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CSAH 2 and CSAH 91

Concept Development Report

Elko New Market

Scott County, MN

Submitted by:

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

EXECUTIVE SUMMARY

County State Aid Highway (CSAH) 2 and CSAH 91 are located in the City of Elko New Market, Scott County, MN, about two miles west of I-35. CSAH 2, an A-Minor Arterial locally known as Main Street, provides an east-west connection to I-35. CSAH 2 currently handles up to 9,200 vehicles per day (vpd) and is expected to carry 18,000 vpd in 2037. CSAH 91, a B-Minor Arterial locally known as Natchez Avenue, currently handles up to 4,050 vpd and is expected to carry 9,200 vpd in 2037.

Delays at the intersection of CSAH 2 and CSAH 91 are anticipated to increase in the next 10 years with the existing side-street stop traffic control. The expected increase in traffic volumes on CSAH 2 will reduce the number of gaps available and increase delays for the growing number of vehicles looking to enter onto or cross CSAH 2. A traffic operations analysis was completed to determine the appropriate traffic control and lane configuration for the intersection now and for the design year (2037). Multiple traffic control and lane configurations were reviewed for the intersection. The preliminary roundabout design shown below was selected as the best alternative to manage the expected increase in traffic and turning movement volumes.



The preliminary roundabout design mitigates potential traffic operations and safety issues associated with the expected traffic growth at this intersection. Specifically, the dual westbound approach and northbound bypass lane are necessary to accommodate the expected traffic volumes. The preliminary roundabout design should be constructed with the potential to expand (add lanes) for the westbound to southbound movement if traffic volumes increase more than what is currently expected.

Conceptual designs, along with estimated cost, were shared with the Elko New Market City Council for approval and input on various project elements.

Based on the considerations of the traffic analysis, financial impacts and council input, the Base Level Design and additional elements are recommended at the intersection of CSAH 2 and 91 and the surrounding area:

Concept	Construction Cost	Right-of-way Cost	+ Project Development and Delivery	Project Cost
Base Level Roundabout	\$1,992,000	\$0	\$408,000	\$2,400,000
+ Grading for Future Left Turn Lane	\$30,000	\$50,000	\$10,000	\$90,000
+ CSAH 91 Shared Use Path	\$145,000	\$0	\$30,000	\$175,000
+ CSAH 2 Shared Use Path	\$154,000	\$50,000	\$41,000	\$245,000
+ Continuous Acorn Lighting	\$485,000	\$0	\$95,000	\$580,000
+ Downtown Acorn Lighting	\$158,000	\$0	\$32,000	\$190,000
Total Cost	\$2,964,000	\$100,000	\$616,000	\$3,680,000

The above table shows the cost per individual item. Construction cost and project development and delivery of the additional elements could potentially be reduced were they included as part of the base level roundabout project.



Certification

CSAH 2 and CSAH 91 Corridor Study Report

Elko New Market,
Scott County, Minnesota

June 18th, 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:

Aaron Warford, P.E.

License No. 46358

Date:

8/16/18

Table of Contents

EXECUTIVE SUMMARY	i
I. INTRODUCTION	1
II. TRAFFIC ANALYSIS	2
III. CONCEPT DEVELOPMENT AND FINANCIAL IMPACTS	3
A. Base Level Design (Preliminary Design Concept)	3
B. Additional Roadway Improvement Opportunities	4
C. Additional Pedestrian Accommodation Opportunities	5
D. Design Contingency Concept.....	6
E. Additional Streetscape and Lighting Opportunities	7
IV. ELKO NEW MARKET COUNCIL MEETING.....	9
V. CONCLUSIONS AND RECOMMENDATIONS	10

Figures

Figure 1: Project Location Map	1
Figure 2: Preliminary Design Roundabout Lane Configuration	2
Figure 3: Base Level Design.....	3
Figure 4: CSAH 91 Left Turn Lane.....	4
Figure 5: CSAH 91 Median Extension.....	5
Figure 6: CSAH 91 Shared Use Path	5
Figure 7: CSAH 91 Shared Use Path	6
Figure 8: Design Contingency Concept	7

Tables

Table 1: Elko New Market City Council Additional Element Selection	9
Table 2: Recommended Elements and Cost	10

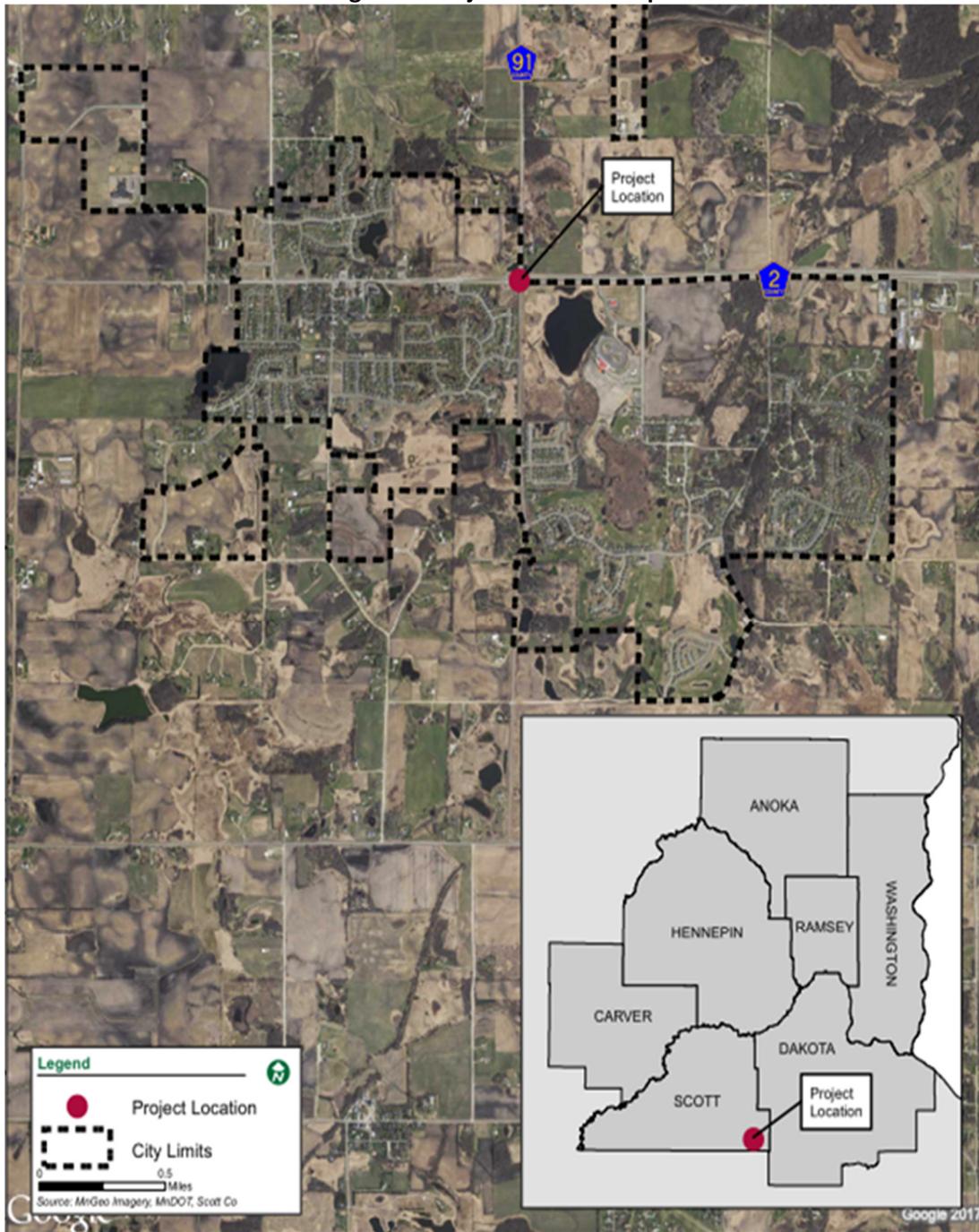
Appendix

- Appendix A: Traffic Analysis Report
- Appendix B: Cost Estimate
- Appendix C: Additional Element Details

I. INTRODUCTION

County State Aid Highway (CSAH) 2 at CSAH 91 in the City of Elko New Market is shown in **Figure 1**. CSAH 2 is a major east-west roadway that connects to I-35 two miles east of its intersection with CSAH 91. A potential development at the southeast quadrant of this intersection includes a gas station, a retail space and an office space. In addition to the proposed development, general growth is expected in the surrounding area that will impact traffic operations at this intersection. This report will address the traffic analysis, concept development and financial impacts.

Figure 1: Project Location Map



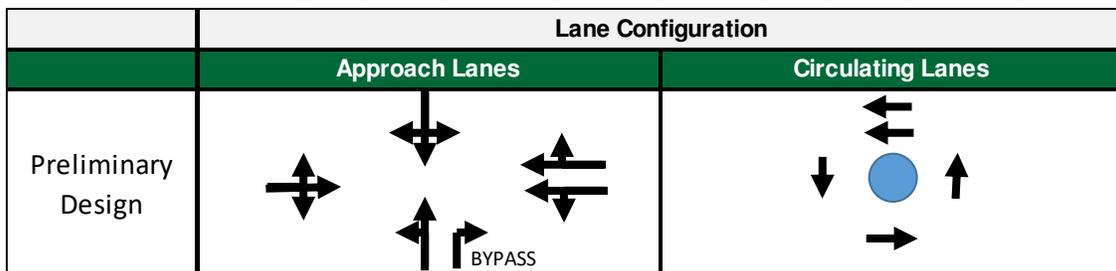
II. TRAFFIC ANALYSIS

The traffic analysis utilized traffic data collected in conjunction with the 2015 Traffic Impact Study completed by Spack Consulting. The future traffic volumes calculation incorporates the 2040 Scott County Transportation model and the most recent MnDOT Average Annual Daily Traffic (AADT). Additional traffic was included to account for potential development in the southeast quadrant of the intersection of CSAH 2 and CSAH 91.

Existing crash data from 2013-2015 indicates the intersection is operating within a normal range compared to other similar intersections statewide. However, the measures are approaching what is considered unsafe and should be monitored in the future.

Elevated delays are anticipated at the intersection of CSAH 2 and CSAH 91 in the next 10 years with the existing side-street stop traffic control. The expected increase in traffic volumes on CSAH 2 will reduce the number of gaps available and increase delays for the growing number of vehicles looking to enter onto or cross CSAH 2. A traffic operations analysis was completed to determine the appropriate traffic control and lane configuration for the intersection now and for the design year (2037). Multiple traffic control and lane configurations were reviewed for the intersection; a preliminary roundabout design with the following lane configuration is anticipated to operate sufficiently with forecasted 2037 peak hour turning movement volumes.

Figure 2: Preliminary Design Roundabout Lane Configuration



The preliminary roundabout design mitigates potential traffic operations and safety issues associated with the expected traffic growth at this intersection. Specifically, the dual westbound approach and northbound bypass lane are necessary to accommodate the expected traffic volumes. The preliminary roundabout design should be constructed with the potential to expand (add lanes) for the westbound to southbound movement if traffic volumes increase greater than what is currently expected.

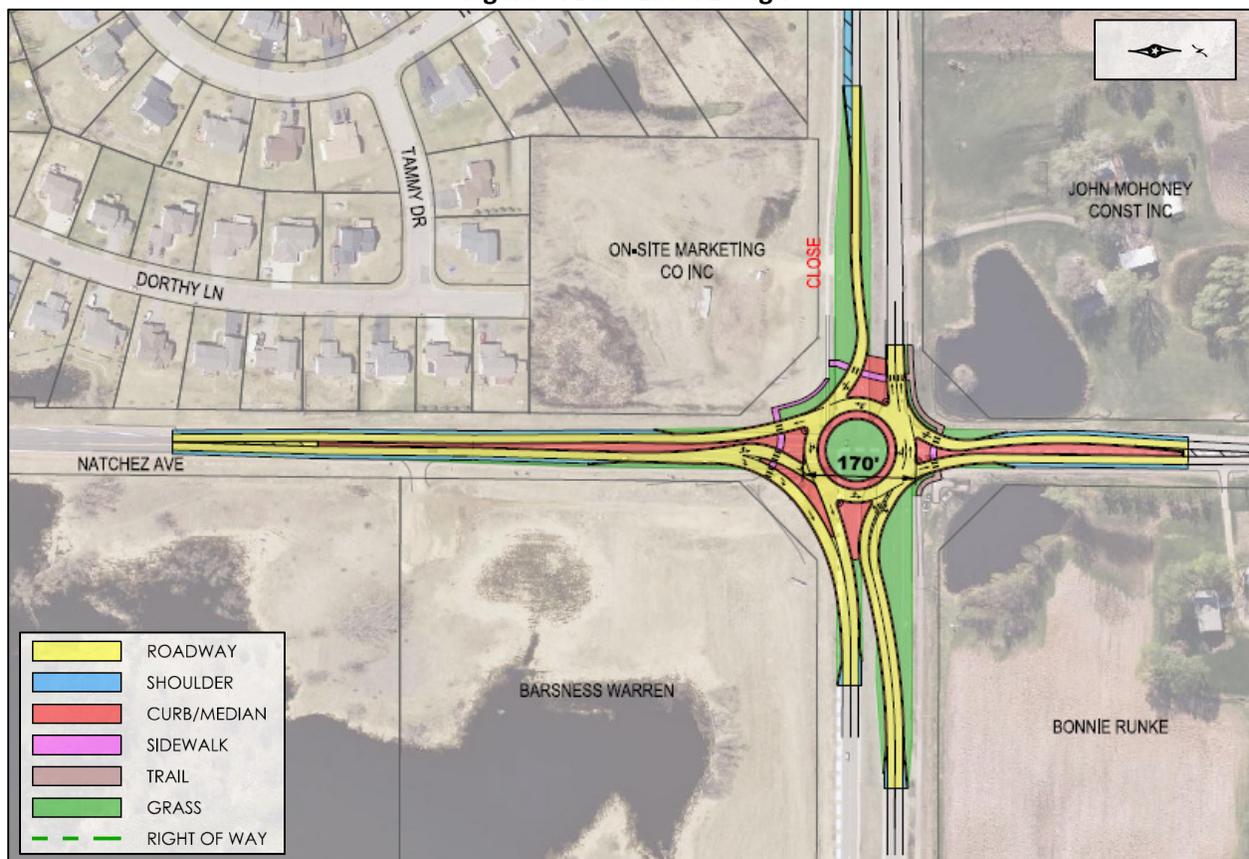
III. CONCEPT DEVELOPMENT AND FINANCIAL IMPACTS

The following sections detail the concept development and financial impacts for construction of a roundabout at the intersection of CSAH 2 and 91. The Base Level Design is designed to meet the current and forecasted traffic volumes needs and improve the safety at the intersection. Other items, including future development access considerations, median extensions, pedestrian accommodations, streetscaping, and lighting, are considered additional elements and are not essential to the operation of the roundabout, but could be include as part of this project. Cost estimate in sections A through D include construction and right-of-way cost but DO NOT include overhead or engineering cost. Construction and financial impacts of the additional elements have been separated from the Base Level Design cost. Cost estimate details are located in **Appendix B and C**.

