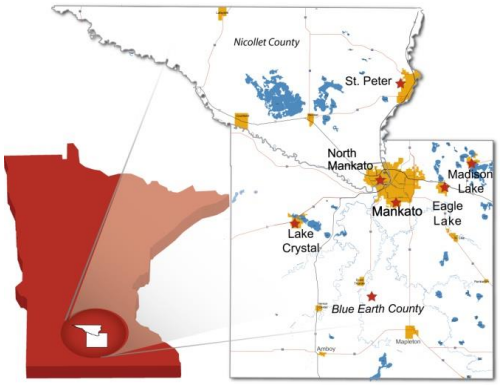


Mankato/North Mankato Area Planning Organization
Technical Advisory Committee
Thursday, January 11, 2018 – 1:30PM
Intergovernmental Center,
Minnesota Valley Room (Behind Elevators 1st Floor of IGC)
10 Civic Center Plaza, Mankato, MN 56001

I. Call to Order

II. Introductions

III. Approval of Agenda

IV. Approval of Minutes – August 17, 2017

V. New Business

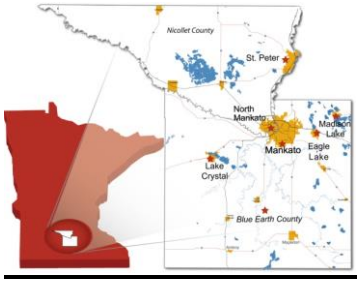
1. Amendment to the 2018 Unified Planning Work Program (UPWP)
2. Resolution Supporting MnDOT Safety Performance Measure Targets
3. Amendment to the 2018-2021 Transportation Improvement Program (TIP)

VI. Other Business, Discussion & Updates

1. Transportation Alternatives Program LOI Review Process Update
2. Intersection Control Evaluation Studies Update
3. Transit Development Plan Update
4. Trunk Highway 22 Corridor Study Update
5. ADA Transition Plan Update

VII. TAC Comments

VIII. Adjournment



SUMMARY OF MEETING
Mankato/North Mankato Area Planning Organization
Technical Advisory Committee Regular Meeting
Thursday, August 17, 2017 – 1:30 p.m.
Minnesota River Room, Intergovernmental Center,
10 Civic Center Plaza, Mankato, MN 56001

A meeting of the Technical Advisory Committee (TAC) of the Mankato/North Mankato Area Planning Organization was held on August 17, at 1:30 p.m. in the Minnesota River Room of the Intergovernmental Center. Present, Paul Vogel – MAPO Executive Director, Lisa Bigham – District 7 Minnesota Department of Transportation, Jake Huebsch – MAPO Transportation Planner, Ed Pankratz – Mankato Township, Todd Owens for Mark Anderson – City of Mankato Transit, Mike Fischer – City of North Mankato, Ryan Thilges – Blue Earth County, Mandy Landkamer – Nicollet County, Seth Greenwood – Nicollet County, Jeff Johnson – Public Works Director City of Mankato. Others present: Bobbi Retzlaff – MnDOT, Scott Poska – SRF

Prior to the start of the meeting, Scott Poska with SRF provided an update on 2017 Intersection Control Evaluation (ICE) Studies. The intersections being evaluated include: Lookout Drive / Howard Drive, Lor Ray Drive / Carlson Drive and Pleasant Street / Stoltzman Road.

I. Call to Order

Chair Fischer called the meeting to order at 2:00 p.m.

III. Approval of Agenda

Mr. Vogel moved and Mr. Johnson seconded a motion to approve the agenda. With all voting in favor, the agenda was approved.

IV. Approval of Minutes, June 15, 2017

Mr. Thilges moved and Mr. Greenwood seconded a motion to approve the minutes. With all voting in favor, the minutes were approved.

V. New Business

1. ADA Transition Plan Consultant Recommendation

MAPO staff explained that the ADA planning is required to conduct a self-evaluation and to formulate and carry out an ADA Transition Plan. The ADA Transition Plan will be limited to assuring that the local jurisdictions within the MAPO planning area meet Federal accessibility requirements when providing pedestrian infrastructure and access to transit. Staff explained that the plan consists of identifying intersection corners, pedestrian crossings and on-street transit facilities within the MAPO Planning Area that do not meet current ADA access guidelines and developing a plan and schedule to bring any non-compliant facilities into compliance. MAPO staff received four proposals for the ADA Transition Plan and a five member review committee reviewed and ranked the proposals. The committee's recommendation was to accept Bolton & Menk's proposal. The recommendation was presented to the TAC along with the scoring summary.

	Bolton Menk	SRF	WSB	Stonebrooke
Total	**483.875**	**463.875**	**385**	**410**
Average	**96.775**	**92.775**	**77**	**82**

Mr. Johnson motioned and Mr. Thilges seconded the motion to recommend to the MAPO Policy Board that the MAPO accept Bolton & Menk proposal for the ADA Transition Plan.

2. MAPO Title VI Program

Staff presented MAPO's Title VI Program and explained MAPO's first Title VI program/plan was originally adopted in April of 2013 and should be updated every three years. The purpose of the Mankato/North Mankato Area Planning Organization's (MAPO) Title VI Program is to ensure that no person, on the grounds of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity under the control of MAPO. The MAPO will ensure that members of the public within the MAPO planning area are aware of Title VI provisions and the responsibilities associated Title VI of the Civil Rights Act of 1964.

Mr. Vogel motioned and Mr. Greenwood seconded the motion to recommend approval of MAPO's Title VI Program to the MAPO Policy Board. With all voting in favor, the motion carried unanimously.

3. 2018 Budget

Staff presented the draft 2018 budget to the TAC. Staff explained two large expenditures for 2018 are ADA Transition Plan and Trunk Highway 22 Corridor Study. Staff explained that those two projects will use up a large part of the MAPO's consultant services budget. Staff explained there are additional funds if the jurisdictions wanted to pursue additional studies, but they would have to be funded over 2018 and 2019. Mr. Thilges requested we include an intersection study of Hoffman Road and Victory Drive to the 2018 budget. In addition, TAC members wanted to include a Pavement Management Plan that would budgeted and conducted over 2018 and 2019. It was recommended MAPO staff adjust the budget to reflect intersection study and pavement management plan as identified above. Staff explained the 2018 Unified Planning Work Program will be reviewed by the Policy Board at their September 7, 2017 meeting.

Mr. Johnson motioned and Mr. Greenwood seconded the motion to recommend approval of MAPO's 2018 budget with changes as discussed to the MAPO Policy Board. With all voting in favor, the motion carried unanimously.

VI. Other Business & Updates

Mr. Vogel provided a brief update on the Transit Development Plan and reminded the TAC of a transit recent survey that was sent out to decision makers in the area. Mr. Huebsch and Ms. Bigham provided information on the Trunk Highway 22 corridor study. On July 22nd SRF along with stakeholder had their first project management team meeting.

The July 6, 2017 MAPO Policy Board Minutes were included as Informational

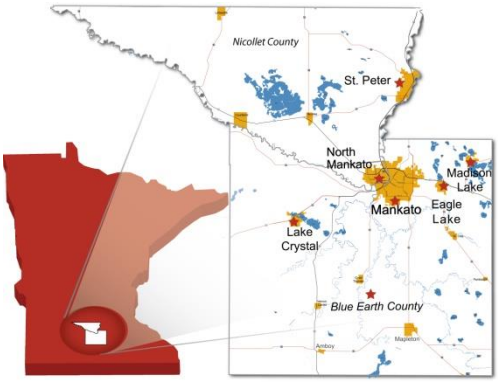
VII. Adjournment

Mr. Vogel moved and Mr. Johnson seconded a motion to adjourn the meeting. With all voting in favor, the motion carried unanimously.

_____

Chair, Mr. Fischer

Meeting Date: January 11, 2018



AGENDA RECOMMENDATION

Agenda Heading: Amendment to the 2018 Unified Planning Work Program (UPWP) No: 5.1

Agenda Item: Amendment to the 2018 Unified Planning Work Program (UPWP)

Recommendation Action(s): Motion to recommend that the MAPO Policy Board approve the amendment to the 2018 UPWP

Summary: The anticipated federal funding levels as depicted in the adopted 2018 UPWP have been reduced by $36,795, or from $324,407 to $287,612. This reduces the overall budget (considering only the reduction of federal funds) from $415,726 to $378,931.Therefore, the purpose of this amendment is to reduce the anticipated expenditures in the budget to reflect the anticipated revenue. Note, the only revenue funds to be reduced are the federal funding levels. State and local funding levels remain the same.

The reduction in funding results in the work on the Pavement Management Plan to be delayed until 2019. In addition, staff confirmed additional 2018 billing for the Americans with Disabilities Act (ADA) Transition Plan and reduced the amount in 2018.

Attachments:
UPWP Amendment Request Form
Amended 2018 UPWP

Unified Planning Work Program Amendment Request

MPO Name: Mankato/North Mankato Area Planning Organization (MAPO)

UPWP Year: 2018

Reason for UPWP Revision: The anticipated federal funding levels as depicted in the adopted 2018 UPWP have been reduced by $36,795 - or $324,407 to $287,612. This reduces the overall budget (considering only the reduction of federal funds) from $415,726 to $378,931. Therefore, the purpose of this amendment is to reduce the anticipated expenditures in the budget to reflect the anticipated revenue. Note, the only revenue funds to be reduced are the federal funding levels. State and local funding levels remain the same.

Is the MPO requesting an amendment to its Consolidated Planning Grant? No

If yes, how much is the MPO requesting to be added or reduced? $

UPWP Task Information — Task Amounts

Amended Task Number & Name	Prior to Revision	After Revision
Continued work on ADA Transition Plan	$ 130,000	$ 113,205
Pavement Management Plan (begin in 2019)	$ 20,000	$ 0
	$	$
	$	$
	$	$
	$	$
	$	$
	$	$
Total Amended Task Amounts:	$ 150,000	$ 113,205

Use additional forms if needed.

Unified Planning Work Program Amendment Request

Date UPWP Amendment Approved by MPO Board: 02/01/2018 (mm/dd/yyyy)

Date MPO Submitted UPWP Amendment to MnDOT for Approval: (mm/dd/yyyy)

Date MnDOT Submitted UPWP Amendment to USDOT for Approval: (mm/dd/yyyy)

Required Attachments to be Included with Form Submission:

- [x] Revised UPWP Summary Budget Table(s) (Original & Amended)
- [x] Revised UPWP Work Activities (Original & Amended)
- [x] MPO Resolution and/or MPO Meeting Minutes Approving UPWP Amendment

MnDOT and USDOT Use Only

MnDOT Action on Request:

MnDOT Signature:

MnDOT Comments:

USDOT Action on Request:

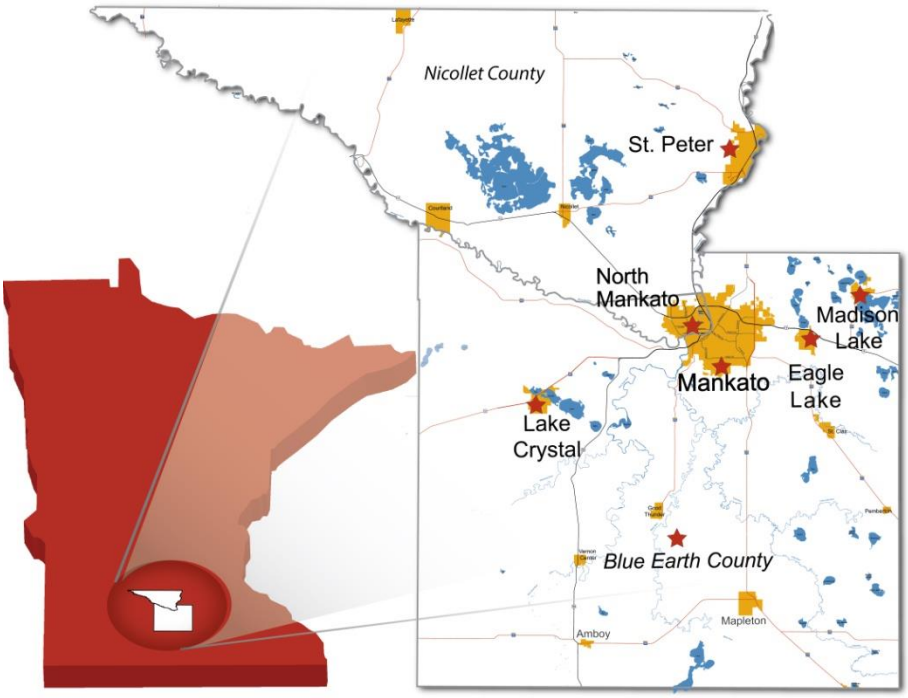
USDOT Signature:

USDOT Comments:

Mankato/North Mankato

Area Planning Organization (MAPO)

2018 & (2019 Draft) Work Program & Budget



Technical Advisory Committee: August 17, 2017

Technical Advisory Committee Recommendation for Amendment January 11, 2018

Policy Board: September 7, 2017

Policy Board Amendment February 1, 2018

Mankato/North Mankato Area Planning Organization
10 Civic Center Plaza
Mankato, MN 56001

Executive Director: Paul Vogel
Office: 507-387-8613
Email: pvogel@mankatomn.gov

Contents

Mankato/North Mankato Area Planning Organization Background and Transportation Planning History

The Mankato/North Mankato Area Planning Organization (MAPO) was established in 2012 in response to the 2010 U.S. Census which designated the Mankato/North Mankato area as an urbanized area requiring the formation of a metropolitan planning agency. The purpose of the MAPO is to meet and maintain a continuing, cooperative and comprehensive metropolitan transportation planning process.

Mankato/North Mankato Area Planning Organization Representation

The MAPO is represented by the following units of government:

- City of Mankato
- City of North Mankato
- City of Eagle Lake
- City of Skyline
- Blue Earth County
- Nicollet County
- Belgrade Township
- Lime Township
- South Bend Township
- LeRay Township
- Mankato Township

The MAPO is directed by a six (6) member policy board. The MAPO is advised by a Technical Advisory Committee (TAC) which reviews and formulates recommendations to the Policy Board regarding the Unified Program Work Plan, Long-Range Transportation Plan, Transportation Improvement Plan and other plans and studies prepared by the MAPO.

Mankato/North Mankato Area Planning Organization Policy Board

Mark Piepho, Chair, Blue Earth County Board of Commissioners

Mike Laven, Vice Chair, City of Mankato

Robert Freyberg, City of North Mankato

Jack Kolars, Nicollet County Board of Commissioners

Daniel Rotchadl, Mankato Township

Brianna Anderson, City of Eagle Lake

Mankato/North Mankato Area Planning Organization Technical Advisory Committee

Sheri Allen, Superintendent of Schools, Independent School District #77

Mark Anderson, Transit Superintendent, City of Mankato

Lisa Bigham, District 7, Minnesota Department of Transportation

Scott Fichtner, Director of Environmental Services, Blue Earth County

Paul Corcoran, Assistant Vice President for Facilities Management, MSU - Mankato

Michael Fischer, Director of Community Development, City of North Mankato

Ryan Thilges, Director of Public Works, Blue Earth County

Jeff Johnson, Director of Public Works / City Engineer, City of Mankato

Karl Friedrichs, Lime Township

Seth Greenwood, County Engineer, Nicollet County

Travis Javens, City Council, City of Skyline

Curt Kloss, Leray Township

Mandy Landkamer, Director of Environmental Services, Nicollet County

Loren Lindsay, Belgrade Township

Sam Parker, Region 9 Development Commission

Open, City Administrator, City of Eagle Lake

Ed Pankratz, Mankato Township

Dan Sarff, North Mankato Engineer

Open, South Bend Township

Paul Vogel, Director of Community Development, City of Mankato

Introduction and Vision Statement

The 2018 Planning Work Program for the Mankato/North Mankato Area Planning Organization (MAPO) outlines work activities that the MAPO will undertake as the designated Metropolitan Planning Organization (MPO) for the Mankato/North Mankato Metropolitan Planning Area.

This document represents the Unified Planning Work Program for the MAPO and was developed with input and cooperation of the local municipalities, agencies, and public through the MAPO Policy Board.

MAPO Vision Statement

Through continuing, cooperative and comprehensive planning, the Mankato/North Mankato Planning Organization will promote a regional transportation system that is safe, increasingly efficient, integrated and multi-modal. This system will support economic development, encourage sustainable growth, and improve mobility and access for area residents and businesses.

Purpose of Work Program Document

The purpose of this work program is to:

1) Provide a detailed description of all transportation-related planning activities anticipated by the MAPO within the metropolitan planning area during 2018.

2) Provide detailed work activities and budget information, including local, state and federal funding shares, to allow the state to document the requirements for planning grants distributed through the Federal Transit Administration (FTA) and the Federal Highway Administration (FHWA).

Scope of Work Program Planning Process

The work activities described within are supported by funding from the Federal Highway Administration, Federal Transit Administration, Minnesota Department of Transportation and MAPO member organizations.

Metropolitan Planning Factors

Federal planning statutes identify planning factors that specify the scope of the planning process to be followed by the MAPO. According to federal planning statutes, the planning process shall provide for consideration and implementation of projects and strategies and services that will address the ten planning factors.

Each factor is listed below. After each factor is a brief description of how the work activities contained in this UPWP support the metropolitan planning factors:

1. Support the economic vitality of the metropolitan area, especially by enabling global competitiveness, productivity, and efficiency.
    - Promote and use the adopted LRTP to ensure that transportation projects are planned in a comprehensive, continuous and complete manner.
    - Continue to monitor travel forecasting with development to reliably and accurately predict future traffic on the Major Street and highway system.

2. Increase the security of the transportation system for motorized and non-motorized users.
    - MAPO staff will continue to serve as a resource to promote programs and opportunities that encourage non-motorized use and users such as the Transportation Alternatives Program, Minnesota Statewide Health Improvement Program (SHIP).
    - Staff will continue to work with local bike and walk advocate groups in their efforts of safe non-motorized use.
    - MAPO will be assisting member communities applying for Transportation Alternative Program grant funding. Depending on type of funding requested, MAPO may assist member communities in improving safety for non-motorized users, such as completing trail system links, critical sidewalk networks around schools, and pedestrian crossing upgrades.

3. Increase the accessibility and mobility of people and for freight.
    - As intersection improvements are planned and constructed, install pedestrian buttons and ADA ramps and consider other mobility options as technology becomes available.
    - Continued development and identification of needs through Trunk Highway 22 Corridor Study and ADA Transition Plan.
    - Perform intersection study on Hoffman Road / Victory Drive.

4. Protect and enhance the environment, promote energy conservation, improve the quality of life, and promote consistency between transportation improvements and State and local planned growth and economic development patterns.
    - MAPO staff will assistant in implementation of the Mankato's and North Mankato's Complete Streets Plan to promote non motorized usage and promotes the health initiatives of the Minnesota Statewide Health Improvement Program (SHIP).

5. Enhance the integration and connectivity of the transportation system, across and between modes, for people and freight.

6. Promote efficient system management and operation
    - Coordination with Area Transportation Partners (ATP) and MnDOT District 7 for review of Transportation Improvement Projects in the MAPO area in the development of the Transportation Improvement Program.
    - Develop the MAPO's area TIP for submission to federal and state sources. The MAPO is charged with developing and promoting programs and projects that best meet the needs of the regional transportation network.

7. Emphasize the preservation of the existing transportation system.
    - MAPO will use the LRTP and its performance measures when examining the conditions of the existing transportation system for consideration in the development of the Transportation Improvement Plan.
    - MAPO will be an active participant in the Area Transportation Partnership of MnDOT District 7 to consider projects that will preserve and enhance the existing transportation system in the urbanized area.

8. Improve the resiliency and reliability of the transportation system and reduce or mitigate storm water impacts of surface transportation.

9. Enhance travel and tourism
    - MAPO staff will assistant in implementation of the Mankato and North Mankato's Complete Streets Plan to enhance commuter and recreational opportunities.

Resolution & Agreements

The signed resolution adopting the annual work program is included as Appendix C.

The following agreements governing the operation of the MAPO are available on the MAPO website at www.mnmapo.org

- Joint Powers Agreement between Governmental Units in the Mankato/North Mankato Urbanizing Area.

- The Memorandum of Understanding between the Minnesota Department of Transportation, the Mankato/North Mankato Area Planning Organization, and the Public Transportation Operator.

Document Organization

The *2018 Planning Work Program for the Mankato/North Mankato Area Planning Organization* is organized into six chapters.

Chapter 1 is the Summary List of 2018 & 2019 Activities for the MAPO.

Chapters 2-5 detail the work activities that will be undertaken in 2018 with program hours and budget information. These activities are:

- 100 Program Support and Administration
- 200 Long-Range Transportation Planning
- 300 Short-Range Transportation Planning
- 400 Program Development
- 500 Strategic Plan

Chapter 6 provides the MAPO Strategic Plan

Appendices provide supporting documentation of activities, details of the budgets and work activities, meeting times, and contact information.

Chapter 1: Executive Summary of 2018 and 2019 Activities

2018 Activities

The main work activities for 2018 are:

- Development of Transportation Improvement Program (TIP).
- Continued work on the Trunk Highway 22 Corridor Study
- Continued work on the MAPO ADA Transition Plan.
- Perform intersection study of Hoffman Road and Victory Drive
- Provide staff administration to the MAPO TAC and Policy Board.
- Continued work on GIS base/data for MAPO Urban and Planning Area.
- Upkeep and maintenance of MAPO web-site.
- Assist MnDOT District 7/Central Office in statewide and regional planning efforts.
- Complete 2019 & 2020 Unified Planning Work Program.
  Note: the 2019 UPWP requires approval the 2020 UPWP is more conceptual.
- Continued involvement in the Transportation Alternative Program (TAP) by providing review and ranking.
- Work with the Region Nine Development Commission Transportation Committee and serve on their TAC.
- Coordination with ATP and MnDOT in reviewing and recommending projects.
- Continued involvement in the Statewide Health Improvement Plan (SHIP).
- Review and Update the MAPO's Public Participation Plan.
- Solicit RFP for intersection study
- Project management and coordination with consultant on various studies.

2019 Activities

Main activities for 2018 may include:

- Continued work on ADA Transition Plan
- Draft Request for Proposal and distribute with goal of retaining consultant for Pavement Management Plan
- Starting process for Long Range Transportation Plan update

MAPO Staff will work with area partners and the MAPO TAC and Policy Board to prioritize future studies.

Chapter 2: Program Support and Administration

100 Program Support and Administration

2018 Staff Hours: 1,500 2018 Budget: $73,615
2019 Staff Hours: 1,350 2019 Budget: $75,467

Introduction

Program Support and Administration activities include the coordination of technical committee and policy board meetings, staff training and travel, preparing the work program and quarterly accounting, vacation and holiday time, etc. and the maintenance of the MAPO website and social media outlets.

- Program Support
  Program support activities keep the policy board and technical committees informed and meeting on a regular basis. Actions include maintaining committee membership lists and bylaws, writing agendas and minutes.
  - Prepare agendas and minutes for MAPO meetings.
  - Prepare agendas, minutes and meeting notices for TAC meetings and Policy Board Meetings.
  - Attend trainings, meetings and conferences.
  - Project task administration and communication between the MAPO and its advisory committee.
  - Review and Update Public Participation Plan.
  - Prepare local jurisdictions for billing.
  - Attend and present information on the LRTP and MAPO updates to the Blue Earth and Nicolet County Board meeting as requested.
  - Attend and present information on the LRTP and other MAPO updates to the City Councils of Mankato, North Mankato, and Eagle Lake as requested.

- Planning Work Program
  The planning work program is updated annually in consultation with the MnDOT, FTA, FHWA, and transit providers, technical committees and the policy board. Quarterly reports and reimbursement forms are prepared and the office accounting is maintained. The annual dues are calculated and billed, and the budget is coordinated with the City of Mankato.
  - Prepare draft 2019-2020 UPWP.
  - Annual and midyear review with MnDOT and FHWA.
  - Prepare budgets and quarterly progress reports for MnDOT and FHWA
  - Review 2019 UPWP with TAC, MnDOT and FHWA for work items to carry forward into 2019-2020 UPWP.
  - Receive input from local TAC, MnDOT and FHWA on work items to include in 2019- 2020 UPWP.
  - Write draft 2019-2020 UPWP.

- Training and Travel
  Travel to MPO Directors' meetings, training, and other activities are included. MnDOT requires that $3,000 of planning funds are used to provide for the MPO's

participation in meeting and workshops for the Minnesota MPO Directors and other professional development and training of the MPO staff. (Hard cost of these items are listed as a line items in the budget)

- Travel to MPO Directors Meetings
- Travel to training opportunities (APA, FHWA, MnDOT)
- Attend Conference
- Attend various statewide and district functions or workshops relevant to the MAPO

- Information Technology
  - Post meeting packets, minutes and other materials to MAPO web-site.
  -Continue work with the City of Mankato's Information Technology and Public Information Departments to build and expand the MAPO web-site.
  - Work with Mankato, North Mankato, Blue Earth County and Nicollet county to continuing development of GIS information for MAPO Area.

- Program Expenses
  Program expenses are the costs included staff vacation, sick and holiday time.

Process and Timeline to Completion:

- *The 2018-2020 unified planning work program will be drafted during 2018 and adopted by September of 2018.*
- *Ongoing maintenance and coordination with City of Mankato Information Technology Department.*
- *The activities in this section will generally be completed in the 2017 Calendar year.*

Chapter 3: Long-Range Transportation Planning

200 Long-Range Transportation Planning

2018 Staff Hours: 155 2018 Budget: $9,031
2019 Staff Hours: 150 2019 Budget: $8,725

Introduction

The Mankato Transit Authority is in development of their Transit Development Plan (. The TDP will represent a strategic vision for the Mankato Transit Authority to promote the operation of an efficient, responsive and financially sustainable transit system. Major components of the Transit Development Plan include: annual performance, service operations, capital programs and funding.

Mankato Transit Authority TDP:

- Coordination and participation in the Mankato Transit Development Plan.
- Plan development through 2017 and 2018 (adoption anticipated in spring of 2018)

LRTP Development 2019

- *Start LRTP update process including writing RFP*

Chapter 4: Short-Range Transportation Planning

300 Short-Range Transportation Planning

2018 Staff Hours: 800 2018 Budget: $251,056
2019 Staff Hours: 675 2019 Budget: $223,296

Introduction

The Short-Range Transportation Planning includes activities that provide necessary planning support and implementation for transportation planning in the MAPO planning area. Short-Range transportation planning activities are typically planning for the next 5 years.

Activities

Specific activities that will be undertaken in the Short-Range Transportation Planning will be:

- Local Planning Assistance
  - Work with area partners on identified intersections to perform Intersection Control Evaluation (ICE) study.
  - Continued work with consultant and area partners on the Trunk Highway 22 Corridor Study.
  - Continued work with consultant and area partners on ADA Transition Plan for the area.
  - Assist local partners with localized transportation planning efforts as needed.
  - Work with partners on future local planning studies as identified by the TAC and Policy Board.
  - Provide communication to Mankato, North Mankato and Eagle Lake on Safe Routes to School and other programs or grant opportunities and solicitations.
  - Assist on general transportation topics that arise.
  - Continued work with the Blue Earth County and Nicollet County Statewide Health Improvement Program (SHIP).

- State Planning Assistance
  - Assist MnDOT District 7/Central Office in statewide and regional planning efforts, including review and commenting on statewide and district plans or projects. Assist as needed in open houses, outreach or other communication.
  - Review requests and present functional classifications changes to TAC and Policy Board
  - Provide reporting and follow up with MnDOT regarding changes or updates to functional classification changes.
  - Work with the Region Nine Development Commission Transportation Committee and serve on their TAC.

- Coordinate with MnDOT District 7, area partners and consultant on the future 169 corridor study.
- Continued involvement in meetings related to MPO functions for local advocacy groups and transportation partnerships.

Process and Timeline to Completion:

- The above referenced planning efforts and activities are anticipated to occur within over the 2018 & 2019 calendar years.

Consultant Studies:

- Trunk Highway Corridor Study
  - Total Contact Amount $137,571
  - Amount Anticipated in 2018 $85,000
  - Anticipated Completion Quarter 4 of 2018

- ADA transition Plan
  - Total Contact Amount $175,316
  - Amount Anticipated in 2018 $113,205
  - Anticipated Completion Quarter 1 of 2019

- One Intersection Control Evaluation Studies
  - Budget Amount $10,000
  - Anticipated Completion Q4 of 2018

- Highway 169 / Highway 14 Area Study
  - Budget amount $80,000 in 2019

Chapter 5: Program Development

400 Program Development & TIP Development

2018 Staff Hours: 575 2018 Budget: $31,479
2019 Staff Hours: 575 2019 Budget: $32,899

Introduction

The Program Development element includes activities related to MAPO Transportation Improvement Program (TIP), Area Transportation Partnership and Area Transportation Improvement Program/State Transportation Improvement Program.

Activities

- Transportation Improvement Program (TIP)
  To develop the MAPO's area 2019-2022 TIP for submission to federal and state sources. The MAPO is charged with developing and promoting programs and projects that best meet the needs of the regional transportation network.
    - Ensure that federal investments are tied to planning, priorities and policies as defined in the MAPO's LRTP.
    - Solicit and prioritize candidate project and assist MnDOT with ATP as a member of the steering committee.
    - Conduct consultation with the Mankato Transit Authority.
    - Prepare a fiscally constrained TIP document.
    - Complete all federal requirements pertaining to TIP development, including relating TIP projects to the federal planning process as shown in the MAPO's Public Participation Plan.
    - Send approved TIP to federal and state agencies.
    - Amend TIP as necessary in response to changes in project schedules and/or scopes.

- Regional Planning Assistance
    - Initial Review of Letters of Intent for Transportation Alternative Program (TAP).
    - Coordinate and interview applicants for submitted TAP projects in MPO planning area.
    - Provide staff recommendation and input for submitted projects.
    - Participate in regional reviewing and ranking of District 7 STP projects.
    - Coordinate with ATP and MnDOT in reviewing and recommending projects, including transit, for inclusion in the Area Transportation Improvement Program/Statewide Transportation Improvement Program.
    - Attend and participate in ATP meetings and review of projects and other supporting documents that relate to the development of the STIP.
- Provide updates to the MAPO TAC and Policy Board on STIP projects that fall within the MPO planning boundary.

Process and Timeline to Completion:

- The above referenced items are yearly planning activities that coincide with District 7 ATP's dates and timelines within the calendar year.

Chapter 6: Strategic Plan

Introduction

What follows is a summary of MAPO overall Strategic Plan as it relates to maintenance of the Long Range Transportation Plan (LRTP) for the Years 2017-2020.

Major Program Actives	2017	2018	2019	2020
Belgrade Ave Corridor Study	X			
Riverfront Drive Corridor Study	X			
Transit Development Plan	X	X		
Three ICE Studies	X			
Highway 22 Corridor Study	X	X		
ADA Transition Plan	X	X	X	
Pavement Management Plan			X	X
Highway 169 / Highway 14 Area Study			X	
Intelligent Trans Plan				X
MAPO Transportation Modeling				X
Long Range Transportation Plan Update			X	X
Warren Street Corridor Study				X
Bike & Pedestrian Plan				X

MAPO staff, TAC and Policy Board will annually review the MAPO Strategic Plan and reevaluate planning studies for inclusion in future work programs.

Appendix A: 2018 UPWP Budget and Details

2018 Program Activity Detail

	100 Program Support and Administration	Budget	Staff Hours
Program Support 100.1	1. Prepare agendas and minutes for MAPO Meetings		
	2. Attending MnDOT and local agency meetings		
	3. Prepare and agendas and minutes for TAC meetings		
	4. Attend training, meetings, and conferences		
	5. Review and Update Public Participation Plan		
	6. Prepare billing for local jurisdiction assessment		
	Total Expense - Program Support	**38,280**	**800**
Planning Work Program 100.2	1. Prepare draft 2019-2020 UPWP and budget		
	2. Review with MnDOT and FHWA		
	3. Reporting to MnDOT & FHWA		
	Total Expense - Planning Work Program	**7,901**	**150**
Training and Travel 100.3	1. Travel to MPO Directors meetings MN MPO workshop		
	2. Travel to workshops		
	3. Attend other meeting related to transportation		
	Total Expense - Training & Travel	**7,901**	**150**
Information Tech & Website 100.4	1. Maintenance of Website - Post minutes, agendas, meeting materials, information		
	Total Staff Expenses	4,936	**100**
	Total Website Expenses	**4,936**	
Program Expenses 100.5	1. Vacation, Sick and Holidays		
	Total Expense - Program Expenses	**14,597**	**300**
Total Expenses - Program Support and Administration		**73,615**	**1500**
	200 Long-Range Planning	**Budget $**	
Transit Development Plan 200.1	1. Coordinate & participation Mankato Transit Development Plan		
	Total Staff Costs - Transit Development Plan	9,031	**155**
	Total Expenses - Transit Development	**9,031**	
Total Expenses - Long-Range Planning		**9,031**	**155**
	300 Short-Range Planning	**Budget $**	
Local Planning Efforts 300.1	1. Continued Trunk Highway 22 Corridor Contract From 2017 Contract with SRF	85,000	
	2. Continued Work on ADA Transition Plan (*$40,845 from unspent 2015 Appropriations)	113,205	
	4. Intersection Study at Hoffman Road and Victory Drive	10,000	
	4. Assist local partners with localized transportation planning efforts as needed		
	5. Coordination and working with local Statewide Health Improvement Program and		
	Active Transportation Groups		
	6. Distribute and share relevant transportation materials & information with area partners		
	Staff Expenses	31,930	**625**
	Total Expenses - Short Range Planning - Local	**240,135**	
State Planning Efforts 300.2	1. Participation in Statewide and District Planning Efforts		
	2. Coordination with MnDOT and local partners for transportation related activities		
	Total Staffing Costs - Short Term Planning - Interagency	10,921	**175**
	Total Expenses - Short Range Planning - Interagency	**10,921**	
Total Expenses - Short-Range Planning		**251,056**	**800**

2018 Program Activity Details Continued

	400 Program Development	Budget $	
Inter Agency - State 400.1	1. TAP LOI Review		
	2. Coordination and review with MnDOT and Transit for STIP		
	Total Staffing Costs - Program Development		
	Total Expenses - Program Development - Interagency	**9,976**	**175**
Inter Agency Local 400.2	1. Public notice of Transportation Improvement Plan (TIP) preparation		
	2. Solicit projects from local partners		
	3. Begin TIP environmental justice analysis		
	4. Conduct consultation with the Greater Mankato Transit		
	5. TIP Development & Documentation		
	6. Coordination with District 7 ATP		
	7. Work with Region 9 RDC & Serve on their Transportation Committee TAC		
	Total Staffing Costs - Inter Agency Local	21,503	**400**
	Total Expenses - Program Development - Interagency	**21,503**	
Total Expenses - Program Development		**31,479**	**575**
	Other Services & Commodities		
	3040 Legal & Advertising	1,000	
	7208 GIS Services (transfer)	5,000	
	3210 Telephone & Postage	500	
	3300 Training, Travel & Conferences	3,000	
	3410 Printing & Publishing	3,000	
	2010 Office Supplies (including software)	750	
	4330 Subscriptions & Memberships	500	
Total Commodities & Other Services		**13,750**	
Total Expenses and Staffing Hours for 2018		**378,931**	**3030**
	* $40,845 from unspent 2015 Appropriations		

2018 Unified Planning Work Program Budget – Federal Funds and Local Match

MAPO FY 2018 Unified Planning Work Program Budget - Federal Funds and Local Match				
UPWP Category	**Project Title**	**Federal Funding Amount**	**Local Funding Amount**	**Total Funding Amount**
100	Program Support	55,874	17,740.66	73,615
200	Long Range Planning	6,855	2,176.40	9,031
300	Short Range Planning	190,553	60,502.59	251,056
400	Program Development	23,893	7,586.20	31,479
	Other Service & Commodies	10,436	3,313.65	13,750
	Funding Totals	287,611	91,319	378,931
Source of Local Funds:				
	Minnesota State Funds		32,698	
	Local Funds		58,622	
	Funding Totals		91,320	

2018 Local Share Amount

2018 LOCAL SHARE AMOUNT		
UNIT OF GOVERNMENT	**LOCAL SHARE**	
Blue Earth County	**$**	**15,436**
Nicollet County	**$**	**4,875**
City of Mankato	**$**	**15,030**
City of North Mankato	**$**	**5,281**
Local Carry Over Assessments	**$**	**18,000**
TOTAL - MAPO	**$**	**58,622**

Local Share Amount by Year

	2013	2014	2015	2016	2017	2018
Blue Earth County	Cover By City of Mankato	$17,316	$8,443	$11,983	$11,196	$15,436
Mankato		$16,824	$8,207	$11,668	$10,901	$15,030
North Mankato		$5,715	$2,787	$4,098	$3,830	$5,281
Nicollet County		$5,223	$2,545	$3,783	$3,535	$4,875

2018 Program Activity Details

2018 Planning Work Program Budget

Account	Funding Source	Funds	Allocation of Funds			
			100	200	300	400
			Program Support	Long Range Planning	Short Range Planning	Program Development
	MAPO Revenue					
	Minnesota Federal Funds	$ 287,611	55,874	6,855	190,533	23,893
		75.9%				
	Local Match - Minnesota Federal Funds	$ 50,447	9,800	1,202	33,423	4,191
		13.3%				
	Minnesota State Funds	$ 32,698	6,352	779	21,664	2,716
		8.6%				
	Local Match - Minnesota State Funds	$ 8,175	1,588	195	5,416	679
		2.2%				
Total Revenue		**$ 378,931**	**$ 73,615**	**$ 9,031**	**$ 251,056**	**$ 31,479**
MAPO Expenses						
	Program Support And Administration	$ 73,615	$ 73,615			
	Long Range Planning	$ 9,031		$ 9,031		
	Short Range Planning	$ 42,851			$ 42,851	
	Program Development	$ 31,479				$ 31,479
	Total Staff Salaries & Benefits	**$ 156,976**				
Commodities & Other Services						
	Legal and Publication	$ 1,000	$ 1,000			
	GIS Services (Transfer)	$ 5,000	$ 5,000			
	Telephone & Postage	$ 500	$ 500			
	Training, Travel & Conferences	$ 3,000	$ 3,000			
	Printing & Publishing	$ 3,000	$ 3,000			
	Office Supplies (Including Software)	$ 750	$ 750			
	Subscriptions and Memberships	$ 500	$ 500			
	Consultant Services	$ 208,205			$ 208,205	
Total Expenses		**$ 378,931**	**$ 87,365**	**$ 9,031**	**$ 251,056**	**$ 31,479**
% of Total Program			23%	2%	66%	8%

Draft 2019 Program Activity Details & Budget

Draft 2019 Program Activity Detail			
	100 Program Support and Administration	**Budget**	**Staff Hours**
Program Support 100.1	1. Prepare agendas and minutes for MAPO Meetings		
	2. Attending MnDOT and local agency meetings		
	3. Prepare and agendas and minutes for TAC meetings		
	4. Attend training, meetings, and conferences		
	5. Review and Update Public Participation Plan		
	6. Prepare billing for local jurisdiction assessment		
	Total Expense - Program Support	**34,898**	**600**
Planning Work Program 100.2	1. Prepare UPWP and budget		
	2. Review with MnDOT and FHWA		
	3. Reporting to MnDOT & FHWA		
	Total Expense - Planning Work Program	**8,725**	**150**
Training and Travel 100.3	1. Travel to MPO Directors meetings MN MPO workshop		
	2. Travel to workshops		
	3. Attend other meeting related to transportation		
	Total Expense - Training & Travel	**8,725**	**150**
Information Tech & Website 100.4	1. Maintenance of Website - Post minutes, agendas, meeting materials, information		
	Total Staff Expenses	6,325	**125**
	Total Website Expenses	**6,325**	
Program Expenses 100.5	1. Vacation, Sick and Holidays		
	Total Expense - Program Expenses	**16,795**	**325**
Total Expenses - Program Support and Administration		**75,467**	**1350**
	200 Long-Range Planning	**Budget $**	
LRTP Development 200.1	1. Start LRTP process update including RFP		
	Total Expenses - LRTP Development	8,725	**150**
		8,725	
Total Expenses - Long-Range Planning		**8,725**	**150**
	300 Short-Range Planning	**Budget $**	
	1. Pavement Management Plan	100,000	
	2. Cotinued ADA Transition Plan	20,000	
	3. Highway 169 / Highway 14 Area Study	80,000	
	4. Coordination and working with local Statewide Health Improvement Program		
	5. Distribute and share relevant transportation materials & information with area partners		
	Staff Expenses	33,626	**500**
	Total Expenses - Short Range Planning - Local	**233,626**	
State Planning Efforts 300.2	1. Participation in Statewide and District Planning Efforts		
	2. Coordination with MnDOT and local partners		
	Total Staffing Costs - Short Term Planning - Interagency	9,670	**175**
	Total Expenses - Short Range Planning - Interagency	**9,670**	
Total Expenses - Short-Range Planning		**243,296**	**675**
	400 Program Development	**Budget $**	
Inter Agency - State 400.1	1. TAP LOI Review		
	2. Coordination and review with MnDOT and Transit for STIP		
	Total Staffing Costs - Program Development		
	Total Expenses - Program Development - Interagency	**8,725**	**150**
Inter Agency Local 400.2	1. Public notice of Transportation Improvement Plan (TIP) preparation		
	2. Solicit projects from local partners		
	3. Begin TIP environmental justice analysis		
	4. Conduct consultation with the Greater Mankato Transit		
	5. TIP Development & Documentation		
	6. Coordination with District 7 ATP		
	7. Work with Region 9 RDC & Serve on their Transportation Committee TAC		
	Total Staffing Costs - Inter Agency Local	24,174	**425**
	Total Expenses - Program Development - Interagency	**24,174**	
Total Expenses - Program Development		**32,899**	**575**
	Other Services & Commodities		
	3040 Legal & Advertising	1,000	
	7208 GIS Services (transfer)	5,000	
	3210 Telephone & Postage	500	
	3300 Training, Travel & Conferences	3,000	
	3410 Printing & Publishing	2,000	
	2010 Office Supplies (including software)	750	
	4330 Subscriptions & Memberships	500	
Total Commodities & Other Services		**12,750**	
Total Expenses and Staffing Hours for 2019		**373,137**	**2750**

Appendix B: MAPO Meeting Locations, Times & Contact information

MAPO Meeting Locations and Times

- The 2017 MAPO Policy Board meetings are typically held every other month on the 1st Thursday of the month unless notified otherwise. Board meeting will be held in the Minnesota River Room, 1st Floor of the Intergovernmental Center at 6:00 pm, 10 Civic Center Plaza, Mankato, MN 56001.

- The MAPO Technical Advisory Committee meetings are typically held every other month on the 3rd Thursday of every month unless notified otherwise. TAC meeting will be held in the Minnesota River Room at 1:30 pm, 1st Floor of the Intergovernmental Center Mankato, Mankato, MN 56001.

MAPO Contact information

Mailing Address:
Mankato/North Mankato Area Planning Organization
10 Civic Center Plaza
Mankato, MN 56001

Website: www.mnmapo.org
Fax: 507-388-7530

Executive Director: Paul Vogel
Direct: 507-387-8613
pvogel@mankatomn.gov

Appendix C: Adopting Resolution

Resolution Adopting 2018 Unified Planning Work Program for the Mankato/North Mankato Area Planning Organization

WHEREAS, the Mankato/North Mankato Area Planning Organization (MAPO) was created as the MPO for the Mankato/North Mankato urbanized area through a Joint Powers Agreement between all local units of government located within the urbanized area; and

WHEREAS, MAPO is the metropolitan planning body responsible for performing transportation planning in conformance with State and Federal regulation for Metropolitan Planning Organizations; and

WHEREAS, the MAPO is recognized by the Governor of Minnesota as the transportation planning policy body for the Mankato/North Mankato urbanized area; and

WHEREAS, MAPO commits to providing the 20 percent local match for the federal and state funds.

NOW, THEREFORE, BE IT RESOLVED: that the Policy Board of the MAPO adopts the 2018 Unified Planning Work Program with potential minor amendments or amendments pending Mn/DOT and FHWA comments; and

NOW, THEREFORE, BE IT FURTHER RESOLVED: that the Chairperson of the Policy Board and Executive Director are authorized to execute all State and Federal Grant agreements, contracts and amendments relating to the funding of the Unified Planning Work Program.

CERTIFICATION

State of Minnesota

I hereby certify that the foregoing Resolution is a true and correct copy of the resolution presented to and adopted by the Mankato/North Mankato Area Planning Organization at a duly authorized meeting thereof, held on the 7th day of Sept, as shown by the minutes of said meeting in my possession.

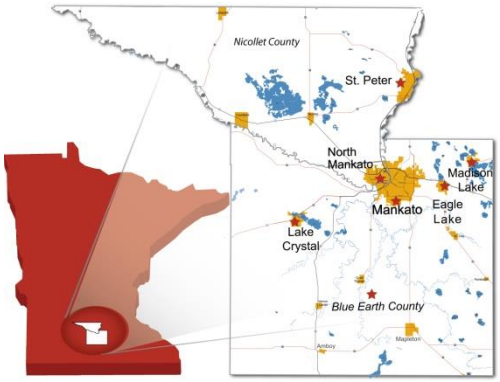
9/7/17

Chair Date

9/7/17

Executive Director Date

Meeting Date: January 11, 2018



AGENDA RECOMMENDATION

Agenda Heading: Resolution Supporting MnDOT Safety Performance Measure Targets
No: 5.2

Agenda Item: Resolution Supporting MnDOT Safety Performance Measure Targets

Recommendation Action(s): Motion to recommend to the MAPO Policy Board to Adopt Resolution Supporting MnDOT Safety Performance Measure Targets

Summary: The Moving Ahead for Progress in the 21st Century (MAP-21) Act instituted transportation performance management for state Departments of Transportation (DOTs) and Metropolitan Planning Organizations (MPOs). State DOTs and MPOs are required to establish targets for each performance measure. As the region's designated MPO, the Mankato/North Mankato Area Planning Organization (MAPO) is required to either agree to support the Minnesota Department of Transportation (MnDOT)'s targets or establish targets specific to the MAPO planning area. It is recommended that the MAPO support the state standards. MPOs must support targets by February 27, 2018. These targets are reported annually and performance data is reported as a component of the Long Range Transportation Plan (LRTP). MAPO's duties consist of:

- Adopt a resolution that supports the state safety targets or establishes its own.
- Report the safety targets to MnDOT annually. An annual resolution will serve as the MAPO's documentation.
- Report baseline safety performance and MAPO's progress toward achieving its targets in the system performance report component of the LRTP. This can be accomplished as part of the normal plan update cycle.
- Incorporate the targets into the Transportation Improvement Program (TIP).

