives are shown in **Table 13** with the existing and 2040 traffic volumes. The RCUT is anticipated to operate with LOS A.

Table 13: 561st Avenue Traffic Operations

Traffic	Peak	Base Condition		RCUT	
		Delay	LOS	Delay	LOS
Existing	AM	4	A	5	A
	PM	5	A	5	A
2040	AM	5	A	5	A
	PM	9	A	5	A

b) Travel Time

The existing travel time on TH 14 is 21.4 second per vehicle through the 561st Avenue area. The RCUT alternative includes the two- to four-lane expansion. Anticipated travel time reduction for the RCUT alternatives is 3.3 seconds per vehicle due to the higher speed with the four-lane divided roadway.

3. Cost

The cost estimate for the 561st Avenue RCUT is $3 million in 2018 dollars. These estimates include construction and right-of-way cost.

Table 14: 561st Avenue Cost

Cost	RCUT
Construction Cost	$2,980,000
ROW Cost	$81,600
Total Cost	**$3,061,600**

2018 Dollars

E. Courtland Area

1. Safety

The safety of the Courtland Area is expected to be improved with all of the alternatives shown in **Table 15**. Removing conflict points is the best way to reduce crashes at intersections. All of the alternatives involve re-routing TH 14 to the north of Courtland and providing access to the city in one or two locations. As a result, the number of access locations (potential conflict points) to TH 14 is significantly reduced.

Concept A (RCUT at CSAH 24) and Concept C (interchange at CSAH 24) condense the access to Courtland with one centralized intersection or interchange. With a centralized location, additional access is not deemed acceptable due to access spacing needs. Concept C has the highest potential crash reduction (82%) since a majority of the conflict points are eliminated by the grade separation and the remaining conflicts occur at roundabout intersections. While two roundabouts are developed, the total traffic volume conflicting that the roundabout locations is much less since mainline TH 14 volume does not go through the roundabouts. Concept A (RCUT at CSAH 24) has a lower potential reduction (72%) because the at-grade intersection still involves the possibility of left turn crashes.

Concept B (RCUT at CSAH 12 and east end of Courtland), Concept E (interchange at CSAH 12 and RCUT at east end of Courtland) and Concept F (quadrant interchange at CSAH 12 and RCUT at east end of Courtland) reduce the access to Courtland to two locations at the east and west ends of the city. With the access locations spread to each end of the city, access spacing needs can still be met. Concept E has the highest potential crash reduction (76%) for the two-access alternatives; this is slightly lower than the potential crash reduction for Concept C because of the conflicts points associated with the RCUT at the east end of Courtland. The grade separation in Concept F removes a majority of the conflict points, but introduces additional intersections (i.e., additional conflict points) on TH 14 and CSAH 12. Concept B has the lowest potential reduction with two access locations and no grade separation.

Table 15: Courtland Area Crash Reduction

Measure	Base Condition	Concept A	Concept B	Concept C	Concept E	Concept F
Potential Reduction	-	**70%**	**62%**	**82%**	**76%**	**63%**

2. Operations

The operational analysis of the Courtland area considers three factors: the overall delay, travel time, and the Access to Anchors analysis. Access to anchors is described below.

a) Overall delay

The overall intersection delay of the Courtland Area alternatives are shown in **Table 16** with the existing and 2040 traffic volumes. All alternatives are anticipated to operate with LOS A.

Table 16: Courtland Area Traffic Operations

Traffic	Peak	Base Condition		Concept A		Concept B		Concept C		Concept E		Concept F	
		Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Existing	AM	3	A	8	A	8	A	5	A	3	A	3	A
	PM	4	A	4	A	4	A	4	A	2	A	2	A
2040	AM	4	A	8	A	8	A	5	A	4	A	3	A
	PM	5	A	4	A	4	A	5	A	3	A	2	A

b) Travel Time

The existing travel time on TH 14 is 246 second per vehicle through Courtland. The anticipated travel time reduction for the alternatives is 62.9 seconds per vehicle. All the alternatives include the two- to four-lane expansion and realignment of TH 14 to the north.

c) Access to Anchors

The Courtland Area alternatives will change the internal traffic patterns of Courtland. Local traffic that is attempting to access TH 14 must navigate to either the centrally located access (Concept A and C) or one of the two accesses on either side of Courtland (Concept B, E, and F).

Three anchor points were selected within Courtland (see **Figure 5**):

W (west end) - S & S motors intersection of existing TH 14 and Zieske Rd

C (center) - Intersection of existing TH 14 and CSAH 24 (4th Street)

E (east end) - Intersection of existing TH 14 and 531st Street

Two external points were selected where the proposed TH 14 alignment diverges from the existing TH 14 alignment on the west (X) and east (Y) of Courtland (see **Figure 5**).

Figure 5: Access to Anchor Points of Interest

Table 17 details the travel time from each of the anchor points to each of the external points for the existing, centrally located access to TH 14 at CSAH 24

(Concepts A and C), and two accesses to TH 14 at CSAH 12 and the east end of Courtland (Concepts B, E, and C).

Table 17: Access to Anchors Travel Time Results

	Existing Travel Times			Central Access to TH 14 (Change in Travel Times)			Two Accesses to TH 14 (change in Travel Times)		
Anchor	*West*	*Central*	*East*	*West*	*Central*	*East*	*West*	*Central*	*East*
To X	0.7	2.0	2.9	+2.7	+0.3	+0.3	+1.0	+0.3	+0.3
To Y	4.3	3.1	2.2	+0.2	+0.2	+1.9	-0.6	0.0	0.0

All data is measured in Minutes

The centrally located access to TH 14 is anticipated to increase the internal travel time from all three anchor points in Courtland to the external points. The most significant change from the existing condition is the "out of direction" travel experienced, for example, from the West anchor point to external point X (increased travel time of 2.7 minutes) and/or from the East anchor point to external point Y (increased travel time of 1.9 minutes).

The two accesses to TH 14 alternatives provide more options for users. The shortest travel time option is shown in **Table 17.** The internal travel time from the anchor points to the west (external point X) is anticipated to increase, however, the travel time is anticipated to stay the same or be reduced from the anchor points to the east (external point Y). The two access concepts generally have a reduced access to internal anchor points in Courtland.

3. Cost

The cost estimate for the Courtland Area alternatives are shown in **Table 18.** These estimates include construction and right-of-way cost, including all costs associated with realigning and reconstructing local, township and country roads. The interchange alternatives (Concepts C, E and F) have the highest construction cost between $10.6 and $12.8 million. The at-grade alternatives (Concepts A and B) have lower construction cost between $7.1 and $8.8 million. The centrally located access alternatives (Concepts A and C) have the highest ROW cost between $0.8 and $0.9 million, Concept E has a ROW cost of about $0.7 million. The higher ROW cost is associated with the additional area required for grading impacts and realigning local, township and county roads. Overall, Concept C (interchange at CSAH 24) has the highest total cost of $13.8 million and Concept B (RCUT at CSAH 12 and at east end of Courtland) has the lowest total cost at $7.5 million. All costs are in 2018 dollars.

Table 18: Courtland Area Cost

Cost	Concept A	Concept B	Concept C	Concept E	Concept F
Construction Cost	$8,844,000	$7,105,000	$12,867,000	$12,006,000	$10,621,000
ROW Cost	$810,400	$460,000	$946,400	$732,800	$581,600
Total Cost	**$9,654,400**	**$7,565,000**	**$13,813,400**	**$12,738,800**	**$11,202,600**

2018 Dollars

VIII. SEGMENT ANALYSIS

A. TH 14 from TH 15 to CSAH 37

1. Safety

The Two-Lane Recondition alternative would not reduce the expected number of crashes. The Constrained Four-Lane Divided alternatives has a potential reduction of 13% with the addition of the center median. The District has also provided direction that a high-tension cable median barrier would likely be placed concurrent with any median.

Table 19: TH 14 from CSAH 37 to TH 15 Crash Reduction

Measure	Base Condition	2-Lane Recondition	Constrained 4-Lane Divided
Potential Reduction	-	**0%**	**29%**

2. Operations

The existing travel time on TH 14 is 117 second per vehicle from TH 15 to CSAH 37. The travel time would not be expected to change with the Two-Lane Recondition alternative. The anticipated travel time reduction for the Constrained Four-Lane Divided alternative is 18 seconds per vehicle due to the higher speed with the four-lane divided roadway.

3. Cost

The cost estimate for the CSAH 37 to TH 15 segment alternatives are shown in **Table 20.** The estimates include construction cost but do not include potential right-of-way cost associated with the Constrained Four-Lane Divided alternative. Right-of-way was not evaluated for this alternative as part of this study. The Constrained Four-Lane Divided alternative construction cost is estimated to be almost six times cost of the Two-Lane Recondition. The cost estimate for the Constrained Four-Lane Divided alternative is $4.7 million. All costs are in 2018 dollars.

Table 20: TH 14 from CSAH 37 to TH 15 Cost

Cost	2-Lane Recondition	Constrained 4-Lane Divided
Construction Cost	$896,780	$4,735,000
ROW Cost	$0	$0*
Total Cost	**$896,780**	**$4,735,000**

2018 Dollars

*ROW acquistion is likely but was not evaluated

B. TH 14 from 571st Lane to 561st Avenue

1. Safety

The Constrained alternative has a potential reduction of 13% with the addition of the center median. The Unconstrained alternative has a higher potential reduction (28%) because of the additional space between through lanes associated with the two- to four-lane expansion. The District has also provided direction that a high-tension cable median barrier would likely be placed concurrent with any median.

Table 21: TH 14 from 571st Lane to 561st Avenue Crash Reduction

Measure	Base Condition	Constrained 4-Lane Divided	Unconstrained 4-Lane Divided
Potential Reduction	-	**13%**	**29%**

2. Operations

The existing travel time on TH 14 is 74 second per vehicle from 571st Lane to 561st Avenue. The anticipated travel time reduction for the both alternatives is 11 seconds per vehicle due to the increased speed with the four-lane divided roadway.

3. Cost

The cost estimate for the 571st Lane to 561st Avenue segment alternatives are shown in **Table 22.** The estimates include construction and right-of-way cost. The estimated construction cost of the Constrained alternative is higher than the Unconstrained because of the additional cost associated with the center median construction. However, the total cost of the Unconstrained alternative is higher because of the additional $2.0 million in right-of-way acquisition. The cost estimate for the Unconstrained and Constrained alternative is $5.0 and $3.3 million, respectively. All costs are in 2018 dollars.

Table 22: TH 14 from 571st Lane to 561st Avenue Cost

Cost	Constrained 4-Lane Divided	Unconstrained 4-Lane Divided
Construction Cost	$3,317,000	$2,995,000
ROW Cost	$0	$2,015,200
Total Cost	**$3,317,000**	**$5,010,200**

2018 Dollars

IX. ECONOMIC EVALUATION

The effects of each alternative is converted into monetary terms. This analysis takes into account both the cost of the alternative but also the incremental benefits of each alternative over time in terms of travel time savings and safety savings.

The total cost and benefits of the alternatives over the base conditions is calculated in terms of total cost, maintenance, delay and safety over the 20-year project life of the improvements. The Cost and Benefit spreadsheets are included in **Appendix G and H**. The guidance for the calculations is based on "User Benefit Analysis for Highways", AASHTO, August 2003 and the Benefit/Cost Analysis for Transportation Projects by the MnDOT. The fiscal year 2018 recommended standard values for the occupancy rates, discount rates, value of time, and crash values used in the calculations were taken from the MnDOT Office of Transportation System Management Benefit-Cost Analysis Standard Value Tables and are indicated below.

Table 23: SFY2018 Recommended Standard Values (a)

Discount Rate *(b)*	**Percent**
Real	1.3
Value of Time ***(c)***	**Dollars per person hour**
Auto	$18.30
Truck	$29.40
Variable Operating Costs ***(d)***	**Dollars per mile**
Auto	$0.25
Truck	$0.81
Mn/DOT Crash Values ***(e)***	**Dollars per crash**
Fatal	$11,000,000
Injury Type A only	$590,000
Injury Type B only	$170,000
Injury Type C only	$87,000
Property damage only	$7,800

Table 24: Minnesota Automobile Occupancy Rates

Project Area			**Urban**	**Rural**	**Overal**
TBI: Automobile, 7 County Metro Area (a)			1.3	1.3	1.3
NHTS: Automobile, Greater MN (b)			1.72	1.31	1.6
NHTS: Truck, Greater MN (b)			-	-	1.02

(a) Source: 2010 Metropolitan Council Travel Behavior Inventory (TBI) Home Interview Survey
(b) Source: 2009 National Household Travel Survey (NHTS), Minnesota data

The calculations tables for each cost or benefit are included in the appendices, but an explanation of the methodology is included as follows. Project costs consider the capital and maintenance cost of each alternative. These are expressed in terms of 2018 dollars. In an effort to analyze just the alternative benefits, the capital cost includes all of the improvements necessary in order to construct the alternative. As a result, the cost shown in the following tables varies from the construction cost in the previous section that includes additional approach (TH 14) costs associated with the alternatives.

Overall, the difference in operating and maintenance cost of the alternatives is minimal over the 20 year time frame of analysis and was not added into the project cost for the benefit of cost calculations.

The travel time (or operating cost) savings are calculated based on the difference between the Base Condition and each alternative. Travel time is expressed as vehicle-hours traveled (VHT). The VHT is estimated using delay estimation models (i.e., Synchro) to develop delay per vehicle estimates for each hour of the day. The estimation of travel time savings includes both the driver and passengers in the vehicle (i.e., vehicle occupancy rates). The valuation of travel time savings is calculated using the standardized cost-per-hour-per-person figures for different vehicles (auto or truck).

The safety benefits were calculated using crash data from the Minnesota Crash Mapping Application Tool (MnCMAT) and crash reduction factors (CRF) from the Crash Modification Factors (CMF) Clearinghouse website. CRF were summarized for each alternative for consistency between alternatives. Safety benefits were calculated using the methodology of the Highway Safety Improvement Program (HSIP).

A summary of the cost and benefits is provided for each alternative group below. The benefit to cost (B/C) ratio presented is the total benefit of the improvement over the benefit cost. Generally, a B/C ratio of 1.00 is needed to substantiate a project.

A. CSAH 37 and 446th Street

Table 25: Cost and Benefit Summary (2018 Dollars) – CSAH 37 and 446th Street

Alternative	Cost (A)	Benefits			Benefit-Cost Ratio ((B+C)/A)
		Vehicle Operating Cost Savings (B)	Safety Benefits (C)	Total Benefit (B+C)	
Traditional At-Grade	$ 1,110,000	$ (1,400,000)	$ 1,000,000	$ (400,000)	**-0.36**
RCUT	$ 1,786,400	$ 12,800,000	$ 2,000,000	$ 14,800,000	**8.28**
High T	$ 14,847,000	$ 13,500,000	$ 1,900,000	$ 15,400,000	**1.04**
Interchange	$ 7,965,000	$ 12,100,000	$ 2,500,000	$ 14,600,000	**1.83**
Roundabout	$ 2,272,400	$ 9,000,000	$ 2,300,000	$ 11,300,000	**4.97**

The Traditional At-Grade alternative does not provide an operational or safety benefit compared to the project cost, resulting in a negative benefit in terms of benefit-cost ratio.

The remaining alternatives at CSAH 37 and 446th Street provide a benefit-cost ratio greater than 1.00. The most significant differences between the alternatives is the cost (A). The High T and Interchange alternatives cost approximately four to eight times the cost of the RCUT and Roundabout alternatives. The operating and safety benefits are relatively the same over the 20-year project life, which is a results of the lower benefit-cost ratio for the High T and Interchange alternatives. Taking into account all of the cost and benefits as calculated in this study the RCUT alternative has the highest benefit-cost ratio.

B. 571st Lane

Table 26: Cost and Benefit Summary (2018 Dollars) – 571st Lane

Alternative	Cost (A)	Benefits			Benefit-Cost Ratio ((B+C)/A)
		Vehicle Operating Cost Savings (B)	Safety Benefits (C)	Total Benefit (B+C)	
Traditional At-Grade	$ 1,296,600	$ 6,300,000	$ 10,000	$ 6,310,000	**4.87**
Green Tee	$ 2,189,600	$ 6,700,000	$ 10,000	$ 6,710,000	**3.06**
RCUT	$ 2,056,000	$ 6,600,000	$ 20,000	$ 6,620,000	**3.22**

All three alternatives at 571st Lane provide a benefit-cost ratio greater than 1.00. The operating and safety benefits are relatively the same over the 20-year project life for the alternatives. The Traditional At-Grade intersection has the lowest cost (A) and therefore has the largest benefit-cost ratio.

C. 561st Avenue

Table 27: Cost and Benefit Summary (2018 Dollars) – 561st Avenue

Alternative	Cost (A)	Benefits			Benefit-Cost Ratio ((B+C)/A)
		Vehicle Operating Cost Savings (B)	Safety Benefits (C)	Total Benefit (B+C)	
RCUT	$ 1,632,600	$ 2,600,000	$ 200,000	$ 2,800,000	**1.72**

The RCUT alternative at 561st Avenue provides a benefit-cost ratio greater than 1.00. The total benefit of the RCUT in this locations is 1.72 times the cost.

D. Courtland Area

The cost (A) included in the calculations for the Courtland Area includes all costs associated with realigning and reconstructing adjacent City, Township and County roads.

Table 28: Cost and Benefit Summary (2018 Dollars) – Courtland Area

Alternative	Cost (A)	Benefits			Benefit-Cost Ratio ((B+C)/A)
		Vehicle Operating Cost Savings (B)	Safety Benefits (C)	Total Benefit (B+C)	
Concept A	$ 9,654,400	$ 38,800,000	$ 1,400,000	$ 40,200,000	**4.16**
Concept B	$ 7,565,000	$ 39,000,000	$ 1,300,000	$ 40,300,000	**5.33**
Concept C	$ 13,813,400	$ 39,000,000	$ 1,900,000	$ 40,900,000	**2.96**
Concept E	$ 12,738,800	$ 40,500,000	$ 1,900,000	$ 42,400,000	**3.33**
Concept F	$ 11,202,600	$ 40,700,000	$ 1,700,000	$ 42,400,000	**3.78**

All the alternatives for the Courtland Area provide a benefit-cost ratio greater than 1.00. The most significant differences between the alternatives is the cost (A). Concept C (interchange at CSAH 24) has the highest cost because of the additional cost associated with interchange grading and realignment of adjacent roads. Concept E (interchange at CSAH 12 and RCUT at east end of Courtland) and Concept F (quadrant interchange at CSAH 12 and RCUT at east end of Courtland) have the cost associated with interchange grading, but less cost for realignment of adjacent roadways. Concept A (RCUT at CSAH 24) and Concept B (RCUT at CSAH 12 and east end of Courtland) are both at-grade intersections but Concept A has additional cost associated with realignment of adjacent roads.

Concept B (RCUT at CSAH 12 and east end of Courtland) has the highest benefit-cost ratio a Concept C (interchange at CSAH 24) has the lowest benefit-cost ratio.

E. TH 14 from TH 15 to CSAH 37

Table 29: Cost and Benefit Summary (2018 Dollars) – CSAH 37 to TH 15

Alternative	Cost (A)	Benefits			Benefit-Cost Ratio ((B+C)/A)
		Vehicle Operating Cost Savings (B)	Safety Benefits (C)	Total Benefit (B+C)	
2-Lane Recondition	$ 896,780	$ -	$ -	$ -	**0.00**
Constrained 4-Lane Divided	$ 4,735,000	$ 6,782,379	$ 22,468	$ 6,804,846	**1.44**

The Two-Lane Recondition alternative does not provide an operational or safety benefit, therefore the benefit-cost ratio is zero.

The Constrained Four-Lane Divided alternatives provide a benefit-cost ratio greater than 1.00. The total benefit of the Four-Lane Divided alternative is 1.44 times the cost.

F. TH 14 from 571st Lane to 561st Avenue

Table 30: Cost and Benefit Summary (2018 Dollars) – 571st Lane to 561st Avenue

Alternative	Cost (A)	Benefits			Benefit-Cost Ratio ((B+C)/A)
		Vehicle Operating Cost Savings (B)	Safety Benefits (C)	Total Benefit (B+C)	
Constrained (56' CL)	$ 3,317,000	$ 4,130,781	$ 44,256	$ 4,175,038	**1.26**
Unconstrained (94' CL)	$ 5,010,200	$ 4,130,781	$ 97,682	$ 4,228,463	**0.84**

The Unconstrained alternative provides a benefit-cost ratio of 0.84. Although a benefit is achieved by this alternatives, the benefit-cost ratio less than 1.00. The total benefit of the Constrained alternative is 1.26 times the cost. The most significant differences between the alternatives is the necessary right-of-way associated with the Unconstrained alternative.

X. ADDITIONAL ANALYSIS

A. Truck Climbing Lane Analysis

The American Association of State Highway and Transportation Officials (AASHTO) Green Book provides three criteria, reflecting the economic considerations, which should be satisfied to justify a Climbing Lane on Two-Lane Highways. The segment considered at the intersection of TH 14 and 571st Avenue satisfies the three criteria for a Climbing Lane on Two-Lane Highways:

1. Upgrade traffic flow rate in excess of 200 vehicles per hour (vph)?

   Existing traffic volume in direction of climbing lane / peak hour factor =
   391 vph / 0.95 = 412 vph upgrade traffic flow rate > 200 vph

2. Upgrade truck flow rate in excess of 20 vph?

   Upgrade traffic flow rate * heavy vehicle percentage =
   412 vph * 12% = 49 vph upgrade truck flow rate > 20 vph

3. One of the following conditions exists:

   a) A 10 mile per hour (mph) or greater speed reduction is expected for a typical heavy truck.

   Yes – Assuming a grade of 4% and a Length of Grade of 3,300 feet, Figure 3-29 of the AASHTO Green Book indicates a greater than 10 mph speed reduction is expected.

   b) Level of service E or F exists on grade.

   No.

   c) A reduction of two or more levels of service is experienced when moving from the approach segment to the grade.

   No.

This indicates that the truck climbing lane would be justified on a two-lane highway.

However, this is not directly relatable to a truck climbing lane need on a multi-lane highway. A multi-lane highway should also consider the LOS E or F criteria. Basically if the segment would be operating above capacity there would be a need for the truck climbing lane in addition to the criteria above. The existing and forecasted traffic volumes on TH 14 indicates that the multi-lane facility will operate sufficiently without a truck climbing lane. Slower moving vehicles on the upgrade are not expected to impede the following vehicles due to the low v/c ratio (0.11).

Highway Capacity Manual Methodology Inputs
Passenger Car Equivalent = 3.0
Proportion of Trucks = 14%
Heavy Vehicle Adjustment Factor = 0.78
Volume = 391 vehicles per hour
Peak Hour Factor = 0.95
Number of Lanes = 2
Demand Flow Rate =264 vehicles per hour
Capacity = 1,900 + 400 = 2,300
v/c = 264/2300 = 0.11

Based on the above, a truck climbing lane is not justified with the four-lane highway configuration but there are additional operational and safety considerations.

There is evidence that crashes are reduced when vehicles in the traffic stream move at the same speed. The intersection at 571st Avenue serves as the entrance for the New Ulm Quartzite Quarries and is located at the bottom of a vertical curve on TH 14. A large difference in speed will be experienced between trucks entering TH 14 and the approaching traffic. Based on truck traffic estimates based on the size of the site and counts at a similar quarry, it is estimated that up to 640 trucks would be entering and exiting the site per day in the summer, with a peak hour volume of up to 74 trucks entering and exiting the site. This number of trucks will greatly impact the speed on one lane in each direction. Although the analysis indicates there is no need for a truck climbing lane based on total traffic volume, there is a need for adequate acceleration and deceleration lanes to ensure the speed of mainline traffic is not compromised due to the high volume of trucks turning in and out of the quarry.

Adequate truck climbing acceleration and deceleration lanes should be included with the upcoming project in recognition of the potential need for safety benefits due to the volume of trucks and the 65 mph speed limit.

- 635 feet of deceleration left turn lane plus 1:15 taper (180')*
- 535 feet of deceleration right turn lane plus 1:15 taper (180')*
- 2,050 feet eastbound acceleration lane plus 1 to speed (65) taper (780')**

*from Design for Turn Lane Guidelines
**based on truck acceleration of 2.25ft/sec2

B. Two-Lane Highway HCM and LOTTR Analysis

The Highway Capacity Manual (HCM) was used to analyze the traffic operations on the two-lane highway with uninterrupted flow conditions. The Level of Service (LOS) for the Class I highway can be measured in terms of Percent Time Spent Following (PTSF). The PTSF in the study area is currently LOS C and D but is anticipated to be LOS D and E with future traffic volumes. High percentages of PTSF is primarily a result of limited passing capacity resulting in vehicles following slower moving vehicles. Adding more opportunities for passing through the addition of passing lanes or an increase in the number of lanes in each direction is recommended to increase the passing capacity and reduce platooning and PTSF.

The Level of Travel Time Reliability (LOTTR) was calculated as part of the Greater Minnesota Mobility Study. Travel time is currently considered reliable on TH 14 between New Ulm and Nicollet.

1. HCM Analysis

The HCM presents methodologies for analyzing two-lane highway operations for uninterrupted-flow conditions. According to the HCM, uninterrupted flow exists "when there are no traffic control devices that interrupt traffic and where no platoons are formed by upstream traffic signals." Chapter 15, Section 3 of the HCM 6th Edition presents methods to calculate Average Travel Speed (ATS) and Percent Time PTSF. These two measures are calculated for both travel directions on TH 14 for two segments of the study area: CSAH 37 to Courtland and Courtland to the recently completed four-lane section of TH 14 in Nicollet. The following table from the HCM 6th Edition details the Level of Service (LOS) thresholds for motorized vehicles on two-lane highways based on ATS and PTSF.

Table 30: LOS for Two-Lane Highways (HCM Analysis)

LOS	Class I Highways ATS (mi/h)	Class I Highways PTSF (%)	Class II Highways PTSF (%)	Class III Highways PFFS (%)
A	>55	≤35	≤40	>91.7
B	>50–55	>35–50	>40–55	>83.3–91.7
C	>45–50	>50–65	>55–70	>75.0–83.3
D	>40–45	>65–80	>70–85	>66.7–75.0
E	≤40	>80	>85	≤66.7
F	Demand exceeds capacity			

Note: For Class I highways, LOS is determined by the worse of ATS-based LOS and PTSF-based LOS.

Table 31 details the input data considered for the analysis. All input values were determined from the TH 14 Intersection Control Evaluation Study and/or from aerial images. Detailed input values for each analysis segment can be found in the **Appendix I**.

Table 31: Two-Lane Highway HCM Analysis Input Data

Measure	Input	Unit	Notes
Highway Class (I, II, III)	I	-	Determined from functional class, land use, motorist expectation
Lane/Shoulder Width	12/8	Feet	
Segment Length	Varies	Miles	
Terrain Type	Level	-	Assumed Level Terrain. Maximum Grade on TH 14 is 2.5% in Study Area
Access Point Density	Varies	Access points/mile	Includes all driveways and crossing streets in segment
Percent No-Passing Zones	Varies	%	Includes no passing zone lengths in analysis direction.
Free-Flow Speed	SL + 10	Mph	
Directional/Opposing Vehicular Demand	Varies	Veh/hour	See Table 32
Analysis Period Length	1	Hour	
Heavy Vehicle Percentage	17	%	

Table 32 details the traffic volumes used for analysis. The directional peak hour volume is the highest hourly volume from the 2018 traffic counts. The existing volumes include a seasonal adjustment factor because the counts were completed in February. The future traffic volumes are forecasted based on historical growth data.

Table 32: Two-Lane Highway HCM Analysis Traffic Volumes

Segment	Existing Traffic Volumes		Future Traffic Volumes	
	AADT	Directional Peak Hour Volume	AADT	Directional Peak Hour Volume
Eastbound – CSAH 37 to Courtland	7,500	534	9,700	690
Eastbound - Courtland to Nicollet	7,300	415	9,450	535
Westbound – Nicollet to Courtland	7,300	497	9,450	660
Westbound – Courtland to CSAH 37	7,500	581	9,700	750

The analysis methodology is followed through use of Highway Capacity Software (HCS) and the analysis is provided in the Appendix.

The existing and future ATS and PTSF for each segment is shown in **Appendix J**. The existing and future ATS are near the posted speed limit of 55 mph for each segment and have adequate LOS. However, for Class I highways, LOS is determined by the worst of ATS-based and PTSF-based LOS. The existing PTSF ranges from 63.0% (LOS C) for eastbound traffic from Courtland to Nicollet to 75.9% (LOS D) for westbound traffic from Courtland to CSAH 37. In the future, the PTSF is expected to increase to 70.0% (LOS D) to 82.7% (LOS E) respectively.

The poor LOS regarding PTSF is primarily a result of limited passing capacity and relatively equal directional and opposing traffic volumes. The situation is magnified with the high heavy vehicle percentage in the study area; heavy vehicles can result in platoons on two-lane highways. Platoons in this instance are when multiple drivers are caught behind one slow-moving vehicle. As platooning and PTSF increase, drivers will desire to make more passing maneuvers. Increasing the passing opportunities or the number of lanes in each direction increases the passing capacity and reduces platooning and PTSF.

The City of Courtland was not included as part of this analysis because this segment of TH 14 would be considered a highway classification III. Class III two-lane highways are often seen as portions of Class I highways that pass through small towns or developed areas. Like the City of Courtland, Class III highways typically have reduced speed limits and the number of driveways and cross streets is much higher. Class III highways are analyzed using Percent of free-flow speed (PFFS) instead of ATS of PTSF. The PFFS represents the ability of vehicles to travel at or near the posted speed limit. It is estimated that the PFFS on TH 14 in the City of Courtland is at acceptable LOS.

2. Level of Travel Time Reliability Analysis

The Federal Highway Administration and United States DOT Rule 23 CRF 490 Subpart E define Level of Travel Time Reliability (LOTTR) as the measure to assess reliability of the National Highway System. This travel time reliability measure is analyzed as part of the Greater Minnesota Mobility Study currently being prepared for MnDOT. The LOTTR is calculated as follows:

$$LOTTR = \frac{80th\ percentile\ travel\ time}{50th\ percentile\ travel\ time}$$

A segment of highway is considered unreliable if LOTTR > 1.5 during any time period analyzed.

Two segments of TH 14 between Nicollet and New Ulm are identified by the mobility study: TH 21 to Courtland and Courtland to the recently completed four-lane section of TH 14 in Nicollet. The LOTTR results are shown in **Table 33.**

Table 33: Level of Travel Time Reliability Results

Segment	Weekday AM	Weekday Midday	Weekday PM	Weekend
Eastbound – TH 21 to Courtland	1.08	1.07	1.05	1.00
Eastbound - Courtland to Nicollet	1.20	1.22	1.15	1.05
Westbound – Nicollet to Courtland	1.20	1.22	1.17	1.06
Westbound – Courtland to TH 21	1.10	1.12	1.08	1.02

The LOTTR does not exceed 1.5 during any time period for either segment of TH 14. **Table 33** shows that travel times are less reliable during the weekday. This could be a result of many factors including higher volumes of traffic, or more specifically, higher volumes of heavy vehicle traffic. A high percentage of heavy vehicles will likely result in less reliable travel times on a two-lane highway. Eastbound and westbound traffic from Nicollet to Courtland has the largest difference between the 80th percentile travel times and the 50th percentile travel times resulting in a LOTTR of 1.22.

Additional Details can be found in the **Appendix K**.

XI. EVALUATION MATRIX

The following provides a summary of the evaluation measures and their results in comparison to each alternative. Further explanation of each measure shown in the evaluation matrices is provide in the analysis sections.

A. Task Force Criteria

Table 34: Task Force Criteria

SAFETY			
Relates to growth	Crash Reduction	Score	Notes
	<0	-	*This would increase crashes*
	10-30%	+	
	30-60%	++	
	>60%	+++	
	>80%	++++	
MOBILITY			
Relates to growth	Travel time savings on corridor	Score	*Comparison against existing condition*
	>0	+	
	>15%	++	
	>25%	+++	
	Intersection Delay		*Comparison against existing condition*
	saving > 1 minute	+++	
	saving > 40 seconds	++	
	saving > 20 seconds	+	
	adding > 20 seconds	-	
	adding > 40 seconds	--	
	adding > 1 minute	---	
Relates to growth and investments	Access to anchors		*Anchor points will be around Courtland comparing existing time to proposed time for accessing Hwy 14*
	<30 seconds	+	*This would decrease travel time*
	>30 seconds	-	
	>1 minute	--	
	>3 minutes	---	
COMPETITIVE			
	Benefit/Cost	Score	*Benefits are crash reduction, time savings, safety improvements. Costs are construction, R/W.*
	>0.5	+	
	>1	++	
	>2	+++	
	>4	++++	

B. Evaluation Matrices

Table 35: CSAH 37 and 446th Street Evaluation Matrix

Measures		Traditional At Grade	RCUT	High T	Interchange	Roundabout	Key
Safety		+	+++	+++	++++	+++	
Mobility	Delay	---	o	o	o	o	
	Travel Time	++	++	++	++	+	
Cost		$5,300,000 - $7,100,000	$5,200,000 - $7,000,000	$16,300,000 - $21,700,000	$10,000,000 - $13,300,000	$5,000,000 - $6,700,000	2018 Dollars
B/C		-	++++	+	+	++++	
Total		3+/4-	9+	6+	7+	8+	

Table 36: 571st Lane Evaluation Matrix

Measures		Traditional At Grade	Green T	RCUT	Key
Safety		+	++	+++	
Mobility	Delay	+	++	++	
	Travel Time	++	++	++	
Cost		$3,700,000 - $5,000,000	$3,900,000 - $5,300,000	$4,100,000 - $5,600,000	2018 Dollars
B/C		++++	+++	+++	
Total		8+	9+	10+	

Table 37: 561st Avenue Evaluation Matrix

Measures		RCUT	Key
Safety		+++	
Mobility	Delay	o	
	Travel Time	++	
Cost	Construction	$2,800,000 - $3,700,000	2018 Dollars
B/C		++	
Total		7+	

Table 38: Courtland Area Evaluation Matrix

Measures		Concept A			Concept B			Concept C			Concept E			Concept F			Key
		RCUT at CSAH 24			Two RCUTs (CSAH 12 and East End of Courtland)			Interchange at CSAH 24			Interchange at CSAH 12 and RCUT at East End of Courtland			Quadrant Interchange at CSAH 12 and RCUT at East End of Courtland			
Safety		+++			+++			++++			+++			+++			
Mobility	Delay	o			o			o			o			o			
	Travel Time	+++			+++			+++			+++			+++			
	Anchor	*West*	*Central*	*East*	*West*	*Central*	*East*	*West*	*Central*	*East*	*West*	*Central*	*East*	*West*	*Central*	*East*	
	To New Ulm	--	o	o	-	o	o	--	o	o	-	o	o	-	o	o	
	To Mankato	o	o	--	+	o	o	o	o	--	+	o	o	+	o	o	
Cost		$8,700,000 - $11,600,000			$6,800,000 - $9,100,000			$12,500,000 - $16,500,000			$11,500,000 - $15,300,000			$10,100,000 - $13,400,000			2018 Dollars
B/C		++++			++++			+++			+++			+++			
Total		10+/4-			11+/1-			10+/4-			10+/1-			10+/1-			

Table 39: TH 14 from CSAH 37 to TH 15 Evaluation Matrix

Measures		2-Lane Recondition	Constrained 4-Lane Divided	Key
Safety		o	++	
Mobility	Travel Time	o	++	
Cost	Construction	$800,000.00 - $1,100,000.00	$4,300,000.00 - $5,700,000.00	2018 Dollars
B/C		o	++	
Total		o	6+	

Table 40: TH 14 from 571st Lane to 561st Avenue Evaluation Matrix

Measures		Constrained 4-Lane	Unconstrained 4-Lane	Key
Safety		+	++	
Mobility	Travel Time	++	++	
Cost	Construction	$2,990,000.00 - $3,990,000.00	$4,510,000.00 - $6,020,000.00	2018 Dollars
B/C		++	+	
Total		5+	5+	

XII. RESULT

The following are the key study conclusions:

- Expansion from two- to four-lanes is anticipated to provide a safety benefit for the corridor
- All alternatives considered are anticipated to provide safety benefits. Grade-separated alternatives are anticipated to provide higher safety benefits than the at-grade alternatives.
- Reducing or combining access to TH 14 is anticipated to increase the safety of the corridor and at intersections.
- All alternatives are anticipated to have acceptable traffic operations with the exception of the Traditional At-Grade alternative at TH 14 and CSAH 37.
- Travel time is anticipated to be improved with the two- to four-lane expansion.
- The Unconstrained Four-Lane Divided segment is considered to be safer than the Constrained, however, traffic operations are anticipated to be equal for both alternatives.
- The Unconstrained Four-Lane Divided alternative will have more impacts to the surrounding area than the Constrained Four-Lane Divided.
- Grade separated alternatives will cost more than at-grade alternatives because of the additional ROW, grading and local, township, and county road realignments.

XIII. RECOMMENDATION

Based on the considerations of safety, operations, and financial impacts the following alternatives are recommended for the TH 14 corridor and intersections:

TH 14 at CSAH 37 and 446th Street

Multi-lane Roundabout or Restricted Crossing U-Turn (RCUT)

TH 14 at 571st Lane

Restricted Crossing U-Turn (RCUT) with eastbound acceleration lane

TH 14 at 561st Avenue

Restricted Crossing U-Turn (RCUT)

Courtland Area

Restricted Crossing U-Turn (RCUT) intersections on the east and west ends of Courtland

TH 14 from TH 15 to CSAH 37

Constrained Four-Lane Divided

TH 14 from 571st Lane to 561st Avenue

Constrained Four-Lane Divided

Taking into account public input and the Task Force evaluation, the Task Force selected the interchange at CSAH 37 and Concept C for the Courtland area, one interchange centered on Courtland, as the preferred alternative. These options do not have the highest scoring based on the criteria identified. The preference for interchanges at CSAH 37 and CSAH 24 is a result of apprehension from the locals regarding RCUTs and a disinterest from having access to town different than what is at the Cities of Nicollet, Waseca, and Janesville. Additionally, Nicollet county has committed to cost participate in interchanges at both New Ulm and Courtland. Furthermore, if two RCUTs are built on each end of Courtland now and an interchange is desired at

a later date, it is anticipated that the land will cost substantially more based on an expected land use changes given the City of Courtland's current long-term planning for development. Industrial development is planned along CSAH 24 and there is a desire to limit the heavy commercial vehicles going through town. One access to the propose TH 14 across from the existing CSAH 24 location would potentially reduce the volume of heavy commercial vehicles using old TH 14.

MnDOT endorses the Task Force recommendation due to the local cost participation on interchanges, a compromise to end the 4-lane expansion at CSAH 37, building RCUTs at 571st Lane and 561st Avenue, and conceptual agreement on the turnbacks in Courtland. The following alternatives are recommended for the TH 14 corridor and intersections:

TH 14 at CSAH 37 and 446th Street

Interchange at CSAH 37 with roundabouts – realign 446th with CSAH 37

TH 14 at 571st Lane

Restricted Crossing U-Turn (RCUT) with eastbound acceleration lane

TH 14 at 561st Avenue

Restricted Crossing U-Turn (RCUT)

Courtland Area

Concept C – Interchange centered on Courtland, extending CSAH 24 to proposed TH 14 alignment

TH 14 from TH 15 to CSAH 37

Constrained Four-Lane Divided

TH 14 from 571st Lane to 561st Avenue

Constrained Four-Lane Divided

The page is intended to be blank.

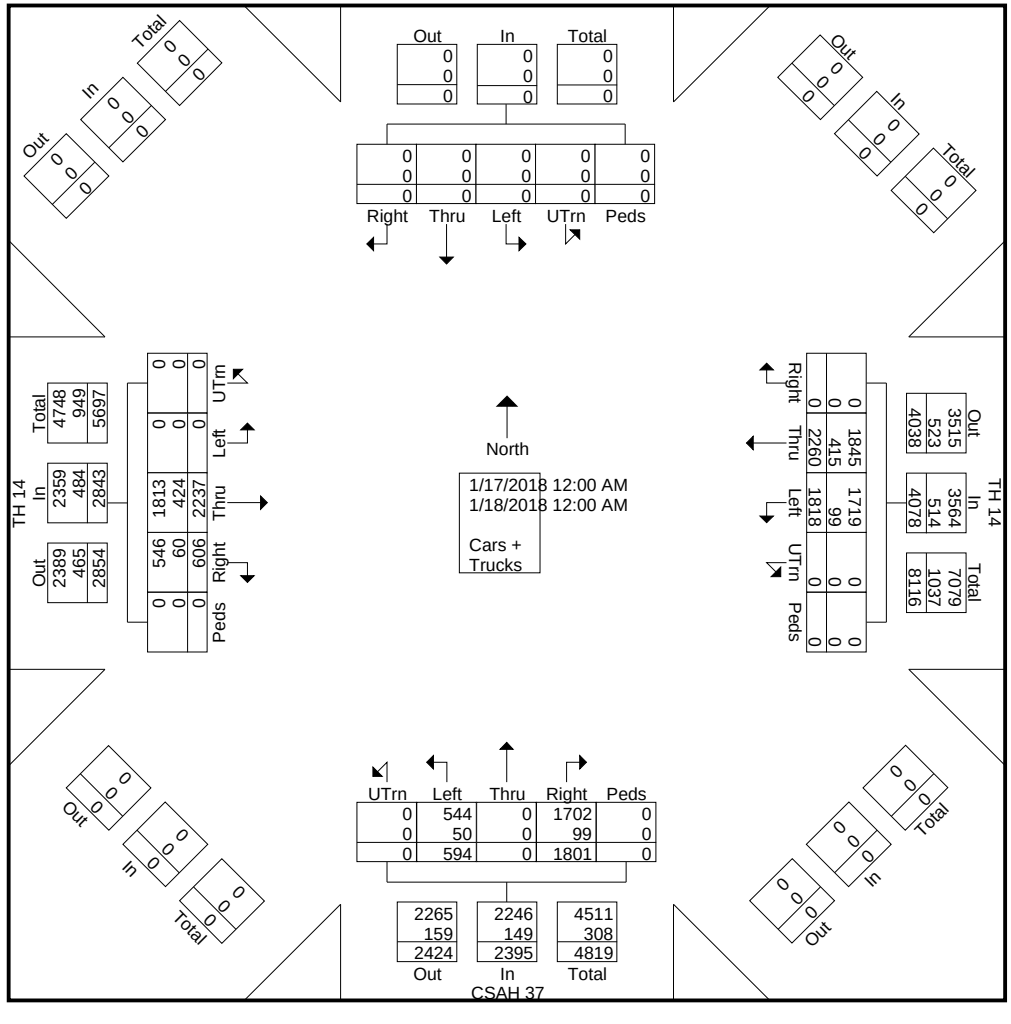
Appendix A: Traffic Count Data

Bolton & Menk

12224 Nicollet Ave
Burnsville, MN 55337
Real People. Real Solutions.

File Name : TH 14 at CSAH 37 (448th St)
Site Code : 1
Start Date : 1/17/2018
Page No : 5

TH 14 at CSAH 37 (448th St)
TH 14 ICE Report



Bolton & Menk

12224 Nicollet Ave
Burnsville, MN 55337
Real People. Real Solutions.

File Name : TH 14 at CSAH 37 (448th St)
Site Code : 1
Start Date : 1/17/2018
Page No : 6

TH 14 at CSAH 37 (448th St)
TH 14 ICE Report

	Southbound						TH 14 Westbound						CSAH 37 Northbound						TH 14 Eastbound						
Start Time	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Int. Total
Peak Hour Analysis From 12:00 AM to 12:00 PM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 07:15 AM																									
07:15 AM	0	0	0	0	0	0	0	49	41	0	0	90	44	0	10	0	0	54	19	59	0	0	0	78	222
07:30 AM	0	0	0	0	0	0	0	55	41	0	0	96	38	0	8	0	0	46	15	48	0	0	0	63	205
07:45 AM	0	0	0	0	0	0	0	51	45	0	0	96	41	0	6	0	0	47	20	49	0	0	0	69	212
08:00 AM	0	0	0	0	0	0	0	43	40	0	0	83	46	0	7	0	0	53	11	50	0	0	0	61	197
Total Volume	0	0	0	0	0	0	0	198	167	0	0	365	169	0	31	0	0	200	65	206	0	0	0	271	836
% App. Total	0	0	0	0	0		0	54.2	45.8	0	0		84.5	0	15.5	0	0		24	76	0	0	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.900	.928	.000	.000	.951	.918	.000	.775	.000	.000	.926	.813	.873	.000	.000	.000	.869	.941
Peak Hour Analysis From 12:15 PM to 12:00 AM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 04:30 PM																									
04:30 PM	0	0	0	0	0	0	0	46	49	0	0	95	52	0	16	0	0	68	10	51	0	0	0	61	224
04:45 PM	0	0	0	0	0	0	0	56	51	0	0	107	47	0	17	0	0	64	11	44	0	0	0	55	226
05:00 PM	0	0	0	0	0	0	0	53	60	0	0	113	48	0	20	0	0	68	11	60	0	0	0	71	252
05:15 PM	0	0	0	0	0	0	0	58	52	0	0	110	39	0	13	0	0	52	14	52	0	0	0	66	228
Total Volume	0	0	0	0	0	0	0	213	212	0	0	425	186	0	66	0	0	252	46	207	0	0	0	253	930
% App. Total	0	0	0	0	0		0	50.1	49.9	0	0		73.8	0	26.2	0	0		18.2	81.8	0	0	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.918	.883	.000	.000	.940	.894	.000	.825	.000	.000	.926	.821	.863	.000	.000	.000	.891	.923

Bolton & Menk, Inc.

12224 Nicollet Ave
Burnsville, MN, 55337

File Name : TH 14 at 571st Ln
Site Code : 1
Start Date : 1/17/2018
Page No : 1

TH 14 at 571st Ln
TH 14 ICE Report

Groups Printed- Cars + - Trucks

	From North						TH 14 From East						571st Ln From South						TH 14 From West						
Start Time	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Int. Total
12:00 AM	0	0	0	0	0	0	0	3	0	0	0	3	0	0	0	0	0	0	0	5	0	0	0	5	8
12:15 AM	0	0	0	0	0	0	0	7	0	0	0	7	0	0	0	0	0	0	0	3	0	0	0	3	10
12:30 AM	0	0	0	0	0	0	0	6	0	0	0	6	0	0	0	0	0	0	0	5	0	0	0	5	11
12:45 AM	0	0	0	0	0	0	0	3	0	0	0	3	0	0	0	0	0	0	0	2	0	0	0	2	5
Total	0	0	0	0	0	0	0	19	0	0	0	19	0	0	0	0	0	0	0	15	0	0	0	15	34
01:00 AM	0	0	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	0	0	2	0	0	0	2	4
01:15 AM	0	0	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	0	0	3	0	0	0	3	5
01:30 AM	0	0	0	0	0	0	0	5	0	0	0	5	0	0	0	0	0	0	0	2	0	0	0	2	7
01:45 AM	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	1	2
Total	0	0	0	0	0	0	0	10	0	0	0	10	0	0	0	0	0	0	0	8	0	0	0	8	18
02:00 AM	0	0	0	0	0	0	0	5	0	0	0	5	0	0	0	0	0	0	0	3	0	0	0	3	8
02:15 AM	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	4	0	0	0	4	5
02:30 AM	0	0	0	0	0	0	0	3	0	0	0	3	0	0	0	0	0	0	0	3	0	0	0	3	6
02:45 AM	0	0	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	0	0	3	0	0	0	3	5
Total	0	0	0	0	0	0	0	11	0	0	0	11	0	0	0	0	0	0	0	13	0	0	0	13	24
03:00 AM	0	0	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	0	0	1	0	0	0	1	3
03:15 AM	0	0	0	0	0	0	0	3	0	0	0	3	0	0	0	0	0	0	0	4	0	0	0	4	7
03:30 AM	0	0	0	0	0	0	0	4	0	0	0	4	0	0	0	0	0	0	0	4	0	0	0	4	8
03:45 AM	0	0	0	0	0	0	0	4	0	0	0	4	0	0	0	0	0	0	0	4	0	0	0	4	8
Total	0	0	0	0	0	0	0	13	0	0	0	13	0	0	0	0	0	0	0	13	0	0	0	13	26
04:00 AM	0	0	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	0	0	7	0	0	0	7	9
04:15 AM	0	0	0	0	0	0	0	5	0	0	0	5	0	0	0	0	0	0	0	11	0	0	0	11	16
04:30 AM	0	0	0	0	0	0	0	6	0	0	0	6	0	0	0	0	0	0	0	10	0	0	0	10	16
04:45 AM	0	0	0	0	0	0	0	8	0	0	0	8	0	0	0	0	0	0	0	12	0	0	0	12	20
Total	0	0	0	0	0	0	0	21	0	0	0	21	0	0	0	0	0	0	0	40	0	0	0	40	61
05:00 AM	0	0	0	0	0	0	0	8	0	0	0	8	0	0	0	0	0	0	0	11	0	0	0	11	19
05:15 AM	0	0	0	0	0	0	0	15	0	0	0	15	0	0	0	0	0	0	0	20	0	0	0	20	35
05:30 AM	0	0	0	0	0	0	0	25	0	0	0	25	0	0	0	0	0	0	0	29	0	0	0	29	54
05:45 AM	0	0	0	0	0	0	0	23	0	0	0	23	0	0	0	0	0	0	0	21	0	0	0	21	44
Total	0	0	0	0	0	0	0	71	0	0	0	71	0	0	0	0	0	0	0	81	0	0	0	81	152
06:00 AM	0	0	0	0	0	0	0	22	0	0	0	22	0	0	1	0	0	1	0	45	0	0	0	45	68
06:15 AM	0	0	0	0	0	0	0	39	0	0	0	39	0	0	0	0	0	0	0	56	0	0	0	56	95
06:30 AM	0	0	0	0	0	0	0	57	0	0	0	57	0	0	0	0	0	0	0	50	0	0	0	50	107
06:45 AM	0	0	0	0	0	0	0	61	0	0	0	61	0	0	0	0	0	0	0	55	0	0	0	55	116
Total	0	0	0	0	0	0	0	179	0	0	0	179	0	0	1	0	0	1	0	206	0	0	0	206	386
07:00 AM	0	0	0	0	0	0	0	73	0	0	0	73	0	0	0	0	0	0	1	94	0	0	0	95	168
07:15 AM	0	0	0	0	0	0	0	92	0	0	0	92	0	0	0	0	0	0	0	103	0	0	0	103	195
07:30 AM	0	0	0	0	0	0	0	100	0	0	0	100	0	0	0	0	0	0	0	86	0	0	0	86	186
07:45 AM	0	0	0	0	0	0	0	97	0	0	0	97	1	0	0	0	0	1	0	90	0	0	0	90	188
Total	0	0	0	0	0	0	0	362	0	0	0	362	1	0	0	0	0	1	1	373	0	0	0	374	737

Bolton & Menk, Inc.

12224 Nicollet Ave
Burnsville, MN, 55337

File Name : TH 14 at 571st Ln
Site Code : 1
Start Date : 1/17/2018
Page No : 2

TH 14 at 571st Ln
TH 14 ICE Report

Groups Printed- Cars + - Trucks

	From North						TH 14 From East						571st Ln From South						TH 14 From West						
Start Time	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Int. Total
08:00 AM	0	0	0	0	0	0	0	79	0	0	0	79	0	0	0	0	0	0	0	95	0	0	0	95	174
08:15 AM	0	0	0	0	0	0	0	65	0	0	0	65	0	0	0	0	0	0	0	73	0	0	0	73	138
08:30 AM	0	0	0	0	0	0	0	58	0	0	0	58	0	0	0	0	0	0	0	53	0	0	0	53	111
08:45 AM	0	0	0	0	0	0	0	51	0	0	0	51	0	0	0	0	0	0	0	45	0	0	0	45	96
Total	0	0	0	0	0	0	0	253	0	0	0	253	0	0	0	0	0	0	0	266	0	0	0	266	519
09:00 AM	0	0	0	0	0	0	0	46	0	0	0	46	0	0	0	0	0	0	0	61	0	0	0	61	107
09:15 AM	0	0	0	0	0	0	0	45	0	0	0	45	0	0	0	0	0	0	0	59	0	0	0	59	104
09:30 AM	0	0	0	0	0	0	0	45	0	0	0	45	0	0	0	0	0	0	1	57	0	0	0	58	103
09:45 AM	0	0	0	0	0	0	0	58	1	0	0	59	1	0	0	0	0	1	0	68	0	0	0	68	128
Total	0	0	0	0	0	0	0	194	1	0	0	195	1	0	0	0	0	1	1	245	0	0	0	246	442
10:00 AM	0	0	0	0	0	0	0	48	0	0	0	48	1	0	0	0	0	1	0	64	0	0	0	64	113
10:15 AM	0	0	0	0	0	0	0	49	0	0	0	49	1	0	0	0	0	1	1	58	0	0	0	59	109
10:30 AM	0	0	0	0	0	0	0	58	0	0	0	58	0	0	0	0	0	0	0	53	0	0	0	53	111
10:45 AM	0	0	0	0	0	0	0	60	1	0	0	61	0	0	0	0	0	0	0	43	0	0	0	43	104
Total	0	0	0	0	0	0	0	215	1	0	0	216	2	0	0	0	0	2	1	218	0	0	0	219	437
11:00 AM	0	0	0	0	0	0	0	48	0	0	0	48	0	0	0	0	0	0	0	60	0	0	0	60	108
11:15 AM	0	0	0	0	0	0	0	42	0	0	0	42	0	0	0	0	0	0	0	48	0	0	0	48	90
11:30 AM	0	0	0	0	0	0	0	33	0	0	0	33	0	0	0	0	0	0	0	36	0	0	0	36	69
11:45 AM	0	0	0	0	0	0	0	46	1	0	0	47	0	0	0	0	0	0	0	59	0	0	0	59	106
Total	0	0	0	0	0	0	0	169	1	0	0	170	0	0	0	0	0	0	0	203	0	0	0	203	373
12:00 PM	0	0	0	0	0	0	0	51	0	0	0	51	0	0	0	0	0	0	0	60	0	0	0	60	111
12:15 PM	0	0	0	0	0	0	0	57	0	0	0	57	0	0	0	0	0	0	0	58	0	0	0	58	115
12:30 PM	0	0	0	0	0	0	0	59	0	0	0	59	0	0	0	0	0	0	0	63	0	0	0	63	122
12:45 PM	0	0	0	0	0	0	0	62	0	0	0	62	0	0	0	0	0	0	1	57	0	0	0	58	120
Total	0	0	0	0	0	0	0	229	0	0	0	229	0	0	0	0	0	0	1	238	0	0	0	239	468
01:00 PM	0	0	0	0	0	0	0	51	0	0	0	51	0	0	0	0	0	0	0	63	0	0	0	63	114
01:15 PM	0	0	0	0	0	0	0	61	0	0	0	61	0	0	0	0	0	0	0	50	0	0	0	50	111
01:30 PM	0	0	0	0	0	0	0	59	0	0	0	59	0	0	1	0	0	1	0	64	0	0	0	64	124
01:45 PM	0	0	0	0	0	0	0	64	0	0	0	64	0	0	0	0	0	0	0	56	0	0	0	56	120
Total	0	0	0	0	0	0	0	235	0	0	0	235	0	0	1	0	0	1	0	233	0	0	0	233	469
02:00 PM	0	0	0	0	0	0	0	59	0	0	0	59	1	0	0	0	0	1	0	63	0	0	0	63	123
02:15 PM	0	0	0	0	0	0	0	72	0	0	0	72	0	0	0	0	0	0	0	67	0	0	0	67	139
02:30 PM	0	0	0	0	0	0	0	69	0	0	0	69	0	0	0	0	0	0	0	59	0	0	0	59	128
02:45 PM	0	0	0	0	0	0	0	77	0	0	0	77	0	0	0	0	0	0	0	58	0	0	0	58	135
Total	0	0	0	0	0	0	0	277	0	0	0	277	1	0	0	0	0	1	0	247	0	0	0	247	525
03:00 PM	0	0	0	0	0	0	0	95	0	0	0	95	0	0	0	0	0	0	0	80	0	0	0	80	175
03:15 PM	0	0	0	0	0	0	0	64	0	0	0	64	1	0	0	0	0	1	0	85	0	0	0	85	150
03:30 PM	0	0	0	0	0	0	0	81	0	0	0	81	0	0	1	0	0	1	0	82	0	0	0	82	164
03:45 PM	0	0	0	0	0	0	0	86	0	0	0	86	0	0	0	0	0	0	0	76	0	0	0	76	162
Total	0	0	0	0	0	0	0	326	0	0	0	326	1	0	1	0	0	2	0	323	0	0	0	323	651

Bolton & Menk, Inc.

12224 Nicollet Ave
Burnsville, MN, 55337

File Name : TH 14 at 571st Ln
Site Code : 1
Start Date : 1/17/2018
Page No : 3

TH 14 at 571st Ln
TH 14 ICE Report

Groups Printed- Cars + - Trucks

	From North						TH 14 From East						571st Ln From South						TH 14 From West						
Start Time	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Int. Total
04:00 PM	0	0	0	0	0	0	0	85	0	0	0	85	0	0	0	0	0	0	0	97	0	0	0	97	182
04:15 PM	0	0	0	0	0	0	0	93	0	0	0	93	0	0	0	0	0	0	0	92	0	0	0	92	185
04:30 PM	0	0	0	0	0	0	0	97	0	0	0	97	0	0	0	0	0	0	0	100	0	0	0	100	197
04:45 PM	0	0	0	0	0	0	0	106	0	0	0	106	0	0	0	0	0	0	0	91	0	0	0	91	197
Total	0	0	0	0	0	0	0	381	0	0	0	381	0	0	0	0	0	0	0	380	0	0	0	380	761
05:00 PM	0	0	0	0	0	0	0	112	0	0	0	112	0	0	0	0	0	0	0	103	0	0	0	103	215
05:15 PM	0	0	0	0	0	0	0	111	0	0	0	111	0	0	0	0	0	0	0	97	0	0	0	97	208
05:30 PM	0	0	0	0	0	0	0	98	0	0	0	98	0	0	0	0	0	0	0	67	0	0	0	67	165
05:45 PM	0	0	0	0	0	0	0	82	0	0	0	82	0	0	0	0	0	0	0	76	0	0	0	76	158
Total	0	0	0	0	0	0	0	403	0	0	0	403	0	0	0	0	0	0	0	343	0	0	0	343	746
06:00 PM	0	0	0	0	0	0	0	69	0	0	0	69	0	0	0	0	0	0	0	52	0	0	0	52	121
06:15 PM	0	0	0	0	0	0	0	59	0	0	0	59	0	0	0	0	0	0	0	44	0	0	0	44	103
06:30 PM	0	0	0	0	0	0	0	53	0	0	0	53	0	0	0	0	0	0	0	42	0	0	0	42	95
06:45 PM	0	0	0	0	0	0	0	46	0	0	0	46	0	0	0	0	0	0	0	44	0	0	0	44	90
Total	0	0	0	0	0	0	0	227	0	0	0	227	0	0	0	0	0	0	0	182	0	0	0	182	409
07:00 PM	0	0	0	0	0	0	0	35	0	0	0	35	0	0	0	0	0	0	0	37	0	0	0	37	72
07:15 PM	0	0	0	0	0	0	0	36	0	0	0	36	0	0	0	0	0	0	0	35	0	0	0	35	71
07:30 PM	0	0	0	0	0	0	0	34	0	0	0	34	0	0	0	0	0	0	0	25	0	0	0	25	59
07:45 PM	0	0	0	0	0	0	0	30	0	0	0	30	0	0	0	0	0	0	0	25	0	0	0	25	55
Total	0	0	0	0	0	0	0	135	0	0	0	135	0	0	0	0	0	0	0	122	0	0	0	122	257
08:00 PM	0	0	0	0	0	0	0	26	0	0	0	26	0	0	0	0	0	0	0	27	0	0	0	27	53
08:15 PM	0	0	0	0	0	0	0	32	0	0	0	32	0	0	0	0	0	0	0	30	0	0	0	30	62
08:30 PM	0	0	0	0	0	0	0	33	0	0	0	33	0	0	0	0	0	0	0	26	0	0	0	26	59
08:45 PM	0	0	0	0	0	0	0	39	0	0	0	39	0	0	0	0	0	0	0	26	0	0	0	26	65
Total	0	0	0	0	0	0	0	130	0	0	0	130	0	0	0	0	0	0	0	109	0	0	0	109	239
09:00 PM	0	0	0	0	0	0	0	43	0	0	0	43	0	0	0	0	0	0	0	24	0	0	0	24	67
09:15 PM	0	0	0	0	0	0	0	27	0	0	0	27	0	0	0	0	0	0	0	28	0	0	0	28	55
09:30 PM	0	0	0	0	0	0	0	28	0	0	0	28	0	0	0	0	0	0	0	22	0	0	0	22	50
09:45 PM	0	0	0	0	0	0	0	15	0	0	0	15	0	0	0	0	0	0	0	17	0	0	0	17	32
Total	0	0	0	0	0	0	0	113	0	0	0	113	0	0	0	0	0	0	0	91	0	0	0	91	204
10:00 PM	0	0	0	0	0	0	0	17	0	0	0	17	0	0	0	0	0	0	0	13	0	0	0	13	30
10:15 PM	0	0	0	0	0	0	0	11	0	0	0	11	0	0	0	0	0	0	0	13	0	0	0	13	24
10:30 PM	0	0	0	0	0	0	0	17	0	0	0	17	0	0	0	0	0	0	0	7	0	0	0	7	24
10:45 PM	0	0	0	0	0	0	0	10	0	0	0	10	0	0	0	0	0	0	0	9	0	0	0	9	19
Total	0	0	0	0	0	0	0	55	0	0	0	55	0	0	0	0	0	0	0	42	0	0	0	42	97
11:00 PM	0	0	0	0	0	0	0	7	0	0	0	7	0	0	0	0	0	0	0	11	0	0	0	11	18
11:15 PM	0	0	0	0	0	0	0	8	0	0	0	8	0	0	0	0	0	0	0	13	0	0	0	13	21
11:30 PM	0	0	0	0	0	0	0	6	0	0	0	6	0	0	0	0	0	0	0	7	0	0	0	7	13
11:45 PM	0	0	0	0	0	0	0	7	0	0	0	7	0	0	0	0	0	0	0	3	0	0	0	3	10
Total	0	0	0	0	0	0	0	28	0	0	0	28	0	0	0	0	0	0	0	34	0	0	0	34	62

Bolton & Menk, Inc.

12224 Nicollet Ave
Burnsville, MN, 55337

File Name : TH 14 at 571st Ln
Site Code : 1
Start Date : 1/17/2018
Page No : 4

TH 14 at 571st Ln
TH 14 ICE Report

Groups Printed- Cars + - Trucks

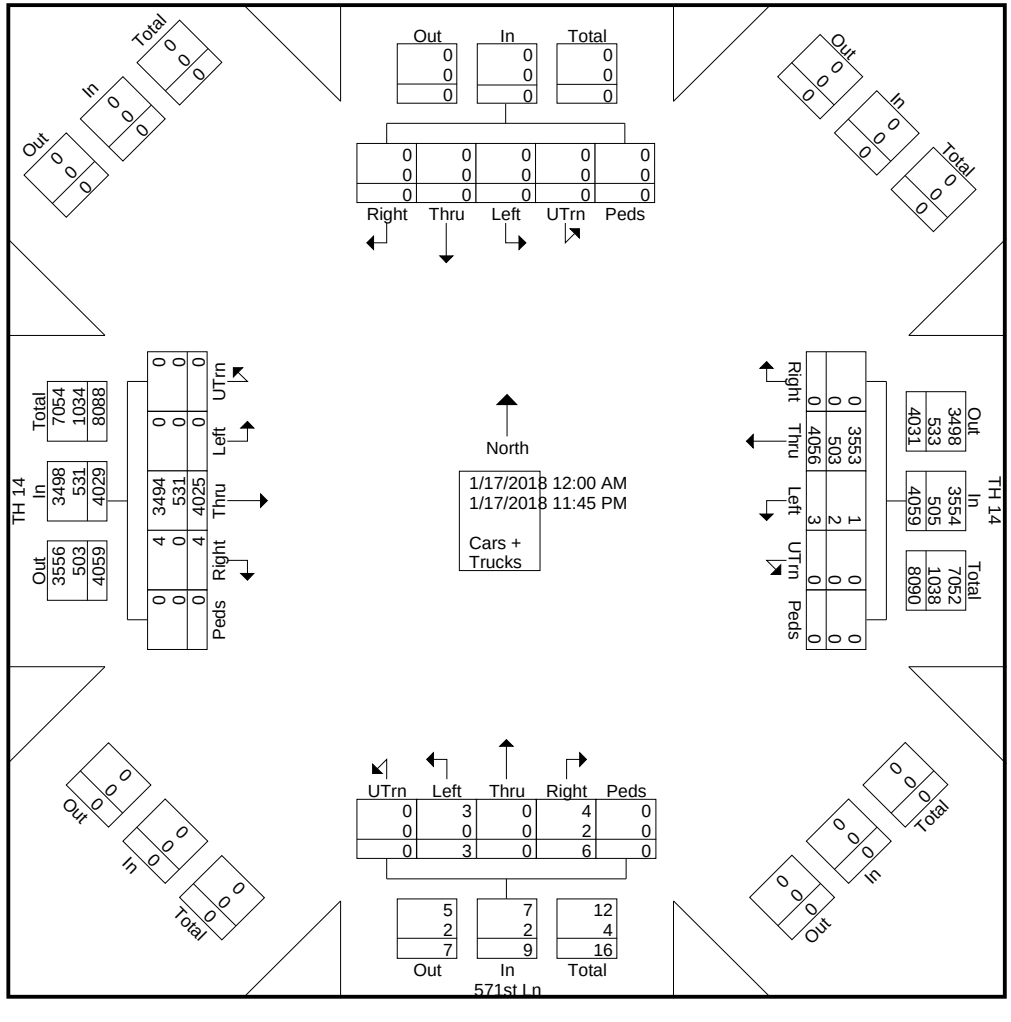
	From North						TH 14 From East						571st Ln From South						TH 14 From West						
	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Int. Total
Grand Total	0	0	0	0	0	0	0	4056	3	0	0	4059	6	0	3	0	0	9	4	4025	0	0	0	4029	8097
Apprch %	0	0	0	0	0		0	99.9	0.1	0	0		66.7	0	33.3	0	0		0.1	99.9	0	0	0		
Total %	0	0	0	0	0	0	0	50.1	0	0	0	50.1	0.1	0	0	0	0	0.1	0	49.7	0	0	0	49.8	
Cars +	0	0	0	0	0	0	0	3553	1	0	0	3554	4	0	3	0	0	7	4	3494	0	0	0	3498	7059
% Cars +	0	0	0	0	0	0	0	87.6	33.3	0	0	87.6	66.7	0	100	0	0	77.8	100	86.8	0	0	0	86.8	87.2
Trucks	0	0	0	0	0	0	0	503	2	0	0	505	2	0	0	0	0	2	0	531	0	0	0	531	1038
% Trucks	0	0	0	0	0	0	0	12.4	66.7	0	0	12.4	33.3	0	0	0	0	22.2	0	13.2	0	0	0	13.2	12.8

Bolton & Menk, Inc.

12224 Nicollet Ave
Burnsville, MN, 55337

File Name : TH 14 at 571st Ln
Site Code : 1
Start Date : 1/17/2018
Page No : 5

TH 14 at 571st Ln
TH 14 ICE Report



Bolton & Menk, Inc.

12224 Nicollet Ave
Burnsville, MN, 55337

File Name : TH 14 at 571st Ln
Site Code : 1
Start Date : 1/17/2018
Page No : 6

TH 14 at 571st Ln
TH 14 ICE Report

	From North						TH 14 From East						571st Ln From South						TH 14 From West						
Start Time	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Int. Total
Peak Hour Analysis From 12:00 AM to 12:00 PM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 07:15 AM																									
07:15 AM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**92**	**0**	**0**	**0**	**92**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	103	0	0	0	103	195
07:30 AM	0	0	0	0	0	0	0	100	0	0	0	**100**	0	0	0	0	0	0	0	86	0	0	0	86	186
07:45 AM	0	0	0	0	0	0	0	97	0	0	0	97	**1**	0	0	0	0	**1**	0	90	0	0	0	90	188
08:00 AM	0	0	0	0	0	0	0	79	0	0	0	79	0	0	0	0	0	0	0	95	0	0	0	95	174
Total Volume	0	0	0	0	0	0	0	368	0	0	0	368	1	0	0	0	0	1	0	374	0	0	0	374	743
% App. Total	0	0	0	0	0		0	100	0	0	0		100	0	0	0	0		0	100	0	0	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.920	.000	.000	.000	.920	.250	.000	.000	.000	.000	.250	.000	.908	.000	.000	.000	.908	.953
Peak Hour Analysis From 12:15 PM to 11:45 PM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 04:30 PM																									
04:30 PM	0	0	0	0	0	0	0	97	0	0	0	97	0	0	0	0	0	0	0	100	0	0	0	100	197
04:45 PM	0	0	0	0	0	0	0	106	0	0	0	106	0	0	0	0	0	0	0	91	0	0	0	91	197
05:00 PM	0	0	0	0	0	0	0	**112**	0	0	0	**112**	0	0	0	0	0	0	0	**103**	0	0	0	**103**	**215**
05:15 PM	0	0	0	0	0	0	0	111	0	0	0	111	0	0	0	0	0	0	0	97	0	0	0	97	208
Total Volume	0	0	0	0	0	0	0	426	0	0	0	426	0	0	0	0	0	0	0	391	0	0	0	391	817
% App. Total	0	0	0	0	0		0	100	0	0	0		0	0	0	0	0		0	100	0	0	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.951	.000	.000	.000	.951	.000	.000	.000	.000	.000	.000	.000	.949	.000	.000	.000	.949	.950

Bolton & Menk, Inc.

12224 Nicollet Ave
Burnsville, MN, 55337

File Name : TH 14 at 561st Ave
Site Code : 1
Start Date : 1/17/2018
Page No : 1

TH 14 at 561th Ave
TH 14 ICE Report

Groups Printed- Cars + - Trucks

	561th Ave From North						TH 14 From East						561th Ave From South						TH 14 From West						
Start Time	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Int. Total
12:00 AM	0	0	0	0	0	0	0	3	0	0	0	3	0	0	0	0	0	0	0	5	0	0	0	5	8
12:15 AM	0	0	0	0	0	0	0	7	0	0	0	7	0	0	0	0	0	0	0	3	0	0	0	3	10
12:30 AM	0	0	0	0	0	0	0	6	0	0	0	6	0	0	0	0	0	0	0	4	0	0	0	4	10
12:45 AM	0	0	0	0	0	0	0	3	0	0	0	3	0	0	0	0	0	0	0	3	0	0	0	3	6
Total	0	0	0	0	0	0	0	19	0	0	0	19	0	0	0	0	0	0	0	15	0	0	0	15	34
01:00 AM	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	1	2
01:15 AM	0	0	0	0	0	0	0	3	0	0	0	3	0	0	0	0	0	0	0	2	0	0	0	2	5
01:30 AM	0	0	0	0	0	0	0	4	0	0	0	4	0	0	0	0	0	0	0	1	0	0	0	1	5
01:45 AM	0	0	0	0	0	0	0	3	0	0	0	3	0	0	0	0	0	0	0	1	0	0	0	1	4
Total	0	0	0	0	0	0	0	11	0	0	0	11	0	0	0	0	0	0	0	5	0	0	0	5	16
02:00 AM	0	0	0	0	0	0	0	3	0	0	0	3	0	0	0	0	0	0	0	3	0	0	0	3	6
02:15 AM	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	4	0	0	0	4	5
02:30 AM	0	0	0	0	0	0	0	3	0	0	0	3	0	0	0	0	0	0	0	3	0	0	0	3	6
02:45 AM	0	0	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	0	0	2	0	0	0	2	4
Total	0	0	0	0	0	0	0	9	0	0	0	9	0	0	0	0	0	0	0	12	0	0	0	12	21
03:00 AM	0	0	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	0	0	2	0	0	0	2	4
03:15 AM	0	0	0	0	0	0	0	3	0	0	0	3	0	0	0	0	0	0	0	3	0	0	0	3	6
03:30 AM	0	0	0	0	0	0	0	4	0	0	0	4	0	0	0	0	0	0	0	4	0	0	0	4	8
03:45 AM	0	0	0	0	0	0	0	4	0	0	0	4	0	0	0	0	0	0	0	5	0	0	0	5	9
Total	0	0	0	0	0	0	0	13	0	0	0	13	0	0	0	0	0	0	0	14	0	0	0	14	27
04:00 AM	0	0	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	0	0	6	0	0	0	6	8
04:15 AM	0	0	0	0	0	0	0	5	0	0	0	5	0	0	0	0	0	0	0	12	0	0	0	12	17
04:30 AM	0	0	0	0	0	0	0	6	0	0	0	6	0	0	0	0	0	0	0	11	0	0	0	11	17
04:45 AM	0	0	0	0	0	0	0	9	0	0	0	9	0	0	0	0	0	0	0	12	0	0	0	12	21
Total	0	0	0	0	0	0	0	22	0	0	0	22	0	0	0	0	0	0	0	41	0	0	0	41	63
05:00 AM	0	0	0	0	0	0	0	8	0	0	0	8	0	0	0	0	0	0	0	10	0	0	0	10	18
05:15 AM	0	0	0	0	0	0	0	11	0	0	0	11	0	0	0	0	0	0	0	19	1	0	0	20	31
05:30 AM	0	0	0	0	0	0	0	24	0	0	0	24	0	0	0	0	0	0	0	30	0	0	0	30	54
05:45 AM	0	0	1	0	0	1	0	20	0	0	0	20	0	0	0	0	0	0	0	20	0	0	0	20	41
Total	0	0	1	0	0	1	0	63	0	0	0	63	0	0	0	0	0	0	0	79	1	0	0	80	144
06:00 AM	0	0	0	0	0	0	0	24	0	0	0	24	0	0	0	0	0	0	0	41	0	0	0	41	65
06:15 AM	0	0	0	0	0	0	0	37	0	0	0	37	0	0	1	0	0	1	0	59	1	0	0	60	98
06:30 AM	0	0	0	0	0	0	0	58	0	0	0	58	0	0	0	0	0	0	0	50	1	0	0	51	109
06:45 AM	0	0	0	0	0	0	1	56	0	0	0	57	0	0	0	0	0	0	0	51	0	0	0	51	108
Total	0	0	0	0	0	0	1	175	0	0	0	176	0	0	1	0	0	1	0	201	2	0	0	203	380
07:00 AM	1	0	1	0	0	2	3	71	0	0	0	74	0	0	0	0	0	0	0	90	6	0	0	96	172
07:15 AM	0	0	1	0	0	1	2	88	0	0	0	90	0	0	0	0	0	0	0	95	6	0	0	101	192
07:30 AM	2	0	0	0	0	2	3	88	0	0	0	91	0	0	1	0	0	1	0	84	7	0	0	91	185
07:45 AM	3	0	1	0	0	4	2	88	0	0	0	90	0	0	0	0	0	0	0	69	15	0	0	84	178
Total	6	0	3	0	0	9	10	335	0	0	0	345	0	0	1	0	0	1	0	338	34	0	0	372	727

Bolton & Menk, Inc.