A. Base Level Design (Preliminary Design Concept)

The Base Level Design is shown in **Figure 3** below. The geometric configuration for this design is described in Appendix A, Traffic Analysis Report, Section III.E.

Figure 3: Base Level Design



The Base Level Design includes a northbound bypass lane that separates traffic from the circulating lane with a raised median. The raised median clearly defines the lane designation and direction of travel for drivers. The northbound bypass lane and the eastbound through lane have separate exit lanes on the east side of the roundabout that match into the existing roadway. The northbound approach median begins approximately 730 feet south of the intersection.

The existing two westbound approach lanes continue through the roundabout. Drivers using the inside westbound lane are allowed to make left turns in the roundabout. The two exit lanes are reduced to one lane to the west of the roundabout, similar to the existing lane configuration.

The southbound and eastbound approaches are single lane. The southbound approach median begins approximately 400 feet north of the intersection allowing full access to the private driveway on CSAH 91 north of the intersection. Two eastbound lanes currently exist at the intersection. The outside eastbound lane is not needed with the Base Level Design roundabout, so it is removed approximately 450 feet west of the roundabout, and is striped as shoulder prior to the roundabout approach curb and gutter.

Pedestrian accommodations are provided across the north, west and south legs of the roundabout, with an option to include a crossing at the east leg if proven necessary in the future.

The City of Elko New Market, with Scott County serving as the sponsor for the City, has received Federal Highway Safety Improvement Program (HSIP) Funding in the amount of **\$1,992,000** to construct a roundabout at the intersection of CSAH 2 and 91. Additional elements could be included as part of the CSAH 2 and 91 roundabout project at an additional cost. The additional elements are described in the following sections.

B. Additional Roadway Improvement Opportunities

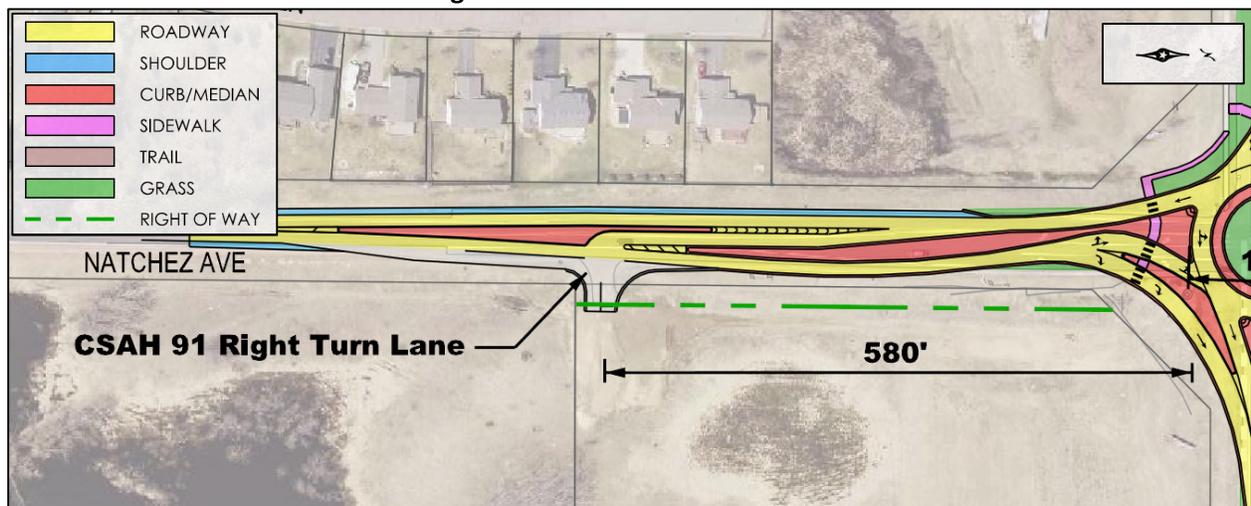
1. CSAH 91 Right Turn Lane

The southeast quadrant of the intersection is a potential development site. A right turn lane on CSAH 91 for northbound traffic is estimated to cost **\$45,000**. The right turn lane is not considered integral to the roundabout and could be added in the future when the property develops. The CSAH 91 Right Turn Lane is shown in **Figure 4**.

2. CSAH 91 Left Turn Lane

The CSAH 91 Left Turn Lane concept allows partial access to the development site at the southeast quadrant with a channelized left turn lane. The CSAH 91 Left Turn Lane is also shown in **Figure 4**:

Figure 4: CSAH 91 Left Turn Lane



The CSAH 91 Left Turn Lane is not considered integral to the roundabout but the inclusion of a left turn lane should be considered during design. The CSAH 91 Left Turn Lane Concept has a wider roadway footprint and wider median than the Base Level Design. Grading and base preparation for the wider footprint can be completed without construction of the left turn lane. The cost estimate to grade for a future left turn lane is **\$30,000**. Grading for the left turn lane would require additional right-of-way of the southeast quadrant property. Estimated right-of-way acquisition is **\$49,500**.

If the left turn lane is desired in the future, it can be added at an additional cost but with less disruption to the current road at that time.

3. CSAH 91 Median Extension

Extending the northbound approach median to the south will improve the pedestrian crossing safety at Aaron Drive and the roundabout. The median and curb provide a pedestrian refuge area at Aaron Drive and create a traffic calming effect, passively reducing speeds prior to the roundabout. The CSAH 91 Median Extension is shown in **Figure 5**:

Figure 5: CSAH 91 Median Extension



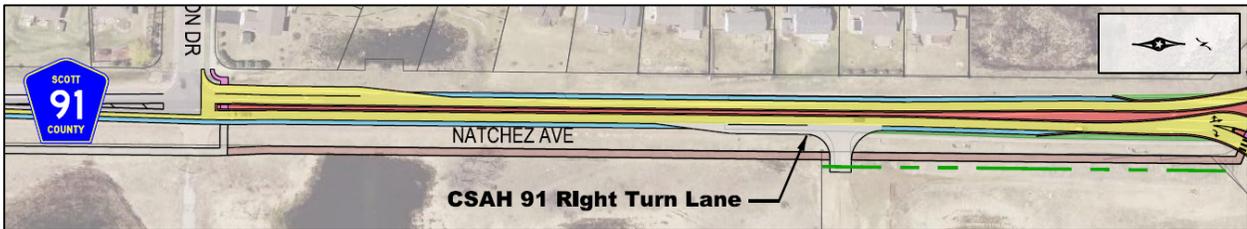
The CSAH 91 Median Extension can be added to the Base Level Design with or without the CSAH 91 Left Turn Lane option. The median extension requires widening of the existing roadway and base material. The additional cost of the median extension is estimated at **\$220,000**.

C. Additional Pedestrian Accommodation Opportunities

1. CSAH 91 Shared Use Path

The CSAH 91 Shared Use Path connects the existing trail on CSASH 91 to the roundabout. **Figure 6** shows the CSAH 91 Shared Use Path connection.

Figure 6: CSAH 91 Shared Use Path



The CSAH 91 Shared Use Path can be added to the Base Level Design along with any of the other add-on concepts (**Figure 6** shows the shared use path along with the CSAH 91 Median Extension). The CSAH 91 Shared Use Path connection is estimated to cost **\$91,000**. The shared use path requires the same additional right-of-way needed for the CSAH 91 Left Turn Lane concept. If the CSAH 91 Shared Use Path connection is added to the Base Level Design, estimated right-of-way acquisition is **\$49,500**.

2. CSAH 2 Shared Use Path

The CSAH 2 Shared Use Path connects the roundabout to the existing trail on France Ave to the east of CSASH 91. **Figure 7** shows the CSAH 2 Shared Use Path connection.

Figure 7: CSAH 91 Shared Use Path

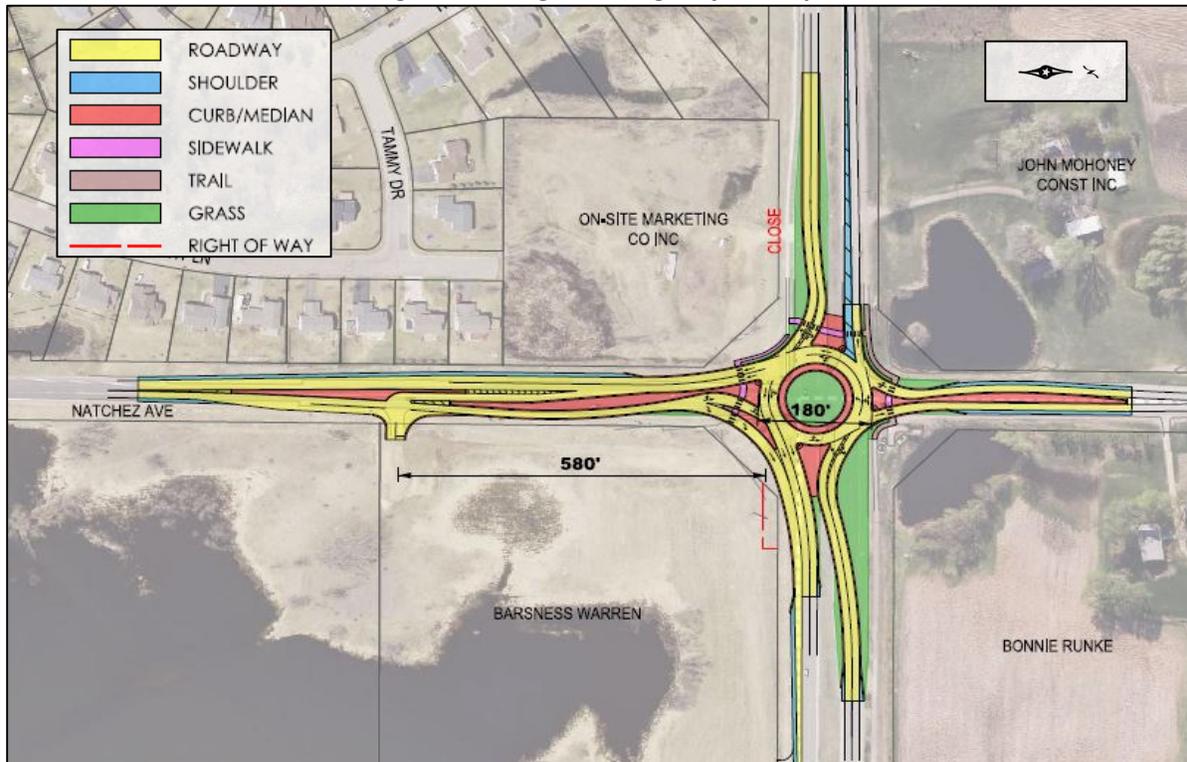


The CSAH 2 Shared Use Path can be added to the Base Level Design along with any of the other add-on concepts. The CSAH 2 Shared Use Path connection is estimated to cost **\$154,000**. The shared use path requires additional right-of-way from the southeast quadrant property. Estimated right-of-way acquisition is **\$49,500**.

D. Design Contingency Concept

The Design Contingency Concept, shown in **Figure 8** below, includes the geometric configuration described in Appendix A, Traffic Analysis Report, Section III.G. The concept is an expansion of the Base Level Design roundabout that can be implemented in the future if traffic volumes change or increase from the current assumptions. The Design Contingency concept should not be implemented unless it is proven necessary in the future.

Figure 8: Design Contingency Concept



The Design Contingency Concept is designed to expand the Base Level Design roundabout with minimal impacts. Additional approach lanes, exit lanes, acceleration lanes and circulating lanes can be added to the roundabout in the future to increase the capacity if needed.

In this concept, the westbound approach lanes are repurposed to allow left turns from both lanes. Consequently, an additional circulating lane is added to the west side of the center circle and an additional exit lane is added to the south leg of the roundabout. The southbound lanes can be reduced to one lane approximately 500 feet south of the roundabout.

An additional eastbound approach lane requires an additional circulating lane for the south side of the center circle. The additional circulating lanes to the west and south sides of the center circle are added by reducing the median size. The northbound bypass lane requires an acceleration lane to maintain the lane separation between eastbound through moving vehicles and northbound right turning vehicles.

The cost estimate for the Design Contingency expansion is **\$338,000**. The northbound bypass lane requires grading easements. Estimated cost for the easement acquisition is **\$3,000**.

E. Additional Streetscape and Lighting Opportunities

Additional opportunity examples and cost estimates are detailed in **Appendix C**.

Improvement opportunities include:

- Continuous Lighting – The Base Level Design concept includes cost for basic roundabout lighting. However, various types and coverage of lighting are evaluated from mostly functional lighting to highly decorative alternatives. Additionally, an option for downtown lighting is evaluated. Lighting costs range from **\$150,000 to \$800,000+**. Lighting options can be done separately from the roundabout project, but potential underground utilities should be considered during design.

- 
- Roundabout Enhancements – These vary from simple plantings and landscaping to hardscape features. These elements would be best accomplished during the roundabout project, but could be done separately. Roundabout enhancement costs range from **\$45,000 to \$105,000**.
 - Landscaping (not including roundabout) – These elements can be done separately from the roundabout project. Scott County is currently working on a landscaping policy that would impact the allowed landscaping for the project area. Landscaping costs range from **\$75,000 to \$150,000**.
 - Monuments - These elements can be done separately from the roundabout project. Monuments vary from simple entry monuments to highly customized monuments. Monument costs range from **\$20,000 each to \$60,000+ each**.
 - Pavement Treatment – These should be completed with the roadway improvements. Pavement treatments include decorative scoring, stamped and/or colored pavements and paver options. Pavement treatment costs range from **\$120,000 to \$380,000**.
 - Site Furnishing and Amenities - These elements include pole banners and benches and can be done separately from the roundabout project depending on location. Site furnishing and amenities costs range from **\$55,000 to \$145,000**.

IV. ELKO NEW MARKET COUNCIL MEETING

The CSAH 2 and 91 Base Level Design roundabout concept and additional elements were presented to the Elko New Market City Council. The Council was asked to endorse the roundabout design and provide direction on whether to perform further design and analysis on the various additional elements. The results of this discussion are shown in **Table 1**.

Table 1: Elko New Market City Council Additional Element Selection

Element	Include?
Base Roundabout	Yes
Left Turn Grading	Yes
Left Turn Lane	No
Median Extension to Aaron Drive	No
CR 91 Shared Use Path Connection	Yes
CSAH 2 Shared Use Path Connection	Yes
Continuous Lighting (Acorn)	Yes
Downtown Lighting (Acorn, Enhanced)	Yes
Roundabout Enhancements	Maybe Later
Landscaping	Maybe Later
Monuments	No
Pavement Treatments	No
Site Furnishings/Amenities	No

Additional details regarding the additional elements can be found in **Appendix C**.