The MAPO will plan and program projects so that the projects contribute to the accomplishment of MnDOT's calendar year 2018 targets of:

- number of fatalities: 375
- rate of fatalities: 0.62/100 million vehicle miles traveled
- number of serious injuries: 1,935
- rate of serious injuries: 3.19/100 million vehicle miles traveled
- number of non-motorized fatalities and non-motorized serious injuries: 348

Attachments:
Resolution Supporting MnDOT Safety Performance Measure Targets

RESOLUTION OF THE MANKATO/NORTH MANKATO AREA PLANNING ORGANIZATION (MAPO)

Supporting MnDOT Performance Measure Targets

Whereas, the U.S. Department of Transportation established five performance measures for the Highway Safety Improvement Program (HSIP) as detailed in 23 CFR 490, Subpart B, National Performance Measures for the Highway Safety Improvement Program;

Whereas, the Minnesota Department of Transportation (MnDOT) established performance targets for each of the five HSIP performance measures in accordance with 23 CFR 490.209; and

Whereas, metropolitan planning organizations (MPOs) must establish performance targets for each of the HSIP performance measures; and

Whereas, MPOs establish HSIP targets by either agreeing to plan and program projects so that they contribute to the accomplishment of the State DOT HSIP target or commit to a quantifiable HSIP target for the metropolitan planning area; and

Now, therefore, be it resolved, that the Mankato/North Mankato Area Planning Organization (MAPO) agrees to plan and program projects so that the projects contribute to the accomplishment of MnDOT's calendar year 2018 HSIP targets as:

- number of fatalities: 375
- rate of fatalities: 0.62/100 million vehicle miles traveled
- number of serious injuries: 1,935
- rate of serious injuries: 3.19/100 million vehicle miles traveled
- number of non-motorized fatalities and non-motorized serious injuries: 348

CERTIFICATION

I hereby certify that the foregoing Resolution is a true and correct copy of the resolution presented to and adopted by the Mankato/North Mankato Area Planning Organization at a duly authorized meeting thereof, held on the 18th day of January, 2018 as shown by the minutes of said meeting in my possession.

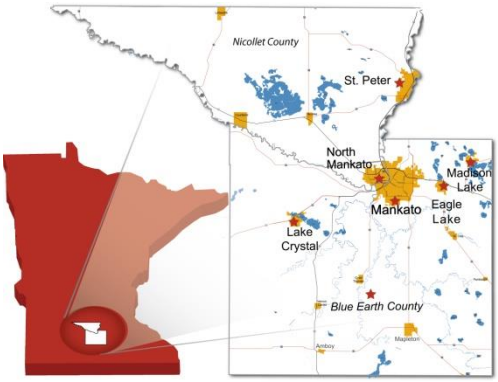
_____

Chair Date

_____

Executive Director Date

Meeting Date: January 11, 2018



AGENDA RECOMMENDATION

Agenda Heading: Amendment to the 2018-2021 Transportation Improvement Program (TIP) No: 5.3

Agenda Item: Amendment to the 2018-2021 Transportation Improvement Program (TIP)

Recommendation Action(s): Motion to recommend that the MAPO Policy Board approve the Resolution to Amend the 2018-2021 Transportation Improvement Program.

Summary:
A brief project description will be delivered by Lisa Bigham, MnDOT District 7 Planning Director.

The US Highway 14 project SP 0702-125 SEQ. #1129 is currently scheduled in Fiscal Year (FY) 2019 as an Early Let Late Award (ELLA). This project needs to be moved into FY 2018 to allow for coordination of construction with a flood mitigation project being done within the project limits. The total cost for the project needs to updated to $5,100,000. The project is comprised of approximately 9.2 miles of US 14, from 0.3 miles west of Lookout Drive to 0.5 miles east of CSAH 86. The work will involve mill and overlay.

The project SP 0702-125 will require $4,080,000 in federal funds and $1,020,000 in state funds for a total project cost of $5,100,000. The project SP 0804-81 SEQ#1085 was let and came in under and had a cost savings of $2,919,703 in federal funds and $729,926 in state funds. The project SP 5209-74 SEQ.#1090 was also let and came in under with a cost savings of $3,215,966 federal funds and $491,491 in state funds. SP 0702-125 will use the cost savings from these two projects leaving $2,055,669 in federal funds and $201,417 in state funds available for use on a future project, therefore fiscal constraint is maintained.

Attachments:
Resolution Supporting Amendment to 2018-2021 Transportation Improvement Program

RESOLUTION OF THE MANKATO/NORTH MANKATO AREA PLANNING ORGANIZATION AMENDING THE 2018-2021 TRANSPORTATION IMPROVEMENT PROGRAM (TIP)

WHEREAS, the Mankato/North Mankato Area Planning Organization (MAPO) was created as the MPO for the Mankato/North Mankato urbanized area through a joint powers Agreement between all local units of government located within the urbanized area; and

WHEREAS, MAPO is the metropolitan planning body responsible for performing transportation planning in conformance with State and Federal regulation for Metropolitan Planning Organizations; and

WHEREAS, staff and the MAPO Technical Advisory Committee has recommended an Amendment to the 2018-2021 Transportation Improvement Program (TIP); and

WHEREAS, the Amendment to the 2018-2021 TIP shall be described as the transition of project SP 0702-125 SEQ. #1129, a project located along approximately 9.2 miles of US Highway 14, from 0.3 miles west of Lookout Drive to 0.5 miles east of CSAH 86, from FY 2019 to FY 2018; and

WHEREAS, the current 2018-2021 Transportation Improvement Program and future Transportation Improvement Programs will be updated to reflect the changes.

NOW, THEREFORE BE IT RESOLVED; that the Mankato / North Mankato Area Planning Organization Policy Board approves the Amendment as presented to the 2018-2021 Transportation Improvement Program.

CERTIFICATION

State of Minnesota

I hereby certify that the foregoing Resolution is a true and correct copy of the resolution presented to and adopted by the Mankato/North Mankato Area Planning Organization at a duly authorized meeting thereof, held on the 18th day of January, 2018 as shown by the minutes of said meeting in my possession.

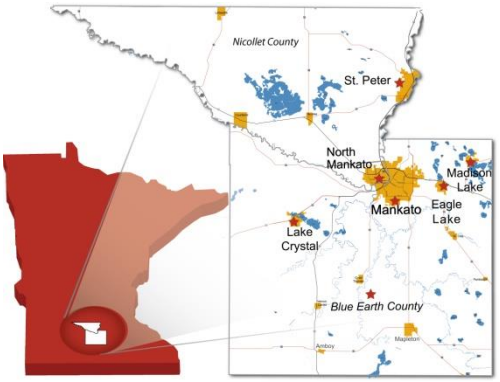
_____

Chair Date

_____

Executive Director Date

Meeting Date: January 11, 2018



AGENDA RECOMMENDATION

Agenda Heading: Transportation Alternatives Program LOI Review Process Update
No: 6.1

Agenda Item: Transportation Alternatives Program LOI Review Process Update

Recommendation Action(s): Informational & Discussion

Summary: Per Area Transportation Partnership (ATP) protocol, Mankato/North Mankato Area Planning Organization (MAPO) staff must meet with and advise prospective qualified applicants for the current year's Transportation Alternatives Program (TAP) solicitation. This is accomplished through an informational review and discussion of the applicants' submitted Letter of Interest (LOI). There were three TAP applicants within the MAPO jurisdiction:

- Blue Earth County: Proposed project was comprised of the construction of a grade-separated pedestrian & bicycle trail along County State Aid Highway (CSAH) 16 (Stoltzman Road) from CSAH 60 (Stadium Road) to Mankato West High School (Pleasant Street) in the City of Mankato.

- The City of Mankato: Proposed project was comprised of the installation of a signalized crosswalk directly north of Rosa Parks Elementary School on Timberwolf Drive, as well as converting the 3-way crosswalk at the intersection of Timberwolf Drive and Heron Drive to a 4-way crosswalk in the City of Mankato.

- The Township of Mankato: Proposed project was comprised of the removal and preservation of the historic Kern Bridge in the Township of Mankato.

MAPO staff met with representatives of Blue Earth County and the Township of Mankato and discussed respective projects' scope, funding, and viability. Because the same MAPO staff person conducting LOI reviews also submitted the City of Mankato's LOI, the City of Mankato LOI was reviewed by ATP and Region Nine staff. This was done to avoid any appearance of conflict of interest.

Attachments:

1. Blue Earth County TAP LOI review
2. City of Mankato TAP LOI review
3. Mankato Township TAP LOI review

RDO/MPO Letter of Intent Review sheet

(Applicants do not need to complete this check-list, but should be prepared to answer these questions during a follow-up conversation with their respective Regional Development Organization or MAPO).

Proposed project name: CSAH 16 Pedestrian & Bicycle Trail

Applicant/Sponsor interviewed: Ryan Thilges, P.E., County Engineer / Public Works Director

Date of LOI interview: November 13, 2017

Interviewer: Charles Androsky, Transportation Planner, MAPO

The following is a list of questions that the reviewing party should discuss with the applicant prior to recommending the project to continue to the full application.

1. **Is the project eligible to receive federal funding through the Transportation Alternatives Program?** *Does the project meet one of the qualifying criteria below?*

   ☒ Construction, planning, and design of on-road and off-road trail facilities for pedestrians, bicyclists, and other non-motorized forms of transportation, including sidewalks, bicycle infrastructure, pedestrian and bicycle signals, traffic calming techniques, lighting and other safety-related infrastructure, and transportation projects to achieve compliance with the Americans with Disabilities Act of 1990 (42 U.S.C. 12101 et seq.).

   ☒ Construction, planning, and design of infrastructure-related projects and systems that will provide safe routes for non-drivers, including children, older adults, and individuals with disabilities to access daily needs.

   ☐ Conversion and use of abandoned railroad corridors for trails for pedestrians, bicyclists, or other non-motorized transportation users.

   ☐ Construction of turnouts, overlooks, and viewing areas.

   ☐ Community improvement activities, *which include but are not limited to* —

      a. inventory, control, or removal of outdoor advertising;
      b. historic preservation and rehabilitation of historic transportation facilities;
      c. vegetation management practices in transportation rights-of-way to improve roadway safety, prevent against invasive species, and provide erosion control; and
      d. archaeological activities relating to impacts from implementation of a transportation project eligible under this title.

   ☒ Any environmental mitigation activity, including pollution prevention and pollution abatement activities and mitigation to:

      a. address storm water management, control, and water pollution prevention or abatement related to highway construction or due to highway runoff, including activities described in sections 12 U.S.C. 133 (b)(3) [as amended under the FAST Act], 328 (a), and 329 of title 23; or
      b. reduce vehicle-caused wildlife mortality or to restore and maintain connectivity among terrestrial or aquatic habitats (Former 23 U.S.C 213(b)(2)-(4)).

   ☐ The recreational trails program under 23 U.S.C. 206 of title 23.

   ☐ The safe routes to school program eligible projects and activities listed at section 1404(f) of the SAFETEA-LU:

      - Infrastructure-related projects.
      - Non-infrastructure-related activities.

- SRTS coordinator. SAFETEA-LU section 1404(f)(2)(A) lists "managers of safe routes to school programs" as eligible under the noninfrastructure projects.

☐ Planning, designing, or constructing boulevards and other roadways largely in the right-of-way of former Interstate System routes or other divided highways.

- See *Boulevards from Divided Highways* for examples.

2. Is the projects primary function a transportation purpose?

"Transportation purpose" has been defined as primarily serving a commuting purpose and/or that connect two destination points; a facility may serve both a transportation purpose and a recreational purpose; a facility that connects people to recreational destinations may be considered to have a transportation purpose.

☒ *The projects primary function is a transportation purpose*

3. Does the applicant have a clear concept of the project for which they are applying for TA funding as well as a clear understanding of the costs associated with the project?

Have the applicant tell you about their project. You should be able to gauge their level of knowledge and project readiness by the depth of clarity about the project details.

☒ Are they clear about what they want to do?

☐ Are they searching for funds and creating a project to fit the funds?

☒ Is it more than a concept?

☒ Has there been good communication with an engineer who can identify costs involved with the various stages of the project?

Applicant is advised to include detailed cost estimation in application.

4. Has the project received written support or equivalent from the sponsoring agency including elected officials and engineers responsible for project delivery?

☐ Do they have written support/resolution from their local unit of government?

Applicant does not have letters yet. There is support for this project outlined within the Blue Earth County Highway Department 5-Year Capital Improvements Plan. Applicant is advised to obtain letters of specific support.

☐ *Do they have written support/resolution from their sponsoring agency, if required*?

As funding will come from Federal and local municipal sources, there is no sponsoring agency.

☐ Does the sponsoring agency's Engineer support the project?

As funding will come from local and municipal sources, there is no sponsoring agency.

RDO/MPO Letter of Intent Review sheet

(Applicants do not need to complete this check-list, but should be prepared to answer these questions during a follow-up conversation with their respective Regional Development Organization or MAPO).

☐ Does the project involve partnering with and / or crossing private, railroad, other local, state or federal agency controlled land / rights of way? If so, the full application should include a Letter of Support from the agency(ies) involved.

☒ Do they have a licensed engineer hired to handle project development/delivery?

☒ Do they have a current contract with their licensed engineer of record?

5. Does this project involve the need to acquire Right of Way or temporary easement, (including railroad)[1], access change, or relocation?

☒Yes ☐No

Among the possible routes discussed, there was some routing through land currently owned by the City of Mankato. The Applicant is advised to obtain a letter of written support from the City.

Does the applicant and/or sponsoring agency have a plan or commitment and timeline to acquire or purchase the necessary right of way (if applicable)? ☒Yes ☐No

6. These questions will help reduce any potential for project "slippage". They should be aware of the following potential issues:

Does the project use Section 4(f) Park Lands or properties and / or Section 6(f)?[2] ☐Yes ☐No
Unclear at time of interview. Applicant is advised to address this issue in application.

Does the project occur within any areas of effect on properties listed, or eligible for listing, on the National Register of Historic Places? ☐Yes ☐No
Unclear at time of interview. Applicant is advised to address this issue in application.

Does the project affect species or critical habitat protected by the Endangered Species Act? ☐Yes ☐No
Unclear at time of interview. Applicant is advised to address this issue in application.

Does the project involve removal of trees?[3] ☒Yes ☐No
Does the project have a high risk of hazardous materials involvement? ☐Yes ☒No
Does the project involve placement of fill into Waters of the U.S.? ☒Yes ☐No
Does the project encroach into a floodplain /wetlands? ☒Yes ☐No
Does the project significantly impact air quality in a negative manner? ☐Yes ☒No
Is the project anticipated to be controversial? ☐Yes ☒No
Will the project involve relocation of utilities? (water, sewer, electric, cable)[4] ☐Yes ☒No
Will the project address ADA? ☒Yes ☐No
Does the property involve redevelopment of an area? What was the previous land use? ☐Yes ☒No
Does the project involve properties with previous uses that involved hazardous materials? ☐Yes ☒No

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[1] Public ROW should be all right, Private ROW might be a challenge – ask the city/county engineer to advise applicant of the process and time it takes to accomplish activities so project would be delivered on time if selected.
[2] Section 4(f) includes school property with public use areas, pocket parks, see: for more information http://www.environment.fhwa.dot.gov/4f/4fAtGlance.asp Section 6(f) is LAWCON http://www.dnr.state.mn.us/aboutdnr/lawcon/index.html
[3] Tree removal is turning out to be a huge issue with the Northern Long-eared Bat. This currently impacts the entire state.
[4] Gopher 1 call - can place an initial request so applicants would have an idea of time required. It normally takes a couple of weeks – because it is not priority for gopher 1

Does the project come near (within 600') of railroad property? [5] ☐Yes ☒No

Is the project within the airport influence zone? [6] ☐Yes ☒No

7. Is the applicant aware of the federal transportation infrastructure project development process and other requirements associated with the receipt of TA funding, including the environmental documentation requirements?

The Applicant has a successful history of delivering federally funded construction contracts.

Following is a partial listing of the regulations that apply to any project receiving federal transportation funds. Ask the applicant if they are familiar with the following federal regulations:

☒ Davis-Bacon and Copeland Acts: Payment of pre-determined wage is applicable to all federal-aid construction contracts exceeding $2,000 and to all related subcontracts.

☒ ADA Requirements: All transportation alternative projects must comply with the federal and state handicapped accessibility mandates.

☒ Anti-Discrimination Laws: Each sponsoring participant must comply with applicable federal and state Anti-discrimination laws and be able to demonstrate compliance.

☒ Project Supervision: All projects must be under the direct supervision of a Minnesota Licensed Professional Engineer.

☒ Environmental Documentation (NEPA) - Avoid, Minimize, Mitigate.

☒ Contract procurement laws and requirements.

8. Is the project identified in a Plan?

Preference will be given to projects that have been identified in a local, regional, or state plan, and have included public involvement.

☒ The project is identified in a plan _ a need for a bicycle and pedestrian connection along the route of this project is identified to varying degrees in the Blue Earth County Highway Department 5-Year Capital Improvement Plan, Mankato/North Mankato Area Planning Organization (MAPO) 2045 Long Range Transportation Plan, and City of Mankato Complete Streets Plan, Mankato Area Public School's Safe Routes to School Plan.

☒ The plan development included a robust public involvement process

The plans identified each had varying levels of public involvement.

☒ Does the public have knowledge of the project and support it? [7]

☒ There has not been any public objection to this project

☒ Applicant is aware that they need to submit the page from the plan that identifies this project[8]

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[5] Connect applicant up with the office of Freight and Waterways for a diagnostic (in southern MN that is Bob Rucker 651.366.3641 robert.rucker@state.mn.us; 600' triggers potential railroad involvement;

[6] Connect applicant up with the aeronautics office- the contact is Rylan Juran, - rylan.juran@state.mn.us - 651-234-7190 airport influence map www.dot.state.mn.us/aero/airportinfluencemaps.html May want to connect the applicant with local airport to see if it is in Zone A, B, C.

[7] Describe – there are various levels of public support or involvement.

[8] Planner may wish to ask for copy of the plans if they are unfamiliar with them

☒ Describe proactive promotion of bike and pedestrian facilities / use if applicable.
The project is a pedestrian and bicycle trail.

9. Is the project an approved Safe Routes to School project?

☐ The project is a SRTS project
Although not specifically delineated in the adopted SRTS plan, the project is well in-line with the spirit, goals, and geographies outlined in the plan.
☐ The school/community has a comprehensive 5E program. Is the applicant pursuing or demonstrating all 5Es?
☐ The MnDOT SRTS Coordinator is aware of the project and supports the application
☐ The applicant understands that the MnDOT SRTS Coordinator will need to sign off on the TA application

10. If Rehabilitation / Replacement / Reconstruction, how was it funded?

If previously funded with federal TEA $ we need to make sure it is beyond the life of the project.

☐ Past TEA project _____ year constructed.

11. Has the applicant and/or sponsoring agency developed a financial strategy to match the federal funding and any additional funding necessary to complete your proposed project?

This question will help gauge their understanding of required match. It is also important to identify whether their match has been verbally committed, is budgeted, or has actually been set aside. *Their match has been:*

☐ Verbally committed ☒ Budgeted

☐ Funds are already encumbered and specifically designated for this project

Do they understand that the TA program can only cover "federal eligible costs" (examples of "ineligible" costs include right of way acquisition, preliminary and construction engineering, etc)? ☒Yes ☐No

If additional funds are required due to unforeseen circumstances, would they be able to come up with the additional funds? ☒Yes ☐No

Are there other funding sources they will be using for this project (e.g. MnDOT, DNR, LCCMR, State Aid)? ☐Yes ☐No

Unclear at time of interview, Applicant is advised to address this issue fully in application.

Do any of the funds have time related requirements? ☒Yes ☐No

If Yes, will the schedule work with the TA funding schedule? ☒Yes ☐No ___04

Are they looking at advance construction? ☐Yes: year _____ ☒No

RDO/MPO Letter of Intent Review sheet

(Applicants do not need to complete this check-list, but should be prepared to answer these questions during a follow-up conversation with their respective Regional Development Organization or MAPO).

RDO/MPO Comments and Recommendation:

MAPO supports the submission of a full application for the CSAH 16 Pedestrian & Bicycle Trail. The applicant was/is advised to:

1. Obtain written support from local units of government, including Blue Earth County and the City of Mankato.
2. Include with application the pages from the various plans which describe the project need (the Blue Earth County Highway Department 5-Year Capital Improvement Plan, Mankato/North Mankato Area Planning Organization (MAPO) 2045 Long Range Transportation Plan, and City of Mankato Complete Streets Plan, Mankato Area Public School's Safe Routes to School Plan).
3. Address if the project occurs on Section 4(f) Park Lands or properties and / or Section 6(f).
4. Address if the project occurs within any areas of effect on properties listed, or eligible for listing, on the National Register of Historic Places.
5. Address if the project affects species or critical habitat protected by the Endangered Species Act.
6. Address placement of fill in waters of the U.S.
7. The applicant presented the opportunity for an alternative route adjustment. In the event the initial route encounters impediments, a contingency route is available. The applicant is advised to detail both routes and obtain written support from all landowning parties on potential routes.
8. Address if other funding sources will be sued for this project (e.g. MnDOT, DNR, LCCMR, State Aid).

RDO/MPO Letter of Intent Review sheet

(Applicants do not need to complete this check-list, but should be prepared to answer these questions during a follow-up conversation with their respective Regional Development Organization or MAPO).

Proposed project name: Timberwolf Drive Schoolchild Pedestrian Crosswalk

Applicant/Sponsor interviewed: City of Mankato: Charles Androsky, Mark Anderson, Landon Bode

Date of LOI interview: November 7, 2017

Interviewer: Annette Fiedler, Sam Parker

The following is a list of questions that the reviewing party should discuss with the applicant prior to recommending the project to continue to the full application.

1. **Is the project eligible to receive federal funding through the Transportation Alternatives Program?** *Does the project meet one of the qualifying criteria below?*

☒ Construction, planning, and design of on-road and off-road trail facilities for pedestrians, bicyclists, and other non-motorized forms of transportation, including sidewalks, bicycle infrastructure, pedestrian and bicycle signals, traffic calming techniques, lighting and other safety-related infrastructure, and transportation projects to achieve compliance with the Americans with Disabilities Act of 1990 (42 U.S.C. 12101 et seq.).

☒ Construction, planning, and design of infrastructure-related projects and systems that will provide safe routes for non-drivers, including children, older adults, and individuals with disabilities to access daily needs.

☐ Conversion and use of abandoned railroad corridors for trails for pedestrians, bicyclists, or other non-motorized transportation users.

☐ Construction of turnouts, overlooks, and viewing areas.

☐ Community improvement activities, *which include but are not limited to* —

a. inventory, control, or removal of outdoor advertising;
b. historic preservation and rehabilitation of historic transportation facilities;
c. vegetation management practices in transportation rights-of-way to improve roadway safety, prevent against invasive species, and provide erosion control; and
d. archaeological activities relating to impacts from implementation of a transportation project eligible under this title.

☐ Any environmental mitigation activity, including pollution prevention and pollution abatement activities and mitigation to:

a. address storm water management, control, and water pollution prevention or abatement related to highway construction or due to highway runoff, including activities described in sections 12 U.S.C. 133 (b)(3) [as amended under the FAST Act], 328 (a), and 329 of title 23; or
b. reduce vehicle-caused wildlife mortality or to restore and maintain connectivity among terrestrial or aquatic habitats (Former 23 U.S.C 213(b)(2)-(4)).

☐ The recreational trails program under 23 U.S.C. 206 of title 23.

☒The safe routes to school program eligible projects and activities listed at section 1404(f) of the SAFETEA-LU:

- Infrastructure-related projects.
- Non-infrastructure-related activities.

- SRTS coordinator. SAFETEA-LU section 1404(f)(2)(A) lists "managers of safe routes to school programs" as eligible under the noninfrastructure projects.

☐ Planning, designing, or constructing boulevards and other roadways largely in the right-of-way of former Interstate System routes or other divided highways.

- See *Boulevards from Divided Highways* for examples.

2. Is the projects primary function a transportation purpose?

"Transportation purpose" has been defined as primarily serving a commuting purpose and/or that connect two destination points; a facility may serve both a transportation purpose and a recreational purpose; a facility that connects people to recreational destinations may be considered to have a transportation purpose.

☒ *The projects primary function is a transportation purpose*

3. Does the applicant have a clear concept of the project for which they are applying for TA funding as well as a clear understanding of the costs associated with the project?

Have the applicant tell you about their project. You should be able to gauge their level of knowledge and project readiness by the depth of clarity about the project details.

☒ Are they clear about what they want to do?

☐ Are they searching for funds and creating a project to fit the funds?

☐ Is it more than a concept?

☒ Has there been good communication with an engineer who can identify costs involved with the various stages of the project?

The project specifics and cost details will be more detailed for the application.

4. Has the project received written support or equivalent from the sponsoring agency including elected officials and engineers responsible for project delivery?

☐ Do they have written support/resolution from their local unit of government?

☐ *Do they have written support/resolution from their sponsoring agency, if required*?

☒ Does the sponsoring agency's Engineer support the project?

☐ Does the project involve partnering with and / or crossing private, railroad, other local, state or federal agency controlled land / rights of way? If so, the full application should include a Letter of Support from the agency(ies) involved.

☒ Do they have a licensed engineer hired to handle project development/delivery?

☒ Do they have a current contract with their licensed engineer of record?

The Mankato City Council will provide a resolution.

5. **Does this project involve the need to acquire Right of Way or temporary easement, (including railroad)[1], access change, or relocation?**

☐Yes ☒No

Does the applicant and/or sponsoring agency have a plan or commitment and timeline to acquire or purchase the necessary right of way (if applicable)? ☐Yes ☐No

6. **These questions will help reduce any potential for project "slippage". They should be aware of the following potential issues:**

Does the project use Section 4(f) Park Lands or properties and / or Section 6(f)?[2]	☐Yes	☒No
Does the project occur within any areas of effect on properties listed, or eligible for listing, on the National Register of Historic Places?	☐Yes	☒No
Does the project affect species or critical habitat protected by the Endangered Species Act?	☐Yes	☒No
Does the project involve removal of trees?[3]	☒Yes	☐No
Does the project have a high risk of hazardous materials involvement?	☐Yes	☒No
Does the project involve placement of fill into Waters of the U.S.?	☐Yes	☒No
Does the project encroach into a floodplain /wetlands?	☐Yes	☒No
Does the project significantly impact air quality in a negative manner?	☐Yes	☒No
Is the project anticipated to be controversial?	☐Yes	☒No
Will the project involve relocation of utilities? (water, sewer, electric, cable)[4]	☒Yes	☐No
Will the project address ADA?	☒Yes	☐No
Does the property involve redevelopment of an area? What was the previous land use?	☐Yes	☒No
Does the project involve properties with previous uses that involved hazardous materials?	☐Yes	☒No
Does the project come near (within 600') of railroad property? [5]	☐Yes	☒No
Is the project within the airport influence zone? [6]	☐Yes	☒No

[1] Public ROW should be all right, Private ROW might be a challenge – ask the city/county engineer to advise applicant of the process and time it takes to accomplish activities so project would be delivered on time if selected.
[2] Section 4(f) includes school property with public use areas, pocket parks, see: for more information http://www.environment.fhwa.dot.gov/4f/4fAtGlance.asp Section 6(f) is LAWCON http://www.dnr.state.mn.us/aboutdnr/lawcon/index.html
[3] Tree removal is turning out to be a huge issue with the Northern Long-eared Bat. This currently impacts the entire state.
[4] Gopher 1 call - can place an initial request so applicants would have an idea of time required. It normally takes a couple of weeks – because it is not priority for gopher 1
[5] Connect applicant up with the office of Freight and Waterways for a diagnostic (in southern MN that is Bob Rucker 651.366.3641 robert.rucker@state.mn.us; 600' triggers potential railroad involvement;
[6] Connect applicant up with the aeronautics office- the contact is Rylan Juran, - rylan.juran@state.mn.us - 651-234-7190 airport influence map www.dot.state.mn.us/aero/airportinfluencemaps.html May want to connect the applicant with local airport to see if it is in Zone A, B, C.

Project could involve removing (and replacing) some trees, depending on specific placement. Tree removal timing was discussed. Some minor utilities may have to be moved, which will be addressed in the application.

7. Is the applicant aware of the federal transportation infrastructure project development process and other requirements associated with the receipt of TA funding, including the environmental documentation requirements?

Following is a partial listing of the regulations that apply to any project receiving federal transportation funds. Ask the applicant if they are familiar with the following federal regulations:

☒Davis-Bacon and Copeland Acts: Payment of pre-determined wage is applicable to all federal-aid construction contracts exceeding $2,000 and to all related subcontracts.

☒ADA Requirements: All transportation alternative projects must comply with the federal and state handicapped accessibility mandates.

☒Anti-Discrimination Laws: Each sponsoring participant must comply with applicable federal and state Anti-discrimination laws and be able to demonstrate compliance.

☒Project Supervision: All projects must be under the direct supervision of a Minnesota Licensed Professional Engineer.

☒Environmental Documentation (NEPA) - Avoid, Minimize, Mitigate.

☒Contract procurement laws and requirements.

City of Mankato familiar with requirements.

8. Is the project identified in a Plan?

Preference will be given to projects that have been identified in a local, regional, or state plan, and have included public involvement.

☒ The project is identified in a plan **SRTS Plan identified priorities, although not this specific crossing as the neighborhood has developed since the plan's completion. SRTS referenced in the City of Mankato's Complete Streets Plan.**
(name of all plans)

☒ The plan development included a robust public involvement process **SRTS plan.**

☒ Does the public have knowledge of the project and support it? [7]**Letters of support available.**

☒ There has not been any public objection to this project

[7] Describe – there are various levels of public support or involvement.

☒ Applicant is aware that they need to submit the **page** from the plan that identifies this project[8]

☐ Describe proactive promotion of bike and pedestrian facilities / use if applicable.

Are there SRTS activities happening at the school? Walking school bus below. Anything else?

9. Is the project an approved Safe Routes to School project?

☒ The project is a SRTS project

☒ The school/community has a comprehensive 5E program. Is the applicant pursuing or demonstrating all 5Es? **Walking school bus used at nearby Rosa Parks Elementary**

☐ The MnDOT SRTS Coordinator is aware of the project and supports the application

☐ The applicant understands that the MnDOT SRTS Coordinator will need to sign off on the TA application

Applicant understands that Dave Cowan of MnDOT will have to support the project and sign off on application.

10. If Rehabilitation / Replacement / Reconstruction, how was it funded?

If previously funded with federal TEA $ we need to make sure it is beyond the life of the project.

☐ Past TEA project _____ year constructed.

11. Has the applicant and/or sponsoring agency developed a financial strategy to match the federal funding and any additional funding necessary to complete your proposed project?

This question will help gauge their understanding of required match. It is also important to identify whether their match has been verbally committed, is budgeted, or has actually been set aside. *Their match has been:*

☒ Verbally committed ☐ Budgeted

☐ Funds are already encumbered and specifically designated for this project

Do they understand that the TA program can only cover "federal eligible costs" (examples of "ineligible" costs include right of way acquisition, preliminary and construction engineering, etc)? ☒Yes ☐No

If additional funds are required due to unforeseen circumstances, would they be able to come up with the additional funds? ☒Yes ☐No

Are there other funding sources they will be using for this project (e.g. MnDOT, DNR, LCCMR, State Aid)? ☐Yes ☒No

[8] Planner may wish to ask for copy of the plans if they are unfamiliar with them

RDO/MPO Letter of Intent Review sheet

(Applicants do not need to complete this check-list, but should be prepared to answer these questions during a follow-up conversation with their respective Regional Development Organization or MAPO).

Do any of the funds have time related requirements? ☐Yes ☒No

If Yes, will the schedule work with the TA funding schedule? ☐Yes ☐No

Are they looking at advance construction? ☐Yes: year **Maybe** ☐No

RDO/MPO Comments and Recommendation: **It is recommended that the City of Mankato move forward with a full application. Due to the federal nature of this work, it is recommended that the city look into bundling other SRTS projects in the Rosa Parks area to reach the $100,000 program goal.**

Showing housing development growth figures is recommended to help the ATP subcommittee better understand the growth of the neighborhood.

RDO/MPO Letter of Intent Review sheet

(Applicants do not need to complete this check-list, but should be prepared to answer these questions during a follow-up conversation with their respective Regional Development Organization or MAPO).

Proposed project name: Historic Kern Bridge Preservation_____

Applicant/Sponsor interviewed: Scott Morgan, representing Mankato Township Board of Directors

Date of LOI interview: November 16, 2017_____

Interviewer: Charles Androsky, Transportation Planner, Mankato/North Mankato Area Planning Organization

The following is a list of questions that the reviewing party should discuss with the applicant prior to recommending the project to continue to the full application.

1. **Is the project eligible to receive federal funding through the Transportation Alternatives Program?** *Does the project meet one of the qualifying criteria below?*

☒ Construction, planning, and design of on-road and off-road trail facilities for pedestrians, bicyclists, and other non-motorized forms of transportation, including sidewalks, bicycle infrastructure, pedestrian and bicycle signals, traffic calming techniques, lighting and other safety-related infrastructure, and transportation projects to achieve compliance with the Americans with Disabilities Act of 1990 (42 U.S.C. 12101 et seq.).
The Applicant presented a range of options for a final bridge destination and use. Depending on which destination is selected, the project could serve variable uses. The current project goal is to serve pedestrians and bicyclists. Due to the bridge's significant historical value, there is a possibility that the bridge could serve as a nonfunctioning historical piece.

☒ Construction, planning, and design of infrastructure-related projects and systems that will provide safe routes for non-drivers, including children, older adults, and individuals with disabilities to access daily needs.
All potential project iterations would be compliant with safety and ADA-related regulation.

☐ Conversion and use of abandoned railroad corridors for trails for pedestrians, bicyclists, or other non-motorized transportation users.

☐ Construction of turnouts, overlooks, and viewing areas.

☐ Community improvement activities, *which include but are not limited to* —

   a. inventory, control, or removal of outdoor advertising;
   b. historic preservation and rehabilitation of historic transportation facilities;
   c. vegetation management practices in transportation rights-of-way to improve roadway safety, prevent against invasive species, and provide erosion control; and
   d. archaeological activities relating to impacts from implementation of a transportation project eligible under this title.

☒ Any environmental mitigation activity, including pollution prevention and pollution abatement activities and mitigation to:

   a. address storm water management, control, and water pollution prevention or abatement related to highway construction or due to highway runoff, including activities described in sections 12 U.S.C. 133 (b)(3) [as amended under the FAST Act], 328 (a), and 329 of title 23; or

b. reduce vehicle-caused wildlife mortality or to restore and maintain connectivity among terrestrial or aquatic habitats (Former 23 U.S.C 213(b)(2)-(4)).
As a bicycle and pedestrian investment, the project would incentivize alternative transportation, with a proportional decrease in CO2 and particulate emission.

☐ The recreational trails program under 23 U.S.C. 206 of title 23.

Depending on the final site location and conditions, the project could potentially qualify as eligible for the RTP.

☐ The safe routes to school program eligible projects and activities listed at section 1404(f) of the SAFETEA-LU:

- Infrastructure-related projects.
- Non-infrastructure-related activities.
- SRTS coordinator. SAFETEA-LU section 1404(f)(2)(A) lists "managers of safe routes to school programs" as eligible under the noninfrastructure projects.

☐ Planning, designing, or constructing boulevards and other roadways largely in the right-of-way of former Interstate System routes or other divided highways.

- See *Boulevards from Divided Highways* for examples.

2. Is the projects primary function a transportation purpose?

"Transportation purpose" has been defined as primarily serving a commuting purpose and/or that connect two destination points; a facility may serve both a transportation purpose and a recreational purpose; a facility that connects people to recreational destinations may be considered to have a transportation purpose.

☒ *The projects primary function is a transportation purpose*
The current vision is for the bridge to retain its transportation function. It was discussed that the bridge may have possible utility as a nonfunctioning historical piece.

3. Does the applicant have a clear concept of the project for which they are applying for TA funding as well as a clear understanding of the costs associated with the project?

Have the applicant tell you about their project. You should be able to gauge their level of knowledge and project readiness by the depth of clarity about the project details.

☐ Are they clear about what they want to do?

There are currently several final location options. There is variability with regard to storage, receiving parties, timing, cost, and match funding sources. The Applicant was/is encouraged to present as much possible detail if they choose to move forward with application.

☐ Are they searching for funds and creating a project to fit the funds?

☐ Is it more than a concept?

The Applicant was/is encouraged to present as much possible detail if they choose to move forward with application.

☒ Has there been good communication with an engineer who can identify costs involved with the various stages of the project?

RDO/MPO Letter of Intent Review sheet

(Applicants do not need to complete this check-list, but should be prepared to answer these questions during a follow-up conversation with their respective Regional Development Organization or MAPO).

4. Has the project received written support or equivalent from the sponsoring agency including elected officials and engineers responsible for project delivery?

☐ Do they have written support/resolution from their local unit of government?

The Mankato Township Board voiced approval for the current TA grant application. This support is documented in public minutes. The Applicant was/is encouraged to present written support with application.

☐ *Do they have written support/resolution from their sponsoring agency, if required*?

☒ Does the sponsoring agency's Engineer support the project?

☐ Does the project involve partnering with and / or crossing private, railroad, other local, state or federal agency controlled land / rights of way? If so, the full application should include a Letter of Support from the agency(ies) involved.

☒ Do they have a licensed engineer hired to handle project development/delivery?

☒ Do they have a current contract with their licensed engineer of record?

The Township has an active licensed engineer on contract, but the engineer is not currently contracted for this specific project.

5. Does this project involve the need to acquire Right of Way or temporary easement, (including railroad)[1], access change, or relocation?

☐Yes ☒No

Does the applicant and/or sponsoring agency have a plan or commitment and timeline to acquire or purchase the necessary right of way (if applicable)? ☐Yes ☐No

Depending on final destination, the project could necessitate acquisition/purchase of right of way. The Applicant believes this is unlikely.

6. These questions will help reduce any potential for project "slippage". They should be aware of the following potential issues:

Does the project use Section 4(f) Park Lands or properties and / or Section 6(f)?[2] ☐Yes ☒No

Does the project occur within any areas of effect on properties listed, or eligible for listing, on the National Register of Historic Places? ☒Yes ☐No

The bridge is documented on the National Register of Historic Places.

Does the project affect species or critical habitat protected by the Endangered Species Act? ☐Yes ☐No

The Applicant was/is encouraged to address this item in application.

Does the project involve removal of trees?[3] ☒Yes ☐No

The Applicant was/is encouraged to address this item in application.

Does the project have a high risk of hazardous materials involvement? ☐Yes ☐No

Unclear, but the bridge may contain a small amount of lead paint.

Does the project involve placement of fill into Waters of the U.S.? ☐Yes ☒No

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[1] Public ROW should be all right, Private ROW might be a challenge – ask the city/county engineer to advise applicant of the process and time it takes to accomplish activities so project would be delivered on time if selected.

[2] Section 4(f) includes school property with public use areas, pocket parks, see: for more information http://www.environment.fhwa.dot.gov/4f/4fAtGlance.asp Section 6(f) is LAWCON http://www.dnr.state.mn.us/aboutdnr/lawcon/index.html

[3] Tree removal is turning out to be a huge issue with the Northern Long-eared Bat. This currently impacts the entire state.

Does the project encroach into a floodplain /wetlands?	☐Yes	☒No
Does the project significantly impact air quality in a negative manner?	☐Yes	☒No
Is the project anticipated to be controversial?	☐Yes	☒No
Will the project involve relocation of utilities? (water, sewer, electric, cable)[4]	☐Yes	☒No
Will the project address ADA?	☒Yes	☐No
Does the property involve redevelopment of an area? What was the previous land use?	☐Yes	☒No
Does the project involve properties with previous uses that involved hazardous materials?	☐Yes	☒No
Does the project come near (within 600') of railroad property? [5]	☐Yes	☐No
Potentially, depending on final destination.		
Is the project within the airport influence zone? [6]	☐Yes	☒No

7. Is the applicant aware of the federal transportation infrastructure project development process and other requirements associated with the receipt of TA funding, including the environmental documentation requirements?

Following is a partial listing of the regulations that apply to any project receiving federal transportation funds. Ask the applicant if they are familiar with the following federal regulations:

- ☒ Davis-Bacon and Copeland Acts: Payment of pre-determined wage is applicable to all federal-aid construction contracts exceeding $2,000 and to all related subcontracts.
- ☒ ADA Requirements: All transportation alternative projects must comply with the federal and state handicapped accessibility mandates.
- ☒ Anti-Discrimination Laws: Each sponsoring participant must comply with applicable federal and state Anti-discrimination laws and be able to demonstrate compliance.
- ☒ Project Supervision: All projects must be under the direct supervision of a Minnesota Licensed Professional Engineer.
- ☒ Environmental Documentation (NEPA) - Avoid, Minimize, Mitigate.
- ☒ Contract procurement laws and requirements.

8. Is the project identified in a Plan?

Preference will be given to projects that have been identified in a local, regional, or state plan, and have included public involvement.

☐ The project is identified in a plan

Depending on final destination and use, the project could potentially meet needs identified in the Minnesota River State Trail Franklin to Le Sueur Master Plan, the Blue Earth County Highway Department 5-Year Capital Improvement Plan, or the Mankato/North Mankato Area Planning Organization (MAPO) 2045 Long Range Transportation Plan.

(name of all plans)

☐ The plan development included a robust public involvement process

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[4] Gopher 1 call - can place an initial request so applicants would have an idea of time required. It normally takes a couple of weeks – because it is not priority for gopher 1

[5] Connect applicant up with the office of Freight and Waterways for a diagnostic (in southern MN that is Bob Rucker 651.366.3641 robert.rucker@state.mn.us; 600' triggers potential railroad involvement;

[6] Connect applicant up with the aeronautics office- the contact is Rylan Juran, - rylan.juran@state.mn.us - 651-234-7190 airport influence map www.dot.state.mn.us/aero/airportinfluencemaps.html May want to connect the applicant with local airport to see if it is in Zone A, B, C.

Each plan had varying levels of public involvement.

☐ Does the public have knowledge of the project and support it? [7]

The project has not yet been widely publicized, but the Applicant believes there will not be much opposition. The project has been discussed at meetings of the Mankato Township Board, the minutes of which are made public.

☒ There has not been any public objection to this project

☒ Applicant is aware that they need to submit the page from the plan that identifies this project[8]

☒ Describe proactive promotion of bike and pedestrian facilities / use if applicable.

As currently understood, the project's ultimate goal is to serve as a bicycle and pedestrian bridge.

9. Is the project an approved Safe Routes to School project?

☐ The project is a SRTS project

☐ The school/community has a comprehensive 5E program. Is the applicant pursuing or demonstrating all 5Es?

☐ The MnDOT SRTS Coordinator is aware of the project and supports the application

☐ The applicant understands that the MnDOT SRTS Coordinator will need to sign off on the TA application

10. If Rehabilitation / Replacement / Reconstruction, how was it funded?

If previously funded with federal TEA $ we need to make sure it is beyond the life of the project.

☐ Past TEA project _____ year constructed.

11. Has the applicant and/or sponsoring agency developed a financial strategy to match the federal funding and any additional funding necessary to complete your proposed project?

This question will help gauge their understanding of required match. It is also important to identify whether their match has been verbally committed, is budgeted, or has actually been set aside. *Their match has been:*

☐ Verbally committed ☐ Budgeted

☐ Funds are already encumbered and specifically designated for this project

The Applicant is actively researching match funding sources. Potential sources include Minnesota Legacy funding, Blue Earth County, the Minnesota DNR, and other MnDOT sources. There was no firm match source as of 11/16/17.

Do they understand that the TA program can only cover "federal eligible costs" (examples of "ineligible" costs include right of way acquisition, preliminary and construction engineering, etc)? ☒Yes ☐No

[7] Describe – there are various levels of public support or involvement.
[8] Planner may wish to ask for copy of the plans if they are unfamiliar with them

RDO/MPO Letter of Intent Review sheet

(Applicants do not need to complete this check-list, but should be prepared to answer these questions during a follow-up conversation with their respective Regional Development Organization or MAPO).

If additional funds are required due to unforeseen circumstances, would they be able to come up with the additional funds? ☐Yes ☐No

Are there other funding sources they will be using for this project (e.g. MnDOT, DNR, LCCMR, State Aid)? ☐Yes ☐No

_____

Do any of the funds have time related requirements? ☐Yes ☐No

If Yes, will the schedule work with the TA funding schedule? ☐Yes ☐No

_____

Are they looking at advance construction? ☐Yes: year _____ ☐No

RDO/MPO Comments and Recommendation:

The MAPO advises the Applicant to assess the options available for final use of the bridge. The Applicant was advised that the estimated project cost of $1,500,000 is significantly higher than the total amount of Transportation Alternatives funding granted to the South Central MN ATP (approx. $700,000). The strength of this project lies in the bridge's noteworthy historic value and potential future use by pedestrians and bicyclists. If the Applicant chooses to proceed with application, they are encouraged to:

1. Communicate both the historic value of the bridge and emphasize the project relationship to pedestrian and bicycle transportation. Although "historic preservation" is listed among the stated goals of the Transportation Alternatives program, the application would be made stronger by an increased emphasis on the potential pedestrian and bicycle utility.

2. Ensure the application presents a comprehensive description of the project. At interview, four potential destinations for the bridge were discussed. Although each prospective destination is feasible, the variability creates a measure of ambiguity. Depending on the bridge's final purpose, there could be potential changes in the project's final outcome with regard to cost, use levels, population served, purpose, etc. For example, cost could vary depending on distance, site conditions, etc. Different geographic locations mean different levels and demographics of population served. If the bridge is installed above or near a high-traffic area, the final utility could include a traffic-calming aspect.

3. Present clear and detailed budgeting information, including sources and amounts of available match funding.

4. As mentioned above, the South Central MN ATP's total funding allotment this round is approximately $700,000. If the Applicant chooses to apply for the full amount of $1,500,000, they are advised to present a clear funding schedule and a detailed explanation of how the project will be funded across multiple TA rounds.

5. The Applicant is encouraged to work with parties on the potential receiving ends of the project (Blue Earth County, any potential property owners, etc.) and present a detailed description of the project from beginning to end.

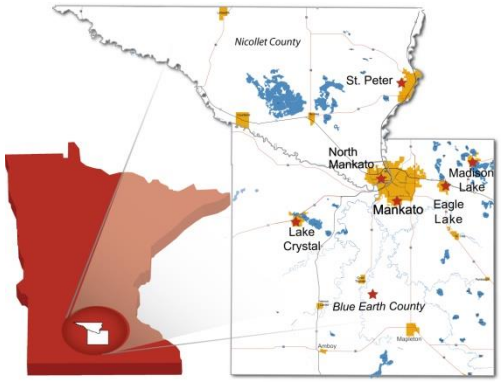
RDO/MPO Letter of Intent Review sheet

(Applicants do not need to complete this check-list, but should be prepared to answer these questions during a follow-up conversation with their respective Regional Development Organization or MAPO).

6. Provide demonstration of support by all parties involved. This includes local governments, the private landowner who currently owns land adjoining the bridge, the landowners of likely future destinations, and any other involved parties.

7. Include with application the pages from any plans which describe the project need. Depending on destination and use, this may include the Blue Earth County Highway Department 5-Year Capital Improvement Plan, Mankato/North Mankato Area Planning Organization (MAPO) 2045 Long Range Transportation Plan, etc.

Meeting Date: January 11, 2018



AGENDA RECOMMENDATION

Agenda Heading: Intersection Control Evaluation Studies Update
No: 6.2

Agenda Item: Intersection Control Evaluation Studies Update

Recommendation Action(s): Informational & Discussion

Summary: In 2017 the MAPO partnered with SRF Consulting Group, Inc. to conduct three Intersection Control Evaluation (ICE) Studies. The studied intersections were:

- Lookout Drive at Howard Drive
- Lor Ray Drive at Carlson/Countryside Drive
- Stoltzman Road at Pleasant Street

MAPO has submitted the finalized studies to their respective municipalities for review and signing. Adrian Potter, Senior Associate with SRF, is scheduled to give a final presentation at the upcoming MAPO Policy Board meeting January 18, 2018.