12224 Nicollet Ave
Burnsville, MN, 55337

File Name : TH 14 at 561st Ave
Site Code : 1
Start Date : 1/17/2018
Page No : 2

TH 14 at 561th Ave
TH 14 ICE Report

Groups Printed- Cars + - Trucks

	561th Ave From North						TH 14 From East						561th Ave From South						TH 14 From West						
Start Time	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Int. Total
08:00 AM	4	0	2	0	0	6	3	64	0	0	0	67	0	0	0	0	0	0	0	82	19	0	0	101	174
08:15 AM	2	0	0	0	0	2	1	63	0	0	0	64	0	0	0	0	0	0	0	68	2	0	0	70	136
08:30 AM	2	0	0	0	0	2	1	54	0	0	0	55	0	0	0	0	0	0	0	51	1	0	0	52	109
08:45 AM	1	0	0	0	0	1	1	47	0	0	0	48	0	0	0	0	0	0	0	45	1	0	0	46	95
Total	9	0	2	0	0	11	6	228	0	0	0	234	0	0	0	0	0	0	0	246	23	0	0	269	514
09:00 AM	2	0	0	0	0	2	1	46	0	0	0	47	0	0	0	0	0	0	0	58	3	0	0	61	110
09:15 AM	0	0	0	0	0	0	0	43	0	0	0	43	0	0	0	0	0	0	0	58	2	0	0	60	103
09:30 AM	1	0	0	0	0	1	1	44	0	0	0	45	0	0	0	0	0	0	0	52	2	0	0	54	100
09:45 AM	2	0	1	0	0	3	3	52	0	0	0	55	0	0	0	0	0	0	0	60	7	0	0	67	125
Total	5	0	1	0	0	6	5	185	0	0	0	190	0	0	0	0	0	0	0	228	14	0	0	242	438
10:00 AM	3	0	2	0	0	5	2	44	0	0	0	46	0	0	0	0	0	0	0	56	10	0	0	66	117
10:15 AM	2	0	0	0	0	2	0	47	0	0	0	47	0	0	0	0	0	0	0	57	2	0	0	59	108
10:30 AM	1	0	0	0	0	1	0	55	0	0	0	55	0	0	0	0	0	0	0	49	1	0	0	50	106
10:45 AM	1	0	0	0	0	1	0	57	0	0	0	57	0	0	0	0	0	0	0	43	1	0	0	44	102
Total	7	0	2	0	0	9	2	203	0	0	0	205	0	0	0	0	0	0	0	205	14	0	0	219	433
11:00 AM	0	0	1	0	0	1	0	46	0	0	0	46	0	0	0	0	0	0	0	54	0	0	0	54	101
11:15 AM	1	0	1	0	0	2	0	48	0	0	0	48	0	0	0	0	0	0	0	57	1	0	0	58	108
11:30 AM	1	0	0	0	0	1	1	48	0	0	0	49	0	0	0	0	0	0	0	52	0	0	0	52	102
11:45 AM	0	0	0	0	0	0	1	42	0	0	0	43	0	0	0	0	0	0	1	53	2	0	0	56	99
Total	2	0	2	0	0	4	2	184	0	0	0	186	0	0	0	0	0	0	1	216	3	0	0	220	410
12:00 PM	0	0	1	0	0	1	0	54	0	0	0	54	0	0	0	0	0	0	0	61	0	0	0	61	116
12:15 PM	1	0	0	0	0	1	0	53	0	0	0	53	0	0	0	0	0	0	0	50	2	0	0	52	106
12:30 PM	1	0	0	0	0	1	0	60	0	0	0	60	0	0	0	0	0	0	0	60	2	0	0	62	123
12:45 PM	1	0	1	0	0	2	0	60	0	0	0	60	0	0	0	0	0	0	0	59	1	0	0	60	122
Total	3	0	2	0	0	5	0	227	0	0	0	227	0	0	0	0	0	0	0	230	5	0	0	235	467
01:00 PM	0	0	1	0	0	1	0	47	0	0	0	47	0	0	0	0	0	0	0	63	1	0	0	64	112
01:15 PM	1	0	0	0	0	1	1	59	0	0	0	60	0	0	0	0	0	0	0	47	0	0	0	47	108
01:30 PM	1	0	0	0	0	1	1	57	0	0	0	58	0	0	0	0	0	0	0	61	1	0	0	62	121
01:45 PM	1	0	1	0	0	2	0	60	0	0	0	60	0	0	0	0	0	0	0	56	1	0	0	57	119
Total	3	0	2	0	0	5	2	223	0	0	0	225	0	0	0	0	0	0	0	227	3	0	0	230	460
02:00 PM	1	0	0	0	0	1	1	60	0	0	0	61	0	0	0	0	0	0	0	58	0	0	0	58	120
02:15 PM	1	0	0	0	0	1	0	72	0	0	0	72	0	0	0	0	0	0	0	62	1	0	0	63	136
02:30 PM	1	0	0	0	0	1	1	68	0	0	0	69	0	0	0	0	0	0	0	54	3	0	0	57	127
02:45 PM	0	0	0	0	0	0	2	71	0	0	0	73	0	0	0	0	0	0	1	58	3	0	0	62	135
Total	3	0	0	0	0	3	4	271	0	0	0	275	0	0	0	0	0	0	1	232	7	0	0	240	518
03:00 PM	25	0	6	0	0	31	1	67	0	0	0	68	0	0	0	0	0	0	0	70	3	0	0	73	172
03:15 PM	5	0	2	0	0	7	0	55	0	0	0	55	0	0	0	0	0	0	1	77	1	0	0	79	141
03:30 PM	1	0	1	0	0	2	1	82	0	0	0	83	0	0	0	0	0	0	0	79	2	0	0	81	166
03:45 PM	1	0	1	0	0	2	2	86	0	0	0	88	0	0	0	0	0	0	0	74	0	0	0	74	164
Total	32	0	10	0	0	42	4	290	0	0	0	294	0	0	0	0	0	0	1	300	6	0	0	307	643

Bolton & Menk, Inc.

12224 Nicollet Ave
Burnsville, MN, 55337

File Name : TH 14 at 561st Ave
Site Code : 1
Start Date : 1/17/2018
Page No : 3

TH 14 at 561th Ave
TH 14 ICE Report

Groups Printed- Cars + - Trucks

	561th Ave From North						TH 14 From East						561th Ave From South						TH 14 From West						
Start Time	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Int. Total
04:00 PM	5	0	2	0	0	7	3	75	0	0	0	78	0	0	0	0	0	0	0	87	3	0	0	90	175
04:15 PM	11	0	4	0	0	15	3	86	0	0	0	89	0	0	0	0	0	0	0	84	6	0	0	90	194
04:30 PM	7	0	2	0	0	9	4	84	0	0	0	88	1	0	0	0	0	1	0	89	7	0	0	96	194
04:45 PM	7	0	2	0	0	9	1	101	0	0	0	102	0	0	0	0	0	0	0	84	3	0	0	87	198
Total	30	0	10	0	0	40	11	346	0	0	0	357	1	0	0	0	0	1	0	344	19	0	0	363	761
05:00 PM	7	0	1	0	0	8	2	107	0	0	0	109	1	0	0	0	0	1	0	92	5	0	0	97	215
05:15 PM	5	0	1	0	0	6	1	101	0	0	0	102	0	0	0	0	0	0	0	87	3	0	0	90	198
05:30 PM	2	0	0	0	0	2	2	93	0	0	0	95	0	0	0	0	0	0	0	65	4	0	0	69	166
05:45 PM	7	0	3	0	0	10	4	73	0	0	0	77	0	0	0	0	0	0	0	62	8	0	0	70	157
Total	21	0	5	0	0	26	9	374	0	0	0	383	1	0	0	0	0	1	0	306	20	0	0	326	736
06:00 PM	4	0	1	0	0	5	1	60	0	0	0	61	0	0	0	0	0	0	0	45	4	0	0	49	115
06:15 PM	6	0	3	0	0	9	1	55	0	0	0	56	0	0	0	0	0	0	0	40	3	0	0	43	108
06:30 PM	4	0	3	0	0	7	2	46	0	0	0	48	0	0	0	0	0	0	0	35	5	0	0	40	95
06:45 PM	2	0	3	0	0	5	2	40	0	0	0	42	0	0	0	0	0	0	0	36	5	0	0	41	88
Total	16	0	10	0	0	26	6	201	0	0	0	207	0	0	0	0	0	0	0	156	17	0	0	173	406
07:00 PM	1	0	0	0	0	1	2	33	0	0	0	35	0	0	0	0	0	0	0	32	4	0	0	36	72
07:15 PM	2	0	0	0	0	2	1	33	0	0	0	34	0	0	0	0	0	0	0	31	2	0	0	33	69
07:30 PM	2	0	1	0	0	3	0	31	0	0	0	31	0	0	0	0	0	0	0	21	1	0	0	22	56
07:45 PM	1	0	0	0	0	1	0	30	0	0	0	30	0	0	0	0	0	0	0	24	2	0	0	26	57
Total	6	0	1	0	0	7	3	127	0	0	0	130	0	0	0	0	0	0	0	108	9	0	0	117	254
08:00 PM	1	0	1	0	0	2	0	24	0	0	0	24	0	0	0	0	0	0	0	22	0	0	0	22	48
08:15 PM	3	0	1	0	0	4	1	30	0	0	0	31	0	0	0	0	0	0	0	29	1	0	0	30	65
08:30 PM	3	0	2	0	0	5	0	32	0	0	0	32	0	0	0	0	0	0	0	23	1	0	0	24	61
08:45 PM	14	0	4	0	0	18	0	24	0	0	0	24	0	0	0	0	0	0	0	24	1	0	0	25	67
Total	21	0	8	0	0	29	1	110	0	0	0	111	0	0	0	0	0	0	0	98	3	0	0	101	241
09:00 PM	14	0	5	0	0	19	0	26	0	0	0	26	0	0	0	0	0	0	0	18	0	0	0	18	63
09:15 PM	1	0	1	0	0	2	0	26	0	0	0	26	0	0	0	0	0	0	0	27	1	0	0	28	56
09:30 PM	0	0	0	0	0	0	0	25	0	0	0	25	0	0	0	0	0	0	0	19	0	0	0	19	44
09:45 PM	0	0	0	0	0	0	0	16	0	0	0	16	0	0	0	0	0	0	0	14	0	0	0	14	30
Total	15	0	6	0	0	21	0	93	0	0	0	93	0	0	0	0	0	0	0	78	1	0	0	79	193
10:00 PM	0	0	0	0	0	0	0	16	0	0	0	16	0	0	0	0	0	0	0	12	0	0	0	12	28
10:15 PM	0	0	0	0	0	0	0	10	0	0	0	10	0	0	0	0	0	0	0	12	0	0	0	12	22
10:30 PM	0	0	0	0	0	0	0	17	0	0	0	17	0	0	0	0	0	0	0	5	0	0	0	5	22
10:45 PM	0	0	0	0	0	0	0	7	0	0	0	7	0	0	0	0	0	0	0	8	0	0	0	8	15
Total	0	0	0	0	0	0	0	50	0	0	0	50	0	0	0	0	0	0	0	37	0	0	0	37	87
11:00 PM	0	0	0	0	0	0	0	7	0	0	0	7	0	0	0	0	0	0	0	10	0	0	0	10	17
11:15 PM	0	0	0	0	0	0	0	8	0	0	0	8	0	0	0	0	0	0	0	12	0	0	0	12	20
11:30 PM	0	0	0	0	0	0	0	5	0	0	0	5	0	0	0	0	0	0	0	7	0	0	0	7	12
11:45 PM	0	0	0	0	0	0	0	7	0	0	0	7	0	0	0	0	0	0	0	3	0	0	0	3	10
Total	0	0	0	0	0	0	0	27	0	0	0	27	0	0	0	0	0	0	0	32	0	0	0	32	59

Bolton & Menk, Inc.

12224 Nicollet Ave
Burnsville, MN, 55337

File Name : TH 14 at 561st Ave
Site Code : 1
Start Date : 1/17/2018
Page No : 4

TH 14 at 561th Ave
TH 14 ICE Report

Groups Printed- Cars + - Trucks

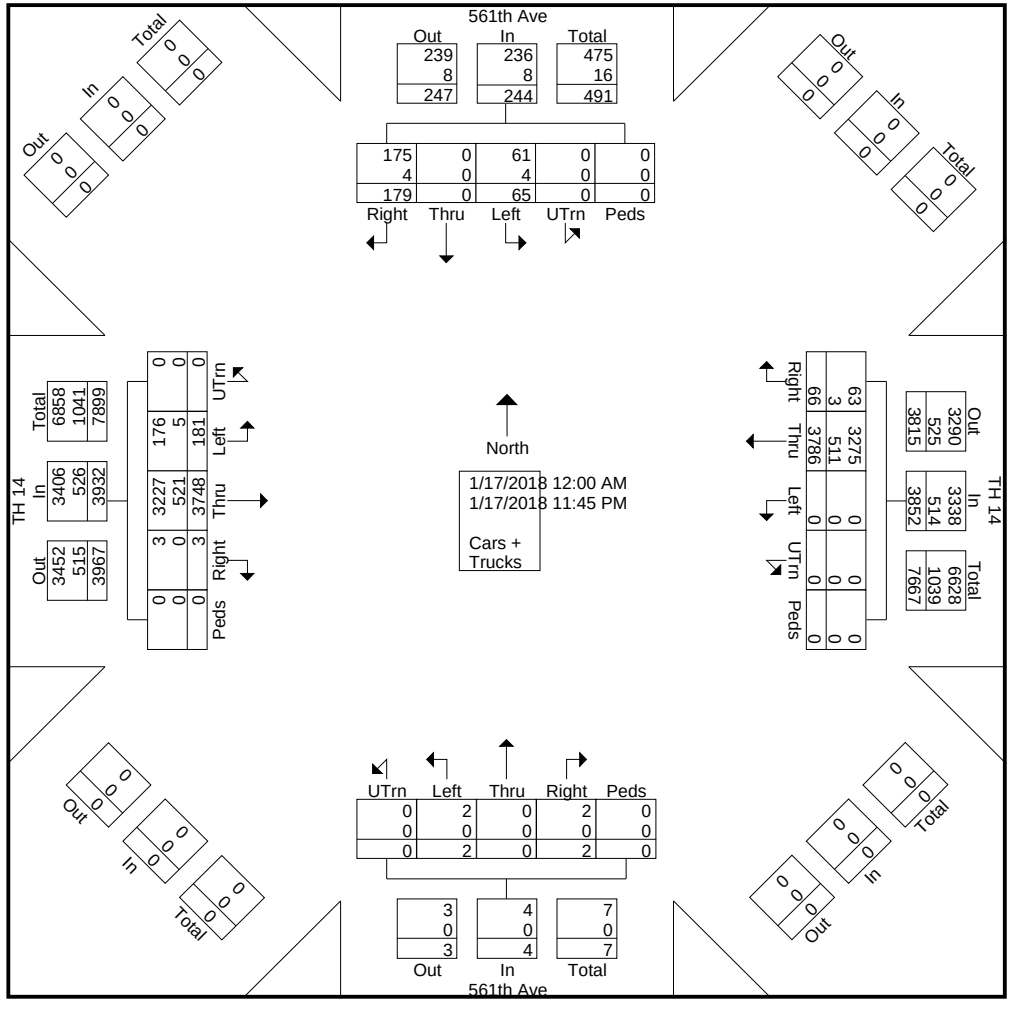
	561th Ave From North						TH 14 From East						561th Ave From South						TH 14 From West						
	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Int. Total
Grand Total	179	0	65	0	0	244	66	3786	0	0	0	3852	2	0	2	0	0	4	3	3748	181	0	0	3932	8032
Apprch %	73.4	0	26.6	0	0		1.7	98.3	0	0	0		50	0	50	0	0		0.1	95.3	4.6	0	0		
Total %	2.2	0	0.8	0	0	3	0.8	47.1	0	0	0	48	0	0	0	0	0	0	0	46.7	2.3	0	0	49	
Cars +	175	0	61	0	0	236	63	3275	0	0	0	3338	2	0	2	0	0	4	3	3227	176	0	0	3406	6984
% Cars +	97.8	0	93.8	0	0	96.7	95.5	86.5	0	0	0	86.7	100	0	100	0	0	100	100	86.1	97.2	0	0	86.6	87
Trucks	4	0	4	0	0	8	3	511	0	0	0	514	0	0	0	0	0	0	0	521	5	0	0	526	1048
% Trucks	2.2	0	6.2	0	0	3.3	4.5	13.5	0	0	0	13.3	0	0	0	0	0	0	0	13.9	2.8	0	0	13.4	13

Bolton & Menk, Inc.

12224 Nicollet Ave
Burnsville, MN, 55337

File Name : TH 14 at 561st Ave
Site Code : 1
Start Date : 1/17/2018
Page No : 5

TH 14 at 561th Ave
TH 14 ICE Report



Bolton & Menk, Inc.

12224 Nicollet Ave
Burnsville, MN, 55337

File Name : TH 14 at 561st Ave
Site Code : 1
Start Date : 1/17/2018
Page No : 6

TH 14 at 561th Ave
TH 14 ICE Report

	561th Ave From North						TH 14 From East						561th Ave From South						TH 14 From West						
Start Time	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Int. Total
Peak Hour Analysis From 12:00 AM to 12:00 PM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 07:15 AM																									
07:15 AM	**0**	**0**	**1**	**0**	**0**	**1**	**2**	88	0	0	0	90	0	0	0	0	0	0	0	95	6	0	0	101	192
07:30 AM	2	0	0	0	0	2	**3**	88	0	0	0	**91**	0	0	**1**	0	0	**1**	0	84	7	0	0	91	185
07:45 AM	3	0	1	0	0	4	2	88	0	0	0	90	0	0	0	0	0	0	0	69	15	0	0	84	178
08:00 AM	**4**	0	**2**	0	0	**6**	3	64	0	0	0	67	0	0	0	0	0	0	0	82	**19**	0	0	101	174
Total Volume	9	0	4	0	0	13	10	328	0	0	0	338	0	0	1	0	0	1	0	330	47	0	0	377	729
% App. Total	69.2	0	30.8	0	0		3	97	0	0	0		0	0	100	0	0		0	87.5	12.5	0	0		
PHF	.563	.000	.500	.000	.000	.542	.833	.932	.000	.000	.000	.929	.000	.000	.250	.000	.000	.250	.000	.868	.618	.000	.000	.933	.949
Peak Hour Analysis From 12:15 PM to 11:45 PM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 04:30 PM																									
04:30 PM	**7**	0	**2**	0	0	**9**	**4**	84	0	0	0	88	**1**	0	0	0	0	**1**	0	89	**7**	0	0	96	194
04:45 PM	7	0	2	0	0	9	1	101	0	0	0	102	0	0	0	0	0	0	0	84	3	0	0	87	198
05:00 PM	7	0	1	0	0	8	2	**107**	0	0	0	**109**	1	0	0	0	0	1	0	**92**	5	0	0	**97**	**215**
05:15 PM	5	0	1	0	0	6	1	101	0	0	0	102	0	0	0	0	0	0	0	87	3	0	0	90	198
Total Volume	26	0	6	0	0	32	8	393	0	0	0	401	2	0	0	0	0	2	0	352	18	0	0	370	805
% App. Total	81.2	0	18.8	0	0		2	98	0	0	0		100	0	0	0	0		0	95.1	4.9	0	0		
PHF	.929	.000	.750	.000	.000	.889	.500	.918	.000	.000	.000	.920	.500	.000	.000	.000	.000	.500	.000	.957	.643	.000	.000	.954	.936

Bolton & Menk

12224 Nicollet Ave
Burnsville, MN 55337
Real People. Real Solutions.

File Name : TH 14 at CSAH 12
Site Code : 1
Start Date : 1/25/2018
Page No : 1

TH 14 at CSAH 12
TH 14 ICE Report

Groups Printed- Cars + - Trucks

	Southbound						TH 14 Westbound						CSAH 37 Northbound						TH 14 Eastbound						
Start Time	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Int. Total
12:00 AM	0	0	0	0	0	0	0	4	0	0	0	4	0	0	0	0	0	0	0	4	0	0	0	4	8
12:15 AM	0	0	0	0	0	0	0	4	0	0	0	4	0	0	0	0	0	0	0	3	0	0	0	3	7
12:30 AM	0	0	0	0	0	0	0	4	0	0	0	4	0	0	0	0	0	0	0	2	0	0	0	2	6
12:45 AM	0	0	0	0	0	0	0	6	0	0	0	6	0	0	0	0	0	0	0	2	0	0	0	2	8
Total	0	0	0	0	0	0	0	18	0	0	0	18	0	0	0	0	0	0	0	11	0	0	0	11	29
01:00 AM	0	0	0	0	0	0	0	4	0	0	0	4	0	0	0	0	0	0	0	5	0	0	0	5	9
01:15 AM	0	0	0	0	0	0	0	4	0	0	0	4	0	0	0	0	0	0	0	2	0	0	0	2	6
01:30 AM	0	0	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	0	0	3	1	0	0	4	6
01:45 AM	0	0	0	0	0	0	0	3	0	0	0	3	0	0	0	0	0	0	0	2	0	0	0	2	5
Total	0	0	0	0	0	0	0	13	0	0	0	13	0	0	0	0	0	0	0	12	1	0	0	13	26
02:00 AM	0	0	1	0	0	1	0	4	0	0	0	4	0	0	0	0	0	0	0	2	0	0	0	2	7
02:15 AM	0	0	1	0	0	1	0	6	0	0	0	6	0	0	0	0	0	0	0	2	0	0	0	2	9
02:30 AM	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	1	2
02:45 AM	0	0	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	2
Total	0	0	2	0	0	2	0	13	0	0	0	13	0	0	0	0	0	0	0	5	0	0	0	5	20
03:00 AM	0	0	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	0	0	2	0	0	0	2	4
03:15 AM	0	0	0	0	0	0	0	4	0	0	0	4	0	0	0	0	0	0	0	4	0	0	0	4	8
03:30 AM	0	0	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	0	0	1	0	0	0	1	3
03:45 AM	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	3	0	0	0	3	4
Total	0	0	0	0	0	0	0	9	0	0	0	9	0	0	0	0	0	0	0	10	0	0	0	10	19
04:00 AM	0	0	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	0	0	1	0	0	0	1	3
04:15 AM	0	0	0	0	0	0	1	7	0	0	0	8	0	0	0	0	0	0	0	9	0	0	0	9	17
04:30 AM	0	0	0	0	0	0	0	9	0	0	0	9	0	0	0	0	0	0	0	15	0	0	0	15	24
04:45 AM	0	0	0	0	0	0	1	12	0	0	0	13	0	0	0	0	0	0	0	7	0	0	0	7	20
Total	0	0	0	0	0	0	2	30	0	0	0	32	0	0	0	0	0	0	0	32	0	0	0	32	64
05:00 AM	0	0	0	0	0	0	2	9	0	0	0	11	0	0	0	0	0	0	0	12	0	0	0	12	23
05:15 AM	0	0	0	0	0	0	2	15	0	0	0	17	0	0	0	0	0	0	0	25	0	0	0	25	42
05:30 AM	1	0	0	0	0	1	0	22	0	0	0	22	0	0	0	0	0	0	0	32	0	0	0	32	55
05:45 AM	1	0	4	0	0	5	1	28	0	0	0	29	0	0	0	0	0	0	0	28	1	0	0	29	63
Total	2	0	4	0	0	6	5	74	0	0	0	79	0	0	0	0	0	0	0	97	1	0	0	98	183
06:00 AM	1	0	2	0	0	3	0	32	0	0	0	32	0	0	0	0	0	0	0	26	0	0	0	26	61
06:15 AM	0	0	0	0	0	0	0	39	0	0	0	39	0	0	0	0	0	0	0	50	1	0	0	51	90
06:30 AM	0	0	1	0	0	1	1	69	0	0	0	70	0	0	0	0	0	0	0	55	0	0	0	55	126
06:45 AM	1	0	4	1	0	6	2	53	0	0	0	55	0	0	0	0	0	0	0	44	1	0	0	45	106
Total	2	0	7	1	0	10	3	193	0	0	0	196	0	0	0	0	0	0	0	175	2	0	0	177	383
07:00 AM	0	0	1	0	0	1	5	72	0	0	0	77	0	0	0	0	0	0	0	90	1	0	0	91	169
07:15 AM	2	0	0	0	0	2	2	82	0	0	0	84	0	0	0	0	0	0	0	93	0	0	0	93	179
07:30 AM	1	0	0	0	0	1	1	99	0	0	0	100	0	0	0	0	0	0	0	103	0	0	0	103	204
07:45 AM	2	0	2	0	0	4	2	103	0	0	0	105	0	0	0	0	0	0	0	71	0	0	0	71	180
Total	5	0	3	0	0	8	10	356	0	0	0	366	0	0	0	0	0	0	0	357	1	0	0	358	732

Bolton & Menk

12224 Nicollet Ave
Burnsville, MN 55337
Real People. Real Solutions.

File Name : TH 14 at CSAH 12
Site Code : 1
Start Date : 1/25/2018

TH 14 at CSAH 12
TH 14 ICE Report

Groups Printed- Cars + - Trucks

	Southbound						TH 14 Westbound						CSAH 37 Northbound						TH 14 Eastbound						
Start Time	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Int. Total
08:00 AM	2	0	1	0	0	3	4	68	0	0	0	72	0	0	0	0	0	0	0	83	0	0	0	83	158
08:15 AM	0	0	3	0	0	3	4	74	0	0	0	78	0	0	0	0	0	0	0	81	0	0	0	81	162
08:30 AM	0	0	3	0	0	3	1	50	0	0	0	51	0	0	0	0	0	0	0	65	1	0	0	66	120
08:45 AM	1	0	0	0	0	1	1	38	0	1	0	40	0	0	0	0	0	0	0	43	1	0	0	44	85
Total	3	0	7	0	0	10	10	230	0	1	0	241	0	0	0	0	0	0	0	272	2	0	0	274	525
09:00 AM	0	0	2	0	0	2	4	44	0	0	0	48	0	0	0	0	0	0	0	57	1	0	0	58	108
09:15 AM	0	0	2	0	0	2	1	43	0	0	0	44	0	0	0	0	0	0	0	70	2	0	0	72	118
09:30 AM	1	0	2	0	0	3	0	52	0	0	0	52	0	0	0	0	0	0	0	50	0	0	0	50	105
09:45 AM	1	0	0	0	0	1	2	55	0	0	0	57	0	0	0	0	0	0	0	58	1	0	0	59	117
Total	2	0	6	0	0	8	7	194	0	0	0	201	0	0	0	0	0	0	0	235	4	0	0	239	448
10:00 AM	0	0	2	0	0	2	1	54	0	1	0	56	0	0	0	0	0	0	0	51	0	0	0	51	109
10:15 AM	0	0	0	0	0	0	1	49	0	0	0	50	0	0	0	0	0	0	0	63	1	0	0	64	114
10:30 AM	1	0	1	0	0	2	6	48	0	0	0	54	0	0	0	0	0	0	0	51	3	0	0	54	110
10:45 AM	0	0	2	0	0	2	4	45	0	0	0	49	0	0	0	0	0	0	0	66	5	0	0	71	122
Total	1	0	5	0	0	6	12	196	0	1	0	209	0	0	0	0	0	0	0	231	9	0	0	240	455
11:00 AM	0	0	2	0	0	2	1	35	0	2	0	38	0	0	0	0	0	0	0	55	0	0	0	55	95
11:15 AM	0	0	0	0	0	0	1	63	0	5	0	69	0	0	0	0	0	0	0	49	0	0	0	49	118
11:30 AM	1	0	1	0	0	2	0	52	0	0	0	52	0	0	0	0	0	0	0	53	1	0	0	54	108
11:45 AM	1	0	1	0	0	2	0	49	0	0	0	49	0	0	0	0	0	0	0	50	2	0	0	52	103
Total	2	0	4	0	0	6	2	199	0	7	0	208	0	0	0	0	0	0	0	207	3	0	0	210	424
12:00 PM	0	0	4	0	0	4	1	55	0	0	0	56	0	0	0	0	0	0	0	54	3	0	0	57	117
12:15 PM	0	0	2	0	0	2	1	55	0	0	0	56	0	0	0	0	0	0	0	57	1	0	0	58	116
12:30 PM	0	0	0	0	0	0	1	42	0	1	0	44	0	0	0	0	0	0	0	69	0	0	0	69	113
12:45 PM	0	0	1	0	0	1	1	57	0	0	0	58	0	0	0	0	0	0	0	54	3	1	0	58	117
Total	0	0	7	0	0	7	4	209	0	1	0	214	0	0	0	0	0	0	0	234	7	1	0	242	463
01:00 PM	0	0	0	0	0	0	4	49	0	0	0	53	0	0	0	0	0	0	0	65	0	0	0	65	118
01:15 PM	0	0	2	0	0	2	3	60	0	1	0	64	0	0	0	0	0	0	0	55	0	0	0	55	121
01:30 PM	0	0	1	0	0	1	1	73	0	0	0	74	0	0	0	0	0	0	0	52	0	0	0	52	127
01:45 PM	1	0	2	0	0	3	2	66	0	0	0	68	0	0	0	0	0	0	0	55	0	0	0	55	126
Total	1	0	5	0	0	6	10	248	0	1	0	259	0	0	0	0	0	0	0	227	0	0	0	227	492
02:00 PM	0	0	3	0	0	3	2	71	0	0	0	73	0	0	0	0	0	0	0	63	1	0	0	64	140
02:15 PM	1	0	3	0	0	4	1	56	0	1	0	58	0	0	0	0	0	0	0	57	4	0	0	61	123
02:30 PM	2	0	0	0	0	2	2	65	0	0	0	67	0	0	0	0	0	0	0	56	1	0	0	57	126
02:45 PM	0	0	2	0	0	2	2	80	0	0	0	82	0	0	0	0	0	0	0	62	0	0	0	62	146
Total	3	0	8	0	0	11	7	272	0	1	0	280	0	0	0	0	0	0	0	238	6	0	0	244	535
03:00 PM	1	0	2	0	0	3	2	68	0	0	0	70	0	0	0	0	0	0	0	58	0	0	0	58	131
03:15 PM	0	0	0	0	0	0	1	71	0	0	0	72	0	0	0	0	0	0	0	79	1	0	0	80	152
03:30 PM	2	0	2	0	0	4	0	84	0	0	0	84	0	0	0	0	0	0	0	79	1	0	0	80	168
03:45 PM	1	0	1	0	0	2	1	101	0	0	0	102	0	0	0	0	0	0	0	69	1	0	0	70	174
Total	4	0	5	0	0	9	4	324	0	0	0	328	0	0	0	0	0	0	0	285	3	0	0	288	625

Bolton & Menk

12224 Nicollet Ave
Burnsville, MN 55337
Real People. Real Solutions.

File Name : TH 14 at CSAH 12
Site Code : 1
Start Date : 1/25/2018

TH 14 at CSAH 12
TH 14 ICE Report

Groups Printed- Cars + - Trucks

	Southbound						TH 14 Westbound						CSAH 37 Northbound						TH 14 Eastbound						
Start Time	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Int. Total
04:00 PM	2	0	4	0	0	6	3	79	0	0	0	82	0	0	0	0	0	0	0	79	0	0	0	79	167
04:15 PM	2	0	1	0	0	3	2	111	0	0	0	113	0	0	0	0	0	0	0	97	3	0	0	100	216
04:30 PM	2	0	2	0	0	4	0	91	0	0	0	91	0	0	0	0	0	0	0	74	1	0	0	75	170
04:45 PM	1	0	4	0	0	5	4	96	0	0	0	100	0	0	0	0	0	0	0	103	0	0	0	103	208
Total	7	0	11	0	0	18	9	377	0	0	0	386	0	0	0	0	0	0	0	353	4	0	0	357	761
05:00 PM	0	0	3	0	0	3	3	100	0	0	0	103	0	0	0	0	0	0	0	105	4	0	0	109	215
05:15 PM	2	0	2	1	0	5	3	94	0	0	0	97	0	0	0	0	0	0	0	107	0	0	0	107	209
05:30 PM	1	0	3	0	0	4	3	91	0	0	0	94	0	0	0	0	0	0	0	84	0	0	0	84	182
05:45 PM	0	0	6	0	0	6	5	70	0	0	0	75	0	0	0	0	0	0	0	69	0	0	0	69	150
Total	3	0	14	1	0	18	14	355	0	0	0	369	0	0	0	0	0	0	0	365	4	0	0	369	756
06:00 PM	1	0	2	0	0	3	2	66	0	0	0	68	0	0	0	0	0	0	0	69	2	0	0	71	142
06:15 PM	1	0	1	0	0	2	1	59	0	0	0	60	0	0	0	0	0	0	0	46	0	0	0	46	108
06:30 PM	0	0	1	0	0	1	3	53	0	0	0	56	0	0	0	0	0	0	0	38	0	0	0	38	95
06:45 PM	1	0	0	0	0	1	0	53	0	0	0	53	0	0	0	0	0	0	0	40	2	0	0	42	96
Total	3	0	4	0	0	7	6	231	0	0	0	237	0	0	0	0	0	0	0	193	4	0	0	197	441
07:00 PM	0	0	1	0	0	1	1	35	0	0	0	36	0	0	0	0	0	0	0	36	0	0	0	36	73
07:15 PM	0	0	0	0	0	0	0	56	0	0	0	56	0	0	0	0	0	0	0	42	0	0	0	42	98
07:30 PM	0	0	1	0	0	1	1	40	0	0	0	41	0	0	0	0	0	0	0	32	0	0	0	32	74
07:45 PM	1	0	1	0	0	2	2	29	0	0	0	31	0	0	0	0	0	0	0	20	0	0	0	20	53
Total	1	0	3	0	0	4	4	160	0	0	0	164	0	0	0	0	0	0	0	130	0	0	0	130	298
08:00 PM	0	0	0	0	0	0	0	27	0	0	0	27	0	0	0	0	0	0	0	14	0	0	0	14	41
08:15 PM	0	0	1	0	0	1	1	30	0	0	0	31	0	0	0	0	0	0	0	33	1	0	0	34	66
08:30 PM	0	0	2	0	0	2	1	34	0	0	0	35	0	0	0	0	0	0	0	14	0	0	0	14	51
08:45 PM	0	0	2	0	0	2	1	24	0	0	0	25	0	0	0	0	0	0	0	42	1	0	0	43	70
Total	0	0	5	0	0	5	3	115	0	0	0	118	0	0	0	0	0	0	0	103	2	0	0	105	228
09:00 PM	0	0	1	0	0	1	3	20	0	0	0	23	0	0	0	0	0	0	0	36	1	0	0	37	61
09:15 PM	0	0	0	0	0	0	0	32	0	0	0	32	0	0	0	0	0	0	0	18	0	0	0	18	50
09:30 PM	0	0	0	0	0	0	2	28	0	0	0	30	0	0	0	0	0	0	0	17	0	0	0	17	47
09:45 PM	0	0	2	0	0	2	0	25	0	0	0	25	0	0	0	0	0	0	0	25	0	0	0	25	52
Total	0	0	3	0	0	3	5	105	0	0	0	110	0	0	0	0	0	0	0	96	1	0	0	97	210
10:00 PM	0	0	1	0	0	1	1	22	0	0	0	23	0	0	0	0	0	0	0	25	0	0	0	25	49
10:15 PM	0	0	0	0	0	0	1	14	0	0	0	15	0	0	0	0	0	0	0	17	0	0	0	17	32
10:30 PM	0	0	0	0	0	0	0	19	0	0	0	19	0	0	0	0	0	0	0	9	0	0	0	9	28
10:45 PM	0	0	0	0	0	0	0	13	0	0	0	13	0	0	0	0	0	0	0	4	0	0	0	4	17
Total	0	0	1	0	0	1	2	68	0	0	0	70	0	0	0	0	0	0	0	55	0	0	0	55	126
11:00 PM	0	0	0	0	0	0	0	7	0	0	0	7	0	0	0	0	0	0	0	11	0	0	0	11	18
11:15 PM	0	0	0	0	0	0	1	8	0	0	0	9	0	0	0	0	0	0	0	19	0	0	0	19	28
11:30 PM	0	0	0	0	0	0	0	11	0	0	0	11	0	0	0	0	0	0	0	6	0	0	0	6	17
11:45 PM	0	0	0	0	0	0	0	7	0	0	0	7	0	0	0	0	0	0	0	5	0	0	0	5	12
Total	0	0	0	0	0	0	1	33	0	0	0	34	0	0	0	0	0	0	0	41	0	0	0	41	75

Bolton & Menk

12224 Nicollet Ave
Burnsville, MN 55337
Real People. Real Solutions.

File Name : TH 14 at CSAH 12
Site Code : 1
Start Date : 1/25/2018

TH 14 at CSAH 12
TH 14 ICE Report

Groups Printed- Cars + - Trucks

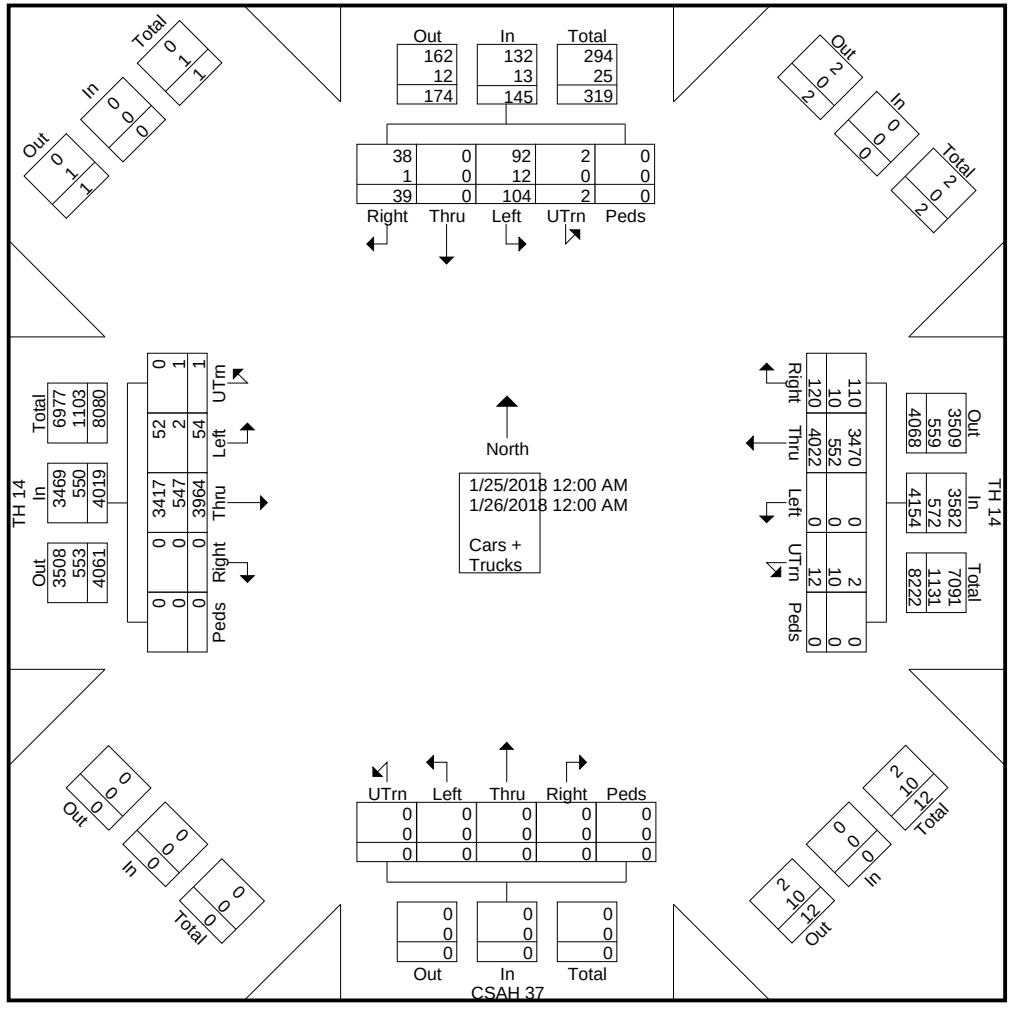
	Southbound						TH 14 Westbound						CSAH 37 Northbound						TH 14 Eastbound						
Start Time	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Int. Total
12:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	39	0	104	2	0	145	120	4022	0	12	0	4154	0	0	0	0	0	0	0	3964	54	1	0	4019	8318
Apprch %	26.9	0	71.7	1.4	0		2.9	96.8	0	0.3	0		0	0	0	0	0		0	98.6	1.3	0	0		
Total %	0.5	0	1.3	0	0	1.7	1.4	48.4	0	0.1	0	49.9	0	0	0	0	0	0	0	47.7	0.6	0	0	48.3	
Cars +	38	0	92	2	0	132	110	3470	0	2	0	3582	0	0	0	0	0	0	0	3417	52	0	0	3469	7183
% Cars +	97.4	0	88.5	100	0	91	91.7	86.3	0	16.7	0	86.2	0	0	0	0	0	0	0	86.2	96.3	0	0	86.3	86.4
Trucks	1	0	12	0	0	13	10	552	0	10	0	572	0	0	0	0	0	0	0	547	2	1	0	550	1135
% Trucks	2.6	0	11.5	0	0	9	8.3	13.7	0	83.3	0	13.8	0	0	0	0	0	0	0	13.8	3.7	100	0	13.7	13.6

Bolton & Menk

12224 Nicollet Ave
Burnsville, MN 55337
Real People. Real Solutions.

File Name : TH 14 at CSAH 12
Site Code : 1
Start Date : 1/25/2018
Page No : 5

TH 14 at CSAH 12
TH 14 ICE Report



TH 14 at CSAH 12
TH 14 ICE Report

Bolton & Menk

12224 Nicollet Ave
Burnsville, MN 55337
Real People. Real Solutions.

File Name : TH 14 at CSAH 12
Site Code : 1
Start Date : 1/25/2018
Page No : 6

TH 14 at CSAH 12
TH 14 ICE Report

	Southbound						TH 14 Westbound						CSAH 37 Northbound						TH 14 Eastbound						
Start Time	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Int. Total
Peak Hour Analysis From 12:00 AM to 12:00 PM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 07:00 AM																									
07:00 AM	0	0	1	0	0	1	5	72	0	0	0	77	0	0	0	0	0	0	0	90	1	0	0	91	169
07:15 AM	2	0	0	0	0	2	2	82	0	0	0	84	0	0	0	0	0	0	0	93	0	0	0	93	179
07:30 AM	1	0	0	0	0	1	1	99	0	0	0	100	0	0	0	0	0	0	0	103	0	0	0	103	204
07:45 AM	2	0	2	0	0	4	2	103	0	0	0	105	0	0	0	0	0	0	0	71	0	0	0	71	180
Total Volume	5	0	3	0	0	8	10	356	0	0	0	366	0	0	0	0	0	0	0	357	1	0	0	358	732
% App. Total	62.5	0	37.5	0	0		2.7	97.3	0	0	0		0	0	0	0	0		0	99.7	0.3	0	0		
PHF	.625	.000	.375	.000	.000	.500	.500	.864	.000	.000	.000	.871	.000	.000	.000	.000	.000	.000	.000	.867	.250	.000	.000	.869	.897
Peak Hour Analysis From 12:15 PM to 12:00 AM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 04:45 PM																									
04:45 PM	1	0	4	0	0	5	4	96	0	0	0	100	0	0	0	0	0	0	0	103	0	0	0	103	208
05:00 PM	0	0	3	0	0	3	3	100	0	0	0	103	0	0	0	0	0	0	0	105	4	0	0	109	215
05:15 PM	2	0	2	1	0	5	3	94	0	0	0	97	0	0	0	0	0	0	0	107	0	0	0	107	209
05:30 PM	1	0	3	0	0	4	3	91	0	0	0	94	0	0	0	0	0	0	0	84	0	0	0	84	182
Total Volume	4	0	12	1	0	17	13	381	0	0	0	394	0	0	0	0	0	0	0	399	4	0	0	403	814
% App. Total	23.5	0	70.6	5.9	0		3.3	96.7	0	0	0		0	0	0	0	0		0	99	1	0	0		
PHF	.500	.000	.750	.250	.000	.850	.813	.953	.000	.000	.000	.956	.000	.000	.000	.000	.000	.000	.000	.932	.250	.000	.000	.924	.947

Bolton & Menk

12224 Nicollet Ave
Burnsville, MN 55337
Real People. Real Solutions.

File Name : TH 14 at CSAH 24
Site Code : 1
Start Date : 1/25/2018
Page No : 1

TH 14 at CSAH 24
TH 14 ICE Report

Groups Printed- Cars + - Trucks

	Southbound						TH 14 Westbound						CSAH 37 Northbound						TH 14 Eastbound						
Start Time	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Int. Total
12:00 AM	0	0	0	0	0	0	0	3	1	0	0	4	0	0	1	0	0	1	0	2	0	0	0	2	7
12:15 AM	0	0	0	0	0	0	0	4	0	0	0	4	0	0	0	0	0	0	0	4	0	0	0	4	8
12:30 AM	0	0	0	0	0	0	0	3	0	0	0	3	0	0	2	0	0	2	0	2	0	0	0	2	7
12:45 AM	0	0	0	0	0	0	0	4	0	0	0	4	0	0	1	0	0	1	0	2	0	0	0	2	7
Total	0	0	0	0	0	0	0	14	1	0	0	15	0	0	4	0	0	4	0	10	0	0	0	10	29
01:00 AM	0	0	0	0	0	0	0	4	0	0	0	4	0	0	0	0	0	0	0	4	0	0	0	4	8
01:15 AM	0	0	0	0	0	0	0	4	0	0	0	4	1	0	0	0	0	1	1	1	0	0	0	2	7
01:30 AM	0	0	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	0	0	3	0	0	0	3	5
01:45 AM	0	0	0	0	0	0	0	4	0	0	0	4	0	0	0	0	0	0	1	1	0	0	0	2	6
Total	0	0	0	0	0	0	0	14	0	0	0	14	1	0	0	0	0	1	2	9	0	0	0	11	26
02:00 AM	0	0	0	0	0	0	0	3	0	0	0	3	0	0	1	0	0	1	0	2	0	0	0	2	6
02:15 AM	0	0	0	0	0	0	0	4	0	0	0	4	0	0	0	0	0	0	0	3	0	0	0	3	7
02:30 AM	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	1	2
02:45 AM	0	0	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	2
Total	0	0	0	0	0	0	0	10	0	0	0	10	0	0	1	0	0	1	0	6	0	0	0	6	17
03:00 AM	0	0	0	0	0	0	0	3	0	0	0	3	0	0	0	0	0	0	0	2	0	0	0	2	5
03:15 AM	0	0	0	0	0	0	0	3	0	0	0	3	0	0	0	0	0	0	0	4	0	0	0	4	7
03:30 AM	0	0	0	0	0	0	0	1	0	0	0	1	1	0	1	0	0	2	0	1	0	0	0	1	4
03:45 AM	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	3	0	0	0	3	4
Total	0	0	0	0	0	0	0	8	0	0	0	8	1	0	1	0	0	2	0	10	0	0	0	10	20
04:00 AM	0	0	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	0	1	0	0	0	0	1	3
04:15 AM	0	0	0	0	0	0	0	7	0	0	0	7	2	0	2	0	0	4	1	8	0	0	0	9	20
04:30 AM	0	0	0	0	0	0	0	9	0	0	0	9	2	0	1	0	0	3	1	13	0	0	0	14	26
04:45 AM	1	0	0	0	0	1	0	7	3	0	0	10	0	1	2	0	0	3	1	7	0	0	0	8	22
Total	1	0	0	0	0	1	0	25	3	0	0	28	4	1	5	0	0	10	4	28	0	0	0	32	71
05:00 AM	0	0	0	0	0	0	0	13	0	0	0	13	1	0	1	0	0	2	0	12	0	0	0	12	27
05:15 AM	0	0	0	0	0	0	0	11	2	0	0	13	2	0	5	0	0	7	1	25	0	0	0	26	46
05:30 AM	0	0	0	0	0	0	0	19	0	0	0	19	4	0	3	0	0	7	1	30	0	0	0	31	57
05:45 AM	0	0	0	0	0	0	0	24	0	0	0	24	2	0	3	0	0	5	2	32	1	0	0	35	64
Total	0	0	0	0	0	0	0	67	2	0	0	69	9	0	12	0	0	21	4	99	1	0	0	104	194
06:00 AM	0	0	1	0	0	1	0	21	0	0	0	21	3	0	10	0	0	13	3	30	0	0	0	33	68
06:15 AM	0	0	0	0	0	0	0	30	0	0	0	30	2	0	3	0	0	5	3	49	0	0	0	52	87
06:30 AM	0	0	0	0	0	0	0	60	1	0	0	61	10	0	9	0	1	20	3	57	0	0	0	60	141
06:45 AM	0	0	0	0	0	0	0	39	2	0	0	41	5	0	10	0	0	15	8	43	0	0	0	51	107
Total	0	0	1	0	0	1	0	150	3	0	0	153	20	0	32	0	1	53	17	179	0	0	0	196	403
07:00 AM	0	0	0	0	0	0	0	47	2	0	0	49	10	0	15	0	0	25	7	86	0	0	0	93	167
07:15 AM	1	0	0	0	0	1	0	67	4	0	2	73	12	0	13	0	0	25	5	93	0	0	0	98	197
07:30 AM	0	0	0	0	0	0	0	61	1	0	0	62	9	0	11	0	0	20	4	103	0	0	0	107	189
07:45 AM	1	0	0	0	0	1	0	81	6	0	0	87	5	0	13	0	0	18	10	64	0	0	0	74	180
Total	2	0	0	0	0	2	0	256	13	0	2	271	36	0	52	0	0	88	26	346	0	0	0	372	733

Bolton & Menk

12224 Nicollet Ave
Burnsville, MN 55337
Real People. Real Solutions.

File Name : TH 14 at CSAH 24
Site Code : 1
Start Date : 1/25/2018
Page No : 2

TH 14 at CSAH 24
TH 14 ICE Report

Groups Printed- Cars + - Trucks

	Southbound						TH 14 Westbound						CSAH 37 Northbound						TH 14 Eastbound						
Start Time	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Int. Total
08:00 AM	0	1	0	0	0	1	0	58	4	0	0	62	5	0	9	0	0	14	11	70	0	0	0	81	158
08:15 AM	0	0	0	0	0	0	0	63	9	0	0	72	5	0	8	0	0	13	5	78	0	0	0	83	168
08:30 AM	0	0	0	0	0	0	0	42	3	0	0	45	7	0	5	0	0	12	7	56	0	0	0	63	120
08:45 AM	0	0	0	0	0	0	0	35	1	0	0	36	1	0	2	0	0	3	2	44	0	0	0	46	85
Total	0	1	0	0	0	1	0	198	17	0	0	215	18	0	24	0	0	42	25	248	0	0	0	273	531
09:00 AM	0	0	0	0	0	0	1	38	5	0	0	44	3	0	4	0	0	7	5	54	0	0	0	59	110
09:15 AM	0	0	0	0	0	0	0	46	7	0	0	53	3	0	4	0	0	7	4	54	0	0	0	58	118
09:30 AM	0	0	0	0	0	0	0	42	1	0	0	43	4	1	5	0	0	10	7	59	0	1	0	67	120
09:45 AM	0	0	0	0	0	0	1	57	3	0	0	61	1	0	6	0	1	8	9	36	0	0	2	47	116
Total	0	0	0	0	0	0	2	183	16	0	0	201	11	1	19	0	1	32	25	203	0	1	2	231	464
10:00 AM	0	0	0	0	0	0	1	50	2	0	0	53	3	0	4	1	0	8	4	49	1	0	0	54	115
10:15 AM	4	0	0	0	0	4	0	52	4	0	0	56	2	1	7	0	1	11	3	37	0	0	0	40	111
10:30 AM	1	0	0	0	0	1	0	37	1	0	0	38	1	1	7	0	1	10	0	55	0	0	0	55	104
10:45 AM	1	0	0	0	0	1	0	46	2	0	0	48	2	0	6	0	0	8	4	78	0	0	0	82	139
Total	6	0	0	0	0	6	1	185	9	0	0	195	8	2	24	1	2	37	11	219	1	0	0	231	469
11:00 AM	0	0	0	0	0	0	1	47	1	0	0	49	0	0	2	0	0	2	4	58	0	0	0	62	113
11:15 AM	0	0	0	0	0	0	0	60	2	0	0	62	0	1	8	0	0	9	2	45	0	0	0	47	118
11:30 AM	1	0	0	0	0	1	0	31	5	0	0	36	5	0	2	0	0	7	3	58	7	0	0	68	112
11:45 AM	0	0	0	0	0	0	0	59	2	0	0	61	1	0	1	0	0	2	2	49	0	0	0	51	114
Total	1	0	0	0	0	1	1	197	10	0	0	208	6	1	13	0	0	20	11	210	7	0	0	228	457
12:00 PM	0	2	0	0	0	2	0	42	8	0	0	50	5	0	7	0	1	13	5	59	0	0	0	64	129
12:15 PM	0	0	0	0	0	0	1	46	4	0	0	51	2	3	7	0	1	13	5	59	0	0	0	64	128
12:30 PM	0	0	2	0	0	2	0	38	3	0	0	41	9	0	6	0	0	15	5	61	0	0	0	66	124
12:45 PM	1	0	2	0	0	3	1	43	2	0	0	46	0	1	10	0	0	11	2	61	0	0	0	63	123
Total	1	2	4	0	0	7	2	169	17	0	0	188	16	4	30	0	2	52	17	240	0	0	0	257	504
01:00 PM	0	0	1	0	0	1	5	46	7	0	0	58	4	0	4	0	0	8	2	62	0	0	1	65	132
01:15 PM	1	2	0	0	0	3	2	63	4	0	0	69	2	0	2	0	0	4	1	36	0	0	0	37	113
01:30 PM	0	0	0	0	0	0	0	73	5	0	0	78	3	0	6	0	0	9	9	71	1	0	0	81	168
01:45 PM	0	0	0	0	1	1	0	58	4	0	1	63	3	0	7	0	0	10	7	49	0	0	0	56	130
Total	1	2	1	0	1	5	7	240	20	0	1	268	12	0	19	0	0	31	19	218	1	0	1	239	543
02:00 PM	0	0	1	0	0	1	0	63	4	0	0	67	7	0	7	0	0	14	7	56	0	0	0	63	145
02:15 PM	0	0	0	0	0	0	0	55	6	0	0	61	8	0	3	0	0	11	4	59	0	0	0	63	135
02:30 PM	0	0	0	0	1	1	0	56	8	0	1	65	3	0	10	0	1	14	9	49	0	0	1	59	139
02:45 PM	1	0	0	0	0	1	0	72	7	0	0	79	4	0	13	0	0	17	4	56	0	0	0	60	157
Total	1	0	1	0	1	3	0	246	25	0	1	272	22	0	33	0	1	56	24	220	0	0	1	245	576
03:00 PM	0	0	0	0	1	1	1	67	4	0	0	72	1	0	7	0	0	8	13	47	0	0	0	60	141
03:15 PM	0	0	0	0	0	0	0	57	4	0	0	61	0	1	7	0	0	8	11	63	0	0	0	74	143
03:30 PM	0	1	0	0	0	1	0	75	4	0	0	79	4	0	5	0	0	9	5	71	0	0	0	76	165
03:45 PM	0	0	0	0	0	0	0	94	7	0	0	101	1	0	7	0	0	8	13	52	0	0	0	65	174
Total	0	1	0	0	1	2	1	293	19	0	0	313	6	1	26	0	0	33	42	233	0	0	0	275	623

Bolton & Menk

12224 Nicollet Ave
Burnsville, MN 55337
Real People. Real Solutions.

File Name : TH 14 at CSAH 24
Site Code : 1
Start Date : 1/25/2018

TH 14 at CSAH 24
TH 14 ICE Report

Groups Printed- Cars + - Trucks

	Southbound						TH 14 Westbound						CSAH 37 Northbound						TH 14 Eastbound						
Start Time	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Int. Total
04:00 PM	0	0	0	0	0	0	0	75	8	0	0	83	5	0	4	0	0	9	11	69	0	0	0	80	172
04:15 PM	0	0	0	0	0	0	0	103	6	0	0	109	5	0	8	0	0	13	16	81	1	0	0	98	220
04:30 PM	0	0	0	0	0	0	0	81	5	0	0	86	8	1	11	0	0	20	10	59	0	0	0	69	175
04:45 PM	1	0	0	0	0	1	0	102	5	0	0	107	8	0	4	0	0	12	10	81	0	0	0	91	211
Total	1	0	0	0	0	1	0	361	24	0	0	385	26	1	27	0	0	54	47	290	1	0	0	338	778
05:00 PM	0	0	0	0	0	0	0	85	11	0	0	96	2	0	14	0	0	16	16	84	0	0	0	100	212
05:15 PM	0	0	0	0	0	0	0	90	6	0	0	96	6	0	7	0	0	13	14	92	1	0	0	107	216
05:30 PM	0	0	0	0	0	0	2	89	9	0	0	100	8	0	8	0	0	16	17	66	1	0	0	84	200
05:45 PM	0	0	0	0	0	0	0	67	3	0	0	70	2	0	5	0	0	7	11	58	1	0	0	70	147
Total	0	0	0	0	0	0	2	331	29	0	0	362	18	0	34	0	0	52	58	300	3	0	0	361	775
06:00 PM	0	0	0	0	0	0	0	66	5	0	0	71	3	0	7	0	0	10	13	54	0	0	0	67	148
06:15 PM	0	0	0	0	0	0	0	47	2	0	0	49	0	0	4	0	0	4	5	43	0	0	0	48	101
06:30 PM	0	0	0	0	0	0	0	50	4	0	0	54	1	0	11	0	0	12	3	29	0	0	0	32	98
06:45 PM	0	0	0	0	0	0	0	44	4	0	0	48	0	0	2	0	0	2	7	31	0	0	0	38	88
Total	0	0	0	0	0	0	0	207	15	0	0	222	4	0	24	0	0	28	28	157	0	0	0	185	435
07:00 PM	0	0	0	0	0	0	0	32	3	0	0	35	0	0	7	0	0	7	4	30	0	0	0	34	76
07:15 PM	0	0	0	0	0	0	0	54	3	0	0	57	3	0	2	0	0	5	5	36	0	0	0	41	103
07:30 PM	0	0	0	0	0	0	0	34	6	0	0	40	0	0	4	0	0	4	5	27	1	0	0	33	77
07:45 PM	0	0	0	0	2	2	0	32	1	0	0	33	0	0	3	0	0	3	2	12	0	0	0	14	52
Total	0	0	0	0	2	2	0	152	13	0	0	165	3	0	16	0	0	19	16	105	1	0	0	122	308
08:00 PM	0	0	0	0	0	0	0	23	2	0	0	25	1	0	0	0	0	1	2	12	0	0	0	14	40
08:15 PM	0	0	0	0	0	0	0	31	5	0	0	36	1	0	0	0	0	1	5	25	0	0	0	30	67
08:30 PM	0	0	0	0	0	0	0	30	3	0	0	33	1	0	4	0	0	5	3	10	0	0	0	13	51
08:45 PM	0	0	0	0	0	0	0	22	1	0	0	23	2	0	1	0	0	3	7	28	1	0	0	36	62
Total	0	0	0	0	0	0	0	106	11	0	0	117	5	0	5	0	0	10	17	75	1	0	0	93	220
09:00 PM	1	0	0	0	0	1	0	20	1	0	0	21	0	1	2	0	0	3	4	29	0	0	0	33	58
09:15 PM	0	0	0	0	0	0	0	31	1	0	0	32	1	0	2	0	0	3	2	16	0	0	0	18	53
09:30 PM	1	0	0	0	0	1	0	29	1	0	0	30	0	0	2	0	0	2	2	13	0	0	0	15	48
09:45 PM	0	0	0	0	0	0	0	24	2	0	0	26	1	0	3	0	0	4	2	21	0	0	0	23	53
Total	2	0	0	0	0	2	0	104	5	0	0	109	2	1	9	0	0	12	10	79	0	0	0	89	212
10:00 PM	0	0	0	0	0	0	0	21	0	0	0	21	1	0	1	0	0	2	5	17	0	0	0	22	45
10:15 PM	0	0	0	0	0	0	0	13	0	0	0	13	1	0	0	0	0	1	4	14	0	0	0	18	32
10:30 PM	0	0	0	0	0	0	0	16	1	0	0	17	1	0	3	0	0	4	3	8	0	0	0	11	32
10:45 PM	0	0	0	0	0	0	0	12	0	0	0	12	0	0	2	0	0	2	0	4	0	0	0	4	18
Total	0	0	0	0	0	0	0	62	1	0	0	63	3	0	6	0	0	9	12	43	0	0	0	55	127
11:00 PM	0	0	0	0	0	0	0	8	1	0	0	9	0	0	0	0	0	0	0	8	0	0	0	8	17
11:15 PM	0	0	0	0	0	0	0	7	0	0	0	7	0	0	2	0	0	2	2	16	0	0	0	18	27
11:30 PM	0	0	0	0	0	0	0	11	0	0	0	11	0	0	0	0	0	0	0	7	0	0	0	7	18
11:45 PM	0	0	0	0	0	0	0	8	0	0	0	8	1	0	0	0	0	1	1	0	0	0	0	1	10
Total	0	0	0	0	0	0	0	34	1	0	0	35	1	0	2	0	0	3	3	31	0	0	0	34	72

Bolton & Menk

12224 Nicollet Ave
Burnsville, MN 55337
Real People. Real Solutions.

File Name : TH 14 at CSAH 24
Site Code : 1
Start Date : 1/25/2018

TH 14 at CSAH 24
TH 14 ICE Report

Groups Printed- Cars + - Trucks

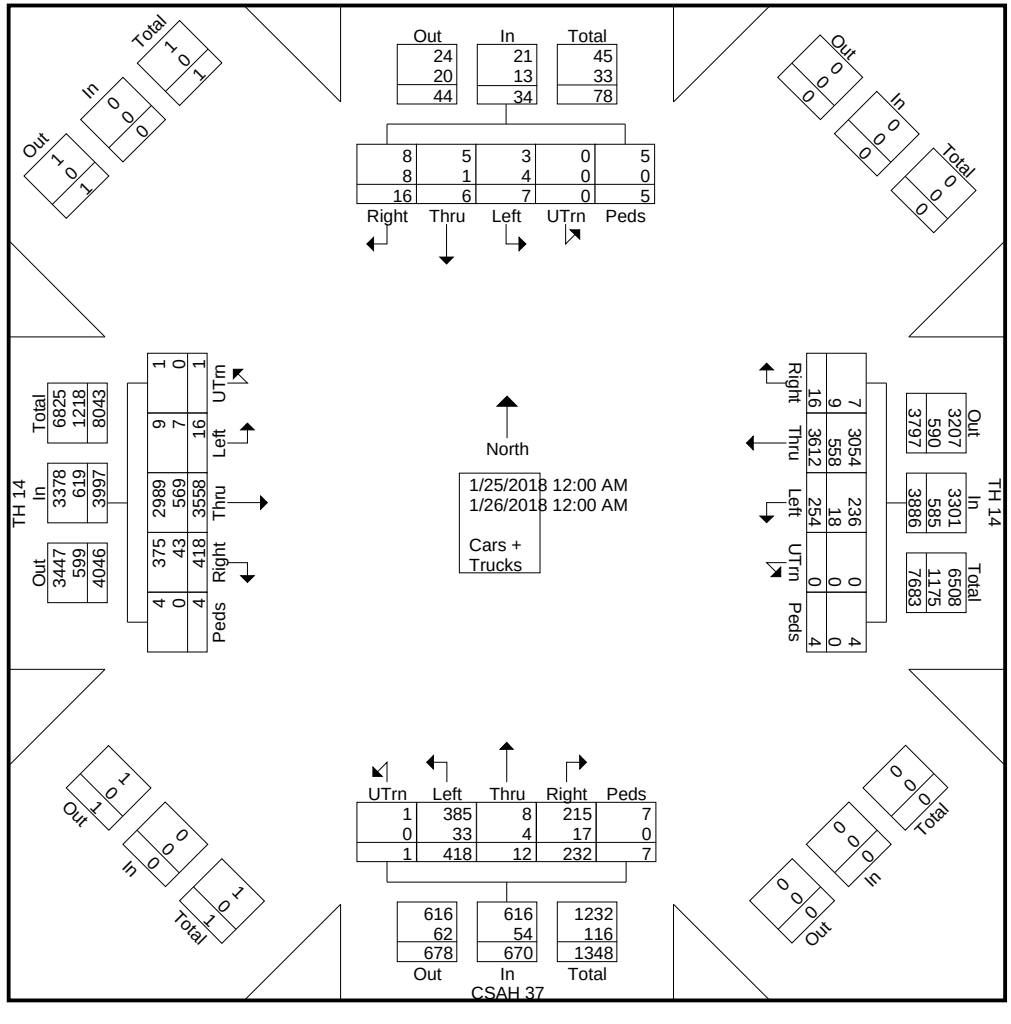
	Southbound						TH 14 Westbound						CSAH 37 Northbound						TH 14 Eastbound						
Start Time	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Int. Total
12:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	16	6	7	0	5	34	16	3612	254	0	4	3886	232	12	418	1	7	670	418	3558	16	1	4	3997	8587
Apprch %	47.1	17.6	20.6	0	14.7		0.4	92.9	6.5	0	0.1		34.6	1.8	62.4	0.1	1		10.5	89	0.4	0	0.1		
Total %	0.2	0.1	0.1	0	0.1	0.4	0.2	42.1	3	0	0	45.3	2.7	0.1	4.9	0	0.1	7.8	4.9	41.4	0.2	0	0	46.5	
Cars +	8	5	3	0	5	21	7	3054	236	0	4	3301	215	8	385	1	7	616	375	2989	9	1	4	3378	7316
% Cars +	50	83.3	42.9	0	100	61.8	43.8	84.6	92.9	0	100	84.9	92.7	66.7	92.1	100	100	91.9	89.7	84	56.2	100	100	84.5	85.2
Trucks	8	1	4	0	0	13	9	558	18	0	0	585	17	4	33	0	0	54	43	569	7	0	0	619	1271
% Trucks	50	16.7	57.1	0	0	38.2	56.2	15.4	7.1	0	0	15.1	7.3	33.3	7.9	0	0	8.1	10.3	16	43.8	0	0	15.5	14.8

Bolton & Menk

12224 Nicollet Ave
Burnsville, MN 55337
Real People. Real Solutions.

File Name : TH 14 at CSAH 24
Site Code : 1
Start Date : 1/25/2018
Page No : 5

TH 14 at CSAH 24
TH 14 ICE Report



Bolton & Menk

12224 Nicollet Ave
Burnsville, MN 55337
Real People. Real Solutions.

File Name : TH 14 at CSAH 24
Site Code : 1
Start Date : 1/25/2018

TH 14 at CSAH 24
TH 14 ICE Report

	Southbound						TH 14 Westbound						CSAH 37 Northbound						TH 14 Eastbound						
Start Time	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Int. Total
Peak Hour Analysis From 12:00 AM to 12:00 PM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 07:00 AM																									
07:00 AM	0	0	0	0	0	0	0	47	2	0	0	49	10	0	15	0	0	25	7	86	0	0	0	93	167
07:15 AM	1	0	0	0	0	1	0	67	4	0	2	73	12	0	13	0	0	25	5	93	0	0	0	98	197
07:30 AM	0	0	0	0	0	0	0	61	1	0	0	62	9	0	11	0	0	20	4	103	0	0	0	107	189
07:45 AM	1	0	0	0	0	1	0	81	6	0	0	87	5	0	13	0	0	18	10	64	0	0	0	74	180
Total Volume	2	0	0	0	0	2	0	256	13	0	2	271	36	0	52	0	0	88	26	346	0	0	0	372	733
% App. Total	100	0	0	0	0		0	94.5	4.8	0	0.7		40.9	0	59.1	0	0		7	93	0	0	0		
PHF	.500	.000	.000	.000	.000	.500	.000	.790	.542	.000	.250	.779	.750	.000	.867	.000	.000	.880	.650	.840	.000	.000	.000	.869	.930
Peak Hour Analysis From 12:15 PM to 12:00 AM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 04:45 PM																									
04:45 PM	1	0	0	0	0	1	0	102	5	0	0	107	8	0	4	0	0	12	10	81	0	0	0	91	211
05:00 PM	0	0	0	0	0	0	0	85	11	0	0	96	2	0	14	0	0	16	16	84	0	0	0	100	212
05:15 PM	0	0	0	0	0	0	0	90	6	0	0	96	6	0	7	0	0	13	14	92	1	0	0	107	216
05:30 PM	0	0	0	0	0	0	2	89	9	0	0	100	8	0	8	0	0	16	17	66	1	0	0	84	200
Total Volume	1	0	0	0	0	1	2	366	31	0	0	399	24	0	33	0	0	57	57	323	2	0	0	382	839
% App. Total	100	0	0	0	0		0.5	91.7	7.8	0	0		42.1	0	57.9	0	0		14.9	84.6	0.5	0	0		
PHF	.250	.000	.000	.000	.000	.250	.250	.897	.705	.000	.000	.932	.750	.000	.589	.000	.000	.891	.838	.878	.500	.000	.000	.893	.971

Bolton & Menk

12224 Nicollet Ave
Burnsville, MN 55337
Real People. Real Solutions.

File Name : TH 14 at 531st
Site Code : 1
Start Date : 1/25/2018

TH 14 at 531st
TH 14 ICE Report

Groups Printed- Cars + - Trucks

	Southbound						TH 14 Westbound						CSAH 37 Northbound						TH 14 Eastbound						
Start Time	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Int. Total
12:00 AM	0	0	0	0	0	0	0	4	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	4
12:15 AM	0	0	0	0	0	0	0	4	0	0	0	4	0	0	0	0	0	0	0	5	0	0	0	5	9
12:30 AM	0	0	0	0	0	0	0	3	0	0	0	3	0	0	0	0	0	0	0	3	0	0	0	3	6
12:45 AM	0	0	0	0	0	0	0	4	0	0	0	4	0	0	0	0	0	0	0	2	0	0	0	2	6
Total	0	0	0	0	0	0	0	15	0	0	0	15	0	0	0	0	0	0	0	10	0	0	0	10	25
01:00 AM	0	0	0	0	0	0	0	4	0	0	0	4	0	0	0	0	0	0	0	3	0	0	0	3	7
01:15 AM	0	0	0	0	0	0	0	4	0	0	0	4	0	0	0	0	0	0	0	2	0	0	0	2	6
01:30 AM	1	0	0	0	0	1	0	1	0	0	0	1	0	0	0	0	0	0	0	4	0	0	0	4	6
01:45 AM	0	0	0	0	0	0	0	5	0	0	0	5	0	0	0	0	0	0	0	1	0	0	0	1	6
Total	1	0	0	0	0	1	0	14	0	0	0	14	0	0	0	0	0	0	0	10	0	0	0	10	25
02:00 AM	0	0	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	0	0	2	0	0	0	2	4
02:15 AM	0	0	0	0	0	0	0	4	0	0	0	4	0	0	0	0	0	0	0	2	0	0	0	2	6
02:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
02:45 AM	0	0	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	2
Total	0	0	0	0	0	0	0	8	0	0	0	8	0	0	0	0	0	0	0	5	0	0	0	5	13
03:00 AM	0	0	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	0	0	2	0	0	0	2	4
03:15 AM	0	0	0	0	0	0	0	4	0	0	0	4	0	0	0	0	0	0	0	4	0	0	0	4	8
03:30 AM	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	1	2
03:45 AM	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	3	0	0	0	3	4
Total	0	0	0	0	0	0	0	8	0	0	0	8	0	0	0	0	0	0	0	10	0	0	0	10	18
04:00 AM	0	0	0	0	0	0	0	3	0	0	0	3	0	0	0	0	0	0	0	1	0	0	0	1	4
04:15 AM	0	0	0	0	0	0	0	5	0	0	0	5	0	0	0	0	0	0	0	7	0	0	0	7	12
04:30 AM	1	0	0	0	0	1	0	7	0	0	0	7	0	0	0	0	0	0	0	15	0	0	0	15	23
04:45 AM	0	0	0	0	0	0	0	12	0	0	0	12	0	0	0	0	0	0	0	9	1	0	0	10	22
Total	1	0	0	0	0	1	0	27	0	0	0	27	0	0	0	0	0	0	0	32	1	0	0	33	61
05:00 AM	0	0	0	0	0	0	0	10	0	0	0	10	0	0	0	0	0	0	0	13	0	0	0	13	23
05:15 AM	0	0	0	0	0	0	0	11	0	0	0	11	0	0	0	0	0	0	0	25	0	0	0	25	36
05:30 AM	2	0	0	0	0	2	0	18	0	0	0	18	0	0	0	0	0	0	0	34	0	0	0	34	54
05:45 AM	1	0	0	0	0	1	0	21	0	0	0	21	0	0	0	0	0	0	0	43	0	0	0	43	65
Total	3	0	0	0	0	3	0	60	0	0	0	60	0	0	0	0	0	0	0	115	0	0	0	115	178
06:00 AM	0	0	0	0	0	0	0	17	0	0	0	17	0	0	0	0	0	0	0	25	0	0	0	25	42
06:15 AM	0	0	0	0	0	0	0	28	0	0	0	28	0	0	0	0	0	0	0	55	0	0	0	55	83
06:30 AM	0	0	0	0	0	0	0	51	0	0	0	51	0	0	0	0	0	0	0	60	1	0	0	61	112
06:45 AM	0	0	2	0	0	2	0	39	0	0	0	39	0	0	0	0	0	0	0	57	1	0	0	58	99
Total	0	0	2	0	0	2	0	135	0	0	0	135	0	0	0	0	0	0	0	197	2	0	0	199	336
07:00 AM	0	0	0	0	0	0	0	40	0	0	0	40	0	0	0	0	0	0	0	85	1	0	0	86	126
07:15 AM	1	0	0	0	0	1	0	59	0	0	0	59	0	0	0	0	0	0	0	111	3	0	0	114	174
07:30 AM	2	0	0	0	0	2	0	65	0	0	0	65	0	0	0	0	0	0	0	109	0	0	0	109	176
07:45 AM	1	0	0	0	0	1	0	78	0	0	0	78	0	0	0	0	0	0	0	80	0	0	0	80	159
Total	4	0	0	0	0	4	0	242	0	0	0	242	0	0	0	0	0	0	0	385	4	0	0	389	635