V. CONCLUSIONS AND RECOMMENDATIONS

Based on the considerations of the traffic analysis, financial impacts and City Council input, the Base Level Design and additional elements are recommended at the intersection of CSAH 2 and 91 and the surrounding area. **Table 2** identifies the cost estimate for each individual item.

Table 2: Recommended Elements and Cost

Concept	Construction Cost	Right-of-way Cost	+ Project Development and Delivery	Project Cost
Base Level Roundabout	\$1,992,000	\$0	\$408,000	\$2,400,000
+ Grading for Future Left Turn Lane	\$30,000	\$50,000	\$10,000	\$90,000
+ CSAH 91 Shared Use Path	\$145,000	\$0	\$30,000	\$175,000
+ CSAH 2 Shared Use Path	\$154,000	\$50,000	\$41,000	\$245,000
+ Continuous Acorn Lighting	\$485,000	\$0	\$95,000	\$580,000
+ Downtown Acorn Lighting	\$158,000	\$0	\$32,000	\$190,000
Total Cost	\$2,964,000	\$100,000	\$616,000	\$3,680,000

Construction costs, project development and delivery of the additional elements can be potentially reduced if they are included as part of the base level roundabout project.

Appendix A: Traffic Analysis Report

I. EXISTING CONDITIONS AND ANALYSIS

CSAH 2 is classified as an A-Minor Arterial locally known as Main Street. CSAH 2 provides an east-west connection to I-35 for the City of Elko New Market and Scott County. At the intersection with CSAH 91, CSAH 2 is a four-lane divided highway with left and right turn lanes. CSAH 2 currently handles 9,200 vehicles per day (vpd) east of CSAH 91 and 6,400 vpd west of CSAH 91 (MnDOT data, 2014). The speed limit on CSAH 2 is 55 miles per hour (mph).

CSAH 91 is classified as a B-Minor Arterial locally known as Natchez Avenue. The north-south connection intersects CSAH 2 as a two-lane, rural section highway with left and right turn lanes. Traffic on CSAH 91 is required to stop at this intersection. CSAH 91 currently handles 4,050 vpd south of CSAH 2 and 1,050 vpd north of CSAH 2 (MnDOT data, 2013). The speed limit on CSAH 91 is 55 mph.

A. Data Collection

The corridor and intersection analysis utilized traffic data collected in conjunction with the 2015 Traffic Impact Study (TIS) completed by Spack Consulting. The 48-hour turning movement count at the CSAH 2 and CSAH 91 is sufficient for evaluation and is a representative of current traffic volumes. The following peak hours were established for analysis of the corridor:

AM peak	6:30 am to 7:30 am
PM peak	4:30 pm to 5:30 pm

Most recent Average Annual Daily Traffic (AADT) data was collected from MnDOT. AM and PM peak hour turning movement volumes and AADTs are included on the figures in **Appendix A-1**.

B. Safety Analysis

Three year crash data (2013-2015) was analyzed as part of the Highway Safety Improvement Program (HSIP). There were seven recorded crashes at this intersection between 2013 and 2015. Five of the seven crashes involved injuries, four of the five injury crashes involved right angle crashes. In the three year data period, the intersection of CSAH 2 and CSAH 91 has a Critical Crash Index of 0.90 and a Critical Severity Index of 0.94. These measures indicate that the intersection is operating within a normal range (critical index <1.0) when compared to other similar intersections statewide, however, the indices are approaching what is considered unsafe and should be monitored in the future.

The City of Elko New Market provided additional crash data for all crashes after 2015. Eight additional crashes were reported from the start of 2016 to September of 2017. Full crash details were not available, but it is known that three of the eight crashes since 2015 resulted in injury.

Crash data are found in **Appendix A-2**.

C. Warrant Analysis

National guidelines for traffic signal warrants have been developed to promote continuity of traffic control devices and to ensure traffic signals are installed at intersections that benefit from their use. A traffic signal is not warranted based on the 2015 count data.

Warrant analysis results are found in the **Appendix A-3**.

D. Operational Analysis

The traffic operation analysis for the intersection included an evaluation of existing intersection delay and Level of Service (LOS). LOS results are described using letters

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 (HCM), which defines the LOS, based 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. The control delay is modeled within the analysis software, Trafficware Synchro and SimTraffic. LOS D is commonly taken as an acceptable design year LOS.

Existing 2015 peak hour turning movement counts were used to model the intersection to determine existing traffic operations. **Table 1** shows the results of the existing traffic operations analysis. All traffic operations result details can be found in **Appendix A-4**.

Table 1. Existing Traffic Operational Analysis – CSAH 2 and CSASH 91

	AM					PM				
	A pproach			Overal		A pproach			Overal	
	Delay (s)	LOS	95% Queue (Veh)	Delay	LOS	Delay (s)	LOS	95% Queue (Veh)	Delay	LOS
Existing Conditions										
CSAH 2 WB	1	A	0	3.2	A	2.3	A	0	4.4	A
CSAH 91 SB	11.3	B	1			34.9	D	3		
CSAH 2 EB	0.9	A	0			1.1	A	0		
CSAH 91 NB	6.1	A	4			10.2	B	2		

The following summarizes the Existing Traffic Operations results:

- The intersection is currently operating at LOS A during the peak hours.
- The southbound approach is operating at a LOS D during the PM peak hour. The southbound traffic on CSAH 91 occasionally has trouble finding sufficient gaps in the westbound traffic to safely perform a crossing maneuver. Southbound traffic currently accounts for less than 5% of the total PM peak hour traffic entering the intersection. Southbound delay and queue lengths would be expected to increase as traffic volumes increase in the future.
- The northbound approach is operating at a LOS A during the AM peak hour. The northbound approach currently accounts for nearly 40% of the entering traffic during the AM peak hour. With the current stop control, the northbound delay and queue lengths would be expected to increase significantly as traffic volumes increase in the future.

II. TRAFFIC FORECASTING

A. Trip Generation

The analysis completed for this report utilized trip generation analysis completed in conjunction with the 2015 Traffic Impact Study (TIS) Commercial/Office Development, CSAH 2 & CSAH 91, Elko New Market, Minnesota completed by Spack Consulting. The analysis accounted for the addition of a gas station with convenience market and carwash, a special retail space and an office space in the southeast quadrant of the CSAH 2 and CSAH 91 intersection. Pass-by trips and internal trips were considered and the distribution of new traffic was based on existing traffic patterns.

B. Traffic Forecasting

Additional traffic growth is expected to account for other developments in the study area.

Growth rates were calculated for each leg of the intersection using the most recent MnDOT AADT volumes and the 2040 Scott County Transportation Model. Table 2 details the most recent MnDOT AADT and growth rate used to calculate the 2027 and 2037 forecasted AADT. The 2027 and 2037 forecasted traffic volumes are shown along with the Scott County Transportation Plan Model AADT's for comparison.

Table 2: Forecasted AADT

Street	Leg	Mndot Most Recent AADT		Growth Rate	Forecasted Volumes		Scott County Trans. Plan AADT
		AADT	Year		2027	2037	2040
CSAH 2	East	9200	2014	2.97%	13500	18000	19700
	West	6400	2014	1.41%	7700	8800	9200
CSAH 91	South	4050	2013	3.47%	6500	9200	11700
	North	1050	2013	5.39%	2200	3700	4333

Traffic forecasts indicate volumes on the east and south legs of the intersection are expected to approximately double by 2037. Volumes on the north leg are expected to increase over 3.5 times by 2037. The Scott County Transportation Plan AADT for the north leg was estimated based on the available data on CSAH 91 north of 230th Street in Scott County. Growth rates were applied to the existing turning movement counts to develop forecasted turning movement counts for the peak hours. The trips generated from the proposed development in the southeast quadrant of the CSAH 2 and CSAH 91 intersection were also added to the forecasted traffic volumes. Existing, 2027, and 2037 AADT volumes and turning movements are detailed in **Appendix A-1**.

C. Future Traffic Warrant Analysis

Signal and All-Way Stop Control (AWSC) warrants were completed using the existing, 2027 and 2037 traffic volumes according to guidelines set out in the Minnesota MUTCD. The signal warrant results shown in **Table 3** do not include the minor street right turning volumes. This is typical practice for signal warrants because it is expected that the minor street right turns can navigate the mainline traffic to perform the right turn. The AWSC warrant results shown in **Table 4** include the minor street right turning volume because all traffic would be expected to stop at all times. Typically, a roundabout can be considered justified if traffic volumes warrant a traffic signal and AWSC.

Table 3: Signal Warrant Analysis Results

Warrant	Required Hrs	2015 Volumes	2027 Forecast	2037 Forecast
1A	8	0	0	1
1B	8	0	1	8
2	4	0	0	4
3	1	0	0	2

Table 4: All-Way Stop Control Warrant Analysis Results

Warrant	Required Hrs	2015 Volumes	2027 Forecast	2037 Forecast
AWSC	8	8	15	16

When the minor street right-turn movements are eliminated, the existing and 2027 forecasted volumes do not meet signal warrants. Warrant 1B and warrant 2 are met with the 2037 forecasted traffic volumes. AWSC warrants are met with the existing, 2027 and 2037 forecasted traffic volumes.

III. FUTURE TRAFFIC OPERATIONS ANALYSIS

The preliminary design concept was developed in part from the future traffic operations analysis. The AM and PM peak hour 2027 and 2037 forecasted turning movement counts were used to analyze different options for the intersection of CSAH 2 and CSAH 91. The following sections document the analysis completed for the CSAH 2 and CSAH 91 intersection.

A. No Build Analysis

Table 5 shows the results of the future traffic operations analysis with the existing geometry and traffic control at CSAH 2 and CSAH 91. Northbound and southbound traffic were required to stop at CSAH 2.

In general, the existing geometry and control do not provide sufficient operations for the northbound and southbound approaches or the westbound left turning movement.

Table 5: 2027 and 2037 No Build

	AM					PM				
	Approach			Overall		Approach			Overall	
	Delay (s)	LOS	95% Queue (Veh)	Delay	LOS	Delay (s)	LOS	95% Queue (Veh)	Delay	LOS
2027 No Build										
CSAH 2 WB	2.6	A	0	11	B	5.7	A	8	133	F
CSAH 91 SB	26.9	D	3			2040	F	55		
CSAH 2 EB	16	A	0			1.8	A	1		
CSAH 91 NB	20.4	C	12			506	F	34		
2037 No Build										
CSAH 2 WB	3.6	A	3	513	F	19.9	C	23	148.7	F
CSAH 91 SB	81.6	F	8			3459	F	45		
CSAH 2 EB	2	A	1			2.2	A	1		
CSAH 91 NB	114.5	F	24			1244	F	32		

The following summarizes the future traffic operations results with no changes to the geometry and traffic control:

- The intersection is anticipated to have LOS F during the PM peak hour with the 2027 forecasted traffic volumes.
- The intersection is anticipated to have LOS F during both peak hours with the 2037 forecasted traffic volumes.
- Northbound and southbound traffic is expected to have LOS F with the current geometry and traffic control with the forecasted traffic volumes.
- Westbound traffic, specifically the westbound left turning movement is expected to have an increase in delay and queueing with the forecasted traffic volumes.

B. Signalized Intersection

Table 6 shows the results of the future traffic operations analysis with a signalized traffic control at CSAH 2 and CSAH 91. The westbound left turning lane was analyzed as a single lane and a dual lane; it is typical to consider a dual left turning lane when turning volumes exceed 300 vehicles per hour. The dual westbound left turning lanes would require widening CSAH 91 south of the intersection to include two southbound exit lanes. The signalized control was only analyzed with the 2037 forecasted traffic volumes because it was determined that a signal was not the optimal control for the intersection.

In general, the signalized control does not provide enough capacity for the eastbound approach with the forecasted traffic volumes.

Table 6: 2037 Signalized

	AM					PM				
	Approach			Overall		Approach			Overall	
	Delay (s)	LOS	95% Queue (Veh)	Delay	LOS	Delay (s)	LOS	95% Queue (Veh)	Delay	LOS
2037 Singal - Single WBL Turn Lane										
CSAH 2 WB	8.5	A	4	54.8	E	15.2	B	16	64.4	E
CSAH 91SB	12.4	B	3			27.8	C	6		
CSAH 2 EB	161.6	F	26			344	F	24		
CSAH 91NB	12.6	B	12			6.7	A	2		
2037 Singal - Dual WBL Turn Lane										
CSAH 2 WB	8.3	A	3	48.6	D	9.7	A	5	53.1	E
CSAH 91SB	13.6	B	3			12.2	B	2		
CSAH 2 EB	138.4	F	23			305.6	F	24		
CSAH 91NB	13.5	B	13			4.2	A	2		

The following summarizes the future traffic operations results with a signalized control:

- The intersection is anticipated to have LOS D or E during the AM and PM peak hours with the 2037 forecasted traffic volumes with both options.
- The eastbound approach is anticipated to have LOS F during the AM and PM peak hours with the 2037 forecasted traffic volumes with both options. Eastbound delays would be expected to exceed 5 minutes during the PM peak hour.

C. Single Lane Roundabout

Table 7 shows the results of the future traffic operations analysis with a single lane roundabout at CSAH 2 and CSAH 91.

In general, the single lane roundabout does not provide enough capacity for the westbound and northbound approaches.

Table 7: 2027 and 2037 Single Lane Roundabout

		Lane Configuration									
		Approach Lanes					Circulating Lanes				
Single Lane Roundabout											
	Traffic Operations										
		AM					PM				
		Approach			Overall		Approach			Overall	
		Delay (s)	LOS	95% Queue (Veh)	Delay	LOS	Delay (s)	LOS	95% Queue (Veh)	Delay	LOS
2027 Single Lane Roundabout											
CSAH 2 WB	4.9	A	1	17.8	C	30.7	D	17	23.3	C	
CSAH 91SB	4.1	A	0			13.7	B	1			
CSAH 2 EB	7.7	A	2			11.4	B	2			
CSAH 91NB	32.1	E	11			6.4	A	1			
2037 Single Lane Roundabout											
CSAH 2 WB	6.3	A	2	89.8	F	137	F	52	96.9	F	
CSAH 91SB	5	A	0			37.2	E	4			
CSAH 2 EB	10.5	B	4			25.4	D	5			
CSAH 91NB	185	F	39			8.5	A	2			

The following summarizes the future traffic operations results with a single lane roundabout:

- The intersection is anticipated to have LOS F with the 2037 forecasted traffic volumes.
- The northbound approach, specifically the northbound right turning movement, is anticipated to have LOS F during the AM peak hour with the 2037 forecasted traffic volumes and LOS E with the 2027 forecasted traffic volumes.
- The westbound approach, specifically the westbound left turning movement, is anticipated to have LOS F during the PM peak hour with the 2037 forecasted traffic volumes and LOS D with the 2027 forecasted traffic volumes.
- Southbound and eastbound approaches are anticipated to have LOS E and D, respectively, during the PM peak hour with the 2037 forecasted traffic volumes.