Attachments:

1. ICE Report: Lookout Drive at Howard Drive
2. ICE Report: Lor Ray Drive at Carlson/Countryside Drive
3. ICE Report: Stoltzman Road at Pleasant Street

Intersection Control Evaluation

Lookout Drive at Howard Drive

in North Mankato, Nicollet County, Minnesota

Mankato/North Mankato Area Planning Organization

SRF Consulting Group, Inc. | Engineers Planners Designers

October 2017

SRF No. 10279

Intersection Control Evaluation

Lookout Drive at Howard Drive

Proposed Letting Date: TBD

Report Certification:

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

Adrian S. Potter	42785
Print Name	Reg. No.
Signature	Date

Approved:

City of North Mankato City Engineer	Date
Nicollet County Public Works Director	Date

Table of Contents

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Introduction

This report contains the intersection control evaluation results for the Lookout Drive (CSAH 13) at Howard Drive intersection in North Mankato, Nicollet County, Minnesota (see Figure 1). The purpose of the evaluation was to analyze the intersection control alternatives for the intersection to identify the long-term preferred intersection control. The following intersection control alternatives were considered applicable and are analyzed within this report:

- All-Way Stop Control
- Roundabout Control
- Traffic Signal Control

A detailed warrants analysis, operational analysis, safety analysis, and planning-level cost analysis were performed to determine the preferred intersection control alternative. In addition to these analyses, other factors considered for this evaluation that were applicable to determining the long-term preferred intersection control included:

- Right-of-Way Considerations
- Transportation System Considerations
- Pedestrian and Bicycle Considerations
- Local Acceptance

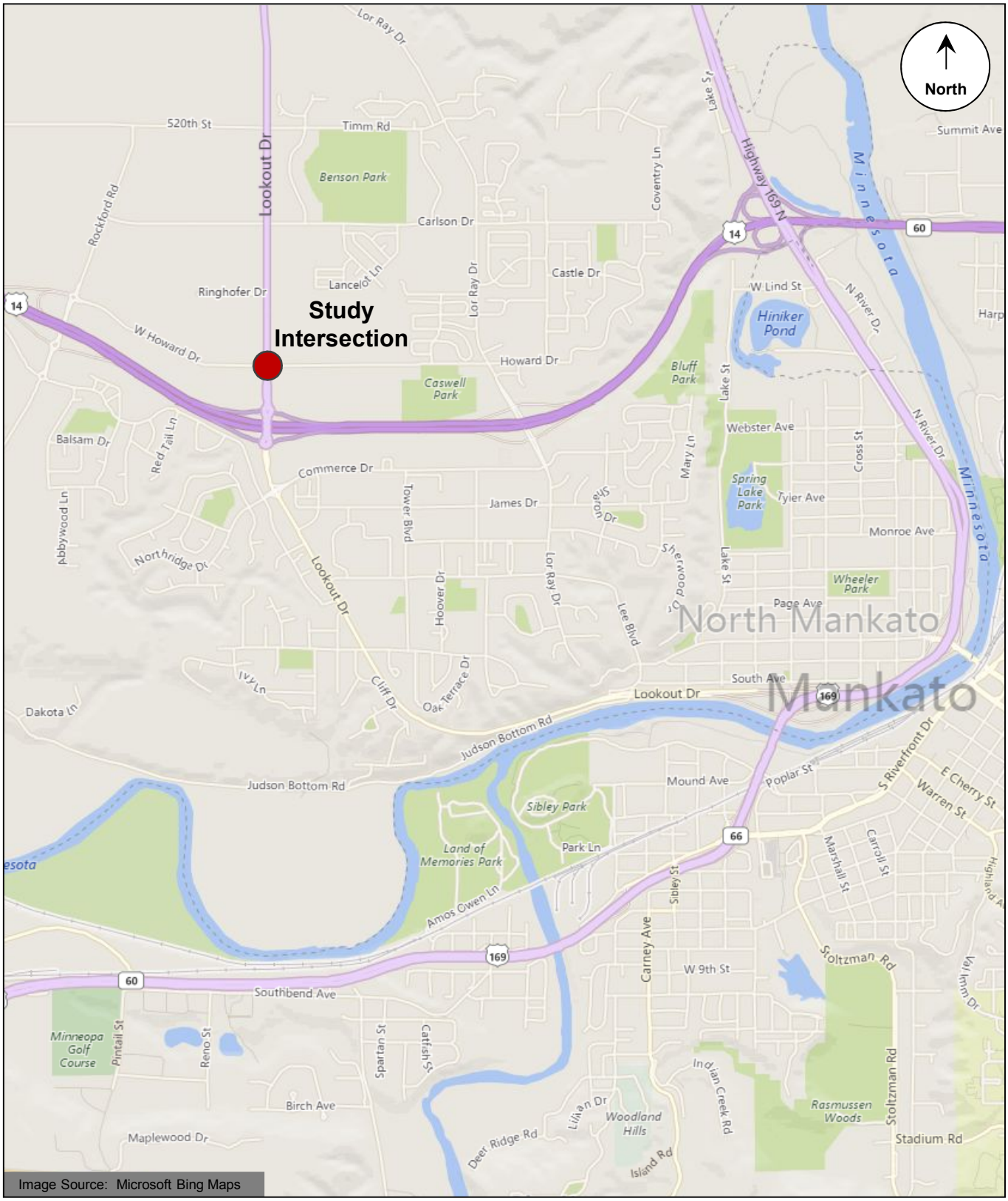


Image Source: Microsoft Bing Maps

SRF Consulting Group, Inc.

Study Intersection

Figure 1

Intersection Control Evaluation
Lookout Drive at Howard Drive
North Mankato, Nicollet County, Minnesota

10279
September 2017

Existing Intersection Characteristics

Existing Conditions

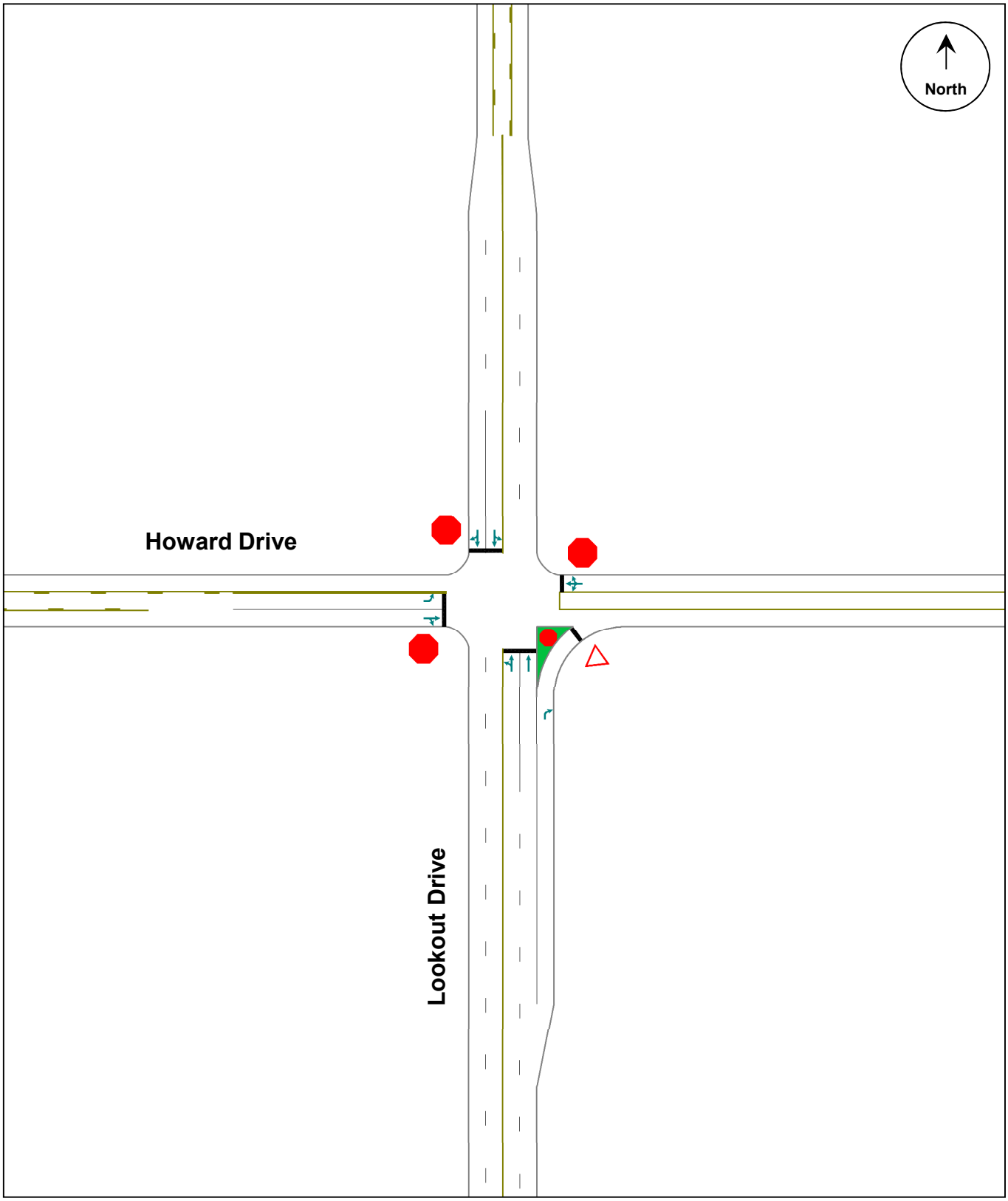
The study intersection is located in the City of North Mankato, Nicollet County as shown in Figure 1. Lookout Drive (CSAH 13) is a four-lane roadway south of the study intersection and transitions to a three-lane roadway immediately north of the intersection. Lookout Drive is functionally classified as a minor arterial. Lookout Drive has a posted speed limit of 45 mph. West of the intersection, Howard Drive is a three-lane roadway and is functionally classified as a local road, while to the east Howard Drive is a two-lane roadway that is functionally classified as a major collector. Howard Drive has a posted speed limit of 30 mph. The intersection of Lookout Drive and Howard Drive is currently all-way stop controlled. There are sidewalks/trails on both sides of Howard Drive and Lookout Drive, except for the north side of Lookout Drive west of the study intersection. There are marked pedestrian crossings on all four legs of the intersection. The adjacent area has primarily industrial land uses. The existing lane configurations for the Lookout Drive at Howard Drive intersection are listed in Table 1 below and are shown in Figure 2.

Table 1. Existing Conditions

Approach	Configuration
Northbound Lookout Drive	One shared thru/left-turn lane, one thru lane, and one channelized right-turn lane
Southbound Lookout Drive	One shared thru/left-turn lane and one shared thru/right-turn lane
Eastbound Howard Drive	One left-turn lane and one shared thru/right-turn lane
Westbound Howard Drive	One shared lane (all movements)

Crash History

Crash data was obtained from the Minnesota Crash Mapping Analysis Tool (MnCMAT) database for a five-year period from 2011 to 2015. There were three recorded crashes at the study intersection during the analysis period. Detailed crash data is provided in the Appendix. This results in a crash rate of 0.19 crashes per million entering vehicles, which is below the statewide average of 0.35 for all-way stop controlled intersections and well below the critical crash rate of 0.76 (0.995 level of confidence) for this intersection.



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Existing Conditions

Figure 2

Intersection Control Evaluation
Lookout Drive at Howard Drive
North Mankato, Nicollet County, Minnesota

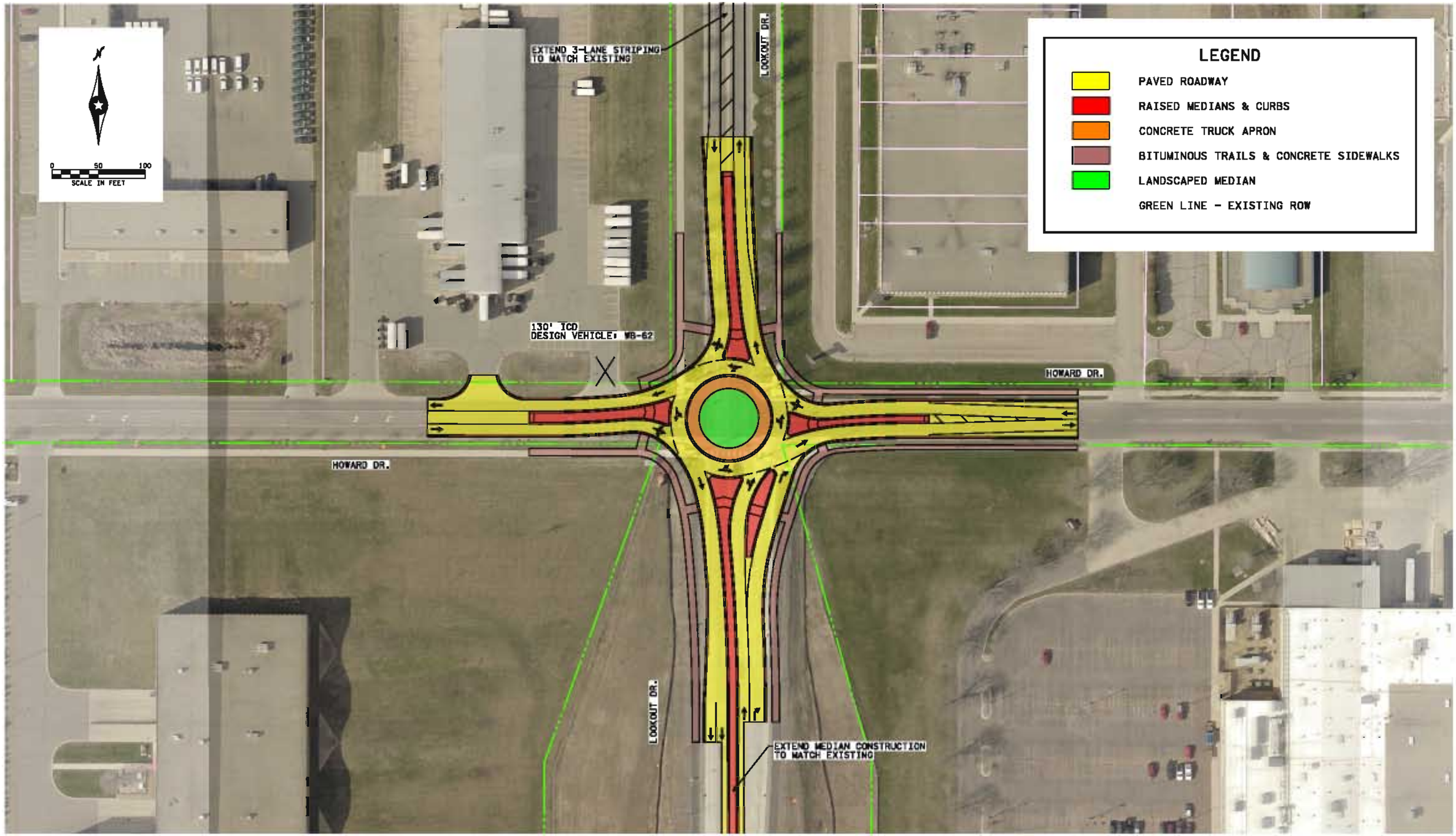
10279
September 2017

Future Conditions

Based on discussions with City and County staff in the summer of 2017, no short-term improvements to Lookout Drive, Howard Drive, or the study intersection are planned. For the alternatives analysis, the existing lane configurations under all-way stop control (listed in Table 1 and shown in Figure 2) were assumed to be the same for the traffic signal control alternative. The lane configurations for the roundabout control alternative are listed in Table 2 below and are shown in Figure 3.

Table 2. Proposed Lane Configurations for Roundabout Control Alternative

Approach	Configuration
Northbound Lookout Drive	One shared thru/left-turn lane and one right-turn bypass lane
Southbound Lookout Drive	One shared lane (all movements)
Eastbound Howard Drive	One shared lane (all movements)
Westbound Howard Drive	One shared lane (all movements)



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September 2017

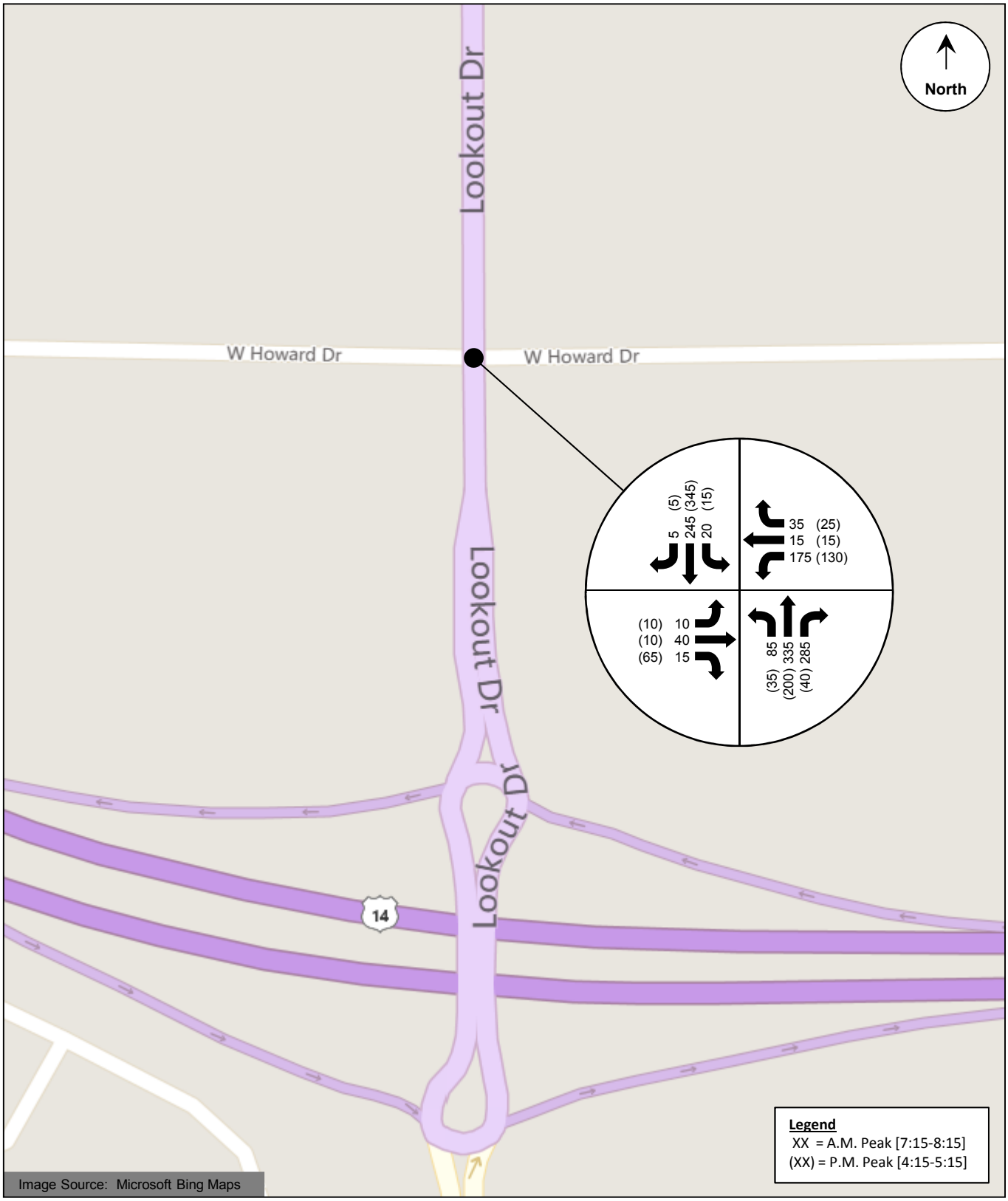
Roundabout Control Alternative

Intersection Control Evaluation
Lookout Drive at Howard Drive

Figure 3

Traffic Volumes

Hourly traffic volumes including the existing a.m. and p.m. peak hour were collected in April 2017 by SRF prior to the conclusion of the spring term at Minnesota State University and are shown in Figure 4. Pedestrian and bicycle volumes were also collected. Growth rates from the MAPO 2045 Transportation Plan (1.2% for the east and west legs, and 1.0% for the north and south legs) were used as the basis for traffic forecasts. The growth rates for the north and south legs were adjusted to 2.0% and 1.5%, respectively, based on significant proposed housing development north of the study intersection in the vicinity of Lookout Drive and Timm Road. These growth rates were used to determine Forecasted Year 2037 peak hour turning movement volumes, which are shown in Figure 5.



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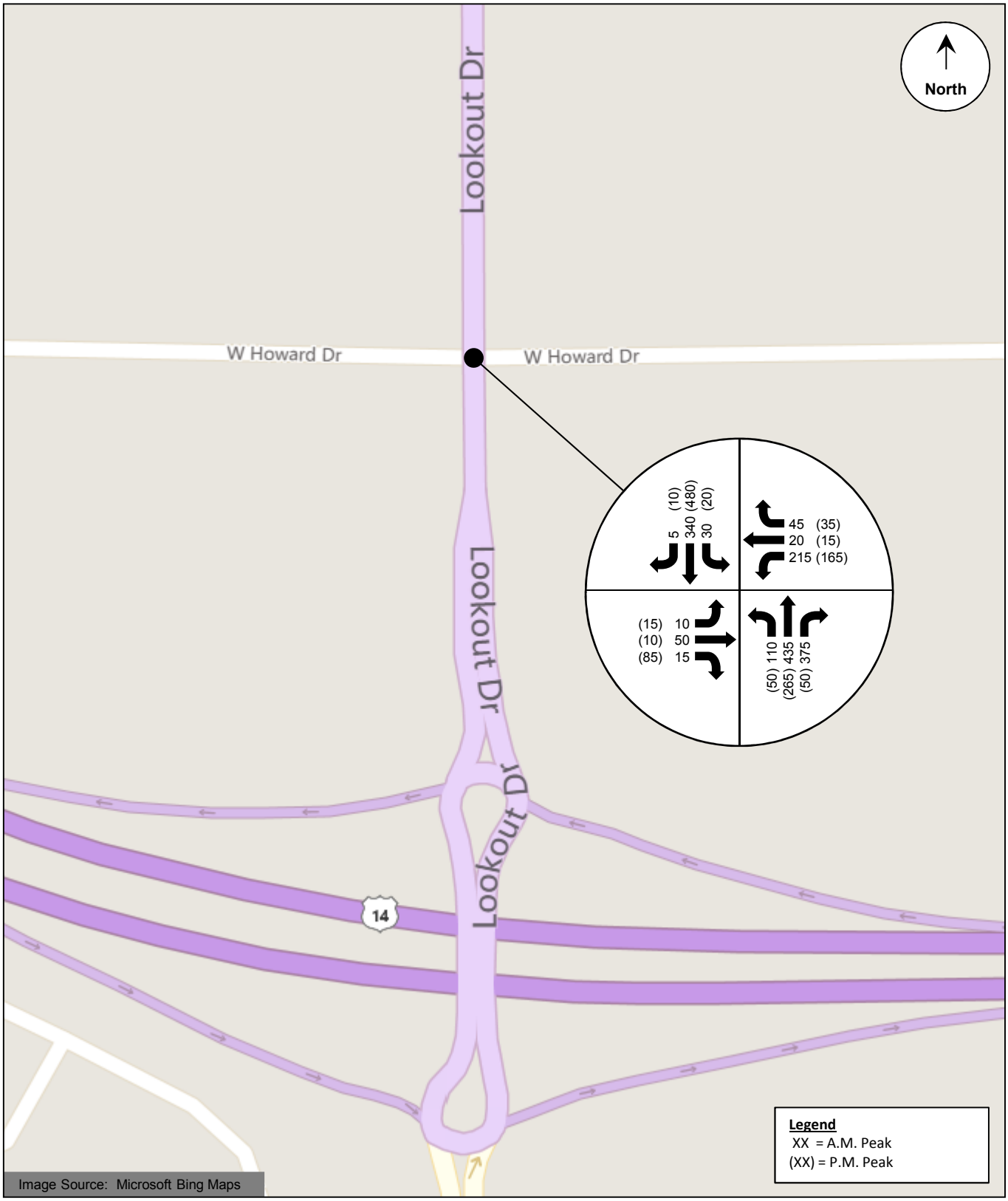
Existing Year 2017 Volumes

Figure 4

Intersection Control Evaluation
Lookout Drive at Howard Drive
North Mankato, Nicollet County, Minnesota



SRF Consulting Group, Inc.

Forecasted Year 2037 Volumes

Figure 5

Intersection Control Evaluation
Lookout Drive at Howard Drive
North Mankato, Nicollet County, Minnesota

10279
September 2017

Analysis of Alternatives

The analysis of the all-way stop control, traffic signal control, and roundabout control alternatives included a warrants analysis, operational analysis, planning-level crash analysis, and a planning-level cost analysis. Existing Year 2017 and Forecasted Year 2037 volumes with proposed lane configurations discussed previously were used for the analysis.

Warrants Analysis

A warrants analysis was performed for the traffic signal control alternative as outlined in the February 2015 *Minnesota Manual on Uniform Traffic Control Devices* (MN MUTCD). The signal warrants analysis was based on the assumptions shown in Table 3.

Table 3. Warrants Analysis Assumptions

Approach	Geometry	Speed
Northbound Major Street (Lookout Drive)	2 or more approach lanes	45 mph
Southbound Major Street (Lookout Drive)	2 or more approach lanes	45 mph
Eastbound Minor Street (Howard Drive)	1 approach lane	30 mph
Westbound Minor Street (Howard Drive)	1 approach lane	30 mph

Northbound right-turns were excluded from the analysis because of the channelized right-turn lane with a long storage length. Minor street right-turns were included in the analysis because of the shared eastbound thru/right-turn lane and the shared westbound lane. The eastbound approach was considered a one lane approach because of the low left-turn volume. Table 4 provides a summary of the results of the warrants analysis. The detailed warrants analysis can be found in the Appendix.

Table 4. Warrants Analysis Results

MN MUTCD Warrant	Hours Required	Existing Year 2017 Volumes		Forecasted Year 2037 Volumes	
		Hours Met	Warrant Met	Hours Met	Warrant Met
Warrant 1A: Minimum Vehicular Volume	8	3	No	6	No
Warrant 1B: Interruption of Continuous Traffic	8	0	No	5	No
Warrant 1C: Combination of Warrants	8	2	No	7	No
Warrant 2: Four-Hour Volume	4	2	No	5	Yes
Warrant 3B: Peak-Hour Volume	1	0	No	2	Yes
Multi-way Stop Applications Condition C	8	7	No	8	Yes

Warrants 4-9 were investigated but were determined to be not applicable. Results of the warrants analysis indicate that Existing Year 2017 volumes do not satisfy any MN MUTCD traffic signal warrants, while Forecasted Year 2037 volumes satisfy the MN MUTCD warrant requirements for traffic signal Warrants 2 and 3B. The intersection meets multi-way stop warrants with Forecasted Year 2037 volumes.

Operational Analysis

An initial planning-level analysis was performed for the roundabout control alternative based on methods found in the *Highway Capacity Manual, Sixth Edition* (Transportation Research Board, 2016). The analysis involved testing the theoretical capacity of a single-lane roundabout against the Forecasted Year 2037 entering and circulating volumes. As shown in Chart 1, the Forecasted Year 2037 volumes do not exceed the theoretical capacity of a single-lane roundabout. Therefore, a single lane roundabout was selected for further analysis. A separate northbound right-turn bypass lane was included because of the existing south leg roadway configuration and the high northbound right-turn volume.

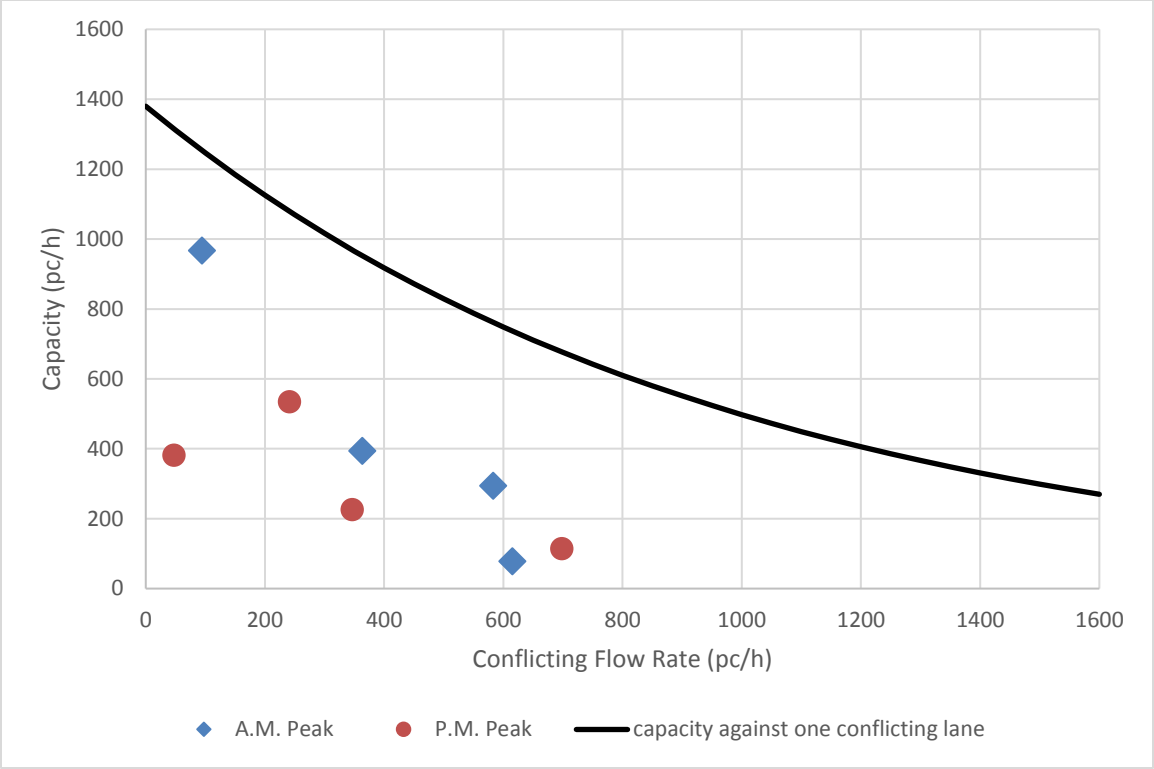


Chart 1. Single-Lane Roundabout Entry Lane Capacity (Forecasted Year 2037 volumes)

Operational analysis of the roundabout control alternative was performed using Highway Capacity Software (HCS). HCS is based on methodologies found in the *Highway Capacity Manual, 6th Edition* (HCM). It is important to note that HCS only reports "stop" or "control" delay. Therefore, to determine the total delay, "geometric" delay, or delay due to vehicle deceleration and acceleration through an intersection, must be added to the "stop" or "control" delay.

The detailed operational analysis of all-way stop control and traffic signal control was performed using methods outlined in the HCM using Synchro/SimTraffic. Synchro/ SimTraffic can calculate various measures of effectiveness such as control delay, queuing, and total travel time impacts. SimTraffic results are reported for the analysis.

The operational analysis identified a Level of Service (LOS), which indicates how well an intersection is operating based on average delay per vehicle. Intersections are given a ranking from LOS A to LOS F. LOS A indicates the best traffic operation and LOS F indicates an intersection where demand exceeds capacity. LOS A through LOS D are generally considered acceptable.

Table 5 and Table 6 provide a summary of the operational analysis for Existing Year 2017 and Forecasted Year 2037 conditions, respectively. Detailed operational analysis results can be found in the Appendix.

Table 5. Existing Year 2017 Operational Analysis Results

Alternative	Analysis Tool	A.M. Peak		P.M. Peak	
		Delay (1) (sec/veh)	LOS	Delay (1) (sec/veh)	LOS
All-Way Stop Control	Synchro/SimTraffic	4/5	A/A	3/4	A/A
Traffic Signal Control	Synchro/SimTraffic	5/9	A/A	4/8	A/A
Roundabout Control	HCS	6/7	A/A	6/7	A/A

(1) Control/stop delay is reported. Overall results are followed by the worst approach results.

Table 6. Forecasted Year 2037 Operational Analysis Results

Alternative	Analysis Tool (Variation)	A.M. Peak		P.M. Peak	
		Delay (1) (sec/veh)	LOS	Delay (1) (sec/veh)	LOS
All-Way Stop Control	Synchro/SimTraffic	6/9	A/A	4/5	A/A
Traffic Signal Control	Synchro/SimTraffic	6/11	A/B	5/8	A/A
Roundabout Control	HCS	8/10	A/A	7/9	A/A

(1) Control/stop delay is reported. Overall results are followed by the worst approach results.

Results of the operational analysis indicate that under the existing all-way stop control, the intersection operates with an acceptable level of service, and would continue to do so under Forecasted Year 2037 conditions. The traffic signal control and roundabout control alternatives would operate with acceptable levels of service under Forecasted Year 2037 conditions.

Safety Analysis

A crash analysis was performed to determine the projected crashes per year for Existing Year 2017 and Forecasted Year 2037 conditions for the study intersection. Crash rates from the MnDOT Green Sheets (2011 to 2015 data) were used for the crash analysis of the alternatives. According to *NCHRP Report 672 Roundabouts: An Informational Guide, Second Edition* (Transportation Research Board, 2010), the conversion of an all-way stop controlled intersection to a roundabout has an insignificant impact on the crash rate. Therefore, the crash rate for all-way stop control was used for the roundabout control alternative. A summary of the crash analysis is shown in Table 7.

Table 7. Crash Analysis Results

Alternative	Intersection AADT (2017)	Intersection AADT (2037)	Crash Rate	Projected Crashes/Year (2017)	Projected Crashes/Year (2037)
All-Way Stop Control	8,700	11,500	0.35	2	2
Traffic Signal Control			0.52	2	3
Roundabout Control			0.35	2	2

Based on the results of the crash analysis, the all-way stop control and roundabout control alternatives are anticipated to have slightly less crashes than the traffic signal control alternative.

Studies have determined that the installation of a roundabout can improve overall safety of an intersection when compared to other forms of intersection control. Roundabouts typically have fewer conflict points than conventional intersections and the geometry of a roundabout induces lower speeds for vehicles approaching and traversing an intersection. With lower speeds, the severity of the crashes is decreased. A roundabout virtually eliminates right-angle and left-turn head-on crashes. Studies have shown the frequency of injury crashes is reduced more than property damage only crashes.

At a roundabout, drivers must be aware of traffic traveling around the circle when merging on or off the roundabout. Conversely, drivers at a traditional intersection must be aware of vehicles at all approaches and the movements they are making. This issue is most prevalent at stop-controlled intersections where there is not a traffic signal to control vehicle movements.

Planning-Level Cost Analysis

Capital Costs

The intersection is currently all-way stop controlled, therefore with the "no build" alternative there would be no cost to continue with this type of intersection control. The traffic signal control alternative can utilize the existing geometric conditions, therefore the cost for this alternative would only be the cost of installing a traffic signal system, along with ADA improvements. The roundabout control alternative would require substantial reconstruction at and leading up to the intersection, which results in a much higher construction cost than the traffic signal control alternative.

Operation and Maintenance Costs

Traffic signals typically have higher operation and maintenance costs than roundabouts because of the electricity required to operate the signal and routine maintenance required to keep the signal in operation. Operation and maintenance costs associated with a roundabout can vary depending on the amount of illumination required or landscaping alternatives used for the center island. All-way stop control operation and maintenance costs are only the ongoing costs of maintaining the stop signs and pavement markings.

A cost analysis summary is shown in Table 8. Detailed cost analysis results can be found in the Appendix.

Table 8. Cost Analysis Summary

Alternative	Capital Costs (1)	Operation/Maintenance Costs (annual)
All-Way Stop Control	$0	< $200
Traffic Signal Control	$300,000	$4,000-$6,000
Roundabout Control	$1,260,000	$500-$1,000

(1) Does not include engineering or right-of-way costs.

Alternatives Assessment

Right-of-Way Considerations

The roadway geometry for the all-way stop control and traffic signal control alternatives would use existing conditions and therefore no additional right-of-way would be required. Construction of a roundabout at the study intersection would require additional right-of-way in all four quadrants of the intersection.

Transportation System Considerations

There are several roundabouts immediately south of the intersection at the TH 14 interchange and immediately west of the intersection along County Road 41. Roundabout control was also recommended for the Lor Ray Drive and Howard Drive intersection east of the subject intersection. The roundabout would require closure of one of the UPS facility driveways. No significant queues are expected with any of the alternatives.

Pedestrian and Bicycle Considerations

As previously mentioned, there are currently sidewalks/trails on both sides of Howard Drive and Lookout Drive, except for the north side of Lookout Drive to the west of the study intersection. There are marked pedestrian crossings on all four legs of the intersection. Pedestrian accommodations can be provided regardless of the selected intersection control.

The design of a roundabout allows pedestrians to cross one direction of traffic at a time with a refuge space in the middle of each leg of the roundabout, and these short crossing distances and reduced travel speeds of vehicle traffic improve pedestrian safety. However, their route is slightly longer since they are kept to the outside of the inscribed circle.

The design of a traffic signal can create a safe environment for pedestrian crossings with the use of pedestrian signal phasing. This phasing allows pedestrians to safely cross an intersection while vehicular movements are served. Although signalized intersections can provide indications showing pedestrian right-of-way, potential conflicts can come from red-light running through vehicles and permissive turning traffic.

The all-way stop alternative provides a safety benefit for pedestrians by having all vehicular movements stop; however, there are safety concerns for pedestrians where all road users expect other road users to stop. Most vehicle-pedestrian collisions at all-way stop controlled intersections are a result of either vehicles not stopping when pedestrians assume they are, or pedestrians not paying attention to vehicles approaching the intersection.

Local Acceptance

Drivers are familiar with traveling through all-way stop controlled and signalized intersections since there are many intersections in the area under these types of traffic control. Drivers are

also familiar with traveling through roundabout controlled intersections since there are many existing roundabouts throughout the greater Mankato area.

Conclusions and Recommendations

The following conclusions are provided for this intersection control evaluation for the Lookout Drive (CSAH 13) at Howard Drive intersection in North Mankato, Nicollet County, Minnesota:

- *Warrants Analysis*
  Results of the warrants analysis indicate that Existing Year 2017 volumes do not satisfy any MN MUTCD traffic signal warrants, while Forecasted Year 2037 volumes satisfy the MN MUTCD warrant requirements for traffic signal Warrants 2 and 3B.

- *Operational Analysis*
  Results of the operational analysis indicate that under the existing all-way stop control, the intersection operates with an acceptable level of service, and would continue to do so under Forecasted Year 2037 conditions. The traffic signal control and roundabout control alternatives would also operate with acceptable levels of service under forecasted conditions.

- *Safety Analysis*
  Based on the results of the crash analysis, the all-way stop control and roundabout control alternatives are anticipated to have slightly less crashes than the traffic signal control alternative. Roundabouts typically have fewer conflict points than conventional intersections and the geometry of a roundabout induces lower speeds for vehicles approaching and traversing an intersection. With lower speeds, the severity of the crashes is decreased.

- *Planning-Level Cost Analysis*
  There would be no cost to continue with the existing all-way stop control. The traffic signal control alternative can utilize the existing geometric conditions, therefore the cost for this alternative would only be the cost of installing a traffic signal system, along with ADA improvements, which would be approximately $300,000. The roundabout control alternative would require substantial reconstruction at and leading up to the intersection, which would cost approximately $1,260,000. Traffic signals typically have higher operation and maintenance costs because of the electricity required to operate the signal and routine maintenance required to keep the signal in operation. Operation and maintenance costs associated with a roundabout can vary depending on the amount of illumination required or landscaping alternatives used for the center island. Stop control operation and maintenance costs are only the ongoing costs of maintaining the stop signs and pavement markings.

- *Right-of-Way Considerations*
  The roadway geometry for the all-way stop and traffic signal control alternatives would use existing conditions and therefore no additional right-of-way would be required. Construction of a roundabout at the study intersection would require additional right-of-way in all four quadrants of the intersection.

- *Transportation System Considerations*
  There are several roundabouts immediately south of the intersection at the TH 14 interchange and immediately west of the intersection along County Road 41. No significant queues are expected with any of the alternatives.

- *Pedestrian and Bicycle Considerations*
  The design of signalized intersections can take pedestrian crossings and safety into consideration with the use of pedestrian signal phasing. The design of a roundabout allows pedestrians to cross one direction of traffic at a time on each leg of the roundabout. Their route is slightly longer since they are kept to the outside of the inscribed circle. All-way stop control provides a safety benefit for pedestrians by having all vehicular movements stop; however, most vehicle-pedestrian collisions at all-way stop controlled intersections are a result of either vehicles not stopping when pedestrians assume they are, or pedestrians not paying attention to vehicles approaching the intersection.

- *Local Acceptance*
  Drivers are familiar with traveling through all-way stop controlled and signalized intersections since there are many intersections in the area under these types of traffic control. Drivers are also familiar with traveling through roundabout controlled intersections since there are many existing roundabouts throughout the greater Mankato area.

A decision matrix was developed to help evaluate the key factors and is provided on the following page. Based on the results of this Intersection Control Evaluation, the all-way stop control, traffic signal control, and roundabout control alternatives are all viable options for the Lookout Drive at Howard Drive intersection. All alternatives have acceptable operations under forecasted conditions. The "no build" all-way stop alternative does not require any capital improvements. The traffic signal control alternative has comparable operations to the all-way stop control alternative. However, it has a significant capital cost. Therefore a traffic signal is not practical at this intersection. Compared to a traffic signal, a roundabout would have more consistent off-peak operations throughout the day when traffic volumes are lower. However, the existing dual northbound and southbound thru lanes provide better operations under all-way stop control than would be provided by a single-lane roundabout, without the additional capital costs. Therefore, maintaining the existing all-way stop control is recommended since this type of control would have no capital cost, require no right-of way, and have low delay. A roundabout should be considered at this location in the future if safety issues develop or traffic volumes increase more than what was forecasted. A roundabout would match the control type used at adjacent intersections.