Bolton & Menk

12224 Nicollet Ave
Burnsville, MN 55337
Real People. Real Solutions.

File Name : TH 14 at 531st
Site Code : 1
Start Date : 1/25/2018

TH 14 at 531st
TH 14 ICE Report

Groups Printed- Cars + - Trucks

	Southbound						TH 14 Westbound						CSAH 37 Northbound						TH 14 Eastbound						
Start Time	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Int. Total
08:00 AM	1	0	0	0	0	1	0	57	0	0	0	57	0	0	0	0	0	0	0	79	0	0	0	79	137
08:15 AM	1	0	0	0	0	1	0	74	0	0	0	74	0	0	0	0	0	0	0	81	0	0	0	81	156
08:30 AM	0	0	0	0	0	0	0	45	0	0	0	45	0	0	0	0	0	0	0	61	2	0	0	63	108
08:45 AM	1	0	0	0	0	1	0	34	0	0	0	34	0	0	0	0	0	0	0	44	2	0	0	46	81
Total	3	0	0	0	0	3	0	210	0	0	0	210	0	0	0	0	0	0	0	265	4	0	0	269	482
09:00 AM	0	0	0	0	0	0	0	46	0	0	0	46	0	0	0	0	0	0	0	46	2	0	0	48	94
09:15 AM	6	0	0	0	0	6	0	47	0	0	0	47	0	0	0	0	0	0	0	70	3	0	0	73	126
09:30 AM	2	0	0	0	0	2	0	50	0	0	0	50	0	0	0	0	0	0	0	33	1	0	0	34	86
09:45 AM	2	0	0	0	0	2	0	56	0	0	0	56	0	0	0	0	0	0	0	63	0	0	0	63	121
Total	10	0	0	0	0	10	0	199	0	0	0	199	0	0	0	0	0	0	0	212	6	0	0	218	427
10:00 AM	1	0	0	0	0	1	0	43	0	0	0	43	0	0	0	0	0	0	0	48	0	0	0	48	92
10:15 AM	0	0	0	0	0	0	0	52	0	0	0	52	0	0	0	0	0	0	0	43	0	0	0	43	95
10:30 AM	0	0	0	0	0	0	0	42	0	0	0	42	0	0	0	0	0	0	0	35	3	0	0	38	80
10:45 AM	1	0	1	0	0	2	0	45	0	0	0	45	0	0	0	0	0	0	0	93	1	0	0	94	141
Total	2	0	1	0	0	3	0	182	0	0	0	182	0	0	0	0	0	0	0	219	4	0	0	223	408
11:00 AM	0	0	0	0	0	0	0	27	0	0	0	27	0	0	0	0	0	0	0	56	0	0	0	56	83
11:15 AM	0	0	0	0	0	0	0	55	0	0	0	55	0	0	0	0	0	0	0	40	0	0	0	40	95
11:30 AM	0	0	0	0	0	0	0	45	0	0	0	45	0	0	0	0	0	0	0	58	0	0	0	58	103
11:45 AM	0	0	0	0	0	0	0	56	0	0	0	56	0	0	0	0	0	0	0	46	0	0	0	46	102
Total	0	0	0	0	0	0	0	183	0	0	0	183	0	0	0	0	0	0	0	200	0	0	0	200	383
12:00 PM	1	0	0	0	0	1	0	47	0	0	0	47	0	0	0	0	0	0	0	47	0	0	0	47	95
12:15 PM	0	0	0	0	0	0	0	47	0	0	0	47	0	0	0	0	0	0	0	54	0	0	0	54	101
12:30 PM	0	0	1	0	0	1	0	47	0	0	0	47	0	0	0	0	0	0	0	52	1	0	0	53	101
12:45 PM	0	0	0	0	0	0	1	50	0	0	0	51	0	0	0	0	0	0	0	42	0	0	0	42	93
Total	1	0	1	0	0	2	1	191	0	0	0	192	0	0	0	0	0	0	0	195	1	0	0	196	390
01:00 PM	3	0	2	0	0	5	0	46	0	0	0	46	0	0	0	0	0	0	0	40	1	0	0	41	92
01:15 PM	0	0	0	0	0	0	0	56	0	0	0	56	0	0	0	0	0	0	0	49	0	0	0	49	105
01:30 PM	0	0	1	0	0	1	0	67	0	0	0	67	0	0	0	0	0	0	0	67	0	0	0	67	135
01:45 PM	1	0	0	0	0	1	0	61	0	0	0	61	0	0	0	0	0	0	0	48	0	0	0	48	110
Total	4	0	3	0	0	7	0	230	0	0	0	230	0	0	0	0	0	0	0	204	1	0	0	205	442
02:00 PM	1	0	0	0	0	1	0	62	0	0	0	62	0	0	0	0	0	0	0	60	1	0	0	61	124
02:15 PM	2	0	0	0	0	2	0	61	0	0	0	61	0	0	0	0	0	0	0	58	2	0	0	60	123
02:30 PM	1	0	0	0	0	1	1	62	0	0	0	63	0	0	0	0	0	0	0	60	0	0	0	60	124
02:45 PM	0	0	0	0	0	0	1	81	0	0	0	82	0	0	0	0	0	0	0	56	1	0	0	57	139
Total	4	0	0	0	0	4	2	266	0	0	0	268	0	0	0	0	0	0	0	234	4	0	0	238	510
03:00 PM	1	0	0	0	0	1	0	66	0	0	0	66	0	0	0	0	0	0	0	46	1	0	0	47	114
03:15 PM	0	0	0	0	0	0	0	64	0	0	0	64	0	0	0	0	0	0	0	64	1	0	0	65	129
03:30 PM	1	0	1	0	0	2	0	77	0	0	0	77	0	0	0	0	0	0	0	67	2	0	0	69	148
03:45 PM	0	0	0	0	0	0	1	96	0	0	0	97	0	0	0	0	0	0	0	55	1	0	0	56	153
Total	2	0	1	0	0	3	1	303	0	0	0	304	0	0	0	0	0	0	0	232	5	0	0	237	544

Bolton & Menk

12224 Nicollet Ave
Burnsville, MN 55337
Real People. Real Solutions.

File Name : TH 14 at 531st
Site Code : 1
Start Date : 1/25/2018

TH 14 at 531st
TH 14 ICE Report

Groups Printed- Cars + - Trucks

	Southbound						TH 14 Westbound						CSAH 37 Northbound						TH 14 Eastbound						
Start Time	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Int. Total
04:00 PM	0	0	0	0	0	0	2	88	0	0	0	90	0	0	0	0	0	0	0	62	1	0	0	63	153
04:15 PM	1	0	0	0	0	1	0	109	0	0	0	109	0	0	0	0	0	0	0	83	2	0	0	85	195
04:30 PM	0	0	0	0	0	0	0	87	0	0	0	87	0	0	0	0	0	0	0	65	1	0	0	66	153
04:45 PM	0	0	1	0	0	1	0	101	0	0	0	101	0	0	0	0	0	0	0	88	2	0	0	90	192
Total	1	0	1	0	0	2	2	385	0	0	0	387	0	0	0	0	0	0	0	298	6	0	0	304	693
05:00 PM	0	0	1	0	0	1	1	106	0	0	0	107	0	0	0	0	0	0	0	76	3	0	0	79	187
05:15 PM	1	0	0	0	0	1	0	92	0	0	0	92	0	0	0	0	0	0	0	92	2	0	0	94	187
05:30 PM	1	0	0	0	0	1	0	90	0	0	0	90	0	0	0	0	0	0	0	64	3	0	0	67	158
05:45 PM	3	0	0	0	0	3	0	68	0	0	0	68	0	0	0	0	0	0	0	58	0	0	0	58	129
Total	5	0	1	0	0	6	1	356	0	0	0	357	0	0	0	0	0	0	0	290	8	0	0	298	661
06:00 PM	1	0	0	0	0	1	0	67	0	0	0	67	0	0	0	0	0	0	0	47	0	0	0	47	115
06:15 PM	1	0	0	0	0	1	0	55	0	0	0	55	0	0	0	0	0	0	0	41	0	0	0	41	97
06:30 PM	0	0	0	0	0	0	0	49	0	0	0	49	0	0	0	0	0	0	0	41	0	0	0	41	90
06:45 PM	0	0	0	0	0	0	1	53	0	0	0	54	0	0	0	0	0	0	0	32	1	0	0	33	87
Total	2	0	0	0	0	2	1	224	0	0	0	225	0	0	0	0	0	0	0	161	1	0	0	162	389
07:00 PM	0	0	0	0	0	0	0	33	0	0	0	33	0	0	0	0	0	0	0	24	0	0	0	24	57
07:15 PM	2	0	0	0	0	2	0	55	0	0	0	55	0	0	0	0	0	0	0	33	0	0	0	33	90
07:30 PM	0	0	0	0	0	0	0	39	0	0	0	39	0	0	0	0	0	0	0	23	0	0	0	23	62
07:45 PM	0	0	0	0	0	0	0	33	0	0	0	33	0	0	0	0	0	0	0	18	0	0	0	18	51
Total	2	0	0	0	0	2	0	160	0	0	0	160	0	0	0	0	0	0	0	98	0	0	0	98	260
08:00 PM	0	0	0	0	0	0	1	25	0	0	0	26	0	0	0	0	0	0	0	8	0	0	0	8	34
08:15 PM	0	0	0	0	0	0	0	33	0	0	0	33	0	0	0	0	0	0	0	24	0	0	0	24	57
08:30 PM	0	0	0	0	0	0	0	32	0	0	0	32	0	0	0	0	0	0	0	8	1	0	0	9	41
08:45 PM	0	0	0	0	0	0	1	24	0	0	0	25	0	0	0	0	0	0	0	25	0	0	0	25	50
Total	0	0	0	0	0	0	2	114	0	0	0	116	0	0	0	0	0	0	0	65	1	0	0	66	182
09:00 PM	0	0	0	0	0	0	1	18	0	0	0	19	0	0	0	0	0	0	0	31	2	0	0	33	52
09:15 PM	2	0	1	0	0	3	0	26	0	0	0	26	0	0	0	0	0	0	0	16	1	0	0	17	46
09:30 PM	0	0	0	0	0	0	0	30	0	0	0	30	0	0	0	0	0	0	0	16	0	0	0	16	46
09:45 PM	0	0	0	0	0	0	1	26	0	0	0	27	0	0	0	0	0	0	0	19	0	0	0	19	46
Total	2	0	1	0	0	3	2	100	0	0	0	102	0	0	0	0	0	0	0	82	3	0	0	85	190
10:00 PM	1	0	0	0	0	1	0	17	0	0	0	17	0	0	0	0	0	0	0	16	0	0	0	16	34
10:15 PM	0	0	0	0	0	0	0	13	0	0	0	13	0	0	0	0	0	0	0	16	1	0	0	17	30
10:30 PM	0	0	0	0	0	0	0	18	0	0	0	18	0	0	0	0	0	0	0	6	1	0	0	7	25
10:45 PM	0	0	0	0	0	0	0	13	0	0	0	13	0	0	0	0	0	0	0	6	0	0	0	6	19
Total	1	0	0	0	0	1	0	61	0	0	0	61	0	0	0	0	0	0	0	44	2	0	0	46	108
11:00 PM	1	0	0	0	0	1	0	8	0	0	0	8	0	0	0	0	0	0	0	5	0	0	0	5	14
11:15 PM	0	0	0	0	0	0	0	7	0	0	0	7	0	0	0	0	0	0	0	16	1	0	0	17	24
11:30 PM	0	0	0	0	0	0	0	11	0	0	0	11	0	0	0	0	0	0	0	6	0	0	0	6	17
11:45 PM	0	0	0	0	0	0	0	8	0	0	0	8	0	0	0	0	0	0	0	1	0	0	0	1	9
Total	1	0	0	0	0	1	0	34	0	0	0	34	0	0	0	0	0	0	0	28	1	0	0	29	64

Bolton & Menk

12224 Nicollet Ave
Burnsville, MN 55337
Real People. Real Solutions.

File Name : TH 14 at 531st
Site Code : 1
Start Date : 1/25/2018
Page No : 4

TH 14 at 531st
TH 14 ICE Report

Groups Printed- Cars + - Trucks

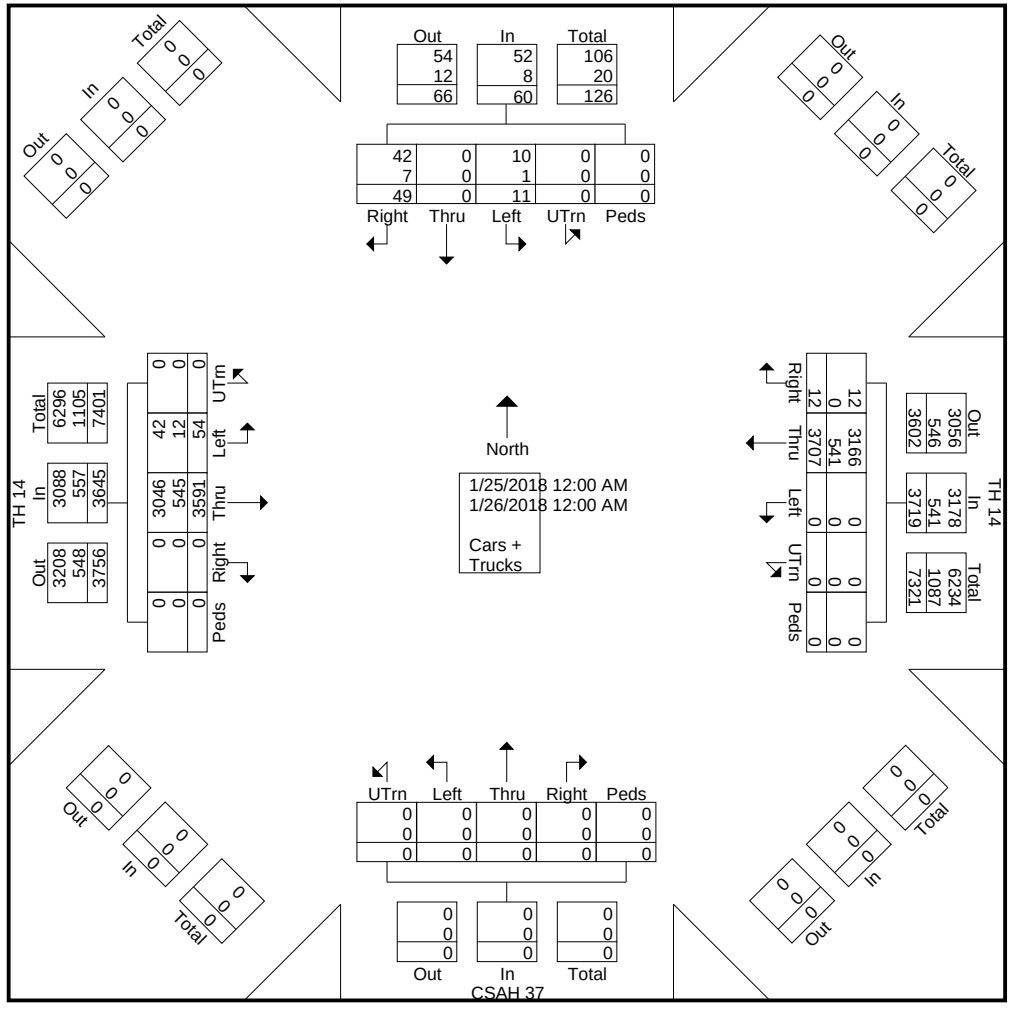
	Southbound						TH 14 Westbound						CSAH 37 Northbound						TH 14 Eastbound						
Start Time	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Int. Total
12:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	49	0	11	0	0	60	12	3707	0	0	0	3719	0	0	0	0	0	0	0	3591	54	0	0	3645	7424
Apprch %	81.7	0	18.3	0	0		0.3	99.7	0	0	0		0	0	0	0	0		0	98.5	1.5	0	0		
Total %	0.7	0	0.1	0	0	0.8	0.2	49.9	0	0	0	50.1	0	0	0	0	0	0	0	48.4	0.7	0	0	49.1	
Cars +	42	0	10	0	0	52	12	3166	0	0	0	3178	0	0	0	0	0	0	0	3046	42	0	0	3088	6318
% Cars +	85.7	0	90.9	0	0	86.7	100	85.4	0	0	0	85.5	0	0	0	0	0	0	0	84.8	77.8	0	0	84.7	85.1
Trucks	7	0	1	0	0	8	0	541	0	0	0	541	0	0	0	0	0	0	0	545	12	0	0	557	1106
% Trucks	14.3	0	9.1	0	0	13.3	0	14.6	0	0	0	14.5	0	0	0	0	0	0	0	15.2	22.2	0	0	15.3	14.9

Bolton & Menk

12224 Nicollet Ave
Burnsville, MN 55337
Real People. Real Solutions.

File Name : TH 14 at 531st
Site Code : 1
Start Date : 1/25/2018
Page No : 5

TH 14 at 531st
TH 14 ICE Report



Bolton & Menk

12224 Nicollet Ave
Burnsville, MN 55337
Real People. Real Solutions.

File Name : TH 14 at 531st
Site Code : 1
Start Date : 1/25/2018

TH 14 at 531st
TH 14 ICE Report

	Southbound						TH 14 Westbound						CSAH 37 Northbound						TH 14 Eastbound						
Start Time	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Int. Total
Peak Hour Analysis From 12:00 AM to 12:00 PM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 07:15 AM																									
07:15 AM	1	0	0	0	0	1	0	59	0	0	0	59	0	0	0	0	0	0	0	111	3	0	0	114	174
07:30 AM	2	0	0	0	0	2	0	65	0	0	0	65	0	0	0	0	0	0	0	109	0	0	0	109	176
07:45 AM	1	0	0	0	0	1	0	78	0	0	0	78	0	0	0	0	0	0	0	80	0	0	0	80	159
08:00 AM	1	0	0	0	0	1	0	57	0	0	0	57	0	0	0	0	0	0	0	79	0	0	0	79	137
Total Volume	5	0	0	0	0	5	0	259	0	0	0	259	0	0	0	0	0	0	0	379	3	0	0	382	646
% App. Total	100	0	0	0	0		0	100	0	0	0		0	0	0	0	0		0	99.2	0.8	0	0		
PHF	.625	.000	.000	.000	.000	.625	.000	.830	.000	.000	.000	.830	.000	.000	.000	.000	.000	.000	.000	.854	.250	.000	.000	.838	.918
Peak Hour Analysis From 12:15 PM to 12:00 AM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 04:15 PM																									
04:15 PM	1	0	0	0	0	1	0	109	0	0	0	109	0	0	0	0	0	0	0	83	2	0	0	85	195
04:30 PM	0	0	0	0	0	0	0	87	0	0	0	87	0	0	0	0	0	0	0	65	1	0	0	66	153
04:45 PM	0	0	1	0	0	1	0	101	0	0	0	101	0	0	0	0	0	0	0	88	2	0	0	90	192
05:00 PM	0	0	1	0	0	1	1	106	0	0	0	107	0	0	0	0	0	0	0	76	3	0	0	79	187
Total Volume	1	0	2	0	0	3	1	403	0	0	0	404	0	0	0	0	0	0	0	312	8	0	0	320	727
% App. Total	33.3	0	66.7	0	0		0.2	99.8	0	0	0		0	0	0	0	0		0	97.5	2.5	0	0		
PHF	.250	.000	.500	.000	.000	.750	.250	.924	.000	.000	.000	.927	.000	.000	.000	.000	.000	.000	.000	.886	.667	.000	.000	.889	.932

Bolton & Menk

12224 Nicollet Ave
Burnsville, MN 55337
Real People. Real Solutions.

File Name : TH 14 at CSAH 25 (478th)
Site Code : 1
Start Date : 1/25/2018
Page No : 1

TH 14 at CSAH 25 (478th)
TH 14 ICE Report

Groups Printed- Cars + - Trucks

	Southbound						TH 14 Westbound						CSAH 37 Northbound						TH 14 Eastbound						
Start Time	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Int. Total
12:00 AM	0	0	0	0	0	0	0	3	0	0	0	3	0	0	1	0	0	1	0	1	0	0	0	1	5
12:15 AM	0	0	0	0	0	0	0	4	0	0	0	4	0	0	0	0	0	0	0	4	0	0	0	4	8
12:30 AM	0	0	0	0	0	0	0	5	0	0	0	5	0	0	0	0	0	0	0	3	0	0	0	3	8
12:45 AM	0	0	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	0	0	2	0	0	0	2	4
Total	0	0	0	0	0	0	0	14	0	0	0	14	0	0	1	0	0	1	0	10	0	0	0	10	25
01:00 AM	0	0	0	0	0	0	0	4	0	0	0	4	0	0	0	0	0	0	1	2	0	0	0	3	7
01:15 AM	0	0	0	0	0	0	0	5	0	0	0	5	0	0	0	0	0	0	0	3	0	0	0	3	8
01:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	3	3
01:45 AM	0	0	0	0	0	0	0	5	0	0	0	5	0	0	0	0	0	0	0	1	0	0	0	1	6
Total	0	0	0	0	0	0	0	14	0	0	0	14	0	0	0	0	0	0	1	9	0	0	0	10	24
02:00 AM	0	0	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	0	1	2	0	0	0	3	5
02:15 AM	0	0	0	0	0	0	0	4	0	0	0	4	0	0	0	0	0	0	0	1	0	0	0	1	5
02:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
02:45 AM	0	0	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	2
Total	0	0	0	0	0	0	0	8	0	0	0	8	0	0	0	0	0	0	1	4	0	0	0	5	13
03:00 AM	0	0	0	0	0	0	0	3	0	0	0	3	0	0	0	0	0	0	0	2	0	0	0	2	5
03:15 AM	0	0	0	0	0	0	0	3	0	0	0	3	0	0	0	0	0	0	0	4	0	0	0	4	7
03:30 AM	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	1	2
03:45 AM	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	3	0	0	0	3	4
Total	0	0	0	0	0	0	0	8	0	0	0	8	0	0	0	0	0	0	0	10	0	0	0	10	18
04:00 AM	0	0	0	0	0	0	0	3	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	3
04:15 AM	0	0	0	0	0	0	0	6	0	0	0	6	0	0	0	0	0	0	0	10	0	0	0	10	16
04:30 AM	0	0	0	0	0	0	0	7	0	0	0	7	0	0	2	0	0	2	1	13	0	0	0	14	23
04:45 AM	0	0	0	0	0	0	0	8	0	0	0	8	0	0	1	0	0	1	2	7	0	0	0	9	18
Total	0	0	0	0	0	0	0	24	0	0	0	24	0	0	3	0	0	3	3	30	0	0	0	33	60
05:00 AM	0	0	0	0	0	0	0	7	0	0	0	7	0	0	3	0	0	3	0	14	0	0	0	14	24
05:15 AM	0	0	0	0	0	0	0	12	0	0	0	12	0	0	1	0	0	1	1	24	0	0	0	25	38
05:30 AM	0	0	0	0	0	0	0	18	0	0	0	18	0	0	1	0	0	1	0	38	0	0	0	38	57
05:45 AM	0	0	0	0	0	0	0	20	0	0	0	20	0	0	1	0	0	1	4	34	0	0	0	38	59
Total	0	0	0	0	0	0	0	57	0	0	0	57	0	0	6	0	0	6	5	110	0	0	0	115	178
06:00 AM	0	0	0	0	0	0	0	17	0	0	0	17	0	0	1	0	0	1	0	32	0	0	0	32	50
06:15 AM	0	0	0	0	0	0	0	26	0	0	0	26	0	0	1	0	0	1	1	52	0	0	0	53	80
06:30 AM	0	0	0	0	0	0	0	54	0	0	0	54	0	0	1	0	0	1	0	55	0	0	0	55	110
06:45 AM	0	0	0	0	0	0	0	34	0	0	0	34	0	0	2	0	0	2	0	61	0	0	0	61	97
Total	0	0	0	0	0	0	0	131	0	0	0	131	0	0	5	0	0	5	1	200	0	0	0	201	337
07:00 AM	0	0	0	0	0	0	0	41	0	0	0	41	0	0	2	0	0	2	0	88	0	0	0	88	131
07:15 AM	0	0	0	0	0	0	0	62	0	0	0	62	0	0	2	0	0	2	3	105	0	0	0	108	172
07:30 AM	0	0	0	0	0	0	0	55	0	0	0	55	0	0	5	0	0	5	2	114	0	0	0	116	176
07:45 AM	0	0	0	0	0	0	0	77	0	0	0	77	0	0	5	0	0	5	6	65	0	0	0	71	153
Total	0	0	0	0	0	0	0	235	0	0	0	235	0	0	14	0	0	14	11	372	0	0	0	383	632

Bolton & Menk

12224 Nicollet Ave
Burnsville, MN 55337
Real People. Real Solutions.

File Name : TH 14 at CSAH 25 (478th)
Site Code : 1
Start Date : 1/25/2018

TH 14 at CSAH 25 (478th)
TH 14 ICE Report

Groups Printed- Cars + - Trucks

	Southbound						TH 14 Westbound						CSAH 37 Northbound						TH 14 Eastbound						
Start Time	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Int. Total
08:00 AM	0	0	0	0	0	0	0	51	0	0	0	51	0	0	9	0	0	9	5	72	0	0	0	77	137
08:15 AM	0	0	0	0	0	0	0	54	0	0	0	54	0	0	8	0	0	8	3	80	0	0	0	83	145
08:30 AM	0	0	0	0	0	0	0	43	0	0	0	43	0	0	5	0	0	5	0	57	0	1	0	58	106
08:45 AM	0	0	0	0	0	0	0	29	0	1	0	30	0	0	0	0	0	0	0	45	0	0	0	45	75
Total	0	0	0	0	0	0	0	177	0	1	0	178	0	0	22	0	0	22	8	254	0	1	0	263	463
09:00 AM	0	0	0	0	0	0	0	49	0	0	0	49	0	0	1	0	0	1	1	45	0	0	0	46	96
09:15 AM	0	0	0	0	0	0	0	59	0	0	0	59	0	0	3	0	0	3	1	63	0	0	0	64	126
09:30 AM	0	0	0	0	0	0	0	43	0	0	0	43	0	0	0	0	0	0	1	51	0	0	0	52	95
09:45 AM	0	0	0	0	0	0	0	56	0	0	0	56	0	0	1	0	0	1	0	40	0	0	0	40	97
Total	0	0	0	0	0	0	0	207	0	0	0	207	0	0	5	0	0	5	3	199	0	0	0	202	414
10:00 AM	0	0	0	0	0	0	0	30	0	0	0	30	0	0	3	0	0	3	1	48	0	0	0	49	82
10:15 AM	0	0	0	0	0	0	0	55	0	0	0	55	0	0	0	0	0	0	0	41	0	0	0	41	96
10:30 AM	0	0	0	0	0	0	0	43	0	0	0	43	0	0	0	0	0	0	0	48	0	0	0	48	91
10:45 AM	0	0	0	0	0	0	0	32	0	0	0	32	1	0	3	0	0	4	4	73	0	1	0	78	114
Total	0	0	0	0	0	0	0	160	0	0	0	160	1	0	6	0	0	7	5	210	0	1	0	216	383
11:00 AM	0	0	0	0	0	0	0	35	0	0	0	35	0	0	1	0	0	1	1	55	0	0	0	56	92
11:15 AM	0	0	0	0	0	0	0	54	0	0	0	54	0	0	0	0	0	0	1	39	0	0	0	40	94
11:30 AM	0	0	0	0	0	0	0	42	0	0	0	42	0	0	0	0	0	0	2	60	0	0	0	62	104
11:45 AM	0	0	0	0	0	0	0	45	0	0	0	45	0	0	1	0	0	1	1	39	0	0	0	40	86
Total	0	0	0	0	0	0	0	176	0	0	0	176	0	0	2	0	0	2	5	193	0	0	0	198	376
12:00 PM	0	0	0	0	0	0	0	48	0	0	0	48	0	0	3	0	0	3	2	49	0	0	0	51	102
12:15 PM	0	0	0	0	0	0	0	45	0	0	0	45	1	0	0	0	0	1	2	51	0	0	0	53	99
12:30 PM	0	0	0	0	0	0	0	50	0	0	0	50	0	0	2	0	0	2	2	53	0	0	0	55	107
12:45 PM	0	0	0	0	0	0	0	50	0	0	0	50	0	0	2	0	0	2	5	45	0	0	0	50	102
Total	0	0	0	0	0	0	0	193	0	0	0	193	1	0	7	0	0	8	11	198	0	0	0	209	410
01:00 PM	0	0	0	0	0	0	0	49	0	0	0	49	0	0	2	0	0	2	2	40	0	0	0	42	93
01:15 PM	0	0	0	0	0	0	0	44	0	0	0	44	0	0	1	0	0	1	2	53	0	0	0	55	100
01:30 PM	0	0	0	0	0	0	0	65	0	0	0	65	0	0	4	0	0	4	1	64	0	0	0	65	134
01:45 PM	0	0	0	0	0	0	0	59	0	0	0	59	0	0	0	0	0	0	3	51	0	0	0	54	113
Total	0	0	0	0	0	0	0	217	0	0	0	217	0	0	7	0	0	7	8	208	0	0	0	216	440
02:00 PM	0	0	0	0	0	0	0	58	0	0	0	58	0	0	3	0	0	3	2	55	0	0	0	57	118
02:15 PM	0	0	0	0	0	0	0	60	0	0	0	60	0	0	1	0	0	1	1	61	0	0	0	62	123
02:30 PM	0	0	0	0	0	0	0	62	0	0	0	62	0	0	2	0	0	2	2	54	0	0	0	56	120
02:45 PM	0	0	0	0	0	0	0	70	0	0	0	70	0	0	6	0	0	6	3	54	0	0	0	57	133
Total	0	0	0	0	0	0	0	250	0	0	0	250	0	0	12	0	0	12	8	224	0	0	0	232	494
03:00 PM	0	0	0	0	0	0	0	70	0	0	0	70	0	0	4	0	0	4	1	45	0	0	0	46	120
03:15 PM	0	0	0	0	0	0	0	57	0	0	0	57	0	0	3	0	0	3	3	64	0	0	0	67	127
03:30 PM	0	0	0	0	0	0	0	76	0	0	0	76	0	0	2	0	0	2	6	58	0	0	0	64	142
03:45 PM	0	0	0	0	0	0	0	105	0	0	0	105	0	0	2	0	0	2	3	53	0	0	0	56	163
Total	0	0	0	0	0	0	0	308	0	0	0	308	0	0	11	0	0	11	13	220	0	0	0	233	552

Bolton & Menk

12224 Nicollet Ave
Burnsville, MN 55337
Real People. Real Solutions.

File Name : TH 14 at CSAH 25 (478th)
Site Code : 1
Start Date : 1/25/2018

TH 14 at CSAH 25 (478th)
TH 14 ICE Report

Groups Printed- Cars + - Trucks

	Southbound						TH 14 Westbound						CSAH 37 Northbound						TH 14 Eastbound						
Start Time	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Int. Total
04:00 PM	0	0	0	0	0	0	0	84	0	0	0	84	0	0	0	0	0	0	2	63	0	0	0	65	149
04:15 PM	0	0	0	0	0	0	0	102	0	0	0	102	0	0	3	0	0	3	2	80	0	0	0	82	187
04:30 PM	0	0	0	0	0	0	0	88	0	0	0	88	0	0	3	0	0	3	2	66	0	0	0	68	159
04:45 PM	0	0	0	0	0	0	0	107	0	0	0	107	0	0	3	0	0	3	1	80	0	0	0	81	191
Total	0	0	0	0	0	0	0	381	0	0	0	381	0	0	9	0	0	9	7	289	0	0	0	296	686
05:00 PM	0	0	0	0	0	0	0	88	0	0	0	88	0	0	3	0	0	3	6	71	0	0	0	77	168
05:15 PM	0	0	0	0	0	0	0	94	0	0	0	94	0	0	2	0	0	2	3	85	0	0	0	88	184
05:30 PM	0	0	0	0	0	0	0	89	0	0	0	89	0	0	3	0	0	3	3	63	0	0	0	66	158
05:45 PM	0	0	0	0	0	0	0	63	0	0	0	63	0	0	2	0	0	2	2	54	0	0	0	56	121
Total	0	0	0	0	0	0	0	334	0	0	0	334	0	0	10	0	0	10	14	273	0	0	0	287	631
06:00 PM	0	0	0	0	0	0	0	67	0	0	0	67	0	0	3	0	0	3	1	51	0	0	0	52	122
06:15 PM	0	0	0	0	0	0	0	44	0	0	0	44	0	0	1	0	0	1	1	34	0	0	0	35	80
06:30 PM	0	0	0	0	0	0	0	56	0	0	0	56	0	0	2	0	0	2	0	31	0	0	0	31	89
06:45 PM	0	0	0	0	0	0	0	45	0	0	0	45	0	0	0	0	0	0	2	28	0	0	0	30	75
Total	0	0	0	0	0	0	0	212	0	0	0	212	0	0	6	0	0	6	4	144	0	0	0	148	366
07:00 PM	0	0	0	0	0	0	0	35	0	0	0	35	0	0	1	0	0	1	2	26	0	0	0	28	64
07:15 PM	0	0	0	0	0	0	0	52	0	0	0	52	0	0	0	0	0	0	1	30	0	0	0	31	83
07:30 PM	0	0	0	0	0	0	0	38	0	0	0	38	0	0	0	0	0	0	0	19	0	0	0	19	57
07:45 PM	0	0	0	0	0	0	0	33	0	0	0	33	0	0	0	0	0	0	1	14	0	0	0	15	48
Total	0	0	0	0	0	0	0	158	0	0	0	158	0	0	1	0	0	1	4	89	0	0	0	93	252
08:00 PM	0	0	0	0	0	0	0	28	0	0	0	28	0	0	0	0	0	0	0	9	0	0	0	9	37
08:15 PM	0	0	0	0	0	0	0	30	0	0	0	30	0	0	1	0	0	1	1	22	0	0	0	23	54
08:30 PM	0	0	0	0	0	0	0	35	0	0	0	35	0	0	0	0	0	0	0	7	0	0	0	7	42
08:45 PM	0	0	0	0	0	0	0	21	0	0	0	21	0	0	0	0	0	0	2	25	0	0	0	27	48
Total	0	0	0	0	0	0	0	114	0	0	0	114	0	0	1	0	0	1	3	63	0	0	0	66	181
09:00 PM	0	0	0	0	0	0	0	19	0	0	0	19	0	0	1	0	0	1	0	29	0	0	0	29	49
09:15 PM	0	0	0	0	0	0	0	32	0	0	0	32	0	0	0	0	0	0	0	14	0	0	0	14	46
09:30 PM	0	0	0	0	0	0	0	29	0	0	0	29	0	0	0	0	0	0	2	14	0	0	0	16	45
09:45 PM	0	0	0	0	0	0	0	23	0	0	0	23	0	0	0	0	0	0	2	16	0	0	0	18	41
Total	0	0	0	0	0	0	0	103	0	0	0	103	0	0	1	0	0	1	4	73	0	0	0	77	181
10:00 PM	0	0	0	0	0	0	0	19	0	0	0	19	0	0	0	0	0	0	1	16	0	0	0	17	36
10:15 PM	0	0	0	0	0	0	0	12	0	0	0	12	0	0	0	0	0	0	1	14	0	0	0	15	27
10:30 PM	0	0	0	0	0	0	0	18	0	0	0	18	0	0	0	0	0	0	1	6	0	0	0	7	25
10:45 PM	0	0	0	0	0	0	0	12	0	0	0	12	0	0	0	0	0	0	0	5	0	0	0	5	17
Total	0	0	0	0	0	0	0	61	0	0	0	61	0	0	0	0	0	0	3	41	0	0	0	44	105
11:00 PM	0	0	0	0	0	0	0	7	0	0	0	7	0	0	0	0	0	0	0	6	0	0	0	6	13
11:15 PM	0	0	0	0	0	0	0	7	0	0	0	7	0	0	0	0	0	0	1	15	0	0	0	16	23
11:30 PM	0	0	0	0	0	0	0	11	0	0	0	11	0	0	0	0	0	0	0	6	0	0	0	6	17
11:45 PM	0	0	0	0	0	0	0	7	0	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	7
Total	0	0	0	0	0	0	0	32	0	0	0	32	0	0	0	0	0	0	1	27	0	0	0	28	60

Bolton & Menk

12224 Nicollet Ave
Burnsville, MN 55337
Real People. Real Solutions.

File Name : TH 14 at CSAH 25 (478th)
Site Code : 1
Start Date : 1/25/2018

TH 14 at CSAH 25 (478th)
TH 14 ICE Report

Groups Printed- Cars + - Trucks

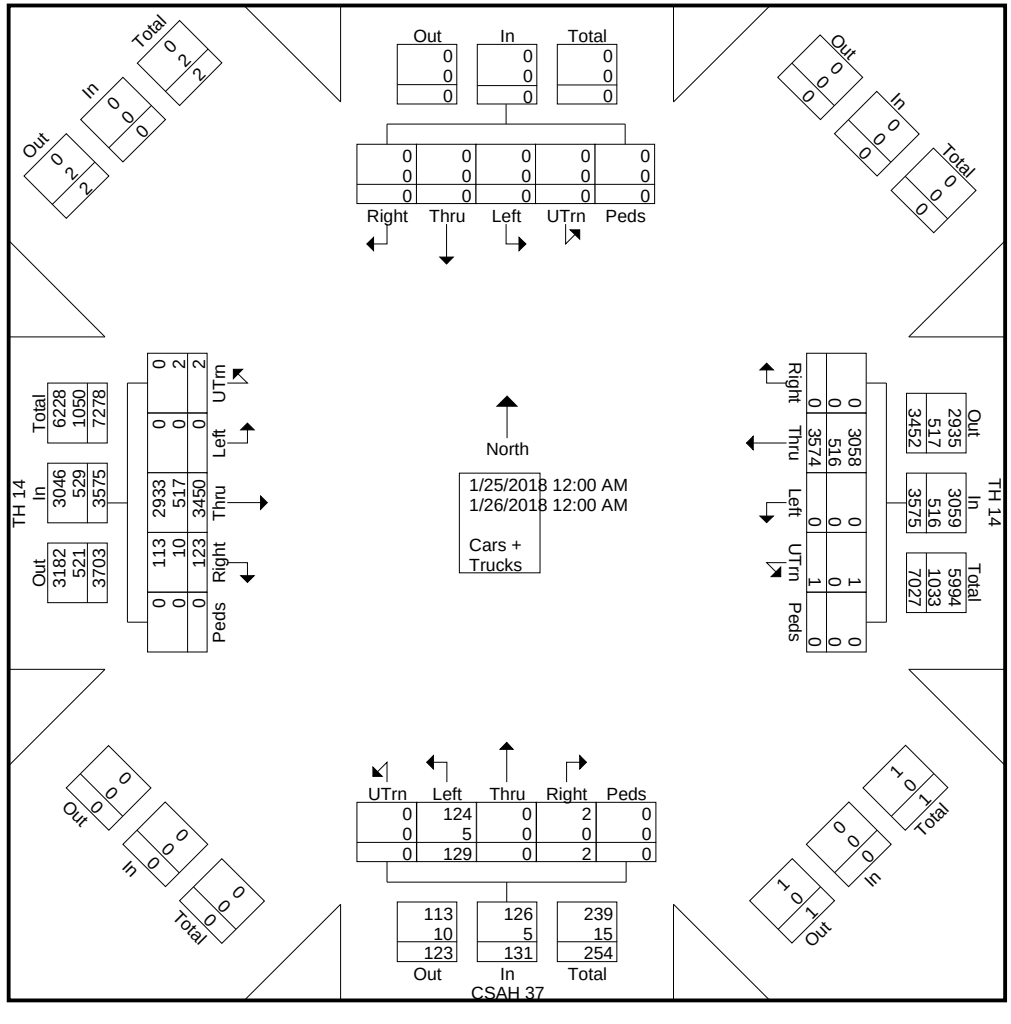
	Southbound						TH 14 Westbound						CSAH 37 Northbound						TH 14 Eastbound						
Start Time	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Int. Total
12:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	0	0	3574	0	1	0	3575	2	0	129	0	0	131	123	3450	0	2	0	3575	7281
Apprch %	0	0	0	0	0		0	100	0	0	0		1.5	0	98.5	0	0		3.4	96.5	0	0.1	0		
Total %	0	0	0	0	0	0	0	49.1	0	0	0	49.1	0	0	1.8	0	0	1.8	1.7	47.4	0	0	0	49.1	
Cars +	0	0	0	0	0	0	0	3058	0	1	0	3059	2	0	124	0	0	126	113	2933	0	0	0	3046	6231
% Cars +	0	0	0	0	0	0	0	85.6	0	100	0	85.6	100	0	96.1	0	0	96.2	91.9	85	0	0	0	85.2	85.6
Trucks	0	0	0	0	0	0	0	516	0	0	0	516	0	0	5	0	0	5	10	517	0	2	0	529	1050
% Trucks	0	0	0	0	0	0	0	14.4	0	0	0	14.4	0	0	3.9	0	0	3.8	8.1	15	0	100	0	14.8	14.4

Bolton & Menk

12224 Nicollet Ave
Burnsville, MN 55337
Real People. Real Solutions.

File Name : TH 14 at CSAH 25 (478th)
Site Code : 1
Start Date : 1/25/2018
Page No : 5

TH 14 at CSAH 25 (478th)
TH 14 ICE Report



Bolton & Menk

12224 Nicollet Ave
Burnsville, MN 55337
Real People. Real Solutions.

File Name : TH 14 at CSAH 25 (478th)
Site Code : 1
Start Date : 1/25/2018
Page No : 6

TH 14 at CSAH 25 (478th)
TH 14 ICE Report

	Southbound						TH 14 Westbound						CSAH 37 Northbound						TH 14 Eastbound						
Start Time	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Int. Total
Peak Hour Analysis From 12:00 AM to 12:00 PM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 07:15 AM																									
07:15 AM	0	0	0	0	0	0	0	62	0	0	0	62	0	0	2	0	0	2	3	105	0	0	0	108	172
07:30 AM	0	0	0	0	0	0	0	55	0	0	0	55	0	0	5	0	0	5	2	114	0	0	0	116	176
07:45 AM	0	0	0	0	0	0	0	77	0	0	0	77	0	0	5	0	0	5	6	65	0	0	0	71	153
08:00 AM	0	0	0	0	0	0	0	51	0	0	0	51	0	0	9	0	0	9	5	72	0	0	0	77	137
Total Volume	0	0	0	0	0	0	0	245	0	0	0	245	0	0	21	0	0	21	16	356	0	0	0	372	638
% App. Total	0	0	0	0	0		0	100	0	0	0		0	0	100	0	0		4.3	95.7	0	0	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.795	.000	.000	.000	.795	.000	.000	.583	.000	.000	.583	.667	.781	.000	.000	.000	.802	.906
Peak Hour Analysis From 12:15 PM to 12:00 AM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 04:15 PM																									
04:15 PM	0	0	0	0	0	0	0	102	0	0	0	102	0	0	3	0	0	3	2	80	0	0	0	82	187
04:30 PM	0	0	0	0	0	0	0	88	0	0	0	88	0	0	3	0	0	3	2	66	0	0	0	68	159
04:45 PM	0	0	0	0	0	0	0	107	0	0	0	107	0	0	3	0	0	3	1	80	0	0	0	81	191
05:00 PM	0	0	0	0	0	0	0	88	0	0	0	88	0	0	3	0	0	3	6	71	0	0	0	77	168
Total Volume	0	0	0	0	0	0	0	385	0	0	0	385	0	0	12	0	0	12	11	297	0	0	0	308	705
% App. Total	0	0	0	0	0		0	100	0	0	0		0	0	100	0	0		3.6	96.4	0	0	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.900	.000	.000	.000	.900	.000	.000	1.00	.000	.000	1.00	.458	.928	.000	.000	.000	.939	.923

Appendix B: Traffic Forecast Calculations

LEAST SQUARES WORKSHEET **SEGMENT A1**

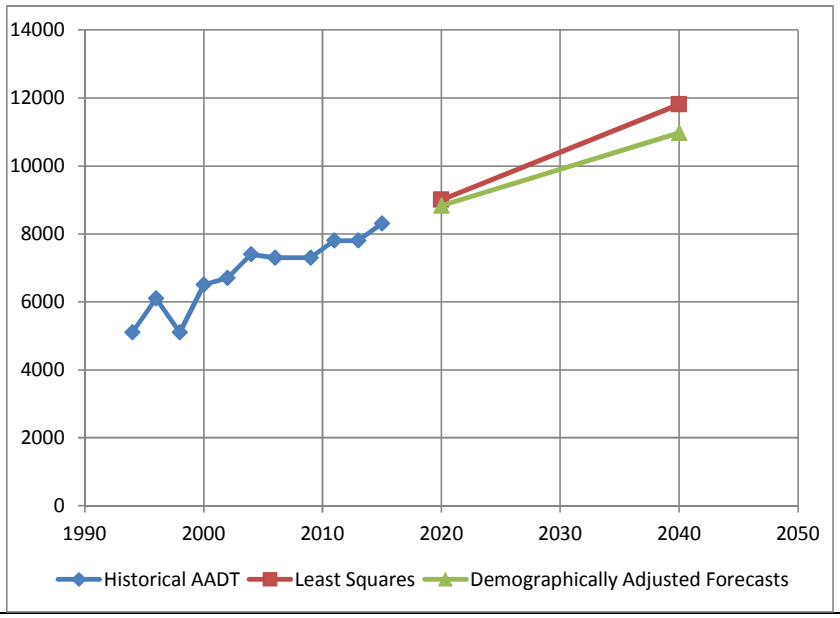
ROUTE: US **SP#:** **DATE** 03/12/18

LOCATION: CSAH 12 to 4th St **Miles :** #N/A

BASE YEAR: 2020 **FORECAST YEAR:** 2040 **Seq #**

# of lanes

YEAR	FLOW MAP AADT (SEG A)
1994	5100
1996	6100
1998	5100
2000	6500
2002	6700
2004	7400
2006	7300
2009	7300
2011	7800
2013	7800
2015	8300



LEAST SQUARES BASED FORECASTS:

Year	AADT	Calc	ADT Calc
2015	8348	-48	8300
2020	9049		9002
2040	11857		11809

Statistics	AADT
R 2	0.86
SLOPE	140.37
INTERCEPT	-274502
N	11

Raw Least Squares Forecasts	
YEAR	AADT
2015	8300
2020	9000
2040	11810
Slope Over Base Year	1.56%

Demographically Adjusted Forecasts	
YEAR	AADT
2015	8300
2020	8830
2040	10970
Slope Over Base Year	1.29%

NOTE:

County Adjustment Factors were developed to Apply to Projected AADT. They are based on 1992-2007 VMT, Population, Labor Force, Household, and Employment Data.

COUNTY	COUNTY FACTOR	GROWTH PROFILE
NICOLLET	0.82	MEDIUM GROWTH AREA

Appendix C: Crash Diagrams

Mn/DOT 2942 (rev 9-11-92)

Collision Diagram

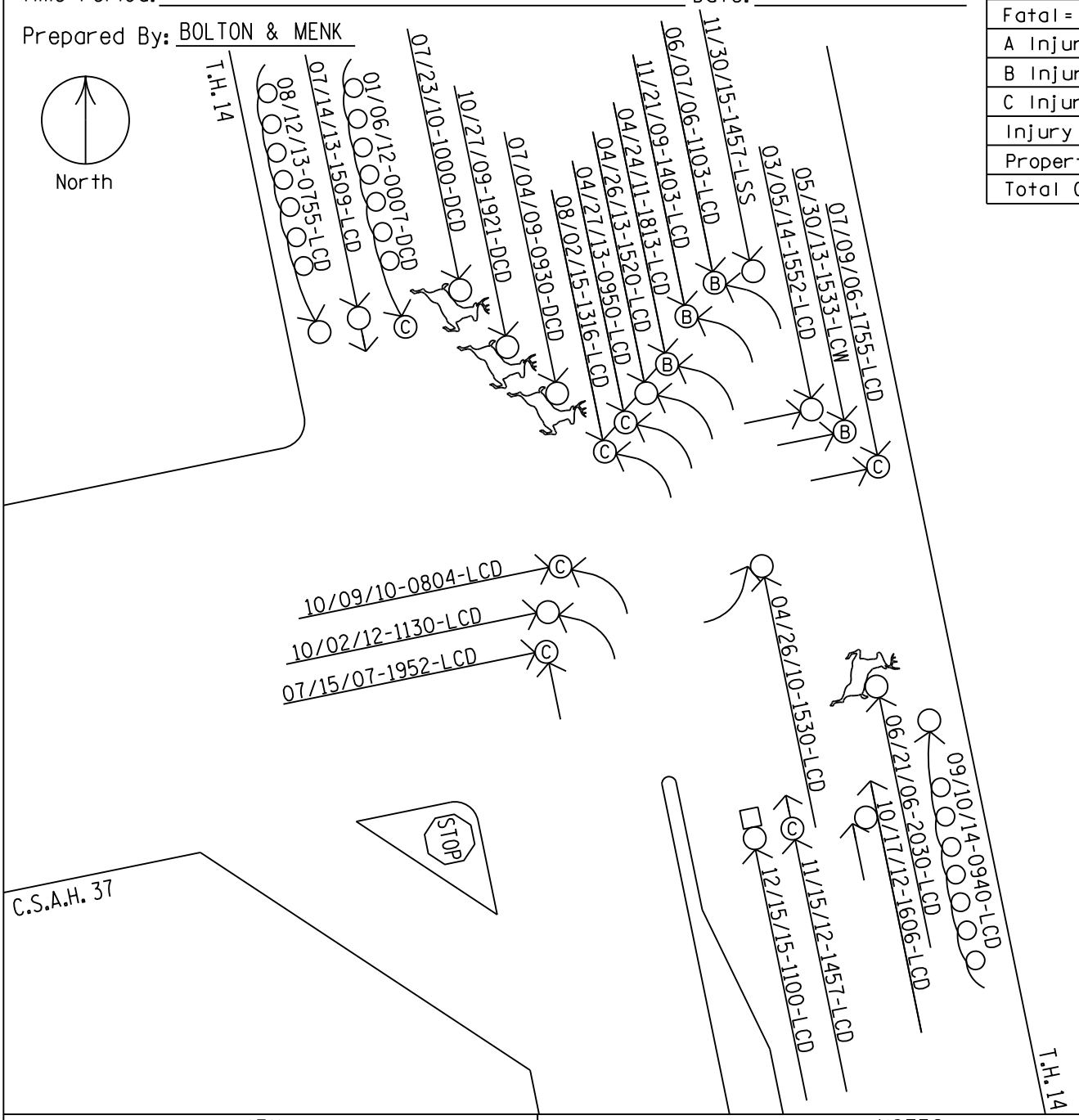
Minnesota Department of Transportation

Location: T.H. 14 AT C.S.A.H. 37

Time Period: 2006-2015 Date: 2-13-2018

Prepared By: BOLTON & MENK

No. of Crashes
Fatal = 0
A Injury = 0
B Injury = 4
C Injury = 7
Injury Total = 11
Property Damage = 14
Total Crashes = 25



KEY

- Motor Vehicle Out of Control
- Motor Vehicle Backing Up
- Motor Vehicle Rollover
- Motor Vehicle Sideswipe
- Fixed Object
- Fatal Crash
- (A) A Injury Crash
- (B) B Injury Crash
- (C) C Injury Crash
- Property Damage Crash
- Pedestrian
- (B) Bicycle
- (M) Motorcycle
- Parked Vehicle
- Rear End Property Damage
- (B) Right Angle B Injury

NOTES

[1] _____

[2] _____

[3] _____

Light:	Weather:	Surface:
L = Daylight (1)	C = Clear or Cloudy (1 or 2)	D = Dry (1)
Dn = Dawn (2)	R = Rain (3)	W = Wet (2)
Du = Dusk (3)	S = Snow or Sleet (4 or 5)	S = Snow, Ice, Slush (3,4 or 5)
Dl = Dark, Lighted (4)	F = Fog, Smog, Smoke (6)	M = Muddy (7)
Do = Dark, Lights Off (5)	B = Blowing Sand/Dust (7)	Db = Debris (8)
D = Dark, Unlighted (6)	W = Severe Crosswinds (8)	O = Oily (9)
X = Unknown (99)	X = Other or Unknown (99)	X = Other or Unknown (99)

(X) = Number of Vehicles in Crash (X) Other Vehicle — Injury Type — [Date] — [Time (hrs)] — [Light-Weather-Surface]

Mn/DOT 2942 (rev 9-11-92)

Collision Diagram

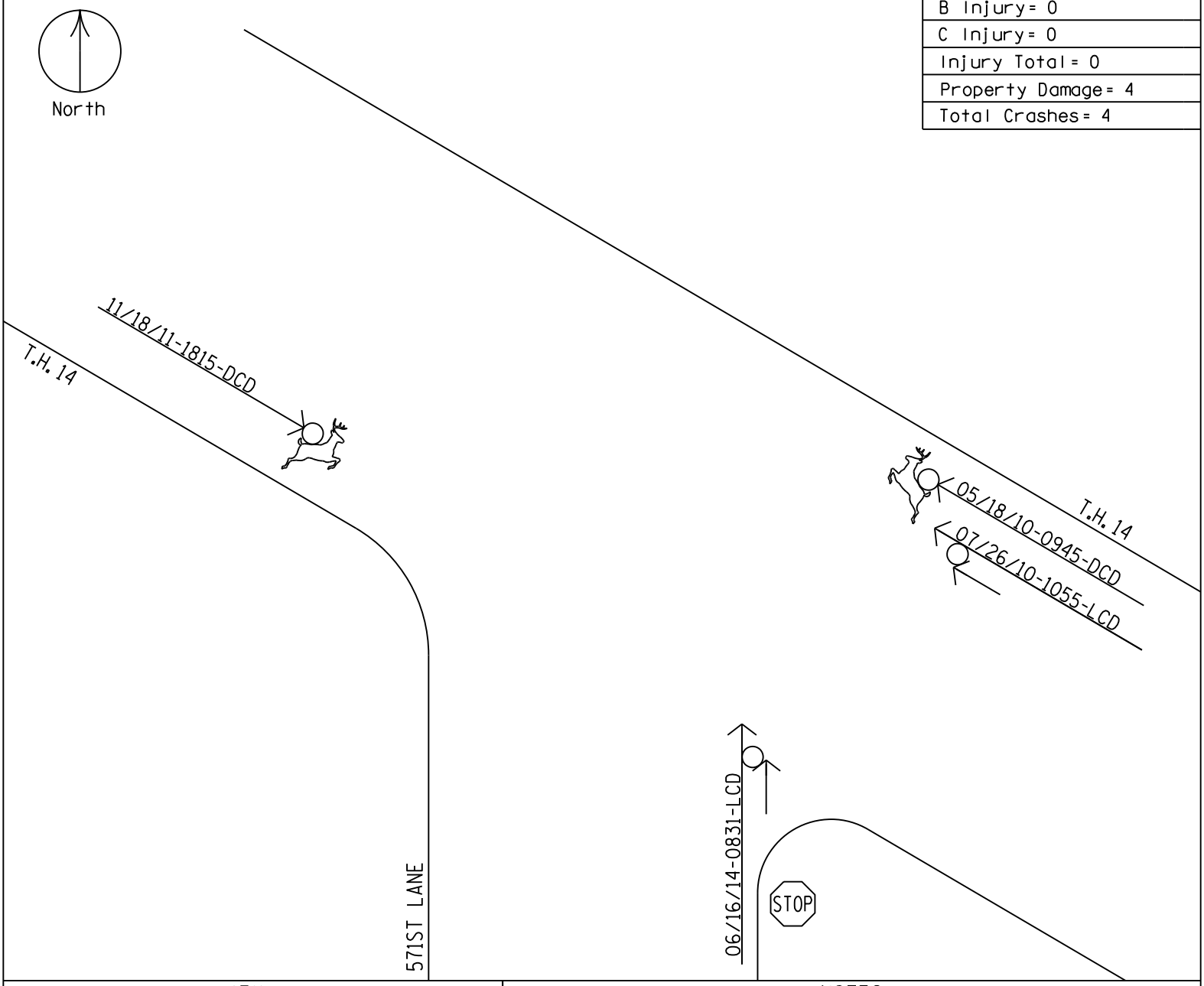
Minnesota Department of Transportation

Location: T.H. 14 AT 571ST LANE

Time Period: 2006-2015 Date: 2-13-2018

Prepared By: BOLTON & MENK

No. of Crashes
Fatal = 0
A Injury = 0
B Injury = 0
C Injury = 0
Injury Total = 0
Property Damage = 4
Total Crashes = 4



KEY

- Motor Vehicle Out of Control
- Motor Vehicle Backing Up
- Motor Vehicle Rollover
- Motor Vehicle Sideswipe
- Fixed Object
- Fatal Crash
- (A) A Injury Crash
- (B) B Injury Crash
- (C) C Injury Crash
- Property Damage Crash
- Pedestrian
- B Bicycle
- M Motorcycle
- Parked Vehicle
- Rear End Property Damage
- (B) Right Angle B Injury

NOTES

[1] _____

[2] _____

[3] _____

Light:	Weather:	Surface:
L = Daylight (1)	C = Clear or Cloudy (1 or 2)	D = Dry (1)
Dn = Dawn (2)	R = Rain (3)	W = Wet (2)
Du = Dusk (3)	S = Snow or Sleet (4 or 5)	S = Snow, Ice, Slush (3,4 or 5)
Dl = Dark, Lighted (4)	F = Fog, Smog, Smoke (6)	M = Muddy (7)
Do = Dark, Lights Off (5)	B = Blowing Sand/Dust (7)	Db = Debris (8)
D = Dark, Unlighted (6)	W = Severe Crosswinds (8)	O = Oily (9)
X = Unknown (99)	X = Other or Unknown (99)	X = Other or Unknown (99)

(X) = Number of Vehicles in Crash (X) Other Vehicle Injury Type [Date]—[Time (hrs)]—[Light-Weather-Surface]

Mn/DOT 2942 (rev 9-11-92)

Collision Diagram

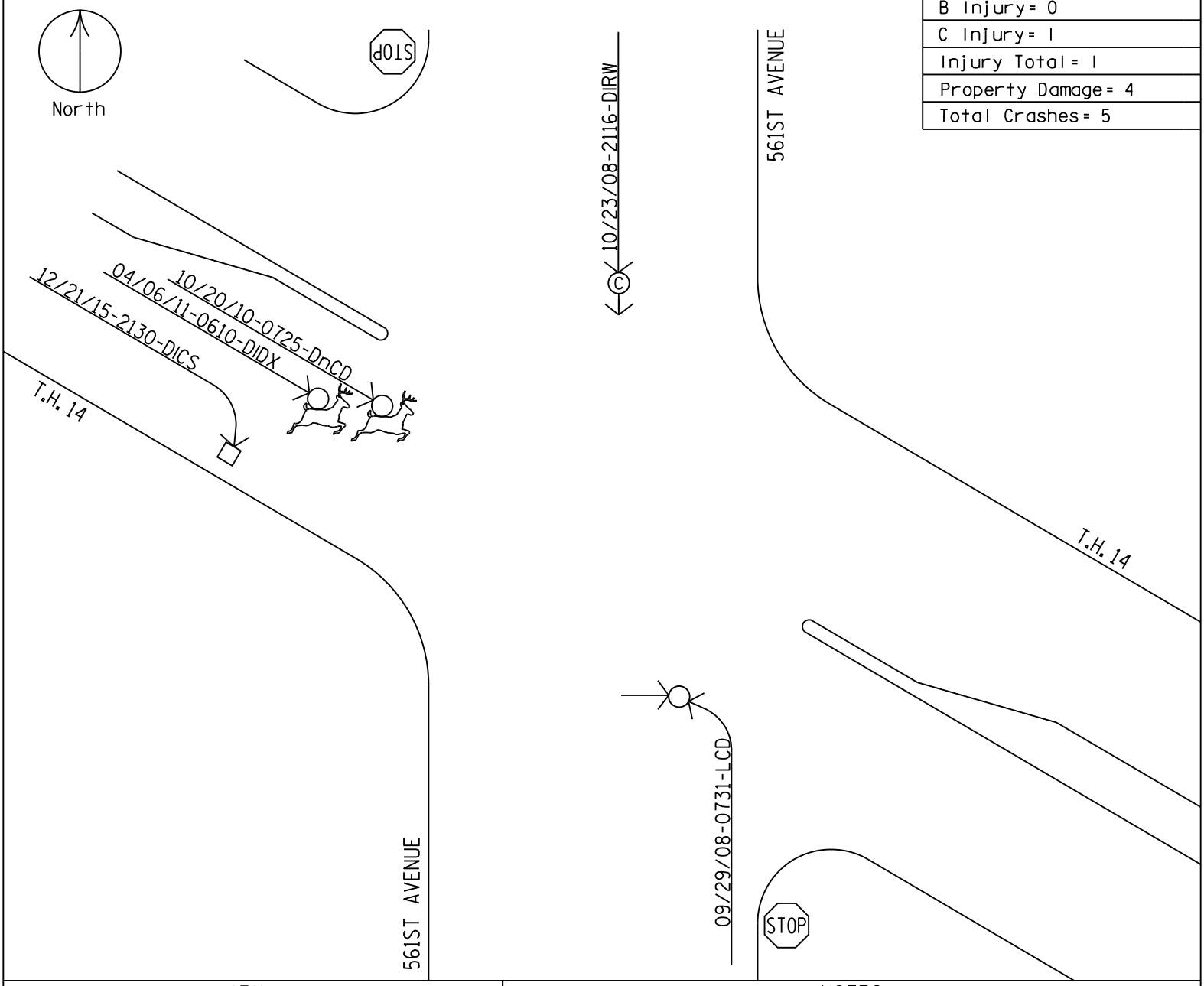
Minnesota Department of Transportation

Location: T.H. 14 AT 561ST AVENUE

Time Period: 2006-2015 Date: 2-13-2018

Prepared By: BOLTON & MENK

No. of Crashes
Fatal = 0
A Injury = 0
B Injury = 0
C Injury = 1
Injury Total = 1
Property Damage = 4
Total Crashes = 5



KEY

- Motor Vehicle Out of Control
- Motor Vehicle Backing Up
- Motor Vehicle Rollover
- Motor Vehicle Sideswipe
- Fixed Object
- Fatal Crash
- (A) A Injury Crash
- (B) B Injury Crash
- (C) C Injury Crash
- Property Damage Crash
- Pedestrian
- (B) Bicycle
- (M) Motorcycle
- Parked Vehicle
- Rear End Property Damage
- (B) Right Angle B Injury

NOTES

[1]

[2]

[3]

Light:	Weather:	Surface:
L = Daylight (1)	C = Clear or Cloudy (1 or 2)	D = Dry (1)
Dn = Dawn (2)	R = Rain (3)	W = Wet (2)
Du = Dusk (3)	S = Snow or Sleet (4 or 5)	S = Snow, Ice, Slush (3,4 or 5)
Dl = Dark, Lighted (4)	F = Fog, Smog, Smoke (6)	M = Muddy (7)
Do = Dark, Lights Off (5)	B = Blowing Sand/Dust (7)	Db = Debris (8)
D = Dark, Unlighted (6)	W = Severe Crosswinds (8)	O = Oily (9)
X = Unknown (99)	X = Other or Unknown (99)	X = Other or Unknown (99)

(X) = Number of Vehicles in Crash (X) Other Vehicle Injury Type [Date]—[Time (hrs)]—[Light-Weather-Surface]

Mn/DOT 2942 (rev 9-11-92)

Collision Diagram

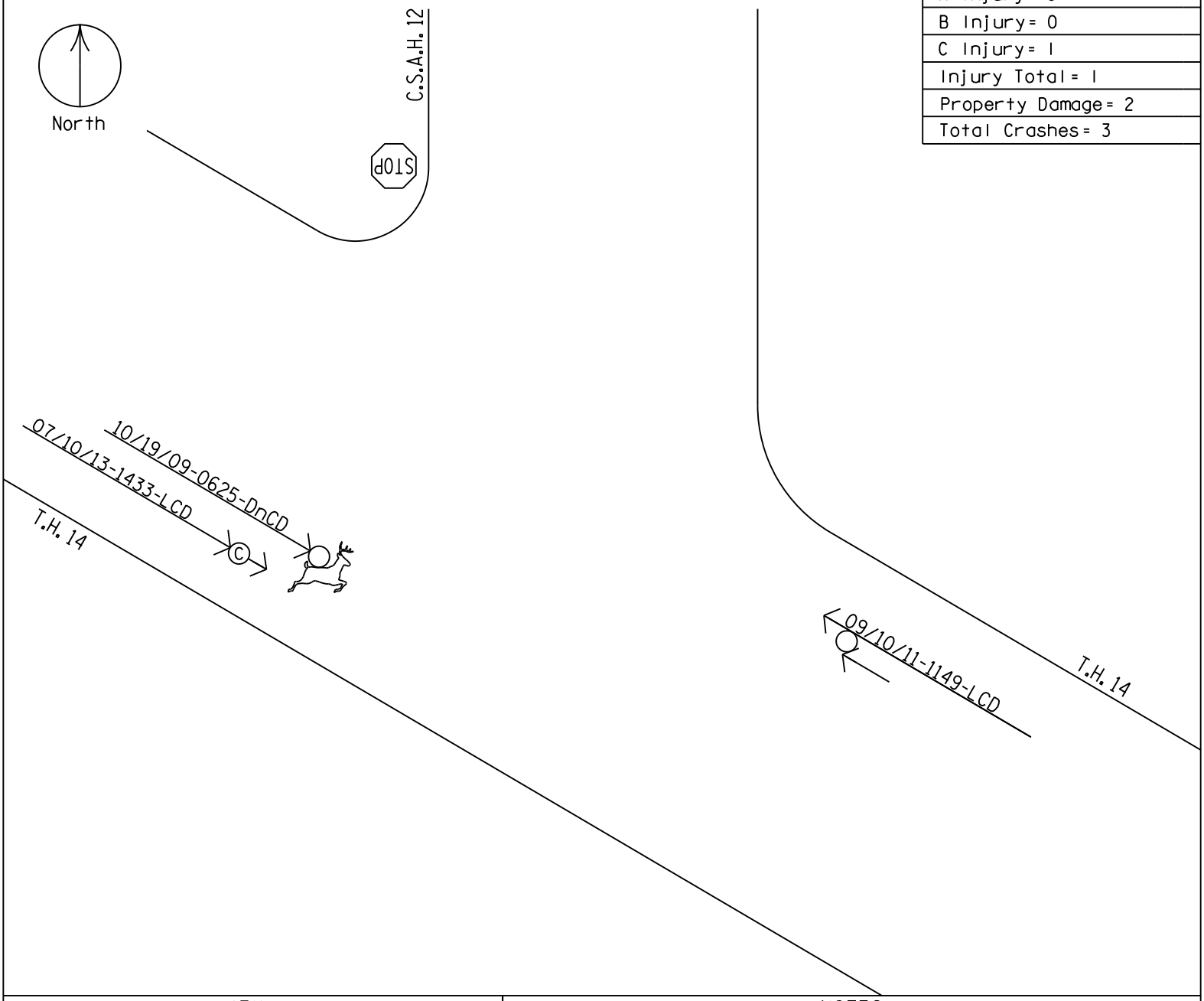
Minnesota Department of Transportation

Location: T.H. 14 AT C.S.A.H. 12

Time Period: 2006-2015 Date: 2-13-2018

Prepared By: BOLTON & MENK

No. of Crashes
Fatal = 0
A Injury = 0
B Injury = 0
C Injury = 1
Injury Total = 1
Property Damage = 2
Total Crashes = 3



KEY

- Motor Vehicle Out of Control
- Motor Vehicle Backing Up
- Motor Vehicle Rollover
- Motor Vehicle Sideswipe
- Fixed Object
- Fatal Crash
- (A) A Injury Crash
- (B) B Injury Crash
- (C) C Injury Crash
- Property Damage Crash
- Pedestrian
- (B) Bicycle
- (M) Motorcycle
- Parked Vehicle
- Rear End Property Damage
- (B) Right Angle B Injury

NOTES

[1]

[2]

[3]

Light:	Weather:	Surface:
L = Daylight (1)	C = Clear or Cloudy (1 or 2)	D = Dry (1)
Dn = Dawn (2)	R = Rain (3)	W = Wet (2)
Du = Dusk (3)	S = Snow or Sleet (4 or 5)	S = Snow, Ice, Slush (3,4 or 5)
Dl = Dark, Lighted (4)	F = Fog, Smog, Smoke (6)	M = Muddy (7)
Do = Dark, Lights Off (5)	B = Blowing Sand/Dust (7)	Db = Debris (8)
D = Dark, Unlighted (6)	W = Severe Crosswinds (8)	O = Oily (9)
X = Unknown (99)	X = Other or Unknown (99)	X = Other or Unknown (99)

(X) = Number of Vehicles in Crash (X) Other Vehicle — Injury Type — [Date] — [Time (hrs)] — [Light-Weather-Surface]

Mn/DOT 2942 (rev 9-11-92)

Collision Diagram

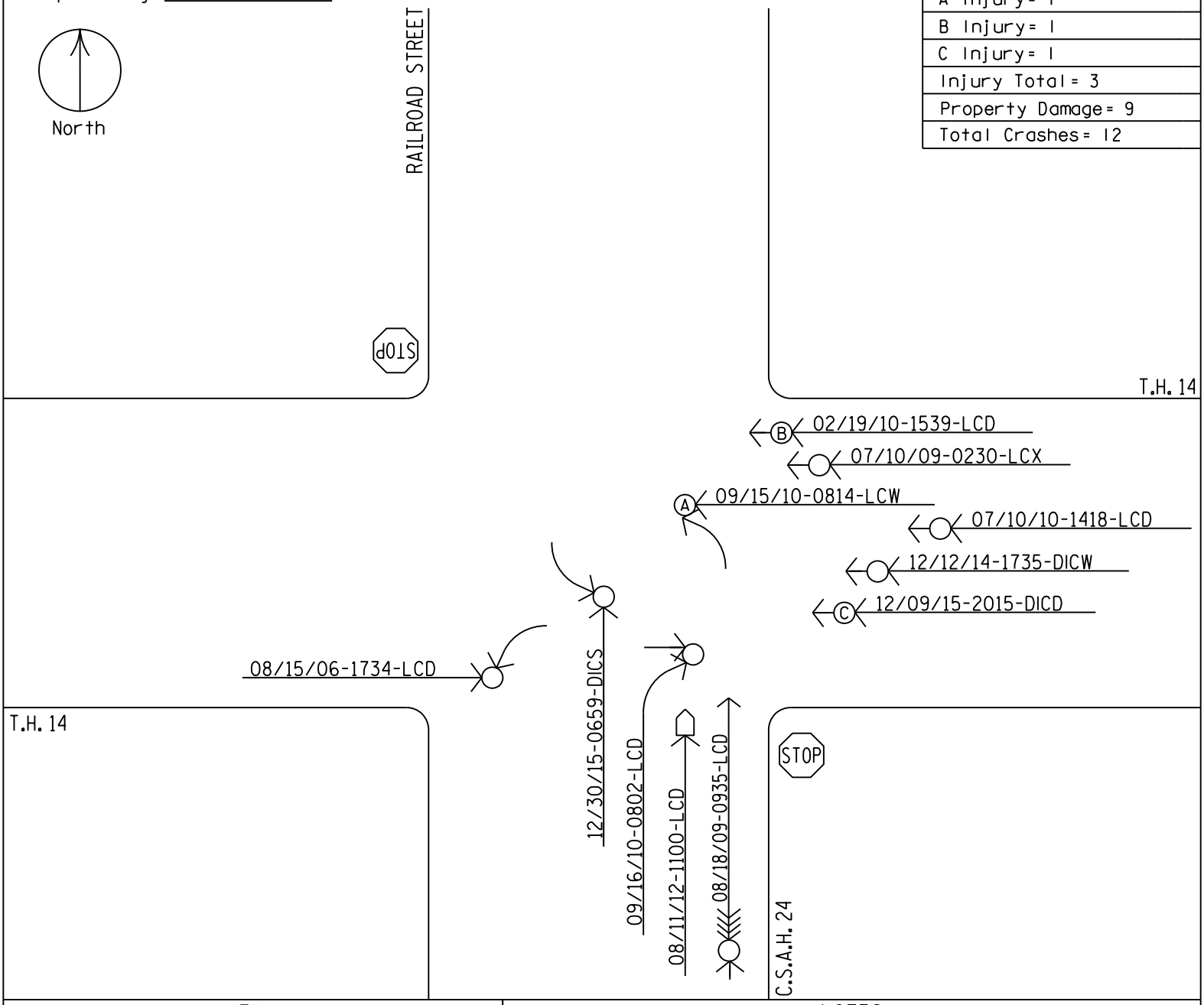
Minnesota Department of Transportation

Location: T.H. 14 AT C.S.A.H. 24/RAILROAD STREET

Time Period: 2006-2015 Date: 2-13-2018

Prepared By: BOLTON & MENK

No. of Crashes
Fatal = 0
A Injury = 1
B Injury = 1
C Injury = 1
Injury Total = 3
Property Damage = 9
Total Crashes = 12



KEY

- Motor Vehicle Out of Control
- Motor Vehicle Backing Up
- Motor Vehicle Rollover
- Motor Vehicle Sideswipe
- Fixed Object
- Fatal Crash
- (A) A Injury Crash
- (B) B Injury Crash
- (C) C Injury Crash
- Property Damage Crash
- Pedestrian
- B Bicycle
- M Motorcycle
- Parked Vehicle
- Rear End Property Damage
- (B) Right Angle B Injury

NOTES

[1] 2 OBSERVED CRASHES WITHOUT ENOUGH DATA TO PLOT

[2]

[3]

Light:

L = Daylight (1)
Dn = Dawn (2)
Du = Dusk (3)
Dl = Dark, Lighted (4)
Do = Dark, Lights Off (5)
D = Dark, Unlighted (6)
X = Unknown (99)

Weather:

C = Clear or Cloudy (1 or 2)
R = Rain (3)
S = Snow or Sleet (4 or 5)
F = Fog, Smog, Smoke (6)
B = Blowing Sand/Dust (7)
W = Severe Crosswinds (8)
X = Other or Unknown (99)

Surface:

D = Dry (1)
W = Wet (2)
S = Snow, Ice, Slush (3,4 or 5)
M = Muddy (7)
Db = Debris (8)
O = Oily (9)
X = Other or Unknown (99)

(X) = Number of Vehicles in Crash (X) Other Vehicle — Injury Type — [Date] — [Time (hrs)] — [Light-Weather-Surface]

Mn/DOT 2942 (rev 9-11-92)

Collision Diagram

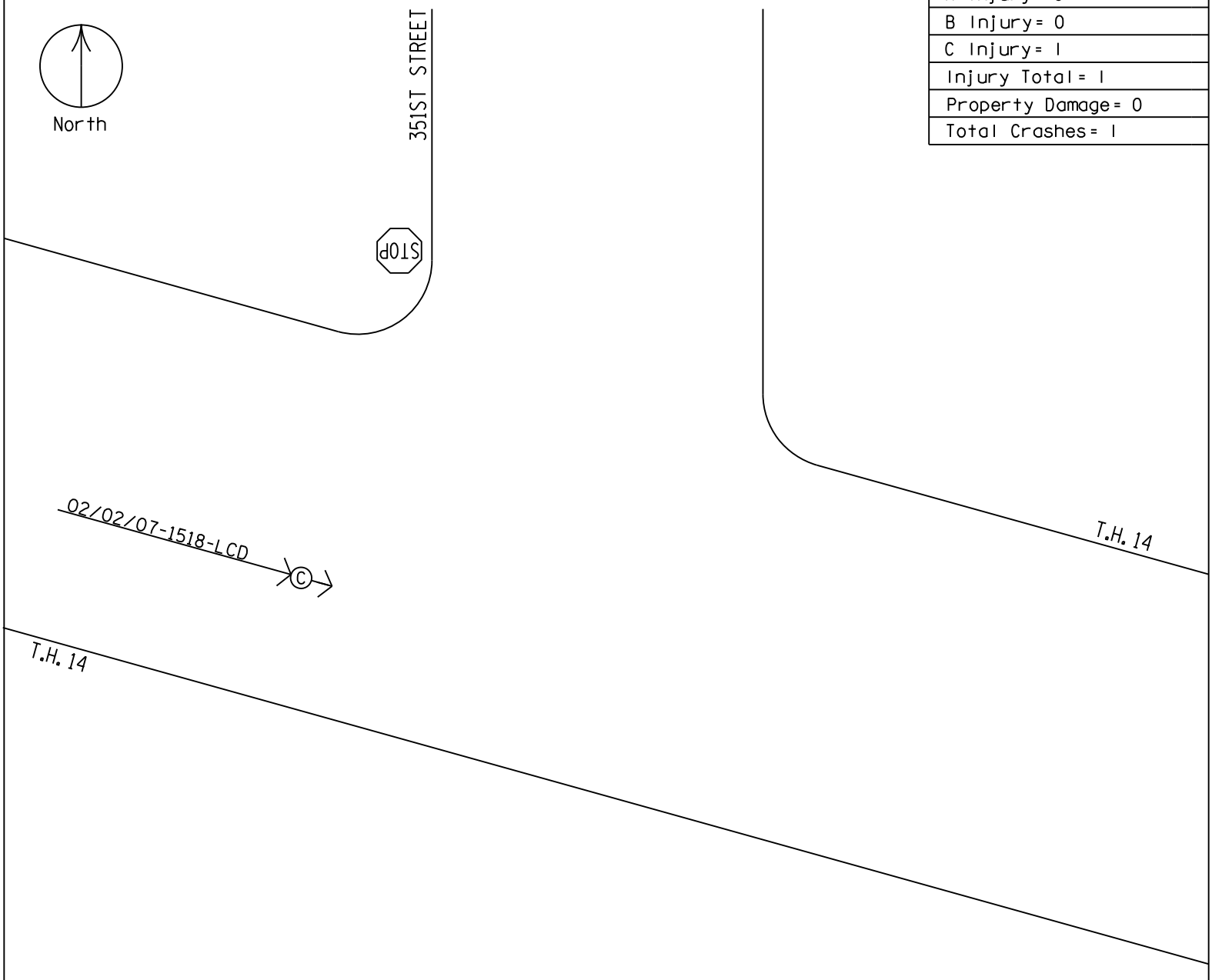
Minnesota Department of Transportation

Location: T.H. 14 AT 351ST STREET

Time Period: 2006-2015 Date: 2-13-2018

Prepared By: BOLTON & MENK

No. of Crashes
Fatal = 0
A Injury = 0
B Injury = 0
C Injury = 1
Injury Total = 1
Property Damage = 0
Total Crashes = 1



KEY

- Motor Vehicle Out of Control
- Motor Vehicle Backing Up
- Motor Vehicle Rollover
- Motor Vehicle Sideswipe
- Fixed Object
- Fatal Crash
- (A) A Injury Crash
- (B) B Injury Crash
- (C) C Injury Crash
- Property Damage Crash
- Pedestrian
- B Bicycle
- M Motorcycle
- Parked Vehicle
- Rear End Property Damage
- (B) Right Angle B Injury

NOTES

[1]

[2]

[3]

Light:	Weather:	Surface:
L = Daylight (1)	C = Clear or Cloudy (1 or 2)	D = Dry (1)
Dn = Dawn (2)	R = Rain (3)	W = Wet (2)
Du = Dusk (3)	S = Snow or Sleet (4 or 5)	S = Snow, Ice, Slush (3,4 or 5)
Dl = Dark, Lighted (4)	F = Fog, Smog, Smoke (6)	M = Muddy (7)
Do = Dark, Lights Off (5)	B = Blowing Sand/Dust (7)	Db = Debris (8)
D = Dark, Unlighted (6)	W = Severe Crosswinds (8)	O = Oily (9)
X = Unknown (99)	X = Other or Unknown (99)	X = Other or Unknown (99)

(X) = Number of Vehicles in Crash (X) Other Vehicle — Injury Type — [Date] — [Time (hrs)] — [Light-Weather-Surface]

Mn/DOT 2942 (rev 9-11-92)

Collision Diagram

Minnesota Department of Transportation

Location: T.H. 14 AT C.S.A.H. 25

Time Period: 2006-2015 Date: 2-13-2018

Prepared By: BOLTON & MENK

No. of Crashes
Fatal = 0
A Injury = 0
B Injury = 1
C Injury = 0
Injury Total = 0
Property Damage = 2
Total Crashes = 3

KEY

- Motor Vehicle Out of Control
- Motor Vehicle Backing Up
- Motor Vehicle Rollover
- Motor Vehicle Sideswipe
- Fixed Object
- Fatal Crash
- (A) A Injury Crash
- (B) B Injury Crash
- (C) C Injury Crash
- Property Damage Crash
- Pedestrian
- B Bicycle
- M Motorcycle
- Parked Vehicle
- Rear End Property Damage
- (B) Right Angle B Injury

NOTES

[1] _____

[2] _____

[3] _____

Light:	Weather:	Surface:
L = Daylight (1)	C = Clear or Cloudy (1 or 2)	D = Dry (1)
Dn = Dawn (2)	R = Rain (3)	W = Wet (2)
Du = Dusk (3)	S = Snow or Sleet (4 or 5)	S = Snow, Ice, Slush (3,4 or 5)
Dl = Dark, Lighted (4)	F = Fog, Smog, Smoke (6)	M = Muddy (7)
Do = Dark, Lights Off (5)	B = Blowing Sand/Dust (7)	Db = Debris (8)
D = Dark, Unlighted (6)	W = Severe Crosswinds (8)	O = Oily (9)
X = Unknown (99)	X = Other or Unknown (99)	X = Other or Unknown (99)

(X) = Number of Vehicles in Crash (X) Other Vehicle Injury Type [Date]—[Time (hrs)]—[Light-Weather-Surface]

Appendix D: Signal Warrant Results

BOLTON & MENK

Real People. Real Solutions.