D. Single Lane Roundabout with Northbound Bypass Lane

Table 8 shows the results of the future traffic operations analysis with a single lane roundabout with a northbound bypass lane at CSAH 2 and CSAH 91.

In general, the single lane roundabout with a northbound bypass lane does not provide enough capacity for the westbound approach.

Table 8: 2027 and 2037 Single Lane Roundabout with NB Bypass Lane

Lane Configuration										
Roundabout with NB Bypass Lane	Approach Lanes					Circulating Lanes				
Traffic Operations										
	AM					PM				
	Approach			Overall		Approach			Overall	
	Delay (s)	LOS	95% Queue (Veh)	Delay	LOS	Delay (s)	LOS	95% Queue (Veh)	Delay	LOS
2027 Add Northbound Bypass										
CSAH 2 WB	4.9	A	1	3.8	A	30.7	D	17	22.6	C
CSAH 91SB	4.1	A	0			13.7	B	1		
CSAH 2 EB	7.7	A	2			11.4	B	2		
CSAH 91NB	0.5	A	1			1	A	0		
2037 Add Northbound Bypass										
CSAH 2 WB	6.3	A	2	4.8	A	137	F	52	95.9	F
CSAH 91SB	5	A	0			37.2	E	4		
CSAH 2 EB	10.5	B	4			25.4	D	5		
CSAH 91NB	0.6	A	1			0.9	A	0		

The following summarizes the future traffic operations results with a single lane roundabout with a northbound bypass lane:

- The intersection is anticipated to have LOS F during the PM peak hour with the 2037 forecasted traffic volumes.
- The northbound bypass lane improves the northbound approach during the AM peak hour from LOS F to LOS A with the 2037 forecasted traffic volumes and from LOS E to LOS A with the 2027 forecasted traffic volumes.
- The westbound approach, specifically the westbound left turning movement, is anticipated to have LOS F during the PM peak hour with the 2037 forecasted traffic volumes and LOS D with the 2027 forecasted traffic volumes.
- Southbound and eastbound approaches are anticipated to have LOS E and D, respectively, during the PM peak hour with the 2037 forecasted traffic volumes.

E. Preliminary Design Roundabout Analysis

Table 9 shows the results of the future traffic operations analysis with the preliminary design roundabout at CSAH 2 and CSAH 91. The preliminary design roundabout includes a northbound bypass lane and two westbound approaches.

In general, the preliminary design roundabout provides sufficient operations for all approaches of the intersection.

Table 9: 2027 and 2037 Preliminary Roundabout Design

Lane Configuration										
	Approach Lanes					Circulating Lanes				
Preliminary Design										
Traffic Operations										
	AM					PM				
	Approach			Overall		Approach			Overall	
	Delay (s)	LOS	95% Queue (Veh)	Delay	LOS	Delay (s)	LOS	95% Queue (Veh)	Delay	LOS
2027 Build - Roundabout										
CSAH 2 WB	3.8	A	0	3.8	A	7.5	A	3	7.6	A
CSAH 91SB	3.9	A	0			10.5	A	1		
CSAH 2 EB	8.1	A	2			12.1	A	2		
CSAH 91NB	0.5	A	1			1	A	0		
2037 Build - Roundabout										
CSAH 2 WB	4.3	A	1	4.4	A	10	B	5	11.8	B
CSAH 91SB	4.5	A	0			20.8	C	3		
CSAH 2 EB	10.5	B	4			25.4	D	5		
CSAH 91NB	0.6	A	2			0.9	A	0		

The following summarizes the future traffic operations results with the preliminary design roundabout:

- The intersection is anticipated to have LOS A or B during the peak hours with the forecasted traffic volumes.
- All approaches are anticipated to have LOS A with the 2027 forecasted traffic volumes.
- The dual westbound approach is necessary to facilitate the westbound through and left turning volumes anticipated during the PM peak hour.
- The northbound right bypass lane is necessary to facilitate the northbound right turning movement anticipated during the AM peak hour. The northbound right bypass lane, along with the single eastbound approach lane, match into the existing two eastbound lanes. Having exclusive lanes for the eastbound through movement and northbound right movement is essential to the operation of the roundabout.
- The worst approach delay of LOS D is the eastbound approach with the 2037 forecasted traffic volumes.

- The maximum 95th percentile queue is anticipated to be 5 vehicles for the westbound and eastbound approaches during the PM peak hour with the 2037 forecasted traffic volumes.

F. Dual Eastbound and Westbound Approach Roundabout Analysis

Table 10 shows the results of the future traffic operations analysis for a roundabout with dual eastbound and westbound approaches at CSAH 2 and CSAH 91.

In general, the dual eastbound lanes negatively affect the northbound approach as the northbound right turning vehicles have to share an exit lane with the eastbound through moving vehicles in the eastbound outside lane.

Table 10: 2027 and 2037 Dual Eastbound and Westbound Approach Roundabout

	Lane Configuration									
	Approach Lanes					Circulating Lanes				
Dual EB and WB Approach										
Traffic Operations										
AM										
PM										
Approach			Overall		Approach			Overall		
Delay (s)	LOS	95% Queue (Veh)	Delay	LOS	Delay (s)	LOS	95% Queue (Veh)	Delay	LOS	
2027 Dual Eastbound and Westbound										
CSAH 2 WB	3.7	A	1	9.3	A	7.3	A	3	7.1	A
CSAH 91SB	3.8	A	0			10.2	B	1		
CSAH 2 EB	4.8	A	1			6.9	A	1		
CSAH 91NB	15.4	C	6			5	A	1		
2037 Dual Eastbound and Westbound										
CSAH 2 WB	4.2	A	1	33.1	D	9.7	A	4	10.1	B
CSAH 91SB	4.4	A	0			19.9	C	3		
CSAH 2 EB	5.6	A	1			10.2	B	1		
CSAH 91NB	65.1	F	21			6.2	A	1		

The following summarizes the future traffic operations results for a roundabout with dual eastbound and westbound approaches:

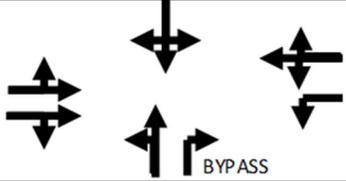
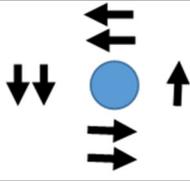
- The northbound approach, specifically the northbound right turning movement, is anticipated to have LOS F during the AM peak hour with the 2037 forecasted traffic volumes as a result of sharing the exit lane with the eastbound through movement.

G. Design Contingency Analysis

Table 11 shows the results of the future traffic operations analysis for the design contingency roundabout at CSAH 2 and CSAH 91.

In general, reallocating the westbound lanes, adding a westbound circulating lane, and adding an eastbound lane increases the capacity of the roundabout.

Table 11: 2037 Design Contingency

		Lane Configuration									
		Approach Lanes					Circulating Lanes				
Design Contingency											
		Traffic Operations									
		AM					PM				
		A pproach			Overall		A pproach			Overall	
		Delay (s)	LOS	95% Queue (Veh)	Delay	LOS	Delay (s)	LOS	95% Queue (Veh)	Delay	LOS
		2037 Design Contingency									
CSAH 2 WB		4.4	A	1	3	A	10.1	B	5	9.8	A
CSAH 91 SB		4.5	A	0			20.8	C	3		
CSAH 2 EB		5.9	A	1			10.6	B	1		
CSAH 91NB		0.5	A	2			0.8	A	0		

The following summarizes the future traffic operations results with the design contingency roundabout:

- The intersection is anticipated to have LOS A during the peak hours with the forecasted traffic volumes.
- All approaches are anticipated to have LOS C or better with the 2037 forecasted traffic volumes.

H. Development Access Analysis

The development access was analyzed with a right-in/right-out only intersection at the East Access to CSAH 2 and a full access intersection at the South Access to CSAH 91. Both intersections were analyzed assuming turn lanes would be included to remove turning traffic from the through lanes. Tables 1 and Tables 5-11 detail the approach delay at the intersection of CSAH 2 and CSAH 91; **Table 12** details the overall, highest delay movement (limiting movement) and maximum approach queues for the development access intersections with the 2037 forecasted traffic volumes. The highest delay movement is more significant for this analysis because of the relative difference between the through movements on either CSAH 2 or CSAH 91 versus the turning movements into the development.

Table 12: 2037 Traffic Operational Analysis – Development Access

Intersection	Peak Hour	Intersection Delay (1.)		Maximum Delay-LOS (2.)		Limiting Movement (3.)	Max Approach Queue		
							Direction	Average Queue	Max Queue (Veh)
CSAH 91 & S Access <i>Full Access</i>	AM	3	A	29	D	WBL	WBL/R	2	3
	PM	3	A	14	B	WBL	WBL/R	1	3
E Access & CSAH 2 <i>Stop Controlled</i>	AM	1	A	10	B	NBR	NBR	1	3
	PM	8	A	4	A	NBR	NBR	1	2

1. Delay in seconds per vehicle

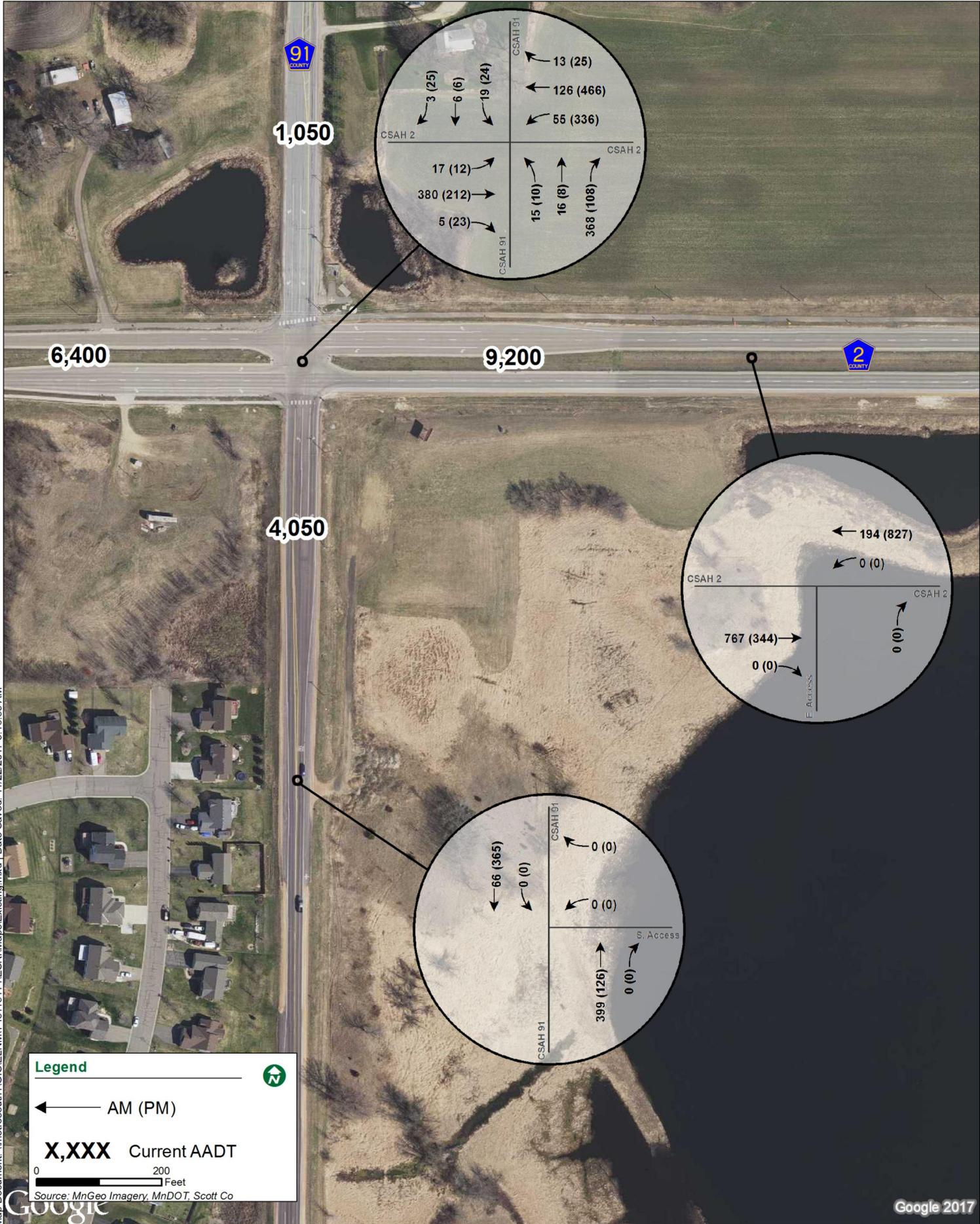
2. Maximum delay and LOS on any approach and/or movement

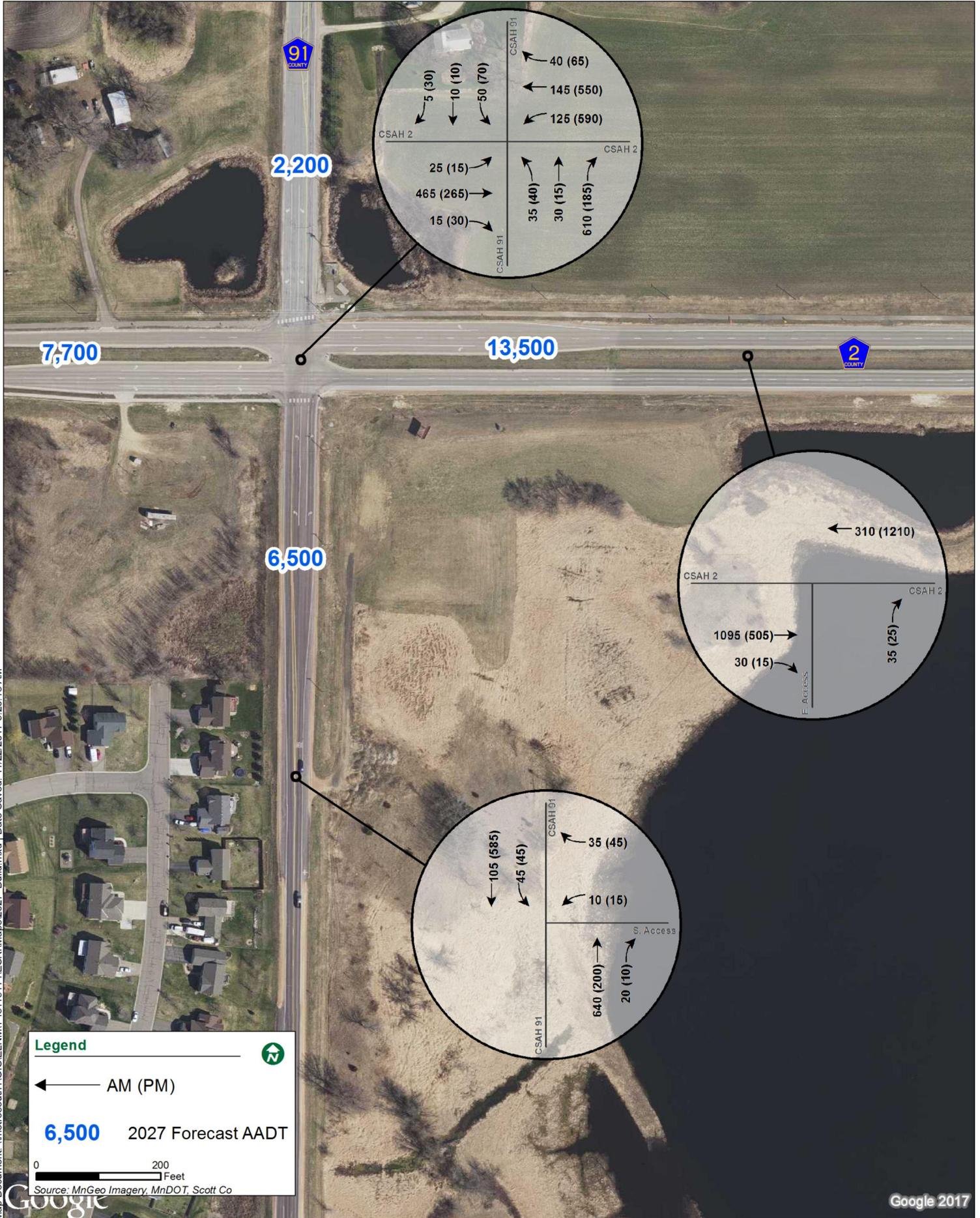
3. Limiting Movement is the highest delay movement.