Alternatives Decision Matrix: Lookout Drive at Howard Drive

Factor		All-Way Stop Control	Traffic Signal Control	Roundabout Control	Recommended Alternative(s) Based on Factor
Warrants Analysis	2017	• AWSC warrant not met	• Existing Year 2017 volumes do not meet traffic signal control warrants	N/A	**Roundabout Control**
	2037	• AWSC warrant met	• Forecasted Year 2037 volumes meet traffic signal control warrants	N/A	**All-Way Stop Control** **Traffic Signal Control** **Roundabout Control**
Operational Analysis	2017	• Acceptable LOS	• Acceptable LOS	• Acceptable LOS • Consistent off-peak operations	**All-Way Stop Control** **Traffic Signal Control** **Roundabout Control**
	2037	• Acceptable LOS	• Acceptable LOS	• Acceptable LOS • Consistent off-peak operations	
Safety Analysis	Pro(s):	• Least number of crashes expected • Lower vehicle speeds through intersection	• Signal indications show vehicle right-of-way	• Least number of crashes expected • Lower vehicle speeds through intersection	**All-Way Stop Control** **Roundabout Control**
	Con(s):	• Drivers decide right-of-way	• Slightly more crashes expected than all-way stop/roundabout	• Drivers select acceptable gaps	
Cost Analysis	Pro(s):	• No capital cost • Low operation/maintenance costs	• Lower capital costs ($300,000) than roundabout control	• Lower operation/maintenance costs than traffic signal control	**All-Way Stop Control**
	Con(s):	none	• Higher operation/maintenance costs than roundabout control	• Higher capital costs ($1,260,000) than traffic signal control • Requires substantial reconstruction	
Right-of-Way	Pro(s):	N/A (existing control)	• No ROW impacts expected	none	**All-Way Stop Control** **Traffic Signal Control**
	Con(s):		none	• Requires additional ROW in all four quadrants	
Transportation System Considerations	Pro(s):	• Existing control	• Nearest signal is south of TH 14 interchange	• Matches adjacent intersections at TH 14 interchange	**Roundabout Control**
	Con(s):	• Majority of adjacent intersections are roundabouts	• Majority of adjacent intersections are roundabouts	none	
Pedestrian and Bicycle Considerations	Pro(s):	• All vehicular movements stop	• Pedestrian pushbuttons and signal phasing	• Pedestrian Refuge islands • Lower vehicle speeds thru intersection	**Traffic Signal Control**
	Con(s):	• Expecting vehicles to yield to pedestrians can lead to a false sense of security	• Pedestrian signal phasing can lead to a false sense of security	• Longer route • No pedestrian phase	
Local Acceptance	Pro(s):	N/A (existing control)	• Familiar to drivers	• Familiar to drivers • Positive public feedback	**All-Way Stop Control** **Roundabout Control**
	Con(s):		none	none	

Appendix

- 2011-2015 Crash History
- Existing Year 2017 Warrants Analysis
- Forecasted Year 2037 Warrants Analysis
- Existing Year 2017 Detailed Operational Analysis
    - All-Way Stop Control
    - Traffic Signal Control
    - Roundabout Control
- Forecasted Year 2037 Detailed Operational Analysis
    - All-Way Stop Control
    - Traffic Signal Control
    - Roundabout Control
- Detailed Cost Analysis

2011-2015 Crash History

Crash Detail Report

Lookout Drive at Howard Drive

Report Version 1.0 March 2010

Crash ID: 110110165 **Date:** 01/10/2011 **Time:** 1600
County: NICOLLET **City:** NORTH MANKATO

Sys: 04-CSAH
Route: 52000013 000+00.220

Severity: PROPERTY DAMAGE
Road Type: OTHER
Road Char: STRAIGHT AND LEVEL
Crash Type: COLL W/MV IN TRANSPORT
Surf Cond: ICE/PACKED SNOW
Light Cond: DAYLIGHT
Weather 1: SNOW
Weather 2: NOT SPECIFIED

First Event: ON ROADWAY
To Junction: INTERSECTION-RELATED
Traffic Device: STOP SIGN 4-WAY
Speed Limit: 45
Diagram: REAR END
Officer:
Reliability: CONFIDENT
# of Vehicles: 2.00

	Unit 1	Unit 2	Unit 3
Trav Dir:	N	S	
Veh Act:	BACKING	STOPPED TRAFFIC	
Veh Type:	SPORT UNTILITY VEHICLE	SPORT UNTILITY VEHICLE	
Age:	25	35	
Gender:	F	M	
Cond:	NORMAL	NORMAL	
Cont Fact 1	SKIDDING	NO IMPROPER DRIVING	
Cont Fact 2	UNSAFE BACKING	NOT SPECIFIED	

Crash ID: 110630060 **Date:** 01/31/2011 **Time:** 0115
County: NICOLLET **City:** NORTH MANKATO

Sys: 05-MSAS
Route: 28550255 000+00.000

Severity: PROPERTY DAMAGE
Road Type: NOT SPECIFIED
Road Char: NOT SPECIFIED
Crash Type: COLL W/MV IN TRANSPORT
Surf Cond: ICE/PACKED SNOW
Light Cond: DAYLIGHT
Weather 1: SNOW
Weather 2: NOT SPECIFIED

First Event: NOT SPECIFIED
To Junction: NOT SPECIFIED
Traffic Device: STOP SIGN 4-WAY
Speed Limit: 30
Diagram: RIGHT ANGLE
Officer:
Reliability: CONFIDENT
# of Vehicles: 2.00

	Unit 1	Unit 2	Unit 3
Trav Dir:	W	N	
Veh Act:	STRAIGHT AHEAD	STRAIGHT AHEAD	
Veh Type:	SPORT UNTILITY VEHICLE	PICKUP TRUCK	
Age:	57	44	
Gender:	M	M	
Cond:	NOT SPECIFIED	NOT SPECIFIED	
Cont Fact 1	NOT SPECIFIED	NOT SPECIFIED	
Cont Fact 2	NOT SPECIFIED	NOT SPECIFIED	

Crash ID:	113340064	**Date:**	11/30/2011	**Time:**	1150
County:	NICOLLET	**City:**	NORTH MANKATO		

Sys:	04-CSAH	
Route:	52000013	000+00.220

Severity:	PROPERTY DAMAGE	**First Event:**	ON ROADWAY
Road Type:	4_6 LANES UNDIV 2_WAY	**To Junction:**	4-LEGGED INTERSECTION
Road Char:	STRAIGHT AND GRADE	**Traffic Device:**	STOP SIGN 4-WAY
Crash Type:	COLL W/MV IN TRANSPORT	**Speed Limit:**	45
Surf Cond:	DRY	**Diagram:**	REAR END
Light Cond:	DAYLIGHT	**Officer:**	
Weather 1:	CLEAR	**Reliability:**	CONFIDENT
Weather 2:	NOT SPECIFIED	**# of Vehicles:**	2.00

	Unit 1	Unit 2	Unit 3
Trav Dir:	N	N	
Veh Act:	STOPPED TRAFFIC	BIKE SLOWING/STOPPING/STARTI	
Veh Type:	SPORT UNTILITY VEHICLE	PASSENGER CAR	
Age:	43	59	
Gender:	F	M	
Cond:	NORMAL	NORMAL	
Cont Fact 1	NO IMPROPER DRIVING	OTHER HUMAN FACTOR	
Cont Fact 2	NOT SPECIFIED	NOT SPECIFIED	

Selection Filter:

WORK AREA: CONST_DIST_CODE('7') - FILTER: CRASH_YEAR('2011','2012','2013','2014','2015') - SPATIAL FILTER APPLIED

Analyst:

Luke James

Notes:

Existing Year 2017 Warrants Analysis

WARRANTS ANALYSIS

Existing Year 2017

Lookout Drive at Howard Drive
Intersection Control Evaluation
City of North Mankato, Nicollet County

Background Information

		Speed (mph)	Lanes	Approach	
Location :	City of North Mankato, Nicollet County	45	2 or more	Major Approach 1:	Northbound Lookout Drive
Date:	5/24/2017	45	2 or more	Major Approach 3:	Southbound Lookout Drive
Analysis Prepared By:	Luke James	30	1	Minor Approach 2:	Eastbound Howard Drive
Population Less than 10,000:	No	30	1	Minor Approach 4:	Westbound Howard Drive
Seventy Percent Factor Used:	Yes				

Warrants Analysis: Warrants 1A, 1B and 1C

Hour	Major Approach 1	Major Approach 3	Total 1 + 3	Warrant Met 420	Warrant Met 630	Minor Approach 2	Minor Approach 4	Largest Minor App.	Warrant Met 105	Warrant Met 53	Met Same Hours Condition A	Met Same Hours Condition B	Combination A	Combination B	MWSA (C) 210	MWSA (C) 140
6 - 7 AM	130	98	228			10	15	15							X	
7 - 8 AM	305	244	549	X		56	179	179	X	X	X		X	X	X	X
8 - 9 AM	359	178	537	X		73	120	120	X	X	X		X	X	X	X
9 - 10 AM	135	108	243			47	53	53		X					X	
10 - 11 AM	117	114	231			38	34	38							X	
11 - 12 AM	169	207	376			59	105	105	X	X			X		X	X
12 - 1 PM	238	229	467	X		71	79	79		X					X	X
1 - 2 PM	212	131	343			40	54	54		X					X	
2 - 3 PM	189	162	351			58	65	65		X					X	
3 - 4 PM	185	204	389			60	238	238	X	X			X		X	X
4 - 5 PM	218	272	490	X		103	162	162	X	X	X		X		X	X
5 - 6 PM	200	283	483	X		83	96	96		X			X		X	X
6 - 7 PM	110	103	213			45	41	45							X	
7 - 8 PM	71	52	123			21	54	54		X						
8 - 9 PM	55	38	93			21	21	21								
9 - 10 PM	38	29	67			13	15	15								
10 - 11 PM	26	22	48			12	4	12								
											3	0	6	2	7	

Warrant Summary

Warrant and Description		Hours Met	Hours Required	Met/Not Met
MWSA (C):	Multiway Stop Applications Condition C	7	8	Not Met
Warrant 1A:	Minimum Vehicular Volume	3	8	Not Met
Warrant 1B:	Interruption of Continuous Traffic	0	8	Not Met
Warrant 1C:	Combination of Warrants	2	8	Not Met
Warrant 2:	Four-Hour Vehicular Volume	2	4	Not Met
Warrant 3B:	Peak Hour	0	1	Not Met

SRF Consulting Group, Inc.

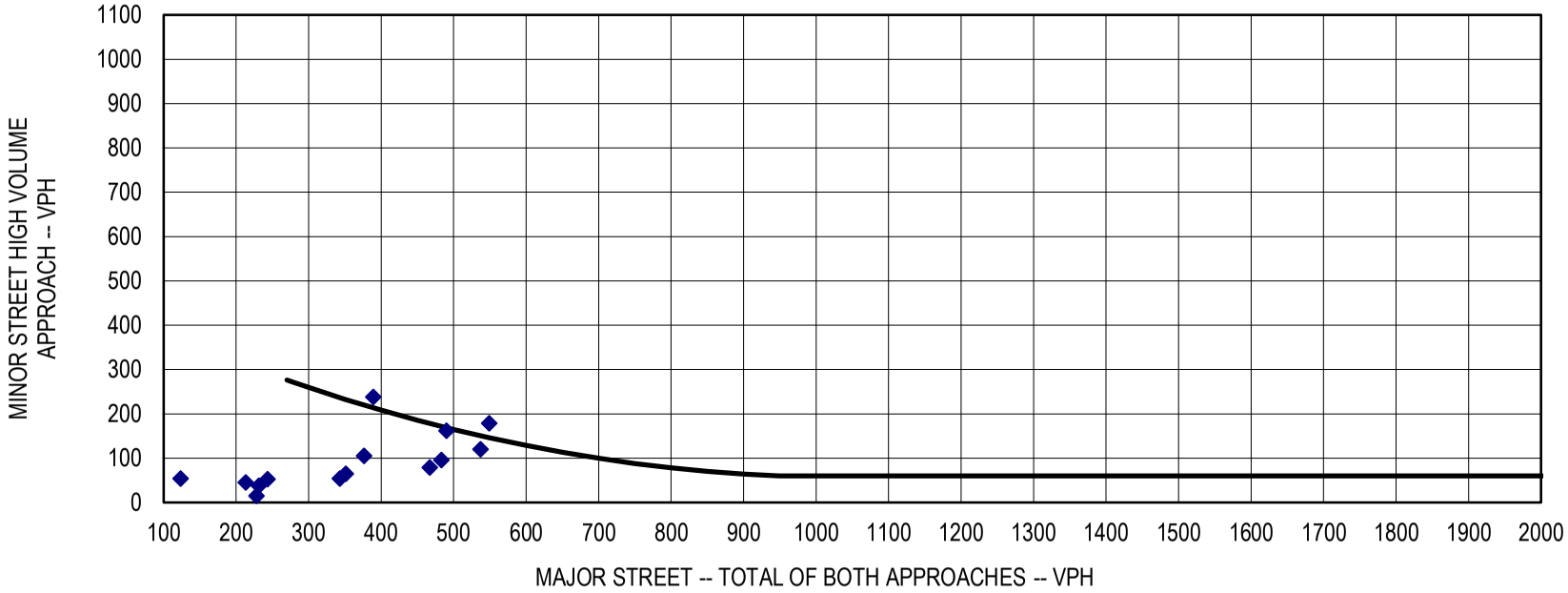
WARRANTS ANALYSIS

Existing Year 2017

Lookout Drive at Howard Drive
Intersection Control Evaluation
City of North Mankato, Nicollet County

Warrants Analysis: Warrant 2

WARRANT 2 - FOUR-HOUR VEHICULAR VOLUME



Number of Hours Satisfying Requirements:	2

Notes:

1. 80 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 60 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.
2. INTERSECTION IS EITHER (1) WITHIN A COMMUNITY LESS THAN 10,000 POPULATION OR (2) HAS SPEEDS ABOVE 40 MPH ON MAJOR STREET.

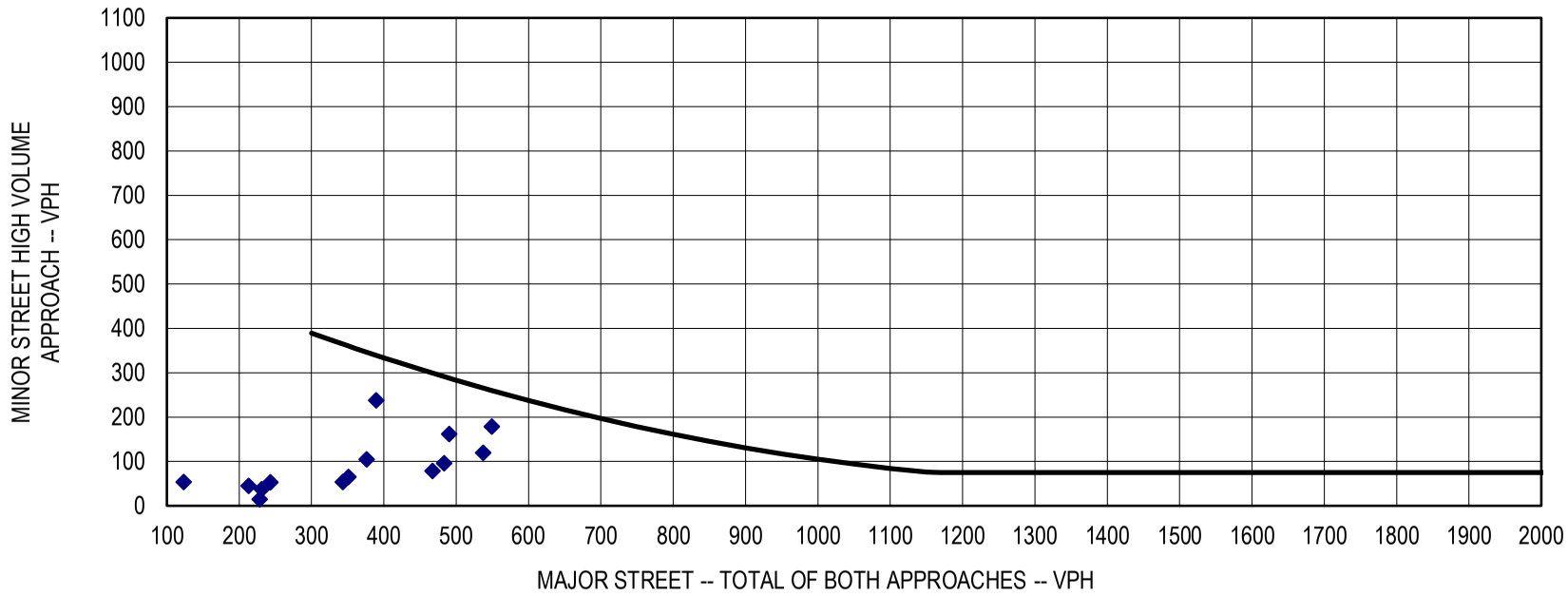
SRF Consulting Group, Inc.

WARRANTS ANALYSIS

Existing Year 2017

Lookout Drive at Howard Drive
Intersection Control Evaluation
City of North Mankato, Nicollet County

Warrants Analysis: Warrant 3



Number of Hours Satisfying Requirements:	0

Notes:
1. 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 75 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.
2. INTERSECTION IS EITHER (1) WITHIN A COMMUNITY LESS THAN 10,000 POPULATION OR (2) HAS SPEEDS ABOVE 40 MPH ON MAJOR STREET.

Forecasted Year 2037 Warrants Analysis

WARRANTS ANALYSIS

Forecasted Year 2037

Lookout Drive at Howard Drive
Intersection Control Evaluation
City of North Mankato, Nicollet County

Background Information

		Speed (mph)	Lanes	Approach	
Location :	City of North Mankato, Nicollet County	45	2 or more	Major Approach 1:	Northbound Lookout Drive
Date:	7/12/2017	45	2 or more	Major Approach 3:	Southbound Lookout Drive
Analysis Prepared By:	Luke James	30	1	Minor Approach 2:	Eastbound Howard Drive
Population Less than 10,000:	No	30	1	Minor Approach 4:	Westbound Howard Drive
Seventy Percent Factor Used:	Yes				

Warrants Analysis: Warrants 1A, 1B, and 1C

Hour	Major Approach 1	Major Approach 3	Total 1 + 3	Warrant Met 420	Warrant Met 630	Minor Approach 2	Minor Approach 4	Largest Minor App.	Warrant Met 105	Warrant Met 53	Met Same Hours Condition A	Met Same Hours Condition B	Combination A	Combination B	MWSA (C) 210	MWSA (C) 140
6 - 7 AM	169	137	306			12	18	18							X	
7 - 8 AM	397	342	739	X	X	69	221	221	X	X	X	X	X	X	X	X
8 - 9 AM	466	249	715	X	X	91	148	148	X	X	X	X	X	X	X	X
9 - 10 AM	176	151	327			58	66	66		X					X	
10 - 11 AM	151	160	311			47	42	47							X	
11 - 12 AM	219	289	508	X		73	130	130	X	X	X		X	X	X	X
12 - 1 PM	309	321	630	X	X	88	98	98		X		X	X	X	X	X
1 - 2 PM	276	183	459	X		50	66	66		X					X	
2 - 3 PM	245	226	471	X		72	80	80		X					X	X
3 - 4 PM	241	286	527	X		74	295	295	X	X	X		X	X	X	X
4 - 5 PM	283	381	664	X	X	127	201	201	X	X	X	X	X	X	X	X
5 - 6 PM	260	396	656	X	X	102	118	118	X	X	X	X	X	X	X	X
6 - 7 PM	142	144	286			55	50	55		X					X	
7 - 8 PM	92	73	165			25	67	67		X						
8 - 9 PM	72	53	125			25	25	25								
9 - 10 PM	49	40	89			16	19	19								
10 - 11 PM	34	31	65			15	4	15								
											6	5	7	7	8	

Warrant Summary

Warrant and Description		Hours Met	Hours Required	Met/Not Met
MWSA (C):	Multiway Stop Applications Condition C	8	8	Met - Multiway Stop Applications
Warrant 1A:	Minimum Vehicular Volume	6	8	Not Met
Warrant 1B:	Interruption of Continuous Traffic	5	8	Not Met
Warrant 1C:	Combination of Warrants	7	8	Not Met
Warrant 2:	Four-Hour Vehicular Volume	5	4	Met - Warrant 2 Satisfied
Warrant 3B:	Peak Hour	2	1	Met - Warrant 3B Satisfied

SRF Consulting Group, Inc.

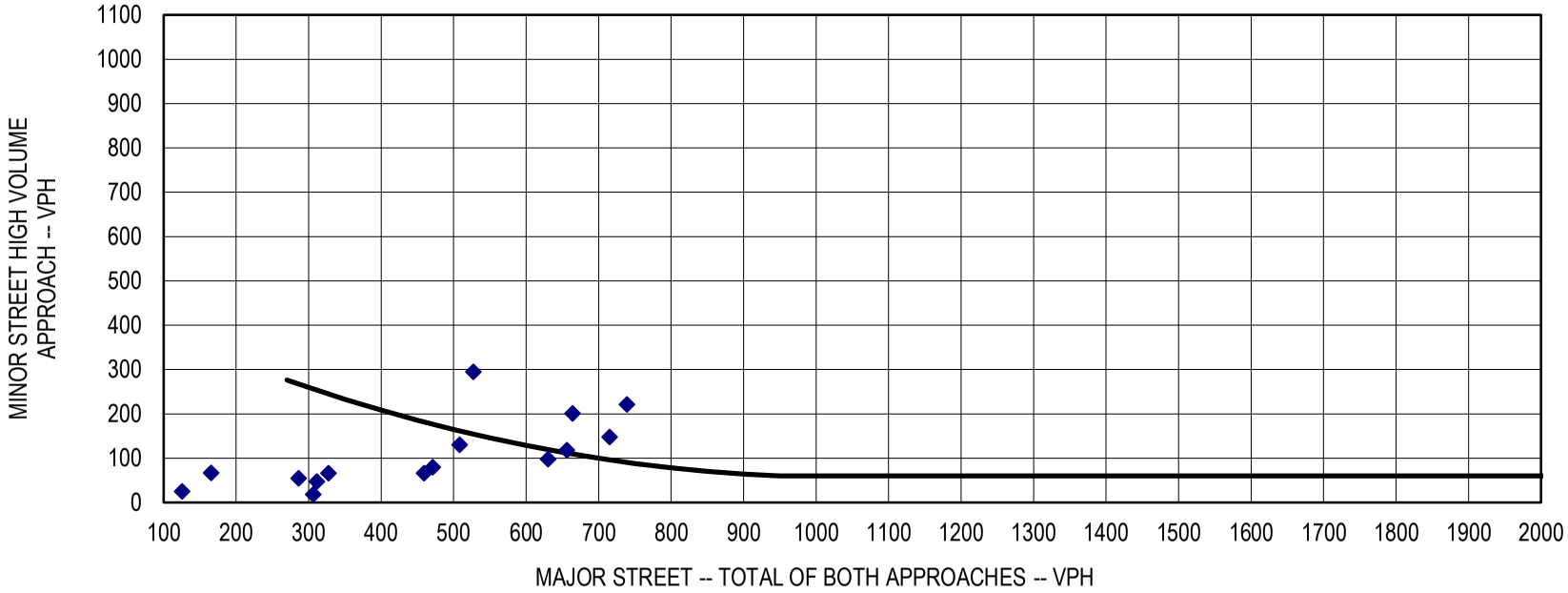
WARRANTS ANALYSIS

Forecasted Year 2037

Lookout Drive at Howard Drive
Intersection Control Evaluation
City of North Mankato, Nicollet County

Warrants Analysis: Warrant 2

WARRANT 2 - FOUR-HOUR VEHICULAR VOLUME



Number of Hours Satisfying Requirements:	5

Notes:
1. 80 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 60 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.
2. INTERSECTION IS EITHER (1) WITHIN A COMMUNITY LESS THAN 10,000 POPULATION OR (2) HAS SPEEDS ABOVE 40 MPH ON MAJOR STREET.

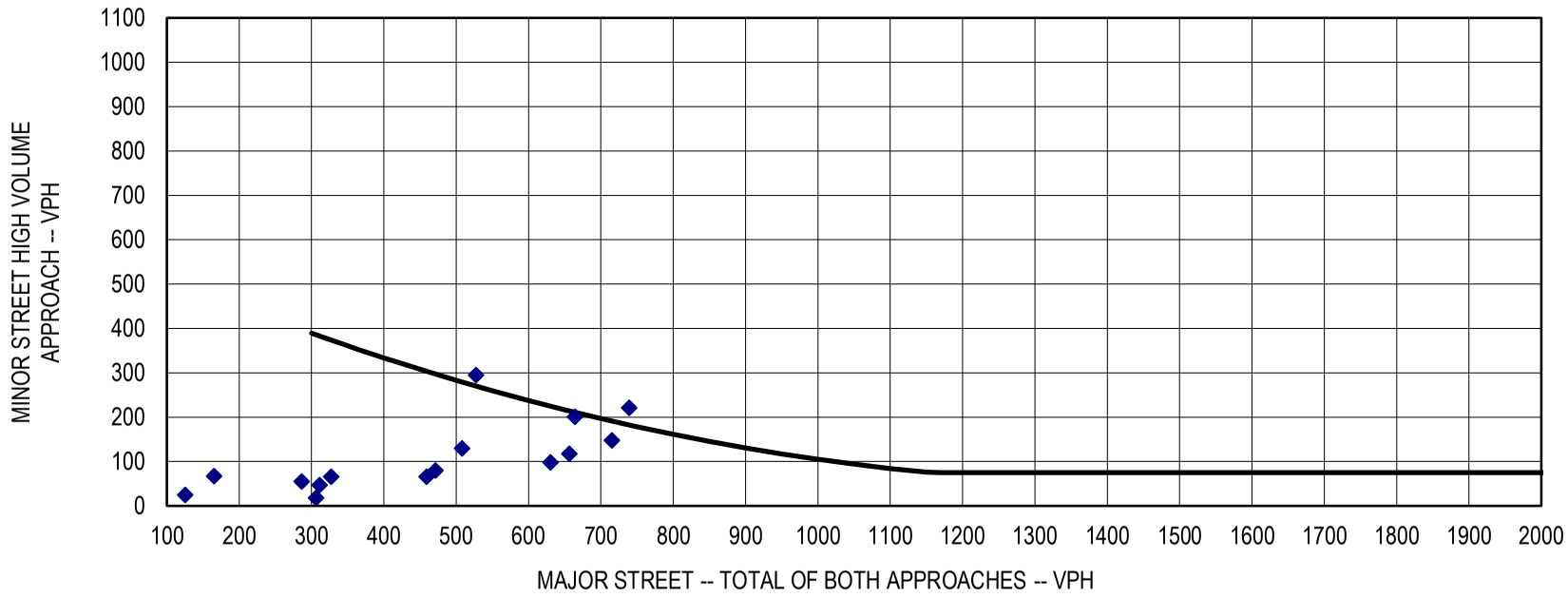
SRF Consulting Group, Inc.

WARRANTS ANALYSIS

Forecasted Year 2037

Lookout Drive at Howard Drive
Intersection Control Evaluation
City of North Mankato, Nicollet County

Warrants Analysis: Warrant 3



Number of Hours Satisfying Requirements:	2

Notes:
1. 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 75 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.
2. INTERSECTION IS EITHER (1) WITHIN A COMMUNITY LESS THAN 10,000 POPULATION OR (2) HAS SPEEDS ABOVE 40 MPH ON MAJOR STREET.

Existing Year 2017 Detailed Operational Analysis

All-Way Stop Control

1: Lookout Drive & Howard Drive Performance by approach

Approach	EB	WB	NB	SB	All
Denied Delay (hr)	0.0	0.0	0.3	0.0	0.3
Denied Del/Veh (s)	0.7	0.2	1.4	0.0	0.8
Total Delay (hr)	0.1	0.5	1.7	0.7	2.9
Total Del/Veh (s)	7.5	7.4	8.8	8.7	8.4
Stop Delay (hr)	0.1	0.3	0.5	0.3	1.2
Stop Del/Veh (s)	4.8	4.7	2.8	3.6	3.5
Total Stops	67	224	425	270	986
Stop/Veh	1.00	1.00	0.62	1.00	0.79

Intersection: 1: Lookout Drive & Howard Drive

Movement	EB	EB	WB	NB	NB	NB	SB	SB
Directions Served	L	TR	LTR	LT	T	R	LT	TR
Maximum Queue (ft)	42	67	112	119	80	91	87	88
Average Queue (ft)	9	31	54	61	38	16	44	40
95th Queue (ft)	34	58	88	99	64	65	71	69
Link Distance (ft)		960	960	966	966		238	238
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)	250					250		
Storage Blk Time (%)								
Queuing Penalty (veh)								

1: Lookout Drive & Howard Drive Performance by approach

Approach	EB	WB	NB	SB	All
Denied Delay (hr)	0.0	0.0	0.1	0.0	0.1
Denied Del/Veh (s)	0.5	0.2	0.7	0.0	0.3
Total Delay (hr)	0.1	0.3	0.7	0.9	2.0
Total Del/Veh (s)	4.5	6.6	8.5	9.0	8.0
Stop Delay (hr)	0.1	0.2	0.2	0.4	0.8
Stop Del/Veh (s)	3.4	4.0	2.7	3.5	3.3
Total Stops	82	173	232	374	861
Stop/Veh	1.00	1.00	0.84	1.00	0.95

Intersection: 1: Lookout Drive & Howard Drive

Movement	EB	EB	WB	NB	NB	NB	SB	SB
Directions Served	L	TR	LTR	LT	T	R	LT	TR
Maximum Queue (ft)	31	62	92	88	70	11	99	101
Average Queue (ft)	7	33	48	45	23	0	49	46
95th Queue (ft)	29	55	76	73	53	8	81	76
Link Distance (ft)		960	960	966	966		238	238
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)	250					250		
Storage Blk Time (%)								
Queuing Penalty (veh)								

Existing Year 2017 Detailed Operational Analysis

Traffic Signal Control

1: Lookout Drive & Howard Drive Performance by approach

Approach	EB	WB	NB	SB	All
Denied Delay (hr)	0.0	0.0	0.3	0.0	0.3
Denied Del/Veh (s)	0.7	0.2	1.4	0.0	0.9
Total Delay (hr)	0.2	0.8	1.8	0.5	3.2
Total Del/Veh (s)	10.2	12.0	8.7	6.6	8.9
Stop Delay (hr)	0.1	0.6	0.8	0.3	1.8
Stop Del/Veh (s)	8.0	8.9	3.7	4.0	4.9
Total Stops	45	157	220	100	522
Stop/Veh	0.69	0.68	0.30	0.37	0.40

Intersection: 1: Lookout Drive & Howard Drive

Movement	EB	EB	WB	NB	NB	NB	SB	SB
Directions Served	L	TR	LTR	LT	T	R	LT	TR
Maximum Queue (ft)	36	76	150	203	140	65	88	95
Average Queue (ft)	8	31	76	82	29	4	43	24
95th Queue (ft)	31	65	131	145	85	30	75	64
Link Distance (ft)		960	960	966	966		238	238
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)	250					250		
Storage Blk Time (%)								
Queuing Penalty (veh)								

1: Lookout Drive & Howard Drive Performance by approach

Approach	EB	WB	NB	SB	All
Denied Delay (hr)	0.0	0.0	0.1	0.0	0.1
Denied Del/Veh (s)	0.5	0.2	0.7	0.0	0.3
Total Delay (hr)	0.1	0.5	0.6	0.6	1.9
Total Del/Veh (s)	5.6	10.5	7.6	6.0	7.4
Stop Delay (hr)	0.1	0.4	0.3	0.3	1.1
Stop Del/Veh (s)	4.6	7.7	3.8	3.3	4.4
Total Stops	51	118	105	125	399
Stop/Veh	0.70	0.66	0.35	0.34	0.44

Intersection: 1: Lookout Drive & Howard Drive

Movement	EB	EB	WB	NB	NB	SB	SB
Directions Served	L	TR	LTR	LT	T	LT	TR
Maximum Queue (ft)	35	69	126	104	48	108	97
Average Queue (ft)	6	28	62	49	10	49	29
95th Queue (ft)	27	57	105	90	39	89	69
Link Distance (ft)		960	960	966	966	238	238
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)	250						
Storage Blk Time (%)							
Queuing Penalty (veh)							

Existing Year 2017 Detailed Operational Analysis

Roundabout Control

HCS7 Roundabouts Report

General Information

Analyst	Luke James
Agency or Co.	SRF Consulting Group, Inc.
Date Performed	7/6/2017
Analysis Year	2017
Time Period	A.M. Peak
Project Description	10279

Site Information

Intersection	Lookout Drive at Howard Drive
E/W Street Name	Howard Drive
N/S Street Name	Lookout Drive
Analysis Time Period (hrs)	0.25
Peak Hour Factor	1.00
Jurisdiction	MAPO

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LT				LTR	
Volume (V), veh/h	0	10	40	15	0	175	15	35	0	85	335	285	0	20	245	5
Percent Heavy Vehicles, %	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Flow Rate (v_{PCE}), pc/h	0	10	42	16	0	184	16	37	0	89	352	299	0	21	257	5
Right-Turn Bypass	None				None				Yielding				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		4.9763			4.9763			4.9763	4.9763		4.9763	
Follow-Up Headway (s)		2.6087			2.6087			2.6087	2.6087		2.6087	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		68			237			441	299		283	
Entry Volume veh/h		65			226			420	285		270	
Circulating Flow (v_c), pc/h	462			451			73			289		
Exiting Flow (v_{ex}), pc/h	63			110			399			457		
Capacity (c_{pce}), pc/h		861			871			1281	1294		1028	
Capacity (c), veh/h		820			830			1220	1232		979	
v/c Ratio (x)		0.08			0.27			0.34	0.23		0.28	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		5.2			7.3			6.2	5.0		6.4	
Lane LOS		A			A			A	A		A	
95% Queue, veh		0.3			1.1			1.6	0.9		1.1	
Approach Delay, s/veh	5.2			7.3			5.7			6.4		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh | LOS	6.1						A					

HCS7 Roundabouts Report

General Information

Analyst	Luke James
Agency or Co.	SRF Consulting Group, Inc.
Date Performed	7/6/2017
Analysis Year	2017
Time Period	P.M. Peak
Project Description	10279

Site Information

Intersection	Lookout Drive at Howard Drive
E/W Street Name	Howard Drive
N/S Street Name	Lookout Drive
Analysis Time Period (hrs)	0.25
Peak Hour Factor	1.00
Jurisdiction	MAPO

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LT				LTR	
Volume (V), veh/h	0	10	10	65	0	130	15	25	0	35	200	40	0	15	345	5
Percent Heavy Vehicles, %	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Flow Rate (v_{PCE}), pc/h	0	10	10	68	0	136	16	26	0	37	210	42	0	16	362	5
Right-Turn Bypass	None				None				Yielding				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		4.9763			4.9763			4.9763	4.9763		4.9763	
Follow-Up Headway (s)		2.6087			2.6087			2.6087	2.6087		2.6087	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		88			178			247	42		383	
Entry Volume veh/h		84			170			235	40		365	
Circulating Flow (v_c), pc/h	514			257			36			189		
Exiting Flow (v_{ex}), pc/h	26			58			246			566		
Capacity (c_{pce}), pc/h		817			1062			1330	1344		1138	
Capacity (c), veh/h		778			1011			1267	1280		1084	
v/c Ratio (x)		0.11			0.17			0.19	0.03		0.34	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		5.7			5.1			4.4	3.1		6.7	
Lane LOS		A			A			A	A		A	
95% Queue, veh		0.4			0.6			0.7	0.1		1.5	
Approach Delay, s/veh	5.7			5.1			4.2			6.7		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh | LOS	5.5						A					

Forecasted Year 2037 Detailed Operational Analysis

All-Way Stop Control

1: Lookout Drive & Howard Drive Performance by approach

Approach	EB	WB	NB	SB	All
Denied Delay (hr)	0.0	0.0	0.4	0.0	0.4
Denied Del/Veh (s)	0.6	0.3	1.4	0.0	0.8
Total Delay (hr)	0.2	0.9	3.1	1.2	5.3
Total Del/Veh (s)	8.2	11.5	12.2	10.9	11.6
Stop Delay (hr)	0.1	0.7	1.4	0.6	2.8
Stop Del/Veh (s)	5.6	8.7	5.5	5.6	6.1
Total Stops	75	276	581	391	1323
Stop/Veh	1.00	0.99	0.64	1.00	0.80

Intersection: 1: Lookout Drive & Howard Drive

Movement	EB	EB	WB	NB	NB	NB	SB	SB
Directions Served	L	TR	LTR	LT	T	R	LT	TR
Maximum Queue (ft)	36	71	163	235	195	138	136	108
Average Queue (ft)	8	33	75	92	52	32	57	50
95th Queue (ft)	31	60	129	171	117	107	97	86
Link Distance (ft)		960	960	966	966		238	238
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)	250					250		
Storage Blk Time (%)					0			
Queuing Penalty (veh)					0			

1: Lookout Drive & Howard Drive Performance by approach

Approach	EB	WB	NB	SB	All
Denied Delay (hr)	0.0	0.0	0.1	0.0	0.1
Denied Del/Veh (s)	0.5	0.2	0.6	0.0	0.3
Total Delay (hr)	0.2	0.5	1.0	1.5	3.0
Total Del/Veh (s)	5.3	7.8	9.7	10.2	9.1
Stop Delay (hr)	0.1	0.3	0.3	0.6	1.4
Stop Del/Veh (s)	4.2	5.2	3.5	4.4	4.2
Total Stops	107	210	305	515	1137
Stop/Veh	0.98	0.99	0.85	1.00	0.95

Intersection: 1: Lookout Drive & Howard Drive

Movement	EB	EB	WB	NB	NB	SB	SB
Directions Served	L	TR	LTR	LT	T	LT	TR
Maximum Queue (ft)	56	78	111	98	78	115	119
Average Queue (ft)	11	37	55	52	29	59	58
95th Queue (ft)	39	65	90	81	57	92	98
Link Distance (ft)		960	960	966	966	238	238
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)	250						
Storage Blk Time (%)							
Queuing Penalty (veh)							

Forecasted Year 2037 Detailed Operational Analysis

Traffic Signal Control

1: Lookout Drive & Howard Drive Performance by approach

Approach	EB	WB	NB	SB	All
Denied Delay (hr)	0.0	0.0	0.4	0.0	0.4
Denied Del/Veh (s)	0.8	0.3	1.4	0.0	0.9
Total Delay (hr)	0.2	1.2	3.0	0.8	5.2
Total Del/Veh (s)	10.9	14.7	11.4	7.8	11.1
Stop Delay (hr)	0.2	0.9	1.4	0.5	3.0
Stop Del/Veh (s)	8.7	11.1	5.4	4.8	6.3
Total Stops	45	206	338	158	747
Stop/Veh	0.66	0.73	0.36	0.41	0.44

Intersection: 1: Lookout Drive & Howard Drive

Movement	EB	EB	WB	NB	NB	NB	SB	SB
Directions Served	L	TR	LTR	LT	T	R	LT	TR
Maximum Queue (ft)	40	74	254	244	190	97	117	121
Average Queue (ft)	8	27	104	108	53	12	58	38
95th Queue (ft)	32	61	189	189	128	57	99	92
Link Distance (ft)		960	960	966	966		238	238
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)	250					250		
Storage Blk Time (%)								
Queuing Penalty (veh)								

1: Lookout Drive & Howard Drive Performance by approach

Approach	EB	WB	NB	SB	All
Denied Delay (hr)	0.0	0.0	0.1	0.0	0.1
Denied Del/Veh (s)	0.7	0.2	0.7	0.0	0.3
Total Delay (hr)	0.2	0.6	1.0	1.1	2.9
Total Del/Veh (s)	6.0	10.4	9.6	7.4	8.5
Stop Delay (hr)	0.1	0.5	0.5	0.6	1.7
Stop Del/Veh (s)	4.9	7.5	5.1	4.1	5.1
Total Stops	67	136	153	204	560
Stop/Veh	0.63	0.63	0.41	0.39	0.46

Intersection: 1: Lookout Drive & Howard Drive

Movement	EB	EB	WB	NB	NB	SB	SB
Directions Served	L	TR	LTR	LT	T	LT	TR
Maximum Queue (ft)	47	81	150	140	92	123	110
Average Queue (ft)	10	34	68	66	21	62	50
95th Queue (ft)	36	66	122	120	60	105	97
Link Distance (ft)		960	960	966	966	238	238
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)	250						
Storage Blk Time (%)							
Queuing Penalty (veh)							

Forecasted Year 2037 Detailed Operational Analysis

Roundabout Control

HCS7 Roundabouts Report

General Information

Analyst	Luke James
Agency or Co.	SRF Consulting Group, Inc.
Date Performed	7/13/2017
Analysis Year	2037
Time Period	A.M. Peak
Project Description	10279

Site Information

Intersection	Lookout Drive at Howard Drive
E/W Street Name	Howard Drive
N/S Street Name	Lookout Drive
Analysis Time Period (hrs)	0.25
Peak Hour Factor	1.00
Jurisdiction	MAPO

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LT				LTR	
Volume (V), veh/h	0	10	50	15	0	215	20	45	0	110	435	375	0	30	340	5
Percent Heavy Vehicles, %	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Flow Rate (v_{PCE}), pc/h	0	10	52	16	0	226	21	47	0	116	457	394	0	32	357	5
Right-Turn Bypass	None				None				Yielding				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		4.9763			4.9763			4.9763	4.9763		4.9763	
Follow-Up Headway (s)		2.6087			2.6087			2.6087	2.6087		2.6087	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		78			294			573	394		394	
Entry Volume veh/h		74			280			546	375		375	
Circulating Flow (v_c), pc/h	615			583			94			363		
Exiting Flow (v_{ex}), pc/h	84			142			514			599		
Capacity (c_{pce}), pc/h		737			761			1254	1267		953	
Capacity (c), veh/h		702			725			1194	1206		908	
v/c Ratio (x)		0.11			0.39			0.46	0.31		0.41	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		6.3			10.0			7.8	5.9		8.8	
Lane LOS		A			A			A	A		A	
95% Queue, veh		0.4			1.8			2.5	1.3		2.1	
Approach Delay, s/veh	6.3			10.0			7.0			8.8		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh | LOS	7.9						A					

HCS7 Roundabouts Report

General Information

Analyst	Luke James
Agency or Co.	SRF Consulting Group, Inc.
Date Performed	7/13/2017
Analysis Year	2037
Time Period	P.M. Peak
Project Description	10279

Site Information

Intersection	Lookout Drive at Howard Drive
E/W Street Name	Howard Drive
N/S Street Name	Lookout Drive
Analysis Time Period (hrs)	0.25
Peak Hour Factor	1.00
Jurisdiction	MAPO

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LT				LTR	
Volume (V), veh/h	0	15	10	85	0	165	15	35	0	50	265	50	0	20	480	10
Percent Heavy Vehicles, %	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Flow Rate (v_{PCE}), pc/h	0	16	10	89	0	173	16	37	0	52	278	52	0	21	504	10
Right-Turn Bypass	None				None				Yielding				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		4.9763			4.9763			4.9763	4.9763		4.9763	
Follow-Up Headway (s)		2.6087			2.6087			2.6087	2.6087		2.6087	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		115			226			330	52		535	
Entry Volume veh/h		110			215			314	50		510	
Circulating Flow (v_c), pc/h		698			346			47			241	
Exiting Flow (v_{ex}), pc/h		31			78			331			766	
Capacity (c_{pce}), pc/h		677			970			1315	1337		1079	
Capacity (c), veh/h		645			923			1253	1273		1028	
v/c Ratio (x)		0.17			0.23			0.25	0.04		0.50	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		7.6			6.2			5.1	3.1		9.4	
Lane LOS		A			A			A	A		A	
95% Queue, veh		0.6			0.9			1.0	0.1		2.8	
Approach Delay, s/veh	7.6			6.2			4.8			9.4		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh | LOS	7.3						A					

Detailed Cost Analysis

SRF Consulting Group, Inc. | Engineers Planners Designers

Concept Cost Estimate (based upon 2017 bid price information)

Prepared By: SRF Consulting Group, Inc., Date 7/2017

						Lookout Drive at Howard Drive	
	ITEM DESCRIPTION		UNIT	UNIT PRICE	EST. QUANTITY	EST. AMOUNT
PAVING AND GRADING COSTS							
GrP 1	Excavation - common & subgrade		cu. yd.	$7.00	5,100	$35,700
GrP 2	Granular Subgrade (CV)		cu. yd.	$14.00	3,000	$42,000
GrP 3	County Road Pavement	(1)	sq. yd.	$32.00	6,060	$193,920
GrP 4	Concrete Median	(1)	sq. yd.	$40.00	1,590	$63,600
GrP 5	Walk / Trail	(1)	sq. yd.	$25.00	1,510	$37,750
GrP 6	ADA Pedestrian Curb Ramp		each	$800.00	18	$14,400
GrP 7	Concrete Curb and Gutter		lin. ft.	$12.00	5,250	$63,000
GrP 8	Removals - Pavement		sq. yd.	$2.50	9,770	$24,425
	SUBTOTAL PAVING AND GRADING COSTS:					**$474,795**
DRAINAGE, UTILITIES AND EROSION CONTROL						
Dr 1	Local Utilities - Sanitary Sewers		lin. ft.			
Dr 2	Local Utilities - Watermains		lin. ft.			
Dr 3	Water Quality Ponds		l.s.			
Dr 5	Drainage - urban (10-30%)		30%			$142,000
Dr 6	Turf Establishment & Erosion Control		10%			$47,000
Dr 7	Landscaping					
	SUBTOTAL DRAINAGE, UTILITIES AND EROSION CONTROL					**$189,000**
SIGNAL AND LIGHTING COSTS						
SGL 1	Signals (permanent)		each	$200,000		
SGL 2	At Grade Intersection Lighting (permanent - non signa		each	$10,000	12	$120,000
	SUBTOTAL SIGNAL AND LIGHTING COSTS:					**$120,000**
SIGNING & STRIPING COSTS						
SGN 1	Mainline Signing (C&D)		mile	$20,000	0.3	$6,000
SGN 2	Mainline Striping		mile	$10,000	0.3	$3,000
	SUBTOTAL SIGNING & STRIPING COSTS:					**$9,000**
	SUBTOTAL CONSTRUCTION COSTS:					**$792,795**
MISCELLANEOUS COSTS						
M 1	Mobilization		6%			$48,000
M 2	Non Quantified Minor Items (10% to 30%)		20%			$159,000
M 3	Temporary Pavement & Drainage		2%			$16,000
M 4	Traffic Control		4%			$32,000
	SUBTOTAL MISCELLANEOUS COSTS:					**$255,000**
	ESTIMATED TOTAL CONSTRUCTION COSTS without Contingency:					**$1,047,795**
1	Contingency or "risk" (10% to 30%)		20%			$210,000
	ESTIMATED TOTAL CONSTRUCTION COSTS PLUS CONTINGENCY:					**$1,257,795**

	OTHER PROJECT COSTS:				
	R/W ACQUISITIONS	Lump Sum			
	DESIGN ENG. & CONSTRUCTION ADMIN.	Lump Sum			
	SUBTOTAL OTHER PROJECT COSTS				
	TOTAL PROJECT COST (based upon 2016 bid price information)				**$1,257,795**

	INFLATION COST (CURRENT YR. TO YR. OF OPE	Years	3%		
	TOTAL PROJECT COST (OPENING YEAR DOLLARS)				**$1,257,795**

NOTE: (1) Includes aggregate base class 5.

MAJOR ITEMS NOT INCLUDED:
- Local utilities (sanitary sewer or watermain)
- Water quality ponds or other BMPs
- R/W acquisitions
- Engineering design fees
- Inflation

Intersection Control Evaluation

Lor Ray Drive at
Carlson Drive/Countryside Drive

in North Mankato, Nicollet County, Minnesota

Mankato/North Mankato Area Planning Organization

SRF Consulting Group, Inc. | Engineers Planners Designers

October 2017

SRF No. 10279

Intersection Control Evaluation

Lor Ray Drive at Carlson Drive/Countryside Drive

Proposed Letting Date: TBD

Report Certification:

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

Adrian S. Potter	42785
Print Name	Reg. No.
Signature	Date

Approved:

City of North Mankato City Engineer	Date

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Introduction

This report contains the intersection control evaluation results for the Lor Ray Drive at Carlson Drive/Countryside Drive intersection in North Mankato, Nicollet County, Minnesota (see Figure 1). The purpose of the evaluation was to analyze the intersection control alternatives for the intersection to identify the long-term preferred intersection control. The following intersection control alternatives were considered applicable and are analyzed within this report:

- Side-Street Stop Control
- All-Way Stop Control
- Roundabout Control

A detailed warrants analysis, operational analysis, safety analysis, and planning-level cost analysis were performed to determine the preferred intersection control alternative. In addition to these analyses, other factors considered for this evaluation that were applicable to determining the long-term preferred intersection control included:

- Right-of-Way Considerations
- Transportation System Considerations
- Pedestrian and Bicycle Considerations
- Local Acceptance

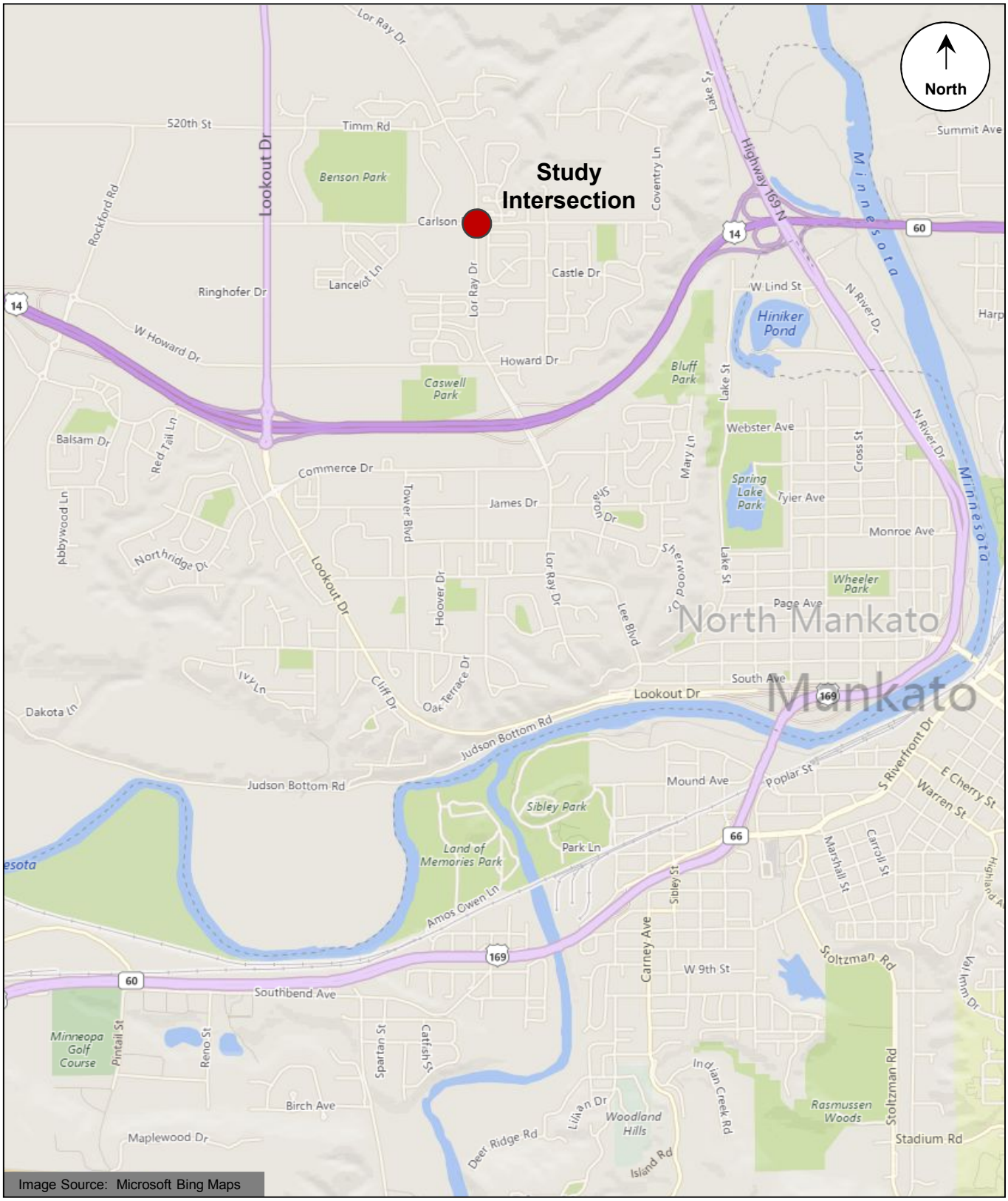


Image Source: Microsoft Bing Maps

SRF Consulting Group, Inc.