SIGNAL WARRANTS ANALYSIS
FOR
TH 14 at 446th St
EXISTING TRAFFIC VOLUMES

LOCATION: New Ulm, MN
COUNTY: Brown
REF. POINT:
DATE: 3/12/2018
OPERATOR: CW

Speed	Approach Description		Lanes
55	Major App1:	TH 14 - Eastbound	1
55	Major App3:	TH 14 - Westbound	1
30	Minor App2:	446th St - Southbound	1
	Minor App4:		

0.70 FACTOR USED? YES
POPULATION < 10,000? No
N/A No

THRESHOLDS 1A/1B: 350/525 105/52

HOUR	MAJOR APP. 1	MAJOR APP. 3	TOTAL 1+3	MAJOR 1A/1B	MINOR APP. 2	MINOR 2 1A/1B	MINOR APP. 4	MINOR 4 1A/1B	**MET SAME 1A/1B**
0:00 - 1:00	10	17	27	/	0	/			/
1:00 - 2:00	8	7	15	/	0	/			/
2:00 - 3:00	11	9	20	/	0	/			/
3:00 - 4:00	13	8	21	/	0	/			/
4:00 - 5:00	29	15	44	/	0	/			/
5:00 - 6:00	61	48	109	/	0	/			/
6:00 - 7:00	139	144	283	/	0	/			/
7:00 - 8:00	282	224	506	X/	4	/			/
8:00 - 9:00	198	174	372	X/	1	/			/
9:00 - 10:00	179	140	319	/	1	/			/
10:00 - 11:00	159	160	319	/	1	/			/
11:00 - 12:00	174	148	322	/	1	/			/
12:00 - 13:00	171	165	336	/	1	/			/
13:00 - 14:00	165	176	341	/	1	/			/
14:00 - 15:00	172	215	387	X/	2	/			/
15:00 - 16:00	221	237	458	X/	1	/			/
16:00 - 17:00	233	247	480	X/	2	/			/
17:00 - 18:00	230	261	491	X/	3	/			/
18:00 - 19:00	113	157	270	/	1	/			/
19:00 - 20:00	79	97	176	/	0	/			/
20:00 - 21:00	74	85	159	/	1	/			/
21:00 - 22:00	68	78	146	/	0	/			/
22:00 - 23:00	32	44	76	/	0	/			/
23:00 - 24:00	29	18	47	/	0	/			/

	Met (Hr)	Required (Hr)	
Warrant 1A	0	8	Not satisfied
Warrant 1B	0	8	Not satisfied
Warrant 2	0	4	Not satisfied
Warrant 3	0	1	Not satisfied
Warrant 7	0	8	Not satisfied

BOLTON & MENK

Real People. Real Solutions.

SIGNAL WARRANTS ANALYSIS
FOR
TH 14 at CSAH 37 (448th St)
EXISTING TRAFFIC VOLUMES

LOCATION: New Ulm, MN
COUNTY: Brown
REF. POINT:
DATE: 3/12/2018
OPERATOR: CW

Speed	Approach Description		Lanes
55	Major App1:	TH 14 - Eastbound	1
55	Major App3:	TH 14 - Westbound	2
30	Minor App2:	CSAH 37 (448th St) - Northbound	1
	Minor App4:		

0.70 FACTOR USED? YES
POPULATION < 10,000? No
N/A No
THRESHOLDS 1A/1B: 420/630 105/52

HOUR	MAJOR APP. 1	MAJOR APP. 3	TOTAL 1+3	MAJOR 1A/1B	MINOR APP. 2	MINOR 2 1A/1B	MINOR APP. 4	MINOR 4 1A/1B	**MET SAME 1A/1B**
0:00 - 1:00	8	19	27	/	3	/			**/**
1:00 - 2:00	7	9	16	/	1	/			**/**
2:00 - 3:00	9	8	17	/	4	/			**/**
3:00 - 4:00	12	9	21	/	0	/			**/**
4:00 - 5:00	28	20	48	/	3	/			**/**
5:00 - 6:00	59	67	126	/	9	/			**/**
6:00 - 7:00	143	177	320	/	20	/			**/**
7:00 - 8:00	281	356	637	X/X	31	/			**/**
8:00 - 9:00	194	259	453	X/	25	/			**/**
9:00 - 10:00	181	195	376	/	26	/			**/**
10:00 - 11:00	162	214	376	/	27	/			**/**
11:00 - 12:00	173	198	371	/	41	/			**/**
12:00 - 13:00	172	229	401	/	42	/			**/**
13:00 - 14:00	167	240	407	/	36	/			**/**
14:00 - 15:00	172	278	450	X/	49	/			**/**
15:00 - 16:00	225	326	551	X/	56	/X			**/**
16:00 - 17:00	228	382	610	X/	58	/X			**/**
17:00 - 18:00	235	405	640	X/X	54	/X			**/X**
18:00 - 19:00	110	230	340	/	32	/			**/**
19:00 - 20:00	76	135	211	/	22	/			**/**
20:00 - 21:00	73	128	201	/	21	/			**/**
21:00 - 22:00	68	116	184	/	15	/			**/**
22:00 - 23:00	33	53	86	/	14	/			**/**
23:00 - 24:00	27	25	52	/	5	/			**/**

	Met (Hr)	Required (Hr)	
Warrant 1A	0	8	Not satisfied
Warrant 1B	1	8	Not satisfied
Warrant 2	0	4	Not satisfied
Warrant 3	0	1	Not satisfied
Warrant 7	3	8	Not satisfied

BOLTON & MENK
Real People. Real Solutions.

SIGNAL WARRANTS ANALYSIS
FOR
TH 14 at 571st Ln
EXISTING TRAFFIC VOLUMES

LOCATION: New Ulm, MN
COUNTY: Brown
REF. POINT:
DATE: 3/12/2018
OPERATOR: CW

Speed	Approach Description		Lanes
55	Major App1:	TH 14 - Eastbound	1
55	Major App3:	TH 14 - Westbound	2
30	Minor App2:	571st Ln - Northbound	1
	Minor App4:		

0.70 FACTOR USED? YES
POPULATION < 10,000? No
N/A No

THRESHOLDS 1A/1B: 420/630 105/52

HOUR	MAJOR APP. 1	MAJOR APP. 3	TOTAL 1+3	MAJOR 1A/1B	MINOR APP. 2	MINOR 2 1A/1B	MINOR APP. 4	MINOR 4 1A/1B	**MET SAME 1A/1B**
0:00 - 1:00	15	19	34	/	0	/			/
1:00 - 2:00	8	10	18	/	0	/			/
2:00 - 3:00	13	11	24	/	0	/			/
3:00 - 4:00	13	13	26	/	0	/			/
4:00 - 5:00	40	21	61	/	0	/			/
5:00 - 6:00	81	71	152	/	0	/			/
6:00 - 7:00	206	179	385	/	1	/			/
7:00 - 8:00	374	362	736	X/X	0	/			/
8:00 - 9:00	266	253	519	X/	0	/			/
9:00 - 10:00	246	195	441	X/	0	/			/
10:00 - 11:00	219	216	435	X/	0	/			/
11:00 - 12:00	203	170	373	/	0	/			/
12:00 - 13:00	239	229	468	X/	0	/			/
13:00 - 14:00	233	235	468	X/	1	/			/
14:00 - 15:00	247	277	524	X/	0	/			/
15:00 - 16:00	323	326	649	X/X	1	/			/
16:00 - 17:00	380	381	761	X/X	0	/			/
17:00 - 18:00	343	403	746	X/X	0	/			/
18:00 - 19:00	182	227	409	/	0	/			/
19:00 - 20:00	122	135	257	/	0	/			/
20:00 - 21:00	109	130	239	/	0	/			/
21:00 - 22:00	91	113	204	/	0	/			/
22:00 - 23:00	42	55	97	/	0	/			/
23:00 - 24:00	34	28	62	/	0	/			/

	Met (Hr)	Required (Hr)	
Warrant 1A	0	8	Not satisfied
Warrant 1B	0	8	Not satisfied
Warrant 2	0	4	Not satisfied
Warrant 3	0	1	Not satisfied
Warrant 7	0	8	Not satisfied

BOLTON & MENK

Real People. Real Solutions.

SIGNAL WARRANTS ANALYSIS
FOR
TH 14 at 561st Ave
EXISTING TRAFFIC VOLUMES

LOCATION: New Ulm, MN
COUNTY: Brown
REF. POINT:
DATE: 3/12/2018
OPERATOR: CW

Speed	Approach Description		Lanes
55	Major App1:	TH 14 - Eastbound	2
55	Major App3:	TH 14 - Westbound	2
30	Minor App2:	561st Ave - Northbound	1
30	Minor App4:	561st Ave - Southbound	1

0.70 FACTOR USED? YES
POPULATION < 10,000? No
N/A No

THRESHOLDS 1A/1B: 420/630 105/52 105/52

HOUR	MAJOR APP. 1	MAJOR APP. 3	TOTAL 1+3	MAJOR 1A/1B	MINOR APP. 2	MINOR 2 1A/1B	MINOR APP. 4	MINOR 4 1A/1B	**MET SAME 1A/1B**
0:00 - 1:00	15	19	34	/	0	/	0	/	**/**
1:00 - 2:00	5	11	16	/	0	/	0	/	**/**
2:00 - 3:00	12	9	21	/	0	/	0	/	**/**
3:00 - 4:00	14	13	27	/	0	/	0	/	**/**
4:00 - 5:00	41	22	63	/	0	/	0	/	**/**
5:00 - 6:00	80	63	143	/	0	/	1	/	**/**
6:00 - 7:00	203	176	379	/	1	/	0	/	**/**
7:00 - 8:00	372	345	717	X/X	1	/	3	/	**/**
8:00 - 9:00	269	234	503	X/	0	/	2	/	**/**
9:00 - 10:00	242	190	432	X/	0	/	1	/	**/**
10:00 - 11:00	219	205	424	X/	0	/	2	/	**/**
11:00 - 12:00	220	186	406	/	0	/	2	/	**/**
12:00 - 13:00	235	227	462	X/	0	/	2	/	**/**
13:00 - 14:00	230	225	455	X/	0	/	2	/	**/**
14:00 - 15:00	240	275	515	X/	0	/	0	/	**/**
15:00 - 16:00	307	294	601	X/	0	/	10	/	**/**
16:00 - 17:00	363	357	720	X/X	0	/	10	/	**/**
17:00 - 18:00	326	383	709	X/X	0	/	5	/	**/**
18:00 - 19:00	173	207	380	/	0	/	10	/	**/**
19:00 - 20:00	117	130	247	/	0	/	1	/	**/**
20:00 - 21:00	101	111	212	/	0	/	8	/	**/**
21:00 - 22:00	79	93	172	/	0	/	6	/	**/**
22:00 - 23:00	37	50	87	/	0	/	0	/	**/**
23:00 - 24:00	32	27	59	/	0	/	0	/	**/**

	Met (Hr)	Required (Hr)	
Warrant 1A	0	8	Not satisfied
Warrant 1B	0	8	Not satisfied
Warrant 2	0	4	Not satisfied
Warrant 3	0	1	Not satisfied
Warrant 7	0	8	Not satisfied

BOLTON & MENK

Real People. Real Solutions.

SIGNAL WARRANTS ANALYSIS
FOR
TH 14 at CSAH 12
EXISTING TRAFFIC VOLUMES

LOCATION: Courtland, MN
COUNTY: Brown
REF. POINT:
DATE: 3/12/2018
OPERATOR: CW

Speed	Approach Description		Lanes
55	Major App1:	TH 14 - Eastbound	1
55	Major App3:	TH 14 - Westbound	1
30	Minor App2:	CSAH 12 - Southbound	1
	Minor App4:		

0.70 FACTOR USED? YES
POPULATION < 10,000? Yes
N/A No

THRESHOLDS 1A/1B: 350/525 105/52

HOUR	MAJOR APP. 1	MAJOR APP. 3	TOTAL 1+3	MAJOR 1A/1B	MINOR APP. 2	MINOR 2 1A/1B	MINOR APP. 4	MINOR 4 1A/1B	**MET SAME 1A/1B**
0:00 - 1:00	11	18	29	/	0	/			/
1:00 - 2:00	13	13	26	/	0	/			/
2:00 - 3:00	5	13	18	/	2	/			/
3:00 - 4:00	10	9	19	/	0	/			/
4:00 - 5:00	32	32	64	/	0	/			/
5:00 - 6:00	98	79	177	/	4	/			/
6:00 - 7:00	177	196	373	X/	7	/			/
7:00 - 8:00	358	366	724	X/X	3	/			/
8:00 - 9:00	274	240	514	X/	7	/			/
9:00 - 10:00	239	201	440	X/	6	/			/
10:00 - 11:00	240	208	448	X/	5	/			/
11:00 - 12:00	210	201	411	X/	4	/			/
12:00 - 13:00	241	213	454	X/	7	/			/
13:00 - 14:00	227	258	485	X/	5	/			/
14:00 - 15:00	244	279	523	X/	8	/			/
15:00 - 16:00	288	328	616	X/X	5	/			/
16:00 - 17:00	357	386	743	X/X	11	/			/
17:00 - 18:00	369	369	738	X/X	14	/			/
18:00 - 19:00	197	237	434	X/	4	/			/
19:00 - 20:00	130	164	294	/	3	/			/
20:00 - 21:00	105	118	223	/	5	/			/
21:00 - 22:00	97	110	207	/	3	/			/
22:00 - 23:00	55	70	125	/	1	/			/
23:00 - 24:00	41	34	75	/	0	/			/

	Met (Hr)	Required (Hr)	
Warrant 1A	0	8	Not satisfied
Warrant 1B	0	8	Not satisfied
Warrant 2	0	4	Not satisfied
Warrant 3	0	1	Not satisfied
Warrant 7	0	8	Not satisfied

BOLTON & MENK

Real People. Real Solutions.

SIGNAL WARRANTS ANALYSIS
FOR
TH 14 at 561st Ave
EXISTING TRAFFIC VOLUMES

LOCATION: Courtland, MN
COUNTY: Brown
REF. POINT:
DATE: 3/12/2018
OPERATOR: CW

Speed	Approach Description		Lanes
55	Major App1:	TH 14 - Eastbound	1
55	Major App3:	TH 14 - Westbound	1
30	Minor App2:	CSAH 24 - Northbound	1
30	Minor App4:	CSAH 24 - Southbound	1

0.70 FACTOR USED? YES
POPULATION < 10,000? Yes
N/A No

THRESHOLDS 1A/1B: 350/525 105/52 105/52

HOUR	MAJOR APP. 1	MAJOR APP. 3	TOTAL 1+3	MAJOR 1A/1B	MINOR APP. 2	MINOR 2 1A/1B	MINOR APP. 4	MINOR 4 1A/1B	**MET SAME 1A/1B**
0:00 - 1:00	10	15	25	/	4	/	0	/	**/**
1:00 - 2:00	11	14	25	/	0	/	0	/	**/**
2:00 - 3:00	6	10	16	/	1	/	0	/	**/**
3:00 - 4:00	10	8	18	/	1	/	0	/	**/**
4:00 - 5:00	32	28	60	/	6	/	0	/	**/**
5:00 - 6:00	104	69	173	/	12	/	0	/	**/**
6:00 - 7:00	196	153	349	/	32	/	1	/	**/**
7:00 - 8:00	372	269	641	X/X	52	/X	0	/	**/X**
8:00 - 9:00	273	215	488	X/	24	/	1	/	**/**
9:00 - 10:00	228	201	429	X/	20	/	0	/	**/**
10:00 - 11:00	231	195	426	X/	26	/	0	/	**/**
11:00 - 12:00	228	208	436	X/	14	/	0	/	**/**
12:00 - 13:00	257	188	445	X/	34	/	6	/	**/**
13:00 - 14:00	238	267	505	X/	19	/	3	/	**/**
14:00 - 15:00	244	271	515	X/	33	/	1	/	**/**
15:00 - 16:00	275	313	588	X/X	27	/	1	/	**/**
16:00 - 17:00	338	385	723	X/X	28	/	0	/	**/**
17:00 - 18:00	361	362	723	X/X	34	/	0	/	**/**
18:00 - 19:00	185	222	407	X/	24	/	0	/	**/**
19:00 - 20:00	122	165	287	/	16	/	0	/	**/**
20:00 - 21:00	93	117	210	/	5	/	0	/	**/**
21:00 - 22:00	89	109	198	/	10	/	0	/	**/**
22:00 - 23:00	55	63	118	/	6	/	0	/	**/**
23:00 - 24:00	34	35	69	/	2	/	0	/	**/**

	Met (Hr)	Required (Hr)	
Warrant 1A	0	8	Not satisfied
Warrant 1B	1	8	Not satisfied
Warrant 2	0	4	Not satisfied
Warrant 3	0	1	Not satisfied
Warrant 7	1	8	Not satisfied

BOLTON & MENK

Real People. Real Solutions.

SIGNAL WARRANTS ANALYSIS
FOR
TH 14 at 531st St
EXISTING TRAFFIC VOLUMES

LOCATION: Courtland, MN
COUNTY: Brown
REF. POINT:
DATE: 3/12/2018
OPERATOR: CW

Speed	Approach Description		Lanes
55	Major App1:	TH 14 - Eastbound	1
55	Major App3:	TH 14 - Westbound	1
30	Minor App2:	531st St - Southbound	1
	Minor App4:		

0.70 FACTOR USED? YES
POPULATION < 10,000? Yes
N/A No

THRESHOLDS 1A/1B: 350/525 105/52

HOUR	MAJOR APP. 1	MAJOR APP. 3	TOTAL 1+3	MAJOR 1A/1B	MINOR APP. 2	MINOR 2 1A/1B	MINOR APP. 4	MINOR 4 1A/1B	**MET SAME 1A/1B**
0:00 - 1:00	10	15	25	/	0	/			/
1:00 - 2:00	10	14	24	/	0	/			/
2:00 - 3:00	5	8	13	/	0	/			/
3:00 - 4:00	10	8	18	/	0	/			/
4:00 - 5:00	33	27	60	/	0	/			/
5:00 - 6:00	115	60	175	/	0	/			/
6:00 - 7:00	199	135	334	/	2	/			/
7:00 - 8:00	389	242	631	X/X	0	/			/
8:00 - 9:00	269	210	479	X/	0	/			/
9:00 - 10:00	218	199	417	X/	0	/			/
10:00 - 11:00	223	182	405	X/	1	/			/
11:00 - 12:00	200	183	383	X/	0	/			/
12:00 - 13:00	196	192	388	X/	1	/			/
13:00 - 14:00	205	230	435	X/	3	/			/
14:00 - 15:00	238	268	506	X/	0	/			/
15:00 - 16:00	237	304	541	X/X	1	/			/
16:00 - 17:00	304	387	691	X/X	1	/			/
17:00 - 18:00	298	357	655	X/X	1	/			/
18:00 - 19:00	162	225	387	X/	0	/			/
19:00 - 20:00	98	160	258	/	0	/			/
20:00 - 21:00	66	116	182	/	0	/			/
21:00 - 22:00	85	102	187	/	1	/			/
22:00 - 23:00	46	61	107	/	0	/			/
23:00 - 24:00	29	34	63	/	0	/			/

	Met (Hr)	Required (Hr)	
Warrant 1A	0	8	Not satisfied
Warrant 1B	0	8	Not satisfied
Warrant 2	0	4	Not satisfied
Warrant 3	0	1	Not satisfied
Warrant 7	0	8	Not satisfied

BOLTON & MENK

Real People. Real Solutions.

SIGNAL WARRANTS ANALYSIS
FOR
TH 14 at CSAH 25
EXISTING TRAFFIC VOLUMES

LOCATION: Courtland, MN
COUNTY: Brown
REF. POINT:
DATE: 3/12/2018
OPERATOR: CW

Speed	Approach Description		Lanes
55	Major App1:	TH 14 - Eastbound	1
55	Major App3:	TH 14 - Westbound	1
30	Minor App2:	CSAH 25 - Northbound	1
	Minor App4:		

0.70 FACTOR USED? YES
POPULATION < 10,000? Yes
N/A No

THRESHOLDS 1A/1B: 350/525 105/52

HOUR	MAJOR APP. 1	MAJOR APP. 3	TOTAL 1+3	MAJOR 1A/1B	MINOR APP. 2	MINOR 2 1A/1B	MINOR APP. 4	MINOR 4 1A/1B	**MET SAME 1A/1B**
0:00 - 1:00	10	14	24	/	1	/			/
1:00 - 2:00	10	14	24	/	0	/			/
2:00 - 3:00	5	8	13	/	0	/			/
3:00 - 4:00	10	8	18	/	0	/			/
4:00 - 5:00	33	24	57	/	3	/			/
5:00 - 6:00	115	57	172	/	6	/			/
6:00 - 7:00	201	131	332	/	5	/			/
7:00 - 8:00	383	235	618	X/X	14	/			/
8:00 - 9:00	262	177	439	X/	22	/			/
9:00 - 10:00	202	207	409	X/	5	/			/
10:00 - 11:00	215	160	375	X/	6	/			/
11:00 - 12:00	198	176	374	X/	2	/			/
12:00 - 13:00	209	193	402	X/	7	/			/
13:00 - 14:00	216	217	433	X/	7	/			/
14:00 - 15:00	232	250	482	X/	12	/			/
15:00 - 16:00	233	308	541	X/X	11	/			/
16:00 - 17:00	296	381	677	X/X	9	/			/
17:00 - 18:00	287	334	621	X/X	10	/			/
18:00 - 19:00	148	212	360	X/	6	/			/
19:00 - 20:00	93	158	251	/	1	/			/
20:00 - 21:00	66	114	180	/	1	/			/
21:00 - 22:00	77	103	180	/	1	/			/
22:00 - 23:00	44	61	105	/	0	/			/
23:00 - 24:00	28	32	60	/	0	/			/

	Met (Hr)	Required (Hr)	
Warrant 1A	0	8	Not satisfied
Warrant 1B	0	8	Not satisfied
Warrant 2	0	4	Not satisfied
Warrant 3	0	1	Not satisfied
Warrant 7	0	8	Not satisfied

Appendix E: Operation and Queuing Results

(Full SimTraffic Results are available upon request)

Existing
CSAH 37 and 446th Alternatives

Existing Conditions

Intersection	Peak Hour	Intersection Delay (sec/veh)		Movement Delay (sec/veh)																											
				NBU		NBL		NBT		NBR		SBU		SBL		SBT		SBR		EBU		EBL		EBT		EBR		WBU		WBL		WBT		WBR	
CSAH 37 & TH 14	AM	3	A	-		17	C	-		4	A	-		-		-		-		-		-		1	A	0	A	-		4	A	1	A	-	
Stop Controlled	PM	5	A	-		40	E	-		4	A	-		-		-		-		-		-		2	A	0	A	-		5	A	1	A	-	
TH 14 & 446th	AM	1	A	-		-		-		-		-		7	A	-		2	A	-		-		1	A	-		-		-		2	A	-	
Stop Controlled	PM	2	A	-		-		-		-		-		9	A	-		-		-		-		1	A	-		-		-		3	A	1	A

Traditional At-Grade

Intersection	Peak Hour	Intersection Delay (sec/veh)		Movement Delay (sec/veh)																											
				NBU		NBL		NBT		NBR		SBU		SBL		SBT		SBR		EBU		EBL		EBT		EBR		WBU		WBL		WBT		WBR	
CSAH 37/446th & TH 14	AM	4	A	-		34	D	-		5	A	-		17	C	-		3	A	-		-		1	A	1	A	-		6	A	1	A	-	
Stop Controlled	PM	12	B	-		113	F	-		10	B	-		37	E	-		-		-		-		1	A	1	A	-		7	A	1	A	1	A

RCUT

Intersection	Peak Hour	Intersection Delay (sec/veh)		Movement Delay (sec/veh)																											
				NBU		NBL		NBT		NBR		SBU		SBL		SBT		SBR		EBU		EBL		EBT		EBR		WBU		WBL		WBT		WBR	
CSAH 37 & TH 14	AM	3	A	-		-		-		5	A	-		-		-		-		-		-		1	A	0	A	-		6	A	1	A	-	
Stop Controlled	PM	3	A	-		-		-		6	A	-		-		-		-		-		-		1	A	0	A	-		6	A	1	A	-	
TH 14 & 446th	AM	0	A	-		-		-		-		-		12	B	-		3	A	-		-		0	A	-		-		-		0	A	-	
Stop Controlled	PM	0	A	-		-		-		-		-		7	A	-		-		-		-		0	A	-		-		-		0	A	0	A
TH 14	AM	1	A	-		-		-		-		-		-		-		-		6	A	-		1	A	-		-		-		1	A	-	
Stop Controlled	PM	1	A	-		-		-		-		-		-		-		-		9	A	-		1	A	-		-		-		1	A	-	

High T

Intersection	Peak Hour	Intersection Delay (sec/veh)		Movement Delay (sec/veh)																											
				NBU		NBL		NBT		NBR		SBU		SBL		SBT		SBR		EBU		EBL		EBT		EBR		WBU		WBL		WBT		WBR	
CSAH 37 & TH 14	AM	2	A	-		10	B	-		3	A	-		-		-		-		-		-		-		-		-		2	A	1	A	-	
Stop Controlled	PM	4	A	-		19	C	-		4	A	-		-		-		-		-		-		-		-		-		3	A	1	A	-	
TH 14	AM	1	A	-		-		-		-		-		-		-		2	A	-		-		-		-		-		-		0	A	-	
Stop Controlled	PM	1	A	-		-		-		-		-		-		-		-		-		-		-		-		-		-		1	A	0	A

Interchange Roundabouts

Intersection	Peak Hour	Intersection Delay (sec/veh)		Movement Delay (sec/veh)							
				EB		WB		NB		SB	
CSAH 37 & TH 14 (North)	AM	5	A	0	A	6	A	4	A	4	A
Roundabout	PM	6	A	0	A	7	A	4	A	5	A
CSAH 37 & TH 14 (South)	AM	5	A	5	A	0	A	6	A	5	A
Roundabout	PM	6	A	5	A	0	A	6	A	6	A

Roundabouts

Intersection	Peak Hour	Intersection Delay (sec/veh)		Movement Delay (sec/veh)					
				EB		WB		NB	
CSAH 37 & TH 14	AM	6	A	10	B	6	A	1	A
Roundabout	PM	7	A	10	B	7	A	2	A

Existing
CSAH 37 and 446th Alternatives

Existing Conditions

Intersection	Peak Hour	Queue Lengths							
		EBR		WBL		NBL		SBL/R	
		Avg	Max	Avg	Max	Avg	Max	Avg	Max
CSAH 37 & TH 14	AM	25	50	50	100	50	100	-	-
Stop Controlled	PM	25	50	50	125	75	200	-	-
TH 14 & 446th	AM	-	-	-	-	-	-	25	25
Stop Controlled	PM	-	-	-	-	-	-	25	25

Traditional At-Grade

Intersection	Peak Hour	Queue Lengths													
		EBR		WBL		WBT 1		WBT 2		NBL/T		NBR		SBL/T/R	
		Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max
CSAH 37/446th & TH 14	AM	25	75	50	100	0	25	-	-	50	100	50	100	25	25
Stop Controlled	PM	25	50	75	150	25	25	25	25	125	400	75	150	25	25

RCUT

Intersection	Peak Hour	Queue Lengths									
		EBU		EBR		WBL		NBR		SBL/R	
		Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max
CSAH 37 & TH 14	AM	-	-	25	50	50	100	50	125	-	-
Stop Controlled	PM	-	-	25	50	75	150	75	100	-	-
TH 14 & 446th	AM	-	-	-	-	-	-	-	-	25	25
Stop Controlled	PM	-	-	-	-	-	-	-	-	25	25
TH 14	AM	25	75	-	-	-	-	-	-	-	-
Stop Controlled	PM	50	100	-	-	-	-	-	-	-	-

High T

Intersection	Peak Hour	Queue Lengths					
		WBL		NBL		SBR	
		Avg	Max	Avg	Max	Avg	Max
CSAH 37 & TH 14	AM	-	-	25	75	-	-
Stop Controlled	PM	0	25	50	150	-	-
TH 14	AM	-	-	-	-	0	25
Stop Controlled	PM	-	-	-	-	-	-

Interchange Roundabouts

Intersection	Peak Hour	Queue Lengths							
		EB		WB		NB		SB	
		Avg	Max	Avg	Max	Avg	Max	Avg	Max
CSAH 37 & TH 14 (North)	AM	-	-	-	25	-	-	-	-
Roundabout	PM	-	-	-	25	-	-	-	-
CSAH 37 & TH 14 (South)	AM	-	-	-	-	-	25	-	25
Roundabout	PM	-	-	-	-	-	25	-	25

Roundabouts

Intersection	Peak Hour	Queue Lengths							
		EBL		WBL		WBT/R		NB	
		Avg	Max	Avg	Max	Avg	Max	Avg	Max
CSAH 37 & TH 14	AM	-	50	-	25	-	25	-	-
Roundabout	PM	-	50	-	25	-	25	-	-

Existing
CSAH 37 and 571st Alternatives

Existing Conditions

Intersection	Peak Hour	Intersection Delay (sec/veh)		Movement Delay (sec/veh)																							
				NBU	NBL		NBT	NBR		SBU	SBL	SBT	SBR	EBU	EBL	EBT		EBR		WBU	WBL		WBT		WBR
571st Ln & TH 14	AM	4	A	-	30	D	-	12	B	-	-	-	-	-	-	3	A	1	A	-	7	A	3	A	-
Stop Controlled	PM	6	A	-	110	F	-	34	D	-	-	-	-	-	-	3	A	1	A	-	10	B	4	A	-

Traditional At-Grade

Intersection	Peak Hour	Intersection Delay (sec/veh)		Movement Delay (sec/veh)																							
				NBU	NBL		NBT	NBR		SBU	SBL	SBT	SBR	EBU	EBL	EBT		EBR		WBU	WBL		WBT		WBR
571st Ln & TH 14	AM	2	A	-	18	C	-	7	A	-	-	-	-	-	-	2	A	0	A	-	7	A	3	A	-
Stop Controlled	PM	3	A	-	23	C	-	7	A	-	-	-	-	-	-	2	A	0	A	-	9	A	3	A	-

Green T

Intersection	Peak Hour	Intersection Delay (sec/veh)		Movement Delay (sec/veh)																							
				NBU	NBL		NBT	NBR		SBU	SBL	SBT	SBR	EBU	EBL	EBT		EBR		WBU	WBL		WBT		WBR
571st Ln & TH 14	AM	1	A	-	8	A	-	4	A	-	-	-	-	-	-	1	A	2	A	-	8	A	1	A	-
Stop Controlled	PM	1	A	-	12	B	-	4	A	-	-	-	-	-	-	1	A	2	A	-	8	A	1	A	-

RCUT

Intersection	Peak Hour	Intersection Delay (sec/veh)		Movement Delay (sec/veh)																							
				NBU	NBL		NBT	NBR		SBU	SBL	SBT	SBR	EBU	EBL	EBT		EBR		WBU	WBL		WBT		WBR
571st Ln & TH 14	AM	1	A	-	-		-	5	A	-	-	-	-	-	-	1	A	0	A	-	7	A	1	A	-
Stop Controlled	PM	1	A	-	-		-	6	A	-	-	-	-	-	-	1	A	0	A	-	7	A	1	A	-
TH 14	AM	1	A	-	-		-	-		-	-	-	-	4	-	1	A	-		-	-		1	A	-
Stop Controlled	PM	1	A	-	-		-	-		-	-	-	-	8	-	1	A	-		-	-		1	A	-

Existing
CSAH 37 and 571st Alternatives

Existing Conditions

Intersection	Peak Hour	Queue Lengths					
		EBT		WBL		NBL/R	
		Avg	Max	Avg	Max	Avg	Max
571st Ln & TH 14	AM	-	-	25	75	25	175
Stop Controlled	PM	0	25	25	100	75	300

Traditional At-Grade

Intersection	Peak Hour	Queue Lengths							
		EBT		EBR		WBL		NBL/R	
		Avg	Max	Avg	Max	Avg	Max	Avg	Max
571st Ln & TH 14	AM	-	-	-	-	25	100	25	125
Stop Controlled	PM	0	25	0	25	25	125	50	150

Green T

Intersection	Peak Hour	Queue Lengths									
		EBT 1		EBT 2		WBL		NBL		NBR	
		Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max
571st Ln & TH 14	AM	0	25	-	-	25	100	25	100	25	100
Stop Controlled	PM	0	25	0	25	25	100	25	100	25	100

RCUT

Intersection	Peak Hour	Queue Lengths											
		EBU		EBT 1		EBT 2		WBL		WBT		NBR	
		Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max
571st Ln & TH 14	AM	-	-	0	25	0	25	25	100	-	-	25	125
Stop Controlled	PM	-	-	0	25	-	-	25	100	-	-	50	100
TH 14	AM	25	75	-	-	-	-	-	-	0	25	-	-
Stop Controlled	PM	25	100	-	-	-	-	-	-	-	-	-	-

Existing
CSAH 37 and 561st Alternatives

Existing Conditions

Intersection	Peak Hour	Intersection Delay (sec/veh)		Movement Delay (sec/veh)																											
				NBU		NBL		NBT		NBR		SBU		SBL		SBT		SBR		EBU		EBL		EBT		EBR		WBU		WBL		WBT		WBR	
TH 14 & 561st	AM	4	A	-		38	E	-		11	B	-		46	E	-		7	A	-		5	A	4	A	2	A	-		5	A	3	A	1	A
Stop Controlled	PM	5	A	-		41	E	-		13	B	-		33	D	-		9	A	-		6	A	4	A	2	A	-		6	A	4	A	1	A

RCUT

Intersection	Peak Hour	Intersection Delay (sec/veh)		Movement Delay (sec/veh)																											
				NBU		NBL		NBT		NBR		SBU		SBL		SBT		SBR		EBU		EBL		EBT		EBR		WBU		WBL		WBT		WBR	
561st Ln & TH 14	AM	0	A	-		-		-		5	A	-		-		-		-		-		-		0	A	0	A	-		7	A	0	A	-	
Stop Controlled	PM	0	A	-		-		-		4	A	-		-		-		-		-		-		0	A	0	A	-		8	A	0	A	-	
TH 14 & 561st Ln	AM	4	A	-		-		-		-		-		-		-		3	A	-		8	A	7	A	-		-		-		0	A	0	A
Stop Controlled	PM	4	A	-		-		-		-		-		-		-		3	A	-		8	A	7	A	-		-		-		0	A	0	A
TH 14	AM	0	A	-		-		-		-		-		-		-		-		5	A	-		0	A	-		-		-		1	A	-	
Stop Controlled	PM	1	A	-		-		-		-		-		-		-		-		7	A	-		0	A	-		-		-		1	A	-	
TH 14	AM	12	B	-		-		-		-		-		-		-		-		-		-		13	B	-		2	A	-		11	B	-	
Stop Controlled	PM	12	B	-		-		-		-		-		-		-		-		-		-		13	B	-		3	A	-		11	B	-	

Existing
CSAH 37 and 561st Alternatives

Existing Conditions

Intersection	Peak Hour	Queue Lengths									
		EBL		EBR		WBL		NBL/T/R		SBL/T/R	
		Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max
TH 14 & 561st	AM	25	50	0	25	25	50	25	100	25	50
Stop Controlled	PM	25	50	-	-	25	75	50	125	25	75

RCUT

Intersection	Peak Hour	Queue Lengths																			
		EBU		EBL		EBT 1		EBT 2		WBU		WBL		WBT 1		WBT 2		NBR		SBR	
		Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max
561st Ln & TH 14	AM	-	-	-	-	-	-	-	-	-	-	25	50	-	-	-	-	25	75	-	-
Stop Controlled	PM	-	-	-	-	-	-	-	-	-	-	25	75	-	-	-	-	25	75	-	-
TH 14 & 561st Ln	AM	-	-	25	75	-	-	-	-	-	-	-	-	-	-	-	-	-	-	25	50
Stop Controlled	PM	-	-	25	50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	25	75
TH 14	AM	25	75	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Stop Controlled	PM	25	75	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TH 14	AM	-	-	-	-	75	125	50	100	25	25	-	-	75	100	75	100	-	-	-	-
Stop Controlled	PM	-	-	-	-	75	125	50	100	25	50	-	-	75	100	75	125	-	-	-	-

Existing
Courtland Alternatives

Existing Conditions

Intersection	Peak Hour	Intersection Delay (sec/veh)		Movement Delay (sec/veh)																											
				NBU		NBL		NBT		NBR		SBU		SBL		SBT		SBR		EBU		EBL		EBT		EBR		WBU		WBL		WBT		WBR	
TH 14 & CSAH 12 (541st)	AM	3	A	-		-		-		-		-		9	A	-		3	A	-		-		2	A	-		-		-		4	A	2	A
Stop Controlled	PM	4	A	-		-		-		-		1	A	11	B	-		5	A	-		4	A	3	A	-		-		-		5	A	4	A
CSAH 24 (4th) & TH 14	AM	5	A	-		11	B	-		7	A	-		-		7	A	5	A	-		-		5	A	4	A	-		7	A	3	A	-	
Stop Controlled	PM	5	A	-		14	B	16	C	5	A	-		-		-		3	A	-		15	C	5	A	4	A	-		8	A	4	A	-	
TH 14 & 531st	AM	3	A	-		-		-		-		-		-		-		5	A	-		5	A	4	A	-		-		-		1	A	-	
Stop Controlled	PM	3	A	-		-		-		-		-		16	C	-		4	A	-		9	A	4	A	-		-		-		1	A	0	A
CSAH 25 (478th) & TH 14	AM	3	A	-		11	B	-		-		-		-		-		-		-		-		3	A	1	A	-		-		2	A	-	
Stop Controlled	PM	3	A	-		11	B	-		-		-		-		-		-		-		-		3	A	1	A	-		-		2	A	-	

Concept A

Intersection	Peak Hour	Intersection Delay (sec/veh)		Movement Delay (sec/veh)																											
				NBU		NBL		NBT		NBR		SBU		SBL		SBT		SBR		EBU		EBL		EBT		EBR		WBU		WBL		WBT		WBR	
CSAH 24 & TH 14	AM	2	A	-		-		-		7	A	-		-		-		4	A	-		3	A	1	A	0	A	-		3	A	1	A	1	A
Stop Controlled	PM	1	A	-		-		-		4	A	-		-		-		3	A	-		4	A	1	A	1	A	-		4	A	1	A	0	A
TH 14 & West U-turn	AM	1	A	-		-		-		-		-		-		-		-		-		-		1	A	-		3	A	-		1	A	-	
Stop Controlled	PM	1	A	-		-		-		-		-		-		-		-		-		-		1	A	-		6	A	-		1	A	-	
TH 14 & East U-Turn	AM	3	A	-		-		-		-		-		-		-		-		6	A	-		1	A	-		-		-		4	A	-	
Stop Controlled	PM	2	A	-		-		-		-		-		-		-		-		5	A	-		1	A	-		-		-		4	A	-	

Concept B

Intersection	Peak Hour	Intersection Delay (sec/veh)		Movement Delay (sec/veh)																											
				NBU		NBL		NBT		NBR		SBU		SBL		SBT		SBR		EBU		EBL		EBT		EBR		WBU		WBL		WBT		WBR	
CSAH 24 & TH 14	AM	2	A	-		-		-		5	A	-		-		-		3	A	-		3	A	1	A	0	A	-		4	A	1	A	1	A
Stop Controlled	PM	1	A	-		-		-		3	A	-		-		-		4	A	-		4	A	1	A	0	A	-		5	A	1	A	0	A
TH 14 & West U-turn	AM	1	A	-		-		-		-		-		-		-		-		-		-		1	A	-		4	A	-		1	A	-	
Stop Controlled	PM	1	A	-		-		-		-		-		-		-		-		-		-		1	A	-		6	A	-		1	A	-	
TH 14 & East U-Turn	AM	2	A	-		-		-		-		-		-		-		-		4	A	-		1	A	-		-		-		4	A	-	
Stop Controlled	PM	3	A	-		-		-		-		-		-		-		-		6	A	-		0	A	-		-		-		4	A	-	
Old TH 14 & TH 14	AM	3	A	-		-		-		4	A	-		-		-		-		-		-		4	A	3	A	-		3	A	0	A	-	
Stop Controlled	PM	2	A	-		-		-		3	A	-		-		-		-		-		-		4	A	3	A	-		2	A	0	A	-	
TH 14 & East Uturn2	AM	1	A	-		-		-		-		-		-		-		-		3	A	-		1	A	-		-		-		0	A	-	
Stop Controlled	PM	1	A	-		-		-		-		-		-		-		-		7	A	-		1	A	-		-		-		0	A	-	

Concept C

Intersection	Peak Hour	Intersection Delay (sec/veh)		Movement Delay (sec/veh)							
				EB		WB		NB		SB	
CSAH 24 & TH 14 (North)	AM	5	A	0	A	5	A	5	A	5	A
Roundabout	PM	4	A	0	A	4	A	4	A	4	A
CSAH 24 & TH 14 (South)	AM	5	A	4	A	0	A	6	A	4	A
Roundabout	PM	4	A	5	A	0	A	4	A	4	A

Concept E (1 of 2)

Intersection	Peak Hour	Intersection Delay (sec/veh)		Movement Delay (sec/veh)							
				EB		WB		NB		SB	
CSAH 24 & TH 14 (North)	AM	5	A	0	A	4	A	5	A	5	A
Roundabout	PM	4	A	0	A	4	A	4	A	4	A
CSAH 24 & TH 14 (South)	AM	5	A	4	A	5	A	5	A	4	A
Roundabout	PM	5	A	4	A	5	A	4	A	5	A

Concept E (2 of 2)

Intersection	Peak Hour	Intersection Delay (sec/veh)		Movement Delay (sec/veh)																											
				NBU		NBL		NBT		NBR		SBU		SBL		SBT		SBR		EBU		EBL		EBT		EBR		WBU		WBL		WBT		WBR	
Old TH 14 & TH 14	AM	3	A	-		-		-		4	A	-		-		-		-		-		-		4	A	3	A	-		3	A	0	A	-	
Stop Controlled	PM	2	A	-		-		-		3	A	-		-		-		-		-		-		4	A	3	A	-		2	A	0	A	-	
TH 14 & East Uturn2	AM	1	A	-		-		-		-		-		-		-		-		3	A	-		1	A	-		-		-		0	A	-	
Stop Controlled	PM	1	A	-		-		-		-		-		-		-		-		7	A	-		1	A	-		-		-		0	A	-	

Concept F

Intersection	Peak Hour	Intersection Delay (sec/veh)		Movement Delay (sec/veh)																											
				NBU		NBL		NBT		NBR		SBU		SBL		SBT		SBR		EBU		EBL		EBT		EBR		WBU		WBL		WBT		WBR	
EB TH 14 Access & TH 14	AM	1	A	-		-		-		3	A	-		-		-		-		-		-		1	A	1	A	-		-		1	A	-	
Stop Controlled	PM	1	A	-		-		-		3	A	-		-		-		-		-		-		1	A	1	A	-		-		1	A	-	
TH 14 & WB TH 14 Access	AM	2	A	-		-		-		-		-		-		-		4	A	-		-		1	A	-		-		-		3	A	3	A
Stop Controlled	PM	3	A	-		-		-		-		-		-		-		3	A	-		-		1	A	-		-		-		4	A	4	A
CSAH 12 & WB TH 14 Access	AM	1	A	-		-		1	A	1	A	-		3	A	0	A	-		-		-		-		-		-		5	A	-		3	A
Stop Controlled	PM	1	A	-		-		0	A	0	A	-		2	A	0	A	-		-		-		-		-		-		4	A	0	A	3	A
Old TH 14 & TH 14	AM	3	A	-		-		-		4	A	-		-		-		-		-		-		4	A	3	A	-		3	A	0	A	-	
Stop Controlled	PM	2	A	-		-		-		3	A	-		-		-		-		-		-		4	A	3	A	-		3	A	0	A	-	
TH 14 & East Uturn2	AM	1	A	-		-		-		-		-		-		-		-		4	A	-		1	A	-		-		-		0	A	-	
Stop Controlled	PM	1	A	-		-		-		-		-		-		-		-		4	A	-		0	A	-		-		-		0	A	-	

Existing
Courtland Alternatives

Existing Conditions

Intersection	Peak Hour	Queue Lengths																	
		EBL/T		EBL/T/R		WBL/T/R		WBT		NBL/R		NBL/T/R		SBU/L/R		SBL/R		SBL/T/R	
		Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max
TH 14 & CSAH 12 (541st)	AM	-	-	-	-	-	-	-	-	-	-	-	-	-	-	25	50	-	-
Stop Controlled	PM	25	75	-	-	-	-	0	25	-	-	-	-	25	75	-	-	-	-
CSAH 24 (4th) & TH 14	AM	-	-	-	-	25	100	-	-	-	-	50	125	-	-	-	-	25	50
Stop Controlled	PM	-	-	25	50	25	150	-	-	-	-	50	100	-	-	-	-	25	25
TH 14 & 531st	AM	25	75	-	-	-	-	0	25	-	-	-	-	-	-	25	75	-	-
Stop Controlled	PM	25	175	-	-	-	-	-	-	-	-	-	-	-	-	25	50	-	-
CSAH 25 (478th) & TH 14	AM	-	-	-	-	-	-	-	-	25	75	-	-	-	-	-	-	-	-
Stop Controlled	PM	-	-	-	-	-	-	-	-	25	50	-	-	-	-	-	-	-	-

Concept A

Intersection	Peak Hour	Queue Lengths															
		EBU		EBL		EBR		WBU		WBL		WBT		NBR		SBR	
		Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max
CSAH 24 & TH 14	AM	-	-	25	50	0	25	-	-	25	50	0	25	75	150	25	75
Stop Controlled	PM	-	-	25	50	25	25	-	-	25	75	-	-	50	75	25	50
TH 14 & West U-turn	AM	-	-	-	-	-	-	25	25	-	-	-	-	-	-	-	-
Stop Controlled	PM	-	-	-	-	-	-	25	50	-	-	-	-	-	-	-	-
TH 14 & East U-Turn	AM	50	125	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Stop Controlled	PM	25	75	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Concept B

Intersection	Peak Hour	Queue Lengths													
		EBU		EBL		EBR		WBU		WBL		NBR		SBR	
		Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max
CSAH 24 & TH 14	AM	-	-	25	50	0	25	-	-	25	50	50	100	25	75
Stop Controlled	PM	-	-	25	75	25	25	-	-	25	50	25	75	25	75
TH 14 & West U-turn	AM	-	-	-	-	-	-	0	25	-	-	-	-	-	-
Stop Controlled	PM	-	-	-	-	-	-	25	50	-	-	-	-	-	-
TH 14 & East U-Turn	AM	50	100	-	-	-	-	-	-	-	-	-	-	-	-
Stop Controlled	PM	25	75	-	-	-	-	-	-	-	-	-	-	-	-
Old TH 14 & TH 14	AM	-	-	-	-	-	-	-	-	25	25	50	75	-	-
Stop Controlled	PM	-	-	-	-	-	-	-	-	25	25	25	50	-	-
TH 14 & East Uturn2	AM	25	50	-	-	-	-	-	-	-	-	-	-	-	-
Stop Controlled	PM	25	50	-	-	-	-	-	-	-	-	-	-	-	-

Concept C

Intersection	Peak Hour	Queue Lengths							
		EB		WB		NB		SB	
		Avg	Max	Avg	Max	Avg	Max	Avg	Max
CSAH 24 & TH 14 (North)	AM	-	-	-	-	-	25	-	-
Roundabout	PM	-	-	-	-	-	-	-	-
CSAH 24 & TH 14 (South)	AM	-	-	-	-	-	25	-	-
Roundabout	PM	-	25	-	-	-	-	-	-

Concept E (1 of 2)

Intersection	Peak Hour	Queue Lengths							
		EB		WB		NB		SB	
		Avg	Max	Avg	Max	Avg	Max	Avg	Max
CSAH 24 & TH 14 (North)	AM	-	-	-	-	-	25	-	-
Roundabout	PM	-	-	-	-	-	-	-	-
CSAH 24 & TH 14 (South)	AM	-	-	-	-	-	25	-	-
Roundabout	PM	-	-	-	25	-	-	-	-

Concept E (2 of 2)

Intersection	Peak Hour	Queue Lengths													
		EBU		EBL		EBR		WBU		WBL		NBR		SBR	
		Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max
Old TH 14 & TH 14	AM	-	-	-	-	-	-	-	-	25	25	50	75	-	-
Stop Controlled	PM	-	-	-	-	-	-	-	-	25	25	25	50	-	-
TH 14 & East Uturn2	AM	25	50	-	-	-	-	-	-	-	-	-	-	-	-
Stop Controlled	PM	25	50	-	-	-	-	-	-	-	-	-	-	-	-

Concept F

Intersection	Peak Hour	Queue Lengths													
		EBU		EBR		WBL		WBL/R		NBR		SBL/T		SBR	
		Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max
EB TH 14 Access & TH 14	AM	-	-	-	-	-	-	-	-	25	50	-	-	-	-
Stop Controlled	PM	-	-	-	-	-	-	-	-	25	50	-	-	-	-
TH 14 & WB TH 14 Access	AM	-	-	-	-	-	-	-	-	-	-	-	-	50	100
Stop Controlled	PM	-	-	-	-	-	-	-	-	-	-	-	-	50	75
CSAH 12 & WB TH 14 Acces	AM	-	-	-	-	-	-	25	50	-	-	25	50	-	-
Stop Controlled	PM	-	-	-	-	-	-	25	75	-	-	0	25	-	-
Old TH 14 & TH 14	AM	-	-	0	25	25	50	-	-	50	75	-	-	-	-
Stop Controlled	PM	-	-	-	-	25	25	-	-	25	75	-	-	-	-
TH 14 & East Uturn2	AM	25	50	-	-	-	-	-	-	-	-	-	-	-	-
Stop Controlled	PM	25	50	-	-	-	-	-	-	-	-	-	-	-	-

2040
CSAH 37 and 446th Alternatives

Existing Conditions

Intersection	Peak Hour	Intersection Delay (sec/veh)		Movement Delay (sec/veh)																											
				NBU		NBL		NBT		NBR		SBU		SBL		SBT		SBR		EBU		EBL		EBT		EBR		WBU		WBL		WBT		WBR	
CSAH 37 & TH 14	AM	4	A	-		44	E	-		4	A	-		-		-		-		-		-		2	A	1	A	-		7	A	1	A	-	
Stop Controlled	PM	25	D	-		202	F	-		36	E	-		-		-		-		-		-		2	A	1	A	-		7	A	1	A	-	
TH 14 & 446th	AM	2	A	-		-		-		-		-		9	A	-		5	A	-		-		1	A	-		-		-		3	A	-	
Stop Controlled	PM	2	A	-		-		-		-		-		15	C	-		-		-		-		1	A	-		-		-		3	A	0	A

Traditional At-Grade

Intersection	Peak Hour	Intersection Delay (sec/veh)		Movement Delay (sec/veh)																											
				NBU		NBL		NBT		NBR		SBU		SBL		SBT		SBR		EBU		EBL		EBT		EBR		WBU		WBL		WBT		WBR	
CSAH 37/446th & TH 14	AM	8	A	-		108	F	-		6	A	-		135	F	21	C	4	A	-		-		1	A	2	A	-		11	B	1	A	-	
Stop Controlled	PM	125	F	-		845	F	-		385	F	-		158	F	62	F	-		-		-		2	A	2	A	-		13	B	1	A	2	A

RCUT

Intersection	Peak Hour	Intersection Delay (sec/veh)		Movement Delay (sec/veh)																											
				NBU		NBL		NBT		NBR		SBU		SBL		SBT		SBR		EBU		EBL		EBT		EBR		WBU		WBL		WBT		WBR	
CSAH 37 & TH 14	AM	4	A	-		-		-		6	A	-		-		-		-		-		-		1	A	0	A	-		9	A	1	A	-	
Stop Controlled	PM	5	A	-		-		-		9	A	-		-		-		-		-		-		2	A	1	A	-		11	B	1	A	-	
TH 14 & 446th	AM	0	A	-		-		-		-		-		16	C	-		3	A	-		-		0	A	-		-		-		0	A	-	
Stop Controlled	PM	0	A	-		-		-		-		-		17	C	-		-		-		-		0	A	-		-		-		0	A	0	A
TH 14	AM	1	A	-		-		-		-		-		-		-		-		12	B	-		1	A	-		-		-		1	A	-	
Stop Controlled	PM	2	A	-		-		-		-		-		-		-		-		17	C	-		1	A	-		-		-		1	A	-	

High T

Intersection	Peak Hour	Intersection Delay (sec/veh)		Movement Delay (sec/veh)																											
				NBU		NBL		NBT		NBR		SBU		SBL		SBT		SBR		EBU		EBL		EBT		EBR		WBU		WBL		WBT		WBR	
CSAH 37 & TH 14	AM	3	A	-		14	B	-		3	A	-		-		-		-		-		-		-		-		-		3	A	1	A	-	
Stop Controlled	PM	5	A	-		29	D	-		4	A	-		-		-		-		-		-		-		-		-		4	A	1	A	-	
TH 14	AM	1	A	-		-		-		-		-		-		-		2	A	-		-		-		-		-		-		1	A	-	
Stop Controlled	PM	1	A	-		-		-		-		-		-		-		-		-		-		-		-		-		-		1	A	0	A

Interchange Roundabouts

Intersection	Peak Hour	Intersection Delay (sec/veh)		Movement Delay (sec/veh)							
				EB		WB		NB		SB	
CSAH 37 & TH 14 (North)	AM	6	A	0	A	7	A	4	A	5	A
Roundabout	PM	7	A	0	A	8	A	5	A	6	A
CSAH 37 & TH 14 (South)	AM	6	A	6	A	0	A	6	A	6	A
Roundabout	PM	7	A	6	A	0	A	7	A	7	A

Roundabouts

Intersection	Peak Hour	Intersection Delay (sec/veh)		Movement Delay (sec/veh)					
				EB		WB		NB	
CSAH 37 & TH 14	AM	8	A	14	B	7	A	1	A
Roundabout	PM	9	A	15	C	9	A	2	A

2040
CSAH 37 and 446th Alternatives

Existing Conditions

Intersection	Peak Hour	Queue Lengths									
		EBR		WBL		NBL		NBR		SBL/R	
		Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max
CSAH 37 & TH 14	AM	25	75	75	150	50	150	-	-	-	-
Stop Controlled	PM	25	75	75	150	325	875	100	275	-	-
TH 14 & 446th	AM	-	-	-	-	-	-	-	-	25	50
Stop Controlled	PM	-	-	-	-	-	-	-	-	25	25

Traditional At-Grade

Intersection	Peak Hour	Queue Lengths															
		EBT		EBR		WBL		WBT 1		WBT 2		NBL/T		NBR		SBL/T/R	
		Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max
CSAH 37/446th & TH 14	AM	-	-	25	75	75	200	25	25	0	25	75	150	75	200	25	50
Stop Controlled	PM	0	25	25	75	100	200	25	50	0	25	1300	2200	175	325	25	50

RCUT

Intersection	Peak Hour	Queue Lengths											
		EBU		EBR		WBL		WBT		NBR		SBL/R	
		Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max
CSAH 37 & TH 14	AM	-	-	25	50	75	150	-	-	75	125	-	-
Stop Controlled	PM	-	-	25	50	100	200	0	25	75	200	-	-
TH 14 & 446th	AM	-	-	-	-	-	-	-	-	-	-	25	25
Stop Controlled	PM	-	-	-	-	-	-	-	-	-	-	25	50
TH 14	AM	25	100	-	-	-	-	-	-	-	-	-	-
Stop Controlled	PM	50	150	-	-	-	-	-	-	-	-	-	-

High T

Intersection	Peak Hour	Queue Lengths					
		WBL		NBL		SBR	
		Avg	Max	Avg	Max	Avg	Max
CSAH 37 & TH 14	AM	0	25	25	75	-	-
Stop Controlled	PM	0	25	75	175	-	-
TH 14	AM	-	-	-	-	25	25
Stop Controlled	PM	-	-	-	-	-	-

Interchange Roundabouts

Intersection	Peak Hour	Queue Lengths							
		EB		WB		NB		SB	
		Avg	Max	Avg	Max	Avg	Max	Avg	Max
CSAH 37 & TH 14 (North)	AM	-	-	-	25	-	-	-	-
Roundabout	PM	-	-	-	50	-	-	-	-
CSAH 37 & TH 14 (South)	AM	-	-	-	-	-	25	-	25
Roundabout	PM	-	-	-	-	-	50	-	25

Roundabouts

Intersection	Peak Hour	Queue Lengths							
		EBL		WBL		WBT/R		NB	
		Avg	Max	Avg	Max	Avg	Max	Avg	Max
CSAH 37 & TH 14	AM	-	100	-	25	-	50	-	25
Roundabout	PM	-	100	-	50	-	50	-	25

2040
CSAH 37 and 571st Alternatives

Existing Conditions

Intersection	Peak Hour	Intersection Delay (sec/veh)		Movement Delay (sec/veh)																							
				NBU	NBL		NBT	NBR		SBU	SBL	SBT	SBR	EBU	EBL	EBT		EBR		WBU	WBL		WBT		WBR
571st Ln & TH 14	AM	90	F	-	644	F	-	593	F	-	-	-	-	-	-	4	A	2	A	-	25	D	6	A	-
Stop Controlled	PM	42	E	-	1098	F	-	964	F	-	-	-	-	-	-	4	A	1	A	-	17	C	5	A	-

Traditional At-Grade

Intersection	Peak Hour	Intersection Delay (sec/veh)		Movement Delay (sec/veh)																							
				NBU	NBL		NBT	NBR		SBU	SBL	SBT	SBR	EBU	EBL	EBT		EBR		WBU	WBL		WBT		WBR
571st Ln & TH 14	AM	3	A	-	26	D	-	10	B	-	-	-	-	-	-	2	A	1	A	-	12	B	3	A	-
Stop Controlled	PM	3	A	-	29	D	-	16	C	-	-	-	-	-	-	2	A	0	A	-	10	B	3	A	-

Green T

Intersection	Peak Hour	Intersection Delay (sec/veh)		Movement Delay (sec/veh)																							
				NBU	NBL		NBT	NBR		SBU	SBL	SBT	SBR	EBU	EBL	EBT		EBR		WBU	WBL		WBT		WBR
571st Ln & TH 14	AM	1	A	-	24	C	-	5	A	-	-	-	-	-	-	1	A	2	A	-	7	A	2	A	-
Stop Controlled	PM	2	A	-	16	C	-	5	A	-	-	-	-	-	-	1	A	2	A	-	9	A	2	A	-

RCUT

Intersection	Peak Hour	Intersection Delay (sec/veh)		Movement Delay (sec/veh)																							
				NBU	NBL		NBT	NBR		SBU	SBL	SBT	SBR	EBU	EBL	EBT		EBR		WBU	WBL		WBT		WBR
571st Ln & TH 14	AM	1	A	-	-		-	7	A	-	-	-	-	-	-	1	A	1	A	-	7	A	1	A	-
Stop Controlled	PM	1	A	-	-		-	7	A	-	-	-	-	-	-	1	A	1	A	-	9	A	1	A	-
TH 14	AM	1	A	-	-		-	-		-	-	-	-	7	A	1	A	-		-	-		1	A	-
Stop Controlled	PM	1	A	-	-		-	-		-	-	-	-	9	A	1	A	-		-	-		1	A	-

2040
CSAH 37 and 571st Alternatives

Existing Conditions

Intersection	Peak Hour	Queue Lengths									
		EBT		EBR		WBL		WBT		NBL/R	
		Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max
571st Ln & TH 14	AM	25	25	25	100	200	475	50	450	1400	1450
Stop Controlled	PM	25	50	25	50	50	125	-	-	775	1250

Traditional At-Grade

Intersection	Peak Hour	Queue Lengths							
		EBT		EBR		WBL		NBL/R	
		Avg	Max	Avg	Max	Avg	Max	Avg	Max
571st Ln & TH 14	AM	-	-	0	25	25	125	25	150
Stop Controlled	PM	0	25	25	25	25	100	50	250

Green T

Intersection	Peak Hour	Queue Lengths									
		EBT 1		EBT 2		WBL		NBL		NBR	
		Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max
571st Ln & TH 14	AM	0	25	0	25	25	100	25	125	25	100
Stop Controlled	PM	0	25	0	25	25	100	50	150	50	125

RCUT

Intersection	Peak Hour	Queue Lengths											
		EBU		EBT 1		EBT 2		WBL		WBT		NBR	
		Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max
571st Ln & TH 14	AM	-	-	25	25	-	-	-	-	25	100	25	125
Stop Controlled	PM	-	-	25	25	25	25	0	25	25	125	50	125
TH 14	AM	25	100	-	-	-	-	-	-	-	-	-	-
Stop Controlled	PM	50	125	-	-	-	-	-	-	-	-	-	-

2040
CSAH 37 and 561st Alternatives

Existing Conditions

Intersection	Peak Hour	Intersection Delay (sec/veh)		Movement Delay (sec/veh)																											
				NBU		NBL		NBT		NBR		SBU		SBL		SBT		SBR		EBU		EBL		EBT		EBR		WBU		WBL		WBT		WBR	
TH 14 & 561st	AM	5	A	-		87	F	-		21	C	-		71	F	-		25	D	-		7	A	4	A	2	A	-		9	A	4	A	1	A
Stop Controlled	PM	9	A	-		176	F	-		74	F	-		118	F	-		62	F	-		8	A	5	A	2	A	-		10	B	4	A	1	A

RCUT

Intersection	Peak Hour	Intersection Delay (sec/veh)		Movement Delay (sec/veh)																											
				NBU		NBL		NBT		NBR		SBU		SBL		SBT		SBR		EBU		EBL		EBT		EBR		WBU		WBL		WBT		WBR	
561st Ln & TH 14	AM	0	A	-		-		-		6	A	-		-		-		-		-		-		0	A	0	A	-		22	C	0	A	-	
Stop Controlled	PM	1	A	-		-		-		7	A	-		-		-		-		-		-		0	A	0	A	-		7	A	0	A	-	
TH 14 & 561st Ln	AM	4	A	-		-		-		-		-		-		-		3	A	-		11	B	7	A	-		-		-		0	A	0	A
Stop Controlled	PM	4	A	-		-		-		-		-		-		-		4	A	-		12	B	7	A	-		-		-		1	A	0	A
TH 14	AM	1	A	-		-		-		-		-		-		-		-		7	A	-		0	A	-		-		-		1	A	-	
Stop Controlled	PM	1	A	-		-		-		-		-		-		-		-		9	A	-		0	A	-		-		-		1	A	-	
TH 14	AM	13	B	-		-		-		-		-		-		-		-		-		-		14	B	-		3	A	-		11	B	-	
Stop Controlled	PM	13	B	-		-		-		-		-		-		-		-		-		-		14	B	-		3	A	-		12	B	-	

2040
CSAH 37 and 561st Alternatives

Existing Conditions

Intersection	Peak Hour	Queue Lengths									
		EBL		EBR		WBL		NBL/T/R		SBL/T/R	
		Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max
TH 14 & 561st	AM	25	75	0	25	25	50	25	150	25	100
Stop Controlled	PM	25	50	-	-	25	75	75	250	75	200

RCUT

Intersection	Peak Hour	Queue Lengths																			
		EBU		EBL		EBT 1		EBT 2		WBU		WBL		WBT 1		WBT 2		NBR		SBR	
		Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max
561st Ln & TH 14	AM	-	-	-	-	-	-	-	-	-	-	25	75	-	-	-	-	25	75	-	-
Stop Controlled	PM	-	-	-	-	-	-	-	-	-	-	25	75	-	-	-	-	25	100	-	-
TH 14 & 561st Ln	AM	-	-	25	75	-	-	-	-	-	-	-	-	0	25	-	-	-	-	25	50
Stop Controlled	PM	-	-	25	75	-	-	-	-	-	-	-	-	-	-	-	-	-	-	50	75
TH 14	AM	25	75	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Stop Controlled	PM	25	75	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TH 14	AM	-	-	-	-	75	125	75	125	25	25	-	-	75	100	75	100	-	-	-	-
Stop Controlled	PM	-	-	-	-	75	125	75	125	25	50	-	-	75	100	75	125	-	-	-	-

2040
Courtland Alternatives

Existing Conditions

Intersection	Peak Hour	Intersection Delay (sec/veh)		Movement Delay (sec/veh)																											
				NBU		NBL		NBT		NBR		SBU		SBL		SBT		SBR		EBU		EBL		EBT		EBR		WBU		WBL		WBT		WBR	
TH 14 & CSAH 12 (541st)	AM	4	A	-		-		-		-		-		13	B	-		7	A	-		-		3	A	-		-		-		5	A	3	A
Stop Controlled	PM	5	A	-		-		-		-		10	B	16	C	-		6	A	-		6	A	3	A	-		-		-		6	A	5	A
CSAH 24 (4th) & TH 14	AM	7	A	-		24	C	-		15	C	-		-		11	B	8	A	-		-		6	A	5	A	-		8	A	4	A	-	
Stop Controlled	PM	8	A	-		34	D	16	C	11	B	-		-		-		7	A	-		15	C	6	A	5	A	-		11	B	6	A	-	
TH 14 & 531st	AM	3	A	-		-		-		-		-		-		-		4	A	-		6	A	5	A	-		-		-		1	A	-	
Stop Controlled	PM	3	A	-		-		-		-		-		19	C	-		6	A	-		10	B	5	A	-		-		-		1	A	0	A
CSAH 25 (478th) & TH 14	AM	3	A	-		16	C	-		-		-		-		-		-		-		-		4	A	1	A	-		-		2	A	-	
Stop Controlled	PM	3	A	-		14	B	-		-		-		-		-		-		-		-		3	A	1	A	-		-		2	A	-	

Concept A

Intersection	Peak Hour	Intersection Delay (sec/veh)		Movement Delay (sec/veh)																											
				NBU		NBL		NBT		NBR		SBU		SBL		SBT		SBR		EBU		EBL		EBT		EBR		WBU		WBL		WBT		WBR	
CSAH 24 & TH 14	AM	3	A	-		-		-		10	B	-		-		-		5	A	-		4	A	2	A	0	A	-		6	A	1	A	1	A
Stop Controlled	PM	2	A	-		-		-		4	A	-		-		-		4	A	-		7	A	1	A	1	A	-		7	A	1	A	1	A
TH 14 & West U-turn	AM	1	A	-		-		-		-		-		-		-		-		-		-		2	A	-		-		-		1	A	-	
Stop Controlled	PM	2	A	-		-		-		-		-		-		-		-		-		-		2	A	-		12	B	-		1	A	-	
TH 14 & East U-Turn	AM	3	A	-		-		-		-		-		-		-		-		8	A	-		1	A	-		-		-		4	A	-	
Stop Controlled	PM	3	A	-		-		-		-		-		-		-		-		8	A	-		1	A	-		-		-		4	A	-	

Concept B

Intersection	Peak Hour	Intersection Delay (sec/veh)		Movement Delay (sec/veh)																											
				NBU		NBL		NBT		NBR		SBU		SBL		SBT		SBR		EBU		EBL		EBT		EBR		WBU		WBL		WBT		WBR	
CSAH 24 & TH 14	AM	2	A	-		-		-		6	A	-		-		-		4	A	-		5	A	1	A	0	A	-		6	A	1	A	1	A
Stop Controlled	PM	1	A	-		-		-		4	A	-		-		-		4	A	-		6	A	1	A	0	A	-		6	A	1	A	0	A
TH 14 & West U-turn	AM	1	A	-		-		-		-		-		-		-		-		-		-		1	A	-		-		-		1	A	-	
Stop Controlled	PM	1	A	-		-		-		-		-		-		-		-		-		-		1	A	-		11	B	-		1	A	-	
TH 14 & East U-Turn	AM	3	A	-		-		-		-		-		-		-		-		8	A	-		1	A	-		-		-		4	A	-	
Stop Controlled	PM	3	A	-		-		-		-		-		-		-		-		8	A	-		1	A	-		-		-		5	A	-	
Old TH 14 & TH 14	AM	3	A	-		-		-		4	A	-		-		-		-		-		-		5	A	4	A	-		5	A	0	A	-	
Stop Controlled	PM	3	A	-		-		-		3	A	-		-		-		-		-		-		5	A	4	A	-		3	A	0	A	-	
TH 14 & East Uturn2	AM	1	A	-		-		-		-		-		-		-		-		6	A	-		1	A	-		-		-		1	A	-	
Stop Controlled	PM	1	A	-		-		-		-		-		-		-		-		11	B	-		1	A	-		-		-		1	A	-	

Concept C

Intersection	Peak Hour	Intersection Delay (sec/veh)		Movement Delay (sec/veh)							
				EB		WB		NB		SB	
CSAH 24 & TH 14 (North)	AM	5	A	0	A	5	A	5	A	5	A
Roundabout	PM	4	A	0	A	5	A	4	A	4	A
CSAH 24 & TH 14 (South)	AM	5	A	4	A	0	A	6	A	4	A
Roundabout	PM	5	A	5	A	0	A	4	A	4	A

Concept E (1 of 2)

Intersection	Peak Hour	Intersection Delay (sec/veh)		Movement Delay (sec/veh)							
				EB		WB		NB		SB	
CSAH 24 & TH 14 (North)	AM	5	A	0	A	4	A	5	A	5	A
Roundabout	PM	4	A	0	A	4	A	4	A	4	A
CSAH 24 & TH 14 (South)	AM	5	A	4	A	5	A	5	A	4	A
Roundabout	PM	5	A	5	A	5	A	4	A	5	A

Concept E (2 of 2)

Intersection	Peak Hour	Intersection Delay (sec/veh)		Movement Delay (sec/veh)																											
				NBU		NBL		NBT		NBR		SBU		SBL		SBT		SBR		EBU		EBL		EBT		EBR		WBU		WBL		WBT		WBR	
Old TH 14 & TH 14	AM	3	A	-		-		-		4	A	-		-		-		-		-		-		5	A	4	A	-		5	A	0	A	-	
Stop Controlled	PM	3	A	-		-		-		3	A	-		-		-		-		-		-		5	A	4	A	-		3	A	0	A	-	
TH 14 & East Uturn2	AM	1	A	-		-		-		-		-		-		-		-		6	A	-		1	A	-		-		-		1	A	-	
Stop Controlled	PM	1	A	-		-		-		-		-		-		-		-		11	B	-		1	A	-		-		-		1	A	-	