The following summarizes the development access Future Traffic Operations results:

- The intersections are anticipated to have LOS A during the peak hours with the 2037 forecasted traffic volumes.
- The westbound left turning movement exiting the development at the south access to CSAH 91 is anticipated to have LOS D and a maximum queue of three vehicles.
- The northbound right turning movement exiting the development at the east access to CSAH 2 is anticipated to have a LOS B and a maximum queue of three vehicles.

Appendix A-1: Traffic Count Data





Map Document: \metrosouth\1\GIS\ELNMT\43115114\IESR\Maps\2027_Build.mxd | Date Saved: 11/22/2017 9:20:18 AM

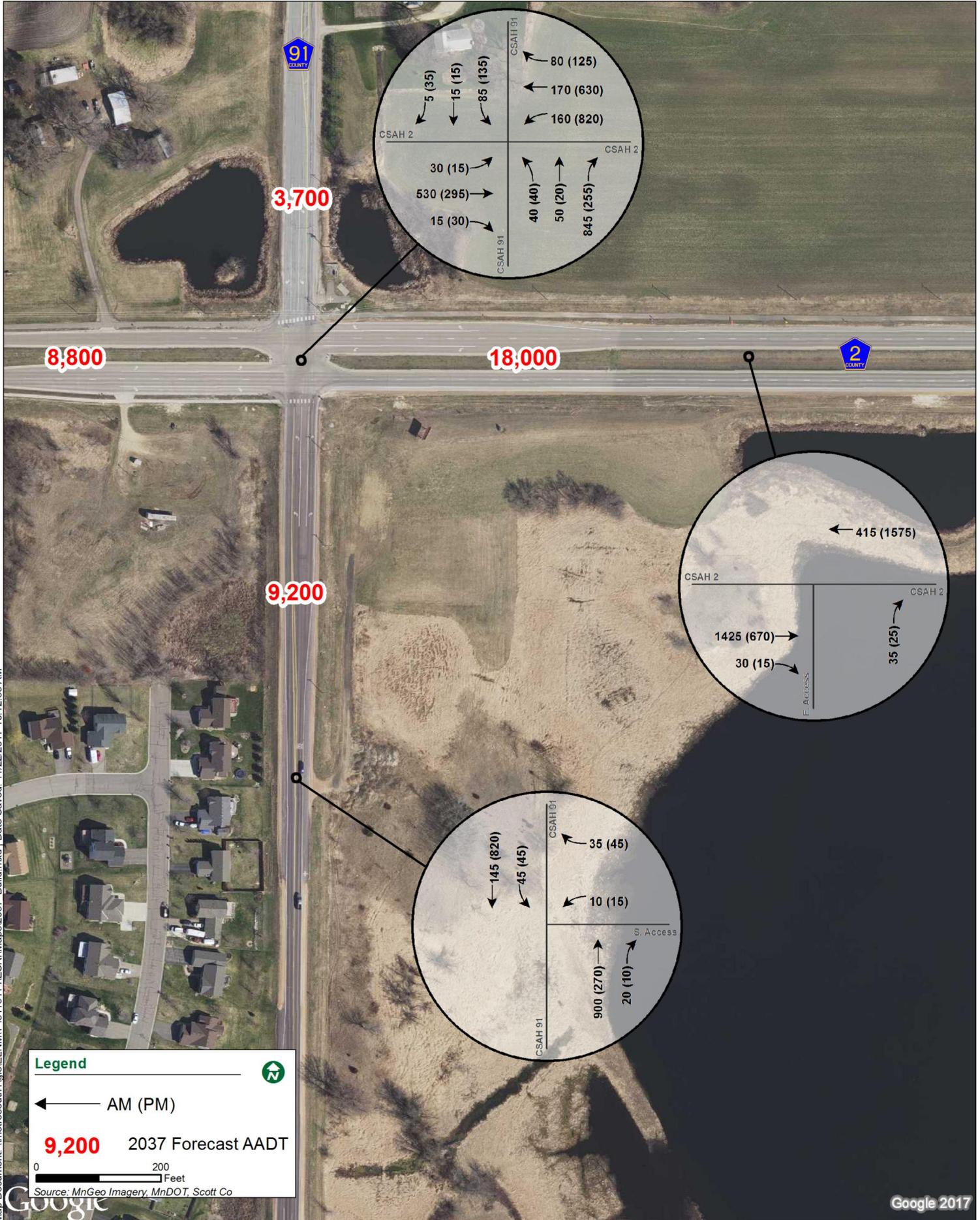
Legend

← AM (PM)

6,500 2027 Forecast AADT

0 200 Feet

Source: MnGeo Imagery, MnDOT, Scott Co



Appendix A-2: Crash Details

Intersection Safety Screening

Intersection: CSAH 91 at CSAH 2



Crash Data, 2013-2015.

Crashes by Crash Severity	
Fatal	0
Incapacitating Injury	1
Non-incapacitating Injury	2
Possible Injury	2
Property Damage	2
Total Crashes	7

Intersection Characteristics	
Entering Volume	10,350
Traffic Control	Thru / stop
Environment	Rural
Speed Limit	55 mph

Annual crash cost = \$363,733

Statewide Comparison

Rural Thru / Stop

Total Crash Rate	
Observed	0.62
Statewide Average	0.26
Critical Rate	0.69
Critical Index	0.90

Fatal & Serious Injury Crash Rate	
Observed	8.82
Statewide Average	1.06
Critical Rate	9.39
Critical Index	0.94

The observed crash rate is the number of crashes per million entering vehicles (MEV). The critical rate is a statistical comparison based on similar intersections statewide. An observed crash rate greater than the critical rate indicates that the intersection operates outside the expected, normal range. The critical index reports the magnitude of this difference.

The observed total crash rate for this period is 0.62 per MEV; this is 10% below the critical rate. Based on similar statewide intersections, an additional 1 crashes over the three years would indicate this intersection operates outside the normal range.

The observed fatal and serious injury crash rate for this period is 8.82 per 100 MEV; this is 6% below the critical rate. The intersection operates within the normal range.



Crash Detail Report

CSAH 2 at CSAH 91 HSIP

Report Version 1.0 March 2010

Crash ID: 132920143	Date: 10/19/2013	Time: 1900	Sys: 04-CSAH
County: SCOTT	City: ELKO		Route: 70000002 014+00.160

Severity: POSSIBLE INJURY	First Event: ON ROADWAY
Road Type: OTHER DIVIDED HIGHWAY	To Junction: 4-LEGGED INTERSECTION
Road Char: STRAIGHT AND LEVEL	Traffic Device: STOP SIGN OTHER
Crash Type: COLL W/MV IN TRANSPORT	Speed Limit: 55
Surf Cond: DRY	Diagram: LEFT TURN INTO TRAFFIC
Light Cond: DARK - STREET LIGHTS ON	Officer:
Weather 1: CLOUDY	Reliability: CONFIDENT
Weather 2: NOT SPECIFIED	# of Vehicles: 3.00

	Unit 1	Unit 2	Unit 3
Trav Dir:	S	E	N
Veh Act:	PED. FAIL TO YIELD R/W TO T	STRAIGHT AHEAD	RIGHT TURN
Veh Type:	PASSENGER CAR	PICKUP TRUCK	SPORT UTILITY VEHICLE
Age:	22	18	56
Gender:	M	M	M
Cond:	UNKNOWN	UNKNOWN	NORMAL
Cont Fact 1	FAIL TO YIELD ROW	NO IMPROPER DRIVING	NO IMPROPER DRIVING
Cont Fact 2	NO IMPROPER DRIVING	NO IMPROPER DRIVING	NO IMPROPER DRIVING

Crash ID: 133450192	Date: 12/11/2013	Time: 1319	Sys: 04-CSAH
County: SCOTT	City: ELKO		Route: 70000002 014+00.160

Severity: PROPERTY DAMAGE	First Event: OUTSIDE RIGHT-OF-WAY
Road Type: 4_6 LANES UNDIV 2_WAY	To Junction: 4-LEGGED INTERSECTION
Road Char: STRAIGHT AND LEVEL	Traffic Device: NOT APPLICABLE
Crash Type: COLL W/UTILITY POLE	Speed Limit: 55
Surf Cond: SLUSH	Diagram: HEAD ON
Light Cond: DAYLIGHT	Officer:
Weather 1: CLEAR	Reliability: CONFIDENT
Weather 2: NOT SPECIFIED	# of Vehicles: 1.00

	Unit 1	Unit 2	Unit 3
Trav Dir:	W		
Veh Act:	STRAIGHT AHEAD		
Veh Type:	PICKUP TRUCK		
Age:	80		
Gender:	M		
Cond:	NORMAL		
Cont Fact 1	DISTRACTION		
Cont Fact 2	SKIDDING		

Crash ID: 150840106 **Date:** 03/21/2015 **Time:** 2223
County: SCOTT **City:** ELKO

Sys: 04-CSAH
Route: 70000002 014+00.159

Severity: POSSIBLE INJURY	First Event: ON ROADWAY
Road Type: OTHER DIVIDED HIGHWAY	To Junction: NON-JUNCTION
Road Char: STRAIGHT AND LEVEL	Traffic Device: NOT APPLICABLE
Crash Type: OVERTURN / ROLLOVER	Speed Limit: 55
Surf Cond: DRY	Diagram: OTHER
Light Cond: DARK - NO STREET LIGHTS	Officer:
Weather 1: CLEAR	Reliability: CONFIDENT
Weather 2: OTHER	# of Vehicles: 1.00

	Unit 1	Unit 2	Unit 3
Trav Dir:	W		
Veh Act:	STRAIGHT AHEAD		
Veh Type:	PASSENGER CAR		
Age:	18		
Gender:	M		
Cond:	UNKNOWN		
Cont Fact 1	OTHER HUMAN FACTOR		
Cont Fact 2	OVER-CORRECTING		

Crash ID: 151020097 **Date:** 04/11/2015 **Time:** 1931
County: SCOTT **City:** ELKO

Sys: 04-CSAH
Route: 70000002 014+00.159

Severity: NON-INCAPACITATING INJURY	First Event: ON ROADWAY
Road Type: 4_6 LANES UNDIV 2_WAY	To Junction: 4-LEGGED INTERSECTION
Road Char: STRAIGHT AND LEVEL	Traffic Device: NOT APPLICABLE
Crash Type: COLL W/MV IN TRANSPORT	Speed Limit: 55
Surf Cond: DRY	Diagram: RIGHT ANGLE
Light Cond: SUNSET	Officer:
Weather 1: CLEAR	Reliability: CONFIDENT
Weather 2: NOT SPECIFIED	# of Vehicles: 2.00

	Unit 1	Unit 2	Unit 3
Trav Dir:	S	E	
Veh Act:	LEFT TURN	STRAIGHT AHEAD	
Veh Type:	PASSENGER CAR	PICKUP TRUCK	
Age:	19	53	
Gender:	F	M	
Cond:	NORMAL	NORMAL	
Cont Fact 1	FAIL TO YIELD ROW	NO IMPROPER DRIVING	
Cont Fact 2	NOT SPECIFIED	NOT SPECIFIED	

Crash ID: 151420180 **Date:** 05/21/2015 **Time:** 1832
County: SCOTT **City:** ELKO

Sys: 04-CSAH
Route: 70000002 014+00.160

Severity: INCAPACITATING INJURY	First Event: ON ROADWAY
Road Type: 4_6 LANES UNDIV 2_WAY	To Junction: INTERSECTION-RELATED
Road Char: STRAIGHT AND LEVEL	Traffic Device: NOT APPLICABLE
Crash Type: COLL W/MV IN TRANSPORT	Speed Limit: 55
Surf Cond: DRY	Diagram: OTHER
Light Cond: DAYLIGHT	Officer:
Weather 1: CLEAR	Reliability: CONFIDENT
Weather 2: CLEAR	# of Vehicles: 2.00