Study Intersection

Figure 1

Intersection Control Evaluation
Lor Ray Drive at Carlson Drive/Countryside Drive
North Mankato, Nicollet County, Minnesota

10279
September 2017

Existing Intersection Characteristics

Existing Conditions

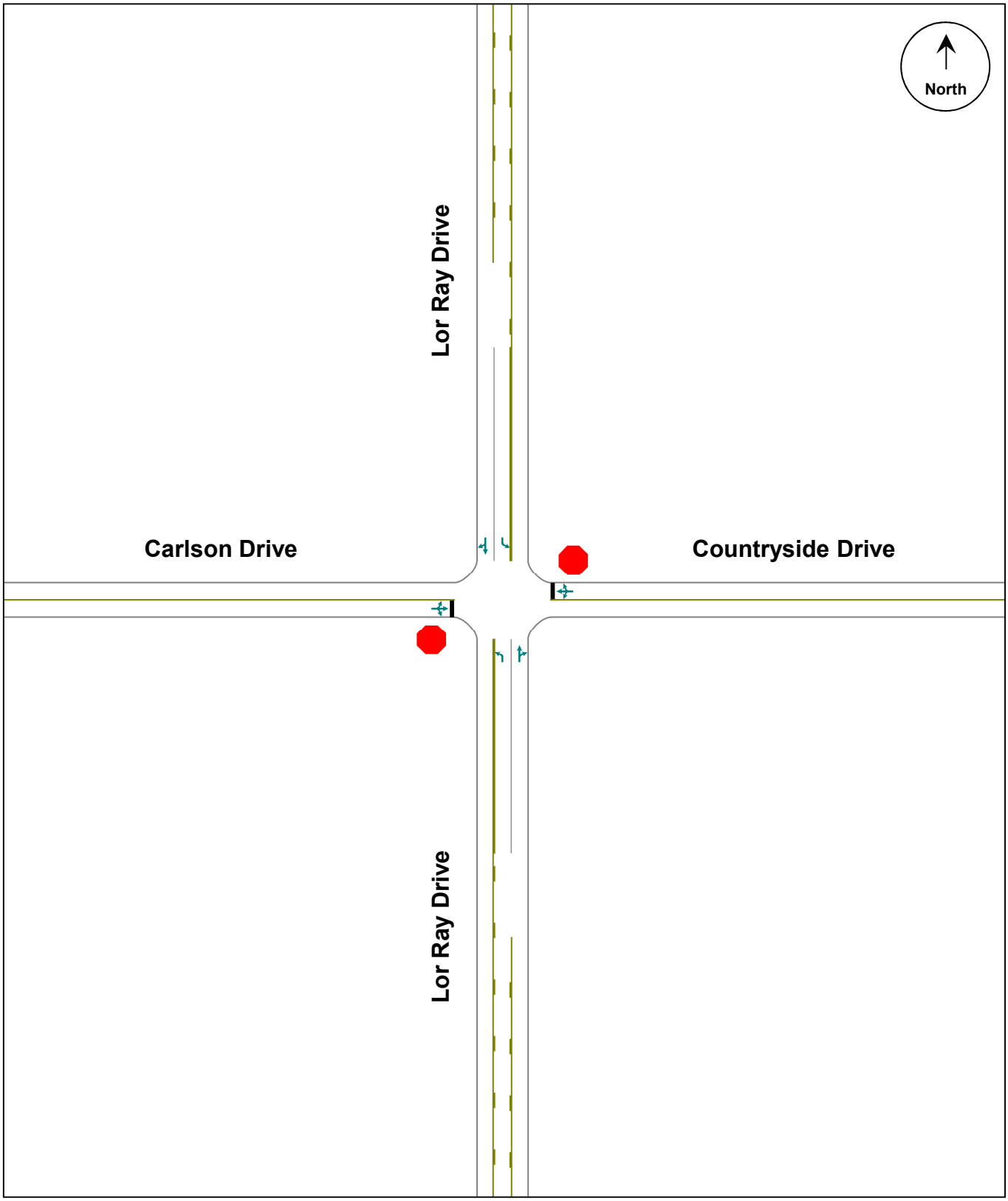
The study intersection is located in the City of North Mankato, Nicollet County as shown in Figure 1. Lor Ray Drive is a three-lane undivided city street and is functionally classified as a minor arterial. Carlson Drive goes west of the intersection and Countryside Drive goes east. Carlson Drive/Countryside Drive is a two-lane undivided city street and is functionally classified as a local road. The intersection of Lor Ray Drive and Carlson Drive/Countryside Drive is currently side-street stop controlled and the speed limit on all approaches is 30 mph. There are sidewalks/trails on both sides of Lor Ray Drive and Carlson Drive, and on the north side of Countryside Drive. There are marked pedestrian crossings on all four legs of the intersection. The adjacent area has primarily residential and recreational land uses. The existing lane configurations for the Lor Ray Drive at Carlson Drive/Countryside Drive intersection are listed in Table 1 below and are shown in Figure 2.

Table 1. Existing Conditions

Approach	Configuration
Northbound Lor Ray Drive	One left-turn lane and one shared thru/right-turn lane
Southbound Lor Ray Drive	One left-turn lane and one shared thru/right-turn lane
Eastbound Carlson Drive	One shared lane (all movements)
Westbound Countryside Drive	One shared lane (all movements)

Crash History

Crash data was obtained from the Minnesota Crash Mapping Analysis Tool (MnCMAT) database for a five-year period from 2011 to 2015. There were eleven recorded crashes at the study intersection during the analysis period. Detailed crash data is provided in the Appendix. This results in a crash rate of 1.21 crashes per million entering vehicles, which is above the statewide average of 0.18 for side-street stop controlled intersections, and is above the critical crash rate of 0.60 (0.995 level of confidence) for this intersection, indicating that there is an existing crash problem.



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September 2017

Existing Conditions

Figure 2

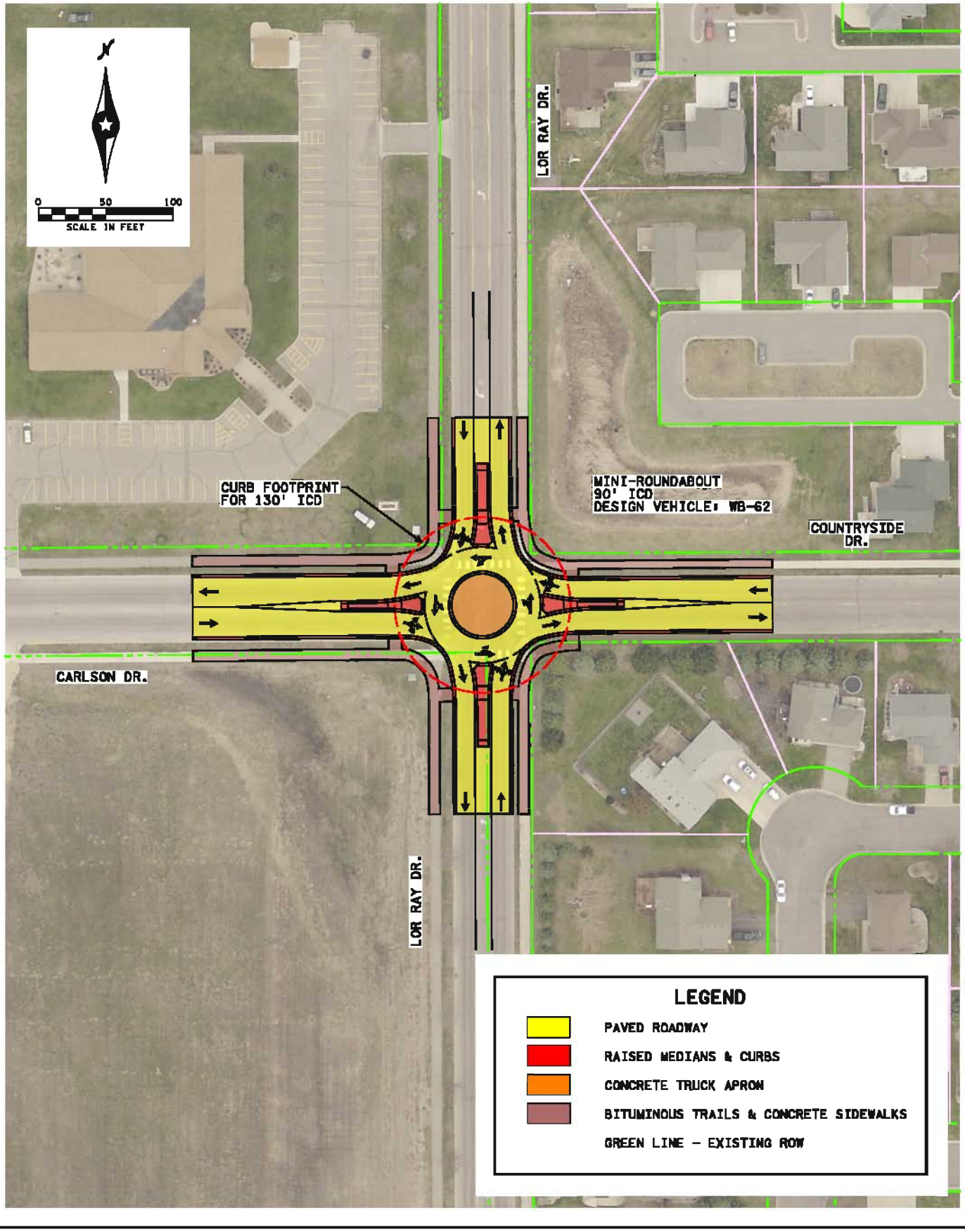
Intersection Control Evaluation
Lor Ray Drive at Carlson Drive/Countryside Drive
North Mankato, Nicollet County, Minnesota

Future Conditions

Based on discussions with City staff in the summer of 2017, no short-term improvements to Lor Ray Drive, Carlson Drive, Countryside Drive, or the study intersection are planned. For the alternatives analysis, the existing lane configurations under side-street stop control (listed in Table 1 and shown in Figure 2) were assumed to be the same for the all-way stop control alternative. The lane configurations for the roundabout control alternative are listed in Table 2 below and are shown in Figure 3, with a mini-roundabout variation being utilized for this alternative. Mini-roundabouts can typically be built within the existing footprint of an intersection, resulting in little or no right-of way impacts. According to *Mini-Roundabouts Technical Summary* (Federal Highway Administration, 2010), mini-roundabouts are best suited and most efficient in lower speed environments (30 mph or less), and are generally recommended for intersections where the total entering daily traffic volume does not exceed approximately 15,000 vehicles. This criteria fits the characteristics of the study intersection.

Table 2. Proposed Lane Configurations for Mini-Roundabout Control Alternative

Approach	Configuration
Northbound Lor Ray Drive	One shared lane (all movements)
Southbound Lor Ray Drive	One shared lane (all movements)
Eastbound Carlson Drive	One shared lane (all movements)
Westbound Countryside Drive	One shared lane (all movements)



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017 10279
September 2017

Mini-Roundabout Control Alternative

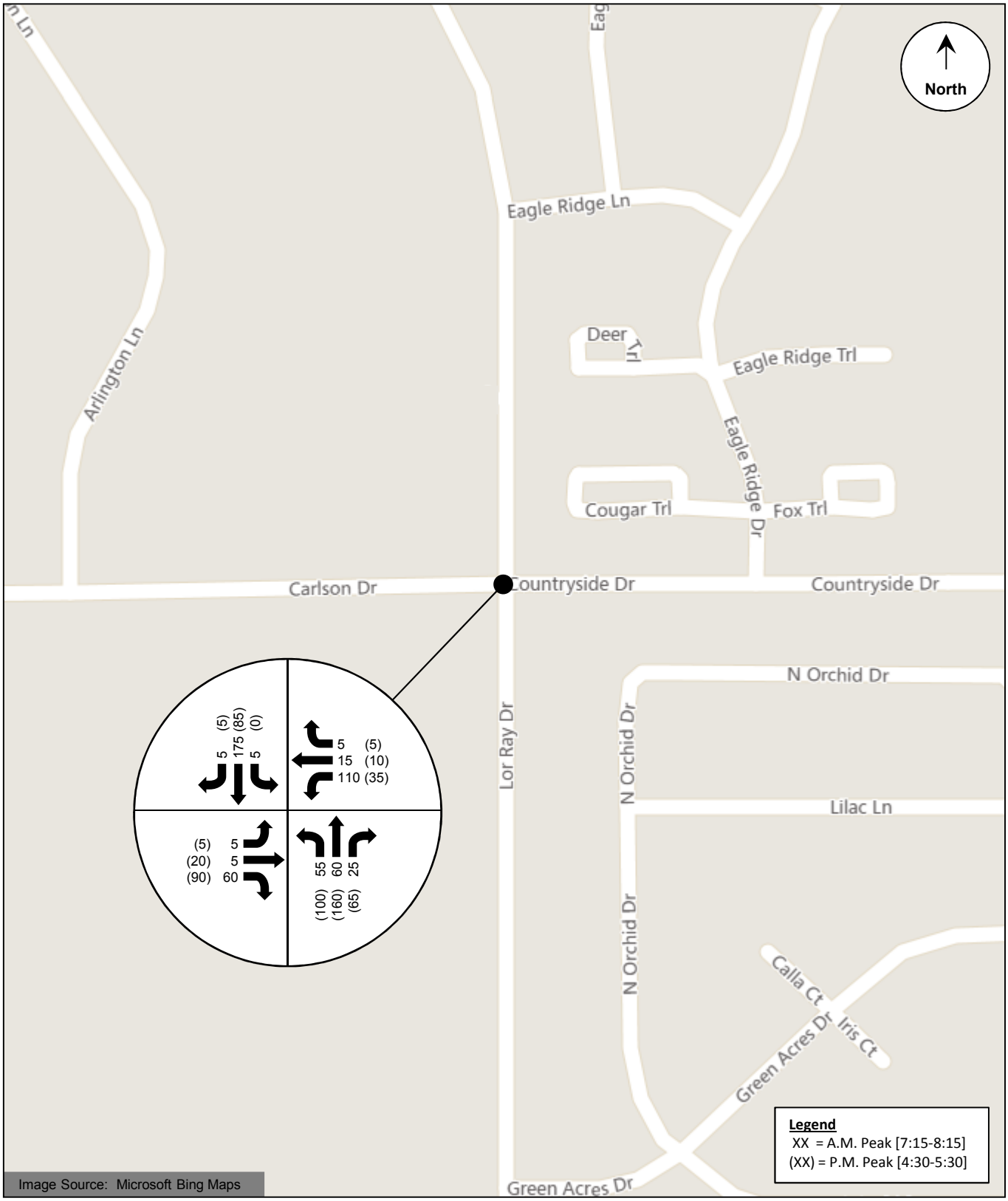
Intersection Control Evaluation

Lor Ray Drive at Carlson Drive/Countyside Drive

Figure 3

Traffic Volumes

Hourly traffic volumes including the existing a.m. and p.m. peak hour were collected in April 2017 by SRF prior to the conclusion of the spring term at Minnesota State University and are shown in Figure 4. Pedestrian and bicycle volumes were also collected. Growth rates from the MAPO 2045 Transportation Plan were explored for traffic forecasts, however, these growth rates do not fully account for recently proposed housing developments north and east of the study intersection. Furthermore, the property in the southwest quadrant is owned by the school district, and is a possible location of a future elementary school. If these developments all occur, there would be significant traffic growth at the study intersection. Therefore, a trip generation was completed for these developments to obtain growth rates. The trip generation assumed the worst-case scenario for the study intersection of an elementary school with all access points on Carlson Drive. The resulting growth rates were 3.7% and 3.0% on the north and south legs of Lor Ray Drive, respectively, 6.0% on Countryside Drive (east leg), and 2.0% on Carlson Drive (west leg). These growth rates account for the two housing developments occurring in the next 20 years, growth in the surrounding area, and the worst-case scenario of an elementary school access on the west leg. These growth rates were used to determine Forecasted Year 2037 peak hour turning movement volumes, which are shown in Figure 5.



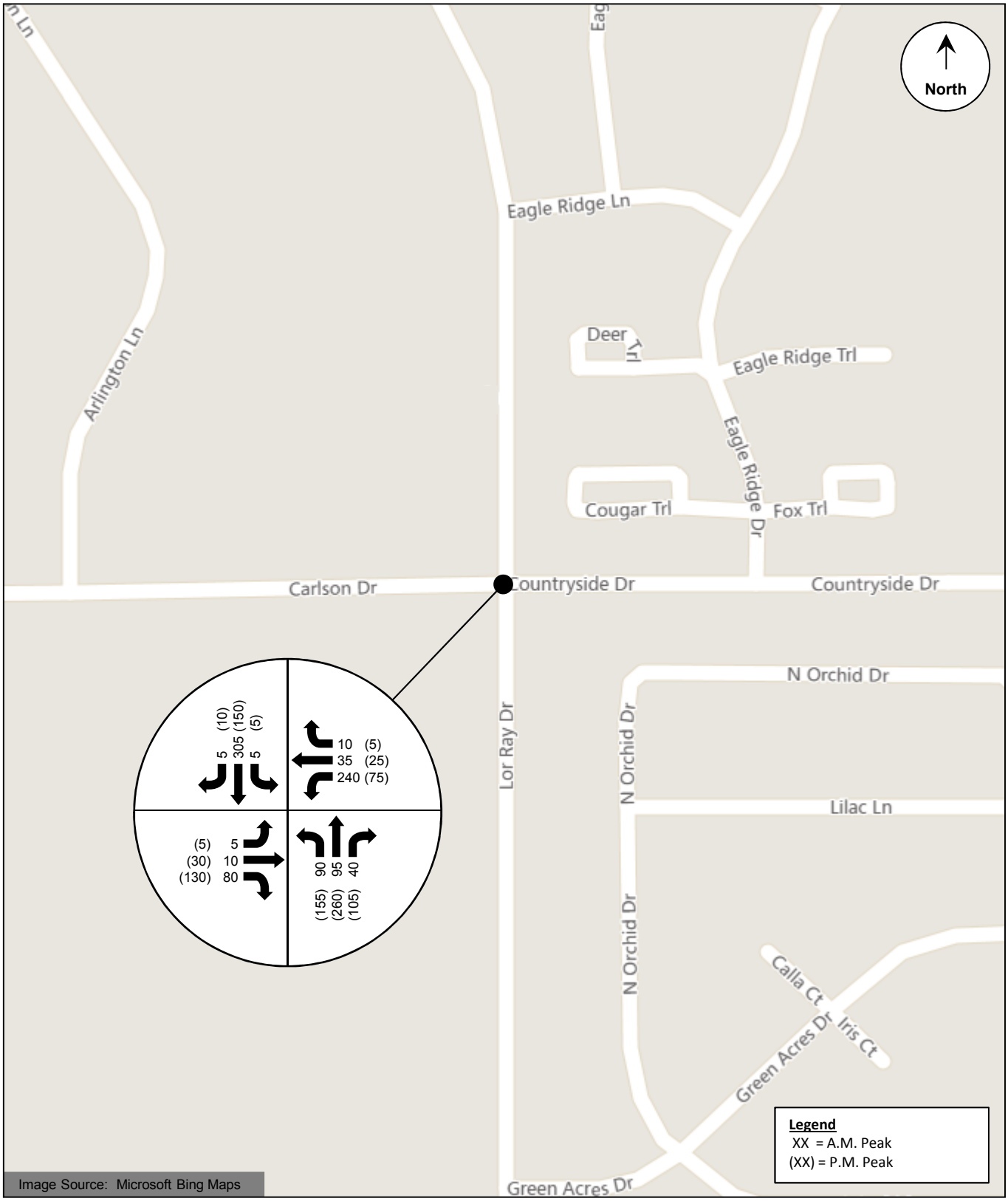
SRF Consulting Group, Inc.

Existing Year 2017 Volumes

Figure 4

Intersection Control Evaluation
Lor Ray Drive at Carlson Drive/Countryside Drive
North Mankato, Nicollet County, Minnesota

10279
September 2017



SRF Consulting Group, Inc.

Forecasted Year 2037 Volumes

Figure 5

Intersection Control Evaluation
Lor Ray Drive at Carlson Drive/Countryside Drive
North Mankato, Nicollet County, Minnesota

10279
September 2017

Analysis of Alternatives

The analysis of the side-street stop control, all-way stop control, and mini-roundabout control alternatives included a warrants analysis, operational analysis, planning-level crash analysis, and a planning-level cost analysis. Existing Year 2017 and Forecasted Year 2037 volumes with proposed lane configurations discussed previously were used for the analysis.

Warrants Analysis

A warrants analysis was performed for the traffic signal control alternative as outlined in the February 2015 *Minnesota Manual on Uniform Traffic Control Devices* (MN MUTCD). The signal warrants analysis was based on the assumptions shown in Table 3.

Table 3. Warrants Analysis Assumptions

Approach	Geometry	Speed
Northbound Major Street (Lor Ray Drive)	2 or more approach lanes	30 mph
Southbound Major Street (Lor Ray Drive)	1 approach lane	30 mph
Eastbound Minor Street (Carlson Drive)	1 approach lane	30 mph
Westbound Minor Street (Countryside Drive)	1 approach lane	30 mph

Minor street right-turns were included in the analysis because of the shared eastbound and westbound lanes. The southbound approach was considered a one lane approach because of the low left-turn volume. Table 4 provides a summary of the results of the warrants analysis. The detailed warrants analysis can be found in the Appendix.

Table 4. Warrants Analysis Results

MN MUTCD Warrant	Hours Required	Existing Year 2017 Volumes		Forecasted Year 2037 Volumes	
		Hours Met	Warrant Met	Hours Met	Warrant Met
Warrant 1A: Minimum Vehicular Volume	8	0	No	0	No
Warrant 1B: Interruption of Continuous Traffic	8	0	No	0	No
Warrant 1C: Combination of Warrants	8	0	No	0	No
Warrant 2: Four-Hour Volume	4	0	No	0	No
Warrant 3B: Peak-Hour Volume	1	0	No	0	No
Multi-way Stop Applications Condition C	8	0	No	4	No

Warrants 4-9 were investigated but were determined to be not applicable. Results of the warrants analysis indicate that the intersection does not satisfy any MN MUTCD traffic signal warrants or multi-way stop warrants in 2017 or 2037.

Operational Analysis

An initial planning-level analysis was performed for the mini-roundabout control alternative based on methods found in the *Highway Capacity Manual, Sixth Edition* (Transportation Research Board, 2016). The analysis involved testing the theoretical capacity of a single-lane roundabout against the Forecasted Year 2037 entering and circulating volumes. As shown in Chart 1, the Forecasted Year 2037 volumes do not exceed the theoretical capacity of a single-lane roundabout. Therefore, a single lane mini-roundabout was selected for further analysis.

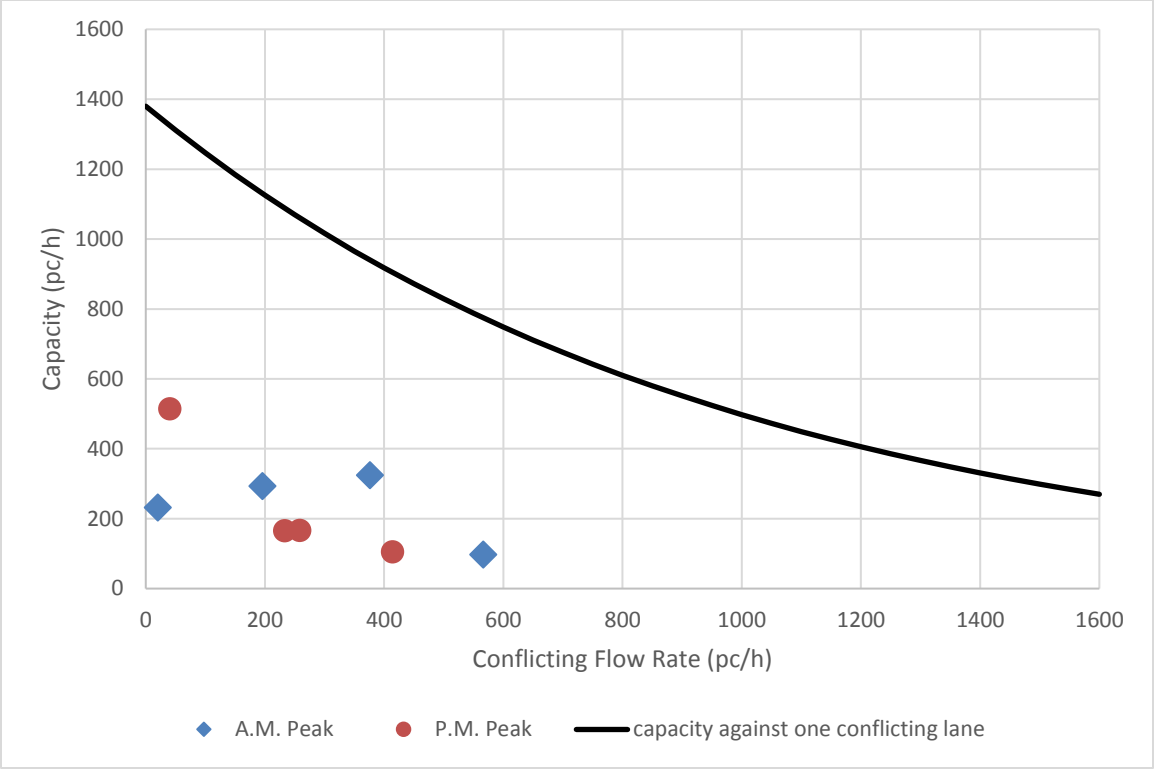


Chart 1. Single-Lane Roundabout Entry Lane Capacity (Forecasted Year 2037 volumes)

Operational analysis of the mini-roundabout control alternative was performed using Highway Capacity Software (HCS). HCS is based on methodologies found in the *Highway Capacity Manual, 6th Edition* (HCM). It is important to note that HCS only reports "stop" or "control" delay. Therefore, to determine the total delay, "geometric" delay, or delay due to vehicle deceleration and acceleration through an intersection, must be added to the "stop" or "control" delay.

The detailed operational analysis of all-way stop control and traffic signal control was performed using methods outlined in the HCM using Synchro/SimTraffic. Synchro/ SimTraffic can calculate various measures of effectiveness such as control delay, queuing, and total travel time impacts. SimTraffic results are reported for the analysis.

The operational analysis identified a Level of Service (LOS), which indicates how well an intersection is operating based on average delay per vehicle. Intersections are given a ranking from LOS A to LOS F. LOS A indicates the best traffic operation and LOS F indicates an intersection where demand exceeds capacity. LOS A through LOS D are generally considered acceptable.

Table 5 and Table 6 provide a summary of the operational analysis for Existing Year 2017 and Forecasted Year 2037 conditions, respectively. Detailed operational analysis results can be found in the Appendix.

Table 5. Existing Year 2017 Operational Analysis Results

Alternative	Analysis Tool	A.M. Peak		P.M. Peak	
		Delay (1) (sec/veh)	LOS	Delay (1) (sec/veh)	LOS
Side-Street Stop Control	Synchro/SimTraffic	2/4	A (2)	1/5	A (2)
All-Way Stop Control	Synchro/SimTraffic	3/3	A/A	3/3	A/A
Mini-Roundabout Control	HCS	4/5	A/A	4/5	A/A

(1) Control/stop delay is reported. Overall results are followed by the worst approach results.
(2) LOS for side-street stop control as defined in the HCM is not applicable to the overall intersection.

Table 6. Forecasted Year 2037 Operational Analysis Results

Alternative	Analysis Tool (Variation)	A.M. Peak		P.M. Peak	
		Delay (1) (sec/veh)	LOS	Delay (1) (sec/veh)	LOS
Side-Street Stop Control	Synchro/SimTraffic	8/24	C (2)	2/8	A (2)
All-Way Stop Control	Synchro/SimTraffic	7/9	A/A	4/4	A/A
Mini-Roundabout Control	HCS	6/8	A/A	6/6	A/A

(1) Control/stop delay is reported. Overall results are followed by the worst approach results.
(2) LOS for side-street stop control as defined in the HCM is not applicable to the overall intersection.

Results of the operational analysis indicate that under the existing side-street stop control, the intersection operates with an acceptable level of service, and would continue to do so under Forecasted Year 2037 conditions. The worst approach delay is LOS C in the Forecasted Year 2037 a.m. peak, with more delay than all-way stop control or mini-roundabout control. The all-way stop control and mini-roundabout control alternatives would also operate with acceptable levels of service under existing and forecasted conditions.

Safety Analysis

A crash analysis was performed to determine the projected crashes per year for Existing Year 2017 and Forecasted Year 2037 conditions for the study intersection. Crash rates from the MnDOT Green Sheets (2011 to 2015 data) were used for the crash analysis of the all-way stop control alternative. The existing crash rate for side-street strop control was used for that alternative, as the existing crash rate far exceeds the average rate. According to *NCHRP Report 672 Roundabouts: An Informational Guide, Second Edition* (Transportation Research Board, 2010), the conversion of a suburban side-street stop controlled intersection to a single lane roundabout results in an estimated 78.2% reduction in crashes. Therefore, the crash rate for the mini-roundabout control alternative was calculated using the existing crash rate and this factor. A summary of the crash analysis is shown in Table 7.

Table 7. Crash Analysis Results

Alternative	Intersection AADT (2017)	Intersection AADT (2037)	Crash Rate	Projected Crashes/Year (2017)	Projected Crashes/Year (2037)
Side-Street Stop Control	5,000	8,400	1.21	3	4
All-Way Stop Control			0.35	1	2
Mini-Roundabout Control			0.26	1	1

Based on the results of the crash analysis, the all-way stop control and mini-roundabout control alternatives are anticipated to have less crashes than the side-street stop control alternative.

Studies have determined that the installation of a roundabout can improve overall safety of an intersection when compared to other forms of intersection control. Roundabouts typically have fewer conflict points than conventional intersections and the geometry of a roundabout induces lower speeds for vehicles approaching and traversing an intersection. With lower speeds, the severity of the crashes is decreased. A roundabout virtually eliminates right-angle and left-turn head-on crashes. Studies have shown the frequency of injury crashes is reduced more than property damage only crashes.

At a roundabout, drivers must be aware of traffic traveling around the circle when merging on or off the roundabout. Conversely, drivers at a traditional intersection must be aware of vehicles at all approaches and the movements they are making. This issue is most prevalent at stop-controlled intersections where there is not a traffic signal to control vehicle movements.

Planning-Level Cost Analysis

Capital Costs

The intersection is currently side-street stop controlled, therefore with the "no build" alternative there would be no cost to continue with this type of intersection control. The mini-roundabout control alternative would require reconstruction at the intersection, which results in a much higher cost than either stop control alternative.

Operation and Maintenance Costs

Operation and maintenance costs associated with a mini-roundabout can vary depending on the amount of illumination required. Mini-roundabouts have a mountable (traversable) center island so there is no additional landscaping to maintain. Stop control operation and maintenance costs are only the ongoing costs of maintaining the stop signs and pavement markings.

A cost analysis summary is shown in Table 8. Detailed cost analysis results can be found in the Appendix.

Table 8. Cost Analysis Summary

Alternative	Capital Costs (1)	Operation/Maintenance Costs (annual)
Side-Street Stop Control	$0	< $200
All-Way Stop Control	$1,000	< $200
Mini-Roundabout Control	$620,000	$500-$1,000

(1) Does not include engineering or right-of-way costs.

Alternatives Assessment

Right-of-Way Considerations

The roadway geometry for the side-street stop control and all-way stop control would use existing conditions and therefore no additional right-of-way would be required. Construction of a mini-roundabout at the study intersection would require additional right-of-way for the sidewalks/trails, but the impacts would be minimal compared to a full-size roundabout.

Transportation System Considerations

There are several roundabouts southwest of the study intersection at the Lookout Drive and County Road 41 interchanges with TH 14. Roundabout control was also recommended for the Lor Ray Drive and Howard Drive intersection to the south. The mini-roundabout control alternative could be considered a traffic calming measure for the surrounding residential area. No significant queues are expected with any of the alternatives.

Pedestrian and Bicycle Considerations

As previously mentioned, there are currently sidewalks/trails on both sides of Lor Ray Drive and Carlson Drive, and on the north side of Countryside Drive. There are marked pedestrian crossings on all four legs of the intersection. Pedestrian accommodations can be provided regardless of the selected intersection control.

The design of a mini-roundabout allows pedestrians to cross one direction of traffic at a time with a small refuge space in the middle of each leg of the mini-roundabout, and these short crossing distances and reduced travel speeds of vehicle traffic improve pedestrian safety. However, their route is slightly longer since they are kept to the outside of the inscribed circle.

The all-way stop alternative provides a safety benefit for pedestrians by having all vehicular movements stop; however, there are safety concerns for pedestrians where all road users expect other road users to stop. Most vehicle-pedestrian collisions at all-way stop controlled intersections are a result of either vehicles not stopping when pedestrians assume they are, or pedestrians not paying attention to vehicles approaching the intersection.

With side-street stop control, mainline vehicles do not have to stop except for pedestrians in crosswalks; when crossing the mainline, pedestrians must select acceptable gaps or verify that vehicles are stopping. Potential conflicts can also come from turning mainline traffic not looking for pedestrians crossing the side-street. In-street pedestrian crossing signs or rectangular rapid flashing beacons can be used to enhance the crossings.

Local Acceptance

Drivers are familiar with traveling through side-street stop controlled and all-way stop controlled intersections since there are many intersections in the area under these types of traffic control. Drivers are also familiar with traveling through roundabout controlled intersections since there are many existing roundabouts throughout the greater Mankato area.

Conclusions and Recommendations

The following conclusions are provided for this intersection control evaluation for the Lor Ray Drive at Carlson Drive/Countryside Drive intersection in North Mankato, Nicollet County, Minnesota:

- *Warrants Analysis*
  Results of the warrants analysis indicate that Existing Year 2017 and Forecasted Year 2037 volumes do not satisfy any MN MUTCD traffic signal warrants or multi-way stop warrants.

- *Operational Analysis*
  Results of the operational analysis indicate that under the existing side-street stop control, the intersection operates with an acceptable level of service, and would continue to do so under Forecasted Year 2037 conditions. The worst approach delay is LOS C in the Forecasted Year 2037 a.m. peak, with more delay than all-way stop control or mini-roundabout control. The all-way stop control and mini-roundabout control alternatives would operate with acceptable levels of servicer under forecasted conditions.

- *Safety Analysis*
  Based on the results of the crash analysis, the all-way stop control and mini-roundabout control alternatives are anticipated to have slightly less crashes than the side-street stop control alternative. Roundabouts typically have fewer conflict points than conventional intersections and the geometry of a roundabout induces lower speeds for vehicles approaching and traversing an intersection. With lower speeds, the severity of the crashes is decreased.

- *Planning-Level Cost Analysis*
  There would be no cost to continue with the existing side-street stop control, and minimal cost to convert to all-way stop control. The mini-roundabout control alternative would require reconstruction at the intersection, which results in a much higher cost estimate of approximately $620,000. Operation and maintenance costs associated with a mini-roundabout can vary depending on the amount of illumination required. Stop control operation and maintenance costs are only the ongoing costs of maintaining the stop signs and pavement markings.

- *Right-of-Way Considerations*
  The roadway geometry for the side-street stop control and all-way stop control alternatives would use existing conditions and therefore no additional right-of-way would be required. Construction of a mini-roundabout at the study intersection would require additional right-of-way, but the impacts would be minimal compared to a full-size roundabout.

- *Transportation System Considerations*
  There are several roundabouts southwest of the study intersection at the Lookout Drive and County Road 41 interchanges with TH 14. The roundabout control alternative could be considered a traffic calming measure for the surrounding residential area.

- *Pedestrian and Bicycle Considerations*
  The design of a roundabout allows pedestrians to cross one direction of traffic at a time on each leg of the roundabout. Their route is slightly longer since they are kept to the outside of the inscribed circle. All-way stop control provides a safety benefit for pedestrians by having all vehicular movements stop; however, most vehicle-pedestrian collisions at all-way stop controlled intersections are a result of either vehicles not stopping when pedestrians assume they are, or pedestrians not paying attention to vehicles approaching the intersection. Side-street stop control is not ideal for pedestrians with high traffic volumes, but can be enhanced by a variety of treatments.

- *Local Acceptance*
  Drivers are familiar with traveling through stop controlled intersections since there are many intersections in the area under these types of traffic control. Drivers are also familiar with traveling through roundabout controlled intersections since there are many existing roundabouts throughout the greater Mankato area.

A decision matrix was developed to help evaluate the key factors and is provided on the following page. Based on the results of this Intersection Control Evaluation, the side-street stop control, all-way stop control, and mini-roundabout control alternatives are all viable options for the Lor Ray Drive at Carlson Drive/Countryside Drive intersection. All alternatives have acceptable operations under forecasted conditions with all-way stop control and mini-roundabout control have less side-street delays. The "no build" alternative of side-street stop control does not require any capital improvements. However, there is an existing crash problem, so improvements to the intersection or change of control type are desired to help address this issue. Changing to all-way stop control would be expected to increase safety, but all-way stop control is not warranted and would greatly impact traffic flow. A mini-roundabout is expected to increase both vehicle and pedestrian safety within the existing intersection footprint, and could be considered a traffic calming measure for the surrounding residential area. Therefore, a mini-roundabout is recommended as the preferred long-term intersection control.

Alternatives Decision Matrix: Lor Ray Drive at Carlson Drive/Countryside Drive

Factor		Side-Street Stop Control	All-Way Stop Control	Mini-Roundabout Control	Recommended Alternative(s) Based on Factor
Warrants Analysis	2017	N/A	• AWSC warrant not met	N/A	Side-Street Stop Control Mini-Roundabout Control
	2037	N/A	• AWSC warrant not met	N/A	
Operational Analysis	2017	• Poor side-street LOS	• Acceptable LOS	• Acceptable LOS • Consistent off-peak operations	All-Way Stop Control Mini-Roundabout Control
	2037	• Poor side-street LOS	• Acceptable LOS	• Acceptable LOS • Consistent off-peak operations	
Safety Analysis	Pro(s):	none	• Low number of crashes expected • Lower vehicle speeds through intersection	• Least number of crashes expected • Lower vehicle speeds through intersection	All-Way Stop Control Mini-Roundabout Control
	Con(s):	• Most number of crashes expected • Higher vehicle speeds through intersection	• Drivers decide right-of-way	• Drivers select acceptable gaps	
Cost Analysis	Pro(s):	• No capital cost • Low operation/maintenance costs	• Low capital cost • Low operation/maintenance costs	• Low operation/maintenance costs	Side-Street Stop Control All-Way Stop Control
	Con(s):	none	none	• Higher capital costs ($620,000) than stop control • Requires substantial reconstruction	
Right-of-Way	Pro(s):	N/A (existing control)	• No ROW impacts expected	none	Side-Street Stop Control All-Way Stop Control
	Con(s):		none	• Requires minimal additional ROW	
Transportation System Considerations	Pro(s):	• Existing control • Adjacent intersections are side-street stop controlled	• Adjacent intersections are all-way stop controlled	• Adjacent intersections are recommended to be roundabouts	Mini-Roundabout Control
	Con(s):	• Adjacent intersections are recommended to be roundabouts	• No adjacent signals • Adjacent intersections are recommended to be roundabouts	none	
Pedestrian and Bicycle Considerations	Pro(s):	none	• All vehicular movements stop	• Pedestrian Refuge islands • Lower vehicle speeds thru intersection	All-Way Stop Control Mini-Roundabout Control
	Con(s):	• Mainline vehicles do not stop • Higher vehicle speeds thru intersection	• Expecting vehicles to yield to pedestrians can lead to a false sense of security	• Longer route	
Local Acceptance	Pro(s):	N/A (existing control)	• Familiar to drivers	• Familiar to drivers • Positive public feedback	Side-Street Stop Control Mini-Roundabout Control
	Con(s):		none	none	

Appendix

- 2011-2015 Crash History
- Existing Year 2017 Warrants Analysis
- Forecasted Year 2037 Warrants Analysis
- Existing Year 2017 Detailed Operational Analysis
    - Side-Street Stop Control
    - All-Way Stop Control
    - Roundabout Control
- Forecasted Year 2037 Detailed Operational Analysis
    - Side-Street Stop Control
    - All-Way Stop Control
    - Roundabout Control
- Detailed Cost Analysis

2011-2015 Crash History

Crash Detail Report

Lor Ray Drive at Carlson Drive/Countryside Drive

Report Version 1.0 March 2010

Crash ID: 110360040 **Date:** 02/04/2011 **Time:** 2202
County: NICOLLET **City:** NORTH MANKATO

Sys: 05-MSAS
Route: 28550117 001+00.332

Severity: PROPERTY DAMAGE
Road Type: 2 LANES UNDIV 2_WAY
Road Char: STRAIGHT AND LEVEL
Crash Type: COLL W/MV IN TRANSPORT
Surf Cond: ICE/PACKED SNOW
Light Cond: DARK - STREET LIGHTS ON
Weather 1: CLOUDY
Weather 2: NOT SPECIFIED

First Event: ON ROADWAY
To Junction: INTERSECTION-RELATED
Traffic Device: STOP SIGN 4-WAY
Speed Limit: 30
Diagram: OTHER
Officer:
Reliability: CONFIDENT
# of Vehicles: 2.00

	Unit 1	Unit 2	Unit 3
Trav Dir:	N	W	
Veh Act:	STRAIGHT AHEAD	START TRAFFIC	
Veh Type:	PASSENGER CAR	PASSENGER CAR	
Age:	20	60	
Gender:	F	F	
Cond:	NORMAL	NORMAL	
Cont Fact 1	NO IMPROPER DRIVING	FAIL TO YIELD ROW	
Cont Fact 2	NOT SPECIFIED	NOT SPECIFIED	

Crash ID: 110520423 **Date:** 02/21/2011 **Time:** 1940
County: NICOLLET **City:** NORTH MANKATO

Sys: 05-MSAS
Route: 28550254 001+00.320

Severity: PROPERTY DAMAGE
Road Type: 2 LANES UNDIV 2_WAY
Road Char: STRAIGHT AND LEVEL
Crash Type: COLL W/MV IN TRANSPORT
Surf Cond: ICE/PACKED SNOW
Light Cond: DARK - STREET LIGHTS ON
Weather 1: SNOW
Weather 2: NOT SPECIFIED

First Event: ON ROADWAY
To Junction: INTERSECTION-RELATED
Traffic Device: STOP SIGN OTHER
Speed Limit: 30
Diagram: RIGHT ANGLE
Officer:
Reliability: CONFIDENT
# of Vehicles: 2.00

	Unit 1	Unit 2	Unit 3
Trav Dir:	EAST	S	
Veh Act:	START TRAFFIC	STRAIGHT AHEAD	
Veh Type:	SPORT UNTILITY VEHICLE	PICKUP TRUCK	
Age:	43	28	
Gender:	M	M	
Cond:	NORMAL	NORMAL	
Cont Fact 1	FAIL TO YIELD ROW	NO IMPROPER DRIVING	
Cont Fact 2	NOT SPECIFIED	NOT SPECIFIED	

Crash ID: 123370008 **Date:** 12/01/2012 **Time:** 1725
County: NICOLLET **City:** NORTH MANKATO

Sys: 05-MSAS
Route: 28550254 001+00.320

Severity: PROPERTY DAMAGE
Road Type: 2 LANES UNDIV 2_WAY
Road Char: STRAIGHT AND LEVEL
Crash Type: COLL W/MV IN TRANSPORT
Surf Cond: DRY
Light Cond: DARK - STREET LIGHTS ON
Weather 1: CLEAR
Weather 2: FOG/SMOG/SMOKE

First Event: ON ROADWAY
To Junction: 4-LEGGED INTERSECTION
Traffic Device: STOP SIGN OTHER
Speed Limit: 30
Diagram: RIGHT ANGLE
Officer:
Reliability: CONFIDENT
# of Vehicles: 2.00

	Unit 1	Unit 2	Unit 3
Trav Dir:	EAST	S	
Veh Act:	PED. FAIL TO YIELD R/W TO T	STRAIGHT AHEAD	
Veh Type:	SPORT UNTILITY VEHICLE	PASSENGER CAR	
Age:	18	45	
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: 131970063 **Date:** 07/16/2013 **Time:** 0930
County: NICOLLET **City:** NORTH MANKATO

Sys: 05-MSAS
Route: 28550254 001+00.320

Severity: PROPERTY DAMAGE
Road Type: 2 LANES UNDIV 2_WAY
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: INTERSECTION-RELATED
Traffic Device: STOP SIGN OTHER
Speed Limit: 30
Diagram: REAR END
Officer:
Reliability: CONFIDENT
# of Vehicles: 2.00

	Unit 1	Unit 2	Unit 3
Trav Dir:	EAST	E	
Veh Act:	STRAIGHT AHEAD	STRAIGHT AHEAD	
Veh Type:	PASSENGER CAR	PASSENGER CAR	
Age:	30	68	
Gender:	F	F	
Cond:	NORMAL	NORMAL	
Cont Fact 1	OTHER HUMAN FACTOR	NO IMPROPER DRIVING	
Cont Fact 2	NOT SPECIFIED	NOT SPECIFIED	

Crash ID: 140170011 **Date:** 01/16/2014 **Time:** 0630
County: NICOLLET **City:** NORTH MANKATO

Sys: 05-MSAS
Route: 28550117 001+00.330

Severity: PROPERTY DAMAGE
Road Type: 2 LANES UNDIV 2_WAY
Road Char: STRAIGHT AND LEVEL
Crash Type: COLL W/MV IN TRANSPORT
Surf Cond: ICE/PACKED SNOW
Light Cond: SUNRISE
Weather 1: BLOWING SAND/DUST/SNOW
Weather 2: NOT SPECIFIED

First Event: ON ROADWAY
To Junction: 4-LEGGED INTERSECTION
Traffic Device: STOP SIGN OTHER
Speed Limit: 30
Diagram: HEAD ON
Officer:
Reliability: CONFIDENT
# of Vehicles: 2.00

	Unit 1	Unit 2	Unit 3
Trav Dir:	N	S	
Veh Act:	STRAIGHT AHEAD	STRAIGHT AHEAD	
Veh Type:	BUS (7-15 SEATS)	PASSENGER CAR	
Age:	53	32	
Gender:	F	F	
Cond:	NORMAL	NORMAL	
Cont Fact 1	SKIDDING	NO IMPROPER DRIVING	
Cont Fact 2	WEATHER	NOT SPECIFIED	

Crash ID: 141540200 **Date:** 06/03/2014 **Time:** 1930
County: NICOLLET **City:** NORTH MANKATO

Sys: 05-MSAS
Route: 28550117 001+00.332

Severity: PROPERTY DAMAGE
Road Type: 2 LANES UNDIV 2_WAY
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: INTERSECTION-RELATED
Traffic Device: STOP SIGN OTHER
Speed Limit: 30
Diagram: RIGHT ANGLE
Officer:
Reliability: CONFIDENT
# of Vehicles: 2.00