Concept F

Intersection	Peak Hour	Intersection Delay (sec/veh)		Movement Delay (sec/veh)																											
				NBU		NBL		NBT		NBR		SBU		SBL		SBT		SBR		EBU		EBL		EBT		EBR		WBU		WBL		WBT		WBR	
EB TH 14 Access & TH 14	AM	1	A	-		-		-		3	A	-		-		-		-		-		-		1	A	1	A	-		-		1	A	-	
Stop Controlled	PM	1	A	-		-		-		3	A	-		-		-		-		-		-		1	A	1	A	-		-		2	A	-	
TH 14 & WB TH 14 Access	AM	3	A	-		-		-		-		-		-		0	A	4	A	-		-		1	A	-		-		-		4	A	3	A
Stop Controlled	PM	3	A	-		-		-		-		-		-		-		4	A	-		-		1	A	-		-		-		5	A	4	A
CSAH 12 & WB TH 14 Access	AM	1	A	-		-		1	A	1	A	-		3	A	0	A	-		-		-		-		-		-		4	A	-		3	A
Stop Controlled	PM	1	A	-		-		1	A	0	A	-		2	A	0	A	-		-		-		-		-		-		5	A	-		3	A
Old TH 14 & TH 14	AM	3	A	-		-		-		4	A	-		-		-		-		-		-		5	A	3	A	-		4	A	0	A	-	
Stop Controlled	PM	3	A	-		-		-		4	A	-		-		-		-		-		-		5	A	3	A	-		4	A	0	A	-	
TH 14 & East Uturn2	AM	1	A	-		-		-		-		-		-		-		-		6	A	-		1	A	-		-		-		1	A	-	
Stop Controlled	PM	1	A	-		-		-		-		-		-		-		-		10	B	-		1	A	-		-		-		1	A	-	

2040
Courtland Alternatives

Existing Conditions

Intersection	Peak Hour	Queue Lengths																	
		EBL/T		EBL/T/R		WBL/T/R		WBT		NBL/R		NBL/T/R		SBU/L/R		SBL/R		SBL/T/R	
		Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max
TH 14 & CSAH 12 (541st)	AM	-	-	-	-	-	-	-	-	-	-	-	-	-	-	25	50	-	-
Stop Controlled	PM	25	125	-	-	-	-	-	-	-	-	-	-	25	50	-	-	-	-
CSAH 24 (4th) & TH 14	AM	-	-	0	25	50	200	-	-	-	-	75	175	-	-	-	-	25	75
Stop Controlled	PM	-	-	25	50	75	250	-	-	-	-	75	175	-	-	-	-	25	50
TH 14 & 531st	AM	25	100	-	-	-	-	-	-	-	-	-	-	-	-	25	50	-	-
Stop Controlled	PM	25	175	-	-	-	-	0	25	-	-	-	-	-	-	25	50	-	-
CSAH 25 (478th) & TH 14	AM	-	-	-	-	-	-	-	-	25	75	-	-	-	-	-	-	-	-
Stop Controlled	PM	-	-	-	-	-	-	-	-	25	75	-	-	-	-	-	-	-	-

Concept A

Intersection	Peak Hour	Queue Lengths																	
		EBU		EBL		EBT		EBR		WBU		WBL		WBT		NBR		SBR	
		Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max
CSAH 24 & TH 14	AM	-	-	25	50	0	25	25	25	-	-	25	75	-	-	100	225	25	75
Stop Controlled	PM	-	-	25	75	-	-	25	50	-	-	25	75	-	-	50	75	25	75
TH 14 & West U-turn	AM	-	-	-	-	-	-	-	-	0	25	-	-	-	-	-	-	-	-
Stop Controlled	PM	-	-	-	-	-	-	-	-	25	50	-	-	-	-	-	-	-	-
TH 14 & East U-Turn	AM	75	125	-	-	-	-	-	-	-	-	-	-	0	25	-	-	-	-
Stop Controlled	PM	50	75	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Concept B

Intersection	Peak Hour	Queue Lengths															
		EBU		EBL		EBR		WBU		WBL		WBR		NBR		SBR	
		Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max
CSAH 24 & TH 14	AM	-	-	25	75	-	-	-	-	25	50	-	-	75	125	25	75
Stop Controlled	PM	-	-	25	100	25	25	-	-	25	50	0	25	50	100	25	75
TH 14 & West U-turn	AM	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Stop Controlled	PM	-	-	-	-	-	-	25	50	-	-	-	-	-	-	-	-
TH 14 & East U-Turn	AM	50	125	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Stop Controlled	PM	25	75	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Old TH 14 & TH 14	AM	-	-	-	-	-	-	-	-	25	50	-	-	50	75	-	-
Stop Controlled	PM	-	-	-	-	-	-	-	-	25	50	-	-	25	50	-	-
TH 14 & East Uturn2	AM	25	75	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Stop Controlled	PM	25	50	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Concept C

Intersection	Peak Hour	Queue Lengths							
		EB		WB		NB		SB	
		Avg	Max	Avg	Max	Avg	Max	Avg	Max
CSAH 24 & TH 14 (North)	AM	-	-	-	-	-	25	-	-
Roundabout	PM	-	-	-	-	-	-	-	-
CSAH 24 & TH 14 (South)	AM	-	-	-	-	-	25	-	-
Roundabout	PM	-	25	-	-	-	-	-	-

Concept E (1 of 2)

Intersection	Peak Hour	Queue Lengths							
		EB		WB		NB		SB	
		Avg	Max	Avg	Max	Avg	Max	Avg	Max
CSAH 24 & TH 14 (North)	AM	-	-	-	-	-	25	-	-
Roundabout	PM	-	-	-	-	-	-	-	-
CSAH 24 & TH 14 (South)	AM	-	-	-	-	-	25	-	-
Roundabout	PM	-	-	-	25	-	-	-	-

Concept E (2 of 2)

Intersection	Peak Hour	Queue Lengths															
		EBU		EBL		EBR		WBU		WBL		WBR		NBR		SBR	
		Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max
Old TH 14 & TH 14	AM	-	-	-	-	-	-	-	-	25	50	-	-	50	75	-	-
Stop Controlled	PM	-	-	-	-	-	-	-	-	25	50	-	-	25	50	-	-
TH 14 & East Uturn2	AM	25	75	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Stop Controlled	PM	25	50	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Concept F

Intersection	Peak Hour	Queue Lengths															
		EBU		EBR		WBL		WBL/R		NBT/R		NBR		SBL/T		SBR	
		Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max
EB TH 14 Access & TH 14	AM	-	-	-	-	-	-	-	-	-	-	25	50	-	-	-	-
Stop Controlled	PM	-	-	-	-	-	-	-	-	-	-	25	75	-	-	-	-
TH 14 & WB TH 14 Access	AM	-	-	-	-	-	-	-	-	-	-	-	-	-	-	50	100
Stop Controlled	PM	-	-	-	-	-	-	-	-	-	-	-	-	-	-	50	75
CSAH 12 & WB TH 14 Acces	AM	-	-	-	-	-	-	25	75	0	25	-	-	25	50	-	-
Stop Controlled	PM	-	-	-	-	-	-	25	75	-	-	-	-	25	25	-	-
Old TH 14 & TH 14	AM	-	-	-	-	25	50	-	-	-	-	50	100	-	-	-	-
Stop Controlled	PM	-	-	0	25	25	50	-	-	-	-	25	75	-	-	-	-
TH 14 & East Uturn2	AM	25	75	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Stop Controlled	PM	25	50	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix F: Concept Figures

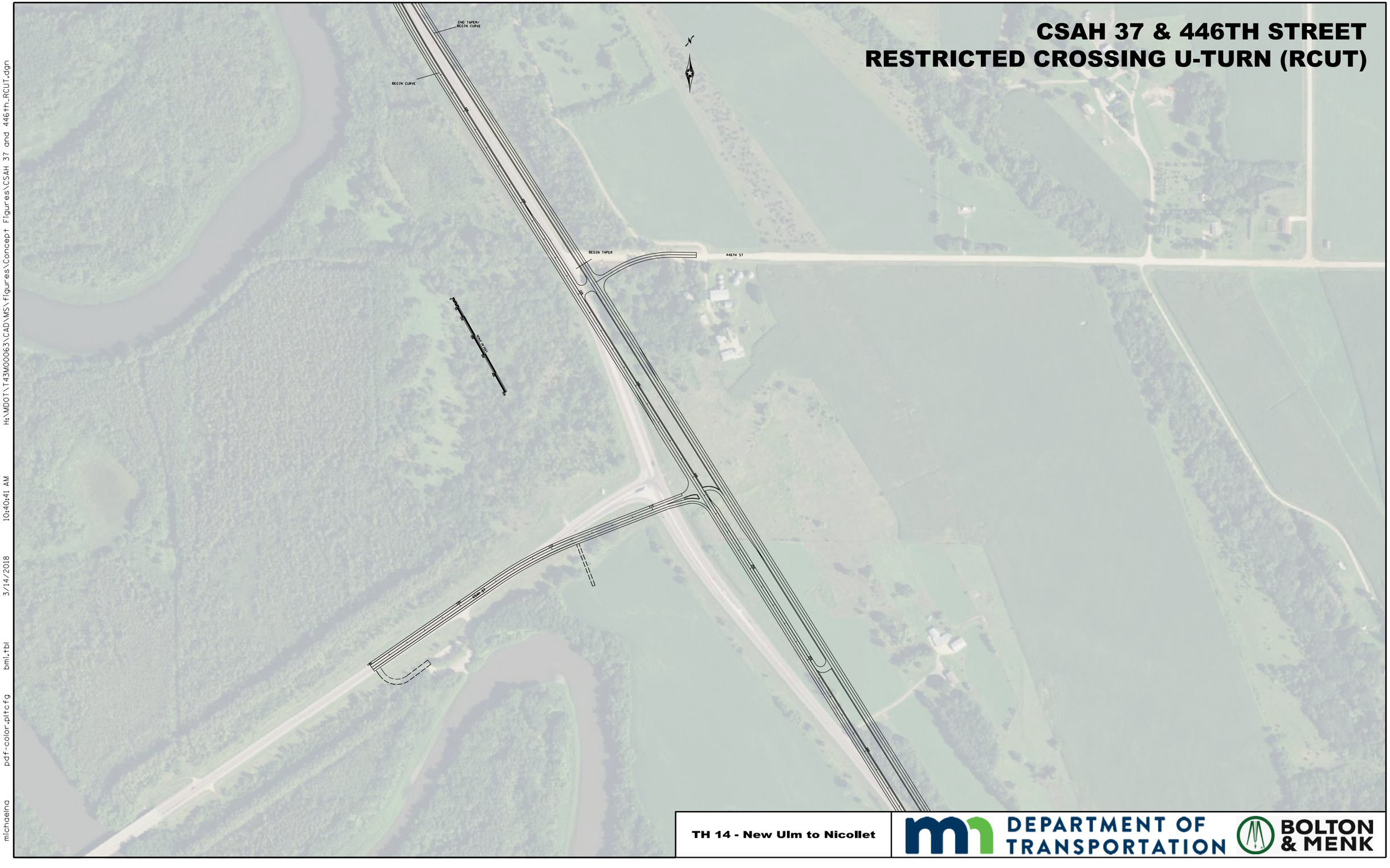
CSAH 37 & 446TH STREET
TRADITIONAL AT-GRADE

TH 14 - New Ulm to Nicollet

DEPARTMENT OF TRANSPORTATION

BOLTON & MENK

CSAH 37 & 446TH STREET
RESTRICTED CROSSING U-TURN (RCUT)



TH 14 - New Ulm to Nicollet

DEPARTMENT OF TRANSPORTATION

BOLTON & MENK

H:\MDOT\T43M00063\CAD\MS\figures\Concept figures\CSAH 37 and 446th_RCUT.dgn
10:40:41 AM
3/14/2018
bmi.tbl
pdf-color-plt.cfg
michaelna

CSAH 37 & 446TH STREET
HIGH-T

TH 14 - New Ulm to Nicollet

DEPARTMENT OF TRANSPORTATION

BOLTON & MENK

H:\MDOT\T43M00063\CAD\MS\figures\Concept Figures\CSAH 37 and 446th_HighT.dgn
4:23:32 PM
3/14/2018
bmi.tbl
pdf-color.pltcfg
jake.pilz

CSAH 37 & 446TH STREET INTERCHANGE

446th St.

TH 14 - New Ulm to Nicollet

DEPARTMENT OF TRANSPORTATION

BOLTON & MENK

H:\MDOT\T43M00063\CAD\MS\figures\Corcept Figures\CSAH 37 and 446th_Interchange.dgn 4:29:06 PM 3/14/2018 bmi.tbl pdf-color.pltcfg jake.pilz

CSAH 37 & 446TH STREET ROUNDABOUT

446th St

TH 14

TH 14 - New Ulm to Nicollet

DEPARTMENT OF TRANSPORTATION

BOLTON & MENK

H:\MDOT\T43M00063\CAD\MS\figures\Concept Figures\CSAH 37 and 446th_Roundabout.dgn
4:30:01 PM
3/14/2018
bmi.tbl
pdf-color.pltcfg
jake.pliz

571ST LANE
TRADITIONAL AT-GRADE

TH 14 - New Ulm to Nicollet

DEPARTMENT OF TRANSPORTATION

BOLTON & MENK

H:\MDOT\T43M00063\CAD\MS\figures\Corcept Figures\571st_AtGrade.dgn
4:33:54 PM
3/14/2018
bmi.tbl
pdf-color.pltcfg
jake.pliz

571ST LANE
GREEN T

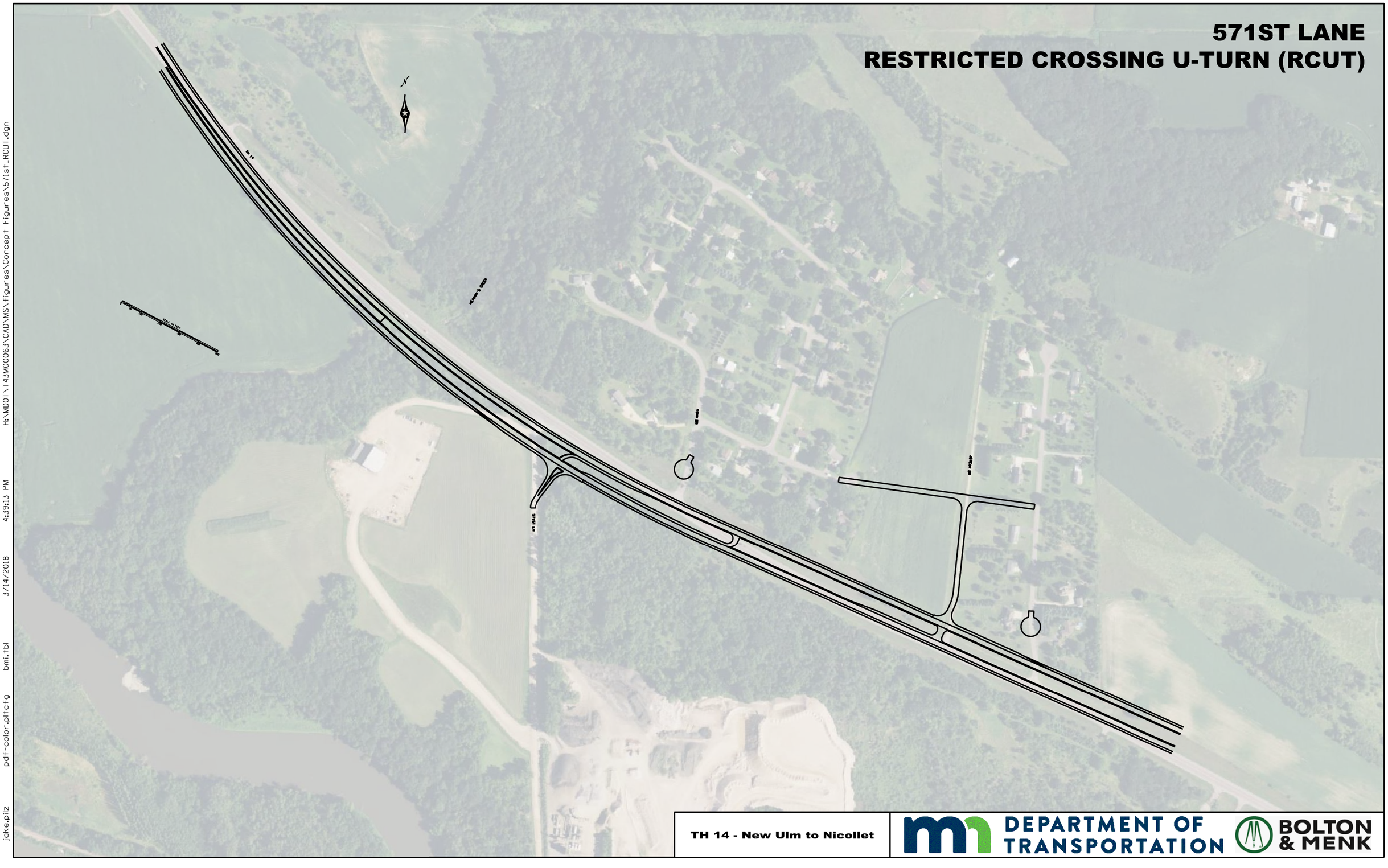
TH 14 - New Ulm to Nicollet

DEPARTMENT OF TRANSPORTATION

BOLTON & MENK

H:\MDOT\T43M00063\CAD\MS\figures\Corcept Figures\571st_GreenT.dgn
4:35:58 PM
3/14/2018
bmi.tbl
pdf-color.pltcfg
jake.pliz

571ST LANE
RESTRICTED CROSSING U-TURN (RCUT)



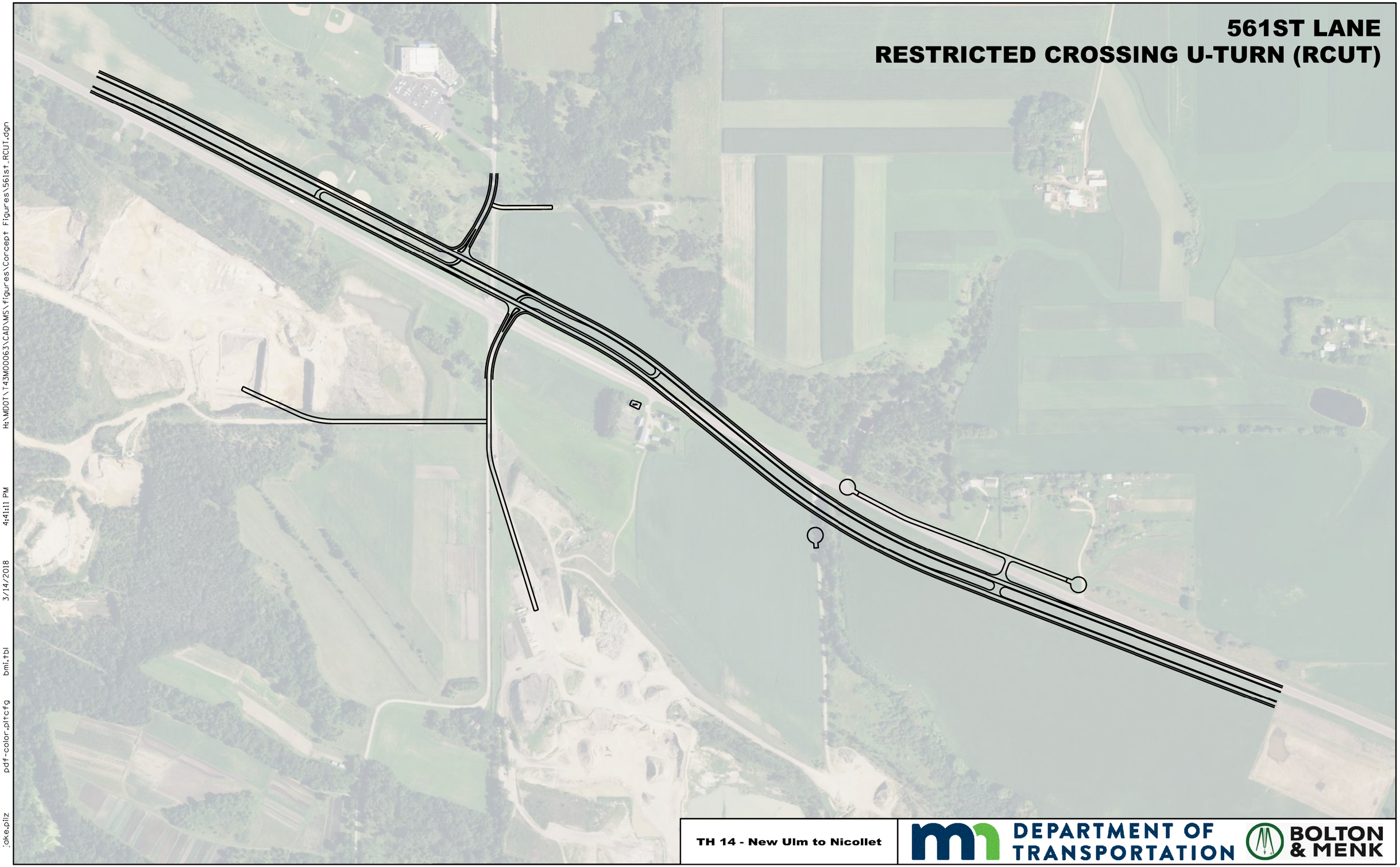
TH 14 - New Ulm to Nicollet

DEPARTMENT OF TRANSPORTATION

BOLTON & MENK

H:\MDOT\T43M00063\CAD\MS\figures\Concept Figures\571st_RCUT.dgn 4:39:13 PM 3/14/2018 bml.tbl pdf-color.pltcfg jake.pliz

561ST LANE
RESTRICTED CROSSING U-TURN (RCUT)



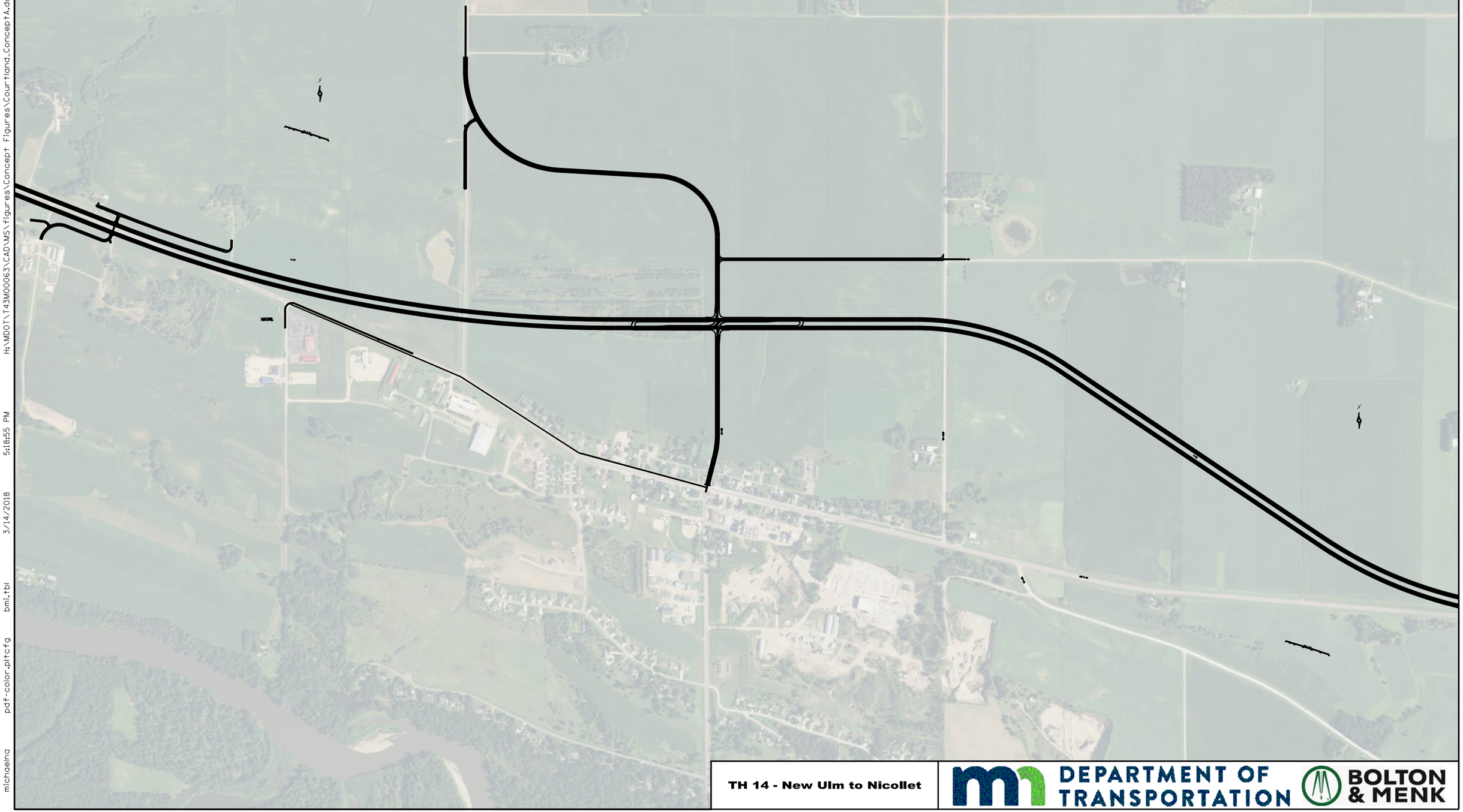
TH 14 - New Ulm to Nicollet

DEPARTMENT OF TRANSPORTATION

BOLTON & MENK

H:\MDOT\T43M00063\CAD\MS\figures\Concept Figures\561st_RCUT.dgn
4:41:11 PM
3/14/2018
bmi.tbl
pdf-color.pltcfg
jake.pilz

CONCEPT A
RESTRICTED CROSSING U-TURN (RCUT) AT CSAH 24

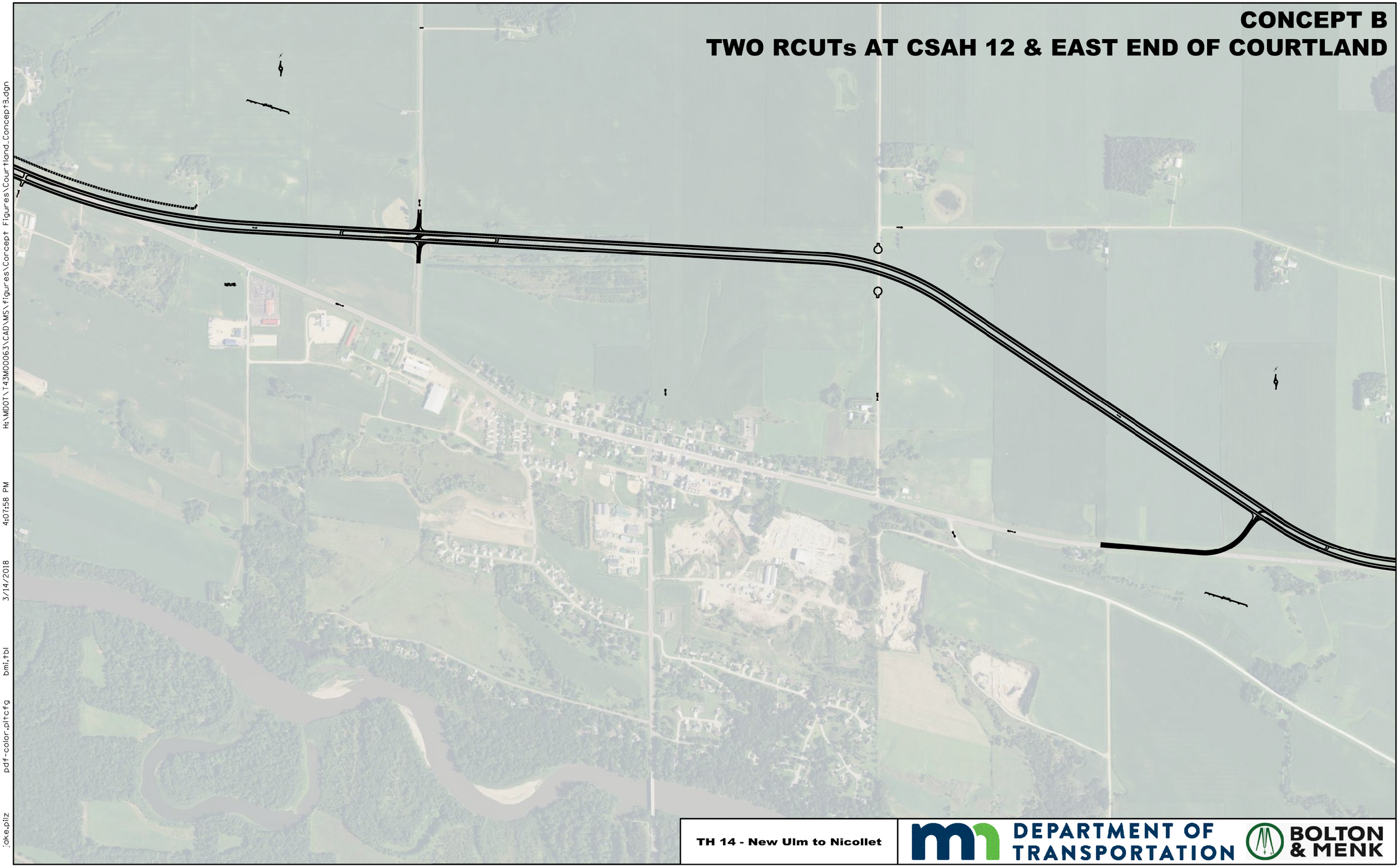


TH 14 - New Ulm to Nicollet

DEPARTMENT OF TRANSPORTATION

BOLTON & MENK

CONCEPT B
TWO RCUTs AT CSAH 12 & EAST END OF COURTLAND



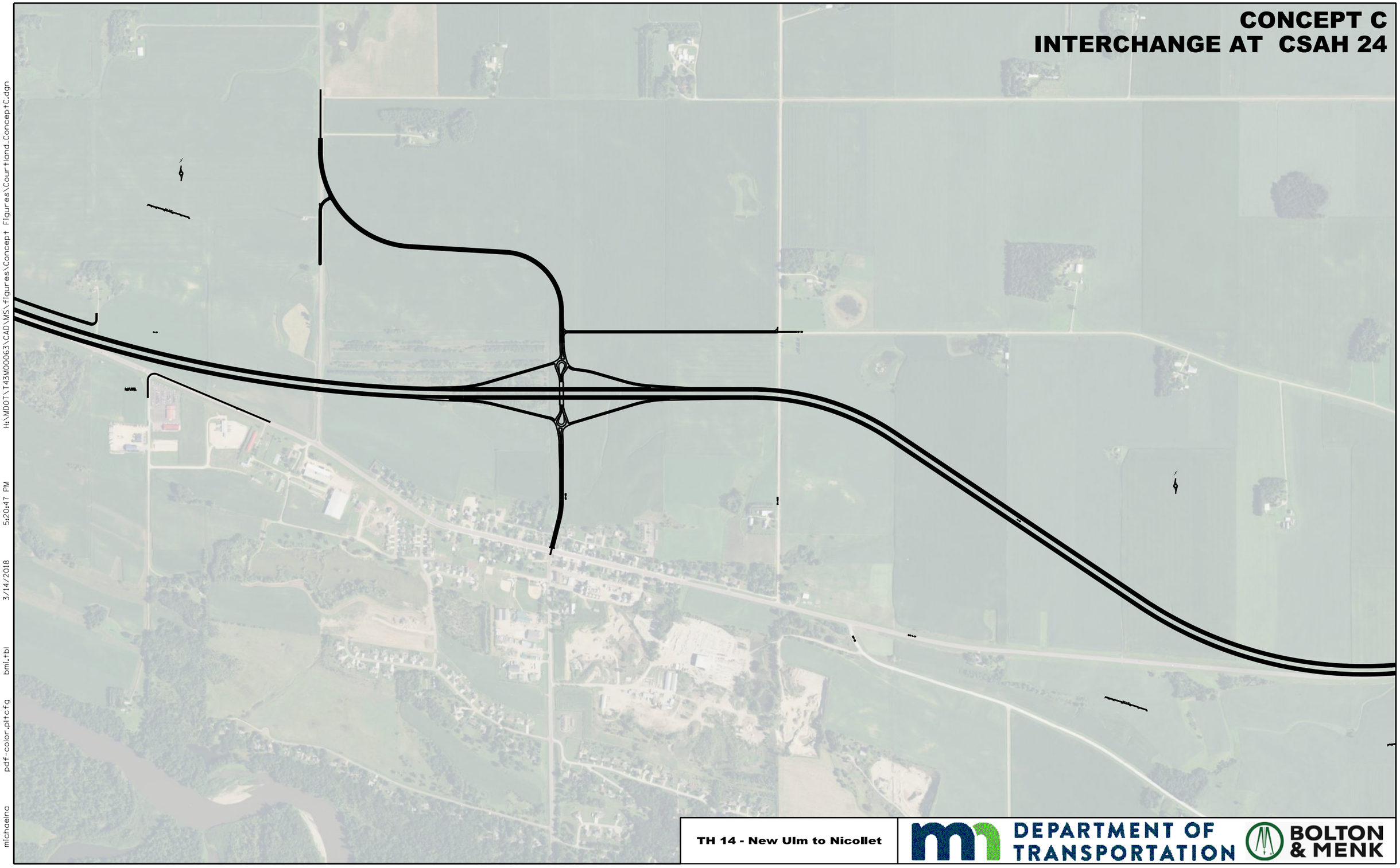
TH 14 - New Ulm to Nicollet

DEPARTMENT OF TRANSPORTATION

BOLTON & MENK

H:\MDOT\T43M00063\CAD\MS\figures\Concept Figures\Courtland_Concept3.dgn
4:07:58 PM
3/14/2018
bmi.tbl
pdf-color.pltcfg
jake.pilz

CONCEPT C
INTERCHANGE AT CSAH 24

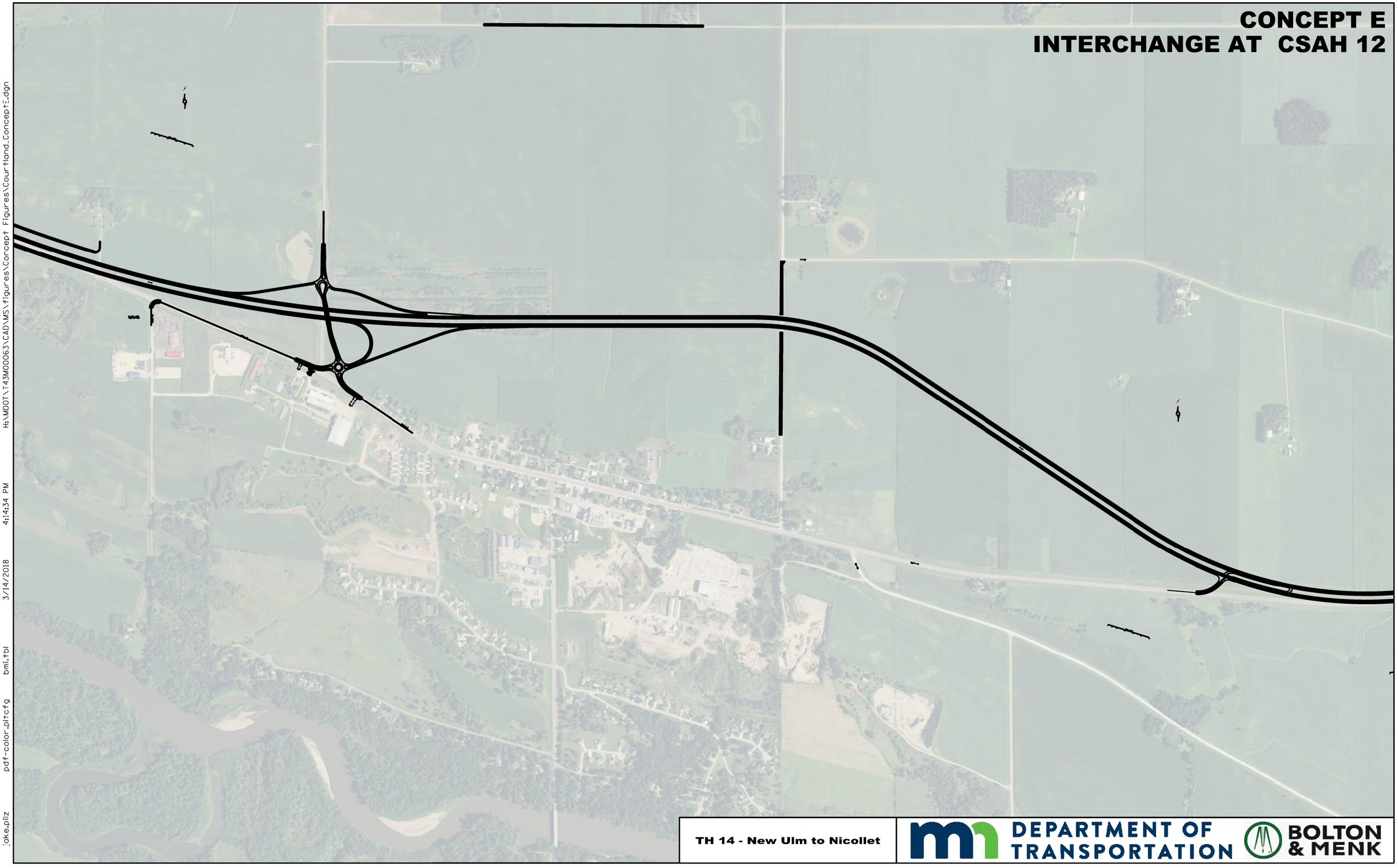


TH 14 - New Ulm to Nicollet

DEPARTMENT OF TRANSPORTATION

BOLTON & MENK

CONCEPT E
INTERCHANGE AT CSAH 12



H:\MDOT\T43M00063\CAD\MS\figures\Concept Figures\CourtHand_ConceptE.dgn
4:14:34 PM
3/14/2018
bmi.tbl
pdf-color.pltcfg
jake.pilz

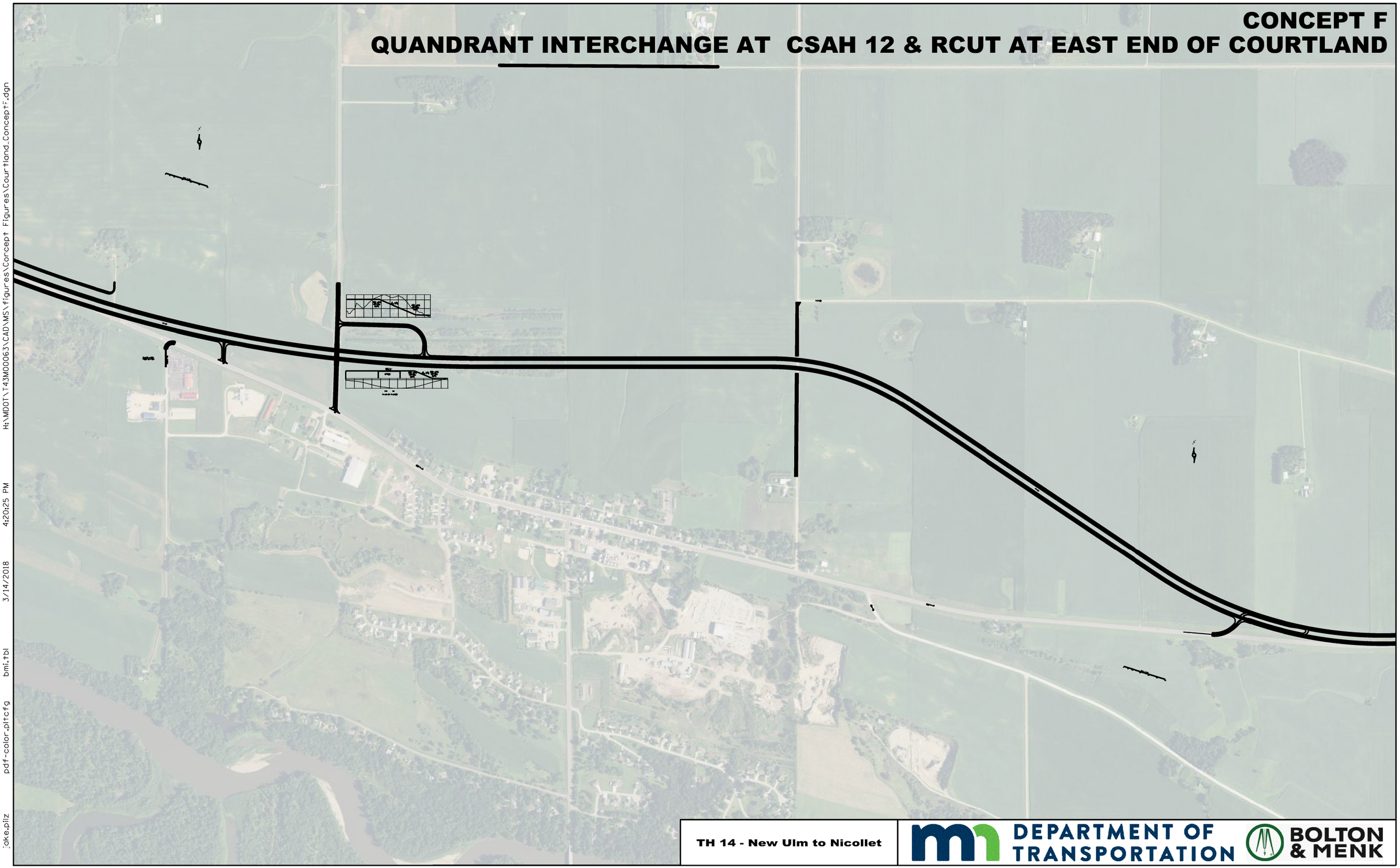
TH 14 - New Ulm to Nicollet

DEPARTMENT OF TRANSPORTATION

BOLTON & MENK

CONCEPT F

QUANDRANT INTERCHANGE AT CSAH 12 & RCUT AT EAST END OF COURTLAND



TH 14 - New Ulm to Nicollet

DEPARTMENT OF TRANSPORTATION

BOLTON & MENK

H:\MDOT\T43M00063\CAD\MS\figures\Concept Figures\Courtland_ConceptF.dgn
4:20:25 PM
3/14/2018
bmi.tbl
pdf-color.pltcfg
jake.pilz

Appendix G: Cost Estimates

Opinion of Probable Cost - Preliminary Cost Estimate

TH 14 Improvements - Estimated Costs - (CSAH 37 Area)

AT-GRADE

2/12/2018

BOLTON & MENK
Real People. Real Solutions.

Item		Unit	Total Qty	Unit Price	Total Cost
MAJOR ROADWAY ITEMS					
	REMOVE BITUMINOUS PAVEMENT	SY	69,300	$ 2.90	$ 201,000
	REMOVE CONCRETE MEDIAN	SY	2,716	$ 6.25	$ 17,000
	REMOVE CURB AND GUTTER	LF		$ 5.95	$ -
	EXCAVATION - COMMON	CY	168,607	$ 3.00	$ 505,900
	COMMON EMBANKMENT (CV)	CY	73,599	$ 2.00	$ 147,200
	SELECT GRANULAR EMBANKMENT (CV)	CY	57,332	$ 14.00	$ 802,700
	TYPE SP 12.5 WEARING COURSE MIX (4,F)	TONS	20,681	$ 74.00	$ 1,530,500
	AGGREGATE BASE (CV) CLASS 6	CY	18,932	$ 26.00	$ 492,300
	CONCRETE CURB AND GUTTER	LF		$ 13.00	$ -
	CONCRETE MEDIAN	SF		$ 5.00	$ -
	CONCRETE MEDIAN BARRIER	LF		$ 81.00	$ -
	LIGHTING	EACH	2	$ 10,000.00	$ 20,000
	Subtotal				$ 3,717,000
	All Roadway Construction Subtotal				**$ 3,717,000**
PERCENTAGE ITEMS					
	MOBILIZATION	5%		of all roadway	$ 185,900
	DRAINAGE	10%		of all roadway	$ 371,700
	SIGNING & PAVEMENT MARKINGS	3%		of all roadway	$ 111,600
	TURF ESTABLISHMENT AND EROSION CONTROL	5%		of all roadway	$ 185,900
	TRAFFIC CONTROL	3%		of all roadway	$ 111,600
	CONTINGENCY FOR ADDITIONAL ITEMS	10%		of all roadway	$ 371,700
	Subtotal				$ 1,338,000
Total Preliminary Construction Cost Estimate (2018 Dollars)					**$ 5,055,000**
RIGHT OF WAY					
	RESIDENTIAL PROPERTY	ACRES		$ 40,000.00	$ -
	AGRICULTURE PROPERTY	ACRES	19.2	$ 8,000.00	$ 153,600
	AGRICULTURE PROPERTY (R-CUT AREA)	ACRES	8.0	$ 8,000.00	$ 64,000
	TOTAL TAKES	EACH			$ -
	Subtotal				$ 217,600
Total Preliminary Construction and R/W Cost Estimate (2018 Dollars)					**$ 5,272,600**

Notes:

1. TH 14 mainline and ramps pavement section assumed is 6.5 inch bituminous pavement, 7 inch aggregate base, and 24 inch sand.
2. Other roadways pavement section assumed is 5 inch bituminous pavement, 8 inch aggregate base, and 24 inch sand.
3. For the purpose of this estimate, non wearing course bituminous is included in wear course quantity.

Opinion of Probable Cost - Preliminary Cost Estimate

TH 14 Improvements - Estimated Costs - (CSAH 37 Area)

AT-GRADE - Benefit Cost

2/12/2018

BOLTON & MENK
Real People. Real Solutions.

Item		Unit	Total Qty	Unit Price	Total Cost
MAJOR ROADWAY ITEMS					
	REMOVE BITUMINOUS PAVEMENT	SY	8,820	$ 2.90	$ 25,600
	REMOVE CONCRETE MEDIAN	SY		$ 6.25	$ -
	REMOVE CURB AND GUTTER	LF		$ 5.95	$ -
	EXCAVATION - COMMON	CY	32,793	$ 3.00	$ 98,400
	COMMON EMBANKMENT (CV)	CY	18,656	$ 2.00	$ 37,400
	SELECT GRANULAR EMBANKMENT (CV)	CY	9,790	$ 14.00	$ 137,100
	TYPE SP 12.5 WEARING COURSE MIX (4,F)	TONS	3,937	$ 74.00	$ 291,400
	AGGREGATE BASE (CV) CLASS 6	CY	2,971	$ 26.00	$ 77,300
	CONCRETE CURB AND GUTTER	LF		$ 13.00	$ -
	CONCRETE MEDIAN	SF		$ 5.00	$ -
	CONCRETE MEDIAN BARRIER	LF		$ 81.00	$ -
	LIGHTING	EACH	2	$ 10,000.00	$ 20,000
	Subtotal				$ 687,000
	All Roadway Construction Subtotal				**$ 687,000**
PERCENTAGE ITEMS					
	MOBILIZATION	5%		of all roadway	$ 34,400
	DRAINAGE	10%		of all roadway	$ 68,700
	SIGNING & PAVEMENT MARKINGS	3%		of all roadway	$ 20,700
	TURF ESTABLISHMENT AND EROSION CONTROL	5%		of all roadway	$ 34,400
	TRAFFIC CONTROL	3%		of all roadway	$ 20,700
	CONTINGENCY FOR ADDITIONAL ITEMS	10%		of all roadway	$ 68,700
	Subtotal				$ 248,000
Total Preliminary Construction Cost Estimate (2018 Dollars)					**$ 935,000**
RIGHT OF WAY					
	RESIDENTIAL PROPERTY	ACRES		$ 40,000.00	$ -
	AGRICULTURE PROPERTY	ACRES		$ 8,000.00	$ -
	AGRICULTURE PROPERTY (R-CUT AREA)	ACRES	8.0	$ 8,000.00	$ 64,000
	TOTAL TAKES	EACH			$ -
	Subtotal				$ 64,000
Total Preliminary Construction and R/W Cost Estimate (2018 Dollars)					**$ 999,000**

Notes:

1. TH 14 mainline and ramps pavement section assumed is 6.5 inch bituminous pavement, 7 inch aggregate base, and 24 inch sand.
2. Other roadways pavement section assumed is 5 inch bituminous pavement, 8 inch aggregate base, and 24 inch sand.
3. For the purpose of this estimate, non wearing course bituminous is included in wear course quantity.

Opinion of Probable Cost - Preliminary Cost Estimate

TH 14 Improvements - Estimated Costs - (CSAH 37 AREA)

R-CUT

2/12/2018

BOLTON & MENK
Real People. Real Solutions.

Item		Unit	Total Qty	Unit Price	Total Cost
MAJOR ROADWAY ITEMS					
	REMOVE BITUMINOUS PAVEMENT	SY	65,000	$ 2.90	$ 188,500
	REMOVE CONCRETE MEDIAN	SF	2,668	$ 6.25	$ 16,700
	REMOVE CURB AND GUTTER	LF		$ 5.95	$ -
	EXCAVATION - COMMON	CY	160,461	$ 3.00	$ 481,400
	COMMON EMBANKMENT (CV)	CY	71,294	$ 2.00	$ 142,600
	SELECT GRANULAR EMBANKMENT (CV)	CY	55,622	$ 14.00	$ 778,800
	TYPE SP 12.5 WEARING COURSE MIX (4,F)	TONS	20,424	$ 74.00	$ 1,511,400
	AGGREGATE BASE (CV) CLASS 6	CY	18,035	$ 26.00	$ 468,900
	CONCRETE CURB AND GUTTER	LF	484	$ 13.00	$ 6,300
	CONCRETE MEDIAN	SY	4,989	$ 5.00	$ 25,000
	8" CONCRETE DRIVEWAY PAVEMENT (RBT APRON)	SY		$ 75.00	$ -
	LIGHTING	EACH	2	$ 10,000.00	$ 20,000
	Subtotal				$ 3,640,000
	All Roadway Construction Subtotal				**$ 3,640,000**
PERCENTAGE ITEMS					
	MOBILIZATION	5%		of all roadway	$ 182,000
	DRAINAGE	10%		of all roadway	$ 364,000
	SIGNING & PAVEMENT MARKINGS	3%		of all roadway	$ 109,200
	TURF ESTABLISHMENT AND EROSION CONTROL	5%		of all roadway	$ 182,000
	TRAFFIC CONTROL	3%		of all roadway	$ 109,200
	CONTINGENCY FOR ADDITIONAL ITEMS	10%		of all roadway	$ 364,000
	Subtotal				$ 1,310,000
Total Preliminary Construction Cost Estimate (2018 Dollars)					**$ 4,950,000**
RIGHT OF WAY					
	RESIDENTIAL PROPERTY	ACRES		$ 40,000.00	$ -
	AGRICULTURE PROPERTY	ACRES	7.8	$ 8,000.00	$ 62,400
	AGRICULTURE PROPERTY (R-CUT AREA)	ACRES	11.8	$ 8,000.00	$ 94,400
	TOTAL TAKES	EACH			$ -
	Subtotal				$ 156,800
Total Preliminary Construction and R/W Cost Estimate (2018 Dollars)					**$ 5,106,800**

Notes:

1. TH 14 mainline and ramps pavement section assumed is 6.5 inch bituminous pavement, 7 inch aggregate base, and 24 inch sand.
2. Other roadways pavement section assumed is 5 inch bituminous pavement, 8 inch aggregate base, and 24 inch sand.
3. For the purpose of this estimate, non wearing course bituminous is included in wear course quantity.

Opinion of Probable Cost - Preliminary Cost Estimate

TH 14 Improvements - Estimated Costs - (CSAH 37 AREA)

R-CUT - Benefit

2/12/2018

BOLTON & MENK
Real People. Real Solutions.

Item		Unit	Total Qty	Unit Price	Total Cost
MAJOR ROADWAY ITEMS					
	REMOVE BITUMINOUS PAVEMENT	SY	24,600	$ 2.90	$ 71,400
	REMOVE CONCRETE MEDIAN	SF		$ 6.25	$ -
	REMOVE CURB AND GUTTER	LF		$ 5.95	$ -
	EXCAVATION - COMMON	CY	47,021	$ 3.00	$ 141,100
	COMMON EMBANKMENT (CV)	CY	25,022	$ 2.00	$ 50,100
	SELECT GRANULAR EMBANKMENT (CV)	CY	16,118	$ 14.00	$ 225,700
	TYPE SP 12.5 WEARING COURSE MIX (4,F)	TONS	6,179	$ 74.00	$ 457,300
	AGGREGATE BASE (CV) CLASS 6	CY	4,987	$ 26.00	$ 129,700
	CONCRETE CURB AND GUTTER	LF	484	$ 13.00	$ 6,300
	CONCRETE MEDIAN	SY	4,989	$ 5.00	$ 25,000
	8" CONCRETE DRIVEWAY PAVEMENT (RBT APRON)	SY		$ 75.00	$ -
	LIGHTING	EACH	2	$ 10,000.00	$ 20,000
	Subtotal				$ 1,127,000
	All Roadway Construction Subtotal				**$ 1,127,000**
PERCENTAGE ITEMS					
	MOBILIZATION	5%		of all roadway	$ 56,400
	DRAINAGE	10%		of all roadway	$ 112,700
	SIGNING & PAVEMENT MARKINGS	3%		of all roadway	$ 33,900
	TURF ESTABLISHMENT AND EROSION CONTROL	5%		of all roadway	$ 56,400
	TRAFFIC CONTROL	3%		of all roadway	$ 33,900
	CONTINGENCY FOR ADDITIONAL ITEMS	10%		of all roadway	$ 112,700
	Subtotal				$ 406,000
Total Preliminary Construction Cost Estimate (2018 Dollars)					**$ 1,533,000**
RIGHT OF WAY					
	RESIDENTIAL PROPERTY	ACRES		$ 40,000.00	$ -
	AGRICULTURE PROPERTY	ACRES		$ 8,000.00	$ -
	AGRICULTURE PROPERTY (R-CUT AREA)	ACRES	11.8	$ 8,000.00	$ 94,400
	TOTAL TAKES	EACH			$ -
	Subtotal				$ 94,400
Total Preliminary Construction and R/W Cost Estimate (2018 Dollars)					**$ 1,627,400**

Notes:

1. TH 14 mainline and ramps pavement section assumed is 6.5 inch bituminous pavement, 7 inch aggregate base, and 24 inch sand.
2. Other roadways pavement section assumed is 5 inch bituminous pavement, 8 inch aggregate base, and 24 inch sand.
3. For the purpose of this estimate, non wearing course bituminous is included in wear course quantity.

Opinion of Probable Cost - Preliminary Cost Estimate

TH 14 Improvements - Estimated Costs - (CSAH 37 Area)

HIGH-TEE

2/12/2018

BOLTON & MENK
Real People. Real Solutions.

Item		Unit	Total Qty	Unit Price	Total Cost
MAJOR ROADWAY ITEMS					
	REMOVE BITUMINOUS PAVEMENT	SY	68,250	$ 2.90	$ 198,000
	REMOVE CONCRETE MEDIAN	SY	2,720	$ 6.25	$ 17,000
	REMOVE CURB AND GUTTER	LF		$ 5.95	$ -
	EXCAVATION - COMMON	CY	216,435	$ 3.00	$ 649,400
	COMMON EMBANKMENT (CV)	CY	214,362	$ 2.00	$ 428,800
	SELECT GRANULAR EMBANKMENT (CV)	CY	67,383	$ 14.00	$ 943,400
	TYPE SP 12.5 WEARING COURSE MIX (4,F)	TONS	25,014	$ 74.00	$ 1,851,100
	AGGREGATE BASE (CV) CLASS 6	CY	21,793	$ 26.00	$ 566,700
	CONCRETE CURB AND GUTTER	LF		$ 13.00	$ -
	CONCRETE MEDIAN	SF		$ 5.00	$ -
	CONCRETE MEDIAN BARRIER	LF	700	$ 81.00	$ 56,700
	LIGHTING	EACH	4	$ 10,000.00	$ 40,000
	Subtotal				$ 4,751,000
	All Roadway Construction Subtotal				**$ 4,751,000**
PERCENTAGE ITEMS					
	MOBILIZATION	5%		of all roadway	$ 237,600
	DRAINAGE	10%		of all roadway	$ 475,100
	SIGNING & PAVEMENT MARKINGS	3%		of all roadway	$ 142,600
	TURF ESTABLISHMENT AND EROSION CONTROL	5%		of all roadway	$ 237,600
	TRAFFIC CONTROL	3%		of all roadway	$ 142,600
	CONTINGENCY FOR ADDITIONAL ITEMS	10%		of all roadway	$ 475,100
	Subtotal				$ 1,711,000
STRUCTURAL					
	CAST IN PLACE RETAINING WALLS	SF	15,000	$ 100.00	$ 1,500,000
	BRIDGE	SF	46,000	$ 200.00	$ 9,200,000
Total Preliminary Construction Cost Estimate (2018 Dollars)					**$ 17,162,000**
RIGHT OF WAY					
	RESIDENTIAL PROPERTY	ACRES		$ 40,000.00	$ -
	AGRICULTURE PROPERTY	ACRES	8.0	$ 8,000.00	$ 64,000
	AGRICULTURE PROPERTY (HIGH T AREA)	ACRES	16.5	$ 8,000.00	$ 132,000
	TOTAL TAKES	EACH			$ -
	Subtotal				$ 196,000
Total Preliminary Construction and R/W Cost Estimate (2018 Dollars)					**$ 17,358,000**

Notes:

1. TH 14 mainline and ramps pavement section assumed is 6.5 inch bituminous pavement, 7 inch aggregate base, and 24 inch sand.
2. Other roadways pavement section assumed is 5 inch bituminous pavement, 8 inch aggregate base, and 24 inch sand.
3. For the purpose of this estimate, non wearing course bituminous is included in wear course quantity.

Opinion of Probable Cost - Preliminary Cost Estimate

TH 14 Improvements - Estimated Costs - (CSAH 37 Area)

HIGH-TEE - Benefit

2/12/2018

BOLTON & MENK
Real People. Real Solutions.

Item		Unit	Total Qty	Unit Price	Total Cost
MAJOR ROADWAY ITEMS					
	REMOVE BITUMINOUS PAVEMENT	SY	29,820	$ 2.90	$ 86,500
	REMOVE CONCRETE MEDIAN	SY		$ 6.25	$ -
	REMOVE CURB AND GUTTER	LF		$ 5.95	$ -
	EXCAVATION - COMMON	CY	61,763	$ 3.00	$ 185,300
	COMMON EMBANKMENT (CV)	CY	32,000	$ 2.00	$ 64,100
	SELECT GRANULAR EMBANKMENT (CV)	CY	37,464	$ 14.00	$ 524,500
	TYPE SP 12.5 WEARING COURSE MIX (4,F)	TONS	14,197	$ 74.00	$ 1,050,600
	AGGREGATE BASE (CV) CLASS 6	CY	11,930	$ 26.00	$ 310,200
	CONCRETE CURB AND GUTTER	LF		$ 13.00	$ -
	CONCRETE MEDIAN	SF		$ 5.00	$ -
	CONCRETE MEDIAN BARRIER	LF	700	$ 81.00	$ 56,700
	LIGHTING	EACH	4	$ 10,000.00	$ 40,000
	Subtotal				$ 2,318,000
	All Roadway Construction Subtotal				**$ 2,318,000**
PERCENTAGE ITEMS					
	MOBILIZATION	5%		of all roadway	$ 115,900
	DRAINAGE	10%		of all roadway	$ 231,800
	SIGNING & PAVEMENT MARKINGS	3%		of all roadway	$ 69,600
	TURF ESTABLISHMENT AND EROSION CONTROL	5%		of all roadway	$ 115,900
	TRAFFIC CONTROL	3%		of all roadway	$ 69,600
	CONTINGENCY FOR ADDITIONAL ITEMS	10%		of all roadway	$ 231,800
	Subtotal				$ 835,000
STRUCTURAL					
	CAST IN PLACE RETAINING WALLS	SF	15,000	$ 100.00	$ 1,500,000
	BRIDGE	SF	46,000	$ 200.00	$ 9,200,000
Total Preliminary Construction Cost Estimate (2018 Dollars)					**$ 13,853,000**
RIGHT OF WAY					
	RESIDENTIAL PROPERTY	ACRES		$ 40,000.00	$ -
	AGRICULTURE PROPERTY	ACRES		$ 8,000.00	$ -
	AGRICULTURE PROPERTY (HIGH T AREA)	ACRES	16.5	$ 8,000.00	$ 132,000
	TOTAL TAKES	EACH			$ -
	Subtotal				$ 132,000
Total Preliminary Construction and R/W Cost Estimate (2018 Dollars)					**$ 13,985,000**

Notes:

1. TH 14 mainline and ramps pavement section assumed is 6.5 inch bituminous pavement, 7 inch aggregate base, and 24 inch sand.
2. Other roadways pavement section assumed is 5 inch bituminous pavement, 8 inch aggregate base, and 24 inch sand.
3. For the purpose of this estimate, non wearing course bituminous is included in wear course quantity.

Opinion of Probable Cost - Preliminary Cost Estimate

TH 14 Improvements - Estimated Costs - (CSAH 37 AREA)

INTERCHANGE

2/12/2018

BOLTON & MENK
Real People. Real Solutions.

	Item	Unit	Total Qty	Unit Price	Total Cost
MAJOR ROADWAY ITEMS					
	REMOVE BITUMINOUS PAVEMENT	SY	65,000	$ 2.90	$ 188,500
	REMOVE CONCRETE MEDIAN	SF	2,668	$ 6.25	$ 16,700
	REMOVE CURB AND GUTTER	LF		$ 5.95	$ -
	EXCAVATION - COMMON	CY	219,695	$ 3.00	$ 659,100
	COMMON EMBANKMENT (CV)	CY	458,231	$ 2.00	$ 916,500
	SELECT GRANULAR EMBANKMENT (CV)	CY	72,030	$ 14.00	$ 1,008,500
	TYPE SP 12.5 WEARING COURSE MIX (4,F)	TONS	27,169	$ 74.00	$ 2,010,500
	AGGREGATE BASE (CV) CLASS 6	CY	23,101	$ 26.00	$ 600,700
	CONCRETE CURB AND GUTTER	LF	5,123	$ 13.00	$ 66,600
	CONCRETE MEDIAN	SY	5,698	$ 5.00	$ 28,500
	8" CONCRETE DRIVEWAY PAVEMENT (RBT APRON)	SY	968	$ 75.00	$ 72,700
	LIGHTING	EACH	20	$ 10,000.00	$ 200,000
	Subtotal				$ 5,768,000
	All Roadway Construction Subtotal				**$ 5,768,000**
PERCENTAGE ITEMS					
	MOBILIZATION	5%		of all roadway	$ 288,400
	DRAINAGE	10%		of all roadway	$ 576,800
	SIGNING & PAVEMENT MARKINGS	3%		of all roadway	$ 173,100
	TURF ESTABLISHMENT AND EROSION CONTROL	5%		of all roadway	$ 288,400
	TRAFFIC CONTROL	3%		of all roadway	$ 173,100
	CONTINGENCY FOR ADDITIONAL ITEMS	10%		of all roadway	$ 576,800
	Subtotal				$ 2,077,000
STRUCTURES					
	BRIDGE	SF	10,730	$ 200.00	$ 2,146,000
Total Preliminary Construction Cost Estimate (2018 Dollars)					**$ 9,991,000**
RIGHT OF WAY					
	RESIDENTIAL PROPERTY	ACRES		$ 40,000.00	$ -
	AGRICULTURE PROPERTY	ACRES	10.0	$ 8,000.00	$ 80,000
	AGRICULTURE PROPERTY (INTERCHANGE AREA)	ACRES	26.5	$ 8,000.00	$ 212,000
	TOTAL TAKES	EACH			$ -
	Subtotal				$ 292,000
Total Preliminary Construction and R/W Cost Estimate (2018 Dollars)					**$ 10,283,000**

Notes:

1. TH 14 mainline and ramps pavement section assumed is 6.5 inch bituminous pavement, 7 inch aggregate base, and 24 inch sand.
2. Other roadways pavement section assumed is 5 inch bituminous pavement, 8 inch aggregate base, and 24 inch sand.
3. For the purpose of this estimate, non wearing course bituminous is included in wear course quantity.

Opinion of Probable Cost - Preliminary Cost Estimate

TH 14 Improvements - Estimated Costs - (CSAH 37 AREA)

INTERCHANGE - Benefit

2/12/2018

BOLTON & MENK
Real People. Real Solutions.

Item		Unit	Total Qty	Unit Price	Total Cost
MAJOR ROADWAY ITEMS					
	REMOVE BITUMINOUS PAVEMENT	SY	30,350	$ 2.90	$ 88,100
	REMOVE CONCRETE MEDIAN	SF		$ 6.25	$ -
	REMOVE CURB AND GUTTER	LF		$ 5.95	$ -
	EXCAVATION - COMMON	CY	1,103	$ 3.00	$ 3,400
	COMMON EMBANKMENT (CV)	CY	58,496	$ 2.00	$ 117,000
	SELECT GRANULAR EMBANKMENT (CV)	CY	45,359	$ 14.00	$ 635,100
	TYPE SP 12.5 WEARING COURSE MIX (4,F)	TONS	17,494	$ 74.00	$ 1,294,600
	AGGREGATE BASE (CV) CLASS 6	CY	14,132	$ 26.00	$ 367,500
	CONCRETE CURB AND GUTTER	LF	5,123	$ 13.00	$ 66,600
	CONCRETE MEDIAN	SY	5,698	$ 5.00	$ 28,500
	8" CONCRETE DRIVEWAY PAVEMENT (RBT APRON)	SY		$ 75.00	$ -
	LIGHTING	EACH	20	$ 10,000.00	$ 200,000
	Subtotal				$ 2,801,000
	All Roadway Construction Subtotal				**$ 2,801,000**
PERCENTAGE ITEMS					
	MOBILIZATION	5%		of all roadway	$ 140,100
	DRAINAGE	10%		of all roadway	$ 280,100
	SIGNING & PAVEMENT MARKINGS	3%		of all roadway	$ 84,100
	TURF ESTABLISHMENT AND EROSION CONTROL	5%		of all roadway	$ 140,100
	TRAFFIC CONTROL	3%		of all roadway	$ 84,100
	CONTINGENCY FOR ADDITIONAL ITEMS	10%		of all roadway	$ 280,100
	Subtotal				$ 1,009,000
STRUCTURES					
	BRIDGE	SF	10,730	$ 200.00	$ 2,146,000
Total Preliminary Construction Cost Estimate (2018 Dollars)					**$ 5,956,000**
RIGHT OF WAY					
	RESIDENTIAL PROPERTY	ACRES		$ 40,000.00	$ -
	AGRICULTURE PROPERTY	ACRES		$ 8,000.00	$ -
	AGRICULTURE PROPERTY (INTERCHANGE AREA)	ACRES	26.5	$ 8,000.00	$ 212,000
	TOTAL TAKES	EACH			$ -
	Subtotal				$ 212,000
Total Preliminary Construction and R/W Cost Estimate (2018 Dollars)					**$ 6,168,000**

Notes:

1. TH 14 mainline and ramps pavement section assumed is 6.5 inch bituminous pavement, 7 inch aggregate base, and 24 inch sand.
2. Other roadways pavement section assumed is 5 inch bituminous pavement, 8 inch aggregate base, and 24 inch sand.
3. For the purpose of this estimate, non wearing course bituminous is included in wear course quantity.

Opinion of Probable Cost - Preliminary Cost Estimate

TH 14 Improvements - Estimated Costs - (CSAH 37 AREA)

R-CUT

2/12/2018

BOLTON & MENK
Real People. Real Solutions.

Item		Unit	Total Qty	Unit Price	Total Cost
MAJOR ROADWAY ITEMS					
	REMOVE BITUMINOUS PAVEMENT	SY	65,000	$ 2.90	$ 188,500
	REMOVE CONCRETE MEDIAN	SF	2,668	$ 6.25	$ 16,700
	REMOVE CURB AND GUTTER	LF		$ 5.95	$ -
	EXCAVATION - COMMON	CY	168,527	$ 3.00	$ 505,600
	COMMON EMBANKMENT (CV)	CY	84,067	$ 2.00	$ 168,200
	SELECT GRANULAR EMBANKMENT (CV)	CY	48,809	$ 14.00	$ 683,400
	TYPE SP 12.5 WEARING COURSE MIX (4,F)	TONS	17,062	$ 74.00	$ 1,262,600
	AGGREGATE BASE (CV) CLASS 6	CY	15,941	$ 26.00	$ 414,500
	CONCRETE CURB AND GUTTER	LF	7,381	$ 13.00	$ 96,000
	CONCRETE MEDIAN	SF	30,800	$ 5.00	$ 154,000
	8" CONCRETE DRIVEWAY PAVEMENT (RBT APRON)	SY	438	$ 75.00	$ 32,900
	LIGHTING	EACH	2	$ 10,000.00	$ 20,000
	Subtotal				$ 3,542,000
	All Roadway Construction Subtotal				**$ 3,542,000**
PERCENTAGE ITEMS					
	MOBILIZATION	5%		of all roadway	$ 177,100
	DRAINAGE	10%		of all roadway	$ 354,200
	SIGNING & PAVEMENT MARKINGS	3%		of all roadway	$ 106,300
	TURF ESTABLISHMENT AND EROSION CONTROL	5%		of all roadway	$ 177,100
	TRAFFIC CONTROL	3%		of all roadway	$ 106,300
	CONTINGENCY FOR ADDITIONAL ITEMS	10%		of all roadway	$ 354,200
	Subtotal				$ 1,275,000
Total Preliminary Construction Cost Estimate (2018 Dollars)					**$ 4,817,000**
RIGHT OF WAY					
	RESIDENTIAL PROPERTY	ACRES		$ 40,000.00	$ -
	AGRICULTURE PROPERTY	ACRES	7.4	$ 8,000.00	$ 59,200
	AGRICULTURE PROPERTY (ROUNDABOUT AREA)	ACRES	10.3	$ 8,000.00	$ 82,400
	TOTAL TAKES	EACH			$ -
	Subtotal				$ 141,600
Total Preliminary Construction and R/W Cost Estimate (2018 Dollars)					**$ 4,958,600**

Notes:

1. TH 14 mainline and ramps pavement section assumed is 6.5 inch bituminous pavement, 7 inch aggregate base, and 24 inch sand.
2. Other roadways pavement section assumed is 5 inch bituminous pavement, 8 inch aggregate base, and 24 inch sand.
3. For the purpose of this estimate, non wearing course bituminous is included in wear course quantity.

Opinion of Probable Cost - Preliminary Cost Estimate

TH 14 Improvements - Estimated Costs - (CSAH 37 AREA)

R-CUT - Benefit

2/12/2018

BOLTON & MENK
Real People. Real Solutions.

Item		Unit	Total Qty	Unit Price	Total Cost
MAJOR ROADWAY ITEMS					
	REMOVE BITUMINOUS PAVEMENT	SY	15,920	$ 2.90	$ 46,200
	REMOVE CONCRETE MEDIAN	SF		$ 6.25	$ -
	REMOVE CURB AND GUTTER	LF		$ 5.95	$ -
	EXCAVATION - COMMON	CY	70,315	$ 3.00	$ 211,000
	COMMON EMBANKMENT (CV)	CY	40,001	$ 2.00	$ 80,100
	SELECT GRANULAR EMBANKMENT (CV)	CY	17,654	$ 14.00	$ 247,200
	TYPE SP 12.5 WEARING COURSE MIX (4,F)	TONS	5,886	$ 74.00	$ 435,600
	AGGREGATE BASE (CV) CLASS 6	CY	5,522	$ 26.00	$ 143,600
	CONCRETE CURB AND GUTTER	LF	7,381	$ 13.00	$ 96,000
	CONCRETE MEDIAN	SF	30,800	$ 5.00	$ 154,000
	8" CONCRETE DRIVEWAY PAVEMENT (RBT APRON)	SY		$ 75.00	$ -
	LIGHTING	EACH	2	$ 10,000.00	$ 20,000
	Subtotal				$ 1,434,000
	All Roadway Construction Subtotal				**$ 1,434,000**
PERCENTAGE ITEMS					
	MOBILIZATION	5%		of all roadway	$ 71,700
	DRAINAGE	10%		of all roadway	$ 143,400
	SIGNING & PAVEMENT MARKINGS	3%		of all roadway	$ 43,100
	TURF ESTABLISHMENT AND EROSION CONTROL	5%		of all roadway	$ 71,700
	TRAFFIC CONTROL	3%		of all roadway	$ 43,100
	CONTINGENCY FOR ADDITIONAL ITEMS	10%		of all roadway	$ 143,400
	Subtotal				$ 516,000
Total Preliminary Construction Cost Estimate (2018 Dollars)					**$ 1,950,000**
RIGHT OF WAY					
	RESIDENTIAL PROPERTY	ACRES		$ 40,000.00	$ -
	AGRICULTURE PROPERTY	ACRES		$ 8,000.00	$ -
	AGRICULTURE PROPERTY (ROUNDABOUT AREA)	ACRES	10.3	$ 8,000.00	$ 82,400
	TOTAL TAKES	EACH			$ -
	Subtotal				$ 82,400
Total Preliminary Construction and R/W Cost Estimate (2018 Dollars)					**$ 2,032,400**

Notes:

1. TH 14 mainline and ramps pavement section assumed is 6.5 inch bituminous pavement, 7 inch aggregate base, and 24 inch sand.
2. Other roadways pavement section assumed is 5 inch bituminous pavement, 8 inch aggregate base, and 24 inch sand.
3. For the purpose of this estimate, non wearing course bituminous is included in wear course quantity.

Opinion of Probable Cost - Preliminary Cost Estimate

TH 14 Improvements - Estimated Costs - (571st Area)

AT-GRADE

2/12/2018

BOLTON & MENK
Real People. Real Solutions.

	Item	Unit	Total Qty	Unit Price	Total Cost
MAJOR ROADWAY ITEMS					
	REMOVE BITUMINOUS PAVEMENT	SY	31,868	$ 2.90	$ 92,500
	REMOVE CONCRETE MEDIAN	SY		$ 6.25	$ -
	REMOVE CURB AND GUTTER	LF		$ 5.95	$ -
	EXCAVATION - COMMON	CY	126,027	$ 3.00	$ 378,100
	COMMON EMBANKMENT (CV)	CY	63,137	$ 2.00	$ 126,300
	SELECT GRANULAR EMBANKMENT (CV)	CY	41,000	$ 14.00	$ 574,100
	TYPE SP 12.5 WEARING COURSE MIX (4,F)	TONS	15,080	$ 74.00	$ 1,116,000
	AGGREGATE BASE (CV) CLASS 6	CY	13,352	$ 26.00	$ 347,200
	CONCRETE CURB AND GUTTER	LF		$ 13.00	$ -
	CONCRETE MEDIAN	SF		$ 5.00	$ -
	LIGHTING	EACH	2	$ 10,000.00	$ 20,000
	Subtotal				$ 2,654,000
	All Roadway Construction Subtotal				**$ 2,654,000**
PERCENTAGE ITEMS					
	MOBILIZATION	5%		of all roadway	$ 132,700
	DRAINAGE	10%		of all roadway	$ 265,400
	SIGNING & PAVEMENT MARKINGS	3%		of all roadway	$ 79,700
	TURF ESTABLISHMENT AND EROSION CONTROL	5%		of all roadway	$ 132,700
	TRAFFIC CONTROL	3%		of all roadway	$ 79,700
	CONTINGENCY FOR ADDITIONAL ITEMS	10%		of all roadway	$ 265,400
	Subtotal				$ 956,000
Total Preliminary Construction Cost Estimate (2018 Dollars)					**$ 3,610,000**
RIGHT OF WAY					
	RESIDENTIAL PROPERTY	ACRES		$ 40,000.00	$ -
	AGRICULTURE PROPERTY	ACRES	12.7	$ 8,000.00	$ 101,600
	AGRICULTURE PROPERTY (R-CUT AREA)	ACRES	5.2	$ 8,000.00	$ 41,600
	TOTAL TAKES	EACH			$ -
	Subtotal				$ 143,200
Total Preliminary Construction and R/W Cost Estimate (2018 Dollars)					**$ 3,753,200**

Notes:

1. TH 14 mainline and ramps pavement section assumed is 6.5 inch bituminous pavement, 7 inch aggregate base, and 24 inch sand.
2. Other roadways pavement section assumed is 5 inch bituminous pavement, 8 inch aggregate base, and 24 inch sand.
3. For the purpose of this estimate, non wearing course bituminous is included in wear course quantity.