<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="background-color: #cccccc;">Unit 1</th> </tr> </thead> <tbody> <tr><td>Trav Dir: EAST</td></tr> <tr><td>Veh Act: STRAIGHT AHEAD</td></tr> <tr><td>Veh Type: MOTORCYCLE</td></tr> <tr><td>Age: 57</td></tr> <tr><td>Gender: M</td></tr> <tr><td>Cond: NORMAL</td></tr> <tr><td>Cont Fact 1 OTHER</td></tr> <tr><td>Cont Fact 2 NOT SPECIFIED</td></tr> </tbody> </table>	Unit 1	Trav Dir: EAST	Veh Act: STRAIGHT AHEAD	Veh Type: MOTORCYCLE	Age: 57	Gender: M	Cond: NORMAL	Cont Fact 1 OTHER	Cont Fact 2 NOT SPECIFIED	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="background-color: #cccccc;">Unit 2</th> </tr> </thead> <tbody> <tr><td>S</td></tr> <tr><td>LEFT TURN</td></tr> <tr><td>PASSENGER CAR</td></tr> <tr><td>65</td></tr> <tr><td>F</td></tr> <tr><td>NORMAL</td></tr> <tr><td>FAIL TO YIELD ROW</td></tr> <tr><td>NOT SPECIFIED</td></tr> </tbody> </table>	Unit 2	S	LEFT TURN	PASSENGER CAR	65	F	NORMAL	FAIL TO YIELD ROW	NOT SPECIFIED	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="background-color: #cccccc;">Unit 3</th> </tr> </thead> <tbody> </tbody> </table>	Unit 3
Unit 1																					
Trav Dir: EAST																					
Veh Act: STRAIGHT AHEAD																					
Veh Type: MOTORCYCLE																					
Age: 57																					
Gender: M																					
Cond: NORMAL																					
Cont Fact 1 OTHER																					
Cont Fact 2 NOT SPECIFIED																					
Unit 2																					
S																					
LEFT TURN																					
PASSENGER CAR																					
65																					
F																					
NORMAL																					
FAIL TO YIELD ROW																					
NOT SPECIFIED																					
Unit 3																					

Crash ID: 153380218 **Date:** 12/04/2015 **Time:** 1754
County: SCOTT **City:** ELKO

Sys: 04-CSAH
Route: 70000002 014+00.160

Severity: PROPERTY DAMAGE	First Event: ON ROADWAY
Road Type: 4_6 LANES UNDIV 2_WAY	To Junction: 4-LEGGED INTERSECTION
Road Char: STRAIGHT AND LEVEL	Traffic Device: NOT APPLICABLE
Crash Type: COLL W/MV IN TRANSPORT	Speed Limit: 55
Surf Cond: DRY	Diagram: LEFT TURN INTO TRAFFIC
Light Cond: DARK - STREET LIGHTS ON	Officer:
Weather 1: CLEAR	Reliability: CONFIDENT
Weather 2: NOT SPECIFIED	# of Vehicles: 2.00

<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="background-color: #cccccc;">Unit 1</th> </tr> </thead> <tbody> <tr><td>Trav Dir: EAST</td></tr> <tr><td>Veh Act: LEFT TURN</td></tr> <tr><td>Veh Type: PICKUP TRUCK</td></tr> <tr><td>Age: 36</td></tr> <tr><td>Gender: M</td></tr> <tr><td>Cond: NORMAL</td></tr> <tr><td>Cont Fact 1 FAIL TO YIELD ROW</td></tr> <tr><td>Cont Fact 2 IMPROPER TURN</td></tr> </tbody> </table>	Unit 1	Trav Dir: EAST	Veh Act: LEFT TURN	Veh Type: PICKUP TRUCK	Age: 36	Gender: M	Cond: NORMAL	Cont Fact 1 FAIL TO YIELD ROW	Cont Fact 2 IMPROPER TURN	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="background-color: #cccccc;">Unit 2</th> </tr> </thead> <tbody> <tr><td>W</td></tr> <tr><td>STRAIGHT AHEAD</td></tr> <tr><td>PASSENGER CAR</td></tr> <tr><td>43</td></tr> <tr><td>F</td></tr> <tr><td>NORMAL</td></tr> <tr><td>NO IMPROPER DRIVING</td></tr> <tr><td>NO IMPROPER DRIVING</td></tr> </tbody> </table>	Unit 2	W	STRAIGHT AHEAD	PASSENGER CAR	43	F	NORMAL	NO IMPROPER DRIVING	NO IMPROPER DRIVING	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="background-color: #cccccc;">Unit 3</th> </tr> </thead> <tbody> </tbody> </table>	Unit 3
Unit 1																					
Trav Dir: EAST																					
Veh Act: LEFT TURN																					
Veh Type: PICKUP TRUCK																					
Age: 36																					
Gender: M																					
Cond: NORMAL																					
Cont Fact 1 FAIL TO YIELD ROW																					
Cont Fact 2 IMPROPER TURN																					
Unit 2																					
W																					
STRAIGHT AHEAD																					
PASSENGER CAR																					
43																					
F																					
NORMAL																					
NO IMPROPER DRIVING																					
NO IMPROPER DRIVING																					
Unit 3																					

Crash ID: 153530120
County: SCOTT

Date: 12/19/2015
City: ELKO

Time: 1423

Sys: 04-CSAH
Route: 70000002

014+00.160

Severity: NON-INCAPACITATING INJURY
Road Type: OTHER DIVIDED HIGHWAY
Road Char: STRAIGHT AND LEVEL
Crash Type: COLL W/MV IN TRANSPORT
Surf Cond: DRY
Light Cond: DAYLIGHT
Weather 1: CLEAR
Weather 2: NOT SPECIFIED

First Event: ON ROADWAY
To Junction: 4-LEGGED INTERSECTION
Traffic Device: STOP SIGN OTHER
Speed Limit: 55
Diagram: LEFT TURN INTO TRAFFIC
Officer:
Reliability: CONFIDENT
of Vehicles: 2.00

	Unit 1	Unit 2	Unit 3
Trav Dir:	NE	W	
Veh Act:	LEFT TURN	STRAIGHT AHEAD	
Veh Type:	PICKUP TRUCK	PASSENGER CAR	
Age:	70	17	
Gender:	M	F	
Cond:	HAD BEEN DRINKING	NORMAL	
Cont Fact 1	FAIL TO YIELD ROW	NO IMPROPER DRIVING	
Cont Fact 2	NOT SPECIFIED	NOT SPECIFIED	

Selection Filter:

WORK AREA: COUNTY_CODE('70') - FILTER: CRASH_YEAR('2012','2013','2014','2015') - SPATIAL FILTER APPLIED

Analyst:

Mike Larson

Notes:

AGN	ICR	Title	Create Date	Cross St Name	Current Status Date
ENMPD	2.013E+11	Accident	10/19/2013	Natchez Av	11/29/2016
ENMPD	2.014E+11	Accident	2/26/2014	Natchez Av	11/29/2016
ENMPD	2.014E+11	Accident	10/12/2014	Natchez Av	11/29/2016
ENMPD	15000686	Accident	6/15/2015	Natchez Av	11/29/2016
ENMPD	15001440	Accident	11/29/2015	Natchez Av	11/29/2016
ENMPD	15001465	Accident	12/4/2015	Natchez Av	11/29/2016
ENMPD	15001513	Accident	12/19/2015	Natchez Av	11/29/2016
ENMPD	16000236	Accident	3/11/2016	Natchez Av	11/29/2016
ENMPD	16002322	Accident	11/1/2016	NATCHEZ AV	11/20/2016
ENMPD	17000558	Accident	2/4/2017	Natchez AVE	2/12/2017
ENMPD	17001154	Accident	3/14/2017	Natchez AVE	3/19/2017
SCSO	17007046	Accident	4/9/2017	Natchez AVE	4/9/2017
ENMPD	17002123	Accident	5/17/2017	NATCHEZ AVE	5/21/2017
SCSO	17018051	Accident	8/19/2017	Natchez AVE	9/10/2017
ENMPD	17003982	Accident	9/8/2017	Natchez AVE	9/11/2017

Red Text indicates crashes prior to 2015

Yellow Highlight indicates injury crash prior to 2015

Appendix A-3: Warrant Analysis Results



BOLTON & MENK

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2015 Traffic Volumes SIGNAL WARRANTS ANALYSIS

FOR CSAH 2 and CSAH 91

(MINOR APPROACH RT TRAFFIC REMOVED)

LOCATION: Elko New Market, MN

COUNTY: Scott

REF. POINT:

DATE: 11/13/2017

OPERATOR: MPN

Speed	Approach Description		Lanes
55	Major App1:	EB CSAH 2	3
55	Major App3:	WB CSAH 2	3
55	Minor App2:	NB CSAH 91	2
55	Minor App4:	SB CSAH 91	2

0.70 FACTOR USED?

YES

POPULATION < 10,000?

Yes

EXISTING SIGNAL ?

No

THRESHOLDS 1A/1B:

420/630

140/70

140/70

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	32	42	/	1	/	0	/	/
1:00 - 2:00	12	16	28	/	1	/	2	/	/
2:00 - 3:00	4	15	19	/	0	/	0	/	/
3:00 - 4:00	11	11	22	/	1	/	0	/	/
4:00 - 5:00	43	15	58	/	2	/	0	/	/
5:00 - 6:00	182	38	220	/	11	/	6	/	/
6:00 - 7:00	363	139	502	X/	22	/	14	/	/
7:00 - 8:00	348	207	555	X/	31	/	33	/	/
8:00 - 9:00	270	194	464	X/	36	/	12	/	/
9:00 - 10:00	216	148	364	/	12	/	14	/	/
10:00 - 11:00	152	164	316	/	10	/	8	/	/
11:00 - 12:00	150	203	353	/	16	/	11	/	/
12:00 - 13:00	134	188	322	/	14	/	22	/	/
13:00 - 14:00	157	230	387	/	11	/	20	/	/
14:00 - 15:00	172	308	480	X/	14	/	23	/	/
15:00 - 16:00	204	601	805	X/X	20	/	27	/	/
16:00 - 17:00	271	789	1060	X/X	18	/	29	/	/
17:00 - 18:00	229	762	991	X/X	23	/	24	/	/
18:00 - 19:00	186	460	646	X/X	25	/	16	/	/
19:00 - 20:00	105	540	645	X/X	16	/	14	/	/
20:00 - 21:00	90	233	323	/	12	/	3	/	/
21:00 - 22:00	47	190	237	/	4	/	10	/	/
22:00 - 23:00	30	140	170	/	1	/	3	/	/
23:00 - 24:00	8	45	53	/	1	/	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



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**2027 Forecasted Traffic Volumes
SIGNAL WARRANTS ANALYSIS**

**FOR
CSAH 2 and CSAH 91**

(MINOR APPROACH RT TRAFFIC REMOVED)

LOCATION: Elko New Market, MN

COUNTY: Scott

REF. POINT:

DATE: 11/13/2017

OPERATOR: MPN

Speed	Approach Description		Lanes
55	Major App1:	EB CSAH 2	3
55	Major App3:	WB CSAH 2	3
55	Minor App2:	NB CSAH 91	2
55	Minor App4:	SB CSAH 91	2

0.70 FACTOR USED?

YES

POPULATION < 10,000?

Yes

EXISTING SIGNAL ?

No

THRESHOLDS 1A/1B:

420/630

140/70

140/70

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	13	43	56	/	2	/	0	/	/
1:00 - 2:00	16	21	37	/	2	/	3	/	/
2:00 - 3:00	5	22	27	/	0	/	0	/	/
3:00 - 4:00	15	14	29	/	2	/	0	/	/
4:00 - 5:00	57	19	76	/	4	/	0	/	/
5:00 - 6:00	242	52	294	/	24	/	20	/	/
6:00 - 7:00	479	193	672	X/X	48	/	33	/	/
7:00 - 8:00	459	280	739	X/X	70	/X	82	/X	/X
8:00 - 9:00	354	257	611	X/	80	/X	26	/	/
9:00 - 10:00	283	199	482	X/	26	/	33	/	/
10:00 - 11:00	199	214	413	/	22	/	20	/	/
11:00 - 12:00	196	267	463	X/	35	/	23	/	/
12:00 - 13:00	175	245	420	X/	30	/	53	/	/
13:00 - 14:00	206	314	520	X/	24	/	43	/	/
14:00 - 15:00	223	397	620	X/	31	/	46	/	/
15:00 - 16:00	265	796	1061	X/X	43	/	53	/	/
16:00 - 17:00	352	1075	1427	X/X	39	/	59	/	/
17:00 - 18:00	297	1030	1327	X/X	50	/	59	/	/
18:00 - 19:00	240	613	853	X/X	55	/	43	/	/
19:00 - 20:00	135	754	889	X/X	34	/	20	/	/
20:00 - 21:00	113	318	431	X/	26	/	3	/	/
21:00 - 22:00	60	262	322	/	9	/	10	/	/
22:00 - 23:00	39	193	232	/	2	/	0	/	/
23:00 - 24:00	11	61	72	/	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	4	8	Not satisfied



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**2037 Forecasted Traffic Volumes
SIGNAL WARRANTS ANALYSIS**

**FOR
CSAH 2 and CSAH 91**

(MINOR APPROACH RT TRAFFIC REMOVED)

LOCATION: Elko New Market, MN

COUNTY: Scott

REF. POINT:

DATE: 11/13/2017

OPERATOR: MPN

Speed	Approach Description		Lanes
55	Major App1:	EB CSAH 2	3
55	Major App3:	WB CSAH 2	3
55	Minor App2:	NB CSAH 91	2
55	Minor App4:	SB CSAH 91	2

0.70 FACTOR USED?

YES

POPULATION < 10,000?

Yes

EXISTING SIGNAL ?