	Unit 1	Unit 2	Unit 3
Trav Dir:	W	N	
Veh Act:	STRAIGHT AHEAD	STRAIGHT AHEAD	
Veh Type:	SPORT UNTILITY VEHICLE	PASSENGER CAR	
Age:	39	68	
Gender:	F	M	
Cond:	NORMAL	NORMAL	
Cont Fact 1	FAIL TO YIELD ROW	NO IMPROPER DRIVING	
Cont Fact 2	DISTRACTION	NOT SPECIFIED	

Crash ID: 142920033 **Date:** 10/18/2014 **Time:** 1508
County: NICOLLET **City:** NORTH MANKATO

Sys: 05-MSAS
Route: 28550254 001+00.320

Severity: NON-INCAPACITATING INJURY
Road Type: 2 LANES UNDIV 2_WAY
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: 30
Diagram: NOT APPLICABLE
Officer:
Reliability: LESS CONFIDENT
# of Vehicles: 2.00

	Unit 1	Unit 2	Unit 3
Trav Dir:	S	E	
Veh Act:	STRAIGHT AHEAD	STRAIGHT AHEAD	
Veh Type:	SPORT UNTILITY VEHICLE	PASSENGER CAR	
Age:	33	48	
Gender:	M	F	
Cond:	NORMAL	NORMAL	
Cont Fact 1	NO IMPROPER DRIVING	FAIL TO YIELD ROW	
Cont Fact 2	NOT SPECIFIED	NOT SPECIFIED	

Crash ID: 150090263 **Date:** 01/07/2015 **Time:** 1540
County: NICOLLET **City:** NORTH MANKATO

Sys: 05-MSAS
Route: 28550117 001+00.332

Severity: PROPERTY DAMAGE
Road Type: 2 LANES UNDIV 2_WAY
Road Char: STRAIGHT AND LEVEL
Crash Type: COLL W/MV IN TRANSPORT
Surf Cond: ICE/PACKED SNOW
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: 30
Diagram: OTHER
Officer:
Reliability: CONFIDENT
# of Vehicles: 2.00

	Unit 1	Unit 2	Unit 3
Trav Dir:	N	E	
Veh Act:	STRAIGHT AHEAD	STRAIGHT AHEAD	
Veh Type:	PASSENGER CAR	PASSENGER CAR	
Age:	36	47	
Gender:	M	M	
Cond:	NORMAL	NORMAL	
Cont Fact 1	NO IMPROPER DRIVING	FAIL TO YIELD ROW	
Cont Fact 2	NOT SPECIFIED	ILLEGAL SPEED	

Crash ID: 150530064 **Date:** 02/22/2015 **Time:** 0853
County: NICOLLET **City:** NORTH MANKATO

Sys: 10-M
Route: 28550194 000+00.000

Severity: PROPERTY DAMAGE
Road Type: 2 LANES UNDIV 2_WAY
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: 30
Diagram: SIDESWIPE OPPOSING
Officer:
Reliability: CONFIDENT
# of Vehicles: 2.00

	Unit 1	Unit 2	Unit 3
Trav Dir:	S	SE	
Veh Act:	STRAIGHT AHEAD	RIGHT TURN	
Veh Type:	VAN OR MINIVAN	PICKUP TRUCK	
Age:	62	28	
Gender:	F	M	
Cond:	NORMAL	NORMAL	
Cont Fact 1	NO IMPROPER DRIVING	FAIL TO YIELD ROW	
Cont Fact 2	NOT SPECIFIED	DISREGARD TRAFFIC DEVICE	

Crash ID: 152300056 **Date:** 08/18/2015 **Time:** 1000
County: NICOLLET **City:** NORTH MANKATO

Sys: 05-MSAS
Route: 28550117 001+00.332

Severity: PROPERTY DAMAGE
Road Type: 2 LANES UNDIV 2_WAY
Road Char: STRAIGHT AND LEVEL
Crash Type: COLL W/MV IN TRANSPORT
Surf Cond: WET
Light Cond: DAYLIGHT
Weather 1: RAIN
Weather 2: NOT SPECIFIED

First Event: ON ROADWAY
To Junction: INTERSECTION-RELATED
Traffic Device: STOP SIGN OTHER
Speed Limit: 30
Diagram: RIGHT ANGLE
Officer:
Reliability: CONFIDENT
# of Vehicles: 2.00

	Unit 1	Unit 2	Unit 3
Trav Dir:	S	S	
Veh Act:	STRAIGHT AHEAD	RIGHT TURN	
Veh Type:	SPORT UNTILITY VEHICLE	PASSENGER CAR	
Age:	41	84	
Gender:	F	M	
Cond:	NORMAL	NORMAL	
Cont Fact 1	NO IMPROPER DRIVING	FAIL TO YIELD ROW	
Cont Fact 2	NOT SPECIFIED	NOT SPECIFIED	

Crash ID:	152720037	**Date:**	09/28/2015	**Time:**	1544
County:	NICOLLET	**City:**	NORTH MANKATO		

Sys: 05-MSAS
Route: 28550117 001+00.332

Severity:	PROPERTY DAMAGE	**First Event:**	ON ROADWAY
Road Type:	2 LANES UNDIV 2_WAY	**To Junction:**	4-LEGGED INTERSECTION
Road Char:	STRAIGHT AND LEVEL	**Traffic Device:**	STOP SIGN OTHER
Crash Type:	COLL W/MV IN TRANSPORT	**Speed Limit:**	30
Surf Cond:	DRY	**Diagram:**	REAR END
Light Cond:	DAYLIGHT	**Officer:**	
Weather 1:	CLEAR	**Reliability:**	CONFIDENT
Weather 2:	NOT SPECIFIED	**# of Vehicles:**	2.00

	Unit 1	Unit 2	Unit 3
Trav Dir:	N	N	
Veh Act:	STRAIGHT AHEAD	STRAIGHT AHEAD	
Veh Type:	PICKUP TRUCK	PICKUP TRUCK	
Age:	55	42	
Gender:	M	M	
Cond:	NORMAL	NORMAL	
Cont Fact 1	NO IMPROPER DRIVING	FOLLOWING TOO CLOSELY	
Cont Fact 2	NOT SPECIFIED	DISTRACTION	

Selection Filter:

WORK AREA: CONST_DIST_CODE('7') - FILTER: CRASH_YEAR('2011','2012','2013','2014','2015') - SPATIAL FILTER APPLIED

Analyst:

Luke James

Notes:

Existing Year 2017 Warrants Analysis

WARRANTS ANALYSIS

Existing Year 2017

Lor Ray Drive at Carlson Drive/Countryside Drive
Intersection Control Evaluation
City of North Mankato, Nicollet County

Background Information

		Speed (mph)	Lanes	Approach	
Location :	City of North Mankato, Nicollet County	30	2 or more	Major Approach 1:	Northbound Lor Ray Drive
Date:	6/7/2017	30	1	Major Approach 3:	Southbound Lor Ray Drive
Analysis Prepared By:	Luke James	30	1	Minor Approach 2:	Eastbound Carlson Drive
Population Less than 10,000:	No	30	1	Minor Approach 4:	Westbound Countryside Drive
Seventy Percent Factor Used:	No	30	1		

Warrants Analysis: Warrants 1A, 1B and 1C

Hour	Major Approach 1	Major Approach 3	Total 1 + 3	Warrant Met 600	Warrant Met 900	Minor Approach 2	Minor Approach 4	Largest Minor App.	Warrant Met 150	Warrant Met 75	Met Same Hours Condition A	Met Same Hours Condition B	Combination A	Combination B	MWSA (C) 300	MWSA (C) 200
6 - 7 AM	39	53	92			48	34	48								
7 - 8 AM	97	183	280			67	116	116		X						
8 - 9 AM	128	69	197			62	60	62								
9 - 10 AM	77	54	131			47	28	47								
10 - 11 AM	89	51	140			37	34	37								
11 - 12 AM	132	63	195			48	35	48								
12 - 1 PM	145	64	209			73	43	73								
1 - 2 PM	121	60	181			50	29	50								
2 - 3 PM	154	79	233			64	41	64								
3 - 4 PM	179	74	253			62	39	62								
4 - 5 PM	232	82	314			84	42	84		X					X	
5 - 6 PM	271	83	354			93	41	93		X					X	
6 - 7 PM	192	65	257			40	45	45								
7 - 8 PM	157	43	200			50	31	50								
8 - 9 PM	110	29	139			27	17	27								
9 - 10 PM	78	18	96			18	11	18								
10 - 11 PM	36	6	42			13	7	13								
											0	0	0	0	0	

Warrant Summary

Warrant and Description		Hours Met	Hours Required	Met/Not Met
MWSA (C):	Multiway Stop Applications Condition C	0	8	Not Met
Warrant 1A:	Minimum Vehicular Volume	0	8	Not Met
Warrant 1B:	Interruption of Continuous Traffic	0	8	Not Met
Warrant 1C:	Combination of Warrants	0	8	Not Met
Warrant 2:	Four-Hour Vehicular Volume	0	4	Not Met
Warrant 3B:	Peak Hour	0	1	Not Met

SRF Consulting Group, Inc.

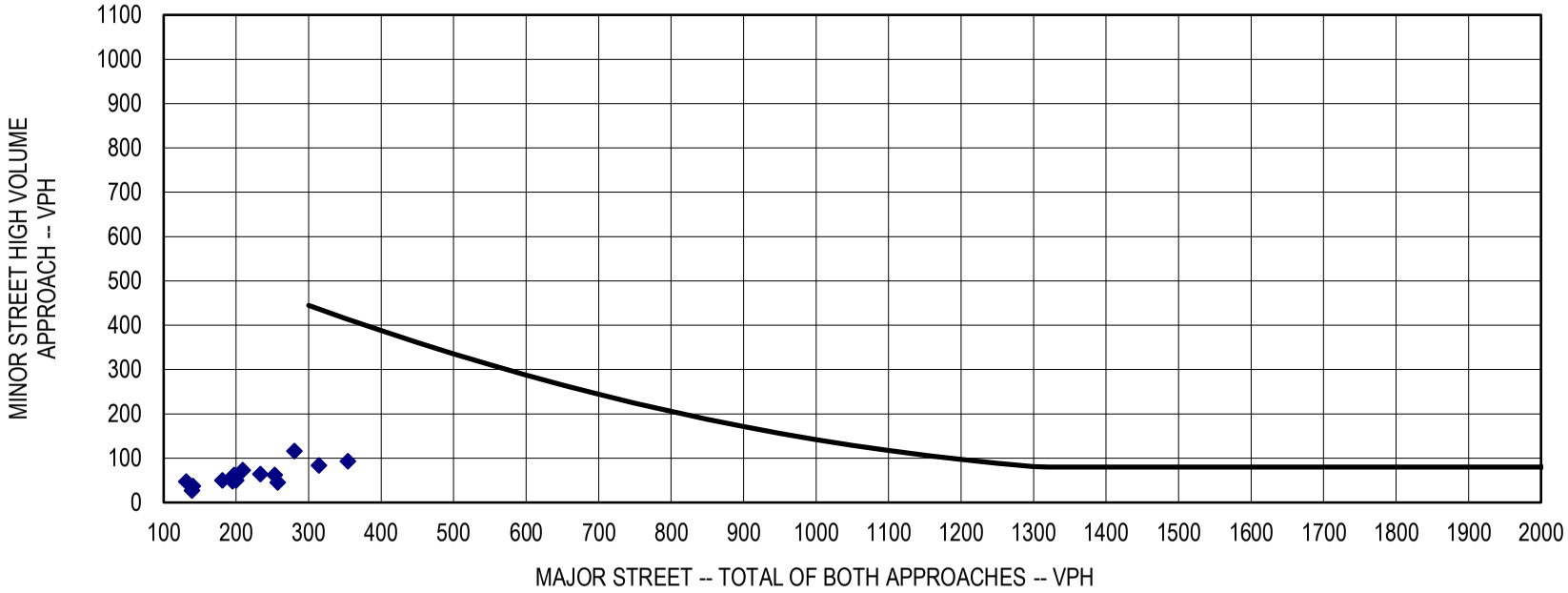
WARRANTS ANALYSIS

Existing Year 2017

Lor Ray Drive at Carlson Drive/Countryside Drive
Intersection Control Evaluation
City of North Mankato, Nicollet County

Warrants Analysis: Warrant 2

WARRANT 2 - FOUR-HOUR VEHICULAR VOLUME



Number of Hours Satisfying Requirements:	0

Notes: 1. 115 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 80 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

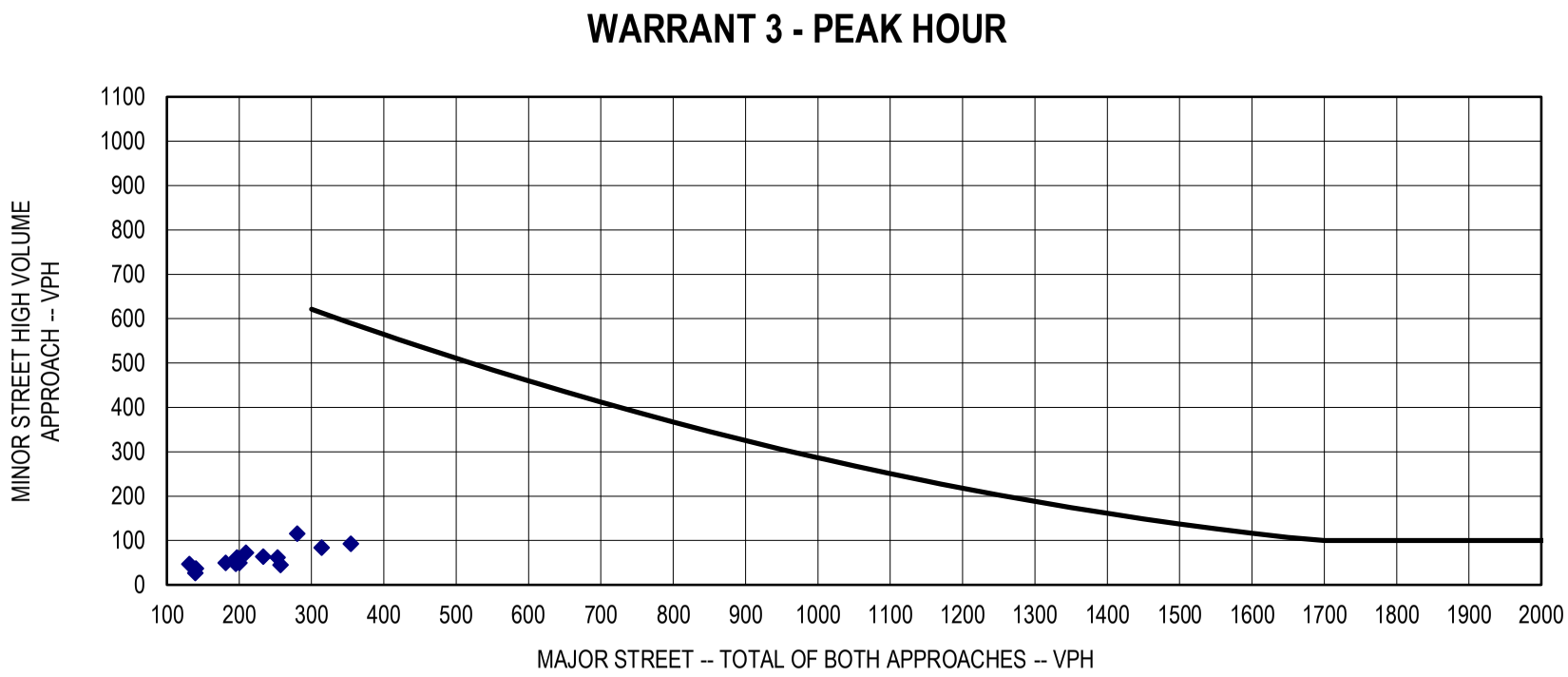
SRF Consulting Group, Inc.

WARRANTS ANALYSIS

Existing Year 2017

Lor Ray Drive at Carlson Drive/Countryside Drive
Intersection Control Evaluation
City of North Mankato, Nicollet County

Warrants Analysis: Warrant 3



Number of Hours Satisfying Requirements:	0

Notes: 1. 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Forecasted Year 2037 Warrants Analysis

SRF Consulting Group, Inc.

WARRANTS ANALYSIS

Forecasted Year 2037

Lor Ray Drive at Carlson Drive/Countryside Drive
Intersection Control Evaluation
City of North Mankato, Nicollet County

Background Information

		Speed (mph)	Lanes	Approach	
Location :	City of North Mankato, Nicollet County	30	2 or more	Major Approach 1:	Northbound Lor Ray Drive
Date:	7/12/2017	30	1	Major Approach 3:	Southbound Lor Ray Drive
Analysis Prepared By:	Luke James	30	1	Minor Approach 2:	Eastbound Carlson Drive
Population Less than 10,000:	No	30	1	Minor Approach 4:	Westbound Countryside Drive
Seventy Percent Factor Used:	No	30	1		

Warrants Analysis: Warrants 1A, 1B, and 1C

Hour	Major Approach 1	Major Approach 3	Total 1 + 3	Warrant Met 600	Warrant Met 900	Minor Approach 2	Minor Approach 4	Largest Minor App.	Warrant Met 150	Warrant Met 75	Met Same Hours Condition A	Met Same Hours Condition B	Combination A	Combination B	MWSA (C) 300	MWSA (C) 200
6 - 7 AM	62	92	154			67	74	74								
7 - 8 AM	154	318	472			94	255	255	X	X					X	X
8 - 9 AM	205	120	325			86	132	132		X					X	X
9 - 10 AM	123	93	216			66	61	66								
10 - 11 AM	142	88	230			52	75	75		X						
11 - 12 AM	211	110	321			67	76	76		X					X	
12 - 1 PM	231	110	341			102	94	102		X					X	
1 - 2 PM	194	104	298			70	63	70								
2 - 3 PM	246	137	383			89	89	89		X					X	
3 - 4 PM	286	128	414			86	86	86		X					X	
4 - 5 PM	370	143	513			117	91	117		X					X	X
5 - 6 PM	434	144	578			130	90	130		X			X		X	X
6 - 7 PM	306	112	418			56	98	98		X					X	
7 - 8 PM	250	74	324			70	67	70							X	
8 - 9 PM	175	50	225			38	37	38								
9 - 10 PM	125	31	156			25	23	25								
10 - 11 PM	58	10	68			18	15	18								
											0	0	1	0	4	

Warrant Summary

	Warrant and Description	Hours Met	Hours Required	Met/Not Met
MWSA (C):	Multiway Stop Applications Condition C	4	8	Not Met
Warrant 1A:	Minimum Vehicular Volume	0	8	Not Met
Warrant 1B:	Interruption of Continuous Traffic	0	8	Not Met
Warrant 1C:	Combination of Warrants	0	8	Not Met
Warrant 2:	Four-Hour Vehicular Volume	0	4	Not Met
Warrant 3B:	Peak Hour	0	1	Not Met

SRF Consulting Group, Inc.

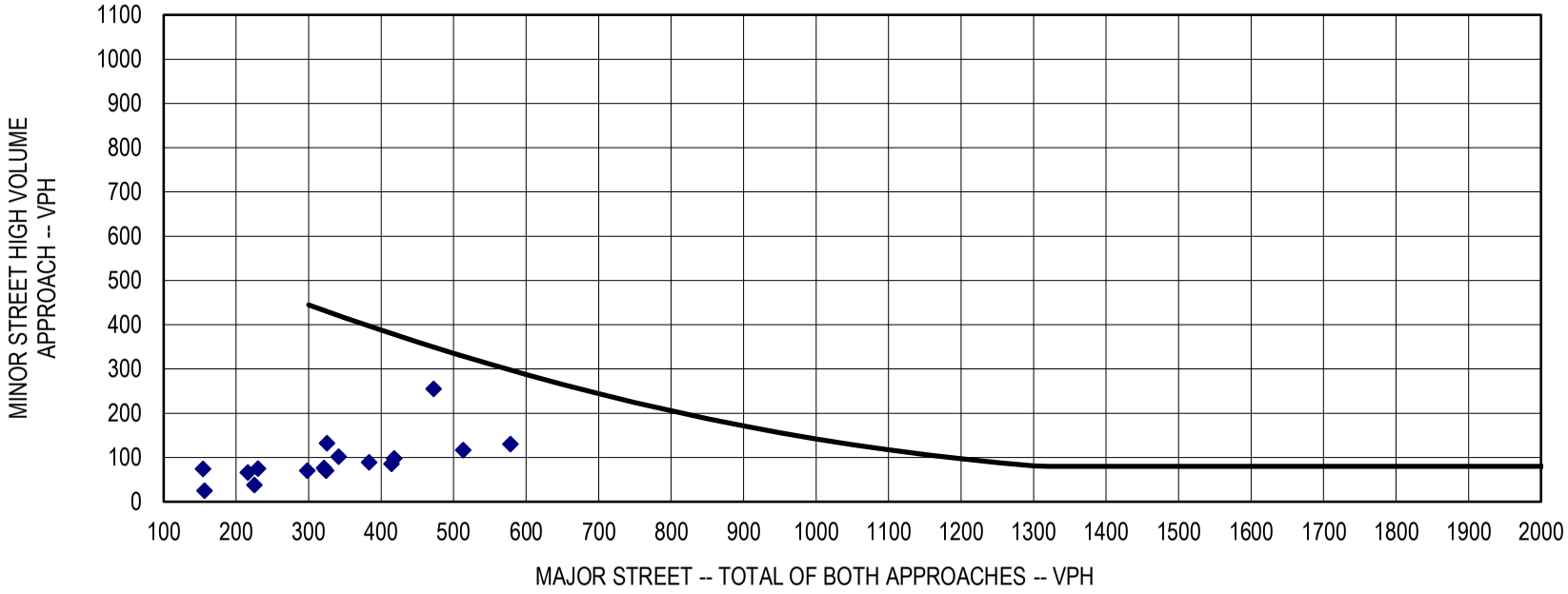
WARRANTS ANALYSIS

Forecasted Year 2037

Lor Ray Drive at Carlson Drive/Countryside Drive
Intersection Control Evaluation
City of North Mankato, Nicollet County

Warrants Analysis: Warrant 2

WARRANT 2 - FOUR-HOUR VEHICULAR VOLUME



Number of Hours Satisfying Requirements:	0

Notes: 1. 115 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 80 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

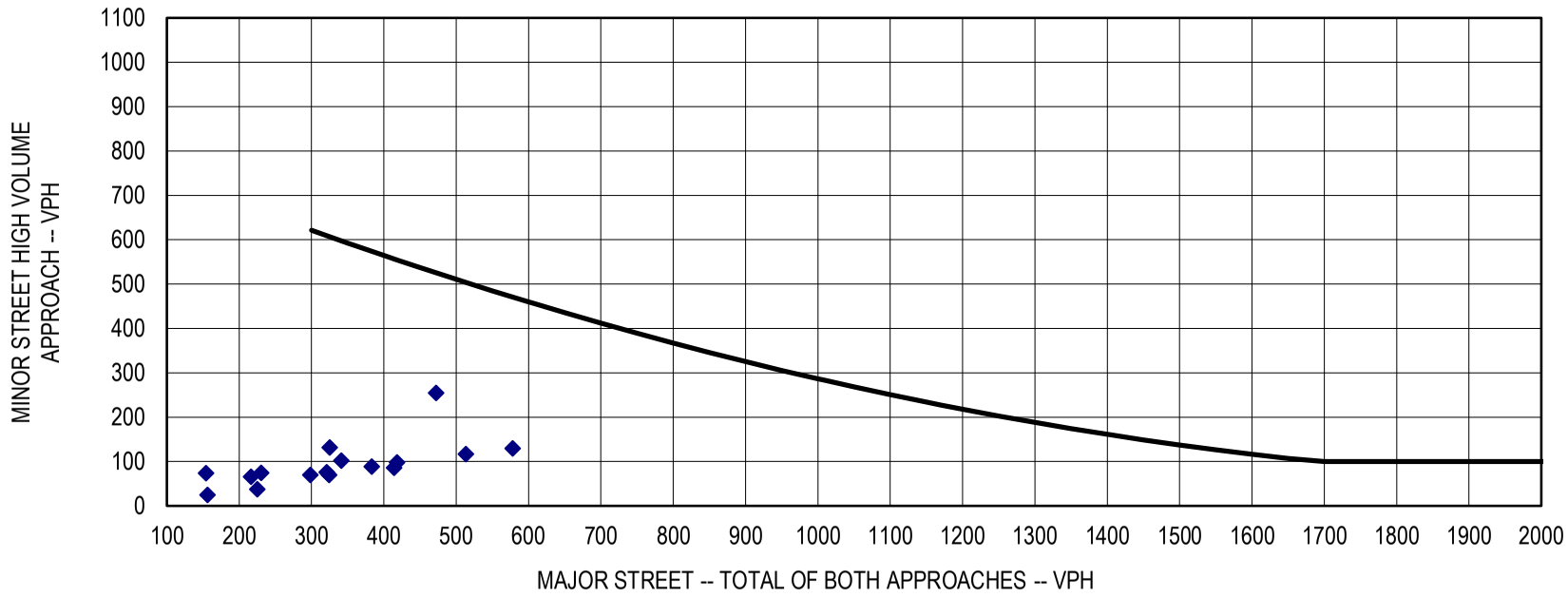
SRF Consulting Group, Inc.

WARRANTS ANALYSIS

Forecasted Year 2037

Lor Ray Drive at Carlson Drive/Countryside Drive
Intersection Control Evaluation
City of North Mankato, Nicollet County

Warrants Analysis: Warrant 3



Number of Hours Satisfying Requirements:	0

Notes: 1. 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Existing Year 2017 Detailed Operational Analysis

Side-Street Stop Control

2: Lor Ray Drive & Carlson Drive/Countryside Drive Performance by approach

Approach	EB	WB	NB	SB	All
Denied Delay (hr)	0.0	0.0	0.1	0.0	0.1
Denied Del/Veh (s)	0.1	0.2	1.5	0.3	0.6
Total Delay (hr)	0.1	0.2	0.0	0.0	0.4
Total Del/Veh (s)	4.6	7.0	1.2	0.6	2.9
Stop Delay (hr)	0.1	0.2	0.0	0.0	0.2
Stop Del/Veh (s)	3.7	4.4	0.2	0.0	1.6
Total Stops	70	128	11	1	210
Stop/Veh	0.99	1.00	0.08	0.01	0.40

Intersection: 2: Lor Ray Drive & Carlson Drive/Countryside Drive

Movement	EB	WB	NB	SB	SB
Directions Served	LTR	LTR	L	L	TR
Maximum Queue (ft)	61	101	48	12	4
Average Queue (ft)	32	42	10	1	0
95th Queue (ft)	56	73	35	9	3
Link Distance (ft)	966	966			972
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)			250	250	
Storage Blk Time (%)					
Queuing Penalty (veh)					

2: Lor Ray Drive & Carlson Drive/Countryside Drive Performance by approach

Approach	EB	WB	NB	SB	All
Denied Delay (hr)	0.0	0.0	0.1	0.0	0.1
Denied Del/Veh (s)	0.1	0.1	1.3	0.1	0.8
Total Delay (hr)	0.1	0.1	0.1	0.0	0.4
Total Del/Veh (s)	4.6	6.5	1.3	0.3	2.3
Stop Delay (hr)	0.1	0.1	0.0	0.0	0.2
Stop Del/Veh (s)	3.2	4.5	0.1	0.0	1.1
Total Stops	111	50	8	0	169
Stop/Veh	1.00	1.00	0.02	0.00	0.29

Intersection: 2: Lor Ray Drive & Carlson Drive/Countryside Drive

Movement	EB	WB	NB
Directions Served	LTR	LTR	L
Maximum Queue (ft)	65	53	39
Average Queue (ft)	37	27	7
95th Queue (ft)	59	50	29
Link Distance (ft)	966	966	
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			250
Storage Blk Time (%)			
Queuing Penalty (veh)			

Existing Year 2017 Detailed Operational Analysis

All-Way Stop Control

2: Lor Ray Drive & Carlson Drive/Countryside Drive Performance by approach

Approach	EB	WB	NB	SB	All
Denied Delay (hr)	0.0	0.0	0.1	0.0	0.1
Denied Del/Veh (s)	0.1	0.2	1.6	0.3	0.6
Total Delay (hr)	0.1	0.2	0.2	0.4	0.9
Total Del/Veh (s)	3.9	5.9	5.6	7.3	6.1
Stop Delay (hr)	0.1	0.1	0.1	0.2	0.5
Stop Del/Veh (s)	3.1	3.4	3.0	3.4	3.2
Total Stops	62	134	148	188	532
Stop/Veh	1.00	0.99	1.00	0.99	1.00

Intersection: 2: Lor Ray Drive & Carlson Drive/Countryside Drive

Movement	EB	WB	NB	NB	SB	SB
Directions Served	LTR	LTR	L	TR	L	TR
Maximum Queue (ft)	54	77	57	76	25	85
Average Queue (ft)	30	40	30	35	5	46
95th Queue (ft)	52	65	53	58	23	73
Link Distance (ft)	966	966		972		972
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)			250		250	
Storage Blk Time (%)						
Queuing Penalty (veh)						

2: Lor Ray Drive & Carlson Drive/Countryside Drive Performance by approach

Approach	EB	WB	NB	SB	All
Denied Delay (hr)	0.0	0.0	0.1	0.0	0.1
Denied Del/Veh (s)	0.1	0.1	1.3	0.2	0.8
Total Delay (hr)	0.1	0.1	0.5	0.2	0.9
Total Del/Veh (s)	4.1	5.0	5.9	6.4	5.6
Stop Delay (hr)	0.1	0.0	0.2	0.1	0.4
Stop Del/Veh (s)	2.7	2.9	2.7	2.9	2.8
Total Stops	111	49	315	97	572
Stop/Veh	0.99	0.98	0.99	0.99	0.99

Intersection: 2: Lor Ray Drive & Carlson Drive/Countryside Drive

Movement	EB	WB	NB	NB	SB
Directions Served	LTR	LTR	L	TR	TR
Maximum Queue (ft)	67	45	59	81	70
Average Queue (ft)	35	26	32	46	36
95th Queue (ft)	52	47	49	72	58
Link Distance (ft)	966	966		972	972
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)			250		
Storage Blk Time (%)					
Queuing Penalty (veh)					

Existing Year 2017 Detailed Operational Analysis

Roundabout Control

HCS7 Roundabouts Report

General Information

Analyst	Luke James
Agency or Co.	SRF Consulting Group, Inc.
Date Performed	7/6/2017
Analysis Year	2017
Time Period	A.M. Peak
Project Description	10279

Site Information

Intersection	Lor Ray Drive at Carlson Drive/Countryside Drive
E/W Street Name	Carlson Drive/Countryside Drive
N/S Street Name	Lor Ray Drive
Analysis Time Period (hrs)	0.25
Peak Hour Factor	1.00
Jurisdiction	MAPO

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	5	5	60	0	110	15	5	0	55	60	25	0	5	175	5
Percent Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Flow Rate (v_{PCE}), pc/h	0	5	5	62	0	113	15	5	0	57	62	26	0	5	180	5
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		4.9763			4.9763			4.9763			4.9763	
Follow-Up Headway (s)		2.6087			2.6087			2.6087			2.6087	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		72			133			145			190	
Entry Volume veh/h		70			129			141			184	
Circulating Flow (v_c), pc/h	298			124			15			185		
Exiting Flow (v_{ex}), pc/h	36			77			72			355		
Capacity (c_{pce}), pc/h		1018			1216			1359			1143	
Capacity (c), veh/h		989			1181			1319			1109	
v/c Ratio (x)		0.07			0.11			0.11			0.17	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		4.3			4.0			3.6			4.7	
Lane LOS		A			A			A			A	
95% Queue, veh		0.2			0.4			0.4			0.6	
Approach Delay, s/veh	4.3			4.0			3.6			4.7		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh | LOS	4.2						A					

HCS7 Roundabouts Report

General Information

Analyst	Luke James
Agency or Co.	SRF Consulting Group, Inc.
Date Performed	7/6/2017
Analysis Year	2017
Time Period	P.M. Peak
Project Description	10279

Site Information

Intersection	Lor Ray Drive at Carlson Drive/Countryside Drive
E/W Street Name	Carlson Drive/Countryside Drive
N/S Street Name	Lor Ray Drive
Analysis Time Period (hrs)	0.25
Peak Hour Factor	1.00
Jurisdiction	MAPO

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	5	20	90	0	35	10	5	0	100	160	65	0	0	85	5
Percent Heavy Vehicles, %	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Flow Rate (v_{PCE}), pc/h	0	5	20	91	0	35	10	5	0	101	162	66	0	0	86	5
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		4.9763			4.9763			4.9763			4.9763	
Follow-Up Headway (s)		2.6087			2.6087			2.6087			2.6087	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		116			50			329			91	
Entry Volume veh/h		115			50			326			90	
Circulating Flow (v_c), pc/h	121			268			25			146		
Exiting Flow (v_{ex}), pc/h	86			116			172			212		
Capacity (c_{pce}), pc/h		1220			1050			1345			1189	
Capacity (c), veh/h		1208			1040			1332			1177	
v/c Ratio (x)		0.10			0.05			0.24			0.08	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		3.8			3.9			4.8			3.7	
Lane LOS		A			A			A			A	
95% Queue, veh		0.3			0.1			1.0			0.2	
Approach Delay, s/veh	3.8			3.9			4.8			3.7		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh | LOS	4.3						A					

Forecasted Year 2037 Detailed Operational Analysis

Side-Street Stop Control

2: Lor Ray Drive & Carlson Drive/Countryside Drive Performance by approach

Approach	EB	WB	NB	SB	All
Denied Delay (hr)	0.0	0.0	0.1	0.0	0.2
Denied Del/Veh (s)	0.2	0.3	1.6	0.3	0.6
Total Delay (hr)	0.2	2.0	0.1	0.1	2.5
Total Del/Veh (s)	8.1	26.6	1.8	1.0	9.5
Stop Delay (hr)	0.2	1.9	0.0	0.0	2.1
Stop Del/Veh (s)	6.9	24.3	0.5	0.0	8.0
Total Stops	98	271	32	0	401
Stop/Veh	0.99	0.99	0.14	0.00	0.43

Intersection: 2: Lor Ray Drive & Carlson Drive/Countryside Drive

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	L	L
Maximum Queue (ft)	79	283	64	6
Average Queue (ft)	40	106	22	0
95th Queue (ft)	68	244	52	6
Link Distance (ft)	966	966		
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)			250	250
Storage Blk Time (%)				
Queuing Penalty (veh)				

2: Lor Ray Drive & Carlson Drive/Countryside Drive Performance by approach

Approach	EB	WB	NB	SB	All
Denied Delay (hr)	0.0	0.0	0.2	0.0	0.2
Denied Del/Veh (s)	0.2	0.2	1.4	0.3	0.9
Total Delay (hr)	0.3	0.3	0.3	0.0	1.0
Total Del/Veh (s)	7.5	10.9	2.0	0.7	3.7
Stop Delay (hr)	0.3	0.2	0.0	0.0	0.5
Stop Del/Veh (s)	5.9	8.3	0.2	0.1	2.0
Total Stops	167	104	30	2	303
Stop/Veh	0.99	0.98	0.06	0.01	0.31

Intersection: 2: Lor Ray Drive & Carlson Drive/Countryside Drive

Movement	EB	WB	NB	NB	SB
Directions Served	LTR	LTR	L	TR	L
Maximum Queue (ft)	112	87	54	9	36
Average Queue (ft)	49	42	19	0	2
95th Queue (ft)	85	70	49	5	15
Link Distance (ft)	966	966		972	
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)			250		250
Storage Blk Time (%)					
Queuing Penalty (veh)					

Forecasted Year 2037 Detailed Operational Analysis

All-Way Stop Control

2: Lor Ray Drive & Carlson Drive/Countryside Drive Performance by approach

Approach	EB	WB	NB	SB	All
Denied Delay (hr)	0.0	0.0	0.1	0.0	0.2
Denied Del/Veh (s)	0.1	0.3	1.6	0.3	0.6
Total Delay (hr)	0.2	1.0	0.4	1.2	2.8
Total Del/Veh (s)	6.2	11.9	7.1	13.4	10.7
Stop Delay (hr)	0.1	0.7	0.3	0.8	2.0
Stop Del/Veh (s)	5.0	8.8	4.4	9.2	7.4
Total Stops	98	297	226	316	937
Stop/Veh	0.99	1.00	0.99	0.99	0.99

Intersection: 2: Lor Ray Drive & Carlson Drive/Countryside Drive

Movement	EB	WB	NB	NB	SB	SB
Directions Served	LTR	LTR	L	TR	L	TR
Maximum Queue (ft)	73	173	78	80	31	197
Average Queue (ft)	37	74	36	41	6	80
95th Queue (ft)	61	133	62	66	26	148
Link Distance (ft)	966	966		972		972
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)			250		250	
Storage Blk Time (%)						1
Queuing Penalty (veh)						0

2: Lor Ray Drive & Carlson Drive/Countryside Drive Performance by approach

Approach	EB	WB	NB	SB	All
Denied Delay (hr)	0.0	0.0	0.2	0.0	0.2
Denied Del/Veh (s)	0.2	0.1	1.4	0.3	0.9
Total Delay (hr)	0.3	0.2	1.1	0.3	1.9
Total Del/Veh (s)	5.3	6.2	7.5	7.4	7.0
Stop Delay (hr)	0.2	0.1	0.5	0.2	1.0
Stop Del/Veh (s)	3.6	3.7	3.7	3.7	3.7
Total Stops	171	97	527	157	952
Stop/Veh	0.99	0.99	0.99	0.99	0.99

Intersection: 2: Lor Ray Drive & Carlson Drive/Countryside Drive

Movement	EB	WB	NB	NB	SB	SB
Directions Served	LTR	LTR	L	TR	L	TR
Maximum Queue (ft)	90	58	66	126	31	89
Average Queue (ft)	45	35	39	62	4	42
95th Queue (ft)	72	54	60	102	21	68
Link Distance (ft)	966	966		972		972
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)			250		250	
Storage Blk Time (%)						
Queuing Penalty (veh)						

Forecasted Year 2037 Detailed Operational Analysis

Roundabout Control

HCS7 Roundabouts Report

General Information

Analyst	Luke James
Agency or Co.	SRF Consulting Group, Inc.
Date Performed	7/13/2017
Analysis Year	2037
Time Period	A.M. Peak
Project Description	10279

Site Information

Intersection	Lor Ray Drive at Carlson Drive/Countryside Drive
E/W Street Name	Carlson Drive/Countryside Drive
N/S Street Name	Lor Ray Drive
Analysis Time Period (hrs)	0.25
Peak Hour Factor	1.00
Jurisdiction	MAPO

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	5	10	80	0	240	35	10	0	90	95	40	0	5	305	5
Percent Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Flow Rate (v_{PCE}), pc/h	0	5	10	82	0	247	36	10	0	93	98	41	0	5	314	5
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		4.9763			4.9763			4.9763			4.9763	
Follow-Up Headway (s)		2.6087			2.6087			2.6087			2.6087	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		97			293			232			324	
Entry Volume veh/h		94			284			225			315	
Circulating Flow (v_c), pc/h	566			196			20			376		
Exiting Flow (v_{ex}), pc/h	56			134			113			643		
Capacity (c_{pce}), pc/h		775			1130			1352			940	
Capacity (c), veh/h		752			1097			1313			913	
v/c Ratio (x)		0.13			0.26			0.17			0.34	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		6.1			5.7			4.2			7.7	
Lane LOS		A			A			A			A	
95% Queue, veh		0.4			1.0			0.6			1.5	
Approach Delay, s/veh	6.1			5.7			4.2			7.7		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh | LOS	6.1						A					

HCS7 Roundabouts Report

General Information

Analyst	Luke James
Agency or Co.	SRF Consulting Group, Inc.
Date Performed	7/13/2017
Analysis Year	2037
Time Period	P.M. Peak
Project Description	10279

Site Information

Intersection	Lor Ray Drive at Carlson Drive/Countryside Drive
E/W Street Name	Carlson Drive/Countryside Drive
N/S Street Name	Lor Ray Drive
Analysis Time Period (hrs)	0.25
Peak Hour Factor	1.00
Jurisdiction	MAPO

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	5	30	130	0	75	25	5	0	155	250	105	0	5	150	10
Percent Heavy Vehicles, %	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Flow Rate (v_{PCE}), pc/h	0	5	30	131	0	76	25	5	0	157	252	106	0	5	152	10
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		4.9763			4.9763			4.9763			4.9763	
Follow-Up Headway (s)		2.6087			2.6087			2.6087			2.6087	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		166			106			515			167	
Entry Volume veh/h		164			105			510			165	
Circulating Flow (v_c), pc/h		233			414			40			258	
Exiting Flow (v_{ex}), pc/h		141			192			262			359	
Capacity (c_{pce}), pc/h		1088			905			1325			1061	
Capacity (c), veh/h		1077			896			1312			1050	
v/c Ratio (x)		0.15			0.12			0.39			0.16	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		4.7			5.1			6.4			4.9	
Lane LOS		A			A			A			A	
95% Queue, veh		0.5			0.4			1.9			0.6	
Approach Delay, s/veh	4.7			5.1			6.4			4.9		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh | LOS	5.7						A					

Detailed Cost Analysis

SRF Consulting Group, Inc. | Engineers Planners Designers

Concept Cost Estimate (based upon 2017 bid price information)

Prepared By: SRF Consulting Group, Inc., Date 7/2017

						Lor Ray Drive at Carlson Drive/ Countryside Drive	
	ITEM DESCRIPTION		**UNIT**	**UNIT PRICE**		**EST. QUANTITY**	**EST. AMOUNT**
PAVING AND GRADING COSTS							
GrP 1	Excavation - common & subgrade		cu. yd.	$7.00		2,400	$16,800
GrP 2	Granular Subgrade (CV)		cu. yd.	$14.00		1,400	$19,600
GrP 3	County Road Pavement	(1)	sq. yd.	$32.00		2,850	$91,200
GrP 4	Concrete Median	(1)	sq. yd.	$40.00		400	$16,000
GrP 5	Walk / Trail	(1)	sq. yd.	$25.00		960	$24,000
GrP 6	ADA Pedestrian Curb Ramp		each	$800.00		16	$12,800
GrP 7	Concrete Curb and Gutter		lin. ft.	$12.00		1,980	$23,760
GrP 8	Removals - Pavement		sq. yd.	$2.50		4,540	$11,350
	SUBTOTAL PAVING AND GRADING COSTS:						**$215,510**
DRAINAGE, UTILITIES AND EROSION CONTROL							
Dr 1	Local Utilities - Sanitary Sewers		lin. ft.				
Dr 2	Local Utilities - Watermains		lin. ft.				
Dr 3	Water Quality Ponds		l.s.				
Dr 5	Drainage - urban (10-30%)		30%				$65,000
Dr 6	Turf Establishment & Erosion Control		10%				$22,000
Dr 7	Landscaping						
	SUBTOTAL DRAINAGE, UTILITIES AND EROSION CONTROL						**$87,000**
SIGNAL AND LIGHTING COSTS							
SGL 1	Signals (permanent)		each	$200,000			
SGL 2	At Grade Intersection Lighting (permanent - non signa		each	$10,000		8	$80,000
	SUBTOTAL SIGNAL AND LIGHTING COSTS:						**$80,000**
SIGNING & STRIPING COSTS							
SGN 1	Mainline Signing (C&D)		mile	$20,000		0.2	$4,000
SGN 2	Mainline Striping		mile	$10,000		0.2	$2,000
	SUBTOTAL SIGNING & STRIPING COSTS:						**$6,000**
	SUBTOTAL CONSTRUCTION COSTS:						**$388,510**
MISCELLANEOUS COSTS							
M 1	Mobilization		6%				$23,000
M 2	Non Quantified Minor Items (10% to 30%)		20%				$78,000
M 3	Temporary Pavement & Drainage		2%				$8,000
M 4	Traffic Control		4%				$16,000
	SUBTOTAL MISCELLANEOUS COSTS:						**$125,000**
ESTIMATED TOTAL CONSTRUCTION COSTS without Contingency:							**$513,510**
1	Contingency or "risk" (10% to 30%)		20%				$103,000
ESTIMATED TOTAL CONSTRUCTION COSTS PLUS CONTINGENCY:							**$616,510**

	OTHER PROJECT COSTS:				
	R/W ACQUISITIONS	Lump Sum			
	DESIGN ENG. & CONSTRUCTION ADMIN.	Lump Sum			
	SUBTOTAL OTHER PROJECT COSTS				
	TOTAL PROJECT COST (based upon 2016 bid price information)				**$616,510**

	INFLATION COST (CURRENT YR. TO YR. OF OPE	Years	3%		
	TOTAL PROJECT COST (OPENING YEAR DOLLARS)				**$616,510**

NOTE: (1) Includes aggregate base class 5.