Opinion of Probable Cost - Preliminary Cost Estimate

TH 14 Improvements - Estimated Costs - (571st Area)

AT-GRADE - Benefit

2/12/2018

BOLTON & MENK
Real People. Real Solutions.

	Item	Unit	Total Qty	Unit Price	Total Cost
MAJOR ROADWAY ITEMS					
	REMOVE BITUMINOUS PAVEMENT	SY	9,188	$ 2.90	$ 26,700
	REMOVE CONCRETE MEDIAN	SY		$ 6.25	$ -
	REMOVE CURB AND GUTTER	LF		$ 5.95	$ -
	EXCAVATION - COMMON	CY	47,193	$ 3.00	$ 141,600
	COMMON EMBANKMENT (CV)	CY	20,129	$ 2.00	$ 40,300
	SELECT GRANULAR EMBANKMENT (CV)	CY	11,397	$ 14.00	$ 159,600
	TYPE SP 12.5 WEARING COURSE MIX (4,F)	TONS	4,363	$ 74.00	$ 322,900
	AGGREGATE BASE (CV) CLASS 6	CY	3,603	$ 26.00	$ 93,700
	CONCRETE CURB AND GUTTER	LF		$ 13.00	$ -
	CONCRETE MEDIAN	SF		$ 5.00	$ -
	LIGHTING	EACH	2	$ 10,000.00	$ 20,000
	Subtotal				$ 805,000
	All Roadway Construction Subtotal				**$ 805,000**
PERCENTAGE ITEMS					
	MOBILIZATION	5%		of all roadway	$ 40,300
	DRAINAGE	10%		of all roadway	$ 80,500
	SIGNING & PAVEMENT MARKINGS	3%		of all roadway	$ 24,200
	TURF ESTABLISHMENT AND EROSION CONTROL	5%		of all roadway	$ 40,300
	TRAFFIC CONTROL	3%		of all roadway	$ 24,200
	CONTINGENCY FOR ADDITIONAL ITEMS	10%		of all roadway	$ 80,500
	Subtotal				$ 290,000
Total Preliminary Construction Cost Estimate (2018 Dollars)					**$ 1,095,000**
RIGHT OF WAY					
	RESIDENTIAL PROPERTY	ACRES		$ 40,000.00	$ -
	AGRICULTURE PROPERTY	ACRES		$ 8,000.00	$ -
	AGRICULTURE PROPERTY (R-CUT AREA)	ACRES	5.2	$ 8,000.00	$ 41,600
	TOTAL TAKES	EACH			$ -
	Subtotal				$ 41,600
Total Preliminary Construction and R/W Cost Estimate (2018 Dollars)					**$ 1,136,600**

Notes:

1. TH 14 mainline and ramps pavement section assumed is 6.5 inch bituminous pavement, 7 inch aggregate base, and 24 inch sand.
2. Other roadways pavement section assumed is 5 inch bituminous pavement, 8 inch aggregate base, and 24 inch sand.
3. For the purpose of this estimate, non wearing course bituminous is included in wear course quantity.

Opinion of Probable Cost - Preliminary Cost Estimate

TH 14 Improvements - Estimated Costs - (571st Area)

GREEN-TEE

2/12/2018

BOLTON & MENK
Real People. Real Solutions.

Item		Unit	Total Qty	Unit Price	Total Cost
MAJOR ROADWAY ITEMS					
	REMOVE BITUMINOUS PAVEMENT	SY	33,548	$ 2.90	$ 97,300
	REMOVE CONCRETE MEDIAN	SY		$ 6.25	$ -
	REMOVE CURB AND GUTTER	LF		$ 5.95	$ -
	EXCAVATION - COMMON	CY	119,985	$ 3.00	$ 360,000
	COMMON EMBANKMENT (CV)	CY	63,725	$ 2.00	$ 127,500
	SELECT GRANULAR EMBANKMENT (CV)	CY	43,463	$ 14.00	$ 608,500
	TYPE SP 12.5 WEARING COURSE MIX (4,F)	TONS	16,154	$ 74.00	$ 1,195,400
	AGGREGATE BASE (CV) CLASS 6	CY	14,046	$ 26.00	$ 365,200
	CONCRETE CURB AND GUTTER	LF		$ 13.00	$ -
	CONCRETE MEDIAN	SF		$ 5.00	$ -
	CONCRETE MEDIAN BARRIER	LF	665	$ 81.00	$ 53,900
	LIGHTING	EACH	2	$ 10,000.00	$ 20,000
	Subtotal				$ 2,828,000
	All Roadway Construction Subtotal				**$ 2,828,000**
PERCENTAGE ITEMS					
	MOBILIZATION	5%		of all roadway	$ 141,400
	DRAINAGE	10%		of all roadway	$ 282,800
	SIGNING & PAVEMENT MARKINGS	3%		of all roadway	$ 84,900
	TURF ESTABLISHMENT AND EROSION CONTROL	5%		of all roadway	$ 141,400
	TRAFFIC CONTROL	3%		of all roadway	$ 84,900
	CONTINGENCY FOR ADDITIONAL ITEMS	10%		of all roadway	$ 282,800
	Subtotal				$ 1,018,000
Total Preliminary Construction Cost Estimate (2018 Dollars)					**$ 3,846,000**
RIGHT OF WAY					
	RESIDENTIAL PROPERTY	ACRES		$ 40,000.00	$ -
	AGRICULTURE PROPERTY	ACRES	10.2	$ 8,000.00	$ 81,600
	AGRICULTURE PROPERTY (GREEN T AREA)	ACRES	8.2	$ 8,000.00	$ 65,600
	TOTAL TAKES	EACH			$ -
	Subtotal				$ 147,200
Total Preliminary Construction and R/W Cost Estimate (2018 Dollars)					**$ 3,993,200**

Notes:

1. TH 14 mainline and ramps pavement section assumed is 6.5 inch bituminous pavement, 7 inch aggregate base, and 24 inch sand.
2. Other roadways pavement section assumed is 5 inch bituminous pavement, 8 inch aggregate base, and 24 inch sand.
3. For the purpose of this estimate, non wearing course bituminous is included in wear course quantity.

Opinion of Probable Cost - Preliminary Cost Estimate

TH 14 Improvements - Estimated Costs - (571st Area)

GREEN-TEE - Benefit

2/12/2018

BOLTON & MENK
Real People. Real Solutions.

Item		Unit	Total Qty	Unit Price	Total Cost
MAJOR ROADWAY ITEMS					
	REMOVE BITUMINOUS PAVEMENT	SY	15,199	$ 2.90	$ 44,100
	REMOVE CONCRETE MEDIAN	SY		$ 6.25	$ -
	REMOVE CURB AND GUTTER	LF		$ 5.95	$ -
	EXCAVATION - COMMON	CY	72,866	$ 3.00	$ 218,600
	COMMON EMBANKMENT (CV)	CY	40,013	$ 2.00	$ 80,100
	SELECT GRANULAR EMBANKMENT (CV)	CY	19,025	$ 14.00	$ 266,400
	TYPE SP 12.5 WEARING COURSE MIX (4,F)	TONS	7,300	$ 74.00	$ 540,200
	AGGREGATE BASE (CV) CLASS 6	CY	6,001	$ 26.00	$ 156,100
	CONCRETE CURB AND GUTTER	LF		$ 13.00	$ -
	CONCRETE MEDIAN	SF		$ 5.00	$ -
	CONCRETE MEDIAN BARRIER	LF	665	$ 81.00	$ 53,900
	LIGHTING	EACH	2	$ 10,000.00	$ 20,000
	Subtotal				$ 1,379,000
	All Roadway Construction Subtotal				**$ 1,379,000**
PERCENTAGE ITEMS					
	MOBILIZATION	5%		of all roadway	$ 69,000
	DRAINAGE	10%		of all roadway	$ 137,900
	SIGNING & PAVEMENT MARKINGS	3%		of all roadway	$ 41,400
	TURF ESTABLISHMENT AND EROSION CONTROL	5%		of all roadway	$ 69,000
	TRAFFIC CONTROL	3%		of all roadway	$ 41,400
	CONTINGENCY FOR ADDITIONAL ITEMS	10%		of all roadway	$ 137,900
	Subtotal				$ 497,000
Total Preliminary Construction Cost Estimate (2018 Dollars)					**$ 1,876,000**
RIGHT OF WAY					
	RESIDENTIAL PROPERTY	ACRES		$ 40,000.00	$ -
	AGRICULTURE PROPERTY	ACRES		$ 8,000.00	$ -
	AGRICULTURE PROPERTY (GREEN T AREA)	ACRES	8.2	$ 8,000.00	$ 65,600
	TOTAL TAKES	EACH			$ -
	Subtotal				$ 65,600
Total Preliminary Construction and R/W Cost Estimate (2018 Dollars)					**$ 1,941,600**

Notes:

1. TH 14 mainline and ramps pavement section assumed is 6.5 inch bituminous pavement, 7 inch aggregate base, and 24 inch sand.
2. Other roadways pavement section assumed is 5 inch bituminous pavement, 8 inch aggregate base, and 24 inch sand.
3. For the purpose of this estimate, non wearing course bituminous is included in wear course quantity.

Opinion of Probable Cost - Preliminary Cost Estimate

TH 14 Improvements - Estimated Costs - (571st Area)

R-CUT

2/12/2018

BOLTON & MENK
Real People. Real Solutions.

Item		Unit	Total Qty	Unit Price	Total Cost
MAJOR ROADWAY ITEMS					
	REMOVE BITUMINOUS PAVEMENT	SY	34,947	$ 2.90	$ 101,400
	REMOVE CONCRETE MEDIAN	SY		$ 6.25	$ -
	REMOVE CURB AND GUTTER	LF		$ 5.95	$ -
	EXCAVATION - COMMON	CY	130,037	$ 3.00	$ 390,200
	COMMON EMBANKMENT (CV)	CY	66,458	$ 2.00	$ 133,000
	SELECT GRANULAR EMBANKMENT (CV)	CY	43,214	$ 14.00	$ 605,000
	TYPE SP 12.5 WEARING COURSE MIX (4,F)	TONS	15,028	$ 74.00	$ 1,112,100
	AGGREGATE BASE (CV) CLASS 6	CY	13,897	$ 26.00	$ 361,400
	CONCRETE CURB AND GUTTER	LF	3,766	$ 13.00	$ 49,000
	CONCRETE MEDIAN	SF	36,541	$ 5.00	$ 182,800
	LIGHTING	EACH	2	$ 10,000.00	$ 20,000
	Subtotal				$ 2,955,000
	All Roadway Construction Subtotal				**$ 2,955,000**
PERCENTAGE ITEMS					
	MOBILIZATION	5%		of all roadway	$ 147,800
	DRAINAGE	10%		of all roadway	$ 295,500
	SIGNING & PAVEMENT MARKINGS	3%		of all roadway	$ 88,700
	TURF ESTABLISHMENT AND EROSION CONTROL	5%		of all roadway	$ 147,800
	TRAFFIC CONTROL	3%		of all roadway	$ 88,700
	CONTINGENCY FOR ADDITIONAL ITEMS	10%		of all roadway	$ 295,500
	Subtotal				$ 1,064,000
Total Preliminary Construction Cost Estimate (2018 Dollars)					**$ 4,019,000**
RIGHT OF WAY					
	RESIDENTIAL PROPERTY	ACRES		$ 40,000.00	$ -
	AGRICULTURE PROPERTY	ACRES	9.9	$ 8,000.00	$ 79,200
	AGRICULTURE PROPERTY (RCUT AREA)	ACRES	8.2	$ 8,000.00	$ 65,600
	TOTAL TAKES	EACH			$ -
	Subtotal				$ 144,800
Total Preliminary Construction and R/W Cost Estimate (2018 Dollars)					**$ 4,163,800**

Notes:

1. TH 14 mainline and ramps pavement section assumed is 6.5 inch bituminous pavement, 7 inch aggregate base, and 24 inch sand.
2. Other roadways pavement section assumed is 5 inch bituminous pavement, 8 inch aggregate base, and 24 inch sand.
3. For the purpose of this estimate, non wearing course bituminous is included in wear course quantity.

Opinion of Probable Cost - Preliminary Cost Estimate

TH 14 Improvements - Estimated Costs - (571st Area)

R-CUT - Benefit

2/12/2018

BOLTON & MENK
Real People. Real Solutions.

Item		Unit	Total Qty	Unit Price	Total Cost
MAJOR ROADWAY ITEMS					
	REMOVE BITUMINOUS PAVEMENT	SY	17,265	$ 2.90	$ 50,100
	REMOVE CONCRETE MEDIAN	SY		$ 6.25	$ -
	REMOVE CURB AND GUTTER	LF		$ 5.95	$ -
	EXCAVATION - COMMON	CY	53,888	$ 3.00	$ 161,700
	COMMON EMBANKMENT (CV)	CY	30,656	$ 2.00	$ 61,400
	SELECT GRANULAR EMBANKMENT (CV)	CY	18,770	$ 14.00	$ 262,800
	TYPE SP 12.5 WEARING COURSE MIX (4,F)	TONS	6,527	$ 74.00	$ 483,100
	AGGREGATE BASE (CV) CLASS 6	CY	5,951	$ 26.00	$ 154,800
	CONCRETE CURB AND GUTTER	LF	1,590	$ 13.00	$ 20,700
	CONCRETE MEDIAN	SF	20,107	$ 5.00	$ 100,600
	LIGHTING	EACH	2	$ 10,000.00	$ 20,000
	BRIDGE	SF		$ 200.00	$ -
	Subtotal				$ 1,315,000
	All Roadway Construction Subtotal				**$ 1,315,000**
PRECENTAGE ITEMS					
	MOBILIZATION	5%		of all roadway	$ 65,800
	DRAINAGE	10%		of all roadway	$ 131,500
	SIGNING & PAVEMENT MARKINGS	3%		of all roadway	$ 39,500
	TURF ESTABLISHMENT AND EROSION CONTROL	5%		of all roadway	$ 65,800
	TRAFFIC CONTROL	3%		of all roadway	$ 39,500
	CONTINGENCY FOR ADDITIONAL ITEMS	10%		of all roadway	$ 131,500
	Subtotal				$ 474,000
Total Preliminary Construction Cost Estimate (2018 Dollars)					**$ 1,789,000**
RIGHT OF WAY					
	RESIDENTIAL PROPERTY	ACRES		$ 40,000.00	$ -
	AGRICULTURE PROPERTY	ACRES		$ 8,000.00	$ -
	AGRICULTURE PROPERTY (RCUT AREA)	ACRES	10.5	$ 8,000.00	$ 84,000
	TOTAL TAKES	EACH			$ -
	Subtotal				$ 84,000
Total Preliminary Construction and R/W Cost Estimate (2018 Dollars)					**$ 1,873,000**

Notes:

1. TH 14 mainline and ramps pavement section assumed is 6.5 inch bituminous pavement, 7 inch aggregate base, and 24 inch sand.
2. Other roadways pavement section assumed is 5 inch bituminous pavement, 8 inch aggregate base, and 24 inch sand.
3. For the purpose of this estimate, non wearing course bituminous is included in wear course quantity.

Opinion of Probable Cost - Preliminary Cost Estimate

TH 14 Improvements - Estimated Costs - (561st Area)

R-CUT

2/12/2018

BOLTON & MENK
Real People. Real Solutions.

Item		Unit	Total Qty	Unit Price	Total Cost
MAJOR ROADWAY ITEMS					
	REMOVE BITUMINOUS PAVEMENT	SY	29,138	$ 2.90	$ 84,500
	REMOVE CONCRETE MEDIAN	SY		$ 6.25	$ -
	REMOVE CURB AND GUTTER	LF		$ 5.95	$ -
	EXCAVATION - COMMON	CY	79,639	$ 3.00	$ 239,000
	COMMON EMBANKMENT (CV)	CY	35,037	$ 2.00	$ 70,100
	SELECT GRANULAR EMBANKMENT (CV)	CY	29,224	$ 14.00	$ 409,200
	TYPE SP 12.5 WEARING COURSE MIX (4,F)	TONS	10,808	$ 74.00	$ 799,800
	AGGREGATE BASE (CV) CLASS 6	CY	9,152	$ 26.00	$ 238,000
	CONCRETE CURB AND GUTTER	LF	3,859	$ 13.00	$ 50,200
	CONCRETE MEDIAN	SF	16,220	$ 5.00	$ 81,100
	LIGHTING	EACH	2	$ 10,000.00	$ 20,000
	Subtotal				$ 1,992,000
	All Roadway Construction Subtotal				**$ 1,992,000**
PERCENTAGE ITEMS					
	MOBILIZATION	5%		of all roadway	$ 99,600
	DRAINAGE	10%		of all roadway	$ 199,200
	SIGNING & PAVEMENT MARKINGS	3%		of all roadway	$ 59,800
	TURF ESTABLISHMENT AND EROSION CONTROL	5%		of all roadway	$ 99,600
	TRAFFIC CONTROL	3%		of all roadway	$ 59,800
	CONTINGENCY FOR ADDITIONAL ITEMS	10%		of all roadway	$ 199,200
	Subtotal				$ 717,000
Total Preliminary Construction Cost Estimate (2018 Dollars)					**$ 2,709,000**
RIGHT OF WAY					
	RESIDENTIAL PROPERTY	ACRES		$ 40,000.00	$ -
	AGRICULTURE PROPERTY	ACRES	5.0	$ 8,000.00	$ 40,000
	AGRICULTURE PROPERTY (R-CUT AREA)	ACRES	5.2	$ 8,000.00	$ 41,600
	TOTAL TAKES	EACH			$ -
	Subtotal				$ 81,600
Total Preliminary Construction and R/W Cost Estimate (2018 Dollars)					**$ 2,790,600**

Notes:

1. TH 14 mainline and ramps pavement section assumed is 6.5 inch bituminous pavement, 7 inch aggregate base, and 24 inch sand.
2. Other roadways pavement section assumed is 5 inch bituminous pavement, 8 inch aggregate base, and 24 inch sand.
3. For the purpose of this estimate, non wearing course bituminous is included in wear course quantity.

Opinion of Probable Cost - Preliminary Cost Estimate

TH 14 Improvements - Estimated Costs - (561st Area)

R-CUT - Benefit

2/12/2018

BOLTON & MENK
Real People. Real Solutions.

Item		Unit	Total Qty	Unit Price	Total Cost
MAJOR ROADWAY ITEMS					
	REMOVE BITUMINOUS PAVEMENT	SY	15,750	$ 2.90	$ 45,700
	REMOVE CONCRETE MEDIAN	SY		$ 6.25	$ -
	REMOVE CURB AND GUTTER	LF		$ 5.95	$ -
	EXCAVATION - COMMON	CY	35,578	$ 3.00	$ 106,800
	COMMON EMBANKMENT (CV)	CY	14,720	$ 2.00	$ 29,500
	SELECT GRANULAR EMBANKMENT (CV)	CY	14,193	$ 14.00	$ 198,800
	TYPE SP 12.5 WEARING COURSE MIX (4,F)	TONS	5,795	$ 74.00	$ 428,900
	AGGREGATE BASE (CV) CLASS 6	CY	4,601	$ 26.00	$ 119,700
	CONCRETE CURB AND GUTTER	LF	3,859	$ 13.00	$ 50,200
	CONCRETE MEDIAN	SF	16,220	$ 5.00	$ 81,100
	LIGHTING	EACH	2	$ 10,000.00	$ 20,000
	BRIDGE	SF		$ 200.00	$ -
	Subtotal				$ 1,081,000
	All Roadway Construction Subtotal				**$ 1,081,000**
PRECENTAGE ITEMS					
	MOBILIZATION	5%		of all roadway	$ 54,100
	DRAINAGE	10%		of all roadway	$ 108,100
	SIGNING & PAVEMENT MARKINGS	3%		of all roadway	$ 32,500
	TURF ESTABLISHMENT AND EROSION CONTROL	5%		of all roadway	$ 54,100
	TRAFFIC CONTROL	3%		of all roadway	$ 32,500
	CONTINGENCY FOR ADDITIONAL ITEMS	10%		of all roadway	$ 108,100
	Subtotal				$ 389,000
Total Preliminary Construction Cost Estimate (2018 Dollars)					**$ 1,470,000**
RIGHT OF WAY					
	RESIDENTIAL PROPERTY	ACRES		$ 40,000.00	$ -
	AGRICULTURE PROPERTY	ACRES		$ 8,000.00	$ -
	AGRICULTURE PROPERTY (R-CUT AREA)	ACRES	5.2	$ 8,000.00	$ 41,600
	TOTAL TAKES	EACH			$ -
	Subtotal				$ 41,600
Total Preliminary Construction and R/W Cost Estimate (2018 Dollars)					**$ 1,511,600**

Notes:

1. TH 14 mainline and ramps pavement section assumed is 6.5 inch bituminous pavement, 7 inch aggregate base, and 24 inch sand.
2. Other roadways pavement section assumed is 5 inch bituminous pavement, 8 inch aggregate base, and 24 inch sand.
3. For the purpose of this estimate, non wearing course bituminous is included in wear course quantity.

Opinion of Probable Cost - Preliminary Cost Estimate

TH 14 Improvements - Estimated Costs - (Courtland Area)

Concept A

2/12/2018

BOLTON & MENK
Real People. Real Solutions.

	Item	Unit	Total Qty	Unit Price	Total Cost
MAJOR ROADWAY ITEMS					
	REMOVE BITUMINOUS PAVEMENT	SY	13,703	$ 2.90	$ 39,800
	REMOVE CONCRETE MEDIAN	SY		$ 6.25	$ -
	REMOVE CURB AND GUTTER	LF		$ 5.95	$ -
	EXCAVATION - COMMON	CY	313,258	$ 3.00	$ 939,800
	COMMON EMBANKMENT (CV)	CY	173,034	$ 2.00	$ 346,100
	SELECT GRANULAR EMBANKMENT (CV)	CY	89,161	$ 14.00	$ 1,248,300
	TYPE SP 12.5 WEARING COURSE MIX (4,F)	TONS	31,569	$ 74.00	$ 2,336,100
	AGGREGATE BASE (CV) CLASS 6	CY	29,796	$ 26.00	$ 774,700
	CONCRETE CURB AND GUTTER	LF	633	$ 13.00	$ 8,300
	CONCRETE MEDIAN	SF	1,283	$ 5.00	$ 6,500
	LIGHTING	EACH	2	$ 10,000.00	$ 20,000
	Subtotal				$ 5,720,000
	All Roadway Construction Subtotal				**$ 5,720,000**
PERCENTAGE ITEMS					
	MOBILIZATION	5%		of all roadway	$ 286,000
	DRAINAGE	10%		of all roadway	$ 572,000
	SIGNING & PAVEMENT MARKINGS	3%		of all roadway	$ 171,600
	TURF ESTABLISHMENT AND EROSION CONTROL	5%		of all roadway	$ 286,000
	TRAFFIC CONTROL	3%		of all roadway	$ 171,600
	CONTINGENCY FOR ADDITIONAL ITEMS	10%		of all roadway	$ 572,000
	Subtotal				$ 2,059,000
Total Preliminary Construction Cost Estimate (2018 Dollars)					**$ 7,779,000**
RIGHT OF WAY					
	RESIDENTIAL PROPERTY	ACRES	0.4	$ 40,000.00	$ 16,000
	AGRICULTURE PROPERTY	ACRES	61.4	$ 8,000.00	$ 491,200
	AGRICULTURE PROPERTY (R-CUT AREA)	ACRES	12.9	$ 8,000.00	$ 103,200
	TOTAL TAKES	EACH	1	$ 200,000.00	$ 200,000
	Subtotal				$ 810,400
Total Preliminary Construction and R/W Cost Estimate (2018 Dollars)					**$ 8,589,400**

Notes:

1. TH 14 mainline and ramps pavement section assumed is 6.5 inch bituminous pavement, 7 inch aggregate base, and 24 inch sand.
2. Other roadways pavement section assumed is 5 inch bituminous pavement, 8 inch aggregate base, and 24 inch sand.
3. For the purpose of this estimate, non wearing course bituminous is included in wear course quantity.

Opinion of Probable Cost - Preliminary Cost Estimate

TH 14 Improvements - Estimated Costs - (Courtland Area)

Concept A - Benefit

2/12/2018

BOLTON & MENK
Real People. Real Solutions.

Item		Unit	Total Qty	Unit Price	Total Cost
MAJOR ROADWAY ITEMS					
	REMOVE BITUMINOUS PAVEMENT	SY		$ 2.90	$ -
	REMOVE CONCRETE MEDIAN	SY		$ 6.25	$ -
	REMOVE CURB AND GUTTER	LF		$ 5.95	$ -
	EXCAVATION - COMMON	CY	46,575	$ 3.00	$ 139,800
	COMMON EMBANKMENT (CV)	CY	26,496	$ 2.00	$ 53,000
	SELECT GRANULAR EMBANKMENT (CV)	CY	15,467	$ 14.00	$ 216,600
	TYPE SP 12.5 WEARING COURSE MIX (4,F)	TONS	6,227	$ 74.00	$ 460,900
	AGGREGATE BASE (CV) CLASS 6	CY	4,664	$ 26.00	$ 121,300
	CONCRETE CURB AND GUTTER	LF	633	$ 13.00	$ 8,300
	CONCRETE MEDIAN	SF	1,283	$ 5.00	$ 6,500
	LIGHTING	EACH	2	$ 10,000.00	$ 20,000
	Subtotal				$ 1,026,000
	All Roadway Construction Subtotal				**$ 1,026,000**
PERCENTAGE ITEMS					
	MOBILIZATION	5%		of all roadway	$ 51,300
	DRAINAGE	10%		of all roadway	$ 102,600
	SIGNING & PAVEMENT MARKINGS	3%		of all roadway	$ 30,800
	TURF ESTABLISHMENT AND EROSION CONTROL	5%		of all roadway	$ 51,300
	TRAFFIC CONTROL	3%		of all roadway	$ 30,800
	CONTINGENCY FOR ADDITIONAL ITEMS			of all roadway	$ -
	Subtotal				$ 267,000
Total Preliminary Construction Cost Estimate (2018 Dollars)					**$ 1,293,000**
RIGHT OF WAY					
	RESIDENTIAL PROPERTY	ACRES		$ 40,000.00	$ -
	AGRICULTURE PROPERTY	ACRES		$ 8,000.00	$ -
	AGRICULTURE PROPERTY (R-CUT AREA)	ACRES	12.9	$ 8,000.00	$ 103,200
	TOTAL TAKES	EACH		$ 200,000.00	$ -
	Subtotal				$ 103,200
Total Preliminary Construction and R/W Cost Estimate (2018 Dollars)					**$ 1,396,200**

Notes:

1. TH 14 mainline and ramps pavement section assumed is 6.5 inch bituminous pavement, 7 inch aggregate base, and 24 inch sand.
2. Other roadways pavement section assumed is 5 inch bituminous pavement, 8 inch aggregate base, and 24 inch sand.
3. For the purpose of this estimate, non wearing course bituminous is included in wear course quantity.

Opinion of Probable Cost - Preliminary Cost Estimate

TH 14 Improvements - Estimated Costs - (Courtland Area)

Concept B

2/12/2018

BOLTON & MENK
Real People. Real Solutions.

	Item	Unit	Total Qty	Unit Price	Total Cost
MAJOR ROADWAY ITEMS					
	REMOVE BITUMINOUS PAVEMENT	SY	9,261	$ 2.90	$ 26,900
	REMOVE CONCRETE MEDIAN	SF		$ 6.25	$ -
	REMOVE CURB AND GUTTER	LF		$ 5.95	$ -
	EXCAVATION - COMMON	CY	227,390	$ 3.00	$ 682,200
	COMMON EMBANKMENT (CV)	CY	127,040	$ 2.00	$ 254,100
	SELECT GRANULAR EMBANKMENT (CV)	CY	65,471	$ 14.00	$ 916,600
	TYPE SP 12.5 WEARING COURSE MIX (4,F)	TONS	24,797	$ 74.00	$ 1,835,100
	AGGREGATE BASE (CV) CLASS 6	CY	20,825	$ 26.00	$ 541,500
	CONCRETE CURB AND GUTTER	LF	1,041	$ 13.00	$ 13,600
	CONCRETE MEDIAN	SF	1,509	$ 5.00	$ 7,600
	LIGHTING	EACH	4	$ 10,000.00	$ 40,000
	Subtotal				$ 4,318,000
	All Roadway Construction Subtotal				**$ 4,318,000**
PERCENTAGE ITEMS					
	MOBILIZATION	5%		of all roadway	$ 215,900
	DRAINAGE	10%		of all roadway	$ 431,800
	SIGNING & PAVEMENT MARKINGS	3%		of all roadway	$ 129,600
	TURF ESTABLISHMENT AND EROSION CONTROL	5%		of all roadway	$ 215,900
	TRAFFIC CONTROL	3%		of all roadway	$ 129,600
	CONTINGENCY FOR ADDITIONAL ITEMS	10%		of all roadway	$ 431,800
	Subtotal				$ 1,555,000
Total Preliminary Construction Cost Estimate (2018 Dollars)					**$ 5,873,000**
RIGHT OF WAY					
	RESIDENTIAL PROPERTY	ACRES		$ 40,000.00	$ -
	AGRICULTURE PROPERTY	ACRES	38.5	$ 8,000.00	$ 308,000
	AGRICULTURE PROPERTY (R-CUT AREA)	ACRES	19.0	$ 8,000.00	$ 152,000
	Subtotal				$ 460,000
Total Preliminary Construction and R/W Cost Estimate (2018 Dollars)					**$ 6,333,000**

Notes:

1. TH 14 mainline and ramps pavement section assumed is 6.5 inch bituminous pavement, 7 inch aggregate base, and 24 inch sand.
2. Other roadways pavement section assumed is 5 inch bituminous pavement, 8 inch aggregate base, and 24 inch sand.
3. For the purpose of this estimate, non wearing course bituminous is included in wear course quantity.

Opinion of Probable Cost - Preliminary Cost Estimate

TH 14 Improvements - Estimated Costs - (Courtland Area)

Concept B - Benefit

2/12/2018

BOLTON & MENK
Real People. Real Solutions.

Item		Unit	Total Qty	Unit Price	Total Cost
MAJOR ROADWAY ITEMS					
	REMOVE BITUMINOUS PAVEMENT	SY	1,964	$ 2.90	$ 5,700
	REMOVE CONCRETE MEDIAN	SF		$ 6.25	$ -
	REMOVE CURB AND GUTTER	LF		$ 5.95	$ -
	EXCAVATION - COMMON	CY	79,762	$ 3.00	$ 239,300
	COMMON EMBANKMENT (CV)	CY	45,376	$ 2.00	$ 90,800
	SELECT GRANULAR EMBANKMENT (CV)	CY	25,911	$ 14.00	$ 362,800
	TYPE SP 12.5 WEARING COURSE MIX (4,F)	TONS	10,295	$ 74.00	$ 761,900
	AGGREGATE BASE (CV) CLASS 6	CY	7,913	$ 26.00	$ 205,800
	CONCRETE CURB AND GUTTER	LF	1,041	$ 13.00	$ 13,600
	CONCRETE MEDIAN	SF	1,509	$ 5.00	$ 7,600
	LIGHTING	EACH	4	$ 10,000.00	$ 40,000
	Subtotal				$ 1,728,000
	All Roadway Construction Subtotal				**$ 1,728,000**
PERCENTAGE ITEMS					
	MOBILIZATION	5%		of all roadway	$ 86,400
	DRAINAGE	10%		of all roadway	$ 172,800
	SIGNING & PAVEMENT MARKINGS	3%		of all roadway	$ 51,900
	TURF ESTABLISHMENT AND EROSION CONTROL	5%		of all roadway	$ 86,400
	TRAFFIC CONTROL	3%		of all roadway	$ 51,900
	CONTINGENCY FOR ADDITIONAL ITEMS	10%		of all roadway	$ 172,800
	Subtotal				$ 622,000
Total Preliminary Construction Cost Estimate (2018 Dollars)					**$ 2,350,000**
RIGHT OF WAY					
	RESIDENTIAL PROPERTY	ACRES		$ 40,000.00	$ -
	AGRICULTURE PROPERTY	ACRES		$ 8,000.00	$ -
	AGRICULTURE PROPERTY (R-CUT AREA)	ACRES	19.0	$ 8,000.00	$ 152,000
	Subtotal				$ 152,000
Total Preliminary Construction and R/W Cost Estimate (2018 Dollars)					**$ 2,502,000**

Notes:

1. TH 14 mainline and ramps pavement section assumed is 6.5 inch bituminous pavement, 7 inch aggregate base, and 24 inch sand.
2. Other roadways pavement section assumed is 5 inch bituminous pavement, 8 inch aggregate base, and 24 inch sand.
3. For the purpose of this estimate, non wearing course bituminous is included in wear course quantity.

Opinion of Probable Cost - Preliminary Cost Estimate

TH 14 Improvements - Estimated Costs - (Courtland Area)

Concept C

2/12/2018

BOLTON & MENK
Real People. Real Solutions.

Item		Unit	Total Qty	Unit Price	Total Cost
MAJOR ROADWAY ITEMS					
	REMOVE BITUMINOUS PAVEMENT	SY	13,050	$ 2.90	$ 37,900
	REMOVE CONCRETE MEDIAN	SF		$ 6.25	$ -
	REMOVE CURB AND GUTTER	LF		$ 5.95	$ -
	EXCAVATION - COMMON	CY	294,890	$ 3.00	$ 884,700
	COMMON EMBANKMENT (CV)	CY	336,290	$ 2.00	$ 672,600
	SELECT GRANULAR EMBANKMENT (CV)	CY	95,019	$ 14.00	$ 1,330,300
	TYPE SP 12.5 WEARING COURSE MIX (4,F)	TONS	34,080	$ 74.00	$ 2,522,000
	AGGREGATE BASE (CV) CLASS 6	CY	31,590	$ 26.00	$ 821,400
	CONCRETE CURB AND GUTTER	LF	5,100	$ 13.00	$ 66,300
	CONCRETE MEDIAN	SY	5,434	$ 5.00	$ 27,200
	8" CONCRETE DRIVEWAY PAVEMENT (RBT APRON)	SY	970	$ 75.00	$ 72,800
	LIGHTING	EACH	20	$ 10,000.00	$ 200,000
	Subtotal				$ 6,635,000
	All Roadway Construction Subtotal				**$ 6,635,000**
PERCENTAGE ITEMS					
	MOBILIZATION	5%		of all roadway	$ 331,800
	DRAINAGE	10%		of all roadway	$ 663,500
	SIGNING & PAVEMENT MARKINGS	3%		of all roadway	$ 199,100
	TURF ESTABLISHMENT AND EROSION CONTROL	5%		of all roadway	$ 331,800
	TRAFFIC CONTROL	3%		of all roadway	$ 199,100
	CONTINGENCY FOR ADDITIONAL ITEMS	10%		of all roadway	$ 663,500
	Subtotal				$ 2,389,000
STRUCTURES					
	BRIDGE	SF	10,715	$ 200.00	$ 2,143,000
Total Preliminary Construction Cost Estimate (2018 Dollars)					**$ 11,167,000**
RIGHT OF WAY					
	RESIDENTIAL PROPERTY	ACRES	0.4	$ 40,000.00	$ 16,000
	AGRICULTURE PROPERTY	ACRES	49.0	$ 8,000.00	$ 392,000
	AGRICULTURE PROPERTY (INTERCHANGE AREA)	ACRES	42.3	$ 8,000.00	$ 338,400
	TOTAL TAKES	EACH	1	$ 200,000.00	$ 200,000
	Subtotal				$ 946,400
Total Preliminary Construction and R/W Cost Estimate (2018 Dollars)					**$ 12,113,400**

Notes:

1. TH 14 mainline and ramps pavement section assumed is 6.5 inch bituminous pavement, 7 inch aggregate base, and 24 inch sand.
2. Other roadways pavement section assumed is 5 inch bituminous pavement, 8 inch aggregate base, and 24 inch sand.
3. For the purpose of this estimate, non wearing course bituminous is included in wear course quantity.

Opinion of Probable Cost - Preliminary Cost Estimate

TH 14 Improvements - Estimated Costs - (Courtland Area)

Concept C - Benefit

2/12/2018

BOLTON & MENK
Real People. Real Solutions.

Item		Unit	Total Qty	Unit Price	Total Cost
MAJOR ROADWAY ITEMS					
	REMOVE BITUMINOUS PAVEMENT	SY		$ 2.90	$ -
	REMOVE CONCRETE MEDIAN	SF		$ 6.25	$ -
	REMOVE CURB AND GUTTER	LF		$ 5.95	$ -
	EXCAVATION - COMMON	CY	79,762	$ 3.00	$ 239,300
	COMMON EMBANKMENT (CV)	CY	45,376	$ 2.00	$ 90,800
	SELECT GRANULAR EMBANKMENT (CV)	CY	33,567	$ 14.00	$ 470,000
	TYPE SP 12.5 WEARING COURSE MIX (4,F)	TONS	13,067	$ 74.00	$ 967,000
	AGGREGATE BASE (CV) CLASS 6	CY	10,357	$ 26.00	$ 269,300
	CONCRETE CURB AND GUTTER	LF	5,100	$ 13.00	$ 66,300
	CONCRETE MEDIAN	SY	5,434	$ 5.00	$ 27,200
	8" CONCRETE DRIVEWAY PAVEMENT (RBT APRON)	SY		$ 75.00	$ -
	LIGHTING	EACH	20	$ 10,000.00	$ 200,000
	Subtotal				$ 2,330,000
	All Roadway Construction Subtotal				**$ 2,330,000**
PERCENTAGE ITEMS					
	MOBILIZATION	5%		of all roadway	$ 116,500
	DRAINAGE	10%		of all roadway	$ 233,000
	SIGNING & PAVEMENT MARKINGS	3%		of all roadway	$ 69,900
	TURF ESTABLISHMENT AND EROSION CONTROL	5%		of all roadway	$ 116,500
	TRAFFIC CONTROL	3%		of all roadway	$ 69,900
	CONTINGENCY FOR ADDITIONAL ITEMS	10%		of all roadway	$ 233,000
	Subtotal				$ 839,000
STRUCTURES					
	BRIDGE	SF	10,715	$ 200.00	$ 2,143,000
Total Preliminary Construction Cost Estimate (2018 Dollars)					**$ 5,312,000**
RIGHT OF WAY					
	RESIDENTIAL PROPERTY	ACRES		$ 40,000.00	$ -
	AGRICULTURE PROPERTY	ACRES		$ 8,000.00	$ -
	AGRICULTURE PROPERTY (INTERCHANGE AREA)	ACRES	42.3	$ 8,000.00	$ 338,400
	TOTAL TAKES	EACH		$ 200,000.00	$ -
	Subtotal				$ 338,400
Total Preliminary Construction and R/W Cost Estimate (2018 Dollars)					**$ 5,650,400**

Notes:

1. TH 14 mainline and ramps pavement section assumed is 6.5 inch bituminous pavement, 7 inch aggregate base, and 24 inch sand.
2. Other roadways pavement section assumed is 5 inch bituminous pavement, 8 inch aggregate base, and 24 inch sand.
3. For the purpose of this estimate, non wearing course bituminous is included in wear course quantity.

Opinion of Probable Cost - Preliminary Cost Estimate

TH 14 Improvements - Estimated Costs - (Courtland Area)

Concept E

2/12/2018

BOLTON & MENK
Real People. Real Solutions.

	Item	Unit	Total Qty	Unit Price	Total Cost
MAJOR ROADWAY ITEMS					
	REMOVE BITUMINOUS PAVEMENT	SY	18,830	$ 2.90	$ 54,700
	REMOVE CONCRETE MEDIAN	SF		$ 6.25	$ -
	REMOVE CURB AND GUTTER	LF		$ 5.95	$ -
	EXCAVATION - COMMON	CY	304,152	$ 3.00	$ 912,500
	COMMON EMBANKMENT (CV)	CY	339,597	$ 2.00	$ 679,200
	SELECT GRANULAR EMBANKMENT (CV)	CY	83,350	$ 14.00	$ 1,167,000
	TYPE SP 12.5 WEARING COURSE MIX (4,F)	TONS	31,188	$ 74.00	$ 2,308,000
	AGGREGATE BASE (CV) CLASS 6	CY	26,684	$ 26.00	$ 693,800
	CONCRETE CURB AND GUTTER	LF	4,556	$ 13.00	$ 59,300
	CONCRETE MEDIAN	SY	14,509	$ 5.00	$ 72,600
	8" CONCRETE DRIVEWAY PAVEMENT (RBT APRON)	SY	872	$ 75.00	$ 65,400
	LIGHTING	EACH	22	$ 10,000.00	$ 220,000
	Subtotal				$ 6,233,000
	All Roadway Construction Subtotal				**$ 6,233,000**
PERCENTAGE ITEMS					
	MOBILIZATION	5%		of all roadway	$ 311,700
	DRAINAGE	10%		of all roadway	$ 623,300
	SIGNING & PAVEMENT MARKINGS	3%		of all roadway	$ 187,000
	TURF ESTABLISHMENT AND EROSION CONTROL	5%		of all roadway	$ 311,700
	TRAFFIC CONTROL	3%		of all roadway	$ 187,000
	CONTINGENCY FOR ADDITIONAL ITEMS	10%		of all roadway	$ 623,300
	Subtotal				$ 2,244,000
STRUCTURES					
	BRIDGE	SF	12,475	$ 200.00	$ 2,495,000
Total Preliminary Construction Cost Estimate (2018 Dollars)					**$ 10,972,000**
RIGHT OF WAY					
	RESIDENTIAL PROPERTY	ACRES		$ 40,000.00	$ -
	AGRICULTURE PROPERTY	ACRES	21.8	$ 8,000.00	$ 174,400
	AGRICULTURE PROPERTY (INTERCHANGE AREA)	ACRES	69.8	$ 8,000.00	$ 558,400
	TOTAL TAKES	EACH			$ -
	Subtotal				$ 732,800
Total Preliminary Construction and R/W Cost Estimate (2018 Dollars)					**$ 11,704,800**

Notes:

1. TH 14 mainline and ramps pavement section assumed is 6.5 inch bituminous pavement, 7 inch aggregate base, and 24 inch sand.
2. Other roadways pavement section assumed is 5 inch bituminous pavement, 8 inch aggregate base, and 24 inch sand.
3. For the purpose of this estimate, non wearing course bituminous is included in wear course quantity.

Opinion of Probable Cost - Preliminary Cost Estimate

TH 14 Improvements - Estimated Costs - (Courtland Area)

Concept E - Benefit

2/12/2018

BOLTON & MENK
Real People. Real Solutions.

Item		Unit	Total Qty	Unit Price	Total Cost
MAJOR ROADWAY ITEMS					
	REMOVE BITUMINOUS PAVEMENT	SY	8,330	$ 2.90	$ 24,200
	REMOVE CONCRETE MEDIAN	SF		$ 6.25	$ -
	REMOVE CURB AND GUTTER	LF		$ 5.95	$ -
	EXCAVATION - COMMON	CY	131,737	$ 3.00	$ 395,300
	COMMON EMBANKMENT (CV)	CY	74,944	$ 2.00	$ 149,900
	SELECT GRANULAR EMBANKMENT (CV)	CY	53,719	$ 14.00	$ 752,100
	TYPE SP 12.5 WEARING COURSE MIX (4,F)	TONS	20,538	$ 74.00	$ 1,519,900
	AGGREGATE BASE (CV) CLASS 6	CY	16,697	$ 26.00	$ 434,200
	CONCRETE CURB AND GUTTER	LF	4,556	$ 13.00	$ 59,300
	CONCRETE MEDIAN	SY	14,509	$ 5.00	$ 72,600
	8" CONCRETE DRIVEWAY PAVEMENT (RBT APRON)	SY		$ 75.00	$ -
	LIGHTING	EACH	22	$ 10,000.00	$ 220,000
	Subtotal				$ 3,628,000
	All Roadway Construction Subtotal				**$ 3,628,000**
PERCENTAGE ITEMS					
	MOBILIZATION	5%		of all roadway	$ 181,400
	DRAINAGE	10%		of all roadway	$ 362,800
	SIGNING & PAVEMENT MARKINGS	3%		of all roadway	$ 108,900
	TURF ESTABLISHMENT AND EROSION CONTROL	5%		of all roadway	$ 181,400
	TRAFFIC CONTROL	3%		of all roadway	$ 108,900
	CONTINGENCY FOR ADDITIONAL ITEMS	10%		of all roadway	$ 362,800
	Subtotal				$ 1,306,000
STRUCTURES					
	BRIDGE	SF	12,475	$ 200.00	$ 2,495,000
Total Preliminary Construction Cost Estimate (2018 Dollars)					**$ 7,429,000**
RIGHT OF WAY					
	RESIDENTIAL PROPERTY	ACRES		$ 40,000.00	$ -
	AGRICULTURE PROPERTY	ACRES		$ 8,000.00	$ -
	AGRICULTURE PROPERTY (INTERCHANGE AREA)	ACRES	69.8	$ 8,000.00	$ 558,400
	TOTAL TAKES	EACH			$ -
	Subtotal				$ 558,400
Total Preliminary Construction and R/W Cost Estimate (2018 Dollars)					**$ 7,987,400**

Notes:

1. TH 14 mainline and ramps pavement section assumed is 6.5 inch bituminous pavement, 7 inch aggregate base, and 24 inch sand.
2. Other roadways pavement section assumed is 5 inch bituminous pavement, 8 inch aggregate base, and 24 inch sand.
3. For the purpose of this estimate, non wearing course bituminous is included in wear course quantity.

Opinion of Probable Cost - Preliminary Cost Estimate

TH 14 Improvements - Estimated Costs - (Courtland Area)

Concept F

2/12/2018

BOLTON & MENK
Real People. Real Solutions.

Item		Unit	Total Qty	Unit Price	Total Cost
MAJOR ROADWAY ITEMS					
	REMOVE BITUMINOUS PAVEMENT	SY	19,772	$ 2.90	$ 57,400
	REMOVE CONCRETE MEDIAN	SY		$ 6.25	$ -
	REMOVE CURB AND GUTTER	LF		$ 5.95	$ -
	EXCAVATION - COMMON	CY	317,766	$ 3.00	$ 953,300
	COMMON EMBANKMENT (CV)	CY	220,721	$ 2.00	$ 441,500
	SELECT GRANULAR EMBANKMENT (CV)	CY	74,896	$ 14.00	$ 1,048,600
	TYPE SP 12.5 WEARING COURSE MIX (4,F)	TONS	27,619	$ 74.00	$ 2,043,800
	AGGREGATE BASE (CV) CLASS 6	CY	24,329	$ 26.00	$ 632,600
	CONCRETE CURB AND GUTTER	LF	594	$ 13.00	$ 7,800
	CONCRETE MEDIAN	SF	645	$ 5.00	$ 3,300
	LIGHTING	EACH	10	$ 10,000.00	$ 100,000
	Subtotal				$ 5,288,000
	All Roadway Construction Subtotal				**$ 5,288,000**
PERCENTAGE ITEMS					
	MOBILIZATION	5%		of all roadway	$ 264,400
	DRAINAGE	10%		of all roadway	$ 528,800
	SIGNING & PAVEMENT MARKINGS	3%		of all roadway	$ 158,700
	TURF ESTABLISHMENT AND EROSION CONTROL	5%		of all roadway	$ 264,400
	TRAFFIC CONTROL	3%		of all roadway	$ 158,700
	CONTINGENCY FOR ADDITIONAL ITEMS	10%		of all roadway	$ 528,800
	Subtotal				$ 1,904,000
STRUCTURES					
	BRIDGE	SF	11,740	$ 200.00	$ 2,348,000
Total Preliminary Construction Cost Estimate (2018 Dollars)					**$ 9,540,000**
RIGHT OF WAY					
	RESIDENTIAL PROPERTY	ACRES		$ 40,000.00	$ -
	AGRICULTURE PROPERTY	ACRES	30.9	$ 8,000.00	$ 247,200
	AGRICULTURE PROPERTY (CONCEPT "F" AREA)	ACRES	41.8	$ 8,000.00	$ 334,400
	TOTAL TAKES	EACH			$ -
	Subtotal				$ 581,600
Total Preliminary Construction and R/W Cost Estimate (2018 Dollars)					**$ 10,121,600**

Notes:

1. TH 14 mainline and ramps pavement section assumed is 6.5 inch bituminous pavement, 7 inch aggregate base, and 24 inch sand.
2. Other roadways pavement section assumed is 5 inch bituminous pavement, 8 inch aggregate base, and 24 inch sand.
3. For the purpose of this estimate, non wearing course bituminous is included in wear course quantity.

Opinion of Probable Cost - Preliminary Cost Estimate

TH 14 Improvements - Estimated Costs - (Courtland Area)

Concept F - Benefit

2/12/2018

BOLTON & MENK
Real People. Real Solutions.

Item		Unit	Total Qty	Unit Price	Total Cost
MAJOR ROADWAY ITEMS					
	REMOVE BITUMINOUS PAVEMENT	SY	8,747	$ 2.90	$ 25,400
	REMOVE CONCRETE MEDIAN	SY		$ 6.25	$ -
	REMOVE CURB AND GUTTER	LF		$ 5.95	$ -
	EXCAVATION - COMMON	CY	104,850	$ 3.00	$ 314,600
	COMMON EMBANKMENT (CV)	CY	59,648	$ 2.00	$ 119,300
	SELECT GRANULAR EMBANKMENT (CV)	CY	36,975	$ 14.00	$ 517,700
	TYPE SP 12.5 WEARING COURSE MIX (4,F)	TONS	13,939	$ 74.00	$ 1,031,600
	AGGREGATE BASE (CV) CLASS 6	CY	11,810	$ 26.00	$ 307,100
	CONCRETE CURB AND GUTTER	LF	594	$ 13.00	$ 7,800
	CONCRETE MEDIAN	SF	645	$ 5.00	$ 3,300
	LIGHTING	EACH	10	$ 10,000.00	$ 100,000
	Subtotal				$ 2,427,000
	All Roadway Construction Subtotal				**$ 2,427,000**
PERCENTAGE ITEMS					
	MOBILIZATION	5%		of all roadway	$ 121,400
	DRAINAGE	10%		of all roadway	$ 242,700
	SIGNING & PAVEMENT MARKINGS	3%		of all roadway	$ 72,900
	TURF ESTABLISHMENT AND EROSION CONTROL	5%		of all roadway	$ 121,400
	TRAFFIC CONTROL	3%		of all roadway	$ 72,900
	CONTINGENCY FOR ADDITIONAL ITEMS	10%		of all roadway	$ 242,700
	Subtotal				$ 874,000
STRUCTURES					
	BRIDGE	SF	11,740	$ 200.00	$ 2,348,000
Total Preliminary Construction Cost Estimate (2018 Dollars)					**$ 5,649,000**
RIGHT OF WAY					
	RESIDENTIAL PROPERTY	ACRES		$ 40,000.00	$ -
	AGRICULTURE PROPERTY	ACRES		$ 8,000.00	$ -
	AGRICULTURE PROPERTY (CONCEPT "F" AREA)	ACRES	41.8	$ 8,000.00	$ 334,400
	TOTAL TAKES	EACH			$ -
	Subtotal				$ 334,400
Total Preliminary Construction and R/W Cost Estimate (2018 Dollars)					**$ 5,983,400**

Notes:

1. TH 14 mainline and ramps pavement section assumed is 6.5 inch bituminous pavement, 7 inch aggregate base, and 24 inch sand.
2. Other roadways pavement section assumed is 5 inch bituminous pavement, 8 inch aggregate base, and 24 inch sand.
3. For the purpose of this estimate, non wearing course bituminous is included in wear course quantity.

Opinion of Probable Cost - Preliminary Cost Estimate

TH 14 Improvements - Estimated Costs - (561st to 571st)

56' Center to Center

2/12/2018

BOLTON & MENK
Real People. Real Solutions.

Item		Unit	Total Qty	Unit Price	Total Cost
MAJOR ROADWAY ITEMS					
	REMOVE BITUMINOUS PAVEMENT	SY	38,325	$ 2.90	$ 111,200
	REMOVE CONCRETE MEDIAN	SY	9,660	$ 6.25	$ 60,400
	REMOVE CURB AND GUTTER	LF		$ 5.95	$ -
	EXCAVATION - COMMON	CY	127,015	$ 3.00	$ 381,100
	COMMON EMBANKMENT (CV)	CY	67,547	$ 2.00	$ 135,100
	SELECT GRANULAR EMBANKMENT (CV)	CY	35,283	$ 14.00	$ 494,000
	TYPE SP 12.5 WEARING COURSE MIX (4,F)	TONS	12,935	$ 74.00	$ 957,200
	AGGREGATE BASE (CV) CLASS 6	CY	11,516	$ 26.00	$ 299,500
	CONCRETE CURB AND GUTTER	LF		$ 13.00	$ -
	CONCRETE MEDIAN	SF		$ 5.00	$ -
	LIGHTING	EACH		$ 10,000.00	$ -
	BRIDGE	SF		$ 200.00	$ -
	Subtotal				$ 2,439,000
	All Roadway Construction Subtotal				**$ 2,439,000**
PRECENTAGE ITEMS					
	MOBILIZATION	5%		of all roadway	$ 122,000
	DRAINAGE	10%		of all roadway	$ 243,900
	SIGNING & PAVEMENT MARKINGS	3%		of all roadway	$ 73,200
	TURF ESTABLISHMENT AND EROSION CONTROL	5%		of all roadway	$ 122,000
	TRAFFIC CONTROL	3.0%		of all roadway	$ 73,200
	CONTINGENCY FOR ADDITIONAL ITEMS	10%		of all roadway	$ 243,900
	Subtotal				$ 878,000
Total Preliminary Construction Cost Estimate (2018 Dollars)					**$ 3,317,000**
RIGHT OF WAY					
	RESIDENTIAL PROPERTY	ACRES		$ 40,000.00	$ -
	AGRICULTURE PROPERTY	ACRES		$ 8,000.00	$ -
	TOTAL TAKES (RESIDENTIAL)	EACH	1	$ 200,000.00	$ 200,000
	TOTAL TAKES (ATHLETIC FIELDS)	EACH		$ 1,100,000.00	$ -
	Subtotal				$ 200,000
Total Preliminary Construction and R/W Cost Estimate (2018 Dollars)					**$ 3,517,000**

Notes:

1. TH 14 mainline and ramps pavement section assumed is 6.5 inch bituminous pavement, 7 inch aggregate base, and 24 inch sand.
2. Other roadways pavement section assumed is 5 inch bituminous pavement, 8 inch aggregate base, and 24 inch sand.
3. For the purpose of this estimate, non wearing course bituminous is included in wear course quantity.

Opinion of Probable Cost - Preliminary Cost Estimate

TH 14 Improvements - Estimated Costs - (561st to 571st)

94' Center to Center

2/12/2018

BOLTON & MENK
Real People. Real Solutions.

	Item	Unit	Total Qty	Unit Price	Total Cost
MAJOR ROADWAY ITEMS					
	REMOVE BITUMINOUS PAVEMENT	SY	38,325	$ 2.90	$ 111,200
	REMOVE CONCRETE MEDIAN	SY	9,660	$ 6.25	$ 60,400
	REMOVE CURB AND GUTTER	LF		$ 5.95	$ -
	EXCAVATION - COMMON	CY	67,682	$ 3.00	$ 203,100
	COMMON EMBANKMENT (CV)	CY	38,502	$ 2.00	$ 77,100
	SELECT GRANULAR EMBANKMENT (CV)	CY	35,270	$ 14.00	$ 493,800
	TYPE SP 12.5 WEARING COURSE MIX (4,F)	TONS	12,931	$ 74.00	$ 956,900
	AGGREGATE BASE (CV) CLASS 6	CY	11,513	$ 26.00	$ 299,400
	CONCRETE CURB AND GUTTER	LF		$ 13.00	$ -
	CONCRETE MEDIAN	SF		$ 5.00	$ -
	LIGHTING	EACH		$ 10,000.00	$ -
	BRIDGE	SF		$ 200.00	$ -
	Subtotal				$ 2,202,000
	All Roadway Construction Subtotal				**$ 2,202,000**
PRECENTAGE ITEMS					
	MOBILIZATION	5%		of all roadway	$ 110,100
	DRAINAGE	10%		of all roadway	$ 220,200
	SIGNING & PAVEMENT MARKINGS	3%		of all roadway	$ 66,100
	TURF ESTABLISHMENT AND EROSION CONTROL	5%		of all roadway	$ 110,100
	TRAFFIC CONTROL	3.0%		of all roadway	$ 66,100
	CONTINGENCY FOR ADDITIONAL ITEMS	10%		of all roadway	$ 220,200
	Subtotal				$ 793,000
Total Preliminary Construction Cost Estimate (2018 Dollars)					**$ 2,995,000**
RIGHT OF WAY					
	RESIDENTIAL PROPERTY	ACRES		$ 40,000.00	$ -
	AGRICULTURE PROPERTY	ACRES	14.4	$ 8,000.00	$ 115,200
	TOTAL TAKES (RESIDENTIAL)	EACH	4	$ 200,000.00	$ 800,000
	TOTAL TAKES (ATHLETIC FIELDS)	EACH	1	$ 1,100,000.00	$ 1,100,000
	Subtotal				$ 2,015,200
Total Preliminary Construction and R/W Cost Estimate (2018 Dollars)					**$ 5,010,200**

Notes:

1. TH 14 mainline and ramps pavement section assumed is 6.5 inch bituminous pavement, 7 inch aggregate base, and 24 inch sand.
2. Other roadways pavement section assumed is 5 inch bituminous pavement, 8 inch aggregate base, and 24 inch sand.
3. For the purpose of this estimate, non wearing course bituminous is included in wear course quantity.

Appendix H: Benefit-Cost Calculations

Project Cost

TH 14 and CSAH 37 - Traditional At-Grade

D7 - MnDOT

		Capital Cost in 2018 Dollars		
	Year	BASE CASE	Traditional At-Grade Alternative	Present Value
2020	0	$ -	$ 1,110,000.00	$ 1,110,000.00
2021	1	$ -	$ -	$ -
2022	2	$ -	$ -	$ -
2023	3	$ -	$ -	$ -
2024	4	$ -	$ -	$ -
2025	5	$ -	$ -	$ -
2026	6	$ -	$ -	$ -
2027	7	$ -	$ -	$ -
2028	8	$ -	$ -	$ -
2029	9	$ -	$ -	$ -
2030	10	$ -	$ -	$ -
2031	11	$ -	$ -	$ -
2032	12	$ -	$ -	$ -
2033	13	$ -	$ -	$ -
2034	14	$ -	$ -	$ -
2035	15	$ -	$ -	$ -
2036	16	$ -	$ -	$ -
2037	17	$ -	$ -	$ -
2038	18	$ -	$ -	$ -
2039	19	$ -	$ -	$ -
2040	20	$ -	$ -	$ -
Present Value of Costs (2018 Dollars)				$ 1,110,000.00

Project Cost

TH 14 and CSAH 37 - RCUT

D7 - MnDOT

		Capital Cost in 2018 Dollars		
	Year	BASE CASE	RCUT Alternative	Present Value
2020	0	$ -	$ 1,786,400.00	$ 1,786,400.00
2021	1	$ -	$ -	$ -
2022	2	$ -	$ -	$ -
2023	3	$ -	$ -	$ -
2024	4	$ -	$ -	$ -
2025	5	$ -	$ -	$ -
2026	6	$ -	$ -	$ -
2027	7	$ -	$ -	$ -
2028	8	$ -	$ -	$ -
2029	9	$ -	$ -	$ -
2030	10	$ -	$ -	$ -
2031	11	$ -	$ -	$ -
2032	12	$ -	$ -	$ -
2033	13	$ -	$ -	$ -
2034	14	$ -	$ -	$ -
2035	15	$ -	$ -	$ -
2036	16	$ -	$ -	$ -
2037	17	$ -	$ -	$ -
2038	18	$ -	$ -	$ -
2039	19	$ -	$ -	$ -
2040	20	$ -	$ -	$ -
Present Value of Costs (2018 Dollars)				$ 1,786,400.00

Project Cost

TH 14 and CSAH 37 - High T

D7 - MnDOT

		Capital Cost in 2018 Dollars		
	Year	BASE CASE	High T Alternative	Present Value
2020	0	$ -	$ 14,847,000.00	$ 14,847,000.00
2021	1	$ -	$ -	$ -
2022	2	$ -	$ -	$ -
2023	3	$ -	$ -	$ -
2024	4	$ -	$ -	$ -
2025	5	$ -	$ -	$ -
2026	6	$ -	$ -	$ -
2027	7	$ -	$ -	$ -
2028	8	$ -	$ -	$ -
2029	9	$ -	$ -	$ -
2030	10	$ -	$ -	$ -
2031	11	$ -	$ -	$ -
2032	12	$ -	$ -	$ -
2033	13	$ -	$ -	$ -
2034	14	$ -	$ -	$ -
2035	15	$ -	$ -	$ -
2036	16	$ -	$ -	$ -
2037	17	$ -	$ -	$ -
2038	18	$ -	$ -	$ -
2039	19	$ -	$ -	$ -
2040	20	$ -	$ -	$ -
Present Value of Costs (2018 Dollars)				$ 14,847,000.00

Project Cost

TH 14 and CSAH 37 - Interchange

D7 - MnDOT

		Capital Cost in 2018 Dollars		
	Year	BASE CASE	Interchange Alternative	Present Value
2020	0	$ -	$ 7,965,000.00	$ 7,965,000.00
2021	1	$ -	$ -	$ -
2022	2	$ -	$ -	$ -
2023	3	$ -	$ -	$ -
2024	4	$ -	$ -	$ -
2025	5	$ -	$ -	$ -
2026	6	$ -	$ -	$ -
2027	7	$ -	$ -	$ -
2028	8	$ -	$ -	$ -
2029	9	$ -	$ -	$ -
2030	10	$ -	$ -	$ -
2031	11	$ -	$ -	$ -
2032	12	$ -	$ -	$ -
2033	13	$ -	$ -	$ -
2034	14	$ -	$ -	$ -
2035	15	$ -	$ -	$ -
2036	16	$ -	$ -	$ -
2037	17	$ -	$ -	$ -
2038	18	$ -	$ -	$ -
2039	19	$ -	$ -	$ -
2040	20	$ -	$ -	$ -
Present Value of Costs (2018 Dollars)				$ 7,965,000.00

Project Cost

TH 14 and CSAH 37 - Roundabout

D7 - MnDOT

		Capital Cost in 2018 Dollars		
	Year	BASE CASE	Roundabout Alternative	Present Value
2020	0	$ -	$ 2,272,400.00	$ 2,272,400.00
2021	1	$ -	$ -	$ -
2022	2	$ -	$ -	$ -
2023	3	$ -	$ -	$ -
2024	4	$ -	$ -	$ -
2025	5	$ -	$ -	$ -
2026	6	$ -	$ -	$ -
2027	7	$ -	$ -	$ -
2028	8	$ -	$ -	$ -
2029	9	$ -	$ -	$ -
2030	10	$ -	$ -	$ -
2031	11	$ -	$ -	$ -
2032	12	$ -	$ -	$ -
2033	13	$ -	$ -	$ -
2034	14	$ -	$ -	$ -
2035	15	$ -	$ -	$ -
2036	16	$ -	$ -	$ -
2037	17	$ -	$ -	$ -
2038	18	$ -	$ -	$ -
2039	19	$ -	$ -	$ -
2040	20	$ -	$ -	$ -
Present Value of Costs (2018 Dollars)				$ 2,272,400.00

Operations Analysis Results

TH 14 and CSAH 37

D7 - MnDOT

BASE	Year	Time Period	# of hours in Time Period	Volume	Intersection Delay per veh	Additional Travel Time Delay per Veh	Total Delay per veh	Daily VHT
	2018	AM Peak	1	1105	2.14	17.1	19.25	5.9
	2018	PM Peak	3	1224	3.91	17.1	21.02	21.4
	2018	Mid	6	857	3.48	17.1	20.59	29.4
	2018	AM2	1	663	2.57	17.1	19.68	3.6
	2018	AM3	1	276	2.26	17.1	19.37	1.5
	2018	PM2	1	979	3.8	17.1	20.91	5.7
	2018	PM3	1	734	3.2	17.1	20.31	4.1
	2018	LATE	7	111	2.2	17.1	19.31	4.1
	2018	LATE2	3	332	2.32	17.1	19.43	5.4
		SUM						**81.2**
	2040	AM Peak	1	1430	3.34	17.1	20.45	8.1
	2040	PM Peak	3	1582	16.38	17.1	33.49	44.1
	2040	Mid	6	1107	4.21	17.1	21.32	39.3
	2040	AM2	1	858	2.84	17.1	19.95	4.8
	2040	AM3	1	358	2.41	17.1	19.52	1.9
	2040	PM2	1	1266	5.36	17.1	22.47	7.9
	2040	PM3	1	949	3.65	17.1	20.76	5.5
	2040	LATE	7	143	2.28	17.1	19.39	5.4
	2040	LATE2	3	429	2.41	17.1	19.52	7.0
		SUM						**124.0**

Traditional At-Grade	Year	Time Period	# of hours in Time Period	Volume	Intersection Delay per veh	Additional Travel Time Delay per Veh	Total Delay per veh	Daily VHT
	2018	AM Peak	1	1107	3.8	0	3.80	1.2
	2018	PM Peak	3	1222	11.8	0	11.80	12.0
	2018	Mid	6	855	4.9	0	4.90	7.0
	2018	AM2	1	664	4	0	4.00	0.7
	2018	AM3	1	277	3.6	0	3.60	0.3
	2018	PM2	1	978	5.2	0	5.20	1.4
	2018	PM3	1	733	4.7	0	4.70	1.0
	2018	LATE	7	111	3.7	0	3.70	0.8
	2018	LATE2	3	332	3.8	0	3.80	1.1
		SUM						**25.4**
	2040	AM Peak	1	1430	8.2	0	8.20	3.3
	2040	PM Peak	3	1592	124.5	0	124.50	165.2
	2040	Mid	6	1114	5.6	0	5.60	10.4
	2040	AM2	1	858	4.2	0	4.20	1.0
	2040	AM3	1	358	3.9	0	3.90	0.4
	2040	PM2	1	1274	6.2	0	6.20	2.2
	2040	PM3	1	955	5.2	0	5.20	1.4
	2040	LATE	7	143	3.7	0	3.70	1.0
	2040	LATE2	3	429	3.9	0	3.90	1.4
		SUM						**186.2**

RCUT	Year	Time Period	# of hours in Time Period	Volume	Intersection Delay per veh	Additional Travel Time Delay per Veh	Total Delay per veh	Daily VHT
	2018	AM Peak	1	1131	2.65	0	2.65	0.8
	2018	PM Peak	3	1224	4.29	0	4.29	4.4
	2018	Mid	6	857	3.93	0	3.93	5.6
	2018	AM2	1	679	2.82	0	2.82	0.5
	2018	AM3	1	283	2.71	0	2.71	0.2
	2018	PM2	1	979	4.3	0	4.30	1.2
	2018	PM3	1	734	3.94	0	3.94	0.8
	2018	LATE	7	113	2.7	0	2.70	0.6
	2018	LATE2	3	339	2.75	0	2.75	0.8
		SUM						**14.9**
	2040	AM Peak	1	1432	3.24	0	3.24	1.3
	2040	PM Peak	3	1591	7.12	0	7.12	9.4
	2040	Mid	6	1114	5.41	0	5.41	10.0
	2040	AM2	1	859	2.86	0	2.86	0.7
	2040	AM3	1	358	2.72	0	2.72	0.3
	2040	PM2	1	1273	5.54	0	5.54	2.0
	2040	PM3	1	955	5.28	0	5.28	1.4
	2040	LATE	7	143	2.68	0	2.68	0.7
	2040	LATE2	3	430	2.76	0	2.76	1.0
		SUM						**26.8**

High T	Year	Time Period	# of hours in Time Period	Volume	Intersection Delay per veh	Additional Travel Time Delay per Veh	Total Delay per veh	Daily VHT
	2018	AM Peak	1	1105	1.7	0	1.70	0.5
	2018	PM Peak	3	1224	2.8	0	2.80	2.9
	2018	Mid	6	857	3.7	0	3.70	5.3
	2018	AM2	1	663	3.7	0	3.70	0.7
	2018	AM3	1	276	3.5	0	3.50	0.3
	2018	PM2	1	979	4.5	0	4.50	1.2
	2018	PM3	1	734	3.7	0	3.70	0.8
	2018	LATE	7	111	3.5	0	3.50	0.8
	2018	LATE2	3	332	3.6	0	3.60	1.0
		SUM						**13.3**
	2040	AM Peak	1	1430	2.2	0	2.20	0.9
	2040	PM Peak	3	1591	3.9	0	3.90	5.2
	2040	Mid	6	1114	4	0	4.00	7.4
	2040	AM2	1	858	3.8	0	3.80	0.9
	2040	AM3	1	358	3.6	0	3.60	0.4
	2040	PM2	1	1273	5	0	5.00	1.8
	2040	PM3	1	955	3.9	0	3.90	1.0
	2040	LATE	7	143	3.5	0	3.50	1.0
	2040	LATE2	3	429	3.6	0	3.60	1.3
		SUM						**19.8**

Interchange	Year	Time Period	# of hours in Time Period	Volume	Intersection Delay per veh	Additional Travel Time Delay per Veh	Total Delay per veh	Daily VHT
	2018	AM Peak	1	1105	5.28	0	5.28	1.6
	2018	PM Peak	3	1224	5.97	0	5.97	6.1
	2018	Mid	6	857	5.05	0	5.05	7.2
	2018	AM2	1	663	4.43	0	4.43	0.8
	2018	AM3	1	276	3.74	0	3.74	0.3
	2018	PM2	1	979	5.32	0	5.32	1.4
	2018	PM3	1	734	4.78	0	4.78	1.0
	2018	LATE	7	111	3.52	0	3.52	0.8
	2018	LATE2	3	332	3.88	0	3.88	1.1
		SUM						**20.3**
	2040	AM Peak	1	1430	6.04	0	6.04	2.4
	2040	PM Peak	3	1591	7.05	0	7.05	9.3
	2040	Mid	6	1114	5.73	0	5.73	10.6
	2040	AM2	1	858	4.78	0	4.78	1.1
	2040	AM3	1	358	3.94	0	3.94	0.4
	2040	PM2	1	1273	6.13	0	6.13	2.2
	2040	PM3	1	955	5.28	0	5.28	1.4
	2040	LATE	7	143	3.58	0	3.58	1.0
	2040	LATE2	3	429	4.04	0	4.04	1.4
		SUM						**29.9**

Roundabout	Year	Time Period	# of hours in Time Period	Volume	Intersection Delay per veh	Additional Travel Time Delay per Veh	Total Delay per veh	Daily VHT
	2018	AM Peak	1	1104	6.2	3.9	10.15	3.1
	2018	PM Peak	3	1227	6.5	3.9	10.45	10.7
	2018	Mid	6	859	5.1	3.9	9.05	13.0
	2018	AM2	1	662	4.6	3.9	8.55	1.6
	2018	AM3	1	276	3.6	3.9	7.55	0.6
	2018	PM2	1	982	5.5	3.9	9.45	2.6
	2018	PM3	1	736	4.7	3.9	8.65	1.8
	2018	LATE	7	110	3.2	3.9	7.15	1.5
	2018	LATE2	3	331	3.7	3.9	7.65	2.1
		SUM						**36.9**
	2040	AM Peak	1	1424	8.1	3.9	12.05	4.8
	2040	PM Peak	3	1584	8.5	3.9	12.45	16.4
	2040	Mid	6	1109	6	3.9	9.95	18.4
	2040	AM2	1	854	5.2	3.9	9.15	2.2
	2040	AM3	1	356	3.8	3.9	7.75	0.8
	2040	PM2	1	1267	6.6	3.9	10.55	3.7
	2040	PM3	1	950	5.4	3.9	9.35	2.5
	2040	LATE	7	142	3.3	3.9	7.25	2.0
	2040	LATE2	3	427	3.9	3.9	7.85	2.8
		SUM						**53.5**

Vehicle Operating Cost Savings

TH 14 and CSAH 37 - Traditional At-Grade

D7 - MnDOT

	Year	BASE VHT	Traditional At-Grade VHT	VHT Difference	Annual Savings	Present Value
2021	1	87.04227065	47.33138965	39.71088101	$ 357,020.58	$ *343,451.10*
2022	2	88.98988077	54.64093712	34.34894365	$ 308,814.09	$ *293,264.39*
2023	3	90.93749088	61.9504846	28.98700628	$ 260,607.61	$ *244,309.22*
2024	4	92.88510099	69.26003207	23.62506892	$ 212,401.12	$ *196,562.26*
2025	5	94.83271111	76.56957955	18.26313156	$ 164,194.64	$ *150,000.55*
2026	6	96.78032122	83.87912702	12.9011942	$ 115,988.15	$ *104,601.54*
2027	7	98.72793134	91.18867449	7.539256842	$ 67,781.67	$ *60,343.05*
2028	8	100.6755415	98.49822197	2.177319482	$ 19,575.19	$ *17,203.29*
2029	9	102.6231516	105.8077694	-3.184617879	$ (28,631.30)	$ *(24,839.17)*
2030	10	104.5707617	113.1173169	-8.546555239	$ (76,837.78)	$ *(65,805.39)*
2031	11	106.5183718	120.4268644	-13.9084926	$ (125,044.27)	$ *(105,716.07)*
2032	12	108.4659819	127.7364119	-19.27042996	$ (173,250.75)	$ *(144,591.54)*
2033	13	110.413592	135.0459593	-24.63236732	$ (221,457.24)	$ *(182,451.82)*
2034	14	112.3612021	142.3555068	-29.99430468	$ (269,663.72)	$ *(219,316.55)*
2035	15	114.3088123	149.6650543	-35.35624204	$ (317,870.21)	$ *(255,205.04)*
2036	16	116.2564224	156.9746018	-40.7181794	$ (366,076.69)	$ *(290,136.29)*
2037	17	118.2040325	164.2841492	-46.08011676	$ (414,283.17)	$ *(324,128.96)*
2038	18	120.1516426	171.5936967	-51.44205412	$ (462,489.66)	$ *(357,201.37)*
2039	19	122.0992527	178.9032442	-56.80399148	$ (510,696.14)	$ *(389,371.56)*
2040	20	124.0468628	186.2	-62.2	$ (558,902.63)	$ *(420,657.23)*
Total Benefits During 20 Year Project Life (2018 Dollars)						**$ (1,369,685.60)**