No

THRESHOLDS 1A/1B:

420/630

140/70

140/70

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	57	72	/	3	/	0	/	/
1:00 - 2:00	18	25	43	/	3	/	6	/	/
2:00 - 3:00	6	32	38	/	0	/	0	/	/
3:00 - 4:00	17	17	34	/	3	/	0	/	/
4:00 - 5:00	65	23	88	/	5	/	0	/	/
5:00 - 6:00	273	69	342	/	30	/	36	/	/
6:00 - 7:00	541	262	803	X/X	62	/	60	/	/
7:00 - 8:00	520	376	896	X/X	89	/X	151	X/X	X/X
8:00 - 9:00	401	337	738	X/X	100	/X	48	/	/X
9:00 - 10:00	320	263	583	X/	30	/	60	/	/
10:00 - 11:00	224	280	504	X/	26	/	36	/	/
11:00 - 12:00	220	346	566	X/	42	/	42	/	/
12:00 - 13:00	197	319	516	X/	37	/	97	/X	/
13:00 - 14:00	232	414	646	X/X	30	/	79	/X	/X
14:00 - 15:00	252	504	756	X/X	40	/	85	/X	/X
15:00 - 16:00	298	1027	1325	X/X	53	/	97	/X	/X
16:00 - 17:00	397	1415	1812	X/X	49	/	109	/X	/X
17:00 - 18:00	333	1349	1682	X/X	63	/	109	/X	/X
18:00 - 19:00	269	793	1062	X/X	67	/	79	/X	/X
19:00 - 20:00	152	1001	1153	X/X	39	/	36	/	/
20:00 - 21:00	129	412	541	X/	30	/	6	/	/
21:00 - 22:00	67	343	410	/	12	/	18	/	/
22:00 - 23:00	43	253	296	/	3	/	0	/	/
23:00 - 24:00	12	78	90	/	2	/	0	/	/

	Met (Hr)	Required (Hr)	
Warrant 1A	1	8	Not satisfied
Warrant 1B	8	8	Satisfied
Warrant 2	4	4	Satisfied
Warrant 3	2	1	Satisfied
Warrant 7	11	8	Satisfied, check accident record

ALL WAY STOP WARRANT 2015 Traffic Volumes

LOCATION: Elko New Markter, MN

COUNTY: Scott

REF. POINT:

DATE: 11/13/2017

OPERATOR: MPN

0.70 FACTOR USED? Yes

Speed	Approach Description	Lanes
55	Major App1: WB CSAH 2	3
55	Major App3: EB CSAH 2	3
55	Minor App2: NB CSAH 91	2
55	Minor App4: SB CSAH 91	2

210

140

HOUR	MAJOR APP. 1	MAJOR APP. 3	MINOR APP. 2	MINOR APP. 4	MAJOR TOTAL Σ (APP. 1 & APP. 3)	MINOR TOTAL APP. 2 + APP. 4	WARRANT MET
0:00 - 1:00	32	10	3	0	42	3	/
1:00 - 2:00	16	12	6	2	28	8	/
2:00 - 3:00	15	4	6	0	19	6	/
3:00 - 4:00	11	11	13	0	22	13	/
4:00 - 5:00	15	43	51	0	58	51	/
5:00 - 6:00	38	182	205	6	220	211	X/X
6:00 - 7:00	139	363	372	14	502	386	X/X
7:00 - 8:00	207	348	370	33	555	403	X/X
8:00 - 9:00	194	270	225	12	464	237	X/X
9:00 - 10:00	148	216	135	14	364	149	X/X
10:00 - 11:00	164	152	101	8	316	109	X/
11:00 - 12:00	203	150	96	11	353	107	X/
12:00 - 13:00	188	134	77	22	322	99	X/
13:00 - 14:00	230	157	89	20	387	109	X/
14:00 - 15:00	308	172	99	23	480	122	X/
15:00 - 16:00	601	204	118	27	805	145	X/X
16:00 - 17:00	789	271	121	29	1060	150	X/X
17:00 - 18:00	762	229	132	24	991	156	X/X
18:00 - 19:00	460	186	110	16	646	126	X/
19:00 - 20:00	540	105	51	14	645	65	X/
20:00 - 21:00	233	90	52	3	323	55	X/
21:00 - 22:00	190	47	25	10	237	35	X/
22:00 - 23:00	140	30	22	3	170	25	/
23:00 - 24:00	45	8	4	0	53	4	/

Met (Hr) Required (Hr)

Allway Stop Warrant: **8** 8 **Satisfied**

REMARKS: _____

ALL WAY STOP WARRANT 2027 Traffic Volumes

LOCATION: Elko New Market, MN

COUNTY: Scott

REF. POINT:

DATE: 11/13/2017

OPERATOR: MPN

0.70 FACTOR USED? Yes

Speed	Approach Description	Lanes
55	Major App1: WB CSAH 2	3
55	Major App3: EB CSAH 2	3
55	Minor App2: NB CSAH 91	2
55	Minor App4: SB CSAH 91	2

210

140

HOUR	MAJOR APP. 1	MAJOR APP. 3	MINOR APP. 2	MINOR APP. 4	MAJOR TOTAL Σ (APP. 1 & APP. 3)	MINOR TOTAL APP. 2 + APP. 4	WARRANT MET
0:00 - 1:00	43	13	6	2	56	8	/
1:00 - 2:00	21	16	12	2	37	14	/
2:00 - 3:00	22	5	12	0	27	12	/
3:00 - 4:00	14	15	27	2	29	29	/
4:00 - 5:00	19	57	105	4	76	109	/
5:00 - 6:00	52	242	422	24	294	446	X/X
6:00 - 7:00	193	479	767	48	672	815	X/X
7:00 - 8:00	280	459	766	70	739	836	X/X
8:00 - 9:00	257	354	468	80	611	548	X/X
9:00 - 10:00	199	283	279	26	482	305	X/X
10:00 - 11:00	214	199	209	22	413	231	X/X
11:00 - 12:00	267	196	199	35	463	234	X/X
12:00 - 13:00	245	175	159	30	420	189	X/X
13:00 - 14:00	314	206	184	24	520	208	X/X
14:00 - 15:00	397	223	206	31	620	237	X/X
15:00 - 16:00	796	265	244	43	1061	287	X/X
16:00 - 17:00	1075	352	250	39	1427	289	X/X
17:00 - 18:00	1030	297	274	50	1327	324	X/X
18:00 - 19:00	613	240	230	55	853	285	X/X
19:00 - 20:00	754	135	106	34	889	140	X/X
20:00 - 21:00	318	113	108	26	431	134	X/
21:00 - 22:00	262	60	52	9	322	61	X/
22:00 - 23:00	193	39	45	2	232	47	X/
23:00 - 24:00	61	11	8	2	72	10	/

Met (Hr) Required (Hr)

Allway Stop Warrant: **15** 8 **Satisfied**

REMARKS: _____

ALL WAY STOP WARRANT 2037 Traffic Volumes

LOCATION: Elko New Market, MN

COUNTY: Scott

REF. POINT:

DATE: 11/13/2017

OPERATOR: MPN

0.70 FACTOR USED? Yes

Speed	Approach Description	Lanes
55	Major App1: WB CSAH 2	3
55	Major App3: EB CSAH 2	3
55	Minor App2: NB CSAH 91	2
55	Minor App4: SB CSAH 91	2

210

140

HOUR	MAJOR APP. 1	MAJOR APP. 3	MINOR APP. 2	MINOR APP. 4	MAJOR TOTAL Σ (APP. 1 & APP. 3)	MINOR TOTAL APP. 2 + APP. 4	WARRANT MET
0:00 - 1:00	57	15	9	0	72	9	/
1:00 - 2:00	25	18	17	6	43	23	/
2:00 - 3:00	32	6	17	0	38	17	/
3:00 - 4:00	17	17	37	0	34	37	/
4:00 - 5:00	23	65	144	0	88	144	/X
5:00 - 6:00	69	273	580	36	342	616	X/X
6:00 - 7:00	262	541	1054	60	803	1114	X/X
7:00 - 8:00	376	520	1050	151	896	1201	X/X
8:00 - 9:00	337	401	636	48	738	684	X/X
9:00 - 10:00	263	320	379	60	583	439	X/X
10:00 - 11:00	280	224	284	36	504	320	X/X
11:00 - 12:00	346	220	269	42	566	311	X/X
12:00 - 13:00	319	197	216	97	516	313	X/X
13:00 - 14:00	414	232	251	79	646	330	X/X
14:00 - 15:00	504	252	281	85	756	366	X/X
15:00 - 16:00	1027	298	331	97	1325	428	X/X
16:00 - 17:00	1415	397	341	109	1812	450	X/X
17:00 - 18:00	1349	333	372	109	1682	481	X/X
18:00 - 19:00	793	269	308	79	1062	387	X/X
19:00 - 20:00	1001	152	138	36	1153	174	X/X
20:00 - 21:00	412	129	143	6	541	149	X/X
21:00 - 22:00	343	67	72	18	410	90	X/
22:00 - 23:00	253	43	63	0	296	63	X/
23:00 - 24:00	78	12	11	0	90	11	/

Met (Hr) Required (Hr)

Allway Stop Warrant: **16** 8 **Satisfied**

REMARKS: _____

Appendix A-4: Traffic Operations

Existing - Delays By Movement

Intersection	Peak Hour	Intersection Delay (1.)		Movement Delay (sec/veh)																									
				NBL		NBT		NBR		SBL		SBT		SBR		EBL		EBT		EBR		WBL		WBT		WBR			
CH 91 & CH 2 <i>Stop Controlled</i>	AM	3	A	12	B	12	B	6	A	14	B	11	B	1	A	1	A	1	A	1	A	1	A	3	A	0	A	0	A
	PM	4	A	89	F	20	C	2	A	79	F	13	B	1	A	4	A	1	A	1	A	1	A	5	A	1	A	0	A

1. Delay in seconds per vehicle

Existing - Queues By Movement

Intersection	Peak Hour	Queue Lengths																	
		EBL		EBR		WBL		NBL		NBT		NBR		SBL		SBT		SBR	
		Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max
CH 91 & CH 2 <i>Stop Controlled</i>	AM	25	25	-	-	25	50	25	50	25	50	50	150	25	50	25	25	25	25
	PM	25	25	25	25	50	125	25	75	25	25	25	50	25	100	25	50	25	50

2037 Build Geometry - Access Review - Delays By Movement

Intersection	Peak Hour	Intersection Delay (I.)		Movement Delay (sec/veh)																				
				NBL		NBT		NBR		SBL		SBT		SBR		EBL		EBT		EBR		WBL		WBT
CH 91 & S Access <i>Stop Controlled</i>	AM	3	A	-	3	A	0	A	8	A	1	A	-	-	-	-	-	-	28	D	-	-	15	C
	PM	3	A	-	1	A	0	A	4	A	3	A	-	-	-	-	-	-	15	C	-	-	5	A
E Access & CH 2 <i>Stop Controlled</i>	AM	2	A	-	-	-	12	B	-	-	-	-	-	-	1	A	1	A	56	F	0	A	-	-
	PM	4	A	-	-	-	4	A	-	-	-	-	-	-	2	A	2	A	9	A	5	A	-	-

1. Delay in seconds per vehicle

2037 Build Geometry - Access Review - Queues By Movement

Intersection	Peak Hour	Queue Lengths																								
		EBL/T/R		EBR		WBL		WBL/R		WBL/T/R		WBT 1		WBT 2		WBT/R		NBL/T		NBR		SBL		SBL/T/R		
		Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	
CH 91 & S Access <i>Stop Controlled</i>	AM	-	-	-	-	-	-	25	75	-	-	-	-	-	-	-	-	-	-	-	-	-	25	50	-	-
	PM	-	-	-	-	-	-	25	75	-	-	-	-	-	-	-	-	-	-	-	-	-	25	50	-	-
E Access & CH 2 <i>Stop Controlled</i>	AM	-	-	0	25	50	100	-	-	-	-	0	25	-	-	-	-	-	-	-	25	75	-	-	-	-
	PM	-	-	-	-	25	75	-	-	-	-	25	125	25	150	-	-	-	-	-	25	50	-	-	-	-

Appendix B: Cost Estimate



Preliminary Cost Estimate
Elko New Market & Scott County
CSAH 91 Right Turn Lane
 January 2018

Real People. Real Solutions.

Item	Unit	Unit Cost	Quantity	Estimated Cost
1.0 Removals				
1.01 REMOVE CURB AND GUTTER	LF	\$ 7.50		\$ -
1.02 REMOVE CONCRETE WALK	SF	\$ 2.00		\$ -
1.03 SAWING BITUMINOUS PAVEMENT FULL DEPTH	LF	\$ 4.25		\$ -
1.04 MILL BITUMINOUS SURFACE (6")	SY	\$ 4.00		\$ -
1.05 DRAINAGE REMOVALS	LS		1	\$ -
				\$ -
2.0 Roadway				
2.01 COMMON EXCAVATION & EMBANKMENT	CY	\$ 21.50	476	\$ 10,241
2.02 SELECT GRANULAR MATERIAL (12")	CY	\$ 22.75	238	\$ 5,418
2.03 AGGREGATE BASE (CV) CLASS 5 (12")	CY	\$ 39.00	213	\$ 8,311
2.04 6" BITUMINOUS (roadway)	TON	\$ 61.50	196	\$ 12,043
2.05 4" CONCRETE (medians)	SF	\$ 5.25		\$ -
2.06 8" CONCRETE APRONS (roundabouts)	SY	\$ 83.00		\$ -
2.07 CONCRETE CURB & GUTTER DESIGN B612	LF	\$ 39.00		\$ -
2.08 CONCRETE CURB & GUTTER DESIGN B624	LF	\$ 26.75		\$ -
2.09 CONCRETE CURB & GUTTER DESIGN S524	LF	\$ 41.75		\$ -
				\$ 36,000
3.0 Sidewalks/Trails				
3.01 COMMON EXCAVATION & EMBANKMENT	CY	\$ 21.50		\$ -
3.02 SELECT GRANULAR MATERIAL (6")	CY	\$ 22.75		\$ -
3.03 AGGREGATE BASE (CV) CLASS 5 (6")	CY	\$ 39.00		\$ -
3.04 3" BITUMINOUS (trail)	TON	\$ 74.00		\$ -
3.05 6" CONCRETE WALK (ped ramps)	SF	\$ 9.25		\$ -
3.06 4" CONCRETE WALK	SF	\$ 5.75		\$ -
3.07 TRUNCATED DOMES	SF	\$ 54.75		\$ -
				\$ -
4.0 Lighting				
4.01 LIGHTING STRUCTURES	LS		1	\$ -
				\$ -
5.0 City Utilities				
5.01 WATERMAIN	LS	\$ -	1	\$ -
5.02 SANITARY SEWER	LS	\$ -	1	\$ -
				\$ -
6.0 Storm Sewer				
6.01 STORM SEWER	LS	\$ -	1	\$ -
6.02 TREATMENT	LS	\$ -	1	\$ -
				\$ -
7.0 Traffic Signing and Striping				
7.01 SIGNS AND PAVEMENT MARKINGS	%		-	\$ -
				\$ -
8.0 Streetscape and Aesthetics				
8.01 STREETScape & AESTHETICS	%		-	\$ -
				\$ -
9.0 Turf and Erosion Control				
9.01 TURF ESTABLISHMENT AND EROSION CONTROL	%		-	\$ -
				\$ -
10.0 Other Misc. Removals				
10.01 MISC. REMOVEVALS	%	10%	-	\$ 4,000
				\$ 4,000
11.0 Other Misc. Items				
11.01 OTHER MISC. ITEMS	%	10%	-	\$ 4,000
				\$ 4,000
12.0 Mobilization/Traffic Control				
12.01 MOBILIZATION	%		-	\$ -
12.02 TRAFFIC CONTROL	%		-	\$ -
				\$ -
TOTAL CONSTRUCTION COST				\$45,000
13.0 Property Acquisitions				
13.01 RIGHT OF WAY ACQUISITIONS	SF	\$ 4.95		\$ -
13.02 EASEMENTS	SF	\$ 1.00		\$ -
				\$ -
14.0 Project Development and Delivery				
14.01 PROJECT DEVELOPMENT AND DELIVERY	%	20%	-	\$ 8,800
				\$ 9,000
TOTAL PROJECT COST				\$55,000

Notes:

Milled Material to be used for Aggregate Base Material for Constuction

Assume 50% recycled bituminous material
 TYPE SP 12.5 (3/C)

Assume 50% recycled bituminous material
 TYPE SP 9.5 (3/C)

Assumed 20SF per location

Connecting to existing, 1 manholes, 2 adjustments to existing manholes

Connecting to existing, 11 drainage structures, 5 casting covers, new sewer pipe

Assumed 5% of Construction Cost

Assumed 5% of Construction Cost

Assumed 10% of Construction Cost

Assumed 10% of Construction Cost

Assumed 5% of Construction Cost

Assumed 5% of Construction Cost

Assumed ~ 20% of full right-of-way acquisition cost

20% Project Delivery

Notes:

The aggregate remaining from MILLED BITUMINOUS SURFACE (1.04) should be used for RECYCLED AGGREGATE BASE MATERIAL (2.03). Cost associated with 2.03 is for moving and placing material. Excess material should be the responsibility of the contractor



Preliminary Cost Estimate
Elko New Market & Scott County
CSAH 2 & 91 - Median to Aaron
 January 2018

Real People. Real Solutions.