MAJOR ITEMS NOT INCLUDED:
- Local utilities (sanitary sewer or watermain)
- Water quality ponds or other BMPs
- R/W acquisitions
- Engineering design fees
- Inflation

Intersection Control Evaluation

Stoltzman Road at Pleasant Street

in Mankato, Blue Earth County, Minnesota

Mankato/North Mankato Area Planning Organization

SRF Consulting Group, Inc. | Engineers Planners Designers

October 2017

SRF No. 10279

Intersection Control Evaluation

Stoltzman Road at Pleasant Street

Proposed Letting Date: TBD

Report Certification:

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

Adrian S. Potter	42785
Print Name	Reg. No.
Signature	Date

Approved:

City of Mankato City Engineer	Date
Blue Earth County Public Works Director	Date

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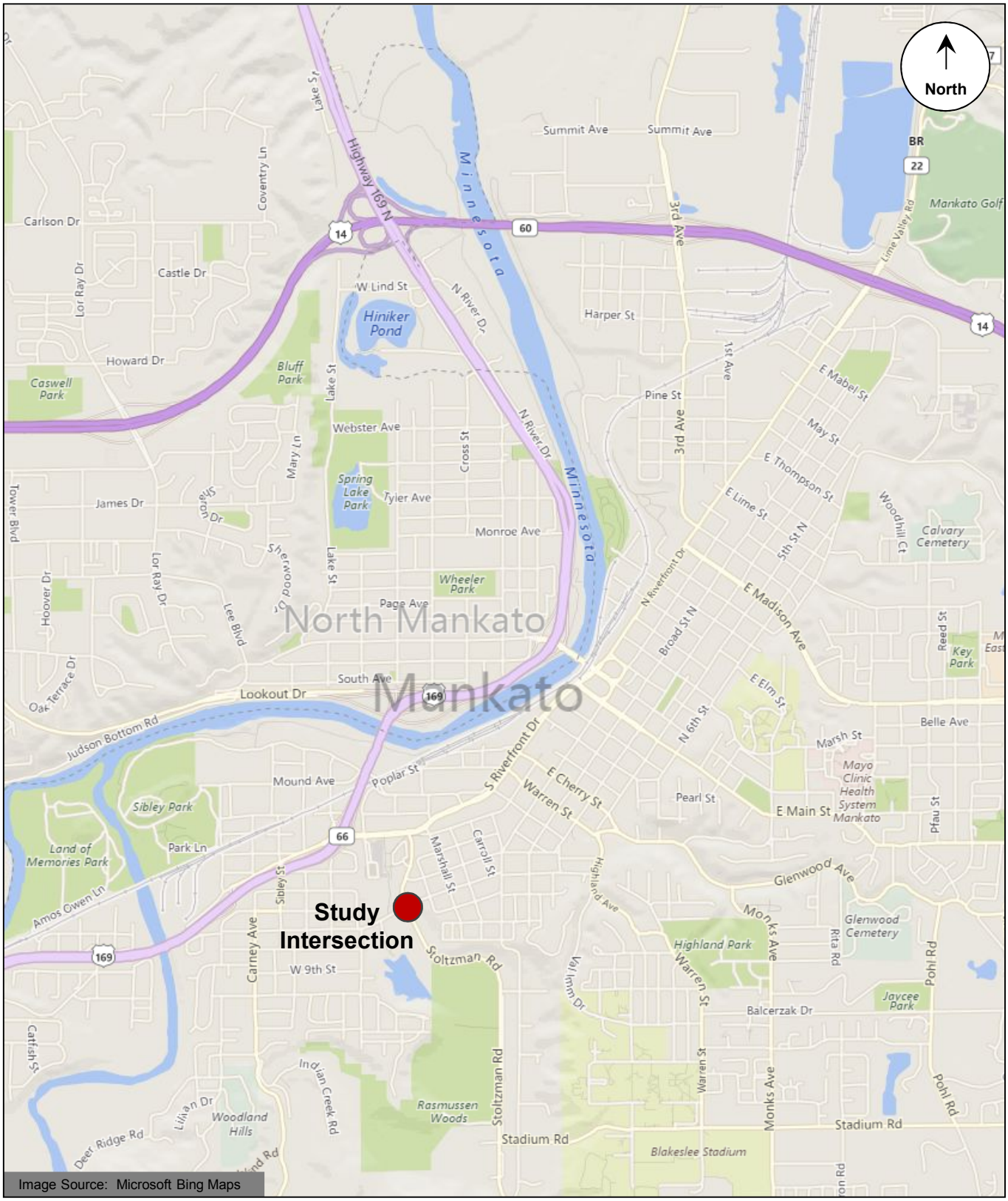
Introduction

This report contains the intersection control evaluation results for the Stoltzman Road (CSAH 16) at Pleasant Street intersection in Mankato, Blue Earth County, Minnesota (see Figure 1). The purpose of the evaluation was to analyze the intersection control alternatives for the intersection to identify the long-term preferred intersection control. The following intersection control alternatives were considered applicable and are analyzed within this report:

- All-Way Stop Control
- Roundabout Control
- Traffic Signal Control

A detailed warrants analysis, operational analysis, safety analysis, and planning-level cost analysis were performed to determine the preferred intersection control alternative. In addition to these analyses, other factors considered for this evaluation that were applicable to determining the long-term preferred intersection control included:

- Right-of-Way Considerations
- Transportation System Considerations
- Pedestrian and Bicycle Considerations
- Local Acceptance



SRF Consulting Group, Inc.

Study Intersection

Figure 1

Intersection Control Evaluation
Stoltzman Road at Pleasant Street
Mankato, Blue Earth County, Minnesota

10279
September 2017

Existing Intersection Characteristics

Existing Conditions

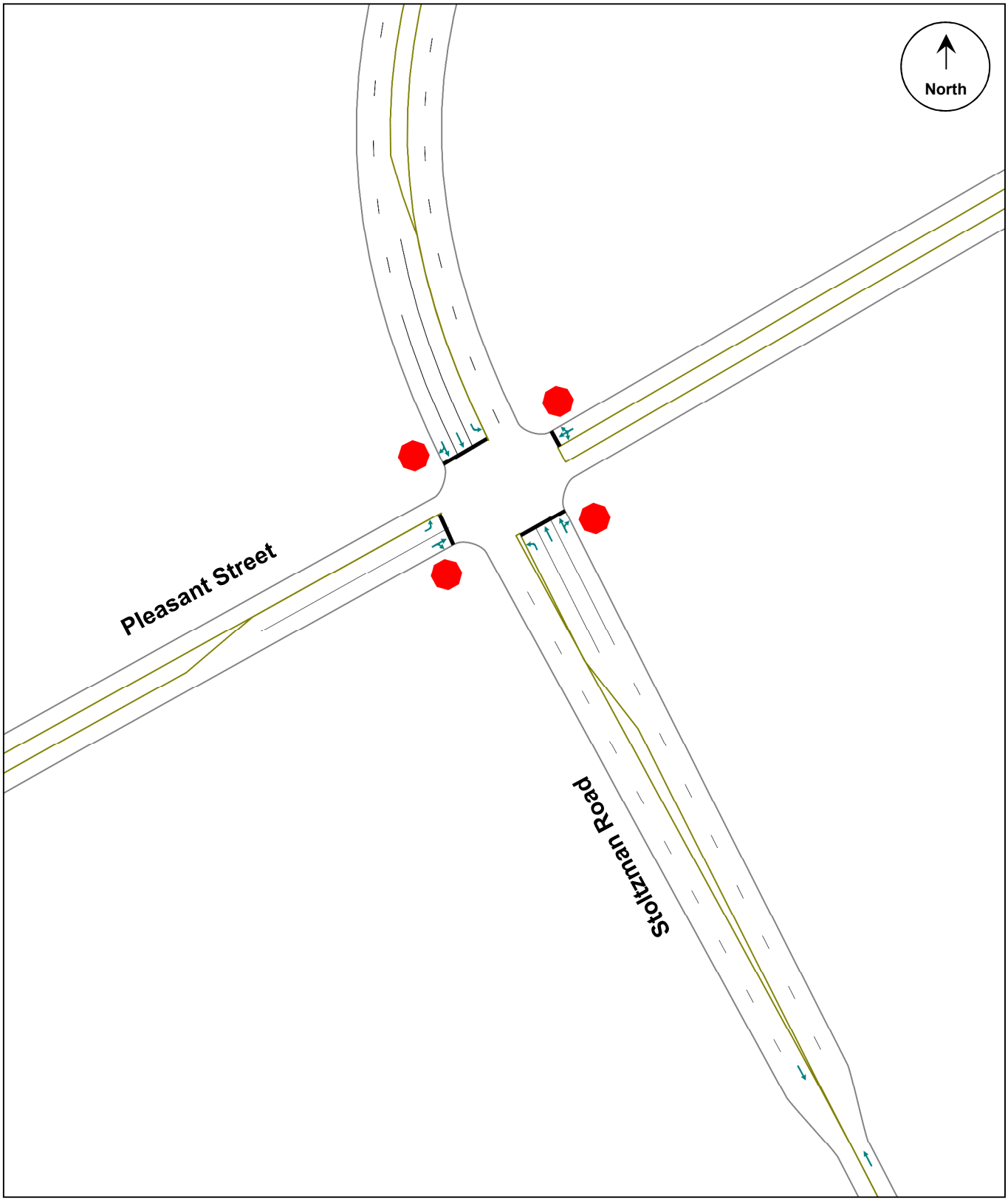
The study intersection is located in the City of Mankato, Blue Earth County as shown in Figure 1. Stoltzman Road (CSAH 16) is a two-lane undivided roadway south of the study intersection, widens to five lanes at the intersection, and is a five-lane undivided roadway to the north. Stoltzman Road is functionally classified as a minor arterial. Stoltzman Road has a posted speed limit of 35 mph south of the study intersection and 30 mph to the north. Pleasant Street is a two-lane undivided city street with a speed limit of 30 mph and is functionally classified as a major collector. Pleasant Street east of the intersection was a one-way eastbound up until recently, paired with a westbound one-way on Van Brunt Street. The intersection of Stoltzman Road and Pleasant Street is currently all-way stop controlled. There are sidewalks on both sides of Pleasant Street, and on the east side of Stoltzman Road north of the intersection. There are marked pedestrian crossings on all four legs of the intersection. The adjacent area has primarily residential and educational land uses with commercial uses to the north. The existing lane configurations for the Stoltzman Road at Pleasant Street intersection are listed in Table 1 below and are shown in Figure 2.

Table 1. Existing Conditions

Approach	Configuration
Northbound Stoltzman Road	One left-turn lane, one thru lane, one shared thru/right-turn lane
Southbound Stoltzman Road	One left-turn lane, one thru lane, one shared thru/right-turn lane
Eastbound Pleasant Street	One left-turn lane and one shared thru/right-turn lane
Westbound Pleasant Street	One shared lane (all movements)

Crash History

Crash data was obtained from the Minnesota Crash Mapping Analysis Tool (MnCMAT) database for a five-year period from 2011 to 2015. There were twelve recorded crashes at the study intersection during the analysis period. Detailed crash data is provided in the Appendix. This results in a crash rate of 0.42 crashes per million entering vehicles, which is above the statewide average of 0.35 for all-way stop controlled intersections, but is still well below the critical crash rate of 0.65 (0.995 level of confidence) for this intersection.



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Existing Conditions

Figure 2

Intersection Control Evaluation
Stoltzman Road at Pleasant Street
Mankato, Blue Earth County, Minnesota

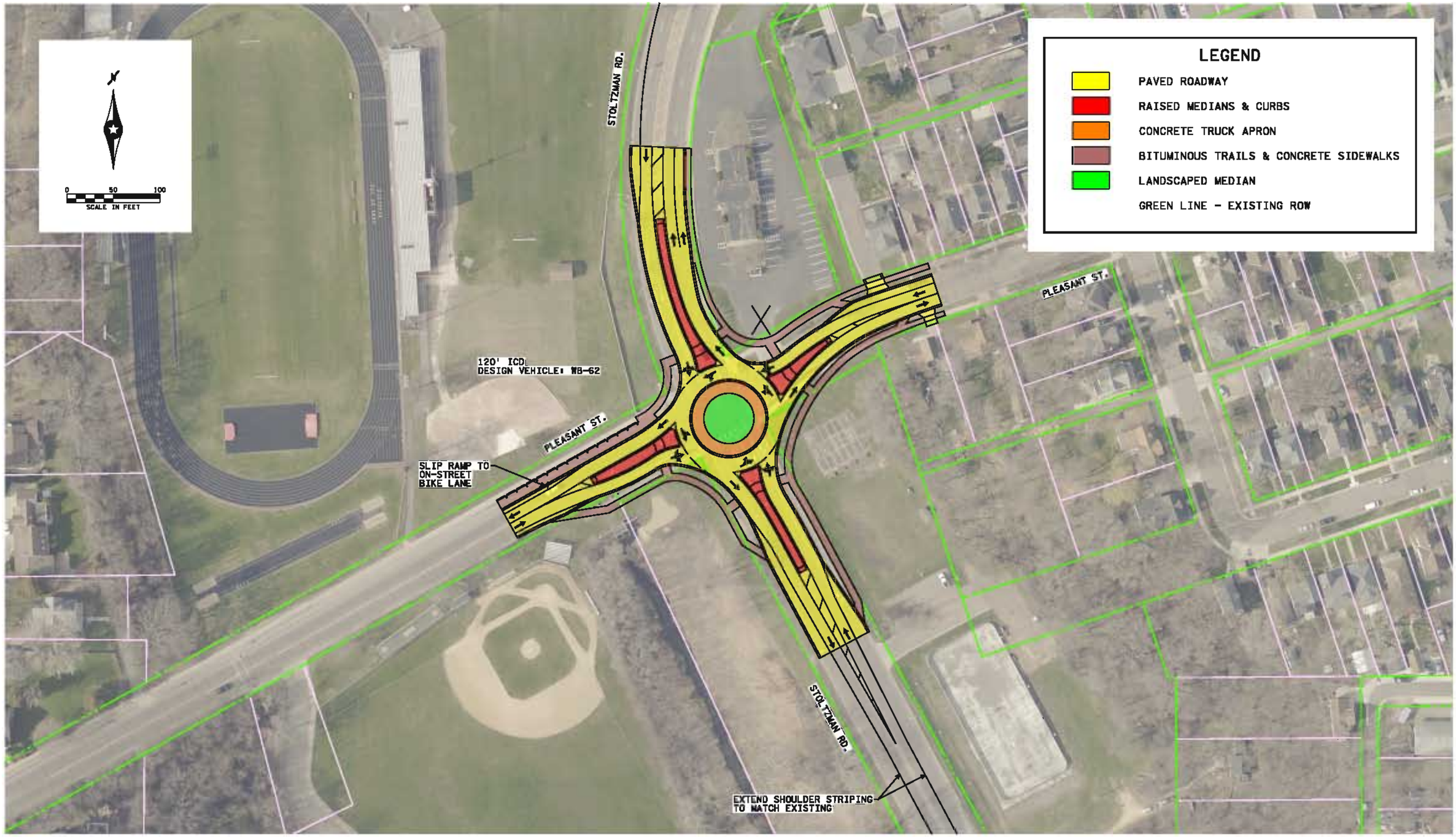
10279
September 2017

Future Conditions

Based on discussions with City and County staff in the summer of 2017, no short-term improvements to Stoltzman Road, Pleasant Street, or the study intersection are planned, except for adding bike lanes on Pleasant Street. For the alternatives analysis, the existing lane configurations under all-way stop control (listed in Table 1 and shown in Figure 2) were assumed to be the same for the traffic signal control alternative. The lane configurations for the roundabout control alternative are listed in Table 2 below and are shown in Figure 3. The roundabout concept shown is offset from the center of the existing intersection to avoid impacts to the retaining walls in the northwest quadrant.

Table 2. Proposed Lane Configurations for Roundabout Control Alternative

Approach	Configuration
Northbound Stoltzman Road	One shared lane (all movements)
Southbound Stoltzman Road	One shared lane (all movements)
Eastbound Pleasant Street	One shared lane (all movements)
Westbound Pleasant Street	One shared lane (all movements)



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September 2017

Roundabout Control Alternative

Intersection Control Evaluation
Stoltzman Road at Pleasant Street

Figure 3

Traffic Volumes

Hourly traffic volumes including the existing a.m. and p.m. peak hour were collected in April 2017 by SRF prior to the conclusion of the spring term at Minnesota State University and are shown in Figure 4. Pedestrian and bicycle volumes were also collected. Growth rates from the MAPO 2045 Transportation Plan (1.0% for the north and south legs) were used to determine Forecasted Year 2037 peak hour turning movement volumes, which are shown in Figure 5. Although the MAPO 2045 Transportation Plan showed 1.5% growth of the east and west legs, no traffic growth was applied based on discussion with City and County staff because the neighborhoods to the east and west of the intersection are already fully developed and, therefore, no further growth is expected.

SRF Consulting Group, Inc.

Existing Year 2017 Volumes

Figure 4

Intersection Control Evaluation
Stoltzman Road at Pleasant Street
Mankato, Blue Earth County, Minnesota

10279
September 2017

SRF Consulting Group, Inc.

Forecasted Year 2037 Volumes

Figure 5

Intersection Control Evaluation
Stoltzman Road at Pleasant Street
Mankato, Blue Earth County, Minnesota

10279
September 2017

Analysis of Alternatives

The analysis of the all-way stop control, traffic signal control, and roundabout control alternatives included a warrants analysis, operational analysis, planning-level crash analysis, and a planning-level cost analysis. Existing Year 2017 and Forecasted Year 2037 volumes with proposed lane configurations discussed previously were used for the analysis.

Warrants Analysis

A warrants analysis was performed for the traffic signal control alternative as outlined in the February 2015 *Minnesota Manual on Uniform Traffic Control Devices* (MN MUTCD). The signal warrants analysis was based on the assumptions shown in Table 3.

Table 3. Warrants Analysis Assumptions

Approach	Geometry	Speed
Northbound Major Street (Stoltzman Road)	2 or more approach lanes	35 mph
Southbound Major Street (Stoltzman Road)	2 or more approach lanes	30 mph
Eastbound Minor Street (Pleasant Street)	2 or more approach lanes	30 mph
Westbound Minor Street (Pleasant Street)	1 approach lane	30 mph

Minor street right-turns were included in the analysis because of the shared eastbound thru/right-turn lane and the shared westbound lane. Table 4 provides a summary of the results of the warrants analysis. The detailed warrants analysis can be found in the Appendix.

Table 4. Warrants Analysis Results

MN MUTCD Warrant	Hours Required	Existing Year 2017 Volumes		Forecasted Year 2037 Volumes	
		Hours Met	Warrant Met	Hours Met	Warrant Met
Warrant 1A: Minimum Vehicular Volume	8	2	No	2	No
Warrant 1B: Interruption of Continuous Traffic	8	4	No	6	No
Warrant 1C: Combination of Warrants	8	5	No	5	No
Warrant 2: Four-Hour Volume	4	2	No	4	Yes
Warrant 3B: Peak-Hour Volume	1	0	No	0	No
Multi-way Stop Applications Condition C	8	9	Yes	9	Yes

Warrants 4-9 were investigated but were determined to be not applicable. Results of the warrants analysis indicate that Existing Year 2017 volumes do not satisfy any MN MUTCD traffic signal warrants, while Forecasted Year 2037 volumes satisfy the MN MUTCD warrant requirements for traffic signal Warrant 2. The Forecasted Year 2037 volumes are less than 1% from meeting Warrant 3B. The intersection meets multi-way stop warrants in 2017 and 2037.

Operational Analysis

An initial planning-level analysis was performed for the roundabout control alternative based on methods found in the *Highway Capacity Manual, Sixth Edition* (Transportation Research Board, 2016). The analysis involved testing the theoretical capacity of a single-lane roundabout against the Forecasted Year 2037 entering and circulating volumes. As shown in Chart 1, the Forecasted Year 2037 volumes do not exceed the theoretical capacity of a single-lane roundabout. Therefore, a single lane roundabout was selected for further analysis.

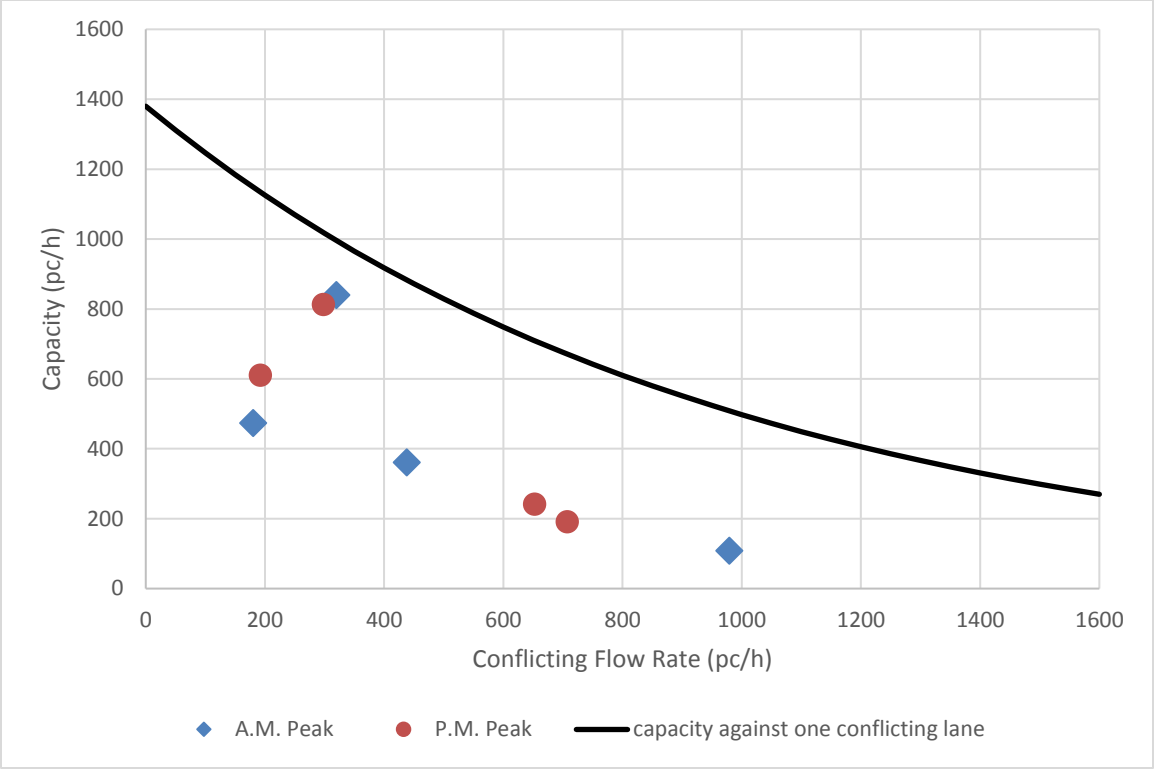


Chart 1. Single-Lane Roundabout Entry Lane Capacity (Forecasted Year 2037 volumes)

Operational analysis of the roundabout control alternative was performed using Highway Capacity Software (HCS). HCS is based on methodologies found in the *Highway Capacity Manual, 6th Edition* (HCM). It is important to note that HCS only reports "stop" or "control" delay. Therefore, to determine the total delay, "geometric" delay, or delay due to vehicle deceleration and acceleration through an intersection, must be added to the "stop" or "control" delay.

The detailed operational analysis of all-way stop control and traffic signal control was performed using methods outlined in the HCM using Synchro/SimTraffic. Synchro/ SimTraffic can calculate various measures of effectiveness such as control delay, queuing, and total travel time impacts. SimTraffic results are reported for the analysis.

The operational analysis identified a Level of Service (LOS), which indicates how well an intersection is operating based on average delay per vehicle. Intersections are given a ranking from LOS A to LOS F. LOS A indicates the best traffic operation and LOS F indicates an intersection where demand exceeds capacity. LOS A through LOS D are generally considered acceptable.

Table 5 and Table 6 provide a summary of the operational analysis for Existing Year 2017 and Forecasted Year 2037 conditions, respectively. Detailed operational analysis results can be found in the Appendix.

Table 5. Existing Year 2017 Operational Analysis Results

Alternative	Analysis Tool	A.M. Peak		P.M. Peak	
		Delay (1) (sec/veh)	LOS	Delay (1) (sec/veh)	LOS
All-Way Stop Control	Synchro/SimTraffic	6/7	A/A	7/8	A/A
Traffic Signal Control	Synchro/SimTraffic	7/10	A/B	7/10	A/B
Roundabout Control	HCS	11/15	B/C	10/13	B/B

(1) Control/stop delay is reported. Overall results are followed by the worst approach results.

Table 6. Forecasted Year 2037 Operational Analysis Results

Alternative	Analysis Tool (Variation)	A.M. Peak		P.M. Peak	
		Delay (1) (sec/veh)	LOS	Delay (1) (sec/veh)	LOS
All-Way Stop Control	Synchro/SimTraffic	9/12	A/B	8/10	A/B
Traffic Signal Control	Synchro/SimTraffic	7/11	A/B	8/10	A/B
Roundabout Control	HCS	16/24	C/C	14/20	B/C

(1) Control/stop delay is reported. Overall results are followed by the worst approach results.

Results of the operational analysis indicate that under the existing all-way stop control, the intersection operates with an acceptable level of service, and would continue to do so under Forecasted Year 2037 conditions. The traffic signal control and roundabout control alternatives would operate with acceptable levels of service under forecasted conditions with the roundabout having the greatest overall delay.

Safety Analysis

A crash analysis was performed to determine the projected crashes per year for Existing Year 2017 and Forecasted Year 2037 conditions for the study intersection. Crash rates from the MnDOT Green Sheets (2011 to 2015 data) were used for the crash analysis of the traffic signal control alternative. The existing crash rate for all-way stop control was used for that alternative, as the existing crash rate exceeds the average rate. According to *NCHRP Report 672 Roundabouts: An Informational Guide, Second Edition* (Transportation Research Board, 2010), the conversion of an all-way stop controlled intersection to a roundabout has an insignificant impact on the crash rate. Therefore, the crash rate for all-way stop control was used for the roundabout control alternative. A summary of the crash analysis is shown in Table 7.

Table 7. Crash Analysis Results

Alternative	Intersection AADT (2017)	Intersection AADT (2037)	Crash Rate	Projected Crashes/Year (2017)	Projected Crashes/Year (2037)
All-Way Stop Control	15,700	18,100	0.42	3	3
Traffic Signal Control			0.52	3	4
Roundabout Control			0.42	3	3

Based on the results of the crash analysis, the all-way stop control and roundabout control alternatives are anticipated to have slightly less crashes than the traffic signal control alternative.

Studies have determined that the installation of a roundabout can improve overall safety of an intersection when compared to other forms of intersection control. Roundabouts typically have fewer conflict points than conventional intersections and the geometry of a roundabout induces lower speeds for vehicles approaching and traversing an intersection. With lower speeds, the severity of the crashes is decreased. A roundabout virtually eliminates right-angle and left-turn head-on crashes. Studies have shown the frequency of injury crashes is reduced more than property damage only crashes.

At a roundabout, drivers must be aware of traffic traveling around the circle when merging on or off the roundabout. Conversely, drivers at a traditional intersection must be aware of vehicles at all approaches and the movements they are making. This issue is most prevalent at stop-controlled intersections where there is not a traffic signal to control vehicle movements.

Planning-Level Cost Analysis

Capital Costs

The intersection is currently all-way stop controlled, therefore with the "no build" alternative there would be no cost to continue with this type of intersection control. The traffic signal control alternative can utilize the existing geometric conditions, therefore the cost for this alternative would only be the cost of installing a traffic signal system, along with ADA improvements. The roundabout control alternative would require substantial reconstruction at and leading up to the intersection, which results in a much higher cost than the traffic signal control alternative.

Operation and Maintenance Costs

Traffic signals typically have higher operation and maintenance costs than roundabouts because of the electricity required to operate the signal and routine maintenance required to keep the signal in operation. Operation and maintenance costs associated with a roundabout can vary depending on the amount of illumination required or landscaping alternatives used for the center island. All-way stop control operation and maintenance costs are only the ongoing costs of maintaining the stop signs and pavement markings.

A cost analysis summary is shown in Table 8. Detailed cost analysis results can be found in the Appendix.

Table 8. Cost Analysis Summary

Alternative	Capital Costs (1)	Operation/Maintenance Costs (annual)
All-Way Stop Control	$0	< $200
Traffic Signal Control	$300,000	$4,000-$6,000
Roundabout Control	$970,000	$500-$1,000

(1) Does not include engineering or right-of-way costs.

Alternatives Assessment

Right-of-Way Considerations

The roadway geometry for the all-way stop control and traffic signal control alternatives would use existing conditions and therefore no additional right-of-way would be required. Construction of a roundabout at the study intersection would require substantial additional right-of-way in all four quadrants of the intersection.

Transportation System Considerations

There is an existing traffic signal approximately one-quarter of a mile north of the study intersection at the Riverfront Drive and Stoltzman Road intersection. The roundabout control alternative could be considered a traffic calming measure for the surrounding residential area. The roundabout would require closure of one business driveway. No significant queues are expected with any of the alternatives.

Pedestrian and Bicycle Considerations

As previously mentioned, there are currently sidewalks on both sides of Pleasant Street, and on the east side of Stoltzman Road north of the intersection. There are marked pedestrian crossings on all four legs of the intersection. Pedestrian accommodations can be provided regardless of the selected intersection control.

The design of a roundabout allows pedestrians to cross one direction of traffic at a time with a refuge space in the middle of each leg of the roundabout, and these short crossing distances and reduced travel speeds of vehicle traffic improve pedestrian safety. However, their route is slightly longer since they are kept to the outside of the inscribed circle.

The design of a traffic signal can create a safe environment for pedestrian crossings with the use of pedestrian signal phasing. This phasing allows pedestrians to safely cross an intersection while vehicular movements are served. Although signalized intersections can provide indications showing pedestrian right-of-way, potential conflicts can come from red-light running through vehicles and permissive turning traffic.

The all-way stop alternative provides a safety benefit for pedestrians by having all vehicular movements stop; however, there are safety concerns for pedestrians where all road users expect other road users to stop. Most vehicle-pedestrian collisions at all-way stop controlled intersections are a result of either vehicles not stopping when pedestrians assume they are, or pedestrians not paying attention to vehicles approaching the intersection.

Local Acceptance

Drivers are familiar with traveling through all-way stop controlled and signalized intersections since there are many intersections in the area under these types of traffic control. Drivers are

also familiar with traveling through roundabout controlled intersections since there are many existing roundabouts throughout the greater Mankato area.

Conclusions and Recommendations

The following conclusions are provided for this intersection control evaluation for the Stoltzman Road (CSAH 16) at Pleasant Street intersection in Mankato, Blue Earth County, Minnesota:

- *Warrants Analysis*
  Results of the warrants analysis indicate that Existing Year 2017 volumes do not satisfy any MN MUTCD traffic signal warrants, while Forecasted Year 2037 volumes satisfy the MN MUTCD warrant requirements for traffic signal Warrant 2.

- *Operational Analysis*
  Results of the operational analysis indicate that under the existing all-way stop control, the intersection operates with an acceptable level of service, and would continue to do so under Forecasted Year 2037 conditions. The traffic signal control and roundabout control alternatives would operate with acceptable levels of service under forecasted conditions with the roundabout alternative having the greatest overall delay.

- *Safety Analysis*
  Based on the results of the crash analysis, the all-way stop control and roundabout control alternatives are anticipated to have slightly less crashes than the traffic signal control alternative. Roundabouts typically have fewer conflict points than conventional intersections and the geometry of a roundabout induces lower speeds for vehicles approaching and traversing an intersection. With lower speeds, the severity of the crashes is decreased.

- *Planning-Level Cost Analysis*
  There would be no cost to continue with the existing all-way stop control. The traffic signal control alternative can utilize the existing geometric conditions, therefore the cost for this alternative would only be the cost of installing a traffic signal system, along with ADA improvements, which would be approximately $300,000. The roundabout control alternative would require substantial reconstruction at and leading up to the intersection, which would cost approximately $970,000. Traffic signals typically have higher operation and maintenance costs because of the electricity required to operate the signal and routine maintenance required to keep the signal in operation. Operation and maintenance costs associated with a roundabout can vary depending on the amount of illumination required or landscaping alternatives used for the center island. Stop control operation and maintenance costs are only the ongoing costs of maintaining the stop signs and pavement markings.

- *Right-of-Way Considerations*
  The roadway geometry for the all-way stop and traffic signal control alternatives would use existing conditions and therefore no additional right-of-way would be required. Construction of a roundabout at the study intersection would require additional right-of-way in all four quadrants of the intersection.

- *Transportation System Considerations*
  There is an existing traffic signal approximately one-quarter of a mile north of the study intersection at the Riverfront Drive and Stoltzman Road intersection. The roundabout control alternative could be considered a traffic calming measure for the surrounding residential area.

- *Pedestrian and Bicycle Considerations*
  The design of signalized intersections can take pedestrian crossings and safety into consideration with the use of pedestrian signal phasing. The design of a roundabout allows pedestrians to cross one direction of traffic at a time on each leg of the roundabout. Their route is slightly longer since they are kept to the outside of the inscribed circle. All-way stop control provides a safety benefit for pedestrians by having all vehicular movements stop; however, most vehicle-pedestrian collisions at all-way stop controlled intersections are a result of either vehicles not stopping when pedestrians assume they are, or pedestrians not paying attention to vehicles approaching the intersection.

- *Local Acceptance*
  Drivers are familiar with traveling through all-way stop controlled and signalized intersections since there are many intersections in the area under these types of traffic control. Drivers are also familiar with traveling through roundabout controlled intersections since there are many existing roundabouts throughout the greater Mankato area.

A decision matrix was developed to help evaluate the key factors and is provided on the following page. Based on the results of this Intersection Control Evaluation, the all-way stop control, traffic signal control, and roundabout control alternatives are all viable options for the Stoltzman Road at Pleasant Street intersection. All alternatives have acceptable operations under forecasted conditions with the roundabout having the greatest overall delay. The "no build" all-way stop alternative does not require any capital improvements. The traffic signal control alternative has comparable operations to the all-way stop control alternative. However, it has a significant capital cost. Therefore a traffic signal is not practical at this intersection. Compared to a traffic signal, a roundabout would have more consistent off-peak operations throughout the day when traffic volumes are lower. However, the existing five-lane section provides better operations under all-way stop control than would be provided by a single-lane roundabout, without the additional capital costs. Therefore, maintaining the existing all-way stop control is recommended since this type of control would have no capital cost, require no right-of way, and have low delay. A roundabout could be considered at this location in the future if safety issues develop or traffic volumes increase more than what was forecasted.

Alternatives Decision Matrix: Stoltzman Road at Pleasant Street

Factor		All-Way Stop Control	Traffic Signal Control	Roundabout Control	Recommended Alternative(s) Based on Factor
Warrants Analysis	2017	• AWSC warrant met	• Existing Year 2017 volumes do not meet traffic signal control warrants	N/A	All-Way Stop Control Roundabout Control
	2037	• AWSC warrant met	• Forecasted Year 2037 volumes meet traffic signal control warrants	N/A	All-Way Stop Control Traffic Signal Control Roundabout Control
Operational Analysis	2017	• Acceptable LOS	• Acceptable LOS	• Acceptable LOS, but greatest overall delay • Consistent off-peak operations	All-Way Stop Control Traffic Signal Control
	2037	• Acceptable LOS	• Acceptable LOS	• Acceptable LOS, but greatest overall delay • Consistent off-peak operations	
Safety Analysis	Pro(s):	• Least number of crashes expected • Lower vehicle speeds through intersection	• Signal indications show vehicle right-of-way	• Least number of crashes expected • Lower vehicle speeds through intersection	All-Way Stop Control Roundabout Control
	Con(s):	• Drivers decide right-of-way	• Slightly more crashes expected than all-way stop/roundabout	• Drivers select acceptable gaps	
Cost Analysis	Pro(s):	• No capital cost • Low operation/maintenance costs	• Lower capital costs ($300,000) than roundabout control	• Lower operation/maintenance costs than traffic signal control	All-Way Stop Control
	Con(s):	none	• Higher operation/maintenance costs than roundabout control	• Higher capital costs ($970,000) than traffic signal control • Requires substantial reconstruction	
Right-of-Way	Pro(s):	N/A (existing control)	• No ROW impacts expected	none	All-Way Stop Control Traffic Signal Control
	Con(s):		none	• Requires additional ROW in all four quadrants	
Transportation System Considerations	Pro(s):	• Existing control • Adjacent intersections on Pleasant are all-way stops	• Provides control continuity along Stoltzman Road to the north	• Traffic calming through residential area	All-Way Stop Control Traffic Signal Control
	Con(s):	none	• Would likely not operate in coordination with other signals	• No adjacent or nearby roundabouts	
Pedestrian and Bicycle Considerations	Pro(s):	• All vehicular movements stop	• Pedestrian pushbuttons and signal phasing	• Pedestrian Refuge islands • Lower vehicle speeds thru intersection	Traffic Signal Control
	Con(s):	• Expecting vehicles to yield to pedestrians can lead to a false sense of security	• Pedestrian signal phasing can lead to a false sense of security	• Longer route • No pedestrian phase	
Local Acceptance	Pro(s):	N/A (existing control)	• Familiar to drivers	• Familiar to drivers • Positive public feedback	All-Way Stop Control Roundabout Control
	Con(s):		none	none	

Appendix

- 2011-2015 Crash History
- Existing Year 2017 Warrants Analysis
- Forecasted Year 2037 Warrants Analysis
- Existing Year 2017 Detailed Operational Analysis
    - All-Way Stop Control
    - Traffic Signal Control
    - Roundabout Control
- Forecasted Year 2037 Detailed Operational Analysis
    - All-Way Stop Control
    - Traffic Signal Control
    - Roundabout Control
- Detailed Cost Analysis

2011-2015 Crash History

Crash Detail Report

Stoltzman Road at Pleasant Street

Report Version 1.0 March 2010

Crash ID: 110660143 **Date:** 02/01/2011 **Time:** 0733
County: BLUE EARTH **City:** MANKATO

Sys: 04-CSAH
Route: 07000016 019+00.960

Severity: POSSIBLE INJURY
Road Type: NOT SPECIFIED
Road Char: NOT SPECIFIED
Crash Type: COLL W/MV IN TRANSPORT
Surf Cond: ICE/PACKED SNOW
Light Cond: DAYLIGHT
Weather 1: CLOUDY
Weather 2: NOT SPECIFIED

First Event: NOT SPECIFIED
To Junction: NOT SPECIFIED
Traffic Device: STOP SIGN 4-WAY
Speed Limit: 30
Diagram: REAR END
Officer:
Reliability: CONFIDENT
# of Vehicles: 2.00

	Unit 1	Unit 2	Unit 3
Trav Dir:	S	S	
Veh Act:	STRAIGHT AHEAD	STRAIGHT AHEAD	
Veh Type:	PASSENGER CAR	PASSENGER CAR	
Age:	23	19	
Gender:	F	M	
Cond:	NOT SPECIFIED	NOT SPECIFIED	
Cont Fact 1	NOT SPECIFIED	NOT SPECIFIED	
Cont Fact 2	NOT SPECIFIED	NOT SPECIFIED	

Crash ID: 111180078 **Date:** 03/26/2011 **Time:** 0900
County: BLUE EARTH **City:** MANKATO

Sys: 05-MSAS
Route: 24200103 000+00.560

Severity: PROPERTY DAMAGE
Road Type: NOT SPECIFIED
Road Char: NOT SPECIFIED
Crash Type: COLL W/MV IN TRANSPORT
Surf Cond: DRY
Light Cond: DAYLIGHT
Weather 1: CLEAR
Weather 2: NOT SPECIFIED

First Event: NOT SPECIFIED
To Junction: NOT SPECIFIED
Traffic Device: STOP SIGN 4-WAY
Speed Limit: 30
Diagram: HEAD ON
Officer:
Reliability: CONFIDENT
# of Vehicles: 2.00

	Unit 1	Unit 2	Unit 3
Trav Dir:	S	N	
Veh Act:	STRAIGHT AHEAD	LEFT TURN	
Veh Type:	PICKUP TRUCK	PASSENGER CAR	
Age:	62	21	
Gender:	M	F	
Cond:	NOT SPECIFIED	NOT SPECIFIED	
Cont Fact 1	NOT SPECIFIED	NOT SPECIFIED	
Cont Fact 2	NOT SPECIFIED	NOT SPECIFIED	

Crash ID: 122810019 **Date:** 10/06/2012 **Time:** 1240
County: BLUE EARTH **City:** MANKATO

Sys: 04-CSAH
Route: 07000016 019+00.960

Severity: POSSIBLE INJURY
Road Type: 4_6 LANES UNDIV 2_WAY
Road Char: STRAIGHT AND LEVEL
Crash Type: COLL W/MV IN TRANSPORT
Surf Cond: DRY
Light Cond: DARK - STREET LIGHTS ON
Weather 1: CLOUDY
Weather 2: CLOUDY

First Event: ON ROADWAY
To Junction: 4-LEGGED INTERSECTION
Traffic Device: STOP SIGN 4-WAY
Speed Limit: 30
Diagram: RIGHT ANGLE
Officer:
Reliability: CONFIDENT
# of Vehicles: 2.00

	Unit 1	Unit 2	Unit 3
Trav Dir:	S	E	
Veh Act:	STRAIGHT AHEAD	STRAIGHT AHEAD	
Veh Type:	PASSENGER CAR	PASSENGER CAR	
Age:	47	61	
Gender:	F	M	
Cond:	NORMAL	NORMAL	
Cont Fact 1	FAIL TO YIELD ROW	NO IMPROPER DRIVING	
Cont Fact 2	FAIL TO YIELD ROW	NO IMPROPER DRIVING	

Crash ID: 123280030 **Date:** 11/22/2012 **Time:** 1602
County: BLUE EARTH **City:** MANKATO

Sys: 04-CSAH
Route: 07000016 019+00.960

Severity: POSSIBLE INJURY
Road Type: 4_6 LANES UNDIV 2_WAY
Road Char: STRAIGHT AND LEVEL
Crash Type: COLL W/MV IN TRANSPORT
Surf Cond: DRY
Light Cond: DAYLIGHT
Weather 1: CLOUDY
Weather 2: OTHER

First Event: ON ROADWAY
To Junction: 5 OR MORE LEG INTERSECT
Traffic Device: STOP SIGN 4-WAY
Speed Limit: 30
Diagram: LEFT TURN INTO TRAFFIC
Officer:
Reliability: CONFIDENT
# of Vehicles: 2.00

	Unit 1	Unit 2	Unit 3
Trav Dir:	S	S	
Veh Act:	LEFT TURN	STRAIGHT AHEAD	
Veh Type:	PASSENGER CAR	PASSENGER CAR	
Age:	18	23	
Gender:	M	M	
Cond:	NORMAL	NORMAL	
Cont Fact 1	NO IMPROPER DRIVING	DISREGARD TRAFFIC DEVICE	
Cont Fact 2	NOT SPECIFIED	NOT SPECIFIED	

Crash ID: 130500094 **Date:** 01/16/2013 **Time:** 0800
County: BLUE EARTH **City:** MANKATO

Sys: 04-CSAH
Route: 07000016 019+00.971

Severity: NON-INCAPACITATING INJURY
Road Type: NOT SPECIFIED
Road Char: NOT SPECIFIED
Crash Type: COLL W/MV IN TRANSPORT
Surf Cond: ICE/PACKED SNOW
Light Cond: DAYLIGHT
Weather 1: CLOUDY
Weather 2: NOT SPECIFIED

First Event: NOT SPECIFIED
To Junction: NOT SPECIFIED
Traffic Device: NOT SPECIFIED
Speed Limit: 35
Diagram: HEAD ON
Officer:
Reliability: LESS CONFIDENT
# of Vehicles: 2.00

	Unit 1	Unit 2	Unit 3
Trav Dir:	EAST	W	
Veh Act:	STRAIGHT AHEAD	STRAIGHT AHEAD	
Veh Type:	PASSENGER CAR	PASSENGER CAR	
Age:	30	39	
Gender:	F	F	
Cond:	NOT SPECIFIED	NOT SPECIFIED	
Cont Fact 1	NOT SPECIFIED	NOT SPECIFIED	
Cont Fact 2	NOT SPECIFIED	NOT SPECIFIED	

Crash ID: 132780037 **Date:** 10/04/2013 **Time:** 2254
County: BLUE EARTH **City:** MANKATO

Sys: 05-MSAS
Route: 24200103 000+00.560

Severity: PROPERTY DAMAGE
Road Type: 4_6 LANES UNDIV 2_WAY
Road Char: STRAIGHT AND LEVEL
Crash Type: COLL W/MV IN TRANSPORT
Surf Cond: WET
Light Cond: DARK - STREET LIGHTS ON
Weather 1: RAIN
Weather 2: NOT SPECIFIED

First Event: ON ROADWAY
To Junction: 4-LEGGED INTERSECTION
Traffic Device: STOP SIGN 4-WAY
Speed Limit: 30
Diagram: REAR END
Officer:
Reliability: CONFIDENT
# of Vehicles: 2.00

	Unit 1	Unit 2	Unit 3
Trav Dir:	N	N	
Veh Act:	STRAIGHT AHEAD	STRAIGHT AHEAD	
Veh Type:	PASSENGER CAR	BUS (16+ SEATS)	
Age:	71	47	
Gender:	F	M	
Cond:	NORMAL	NORMAL	
Cont Fact 1	WEATHER	WEATHER	
Cont Fact 2	NOT SPECIFIED	NOT SPECIFIED	

Crash ID: 140650074 **Date:** 01/31/2014 **Time:** 0754
County: BLUE EARTH **City:** MANKATO

Sys: 04-CSAH
Route: 07000016 019+00.969

Severity: PROPERTY DAMAGE
Road Type: NOT SPECIFIED
Road Char: NOT SPECIFIED
Crash Type: COLL W/MV IN TRANSPORT
Surf Cond: ICE/PACKED SNOW
Light Cond: DAYLIGHT
Weather 1: CLEAR
Weather 2: NOT SPECIFIED

First Event: NOT SPECIFIED
To Junction: NOT SPECIFIED
Traffic Device: STOP SIGN 4-WAY
Speed Limit: 30
Diagram: REAR END
Officer:
Reliability: CONFIDENT
# of Vehicles: 2.00

	Unit 1	Unit 2	Unit 3
Trav Dir:	S	S	
Veh Act:	STOPPED TRAFFIC	SLOWING TRAFFIC	
Veh Type:	SPORT UNTILITY VEHICLE	PASSENGER CAR	
Age:	52	21	
Gender:	F	M	
Cond:	NOT SPECIFIED	NOT SPECIFIED	
Cont Fact 1	NOT SPECIFIED	NOT SPECIFIED	
Cont Fact 2	NOT SPECIFIED	NOT SPECIFIED	

Crash ID: 140830045 **Date:** 02/21/2014 **Time:** 1100
County: BLUE EARTH **City:** MANKATO

Sys: 04-CSAH
Route: 07000016 019+00.960

Severity: PROPERTY DAMAGE
Road Type: NOT SPECIFIED
Road Char: NOT SPECIFIED
Crash Type: COLL W/MV IN TRANSPORT
Surf Cond: ICE/PACKED SNOW
Light Cond: DAYLIGHT
Weather 1: CLEAR
Weather 2: NOT SPECIFIED

First Event: NOT SPECIFIED
To Junction: NOT SPECIFIED
Traffic Device: STOP SIGN 4-WAY
Speed Limit: 30
Diagram: RIGHT ANGLE
Officer:
Reliability: CONFIDENT
# of Vehicles: 2.00

	Unit 1	Unit 2	Unit 3
Trav Dir:	N	E	
Veh Act:	STRAIGHT AHEAD	STRAIGHT AHEAD	
Veh Type:	PASSENGER CAR	99	
Age:	55	25	
Gender:	M	M	
Cond:	NOT SPECIFIED	NOT SPECIFIED	
Cont Fact 1	NOT SPECIFIED	NOT SPECIFIED	
Cont Fact 2	NOT SPECIFIED	NOT SPECIFIED	

Crash ID: 142800092 **Date:** 09/04/2014 **Time:** 1650
County: BLUE EARTH **City:** MANKATO

Sys: 04-CSAH
Route: 07000016 019+00.960

Severity: PROPERTY DAMAGE
Road Type: NOT SPECIFIED
Road Char: NOT SPECIFIED
Crash Type: COLL W/MV IN TRANSPORT
Surf Cond: DRY
Light Cond: DAYLIGHT
Weather 1: CLEAR
Weather 2: NOT SPECIFIED

First Event: NOT SPECIFIED
To Junction: NOT SPECIFIED
Traffic Device: STOP SIGN 4-WAY
Speed Limit: 30
Diagram: RIGHT ANGLE
Officer:
Reliability: CONFIDENT
# of Vehicles: 2.00

	Unit 1	Unit 2	Unit 3
Trav Dir:	N	S	
Veh Act:	LEFT TURN	STRAIGHT AHEAD	
Veh Type:	PASSENGER CAR	PASSENGER CAR	
Age:	49	19	
Gender:	F	F	
Cond:	NOT SPECIFIED	NOT SPECIFIED	
Cont Fact 1	NOT SPECIFIED	NOT SPECIFIED	
Cont Fact 2	NOT SPECIFIED	NOT SPECIFIED	

Crash ID: 150070018 **Date:** 01/06/2015 **Time:** 2129
County: BLUE EARTH **City:** MANKATO

Sys: 04-CSAH
Route: 07000016 019+00.960

Severity: PROPERTY DAMAGE
Road Type: 4_6 LANES UNDIV 2_WAY
Road Char: STRAIGHT AND LEVEL
Crash Type: COLL W/MV IN TRANSPORT
Surf Cond: SNOW
Light Cond: DARK - STREET LIGHTS ON
Weather 1: CLOUDY
Weather 2: NOT SPECIFIED

First Event: ON ROADWAY
To Junction: 4-LEGGED INTERSECTION
Traffic Device: STOP SIGN 4-WAY
Speed Limit: 35
Diagram: OTHER
Officer:
Reliability: CONFIDENT
# of Vehicles: 2.00

	Unit 1	Unit 2	Unit 3
Trav Dir:	EAST	S	
Veh Act:	BIKE SLOWING/STOPPING/START	BIKE SLOWING/STOPPING/STARTI	
Veh Type:	PASSENGER CAR	PICKUP TRUCK	
Age:	27	24	
Gender:	F	M	
Cond:	NORMAL	NORMAL	
Cont Fact 1	NO IMPROPER DRIVING	SKIDDING	
Cont Fact 2	NOT SPECIFIED	NOT SPECIFIED	

Crash ID: 150370106 **Date:** 01/04/2015 **Time:** 2128
County: BLUE EARTH **City:** MANKATO

Sys: 04-CSAH
Route: 07000016 019+00.960

Severity: PROPERTY DAMAGE
Road Type: NOT SPECIFIED
Road Char: NOT SPECIFIED
Crash Type: COLL W/MV IN TRANSPORT
Surf Cond: WET
Light Cond: DARK - STREET LIGHTS ON
Weather 1: CLEAR
Weather 2: NOT SPECIFIED

First Event: NOT SPECIFIED
To Junction: NOT SPECIFIED
Traffic Device: STOP SIGN 4-WAY
Speed Limit: 30
Diagram: REAR END
Officer:
Reliability: CONFIDENT
# of Vehicles: 2.00

	Unit 1	Unit 2	Unit 3
Trav Dir:	S	MC	
Veh Act:	STRAIGHT AHEAD	BIKE WITH TRAFFIC	
Veh Type:	PASSENGER CAR	PASSENGER CAR	
Age:	17	20	
Gender:	F	F	
Cond:	NOT SPECIFIED	NOT SPECIFIED	
Cont Fact 1	NOT SPECIFIED	NOT SPECIFIED	
Cont Fact 2	NOT SPECIFIED	NOT SPECIFIED	

Crash ID: 151870151 **Date:** 07/06/2015 **Time:** 1219
County: BLUE EARTH **City:** MANKATO

Sys: 04-CSAH
Route: 07000016 019+00.960

Severity: POSSIBLE INJURY
Road Type: 2 LANES UNDIV 2_WAY
Road Char: STRAIGHT AND LEVEL
Crash Type: COLL W/MV IN TRANSPORT
Surf Cond: WET
Light Cond: DAYLIGHT
Weather 1: RAIN
Weather 2: CLOUDY

First Event: ON ROADWAY
To Junction: 4-LEGGED INTERSECTION
Traffic Device: STOP SIGN 4-WAY
Speed Limit: 30
Diagram: RIGHT ANGLE
Officer:
Reliability: CONFIDENT
# of Vehicles: 2.00

	Unit 1	Unit 2	Unit 3
Trav Dir:	S	W	
Veh Act:	STRAIGHT AHEAD	LEFT ON RED	
Veh Type:	TRUCK W/ SEMI TRAILER	PICKUP TRUCK	
Age:	50	82	
Gender:	M	M	
Cond:	NORMAL	NORMAL	
Cont Fact 1	DISREGARD TRAFFIC DEVICE	NOT SPECIFIED	
Cont Fact 2	FAIL TO YIELD ROW	NOT SPECIFIED	

Selection Filter:

WORK AREA: CONST_DIST_CODE('7') - FILTER: CRASH_YEAR('2011','2012','2013','2014','2015') - SPATIAL FILTER APPLIED

Analyst:

Luke James

Notes:

Existing Year 2017 Warrants Analysis

Consulting Group, Inc.