Vehicle Operating Cost Savings

TH 14 and CSAH 37 - RCUT

D7 - MnDOT

	Year	BASE VHT	RCUT VHT	VHT Difference	Annual Savings	Present Value
2021	1	87.04227065	16.53321468	70.50905597	$ 633,911.49	$ *609,818.07*
2022	2	88.98988077	17.07445388	71.91542689	$ 646,555.47	$ *613,999.48*
2023	3	90.93749088	17.61569307	73.32179781	$ 659,199.44	$ *617,973.15*
2024	4	92.88510099	18.15693227	74.72816872	$ 671,843.41	$ *621,743.70*
2025	5	94.83271111	18.69817147	76.13453964	$ 684,487.39	$ *625,315.70*
2026	6	96.78032122	19.23941067	77.54091055	$ 697,131.36	$ *628,693.63*
2027	7	98.72793134	19.78064987	78.94728147	$ 709,775.34	$ *631,881.87*
2028	8	100.6755415	20.32188907	80.35365239	$ 722,419.31	$ *634,884.75*
2029	9	102.6231516	20.86312826	81.7600233	$ 735,063.29	$ *637,706.48*
2030	10	104.5707617	21.40436746	83.16639422	$ 747,707.26	$ *640,351.24*
2031	11	106.5183718	21.94560666	84.57276513	$ 760,351.23	$ *642,823.09*
2032	12	108.4659819	22.48684586	85.97913605	$ 772,995.21	$ *645,126.03*
2033	13	110.413592	23.02808506	87.38550697	$ 785,639.18	$ *647,264.00*
2034	14	112.3612021	23.56932426	88.79187788	$ 798,283.16	$ *649,240.85*
2035	15	114.3088123	24.11056345	90.1982488	$ 810,927.13	$ *651,060.37*
2036	16	116.2564224	24.65180265	91.60461971	$ 823,571.10	$ *652,726.26*
2037	17	118.2040325	25.19304185	93.01099063	$ 836,215.08	$ *654,242.17*
2038	18	120.1516426	25.73428105	94.41736155	$ 848,859.05	$ *655,611.67*
2039	19	122.0992527	26.27552025	95.82373246	$ 861,503.03	$ *656,838.28*
2040	20	124.0468628	26.8	97.2	$ 874,147.00	$ *657,925.43*
Total Benefits During 20 Year Project Life (2018 Dollars)						**$ 12,775,226.22**

Vehicle Operating Cost Savings

TH 14 and CSAH 37 - High T

D7 - MnDOT

	Year	BASE VHT	High T VHT	VHT Difference	Annual Savings	Present Value
2021	1	87.04227065	14.21733277	72.82493789	$ 654,732.42	$ *629,847.65*
2022	2	88.98988077	14.51087285	74.47900791	$ 669,603.33	$ *635,886.82*
2023	3	90.93749088	14.80441294	76.13307794	$ 684,474.25	$ *641,667.27*
2024	4	92.88510099	15.09795303	77.78714796	$ 699,345.16	$ *647,194.62*
2025	5	94.83271111	15.39149312	79.44121799	$ 714,216.07	$ *652,474.44*
2026	6	96.78032122	15.68503321	81.09528802	$ 729,086.98	$ *657,512.15*
2027	7	98.72793134	15.9785733	82.74935804	$ 743,957.90	$ *662,313.11*
2028	8	100.6755415	16.27211338	84.40342807	$ 758,828.81	$ *666,882.56*
2029	9	102.6231516	16.56565347	86.05749809	$ 773,699.72	$ *671,225.65*
2030	10	104.5707617	16.85919356	87.71156812	$ 788,570.63	$ *675,347.44*
2031	11	106.5183718	17.15273365	89.36563814	$ 803,441.55	$ *679,252.89*
2032	12	108.4659819	17.44627374	91.01970817	$ 818,312.46	$ *682,946.88*
2033	13	110.413592	17.73981383	92.6737782	$ 833,183.37	$ *686,434.20*
2034	14	112.3612021	18.03335391	94.32784822	$ 848,054.28	$ *689,719.53*
2035	15	114.3088123	18.326894	95.98191825	$ 862,925.20	$ *692,807.50*
2036	16	116.2564224	18.62043409	97.63598827	$ 877,796.11	$ *695,702.61*
2037	17	118.2040325	18.91397418	99.2900583	$ 892,667.02	$ *698,409.32*
2038	18	120.1516426	19.20751427	100.9441283	$ 907,537.93	$ *700,931.99*
2039	19	122.0992527	19.50105436	102.5981984	$ 922,408.85	$ *703,274.88*
2040	20	124.0468628	19.8	104.3	$ 937,279.76	$ *705,442.21*
Total Benefits During 20 Year Project Life (2018 Dollars)						**$ 13,475,273.71**

Vehicle Operating Cost Savings

TH 14 and CSAH 37 - Interchange

D7 - MnDOT

	Year	BASE VHT	Interchange VHT	VHT Difference	Annual Savings	Present Value
2021	1	87.04227065	21.58988754	65.45238311	$ 588,449.49	$ *566,083.96*
2022	2	88.98988077	22.02830366	66.9615771	$ 602,017.89	$ *571,704.51*
2023	3	90.93749088	22.46671979	68.4707711	$ 615,586.30	$ *577,087.57*
2024	4	92.88510099	22.90513591	69.97996509	$ 629,154.70	$ *582,238.30*
2025	5	94.83271111	23.34355203	71.48915908	$ 642,723.11	$ *587,161.80*
2026	6	96.78032122	23.78196816	72.99835307	$ 656,291.51	$ *591,863.04*
2027	7	98.72793134	24.22038428	74.50754706	$ 669,859.92	$ *596,346.92*
2028	8	100.6755415	24.6588004	76.01674105	$ 683,428.32	$ *600,618.24*
2029	9	102.6231516	25.09721653	77.52593504	$ 696,996.73	$ *604,681.72*
2030	10	104.5707617	25.53563265	79.03512903	$ 710,565.13	$ *608,541.99*
2031	11	106.5183718	25.97404878	80.54432302	$ 724,133.53	$ *612,203.59*
2032	12	108.4659819	26.4124649	82.05351701	$ 737,701.94	$ *615,670.99*
2033	13	110.413592	26.85088102	83.562711	$ 751,270.34	$ *618,948.57*
2034	14	112.3612021	27.28929715	85.07190499	$ 764,838.75	$ *622,040.64*
2035	15	114.3088123	27.72771327	86.58109898	$ 778,407.15	$ *624,951.40*
2036	16	116.2564224	28.16612939	88.09029297	$ 791,975.56	$ *627,685.02*
2037	17	118.2040325	28.60454552	89.59948696	$ 805,543.96	$ *630,245.55*
2038	18	120.1516426	29.04296164	91.10868095	$ 819,112.37	$ *632,636.98*
2039	19	122.0992527	29.48137777	92.61787494	$ 832,680.77	$ *634,863.24*
2040	20	124.0468628	29.9	94.1	$ 846,249.18	$ *636,928.18*
	Total Benefits During 20 Year Project Life (2018 Dollars)					**$ 12,142,502.21**

Vehicle Operating Cost Savings

TH 14 and CSAH 37 - Roundabout

D7 - MnDOT

	Year	BASE VHT	Roundabout VHT	VHT Difference	Annual Savings	Present Value
2021	1	87.04227065	39.15340736	47.88886329	$ 430,544.71	$ *414,180.76*
2022	2	88.98988077	39.90844448	49.08143628	$ 441,266.53	$ *419,047.45*
2023	3	90.93749088	40.66348161	50.27400927	$ 451,988.35	$ *423,721.03*
2024	4	92.88510099	41.41851873	51.46658226	$ 462,710.18	$ *428,205.64*
2025	5	94.83271111	42.17355586	52.65915525	$ 473,432.00	$ *432,505.36*
2026	6	96.78032122	42.92859298	53.85172824	$ 484,153.83	$ *436,624.20*
2027	7	98.72793134	43.6836301	55.04430123	$ 494,875.65	$ *440,566.10*
2028	8	100.6755415	44.43866723	56.23687422	$ 505,597.48	$ *444,334.92*
2029	9	102.6231516	45.19370435	57.42944721	$ 516,319.30	$ *447,934.45*
2030	10	104.5707617	45.94874148	58.6220202	$ 527,041.13	$ *451,368.41*
2031	11	106.5183718	46.7037786	59.81459319	$ 537,762.95	$ *454,640.47*
2032	12	108.4659819	47.45881573	61.00716618	$ 548,484.78	$ *457,754.20*
2033	13	110.413592	48.21385285	62.19973917	$ 559,206.60	$ *460,713.15*
2034	14	112.3612021	48.96888998	63.39231216	$ 569,928.42	$ *463,520.76*
2035	15	114.3088123	49.7239271	64.58488515	$ 580,650.25	$ *466,180.44*
2036	16	116.2564224	50.47896422	65.77745814	$ 591,372.07	$ *468,695.51*
2037	17	118.2040325	51.23400135	66.97003113	$ 602,093.90	$ *471,069.26*
2038	18	120.1516426	51.98903847	68.16260412	$ 612,815.72	$ *473,304.89*
2039	19	122.0992527	52.7440756	69.35517711	$ 623,537.55	$ *475,405.56*
2040	20	124.0468628	53.5	70.5	$ 634,259.37	$ *477,374.37*
	Total Benefits During 20 Year Project Life (2018 Dollars)					**$ 9,007,146.93**

Safety Benefit Savings
TH 14 and CSAH 37 - Traditional At-Grade
D7 - MnDOT

	Year	Traditional At-Grade Annual Savings	Present Value
2021	1	$ 50,565.15	$ *50,565.15*
2022	2	$ 51,217.44	$ *50,560.15*
2023	3	$ 51,878.14	$ *50,555.16*
2024	4	$ 52,547.37	$ *50,550.17*
2025	5	$ 53,225.23	$ *50,545.18*
2026	6	$ 53,911.84	$ *50,540.19*
2027	7	$ 54,607.30	$ *50,535.20*
2028	8	$ 55,311.73	$ *50,530.22*
2029	9	$ 56,025.25	$ *50,525.23*
2030	10	$ 56,747.98	$ *50,520.24*
2031	11	$ 57,480.03	$ *50,515.25*
2032	12	$ 58,221.52	$ *50,510.27*
2033	13	$ 58,972.58	$ *50,505.28*
2034	14	$ 59,733.33	$ *50,500.29*
2035	15	$ 60,503.89	$ *50,495.31*
2036	16	$ 61,284.39	$ *50,490.32*
2037	17	$ 62,074.95	$ *50,485.34*
2038	18	$ 62,875.72	$ *50,480.36*
2039	19	$ 63,686.82	$ *50,475.37*
2040	20	$ 64,508.38	$ *50,470.39*
	Total Benefits During 20 Year Project Life (2018 Dollars)		**$ 1,010,355.08**

Safety Benefit Savings
TH 14 and CSAH 37 - RCUT
D7 - MnDOT

	Year	RCUT Annual Savings	Present Value
2021	1	$ 98,960.13	$ *98,960.13*
2022	2	$ 100,236.71	$ *98,950.36*
2023	3	$ 101,529.77	$ *98,940.59*
2024	4	$ 102,839.50	$ *98,930.82*
2025	5	$ 104,166.13	$ *98,921.06*
2026	6	$ 105,509.87	$ *98,911.29*
2027	7	$ 106,870.95	$ *98,901.53*
2028	8	$ 108,249.59	$ *98,891.76*
2029	9	$ 109,646.01	$ *98,882.00*
2030	10	$ 111,060.44	$ *98,872.24*
2031	11	$ 112,493.12	$ *98,862.48*
2032	12	$ 113,944.28	$ *98,852.72*
2033	13	$ 115,414.16	$ *98,842.96*
2034	14	$ 116,903.00	$ *98,833.21*
2035	15	$ 118,411.05	$ *98,823.45*
2036	16	$ 119,938.56	$ *98,813.69*
2037	17	$ 121,485.76	$ *98,803.94*
2038	18	$ 123,052.93	$ *98,794.19*
2039	19	$ 124,640.31	$ *98,784.43*
2040	20	$ 126,248.17	$ *98,774.68*
	Total Benefits During 20 Year Project Life (2020 Dollars)		**$ 1,977,347.54**

Safety Benefit Savings
TH 14 and CSAH 37 - High T
D7 - MnDOT

	Year	High T Annual Savings	Present Value
2021	1	$ 96,840.77	$ *96,840.77*
2022	2	$ 98,090.01	$ *96,831.21*
2023	3	$ 99,355.38	$ *96,821.65*
2024	4	$ 100,637.06	$ *96,812.09*
2025	5	$ 101,935.28	$ *96,802.53*
2026	6	$ 103,250.24	$ *96,792.98*
2027	7	$ 104,582.17	$ *96,783.42*
2028	8	$ 105,931.28	$ *96,773.87*
2029	9	$ 107,297.79	$ *96,764.32*
2030	10	$ 108,681.94	$ *96,754.76*
2031	11	$ 110,083.93	$ *96,745.21*
2032	12	$ 111,504.02	$ *96,735.66*
2033	13	$ 112,942.42	$ *96,726.11*
2034	14	$ 114,399.37	$ *96,716.56*
2035	15	$ 115,875.13	$ *96,707.02*
2036	16	$ 117,369.92	$ *96,697.47*
2037	17	$ 118,883.99	$ *96,687.92*
2038	18	$ 120,417.59	$ *96,678.38*
2039	19	$ 121,970.98	$ *96,668.84*
2040	20	$ 123,544.40	$ *96,659.29*
	Total Benefits During 20 Year Project Life (2018 Dollars)		**$ 1,935,000.08**

Safety Benefit Savings
TH 14 and CSAH 37 - Interchange
D7 - MnDOT

	Year	Interchange Annual Savings	Present Value
2021	1	$ 125,747.95	$ *125,747.95*
2022	2	$ 127,370.10	$ *125,735.54*
2023	3	$ 129,013.17	$ *125,723.12*
2024	4	$ 130,677.44	$ *125,710.71*
2025	5	$ 132,363.18	$ *125,698.30*
2026	6	$ 134,070.67	$ *125,685.89*
2027	7	$ 135,800.18	$ *125,673.49*
2028	8	$ 137,552.00	$ *125,661.08*
2029	9	$ 139,326.42	$ *125,648.68*
2030	10	$ 141,123.73	$ *125,636.27*
2031	11	$ 142,944.23	$ *125,623.87*
2032	12	$ 144,788.21	$ *125,611.47*
2033	13	$ 146,655.98	$ *125,599.07*
2034	14	$ 148,547.84	$ *125,586.67*
2035	15	$ 150,464.10	$ *125,574.27*
2036	16	$ 152,405.09	$ *125,561.88*
2037	17	$ 154,371.12	$ *125,549.48*
2038	18	$ 156,362.50	$ *125,537.09*
2039	19	$ 158,379.58	$ *125,524.69*
2040	20	$ 160,422.68	$ *125,512.30*
	Total Benefits During 20 Year Project Life (2018 Dollars)		**$ 2,512,601.82**

Safety Benefit Savings
TH 14 and CSAH 37 - Roundabout
D7 - MnDOT

	Year	Roundabout Annual Savings	Present Value
2021	1	$ 113,417.53	$ *113,417.53*
2022	2	$ 114,880.61	$ *113,406.33*
2023	3	$ 116,362.57	$ *113,395.14*
2024	4	$ 117,863.65	$ *113,383.94*
2025	5	$ 119,384.09	$ *113,372.75*
2026	6	$ 120,924.15	$ *113,361.56*
2027	7	$ 122,484.07	$ *113,350.37*
2028	8	$ 124,064.11	$ *113,339.18*
2029	9	$ 125,664.54	$ *113,327.99*
2030	10	$ 127,285.61	$ *113,316.80*
2031	11	$ 128,927.60	$ *113,305.61*
2032	12	$ 130,590.76	$ *113,294.43*
2033	13	$ 132,275.38	$ *113,283.25*
2034	14	$ 133,981.73	$ *113,272.06*
2035	15	$ 135,710.10	$ *113,260.88*
2036	16	$ 137,460.76	$ *113,249.70*
2037	17	$ 139,234.00	$ *113,238.52*
2038	18	$ 141,030.12	$ *113,227.34*
2039	19	$ 142,849.41	$ *113,216.16*
2040	20	$ 144,692.17	$ *113,204.99*
	Total Benefits During 20 Year Project Life (2018 Dollars)		**$ 2,266,224.52**

Project Cost

TH 14 and 571st Ln - Traditional At-Grade

D7 - MnDOT

		Capital Cost in 2018 Dollars		
	Year	BASE CASE	Traditional At-Grade Alternative	Present Value
2020	0	$ -	$ 1,296,600.00	$ 1,296,600.00
2021	1	$ -	$ -	$ -
2022	2	$ -	$ -	$ -
2023	3	$ -	$ -	$ -
2024	4	$ -	$ -	$ -
2025	5	$ -	$ -	$ -
2026	6	$ -	$ -	$ -
2027	7	$ -	$ -	$ -
2028	8	$ -	$ -	$ -
2029	9	$ -	$ -	$ -
2030	10	$ -	$ -	$ -
2031	11	$ -	$ -	$ -
2032	12	$ -	$ -	$ -
2033	13	$ -	$ -	$ -
2034	14	$ -	$ -	$ -
2035	15	$ -	$ -	$ -
2036	16	$ -	$ -	$ -
2037	17	$ -	$ -	$ -
2038	18	$ -	$ -	$ -
2039	19	$ -	$ -	$ -
2040	20	$ -	$ -	$ -
Present Value of Costs (2018 Dollars)				$ 1,296,600.00

Project Cost

TH 14 and 571st Ln - Green T

D7 - MnDOT

		Capital Cost in 2018 Dollars		
	Year	BASE CASE	Green T Alternative	Present Value
2020	0	$ -	$ 2,189,600.00	$ 2,189,600.00
2021	1	$ -	$ -	$ -
2022	2	$ -	$ -	$ -
2023	3	$ -	$ -	$ -
2024	4	$ -	$ -	$ -
2025	5	$ -	$ -	$ -
2026	6	$ -	$ -	$ -
2027	7	$ -	$ -	$ -
2028	8	$ -	$ -	$ -
2029	9	$ -	$ -	$ -
2030	10	$ -	$ -	$ -
2031	11	$ -	$ -	$ -
2032	12	$ -	$ -	$ -
2033	13	$ -	$ -	$ -
2034	14	$ -	$ -	$ -
2035	15	$ -	$ -	$ -
2036	16	$ -	$ -	$ -
2037	17	$ -	$ -	$ -
2038	18	$ -	$ -	$ -
2039	19	$ -	$ -	$ -
2040	20	$ -	$ -	$ -
Present Value of Costs (2018 Dollars)				$ 2,189,600.00

Project Cost

TH 14 and 571st Ln - RCUT

D7 - MnDOT

		Capital Cost in 2018 Dollars		
	Year	BASE CASE	RCUT Alternative	Present Value
2020	0	$ -	$ 2,056,000.00	$ 2,056,000.00
2021	1	$ -	$ -	$ -
2022	2	$ -	$ -	$ -
2023	3	$ -	$ -	$ -
2024	4	$ -	$ -	$ -
2025	5	$ -	$ -	$ -
2026	6	$ -	$ -	$ -
2027	7	$ -	$ -	$ -
2028	8	$ -	$ -	$ -
2029	9	$ -	$ -	$ -
2030	10	$ -	$ -	$ -
2031	11	$ -	$ -	$ -
2032	12	$ -	$ -	$ -
2033	13	$ -	$ -	$ -
2034	14	$ -	$ -	$ -
2035	15	$ -	$ -	$ -
2036	16	$ -	$ -	$ -
2037	17	$ -	$ -	$ -
2038	18	$ -	$ -	$ -
2039	19	$ -	$ -	$ -
2040	20	$ -	$ -	$ -
Present Value of Costs (2018 Dollars)				$ 2,056,000.00

Operations Analysis Results

TH 14 and 571st Ln

D7 - MnDOT

BASE	Year	Time Period	# of hours in Time Period	Volume	Intersection Delay per veh	Additional Travel Time Delay per Veh	Total Delay per veh	Daily VHT
	2018	AM Peak	1	1016	3.5	3.0	6.52	1.8
	2018	PM Peak	3	1151	5.8	3.0	8.82	8.5
	2018	Mid	6	806	0.7	3.0	3.72	5.0
	2018	AM2	1	610	0.3	3.0	3.32	0.6
	2018	AM3	1	254	0.3	3.0	3.32	0.2
	2018	PM2	1	921	0.7	3.0	3.72	1.0
	2018	PM3	1	691	0.6	3.0	3.62	0.7
	2018	LATE	7	102	0.3	3.0	3.32	0.7
	2018	LATE2	3	305	0.3	3.0	3.32	0.8
		SUM						**19.2**
	2040	AM Peak	1	1313	5.2	3.0	8.22	3.0
	2040	PM Peak	3	1486	42	3.0	45.02	55.8
	2040	Mid	6	1040	0.8	3.0	3.82	6.6
	2040	AM2	1	788	0.4	3.0	3.42	0.7
	2040	AM3	1	328	0.3	3.0	3.32	0.3
	2040	PM2	1	1189	1	3.0	4.02	1.3
	2040	PM3	1	892	0.7	3.0	3.72	0.9
	2040	LATE	7	131	0.2	3.0	3.22	0.8
	2040	LATE2	3	394	0.2	3.0	3.22	1.1
		SUM						**70.6**

Traditional At-Grade	Year	Time Period	# of hours in Time Period	Volume	Intersection Delay per veh	Additional Travel Time Delay per Veh	Total Delay per veh	Daily VHT
	2018	AM Peak	1	1016	2.4	0	2.4	0.7
	2018	PM Peak	3	1151	2.8	0	2.8	2.7
	2018	Mid	6	806	0.6	0	0.6	0.8
	2018	AM2	1	610	0.3	0	0.3	0.1
	2018	AM3	1	254	0.3	0	0.3	0.0
	2018	PM2	1	921	0.7	0	0.7	0.2
	2018	PM3	1	691	0.6	0	0.6	0.1
	2018	LATE	7	102	0.3	0	0.3	0.1
	2018	LATE2	3	305	0.3	0	0.3	0.1
		SUM						**4.7**
	2040	AM Peak	1	1313	2.6	0	2.6	0.9
	2040	PM Peak	3	1486	3.3	0	3.3	4.1
	2040	Mid	6	1040	0.8	0	0.8	1.4
	2040	AM2	1	788	0.4	0	0.4	0.1
	2040	AM3	1	328	0.3	0	0.3	0.0
	2040	PM2	1	1189	0.9	0	0.9	0.3
	2040	PM3	1	892	0.7	0	0.7	0.2
	2040	LATE	7	131	0.2	0	0.2	0.1
	2040	LATE2	3	394	0.2	0	0.2	0.1
		SUM						**7.1**

Green T	Year	Time Period	# of hours in Time Period	Volume	Intersection Delay per veh	Additional Travel Time Delay per Veh	Total Delay per veh	Daily VHT
	2018	AM Peak	1	1016	1	0	1	0.3
	2018	PM Peak	3	1151	1.3	0	1.3	1.2
	2018	Mid	6	806	0.6	0	0.6	0.8
	2018	AM2	1	610	0.3	0	0.3	0.1
	2018	AM3	1	254	0.5	0	0.5	0.0
	2018	PM2	1	921	0.6	0	0.6	0.2
	2018	PM3	1	691	0.6	0	0.6	0.1
	2018	LATE	7	102	0.4	0	0.4	0.1
	2018	LATE2	3	305	0.3	0	0.3	0.1
		SUM						**2.8**
	2040	AM Peak	1	1313	1.4	0	1.4	0.5
	2040	PM Peak	3	1486	1.6	0	1.6	2.0
	2040	Mid	6	1040	0.8	0	0.8	1.4
	2040	AM2	1	788	0.4	0	0.4	0.1
	2040	AM3	1	328	0.3	0	0.3	0.0
	2040	PM2	1	1189	0.8	0	0.8	0.3
	2040	PM3	1	892	0.7	0	0.7	0.2
	2040	LATE	7	131	0.2	0	0.2	0.1
	2040	LATE2	3	394	0.2	0	0.2	0.1
		SUM						**4.5**

RCUT	Year	Time Period	# of hours in Time Period	Volume	Intersection Delay per veh	Additional Travel Time Delay per Veh	Total Delay per veh	Daily VHT
	2018	AM Peak	1	1009	0.95	0	0.95	0.3
	2018	PM Peak	3	1161	1.33	0	1.33	1.3
	2018	Mid	6	813	0.83	0	0.83	1.1
	2018	AM2	1	605	0.5	0	0.5	0.1
	2018	AM3	1	252	0.5	0	0.5	0.0
	2018	PM2	1	929	0.83	0	0.83	0.2
	2018	PM3	1	697	0.83	0	0.83	0.2
	2018	LATE	7	101	0.5	0	0.5	0.1
	2018	LATE2	3	303	0.5	0	0.5	0.1
		SUM						**3.4**
	2040	AM Peak	1	1303	1.11	0	1.11	0.4
	2040	PM Peak	3	1478	1.6	0	1.6	2.0
	2040	Mid	6	1035	0.91	0	0.91	1.6
	2040	AM2	1	782	0.51	0	0.51	0.1
	2040	AM3	1	326	0.51	0	0.51	0.0
	2040	PM2	1	1182	0.91	0	0.91	0.3
	2040	PM3	1	887	0.86	0	0.86	0.2
	2040	LATE	7	130	0.51	0	0.51	0.1
	2040	LATE2	3	391	0.51	0	0.51	0.2
		SUM						**4.9**

Vehicle Operating Cost Savings

TH 14 and 571st Ln - Traditional At-Grade

D7 - MnDOT

	Year	BASE VHT	Traditional At-Grade VHT	VHT Difference	Annual Savings	Present Value
2021	1	26.2451472	5.004859407	21.24028779	$ 190,960.75	$ *183,702.80*
2022	2	28.5776794	5.116386616	23.46129278	$ 210,928.69	$ *200,307.81*
2023	3	30.9102116	5.227913826	25.68229778	$ 230,896.63	$ *216,456.37*
2024	4	33.24274381	5.339441035	27.90330277	$ 250,864.57	$ *232,157.47*
2025	5	35.57527601	5.450968245	30.12430776	$ 270,832.51	$ *247,419.93*
2026	6	37.90780821	5.562495455	32.34531276	$ 290,800.45	$ *262,252.43*
2027	7	40.24034042	5.674022664	34.56631775	$ 310,768.39	$ *276,663.48*
2028	8	42.57287262	5.785549874	36.78732275	$ 330,736.33	$ *290,661.46*
2029	9	44.90540482	5.897077083	39.00832774	$ 350,704.27	$ *304,254.60*
2030	10	47.23793703	6.008604293	41.22933273	$ 370,672.21	$ *317,450.99*
2031	11	49.57046923	6.120131503	43.45033773	$ 390,640.15	$ *330,258.57*
2032	12	51.90300143	6.231658712	45.67134272	$ 410,608.09	$ *342,685.14*
2033	13	54.23553364	6.343185922	47.89234771	$ 430,576.03	$ *354,738.37*
2034	14	56.56806584	6.454713131	50.11335271	$ 450,543.97	$ *366,425.81*
2035	15	58.90059804	6.566240341	52.3343577	$ 470,511.91	$ *377,754.85*
2036	16	61.23313025	6.677767551	54.5553627	$ 490,479.85	$ *388,732.77*
2037	17	63.56566245	6.78929476	56.77636769	$ 510,447.79	$ *399,366.72*
2038	18	65.89819465	6.90082197	58.99737268	$ 530,415.73	$ *409,663.71*
2039	19	68.23072686	7.012349179	61.21837768	$ 550,383.67	$ *419,630.64*
2040	20	70.56325906	7.1	63.4	$ 570,351.61	$ *429,274.29*
	Total Benefits During 20 Year Project Life (2018 Dollars)					**$ 6,349,858.21**

Vehicle Operating Cost Savings

TH 14 and 571st Ln - Green T

D7 - MnDOT

	Year	BASE VHT	Green T VHT	VHT Difference	Annual Savings	Present Value
2021	1	26.2451472	3.076975821	23.16817138	$ 208,293.39	$ *200,376.67*
2022	2	28.5776794	3.154399242	25.42328016	$ 228,567.94	$ *217,058.86*
2023	3	30.9102116	3.231822664	27.67838894	$ 248,842.49	$ *233,279.89*
2024	4	33.24274381	3.309246086	29.93349772	$ 269,117.04	$ *249,048.84*
2025	5	35.57527601	3.386669508	32.1886065	$ 289,391.59	$ *264,374.63*
2026	6	37.90780821	3.464092929	34.44371528	$ 309,666.14	$ *279,266.06*
2027	7	40.24034042	3.541516351	36.69882407	$ 329,940.69	$ *293,731.73*
2028	8	42.57287262	3.618939773	38.95393285	$ 350,215.24	$ *307,780.13*
2029	9	44.90540482	3.696363194	41.20904163	$ 370,489.79	$ *321,419.59*
2030	10	47.23793703	3.773786616	43.46415041	$ 390,764.34	$ *334,658.28*
2031	11	49.57046923	3.851210038	45.71925919	$ 411,038.89	$ *347,504.25*
2032	12	51.90300143	3.92863346	47.97436797	$ 431,313.44	$ *359,965.39*
2033	13	54.23553364	4.006056881	50.22947676	$ 451,587.99	$ *372,049.48*
2034	14	56.56806584	4.083480303	52.48458554	$ 471,862.54	$ *383,764.12*
2035	15	58.90059804	4.160903725	54.73969432	$ 492,137.08	$ *395,116.82*
2036	16	61.23313025	4.238327146	56.9948031	$ 512,411.63	$ *406,114.94*
2037	17	63.56566245	4.315750568	59.24991188	$ 532,686.18	$ *416,765.70*
2038	18	65.89819465	4.39317399	61.50502066	$ 552,960.73	$ *427,076.22*
2039	19	68.23072686	4.470597412	63.76012945	$ 573,235.28	$ *437,053.46*
2040	20	70.56325906	4.5	66.0	$ 593,509.83	$ *446,704.29*
	Total Benefits During 20 Year Project Life (2018 Dollars)					**$ 6,693,109.35**

Vehicle Operating Cost Savings

TH 14 and 571st Ln - RCUT

D7 - MnDOT

	Year	BASE VHT	RCUT VHT	VHT Difference	Annual Savings	Present Value
2021	1	26.2451472	3.601157784	22.64398941	$ 203,580.73	$ *195,843.13*
2022	2	28.5776794	3.669757323	24.90792208	$ 223,934.61	$ *212,658.84*
2023	3	30.9102116	3.738356862	27.17185474	$ 244,288.49	$ *229,010.70*
2024	4	33.24274381	3.806956402	29.4357874	$ 264,642.37	$ *244,907.85*
2025	5	35.57527601	3.875555941	31.69972007	$ 284,996.25	$ *260,359.26*
2026	6	37.90780821	3.94415548	33.96365273	$ 305,350.13	$ *275,373.76*
2027	7	40.24034042	4.012755019	36.2275854	$ 325,704.02	$ *289,960.01*
2028	8	42.57287262	4.081354558	38.49151806	$ 346,057.90	$ *304,126.53*
2029	9	44.90540482	4.149954097	40.75545073	$ 366,411.78	$ *317,881.70*
2030	10	47.23793703	4.218553636	43.01938339	$ 386,765.66	$ *331,233.73*
2031	11	49.57046923	4.287153176	45.28331605	$ 407,119.54	$ *344,190.72*
2032	12	51.90300143	4.355752715	47.54724872	$ 427,473.42	$ *356,760.60*
2033	13	54.23553364	4.424352254	49.81118138	$ 447,827.30	$ *368,951.17*
2034	14	56.56806584	4.492951793	52.07511405	$ 468,181.18	$ *380,770.09*
2035	15	58.90059804	4.561551332	54.33904671	$ 488,535.06	$ *392,224.91*
2036	16	61.23313025	4.630150871	56.60297938	$ 508,888.94	$ *403,323.01*
2037	17	63.56566245	4.69875041	58.86691204	$ 529,242.83	$ *414,071.67*
2038	18	65.89819465	4.767349949	61.1308447	$ 549,596.71	$ *424,478.03*
2039	19	68.23072686	4.835949489	63.39477737	$ 569,950.59	$ *434,549.10*
2040	20	70.56325906	4.9	65.7	$ 590,304.47	$ *444,291.77*
	Total Benefits During 20 Year Project Life (2018 Dollars)					**$ 6,624,966.58**

Safety Benefit Savings

TH 14 and 571st Ln - Traditional At-Grade

D7 - MnDOT

	Year	Traditional At-Grade Annual Savings	Present Value
2021	1	$ 577.04	$ *577.04*
2022	2	$ 584.49	$ *576.98*
2023	3	$ 592.03	$ *576.93*
2024	4	$ 599.66	$ *576.87*
2025	5	$ 607.40	$ *576.81*
2026	6	$ 615.23	$ *576.76*
2027	7	$ 623.17	$ *576.70*
2028	8	$ 631.21	$ *576.64*
2029	9	$ 639.35	$ *576.59*
2030	10	$ 647.60	$ *576.53*
2031	11	$ 655.95	$ *576.47*
2032	12	$ 664.42	$ *576.42*
2033	13	$ 672.99	$ *576.36*
2034	14	$ 681.67	$ *576.30*
2035	15	$ 690.46	$ *576.24*
2036	16	$ 699.37	$ *576.19*
2037	17	$ 708.39	$ *576.13*
2038	18	$ 717.53	$ *576.07*
2039	19	$ 726.78	$ *576.02*
2040	20	$ 736.16	$ *575.96*
	Total Benefits During 20 Year Project Life (2018 Dollars)		**$ 11,530.02**

Safety Benefit Savings

TH 14 and 571st Ln - Green T

D7 - MnDOT

	Year	Green T Annual Savings	Present Value
2021	1	$ 460.07	$ *460.07*
2022	2	$ 466.01	$ *460.03*
2023	3	$ 472.02	$ *459.98*
2024	4	$ 478.11	$ *459.94*
2025	5	$ 484.28	$ *459.89*
2026	6	$ 490.52	$ *459.85*
2027	7	$ 496.85	$ *459.80*
2028	8	$ 503.26	$ *459.76*
2029	9	$ 509.75	$ *459.71*
2030	10	$ 516.33	$ *459.67*
2031	11	$ 522.99	$ *459.62*
2032	12	$ 529.74	$ *459.57*
2033	13	$ 536.57	$ *459.53*
2034	14	$ 543.49	$ *459.48*
2035	15	$ 550.50	$ *459.44*
2036	16	$ 557.60	$ *459.39*
2037	17	$ 564.80	$ *459.35*
2038	18	$ 572.08	$ *459.30*
2039	19	$ 579.46	$ *459.26*
2040	20	$ 586.94	$ *459.21*
	Total Benefits During 20 Year Project Life (2018 Dollars)		**$ 9,192.85**

Safety Benefit Savings

TH 14 and 571st Ln - RCUT

D7 - MnDOT

	Year	RCUT Annual Savings	Present Value
2021	1	$ 957.58	$ *957.58*
2022	2	$ 969.93	$ *957.48*
2023	3	$ 982.44	$ *957.39*
2024	4	$ 995.12	$ *957.29*
2025	5	$ 1,007.95	$ *957.20*
2026	6	$ 1,020.96	$ *957.11*
2027	7	$ 1,034.13	$ *957.01*
2028	8	$ 1,047.47	$ *956.92*
2029	9	$ 1,060.98	$ *956.82*
2030	10	$ 1,074.67	$ *956.73*
2031	11	$ 1,088.53	$ *956.63*
2032	12	$ 1,102.57	$ *956.54*
2033	13	$ 1,116.79	$ *956.44*
2034	14	$ 1,131.20	$ *956.35*
2035	15	$ 1,145.79	$ *956.26*
2036	16	$ 1,160.57	$ *956.16*
2037	17	$ 1,175.54	$ *956.07*
2038	18	$ 1,190.71	$ *955.97*
2039	19	$ 1,206.07	$ *955.88*
2040	20	$ 1,221.63	$ *955.78*
	Total Benefits During 20 Year Project Life (2018 Dollars)		**$ 19,133.60**

Project Cost

TH 14 and 561st Ln - RCUT

D7 - MnDOT

		Capital Cost in 2018 Dollars		
	Year	BASE CASE	RCUT1 Alternative	Present Value
2020	0	$ -	$ 1,632,600.00	$ 1,632,600.00
2021	1	$ -	$ -	$ -
2022	2	$ -	$ -	$ -
2023	3	$ -	$ -	$ -
2024	4	$ -	$ -	$ -
2025	5	$ -	$ -	$ -
2026	6	$ -	$ -	$ -
2027	7	$ -	$ -	$ -
2028	8	$ -	$ -	$ -
2029	9	$ -	$ -	$ -
2030	10	$ -	$ -	$ -
2031	11	$ -	$ -	$ -
2032	12	$ -	$ -	$ -
2033	13	$ -	$ -	$ -
2034	14	$ -	$ -	$ -
2035	15	$ -	$ -	$ -
2036	16	$ -	$ -	$ -
2037	17	$ -	$ -	$ -
2038	18	$ -	$ -	$ -
2039	19	$ -	$ -	$ -
2040	20	$ -	$ -	$ -
	Present Value of Costs (2018 Dollars)			$ 1,632,600.00

Operations Analysis Results

561st Ln

D7 - MnDOT

BASE	Year	Time Period	# of hours in Time Period	Volume	Delay per veh	Additional Travel Time Delay per Veh	Delay per veh	Daily VHT
	2018	AM Peak	1	981	4	3.3	7.30	2.0
	2018	PM Peak	3	1099	4.5	3.3	7.80	7.1
	2018	Mid	6	769	1	3.3	4.30	5.5
	2018	AM2	1	589	0.9	3.3	4.20	0.7
	2018	AM3	1	245	1	3.3	4.30	0.3
	2018	PM2	1	879	1.1	3.3	4.40	1.1
	2018	PM3	1	659	1	3.3	4.30	0.8
	2018	LATE	7	98	0.9	3.3	4.20	0.8
	2018	LATE2	3	294	1	3.3	4.30	1.1
		SUM						**19.3**
	2040	AM Peak	1	1261	5.3	3.3	8.60	3.0
	2040	PM Peak	3	1411	9	3.3	12.30	14.5
	2040	Mid	6	988	1.1	3.3	4.40	7.2
	2040	AM2	1	757	0.9	3.3	4.20	0.9
	2040	AM3	1	315	1	3.3	4.30	0.4
	2040	PM2	1	1129	1.3	3.3	4.60	1.4
	2040	PM3	1	847	1	3.3	4.30	1.0
	2040	LATE	7	126	0.9	3.3	4.20	1.0
	2040	LATE2	3	378	0.9	3.3	4.20	1.3
		SUM						**30.8**

RCUT	Year	Time Period	# of hours in Time Period	Volume	Delay per veh	Additional Travel Time Delay per Veh	Delay per veh	Daily VHT
	2018	AM Peak	1	981	4.59	0	4.59	1.3
	2018	PM Peak	3	1102	4.72	0	4.72	4.3
	2018	Mid	6	771	0.76	0	0.76	1.0
	2018	AM2	1	589	0.62	0	0.62	0.1
	2018	AM3	1	245	0.59	0	0.59	0.0
	2018	PM2	1	882	0.78	0	0.78	0.2
	2018	PM3	1	661	0.76	0	0.76	0.1
	2018	LATE	7	98	0.59	0	0.59	0.1
	2018	LATE2	3	294	0.59	0	0.59	0.1
		SUM						**7.3**
	2040	AM Peak	1	1263	4.9	0	4.9	1.7
	2040	PM Peak	3	1397	4.99	0	4.99	5.8
	2040	Mid	6	978	0.72	0	0.72	1.2
	2040	AM2	1	758	0.58	0	0.58	0.1
	2040	AM3	1	316	0.58	0	0.58	0.1
	2040	PM2	1	1118	0.72	0	0.72	0.2
	2040	PM3	1	838	0.69	0	0.69	0.2
	2040	LATE	7	126	0.58	0	0.58	0.1
	2040	LATE2	3	379	0.58	0	0.58	0.2
		SUM						**9.6**

Vehicle Operating Cost Savings

TH 14 and 561st Ln - RCUT

D7 - MnDOT

	Year	BASE VHT	RCUT VHT	VHT Difference	Annual Savings	Present Value
2021	**1**	20.90168669	7.604452216	13.29723448	$ 119,548.75	*$ 115,005.00*
2022	**2**	21.42172106	7.708663371	13.71305769	$ 123,287.21	*$ 117,079.33*
2023	**3**	21.94175543	7.812874527	14.12888091	$ 127,025.67	*$ 119,081.49*
2024	**4**	22.4617898	7.917085682	14.54470412	$ 130,764.13	*$ 121,012.98*
2025	**5**	22.98182417	8.021296837	14.96052734	$ 134,502.58	*$ 122,875.28*
2026	**6**	23.50185854	8.125507992	15.37635055	$ 138,241.04	*$ 124,669.85*
2027	**7**	24.02189291	8.229719148	15.79217376	$ 141,979.50	*$ 126,398.12*
2028	**8**	24.54192728	8.333930303	16.20799698	$ 145,717.96	*$ 128,061.51*
2029	**9**	25.06196165	8.438141458	16.62382019	$ 149,456.41	*$ 129,661.39*
2030	**10**	25.58199602	8.542352614	17.03964341	$ 153,194.87	*$ 131,199.11*
2031	**11**	26.10203039	8.646563769	17.45546662	$ 156,933.33	*$ 132,676.01*
2032	**12**	26.62206476	8.750774924	17.87128984	$ 160,671.79	*$ 134,093.40*
2033	**13**	27.14209913	8.85498608	18.28711305	$ 164,410.24	*$ 135,452.55*
2034	**14**	27.6621335	8.959197235	18.70293627	$ 168,148.70	*$ 136,754.74*
2035	**15**	28.18216787	9.06340839	19.11875948	$ 171,887.16	*$ 138,001.20*
2036	**16**	28.70220224	9.167619545	19.5345827	$ 175,625.62	*$ 139,193.14*
2037	**17**	29.22223661	9.271830701	19.95040591	$ 179,364.07	*$ 140,331.77*
2038	**18**	29.74227098	9.376041856	20.36622912	$ 183,102.53	*$ 141,418.24*
2039	**19**	30.26230535	9.480253011	20.78205234	$ 186,840.99	*$ 142,453.72*
2040	**20**	30.78233972	9.6	21.2	$ 190,579.45	*$ 143,439.34*
	Total Benefits During 20 Year Project Life (2018 Dollars)					**$ 2,618,858.17**

Safety Benefit Savings

TH 14 and 561st Ln - RCUT

D7 - MnDOT

	Year	RCUT Annual Savings	Present Value
2021	**1**	$ 8,732.59	*$ 8,732.59*
2022	**2**	$ 8,845.24	*$ 8,731.73*
2023	**3**	$ 8,959.34	*$ 8,730.86*
2024	**4**	$ 9,074.92	*$ 8,730.00*
2025	**5**	$ 9,191.98	*$ 8,729.14*
2026	**6**	$ 9,310.56	*$ 8,728.28*
2027	**7**	$ 9,430.67	*$ 8,727.42*
2028	**8**	$ 9,552.32	*$ 8,726.55*
2029	**9**	$ 9,675.55	*$ 8,725.69*
2030	**10**	$ 9,800.36	*$ 8,724.83*
2031	**11**	$ 9,926.79	*$ 8,723.97*
2032	**12**	$ 10,054.84	*$ 8,723.11*
2033	**13**	$ 10,184.55	*$ 8,722.25*
2034	**14**	$ 10,315.93	*$ 8,721.39*
2035	**15**	$ 10,449.01	*$ 8,720.53*
2036	**16**	$ 10,583.80	*$ 8,719.67*
2037	**17**	$ 10,720.33	*$ 8,718.80*
2038	**18**	$ 10,858.62	*$ 8,717.94*
2039	**19**	$ 10,998.70	*$ 8,717.08*
2040	**20**	$ 11,140.58	*$ 8,716.22*
Total Benefits During 20 Year Project Life (2018 Dollars)			**$ 174,488.06**

Project Cost

TH 14 thru Courtland - Concept A

D7 - MnDOT

		Capital Cost in 2018 Dollars		
	Year	BASE CASE	Concept A Alternative	Present Value
2020	0	$ -	$ 1,543,200.00	$ 1,543,200.00
2021	1	$ -	$ -	$ -
2022	2	$ -	$ -	$ -
2023	3	$ -	$ -	$ -
2024	4	$ -	$ -	$ -
2025	5	$ -	$ -	$ -
2026	6	$ -	$ -	$ -
2027	7	$ -	$ -	$ -
2028	8	$ -	$ -	$ -
2029	9	$ -	$ -	$ -
2030	10	$ -	$ -	$ -
2031	11	$ -	$ -	$ -
2032	12	$ -	$ -	$ -
2033	13	$ -	$ -	$ -
2034	14	$ -	$ -	$ -
2035	15	$ -	$ -	$ -
2036	16	$ -	$ -	$ -
2037	17	$ -	$ -	$ -
2038	18	$ -	$ -	$ -
2039	19	$ -	$ -	$ -
2040	20	$ -	$ -	$ -
Present Value of Costs (2018 Dollars)				$ 1,543,200.00

Project Cost

TH 14 thru Courtland - Concept B

D7 - MnDOT

		Capital Cost in 2018 Dollars		
	Year	BASE CASE	Concept B Alternative	Present Value
2020	0	$ -	$ 2,773,000.00	$ 2,773,000.00
2021	1	$ -	$ -	$ -
2022	2	$ -	$ -	$ -
2023	3	$ -	$ -	$ -
2024	4	$ -	$ -	$ -
2025	5	$ -	$ -	$ -
2026	6	$ -	$ -	$ -
2027	7	$ -	$ -	$ -
2028	8	$ -	$ -	$ -
2029	9	$ -	$ -	$ -
2030	10	$ -	$ -	$ -
2031	11	$ -	$ -	$ -
2032	12	$ -	$ -	$ -
2033	13	$ -	$ -	$ -
2034	14	$ -	$ -	$ -
2035	15	$ -	$ -	$ -
2036	16	$ -	$ -	$ -
2037	17	$ -	$ -	$ -
2038	18	$ -	$ -	$ -
2039	19	$ -	$ -	$ -
2040	20	$ -	$ -	$ -
Present Value of Costs (2018 Dollars)				$ 2,773,000.00

Project Cost

TH 14 thru Courtland - Concept C

D7 - MnDOT

		Capital Cost in 2018 Dollars		
	Year	BASE CASE	Concept C Alternative	Present Value
2020	0	$ -	$ 7,009,400.00	$ 7,009,400.00
2021	1	$ -	$ -	$ -
2022	2	$ -	$ -	$ -
2023	3	$ -	$ -	$ -
2024	4	$ -	$ -	$ -
2025	5	$ -	$ -	$ -
2026	6	$ -	$ -	$ -
2027	7	$ -	$ -	$ -
2028	8	$ -	$ -	$ -
2029	9	$ -	$ -	$ -
2030	10	$ -	$ -	$ -
2031	11	$ -	$ -	$ -
2032	12	$ -	$ -	$ -
2033	13	$ -	$ -	$ -
2034	14	$ -	$ -	$ -
2035	15	$ -	$ -	$ -
2036	16	$ -	$ -	$ -
2037	17	$ -	$ -	$ -
2038	18	$ -	$ -	$ -
2039	19	$ -	$ -	$ -
2040	20	$ -	$ -	$ -
Present Value of Costs (2018 Dollars)				$ 7,009,400.00

Project Cost

TH 14 thru Courtland - Concept E

D7 - MnDOT

		Capital Cost in 2018 Dollars		
	Year	BASE CASE	Concept E Alternative	Present Value
2020	0	$ -	$ 9,440,400.00	$ 9,440,400.00
2021	1	$ -	$ -	$ -
2022	2	$ -	$ -	$ -
2023	3	$ -	$ -	$ -
2024	4	$ -	$ -	$ -
2025	5	$ -	$ -	$ -
2026	6	$ -	$ -	$ -
2027	7	$ -	$ -	$ -
2028	8	$ -	$ -	$ -
2029	9	$ -	$ -	$ -
2030	10	$ -	$ -	$ -
2031	11	$ -	$ -	$ -
2032	12	$ -	$ -	$ -
2033	13	$ -	$ -	$ -
2034	14	$ -	$ -	$ -
2035	15	$ -	$ -	$ -
2036	16	$ -	$ -	$ -
2037	17	$ -	$ -	$ -
2038	18	$ -	$ -	$ -
2039	19	$ -	$ -	$ -
2040	20	$ -	$ -	$ -
Present Value of Costs (2018 Dollars)				$ 9,440,400.00

Project Cost

TH 14 thru Courtland - Concept F

D7 - MnDOT

		Capital Cost in 2018 Dollars		
	Year	BASE CASE	Concept F Alternative	Present Value
2020	0	$ -	$ 7,064,400.00	$ 7,064,400.00
2021	1	$ -	$ -	$ -
2022	2	$ -	$ -	$ -
2023	3	$ -	$ -	$ -
2024	4	$ -	$ -	$ -
2025	5	$ -	$ -	$ -
2026	6	$ -	$ -	$ -
2027	7	$ -	$ -	$ -
2028	8	$ -	$ -	$ -
2029	9	$ -	$ -	$ -
2030	10	$ -	$ -	$ -
2031	11	$ -	$ -	$ -
2032	12	$ -	$ -	$ -
2033	13	$ -	$ -	$ -
2034	14	$ -	$ -	$ -
2035	15	$ -	$ -	$ -
2036	16	$ -	$ -	$ -
2037	17	$ -	$ -	$ -
2038	18	$ -	$ -	$ -
2039	19	$ -	$ -	$ -
2040	20	$ -	$ -	$ -
Present Value of Costs (2018 Dollars)				$ 7,064,400.00

Operations Analysis Results

TH 14 thru Courtland

D7 - MnDOT

BASE	Year	Time Period	# of hours in Time Period	Volume	Intersection Delay per veh	Additional Travel Time Delay per Veh	Total Delay per veh	Daily VHT
	2018	AM Peak	1	942	3.4	62.9	66.30	17.3
	2018	PM Peak	3	1140	3.6	62.9	66.50	63.2
	2018	Mid	6	798	0.6	62.9	63.50	84.5
	2018	AM2	1	565	0.6	62.9	63.50	10.0
	2018	AM3	1	236	0.5	62.9	63.40	4.1
	2018	PM2	1	912	0.7	62.9	63.60	16.1
	2018	PM3	1	684	0.6	62.9	63.50	12.1
	2018	LATE	7	94	0.4	62.9	63.30	11.6
	2018	LATE2	3	283	0.5	62.9	63.40	14.9
		SUM						**233.8**
	2040	AM Peak	1	1211	4.3	62.9	67.20	22.6
	2040	PM Peak	3	1472	4.8	62.9	67.70	83.0
	2040	Mid	6	1030	0.7	62.9	63.60	109.2
	2040	AM2	1	727	0.7	62.9	63.60	12.8
	2040	AM3	1	303	0.5	62.9	63.40	5.3
	2040	PM2	1	1178	0.9	62.9	63.80	20.9
	2040	PM3	1	883	0.6	62.9	63.50	15.6
	2040	LATE	7	121	0.46	62.9	63.36	14.9
	2040	LATE2	3	363	0.5	62.9	63.40	19.2
		SUM						**303.6**

Concept A	Year	Time Period	# of hours in Time Period	Volume	Intersection Delay per veh	Additional Travel Time Delay per Veh	Total Delay per veh	Daily VHT
	2018	AM Peak	1	1076	8.26	0	8.26	2.5
	2018	PM Peak	3	1132	3.87	0	3.87	3.7
	2018	Mid	6	792	2.96	0	2.96	3.9
	2018	AM2	1	646	7.3	0	7.30	1.3
	2018	AM3	1	269	6.79	0	6.79	0.5
	2018	PM2	1	906	2.99	0	2.99	0.8
	2018	PM3	1	679	2.96	0	2.96	0.6
	2018	LATE	7	108	6.52	0	6.52	1.4
	2018	LATE2	3	323	6.86	0	6.86	1.8
		SUM						**16.4**
	2040	AM Peak	1	1344	8.25	0	8.25	3.1
	2040	PM Peak	3	1459	4.38	0	4.38	5.3
	2040	Mid	6	1021	3.01	0	3.01	5.1
	2040	AM2	1	806	6.69	0	6.69	1.5
	2040	AM3	1	336	6.57	0	6.57	0.6
	2040	PM2	1	1167	3.01	0	3.01	1.0
	2040	PM3	1	875	2.98	0	2.98	0.7
	2040	LATE	7	134	6.53	0	6.53	1.7
	2040	LATE2	3	403	6.61	0	6.61	2.2
		SUM						**21.3**

Concept B	Year	Time Period	# of hours in Time Period	Volume	Intersection Delay per veh	Additional Travel Time Delay per Veh	Total Delay per veh	Daily VHT
	2018	AM Peak	1	1077	7.73	0	7.73	2.3
	2018	PM Peak	3	1132	3.74	0	3.74	3.5
	2018	Mid	6	792	2.79	0	2.79	3.7
	2018	AM2	1	646	6.67	0	6.67	1.2
	2018	AM3	1	269	6.63	0	6.63	0.5
	2018	PM2	1	906	2.78	0	2.78	0.7
	2018	PM3	1	679	2.78	0	2.78	0.5
	2018	LATE	7	108	6.62	0	6.62	1.4
	2018	LATE2	3	323	6.62	0	6.62	1.8
		SUM						**15.6**
	2040	AM Peak	1	1345	7.6	0	7.60	2.8
	2040	PM Peak	3	1459	4.14	0	4.14	5.0
	2040	Mid	6	1021	2.81	0	2.81	4.8
	2040	AM2	1	807	6.34	0	6.34	1.4
	2040	AM3	1	336	6.28	0	6.28	0.6
	2040	PM2	1	1167	2.81	0	2.81	0.9
	2040	PM3	1	875	2.81	0	2.81	0.7
	2040	LATE	7	135	6.28	0	6.28	1.6
	2040	LATE2	3	404	6.3	0	6.30	2.1
		SUM						**20.0**

Concept C	Year	Time Period	# of hours in Time Period	Volume	Intersection Delay per veh	Additional Travel Time Delay per Veh	Total Delay per veh	Daily VHT
	2018	AM Peak	1	1077	5.07	0	5.07	1.5
	2018	PM Peak	3	1132	4.31	0	4.31	4.1
	2018	Mid	6	792	3.95	0	3.95	5.2
	2018	AM2	1	646	4.28	0	4.28	0.8
	2018	AM3	1	269	3.62	0	3.62	0.3
	2018	PM2	1	906	4.13	0	4.13	1.0
	2018	PM3	1	679	3.88	0	3.88	0.7
	2018	LATE	7	108	3.38	0	3.38	0.7
	2018	LATE2	3	323	3.7	0	3.70	1.0
		SUM						**15.3**
	2040	AM Peak	1	1345	5.35	0	5.35	2.0
	2040	PM Peak	3	1459	4.56	0	4.56	5.5
	2040	Mid	6	1021	4.12	0	4.12	7.0
	2040	AM2	1	807	4.38	0	4.38	1.0
	2040	AM3	1	336	3.7	0	3.70	0.3
	2040	PM2	1	1167	4.29	0	4.29	1.4
	2040	PM3	1	875	4.02	0	4.02	1.0
	2040	LATE	7	135	3.4	0	3.40	0.9
	2040	LATE2	3	404	3.8	0	3.80	1.3
		SUM						**20.4**

Concept E	Year	Time Period	# of hours in Time Period	Volume	Intersection Delay per veh	Additional Travel Time Delay per Veh	Total Delay per veh	Daily VHT
	2018	AM Peak	1	1029	3.03	0	3.03	0.9
	2018	PM Peak	3	1134	2.11	0	2.11	2.0
	2018	Mid	6	794	1.33	0	1.33	1.8
	2018	AM2	1	617	2	0	2.00	0.3
	2018	AM3	1	257	1.89	0	1.89	0.1
	2018	PM2	1	907	1.34	0	1.34	0.3
	2018	PM3	1	680	1.32	0	1.32	0.2
	2018	LATE	7	103	1.86	0	1.86	0.4
	2018	LATE2	3	309	1.89	0	1.89	0.5
		SUM						**6.5**
	2040	AM Peak	1	1345	3.54	0	3.54	1.3
	2040	PM Peak	3	1459	2.55	0	2.55	3.1
	2040	Mid	6	1021	1.32	0	1.32	2.2
	2040	AM2	1	807	2.26	0	2.26	0.5
	2040	AM3	1	336	2.15	0	2.15	0.2
	2040	PM2	1	1167	1.34	0	1.34	0.4
	2040	PM3	1	875	1.31	0	1.31	0.3
	2040	LATE	7	135	2.11	0	2.11	0.6
	2040	LATE2	3	404	2.15	0	2.15	0.7
		SUM						**9.4**

Concept F	Year	Time Period	# of hours in Time Period	Volume	Intersection Delay per veh	Additional Travel Time Delay per Veh	Total Delay per veh	Daily VHT
	2018	AM Peak	1	1079	2.5	0	2.50	0.7
	2018	PM Peak	3	1152	1.98	0	1.98	1.9
	2018	Mid	6	806	0.92	0	0.92	1.2
	2018	AM2	1	647	1.78	0	1.78	0.3
	2018	AM3	1	270	1.74	0	1.74	0.1
	2018	PM2	1	922	0.92	0	0.92	0.2
	2018	PM3	1	691	0.92	0	0.92	0.2
	2018	LATE	7	108	1.71	0	1.71	0.4
	2018	LATE2	3	324	1.74	0	1.74	0.5
		SUM						**5.6**
	2040	AM Peak	1	1348	2.73	0	2.73	1.0
	2040	PM Peak	3	1479	2.29	0	2.29	2.8
	2040	Mid	6	1035	0.89	0	0.89	1.5
	2040	AM2	1	809	1.78	0	1.78	0.4
	2040	AM3	1	337	1.72	0	1.72	0.2
	2040	PM2	1	1183	0.89	0	0.89	0.3
	2040	PM3	1	887	0.89	0	0.89	0.2
	2040	LATE	7	135	1.7	0	1.70	0.4
	2040	LATE2	3	404	1.72	0	1.72	0.6
		SUM						**7.5**

Vehicle Operating Cost Savings

TH 14 thru Courtland - Concept A

D7 - MnDOT

	Year	BASE VHT	Concept A VHT	VHT Difference	Annual Savings	Present Value
2021	1	243.3165789	17.03390854	226.2826703	$ 2,034,393.78	$ *1,957,071.46*
2022	2	246.4895829	17.25678934	229.2327936	$ 2,060,916.86	$ *1,957,143.59*
2023	3	249.662587	17.47967015	232.1829168	$ 2,087,439.93	$ *1,956,891.56*
2024	4	252.8355911	17.70255096	235.1330401	$ 2,113,963.01	$ *1,956,323.68*
2025	5	256.0085951	17.92543177	238.0831634	$ 2,140,486.08	$ *1,955,448.09*
2026	6	259.1815992	18.14831258	241.0332866	$ 2,167,009.16	$ *1,954,272.79*
2027	7	262.3546033	18.37119338	243.9834099	$ 2,193,532.24	$ *1,952,805.61*
2028	8	265.5276073	18.59407419	246.9335331	$ 2,220,055.31	$ *1,951,054.23*
2029	9	268.7006114	18.816955	249.8836564	$ 2,246,578.39	$ *1,949,026.20*
2030	10	271.8736155	19.03983581	252.8337796	$ 2,273,101.46	$ *1,946,728.90*
2031	11	275.0466195	19.26271662	255.7839029	$ 2,299,624.54	$ *1,944,169.59*
2032	12	278.2196236	19.48559742	258.7340262	$ 2,326,147.62	$ *1,941,355.35*
2033	13	281.3926277	19.70847823	261.6841494	$ 2,352,670.69	$ *1,938,293.15*
2034	14	284.5656317	19.93135904	264.6342727	$ 2,379,193.77	$ *1,934,989.83*
2035	15	287.7386358	20.15423985	267.5843959	$ 2,405,716.84	$ *1,931,452.08*
2036	16	290.9116398	20.37712066	270.5345192	$ 2,432,239.92	$ *1,927,686.45*
2037	17	294.0846439	20.60000146	273.4846424	$ 2,458,762.99	$ *1,923,699.39*
2038	18	297.257648	20.82288227	276.4347657	$ 2,485,286.07	$ *1,919,497.18*
2039	19	300.430652	21.04576308	279.384889	$ 2,511,809.15	$ *1,915,086.02*
2040	20	303.6036561	21.3	282.3	$ 2,538,332.22	$ *1,910,471.95*
	Total Benefits During 20 Year Project Life (2018 Dollars					**$ 38,823,467.09**

Vehicle Operating Cost Savings

TH 14 thru Courtland - Concept B

D7 - MnDOT

	Year	BASE VHT	Concept B VHT	VHT Difference	Annual Savings	Present Value
2021	1	243.3165789	16.21209958	227.1044793	$ 2,041,782.25	$ *1,964,179.11*
2022	2	246.4895829	16.41246282	230.0771201	$ 2,068,507.77	$ *1,964,352.28*
2023	3	249.662587	16.61282605	233.0497609	$ 2,095,233.29	$ *1,964,197.53*
2024	4	252.8355911	16.81318929	236.0224018	$ 2,121,958.81	$ *1,963,723.23*
2025	5	256.0085951	17.01355253	238.9950426	$ 2,148,684.33	$ *1,962,937.63*
2026	6	259.1815992	17.21391577	241.9676834	$ 2,175,409.85	$ *1,961,848.78*
2027	7	262.3546033	17.41427901	244.9403242	$ 2,202,135.37	$ *1,960,464.60*
2028	8	265.5276073	17.61464225	247.9129651	$ 2,228,860.89	$ *1,958,792.85*
2029	9	268.7006114	17.81500549	250.8856059	$ 2,255,586.41	$ *1,956,841.14*
2030	10	271.8736155	18.01536872	253.8582467	$ 2,282,311.93	$ *1,954,616.93*
2031	11	275.0466195	18.21573196	256.8308876	$ 2,309,037.45	$ *1,952,127.54*
2032	12	278.2196236	18.4160952	259.8035284	$ 2,335,762.97	$ *1,949,380.13*
2033	13	281.3926277	18.61645844	262.7761692	$ 2,362,488.49	$ *1,946,381.74*
2034	14	284.5656317	18.81682168	265.74881	$ 2,389,214.01	$ *1,943,139.26*
2035	15	287.7386358	19.01718492	268.7214509	$ 2,415,939.53	$ *1,939,659.46*
2036	16	290.9116398	19.21754816	271.6940917	$ 2,442,665.05	$ *1,935,948.96*
2037	17	294.0846439	19.4179114	274.6667325	$ 2,469,390.57	$ *1,932,014.24*
2038	18	297.257648	19.61827463	277.6393733	$ 2,496,116.09	$ *1,927,861.69*
2039	19	300.430652	19.81863787	280.6120142	$ 2,522,841.61	$ *1,923,497.53*
2040	20	303.6036561	20.0	283.6	$ 2,549,567.13	$ *1,918,927.88*
	Total Benefits During 20 Year Project Life (2018 Dollars					**$ 38,980,892.51**

Vehicle Operating Cost Savings

TH 14 thru Courtland - Concept C

D7 - MnDOT

	Year	BASE VHT	Concept C VHT	VHT Difference	Annual Savings	Present Value
2021	1	243.3165789	16.00940194	227.3071769	$ 2,043,604.61	$ *1,965,932.20*
2022	2	246.4895829	16.24147417	230.2481088	$ 2,070,045.05	$ *1,965,812.15*
2023	3	249.662587	16.47354639	233.1890406	$ 2,096,485.49	$ *1,965,371.41*
2024	4	252.8355911	16.70561861	236.1299724	$ 2,122,925.93	$ *1,964,618.23*
2025	5	256.0085951	16.93769083	239.0709043	$ 2,149,366.37	$ *1,963,560.70*
2026	6	259.1815992	17.16976306	242.0118361	$ 2,175,806.81	$ *1,962,206.76*
2027	7	262.3546033	17.40183528	244.952768	$ 2,202,247.25	$ *1,960,564.20*
2028	8	265.5276073	17.6339075	247.8936998	$ 2,228,687.69	$ *1,958,640.64*
2029	9	268.7006114	17.86597972	250.8346317	$ 2,255,128.13	$ *1,956,443.56*
2030	10	271.8736155	18.09805194	253.7755635	$ 2,281,568.57	$ *1,953,980.30*
2031	11	275.0466195	18.33012417	256.7164954	$ 2,308,009.01	$ *1,951,258.06*
2032	12	278.2196236	18.56219639	259.6574272	$ 2,334,449.45	$ *1,948,283.89*
2033	13	281.3926277	18.79426861	262.598359	$ 2,360,889.89	$ *1,945,064.70*
2034	14	284.5656317	19.02634083	265.5392909	$ 2,387,330.33	$ *1,941,607.27*
2035	15	287.7386358	19.25841306	268.4802227	$ 2,413,770.77	$ *1,937,918.25*
2036	16	290.9116398	19.49048528	271.4211546	$ 2,440,211.21	$ *1,934,004.15*
2037	17	294.0846439	19.7225575	274.3620864	$ 2,466,651.65	$ *1,929,871.35*
2038	18	297.257648	19.95462972	277.3030183	$ 2,493,092.09	$ *1,925,526.12*
2039	19	300.430652	20.18670194	280.2439501	$ 2,519,532.53	$ *1,920,974.58*
2040	20	303.6036561	20.4	283.2	$ 2,545,972.97	$ *1,916,222.75*
	Total Benefits During 20 Year Project Life (2018 Dollars					**$ 38,967,861.26**

TH 14 thru Courtland - Concept E

D7 - MnDOT

	Year	BASE VHT	Concept E VHT	VHT Difference	Annual Savings	Present Value
2021	1	243.3165789	6.93343822	236.3831406	$ 2,125,202.04	$ *2,044,428.31*
2022	2	246.4895829	7.063521376	239.4260616	$ 2,152,559.41	$ *2,044,171.67*
2023	3	249.662587	7.193604533	242.4689825	$ 2,179,916.78	$ *2,043,584.91*
2024	4	252.8355911	7.323687689	245.5119034	$ 2,207,274.15	$ *2,042,676.56*
2025	5	256.0085951	7.453770846	248.5548243	$ 2,234,631.53	$ *2,041,454.97*
2026	6	259.1815992	7.583854003	251.5977452	$ 2,261,988.90	$ *2,039,928.32*
2027	7	262.3546033	7.713937159	254.6406661	$ 2,289,346.27	$ *2,038,104.64*
2028	8	265.5276073	7.844020316	257.683587	$ 2,316,703.64	$ *2,035,991.82*
2029	9	268.7006114	7.974103472	260.7265079	$ 2,344,061.02	$ *2,033,597.57*
2030	10	271.8736155	8.104186629	263.7694288	$ 2,371,418.39	$ *2,030,929.46*
2031	11	275.0466195	8.234269785	266.8123497	$ 2,398,775.76	$ *2,027,994.92*
2032	12	278.2196236	8.364352942	269.8552706	$ 2,426,133.14	$ *2,024,801.22*
2033	13	281.3926277	8.494436098	272.8981916	$ 2,453,490.51	$ *2,021,355.51*
2034	14	284.5656317	8.624519255	275.9411125	$ 2,480,847.88	$ *2,017,664.76*
2035	15	287.7386358	8.754602412	278.9840334	$ 2,508,205.25	$ *2,013,735.85*
2036	16	290.9116398	8.884685568	282.0269543	$ 2,535,562.63	$ *2,009,575.49*
2037	17	294.0846439	9.014768725	285.0698752	$ 2,562,920.00	$ *2,005,190.27*
2038	18	297.257648	9.144851881	288.1127961	$ 2,590,277.37	$ *2,000,586.64*
2039	19	300.430652	9.274935038	291.155717	$ 2,617,634.75	$ *1,995,770.94*
2040	20	303.6036561	9.4	294.2	$ 2,644,992.12	$ *1,990,749.36*
	Total Benefits During 20 Year Project Life (2018 Dollars					**$ 40,502,293.19**

TH 14 thru Courtland - Concept F

D7 - MnDOT

	Year	BASE VHT	Concept F VHT	VHT Difference	Annual Savings	Present Value
2021	1	243.3165789	5.83659298	237.4799859	$ 2,135,063.22	$ *2,053,914.70*
2022	2	246.4895829	5.923003788	240.5665791	$ 2,162,813.23	$ *2,053,909.18*
2023	3	249.662587	6.009414596	243.6531724	$ 2,190,563.24	$ *2,053,565.54*
2024	4	252.8355911	6.095825404	246.7397657	$ 2,218,313.25	$ *2,052,892.46*
2025	5	256.0085951	6.182236212	249.8263589	$ 2,246,063.26	$ *2,051,898.46*
2026	6	259.1815992	6.26864702	252.9129522	$ 2,273,813.26	$ *2,050,591.88*
2027	7	262.3546033	6.355057828	255.9995454	$ 2,301,563.27	$ *2,048,980.90*
2028	8	265.5276073	6.441468636	259.0861387	$ 2,329,313.28	$ *2,047,073.56*
2029	9	268.7006114	6.527879444	262.1727319	$ 2,357,063.29	$ *2,044,877.73*
2030	10	271.8736155	6.614290253	265.2593252	$ 2,384,813.30	$ *2,042,401.12*
2031	11	275.0466195	6.700701061	268.3459185	$ 2,412,563.31	$ *2,039,651.31*
2032	12	278.2196236	6.787111869	271.4325117	$ 2,440,313.32	$ *2,036,635.71*
2033	13	281.3926277	6.873522677	274.519105	$ 2,468,063.33	$ *2,033,361.60*
2034	14	284.5656317	6.959933485	277.6056982	$ 2,495,813.34	$ *2,029,836.11*
2035	15	287.7386358	7.046344293	280.6922915	$ 2,523,563.34	$ *2,026,066.24*
2036	16	290.9116398	7.132755101	283.7788847	$ 2,551,313.35	$ *2,022,058.82*
2037	17	294.0846439	7.219165909	286.865478	$ 2,579,063.36	$ *2,017,820.59*
2038	18	297.257648	7.305576717	289.9520713	$ 2,606,813.37	$ *2,013,358.13*
2039	19	300.430652	7.391987525	293.0386645	$ 2,634,563.38	$ *2,008,677.89*
2040	20	303.6036561	7.5	296.1	$ 2,662,313.39	$ *2,003,786.19*
	Total Benefits During 20 Year Project Life (2018 Dollars					**$ 40,731,358.14**

Safety Benefit Savings
TH 14 thru Courtland - Concept A
D7 - MnDOT

	Year	Concept A Annual Savings	Present Value
2021	1	$ 68,008.31	$ *68,008.31*
2022	2	$ 68,885.61	$ *68,001.59*
2023	3	$ 69,774.24	$ *67,994.88*
2024	4	$ 70,674.33	$ *67,988.17*
2025	5	$ 71,586.03	$ *67,981.46*
2026	6	$ 72,509.49	$ *67,974.75*
2027	7	$ 73,444.86	$ *67,968.04*
2028	8	$ 74,392.30	$ *67,961.33*
2029	9	$ 75,351.96	$ *67,954.62*
2030	10	$ 76,324.00	$ *67,947.91*
2031	11	$ 77,308.58	$ *67,941.20*
2032	12	$ 78,305.86	$ *67,934.49*
2033	13	$ 79,316.00	$ *67,927.79*
2034	14	$ 80,339.18	$ *67,921.08*
2035	15	$ 81,375.55	$ *67,914.38*
2036	16	$ 82,425.30	$ *67,907.67*
2037	17	$ 83,488.59	$ *67,900.97*
2038	18	$ 84,565.59	$ *67,894.27*
2039	19	$ 85,656.48	$ *67,887.56*
2040	20	$ 86,761.45	$ *67,880.86*
	Total Benefits During 20 Year Project Life (2018 Dollars)		**$ 1,358,891.33**

Safety Benefit Savings
TH 14 thru Courtland - Concept B
D7 - MnDOT

	Year	Concept B Annual Savings	Present Value
2021	1	$ 62,667.97	$ *62,667.97*
2022	2	$ 63,476.39	$ *62,661.78*
2023	3	$ 64,295.23	$ *62,655.60*
2024	4	$ 65,124.64	$ *62,649.41*
2025	5	$ 65,964.75	$ *62,643.23*
2026	6	$ 66,815.69	$ *62,637.04*
2027	7	$ 67,677.62	$ *62,630.86*
2028	8	$ 68,550.66	$ *62,624.68*
2029	9	$ 69,434.96	$ *62,618.50*
2030	10	$ 70,330.67	$ *62,612.32*
2031	11	$ 71,237.94	$ *62,606.13*
2032	12	$ 72,156.91	$ *62,599.95*
2033	13	$ 73,087.73	$ *62,593.77*
2034	14	$ 74,030.56	$ *62,587.60*
2035	15	$ 74,985.56	$ *62,581.42*
2036	16	$ 75,952.87	$ *62,575.24*
2037	17	$ 76,932.66	$ *62,569.06*
2038	18	$ 77,925.10	$ *62,562.89*
2039	19	$ 78,930.33	$ *62,556.71*
2040	20	$ 79,948.53	$ *62,550.53*
	Total Benefits During 20 Year Project Life (2018 Dollars)		**$ 1,252,184.70**

Safety Benefit Savings
TH 14 thru Courtland - Concept C
D7 - MnDOT

	Year	Concept C Annual Savings	Present Value
2021	1	$ 94,733	$ 94,733
2022	2	$ 95,955	$ 94,724
2023	3	$ 97,193	$ 94,714
2024	4	$ 98,447	$ 94,705
2025	5	$ 99,717	$ 94,696
2026	6	$ 101,003	$ 94,686
2027	7	$ 102,306	$ 94,677
2028	8	$ 103,626	$ 94,668
2029	9	$ 104,963	$ 94,658
2030	10	$ 106,317	$ 94,649
2031	11	$ 107,688	$ 94,640
2032	12	$ 109,077	$ 94,630
2033	13	$ 110,484	$ 94,621
2034	14	$ 111,910	$ 94,612
2035	15	$ 113,353	$ 94,602
2036	16	$ 114,815	$ 94,593
2037	17	$ 116,297	$ 94,584
2038	18	$ 117,797	$ 94,574
2039	19	$ 119,316	$ 94,565
2040	20	$ 120,856	$ 94,556
	Total Benefits During 20 Year Project Life (2018 Dollars)		**$ 1,892,885.94**

Safety Benefit Savings
TH 14 thru Courtland - Concept E
D7 - MnDOT

	Year	Concept D Annual Savings	Present Value
2021	1	$ 94,733.09	$ *94,733.09*
2022	2	$ 95,955.14	$ *94,723.73*
2023	3	$ 97,192.96	$ *94,714.38*
2024	4	$ 98,446.75	$ *94,705.03*
2025	5	$ 99,716.72	$ *94,695.68*
2026	6	$ 101,003.06	$ *94,686.34*
2027	7	$ 102,306.00	$ *94,676.99*
2028	8	$ 103,625.75	$ *94,667.64*
2029	9	$ 104,962.52	$ *94,658.30*
2030	10	$ 106,316.54	$ *94,648.95*
2031	11	$ 107,688.02	$ *94,639.61*
2032	12	$ 109,077.20	$ *94,630.27*
2033	13	$ 110,484.29	$ *94,620.93*
2034	14	$ 111,909.54	$ *94,611.59*
2035	15	$ 113,353.17	$ *94,602.25*
2036	16	$ 114,815.43	$ *94,592.91*
2037	17	$ 116,296.55	$ *94,583.57*
2038	18	$ 117,796.77	$ *94,574.23*
2039	19	$ 119,316.35	$ *94,564.90*
2040	20	$ 120,855.53	$ *94,555.56*
	Total Benefits During 20 Year Project Life (2018 Dollars)		**$ 1,892,885.94**