Item	Unit	Unit Cost	Quantity	Estimated Cost
1.0 Removals				
1.01 REMOVE CURB AND GUTTER	LF	\$ 7.50		\$ -
1.02 REMOVE CONCRETE WALK	SF	\$ 2.00		\$ -
1.03 SAWING BITUMINOUS PAVEMENT FULL DEPTH	LF	\$ 4.25	333	\$ 1,415
1.04 MILL BITUMINOUS SURFACE (6")	SY	\$ 4.00	2562	\$ 10,247
1.05 DRAINAGE REMOVALS	LS	\$ 10,000		\$ -
				\$ 12,000
2.0 Roadway				
2.01 COMMON EXCAVATION & EMBANKMENT	CY	\$ 21.50	1303	\$ 28,024
2.02 SELECT GRANULAR MATERIAL (12")	CY	\$ 22.75	652	\$ 14,826
2.03 AGGREGATE BASE (CV) CLASS 5 (12")	CY	\$ 39.00	271	\$ 10,557
2.04 6" BITUMINOUS (roadway)	TON	\$ 61.50	1063	\$ 65,387
2.05 4" CONCRETE (medians)	SF	\$ 5.25	2800	\$ 14,698
2.06 8" CONCRETE APRONS (roundabouts)	SY	\$ 83.00		\$ -
2.07 CONCRETE CURB & GUTTER DESIGN B612	LF	\$ 39.00		\$ -
2.08 CONCRETE CURB & GUTTER DESIGN B624	LF	\$ 26.75	1360	\$ 36,373
2.09 CONCRETE CURB & GUTTER DESIGN S524	LF	\$ 41.75		\$ -
				\$ 170,000
3.0 Sidewalks/Trails				
3.01 COMMON EXCAVATION & EMBANKMENT	CY	\$ 21.50	36	\$ 770
3.02 SELECT GRANULAR MATERIAL (6")	CY	\$ 22.75	19	\$ 439
3.03 AGGREGATE BASE (CV) CLASS 5 (6")	CY	\$ 39.00	13	\$ 497
3.04 3" BITUMINOUS (trail)	TON	\$ 74.00		\$ -
3.05 6" CONCRETE WALK (ped ramps)	SF	\$ 9.25	274	\$ 2,537
3.06 4" CONCRETE WALK	SF	\$ 5.75	103	\$ 591
3.07 TRUNCATED DOMES	SF	\$ 54.75	91	\$ 4,980
				\$ 10,000
4.0 Lighting				
4.01 LIGHTING STRUCTURES	LS	\$ 80,000		\$ -
				\$ -
5.0 City Utilities				
5.01 WATERMAIN	LS	\$ -		\$ -
5.02 SANITARY SEWER	LS	\$ 12,000		\$ -
				\$ -
6.0 Storm Sewer				
6.01 STORM SEWER	LS	\$ 72,000		\$ -
6.02 TREATMENT	LS	\$ 24,000		\$ -
				\$ -
7.0 Traffic Signing and Striping				
7.01 SIGNS AND PAVEMENT MARKINGS	%	4%	-	\$ 8,000
				\$ 8,000
8.0 Streetscape and Aesthetics				
8.01 STREETScape & AESTHETICS	%		-	\$ -
				\$ -
9.0 Turf and Erosion Control				
9.01 TURF ESTABLISHMENT AND EROSION CONTROL	%		-	\$ -
				\$ -
10.0 Other Misc. Removals				
10.01 MISC. REMOVEVALS	%	5%	-	\$ 10,000
				\$ 10,000
11.0 Other Misc. Items				
11.01 OTHER MISC. ITEMS	%	5%	-	\$ 10,000
				\$ 10,000
12.0 Mobilization/Traffic Control				
12.01 MOBILIZATION	%		-	\$ -
12.02 TRAFFIC CONTROL	%		-	\$ -
				\$ -
TOTAL CONSTRUCTION COST				\$220,000
13.0 Property Acquisitions				
13.01 RIGHT OF WAY ACQUISITIONS	SF	\$ 4.95		\$ -
13.02 EASEMENTS	SF	\$ 1.00		\$ -
				\$ -
14.0 Project Development and Delivery				
14.01 PROJECT DEVELOPMENT AND DELIVERY	%	20%	-	\$ 44,000
				\$ 44,000
TOTAL PROJECT COST				\$264,000

Notes:

Milled Material to be used for Aggregate Base Material for Constuction

Assume 50% recycled bituminous material
 TYPE SP 12.5 (3/C)

Assume 50% recycled bituminous material
 TYPE SP 9.5 (3/C)

Assumed 20SF per location

Connecting to existing, 1 manholes, 2 adjustments to existing manholes

Connecting to existing, 11 drainage structures, 5 casting covers, new sewer pipe

Assumed 5% of Construction Cost

Assumed 5% of Construction Cost

Assumed 5% of Construction Cost

Assumed 10% of Construction Cost

Assumed 10% of Construction Cost

Assumed 5% of Construction Cost

Assumed 5% of Construction Cost

Assumed ~ 20% of full right-of-way acquisition cost

20% Project Delivery

Notes:

The aggregate remaining from MILLED BITUMINOUS SURFACE (1.04) should be used for RECYCLED AGGREGATE BASE MATERIAL (2.03). Cost associated with 2.03 is for moving and placing material. Excess material should be the responsibility of the contractor



Preliminary Cost Estimate
Elko New Market & Scott County
CSAH 2 & 91 - Left Turn Lane
 January 2018

Real People. Real Solutions.

Item	Unit	Unit Cost	Quantity	Estimated Cost
1.0 Removals				
1.01 REMOVE CURB AND GUTTER	LF	\$ 7.50		\$ -
1.02 REMOVE CONCRETE WALK	SF	\$ 2.00		\$ -
1.03 SAWING BITUMINOUS PAVEMENT FULL DEPTH	LF	\$ 4.25	6	\$ 24
1.04 MILL BITUMINOUS SURFACE (6")	SY	\$ 4.00	188	\$ 753
1.05 DRAINAGE REMOVALS	LS	\$ 10,000	1	\$ 10,000
				\$ 11,000
2.0 Roadway				
2.01 COMMON EXCAVATION & EMBANKMENT	CY	\$ 21.50	671	\$ 14,424
2.02 SELECT GRANULAR MATERIAL (12")	CY	\$ 22.75	335	\$ 7,631
2.03 AGGREGATE BASE (CV) CLASS 5 (12")	CY	\$ 39.00	152	\$ 5,946
2.04 6" BITUMINOUS (roadway)	TON	\$ 61.50	216	\$ 13,282
2.05 4" CONCRETE (medians)	SF	\$ 5.25	3,878	\$ 20,362
2.06 8" CONCRETE APRONS (roundabouts)	SY	\$ 83.00		\$ -
2.07 CONCRETE CURB & GUTTER DESIGN B612	LF	\$ 39.00	758	\$ 29,571
2.08 CONCRETE CURB & GUTTER DESIGN B624	LF	\$ 26.75		\$ -
2.09 CONCRETE CURB & GUTTER DESIGN S524	LF	\$ 41.75		\$ -
				\$ 91,000
3.0 Sidewalks/Trails				
3.01 COMMON EXCAVATION & EMBANKMENT	CY	\$ 21.50		\$ -
3.02 SELECT GRANULAR MATERIAL (6")	CY	\$ 22.75		\$ -
3.03 AGGREGATE BASE (CV) CLASS 5 (6")	CY	\$ 39.00		\$ -
3.04 3" BITUMINOUS (trail)	TON	\$ 74.00		\$ -
3.05 6" CONCRETE WALK (ped ramps)	SF	\$ 9.25		\$ -
3.06 4" CONCRETE WALK	SF	\$ 5.75		\$ -
3.07 TRUNCATED DOMES	SF	\$ 54.75		\$ -
				\$ -
4.0 Lighting				
4.01 LIGHTING STRUCTURES	LS	\$ 80,000		\$ -
				\$ -
5.0 City Utilities				
5.01 WATERMAIN	LS	\$ -		\$ -
5.02 SANITARY SEWER	LS	\$ 12,000		\$ -
				\$ -
6.0 Storm Sewer				
6.01 STORM SEWER	LS	\$ 72,000		\$ -
6.02 TREATMENT	LS	\$ 24,000		\$ -
				\$ -
7.0 Traffic Signing and Striping				
7.01 SIGNS AND PAVEMENT MARKINGS	%	5%	-	\$ 6,000
				\$ 6,000
8.0 Streetscape and Aesthetics				
8.01 STREETScape & AESTHETICS	%		-	\$ -
				\$ -
9.0 Turf and Erosion Control				
9.01 TURF ESTABLISHMENT AND EROSION CONTROL	%		-	\$ -
				\$ -
10.0 Other Misc. Removals				
10.01 MISC. REMOVEVALS	%	7%	-	\$ 8,000
				\$ 8,000
11.0 Other Misc. Items				
11.01 OTHER MISC. ITEMS	%	8%	-	\$ 9,000
				\$ 9,000
12.0 Mobilization/Traffic Control				
12.01 MOBILIZATION	%		-	\$ -
12.02 TRAFFIC CONTROL	%		-	\$ -
				\$ -
TOTAL CONSTRUCTION COST				\$125,000
13.0 Property Acquisitions				
13.01 RIGHT OF WAY ACQUISITIONS	SF	\$ 4.95	10,000	\$ 49,500
13.02 EASEMENT	SF	\$ 1.00		\$ -
				\$ 50,000
14.0 Project Development and Delivery				
14.01 PROJECT DEVELOPMENT AND DELIVERY	%	20%	-	\$ 25,000
				\$ 25,000
TOTAL PROJECT COST				\$200,000

Notes:

Milled Material to be used for Aggregate Base Material for Constuction

Assume 50% recycled bituminous material
 TYPE SP 12.5 (3/C)

Assume 50% recycled bituminous material
 TYPE SP 9.5 (3/C)

Assumed 20SF per location

16 lights for roundabout at \$5,000

Connecting to existing, 1 manholes, 2 adjustments to existing manholes

Connecting to existing, 11 drainage structures, 5 casting covers, new sewer pipe

Assumed 5% of Construction Cost

Assumed 5% of Construction Cost

Assumed 5% of Construction Cost

Assumed 10% of Construction Cost

Assumed 10% of Construction Cost

Assumed 5% of Construction Cost

Assumed 5% of Construction Cost

20% Project Delivery

Notes:

The aggregate remaining from MILLED BITUMINOUS SURFACE (1.04) should be used for RECYCLED AGGREGATE BASE MATERIAL (2.03). Cost associated with 2.03 is for moving and placing material. Excess material should be the responsibility of the contractor

Appendix C: Additional Element Details

Additional Improvement Opportunities

CSAH 2 & CSAH 91 Roundabout

Improvement Opportunity	Alternatives	Example & Cost Estimates	Public Support	Notes
Trail Connections	CR 91 to Aaron Drive	\$175, 000	Business Advisory Meeting: <ul style="list-style-type: none"> • 6 votes as second highest priority • 4 votes as second highest priority • 1 vote as third highest priority Open House: <ul style="list-style-type: none"> • 7 votes 	
	CR 2 (Main St) to France Ave	\$245, 000		
Continuous Lighting	Functional Lighting	\$150, 000 	Business Advisory Meeting: <ul style="list-style-type: none"> • 2 votes as highest priority • 1 vote as second highest priority Open House: <ul style="list-style-type: none"> • 7 votes 	Calculated to meet lighting requirements for County arterial roadway
	Acorn (Continuation of lighting identified in Downtown Improvement Committee lighting plan)	\$580, 000 		Cost covers lighting spaced at 100' O.C. along both sides of road
	Additional Decorative Alternatives	\$710,000+ 		Examples of enhanced features: decorative poles & bases, banner arm/flag pole, additional lamps, customizations

Improvement Opportunity	Alternatives	Example & Cost Estimates	Public Support	Notes
Downtown Lighting	Acorn	\$190,000 	n/a	Estimated from 2008 Downtown improvement committee layout
Roundabout Enhancements	Plantings	\$45,000 	Business Advisory Meeting: <ul style="list-style-type: none"> • 2 votes as second highest priority • 4 votes as third highest priority Open House: <ul style="list-style-type: none"> • 6 votes 	Examples of plantings: ornamental trees, evergreen trees, perennials, ornamental grasses
	Plantings & Hardscape Feature	\$105,000 		Hardscape features may include: entry monument, public artwork, specialty pavement, raised planting bed
Landscaping *not including roundabout	Street Trees	*\$75,000 	Open House: <ul style="list-style-type: none"> • 9 votes 	*Wide range of application levels with associated cost implications
	Street Trees & Perennial Plantings	*\$150,000+ 		

Improvement Opportunity	Alternatives	Example & Cost Estimates	Public Support	Notes
Monuments	Simple entry monument at key points	\$20,000 each 	Business Advisory Meeting: <ul style="list-style-type: none"> • 1 vote as second highest priority • 5 votes as lowest priority Open House: <ul style="list-style-type: none"> • Item did not receive nay votes 	
	Additional customization to entry monument	\$30,000 each 		
	Highly customized w/ several different elements	\$60,000+ each 		
Pavement Treatments	Decorative Scoring	\$120,000  <p><i>Pavement treatments continued on next page</i></p>	Business Advisory Meeting: <ul style="list-style-type: none"> • 2 votes as third highest priority • 3 votes as lowest priority Open House: <ul style="list-style-type: none"> • Item did not receive nay votes 	

Improvement Opportunity	Alternatives	Example & Cost Estimates	Public Support	Notes
Pavement Treatments <i>(continued)</i>	Stamped & Colored	\$260,000 	See previous page	
	Pavers	\$300,000 		
	Enhanced Stamp & Color	\$380,000 		
Site Furnishings/ Amenities	Banner Pole with or without Light	With light: \$145,000 Without light: \$54,000 	Business Advisory Meeting: <ul style="list-style-type: none"> • 1 vote as third highest priority Open House: <ul style="list-style-type: none"> • 1 vote 	
	Benches	\$800 each 		