WARRANTS ANALYSIS

Existing Year 2017

Stoltzman Road at Pleasant Street
Intersection Control Evaluation
City of Mankato, Blue Earth County

Background Information

Location :	City of Mankato, Blue Earth County
Date:	6/7/2017
Analysis Prepared By:	Luke James
Population Less than 10,000:	No
Seventy Percent Factor Used:	No

Speed (mph)	Lanes	Approach	
35	2 or more	Major Approach 1:	Northbound Stoltzman Road
30	2 or more	Major Approach 3:	Southbound Stoltzman Road
30	2 or more	Minor Approach 2:	Eastbound Pleasant Street
30	1	Minor Approach 4:	Westbound Pleasant Street

Warrants Analysis: Warrants 1A, 1B and 1C

Hour	Major Approach 1	Major Approach 3	Total 1 + 3	Warrant Met 600	Warrant Met 900	Minor Approach 2	Minor Approach 4	Largest Minor App.	Warrant Met 200	Warrant Met 100	Met Same Hours Condition A	Met Same Hours Condition B	Combination A	Combination B	MWSA (C) 300	MWSA (C) 200
6 - 7 AM	198	125	323			89	25	89							X	
7 - 8 AM	652	311	963	X	X	308	96	308	X	X	X	X	X	X	X	X
8 - 9 AM	330	324	654	X		208	60	208	X	X	X		X		X	X
9 - 10 AM	244	231	475			130	51	130		X					X	
10 - 11 AM	263	253	516			129	59	129		X					X	
11 - 12 AM	294	307	601	X		116	82	116		X					X	
12 - 1 PM	350	399	749	X		158	93	158		X				X	X	X
1 - 2 PM	335	324	659	X		123	88	123		X					X	X
2 - 3 PM	435	378	813	X		154	116	154		X				X	X	X
3 - 4 PM	446	501	947	X	X	198	105	198		X		X	X	X	X	X
4 - 5 PM	462	526	988	X	X	157	179	179		X		X	X	X	X	X
5 - 6 PM	427	655	1082	X	X	197	142	197		X		X	X	X	X	X
6 - 7 PM	359	447	806	X		144	94	144		X				X	X	X
7 - 8 PM	287	357	644	X		109	57	109		X					X	
8 - 9 PM	226	288	514			69	56	69							X	
9 - 10 PM	183	199	382			47	36	47							X	
10 - 11 PM	100	149	249			28	20	28								
											2	4	5	7	9	

Warrant Summary

Warrant and Description		Hours Met	Hours Required	Met/Not Met
MWSA (C):	Multiway Stop Applications Condition C	9	8	Met - Multiway Stop Applications
Warrant 1A:	Minimum Vehicular Volume	2	8	Not Met
Warrant 1B:	Interruption of Continuous Traffic	4	8	Not Met
Warrant 1C:	Combination of Warrants	5	8	Not Met
Warrant 2:	Four-Hour Vehicular Volume	2	4	Not Met
Warrant 3B:	Peak Hour	0	1	Not Met

SRF Consulting Group, Inc.

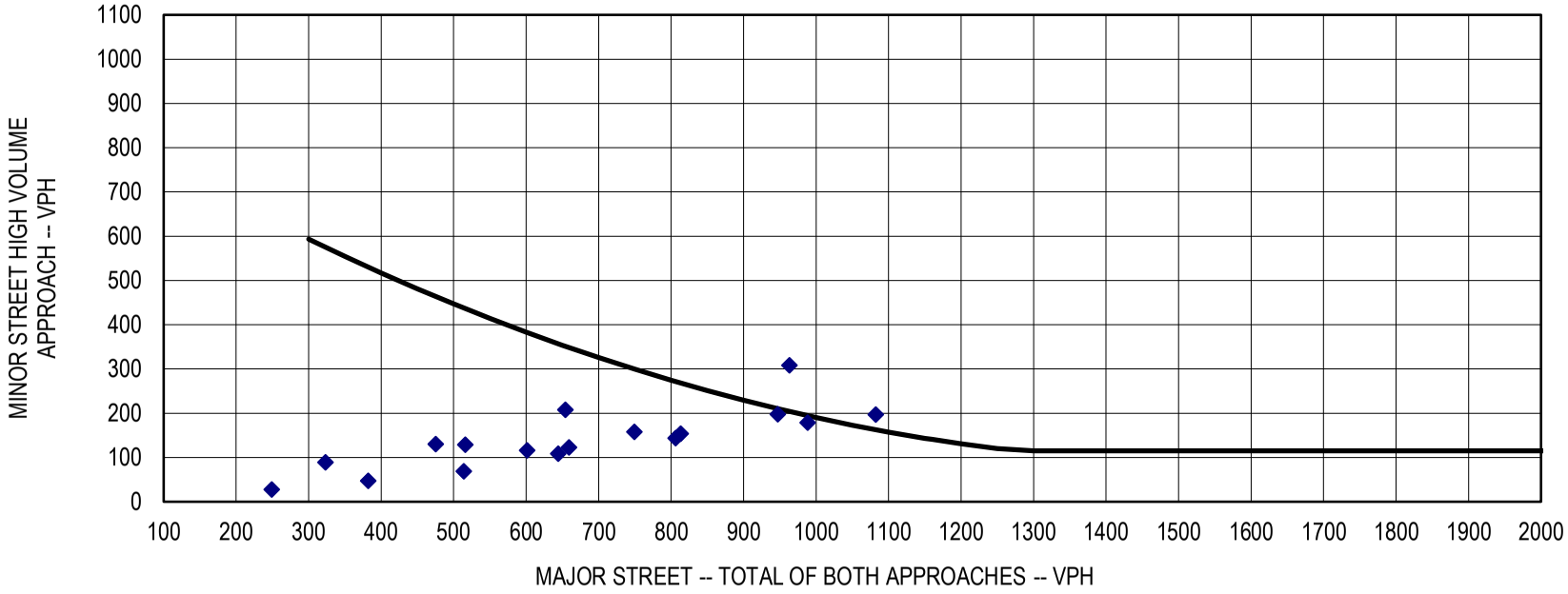
WARRANTS ANALYSIS

Existing Year 2017

Stoltzman Road at Pleasant Street
Intersection Control Evaluation
City of Mankato, Blue Earth County

Warrants Analysis: Warrant 2

WARRANT 2 - FOUR-HOUR VEHICULAR VOLUME



Number of Hours Satisfying Requirements:	2

Notes: 1. 115 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 80 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

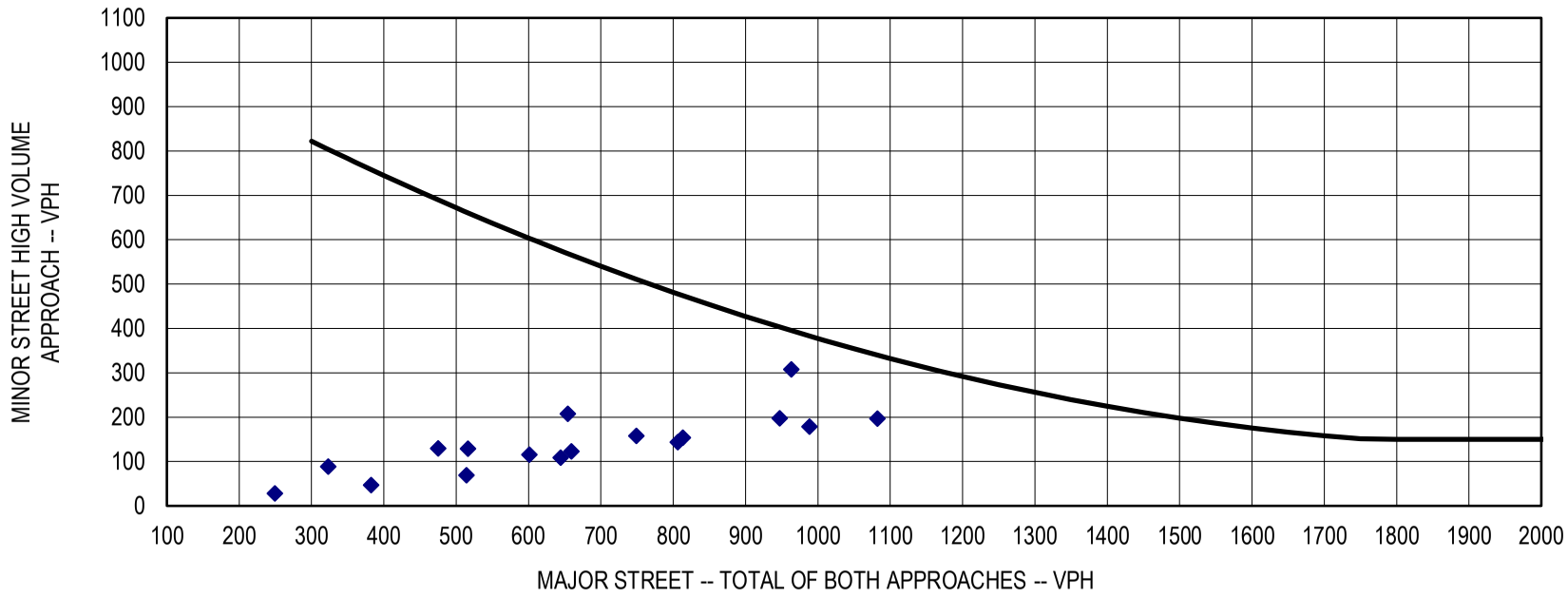
SRF Consulting Group, Inc.

WARRANTS ANALYSIS

Existing Year 2017

Stoltzman Road at Pleasant Street
Intersection Control Evaluation
City of Mankato, Blue Earth County

Warrants Analysis: Warrant 3



Number of Hours Satisfying Requirements:	0

Notes: 1. 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Forecasted Year 2037 Warrants Analysis

SRF Consulting Group, Inc.

WARRANTS ANALYSIS

Forecasted Year 2037

Stoltzman Road at Pleasant Street
Intersection Control Evaluation
City of Mankato, Blue Earth County

Background Information

Location :	City of Mankato, Blue Earth County
Date:	7/12/2017
Analysis Prepared By:	Luke James
Population Less than 10,000:	No
Seventy Percent Factor Used:	No

Speed (mph)	Lanes	Approach	
35	2 or more	Major Approach 1:	Northbound Stoltzman Road
30	2 or more	Major Approach 3:	Southbound Stoltzman Road
30	2 or more	Minor Approach 2:	Eastbound Pleasant Street
30	1	Minor Approach 4:	Westbound Pleasant Street

Warrants Analysis: Warrants 1A, 1B, and 1C

Hour	Major Approach 1	Major Approach 3	Total 1 + 3	Warrant Met 600	Warrant Met 900	Minor Approach 2	Minor Approach 4	Largest Minor App.	Warrant Met 200	Warrant Met 100	Met Same Hours Condition A	Met Same Hours Condition B	Combination A	Combination B	MWSA (C) 300	MWSA (C) 200
6 - 7 AM	238	150	388			89	25	89							X	
7 - 8 AM	782	373	1155	X	X	308	96	308	X	X	X	X	X	X	X	X
8 - 9 AM	396	389	785	X		208	60	208	X	X	X		X	X	X	X
9 - 10 AM	293	277	570			130	51	130		X					X	
10 - 11 AM	315	304	619	X		129	59	129		X					X	
11 - 12 AM	353	368	721	X		116	82	116		X				X	X	
12 - 1 PM	420	478	898	X		158	93	158		X				X	X	X
1 - 2 PM	401	388	789	X		123	88	123		X				X	X	X
2 - 3 PM	522	453	975	X	X	154	116	154		X		X		X	X	X
3 - 4 PM	535	601	1136	X	X	198	105	198		X		X	X	X	X	X
4 - 5 PM	554	631	1185	X	X	157	179	179		X		X	X	X	X	X
5 - 6 PM	512	785	1297	X	X	197	142	197		X		X	X	X	X	X
6 - 7 PM	431	536	967	X	X	144	94	144		X		X		X	X	X
7 - 8 PM	344	428	772	X		109	57	109		X				X	X	
8 - 9 PM	271	345	616	X		69	56	69							X	
9 - 10 PM	219	239	458			47	36	47							X	
10 - 11 PM	119	179	298			28	20	28								
											2	6	5	11	9	

Warrant Summary

Warrant and Description		Hours Met	Hours Required	Met/Not Met
MWSA (C):	Multiway Stop Applications Condition C	9	8	Met - Multiway Stop Applications
Warrant 1A:	Minimum Vehicular Volume	2	8	Not Met
Warrant 1B:	Interruption of Continuous Traffic	6	8	Not Met
Warrant 1C:	Combination of Warrants	5	8	Not Met
Warrant 2:	Four-Hour Vehicular Volume	4	4	Met - Warrant 2 Satisfied
Warrant 3B:	Peak Hour	0	1	Not Met

SRF Consulting Group, Inc.

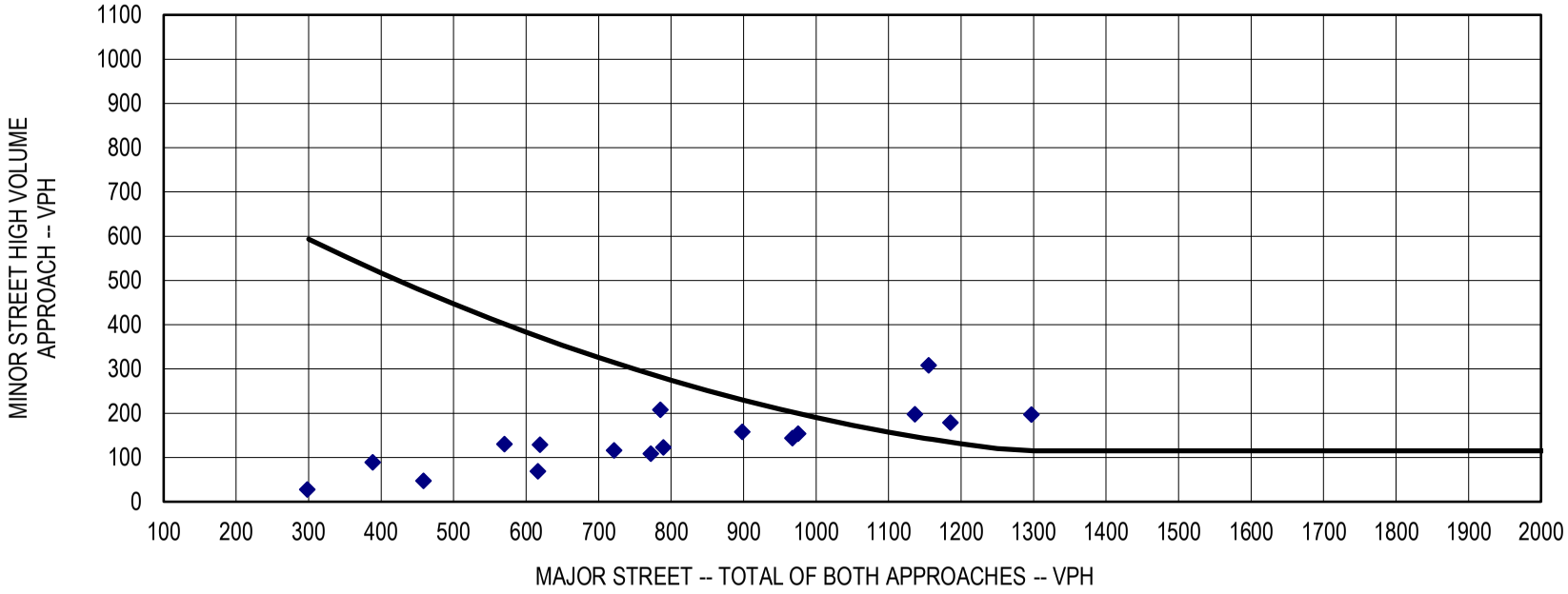
WARRANTS ANALYSIS

Forecasted Year 2037

Stoltzman Road at Pleasant Street
Intersection Control Evaluation
City of Mankato, Blue Earth County

Warrants Analysis: Warrant 2

WARRANT 2 - FOUR-HOUR VEHICULAR VOLUME



Number of Hours Satisfying Requirements:	4

Notes: 1. 115 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 80 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

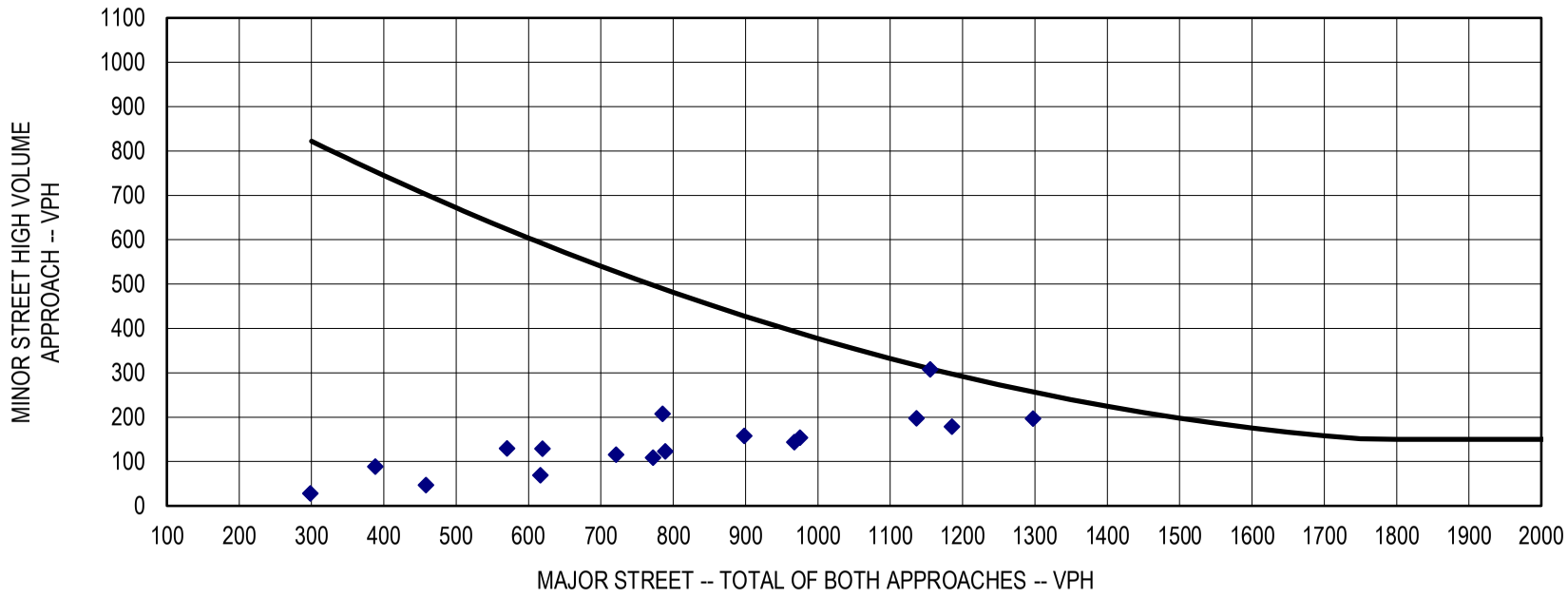
SRF Consulting Group, Inc.

WARRANTS ANALYSIS

Forecasted Year 2037

Stoltzman Road at Pleasant Street
Intersection Control Evaluation
City of Mankato, Blue Earth County

Warrants Analysis: Warrant 3



Number of Hours Satisfying Requirements:	0

Notes: 1. 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Existing Year 2017 Detailed Operational Analysis

All-Way Stop Control

3: Stoltzman Road & Pleasant Street Performance by approach

Approach	EB	WB	NB	SB	All
Denied Delay (hr)	0.2	0.0	0.0	0.0	0.2
Denied Del/Veh (s)	2.0	0.2	0.0	0.3	0.6
Total Delay (hr)	1.0	0.3	2.1	1.0	4.3
Total Del/Veh (s)	9.8	8.6	11.2	8.9	10.1
Stop Delay (hr)	0.7	0.2	1.2	0.6	2.7
Stop Del/Veh (s)	6.9	6.3	6.4	5.6	6.3
Total Stops	352	107	677	394	1530
Stop/Veh	0.99	0.99	1.00	1.00	1.00

Intersection: 3: Stoltzman Road & Pleasant Street

Movement	EB	EB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	LTR	L	T	TR	L	T	TR
Maximum Queue (ft)	147	114	84	74	132	143	45	108	80
Average Queue (ft)	58	52	41	35	67	70	18	55	40
95th Queue (ft)	105	85	71	59	105	115	44	90	67
Link Distance (ft)		954	952		438	438		963	963
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)	150			100			150		
Storage Blk Time (%)	0	0		0	1			0	
Queuing Penalty (veh)	1	0		0	1			0	

3: Stoltzman Road & Pleasant Street Performance by approach

Approach	EB	WB	NB	SB	All
Denied Delay (hr)	0.1	0.0	0.0	0.1	0.2
Denied Del/Veh (s)	1.6	0.2	0.0	0.3	0.4
Total Delay (hr)	0.5	0.8	1.4	2.1	4.8
Total Del/Veh (s)	8.3	11.7	9.9	11.3	10.6
Stop Delay (hr)	0.3	0.6	0.8	1.4	3.1
Stop Del/Veh (s)	5.7	8.3	5.6	7.7	6.9
Total Stops	198	245	495	674	1612
Stop/Veh	0.99	0.98	0.99	1.00	0.99

Intersection: 3: Stoltzman Road & Pleasant Street

Movement	EB	EB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	LTR	L	T	TR	L	T	TR
Maximum Queue (ft)	68	95	119	62	92	92	51	152	139
Average Queue (ft)	33	43	66	33	54	52	23	77	65
95th Queue (ft)	58	70	102	56	78	81	47	124	111
Link Distance (ft)		954	952		438	438		963	963
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)	150			100			150		
Storage Blk Time (%)		0			0			0	
Queuing Penalty (veh)		0			0			0	

Existing Year 2017 Detailed Operational Analysis

Traffic Signal Control

3: Stoltzman Road & Pleasant Street Performance by approach

Approach	EB	WB	NB	SB	All
Denied Delay (hr)	0.2	0.0	0.0	0.0	0.2
Denied Del/Veh (s)	2.0	0.2	0.0	0.3	0.6
Total Delay (hr)	1.2	0.3	1.7	0.9	4.2
Total Del/Veh (s)	12.7	10.6	9.3	8.1	9.9
Stop Delay (hr)	1.0	0.2	1.1	0.6	3.0
Stop Del/Veh (s)	9.8	8.4	6.1	5.8	7.0
Total Stops	238	73	319	195	825
Stop/Veh	0.68	0.68	0.48	0.49	0.54

Intersection: 3: Stoltzman Road & Pleasant Street

Movement	EB	EB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	LTR	L	T	TR	L	T	TR
Maximum Queue (ft)	149	118	86	106	150	156	55	119	96
Average Queue (ft)	71	53	41	40	71	62	17	62	33
95th Queue (ft)	124	98	75	76	118	120	44	103	72
Link Distance (ft)		954	952		438	438		963	963
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)	150			100			150		
Storage Blk Time (%)	0	0		0	2			0	
Queuing Penalty (veh)	1	0		0	2			0	

3: Stoltzman Road & Pleasant Street Performance by approach

Approach	EB	WB	NB	SB	All
Denied Delay (hr)	0.1	0.0	0.0	0.1	0.2
Denied Del/Veh (s)	1.6	0.2	0.0	0.3	0.4
Total Delay (hr)	0.6	1.0	1.2	1.7	4.5
Total Del/Veh (s)	12.2	13.9	9.1	9.0	10.1
Stop Delay (hr)	0.5	0.7	0.9	1.2	3.2
Stop Del/Veh (s)	9.9	10.4	6.4	6.0	7.2
Total Stops	127	168	237	352	884
Stop/Veh	0.69	0.68	0.49	0.51	0.55

Intersection: 3: Stoltzman Road & Pleasant Street

Movement	EB	EB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	LTR	L	T	TR	L	T	TR
Maximum Queue (ft)	92	78	163	77	96	93	98	165	146
Average Queue (ft)	38	38	75	36	53	44	25	86	62
95th Queue (ft)	76	68	126	66	88	78	65	138	114
Link Distance (ft)		954	952		438	438		963	963
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)	150			100			150		
Storage Blk Time (%)				0	0			0	
Queuing Penalty (veh)				0	0			0	

Existing Year 2017 Detailed Operational Analysis

Roundabout Control

HCS7 Roundabouts Report

General Information

Analyst	Luke James
Agency or Co.	SRF Consulting Group, Inc.
Date Performed	7/6/2017
Analysis Year	2017
Time Period	A.M. Peak
Project Description	10279

Site Information

Intersection	Stoltzman Road at Pleasant Street
E/W Street Name	Pleasant Street
N/S Street Name	Stoltzman Road
Analysis Time Period (hrs)	0.25
Peak Hour Factor	1.00
Jurisdiction	MAPO

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	185	95	70	0	40	35	30	0	85	555	40	0	25	295	60
Percent Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Flow Rate (v_{PCE}), pc/h	0	191	98	72	0	41	36	31	0	88	572	41	0	26	304	62
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		4.9763			4.9763			4.9763			4.9763	
Follow-Up Headway (s)		2.6087			2.6087			2.6087			2.6087	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		361			108			701			392	
Entry Volume veh/h		350			105			681			381	
Circulating Flow (v_c), pc/h		371			851			315			165	
Exiting Flow (v_{ex}), pc/h		165			186			794			417	
Capacity (c_{pce}), pc/h		945			579			1001			1166	
Capacity (c), veh/h		918			562			972			1132	
v/c Ratio (x)		0.38			0.19			0.70			0.34	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		8.2			8.8			15.4			6.5	
Lane LOS		A			A			C			A	
95% Queue, veh		1.8			0.7			6.0			1.5	
Approach Delay, s/veh	8.2			8.8			15.4			6.5		
Approach LOS	A			A			C			A		
Intersection Delay, s/veh | LOS	11.0						B					

HCS7 Roundabouts Report

General Information

Analyst	Luke James
Agency or Co.	SRF Consulting Group, Inc.
Date Performed	7/6/2017
Analysis Year	2017
Time Period	P.M. Peak
Project Description	10279

Site Information

Intersection	Stoltzman Road at Pleasant Street
E/W Street Name	Pleasant Street
N/S Street Name	Stoltzman Road
Analysis Time Period (hrs)	0.25
Peak Hour Factor	1.00
Jurisdiction	MAPO

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	80	65	45	0	70	140	30	0	70	400	30	0	40	490	145
Percent Heavy Vehicles, %	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Flow Rate (v_{PCE}), pc/h	0	81	66	45	0	71	141	30	0	71	404	30	0	40	495	146
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		4.9763			4.9763			4.9763			4.9763	
Follow-Up Headway (s)		2.6087			2.6087			2.6087			2.6087	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		192			242			505			681	
Entry Volume veh/h		190			240			500			674	
Circulating Flow (v_c), pc/h		606			556			187			283	
Exiting Flow (v_{ex}), pc/h		136			358			515			611	
Capacity (c_{pce}), pc/h		744			783			1140			1034	
Capacity (c), veh/h		736			775			1129			1024	
v/c Ratio (x)		0.26			0.31			0.44			0.66	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		7.9			8.3			7.9			13.3	
Lane LOS		A			A			A			B	
95% Queue, veh		1.0			1.3			2.3			5.2	
Approach Delay, s/veh	7.9			8.3			7.9			13.3		
Approach LOS	A			A			A			B		
Intersection Delay, s/veh | LOS	10.2						B					

Forecasted Year 2037 Detailed Operational Analysis

All-Way Stop Control

3: Stoltzman Road & Pleasant Street Performance by approach

Approach	EB	WB	NB	SB	All
Denied Delay (hr)	0.2	0.0	0.0	0.0	0.3
Denied Del/Veh (s)	2.0	0.2	0.0	0.3	0.5
Total Delay (hr)	1.0	0.3	3.9	1.3	6.5
Total Del/Veh (s)	9.9	9.9	17.1	10.1	13.3
Stop Delay (hr)	0.7	0.2	2.8	0.8	4.6
Stop Del/Veh (s)	6.9	7.4	12.2	6.6	9.4
Total Stops	361	110	841	450	1762
Stop/Veh	0.99	0.99	1.01	0.99	1.00

Intersection: 3: Stoltzman Road & Pleasant Street

Movement	EB	EB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	LTR	L	T	TR	L	T	TR
Maximum Queue (ft)	109	100	106	139	270	287	55	136	107
Average Queue (ft)	54	52	46	49	96	99	20	65	47
95th Queue (ft)	86	85	82	111	200	208	45	109	83
Link Distance (ft)		954	952		438	438		963	963
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)	150			100			150		
Storage Blk Time (%)	0	0		0	10			0	
Queuing Penalty (veh)	0	0		0	13			0	

3: Stoltzman Road & Pleasant Street Performance by approach

Approach	EB	WB	NB	SB	All
Denied Delay (hr)	0.1	0.0	0.0	0.1	0.2
Denied Del/Veh (s)	1.6	0.2	0.0	0.3	0.3
Total Delay (hr)	0.4	0.8	1.8	3.2	6.3
Total Del/Veh (s)	8.4	12.5	10.7	14.1	12.2
Stop Delay (hr)	0.3	0.6	1.1	2.4	4.4
Stop Del/Veh (s)	5.9	9.2	6.3	10.4	8.4
Total Stops	187	239	612	812	1850
Stop/Veh	1.00	0.99	1.00	0.99	0.99

Intersection: 3: Stoltzman Road & Pleasant Street

Movement	EB	EB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	LTR	L	T	TR	L	T	TR
Maximum Queue (ft)	72	79	118	76	104	105	83	188	189
Average Queue (ft)	34	39	67	35	59	61	29	93	84
95th Queue (ft)	59	63	102	63	88	96	71	154	150
Link Distance (ft)		954	952		438	438		963	963
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)	150			100			150		
Storage Blk Time (%)				0	0			2	
Queuing Penalty (veh)				0	0			1	

Forecasted Year 2037 Detailed Operational Analysis

Traffic Signal Control

3: Stoltzman Road & Pleasant Street Performance by approach

Approach	EB	WB	NB	SB	All
Denied Delay (hr)	0.2	0.0	0.0	0.0	0.2
Denied Del/Veh (s)	2.0	0.2	0.0	0.3	0.5
Total Delay (hr)	1.4	0.3	2.2	1.1	5.0
Total Del/Veh (s)	13.7	11.8	10.0	8.4	10.4
Stop Delay (hr)	1.1	0.3	1.4	0.7	3.5
Stop Del/Veh (s)	10.6	9.5	6.4	5.9	7.3
Total Stops	252	69	396	229	946
Stop/Veh	0.71	0.70	0.50	0.50	0.55

Intersection: 3: Stoltzman Road & Pleasant Street

Movement	EB	EB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	LTR	L	T	TR	L	T	TR
Maximum Queue (ft)	150	127	95	99	146	155	55	143	115
Average Queue (ft)	74	53	40	45	80	77	19	68	38
95th Queue (ft)	124	100	80	83	128	130	48	117	80
Link Distance (ft)		954	952		438	438		963	963
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)	150			100			150		
Storage Blk Time (%)	0	0		0	2			0	
Queuing Penalty (veh)	0	0		1	2			0	

3: Stoltzman Road & Pleasant Street Performance by approach

Approach	EB	WB	NB	SB	All
Denied Delay (hr)	0.1	0.0	0.0	0.1	0.2
Denied Del/Veh (s)	1.6	0.3	0.0	0.3	0.3
Total Delay (hr)	0.7	0.9	1.8	2.2	5.6
Total Del/Veh (s)	12.7	13.7	11.0	9.7	11.0
Stop Delay (hr)	0.6	0.7	1.3	1.5	4.0
Stop Del/Veh (s)	10.4	10.1	8.0	6.5	7.9
Total Stops	137	165	304	417	1023
Stop/Veh	0.68	0.68	0.51	0.52	0.55

Intersection: 3: Stoltzman Road & Pleasant Street

Movement	EB	EB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	LTR	L	T	TR	L	T	TR
Maximum Queue (ft)	95	92	150	108	121	106	62	182	157
Average Queue (ft)	41	42	77	46	64	55	24	100	73
95th Queue (ft)	78	75	127	90	103	100	52	159	134
Link Distance (ft)		954	952		438	438		963	963
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)	150			100			150		
Storage Blk Time (%)				1	1			1	
Queuing Penalty (veh)				2	1			0	

Forecasted Year 2037 Detailed Operational Analysis

Roundabout Control

HCS7 Roundabouts Report

General Information

Analyst	Luke James
Agency or Co.	SRF Consulting Group, Inc.
Date Performed	7/13/2017
Analysis Year	2037
Time Period	A.M. Peak
Project Description	10279

Site Information

Intersection	Stoltzman Road at Pleasant Street
E/W Street Name	Pleasant Street
N/S Street Name	Stoltzman Road
Analysis Time Period (hrs)	0.25
Peak Hour Factor	1.00
Jurisdiction	MAPO

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	185	95	70	0	40	35	30	0	100	665	50	0	30	355	75
Percent Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Flow Rate (v_{PCE}), pc/h	0	191	98	72	0	41	36	31	0	103	685	52	0	31	366	77
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		4.9763			4.9763			4.9763			4.9763	
Follow-Up Headway (s)		2.6087			2.6087			2.6087			2.6087	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		361			108			840			474	
Entry Volume veh/h		350			105			816			460	
Circulating Flow (v_c), pc/h		438			979			320			180	
Exiting Flow (v_{ex}), pc/h		181			216			907			479	
Capacity (c_{pce}), pc/h		883			508			996			1149	
Capacity (c), veh/h		857			494			967			1115	
v/c Ratio (x)		0.41			0.21			0.84			0.41	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		9.1			10.3			24.3			7.5	
Lane LOS		A			B			C			A	
95% Queue, veh		2.0			0.8			10.4			2.1	
Approach Delay, s/veh	9.1			10.3			24.3			7.5		
Approach LOS	A			B			C			A		
Intersection Delay, s/veh | LOS	15.9						C					

HCS7 Roundabouts Report

General Information

Analyst	Luke James
Agency or Co.	SRF Consulting Group, Inc.
Date Performed	7/13/2017
Analysis Year	2037
Time Period	P.M. Peak
Project Description	10279

Site Information

Intersection	Stoltzman Road at Pleasant Street
E/W Street Name	Pleasant Street
N/S Street Name	Stoltzman Road
Analysis Time Period (hrs)	0.25
Peak Hour Factor	1.00
Jurisdiction	MAPO

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	80	65	45	0	70	140	30	0	85	480	40	0	45	585	175
Percent Heavy Vehicles, %	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Flow Rate (v_{PCE}), pc/h	0	81	66	45	0	71	141	30	0	86	485	40	0	45	591	177
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		4.9763			4.9763			4.9763			4.9763	
Follow-Up Headway (s)		2.6087			2.6087			2.6087			2.6087	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		192			242			611			813	
Entry Volume veh/h		190			240			605			805	
Circulating Flow (v_c), pc/h		707			652			192			298	
Exiting Flow (v_{ex}), pc/h		151			404			596			707	
Capacity (c_{pce}), pc/h		671			710			1135			1018	
Capacity (c), veh/h		664			703			1123			1008	
v/c Ratio (x)		0.29			0.34			0.54			0.80	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		9.0			9.5			9.6			20.0	
Lane LOS		A			A			A			C	
95% Queue, veh		1.2			1.5			3.3			8.8	
Approach Delay, s/veh	9.0			9.5			9.6			20.0		
Approach LOS	A			A			A			C		
Intersection Delay, s/veh | LOS	14.1						B					

Detailed Cost Analysis

SRF Consulting Group, Inc. | Engineers Planners Designers

Concept Cost Estimate (based upon 2017 bid price information)

Prepared By: SRF Consulting Group, Inc., Date 7/2017

						Stolzman Road at Pleasant Street	
	ITEM DESCRIPTION		UNIT	UNIT PRICE	EST. QUANTITY	EST. AMOUNT
PAVING AND GRADING COSTS							
GrP 1	Excavation - common & subgrade		cu. yd.	$7.00	3,800	$26,600
GrP 2	Granular Subgrade (CV)		cu. yd.	$14.00	2,300	$32,200
GrP 3	County Road Pavement	(1)	sq. yd.	$32.00	4,500	$144,000
GrP 4	Concrete Median	(1)	sq. yd.	$40.00	890	$35,600
GrP 5	Walk / Trail	(1)	sq. yd.	$25.00	1,350	$33,750
GrP 6	ADA Pedestrian Curb Ramp		each	$800.00	16	$12,800
GrP 7	Concrete Curb and Gutter		lin. ft.	$12.00	3,550	$42,600
GrP 8	Removals - Pavement		sq. yd.	$2.50	7,180	$17,950
	SUBTOTAL PAVING AND GRADING COSTS:					**$345,500**
DRAINAGE, UTILITIES AND EROSION CONTROL						
Dr 1	Local Utilities - Sanitary Sewers		lin. ft.			
Dr 2	Local Utilities - Watermains		lin. ft.			
Dr 3	Water Quality Ponds		l.s.			
Dr 5	Drainage - urban (10-30%)		30%			$104,000
Dr 6	Turf Establishment & Erosion Control		10%			$35,000
Dr 7	Landscaping					
	SUBTOTAL DRAINAGE, UTILITIES AND EROSION CONTROL					**$139,000**
SIGNAL AND LIGHTING COSTS						
SGL 1	Signals (permanent)		each	$200,000		
SGL 2	At Grade Intersection Lighting (permanent - non signa		each	$10,000	12	$120,000
	SUBTOTAL SIGNAL AND LIGHTING COSTS:					**$120,000**
SIGNING & STRIPING COSTS						
SGN 1	Mainline Signing (C&D)		mile	$20,000	0.3	$6,000
SGN 2	Mainline Striping		mile	$10,000	0.3	$3,000
	SUBTOTAL SIGNING & STRIPING COSTS:					**$9,000**
	SUBTOTAL CONSTRUCTION COSTS:					**$613,500**
MISCELLANEOUS COSTS						
M 1	Mobilization		6%			$37,000
M 2	Non Quantified Minor Items (10% to 30%)		20%			$123,000
M 3	Temporary Pavement & Drainage		2%			$12,000
M 4	Traffic Control		4%			$25,000
	SUBTOTAL MISCELLANEOUS COSTS:					**$197,000**
	ESTIMATED TOTAL CONSTRUCTION COSTS without Contingency:					**$810,500**
1	Contingency or "risk" (10% to 30%)		20%			$162,000
	ESTIMATED TOTAL CONSTRUCTION COSTS PLUS CONTINGENCY:					**$972,500**

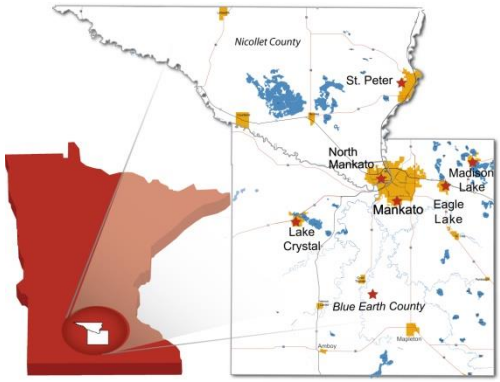
	OTHER PROJECT COSTS:				
	R/W ACQUISITIONS	Lump Sum			
	DESIGN ENG. & CONSTRUCTION ADMIN.	Lump Sum			
	SUBTOTAL OTHER PROJECT COSTS				
	TOTAL PROJECT COST (based upon 2016 bid price information)				**$972,500**

	INFLATION COST (CURRENT YR. TO YR. OF OPE	Years	3%		
	TOTAL PROJECT COST (OPENING YEAR DOLLARS)				**$972,500**

NOTE: (1) Includes aggregate base class 5.

MAJOR ITEMS NOT INCLUDED:
- Local utilities (sanitary sewer or watermain)
- Water quality ponds or other BMPs
- R/W acquisitions
- Engineering design fees
- Inflation

Meeting Date: January 11, 2018



AGENDA RECOMMENDATION

Agenda Heading: Transit Development Plan Update
No: 6.3

Agenda Item: Transit Development Plan Update

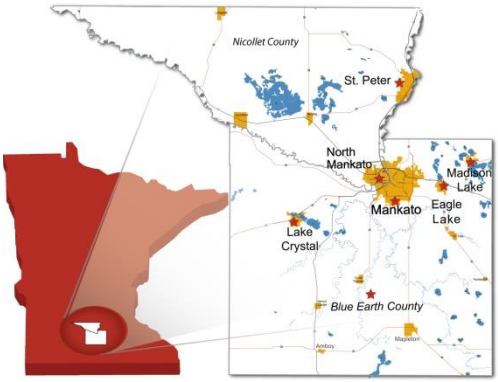
Recommendation Action(s): Informational & Discussion

Summary: Mark Anderson, City of Mankato Superintendent of Transit, will deliver a brief update on the progress of the ongoing Transit Development Plan (TDP).

Attachments:

1. None

Meeting Date: January 11, 2018



AGENDA RECOMMENDATION

Agenda Heading: Trunk Highway 22 Corridor Study Update
No: 6.4

Agenda Item: Trunk Highway 22 Corridor Study Update

Recommendation Action(s): Informational & Discussion

Summary: The Mankato/North Mankato Area Planning Organization (MAPO) staff, the Minnesota Department of Transportation (MnDOT), and SRF Consulting Group, Inc. continue to make progress on the Trunk Highway 22 Corridor Study. This includes production and review of drafts of existing conditions, traffic forecasting, and recommendations.

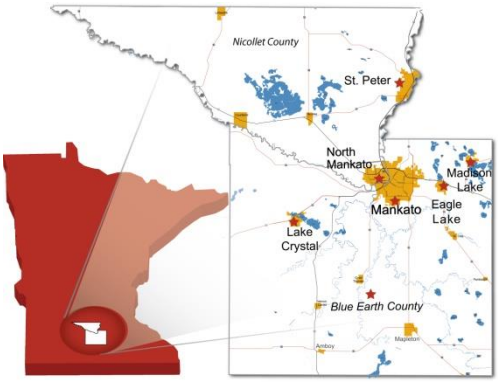
An open house/public input meeting is scheduled to be held at MnDOT headquarters (2151 Basset Drive, Mankato) at 4:30PM on January 18, 2018. Directly following the open house/public input meeting MAPO and SRF will host a pop-up event at the Hy-Vee grocery store along the corridor (2010 Adams Street).

An interactive map for gathering public feedback was launched in January 2018. The map can be accessed from the project website site, located at: th22corridorstudy.com/

Attachments:

1. None

Meeting Date: January 11, 2018



AGENDA RECOMMENDATION

Agenda Heading: ADA Transition Plan Update
No: 6.5

Agenda Item: ADA Transition Plan Update

Recommendation Action(s): Informational & Discussion

Summary: In 2017 the contracted consultant began collecting inventory of Americans with Disabilities Act (ADA) compliance within the Mankato/North Mankato Area Planning Organization (MAPO) area's public right of way. Inventory collection has stopped for the winter and will resume late March or early April, weather permitting. A stakeholder and public input meeting was held at the Mankato IGC on November 9, 2017.

On January 31, 2018 at 6:00pm, the MAPO and consultant will host the project's first open house at the Mankato IGC. The purpose of the first open house will be to communicate project information to the public and solicit feedback on locations of ADA deficiencies in the MAPO area. The meeting will also educate citizens on ADA law, Self-Evaluation policies, practices, and infrastructure and the Transition Plan schedule for removing barriers to ADA compliance. Citizens will also receive information on other methods of providing continual feedback.

Attachments:

1. None