Safety Benefit Savings
TH 14 thru Courtland - Concept F
D7 - MnDOT

	Year	Concept D Annual Savings	Present Value
2021	1	$ 83,600.70	$ *83,600.70*
2022	2	$ 84,679.14	$ *83,592.44*
2023	3	$ 85,771.51	$ *83,584.19*
2024	4	$ 86,877.96	$ *83,575.94*
2025	5	$ 87,998.68	$ *83,567.69*
2026	6	$ 89,133.87	$ *83,559.44*
2027	7	$ 90,283.69	$ *83,551.19*
2028	8	$ 91,448.35	$ *83,542.94*
2029	9	$ 92,628.04	$ *83,534.70*
2030	10	$ 93,822.94	$ *83,526.45*
2031	11	$ 95,033.25	$ *83,518.20*
2032	12	$ 96,259.18	$ *83,509.96*
2033	13	$ 97,500.93	$ *83,501.72*
2034	14	$ 98,758.69	$ *83,493.47*
2035	15	$ 100,032.68	$ *83,485.23*
2036	16	$ 101,323.10	$ *83,476.99*
2037	17	$ 102,630.17	$ *83,468.75*
2038	18	$ 103,954.09	$ *83,460.51*
2039	19	$ 105,295.10	$ *83,452.27*
2040	20	$ 106,653.41	$ *83,444.03*
	Total Benefits During 20 Year Project Life (2018 Dollars)		**$ 1,670,446.81**

Project Cost

TH 14 from 571st to 561st - Constrained 4-Lane

D7 - MnDOT

		Capital Cost in 2018 Dollars		
	Year	BASE CASE	Constrained Alternative	Present Value
2020	0	$ -	$ 3,317,000.00	$ 3,317,000.00
2021	1	$ -	$ -	$ -
2022	2	$ -	$ -	$ -
2023	3	$ -	$ -	$ -
2024	4	$ -	$ -	$ -
2025	5	$ -	$ -	$ -
2026	6	$ -	$ -	$ -
2027	7	$ -	$ -	$ -
2028	8	$ -	$ -	$ -
2029	9	$ -	$ -	$ -
2030	10	$ -	$ -	$ -
2031	11	$ -	$ -	$ -
2032	12	$ -	$ -	$ -
2033	13	$ -	$ -	$ -
2034	14	$ -	$ -	$ -
2035	15	$ -	$ -	$ -
2036	16	$ -	$ -	$ -
2037	17	$ -	$ -	$ -
2038	18	$ -	$ -	$ -
2039	19	$ -	$ -	$ -
2040	20	$ -	$ -	$ -
Present Value of Costs (2018 Dollars)				$ 3,317,000.00

Project Cost

TH 14 from 571st to 561st - Unconstrained 4-Lane

D7 - MnDOT

		Capital Cost in 2018 Dollars		
	Year	BASE CASE	Unconstrained Alternative	Present Value
2020	0	$ -	$ 5,010,200.00	$ 5,010,200.00
2021	1	$ -	$ -	$ -
2022	2	$ -	$ -	$ -
2023	3	$ -	$ -	$ -
2024	4	$ -	$ -	$ -
2025	5	$ -	$ -	$ -
2026	6	$ -	$ -	$ -
2027	7	$ -	$ -	$ -
2028	8	$ -	$ -	$ -
2029	9	$ -	$ -	$ -
2030	10	$ -	$ -	$ -
2031	11	$ -	$ -	$ -
2032	12	$ -	$ -	$ -
2033	13	$ -	$ -	$ -
2034	14	$ -	$ -	$ -
2035	15	$ -	$ -	$ -
2036	16	$ -	$ -	$ -
2037	17	$ -	$ -	$ -
2038	18	$ -	$ -	$ -
2039	19	$ -	$ -	$ -
2040	20	$ -	$ -	$ -
Present Value of Costs (2018 Dollars)				$ 5,010,200.00

Operations Analysis Results

TH 14 from 571st to 561st

BASE	Year	Time Period	# of hours in Time Period	Volume Factor (hide)	Volume	Delay per veh	Daily VHT
	2018	Daily	1	1	7500	74.00	154.2
	2018						0.0
	2018						0.0
	2018						0.0
	2018						0.0
	2018						0.0
	2018						0.0
	2018						0.0
	2018						0.0
		SUM					**154.2**
	2040	Daily	1	1	9890	74.00	203.3
	2040						0.0
	2040						0.0
	2040						0.0
	2040						0.0
	2040						0.0
	2040						0.0
	2040						0.0
	2040						0.0
		SUM					**203.3**

Constrained 4-lane	Year	Time Period	# of hours in Time Period	Volume Factor (hide)	Volume	Delay per veh	Daily VHT
	2018	Daily	1	24	7500	63	131.3
	2018						0.0
	2018						0.0
	2018						0.0
	2018						0.0
	2018						0.0
	2018						0.0
	2018						0.0
	2018						0.0
		SUM					**131.3**
	2040	Daily	1	1	9890	63	173.1
	2040						0.0
	2040						0.0
	2040						0.0
	2040						0.0
	2040						0.0
	2040						0.0
	2040						0.0
	2040						0.0
		SUM					**173.1**

Unconstrained 4-lane	Year	Time Period	# of hours in Time Period	Volume Factor (hide)	Volume	Delay per veh	Daily VHT
	2018	Daily	1	24	7500	63	131.3
	2018						0.0
	2018						0.0
	2018						0.0
	2018						0.0
	2018						0.0
	2018						0.0
	2018						0.0
	2018						0.0
		SUM					**131.3**
	2040	Daily	1	1	9890	63	173.1
	2040						0.0
	2040						0.0
	2040						0.0
	2040						0.0
	2040						0.0
	2040						0.0
	2040						0.0
	2040						0.0
		SUM					**173.1**

Vehicle Operating Cost Savings

TH 14 from 571st to 561st - Constrained 4-Lane

	Year	BASE VHT	Constrained 4-Lane VHT	VHT Difference	Annual Savings	Present Value
2018	-2	154.1666667	131.3	22.9	$ 206,032.23	$ 206,032.23
2019	-1	156.3997475	133.1511364	23.24861111	$ 209,016.58	$ *206,334.24*
2020	0	158.6328283	135.0522727	23.58055556	$ 212,000.93	$ *206,594.55*
2021	1	160.8659091	136.9534091	23.9125	$ 214,985.27	$ *206,814.21*
2022	2	163.0989899	138.8545455	24.24444444	$ 217,969.62	$ *206,994.20*
2023	3	165.3320707	140.7556818	24.57638889	$ 220,953.96	$ *207,135.51*
2024	4	167.5651515	142.6568182	24.90833333	$ 223,938.31	$ *207,239.11*
2025	5	169.7982323	144.5579545	25.24027778	$ 226,922.65	$ *207,305.94*
2026	6	172.0313131	146.4590909	25.57222222	$ 229,907.00	$ *207,336.91*
2027	7	174.2643939	148.3602273	25.90416667	$ 232,891.35	$ *207,332.96*
2028	8	176.4974747	150.2613636	26.23611111	$ 235,875.69	$ *207,294.95*
2029	9	178.7305556	152.1625	26.56805556	$ 238,860.04	$ *207,223.78*
2030	10	180.9636364	154.0636364	26.9	$ 241,844.38	$ *207,120.30*
2031	11	183.1967172	155.9647727	27.23194444	$ 244,828.73	$ *206,985.34*
2032	12	185.429798	157.8659091	27.56388889	$ 247,813.07	$ *206,819.74*
2033	13	187.6628788	159.7670455	27.89583333	$ 250,797.42	$ *206,624.29*
2034	14	189.8959596	161.6681818	28.22777778	$ 253,781.77	$ *206,399.81*
2035	15	192.1290404	163.5693182	28.55972222	$ 256,766.11	$ *206,147.05*
2036	16	194.3621212	165.4704545	28.89166667	$ 259,750.46	$ *205,866.80*
2037	17	196.595202	167.3715909	29.22361111	$ 262,734.80	$ *205,559.78*
2038	18	198.8282828	169.2727273	29.55555556	$ 265,719.15	$ *205,226.74*
2039	19	201.0613636	171.1738636	29.8875	$ 268,703.49	$ *204,868.39*
2040	20	203.2944444	173.1	30.2	$ 271,687.84	$ *204,485.45*
	Total Benefits During 20 Year Project Life (2018 Dollars)					**$ 4,130,781.26**

Vehicle Operating Cost Savings

TH 14 from 571st to 561st - Unconstrained 4-Lane

	Year	BASE VHT	Unconstrained 4-Lane VHT	VHT Difference	Annual Savings	Present Value
2018	-2	154.1666667	131.3	22.9	$ 206,032.23	$ 206,032.23
2019	-1	156.3997475	133.1511364	23.24861111	$ 209,016.58	$ *206,334.24*
2020	0	158.6328283	135.0522727	23.58055556	$ 212,000.93	$ *206,594.55*
2021	1	160.8659091	136.9534091	23.9125	$ 214,985.27	$ *206,814.21*
2022	2	163.0989899	138.8545455	24.24444444	$ 217,969.62	$ *206,994.20*
2023	3	165.3320707	140.7556818	24.57638889	$ 220,953.96	$ *207,135.51*
2024	4	167.5651515	142.6568182	24.90833333	$ 223,938.31	$ *207,239.11*
2025	5	169.7982323	144.5579545	25.24027778	$ 226,922.65	$ *207,305.94*
2026	6	172.0313131	146.4590909	25.57222222	$ 229,907.00	$ *207,336.91*
2027	7	174.2643939	148.3602273	25.90416667	$ 232,891.35	$ *207,332.96*
2028	8	176.4974747	150.2613636	26.23611111	$ 235,875.69	$ *207,294.95*
2029	9	178.7305556	152.1625	26.56805556	$ 238,860.04	$ *207,223.78*
2030	10	180.9636364	154.0636364	26.9	$ 241,844.38	$ *207,120.30*
2031	11	183.1967172	155.9647727	27.23194444	$ 244,828.73	$ *206,985.34*
2032	12	185.429798	157.8659091	27.56388889	$ 247,813.07	$ *206,819.74*
2033	13	187.6628788	159.7670455	27.89583333	$ 250,797.42	$ *206,624.29*
2034	14	189.8959596	161.6681818	28.22777778	$ 253,781.77	$ *206,399.81*
2035	15	192.1290404	163.5693182	28.55972222	$ 256,766.11	$ *206,147.05*
2036	16	194.3621212	165.4704545	28.89166667	$ 259,750.46	$ *205,866.80*
2037	17	196.595202	167.3715909	29.22361111	$ 262,734.80	$ *205,559.78*
2038	18	198.8282828	169.2727273	29.55555556	$ 265,719.15	$ *205,226.74*
2039	19	201.0613636	171.1738636	29.8875	$ 268,703.49	$ *204,868.39*
2040	20	203.2944444	173.1	30.2	$ 271,687.84	$ *204,485.45*
	Total Benefits During 20 Year Project Life (2018 Dollars)					**$ 4,130,781.26**

Vehicle Operating Cost Savings

TH 14 from 571st to 561st - Constrained 4-Lane

D7 - MnDOT

	Year	Traditional At-Grade Annual Savings	Present Value
2021	1	$ 2,214.89	$ *2,214.89*
2022	2	$ 2,243.47	$ *2,214.67*
2023	3	$ 2,272.41	$ *2,214.46*
2024	4	$ 2,301.72	$ *2,214.24*
2025	5	$ 2,331.41	$ *2,214.02*
2026	6	$ 2,361.49	$ *2,213.80*
2027	7	$ 2,391.95	$ *2,213.58*
2028	8	$ 2,422.81	$ *2,213.36*
2029	9	$ 2,454.06	$ *2,213.14*
2030	10	$ 2,485.72	$ *2,212.93*
2031	11	$ 2,517.78	$ *2,212.71*
2032	12	$ 2,550.26	$ *2,212.49*
2033	13	$ 2,583.16	$ *2,212.27*
2034	14	$ 2,616.48	$ *2,212.05*
2035	15	$ 2,650.24	$ *2,211.83*
2036	16	$ 2,684.43	$ *2,211.62*
2037	17	$ 2,719.05	$ *2,211.40*
2038	18	$ 2,754.13	$ *2,211.18*
2039	19	$ 2,789.66	$ *2,210.96*
2040	20	$ 2,825.65	$ *2,210.74*
	Total Benefits During 20 Year Project Life (2018 Dollars)		**$ 44,256.35**

Vehicle Operating Cost Savings

TH 14 from 571st to 561st - Unconstrained 4-Lane

D7 - MnDOT

	Year	Green T Annual Savings	Present Value
2021	1	$ 4,888.66	$ *4,888.66*
2022	2	$ 4,951.72	$ *4,888.18*
2023	3	$ 5,015.60	$ *4,887.70*
2024	4	$ 5,080.30	$ *4,887.21*
2025	5	$ 5,145.84	$ *4,886.73*
2026	6	$ 5,212.22	$ *4,886.25*
2027	7	$ 5,279.46	$ *4,885.77*
2028	8	$ 5,347.56	$ *4,885.28*
2029	9	$ 5,416.55	$ *4,884.80*
2030	10	$ 5,486.42	$ *4,884.32*
2031	11	$ 5,557.19	$ *4,883.84*
2032	12	$ 5,628.88	$ *4,883.35*
2033	13	$ 5,701.49	$ *4,882.87*
2034	14	$ 5,775.04	$ *4,882.39*
2035	15	$ 5,849.54	$ *4,881.91*
2036	16	$ 5,925.00	$ *4,881.43*
2037	17	$ 6,001.43	$ *4,880.94*
2038	18	$ 6,078.85	$ *4,880.46*
2039	19	$ 6,157.27	$ *4,879.98*
2040	20	$ 6,236.70	$ *4,879.50*
	Total Benefits During 20 Year Project Life (2018 Dollars)		**$ 97,681.57**

Project Cost

TH 14 from TH 15 to CSAH 37 - 2 Lane Recondition

		Capital Cost in 2018 Dollars		
	Year	BASE CASE	2-Lane Recondition Alternative	Present Value
2020	0	$ -	$ 4,735,000.00	$ 4,735,000.00
2021	1	$ -	$ -	$ -
2022	2	$ -	$ -	$ -
2023	3	$ -	$ -	$ -
2024	4	$ -	$ -	$ -
2025	5	$ -	$ -	$ -
2026	6	$ -	$ -	$ -
2027	7	$ -	$ -	$ -
2028	8	$ -	$ -	$ -
2029	9	$ -	$ -	$ -
2030	10	$ -	$ -	$ -
2031	11	$ -	$ -	$ -
2032	12	$ -	$ -	$ -
2033	13	$ -	$ -	$ -
2034	14	$ -	$ -	$ -
2035	15	$ -	$ -	$ -
2036	16	$ -	$ -	$ -
2037	17	$ -	$ -	$ -
2038	18	$ -	$ -	$ -
2039	19	$ -	$ -	$ -
2040	20	$ -	$ -	$ -
Present Value of Costs (2018 Dollars)				$ 4,735,000.00

Project Cost

TH 14 from TH 15 to CSAH 37 - 4-Lane Divided

		Capital Cost in 2018 Dollars		
	Year	BASE CASE	4-Lane Divided Alternative	Present Value
2020	0	$ -	$ -	$ -
2021	1	$ -	$ -	$ -
2022	2	$ -	$ -	$ -
2023	3	$ -	$ -	$ -
2024	4	$ -	$ -	$ -
2025	5	$ -	$ -	$ -
2026	6	$ -	$ -	$ -
2027	7	$ -	$ -	$ -
2028	8	$ -	$ -	$ -
2029	9	$ -	$ -	$ -
2030	10	$ -	$ -	$ -
2031	11	$ -	$ -	$ -
2032	12	$ -	$ -	$ -
2033	13	$ -	$ -	$ -
2034	14	$ -	$ -	$ -
2035	15	$ -	$ -	$ -
2036	16	$ -	$ -	$ -
2037	17	$ -	$ -	$ -
2038	18	$ -	$ -	$ -
2039	19	$ -	$ -	$ -
2040	20	$ -	$ -	$ -
Present Value of Costs (2018 Dollars)				$ -

Operations Analysis Results

TH 14 from TH 15 to CSAH 37

BASE	Year	Time Period	# of hours in Time Period	Volume Factor (hide)	Volume	Delay per veh	Daily VHT
	2018	Daily	1	1	7500	117.40	244.6
	2018						0.0
	2018						0.0
	2018						0.0
	2018						0.0
	2018						0.0
	2018						0.0
	2018						0.0
	2018						0.0
		SUM					**244.6**
	2040	Daily	1	1	9890	117.40	322.5
	2040						0.0
	2040						0.0
	2040						0.0
	2040						0.0
	2040						0.0
	2040						0.0
	2040						0.0
	2040						0.0
		SUM					**322.5**

2-Lane Recondition	Year	Time Period	# of hours in Time Period	Volume Factor (hide)	Volume	Delay per veh	Daily VHT
	2018	Daily	1	24	7500	117.3966942	244.6
	2018						0.0
	2018						0.0
	2018						0.0
	2018						0.0
	2018						0.0
	2018						0.0
	2018						0.0
	2018						0.0
		SUM					**244.6**
	2040	Daily	1	1	9890	117.3966942	322.5
	2040						0.0
	2040						0.0
	2040						0.0
	2040						0.0
	2040						0.0
	2040						0.0
	2040						0.0
	2040						0.0
		SUM					**322.5**

4-Lane Divided	Year	Time Period	# of hours in Time Period	Volume Factor (hide)	Volume	Delay per veh	Daily VHT
	2018	Daily	1	24	7500	99.33566434	206.9
	2018						0.0
	2018						0.0
	2018						0.0
	2018						0.0
	2018						0.0
	2018						0.0
	2018						0.0
	2018						0.0
		SUM					**206.9**
	2040	Daily	1	1	9890	99.33566434	272.9
	2040						0.0
	2040						0.0
	2040						0.0
	2040						0.0
	2040						0.0
	2040						0.0
	2040						0.0
	2040						0.0
		SUM					**272.9**

Vehicle Operating Cost Savings

TH 15 to CSAH 37 - 2-Lane Recondition

	Year	BASE VHT	2-Lane Recondition VHT	VHT Difference	Annual Savings	Present Value
2018	-2	244.5764463	244.6	0.0	$ -	$ -
2019	-1	248.119099	248.119099	0	$ -	$ -
2020	0	251.6617518	251.6617518	0	$ -	$ -
2021	1	255.2044046	255.2044046	0	$ -	$ -
2022	2	258.7470574	258.7470574	0	$ -	$ -
2023	3	262.2897101	262.2897101	0	$ -	$ -
2024	4	265.8323629	265.8323629	0	$ -	$ -
2025	5	269.3750157	269.3750157	0	$ -	$ -
2026	6	272.9176684	272.9176684	0	$ -	$ -
2027	7	276.4603212	276.4603212	0	$ -	$ -
2028	8	280.002974	280.002974	0	$ -	$ -
2029	9	283.5456267	283.5456267	0	$ -	$ -
2030	10	287.0882795	287.0882795	0	$ -	$ -
2031	11	290.6309323	290.6309323	0	$ -	$ -
2032	12	294.173585	294.173585	0	$ -	$ -
2033	13	297.7162378	297.7162378	0	$ -	$ -
2034	14	301.2588906	301.2588906	0	$ -	$ -
2035	15	304.8015433	304.8015433	0	$ -	$ -
2036	16	308.3441961	308.3441961	0	$ -	$ -
2037	17	311.8868489	311.8868489	0	$ -	$ -
2038	18	315.4295016	315.4295016	0	$ -	$ -
2039	19	318.9721544	318.9721544	0	$ -	$ -
2040	20	322.5148072	322.5	0.0	$ -	$ -
	Total Benefits During 20 Year Project Life (2018 Dollars)					**$ -**

Vehicle Operating Cost Savings

TH 15 to CSAH 37 - 4-Lane Divide

	Year	BASE VHT	4-Lane Divided VHT	VHT Difference	Annual Savings	Present Value
2018	-2	244.5764463	206.9	37.6	$ 338,286.76	$ 338,286.76
2019	-1	248.119099	209.94693	38.17216908	$ 343,186.79	*$ 338,782.62*
2020	0	251.6617518	212.9445592	38.71719259	$ 348,086.82	*$ 339,210.04*
2021	1	255.2044046	215.9421885	39.26221609	$ 352,986.86	*$ 339,570.69*
2022	2	258.7470574	218.9398178	39.80723959	$ 357,886.89	*$ 339,866.22*
2023	3	262.2897101	221.937447	40.3522631	$ 362,786.92	*$ 340,098.25*
2024	4	265.8323629	224.9350763	40.8972866	$ 367,686.95	*$ 340,268.34*
2025	5	269.3750157	227.9327056	41.4423101	$ 372,586.99	*$ 340,378.06*
2026	6	272.9176684	230.9303348	41.9873336	$ 377,487.02	*$ 340,428.93*
2027	7	276.4603212	233.9279641	42.53235711	$ 382,387.05	*$ 340,422.43*
2028	8	280.002974	236.9255933	43.07738061	$ 387,287.08	*$ 340,360.03*
2029	9	283.5456267	239.9232226	43.62240411	$ 392,187.12	*$ 340,243.17*
2030	10	287.0882795	242.9208519	44.16742761	$ 397,087.15	*$ 340,073.26*
2031	11	290.6309323	245.9184811	44.71245112	$ 401,987.18	*$ 339,851.67*
2032	12	294.173585	248.9161104	45.25747462	$ 406,887.21	*$ 339,579.77*
2033	13	297.7162378	251.9137397	45.80249812	$ 411,787.24	*$ 339,258.87*
2034	14	301.2588906	254.9113689	46.34752162	$ 416,687.28	*$ 338,890.28*
2035	15	304.8015433	257.9089982	46.89254513	$ 421,587.31	*$ 338,475.28*
2036	16	308.3441961	260.9066275	47.43756863	$ 426,487.34	*$ 338,015.12*
2037	17	311.8868489	263.9042567	47.98259213	$ 431,387.37	*$ 337,511.03*
2038	18	315.4295016	266.901886	48.52761564	$ 436,287.41	*$ 336,964.21*
2039	19	318.9721544	269.8995153	49.07263914	$ 441,187.44	*$ 336,375.83*
2040	20	322.5148072	272.9	49.6	$ 446,087.47	*$ 335,747.07*
	Total Benefits During 20 Year Project Life (2018 Dollars)					**$ 6,782,378.53**

Vehicle Operating Cost Savings

TH 14 from TH 15 to CSAH 37 - 2-Lane Recondition

D7 - MnDOT

	Year	Traditional At-Grade Annual Savings	Present Value
2021	1		
2022	2		
2023	3		
2024	4		
2025	5		
2026	6		
2027	7		
2028	8		
2029	9		
2030	10		
2031	11		
2032	12		
2033	13		
2034	14		
2035	15		
2036	16		
2037	17		
2038	18		
2039	19		
2040	20		
	Total Benefits During 20 Year Project Life (2018 Dollars)		$ -

Vehicle Operating Cost Savings

TH 14 from TH 15 to CSAH 37 - 4 Lane Divided

	Year	4-Lane Divided Annual Savings	Present Value
2021	1	$ 1,124.45	$ *1,124.45*
2022	2	$ 1,138.96	$ *1,124.34*
2023	3	$ 1,153.65	$ *1,124.23*
2024	4	$ 1,168.53	$ *1,124.12*
2025	5	$ 1,183.61	$ *1,124.01*
2026	6	$ 1,198.87	$ *1,123.90*
2027	7	$ 1,214.34	$ *1,123.79*
2028	8	$ 1,230.01	$ *1,123.68*
2029	9	$ 1,245.87	$ *1,123.56*
2030	10	$ 1,261.94	$ *1,123.45*
2031	11	$ 1,278.22	$ *1,123.34*
2032	12	$ 1,294.71	$ *1,123.23*
2033	13	$ 1,311.41	$ *1,123.12*
2034	14	$ 1,328.33	$ *1,123.01*
2035	15	$ 1,345.47	$ *1,122.90*
2036	16	$ 1,362.82	$ *1,122.79*
2037	17	$ 1,380.40	$ *1,122.68*
2038	18	$ 1,398.21	$ *1,122.57*
2039	19	$ 1,416.25	$ *1,122.46*
2040	20	$ 1,434.52	$ *1,122.34*
	Total Benefits During 20 Year Project Life (2018 Dollars)		**$ 22,467.96**

Appendix I: HCM Two-Lane Highway Analysis Details

Appendix I:
HCM 6th Edition - Two-Lane Highway Analysis
Existing Traffic Volumes

Phone: Fax:
E-Mail:

Directional Two-Lane Highway Segment Analysis

Analyst	Michael Narow
Agency/Co.	BMI
Date Performed	10/18/2018
Analysis Time Period	PM Peak Hour
Highway	TH 14
From/To	EB from Courtland to Nicollet
Jurisdiction	District 7
Analysis Year	2040 Forecasted Volumes
Description	

Input Data

Highway class	Class 1		Peak hour factor, PHF	0.88	
Shoulder width	8.0	ft	% Trucks and buses	17	%
Lane width	12.0	ft	% Trucks crawling	0.0	%
Segment length	6.1	mi	Truck crawl speed	0.0	mi/hr
Terrain type	Level		% Recreational vehicles	0	%
Grade: Length	-	mi	% No-passing zones	27	%
Up/down	-	%	Access point density	3	/mi

Analysis direction volume, Vd 535 veh/h
Opposing direction volume, Vo 660 veh/h

Average Travel Speed

Direction	Analysis(d)		Opposing (o)	
PCE for trucks, ET	1.1		1.1*	
PCE for RVs, ER	1.0		1.0	
Heavy-vehicle adj. factor,(note-5) fHV	0.983		0.983	
Grade adj. factor,(note-1) fg	1.00		1.00	
Directional flow rate,(note-2) vi	618	pc/h	763	pc/h

Free-Flow Speed from Field Measurement:

Field measured speed,(note-3) S FM	-	mi/h
Observed total demand,(note-3) V	-	veh/h

Estimated Free-Flow Speed:

Base free-flow speed,(note-3) BFFS	65.0	mi/h
Adj. for lane and shoulder width,(note-3) fLS	0.0*	mi/h
Adj. for access point density,(note-3) fA	1.1*	mi/h
Free-flow speed, FFSd	63.9	mi/h
Adjustment for no-passing zones, fnp	0.9	mi/h
Average travel speed, ATSd	52.3	mi/h
Percent Free Flow Speed, PFFS	81.8	%

Percent Time-Spent-Following

Direction	Analysis(d)	Opposing (o)
PCE for trucks, ET	1.0	1.0
PCE for RVs, ER	1.0	1.0
Heavy-vehicle adjustment factor, fHV	1.000	1.000
Grade adjustment factor,(note-1) fg	1.00	1.00
Directional flow rate,(note-2) vi	608 pc/h	750 pc/h
Base percent time-spent-following,(note-4) BPTSFd	60.4 %	
Adjustment for no-passing zones, fnp	21.5	
Percent time-spent-following, PTSFd	70.0 %	

Level of Service and Other Performance Measures

Level of service, LOS	D	
Volume to capacity ratio, v/c	0.36	
Peak 15-min vehicle-miles of travel, VMT15	927	veh-mi
Peak-hour vehicle-miles of travel, VMT60	3263	veh-mi
Peak 15-min total travel time, TT15	17.7	veh-h
Capacity from ATS, CdATS	1671	veh/h
Capacity from PTSF, CdPTSF	1700	veh/h
Directional Capacity	1671	veh/h

Passing Lane Analysis

Total length of analysis segment, Lt	6.1	mi
Length of two-lane highway upstream of the passing lane, Lu	-	mi
Length of passing lane including tapers, Lpl	-	mi
Average travel speed, ATSd (from above)	52.3	mi/h
Percent time-spent-following, PTSFd (from above)	70.0	
Level of service, LOSd (from above)	D	

Average Travel Speed with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for average travel speed, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for average travel speed, Ld	-	mi
Adj. factor for the effect of passing lane on average speed, fpl	-	
Average travel speed including passing lane, ATSpl	-	
Percent free flow speed including passing lane, PFFSpl	0.0	%

Percent Time-Spent-Following with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for percent time-spent-following, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for percent time-spent-following, Ld	-	mi
Adj. factor for the effect of passing lane on percent time-spent-following, fpl	-	
Percent time-spent-following including passing lane, PTSFpl	-	%

Level of Service and Other Performance Measures with Passing Lane

Level of service including passing lane, LOSpl	E	
Peak 15-min total travel time, TT15	-	veh-h

Bicycle Level of Service

Phone: Fax:
E-Mail:

Directional Two-Lane Highway Segment Analysis

Analyst	Michael Narow
Agency/Co.	BMI
Date Performed	10/18/2018
Analysis Time Period	PM Peak Hour
Highway	TH 14
From/To	EB from CSAH 37 to Courtland
Jurisdiction	District 7
Analysis Year	2040 Forecasted Volumes
Description	

Input Data

Highway class	Class 1		Peak hour factor, PHF	0.88	
Shoulder width	8.0	ft	% Trucks and buses	17	%
Lane width	12.0	ft	% Trucks crawling	0.0	%
Segment length	3.7	mi	Truck crawl speed	0.0	mi/hr
Terrain type	Level		% Recreational vehicles	0	%
Grade: Length	-	mi	% No-passing zones	25	%
Up/down	-	%	Access point density	4	/mi

Analysis direction volume, Vd 690 veh/h
Opposing direction volume, Vo 750 veh/h

Average Travel Speed

Direction	Analysis(d)		Opposing (o)	
PCE for trucks, ET	1.1		1.1*	
PCE for RVs, ER	1.0		1.0	
Heavy-vehicle adj. factor,(note-5) fHV	0.983		0.983	
Grade adj. factor,(note-1) fg	1.00		1.00	
Directional flow rate,(note-2) vi	798	pc/h	867	pc/h

Free-Flow Speed from Field Measurement:

Field measured speed,(note-3) S FM	-	mi/h
Observed total demand,(note-3) V	-	veh/h

Estimated Free-Flow Speed:

Base free-flow speed,(note-3) BFFS	65.0	mi/h
Adj. for lane and shoulder width,(note-3) fLS	0.0*	mi/h
Adj. for access point density,(note-3) fA	1.1*	mi/h
Free-flow speed, FFSd	63.9	mi/h
Adjustment for no-passing zones, fnp	0.7	mi/h
Average travel speed, ATSd	50.3	mi/h
Percent Free Flow Speed, PFFS	78.7	%

Percent Time-Spent-Following

Direction	Analysis(d)	Opposing (o)
PCE for trucks, ET	1.0	1.0
PCE for RVs, ER	1.0	1.0
Heavy-vehicle adjustment factor, fHV	1.000	1.000
Grade adjustment factor,(note-1) fg	1.00	1.00
Directional flow rate,(note-2) vi	784 pc/h	852 pc/h
Base percent time-spent-following,(note-4) BPTSFd	69.2 %	
Adjustment for no-passing zones, fnp	18.1	
Percent time-spent-following, PTSFd	77.9 %	

Level of Service and Other Performance Measures

Level of service, LOS	D	
Volume to capacity ratio, v/c	0.47	
Peak 15-min vehicle-miles of travel, VMT15	725	veh-mi
Peak-hour vehicle-miles of travel, VMT60	2553	veh-mi
Peak 15-min total travel time, TT15	14.4	veh-h
Capacity from ATS, CdATS	1700	veh/h
Capacity from PTSF, CdPTSF	1700	veh/h
Directional Capacity	1700	veh/h

Passing Lane Analysis

Total length of analysis segment, Lt	3.7	mi
Length of two-lane highway upstream of the passing lane, Lu	-	mi
Length of passing lane including tapers, Lpl	-	mi
Average travel speed, ATSd (from above)	50.3	mi/h
Percent time-spent-following, PTSFd (from above)	77.9	
Level of service, LOSd (from above)	D	

Average Travel Speed with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for average travel speed, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for average travel speed, Ld	-	mi
Adj. factor for the effect of passing lane on average speed, fpl	-	
Average travel speed including passing lane, ATSpl	-	
Percent free flow speed including passing lane, PFFSpl	0.0	%

Percent Time-Spent-Following with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for percent time-spent-following, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for percent time-spent-following, Ld	-	mi
Adj. factor for the effect of passing lane on percent time-spent-following, fpl	-	
Percent time-spent-following including passing lane, PTSFpl	-	%

Level of Service and Other Performance Measures with Passing Lane

Level of service including passing lane, LOSpl	E	
Peak 15-min total travel time, TT15	-	veh-h

Bicycle Level of Service

Phone: Fax:
E-Mail:

Directional Two-Lane Highway Segment Analysis

Analyst	Michael Narow
Agency/Co.	BMI
Date Performed	10/18/2018
Analysis Time Period	PM Peak 15 min x 4
Highway	TH 14
From/To	WB from Courtland to CSAH 37
Jurisdiction	District 7
Analysis Year	2040 Forecasted Volumes
Description	

Input Data

Highway class	Class 1		Peak hour factor, PHF	0.88	
Shoulder width	8.0	ft	% Trucks and buses	17	%
Lane width	12.0	ft	% Trucks crawling	0.0	%
Segment length	3.7	mi	Truck crawl speed	0.0	mi/hr
Terrain type	Level		% Recreational vehicles	0	%
Grade: Length	-	mi	% No-passing zones	57	%
Up/down	-	%	Access point density	4	/mi

Analysis direction volume, Vd 750 veh/h
Opposing direction volume, Vo 690 veh/h

Average Travel Speed

Direction	Analysis(d)		Opposing (o)	
PCE for trucks, ET	1.0		1.1*	
PCE for RVs, ER	1.0		1.0	
Heavy-vehicle adj. factor,(note-5) fHV	1.000		0.983	
Grade adj. factor,(note-1) fg	1.00		1.00	
Directional flow rate,(note-2) vi	852	pc/h	798	pc/h

Free-Flow Speed from Field Measurement:

Field measured speed,(note-3) S FM	-	mi/h
Observed total demand,(note-3) V	-	veh/h

Estimated Free-Flow Speed:

Base free-flow speed,(note-3) BFFS	65.0	mi/h
Adj. for lane and shoulder width,(note-3) fLS	0.0*	mi/h
Adj. for access point density,(note-3) fA	1.1*	mi/h
Free-flow speed, FFSd	63.9	mi/h
Adjustment for no-passing zones, fnp	1.2	mi/h
Average travel speed, ATSd	49.9	mi/h
Percent Free Flow Speed, PFFS	78.2	%

Percent Time-Spent-Following

Direction	Analysis(d)	Opposing (o)
PCE for trucks, ET	1.0	1.0
PCE for RVs, ER	1.0	1.0
Heavy-vehicle adjustment factor, fHV	1.000	1.000
Grade adjustment factor,(note-1) fg	1.00	1.00
Directional flow rate,(note-2) vi	852 pc/h	784 pc/h
Base percent time-spent-following,(note-4) BPTSFd	71.1 %	
Adjustment for no-passing zones, fnp	22.2	
Percent time-spent-following, PTSFd	82.7 %	

Level of Service and Other Performance Measures

Level of service, LOS	E	
Volume to capacity ratio, v/c	0.50	
Peak 15-min vehicle-miles of travel, VMT15	788	veh-mi
Peak-hour vehicle-miles of travel, VMT60	2775	veh-mi
Peak 15-min total travel time, TT15	15.8	veh-h
Capacity from ATS, CdATS	1671	veh/h
Capacity from PTSF, CdPTSF	1700	veh/h
Directional Capacity	1671	veh/h

Passing Lane Analysis

Total length of analysis segment, Lt	3.7	mi
Length of two-lane highway upstream of the passing lane, Lu	-	mi
Length of passing lane including tapers, Lpl	-	mi
Average travel speed, ATSd (from above)	49.9	mi/h
Percent time-spent-following, PTSFd (from above)	82.7	
Level of service, LOSd (from above)	E	

Average Travel Speed with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for average travel speed, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for average travel speed, Ld	-	mi
Adj. factor for the effect of passing lane on average speed, fpl	-	
Average travel speed including passing lane, ATSpl	-	
Percent free flow speed including passing lane, PFFSpl	0.0	%

Percent Time-Spent-Following with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for percent time-spent-following, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for percent time-spent-following, Ld	-	mi
Adj. factor for the effect of passing lane on percent time-spent-following, fpl	-	
Percent time-spent-following including passing lane, PTSFpl	-	%

Level of Service and Other Performance Measures with Passing Lane

Level of service including passing lane, LOSpl	E	
Peak 15-min total travel time, TT15	-	veh-h

Bicycle Level of Service

Phone: Fax:
E-Mail:

Directional Two-Lane Highway Segment Analysis

Analyst	Michael Narow
Agency/Co.	BMI
Date Performed	10/18/2018
Analysis Time Period	PM Peak Hour
Highway	TH 14
From/To	WB from Nicollet to Courtland
Jurisdiction	District 7
Analysis Year	2040 Forecasted Volumes
Description	

Input Data

Highway class	Class 1		Peak hour factor, PHF	0.88	
Shoulder width	8.0	ft	% Trucks and buses	17	%
Lane width	12.0	ft	% Trucks crawling	0.0	%
Segment length	6.1	mi	Truck crawl speed	0.0	mi/hr
Terrain type	Level		% Recreational vehicles	0	%
Grade: Length	-	mi	% No-passing zones	24	%
Up/down	-	%	Access point density	3	/mi

Analysis direction volume, Vd 660 veh/h
Opposing direction volume, Vo 535 veh/h

Average Travel Speed

Direction	Analysis(d)		Opposing (o)	
PCE for trucks, ET	1.1		1.1*	
PCE for RVs, ER	1.0		1.0	
Heavy-vehicle adj. factor,(note-5) fHV	0.983		0.983	
Grade adj. factor,(note-1) fg	1.00		1.00	
Directional flow rate,(note-2) vi	763	pc/h	618	pc/h

Free-Flow Speed from Field Measurement:

Field measured speed,(note-3) S FM	-	mi/h
Observed total demand,(note-3) V	-	veh/h

Estimated Free-Flow Speed:

Base free-flow speed,(note-3) BFFS	65.0	mi/h
Adj. for lane and shoulder width,(note-3) fLS	0.0*	mi/h
Adj. for access point density,(note-3) fA	1.1*	mi/h
Free-flow speed, FFSd	63.9	mi/h
Adjustment for no-passing zones, fnp	1.3	mi/h
Average travel speed, ATSd	51.9	mi/h
Percent Free Flow Speed, PFFS	81.2	%

Percent Time-Spent-Following

Direction	Analysis(d)	Opposing (o)
PCE for trucks, ET	1.0	1.0
PCE for RVs, ER	1.0	1.0
Heavy-vehicle adjustment factor, fHV	1.000	1.000
Grade adjustment factor,(note-1) fg	1.00	1.00
Directional flow rate,(note-2) vi	750 pc/h	608 pc/h
Base percent time-spent-following,(note-4) BPTSFd	64.6 %	
Adjustment for no-passing zones, fnp	21.0	
Percent time-spent-following, PTSFd	76.2 %	

Level of Service and Other Performance Measures

Level of service, LOS	D	
Volume to capacity ratio, v/c	0.45	
Peak 15-min vehicle-miles of travel, VMT15	1144	veh-mi
Peak-hour vehicle-miles of travel, VMT60	4026	veh-mi
Peak 15-min total travel time, TT15	22.1	veh-h
Capacity from ATS, CdATS	1671	veh/h
Capacity from PTSF, CdPTSF	1700	veh/h
Directional Capacity	1671	veh/h

Passing Lane Analysis

Total length of analysis segment, Lt	6.1	mi
Length of two-lane highway upstream of the passing lane, Lu	-	mi
Length of passing lane including tapers, Lpl	-	mi
Average travel speed, ATSd (from above)	51.9	mi/h
Percent time-spent-following, PTSFd (from above)	76.2	
Level of service, LOSd (from above)	D	

Average Travel Speed with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for average travel speed, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for average travel speed, Ld	-	mi
Adj. factor for the effect of passing lane on average speed, fpl	-	
Average travel speed including passing lane, ATSpl	-	
Percent free flow speed including passing lane, PFFSpl	0.0	%

Percent Time-Spent-Following with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for percent time-spent-following, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for percent time-spent-following, Ld	-	mi
Adj. factor for the effect of passing lane on percent time-spent-following, fpl	-	
Percent time-spent-following including passing lane, PTSFpl	-	%

Level of Service and Other Performance Measures with Passing Lane

Level of service including passing lane, LOSpl	E	
Peak 15-min total travel time, TT15	-	veh-h

Bicycle Level of Service

Appendix I:
HCM 6th Edition - Two-Lane Highway Analysis
Future Traffic Volumes

HCS 2010: Two-Lane Highways Release 6.65

Phone: Fax:
E-Mail:

Directional Two-Lane Highway Segment Analysis

Analyst	Michael Narow
Agency/Co.	BMI
Date Performed	10/18/2018
Analysis Time Period	PM Peak Hour
Highway	TH 14
From/To	EB from CSAH 37 to Courtland
Jurisdiction	District 7
Analysis Year	2018 Seasonal Adjusted Volumes
Description	

Input Data

Highway class	Class 1		Peak hour factor, PHF	0.88	
Shoulder width	8.0	ft	% Trucks and buses	17	%
Lane width	12.0	ft	% Trucks crawling	0.0	%
Segment length	3.7	mi	Truck crawl speed	0.0	mi/hr
Terrain type	Level		% Recreational vehicles	0	%
Grade: Length	-	mi	% No-passing zones	25	%
Up/down	-	%	Access point density	4	/mi

Analysis direction volume, Vd 534 veh/h
Opposing direction volume, Vo 581 veh/h

Average Travel Speed

Direction	Analysis(d)		Opposing (o)	
PCE for trucks, ET	1.1		1.1*	
PCE for RVs, ER	1.0		1.0	
Heavy-vehicle adj. factor,(note-5) fHV	0.983		0.983	
Grade adj. factor,(note-1) fg	1.00		1.00	
Directional flow rate,(note-2) vi	617	pc/h	672	pc/h

Free-Flow Speed from Field Measurement:

Field measured speed,(note-3) S FM	-	mi/h
Observed total demand,(note-3) V	-	veh/h

Estimated Free-Flow Speed:

Base free-flow speed,(note-3) BFFS	65.0	mi/h
Adj. for lane and shoulder width,(note-3) fLS	0.0*	mi/h
Adj. for access point density,(note-3) fA	1.1*	mi/h
Free-flow speed, FFSd	63.9	mi/h
Adjustment for no-passing zones, fnp	1.1	mi/h
Average travel speed, ATSd	52.8	mi/h
Percent Free Flow Speed, PFFS	82.6	%

Percent Time-Spent-Following

Direction	Analysis(d)	Opposing (o)
PCE for trucks, ET	1.0	1.0
PCE for RVs, ER	1.0	1.0
Heavy-vehicle adjustment factor, fHV	1.000	1.000
Grade adjustment factor,(note-1) fg	1.00	1.00
Directional flow rate,(note-2) vi	607 pc/h	660 pc/h
Base percent time-spent-following,(note-4) BPTSFd	59.7 %	
Adjustment for no-passing zones, fnp	23.7	
Percent time-spent-following, PTSFd	71.1 %	

Level of Service and Other Performance Measures

Level of service, LOS	D	
Volume to capacity ratio, v/c	0.36	
Peak 15-min vehicle-miles of travel, VMT15	561	veh-mi
Peak-hour vehicle-miles of travel, VMT60	1976	veh-mi
Peak 15-min total travel time, TT15	10.6	veh-h
Capacity from ATS, CdATS	1671	veh/h
Capacity from PTSF, CdPTSF	1700	veh/h
Directional Capacity	1671	veh/h

Passing Lane Analysis

Total length of analysis segment, Lt	3.7	mi
Length of two-lane highway upstream of the passing lane, Lu	-	mi
Length of passing lane including tapers, Lpl	-	mi
Average travel speed, ATSd (from above)	52.8	mi/h
Percent time-spent-following, PTSFd (from above)	71.1	
Level of service, LOSd (from above)	D	

Average Travel Speed with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for average travel speed, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for average travel speed, Ld	-	mi
Adj. factor for the effect of passing lane on average speed, fpl	-	
Average travel speed including passing lane, ATSpl	-	
Percent free flow speed including passing lane, PFFSpl	0.0	%

Percent Time-Spent-Following with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for percent time-spent-following, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for percent time-spent-following, Ld	-	mi
Adj. factor for the effect of passing lane on percent time-spent-following, fpl	-	
Percent time-spent-following including passing lane, PTSFpl	-	%

Level of Service and Other Performance Measures with Passing Lane

Level of service including passing lane, LOSpl	E	
Peak 15-min total travel time, TT15	-	veh-h

Bicycle Level of Service

Phone: Fax:
E-Mail:

Directional Two-Lane Highway Segment Analysis

Analyst	Michael Narow
Agency/Co.	BMI
Date Performed	10/18/2018
Analysis Time Period	PM Peak Hour
Highway	TH 14
From/To	EB from Courtland to Nicollet
Jurisdiction	District 7
Analysis Year	2018 Seasonal Adjusted Volumes
Description	

Input Data

Highway class	Class 1		Peak hour factor, PHF	0.88	
Shoulder width	8.0	ft	% Trucks and buses	17	%
Lane width	12.0	ft	% Trucks crawling	0.0	%
Segment length	6.1	mi	Truck crawl speed	0.0	mi/hr
Terrain type	Level		% Recreational vehicles	0	%
Grade: Length	-	mi	% No-passing zones	27	%
Up/down	-	%	Access point density	3	/mi

Analysis direction volume, Vd	415	veh/h
Opposing direction volume, Vo	497	veh/h

Average Travel Speed

Direction	Analysis(d)		Opposing (o)	
PCE for trucks, ET	1.2		1.1*	
PCE for RVs, ER	1.0		1.0	
Heavy-vehicle adj. factor,(note-5) fHV	0.967		0.983	
Grade adj. factor,(note-1) fg	1.00		1.00	
Directional flow rate,(note-2) vi	488	pc/h	575	pc/h

Free-Flow Speed from Field Measurement:		
Field measured speed,(note-3) S FM	-	mi/h
Observed total demand,(note-3) V	-	veh/h
Estimated Free-Flow Speed:		
Base free-flow speed,(note-3) BFFS	65.0	mi/h
Adj. for lane and shoulder width,(note-3) fLS	0.0*	mi/h
Adj. for access point density,(note-3) fA	1.1*	mi/h
Free-flow speed, FFSd	63.9	mi/h
Adjustment for no-passing zones, fnp	1.4	mi/h
Average travel speed, ATSd	54.2	mi/h
Percent Free Flow Speed, PFFS	84.9	%

Percent Time-Spent-Following

Direction	Analysis(d)	Opposing (o)
PCE for trucks, ET	1.0	1.0
PCE for RVs, ER	1.0	1.0
Heavy-vehicle adjustment factor, fHV	1.000	1.000
Grade adjustment factor,(note-1) fg	1.00	1.00
Directional flow rate,(note-2) vi	472 pc/h	565 pc/h
Base percent time-spent-following,(note-4) BPTSFd	50.1 %	
Adjustment for no-passing zones, fnp	28.4	
Percent time-spent-following, PTSFd	63.0 %	

Level of Service and Other Performance Measures

Level of service, LOS	C	
Volume to capacity ratio, v/c	0.29	
Peak 15-min vehicle-miles of travel, VMT15	719	veh-mi
Peak-hour vehicle-miles of travel, VMT60	2531	veh-mi
Peak 15-min total travel time, TT15	13.3	veh-h
Capacity from ATS, CdATS	1671	veh/h
Capacity from PTSF, CdPTSF	1700	veh/h
Directional Capacity	1671	veh/h

Passing Lane Analysis

Total length of analysis segment, Lt	6.1	mi
Length of two-lane highway upstream of the passing lane, Lu	-	mi
Length of passing lane including tapers, Lpl	-	mi
Average travel speed, ATSd (from above)	54.2	mi/h
Percent time-spent-following, PTSFd (from above)	63.0	
Level of service, LOSd (from above)	C	

Average Travel Speed with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for average travel speed, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for average travel speed, Ld	-	mi
Adj. factor for the effect of passing lane on average speed, fpl	-	
Average travel speed including passing lane, ATSpl	-	
Percent free flow speed including passing lane, PFFSpl	0.0	%

Percent Time-Spent-Following with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for percent time-spent-following, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for percent time-spent-following, Ld	-	mi
Adj. factor for the effect of passing lane on percent time-spent-following, fpl	-	
Percent time-spent-following including passing lane, PTSFpl	-	%

Level of Service and Other Performance Measures with Passing Lane

Level of service including passing lane, LOSpl	E	
Peak 15-min total travel time, TT15	-	veh-h

Bicycle Level of Service

Phone: Fax:
E-Mail:

Directional Two-Lane Highway Segment Analysis

Analyst	Michael Narow
Agency/Co.	BMI
Date Performed	10/18/2018
Analysis Time Period	PM Peak Hour
Highway	TH 14
From/To	WB from Nicollet to Courtland
Jurisdiction	District 7
Analysis Year	2018 Seasonal Adjusted Volumes
Description	

Input Data

Highway class	Class 1		Peak hour factor, PHF	0.88	
Shoulder width	8.0	ft	% Trucks and buses	17	%
Lane width	12.0	ft	% Trucks crawling	0.0	%
Segment length	6.1	mi	Truck crawl speed	0.0	mi/hr
Terrain type	Level		% Recreational vehicles	0	%
Grade: Length	-	mi	% No-passing zones	24	%
Up/down	-	%	Access point density	3	/mi

Analysis direction volume, Vd 497 veh/h
Opposing direction volume, Vo 415 veh/h

Average Travel Speed

Direction	Analysis(d)		Opposing (o)	
PCE for trucks, ET	1.1		1.1*	
PCE for RVs, ER	1.0		1.0	
Heavy-vehicle adj. factor,(note-5) fHV	0.983		0.983	
Grade adj. factor,(note-1) fg	1.00		1.00	
Directional flow rate,(note-2) vi	575	pc/h	480	pc/h

Free-Flow Speed from Field Measurement:

Field measured speed,(note-3) S FM	-	mi/h
Observed total demand,(note-3) V	-	veh/h

Estimated Free-Flow Speed:

Base free-flow speed,(note-3) BFFS	65.0	mi/h
Adj. for lane and shoulder width,(note-3) fLS	0.0*	mi/h
Adj. for access point density,(note-3) fA	1.1*	mi/h
Free-flow speed, FFSd	63.9	mi/h
Adjustment for no-passing zones, fnp	1.6	mi/h
Average travel speed, ATSd	54.2	mi/h
Percent Free Flow Speed, PFFS	84.7	%

Percent Time-Spent-Following

Direction	Analysis(d)	Opposing (o)
PCE for trucks, ET	1.0	1.0
PCE for RVs, ER	1.0	1.0
Heavy-vehicle adjustment factor, fHV	1.000	1.000
Grade adjustment factor,(note-1) fg	1.00	1.00
Directional flow rate,(note-2) vi	565 pc/h	472 pc/h
Base percent time-spent-following,(note-4) BPTSFd	55.0 %	
Adjustment for no-passing zones, fnp	27.6	
Percent time-spent-following, PTSFd	70.0 %	

Level of Service and Other Performance Measures

Level of service, LOS	D	
Volume to capacity ratio, v/c	0.34	
Peak 15-min vehicle-miles of travel, VMT15	861	veh-mi
Peak-hour vehicle-miles of travel, VMT60	3032	veh-mi
Peak 15-min total travel time, TT15	15.9	veh-h
Capacity from ATS, CdATS	1644	veh/h
Capacity from PTSF, CdPTSF	1700	veh/h
Directional Capacity	1644	veh/h

Passing Lane Analysis

Total length of analysis segment, Lt	6.1	mi
Length of two-lane highway upstream of the passing lane, Lu	-	mi
Length of passing lane including tapers, Lpl	-	mi
Average travel speed, ATSd (from above)	54.2	mi/h
Percent time-spent-following, PTSFd (from above)	70.0	
Level of service, LOSd (from above)	D	

Average Travel Speed with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for average travel speed, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for average travel speed, Ld	-	mi
Adj. factor for the effect of passing lane on average speed, fpl	-	
Average travel speed including passing lane, ATSpl	-	
Percent free flow speed including passing lane, PFFSpl	0.0	%

Percent Time-Spent-Following with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for percent time-spent-following, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for percent time-spent-following, Ld	-	mi
Adj. factor for the effect of passing lane on percent time-spent-following, fpl	-	
Percent time-spent-following including passing lane, PTSFpl	-	%

Level of Service and Other Performance Measures with Passing Lane

Level of service including passing lane, LOSpl	E	
Peak 15-min total travel time, TT15	-	veh-h

Bicycle Level of Service

HCS 2010: Two-Lane Highways Release 6.65

Phone: Fax:
E-Mail:

Directional Two-Lane Highway Segment Analysis

Analyst	Michael Narow
Agency/Co.	BMI
Date Performed	10/18/2018
Analysis Time Period	PM Peak Hour
Highway	TH 14
From/To	WB from Courtland to CSAH 37
Jurisdiction	District 7
Analysis Year	2018 Seasonal Adjusted Volumes
Description	

Input Data

Highway class	Class 1		Peak hour factor, PHF	0.88	
Shoulder width	8.0	ft	% Trucks and buses	17	%
Lane width	12.0	ft	% Trucks crawling	0.0	%
Segment length	3.7	mi	Truck crawl speed	0.0	mi/hr
Terrain type	Level		% Recreational vehicles	0	%
Grade: Length	-	mi	% No-passing zones	57	%
Up/down	-	%	Access point density	4	/mi

Analysis direction volume, Vd 581 veh/h
Opposing direction volume, Vo 534 veh/h

Average Travel Speed

Direction	Analysis(d)		Opposing (o)	
PCE for trucks, ET	1.1		1.1*	
PCE for RVs, ER	1.0		1.0	
Heavy-vehicle adj. factor,(note-5) fHV	0.983		0.983	
Grade adj. factor,(note-1) fg	1.00		1.00	
Directional flow rate,(note-2) vi	672	pc/h	617	pc/h

Free-Flow Speed from Field Measurement:

Field measured speed,(note-3) S FM	-	mi/h
Observed total demand,(note-3) V	-	veh/h

Estimated Free-Flow Speed:

Base free-flow speed,(note-3) BFFS	65.0	mi/h
Adj. for lane and shoulder width,(note-3) fLS	0.0*	mi/h
Adj. for access point density,(note-3) fA	1.1*	mi/h
Free-flow speed, FFSd	63.9	mi/h
Adjustment for no-passing zones, fnp	1.6	mi/h
Average travel speed, ATSd	52.3	mi/h
Percent Free Flow Speed, PFFS	81.8	%

Percent Time-Spent-Following

Direction	Analysis(d)	Opposing (o)
PCE for trucks, ET	1.0	1.0
PCE for RVs, ER	1.0	1.0
Heavy-vehicle adjustment factor, fHV	1.000	1.000
Grade adjustment factor,(note-1) fg	1.00	1.00
Directional flow rate,(note-2) vi	660 pc/h	607 pc/h
Base percent time-spent-following,(note-4) BPTSFd	60.6 %	
Adjustment for no-passing zones, fnp	29.3	
Percent time-spent-following, PTSFd	75.9 %	

Level of Service and Other Performance Measures

Level of service, LOS	D	
Volume to capacity ratio, v/c	0.40	
Peak 15-min vehicle-miles of travel, VMT15	611	veh-mi
Peak-hour vehicle-miles of travel, VMT60	2150	veh-mi
Peak 15-min total travel time, TT15	11.7	veh-h
Capacity from ATS, CdATS	1671	veh/h
Capacity from PTSF, CdPTSF	1700	veh/h
Directional Capacity	1671	veh/h

Passing Lane Analysis

Total length of analysis segment, Lt	3.7	mi
Length of two-lane highway upstream of the passing lane, Lu	-	mi
Length of passing lane including tapers, Lpl	-	mi
Average travel speed, ATSd (from above)	52.3	mi/h
Percent time-spent-following, PTSFd (from above)	75.9	
Level of service, LOSd (from above)	D	

Average Travel Speed with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for average travel speed, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for average travel speed, Ld	-	mi
Adj. factor for the effect of passing lane on average speed, fpl	-	
Average travel speed including passing lane, ATSpl	-	
Percent free flow speed including passing lane, PFFSpl	0.0	%

Percent Time-Spent-Following with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for percent time-spent-following, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for percent time-spent-following, Ld	-	mi
Adj. factor for the effect of passing lane on percent time-spent-following, fpl	-	
Percent time-spent-following including passing lane, PTSFpl	-	%

Level of Service and Other Performance Measures with Passing Lane

Level of service including passing lane, LOSpl	E	
Peak 15-min total travel time, TT15	-	veh-h

Bicycle Level of Service

Appendix J: PTSP and ATS Result Figures

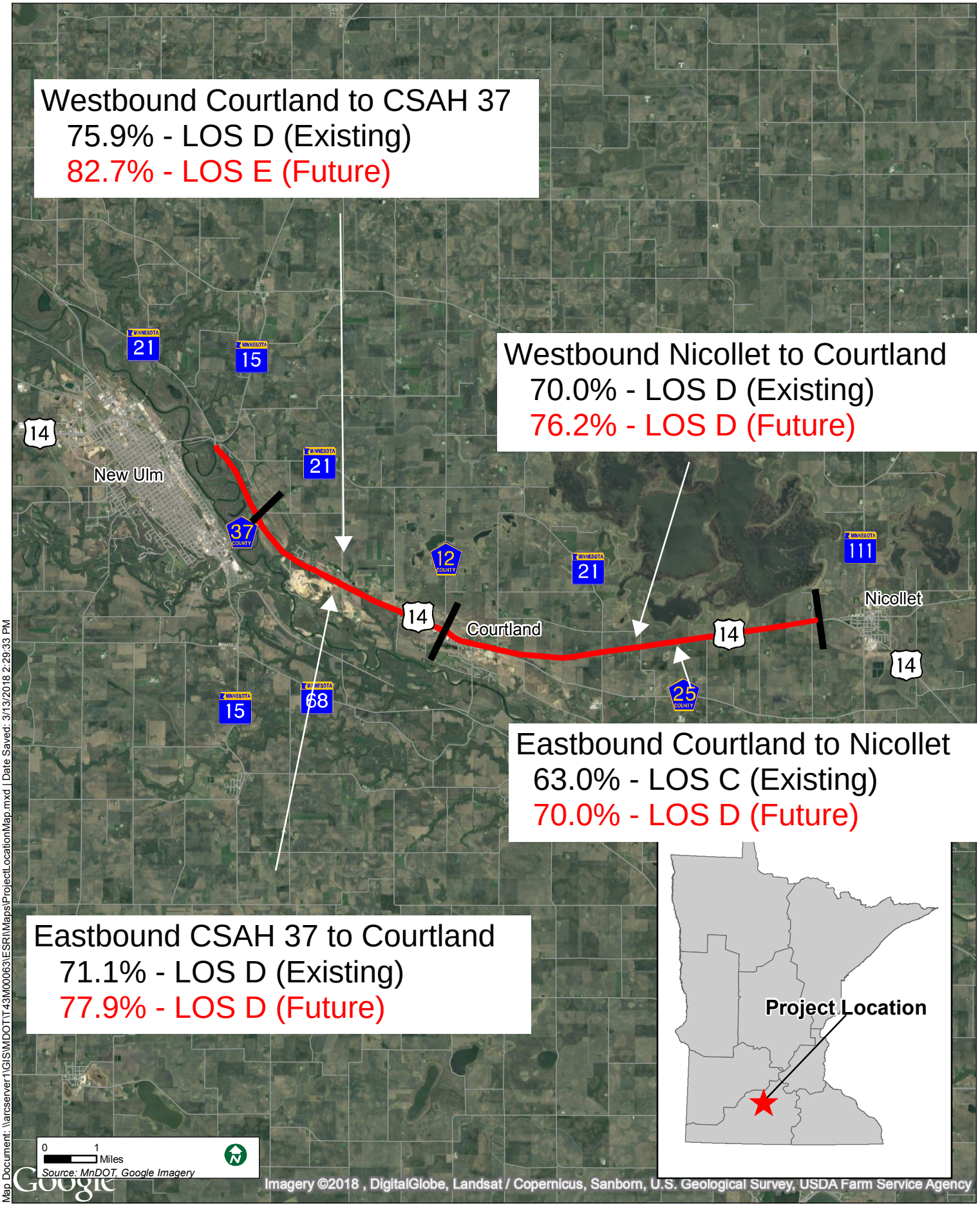
DEPARTMENT OF TRANSPORTATION

TH14 - New Ulm to Nicollet

Minnesota Department of Transportation

Percent Time Spent Following (PTSF)

BOLTON & MENK
Real People. Real Solutions.



Map Document: \\arcserver1\GIS\MDOT\T43M00063\ESRI\Maps\ProjectLocationMap.mxd | Date Saved: 3/13/2018 2:29:33 PM

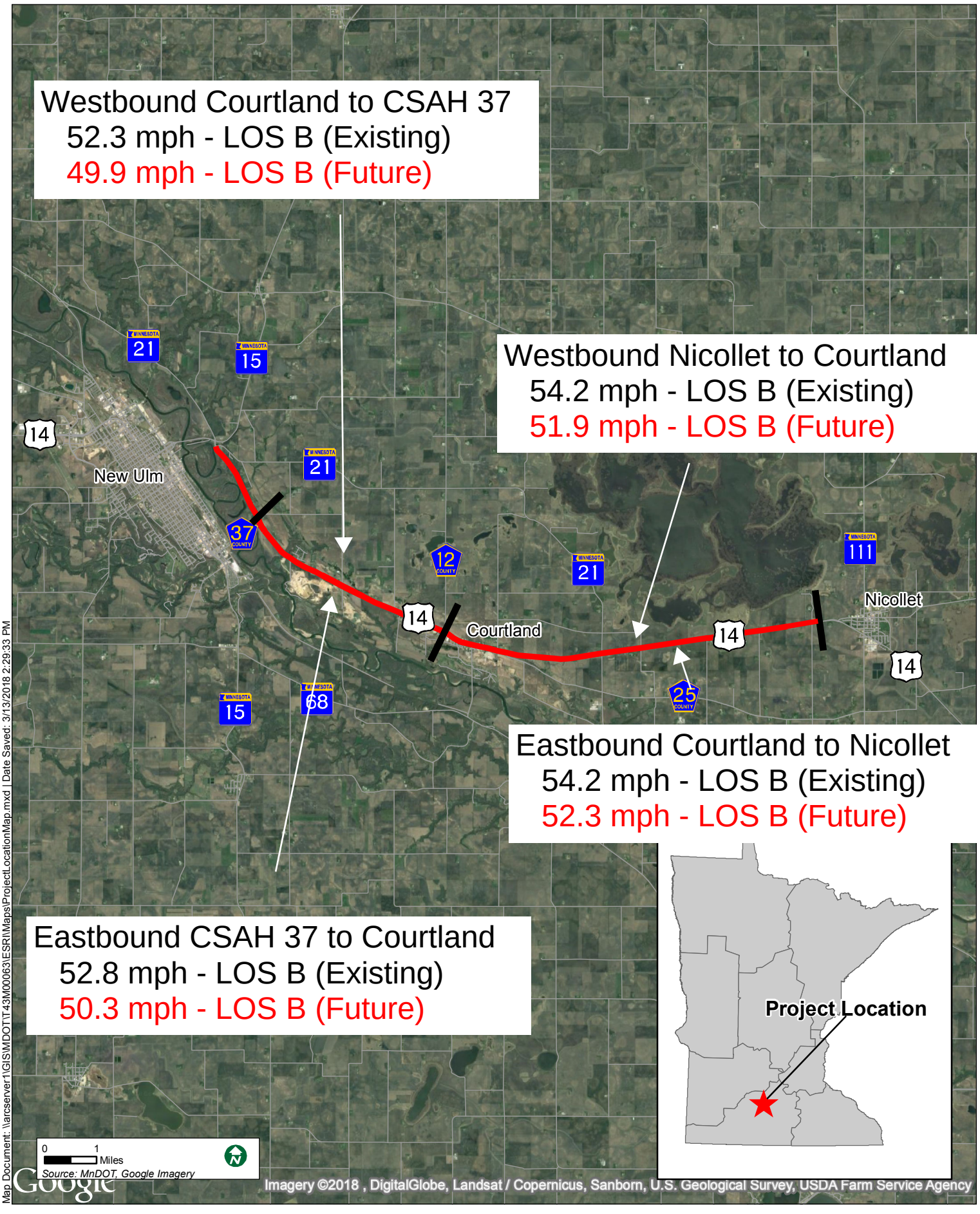
DEPARTMENT OF TRANSPORTATION

TH14 - New Ulm to Nicollet

Minnesota Department of Transportation

Average Travel Speed (ATS)

BOLTON & MENK
Real People. Real Solutions.



Map Document: \\arcserver1\GIS\MDOT\T43M00063\ESRI\Maps\ProjectLocationMap.mxd | Date Saved: 3/13/2018 2:29:33 PM

Appendix K: Level of Travel Time Reliability Details

Greater Minnesota MOBILITY STUDY

TMC: 118+09028

Description

Length (Miles): 5.9551
AADT: 6,911
HCAADT: 1,190
Posted Speed: 54
Route: 14
Direction: E

Total Score: 2.66

LOTTR Score: 3
Speed Index Score: 7
Mobility Bonus: 0
Crash Rate Score: 2
Fatal/Serious Crash Score: 0
HCAADT Score: 4
Average Trip Length Score: 1
Rail Crossing Score: 0
Tourism Score: 10

Details

Tmc
118+09028

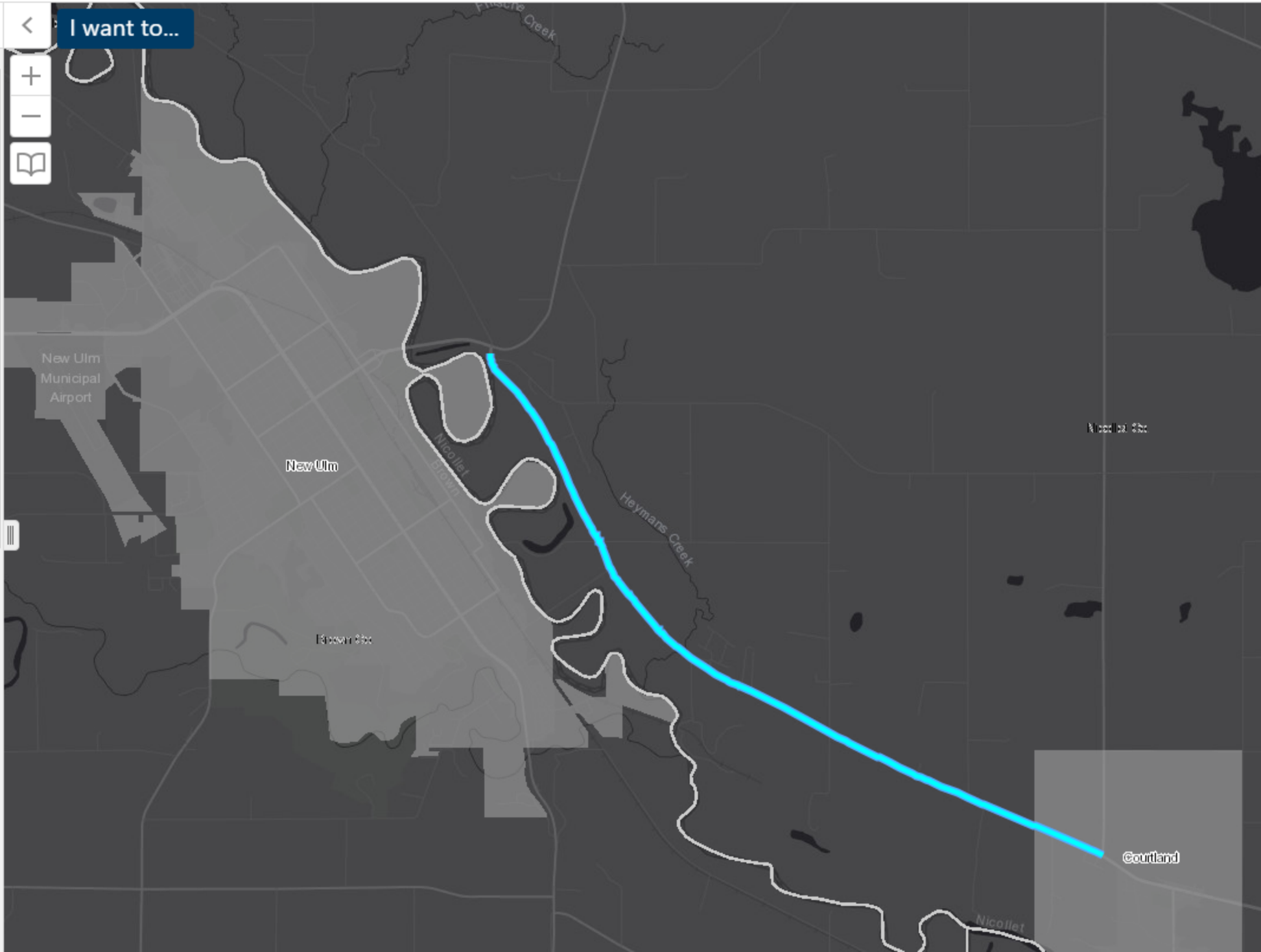
Max_LOTTR Score
1

Week Am LOTTR
1.0789

Week Midday LOTTR
1.0735

Week Pm LOTTR
1.0529

Weekend LOTTR
1.0004



Greater Minnesota MOBILITY STUDY

TMC: 118-09027

Description

Length (Miles): 5.9543
AADT: 6,911
HCAADT: 1,190
Posted Speed: 54
Route: 14
Direction: W

Total Score: 2.66

LOTTR Score: 3
Speed Index Score: 7
Mobility Bonus: 0
Crash Rate Score: 2
Fatal/Serious Crash Score: 0
HCAADT Score: 4
Average Trip Length Score: 1
Rail Crossing Score: 0
Tourism Score: 10

Details

Tmc
118-09027

Max_LOTTR Score
2

Week Am LOTTR
1.1007

Week Midday LOTTR
1.1168

Week Pm LOTTR
1.0791

Weekend LOTTR
1.0191

TMC: 118+09029

Description

Length (Miles): 7.666
AADT: 7,368
HCAADT: 916
Posted Speed: 52
Route: 14
Direction: E

Total Score: 2.57

LOTTR Score: 4
Speed Index Score: 7
Mobility Bonus: 0
Crash Rate Score: 1
Fatal/Serious Crash Score: 0
HCAADT Score: 2
Average Trip Length Score: 0
Rail Crossing Score: 0
Tourism Score: 10

Details

Tmc
118+09029

Max_LOTTR Score
3

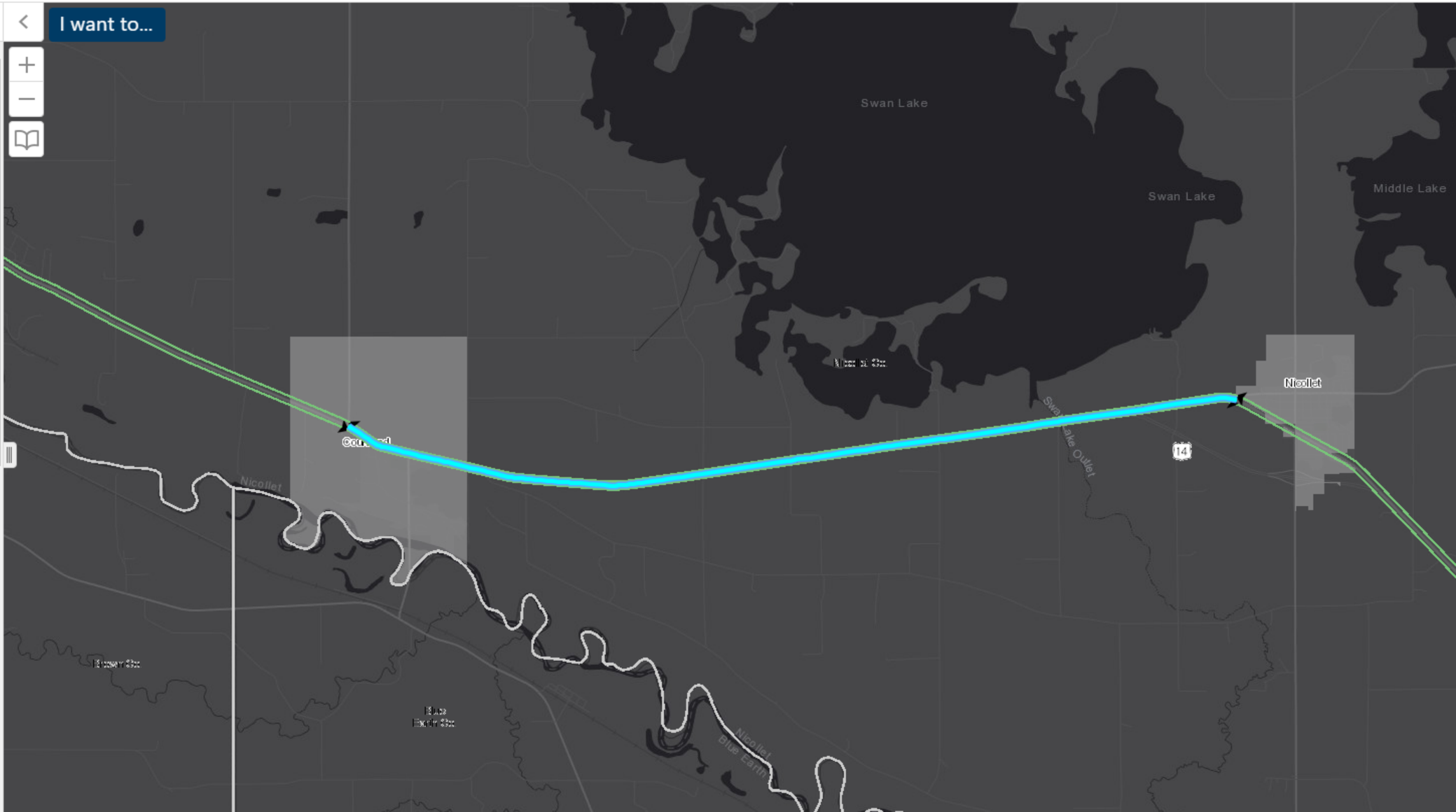
Week Am LOTTR
1.1992

Week Midday LOTTR
1.2222

Week Pm LOTTR
1.1492

Weekend LOTTR
1.0505

I want to...



TMC: 118-09028

Description

Length (Miles): 7.666
AADT: 7,368
HCAADT: 916
Posted Speed: 52
Route: 14
Direction: W

Total Score: 2.57

LOTTR Score: 4
Speed Index Score: 7
Mobility Bonus: 0
Crash Rate Score: 1
Fatal/Serious Crash Score: 0
HCAADT Score: 2
Average Trip Length Score: 0
Rail Crossing Score: 0
Tourism Score: 10

Details

Tmc
118-09028

Max_LOTTR Score
3

Week Am LOTTR
1.1978

Week Midday LOTTR
1.2222

Week Pm LOTTR
1.1723

Weekend LOTTR
1.0596